



2012 ANTHROPOMETRIC SURVEY OF U.S. ARMY PERSONNEL: METHODS AND SUMMARY STATISTICS

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December 2014

Final Report
October 2010 – April 2012

Approved for public release; distribution is unlimited

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

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1. REPORT DATE (DD-MM-YYYY) 05-12-2014			2. REPORT TYPE Final		3. DATES COVERED (From - To) October 2010 – April 2012	
4. TITLE AND SUBTITLE 2012 ANTHROPOMETRIC SURVEY OF U.S. ARMY PERSONNEL: METHODS AND SUMMARY STATISTICS			5a. CONTRACT NUMBER			
			5b. GRANT NUMBER			
			5c. PROGRAM ELEMENT NUMBER PE 63001			
6. AUTHOR(S) Claire C. Gordon, Cynthia L. Blackwell, Bruce Bradtmiller*, Joseph L. Parham, Patricia Barrientos*, Steven P. Paquette, Brian D. Corner, Jeremy M. Carson, Joseph C. Venezia, Belva M. Rockwell*, Michael Mucher*, and Shirley Kristensen*			5d. PROJECT NUMBER 62786/63001			
			5e. TASK NUMBER 43/30			
			5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Natick Soldier Research, Development and Engineering Center ATTN: RDNS-WSH Kansas St., Natick, MA 01760-2642			8. PERFORMING ORGANIZATION REPORT NUMBER NATICK/TR-15/007			
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)			
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited						
13. SUPPLEMENTARY NOTES *Anthrotech, 503 Xenia Avenue, Yellow Springs, OH 45387.						
14. ABSTRACT This report presents results of a comprehensive anthropometric survey of U.S. Army Soldiers (ANSUR II), completed in 2012 by the Natick Soldier Research, Development and Engineering Center. Goals of the survey were to acquire a large body of data from comparably measured males and females to serve the Army's current design and engineering needs, as well as those anticipated well into the future. Ninety-four directly measured dimensions, 39 derived dimensions, and three-dimensional (3-D) head, foot, and full-body scans were obtained on each subject in this study. The sample consisted of 7435 men and 3922 women. This includes Active Duty, National Guard, and Army Reserve Soldiers. Results of the directly measured dimensions are given here in the form of summary statistics, percentile data, and frequency distributions. Also included are well-illustrated descriptions of the measurements and of the landmarks used to define them; an explanation of the manual and 3-D procedures used in the study; demographic data characterizing the sample in terms of its racial/ethnic, gender, age, geographic, and occupational distribution; comparative statistics showing changes in the body sizes of Army personnel since the last large-scale survey in 1988; and, a detailed explanation of how observer error was calculated for this study to ensure optimum reliability. The sampling strategy (rationale and execution) is detailed in an appendix. Other appendices include information on the comparability of the measurement techniques used in this survey with those used in other large-scale military surveys, visual indices to help readers locate dimensions with unfamiliar names, and a cross-reference table to help readers accustomed to locating dimensions by number.						
15. SUBJECT TERMS						
SURVEYS	HUMAN BODY	ARMY PERSONNEL	THREE DIMENSIONAL	ACCURACY		
SCANNING	ARMY RESERVE	ANTHROPOMETRY	COMPUTER PROGRAMS	SAMPLING		
BODY SIZE	METHODOLOGY	STANDARDIZATION	BODY MEASUREMENTS	CLOTHING		
BODY SCANS	DEMOGRAPHY	SIZES(DIMENSIONS)	MEASURING INSTRUMENTS	STATISTICS		
COMPARISON	MEASUREMENT	WHOLE BODY SCAN	ARMY NATIONAL GUARD	USER MANUALS		
HUMAN FACTORS ENGINEERING			FREQUENCY DISTRIBUTIONS	INFORMATION RETRIEVAL		
ANTHROPOMETRIC MEASUREMENT TOOL			HANDBOOKS	THREE DIMENSIONAL SCANNING		
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Cynthia L. Blackwell	
a. REPORT	b. ABSTRACT	c. THIS PAGE	SAR	452	19b. TELEPHONE NUMBER (include area code) 508-233-5210	
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TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES.....	v
LIST OF TABLES.....	vi
EXECUTIVE SUMMARY.....	viii
CHAPTER I INTRODUCTION	1
1.1 Selection of Survey Dimensions	2
1.2 Overview of the Sample.....	3
1.3 How to Use this Report.....	4
CHAPTER II THE SURVEY	6
2.1 Participant Processing and Measurer Training	6
2.2 Data Management Procedures	9
2.3 Data Editing Routines	10
2.4 Anthropometric and Landmarking Instruments	10
2.5 Three-Dimensional Scanners	17
2.6 The Landmarks	18
CHAPTER III THE SAMPLE	31
CHAPTER IV THE BODY MEASUREMENTS	44
CHAPTER V THE DERIVED DIMENSIONS	231
CHAPTER VI THREE-DIMENSIONAL SCANNING	315
6.1 Participant Preparation	315
6.1.1 Whole-Body Scanning	320
6.1.2 Head Scanning	320
6.1.3 Foot Scanning	321
6.2 The Utility of 3-D Scanning	322
6.3 Traditional Anthropometry and 3-D Scanning	323
6.4 Posture	324
CHAPTER VII OBSERVER ERROR	326
7.1 Observer Error in the Anthropometric Literature	327
7.2 Observer Error Test	328
7.3 Results	330
7.4 Daily Observer Error	338
7.5 Estimated Observer Error for Derived Dimensions	344
7.6 Technical Error of Measurement and Reliability Coefficient....	348

TABLE OF CONTENTS Continued

	<u>Page</u>
REFERENCES	354
INDEX	359
APPENDICES	
A Applications for Measured and Derived Dimensions	371
B Sampling Strategy for the ANSUR II Database.....	377
C Visual Index of Body Measurements	389
D Visual Index of Derived Dimensions	405
E Statistical Measures.....	417
F Dimension-Number Cross-Reference Table	421
G Comparability of ANSUR II Dimensions with Dimensions of Other Large-Scale Surveys	429
H Demographic/Biographical Form	437
I Glossary of Anatomical and Anthropometric Terms.....	441

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1 Participant Flow		7
2 Anthropometer: Assembled and in Parts		11
3 Beam Caliper.....		11
4 Spreading Caliper.....		11
5 Sliding Caliper		11
6 Holtain Caliper		11
7 Poech Sliding Caliper		12
8 Steel Tape		12
9 Scale		12
10 Pupillometer.....		13
11 Modified Brannock Device®		13
12 Modified Height Gauge.....		14
13 Wall Chart.....		14
14 Modified Steel Tape.....		15
15 Modified Beam Caliper with Dowel		15
16 Landmark Transfer Rod.....		16
17 Scye Marking Aid.....		16
18 WBX Scanner		17
19 PX Scanner		17
20 Foot Scanner		18
21 Scanning Instruments		315
22 Lateral View of Head Scanning Landmarks.....		316
23 Anterior View of Head Scanning Landmarks		317
24 Lateral View of Body Scanning Landmarks		318
25 Anterior (Left) and Posterior (Right) Views of Body Scanning Landmarks ...		319
26 Anterior View of Whole-Body Scan.....		320
27 Lateral View of Whole-Body Scan		320
28 Anterior View of Head Scan		321
29 Lateral View of Head Scan		321
30 Lateral View of Foot Scan		322
31 Plantar View of Foot Scan		322
32 Traditional and ANSUR II Posture		325

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Age Distribution of the ANSUR II Participants	3
2	Racial/Ethnic Distribution of the ANSUR II Participants.....	3
3	Percentages of the ANSUR II Participants by Age Group and Racial/Ethnic Category.....	4
4	ANSUR II Measuring Sites and Total Count at Each Site.....	32
5	ANSUR II Database Sex and Component Disributions	34
6	ANSUR II Database Sex and Age Group Distributions.....	34
7	ANSUR II Database Sex and DOD Racial/Ethnic Distributions	34
8	Population Subgroups in the ANSUR II Databases	35
9	U.S. Birthplaces of ANSUR II Participants.....	36
10	International Birthplaces of ANSUR II Participants	37
11	Ages of ANSUR II Participants	38
12	Grades and Ranks of ANSUR II Participants	39
13	Age Group and Grade of ANSUR II Participants.....	40
14	Military Occupations of ANSUR II Participants	41
15	Time Elapsed Since Last Deployment for ANSUR II Participants.....	42
16	Relationship of Age to Deployment Experience among ANSUR II Participants	42
17	Last Deployment Location for ANSUR II Participants.....	43
18	Future Deployments Scheduled for ANSUR II Participants	43
19	Deployments Scheduled for Previously Not-Deployed ANSUR II Participants	43
20	ANSUR Mean Values Used in Derived Dimensions	231
21	Absolute Differences (ABS) of Dimensions by Measurer: New Dimensions	330
22	Absolute Differences (ABS) of Dimensions by Measurer: Dimensions for Which New Allowable Errors Were Proposed.....	331
23	Absolute Differences (ABS) of Dimensions by Measurer: Modified Technique	332
24	Measurements Tested for Technique/Instrument Modification: Mean over Four Measurers.....	333
25	Landmark Transfer/No Landmark Transfer Decision Summary.....	334
26	New Technique/Instrument Decision Summary.....	335
27	Allowable Errors: Tested Dimensions	337
28	Observer Error for Standing Heights	339
29	Observer Error for Sitting Heights.....	339
30	Observer Error for Lengths	340
31	Observer Error for Breadths	341
32	Observer Error for Depths and Weight	341

LIST OF TABLES Continued

<u>Table</u>	<u>Page</u>
33 Observer Error for Large Circumferences	341
34 Observer Error for Small Circumferences.....	342
35 Observer Error for Head Dimensions	342
36 Observer Error for Hand Dimensions	343
37 Observer Error for Foot Dimensions.....	343
38 Observer Error for Reach Dimensions.....	343
39 Estimated Observer Error for Derived Dimensions.....	347
40 TEM and R for Standing Heights	349
41 TEM and R for Sitting Heights	349
42 TEM and R for Lengths	350
43 TEM and R for Breadths	350
44 TEM and R for Depths and Weight.....	351
45 TEM and R for Large Circumferences	351
46 TEM and R for Small Circumferences	351
47 TEM and R for Head Dimensions	352
48 TEM and R for Hand Dimensions	352
49 TEM and R for Foot Dimensions	352
50 TEM and R for Reach Dimensions	353

EXECUTIVE SUMMARY

A comprehensive anthropometric survey of the U.S. Army was completed by the Natick Soldier Research, Development and Engineering Center (NSRDEC) in 2012. The goals of the survey were to acquire a large body of data from comparably measured males and females to serve the Army's current design and engineering needs, as well as those anticipated well into the future. Ninety-three directly measured dimensions and 41 derived dimensions, as well as three-dimensional head, foot, and whole-body scans, were obtained in this study. The sample here, which represents the Total Army, was composed of 4,082 men and 1,986 women, measured between October 4, 2010 and April 5, 2012. Results of the traditionally measured and derived dimensions were compiled in the form of summary statistics, percentile data, and frequency distributions. Demographic data characterizing the sample were collected in terms of the racial/ethnic, gender, age, geographic, and occupational distribution of the participants, and a detailed explanation of how observer error was calculated for the study to ensure optimum reliability..

The impetus for this survey was the concern that Army body size and shape had changed since the last anthropometric survey in 1987-1988 (ANSUR). A pilot study conducted in 2006 confirmed that significant changes had taken place. Army body size for a number of dimensions had increased, on average, and the variability had increased as well. Further, ANSUR included only Active Duty personnel, whereas today's forces are integrated as part of the Total Army concept. To the extent that the current anthropometry is different from ANSUR, equipment and workspaces may no longer be optimal.

2010-2012 ANTHROPOMETRIC SURVEY OF U.S. ARMY PERSONNEL: METHODS AND SUMMARY STATISTICS

CHAPTER I

INTRODUCTION

This report contains results of an anthropometric survey of U.S. Army Soldiers completed between October 2010 and April 2012 by the Natick Soldier Research, Development and Engineering Center (NSRDEC).

All U.S. military services and many foreign militaries compile and maintain extensive collections of body-size information used primarily to guide design and sizing of clothing, personal protective equipment, work stations, and computer-generated digital human models. To be effective, such a database must be updated periodically to accurately reflect the body sizes and proportions of the military population it represents.

The last anthropometric survey of U.S. Army (ANSUR) men and women was conducted in 1988 (Gordon et al., 1988), 26 years, or the equivalent of a military generation, ago. ANSUR only included active duty personnel, but today's Active, Guard, and Reserve forces are integrated as part of the Total Army concept. Since past anthropometric data of Army National Guard and Army Reserves components have been limited, both these contingents needed to be included in this survey.

Women now make up almost 16% of the total U.S. Army population, and with each passing year, more jobs are filled by women. This means that clothing, protective equipment, and workspaces, originally sized and designed to accommodate only males, must be modified and redesigned to accommodate the larger variations represented by an integrated male/female population.

In 2006, amid concerns that the Army's anthropometric database no longer adequately represented Army personnel, a preliminary study was undertaken to determine whether a new anthropometric survey was needed. The results of that study (Bradtmiller et al., 2009; Paquette et al., 2009) indicated that the Army had become larger in overall body size and more variable in body proportion. Dimensions consisting of significant fleshy components (e.g., Weight, Buttock Circumference, and Waist Circumference) had the largest increases in standard deviation substantially affecting product designs, which are developed from extreme low and high values. In addition, the different components of the Army were sufficiently different to necessitate a database not based exclusively on active duty personnel. Therefore, a new survey was needed to correct these deficiencies and to provide new data that were previously unavailable.

In 2009, NSRDEC undertook the task of conducting a comprehensive body-size study of U.S. Army men and women. The goals of this U.S. Army anthropometric survey (ANSUR II) were to acquire a large body of data from comparably measured males and

females to serve the Army's current design and engineering needs, as well as those anticipated well into the future. A specific innovation added to address future needs was the addition of three-dimensional (3-D) scans of the head, the foot, and the whole-body. These scans provide geometric and morphological data on the human body that cannot be gathered using traditional body measurements alone.

ANSUR II was conducted in conjunction with the Marine Corps anthropometric survey (MC-ANSUR). Since MC-ANSUR preceded ANSUR II, the majority of the planning occurred 6 months before either survey. During this time, candidate dimensions were reviewed for relevance, replicability, and comparability to arrive at the final selection, which included 94 directly measured dimensions and 41 derived dimensions. Summary statistics for these traditional measurements, including percentile and frequency tables, are reported in this volume. Whole-body, head, and foot scans were also taken of each measured individual, although they are not included in this report.

1.1 SELECTION OF SURVEY DIMENSIONS

The list of dimensions was developed from the 1987-1988 ANSUR, the U.S. military's most comprehensive anthropometric survey. A team of government and contractor scientists evaluated each dimension on the list, assessing its usefulness for Army needs. Dimensions that have not proved useful were dropped. Dimensions that could reliably be estimated from other measured dimensions were also dropped. Dimensions that would have been useful, but were not measured in ANSUR, as well as a few additional dimensions recommended by international standards, were added.

After the dimension list was established, the specific definition for each dimension was reviewed. In general, the ANSUR definitions were used both because they were well defined in 1987 and a consistent definition would allow comparisons between newly collected data and historic data. However, a few definitions were modified. In some cases, the modification simply improved the clarity of the original ANSUR definition. In other cases, the new definitions reflected international standards. Finally, some modifications were necessary due to changes in human physique over the decades. In every case where a definition in this report differs from the ANSUR definition, it is noted in the dimension description.

The final dimension list includes dimensions that can be used in many different applications. Appendix A shows seven categories of uses (e.g., clothing design, workstation design, and human analog design) and identifies which of the 94 measured dimensions and 41 derived dimensions are most useful for meeting those needs.

1.2 OVERVIEW OF THE SAMPLE

The Army participants were chosen using rostering and random sampling methods to obtain an appropriate mix of ages, racial/ethnic backgrounds, and sex. Chapter III and Appendix B provide more details of the sampling strategy. Tables 1 through 3 provide an overview of the ANSUR II database by age, race/ethnicity, and gender.

TABLE 1

Age Distribution of the ANSUR II Participants

Age Group	Males		Females	
	Frequency	Percent	Frequency	Percent
≤20	422	10.34	258	12.99
21-25	1145	28.05	611	30.77
26-30	874	21.41	429	21.60
31-40	1001	24.52	429	21.60
≥41	640	15.68	259	13.04
Total	4082	100.00	1986	100.00

TABLE 2

Racial/Ethnic Distribution of the ANSUR II Participants

Race/Ethnicity	Males		Females	
	Frequency	Percent	Frequency	Percent
White, not of Hispanic descent	2647	64.85	914	46.02
Black, not of Hispanic descent	502	12.30	524	26.38
Hispanic	346	8.48	194	9.77
Asian	66	1.62	43	2.17
Native American	7	0.17	11	0.55
Native Hawaiian/Pacific Islander	36	0.88	25	1.26
More than one and Other	478	11.71	275	13.85
Total	4082	100.00	1986	100.00

TABLE 3

Percentages of the ANSUR II Participants by Age Group and Racial/Ethnic Category

Age Group	White, not of Hispanic descent	Black, not of Hispanic descent	Hispanic	Asian	Native American	Native Hawaiian/Pacific Islander	More than One and Other
Males							
≤ 20	6.76	1.15	0.88	0.12	0.02	0.10	1.30
21-25	18.74	2.89	1.98	0.61	0.10	0.12	3.60
26-30	14.11	2.03	1.89	0.44	0.02	0.20	2.72
31-40	15.14	3.63	2.45	0.34	0.02	0.32	2.62
≥ 41	10.09	2.60	1.27	0.10	0.00	0.12	1.49
Females							
≤ 20	6.29	2.77	1.41	0.20	0.10	0.25	1.96
21-25	15.36	7.30	3.12	0.50	0.10	0.35	4.03
26-30	10.02	5.44	2.32	0.70	0.10	0.15	2.87
31-40	8.96	6.45	2.11	0.50	0.15	0.35	3.07
≥ 41	5.39	4.43	0.86	0.25	0.10	0.10	1.91

1.3 HOW TO USE THIS REPORT

The landmarks used to define the origin and termination of the measurements made in this survey are listed and briefly described in Chapter II. That chapter also summarizes the operational aspects of the survey and includes descriptions, illustrations, and sources of the instruments used. A full explanation of the sampling strategy appears in Chapter III and Appendix B; Chapter III also includes a number of tables that describe the demographic character of the ANSUR II database.

The anthropometric data in this report are given in Chapters IV and V, which include summary statistics and descriptions of the body measurements and the derived measurements, respectively. Each dimension is described and illustrated. Summary statistics are reported separately for males and females. Visual indices designed to help readers identify and locate those dimensions by their anthropometric designations appear in Appendices C (measured) and D (derived). Users should note that the body positions represented in the visual indices are approximate. To confirm exact body positions and measurement procedures for the body measurements, users should consult the specific dimension descriptions in the Measurer's Handbook (Hotzman et al., 2011). Appendix E contains a brief explanation of the summary statistics used to report the measurement data in Chapters IV and V.

Chapter VI discusses 3-D scanning equipment, landmarks, and scan protocols, and Chapter VII details the procedures developed to minimize observer error throughout the duration of the survey.

For users familiar with the original numbers assigned to dimensions in the 1988 ANSUR survey, a cross-reference table is provided in Appendix F linking ANSUR II dimension numbers to those of comparably measured dimensions from ANSUR. This table can also be used as a quick reference to determine which of the ANSUR dimensions were identically defined in the current survey and which dimensions were modified. An assessment of the comparability of measurements obtained in this survey with measurements from other major anthropometric surveys appears in tabular form in Appendix G. A copy of the demographic/biographical form completed by each soldier is located in Appendix H. Finally, a glossary of anatomical and anthropometric terms (Appendix I) and an index are included to further help the reader understand the terminology used in this report and to locate dimensions of interest quickly.

CHAPTER II

THE SURVEY

2.1 PARTICIPANT PROCESSING AND MEASURER TRAINING

The survey team visited 12 Army installations during an 18-month period to collect body measurements and 3-D scans. Considerable advance planning took place both at Anthrotech and at NSRDEC. In preparation for assembling a measuring team, project personnel prepared a training manual designed to serve as the primary instructional guide for the survey measurers (Hotzman et al., 2011). This handbook contained detailed written and illustrated instructions for marking and measuring participants, and explained the operation and maintenance of the whole-body, head, and foot scanners.

A streamlined procedure was devised for measuring approximately 50 participants a day. The measurements were divided into four manageable groups, based on principles of time and motion efficiency. Dimensions assigned to a given measuring station were those that could most easily be measured in sequence without excessive repositioning of participants and those that required a minimum of instrument handling. Dimensions were also grouped in such a way that the time required to measure all dimensions at each station was approximately equal. Two landmarking stations were similarly established, as were in- and out-processing stations. Figure 1 illustrates the plan for the flow of participants through the process.

In the meantime, NSRDEC and Army personnel made all the necessary arrangements at the Army installations where measuring teams were to work for periods ranging from 3 weeks to 2 months. The itinerary was as follows:

Fort Hood, Texas – October 4, 2010 - November 4, 2010
Fort Bliss, Texas – November 16, 2010 - February 25, 2011
Camp Atterbury, Indiana – March 9, 2011 - March 31, 2011
Fort Drum, New York – April 7, 2011 - May 4, 2011
Fort McCoy, Wisconsin – May 17, 2011 - June 9, 2011
Fort Lee, Virginia – June 20, 2011 - July 18, 2011
Fort Stewart, Georgia – July 25, 2011 - August 16, 2011
Fort Rucker, Alabama – August 23, 2011 - September 23, 2011
Fort Bragg, North Carolina – October 3, 2011 - October 27, 2011
Fort Gordon, Georgia – November 3, 2011 - December 15, 2011
Fort Huachuca, Arizona – January 12, 2012 - February 4, 2012
Camp Shelby, Mississippi – February 15, 2012- April 5, 2012

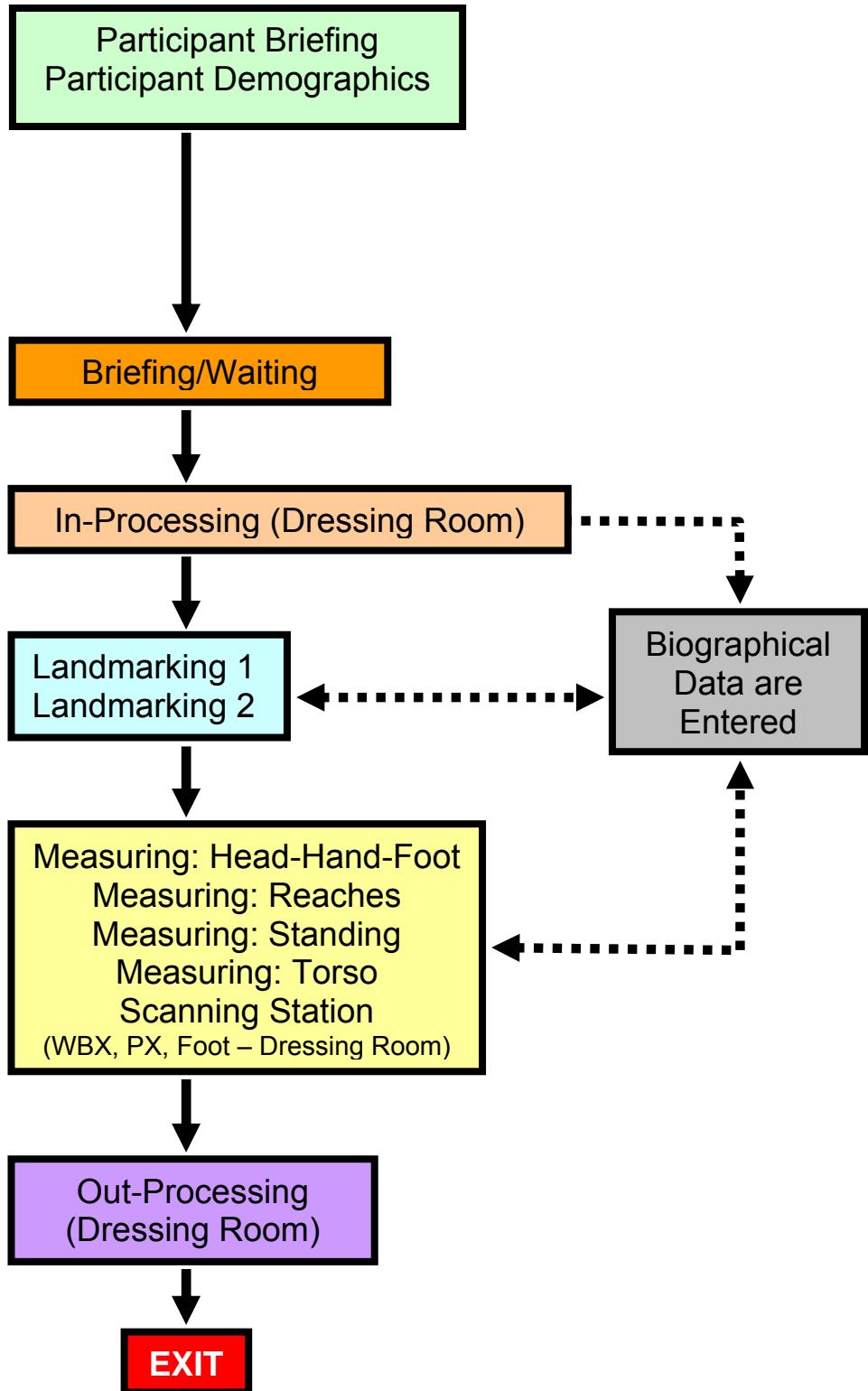


FIGURE 1

Participant Flow

This anthropometric survey was conducted immediately following the Marine Corps anthropometric survey (MC-ANSUR). Therefore, the measuring team assembled for MC-ANSUR was used for the ANSUR II data collection effort. In April 2010, the initial MC-ANSUR measuring team of 21 people began an intensive 4-week training period prior to their deployment in the field. Early in the training period, team members were assigned to one of the stations—landmarking, measuring, scanning, and demography—at which they would work. Thus, each team member, under the instruction of professional anthropometrists, concentrated for about 3 weeks on learning to locate and draw the landmarks or measure the dimensions for which he or she would be subsequently responsible. During and following MC-ANSUR, some personnel were replaced. The new personnel were trained for 1 week specifically for the station where they would work.

Two people were assigned to each measuring station: one to serve as a measurer and one as a recorder; pairs of team members alternated these functions throughout each day. Two women were permanently assigned to two of the measuring stations, Reaches and Standing, and two men were permanently assigned to the Head, Hand and Foot measuring station. Depending on whether participants were men or women, a male team alternated with a female team at the remaining station, Torso, where most dimensions between the waist and knees were measured. These same teams alternated assignments to the out-processing station. Male and female marking personnel at the landmarking stations also changed from day to day, depending on whether the participants were men or women. They alternated as in-processors when members of the opposite sex were being marked.

When participants arrived at the measuring site, they were briefed on the general purposes of the survey by a Government representative and filled out machine-readable forms giving demographic and biographical information about them (see Appendix H). After the participants completed the biographical forms, an Anthrotech employee briefed the Soldiers on the specific landmarking, measurement, and scanning procedures to be conducted. Following the briefing, all Soldiers were given nylon tricot track shorts (see photos in Chapter IV) in which they were measured. Men were measured bare-chested. Women were measured in their own bras, unless they requested a jog bra—a cotton spandex sports bra with racer back design. Both were issued tank tops to wear while moving around between measuring stations and at stations where upper body exposure was not required. When participants reached the whole-body scanning station, they changed again into mid-thigh-length nylon spandex compression shorts (see Figure 26 in Section 6.1). Women who had been wearing their own bras changed into the cotton spandex sports bras.

While the Soldiers were changing into the track shorts prior to beginning the measuring process, the demographic forms were run through a form reader, and the scanned data were transferred to the demographic station. As the Soldiers moved through each of the measuring stations, one stop was the demographic station where an Anthrotech employee verified the entered information. Typically this occurred while the participant was waiting for an available measuring or scanning station. After

demographic data verification, the forms were shredded to protect the participants' privacy.

2.2 DATA MANAGEMENT PROCEDURES

One feature that distinguishes this survey from its predecessors is the use of networked laptops for data entry in the field. Networked computers were used for three reasons:

-Entering the data onto electronic media allowed the data to be ready for analysis quickly and eliminated transferring handwritten data as a source of error. The network made it possible for the data from each station to be assembled and sent daily to Anthrotech, from which they were forwarded to a NSRDEC server.

-The computers were equipped with proprietary software that reviewed data values as they were entered (see Section 2.3). If a questionable value was identified by the software, the measurers could check it while the participant was still present. Thus, the data coming in from the field contained fewer errors of measurement or entry and fewer questionable values about which the data editors had to make decisions.

-A final field data check was carried out at the out-processing station, where input dimensions from all stations were available for use in calculating regression estimates.

Barcodes representing participant numbers were pre-printed on each demographic form. This eliminated the possibility of duplicate participant numbers. As each Soldier completed his or her demographic form, that barcode was scanned at the in-processing station, entering that participant into the data management system with an associated participant number but no personally identifiable information. At that time, the in-processing station printed out measurement forms for each of the four measuring stations. These forms—unique to each Soldier—were also imprinted with each participant's bar-coded participant number.

Laptop computers were used at each measuring station. When a Soldier arrived at a measuring station, the barcode was scanned into that laptop so that the participant's data could be associated with his or her data from each of the other stations. As each participant was measured, the recorder entered the data into the station's computer. The recorder also manually recorded the measurements on the data forms as a back-up. At the scanning station, the operators also scanned the barcode on the demographic form. The participant number was then incorporated into the image file name generated by each of the scanners. After the participant was measured and scanned, a team member at the out-processing station checked to verify that the participant had been processed at each of the previous stations. The barcode was scanned a final time to remove the participant from the list of "in-process" participants.

2.3 DATA EDITING ROUTINES

The editing routines in the software were based on procedures that had been used successfully by the contractor in a number of previous military surveys. The approach is essentially two-phased. A value is first checked against the highest value and the lowest value measured for that variable. If the measured value is higher than the highest value to date, or lower than the lowest value to date, a notification is given that instructs the measurer to take the measurement again. The software does not allow the measurer to continue until the measurement has been re-taken or an explanation is given as to why that value is correct (e.g., short torso, very long legs). This approach is very effective in screening out wildly aberrant values resulting from misassembling an instrument, misreading an instrument, transposing digits, or mis-entering a value by 100 or 1000.

After all dimensions at a given station were measured, the second phase of data editing began. The software contained a series of multiple regression equations in which the value for each dimension was predicted from the values of two other dimensions at that station. The measured value for a given participant, for a given dimension, was compared to the predicted value. If the measured and the predicted value differed by more than a preset amount, the measurer was asked to re-measure that dimension, as well as the associated dimensions from the regression. In that way, values which were not aberrant for the population as a whole but were disproportionate for that individual were identified and checked. The original version of the data entry and editing system, including program source code listing, is completely described in Churchill and coworkers (1988).

2.4 ANTHROPOMETRIC AND LANDMARKING INSTRUMENTS

The instruments used for measuring the body in this survey were:

Anthropometer	Poech sliding caliper
Beam caliper	Pupilometer
Foot scanner	Scale (weighing)
Head scanner	Sliding caliper
Holtain caliper	Spreading caliper
Modified beam caliper with dowel	Steel tape
Modified Brannock device	Wall chart
Modified height gauge	Whole-body scanner
Modified steel tape	

Standard anthropometric instruments are made by GPM, Switzerland and by Holtain LTD, Great Britain. Seritex, Inc., 1 Madison Street, East Rutherford NJ 07073 (www.seritex.com) is the U.S. distributor for both companies. The steel tape measure is a Lufkin Executive Diameter metric tape measure (W606PM) manufactured by Cooper Hand Tools and available from online retailers at www.grainger.com. These instruments are illustrated below in Figures 2 through 8.



FIGURE 2

Anthropometer: Assembled and in Parts



FIGURE 3

Beam Caliper



FIGURE 4

Spreading Caliper



FIGURE 5

Sliding Caliper



FIGURE 6

Holtain Caliper

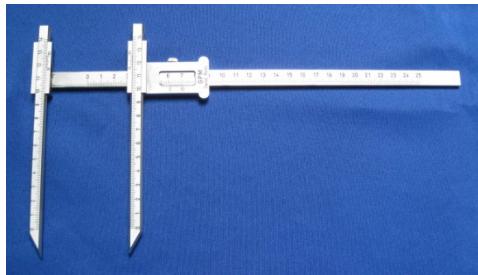


FIGURE 7

Poech Sliding Caliper



FIGURE 8

Steel Tape

The anthropometer is the basic tool of the anthropometrist and is used to measure all linear dimensions. The bottom portion of the anthropometer is detachable for use in measuring heights from a standing surface to the lower parts of the body, or from a sitting surface to the head or upper body parts of a seated participant. The detached upper half forms a beam caliper to measure breadths, depths, and body segment lengths. The smaller sliding, spreading, Holtain, and Poech sliding calipers were used primarily for measuring dimensions of the head, face, and hands. The steel tape was used to measure body circumferences and arcs.

A battery-operated digital scale, manufactured by Seca, was used for measuring body weight (Figure 9). It is widely available through a number of online retailers.



FIGURE 9

Scale

A digital read-out Hoya pupillometer, using the corneal reflection/hairline alignment method, was used to measure interpupillary distance (Figure 10). This pupillometer can be ordered online from www.GetOptic.com.



FIGURE 10

Pupillometer

Measuring instruments that were modified or created for the survey included: foot measuring devices, a modified Vernier height gauge, a wall chart, a modified steel tape, and a beam caliper modified to include a dowel on the fixed blade.

The foot measuring devices were a Men's Brannock Device® size 4-16/ width 3A-3E (used for both men and women) and a Pro Series Brannock Device® size 10-25 (used for large sizes); both were modified with a Kreg Model KMS729 L-R reading metric measuring tape (Figure 11). These materials can be obtained from The Brannock Device Company, Inc., 116 Luther Avenue, Liverpool NY 13088 (www.brannock.com) and Kreg Tool Company, 201 Campus Drive, Huxley IA 50124 (www.kregtool.com). The Brannock Device® facilitates positioning and measuring of the foot.



FIGURE 11

Modified Brannock Device®

A standard metric Vernier height gauge was modified (Figure 12) for use in measuring Lateral Malleolus Height and Acromion-Wall Depth. The metal base was replaced with a wooden base and its carbide tip was blunted. A similar model (Series H04, Id: 161-103k) can be obtained at the Tresna on-line-store (www.tresnainstrument.com).



FIGURE 12

Modified Height Gauge

A wall chart made of drafting mm graph paper sealed in Mylar® sheeting (Figure 13) was used to measure Thumtip Reach and Span. The graph paper is marked at 5 cm and 10 cm intervals. This graph is 230 cm wide. It is placed 50 cm from an adjacent wall, which serves as the back plane for the measurements.

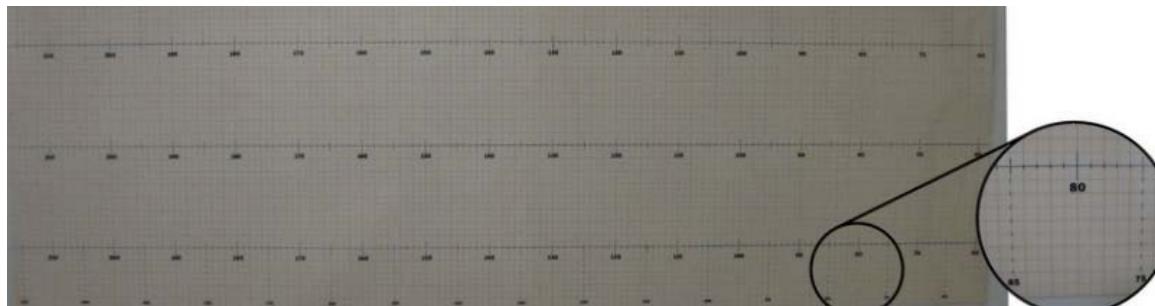


FIGURE 13

Wall Chart

The modified steel tape, used for Crotch Length, Posterior (Omphalion), was made by attaching a dowel (5 inches long by $\frac{1}{4}$ inch in diameter) to the zero end of the standard steel tape as a hand hold (Figure 14). A 2-cm triangular plastic pennant was affixed at the 0 mark of the tape.

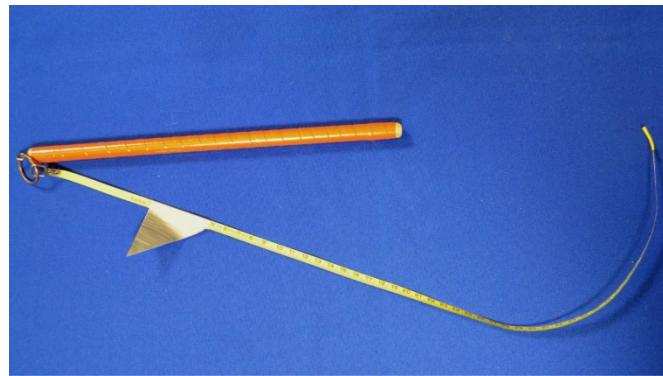


FIGURE 14
Modified Steel Tape

A beam caliper was modified with a 1¼ inch diameter wooden dowel and was used for measuring Forearm-Center of Grip Length (Figure 15). The measuring blade was inserted into the dowel so that the calibrated edge was located in the center of the dowel.

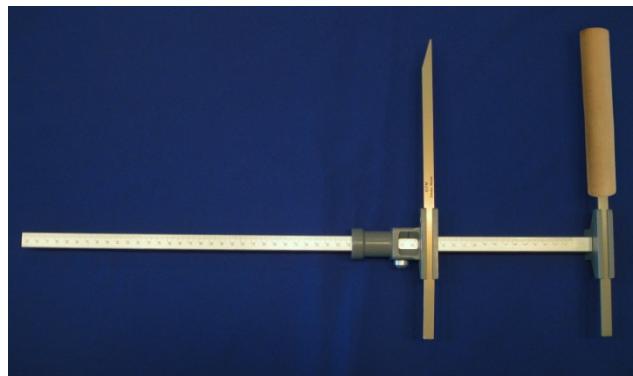


FIGURE 15
Modified Beam Caliper with Dowel

A number of marking aids were used in this study, including a landmark transfer rod (Figure 16) and a scye marking aid (Figure 17). The base of the landmark transfer rod has five casters on the bottom to permit the device to be easily rolled around the participant. A slide that can be moved up and down is mounted on the vertical rod. The device is used to transfer landmarks from one side of the body to the same level on the other side. The dimensions of the landmark transfer rod are as follows:

Total height = 184 cm
Pentagonal base measuring 21 cm on each of the five sides
Arm length = 34 cm
Arm end width = 35 cm

Rod diameter = 1.85 cm
Wheel circumference = 15.8 cm
Ground to base height (bottom) = 6.2 cm
Ground to base height (top) = 6.8 cm
Base thickness = 1.9 cm
Square base on pentagonal base = 20 cm x 20 cm



FIGURE 16

Landmark Transfer Rod

The scye marking aid is a rigid Plexiglas straight edge 480 mm long, 35 mm wide, and 3 mm thick. A line level was epoxied to the lower left margin of the straight edge. This device is used to establish the anterior and posterior scye marks.

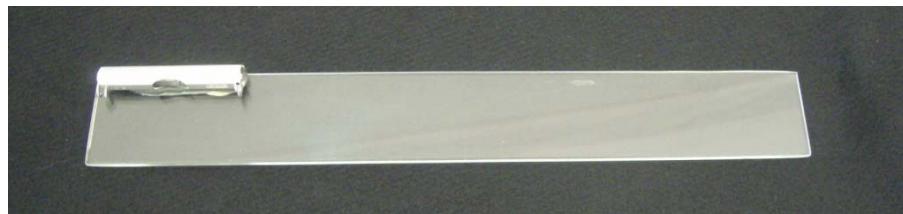


FIGURE 17

Scye Marking Aid

2.5 THREE-DIMENSIONAL SCANNERS

The whole-body scanner (WBX), head scanner (PX), and foot scanner are low-power laser systems (Figures 18, 19, and 20, respectively) that are completely safe for human use. The WBX and PX were government furnished property obtained from Cyberware, Inc., 2110 Del Monte Avenue, Monterey, California 93940. Before ANSUR II data collection began, Cyberware ceased operations, so these scanners are no longer available for purchase. The INFOOT foot scanner is available from I-Ware Laboratory, MINOH Fureres Bldg. 5F, 1-10-9, Senba-Higashi, MINOH-City, Osaka 562-0035 Japan. Each of these scanners records surface images of the body to capture the overall morphology of the participants. Scanning in each of the scanners takes approximately 15-20 s to complete. The software for participant scanning, CyScan for the whole-body and head scanners and INFOOT for the foot scanner, runs on the Windows XP operating system. Each scanner had a separate computer attached that was solely responsible for collecting that scanner's data. CyScan software on the WBX ran in conjunction with the Enhanced Anthropometric Rating System (EARS) Program. EARS, developed by Arizona State University under contract to NSRDEC, was used as an evaluation step to assist the operator in gathering high quality scans. Scan data files from each scanner were transferred over a local network via Ethernet data cable connection to the system server. In addition to the daily uploads of all survey data to the NSRDEC server, the scan data and traditional measurement data were backed up daily onto a DVD. Detailed instructions for operating each of these scanners can be found in the Measurer's Handbook (Hotzman et al., 2011).

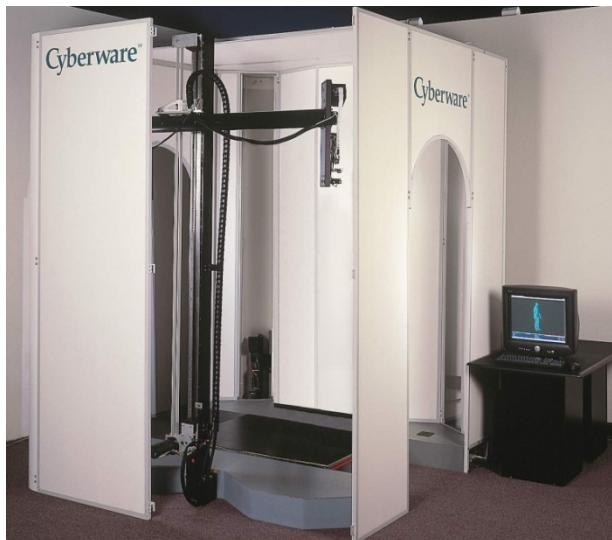


FIGURE 18

WBX Scanner



FIGURE 19

PX Scanner



FIGURE 20

Foot Scanner

2.6 THE LANDMARKS

Dimensions are measured from one point on the body (or a fixed surface such as the floor) to another or, in the case of circumferences, around a part of the body at a specified level. To ensure that each dimension is measured accurately and consistently from participant to participant, dimensions are defined in terms of body landmarks, which serve as the origin, termination, or level of measurement of a dimension.

Two men and two women were trained in locating the points to be marked by palpation or by sight, and in placing actual drawn marks on the bodies of all participants in this survey. Measurers were also trained to recognize other easily located landmarks such as Dactylion III, the tip of the middle finger, for which marking was not necessary.

The landmarks used to define the measurements in the survey are listed and briefly described on the following pages. Detailed instructions for locating these landmarks can be found in the Measurer's Handbook (Hotzman et al., 2011). The definition of some of these landmarks has changed from the previous survey of U.S. Army personnel (ANSUR) (Gordon et al., 1989) on which the current survey was modeled, although the names remain the same. These changes are summarized below.

A total of four landmarks from the original ANSUR survey were modified in the ANSUR II survey. The cervicale landmark was located at the "superior palpable point" of the spine of the seventh cervical vertebra in the ANSUR survey. This was changed to "most prominent point" in the current survey in order to bring the definition into compliance with standard anatomical usage (Martin, 1914) and international practice (ISO 7250-1). Typically the distance between the two landmarks is not more than 1 or 2 mm, with the new definition usually producing the lower mark.

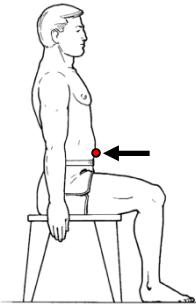
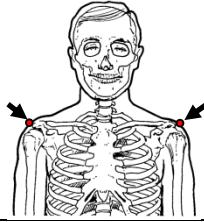
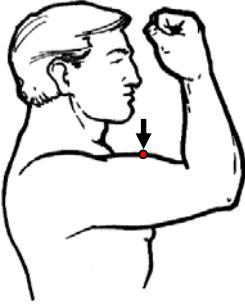
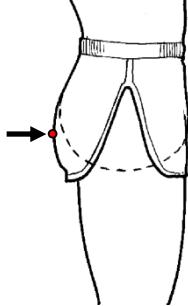
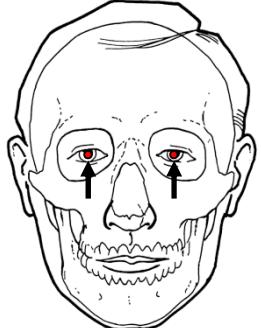
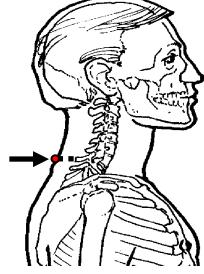
A second modification occurred in the use of an ANSUR II landmark called chest point, anterior. In ANSUR this landmark was named bustpoint/thelion, and it referred to

the most anterior point on the bust for females and the center of the nipple (thelion) for males. The male landmark was used for ANSUR Chest Height and Chest Depth, while ANSUR Chest Circumference was measured at the fullest part of the chest. The definition of this landmark remains unchanged in the current survey for female participants, although the name has been changed to chest point, anterior. Now, chest point, anterior is used for both males and females. The change from thelion to chest point, anterior was made to ensure that measurements were made at the largest portion of the chest (regardless of nipple location) for all chest dimensions, which is required for determining clearance as well as for clothing and protective gear. For some males—those with relatively flat chests—there is no practical difference between the two landmarks. For those with heavier chest development, the new landmark will produce a larger Chest Circumference and Chest Depth, and produce a higher Chest Height.

Deltoid point, right and left, is used to establish the level at which Shoulder Circumference is measured. On heavier participants, the previous ANSUR definition at the “lateral point of the deltoid muscle” results in a Shoulder Circumference measurement that is too low to be useful for clothing design. The definition for the deltoid landmarks were thus changed to the midpoint of the right and left deltoid muscles. For most individuals, there will be no change in Shoulder Circumference as a result of the landmark change. For heavier individuals, Shoulder Circumference will be somewhat smaller and higher.

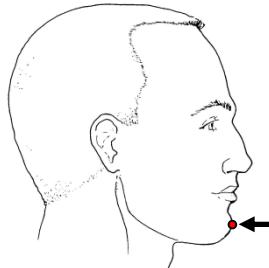
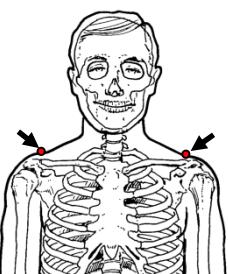
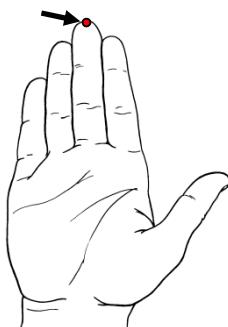
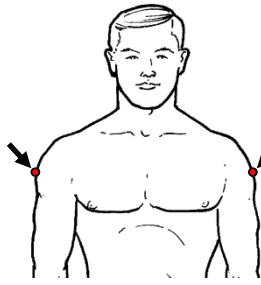
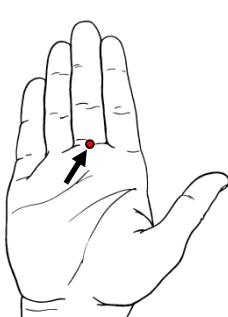
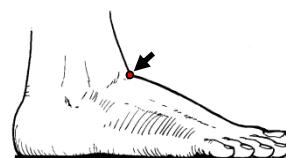
The final modification was a name change for orbitale. This landmark was previously termed “infraorbitale” in ANSUR. The change to orbitale was made to bring the nomenclature into compliance with traditional anatomical usage (Martin, 1914) and standard international practice (ISO 7250-1).

LANDMARKS

<p>Abdominal point, anterior: The most protruding point of the relaxed abdomen on a sitting participant.</p> 	<p>Acromion, right and left: The point of intersection of the lateral border of the acromial process and a line running down the middle of the shoulder from the neck to the tip of the shoulder.</p> 
<p>Acropodium: The tip of the first or second toe of the right foot, whichever is longer.</p> 	<p>Axillary fold, posterior: right and left: The highest points of the right and left axillary folds on the back.</p> 
<p>Biceps point: The highest point of the right flexed biceps brachii muscle as viewed from the participant's right side.</p> 	<p>Buttock point, posterior: The point of maximum protrusion of the right buttock of a standing participant.</p> 
<p>Center of pupil, right and left: The center of the pupil of the eye.</p> 	<p>Cervicale*: The most prominent palpable point of the spine of the seventh cervical vertebra.</p> 

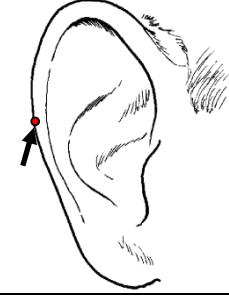
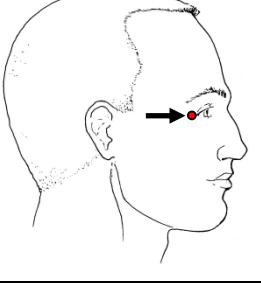
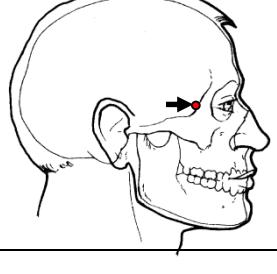
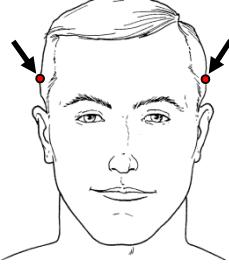
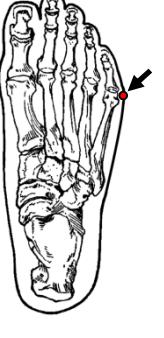
* Change from ANSUR. See page 18 for details.

LANDMARKS Continued

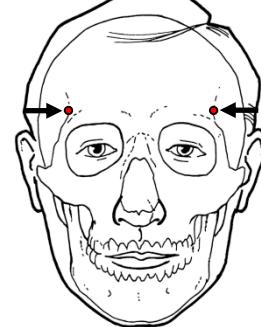
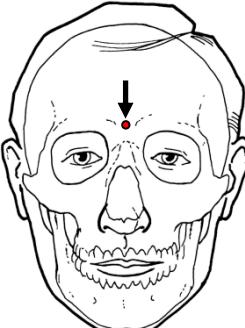
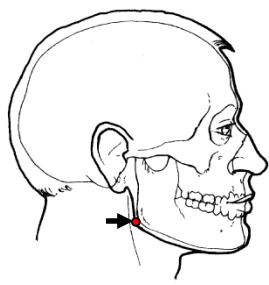
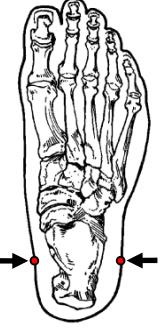
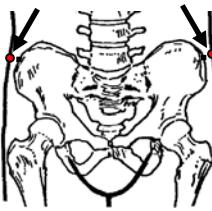
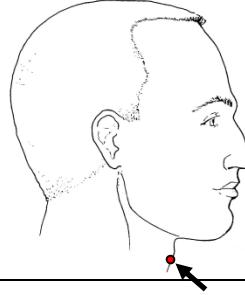
<p>Chest point, anterior*: The most anterior right point on the chest.</p> 	<p>Chin: The most protruding point on the bottom edge of the chin, along the jaw line.</p> 
<p>Clavicle, right and left: The superior points of the lateral ends of the clavicles (collar bones).</p> 	<p>Crotch: The point at the level of the lower edge of the pubis bone of the os coxa.</p> 
<p>Dactylion III, right and left: The tip of the middle finger.</p> 	<p>Deltoid point*, right and left: The midpoint of the left and right deltoid muscles.</p> 
<p>Digit III, base: The center of the crease at the base of the middle finger.</p> 	<p>Dorsal juncture of the foot and leg: The top of a skin crease between the foot and the front of the ankle when the knees and ankles are flexed about 30°.</p> 

* Change from ANSUR. See page 18-19 for details.

LANDMARKS Continued

<p>Ear, bottom: The lowest point of the right ear on its long axis.</p> 	<p>Ear point: The lateral point (farthest from the head) of the right ear.</p> 
<p>Ear, top: The highest point of the right ear on its long axis.</p> 	<p>Ectocanthus: The outside corner of the right eye formed by the meeting of the upper and lower eyelids.</p> 
<p>Ectoorbitale, right and left: The posterior point on the frontal process of the zygomatic bone at the level of the outer corner of the eye.</p> 	<p>Elbow Crease: The skin crease on the inside of the elbow joint when the elbow is flexed 90°.</p> 
<p>Euryon, right and left: The most lateral point in the region above the plane of attachment of the ear.</p> 	<p>Fifth metatarsophalangeal protrusion: The most lateral protrusion of the right foot in the region of the fifth metatarsophalangeal joint.</p> 

LANDMARKS Continued

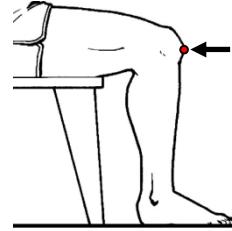
<p>First metatarsophalangeal protrusion: The most medial protrusion of the right foot in the region of the first metatarsophalangeal joint.</p> 	<p>Frontotemporale, right and left: The point of deepest indentation of the temporal crest of the frontal bone above the browridges.</p> 
<p>Glabella: The most anterior point on the frontal bone midway between the bony browridges.</p> 	<p>Gluteal furrow point: The lowest point of the lowest furrow or crease at the juncture of the right buttock and the thigh.</p> 
<p>Gonion, right and left: The most lateral point on the posterior angle of the mandible (lower jawbone).</p> 	<p>Heel point, lateral and medial: The lateral and medial points of the right heel located at or behind the most protruding point of the lateral malleolus (outside ankle bone).</p> 
<p>Iliocristale, right and left: The highest palpable point of the right and left iliac crests of the pelvis, one-half the distance between the anterior superior iliac and posterior superior iliac spines.</p> 	<p>Infrathyroid: The inferior point of the thyroid cartilage (Adam's apple) in the midsagittal plane.</p> 

LANDMARKS Continued

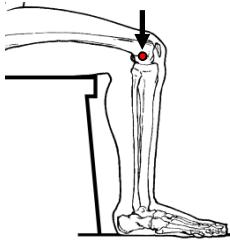
Inner thigh: A vertical line halfway between the front and back of the right inner thigh, extending downward from the level of the gluteal furrow.



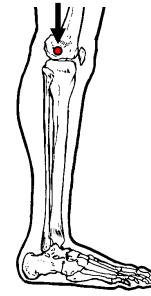
Knee point, anterior: The most protruding point of the right kneecap of a sitting participant.



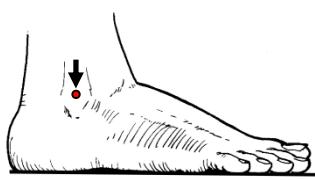
Lateral femoral epicondyle, sitting: The lateral point of the right femoral epicondyle (knee pivot point) of a sitting participant.



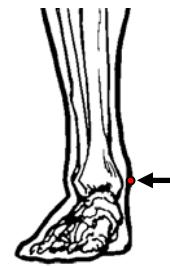
Lateral femoral epicondyle, standing: The lateral point of the right femoral epicondyle (knee pivot point) of a standing participant.



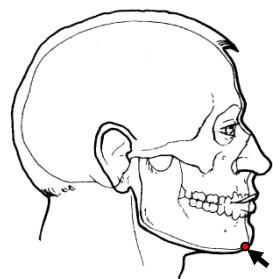
Lateral malleolus: The most lateral point of the right lateral malleolus (the ankle bone on the outside of the foot).



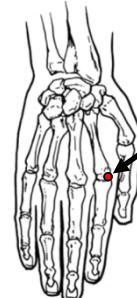
Medial malleolus: The medial point of the medial malleolus (inside ankle bone).



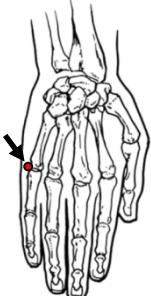
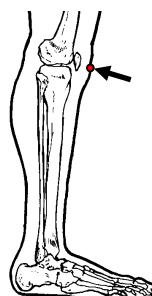
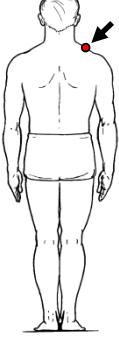
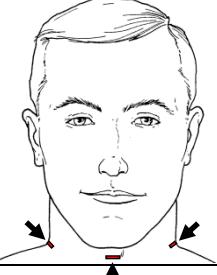
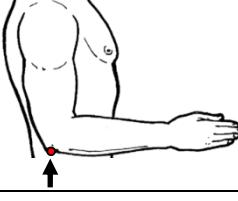
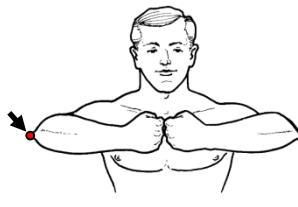
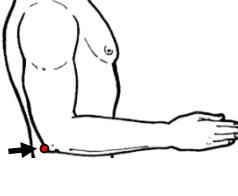
Menton: The inferior point of the mandible in the midsagittal plane (bottom of the chin).



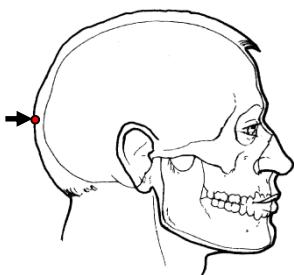
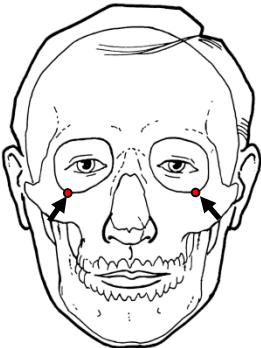
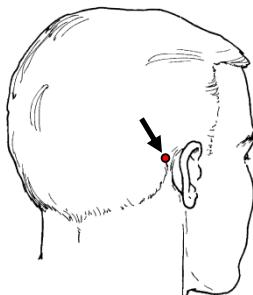
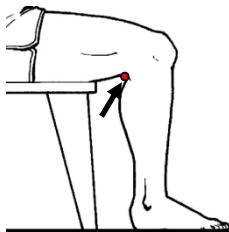
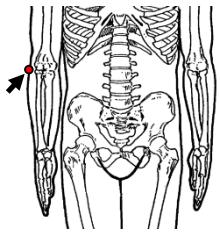
Metacarpale II: The most lateral point of the right metacarpophalangeal joint II (at the base of the index finger).



LANDMARKS Continued

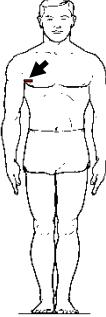
<p>Metacarpale V: The most medial point of the right metacarpophalangeal joint V (at the base of the little finger).</p> 	<p>Midpatella: The anterior point halfway between the top and bottom of the patella (the kneecap).</p> 
<p>Midshoulder: The point on top of the right shoulder midway between the neck (trapezius point, right) and the tip of the shoulder (acromion, right).</p> 	<p>Midspine: A line down the center of the back.</p> 
<p>Neck, anterior, right and left lateral: The anterior and lateral points at the base of the neck.</p> 	<p>Olecranon, bottom: The lowest point of the elbow with the elbow flexed 90°.</p> 
<p>Olecranon, center: A point on the center of the curvature of the right olecranon process with the elbow flexed about 115°.</p> 	<p>Olecranon, rear: The rearmost point of the elbow with the elbow flexed 90°.</p> 

LANDMARKS Continued

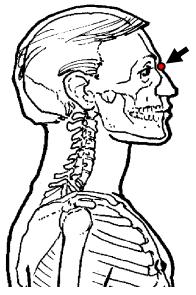
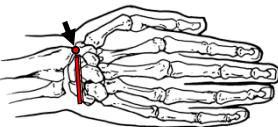
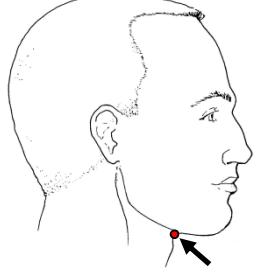
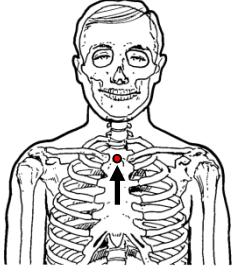
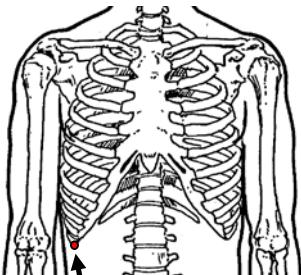
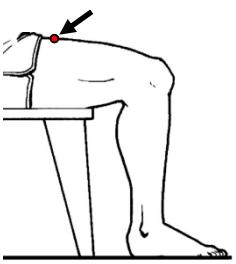
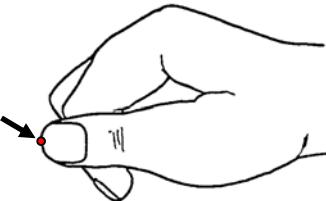
<p>Opisthocranion: The posterior point on the back of the head.</p> 	<p>Orbitale*, right and left: The lowest point on the anterior border of the bony eye socket.</p> 
<p>Otobasion, superior: The anterior superior point of the juncture between the right ear and the head.</p> 	<p>Popliteal fossa at the dorsal juncture of the calf and thigh: The bottom surface of the thigh just behind the knee.</p> 
<p>Pternion: The posterior point on the heel of the foot.</p> 	<p>Radiale: The superior palpable point on the outside edge of the radius.</p> 

* Change from ANSUR. See page 19 for details.

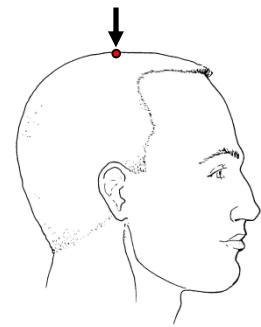
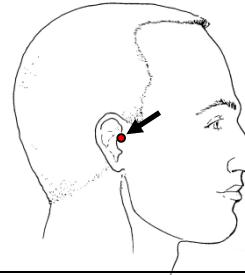
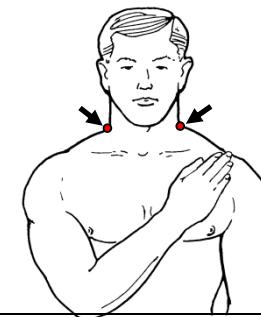
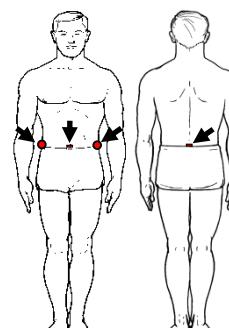
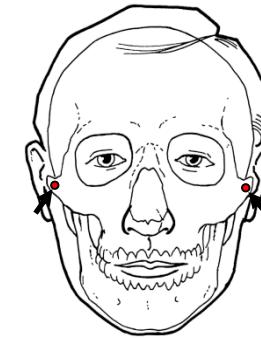
LANDMARKS Continued

<p>Scye: Landmarks on the upper arm and torso associated with the armhole of a garment.</p>	<p>Anterior scye on the torso: A short horizontal line on the torso originating at the apex of the right anterior axillary fold.</p> 
<p>Midscye, right and left: A short horizontal line bisecting the posterior diagonal scye landmark.</p> 	<p>Posterior diagonal scye, right and left: A diagonal line connecting the apex of the posterior axillary fold with the acromion landmark on the tip of the shoulder.</p> 
<p>Posterior horizontal scye, right and left: A short horizontal line on the back originating at the apex of the posterior axillary fold.</p> 	<p>Posterior vertical scye, right and left: A short vertical line on the back originating at the apex of the posterior axillary fold.</p> 

LANDMARKS Continued

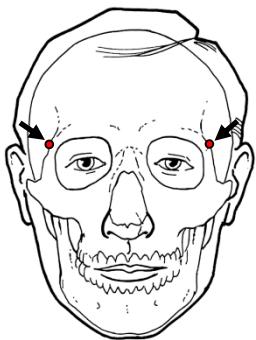
<p>Sellion: The point of the deepest depression of the nasal bones at the top of the nose.</p> 	<p>Stylin, dorsal stylin, and ventral stylin: The inferior point of the bottom of the radius and the extension of this landmark on the dorsal and ventral sides of the wrist.</p> 
<p>Submandibular: The juncture, in the midsagittal plane, of the lower jaw and the neck.</p> 	<p>Suprapatella: The superior point of the patella (kneecap).</p> 
<p>Suprasternale: The inferior point of the jugular notch of the sternum (top of the breastbone).</p> 	<p>Tenth rib: The inferior point of the right tenth rib (bottom of the rib cage).</p> 
<p>Thigh point, top: The highest point of the top of the right thigh of a sitting participant.</p> 	<p>Thumbtip: The tip of the thumb.</p> 

LANDMARKS Continued

<p>Tibiale: The superior palpable point on the medial condyle of the right tibia.</p> 	<p>Top of head (vertex): The highest point on the head when the head is in the Frankfurt plane.</p> 
<p>Tragion, right and left: The superior point on the juncture of the cartilaginous flap (tragus) of the ear with the head.</p> 	<p>Trapezius, right and left: The point at which the anterior border of the trapezius muscle crosses the neck lateral landmark.</p> 
<p>Trochanter: A point at the center of the lateral surface of the right greater trochanter of the right femur of a sitting participant.</p> 	<p>Trochanterion: The superior point of the greater trochanter of the right femur of a standing participant.</p> 
<p>Waist (Omphalion), right, left, anterior, and posterior: The level at the center of the navel.</p> 	<p>Zygion, right and left: The most lateral point on the zygomatic arch.</p> 

LANDMARKS Continued

Zygofrontale, right and left: The most lateral point of the frontal bone on its zygomatic process.



CHAPTER III

THE SAMPLE

Anthropometric data for design are most useful when the data are representative of the overall population for which the designs will be created. It is relatively easy, after the fact, to determine whether a particular sample is representative of the target population. It is a far greater challenge to collect a representative sample in real time, particularly when a large proportion of the target population is deployed in military operations.

Previous research (Bradtmiller et al., 1985; ISO 15535) has shown that age, racial/ethnic background, and gender are the key drivers of anthropometric variability. Thus a plan to achieve representativeness in any anthropometric database survey sample must take these characteristics into account. The sampling plan for this survey was based on age and racial/ethnic group, with males and females treated separately.

In addition to demographic sampling requirements, it is desirable to have a cross section of occupations in an anthropometric database. Previous Army research using the 1988 ANSUR database has shown that, with the exception of occupations that have explicit anthropometric requirements (such as aviators and military police), anthropometric differences among Army occupational groups are primarily due to differences in their demographic distributions (Greiner et al., 1995). Thus, sampling every MOS (Military Occupational Specialty) in addition to sampling by age/race/sex is unnecessary. That said, it is still desirable to have survey participants representing Combat Arms, Combat Support, and Combat Service Support occupations in approximately the same proportion as the Army as a whole. This was achieved by visiting posts with a cross section of combat divisions and by requesting a cross section of functional units.

Army component (Active, Reserve, Guard) is another consideration that is quite important for a representative Army database. Previous research using data from the ANSUR II pilot study showed relatively small but statistically significant differences among Army components for 9 of 12 body dimensions reported (Gordon et al., 2008). Post hoc tests on body dimensions with significant differences showed that the largest differences were between Active Duty and National Guard, with Reserve means always intermediate in magnitude but significantly different from the other components in only two of nine dimensions. Because Army Reservists are relatively few in number and quite geographically dispersed, only Active Duty and National Guard units were explicitly sampled in this study. However, Army Reserve Soldiers affiliated with units participating in ANSUR II went through the same demographic selection and measuring processes as the Active Duty and National Guard Soldiers.

A sample must not only be representative, it must also be large enough to accurately reflect body size variability in the target population it is intended to represent. A power analysis is typically used to calculate the overall number of participants who

should be measured to achieve reasonable confidence in the resulting statistics. A power analysis was done in this case, and the results showed that, ideally, the target sample should include at least 2500 participants for each sex (male, female) and component (Active, Guard) subgroup. A complete description and discussion of the ANSUR II power analysis appears in Appendix B.

Site selection is a critical part of sampling plan implementation because Soldiers are not randomly distributed across Army posts. Active Duty Soldiers are most numerous at posts housing major Army Divisions. National Guard Soldiers are most numerous at training and deployment centers. Female Soldiers in all components are less numerous in traditional combat units and more concentrated in TRADOC schools of occupations that attract large numbers of females. In this study, an EXORD tasking to support the survey was given to FORSCOM and TRADOC, and site selection, measuring dates, and participation of specific units were determined by FORSCOM and TRADOC tasking offices in collaboration with NSRDEC ANSUR II personnel familiar with the sampling requirements. Table 4 shows the measuring sites for ANSUR II and the counts of Soldiers measured at each site.

TABLE 4

ANSUR II Measuring Sites and Total Count at Each Site

Site	Active Duty		National Guard		Reserve		Total
	Males	Females	Males	Females	Males	Females	
	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	
Fort Hood, TX	792	168	0	0	0	0	960
Fort Bliss, TX	1073	332	224	33	56	53	1771
Camp Atterbury, IN	3	0	480	52	44	6	585
Fort Drum, NY	642	187	0	0	1	0	830
Fort McCoy, WI	1	2	479	136	28	3	649
Fort Lee, VA	0	640	0	158	0	24	822
Fort Stewart, GA	478	241	36	40	1	0	796
Fort Rucker, AL	728	33	207	7	35	1	1011
Fort Bragg, NC	618	271	0	0	0	0	889
Fort Gordon, GA	226	660	244	147	0	56	1333
Fort Huachuca, AZ	455	132	97	27	13	10	734
Camp Shelby, MS	0	0	1155	421	4	1	1581
Total Measured	5016	2666	2922	1021	182	154	11961

As can be seen in Table 4, ideal sampling objectives ($n>2500$) for Active Duty and National Guard were exceeded in all but the Female National Guard subgroup. The sample size of 1021 female National Guard personnel will not support the same level of confidence and precision in National Guard female statistics and hypothesis testing for the most variable body dimensions (such as waist circumference), but it is sufficient for most Army design and sizing applications because these are based on Total Army parameter estimates that will also include Active Duty females.

Because demographic (age and racial/ethnic) minorities were oversampled for hypothesis testing and statistical modeling purposes (see Appendix B), the totality of ANSUR II participants was not representative of the Army population – or any user group for that matter. Representative samples for Army acquisition requirements and public release were created using stratified random sampling, with sampling fractions calculated from Defense Manpower Data Center (DMDC) census data (DMDC, 2012) for 30 September 2011, a date midpoint in the ANSUR II data collection period. Representative male and female databases were created independently, with age, racial/ethnic, and component subgroups of each database closely matching the frequency distributions of the Total Army. Army Reserve Soldiers were pooled with Army National Guard Soldiers in this process.

Five candidate databases were created for each sex using stratified random sampling, and their means, standard deviations, minimum values, and maximum values for five important body dimensions (height, weight, sitting height, chest circumference, and waist circumference) were compared to each other and to parameter estimates calculated using all the ANSUR II survey data, but with participants statistically weighted to match DMDC (2012) census distributions. For each sex, the database that was closest to the weighted parameter estimates was chosen as the ANSUR II “working database”. These databases and their statistical summaries, which are reported in this volume, should be the primary reference for Army design and acquisition applications requiring information about anthropometric distributions of Total Army personnel.

Tables 5 through 8 present the demographic distributions of the ANSUR II working databases compared to U.S. Army census data for 30 September 2011 (DMDC, 2012). As expected when stratified random sampling is used to create a representative database, the distributions of component, age, and race in the working databases are very close to those of the Total Army at the time of the survey.

It should be noted that the DMDC data on race/ethnicity at the time of this study did not include information on soldiers whose heritage included more than one racial/ethnic group. This is, however, an increasingly common occurrence in the U.S. Army and in the U.S. population as a whole. For that reason, the ANSUR II databases contain a second racial/ethnic variable that allowed Soldiers to report more than one subgroup. Some 10.2% of males and 11.3% of females in ANSUR II reported more than one racial/ethnic group, compared to 2% for both males and females in ANSUR 1988. See Table 8.

The birthplaces of ANSUR II participants are reported in Table 9 (50 U.S. states) and Table 10 (international locations, including U.S. territories). Overall, 3683 of 4082 (90.2%) of ANSUR II males and 1725 of 1986 (86.9%) of females were born in one of the US states. An additional 399 (9.8%) of ANSUR II males and 261 (13.1%) of females were born outside the United States compared to 6.6% of males and 5.9% of females born outside the United States in ANSUR 1988. The most common ANSUR II U.S. birthplaces were California, New York, and Texas; the most common international birthplaces were Puerto Rico (U.S. territory), Philippines, Mexico, Jamaica, and

Germany. As in ANSUR 1988, it is likely that many German-born Soldiers were born to U.S. military families stationed in Germany.

TABLE 5

ANSUR II Database Sex and Component Distributions

Component	Males				Females			
	ANSUR II		Army		ANSUR II		Army	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Active Duty	2120	51.94	485422	51.01	1020	51.36	76015	43.16
Guard & Reserve	1962	48.06	466256	48.99	966	48.64	100103	56.84
Total	4082	100.00	951678	100.00	1986	100.00	176118	100.00

TABLE 6

ANSUR II Database Sex and Age Group Distributions

Age Group	Males				Females			
	ANSUR II		Army		ANSUR II		Army	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
17-20	422	10.34	97273	10.22	258	12.99	22316	12.67
21-25	1145	28.05	264467	27.79	611	30.77	53029	30.11
26-30	874	21.41	203255	21.36	429	21.60	37869	21.50
31-40	1001	24.52	236105	24.81	429	21.60	38175	21.68
≥41	640	15.68	150578	15.82	259	13.04	24729	14.04
Total	4082	100.00	951678	100.00	1986	100.00	176118	100.00

TABLE 7

ANSUR II Database Sex and DOD Racial/Ethnic Distributions

Race/Ethnicity	Males				Females			
	ANSUR II		Army		ANSUR II		Army	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
White	2817	69.01	647506	68.04	975	49.09	85650	48.63
Black	642	15.73	147393	15.49	656	33.03	56505	32.08
Hispanic	440	10.78	101156	10.63	239	12.03	20551	11.67
Asian	117	2.87	27074	2.84	71	3.58	6223	3.53
Native American	29	0.71	6478	0.68	20	1.01	1755	1.00
Pacific Islander	34	0.83	7500	0.79	25	1.26	2229	1.27
Other	3	0.07	1356	0.14	0	0.00	279	0.16
Unknown	NA	NA	13215	1.39	NA	NA	2926	1.66
Total	4082	100.00	951678	100.00	1986	100.00	176118	100.00

TABLE 8
Population Subgroups in the ANSUR II Databases

Population Subgroup	Males		Females	
	Frequency	Percent	Frequency	Percent
White, Not of Hispanic Descent	2647	64.85	914	46.00
Black, Not of Hispanic Descent	502	12.30	524	26.37
Hispanic	346	8.48	194	9.76
Mexican	138		97	
Puerto Rican	99		40	
Dominican	17		9	
Colombian	10		4	
Other Hispanic Groups	39		27	
Two or more Hispanic Groups	43		17	
Asian	66	1.62	43	2.16
Korean	20		15	
Chinese	11		10	
Vietnamese	10		7	
Other Asian Groups	18		9	
Two or more Asian Groups	7		2	
Pacific Islander	36	0.88	25	1.26
Filipino	25		14	
Samoan	4		6	
Micronesian	4		2	
Other Pacific Islander Groups	1		1	
Two or more Pacific Islander Groups	2		2	
Native American/Alaskan Native	7	0.17	11	0.55
Navajo	0		3	
Sioux	2		1	
Other Tribes	4		2	
Two or more Tribes	1		4	
Eskimo	0		1	
Other	64	1.57	52	2.62
Caribbean Islander	47		46	
Asian Indian	6		3	
Arab or Middle Eastern	5		3	
All Other	6		0	
Two Population Subgroups	382	9.36	190	9.56
White & Hispanic	123		37	
White & Native American	88		38	
White & Asian	34		12	
White & Black	31		29	
Black & Hispanic	19		15	
White & Pacific Islander	18		15	
Other Two Group Combinations	69		44	0.00
More than Two Subgroups	32	0.78	33	1.71
Total	4082	100.00	1986	100.00

TABLE 9
U.S. Birthplaces of ANSUR II Participants

Birthplace	Males		Females	
	Frequency	Percent*	Frequency	Percent*
Alabama	92	2.25	72	3.63
Alaska	7	0.17	1	0.05
Arizona	56	1.37	28	1.41
Arkansas	46	1.13	8	0.40
California	292	7.15	154	7.75
Colorado	54	1.32	27	1.36
Connecticut	28	0.69	8	0.40
Delaware	11	0.27	6	0.30
District of Columbia	11	0.27	8	0.40
Florida	135	3.31	75	3.78
Georgia	92	2.25	78	3.93
Hawaii	16	0.39	13	0.65
Idaho	16	0.39	4	0.20
Illinois	141	3.45	75	3.78
Indiana	215	5.27	51	2.57
Iowa	42	1.03	13	0.65
Kansas	48	1.18	15	0.76
Kentucky	53	1.30	16	0.81
Louisiana	96	2.35	41	2.06
Maine	10	0.24	8	0.40
Maryland	63	1.54	17	0.86
Massachusetts	87	2.13	25	1.26
Michigan	128	3.14	68	3.42
Minnesota	125	3.06	75	3.78
Mississippi	117	2.87	77	3.88
Missouri	67	1.64	17	0.86
Montana	9	0.22	3	0.15
Nebraska	22	0.54	9	0.45
Nevada	14	0.34	10	0.50
New Hampshire	10	0.24	4	0.20
New Jersey	59	1.45	30	1.51
New Mexico	13	0.32	4	0.20
New York	314	7.69	106	5.34
North Carolina	96	2.35	53	2.67
North Dakota	11	0.27	7	0.35
Ohio	101	2.47	41	2.06
Oklahoma	182	4.46	39	1.96
Oregon	32	0.78	10	0.50
Pennsylvania	80	1.96	52	2.62
Rhode Island	18	0.44	1	0.05
South Carolina	103	2.52	58	2.92
South Dakota	41	1.00	15	0.76
Tennessee	50	1.22	24	1.21
Texas	268	6.57	129	6.50

Percent of total ANSUR II birthplaces - not percent of U.S. birthplaces.

TABLE 9 Continued

U.S. Birthplaces of ANSUR II Participants

Birthplace	Males		Females	
	Frequency	Percent	Frequency	Percent
Utah	21	0.51	7	0.35
Vermont	9	0.22	4	0.20
Virginia	64	1.57	54	2.72
Washington	42	1.03	24	1.21
West Virginia	15	0.37	11	0.55
Wisconsin	57	1.40	45	2.27
Wyoming	4	0.10	3	0.15
U.S. unspecified	0	0.00	2	0.10
Total U.S. Born	3683	90.23	1725	86.86

TABLE 10

International Birthplaces of ANSUR II Participants

Most Frequent Locations	Males		Females	
	Frequency	Percent*	Frequency	Percent*
Canada	8	0.20	1	0.05
Colombia	8	0.20	5	0.25
Dominican Republic	11	0.27	6	0.30
Germany	54	1.32	38	1.91
Guam	6	0.15	4	0.20
Haiti	6	0.15	6	0.30
Jamaica	14	0.34	21	1.06
Japan	6	0.15	5	0.25
Mexico	22	0.54	17	0.86
Panama	5	0.12	5	0.25
Philippines	28	0.69	18	0.91
Puerto Rico	69	1.69	19	0.96
South Korea	15	0.37	16	0.81
United Kingdom	4	0.10	7	0.35
Vietnam	9	0.22	4	0.20
Other Locations				
Africa	32	0.78	12	0.60
Asia	23	0.56	19	0.96
Caribbean Islands	22	0.54	17	0.86
Central America	11	0.27	3	0.15
Europe	20	0.49	18	0.91
Middle East	7	0.17	3	0.15
Oceania	7	0.17	8	0.40
South America	12	0.29	9	0.45
Total International Born	399	9.77	261	13.14

* Percent of total ANSUR II birthplaces - not percent of international birthplaces.

The age distribution of ANSUR II participants ranged from 17 to 58 for both males and females. The full distribution is reported in Table 11.

TABLE 11

Ages of ANSUR II Participants

Age	Males			Females		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
17	1	0.02	0.02	1	0.05	0.05
18	49	1.20	1.22	63	3.17	3.22
19	157	3.85	5.07	89	4.48	7.70
20	215	5.27	10.34	105	5.29	12.99
21	254	6.22	16.56	129	6.50	19.49
22	245	6.00	22.56	127	6.39	25.88
23	234	5.73	28.29	120	6.04	31.92
24	203	4.97	33.27	133	6.70	38.62
25	209	5.12	38.39	102	5.14	43.76
26	214	5.24	43.63	97	4.88	48.64
27	168	4.12	47.75	104	5.24	53.88
28	186	4.56	52.30	92	4.63	58.51
29	154	3.77	56.08	73	3.68	62.19
30	152	3.72	59.80	63	3.17	65.36
31	162	3.97	63.77	71	3.58	68.93
32	106	2.60	66.36	48	2.42	71.35
33	105	2.57	68.94	51	2.57	73.92
34	85	2.08	71.02	31	1.56	75.48
35	87	2.13	73.15	39	1.96	77.44
36	80	1.96	75.11	35	1.76	79.20
37	89	2.18	77.29	38	1.91	81.12
38	96	2.35	79.64	39	1.96	83.08
39	97	2.38	82.02	30	1.51	84.59
40	94	2.30	84.32	47	2.37	86.96
41	96	2.35	86.67	51	2.57	89.53
42	93	2.28	88.95	48	2.42	91.94
43	63	1.54	90.49	22	1.11	93.05
44	62	1.52	92.01	32	1.61	94.66
45	47	1.15	93.17	28	1.41	96.07
46	42	1.03	94.19	16	0.81	96.88
47	48	1.18	95.37	8	0.40	97.28
48	39	0.96	96.33	11	0.55	97.83
49	31	0.76	97.08	8	0.40	98.24
50	32	0.78	97.87	8	0.40	98.64
51	25	0.61	98.48	6	0.30	98.94
52	11	0.27	98.75	6	0.30	99.24
53	17	0.42	99.17	6	0.30	99.55
54	9	0.22	99.39	4	0.20	99.75
55	7	0.17	99.56	2	0.10	99.85
56	10	0.24	99.80	2	0.10	99.95
57	4	0.10	99.90	0	0.00	99.95
58	4	0.10	100.00	1	0.05	100.00
Total	4082	100.00	100.00	1986	100.00	100.00

The grades and ranks of ANSUR II participants are presented in Table 12. All ranks except General Officer are represented in the database. As expected in most military samples, grade and rank are closely related to age (Table 13).

TABLE 12
Grades and Ranks of ANSUR II Participants

Grade	Rank	Males		Females	
		Frequency	Percent	Frequency	Percent
E-1	Private (E-1)	88	2.16	125	6.29
E-2	Private (E-2)	196	4.80	133	6.70
E-3	Private First Class	545	13.35	272	13.70
E-4	Corporal	45	1.10	11	0.55
E-4	Specialist	1328	32.53	521	26.23
E-5	Sergeant	692	16.95	299	15.06
E-6	Staff Sergeant	449	11.00	191	9.62
E-7	Sergeant First Class	178	4.36	104	5.24
E-8	First Sergeant	22	0.54	4	0.20
E-8	Master Sergeant	162	3.97	38	1.91
E-9	Command Sergeant Major	5	0.12	1	0.05
E-9	Sergeant Major	43	1.05	13	0.65
O-1	Second Lieutenant	90	2.20	67	3.37
O-2	First Lieutenant	61	1.49	50	2.52
O-3	Captain	87	2.13	94	4.73
O-4	Major	23	0.56	20	1.01
O-5	Lieutenant Colonel	7	0.17	9	0.45
O-6	Colonel	2	0.05	2	0.10
WO1	Warrant Officer	14	0.34	11	0.55
CW2	Chief Warrant Officer	22	0.54	11	0.55
CW3	Chief Warrant Officer	11	0.27	6	0.30
CW4	Chief Warrant Officer	9	0.22	3	0.15
CW5	Chief Warrant Officer	3	0.07	1	0.05
Total		4082	100.00	1986	100.00

TABLE 13

Age Group and Grade of ANSUR II Participants

Grade	Age Group					Totals
	17-20	21-25	26-30	31-40	≥41	
E-1	120	72	13	6	2	213
E-2	155	133	31	10	0	329
E-3	278	340	120	70	9	817
E-4	126	880	489	313	97	1905
E-5	1	193	310	319	168	991
E-6	0	21	154	298	167	640
E-7	0	0	19	135	128	282
E-8	0	0	0	78	148	226
E-9	0	0	0	8	54	62
O-1	0	77	48	28	4	157
O-2	0	34	43	33	1	111
O-3	0	6	65	73	37	181
O-4	0	0	0	21	22	43
O-5	0	0	0	0	16	16
O-6	0	0	0	0	4	4
WO1	0	0	10	13	2	25
CW2	0	0	1	18	14	33
CW3	0	0	0	5	12	17
CW4	0	0	0	2	10	12
CW5	0	0	0	0	4	4
Total	680	1756	1303	1430	899	6068

Table 14 details the military occupations of ANSUR II participants using groupings based on the first two digits of their MOS. The MOS classification systems for officers and enlisted personnel have evolved over time, and some codes were modified during the course of the ANSUR II survey. As a result, some ANSUR II participants reported their MOS using an “old code” that is not currently recognized. Fortunately both current and historical MOS codes are detailed in the Personnel Authorizations Module (PAM XXI, 2012) published by the Army Deputy Chief of Staff for Personnel (G-1). This document enabled conversion of older MOS codes and correct association of comparable enlisted, officer, and warrant officer occupational groups. Note that the nomenclature for comparable enlisted/officer occupational groups may differ slightly for some MOS groups. In those cases both titles are listed in Table 14 using an “officer/enlisted” nomenclature format.

TABLE 14

Military Occupations of ANSUR II Participants

MOS Group	Males		Females	
	Frequency	Percent	Frequency	Percent
92_Quartermaster/Supply and Services	321	7.86	534	26.89
25_Signal Corps/Communication and Information Systems	504	12.35	305	15.36
11_Infantry	784	19.21	0	0.00
91_Ordnance/Mechanical Maintenance	372	9.11	158	7.96
35_Military Intelligence	356	8.72	159	8.01
88_Transportation	239	5.85	129	6.50
12_Engineers	311	7.62	38	1.91
68_Medical CMF*	135	3.31	194	9.77
13_Field Artillery	275	6.74	0	0.00
42_Adjutant General (Human Resources)	77	1.89	144	7.25
31_Military Police	148	3.63	68	3.42
19_Armor	191	4.68	0	0.00
74_Chemical, Biological, Radiological and Nuclear (CBRN)	74	1.81	58	2.92
94_Electronic Maintenance	64	1.57	28	1.41
15_Aviation	63	1.54	16	0.81
14_Air Defense Artillery	38	0.93	20	1.01
89_Ammunition	24	0.59	11	0.55
36_Financial Management	17	0.42	16	0.81
90_Logistics	7	0.17	24	1.21
27_Judge Advocate General/Paralegal	9	0.22	17	0.86
56_Chaplain/Religious Support	20	0.49	6	0.30
70_Health Services FA**	8	0.20	13	0.65
66_Army Nurse Corps	0	0.00	17	0.86
All other MOS Groups (22 additional groups)	45	1.10	30	1.56
MOS unknown	0	0.00	1	0.05
Total	4082	100.00	1986	100.00

*The Medical CMF is an enlisted-only designation that comprises medical technician specialties.

**The Health Services FA is an officer-only designation that comprises healthcare administrative specialties.

Although a wide variety of occupations is represented in the ANSUR II male and female databases, the most frequent MOS groups for ANSUR II males were 11_Infantry, 25_Signal/Communications, 91_Ordnance/Mechanical Maintenance, and 35_Military Intelligence. The most frequent MOS groups for ANSUR II females were 92_Quartermaster/Supply, 25_Signal, 68_Medical, and 35_Military Intelligence.

Because the ANSUR II survey was conducted while the Army had significant military commitments in Iraq and Afghanistan, questions regarding deployment experience were included in the biographical portion of the survey. Table 15

summarizes the most recent deployment experience of ANSUR II participants, Table 16 shows the relationship between deployment experience and age, and Table 17 shows locations for the most recent deployments. Deployment information was missing for 10 male and 10 female participants.

As can be seen in Table 15, 62.9% of male ANSUR II participants, and 44.7% of female participants had been deployed outside the United States sometime in their careers, many within 12 months of their participation in ANSUR II. Lack of deployment experience was most frequent in the two youngest age groups (Table 16). Of those with deployment experience (Table 17), Soldiers had been most frequently deployed to Iraq or Afghanistan (58.3% and 32.1%, respectively, for males and 63.5% and 21.6%, respectively, for females).

TABLE 15

Time Elapsed Since Last Deployment for ANSUR II Participants

Returned from Deployment	Males		Females	
	Frequency	Percent	Frequency	Percent
Never deployed	1509	37.06	1093	55.31
< 1 month ago	339	8.33	56	2.83
1-3 months ago	98	2.41	51	2.58
4-6 months ago	217	5.33	57	2.88
7-12 months ago	446	10.95	154	7.79
> 1 year ago	1463	35.93	565	28.59
Total	4072	100.00	1976	100.00

TABLE 16

Relationship of Age to Deployment Experience among ANSUR II Participants

Returned from Deployment	Age Group					Total
	17-20	21-25	26-30	31-40	≥41	
Never deployed	607	1029	428	349	189	2602
< 1 month ago	14	46	38	35	16	149
1-3 months ago	14	88	69	78	25	274
4-6 months ago	12	168	157	181	82	600
7-12 months ago	27	147	94	91	36	395
> 1 year ago	5	275	510	690	548	2028
Total	679	1753	1296	1424	896	6048

TABLE 17

Last Deployment Location for ANSUR II Participants

Last Deployment Location	Males		Females	
	Frequency	Percent	Frequency	Percent
Iraq	1495	58.33	561	63.53
Afghanistan	823	32.11	191	21.63
Other Persian Gulf	132	5.15	80	9.06
All Other Deployments	113	4.41	51	5.78
Total	2563	100.00	883	100.00

Table 18 reports future deployment plans of ANSUR II participants. Some 24.7% of ANSUR II males and 22.4% of ANSUR II females were scheduled for deployment within 6 months of the date they were measured. Another 15.4% of males and 10.0% of females were scheduled to deploy, but more than 6 months after the date they were measured. The majority of ANSUR II participants either were not yet scheduled to deploy or they did not know whether they were scheduled to deploy.

TABLE 18

Future Deployments Scheduled for ANSUR II Participants

Next Deployment	Males		Females	
	Frequency	Percent	Frequency	Percent
Less than 6 months	1008	24.69	445	22.41
More than 6 months	628	15.38	199	10.02
Not currently scheduled	1224	29.99	665	33.48
Do not know	1222	29.94	677	34.09
Total	4082	100.00	1986	100.00

Table 19 reports the deployment plans for ANSUR II participants who had not yet been deployed in their Army careers. Of the ANSUR II participants not previously deployed, 51.3% of males and 37.1% of females reported that they were scheduled for future deployment.

TABLE 19

Deployments Scheduled for Previously Not-Deployed ANSUR II Participants

Deployment Scheduled in:	Males		Female	
	Frequency	Percent	Frequency	Percent
Less than 6 months	569	37.71	316	28.91
More than 6 months	206	13.65	90	8.23
Not currently scheduled	304	20.15	273	24.98
Do not know	430	28.50	414	37.88
Total	1509	100.00	1093	100.00

CHAPTER IV

THE BODY MEASUREMENTS

Ninety-four directly measured dimensions were obtained in this survey, using traditional measuring instruments and methods. Where there was a choice of right or left, all measurements were taken on the right side unless otherwise specified or in the rare cases where an injury or anatomical abnormality made it necessary to measure on the left side. All measurements were taken to the nearest millimeter. Weight was taken to the nearest 0.1 kilogram. Detailed illustrated instructions for making these measurements can be found in the Measurer's Handbook (Hotzman et al., 2011).

A visual index, designed to assist the reader in locating particular dimensions whose names may be unfamiliar, appears in Appendix C. The numbers on the visual index correspond to the dimension numbers. The following pages include brief dimension descriptions, summary statistics, and percentile and frequency tables for the male and female participants. Users of these data will note 0.00 standard error values for some means and standard deviations. This occurs because values in these tables are not listed beyond two decimal places.

Only 93 of the 94 measured dimensions are reported here. Acromion-Wall Depth was highly variable, and it was poorly correlated with other dimensions. The variability was attributed to the posterior contour of many participants, which affected their positioning against the wall. Thus, the variability seen in the dimension comprised not only the variability of Acromion-Wall Depth itself, but also the depth of the buttock, the shape of the shoulders, the thickness of the calves, and sometimes other body shape characteristics.

Four head dimensions are not strictly equivalent to 1988 ANSUR dimensions for some females. Female Soldiers with hair in French braids or buns were asked to take down the hair style prior to measuring. Female Soldiers who had braids or cornrows in their hair were measured in the four dimensions with the braids or cornrows included because they were unable to alter the hair style so that the measurer could get the calipers or tape in contact with the scalp, as would normally be done. The rationale for this was that helmets and other protective equipment worn on the head need to accommodate the hair as well as the head itself. To determine whether including these women's measurements in the database would adversely affect the resulting statistics, the mean values of the sample were compared with these Soldiers' measurements both included and excluded. There was no difference in the means (significance test at the 0.05 level). The affected dimensions were:

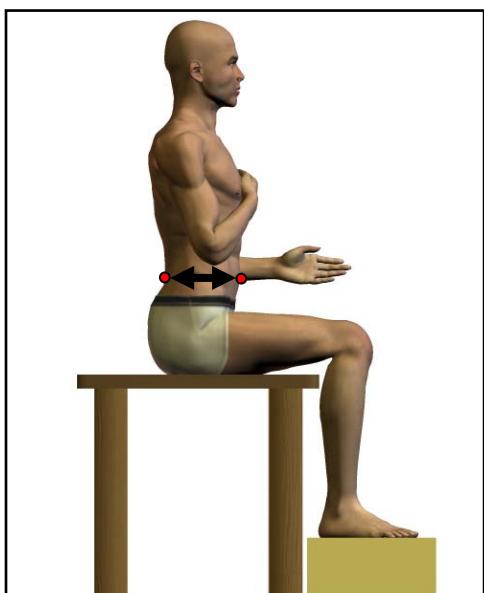
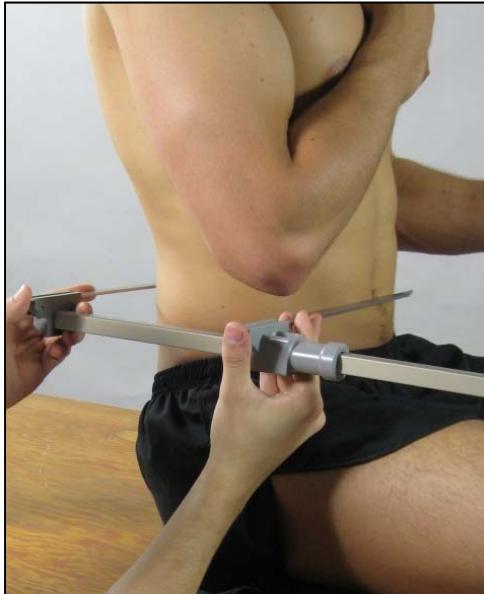
Head Breadth
Head Circumference

Head Length
Tragion-Top Of Head

Note that the issue did not arise for Stature, measured to the top of the head, as it was always possible to place the anthropometer blade between the cornrows or braids and make contact with the skull in the usual way.

(1) ABDOMINAL EXTENSION DEPTH, SITTING

The horizontal distance between the abdominal point anterior and the back at the same level is measured with a beam caliper. The participant sits erect, looking straight ahead. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
17.00	6.69	1ST	18.50	7.28	
17.60	6.93	2ND	19.00	7.48	
17.90	7.05	3RD	19.40	7.64	
18.40	7.24	5TH	20.00	7.87	
19.20	7.56	10TH	20.90	8.23	
19.70	7.76	15TH	21.60	8.50	
20.30	7.99	20TH	22.20	8.74	
20.70	8.15	25TH	22.70	8.94	
21.10	8.31	30TH	23.20	9.13	
21.50	8.46	35TH	23.70	9.33	
21.80	8.58	40TH	24.10	9.49	
22.20	8.74	45TH	24.60	9.69	
22.70	8.94	50TH	25.10	9.88	
23.00	9.06	55TH	25.60	10.08	
23.50	9.25	60TH	26.10	10.28	
23.90	9.41	65TH	26.70	10.51	
24.30	9.57	70TH	27.30	10.75	
24.90	9.80	75TH	27.90	10.98	
25.50	10.04	80TH	28.70	11.30	
26.40	10.39	85TH	29.40	11.57	
27.20	10.71	90TH	30.50	12.01	
28.50	11.22	95TH	32.00	12.60	
29.50	11.61	97TH	33.20	13.07	
30.10	11.85	98TH	34.00	13.39	
31.00	12.20	99TH	35.20	13.86	

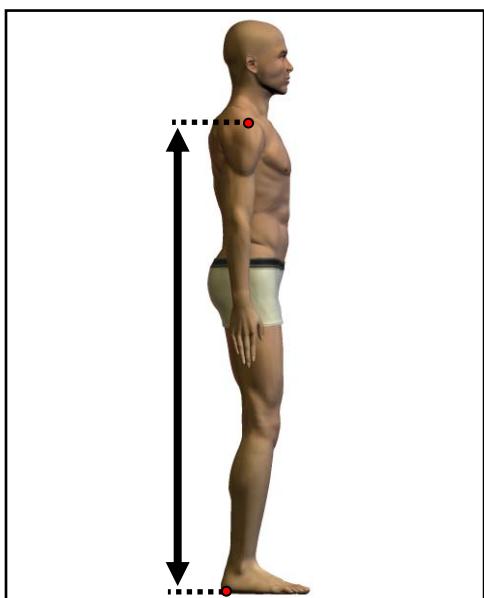
(1) ABDOMINAL EXTENSION DEPTH, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
22.97	9.04		25.47	10.03	
0.07	0.03		0.06	0.02	
3.15	1.24		3.73	1.47	
0.05	0.02		0.04	0.02	
15.50	6.10		16.30	6.42	
35.80	14.09		45.10	17.76	
SKEWNESS	0.53		SKEWNESS	0.49	
KURTOSIS	3.21		KURTOSIS	3.16	
COEFFICIENT OF VARIATION	13.7%		COEFFICIENT OF VARIATION	14.7%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
4	0.20	4	0.20	15.25	-	16.00	
8	0.40	12	0.60	16.00	-	16.75	4
23	1.16	35	1.76	16.75	-	17.50	5
51	2.57	86	4.33	17.50	-	18.25	16
90	4.53	176	8.86	18.25	-	19.00	48
124	6.24	300	15.11	19.00	-	19.75	101
140	7.05	440	22.16	19.75	-	20.50	115
190	9.57	630	31.72	20.50	-	21.25	223
197	9.92	827	41.64	21.25	-	22.00	207
191	9.62	1018	51.26	22.00	-	22.75	327
160	8.06	1178	59.32	22.75	-	23.50	288
188	9.47	1366	68.78	23.50	-	24.25	353
124	6.24	1490	75.03	24.25	-	25.00	281
126	6.34	1616	81.37	25.00	-	25.75	335
80	4.03	1696	85.40	25.75	-	26.50	253
94	4.73	1790	90.13	26.50	-	27.25	283
48	2.42	1838	92.55	27.25	-	28.00	229
66	3.32	1904	95.87	28.00	-	28.75	232
22	1.11	1926	96.98	28.75	-	29.50	170
26	1.31	1952	98.29	29.50	-	30.25	162
13	0.65	1965	98.94	30.25	-	31.00	109
5	0.25	1970	99.19	31.00	-	31.75	105
3	0.15	1973	99.35	31.75	-	32.50	79
7	0.35	1980	99.70	32.50	-	33.25	39
2	0.10	1982	99.80	33.25	-	34.00	36
1	0.05	1983	99.85	34.00	-	34.75	34
2	0.10	1985	99.95	34.75	-	35.50	16
1	0.05	1986	100.00	35.50	-	36.25	11
				36.25	-	37.00	4
				37.00	-	37.75	6
				37.75	-	38.50	5
				38.50	-	39.25	3
				39.25	-	40.00	0
				40.00	-	40.75	2
				40.75	-	41.50	0
				41.50	-	42.25	0
				42.25	-	43.00	0
				43.00	-	43.75	0
				43.75	-	44.50	0
				44.50	-	45.25	1

(2) ACROMIAL HEIGHT

The vertical distance between a standing surface and the right acromion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
120.10	47.28	1ST	129.60	51.02	
121.90	47.99	2ND	131.20	51.65	
122.80	48.35	3RD	132.60	52.20	
124.20	48.90	5TH	133.90	52.72	
126.20	49.69	10TH	136.10	53.58	
127.60	50.24	15TH	137.50	54.13	
128.90	50.75	20TH	138.80	54.65	
129.80	51.10	25TH	139.80	55.04	
130.60	51.42	30TH	140.80	55.43	
131.40	51.73	35TH	141.60	55.75	
131.90	51.93	40TH	142.40	56.06	
132.50	52.17	45TH	143.20	56.38	
133.20	52.44	50TH	143.90	56.65	
133.90	52.72	55TH	144.70	56.97	
134.70	53.03	60TH	145.60	57.32	
135.60	53.39	65TH	146.40	57.64	
136.40	53.70	70TH	147.30	57.99	
137.40	54.09	75TH	148.10	58.31	
138.30	54.45	80TH	149.30	58.78	
139.50	54.92	85TH	150.50	59.25	
141.10	55.55	90TH	152.10	59.88	
143.40	56.46	95TH	154.60	60.87	
145.00	57.09	97TH	156.50	61.61	
145.90	57.44	98TH	157.80	62.13	
147.30	57.99	99TH	159.70	62.87	

(2) ACROMIAL HEIGHT

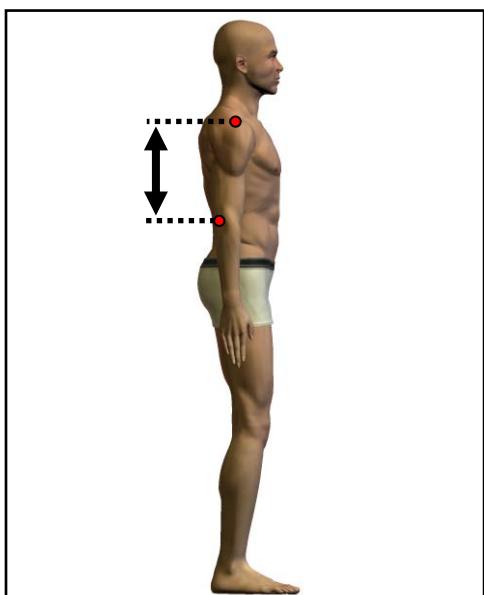
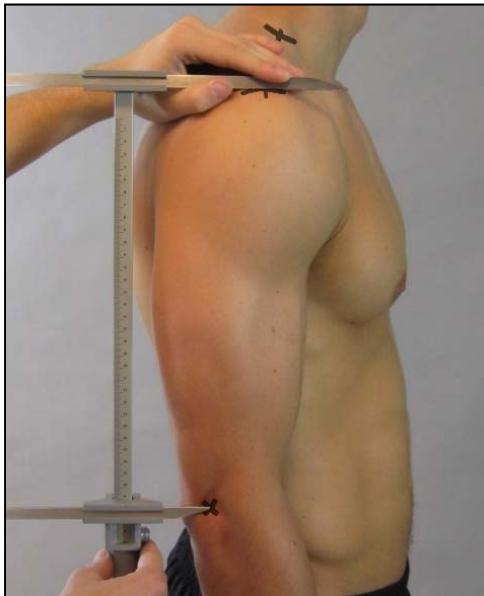
FEMALES		
<u>CM</u>		<u>IN</u>
133.51	MEAN	52.56
0.13	STD ERROR (MEAN)	0.05
5.81	STANDARD DEVIATION	2.29
0.09	STD ERROR (STD DEV)	0.04
111.50	MINIMUM	43.90
153.60	MAXIMUM	60.47
SKEWNESS		0.09
KURTOSIS		3.10
COEFFICIENT OF VARIATION		4.4%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
144.07	MEAN	56.72
0.10	STD ERROR (MEAN)	0.04
6.33	STANDARD DEVIATION	2.49
0.07	STD ERROR (STD DEV)	0.03
119.40	MINIMUM	47.01
168.30	MAXIMUM	66.26
SKEWNESS		0.12
KURTOSIS		3.12
COEFFICIENT OF VARIATION		4.4%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	F	FPct
1	0.05	1	0.05	111.25	-	112.75	
0	0.00	1	0.05	112.75	-	114.25	
1	0.05	2	0.10	114.25	-	115.75	
3	0.15	5	0.25	115.75	-	117.25	
3	0.15	8	0.40	117.25	-	118.75	
13	0.65	21	1.06	118.75	-	120.25	1 0.02
17	0.86	38	1.91	120.25	-	121.75	0 0.00
33	1.66	71	3.58	121.75	-	123.25	0 0.00
59	2.97	130	6.55	123.25	-	124.75	1 0.02
73	3.68	203	10.22	124.75	-	126.25	3 0.07
103	5.19	306	15.41	126.25	-	127.75	10 0.24
122	6.14	428	21.55	127.75	-	129.25	15 0.37
188	9.47	616	31.02	129.25	-	130.75	42 1.03
238	11.98	854	43.00	130.75	-	132.25	38 0.93
221	11.13	1075	54.13	132.25	-	133.75	81 1.98
179	9.01	1254	63.14	133.75	-	135.25	133 3.26
165	8.31	1419	71.45	135.25	-	136.75	177 4.34
157	7.91	1576	79.36	136.75	-	138.25	225 5.51
138	6.95	1714	86.30	138.25	-	139.75	278 6.81
76	3.83	1790	90.13	139.75	-	141.25	316 7.74
72	3.63	1862	93.76	141.25	-	142.75	411 10.07
48	2.42	1910	96.17	142.75	-	144.25	390 9.55
33	1.66	1943	97.83	144.25	-	145.75	379 9.28
21	1.06	1964	98.89	145.75	-	147.25	356 8.72
13	0.65	1977	99.55	147.25	-	148.75	314 7.69
3	0.15	1980	99.70	148.75	-	150.25	257 6.30
5	0.25	1985	99.95	150.25	-	151.75	209 5.12
0	0.00	1985	99.95	151.75	-	153.25	145 3.55
1	0.05	1986	100.00	153.25	-	154.75	104 2.55
				154.75	-	156.25	66 1.62
				156.25	-	157.75	49 1.20
				157.75	-	159.25	33 0.81
				159.25	-	160.75	18 0.44
				160.75	-	162.25	15 0.37
				162.25	-	163.75	10 0.24
				163.75	-	165.25	3 0.07
				165.25	-	166.75	2 0.05
				166.75	-	168.25	0 0.00
				168.25	-	169.75	1 0.02

(3) ACROMION-RADIALE LENGTH

The distance between the right acromion landmark and the radiale landmark is measured with a beam caliper held parallel to the long axis of the arm. The participant stands erect. The shoulders and upper extremities are relaxed with the palms facing the thighs.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
27.10	10.67	1ST	29.60	11.65
27.70	10.91	2ND	30.00	11.81
28.00	11.02	3RD	30.30	11.93
28.30	11.14	5TH	30.70	12.09
29.00	11.42	10TH	31.30	12.32
29.30	11.54	15TH	31.70	12.48
29.70	11.69	20TH	32.10	12.64
30.00	11.81	25TH	32.40	12.76
30.20	11.89	30TH	32.60	12.83
30.50	12.01	35TH	32.80	12.91
30.60	12.05	40TH	33.10	13.03
30.80	12.13	45TH	33.30	13.11
31.10	12.24	50TH	33.50	13.19
31.30	12.32	55TH	33.70	13.27
31.50	12.40	60TH	33.90	13.35
31.70	12.48	65TH	34.20	13.46
32.00	12.60	70TH	34.40	13.54
32.30	12.72	75TH	34.60	13.62
32.60	12.83	80TH	35.00	13.78
32.90	12.95	85TH	35.30	13.90
33.30	13.11	90TH	35.80	14.09
34.00	13.39	95TH	36.50	14.37
34.40	13.54	97TH	36.90	14.53
34.70	13.66	98TH	37.30	14.69
35.40	13.94	99TH	37.70	14.84

(3) ACROMION-RADIALE LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
31.12	12.25		33.52	13.20	
0.04	0.02		0.03	0.01	
1.72	0.68		1.75	0.69	
0.03	0.01		0.02	0.01	
24.90	9.80		27.00	10.63	
37.10	14.61		39.30	15.47	
SKEWNESS	0.04		SKEWNESS	0.10	
KURTOSIS	3.19		KURTOSIS	3.09	
COEFFICIENT OF VARIATION	5.5%		COEFFICIENT OF VARIATION	5.2%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	24.85	-	25.20	
1	0.05	3	0.15	25.20	-	25.55	
2	0.10	5	0.25	25.55	-	25.90	
2	0.10	7	0.35	25.90	-	26.25	
3	0.15	10	0.50	26.25	-	26.60	
8	0.40	18	0.91	26.60	-	26.95	
6	0.30	24	1.21	26.95	-	27.30	1 0.02 1 0.02
15	0.76	39	1.96	27.30	-	27.65	0 0.00 1 0.02
17	0.86	56	2.82	27.65	-	28.00	1 0.02 2 0.05
44	2.22	100	5.04	28.00	-	28.35	6 0.15 8 0.20
33	1.66	133	6.70	28.35	-	28.70	3 0.07 11 0.27
88	4.43	221	11.13	28.70	-	29.05	8 0.20 19 0.47
79	3.98	300	15.11	29.05	-	29.40	11 0.27 30 0.73
117	5.89	417	21.00	29.40	-	29.75	22 0.54 52 1.27
89	4.48	506	25.48	29.75	-	30.10	38 0.93 90 2.20
175	8.81	681	34.29	30.10	-	30.45	62 1.52 152 3.72
166	8.36	847	42.65	30.45	-	30.80	65 1.59 217 5.32
189	9.52	1036	52.17	30.80	-	31.15	125 3.06 342 8.38
124	6.24	1160	58.41	31.15	-	31.50	142 3.48 484 11.86
176	8.86	1336	67.27	31.50	-	31.85	190 4.65 674 16.51
101	5.09	1437	72.36	31.85	-	32.20	197 4.83 871 21.34
148	7.45	1585	79.81	32.20	-	32.55	301 7.37 1172 28.71
95	4.78	1680	84.59	32.55	-	32.90	265 6.49 1437 35.20
100	5.04	1780	89.63	32.90	-	33.25	350 8.57 1787 43.78
56	2.82	1836	92.45	33.25	-	33.60	314 7.69 2101 51.47
43	2.17	1879	94.61	33.60	-	33.95	370 9.06 2471 60.53
34	1.71	1913	96.32	33.95	-	34.30	272 6.66 2743 67.20
31	1.56	1944	97.89	34.30	-	34.65	323 7.91 3066 75.11
14	0.70	1958	98.59	34.65	-	35.00	192 4.70 3258 79.81
8	0.40	1966	98.99	35.00	-	35.35	244 5.98 3502 85.79
6	0.30	1972	99.30	35.35	-	35.70	128 3.14 3630 88.93
10	0.50	1982	99.80	35.70	-	36.05	129 3.16 3759 92.09
2	0.10	1984	99.90	36.05	-	36.40	84 2.06 3843 94.15
0	0.00	1984	99.90	36.40	-	36.75	83 2.03 3926 96.18
1	0.05	1985	99.95	36.75	-	37.10	48 1.18 3974 97.35
1	0.05	1986	100.00	37.10	-	37.45	41 1.00 4015 98.36
				37.45	-	37.80	27 0.66 4042 99.02
				37.80	-	38.15	16 0.39 4058 99.41
				38.15	-	38.50	6 0.15 4064 99.56
				38.50	-	38.85	11 0.27 4075 99.83
				38.85	-	39.20	5 0.12 4080 99.95
				39.20	-	39.55	2 0.05 4082 100.00

(4) ANKLE CIRCUMFERENCE

The minimum horizontal circumference of the right ankle is measured with a tape. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>		
18.50	7.28	1ST	19.80	7.80	
18.80	7.40	2ND	20.20	7.95	
19.00	7.48	3RD	20.40	8.03	
19.30	7.60	5TH	20.60	8.11	
19.70	7.76	10TH	21.10	8.31	
20.00	7.87	15TH	21.50	8.46	
20.30	7.99	20TH	21.70	8.54	
20.50	8.07	25TH	21.90	8.62	
20.70	8.15	30TH	22.20	8.74	
21.00	8.27	35TH	22.30	8.78	
21.20	8.35	40TH	22.50	8.86	
21.30	8.39	45TH	22.70	8.94	
21.50	8.46	50TH	22.80	8.98	
21.70	8.54	55TH	23.00	9.06	
21.80	8.58	60TH	23.30	9.17	
22.00	8.66	65TH	23.40	9.21	
22.30	8.78	70TH	23.60	9.29	
22.50	8.86	75TH	23.90	9.41	
22.70	8.94	80TH	24.20	9.53	
23.10	9.09	85TH	24.40	9.61	
23.50	9.25	90TH	24.80	9.76	
24.20	9.53	95TH	25.40	10.00	
24.70	9.72	97TH	25.70	10.12	
24.80	9.76	98TH	26.20	10.31	
25.50	10.04	99TH	26.80	10.55	

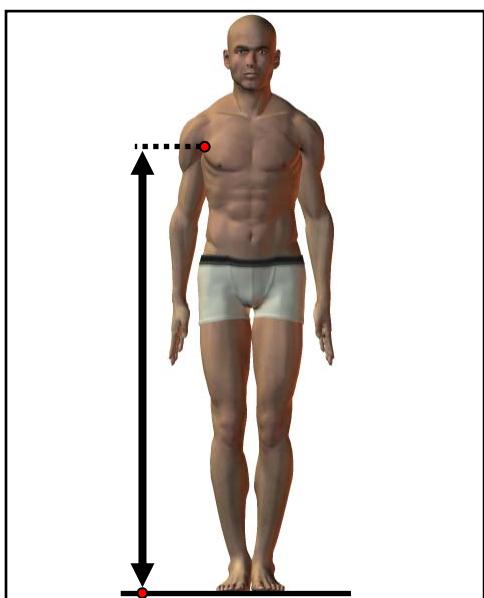
(4) ANKLE CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
21.57	STD ERROR (MEAN)	8.49	22.93	STD ERROR (MEAN)	9.03
0.03	STANDARD DEVIATION	0.01	0.02	STANDARD DEVIATION	0.01
1.49	STD ERROR (STD DEV)	0.59	1.46	STD ERROR (STD DEV)	0.58
0.02	MINIMUM	0.01	0.02	MINIMUM	0.01
17.00	MAXIMUM	6.69	15.60	MAXIMUM	6.14
27.50		10.83	29.30		11.54
SKEWNESS		0.37	SKEWNESS		0.29
KURTOSIS		3.33	KURTOSIS		3.36
COEFFICIENT OF VARIATION		6.9%	COEFFICIENT OF VARIATION		6.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
F	FPct	CumF	CumFPct	FEMALES		MALES	
				CM	F	FPct	CumF
1	0.05	1	0.05	15.45	-	15.80	1
1	0.05	2	0.10	15.80	-	16.15	0
3	0.15	5	0.25	16.15	-	16.50	0
9	0.45	14	0.70	16.50	-	16.85	0
7	0.35	21	1.06	16.85	-	17.20	0
29	1.46	50	2.52	17.20	-	17.55	1
41	2.06	91	4.58	17.55	-	17.90	0
85	4.28	176	8.86	17.90	-	18.25	0
83	4.18	259	13.04	18.25	-	18.60	0
162	8.16	421	21.20	18.60	-	18.95	1
115	5.79	536	26.99	18.95	-	19.30	7
201	10.12	737	37.11	19.30	-	19.65	15
195	9.82	932	46.93	19.65	-	20.00	20
218	10.98	1150	57.91	20.00	-	20.35	75
155	7.80	1305	65.71	20.35	-	20.70	92
147	7.40	1452	73.11	20.70	-	21.05	163
148	7.45	1600	80.56	21.05	-	21.40	189
98	4.93	1698	85.50	21.40	-	21.75	312
78	3.93	1776	89.43	21.75	-	22.10	279
74	3.73	1850	93.15	22.10	-	22.45	407
32	1.61	1882	94.76	22.45	-	22.80	395
37	1.86	1919	96.63	22.80	-	23.15	378
28	1.41	1947	98.04	23.15	-	23.50	367
12	0.60	1959	98.64	23.50	-	23.85	358
9	0.45	1968	99.09	23.85	-	24.20	194
7	0.35	1975	99.45	24.20	-	24.55	284
3	0.15	1978	99.60	24.55	-	24.90	159
3	0.15	1981	99.75	24.90	-	25.25	122
1	0.05	1982	99.80	25.25	-	25.60	96
2	0.10	1984	99.90	25.60	-	25.95	65
2	0.10	1986	100.00	25.95	-	26.30	29
				26.30	-	26.65	17
				26.65	-	27.00	23
				27.00	-	27.35	15
				27.35	-	27.70	6
				27.70	-	28.05	8
				28.05	-	28.40	3
				28.40	-	28.75	0
				28.75	-	29.10	1
				29.10	-	29.45	1

(5) AXILLA HEIGHT

The vertical distance between a standing surface and the anterior-scye-on-the-torso landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed with the palms facing the thighs. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
111.20	43.78	1ST	119.60	47.09
112.70	44.37	2ND	120.90	47.60
113.70	44.76	3RD	121.90	47.99
114.90	45.24	5TH	123.40	48.58
116.90	46.02	10TH	125.40	49.37
118.30	46.57	15TH	126.70	49.88
119.40	47.01	20TH	127.90	50.35
120.20	47.32	25TH	128.90	50.75
121.00	47.64	30TH	129.80	51.10
121.70	47.91	35TH	130.60	51.42
122.30	48.15	40TH	131.30	51.69
122.90	48.39	45TH	132.10	52.01
123.60	48.66	50TH	132.80	52.28
124.30	48.94	55TH	133.50	52.56
125.10	49.25	60TH	134.40	52.91
125.90	49.57	65TH	135.00	53.15
126.80	49.92	70TH	135.90	53.50
127.70	50.28	75TH	136.70	53.82
128.50	50.59	80TH	137.80	54.25
129.70	51.06	85TH	139.00	54.72
131.30	51.69	90TH	140.40	55.28
133.30	52.48	95TH	142.70	56.18
134.80	53.07	97TH	144.50	56.89
136.10	53.58	98TH	145.70	57.36
136.90	53.90	99TH	147.70	58.15

(5) AXILLA HEIGHT

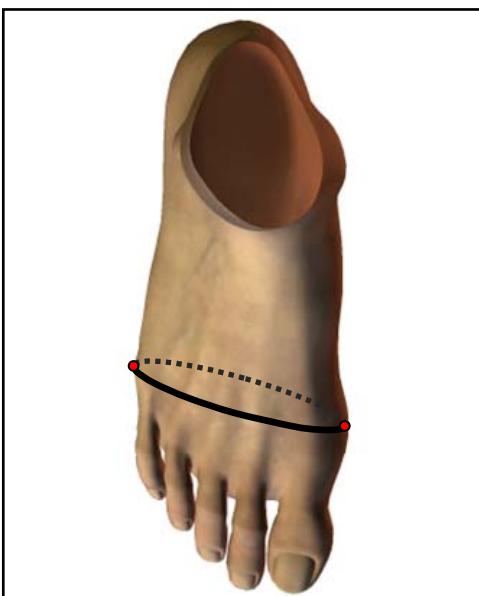
FEMALES		
CM		IN
123.90	MEAN	48.78
0.13	STD ERROR (MEAN)	0.05
5.58	STANDARD DEVIATION	2.20
0.09	STD ERROR (STD DEV)	0.03
103.80	MINIMUM	40.87
141.90	MAXIMUM	55.87
SKEWNESS		0.09
KURTOSIS		3.01
COEFFICIENT OF VARIATION		4.5%
NUMBER OF PARTICIPANTS		1986

MALES		
CM		IN
132.91	MEAN	52.33
0.09	STD ERROR (MEAN)	0.04
5.95	STANDARD DEVIATION	2.34
0.07	STD ERROR (STD DEV)	0.03
110.60	MINIMUM	43.54
155.30	MAXIMUM	61.14
SKEWNESS		0.13
KURTOSIS		3.15
COEFFICIENT OF VARIATION		4.5%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	103.55	-	104.55	
0	0.00	1	0.05	104.55	-	105.55	
1	0.05	2	0.10	105.55	-	106.55	
2	0.10	4	0.20	106.55	-	107.55	
2	0.10	6	0.30	107.55	-	108.55	
3	0.15	9	0.45	108.55	-	109.55	
4	0.20	13	0.65	109.55	-	110.55	
9	0.45	22	1.11	110.55	-	111.55	1 0.02
13	0.65	35	1.76	111.55	-	112.55	0 0.00
24	1.21	59	2.97	112.55	-	113.55	0 0.00
28	1.41	87	4.38	113.55	-	114.55	0 0.00
41	2.06	128	6.45	114.55	-	115.55	4 0.10
50	2.52	178	8.96	115.55	-	116.55	3 0.07
70	3.52	248	12.49	116.55	-	117.55	7 0.17
69	3.47	317	15.96	117.55	-	118.55	11 0.27
97	4.88	414	20.85	118.55	-	119.55	14 0.34
121	6.09	535	26.94	119.55	-	120.55	31 0.76
137	6.90	672	33.84	120.55	-	121.55	38 0.93
167	8.41	839	42.25	121.55	-	122.55	40 0.98
148	7.45	987	49.70	122.55	-	123.55	68 1.67
132	6.65	1119	56.34	123.55	-	124.55	91 2.23
143	7.20	1262	63.54	124.55	-	125.55	123 3.01
98	4.93	1360	68.48	125.55	-	126.55	158 3.87
116	5.84	1476	74.32	126.55	-	127.55	168 4.12
121	6.09	1597	80.41	127.55	-	128.55	181 4.43
79	3.98	1676	84.39	128.55	-	129.55	241 5.90
65	3.27	1741	87.66	129.55	-	130.55	242 5.93
60	3.02	1801	90.68	130.55	-	131.55	275 6.74
48	2.42	1849	93.10	131.55	-	132.55	272 6.66
43	2.17	1892	95.27	132.55	-	133.55	286 7.01
28	1.41	1920	96.68	133.55	-	134.55	266 6.52
16	0.81	1936	97.48	134.55	-	135.55	246 6.03
24	1.21	1960	98.69	135.55	-	136.55	255 6.25
14	0.70	1974	99.40	136.55	-	137.55	201 4.92
6	0.30	1980	99.70	137.55	-	138.55	174 4.26
1	0.05	1981	99.75	138.55	-	139.55	148 3.63
1	0.05	1982	99.80	139.55	-	140.55	147 3.60
3	0.15	1985	99.95	140.55	-	141.55	103 2.52
1	0.05	1986	100.00	141.55	-	142.55	70 1.71
				142.55	-	143.55	49 1.20
				143.55	-	144.55	48 1.18
				144.55	-	145.55	36 0.88
				145.55	-	146.55	19 0.47
				146.55	-	147.55	20 0.49
				147.55	-	148.55	13 0.32
				148.55	-	149.55	9 0.22
				149.55	-	150.55	12 0.29
				150.55	-	151.55	5 0.12
				151.55	-	152.55	2 0.05
				152.55	-	153.55	4 0.10
				153.55	-	154.55	0 0.00
				154.55	-	155.55	1 0.02

(6) BALL OF FOOT CIRCUMFERENCE

The circumference of the foot at the first and fifth metatarsophalangeal landmarks is measured with a tape. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
20.30	7.99	1ST	22.40	8.82	
20.50	8.07	2ND	22.70	8.94	
20.70	8.15	3RD	22.80	8.98	
20.90	8.23	5TH	23.20	9.13	
21.40	8.43	10TH	23.60	9.29	
21.60	8.50	15TH	23.90	9.41	
21.80	8.58	20TH	24.10	9.49	
22.00	8.66	25TH	24.30	9.57	
22.20	8.74	30TH	24.50	9.65	
22.30	8.78	35TH	24.70	9.72	
22.50	8.86	40TH	24.80	9.76	
22.60	8.90	45TH	25.00	9.84	
22.70	8.94	50TH	25.20	9.92	
22.90	9.02	55TH	25.30	9.96	
23.10	9.09	60TH	25.50	10.04	
23.20	9.13	65TH	25.70	10.12	
23.40	9.21	70TH	25.80	10.16	
23.60	9.29	75TH	26.10	10.28	
23.80	9.37	80TH	26.30	10.35	
24.00	9.45	85TH	26.60	10.47	
24.40	9.61	90TH	26.90	10.59	
24.80	9.76	95TH	27.30	10.75	
25.20	9.92	97TH	27.70	10.91	
25.40	10.00	98TH	28.00	11.02	
25.70	10.12	99TH	28.40	11.18	

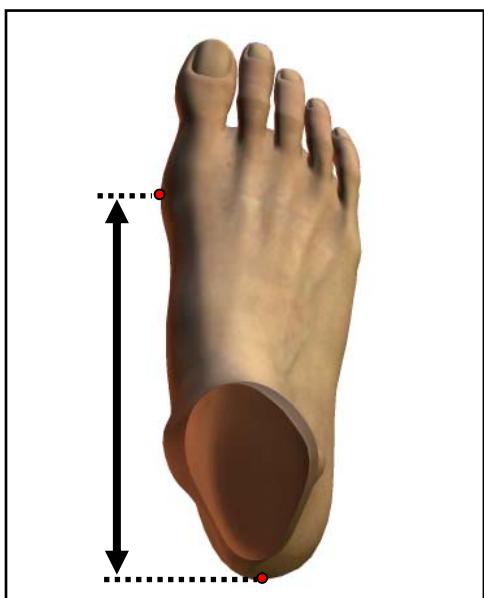
(6) BALL OF FOOT CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
22.81		8.98	25.20		9.92
0.03	STD ERROR (MEAN)	0.01	0.02	STD ERROR (MEAN)	0.01
1.18	STANDARD DEVIATION	0.46	1.29	STANDARD DEVIATION	0.51
0.02	STD ERROR (STD DEV)	0.01	0.01	STD ERROR (STD DEV)	0.01
19.40	MINIMUM	7.64	18.60	MINIMUM	7.32
27.00	MAXIMUM	10.63	30.60	MAXIMUM	12.05
SKEWNESS		0.20	SKEWNESS		0.18
KURTOSIS		3.01	KURTOSIS		3.30
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		5.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	18.60	-	18.85	1
4	0.20	7	0.35	18.85	-	19.10	0
4	0.20	11	0.55	19.10	-	19.35	0
14	0.70	25	1.26	19.35	-	19.60	0
15	0.76	40	2.01	19.60	-	19.85	0
48	2.42	88	4.43	19.85	-	20.10	0
30	1.51	118	5.94	20.10	-	20.35	0
76	3.83	194	9.77	20.35	-	20.60	0
74	3.73	268	13.49	20.60	-	20.85	1
168	8.46	436	21.95	20.85	-	21.10	1
104	5.24	540	27.19	21.10	-	21.35	1
163	8.21	703	35.40	21.35	-	21.60	2
134	6.75	837	42.15	21.60	-	21.85	7
230	11.58	1067	53.73	21.85	-	22.10	0.17
111	5.59	1178	59.32	22.10	-	22.35	6
178	8.96	1356	68.28	22.35	-	22.60	13
99	4.98	1455	73.26	22.60	-	22.85	0.15
179	9.01	1634	82.28	22.85	-	23.10	19
79	3.98	1713	86.25	23.10	-	23.35	6
73	3.68	1786	89.93	23.35	-	23.60	122
53	2.67	1839	92.60	23.60	-	23.85	105
51	2.57	1890	95.17	23.85	-	24.10	204
22	1.11	1912	96.27	24.10	-	24.35	50
30	1.51	1942	97.78	24.35	-	24.60	144
13	0.65	1955	98.44	24.60	-	24.85	293
15	0.76	1970	99.19	24.85	-	25.10	243
6	0.30	1976	99.50	25.10	-	25.35	420
6	0.30	1982	99.80	25.35	-	25.60	10.29
1	0.05	1983	99.85	25.60	-	25.85	1704
2	0.10	1985	99.95	25.85	-	26.10	5.19
1	0.05	1986	100.00	26.10	-	26.35	1916
				26.35	-	26.60	19.16
				26.60	-	26.85	2248
				26.85	-	27.10	55.07
				27.10	-	27.35	61.37
				27.35	-	27.60	2505
				27.60	-	27.85	1284
				27.85	-	28.10	31.46
				28.10	-	28.35	2892
				28.35	-	28.60	70.85
				28.60	-	28.85	4040
				28.85	-	29.10	98.97
				29.10	-	29.35	4053
				29.35	-	29.60	99.29
				29.60	-	29.85	4063
				29.85	-	30.10	99.53
				30.10	-	30.35	4066
				30.35	-	30.60	99.61
				30.60	-	30.85	4071
							99.73
							99.80
							99.88
							99.90
							99.95
							99.98
							100.00

(7) BALL OF FOOT LENGTH

The distance from the back of the heel to the landmark at the first metatarsophalangeal protrusion is measured with the Brannock Device®. The participant stands erect with the right foot in the Brannock Device® and the other foot on a board of equal height. The weight is distributed equally on both feet. The medial side of the right foot is parallel with the long axis of the device.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
16.10	6.34	1ST	17.80	7.01
16.30	6.42	2ND	18.00	7.09
16.40	6.46	3RD	18.20	7.17
16.70	6.57	5TH	18.40	7.24
17.00	6.69	10TH	18.80	7.40
17.20	6.77	15TH	19.00	7.48
17.40	6.85	20TH	19.20	7.56
17.50	6.89	25TH	19.40	7.64
17.70	6.97	30TH	19.50	7.68
17.80	7.01	35TH	19.70	7.76
17.90	7.05	40TH	19.80	7.80
18.10	7.13	45TH	20.00	7.87
18.20	7.17	50TH	20.10	7.91
18.30	7.20	55TH	20.20	7.95
18.40	7.24	60TH	20.30	7.99
18.50	7.28	65TH	20.50	8.07
18.70	7.36	70TH	20.60	8.11
18.80	7.40	75TH	20.80	8.19
19.00	7.48	80TH	21.00	8.27
19.30	7.60	85TH	21.20	8.35
19.50	7.68	90TH	21.50	8.46
19.80	7.80	95TH	21.80	8.58
20.10	7.91	97TH	22.10	8.70
20.30	7.99	98TH	22.30	8.78
20.40	8.03	99TH	22.50	8.86

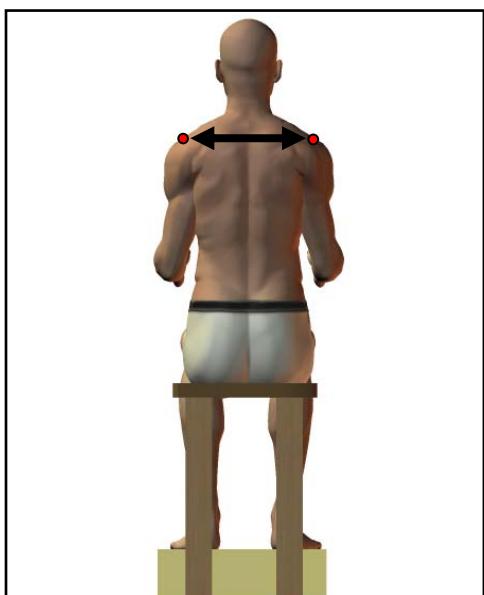
(7) BALL OF FOOT LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
18.21	7.17		20.09	7.91	
0.02	0.01		0.02	0.01	
0.96	0.38		1.05	0.41	
0.02	0.01		0.01	0.00	
15.10	5.94		15.60	6.14	
21.60	8.50		24.50	9.65	
SKEWNESS	0.09		SKEWNESS	0.11	
KURTOSIS	2.87		KURTOSIS	3.15	
COEFFICIENT OF VARIATION	5.3%		COEFFICIENT OF VARIATION	5.2%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	14.95	- 15.15
1	0.05	2	0.10	15.15	- 15.35
1	0.05	3	0.15	15.35	- 15.55
8	0.40	11	0.55	15.55	- 15.75
4	0.20	15	0.76	15.75	- 15.95
16	0.81	31	1.56	15.95	- 16.15
18	0.91	49	2.47	16.15	- 16.35
30	1.51	79	3.98	16.35	- 16.55
34	1.71	113	5.69	16.55	- 16.75
53	2.67	166	8.36	16.75	- 16.95
99	4.98	265	13.34	16.95	- 17.15
114	5.74	379	19.08	17.15	- 17.35
133	6.70	512	25.78	17.35	- 17.55
141	7.10	653	32.88	17.55	- 17.75
146	7.35	799	40.23	17.75	- 17.95
173	8.71	972	48.94	17.95	- 18.15
160	8.06	1132	57.00	18.15	- 18.35
159	8.01	1291	65.01	18.35	- 18.55
127	6.39	1418	71.40	18.55	- 18.75
125	6.29	1543	77.69	18.75	- 18.95
111	5.59	1654	83.28	18.95	- 19.15
82	4.13	1736	87.41	19.15	- 19.35
79	3.98	1815	91.39	19.35	- 19.55
50	2.52	1865	93.91	19.55	- 19.75
41	2.06	1906	95.97	19.75	- 19.95
31	1.56	1937	97.53	19.95	- 20.15
19	0.96	1956	98.49	20.15	- 20.35
17	0.86	1973	99.35	20.35	- 20.55
7	0.35	1980	99.70	20.55	- 20.75
4	0.20	1984	99.90	20.75	- 20.95
1	0.05	1985	99.95	20.95	- 21.15
0	0.00	1985	99.95	21.15	- 21.35
0	0.00	1985	99.95	21.35	- 21.55
1	0.05	1986	100.00	21.55	- 21.75
				21.75	- 21.95
				21.95	- 22.15
				22.15	- 22.35
				22.35	- 22.55
				22.55	- 22.75
				22.75	- 22.95
				22.95	- 23.15
				23.15	- 23.35
				23.35	- 23.55
				23.55	- 23.75
				23.75	- 23.95
				23.95	- 24.15
				24.15	- 24.35
				24.35	- 24.55

(8) BIACROMIAL BREADTH

The distance between the right and left acromion landmarks is measured with a beam caliper. The participant sits erect. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
32.20	12.68	1ST	37.10	14.61	
32.90	12.95	2ND	37.70	14.84	
33.20	13.07	3RD	38.00	14.96	
33.50	13.19	5TH	38.40	15.12	
34.20	13.46	10TH	39.20	15.43	
34.70	13.66	15TH	39.60	15.59	
35.00	13.78	20TH	40.00	15.75	
35.30	13.90	25TH	40.30	15.87	
35.60	14.02	30TH	40.60	15.98	
35.90	14.13	35TH	40.80	16.06	
36.10	14.21	40TH	41.10	16.18	
36.30	14.29	45TH	41.30	16.26	
36.50	14.37	50TH	41.50	16.34	
36.80	14.49	55TH	41.70	16.42	
37.00	14.57	60TH	42.00	16.54	
37.20	14.65	65TH	42.20	16.61	
37.50	14.76	70TH	42.50	16.73	
37.80	14.88	75TH	42.80	16.85	
38.00	14.96	80TH	43.10	16.97	
38.40	15.12	85TH	43.50	17.13	
38.90	15.31	90TH	44.10	17.36	
39.60	15.59	95TH	44.70	17.60	
40.00	15.75	97TH	45.30	17.83	
40.30	15.87	98TH	45.70	17.99	
40.60	15.98	99TH	46.30	18.23	

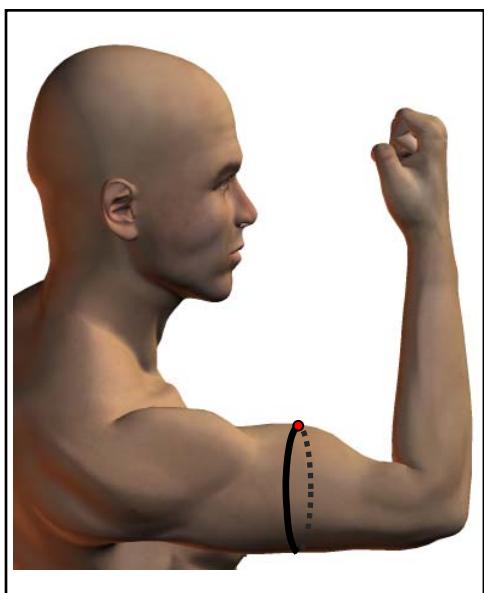
(8) BIACROMIAL BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
36.53	14.38		41.57	16.37	
0.04	0.02		0.03	0.01	
1.83	0.72		1.92	0.75	
0.03	0.01		0.02	0.01	
28.30	11.14		33.70	13.27	
42.20	16.61		48.90	19.25	
SKEWNESS	-0.05		SKEWNESS	0.08	
KURTOSIS	3.15		KURTOSIS	3.30	
COEFFICIENT OF VARIATION	5.0%		COEFFICIENT OF VARIATION	4.6%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	28.25	- 28.75
0	0.00	1	0.05	28.75	- 29.25
1	0.05	2	0.10	29.25	- 29.75
0	0.00	2	0.10	29.75	- 30.25
0	0.00	2	0.10	30.25	- 30.75
3	0.15	5	0.25	30.75	- 31.25
6	0.30	11	0.55	31.25	- 31.75
12	0.60	23	1.16	31.75	- 32.25
11	0.55	34	1.71	32.25	- 32.75
37	1.86	71	3.58	32.75	- 33.25
58	2.92	129	6.50	33.25	- 33.75
79	3.98	208	10.47	33.75	- 34.25
105	5.29	313	15.76	34.25	- 34.75
157	7.91	470	23.67	34.75	- 35.25
191	9.62	661	33.28	35.25	- 35.75
212	10.67	873	43.96	35.75	- 36.25
218	10.98	1091	54.93	36.25	- 36.75
214	10.78	1305	65.71	36.75	- 37.25
183	9.21	1488	74.92	37.25	- 37.75
149	7.50	1637	82.43	37.75	- 38.25
125	6.29	1762	88.72	38.25	- 38.75
81	4.08	1843	92.80	38.75	- 39.25
60	3.02	1903	95.82	39.25	- 39.75
40	2.01	1943	97.83	39.75	- 40.25
25	1.26	1968	99.09	40.25	- 40.75
8	0.40	1976	99.50	40.75	- 41.25
4	0.20	1980	99.70	41.25	- 41.75
6	0.30	1986	100.00	41.75	- 42.25
				42.25	- 42.75
				42.75	- 43.25
				43.25	- 43.75
				43.75	- 44.25
				44.25	- 44.75
				44.75	- 45.25
				45.25	- 45.75
				45.75	- 46.25
				46.25	- 46.75
				46.75	- 47.25
				47.25	- 47.75
				47.75	- 48.25
				48.25	- 48.75
				48.75	- 49.25

(9) BICEPS CIRCUMFERENCE, FLEXED

The circumference of the right upper arm around the flexed biceps brachii muscle at the biceps point landmark is measured with a tape held perpendicular to the long axis of the upper arm. The participant stands with the upper arm extended horizontally and the elbow flexed 90°. The fist is clenched and held facing the head, and the participant exerts maximum effort in contracting the biceps brachii muscle.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
24.40	9.61	1ST	28.00	11.02	
25.00	9.84	2ND	29.00	11.42	
25.40	10.00	3RD	29.50	11.61	
25.90	10.20	5TH	30.30	11.93	
26.80	10.55	10TH	31.50	12.40	
27.40	10.79	15TH	32.30	12.72	
28.00	11.02	20TH	32.90	12.95	
28.50	11.22	25TH	33.50	13.19	
28.80	11.34	30TH	34.00	13.39	
29.30	11.54	35TH	34.40	13.54	
29.60	11.65	40TH	34.80	13.70	
30.00	11.81	45TH	35.30	13.90	
30.40	11.97	50TH	35.70	14.06	
30.70	12.09	55TH	36.20	14.25	
31.10	12.24	60TH	36.60	14.41	
31.50	12.40	65TH	37.00	14.57	
31.90	12.56	70TH	37.50	14.76	
32.40	12.76	75TH	38.00	14.96	
32.90	12.95	80TH	38.60	15.20	
33.70	13.27	85TH	39.30	15.47	
34.70	13.66	90TH	40.20	15.83	
36.00	14.17	95TH	41.80	16.46	
37.00	14.57	97TH	42.80	16.85	
37.70	14.84	98TH	43.50	17.13	
38.80	15.28	99TH	44.80	17.64	

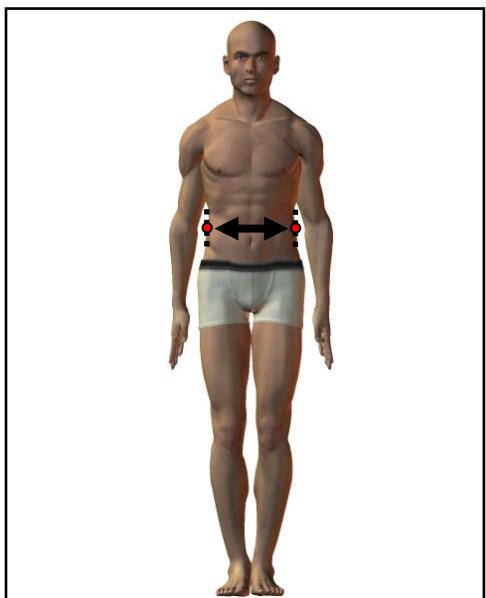
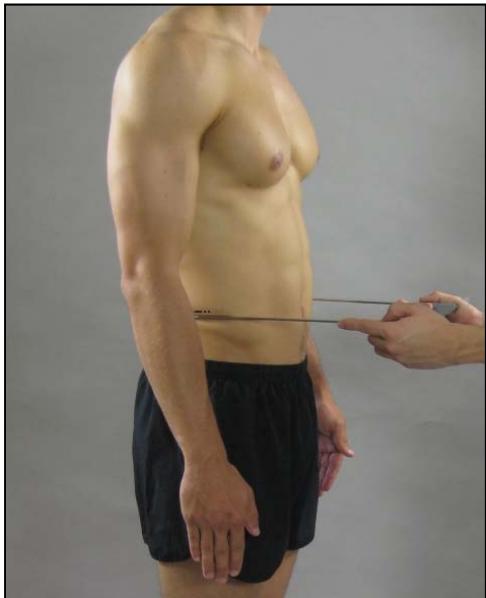
(9) BICEPS CIRCUMFERENCE, FLEXED

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
30.56	12.03		35.81	14.10	
0.07	0.03		0.05	0.02	
3.08	1.21		3.46	1.36	
0.05	0.02		0.04	0.02	
21.60	8.50		24.60	9.69	
43.50	17.13		49.00	19.29	
SKEWNESS	0.47		SKEWNESS	0.22	
KURTOSIS	3.37		KURTOSIS	3.21	
COEFFICIENT OF VARIATION	10.1%		COEFFICIENT OF VARIATION	9.7%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	21.25	-	22.00	
0	0.00	1	0.05	22.00	-	22.75	
3	0.15	4	0.20	22.75	-	23.50	
14	0.70	18	0.91	23.50	-	24.25	
16	0.81	34	1.71	24.25	-	25.00	
56	2.82	90	4.53	25.00	-	25.75	
63	3.17	153	7.70	25.75	-	26.50	
118	5.94	271	13.65	26.50	-	27.25	
112	5.64	383	19.28	27.25	-	28.00	
190	9.57	573	28.85	28.00	-	28.75	
177	8.91	750	37.76	28.75	-	29.50	
212	10.67	962	48.44	29.50	-	30.25	
189	9.52	1151	57.96	30.25	-	31.00	
200	10.07	1351	68.03	31.00	-	31.75	
153	7.70	1504	75.73	31.75	-	32.50	
131	6.60	1635	82.33	32.50	-	33.25	
78	3.93	1713	86.25	33.25	-	34.00	
77	3.88	1790	90.13	34.00	-	34.75	
59	2.97	1849	93.10	34.75	-	35.50	
50	2.52	1899	95.62	35.50	-	36.25	
27	1.36	1926	96.98	36.25	-	37.00	
21	1.06	1947	98.04	37.00	-	37.75	
12	0.60	1959	98.64	37.75	-	38.50	
12	0.60	1971	99.24	38.50	-	39.25	
6	0.30	1977	99.55	39.25	-	40.00	
3	0.15	1980	99.70	40.00	-	40.75	
3	0.15	1983	99.85	40.75	-	41.50	
1	0.05	1984	99.90	41.50	-	42.25	
1	0.05	1985	99.95	42.25	-	43.00	
1	0.05	1986	100.00	43.00	-	43.75	
				43.75	-	44.50	
				44.50	-	45.25	
				45.25	-	46.00	
				46.00	-	46.75	
				46.75	-	47.50	
				47.50	-	48.25	
				48.25	-	49.00	
				49.00	-	49.75	

(10) BICRISTAL BREADTH

The straight-line distance between the right and left iliocristale landmarks is measured with a beam caliper. The participant stands erect, looking straight ahead. The tissue is firmly compressed to ensure the measurement is taken on the bony landmarks.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
22.70	8.94	1ST	23.60	9.29	
23.10	9.09	2ND	24.10	9.49	
23.30	9.17	3RD	24.30	9.57	
23.70	9.33	5TH	24.70	9.72	
24.50	9.65	10TH	25.30	9.96	
25.00	9.84	15TH	25.70	10.12	
25.50	10.04	20TH	26.10	10.28	
25.80	10.16	25TH	26.30	10.35	
26.20	10.31	30TH	26.60	10.47	
26.50	10.43	35TH	26.80	10.55	
26.80	10.55	40TH	27.00	10.63	
27.00	10.63	45TH	27.30	10.75	
27.30	10.75	50TH	27.50	10.83	
27.50	10.83	55TH	27.70	10.91	
27.90	10.98	60TH	28.00	11.02	
28.20	11.10	65TH	28.20	11.10	
28.40	11.18	70TH	28.50	11.22	
28.70	11.30	75TH	28.80	11.34	
29.20	11.50	80TH	29.00	11.42	
29.60	11.65	85TH	29.40	11.57	
30.00	11.81	90TH	29.80	11.73	
31.00	12.20	95TH	30.50	12.01	
31.80	12.52	97TH	30.80	12.13	
32.50	12.80	98TH	31.20	12.28	
33.20	13.07	99TH	31.60	12.44	

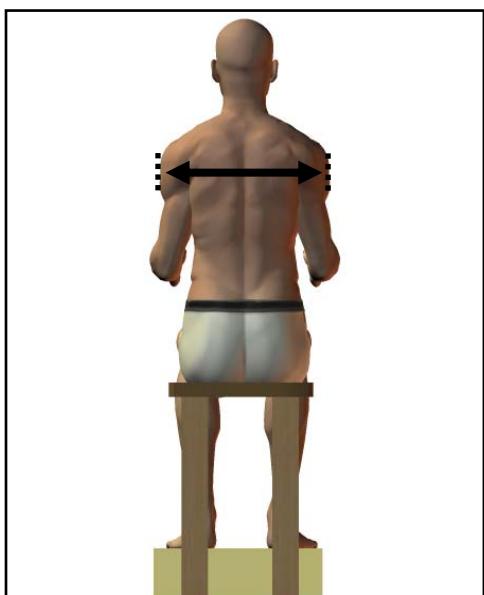
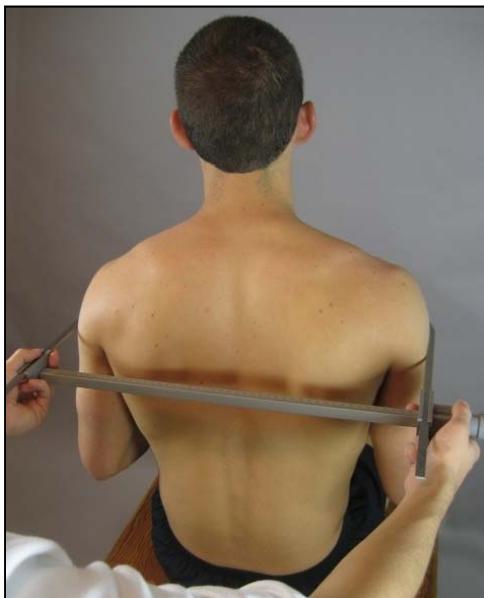
(10) BICRISTAL BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
27.33	STD ERROR (MEAN)	10.76	27.54	STD ERROR (MEAN)	10.84
0.05	STANDARD DEVIATION	0.02	0.03	STANDARD DEVIATION	0.01
2.23	STD ERROR (STD DEV)	0.88	1.75	STD ERROR (STD DEV)	0.69
0.04	MINIMUM	0.01	0.02	MINIMUM	0.01
19.70	MAXIMUM	7.76	21.90	MAXIMUM	8.62
36.20	SKEWNESS	14.25	33.40	KURTOSIS	13.15
	KURTOSIS	0.20		COEFFICIENT OF VARIATION	0.10
	COEFFICIENT OF VARIATION	3.26		NUMBER OF PARTICIPANTS	2.94
	NUMBER OF PARTICIPANTS	8.1%		NUMBER OF PARTICIPANTS	6.4%
		1986			4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	19.65	-	20.00	
1	0.05	2	0.10	20.00	-	20.35	
1	0.05	3	0.15	20.35	-	20.70	
1	0.05	4	0.20	20.70	-	21.05	
3	0.15	7	0.35	21.05	-	21.40	
1	0.05	8	0.40	21.40	-	21.75	
1	0.05	9	0.45	21.75	-	22.10	
3	0.15	12	0.60	22.10	-	22.45	
11	0.55	23	1.16	22.45	-	22.80	
21	1.06	44	2.22	22.80	-	23.15	
27	1.36	71	3.58	23.15	-	23.50	
38	1.91	109	5.49	23.50	-	23.85	
41	2.06	150	7.55	23.85	-	24.20	
64	3.22	214	10.78	24.20	-	24.55	
43	2.17	257	12.94	24.55	-	24.90	
92	4.63	349	17.57	24.90	-	25.25	
83	4.18	432	21.75	25.25	-	25.60	
98	4.93	530	26.69	25.60	-	25.95	
96	4.83	626	31.52	25.95	-	26.30	
138	6.95	764	38.47	26.30	-	26.65	
99	4.98	863	43.45	26.65	-	27.00	
155	7.80	1018	51.26	27.00	-	27.35	
105	5.29	1123	56.55	27.35	-	27.70	
134	6.75	1257	63.29	27.70	-	28.05	
102	5.14	1359	68.43	28.05	-	28.40	
134	6.75	1493	75.18	28.40	-	28.75	
81	4.08	1574	79.25	28.75	-	29.10	
77	3.88	1651	83.13	29.10	-	29.45	
59	2.97	1710	86.10	29.45	-	29.80	
92	4.63	1802	90.74	29.80	-	30.15	
42	2.11	1844	92.85	30.15	-	30.50	
33	1.66	1877	94.51	30.50	-	30.85	
20	1.01	1897	95.52	30.85	-	31.20	
20	1.01	1917	96.53	31.20	-	31.55	
12	0.60	1929	97.13	31.55	-	31.90	
13	0.65	1942	97.78	31.90	-	32.25	
8	0.40	1950	98.19	32.25	-	32.60	
11	0.55	1961	98.74	32.60	-	32.95	
6	0.30	1967	99.04	32.95	-	33.30	
8	0.40	1975	99.45	33.30	-	33.65	
6	0.30	1981	99.75	33.65	-	34.00	
2	0.10	1983	99.85	34.00	-	34.35	
0	0.00	1983	99.85	34.35	-	34.70	
1	0.05	1984	99.90	34.70	-	35.05	
0	0.00	1984	99.90	35.05	-	35.40	
1	0.05	1985	99.95	35.40	-	35.75	
0	0.00	1985	99.95	35.75	-	36.10	
1	0.05	1986	100.00	36.10	-	36.45	

(11) BIDELTOID BREADTH

The maximum horizontal distance between the lateral margins of the upper arms on the deltoid muscles is measured with a beam caliper. The participant sits erect, looking straight ahead. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
38.80	15.28	1ST	43.90	17.28	
39.50	15.55	2ND	44.70	17.60	
40.00	15.75	3RD	45.20	17.80	
40.60	15.98	5TH	45.90	18.07	
41.50	16.34	10TH	47.00	18.50	
42.10	16.57	15TH	47.70	18.78	
42.60	16.77	20TH	48.30	19.02	
43.00	16.93	25TH	48.90	19.25	
43.50	17.13	30TH	49.30	19.41	
43.90	17.28	35TH	49.70	19.57	
44.30	17.44	40TH	50.20	19.76	
44.70	17.60	45TH	50.50	19.88	
45.00	17.72	50TH	50.90	20.04	
45.30	17.83	55TH	51.30	20.20	
45.60	17.95	60TH	51.70	20.35	
46.00	18.11	65TH	52.10	20.51	
46.40	18.27	70TH	52.60	20.71	
46.90	18.46	75TH	53.10	20.91	
47.40	18.66	80TH	53.70	21.14	
47.90	18.86	85TH	54.40	21.42	
48.80	19.21	90TH	55.30	21.77	
49.90	19.65	95TH	56.70	22.32	
50.80	20.00	97TH	57.50	22.64	
51.40	20.24	98TH	58.30	22.95	
52.20	20.55	99TH	59.30	23.35	

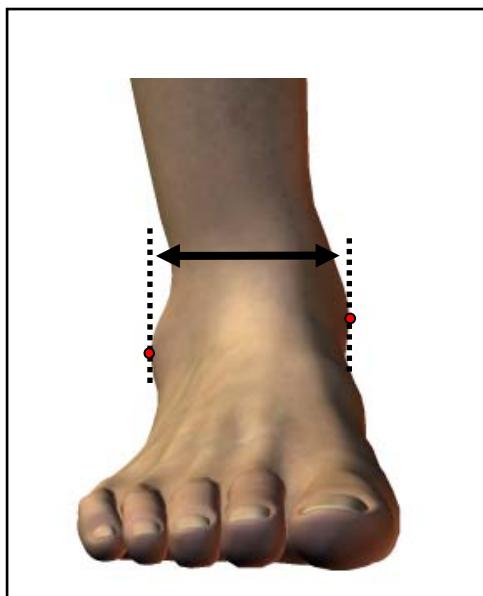
(11) BIDELTOID BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
45.03	MEAN	17.73	51.04	MEAN	20.10
0.06	STD ERROR (MEAN)	0.03	0.05	STD ERROR (MEAN)	0.02
2.87	STANDARD DEVIATION	1.13	3.25	STANDARD DEVIATION	1.28
0.05	STD ERROR (STD DEV)	0.02	0.04	STD ERROR (STD DEV)	0.01
35.70	MINIMUM	14.06	37.40	MINIMUM	14.72
55.80	MAXIMUM	21.97	63.70	MAXIMUM	25.08
SKEWNESS		0.22	SKEWNESS		0.21
KURTOSIS		3.18	KURTOSIS		3.14
COEFFICIENT OF VARIATION		6.4%	COEFFICIENT OF VARIATION		6.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	35.25	-	36.00	
1	0.05	3	0.15	36.00	-	36.75	
3	0.15	6	0.30	36.75	-	37.50	1 0.02
6	0.30	12	0.60	37.50	-	38.25	0 0.00
11	0.55	23	1.16	38.25	-	39.00	0 0.00
26	1.31	49	2.47	39.00	-	39.75	0 0.00
44	2.22	93	4.68	39.75	-	40.50	0 0.00
72	3.63	165	8.31	40.50	-	41.25	2 0.05
106	5.34	271	13.65	41.25	-	42.00	3 0.07
174	8.76	445	22.41	42.00	-	42.75	4 0.10
150	7.55	595	29.96	42.75	-	43.50	14 0.34
198	9.97	793	39.93	43.50	-	44.25	29 0.71
192	9.67	985	49.60	44.25	-	45.00	46 1.13
254	12.79	1239	62.39	45.00	-	45.75	88 2.16
158	7.96	1397	70.34	45.75	-	46.50	111 2.72
163	8.21	1560	78.55	46.50	-	47.25	180 4.41
131	6.60	1691	85.15	47.25	-	48.00	202 4.95
94	4.73	1785	89.88	48.00	-	48.75	292 7.15
67	3.37	1852	93.25	48.75	-	49.50	323 7.91
50	2.52	1902	95.77	49.50	-	50.25	399 9.77
34	1.71	1936	97.48	50.25	-	51.00	357 8.75
21	1.06	1957	98.54	51.00	-	51.75	408 10.00
14	0.70	1971	99.24	51.75	-	52.50	349 8.55
7	0.35	1978	99.60	52.50	-	53.25	297 7.28
2	0.10	1980	99.70	53.25	-	54.00	237 5.81
3	0.15	1983	99.85	54.00	-	54.75	211 5.17
1	0.05	1984	99.90	54.75	-	55.50	159 3.90
2	0.10	1986	100.00	55.50	-	56.25	119 2.92
				56.25	-	57.00	79 1.94
				57.00	-	57.75	65 1.59
				57.75	-	58.50	34 0.83
				58.50	-	59.25	31 0.76
				59.25	-	60.00	18 0.44
				60.00	-	60.75	13 0.32
				60.75	-	61.50	7 0.17
				61.50	-	62.25	2 0.05
				62.25	-	63.00	1 0.02
				63.00	-	63.75	1 0.02

(12) BIMALLEOLAR BREADTH

The horizontal distance between the maximum protrusions of the ankle bones (lateral and medial malleoli) of the right foot is measured with a Holtain caliper. The participant stands with the weight equally distributed on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
5.90	2.32	1ST	6.60	2.60	
6.00	2.36	2ND	6.70	2.64	
6.10	2.40	3RD	6.70	2.64	
6.10	2.40	5TH	6.80	2.68	
6.30	2.48	10TH	7.00	2.76	
6.40	2.52	15TH	7.00	2.76	
6.40	2.52	20TH	7.10	2.80	
6.50	2.56	25TH	7.20	2.83	
6.50	2.56	30TH	7.30	2.87	
6.60	2.60	35TH	7.30	2.87	
6.60	2.60	40TH	7.40	2.91	
6.60	2.60	45TH	7.40	2.91	
6.70	2.64	50TH	7.50	2.95	
6.70	2.64	55TH	7.50	2.95	
6.80	2.68	60TH	7.60	2.99	
6.80	2.68	65TH	7.60	2.99	
6.90	2.72	70TH	7.70	3.03	
6.90	2.72	75TH	7.70	3.03	
7.00	2.76	80TH	7.80	3.07	
7.10	2.80	85TH	7.90	3.11	
7.10	2.80	90TH	8.00	3.15	
7.30	2.87	95TH	8.10	3.19	
7.40	2.91	97TH	8.30	3.27	
7.50	2.95	98TH	8.40	3.31	
7.50	2.95	99TH	8.50	3.35	

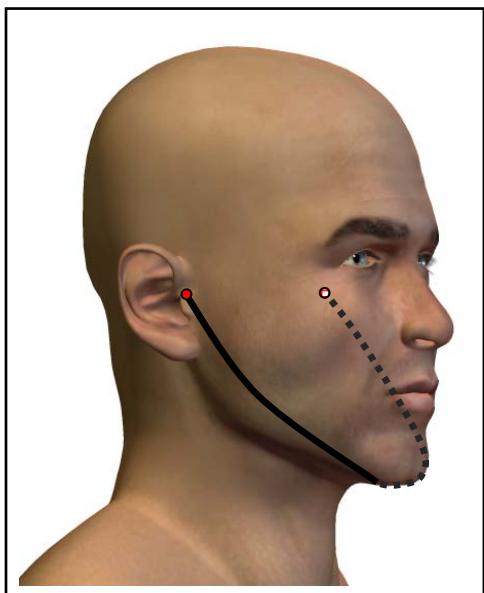
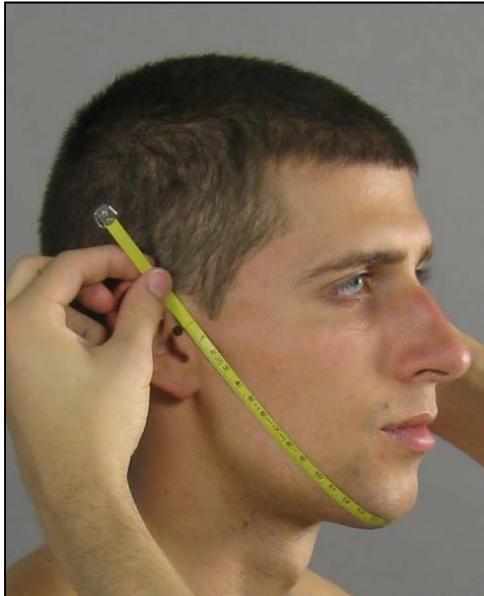
(12) BIMALLEOLAR BREADTH

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
6.70	MEAN	2.64	7.48	MEAN	2.94
0.01	STD ERROR (MEAN)	0.00	0.01	STD ERROR (MEAN)	0.00
0.35	STANDARD DEVIATION	0.14	0.41	STANDARD DEVIATION	0.16
0.01	STD ERROR (STD DEV)	0.00	0.00	STD ERROR (STD DEV)	0.00
5.50	MINIMUM	2.17	5.90	MINIMUM	2.32
8.30	MAXIMUM	3.27	9.10	MAXIMUM	3.58
SKEWNESS		0.18	SKEWNESS		0.17
KURTOSIS		3.42	KURTOSIS		3.24
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		5.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	5.45	- 5.55	1	0.02
3	0.15	4	0.20	5.55	- 5.65	1	0.02
3	0.15	7	0.35	5.65	- 5.75	1	0.02
5	0.25	12	0.60	5.75	- 5.85	3	0.07
8	0.40	20	1.01	5.85	- 5.95	4	0.10
38	1.91	58	2.92	5.95	- 6.05	25	0.61
54	2.72	112	5.64	6.05	- 6.15	45	1.10
69	3.47	181	9.11	6.15	- 6.25	47	1.15
70	3.52	251	12.64	6.25	- 6.35	104	2.55
193	9.72	444	22.36	6.35	- 6.45	123	3.01
209	10.52	653	32.88	6.45	- 6.55	289	7.08
247	12.44	900	45.32	6.55	- 6.65	277	6.79
247	12.44	1147	57.75	6.65	- 6.75	278	6.81
210	10.57	1357	68.33	6.75	- 6.85	288	7.06
151	7.60	1508	75.93	6.85	- 6.95	290	7.10
170	8.56	1678	84.49	6.95	- 7.05	395	9.68
116	5.84	1794	90.33	7.05	- 7.15	391	9.58
72	3.63	1866	93.96	7.15	- 7.25	341	8.35
30	1.51	1896	95.47	7.25	- 7.35	341	8.35
49	2.47	1945	97.94	7.35	- 7.45	468	11.46
23	1.16	1968	99.09	7.45	- 7.55	395	9.68
9	0.45	1977	99.55	7.55	- 7.65	391	9.58
5	0.25	1982	99.80	7.65	- 7.75	341	8.35
1	0.05	1983	99.85	7.75	- 7.85	290	7.10
1	0.05	1984	99.90	7.85	- 7.95	196	4.80
0	0.00	1984	99.90	7.95	- 8.05	197	4.83
0	0.00	1984	99.90	8.05	- 8.15	126	3.09
1	0.05	1985	99.95	8.15	- 8.25	53	1.30
1	0.05	1986	100.00	8.25	- 8.35	36	0.88
				8.35	- 8.45	44	1.08
				8.45	- 8.55	20	0.49
				8.55	- 8.65	13	0.32
				8.65	- 8.75	12	0.29
				8.75	- 8.85	8	0.20
				8.85	- 8.95	2	0.05
				8.95	- 9.05	2	0.05
				9.05	- 9.15	1	0.02

(13) BITRAGION CHIN ARC

The surface distance between the right and left tragion landmarks across the chin landmark is measured with a tape. The teeth are lightly occluded.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
28.00	11.02	1ST	29.80	11.73	
28.30	11.14	2ND	30.30	11.93	
28.50	11.22	3RD	30.60	12.05	
28.80	11.34	5TH	30.90	12.17	
29.30	11.54	10TH	31.40	12.36	
29.60	11.65	15TH	31.70	12.48	
29.80	11.73	20TH	32.00	12.60	
30.20	11.89	25TH	32.20	12.68	
30.40	11.97	30TH	32.40	12.76	
30.50	12.01	35TH	32.60	12.83	
30.70	12.09	40TH	32.80	12.91	
30.80	12.13	45TH	33.00	12.99	
31.10	12.24	50TH	33.20	13.07	
31.30	12.32	55TH	33.30	13.11	
31.50	12.40	60TH	33.50	13.19	
31.60	12.44	65TH	33.70	13.27	
31.80	12.52	70TH	33.90	13.35	
32.10	12.64	75TH	34.10	13.43	
32.30	12.72	80TH	34.40	13.54	
32.60	12.83	85TH	34.60	13.62	
32.90	12.95	90TH	35.00	13.78	
33.50	13.19	95TH	35.50	13.98	
33.80	13.31	97TH	35.70	14.06	
34.00	13.39	98TH	36.10	14.21	
34.40	13.54	99TH	36.60	14.41	

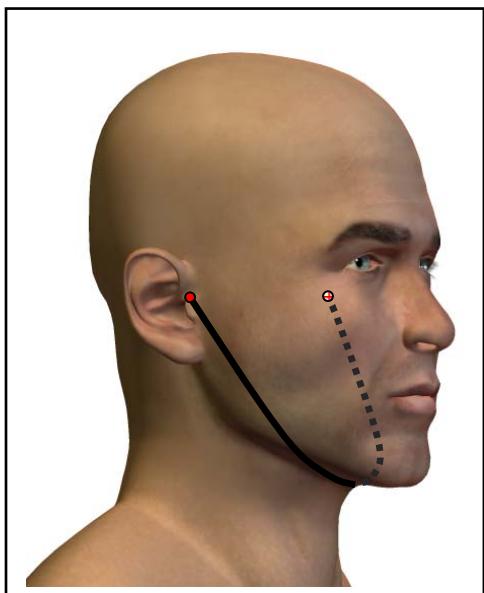
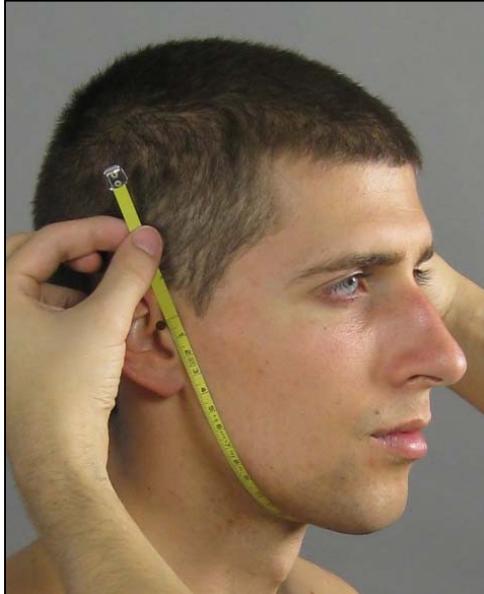
(13) BITRAGION CHIN ARC

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
31.10	12.24		33.17	13.06	
0.03	0.01		0.02	0.01	
1.42	0.56		1.40	0.55	
0.02	0.01		0.02	0.01	
26.70	10.51		28.10	11.06	
37.00	14.57		38.50	15.16	
SKEWNESS	0.14		SKEWNESS	0.03	
KURTOSIS	3.08		KURTOSIS	3.15	
COEFFICIENT OF VARIATION	4.6%		COEFFICIENT OF VARIATION	4.2%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
3	0.15	3	0.15	26.60	- 26.85		
0	0.00	3	0.15	26.85	- 27.10		
1	0.05	4	0.20	27.10	- 27.35		
2	0.10	6	0.30	27.35	- 27.60		
7	0.35	13	0.65	27.60	- 27.85		
9	0.45	22	1.11	27.85	- 28.10		
20	1.01	42	2.11	28.10	- 28.35	1	0.02
24	1.21	66	3.32	28.35	- 28.60	1	0.02
44	2.22	110	5.54	28.60	- 28.85	5	0.12
30	1.51	140	7.05	28.85	- 29.10	3	0.07
63	3.17	203	10.22	29.10	- 29.35	8	0.20
71	3.58	274	13.80	29.35	- 29.60	8	0.20
126	6.34	400	20.14	29.60	- 29.85	15	0.37
69	3.47	469	23.62	29.85	- 30.10	13	0.32
121	6.09	590	29.71	30.10	- 30.35	35	0.86
118	5.94	708	35.65	30.35	- 30.60	32	0.78
188	9.47	896	45.12	30.60	- 30.85	76	1.86
85	4.28	981	49.40	30.85	- 31.10	50	1.22
142	7.15	1123	56.55	31.10	- 31.35	129	3.16
113	5.69	1236	62.24	31.35	- 31.60	122	2.99
168	8.46	1404	70.69	31.60	- 31.85	218	5.34
82	4.13	1486	74.82	31.85	- 32.10	160	3.92
135	6.80	1621	81.62	32.10	- 32.35	252	6.17
64	3.22	1685	84.84	32.35	- 32.60	214	5.24
99	4.98	1784	89.83	32.60	- 32.85	340	8.33
28	1.41	1812	91.24	32.85	- 33.10	247	6.05
59	2.97	1871	94.21	33.10	- 33.35	321	7.86
27	1.36	1898	95.57	33.35	- 33.60	240	5.88
32	1.61	1930	97.18	33.60	- 33.85	364	8.92
17	0.86	1947	98.04	33.85	- 34.10	165	4.04
15	0.76	1962	98.79	34.10	- 34.35	219	5.37
7	0.35	1969	99.14	34.35	- 34.60	181	4.43
5	0.25	1974	99.40	34.60	- 34.85	218	5.34
2	0.10	1976	99.50	34.85	- 35.10	91	2.23
3	0.15	1979	99.65	35.10	- 35.35	102	2.50
2	0.10	1981	99.75	35.35	- 35.60	84	2.06
3	0.15	1984	99.90	35.60	- 35.85	59	1.45
0	0.00	1984	99.90	35.85	- 36.10	25	0.61
0	0.00	1984	99.90	36.10	- 36.35	23	0.56
1	0.05	1985	99.95	36.35	- 36.60	19	0.47
0	0.00	1985	99.95	36.60	- 36.85	14	0.34
1	0.05	1986	100.00	36.85	- 37.10	9	0.22
				37.10	- 37.35	10	0.24
				37.35	- 37.60	3	0.07
				37.60	- 37.85	5	0.12
				37.85	- 38.10	0	0.00
				38.10	- 38.35	0	0.00
				38.35	- 38.60	1	0.02

(14) BITRAGION SUBMANDIBULAR ARC

The surface distance between the right and left tragion landmarks across the submandibular landmark is measured with a tape. The head is in the Frankfurt plane, and the teeth are lightly occluded.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
25.50	10.04	1ST	27.90	10.98	
25.70	10.12	2ND	28.30	11.14	
26.10	10.28	3RD	28.60	11.26	
26.40	10.39	5TH	28.90	11.38	
26.80	10.55	10TH	29.50	11.61	
27.20	10.71	15TH	29.90	11.77	
27.50	10.83	20TH	30.20	11.89	
27.70	10.91	25TH	30.50	12.01	
28.00	11.02	30TH	30.70	12.09	
28.20	11.10	35TH	31.00	12.20	
28.40	11.18	40TH	31.10	12.24	
28.60	11.26	45TH	31.30	12.32	
28.70	11.30	50TH	31.50	12.40	
29.00	11.42	55TH	31.70	12.48	
29.20	11.50	60TH	32.00	12.60	
29.30	11.54	65TH	32.20	12.68	
29.60	11.65	70TH	32.40	12.76	
29.70	11.69	75TH	32.60	12.83	
30.10	11.85	80TH	33.00	12.99	
30.40	11.97	85TH	33.30	13.11	
30.70	12.09	90TH	33.70	13.27	
31.30	12.32	95TH	34.50	13.58	
31.70	12.48	97TH	34.80	13.70	
32.10	12.64	98TH	35.20	13.86	
32.40	12.76	99TH	35.70	14.06	

(14) BITRAGION SUBMANDIBULAR ARC

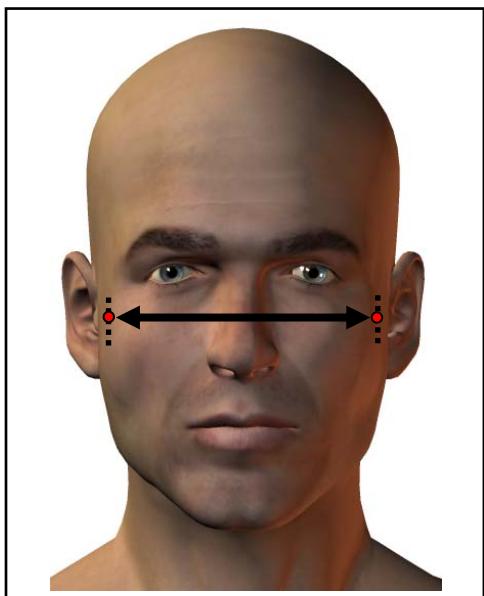
FEMALES		
<u>CM</u>		<u>IN</u>
28.80	MEAN	11.34
0.03	STD ERROR (MEAN)	0.01
1.53	STANDARD DEVIATION	0.60
0.02	STD ERROR (STD DEV)	0.01
24.50	MINIMUM	9.65
37.80	MAXIMUM	14.88
SKEWNESS		0.25
KURTOSIS		3.49
COEFFICIENT OF VARIATION		5.3%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
31.57	MEAN	12.43
0.03	STD ERROR (MEAN)	0.01
1.66	STANDARD DEVIATION	0.66
0.02	STD ERROR (STD DEV)	0.01
25.90	MINIMUM	10.20
39.00	MAXIMUM	15.35
SKEWNESS		0.16
KURTOSIS		3.13
COEFFICIENT OF VARIATION		5.3%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	F	FPct
5	0.25	5	0.25	24.45	-	24.80	
3	0.15	8	0.40	24.80	-	25.15	
9	0.45	17	0.86	25.15	-	25.50	
24	1.21	41	2.06	25.50	-	25.85	
34	1.71	75	3.78	25.85	-	26.20	1 0.02
52	2.62	127	6.39	26.20	-	26.55	2 0.05
79	3.98	206	10.37	26.55	-	26.90	3 0.07
103	5.19	309	15.56	26.90	-	27.25	8 0.20
103	5.19	412	20.75	27.25	-	27.60	9 0.22
170	8.56	582	29.31	27.60	-	27.95	22 0.54
145	7.30	727	36.61	27.95	-	28.30	31 0.76
201	10.12	928	46.73	28.30	-	28.65	57 1.40
150	7.55	1078	54.28	28.65	-	29.00	86 2.11
216	10.88	1294	65.16	29.00	-	29.35	141 3.45
156	7.85	1450	73.01	29.35	-	29.70	164 4.02
136	6.85	1586	79.86	29.70	-	30.05	207 5.07
87	4.38	1673	84.24	30.05	-	30.40	194 4.75
119	5.99	1792	90.23	30.40	-	30.75	384 9.41
41	2.06	1833	92.30	30.75	-	31.10	238 5.83
60	3.02	1893	95.32	31.10	-	31.45	407 9.97
35	1.76	1928	97.08	31.45	-	31.80	344 8.43
22	1.11	1950	98.19	31.80	-	32.15	338 8.28
17	0.86	1967	99.04	32.15	-	32.50	253 6.20
9	0.45	1976	99.50	32.50	-	32.85	338 8.28
3	0.15	1979	99.65	32.85	-	33.20	160 3.92
2	0.10	1981	99.75	33.20	-	33.55	217 5.32
2	0.10	1983	99.85	33.55	-	33.90	124 3.04
1	0.05	1984	99.90	33.90	-	34.25	103 2.52
1	0.05	1985	99.95	34.25	-	34.60	74 1.81
0	0.00	1985	99.95	34.60	-	34.95	73 1.79
0	0.00	1985	99.95	34.95	-	35.30	30 0.73
0	0.00	1985	99.95	35.30	-	35.65	33 0.81
0	0.00	1985	99.95	35.65	-	36.00	16 0.39
0	0.00	1985	99.95	36.00	-	36.35	12 0.29
0	0.00	1985	99.95	36.35	-	36.70	5 0.12
0	0.00	1985	99.95	36.70	-	37.05	4 0.10
0	0.00	1985	99.95	37.05	-	37.40	0 0.00
0	0.00	1985	99.95	37.40	-	37.75	1 0.02
1	0.05	1986	100.00	37.75	-	38.10	1 0.02
				38.10	-	38.45	1 0.02
				38.45	-	38.80	0 0.00
				38.80	-	39.15	1 0.02

(15) BIZYGMATIC BREADTH

The maximum horizontal breadth of the face (between the zygomatic arches) at the left and right zygion landmarks is measured with a spreading caliper.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
12.20	4.80	1ST	12.90	5.08	
12.30	4.84	2ND	13.10	5.16	
12.40	4.88	3RD	13.10	5.16	
12.50	4.92	5TH	13.30	5.24	
12.60	4.96	10TH	13.50	5.31	
12.80	5.04	15TH	13.60	5.35	
12.90	5.08	20TH	13.70	5.39	
13.00	5.12	25TH	13.80	5.43	
13.10	5.16	30TH	13.90	5.47	
13.10	5.16	35TH	14.00	5.51	
13.20	5.20	40TH	14.10	5.55	
13.30	5.24	45TH	14.20	5.59	
13.40	5.28	50TH	14.30	5.63	
13.40	5.28	55TH	14.30	5.63	
13.50	5.31	60TH	14.40	5.67	
13.60	5.35	65TH	14.50	5.71	
13.60	5.35	70TH	14.60	5.75	
13.70	5.39	75TH	14.70	5.79	
13.80	5.43	80TH	14.80	5.83	
14.00	5.51	85TH	14.90	5.87	
14.10	5.55	90TH	15.00	5.91	
14.30	5.63	95TH	15.30	6.02	
14.50	5.71	97TH	15.40	6.06	
14.60	5.75	98TH	15.60	6.14	
14.70	5.79	99TH	15.80	6.22	

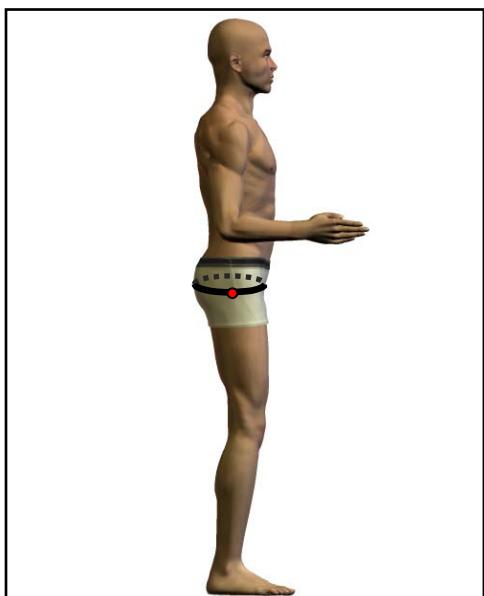
(15) BIZYGOMATIC BREADTH

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
13.38	MEAN	5.27	14.26	MEAN	5.61
0.01	STD ERROR (MEAN)	0.00	0.01	STD ERROR (MEAN)	0.00
0.56	STANDARD DEVIATION	0.22	0.62	STANDARD DEVIATION	0.25
0.01	STD ERROR (STD DEV)	0.00	0.01	STD ERROR (STD DEV)	0.00
11.60	MINIMUM	4.57	12.00	MINIMUM	4.72
15.20	MAXIMUM	5.98	17.40	MAXIMUM	6.85
SKEWNESS		0.17	SKEWNESS		0.14
KURTOSIS		2.94	KURTOSIS		3.19
COEFFICIENT OF VARIATION		4.2%	COEFFICIENT OF VARIATION		4.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	11.55	-	11.70	
2	0.10	3	0.15	11.70	-	11.85	
2	0.10	5	0.25	11.85	-	12.00	
13	0.65	18	0.91	12.00	-	12.15	2
12	0.60	30	1.51	12.15	-	12.30	0
49	2.47	79	3.98	12.30	-	12.45	4
44	2.22	123	6.19	12.45	-	12.60	2
134	6.75	257	12.94	12.60	-	12.75	12
94	4.73	351	17.67	12.75	-	12.90	18
230	11.58	581	29.25	12.90	-	13.05	42
123	6.19	704	35.45	13.05	-	13.20	52
276	13.90	980	49.35	13.20	-	13.35	161
130	6.55	1110	55.89	13.35	-	13.50	92
281	14.15	1391	70.04	13.50	-	13.65	287
114	5.74	1505	75.78	13.65	-	13.80	179
175	8.81	1680	84.59	13.80	-	13.95	383
96	4.83	1776	89.43	13.95	-	14.10	307
74	3.73	1850	93.15	14.10	-	14.25	457
40	2.01	1890	95.17	14.25	-	14.40	277
52	2.62	1942	97.78	14.40	-	14.55	526
10	0.50	1952	98.29	14.55	-	14.70	205
22	1.11	1974	99.40	14.70	-	14.85	403
4	0.20	1978	99.60	14.85	-	15.00	124
7	0.35	1985	99.95	15.00	-	15.15	235
1	0.05	1986	100.00	15.15	-	15.30	79
				15.30	-	15.45	114
				15.45	-	15.60	31
				15.60	-	15.75	44
				15.75	-	15.90	14
				15.90	-	16.05	19
				16.05	-	16.20	6
				16.20	-	16.35	2
				16.35	-	16.50	1
				16.50	-	16.65	3
				16.65	-	16.80	0
				16.80	-	16.95	0
				16.95	-	17.10	0
				17.10	-	17.25	0
				17.25	-	17.40	0
				17.40	-	17.55	1

(16) BUTTOCK CIRCUMFERENCE

The horizontal circumference of the trunk at the level of the buttock point, posterior, right and left lateral landmarks, is measured with a tape. The participant stands erect with the heels together and the weight equally distributed on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
86.70	34.13	1ST	86.10	33.90	
87.50	34.45	2ND	87.40	34.41	
88.50	34.84	3RD	88.20	34.72	
90.10	35.47	5TH	89.90	35.39	
92.60	36.46	10TH	92.20	36.30	
94.50	37.20	15TH	94.10	37.05	
95.80	37.72	20TH	95.50	37.60	
96.90	38.15	25TH	96.70	38.07	
98.00	38.58	30TH	97.70	38.46	
98.90	38.94	35TH	98.80	38.90	
99.90	39.33	40TH	99.70	39.25	
100.80	39.69	45TH	100.80	39.69	
101.80	40.08	50TH	101.70	40.04	
102.90	40.51	55TH	102.60	40.39	
103.70	40.83	60TH	103.60	40.79	
104.60	41.18	65TH	104.70	41.22	
105.80	41.65	70TH	105.70	41.61	
106.90	42.09	75TH	106.80	42.05	
108.20	42.60	80TH	108.20	42.60	
110.00	43.31	85TH	109.90	43.27	
111.70	43.98	90TH	111.80	44.02	
115.60	45.51	95TH	114.90	45.24	
117.10	46.10	97TH	117.20	46.14	
118.20	46.54	98TH	118.90	46.81	
120.80	47.56	99TH	121.80	47.95	

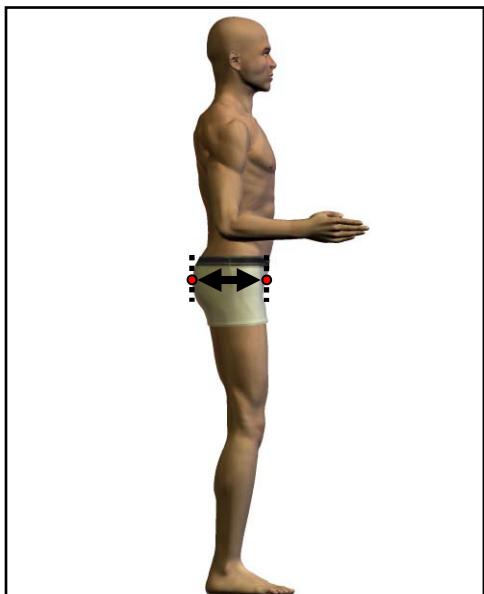
(16) BUTTOCK CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
102.12	STD ERROR (MEAN)	40.21	101.95	STD ERROR (MEAN)	40.14
0.17	STANDARD DEVIATION	0.07	0.12	STANDARD DEVIATION	0.05
7.59	STD ERROR (STD DEV)	2.99	7.67	STD ERROR (STD DEV)	3.02
0.12	MINIMUM	0.05	0.08	MINIMUM	0.03
79.80	MAXIMUM	31.42	73.70	MAXIMUM	29.02
134.10		52.80	130.50		51.38
SKEWNESS		0.31	SKEWNESS		0.27
KURTOSIS		3.25	KURTOSIS		3.17
COEFFICIENT OF VARIATION		7.4%	COEFFICIENT OF VARIATION		7.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
F	FPct	CumF	CumFPct	CM	MALES
2	0.10	2	0.10	73.25	- 74.75
2	0.10	4	0.20	74.75	1 0.02
4	0.20	8	0.40	76.25	0 0.00
3	0.15	11	0.55	77.75	1 0.02
11	0.55	22	1.11	79.25	0 0.00
32	1.61	54	2.72	80.75	1 0.02
28	1.41	82	4.13	82.25	4 0.10
54	2.72	136	6.85	83.75	3 0.07
70	3.52	206	10.37	85.25	16 0.39
80	4.03	286	14.40	86.75	33 0.81
108	5.44	394	19.84	88.25	66 1.62
132	6.65	526	26.49	89.75	72 1.76
157	7.91	683	34.39	91.25	114 2.79
154	7.75	837	42.15	92.75	155 3.80
148	7.45	985	49.60	94.25	176 4.31
151	7.60	1136	57.20	95.75	210 5.14
161	8.11	1297	65.31	97.25	265 6.49
142	7.15	1439	72.46	98.75	303 7.42
113	5.69	1552	78.15	100.25	311 7.62
100	5.04	1652	83.18	101.75	330 8.08
89	4.48	1741	87.66	103.25	327 8.01
57	2.87	1798	90.53	104.75	290 7.10
40	2.01	1838	92.55	106.25	268 6.57
43	2.17	1881	94.71	107.75	261 6.39
38	1.91	1919	96.63	109.25	193 4.73
28	1.41	1947	98.04	110.75	178 4.36
13	0.65	1960	98.69	112.25	132 3.23
9	0.45	1969	99.14	113.75	99 2.43
3	0.15	1972	99.30	115.25	79 1.94
3	0.15	1975	99.45	116.75	57 1.40
3	0.15	1978	99.60	118.25	45 1.10
3	0.15	1981	99.75	120.75	22 0.54
2	0.10	1983	99.85	122.75	21 0.51
0	0.00	1983	99.85	124.25	14 0.34
2	0.10	1985	99.95	125.75	14 0.34
0	0.00	1985	99.95	127.25	9 0.22
1	0.05	1986	100.00	128.75	4 0.10
				130.25	5 0.12
				131.75	1 0.02
				133.25	4082 100.00
				134.75	

(17) BUTTOCK DEPTH

The horizontal depth of the torso at the level of the buttock point, posterior and right lateral landmarks, is measured using a beam caliper. The participant stands erect with the heels together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
18.50	7.28	1ST	19.20	7.56	
19.00	7.48	2ND	19.60	7.72	
19.20	7.56	3RD	20.00	7.87	
19.60	7.72	5TH	20.40	8.03	
20.40	8.03	10TH	21.20	8.35	
20.90	8.23	15TH	21.70	8.54	
21.30	8.39	20TH	22.20	8.74	
21.60	8.50	25TH	22.70	8.94	
21.90	8.62	30TH	23.10	9.09	
22.20	8.74	35TH	23.50	9.25	
22.50	8.86	40TH	23.80	9.37	
22.80	8.98	45TH	24.20	9.53	
23.10	9.09	50TH	24.60	9.69	
23.40	9.21	55TH	24.90	9.80	
23.70	9.33	60TH	25.20	9.92	
24.00	9.45	65TH	25.50	10.04	
24.40	9.61	70TH	25.90	10.20	
24.80	9.76	75TH	26.30	10.35	
25.20	9.92	80TH	26.80	10.55	
25.80	10.16	85TH	27.30	10.75	
26.50	10.43	90TH	28.00	11.02	
27.70	10.91	95TH	29.10	11.46	
28.20	11.10	97TH	29.70	11.69	
28.70	11.30	98TH	30.30	11.93	
30.00	11.81	99TH	31.30	12.32	

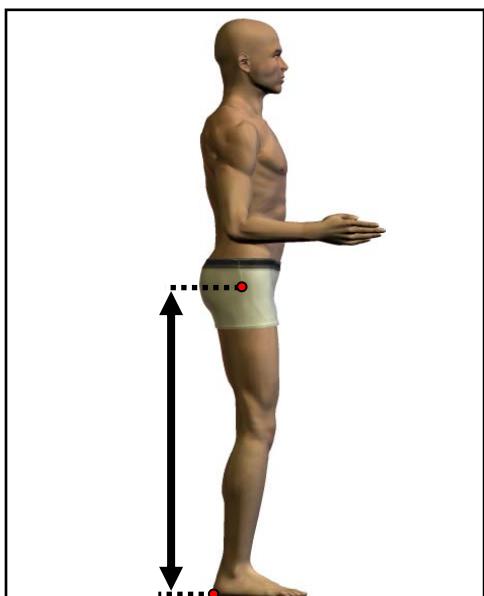
(17) BUTTOCK DEPTH

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
23.29	MEAN	9.17	24.58	MEAN	9.68
0.05	STD ERROR (MEAN)	0.02	0.04	STD ERROR (MEAN)	0.02
2.43	STANDARD DEVIATION	0.96	2.65	STANDARD DEVIATION	1.04
0.04	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
16.80	MINIMUM	6.61	17.10	MINIMUM	6.73
34.90	MAXIMUM	13.74	34.30	MAXIMUM	13.50
SKEWNESS		0.51	SKEWNESS		0.25
KURTOSIS		3.43	KURTOSIS		2.96
COEFFICIENT OF VARIATION		10.4%	COEFFICIENT OF VARIATION		10.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
2	0.10	2	0.10	16.75	-	17.25	1
2	0.10	4	0.20	17.25	-	17.75	2
9	0.45	13	0.65	17.75	-	18.25	6
15	0.76	28	1.41	18.25	-	18.75	7
33	1.66	61	3.07	18.75	-	19.25	32
48	2.42	109	5.49	19.25	-	19.75	49
70	3.52	179	9.01	19.75	-	20.25	69
90	4.53	269	13.54	20.25	-	20.75	122
128	6.45	397	19.99	20.75	-	21.25	153
158	7.96	555	27.95	21.25	-	21.75	177
170	8.56	725	36.51	21.75	-	22.25	202
163	8.21	888	44.71	22.25	-	22.75	231
147	7.40	1035	52.11	22.75	-	23.25	232
159	8.01	1194	60.12	23.25	-	23.75	274
154	7.75	1348	67.88	23.75	-	24.25	286
128	6.45	1476	74.32	24.25	-	24.75	315
119	5.99	1595	80.31	24.75	-	25.25	336
88	4.43	1683	84.74	25.25	-	25.75	291
72	3.63	1755	88.37	25.75	-	26.25	255
53	2.67	1808	91.04	26.25	-	26.75	214
49	2.47	1857	93.50	26.75	-	27.25	186
31	1.56	1888	95.07	27.25	-	27.75	163
39	1.96	1927	97.03	27.75	-	28.25	137
21	1.06	1948	98.09	28.25	-	28.75	79
7	0.35	1955	98.44	28.75	-	29.25	80
7	0.35	1962	98.79	29.25	-	29.75	62
8	0.40	1970	99.19	29.75	-	30.25	35
6	0.30	1976	99.50	30.25	-	30.75	19
2	0.10	1978	99.60	30.75	-	31.25	21
4	0.20	1982	99.80	31.25	-	31.75	19
2	0.10	1984	99.90	31.75	-	32.25	13
1	0.05	1985	99.95	32.25	-	32.75	6
0	0.00	1985	99.95	32.75	-	33.25	2
0	0.00	1985	99.95	33.25	-	33.75	1
0	0.00	1985	99.95	33.75	-	34.25	4
0	0.00	1985	99.95	34.25	-	34.75	1
1	0.05	1986	100.00	34.75	-	35.25	0.02

(18) BUTTOCK HEIGHT

The vertical distance between a standing surface and the level of the buttock point, right lateral landmark, is measured with an anthropometer at the right side of the thigh. The participant stands erect with the heels together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
72.90	28.70	1ST	78.00	30.71	
74.20	29.21	2ND	79.20	31.18	
75.10	29.57	3RD	80.00	31.50	
76.10	29.96	5TH	80.90	31.85	
77.70	30.59	10TH	82.60	32.52	
78.80	31.02	15TH	83.70	32.95	
79.70	31.38	20TH	84.50	33.27	
80.40	31.65	25TH	85.30	33.58	
81.00	31.89	30TH	86.00	33.86	
81.50	32.09	35TH	86.60	34.09	
82.10	32.32	40TH	87.30	34.37	
82.60	32.52	45TH	88.00	34.65	
83.10	32.72	50TH	88.50	34.84	
83.80	32.99	55TH	89.20	35.12	
84.30	33.19	60TH	89.90	35.39	
84.90	33.43	65TH	90.60	35.67	
85.70	33.74	70TH	91.30	35.94	
86.40	34.02	75TH	92.00	36.22	
87.30	34.37	80TH	92.90	36.57	
88.10	34.69	85TH	94.00	37.01	
89.50	35.24	90TH	95.30	37.52	
91.10	35.87	95TH	97.20	38.27	
91.90	36.18	97TH	98.70	38.86	
92.90	36.57	98TH	99.90	39.33	
94.70	37.28	99TH	101.40	39.92	

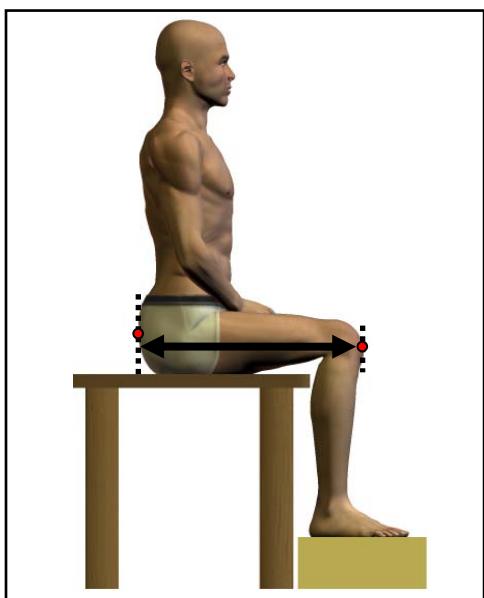
(18) BUTTOCK HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
83.37	STD ERROR (MEAN)	32.82	88.79	34.96	
0.10	STANDARD DEVIATION	0.04	0.08	0.03	
4.57	STD ERROR (STD DEV)	1.80	4.99	1.97	
0.07	MINIMUM	0.03	0.06	0.02	
65.60	MAXIMUM	25.83	71.60	28.19	
99.50		39.17	108.00	42.52	
SKEWNESS		0.09	SKEWNESS		0.24
KURTOSIS		3.22	KURTOSIS		3.12
COEFFICIENT OF VARIATION		5.5%	COEFFICIENT OF VARIATION		5.6%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	65.55	- 66.55		
1	0.05	2	0.10	66.55	- 67.55		
1	0.05	3	0.15	67.55	- 68.55		
2	0.10	5	0.25	68.55	- 69.55		
2	0.10	7	0.35	69.55	- 70.55		
3	0.15	10	0.50	70.55	- 71.55		
6	0.30	16	0.81	71.55	- 72.55	3	0.07
11	0.55	27	1.36	72.55	- 73.55	1	0.02
17	0.86	44	2.22	73.55	- 74.55	1	0.02
36	1.81	80	4.03	74.55	- 75.55	6	0.15
39	1.96	119	5.99	75.55	- 76.55	3	0.07
74	3.73	193	9.72	76.55	- 77.55	11	0.27
82	4.13	275	13.85	77.55	- 78.55	29	0.71
113	5.69	388	19.54	78.55	- 79.55	39	0.96
141	7.10	529	26.64	79.55	- 80.55	70	1.71
172	8.66	701	35.30	80.55	- 81.55	93	2.28
183	9.21	884	44.51	81.55	- 82.55	146	3.58
178	8.96	1062	53.47	82.55	- 83.55	186	4.56
171	8.61	1233	62.08	83.55	- 84.55	246	6.03
141	7.10	1374	69.18	84.55	- 85.55	255	6.25
143	7.20	1517	76.38	85.55	- 86.55	304	7.45
114	5.74	1631	82.12	86.55	- 87.55	316	7.74
87	4.38	1718	86.51	87.55	- 88.55	340	8.33
73	3.68	1791	90.18	88.55	- 89.55	295	7.23
65	3.27	1856	93.45	89.55	- 90.55	308	7.55
52	2.62	1908	96.07	90.55	- 91.55	278	6.81
32	1.61	1940	97.68	91.55	- 92.55	263	6.44
13	0.65	1953	98.34	92.55	- 93.55	185	4.53
10	0.50	1963	98.84	93.55	- 94.55	198	4.85
14	0.70	1977	99.55	94.55	- 95.55	131	3.21
2	0.10	1979	99.65	95.55	- 96.55	119	2.92
3	0.15	1982	99.80	96.55	- 97.55	73	1.79
2	0.10	1984	99.90	97.55	- 98.55	50	1.22
2	0.10	1986	100.00	98.55	- 99.55	42	1.03
				99.55	- 100.55	34	0.83
				100.55	- 101.55	23	0.56
				101.55	- 102.55	10	0.24
				102.55	- 103.55	11	0.27
				103.55	- 104.55	5	0.12
				104.55	- 105.55	1	0.02
				105.55	- 106.55	2	0.05
				106.55	- 107.55	4	0.10
				107.55	- 108.55	1	0.02

(19) BUTTOCK-KNEE LENGTH

The horizontal distance between a buttock plate placed at the most posterior point on either buttock and the knee point, anterior landmark, is measured with an anthropometer. The participant sits erect. The thighs are parallel and the knees flexed 90° with the feet in line with the thighs.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
51.90	20.43	1ST	55.00	21.65	
52.70	20.75	2ND	55.80	21.97	
53.00	20.87	3RD	56.20	22.13	
54.10	21.30	5TH	56.90	22.40	
55.00	21.65	10TH	57.80	22.76	
55.80	21.97	15TH	58.60	23.07	
56.50	22.24	20TH	59.20	23.31	
56.90	22.40	25TH	59.70	23.50	
57.40	22.60	30TH	60.20	23.70	
57.80	22.76	35TH	60.60	23.86	
58.20	22.91	40TH	61.00	24.02	
58.50	23.03	45TH	61.30	24.13	
58.90	23.19	50TH	61.70	24.29	
59.30	23.35	55TH	62.10	24.45	
59.70	23.50	60TH	62.50	24.61	
60.10	23.66	65TH	62.90	24.76	
60.60	23.86	70TH	63.40	24.96	
61.00	24.02	75TH	63.90	25.16	
61.60	24.25	80TH	64.40	25.35	
62.40	24.57	85TH	64.90	25.55	
63.40	24.96	90TH	65.80	25.91	
64.60	25.43	95TH	66.90	26.34	
65.70	25.87	97TH	67.70	26.65	
66.60	26.22	98TH	68.20	26.85	
67.30	26.50	99TH	69.20	27.24	

(19) BUTTOCK-KNEE LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
59.06	STD ERROR (MEAN)	23.25	61.80	STD ERROR (MEAN)	24.33
0.07	STANDARD DEVIATION	0.03	0.05	STANDARD DEVIATION	0.02
3.26	STD ERROR (STD DEV)	1.28	3.06	STD ERROR (STD DEV)	1.20
0.05	MINIMUM	0.02	0.03	MINIMUM	0.01
46.60	MAXIMUM	18.35	51.80	MAXIMUM	20.39
70.90		27.91	73.60		28.98
SKEWNESS		0.22	SKEWNESS		0.14
KURTOSIS		3.35	KURTOSIS		2.95
COEFFICIENT OF VARIATION		5.5%	COEFFICIENT OF VARIATION		4.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	46.25	-	47.00	
0	0.00	1	0.05	47.00	-	47.75	
1	0.05	2	0.10	47.75	-	48.50	
1	0.05	3	0.15	48.50	-	49.25	
3	0.15	6	0.30	49.25	-	50.00	
3	0.15	9	0.45	50.00	-	50.75	
4	0.20	13	0.65	50.75	-	51.50	
12	0.60	25	1.26	51.50	-	52.25	
30	1.51	55	2.77	52.25	-	53.00	
32	1.61	87	4.38	53.00	-	53.75	
42	2.11	129	6.50	53.75	-	54.50	
101	5.09	230	11.58	54.50	-	55.25	
80	4.03	310	15.61	55.25	-	56.00	
151	7.60	461	23.21	56.00	-	56.75	
146	7.35	607	30.56	56.75	-	57.50	
218	10.98	825	41.54	57.50	-	58.25	
188	9.47	1013	51.01	58.25	-	59.00	
181	9.11	1194	60.12	59.00	-	59.75	
165	8.31	1359	68.43	59.75	-	60.50	
174	8.76	1533	77.19	60.50	-	61.25	
100	5.04	1633	82.23	61.25	-	62.00	
99	4.98	1732	87.21	62.00	-	62.75	
58	2.92	1790	90.13	62.75	-	63.50	
69	3.47	1859	93.61	63.50	-	64.25	
48	2.42	1907	96.02	64.25	-	65.00	
22	1.11	1929	97.13	65.00	-	65.75	
15	0.76	1944	97.89	65.75	-	66.50	
22	1.11	1966	98.99	66.50	-	67.25	
7	0.35	1973	99.35	67.25	-	68.00	
6	0.30	1979	99.65	68.00	-	68.75	
2	0.10	1981	99.75	68.75	-	69.50	
4	0.20	1985	99.95	69.50	-	70.25	
1	0.05	1986	100.00	70.25	-	71.00	
				71.00	-	71.75	3
				71.75	-	72.50	2
				72.50	-	73.25	1
				73.25	-	74.00	1

(20) BUTTOCK-POPLITEAL LENGTH

The horizontal distance between a buttock plate placed at the most posterior point on either buttock and the back of the right knee (the popliteal fossa at the dorsal juncture of the calf and thigh) is measured with an anthropometer. The participant sits erect. The thighs are parallel and the knees flexed 90° with the feet in line with the thighs.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
41.90	16.50	1ST	44.30	17.44	
42.80	16.85	2ND	44.80	17.64	
43.40	17.09	3RD	45.30	17.83	
44.10	17.36	5TH	45.90	18.07	
45.00	17.72	10TH	46.70	18.39	
45.70	17.99	15TH	47.40	18.66	
46.20	18.19	20TH	48.00	18.90	
46.60	18.35	25TH	48.40	19.06	
47.00	18.50	30TH	48.80	19.21	
47.30	18.62	35TH	49.20	19.37	
47.70	18.78	40TH	49.50	19.49	
48.00	18.90	45TH	49.90	19.65	
48.30	19.02	50TH	50.20	19.76	
48.70	19.17	55TH	50.50	19.88	
49.10	19.33	60TH	50.90	20.04	
49.50	19.49	65TH	51.30	20.20	
49.90	19.65	70TH	51.70	20.35	
50.30	19.80	75TH	52.20	20.55	
50.80	20.00	80TH	52.70	20.75	
51.50	20.28	85TH	53.20	20.94	
52.40	20.63	90TH	53.80	21.18	
53.50	21.06	95TH	54.80	21.57	
54.20	21.34	97TH	55.60	21.89	
54.70	21.54	98TH	56.10	22.09	
55.70	21.93	99TH	56.80	22.36	

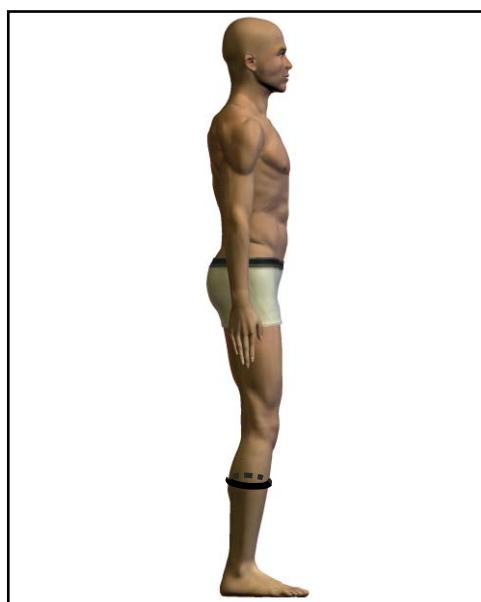
(20) BUTTOCK-POPLITEAL LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
48.51	STD ERROR (MEAN)	19.10	50.29	STD ERROR (MEAN)	19.80
0.06	STANDARD DEVIATION	0.03	0.04	STANDARD DEVIATION	0.02
2.87	STD ERROR (STD DEV)	1.13	2.74	STD ERROR (STD DEV)	1.08
0.05	MINIMUM	0.02	0.03	MINIMUM	0.01
36.70	MAXIMUM	14.45	41.80	MAXIMUM	16.46
59.70		23.50	60.50		23.82
SKEWNESS		0.17	SKEWNESS		0.12
KURTOSIS		3.33	KURTOSIS		2.93
COEFFICIENT OF VARIATION		5.9%	COEFFICIENT OF VARIATION		5.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	36.25	-	36.75	
0	0.00	1	0.05	36.75	-	37.25	
0	0.00	1	0.05	37.25	-	37.75	
1	0.05	2	0.10	37.75	-	38.25	
0	0.00	2	0.10	38.25	-	38.75	
1	0.05	3	0.15	38.75	-	39.25	
0	0.00	3	0.15	39.25	-	39.75	
1	0.05	4	0.20	39.75	-	40.25	
3	0.15	7	0.35	40.25	-	40.75	
5	0.25	12	0.60	40.75	-	41.25	
3	0.15	15	0.76	41.25	-	41.75	
9	0.45	24	1.21	41.75	-	42.25	
14	0.70	38	1.91	42.25	-	42.75	
11	0.55	49	2.47	42.75	-	43.25	
28	1.41	77	3.88	43.25	-	43.75	
37	1.86	114	5.74	43.75	-	44.25	
49	2.47	163	8.21	44.25	-	44.75	
70	3.52	233	11.73	44.75	-	45.25	
66	3.32	299	15.06	45.25	-	45.75	
102	5.14	401	20.19	45.75	-	46.25	
119	5.99	520	26.18	46.25	-	46.75	
157	7.91	677	34.09	46.75	-	47.25	
142	7.15	819	41.24	47.25	-	47.75	
153	7.70	972	48.94	47.75	-	48.25	
137	6.90	1109	55.84	48.25	-	48.75	
129	6.50	1238	62.34	48.75	-	49.25	
115	5.79	1353	68.13	49.25	-	49.75	
120	6.04	1473	74.17	49.75	-	50.25	
102	5.14	1575	79.31	50.25	-	50.75	
71	3.58	1646	82.88	50.75	-	51.25	
65	3.27	1711	86.15	51.25	-	51.75	
67	3.37	1778	89.53	51.75	-	52.25	
57	2.87	1835	92.40	52.25	-	52.75	
31	1.56	1866	93.96	52.75	-	53.25	
32	1.61	1898	95.57	53.25	-	53.75	
35	1.76	1933	97.33	53.75	-	54.25	
16	0.81	1949	98.14	54.25	-	54.75	
10	0.50	1959	98.64	54.75	-	55.25	
8	0.40	1967	99.04	55.25	-	55.75	
6	0.30	1973	99.35	55.75	-	56.25	
5	0.25	1978	99.60	56.25	-	56.75	
4	0.20	1982	99.80	56.75	-	57.25	
1	0.05	1983	99.85	57.25	-	57.75	
2	0.10	1985	99.95	57.75	-	58.25	
0	0.00	1985	99.95	58.25	-	58.75	
0	0.00	1985	99.95	58.75	-	59.25	
1	0.05	1986	100.00	59.25	-	59.75	
				59.75	-	60.25	
				60.25	-	60.75	

(21) CALF CIRCUMFERENCE

The maximum horizontal circumference of the right calf is measured with a tape. The participant stands erect with the heels approximately 10 cm apart and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
31.10	12.24	1ST	32.90	12.95	
32.00	12.58	2ND	33.50	13.19	
32.40	12.76	3RD	34.00	13.39	
32.80	12.91	5TH	34.60	13.62	
33.80	13.31	10TH	35.50	13.98	
34.50	13.58	15TH	36.20	14.25	
35.00	13.78	20TH	36.70	14.45	
35.40	13.94	25TH	37.20	14.65	
35.80	14.09	30TH	37.60	14.80	
36.20	14.25	35TH	38.00	14.96	
36.50	14.37	40TH	38.40	15.12	
36.80	14.49	45TH	38.70	15.24	
37.20	14.65	50TH	39.20	15.43	
37.50	14.76	55TH	39.50	15.55	
37.80	14.88	60TH	39.80	15.67	
38.30	15.08	65TH	40.30	15.87	
38.70	15.24	70TH	40.70	16.02	
39.20	15.43	75TH	41.20	16.22	
39.50	15.55	80TH	41.70	16.42	
40.20	15.83	85TH	42.30	16.65	
41.00	16.14	90TH	43.00	16.93	
42.30	16.65	95TH	44.30	17.44	
43.20	17.03	97TH	45.10	17.76	
44.00	17.34	98TH	45.70	17.99	
45.20	17.80	99TH	46.70	18.39	

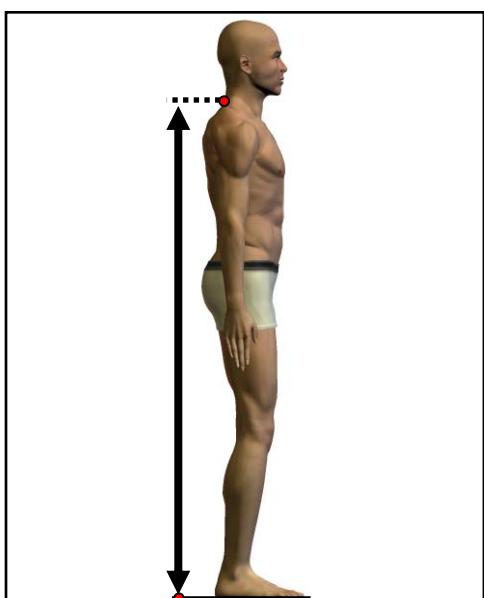
(21) CALF CIRCUMFERENCE

FEMALES			MALES		
CM	MEAN	IN	CM	MEAN	IN
37.33	14.70		39.23	15.44	
0.06	STD ERROR (MEAN)	0.03	0.05	STD ERROR (MEAN)	0.02
2.85	STANDARD DEVIATION	1.12	2.97	STANDARD DEVIATION	1.17
0.05	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
28.20	MINIMUM	11.10	26.60	MINIMUM	10.47
48.20	MAXIMUM	18.98	52.30	MAXIMUM	20.59
SKEWNESS		0.33	SKEWNESS		0.25
KURTOSIS		3.36	KURTOSIS		3.22
COEFFICIENT OF VARIATION		7.6%	COEFFICIENT OF VARIATION		7.6%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
				26.25	-	26.75	
				26.75	-	27.25	1
				27.25	-	27.75	0
1	0.05	1	0.05	27.75	-	28.25	0
0	0.00	1	0.05	28.25	-	28.75	0
1	0.05	2	0.10	28.75	-	29.25	0
4	0.20	6	0.30	29.25	-	29.75	1
4	0.20	10	0.50	29.75	-	30.25	0
4	0.20	14	0.70	30.25	-	30.75	1
6	0.30	20	1.01	30.75	-	31.25	2
14	0.70	34	1.71	31.25	-	31.75	1
16	0.81	50	2.52	31.75	-	32.25	7
40	2.01	90	4.53	32.25	-	32.75	24
36	1.81	126	6.34	32.75	-	33.25	22
58	2.92	184	9.26	33.25	-	33.75	41
64	3.22	248	12.49	33.75	-	34.25	54
98	4.93	346	17.42	34.25	-	34.75	86
104	5.24	450	22.66	34.75	-	35.25	93
138	6.95	588	29.61	35.25	-	35.75	146
137	6.90	725	36.51	35.75	-	36.25	160
142	7.15	867	43.66	36.25	-	36.75	218
152	7.65	1019	51.31	36.75	-	37.25	190
157	7.91	1176	59.21	37.25	-	37.75	260
110	5.54	1286	64.75	37.75	-	38.25	217
119	5.99	1405	70.75	38.25	-	38.75	318
104	5.24	1509	75.98	38.75	-	39.25	232
108	5.44	1617	81.42	39.25	-	39.75	320
74	3.73	1691	85.15	39.75	-	40.25	255
68	3.42	1759	88.57	40.25	-	40.75	249
54	2.72	1813	91.29	40.75	-	41.25	212
48	2.42	1861	93.71	41.25	-	41.75	194
23	1.16	1884	94.86	41.75	-	42.25	154
23	1.16	1907	96.02	42.25	-	42.75	144
20	1.01	1927	97.03	42.75	-	43.25	102
15	0.76	1942	97.78	43.25	-	43.75	101
6	0.30	1948	98.09	43.75	-	44.25	71
12	0.60	1960	98.69	44.25	-	44.75	52
9	0.45	1969	99.14	44.75	-	45.25	41
9	0.45	1978	99.60	45.25	-	45.75	34
4	0.20	1982	99.80	45.75	-	46.25	18
0	0.00	1982	99.80	46.25	-	46.75	22
2	0.10	1984	99.90	46.75	-	47.25	10
0	0.00	1984	99.90	47.25	-	47.75	6
2	0.10	1986	100.00	47.75	-	48.25	8
				48.25	-	48.75	6
				48.75	-	49.25	4
				49.25	-	49.75	0
				49.75	-	50.25	3
				50.25	-	50.75	0
				50.75	-	51.25	1
				51.25	-	51.75	0
				51.75	-	52.25	0
				52.25	-	52.75	1

(22) CERVICALE HEIGHT*

The vertical distance between a standing surface and the cervicale landmark is measured with an anthropometer. The participant stands erect with the head in the Frankfurt plane. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
126.20	49.69	1ST	137.30	54.06	
127.60	50.24	2ND	138.80	54.65	
128.70	50.67	3RD	140.20	55.20	
130.00	51.18	5TH	141.60	55.75	
132.00	51.97	10TH	143.70	56.57	
133.40	52.52	15TH	145.00	57.09	
134.70	53.03	20TH	146.30	57.60	
135.50	53.35	25TH	147.50	58.07	
136.40	53.70	30TH	148.50	58.46	
137.20	54.02	35TH	149.30	58.78	
137.90	54.29	40TH	150.10	59.09	
138.70	54.61	45TH	150.90	59.41	
139.30	54.84	50TH	151.70	59.72	
140.10	55.16	55TH	152.50	60.04	
141.00	55.51	60TH	153.30	60.35	
141.70	55.79	65TH	154.00	60.63	
142.60	56.14	70TH	155.00	61.02	
143.40	56.46	75TH	155.80	61.34	
144.40	56.85	80TH	156.90	61.77	
145.70	57.36	85TH	158.30	62.32	
147.50	58.07	90TH	159.70	62.87	
149.80	58.98	95TH	162.30	63.90	
151.20	59.53	97TH	164.00	64.57	
152.10	59.88	98TH	165.40	65.12	
153.30	60.35	99TH	167.80	66.06	

* In ANSUR cervicale was defined as the highest point on the seventh cervical vertebra. For consistency with international standards, it is now the most prominent point on the seventh cervical vertebra.

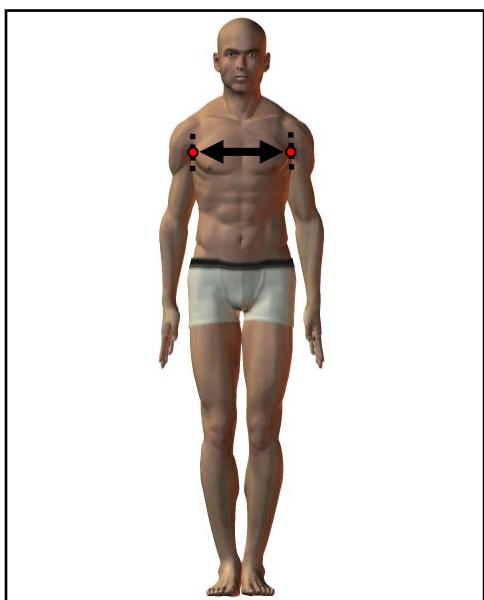
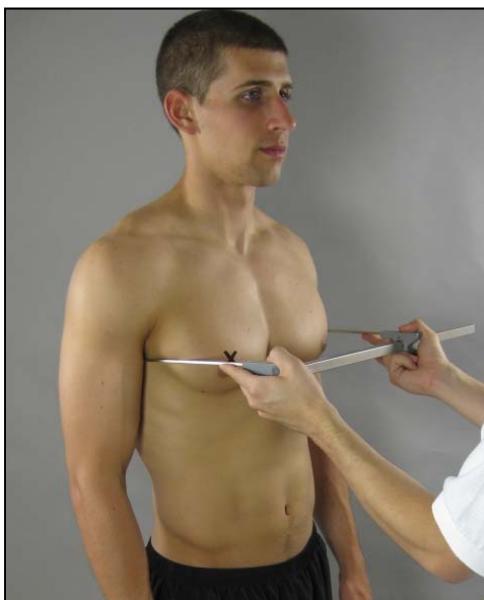
(22) CERVICALE HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
139.57	54.95		151.73	59.74	
0.13	0.05		0.10	0.04	
5.95	2.34		6.33	2.49	
0.09	0.04		0.07	0.03	
118.40	46.61		126.90	49.96	
158.70	62.48		173.80	68.43	
SKEWNESS	0.09		SKEWNESS	0.08	
KURTOSIS	3.01		KURTOSIS	3.09	
COEFFICIENT OF VARIATION	4.3%		COEFFICIENT OF VARIATION	4.2%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	117.25	- 118.75		
0	0.00	1	0.05	118.75	- 120.25		
2	0.10	3	0.15	120.25	- 121.75		
2	0.10	5	0.25	121.75	- 123.25		
6	0.30	11	0.55	123.25	- 124.75		
9	0.45	20	1.01	124.75	- 126.25		
21	1.06	41	2.06	126.25	- 127.75	1	0.02
34	1.71	75	3.78	127.75	- 129.25	0	0.00
59	2.97	134	6.75	129.25	- 130.75	1	0.02
79	3.98	213	10.73	130.75	- 132.25	0	0.00
105	5.29	318	16.01	132.25	- 133.75	5	0.12
144	7.25	462	23.26	133.75	- 135.25	11	0.27
172	8.66	634	31.92	135.25	- 136.75	16	0.39
209	10.52	843	42.45	136.75	- 138.25	30	0.73
204	10.27	1047	52.72	138.25	- 139.75	42	1.03
184	9.26	1231	61.98	139.75	- 141.25	79	1.94
179	9.01	1410	71.00	141.25	- 142.75	111	2.72
160	8.06	1570	79.05	142.75	- 144.25	204	5.00
120	6.04	1690	85.10	144.25	- 145.75	222	5.44
78	3.93	1768	89.02	145.75	- 147.25	252	6.17
80	4.03	1848	93.05	147.25	- 148.75	304	7.45
55	2.77	1903	95.82	148.75	- 150.25	403	9.87
35	1.76	1938	97.58	150.25	- 151.75	368	9.02
27	1.36	1965	98.94	151.75	- 153.25	390	9.55
11	0.55	1976	99.50	153.25	- 154.75	365	8.94
3	0.15	1979	99.65	154.75	- 156.25	338	8.28
3	0.15	1982	99.80	156.25	- 157.75	267	6.54
4	0.20	1986	100.00	157.75	- 159.25	203	4.97
				159.25	- 160.75	164	4.02
				160.75	- 162.25	101	2.47
				162.25	- 163.75	71	1.74
				163.75	- 165.25	45	1.10
				165.25	- 166.75	37	0.91
				166.75	- 168.25	20	0.49
				168.25	- 169.75	18	0.44
				169.75	- 171.25	9	0.22
				171.25	- 172.75	4	0.10
				172.75	- 174.25	1	0.02

(23) CHEST BREADTH*

The maximum horizontal breadth of the chest at the level of the chest point anterior landmark is measured with a beam caliper. The participant stands erect, looking straight ahead with the heels together and the weight distributed evenly on both feet. The participant places both hands on the hips and takes a deep breath and holds it. The tissue is compressed with the beam caliper, and then the participant lowers the arms. The measurement is taken at maximum inspiration.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
23.20	9.13	1ST	25.00	9.84	
23.40	9.21	2ND	25.40	10.00	
23.80	9.37	3RD	25.60	10.08	
24.10	9.49	5TH	26.10	10.28	
24.60	9.69	10TH	26.60	10.47	
25.00	9.84	15TH	27.00	10.63	
25.40	10.00	20TH	27.30	10.75	
25.70	10.12	25TH	27.70	10.91	
25.90	10.20	30TH	27.90	10.98	
26.20	10.31	35TH	28.20	11.10	
26.40	10.39	40TH	28.40	11.18	
26.60	10.47	45TH	28.70	11.30	
26.80	10.55	50TH	28.90	11.38	
27.00	10.63	55TH	29.10	11.46	
27.30	10.75	60TH	29.40	11.57	
27.50	10.83	65TH	29.60	11.65	
27.80	10.94	70TH	29.90	11.77	
28.10	11.06	75TH	30.10	11.85	
28.50	11.22	80TH	30.40	11.97	
28.90	11.38	85TH	30.80	12.13	
29.40	11.57	90TH	31.30	12.32	
30.20	11.89	95TH	32.00	12.60	
30.60	12.05	97TH	32.60	12.83	
30.90	12.17	98TH	32.90	12.95	
31.40	12.36	99TH	33.50	13.19	

* In ANSUR this measurement was taken (in males) at the level of the ilion (nipple). This change was made in order to capture the breadth of the chest at its maximum. The landmark is unchanged for females. This measurement also differs from ANSUR because the tissue is now compressed and the measurement is taken at maximum inspiration.

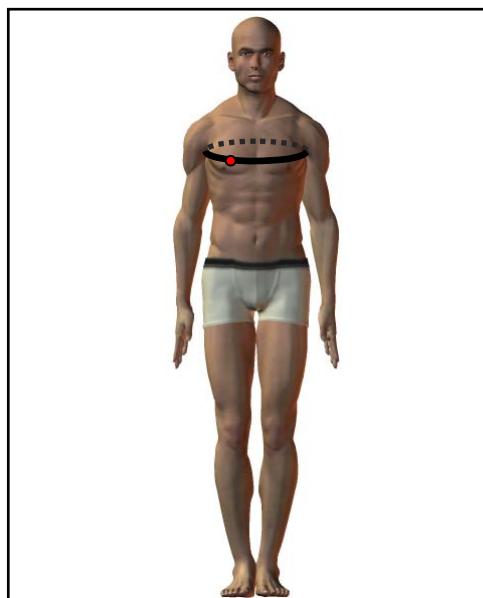
(23) CHEST BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
26.93	10.60		28.94	11.40	
0.04	0.02		0.03	0.01	
1.86	0.73		1.83	0.72	
0.03	0.01		0.02	0.01	
21.30	8.39		23.10	9.09	
34.80	13.70		36.30	14.29	
SKEWNESS	0.29		SKEWNESS	0.17	
KURTOSIS	3.13		KURTOSIS	3.05	
COEFFICIENT OF VARIATION	6.9%		COEFFICIENT OF VARIATION	6.3%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	21.15	-	21.50	
1	0.05	3	0.15	21.50	-	21.85	
4	0.20	7	0.35	21.85	-	22.20	
1	0.05	8	0.40	22.20	-	22.55	
6	0.30	14	0.70	22.55	-	22.90	
11	0.55	25	1.26	22.90	-	23.25	
18	0.91	43	2.17	23.25	-	23.60	
37	1.86	80	4.03	23.60	-	23.95	
50	2.52	130	6.55	23.95	-	24.30	
78	3.93	208	10.47	24.30	-	24.65	
88	4.43	296	14.90	24.65	-	25.00	
97	4.88	393	19.79	25.00	-	25.35	
98	4.93	491	24.72	25.35	-	25.70	
173	8.71	664	33.43	25.70	-	26.05	
120	6.04	784	39.48	26.05	-	26.40	
162	8.16	946	47.63	26.40	-	26.75	
153	7.70	1099	55.34	26.75	-	27.10	
147	7.40	1246	62.74	27.10	-	27.45	
116	5.84	1362	68.58	27.45	-	27.80	
131	6.60	1493	75.18	27.80	-	28.15	
79	3.98	1572	79.15	28.15	-	28.50	
112	5.64	1684	84.79	28.50	-	28.85	
53	2.67	1737	87.46	28.85	-	29.20	
75	3.78	1812	91.24	29.20	-	29.55	
35	1.76	1847	93.00	29.55	-	29.90	
43	2.17	1890	95.17	29.90	-	30.25	
36	1.81	1926	96.98	30.25	-	30.60	
23	1.16	1949	98.14	30.60	-	30.95	
14	0.70	1963	98.84	30.95	-	31.30	
10	0.50	1973	99.35	31.30	-	31.65	
4	0.20	1977	99.55	31.65	-	32.00	
1	0.05	1978	99.60	32.00	-	32.35	
2	0.10	1980	99.70	32.35	-	32.70	
0	0.00	1980	99.70	32.70	-	33.05	
2	0.10	1982	99.80	33.05	-	33.40	
1	0.05	1983	99.85	33.40	-	33.75	
2	0.10	1985	99.95	33.75	-	34.10	
0	0.00	1985	99.95	34.10	-	34.45	
0	0.00	1985	99.95	34.45	-	34.80	
1	0.05	1986	100.00	34.80	-	35.15	
				35.15	-	35.50	
				35.50	-	35.85	
				35.85	-	36.20	
				36.20	-	36.55	

(24) CHEST CIRCUMFERENCE*

The maximum horizontal circumference of the chest at the level of chest point, anterior is measured with a tape. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
78.40	30.87	1ST	87.20	34.33	
79.50	31.30	2ND	89.40	35.20	
80.70	31.77	3RD	90.70	35.71	
82.40	32.44	5TH	92.20	36.30	
84.50	33.27	10TH	94.80	37.32	
86.30	33.98	15TH	96.70	38.07	
87.70	34.53	20TH	98.30	38.70	
88.90	35.00	25TH	99.60	39.21	
90.00	35.43	30TH	100.90	39.72	
90.90	35.79	35TH	102.10	40.20	
92.00	36.22	40TH	103.20	40.63	
92.90	36.57	45TH	104.30	41.06	
94.00	37.01	50TH	105.60	41.57	
95.00	37.40	55TH	106.70	42.01	
96.10	37.83	60TH	107.80	42.44	
97.50	38.39	65TH	109.00	42.91	
98.70	38.86	70TH	110.40	43.46	
99.90	39.33	75TH	111.70	43.98	
101.50	39.96	80TH	113.30	44.61	
103.30	40.67	85TH	115.10	45.31	
105.70	41.61	90TH	117.20	46.14	
109.40	43.07	95TH	120.70	47.52	
111.80	44.02	97TH	123.30	48.54	
114.00	44.88	98TH	125.10	49.25	
116.10	45.71	99TH	127.70	50.28	

* In ANSUR this measurement was taken “at the fullest part of the breast”. Although the wording of the definition has changed, the dimensions are equivalent.

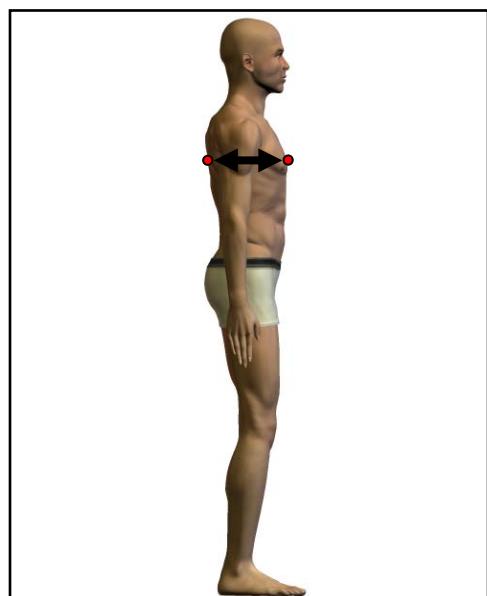
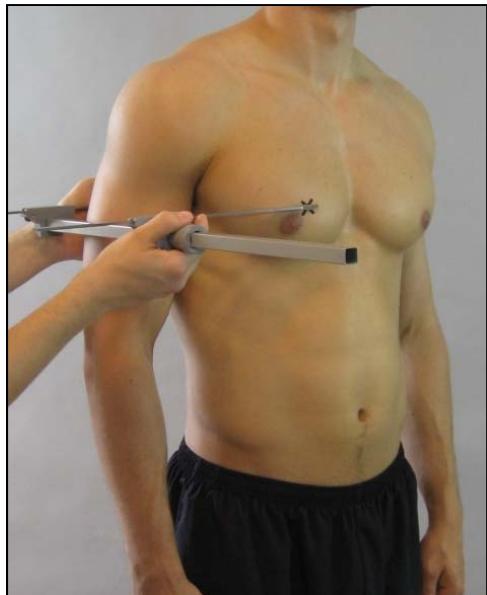
(24) CHEST CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
94.69	STD ERROR (MEAN)	0.07	105.87	STD ERROR (MEAN)	41.68
0.19	STANDARD DEVIATION	3.26	0.14	STANDARD DEVIATION	0.05
8.27	STD ERROR (STD DEV)	0.05	8.74	STD ERROR (STD DEV)	3.44
0.13	MINIMUM	27.36	0.10	MINIMUM	0.04
69.50	MAXIMUM	49.84	77.40	MAXIMUM	30.47
126.60	SKEWNESS	0.43	146.90	SKEWNESS	57.83
KURTOSIS		3.12	KURTOSIS		0.23
COEFFICIENT OF VARIATION		8.7%	COEFFICIENT OF VARIATION		2.95
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		8.3%
					4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	69.25	-	70.75	
0	0.00	1	0.05	70.75	-	72.25	
2	0.10	3	0.15	72.25	-	73.75	
0	0.00	3	0.15	73.75	-	75.25	
3	0.15	6	0.30	75.25	-	76.75	
10	0.50	16	0.81	76.75	-	78.25	
25	1.26	41	2.06	78.25	-	79.75	
28	1.41	69	3.47	79.75	-	81.25	
47	2.37	116	5.84	81.25	-	82.75	
66	3.32	182	9.16	82.75	-	84.25	
86	4.33	268	13.49	84.25	-	85.75	
98	4.93	366	18.43	85.75	-	87.25	
124	6.24	490	24.67	87.25	-	88.75	
147	7.40	637	32.07	88.75	-	90.25	
141	7.10	778	39.17	90.25	-	91.75	
151	7.60	929	46.78	91.75	-	93.25	
148	7.45	1077	54.23	93.25	-	94.75	
124	6.24	1201	60.47	94.75	-	96.25	
116	5.84	1317	66.31	96.25	-	97.75	
125	6.29	1442	72.61	97.75	-	99.25	
104	5.24	1546	77.84	99.25	-	100.75	
84	4.23	1630	82.07	100.75	-	102.25	
86	4.33	1716	86.40	102.25	-	103.75	
56	2.82	1772	89.22	103.75	-	105.25	
50	2.52	1822	91.74	105.25	-	106.75	
37	1.86	1859	93.61	106.75	-	108.25	
36	1.81	1895	95.42	108.25	-	109.75	
24	1.21	1919	96.63	109.75	-	111.25	
14	0.70	1933	97.33	111.25	-	112.75	
17	0.86	1950	98.19	112.75	-	114.25	
14	0.70	1964	98.89	114.25	-	115.75	
7	0.35	1971	99.24	115.75	-	117.25	
2	0.10	1973	99.35	117.25	-	118.75	
6	0.30	1979	99.65	118.75	-	120.25	
4	0.20	1983	99.85	120.25	-	121.75	
2	0.10	1985	99.95	121.75	-	123.25	
0	0.00	1985	99.95	123.25	-	124.75	
0	0.00	1985	99.95	124.75	-	126.25	
1	0.05	1986	100.00	126.25	-	127.75	
				127.75	-	129.25	
				129.25	-	130.75	
				130.75	-	132.25	
				132.25	-	133.75	
				133.75	-	135.25	
				135.25	-	136.75	
				136.75	-	138.25	
				138.25	-	139.75	
				139.75	-	141.25	
				141.25	-	142.75	
				142.75	-	144.25	
				144.25	-	145.75	
				145.75	-	147.25	

(25) CHEST DEPTH*

The horizontal distance between the chest point anterior landmark and the back at the same level is measured with a beam caliper. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
18.90	7.44	1ST	19.70	7.76	
19.70	7.76	2ND	20.20	7.95	
19.90	7.83	3RD	20.60	8.11	
20.50	8.07	5TH	21.10	8.31	
21.30	8.39	10TH	22.00	8.66	
21.90	8.62	15TH	22.70	8.94	
22.50	8.86	20TH	23.10	9.09	
22.80	8.98	25TH	23.60	9.29	
23.20	9.13	30TH	23.90	9.41	
23.60	9.29	35TH	24.30	9.57	
23.90	9.41	40TH	24.60	9.69	
24.20	9.53	45TH	25.00	9.84	
24.50	9.65	50TH	25.30	9.96	
24.90	9.80	55TH	25.60	10.08	
25.30	9.96	60TH	26.00	10.24	
25.60	10.08	65TH	26.40	10.39	
26.00	10.24	70TH	26.70	10.51	
26.60	10.47	75TH	27.20	10.71	
27.00	10.63	80TH	27.70	10.91	
27.60	10.87	85TH	28.10	11.06	
28.40	11.18	90TH	28.80	11.34	
29.60	11.65	95TH	29.80	11.73	
30.10	11.85	97TH	30.40	11.97	
30.70	12.09	98TH	30.90	12.17	
32.20	12.68	99TH	31.60	12.44	

* In ANSUR this measurement was taken (in males) at the level of thelion (nipple). This change was made in order to capture the breadth of the chest at its maximum. The landmark is unchanged for females.

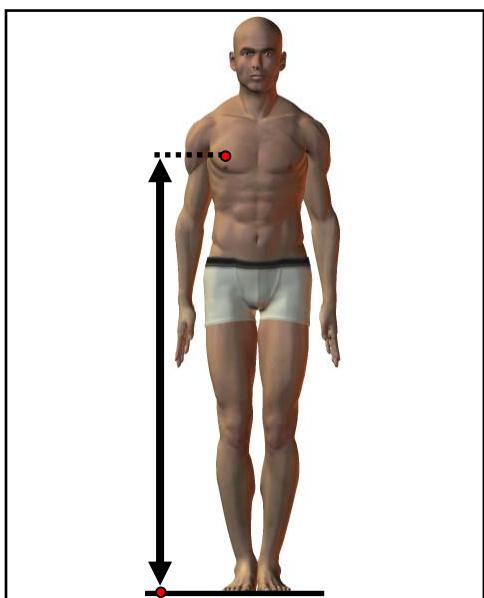
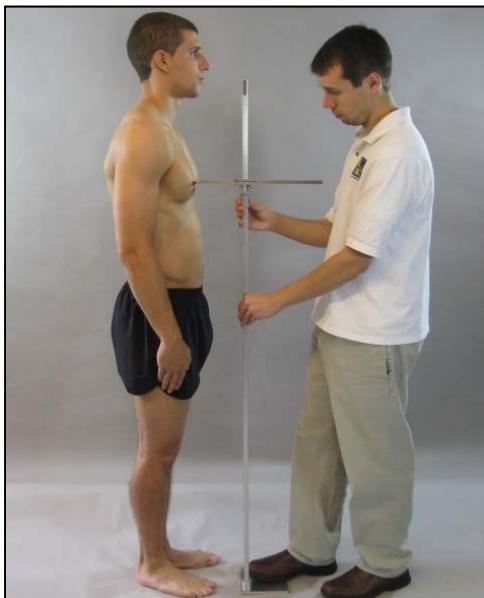
(25) CHEST DEPTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
24.74	STD ERROR (MEAN)	9.74	25.38	STD ERROR (MEAN)	9.99
0.06	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.73	STD ERROR (STD DEV)	1.08	2.62	STD ERROR (STD DEV)	1.03
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
17.00	MAXIMUM	6.69	17.60	MAXIMUM	6.93
35.30	SKEWNESS	13.90	38.30	KURTOSIS	15.08
	KURTOSIS	0.33		Coefficient of Variation	0.16
	Coefficient of Variation	3.11		Number of Participants	2.91
	Number of Participants	11.0%			10.3%
		1986			4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	16.75	-	17.25	
0	0.00	2	0.10	17.25	-	17.75	1
1	0.05	3	0.15	17.75	-	18.25	2
10	0.50	13	0.65	18.25	-	18.75	3
17	0.86	30	1.51	18.75	-	19.25	13
14	0.70	44	2.22	19.25	-	19.75	22
39	1.96	83	4.18	19.75	-	20.25	43
40	2.01	123	6.19	20.25	-	20.75	64
59	2.97	182	9.16	20.75	-	21.25	80
82	4.13	264	13.29	21.25	-	21.75	93
86	4.33	350	17.62	21.75	-	22.25	150
127	6.39	477	24.02	22.25	-	22.75	175
119	5.99	596	30.01	22.75	-	23.25	224
141	7.10	737	37.11	23.25	-	23.75	256
163	8.21	900	45.32	23.75	-	24.25	268
150	7.55	1050	52.87	24.25	-	24.75	318
141	7.10	1191	59.97	24.75	-	25.25	300
145	7.30	1336	67.27	25.25	-	25.75	300
102	5.14	1438	72.41	25.75	-	26.25	292
104	5.24	1542	77.64	26.25	-	26.75	266
96	4.83	1638	82.48	26.75	-	27.25	237
69	3.47	1707	85.95	27.25	-	27.75	196
62	3.12	1769	89.07	27.75	-	28.25	201
57	2.87	1826	91.94	28.25	-	28.75	142
40	2.01	1866	93.96	28.75	-	29.25	132
39	1.96	1905	95.92	29.25	-	29.75	92
25	1.26	1930	97.18	29.75	-	30.25	72
17	0.86	1947	98.04	30.25	-	30.75	45
9	0.45	1956	98.49	30.75	-	31.25	33
7	0.35	1963	98.84	31.25	-	31.75	28
6	0.30	1969	99.14	31.75	-	32.25	14
9	0.45	1978	99.60	32.25	-	32.75	8
2	0.10	1980	99.70	32.75	-	33.25	5
3	0.15	1983	99.85	33.25	-	33.75	3
2	0.10	1985	99.95	33.75	-	34.25	3
0	0.00	1985	99.95	34.25	-	34.75	0
0	0.00	1985	99.95	34.75	-	35.25	0
1	0.05	1986	100.00	35.25	-	35.75	0
				35.75	-	36.25	0
				36.25	-	36.75	0
				36.75	-	37.25	0
				37.25	-	37.75	0
				37.75	-	38.25	0
				38.25	-	38.75	1

(26) CHEST HEIGHT*

The vertical distance between a standing surface and the chest point anterior landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
104.60	41.18	1ST	116.20	45.75
105.90	41.69	2ND	117.90	46.42
106.90	42.09	3RD	118.70	46.73
108.00	42.52	5TH	120.00	47.24
110.10	43.35	10TH	122.00	48.03
111.50	43.90	15TH	123.30	48.54
112.50	44.29	20TH	124.40	48.98
113.40	44.65	25TH	125.20	49.29
114.30	45.00	30TH	126.10	49.65
115.00	45.28	35TH	126.80	49.92
115.70	45.55	40TH	127.50	50.20
116.40	45.83	45TH	128.20	50.47
116.90	46.02	50TH	128.90	50.75
117.60	46.30	55TH	129.70	51.06
118.40	46.61	60TH	130.50	51.38
119.20	46.93	65TH	131.10	51.61
120.00	47.24	70TH	132.00	51.97
120.90	47.60	75TH	132.90	52.32
121.90	47.99	80TH	133.80	52.68
122.90	48.39	85TH	135.00	53.15
124.40	48.98	90TH	136.40	53.70
126.60	49.84	95TH	138.70	54.61
127.70	50.28	97TH	140.30	55.24
129.00	50.79	98TH	141.50	55.71
130.50	51.38	99TH	143.20	56.38

* In ANSUR this measurement was taken (in males) at the level of thelions (nipple). This change was made in order to capture the breadth of the chest at its maximum. The landmark is unchanged for females.

(26) CHEST HEIGHT

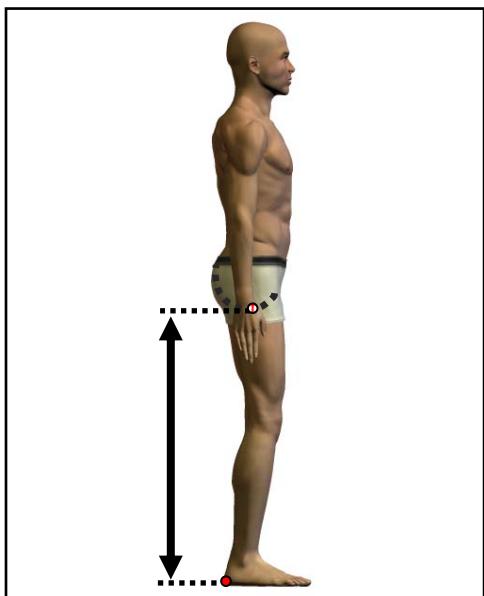
FEMALES		
<u>CM</u>		<u>IN</u>
117.16	MEAN	46.13
0.12	STD ERROR (MEAN)	0.05
5.55	STANDARD DEVIATION	2.19
0.09	STD ERROR (STD DEV)	0.03
98.40	MINIMUM	38.74
135.50	MAXIMUM	53.35
SKEWNESS		0.08
KURTOSIS		3.00
COEFFICIENT OF VARIATION		4.7%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
129.11	MEAN	50.83
0.09	STD ERROR (MEAN)	0.04
5.70	STANDARD DEVIATION	2.24
0.06	STD ERROR (STD DEV)	0.02
108.80	MINIMUM	42.83
150.60	MAXIMUM	59.29
SKEWNESS		0.15
KURTOSIS		3.15
COEFFICIENT OF VARIATION		4.4%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	98.25	- 99.50		
3	0.15	4	0.20	99.50	- 100.75		
2	0.10	6	0.30	100.75	- 102.00		
4	0.20	10	0.50	102.00	- 103.25		
7	0.35	17	0.86	103.25	- 104.50		
19	0.96	36	1.81	104.50	- 105.75		
25	1.26	61	3.07	105.75	- 107.00		
43	2.17	104	5.24	107.00	- 108.25		
47	2.37	151	7.60	108.25	- 109.50	1	0.02
93	4.68	244	12.29	109.50	- 110.75	0	0.00
94	4.73	338	17.02	110.75	- 112.00	3	0.07
139	7.00	477	24.02	112.00	- 113.25	4	0.10
145	7.30	622	31.32	113.25	- 114.50	14	0.34
177	8.91	799	40.23	114.50	- 115.75	10	0.24
195	9.82	994	50.05	115.75	- 117.00	20	0.49
171	8.61	1165	58.66	117.00	- 118.25	50	1.22
159	8.01	1324	66.67	118.25	- 119.50	55	1.35
147	7.40	1471	74.07	119.50	- 120.75	105	2.57
128	6.45	1599	80.51	120.75	- 122.00	138	3.38
111	5.59	1710	86.10	122.00	- 123.25	207	5.07
82	4.13	1792	90.23	123.25	- 124.50	228	5.59
61	3.07	1853	93.30	124.50	- 125.75	305	7.47
47	2.37	1900	95.67	125.75	- 127.00	323	7.91
35	1.76	1935	97.43	127.00	- 128.25	383	9.38
18	0.91	1953	98.34	128.25	- 129.50	337	8.26
19	0.96	1972	99.30	129.50	- 130.75	351	8.60
6	0.30	1978	99.60	130.75	- 132.00	313	7.67
5	0.25	1983	99.85	132.00	- 133.25	324	7.94
1	0.05	1984	99.90	133.25	- 134.50	211	5.17
2	0.10	1986	100.00	134.50	- 135.75	212	5.19
				135.75	- 137.00	134	3.28
				137.00	- 138.25	126	3.09
				138.25	- 139.50	67	1.64
				139.50	- 140.75	52	1.27
				140.75	- 142.00	36	0.88
				142.00	- 143.25	34	0.83
				143.25	- 144.50	10	0.24
				144.50	- 145.75	19	0.47
				145.75	- 147.00	1	0.02
				147.00	- 148.25	6	0.15
				148.25	- 149.50	0	0.00
				149.50	- 150.75	3	0.07

(27) CROTCH HEIGHT

The vertical distance between the standing surface and the crotch is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together, and the weight is distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
68.50	26.97	1ST	74.60	29.37	
69.40	27.32	2ND	75.80	29.84	
70.00	27.56	3RD	76.40	30.08	
71.20	28.03	5TH	77.10	30.35	
72.70	28.62	10TH	78.80	31.02	
73.70	29.02	15TH	79.90	31.46	
74.50	29.33	20TH	80.70	31.77	
75.30	29.65	25TH	81.40	32.05	
75.80	29.84	30TH	82.00	32.28	
76.40	30.08	35TH	82.60	32.52	
76.90	30.28	40TH	83.20	32.76	
77.40	30.47	45TH	83.90	33.03	
78.00	30.71	50TH	84.50	33.27	
78.50	30.91	55TH	85.10	33.50	
79.20	31.18	60TH	85.70	33.74	
79.90	31.46	65TH	86.30	33.98	
80.50	31.69	70TH	87.00	34.25	
81.20	31.97	75TH	87.60	34.49	
82.10	32.32	80TH	88.30	34.76	
82.90	32.64	85TH	89.30	35.16	
84.10	33.11	90TH	90.60	35.67	
85.70	33.74	95TH	92.50	36.42	
86.90	34.21	97TH	93.90	36.97	
87.70	34.53	98TH	94.80	37.32	
88.90	35.00	99TH	96.00	37.80	

(27) CROTCH HEIGHT

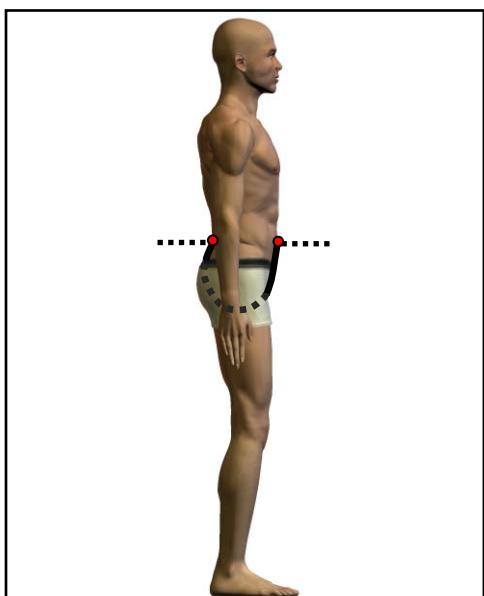
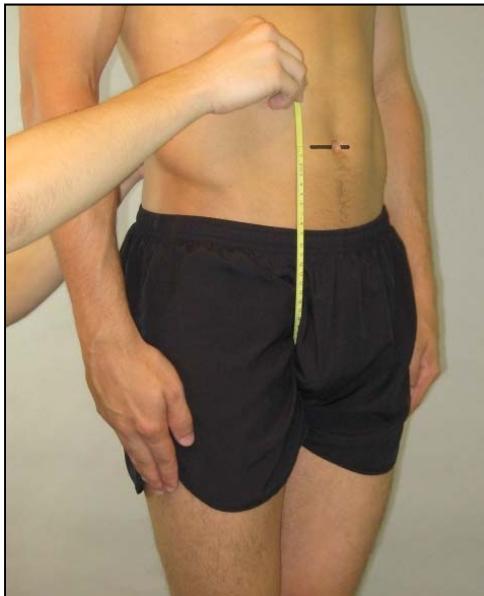
FEMALES		
<u>CM</u>		<u>IN</u>
78.23	MEAN	30.80
0.10	STD ERROR (MEAN)	0.04
4.46	STANDARD DEVIATION	1.76
0.07	STD ERROR (STD DEV)	0.03
61.00	MINIMUM	24.02
94.70	MAXIMUM	37.28
SKEWNESS		0.13
KURTOSIS		3.17
COEFFICIENT OF VARIATION		5.7%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
84.59	MEAN	33.30
0.07	STD ERROR (MEAN)	0.03
4.65	STANDARD DEVIATION	1.83
0.05	STD ERROR (STD DEV)	0.02
70.20	MINIMUM	27.64
103.10	MAXIMUM	40.59
SKEWNESS		0.20
KURTOSIS		3.11
COEFFICIENT OF VARIATION		5.5%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	60.55	- 61.55		
1	0.05	2	0.10	61.55	- 62.55		
0	0.00	2	0.10	62.55	- 63.55		
3	0.15	5	0.25	63.55	- 64.55		
1	0.05	6	0.30	64.55	- 65.55		
2	0.10	8	0.40	65.55	- 66.55		
3	0.15	11	0.55	66.55	- 67.55		
10	0.50	21	1.06	67.55	- 68.55		
24	1.21	45	2.27	68.55	- 69.55		
28	1.41	73	3.68	69.55	- 70.55	4	0.10
42	2.11	115	5.79	70.55	- 71.55	5	0.12
73	3.68	188	9.47	71.55	- 72.55	6	0.15
89	4.48	277	13.95	72.55	- 73.55	11	0.27
125	6.29	402	20.24	73.55	- 74.55	14	0.34
156	7.85	558	28.10	74.55	- 75.55	30	0.73
168	8.46	726	36.56	75.55	- 76.55	74	1.81
193	9.72	919	46.27	76.55	- 77.55	106	2.60
176	8.86	1095	55.14	77.55	- 78.55	127	3.11
157	7.91	1252	63.04	78.55	- 79.55	176	4.31
153	7.70	1405	70.75	79.55	- 80.55	238	5.83
128	6.45	1533	77.19	80.55	- 81.55	277	6.79
112	5.64	1645	82.83	81.55	- 82.55	350	8.57
103	5.19	1748	88.02	82.55	- 83.55	322	7.89
70	3.52	1818	91.54	83.55	- 84.55	334	8.18
63	3.17	1881	94.71	84.55	- 85.55	321	7.86
33	1.66	1914	96.37	85.55	- 86.55	353	8.65
31	1.56	1945	97.94	86.55	- 87.55	311	7.62
19	0.96	1964	98.89	87.55	- 88.55	253	6.20
6	0.30	1970	99.19	88.55	- 89.55	192	4.70
5	0.25	1975	99.45	89.55	- 90.55	154	3.77
6	0.30	1981	99.75	90.55	- 91.55	134	3.28
2	0.10	1983	99.85	91.55	- 92.55	94	2.30
2	0.10	1985	99.95	92.55	- 93.55	61	1.49
0	0.00	1985	99.95	93.55	- 94.55	45	1.10
1	0.05	1986	100.00	94.55	- 95.55	34	0.83
				95.55	- 96.55	26	0.64
				96.55	- 97.55	15	0.37
				97.55	- 98.55	5	0.12
				98.55	- 99.55	2	0.05
				99.55	- 100.55	1	0.02
				100.55	- 101.55	4	0.10
				101.55	- 102.55	2	0.05
				102.55	- 103.55	1	0.02

(28) CROTCH LENGTH (OMPHALION)

The distance between the abdomen at the level of the omphalion landmark to the same level on the back is measured with a tape passing through the crotch to the right of the genitalia. The tape is held vertically both in front and in back. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
52.70	20.75	1ST	52.20	20.55
54.20	21.34	2ND	53.20	20.94
54.60	21.50	3RD	54.00	21.26
55.30	21.77	5TH	54.90	21.61
56.70	22.32	10TH	56.40	22.20
57.80	22.76	15TH	57.40	22.60
58.50	23.03	20TH	58.30	22.95
59.10	23.27	25TH	59.00	23.23
59.70	23.50	30TH	59.80	23.54
60.30	23.74	35TH	60.30	23.74
60.80	23.94	40TH	60.80	23.94
61.40	24.17	45TH	61.40	24.17
61.90	24.37	50TH	62.00	24.41
62.40	24.57	55TH	62.70	24.69
63.00	24.80	60TH	63.20	24.88
63.50	25.00	65TH	63.80	25.12
64.20	25.28	70TH	64.50	25.39
64.90	25.55	75TH	65.20	25.67
65.70	25.87	80TH	66.00	25.98
66.70	26.26	85TH	67.10	26.42
67.60	26.61	90TH	68.40	26.93
69.20	27.24	95TH	70.10	27.60
70.40	27.72	97TH	71.50	28.15
71.20	28.03	98TH	72.40	28.50
72.30	28.46	99TH	74.00	29.13

(28) CROTCH LENGTH (OMPHALION)

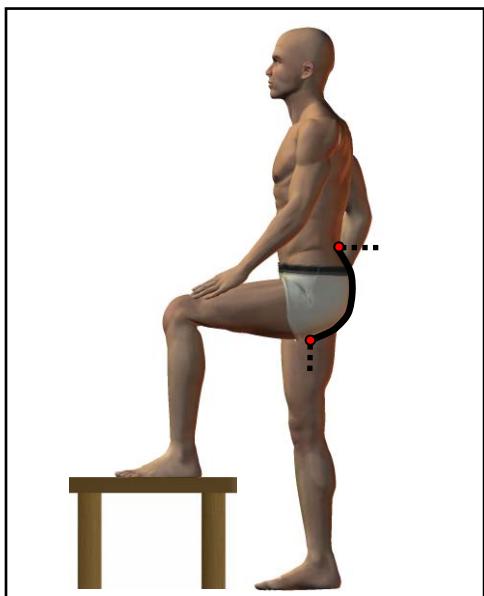
FEMALES		
<u>CM</u>		<u>IN</u>
62.08	MEAN	24.44
0.10	STD ERROR (MEAN)	0.04
4.24	STANDARD DEVIATION	1.67
0.07	STD ERROR (STD DEV)	0.03
49.50	MINIMUM	19.49
77.90	MAXIMUM	30.67
SKEWNESS		0.21
KURTOSIS		2.96
COEFFICIENT OF VARIATION		6.8%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
62.23	MEAN	24.50
0.07	STD ERROR (MEAN)	0.03
4.67	STANDARD DEVIATION	1.84
0.05	STD ERROR (STD DEV)	0.02
47.30	MINIMUM	18.62
79.90	MAXIMUM	31.46
SKEWNESS		0.26
KURTOSIS		3.10
COEFFICIENT OF VARIATION		7.5%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	47.25	-	48.00	2
2	0.10	4	0.20	48.00	-	48.75	0
4	0.20	8	0.40	48.75	-	49.50	1
9	0.45	17	0.86	49.50	-	50.25	4
9	0.45	26	1.31	50.25	-	51.00	6
8	0.40	34	1.71	51.00	-	51.75	14
30	1.51	64	3.22	51.75	-	52.50	20
46	2.32	110	5.54	52.50	-	53.25	36
46	2.32	156	7.85	53.25	-	54.00	37
57	2.87	213	10.73	54.00	-	54.75	70
77	3.88	290	14.60	54.75	-	55.50	68
97	4.88	387	19.49	55.50	-	56.25	120
128	6.45	515	25.93	56.25	-	57.00	130
123	6.19	638	32.12	57.00	-	57.75	195
146	7.35	784	39.48	57.75	-	58.50	172
114	5.74	898	45.22	58.50	-	59.25	211
163	8.21	1061	53.42	59.25	-	60.00	215
112	5.64	1173	59.06	60.00	-	60.75	298
156	7.85	1329	66.92	60.75	-	61.50	262
96	4.83	1425	71.75	61.50	-	62.25	206
102	5.14	1527	76.89	62.25	-	63.75	252
81	4.08	1608	80.97	63.75	-	64.50	226
89	4.48	1697	85.45	64.50	-	66.00	187
71	3.58	1768	89.02	66.00	-	66.75	149
68	3.42	1836	92.45	66.75	-	67.50	131
33	1.66	1869	94.11	67.50	-	68.25	123
39	1.96	1908	96.07	68.25	-	69.00	92
20	1.01	1928	97.08	69.00	-	69.75	91
19	0.96	1947	98.04	69.75	-	70.50	65
15	0.76	1962	98.79	70.50	-	71.25	47
10	0.50	1972	99.30	71.25	-	72.00	31
3	0.15	1975	99.45	72.00	-	72.75	35
4	0.20	1979	99.65	72.75	-	73.50	14
1	0.05	1980	99.70	73.50	-	74.25	17
2	0.10	1982	99.80	74.25	-	75.00	6
2	0.10	1984	99.90	75.00	-	75.75	13
1	0.05	1985	99.95	75.75	-	76.50	6
1	0.05	1986	100.00	76.50	-	77.25	3
				77.25	-	78.00	3
				78.00	-	78.75	3
				78.75	-	79.50	0
				79.50	-	80.25	3

(29) CROTCH LENGTH, POSTERIOR (OMPHALION)

The surface distance from the crotch at the inner thigh landmark to the omphalion posterior landmark is measured with a tape. The tape passes between the buttocks to the back of the waist. The participant stands with the left foot on a platform so that the knee is flexed.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
27.80	10.94	1ST	29.30	11.54	
28.60	11.26	2ND	29.80	11.73	
29.00	11.42	3RD	30.20	11.89	
29.70	11.69	5TH	30.90	12.17	
30.60	12.05	10TH	31.90	12.56	
31.20	12.28	15TH	32.50	12.80	
31.70	12.48	20TH	33.00	12.99	
32.10	12.64	25TH	33.50	13.19	
32.50	12.80	30TH	33.90	13.35	
33.00	12.99	35TH	34.30	13.50	
33.40	13.15	40TH	34.70	13.66	
33.80	13.31	45TH	35.10	13.82	
34.10	13.43	50TH	35.50	13.98	
34.50	13.58	55TH	35.90	14.13	
34.90	13.74	60TH	36.30	14.29	
35.30	13.90	65TH	36.70	14.45	
35.70	14.06	70TH	37.10	14.61	
36.10	14.21	75TH	37.60	14.80	
36.50	14.37	80TH	38.10	15.00	
37.20	14.65	85TH	38.70	15.24	
37.90	14.92	90TH	39.50	15.55	
39.00	15.35	95TH	40.60	15.98	
39.60	15.59	97TH	41.30	16.26	
40.20	15.83	98TH	41.80	16.46	
40.80	16.06	99TH	42.70	16.81	

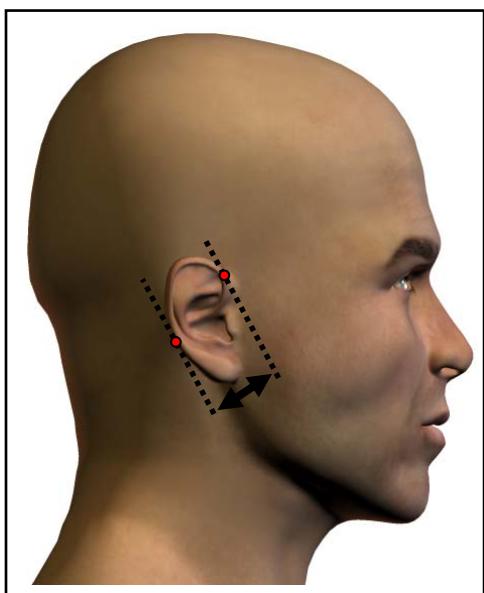
(29) CROTCH LENGTH, POSTERIOR (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
34.19	13.46		35.59	14.01	
0.06	STD ERROR (MEAN)	0.03	0.05	STD ERROR (MEAN)	0.02
2.86	STANDARD DEVIATION	1.13	2.95	STANDARD DEVIATION	1.16
0.05	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
24.30	MINIMUM	9.57	26.10	MINIMUM	10.28
45.10	MAXIMUM	17.76	46.80	MAXIMUM	18.43
SKEWNESS		0.15	SKEWNESS		0.18
KURTOSIS		3.04	KURTOSIS		2.83
COEFFICIENT OF VARIATION		8.4%	COEFFICIENT OF VARIATION		8.3%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	24.25	-	24.75	
0	0.00	2	0.10	24.75	-	25.25	
0	0.00	2	0.10	25.25	-	25.75	
0	0.00	2	0.10	25.75	-	26.25	
3	0.15	5	0.25	26.25	-	26.75	
3	0.15	8	0.40	26.75	-	27.25	
10	0.50	18	0.91	27.25	-	27.75	
13	0.65	31	1.56	27.75	-	28.25	
14	0.70	45	2.27	28.25	-	28.75	
20	1.01	65	3.27	28.75	-	29.25	
40	2.01	105	5.29	29.25	-	29.75	
59	2.97	164	8.26	29.75	-	30.25	
53	2.67	217	10.93	30.25	-	30.75	
90	4.53	307	15.46	30.75	-	31.25	
100	5.04	407	20.49	31.25	-	31.75	
118	5.94	525	26.44	31.75	-	32.25	
101	5.09	626	31.52	32.25	-	32.75	
124	6.24	750	37.76	32.75	-	33.25	
130	6.55	880	44.31	33.25	-	33.75	
156	7.85	1036	52.17	33.75	-	34.25	
123	6.19	1159	58.36	34.25	-	34.75	
124	6.24	1283	64.60	34.75	-	35.25	
119	5.99	1402	70.59	35.25	-	35.75	
115	5.79	1517	76.38	35.75	-	36.25	
105	5.29	1622	81.67	36.25	-	36.75	
77	3.88	1699	85.55	36.75	-	37.25	
74	3.73	1773	89.27	37.25	-	37.75	
51	2.57	1824	91.84	37.75	-	38.25	
42	2.11	1866	93.96	38.25	-	38.75	
41	2.06	1907	96.02	38.75	-	39.25	
24	1.21	1931	97.23	39.25	-	39.75	
21	1.06	1952	98.29	39.75	-	40.25	
12	0.60	1964	98.89	40.25	-	40.75	
7	0.35	1971	99.24	40.75	-	41.25	
4	0.20	1975	99.45	41.25	-	41.75	
4	0.20	1979	99.65	41.75	-	42.25	
2	0.10	1981	99.75	42.25	-	42.75	
2	0.10	1983	99.85	42.75	-	43.25	
0	0.00	1983	99.85	43.25	-	43.75	
0	0.00	1983	99.85	43.75	-	44.25	
0	0.00	1983	99.85	44.25	-	44.75	
3	0.15	1986	100.00	44.75	-	45.25	
				45.25	-	45.75	
				45.75	-	46.25	
				46.25	-	46.75	
				46.75	-	47.25	

(30) EAR BREADTH

The maximum breadth of the right ear perpendicular to its long axis is measured with a sliding caliper.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
2.70	1.06	1ST	2.90	1.14	
2.80	1.10	2ND	3.00	1.18	
2.80	1.10	3RD	3.00	1.18	
2.90	1.14	5TH	3.10	1.22	
3.00	1.18	10TH	3.20	1.26	
3.00	1.18	15TH	3.30	1.30	
3.10	1.22	20TH	3.40	1.34	
3.10	1.22	25TH	3.40	1.34	
3.20	1.26	30TH	3.40	1.34	
3.20	1.26	35TH	3.50	1.38	
3.30	1.30	40TH	3.50	1.38	
3.30	1.30	45TH	3.60	1.42	
3.30	1.30	50TH	3.60	1.42	
3.40	1.34	55TH	3.60	1.42	
3.40	1.34	60TH	3.70	1.46	
3.40	1.34	65TH	3.70	1.46	
3.50	1.38	70TH	3.80	1.50	
3.50	1.38	75TH	3.80	1.50	
3.50	1.38	80TH	3.90	1.54	
3.60	1.42	85TH	3.90	1.54	
3.70	1.46	90TH	4.00	1.57	
3.80	1.50	95TH	4.10	1.61	
3.90	1.54	97TH	4.20	1.65	
3.90	1.54	98TH	4.30	1.69	
4.00	1.57	99TH	4.40	1.73	

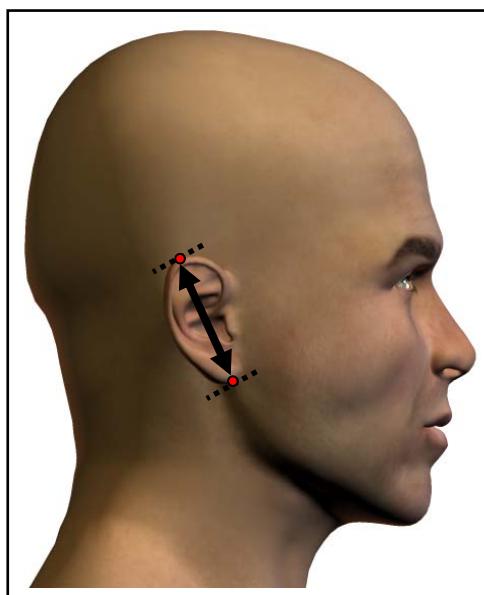
(30) EAR BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
3.32	MEAN	1.31	3.61	MEAN	1.42
0.01	STD ERROR (MEAN)	0.00	0.00	STD ERROR (MEAN)	0.00
0.28	STANDARD DEVIATION	0.11	0.30	STANDARD DEVIATION	0.12
0.00	STD ERROR (STD DEV)	0.00	0.00	STD ERROR (STD DEV)	0.00
2.50	MINIMUM	0.98	2.60	MINIMUM	1.02
4.20	MAXIMUM	1.65	4.60	MAXIMUM	1.81
SKEWNESS		0.08	SKEWNESS		0.15
KURTOSIS		2.87	KURTOSIS		3.13
COEFFICIENT OF VARIATION		8.3%	COEFFICIENT OF VARIATION		8.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	2.45	-	2.55	
2	0.10	5	0.25	2.55	-	2.65	2
26	1.31	31	1.56	2.65	-	2.75	4
48	2.42	79	3.98	2.75	-	2.85	14
113	5.69	192	9.67	2.85	-	2.95	35
151	7.60	343	17.27	2.95	-	3.05	68
190	9.57	533	26.84	3.05	-	3.15	117
235	11.83	768	38.67	3.15	-	3.25	197
304	15.31	1072	53.98	3.25	-	3.35	361
285	14.35	1357	68.33	3.35	-	3.45	471
245	12.34	1602	80.66	3.45	-	3.55	521
151	7.60	1753	88.27	3.55	-	3.65	505
103	5.19	1856	93.45	3.65	-	3.75	550
69	3.47	1925	96.93	3.75	-	3.85	401
32	1.61	1957	98.54	3.85	-	3.95	305
20	1.01	1977	99.55	3.95	-	4.05	245
7	0.35	1984	99.90	4.05	-	4.15	133
2	0.10	1986	100.00	4.15	-	4.25	67
				4.25	-	4.35	37
				4.35	-	4.45	27
				4.45	-	4.55	14
				4.55	-	4.65	8

(31) EAR LENGTH

The length of the right ear, from its highest to lowest points on a line parallel to the long axis of the ear, is measured with a sliding caliper.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>		
5.00	1.97	1ST	5.40	2.13	
5.20	2.05	2ND	5.60	2.20	
5.30	2.09	3RD	5.60	2.20	
5.30	2.09	5TH	5.70	2.24	
5.50	2.17	10TH	5.80	2.28	
5.50	2.17	15TH	6.00	2.36	
5.60	2.20	20TH	6.00	2.36	
5.70	2.24	25TH	6.10	2.40	
5.70	2.24	30TH	6.20	2.44	
5.80	2.28	35TH	6.20	2.44	
5.80	2.28	40TH	6.30	2.48	
5.90	2.32	45TH	6.40	2.52	
6.00	2.36	50TH	6.40	2.52	
6.00	2.36	55TH	6.50	2.56	
6.00	2.36	60TH	6.50	2.56	
6.10	2.40	65TH	6.60	2.60	
6.10	2.40	70TH	6.70	2.64	
6.20	2.44	75TH	6.70	2.64	
6.30	2.48	80TH	6.80	2.68	
6.40	2.52	85TH	6.90	2.72	
6.40	2.52	90TH	7.00	2.76	
6.60	2.60	95TH	7.20	2.83	
6.70	2.64	97TH	7.30	2.87	
6.70	2.64	98TH	7.40	2.91	
6.90	2.72	99TH	7.50	2.95	

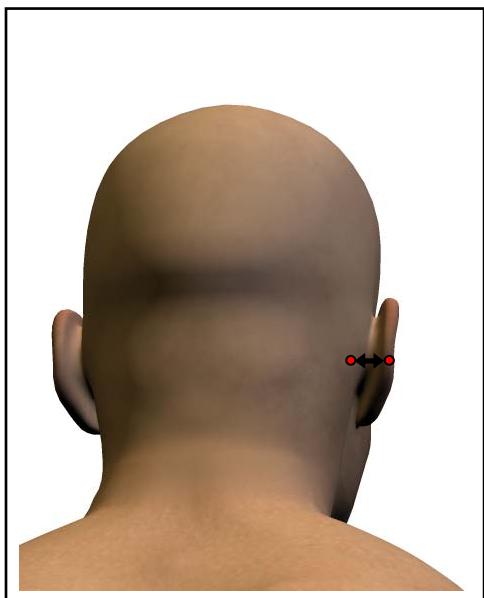
(31) EAR LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
5.94	STD ERROR (MEAN)	0.00	6.42	STD ERROR (MEAN)	2.53
0.01	STANDARD DEVIATION	0.15	0.01	STANDARD DEVIATION	0.00
0.39	STD ERROR (STD DEV)	0.00	0.45	STD ERROR (STD DEV)	0.18
0.01	MINIMUM	1.81	5.00	MINIMUM	1.97
4.60	MAXIMUM	2.91	8.10	MAXIMUM	3.19
SKEWNESS		0.09	SKEWNESS		0.16
KURTOSIS		3.02	KURTOSIS		2.94
COEFFICIENT OF VARIATION		6.5%	COEFFICIENT OF VARIATION		7.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
2	0.10	2	0.10	4.55	-
2	0.10	4	0.20	4.65	-
3	0.15	7	0.35	4.75	-
4	0.20	11	0.55	4.85	-
10	0.50	21	1.06	4.95	-
11	0.55	32	1.61	5.05	-
26	1.31	58	2.92	5.15	-
50	2.52	108	5.44	5.25	-
86	4.33	194	9.77	5.35	-
138	6.95	332	16.72	5.45	-
121	6.09	453	22.81	5.55	-
194	9.77	647	32.58	5.65	-
207	10.42	854	43.00	5.75	-
137	6.90	991	49.90	5.85	-
293	14.75	1284	64.65	5.95	-
153	7.70	1437	72.36	6.05	-
132	6.65	1569	79.00	6.15	-
97	4.88	1666	83.89	6.25	-
123	6.19	1789	90.08	6.35	-
82	4.13	1871	94.21	6.45	-
45	2.27	1916	96.48	6.55	-
31	1.56	1947	98.04	6.65	-
19	0.96	1966	98.99	6.75	-
12	0.60	1978	99.60	6.85	-
4	0.20	1982	99.80	6.95	-
3	0.15	1985	99.95	7.05	-
0	0.00	1985	99.95	7.15	-
0	0.00	1985	99.95	7.25	-
1	0.05	1986	100.00	7.35	-
				7.45	-
				7.55	-
				7.65	-
				7.75	-
				7.85	-
				7.95	-
				8.05	-

(32) EAR PROTRUSION

The horizontal distance between the mastoid process and the outside edge of the right ear at its most lateral point is measured using a sliding caliper with its slide reversed.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
1.50	0.59	1ST	1.70	0.67	
1.60	0.63	2ND	1.80	0.71	
1.60	0.63	3RD	1.80	0.71	
1.60	0.63	5TH	1.90	0.75	
1.70	0.67	10TH	1.90	0.75	
1.80	0.71	15TH	2.00	0.79	
1.80	0.71	20TH	2.10	0.83	
1.90	0.75	25TH	2.10	0.83	
1.90	0.75	30TH	2.20	0.87	
1.90	0.75	35TH	2.20	0.87	
2.00	0.79	40TH	2.20	0.87	
2.00	0.79	45TH	2.30	0.91	
2.00	0.79	50TH	2.30	0.91	
2.00	0.79	55TH	2.30	0.91	
2.10	0.83	60TH	2.40	0.94	
2.10	0.83	65TH	2.40	0.94	
2.20	0.87	70TH	2.50	0.98	
2.20	0.87	75TH	2.50	0.98	
2.30	0.91	80TH	2.60	1.02	
2.30	0.91	85TH	2.60	1.02	
2.40	0.94	90TH	2.70	1.06	
2.50	0.98	95TH	2.80	1.10	
2.60	1.02	97TH	2.90	1.14	
2.60	1.02	98TH	3.00	1.18	
2.70	1.06	99TH	3.10	1.22	

(32) EAR PROTRUSION

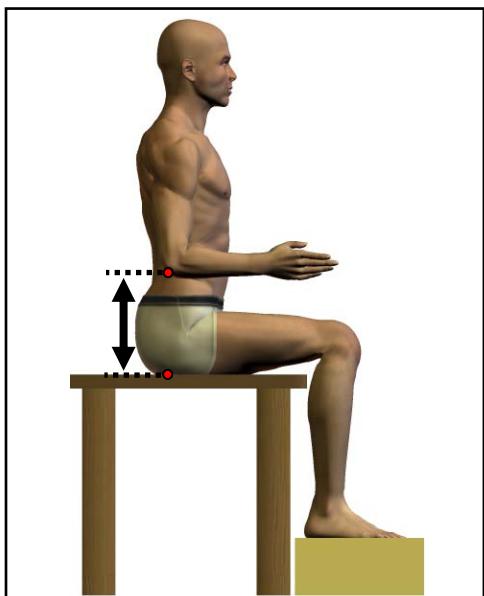
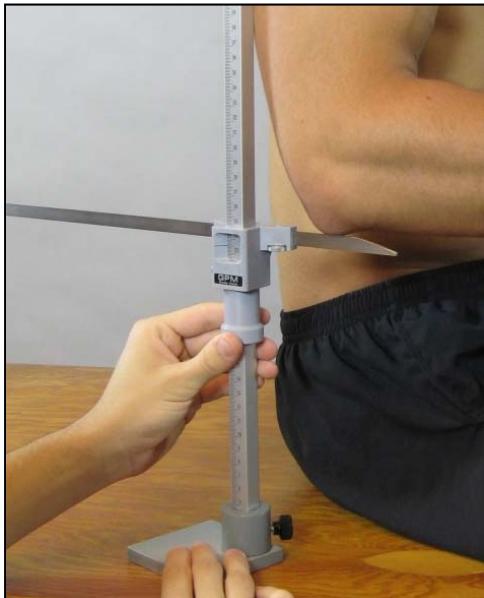
FEMALES		
<u>CM</u>		<u>IN</u>
2.04	MEAN	0.80
0.01	STD ERROR (MEAN)	0.00
0.27	STANDARD DEVIATION	0.10
0.00	STD ERROR (STD DEV)	0.00
1.30	MINIMUM	0.51
3.10	MAXIMUM	1.22
SKEWNESS		0.45
KURTOSIS		3.44
COEFFICIENT OF VARIATION		13.0%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
2.32	MEAN	0.91
0.00	STD ERROR (MEAN)	0.00
0.30	STANDARD DEVIATION	0.12
0.00	STD ERROR (STD DEV)	0.00
1.40	MINIMUM	0.55
3.40	MAXIMUM	1.34
SKEWNESS		0.30
KURTOSIS		3.07
COEFFICIENT OF VARIATION		12.9%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	1.25	-	1.35	
5	0.25	8	0.40	1.35	-	1.45	
28	1.41	36	1.81	1.45	-	1.55	
68	3.42	104	5.24	1.55	-	1.65	
166	8.36	270	13.60	1.65	-	1.75	
196	9.87	466	23.46	1.75	-	1.85	
300	15.11	766	38.57	1.85	-	1.95	
345	17.37	1111	55.94	1.95	-	2.05	
253	12.74	1364	68.68	2.05	-	2.15	
220	11.08	1584	79.76	2.15	-	2.25	
150	7.55	1734	87.31	2.25	-	2.35	
117	5.89	1851	93.20	2.35	-	2.45	
67	3.37	1918	96.58	2.45	-	2.55	
31	1.56	1949	98.14	2.55	-	2.65	
19	0.96	1968	99.09	2.65	-	2.75	
7	0.35	1975	99.45	2.75	-	2.85	
4	0.20	1979	99.65	2.85	-	2.95	
4	0.20	1983	99.85	2.95	-	3.05	
3	0.15	1986	100.00	3.05	-	3.15	
				3.15	-	3.25	
				3.25	-	3.35	
				3.35	-	3.45	

(33) ELBOW REST HEIGHT

The vertical distance between a sitting surface and the olecranon, bottom landmark on the flexed right elbow, is measured with an anthropometer. The participant sits erect, looking straight ahead. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
17.20	6.77	1ST	17.60	6.93	
17.70	6.97	2ND	18.30	7.20	
18.20	7.17	3RD	18.80	7.40	
18.90	7.44	5TH	19.70	7.76	
19.80	7.80	10TH	20.80	8.19	
20.40	8.03	15TH	21.60	8.50	
21.00	8.27	20TH	22.10	8.70	
21.50	8.46	25TH	22.60	8.90	
21.90	8.62	30TH	23.00	9.06	
22.30	8.78	35TH	23.40	9.21	
22.60	8.90	40TH	23.80	9.37	
22.90	9.02	45TH	24.20	9.53	
23.30	9.17	50TH	24.60	9.69	
23.60	9.29	55TH	25.00	9.84	
23.90	9.41	60TH	25.30	9.96	
24.30	9.57	65TH	25.70	10.12	
24.70	9.72	70TH	26.10	10.28	
25.10	9.88	75TH	26.50	10.43	
25.50	10.04	80TH	27.00	10.63	
26.00	10.24	85TH	27.50	10.83	
26.50	10.43	90TH	28.20	11.10	
27.60	10.87	95TH	29.10	11.46	
28.10	11.06	97TH	29.80	11.73	
28.50	11.22	98TH	30.20	11.89	
29.30	11.54	99TH	30.90	12.17	

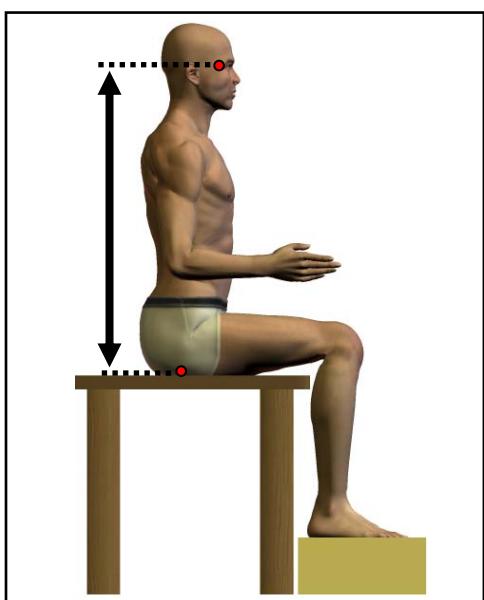
(33) ELBOW REST HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
23.24	STD ERROR (MEAN)	9.15	24.50	STD ERROR (MEAN)	9.65
0.06	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.63	STD ERROR (STD DEV)	1.03	2.87	STD ERROR (STD DEV)	1.13
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
14.50	MAXIMUM	5.71	13.80	MAXIMUM	5.43
31.00		12.20	34.50		13.58
SKEWNESS		-0.07	SKEWNESS		-0.12
KURTOSIS		2.83	KURTOSIS		2.95
COEFFICIENT OF VARIATION		11.3%	COEFFICIENT OF VARIATION		11.7%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	13.75	-	14.25	1
0	0.00	1	0.05	14.25	-	14.75	0
3	0.15	4	0.20	14.75	-	15.25	0
1	0.05	5	0.25	15.25	-	15.75	4
8	0.40	13	0.65	15.75	-	16.25	4
7	0.35	20	1.01	16.25	-	16.75	6
22	1.11	42	2.11	16.75	-	17.25	13
22	1.11	64	3.22	17.25	-	17.75	18
27	1.36	91	4.58	17.75	-	18.25	24
38	1.91	129	6.50	18.25	-	18.75	45
66	3.32	195	9.82	18.75	-	19.25	52
67	3.37	262	13.19	19.25	-	19.75	86
99	4.98	361	18.18	19.75	-	20.25	90
86	4.33	447	22.51	20.25	-	20.75	130
105	5.29	552	27.79	20.75	-	21.25	160
124	6.24	676	34.04	21.25	-	21.75	171
163	8.21	839	42.25	21.75	-	22.25	249
145	7.30	984	49.55	22.25	-	22.75	234
159	8.01	1143	57.55	22.75	-	23.25	256
130	6.55	1273	64.10	23.25	-	23.75	260
131	6.60	1404	70.69	23.75	-	24.25	277
131	6.60	1535	77.29	24.25	-	24.75	271
105	5.29	1640	82.58	24.75	-	25.25	299
95	4.78	1735	87.36	25.25	-	25.75	247
84	4.23	1819	91.59	25.75	-	26.25	227
42	2.11	1861	93.71	26.25	-	26.75	196
40	2.01	1901	95.72	26.75	-	27.25	190
32	1.61	1933	97.33	27.25	-	27.75	144
22	1.11	1955	98.44	27.75	-	28.25	126
11	0.55	1966	98.99	28.25	-	28.75	84
10	0.50	1976	99.50	28.75	-	29.25	44
5	0.25	1981	99.75	29.25	-	29.75	49
4	0.20	1985	99.95	29.75	-	30.25	27
1	0.05	1986	100.00	30.25	-	31.25	16
				31.25	-	31.75	11
				31.75	-	32.25	9
				32.25	-	32.75	6
				32.75	-	33.25	3
				33.25	-	33.75	1
				33.75	-	34.25	0
				34.25	-	34.75	1

(34) EYE HEIGHT, SITTING

The vertical distance between a sitting surface and the ectocanthus landmark is measured with an anthropometer. The participant sits erect with the head in the Frankfurt plane. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The thighs are parallel, and the knees are flexed 90° with the feet in line with the thighs. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
68.10	26.81	1ST	72.80	28.66
68.60	27.01	2ND	73.50	28.94
69.00	27.17	3RD	74.20	29.21
69.80	27.48	5TH	75.00	29.53
70.80	27.87	10TH	76.30	30.04
71.50	28.15	15TH	77.10	30.35
72.20	28.43	20TH	77.70	30.59
72.70	28.62	25TH	78.20	30.79
73.20	28.82	30TH	78.70	30.98
73.60	28.98	35TH	79.10	31.14
74.00	29.13	40TH	79.50	31.30
74.40	29.29	45TH	80.00	31.50
74.80	29.45	50TH	80.40	31.65
75.20	29.61	55TH	80.80	31.81
75.50	29.72	60TH	81.30	32.01
75.90	29.88	65TH	81.70	32.17
76.40	30.08	70TH	82.20	32.36
76.80	30.24	75TH	82.70	32.56
77.40	30.47	80TH	83.20	32.76
78.00	30.71	85TH	83.90	33.03
78.70	30.98	90TH	84.70	33.35
79.90	31.46	95TH	86.00	33.86
80.50	31.69	97TH	86.90	34.21
81.00	31.89	98TH	87.50	34.45
81.60	32.13	99TH	88.30	34.76

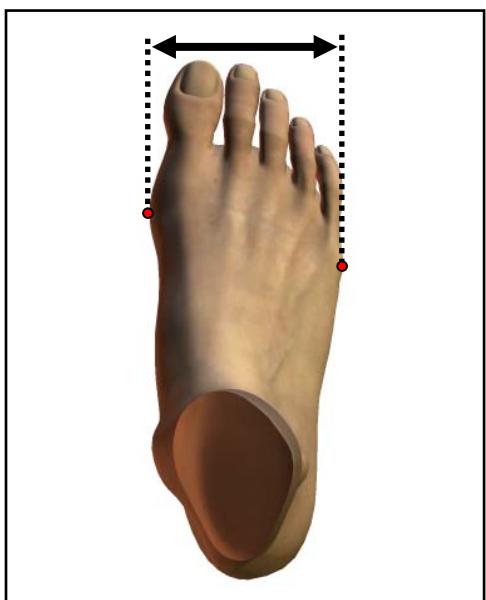
(34) EYE HEIGHT, SITTING

FEMALES			MALES		
CM		IN	CM		IN
74.77	MEAN	29.44	80.45	MEAN	31.67
0.07	STD ERROR (MEAN)	0.03	0.05	STD ERROR (MEAN)	0.02
3.04	STANDARD DEVIATION	1.20	3.32	STANDARD DEVIATION	1.31
0.05	STD ERROR (STD DEV)	0.02	0.04	STD ERROR (STD DEV)	0.01
65.40	MINIMUM	25.75	68.80	MINIMUM	27.09
83.70	MAXIMUM	32.95	91.20	MAXIMUM	35.91
SKEWNESS		-0.01	SKEWNESS		0.04
KURTOSIS		2.77	KURTOSIS		3.05
COEFFICIENT OF VARIATION		4.1%	COEFFICIENT OF VARIATION		4.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
2	0.10	2	0.10	65.25	- 65.75
3	0.15	5	0.25	65.75	- 66.25
3	0.15	8	0.40	66.25	- 66.75
3	0.15	11	0.55	66.75	- 67.25
4	0.20	15	0.76	67.25	- 67.75
11	0.55	26	1.31	67.75	- 68.25
21	1.06	47	2.37	68.25	- 68.75
23	1.16	70	3.52	68.75	- 69.25
23	1.16	93	4.68	69.25	- 69.75
41	2.06	134	6.75	69.75	- 70.25
53	2.67	187	9.42	70.25	- 70.75
67	3.37	254	12.79	70.75	- 71.25
83	4.18	337	16.97	71.25	- 71.75
75	3.78	412	20.75	71.75	- 72.25
99	4.98	511	25.73	72.25	- 72.75
92	4.63	603	30.36	72.75	- 73.25
138	6.95	741	37.31	73.25	- 73.75
120	6.04	861	43.35	73.75	- 74.25
121	6.09	982	49.45	74.25	- 74.75
132	6.65	1114	56.09	74.75	- 75.25
131	6.60	1245	62.69	75.25	- 75.75
110	5.54	1355	68.23	75.75	- 76.25
122	6.14	1477	74.37	76.25	- 76.75
91	4.58	1568	78.95	76.75	- 77.25
89	4.48	1657	83.43	77.25	- 77.75
70	3.52	1727	86.96	77.75	- 78.25
66	3.32	1793	90.28	78.25	- 78.75
44	2.22	1837	92.50	78.75	- 79.25
38	1.91	1875	94.41	79.25	- 79.75
33	1.66	1908	96.07	79.75	- 80.25
26	1.31	1934	97.38	80.25	- 80.75
19	0.96	1953	98.34	80.75	- 81.25
15	0.76	1968	99.09	81.25	- 81.75
12	0.60	1980	99.70	81.75	- 82.25
3	0.15	1983	99.85	82.25	- 82.75
0	0.00	1983	99.85	82.75	- 83.25
3	0.15	1986	100.00	83.25	- 83.75
				83.75	- 84.25
				84.25	- 84.75
				84.75	- 85.25
				85.25	- 85.75
				85.75	- 86.25
				86.25	- 86.75
				86.75	- 87.25
				87.25	- 87.75
				87.75	- 88.25
				88.25	- 88.75
				88.75	- 89.25
				89.25	- 89.75
				89.75	- 90.25
				90.25	- 90.75
				90.75	- 91.25

(35) FOOT BREADTH, HORIZONTAL

The maximum breadth of the right foot is measured with a Brannock Device®. The participant stands with the right foot on the device and the left foot on a board of equal height with the weight distributed equally on both feet. The heel of the right foot lightly touches the back of the device, and the medial side of the right foot is parallel with the long axis of the device. The vertical slide of the device is moved until it lightly touches the fifth metatarsophalangeal protrusion landmark.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
8.20	3.23	1ST	9.10	3.58	
8.40	3.31	2ND	9.20	3.62	
8.40	3.31	3RD	9.20	3.62	
8.50	3.35	5TH	9.40	3.70	
8.70	3.43	10TH	9.50	3.74	
8.80	3.46	15TH	9.70	3.82	
8.90	3.50	20TH	9.80	3.86	
8.90	3.50	25TH	9.80	3.86	
9.00	3.54	30TH	9.90	3.90	
9.10	3.58	35TH	10.00	3.94	
9.10	3.58	40TH	10.00	3.94	
9.20	3.62	45TH	10.10	3.98	
9.30	3.66	50TH	10.20	4.02	
9.30	3.66	55TH	10.20	4.02	
9.40	3.70	60TH	10.30	4.06	
9.40	3.70	65TH	10.40	4.09	
9.50	3.74	70TH	10.40	4.09	
9.60	3.78	75TH	10.50	4.13	
9.70	3.82	80TH	10.60	4.17	
9.80	3.86	85TH	10.70	4.21	
9.90	3.90	90TH	10.90	4.29	
10.10	3.98	95TH	11.10	4.37	
10.20	4.02	97TH	11.20	4.41	
10.30	4.06	98TH	11.40	4.49	
10.40	4.09	99TH	11.50	4.53	

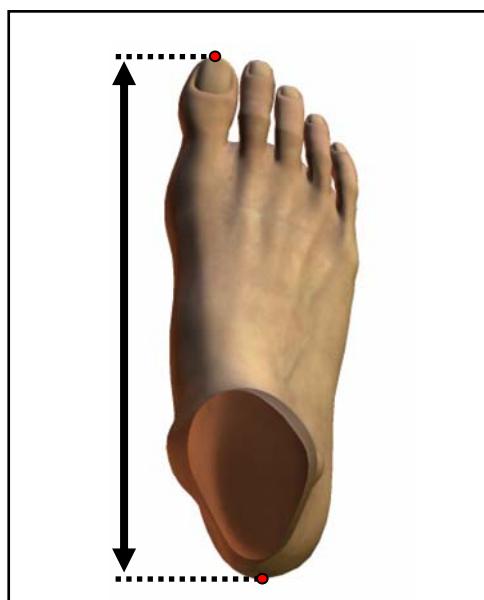
(35) FOOT BREADTH, HORIZONTAL

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
9.27	3.65		10.19	4.01	
0.01	STD ERROR (MEAN)	0.00	0.01	STD ERROR (MEAN)	0.00
0.48	STANDARD DEVIATION	0.19	0.52	STANDARD DEVIATION	0.21
0.01	STD ERROR (STD DEV)	0.00	0.01	STD ERROR (STD DEV)	0.00
7.70	MINIMUM	3.03	7.90	MINIMUM	3.11
10.80	MAXIMUM	4.25	12.60	MAXIMUM	4.96
SKEWNESS		0.12	SKEWNESS		0.27
KURTOSIS		2.92	KURTOSIS		3.54
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		5.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	7.65	-	7.75	
1	0.05	4	0.20	7.75	-	7.85	
1	0.05	5	0.25	7.85	-	7.95	
2	0.10	7	0.35	7.95	-	8.05	
5	0.25	12	0.60	8.05	-	8.15	
8	0.40	20	1.01	8.15	-	8.25	
16	0.81	36	1.81	8.25	-	8.35	
35	1.76	71	3.58	8.35	-	8.45	
52	2.62	123	6.19	8.45	-	8.55	
55	2.77	178	8.96	8.55	-	8.65	
97	4.88	275	13.85	8.65	-	8.75	
113	5.69	388	19.54	8.75	-	8.85	
134	6.75	522	26.28	8.85	-	8.95	
145	7.30	667	33.59	8.95	-	9.05	
145	7.30	812	40.89	9.05	-	9.15	
159	8.01	971	48.89	9.15	-	9.25	
157	7.91	1128	56.80	9.25	-	9.35	
176	8.86	1304	65.66	9.35	-	9.45	
138	6.95	1442	72.61	9.45	-	9.55	
105	5.29	1547	77.90	9.55	-	9.65	
127	6.39	1674	84.29	9.65	-	9.75	
72	3.63	1746	87.92	9.75	-	9.85	
78	3.93	1824	91.84	9.85	-	9.95	
58	2.92	1882	94.76	9.95	-	10.05	
29	1.46	1911	96.22	10.05	-	10.15	
29	1.46	1940	97.68	10.15	-	10.25	
17	0.86	1957	98.54	10.25	-	10.35	
15	0.76	1972	99.30	10.35	-	10.45	
5	0.25	1977	99.55	10.45	-	10.55	
4	0.20	1981	99.75	10.55	-	10.65	
2	0.10	1983	99.85	10.65	-	10.75	
3	0.15	1986	100.00	10.75	-	10.85	
				10.85	-	10.95	
				10.95	-	11.05	
				11.05	-	11.15	
				11.15	-	11.25	
				11.25	-	11.35	
				11.35	-	11.45	
				11.45	-	11.55	
				11.55	-	11.65	
				11.65	-	11.75	
				11.75	-	11.85	
				11.85	-	11.95	
				11.95	-	12.05	
				12.05	-	12.15	
				12.15	-	12.25	
				12.25	-	12.35	
				12.35	-	12.45	
				12.45	-	12.55	
				12.55	-	12.65	

(36) FOOT LENGTH

The maximum length of the right foot is measured with a Brannock Device®. The participant stands with the right foot on the device and the left foot on a board of equal height with the weight distributed equally on both feet. The heel of the right foot lightly touches the back of the device, and the medial side of the right foot is parallel with the long axis of the device. A block is placed against the tip of the longest toe to establish the measurement on the scale of the device.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
21.90	8.62	1ST	24.20	9.53	
22.20	8.74	2ND	24.40	9.61	
22.40	8.82	3RD	24.70	9.72	
22.60	8.90	5TH	25.00	9.84	
23.00	9.06	10TH	25.40	10.00	
23.30	9.17	15TH	25.70	10.12	
23.60	9.29	20TH	26.00	10.24	
23.80	9.37	25TH	26.30	10.35	
23.90	9.41	30TH	26.40	10.39	
24.10	9.49	35TH	26.60	10.47	
24.30	9.57	40TH	26.80	10.55	
24.40	9.61	45TH	26.90	10.59	
24.60	9.69	50TH	27.10	10.67	
24.80	9.76	55TH	27.30	10.75	
24.90	9.80	60TH	27.40	10.79	
25.10	9.88	65TH	27.60	10.87	
25.30	9.96	70TH	27.80	10.94	
25.40	10.00	75TH	28.00	11.02	
25.70	10.12	80TH	28.20	11.10	
25.90	10.20	85TH	28.50	11.22	
26.30	10.35	90TH	28.80	11.34	
26.80	10.55	95TH	29.30	11.54	
27.10	10.67	97TH	29.60	11.65	
27.30	10.75	98TH	29.90	11.77	
27.60	10.87	99TH	30.20	11.89	

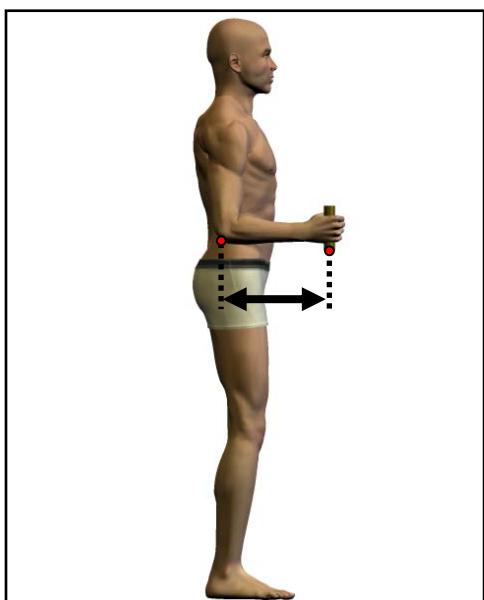
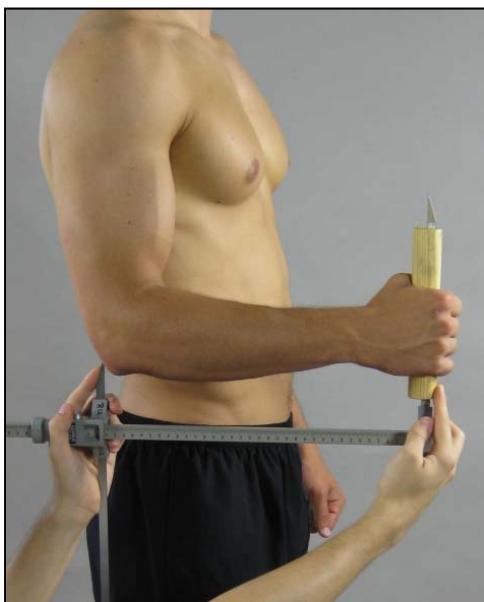
(36) FOOT LENGTH

FEMALES			MALES		
CM		IN	CM		IN
24.63	MEAN	9.70	27.12	MEAN	10.68
0.03	STD ERROR (MEAN)	0.01	0.02	STD ERROR (MEAN)	0.01
1.24	STANDARD DEVIATION	0.49	1.31	STANDARD DEVIATION	0.52
0.02	STD ERROR (STD DEV)	0.01	0.01	STD ERROR (STD DEV)	0.01
19.80	MINIMUM	7.80	21.60	MINIMUM	8.50
28.60	MAXIMUM	11.26	32.30	MAXIMUM	12.72
SKEWNESS		0.11	SKEWNESS		0.05
KURTOSIS		2.93	KURTOSIS		3.06
COEFFICIENT OF VARIATION		5.0%	COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	19.60	- 19.85
0	0.00	1	0.05	19.85	- 20.10
0	0.00	1	0.05	20.10	- 20.35
0	0.00	1	0.05	20.35	- 20.60
0	0.00	1	0.05	20.60	- 20.85
1	0.05	2	0.10	20.85	- 21.10
2	0.10	4	0.20	21.10	- 21.35
4	0.20	8	0.40	21.35	- 21.60
9	0.45	17	0.86	21.60	- 21.85
11	0.55	28	1.41	21.85	- 22.10
27	1.36	55	2.77	22.10	- 22.35
30	1.51	85	4.28	22.35	- 22.60
67	3.37	152	7.65	22.60	- 22.85
58	2.92	210	10.57	22.85	- 23.10
89	4.48	299	15.06	23.10	- 23.35
92	4.63	391	19.69	23.35	- 23.60
163	8.21	554	27.90	23.60	- 23.85
102	5.14	656	33.03	23.85	- 24.10
173	8.71	829	41.74	24.10	- 24.35
135	6.80	964	48.54	24.35	- 24.60
175	8.81	1139	57.35	24.60	- 24.85
124	6.24	1263	63.60	24.85	- 25.10
183	9.21	1446	72.81	25.10	- 25.35
91	4.58	1537	77.39	25.35	- 25.60
135	6.80	1672	84.19	25.60	- 25.85
66	3.32	1738	87.51	25.85	- 26.10
71	3.58	1809	91.09	26.10	- 26.35
46	2.32	1855	93.40	26.35	- 26.60
49	2.47	1904	95.87	26.60	- 26.85
22	1.11	1926	96.98	26.85	- 27.10
21	1.06	1947	98.04	27.10	- 27.35
18	0.91	1965	98.94	27.35	- 27.60
10	0.50	1975	99.45	27.60	- 27.85
5	0.25	1980	99.70	27.85	- 28.10
4	0.20	1984	99.90	28.10	- 28.35
1	0.05	1985	99.95	28.35	- 28.60
1	0.05	1986	100.00	28.60	- 28.85
				28.85	- 29.10
				29.10	- 29.35
				29.35	- 29.60
				29.60	- 29.85
				29.85	- 30.10
				30.10	- 30.35
				30.35	- 30.60
				30.60	- 30.85
				30.85	- 31.10
				31.10	- 31.35
				31.35	- 31.60
				31.60	- 31.85
				31.85	- 32.10
				32.10	- 32.35

(37) FOREARM-CENTER OF GRIP LENGTH

The horizontal distance between the olecranon rear landmark and the center of a 1-1/4"-diameter dowel gripped in the right hand is measured with a beam caliper. The participant stands erect with the upper arms hanging at the side and the right elbow flexed 90°. The hand grips a 1-1/4"-diameter dowel placed on the fixed blade of a beam caliper. The hand gripping the dowel should be in line with the long axis of the arm.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
27.90	10.98	1ST	31.00	12.20	
28.30	11.14	2ND	31.40	12.36	
28.60	11.26	3RD	31.70	12.48	
29.00	11.42	5TH	32.00	12.60	
29.60	11.65	10TH	32.60	12.83	
30.00	11.81	15TH	33.00	12.99	
30.30	11.93	20TH	33.40	13.15	
30.60	12.05	25TH	33.70	13.27	
30.80	12.13	30TH	33.90	13.35	
31.00	12.20	35TH	34.20	13.46	
31.20	12.28	40TH	34.40	13.54	
31.40	12.36	45TH	34.60	13.62	
31.60	12.44	50TH	34.80	13.70	
31.80	12.52	55TH	35.10	13.82	
32.10	12.64	60TH	35.30	13.90	
32.30	12.72	65TH	35.60	14.02	
32.50	12.80	70TH	35.80	14.09	
32.90	12.95	75TH	36.10	14.21	
33.20	13.07	80TH	36.40	14.33	
33.60	13.23	85TH	36.70	14.45	
34.10	13.43	90TH	37.20	14.65	
35.00	13.78	95TH	37.90	14.92	
35.40	13.94	97TH	38.50	15.16	
35.80	14.09	98TH	38.90	15.31	
36.40	14.33	99TH	39.50	15.55	

(37) FOREARM-CENTER OF GRIP LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
31.77	12.51		34.90	13.74	
0.04	0.02		0.03	0.01	
1.80	0.71		1.80	0.71	
0.03	0.01		0.02	0.01	
25.80	10.16		29.00	11.42	
39.20	15.43		41.60	16.38	
SKEWNESS	0.30		SKEWNESS	0.20	
KURTOSIS	3.28		KURTOSIS	3.15	
COEFFICIENT OF VARIATION	5.7%		COEFFICIENT OF VARIATION	5.2%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	25.65	-	26.00	
0	0.00	2	0.10	26.00	-	26.35	
2	0.10	4	0.20	26.35	-	26.70	
5	0.25	9	0.45	26.70	-	27.05	
0	0.00	9	0.45	27.05	-	27.40	
7	0.35	16	0.81	27.40	-	27.75	
13	0.65	29	1.46	27.75	-	28.10	
25	1.26	54	2.72	28.10	-	28.45	
18	0.91	72	3.63	28.45	-	28.80	
42	2.11	114	5.74	28.80	-	29.15	3 0.07
46	2.32	160	8.06	29.15	-	29.50	0 0.00
105	5.29	265	13.34	29.50	-	29.85	4 0.10
75	3.78	340	17.12	29.85	-	30.20	6 0.15
151	7.60	491	24.72	30.20	-	30.55	5 0.12
134	6.75	625	31.47	30.55	-	30.90	14 0.34
176	8.86	801	40.33	30.90	-	31.25	31 0.76
153	7.70	954	48.04	31.25	-	31.60	33 0.81
188	9.47	1142	57.50	31.60	-	31.95	85 2.08
137	6.90	1279	64.40	31.95	-	32.30	90 2.20
143	7.20	1422	71.60	32.30	-	32.65	139 3.41
82	4.13	1504	75.73	32.65	-	33.00	159 3.90
109	5.49	1613	81.22	33.00	-	33.35	243 5.95
80	4.03	1693	85.25	33.35	-	33.70	199 4.88
79	3.98	1772	89.22	33.70	-	34.05	304 7.45
42	2.11	1814	91.34	34.05	-	34.40	258 6.32
45	2.27	1859	93.61	34.40	-	34.75	358 8.77
28	1.41	1887	95.02	34.75	-	35.10	287 7.03
40	2.01	1927	97.03	35.10	-	35.45	338 8.28
17	0.86	1944	97.89	35.45	-	35.80	255 6.25
13	0.65	1957	98.54	35.80	-	36.15	308 7.55
11	0.55	1968	99.09	36.15	-	36.50	192 4.70
11	0.55	1979	99.65	36.50	-	36.85	233 5.71
2	0.10	1981	99.75	36.85	-	37.20	104 2.55
2	0.10	1983	99.85	37.20	-	37.55	149 3.65
1	0.05	1984	99.90	37.55	-	37.90	77 1.89
1	0.05	1985	99.95	37.90	-	38.25	62 1.52
0	0.00	1985	99.95	38.25	-	38.60	35 0.86
0	0.00	1985	99.95	38.60	-	38.95	33 0.81
1	0.05	1986	100.00	38.95	-	39.30	22 0.54
				39.30	-	39.65	21 0.51
				39.65	-	40.00	9 0.22
				40.00	-	40.35	12 0.29
				40.35	-	40.70	7 0.17
				40.70	-	41.05	2 0.05
				41.05	-	41.40	2 0.05
				41.40	-	41.75	3 0.07

(38) FOREARM CIRCUMFERENCE, FLEXED

The circumference of the flexed right forearm is measured with a tape passing across the crease at the juncture between the upper arm and the forearm. The measurement is taken in a plane perpendicular to the long axis of the forearm. The participant stands with the upper arm extended forward horizontally, the elbow flexed 90°, and the fist tightly clenched with palm facing the head.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
22.50	8.86	1ST	26.30	10.35	
22.90	9.02	2ND	26.70	10.51	
23.20	9.13	3RD	27.00	10.63	
23.50	9.25	5TH	27.50	10.83	
24.10	9.49	10TH	28.30	11.14	
24.50	9.65	15TH	28.80	11.34	
24.80	9.76	20TH	29.10	11.46	
25.10	9.88	25TH	29.50	11.61	
25.40	10.00	30TH	29.80	11.73	
25.60	10.08	35TH	30.10	11.85	
25.90	10.20	40TH	30.40	11.97	
26.10	10.28	45TH	30.70	12.09	
26.30	10.35	50TH	31.00	12.20	
26.50	10.43	55TH	31.20	12.28	
26.80	10.55	60TH	31.50	12.40	
27.00	10.63	65TH	31.80	12.52	
27.30	10.75	70TH	32.10	12.64	
27.60	10.87	75TH	32.40	12.76	
27.90	10.98	80TH	32.80	12.91	
28.30	11.14	85TH	33.20	13.07	
28.70	11.30	90TH	33.80	13.31	
29.60	11.65	95TH	34.80	13.70	
30.30	11.93	97TH	35.40	13.94	
30.70	12.09	98TH	35.80	14.09	
31.30	12.32	99TH	36.50	14.37	

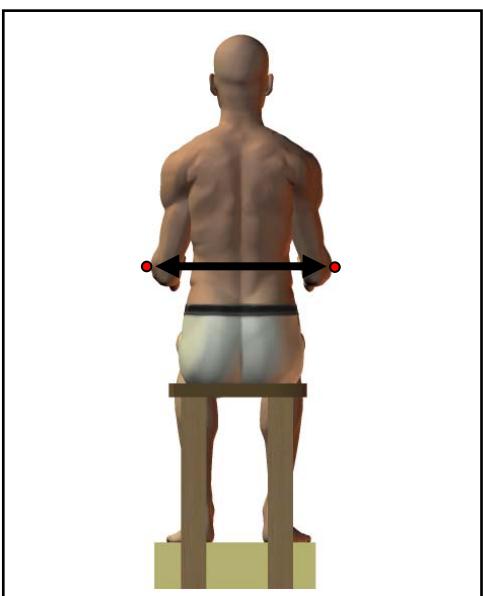
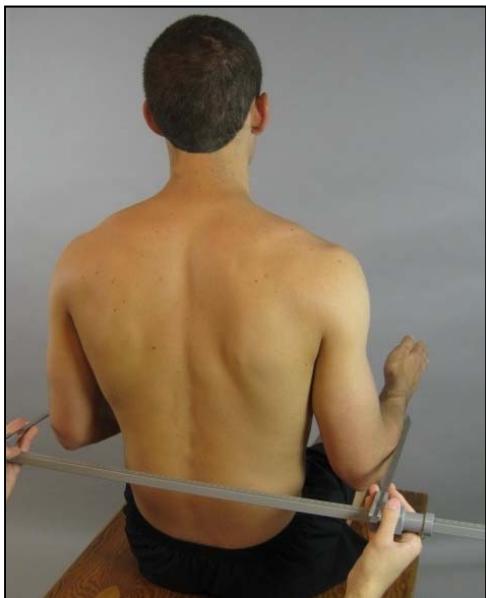
(38) FOREARM CIRCUMFERENCE, FLEXED

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
26.41	10.40		31.01	12.21	
0.04	0.02		0.03	0.01	
1.85	0.73		2.20	0.87	
0.03	0.01		0.02	0.01	
20.00	7.87		23.30	9.17	
34.20	13.46		40.20	15.83	
SKEWNESS	0.34		SKEWNESS	0.22	
KURTOSIS	3.31		KURTOSIS	3.15	
COEFFICIENT OF VARIATION	7.0%		COEFFICIENT OF VARIATION	7.1%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	19.75	- 20.25		
0	0.00	1	0.05	20.25	- 20.75		
0	0.00	1	0.05	20.75	- 21.25		
2	0.10	3	0.15	21.25	- 21.75		
11	0.55	14	0.70	21.75	- 22.25		
16	0.81	30	1.51	22.25	- 22.75		
35	1.76	65	3.27	22.75	- 23.25		
65	3.27	130	6.55	23.25	- 23.75	1	0.02
90	4.53	220	11.08	23.75	- 24.25	0	0.00
151	7.60	371	18.68	24.25	- 24.75	3	0.07
178	8.96	549	27.64	24.75	- 25.25	4	0.10
193	9.72	742	37.36	25.25	- 25.75	13	0.32
230	11.58	972	48.94	25.75	- 26.25	19	0.47
210	10.57	1182	59.52	26.25	- 26.75	44	1.08
200	10.07	1382	69.59	26.75	- 27.25	75	1.84
164	8.26	1546	77.84	27.25	- 27.75	94	2.30
141	7.10	1687	84.94	27.75	- 28.25	155	3.80
106	5.34	1793	90.28	28.25	- 28.75	197	4.83
63	3.17	1856	93.45	28.75	- 29.25	281	6.88
38	1.91	1894	95.37	29.25	- 29.75	317	7.77
28	1.41	1922	96.78	29.75	- 30.25	356	8.72
26	1.31	1948	98.09	30.25	- 30.75	339	8.30
18	0.91	1966	98.99	30.75	- 31.25	388	9.51
11	0.55	1977	99.55	31.25	- 31.75	333	8.16
4	0.20	1981	99.75	31.75	- 32.25	330	8.08
2	0.10	1983	99.85	32.25	- 32.75	289	7.08
1	0.05	1984	99.90	32.75	- 33.25	237	5.81
1	0.05	1985	99.95	33.25	- 33.75	183	4.48
1	0.05	1986	100.00	33.75	- 34.25	127	3.11
				34.25	- 34.75	92	2.25
				34.75	- 35.25	72	1.76
				35.25	- 35.75	41	1.00
				35.75	- 36.25	38	0.93
				36.25	- 36.75	17	0.42
				36.75	- 37.25	15	0.37
				37.25	- 37.75	8	0.20
				37.75	- 38.25	6	0.15
				38.25	- 38.75	6	0.15
				38.75	- 39.25	1	0.02
				39.25	- 39.75	0	0.00
				39.75	- 40.25	1	0.02

(39) FOREARM-FOREARM BREADTH

The maximum horizontal distance across the upper body between the outer sides of the forearms is measured with a beam caliper. The participant sits erect, looking straight ahead. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
40.70	16.02	1ST	47.00	18.50	
41.60	16.38	2ND	48.00	18.90	
42.30	16.65	3RD	48.80	19.21	
43.20	17.01	5TH	49.70	19.57	
44.30	17.44	10TH	51.40	20.24	
45.20	17.80	15TH	52.50	20.67	
46.00	18.11	20TH	53.60	21.10	
46.60	18.35	25TH	54.50	21.46	
47.20	18.58	30TH	55.30	21.77	
47.70	18.78	35TH	55.90	22.01	
48.30	19.02	40TH	56.60	22.28	
48.70	19.17	45TH	57.30	22.56	
49.20	19.37	50TH	57.90	22.80	
49.80	19.61	55TH	58.60	23.07	
50.30	19.80	60TH	59.20	23.31	
51.00	20.08	65TH	59.90	23.58	
51.50	20.28	70TH	60.60	23.86	
52.00	20.47	75TH	61.30	24.13	
52.80	20.79	80TH	62.30	24.53	
53.80	21.18	85TH	63.30	24.92	
55.00	21.65	90TH	64.60	25.43	
56.40	22.20	95TH	66.70	26.26	
57.50	22.64	97TH	67.80	26.69	
58.60	23.07	98TH	68.70	27.05	
59.80	23.54	99TH	70.00	27.56	

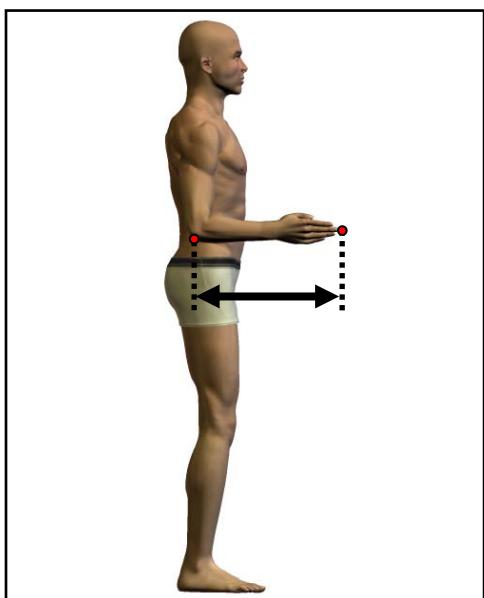
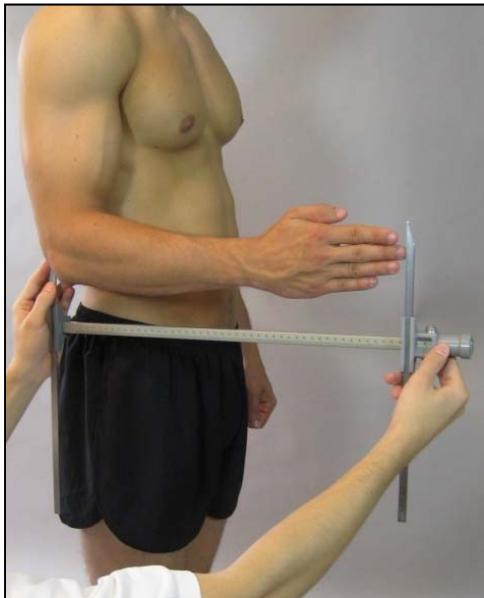
(39) FOREARM-FOREARM BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
49.48	19.48		57.99	22.83	
0.09	STD ERROR (MEAN)	0.04	0.08	STD ERROR (MEAN)	0.03
4.10	STANDARD DEVIATION	1.61	5.09	STANDARD DEVIATION	2.01
0.07	STD ERROR (STD DEV)	0.03	0.06	STD ERROR (STD DEV)	0.02
37.60	MINIMUM	14.80	39.80	MINIMUM	15.67
66.70	MAXIMUM	26.26	77.80	MAXIMUM	30.63
SKEWNESS		0.27	SKEWNESS		0.13
KURTOSIS		3.11	KURTOSIS		2.86
COEFFICIENT OF VARIATION		8.3%	COEFFICIENT OF VARIATION		8.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
2	0.10	2	0.10	37.55	- 38.55		
7	0.35	9	0.45	38.55	- 39.55		
10	0.50	19	0.96	39.55	- 40.55	1	0.02
20	1.01	39	1.96	40.55	- 41.55	0	0.00
29	1.46	68	3.42	41.55	- 42.55	1	0.02
61	3.07	129	6.50	42.55	- 43.55	1	0.02
82	4.13	211	10.62	43.55	- 44.55	1	0.02
120	6.04	331	16.67	44.55	- 45.55	6	0.15
159	8.01	490	24.67	45.55	- 46.55	12	0.29
173	8.71	663	33.38	46.55	- 47.55	38	0.93
192	9.67	855	43.05	47.55	- 48.55	53	1.30
199	10.02	1054	53.07	48.55	- 49.55	77	1.89
172	8.66	1226	61.73	49.55	- 50.55	106	2.60
174	8.76	1400	70.49	50.55	- 51.55	132	3.23
153	7.70	1553	78.20	51.55	- 52.55	190	4.65
113	5.69	1666	83.89	52.55	- 53.55	197	4.83
89	4.48	1755	88.37	53.55	- 54.55	226	5.54
80	4.03	1835	92.40	54.55	- 55.55	265	6.49
64	3.22	1899	95.62	55.55	- 56.55	300	7.35
30	1.51	1929	97.13	56.55	- 57.55	313	7.67
17	0.86	1946	97.99	57.55	- 58.55	320	7.84
14	0.70	1960	98.69	58.55	- 59.55	314	7.69
11	0.55	1971	99.24	59.55	- 60.55	281	6.88
9	0.45	1980	99.70	60.55	- 61.55	277	6.79
2	0.10	1982	99.80	61.55	- 62.55	216	5.29
2	0.10	1984	99.90	62.55	- 63.55	188	4.61
1	0.05	1985	99.95	63.55	- 64.55	146	3.58
0	0.00	1985	99.95	64.55	- 65.55	120	2.94
0	0.00	1985	99.95	65.55	- 66.55	94	2.30
1	0.05	1986	100.00	66.55	- 67.55	67	1.64
				67.55	- 68.55	52	1.27
				68.55	- 69.55	34	0.83
				69.55	- 70.55	25	0.61
				70.55	- 71.55	10	0.24
				71.55	- 72.55	9	0.22
				72.55	- 73.55	5	0.12
				73.55	- 74.55	4	0.10
				74.55	- 75.55	0	0.00
				75.55	- 76.55	0	0.00
				76.55	- 77.55	0	0.00
				77.55	- 78.55	1	0.02

(40) FOREARM-HAND LENGTH

The horizontal distance between the olecranon rear landmark and the dactylion III landmark is measured with a beam caliper. The participant stands erect with the upper arms hanging at the sides and the right elbow flexed 90°. The hand is held out straight with the palm facing inward.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
39.00	15.35	1ST	43.00	16.93	
39.60	15.59	2ND	43.60	17.17	
40.00	15.75	3RD	43.90	17.28	
40.40	15.91	5TH	44.40	17.48	
41.20	16.22	10TH	45.00	17.72	
41.60	16.38	15TH	45.60	17.95	
42.10	16.57	20TH	46.00	18.11	
42.40	16.69	25TH	46.50	18.31	
42.70	16.81	30TH	46.80	18.43	
43.00	16.93	35TH	47.10	18.54	
43.30	17.05	40TH	47.40	18.66	
43.50	17.13	45TH	47.70	18.78	
43.80	17.24	50TH	48.00	18.90	
44.00	17.32	55TH	48.30	19.02	
44.40	17.48	60TH	48.50	19.09	
44.70	17.60	65TH	48.80	19.21	
45.10	17.76	70TH	49.20	19.37	
45.40	17.87	75TH	49.50	19.49	
45.90	18.07	80TH	49.90	19.65	
46.50	18.31	85TH	50.40	19.84	
47.10	18.54	90TH	50.90	20.04	
48.00	18.90	95TH	52.00	20.47	
48.80	19.21	97TH	52.70	20.75	
49.20	19.37	98TH	53.20	20.94	
50.00	19.69	99TH	54.00	21.26	

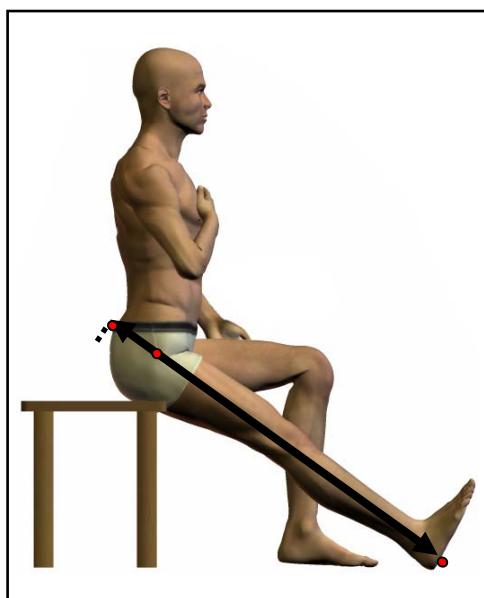
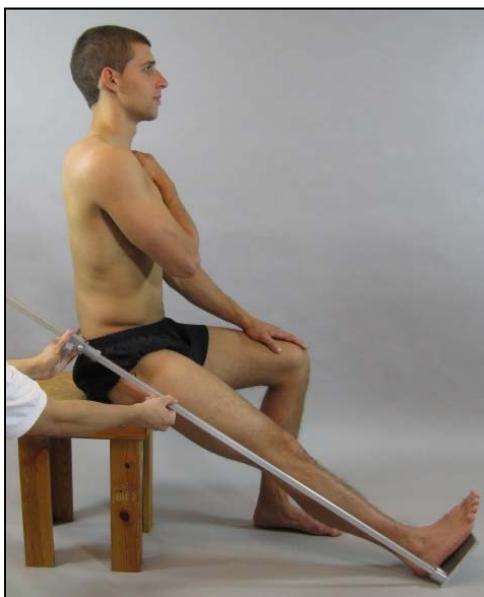
(40) FOREARM-HAND LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
43.99	STD ERROR (MEAN)	17.32	48.02	STD ERROR (MEAN)	18.91
0.05	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.01
2.34	STD ERROR (STD DEV)	0.92	2.33	STD ERROR (STD DEV)	0.92
0.04	MINIMUM	0.01	0.03	MINIMUM	0.01
34.20	MAXIMUM	13.46	40.00	MAXIMUM	15.75
52.70		20.75	57.40		22.60
SKEWNESS		0.28	SKEWNESS		0.24
KURTOSIS		3.27	KURTOSIS		3.24
COEFFICIENT OF VARIATION		5.3%	COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	33.75	- 34.25	1	0.02
0	0.00	1	0.05	34.25	- 34.75	0	0.00
0	0.00	1	0.05	34.75	- 35.25	2	0.05
0	0.00	1	0.05	35.25	- 35.75	5	0.12
0	0.00	1	0.05	35.75	- 36.25	8	0.20
1	0.05	2	0.10	36.25	- 36.75	13	0.32
2	0.10	4	0.20	36.75	- 37.25	33	0.81
3	0.15	7	0.35	37.25	- 37.75	62	1.52
1	0.05	8	0.40	37.75	- 38.25	105	2.57
7	0.35	15	0.76	38.25	- 38.75	182	4.46
10	0.50	25	1.26	38.75	- 39.25	303	7.42
18	0.91	43	2.17	39.25	- 39.75	493	12.08
40	2.01	83	4.18	39.75	- 40.25	460	16.88
58	2.92	141	7.10	40.25	- 40.75	518	22.46
75	3.78	216	10.88	40.75	- 41.25	576	29.79
102	5.14	318	16.01	41.25	- 41.75	634	37.58
120	6.04	438	22.05	41.75	- 42.25	692	46.18
175	8.81	613	30.87	42.25	- 42.75	750	54.63
181	9.11	794	39.98	42.75	- 43.25	808	63.25
178	8.96	972	48.94	43.25	- 43.75	866	71.24
181	9.11	1153	58.06	43.75	- 44.25	924	78.37
142	7.15	1295	65.21	44.25	- 44.75	982	86.65
139	7.00	1434	72.21	44.75	- 45.25	1040	94.65
132	6.65	1566	78.85	45.25	- 45.75	1098	100.00
84	4.23	1650	83.08	45.75	- 46.25	1156	
78	3.93	1728	87.01	46.25	- 46.75	1214	
80	4.03	1808	91.04	46.75	- 47.25	1272	
49	2.47	1857	93.50	47.25	- 47.75	1330	
45	2.27	1902	95.77	47.75	- 48.25	1388	
22	1.11	1924	96.88	48.25	- 48.75	1446	
23	1.16	1947	98.04	48.75	- 49.25	1504	
13	0.65	1960	98.69	49.25	- 49.75	1562	
12	0.60	1972	99.30	49.75	- 50.25	1620	
5	0.25	1977	99.55	50.25	- 50.75	1678	
6	0.30	1983	99.85	50.75	- 51.25	1736	
1	0.05	1984	99.90	51.25	- 51.75	1794	
1	0.05	1985	99.95	51.75	- 52.25	1852	
1	0.05	1986	100.00	52.25	- 52.75	1910	
				52.75	- 53.25	1968	
				53.25	- 53.75	2026	
				53.75	- 54.25	2084	
				54.25	- 54.75	2142	
				54.75	- 55.25	2199	
				55.25	- 55.75	2257	
				55.75	- 56.25	2315	
				56.25	- 56.75	2373	
				56.75	- 57.25	2431	
				57.25	- 57.75	2489	

(41) FUNCTIONAL LEG LENGTH

The straight-line distance between the plane of the bottom of the right foot with the leg extended and the back of the body of a seated participant is measured with an anthropometer passing over the trochanter landmark. The participant sits erect on a stool 45.8¹ cm high. The right leg is extended, and the foot is on the base plate of the anthropometer, which rests on the floor. The measurement is taken from the footrest surface of the base plate.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
91.80	36.14	1ST	100.00	39.37	
93.50	36.81	2ND	101.70	40.04	
94.80	37.32	3RD	102.70	40.43	
96.00	37.80	5TH	104.10	40.98	
97.60	38.43	10TH	106.00	41.73	
98.90	38.94	15TH	107.10	42.17	
99.90	39.33	20TH	108.20	42.60	
100.80	39.69	25TH	109.10	42.95	
101.60	40.00	30TH	109.90	43.27	
102.30	40.28	35TH	110.80	43.62	
102.80	40.47	40TH	111.70	43.98	
103.50	40.75	45TH	112.40	44.25	
104.20	41.02	50TH	113.10	44.53	
105.00	41.34	55TH	113.70	44.76	
105.50	41.54	60TH	114.30	45.00	
106.30	41.85	65TH	115.00	45.28	
107.20	42.20	70TH	115.80	45.59	
108.00	42.52	75TH	116.60	45.91	
109.00	42.91	80TH	117.70	46.34	
110.00	43.31	85TH	118.80	46.77	
111.40	43.86	90TH	120.30	47.36	
113.60	44.72	95TH	122.40	48.19	
114.70	45.16	97TH	123.80	48.74	
115.70	45.55	98TH	124.90	49.17	
117.20	46.14	99TH	126.70	49.88	

¹ The stool height in ANSUR was 40.8 cm.

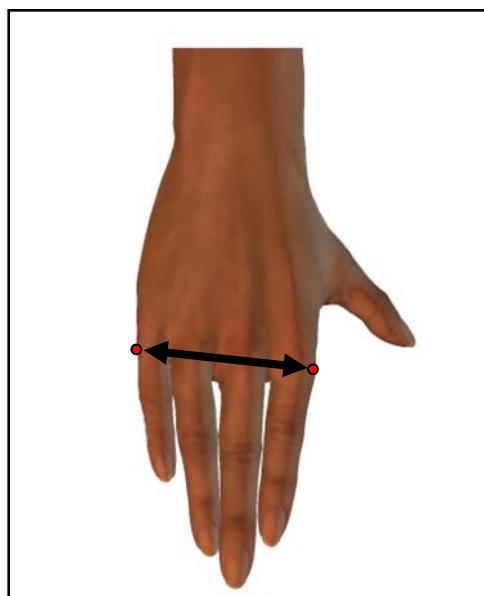
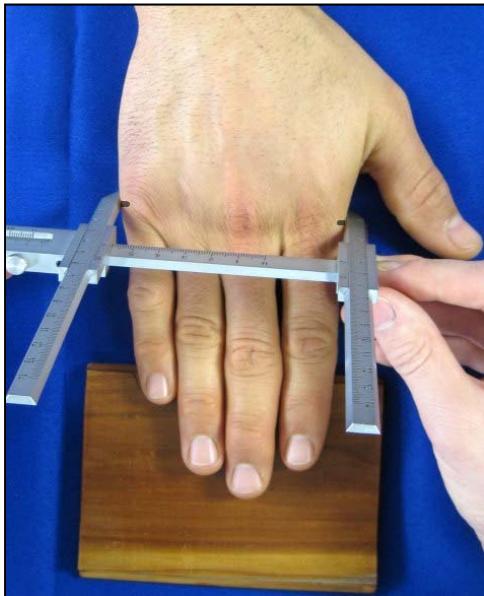
(41) FUNCTIONAL LEG LENGTH

FEMALES			MALES		
CM		IN	CM		IN
104.43	MEAN	41.11	113.02	MEAN	44.49
0.12	STD ERROR (MEAN)	0.05	0.09	STD ERROR (MEAN)	0.03
5.40	STANDARD DEVIATION	2.13	5.61	STANDARD DEVIATION	2.21
0.09	STD ERROR (STD DEV)	0.03	0.06	STD ERROR (STD DEV)	0.02
83.50	MINIMUM	32.87	94.30	MINIMUM	37.13
122.80	MAXIMUM	48.35	131.60	MAXIMUM	51.81
SKEWNESS		0.08	SKEWNESS		0.09
KURTOSIS		3.11	KURTOSIS		3.03
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	82.55	- 83.55
0	0.00	1	0.05	83.55	- 84.55
1	0.05	2	0.10	84.55	- 85.55
0	0.00	2	0.10	85.55	- 86.55
1	0.05	3	0.15	86.55	- 87.55
1	0.05	4	0.20	87.55	- 88.55
1	0.05	5	0.25	88.55	- 89.55
5	0.25	10	0.50	89.55	- 90.55
8	0.40	18	0.91	90.55	- 91.55
6	0.30	24	1.21	91.55	- 92.55
16	0.81	40	2.01	92.55	- 93.55
14	0.70	54	2.72	93.55	- 94.55
30	1.51	84	4.23	94.55	- 95.55
43	2.17	127	6.39	95.55	- 96.55
67	3.37	194	9.77	96.55	- 97.55
78	3.93	272	13.70	97.55	- 98.55
92	4.63	364	18.33	98.55	- 99.55
110	5.54	474	23.87	99.55	- 100.55
118	5.94	592	29.81	100.55	- 101.55
144	7.25	736	37.06	101.55	- 102.55
159	8.01	895	45.07	102.55	- 103.55
139	7.00	1034	52.06	103.55	- 104.55
158	7.96	1192	60.02	104.55	- 105.55
128	6.45	1320	66.47	105.55	- 106.55
120	6.04	1440	72.51	106.55	- 107.55
108	5.44	1548	77.95	107.55	- 108.55
96	4.83	1644	82.78	108.55	- 109.55
78	3.93	1722	86.71	109.55	- 110.55
71	3.58	1793	90.28	110.55	- 111.55
51	2.57	1844	92.85	111.55	- 112.55
37	1.86	1881	94.71	112.55	- 113.55
41	2.06	1922	96.78	113.55	- 114.55
21	1.06	1943	97.83	114.55	- 115.55
15	0.76	1958	98.59	115.55	- 116.55
10	0.50	1968	99.09	116.55	- 117.55
7	0.35	1975	99.45	117.55	- 118.55
4	0.20	1979	99.65	118.55	- 119.55
4	0.20	1983	99.85	119.55	- 120.55
1	0.05	1984	99.90	120.55	- 121.55
1	0.05	1985	99.95	121.55	- 122.55
1	0.05	1986	100.00	122.55	- 123.55
				123.55	- 124.55
				124.55	- 125.55
				125.55	- 126.55
				126.55	- 127.55
				127.55	- 128.55
				128.55	- 129.55
				129.55	- 130.55
				130.55	- 131.55
				131.55	- 132.55

(42) HAND BREADTH

The breadth of the right hand between the landmarks at metacarpale II and metacarpale V is measured with a sliding caliper. The participant places the palm on a table with the fingers together and the thumb abducted. The middle finger is parallel to the long axis of the forearm. The two distal phalanges of the fingers lie on a flat surface 8 mm higher than the table.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
6.90	2.72	1ST	7.80	3.07	
7.00	2.76	2ND	8.00	3.15	
7.10	2.80	3RD	8.00	3.15	
7.20	2.83	5TH	8.10	3.19	
7.30	2.87	10TH	8.30	3.27	
7.40	2.91	15TH	8.40	3.31	
7.50	2.95	20TH	8.50	3.35	
7.50	2.95	25TH	8.50	3.35	
7.60	2.99	30TH	8.60	3.39	
7.70	3.03	35TH	8.70	3.43	
7.70	3.03	40TH	8.70	3.43	
7.80	3.07	45TH	8.80	3.46	
7.80	3.07	50TH	8.80	3.46	
7.80	3.07	55TH	8.90	3.50	
7.90	3.11	60TH	8.90	3.50	
8.00	3.15	65TH	9.00	3.54	
8.00	3.15	70TH	9.00	3.54	
8.00	3.15	75TH	9.10	3.58	
8.10	3.19	80TH	9.20	3.62	
8.20	3.23	85TH	9.30	3.66	
8.30	3.27	90TH	9.40	3.70	
8.50	3.35	95TH	9.60	3.78	
8.60	3.39	97TH	9.70	3.82	
8.70	3.43	98TH	9.80	3.86	
8.70	3.43	99TH	9.90	3.90	

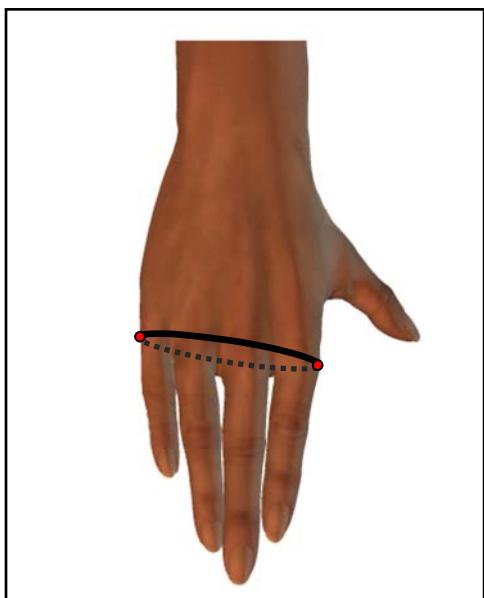
(42) HAND BREADTH

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
7.82	MEAN	3.08	8.83	MEAN	3.47
0.01	STD ERROR (MEAN)	0.00	0.01	STD ERROR (MEAN)	0.00
0.38	STANDARD DEVIATION	0.15	0.44	STANDARD DEVIATION	0.17
0.01	STD ERROR (STD DEV)	0.00	0.00	STD ERROR (STD DEV)	0.00
6.70	MINIMUM	2.64	7.40	MINIMUM	2.91
9.20	MAXIMUM	3.62	10.50	MAXIMUM	4.13
SKEWNESS		0.16	SKEWNESS		0.14
KURTOSIS		3.07	KURTOSIS		3.11
COEFFICIENT OF VARIATION		4.9%	COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
4	0.20	4	0.20	6.65	-
6	0.30	10	0.50	6.75	-
10	0.50	20	1.01	6.85	-
20	1.01	40	2.01	6.95	-
29	1.46	69	3.47	7.05	-
58	2.92	127	6.39	7.15	-
74	3.73	201	10.12	7.25	-
143	7.20	344	17.32	7.35	-
165	8.31	509	25.63	7.45	-
133	6.70	642	32.33	7.55	-
226	11.38	868	43.71	7.65	-
250	12.59	1118	56.29	7.75	-
157	7.91	1275	64.20	7.85	-
216	10.88	1491	75.08	7.95	-
128	6.45	1619	81.52	8.05	-
97	4.88	1716	86.40	8.15	-
95	4.78	1811	91.19	8.25	-
66	3.32	1877	94.51	8.35	-
42	2.11	1919	96.63	8.45	-
27	1.36	1946	97.99	8.55	-
22	1.11	1968	99.09	8.65	-
7	0.35	1975	99.45	8.75	-
6	0.30	1981	99.75	8.85	-
2	0.10	1983	99.85	8.95	-
2	0.10	1985	99.95	9.05	-
1	0.05	1986	100.00	9.15	-
				9.25	-
				9.35	199
				9.35	182
				9.45	4.46
				9.45	3785
				9.45	92.72
				9.45	3869
				9.45	94.78
				9.55	70
				9.55	1.71
				9.55	3939
				9.65	96.50
				9.65	3981
				9.75	97.53
				9.75	4026
				9.85	98.63
				9.85	4046
				9.95	99.12
				9.95	4063
				10.05	99.53
				10.05	4071
				10.05	99.73
				10.15	4079
				10.25	99.93
				10.35	4081
				10.45	99.98
				10.45	4082
				10.55	100.00

(43) HAND CIRCUMFERENCE

The circumference of the right hand is measured with a tape passing over the landmarks at metacarpale II and metacarpale V. The participant places the palm on a table with the fingers together and the thumb abducted. The middle finger is parallel to the long axis of the forearm. The two distal phalanges of the fingers lie on a flat surface 8 mm higher than the table.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
16.70	6.57	1ST	18.90	7.44
16.90	6.65	2ND	19.20	7.56
17.00	6.69	3RD	19.30	7.60
17.30	6.81	5TH	19.50	7.68
17.50	6.89	10TH	19.90	7.83
17.70	6.97	15TH	20.20	7.95
17.90	7.05	20TH	20.40	8.03
18.00	7.09	25TH	20.60	8.11
18.20	7.17	30TH	20.70	8.15
18.30	7.20	35TH	20.80	8.19
18.40	7.24	40TH	21.00	8.27
18.60	7.32	45TH	21.10	8.31
18.70	7.36	50TH	21.20	8.35
18.70	7.36	55TH	21.30	8.39
18.80	7.40	60TH	21.50	8.46
19.00	7.48	65TH	21.60	8.50
19.10	7.52	70TH	21.70	8.54
19.20	7.56	75TH	21.90	8.62
19.40	7.64	80TH	22.10	8.70
19.60	7.72	85TH	22.30	8.78
19.80	7.80	90TH	22.50	8.86
20.20	7.95	95TH	23.00	9.06
20.40	8.03	97TH	23.30	9.17
20.50	8.07	98TH	23.40	9.21
20.70	8.15	99TH	23.70	9.33

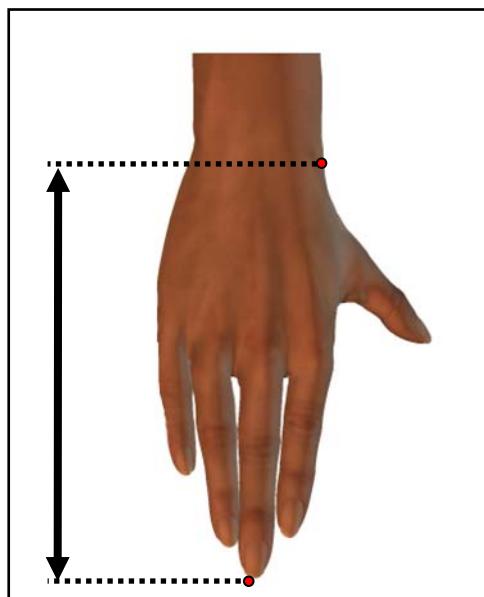
(43) HAND CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
18.66	MEAN	7.34	21.23	MEAN	8.36
0.02	STD ERROR (MEAN)	0.01	0.02	STD ERROR (MEAN)	0.01
0.88	STANDARD DEVIATION	0.35	1.02	STANDARD DEVIATION	0.40
0.01	STD ERROR (STD DEV)	0.01	0.01	STD ERROR (STD DEV)	0.00
15.20	MINIMUM	5.98	17.90	MINIMUM	7.05
21.40	MAXIMUM	8.43	24.80	MAXIMUM	9.76
SKEWNESS		0.06	SKEWNESS		0.08
KURTOSIS		3.00	KURTOSIS		3.00
COEFFICIENT OF VARIATION		4.7%	COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	15.15	- 15.35
0	0.00	1	0.05	15.35	- 15.55
0	0.00	1	0.05	15.55	- 15.75
0	0.00	1	0.05	15.75	- 15.95
1	0.05	2	0.10	15.95	- 16.15
6	0.30	8	0.40	16.15	- 16.35
9	0.45	17	0.86	16.35	- 16.55
9	0.45	26	1.31	16.55	- 16.75
21	1.06	47	2.37	16.75	- 16.95
31	1.56	78	3.93	16.95	- 17.15
57	2.87	135	6.80	17.15	- 17.35
68	3.42	203	10.22	17.35	- 17.55
122	6.14	325	16.36	17.55	- 17.75
105	5.29	430	21.65	17.75	- 17.95
114	5.74	544	27.39	17.95	- 18.15
198	9.97	742	37.36	18.15	- 18.35
136	6.85	878	44.21	18.35	- 18.55
234	11.78	1112	55.99	18.55	- 18.75
159	8.01	1271	64.00	18.75	- 18.95
149	7.50	1420	71.50	18.95	- 19.15
161	8.11	1581	79.61	19.15	- 19.35
99	4.98	1680	84.59	19.35	- 19.55
104	5.24	1784	89.83	19.55	- 19.75
46	2.32	1830	92.15	19.75	- 19.95
49	2.47	1879	94.61	19.95	- 20.15
42	2.11	1921	96.73	20.15	- 20.35
28	1.41	1949	98.14	20.35	- 20.55
18	0.91	1967	99.04	20.55	- 20.75
11	0.55	1978	99.60	20.75	- 20.95
3	0.15	1981	99.75	20.95	- 21.15
4	0.20	1985	99.95	21.15	- 21.35
1	0.05	1986	100.00	21.35	- 21.55
				21.55	- 21.75
				21.75	- 21.95
				21.95	- 22.15
				22.15	- 22.35
				22.35	- 22.55
				22.55	- 22.75
				22.75	- 22.95
				22.95	- 23.15
				23.15	- 23.35
				23.35	- 23.55
				23.55	- 23.75
				23.75	- 23.95
				23.95	- 24.15
				24.15	- 24.35
				24.35	- 24.55
				24.55	- 24.75
				24.75	- 24.95

(44) HAND LENGTH

The length of the right hand between the stylion landmark on the wrist and the tip of the middle finger is measured with a Poech sliding caliper. The participant places the palm on a table with the fingers together and the thumb abducted. The middle finger is parallel to the long axis of the forearm. The two distal phalanges of the fingers lie on a flat surface 8 mm higher than the table.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
16.00	6.30	1ST	17.20	6.77	
16.20	6.38	2ND	17.40	6.85	
16.30	6.42	3RD	17.50	6.89	
16.50	6.50	5TH	17.70	6.97	
16.90	6.65	10TH	18.10	7.13	
17.10	6.73	15TH	18.30	7.20	
17.30	6.81	20TH	18.50	7.28	
17.40	6.85	25TH	18.70	7.36	
17.60	6.93	30TH	18.80	7.40	
17.70	6.97	35TH	19.00	7.48	
17.80	7.01	40TH	19.00	7.48	
17.90	7.05	45TH	19.20	7.56	
18.00	7.09	50TH	19.30	7.60	
18.20	7.17	55TH	19.40	7.64	
18.30	7.20	60TH	19.50	7.68	
18.40	7.24	65TH	19.70	7.76	
18.60	7.32	70TH	19.80	7.80	
18.70	7.36	75TH	20.00	7.87	
18.90	7.44	80TH	20.10	7.91	
19.10	7.52	85TH	20.30	7.99	
19.40	7.64	90TH	20.60	8.11	
19.90	7.83	95TH	21.00	8.27	
20.20	7.95	97TH	21.30	8.39	
20.40	8.03	98TH	21.50	8.46	
20.70	8.15	99TH	21.80	8.58	

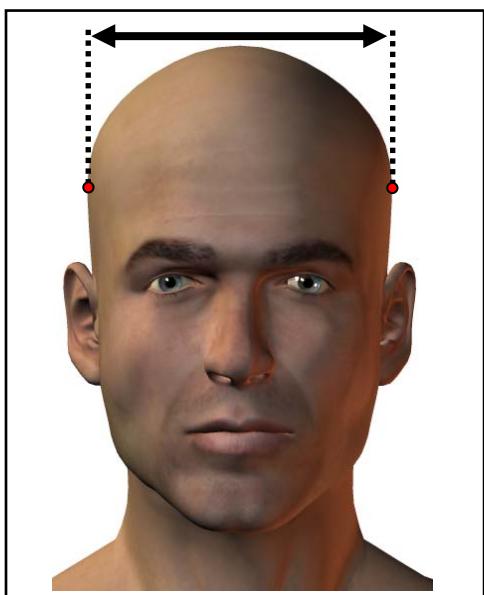
(44) HAND LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
18.11	MEAN	7.13	19.33	MEAN	7.61
0.02	STD ERROR (MEAN)	0.01	0.02	STD ERROR (MEAN)	0.01
1.01	STANDARD DEVIATION	0.40	0.99	STANDARD DEVIATION	0.39
0.02	STD ERROR (STD DEV)	0.01	0.01	STD ERROR (STD DEV)	0.00
14.50	MINIMUM	5.71	16.40	MINIMUM	6.46
22.00	MAXIMUM	8.66	23.90	MAXIMUM	9.41
SKEWNESS		0.32	SKEWNESS		0.23
KURTOSIS		3.32	KURTOSIS		3.29
COEFFICIENT OF VARIATION		5.6%	COEFFICIENT OF VARIATION		5.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	14.35	- 14.55
0	0.00	1	0.05	14.55	- 14.75
0	0.00	1	0.05	14.75	- 14.95
1	0.05	2	0.10	14.95	- 15.15
0	0.00	2	0.10	15.15	- 15.35
4	0.20	6	0.30	15.35	- 15.55
6	0.30	12	0.60	15.55	- 15.75
6	0.30	18	0.91	15.75	- 15.95
19	0.96	37	1.86	15.95	- 16.15
24	1.21	61	3.07	16.15	- 16.35
43	2.17	104	5.24	16.35	- 16.55
58	2.92	162	8.16	16.55	- 16.75
53	2.67	215	10.83	16.75	- 16.95
102	5.14	317	15.96	16.95	- 17.15
96	4.83	413	20.80	17.15	- 17.35
174	8.76	587	29.56	17.35	- 17.55
162	8.16	749	37.71	17.55	- 17.75
157	7.91	906	45.62	17.75	- 17.95
162	8.16	1068	53.78	17.95	- 18.15
167	8.41	1235	62.19	18.15	- 18.35
152	7.65	1387	69.84	18.35	- 18.55
134	6.75	1521	76.59	18.55	- 18.75
90	4.53	1611	81.12	18.75	- 18.95
78	3.93	1689	85.05	18.95	- 19.15
71	3.58	1760	88.62	19.15	- 19.35
55	2.77	1815	91.39	19.35	- 19.55
50	2.52	1865	93.91	19.55	- 19.75
31	1.56	1896	95.47	19.75	- 19.95
26	1.31	1922	96.78	19.95	- 20.15
12	0.60	1934	97.38	20.15	- 20.35
23	1.16	1957	98.54	20.35	- 20.55
11	0.55	1968	99.09	20.55	- 20.75
8	0.40	1976	99.50	20.75	- 20.95
3	0.15	1979	99.65	20.95	- 21.15
3	0.15	1982	99.80	21.15	- 21.35
2	0.10	1984	99.90	21.35	- 21.55
1	0.05	1985	99.95	21.55	- 21.75
0	0.00	1985	99.95	21.75	- 21.95
1	0.05	1986	100.00	21.95	- 22.15
				22.15	- 22.35
				22.35	- 22.55
				22.55	- 22.75
				22.75	- 22.95
				22.95	- 23.15
				23.15	- 23.35
				23.35	- 23.55
				23.55	- 23.75
				23.75	- 23.95

(45) HEAD BREADTH*

The maximum horizontal breadth of the head above the plane of attachment of the ears is measured with a spreading caliper. For female participants with braids or cornrows, the measurement includes the styled hair.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
13.60	5.35	1ST	14.20	5.59	
13.70	5.39	2ND	14.40	5.67	
13.80	5.43	3RD	14.40	5.67	
14.00	5.51	5TH	14.60	5.75	
14.10	5.55	10TH	14.70	5.79	
14.30	5.63	15TH	14.90	5.87	
14.40	5.67	20TH	15.00	5.91	
14.40	5.67	25TH	15.10	5.94	
14.50	5.71	30TH	15.20	5.98	
14.60	5.75	35TH	15.20	5.98	
14.60	5.75	40TH	15.30	6.02	
14.70	5.79	45TH	15.30	6.02	
14.70	5.79	50TH	15.40	6.06	
14.80	5.83	55TH	15.50	6.10	
14.90	5.87	60TH	15.50	6.10	
15.00	5.91	65TH	15.60	6.14	
15.00	5.91	70TH	15.70	6.18	
15.10	5.94	75TH	15.80	6.22	
15.20	5.98	80TH	15.90	6.26	
15.30	6.02	85TH	16.00	6.30	
15.40	6.06	90TH	16.10	6.34	
15.60	6.14	95TH	16.30	6.42	
15.80	6.22	97TH	16.50	6.50	
15.90	6.26	98TH	16.70	6.57	
16.00	6.30	99TH	16.80	6.61	

* This measurement is not equivalent to ANSUR for females. See text on page 44 for details.

(45) HEAD BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
14.78	STD ERROR (MEAN)	5.82	15.43	STD ERROR (MEAN)	6.08
0.01	STANDARD DEVIATION	0.00	0.01	STANDARD DEVIATION	0.00
0.52	STD ERROR (STD DEV)	0.20	0.55	STD ERROR (STD DEV)	0.22
0.01	MINIMUM	0.00	0.01	MINIMUM	0.00
13.10	MAXIMUM	5.16	13.50	MAXIMUM	5.31
16.70		6.57	18.00		7.09
SKEWNESS		0.15	SKEWNESS		0.25
KURTOSIS		3.13	KURTOSIS		3.54
COEFFICIENT OF VARIATION		3.5%	COEFFICIENT OF VARIATION		3.6%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	13.05	- 13.15
3	0.15	4	0.20	13.15	- 13.25
1	0.05	5	0.25	13.25	- 13.35
4	0.20	9	0.45	13.35	- 13.45
7	0.35	16	0.81	13.45	- 13.55
8	0.40	24	1.21	13.55	- 13.65
18	0.91	42	2.11	13.65	- 13.75
32	1.61	74	3.73	13.75	- 13.85
24	1.21	98	4.93	13.85	- 13.95
49	2.47	147	7.40	13.95	- 14.05
57	2.87	204	10.27	14.05	- 14.15
60	3.02	264	13.29	14.15	- 14.25
124	6.24	388	19.54	14.25	- 14.35
148	7.45	536	26.99	14.35	- 14.45
159	8.01	695	34.99	14.45	- 14.55
146	7.35	841	42.35	14.55	- 14.65
154	7.75	995	50.10	14.65	- 14.75
143	7.20	1138	57.30	14.75	- 14.85
117	5.89	1255	63.19	14.85	- 14.95
158	7.96	1413	71.15	14.95	- 15.05
102	5.14	1515	76.28	15.05	- 15.15
114	5.74	1629	82.02	15.15	- 15.25
88	4.43	1717	86.46	15.25	- 15.35
72	3.63	1789	90.08	15.35	- 15.45
60	3.02	1849	93.10	15.45	- 15.55
38	1.91	1887	95.02	15.55	- 15.65
27	1.36	1914	96.37	15.65	- 15.75
21	1.06	1935	97.43	15.75	- 15.85
19	0.96	1954	98.39	15.85	- 15.95
15	0.76	1969	99.14	15.95	- 16.05
5	0.25	1974	99.40	16.05	- 16.15
6	0.30	1980	99.70	16.15	- 16.25
0	0.00	1980	99.70	16.25	- 16.35
3	0.15	1983	99.85	16.35	- 16.45
1	0.05	1984	99.90	16.45	- 16.55
1	0.05	1985	99.95	16.55	- 16.65
1	0.05	1986	100.00	16.65	- 16.75
				16.75	- 16.85
				16.85	- 16.95
				16.95	- 17.05
				17.05	- 17.15
				17.15	- 17.25
				17.25	- 17.35
				17.35	- 17.45
				17.45	- 17.55
				17.55	- 17.65
				17.65	- 17.75
				17.75	- 17.85
				17.85	- 17.95
				17.95	- 18.05

(46) HEAD CIRCUMFERENCE*

The maximum circumference of the head above the attachment of the ears is measured with a tape passing just above the ridges of the eyebrows and around the back of the head. For female participants with braids or cornrows, the measurement includes the styled hair.



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
52.10	20.51	1ST	53.80	21.18
52.50	20.67	2ND	54.30	21.38
52.80	20.79	3RD	54.50	21.46
53.20	20.94	5TH	54.80	21.57
53.80	21.18	10TH	55.40	21.81
54.20	21.34	15TH	55.80	21.97
54.50	21.46	20TH	56.10	22.09
54.80	21.57	25TH	56.30	22.17
55.00	21.65	30TH	56.60	22.28
55.30	21.77	35TH	56.80	22.36
55.50	21.85	40TH	57.00	22.44
55.70	21.93	45TH	57.30	22.56
56.00	22.05	50TH	57.40	22.60
56.20	22.13	55TH	57.60	22.68
56.40	22.20	60TH	57.80	22.76
56.70	22.32	65TH	58.00	22.83
57.00	22.44	70TH	58.30	22.95
57.30	22.56	75TH	58.50	23.03
57.60	22.68	80TH	58.70	23.11
58.00	22.83	85TH	59.00	23.23
58.70	23.11	90TH	59.50	23.43
59.70	23.50	95TH	60.10	23.66
60.20	23.70	97TH	60.50	23.82
60.70	23.90	98TH	60.80	23.94
61.10	24.06	99TH	61.50	24.21

* This measurement is not equivalent to ANSUR for females. See text on page 44 for details.

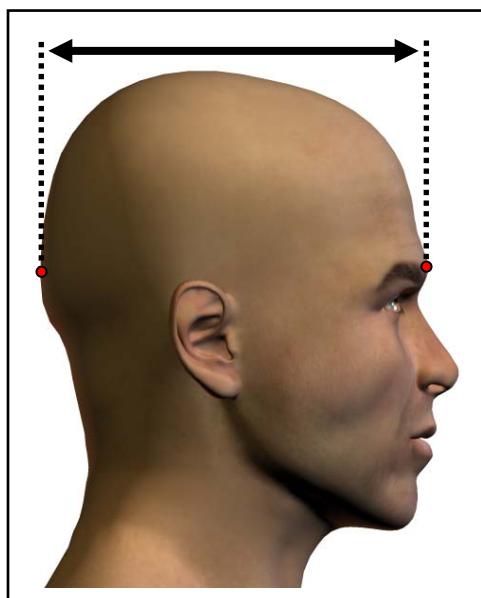
(46) HEAD CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
56.11	MEAN	22.09	57.44	MEAN	22.61
0.04	STD ERROR (MEAN)	0.02	0.03	STD ERROR (MEAN)	0.01
1.94	STANDARD DEVIATION	0.76	1.60	STANDARD DEVIATION	0.63
0.03	STD ERROR (STD DEV)	0.01	0.02	STD ERROR (STD DEV)	0.01
50.00	MINIMUM	19.69	51.60	MINIMUM	20.31
63.50	MAXIMUM	25.00	63.30	MAXIMUM	24.92
SKEWNESS		0.42	SKEWNESS		0.12
KURTOSIS		3.35	KURTOSIS		3.10
COEFFICIENT OF VARIATION		3.5%	COEFFICIENT OF VARIATION		2.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	49.85	-	50.20	
1	0.05	2	0.10	50.20	-	50.55	
2	0.10	4	0.20	50.55	-	50.90	
1	0.05	5	0.25	50.90	-	51.25	
0	0.00	5	0.25	51.25	-	51.60	
10	0.50	15	0.76	51.60	-	51.95	2
10	0.50	25	1.26	51.95	-	52.30	0
25	1.26	50	2.52	52.30	-	52.65	3
23	1.16	73	3.68	52.65	-	53.00	2
44	2.22	117	5.89	53.00	-	53.35	9
49	2.47	166	8.36	53.35	-	53.70	15
104	5.24	270	13.60	53.70	-	54.05	24
75	3.78	345	17.37	54.05	-	54.40	33
133	6.70	478	24.07	54.40	-	54.75	89
119	5.99	597	30.06	54.75	-	55.10	96
153	7.70	750	37.76	55.10	-	55.45	155
168	8.46	918	46.22	55.45	-	55.80	184
169	8.51	1087	54.73	55.80	-	56.15	244
115	5.79	1202	60.52	56.15	-	56.50	257
160	8.06	1362	68.58	56.50	-	56.85	387
84	4.23	1446	72.81	56.85	-	57.20	247
130	6.55	1576	79.36	57.20	-	57.55	438
73	3.68	1649	83.03	57.55	-	57.90	334
80	4.03	1729	87.06	57.90	-	58.25	326
40	2.01	1769	89.07	58.25	-	58.60	281
50	2.52	1819	91.59	58.60	-	58.95	265
30	1.51	1849	93.10	58.95	-	59.30	152
33	1.66	1882	94.76	59.30	-	59.65	189
22	1.11	1904	95.87	59.65	-	60.00	90
26	1.31	1930	97.18	60.00	-	60.35	113
15	0.76	1945	97.94	60.35	-	60.70	44
20	1.01	1965	98.94	60.70	-	61.05	32
4	0.20	1969	99.14	61.05	-	61.40	20
5	0.25	1974	99.40	61.40	-	61.75	30
7	0.35	1981	99.75	61.75	-	62.10	6
1	0.05	1982	99.80	62.10	-	62.45	6
1	0.05	1983	99.85	62.45	-	62.80	5
1	0.05	1984	99.90	62.80	-	63.15	3
1	0.05	1985	99.95	63.15	-	63.50	1
1	0.05	1986	100.00	63.50	-	63.85	

(47) HEAD LENGTH*

The distance from the glabella landmark to the opisthocranion landmark is measured with a spreading caliper. For female participants with braids or cornrows, the measurement includes the styled hair.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
17.10	6.73	1ST	18.20	7.17	
17.40	6.85	2ND	18.40	7.24	
17.60	6.93	3RD	18.60	7.32	
17.80	7.01	5TH	18.80	7.40	
18.00	7.09	10TH	19.10	7.52	
18.20	7.17	15TH	19.20	7.56	
18.30	7.20	20TH	19.40	7.64	
18.50	7.28	25TH	19.50	7.68	
18.60	7.32	30TH	19.60	7.72	
18.70	7.36	35TH	19.70	7.76	
18.80	7.40	40TH	19.80	7.80	
18.90	7.44	45TH	19.90	7.83	
19.00	7.48	50TH	20.00	7.87	
19.10	7.52	55TH	20.00	7.87	
19.20	7.56	60TH	20.10	7.91	
19.30	7.60	65TH	20.20	7.95	
19.40	7.64	70TH	20.30	7.99	
19.50	7.68	75TH	20.40	8.03	
19.60	7.72	80TH	20.50	8.07	
19.70	7.76	85TH	20.70	8.15	
19.90	7.83	90TH	20.80	8.19	
20.20	7.95	95TH	21.10	8.31	
20.50	8.07	97TH	21.30	8.39	
20.60	8.11	98TH	21.40	8.43	
20.80	8.19	99TH	21.50	8.46	

* This measurement is not equivalent to ANSUR for females. See text on page 44 for details.

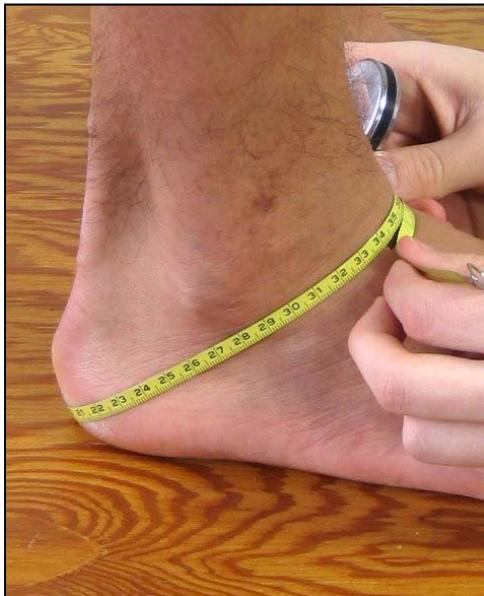
(47) HEAD LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
18.98	7.47		19.95	7.85	
0.02	0.01		0.01	0.00	
0.74	0.29		0.70	0.28	
0.01	0.00		0.01	0.00	
16.80	6.61		17.20	6.77	
21.50	8.46		22.50	8.86	
SKEWNESS	0.05		SKEWNESS	-0.08	
KURTOSIS	3.19		KURTOSIS	3.10	
COEFFICIENT OF VARIATION	3.9%		COEFFICIENT OF VARIATION	3.5%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
5	0.25	5	0.25	16.75	-
8	0.40	13	0.65	16.90	-
7	0.35	20	1.01	17.05	-
12	0.60	32	1.61	17.20	-
9	0.45	41	2.06	17.35	-
21	1.06	62	3.12	17.50	-
29	1.46	91	4.58	17.65	-
65	3.27	156	7.85	17.80	-
48	2.42	204	10.27	17.95	-
111	5.59	315	15.86	18.10	-
90	4.53	405	20.39	18.25	-
157	7.91	562	28.30	18.40	-
91	4.58	653	32.88	18.55	-
206	10.37	859	43.25	18.70	-
82	4.13	941	47.38	18.85	-
199	10.02	1140	57.40	19.00	-
115	5.79	1255	63.19	19.15	-
211	10.62	1466	73.82	19.30	-
86	4.33	1552	78.15	19.45	-
168	8.46	1720	86.61	19.60	-
43	2.17	1763	88.77	19.75	-
95	4.78	1858	93.55	19.90	-
23	1.16	1881	94.71	20.05	-
34	1.71	1915	96.42	20.20	-
11	0.55	1926	96.98	20.35	-
29	1.46	1955	98.44	20.50	-
8	0.40	1963	98.84	20.65	-
6	0.30	1969	99.14	20.80	-
7	0.35	1976	99.50	20.95	-
4	0.20	1980	99.70	21.10	-
1	0.05	1981	99.75	21.25	-
5	0.25	1986	100.00	21.40	-
				21.55	-
				21.70	12
				21.85	16
				21.85	3
				22.00	6
				22.15	1
				22.30	0
				22.45	1
				22.60	0.02

(48) HEEL-ANKLE CIRCUMFERENCE

The circumference of the right foot is measured with a tape passing over the point at which the heel first contacts the table and over the dorsal juncture of the foot and leg landmark at the front of the ankle. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
27.70	10.91	1ST	30.70	12.09	
27.90	10.98	2ND	31.10	12.24	
28.30	11.14	3RD	31.30	12.32	
28.70	11.30	5TH	31.70	12.48	
29.20	11.50	10TH	32.30	12.72	
29.50	11.61	15TH	32.70	12.87	
29.70	11.69	20TH	33.00	12.99	
30.00	11.81	25TH	33.30	13.11	
30.20	11.89	30TH	33.50	13.19	
30.40	11.97	35TH	33.70	13.27	
30.60	12.05	40TH	33.80	13.31	
30.80	12.13	45TH	34.10	13.43	
31.00	12.20	50TH	34.30	13.50	
31.20	12.28	55TH	34.50	13.58	
31.30	12.32	60TH	34.70	13.66	
31.60	12.44	65TH	34.90	13.74	
31.80	12.52	70TH	35.20	13.86	
32.00	12.60	75TH	35.40	13.94	
32.30	12.72	80TH	35.70	14.06	
32.60	12.83	85TH	36.00	14.17	
33.00	12.99	90TH	36.50	14.37	
33.70	13.27	95TH	37.20	14.65	
34.20	13.46	97TH	37.60	14.80	
34.50	13.58	98TH	37.80	14.88	
34.80	13.70	99TH	38.50	15.16	

(48) HEEL-ANKLE CIRCUMFERENCE

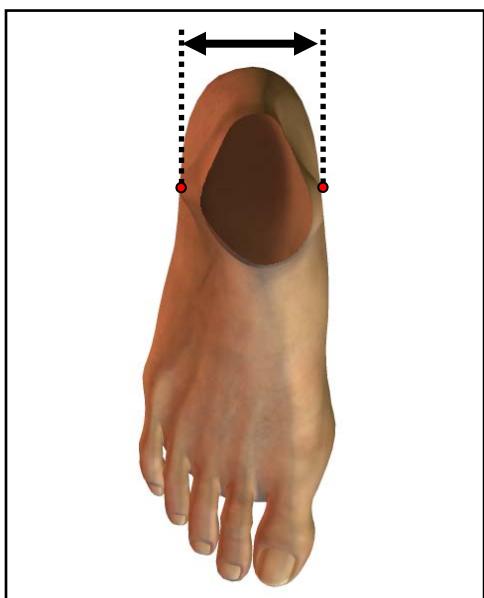
FEMALES		
<u>CM</u>		<u>IN</u>
31.03	MEAN	12.22
0.03	STD ERROR (MEAN)	0.01
1.53	STANDARD DEVIATION	0.60
0.02	STD ERROR (STD DEV)	0.01
26.40	MINIMUM	10.39
37.60	MAXIMUM	14.80
SKEWNESS		0.25
KURTOSIS		3.07
COEFFICIENT OF VARIATION		4.9%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
34.35	MEAN	13.52
0.03	STD ERROR (MEAN)	0.01
1.66	STANDARD DEVIATION	0.65
0.02	STD ERROR (STD DEV)	0.01
25.80	MINIMUM	10.16
40.30	MAXIMUM	15.87
SKEWNESS		0.15
KURTOSIS		3.25
COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	25.75	-	26.10	1
0	0.00	1	0.05	26.10	-	26.45	0
2	0.10	3	0.15	26.45	-	26.80	0
6	0.30	9	0.45	26.80	-	27.15	0
23	1.16	32	1.61	27.15	-	27.50	0
20	1.01	52	2.62	27.50	-	27.85	0
39	1.96	91	4.58	27.85	-	28.20	0
45	2.27	136	6.85	28.20	-	28.55	0
74	3.73	210	10.57	28.55	-	28.90	0
126	6.34	336	16.92	28.90	-	29.25	3
158	7.96	494	24.87	29.25	-	29.60	5
116	5.84	610	30.72	29.60	-	29.95	3
198	9.97	808	40.68	29.95	-	30.30	4
167	8.41	975	49.09	30.30	-	30.65	23
229	11.53	1204	60.62	30.65	-	31.00	20
126	6.34	1330	66.97	31.00	-	31.35	67
176	8.86	1506	75.83	31.35	-	31.70	70
107	5.39	1613	81.22	31.70	-	32.05	121
121	6.09	1734	87.31	32.05	-	32.40	123
61	3.07	1795	90.38	32.40	-	32.75	242
70	3.52	1865	93.91	32.75	-	33.10	203
30	1.51	1895	95.42	33.10	-	33.45	336
29	1.46	1924	96.88	33.45	-	33.80	294
17	0.86	1941	97.73	33.80	-	34.15	366
26	1.31	1967	99.04	34.15	-	34.50	330
8	0.40	1975	99.45	34.50	-	34.85	396
8	0.40	1983	99.85	34.85	-	35.20	212
1	0.05	1984	99.90	35.20	-	35.55	343
1	0.05	1985	99.95	35.55	-	35.90	203
0	0.00	1985	99.95	35.90	-	36.25	191
0	0.00	1985	99.95	36.25	-	36.60	137
0	0.00	1985	99.95	36.60	-	36.95	114
1	0.05	1986	100.00	36.95	-	37.30	84
				37.30	-	37.65	74
				37.65	-	38.00	44
				38.00	-	38.35	23
				38.35	-	38.70	17
				38.70	-	39.05	11
				39.05	-	39.40	9
				39.40	-	39.75	8
				39.75	-	40.10	3
				40.10	-	40.45	2

(49) HEEL BREADTH

The maximum horizontal distance between the medial and lateral points of the right heel, at or posterior to the lateral malleolus landmark, is measured with a Holtain caliper. The measurement is taken just above the level of the standing surface at the most protruding points of the curvature of the heel. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
5.70	2.24	1ST	6.10	2.40	
5.80	2.28	2ND	6.20	2.44	
5.90	2.32	3RD	6.30	2.48	
6.00	2.36	5TH	6.40	2.52	
6.10	2.40	10TH	6.60	2.60	
6.20	2.44	15TH	6.70	2.64	
6.30	2.48	20TH	6.80	2.68	
6.40	2.52	25TH	6.90	2.72	
6.40	2.52	30TH	7.00	2.76	
6.50	2.56	35TH	7.00	2.76	
6.60	2.60	40TH	7.10	2.80	
6.60	2.60	45TH	7.10	2.80	
6.70	2.64	50TH	7.20	2.83	
6.70	2.64	55TH	7.30	2.87	
6.80	2.68	60TH	7.40	2.91	
6.90	2.72	65TH	7.40	2.91	
7.00	2.76	70TH	7.50	2.95	
7.00	2.76	75TH	7.60	2.99	
7.10	2.80	80TH	7.70	3.03	
7.20	2.83	85TH	7.80	3.07	
7.40	2.91	90TH	8.00	3.15	
7.60	2.99	95TH	8.20	3.23	
7.80	3.07	97TH	8.40	3.31	
7.90	3.11	98TH	8.50	3.35	
8.10	3.19	99TH	8.70	3.43	

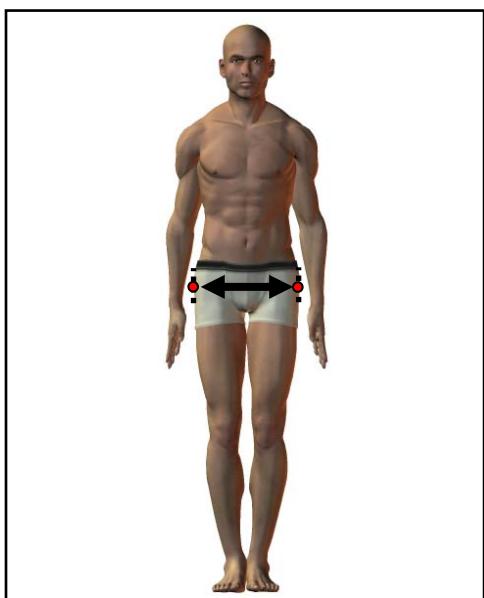
(49) HEEL BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
6.72	2.64		7.25	2.85	
0.01	STD ERROR (MEAN)	0.00	0.01	STD ERROR (MEAN)	0.00
0.52	STANDARD DEVIATION	0.20	0.55	STANDARD DEVIATION	0.21
0.01	STD ERROR (STD DEV)	0.00	0.01	STD ERROR (STD DEV)	0.00
5.30	MINIMUM	2.09	4.80	MINIMUM	1.89
8.90	MAXIMUM	3.50	9.30	MAXIMUM	3.66
SKEWNESS		0.40	SKEWNESS		0.35
KURTOSIS		3.16	KURTOSIS		3.39
COEFFICIENT OF VARIATION		7.7%	COEFFICIENT OF VARIATION		7.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
F	FPct	CumF	CumFPct	MALES	
				<u>CM</u>	F
				4.75	-
				4.85	-
				4.95	-
				5.05	-
				5.15	-
				5.25	-
2	0.10	2	0.10	5.25	-
4	0.20	6	0.30	5.35	-
1	0.05	7	0.35	5.45	-
12	0.60	19	0.96	5.55	-
14	0.70	33	1.66	5.65	-
21	1.06	54	2.72	5.75	-
38	1.91	92	4.63	5.85	-
85	4.28	177	8.91	5.95	-
105	5.29	282	14.20	6.05	-
91	4.58	373	18.78	6.15	-
99	4.98	472	23.77	6.25	-
174	8.76	646	32.53	6.35	-
145	7.30	791	39.83	6.45	-
155	7.80	946	47.63	6.55	-
164	8.26	1110	55.89	6.65	-
140	7.05	1250	62.94	6.75	-
119	5.99	1369	68.93	6.85	-
141	7.10	1510	76.03	6.95	-
104	5.24	1614	81.27	7.05	-
75	3.78	1689	85.05	7.15	-
52	2.62	1741	87.66	7.25	-
61	3.07	1802	90.74	7.35	-
48	2.42	1850	93.15	7.45	-
43	2.17	1893	95.32	7.55	-
32	1.61	1925	96.93	7.65	-
15	0.76	1940	97.68	7.75	-
15	0.76	1955	98.44	7.85	-
11	0.55	1966	98.99	7.95	-
8	0.40	1974	99.40	8.05	-
4	0.20	1978	99.60	8.15	-
3	0.15	1981	99.75	8.25	-
3	0.15	1984	99.90	8.35	-
0	0.00	1984	99.90	8.45	-
0	0.00	1984	99.90	8.55	-
1	0.05	1985	99.95	8.65	-
0	0.00	1985	99.95	8.75	-
1	0.05	1986	100.00	8.85	-
				8.95	-
				9.05	-
				9.05	-
				9.15	-
				9.15	-
				9.25	-
				9.35	-

(50) HIP BREADTH

The horizontal distance between the lateral buttock landmarks is measured with a beam caliper. The participant stands erect with the heels together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
29.30	11.54	1ST	29.50	11.61	
30.10	11.85	2ND	30.00	11.81	
30.60	12.05	3RD	30.30	11.93	
31.10	12.24	5TH	30.80	12.13	
32.00	12.60	10TH	31.60	12.44	
32.70	12.87	15TH	32.10	12.64	
33.20	13.07	20TH	32.60	12.83	
33.60	13.23	25TH	32.90	12.95	
34.00	13.39	30TH	33.30	13.11	
34.30	13.50	35TH	33.60	13.23	
34.60	13.62	40TH	33.90	13.35	
35.00	13.78	45TH	34.20	13.46	
35.30	13.90	50TH	34.40	13.54	
35.60	14.02	55TH	34.70	13.66	
36.00	14.17	60TH	35.10	13.82	
36.30	14.29	65TH	35.30	13.90	
36.60	14.41	70TH	35.70	14.06	
37.00	14.57	75TH	36.10	14.21	
37.40	14.72	80TH	36.50	14.37	
38.00	14.96	85TH	37.00	14.57	
38.70	15.24	90TH	37.70	14.84	
40.00	15.75	95TH	38.70	15.24	
40.80	16.06	97TH	39.60	15.59	
41.30	16.26	98TH	40.10	15.79	
42.30	16.65	99TH	40.90	16.10	

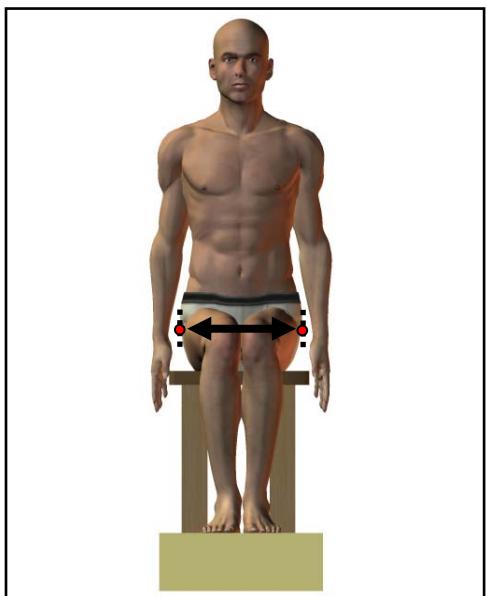
(50) HIP BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
35.38	STD ERROR (MEAN)	13.93	34.57	STD ERROR (MEAN)	13.61
0.06	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.01
2.67	STD ERROR (STD DEV)	1.05	2.42	STD ERROR (STD DEV)	0.95
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
27.60	MAXIMUM	10.87	26.40	MAXIMUM	10.39
47.30		18.62	45.20		17.80
SKEWNESS		0.32	SKEWNESS		0.37
KURTOSIS		3.53	KURTOSIS		3.47
COEFFICIENT OF VARIATION		7.5%	COEFFICIENT OF VARIATION		7.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	26.25	-	26.75	2
1	0.05	2	0.10	26.75	-	27.25	1
5	0.25	7	0.35	28.25	-	28.75	11
10	0.50	17	0.86	28.75	-	29.25	14
10	0.50	27	1.36	29.25	-	29.75	28
15	0.76	42	2.11	29.75	-	30.25	56
27	1.36	69	3.47	30.25	-	30.75	69
39	1.96	108	5.44	30.75	-	31.25	112
41	2.06	149	7.50	31.25	-	31.75	171
72	3.63	221	11.13	31.75	-	32.25	209
78	3.93	299	15.06	32.25	-	32.75	241
106	5.34	405	20.39	32.75	-	33.25	300
139	7.00	544	27.39	33.25	-	33.75	323
140	7.05	684	34.44	33.75	-	34.25	368
150	7.55	834	41.99	34.25	-	34.75	364
144	7.25	978	49.24	34.75	-	35.25	315
146	7.35	1124	56.60	35.25	-	35.75	307
149	7.50	1273	64.10	35.75	-	36.25	265
141	7.10	1414	71.20	36.25	-	36.75	234
139	7.00	1553	78.20	36.75	-	37.25	171
92	4.63	1645	82.83	37.25	-	37.75	121
81	4.08	1726	86.91	37.75	-	38.25	105
64	3.22	1790	90.13	38.25	-	38.75	90
44	2.22	1834	92.35	38.75	-	39.25	57
35	1.76	1869	94.11	39.25	-	39.75	39
37	1.86	1906	95.97	39.75	-	40.25	34
20	1.01	1926	96.98	40.25	-	40.75	27
19	0.96	1945	97.94	40.75	-	41.25	14
10	0.50	1955	98.44	41.25	-	41.75	9
9	0.45	1964	98.89	41.75	-	42.25	8
8	0.40	1972	99.30	42.25	-	42.75	5
5	0.25	1977	99.55	42.75	-	43.25	4
1	0.05	1978	99.60	43.25	-	43.75	1
3	0.15	1981	99.75	43.75	-	44.25	1
1	0.05	1982	99.80	44.25	-	44.75	2
1	0.05	1983	99.85	44.75	-	45.25	2
1	0.05	1984	99.90	45.25	-	45.75	
0	0.00	1984	99.90	45.75	-	46.25	
0	0.00	1984	99.90	46.25	-	46.75	
1	0.05	1985	99.95	46.75	-	47.25	
1	0.05	1986	100.00	47.25	-	47.75	

(51) HIP BREADTH, SITTING

The distance between the lateral points of the hips or thighs (whichever are broader) is measured with a beam caliper. The participant sits erect with the feet and knees together.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
33.10	13.03	1ST	31.70	12.48	
33.70	13.27	2ND	32.30	12.72	
34.10	13.43	3RD	32.80	12.91	
34.80	13.70	5TH	33.30	13.11	
35.90	14.13	10TH	34.20	13.46	
36.60	14.41	15TH	34.80	13.70	
37.20	14.65	20TH	35.40	13.94	
37.70	14.84	25TH	35.80	14.09	
38.10	15.00	30TH	36.30	14.29	
38.50	15.16	35TH	36.70	14.45	
38.90	15.31	40TH	37.00	14.57	
39.30	15.47	45TH	37.40	14.72	
39.70	15.63	50TH	37.80	14.88	
40.20	15.83	55TH	38.20	15.04	
40.70	16.02	60TH	38.50	15.16	
41.00	16.14	65TH	38.90	15.31	
41.40	16.30	70TH	39.30	15.47	
41.90	16.50	75TH	39.70	15.63	
42.50	16.73	80TH	40.30	15.87	
43.20	17.01	85TH	41.00	16.14	
44.00	17.32	90TH	41.80	16.46	
45.60	17.95	95TH	43.10	16.97	
46.40	18.27	97TH	44.00	17.32	
47.50	18.70	98TH	44.90	17.68	
48.50	19.09	99TH	46.20	18.19	

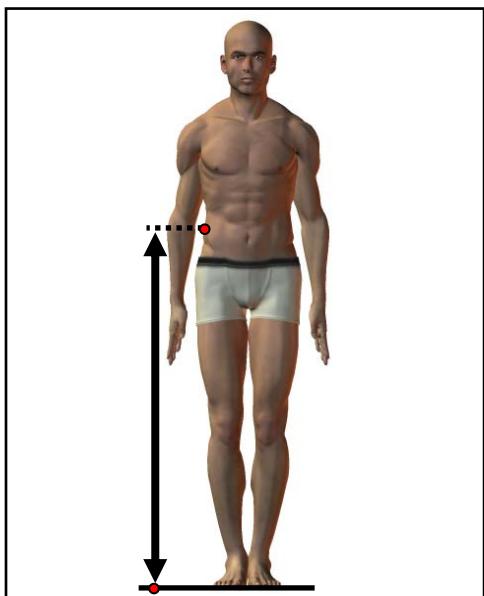
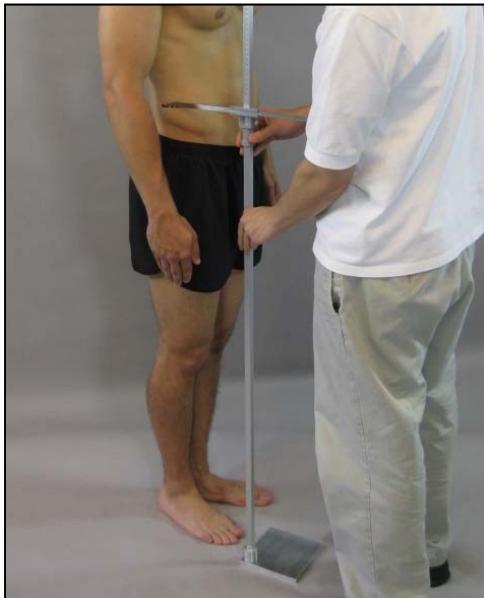
(51) HIP BREADTH, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
39.90	15.71		37.93	14.93	
0.07	0.03		0.05	0.02	
3.27	1.29		3.02	1.19	
0.05	0.02		0.03	0.01	
30.70	12.09		28.00	11.02	
54.10	21.30		50.90	20.04	
SKEWNESS	0.36		SKEWNESS	0.40	
KURTOSIS	3.44		KURTOSIS	3.43	
COEFFICIENT OF VARIATION	8.2%		COEFFICIENT OF VARIATION	8.0%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE					
F	FPct	CumF	CumFPct	MALES	
				<u>CM</u>	F
27.75	-	28.25		1	0.02
28.25	-	28.75		0	0.00
28.75	-	29.25		2	0.05
29.25	-	29.75		1	0.02
29.75	-	30.25		3	0.07
30.25	-	30.75		3	0.07
30.75	-	31.25		9	0.22
31.25	-	31.75		26	0.64
31.75	-	32.25		31	0.76
32.25	-	32.75		37	0.91
32.75	-	33.25		89	2.18
33.25	-	33.75		101	2.47
33.75	-	34.25		130	3.18
34.25	-	34.75		158	3.87
34.75	-	35.25		175	4.29
35.25	-	35.75		215	5.27
35.75	-	36.25		208	5.10
36.25	-	36.75		274	6.71
36.75	-	37.25		272	6.66
37.25	-	37.75		269	6.59
37.75	-	38.25		306	7.50
38.25	-	38.75		280	6.86
38.75	-	39.25		233	5.71
39.25	-	39.75		239	5.85
39.75	-	40.25		179	4.39
40.25	-	40.75		171	4.19
40.75	-	41.25		119	2.92
41.25	-	41.75		117	2.87
41.75	-	42.25		100	2.45
42.25	-	42.75		82	2.01
42.75	-	43.25		54	1.32
43.25	-	43.75		49	1.20
43.75	-	44.25		45	1.10
44.25	-	44.75		18	0.44
44.75	-	45.25		19	0.47
45.25	-	45.75		14	0.34
45.75	-	46.25		13	0.32
46.25	-	46.75		13	0.32
46.75	-	47.25		5	0.12
47.25	-	47.75		7	0.17
47.75	-	48.25		6	0.15
48.25	-	48.75		3	0.07
48.75	-	49.25		2	0.05
49.25	-	49.75		2	0.05
49.75	-	50.25		0	0.00
50.25	-	50.75		1	0.02
50.75	-	51.25		1	0.02
51.25	-	51.75			
51.75	-	52.25			
52.25	-	52.75			
52.75	-	53.25			
53.25	-	53.75			
53.75	-	54.25			

(52) ILIOCRISTALE HEIGHT

The vertical distance between a standing surface and the right iliocristale landmark is measured with an anthropometer. The participant stands erect with the heels together and the weight distributed equally on both feet. The shoulders and upper extremities are relaxed.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
87.90	34.61	1ST	94.70	37.28	
90.00	35.43	2ND	96.00	37.80	
90.50	35.63	3RD	96.80	38.11	
91.80	36.14	5TH	97.70	38.46	
93.40	36.77	10TH	99.60	39.21	
94.50	37.20	15TH	100.80	39.69	
95.60	37.64	20TH	101.80	40.08	
96.30	37.91	25TH	102.80	40.47	
97.00	38.19	30TH	103.40	40.71	
97.50	38.39	35TH	104.10	40.98	
98.00	38.58	40TH	104.70	41.22	
98.70	38.86	45TH	105.40	41.50	
99.30	39.09	50TH	106.10	41.77	
100.00	39.37	55TH	106.70	42.01	
100.70	39.65	60TH	107.40	42.28	
101.40	39.92	65TH	108.10	42.56	
102.10	40.20	70TH	108.70	42.80	
102.80	40.47	75TH	109.50	43.11	
103.80	40.87	80TH	110.40	43.46	
105.00	41.34	85TH	111.40	43.86	
106.00	41.73	90TH	112.80	44.41	
108.00	42.52	95TH	114.80	45.20	
109.30	43.03	97TH	116.40	45.83	
110.00	43.31	98TH	117.30	46.18	
111.40	43.86	99TH	119.30	46.97	

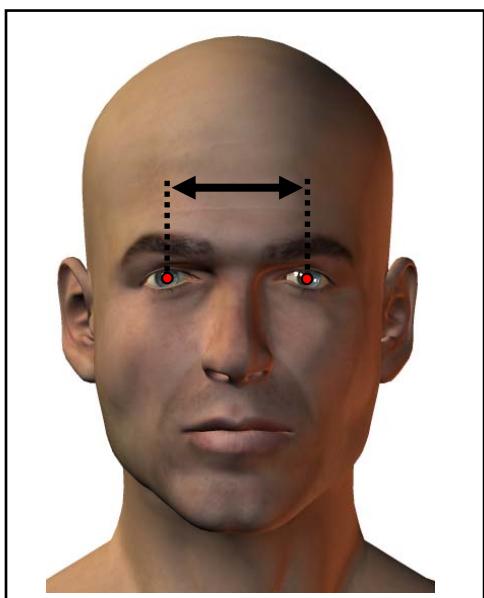
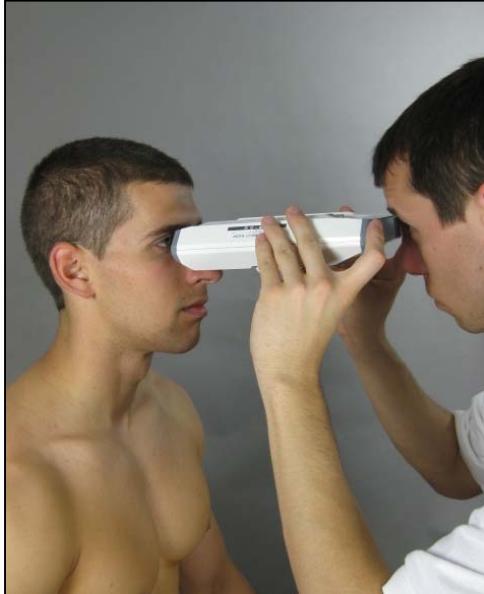
(52) ILOCRISTALE HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
99.57	STD ERROR (MEAN)	39.20	106.16	STD ERROR (MEAN)	41.80
0.11	STANDARD DEVIATION	0.04	0.08	STANDARD DEVIATION	0.03
4.97	STD ERROR (STD DEV)	1.96	5.20	STD ERROR (STD DEV)	2.05
0.08	MINIMUM	0.03	0.06	MINIMUM	0.02
81.60	MAXIMUM	32.13	85.40	MAXIMUM	33.62
116.30	SKEWNESS	45.79	125.30	KURTOSIS	49.33
	KURTOSIS	0.08		COEFFICIENT OF VARIATION	0.15
	COEFFICIENT OF VARIATION	3.09		NUMBER OF PARTICIPANTS	3.15
	NUMBER OF PARTICIPANTS	5.0%			4.9%
		1986			4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
2	0.10	2	0.10	81.55	- 82.55		
2	0.10	4	0.20	82.55	- 83.55		
1	0.05	5	0.25	83.55	- 84.55		
0	0.00	5	0.25	84.55	- 85.55	1	0.02
6	0.30	11	0.55	85.55	- 86.55	0	0.00
5	0.25	16	0.81	86.55	- 87.55	0	0.00
8	0.40	24	1.21	87.55	- 88.55	0	0.00
8	0.40	32	1.61	88.55	- 89.55	0	0.00
30	1.51	62	3.12	89.55	- 90.55	0	0.00
24	1.21	86	4.33	90.55	- 91.55	7	0.17
56	2.82	142	7.15	91.55	- 92.55	7	0.17
68	3.42	210	10.57	92.55	- 93.55	12	0.29
95	4.78	305	15.36	93.55	- 94.55	12	0.29
92	4.63	397	19.99	94.55	- 95.55	20	0.49
125	6.29	522	26.28	95.55	- 96.55	49	1.20
182	9.16	704	35.45	96.55	- 97.55	83	2.03
172	8.66	876	44.11	97.55	- 98.55	94	2.30
149	7.50	1025	51.61	98.55	- 99.55	122	2.99
150	7.55	1175	59.16	99.55	- 100.55	170	4.16
134	6.75	1309	65.91	100.55	- 101.55	194	4.75
147	7.40	1456	73.31	101.55	- 102.55	203	4.97
107	5.39	1563	78.70	102.55	- 103.55	282	6.91
96	4.83	1659	83.53	103.55	- 104.55	316	7.74
88	4.43	1747	87.97	104.55	- 105.55	307	7.52
72	3.63	1819	91.59	105.55	- 106.55	311	7.62
48	2.42	1867	94.01	106.55	- 107.55	317	7.77
39	1.96	1906	95.97	107.55	- 108.55	308	7.55
32	1.61	1938	97.58	108.55	- 109.55	262	6.42
19	0.96	1957	98.54	109.55	- 110.55	224	5.49
12	0.60	1969	99.14	110.55	- 111.55	193	4.73
8	0.40	1977	99.55	111.55	- 112.55	142	3.48
3	0.15	1980	99.70	112.55	- 113.55	130	3.18
2	0.10	1982	99.80	113.55	- 114.55	81	1.98
3	0.15	1985	99.95	114.55	- 115.55	68	1.67
1	0.05	1986	100.00	115.55	- 116.55	49	1.20
				116.55	- 117.55	41	1.00
				117.55	- 118.55	20	0.49
				118.55	- 119.55	20	0.49
				119.55	- 120.55	14	0.34
				120.55	- 121.55	10	0.24
				121.55	- 122.55	7	0.17
				122.55	- 123.55	3	0.07
				123.55	- 124.55	1	0.02
				124.55	- 125.55	2	0.05

(53) INTERPUPILLARY BREADTH

The distance between the two pupils is measured with a pupillometer.



PERCENTILES					
FEMALES			MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
5.35	2.11	1ST	5.60	2.20	
5.40	2.13	2ND	5.70	2.24	
5.45	2.15	3RD	5.75	2.26	
5.55	2.19	5TH	5.85	2.30	
5.70	2.24	10TH	6.00	2.36	
5.80	2.28	15TH	6.05	2.38	
5.85	2.30	20TH	6.15	2.42	
5.95	2.34	25TH	6.15	2.42	
6.00	2.36	30TH	6.20	2.44	
6.05	2.38	35TH	6.25	2.46	
6.10	2.40	40TH	6.30	2.48	
6.15	2.42	45TH	6.35	2.50	
6.20	2.44	50TH	6.40	2.52	
6.20	2.44	55TH	6.45	2.54	
6.25	2.46	60TH	6.45	2.54	
6.30	2.48	65TH	6.50	2.56	
6.35	2.50	70TH	6.55	2.58	
6.40	2.52	75TH	6.60	2.60	
6.45	2.54	80TH	6.70	2.64	
6.55	2.58	85TH	6.75	2.66	
6.65	2.62	90TH	6.85	2.70	
6.75	2.66	95TH	7.00	2.76	
6.85	2.70	97TH	7.05	2.78	
6.95	2.74	98TH	7.15	2.81	
7.05	2.78	99TH	7.25	2.85	

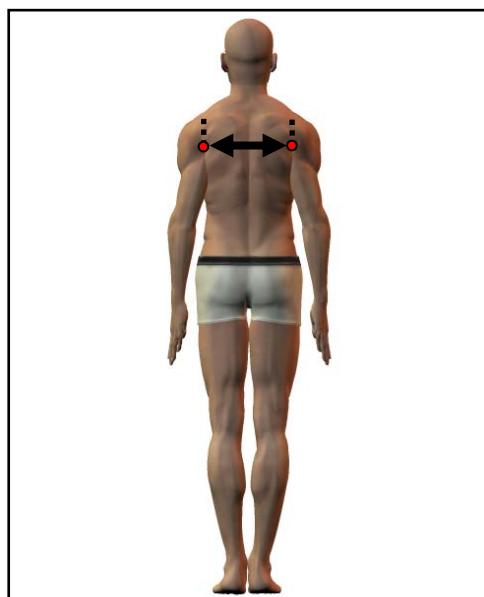
(53) INTERPUPILLARY BREADTH

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
6.17	MEAN	2.43	6.40	MEAN	2.52
0.01	STD ERROR (MEAN)	0.00	0.01	STD ERROR (MEAN)	0.00
0.36	STANDARD DEVIATION	0.14	0.34	STANDARD DEVIATION	0.14
0.01	STD ERROR (STD DEV)	0.00	0.00	STD ERROR (STD DEV)	0.00
5.10	MINIMUM	2.01	5.30	MINIMUM	2.09
7.45	MAXIMUM	2.93	7.70	MAXIMUM	3.03
SKEWNESS		0.01	SKEWNESS		0.14
KURTOSIS		3.00	KURTOSIS		3.30
COEFFICIENT OF VARIATION		5.9%	COEFFICIENT OF VARIATION		5.3%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	5.05	-	5.15	
5	0.25	6	0.30	5.15	-	5.25	
6	0.30	12	0.60	5.25	-	5.35	
33	1.66	45	2.27	5.35	-	5.45	
33	1.66	78	3.93	5.45	-	5.55	
62	3.12	140	7.05	5.55	-	5.65	
83	4.18	223	11.23	5.65	-	5.75	
106	5.34	329	16.57	5.75	-	5.85	
151	7.60	480	24.17	5.85	-	5.95	
198	9.97	678	34.14	5.95	-	6.05	
193	9.72	871	43.86	6.05	-	6.15	
243	12.24	1114	56.09	6.15	-	6.25	
208	10.47	1322	66.57	6.25	-	6.35	
191	9.62	1513	76.18	6.35	-	6.45	
160	8.06	1673	84.24	6.45	-	6.55	
112	5.64	1785	89.88	6.55	-	6.65	
80	4.03	1865	93.91	6.65	-	6.75	
51	2.57	1916	96.48	6.75	-	6.85	
28	1.41	1944	97.89	6.85	-	6.95	
21	1.06	1965	98.94	6.95	-	7.05	
12	0.60	1977	99.55	7.05	-	7.15	
5	0.25	1982	99.80	7.15	-	7.25	
3	0.15	1985	99.95	7.25	-	7.35	
0	0.00	1985	99.95	7.35	-	7.45	
1	0.05	1986	100.00	7.45	-	7.55	
				7.55	-	7.65	
				7.65	-	7.75	

(54) INTERSCYE I

The distance across the back between the right and left posterior axillary fold landmarks is measured with a tape. The tape is held on the skin surface except where the tape spans the hollow of the back. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
30.60	12.05	1ST	35.20	13.86	
31.50	12.40	2ND	36.20	14.25	
32.00	12.60	3RD	36.70	14.45	
32.60	12.83	5TH	37.40	14.72	
33.50	13.19	10TH	38.60	15.20	
34.20	13.46	15TH	39.40	15.51	
34.80	13.70	20TH	40.00	15.75	
35.20	13.86	25TH	40.60	15.98	
35.60	14.02	30TH	41.10	16.18	
36.10	14.21	35TH	41.60	16.38	
36.50	14.37	40TH	42.10	16.57	
37.00	14.57	45TH	42.50	16.73	
37.30	14.69	50TH	43.00	16.93	
37.70	14.84	55TH	43.50	17.13	
38.00	14.96	60TH	44.00	17.32	
38.50	15.16	65TH	44.40	17.48	
39.00	15.35	70TH	45.00	17.72	
39.30	15.47	75TH	45.50	17.91	
39.80	15.67	80TH	46.00	18.11	
40.30	15.87	85TH	46.70	18.39	
41.10	16.18	90TH	47.60	18.74	
42.30	16.65	95TH	49.10	19.33	
43.10	16.97	97TH	50.00	19.69	
43.90	17.28	98TH	50.60	19.92	
44.60	17.56	99TH	51.50	20.28	

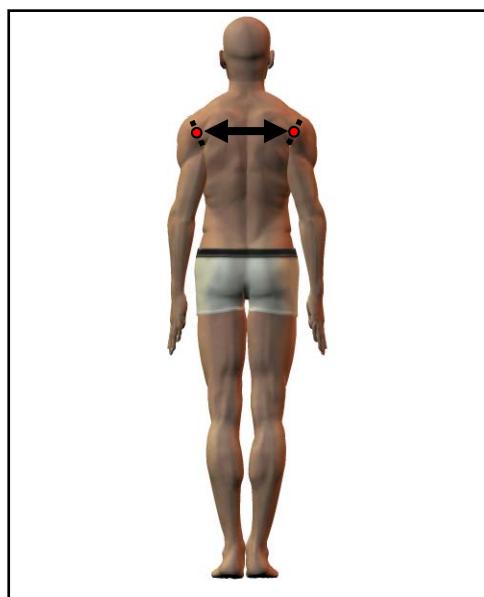
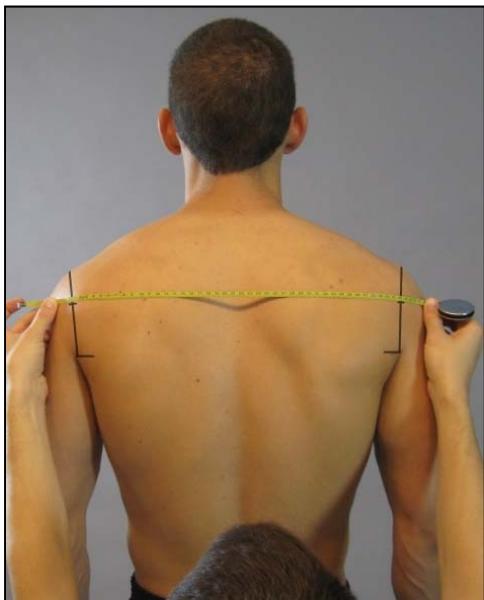
(54) INTERSCYE I

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
37.34	STD ERROR (MEAN)	14.70	43.09	STD ERROR (MEAN)	16.96
0.07	STANDARD DEVIATION	0.03	0.06	STANDARD DEVIATION	0.02
2.98	STD ERROR (STD DEV)	1.17	3.52	STD ERROR (STD DEV)	1.39
0.05	MINIMUM	0.02	0.04	MINIMUM	0.02
27.00	MAXIMUM	10.63	32.80	MAXIMUM	12.91
48.10		18.94	56.20		22.13
SKEWNESS		0.13	SKEWNESS		0.14
KURTOSIS		3.04	KURTOSIS		2.93
COEFFICIENT OF VARIATION		8.0%	COEFFICIENT OF VARIATION		8.2%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	26.75	-	27.50	
1	0.05	2	0.10	27.50	-	28.25	
1	0.05	3	0.15	28.25	-	29.00	
5	0.25	8	0.40	29.00	-	29.75	
6	0.30	14	0.70	29.75	-	30.50	
21	1.06	35	1.76	30.50	-	31.25	
16	0.81	51	2.57	31.25	-	32.00	
53	2.67	104	5.24	32.00	-	32.75	
72	3.63	176	8.86	32.75	-	33.50	
139	7.00	315	15.86	33.50	-	34.25	
97	4.88	412	20.75	34.25	-	35.00	
202	10.17	614	30.92	35.00	-	35.75	
147	7.40	761	38.32	35.75	-	36.50	
230	11.58	991	49.90	36.50	-	37.25	
131	6.60	1122	56.50	37.25	-	38.00	
245	12.34	1367	68.83	38.00	-	38.75	
147	7.40	1514	76.23	38.75	-	39.50	
168	8.46	1682	84.69	39.50	-	40.25	
73	3.68	1755	88.37	40.25	-	41.00	
81	4.08	1836	92.45	41.00	-	41.75	
55	2.77	1891	95.22	41.75	-	42.50	
39	1.96	1930	97.18	42.50	-	43.25	
17	0.86	1947	98.04	43.25	-	44.00	
21	1.06	1968	99.09	44.00	-	44.75	
10	0.50	1978	99.60	44.75	-	45.50	
4	0.20	1982	99.80	45.50	-	46.25	
1	0.05	1983	99.85	46.25	-	47.00	
1	0.05	1984	99.90	47.00	-	47.75	
2	0.10	1986	100.00	47.75	-	48.50	
				48.50	-	49.25	
				49.25	-	50.00	
				50.00	-	50.75	
				50.75	-	51.50	
				51.50	-	52.25	
				52.25	-	53.00	
				53.00	-	53.75	
				53.75	-	54.50	
				54.50	-	55.25	
				55.25	-	56.00	
				56.00	-	56.75	

(55) INTERSCYE II

The distance across the back between the right and left midscye landmarks is measured with a tape. The tape is held on the skin surface except where it spans the hollow of the back. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
33.10	13.03	1ST	38.10	15.00	
34.20	13.46	2ND	39.00	15.35	
34.60	13.62	3RD	39.40	15.51	
35.40	13.94	5TH	40.00	15.75	
36.40	14.33	10TH	41.10	16.18	
37.00	14.57	15TH	42.00	16.54	
37.50	14.76	20TH	42.40	16.69	
37.90	14.92	25TH	43.00	16.93	
38.20	15.04	30TH	43.50	17.13	
38.60	15.20	35TH	43.90	17.28	
39.00	15.35	40TH	44.30	17.44	
39.20	15.43	45TH	44.60	17.56	
39.60	15.59	50TH	45.00	17.72	
40.00	15.75	55TH	45.40	17.87	
40.20	15.83	60TH	45.70	17.99	
40.60	15.98	65TH	46.20	18.19	
41.00	16.14	70TH	46.60	18.35	
41.20	16.22	75TH	47.10	18.54	
41.60	16.38	80TH	47.50	18.70	
42.10	16.57	85TH	48.10	18.94	
42.70	16.81	90TH	49.00	19.29	
43.80	17.24	95TH	50.10	19.72	
44.40	17.48	97TH	50.80	20.00	
45.00	17.72	98TH	51.40	20.24	
45.80	18.03	99TH	52.40	20.63	

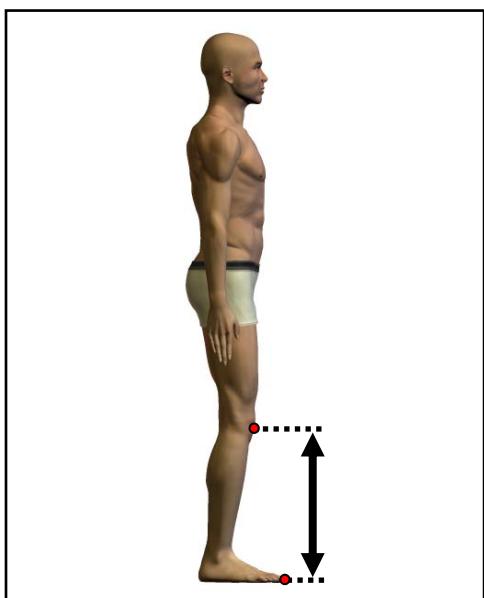
(55) INTERSCYE II

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
39.57	MEAN	15.58	45.02	MEAN	17.72
0.06	STD ERROR (MEAN)	0.02	0.05	STD ERROR (MEAN)	0.02
2.57	STANDARD DEVIATION	1.01	3.05	STANDARD DEVIATION	1.20
0.04	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
30.60	MINIMUM	12.05	34.50	MINIMUM	13.58
49.30	MAXIMUM	19.41	57.70	MAXIMUM	22.72
SKEWNESS		-0.02	SKEWNESS		0.06
KURTOSIS		3.27	KURTOSIS		3.02
COEFFICIENT OF VARIATION		6.5%	COEFFICIENT OF VARIATION		6.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	30.25	- 31.00
3	0.15	4	0.20	31.00	- 31.75
5	0.25	9	0.45	31.75	- 32.50
15	0.76	24	1.21	32.50	- 33.25
7	0.35	31	1.56	33.25	- 34.00
32	1.61	63	3.17	34.00	- 34.75
38	1.91	101	5.09	34.75	- 35.50
79	3.98	180	9.06	35.50	- 36.25
88	4.43	268	13.49	36.25	- 37.00
206	10.37	474	23.87	37.00	- 37.75
158	7.96	632	31.82	37.75	- 38.50
270	13.60	902	45.42	38.50	- 39.25
179	9.01	1081	54.43	39.25	- 40.00
253	12.74	1334	67.17	40.00	- 40.75
192	9.67	1526	76.84	40.75	- 41.50
196	9.87	1722	86.71	41.50	- 42.25
79	3.98	1801	90.68	42.25	- 43.00
85	4.28	1886	94.96	43.00	- 43.75
42	2.11	1928	97.08	43.75	- 44.50
28	1.41	1956	98.49	44.50	- 45.25
12	0.60	1968	99.09	45.25	- 46.00
12	0.60	1980	99.70	46.00	- 46.75
2	0.10	1982	99.80	46.75	- 47.50
2	0.10	1984	99.90	47.50	- 48.25
1	0.05	1985	99.95	48.25	- 49.00
1	0.05	1986	100.00	49.00	- 49.75
				49.75	- 50.50
				50.50	- 51.25
				51.25	- 52.00
				52.00	- 52.75
				52.75	- 53.50
				53.50	- 54.25
				54.25	- 55.00
				55.00	- 55.75
				55.75	- 56.50
				56.50	- 57.25
				57.25	- 58.00

(56) KNEE HEIGHT, MIDPATELLA

The vertical distance between a standing surface and the midpatella landmark is measured with an anthropometer. The participant stands erect with the heels together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
39.00	15.35	1ST	42.80	16.85	
39.60	15.59	2ND	43.40	17.09	
40.20	15.83	3RD	43.80	17.24	
40.80	16.06	5TH	44.30	17.44	
41.70	16.42	10TH	45.20	17.80	
42.40	16.69	15TH	46.00	18.11	
42.80	16.85	20TH	46.50	18.31	
43.20	17.01	25TH	46.90	18.46	
43.50	17.13	30TH	47.30	18.62	
43.80	17.24	35TH	47.70	18.78	
44.20	17.40	40TH	48.10	18.94	
44.50	17.52	45TH	48.40	19.06	
44.80	17.64	50TH	48.70	19.17	
45.10	17.76	55TH	49.10	19.33	
45.40	17.87	60TH	49.50	19.49	
45.80	18.03	65TH	49.80	19.61	
46.20	18.19	70TH	50.20	19.76	
46.60	18.35	75TH	50.70	19.96	
47.10	18.54	80TH	51.20	20.16	
47.70	18.78	85TH	51.70	20.35	
48.20	18.98	90TH	52.50	20.67	
49.30	19.41	95TH	53.60	21.10	
49.90	19.65	97TH	54.40	21.42	
50.50	19.88	98TH	55.00	21.65	
51.40	20.24	99TH	55.70	21.93	

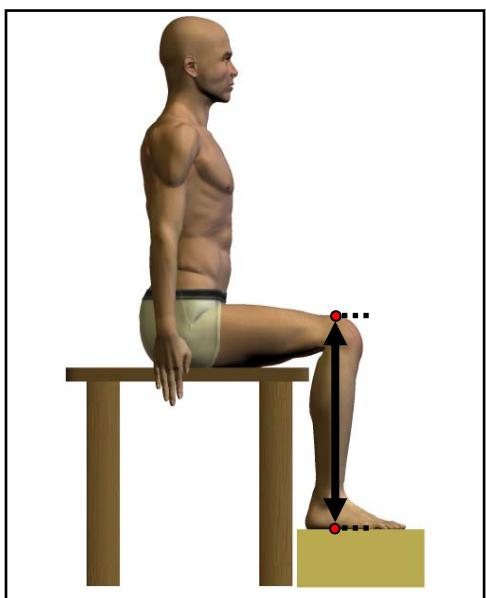
(56) KNEE HEIGHT, MIDPATELLA

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
44.90	STD ERROR (MEAN)	17.68	48.84	STD ERROR (MEAN)	19.23
0.06	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.60	STD ERROR (STD DEV)	1.02	2.81	STD ERROR (STD DEV)	1.11
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
34.60	MAXIMUM	13.62	39.70	MAXIMUM	15.63
54.00		21.26	61.20		24.09
SKEWNESS		0.10	SKEWNESS		0.18
KURTOSIS		3.31	KURTOSIS		3.15
COEFFICIENT OF VARIATION		5.8%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	34.25	-	35.00	
2	0.10	3	0.15	35.00	-	35.75	
1	0.05	4	0.20	35.75	-	36.50	
1	0.05	5	0.25	36.50	-	37.25	
2	0.10	7	0.35	37.25	-	38.00	
8	0.40	15	0.76	38.00	-	38.75	
19	0.96	34	1.71	38.75	-	39.50	
30	1.51	64	3.22	39.50	-	40.25	
50	2.52	114	5.74	40.25	-	41.00	
95	4.78	209	10.52	41.00	-	41.75	
101	5.09	310	15.61	41.75	-	42.50	
192	9.67	502	25.28	42.50	-	43.25	
215	10.83	717	36.10	43.25	-	44.00	
269	13.54	986	49.65	44.00	-	44.75	
209	10.52	1195	60.17	44.75	-	45.50	
215	10.83	1410	71.00	45.50	-	46.25	
143	7.20	1553	78.20	46.25	-	47.00	
155	7.80	1708	86.00	47.00	-	47.75	
99	4.98	1807	90.99	47.75	-	48.50	
67	3.37	1874	94.36	48.50	-	49.25	
53	2.67	1927	97.03	49.25	-	50.00	
26	1.31	1953	98.34	50.00	-	50.75	
16	0.81	1969	99.14	50.75	-	51.50	
9	0.45	1978	99.60	51.50	-	52.25	
3	0.15	1981	99.75	52.25	-	53.00	
4	0.20	1985	99.95	53.00	-	53.75	
1	0.05	1986	100.00	53.75	-	54.50	
				54.50	-	55.25	
				55.25	-	56.00	
				56.00	-	56.75	
				56.75	-	57.50	
				57.50	-	58.25	
				58.25	-	59.00	
				59.00	-	59.75	
				59.75	-	60.50	
				60.50	-	61.25	

(57) KNEE HEIGHT, SITTING

The vertical distance between a footrest surface and the suprapatella landmark is measured with an anthropometer. The participant sits with the thighs parallel, the knees flexed 90°, and the feet in line with the thighs.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
45.10	17.76	1ST	49.30	19.41	
45.70	17.99	2ND	49.90	19.65	
46.30	18.23	3RD	50.40	19.84	
46.90	18.46	5TH	50.90	20.04	
47.80	18.82	10TH	51.80	20.39	
48.50	19.09	15TH	52.60	20.71	
48.90	19.25	20TH	53.10	20.91	
49.30	19.41	25TH	53.50	21.06	
49.70	19.57	30TH	54.00	21.26	
50.00	19.69	35TH	54.30	21.38	
50.30	19.80	40TH	54.70	21.54	
50.70	19.96	45TH	55.00	21.65	
51.00	20.08	50TH	55.30	21.77	
51.30	20.20	55TH	55.70	21.93	
51.70	20.35	60TH	56.10	22.09	
52.00	20.47	65TH	56.40	22.20	
52.40	20.63	70TH	56.80	22.36	
52.90	20.83	75TH	57.20	22.52	
53.40	21.02	80TH	57.70	22.72	
53.90	21.22	85TH	58.30	22.95	
54.70	21.54	90TH	59.00	23.23	
55.70	21.93	95TH	60.20	23.70	
56.60	22.28	97TH	60.90	23.98	
57.30	22.56	98TH	61.50	24.21	
58.00	22.83	99TH	62.50	24.61	

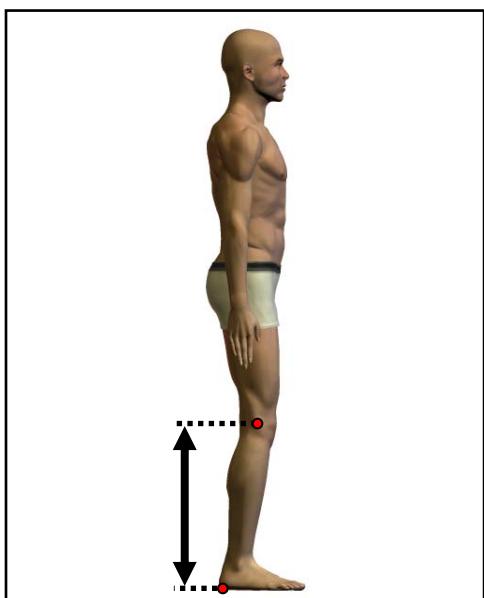
(57) KNEE HEIGHT, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
51.13	MEAN	20.13	55.42	MEAN	21.82
0.06	STD ERROR (MEAN)	0.02	0.04	STD ERROR (MEAN)	0.02
2.71	STANDARD DEVIATION	1.07	2.79	STANDARD DEVIATION	1.10
0.04	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
40.70	MINIMUM	16.02	45.10	MINIMUM	17.76
60.50	MAXIMUM	23.82	66.60	MAXIMUM	26.22
SKEWNESS		0.17	SKEWNESS		0.17
KURTOSIS		3.27	KURTOSIS		3.18
COEFFICIENT OF VARIATION		5.3%	COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	40.25	-	40.75	
1	0.05	2	0.10	40.75	-	41.25	
0	0.00	2	0.10	41.25	-	41.75	
0	0.00	2	0.10	41.75	-	42.25	
1	0.05	3	0.15	42.25	-	42.75	
2	0.10	5	0.25	42.75	-	43.25	
3	0.15	8	0.40	43.25	-	43.75	
4	0.20	12	0.60	43.75	-	44.25	
2	0.10	14	0.70	44.25	-	44.75	
8	0.40	22	1.11	44.75	-	45.25	
18	0.91	40	2.01	45.25	-	45.75	
17	0.86	57	2.87	45.75	-	46.25	
30	1.51	87	4.38	46.25	-	46.75	
37	1.86	124	6.24	46.75	-	47.25	
72	3.63	196	9.87	47.25	-	47.75	
64	3.22	260	13.09	47.75	-	48.25	
102	5.14	362	18.23	48.25	-	48.75	
104	5.24	466	23.46	48.75	-	49.25	
144	7.25	610	30.72	49.25	-	49.75	
163	8.21	773	38.92	49.75	-	50.25	
143	7.20	916	46.12	50.25	-	50.75	
153	7.70	1069	53.83	50.75	-	51.25	
155	7.80	1224	61.63	51.25	-	51.75	
132	6.65	1356	68.28	51.75	-	52.25	
106	5.34	1462	73.62	52.25	-	52.75	
98	4.93	1560	78.55	52.75	-	53.25	
100	5.04	1660	83.59	53.25	-	53.75	
68	3.42	1728	87.01	53.75	-	54.25	
72	3.63	1800	90.63	54.25	-	54.75	
53	2.67	1853	93.30	54.75	-	55.25	
35	1.76	1888	95.07	55.25	-	55.75	
27	1.36	1915	96.42	55.75	-	56.25	
19	0.96	1934	97.38	56.25	-	56.75	
12	0.60	1946	97.99	56.75	-	57.25	
14	0.70	1960	98.69	57.25	-	57.75	
13	0.65	1973	99.35	57.75	-	58.25	
5	0.25	1978	99.60	58.25	-	58.75	
3	0.15	1981	99.75	58.75	-	59.25	
3	0.15	1984	99.90	59.25	-	59.75	
1	0.05	1985	99.95	59.75	-	60.25	
1	0.05	1986	100.00	60.25	-	60.75	
				60.75	-	61.25	
				61.25	-	61.75	
				61.75	-	62.25	
				62.25	-	62.75	
				62.75	-	63.25	
				63.25	-	63.75	
				63.75	-	64.25	
				64.25	-	64.75	
				64.75	-	65.25	
				65.25	-	65.75	
				65.75	-	66.25	
				66.25	-	66.75	

(58) LATERAL FEMORAL EPICONDYLE HEIGHT

The vertical distance between a standing surface and the standing lateral femoral epicondyle landmark is measured with an anthropometer. The participant stands erect with the heels together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
40.50	15.94	1ST	43.30	17.05	
41.30	16.26	2ND	44.00	17.32	
41.70	16.42	3RD	44.40	17.48	
42.20	16.61	5TH	44.90	17.68	
43.40	17.09	10TH	45.80	18.03	
43.90	17.28	15TH	46.40	18.27	
44.40	17.48	20TH	46.90	18.46	
44.70	17.60	25TH	47.30	18.62	
45.10	17.76	30TH	47.70	18.78	
45.50	17.91	35TH	48.10	18.94	
45.80	18.03	40TH	48.40	19.06	
46.20	18.19	45TH	48.80	19.21	
46.50	18.31	50TH	49.10	19.33	
46.90	18.46	55TH	49.40	19.45	
47.20	18.58	60TH	49.80	19.61	
47.50	18.70	65TH	50.10	19.72	
47.90	18.86	70TH	50.50	19.88	
48.30	19.02	75TH	50.90	20.04	
48.90	19.25	80TH	51.40	20.24	
49.40	19.45	85TH	51.90	20.43	
50.10	19.72	90TH	52.60	20.71	
51.10	20.12	95TH	53.70	21.14	
51.80	20.39	97TH	54.30	21.38	
52.30	20.59	98TH	54.80	21.57	
53.40	21.02	99TH	55.70	21.93	

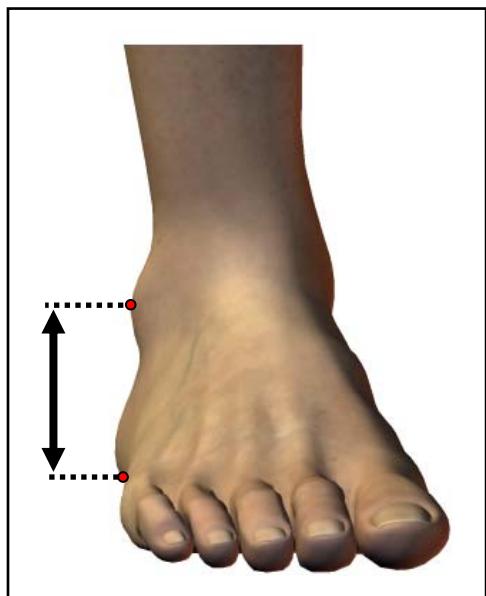
(58) LATERAL FEMORAL EPICONDYLE HEIGHT

FEMALES			MALES		
CM	MEAN	IN	CM	MEAN	IN
46.59	18.34		49.17	19.36	
0.06	STD ERROR (MEAN)	0.02	0.04	STD ERROR (MEAN)	0.02
2.71	STANDARD DEVIATION	1.07	2.66	STANDARD DEVIATION	1.05
0.04	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
35.20	MINIMUM	13.86	40.70	MINIMUM	16.02
58.00	MAXIMUM	22.83	59.40	MAXIMUM	23.39
SKEWNESS		0.09	SKEWNESS		0.16
KURTOSIS		3.37	KURTOSIS		3.08
COEFFICIENT OF VARIATION		5.8%	COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	34.75	- 35.25		
0	0.00	1	0.05	35.25	- 35.75		
0	0.00	1	0.05	35.75	- 36.25		
0	0.00	1	0.05	36.25	- 36.75		
2	0.10	3	0.15	36.75	- 37.25		
1	0.05	4	0.20	37.25	- 37.75		
1	0.05	5	0.25	37.75	- 38.25		
1	0.05	6	0.30	38.25	- 38.75		
0	0.00	6	0.30	38.75	- 39.25		
6	0.30	12	0.60	39.25	- 39.75		
6	0.30	18	0.91	39.75	- 40.25		
7	0.35	25	1.26	40.25	- 40.75	1	0.02
14	0.70	39	1.96	40.75	- 41.25	2	0.05
24	1.21	63	3.17	41.25	- 41.75	5	0.12
40	2.01	103	5.19	41.75	- 42.25	6	0.15
41	2.06	144	7.25	42.25	- 42.75	7	0.17
43	2.17	187	9.42	42.75	- 43.25	15	0.37
74	3.73	261	13.14	43.25	- 43.75	25	0.61
113	5.69	374	18.83	43.75	- 44.25	46	1.13
132	6.65	506	25.48	44.25	- 44.75	72	1.76
118	5.94	624	31.42	44.75	- 45.25	100	2.45
146	7.35	770	38.77	45.25	- 45.75	114	2.79
128	6.45	898	45.22	45.75	- 46.25	170	4.16
160	8.06	1058	53.27	46.25	- 46.75	187	4.58
141	7.10	1199	60.37	46.75	- 47.25	231	5.66
147	7.40	1346	67.77	47.25	- 47.75	248	6.08
121	6.09	1467	73.87	47.75	- 48.25	293	7.18
97	4.88	1564	78.75	48.25	- 48.75	302	7.40
95	4.78	1659	83.53	48.75	- 49.25	320	7.84
73	3.68	1732	87.21	49.25	- 49.75	290	7.10
77	3.88	1809	91.09	49.75	- 50.25	286	7.01
52	2.62	1861	93.71	50.25	- 50.75	267	6.54
35	1.76	1896	95.47	50.75	- 51.25	218	5.34
29	1.46	1925	96.93	51.25	- 51.75	217	5.32
20	1.01	1945	97.94	51.75	- 52.25	182	4.46
14	0.70	1959	98.64	52.25	- 52.75	112	2.74
6	0.30	1965	98.94	52.75	- 53.25	89	2.18
8	0.40	1973	99.35	53.25	- 53.75	76	1.86
5	0.25	1978	99.60	53.75	- 54.25	74	1.81
4	0.20	1982	99.80	54.25	- 54.75	39	0.96
1	0.05	1983	99.85	54.75	- 55.25	33	0.81
1	0.05	1984	99.90	55.25	- 55.75	18	0.44
0	0.00	1984	99.90	55.75	- 56.25	12	0.29
1	0.05	1985	99.95	56.25	- 56.75	9	0.22
0	0.00	1985	99.95	56.75	- 57.25	4	0.10
0	0.00	1985	99.95	57.25	- 57.75	5	0.12
1	0.05	1986	100.00	57.75	- 58.25	2	0.05
				58.25	- 58.75	1	0.02
				58.75	- 59.25	3	0.07
				59.25	- 59.75	1	0.02

(59) LATERAL MALLEOLUS HEIGHT

The vertical distance between a standing surface and the lateral malleolus landmark is measured with a modified height gauge. The participant stands erect with the heels together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
5.10	2.01	1ST	6.00	2.36	
5.30	2.09	2ND	6.20	2.44	
5.30	2.09	3RD	6.30	2.48	
5.40	2.13	5TH	6.40	2.52	
5.70	2.24	10TH	6.60	2.60	
5.70	2.24	15TH	6.70	2.64	
5.80	2.28	20TH	6.80	2.68	
5.90	2.32	25TH	6.90	2.72	
6.00	2.36	30TH	7.00	2.76	
6.10	2.40	35TH	7.10	2.80	
6.10	2.40	40TH	7.10	2.80	
6.20	2.44	45TH	7.20	2.83	
6.30	2.48	50TH	7.30	2.87	
6.30	2.48	55TH	7.40	2.91	
6.40	2.52	60TH	7.40	2.91	
6.50	2.56	65TH	7.50	2.95	
6.50	2.56	70TH	7.60	2.99	
6.60	2.60	75TH	7.70	3.03	
6.70	2.64	80TH	7.70	3.03	
6.80	2.68	85TH	7.90	3.11	
6.90	2.72	90TH	8.00	3.15	
7.10	2.80	95TH	8.30	3.27	
7.30	2.87	97TH	8.40	3.31	
7.30	2.87	98TH	8.50	3.35	
7.50	2.95	99TH	8.70	3.43	

(59) LATERAL MALLEOLUS HEIGHT

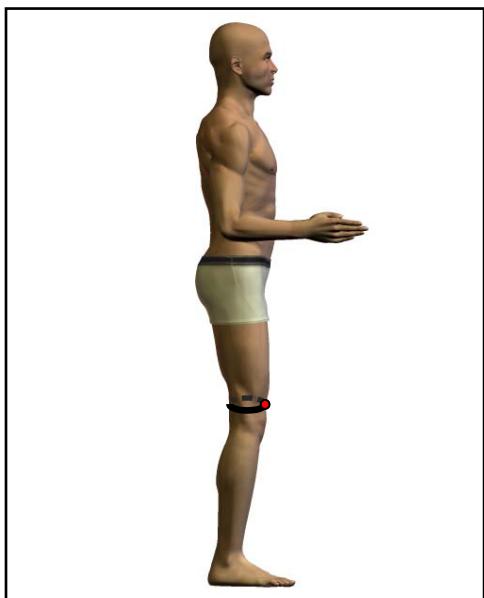
FEMALES		
<u>CM</u>		<u>IN</u>
6.27	MEAN	2.47
0.01	STD ERROR (MEAN)	0.00
0.51	STANDARD DEVIATION	0.20
0.01	STD ERROR (STD DEV)	0.00
4.30	MINIMUM	1.69
7.90	MAXIMUM	3.11
SKEWNESS		0.01
KURTOSIS		2.95
COEFFICIENT OF VARIATION		8.1%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
7.29	MEAN	2.87
0.01	STD ERROR (MEAN)	0.00
0.57	STANDARD DEVIATION	0.22
0.01	STD ERROR (STD DEV)	0.00
5.40	MINIMUM	2.13
9.30	MAXIMUM	3.66
SKEWNESS		0.13
KURTOSIS		3.03
COEFFICIENT OF VARIATION		7.8%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	F	FPct
1	0.05	1	0.05	4.25	-	4.35	
0	0.00	1	0.05	4.35	-	4.45	
0	0.00	1	0.05	4.45	-	4.55	
0	0.00	1	0.05	4.55	-	4.65	
2	0.10	3	0.15	4.65	-	4.75	
1	0.05	4	0.20	4.75	-	4.85	
5	0.25	9	0.45	4.85	-	4.95	
5	0.25	14	0.70	4.95	-	5.05	
10	0.50	24	1.21	5.05	-	5.15	
13	0.65	37	1.86	5.15	-	5.25	
35	1.76	72	3.63	5.25	-	5.35	
33	1.66	105	5.29	5.35	-	5.45	
46	2.32	151	7.60	5.45	-	5.55	
46	2.32	197	9.92	5.55	-	5.65	
118	5.94	315	15.86	5.65	-	5.75	
96	4.83	411	20.69	5.75	-	5.85	
125	6.29	536	26.99	5.85	-	5.95	
158	7.96	694	34.94	5.95	-	6.05	
101	5.09	795	40.03	6.05	-	6.15	
141	7.10	936	47.13	6.15	-	6.25	
170	8.56	1106	55.69	6.25	-	6.35	
149	7.50	1255	63.19	6.35	-	6.45	
144	7.25	1399	70.44	6.45	-	6.55	
101	5.09	1500	75.53	6.55	-	6.65	
147	7.40	1647	82.93	6.65	-	6.75	
88	4.43	1735	87.36	6.75	-	6.85	
70	3.52	1805	90.89	6.85	-	6.95	
63	3.17	1868	94.06	6.95	-	7.05	
28	1.41	1896	95.47	7.05	-	7.15	
30	1.51	1926	96.98	7.15	-	7.25	
25	1.26	1951	98.24	7.25	-	7.35	
11	0.55	1962	98.79	7.35	-	7.45	
12	0.60	1974	99.40	7.45	-	7.55	
3	0.15	1977	99.55	7.55	-	7.65	
7	0.35	1984	99.90	7.65	-	7.75	
0	0.00	1984	99.90	7.75	-	7.85	
2	0.10	1986	100.00	7.85	-	7.95	
				7.95	-	8.05	
				8.05	-	8.15	
				8.15	-	8.25	
				8.25	-	8.35	
				8.35	-	8.45	
				8.45	-	8.55	
				8.55	-	8.65	
				8.65	-	8.75	
				8.75	-	8.85	
				8.85	-	8.95	
				8.95	-	9.05	
				9.05	-	9.15	
				9.15	-	9.25	
				9.25	-	9.35	

(60) LOWER THIGH CIRCUMFERENCE

The horizontal circumference of the right thigh at the level of the suprapatella landmark is measured with a tape. The participant stands erect with the feet about 10 cm apart and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
32.90	12.95	1ST	34.30	13.50	
33.60	13.23	2ND	34.70	13.66	
34.10	13.43	3RD	35.30	13.90	
34.70	13.66	5TH	35.90	14.13	
35.80	14.09	10TH	37.00	14.57	
36.60	14.41	15TH	37.70	14.84	
37.20	14.65	20TH	38.20	15.04	
37.70	14.84	25TH	38.70	15.24	
38.10	15.00	30TH	39.20	15.43	
38.60	15.20	35TH	39.70	15.63	
39.00	15.35	40TH	40.10	15.79	
39.40	15.51	45TH	40.40	15.91	
39.80	15.67	50TH	40.80	16.06	
40.30	15.87	55TH	41.20	16.22	
40.70	16.02	60TH	41.70	16.42	
41.10	16.18	65TH	42.00	16.54	
41.60	16.38	70TH	42.40	16.69	
42.20	16.61	75TH	42.90	16.89	
42.70	16.81	80TH	43.50	17.13	
43.50	17.13	85TH	44.20	17.40	
44.50	17.52	90TH	45.00	17.72	
46.50	18.31	95TH	46.30	18.23	
47.50	18.70	97TH	47.40	18.66	
48.10	18.94	98TH	48.00	18.90	
50.20	19.76	99TH	49.30	19.41	

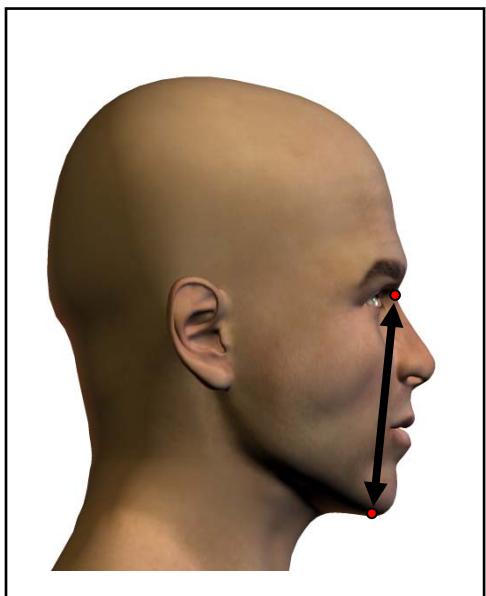
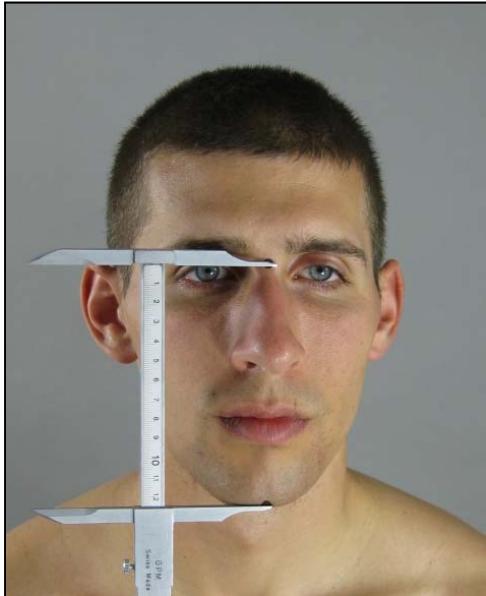
(60) LOWER THIGH CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
40.07	15.78		40.93	16.11	
0.08	STD ERROR (MEAN)	0.03	0.05	STD ERROR (MEAN)	0.02
3.52	STANDARD DEVIATION	1.38	3.19	STANDARD DEVIATION	1.25
0.06	STD ERROR (STD DEV)	0.02	0.04	STD ERROR (STD DEV)	0.01
30.20	MINIMUM	11.89	29.00	MINIMUM	11.42
60.00	MAXIMUM	23.62	54.00	MAXIMUM	21.26
SKEWNESS		0.55	SKEWNESS		0.25
KURTOSIS		3.97	KURTOSIS		3.24
COEFFICIENT OF VARIATION		8.8%	COEFFICIENT OF VARIATION		7.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	28.75	-	29.50	1
0	0.00	1	0.05	29.50	-	30.25	1
4	0.20	5	0.25	30.25	-	31.00	0
8	0.40	13	0.65	31.00	-	31.75	3
14	0.70	27	1.36	31.75	-	32.50	2
25	1.26	52	2.62	32.50	-	33.25	13
53	2.67	105	5.29	33.25	-	34.00	52
53	2.67	158	7.96	34.00	-	34.75	61
99	4.98	257	12.94	34.75	-	35.50	113
91	4.58	348	17.52	35.50	-	36.25	277
168	8.46	516	25.98	36.25	-	37.00	150
149	7.50	665	33.48	37.00	-	37.75	250
172	8.66	837	42.15	37.75	-	38.50	252
183	9.21	1020	51.36	38.50	-	39.25	315
191	9.62	1211	60.98	39.25	-	40.00	341
148	7.45	1359	68.43	40.00	-	40.75	455
152	7.65	1511	76.08	40.75	-	41.50	340
97	4.88	1608	80.97	41.50	-	42.25	391
110	5.54	1718	86.51	42.25	-	43.00	316
68	3.42	1786	89.93	43.00	-	43.75	293
53	2.67	1839	92.60	43.75	-	44.50	190
32	1.61	1871	94.21	44.50	-	45.25	164
31	1.56	1902	95.77	45.25	-	46.00	114
23	1.16	1925	96.93	46.00	-	46.75	86
24	1.21	1949	98.14	46.75	-	47.50	48
7	0.35	1956	98.49	47.50	-	48.25	54
7	0.35	1963	98.84	48.25	-	49.00	19
6	0.30	1969	99.14	49.00	-	49.75	20
7	0.35	1976	99.50	49.75	-	50.50	11
4	0.20	1980	99.70	50.50	-	51.25	3
2	0.10	1982	99.80	51.25	-	52.00	7
1	0.05	1983	99.85	52.00	-	52.75	3
2	0.10	1985	99.95	52.75	-	53.50	1
0	0.00	1985	99.95	53.50	-	54.25	0.27
0	0.00	1985	99.95	54.25	-	55.00	4067
0	0.00	1985	99.95	55.00	-	55.75	99.63
0	0.00	1985	99.95	55.75	-	56.50	3
0	0.00	1985	99.95	56.50	-	57.25	0.07
0	0.00	1985	99.95	57.25	-	58.00	4070
0	0.00	1985	99.95	58.00	-	58.75	99.71
0	0.00	1985	99.95	58.75	-	59.50	4077
0	0.00	1985	99.95	59.50	-	60.25	99.88
1	0.05	1986	100.00	59.75	-	60.75	4080

(61) MENTON-SELLION LENGTH

The distance between the menton landmark and the sellion landmark is measured with a sliding caliper. The teeth are lightly occluded.



PERCENTILES

FEMALES		MALES	
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>
10.00	3.94	1ST	10.70
10.10	3.98	2ND	10.90
10.20	4.02	3RD	11.00
10.40	4.09	5TH	11.20
10.50	4.13	10TH	11.40
10.70	4.21	15TH	11.60
10.80	4.25	20TH	11.70
10.90	4.29	25TH	11.80
11.00	4.33	30TH	11.90
11.10	4.37	35TH	12.00
11.10	4.37	40TH	12.10
11.20	4.41	45TH	12.20
11.30	4.45	50TH	12.30
11.40	4.49	55TH	12.30
11.50	4.53	60TH	12.40
11.50	4.53	65TH	12.50
11.60	4.57	70TH	12.60
11.70	4.61	75TH	12.70
11.80	4.65	80TH	12.80
11.90	4.69	85TH	13.00
12.10	4.76	90TH	13.10
12.30	4.84	95TH	13.40
12.50	4.92	97TH	13.50
12.60	4.96	98TH	13.70
12.80	5.04	99TH	13.80
			5.43

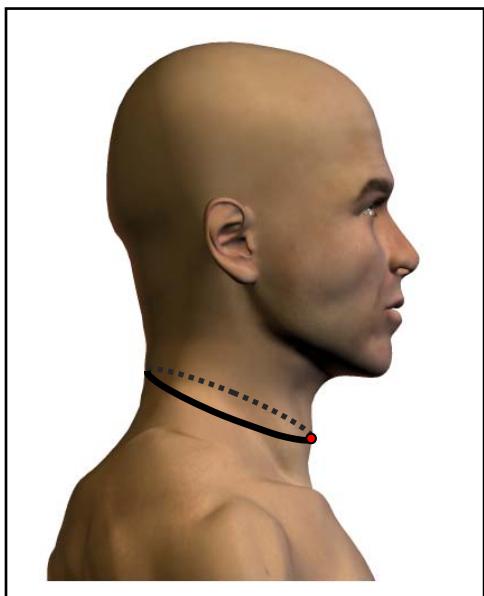
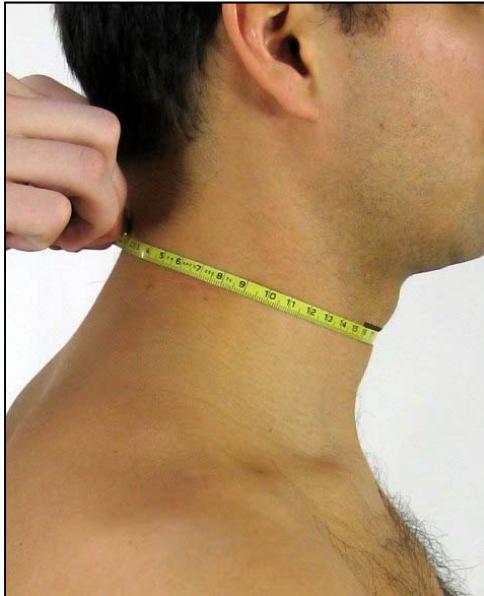
(61) MENTON-SELLION LENGTH

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
11.31	MEAN	4.45	12.26	MEAN	4.83
0.01	STD ERROR (MEAN)	0.01	0.01	STD ERROR (MEAN)	0.00
0.61	STANDARD DEVIATION	0.24	0.67	STANDARD DEVIATION	0.26
0.01	STD ERROR (STD DEV)	0.00	0.01	STD ERROR (STD DEV)	0.00
9.10	MINIMUM	3.58	9.90	MINIMUM	3.90
13.60	MAXIMUM	5.35	15.60	MAXIMUM	6.14
SKEWNESS		0.13	SKEWNESS		0.05
KURTOSIS		3.05	KURTOSIS		3.09
COEFFICIENT OF VARIATION		5.4%	COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	9.05	-	9.20	
0	0.00	1	0.05	9.20	-	9.35	
2	0.10	3	0.15	9.35	-	9.50	
1	0.05	4	0.20	9.50	-	9.65	
6	0.30	10	0.50	9.65	-	9.80	
8	0.40	18	0.91	9.80	-	9.95	
11	0.55	29	1.46	9.95	-	10.10	
33	1.66	62	3.12	10.10	-	10.25	
36	1.81	98	4.93	10.25	-	10.40	
102	5.14	200	10.07	10.40	-	10.55	
63	3.17	263	13.24	10.55	-	10.70	
206	10.37	469	23.62	10.70	-	10.85	
94	4.73	563	28.35	10.85	-	11.00	
267	13.44	830	41.79	11.00	-	11.15	
114	5.74	944	47.53	11.15	-	11.30	
235	11.83	1179	59.37	11.30	-	11.45	
113	5.69	1292	65.06	11.45	-	11.60	
232	11.68	1524	76.74	11.60	-	11.75	
94	4.73	1618	81.47	11.75	-	11.90	
141	7.10	1759	88.57	11.90	-	12.05	
55	2.77	1814	91.34	12.05	-	12.20	
80	4.03	1894	95.37	12.20	-	12.35	
28	1.41	1922	96.78	12.35	-	12.50	
36	1.81	1958	98.59	12.50	-	12.65	
6	0.30	1964	98.89	12.65	-	12.80	
14	0.70	1978	99.60	12.80	-	12.95	
3	0.15	1981	99.75	12.95	-	13.10	
1	0.05	1982	99.80	13.10	-	13.25	
1	0.05	1983	99.85	13.25	-	13.40	
2	0.10	1985	99.95	13.40	-	13.55	
1	0.05	1986	100.00	13.55	-	13.70	
				13.70	-	13.85	
				13.85	-	14.00	
				14.00	-	14.15	
				14.15	-	14.30	
				14.30	-	14.45	
				14.45	-	14.60	
				14.60	-	14.75	
				14.75	-	14.90	
				14.90	-	15.05	
				15.05	-	15.20	
				15.20	-	15.35	
				15.35	-	15.50	
				15.50	-	15.65	

(62) NECK CIRCUMFERENCE

The circumference of the neck at the level of the infrathyroid landmark (Adam's apple) is measured with a tape. The plane of the measurement is perpendicular to the long axis of the neck. The participant stands erect with the head in the Frankfurt plane. The shoulders and upper extremities are relaxed.



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
29.10	11.46	1ST	34.60	13.62
29.60	11.65	2ND	35.20	13.86
29.90	11.77	3RD	35.50	13.98
30.20	11.89	5TH	36.00	14.17
30.70	12.09	10TH	36.70	14.45
31.00	12.20	15TH	37.20	14.65
31.30	12.32	20TH	37.50	14.76
31.60	12.44	25TH	37.90	14.92
31.90	12.56	30TH	38.30	15.08
32.10	12.64	35TH	38.60	15.20
32.40	12.76	40TH	38.90	15.31
32.60	12.83	45TH	39.20	15.43
32.80	12.91	50TH	39.50	15.55
33.00	12.99	55TH	39.90	15.71
33.30	13.11	60TH	40.20	15.83
33.60	13.23	65TH	40.50	15.94
33.80	13.31	70TH	41.00	16.14
34.20	13.46	75TH	41.40	16.30
34.50	13.58	80TH	41.80	16.46
35.00	13.78	85TH	42.40	16.69
35.50	13.98	90TH	43.20	17.01
36.30	14.29	95TH	44.30	17.44
36.90	14.53	97TH	45.10	17.76
37.50	14.76	98TH	45.80	18.03
38.50	15.16	99TH	46.80	18.43

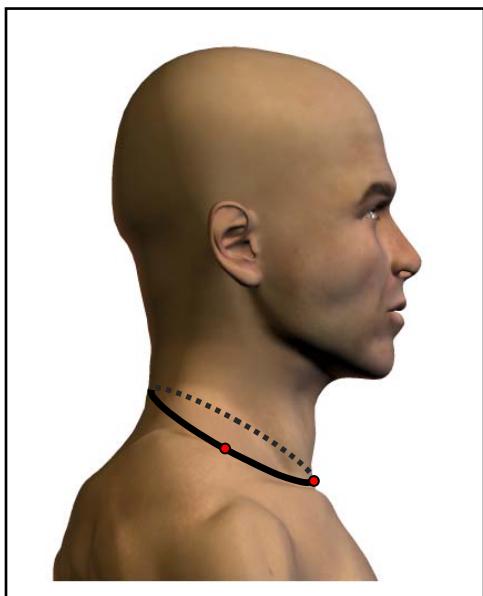
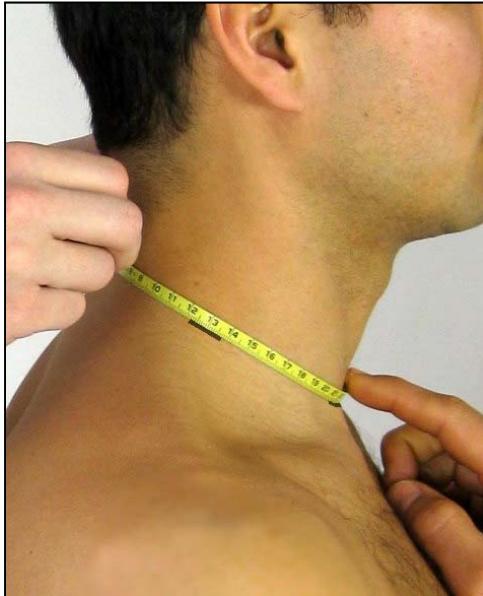
(62) NECK CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
32.98		12.98	39.76		15.66
0.04	STD ERROR (MEAN)	0.02	0.04	STD ERROR (MEAN)	0.02
1.92	STANDARD DEVIATION	0.76	2.58	STANDARD DEVIATION	1.01
0.03	STD ERROR (STD DEV)	0.01	0.03	STD ERROR (STD DEV)	0.01
27.50	MINIMUM	10.83	31.10	MINIMUM	12.24
42.40	MAXIMUM	16.69	51.40	MAXIMUM	20.24
SKEWNESS		0.58	SKEWNESS		0.48
KURTOSIS		3.79	KURTOSIS		3.38
COEFFICIENT OF VARIATION		5.8%	COEFFICIENT OF VARIATION		6.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	27.25	-	27.75	
4	0.20	5	0.25	27.75	-	28.25	
4	0.20	9	0.45	28.25	-	28.75	
15	0.76	24	1.21	28.75	-	29.25	
28	1.41	52	2.62	29.25	-	29.75	
52	2.62	104	5.24	29.75	-	30.25	
103	5.19	207	10.42	30.25	-	30.75	
168	8.46	375	18.88	30.75	-	31.25	1
179	9.01	554	27.90	31.25	-	31.75	0
203	10.22	757	38.12	31.75	-	32.25	0
220	11.08	977	49.19	32.25	-	32.75	2
192	9.67	1169	58.86	32.75	-	33.25	5
188	9.47	1357	68.33	33.25	-	33.75	4
171	8.61	1528	76.94	33.75	-	34.25	11
118	5.94	1646	82.88	34.25	-	34.75	24
95	4.78	1741	87.66	34.75	-	35.25	47
90	4.53	1831	92.20	35.25	-	35.75	68
51	2.57	1882	94.76	35.75	-	36.25	106
35	1.76	1917	96.53	36.25	-	36.75	183
25	1.26	1942	97.78	36.75	-	37.25	214
8	0.40	1950	98.19	37.25	-	37.75	256
13	0.65	1963	98.84	37.75	-	38.25	287
7	0.35	1970	99.19	38.25	-	38.75	330
8	0.40	1978	99.60	38.75	-	39.25	299
1	0.05	1979	99.65	39.25	-	39.75	329
2	0.10	1981	99.75	39.75	-	40.25	314
2	0.10	1983	99.85	40.25	-	40.75	284
2	0.10	1985	99.95	40.75	-	41.25	258
0	0.00	1985	99.95	41.25	-	41.75	230
0	0.00	1985	99.95	41.75	-	42.25	173
1	0.05	1986	100.00	42.25	-	42.75	136
				42.75	-	43.25	118
				43.25	-	43.75	101
				43.75	-	44.25	95
				44.25	-	44.75	49
				44.75	-	45.25	48
				45.25	-	45.75	27
				45.75	-	46.25	19
				46.25	-	46.75	23
				46.75	-	47.25	17
				47.25	-	47.75	9
				47.75	-	48.25	3
				48.25	-	48.75	7
				48.75	-	49.25	1
				49.25	-	49.75	0
				49.75	-	50.25	2
				50.25	-	50.75	1
				50.75	-	51.25	0
				51.25	-	51.75	1

(63) NECK CIRCUMFERENCE, BASE

The circumference of the base of the neck is measured with a tape, passing over the drawn lateral and anterior neck landmarks. The participant stands erect with the head in the Frankfurt plane. The shoulders and upper extremities are relaxed.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
32.90	12.95	1ST	38.00	14.96	
33.50	13.19	2ND	38.70	15.24	
33.70	13.27	3RD	39.00	15.35	
34.00	13.39	5TH	39.50	15.55	
34.70	13.66	10TH	40.30	15.87	
35.10	13.82	15TH	40.80	16.06	
35.50	13.98	20TH	41.30	16.26	
35.80	14.09	25TH	41.70	16.42	
36.10	14.21	30TH	42.10	16.57	
36.30	14.29	35TH	42.40	16.69	
36.50	14.37	40TH	42.70	16.81	
36.80	14.49	45TH	43.00	16.93	
37.00	14.57	50TH	43.30	17.05	
37.30	14.69	55TH	43.70	17.20	
37.50	14.76	60TH	44.00	17.32	
37.70	14.84	65TH	44.30	17.44	
38.00	14.96	70TH	44.70	17.60	
38.30	15.08	75TH	45.10	17.76	
38.70	15.24	80TH	45.50	17.91	
39.10	15.39	85TH	46.00	18.11	
39.50	15.55	90TH	46.80	18.43	
40.50	15.94	95TH	47.90	18.86	
41.10	16.18	97TH	48.70	19.17	
41.50	16.34	98TH	49.20	19.37	
42.30	16.65	99TH	50.20	19.76	

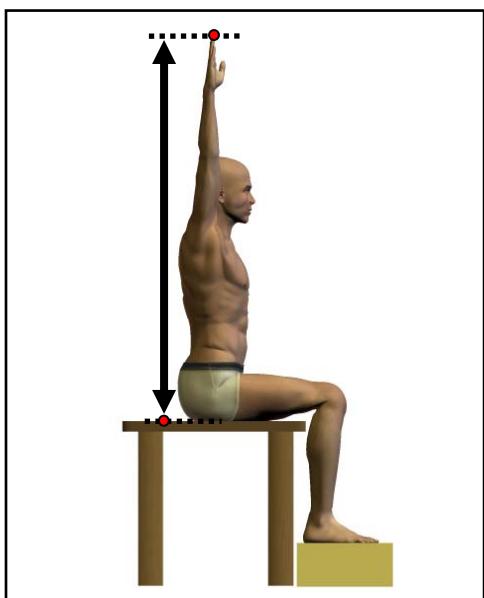
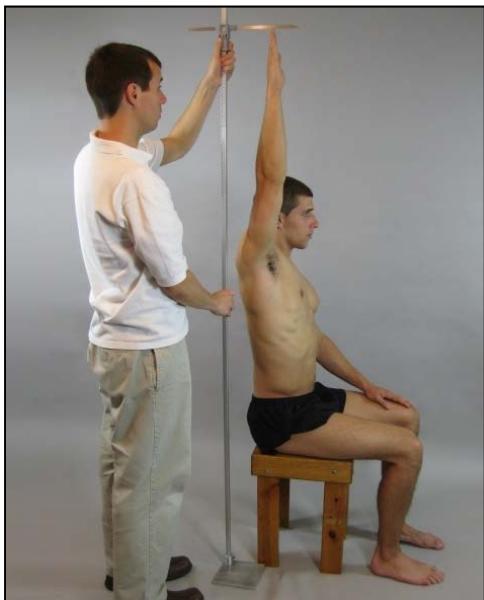
(63) NECK CIRCUMFERENCE, BASE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
37.12	14.61		43.46	17.11	
0.04	STD ERROR (MEAN)	0.02	0.04	STD ERROR (MEAN)	0.02
1.97	STANDARD DEVIATION	0.77	2.57	STANDARD DEVIATION	1.01
0.03	STD ERROR (STD DEV)	0.01	0.03	STD ERROR (STD DEV)	0.01
30.20	MINIMUM	11.89	35.00	MINIMUM	13.78
45.70	MAXIMUM	17.99	54.50	MAXIMUM	21.46
SKEWNESS		0.39	SKEWNESS		0.34
KURTOSIS		3.71	KURTOSIS		3.25
COEFFICIENT OF VARIATION		5.3%	COEFFICIENT OF VARIATION		5.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	29.75	- 30.25
0	0.00	1	0.05	30.25	- 30.75
1	0.05	2	0.10	30.75	- 31.25
0	0.00	2	0.10	31.25	- 31.75
3	0.15	5	0.25	31.75	- 32.25
10	0.50	15	0.76	32.25	- 32.75
16	0.81	31	1.56	32.75	- 33.25
33	1.66	64	3.22	33.25	- 33.75
71	3.58	135	6.80	33.75	- 34.25
71	3.58	206	10.37	34.25	- 34.75
128	6.45	334	16.82	34.75	- 35.25
147	7.40	481	24.22	35.25	- 35.75
185	9.32	666	33.53	35.75	- 36.25
209	10.52	875	44.06	36.25	- 36.75
213	10.73	1088	54.78	36.75	- 37.25
205	10.32	1293	65.11	37.25	- 37.75
191	9.62	1484	74.72	37.75	- 38.25
119	5.99	1603	80.72	38.25	- 38.75
128	6.45	1731	87.16	38.75	- 39.25
82	4.13	1813	91.29	39.25	- 39.75
52	2.62	1865	93.91	39.75	- 40.25
41	2.06	1906	95.97	40.25	- 40.75
31	1.56	1937	97.53	40.75	- 41.25
16	0.81	1953	98.34	41.25	- 41.75
12	0.60	1965	98.94	41.75	- 42.25
8	0.40	1973	99.35	42.25	- 42.75
3	0.15	1976	99.50	42.75	- 43.25
1	0.05	1977	99.55	43.25	- 43.75
3	0.15	1980	99.70	43.75	- 44.25
1	0.05	1981	99.75	44.25	- 44.75
3	0.15	1984	99.90	44.75	- 45.25
2	0.10	1986	100.00	45.25	- 45.75
				45.75	- 46.25
				46.25	- 46.75
				46.75	- 47.25
				47.25	- 47.75
				47.75	- 48.25
				48.25	- 48.75
				48.75	- 49.25
				49.25	- 49.75
				49.75	- 50.25
				50.25	- 50.75
				50.75	- 51.25
				51.25	- 51.75
				51.75	- 52.25
				52.25	- 52.75
				52.75	- 53.25
				53.25	- 53.75
				53.75	- 54.25
				54.25	- 54.75

(64) OVERHEAD FINGERTIP REACH, SITTING

The vertical distance between a sitting surface and the dactylion III landmark of a seated participant whose arm is extended overhead is measured with an anthropometer. The participant sits erect on a flat surface 45.8 cm high with the right arm and hand extended vertically overhead as far as possible and the palm of the hand facing forward. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
116.50	45.87	1ST	127.60	50.24	
118.40	46.61	2ND	129.00	50.79	
119.40	47.01	3RD	130.20	51.26	
120.70	47.52	5TH	131.60	51.81	
123.00	48.43	10TH	134.00	52.76	
124.60	49.06	15TH	135.50	53.35	
125.70	49.49	20TH	136.90	53.90	
126.70	49.88	25TH	138.00	54.33	
127.60	50.24	30TH	139.10	54.76	
128.50	50.59	35TH	140.10	55.16	
129.30	50.91	40TH	140.90	55.47	
130.10	51.22	45TH	141.70	55.79	
130.90	51.54	50TH	142.60	56.14	
131.80	51.89	55TH	143.30	56.42	
132.40	52.13	60TH	144.20	56.77	
133.10	52.40	65TH	145.20	57.17	
134.00	52.76	70TH	146.10	57.52	
135.00	53.15	75TH	147.20	57.95	
136.10	53.58	80TH	148.30	58.39	
137.60	54.17	85TH	149.80	58.98	
139.50	54.92	90TH	151.50	59.65	
141.30	55.63	95TH	154.00	60.63	
142.90	56.26	97TH	155.50	61.22	
144.00	56.69	98TH	157.00	61.81	
145.30	57.20	99TH	158.80	62.52	

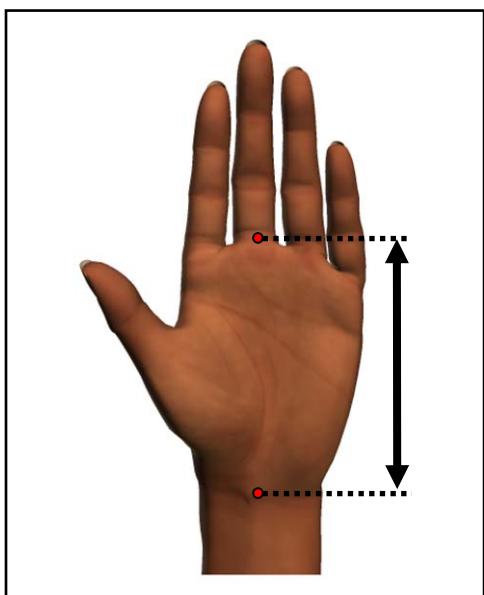
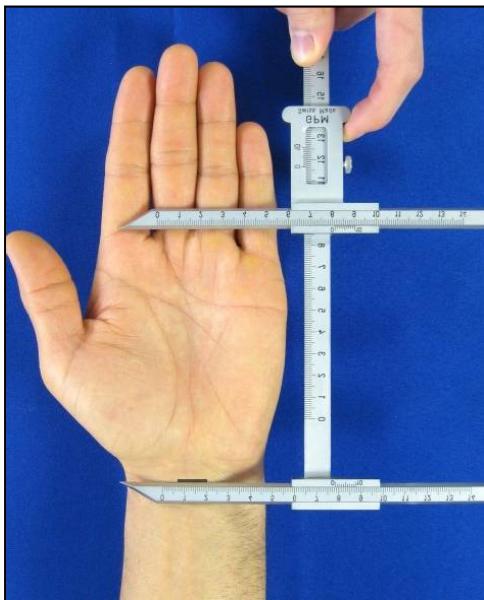
(64) OVERHEAD FINGERTIP REACH, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
130.97	51.56		142.67	56.17	
0.14	0.06		0.11	0.04	
6.24	2.46		6.77	2.67	
0.10	0.04		0.07	0.03	
111.10	43.74		119.70	47.13	
153.80	60.55		165.10	65.00	
SKEWNESS	0.06		SKEWNESS	0.07	
KURTOSIS	2.91		KURTOSIS	2.96	
COEFFICIENT OF VARIATION	4.8%		COEFFICIENT OF VARIATION	4.7%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	110.75	-	112.25	
2	0.10	4	0.20	112.25	-	113.75	
3	0.15	7	0.35	113.75	-	115.25	
17	0.86	24	1.21	115.25	-	116.75	
14	0.70	38	1.91	116.75	-	118.25	
25	1.26	63	3.17	118.25	-	119.75	
49	2.47	112	5.64	119.75	-	121.25	
77	3.88	189	9.52	121.25	-	122.75	
90	4.53	279	14.05	122.75	-	124.25	
119	5.99	398	20.04	124.25	-	125.75	
148	7.45	546	27.49	125.75	-	127.25	
180	9.06	726	36.56	127.25	-	128.75	
183	9.21	909	45.77	128.75	-	130.25	
183	9.21	1092	54.98	130.25	-	131.75	
215	10.83	1307	65.81	131.75	-	133.25	
156	7.85	1463	73.67	133.25	-	134.75	
137	6.90	1600	80.56	134.75	-	136.25	
98	4.93	1698	85.50	136.25	-	137.75	
76	3.83	1774	89.33	137.75	-	139.25	
87	4.38	1861	93.71	139.25	-	140.75	
52	2.62	1913	96.32	140.75	-	142.25	
28	1.41	1941	97.73	142.25	-	143.75	
24	1.21	1965	98.94	143.75	-	145.25	
11	0.55	1976	99.50	145.25	-	146.75	
6	0.30	1982	99.80	146.75	-	148.25	
2	0.10	1984	99.90	148.25	-	149.75	
1	0.05	1985	99.95	149.75	-	151.25	
0	0.00	1985	99.95	151.25	-	152.75	
1	0.05	1986	100.00	152.75	-	154.25	
				154.25	-	155.75	
				155.75	-	157.25	
				157.25	-	158.75	
				158.75	-	160.25	
				160.25	-	161.75	
				161.75	-	163.25	
				163.25	-	164.75	
				164.75	-	166.25	
					100	2.45	3892
					80	1.96	3972
					40	0.98	4012
					29	0.71	4041
					21	0.51	4062
					6	0.15	4068
					6	0.15	4074
					7	0.17	4081
					1	0.02	4082
							100.00

(65) PALM LENGTH

The distance between the center of the crease at the base of the middle finger (digit III, base) and the ventral stylion landmark is measured with a Poech sliding caliper. The participant holds the right forearm horizontal with the hand straight, palm up. The fingers are together, and the thumb is abducted approximately 45°. The middle finger is parallel to the long axis of the forearm.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
9.60	3.78	1ST	10.30	4.06	
9.70	3.82	2ND	10.40	4.09	
9.80	3.86	3RD	10.50	4.13	
10.00	3.94	5TH	10.70	4.21	
10.20	4.02	10TH	10.90	4.29	
10.30	4.06	15TH	11.00	4.33	
10.40	4.09	20TH	11.10	4.37	
10.50	4.13	25TH	11.20	4.41	
10.50	4.13	30TH	11.30	4.45	
10.60	4.17	35TH	11.40	4.49	
10.70	4.21	40TH	11.50	4.53	
10.70	4.21	45TH	11.50	4.53	
10.80	4.25	50TH	11.60	4.57	
10.90	4.29	55TH	11.70	4.61	
11.00	4.33	60TH	11.80	4.65	
11.10	4.37	65TH	11.80	4.65	
11.20	4.41	70TH	12.00	4.72	
11.30	4.45	75TH	12.00	4.72	
11.40	4.49	80TH	12.20	4.80	
11.50	4.53	85TH	12.30	4.84	
11.60	4.57	90TH	12.50	4.92	
11.90	4.69	95TH	12.70	5.00	
12.10	4.76	97TH	12.90	5.08	
12.30	4.84	98TH	13.10	5.16	
12.40	4.88	99TH	13.30	5.24	

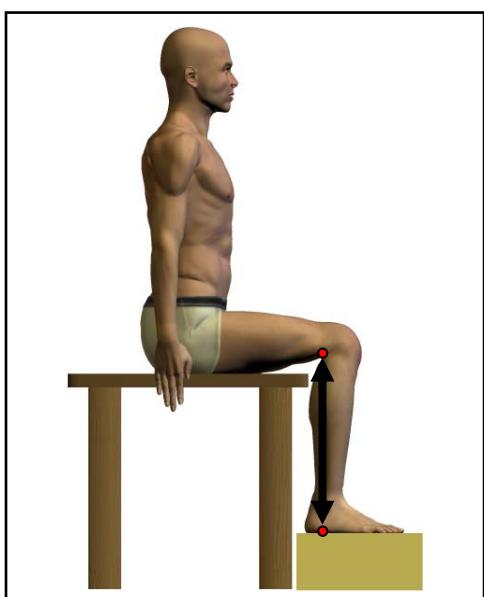
(65) PALM LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
10.87	MEAN	4.28	11.65	MEAN	4.59
0.01	STD ERROR (MEAN)	0.01	0.01	STD ERROR (MEAN)	0.00
0.59	STANDARD DEVIATION	0.23	0.62	STANDARD DEVIATION	0.25
0.01	STD ERROR (STD DEV)	0.00	0.01	STD ERROR (STD DEV)	0.00
8.80	MINIMUM	3.46	9.50	MINIMUM	3.74
13.00	MAXIMUM	5.12	14.00	MAXIMUM	5.51
SKEWNESS		0.33	SKEWNESS		0.27
KURTOSIS		3.11	KURTOSIS		3.22
COEFFICIENT OF VARIATION		5.5%	COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	8.85	-	8.95	
0	0.00	1	0.05	8.95	-	9.05	
0	0.00	1	0.05	9.05	-	9.15	
1	0.05	2	0.10	9.15	-	9.25	
1	0.05	3	0.15	9.25	-	9.35	
2	0.10	5	0.25	9.35	-	9.45	
8	0.40	13	0.65	9.45	-	9.55	
10	0.50	23	1.16	9.55	-	9.65	
18	0.91	41	2.06	9.65	-	9.75	
27	1.36	68	3.42	9.75	-	9.85	
19	0.96	87	4.38	9.85	-	9.95	
58	2.92	145	7.30	9.95	-	10.05	
48	2.42	193	9.72	10.05	-	10.15	
72	3.63	265	13.34	10.15	-	10.25	
100	5.04	365	18.38	10.25	-	10.35	
119	5.99	484	24.37	10.35	-	10.45	
148	7.45	632	31.82	10.45	-	10.55	
123	6.19	755	38.02	10.55	-	10.65	
158	7.96	913	45.97	10.65	-	10.75	
128	6.45	1041	52.42	10.75	-	10.85	
95	4.78	1136	57.20	10.85	-	10.95	
137	6.90	1273	64.10	10.95	-	11.05	
115	5.79	1388	69.89	11.05	-	11.15	
83	4.18	1471	74.07	11.15	-	11.25	
95	4.78	1566	78.85	11.25	-	11.35	
104	5.24	1670	84.09	11.35	-	11.45	
73	3.68	1743	87.76	11.45	-	11.55	
48	2.42	1791	90.18	11.55	-	11.65	
40	2.01	1831	92.20	11.65	-	11.75	
41	2.06	1872	94.26	11.75	-	11.85	
18	0.91	1890	95.17	11.85	-	11.95	
29	1.46	1919	96.63	11.95	-	12.05	
14	0.70	1933	97.33	12.05	-	12.15	
12	0.60	1945	97.94	12.15	-	12.25	
13	0.65	1958	98.59	12.25	-	12.35	
15	0.76	1973	99.35	12.35	-	12.45	
4	0.20	1977	99.55	12.45	-	12.55	
4	0.20	1981	99.75	12.55	-	12.65	
2	0.10	1983	99.85	12.65	-	12.75	
0	0.00	1983	99.85	12.75	-	12.85	
2	0.10	1985	99.95	12.85	-	12.95	
1	0.05	1986	100.00	12.95	-	13.05	
				13.05	-	13.15	
				13.15	-	13.25	
				13.25	-	13.35	
				13.35	-	13.45	
				13.45	-	13.55	
				13.55	-	13.65	
				13.65	-	13.75	
				13.75	-	13.85	
				13.85	-	13.95	
				13.95	-	14.05	

(66) POPLITEAL HEIGHT

The vertical distance from a footrest surface to the back of the right knee (the popliteal fossa at the dorsal juncture of the calf and thigh) is measured with an anthropometer. The participant sits with the thighs parallel, the feet in line with the thighs, and the knees flexed 90°.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
33.60	13.23	1ST	37.40	14.72	
34.10	13.43	2ND	38.10	15.00	
34.60	13.62	3RD	38.50	15.16	
35.00	13.78	5TH	39.00	15.35	
35.80	14.09	10TH	39.80	15.67	
36.40	14.33	15TH	40.40	15.91	
36.90	14.53	20TH	40.80	16.06	
37.30	14.69	25TH	41.30	16.26	
37.60	14.80	30TH	41.60	16.38	
37.90	14.92	35TH	42.00	16.54	
38.20	15.04	40TH	42.30	16.65	
38.50	15.16	45TH	42.60	16.77	
38.70	15.24	50TH	43.00	16.93	
39.00	15.35	55TH	43.30	17.05	
39.30	15.47	60TH	43.60	17.17	
39.70	15.63	65TH	43.90	17.28	
40.00	15.75	70TH	44.20	17.40	
40.30	15.87	75TH	44.70	17.60	
40.80	16.06	80TH	45.00	17.72	
41.30	16.26	85TH	45.50	17.91	
41.90	16.50	90TH	46.10	18.15	
42.80	16.85	95TH	47.10	18.54	
43.40	17.09	97TH	47.70	18.78	
43.80	17.24	98TH	48.40	19.06	
44.50	17.52	99TH	49.10	19.33	

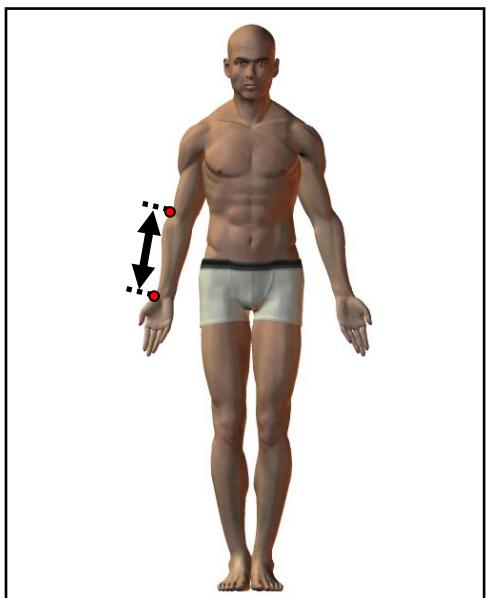
(66) POPLITEAL HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
38.82	15.28		42.98	16.92	
0.05	STD ERROR (MEAN)	0.02	0.04	STD ERROR (MEAN)	0.02
2.36	STANDARD DEVIATION	0.93	2.48	STANDARD DEVIATION	0.98
0.04	STD ERROR (STD DEV)	0.01	0.03	STD ERROR (STD DEV)	0.01
30.50	MINIMUM	12.01	34.60	MINIMUM	13.62
47.60	MAXIMUM	18.74	52.50	MAXIMUM	20.67
SKEWNESS		0.10	SKEWNESS		0.14
KURTOSIS		3.23	KURTOSIS		3.17
COEFFICIENT OF VARIATION		6.1%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	30.25	- 30.75	1	0.02
2	0.10	3	0.15	30.75	- 31.25	2	0.05
3	0.15	6	0.30	31.25	- 31.75	2	0.05
2	0.10	8	0.40	31.75	- 32.25	5	0.12
3	0.15	11	0.55	32.25	- 32.75	13	0.32
3	0.15	14	0.70	32.75	- 33.25	13	0.32
14	0.70	28	1.41	33.25	- 33.75	22	0.54
17	0.86	45	2.27	33.75	- 34.25	34	0.83
31	1.56	76	3.83	34.25	- 34.75	73	1.79
43	2.17	119	5.99	34.75	- 35.25	80	1.96
70	3.52	189	9.52	35.25	- 35.75	140	3.43
80	4.03	269	13.54	35.75	- 36.25	156	3.82
96	4.83	365	18.38	36.25	- 36.75	156	3.82
126	6.34	491	24.72	36.75	- 37.25	156	3.82
152	7.65	643	32.38	37.25	- 37.75	156	3.82
155	7.80	798	40.18	37.75	- 38.25	156	3.82
201	10.12	999	50.30	38.25	- 38.75	156	3.82
178	8.96	1177	59.26	38.75	- 39.25	156	3.82
146	7.35	1323	66.62	39.25	- 39.75	156	3.82
143	7.20	1466	73.82	39.75	- 40.25	156	3.82
117	5.89	1583	79.71	40.25	- 40.75	156	3.82
104	5.24	1687	84.94	40.75	- 41.25	156	3.82
79	3.98	1766	88.92	41.25	- 41.75	156	3.82
76	3.83	1842	92.75	41.75	- 42.25	156	3.82
43	2.17	1885	94.91	42.25	- 42.75	156	3.82
30	1.51	1915	96.42	42.75	- 43.25	156	3.82
29	1.46	1944	97.89	43.25	- 43.75	156	3.82
18	0.91	1962	98.79	43.75	- 44.25	156	3.82
10	0.50	1972	99.30	44.25	- 44.75	156	3.82
5	0.25	1977	99.55	44.75	- 45.25	156	3.82
3	0.15	1980	99.70	45.25	- 45.75	156	3.82
2	0.10	1982	99.80	45.75	- 46.25	156	3.82
0	0.00	1982	99.80	46.25	- 46.75	156	3.82
2	0.10	1984	99.90	46.75	- 47.25	156	3.82
2	0.10	1986	100.00	47.25	- 47.75	156	3.82
				47.75	- 48.25	156	3.82
				48.25	- 48.75	156	3.82
				48.75	- 49.25	156	3.82
				49.25	- 49.75	156	3.82
				49.75	- 50.25	156	3.82
				50.25	- 50.75	156	3.82
				50.75	- 51.25	156	3.82
				51.25	- 51.75	156	3.82
				51.75	- 52.25	156	3.82
				52.25	- 52.75	156	3.82

(67) RADIALE-STYLIUM LENGTH

The distance between the radiale landmark and the stylium landmark is measured with a beam caliper held parallel to the long axis of the forearm. The participant stands with the arms relaxed at the sides. The hand and fingers are held straight in line with the long axis of the forearm with the palm facing forward.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
20.90	8.23	1ST	23.50	9.25	
21.20	8.35	2ND	23.80	9.37	
21.50	8.46	3RD	24.10	9.49	
21.80	8.58	5TH	24.40	9.61	
22.30	8.78	10TH	24.80	9.76	
22.60	8.90	15TH	25.20	9.92	
22.90	9.02	20TH	25.50	10.04	
23.20	9.13	25TH	25.70	10.12	
23.30	9.17	30TH	26.00	10.24	
23.50	9.25	35TH	26.20	10.31	
23.70	9.33	40TH	26.40	10.39	
23.90	9.41	45TH	26.60	10.47	
24.00	9.45	50TH	26.70	10.51	
24.20	9.53	55TH	26.90	10.59	
24.40	9.61	60TH	27.10	10.67	
24.60	9.69	65TH	27.30	10.75	
24.80	9.76	70TH	27.50	10.83	
25.10	9.88	75TH	27.80	10.94	
25.40	10.00	80TH	28.00	11.02	
25.80	10.16	85TH	28.30	11.14	
26.20	10.31	90TH	28.80	11.34	
26.80	10.55	95TH	29.50	11.61	
27.20	10.71	97TH	29.80	11.73	
27.50	10.83	98TH	30.20	11.89	
27.90	10.98	99TH	30.80	12.13	

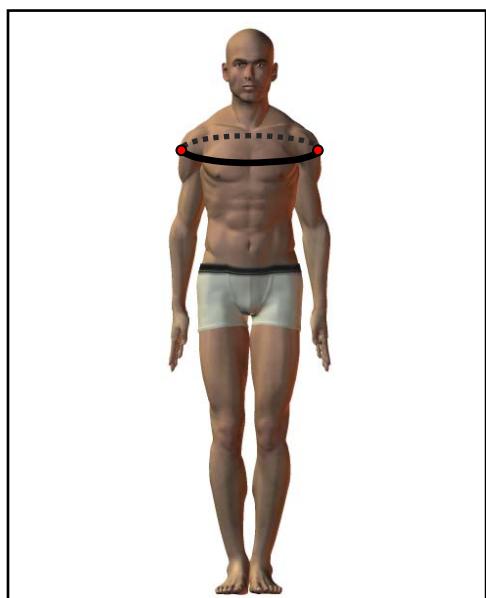
(67) RADIALE-STYLION LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
24.13	STD ERROR (MEAN)	9.50	26.79	STD ERROR (MEAN)	10.55
0.03	STANDARD DEVIATION	0.01	0.02	STANDARD DEVIATION	0.01
1.52	STD ERROR (STD DEV)	0.60	1.54	STD ERROR (STD DEV)	0.61
0.02	MINIMUM	0.01	0.02	MINIMUM	0.01
16.90	MAXIMUM	6.65	21.60	MAXIMUM	8.50
29.70		11.69	32.80		12.91
SKEWNESS		0.24	SKEWNESS		0.24
KURTOSIS		3.40	KURTOSIS		3.21
COEFFICIENT OF VARIATION		6.3%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	16.85	-	17.20	
0	0.00	1	0.05	17.20	-	17.55	
0	0.00	1	0.05	17.55	-	17.90	
0	0.00	1	0.05	17.90	-	18.25	
0	0.00	1	0.05	18.25	-	18.60	
0	0.00	1	0.05	18.60	-	18.95	
0	0.00	1	0.05	18.95	-	19.30	
2	0.10	3	0.15	19.30	-	19.65	
3	0.15	6	0.30	19.65	-	20.00	
5	0.25	11	0.55	20.00	-	20.35	
4	0.20	15	0.76	20.35	-	20.70	
11	0.55	26	1.31	20.70	-	21.05	
27	1.36	53	2.67	21.05	-	21.40	
36	1.81	89	4.48	21.40	-	21.75	
55	2.77	144	7.25	21.75	-	22.10	
109	5.49	253	12.74	22.10	-	22.45	
104	5.24	357	17.98	22.45	-	22.80	
130	6.55	487	24.52	22.80	-	23.15	
172	8.66	659	33.18	23.15	-	23.50	
228	11.48	887	44.66	23.50	-	23.85	
179	9.01	1066	53.68	23.85	-	24.20	
220	11.08	1286	64.75	24.20	-	24.55	
128	6.45	1414	71.20	24.55	-	24.90	
133	6.70	1547	77.90	24.90	-	25.25	
97	4.88	1644	82.78	25.25	-	25.60	
93	4.68	1737	87.46	25.60	-	25.95	
68	3.42	1805	90.89	25.95	-	26.30	
62	3.12	1867	94.01	26.30	-	26.65	
31	1.56	1898	95.57	26.65	-	27.00	
35	1.76	1933	97.33	27.00	-	27.35	
20	1.01	1953	98.34	27.35	-	27.70	
17	0.86	1970	99.19	27.70	-	28.05	
5	0.25	1975	99.45	28.05	-	28.40	
5	0.25	1980	99.70	28.40	-	28.75	
4	0.20	1984	99.90	28.75	-	29.10	
1	0.05	1985	99.95	29.10	-	29.45	
1	0.05	1986	100.00	29.45	-	29.80	
				29.80	-	30.15	
				30.15	-	30.50	
				30.50	-	30.85	
				30.85	-	31.20	
				31.20	-	31.55	
				31.55	-	31.90	
				31.90	-	32.25	
				32.25	-	32.60	
				32.60	-	32.95	

(68) SHOULDER CIRCUMFERENCE*

The circumference of the shoulders at the level of the right and left deltoid point landmarks is measured with a tape. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed with the palms facing the thighs. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
91.50	36.02	1ST	103.90	40.91	
92.90	36.57	2ND	105.40	41.50	
93.50	36.81	3RD	106.50	41.93	
94.40	37.17	5TH	108.00	42.52	
96.10	37.83	10TH	110.00	43.31	
97.40	38.35	15TH	111.40	43.86	
98.30	38.70	20TH	112.50	44.29	
99.10	39.02	25TH	113.50	44.69	
99.80	39.29	30TH	114.40	45.04	
100.60	39.61	35TH	115.30	45.39	
101.30	39.88	40TH	116.00	45.67	
102.00	40.16	45TH	116.80	45.98	
102.70	40.43	50TH	117.60	46.30	
103.30	40.67	55TH	118.40	46.61	
104.00	40.94	60TH	119.30	46.97	
104.70	41.22	65TH	120.10	47.28	
105.40	41.50	70TH	121.00	47.64	
106.20	41.81	75TH	122.00	48.03	
107.20	42.20	80TH	123.10	48.46	
108.20	42.60	85TH	124.40	48.98	
109.90	43.27	90TH	126.00	49.61	
111.90	44.06	95TH	128.80	50.71	
113.00	44.49	97TH	130.80	51.50	
114.30	45.00	98TH	131.90	51.93	
115.90	45.63	99TH	134.10	52.80	

* The definition of the deltoid landmark has changed since the ANSUR survey; (see Section 2.6). As the level of the two shoulders is often slightly different, this measurement may not always be horizontal.

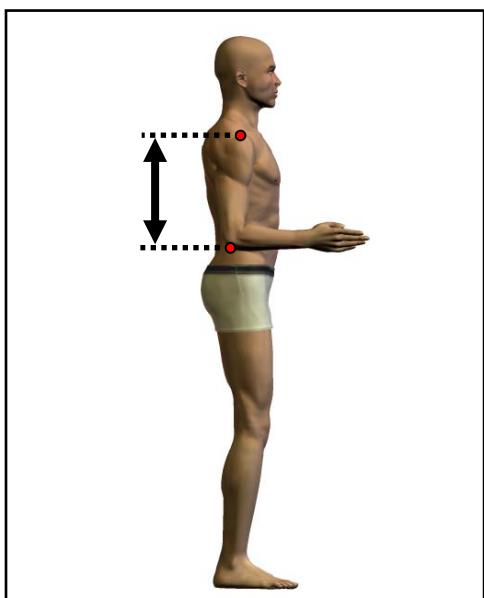
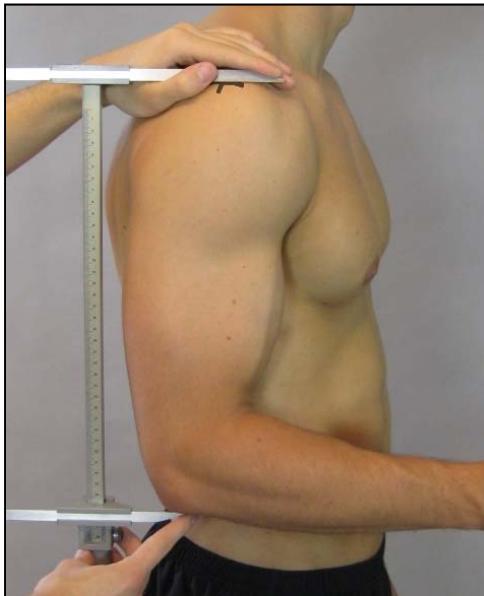
(68) SHOULDER CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
102.82	STD ERROR (MEAN)	40.48	117.86	STD ERROR (MEAN)	46.40
0.12	STANDARD DEVIATION	0.05	0.10	STANDARD DEVIATION	0.04
5.29	STD ERROR (STD DEV)	2.08	6.36	STD ERROR (STD DEV)	2.50
0.08	MINIMUM	0.03	0.07	MINIMUM	0.03
85.20	MAXIMUM	33.54	92.50	MAXIMUM	36.42
122.50		48.23	141.30		55.63
SKEWNESS		0.18	SKEWNESS		0.19
KURTOSIS		3.03	KURTOSIS		3.14
COEFFICIENT OF VARIATION		5.1%	COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	84.25	- 85.75
2	0.10	3	0.15	85.75	- 87.25
2	0.10	5	0.25	87.25	- 88.75
6	0.30	11	0.55	88.75	- 90.25
15	0.76	26	1.31	90.25	- 91.75
25	1.26	51	2.57	91.75	- 93.25
67	3.37	118	5.94	93.25	- 94.75
88	4.43	206	10.37	94.75	- 96.25
132	6.65	338	17.02	96.25	- 97.75
177	8.91	515	25.93	97.75	- 99.25
198	9.97	713	35.90	99.25	- 100.75
212	10.67	925	46.58	100.75	- 102.25
234	11.78	1159	58.36	102.25	- 103.75
211	10.62	1370	68.98	103.75	- 105.25
177	8.91	1547	77.90	105.25	- 106.75
142	7.15	1689	85.05	106.75	- 108.25
91	4.58	1780	89.63	108.25	- 109.75
82	4.13	1862	93.76	109.75	- 111.25
59	2.97	1921	96.73	111.25	- 112.75
25	1.26	1946	97.99	112.75	- 114.25
20	1.01	1966	98.99	114.25	- 115.75
10	0.50	1976	99.50	115.75	- 117.25
6	0.30	1982	99.80	117.25	- 118.75
1	0.05	1983	99.85	118.75	- 120.25
2	0.10	1985	99.95	120.25	- 121.75
1	0.05	1986	100.00	121.75	- 123.25
				123.25	- 124.75
				124.75	- 126.25
				126.25	- 127.75
				127.75	- 129.25
				129.25	- 130.75
				130.75	- 132.25
				132.25	- 133.75
				133.75	- 135.25
				135.25	- 136.75
				136.75	- 138.25
				138.25	- 139.75
				139.75	- 141.25
				141.25	- 142.75

(69) SHOULDER-ELBOW LENGTH

The distance between the right acromion landmark and the olecranon bottom landmark is measured with a beam caliper parallel to the long axis of the upper arm. The participant stands with the right upper arm hanging at the side and the elbow flexed 90°. The hand is straight, and the palm faces inward.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
29.20	11.50	1ST	32.20	12.68	
29.80	11.73	2ND	32.70	12.87	
30.30	11.93	3RD	33.00	12.99	
30.70	12.09	5TH	33.40	13.15	
31.30	12.32	10TH	34.00	13.39	
31.70	12.48	15TH	34.50	13.58	
32.00	12.60	20TH	34.80	13.70	
32.30	12.72	25TH	35.20	13.86	
32.50	12.80	30TH	35.50	13.98	
32.80	12.91	35TH	35.70	14.06	
33.00	12.99	40TH	35.90	14.13	
33.20	13.07	45TH	36.10	14.21	
33.40	13.15	50TH	36.30	14.29	
33.60	13.23	55TH	36.50	14.37	
33.80	13.31	60TH	36.80	14.49	
34.00	13.39	65TH	37.00	14.57	
34.30	13.50	70TH	37.30	14.69	
34.60	13.62	75TH	37.60	14.80	
34.90	13.74	80TH	37.90	14.92	
35.20	13.86	85TH	38.30	15.08	
35.70	14.06	90TH	38.70	15.24	
36.30	14.29	95TH	39.40	15.51	
36.60	14.41	97TH	39.90	15.71	
36.90	14.53	98TH	40.20	15.83	
37.60	14.80	99TH	40.80	16.06	

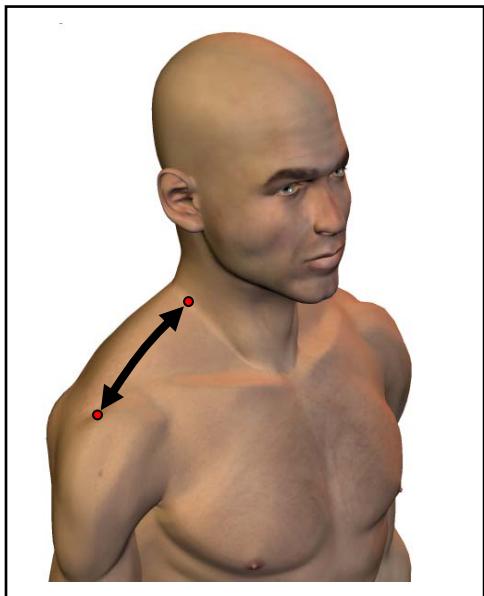
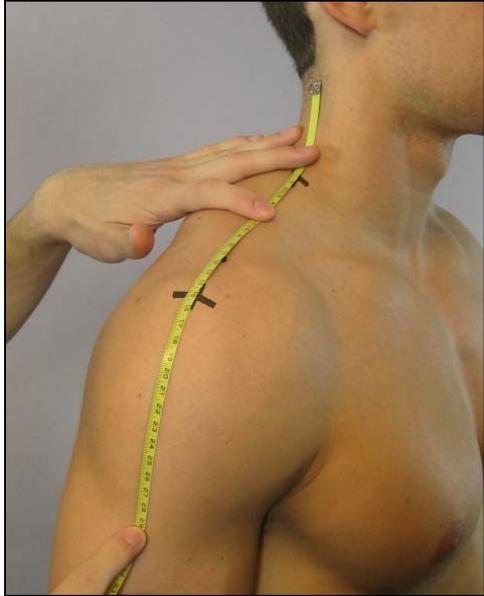
(69) SHOULDER-ELBOW LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
33.43		13.16	36.37		14.32
0.04	STD ERROR (MEAN)	0.02	0.03	STD ERROR (MEAN)	0.01
1.73	STANDARD DEVIATION	0.68	1.82	STANDARD DEVIATION	0.72
0.03	STD ERROR (STD DEV)	0.01	0.02	STD ERROR (STD DEV)	0.01
27.10	MINIMUM	10.67	29.80	MINIMUM	11.73
39.80	MAXIMUM	15.67	42.30	MAXIMUM	16.65
SKEWNESS		0.04	SKEWNESS		0.07
KURTOSIS		3.33	KURTOSIS		3.03
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	26.80	- 27.15		
1	0.05	2	0.10	27.15	- 27.50		
1	0.05	3	0.15	27.50	- 27.85		
3	0.15	6	0.30	27.85	- 28.20		
3	0.15	9	0.45	28.20	- 28.55		
2	0.10	11	0.55	28.55	- 28.90		
10	0.50	21	1.06	28.90	- 29.25		
10	0.50	31	1.56	29.25	- 29.60		
13	0.65	44	2.22	29.60	- 29.95	1	0.02
14	0.70	58	2.92	29.95	- 30.30	0	0.00
36	1.81	94	4.73	30.30	- 30.65	1	0.02
37	1.86	131	6.60	30.65	- 31.00	4	0.10
77	3.88	208	10.47	31.00	- 31.35	3	0.07
73	3.68	281	14.15	31.35	- 31.70	8	0.20
118	5.94	399	20.09	31.70	- 32.05	11	0.27
113	5.69	512	25.78	32.05	- 32.40	19	0.47
179	9.01	691	34.79	32.40	- 32.75	44	1.08
138	6.95	829	41.74	32.75	- 33.10	36	0.88
207	10.42	1036	52.17	33.10	- 33.45	95	2.33
127	6.39	1163	58.56	33.45	- 33.80	84	2.06
180	9.06	1343	67.62	33.80	- 34.15	146	3.58
103	5.19	1446	72.81	34.15	- 34.50	134	3.28
126	6.34	1572	79.15	34.50	- 34.85	239	5.85
94	4.73	1666	83.89	34.85	- 35.20	187	4.58
100	5.04	1766	88.92	35.20	- 35.55	294	7.20
61	3.07	1827	91.99	35.55	- 35.90	264	6.47
58	2.92	1885	94.91	35.90	- 36.25	388	9.51
36	1.81	1921	96.73	36.25	- 36.60	308	7.55
27	1.36	1948	98.09	36.60	- 36.95	333	8.16
8	0.40	1956	98.49	36.95	- 37.30	231	5.66
13	0.65	1969	99.14	37.30	- 37.65	282	6.91
6	0.30	1975	99.45	37.65	- 38.00	178	4.36
3	0.15	1978	99.60	38.00	- 38.35	231	5.66
1	0.05	1979	99.65	38.35	- 38.70	118	2.89
1	0.05	1980	99.70	38.70	- 39.05	142	3.48
4	0.20	1984	99.90	39.05	- 39.40	76	1.86
1	0.05	1985	99.95	39.40	- 39.75	89	2.18
1	0.05	1986	100.00	39.75	- 40.10	36	0.88
				40.10	- 40.45	38	0.93
				40.45	- 40.80	19	0.47
				40.80	- 41.15	19	0.47
				41.15	- 41.50	5	0.12
				41.50	- 41.85	16	0.39
				41.85	- 42.20	0	0.00
				42.20	- 42.55	3	0.07

(70) SHOULDER LENGTH

The surface distance between the right trapezius landmark and the right acromion landmark is measured with a tape. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
11.30	4.45	1ST	12.50	4.92	
11.50	4.53	2ND	12.90	5.08	
11.70	4.61	3RD	13.00	5.12	
12.00	4.72	5TH	13.30	5.24	
12.20	4.80	10TH	13.70	5.39	
12.50	4.92	15TH	13.90	5.47	
12.70	5.00	20TH	14.10	5.55	
12.80	5.04	25TH	14.20	5.59	
13.00	5.12	30TH	14.40	5.67	
13.10	5.16	35TH	14.50	5.71	
13.20	5.20	40TH	14.70	5.79	
13.40	5.28	45TH	14.80	5.83	
13.50	5.31	50TH	15.00	5.91	
13.60	5.35	55TH	15.10	5.94	
13.80	5.43	60TH	15.20	5.98	
13.90	5.47	65TH	15.40	6.06	
14.00	5.51	70TH	15.50	6.10	
14.20	5.59	75TH	15.70	6.18	
14.40	5.67	80TH	15.90	6.26	
14.60	5.75	85TH	16.00	6.30	
14.90	5.87	90TH	16.30	6.42	
15.30	6.02	95TH	16.70	6.57	
15.60	6.14	97TH	17.00	6.69	
15.80	6.22	98TH	17.20	6.77	
16.10	6.34	99TH	17.50	6.89	

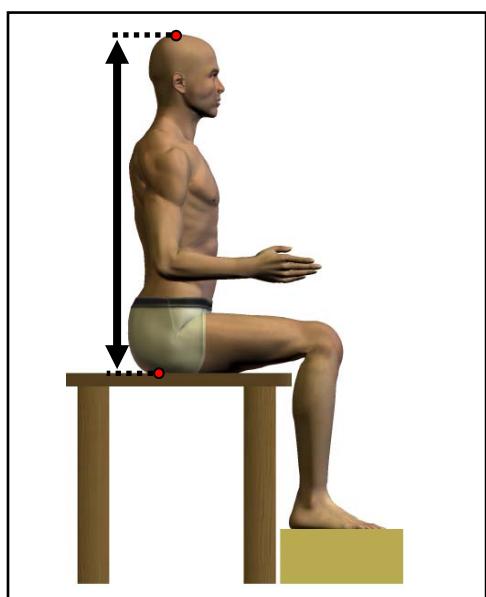
(70) SHOULDER LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
13.54	5.33		14.98	5.90	
0.02	0.01		0.02	0.01	
1.03	0.40		1.05	0.41	
0.02	0.01		0.01	0.00	
10.70	4.21		11.30	4.45	
17.50	6.89		18.50	7.28	
SKEWNESS	0.28		SKEWNESS	0.07	
KURTOSIS	3.24		KURTOSIS	3.05	
COEFFICIENT OF VARIATION	7.6%		COEFFICIENT OF VARIATION	7.0%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	10.55	- 10.75
2	0.10	3	0.15	10.75	- 10.95
9	0.45	12	0.60	10.95	- 11.15
8	0.40	20	1.01	11.15	- 11.35
21	1.06	41	2.06	11.35	- 11.55
27	1.36	68	3.42	11.55	- 11.75
22	1.11	90	4.53	11.75	- 11.95
76	3.83	166	8.36	11.95	- 12.15
68	3.42	234	11.78	12.15	- 12.35
111	5.59	345	17.37	12.35	- 12.55
107	5.39	452	22.76	12.55	- 12.75
109	5.49	561	28.25	12.75	- 12.95
155	7.80	716	36.05	12.95	- 13.15
154	7.75	870	43.81	13.15	- 13.35
169	8.51	1039	52.32	13.35	- 13.55
144	7.25	1183	59.57	13.55	- 13.75
119	5.99	1302	65.56	13.75	- 13.95
162	8.16	1464	73.72	13.95	- 14.15
109	5.49	1573	79.20	14.15	- 14.35
108	5.44	1681	84.64	14.35	- 14.55
76	3.83	1757	88.47	14.55	- 14.75
56	2.82	1813	91.29	14.75	- 14.95
50	2.52	1863	93.81	14.95	- 15.15
35	1.76	1898	95.57	15.15	- 15.35
25	1.26	1923	96.83	15.35	- 15.55
17	0.86	1940	97.68	15.55	- 15.75
20	1.01	1960	98.69	15.75	- 15.95
9	0.45	1969	99.14	15.95	- 16.15
3	0.15	1972	99.30	16.15	- 16.35
5	0.25	1977	99.55	16.35	- 16.55
1	0.05	1978	99.60	16.55	- 16.75
0	0.00	1978	99.60	16.75	- 16.95
2	0.10	1980	99.70	16.95	- 17.15
5	0.25	1985	99.95	17.15	- 17.35
1	0.05	1986	100.00	17.35	- 17.55
				17.55	- 17.75
				17.75	- 17.95
				17.95	- 18.15
				18.15	- 18.35
				18.35	- 18.55

(71) SITTING HEIGHT

The vertical distance between a sitting surface and the top of the head is measured with an anthropometer. The participant sits erect with the head in the Frankfurt plane. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The thighs are parallel, and the knees are flexed 90° with the feet in line with the thighs. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES			MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
78.40	30.87	1ST	83.50	32.87	
79.10	31.14	2ND	84.50	33.27	
79.60	31.34	3RD	85.10	33.50	
80.30	31.61	5TH	86.00	33.86	
81.30	32.01	10TH	87.30	34.37	
82.20	32.36	15TH	88.20	34.72	
82.80	32.60	20TH	88.90	35.00	
83.40	32.83	25TH	89.40	35.20	
83.90	33.03	30TH	89.90	35.39	
84.30	33.19	35TH	90.40	35.59	
84.80	33.39	40TH	90.80	35.75	
85.30	33.58	45TH	91.30	35.94	
85.70	33.74	50TH	91.80	36.14	
86.10	33.90	55TH	92.20	36.30	
86.50	34.06	60TH	92.70	36.50	
86.90	34.21	65TH	93.20	36.69	
87.40	34.41	70TH	93.70	36.89	
87.90	34.61	75TH	94.30	37.13	
88.50	34.84	80TH	94.80	37.32	
89.10	35.08	85TH	95.50	37.60	
90.00	35.43	90TH	96.40	37.95	
91.20	35.91	95TH	97.70	38.46	
91.90	36.18	97TH	98.70	38.86	
92.30	36.34	98TH	99.20	39.06	
93.30	36.73	99TH	100.20	39.45	

(71) SITTING HEIGHT

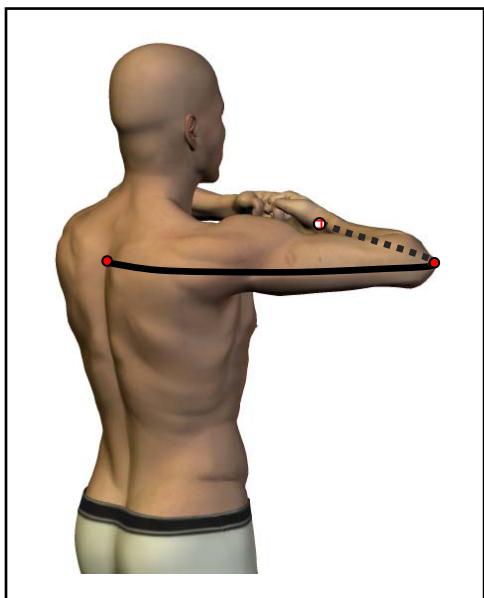
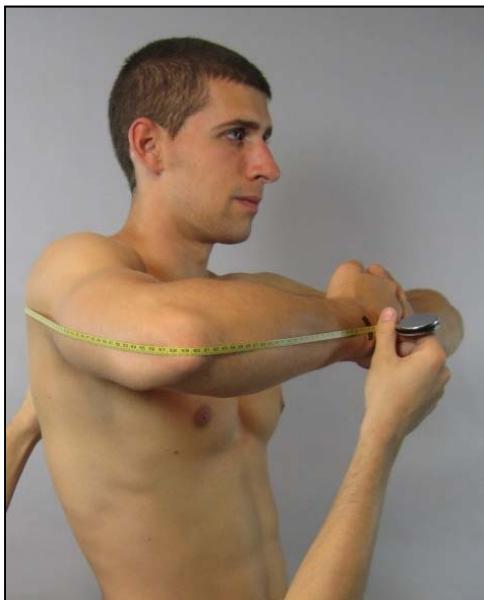
FEMALES		
<u>CM</u>		<u>IN</u>
85.66	MEAN	33.73
0.07	STD ERROR (MEAN)	0.03
3.31	STANDARD DEVIATION	1.30
0.05	STD ERROR (STD DEV)	0.02
75.00	MINIMUM	29.53
95.30	MAXIMUM	37.52
SKEWNESS		0.02
KURTOSIS		2.72
COEFFICIENT OF VARIATION		3.9%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
91.83	MEAN	36.15
0.06	STD ERROR (MEAN)	0.02
3.57	STANDARD DEVIATION	1.41
0.04	STD ERROR (STD DEV)	0.02
79.00	MINIMUM	31.10
103.90	MAXIMUM	40.91
SKEWNESS		0.02
KURTOSIS		3.02
COEFFICIENT OF VARIATION		3.9%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	74.75	-	75.50	
1	0.05	2	0.10	75.50	-	76.25	
2	0.10	4	0.20	76.25	-	77.00	
5	0.25	9	0.45	77.00	-	77.75	
14	0.70	23	1.16	77.75	-	78.50	
25	1.26	48	2.42	78.50	-	79.25	1 0.02
32	1.61	80	4.03	79.25	-	80.00	1 0.02
66	3.32	146	7.35	80.00	-	80.75	4 0.10
69	3.47	215	10.83	80.75	-	81.50	1 0.02
89	4.48	304	15.31	81.50	-	82.25	10 0.24
120	6.04	424	21.35	82.25	-	83.00	14 0.34
144	7.25	568	28.60	83.00	-	83.75	15 0.37
144	7.25	712	35.85	83.75	-	84.50	35 0.86
165	8.31	877	44.16	84.50	-	85.25	51 1.25
189	9.52	1066	53.68	85.25	-	86.00	60 1.47
186	9.37	1252	63.04	86.00	-	86.75	120 2.94
152	7.65	1404	70.69	86.75	-	87.50	149 3.65
142	7.15	1546	77.84	87.50	-	88.25	165 4.04
116	5.84	1662	83.69	88.25	-	89.00	208 5.10
96	4.83	1758	88.52	89.00	-	89.75	304 7.45
70	3.52	1828	92.04	89.75	-	90.50	301 7.37
59	2.97	1887	95.02	90.50	-	91.25	357 8.75
42	2.11	1929	97.13	91.25	-	92.00	325 7.96
27	1.36	1956	98.49	92.00	-	92.75	342 8.38
13	0.65	1969	99.14	92.75	-	93.50	271 6.64
13	0.65	1982	99.80	93.50	-	94.25	325 7.96
3	0.15	1985	99.95	94.25	-	95.00	257 6.30
1	0.05	1986	100.00	95.00	-	95.75	206 5.05
				95.75	-	96.50	155 3.80
				96.50	-	97.25	142 3.48
				97.25	-	98.00	79 1.94
				98.00	-	98.75	71 1.74
				98.75	-	99.50	44 1.08
				99.50	-	100.25	30 0.73
				100.25	-	101.00	14 0.34
				101.00	-	101.75	15 0.37
				101.75	-	102.50	4 0.10
				102.50	-	103.25	5 0.12
				103.25	-	104.00	1 0.02

(72) SLEEVE LENGTH: SPINE-WRIST

The horizontal surface distance from the midspine landmark, across the olecranon, center landmark at the tip of the raised right elbow, to the dorsal stylinon landmark is measured with a tape. The measurement is taken while the participant holds his/her arms up in a horizontal position parallel to the standing surface and joins them by bringing the fists together at the metacarpophalangeal and proximal interphalangeal knuckles. The forearms and fists are in a straight line.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
71.60	28.19	1ST	80.50	31.69	
73.20	28.82	2ND	81.60	32.13	
73.80	29.06	3RD	82.20	32.36	
74.60	29.37	5TH	83.10	32.72	
75.90	29.88	10TH	84.50	33.27	
76.90	30.28	15TH	85.30	33.58	
77.50	30.51	20TH	86.20	33.94	
78.20	30.79	25TH	86.80	34.17	
78.70	30.98	30TH	87.50	34.45	
79.20	31.18	35TH	88.00	34.65	
79.70	31.38	40TH	88.50	34.84	
80.10	31.54	45TH	89.00	35.04	
80.50	31.69	50TH	89.50	35.24	
81.00	31.89	55TH	90.00	35.43	
81.50	32.09	60TH	90.60	35.67	
82.00	32.28	65TH	91.10	35.87	
82.50	32.48	70TH	91.70	36.10	
83.00	32.68	75TH	92.20	36.30	
83.90	33.03	80TH	92.90	36.57	
84.70	33.35	85TH	93.70	36.89	
85.70	33.74	90TH	94.80	37.32	
87.00	34.25	95TH	96.30	37.91	
88.00	34.65	97TH	97.50	38.39	
88.50	34.84	98TH	98.10	38.62	
89.80	35.35	99TH	99.00	38.98	

(72) SLEEVE LENGTH: SPINE-WRIST

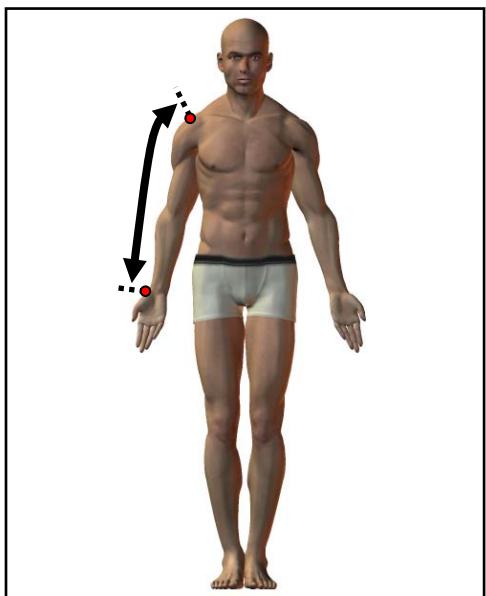
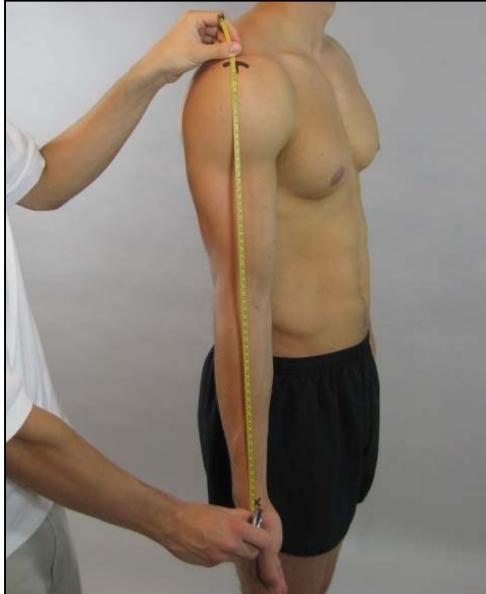
FEMALES		
CM		IN
80.67	MEAN	31.76
0.09	STD ERROR (MEAN)	0.03
3.79	STANDARD DEVIATION	1.49
0.06	STD ERROR (STD DEV)	0.02
63.60	MINIMUM	25.04
93.00	MAXIMUM	36.61
SKEWNESS		0.01
KURTOSIS		3.28
COEFFICIENT OF VARIATION		4.7%
NUMBER OF PARTICIPANTS		1986

MALES		
CM		IN
89.58	MEAN	35.27
0.06	STD ERROR (MEAN)	0.02
4.02	STANDARD DEVIATION	1.58
0.04	STD ERROR (STD DEV)	0.02
73.20	MINIMUM	28.82
105.80	MAXIMUM	41.65
SKEWNESS		0.06
KURTOSIS		3.15
COEFFICIENT OF VARIATION		4.5%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	63.55	- 64.55	1	0.02
0	0.00	1	0.05	64.55	- 65.55	2	0.05
0	0.00	1	0.05	65.55	- 66.55	0	0.00
1	0.05	2	0.10	66.55	- 67.55	1	0.02
3	0.15	5	0.25	67.55	- 68.55	4	0.10
3	0.15	8	0.40	68.55	- 69.55	7	0.17
4	0.20	12	0.60	69.55	- 70.55	9	0.22
7	0.35	19	0.96	70.55	- 71.55	21	0.51
7	0.35	26	1.31	71.55	- 72.55	33	0.81
25	1.26	51	2.57	72.55	- 73.55	72	1.76
46	2.32	97	4.88	73.55	- 74.55	106	2.60
72	3.63	169	8.51	74.55	- 75.55	157	3.85
99	4.98	268	13.49	75.55	- 76.55	246	6.03
132	6.65	400	20.14	76.55	- 77.55	272	6.66
171	8.61	571	28.75	77.55	- 78.55	334	8.18
198	9.97	769	38.72	78.55	- 79.55	391	9.58
231	11.63	1000	50.35	79.55	- 80.55	403	9.87
220	11.08	1220	61.43	80.55	- 81.55	387	9.48
201	10.12	1421	71.55	81.55	- 82.55	371	9.09
135	6.80	1556	78.35	82.55	- 83.55	378	9.26
119	5.99	1675	84.34	83.55	- 84.55	256	6.27
100	5.04	1775	89.38	84.55	- 85.55	413	10.12
90	4.53	1865	93.91	85.55	- 86.55	246	6.03
49	2.47	1914	96.37	86.55	- 87.55	931	16.14
35	1.76	1949	98.14	87.55	- 88.55	936	22.81
15	0.76	1964	98.89	88.55	- 89.55	393	30.99
11	0.55	1975	99.45	89.55	- 90.55	2817	40.57
7	0.35	1982	99.80	90.55	- 91.55	2059	50.44
3	0.15	1985	99.95	91.55	- 92.55	2446	59.92
1	0.05	1986	100.00	92.55	- 93.55	3195	59.92
				93.55	- 94.55	3451	69.01
				94.55	- 95.55	3648	78.27
				95.55	- 96.55	3790	84.54
				96.55	- 97.55	3900	92.85
				97.55	- 98.55	3965	95.54
				98.55	- 99.55	4024	97.13
				99.55	- 100.55	4052	98.58
				100.55	- 101.55	4065	99.27
				101.55	- 102.55	4077	99.58
				102.55	- 103.55	4078	99.88
				103.55	- 104.55	4080	99.95
				104.55	- 105.55	4081	99.98
				105.55	- 106.55	4082	100.00

(73) SLEEVE OUTSEAM

The straight-line distance between the right acromion landmark and the stylinon landmark is measured with a tape. The participant stands erect with both arms straight at the sides with the hands straight and the palms facing forward.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
47.60	18.74	1ST	52.20	20.55	
48.70	19.17	2ND	53.10	20.91	
49.00	19.29	3RD	53.60	21.10	
49.70	19.57	5TH	54.50	21.46	
50.60	19.92	10TH	55.40	21.81	
51.40	20.24	15TH	56.10	22.09	
52.00	20.47	20TH	56.80	22.36	
52.50	20.67	25TH	57.20	22.52	
52.80	20.79	30TH	57.60	22.68	
53.20	20.94	35TH	58.10	22.87	
53.50	21.06	40TH	58.50	23.03	
54.00	21.26	45TH	58.90	23.19	
54.20	21.34	50TH	59.20	23.31	
54.50	21.46	55TH	59.60	23.46	
55.00	21.65	60TH	60.00	23.62	
55.50	21.85	65TH	60.50	23.82	
55.80	21.97	70TH	60.80	23.94	
56.30	22.17	75TH	61.20	24.09	
56.80	22.36	80TH	61.80	24.33	
57.40	22.60	85TH	62.50	24.61	
58.10	22.87	90TH	63.40	24.96	
59.40	23.39	95TH	64.50	25.39	
60.20	23.70	97TH	65.30	25.71	
60.50	23.82	98TH	66.00	25.98	
61.10	24.06	99TH	67.00	26.38	

(73) SLEEVE OUTSEAM

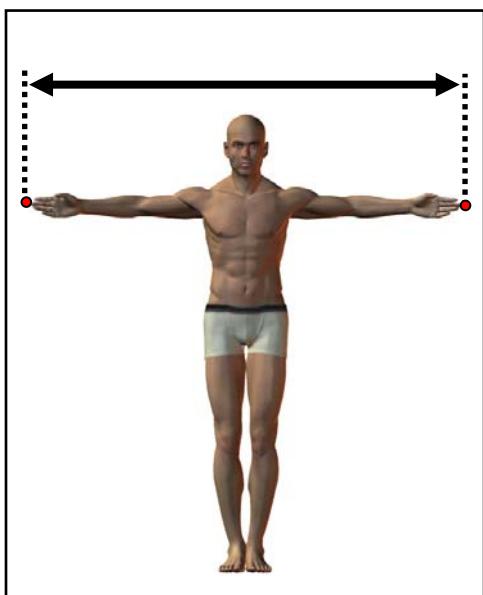
FEMALES		
<u>CM</u>		<u>IN</u>
54.36	MEAN	21.40
0.07	STD ERROR (MEAN)	0.03
2.94	STANDARD DEVIATION	1.16
0.05	STD ERROR (STD DEV)	0.02
41.00	MINIMUM	16.14
66.20	MAXIMUM	26.06
SKEWNESS		0.09
KURTOSIS		3.30
COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
59.31	MEAN	23.35
0.05	STD ERROR (MEAN)	0.02
3.08	STANDARD DEVIATION	1.21
0.03	STD ERROR (STD DEV)	0.01
48.80	MINIMUM	19.21
70.90	MAXIMUM	27.91
SKEWNESS		0.13
KURTOSIS		3.13
COEFFICIENT OF VARIATION		5.2%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	F	FPct
1	0.05	1	0.05	40.75	-	41.50	
0	0.00	1	0.05	41.50	-	42.25	
0	0.00	1	0.05	42.25	-	43.00	
0	0.00	1	0.05	43.00	-	43.75	
1	0.05	2	0.10	43.75	-	44.50	
1	0.05	3	0.15	44.50	-	45.25	
3	0.15	6	0.30	45.25	-	46.00	
6	0.30	12	0.60	46.00	-	46.75	
2	0.10	14	0.70	46.75	-	47.50	
12	0.60	26	1.31	47.50	-	48.25	
26	1.31	52	2.62	48.25	-	49.00	1 0.02
52	2.62	104	5.24	49.00	-	49.75	2 0.05
64	3.22	168	8.46	49.75	-	50.50	1 0.02
118	5.94	286	14.40	50.50	-	51.25	12 0.29
101	5.09	387	19.49	51.25	-	52.00	14 0.34
188	9.47	575	28.95	52.00	-	52.75	32 0.78
171	8.61	746	37.56	52.75	-	53.50	39 0.96
266	13.39	1012	50.96	53.50	-	54.25	74 1.81
170	8.56	1182	59.52	54.25	-	55.00	121 2.96
199	10.02	1381	69.54	55.00	-	55.75	199 4.88
125	6.29	1506	75.83	55.75	-	56.50	197 4.83
168	8.46	1674	84.29	56.50	-	57.25	343 8.40
90	4.53	1764	88.82	57.25	-	58.00	296 7.25
73	3.68	1837	92.50	58.00	-	58.75	447 10.95
51	2.57	1888	95.07	58.75	-	59.50	346 8.48
42	2.11	1930	97.18	59.50	-	60.25	460 11.27
27	1.36	1957	98.54	60.25	-	61.00	297 7.28
17	0.86	1974	99.40	61.00	-	61.75	371 9.09
4	0.20	1978	99.60	61.75	-	62.50	196 4.80
4	0.20	1982	99.80	62.50	-	63.25	209 5.12
2	0.10	1984	99.90	63.25	-	64.00	126 3.09
1	0.05	1985	99.95	64.00	-	64.75	120 2.94
0	0.00	1985	99.95	64.75	-	65.50	67 1.64
1	0.05	1986	100.00	65.50	-	66.25	45 1.10
				66.25	-	67.00	25 0.61
				67.00	-	67.75	21 0.51
				67.75	-	68.50	7 0.17
				68.50	-	69.25	8 0.20
				69.25	-	70.00	4 0.10
				70.00	-	70.75	1 0.02
				70.75	-	71.50	1 0.02

(74) SPAN

The distance between the tips of the middle fingers (dactylion III) of the horizontally outstretched arms is measured on a wall chart. The participant stands erect with the back against a wall-mounted scale and the heels together. Both arms and hands are stretched horizontally along the wall with the tip of the middle finger of one hand just touching a side wall. A block is placed at the tip of the middle finger of the other hand to establish the measurement on the scale. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
		FEMALES		MALES	
		CM	IN	CM	IN
		148.00	58.27	1ST	162.70
		150.20	59.13	2ND	165.10
		151.30	59.57	3RD	166.30
		152.90	60.20	5TH	168.00
		155.50	61.22	10TH	170.70
		157.70	62.09	15TH	172.50
		159.10	62.64	20TH	174.30
		160.50	63.19	25TH	175.70
		161.70	63.66	30TH	177.00
		162.60	64.02	35TH	178.00
		163.60	64.41	40TH	179.20
		164.60	64.80	45TH	180.20
		165.70	65.24	50TH	181.20
		166.70	65.63	55TH	182.20
		167.80	66.06	60TH	183.20
		168.80	66.46	65TH	184.40
		170.00	66.93	70TH	185.60
		171.30	67.44	75TH	186.90
		172.80	68.03	80TH	188.30
		174.50	68.70	85TH	189.90
		177.10	69.72	90TH	192.30
		180.30	70.98	95TH	195.70
		182.40	71.81	97TH	198.20
		183.80	72.36	98TH	199.70
		186.20	73.31	99TH	203.20
					80.00

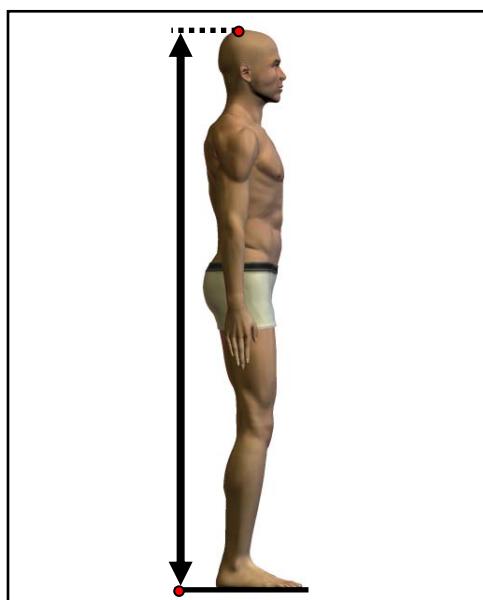
(74) SPAN

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
166.03	STD ERROR (MEAN)	0.07	181.42	STD ERROR (MEAN)	0.05
0.19	STANDARD DEVIATION	3.27	8.46	STANDARD DEVIATION	3.33
8.30	STD ERROR (STD DEV)	0.05	0.09	STD ERROR (STD DEV)	0.04
0.13	MINIMUM	52.09	150.10	MINIMUM	59.09
132.30	MAXIMUM	76.30	212.10	MAXIMUM	83.50
193.80	SKEWNESS	0.17	KURTOSIS	3.15	
SKEWNESS	KURTOSIS		COEFFICIENT OF VARIATION	5.0%	4.7%
KURTOSIS	COEFFICIENT OF VARIATION		NUMBER OF PARTICIPANTS	1986	4082
COEFFICIENT OF VARIATION	NUMBER OF PARTICIPANTS				

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	131.55	-	133.55	
0	0.00	1	0.05	133.55	-	135.55	
0	0.00	1	0.05	135.55	-	137.55	
0	0.00	1	0.05	137.55	-	139.55	
2	0.10	3	0.15	139.55	-	141.55	
5	0.25	8	0.40	141.55	-	143.55	
5	0.25	13	0.65	143.55	-	145.55	
4	0.20	17	0.86	145.55	-	147.55	
12	0.60	29	1.46	147.55	-	149.55	
38	1.91	67	3.37	149.55	-	151.55	
65	3.27	132	6.65	151.55	-	153.55	
67	3.37	199	10.02	153.55	-	155.55	
86	4.33	285	14.35	155.55	-	157.55	
142	7.15	427	21.50	157.55	-	159.55	
158	7.96	585	29.46	159.55	-	161.55	
207	10.42	792	39.88	161.55	-	163.55	
192	9.67	984	49.55	163.55	-	165.55	
183	9.21	1167	58.76	165.55	-	167.55	
185	9.32	1352	68.08	167.55	-	169.55	
162	8.16	1514	76.23	169.55	-	171.55	
114	5.74	1628	81.97	171.55	-	173.55	
104	5.24	1732	87.21	173.55	-	175.55	
71	3.58	1803	90.79	175.55	-	177.55	
56	2.82	1859	93.61	177.55	-	179.55	
51	2.57	1910	96.17	179.55	-	181.55	
28	1.41	1938	97.58	181.55	-	183.55	
24	1.21	1962	98.79	183.55	-	185.55	
12	0.60	1974	99.40	185.55	-	187.55	
5	0.25	1979	99.65	187.55	-	189.55	
1	0.05	1980	99.70	189.55	-	191.55	
5	0.25	1985	99.95	191.55	-	193.55	
1	0.05	1986	100.00	193.55	-	195.55	
				195.55	-	197.55	
				197.55	-	199.55	
				199.55	-	201.55	
				201.55	-	203.55	
				203.55	-	205.55	
				205.55	-	207.55	
				207.55	-	209.55	
				209.55	-	211.55	
				211.55	-	213.55	

(75) STATURE

The vertical distance from a standing surface to the top of the head is measured with an anthropometer. The participant stands erect with the head in the Frankfurt plane. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
148.00	58.27	1ST	160.00	62.99	
149.80	58.98	2ND	162.10	63.82	
150.90	59.41	3RD	163.40	64.33	
152.50	60.04	5TH	164.80	64.88	
154.70	60.91	10TH	166.90	65.71	
156.30	61.54	15TH	168.50	66.34	
157.50	62.01	20TH	169.90	66.89	
158.60	62.44	25TH	171.00	67.32	
159.50	62.80	30TH	172.00	67.72	
160.30	63.11	35TH	172.90	68.07	
161.10	63.43	40TH	173.80	68.43	
161.70	63.66	45TH	174.50	68.70	
162.60	64.02	50TH	175.50	69.09	
163.40	64.33	55TH	176.40	69.45	
164.30	64.69	60TH	177.30	69.80	
165.30	65.08	65TH	178.20	70.16	
166.10	65.39	70TH	179.10	70.51	
167.20	65.83	75TH	180.20	70.94	
168.10	66.18	80TH	181.30	71.38	
169.60	66.77	85TH	182.70	71.93	
171.30	67.44	90TH	184.40	72.60	
174.00	68.50	95TH	187.00	73.62	
175.20	68.98	97TH	189.00	74.41	
176.60	69.53	98TH	190.50	75.00	
178.10	70.12	99TH	192.70	75.87	

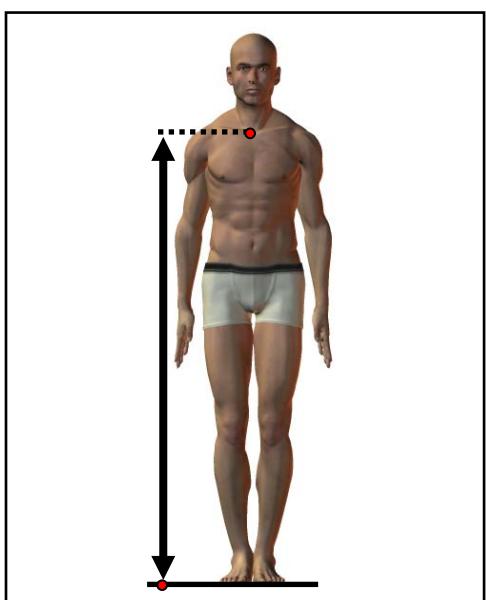
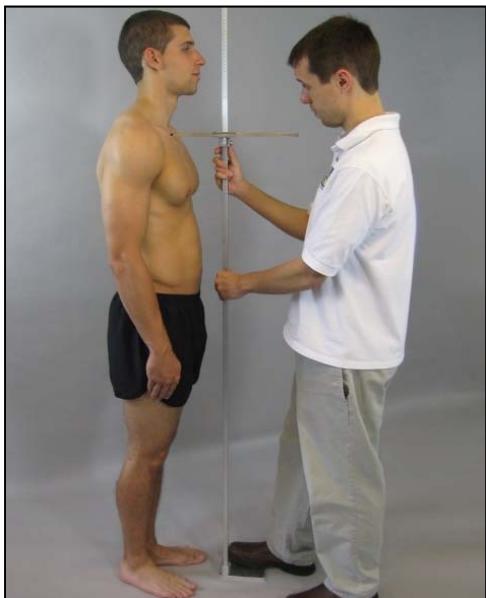
(75) STATURE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
162.85	STD ERROR (MEAN)	64.11	175.62	STD ERROR (MEAN)	69.14
0.14	STANDARD DEVIATION	0.06	0.11	STANDARD DEVIATION	0.04
6.42	STD ERROR (STD DEV)	2.53	6.86	STD ERROR (STD DEV)	2.70
0.10	MINIMUM	0.04	0.08	MINIMUM	0.03
140.90	MAXIMUM	55.47	149.10	MAXIMUM	58.70
182.90		72.01	199.30		78.46
SKEWNESS		0.09	SKEWNESS		0.11
KURTOSIS		3.01	KURTOSIS		3.07
COEFFICIENT OF VARIATION		3.9%	COEFFICIENT OF VARIATION		3.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	139.75	- 141.25
0	0.00	1	0.05	141.25	- 142.75
3	0.15	4	0.20	142.75	- 144.25
3	0.15	7	0.35	144.25	- 145.75
7	0.35	14	0.70	145.75	- 147.25
8	0.40	22	1.11	147.25	- 148.75
26	1.31	48	2.42	148.75	- 150.25
27	1.36	75	3.78	150.25	- 151.75
54	2.72	129	6.50	151.75	- 153.25
71	3.58	200	10.07	153.25	- 154.75
92	4.63	292	14.70	154.75	- 156.25
123	6.19	415	20.90	156.25	- 157.75
155	7.80	570	28.70	157.75	- 159.25
182	9.16	752	37.87	159.25	- 160.75
196	9.87	948	47.73	160.75	- 162.25
189	9.52	1137	57.25	162.25	- 163.75
152	7.65	1289	64.90	163.75	- 165.25
161	8.11	1450	73.01	165.25	- 166.75
149	7.50	1599	80.51	166.75	- 168.25
99	4.98	1698	85.50	168.25	- 169.75
88	4.43	1786	89.93	169.75	- 171.25
59	2.97	1845	92.90	171.25	- 172.75
48	2.42	1893	95.32	172.75	- 174.25
42	2.11	1935	97.43	174.25	- 175.75
25	1.26	1960	98.69	175.75	- 177.25
11	0.55	1971	99.24	177.25	- 178.75
7	0.35	1978	99.60	178.75	- 180.25
2	0.10	1980	99.70	180.25	- 181.75
6	0.30	1986	100.00	181.75	- 183.25
				183.25	- 184.75
				184.75	- 186.25
				186.25	- 187.75
				187.75	- 189.25
				189.25	- 190.75
				190.75	- 192.25
				192.25	- 193.75
				193.75	- 195.25
				195.25	- 196.75
				196.75	- 198.25
				198.25	- 199.75

(76) SUPRASTERNALE HEIGHT

The vertical distance between a standing surface and the suprasternale landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
119.80	47.17	1ST	130.00	51.18	
121.50	47.83	2ND	131.70	51.85	
122.40	48.19	3RD	132.70	52.24	
123.60	48.66	5TH	134.10	52.80	
125.90	49.57	10TH	136.00	53.54	
127.20	50.08	15TH	137.40	54.09	
128.40	50.55	20TH	138.80	54.65	
129.30	50.91	25TH	139.80	55.04	
130.00	51.18	30TH	140.70	55.39	
130.80	51.50	35TH	141.50	55.71	
131.30	51.69	40TH	142.20	55.98	
132.00	51.97	45TH	143.00	56.30	
132.60	52.20	50TH	143.70	56.57	
133.30	52.48	55TH	144.50	56.89	
134.30	52.87	60TH	145.30	57.20	
135.00	53.15	65TH	146.10	57.52	
135.90	53.50	70TH	146.80	57.80	
136.70	53.82	75TH	147.80	58.19	
137.70	54.21	80TH	148.90	58.62	
138.90	54.69	85TH	150.20	59.13	
140.50	55.31	90TH	151.70	59.72	
142.80	56.22	95TH	154.00	60.63	
144.10	56.73	97TH	155.70	61.30	
145.30	57.20	98TH	157.60	62.05	
146.80	57.80	99TH	159.20	62.68	

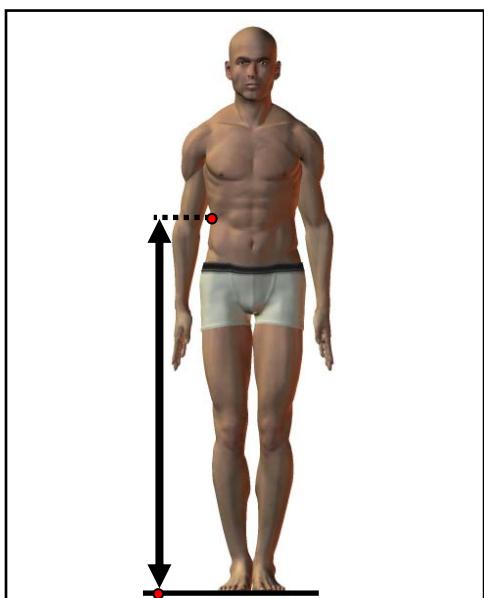
(76) SUPRASTERNALE HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
132.97	52.35		143.86	56.64	
0.13	0.05		0.10	0.04	
5.72	2.25		6.12	2.41	
0.09	0.04		0.07	0.03	
113.10	44.53		119.20	46.93	
151.60	59.69		165.00	64.96	
SKEWNESS	0.09				0.12
KURTOSIS	3.08				3.10
COEFFICIENT OF VARIATION	4.3%				4.3%
NUMBER OF PARTICIPANTS	1986				4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	112.55	- 113.55		
1	0.05	2	0.10	113.55	- 114.55		
1	0.05	3	0.15	114.55	- 115.55		
1	0.05	4	0.20	115.55	- 116.55		
4	0.20	8	0.40	116.55	- 117.55		
5	0.25	13	0.65	117.55	- 118.55		
3	0.15	16	0.81	118.55	- 119.55	1	0.02
11	0.55	27	1.36	119.55	- 120.55	0	0.00
14	0.70	41	2.06	120.55	- 121.55	0	0.00
26	1.31	67	3.37	121.55	- 122.55	0	0.00
28	1.41	95	4.78	122.55	- 123.55	0	0.00
35	1.76	130	6.55	123.55	- 124.55	1	0.02
47	2.37	177	8.91	124.55	- 125.55	0	0.00
71	3.58	248	12.49	125.55	- 126.55	3	0.07
89	4.48	337	16.97	126.55	- 127.55	10	0.24
74	3.73	411	20.69	127.55	- 128.55	10	0.24
130	6.55	541	27.24	128.55	- 129.55	9	0.22
123	6.19	664	33.43	129.55	- 130.55	16	0.39
167	8.41	831	41.84	130.55	- 131.55	30	0.73
147	7.40	978	49.24	131.55	- 132.55	37	0.91
140	7.05	1118	56.29	132.55	- 133.55	48	1.18
118	5.94	1236	62.24	133.55	- 134.55	66	1.62
120	6.04	1356	68.28	134.55	- 135.55	105	2.57
119	5.99	1475	74.27	135.55	- 136.55	134	3.28
100	5.04	1575	79.31	136.55	- 137.55	158	3.87
88	4.43	1663	83.74	137.55	- 138.55	169	4.14
70	3.52	1733	87.26	138.55	- 139.55	170	4.16
57	2.87	1790	90.13	139.55	- 140.55	220	5.39
51	2.57	1841	92.70	140.55	- 141.55	266	6.52
38	1.91	1879	94.61	141.55	- 142.55	268	6.57
38	1.91	1917	96.53	142.55	- 143.55	302	7.40
19	0.96	1936	97.48	143.55	- 144.55	231	5.66
16	0.81	1952	98.29	144.55	- 145.55	245	6.00
12	0.60	1964	98.89	145.55	- 146.55	276	6.76
11	0.55	1975	99.45	146.55	- 147.55	227	5.56
3	0.15	1978	99.60	147.55	- 148.55	207	5.07
3	0.15	1981	99.75	148.55	- 149.55	163	3.99
2	0.10	1983	99.85	149.55	- 150.55	164	4.02
2	0.10	1985	99.95	150.55	- 151.55	121	2.96
1	0.05	1986	100.00	151.55	- 152.55	108	2.65
				152.55	- 153.55	77	1.89
				153.55	- 154.55	63	1.54
				154.55	- 155.55	47	1.15
				155.55	- 156.55	23	0.56
				156.55	- 157.55	24	0.59
				157.55	- 158.55	34	0.83
				158.55	- 159.55	14	0.34
				159.55	- 160.55	11	0.27
				160.55	- 161.55	12	0.29
				161.55	- 162.55	5	0.12
				162.55	- 163.55	5	0.12
				163.55	- 164.55	1	0.02
				164.55	- 165.55	1	0.02

(77) TENTH RIB HEIGHT

The vertical distance between a standing surface and the tenth rib landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
94.20	37.09	1ST	100.30	39.49	
96.00	37.80	2ND	101.50	39.96	
96.60	38.03	3RD	102.40	40.31	
97.60	38.43	5TH	103.40	40.71	
99.50	39.17	10TH	105.30	41.46	
100.60	39.61	15TH	106.40	41.89	
101.60	40.00	20TH	107.50	42.32	
102.40	40.31	25TH	108.40	42.68	
103.00	40.55	30TH	109.20	42.99	
103.60	40.79	35TH	109.90	43.27	
104.10	40.98	40TH	110.60	43.54	
104.80	41.26	45TH	111.30	43.82	
105.40	41.50	50TH	111.90	44.06	
106.00	41.73	55TH	112.60	44.33	
106.70	42.01	60TH	113.40	44.65	
107.50	42.32	65TH	114.10	44.92	
108.10	42.56	70TH	114.90	45.24	
109.00	42.91	75TH	115.60	45.51	
109.80	43.23	80TH	116.50	45.87	
110.90	43.66	85TH	117.50	46.26	
112.20	44.17	90TH	118.90	46.81	
114.00	44.88	95TH	121.10	47.68	
115.30	45.39	97TH	122.60	48.27	
116.00	45.67	98TH	123.80	48.74	
117.50	46.26	99TH	125.60	49.45	

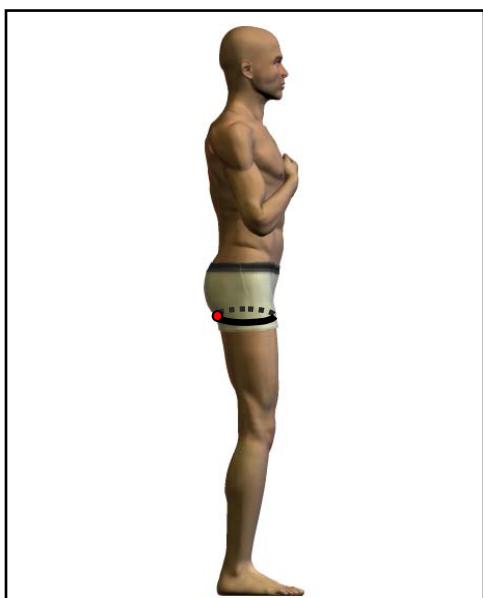
(77) TENTH RIB HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
105.63	STD ERROR (MEAN)	41.58	112.07	STD ERROR (MEAN)	44.12
0.11	STANDARD DEVIATION	0.04	0.08	STANDARD DEVIATION	0.03
5.00	STD ERROR (STD DEV)	1.97	5.36	STD ERROR (STD DEV)	2.11
0.08	MINIMUM	0.03	0.06	MINIMUM	0.02
86.80	MAXIMUM	34.17	91.70	MAXIMUM	36.10
121.90		47.99	130.50		51.38
SKEWNESS		0.10	SKEWNESS		0.15
KURTOSIS		3.10	KURTOSIS		3.04
COEFFICIENT OF VARIATION		4.7%	COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	86.55	-	87.55	
0	0.00	2	0.10	87.55	-	88.55	
0	0.00	2	0.10	88.55	-	89.55	
1	0.05	3	0.15	89.55	-	90.55	
2	0.10	5	0.25	90.55	-	91.55	
4	0.20	9	0.45	91.55	-	92.55	1
3	0.15	12	0.60	92.55	-	93.55	0
11	0.55	23	1.16	93.55	-	94.55	0
13	0.65	36	1.81	94.55	-	95.55	1
22	1.11	58	2.92	95.55	-	96.55	3
37	1.86	95	4.78	96.55	-	97.55	4
50	2.52	145	7.30	97.55	-	98.55	3
61	3.07	206	10.37	98.55	-	99.55	15
86	4.33	292	14.70	99.55	-	100.55	20
99	4.98	391	19.69	100.55	-	101.55	36
131	6.60	522	26.28	101.55	-	102.55	51
172	8.66	694	34.94	102.55	-	103.55	82
170	8.56	864	43.50	103.55	-	104.55	101
157	7.91	1021	51.41	104.55	-	105.55	134
155	7.80	1176	59.21	105.55	-	106.55	178
132	6.65	1308	65.86	106.55	-	107.55	202
140	7.05	1448	72.91	107.55	-	108.55	214
103	5.19	1551	78.10	108.55	-	109.55	276
101	5.09	1652	83.18	109.55	-	110.55	304
89	4.48	1741	87.66	110.55	-	111.55	310
64	3.22	1805	90.89	111.55	-	112.55	283
63	3.17	1868	94.06	112.55	-	113.55	289
33	1.66	1901	95.72	113.55	-	114.55	275
35	1.76	1936	97.48	114.55	-	115.55	271
20	1.01	1956	98.49	115.55	-	116.55	232
11	0.55	1967	99.04	116.55	-	117.55	195
5	0.25	1972	99.30	117.55	-	118.55	159
6	0.30	1978	99.60	118.55	-	119.55	116
4	0.20	1982	99.80	119.55	-	120.55	81
1	0.05	1983	99.85	120.55	-	121.55	71
3	0.15	1986	100.00	121.55	-	122.55	50
				122.55	-	123.55	32
				123.55	-	124.55	32
				124.55	-	125.55	18
				125.55	-	126.55	21
				126.55	-	127.55	8
				127.55	-	128.55	8
				128.55	-	129.55	3
				129.55	-	130.55	3

(78) THIGH CIRCUMFERENCE

The circumference of the right thigh at the gluteal furrow landmark is measured with a tape. The measurement is taken perpendicular to the long axis of the thigh. The participant stands erect with the weight distributed equally on both feet. The legs are spread apart just enough so that the thighs do not touch.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
49.50	19.49	1ST	49.70	19.57	
50.90	20.04	2ND	50.70	19.96	
51.60	20.31	3RD	51.70	20.35	
52.70	20.75	5TH	53.20	20.94	
54.40	21.42	10TH	55.10	21.69	
55.70	21.93	15TH	56.50	22.24	
57.20	22.52	20TH	57.60	22.68	
57.90	22.80	25TH	58.60	23.07	
58.60	23.07	30TH	59.50	23.43	
59.40	23.39	35TH	60.20	23.70	
60.00	23.62	40TH	61.00	24.02	
60.60	23.86	45TH	61.70	24.29	
61.30	24.13	50TH	62.40	24.57	
62.00	24.41	55TH	63.10	24.84	
62.90	24.76	60TH	63.80	25.12	
63.60	25.04	65TH	64.60	25.43	
64.30	25.31	70TH	65.40	25.75	
65.10	25.63	75TH	66.20	26.06	
66.40	26.14	80TH	67.20	26.46	
67.40	26.54	85TH	68.30	26.89	
68.80	27.09	90TH	69.80	27.48	
71.10	27.99	95TH	72.30	28.46	
72.50	28.54	97TH	74.20	29.21	
73.10	28.78	98TH	75.60	29.76	
75.70	29.80	99TH	77.40	30.47	

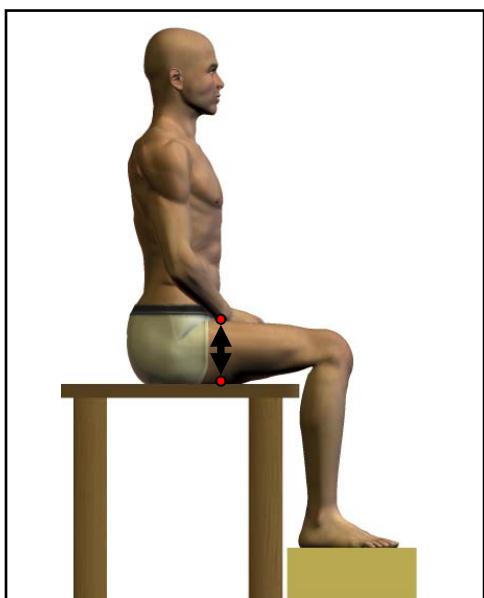
(78) THIGH CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
61.61	24.26		62.51	24.61	
0.13	0.05		0.09	0.04	
5.58	2.20		5.85	2.30	
0.09	0.03		0.06	0.03	
44.80	17.64		41.20	16.22	
87.00	34.25		84.30	33.19	
SKEWNESS	0.29		SKEWNESS	0.22	
KURTOSIS	3.40		KURTOSIS	3.27	
COEFFICIENT OF VARIATION	9.1%		COEFFICIENT OF VARIATION	9.4%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
F	Fpct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	44.55	-	45.55	1
1	0.05	2	0.10	45.55	-	46.55	2
1	0.05	3	0.15	46.55	-	47.55	6
5	0.25	8	0.40	47.55	-	48.55	13
13	0.65	21	1.06	48.55	-	49.55	15
12	0.60	33	1.66	49.55	-	50.55	35
23	1.16	56	2.82	50.55	-	51.55	41
38	1.91	94	4.73	51.55	-	52.55	50
40	2.01	134	6.75	52.55	-	53.55	74
76	3.83	210	10.57	53.55	-	54.55	95
73	3.68	283	14.25	54.55	-	55.55	136
64	3.22	347	17.47	55.55	-	56.55	146
100	5.04	447	22.51	56.55	-	57.55	189
140	7.05	587	29.56	57.55	-	58.55	205
136	6.85	723	36.40	58.55	-	59.55	223
156	7.85	879	44.26	59.55	-	60.55	287
150	7.55	1029	51.81	60.55	-	61.55	271
127	6.39	1156	58.21	61.55	-	62.55	277
126	6.34	1282	64.55	62.55	-	63.55	311
139	7.00	1421	71.55	63.55	-	64.55	272
104	5.24	1525	76.79	64.55	-	65.55	254
90	4.53	1615	81.32	65.55	-	66.55	237
91	4.58	1706	85.90	66.55	-	67.55	201
70	3.52	1776	89.43	67.55	-	68.55	159
51	2.57	1827	91.99	68.55	-	69.55	141
47	2.37	1874	94.36	69.55	-	70.55	101
30	1.51	1904	95.87	70.55	-	71.55	78
26	1.31	1930	97.18	71.55	-	72.55	67
23	1.16	1953	98.34	72.55	-	73.55	48
7	0.35	1960	98.69	73.55	-	74.55	33
5	0.25	1965	98.94	74.55	-	75.55	29
4	0.20	1969	99.14	75.55	-	76.55	24
3	0.15	1972	99.30	76.55	-	77.55	22
5	0.25	1977	99.55	77.55	-	78.55	10
3	0.15	1980	99.70	78.55	-	79.55	7
1	0.05	1981	99.75	79.55	-	80.55	3
2	0.10	1983	99.85	80.55	-	81.55	8
0	0.00	1983	99.85	81.55	-	82.55	4
1	0.05	1984	99.90	82.55	-	83.55	4
0	0.00	1984	99.90	83.55	-	84.55	2
0	0.00	1984	99.90	84.55	-	85.55	
0	0.00	1984	99.90	85.55	-	86.55	
2	0.10	1986	100.00	86.55	-	87.55	

(79) THIGH CLEARANCE

The vertical distance between a sitting surface and the thigh point, top landmark is measured with an anthropometer. The participant sits with the thighs parallel, knees flexed 90°, and the feet in line with the thighs.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
13.80	5.43	1ST	14.80	5.83	
14.10	5.55	2ND	15.10	5.94	
14.20	5.59	3RD	15.30	6.02	
14.50	5.71	5TH	15.70	6.18	
15.00	5.91	10TH	16.20	6.38	
15.30	6.02	15TH	16.50	6.50	
15.60	6.14	20TH	16.70	6.57	
15.80	6.22	25TH	17.00	6.69	
16.00	6.30	30TH	17.20	6.77	
16.30	6.42	35TH	17.40	6.85	
16.40	6.46	40TH	17.60	6.93	
16.60	6.54	45TH	17.80	7.01	
16.70	6.57	50TH	18.00	7.09	
16.90	6.65	55TH	18.20	7.17	
17.10	6.73	60TH	18.30	7.20	
17.30	6.81	65TH	18.50	7.28	
17.40	6.85	70TH	18.80	7.40	
17.70	6.97	75TH	19.00	7.48	
17.90	7.05	80TH	19.30	7.60	
18.30	7.20	85TH	19.60	7.72	
18.60	7.32	90TH	20.10	7.91	
19.10	7.52	95TH	20.70	8.15	
19.60	7.72	97TH	21.30	8.39	
19.80	7.80	98TH	21.70	8.54	
20.30	7.99	99TH	22.30	8.78	

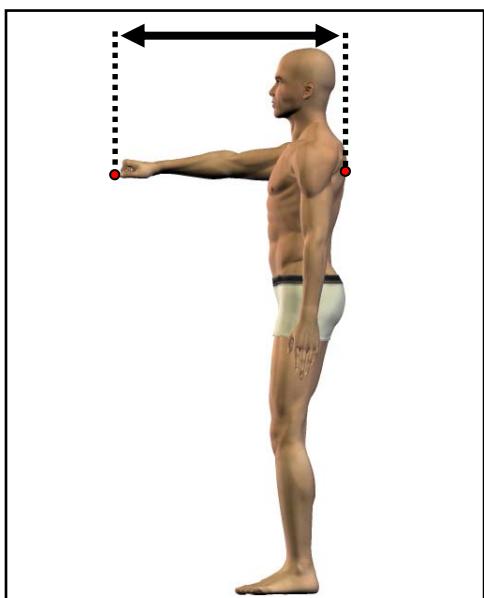
(79) THIGH CLEARANCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
16.79	STD ERROR (MEAN)	0.01	18.05	STD ERROR (MEAN)	0.01
0.03	STANDARD DEVIATION	0.55	0.02	STANDARD DEVIATION	0.61
1.41	STD ERROR (STD DEV)	0.01	1.56	STD ERROR (STD DEV)	0.01
0.02	MINIMUM	4.76	0.02	MINIMUM	5.20
12.10	MAXIMUM	9.41	13.20	MAXIMUM	10.20
SKEWNESS		0.31	SKEWNESS		0.39
KURTOSIS		3.52	KURTOSIS		3.38
COEFFICIENT OF VARIATION		8.4%	COEFFICIENT OF VARIATION		8.6%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	11.95	-	12.30	
0	0.00	1	0.05	12.30	-	12.65	
2	0.10	3	0.15	12.65	-	13.00	
2	0.10	5	0.25	13.00	-	13.35	1
6	0.30	11	0.55	13.35	-	13.70	2
24	1.21	35	1.76	13.70	-	14.05	7
46	2.32	81	4.08	14.05	-	14.40	7
55	2.77	136	6.85	14.40	-	14.75	14
64	3.22	200	10.07	14.75	-	15.10	39
135	6.80	335	16.87	15.10	-	15.45	74
137	6.90	472	23.77	15.45	-	15.80	87
173	8.71	645	32.48	15.80	-	16.15	166
184	9.26	829	41.74	16.15	-	16.50	200
229	11.53	1058	53.27	16.50	-	16.85	338
176	8.86	1234	62.13	16.85	-	17.20	253
209	10.52	1443	72.66	17.20	-	17.55	407
122	6.14	1565	78.80	17.55	-	17.90	320
117	5.89	1682	84.69	17.90	-	18.25	427
88	4.43	1770	89.12	18.25	-	18.60	329
87	4.38	1857	93.50	18.60	-	18.95	338
43	2.17	1900	95.67	18.95	-	19.30	228
32	1.61	1932	97.28	19.30	-	19.65	236
23	1.16	1955	98.44	19.65	-	20.00	159
18	0.91	1973	99.35	20.00	-	20.35	148
2	0.10	1975	99.45	20.35	-	20.70	79
4	0.20	1979	99.65	20.70	-	21.05	68
2	0.10	1981	99.75	21.05	-	21.40	36
2	0.10	1983	99.85	21.40	-	21.75	45
1	0.05	1984	99.90	21.75	-	22.10	19
0	0.00	1984	99.90	22.10	-	22.45	24
0	0.00	1984	99.90	22.45	-	22.80	14
0	0.00	1984	99.90	22.80	-	23.15	7
0	0.00	1984	99.90	23.15	-	23.50	5
1	0.05	1985	99.95	23.50	-	23.85	4
1	0.05	1986	100.00	23.85	-	24.20	0
				24.20	-	24.55	0
				24.55	-	24.90	0
				24.90	-	25.25	0
				25.25	-	25.60	0
				25.60	-	25.95	1

(80) THUMBTIP REACH

The horizontal distance from a back wall to the tip of the right thumb is measured on a wall scale. The participant stands erect in a corner, looking straight ahead with the feet together and the heels 20 cm from the back wall. The buttocks and shoulders are against the wall. The right arm and hand, palm down, are stretched forward horizontally along a scale on the side wall. The thumb continues the horizontal line of the arm, and the remaining fingers curve around to form a fist. The participant's right shoulder is held against the rear wall (not shown in the photo in order to show participant position).



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
65.10	25.63	1ST	71.60	28.19
66.10	26.02	2ND	72.60	28.58
66.70	26.26	3RD	73.20	28.82
67.40	26.54	5TH	74.20	29.21
69.10	27.20	10TH	75.70	29.80
70.20	27.64	15TH	76.70	30.20
70.90	27.91	20TH	77.60	30.55
71.50	28.15	25TH	78.20	30.79
72.10	28.39	30TH	78.90	31.06
72.60	28.58	35TH	79.50	31.30
73.10	28.78	40TH	80.00	31.50
73.60	28.98	45TH	80.60	31.73
74.20	29.21	50TH	81.10	31.93
74.80	29.45	55TH	81.70	32.17
75.30	29.65	60TH	82.20	32.36
75.90	29.88	65TH	82.70	32.56
76.60	30.16	70TH	83.30	32.80
77.20	30.39	75TH	83.80	32.99
78.00	30.71	80TH	84.60	33.31
79.00	31.10	85TH	85.60	33.70
80.10	31.54	90TH	86.80	34.17
81.60	32.13	95TH	88.60	34.88
82.70	32.56	97TH	89.70	35.31
83.60	32.91	98TH	91.00	35.83
85.20	33.54	99TH	92.30	36.34

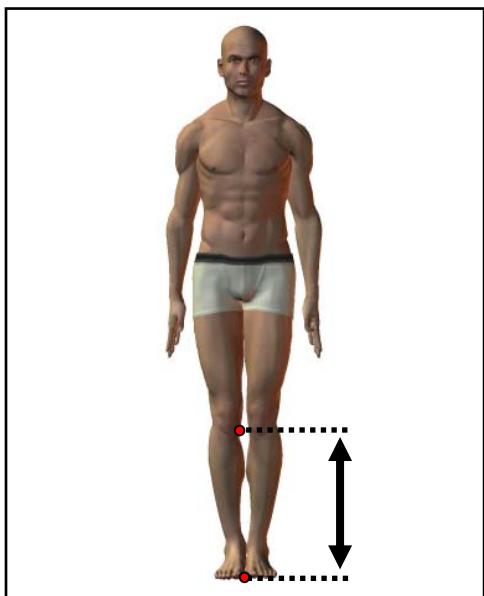
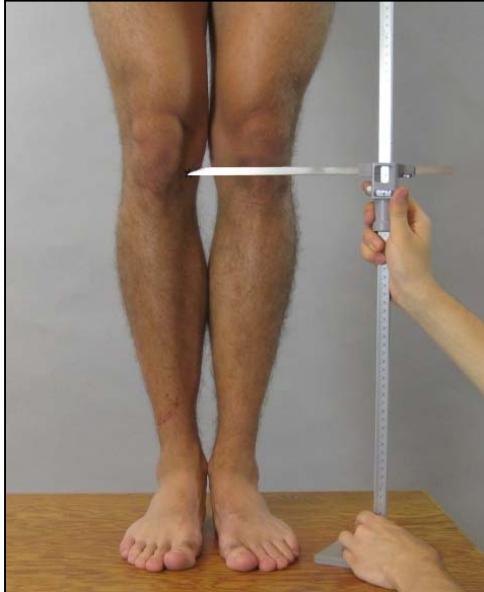
(80) THUMBTIP REACH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
74.40	STD ERROR (MEAN)	29.29	81.19	STD ERROR (MEAN)	31.97
0.10	STANDARD DEVIATION	0.04	0.07	STANDARD DEVIATION	0.03
4.28	STD ERROR (STD DEV)	1.68	4.37	STD ERROR (STD DEV)	1.72
0.07	MINIMUM	0.03	0.05	MINIMUM	0.02
60.20	MAXIMUM	23.70	65.00	MAXIMUM	25.59
89.40	SKEWNESS	35.20	99.80	KURTOSIS	39.29
	KURTOSIS	0.17		COEFFICIENT OF VARIATION	0.21
	COEFFICIENT OF VARIATION	3.00		NUMBER OF PARTICIPANTS	3.26
	NUMBER OF PARTICIPANTS	5.7%			5.4%
		1986			4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	59.55	-	60.55	
2	0.10	3	0.15	60.55	-	61.55	
1	0.05	4	0.20	61.55	-	62.55	
1	0.05	5	0.25	62.55	-	63.55	
8	0.40	13	0.65	63.55	-	64.55	
16	0.81	29	1.46	64.55	-	65.55	
28	1.41	57	2.87	65.55	-	66.55	
46	2.32	103	5.19	66.55	-	67.55	
59	2.97	162	8.16	67.55	-	68.55	
82	4.13	244	12.29	68.55	-	69.55	
94	4.73	338	17.02	69.55	-	70.55	
166	8.36	504	25.38	70.55	-	71.55	
178	8.96	682	34.34	71.55	-	72.55	
197	9.92	879	44.26	72.55	-	73.55	
179	9.01	1058	53.27	73.55	-	74.55	
180	9.06	1238	62.34	74.55	-	75.55	
152	7.65	1390	69.99	75.55	-	76.55	
143	7.20	1533	77.19	76.55	-	77.55	
112	5.64	1645	82.83	77.55	-	78.55	
92	4.63	1737	87.46	78.55	-	79.55	
93	4.68	1830	92.15	79.55	-	80.55	
51	2.57	1881	94.71	80.55	-	81.55	
42	2.11	1923	96.83	81.55	-	82.55	
23	1.16	1946	97.99	82.55	-	83.55	
13	0.65	1959	98.64	83.55	-	84.55	
15	0.76	1974	99.40	84.55	-	85.55	
6	0.30	1980	99.70	85.55	-	86.55	
5	0.25	1985	99.95	86.55	-	87.55	
0	0.00	1985	99.95	87.55	-	88.55	
1	0.05	1986	100.00	88.55	-	89.55	
				89.55	-	90.55	
				90.55	-	91.55	
				91.55	-	92.55	
				92.55	-	93.55	
				93.55	-	94.55	
				94.55	-	95.55	
				95.55	-	96.55	
				96.55	-	97.55	
				97.55	-	98.55	
				98.55	-	99.55	
				99.55	-	100.55	

(81) TIBIAL HEIGHT

The vertical distance between a standing surface and the tibiale landmark is measured with an anthropometer. The participant stands erect on a table with the feet together and the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
38.10	15.00	1ST	40.80	16.06	
38.80	15.28	2ND	41.70	16.42	
39.20	15.43	3RD	42.00	16.54	
39.90	15.71	5TH	42.60	16.77	
40.70	16.02	10TH	43.50	17.13	
41.30	16.26	15TH	44.10	17.36	
41.70	16.42	20TH	44.60	17.56	
42.10	16.57	25TH	45.00	17.72	
42.50	16.73	30TH	45.40	17.87	
42.80	16.85	35TH	45.70	17.99	
43.10	16.97	40TH	46.10	18.15	
43.40	17.09	45TH	46.50	18.31	
43.70	17.20	50TH	46.70	18.39	
44.00	17.32	55TH	47.10	18.54	
44.20	17.40	60TH	47.40	18.66	
44.60	17.56	65TH	47.80	18.82	
45.00	17.72	70TH	48.10	18.94	
45.40	17.87	75TH	48.60	19.13	
45.90	18.07	80TH	49.00	19.29	
46.50	18.31	85TH	49.60	19.53	
47.10	18.54	90TH	50.20	19.76	
47.90	18.86	95TH	51.30	20.20	
48.70	19.17	97TH	52.00	20.47	
49.30	19.41	98TH	52.60	20.71	
49.80	19.61	99TH	53.50	21.06	

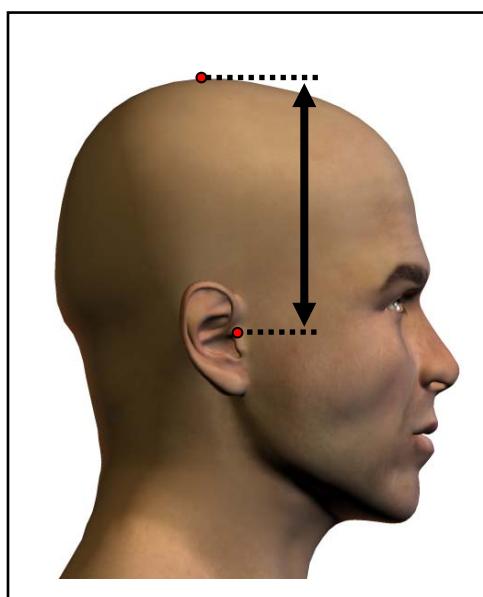
(81) TIBIAL HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
43.78	STD ERROR (MEAN)	0.02	46.82	STD ERROR (MEAN)	0.02
0.06	STANDARD DEVIATION	0.99	2.50	STANDARD DEVIATION	1.05
0.04	STD ERROR (STD DEV)	0.02	0.03	STD ERROR (STD DEV)	0.01
34.40	MINIMUM	13.54	37.60	MINIMUM	14.80
52.70	MAXIMUM	20.75	58.40	MAXIMUM	22.99
SKEWNESS		0.11	SKEWNESS		0.16
KURTOSIS		3.25	KURTOSIS		3.19
COEFFICIENT OF VARIATION		5.7%	COEFFICIENT OF VARIATION		5.7%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	34.25	-	34.75	
2	0.10	5	0.25	34.75	-	35.25	
0	0.00	5	0.25	35.25	-	35.75	
0	0.00	5	0.25	35.75	-	36.25	
2	0.10	7	0.35	36.25	-	36.75	
0	0.00	7	0.35	36.75	-	37.25	
4	0.20	11	0.55	37.25	-	37.75	
11	0.55	22	1.11	37.75	-	38.25	
16	0.81	38	1.91	38.25	-	38.75	
22	1.11	60	3.02	38.75	-	39.25	
26	1.31	86	4.33	39.25	-	39.75	
61	3.07	147	7.40	39.75	-	40.25	
60	3.02	207	10.42	40.25	-	40.75	
81	4.08	288	14.50	40.75	-	41.25	
115	5.79	403	20.29	41.25	-	41.75	
131	6.60	534	26.89	41.75	-	42.25	
154	7.75	688	34.64	42.25	-	42.75	
165	8.31	853	42.95	42.75	-	43.25	
186	9.37	1039	52.32	43.25	-	43.75	
154	7.75	1193	60.07	43.75	-	44.25	
129	6.50	1322	66.57	44.25	-	44.75	
121	6.09	1443	72.66	44.75	-	45.25	
114	5.74	1557	78.40	45.25	-	45.75	
92	4.63	1649	83.03	45.75	-	46.25	
88	4.43	1737	87.46	46.25	-	46.75	
75	3.78	1812	91.24	46.75	-	47.25	
61	3.07	1873	94.31	47.25	-	47.75	
32	1.61	1905	95.92	47.75	-	48.25	
26	1.31	1931	97.23	48.25	-	48.75	
15	0.76	1946	97.99	48.75	-	49.25	
20	1.01	1966	98.99	49.25	-	49.75	
6	0.30	1972	99.30	49.75	-	50.25	
6	0.30	1978	99.60	50.25	-	50.75	
4	0.20	1982	99.80	50.75	-	51.25	
0	0.00	1982	99.80	51.25	-	51.75	
3	0.15	1985	99.95	51.75	-	52.25	
1	0.05	1986	100.00	52.25	-	52.75	
				52.75	-	53.25	
				53.25	-	53.75	
				53.75	-	54.25	
				54.25	-	54.75	
				54.75	-	55.25	
				55.25	-	55.75	
				55.75	-	56.25	
				56.25	-	56.75	
				56.75	-	57.25	
				57.25	-	57.75	
				57.75	-	58.25	
				58.25	-	58.75	

(82) TRAGION - TOP OF HEAD*

The vertical distance between the right tragion landmark and the horizontal plane tangent to the top of the head is measured with a beam caliper with a paddle blade. The participant sits with the head in the Frankfurt plane. For female participants with braids or cornrows, the measurement includes the styled hair.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
11.00	4.33	1ST		11.60	4.57
11.30	4.45	2ND		11.80	4.65
11.40	4.49	3RD		12.00	4.72
11.60	4.57	5TH		12.10	4.76
11.80	4.65	10TH		12.30	4.84
12.00	4.72	15TH		12.50	4.92
12.10	4.76	20TH		12.60	4.96
12.20	4.80	25TH		12.70	5.00
12.30	4.84	30TH		12.80	5.04
12.40	4.88	35TH		12.90	5.08
12.50	4.92	40TH		13.00	5.12
12.60	4.96	45TH		13.00	5.12
12.70	5.00	50TH		13.10	5.16
12.70	5.00	55TH		13.20	5.20
12.80	5.04	60TH		13.30	5.24
12.90	5.08	65TH		13.40	5.28
13.00	5.12	70TH		13.40	5.28
13.10	5.16	75TH		13.50	5.31
13.20	5.20	80TH		13.60	5.35
13.30	5.24	85TH		13.80	5.43
13.40	5.28	90TH		13.90	5.47
13.70	5.39	95TH		14.10	5.55
13.90	5.47	97TH		14.20	5.59
14.00	5.51	98TH		14.40	5.67
14.20	5.59	99TH		14.50	5.71

* This measurement is not equivalent to ANSUR for females. See text on page 44 for details.

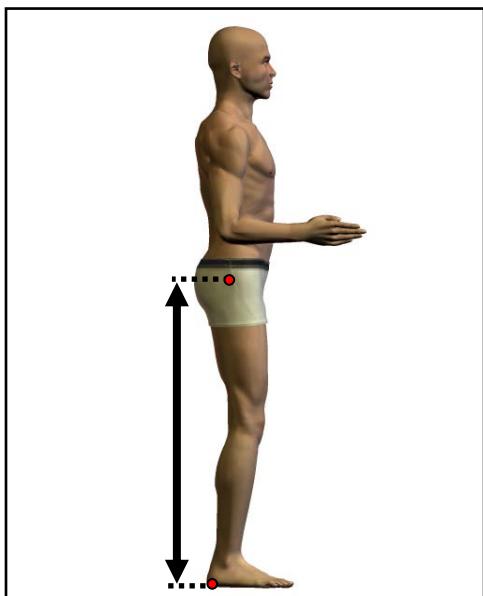
(82) TRAGION-TOP OF HEAD

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
12.65	MEAN	4.98	13.11	MEAN	5.16
0.01	STD ERROR (MEAN)	0.01	0.01	STD ERROR (MEAN)	0.00
0.65	STANDARD DEVIATION	0.26	0.62	STANDARD DEVIATION	0.24
0.01	STD ERROR (STD DEV)	0.00	0.01	STD ERROR (STD DEV)	0.00
10.50	MINIMUM	4.13	11.00	MINIMUM	4.33
14.80	MAXIMUM	5.83	15.00	MAXIMUM	5.91
SKEWNESS		-0.04	SKEWNESS		-0.10
KURTOSIS		3.17	KURTOSIS		2.98
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		4.7%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	10.45	-	10.55	
2	0.10	4	0.20	10.55	-	10.65	
3	0.15	7	0.35	10.65	-	10.75	
3	0.15	10	0.50	10.75	-	10.85	
3	0.15	13	0.65	10.85	-	10.95	
8	0.40	21	1.06	10.95	-	11.05	4
5	0.25	26	1.31	11.05	-	11.15	2
13	0.65	39	1.96	11.15	-	11.25	3
9	0.45	48	2.42	11.25	-	11.35	2
20	1.01	68	3.42	11.35	-	11.45	11
28	1.41	96	4.83	11.45	-	11.55	10
27	1.36	123	6.19	11.55	-	11.65	16
52	2.62	175	8.81	11.65	-	11.75	25
47	2.37	222	11.18	11.75	-	11.85	26
43	2.17	265	13.34	11.85	-	11.95	21
103	5.19	368	18.53	11.95	-	12.05	67
70	3.52	438	22.05	12.05	-	12.15	53
94	4.73	532	26.79	12.15	-	12.25	77
108	5.44	640	32.23	12.25	-	12.35	96
105	5.29	745	37.51	12.35	-	12.45	126
101	5.09	846	42.60	12.45	-	12.55	168
114	5.74	960	48.34	12.55	-	12.65	191
152	7.65	1112	55.99	12.65	-	12.75	254
108	5.44	1220	61.43	12.75	-	12.85	230
111	5.59	1331	67.02	12.85	-	12.95	198
147	7.40	1478	74.42	12.95	-	13.05	325
93	4.68	1571	79.10	13.05	-	13.15	227
82	4.13	1653	83.23	13.15	-	13.25	227
80	4.03	1733	87.26	13.25	-	13.35	291
63	3.17	1796	90.43	13.35	-	13.45	212
34	1.71	1830	92.15	13.45	-	13.55	240
21	1.06	1851	93.20	13.55	-	13.65	182
36	1.81	1887	95.02	13.65	-	13.75	163
28	1.41	1915	96.42	13.75	-	13.85	140
19	0.96	1934	97.38	13.85	-	13.95	108
21	1.06	1955	98.44	13.95	-	14.05	152
7	0.35	1962	98.79	14.05	-	14.15	59
7	0.35	1969	99.14	14.15	-	14.25	57
6	0.30	1975	99.45	14.25	-	14.35	35
2	0.10	1977	99.55	14.35	-	14.45	31
5	0.25	1982	99.80	14.45	-	14.55	25
2	0.10	1984	99.90	14.55	-	14.65	14
1	0.05	1985	99.95	14.65	-	14.75	6
1	0.05	1986	100.00	14.75	-	14.85	3
				14.85	-	14.95	3
				14.95	-	15.05	2

(83) TROCHANTERION HEIGHT

The vertical distance between a standing surface and the trochanterion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
74.50	29.33	1ST	79.50	31.30	
75.70	29.80	2ND	80.50	31.69	
76.40	30.08	3RD	81.40	32.05	
77.40	30.47	5TH	82.40	32.44	
79.00	31.10	10TH	84.00	33.07	
79.90	31.46	15TH	85.00	33.46	
80.80	31.81	20TH	85.90	33.82	
81.60	32.13	25TH	86.70	34.13	
82.20	32.36	30TH	87.40	34.41	
82.80	32.60	35TH	88.10	34.69	
83.30	32.80	40TH	88.70	34.92	
83.80	32.99	45TH	89.30	35.16	
84.40	33.23	50TH	89.90	35.39	
84.90	33.43	55TH	90.50	35.63	
85.50	33.66	60TH	91.10	35.87	
86.20	33.94	65TH	91.80	36.14	
86.80	34.17	70TH	92.50	36.42	
87.40	34.41	75TH	93.20	36.69	
88.30	34.76	80TH	94.10	37.05	
89.20	35.12	85TH	95.20	37.48	
90.40	35.59	90TH	96.40	37.95	
91.90	36.18	95TH	98.50	38.78	
92.80	36.54	97TH	100.10	39.41	
94.00	37.01	98TH	101.10	39.80	
95.20	37.48	99TH	102.20	40.24	

(83) TROCHANTERION HEIGHT

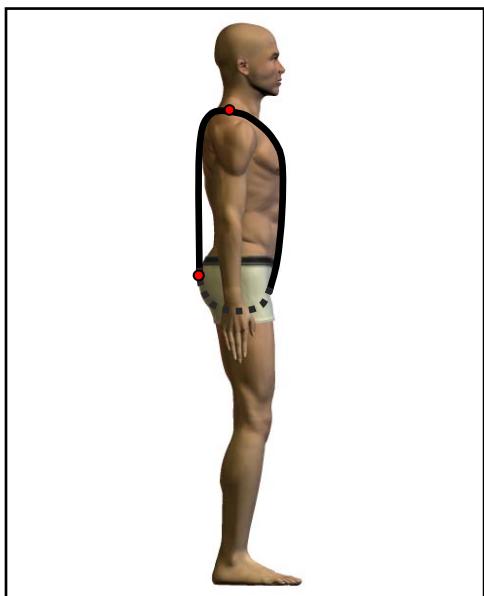
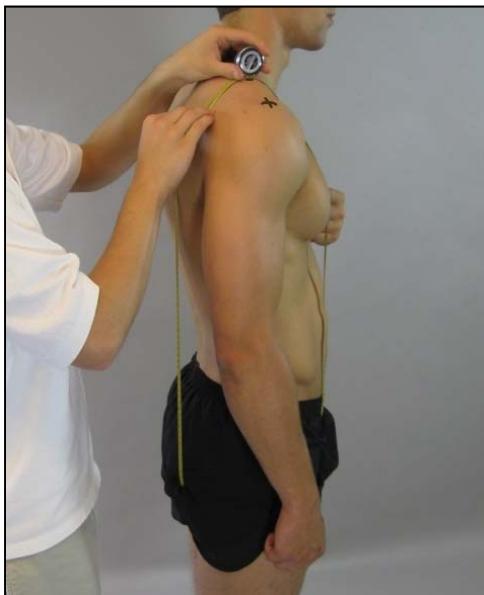
FEMALES		
<u>CM</u>		<u>IN</u>
84.54	MEAN	33.28
0.10	STD ERROR (MEAN)	0.04
4.47	STANDARD DEVIATION	1.76
0.07	STD ERROR (STD DEV)	0.03
66.00	MINIMUM	25.98
101.80	MAXIMUM	40.08
SKEWNESS		0.08
KURTOSIS		3.27
COEFFICIENT OF VARIATION		5.3%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
90.09	MEAN	35.47
0.08	STD ERROR (MEAN)	0.03
4.92	STANDARD DEVIATION	1.94
0.05	STD ERROR (STD DEV)	0.02
73.10	MINIMUM	28.78
109.50	MAXIMUM	43.11
SKEWNESS		0.24
KURTOSIS		3.17
COEFFICIENT OF VARIATION		5.5%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
1	0.05	1	0.05	65.55	- 66.55		
0	0.00	1	0.05	66.55	- 67.55		
1	0.05	2	0.10	67.55	- 68.55		
0	0.00	2	0.10	68.55	- 69.55		
2	0.10	4	0.20	69.55	- 70.55		
2	0.10	6	0.30	70.55	- 71.55		
2	0.10	8	0.40	71.55	- 72.55		
6	0.30	14	0.70	72.55	- 73.55	1	0.02
6	0.30	20	1.01	73.55	- 74.55	2	0.05
15	0.76	35	1.76	74.55	- 75.55	3	0.07
26	1.31	61	3.07	75.55	- 76.55	0	0.00
46	2.32	107	5.39	76.55	- 77.55	4	0.10
54	2.72	161	8.11	77.55	- 78.55	13	0.32
96	4.83	257	12.94	78.55	- 79.55	21	0.51
113	5.69	370	18.63	79.55	- 80.55	38	0.93
122	6.14	492	24.77	80.55	- 81.55	52	1.27
169	8.51	661	33.28	81.55	- 82.55	89	2.18
181	9.11	842	42.40	82.55	- 83.55	111	2.72
188	9.47	1030	51.86	83.55	- 84.55	166	4.07
172	8.66	1202	60.52	84.55	- 85.55	233	5.71
150	7.55	1352	68.08	85.55	- 86.55	240	5.88
148	7.45	1500	75.53	86.55	- 87.55	297	7.28
112	5.64	1612	81.17	87.55	- 88.55	296	7.25
103	5.19	1715	86.35	88.55	- 89.55	351	8.60
78	3.93	1793	90.28	89.55	- 90.55	336	8.23
76	3.83	1869	94.11	90.55	- 91.55	329	8.06
50	2.52	1919	96.63	91.55	- 92.55	292	7.15
19	0.96	1938	97.58	92.55	- 93.55	260	6.37
21	1.06	1959	98.64	93.55	- 94.55	222	5.44
11	0.55	1970	99.19	94.55	- 95.55	198	4.85
8	0.40	1978	99.60	95.55	- 96.55	136	3.33
1	0.05	1979	99.65	96.55	- 97.55	106	2.60
2	0.10	1981	99.75	97.55	- 98.55	82	2.01
3	0.15	1984	99.90	98.55	- 99.55	56	1.37
1	0.05	1985	99.95	99.55	- 100.55	47	1.15
0	0.00	1985	99.95	100.55	- 101.55	36	0.88
1	0.05	1986	100.00	101.55	- 102.55	30	0.73
				102.55	- 103.55	13	0.32
				103.55	- 104.55	6	0.15
				104.55	- 105.55	7	0.17
				105.55	- 106.55	4	0.10
				106.55	- 107.55	0	0.00
				107.55	- 108.55	3	0.07
				108.55	- 109.55	2	0.05

(84) VERTICAL TRUNK CIRCUMFERENCE (USA)

The vertical circumference of the torso is measured with a tape passing over the buttock point posterior landmark, to the right of the genitalia, midway between the sternum and the anterior axillary fold, and across the midshoulder landmark. The participant stands erect, looking straight ahead with the right arm hanging relaxed at the side. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
139.10	54.76	1ST	146.80	57.80	
141.40	55.67	2ND	148.80	58.58	
142.10	55.94	3RD	150.20	59.13	
144.00	56.69	5TH	151.90	59.80	
146.30	57.60	10TH	154.90	60.98	
148.20	58.35	15TH	157.20	61.89	
149.60	58.90	20TH	158.90	62.56	
150.80	59.37	25TH	160.50	63.19	
151.80	59.76	30TH	161.70	63.66	
152.70	60.12	35TH	162.80	64.09	
153.70	60.51	40TH	164.10	64.61	
154.50	60.83	45TH	165.30	65.08	
155.50	61.22	50TH	166.40	65.51	
156.50	61.61	55TH	167.40	65.91	
157.60	62.05	60TH	168.50	66.34	
158.70	62.48	65TH	169.60	66.77	
159.80	62.91	70TH	170.80	67.24	
161.00	63.39	75TH	172.30	67.83	
162.50	63.98	80TH	174.00	68.50	
164.20	64.65	85TH	175.90	69.25	
166.00	65.35	90TH	178.00	70.08	
168.50	66.34	95TH	181.40	71.42	
170.20	67.01	97TH	183.80	72.36	
172.40	67.87	98TH	185.40	72.99	
174.50	68.70	99TH	188.10	74.06	

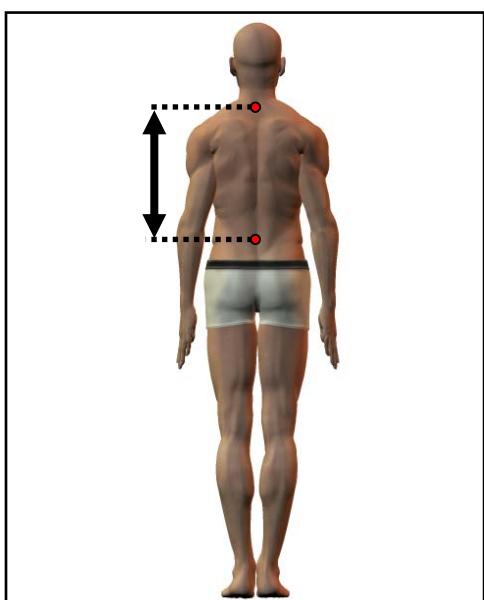
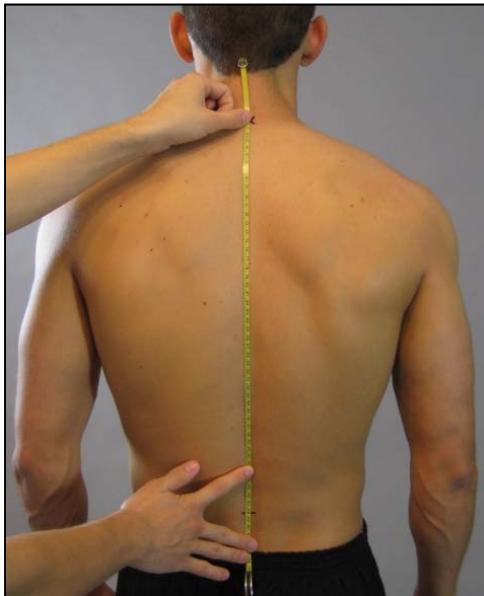
(84) VERTICAL TRUNK CIRCUMFERENCE (USA)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
155.94	STD ERROR (MEAN)	61.39	166.48	STD ERROR (MEAN)	65.54
0.17	STANDARD DEVIATION	0.07	0.14	STANDARD DEVIATION	0.06
7.60	STD ERROR (STD DEV)	2.99	8.95	STD ERROR (STD DEV)	3.52
0.12	MINIMUM	0.05	0.10	MINIMUM	0.04
134.20	MAXIMUM	52.83	136.10	MAXIMUM	53.58
182.80		71.97	199.10		78.39
SKEWNESS		0.17	SKEWNESS		0.12
KURTOSIS		2.91	KURTOSIS		3.02
COEFFICIENT OF VARIATION		4.9%	COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	133.75	-	135.25	
3	0.15	6	0.30	135.25	-	136.75	2
6	0.30	12	0.60	136.75	-	138.25	0
10	0.50	22	1.11	138.25	-	139.75	1
14	0.70	36	1.81	139.75	-	141.25	3
43	2.17	79	3.98	141.25	-	142.75	8
29	1.46	108	5.44	142.75	-	144.25	8
65	3.27	173	8.71	144.25	-	145.75	7
72	3.63	245	12.34	145.75	-	147.25	19
93	4.68	338	17.02	147.25	-	148.75	31
114	5.74	452	22.76	148.75	-	150.25	50
138	6.95	590	29.71	150.25	-	151.75	63
158	7.96	748	37.66	151.75	-	153.25	67
174	8.76	922	46.42	153.25	-	154.75	128
145	7.30	1067	53.73	154.75	-	156.25	143
137	6.90	1204	60.62	156.25	-	157.75	149
129	6.50	1333	67.12	157.75	-	159.25	179
132	6.65	1465	73.77	159.25	-	160.75	199
107	5.39	1572	79.15	160.75	-	162.25	270
88	4.43	1660	83.59	162.25	-	163.75	254
86	4.33	1746	87.92	163.75	-	165.25	243
78	3.93	1824	91.84	165.25	-	166.75	265
50	2.52	1874	94.36	166.75	-	168.25	304
40	2.01	1914	96.37	168.25	-	169.75	289
22	1.11	1936	97.48	169.75	-	171.25	249
18	0.91	1954	98.39	171.25	-	172.75	177
10	0.50	1964	98.89	172.75	-	174.25	186
13	0.65	1977	99.55	174.25	-	175.75	156
3	0.15	1980	99.70	175.75	-	177.25	152
1	0.05	1981	99.75	177.25	-	178.75	117
2	0.10	1983	99.85	178.75	-	180.25	90
2	0.10	1985	99.95	180.25	-	181.75	74
1	0.05	1986	100.00	181.75	-	183.25	56
				183.25	-	184.75	45
				184.75	-	186.25	31
				186.25	-	187.75	21
				187.75	-	189.25	18
				189.25	-	190.75	9
				190.75	-	192.25	5
				192.25	-	193.75	4
				193.75	-	195.25	4
				195.25	-	196.75	5
				196.75	-	198.25	0
				198.25	-	199.75	1

(85) WAIST BACK LENGTH (OMPHALION)*

The surface distance between the cervicale landmark and the posterior omphalion landmark is measured with a tape. The participant stands erect with the head in the Frankfurt plane. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
36.40	14.33	1ST	41.50	16.34
37.30	14.69	2ND	42.30	16.65
37.70	14.84	3RD	42.70	16.81
38.40	15.12	5TH	43.30	17.05
39.40	15.51	10TH	44.30	17.44
39.90	15.71	15TH	45.00	17.72
40.40	15.91	20TH	45.50	17.91
40.70	16.02	25TH	45.90	18.07
41.10	16.18	30TH	46.30	18.23
41.50	16.34	35TH	46.60	18.35
41.80	16.46	40TH	47.00	18.50
42.00	16.54	45TH	47.40	18.66
42.40	16.69	50TH	47.70	18.78
42.80	16.85	55TH	48.00	18.90
43.10	16.97	60TH	48.30	19.02
43.50	17.13	65TH	48.70	19.17
43.90	17.28	70TH	49.10	19.33
44.20	17.40	75TH	49.50	19.49
44.70	17.60	80TH	50.00	19.69
45.20	17.80	85TH	50.60	19.92
46.00	18.11	90TH	51.30	20.20
47.00	18.50	95TH	52.40	20.63
47.80	18.82	97TH	53.00	20.87
48.20	18.98	98TH	53.80	21.18
49.50	19.49	99TH	54.90	21.61

* In ANSUR cervicale was defined as the highest point on the seventh cervical vertebra. For consistency with international standards, it is now the most prominent point on the seventh cervical vertebra.

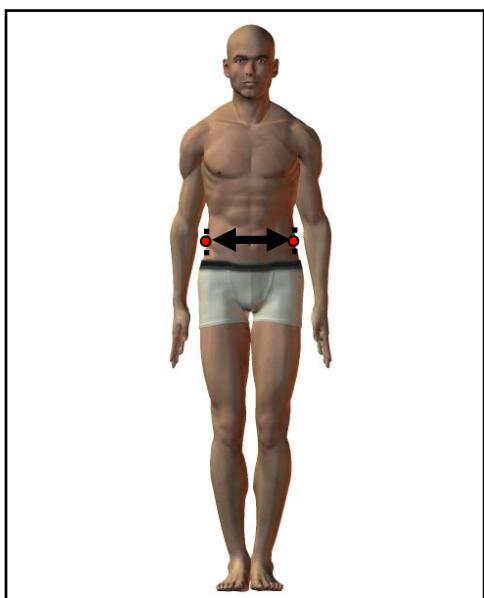
(85) WAIST BACK LENGTH (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
42.54	STD ERROR (MEAN)	16.75	47.76	STD ERROR (MEAN)	18.80
0.06	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.64	STD ERROR (STD DEV)	1.04	2.77	STD ERROR (STD DEV)	1.09
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
34.50	MAXIMUM	13.58	38.30	MAXIMUM	15.08
53.20		20.94	59.80		23.54
SKEWNESS		0.25	SKEWNESS		0.18
KURTOSIS		3.33	KURTOSIS		3.28
COEFFICIENT OF VARIATION		6.2%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	34.25	-	34.75	
0	0.00	1	0.05	34.75	-	35.25	
6	0.30	7	0.35	35.25	-	35.75	
11	0.55	18	0.91	35.75	-	36.25	
9	0.45	27	1.36	36.25	-	36.75	
10	0.50	37	1.86	36.75	-	37.25	
23	1.16	60	3.02	37.25	-	37.75	
27	1.36	87	4.38	37.75	-	38.25	
40	2.01	127	6.39	38.25	-	38.75	
54	2.72	181	9.11	38.75	-	39.25	
89	4.48	270	13.60	39.25	-	39.75	
106	5.34	376	18.93	39.75	-	40.25	
127	6.39	503	25.33	40.25	-	40.75	
140	7.05	643	32.38	40.75	-	41.25	
146	7.35	789	39.73	41.25	-	41.75	
162	8.16	951	47.89	41.75	-	42.25	
135	6.80	1086	54.68	42.25	-	42.75	
147	7.40	1233	62.08	42.75	-	43.25	
139	7.00	1372	69.08	43.25	-	43.75	
123	6.19	1495	75.28	43.75	-	44.25	
108	5.44	1603	80.72	44.25	-	44.75	
86	4.33	1689	85.05	44.75	-	45.25	
87	4.38	1776	89.43	45.25	-	45.75	
53	2.67	1829	92.09	45.75	-	46.25	
35	1.76	1864	93.86	46.25	-	46.75	
38	1.91	1902	95.77	46.75	-	47.25	
20	1.01	1922	96.78	47.25	-	47.75	
25	1.26	1947	98.04	47.75	-	48.25	
9	0.45	1956	98.49	48.25	-	48.75	
9	0.45	1965	98.94	48.75	-	49.25	
6	0.30	1971	99.24	49.25	-	49.75	
7	0.35	1978	99.60	49.75	-	50.25	
1	0.05	1979	99.65	50.25	-	50.75	
1	0.05	1980	99.70	50.75	-	51.25	
3	0.15	1983	99.85	51.25	-	51.75	
1	0.05	1984	99.90	51.75	-	52.25	
1	0.05	1985	99.95	52.25	-	52.75	
1	0.05	1986	100.00	52.75	-	53.25	
				53.25	-	53.75	
				53.75	-	54.25	
				54.25	-	54.75	
				54.75	-	55.25	
				55.25	-	55.75	
				55.75	-	56.25	
				56.25	-	56.75	
				56.75	-	57.25	
				57.25	-	57.75	
				57.75	-	58.25	
				58.25	-	58.75	
				58.75	-	59.25	
				59.25	-	59.75	
				59.75	-	60.25	

(86) WAIST BREADTH

The horizontal breadth of the waist at the level of omphalion is measured with a beam caliper. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN	CM	IN
23.20	9.13	1ST	25.70	10.12	
23.90	9.41	2ND	26.20	10.31	
24.30	9.57	3RD	26.60	10.47	
25.00	9.84	5TH	27.20	10.71	
26.00	10.24	10TH	28.20	11.10	
26.60	10.47	15TH	28.90	11.38	
27.20	10.71	20TH	29.50	11.61	
27.60	10.87	25TH	30.10	11.85	
28.10	11.06	30TH	30.70	12.09	
28.50	11.22	35TH	31.20	12.28	
28.90	11.38	40TH	31.60	12.44	
29.40	11.57	45TH	32.10	12.64	
29.80	11.73	50TH	32.50	12.80	
30.20	11.89	55TH	33.00	12.99	
30.60	12.05	60TH	33.50	13.19	
31.10	12.24	65TH	34.00	13.39	
31.50	12.40	70TH	34.50	13.58	
32.10	12.64	75TH	35.00	13.78	
32.70	12.87	80TH	35.60	14.02	
33.40	13.15	85TH	36.20	14.25	
34.40	13.54	90TH	37.10	14.61	
35.60	14.02	95TH	38.50	15.16	
36.70	14.45	97TH	39.50	15.55	
37.50	14.76	98TH	40.20	15.83	
38.50	15.16	99TH	41.30	16.26	

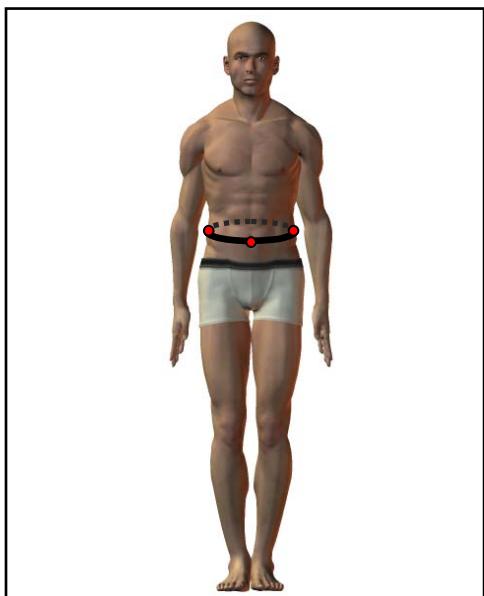
(86) WAIST BREADTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
29.99	STD ERROR (MEAN)	11.81	32.64	STD ERROR (MEAN)	12.85
0.07	STANDARD DEVIATION	0.03	0.05	STANDARD DEVIATION	0.02
3.30	STD ERROR (STD DEV)	1.30	3.47	STD ERROR (STD DEV)	1.37
0.05	MINIMUM	0.02	0.04	MINIMUM	0.02
21.10	MAXIMUM	8.31	23.20	MAXIMUM	9.13
46.10	SKEWNESS	18.15	45.90	KURTOSIS	18.07
	KURTOSIS	0.41		SKEWNESS	0.25
	COEFFICIENT OF VARIATION	3.34		KURTOSIS	2.87
	NUMBER OF PARTICIPANTS	11.0%		COEFFICIENT OF VARIATION	10.6%
		1986		NUMBER OF PARTICIPANTS	4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	20.75	-	21.25	
1	0.05	3	0.15	21.25	-	21.75	
4	0.20	7	0.35	21.75	-	22.25	
4	0.20	11	0.55	22.25	-	22.75	
10	0.50	21	1.06	22.75	-	23.25	1
10	0.50	31	1.56	23.25	-	23.75	1
25	1.26	56	2.82	23.75	-	24.25	5
19	0.96	75	3.78	24.25	-	24.75	4
42	2.11	117	5.89	24.75	-	25.25	17
58	2.92	175	8.81	25.25	-	25.75	14
65	3.27	240	12.08	25.75	-	26.25	45
73	3.68	313	15.76	26.25	-	26.75	57
91	4.58	404	20.34	26.75	-	27.25	73
121	6.09	525	26.44	27.25	-	27.75	98
97	4.88	622	31.32	27.75	-	28.25	118
121	6.09	743	37.41	28.25	-	28.75	122
133	6.70	876	44.11	28.75	-	29.25	155
107	5.39	983	49.50	29.25	-	29.75	201
125	6.29	1108	55.79	29.75	-	30.25	167
113	5.69	1221	61.48	30.25	-	30.75	174
110	5.54	1331	67.02	30.75	-	31.25	222
101	5.09	1432	72.10	31.25	-	31.75	220
82	4.13	1514	76.23	31.75	-	32.25	215
88	4.43	1602	80.66	32.25	-	32.75	231
67	3.37	1669	84.04	32.75	-	33.25	218
59	2.97	1728	87.01	33.25	-	33.75	198
43	2.17	1771	89.17	33.75	-	34.25	203
46	2.32	1817	91.49	34.25	-	34.75	214
47	2.37	1864	93.86	34.75	-	35.25	172
26	1.31	1890	95.17	35.25	-	35.75	177
24	1.21	1914	96.37	35.75	-	36.25	155
14	0.70	1928	97.08	36.25	-	36.75	129
11	0.55	1939	97.63	36.75	-	37.25	97
11	0.55	1950	98.19	37.25	-	37.75	75
10	0.50	1960	98.69	37.75	-	38.25	78
11	0.55	1971	99.24	38.25	-	38.75	50
3	0.15	1974	99.40	38.75	-	39.25	33
4	0.20	1978	99.60	39.25	-	39.75	34
2	0.10	1980	99.70	39.75	-	40.25	33
2	0.10	1982	99.80	40.25	-	40.75	18
1	0.05	1983	99.85	40.75	-	41.25	15
1	0.05	1984	99.90	41.25	-	41.75	15
0	0.00	1984	99.90	41.75	-	42.25	7
0	0.00	1984	99.90	42.25	-	42.75	2
0	0.00	1984	99.90	42.75	-	43.25	8
0	0.00	1984	99.90	43.25	-	43.75	3
1	0.05	1985	99.95	43.75	-	44.25	2
0	0.00	1985	99.95	44.25	-	44.75	4
0	0.00	1985	99.95	44.75	-	45.25	1
0	0.00	1985	99.95	45.25	-	45.75	0
1	0.05	1986	100.00	45.75	-	46.25	1

(87) WAIST CIRCUMFERENCE (OMPHALION)

The horizontal circumference of the waist, passing over all omphalion landmarks, is measured with a tape. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
66.50	26.18	1ST	72.40	28.50	
68.00	26.77	2ND	74.00	29.13	
69.60	27.40	3RD	75.20	29.61	
71.00	27.95	5TH	76.80	30.24	
73.90	29.09	10TH	79.70	31.38	
76.00	29.92	15TH	82.00	32.28	
77.70	30.59	20TH	83.80	32.99	
79.00	31.10	25TH	85.70	33.74	
80.30	31.61	30TH	87.50	34.45	
81.40	32.05	35TH	89.10	35.08	
82.70	32.56	40TH	90.70	35.71	
84.00	33.07	45TH	92.00	36.22	
85.20	33.54	50TH	93.70	36.89	
86.50	34.06	55TH	95.20	37.48	
87.80	34.57	60TH	96.70	38.07	
89.50	35.24	65TH	98.30	38.70	
90.70	35.71	70TH	100.00	39.37	
92.50	36.42	75TH	101.60	40.00	
94.30	37.13	80TH	103.50	40.75	
96.40	37.95	85TH	106.00	41.73	
99.50	39.17	90TH	108.60	42.76	
104.00	40.94	95TH	113.10	44.53	
106.90	42.09	97TH	115.70	45.55	
109.00	42.91	98TH	117.90	46.42	
112.10	44.13	99TH	121.40	47.80	

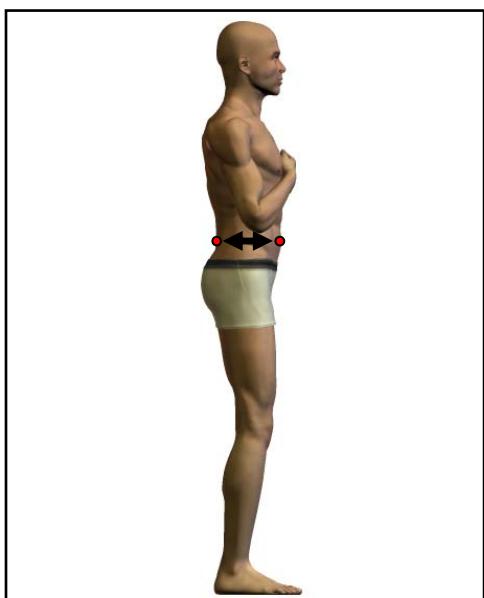
(87) WAIST CIRCUMFERENCE (OMPHALION)

FEMALES			MALES		
CM	MEAN	IN	CM	MEAN	IN
86.09		33.89	94.06		37.03
0.22	STD ERROR (MEAN)	0.09	0.17	STD ERROR (MEAN)	0.07
9.99	STANDARD DEVIATION	3.93	11.17	STANDARD DEVIATION	4.40
0.16	STD ERROR (STD DEV)	0.06	0.12	STD ERROR (STD DEV)	0.05
61.10	MINIMUM	24.06	64.80	MINIMUM	25.51
133.40	MAXIMUM	52.52	137.90	MAXIMUM	54.29
SKEWNESS		0.47	SKEWNESS		0.30
KURTOSIS		3.28	KURTOSIS		2.86
COEFFICIENT OF VARIATION		11.6%	COEFFICIENT OF VARIATION		11.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
3	0.15	3	0.15	60.75	-	62.25	
4	0.20	7	0.35	62.25	-	63.75	
5	0.25	12	0.60	63.75	-	65.25	
10	0.50	22	1.11	65.25	-	66.75	
22	1.11	44	2.22	66.75	-	68.25	
18	0.91	62	3.12	68.25	-	69.75	
43	2.17	105	5.29	69.75	-	71.25	
47	2.37	152	7.65	71.25	-	72.75	
64	3.22	216	10.88	72.75	-	74.25	
69	3.47	285	14.35	74.25	-	75.75	
91	4.58	376	18.93	75.75	-	77.25	
105	5.29	481	24.22	77.25	-	78.75	
113	5.69	594	29.91	78.75	-	80.25	
131	6.60	725	36.51	80.25	-	81.75	
115	5.79	840	42.30	81.75	-	83.25	
117	5.89	957	48.19	83.25	-	84.75	
118	5.94	1075	54.13	84.75	-	86.25	
108	5.44	1183	59.57	86.25	-	87.75	
100	5.04	1283	64.60	87.75	-	89.25	
108	5.44	1391	70.04	89.25	-	90.75	
87	4.38	1478	74.42	90.75	-	92.25	
80	4.03	1558	78.45	92.25	-	93.75	
74	3.73	1632	82.18	93.75	-	95.25	
74	3.73	1706	85.90	95.25	-	96.75	
55	2.77	1761	88.67	96.75	-	98.25	
34	1.71	1795	90.38	98.25	-	99.75	
36	1.81	1831	92.20	99.75	-	101.25	
29	1.46	1860	93.66	101.25	-	102.75	
31	1.56	1891	95.22	102.75	-	104.25	
23	1.16	1914	96.37	104.25	-	105.75	
16	0.81	1930	97.18	105.75	-	107.25	
15	0.76	1945	97.94	107.25	-	108.75	
11	0.55	1956	98.49	108.75	-	110.25	
10	0.50	1966	98.99	110.25	-	111.75	
4	0.20	1970	99.19	111.75	-	113.25	
6	0.30	1976	99.50	113.25	-	114.75	
2	0.10	1978	99.60	114.75	-	116.25	
5	0.25	1983	99.85	116.25	-	117.75	
0	0.00	1983	99.85	117.75	-	119.25	
1	0.05	1984	99.90	119.25	-	120.75	
0	0.00	1984	99.90	120.75	-	122.25	
0	0.00	1984	99.90	122.25	-	123.75	
0	0.00	1984	99.90	123.75	-	125.25	
0	0.00	1984	99.90	125.25	-	126.75	
0	0.00	1984	99.90	126.75	-	128.25	
0	0.00	1984	99.90	128.25	-	129.75	
1	0.05	1985	99.95	129.75	-	131.25	
0	0.00	1985	99.95	131.25	-	132.75	
1	0.05	1986	100.00	132.75	-	134.25	
				134.25	-	135.75	
				135.75	-	137.25	
				137.25	-	138.75	

(88) WAIST DEPTH

The horizontal distance between the anterior and posterior omphalion landmarks is measured with a beam caliper. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES			MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
15.90	6.26	1ST	17.40	6.85	
16.30	6.42	2ND	17.90	7.05	
16.50	6.50	3RD	18.30	7.20	
16.90	6.65	5TH	18.80	7.40	
17.60	6.93	10TH	19.60	7.72	
18.20	7.17	15TH	20.20	7.95	
18.60	7.32	20TH	20.70	8.15	
19.00	7.48	25TH	21.20	8.35	
19.40	7.64	30TH	21.60	8.50	
19.80	7.80	35TH	22.10	8.70	
20.10	7.91	40TH	22.50	8.86	
20.50	8.07	45TH	22.90	9.02	
20.90	8.23	50TH	23.40	9.21	
21.30	8.39	55TH	23.90	9.41	
21.70	8.54	60TH	24.30	9.57	
22.20	8.74	65TH	24.80	9.76	
22.60	8.90	70TH	25.50	10.04	
23.20	9.13	75TH	26.10	10.28	
23.80	9.37	80TH	26.70	10.51	
24.50	9.65	85TH	27.40	10.79	
25.60	10.08	90TH	28.40	11.18	
27.10	10.67	95TH	30.00	11.81	
28.20	11.10	97TH	30.90	12.17	
28.90	11.38	98TH	31.80	12.52	
30.00	11.81	99TH	32.90	12.95	

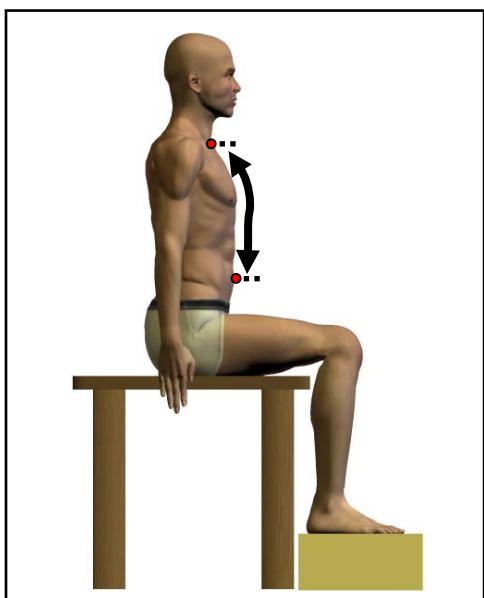
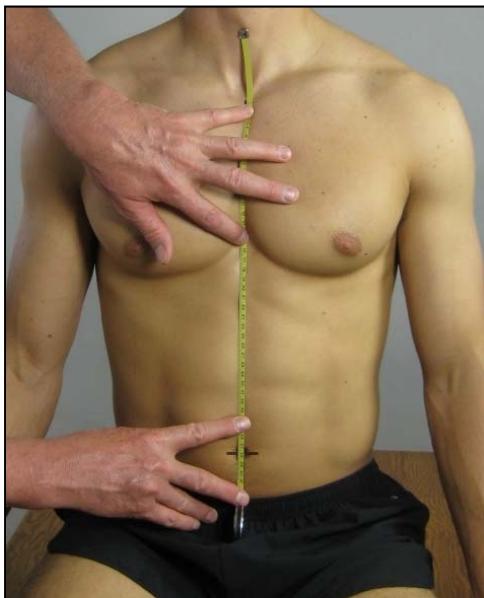
(88) WAIST DEPTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
21.30	8.39		23.78	9.36	
0.07	0.03		0.05	0.02	
3.14	1.24		3.47	1.37	
0.05	0.02		0.04	0.02	
13.80	5.43		15.10	5.94	
36.70	14.45		40.60	15.98	
SKEWNESS	0.75		SKEWNESS	0.56	
KURTOSIS	3.76		KURTOSIS	3.24	
COEFFICIENT OF VARIATION	14.7%		COEFFICIENT OF VARIATION	14.6%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	13.25	-	14.00	
3	0.15	4	0.20	14.00	-	14.75	
5	0.25	9	0.45	14.75	-	15.50	
30	1.51	39	1.96	15.50	-	16.25	
62	3.12	101	5.09	16.25	-	17.00	
117	5.89	218	10.98	17.00	-	17.75	
131	6.60	349	17.57	17.75	-	18.50	
211	10.62	560	28.20	18.50	-	19.25	
186	9.37	746	37.56	19.25	-	20.00	
218	10.98	964	48.54	20.00	-	20.75	
175	8.81	1139	57.35	20.75	-	21.50	
174	8.76	1313	66.11	21.50	-	22.25	
141	7.10	1454	73.21	22.25	-	23.00	
127	6.39	1581	79.61	23.00	-	23.75	
94	4.73	1675	84.34	23.75	-	24.50	
83	4.18	1758	88.52	24.50	-	25.25	
59	2.97	1817	91.49	25.25	-	26.00	
53	2.67	1870	94.16	26.00	-	26.75	
35	1.76	1905	95.92	26.75	-	27.50	
25	1.26	1930	97.18	27.50	-	28.25	
18	0.91	1948	98.09	28.25	-	29.00	
16	0.81	1964	98.89	29.00	-	29.75	
5	0.25	1969	99.14	29.75	-	30.50	
6	0.30	1975	99.45	30.50	-	31.25	
4	0.20	1979	99.65	31.25	-	32.00	
3	0.15	1982	99.80	32.00	-	32.75	
1	0.05	1983	99.85	32.75	-	33.50	
1	0.05	1984	99.90	33.50	-	34.25	
0	0.00	1984	99.90	34.25	-	35.00	
0	0.00	1984	99.90	35.00	-	35.75	
1	0.05	1985	99.95	35.75	-	36.50	
1	0.05	1986	100.00	36.50	-	37.25	
				37.25	-	38.00	
				38.00	-	38.75	
				38.75	-	39.50	
				39.50	-	40.25	
				40.25	-	41.00	

(89) WAIST FRONT LENGTH, SITTING

The surface distance between the suprasternale landmark and the anterior omphalion landmark is measured with a tape. The participant is in the anthropometric sitting position with the head in the Frankfurt plane and the arms relaxed at the sides. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
CM	IN	1ST	CM	IN	
30.40	11.97	1ST	32.40	12.76	
31.00	12.20	2ND	33.10	13.03	
31.30	12.32	3RD	33.50	13.19	
31.70	12.48	5TH	34.20	13.46	
32.50	12.80	10TH	35.10	13.82	
33.00	12.99	15TH	35.70	14.06	
33.40	13.15	20TH	36.30	14.29	
33.80	13.31	25TH	36.70	14.45	
34.20	13.46	30TH	37.20	14.65	
34.50	13.58	35TH	37.50	14.76	
34.80	13.70	40TH	37.90	14.92	
35.20	13.86	45TH	38.30	15.08	
35.50	13.98	50TH	38.60	15.20	
35.70	14.06	55TH	39.00	15.35	
36.10	14.21	60TH	39.40	15.51	
36.40	14.33	65TH	39.80	15.67	
36.70	14.45	70TH	40.20	15.83	
37.00	14.57	75TH	40.70	16.02	
37.50	14.76	80TH	41.20	16.22	
38.00	14.96	85TH	41.80	16.46	
38.70	15.24	90TH	42.70	16.81	
39.60	15.59	95TH	43.80	17.24	
40.20	15.83	97TH	44.60	17.56	
40.60	15.98	98TH	45.10	17.76	
41.30	16.26	99TH	46.00	18.11	

(89) WAIST FRONT LENGTH, SITTING

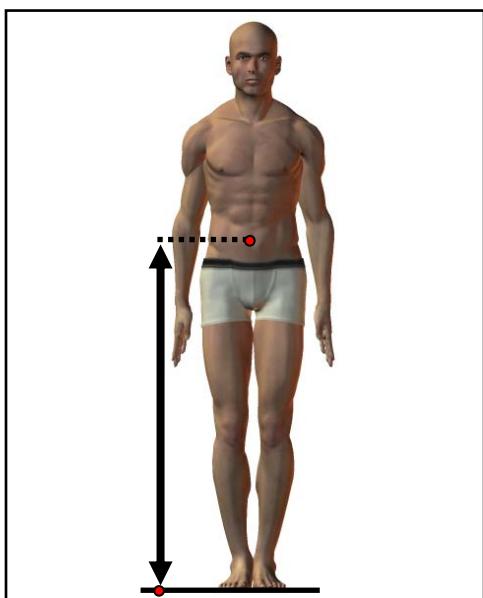
FEMALES		
<u>CM</u>		<u>IN</u>
35.51	MEAN	13.98
0.05	STD ERROR (MEAN)	0.02
2.39	STANDARD DEVIATION	0.94
0.04	STD ERROR (STD DEV)	0.01
28.90	MINIMUM	11.38
43.20	MAXIMUM	17.01
SKEWNESS		0.19
KURTOSIS		2.84
COEFFICIENT OF VARIATION		6.7%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
38.76	MEAN	15.26
0.05	STD ERROR (MEAN)	0.02
2.93	STANDARD DEVIATION	1.16
0.03	STD ERROR (STD DEV)	0.01
29.30	MINIMUM	11.54
49.40	MAXIMUM	19.45
SKEWNESS		0.20
KURTOSIS		2.97
COEFFICIENT OF VARIATION		7.6%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
2	0.10	2	0.10	28.75	-	29.25	
6	0.30	8	0.40	29.25	-	29.75	2
8	0.40	16	0.81	29.75	-	30.25	3
15	0.76	31	1.56	30.25	-	30.75	3
24	1.21	55	2.77	30.75	-	31.25	6
47	2.37	102	5.14	31.25	-	31.75	11
66	3.32	168	8.46	31.75	-	32.25	8
77	3.88	245	12.34	32.25	-	32.75	29
117	5.89	362	18.23	32.75	-	33.25	30
129	6.50	491	24.72	33.25	-	33.75	64
120	6.04	611	30.77	33.75	-	34.25	58
167	8.41	778	39.17	34.25	-	34.75	123
151	7.60	929	46.78	34.75	-	35.25	103
169	8.51	1098	55.29	35.25	-	35.75	176
152	7.65	1250	62.94	35.75	-	36.25	164
162	8.16	1412	71.10	36.25	-	36.75	258
115	5.79	1527	76.89	36.75	-	37.25	247
106	5.34	1633	82.23	37.25	-	37.75	273
95	4.78	1728	87.01	37.75	-	38.25	275
65	3.27	1793	90.28	38.25	-	38.75	295
45	2.27	1838	92.55	38.75	-	39.25	233
65	3.27	1903	95.82	39.25	-	39.75	273
26	1.31	1929	97.13	39.75	-	40.25	251
23	1.16	1952	98.29	40.25	-	40.75	206
9	0.45	1961	98.74	40.75	-	41.25	190
12	0.60	1973	99.35	41.25	-	41.75	166
5	0.25	1978	99.60	41.75	-	42.25	128
6	0.30	1984	99.90	42.25	-	42.75	112
2	0.10	1986	100.00	42.75	-	43.25	93
				43.25	-	43.75	80
				43.75	-	44.25	71
				44.25	-	44.75	39
				44.75	-	45.25	36
				45.25	-	45.75	24
				45.75	-	46.25	19
				46.25	-	46.75	14
				46.75	-	47.25	12
				47.25	-	47.75	3
				47.75	-	48.25	2
				48.25	-	48.75	0
				48.75	-	49.25	0
				49.25	-	49.75	2

(90) WAIST HEIGHT (OMPHALION)

The vertical distance between a standing surface and the anterior omphalion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
86.70	34.13	1ST	94.30	37.13	
88.00	34.65	2ND	95.40	37.56	
88.90	35.00	3RD	96.20	37.87	
90.00	35.43	5TH	97.20	38.27	
91.80	36.14	10TH	99.00	38.98	
93.00	36.61	15TH	100.10	39.41	
93.90	36.97	20TH	101.20	39.84	
94.70	37.28	25TH	102.00	40.16	
95.30	37.52	30TH	102.90	40.51	
96.00	37.80	35TH	103.60	40.79	
96.60	38.03	40TH	104.30	41.06	
97.20	38.27	45TH	104.90	41.30	
97.70	38.46	50TH	105.50	41.54	
98.40	38.74	55TH	106.20	41.81	
99.10	39.02	60TH	107.00	42.13	
99.80	39.29	65TH	107.70	42.40	
100.60	39.61	70TH	108.30	42.64	
101.30	39.88	75TH	109.00	42.91	
102.20	40.24	80TH	109.90	43.27	
103.30	40.67	85TH	111.00	43.70	
104.60	41.18	90TH	112.30	44.21	
106.40	41.89	95TH	114.50	45.08	
107.40	42.28	97TH	115.50	45.47	
108.40	42.68	98TH	116.90	46.02	
110.10	43.35	99TH	118.60	46.69	

(90) WAIST HEIGHT (OMPHALION)

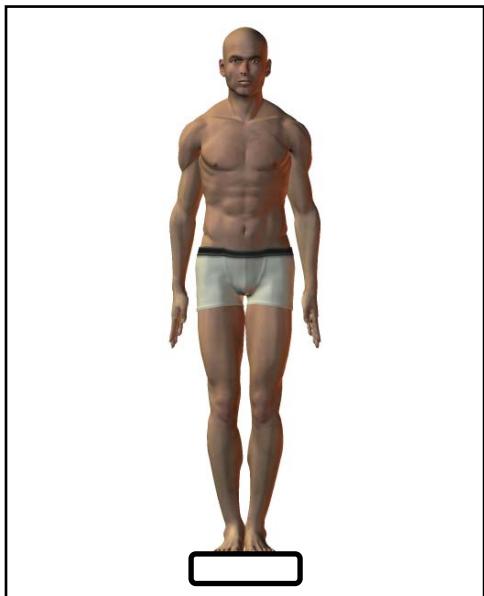
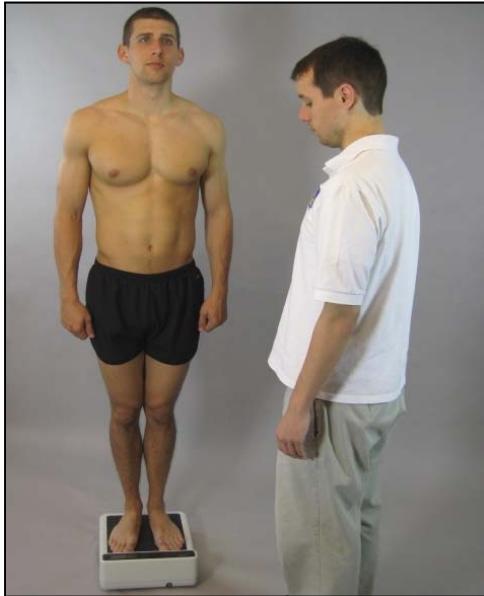
FEMALES		
<u>CM</u>		<u>IN</u>
98.01	MEAN	38.59
0.11	STD ERROR (MEAN)	0.04
5.00	STANDARD DEVIATION	1.97
0.08	STD ERROR (STD DEV)	0.03
80.50	MINIMUM	31.69
114.20	MAXIMUM	44.96
SKEWNESS		0.08
KURTOSIS		3.07
COEFFICIENT OF VARIATION		5.1%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
105.65	MEAN	41.59
0.08	STD ERROR (MEAN)	0.03
5.22	STANDARD DEVIATION	2.05
0.06	STD ERROR (STD DEV)	0.02
87.60	MINIMUM	34.49
124.50	MAXIMUM	49.02
SKEWNESS		0.12
KURTOSIS		3.03
COEFFICIENT OF VARIATION		4.9%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		F	FPct
2	0.10	2	0.10	79.55	- 80.55		
1	0.05	3	0.15	80.55	- 81.55		
1	0.05	4	0.20	81.55	- 82.55		
1	0.05	5	0.25	82.55	- 83.55		
3	0.15	8	0.40	83.55	- 84.55		
1	0.05	9	0.45	84.55	- 85.55		
9	0.45	18	0.91	85.55	- 86.55		
12	0.60	30	1.51	86.55	- 87.55		
24	1.21	54	2.72	87.55	- 88.55	2	0.05
22	1.11	76	3.83	88.55	- 89.55	1	0.02
51	2.57	127	6.39	89.55	- 90.55	1	0.02
54	2.72	181	9.11	90.55	- 91.55	3	0.07
73	3.68	254	12.79	91.55	- 92.55	11	0.27
102	5.14	356	17.93	92.55	- 93.55	11	0.27
122	6.14	478	24.07	93.55	- 94.55	17	0.42
158	7.96	636	32.02	94.55	- 95.55	40	0.98
153	7.70	789	39.73	95.55	- 96.55	68	1.67
169	8.51	958	48.24	96.55	- 97.55	84	2.06
151	7.60	1109	55.84	97.55	- 98.55	102	2.50
146	7.35	1255	63.19	98.55	- 99.55	162	3.97
132	6.65	1387	69.84	99.55	- 100.55	187	4.58
135	6.80	1522	76.64	100.55	- 101.55	203	4.97
98	4.93	1620	81.57	101.55	- 102.55	249	6.10
95	4.78	1715	86.35	102.55	- 103.55	275	6.74
67	3.37	1782	89.73	103.55	- 104.55	307	7.52
56	2.82	1838	92.55	104.55	- 105.55	335	8.21
56	2.82	1894	95.37	105.55	- 106.55	279	6.83
38	1.91	1932	97.28	106.55	- 107.55	280	6.86
16	0.81	1948	98.09	107.55	- 108.55	318	7.79
13	0.65	1961	98.74	108.55	- 109.55	240	5.88
8	0.40	1969	99.14	109.55	- 110.55	211	5.17
7	0.35	1976	99.50	110.55	- 111.55	185	4.53
5	0.25	1981	99.75	111.55	- 112.55	131	3.21
4	0.20	1985	99.95	112.55	- 113.55	117	2.87
1	0.05	1986	100.00	113.55	- 114.55	66	1.62
				114.55	- 115.55	76	1.86
				115.55	- 116.55	28	0.69
				116.55	- 117.55	31	0.76
				117.55	- 118.55	19	0.47
				118.55	- 119.55	14	0.34
				119.55	- 120.55	19	0.47
				120.55	- 121.55	3	0.07
				121.55	- 122.55	1	0.02
				122.55	- 123.25	4	0.10
				123.25	- 124.25	1	0.02
				124.25	- 125.25	1	0.02

(91) WEIGHT

The weight of the participant is taken to the nearest tenth of a kilogram. The participant stands on the platform of a scale with the weight distributed evenly on both feet.



PERCENTILES				
FEMALES		MALES		
<u>KG</u>	<u>LB</u>		<u>KG</u>	<u>LB</u>
46.40	102.29	1ST	57.80	127.43
48.00	105.82	2ND	60.00	132.28
49.90	110.01	3RD	61.90	136.46
51.30	113.10	5TH	64.40	141.98
54.60	120.37	10TH	68.20	150.35
56.70	125.00	15TH	70.80	156.09
58.50	128.97	20TH	73.40	161.82
60.10	132.50	25TH	75.60	166.67
61.60	135.80	30TH	77.40	170.64
63.10	139.11	35TH	79.20	174.60
64.50	142.20	40TH	81.00	178.57
65.70	144.84	45TH	82.80	182.54
66.80	147.27	50TH	84.60	186.51
68.00	149.91	55TH	86.40	190.48
69.50	153.22	60TH	88.00	194.00
70.80	156.09	65TH	89.80	197.97
72.60	160.05	70TH	92.00	202.82
74.60	164.46	75TH	94.40	208.11
76.40	168.43	80TH	96.60	212.96
78.90	173.94	85TH	100.00	220.46
82.40	181.66	90TH	104.40	230.16
87.10	192.02	95TH	110.70	244.05
91.40	201.50	97TH	115.10	253.75
93.40	205.91	98TH	118.90	262.13
98.30	216.71	99TH	124.70	274.91

(91) WEIGHT

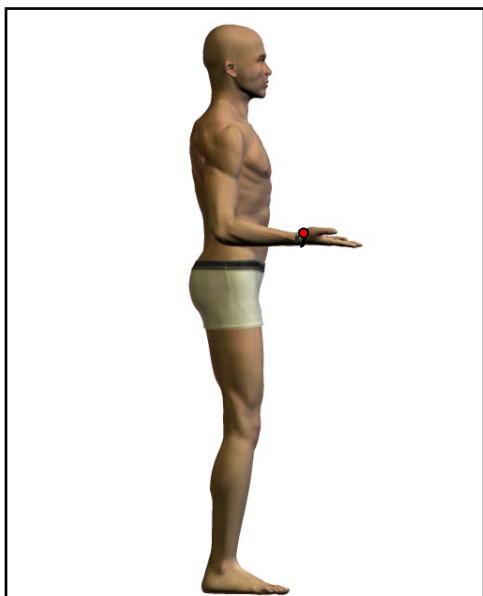
FEMALES		
<u>KG</u>		<u>LB</u>
67.76	MEAN	149.38
0.25	STD ERROR (MEAN)	0.54
10.98	STANDARD DEVIATION	24.22
0.17	STD ERROR (STD DEV)	0.38
35.80	MINIMUM	78.92
119.60	MAXIMUM	263.67
SKEWNESS		0.56
KURTOSIS		3.67
COEFFICIENT OF VARIATION		16.2%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>KG</u>		<u>LB</u>
85.52	MEAN	188.55
0.22	STD ERROR (MEAN)	0.49
14.22	STANDARD DEVIATION	31.35
0.16	STD ERROR (STD DEV)	0.35
39.30	MINIMUM	86.64
144.20	MAXIMUM	317.90
SKEWNESS		0.48
KURTOSIS		3.36
COEFFICIENT OF VARIATION		16.6%
NUMBER OF PARTICIPANTS		4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	KG	F	FPct	CumF
1	0.05	1	0.05	34.75	-	37.00	
0	0.00	1	0.05	37.00	-	39.25	
1	0.05	2	0.10	39.25	-	41.50	1
7	0.35	9	0.45	41.50	-	43.75	0
7	0.35	16	0.81	43.75	-	46.00	1
25	1.26	41	2.06	46.00	-	48.25	2
37	1.86	78	3.93	48.25	-	50.50	0
64	3.22	142	7.15	50.50	-	52.75	2
78	3.93	220	11.08	52.75	-	55.00	10
100	5.04	320	16.11	55.00	-	57.25	20
141	7.10	461	23.21	57.25	-	59.50	34
150	7.55	611	30.77	59.50	-	61.75	48
136	6.85	747	37.61	61.75	-	64.00	74
196	9.87	943	47.48	64.00	-	66.25	104
175	8.81	1118	56.29	66.25	-	68.50	133
168	8.46	1286	64.75	68.50	-	70.75	175
123	6.19	1409	70.95	70.75	-	73.00	179
119	5.99	1528	76.94	73.00	-	75.25	207
109	5.49	1637	82.43	75.25	-	77.50	235
86	4.33	1723	86.76	77.50	-	79.75	269
49	2.47	1772	89.22	79.75	-	82.00	251
67	3.37	1839	92.60	82.00	-	84.25	256
40	2.01	1879	94.61	84.25	-	86.50	252
26	1.31	1905	95.92	86.50	-	88.75	286
20	1.01	1925	96.93	88.75	-	91.00	225
19	0.96	1944	97.89	91.00	-	93.25	199
15	0.76	1959	98.64	93.25	-	95.50	194
7	0.35	1966	98.99	95.50	-	97.75	190
8	0.40	1974	99.40	97.75	-	100.00	122
3	0.15	1977	99.55	100.00	-	102.25	124
1	0.05	1978	99.60	102.25	-	104.50	81
2	0.10	1980	99.70	104.50	-	106.75	90
3	0.15	1983	99.85	106.75	-	109.00	63
0	0.00	1983	99.85	109.00	-	111.25	65
1	0.05	1984	99.90	111.25	-	113.50	41
0	0.00	1984	99.90	113.50	-	115.75	32
1	0.05	1985	99.95	115.75	-	118.00	26
1	0.05	1986	100.00	118.00	-	120.25	24
				120.25	-	122.50	18
				122.50	-	124.75	9
				124.75	-	127.00	13
				127.00	-	129.25	7
				129.25	-	131.50	5
				131.50	-	133.75	4
				133.75	-	136.00	4
				136.00	-	138.25	3
				138.25	-	140.50	1
				140.50	-	142.75	1
				142.75	-	145.00	2

(92) WRIST CIRCUMFERENCE

The circumference of the wrist, perpendicular to the long axis of the forearm, is measured with a tape passing over the stylion landmark. The participant extends the right arm forward with the palm up.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
13.80	5.43	1ST	15.60	6.14	
14.00	5.51	2ND	15.80	6.22	
14.10	5.55	3RD	16.00	6.30	
14.20	5.59	5TH	16.20	6.38	
14.50	5.71	10TH	16.50	6.50	
14.70	5.79	15TH	16.70	6.57	
14.80	5.83	20TH	16.80	6.61	
15.00	5.91	25TH	17.00	6.69	
15.00	5.91	30TH	17.10	6.73	
15.20	5.98	35TH	17.20	6.77	
15.30	6.02	40TH	17.40	6.85	
15.30	6.02	45TH	17.50	6.89	
15.40	6.06	50TH	17.60	6.93	
15.50	6.10	55TH	17.70	6.97	
15.60	6.14	60TH	17.80	7.01	
15.70	6.18	65TH	17.90	7.05	
15.90	6.26	70TH	18.00	7.09	
16.00	6.30	75TH	18.20	7.17	
16.20	6.38	80TH	18.30	7.20	
16.30	6.42	85TH	18.50	7.28	
16.50	6.50	90TH	18.70	7.36	
16.80	6.61	95TH	19.10	7.52	
17.00	6.69	97TH	19.40	7.64	
17.20	6.77	98TH	19.60	7.72	
17.40	6.85	99TH	19.80	7.80	

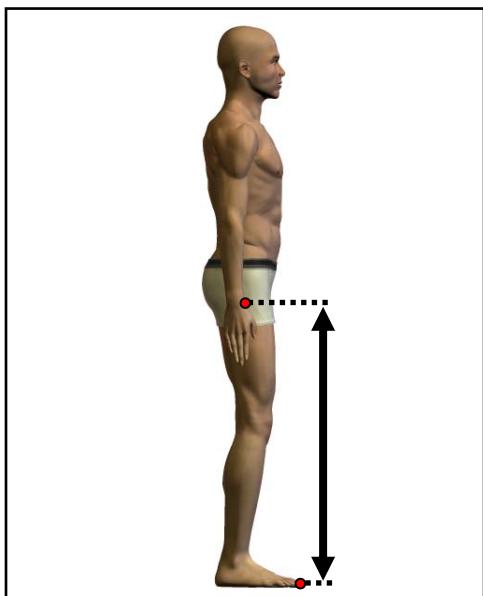
(92) WRIST CIRCUMFERENCE

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
15.48	6.09		17.59	6.93	
0.02	0.01		0.01	0.01	
0.78	0.31		0.90	0.35	
0.01	0.00		0.01	0.00	
12.40	4.88		14.10	5.55	
18.30	7.20		21.60	8.50	
SKEWNESS	0.25		SKEWNESS	0.19	
KURTOSIS	3.21		KURTOSIS	3.34	
COEFFICIENT OF VARIATION	5.1%		COEFFICIENT OF VARIATION	5.1%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCY TABLE					
FEMALES			MALES		
F	FPct	CumF	CumFPct	CM	F
1	0.05	1	0.05	12.35	- 12.55
0	0.00	1	0.05	12.55	- 12.75
0	0.00	1	0.05	12.75	- 12.95
0	0.00	1	0.05	12.95	- 13.15
1	0.05	2	0.10	13.15	- 13.35
7	0.35	9	0.45	13.35	- 13.55
7	0.35	16	0.81	13.55	- 13.75
17	0.86	33	1.66	13.75	- 13.95
32	1.61	65	3.27	13.95	- 14.15
64	3.22	129	6.50	14.15	- 14.35
91	4.58	220	11.08	14.35	- 14.55
135	6.80	355	17.88	14.55	- 14.75
122	6.14	477	24.02	14.75	- 14.95
201	10.12	678	34.14	14.95	- 15.15
224	11.28	902	45.42	15.15	- 15.35
232	11.68	1134	57.10	15.35	- 15.55
161	8.11	1295	65.21	15.55	- 15.75
153	7.70	1448	72.91	15.75	- 15.95
138	6.95	1586	79.86	15.95	- 16.15
130	6.55	1716	86.40	16.15	- 16.35
97	4.88	1813	91.29	16.35	- 16.55
60	3.02	1873	94.31	16.55	- 16.75
38	1.91	1911	96.22	16.75	- 16.95
33	1.66	1944	97.89	16.95	- 17.15
18	0.91	1962	98.79	17.15	- 17.35
7	0.35	1969	99.14	17.35	- 17.55
6	0.30	1975	99.45	17.55	- 17.75
3	0.15	1978	99.60	17.75	- 17.95
4	0.20	1982	99.80	17.95	- 18.15
4	0.20	1986	100.00	18.15	- 18.35
				18.35	- 18.55
				18.55	- 18.75
				18.75	- 18.95
				18.95	- 19.15
				19.15	- 19.35
				19.35	- 19.55
				19.55	- 19.75
				19.75	- 19.95
				19.95	- 20.15
				20.15	- 20.35
				20.35	- 20.55
				20.55	- 20.75
				20.75	- 20.95
				20.95	- 21.15
				21.15	- 21.35
				21.35	- 21.55
				21.55	- 21.75

(93) WRIST HEIGHT

The vertical distance between a standing surface and the stylion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead with the heels together and the weight distributed equally on both feet. The shoulders are relaxed, and the arms are extended downwards with the elbow, wrist, and fingers held rigidly straight. The arms lightly touch the sides. The measurement is taken at the maximum point of quiet respiration.



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
71.00	27.95	1ST	75.30	29.65
71.90	28.31	2ND	76.10	29.96
72.50	28.54	3RD	77.00	30.31
73.20	28.82	5TH	78.00	30.71
74.50	29.33	10TH	79.50	31.30
75.40	29.69	15TH	80.40	31.65
76.20	30.00	20TH	81.30	32.01
76.90	30.28	25TH	81.90	32.24
77.40	30.47	30TH	82.50	32.48
77.90	30.67	35TH	83.10	32.72
78.40	30.87	40TH	83.70	32.95
78.90	31.06	45TH	84.20	33.15
79.40	31.26	50TH	84.70	33.35
79.80	31.42	55TH	85.20	33.54
80.20	31.57	60TH	85.80	33.78
80.80	31.81	65TH	86.30	33.98
81.30	32.01	70TH	86.90	34.21
81.90	32.24	75TH	87.50	34.45
82.50	32.48	80TH	88.20	34.72
83.20	32.76	85TH	89.00	35.04
84.30	33.19	90TH	90.20	35.51
86.00	33.86	95TH	91.70	36.10
86.90	34.21	97TH	92.80	36.54
87.60	34.49	98TH	93.60	36.85
88.90	35.00	99TH	94.70	37.28

(93) WRIST HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
79.42	STD ERROR (MEAN)	31.27	84.75	STD ERROR (MEAN)	33.37
0.09	STANDARD DEVIATION	0.03	0.07	STANDARD DEVIATION	0.03
3.82	STD ERROR (STD DEV)	1.50	4.17	STD ERROR (STD DEV)	1.64
0.06	MINIMUM	0.02	0.05	MINIMUM	0.02
67.20	MAXIMUM	26.46	69.50	MAXIMUM	27.36
94.10	SKEWNESS	37.05	100.90	KURTOSIS	39.72
	KURTOSIS	0.17		COEFFICIENT OF VARIATION	0.11
	COEFFICIENT OF VARIATION	3.11		NUMBER OF PARTICIPANTS	3.08
	NUMBER OF PARTICIPANTS	4.8%		NUMBER OF PARTICIPANTS	4.9%
		1986			4082

FREQUENCY TABLE							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	F	FPct	CumF
1	0.05	1	0.05	66.75	-	67.50	
0	0.00	1	0.05	67.50	-	68.25	
2	0.10	3	0.15	68.25	-	69.00	
3	0.15	6	0.30	69.00	-	69.75	
6	0.30	12	0.60	69.75	-	70.50	
14	0.70	26	1.31	70.50	-	71.25	
15	0.76	41	2.06	71.25	-	72.00	
31	1.56	72	3.63	72.00	-	72.75	
43	2.17	115	5.79	72.75	-	73.50	
57	2.87	172	8.66	73.50	-	74.25	
74	3.73	246	12.39	74.25	-	75.00	
87	4.38	333	16.77	75.00	-	75.75	
99	4.98	432	21.75	75.75	-	76.50	
118	5.94	550	27.69	76.50	-	77.25	
147	7.40	697	35.10	77.25	-	78.00	
157	7.91	854	43.00	78.00	-	78.75	
164	8.26	1018	51.26	78.75	-	79.50	
175	8.81	1193	60.07	79.50	-	80.25	
129	6.50	1322	66.57	80.25	-	81.00	
140	7.05	1462	73.62	81.00	-	81.75	
122	6.14	1584	79.76	81.75	-	82.50	
111	5.59	1695	85.35	82.50	-	83.25	
58	2.92	1753	88.27	83.25	-	84.00	
64	3.22	1817	91.49	84.00	-	84.75	
39	1.96	1856	93.45	84.75	-	85.50	
39	1.96	1895	95.42	85.50	-	86.25	
33	1.66	1928	97.08	86.25	-	87.00	
22	1.11	1950	98.19	87.00	-	87.75	
12	0.60	1962	98.79	87.75	-	88.50	
7	0.35	1969	99.14	88.50	-	89.25	
5	0.25	1974	99.40	89.25	-	90.00	
7	0.35	1981	99.75	90.00	-	90.75	
2	0.10	1983	99.85	90.75	-	91.50	
1	0.05	1984	99.90	91.50	-	92.25	
1	0.05	1985	99.95	92.25	-	93.00	
0	0.00	1985	99.95	93.00	-	93.75	
1	0.05	1986	100.00	93.75	-	94.50	
				94.50	-	95.25	
				95.25	-	96.00	
				96.00	-	96.75	
				96.75	-	97.50	
				97.50	-	98.25	
				98.25	-	99.00	
				99.00	-	99.75	
				99.75	-	100.50	
				100.50	-	101.25	

CHAPTER V

THE DERIVED DIMENSIONS

While time and cost demand a reasonable limit to the number of dimensions that can be measured in an anthropometric survey, many additional dimensions can be calculated from the measured data. Forty-one additional dimensions, concentrated in areas applicable to clothing, workspace, and analog design, were derived from the measured dimensions in this survey. These derived dimensions are intended to meet some of the more specialized needs of designers and engineers, though users should be cautioned that derived dimensions may not be as reliable as data obtained by direct measurement.

Generally, derived dimensions are calculated from directly measured dimensions, one at a time, for each individual. The summary statistics are calculated from those individual values. In some cases, particularly those involving functional reaches with different hand positions, a component dimension was not measured in this survey, but was measured previously in ANSUR. In those cases the ANSUR male and female mean values were used in the calculations of derived dimensions for each participant. For example, to calculate Index Finger Reach for males, 12.44 cm (the male ANSUR mean of Wrist-Thumtip Length) was subtracted from each male participant's measured Thumtip Reach, and 18.80 cm (the male ANSUR mean of Wrist-Index Finger Length) was added to that amount. All the ANSUR mean values used in these calculations are seen in Table 20.

TABLE 20
ANSUR Mean Values Used in Derived Dimensions
(values in cm)

Dimension	Males	Females
Hand Length	19.38	18.05
Wrist-Center of Grip Length	6.97	6.63
Wrist-Index Finger Length	18.08	16.92
Wrist-Thumtip Length	12.44	11.76
Wrist-Wall Length	68.09	61.98

This approach is sound because the ANSUR II pilot study (Paquette et al., 2009) showed that no secular change in Hand Length has occurred in the last two decades and there is no empirical evidence to suggest that current finger lengths are now different with respect to Hand Length.

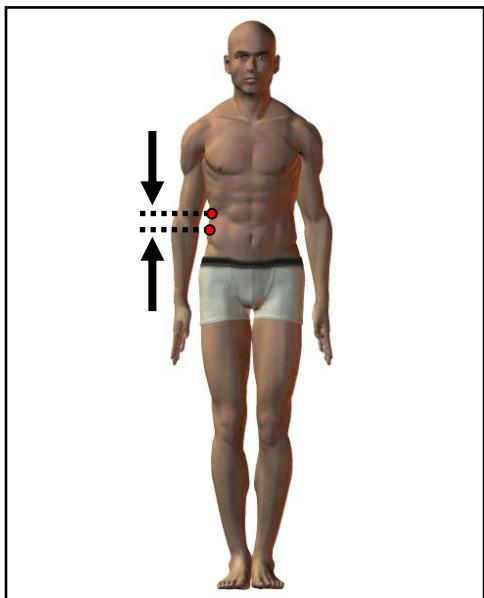
Two dimensions which were derived in ANSUR were directly measured in this survey. Forearm-Center of Grip (termed Elbow-Center of Grip in ANSUR) was measured with a modified beam caliper, as the intervening years since ANSUR had shown that it was an extremely useful dimension and thus would be better measured

than calculated. Thumtip Reach was also measured directly, this time using it as the anchor dimension from which other reaches could be calculated.

A visual index, designed to assist the reader in locating particular derived dimensions whose names may be unfamiliar, appears in Appendix D. The numbers on the visual index correspond to the derived dimension number. Completing this section are the data pages, which include brief measurement descriptions, summary statistics, and percentile and frequency tables.

(D1) ABDOMINAL LINK

The vertical distance between the tenth rib landmark and the iliocristale landmark on the right side is calculated as follows: TENTH RIB HEIGHT minus ILOCRISTALE HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
3.10	1.22	1ST	2.40	0.94	
3.40	1.34	2ND	2.80	1.10	
3.60	1.42	3RD	3.00	1.18	
3.90	1.54	5TH	3.30	1.30	
4.40	1.73	10TH	3.80	1.50	
4.70	1.85	15TH	4.10	1.61	
5.00	1.97	20TH	4.40	1.73	
5.20	2.05	25TH	4.70	1.85	
5.50	2.17	30TH	4.90	1.93	
5.60	2.20	35TH	5.10	2.01	
5.70	2.24	40TH	5.30	2.09	
5.90	2.32	45TH	5.60	2.20	
6.00	2.36	50TH	5.80	2.28	
6.20	2.44	55TH	6.00	2.36	
6.30	2.48	60TH	6.20	2.44	
6.50	2.56	65TH	6.50	2.56	
6.60	2.60	70TH	6.80	2.68	
6.80	2.68	75TH	7.10	2.80	
7.10	2.80	80TH	7.40	2.91	
7.30	2.87	85TH	7.70	3.03	
7.70	3.03	90TH	8.20	3.23	
8.20	3.23	95TH	8.90	3.50	
8.70	3.43	97TH	9.40	3.70	
9.00	3.54	98TH	9.70	3.82	
9.60	3.78	99TH	10.30	4.06	

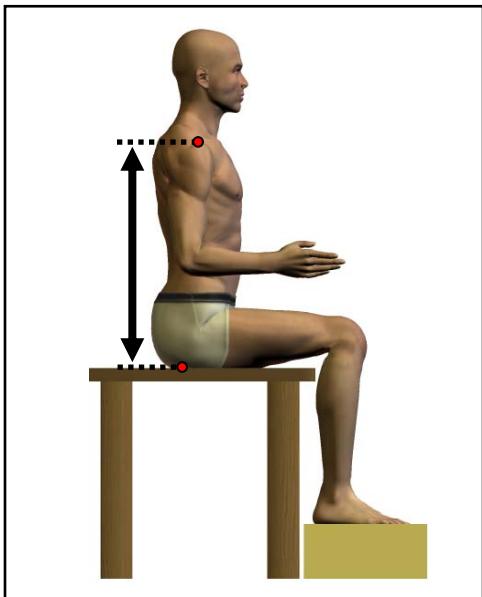
(D1) ABDOMINAL LINK

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
6.05	MEAN	2.38	5.90	MEAN	2.32
0.03	STD. ERROR (MEAN)	0.01	0.03	STD. ERROR (MEAN)	0.01
1.32	STANDARD DEVIATION	0.52	1.71	STANDARD DEVIATION	0.68
0.02	STD. ERROR (STD.DEV)	0.01	0.02	STD. ERROR (STD.DEV)	0.01
0.00	MINIMUM	0.00	1.30	MINIMUM	0.51
12.00	MAXIMUM	4.72	12.40	MAXIMUM	4.88
SKEWNESS		0.16	SKEWNESS		0.34
KURTOSIS		3.76	KURTOSIS		2.92
COEFFICIENT OF VARIATION		21.8%	COEFFICIENT OF VARIATION		29.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	-0.05	0.20
0	0.00	1	0.05	0.20	0.45
0	0.00	1	0.05	0.45	0.70
0	0.00	1	0.05	0.70	0.95
0	0.00	1	0.05	0.95	1.20
1	0.05	2	0.10	1.20	1.45
0	0.00	2	0.10	1.45	1.70
2	0.10	4	0.20	1.70	1.95
0	0.00	4	0.20	1.95	2.20
1	0.05	5	0.25	2.20	2.45
3	0.15	8	0.40	2.45	2.70
9	0.45	17	0.86	2.70	2.95
8	0.40	25	1.26	2.95	3.20
22	1.11	47	2.37	3.20	3.45
17	0.86	64	3.22	3.45	3.70
40	2.01	104	5.24	3.70	3.95
38	1.91	142	7.15	3.95	4.20
70	3.52	212	10.67	4.20	4.45
65	3.27	277	13.95	4.45	4.70
106	5.34	383	19.28	4.70	4.95
83	4.18	466	23.46	4.95	5.20
129	6.50	595	29.96	5.20	5.45
133	6.70	728	36.66	5.45	5.70
198	9.97	926	46.63	5.70	5.95
154	7.75	1080	54.38	5.95	6.20
194	9.77	1274	64.15	6.20	6.45
129	6.50	1403	70.64	6.45	6.70
131	6.60	1534	77.24	6.70	6.95
85	4.28	1619	81.52	6.95	7.20
104	5.24	1723	86.76	7.20	7.45
52	2.62	1775	89.38	7.45	7.70
72	3.63	1847	93.00	7.70	7.95
33	1.66	1880	94.66	7.95	8.20
28	1.41	1908	96.07	8.20	8.45
15	0.76	1923	96.83	8.45	8.70
22	1.11	1945	97.94	8.70	8.95
9	0.45	1954	98.39	8.95	9.20
7	0.35	1961	98.74	9.20	9.45
6	0.30	1967	99.04	9.45	9.70
7	0.35	1974	99.40	9.70	9.95
3	0.15	1977	99.55	9.95	10.20
5	0.25	1982	99.80	10.20	10.45
2	0.10	1984	99.90	10.45	10.70
1	0.05	1985	99.95	10.70	10.95
0	0.00	1985	99.95	10.95	11.20
0	0.00	1985	99.95	11.20	11.45
0	0.00	1985	99.95	11.45	11.70
0	0.00	1985	99.95	11.70	11.95
1	0.05	1986	100.00	11.95	12.20
				12.20	12.45

(D2) ACROMIAL HEIGHT, SITTING

The vertical distance between a sitting surface and the right acromion landmark is calculated as follows: SITTING HEIGHT minus (STATURE minus ACROMIAL HEIGHT).



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
50.00	19.69	1ST	53.00	20.87
50.80	20.00	2ND	54.00	21.26
51.00	20.08	3RD	54.50	21.46
51.50	20.28	5TH	55.20	21.73
52.70	20.75	10TH	56.40	22.20
53.50	21.06	15TH	57.20	22.52
53.90	21.22	20TH	57.70	22.72
54.40	21.42	25TH	58.20	22.91
54.80	21.57	30TH	58.60	23.07
55.20	21.73	35TH	59.10	23.27
55.60	21.89	40TH	59.50	23.43
56.00	22.05	45TH	59.90	23.58
56.40	22.20	50TH	60.30	23.74
56.70	22.32	55TH	60.60	23.86
57.10	22.48	60TH	61.00	24.02
57.40	22.60	65TH	61.50	24.21
57.80	22.76	70TH	61.90	24.37
58.20	22.91	75TH	62.40	24.57
58.70	23.11	80TH	62.90	24.76
59.20	23.31	85TH	63.50	25.00
59.80	23.54	90TH	64.20	25.28
60.90	23.98	95TH	65.30	25.71
61.60	24.25	97TH	66.10	26.02
62.10	24.45	98TH	66.70	26.26
62.90	24.76	99TH	67.60	26.61

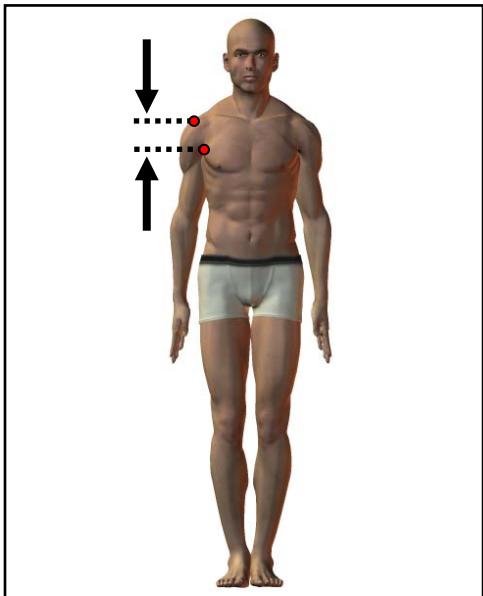
(D2) ACROMIAL HEIGHT, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
56.32	STD. ERROR (MEAN)	22.18	60.28	STD. ERROR (MEAN)	23.73
0.06	STANDARD DEVIATION	0.02	0.05	STANDARD DEVIATION	0.02
2.78	STD. ERROR (STD.DEV)	1.10	3.08	STD. ERROR (STD.DEV)	1.21
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
47.60	MAXIMUM	18.74	50.10	MAXIMUM	19.72
64.90		25.55	71.40		28.11
SKEWNESS		0.01	SKEWNESS		0.01
KURTOSIS		2.86	KURTOSIS		3.03
COEFFICIENT OF VARIATION		4.9%	COEFFICIENT OF VARIATION		5.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	47.25	-
1	0.05	2	0.10	47.75	-
2	0.10	4	0.20	48.25	-
1	0.05	5	0.25	48.75	-
11	0.55	16	0.81	49.25	-
8	0.40	24	1.21	49.75	-
15	0.76	39	1.96	50.25	-
37	1.86	76	3.83	50.75	-
34	1.71	110	5.54	51.25	-
35	1.76	145	7.30	51.75	-
59	2.97	204	10.27	52.25	-
61	3.07	265	13.34	52.75	-
88	4.43	353	17.77	53.25	-
118	5.94	471	23.72	53.75	-
110	5.54	581	29.25	54.25	-
121	6.09	702	35.35	54.75	-
122	6.14	824	41.49	55.25	-
130	6.55	954	48.04	55.75	-
146	7.35	1100	55.39	56.25	-
141	7.10	1241	62.49	56.75	-
135	6.80	1376	69.28	57.25	-
129	6.50	1505	75.78	57.75	-
96	4.83	1601	80.61	58.25	-
101	5.09	1702	85.70	58.75	-
74	3.73	1776	89.43	59.25	-
62	3.12	1838	92.55	59.75	-
35	1.76	1873	94.31	60.25	-
37	1.86	1910	96.17	60.75	-
24	1.21	1934	97.38	61.25	-
17	0.86	1951	98.24	61.75	-
13	0.65	1964	98.89	62.25	-
8	0.40	1972	99.30	62.75	-
7	0.35	1979	99.65	63.25	-
3	0.15	1982	99.80	63.75	-
3	0.15	1985	99.95	64.25	-
1	0.05	1986	100.00	64.75	-
				65.25	-
				65.75	-
				66.25	-
				66.75	-
				67.25	-
				67.75	-
				68.25	-
				68.75	-
				69.25	-
				69.75	-
				70.25	-
				70.75	-
				71.25	-
				71.75	-

(D3) ACROMION-AXILLA LENGTH

The vertical distance between the acromion right landmark and the anterior-scye-on-the-torso landmark of a participant standing erect with the arms relaxed at the sides is calculated as follows: ACROMIAL HEIGHT minus AXILLA HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
7.10	2.80	1ST	8.50	3.35	
7.50	2.95	2ND	8.80	3.46	
7.70	3.03	3RD	9.00	3.54	
7.80	3.07	5TH	9.20	3.62	
8.20	3.23	10TH	9.70	3.82	
8.50	3.35	15TH	9.90	3.90	
8.70	3.43	20TH	10.10	3.98	
8.80	3.46	25TH	10.30	4.06	
9.00	3.54	30TH	10.50	4.13	
9.20	3.62	35TH	10.70	4.21	
9.30	3.66	40TH	10.80	4.25	
9.40	3.70	45TH	11.00	4.33	
9.50	3.74	50TH	11.10	4.37	
9.70	3.82	55TH	11.30	4.45	
9.80	3.86	60TH	11.40	4.49	
10.00	3.94	65TH	11.60	4.57	
10.20	4.02	70TH	11.80	4.65	
10.30	4.06	75TH	12.00	4.72	
10.60	4.17	80TH	12.20	4.80	
10.80	4.25	85TH	12.40	4.88	
11.10	4.37	90TH	12.70	5.00	
11.50	4.53	95TH	13.20	5.20	
11.70	4.61	97TH	13.50	5.31	
11.90	4.69	98TH	13.80	5.43	
12.40	4.88	99TH	14.20	5.59	

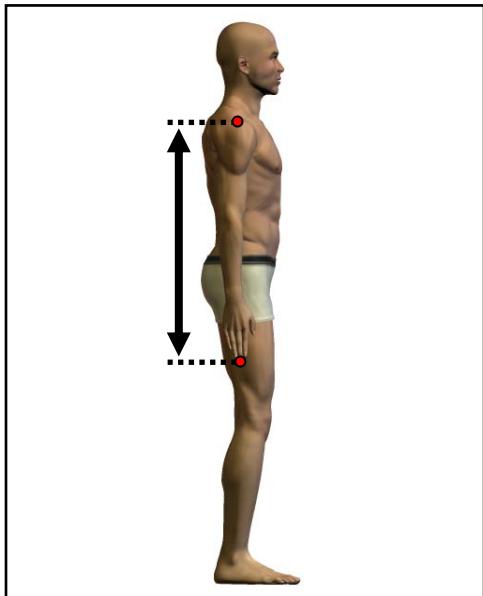
(D3) ACROMION-AXILLA LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
9.61	MEAN	3.78	11.17	MEAN	4.40
0.03	STD. ERROR (MEAN)	0.01	0.02	STD. ERROR (MEAN)	0.01
1.12	STANDARD DEVIATION	0.44	1.21	STANDARD DEVIATION	0.48
0.02	STD. ERROR (STD.DEV)	0.01	0.01	STD. ERROR (STD.DEV)	0.01
5.80	MINIMUM	2.28	6.80	MINIMUM	2.68
14.50	MAXIMUM	5.71	16.40	MAXIMUM	6.46
SKEWNESS		0.23	SKEWNESS		0.18
KURTOSIS		3.23	KURTOSIS		3.20
COEFFICIENT OF VARIATION		11.6%	COEFFICIENT OF VARIATION		10.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	5.75	- 6.00
1	0.05	2	0.10	6.00	- 6.25
2	0.10	4	0.20	6.25	- 6.50
4	0.20	8	0.40	6.50	- 6.75
4	0.20	12	0.60	6.75	- 7.00
9	0.45	21	1.06	7.00	- 7.25
13	0.65	34	1.71	7.25	- 7.50
37	1.86	71	3.58	7.50	- 7.75
54	2.72	125	6.29	7.75	- 8.00
97	4.88	222	11.18	8.00	- 8.25
66	3.32	288	14.50	8.25	- 8.50
157	7.91	445	22.41	8.50	- 8.75
124	6.24	569	28.65	8.75	- 9.00
183	9.21	752	37.87	9.00	- 9.25
164	8.26	916	46.12	9.25	- 9.50
228	11.48	1144	57.60	9.50	- 9.75
128	6.45	1272	64.05	9.75	- 10.00
162	8.16	1434	72.21	10.00	- 10.25
107	5.39	1541	77.59	10.25	- 10.50
138	6.95	1679	84.54	10.50	- 10.75
73	3.68	1752	88.22	10.75	- 11.00
84	4.23	1836	92.45	11.00	- 11.25
37	1.86	1873	94.31	11.25	- 11.50
54	2.72	1927	97.03	11.50	- 11.75
20	1.01	1947	98.04	11.75	- 12.00
16	0.81	1963	98.84	12.00	- 12.25
5	0.25	1968	99.09	12.25	- 12.50
7	0.35	1975	99.45	12.50	- 12.75
4	0.20	1979	99.65	12.75	- 13.00
3	0.15	1982	99.80	13.00	- 13.25
1	0.05	1983	99.85	13.25	- 13.50
1	0.05	1984	99.90	13.50	- 13.75
1	0.05	1985	99.95	13.75	- 14.00
0	0.00	1985	99.95	14.00	- 14.25
0	0.00	1985	99.95	14.25	- 14.50
1	0.05	1986	100.00	14.50	- 14.75
				14.75	- 15.00
				15.00	- 15.25
				15.25	- 15.50
				15.50	- 15.75
				15.75	- 16.00
				16.00	- 16.25
				16.25	- 16.50

(D4) ARM LENGTH

The vertical distance between the acromion right landmark and the dactylion III landmark of a participant standing erect with the arms straight at the sides is calculated as follows: ACROMIAL HEIGHT minus WRIST HEIGHT plus HAND LENGTH.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
63.90	25.16	1ST	70.10	27.60
65.00	25.59	2ND	71.00	27.95
65.50	25.79	3RD	71.60	28.19
66.30	26.10	5TH	72.40	28.50
67.50	26.57	10TH	73.70	29.02
68.50	26.97	15TH	74.60	29.37
69.20	27.24	20TH	75.30	29.65
69.80	27.48	25TH	75.90	29.88
70.20	27.64	30TH	76.60	30.16
70.70	27.83	35TH	77.10	30.35
71.10	27.99	40TH	77.60	30.55
71.50	28.15	45TH	78.10	30.75
72.00	28.35	50TH	78.60	30.94
72.50	28.54	55TH	79.10	31.14
73.00	28.74	60TH	79.60	31.34
73.40	28.90	65TH	80.10	31.54
74.10	29.17	70TH	80.60	31.73
74.70	29.41	75TH	81.10	31.93
75.40	29.69	80TH	81.80	32.20
76.20	30.00	85TH	82.60	32.52
77.20	30.39	90TH	83.60	32.91
78.50	30.91	95TH	85.30	33.58
79.40	31.26	97TH	86.20	33.94
79.90	31.46	98TH	87.00	34.25
81.00	31.89	99TH	88.30	34.76

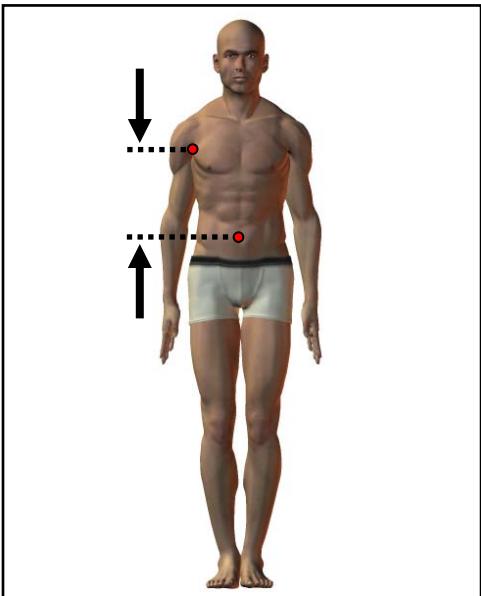
(D4) ARM LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
72.20	28.42		78.65	30.96	
0.08	STD. ERROR (MEAN)	0.03	0.06	STD. ERROR (MEAN)	0.02
3.73	STANDARD DEVIATION	1.47	3.89	STANDARD DEVIATION	1.53
0.06	STD. ERROR (STD.DEV)	0.02	0.04	STD. ERROR (STD.DEV)	0.02
56.70	MINIMUM	22.32	66.20	MINIMUM	26.06
86.60	MAXIMUM	34.09	96.10	MAXIMUM	37.83
SKEWNESS		0.11	SKEWNESS		0.17
KURTOSIS		3.21	KURTOSIS		3.16
COEFFICIENT OF VARIATION		5.2%	COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	56.55	57.55
0	0.00	1	0.05	57.55	58.55
2	0.10	3	0.15	58.55	59.55
0	0.00	3	0.15	59.55	60.55
2	0.10	5	0.25	60.55	61.55
7	0.35	12	0.60	61.55	62.55
7	0.35	19	0.96	62.55	63.55
6	0.30	25	1.26	63.55	64.55
36	1.81	61	3.07	64.55	65.55
56	2.82	117	5.89	65.55	66.55
84	4.23	201	10.12	66.55	67.55
107	5.39	308	15.51	67.55	68.55
143	7.20	451	22.71	68.55	69.55
226	11.38	677	34.09	69.55	70.55
231	11.63	908	45.72	70.55	71.55
199	10.02	1107	55.74	71.55	72.55
206	10.37	1313	66.11	72.55	73.55
155	7.80	1468	73.92	73.55	74.55
149	7.50	1617	81.42	74.55	75.55
108	5.44	1725	86.86	75.55	76.55
97	4.88	1822	91.74	76.55	77.55
70	3.52	1892	95.27	77.55	78.55
43	2.17	1935	97.43	78.55	79.55
28	1.41	1963	98.84	79.55	80.55
8	0.40	1971	99.24	80.55	81.55
7	0.35	1978	99.60	81.55	82.55
4	0.20	1982	99.80	82.55	83.55
2	0.10	1984	99.90	83.55	84.55
1	0.05	1985	99.95	84.55	85.55
0	0.00	1985	99.95	85.55	86.55
1	0.05	1986	100.00	86.55	87.55
				87.55	88.55
				88.55	89.55
				89.55	90.55
				90.55	91.55
				91.55	92.55
				92.55	93.55
				93.55	94.55
				94.55	95.55
				95.55	96.55

(D5) AXILLA-WAIST LENGTH (OMPHALION)

The vertical distance between the anterior-scye-on-the-torso landmark and the anterior omphalion landmark is calculated as follows: AXILLA HEIGHT minus WAIST HEIGHT (OMPHALION).



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
21.10	8.31	1ST	22.10	8.70	
21.70	8.54	2ND	22.80	8.98	
21.90	8.62	3RD	23.10	9.09	
22.40	8.82	5TH	23.50	9.25	
23.20	9.13	10TH	24.30	9.57	
23.70	9.33	15TH	24.90	9.80	
24.10	9.49	20TH	25.30	9.96	
24.40	9.61	25TH	25.70	10.12	
24.70	9.72	30TH	26.00	10.24	
25.10	9.88	35TH	26.30	10.35	
25.30	9.96	40TH	26.60	10.47	
25.60	10.08	45TH	26.90	10.59	
25.90	10.20	50TH	27.20	10.71	
26.10	10.28	55TH	27.50	10.83	
26.40	10.39	60TH	27.70	10.91	
26.70	10.51	65TH	28.10	11.06	
26.90	10.59	70TH	28.40	11.18	
27.30	10.75	75TH	28.80	11.34	
27.60	10.87	80TH	29.20	11.50	
28.00	11.02	85TH	29.70	11.69	
28.70	11.30	90TH	30.30	11.93	
29.60	11.65	95TH	31.20	12.28	
30.10	11.85	97TH	31.80	12.52	
30.40	11.97	98TH	32.30	12.72	
31.00	12.20	99TH	32.90	12.95	

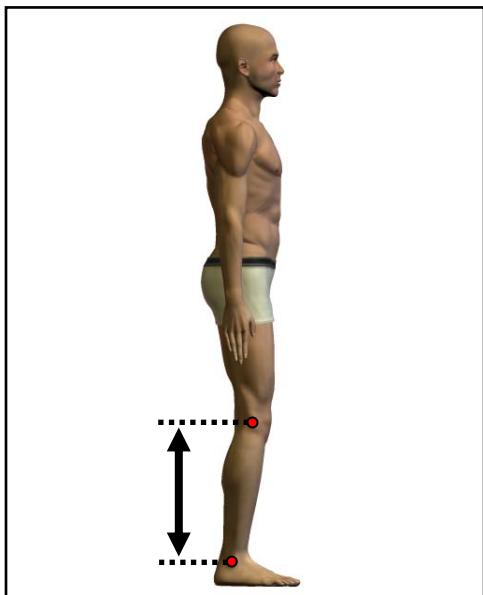
(D5) AXILLA-WAIST LENGTH (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
25.89	STD. ERROR (MEAN)	10.19	27.26	STD. ERROR (MEAN)	10.73
0.05	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.01
2.13	STD. ERROR (STD.DEV)	0.84	2.33	STD. ERROR (STD.DEV)	0.92
0.03	MINIMUM	0.01	0.03	MINIMUM	0.01
19.30	MAXIMUM	7.60	18.90	MAXIMUM	7.44
33.40		13.15	38.60		15.20
SKEWNESS		0.13	SKEWNESS		0.17
KURTOSIS		3.01	KURTOSIS		3.23
COEFFICIENT OF VARIATION		8.2%	COEFFICIENT OF VARIATION		8.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
E	FPct	CumF	CumFPct	CM	E	FPct	CumF
1	0.05	1	0.05	18.75	-	19.25	1
2	0.10	3	0.15	19.25	-	19.75	1
11	0.55	14	0.70	19.75	-	20.25	5
7	0.35	21	1.06	20.25	-	20.75	6
22	1.11	43	2.17	20.75	-	21.25	4
42	2.11	85	4.28	21.25	-	21.75	9
55	2.77	140	7.05	21.75	-	22.25	23
65	3.27	205	10.32	22.25	-	22.75	28
106	5.34	311	15.66	22.75	-	23.25	61
138	6.95	449	22.61	23.25	-	23.75	106
148	7.45	597	30.06	23.75	-	24.25	143
178	8.96	775	39.02	24.25	-	24.75	181
170	8.56	945	47.58	24.75	-	25.25	224
188	9.47	1133	57.05	25.25	-	25.75	260
181	9.11	1314	66.16	25.75	-	26.25	313
175	8.81	1489	74.97	26.25	-	26.75	360
144	7.25	1633	82.23	26.75	-	27.25	374
97	4.88	1730	87.11	27.25	-	27.75	192
72	3.63	1802	90.74	27.75	-	28.25	470
51	2.57	1853	93.30	28.25	-	28.75	360
55	2.77	1908	96.07	28.75	-	29.25	272
26	1.31	1934	97.38	29.25	-	29.75	192
26	1.31	1960	98.69	29.75	-	30.25	121
10	0.50	1970	99.19	30.25	-	30.75	97
7	0.35	1977	99.55	30.75	-	31.25	57
4	0.20	1981	99.75	31.25	-	31.75	50
3	0.15	1984	99.90	31.75	-	32.25	32
1	0.05	1985	99.95	32.25	-	32.75	23
1	0.05	1986	100.00	32.75	-	33.25	11
				33.25	-	33.75	9
				33.75	-	34.25	0.27
				34.25	-	34.75	4063
				34.75	-	35.25	99.53
				35.25	-	35.75	4072
				35.75	-	36.25	99.76
				36.25	-	36.75	4075
				36.75	-	37.25	99.83
				37.25	-	37.75	4079
				37.75	-	38.25	99.93
				38.25	-	38.75	4080

(D6) CALF LINK

The vertical distance between the lateral femoral epicondyle landmark and the lateral malleolus landmark is calculated as follows: LATERAL FEMORAL EPICONDRYLE HEIGHT minus LATERAL MALLEOLUS HEIGHT.



PERCENTILES			
FEMALES		MALES	
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>
34.40	13.54	1ST	36.60
35.20	13.86	2ND	37.20
35.60	14.02	3RD	37.50
36.10	14.21	5TH	37.90
37.20	14.65	10TH	38.70
37.80	14.88	15TH	39.40
38.20	15.04	20TH	39.80
38.60	15.20	25TH	40.20
38.90	15.31	30TH	40.60
39.30	15.47	35TH	40.90
39.60	15.59	40TH	41.20
39.90	15.71	45TH	41.50
40.20	15.83	50TH	41.80
40.50	15.94	55TH	42.10
40.90	16.10	60TH	42.40
41.20	16.22	65TH	42.70
41.60	16.38	70TH	43.10
42.00	16.54	75TH	43.50
42.50	16.73	80TH	43.90
43.00	16.93	85TH	44.30
43.70	17.20	90TH	45.00
44.60	17.56	95TH	46.00
45.30	17.83	97TH	46.70
45.80	18.03	98TH	47.20
46.90	18.46	99TH	47.90
			18.86

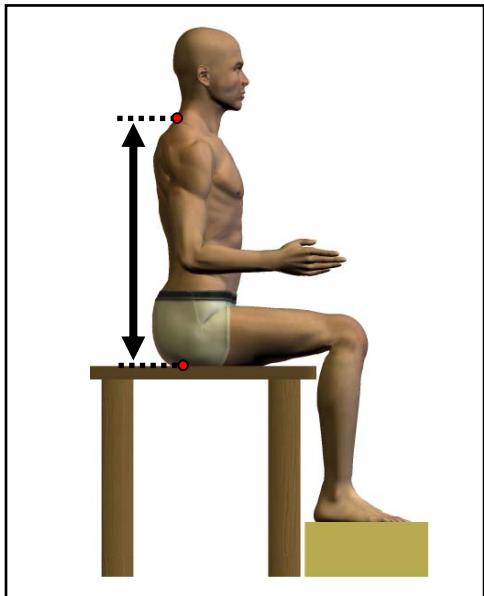
(D6) CALF LINK

FEMALES			MALES		
<u>CM</u>		<u>IN</u>	<u>CM</u>		<u>IN</u>
40.32	MEAN	15.87	41.88	MEAN	16.49
0.06	STD. ERROR (MEAN)	0.02	0.04	STD. ERROR (MEAN)	0.02
2.59	STANDARD DEVIATION	1.02	2.46	STANDARD DEVIATION	0.97
0.04	STD. ERROR (STD.DEV)	0.02	0.03	STD. ERROR (STD.DEV)	0.01
29.40	MINIMUM	11.57	34.40	MINIMUM	13.54
50.60	MAXIMUM	19.92	51.90	MAXIMUM	20.43
SKEWNESS		0.10	SKEWNESS		0.20
KURTOSIS		3.40	KURTOSIS		3.16
COEFFICIENT OF VARIATION		6.4%	COEFFICIENT OF VARIATION		5.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	29.25	- 29.75
0	0.00	1	0.05	29.75	- 30.25
1	0.05	2	0.10	30.25	- 30.75
1	0.05	3	0.15	30.75	- 31.25
0	0.00	3	0.15	31.25	- 31.75
2	0.10	5	0.25	31.75	- 32.25
1	0.05	6	0.30	32.25	- 32.75
0	0.00	6	0.30	32.75	- 33.25
4	0.20	10	0.50	33.25	- 33.75
5	0.25	15	0.76	33.75	- 34.25
12	0.60	27	1.36	34.25	- 34.75
14	0.70	41	2.06	34.75	- 35.25
26	1.31	67	3.37	35.25	- 35.75
40	2.01	107	5.39	35.75	- 36.25
43	2.17	150	7.55	36.25	- 36.75
56	2.82	206	10.37	36.75	- 37.25
90	4.53	296	14.90	37.25	- 37.75
130	6.55	426	21.45	37.75	- 38.25
108	5.44	534	26.89	38.25	- 38.75
149	7.50	683	34.39	38.75	- 39.25
142	7.15	825	41.54	39.25	- 39.75
173	8.71	998	50.25	39.75	- 40.25
147	7.40	1145	57.65	40.25	- 40.75
157	7.91	1302	65.56	40.75	- 41.25
131	6.60	1433	72.16	41.25	- 41.75
120	6.04	1553	78.20	41.75	- 42.25
93	4.68	1646	82.88	42.25	- 42.75
80	4.03	1726	86.91	42.75	- 43.25
67	3.37	1793	90.28	43.25	- 43.75
69	3.47	1862	93.76	43.75	- 44.25
32	1.61	1894	95.37	44.25	- 44.75
29	1.46	1923	96.83	44.75	- 45.25
21	1.06	1944	97.89	45.25	- 45.75
14	0.70	1958	98.59	45.75	- 46.25
6	0.30	1964	98.89	46.25	- 46.75
10	0.50	1974	99.40	46.75	- 47.25
5	0.25	1979	99.65	47.25	- 47.75
3	0.15	1982	99.80	47.75	- 48.25
1	0.05	1983	99.85	48.25	- 48.75
1	0.05	1984	99.90	48.75	- 49.25
0	0.00	1984	99.90	49.25	- 49.75
1	0.05	1985	99.95	49.75	- 50.25
1	0.05	1986	100.00	50.25	- 50.75
				50.75	- 51.25
				51.25	- 51.75
				51.75	- 52.25

(D7) CERVICALE HEIGHT, SITTING*

The vertical distance between a sitting surface and the cervicale landmark is calculated as follows: SITTING HEIGHT minus (STATURE minus CERVICALE HEIGHT).



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
56.10	22.09	1ST	60.60	23.86
56.80	22.36	2ND	61.80	24.33
57.20	22.52	3RD	62.20	24.49
57.80	22.76	5TH	63.00	24.80
58.90	23.19	10TH	64.10	25.24
59.40	23.39	15TH	64.90	25.55
59.90	23.58	20TH	65.50	25.79
60.40	23.78	25TH	66.00	25.98
60.90	23.98	30TH	66.40	26.14
61.30	24.13	35TH	66.80	26.30
61.70	24.29	40TH	67.20	26.46
62.10	24.45	45TH	67.50	26.57
62.40	24.57	50TH	67.90	26.73
62.80	24.72	55TH	68.30	26.89
63.20	24.88	60TH	68.70	27.05
63.50	25.00	65TH	69.10	27.20
63.80	25.12	70TH	69.50	27.36
64.20	25.28	75TH	69.90	27.52
64.80	25.51	80TH	70.40	27.72
65.30	25.71	85TH	71.00	27.95
66.00	25.98	90TH	71.70	28.23
66.90	26.34	95TH	72.80	28.66
67.60	26.61	97TH	73.50	28.94
68.10	26.81	98TH	74.00	29.13
68.90	27.13	99TH	74.80	29.45

* In ANSUR cervicale was defined as the highest point on the seventh cervical vertebra. For consistency with international standards, it is now the most prominent point on the seventh cervical vertebra.

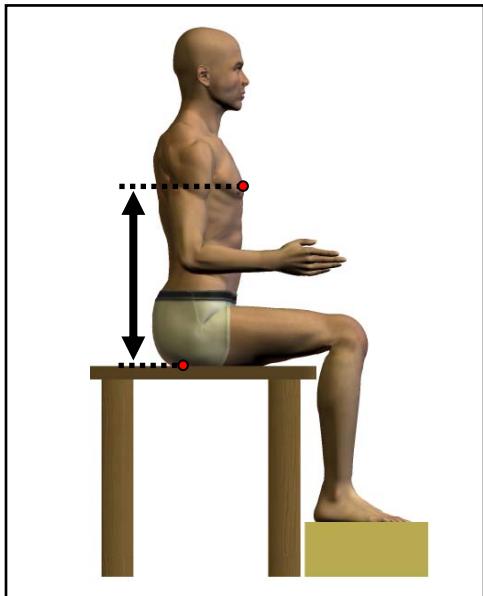
(D7) CERVICALE HEIGHT, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
62.38	24.56		67.94	26.75	
0.06	0.02		0.05	0.02	
2.78	1.09		2.99	1.18	
0.04	0.02		0.03	0.01	
53.00	20.87		58.00	22.83	
70.50	27.76		79.20	31.18	
SKEWNESS	0.00		SKEWNESS	-0.05	
KURTOSIS	2.74		KURTOSIS	3.08	
COEFFICIENT OF VARIATION	4.5%		COEFFICIENT OF VARIATION	4.4%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	52.75	- 53.25
0	0.00	1	0.05	53.25	- 53.75
0	0.00	1	0.05	53.75	- 54.25
0	0.00	1	0.05	54.25	- 54.75
5	0.25	6	0.30	54.75	- 55.25
5	0.25	11	0.55	55.25	- 55.75
12	0.60	23	1.16	55.75	- 56.25
15	0.76	38	1.91	56.25	- 56.75
24	1.21	62	3.12	56.75	- 57.25
33	1.66	95	4.78	57.25	- 57.75
44	2.22	139	7.00	57.75	- 58.25
54	2.72	193	9.72	58.25	- 58.75
76	3.83	269	13.54	58.75	- 59.25
102	5.14	371	18.68	59.25	- 59.75
97	4.88	468	23.56	59.75	- 60.25
92	4.63	560	28.20	60.25	- 60.75
112	5.64	672	33.84	60.75	- 61.25
129	6.50	801	40.33	61.25	- 61.75
149	7.50	950	47.83	61.75	- 62.25
132	6.65	1082	54.48	62.25	- 62.75
144	7.25	1226	61.73	62.75	- 63.25
152	7.65	1378	69.39	63.25	- 63.75
112	5.64	1490	75.03	63.75	- 64.25
84	4.23	1574	79.25	64.25	- 64.75
103	5.19	1677	84.44	64.75	- 65.25
78	3.93	1755	88.37	65.25	- 65.75
70	3.52	1825	91.89	65.75	- 66.25
49	2.47	1874	94.36	66.25	- 66.75
32	1.61	1906	95.97	66.75	- 67.25
28	1.41	1934	97.38	67.25	- 67.75
21	1.06	1955	98.44	67.75	- 68.25
11	0.55	1966	98.99	68.25	- 68.75
7	0.35	1973	99.35	68.75	- 69.25
9	0.45	1982	99.80	69.25	- 69.75
3	0.15	1985	99.95	69.75	- 70.25
1	0.05	1986	100.00	70.25	- 70.75
				70.75	- 71.25
				71.25	- 71.75
				71.75	- 72.25
				72.25	- 72.75
				72.75	- 73.25
				73.25	- 73.75
				73.75	- 74.25
				74.25	- 74.75
				74.75	- 75.25
				75.25	- 75.75
				75.75	- 76.25
				76.25	- 76.75
				76.75	- 77.25
				77.25	- 77.75
				77.75	- 78.25
				78.25	- 78.75
				78.75	- 79.25

(D8) CHEST HEIGHT, SITTING*

The vertical distance between a sitting surface and the chest point, anterior landmark is calculated as follows: SITTING HEIGHT minus (STATURE minus CHEST HEIGHT).



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
33.00	12.99	1ST	39.00	15.35
34.00	13.39	2ND	39.90	15.71
34.30	13.50	3RD	40.30	15.87
35.00	13.78	5TH	41.00	16.14
36.40	14.33	10TH	41.90	16.50
37.10	14.61	15TH	42.60	16.77
37.70	14.84	20TH	43.10	16.97
38.10	15.00	25TH	43.60	17.17
38.50	15.16	30TH	43.90	17.28
39.00	15.35	35TH	44.30	17.44
39.30	15.47	40TH	44.60	17.56
39.70	15.63	45TH	45.00	17.72
40.10	15.79	50TH	45.30	17.83
40.40	15.91	55TH	45.60	17.95
40.70	16.02	60TH	46.00	18.11
41.00	16.14	65TH	46.30	18.23
41.40	16.30	70TH	46.70	18.39
41.80	16.46	75TH	47.10	18.54
42.40	16.69	80TH	47.50	18.70
42.90	16.89	85TH	48.00	18.90
43.70	17.20	90TH	48.70	19.17
44.50	17.52	95TH	49.80	19.61
45.20	17.80	97TH	50.40	19.84
45.70	17.99	98TH	50.80	20.00
46.70	18.39	99TH	51.40	20.24

*In ANSUR this measurement was taken (in males) at the level of thelion (nipple). This change was made in order to capture the breadth of the chest at its maximum. The landmark is unchanged for females.

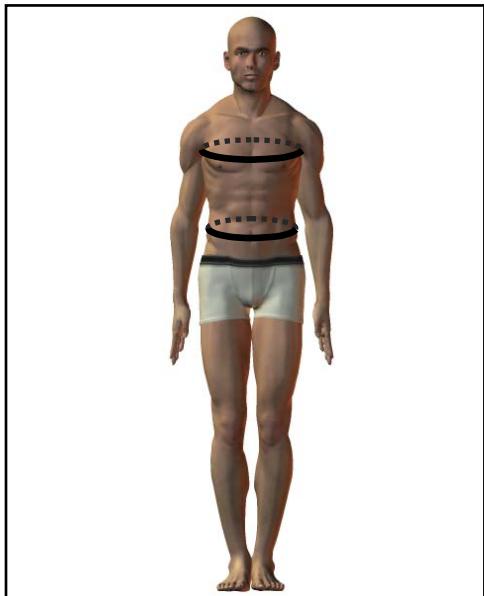
(D8) CHEST HEIGHT, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
39.98	STD. ERROR (MEAN)	15.74	45.32	STD. ERROR (MEAN)	17.84
0.06	STANDARD DEVIATION	0.03	0.04	STANDARD DEVIATION	0.02
2.86	STD. ERROR (STD.DEV)	1.13	2.64	STD. ERROR (STD.DEV)	1.04
0.05	MINIMUM	0.02	0.03	MINIMUM	0.01
27.80	MAXIMUM	10.94	35.20	MAXIMUM	13.86
49.30		19.41	55.50		21.85
SKEWNESS		-0.16	SKEWNESS		0.02
KURTOSIS		3.29	KURTOSIS		3.08
COEFFICIENT OF VARIATION		7.1%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	27.25	-
0	0.00	1	0.05	28.00	-
1	0.05	2	0.10	28.75	-
0	0.00	2	0.10	29.50	-
4	0.20	6	0.30	30.25	-
4	0.20	10	0.50	31.00	-
1	0.05	11	0.55	31.75	-
12	0.60	23	1.16	32.50	-
16	0.81	39	1.96	33.25	-
44	2.22	83	4.18	34.00	-
38	1.91	121	6.09	34.75	-
58	2.92	179	9.01	35.50	-
94	4.73	273	13.75	36.25	-
131	6.60	404	20.34	37.00	-
159	8.01	563	28.35	37.75	-
212	10.67	775	39.02	38.50	-
189	9.52	964	48.54	39.25	-
242	12.19	1206	60.73	40.00	-
190	9.57	1396	70.29	40.75	-
169	8.51	1565	78.80	41.50	-
125	6.29	1690	85.10	42.25	-
106	5.34	1796	90.43	43.00	-
88	4.43	1884	94.86	43.75	-
47	2.37	1931	97.23	44.50	-
24	1.21	1955	98.44	45.25	-
14	0.70	1969	99.14	46.00	-
10	0.50	1979	99.65	46.75	-
4	0.20	1983	99.85	47.50	-
2	0.10	1985	99.95	48.25	-
1	0.05	1986	100.00	49.00	-
				49.75	-
				50.50	96
				50.50	-
				51.25	73
				51.25	-
				52.00	25
				52.00	-
				52.75	12
				52.75	-
				53.50	5
				53.50	-
				54.25	4
				54.25	-
				55.00	1
				55.75	-

(D9) CHEST-WAIST DROP (OMPHALION)*

The difference between the circumference of the chest and the circumference of the waist at omphalion is calculated as follows: CHEST CIRCUMFERENCE minus WAIST CIRCUMFERENCE (OMPHALION).



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>		
-4.90	-1.93	1ST	-1.70	-0.67	
-3.20	-1.26	2ND	0.10	0.04	
-2.00	-0.79	3RD	1.40	0.55	
-0.50	-0.20	5TH	2.80	1.10	
1.50	0.59	10TH	5.10	2.01	
3.00	1.18	15TH	6.50	2.56	
4.30	1.69	20TH	7.50	2.95	
5.20	2.05	25TH	8.30	3.27	
6.00	2.36	30TH	9.10	3.58	
6.80	2.68	35TH	9.90	3.90	
7.50	2.95	40TH	10.50	4.13	
8.10	3.19	45TH	11.30	4.45	
8.70	3.43	50TH	11.90	4.69	
9.30	3.66	55TH	12.60	4.96	
10.10	3.98	60TH	13.30	5.24	
10.80	4.25	65TH	14.00	5.51	
11.60	4.57	70TH	14.70	5.79	
12.30	4.84	75TH	15.50	6.10	
13.10	5.16	80TH	16.30	6.42	
14.10	5.55	85TH	17.20	6.77	
15.40	6.06	90TH	18.40	7.24	
17.00	6.69	95TH	20.10	7.91	
18.10	7.13	97TH	21.40	8.43	
19.00	7.48	98TH	22.10	8.70	
20.40	8.03	99TH	23.30	9.17	

* In ANSUR this measurement was taken (in males) at the level of thelion (nipple). This change was made in order to capture the breadth of the chest at its maximum. The landmark is unchanged for females. This measurement also differs from ANSUR because the tissue is now compressed and the measurement is taken at maximum inspiration.

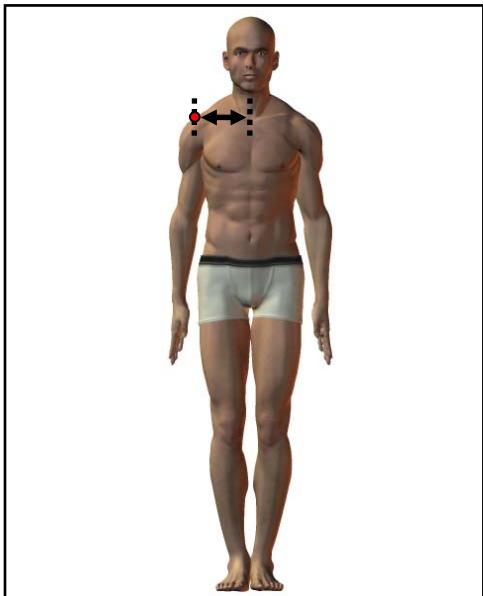
(D9) CHEST-WAIST DROP (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
8.60	MEAN	3.38	11.81	MEAN	4.65
0.12	STD. ERROR (MEAN)	0.05	0.08	STD. ERROR (MEAN)	0.03
5.36	STANDARD DEVIATION	2.11	5.31	STANDARD DEVIATION	2.09
0.09	STD. ERROR (STD.DEV)	0.03	0.06	STD. ERROR (STD.DEV)	0.02
-17.30	MINIMUM	-6.81	-11.20	MINIMUM	-4.41
26.30	MAXIMUM	10.35	32.00	MAXIMUM	12.60
SKEWNESS		-0.25	SKEWNESS		-0.16
KURTOSIS		3.34	KURTOSIS		3.26
COEFFICIENT OF VARIATION		62.4%	COEFFICIENT OF VARIATION		44.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	-17.55	-16.55
0	0.00	1	0.05	-16.55	-15.55
0	0.00	1	0.05	-15.55	-14.55
0	0.00	1	0.05	-14.55	-13.55
0	0.00	1	0.05	-13.55	-12.55
1	0.05	2	0.10	-12.55	-11.55
0	0.00	2	0.10	-11.55	-10.55
1	0.05	3	0.15	-10.55	-9.55
0	0.00	3	0.15	-9.55	-8.55
4	0.20	7	0.35	-8.55	-7.55
4	0.20	11	0.55	-7.55	-6.55
5	0.25	16	0.81	-6.55	-5.55
7	0.35	23	1.16	-5.55	-4.55
8	0.40	31	1.56	-4.55	-3.55
19	0.96	50	2.52	-3.55	-2.55
19	0.96	69	3.47	-2.55	-1.55
28	1.41	97	4.88	-1.55	-0.55
31	1.56	128	6.45	-0.55	0.45
67	3.37	195	9.82	0.45	1.45
60	3.02	255	12.84	1.45	2.45
73	3.68	328	16.52	2.45	3.45
84	4.23	412	20.75	3.45	4.45
102	5.14	514	25.88	4.45	5.45
142	7.15	656	33.03	5.45	6.45
122	6.14	778	39.17	6.45	7.45
165	8.31	943	47.48	7.45	8.45
166	8.36	1109	55.84	8.45	9.45
141	7.10	1250	62.94	9.45	10.45
129	6.50	1379	69.44	10.45	11.45
128	6.45	1507	75.88	11.45	12.45
124	6.24	1631	82.12	12.45	13.45
90	4.53	1721	86.66	13.45	14.45
72	3.63	1793	90.28	14.45	15.45
61	3.07	1854	93.35	15.45	16.45
51	2.57	1905	95.92	16.45	17.45
34	1.71	1939	97.63	17.45	18.45
16	0.81	1955	98.44	18.45	19.45
12	0.60	1967	99.04	19.45	20.45
9	0.45	1976	99.50	20.45	21.45
5	0.25	1981	99.75	21.45	22.45
2	0.10	1983	99.85	22.45	23.45
1	0.05	1984	99.90	23.45	24.45
1	0.05	1985	99.95	24.45	25.45
1	0.05	1986	100.00	25.45	26.45
				26.45	27.45
				27.45	28.45
				28.45	29.45
				29.45	30.45
				30.45	31.45
				31.45	32.45

(D10) CLAVICLE LINK

The distance between the midline of the body and the acromion right landmark is calculated as one-half of BIACROMIAL BREADTH.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
16.10	6.34	1ST	18.60	7.32	
16.50	6.50	2ND	18.90	7.44	
16.60	6.54	3RD	19.00	7.48	
16.80	6.61	5TH	19.20	7.56	
17.10	6.73	10TH	19.60	7.72	
17.40	6.85	15TH	19.80	7.80	
17.50	6.89	20TH	20.00	7.87	
17.70	6.97	25TH	20.20	7.95	
17.80	7.01	30TH	20.30	7.99	
18.00	7.09	35TH	20.40	8.03	
18.10	7.13	40TH	20.60	8.11	
18.20	7.17	45TH	20.70	8.15	
18.30	7.20	50TH	20.80	8.19	
18.40	7.24	55TH	20.90	8.23	
18.50	7.28	60TH	21.00	8.27	
18.60	7.32	65TH	21.10	8.31	
18.80	7.40	70TH	21.30	8.39	
18.90	7.44	75TH	21.40	8.43	
19.00	7.48	80TH	21.60	8.50	
19.20	7.56	85TH	21.80	8.58	
19.50	7.68	90TH	22.10	8.70	
19.80	7.80	95TH	22.40	8.82	
20.00	7.87	97TH	22.70	8.94	
20.20	7.95	98TH	22.90	9.02	
20.30	7.99	99TH	23.20	9.13	

(D10) CLAVICLE LINK

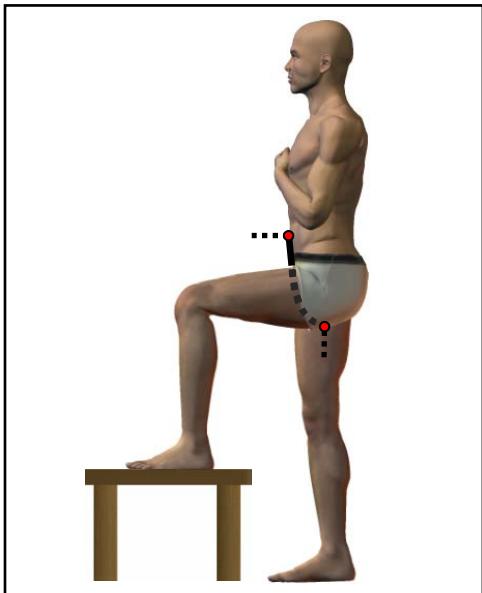
FEMALES		
<u>CM</u>		<u>IN</u>
18.29	MEAN	7.20
0.02	STD. ERROR (MEAN)	0.01
0.91	STANDARD DEVIATION	0.36
0.01	STD. ERROR (STD.DEV)	0.01
14.20	MINIMUM	5.59
21.10	MAXIMUM	8.31
SKEWNESS		-0.05
KURTOSIS		3.14
COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
20.81	MEAN	8.19
0.02	STD. ERROR (MEAN)	0.01
0.96	STANDARD DEVIATION	0.38
0.01	STD. ERROR (STD.DEV)	0.00
16.90	MINIMUM	6.65
24.50	MAXIMUM	9.65
SKEWNESS		0.08
KURTOSIS		3.29
COEFFICIENT OF VARIATION		4.6%
NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		E	FPct
1	0.05	1	0.05	14.15	-	14.35	
0	0.00	1	0.05	14.35	-	14.55	
0	0.00	1	0.05	14.55	-	14.75	
1	0.05	2	0.10	14.75	-	14.95	
0	0.00	2	0.10	14.95	-	15.15	
0	0.00	2	0.10	15.15	-	15.35	
0	0.00	2	0.10	15.35	-	15.55	
4	0.20	6	0.30	15.55	-	15.75	
7	0.35	13	0.65	15.75	-	15.95	
10	0.50	23	1.16	15.95	-	16.15	
7	0.35	30	1.51	16.15	-	16.35	
24	1.21	54	2.72	16.35	-	16.55	
39	1.96	93	4.68	16.55	-	16.75	
52	2.62	145	7.30	16.75	-	16.95	1 0.02
63	3.17	208	10.47	16.95	-	17.15	0 0.00
88	4.43	296	14.90	17.15	-	17.35	1 0.02
104	5.24	400	20.14	17.35	-	17.55	1 0.02
150	7.55	550	27.69	17.55	-	17.75	2 0.05
145	7.30	695	34.99	17.75	-	17.95	4 0.10
178	8.96	873	43.96	17.95	-	18.15	3 0.07
181	9.11	1054	53.07	18.15	-	18.35	11 0.27
168	8.46	1222	61.53	18.35	-	18.55	16 0.39
142	7.15	1364	68.68	18.55	-	18.75	25 0.61
169	8.51	1533	77.19	18.75	-	18.95	38 0.93
104	5.24	1637	82.43	18.95	-	19.15	73 1.79
97	4.88	1734	87.31	19.15	-	19.35	78 1.91
84	4.23	1818	91.54	19.35	-	19.55	99 2.43
56	2.82	1874	94.36	19.55	-	19.75	162 3.97
41	2.06	1915	96.42	19.75	-	19.95	207 5.07
28	1.41	1943	97.83	19.95	-	20.15	257 6.30
24	1.21	1967	99.04	20.15	-	20.35	288 7.06
5	0.25	1972	99.30	20.35	-	20.55	332 8.13
7	0.35	1979	99.65	20.55	-	20.75	369 9.04
3	0.15	1982	99.80	20.75	-	20.95	377 9.24
4	0.20	1986	100.00	20.95	-	21.15	317 7.77
				21.15	-	21.35	303 7.42
				21.35	-	21.55	283 6.93
				21.55	-	21.75	182 4.46
				21.75	-	21.95	167 4.09
				21.95	-	22.15	135 3.31
				22.15	-	22.35	122 2.99
				22.35	-	22.55	85 2.08
				22.55	-	22.75	50 1.22
				22.75	-	22.95	25 0.61
				22.95	-	23.15	27 0.66
				23.15	-	23.35	16 0.39
				23.35	-	23.55	10 0.24
				23.55	-	23.75	6 0.15
				23.75	-	23.95	6 0.15
				23.95	-	24.15	1 0.02
				24.15	-	24.35	2 0.05
				24.35	-	24.55	1 0.02

(D11) CROTCH LENGTH, ANTERIOR (OMPHALION)

The surface distance between the inner thigh landmark and the abdomen at the level of the waist at the navel (omphalion) of a participant standing with one leg on a step is calculated as follows: CROTCH LENGTH (OMPHALION) minus CROTCH LENGTH, POSTERIOR (OMPHALION).



PERCENTILES					
FEMALES			MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
21.00	8.27	1ST	19.20	7.56	
21.90	8.62	2ND	20.00	7.87	
22.40	8.82	3RD	20.40	8.03	
23.10	9.09	5TH	21.10	8.31	
24.10	9.49	10TH	22.30	8.78	
25.00	9.84	15TH	23.00	9.06	
25.40	10.00	20TH	23.60	9.29	
25.90	10.20	25TH	24.20	9.53	
26.30	10.35	30TH	24.70	9.72	
26.80	10.55	35TH	25.20	9.92	
27.10	10.67	40TH	25.60	10.08	
27.50	10.83	45TH	26.00	10.24	
27.90	10.98	50TH	26.50	10.43	
28.30	11.14	55TH	27.00	10.63	
28.60	11.26	60TH	27.40	10.79	
29.00	11.42	65TH	27.80	10.94	
29.50	11.61	70TH	28.40	11.18	
29.90	11.77	75TH	29.00	11.42	
30.40	11.97	80TH	29.60	11.65	
31.00	12.20	85TH	30.30	11.93	
31.70	12.48	90TH	31.20	12.28	
32.80	12.91	95TH	32.70	12.87	
33.40	13.15	97TH	33.50	13.19	
33.80	13.31	98TH	34.10	13.43	
34.80	13.70	99TH	35.20	13.86	

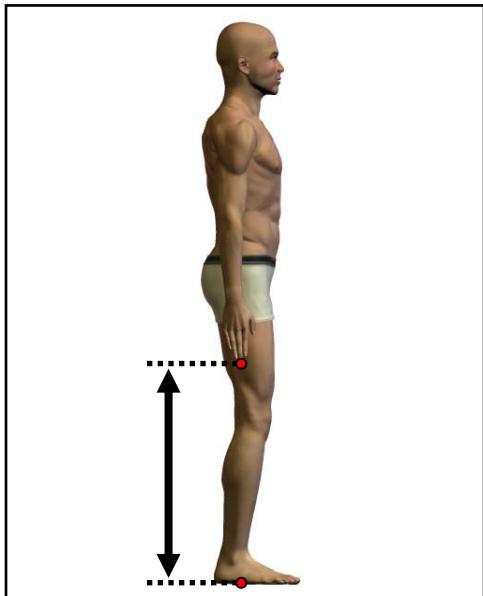
(D11) CROTCH LENGTH, ANTERIOR (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
27.90	10.98		26.64	10.49	
0.07	STD. ERROR (MEAN)	0.03	0.05	STD. ERROR (MEAN)	0.02
2.95	STANDARD DEVIATION	1.16	3.50	STANDARD DEVIATION	1.38
0.05	STD. ERROR (STD.DEV)	0.02	0.04	STD. ERROR (STD.DEV)	0.02
16.50	MINIMUM	6.50	14.20	MINIMUM	5.59
39.20	MAXIMUM	15.43	40.00	MAXIMUM	15.75
SKEWNESS		0.01	SKEWNESS		0.20
KURTOSIS		3.07	KURTOSIS		2.94
COEFFICIENT OF VARIATION		10.6%	COEFFICIENT OF VARIATION		13.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
E	FPct	CumF	CumFPct	CM	E	FPct	CumF
				13.75	-	14.25	
				14.25	-	14.75	1
				14.75	-	15.25	0
				15.25	-	15.75	0
				15.75	-	16.25	0
				16.25	-	16.75	0
1	0.05	1	0.05	16.75	-	17.25	1
0	0.00	1	0.05	17.25	-	17.75	4
0	0.00	1	0.05	17.75	-	18.25	2
2	0.10	3	0.15	18.25	-	18.75	8
0	0.00	3	0.15	18.75	-	19.25	13
0	0.00	3	0.15	19.25	-	19.75	12
2	0.10	5	0.25	19.75	-	20.25	24
4	0.20	9	0.45	20.25	-	20.75	42
9	0.45	18	0.91	20.75	-	21.25	55
8	0.40	26	1.31	21.25	-	21.75	63
12	0.60	38	1.91	21.75	-	22.25	76
16	0.81	54	2.72	21.75	-	22.25	102
21	1.06	75	3.78	22.25	-	22.75	141
34	1.71	109	5.49	22.75	-	23.25	144
45	2.27	154	7.75	23.25	-	23.75	172
55	2.77	209	10.52	23.75	-	24.25	170
53	2.67	262	13.19	24.25	-	24.75	207
100	5.04	362	18.23	24.75	-	25.25	213
115	5.79	477	24.02	25.25	-	25.75	241
117	5.89	594	29.91	25.75	-	26.25	236
101	5.09	695	34.99	26.25	-	26.75	218
131	6.60	826	41.59	26.75	-	27.25	253
137	6.90	963	48.49	27.25	-	27.75	222
123	6.19	1086	54.68	27.75	-	28.25	170
131	6.60	1217	61.28	28.25	-	28.75	188
126	6.34	1343	67.62	28.75	-	29.25	179
119	5.99	1462	73.62	29.25	-	29.75	159
103	5.19	1565	78.80	29.75	-	30.25	143
82	4.13	1647	82.93	30.25	-	30.75	120
80	4.03	1727	86.96	30.75	-	31.25	105
65	3.27	1792	90.23	31.25	-	31.75	69
50	2.52	1842	92.75	31.75	-	32.25	62
43	2.17	1885	94.91	32.25	-	32.75	69
37	1.86	1922	96.78	32.75	-	33.25	49
23	1.16	1945	97.94	33.25	-	33.75	42
11	0.55	1956	98.49	33.75	-	34.25	34
8	0.40	1964	98.89	34.25	-	34.75	14
10	0.50	1974	99.40	34.75	-	35.25	18
6	0.30	1980	99.70	35.25	-	35.75	14
2	0.10	1982	99.80	35.75	-	36.25	10
0	0.00	1982	99.80	36.25	-	36.75	5
2	0.10	1984	99.90	36.75	-	37.25	3
0	0.00	1984	99.90	37.25	-	37.75	3
0	0.00	1984	99.90	37.75	-	38.25	2
0	0.00	1984	99.90	38.25	-	38.75	0
2	0.10	1986	100.00	38.75	-	39.25	2
				39.25	-	39.75	0
				39.75	-	40.25	1

(D12) DACTYLION HEIGHT

The vertical distance between a standing surface and the dactylion III landmark of a participant standing erect with the arms and hands straight at the sides is calculated as follows: WRIST HEIGHT minus HAND LENGTH.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
53.40	21.02	1ST	57.10	22.48
54.40	21.42	2ND	58.00	22.83
54.90	21.61	3RD	58.30	22.95
55.60	21.89	5TH	59.30	23.35
56.80	22.36	10TH	60.70	23.90
57.70	22.72	15TH	61.60	24.25
58.40	22.99	20TH	62.30	24.53
59.00	23.23	25TH	62.90	24.76
59.50	23.43	30TH	63.40	24.96
60.00	23.62	35TH	64.00	25.20
60.50	23.82	40TH	64.40	25.35
60.90	23.98	45TH	64.90	25.55
61.30	24.13	50TH	65.40	25.75
61.70	24.29	55TH	65.90	25.94
62.10	24.45	60TH	66.30	26.10
62.60	24.65	65TH	66.80	26.30
63.10	24.84	70TH	67.40	26.54
63.60	25.04	75TH	67.90	26.73
64.10	25.24	80TH	68.60	27.01
64.80	25.51	85TH	69.30	27.28
65.60	25.83	90TH	70.30	27.68
67.20	26.46	95TH	71.70	28.23
67.90	26.73	97TH	72.50	28.54
68.60	27.01	98TH	73.10	28.78
70.30	27.68	99TH	74.20	29.21

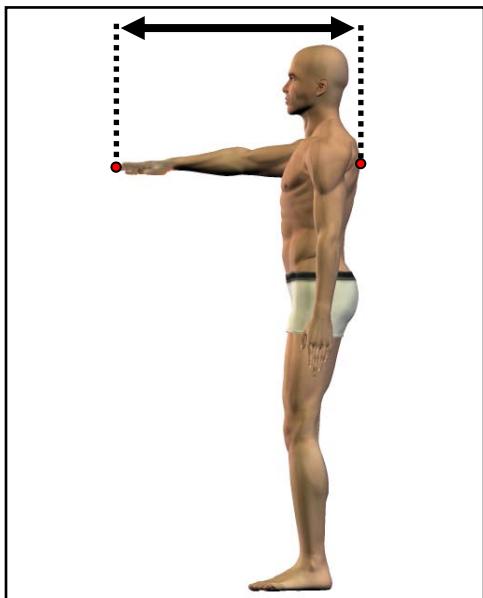
(D12) DACTYLION HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
61.31	24.14		65.42	25.76	
0.08	STD. ERROR (MEAN)	0.03	0.06	STD. ERROR (MEAN)	0.02
3.48	STANDARD DEVIATION	1.37	3.74	STANDARD DEVIATION	1.47
0.06	STD. ERROR (STD.DEV)	0.02	0.04	STD. ERROR (STD.DEV)	0.02
50.00	MINIMUM	19.69	53.00	MINIMUM	20.87
75.30	MAXIMUM	29.65	79.60	MAXIMUM	31.34
SKEWNESS		0.12	SKEWNESS		0.10
KURTOSIS		3.19	KURTOSIS		3.01
COEFFICIENT OF VARIATION		5.7%	COEFFICIENT OF VARIATION		5.7%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
2	0.10	2	0.10	49.75	- 50.50
0	0.00	2	0.10	50.50	- 51.25
2	0.10	4	0.20	51.25	- 52.00
8	0.40	12	0.60	52.00	- 52.75
8	0.40	20	1.01	52.75	- 53.50
17	0.86	37	1.86	53.50	- 54.25
24	1.21	61	3.07	54.25	- 55.00
48	2.42	109	5.49	55.00	- 55.75
59	2.97	168	8.46	55.75	- 56.50
81	4.08	249	12.54	56.50	- 57.25
85	4.28	334	16.82	57.25	- 58.00
121	6.09	455	22.91	58.00	- 58.75
134	6.75	589	29.66	58.75	- 59.50
162	8.16	751	37.81	59.50	- 60.25
150	7.55	901	45.37	60.25	- 61.00
193	9.72	1094	55.09	61.00	- 61.75
175	8.81	1269	63.90	61.75	- 62.50
150	7.55	1419	71.45	62.50	- 63.25
142	7.15	1561	78.60	63.25	- 64.00
121	6.09	1682	84.69	64.00	- 64.75
90	4.53	1772	89.22	64.75	- 65.50
62	3.12	1834	92.35	65.50	- 66.25
37	1.86	1871	94.21	66.25	- 67.00
45	2.27	1916	96.48	67.00	- 67.75
28	1.41	1944	97.89	67.75	- 68.50
15	0.76	1959	98.64	68.50	- 69.25
4	0.20	1963	98.84	69.25	- 70.00
9	0.45	1972	99.30	70.00	- 70.75
6	0.30	1978	99.60	70.75	- 71.50
4	0.20	1982	99.80	71.50	- 72.25
2	0.10	1984	99.90	72.25	- 73.00
1	0.05	1985	99.95	73.00	- 73.75
0	0.00	1985	99.95	73.75	- 74.50
0	0.00	1985	99.95	74.50	- 75.25
1	0.05	1986	100.00	75.25	- 76.00
				76.00	- 76.75
				76.75	- 77.50
				77.50	- 78.25
				78.25	- 79.00
				79.00	- 79.75

(D13) DACTYLION REACH FROM WALL

The horizontal distance between the plane of the back and the dactylion III landmark of a participant standing erect with the back against a wall and the arm, hand, and fingers extended forward horizontally is calculated as follows: THUMBTIP REACH plus (ANSUR mean of HAND LENGTH minus ANSUR mean of WRIST-THUMBTIP LENGTH).



PERCENTILES					
FEMALES			MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
71.40	28.11	1ST	78.50	30.91	
72.40	28.50	2ND	79.50	31.30	
73.00	28.74	3RD	80.10	31.54	
73.70	29.02	5TH	81.10	31.93	
75.40	29.69	10TH	82.60	32.52	
76.50	30.12	15TH	83.60	32.91	
77.20	30.39	20TH	84.50	33.27	
77.80	30.63	25TH	85.10	33.50	
78.40	30.87	30TH	85.80	33.78	
78.90	31.06	35TH	86.40	34.02	
79.40	31.26	40TH	86.90	34.21	
79.90	31.46	45TH	87.50	34.45	
80.50	31.69	50TH	88.00	34.65	
81.10	31.93	55TH	88.60	34.88	
81.60	32.13	60TH	89.10	35.08	
82.20	32.36	65TH	89.60	35.28	
82.90	32.64	70TH	90.20	35.51	
83.50	32.87	75TH	90.70	35.71	
84.30	33.19	80TH	91.50	36.02	
85.30	33.58	85TH	92.50	36.42	
86.40	34.02	90TH	93.70	36.89	
87.90	34.61	95TH	95.50	37.60	
89.00	35.04	97TH	96.60	38.03	
89.90	35.39	98TH	97.90	38.54	
91.50	36.02	99TH	99.20	39.06	

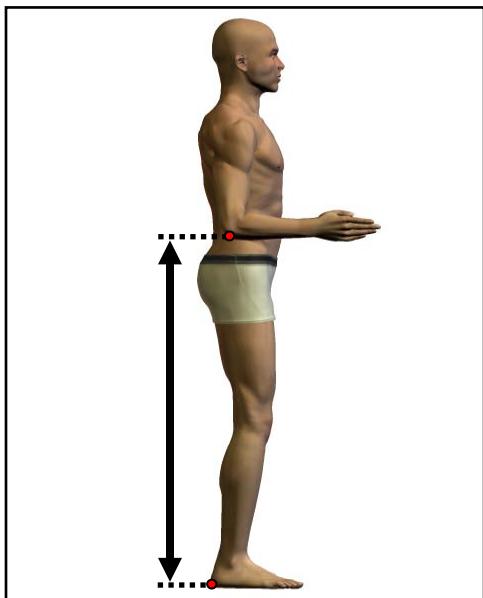
(D13) DACTYLION REACH FROM WALL

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
80.70	STD. ERROR (MEAN)	0.04	88.09	STD. ERROR (MEAN)	0.03
0.10	STANDARD DEVIATION	1.68	4.28	STANDARD DEVIATION	1.72
4.28	STD. ERROR (STD.DEV)	0.03	0.07	STD. ERROR (STD.DEV)	0.02
0.07	MINIMUM	26.18	71.90	MINIMUM	28.31
66.50	MAXIMUM	37.68	106.70	MAXIMUM	42.01
SKEWNESS		0.17	SKEWNESS		0.21
KURTOSIS		3.00	KURTOSIS		3.26
COEFFICIENT OF VARIATION		5.3%	COEFFICIENT OF VARIATION		5.0%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	65.55	- 66.55
1	0.05	2	0.10	66.55	- 67.55
1	0.05	3	0.15	67.55	- 68.55
2	0.10	5	0.25	68.55	- 69.55
7	0.35	12	0.60	69.55	- 70.55
14	0.70	26	1.31	70.55	- 71.55
16	0.81	42	2.11	71.55	- 72.55
48	2.42	90	4.53	72.55	- 73.55
55	2.77	145	7.30	73.55	- 74.55
64	3.22	209	10.52	74.55	- 75.55
97	4.88	306	15.41	75.55	- 76.55
147	7.40	453	22.81	76.55	- 77.55
181	9.11	634	31.92	77.55	- 78.55
187	9.42	821	41.34	78.55	- 79.55
196	9.87	1017	51.21	79.55	- 80.55
162	8.16	1179	59.37	80.55	- 81.55
169	8.51	1348	67.88	81.55	- 82.55
144	7.25	1492	75.13	82.55	- 83.55
118	5.94	1610	81.07	83.55	- 84.55
99	4.98	1709	86.05	84.55	- 85.55
94	4.73	1803	90.79	85.55	- 86.55
61	3.07	1864	93.86	86.55	- 87.55
52	2.62	1916	96.48	87.55	- 88.55
24	1.21	1940	97.68	88.55	- 89.55
16	0.81	1956	98.49	89.55	- 90.55
13	0.65	1969	99.14	90.55	- 91.55
9	0.45	1978	99.60	91.55	- 92.55
4	0.20	1982	99.80	92.55	- 93.55
3	0.15	1985	99.95	93.55	- 94.55
0	0.00	1985	99.95	94.55	- 95.55
1	0.05	1986	100.00	95.55	- 96.55
				96.55	- 97.55
				97.55	- 98.55
				98.55	- 99.55
				99.55	- 100.55
				100.55	- 101.55
				101.55	- 102.55
				102.55	- 103.55
				103.55	- 104.55
				104.55	- 105.55
				105.55	- 106.55
				106.55	- 107.55

(D14) ELBOW REST HEIGHT, STANDING

The vertical distance between a standing surface and the olecranon bottom landmark of a participant standing erect with the forearm and hand held horizontally is calculated as follows: ELBOW REST HEIGHT plus STATURE minus SITTING HEIGHT.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
90.30	35.55	1ST	97.20	38.27	
91.20	35.91	2ND	98.40	38.74	
92.20	36.30	3RD	99.10	39.02	
93.20	36.69	5TH	100.40	39.53	
94.80	37.32	10TH	101.90	40.12	
95.80	37.72	15TH	103.10	40.59	
96.60	38.03	20TH	104.00	40.94	
97.30	38.31	25TH	104.80	41.26	
98.00	38.58	30TH	105.60	41.57	
98.50	38.78	35TH	106.30	41.85	
99.10	39.02	40TH	107.00	42.13	
99.70	39.25	45TH	107.60	42.36	
100.20	39.45	50TH	108.30	42.64	
100.80	39.69	55TH	108.90	42.87	
101.30	39.88	60TH	109.40	43.07	
101.90	40.12	65TH	110.10	43.35	
102.60	40.39	70TH	110.80	43.62	
103.40	40.71	75TH	111.60	43.94	
104.30	41.06	80TH	112.40	44.25	
105.10	41.38	85TH	113.40	44.65	
106.20	41.81	90TH	114.70	45.16	
108.40	42.68	95TH	116.70	45.94	
109.10	42.95	97TH	117.90	46.42	
110.50	43.50	98TH	119.10	46.89	
111.60	43.94	99TH	120.80	47.56	

(D14) ELBOW REST HEIGHT, STANDING

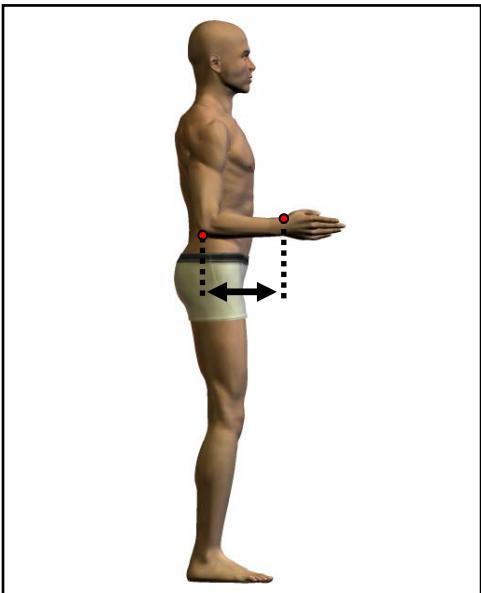
FEMALES		
<u>CM</u>		<u>IN</u>
100.43	MEAN	39.54
0.10	STD. ERROR (MEAN)	0.04
4.54	STANDARD DEVIATION	1.79
0.07	STD. ERROR (STD.DEV)	0.03
85.30	MINIMUM	33.58
116.20	MAXIMUM	45.75
SKEWNESS		0.17
KURTOSIS		3.04
COEFFICIENT OF VARIATION		4.5%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
108.30	MEAN	42.64
0.08	STD. ERROR (MEAN)	0.03
5.01	STANDARD DEVIATION	1.97
0.06	STD. ERROR (STD.DEV)	0.02
89.60	MINIMUM	35.28
127.60	MAXIMUM	50.24
SKEWNESS		0.13
KURTOSIS		3.08
COEFFICIENT OF VARIATION		4.6%
NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM		E	FPct
1	0.05	1	0.05	84.55	-	85.55	
1	0.05	2	0.10	85.55	-	86.55	
1	0.05	3	0.15	86.55	-	87.55	
3	0.15	6	0.30	87.55	-	88.55	
4	0.20	10	0.50	88.55	-	89.55	
14	0.70	24	1.21	89.55	-	90.55	1 0.02
18	0.91	42	2.11	90.55	-	91.55	0 0.00
29	1.46	71	3.58	91.55	-	92.55	1 0.02
44	2.22	115	5.79	92.55	-	93.55	1 0.02
65	3.27	180	9.06	93.55	-	94.55	5 0.12
85	4.28	265	13.34	94.55	-	95.55	7 0.17
122	6.14	387	19.49	95.55	-	96.55	15 0.37
133	6.70	520	26.18	96.55	-	97.55	23 0.56
176	8.86	696	35.05	97.55	-	98.55	37 0.91
173	8.71	869	43.76	98.55	-	99.55	54 1.32
177	8.91	1046	52.67	99.55	-	100.55	80 1.96
182	9.16	1228	61.83	100.55	-	101.55	124 3.04
156	7.85	1384	69.69	101.55	-	102.55	168 4.12
123	6.19	1507	75.88	102.55	-	103.55	190 4.65
115	5.79	1622	81.67	103.55	-	104.55	244 5.98
97	4.88	1719	86.56	104.55	-	105.55	261 6.39
81	4.08	1800	90.63	105.55	-	106.55	297 7.28
55	2.77	1855	93.40	106.55	-	107.55	299 7.32
38	1.91	1893	95.32	107.55	-	108.55	321 7.86
42	2.11	1935	97.43	108.55	-	109.55	359 8.79
15	0.76	1950	98.19	109.55	-	110.55	283 6.93
16	0.81	1966	98.99	110.55	-	111.55	282 6.91
10	0.50	1976	99.50	111.55	-	112.55	237 5.81
4	0.20	1980	99.70	112.55	-	113.55	203 4.97
4	0.20	1984	99.90	113.55	-	114.55	158 3.87
0	0.00	1984	99.90	114.55	-	115.55	129 3.16
2	0.10	1986	100.00	115.55	-	116.55	81 1.98
				116.55	-	117.55	76 1.86
				117.55	-	118.55	46 1.13
				118.55	-	119.55	33 0.81
				119.55	-	120.55	21 0.51
				120.55	-	121.55	18 0.44
				121.55	-	122.55	13 0.32
				122.55	-	123.55	7 0.17
				123.55	-	124.55	3 0.07
				124.55	-	125.55	3 0.07
				125.55	-	126.55	0 0.00
				126.55	-	127.55	1 0.02
				127.55	-	128.55	1 0.02

(D15) ELBOW-WRIST LENGTH

The horizontal distance between the olecranon rear landmark and the stylion landmark of a participant standing with the forearm and hand held horizontally is calculated as follows: FOREARM-HAND LENGTH minus HAND LENGTH.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>		
22.50	8.86	1ST	25.20	9.92	
22.90	9.02	2ND	25.70	10.12	
23.20	9.13	3RD	25.90	10.20	
23.50	9.25	5TH	26.30	10.35	
24.10	9.49	10TH	26.70	10.51	
24.40	9.61	15TH	27.10	10.67	
24.60	9.69	20TH	27.40	10.79	
24.80	9.76	25TH	27.60	10.87	
25.00	9.84	30TH	27.90	10.98	
25.20	9.92	35TH	28.10	11.06	
25.40	10.00	40TH	28.30	11.14	
25.50	10.04	45TH	28.40	11.18	
25.80	10.16	50TH	28.70	11.30	
26.00	10.24	55TH	28.90	11.38	
26.20	10.31	60TH	29.10	11.46	
26.40	10.39	65TH	29.30	11.54	
26.60	10.47	70TH	29.50	11.61	
26.90	10.59	75TH	29.70	11.69	
27.20	10.71	80TH	29.90	11.77	
27.50	10.83	85TH	30.30	11.93	
27.90	10.98	90TH	30.70	12.09	
28.50	11.22	95TH	31.40	12.36	
29.00	11.42	97TH	31.70	12.48	
29.30	11.54	98TH	32.00	12.60	
29.80	11.73	99TH	32.70	12.87	

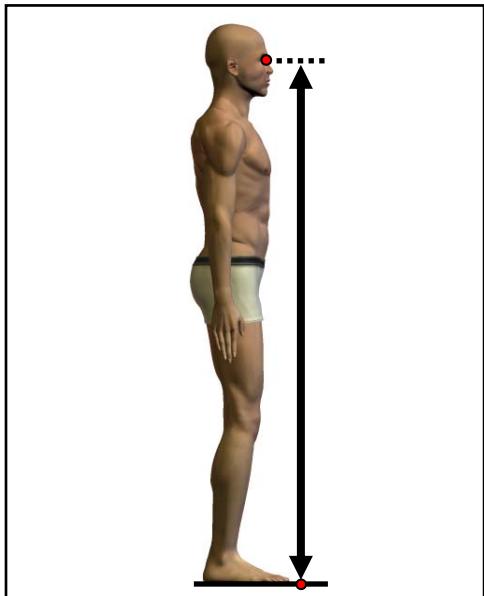
(D15) ELBOW-WRIST LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
25.88	STD. ERROR (MEAN)	0.01	28.69	STD. ERROR (MEAN)	0.01
0.03	STANDARD DEVIATION	0.61	0.02	STANDARD DEVIATION	0.61
1.54	STD. ERROR (STD.DEV)	0.01	0.02	STD. ERROR (STD.DEV)	0.01
0.02	MINIMUM	7.36	23.50	MINIMUM	9.25
18.70	MAXIMUM	12.20	35.50	MAXIMUM	13.98
SKEWNESS		0.22	SKEWNESS		0.20
KURTOSIS		3.28	KURTOSIS		3.17
COEFFICIENT OF VARIATION		6.0%	COEFFICIENT OF VARIATION		5.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	18.55	-
0	0.00	1	0.05	18.90	-
0	0.00	1	0.05	19.25	-
0	0.00	1	0.05	19.60	-
0	0.00	1	0.05	19.95	-
0	0.00	1	0.05	20.30	-
0	0.00	1	0.05	20.65	-
0	0.00	1	0.05	20.65	-
1	0.05	2	0.10	21.00	-
2	0.10	4	0.20	21.35	-
7	0.35	11	0.55	21.70	-
6	0.30	17	0.86	22.05	-
18	0.91	35	1.76	22.40	-
13	0.65	48	2.42	22.75	-
41	2.06	89	4.48	23.10	-
49	2.47	138	6.95	23.45	-
91	4.58	229	11.53	23.80	-
100	5.04	329	16.57	24.15	-
174	8.76	503	25.33	24.50	-
166	8.36	669	33.69	24.85	-
225	11.33	894	45.02	25.20	-
144	7.25	1038	52.27	25.55	-
180	9.06	1218	61.33	25.90	-
139	7.00	1357	68.33	26.25	-
171	8.61	1528	76.94	26.60	-
94	4.73	1622	81.67	26.95	-
107	5.39	1729	87.06	27.30	-
59	2.97	1788	90.03	27.65	-
68	3.42	1856	93.45	28.00	-
43	2.17	1899	95.62	28.35	-
36	1.81	1935	97.43	28.70	-
18	0.91	1953	98.34	29.05	-
12	0.60	1965	98.94	29.40	-
7	0.35	1972	99.30	29.75	-
7	0.35	1979	99.65	30.10	-
3	0.15	1982	99.80	30.45	-
4	0.20	1986	100.00	30.80	-
				31.15	-
				31.15	-
				31.50	-
				31.50	-
				31.85	-
				31.85	-
				32.20	-
				32.20	-
				32.55	-
				32.55	-
				32.90	-
				33.25	-
				33.60	-
				33.95	-
				33.95	-
				34.30	-
				34.30	-
				34.65	-
				34.65	-
				35.00	-
				35.35	-
				35.70	-
				1	0.02
				1	0.02
					4082
					100.00

(D16) EYE HEIGHT

The vertical distance between a standing surface and the ectocanthus landmark of a participant standing erect with the head in the Frankfurt plane is calculated as follows:
EYE HEIGHT SITTING plus STATURE minus SITTING HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
137.80	54.25	1ST	149.20	58.74	
139.20	54.80	2ND	151.10	59.49	
140.40	55.28	3RD	152.20	59.92	
142.10	55.94	5TH	153.60	60.47	
144.20	56.77	10TH	155.70	61.30	
145.60	57.32	15TH	157.30	61.93	
147.00	57.87	20TH	158.70	62.48	
147.90	58.23	25TH	159.90	62.95	
148.80	58.58	30TH	160.70	63.27	
149.50	58.86	35TH	161.60	63.62	
150.10	59.09	40TH	162.40	63.94	
151.00	59.45	45TH	163.20	64.25	
151.70	59.72	50TH	164.00	64.57	
152.60	60.08	55TH	164.90	64.92	
153.40	60.39	60TH	165.90	65.31	
154.20	60.71	65TH	166.80	65.67	
155.10	61.06	70TH	167.70	66.02	
156.10	61.46	75TH	168.60	66.38	
157.10	61.85	80TH	169.60	66.77	
158.30	62.32	85TH	171.10	67.36	
160.10	63.03	90TH	172.70	67.99	
162.60	64.02	95TH	175.30	69.02	
164.10	64.61	97TH	177.10	69.72	
165.20	65.04	98TH	178.70	70.35	
166.00	65.35	99TH	180.90	71.22	

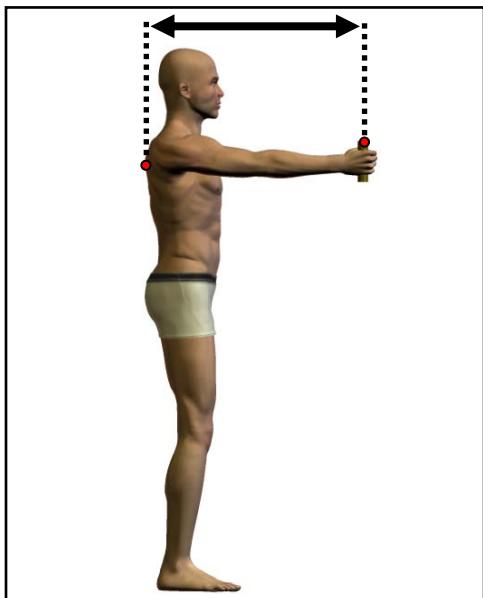
(D16) EYE HEIGHT

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
151.95	STD. ERROR (MEAN)	59.82	164.24	STD. ERROR (MEAN)	64.66
0.14	STANDARD DEVIATION	0.05	0.10	STANDARD DEVIATION	0.04
6.17	STD. ERROR (STD.DEV)	2.43	6.65	STD. ERROR (STD.DEV)	2.62
0.10	MINIMUM	0.04	0.07	MINIMUM	0.03
130.40	MAXIMUM	51.34	138.90	MAXIMUM	54.69
171.80		67.64	186.60		73.46
SKEWNESS		0.07	SKEWNESS		0.12
KURTOSIS		3.01	KURTOSIS		3.09
COEFFICIENT OF VARIATION		4.1%	COEFFICIENT OF VARIATION		4.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	130.25	-
1	0.05	2	0.10	131.75	-
2	0.10	4	0.20	133.25	-
6	0.30	10	0.50	134.75	-
9	0.45	19	0.96	136.25	-
23	1.16	42	2.11	137.75	-
22	1.11	64	3.22	139.25	-
39	1.96	103	5.19	140.75	-
74	3.73	177	8.91	142.25	-
88	4.43	265	13.34	143.75	-
115	5.79	380	19.13	145.25	-
145	7.30	525	26.44	146.75	-
211	10.62	736	37.06	148.25	-
206	10.37	942	47.43	149.75	-
173	8.71	1115	56.14	151.25	-
176	8.86	1291	65.01	152.75	-
166	8.36	1457	73.36	154.25	-
152	7.65	1609	81.02	155.75	-
103	5.19	1712	86.20	157.25	-
83	4.18	1795	90.38	158.75	-
68	3.42	1863	93.81	160.25	-
47	2.37	1910	96.17	161.75	-
29	1.46	1939	97.63	163.25	-
31	1.56	1970	99.19	164.75	-
5	0.25	1975	99.45	166.25	-
6	0.30	1981	99.75	167.75	-
3	0.15	1984	99.90	169.25	-
2	0.10	1986	100.00	170.75	-
				172.25	-
				172.25	-
				173.75	-
				173.75	-
				175.25	-
				175.25	-
				176.75	-
				176.75	-
				178.25	-
				178.25	-
				179.75	-
				179.75	-
				181.25	-
				181.25	-
				182.75	-
				182.75	-
				184.25	-
				184.25	-
				185.75	-
				185.75	-
				187.25	-

(D17) FUNCTIONAL GRIP REACH

The horizontal distance between the vertical plane of the back and the center of a 1-1/4-in diameter dowel gripped in the right hand of a participant standing erect with the back against a wall and the arm and hand extended forward horizontally is calculated as follows: THUMBTIP REACH minus ANSUR mean of WRIST-THUMBTIP LENGTH plus ANSUR mean of WRIST-CENTER OF GRIP LENGTH.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
60.00	23.62	1ST	66.10	26.02
61.00	24.02	2ND	67.10	26.42
61.60	24.25	3RD	67.70	26.65
62.30	24.53	5TH	68.70	27.05
64.00	25.20	10TH	70.20	27.64
65.10	25.63	15TH	71.20	28.03
65.80	25.91	20TH	72.10	28.39
66.40	26.14	25TH	72.70	28.62
67.00	26.38	30TH	73.40	28.90
67.50	26.57	35TH	74.00	29.13
68.00	26.77	40TH	74.50	29.33
68.50	26.97	45TH	75.10	29.57
69.10	27.20	50TH	75.60	29.76
69.70	27.44	55TH	76.20	30.00
70.20	27.64	60TH	76.70	30.20
70.80	27.87	65TH	77.20	30.39
71.50	28.15	70TH	77.80	30.63
72.10	28.39	75TH	78.30	30.83
72.90	28.70	80TH	79.10	31.14
73.90	29.09	85TH	80.10	31.54
75.00	29.53	90TH	81.30	32.01
76.50	30.12	95TH	83.10	32.72
77.60	30.55	97TH	84.20	33.15
78.50	30.91	98TH	85.50	33.66
80.10	31.54	99TH	86.80	34.17

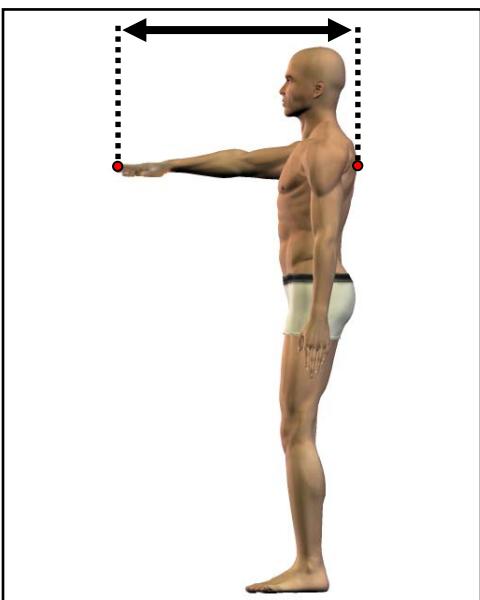
(D17) FUNCTIONAL GRIP REACH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
69.30	STD. ERROR (MEAN)	27.28	75.69	STD. ERROR (MEAN)	29.80
0.10	STANDARD DEVIATION	0.04	0.07	STANDARD DEVIATION	0.03
4.28	STD. ERROR (STD.DEV)	1.68	4.37	STD. ERROR (STD.DEV)	1.72
0.07	MINIMUM	0.03	0.05	MINIMUM	0.02
55.10	MAXIMUM	21.69	59.50	MAXIMUM	23.43
84.30		33.19	94.30		37.13
SKEWNESS		0.17	SKEWNESS		0.21
KURTOSIS		3.00	KURTOSIS		3.26
COEFFICIENT OF VARIATION		6.2%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	54.75	- 55.50
1	0.05	2	0.10	55.50	- 56.25
1	0.05	3	0.15	56.25	- 57.00
1	0.05	4	0.20	57.00	- 57.75
1	0.05	5	0.25	57.75	- 58.50
7	0.35	12	0.60	58.50	- 59.25
5	0.25	17	0.86	59.25	- 60.00
17	0.86	34	1.71	60.00	- 60.75
23	1.16	57	2.87	60.75	- 61.50
40	2.01	97	4.88	61.50	- 62.25
33	1.66	130	6.55	62.25	- 63.00
50	2.52	180	9.06	63.00	- 63.75
64	3.22	244	12.29	63.75	- 64.50
75	3.78	319	16.06	64.50	- 65.25
99	4.98	418	21.05	65.25	- 66.00
139	7.00	557	28.05	66.00	- 66.75
125	6.29	682	34.34	66.75	- 67.50
160	8.06	842	42.40	67.50	- 68.25
131	6.60	973	48.99	68.25	- 69.00
139	7.00	1112	55.99	69.00	- 69.75
126	6.34	1238	62.34	69.75	- 70.50
125	6.29	1363	68.63	70.50	- 71.25
102	5.14	1465	73.77	71.25	- 72.00
108	5.44	1573	79.20	72.00	- 72.75
72	3.63	1645	82.83	72.75	- 73.50
78	3.93	1723	86.76	73.50	- 74.25
63	3.17	1786	89.93	74.25	- 75.00
63	3.17	1849	93.10	75.00	- 75.75
32	1.61	1881	94.71	75.75	- 76.50
38	1.91	1919	96.63	76.50	- 77.25
16	0.81	1935	97.43	77.25	- 78.00
18	0.91	1953	98.34	78.00	- 78.75
6	0.30	1959	98.64	78.75	- 79.50
12	0.60	1971	99.24	79.50	- 80.25
4	0.20	1975	99.45	80.25	- 81.00
6	0.30	1981	99.75	81.00	- 81.75
4	0.20	1985	99.95	81.75	- 82.50
0	0.00	1985	99.95	82.50	- 83.25
0	0.00	1985	99.95	83.25	- 84.00
1	0.05	1986	100.00	84.00	- 84.75
				84.75	- 85.50
				85.50	- 86.25
				86.25	- 87.00
				87.00	- 87.75
				87.75	- 88.50
				88.50	- 89.25
				89.25	- 90.00
				90.00	- 90.75
				90.75	- 91.50
				91.50	- 92.25
				92.25	- 93.00
				93.00	- 93.75
				93.75	- 94.50
				94.50	- 95.25
				95.25	- 96.00
				96.00	- 96.75
				96.75	- 97.50
				97.50	- 98.25
				98.25	- 99.00
				99.00	- 99.75
				99.75	- 100.00

(D18) INDEX FINGER REACH

The horizontal distance between the vertical plane of the back and the tip of the right index finger of a participant standing erect with the back against a wall and the arm, hand, and fingers extended forward horizontally is calculated as follows: THUMBTIP REACH minus ANSUR mean of WRIST-THUMBTIP LENGTH plus ANSUR mean of WRIST-INDEX FINGER LENGTH.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
70.30	27.68	1ST	77.20	30.39	
71.30	28.07	2ND	78.20	30.79	
71.90	28.31	3RD	78.80	31.02	
72.60	28.58	5TH	79.80	31.42	
74.30	29.25	10TH	81.30	32.01	
75.40	29.69	15TH	82.30	32.40	
76.10	29.96	20TH	83.20	32.76	
76.70	30.20	25TH	83.80	32.99	
77.30	30.43	30TH	84.50	33.27	
77.80	30.63	35TH	85.10	33.50	
78.30	30.83	40TH	85.60	33.70	
78.80	31.02	45TH	86.20	33.94	
79.40	31.26	50TH	86.70	34.13	
80.00	31.50	55TH	87.30	34.37	
80.50	31.69	60TH	87.80	34.57	
81.10	31.93	65TH	88.30	34.76	
81.80	32.20	70TH	88.90	35.00	
82.40	32.44	75TH	89.40	35.20	
83.20	32.76	80TH	90.20	35.51	
84.20	33.15	85TH	91.20	35.91	
85.30	33.58	90TH	92.40	36.38	
86.80	34.17	95TH	94.20	37.09	
87.90	34.61	97TH	95.30	37.52	
88.80	34.96	98TH	96.60	38.03	
90.40	35.59	99TH	97.90	38.54	

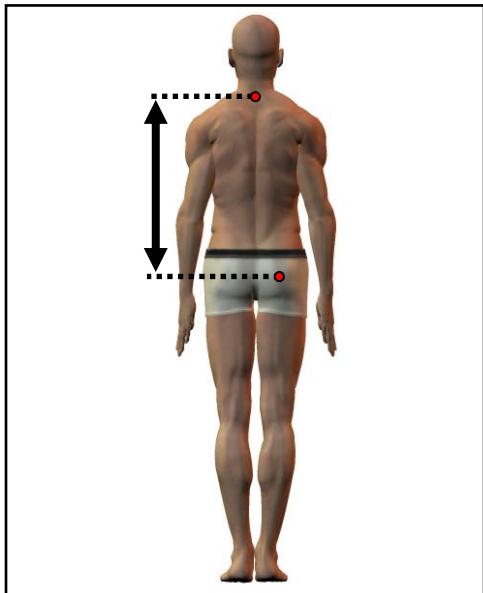
(D18) INDEX FINGER REACH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
79.60	STD. ERROR (MEAN)	31.34	86.79	STD. ERROR (MEAN)	34.17
0.10	STANDARD DEVIATION	0.04	0.07	STANDARD DEVIATION	0.03
4.28	STD. ERROR (STD.DEV)	1.68	4.37	STD. ERROR (STD.DEV)	1.72
0.07	MINIMUM	0.03	0.05	MINIMUM	0.02
65.40	MAXIMUM	25.75	70.60	MAXIMUM	27.80
94.60	SKEWNESS	37.24	105.40	KURTOSIS	41.50
	KURTOSIS	0.17		COEFFICIENT OF VARIATION	0.21
	COEFFICIENT OF VARIATION	3.00		NUMBER OF PARTICIPANTS	3.26
	NUMBER OF PARTICIPANTS	5.4%			5.0%
		1986			4082

FREQUENCIES					
FEMALES				MALES	
E	FPct	CumF	CumFPct	E	FPct
1	0.05	1	0.05	64.55	- 65.55
1	0.05	2	0.10	65.55	- 66.55
1	0.05	3	0.15	66.55	- 67.55
2	0.10	5	0.25	67.55	- 68.55
7	0.35	12	0.60	68.55	- 69.55
14	0.70	26	1.31	69.55	- 70.55
19	0.96	45	2.27	70.55	- 71.55
52	2.62	97	4.88	71.55	- 72.55
55	2.77	152	7.65	72.55	- 73.55
70	3.52	222	11.18	73.55	- 74.55
97	4.88	319	16.06	74.55	- 75.55
158	7.96	477	24.02	75.55	- 76.55
175	8.81	652	32.83	76.55	- 77.55
190	9.57	842	42.40	77.55	- 78.55
195	9.82	1037	52.22	78.55	- 79.55
162	8.16	1199	60.37	79.55	- 80.55
164	8.26	1363	68.63	80.55	- 81.55
143	7.20	1506	75.83	81.55	- 82.55
117	5.89	1623	81.72	82.55	- 83.55
100	5.04	1723	86.76	83.55	- 84.55
89	4.48	1812	91.24	84.55	- 85.55
57	2.87	1869	94.11	85.55	- 86.55
50	2.52	1919	96.63	86.55	- 87.55
23	1.16	1942	97.78	87.55	- 88.55
16	0.81	1958	98.59	88.55	- 89.55
13	0.65	1971	99.24	89.55	- 90.55
9	0.45	1980	99.70	90.55	- 91.55
2	0.10	1982	99.80	91.55	- 92.55
3	0.15	1985	99.95	92.55	- 93.55
0	0.00	1985	99.95	93.55	- 94.55
1	0.05	1986	100.00	94.55	- 95.55
				95.55	- 96.55
				96.55	- 97.55
				97.55	- 98.55
				98.55	- 99.55
				99.55	- 100.55
				100.55	- 101.55
				101.55	- 102.55
				102.55	- 103.55
				103.55	- 104.55
				104.55	- 105.55

(D19) NECK-BUTTOCK LENGTH

The vertical distance between the cervicale landmark and the buttock point right landmark is calculated as follows: CERVICALE HEIGHT minus BUTTOCK HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN		CM	IN	
49.50	19.49	1ST	55.00	21.65	
50.10	19.72	2ND	55.80	21.97	
50.40	19.84	3RD	56.30	22.17	
51.10	20.12	5TH	57.20	22.52	
52.20	20.55	10TH	58.60	23.07	
53.00	20.87	15TH	59.50	23.43	
53.60	21.10	20TH	60.10	23.66	
54.10	21.30	25TH	60.70	23.90	
54.60	21.50	30TH	61.20	24.09	
55.00	21.65	35TH	61.60	24.25	
55.40	21.81	40TH	62.10	24.45	
55.70	21.93	45TH	62.60	24.65	
56.10	22.09	50TH	63.00	24.80	
56.50	22.24	55TH	63.40	24.96	
56.90	22.40	60TH	63.90	25.16	
57.50	22.64	65TH	64.30	25.31	
57.90	22.80	70TH	64.80	25.51	
58.30	22.95	75TH	65.30	25.71	
58.80	23.15	80TH	65.80	25.91	
59.40	23.39	85TH	66.50	26.18	
60.10	23.66	90TH	67.30	26.50	
61.10	24.06	95TH	68.30	26.89	
61.80	24.33	97TH	69.10	27.20	
62.70	24.69	98TH	69.70	27.44	
63.60	25.04	99TH	70.40	27.72	

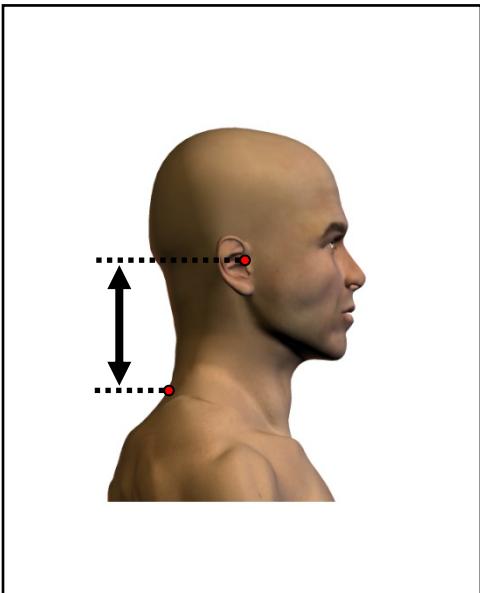
(D19) NECK-BUTTOCK LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
56.19	22.12		62.94	24.78	
0.07	0.03		0.05	0.02	
3.06	1.20		3.37	1.33	
0.05	0.02		0.04	0.01	
47.10	18.54		49.00	19.29	
65.50	25.79		75.70	29.80	
SKEWNESS	0.04		SKEWNESS	-0.11	
KURTOSIS	2.84		KURTOSIS	2.95	
COEFFICIENT OF VARIATION	5.4%		COEFFICIENT OF VARIATION	5.4%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
2	0.10	2	0.10	46.75	-
6	0.30	8	0.40	47.50	-
8	0.40	16	0.81	48.25	-
10	0.50	26	1.31	49.00	-
36	1.81	62	3.12	49.75	-
44	2.22	106	5.34	50.50	-
55	2.77	161	8.11	51.25	-
108	5.44	269	13.54	52.00	-
104	5.24	373	18.78	52.75	-
156	7.85	529	26.64	53.50	-
155	7.80	684	34.44	54.25	-
217	10.93	901	45.37	55.00	-
186	9.37	1087	54.73	55.75	-
169	8.51	1256	63.24	56.50	-
138	6.95	1394	70.19	57.25	-
187	9.42	1581	79.61	58.00	-
116	5.84	1697	85.45	58.75	-
107	5.39	1804	90.84	59.50	-
62	3.12	1866	93.96	60.25	-
58	2.92	1924	96.88	61.00	-
19	0.96	1943	97.83	61.75	-
18	0.91	1961	98.74	62.50	-
14	0.70	1975	99.45	63.25	-
8	0.40	1983	99.85	64.00	-
2	0.10	1985	99.95	64.75	-
1	0.05	1986	100.00	65.50	-
				66.25	-
				66.25	-
				67.00	-
				67.00	-
				67.75	-
				67.75	-
				68.50	-
				68.50	-
				68.50	-
				69.25	-
				69.25	-
				69.25	-
				70.00	-
				70.00	-
				70.75	-
				70.75	-
				71.50	-
				71.50	-
				72.25	-
				72.25	-
				73.00	-
				73.00	-
				73.75	-
				73.75	-
				74.50	-
				74.50	-
				75.25	-
				75.25	-
				76.00	-
				76.00	-
				196	4.80
				177	4.34
				119	2.92
				80	1.96
				43	1.05
				34	0.83
				14	0.34
				9	0.22
				3	0.07
				2	0.05
				0	0.00
				0	0.00
				1	0.02

(D20) NECK LINK

The vertical distance between the cervicale landmark and the tragion landmark is calculated as follows: STATURE minus TRAGION-TOP OF HEAD minus CERVICALE HEIGHT.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	1ST	<u>CM</u>	<u>IN</u>	
7.90	3.11	1ST	8.00	3.15	
8.20	3.23	2ND	8.20	3.23	
8.50	3.35	3RD	8.40	3.31	
8.70	3.43	5TH	8.70	3.43	
9.10	3.58	10TH	9.20	3.62	
9.40	3.70	15TH	9.50	3.74	
9.60	3.78	20TH	9.70	3.82	
9.80	3.86	25TH	9.90	3.90	
10.00	3.94	30TH	10.10	3.98	
10.10	3.98	35TH	10.30	4.06	
10.30	4.06	40TH	10.40	4.09	
10.40	4.09	45TH	10.60	4.17	
10.60	4.17	50TH	10.80	4.25	
10.80	4.25	55TH	10.90	4.29	
10.90	4.29	60TH	11.10	4.37	
11.10	4.37	65TH	11.30	4.45	
11.30	4.45	70TH	11.40	4.49	
11.40	4.49	75TH	11.60	4.57	
11.60	4.57	80TH	11.80	4.65	
11.80	4.65	85TH	12.10	4.76	
12.20	4.80	90TH	12.40	4.88	
12.70	5.00	95TH	12.90	5.08	
12.90	5.08	97TH	13.30	5.24	
13.10	5.16	98TH	13.50	5.31	
13.60	5.35	99TH	13.80	5.43	

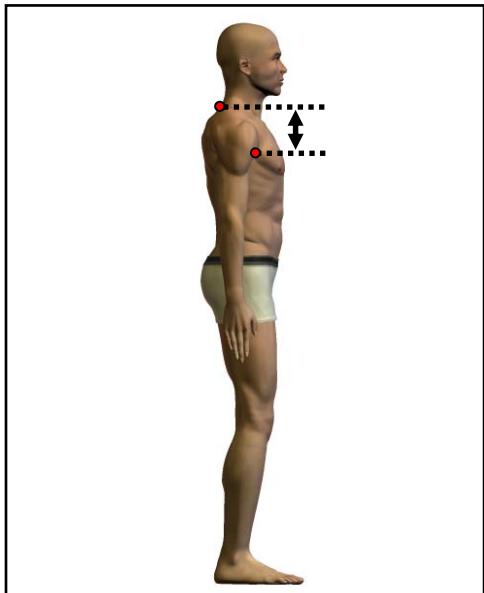
(D20) NECK LINK

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
10.63	MEAN	4.19	10.78	MEAN	4.24
0.03	STD. ERROR (MEAN)	0.01	0.02	STD. ERROR (MEAN)	0.01
1.18	STANDARD DEVIATION	0.47	1.27	STANDARD DEVIATION	0.50
0.02	STD. ERROR (STD.DEV)	0.01	0.01	STD. ERROR (STD.DEV)	0.01
7.10	MINIMUM	2.80	6.20	MINIMUM	2.44
15.00	MAXIMUM	5.91	15.10	MAXIMUM	5.94
SKEWNESS		0.14	SKEWNESS		0.08
KURTOSIS		3.05	KURTOSIS		2.94
COEFFICIENT OF VARIATION		11.1%	COEFFICIENT OF VARIATION		11.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
E	FPct	CumF	CumFPct	CM	E	FPct	CumF
1	0.05	1	0.05	6.15	-	6.35	1
1	0.05	2	0.10	6.35	-	6.55	0
3	0.15	5	0.25	6.55	-	6.75	0
2	0.10	7	0.35	6.75	-	6.95	1
14	0.70	21	1.06	6.95	-	7.15	3
10	0.50	31	1.56	7.15	-	7.35	4
15	0.76	46	2.32	7.35	-	7.55	8
25	1.26	71	3.58	7.55	-	7.75	5
30	1.51	101	5.09	7.75	-	7.95	13
46	2.32	147	7.40	7.95	-	8.15	33
63	3.17	210	10.57	8.15	-	8.35	37
67	3.37	277	13.95	8.35	-	8.55	53
82	4.13	359	18.08	8.55	-	8.75	65
95	4.78	454	22.86	8.75	-	8.95	83
105	5.29	559	28.15	8.95	-	9.15	99
139	7.00	698	35.15	9.15	-	9.35	124
131	6.60	829	41.74	9.35	-	9.55	147
124	6.24	953	47.99	9.55	-	9.75	192
131	6.60	1084	54.58	9.75	-	9.95	193
108	5.44	1192	60.02	9.75	-	10.05	213
133	6.70	1325	66.72	10.05	-	10.15	210
121	6.09	1446	72.81	10.15	-	10.35	297
126	6.34	1572	79.15	10.35	-	10.55	242
85	4.28	1657	83.43	10.55	-	10.75	283
74	3.73	1731	87.16	10.75	-	11.05	224
56	2.82	1787	89.98	10.95	-	11.15	240
47	2.37	1834	92.35	11.15	-	11.35	221
40	2.01	1874	94.36	11.35	-	11.55	175
31	1.56	1905	95.92	12.55	-	12.75	92
26	1.31	1931	97.23	12.75	-	12.95	64
21	1.06	1952	98.29	12.95	-	13.15	46
7	0.35	1959	98.64	13.15	-	13.35	41
6	0.30	1965	98.94	13.35	-	13.55	32
6	0.30	1971	99.24	13.55	-	13.75	18
8	0.40	1979	99.65	13.75	-	13.95	25
1	0.05	1980	99.70	13.95	-	14.15	8
1	0.05	1981	99.75	14.15	-	14.35	8
1	0.05	1982	99.80	14.35	-	14.55	3
3	0.15	1985	99.95	14.55	-	14.75	4
0	0.00	1985	99.95	14.75	-	14.95	0
1	0.05	1986	100.00	14.95	-	15.15	3

(D21) NECK-SCYE LENGTH

The vertical distance between the cervicale landmark and the anterior scye landmark is calculated as follows: CERVICALE HEIGHT minus AXILLA HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
12.20	4.80	1ST	15.50	6.10	
12.60	4.96	2ND	15.80	6.22	
12.90	5.08	3RD	16.10	6.34	
13.30	5.24	5TH	16.50	6.50	
13.90	5.47	10TH	17.00	6.69	
14.20	5.59	15TH	17.30	6.81	
14.50	5.71	20TH	17.60	6.93	
14.70	5.79	25TH	17.90	7.05	
14.90	5.87	30TH	18.10	7.13	
15.10	5.94	35TH	18.30	7.20	
15.30	6.02	40TH	18.50	7.28	
15.40	6.06	45TH	18.70	7.36	
15.60	6.14	50TH	18.80	7.40	
15.80	6.22	55TH	19.00	7.48	
16.00	6.30	60TH	19.20	7.56	
16.20	6.38	65TH	19.40	7.64	
16.40	6.46	70TH	19.60	7.72	
16.60	6.54	75TH	19.80	7.80	
16.80	6.61	80TH	20.00	7.87	
17.10	6.73	85TH	20.30	7.99	
17.50	6.89	90TH	20.70	8.15	
18.00	7.09	95TH	21.20	8.35	
18.40	7.24	97TH	21.50	8.46	
18.60	7.32	98TH	21.80	8.58	
18.90	7.44	99TH	22.20	8.74	

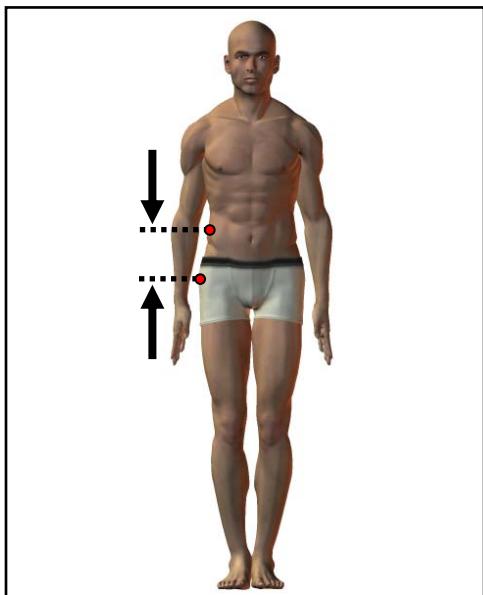
(D21) NECK-SCYE LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
15.66	6.17		18.82	7.41	
0.03	STD. ERROR (MEAN)	0.01	0.02	STD. ERROR (MEAN)	0.01
1.45	STANDARD DEVIATION	0.57	1.45	STANDARD DEVIATION	0.57
0.02	STD. ERROR (STD.DEV)	0.01	0.02	STD. ERROR (STD.DEV)	0.01
11.30	MINIMUM	4.45	13.60	MINIMUM	5.35
21.20	MAXIMUM	8.35	25.50	MAXIMUM	10.04
SKEWNESS		0.09	SKEWNESS		-0.01
KURTOSIS		3.25	KURTOSIS		3.15
COEFFICIENT OF VARIATION		9.2%	COEFFICIENT OF VARIATION		7.7%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
3	0.15	3	0.15	11.25	- 11.60
8	0.40	11	0.55	11.60	- 11.95
9	0.45	20	1.01	11.95	- 12.30
23	1.16	43	2.17	12.30	- 12.65
20	1.01	63	3.17	12.65	- 13.00
43	2.17	106	5.34	13.00	- 13.35
48	2.42	154	7.75	13.35	- 13.70
96	4.83	250	12.59	13.70	- 14.05
87	4.38	337	16.97	14.05	- 14.40
176	8.86	513	25.83	14.40	- 14.75
163	8.21	676	34.04	14.75	- 15.10
228	11.48	904	45.52	15.10	- 15.45
152	7.65	1056	53.17	15.45	- 15.80
209	10.52	1265	63.70	15.80	- 16.15
148	7.45	1413	71.15	16.15	- 16.50
176	8.86	1589	80.01	16.50	- 16.85
104	5.24	1693	85.25	16.85	- 17.20
103	5.19	1796	90.43	17.20	- 17.55
55	2.77	1851	93.20	17.55	- 17.90
58	2.92	1909	96.12	17.90	- 18.25
32	1.61	1941	97.73	18.25	- 18.60
27	1.36	1968	99.09	18.60	- 18.95
1	0.05	1969	99.14	18.95	- 19.30
8	0.40	1977	99.55	19.30	- 19.65
2	0.10	1979	99.65	19.65	- 20.00
2	0.10	1981	99.75	20.00	- 20.35
0	0.00	1981	99.75	20.35	- 20.70
2	0.10	1983	99.85	20.70	- 21.05
3	0.15	1986	100.00	21.05	- 21.40
				21.40	- 21.75
				21.75	- 22.10
				22.10	- 22.45
				22.45	- 22.80
				22.80	- 23.15
				23.15	- 23.50
				23.50	- 23.85
				23.85	- 24.20
				24.20	- 24.55
				24.55	- 24.90
				24.90	- 25.25
				25.25	- 25.60

(D22) PELVIC LINK

The vertical distance between the iliocristale right landmark and the level of the trochanterion landmark is calculated as follows: ILIOCRISTALE HEIGHT minus TROCHANTERION HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
10.60	4.17	1ST	10.80	4.25	
11.40	4.49	2ND	11.40	4.49	
11.70	4.61	3RD	11.70	4.61	
12.10	4.76	5TH	12.20	4.80	
12.60	4.96	10TH	13.10	5.16	
13.10	5.16	15TH	13.70	5.39	
13.50	5.31	20TH	14.20	5.59	
13.80	5.43	25TH	14.60	5.75	
14.00	5.51	30TH	14.90	5.87	
14.30	5.63	35TH	15.30	6.02	
14.50	5.71	40TH	15.60	6.14	
14.80	5.83	45TH	15.90	6.26	
15.00	5.91	50TH	16.20	6.38	
15.30	6.02	55TH	16.40	6.46	
15.50	6.10	60TH	16.70	6.57	
15.80	6.22	65TH	17.00	6.69	
16.00	6.30	70TH	17.30	6.81	
16.30	6.42	75TH	17.60	6.93	
16.60	6.54	80TH	18.00	7.09	
17.00	6.69	85TH	18.40	7.24	
17.50	6.89	90TH	18.90	7.44	
18.20	7.17	95TH	19.60	7.72	
18.60	7.32	97TH	20.00	7.87	
18.90	7.44	98TH	20.40	8.03	
19.40	7.64	99TH	21.00	8.27	

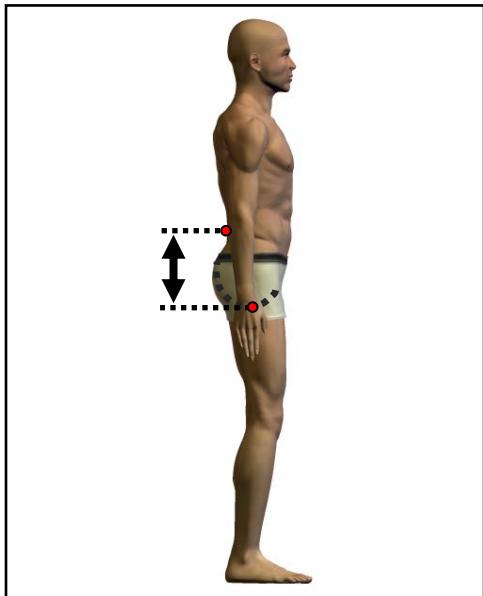
(D22) PELVIC LINK

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
15.04	MEAN	5.92	16.07	MEAN	6.33
0.04	STD. ERROR (MEAN)	0.02	0.03	STD. ERROR (MEAN)	0.01
1.87	STANDARD DEVIATION	0.74	2.23	STANDARD DEVIATION	0.88
0.03	STD. ERROR (STD.DEV)	0.01	0.02	STD. ERROR (STD.DEV)	0.01
8.60	MINIMUM	3.39	6.90	MINIMUM	2.72
21.20	MAXIMUM	8.35	23.60	MAXIMUM	9.29
SKEWNESS		0.03	SKEWNESS		-0.16
KURTOSIS		2.91	KURTOSIS		3.00
COEFFICIENT OF VARIATION		12.4%	COEFFICIENT OF VARIATION		13.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
E	Fpct	CumF	CumFPct	CM	MALES
				6.60	- 6.95
				6.95	- 7.30
				7.30	- 7.65
				7.65	- 8.00
				8.00	- 8.35
1	0.05	1	0.05	8.35	- 8.70
0	0.00	1	0.05	8.70	- 9.05
1	0.05	2	0.10	9.05	- 9.40
3	0.15	5	0.25	9.40	- 9.75
5	0.25	10	0.50	9.75	- 10.10
6	0.30	16	0.81	10.10	- 10.45
6	0.30	22	1.11	10.45	- 10.80
12	0.60	34	1.71	10.80	- 11.15
10	0.50	44	2.22	11.15	- 11.50
30	1.51	74	3.73	11.50	- 11.85
35	1.76	109	5.49	11.85	- 12.20
71	3.58	180	9.06	12.20	- 12.55
69	3.47	249	12.54	12.55	- 12.90
86	4.33	335	16.87	12.90	- 13.25
92	4.63	427	21.50	13.25	- 13.60
155	7.80	582	29.31	13.60	- 13.95
109	5.49	691	34.79	13.95	- 14.30
150	7.55	841	42.35	14.30	- 14.65
137	6.90	978	49.24	14.65	- 15.00
161	8.11	1139	57.35	15.00	- 15.35
105	5.29	1244	62.64	15.35	- 15.70
157	7.91	1401	70.54	15.70	- 16.05
95	4.78	1496	75.33	16.05	- 16.40
130	6.55	1626	81.87	16.40	- 16.75
80	4.03	1706	85.90	16.75	- 17.10
79	3.98	1785	89.88	17.10	- 17.45
47	2.37	1832	92.25	17.45	- 17.80
52	2.62	1884	94.86	17.80	- 18.15
31	1.56	1915	96.42	18.15	- 18.50
29	1.46	1944	97.89	18.50	- 18.85
14	0.70	1958	98.59	18.85	- 19.20
13	0.65	1971	99.24	19.20	- 19.55
4	0.20	1975	99.45	19.55	- 19.90
8	0.40	1983	99.85	19.90	- 20.25
2	0.10	1985	99.95	20.25	- 20.60
0	0.00	1985	99.95	20.60	- 20.95
1	0.05	1986	100.00	20.95	- 21.30
				21.30	- 21.65
				21.65	- 22.00
				22.00	- 22.35
				22.35	- 22.70
				22.70	- 23.05
				23.05	- 23.40
				23.40	- 23.75

(D23) RISE (OMPHALION)

The vertical distance between the level of the waist at the navel (omphalion) and the crotch of a participant standing erect is calculated as follows: WAIST HEIGHT (OMPHALION) minus CROTCH HEIGHT.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
14.90	5.87	1ST	16.10	6.34	
15.40	6.06	2ND	16.60	6.54	
15.80	6.22	3RD	17.10	6.73	
16.40	6.46	5TH	17.60	6.93	
17.10	6.73	10TH	18.30	7.20	
17.70	6.97	15TH	18.80	7.40	
18.00	7.09	20TH	19.30	7.60	
18.40	7.24	25TH	19.70	7.76	
18.60	7.32	30TH	20.00	7.87	
18.90	7.44	35TH	20.20	7.95	
19.20	7.56	40TH	20.50	8.07	
19.50	7.68	45TH	20.80	8.19	
19.80	7.80	50TH	21.10	8.31	
20.10	7.91	55TH	21.30	8.39	
20.30	7.99	60TH	21.60	8.50	
20.60	8.11	65TH	21.90	8.62	
20.90	8.23	70TH	22.20	8.74	
21.20	8.35	75TH	22.40	8.82	
21.60	8.50	80TH	22.80	8.98	
22.00	8.66	85TH	23.20	9.13	
22.40	8.82	90TH	23.80	9.37	
23.20	9.13	95TH	24.60	9.69	
23.70	9.33	97TH	25.10	9.88	
24.20	9.53	98TH	25.50	10.04	
24.90	9.80	99TH	26.00	10.24	

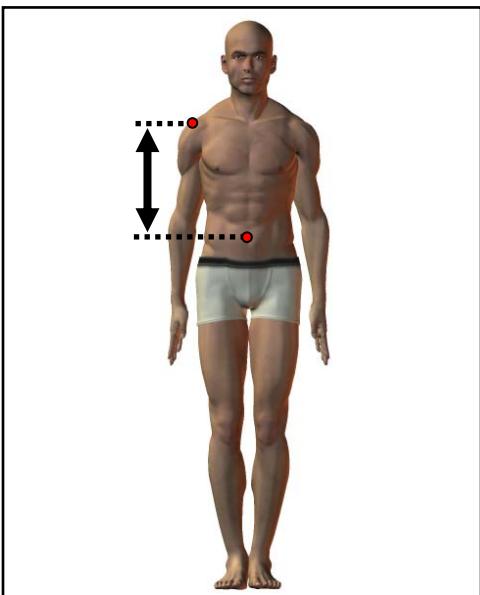
(D23) RISE (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
19.78	MEAN	7.79	21.06	MEAN	8.29
0.05	STD. ERROR (MEAN)	0.02	0.03	STD. ERROR (MEAN)	0.01
2.10	STANDARD DEVIATION	0.83	2.13	STANDARD DEVIATION	0.84
0.03	STD. ERROR (STD.DEV)	0.01	0.02	STD. ERROR (STD.DEV)	0.01
12.50	MINIMUM	4.92	11.80	MINIMUM	4.65
27.60	MAXIMUM	10.87	28.30	MAXIMUM	11.14
SKEWNESS		0.03	SKEWNESS		-0.05
KURTOSIS		3.15	KURTOSIS		3.19
COEFFICIENT OF VARIATION		10.6%	COEFFICIENT OF VARIATION		10.1%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
E	FPct	CumF	CumFPct	CM	E	FPct	CumF
2	0.10	2	0.10	11.75	-	12.10	1
2	0.10	4	0.20	12.10	-	12.45	0
1	0.05	5	0.25	12.80	-	13.15	2
1	0.05	6	0.30	13.15	-	13.50	1
2	0.10	8	0.40	13.50	-	13.85	0
5	0.25	13	0.65	13.85	-	14.20	2
6	0.30	19	0.96	14.20	-	14.55	0
10	0.50	29	1.46	14.55	-	14.90	0
17	0.86	46	2.32	14.90	-	15.25	6
20	1.01	66	3.32	15.25	-	15.60	12
19	0.96	85	4.28	15.60	-	15.95	8
39	1.96	124	6.24	15.95	-	16.30	10
47	2.37	171	8.61	16.30	-	16.65	39
69	3.47	240	12.08	16.65	-	17.00	25
55	2.77	295	14.85	17.00	-	17.35	46
109	5.49	404	20.34	17.35	-	17.70	93
89	4.48	493	24.82	17.70	-	18.05	98
139	7.00	632	31.82	18.05	-	18.40	153
115	5.79	747	37.61	18.40	-	18.75	3.75
130	6.55	877	44.16	18.75	-	19.10	565
98	4.93	975	49.09	19.10	-	19.45	714
135	6.80	1110	55.89	19.45	-	19.80	149
138	6.95	1248	62.84	19.80	-	20.15	192
138	6.95	1386	69.79	20.15	-	20.50	4.70
95	4.78	1481	74.57	20.50	-	20.85	311
106	5.34	1587	79.91	20.85	-	21.20	232
75	3.78	1662	83.69	21.20	-	21.55	297
93	4.68	1755	88.37	21.55	-	21.90	217
57	2.87	1812	91.24	21.90	-	22.25	299
48	2.42	1860	93.66	22.25	-	22.60	211
29	1.46	1889	95.12	22.60	-	22.95	223
34	1.71	1923	96.83	22.95	-	23.30	114
12	0.60	1935	97.43	23.30	-	23.65	156
16	0.81	1951	98.24	23.65	-	24.00	3.82
9	0.45	1960	98.69	24.00	-	24.35	3628
11	0.55	1971	99.24	24.35	-	24.70	2.79
6	0.30	1977	99.55	24.70	-	25.05	3472
3	0.15	1980	99.70	25.05	-	25.40	85.06
1	0.05	1981	99.75	25.40	-	25.75	342
1	0.05	1982	99.80	25.75	-	26.10	34.72
3	0.15	1985	99.95	26.10	-	26.45	1360
0	0.00	1985	99.95	26.45	-	26.80	28.2
0	0.00	1985	99.95	26.80	-	27.15	9.14
1	0.05	1986	100.00	27.15	-	27.50	3.27
				27.50	-	27.85	4055
				27.85	-	28.20	4065
				28.20	-	28.55	4076

(D24) SHOULDER-WAIST LENGTH (OMPHALION)

The vertical distance between the acromion right landmark and the level of the waist at the navel (omphalion) of a participant standing erect is calculated as follows: ACROMIAL HEIGHT minus WAIST HEIGHT (OMPHALION).



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
29.90	11.77	1ST	32.10	12.64
30.50	12.01	2ND	32.70	12.87
30.80	12.13	3RD	33.30	13.11
31.60	12.44	5TH	33.90	13.35
32.50	12.80	10TH	34.90	13.74
33.00	12.99	15TH	35.50	13.98
33.50	13.19	20TH	36.10	14.21
33.80	13.31	25TH	36.50	14.37
34.10	13.43	30TH	36.90	14.53
34.50	13.58	35TH	37.40	14.72
34.80	13.70	40TH	37.70	14.84
35.20	13.86	45TH	38.00	14.96
35.40	13.94	50TH	38.30	15.08
35.80	14.09	55TH	38.70	15.24
36.10	14.21	60TH	39.00	15.35
36.40	14.33	65TH	39.40	15.51
36.70	14.45	70TH	39.80	15.67
37.10	14.61	75TH	40.20	15.83
37.50	14.76	80TH	40.70	16.02
38.00	14.96	85TH	41.30	16.26
38.60	15.20	90TH	42.00	16.54
39.70	15.63	95TH	43.30	17.05
40.30	15.87	97TH	44.20	17.40
40.70	16.02	98TH	44.70	17.60
41.70	16.42	99TH	45.80	18.03

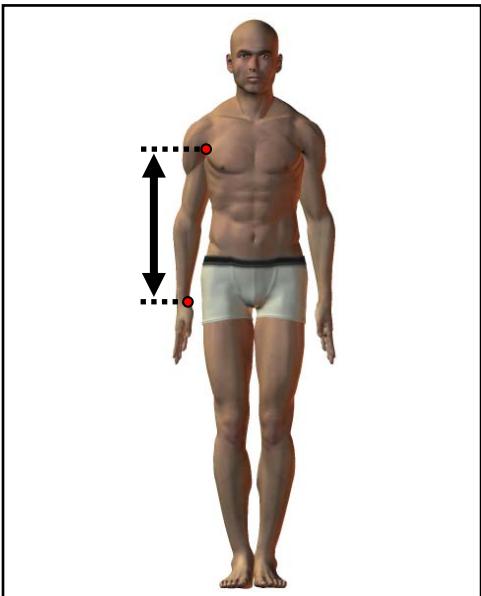
(D24) SHOULDER-WAIST LENGTH (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
35.49	13.97		38.43	15.13	
0.06	STD. ERROR (MEAN)	0.02	0.04	STD. ERROR (MEAN)	0.02
2.45	STANDARD DEVIATION	0.97	2.85	STANDARD DEVIATION	1.12
0.04	STD. ERROR (STD.DEV)	0.02	0.03	STD. ERROR (STD.DEV)	0.01
28.30	MINIMUM	11.14	29.00	MINIMUM	11.42
44.30	MAXIMUM	17.44	50.90	MAXIMUM	20.04
SKEWNESS		0.14	SKEWNESS		0.20
KURTOSIS		3.05	KURTOSIS		3.27
COEFFICIENT OF VARIATION		6.9%	COEFFICIENT OF VARIATION		7.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	E	FPct	CumF
2	0.10	2	0.10	28.25	-	28.75	
4	0.20	6	0.30	28.75	-	29.25	2
8	0.40	14	0.70	29.25	-	29.75	1
13	0.65	27	1.36	29.75	-	30.25	3
30	1.51	57	2.87	30.25	-	30.75	4
27	1.36	84	4.23	30.75	-	31.25	7
36	1.81	120	6.04	31.25	-	31.75	13
57	2.87	177	8.91	31.75	-	32.25	18
67	3.37	244	12.29	32.25	-	32.75	35
98	4.93	342	17.22	32.75	-	33.25	39
126	6.34	468	23.56	33.25	-	33.75	63
166	8.36	634	31.92	33.75	-	34.25	84
145	7.30	779	39.22	34.25	-	34.75	109
144	7.25	923	46.48	34.75	-	35.25	150
166	8.36	1089	54.83	35.25	-	35.75	168
166	8.36	1255	63.19	35.75	-	36.25	191
143	7.20	1398	70.39	36.25	-	36.75	251
130	6.55	1528	76.94	36.75	-	37.25	225
99	4.98	1627	81.92	37.25	-	37.75	321
111	5.59	1738	87.51	37.75	-	38.25	298
74	3.73	1812	91.24	38.25	-	38.75	308
42	2.11	1854	93.35	38.75	-	39.25	286
36	1.81	1890	95.17	39.25	-	39.75	254
30	1.51	1920	96.68	39.75	-	40.25	259
30	1.51	1950	98.19	40.25	-	40.75	187
10	0.50	1960	98.69	40.75	-	41.25	173
8	0.40	1968	99.09	41.25	-	41.75	151
6	0.30	1974	99.40	41.75	-	42.25	121
6	0.30	1980	99.70	42.25	-	42.75	83
5	0.25	1985	99.95	42.75	-	43.25	65
0	0.00	1985	99.95	43.25	-	43.75	58
0	0.00	1985	99.95	43.75	-	44.25	43
1	0.05	1986	100.00	44.25	-	44.75	34
				44.75	-	45.25	26
				45.25	-	45.75	11
				45.75	-	46.25	14
				46.25	-	46.75	9
				46.75	-	47.25	5
				47.25	-	47.75	6
				47.75	-	48.25	4
				48.25	-	48.75	2
				48.75	-	49.25	0
				49.25	-	49.75	0
				49.75	-	50.25	0
				50.25	-	50.75	0
				50.75	-	51.25	1

(D25) SLEEVE INSEAM

The vertical distance between the anterior-scye-on-the-torso landmark and the stylion landmark of a participant standing erect with the arms straight at the sides is calculated as follows: AXILLA HEIGHT minus WRIST HEIGHT.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
37.80	14.88	1ST	41.00	16.14
38.50	15.16	2ND	42.00	16.54
39.20	15.43	3RD	42.40	16.69
39.80	15.67	5TH	43.20	17.01
40.70	16.02	10TH	44.20	17.40
41.50	16.34	15TH	45.00	17.72
42.00	16.54	20TH	45.60	17.95
42.50	16.73	25TH	46.00	18.11
42.90	16.89	30TH	46.50	18.31
43.20	17.01	35TH	46.90	18.46
43.60	17.17	40TH	47.30	18.62
44.00	17.32	45TH	47.70	18.78
44.40	17.48	50TH	48.10	18.94
44.80	17.64	55TH	48.50	19.09
45.20	17.80	60TH	49.00	19.29
45.60	17.95	65TH	49.40	19.45
46.00	18.11	70TH	49.80	19.61
46.50	18.31	75TH	50.20	19.76
47.00	18.50	80TH	50.70	19.96
47.70	18.78	85TH	51.30	20.20
48.40	19.06	90TH	52.10	20.51
49.40	19.45	95TH	53.40	21.02
50.30	19.80	97TH	54.10	21.30
50.70	19.96	98TH	54.90	21.61
51.40	20.24	99TH	56.00	22.05

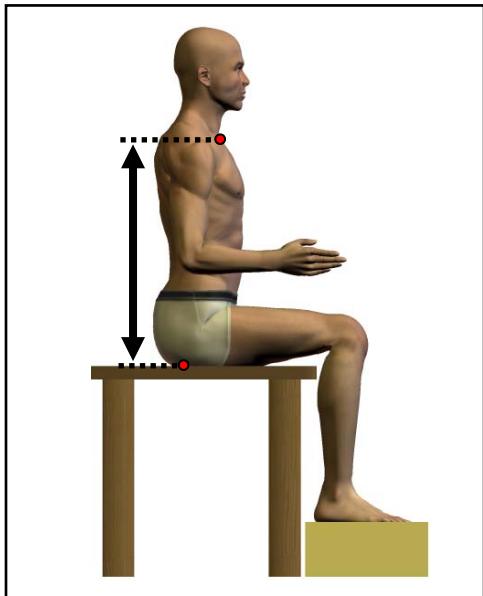
(D25) SLEEVE INSEAM

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
44.48	STD. ERROR (MEAN)	17.51	48.16	STD. ERROR (MEAN)	18.96
0.07	STANDARD DEVIATION	0.03	0.05	STANDARD DEVIATION	0.02
2.98	STD. ERROR (STD.DEV)	1.17	3.13	STD. ERROR (STD.DEV)	1.23
0.05	MINIMUM	0.02	0.03	MINIMUM	0.01
32.80	MAXIMUM	12.91	36.00	MAXIMUM	14.17
55.60		21.89	61.80		24.33
SKEWNESS		0.08	SKEWNESS		0.11
KURTOSIS		3.12	KURTOSIS		3.23
COEFFICIENT OF VARIATION		6.7%	COEFFICIENT OF VARIATION		6.5%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	32.75	- 33.50
1	0.05	2	0.10	33.50	- 34.25
1	0.05	3	0.15	34.25	- 35.00
1	0.05	4	0.20	35.00	- 35.75
3	0.15	7	0.35	35.75	- 36.50
6	0.30	13	0.65	36.50	- 37.25
8	0.40	21	1.06	37.25	- 38.00
27	1.36	48	2.42	38.00	- 38.75
27	1.36	75	3.78	38.75	- 39.50
76	3.83	151	7.60	39.50	- 40.25
70	3.52	221	11.13	40.25	- 41.00
129	6.50	350	17.62	41.00	- 41.75
131	6.60	481	24.22	41.75	- 42.50
225	11.33	706	35.55	42.50	- 43.25
170	8.56	876	44.11	43.25	- 44.00
212	10.67	1088	54.78	44.00	- 44.75
166	8.36	1254	63.14	44.75	- 45.50
184	9.26	1438	72.41	45.50	- 46.25
148	7.45	1586	79.86	46.25	- 47.00
124	6.24	1710	86.10	47.00	- 47.75
83	4.18	1793	90.28	47.75	- 48.50
80	4.03	1873	94.31	48.50	- 49.25
41	2.06	1914	96.37	49.25	- 50.00
33	1.66	1947	98.04	50.00	- 50.75
20	1.01	1967	99.04	50.75	- 51.50
10	0.50	1977	99.55	51.50	- 52.25
4	0.20	1981	99.75	52.25	- 53.00
1	0.05	1982	99.80	53.00	- 53.75
2	0.10	1984	99.90	53.75	- 54.50
1	0.05	1985	99.95	54.50	- 55.25
1	0.05	1986	100.00	55.25	- 56.00
				56.00	- 56.75
				56.75	- 57.50
				57.50	- 58.25
				58.25	- 59.00
				59.00	- 59.75
				59.75	- 60.50
				60.50	- 61.25
				61.25	- 62.00

(D26) SUPRASTERNALE HEIGHT, SITTING

The vertical distance between a sitting surface and the suprasternale landmark of a participant sitting erect is calculated as follows: SUPRASTERNALE HEIGHT minus (STATURE minus SITTING HEIGHT).



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
50.10	19.72	1ST	53.30	20.98
50.60	19.92	2ND	54.30	21.38
51.10	20.12	3RD	54.80	21.57
51.60	20.31	5TH	55.50	21.85
52.40	20.63	10TH	56.40	22.20
53.10	20.91	15TH	57.10	22.48
53.60	21.10	20TH	57.70	22.72
54.00	21.26	25TH	58.10	22.87
54.50	21.46	30TH	58.50	23.03
54.80	21.57	35TH	59.00	23.23
55.10	21.69	40TH	59.30	23.35
55.50	21.85	45TH	59.70	23.50
55.80	21.97	50TH	60.10	23.66
56.10	22.09	55TH	60.40	23.78
56.40	22.20	60TH	60.80	23.94
56.70	22.32	65TH	61.10	24.06
57.10	22.48	70TH	61.50	24.21
57.50	22.64	75TH	62.00	24.41
57.90	22.80	80TH	62.50	24.61
58.50	23.03	85TH	63.10	24.84
59.10	23.27	90TH	63.80	25.12
60.00	23.62	95TH	64.80	25.51
60.60	23.86	97TH	65.50	25.79
61.00	24.02	98TH	66.00	25.98
61.50	24.21	99TH	66.70	26.26

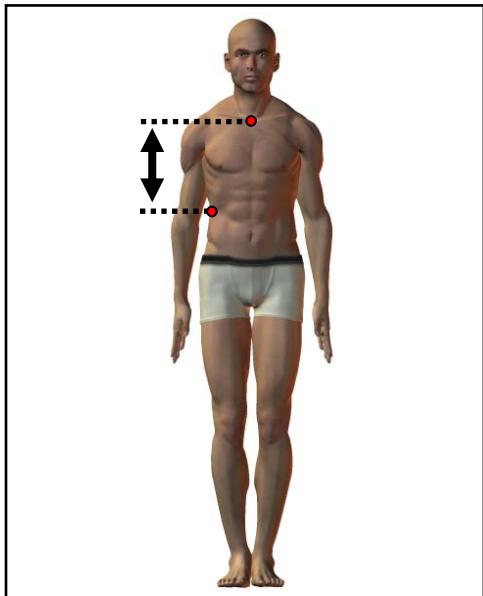
(D26) SUPRASTERNALE HEIGHT, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
55.78	STD. ERROR (MEAN)	21.96	60.07	STD. ERROR (MEAN)	23.65
0.06	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.54	STD. ERROR (STD.DEV)	1.00	2.86	STD. ERROR (STD.DEV)	1.13
0.04	MINIMUM	0.02	0.03	MINIMUM	0.01
47.40	MAXIMUM	18.66	49.60	MAXIMUM	19.53
64.10		25.24	69.10		27.20
SKEWNESS		-0.01	SKEWNESS		0.00
KURTOSIS		2.78	KURTOSIS		3.01
COEFFICIENT OF VARIATION		4.6%	COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	47.25	-
1	0.05	2	0.10	47.75	-
1	0.05	3	0.15	48.25	-
5	0.25	8	0.40	48.75	-
5	0.25	13	0.65	49.25	-
14	0.70	27	1.36	49.75	-
14	0.70	41	2.06	50.25	-
27	1.36	68	3.42	50.75	-
49	2.47	117	5.89	51.25	-
60	3.02	177	8.91	51.75	-
69	3.47	246	12.39	52.25	-
77	3.88	323	16.26	52.75	-
100	5.04	423	21.30	53.25	-
124	6.24	547	27.54	53.75	-
124	6.24	671	33.79	54.25	-
155	7.80	826	41.59	54.75	-
144	7.25	970	48.84	55.25	-
171	8.61	1141	57.45	55.75	-
155	7.80	1296	65.26	56.25	-
122	6.14	1418	71.40	56.75	-
124	6.24	1542	77.64	57.25	-
111	5.59	1653	83.23	57.75	-
76	3.83	1729	87.06	58.25	-
85	4.28	1814	91.34	58.75	-
47	2.37	1861	93.71	59.25	-
40	2.01	1901	95.72	59.75	-
33	1.66	1934	97.38	60.25	-
25	1.26	1959	98.64	60.75	-
14	0.70	1973	99.35	61.25	-
8	0.40	1981	99.75	61.75	-
1	0.05	1982	99.80	62.25	-
2	0.10	1984	99.90	62.75	-
1	0.05	1985	99.95	63.25	-
1	0.05	1986	100.00	63.75	-
				64.25	-
				64.75	-
				65.25	-
				65.75	-
				66.25	-
				66.75	-
				67.25	-
				67.75	-
				68.25	-
				68.75	-
				69.25	-

(D27) SUPRASTERNALE-TENTH RIB LENGTH

The vertical distance between the suprasternale landmark and the tenth rib landmark is calculated as follows: SUPRASTERNALE HEIGHT minus TENTH RIB HEIGHT.



PERCENTILES				
FEMALES		MALES		
CM	IN	1ST	CM	IN
23.40	9.21	1ST	26.70	10.51
23.90	9.41	2ND	27.20	10.71
24.10	9.49	3RD	27.60	10.87
24.50	9.65	5TH	28.10	11.06
25.20	9.92	10TH	28.90	11.38
25.60	10.08	15TH	29.50	11.61
25.90	10.20	20TH	29.90	11.77
26.20	10.31	25TH	30.30	11.93
26.40	10.39	30TH	30.70	12.09
26.70	10.51	35TH	31.00	12.20
26.90	10.59	40TH	31.30	12.32
27.10	10.67	45TH	31.60	12.44
27.30	10.75	50TH	31.80	12.52
27.60	10.87	55TH	32.10	12.64
27.80	10.94	60TH	32.40	12.76
28.00	11.02	65TH	32.70	12.87
28.20	11.10	70TH	33.00	12.99
28.50	11.22	75TH	33.30	13.11
28.80	11.34	80TH	33.60	13.23
29.10	11.46	85TH	34.10	13.43
29.50	11.61	90TH	34.50	13.58
30.20	11.89	95TH	35.30	13.90
30.60	12.05	97TH	35.80	14.09
30.80	12.13	98TH	36.20	14.25
31.20	12.28	99TH	36.80	14.49

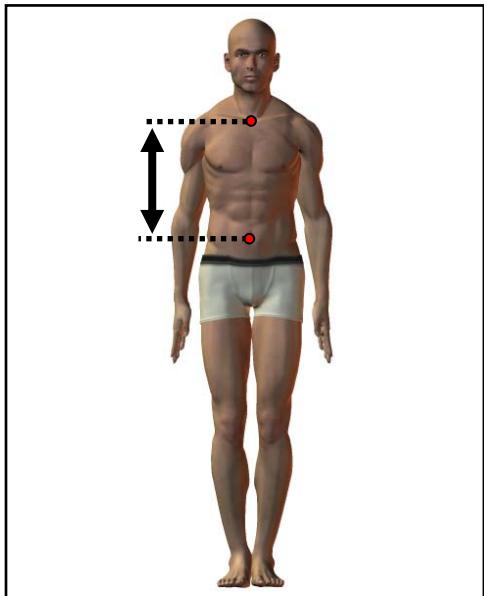
(D27) SUPRASTERNALE-TENTH RIB LENGTH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
27.34	STD. ERROR (MEAN)	10.77	31.79	STD. ERROR (MEAN)	12.52
0.04	STANDARD DEVIATION	0.02	0.03	STANDARD DEVIATION	0.01
1.71	STD. ERROR (STD.DEV)	0.67	2.19	STD. ERROR (STD.DEV)	0.86
0.03	MINIMUM	8.23	0.02	MINIMUM	9.61
20.90	MAXIMUM	13.07	24.40	MAXIMUM	15.35
SKEWNESS		0.00	SKEWNESS		-0.08
KURTOSIS		3.03	KURTOSIS		2.85
COEFFICIENT OF VARIATION		6.2%	COEFFICIENT OF VARIATION		6.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	20.75	- 21.25
0	0.00	1	0.05	21.25	- 21.75
3	0.15	4	0.20	21.75	- 22.25
3	0.15	7	0.35	22.25	- 22.75
10	0.50	17	0.86	22.75	- 23.25
14	0.70	31	1.56	23.25	- 23.75
43	2.17	74	3.73	23.75	- 24.25
59	2.97	133	6.70	24.25	- 24.75
77	3.88	210	10.57	24.75	- 25.25
135	6.80	345	17.37	25.25	- 25.75
172	8.66	517	26.03	25.75	- 26.25
204	10.27	721	36.30	26.25	- 26.75
217	10.93	938	47.23	26.75	- 27.25
249	12.54	1187	59.77	27.25	- 27.75
214	10.78	1401	70.54	27.75	- 28.25
177	8.91	1578	79.46	28.25	- 28.75
140	7.05	1718	86.51	28.75	- 29.25
115	5.79	1833	92.30	29.25	- 29.75
57	2.87	1890	95.17	29.75	- 30.25
52	2.62	1942	97.78	30.25	- 30.75
25	1.26	1967	99.04	30.75	- 31.25
10	0.50	1977	99.55	31.25	- 31.75
5	0.25	1982	99.80	31.75	- 32.25
3	0.15	1985	99.95	32.25	- 32.75
1	0.05	1986	100.00	32.75	- 33.25
				33.25	- 33.75
				33.75	- 34.25
				34.25	- 34.75
				34.75	- 35.25
				35.25	- 35.75
				35.75	- 36.25
				36.25	- 36.75
				36.75	- 37.25
				37.25	- 37.75
				37.75	- 38.25
				38.25	- 38.75
				38.75	- 39.25

(D28) SUPRASTERNALE-WAIST LENGTH (OMPHALION)

The vertical distance between the suprasternale landmark and the waist (omphalion) landmark is calculated as follows: SUPRASTERNALE HEIGHT minus WAIST HEIGHT (OMPHALION).



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
30.10	11.85	1ST	32.60	12.83
30.50	12.01	2ND	33.30	13.11
30.90	12.17	3RD	33.60	13.23
31.50	12.40	5TH	34.20	13.46
32.10	12.64	10TH	35.00	13.78
32.60	12.83	15TH	35.50	13.98
33.00	12.99	20TH	36.10	14.21
33.50	13.19	25TH	36.40	14.33
33.80	13.31	30TH	36.80	14.49
34.10	13.43	35TH	37.20	14.65
34.30	13.50	40TH	37.50	14.76
34.60	13.62	45TH	37.80	14.88
34.90	13.74	50TH	38.10	15.00
35.20	13.86	55TH	38.30	15.08
35.40	13.94	60TH	38.70	15.24
35.70	14.06	65TH	39.10	15.39
36.00	14.17	70TH	39.40	15.51
36.40	14.33	75TH	39.90	15.71
36.80	14.49	80TH	40.30	15.87
37.30	14.69	85TH	40.90	16.10
37.80	14.88	90TH	41.60	16.38
38.80	15.28	95TH	42.70	16.81
39.40	15.51	97TH	43.40	17.09
39.80	15.67	98TH	43.90	17.28
40.40	15.91	99TH	44.80	17.64

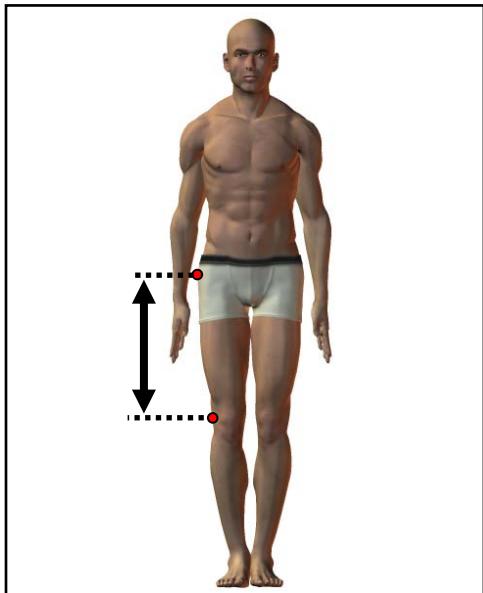
(D28) SUPRASTERNALE-WAIST LENGTH (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
34.95	STD. ERROR (MEAN)	13.76	38.21	STD. ERROR (MEAN)	15.04
0.05	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.23	STD. ERROR (STD.DEV)	0.88	2.59	STD. ERROR (STD.DEV)	1.02
0.04	MINIMUM	0.01	0.03	MINIMUM	0.01
28.40	MAXIMUM	11.18	29.30	MAXIMUM	11.54
43.50		17.13	48.30		19.02
SKEWNESS		0.20	SKEWNESS		0.25
KURTOSIS		3.05	KURTOSIS		3.13
COEFFICIENT OF VARIATION		6.4%	COEFFICIENT OF VARIATION		6.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	E	FPct	CumF
1	0.05	1	0.05	28.25	-	28.75	
4	0.20	5	0.25	28.75	-	29.25	
7	0.35	12	0.60	29.25	-	29.75	
15	0.76	27	1.36	29.75	-	30.25	
26	1.31	53	2.67	30.25	-	30.75	
33	1.66	86	4.33	30.75	-	31.25	
64	3.22	150	7.55	31.25	-	31.75	
67	3.37	217	10.93	31.75	-	32.25	
112	5.64	329	16.57	32.25	-	32.75	
117	5.89	446	22.46	32.75	-	33.25	
134	6.75	580	29.20	33.25	-	33.75	
177	8.91	757	38.12	33.75	-	34.25	
200	10.07	957	48.19	34.25	-	34.75	
160	8.06	1117	56.24	34.75	-	35.25	
176	8.86	1293	65.11	35.25	-	35.75	
155	7.80	1448	72.91	35.75	-	36.25	
133	6.70	1581	79.61	36.25	-	36.75	
106	5.34	1687	84.94	36.75	-	37.25	
89	4.48	1776	89.43	37.25	-	37.75	
57	2.87	1833	92.30	37.75	-	38.25	
50	2.52	1883	94.81	38.25	-	38.75	
35	1.76	1918	96.58	38.75	-	39.25	
26	1.31	1944	97.89	39.25	-	39.75	
20	1.01	1964	98.89	39.75	-	40.25	
9	0.45	1973	99.35	40.25	-	40.75	
6	0.30	1979	99.65	40.75	-	41.25	
2	0.10	1981	99.75	41.25	-	41.75	
2	0.10	1983	99.85	41.75	-	42.25	
1	0.05	1984	99.90	42.25	-	42.75	
1	0.05	1985	99.95	42.75	-	43.25	
1	0.05	1986	100.00	43.25	-	43.75	
				43.75	-	44.25	
				44.25	-	44.75	
				44.75	-	45.25	
				45.25	-	45.75	
				45.75	-	46.25	
				46.25	-	46.75	
				46.75	-	47.25	
				47.25	-	47.75	
				47.75	-	48.25	
				48.25	-	48.75	

(D29) THIGH LINK

The vertical distance between the trochanterion landmark and the lateral femoral epicondyle landmark is calculated as follows: TROCHANTERION HEIGHT minus LATERAL FEMORAL EPICONDYLE HEIGHT.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
32.60	12.83	1ST	34.60	13.62	
33.10	13.03	2ND	35.30	13.90	
33.40	13.15	3RD	35.90	14.13	
34.00	13.39	5TH	36.40	14.33	
34.90	13.74	10TH	37.40	14.72	
35.50	13.98	15TH	38.00	14.96	
35.90	14.13	20TH	38.50	15.16	
36.30	14.29	25TH	39.00	15.35	
36.70	14.45	30TH	39.40	15.51	
37.00	14.57	35TH	39.80	15.67	
37.30	14.69	40TH	40.10	15.79	
37.70	14.84	45TH	40.50	15.94	
37.90	14.92	50TH	40.80	16.06	
38.20	15.04	55TH	41.20	16.22	
38.50	15.16	60TH	41.50	16.34	
38.80	15.28	65TH	41.90	16.50	
39.10	15.39	70TH	42.30	16.65	
39.50	15.55	75TH	42.70	16.81	
40.00	15.75	80TH	43.30	17.05	
40.50	15.94	85TH	43.90	17.28	
41.00	16.14	90TH	44.60	17.56	
41.80	16.46	95TH	45.80	18.03	
42.50	16.73	97TH	46.50	18.31	
42.80	16.85	98TH	47.00	18.50	
43.80	17.24	99TH	48.00	18.90	

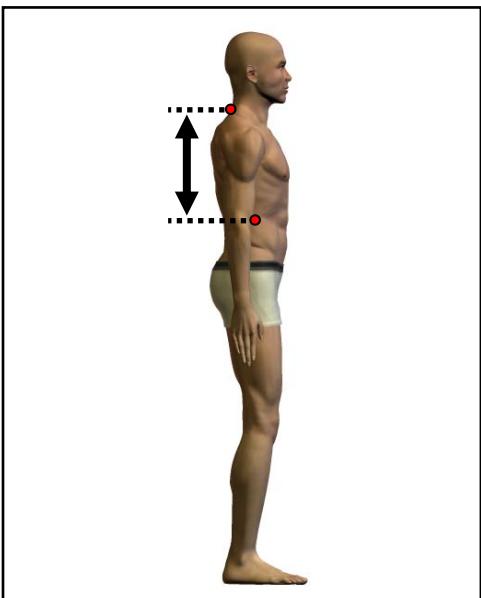
(D29) THIGH LINK

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
37.94	14.94		40.93	16.11	
0.05	STD. ERROR (MEAN)	0.02	0.04	STD. ERROR (MEAN)	0.02
2.40	STANDARD DEVIATION	0.95	2.84	STANDARD DEVIATION	1.12
0.04	STD. ERROR (STD.DEV)	0.02	0.03	STD. ERROR (STD.DEV)	0.01
30.40	MINIMUM	11.97	29.80	MINIMUM	11.73
47.40	MAXIMUM	18.66	52.00	MAXIMUM	20.47
SKEWNESS		0.10	SKEWNESS		0.17
KURTOSIS		3.15	KURTOSIS		3.12
COEFFICIENT OF VARIATION		6.3%	COEFFICIENT OF VARIATION		6.9%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
E	FPct	CumF	CumFPct	CM	E	FPct	CumF
3	0.15	3	0.15	29.75	-	30.25	1
3	0.15	6	0.30	30.25	-	30.75	0
3	0.15	9	0.45	31.25	-	31.25	0
5	0.25	14	0.70	31.75	-	32.25	1
13	0.65	27	1.36	32.25	-	32.75	2
18	0.91	45	2.27	32.75	-	33.25	4
37	1.86	82	4.13	33.25	-	33.75	7
39	1.96	121	6.09	33.75	-	34.25	11
55	2.77	176	8.86	34.25	-	34.75	26
74	3.73	250	12.59	34.75	-	35.25	27
109	5.49	359	18.08	35.25	-	35.75	34
119	5.99	478	24.07	35.75	-	36.25	59
134	6.75	612	30.82	36.25	-	36.75	88
153	7.70	765	38.52	36.75	-	37.25	117
161	8.11	926	46.63	37.25	-	37.75	148
194	9.77	1120	56.39	37.75	-	38.25	175
155	7.80	1275	64.20	38.25	-	38.75	217
140	7.05	1415	71.25	38.75	-	39.25	258
117	5.89	1532	77.14	39.25	-	39.75	217
107	5.39	1639	82.53	39.75	-	40.25	307
106	5.34	1745	87.87	40.25	-	40.75	307
73	3.68	1818	91.54	40.75	-	41.25	267
58	2.92	1876	94.46	41.25	-	41.75	282
37	1.86	1913	96.32	41.75	-	42.25	270
31	1.56	1944	97.89	42.25	-	42.75	237
13	0.65	1957	98.54	42.75	-	43.25	199
9	0.45	1966	98.99	43.25	-	43.75	164
7	0.35	1973	99.35	43.75	-	44.25	153
1	0.05	1974	99.40	44.25	-	44.75	124
5	0.25	1979	99.65	44.75	-	45.25	91
4	0.20	1983	99.85	45.25	-	45.75	76
1	0.05	1984	99.90	45.75	-	46.25	64
1	0.05	1985	99.95	46.25	-	46.75	53
0	0.00	1985	99.95	46.75	-	47.25	33
1	0.05	1986	100.00	47.25	-	47.75	16
				47.75	-	48.25	13
				48.25	-	48.75	14
				48.75	-	49.25	9
				49.25	-	49.75	2
				49.75	-	50.25	2
				50.25	-	50.75	4
				50.75	-	51.25	1
				51.25	-	51.75	0
				51.75	-	52.25	2

(D30) THORAX LINK

The vertical distance between the cervicale landmark and tenth rib landmark is calculated as follows: CERVICALE HEIGHT minus TENTH RIB HEIGHT.



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
29.50	11.61	1ST	34.40	13.54
29.80	11.73	2ND	35.00	13.78
30.20	11.89	3RD	35.40	13.94
30.70	12.09	5TH	35.90	14.13
31.40	12.36	10TH	36.80	14.49
31.90	12.56	15TH	37.30	14.69
32.30	12.72	20TH	37.80	14.88
32.60	12.83	25TH	38.20	15.04
32.90	12.95	30TH	38.50	15.16
33.20	13.07	35TH	38.90	15.31
33.40	13.15	40TH	39.20	15.43
33.70	13.27	45TH	39.50	15.55
34.00	13.39	50TH	39.80	15.67
34.20	13.46	55TH	40.00	15.75
34.40	13.54	60TH	40.30	15.87
34.70	13.66	65TH	40.60	15.98
35.00	13.78	70TH	40.90	16.10
35.20	13.86	75TH	41.20	16.22
35.50	13.98	80TH	41.50	16.34
35.90	14.13	85TH	41.90	16.50
36.40	14.33	90TH	42.40	16.69
37.10	14.61	95TH	43.10	16.97
37.70	14.84	97TH	43.60	17.17
38.00	14.96	98TH	44.00	17.32
38.40	15.12	99TH	44.70	17.60

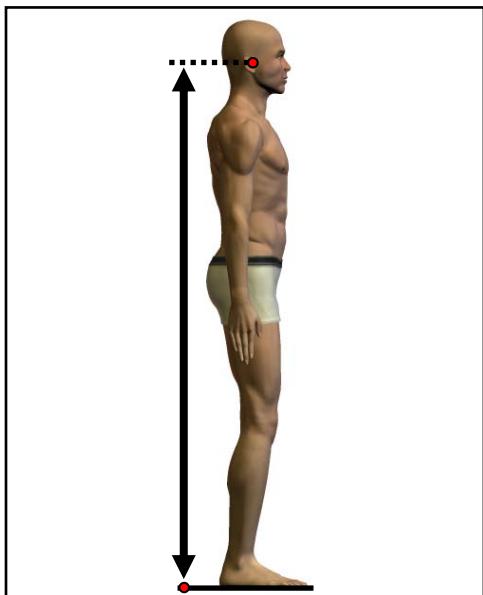
(D30) THORAX LINK

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
33.94	13.36		39.66	15.62	
0.04	0.02		0.03	0.01	
1.95	0.77		2.19	0.86	
0.03	0.01		0.02	0.01	
27.90	10.98		32.30	12.72	
41.00	16.14		47.40	18.66	
SKEWNESS	0.00		SKEWNESS	-0.12	
KURTOSIS	2.96		KURTOSIS	2.94	
COEFFICIENT OF VARIATION	5.7%		COEFFICIENT OF VARIATION	5.5%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
5	0.25	5	0.25	27.75	- 28.25
3	0.15	8	0.40	28.25	- 28.75
7	0.35	15	0.76	28.75	- 29.25
20	1.01	35	1.76	29.25	- 29.75
25	1.26	60	3.02	29.75	- 30.25
41	2.06	101	5.09	30.25	- 30.75
67	3.37	168	8.46	30.75	- 31.25
84	4.23	252	12.69	31.25	- 31.75
127	6.39	379	19.08	31.75	- 32.25
173	8.71	552	27.79	32.25	- 32.75
173	8.71	725	36.51	32.75	- 33.25
169	8.51	894	45.02	33.25	- 33.75
234	11.78	1128	56.80	33.75	- 34.25
181	9.11	1309	65.91	34.25	- 34.75
188	9.47	1497	75.38	34.75	- 35.25
154	7.75	1651	83.13	35.25	- 35.75
97	4.88	1748	88.02	35.75	- 36.25
87	4.38	1835	92.40	36.25	- 36.75
59	2.97	1894	95.37	36.75	- 37.25
36	1.81	1930	97.18	37.25	- 37.75
27	1.36	1957	98.54	37.75	- 38.25
17	0.86	1974	99.40	38.25	- 38.75
7	0.35	1981	99.75	38.75	- 39.25
3	0.15	1984	99.90	39.25	- 39.75
1	0.05	1985	99.95	39.75	- 40.25
0	0.00	1985	99.95	40.25	- 40.75
1	0.05	1986	100.00	40.75	- 41.25
				41.25	- 41.75
				41.75	- 42.25
				42.25	- 42.75
				42.75	- 43.25
				43.25	- 43.75
				43.75	- 44.25
				44.25	- 44.75
				44.75	- 45.25
				45.25	- 45.75
				45.75	- 46.25
				46.25	- 46.75
				46.75	- 47.25
				47.25	- 47.75

(D31) TRAGION HEIGHT

The vertical distance between a standing surface and the tragion landmark of a participant standing erect with the head in the Frankfurt plane is calculated as follows: STATURE minus TRAGION-TOP OF HEAD.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
135.90	53.50	1ST	147.30	57.99	
137.30	54.06	2ND	148.90	58.62	
138.30	54.45	3RD	150.10	59.09	
140.20	55.20	5TH	151.70	59.72	
142.30	56.02	10TH	153.90	60.59	
143.80	56.61	15TH	155.50	61.22	
145.10	57.13	20TH	156.90	61.77	
146.10	57.52	25TH	158.00	62.20	
146.90	57.83	30TH	158.90	62.56	
147.70	58.15	35TH	159.80	62.91	
148.40	58.43	40TH	160.70	63.27	
149.10	58.70	45TH	161.50	63.58	
149.90	59.02	50TH	162.40	63.94	
150.70	59.33	55TH	163.30	64.29	
151.50	59.65	60TH	164.10	64.61	
152.60	60.08	65TH	165.00	64.96	
153.50	60.43	70TH	165.90	65.31	
154.30	60.75	75TH	166.90	65.71	
155.30	61.14	80TH	168.10	66.18	
156.80	61.73	85TH	169.30	66.65	
158.50	62.40	90TH	171.10	67.36	
160.90	63.35	95TH	173.70	68.39	
162.50	63.98	97TH	175.60	69.13	
163.90	64.53	98TH	177.00	69.69	
165.40	65.12	99TH	179.40	70.63	

(D31) TRAGION HEIGHT

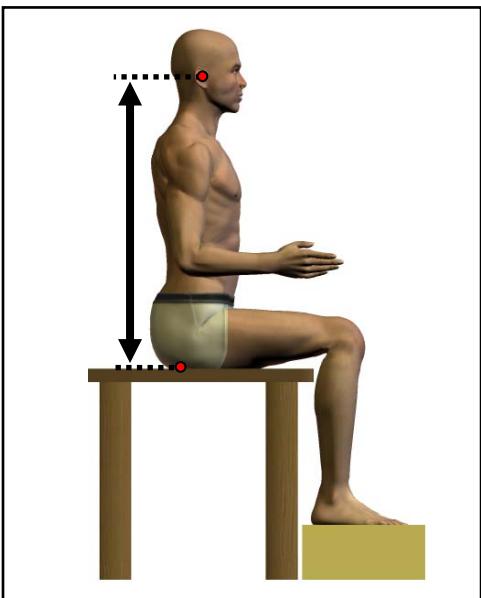
FEMALES		
<u>CM</u>		<u>IN</u>
150.20	MEAN	59.13
0.14	STD. ERROR (MEAN)	0.06
6.31	STANDARD DEVIATION	2.48
0.10	STD. ERROR (STD.DEV)	0.04
128.50	MINIMUM	50.59
170.40	MAXIMUM	67.09
SKEWNESS		0.10
KURTOSIS		3.03
COEFFICIENT OF VARIATION		4.2%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
162.51	MEAN	63.98
0.11	STD. ERROR (MEAN)	0.04
6.76	STANDARD DEVIATION	2.66
0.07	STD. ERROR (STD.DEV)	0.03
136.20	MINIMUM	53.62
185.90	MAXIMUM	73.19
SKEWNESS		0.11
KURTOSIS		3.07
COEFFICIENT OF VARIATION		4.2%
NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	FPct	CumF
1	0.05	1	0.05	128.25	-	129.75	
1	0.05	2	0.10	129.75	-	131.25	
3	0.15	5	0.25	131.25	-	132.75	
5	0.25	10	0.50	132.75	-	134.25	
7	0.35	17	0.86	134.25	-	135.75	
20	1.01	37	1.86	135.75	-	137.25	1
29	1.46	66	3.32	137.25	-	138.75	0
35	1.76	101	5.09	138.75	-	140.25	0
76	3.83	177	8.91	140.25	-	141.75	2
77	3.88	254	12.79	141.75	-	143.25	1
124	6.24	378	19.03	143.25	-	144.75	12
133	6.70	511	25.73	144.75	-	146.25	14
194	9.77	705	35.50	146.25	-	147.75	20
215	10.83	920	46.32	147.75	-	149.25	37
175	8.81	1095	55.14	149.25	-	150.75	65
168	8.46	1263	63.60	150.75	-	152.25	84
161	8.11	1424	71.70	152.25	-	153.75	157
164	8.26	1588	79.96	153.75	-	155.25	197
95	4.78	1683	84.74	155.25	-	156.75	211
87	4.38	1770	89.12	156.75	-	158.25	282
73	3.68	1843	92.80	158.25	-	159.75	326
52	2.62	1895	95.42	159.75	-	161.25	380
36	1.81	1931	97.23	161.25	-	162.75	337
25	1.26	1956	98.49	162.75	-	164.25	346
17	0.86	1973	99.35	164.25	-	165.75	347
5	0.25	1978	99.60	165.75	-	167.25	299
2	0.10	1980	99.70	167.25	-	168.75	246
4	0.20	1984	99.90	168.75	-	170.25	201
2	0.10	1986	100.00	170.25	-	171.75	168
				171.75	-	173.25	115
				173.25	-	174.75	78
				174.75	-	176.25	57
				176.25	-	177.75	29
				177.75	-	179.25	28
				179.25	-	180.75	16
				180.75	-	182.25	15
				182.25	-	183.75	7
				183.75	-	185.25	3
				185.25	-	186.75	1

(D32) TRAGION HEIGHT, SITTING

The vertical distance between a sitting surface and the tragion landmark of a participant sitting erect with the head in the Frankfurt plane is calculated as follows: SITTING HEIGHT minus TRAGION-TOP OF HEAD.



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
66.00	25.98	1ST	70.60	27.80
66.50	26.18	2ND	71.80	28.27
67.00	26.38	3RD	72.20	28.43
67.70	26.65	5TH	73.10	28.78
68.80	27.09	10TH	74.30	29.25
69.60	27.40	15TH	75.20	29.61
70.30	27.68	20TH	75.80	29.84
70.80	27.87	25TH	76.40	30.08
71.30	28.07	30TH	76.90	30.28
71.70	28.23	35TH	77.40	30.47
72.10	28.39	40TH	77.80	30.63
72.60	28.58	45TH	78.20	30.79
73.00	28.74	50TH	78.60	30.94
73.40	28.90	55TH	79.10	31.14
73.80	29.06	60TH	79.60	31.34
74.30	29.25	65TH	80.00	31.50
74.70	29.41	70TH	80.50	31.69
75.20	29.61	75TH	81.10	31.93
75.70	29.80	80TH	81.60	32.13
76.40	30.08	85TH	82.30	32.40
77.20	30.39	90TH	83.20	32.76
78.50	30.91	95TH	84.50	33.27
79.10	31.14	97TH	85.40	33.62
79.50	31.30	98TH	86.00	33.86
80.50	31.69	99TH	86.90	34.21

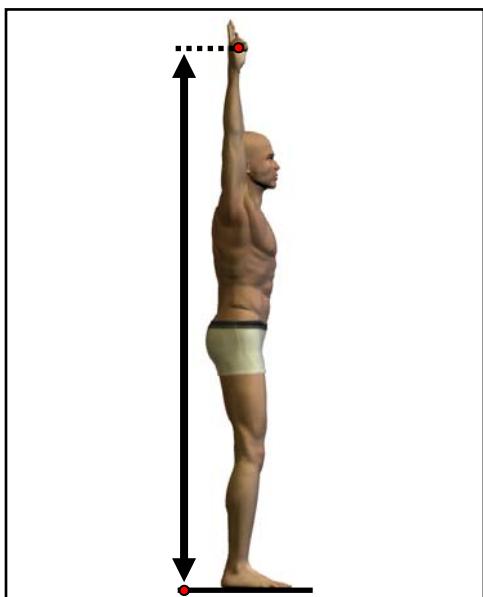
(D32) TRAGION HEIGHT, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
73.02	28.75		78.71	30.99	
0.07	0.03		0.05	0.02	
3.21	1.26		3.47	1.36	
0.05	0.02		0.04	0.02	
62.30	24.53		66.70	26.26	
82.30	32.40		90.30	35.55	
SKEWNESS	0.04		SKEWNESS	0.03	
KURTOSIS	2.73		KURTOSIS	3.01	
COEFFICIENT OF VARIATION	4.4%		COEFFICIENT OF VARIATION	4.4%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	
1	0.05	1	0.05	62.25	- 63.00
0	0.00	1	0.05	63.00	- 63.75
1	0.05	2	0.10	63.75	- 64.50
5	0.25	7	0.35	64.50	- 65.25
12	0.60	19	0.96	65.25	- 66.00
25	1.26	44	2.22	66.00	- 66.75
38	1.91	82	4.13	66.75	- 67.50
62	3.12	144	7.25	67.50	- 68.25
63	3.17	207	10.42	68.25	- 69.00
114	5.74	321	16.16	69.00	- 69.75
107	5.39	428	21.55	69.75	- 70.50
158	7.96	586	29.51	70.50	- 71.25
179	9.01	765	38.52	71.25	- 72.00
169	8.51	934	47.03	72.00	- 72.75
159	8.01	1093	55.04	72.75	- 73.50
197	9.92	1290	64.95	73.50	- 74.25
155	7.80	1445	72.76	74.25	- 75.00
149	7.50	1594	80.26	75.00	- 75.75
103	5.19	1697	85.45	75.75	- 76.50
93	4.68	1790	90.13	76.50	- 77.25
59	2.97	1849	93.10	77.25	- 78.00
54	2.72	1903	95.82	78.00	- 78.75
40	2.01	1943	97.83	78.75	- 79.50
20	1.01	1963	98.84	79.50	- 80.25
13	0.65	1976	99.50	80.25	- 81.00
6	0.30	1982	99.80	81.00	- 81.75
4	0.20	1986	100.00	81.75	- 82.50
				82.50	- 83.25
				83.25	- 84.00
				84.00	- 84.75
				84.75	- 85.50
				85.50	- 86.25
				86.25	- 87.00
				87.00	- 87.75
				87.75	- 88.50
				88.50	- 89.25
				89.25	- 90.00
				90.00	- 90.75
					175 4.29
					118 2.89
					327 8.01
					161 3.94
					378 9.26
					242 5.93
					311 7.62
					365 8.94
					2388 58.50
					3019 73.96
					3321 81.36
					3511 86.01
					3686 90.30
					3804 93.19
					3908 95.74
					3967 97.18
					4013 98.31
					4043 99.04
					4064 99.56
					4073 99.78
					4077 99.88
					4081 99.98
					4082 100.00

(D33) VERTICAL GRIP REACH

The vertical distance between a standing surface and the center of a 1-1/4-in diameter dowel gripped horizontally in the right hand of a participant standing erect with the shoulder, arm, and hand held straight overhead is calculated as follows: OVERHEAD FINGERTIP REACH SITTING plus (STATURE minus SITTING HEIGHT) minus ANSUR mean of HAND LENGTH plus ANSUR mean of WRIST-CENTER OF GRIP LENGTH.



PERCENTILES				
FEMALES		MALES		
CM	IN	1ST	CM	IN
174.90	68.86	1ST	190.70	75.08
176.90	69.65	2ND	193.40	76.14
178.30	70.20	3RD	194.90	76.73
181.20	71.34	5TH	197.30	77.68
184.60	72.68	10TH	200.60	78.98
186.70	73.50	15TH	203.20	80.00
188.60	74.25	20TH	205.20	80.79
190.20	74.88	25TH	207.00	81.50
191.60	75.43	30TH	208.70	82.17
192.90	75.94	35TH	210.10	82.72
193.90	76.34	40TH	211.40	83.23
195.20	76.85	45TH	212.70	83.74
196.40	77.32	50TH	213.90	84.21
197.50	77.76	55TH	215.20	84.72
198.70	78.23	60TH	216.40	85.20
200.10	78.78	65TH	217.90	85.79
201.50	79.33	70TH	219.40	86.38
203.30	80.04	75TH	220.80	86.93
205.10	80.75	80TH	222.60	87.64
207.40	81.65	85TH	224.90	88.54
210.00	82.68	90TH	227.40	89.53
213.90	84.21	95TH	231.40	91.10
215.30	84.76	97TH	234.10	92.17
216.50	85.24	98TH	236.40	93.07
219.30	86.34	99TH	239.40	94.25

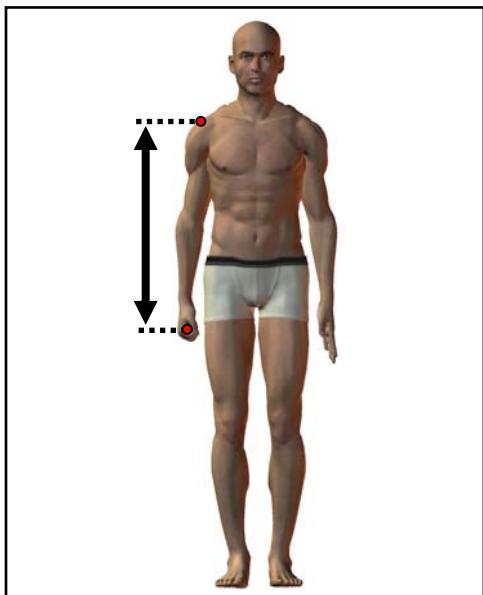
(D33) VERTICAL GRIP REACH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
196.76	STD. ERROR (MEAN)	0.09	214.06	STD. ERROR (MEAN)	84.28
0.22	STANDARD DEVIATION	3.87	0.16	STANDARD DEVIATION	0.06
9.82	STD. ERROR (STD.DEV)	0.06	10.44	STD. ERROR (STD.DEV)	4.11
0.16	MINIMUM	64.96	0.12	MINIMUM	0.05
165.00	MAXIMUM	90.71	174.70	MAXIMUM	68.78
230.40	SKEWNESS	0.10	252.70	KURTOSIS	99.49
KURTOSIS	COEFFICIENT OF VARIATION	5.0%	SKEWNESS	KURTOSIS	0.11
NUMBER OF PARTICIPANTS	1986		COEFFICIENT OF VARIATION	3.06	
			NUMBER OF PARTICIPANTS	4.9%	
					4082

FREQUENCIES					
FEMALES				MALES	
E	FPct	CumF	CumFPct	CM	
3	0.15	3	0.15	164.55	- 166.55
1	0.05	4	0.20	166.55	- 168.55
1	0.05	5	0.25	168.55	- 170.55
7	0.35	12	0.60	170.55	- 172.55
6	0.30	18	0.91	172.55	- 174.55
18	0.91	36	1.81	174.55	- 176.55
26	1.31	62	3.12	176.55	- 178.55
27	1.36	89	4.48	178.55	- 180.55
47	2.37	136	6.85	180.55	- 182.55
60	3.02	196	9.87	182.55	- 184.55
90	4.53	286	14.40	184.55	- 186.55
111	5.59	397	19.99	186.55	- 188.55
129	6.50	526	26.49	188.55	- 190.55
136	6.85	662	33.33	190.55	- 192.55
183	9.21	845	42.55	192.55	- 194.55
167	8.41	1012	50.96	194.55	- 196.55
167	8.41	1179	59.37	196.55	- 198.55
144	7.25	1323	66.62	198.55	- 200.55
125	6.29	1448	72.91	200.55	- 202.55
109	5.49	1557	78.40	202.55	- 204.55
96	4.83	1653	83.23	204.55	- 206.55
85	4.28	1738	87.51	206.55	- 208.55
64	3.22	1802	90.74	208.55	- 210.55
57	2.87	1859	93.61	210.55	- 212.55
49	2.47	1908	96.07	212.55	- 214.55
40	2.01	1948	98.09	214.55	- 216.55
14	0.70	1962	98.79	216.55	- 218.55
9	0.45	1971	99.24	218.55	- 220.55
5	0.25	1976	99.50	220.55	- 222.55
5	0.25	1981	99.75	222.55	- 224.55
3	0.15	1984	99.90	224.55	- 226.55
0	0.00	1984	99.90	226.55	- 228.55
2	0.10	1986	100.00	228.55	- 230.55
				230.55	- 232.55
				232.55	- 234.55
				234.55	- 236.55
				236.55	- 238.55
				238.55	- 240.55
				240.55	- 242.55
				242.55	- 244.55
				244.55	- 246.55
				246.55	- 248.55
				248.55	- 250.55
				250.55	- 252.55
				252.55	- 254.55

(D34) VERTICAL GRIP REACH DOWN

The vertical distance between the acromion right landmark and the center of a 1-1/4-in diameter dowel gripped horizontally in the right hand of a participant standing erect with the arms held straight at the sides is calculated as follows: ACROMIAL HEIGHT minus WRIST HEIGHT plus ANSUR mean of WRIST-CENTER OF GRIP LENGTH.



PERCENTILES				
FEMALES		MALES		
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>
53.90	21.22	1ST	59.30	23.35
54.80	21.57	2ND	60.00	23.62
55.30	21.77	3RD	60.60	23.86
55.90	22.01	5TH	61.20	24.09
56.90	22.40	10TH	62.30	24.53
57.60	22.68	15TH	63.00	24.80
58.30	22.95	20TH	63.70	25.08
58.80	23.15	25TH	64.10	25.24
59.10	23.27	30TH	64.60	25.43
59.50	23.43	35TH	65.00	25.59
59.80	23.54	40TH	65.50	25.79
60.20	23.70	45TH	65.90	25.94
60.60	23.86	50TH	66.30	26.10
60.90	23.98	55TH	66.70	26.26
61.30	24.13	60TH	67.10	26.42
61.70	24.29	65TH	67.50	26.57
62.20	24.49	70TH	67.90	26.73
62.70	24.69	75TH	68.40	26.93
63.20	24.88	80TH	68.90	27.13
63.90	25.16	85TH	69.50	27.36
64.50	25.39	90TH	70.40	27.72
65.70	25.87	95TH	71.80	28.27
66.30	26.10	97TH	72.60	28.58
66.70	26.26	98TH	73.00	28.74
67.70	26.65	99TH	74.30	29.25

(D34) VERTICAL GRIP REACH DOWN

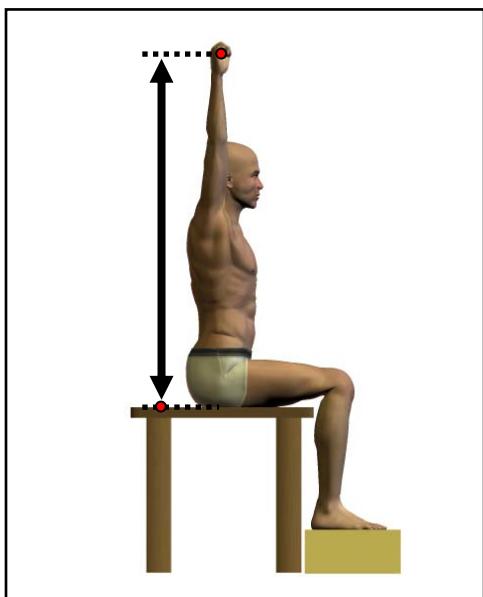
FEMALES		
<u>CM</u>		<u>IN</u>
60.69	MEAN	23.89
0.07	STD. ERROR (MEAN)	0.03
2.98	STANDARD DEVIATION	1.17
0.05	STD. ERROR (STD.DEV)	0.02
47.80	MINIMUM	18.82
73.30	MAXIMUM	28.86
SKEWNESS		0.06
KURTOSIS		3.25
COEFFICIENT OF VARIATION		4.9%
NUMBER OF PARTICIPANTS		1986

MALES		
<u>CM</u>		<u>IN</u>
66.32	MEAN	26.11
0.05	STD. ERROR (MEAN)	0.02
3.17	STANDARD DEVIATION	1.25
0.04	STD. ERROR (STD.DEV)	0.01
55.80	MINIMUM	21.97
79.20	MAXIMUM	31.18
SKEWNESS		0.15
KURTOSIS		3.11
COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		4082

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	FPct	CumF
1	0.05	1	0.05	47.75	-	48.50	
0	0.00	1	0.05	48.50	-	49.25	
0	0.00	1	0.05	49.25	-	50.00	
1	0.05	2	0.10	50.00	-	50.75	
1	0.05	3	0.15	50.75	-	51.50	
5	0.25	8	0.40	51.50	-	52.25	
3	0.15	11	0.55	52.25	-	53.00	
5	0.25	16	0.81	53.00	-	53.75	
16	0.81	32	1.61	53.75	-	54.50	
27	1.36	59	2.97	54.50	-	55.25	
41	2.06	100	5.04	55.25	-	56.00	1 0.02
82	4.13	182	9.16	56.00	-	56.75	2 0.05
86	4.33	268	13.49	56.75	-	57.50	6 0.15
119	5.99	387	19.49	57.50	-	58.25	8 0.20
159	8.01	546	27.49	58.25	-	59.00	11 0.27
216	10.88	762	38.37	59.00	-	59.75	34 0.83
199	10.02	961	48.39	59.75	-	60.50	46 1.13
204	10.27	1165	58.66	60.50	-	61.25	98 2.40
182	9.16	1347	67.82	61.25	-	62.00	128 3.14
145	7.30	1492	75.13	62.00	-	62.75	190 4.65
135	6.80	1627	81.92	62.75	-	63.50	212 5.19
122	6.14	1749	88.07	63.50	-	64.25	326 7.99
76	3.83	1825	91.89	64.25	-	65.00	342 8.38
69	3.47	1894	95.37	65.00	-	65.75	365 8.94
40	2.01	1934	97.38	65.75	-	66.50	360 8.82
26	1.31	1960	98.69	66.50	-	67.25	424 10.39
12	0.60	1972	99.30	67.25	-	68.00	320 7.84
4	0.20	1976	99.50	68.00	-	68.75	345 8.45
4	0.20	1980	99.70	68.75	-	69.50	224 5.49
5	0.25	1985	99.95	69.50	-	70.25	202 4.95
0	0.00	1985	99.95	70.25	-	71.00	129 3.16
0	0.00	1985	99.95	71.00	-	71.75	99 2.43
0	0.00	1985	99.95	71.75	-	72.50	78 1.91
0	0.00	1985	99.95	72.50	-	73.25	59 1.45
1	0.05	1986	100.00	73.25	-	74.00	26 0.64
				74.00	-	74.75	19 0.47
				74.75	-	75.50	12 0.29
				75.50	-	76.25	9 0.22
				76.25	-	77.00	4 0.10
				77.00	-	77.75	0 0.00
				77.75	-	78.50	2 0.05
				78.50	-	79.25	1 0.02

(D35) VERTICAL GRIP REACH, SITTING

The vertical distance between a sitting surface and the center of a 1-1/4-in diameter dowel gripped horizontally in the right hand of a participant sitting erect with the arm held straight overhead is calculated as follows: OVERHEAD FINGERTIP REACH SITTING minus ANSUR mean of HAND LENGTH plus ANSUR mean of WRIST-CENTER OF GRIP LENGTH.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
105.10	41.38	1ST	115.20	45.35	
107.00	42.13	2ND	116.60	45.91	
108.00	42.52	3RD	117.80	46.38	
109.30	43.03	5TH	119.20	46.93	
111.60	43.94	10TH	121.60	47.87	
113.20	44.57	15TH	123.10	48.46	
114.30	45.00	20TH	124.50	49.02	
115.30	45.39	25TH	125.60	49.45	
116.20	45.75	30TH	126.70	49.88	
117.10	46.10	35TH	127.70	50.28	
117.90	46.42	40TH	128.50	50.59	
118.70	46.73	45TH	129.30	50.91	
119.50	47.05	50TH	130.20	51.26	
120.40	47.40	55TH	130.90	51.54	
121.00	47.64	60TH	131.80	51.89	
121.70	47.91	65TH	132.80	52.28	
122.60	48.27	70TH	133.70	52.64	
123.60	48.66	75TH	134.80	53.07	
124.70	49.09	80TH	135.90	53.50	
126.20	49.69	85TH	137.40	54.09	
128.10	50.43	90TH	139.10	54.76	
129.90	51.14	95TH	141.60	55.75	
131.50	51.77	97TH	143.10	56.34	
132.60	52.20	98TH	144.60	56.93	
133.90	52.72	99TH	146.40	57.64	

(D35) VERTICAL GRIP REACH, SITTING

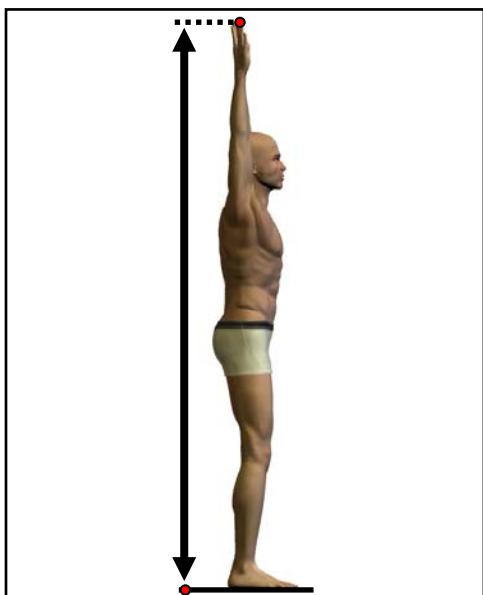
FEMALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>
119.57	47.08	
0.14	0.06	
6.24	2.46	
0.10	0.04	
99.70	39.25	
142.40	56.06	
SKEWNESS	0.06	
KURTOSIS	2.91	
COEFFICIENT OF VARIATION	5.2%	
NUMBER OF PARTICIPANTS	1986	

MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>
130.27	51.29	
0.11	0.04	
6.77	2.67	
0.07	0.03	
107.30	42.24	
152.70	60.12	
SKEWNESS	0.07	
KURTOSIS	2.96	
COEFFICIENT OF VARIATION	5.2%	
NUMBER OF PARTICIPANTS	4082	

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	-	E	FPct
2	0.10	2	0.10	99.25	-	100.75	
2	0.10	4	0.20	100.75	-	102.25	
2	0.10	6	0.30	102.25	-	103.75	
16	0.81	22	1.11	103.75	-	105.25	
15	0.76	37	1.86	105.25	-	106.75	
26	1.31	63	3.17	106.75	-	108.25	
48	2.42	111	5.59	108.25	-	109.75	
70	3.52	181	9.11	109.75	-	111.25	
88	4.43	269	13.54	111.25	-	112.75	
124	6.24	393	19.79	112.75	-	114.25	
147	7.40	540	27.19	114.25	-	115.75	
172	8.66	712	35.85	115.75	-	117.25	
186	9.37	898	45.22	117.25	-	118.75	
181	9.11	1079	54.33	118.75	-	120.25	
216	10.88	1295	65.21	120.25	-	121.75	
160	8.06	1455	73.26	121.75	-	123.25	
136	6.85	1591	80.11	123.25	-	124.75	
99	4.98	1690	85.10	124.75	-	126.25	
77	3.88	1767	88.97	126.25	-	127.75	
91	4.58	1858	93.55	127.75	-	129.25	
54	2.72	1912	96.27	129.25	-	130.75	
26	1.31	1938	97.58	130.75	-	132.25	
27	1.36	1965	98.94	132.25	-	133.75	
10	0.50	1975	99.45	133.75	-	135.25	
6	0.30	1981	99.75	135.25	-	136.75	
3	0.15	1984	99.90	136.75	-	138.25	
1	0.05	1985	99.95	138.25	-	139.75	
0	0.00	1985	99.95	139.75	-	141.25	
1	0.05	1986	100.00	141.25	-	142.75	
				142.75	-	144.25	
				144.25	-	145.75	
				145.75	-	147.25	
				147.25	-	148.75	
				148.75	-	150.25	
				150.25	-	151.75	
				151.75	-	153.25	

(D36) VERTICAL INDEX FINGERTIP REACH

The vertical distance between a standing surface and the tip of the right index finger of a participant standing erect with the right shoulder, arm, and fingers stretched straight overhead is calculated as follows: OVERHEAD FINGERTIP REACH SITTING plus (STATURE minus SITTING HEIGHT) minus (ANSUR mean of HAND LENGTH minus ANSUR mean of WRIST-INDEX FINGER LENGTH).



PERCENTILES				
FEMALES		MALES		
CM	IN		CM	IN
185.20	72.91	1ST	201.80	79.45
187.20	73.70	2ND	204.50	80.51
188.60	74.25	3RD	206.00	81.10
191.50	75.39	5TH	208.40	82.05
194.90	76.73	10TH	211.70	83.35
197.00	77.56	15TH	214.30	84.37
198.90	78.31	20TH	216.30	85.16
200.50	78.94	25TH	218.10	85.87
201.90	79.49	30TH	219.80	86.54
203.20	80.00	35TH	221.20	87.09
204.20	80.39	40TH	222.50	87.60
205.50	80.91	45TH	223.80	88.11
206.70	81.38	50TH	225.00	88.58
207.80	81.81	55TH	226.30	89.09
209.00	82.28	60TH	227.50	89.57
210.40	82.83	65TH	229.00	90.16
211.80	83.39	70TH	230.50	90.75
213.60	84.09	75TH	231.90	91.30
215.40	84.80	80TH	233.70	92.01
217.70	85.71	85TH	236.00	92.91
220.30	86.73	90TH	238.50	93.90
224.20	88.27	95TH	242.50	95.47
225.60	88.82	97TH	245.20	96.54
226.80	89.29	98TH	247.50	97.44
229.60	90.39	99TH	250.50	98.62

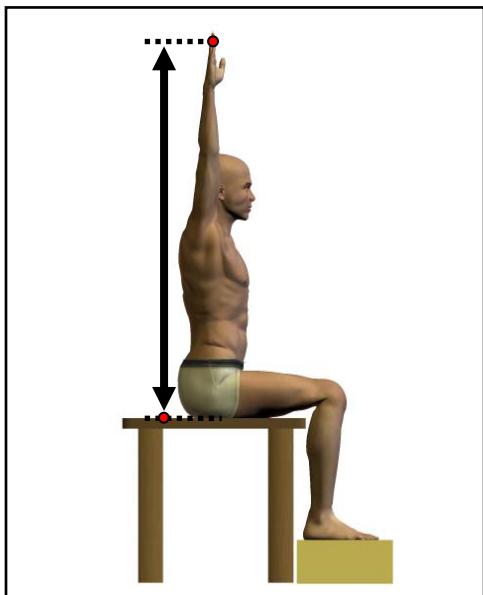
(D36) VERTICAL INDEX FINGERTIP REACH

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
207.06	STD. ERROR (MEAN)	81.52	225.16	STD. ERROR (MEAN)	88.65
0.22	STANDARD DEVIATION	0.09	0.16	STANDARD DEVIATION	0.06
9.82	STD. ERROR (STD.DEV)	3.87	10.44	STD. ERROR (STD.DEV)	4.11
0.16	MINIMUM	0.06	0.12	MINIMUM	0.05
175.30	MAXIMUM	69.02	185.80	MAXIMUM	73.15
240.70		94.76	263.80		103.86
SKEWNESS		0.10	SKEWNESS		0.11
KURTOSIS		2.96	KURTOSIS		3.06
COEFFICIENT OF VARIATION		4.7%	COEFFICIENT OF VARIATION		4.6%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
3	0.15	3	0.15	174.55	-
1	0.05	4	0.20	176.55	-
0	0.00	4	0.20	178.55	-
7	0.35	11	0.55	180.55	-
7	0.35	18	0.91	182.55	-
17	0.86	35	1.76	184.55	-
21	1.06	56	2.82	186.55	-
28	1.41	84	4.23	188.55	-
42	2.11	126	6.34	190.55	-
58	2.92	184	9.26	192.55	-
86	4.33	270	13.60	194.55	-
114	5.74	384	19.34	196.55	-
115	5.79	499	25.13	198.55	-
145	7.30	644	32.43	200.55	-
176	8.86	820	41.29	202.55	-
165	8.31	985	49.60	204.55	-
168	8.46	1153	58.06	206.55	-
150	7.55	1303	65.61	208.55	-
133	6.70	1436	72.31	210.55	-
108	5.44	1544	77.74	212.55	-
96	4.83	1640	82.58	214.55	-
84	4.23	1724	86.81	216.55	-
71	3.58	1795	90.38	218.55	-
57	2.87	1852	93.25	220.55	-
43	2.17	1895	95.42	222.55	-
46	2.32	1941	97.73	224.55	-
20	1.01	1961	98.74	226.55	-
10	0.50	1971	99.24	228.55	-
4	0.20	1975	99.45	230.55	-
6	0.30	1981	99.75	232.55	-
2	0.10	1983	99.85	234.55	-
1	0.05	1984	99.90	236.55	-
1	0.05	1985	99.95	238.55	-
1	0.05	1986	100.00	240.55	-
				242.55	-
				244.55	-
				244.55	-
				246.55	-
				246.55	-
				248.55	-
				250.55	-
				252.55	-
				254.55	-
				256.55	-
				258.55	-
				260.55	-
				262.55	-
				264.55	-

(D37) VERTICAL INDEX FINGERTIP REACH, SITTING

The vertical distance between a sitting surface and the tip of the right index finger of a participant sitting erect and raising the right shoulder, arm, and fingers straight overhead is calculated as follows: OVERHEAD FINGERTIP REACH SITTING minus ANSUR mean of HAND LENGTH plus ANSUR mean of WRIST-INDEX FINGER LENGTH.



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
115.40	45.43	1ST	126.30	49.72	
117.30	46.18	2ND	127.70	50.28	
118.30	46.57	3RD	128.90	50.75	
119.60	47.09	5TH	130.30	51.30	
121.90	47.99	10TH	132.70	52.24	
123.50	48.62	15TH	134.20	52.83	
124.60	49.06	20TH	135.60	53.39	
125.60	49.45	25TH	136.70	53.82	
126.50	49.80	30TH	137.80	54.25	
127.40	50.16	35TH	138.80	54.65	
128.20	50.47	40TH	139.60	54.96	
129.00	50.79	45TH	140.40	55.28	
129.80	51.10	50TH	141.30	55.63	
130.70	51.46	55TH	142.00	55.91	
131.30	51.69	60TH	142.90	56.26	
132.00	51.97	65TH	143.90	56.65	
132.90	52.32	70TH	144.80	57.01	
133.90	52.72	75TH	145.90	57.44	
135.00	53.15	80TH	147.00	57.87	
136.50	53.74	85TH	148.50	58.46	
138.40	54.49	90TH	150.20	59.13	
140.20	55.20	95TH	152.70	60.12	
141.80	55.83	97TH	154.20	60.71	
142.90	56.26	98TH	155.70	61.30	
144.20	56.77	99TH	157.50	62.01	

(D37) VERTICAL INDEX FINGERTIP REACH, SITTING

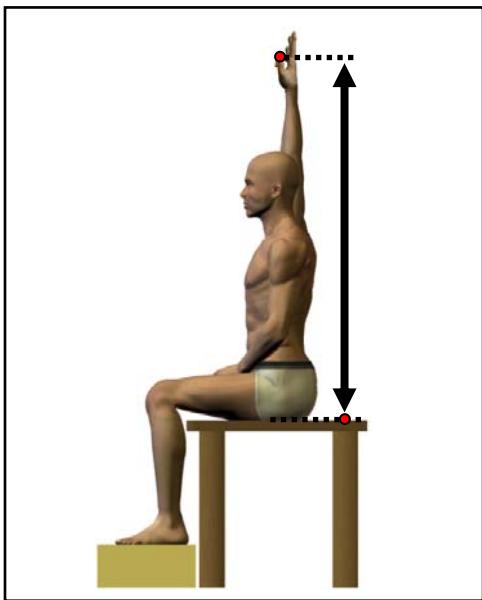
FEMALES		
CM		IN
129.87	MEAN	51.13
0.14	STD. ERROR (MEAN)	0.06
6.24	STANDARD DEVIATION	2.46
0.10	STD. ERROR (STD.DEV)	0.04
110.00	MINIMUM	43.31
152.70	MAXIMUM	60.12
SKEWNESS		0.06
KURTOSIS		2.91
COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		1986

MALES		
CM		IN
141.37	MEAN	55.66
0.11	STD. ERROR (MEAN)	0.04
6.77	STANDARD DEVIATION	2.67
0.07	STD. ERROR (STD.DEV)	0.03
118.40	MINIMUM	46.61
163.80	MAXIMUM	64.49
SKEWNESS		0.07
KURTOSIS		2.96
COEFFICIENT OF VARIATION		4.8%
NUMBER OF PARTICIPANTS		4082

FREQUENCIES										
FEMALES								MALES		
E	FPct	CumF	CumFPct	CM			E	FPct	CumF	CumFPct
2	0.10	2	0.10	109.25	-	110.75				
1	0.05	3	0.15	110.75	-	112.25				
3	0.15	6	0.30	112.25	-	113.75				
9	0.45	15	0.76	113.75	-	115.25				
20	1.01	35	1.76	115.25	-	116.75				
23	1.16	58	2.92	116.75	-	118.25				
43	2.17	101	5.09	118.25	-	119.75	2	0.05	2	0.05
67	3.37	168	8.46	119.75	-	121.25	3	0.07	5	0.12
77	3.88	245	12.34	121.25	-	122.75	3	0.07	8	0.20
119	5.99	364	18.33	122.75	-	124.25	12	0.29	20	0.49
147	7.40	511	25.73	124.25	-	125.75	11	0.27	31	0.76
173	8.71	684	34.44	125.75	-	127.25	35	0.86	66	1.62
176	8.86	860	43.30	127.25	-	128.75	52	1.27	118	2.89
178	8.96	1038	52.27	128.75	-	130.25	85	2.08	203	4.97
211	10.62	1249	62.89	130.25	-	131.75	109	2.67	312	7.64
172	8.66	1421	71.55	131.75	-	133.25	160	3.92	472	11.56
138	6.95	1559	78.50	133.25	-	134.75	205	5.02	677	16.59
111	5.59	1670	84.09	134.75	-	136.25	255	6.25	932	22.83
83	4.18	1753	88.27	136.25	-	137.75	281	6.88	1213	29.72
91	4.58	1844	92.85	137.75	-	139.25	313	7.67	1526	37.38
62	3.12	1906	95.97	139.25	-	140.75	380	9.31	1906	46.69
27	1.36	1933	97.33	140.75	-	142.25	398	9.75	2304	56.44
25	1.26	1958	98.59	142.25	-	143.75	313	7.67	2617	64.11
15	0.76	1973	99.35	143.75	-	145.25	318	7.79	2935	71.90
8	0.40	1981	99.75	145.25	-	146.75	294	7.20	3229	79.10
3	0.15	1984	99.90	146.75	-	148.25	213	5.22	3442	84.32
1	0.05	1985	99.95	148.25	-	149.75	183	4.48	3625	88.80
0	0.00	1985	99.95	149.75	-	151.25	152	3.72	3777	92.53
1	0.05	1986	100.00	151.25	-	152.75	101	2.47	3878	95.00
				152.75	-	154.25	84	2.06	3962	97.06
				154.25	-	155.75	41	1.00	4003	98.06
				155.75	-	157.25	35	0.86	4038	98.92
				157.25	-	158.75	23	0.56	4061	99.49
				158.75	-	160.25	7	0.17	4068	99.66
				160.25	-	161.75	5	0.12	4073	99.78
				161.75	-	163.25	5	0.12	4078	99.90
				163.25	-	164.75	4	0.10	4082	100.00

(D38) VERTICAL THUMBTIP REACH, SITTING

The vertical distance between a sitting surface and the tip of the right thumb of a participant sitting erect with the right shoulder, arm, and hand held straight overhead with the thumb lying on the first knuckle of the index finger is calculated as follows: OVERHEAD FINGERTIP REACH SITTING minus ANSUR mean of HAND LENGTH plus ANSUR mean of WRIST-THUMBTIP LENGTH.



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
110.20	43.39	1ST	120.70	47.52	
112.10	44.13	2ND	122.10	48.07	
113.10	44.53	3RD	123.30	48.54	
114.40	45.04	5TH	124.70	49.09	
116.70	45.94	10TH	127.10	50.04	
118.30	46.57	15TH	128.60	50.63	
119.40	47.01	20TH	130.00	51.18	
120.40	47.40	25TH	131.10	51.61	
121.30	47.76	30TH	132.20	52.05	
122.20	48.11	35TH	133.20	52.44	
123.00	48.43	40TH	134.00	52.76	
123.80	48.74	45TH	134.80	53.07	
124.60	49.06	50TH	135.70	53.43	
125.50	49.41	55TH	136.40	53.70	
126.10	49.65	60TH	137.30	54.06	
126.80	49.92	65TH	138.30	54.45	
127.70	50.28	70TH	139.20	54.80	
128.70	50.67	75TH	140.30	55.24	
129.80	51.10	80TH	141.40	55.67	
131.30	51.69	85TH	142.90	56.26	
133.20	52.44	90TH	144.60	56.93	
135.00	53.15	95TH	147.10	57.91	
136.60	53.78	97TH	148.60	58.50	
137.70	54.21	98TH	150.10	59.09	
139.00	54.72	99TH	151.90	59.80	

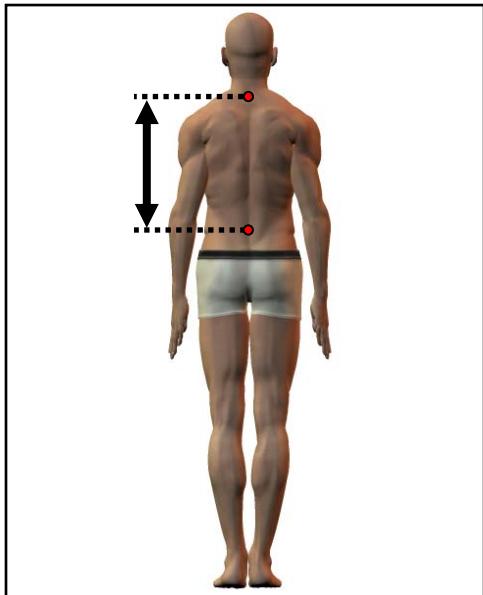
(D38) VERTICAL THUMBTIP REACH, SITTING

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
124.67	49.08		135.77	53.45	
0.14	0.06		0.11	0.04	
6.24	2.46		6.77	2.67	
0.10	0.04		0.07	0.03	
104.80	41.26		112.80	44.41	
147.50	58.07		158.20	62.28	
SKEWNESS	0.06		SKEWNESS	0.07	
KURTOSIS	2.91		KURTOSIS	2.96	
COEFFICIENT OF VARIATION	5.0%		COEFFICIENT OF VARIATION	5.0%	
NUMBER OF PARTICIPANTS	1986		NUMBER OF PARTICIPANTS	4082	

FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	E	FPct	CumF
3	0.15	3	0.15	104.75	-	106.25	
1	0.05	4	0.20	106.25	-	107.75	
7	0.35	11	0.55	107.75	-	109.25	
14	0.70	25	1.26	109.25	-	110.75	
17	0.86	42	2.11	110.75	-	112.25	
34	1.71	76	3.83	112.25	-	113.75	
48	2.42	124	6.24	113.75	-	115.25	
77	3.88	201	10.12	115.25	-	116.75	
94	4.73	295	14.85	116.75	-	118.25	
132	6.65	427	21.50	118.25	-	119.75	
161	8.11	588	29.61	119.75	-	121.25	
178	8.96	766	38.57	121.25	-	122.75	
184	9.26	950	47.83	122.75	-	124.25	
188	9.47	1138	57.30	124.25	-	125.75	
199	10.02	1337	67.32	125.75	-	127.25	
155	7.80	1492	75.13	127.25	-	128.75	
128	6.45	1620	81.57	128.75	-	130.25	
94	4.73	1714	86.30	130.25	-	131.75	
77	3.88	1791	90.18	131.75	-	133.25	
81	4.08	1872	94.26	133.25	-	134.75	
47	2.37	1919	96.63	134.75	-	136.25	
29	1.46	1948	98.09	136.25	-	137.75	
23	1.16	1971	99.24	137.75	-	139.25	
7	0.35	1978	99.60	139.25	-	140.75	
5	0.25	1983	99.85	140.75	-	142.25	
1	0.05	1984	99.90	142.25	-	143.75	
1	0.05	1985	99.95	143.75	-	145.25	
0	0.00	1985	99.95	145.25	-	146.75	
1	0.05	1986	100.00	146.75	-	148.25	
				148.25	-	149.75	
				149.75	-	151.25	
				151.25	-	152.75	
				152.75	-	154.25	
				154.25	-	155.75	
				155.75	-	157.25	
				157.25	-	158.75	

(D39) WAIST BACK, VERTICAL (OMPHALION)*

The vertical distance between the cervicale landmark and the waist at the level of the navel (omphalion) is calculated as follows: CERVICALE HEIGHT minus WAIST HEIGHT (OMPHALION).



PERCENTILES					
FEMALES		MALES			
CM	IN	CM	IN		
35.90	14.13	1ST	40.30	15.87	
36.70	14.45	2ND	40.90	16.10	
37.30	14.69	3RD	41.30	16.26	
37.90	14.92	5TH	41.90	16.50	
38.70	15.24	10TH	42.70	16.81	
39.20	15.43	15TH	43.40	17.09	
39.60	15.59	20TH	43.90	17.28	
40.00	15.75	25TH	44.30	17.44	
40.30	15.87	30TH	44.70	17.60	
40.60	15.98	35TH	45.10	17.76	
40.90	16.10	40TH	45.40	17.87	
41.20	16.22	45TH	45.70	17.99	
41.50	16.34	50TH	46.00	18.11	
41.70	16.42	55TH	46.40	18.27	
42.10	16.57	60TH	46.70	18.39	
42.40	16.69	65TH	47.00	18.50	
42.70	16.81	70TH	47.30	18.62	
43.10	16.97	75TH	47.70	18.78	
43.50	17.13	80TH	48.20	18.98	
43.90	17.28	85TH	48.70	19.17	
44.60	17.56	90TH	49.40	19.45	
45.50	17.91	95TH	50.40	19.84	
46.10	18.15	97TH	51.20	20.16	
46.60	18.35	98TH	51.70	20.35	
47.30	18.62	99TH	52.80	20.79	

* In ANSUR cervicale was defined as the highest point on the seventh cervical vertebra. For consistency with international standards, it is now the most prominent point on the seventh cervical vertebra.

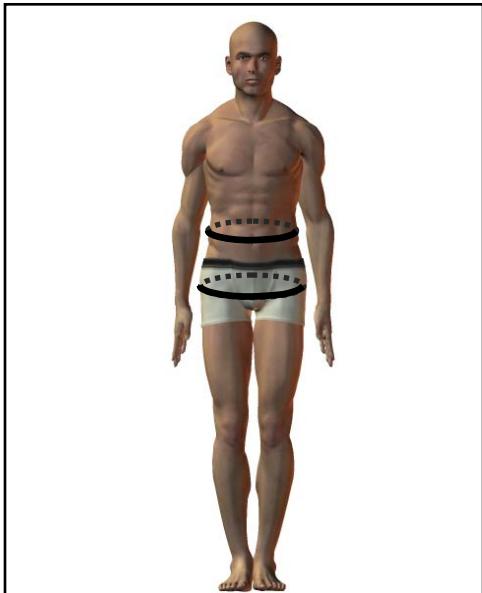
(D39) WAIST BACK, VERTICAL (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
41.55	STD. ERROR (MEAN)	16.36	46.08	STD. ERROR (MEAN)	18.14
0.05	STANDARD DEVIATION	0.02	0.04	STANDARD DEVIATION	0.02
2.34	STD. ERROR (STD.DEV)	0.92	2.61	STD. ERROR (STD.DEV)	1.03
0.04	MINIMUM	0.01	0.03	MINIMUM	0.01
34.60	MAXIMUM	13.62	37.50	MAXIMUM	14.76
50.50		19.88	57.30		22.56
SKEWNESS		0.13	SKEWNESS		0.16
KURTOSIS		3.20	KURTOSIS		3.23
COEFFICIENT OF VARIATION		5.6%	COEFFICIENT OF VARIATION		5.7%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES					
FEMALES				MALES	
F	FPct	CumF	CumFPct	CM	E
1	0.05	1	0.05	34.25	-
8	0.40	9	0.45	34.75	-
6	0.30	15	0.76	35.25	-
14	0.70	29	1.46	35.75	-
12	0.60	41	2.06	36.25	-
15	0.76	56	2.82	36.75	-
30	1.51	86	4.33	37.25	-
48	2.42	134	6.75	37.75	-
83	4.18	217	10.93	38.25	-
97	4.88	314	15.81	38.75	-
121	6.09	435	21.90	39.25	-
127	6.39	562	28.30	39.75	-
166	8.36	728	36.66	40.25	-
183	9.21	911	45.87	40.75	-
182	9.16	1093	55.04	41.25	-
156	7.85	1249	62.89	41.75	-
159	8.01	1408	70.90	42.25	-
115	5.79	1523	76.69	42.75	-
134	6.75	1657	83.43	43.25	-
91	4.58	1748	88.02	43.75	-
62	3.12	1810	91.14	44.25	-
58	2.92	1868	94.06	44.75	-
33	1.66	1901	95.72	45.25	-
30	1.51	1931	97.23	45.75	-
21	1.06	1952	98.29	46.25	-
14	0.70	1966	98.99	46.75	-
10	0.50	1976	99.50	47.25	-
3	0.15	1979	99.65	47.75	-
1	0.05	1980	99.70	48.25	-
3	0.15	1983	99.85	48.75	-
2	0.10	1985	99.95	49.25	-
0	0.00	1985	99.95	49.75	-
1	0.05	1986	100.00	50.25	-
				50.75	-
				51.25	-
				51.75	-
				52.25	-
				52.75	-
				53.25	-
				53.75	-
				54.25	-
				54.75	-
				55.25	-
				55.75	-
				56.25	-
				56.75	-
				57.25	-
				57.75	-

(D40) WAIST-BUTTOCK DROP (OMPHALION)

The difference between the circumference of the waist at the level of the navel (omphalion) and the circumference at the level of the buttock point landmarks is calculated as follows: BUTTOCK CIRCUMFERENCE minus WAIST CIRCUMFERENCE (OMPHALION).



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>		<u>CM</u>	<u>IN</u>	
0.60	0.24	1ST	-6.30	-2.48	
2.50	0.98	2ND	-4.70	-1.85	
3.80	1.50	3RD	-3.40	-1.34	
5.70	2.24	5TH	-2.10	-0.83	
8.20	3.23	10TH	0.20	0.08	
9.80	3.86	15TH	1.60	0.63	
11.20	4.41	20TH	2.90	1.14	
12.30	4.84	25TH	3.90	1.54	
13.40	5.28	30TH	4.80	1.89	
14.20	5.59	35TH	5.80	2.28	
15.00	5.91	40TH	6.60	2.60	
15.70	6.18	45TH	7.40	2.91	
16.40	6.46	50TH	8.20	3.23	
17.00	6.69	55TH	9.00	3.54	
17.80	7.01	60TH	9.90	3.90	
18.60	7.32	65TH	10.60	4.17	
19.30	7.60	70TH	11.40	4.49	
20.00	7.87	75TH	12.30	4.84	
20.90	8.23	80TH	13.20	5.20	
21.90	8.62	85TH	14.00	5.51	
23.30	9.17	90TH	15.00	5.91	
25.20	9.92	95TH	16.40	6.46	
26.60	10.47	97TH	17.60	6.93	
27.70	10.91	98TH	18.40	7.24	
29.00	11.42	99TH	19.40	7.64	

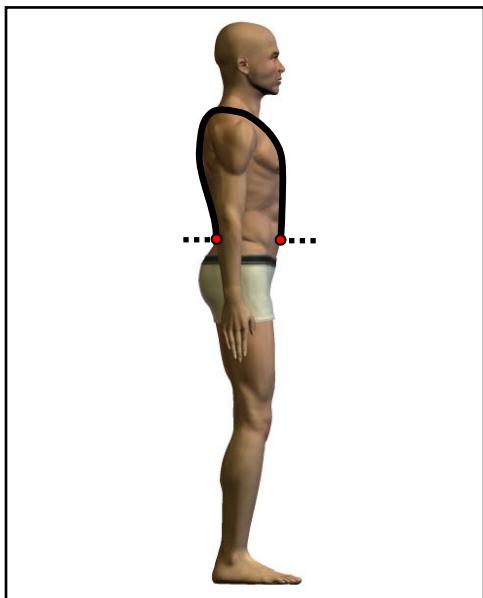
(D40) WAIST-BUTTOCK DROP (OMPHALION)

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
16.03	MEAN	6.31	7.89	MEAN	3.11
0.13	STD. ERROR (MEAN)	0.05	0.09	STD. ERROR (MEAN)	0.04
5.98	STANDARD DEVIATION	2.35	5.79	STANDARD DEVIATION	2.28
0.09	STD. ERROR (STD.DEV)	0.04	0.06	STD. ERROR (STD.DEV)	0.03
-10.60	MINIMUM	-4.17	-24.50	MINIMUM	-9.65
34.70	MAXIMUM	13.66	24.50	MAXIMUM	9.65
SKEWNESS		-0.30	SKEWNESS		-0.35
KURTOSIS		3.28	KURTOSIS		3.03
COEFFICIENT OF VARIATION		37.3%	COEFFICIENT OF VARIATION		73.4%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

FREQUENCIES									
FEMALES				MALES					
E	FPct	CumF	CumFPct	CM	E	FPct	CumF	CumFPct	
				-25.75	-	-24.25	1	0.02	1
				-24.25	-	-22.75	0	0.00	1
				-22.75	-	-21.25	0	0.00	1
				-21.25	-	-19.75	0	0.00	1
				-19.75	-	-18.25	0	0.00	1
				-18.25	-	-16.75	1	0.02	2
				-16.75	-	-15.25	1	0.02	3
				-15.25	-	-13.75	0	0.00	3
				-13.75	-	-12.25	1	0.02	4
				-12.25	-	-10.75	2	0.05	6
				-10.75	-	-9.25	3	0.07	9
1	0.05	1	0.05	-9.25	-	-7.75	12	0.29	21
0	0.00	1	0.05	-7.75	-	-6.25	21	0.51	51
0	0.00	1	0.05	-6.25	-	-4.75	37	0.91	79
0	0.00	1	0.05	-4.75	-	-3.25	52	1.27	131
2	0.10	3	0.15	-3.25	-	-1.75	93	2.28	224
4	0.20	7	0.35	-1.75	-	-0.25	126	3.09	350
10	0.50	17	0.86	-0.25	-	1.25	202	4.95	552
6	0.30	23	1.16	1.25	-	2.75	245	6.00	797
19	0.96	42	2.11	2.75	-	4.25	301	7.37	1098
24	1.21	66	3.32	4.25	-	5.75	324	7.94	1422
35	1.76	101	5.09	5.75	-	7.25	367	8.99	1789
58	2.92	159	8.01	7.25	-	8.75	372	9.11	2161
80	4.03	239	12.03	8.75	-	10.25	389	9.53	2550
88	4.43	327	16.47	10.25	-	11.75	363	8.89	2913
126	6.34	453	22.81	11.75	-	13.25	380	9.31	3293
133	6.70	586	29.51	13.25	-	14.75	339	8.30	3632
173	8.71	759	38.22	14.75	-	16.25	224	5.49	3856
215	10.83	974	49.04	14.75	-	17.75	118	2.89	3974
214	10.78	1188	59.82	16.25	-	19.25	65	1.59	4039
197	9.92	1385	69.74	17.75	-	20.75	27	0.66	4066
179	9.01	1564	78.75	19.25	-	22.25	12	0.29	4078
151	7.60	1715	86.35	20.75	-	23.75	3	0.07	4081
98	4.93	1813	91.29	22.25	-	25.25	1	0.02	4082
75	3.78	1888	95.07	23.75	-	26.75			100.00
41	2.06	1929	97.13	25.25	-	28.25			
24	1.21	1953	98.34	26.75	-	29.75			
21	1.06	1974	99.40	28.25	-	31.25			
5	0.25	1979	99.65	29.75	-	32.75			
5	0.25	1984	99.90	31.25	-	34.25			
1	0.05	1985	99.95	32.75	-				
1	0.05	1986	100.00	34.25	-	35.75			

(D41) WAIST-WAIST (OMPHALION) OVER SHOULDER

The vertical circumference of the upper torso between the front of the waist at the navel (omphalion) passing up over the midpoint between the sternum and the anterior axillary fold, over the midshoulder landmark, and down the back to the waist (omphalion) posterior landmark is calculated as follows: VERTICAL TRUNK CIRCUMFERENCE (USA) minus CROTCH LENGTH (OMPHALION).



PERCENTILES					
FEMALES		MALES			
<u>CM</u>	<u>IN</u>	<u>CM</u>	<u>IN</u>		
81.40	32.05	1ST	91.00	35.83	
82.90	32.64	2ND	92.10	36.26	
83.50	32.87	3RD	93.20	36.69	
84.70	33.35	5TH	94.60	37.24	
86.70	34.13	10TH	96.70	38.07	
88.00	34.65	15TH	98.00	38.58	
89.10	35.08	20TH	99.10	39.02	
89.80	35.35	25TH	100.00	39.37	
90.60	35.67	30TH	100.90	39.72	
91.40	35.98	35TH	101.70	40.04	
92.30	36.34	40TH	102.50	40.35	
93.00	36.61	45TH	103.30	40.67	
93.50	36.81	50TH	104.10	40.98	
94.30	37.13	55TH	104.80	41.26	
95.10	37.44	60TH	105.50	41.54	
95.90	37.76	65TH	106.40	41.89	
96.70	38.07	70TH	107.20	42.20	
97.60	38.43	75TH	108.20	42.60	
98.70	38.86	80TH	109.30	43.03	
99.90	39.33	85TH	110.60	43.54	
101.30	39.88	90TH	112.20	44.17	
103.50	40.75	95TH	114.30	45.00	
105.20	41.42	97TH	116.30	45.79	
106.40	41.89	98TH	117.50	46.26	
108.20	42.60	99TH	119.90	47.20	

(D41) WAIST-WAIST (OMPHALION) OVER SHOULDER

FEMALES			MALES		
<u>CM</u>	<u>MEAN</u>	<u>IN</u>	<u>CM</u>	<u>MEAN</u>	<u>IN</u>
93.86	STD. ERROR (MEAN)	36.95	104.25	STD. ERROR (MEAN)	41.04
0.13	STANDARD DEVIATION	0.05	0.10	STANDARD DEVIATION	0.04
5.70	STD. ERROR (STD.DEV)	2.25	6.09	STD. ERROR (STD.DEV)	2.40
0.09	MINIMUM	0.04	0.07	MINIMUM	0.03
76.10	MAXIMUM	29.96	85.60	MAXIMUM	33.70
114.10		44.92	127.90		50.35
SKEWNESS		0.19	SKEWNESS		0.22
KURTOSIS		2.95	KURTOSIS		3.09
COEFFICIENT OF VARIATION		6.1%	COEFFICIENT OF VARIATION		5.8%
NUMBER OF PARTICIPANTS		1986	NUMBER OF PARTICIPANTS		4082

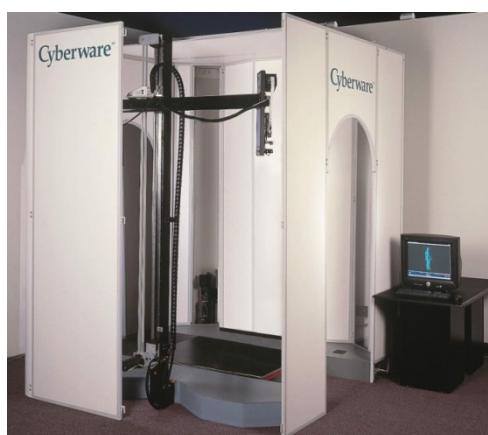
FREQUENCIES							
FEMALES				MALES			
F	FPct	CumF	CumFPct	CM	E	FPct	CumF
1	0.05	1	0.05	75.55	-	76.55	
0	0.00	1	0.05	76.55	-	77.55	
3	0.15	4	0.20	77.55	-	78.55	
2	0.10	6	0.30	78.55	-	79.55	
9	0.45	15	0.76	79.55	-	80.55	
5	0.25	20	1.01	80.55	-	81.55	
10	0.50	30	1.51	81.55	-	82.55	
30	1.51	60	3.02	82.55	-	83.55	
29	1.46	89	4.48	83.55	-	84.55	
45	2.27	134	6.75	84.55	-	85.55	
55	2.77	189	9.52	85.55	-	86.55	
63	3.17	252	12.69	86.55	-	87.55	
92	4.63	344	17.32	87.55	-	88.55	
107	5.39	451	22.71	88.55	-	89.55	
136	6.85	587	29.56	89.55	-	90.55	
125	6.29	712	35.85	90.55	-	91.55	
124	6.24	836	42.09	91.55	-	92.55	
158	7.96	994	50.05	92.55	-	93.55	
129	6.50	1123	56.55	93.55	-	94.55	
121	6.09	1244	62.64	94.55	-	95.55	
125	6.29	1369	68.93	95.55	-	96.55	
118	5.94	1487	74.87	96.55	-	97.55	
83	4.18	1570	79.05	97.55	-	98.55	
98	4.93	1668	83.99	98.55	-	99.55	
68	3.42	1736	87.41	99.55	-	100.55	
67	3.37	1803	90.79	100.55	-	101.55	
46	2.32	1849	93.10	101.55	-	102.55	
39	1.96	1888	95.07	102.55	-	103.55	
28	1.41	1916	96.48	103.55	-	104.55	
14	0.70	1930	97.18	104.55	-	105.55	
20	1.01	1950	98.19	105.55	-	106.55	
11	0.55	1961	98.74	106.55	-	107.55	
10	0.50	1971	99.24	107.55	-	108.55	
7	0.35	1978	99.60	108.55	-	109.55	
4	0.20	1982	99.80	109.55	-	110.55	
3	0.15	1985	99.95	110.55	-	111.55	
0	0.00	1985	99.95	111.55	-	112.55	
0	0.00	1985	99.95	112.55	-	113.55	
1	0.05	1986	100.00	113.55	-	114.55	
				114.55	-	115.55	
				115.55	-	116.55	
				116.55	-	117.55	
				117.55	-	118.55	
				118.55	-	119.55	
				119.55	-	120.55	
				120.55	-	121.55	
				121.55	-	122.55	
				122.55	-	123.55	
				123.55	-	124.55	
				124.55	-	125.55	
				125.55	-	126.55	
				126.55	-	127.55	
				127.55	-	128.55	

CHAPTER VI

THREE-DIMENSIONAL SCANNING

In addition to the traditional measurement stations, ANSUR II participants also visited the scanning station, where 3-D images were taken by three digital scanners: whole-body, head, and foot. Team members directed participants to each of the three scanners in a sequence that minimized wait time.

All three machines used in this survey—the Cyberware WBX and PX scanners, and the INFOOT foot scanner—were low-power, infrared laser systems that offer no risk of damage to the body (Figure 21). The machines were calibrated daily. Cyscan, the software for the WBX and PX systems, runs on the Windows XP operating system, as does the INFOOT software used in conjunction with the foot scanner. The computers associated with the scanners were set up so that they only connected with the in-field Anthrotech network. Scan data files were transferred over this network via Ethernet data cable connection to the local system server and then uploaded daily to a server located in Yellow Springs, OH (Anthrotech HQ). Data files were transferred daily to a secure server at NSRDEC via a secure connection.



WBX Scanner



PX Scanner



Foot Scanner

FIGURE 21

Scanning Instruments

Furnished by the Government, the CyScan software on the WBX runs in conjunction with the EARS program. EARS (Yin et al., 2009; Yin et al., 2010), also furnished by the Government, was used as an evaluation step to assist the operator in evaluating scan quality.

6.1 PARTICIPANT PREPARATION

When participants arrived at the scanning stations, they were shown to a changing room and asked to change into the appropriately sized scan wear. Scan wear

was spandex compression shorts for men and spandex shorts and a jog bra for women. Wig caps were placed on the participants' heads to 1) allow capture of the head surface and 2) compress the hair to minimize the increase to apparent head size caused by hair bulk. Some hair types and styles also caused irregular reflections of the laser light, resulting in extraneous points on the scan; the wig cap minimized this effect as well. A team member placed orange half-inch adhesive dots over selected landmarks previously drawn on the body and orange quarter-inch adhesive dots on all head landmarks. Wooden disks were used to mark left and right acromion landmarks. The landmarks used for the scan procedure are illustrated in Figures 22 through 25.

The participant was then directed to whichever scanner was available. Scanning of a single participant took approximately 15-20 s to complete for each scanner, but he/she was asked to remain in the scanner while the operator checked the visual images, as rescans were sometimes necessary to correct problems.

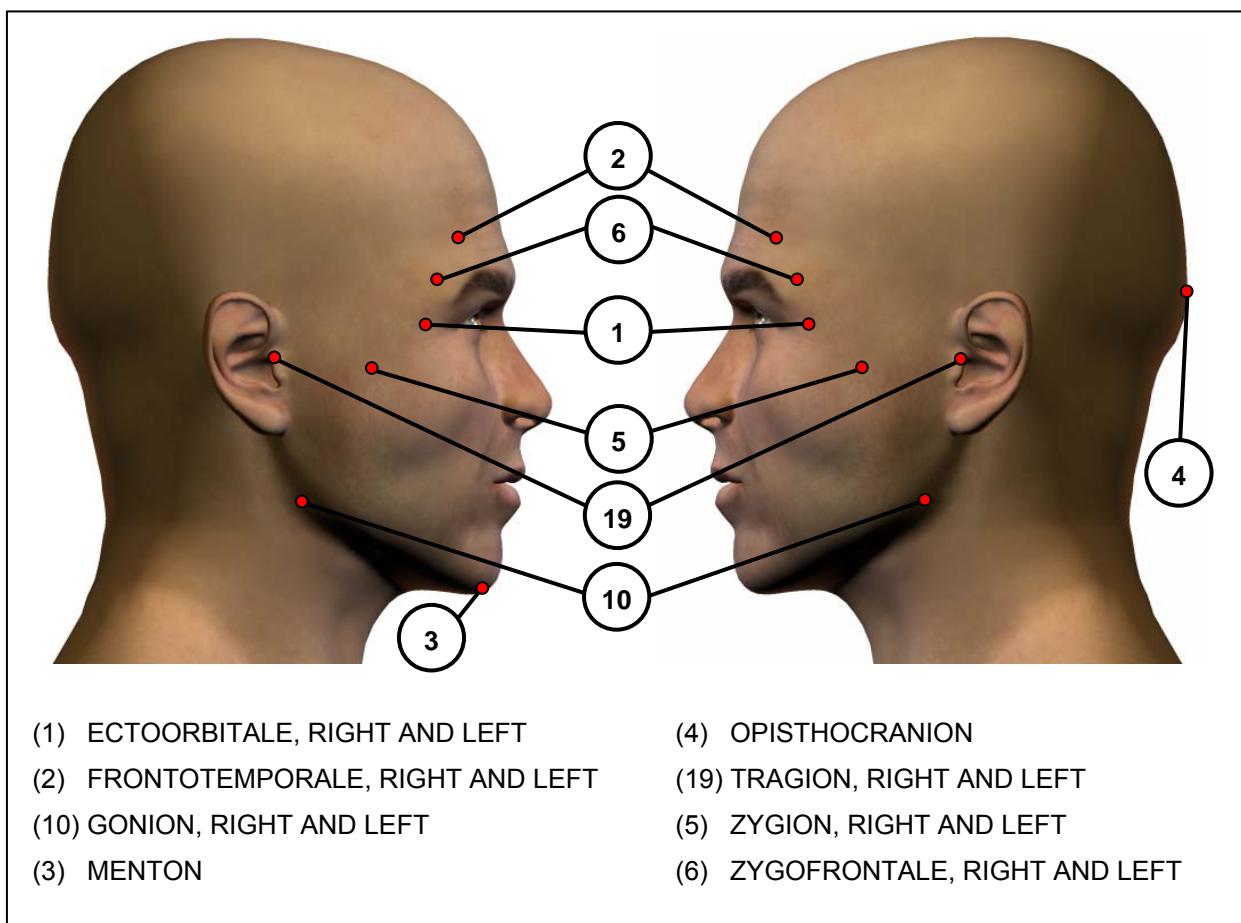


FIGURE 22
Lateral View of Head Scanning Landmarks

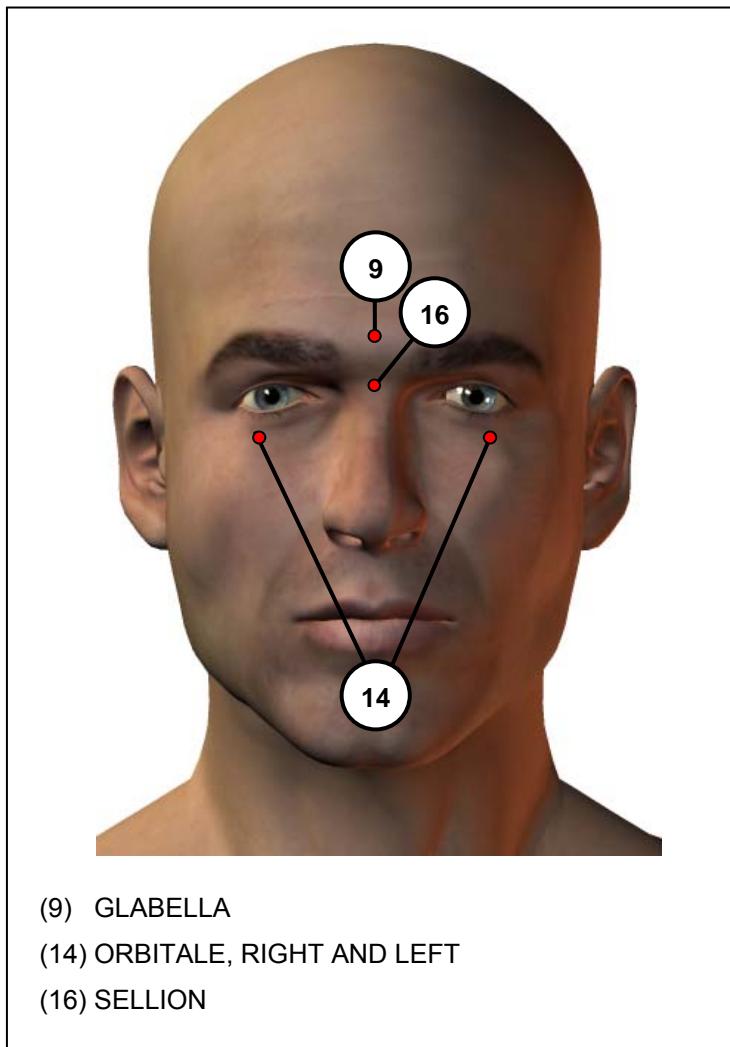
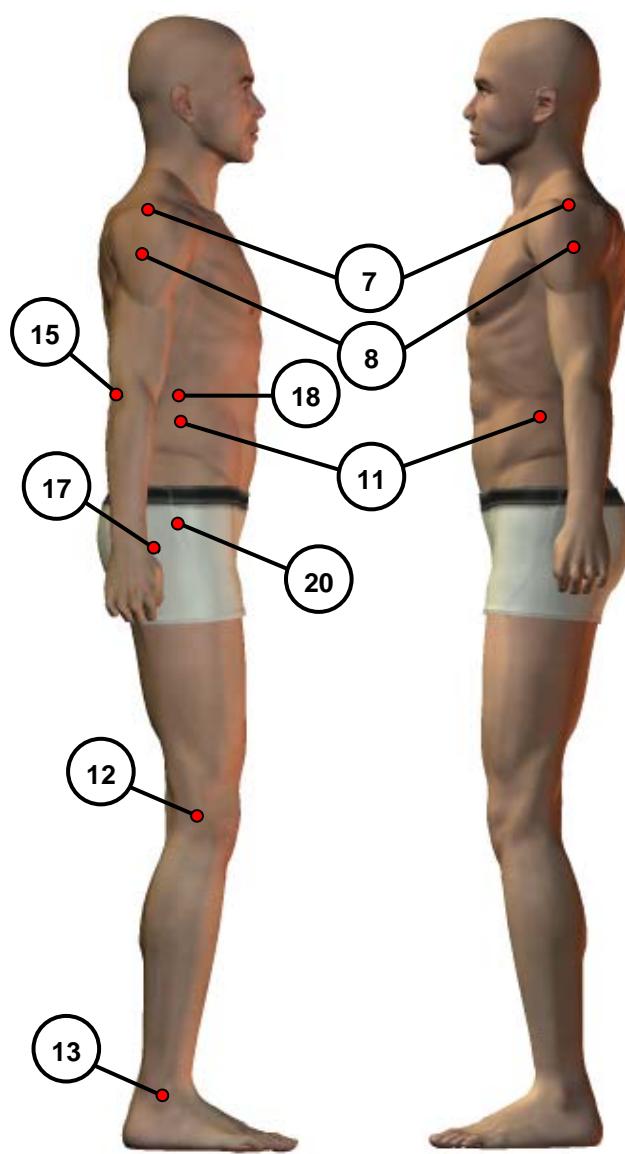


FIGURE 23
Anterior View of Head Scanning Landmarks



- (7) ACROMION, RIGHT AND LEFT
(8) DELTOID POINT, RIGHT AND LEFT
(11) ILOCRISTALE, RIGHT AND LEFT
(12) LATERAL FEMORAL EPICONDYLE,
STANDING, RIGHT
(13) LATERAL MALLEOLUS, RIGHT
(15) RADIALE, RIGHT
(17) STYLIUM, RIGHT
(18) TENTH RIB, RIGHT
(20) TROCHANTERION, RIGHT

FIGURE 24

Lateral View of Body Scanning Landmarks

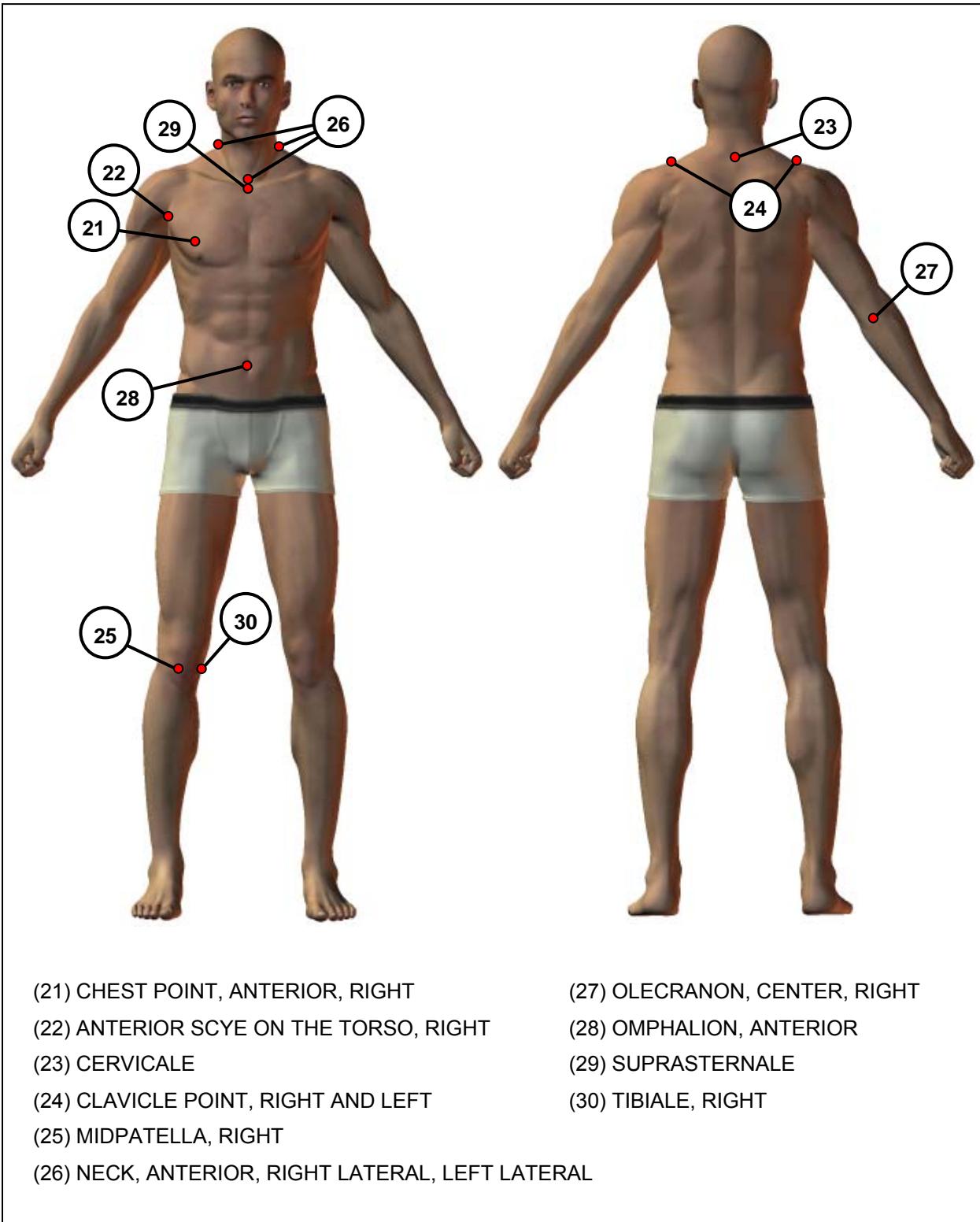


FIGURE 25

Anterior (Left) and Posterior (Right) Views of Body Scanning Landmarks

6.1.1 Whole-Body Scanning

Participants were briefed on the proper posture to assume for the whole-body scan (Figures 26 and 27). In general, the position required that participants stand erect without stiffness. The feet were positioned 30 cm apart and parallel to one another. The arms were straight and held away from the body with fists clenched. The head was in the Frankfurt plane. When participants stepped onto the scan platform, a team member checked to make sure that the scan wear was wrinkle-free, that the wig caps were placed correctly, and that all the landmark dots were in place.



FIGURE 26

Anterior View of Whole-Body Scan*

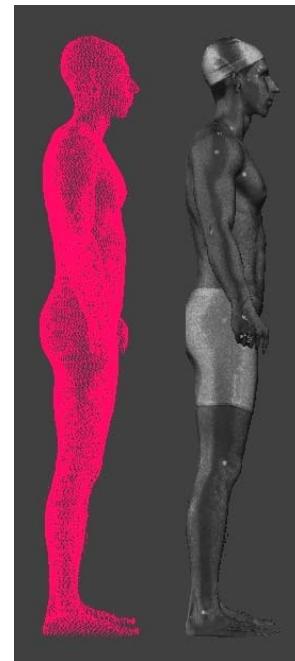


FIGURE 27

Lateral View of Whole-Body Scan

6.1.2 Head Scanning

Head scans were taken with participants in the seated position. Operators adjusted the height of the chair to ensure that the head was within the scanner field and lightly touched the head stabilizer. Participants were positioned with their heads in the Frankfurt plane and then asked to lift their chins slightly to enable the scanner to completely capture the region beneath the chin (Figures 28 and 29).

* The individual shown in Figures 26-31 is a civilian model, and was not part of ANSUR II.

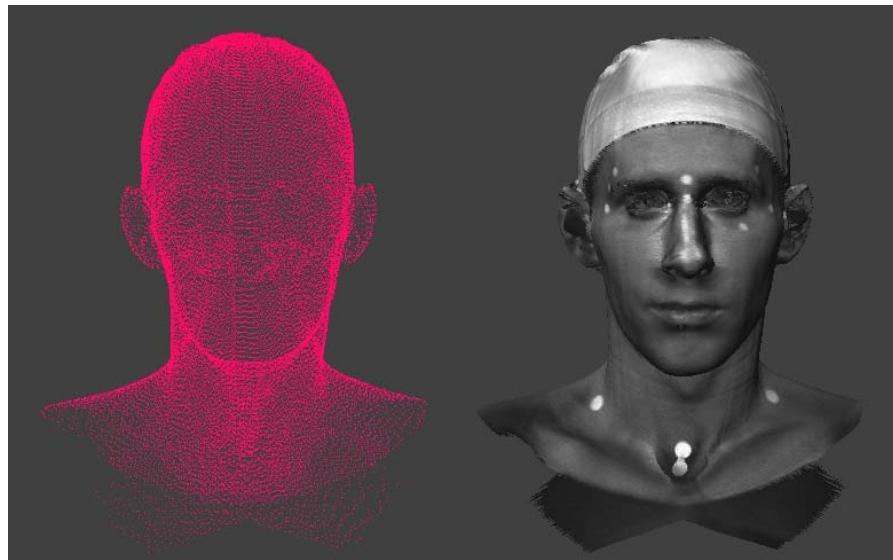


FIGURE 28
Anterior View of Head Scan

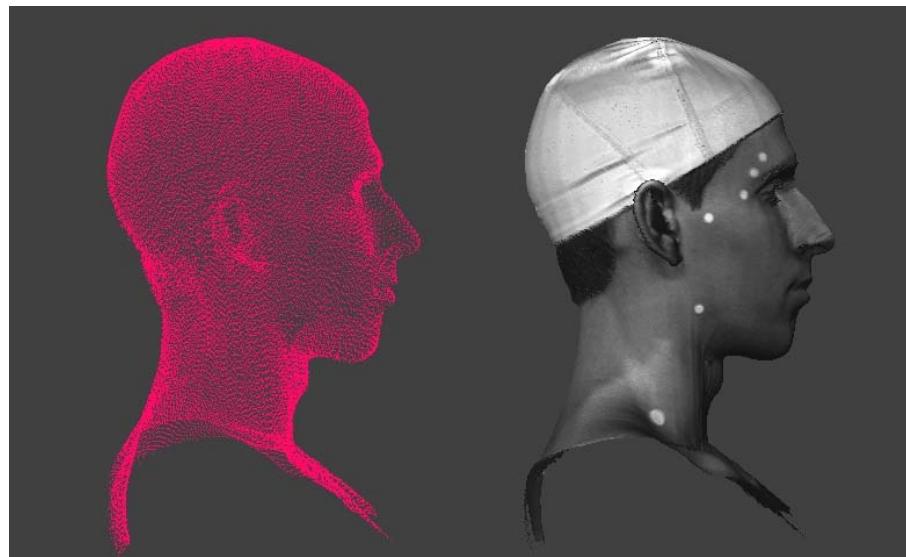


FIGURE 29
Lateral View of Head Scan

6.1.3 Foot Scanning

In preparation for foot scanning, which was done on the right foot only, a team member checked that the right foot was clean and dry (without perspiration). If the participant had noticeable leg hair, he or she was asked to put on a stocking from ankle to knee to prevent scan distortion caused by hair. A sanitary protective paper was

wrapped around the leg just below the knee where the scanner closed around the leg. Each participant was asked to step onto the left-foot stage with the left foot and to place the right foot into the scanner. The right foot was aligned with marks on the bottom of the scanner base. Scans were taken in the standing posture with the weight distributed evenly between both feet. Foot scans are seen in Figures 30 and 31.

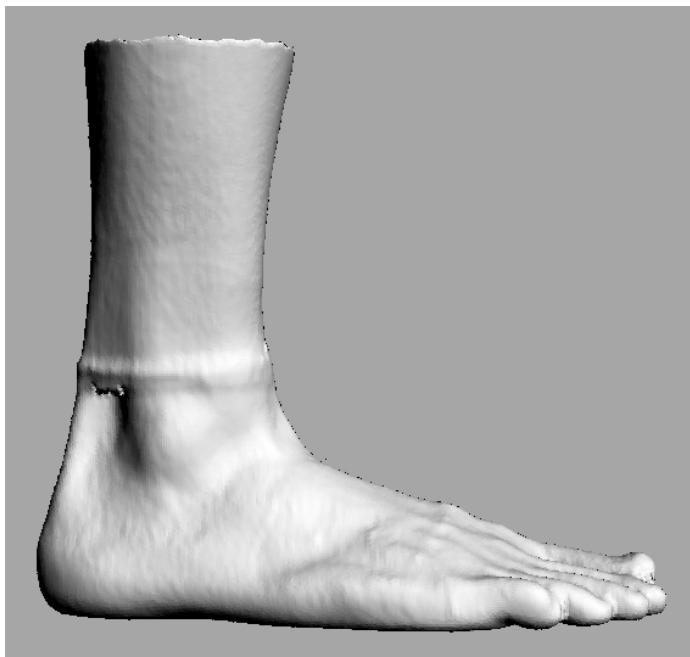


FIGURE 30

Lateral View of Foot Scan



FIGURE 31

Plantar View of Foot Scan

6.2 THE UTILITY OF 3-D SCANNING

Until the 1980s, anthropometric databases consisted almost wholly of hundreds of manually measured body-size variables obtained by using traditional instruments such as anthropometers, calipers, and tapes. These methods, when properly employed, were—and still are—a highly accurate means of documenting the body sizes of individuals and of whole populations. What traditional anthropometry cannot do well, however, is reflect human shape. Approximately 30 years ago, the nation's military services began to explore 3-D scanning methodology as a means of supplementing their existing anthropometric databases—beginning with the use of smaller devices for scanning heads and other body parts and, today, use of whole-body scanners.

The two most common uses of 3-D scan data in an ergonomic context are in the design, sizing, and production of military clothing and equipment and the creation of accurately proportioned 3-D computer-aided design (CAD) models for the ergonomic design of working environments. Today, the entire production chain for a piece of clothing, beginning with the design and sizing of an item and culminating in the

fabrication of the garment, can be achieved in a computer environment populated by 3-D models (Grotewall et al., 2002). While a large-scale operation such as this is still in the future for the nation's military services, a digital system for custom designing clothing for service personnel who fall outside established anthropometric design limits is already under limited trial (Gentsch et al., 2000). The obvious advantages of 3-D scan images for this undertaking include the production of better-fitting garments, reduction in the costs of stocking unusual sizes, and faster response time between measurement and delivery.

Three-dimensional human analogues created from scanned images have an almost infinite number of uses in the design of workplaces such as military vehicles and cockpits where accommodation, lines of vision, and ability to reach hand and foot controls can be tested on a computer screen. Fully dressed and equipped soldiers can also be scanned for input into CAD models for assessing workplace interactions.

Other uses for 3-D images stem from the ability of the scanner to record the surface area and volume of the body or any of its parts. The Army made early use of this capacity, for example, by writing software for the scanner to assess the degree of ballistic protection afforded soldiers wearing various designs of protective body armor (Paquette, 1996).

As an anthropometric tool, 3-D scanning complements traditional methods in two ways. First, a participant can be scanned in a matter of seconds, and the scanned images become permanent records. Users can return to them as many times as needed to extract new dimensions or to employ them in the creation of computer models. Second, the relationship of one dimension to another, or to several other dimensions, is clearly apparent. This aids in understanding body shape, as well as body size.

6.3 TRADITIONAL ANTHROPOMETRY AND 3-D SCANNING

While some progress has been made in achieving consistency between traditional anthropometric measurements and those obtained by extraction from 3-D scans, significant differences between the two techniques remain. While researchers have identified a number of reasons for these differences (Han et al., 2010; Kouchi & Mochimaru, 2006; Perkins et al., 2000), the three chief causes appear to be tissue compression that occurs in manual measurements, algorithms used to extract measurements from 3-D images, and posture.

Comparisons show that scan-generated measurements tend to be significantly larger than those obtained by manual measurement. One way to assess the importance of these differences is to determine whether they exceed the allowable errors established for interobserver differences in the first ANSUR survey (Gordon et al., 1989) and subsequently adopted by the International Organization for Standardization (ISO) (ISO 20685). A recent study of 14 comparative measurements, for example,

found that the differences between the scanned and traditional measurements exceeded the allowable errors specified by ISO 20685 in all cases (Han et al., 2010).

In these comparisons, circumference measurements are the most problematic. Manual methods of measuring around the body and its parts generally require that the tape be in contact with the skin all the way around the body part. This is difficult to achieve without slightly compressing the flesh and, thus, may result in a somewhat smaller value than that obtained by the scanner, which simply “sees” the outlines and has no effect on the tissue. An alternative explanation, persuasive especially for scanners with lower point density, is that the scanner-extracted circumference must use available points, essentially “connecting the dots” and that that route between dots may be more jagged (and therefore longer) than the smooth route taken by the tape.

When sufficient care is taken in positioning the participant and ensuring that the hair is covered by a bald cap, heights and lengths in general show smaller, though sometimes significant, discrepancies. Han and her colleagues (2010) have developed regression equations for adjusting values of some extracted scan data to make them more consistent with traditionally measured values.

6.4 POSTURE

Consistent participant positioning is a major factor in obtaining reliable body-size measurements in both traditional and 3-D scanning methods, as well as a source of differences in outcome between the two methods when whole-body scanning is required. The basic standing posture used in manual measuring calls for the participant to stand straight with the heels together and the arms hanging relaxed at the sides. This position is impractical for a system that uses light to produce digital images. When arms and legs are too close to the torso, or too close together, they prevent the scanner from capturing other parts of the body (such as the crotch and armpits). Thus, scanned participants are asked to stand with arms held away from the body and legs placed farther apart.

Experiments conducted by Kouchi and Mochimaru (2006) established the effects of postural differences in 42 manual and scanned measurements of 40 Japanese adults. Participants were measured and scanned in four different positions, the basic traditional posture (Figure 32a), and in three postures in which the arms were held increasingly away from the body and the feet were spread increasingly apart. The researchers found that leg abduction significantly affected hip and thigh measurements, while abduction of the arms significantly affected measurements of the shoulder and chest. For most other variables, when the feet were placed less than 25 cm apart and the arms were abducted less than 10°, the measurements were comparable to those obtained in the basic traditional posture. The posture used in ANSUR II is very similar to this posture (Figure 32b).

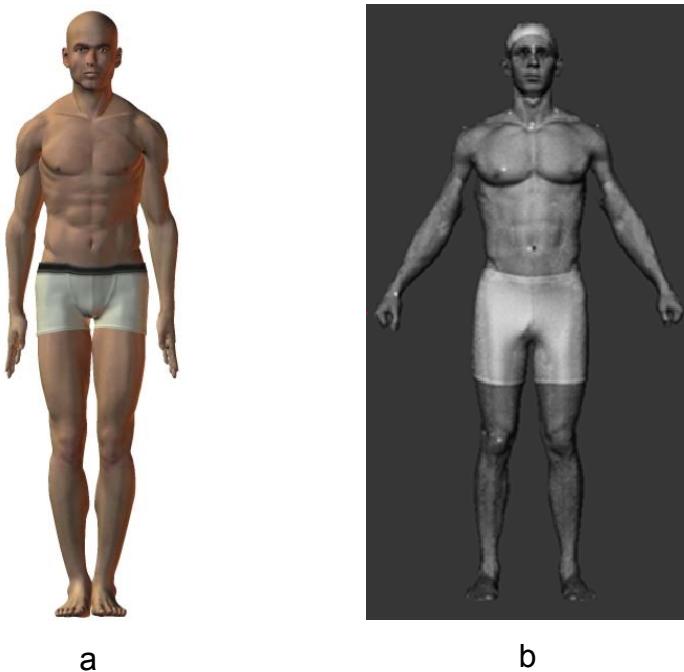


FIGURE 32

Traditional and ANSUR II Posture

Posture is especially important in systems where measurements and landmarks are located automatically. The algorithms that locate measurement points assume a particular posture on the part of the participant. If the participant is in a posture that differs from the assumed posture, even slightly, then measurements can be taken at inappropriate locations. Of course, such measurements are never comparable. Automatic landmark location was not used in the ANSUR II survey.

In general, it is difficult to draw too many conclusions about the comparability of scan-extracted and directly measured anthropometry from the published literature. The tested systems vary in scan quality, and they vary in the mathematical techniques used in extracting dimensions. Some of these applications can be used on any scan; others function only on one system. Some systems are fully automatic—they can extract dimensions from a scan whose participant has had no preparation. Others require an operator to identify a set of key landmarks before extraction can begin. Still others identify landmarks that have been identified through palpation (by a trained anthropometrist) prior to scanning. The consensus in the anthropometric community is that the most likely way to obtain scan-extracted dimensions that are similar to traditionally measured ones is to pre-mark the study participants using palpation of traditional landmarks. That was the approach taken in this study. As scan extraction software continues to improve, this data set will continue to be useful, since the landmarks were verified through palpation and they are visible on the scan.

CHAPTER VII

OBSERVER ERROR

Since anthropometric data are used in the design of workspaces, uniforms, and personal protective clothing and equipment, excessive error in the data can result in badly designed workspaces, poorly fitting uniforms, and potentially unsafe protective gear. Further, several studies have shown that insufficient information about observer error can lead to misinterpretation of population comparisons (Jamison and Zegura, 1974; Utermohle and Zegura, 1982; Utermohle et al., 1983). While considerable effort was made to minimize the amount of interobserver error (hereafter, observer error) in the ANSUR II survey, observer error is a fact of life in almost any scientific endeavor. Because such problems cannot be eliminated entirely, the most responsible approach is to measure the observer error so that users of the data will be able to judge for themselves its effects on their particular applications.

Error analysis of anthropometric data is usually performed *after* the data collection has been completed. The approach used in the ANSUR II survey was to establish an allowable observer error for each dimension *prior* to the commencement of data collection. This enabled the use of repeated measures data during the survey to monitor and improve the quality of the data. Selected participants were re-measured daily at each station throughout the course of the survey and the resultant data were analyzed weekly for observer error. This information was used as continuous feedback to the team to maintain the high quality of the data collection.

The allowable errors were established for three purposes. First, they were used during the initial training period as an indicator that measurers had successfully learned their tasks. Team members conducted practice measurements on a group of participants to learn their assigned dimensions. Observer error results were calculated regularly to assess the ability of each measurer to repeat measurements within fixed limitations, and the ability of each pair of measurers to achieve interobserver consistency. The performance of measurers in training was rated against standards established by experienced measurers (see Section 7.2).

The second use of the allowable observer error levels was to "recalibrate" the team at the beginning of each new survey location. Because the team traveled by car to each new location, there was often a period of several days between measuring sessions. In order to ensure consistency from one location to the next and to minimize measurer "drift" during the course of the survey, error trials were conducted at the beginning of each new location.

Finally, allowable observer error was used as a standard for daily error checks. Twice a day, at each station, a participant was re-measured to provide error data on actual participants during the course of the survey. These data were examined daily and analyzed weekly. If a measuring pair consistently exceeded the allowable observer error for a given dimension, the cause of the drift was determined and corrective action

taken. Thus, the allowable error values in a very real sense established the minimum reliability for the data collected in the survey.

7.1 OBSERVER ERROR IN THE ANTHROPOMETRIC LITERATURE

There are a number of different analytical methods and approaches to error analysis. A literature review of anthropometric error data revealed six approaches: analysis of variance (Bennett and Osborne, 1986; Jamison and Zegura, 1974; Kouchi et al., 1999; Utermohle and Zegura, 1982), correlation coefficients (Branson et al., 1982; Gordon and Bradtmiller, 1992; Jamison and Ward, 1993; Jamison and Zegura, 1974; Kouchi et al., 1996; Kemper and Pieters, 1974; Ulijaszek and Kerr, 1999; Ulijaszek and Lourie, 1994), mean differences (Branson et al., 1982; Gordon and Bradtmiller, 1992; Kouchi et al., 1996), technical error measurement (Branson et al., 1982; Cameron, 1984; Gordon and Bradtmiller, 1992; Goto and Mascie-Taylor, 2007; Harris and Smith, 2009; Jamison and Ward, 1993; Johnston and Mack, 1985; Kouchi et al., 1996; Ulijaszek and Kerr, 1999; Ulijaszek and Lourie, 1994; Utermohle and Zegura, 1982), paired T-tests (Albrecht, 1983; Utermohle and Zegura, 1982), 11 separate univariate measures (Utermohle et al., 1983), and various multivariate measures (Jamison and Zegura, 1974; Page, 1976; Utermohle et al., 1983). Utermohle and colleagues (1983) have observed: "There is no consensus concerning which statistical procedures are optimal or even important for the analysis of measurement error in physical anthropology." This literature review appears to bear that out.

Analysis of variance is a generally useful technique, which has often been applied to error data. Depending upon how it is applied, it can show how much of the measurement error is due to *interobserver* differences, how much to *intraobserver* differences and, where applicable, how much is due to the use of varying measurement methods or instruments. As Bennett and Osborne (1986) emphasize, analyses of variance are often used as a measure of differences between populations. Thus, when these analyses of variance can demonstrate statistically significant differences between groups as defined by measurers (*interobserver* error), the conclusions of a large number of studies showing anthropometric differences between populations should be questioned. This point is also made by Jamison and Zegura (1974) about multivariate techniques and by Page (1976) about principal components.

While the partitioning of error variance into *interobserver* and *intraobserver* components can be useful for population comparisons, and is of interest in its own right, it nevertheless has little to offer for the setting of permissible error levels in advance of data collection. Indeed in the present case, because the sample size is large, an analysis that relies solely on statistical significance must be regarded with extreme caution. What is needed in addition is a technique that examines observer differences in terms of the units of measurement.

A second analytical approach to error data is exemplified by Kemper and Pieters (1974). In that study, the investigators compared nine measurements obtained on the same participants by measurers at two different research institutes in The Netherlands.

(An important distinction here is that the two teams were trained on the basis of the same written document, but were not trained by the same persons or trained with each other.) The authors calculated the mean differences between measurements, including the sign (positive or negative) of the differences. Additionally, they calculated correlation coefficients between the two measurements. These ranged from 0.872 for Biacromial Diameter to 0.996 for Stature. A third value calculated in their study was a correlation coefficient between the difference (between the two measurements) and the mean of the two measurements. This last value was a measure of whether the difference increases with an increase in the absolute size of the measurement. Most correlation coefficients were not statistically different from zero, and all but three were less than 0.2. Here again, however, these values are useful in analyzing data after they have been collected, but are not directly applicable to setting maximum acceptable error levels in advance of data collection, or monitoring measurer performance during data collection.

In the context of this lack of consensus for reporting statistics and the lack of utility of many of these statistics for ongoing data monitoring, the 1988 ANSUR (Gordon et al., 1989) set allowable error rates based on the mean of absolute differences. This was simple to calculate and easily interpretable. The decision at that time was validated by the usefulness of those data during data collection, and by their usefulness in data interpretation following the survey. Those values have been incorporated into an international standard as well (ISO 20685:2010).

7.2 OBSERVER ERROR TEST

The vast majority of the traditional anthropometric dimensions measured in this study were duplicated from the 1987-1988 U.S. Army ANSUR (Gordon et al., 1989). The values established for the ANSUR survey were developed from three main sources: 1) the research literature, 2) examination of test/retest values from surveys in the Harry G. Armstrong Aerospace Medical Research Laboratory Anthropometric Data Bank, and 3) analysis of the results of an observer error test conducted specifically for the ANSUR survey by acknowledged experts in anthropometry. For the ANSUR dimensions retained in the ANSUR II survey, there was no need to re-validate the allowable errors, since it was known in advance that the measurements could be reliably done and in every case the ANSUR actual observer errors were within the allowable error limits. Not all the dimensions to be measured in the ANSUR II survey were pre-validated by ANSUR, however. Anthrotech performed a new validation trial on a subset of ANSUR II dimensions for three reasons: 1) the dimension was new, 2) the ANSUR dimension was modified in some way, or 3) the actual observer errors in ANSUR suggested that the pre-set allowable errors could be lowered.

Validation trials were conducted over 2 days, using 10 participants and 4 experienced measurers, following the validation procedures first used in ANSUR (Gordon et al., 1989; Hotzman et al., 2010). Each participant was measured twice—once in the morning and once in the afternoon—by each measurer for a total of eight

values for each dimension. Landmarks were retained throughout the day, and refreshed after lunch as needed. The same procedure was repeated the following day on five different participants. For those dimensions that were new or for which it was proposed that the allowable error be adjusted, the MAD for each measurer was calculated and, in most cases, the largest MAD was chosen as the new recommended allowable error.

The new dimensions tested were:

Bicristal Breadth
Forearm-Center of Grip Length
Palm Length
Tibial Height
Waist Front Length, Sitting

The established dimensions whose ANSUR allowable errors were thought to be too high were tested to determine if the errors could be lowered. These dimensions were:

Axilla Height	Head Circumference
Ball of Foot Length	Heel-Ankle Circumference
Bideltoid Breadth	Hip Breadth
Buttock Height	Lateral Malleolus Height
Calf Circumference	Neck Circumference, Base
Cervicale Height	Popliteal Height
Chest Breadth	Shoulder Circumference
Chest Circumference	Span
Chest Height	Stature
Ear Breadth	Trochanterion Height
Ear Protrusion	Waist Depth
Foot Breadth, Horizontal	Weight
Functional Leg Length	Wrist Circumference
Hand Circumference	

Finally, some measurements, including five from the list above, were modified for a number of reasons and re-tested.

Waist Circumference (Omphalion), Waist Breadth, Hip Breadth, Shoulder Circumference, and Buttock Circumference were tested to see if they could be reliably measured with only the key landmark marked—in other words, to determine whether the transferred landmarks could be eliminated. Thigh Clearance was tested to determine if a change in the foot platform would affect the measurement. The original platform consisted of a foot board that was raised and lowered with screw jacks. The new platform consisted of a foot board that adjusts in height based on the number of Styrofoam squares placed underneath. Two methods of measuring Calf Circumference were tested. The first method involved moving the tape up and down the calf to locate

the greatest circumference, marking the calf at that point, and taking the measurement at that level. The second method was to identify the area that appeared to have the largest circumference, taking the measurement with the tape three times in that area, and recording the highest value.

The remaining three dimensions (Foot Length, Ball of Foot Length, and Foot Breadth, Horizontal) traditionally involved the use of a foot box. Use of a Brannock Device® (the typical foot measuring apparatus seen in shoe stores) that had been modified to show metric scales instead of American shoe sizes was proposed. For all of these technique/instrument changes, both methods (the original ANSUR method and the proposed new method) were tested to ensure that 1) the resulting measurement values were the same and 2) the reliability (as measured by observer error) was the same or better.

7.3 RESULTS

The analysis of observer error—on new dimensions and on modified dimensions—was done for all dimensions in the validation study. The absolute differences between the first and second measurements for each measurer are reported in Tables 21 and 22, along with the MAD for each dimension. Table 21 shows the validation data for the new dimensions and Table 22 shows the dimensions for which new allowable errors were proposed.

TABLE 21

Absolute Differences (ABS) of Dimensions by Measurer: New Dimensions
(values in mm)

Dimension	ABS Means				Grand MAD
	Measurer 1	Measurer 2	Measurer 3	Measurer 4	
Bicristal Breadth	4.2	10.7	9.3	5.6	7.5
Forearm-Center of Grip	3.1	3.2	6.9	6.7	5.0
Palm Length	1.0	1.3	2	2.1	1.6
Tibial Height	2.0	2.3	1.7	1.9	2.0
Waist Front Length, Sitting	7.2	7.1	8.2	8.1	7.7

TABLE 22

Absolute Differences (ABS) of Dimensions by Measurer:
Dimensions for Which New Allowable Errors Were Proposed
(values in mm and kg)

Dimension*	ABS Means				Grand MAD
	Measurer 1	Measurer 2	Measurer 3	Measurer 4	
Axilla Height	7.5	6.4	5.9	7.4	6.8
Ball of Foot Length 2	0.7	1.4	1.8	0.7	1.2
Bideltoid Breadth	6.7	2.7	5.3	5.7	5.1
Buttock Height	2.8	2.7	2.7	4.4	3.2
Calf Circumference 2	1.3	1.6	2.1	1.5	1.6
Cervicale Height	2.3	3.6	3.1	4.6	3.4
Chest Breadth	4.3	3.5	3.2	6.8	4.5
Chest Circumference	12.9	17.7	8	6.9	11.4
Chest Height	4.9	4.7	6.1	3.0	4.7
Ear Breadth	1.2	1.3	1.7	1.5	1.4
Ear Protrusion	2.3	2.6	1.8	2.0	2.2
Foot Breadth Horizontal 2	1.1	1.6	2.3	1.1	1.5
Functional Leg Length	8.3	20.5	19.4	22.7	17.7
Hand Circumference	2.1	1.8	2.8	2.7	2.4
Head Circumference	2.2	2.0	3.4	4.2	3.0
Heel Ankle Circumference	2.0	2.5	1.9	1.7	2.0
Hip Breadth 1	2.6	5.5	3.7	2.3	3.5
Lateral Malleolus Height	1.0	0.7	1.7	1.2	1.2
Neck Circumference, Base	6.6	5.3	7.6	11.3	7.7
Popliteal Height	2.9	3.5	5.1	2.6	3.5
Shoulder Circumference 1	6.4	6.1	6.3	5.8	6.2
Span	7.8	6.1	5.1	5.9	6.2
Stature	2.4	3.6	3.6	4.2	3.5
Trochanterion Height	4.3	3.3	8.8	6.6	5.7
Waist Depth (O)	7.0	5.5	7.6	4.9	6.3
Weight	.40	.35	.34	.38	.37
Wrist Circumference	1.8	3.0	1.8	1.8	2.1

* Variables listed with a "1" indicate the original measuring techniques; those listed with a "2" indicate proposed new measuring techniques.

Following ANSUR procedures, the absolute differences between the first and second measurements for each measurer are reported in Table 23, along with the MAD for each dimension.

TABLE 23

Absolute Differences (ABS) of Dimensions by Measurer: Modified Technique
(values in mm)

Dimension*	ABS Means				Grand MAD
	Measurer 1	Measurer 2	Measurer 3	Measurer 4	
Ball of Foot Length 2	0.7	1.4	1.8	0.7	1.2
Ball of Foot Length 1	1.6	1.3	1.2	1.2	1.3
Buttock Circumference 2	4.5	6.0	6.4	7.5	6.1
Buttock Circumference 1	5.2	4.9	5.2	4.0	4.8
Calf Circumference 2	1.3	1.6	2.1	1.5	1.6
Calf Circumference 1	1.3	2.0	1.0	1.0	1.3
Foot Breadth Horizontal 2	1.1	1.6	2.3	1.1	1.5
Foot Breadth Horizontal 1	1.4	1.1	1.2	1.5	1.3
Foot Length 2	1.2	1.9	1.0	0.7	1.2
Foot Length 1	1.1	1.2	1.2	1.4	1.2
Hip Breadth 2	4.0	2.6	6.4	4.9	4.5
Hip Breadth 1	2.6	5.5	3.7	2.3	3.5
Shoulder Circumference 2	11.3	18.2	7.9	6.6	11.0
Shoulder Circumference 1	6.4	6.1	6.3	5.8	6.2
Thigh Clearance 2	3.8	1.7	4.0	2.7	3.1
Thigh Clearance 1	3.6	2.1	3.7	3.2	3.2
Waist Breadth (O) 2	4.6	7.4	6.8	3.4	5.6
Waist Breadth (O) 1	4.9	3.5	4.1	2.8	3.8
Waist Circumference (O) 2	18.3	15.8	13.4	13.1	15.2
Waist Circumference (O) 1	3.8	6.6	7.1	6.6	6.0

* Variables listed with a "1" indicate the original measuring techniques; those listed with a "2" indicate proposed new measuring techniques.

For the dimensions in which a new instrument or new technique was tested, the individual measurement values were compared to determine whether or not the two instruments/techniques were comparable. Table 24 provides the measurement data for both techniques and the differences between them. The values shown in the table are the mean of the four measurers on their first trial. Note that the differences seen in Table 24 are not absolute differences, but they are signed differences, as it is useful to know whether a new method produces a larger, smaller or, on average, the same measurement.

TABLE 24

Measurements Tested for Technique/Instrument Modification: Mean over Four Measurers
(values in mm)

Dimension*	Participant										Overall Mean Difference (Signed)
	1	2	3	4	5	6	7	8	9	10	
Ball of Foot Length 2	183.3	172.4	169.6	200.1	175.5	202.0	197.5	198.4	197.6	206.1	
Ball of Foot Length 1	181.6	170.0	169.8	196.4	174.4	201.1	195.5	197.5	194.4	205.8	
Difference	1.7	2.4	-0.2	3.7	1.1	0.9	2.0	0.9	3.2	0.3	1.6
<hr/>											
Calf Circumference 2 (3X's)	347.6	347.9	335.6	380.6	392.5	341.1	361.8	371.6	391.3	338.9	
Calf Circumference 1	347.3	349.3	334.3	381.1	393.3	341.5	361.0	372.6	391.4	338.0	
Difference	0.3	-1.4	1.4	-0.5	-0.8	-0.4	0.8	-1.0	-0.1	0.9	-0.1
<hr/>											
Foot Breadth Horizontal 2	89.0	94.8	88.5	97.0	92.1	98.4	97.5	98.5	96.3	105.6	
Foot Breadth Horizontal 1	89.4	92.6	85.6	98.0	92.6	96.3	96.1	94.8	94.9	103.6	
Difference	-0.4	2.2	2.9	-1.0	-0.5	2.1	1.4	3.7	1.4	2.0	1.4
<hr/>											
Foot Length 2	249.4	242.3	228.4	269.0	241.5	272.6	265.8	263.5	263.5	278.4	
Foot Length 1	248.8	240.1	228.6	267.0	239.9	271.4	263.5	262.4	261.1	277.4	
Difference	0.6	2.2	-0.2	2.0	1.6	1.2	2.3	1.1	2.4	1.0	1.4
<hr/>											
Thigh Clearance 2	141.9	154.9	152.8	172.6	159.5	163.6	167.8	168.9	191.4	166.5	
Thigh Clearance 1	142.5	155.6	151.1	174.3	160.5	164.8	166.8	171.5	193.3	165.0	
Difference	-0.6	-0.7	1.7	-1.7	-1.0	-1.2	1.0	-2.6	-1.9	1.5	-0.6

* Variables listed with a "1" indicate the original measuring techniques; those listed with a "2" indicate proposed new measuring techniques.

Transferring landmarks takes considerable time during landmarking, and it had been observed in the years since ANSUR that this process was sometimes carried out too quickly, with the result that the transferred landmarks were not on a horizontal line with the key landmark. In such cases the measurers had always been instructed to measure a horizontal circumference, even if it was not on the transferred mark. Therefore, in some studies, assessment of horizontality had been done on a visual basis, at the time of measurement. However, no test had been done to verify that a visual test was superior or inferior to transferred landmarks.

The five horizontal circumferences were tested to determine whether the investment of landmark transfer time had an effect on reliability. To test this question, the MADs between the two methods were compared. Table 25 lists these measurements and the differences between the observer errors under the old and new methods. In each case, the observer error increased, indicating that transferring the landmarks, even if it is an imperfect method, yields better data than not transferring the marks.

TABLE 25

Landmark Transfer/No Landmark Transfer Decision Summary
(values in mm)

Dimension	Difference Between MADs	Decision
Buttock Circumference	1.3	Landmark Transfer
Hip Breadth	1.0	Landmark Transfer
Shoulder Circumference	4.8	Landmark Transfer
Waist Breadth	1.8	Landmark Transfer
Waist Circumference	9.2	Landmark Transfer

The decision to keep the original method for Hip Breadth was due to the need for the same transferred landmark for Buttock Circumference. This rationale also applied to Waist Breadth, i.e., the landmark is needed for Waist Circumference; therefore it will be used for Waist Breadth as well.

The dimensions involving a new technique or a new instrument were evaluated based on examining the differences between the two methods. Table 26 summarizes the decisions made based on these trials.

TABLE 26

New Technique/Instrument Decision Summary
(values in mm)

Dimension	Mean Difference	Decision
Ball of Foot Length	1.61	New Instrument
Calf Circumference	-0.08	New Method
Foot Breadth, Horizontal	1.38	New Instrument
Foot Length	1.41	New Instrument
Thigh Clearance	-0.55	New Method

For Thigh Clearance, the proposed new platform allows for quicker height adjustment. Although there are a number of seated dimensions which require the use of the foot platform, Thigh Clearance is the most sensitive with respect to the positioning of the legs. Thigh Clearance was used therefore as a proxy for all the seated dimensions requiring a foot platform. Since there is less than 1 mm difference between the two types of foot platform, the quicker method was used.

The new method for Calf Circumference involved taking three measurements and using the highest value as opposed to measuring the calf at the level of the calf landmark. There is less than 0.1 mm difference between the two methods. Since Calf Height was not measured as it was in ANSUR (requiring a calf landmark), the three-time method was used instead. Even though measuring Calf Circumference three times was slightly slower than measuring once at the marked point, this method was faster overall, since the calf mark could be eliminated.

For the three foot dimensions, the modified Brannock Device® was used in place of the foot boxes. For Foot Breadth, Foot Length and Ball of Foot Length, the Brannock Device® produced very slightly larger measurements, but the differences were less than the allowable error of 2 mm. The decision was to use the new (Brannock) method because it was considerably faster than the foot box.

Most of the dimensions measured in ANSUR were measured using the same landmarks and procedures in ANSUR II. However, results of the in-field observer error data from ANSUR were examined to determine if some of the allowable errors should be changed, based on the experience of the ANSUR measurers over the course of the 11-month data collection. Using that analysis, proposed changes to some of the ANSUR allowable errors were made even when nothing about the procedure had changed. As noted above, in some cases the actual observer error in ANSUR was significantly lower than the allowable error, so the possibility of reducing the allowable error was explored. In most cases, the validation trials supported the proposed changes. The exceptions were: Ear Protrusion, Foot Breadth Horizontal, Functional Leg Length, Span, Hand Circumference, and Weight. Only one of the measurer's MADs for Ear Protrusion was below the proposed allowable error of 2 mm. The other three were all above, and two of the three were above the original allowable error of 3 mm. Thus the allowable error was retained at 3 mm. Functional Leg Length is a

difficult dimension to measure repeatedly. A number of improvements had been made in standardizing the body position prior to measurement in order to improve repeatability, but three of the four experienced measurers were outside the original allowable error of 17 mm. Thus the allowable error for that dimension was not lowered. Only one of the measurers had a mean ABS below 2 mm for Hand Circumference; therefore, the allowable error of 3 mm was retained for this dimension. Finally, the validation trial data suggested that the proposed 0.2 kg was too small a window for Weight. The MADs of the four measurers ranged from 0.34 kg to 0.40 kg, with a grand mean of 0.37 kg. The original allowable error of 0.3 kg was retained.

For the new dimensions, the procedures in ANSUR for setting the allowable errors were generally followed. The ANSUR procedures for Bicristal Breadth would have produced an allowable error of 11 mm. Some improvements were made in the procedures (after the validation trial data collection) to reduce the observer error and the provisional allowable error was set at 5 mm. Time did not permit a formal repeat of the validation trial to test whether this was reasonable. The improvements made some difference in the observer error, but were not enough to justify the optimistic 5 mm value. It was later learned that the allowable error for this dimension in the Fels Longitudinal Study is set at 10 mm (Payne, personal communication, 2010). The ANSUR II allowable error for Bicristal Breadth was therefore adjusted to 8 mm. Tragion – Top of Head was tested during measurer training. The MAD for the measurers was 2.6; thus, the proposed allowable error of 4 mm was retained. The final list of new allowable errors is seen in Table 27, along with the corresponding values from ANSUR, where applicable.

The validation trial was useful in setting (and in some cases re-setting) the allowable errors to be used in evaluating data quality during the ANSUR II data collection. It also served, as such experiments often do, to highlight specific points in some measurement procedures that could be improved. Finally, it allowed testing of some new measurement methods against the original ANSUR methods, to determine whether the proposed new methods were equivalent. In cases where equivalence was shown, the switch was made to the new methods, which were generally faster. In other cases, it was shown that the faster method resulted in less reliable data. In those cases the original slower, but more reliable, method was retained.

TABLE 27
Allowable Errors: Tested Dimensions
(values in mm and kg)

Dimension	ANSUR Allowable Error	ANSUR II Allowable Error
Axilla Height	10	7
Ball of Foot Length	6	2
Bicristal Breadth*		8
Bideltoid Breadth	8	8
Buttock Height	7	4
Calf Circumference	5	4
Cervicale Height	7	7
Chest Breadth	8	7
Chest Circumference	15	14
Chest Height	11	9
Ear Breadth	3	2
Ear Protrusion	3	3
Foot Breadth, Horizontal	2	2
Forearm-Center of Grip Length*		7
Functional Leg Length	17	17
Hand Circumference	4	3
Head Circumference	5	3
Heel-Ankle Circumference	6	4
Hip Breadth	7	6
Lateral Malleolus Height	3	2
Neck Circumference, Base	11	8
Palm Length*		2
Popliteal Height	7	6
Shoulder Circumference	22	12
Span	10	10
Stature	11	6
Tibial Height*		2
Tragion-Top of Head*		4
Trochanterion Height	7	4
Waist Depth	8	6
Waist Front Length, Sitting*		7
Weight	0.3	0.3
Wrist Circumference	5	3

* New dimensions tested

7.4 DAILY OBSERVER ERROR

As noted in Chapter II, data collection was organized into half-day units. In each half day, each station measured one participant twice. Each station therefore had a total of 10 re-measure participants for each full week of measuring. The re-measure participants were typically measured by the second measurer at the station. Exceptions occurred when a team member was absent, or during transitions when one team member was being replaced by another. In those cases a substitute recorder was used, as only trained measurers collected data. When substitute recorders were used, the sole measurer measured the participant for both the original measure and the repeat measure. Thus most data collected were inter-observer data, but there were occasions where intra-observer data were collected. For simplicity of presentation, the small amount of intra-observer error data was combined with the much larger body of inter-observer error data for analysis. In addition, where permanent measurer substitutions were made, the inter-observer error data from all measurer pairs at a station were combined for analysis. At the end of each week, a weekly summary of re-measure data for each station was compiled. The MADs for the re-measure participants were evaluated. If the mean of the deltas exceeded the allowable error, the team supervisor met with the measurers at that station to determine the cause of the difficulty. Even when no mean delta exceeded the allowable error, however, the weekly summary was shown to the measurers so they could monitor their own performance over the course of the survey. Note that participants were also sent for repeat scans, but data from those scans were not examined during data collection, nor are they analyzed here.

Tables 28 through 38 show the means of the absolute values of the deltas for each measured dimension. The right-hand columns show the allowable error for each dimension. Dimensions are grouped by type. In nearly every case, the MAD (observer error) was lower than the allowable error. The observer errors ranged from a low of 0.9 mm for both male and female Interpupillary Breadths, as well as male Head Breadth to a high of 16.8 mm for the male Vertical Trunk Circumference (USA). Although the observer errors were lower than the allowable errors, the larger observer errors were associated with dimensions which have the larger allowable errors. The standing heights (Table 28) generally had observer errors in the 2- to 6-mm range, with the exception of Crotch Height, which involves subjective judgment about the amount of pressure used, and Wrist Height, which is highly sensitive to the position of the shoulders. Errors in the sitting heights (Table 29) were somewhat higher, being generally in the 2- to 5-mm range. Errors were higher in Elbow Rest Height, since it is sensitive to both arm and torso positioning, and errors were higher in Waist Front Length, Sitting (5.3 mm males; 5.4 mm females), since it is sensitive to torso positioning.

TABLE 28
Observer Error for Standing Heights²
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer* Error	n	Observer Error	
Acromial Height	337	3.6	174	3.4	7
Axilla Height	337	4.2	174	4.8	7
Buttock Height	354	2.4	201	2.3	4
Cervicale Height	337	2.8	174	3.0	7
Chest Height	354	4.9	201	6.0	9
Crotch Height	354	6.2	201	5.8	10
Iliocristale Height	337	2.6	174	3.1	5
Knee Height, Midpatella	354	2.8	201	2.2	6
Lateral Femoral Epicondyle Height	354	1.6	201	1.7	3
Lateral Malleolus Height	300	1.1	161	1.2	2
Stature	337	3.1	174	2.8	6
Suprasternale Height	337	3.5	174	3.4	5
Tenth Rib Height	337	2.6	174	2.3	5
Tibial Height	354	1.9	201	1.9	2
Trochanterion Height	354	2.5	201	2.6	4
Waist Height (Omphalion)	337	3.6	174	4.0	7
Wrist Height	337	6.4	174	5.8	11

*MAD

TABLE 29
Observer Error for Sitting Heights
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Elbow Rest Height	345	5.5	166	5.5	10
Eye Height, Sitting	345	3.9	166	4.4	8
Knee Height, Sitting	345	1.8	166	2.1	2
Popliteal Height	345	2.2	166	2.6	6
Sitting Height	345	2.7	166	3.1	6
Thigh Clearance	345	1.7	166	1.8	3
Waist Front Length, Sitting	345	5.3	166	5.5	7

² The dimensions are grouped here by type, but were grouped for efficiency into several stations for data collection (see Chapter II). The different n's in these tables reflect different number of repeat participants by station, due to absent and replaced team members.

The errors for length dimensions (Table 30) ranged generally from 2 to 12 mm. The lower errors were associated with dimensions encompassing bony landmarks, e.g., Acromion-Radiale Length (2.5 mm males; 2.8 mm females). The higher errors were for dimensions involving soft tissue landmarks, e.g., Interscye II (5.1 mm males; 5.2 mm females). Variable tape tension and interference from the running shorts as the tape passes through the crotch contribute to observer error in both crotch lengths. Functional Leg Length was also among the higher observer error dimensions; this can be attributed to the difficulty of achieving consistency in body position.

TABLE 30

Observer Error for Lengths
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Acromion-Radiale Length	337	2.5	174	2.7	4
Buttock-Knee Length	345	5.1	166	5.1	6
Buttock-Popliteal Length	345	5.8	166	5.8	7
Crotch Length (Omphalion)	354	11.6	201	8.1	18
Crotch Length, Posterior (Omphalion)	354	8.6	201	7.4	11
Forearm-Center of Grip Length	337	4.1	174	4.8	7
Forearm-Hand Length	337	2.4	174	2.3	4
Functional Leg Length	345	7.8	166	13.0	17
Interscye I	337	5.3	174	5.7	10
Interscye II	337	5.1	174	5.2	13
Radiale-Stylium Length	337	3.4	174	3.5	6
Shoulder-Elbow Length	337	2.5	174	2.7	6
Shoulder Length	337	2.2	174	2.4	3
Sleeve Length: Spine-Wrist	337	5.3	174	3.7	9
Sleeve Outseam	337	3.8	174	3.7	6
Waist Back Length (Omphalion)	337	3.0	174	2.9	5

Observer errors for breadths and depths (Tables 31 and 32, respectively) ranged generally from 2 to 6 mm. One exception was Forearm-Forearm Breadth (8.4 mm males; 10.5 mm females) for which both body position and breathing cycle are important factors in measurement. The errors in large horizontal circumferences (Table 33) ranged from 5 to 8 mm, while the Vertical Trunk Circumference (USA) errors ranged from 11 to 17 mm. The considerable difference in observer error between male and female Vertical Trunk Circumference can be attributed to the difficulty in standardizing tape tension near the male genitalia. The observer errors for small circumferences (Table 34), as a whole, ranged from 2 to 5 mm.

TABLE 31
Observer Error for Breadths
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Biacromial Breadth	345	3.4	166	4.3	8
Bicristal Breadth	354	4.3	201	5.7	8
Bideltoid Breadth	345	4.6	166	5.0	8
Bimalleolar Breadth	300	1.2	161	1.0	2
Chest Breadth	354	5.0	201	4.9	7
Forearm-Forearm Breadth	345	8.4	166	10.4	17
Hip Breadth	354	2.4	201	3.2	6
Hip Breadth, Sitting	345	3.8	166	4.9	6
Waist Breadth	354	3.5	201	3.9	6

TABLE 32
Observer Error for Depths and Weight
(values in mm and kg)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Abdominal Extension Depth, Sitting	345	4.5	166	4.8	10
Buttock Depth	354	4.9	201	5.0	8
Chest Depth	354	3.5	201	3.5	4
Waist Depth	354	3.7	201	3.5	6
Weight	337	0.1	174	0.1	0.3

TABLE 33
Observer Error for Large Circumferences
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Buttock Circumference	354	5.6	201	4.8	12
Chest Circumference	354	8.2	201	8.5	14
Shoulder Circumference	338	5.6	172	5.1	12
Vertical Trunk Circumference (USA)	354	16.8	201	11.8	24
Waist Circumference (Omphalion)	338	5.9	172	5.9	12

TABLE 34
Observer Error for Small Circumferences
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Ankle Circumference	300	1.8	161	2.0	4
Biceps Circumference, Flexed	337	3.2	174	4.8	6
Calf Circumference	300	1.8	161	1.8	4
Forearm Circumference, Flexed	337	3.5	174	3.7	5
Heel-Ankle Circumference	300	2.0	161	1.9	4
Lower Thigh Circumference	334	2.2	163	3.0	4
Neck Circumference	337	3.0	174	3.5	6
Neck Circumference, Base	337	3.6	174	4.4	8
Thigh Circumference	354	5.1	201	4.3	6
Wrist Circumference	337	1.9	174	2.0	3

Observer errors for the head (Table 35), hand (Table 36), and foot dimensions (Table 37) were generally quite low. All were less than 3 mm, and most approached 1 mm, the smallest unit to which these measurements are recorded. These dimensions are small in magnitude, and body position and breathing cycle generally do not affect their measurement. Bitragion Submandibular Arc (3.5 mm males; 4.3 mm females) may have been affected by compression of the soft tissue of the mandible. The reaches (Table 38), on the other hand, are the most sensitive of all dimensions to body positioning difficulties. The observer errors for most reaches ranged from 7 to 11 mm.

TABLE 35
Observer Error for Head Dimensions
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Bitragion Chin Arc	300	3.0	161	3.0	8
Bitragion Submandibular Arc	300	3.4	161	4.3	6
Bizygomatic Breadth	300	1.2	161	1.3	2
Ear Breadth	300	1.2	161	1.2	2
Ear Length	300	1.4	161	1.3	2
Ear Protrusion	300	1.0	161	1.2	3
Head Breadth	300	0.9	161	1.1	2
Head Circumference	300	1.8	161	2.0	3
Head Length	300	1.0	161	1.6	2
Interpupillary Breadth	300	0.8	161	0.9	2
Menton-Sellion Length	300	1.7	161	1.8	3
Tragion-Top of Head	300	1.8	161	2.1	4

TABLE 36
Observer Error for Hand Dimensions
(values in mm)

Dimension	Males		Females		Allowable Error
	N	Observer Error	n	Observer Error	
Hand Breadth	300	1.3	161	1.3	2
Hand Circumference	300	1.6	161	1.7	3
Hand Length	300	1.6	161	1.6	3
Palm Length	300	1.4	161	1.5	2

TABLE 37
Observer Error for Foot Dimensions
(values in mm)

Dimension	Males		Females		Allowable Error
	N	Observer Error	n	Observer Error	
Ball of Foot Circumference	300	1.9	161	1.9	4
Ball of Foot Length	299	1.4	161	1.3	2
Foot Breadth, Horizontal	299	1.3	161	1.4	2
Foot Length	299	1.2	161	1.3	3
Heel Breadth	300	1.2	161	1.3	2

TABLE 38
Observer Error for Reach Dimensions
(values in mm)

Dimension	Males		Females		Allowable Error
	N	Observer Error	n	Observer Error	
Overhead Fingertip Reach, Sitting	345	7.7	166	10.1	20
Span	345	7.6	166	9.7	10
Thumbtip Reach	345	8.6	166	11.0	20

The allowable errors were of considerable value in monitoring the progress of training. In the past, the assessment of whether team members were ready to begin data collection was subjective. In ANSUR II, there was a fixed standard, the allowable error, which told both trainers and team members alike when the team was ready to begin actual data collection. Allowable errors also aided in maintaining measurement standards and avoiding measurer drift over the course of a long data collection period. This was of critical importance because the ANSUR II survey took place over 18 months, with as much as 1 to 2 weeks between some measuring sites.

A potential disadvantage of establishing maximum allowable errors in advance is that team members might strive to achieve that level of interpair comparability and then stop trying to improve. As many of the mean observer errors were considerably lower than the allowable errors, however, this appears not to have been the case in this survey. It remains a potential difficulty, though, in cases where team motivation is a problem.

Observer error measured on a daily basis, as was done in this survey, has two advantages. First, because observer error data are collected throughout the survey, the data collected can be assumed to be "real", i.e., not an artifact of the team making special efforts for a single day of re-measured participants. Second, the daily checking can be used to detect measurement technique problems as soon as they arise, and they can be corrected before the problems become entrenched in the data.

On the other hand, there are two disadvantages to daily collection of observer error data, although they are believed to be outweighed by the advantages. First, the re-measure participants, who are generally not especially pleased to be measured in the first place, are even less pleased to be measured again. This is generally not a significant problem with military participants who are accustomed to following orders. Second, time spent measuring participants a second time is time not spent measuring new participants, but this is a small price to pay for the assurance of data quality gained by including the daily error checks. No modifications in this approach to daily observer error data collection are recommended.

7.5 ESTIMATED OBSERVER ERROR FOR DERIVED DIMENSIONS

Observer error for derived dimensions obviously has no place in correcting problems of measurement technique since these dimensions are not calculated until the survey is completed. However, because the observer error data are useful in assessing statistical significance tests or in analyzing or developing sizing systems and laying out workstations, it is helpful to know the magnitude of the observer error of these dimensions, even after the fact.

Since direct calculation of observer error for the derived dimensions was not generally possible, an alternative strategy was employed. It consisted of estimating observer error using the observer error of the component dimensions. Most of the derived dimensions are calculated by adding or subtracting values of other dimensions. For these dimensions, the observer error is estimated as less than or equal to the sum of the MADs of all component dimensions. Note that addition is used whether the component dimensions are added or subtracted to create the derived dimension. For Clavicle Link, which is created by dividing Biacromial Breadth by two, the observer error is estimated by dividing the observer error of Biacromial Breadth by two.

A model derivation, showing how the observer error for derived dimensions can be estimated using the MAD of component dimensions is shown below for two types of calculation (Gordon et al., 1989). The first is a derived dimension created by

subtraction. The same demonstration could be used for dimensions created by addition alone, by two subtractions, or by a combination of additions and subtractions. The second shows how the observer error for Clavicle Link can be calculated from the MAD of Biacromial Breadth.

Let z be the calculated dimension and x and y be the measured dimensions.

$$z = x - y \quad MAD(z) = ?$$

$$MAD(z) = MAD(x - y)$$

$$= \frac{\sum_{i=1}^n |(x_{1i} - y_{1i}) - (x_{2i} - y_{2i})|}{n}$$

where x_{1i} , x_{2i} , y_{1i} , y_{2i} ($i = 1 \dots n$), are the measurements for the i th individual and x_{1i} , y_{1i} are measurements for observer 1.

$$= \frac{\sum_{i=1}^n |(x_{1i} - x_{2i}) - (y_{1i} - y_{2i})|}{n}$$

$i=1$

$$\leq \frac{\sum_{i=1}^n |(x_{1i} - x_{2i})| + \sum_{i=1}^n |(y_{1i} - y_{2i})|}{n}$$

$$\leq \frac{\sum_{i=1}^n |(x_{1i} - x_{2i})|}{n} + \frac{\sum_{i=1}^n |(y_{1i} - y_{2i})|}{n}$$

$$\leq MAD(x) + MAD(y)$$

$$\therefore MAD(z) \leq MAD(x) + MAD(y)$$

Let r be the calculated dimension and w be the measured dimension.

$$r = \frac{w}{2} \quad MAD(r) = ?$$

$$MAD(r) = MAD\left(\frac{w}{2}\right)$$

$$= \frac{\sum_{i=1}^n \left| \left(\frac{w_{1i}}{2} - \frac{w_{2i}}{2} \right) \right|}{n}$$

$$= \frac{1}{2} \frac{\sum_{i=1}^n |(w_{1i} - w_{2i})|}{n}$$

$$= \frac{1}{2} MAD(w)$$

$$\therefore MAD(r) = \frac{1}{2} MAD(w)$$

The estimated observer errors for all derived dimensions are shown in Table 39. These values can be used for the same purposes as observer errors of measured dimensions, although the user should keep in mind that the derived dimension measurements are estimated rather than measured values.

TABLE 39
Estimated Observer Error for Derived Dimensions
(values in mm)

Derived Dimension	Males	Females
Abdominal Link	5.2	5.4
Acromial Height, Sitting	9.4	9.3
Acromion-Axilla Length	7.8	8.2
Arm Length	11.7	10.9
Axilla-Waist Length (Omphalion)	7.8	8.8
Calf Link	2.7	2.9
Cervicale Height, Sitting	8.6	8.9
Chest Height, Sitting	10.7	11.8
Chest-Waist Drop (Omphalion)	14.1	14.3
Clavicle Link	2.0	2.0
Crotch Length, Anterior (Omphalion)	20.2	15.5
Dactylion Height	8.1	7.4
Dactylion Reach from Wall	8.6	11.0
Elbow Rest Height, Standing	11.3	11.4
Elbow-Wrist Length	4.0	3.9
Eye Height	9.7	10.2
Functional Grip Reach	8.6	11.0
Index Finger Reach	8.6	11.0
Neck-Buttock Length	5.2	5.4
Neck Link	7.7	7.9
Neck-Scye Length	7.0	7.8
Pelvic Link	5.1	5.6
Rise (Omphalion)	9.8	9.9
Shoulder-Waist Length (Omphalion)	7.2	7.5
Sleeve Inseam	10.6	10.6
Suprasternale Height, Sitting	9.3	9.2
Suprasternale-Tenth Rib Length	6.1	5.7
Suprasternale-Waist Length (Omphalion)	7.1	7.4
Thigh Link	4.1	4.2
Thorax Link	5.4	5.4
Tragion Height	4.9	4.9
Tragion Height, Sitting	4.5	5.2
Vertical Grip Reach	13.5	15.9
Vertical Grip Reach Down	10.1	9.2
Vertical Grip Reach, Sitting	7.7	10.1
Vertical Index Fingertip Reach	13.5	15.9
Vertical Index Fingertip Reach, Sitting	7.7	10.1
Vertical Thumtip Reach, Sitting	7.7	10.1
Waist Back, Vertical (Omphalion)	6.4	7.1
Waist-Buttock Drop (Omphalion)	11.6	10.7
Waist-Waist (Omphalion) Over Shoulder	25.4	19.2

7.6 TECHNICAL ERROR OF MEASUREMENT AND RELIABILITY COEFFICIENT

There are other methods for analyzing observer data. Two commonly seen in the literature are the technical error of measurement (TEM) and the reliability coefficient (R). Technical error of measurement expresses error in terms of the unit of measurement using the following formula:

$$TEM = \sqrt{\frac{\sum D^2}{2N}}$$

where D is the difference between the first and second measurements and N is the number of individuals measured. As can be seen from the formula, the technical error is basically a way of summarizing differences between two measurements over a series of participants (Ulijaszek and Lourie, 1994).

The reliability coefficient (R) reveals how much of the variation between participants in the measured population is free of measurement error (Ulijaszek and Lourie, 1994). R is calculated as follows:

$$R = 1 - \left\{ \frac{(TEM)^2}{(SD)^2} \right\}$$

where SD is the standard deviation of the measured values. Since R is dimensionless, it can be used to make comparisons between variables that have different magnitudes (Gordon and Bradtmiller, 1992).

Due to the high correlation between TEM and MAD (Utermohle et al., 1983), using both methods is potentially redundant (Gordon and Bradtmiller, 1992); however due to the ubiquitous use of TEM and R in the literature, it may be helpful to some readers to include both of the statistics that are included in this report for comparative purposes. Tables 40 through 50 report TEM and R for the dimensions measured in ANSUR II. In general, the relative magnitude of TEM, and inversely, R, corresponds to that of the MAD seen in the previous tables and varies with dimension type in the same way.

TABLE 40
TEM and R for Standing Heights
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Acromial Height	3.53	99.6	3.34	99.6
Axilla Height	3.89	99.5	4.22	99.3
Buttock Height	2.57	99.7	2.11	99.8
Cervicale Height	2.68	99.8	2.81	99.7
Chest Height	4.67	99.3	5.73	98.8
Crotch Height	5.87	98.8	5.27	98.6
Iliocristale Height	2.47	99.7	3.12	99.5
Knee Height, Midpatella	2.91	98.9	1.98	99.4
Lateral Femoral Epicondyle Height	1.72	99.6	1.71	99.6
Lateral Malleolus Height	0.95	97.0	1.11	94.9
Stature	3.02	99.8	2.75	99.8
Suprasternale Height	3.22	99.7	3.06	99.6
Tenth Rib Height	2.44	99.8	2.38	99.7
Tibial Height	1.96	99.4	2.09	99.3
Trochanterion Height	2.39	99.8	2.60	99.7
Waist Height (Omphalion)	3.38	99.5	3.79	99.3
Wrist Height	5.91	97.8	5.52	97.4

TABLE 41
TEM and R for Sitting Heights
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Elbow Rest Height	5.65	95.9	5.48	94.9
Eye Height, Sitting	4.11	98.4	4.12	98.2
Knee Height, Sitting	1.74	99.6	1.98	99.4
Popliteal Height	2.12	99.2	2.53	98.8
Sitting Height	2.99	99.3	2.98	99.2
Thigh Clearance	1.66	98.1	1.65	98.1
Waist Front Length, Sitting	5.20	95.7	5.23	94.2

TABLE 42

TEM and R for Lengths
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Acromion-Radiale Length	2.43	97.8	2.47	97.5
Buttock-Knee Length	5.74	96.0	4.72	97.6
Buttock-Popliteal Length	6.73	93.8	5.62	96.0
Crotch Length (Omphalion)	10.43	94.0	7.47	96.4
Crotch Length, Posterior (Omphalion)	8.07	91.8	6.51	93.0
Forearm-Center of Grip Length	3.75	94.7	4.31	92.9
Forearm-Hand Length	2.15	99.0	2.10	99.0
Functional Leg Length	8.89	97.0	13.46	93.3
Interscye I	5.85	96.4	6.32	94.7
Interscye II	5.41	95.9	5.78	94.4
Radiale-Stylium Length	3.13	95.1	3.21	94.7
Shoulder-Elbow Length	2.50	97.8	2.47	97.6
Shoulder Length	2.23	93.9	2.29	94.6
Sleeve Length: Spine-Wrist	5.76	97.4	3.84	98.7
Sleeve Outseam	3.60	98.4	3.39	98.5
Waist Back Length (Omphalion)	3.04	98.5	2.87	98.6

TABLE 43

TEM and R for Breadths
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Biacromial Breadth	3.34	96.6	4.47	93.5
Bicristal Breadth	3.98	94.3	5.52	90.8
Bideltoid Breadth	4.40	96.7	4.64	96.2
Bimalleolar Breadth	1.18	91.5	0.97	92.7
Chest Breadth	4.72	91.5	4.31	93.3
Forearm-Forearm Breadth	8.95	94.4	10.91	89.8
Hip Breadth	2.23	98.8	2.99	98.1
Hip Breadth, Sitting	3.70	97.6	4.30	98.0
Waist Breadth	3.28	98.5	3.23	97.6

TABLE 44

TEM and R for Depths and Weight
(values in mm and kg)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Abdominal Extension Depth, Sitting	4.28	97.2	4.66	96.7
Buttock Depth	4.41	95.4	4.40	94.6
Chest Depth	3.17	97.4	3.48	97.3
Waist Depth	3.74	97.3	3.23	97.6
Weight	0.28	99.9	0.08	100.0

TABLE 45

TEM and R for Large Circumferences
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Buttock Circumference	5.41	99.2	4.25	99.5
Chest Circumference	8.09	98.6	7.55	98.5
Shoulder Circumference	5.91	98.9	5.55	98.4
Vertical Trunk Circumference (USA)	16.23	95.7	10.57	97.2
Waist Circumference (Omphalion)	6.21	99.5	6.28	99.3

TABLE 46

TEM and R for Small Circumferences
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Ankle Circumference	1.86	98.2	2.15	98.0
Biceps Circumference, Flexed	3.75	98.5	5.93	93.3
Calf Circumference	1.78	99.6	1.61	99.7
Forearm Circumference, Flexed	3.44	97.0	3.55	93.7
Heel-Ankle Circumference	1.85	98.5	1.91	98.8
Lower Thigh Circumference	2.07	99.9	3.70	98.8
Neck Circumference	2.78	98.2	3.48	94.6
Neck Circumference, Base	3.50	97.6	4.05	93.5
Thigh Circumference	4.65	99.1	3.96	99.2
Wrist Circumference	1.88	95.3	1.95	91.2

TABLE 47
TEM and R for Head Dimensions
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Bitragion Chin Arc	2.61	96.1	2.88	96.3
Bitragion Submandibular Arc	3.22	95.4	3.92	93.2
Bizygomatic Breadth	1.05	97.0	1.35	95.5
Ear Breadth	1.13	86.1	1.11	83.1
Ear Length	1.27	91.0	1.10	93.3
Ear Protrusion	0.92	89.4	1.11	80.2
Head Breadth	0.88	97.2	1.07	96.4
Head Circumference	1.62	98.9	2.59	98.4
Head Length	1.02	97.7	1.70	94.3
Interpupillary Breadth	0.82	93.7	0.93	93.6
Menton-Sellion Length	1.65	93.1	1.66	93.2
Tragion-Top of Head	1.67	92.7	1.78	92.4

TABLE 48
TEM and R for Hand Dimensions
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Hand Breadth	1.09	94.2	1.13	91.3
Hand Circumference	1.48	97.9	1.51	97.1
Hand Length	1.40	97.7	1.44	97.9
Palm Length	1.27	96.0	1.31	95.3

TABLE 49
TEM and R for Foot Dimensions
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Ball of Foot Circumference	1.65	98.2	1.75	97.8
Ball of Foot Length	1.21	98.8	1.12	98.7
Foot Breadth, Horizontal	1.13	95.0	1.21	93.8
Foot Length	1.05	99.3	1.10	99.2
Heel Breadth	1.10	95.6	1.10	95.9

TABLE 50
TEM and R for Reach Dimensions
(values in mm)

Dimension	Males		Females	
	TEM	R (%)	TEM	R (%)
Overhead Fingertip Reach, Sitting	7.78	98.3	9.50	97.4
Span	7.47	99.1	11.28	97.9
Thumbtip Reach	8.72	95.4	10.28	93.2

This document reports research undertaken at the U.S. Army Natick Soldier Research, Development and Engineering Center, Natick, MA, and has been assigned No. Natick/TR- 15/007 in a series of reports approved for publication.

CHAPTER VIII

REFERENCES

(Includes references from Appendices B and G)

Albrecht GH (1983) Humidity as a Source of Measurement Error in Osteometrics. *American Journal of Physical Anthropology*. 60:517-521.

Bennett KA, Osbourne RH (1986) Interobserver Measurement Reliability in Anthropometry. *Human Biology*. 58(5):751-759.

Blackwell S, Robinette KM, Boehmer M, Fleming S, Kelly S, Brill T, Hoeferlin D, Burnsides D, Daanen H (2002) *Civilian American and European Surface Anthropometry Resource (CAESAR), Final Report, Volume II: Descriptions*. Technical Report AFRL-HE-WP-TR-2002-0173, Human Effectiveness Directorate, Crew Systems Interface Division, Wright-Patterson Air Force Base, OH.

Bolton CB, Kenward M, Simpson RE, Turner GM (1973) *An Anthropometric Survey of 2000 Royal Air Force Aircrew 1970/1971*. Technical Report 73083, Royal Air Force Establishment, Farnborough, Hants, England.

Bradtmiller B, Ratnaparkhi J, Tebbetts I (1985) *Demographic and Anthropometric Assessment of U.S. Army Anthropometric Data Base*. Technical Report TR-86-004 (AD A164 637). U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.

Bradtmiller B, Gordon CC, Paquette SP (2009) Anthropometric change in the U.S. Army: Implications for design. In: *Human Diversity*, Proceedings of the 9th International Congress of Physiological Anthropology. Delft, The Netherlands: International Association of Physiological Anthropology. 48-51.

Branson RS, Vaucher YE, Harrison GG, Vargas M, Thies C (1982) Inter- and Intra-observer Reliability of Skinfold Thickness and Newborn Infants. *Human Biology*. 54:137-143.

Cameron N (1984) *The Measurement of Human Growth*. Croom Helm:London, England.

Centers for Disease Control and Prevention (CDC) 2012 National Center for Health Statistics (NCHS). *National Health and Nutrition Examination Survey Examination Protocol*. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. 2009-2010.
http://www.cdc.gov/nchs/data/nhanes/nhanes_09_10/BodyMeasures_09.pdf.

Churchill E, Churchill T, McConville JT, White RM (1977) *Anthropometry of Women of the U.S. Army—1977: Report No. 2 - The Basic Univariate Statistics*. Technical Report

NATICK-TR-77/024 (AD A044 806). U.S. Army Natick Research and Development Command, Natick, MA.

Churchill E, Kikta P, Churchill T (1977) *The AMRL Anthropometric Data Bank Library: Volumes I-V*. Technical Report AMRL-TR-77-1(AD A047 314). Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, OH.

Churchill E, McConville JT, Laubach LL, White RM (1971) *Anthropometry of U.S. Army Aviators - 1970*. Technical Report TR-72-52-CE (AD 743 528). U.S. Army Natick Laboratories, Natick, MA.

Churchill T, Bradtmiller B, Gordon CC (1988) *Computer Software Used in the U.S. Army Anthropometric Survey 1987-1988*. Technical Report TR-88-045 (AD A201 185). U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.

Clauser CE, McConville JT, Gordon CC, Tebbetts I (1986) *Selection of Dimensions for an Anthropometric Data Base Volume II: Dimension Evaluation Sheets*. Technical Report TR-86-054 (AD A179 472). U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.

Clauser CE, Tucker PE, McConville JT, Churchill E, Laubach L, Reardon J (1972) *Anthropometry of Air Force Women*. Technical Report AMRL-TR-70-5 (AD 743 113). Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, OH.

Donelson SM, Gordon CC (1996) *Validation of a Statistical Matching Procedure Used to Create United States Marine Corps Anthropometric Databases*. Technical Report (TR-96-035) (ADA316645). U.S. Army Natick Research, Development and Engineering Center, Natick, MA.

DMDC (2010) *Army Strength by Component, Gender, Age and Race/Ethnicity Type as of March 31, 2010*. Defense Manpower Data Center DRS12650_1003 data request prepared for Dr. Claire C. Gordon.

DMDC (2012) *Army Strength by Component, Gender, Age and Race/Ethnicity Type as of September 30, 2011*. Defense Manpower Data Center DRS12650_1109 data request prepared for Dr. Claire C. Gordon.

Gentsch EL, Moody AC, Vandenberghe JJ (2000) *Operational Baseline of the MCRD-San Diego 3-D Scanner Implementation*, Contractor Technical Report delivered to Defense Logistics Agency, Fort Belvoir, VA.

Gifford EC, Provost JR, Lazo J (1965) *Anthropometry of Naval Aviators - 1964*. Aerospace Crew Equipment Laboratory Report No. NAEC ACEL 533. U.S. Naval Air Engineering Center, Philadelphia, PA.

Gordon CC, Bradtmiller B (1992) Interobserver Error in a Large Scale Anthropometric Survey. *American Journal of Human Biology*. 4:253-263.

Gordon CC, Bradtmiller B, Clauser CE, Churchill T, McConville JT, Tebbetts I, Walker RA (1989) *1987-1988 Anthropometric Survey of U.S. Army Personnel: Methods and Summary Statistics*. Technical Report TR-89-044 (AD A225 094). U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.

Gordon CC, Paquette SP, Bradtmiller B (2008) *Anthropometric Change in the U.S. Army: 1987-2007*. Paper presented at the 33rd Annual Meeting of the Human Biology Association, 9-10 April 2008, Columbus, OH. Abstract published in *American Journal of Human Biology* V20(2): 222.

Goto R, Mascie-Taylor CGN (2007) Precision of Measurement as a Component of Human Variation. *Journal of Physiological Anthropology*. 26(2):253-256.

Greiner TM, Gordon CC, Carson EA (1995) *An Analysis of Anthropometric Differences Among Occupational Groups in the U.S. Army*. Technical Report NATICK/TR-95-016. U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.

Grotewall J, Speyer H, Kaiser R (2002) Generation and use of human 3D-CAD models. *SPIE*. 4537:501-504.

Han H, Nam Y, Choi K (2010) Comparative Analysis of 3D Body Scan Measurements and Manual Measurements of Size Korea Adult Females. *International Journal of Industrial Ergonomics*. 40: 530-540.

Harris EF, Smith RN (2009) Accounting for Measurement Error: A Critical but often Overlooked Process. *Archives of Oral Biology*. 54S:S107-S117.

Hotzman J, Bradtmiller B, Kristensen K (2010) *ANSURII/MC-ANSUR Validation Trials for New and Modified Dimensions*. Technical Report. U.S. Army Soldiers Systems Center, Natick, Natick, MA. (in press)

Hotzman J, Gordon CC, Bradtmiller B, Corner BD, Mucher M, Kristensen S, Paquette S, Blackwell C (2011) *Measurer's Handbook: US Army and Marine Corps Anthropometric Surveys, 2010-2011*. Technical Report TR-11-017. U.S. Army Natick Soldier Research, Development, and Engineering Center, Natick, MA.

ISO 7250-1:2008 *Basic human body measurements for technological design -- Part 1: Body measurement definitions and landmarks*. International Organization for Standardization, Geneva.

ISO 15535:2012 *General requirements for establishing anthropometric databases*. International Organization for Standardization, Geneva.

ISO 20685:2010 *3-D scanning methodologies for internationally compatible anthropometric databases*, International Organization for Standardization, Geneva.

Jamison PL, Ward RE (1993) Brief Communication: Measurement Size, Precision, and Reliability in Craniofacial Anthropometry: Bigger is Better. *American Journal of Physical Anthropology*. 90(4):495-500.

Jamison PL, Zegura SL (1974) A Univariate and Multivariate Examination of Measurement Error in Anthropometry. *American Journal of Physical Anthropology*. 8:417-426.

Johnston FE, Mack RW (1985) Interobserver Reliability of Skinfold Measurements in Infants and Young Children. *American Journal of Physical Anthropology*. 67:285-289.

Kemper HCG, Pieters JJL (1974) Comparative Study of Anthropometric Measurements on the Same Subjects in Two Different Institutes. *American Journal of Physical Anthropology*. 40:341-344.

Kouchi M, Mochimaru M (2006) Why Scan-Derived Body Measurements Differ From Measurements by the Traditional Methods? *Proceedings IEA 2006 Congress*. pg5.

Kouchi M, Mochimaru M, Tsuzuki K, Yokoi T (1996) Random Errors in Anthropometry. *Journal of Human Ergology*. 25:155-166.

Kouchi M, Mochimaru M, Tsuzuki K, Yokoi T (1999) Interobserver errors in anthropometry. *Journal of Human Ergology*. 28:15-24.

Martin R (1914) *Lehrbuch Der Anthropologie*. Jena: Verlag von Gustav Fischer.

McCann C, Noy I, Rodden E, Logan O (1975) *1974 Anthropometric Survey of Canadian Forces Personnel*. DCIEM Report No. 75-R-1114. Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada.

Page JW (1976) A Note on Interobserver Error in Multivariate Analysis of Populations. *American Journal of Physical Anthropology*. 44:521-526.

Personnel Authorization Module XXI, 2012,
<https://pamxxi.armyg1.army.mil/WelcomeUnclas.aspx>

Paquette S (1996) 3D Scanning in Apparel Design and Human Engineering. *IEEE Computer Graphics and Applications*. 16(5):11-15.

Paquette S, Gordon CC, Bradtmiller B (2009) *Anthropometric Survey (ANSUR) II Pilot Study: Methods and Summary Statistics*. Technical Report TR-09-014. U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.

Payne J, personal communication (2010).

Perkins T, Burnsides DB, Robinette KM, Naishadham, D (2000) *Comparative Consistency of Univariate Measures from Traditional and 3-D Scan Anthropometry*. SAE International Paper Number 2000-01-2145.

Sokal RR, Rohlf FJ (2011) *Biometry: The Principles and Practices of Statistics in Biological Research, 4th Edition*. New York: W.H. Freeman.

Ulijaszek SJ, Kerr DA (1999) Anthropometric Measurement Error and the Assessment of Nutritional Status. *British Journal of Nutrition*. 82:165-177.

Ulijaszek SJ, Lourie JA (1994) Intra- and Inter-Observer Error in Anthropometric Measurement. In Eds (Ulijaszek SJ, Mascie-Taylor CGN) *Anthropometry: The Individual and the Population*. Cambridge: Cambridge University Press. Vol 14: 30-55.

Utermohle CJ, Zegura SL (1982) Intra- and Interobserver Error in Craniometry: A Cautionary Tale. *American Journal of Physical Anthropology*. 8:417-426.

Utermohle CJ, Zegura SL, Heathcote GM (1983) Multivariate Observers, Humidity, and Choice of Precision Statistics: Factors Influencing Craniometric Data Quality. *American Journal of Physical Anthropology*. 61:85-95.

Walker RA (1993) "The Impact of Racial Variation on Human Engineering Design Criteria." In: CC Gordon (ed) *Race, Ethnicity, and Applied Bioanthropology*, pp 7-21. Washington, D.C.: American Anthropological Association, NAPA Bulletin 13.

White RM, Churchill E (1971) *The Body Size of Soldiers*. U.S. Army Anthropometry - 1966. Technical Report 72-51-CE (AD 743 465). U.S. Army Natick Laboratories, Natick, MA.

Yin X, Corner BD, Razdan A (2009) EARS: A System for Geometric and Anthropometric Evaluation of Human Body Scans. *Computer-Aided Design and Applications*. 6:431-445. DOI: 10.3722/cadaps.2009.431-445.

Yin X, Corner BD, Razdan A (2010) EARS: Toward Fast Analysis of 3D Human Scans. *Advances in Applied Digital Human Modeling*, V. Duffy, ed. CRC Press, Taylor & Francis Group.

Zar JH (2010) *Biostatistical Analysis, 5th Edition*. Prentice Hall: Englewood Cliffs, NJ.

INDEX*

	<u>Page</u>
ABDOMINAL EXTENSION DEPTH, SITTING	46
Abdominal Link	234
Abdominal point, anterior landmark	20
ACROMIAL HEIGHT	48
Acromial Height, Sitting	236
Acromion landmark	20
Acromion-Axilla Length	238
ACROMION-RADIALE LENGTH	50
Acropodium landmark	20
ANKLE CIRCUMFERENCE	52
Anthropometer	11
Arm Length	240
AXILLA HEIGHT	54
Axillary fold, posterior landmark	20
Axilla-Waist Length (Omphalion)	242
BALL OF FOOT CIRCUMFERENCE	56
BALL OF FOOT LENGTH	58
Beam caliper	11

* This is an index of landmarks, dimensions, and measuring instruments. The page number refers to where the entry is most fully described. Measured dimensions appear in the Index as ALL CAPS. Derived dimensions appear in the Index as Title Case. Landmarks appear in the Index in Sentence case and have the word "landmark" in the title. Instruments also appear in Sentence case.

	<u>Page</u>
BIACROMIAL BREADTH	60
BICEPS CIRCUMFERENCE, FLEXED	62
Biceps point landmark	20
BICRISTAL BREADTH	64
BIDELTOID BREADTH	66
BIMALLEOLAR BREADTH	68
BITRAGION CHIN ARC	70
BITRAGION SUBMANDIBULAR ARC	72
BIZYGOMATIC BREADTH	74
BUTTOCK CIRCUMFERENCE	76
BUTTOCK DEPTH	78
BUTTOCK HEIGHT	80
BUTTOCK-KNEE LENGTH	82
Buttock point, posterior landmark	20
BUTTOCK-POPLITEAL LENGTH	84
CALF CIRCUMFERENCE	86
Calf Link	244
Center of pupil landmark	20
Cervicale Height, Sitting	246
Cervicale landmark	20
CERVICALE HEIGHT	88
CHEST BREADTH	90

	<u>Page</u>
CHEST CIRCUMFERENCE	92
CHEST DEPTH	94
CHEST HEIGHT	96
Chest Height, Sitting	248
Chest point, anterior landmark	21
Chest-Waist Drop (Omphalion)	250
Chin landmark	21
Clavicle Link	252
Clavicle landmark	21
CROTCH HEIGHT	98
Crotch landmark	21
Crotch Length, Anterior (Omphalion)	254
CROTCH LENGTH (OMPHALION)	100
CROTCH LENGTH, POSTERIOR (OMPHALION)	102
Dactylion Height	256
Dactylion Reach from Wall	258
Dactylion III landmark	21
Deltoid point landmark	21
Digit III, base landmark	21
Dorsal juncture of the foot and leg landmark	21
Ear, bottom landmark	22
EAR BREADTH	104

	<u>Page</u>
EAR LENGTH	106
Ear point landmark	22
EAR PROTRUSION	108
Ear, top landmark	22
Ectocanthus landmark	22
Ectoorbitale landmark	22
Elbow crease landmark	22
ELBOW REST HEIGHT	110
Elbow Rest Height, Standing	260
Elbow-Wrist Length	262
Euryon landmark	22
Eye Height	264
EYE HEIGHT, SITTING	112
Fifth metatarsophalangeal protrusion landmark	22
First metatarsophalangeal protrusion landmark	23
FOOT BREADTH, HORIZONTAL	114
FOOT LENGTH	116
Foot scanner	18
FOREARM-CENTER OF GRIP LENGTH	118
FOREARM CIRCUMFERENCE, FLEXED	120
FOREARM-FOREARM BREADTH	122
FOREARM-HAND LENGTH	124

	<u>Page</u>
Frontotemporale landmark	23
Functional Grip Reach	266
FUNCTIONAL LEG LENGTH	126
Glabella landmark	23
Gluteal furrow point landmark	23
Gonion landmark	23
HAND BREADTH	128
HAND CIRCUMFERENCE	130
HAND LENGTH	132
HEAD BREADTH	134
HEAD CIRCUMFERENCE	136
HEAD LENGTH	138
Head scanner (PX)	17
HEEL-ANKLE CIRCUMFERENCE	140
HEEL BREADTH	142
Heel point, lateral, and medial landmarks	23
HIP BREADTH	144
HIP BREADTH, SITTING	146
Holtain caliper	11
ILIOCRISTALE HEIGHT	148
Iliocristale landmark	23

	<u>Page</u>
Index Finger Reach	268
Infraorbitale landmark (see Orbitale landmark)	26
Infrathyroid landmark	23
Inner thigh landmark	24
INTERPUPILLARY BREADTH	150
INTERSCYE I	152
INTERSCYE II	154
KNEE HEIGHT, MIDPATELLA	156
KNEE HEIGHT, SITTING	158
Knee point, anterior landmark	24
Landmark transfer rod	16
LATERAL FEMORAL EPICONDYLE HEIGHT	160
Lateral femoral epicondyle, sitting and standing landmarks	24
LATERAL MALLEOLUS HEIGHT	162
Lateral malleolus landmark	24
LOWER THIGH CIRCUMFERENCE	164
Medial malleolus landmark	24
Menton landmark	24
MENTON-SELLION LENGTH	166
Metacarpale II landmark	24
Metacarpale V landmark	25
Midpatella landmark	25

	<u>Page</u>
Midshoulder landmark	25
Midspine landmark	25
Modified beam caliper with dowel	15
Modified Brannock Device®	13
Modified height gauge	14
Modified steel tape	15
Neck-Buttock Length	270
NECK CIRCUMFERENCE	168
NECK CIRCUMFERENCE, BASE	170
Neck, anterior and lateral landmarks	25
Neck Link	272
Neck-Scye Length	274
Olecranon, bottom, center and rear landmarks	25
Opisthocranion landmark	26
Orbitale landmark	26
Otobasion, superior landmark	26
OVERHEAD FINGERTIP REACH, SITTING	172
PALM LENGTH	174
Pelvic Link	276
Poechoch sliding caliper	12
Popliteal fossa at the dorsal juncture of the calf and thigh landmark	26
POPLITEAL HEIGHT	176

	<u>Page</u>
Pternion landmark	26
Pupillometer	13
Radiale landmark	26
RADIALE-STYLIUM LENGTH	178
Rise (Omphalion)	278
Scale	12
Scye landmarks	27
Scye marking aid	16
Sellion landmark	28
SHOULDER CIRCUMFERENCE	180
SHOULDER-ELBOW LENGTH	182
SHOULDER LENGTH	184
Shoulder-Waist Length (Omphalion)	280
SITTING HEIGHT	186
Sleeve Inseam	282
SLEEVE LENGTH: SPINE-WRIST	188
SLEEVE OUTSEAM	190
Sliding caliper	11
SPAN	192
Spreading caliper	11
STATURE	194
Steel tape	12

	<u>Page</u>
Styliion, dorsal and ventral landmarks	28
Submandibular landmark	28
Suprapatella landmark	28
SUPRASTERNALE HEIGHT	196
Suprasternale Height, Sitting	284
Suprasternale landmark	28
Suprasternale-Tenth Rib Length	286
Suprasternale-Waist Length (Omphalion)	288
TENTH RIB HEIGHT	198
Tenth rib landmark	28
THIGH CIRCUMFERENCE	200
THIGH CLEARANCE	202
Thigh Link	290
Thigh point, top landmark	28
Thorax Link	292
Thumbtip landmark	28
THUMBTIP REACH	204
TIBIAL HEIGHT	206
Tibiale landmark	29
Top of head (vertex) landmark	29
Tragion Height	294
Tragion Height, Sitting	296

	<u>Page</u>
Tragion landmark	29
TRAGION-TOP OF HEAD	208
Trapezius landmark	29
Trochanter landmark	29
TROCHANTERION HEIGHT	210
Trochanterion landmark	29
Vertical Grip Reach	298
Vertical Grip Reach Down	300
Vertical Grip Reach, Sitting	302
Vertical Index Fingertip Reach	304
Vertical Index Fingertip Reach, Sitting	306
Vertical Thumbtip Reach, Sitting	308
VERTICAL TRUNK CIRCUMFERENCE (USA)	212
WAIST BACK LENGTH (OMPHALION)	214
Waist Back, Vertical (Omphalion)	310
WAIST BREADTH	216
Waist-Buttock Drop (Omphalion)	312
WAIST CIRCUMFERENCE (OMPHALION)	218
WAIST DEPTH	220
WAIST FRONT LENGTH, SITTING	222
WAIST HEIGHT (OMPHALION)	224
Waist (omphalion), anterior and posterior landmarks	29

	<u>Page</u>
Waist-Waist (Omphalion) Over Shoulder	314
Wall chart	14
WEIGHT	226
Whole-body scanner (WBX)	17
WRIST CIRCUMFERENCE	228
WRIST HEIGHT	230
Zygion landmark	29
Zygofrontale landmark	30

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APPENDIX A

APPLICATIONS FOR MEASURED AND DERIVED DIMENSIONS

Most of the measured and derived dimensions for which data are reported in this volume serve multiple design and sizing uses. Some, chiefly head, hand, and foot variables, are needed for the design of a particular class of item to be worn on that part of the body. All the dimensions serve at least one of the seven use categories described below:

Describing Overall Body Size and Proportions: These are dimensions of overall body size and proportions. They are required to determine the anthropometric differences or similarities between populations. They are also used for selecting samples of participants that are anthropometrically representative of a particular population for studies in which body size is of significance (e.g., the evaluation of the workstation layouts for a new armored vehicle). Further, these dimensions are commonly used in anthropometric studies world-wide, and their definitions are generally agreed upon. This means that international population comparisons using these dimensions are valid.

Clothing and Personal Protection Design, Sizing, and Issue: These dimensions are useful for the design and sizing of Army uniforms, utility garments, and personal protective equipment (e.g., body armor, respirators, chemical defense clothing). In this context, “personal protection” also includes boots, gloves, helmets, goggles, and various special purpose items.

Workstation Design: Dimensions in this group are central to the design and layout of single- and multi-person workstations occupied by military personnel. They are also of paramount importance in the design and layout of workstations of weapon systems, particularly those, like tanks, in which space is at a premium. Body clearance dimensions dictate, for example, the size of escape hatches and limited-size passageways that must be designed to allow quick and safe passage of an individual. In the field or in a depot, the performance of maintenance activities is also greatly enhanced if personnel have ready physical and visual access to maintenance and inspection ports, and have the reach capabilities to perform necessary service, repair, or replacement activities, often conducted under adverse conditions.

Occupational Selection: These dimensions are used to screen candidates for anthropometric incompatibility when job assignments are being made. The physical constraints inherent in some occupations, e.g. the dimensions of a helicopter cockpit, preclude individuals of certain sizes and proportions from safely carrying out those missions.

Digital Human Models: These dimensions are needed for developing digital human models used to assess the body’s reaction to hazardous environments, and for

two- and three-dimensional models used in the design and evaluation of Army crewstations and workstations. Digital models are increasingly used in the design process for seated and standing workstations, as well as group modeling for battlefield scenarios.

3-D Scan Validation: The dimensions in this group are those required to create and refine automated scan data extraction algorithms. As scanners are more frequently used as a substitute for actual anthropometric data collection, it becomes more critical than ever to assure users of the data that the measurements arising from 3-D scans are equivalent to those taken with tapes and calipers. As data extraction applications are continuously improving, this is a foreseeable goal. In the interim, however, it is necessary to collect traditional (tape & caliper) dimensions that can be used to test the validity of these applications and the assumptions and the algorithms that underlie them.

International Standards for Ergonomic Design: These dimensions are useful for comparing data sets between nations, and are measured according to the protocol in ISO 7250-1, as well as other international standards. Further, these dimensions form part of a minimum set of dimensions recommended for collection any time humans are measured. The inclusion of these dimensions ensures that the U.S. is using internationally recognized "Best Practices" in its survey design.

Table A-1 lists all the measured and derived dimensions in the ANSUR II survey and designates the use or uses each may serve.

TABLE A-1
Applications for Measured and Derived Dimensions*

Measured or Derived Dimension	Describing Overall Body Size and Proportions	Clothing and Personal Protection Design, Sizing, and Issue	Workstation Design	Occupational Selection	Digital Human Models	3-D Scan Validation	International Standards for Ergonomic Design
1 Abdominal Extension Depth, Sitting D1 Abdominal Link 2 Acromial Height D2 Acromial Height, Sitting D3 Acromion-Axilla Length		✓ ✓	✓ ✓	✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓
3 Acromion-Radiale Length 4 Ankle Circumference D4 Arm Length 5 Axilla Height	✓ ✓ ✓	✓ ✓ ✓			✓ ✓ ✓	✓ ✓	✓ ✓
D5 Axilla-Waist Length (Omphalion) 6 Ball Of Foot Circumference 7 Ball Of Foot Length 8 Biacromial Breadth 9 Biceps Circumference Flexed		✓ ✓ ✓ ✓ ✓			✓ ✓ ✓	✓ ✓	✓ ✓
10 Bicristal Breadth 11 Bideltoid Breadth 12 Bimalleolar Breadth 13 Bitragion Chin Arc 14 Bitragion Submandibular Arc	✓ ✓ ✓		✓ ✓	✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓
15 Bzygomatic Breadth 16 Buttock Circumference 17 Buttock Depth 18 Buttock Height 19 Buttock-Knee Length	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓		✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓
20 Buttock-Popliteal Length 21 Calf Circumference D6 Calf Link 22 Cervicale Height D7 Cervicale Height, Sitting		✓ ✓ ✓	✓ ✓	✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓

* After Clauser et al., 1986

Measured or Derived Dimension	Describing Overall Body Size and Proportions	Clothing and Personal Protection Design, Sizing, and Issue	Workstation Design	Occupational Selection	Digital Human Models	3-D Scan Validation	International Standards for Ergonomic Design
23 Chest Breadth 24 Chest Circumference 25 Chest Depth 26 Chest Height D8 Chest Height, Sitting	✓ ✓ ✓	✓ ✓ ✓	✓	✓	✓ ✓ ✓	✓	✓ ✓
D9 Chest-Waist Drop (Omphalion) D10 Clavicle Link 27 Crotch Height D11 Crotch Length Anterior (Omphalion) 28 Crotch Length Omphalion	✓	✓ ✓ ✓		✓	✓ ✓ ✓		✓
29 Crotch Length Posterior Omphalion D12 Dactylion Height D13 Dactylion Reach From Wall 30 Ear Breadth 31 Ear Length		✓	✓ ✓	✓ ✓	✓ ✓ ✓	✓	
32 Ear Protrusion 33 Elbow Rest Height D14 Elbow Rest Height, Standing D15 Elbow-Wrist Length D16 Eye Height		✓		✓ ✓ ✓	✓ ✓ ✓		✓ ✓
34 Eye Height, Sitting 35 Foot Breadth Horizontal 36 Foot Length 38 Forearm Circumference Flexed 37 Forearm-Center Of Grip Length	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓		✓ ✓
39 Forearm-Forearm Breadth 40 Forearm-Hand Length D17 Functional Grip Reach 41 Functional Leg Length 42 Hand Breadth	✓		✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓		✓ ✓
43 Hand Circumference 44 Hand Length 45 Head Breadth 46 Head Circumference 47 Head Length	✓ ✓ ✓	✓ ✓ ✓	✓	✓ ✓ ✓	✓ ✓ ✓		✓ ✓

Measured or Derived Dimension	Describing Overall Body Size and Proportions	Clothing and Personal Protection Design, Sizing, and Issue	Workstation Design	Occupational Selection	Digital Human Models	3-D Scan Validation	International Standards for Ergonomic Design
48 Heel Ankle Circumference 49 Heel Breadth 50 Hip Breadth 51 Hip Breadth, Sitting 52 Iliocristale Height	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓
D18 Index Finger Reach 53 Interpupillary Breadth 54 Interscye I 55 Interscye II 56 Knee Height Midpatella		✓ ✓ ✓ ✓	✓		✓ ✓ ✓ ✓		
57 Knee Height, Sitting 58 Lateral Femoral Epicondyle Height 59 Lateral Malleolus Height 60 Lower Thigh Circumference 61 Menton-Sellion Length	✓ ✓ ✓ ✓		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓	✓
D19 Neck-Buttock Length 62 Neck Circumference 63 Neck Circumference Base D20 Neck Link D21 Neck-Scye Length	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓
64 Overhead Fingertip Reach, Sitting 65 Palm Length D22 Pelvic Link 66 Popliteal Height 67 Radiale-Stylium Length		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		✓ ✓
D23 Rise (Omphalion) 68 Shoulder Circumference 69 Shoulder-Elbow Length 70 Shoulder Length D24 Shoulder-Waist Length (Omph)	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓	✓
71 Sitting Height D25 Sleeve Inseam 72 Sleeve Length Spine-Wrist 73 Sleeve Outseam 74 Span	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓		✓ ✓ ✓

Measured or Derived Dimension	Describing Overall Body Size and Proportions	Clothing and Personal Protection Design, Sizing, and Issue	Workstation Design	Occupational Selection	Digital Human Models	3-D Scan Validation	International Standards for Ergonomic Design
75 Stature 76 Suprasternale Height D26 Suprasternale Height, Sitting D27 Suprasternale-Tenth Rib Length D28 Suprasternale-Waist (Omph) Length	✓ ✓	✓ ✓ ✓	✓	✓	✓ ✓ ✓	✓	✓
77 Tenth Rib Height 78 Thigh Circumference 79 Thigh Clearance D29 Thigh Link D30 Thorax Link	✓	✓	✓	✓ ✓	✓ ✓ ✓ ✓	✓	✓ ✓
80 Thumtip Reach 81 Tibial Height D31 Tragion Height D32 Tragion Height, Sitting 82 Tragion-Top Of Head	✓	✓	✓	✓	✓ ✓ ✓ ✓		✓ ✓
83 Trochanterion Height D33 Vertical Grip Reach D34 Vertical Grip Reach Down D35 Vertical Grip Reach, Sitting D36 Vertical Index Fingertip Reach	✓		✓ ✓ ✓		✓ ✓ ✓ ✓		✓ ✓
D37 Vertical Index Fingertip Reach, Sitting D38 Vertical Thumtip Reach, Sitting 84 Vertical Trunk Circumference (USA) 85 Waist Back Length Omphalion D39 Waist Back, Vertical (Omphalion)		✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓ ✓		✓
86 Waist Breadth 87 Waist Circumference Omphalion 88 Waist Depth 89 Waist Front Length, Sitting 90 Waist Height Omphalion	✓ ✓ ✓ ✓	✓ ✓ ✓			✓ ✓ ✓ ✓	✓	✓
D40 Waist-Buttock Drop (Omphalion) D41 Waist-Waist (Omph) Over Shoulder 91 Weight 92 Wrist Circumference 93 Wrist Height		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓	✓ ✓ ✓ ✓		✓ ✓

APPENDIX B

SAMPLING STRATEGY FOR THE ANSUR II DATABASE

Claire C. Gordon, Ph.D.

This appendix describes the methods used to establish minimum sampling requirements for the ANSUR II databases, including component/sex/age/race sample cell targets, and it also discusses the sample acquisition strategy used to meet these requirements.

B.1 DETERMINING MINIMUM SAMPLE SIZES

Design criteria for Total Army acquisition requirements must address anthropometric variation in all Total Army components: Active Duty Army, Army Reserve, and Army National Guard. In addition, since small but significant differences between Active Duty Army and Army National Guard components were found in a pilot study (Gordon et. al, 2008) and because uniforms and equipment are often purchased separately for the two components when they are not deploying together, it is important to have samples sufficient to describe and compare the Active/Guard components separately. Anthropometric sizing and design methods require that male and female data be treated separately in most initial statistical analyses, so power analyses for both men and women were conducted to ensure sufficient sample sizes to accurately describe design requirements for each sex whenever appropriate.

An approach similar to that used in the 1988 ANSUR survey was used to establish minimum sample sizes for the ANSUR II databases. This approach involves identification of the statistical parameters and tests commonly required of engineering databases, definition of the desired confidence and precision of those parameter estimates and tests, and estimation of the sample sizes required to achieve the desired level of confidence and precision. A “worst case” scenario—the most difficult (in terms of sample size required) statistic for the most variable body dimension—is used to set the minimum sample size for the database as a whole to ensure that the minimum requirements for all other less demanding statistical tests and less variable body dimensions are automatically met. For most engineering databases, the most challenging parameter estimates are the 5th and 95th percentiles, which are commonly used to establish accommodation boundaries in military design and sizing requirements. Statistical estimation of means is also commonly done as part of statistical approaches to design in order to center sizing systems at the densest part of the user distribution. In general, the sample sizes needed to obtain a given level of precision and confidence in statistics at the tails of body size distributions are far larger than those needed to estimate the center of the distribution.

Equation 1 is a simplified expression of the minimum sample size required for estimation of 5th/95th percentiles with 95% confidence and a precision of 1% of the mean value (Sokal & Rohlf, 2011; ISO 15535:2012). Equation 2 gives the minimum

sample sizes needed to estimate mean values with 95% confidence and a 1% precision (Sokal & Rohlf, 2011; ISO 15535:2012; Zar, 2010).

$$\text{Equation 1: } n \geq (1.96 * CV)^2 * (1.534)^2$$

$$\text{Equation 2: } n \geq (1.96 * CV)^2$$

where n = minimum sample size, and CV = Coefficient of Variation = (Standard Deviation/Mean) * 100.

As can be seen above, minimum sample sizes for 5th/95th percentiles are larger than those needed for the same precision/confidence in means by a factor of approximately $1.534^2 = 2.4$. Knowing average values precisely, however, is not sufficient to design military systems that must accommodate a broad range of body sizes and shapes. Design envelopes such as those used in military requirements documents require relatively precise estimates at the tails of the body size distributions. For this reason, the 5th/95th percentile requirements (Equation 1) usually set minimum sample sizes for reference engineering database; such minimums will be sufficient for defining accommodation envelopes and more than sufficient for other statistical applications.

In addition, because potential differences between male and female Soldiers and between Active Duty and National Guard Soldiers were of interest in this study, statistical tests of mean differences were also an important power consideration for ANSUR II sampling plans. Equation 3 is a simplified version of the minimum sample size needed to conduct a two-sided t-test between means to detect a statistically significant difference of δ units or larger at the .05 level with 90% power in large samples (Zar, 2010).

$$\text{Equation 3: } n \geq (2 * SD^2 / \delta^2) * (1.96 + 1.282)^2$$

Where n = minimum sample size, SD = Standard Deviation of pooled population, and δ = magnitude of smallest difference to be detected. For practical purposes, differences smaller in magnitude than differences in repeated measurements of the same subjects are not important, so δ was set at 12 mm for Waist Circumference and 14 mm for Chest Circumference; twice the mean absolute differences reported in the ANSUR 1988 survey (Gordon et al., 1989).

Note that a different minimum sample size for each body dimension in an anthropometric survey could theoretically be derived because the means and variances for most dimensions are different. However, because correlations between body dimensions are so important in multivariate modeling and anthropometric sizing and design, it is impractical to have different sample sizes for different body dimensions. Ideally all dimensions should be measured on all survey participants, even though body dimensions with lower CVs theoretically require smaller sample sizes to obtain reliable percentile estimates. Again, a worst case approach is taken by choosing those critical

body dimensions with the highest CVs to establish minimum sample sizes, knowing that the results will be more than sufficient for less variable body dimensions.

Previous military surveys have shown that of the most commonly used body dimensions, the two with the largest CVs (therefore requiring the largest sample sizes for precise parameter estimates) are Waist Circumference and Chest Circumference. Table B-1 presents estimates of Army Waist and Chest Circumference means, standard deviations, and CVs from two sources: the 1988 ANSUR survey (Gordon et al., 1989) and the 2007 ANSUR II pilot study (Gordon et al., 2008; Paquette et al., 2009). As can be seen in Table B-1, Army Waist and Chest Circumferences were more variable in the 2007 pilot study than in the 1988 ANSUR survey, so standard deviations and coefficients of variation from the 2007 pilot study were used for the ANSUR II power analyses.

TABLE B-1

Waist and Chest Circumference Statistics from Previous Army Surveys

Males											
Waist Circumference	1988				2007						
	n	Mean	SD	CV ³	n	Mean	SD	CV			
Active Duty	1774	862.42	86.40	10.4	1475	921.93	106.83	11.6			
Reserve		Not applicable			771	944.01	105.48	11.2			
National Guard					565	962.38	117.73	12.2			
Chest Circumference	1988				2007						
	n	Mean	SD	CV	n	Mean	SD	CV			
Active Duty	1774	991.37	69.06	7.0	1475	1037.05	91.41	8.8			
Reserve		Not applicable			771	1052.00	91.20	8.7			
National Guard					565	1059.77	94.25	8.9			
Females											
Waist Circumference	1988				2007						
	n	Mean	SD	CV	n	Mean	SD	CV			
Active Duty	2208	791.88	82.71	10.4	287	854.48	106.54	12.5			
Reserve		Not applicable			246	857.12	111.03	13.0			
National Guard					118	841.82	101.25	12.0			
Chest Circumference	1988				2007						
	n	Mean	SD	CV	n	Mean	SD	CV			
Active Duty	2208	907.08	63.52	8.9	287	961.62	88.01	9.2			
Reserve		Not applicable			246	957.78	91.29	9.5			
National Guard					118	940.84	83.82	8.9			

³ Note that CV values are reported to the nearest .1 unit to improve table clarity, but were carried to 13 decimal places for the power calculations reported in Table B-2.

When CVs from Table B-1 are inserted into power equations (1, 2) above, the following results (Table B-2) were obtained.

TABLE B-2

Minimum Sample Sizes for ANSUR II Parameter Estimates

Waist Circumference		Males		Females	
		Mean	5th/95th	Mean	5th/95th
Active Duty	n ≥	516	1214	597	1405
Reserve	n ≥	480	1129	645	1517
National Guard	n ≥	575	1353	556	1308
Chest Circumference		Males		Females	
		Mean	5th/95th	Mean	5th/95th
Active Duty	n ≥	298	702	322	757
Reserve	n ≥	289	679	349	821
National Guard	n ≥	304	715	305	718

As expected, the sample requirements for precise estimates of the mean are substantially lower than those needed to determine 5th/95th percentiles with the same confidence and precision. In addition, there are substantial differences in the sample sizes needed for parameter estimates of Waist Circumference and Chest Circumference due to the larger CVs for Waist Circumference. Unfortunately, Waist Circumference is a very important measurement for clothing and protective equipment design, and so it cannot be ignored.

Table B-3 summarizes the pooled variance estimates for Active Duty and National Guard Waist and Chest Circumferences and presents the results when these are inserted in Equation 3 to establish minimum sample sizes needed to detect differences between Active Duty and National Guard of at least twice the magnitude of observer error at the .05 level with 90% power.

TABLE B-3

Minimum Sample Sizes for ANSUR II Active Duty and National Guard T-Tests

Dimension	Males		Females	
	Pooled SD*	n ≥	Pooled SD*	n ≥
Waist Circumference	111.41	1812	105.06	1611
Chest Circumference	92.74	922	87.22	816

*Pooled Active/Guard standard deviations are from the 2007 pilot study database.

Because comparisons of male and female body dimensions are common in the design process, Table B-4 repeats the power analysis above using pooled variance estimates for Waist and Chest Circumferences of Total Army males and females. These results indicate that Total Army databases should be greater than or equal to 1947 subjects each in order to detect male-female differences of at least twice the magnitude of observer error at the .05 level with 90% power.

TABLE B-4

Minimum Sample Sizes for ANSUR II Male and Female T-Tests

Dimension	Total Army	
	Pooled SD*	n ≥
Waist Circumference	115.48	1,947
Chest Circumference	98.83	1,048

*Pooled male/female standard deviations are from the 2007 pilot study database.

The results of these power analyses indicated that ANSUR II representative databases for male/female, Active/Reserve/Guard subgroups should have at least 1,947 subjects each. For survey planning purposes, these targets were rounded up to 2,000 each, and initial survey project plans and cost estimates were based on 2 (sex) by 3 (component) by 2,000 participants each for a total survey of approximately 12,000 soldiers.

Later, as plans for accessing ANSUR II participants were being developed, it became apparent that Reserve troops were so geographically dispersed that sampling large numbers of them would be logistically impossible. Thus in September of 2010 a decision was made to measure Reserve soldiers whenever they were serving with units participating in ANSUR II, but not to target them specifically for stand-alone databases. As funding had already been secured for a sample of 12,000, measuring days originally planned for Reserve soldiers were redistributed. These additional measuring days for Active/Guard soldiers proved extremely important because 1) they provided a cushion against unexpected subject acquisition problems that might have threatened access to representative samples of the required minimum size; and 2) they enabled oversampling of minority groups as was done in ANSUR 1988 to ensure that subgroup samples were large enough to determine whether/when racial/ethnic minorities might be at risk for unintentional disaccommodation in Army-wide engineering design criteria (Walker, 1993).

B.2 ESTABLISHING REPRESENTATIVE SAMPLING TARGETS

Simply measuring the minimum number of soldiers called for in a power analysis does not ensure that the soldiers measured are *representative* of the target population of users. Previous anthropometric research has demonstrated that most anthropometric variation is explained by age, sex, and population affiliation (Bradtmiller et al., 1985; ISO 15535:2012). A stratified sampling strategy based on component, sex, age, and racial/ethnic group was thus used to guide subject acquisition in ANSUR II so that the resulting samples would be demographically and anthropometrically representative of the Army. Defense Manpower Data Center census counts from 31 March 2010 (DMDC, 2010: DRS12650_1003) were used to establish the age and racial/ethnic frequencies needed to match Army distributions (Table B-5), and these proportions were then used to distribute the sample sizes established through power analysis to set minimum targets for each sample cell (Table B-6).

TABLE B-5

Demographic Distributions of Army Personnel (DMDC, 2010) (values in percent)

Active Duty Males							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	7.17	1.45	1.19	0.21	0.10	0.08	0.02
21-25	22.06	4.17	3.45	0.86	0.25	0.24	0.16
26-30	14.90	3.81	2.66	0.72	0.16	0.23	0.41
31-40	15.55	5.76	2.82	0.78	0.17	0.26	0.98
≥41	5.70	2.14	0.78	0.23	0.06	0.06	0.40
Active Duty Females							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	5.83	3.37	1.72	0.31	0.19	0.23	0.05
21-25	14.98	9.82	4.44	1.08	0.42	0.57	0.33
26-30	9.93	7.96	2.84	1.02	0.27	0.37	0.69
31-40	8.60	10.71	2.43	1.09	0.23	0.31	1.04
≥41	3.55	4.12	0.65	0.32	0.07	0.07	0.38
National Guard Males							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	10.10	1.49	0.94	0.26	0.08	0.03	0.07
21-25	19.84	2.62	1.79	0.58	0.19	0.06	0.31
26-30	14.25	1.77	1.35	0.41	0.12	0.09	0.32
31-40	17.73	2.57	1.99	0.44	0.16	0.12	0.44
≥41	14.64	2.79	1.72	0.23	0.12	0.10	0.28
National Guard Females							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	12.51	4.37	1.75	0.42	0.21	0.06	0.13
21-25	19.34	6.60	2.76	0.78	0.29	0.11	0.54
26-30	11.74	4.28	1.69	0.45	0.17	0.12	0.37
31-40	10.66	4.66	1.65	0.46	0.22	0.14	0.39
≥41	7.89	3.52	1.04	0.20	0.17	0.09	0.21

TABLE B-6

ANSUR II Representative Sample Requirements for n=2000⁴ Subgroups

Active Duty Males							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	143	29	24	4	2	2	0
21-25	441	83	69	17	5	5	3
26-30	298	76	53	14	3	5	8
31-40	311	115	57	16	4	5	20
≥41	114	43	16	5	1	1	8
Active Duty Females							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	117	67	34	6	4	5	1
21-25	300	196	89	22	8	11	7
26-30	199	159	57	21	5	7	14
31-40	172	214	49	22	5	6	21
≥41	71	82	13	6	2	1	8
National Guard Males							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	202	30	19	5	2	1	1
21-25	397	53	36	12	4	1	6
26-30	285	35	27	8	2	2	6
31-40	355	51	40	9	3	2	9
≥41	293	56	35	5	3	2	6
National Guard Females							
Ages	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other
≤20	250	87	35	9	4	1	3
21-25	387	132	55	16	6	2	11
26-30	235	86	34	9	4	2	7
31-40	213	93	33	9	5	3	8
≥41	158	70	21	4	3	2	4

As mentioned previously, when it became apparent that creating an independent subsample of Reserve Soldiers was not feasible, the Reserve sample was redistributed to set sampling targets greater than the minimum required for representative samples of sufficient power and to oversample racial/ethnic minority groups so that they could be

⁴ Note that cell entries have been rounded to the nearest whole person so the sum of rounded cell entries may not exactly equal 2000.

described separately when appropriate for design. Table B-7 shows the result of interactive calculations in Microsoft Excel to maximize representative database sizes while also maximizing the ability to represent and compare racial/ethnic minority groups.

TABLE B-7

ANSUR II Sampling Targets

ACTIVE DUTY MALES	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other	
<=20	148	59	88	31	11	9	7	
25	455	168	253	122	27	28	22	
30	308	154	195	102	17	26	21	
40	321	233	207	112	19	30	24	
>=41	118	86	57	33	6	7	6	
Total	1350	700	800	400	80	100	80	3510
ACTIVE DUTY FEMALES	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other	
<=20	122	75	100	24	8	7	15	
25	315	218	257	85	18	19	37	
30	209	177	165	80	11	12	24	
40	180	238	141	86	10	10	20	
>=41	74	92	37	25	3	2	4	
Total	900	800	700	300	50	50	100	2900
NATIONAL GUARD MALES	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other	
<=20	203	56	49	10	4	1	3	
25	399	98	92	23	9	2	8	
30	287	66	69	16	5	3	11	
40	357	96	102	17	7	5	15	
>=41	294	104	88	9	5	4	13	
Total	1540	420	400	75	30	15	50	2530
NATIONAL GUARD FEMALES	White	Black	Hispanic	Asian	Native American	Pacific Islander	Other	
<=20	252	131	79	15	6	2	6	
25	389	197	124	27	8	4	10	
30	236	128	76	15	5	5	12	
40	214	139	74	16	6	5	13	
>=41	159	105	47	7	5	4	9	
Total	1250	700	400	80	30	20	50	2530

Note that the targets for each subgroup in Table B-7 total 11,470, not the 12,000 participants used to establish ANSUR II plans. The remaining 530 subjects were expected to be Reservists mixed in with Active/Guard units and/or sampling losses due to unforeseen logistical difficulties.

Note also that the sampling targets of Active Duty databases were increased more than those of National Guard and that the male Active Duty database was increased more than the female Active Duty database. These decisions were the result of the following practical considerations:

- 1) Active Duty personnel are easier to access than National Guard because Active Duty are concentrated at large Army posts. During the time of this study National Guard personnel were deploying or returning from deployment at only a few locations. They were not concentrated in large numbers at other times except for training events, which cannot support an anthropometric survey without adversely impacting military objectives.
- 2) There are relatively few (<16%) female Soldiers, and they are most concentrated at TRADOC (Training & Doctrine Command) schools. They are generally not widely available at large Army posts with combat divisions.
- 3) Large screening formations wherein minorities are most effectively oversampled are not logistically possible in training or deployment scenarios.

B.3 SAMPLING ACQUISITION PLANNING

Deriving sampling targets from statistical power equations and user-population census data is a relatively easy process compared to the logistical challenge of executing a sampling strategy in the field. Accessing anthropometric survey participants in military settings requires coordination with liaison personnel from measuring sites and units, and implementation of a participant selection process that does not bias the sample and its resulting anthropometric distributions. Potential sources of bias in military samples include limited geographic and operational representation at measuring sites and participating military units, biases in unit availability that increase the probability of sampling personnel from noncombat occupational groups and units, and an age/rank participation bias that makes representative sampling of older age groups extremely challenging.

ANSUR II procedures addressed potential sample acquisition biases in several ways:

- 1) Measuring sites were chosen to sample a cross section of Combat Divisions and geographic locations.

2) Units at measuring sites were sampled according to military function to ensure a cross section of combat, combat support, and combat service support occupational groups.

3) Whenever possible whole units were assembled for subject screening or screened virtually (using unit rosters) so that survey participants could be randomly selected from within sex/age/racial-ethnic sampling strata.

This approach (which was also used in ANSUR 1988) required a very high level of military commitment to the project. ANSUR II was executed under an HQDA Executive Order (EXORD) that was coordinated through the Army G-3 and G-4 offices well over nine months in advance of data collection. It was drafted and coordinated with subordinate commands six months in advance of data collection, and finalized four months in advance. This approach allowed the NSRDEC project team to brief General Officers whose commands were impacted by the study and to work directly with their tasking offices who ultimately selected the survey measuring sites and dates.

Unfortunately an HQDA EXORD is no guarantee of timely and enthusiastic local cooperation for any anthropometric survey. Thus, a full time military liaison team was assigned to support ANSUR II execution. An O-5 liaison officer (LTC Richard Hall) was assigned from the project's inception to partner with the ANSUR II Project Manager (Cynthia Blackwell). Full time O-3 (CPT Christopher Simone) and E-8 (MSG Philip Harting) liaisons were present in the field every day with the measuring team to coordinate survey requirements with local chains of command at each measuring site and to troubleshoot sample acquisition on a daily basis, ensuring a steady flow of survey participants so that the measuring team was fully occupied every day. Full time assignment of a military liaison team enabled top-down briefings and courtesy calls to selected units that minimized misunderstandings and tasking conflicts. The presence of military liaisons on site also enabled immediate troubleshooting that minimized sampling losses when participating units or individuals went missing.

Daily tracking of sample acquisition by an Army civilian scientist serving as Field Supervisor (Joseph Parham) was another key element that ensured ANSUR II sampling strategies could be successfully executed in the field. The Field Supervisor ensured that racial/ethnic data collected from ANSUR II participants were accurate, and he maintained component and sex-specific race by age spreadsheets showing the number required and the number measured for each component/sex/age/race sample cell. Real time sample acquisition tracking enabled daily adjustment of sampling fractions so that sample cells were filled gradually from multiple sites and units, and these spreadsheets were crucial to the measuring site and unit trade-off decisions that were made near the end of the survey to meet sampling requirements.

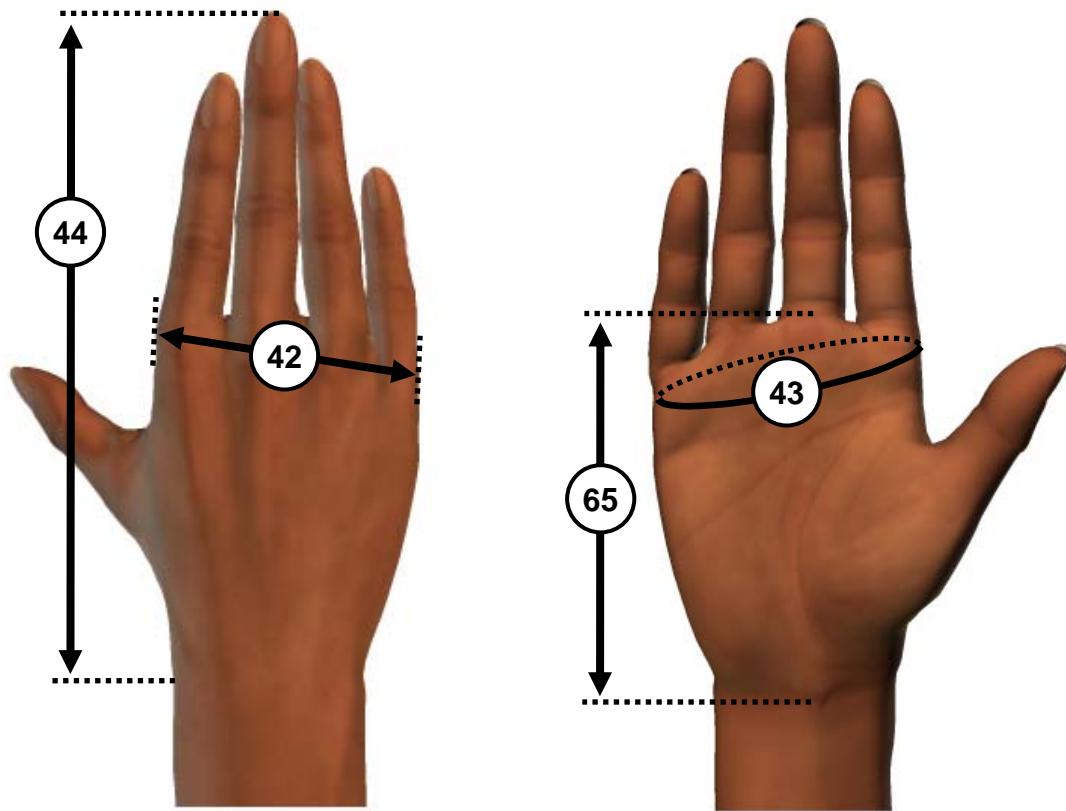
REFERENCES*

- Bradtmiller B, Ratnaparkhi J, Tebbetts I (1985) *Demographic and Anthropometric Assessment of U.S. Army Anthropometric Data Base*. Technical Report TR-86-004 (DTIC Number: AD A164 637). U.S. Army Natick Research, Development, and Engineering Center, Natick, MA.
- DMDC (2010) *Army Strength by Component, Gender, Age and Race/Ethnicity Type as of March 31, 2010*. Defense Manpower Data Center DRS12650_1003 data request prepared for Dr. Claire C. Gordon.
- Gordon CC, Bradtmiller B, Clauser CE, Churchill T, McConville JT, Tebbetts I, Walker RA (1989) *1987-1988 Anthropometric Survey of U.S. Army Personnel: Methods and Summary Statistics*. Technical Report (TR-89-044) (AD A225 094). U.S. Army Natick Research, Development and Engineering Center, Natick, MA.
- Gordon CC, Paquette SP, Bradtmiller B (2008) *Anthropometric Change in the U.S. Army: 1987-2007*. Paper presented at the 33rd Annual Meeting of the Human Biology Association, 9-10 April 2008, Columbus, OH. Abstract published in *American Journal of Human Biology* V20(2): 222.
- ISO 15535:2012 *General requirements for establishing anthropometric databases*. International Organization for Standardization, Geneva.
- Paquette SP, Gordon CC, Bradtmiller B (2009) *Anthropometric Survey (ANSUR) II Pilot Study: Methods and Summary Statistics*. NATICK/TR-09/014 (AD A498 172). Natick, MA: U.S. Army Natick Soldier Center, Natick, MA.
- Sokal RR, Rohlf FJ (2011) *Biometry: The Principles and Practices of Statistics in Biological Research, 4th Edition*. New York: W.H. Freeman.
- Walker RA (1993) The impact of racial variation on human engineering design criteria. In: CC Gordon (ed.) *Race, Ethnicity, and Applied Bioanthropology*, pp 7-21. Washington, D.C.: American Anthropological Association, NAPA Bulletin 13.
- Zar JH (2010) *Biostatistical Analysis, 5th Edition*. Prentice Hall: Englewood Cliffs, NJ.

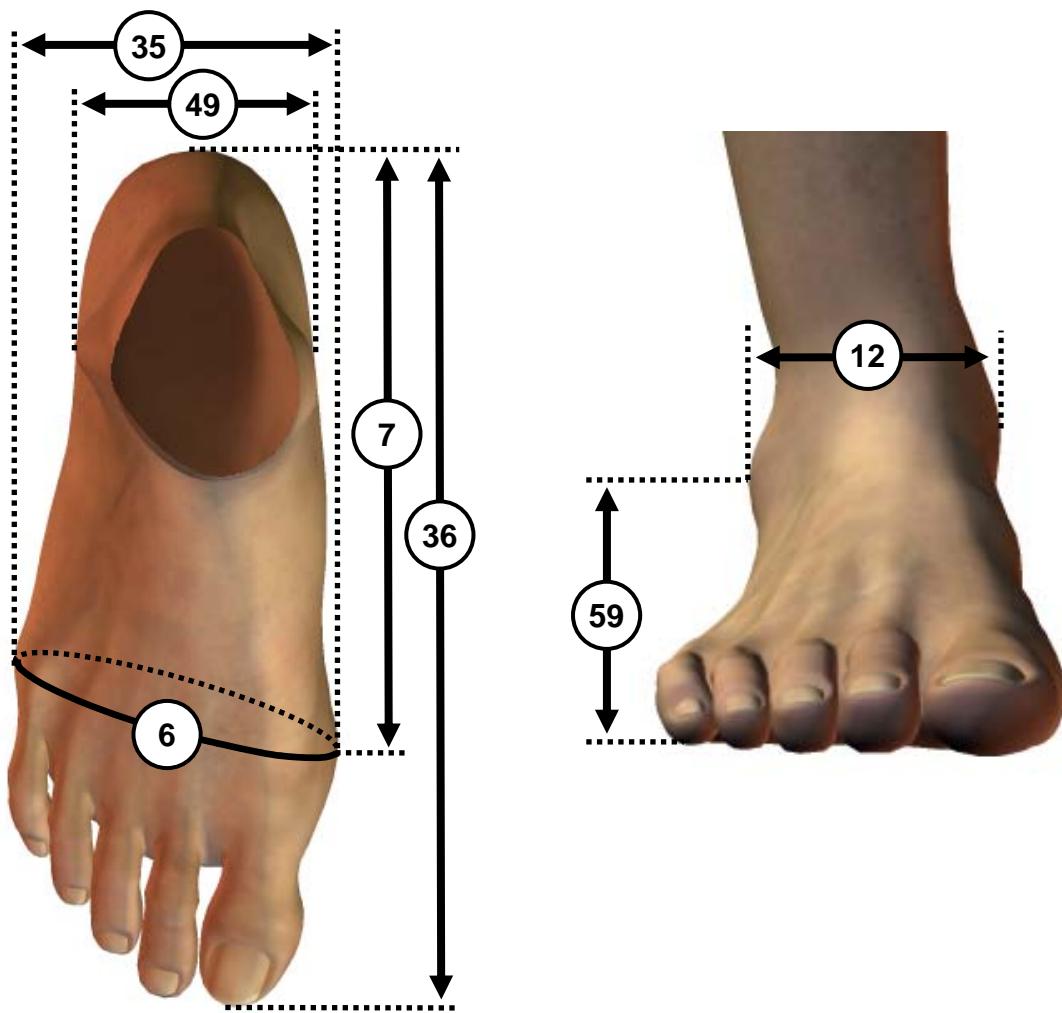
* The references for this appendix are included here for ease of use, but are also included in the main References section.

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APPENDIX C
VISUAL INDEX OF BODY MEASUREMENTS



- (42) HAND BREADTH
- (43) HAND CIRCUMFERENCE
- (44) HAND LENGTH
- (65) PALM LENGTH



(6) BALL OF FOOT CIRCUMFERENCE

(7) BALL OF FOOT LENGTH

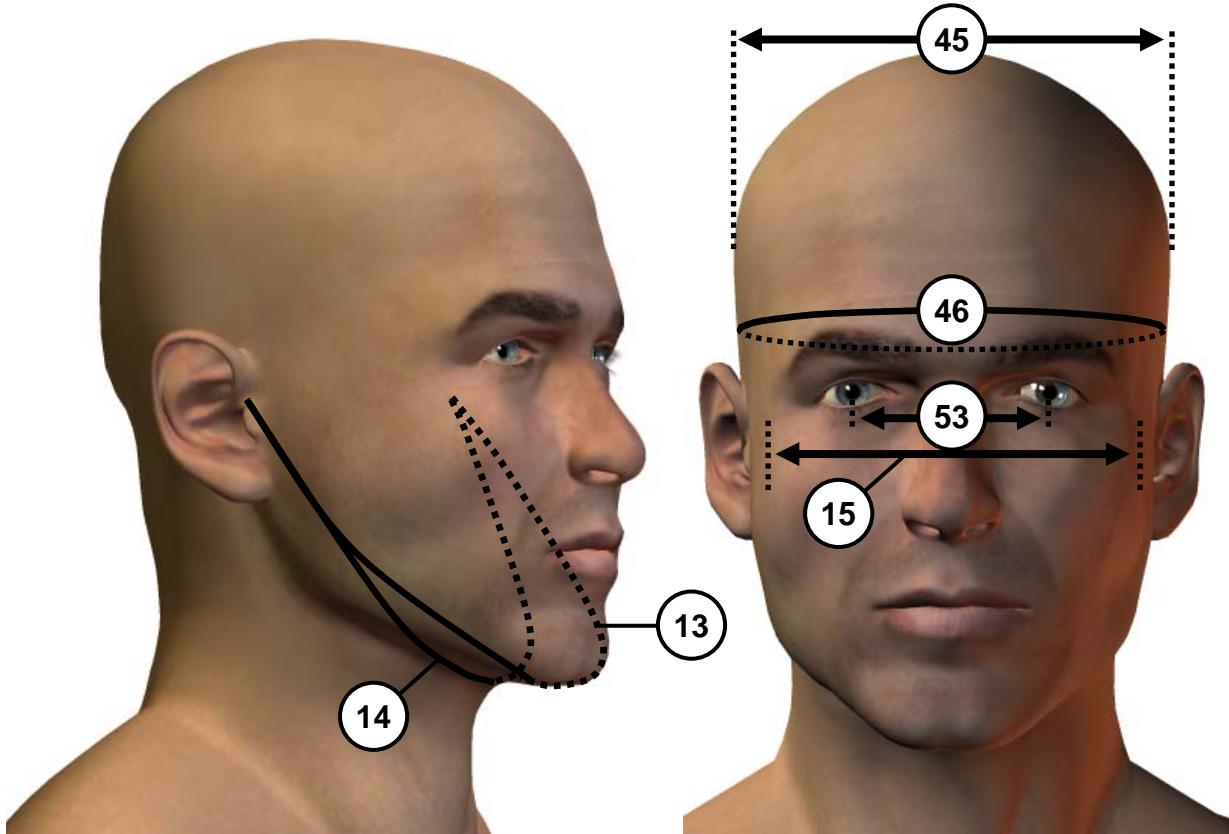
(12) BIMALLEOLAR BREADTH

(35) FOOT BREADTH, HORIZONTAL

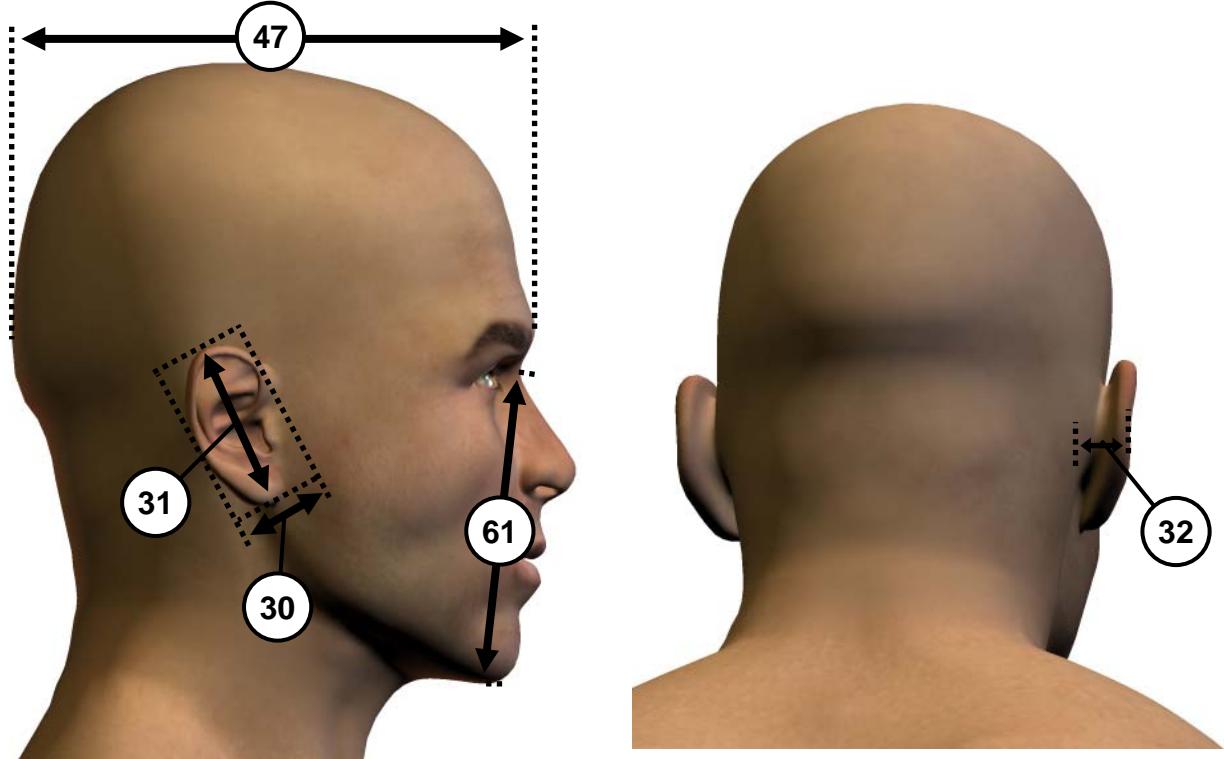
(36) FOOT LENGTH

(49) HEEL BREADTH

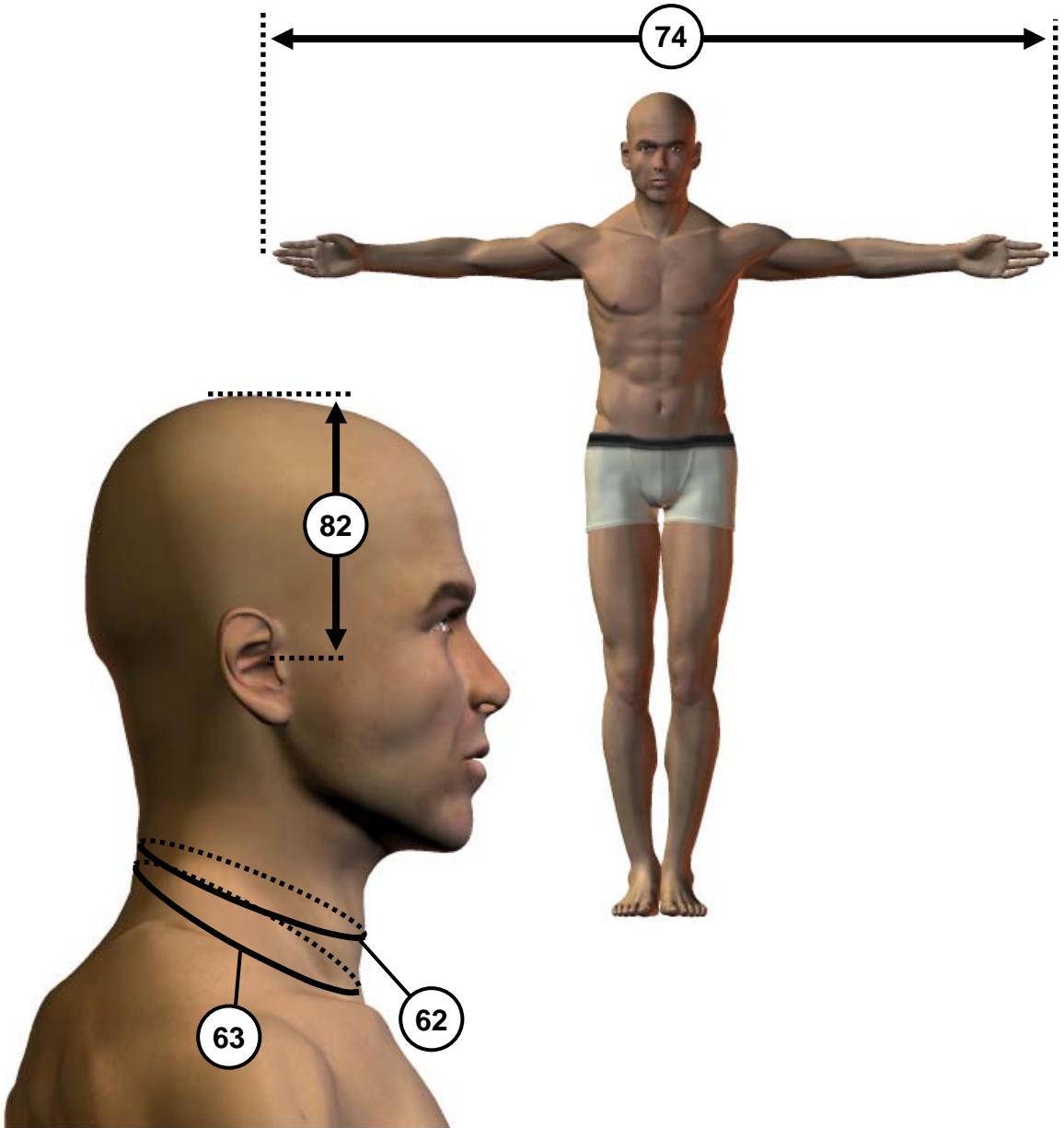
(59) LATERAL MALLEOLUS HEIGHT



- (13) BITRAGION CHIN ARC
- (14) BITRAGION SUBMANDIBULAR ARC
- (15) BIZYGMATIC BREADTH
- (45) HEAD BREADTH
- (46) HEAD CIRCUMFERENCE
- (53) INTERPUPILLARY BREADTH



- (30) EAR BREADTH
- (31) EAR LENGTH
- (32) EAR PROTRUSION
- (47) HEAD LENGTH
- (61) MENTON-SELLION LENGTH

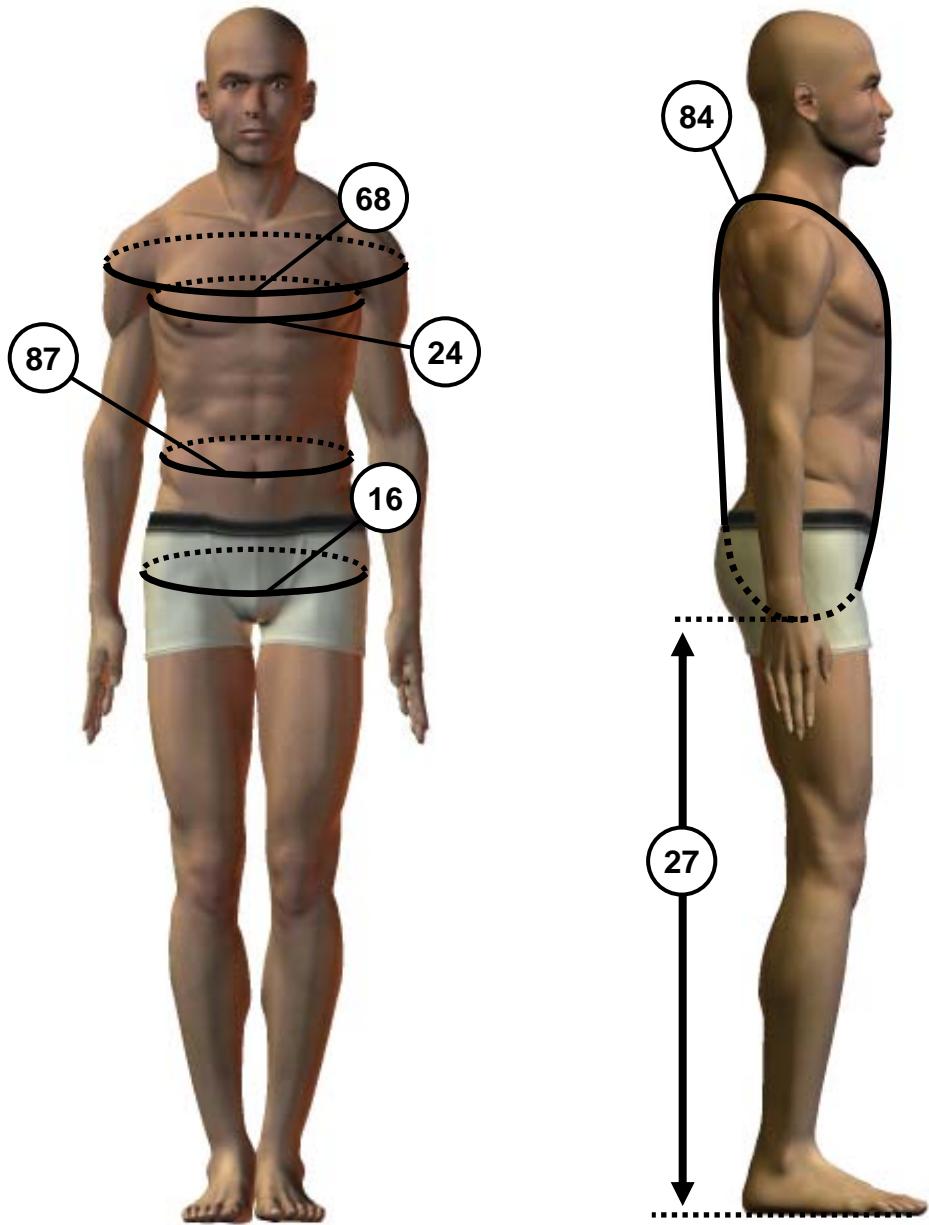


(62) NECK CIRCUMFERENCE

(63) NECK CIRCUMFERENCE, BASE

(74) SPAN

(82) TRAGION-TOP OF HEAD



(16) BUTTOCK CIRCUMFERENCE

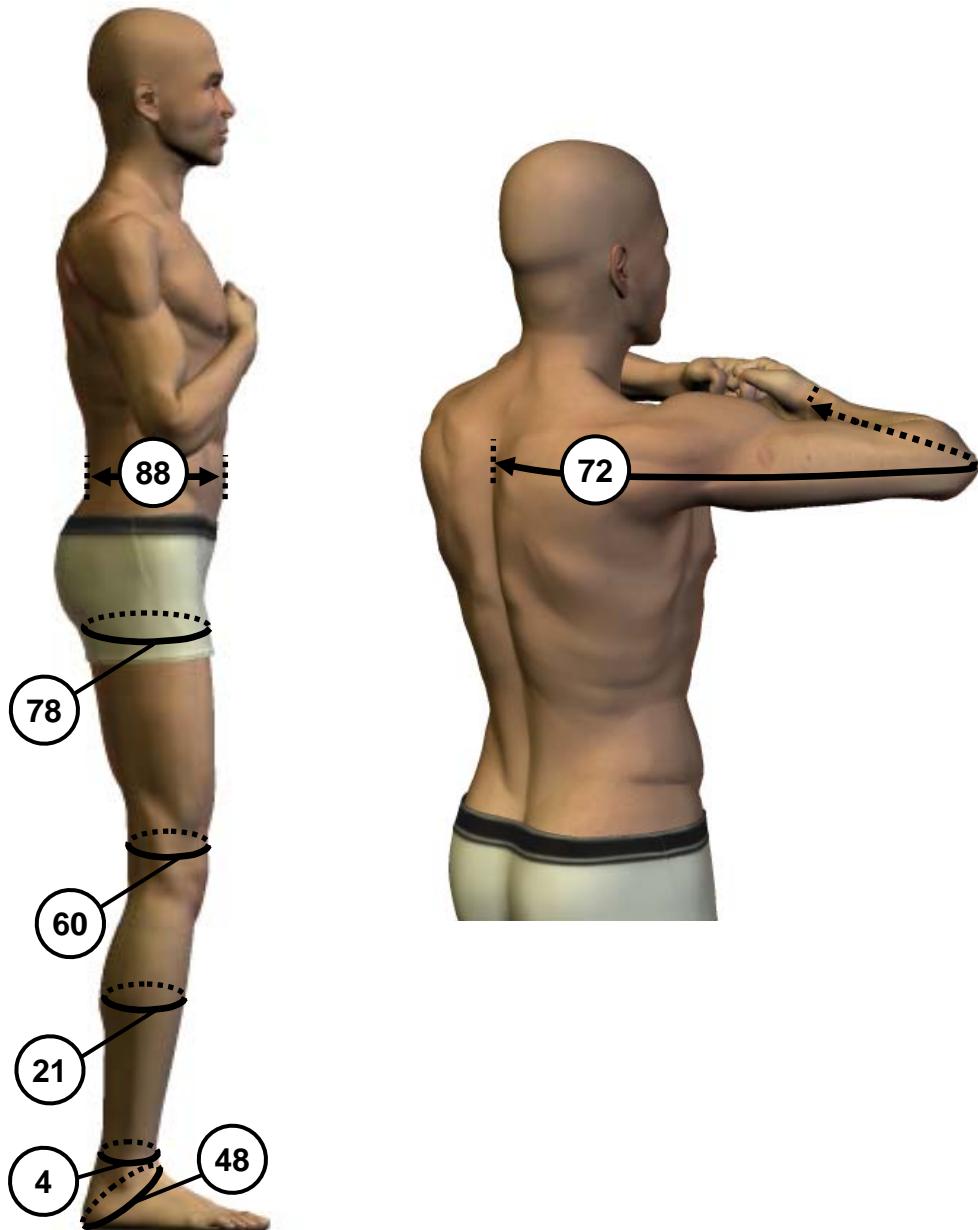
(24) CHEST CIRCUMFERENCE

(27) CROTCH HEIGHT

(68) SHOULDER CIRCUMFERENCE

(84) VERTICAL TRUNK CIRCUMFERENCE (USA)

(87) WAIST CIRCUMFERENCE (OMPHALION)



(4) ANKLE CIRCUMFERENCE

(21) CALF CIRCUMFERENCE

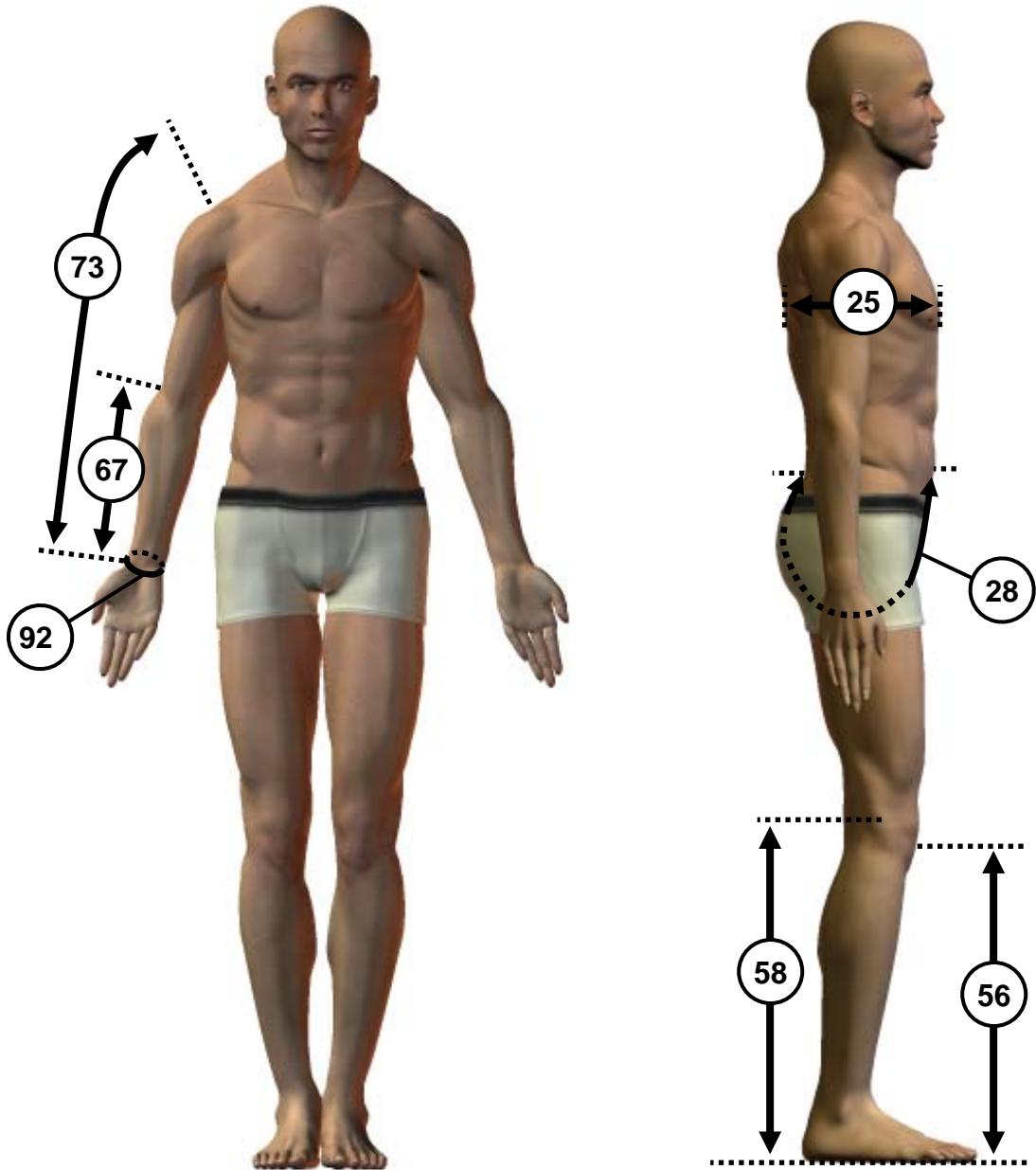
(48) HEEL-ANKLE CIRCUMFERENCE

(60) LOWER THIGH CIRCUMFERENCE

(72) SLEEVE LENGTH: SPINE-WRIST

(78) THIGH CIRCUMFERENCE

(88) WAIST DEPTH



(25) CHEST DEPTH

(28) CROTCH LENGTH (OMPHALION)

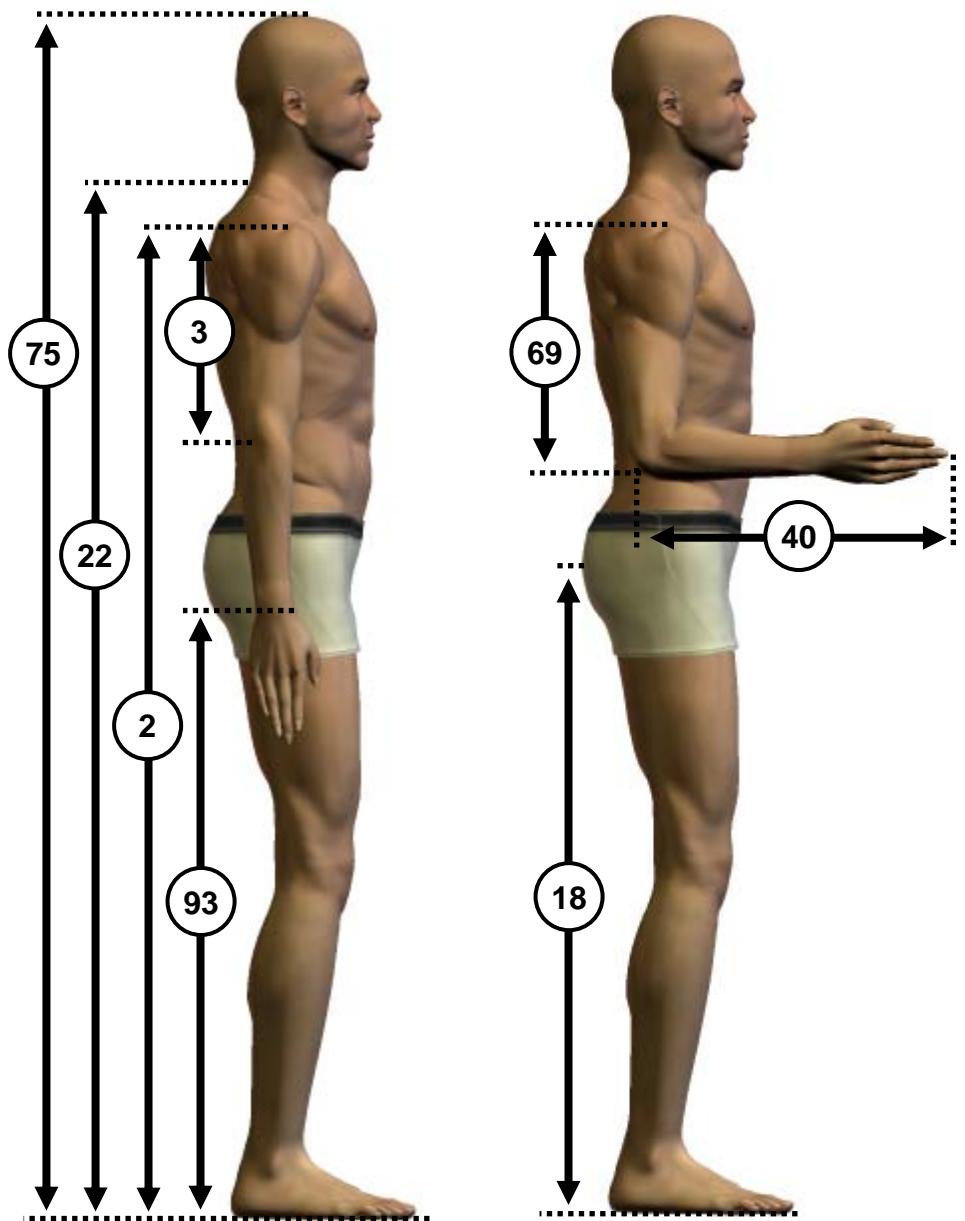
(56) KNEE HEIGHT, MIDPATELLA

(58) LATERAL FEMORAL EPICONDYLE HEIGHT

(67) RADIALE-STYLION LENGTH

(73) SLEEVE OUTSEAM

(92) WRIST CIRCUMFERENCE



(2) ACROMIAL HEIGHT

(3) ACROMION-RADIALE LENGTH

(18) BUTTOCK HEIGHT

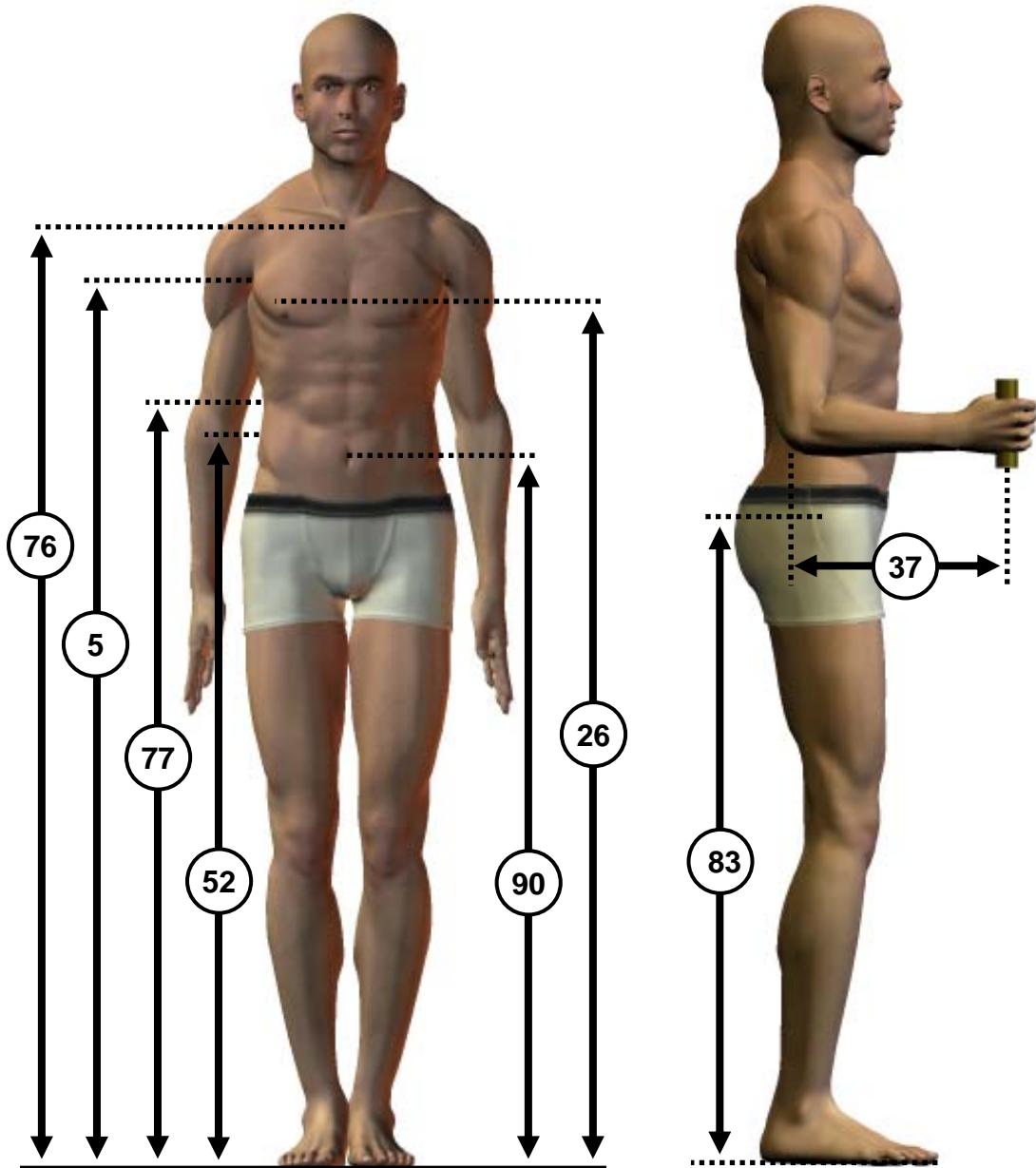
(22) CERVICALE HEIGHT

(40) FOREARM-HAND LENGTH

(69) SHOULDER-ELBOW LENGTH

(75) STATURE

(93) WRIST HEIGHT



(5) AXILLA HEIGHT

(26) CHEST HEIGHT

(37) FOREARM-CENTER OF GRIP LENGTH

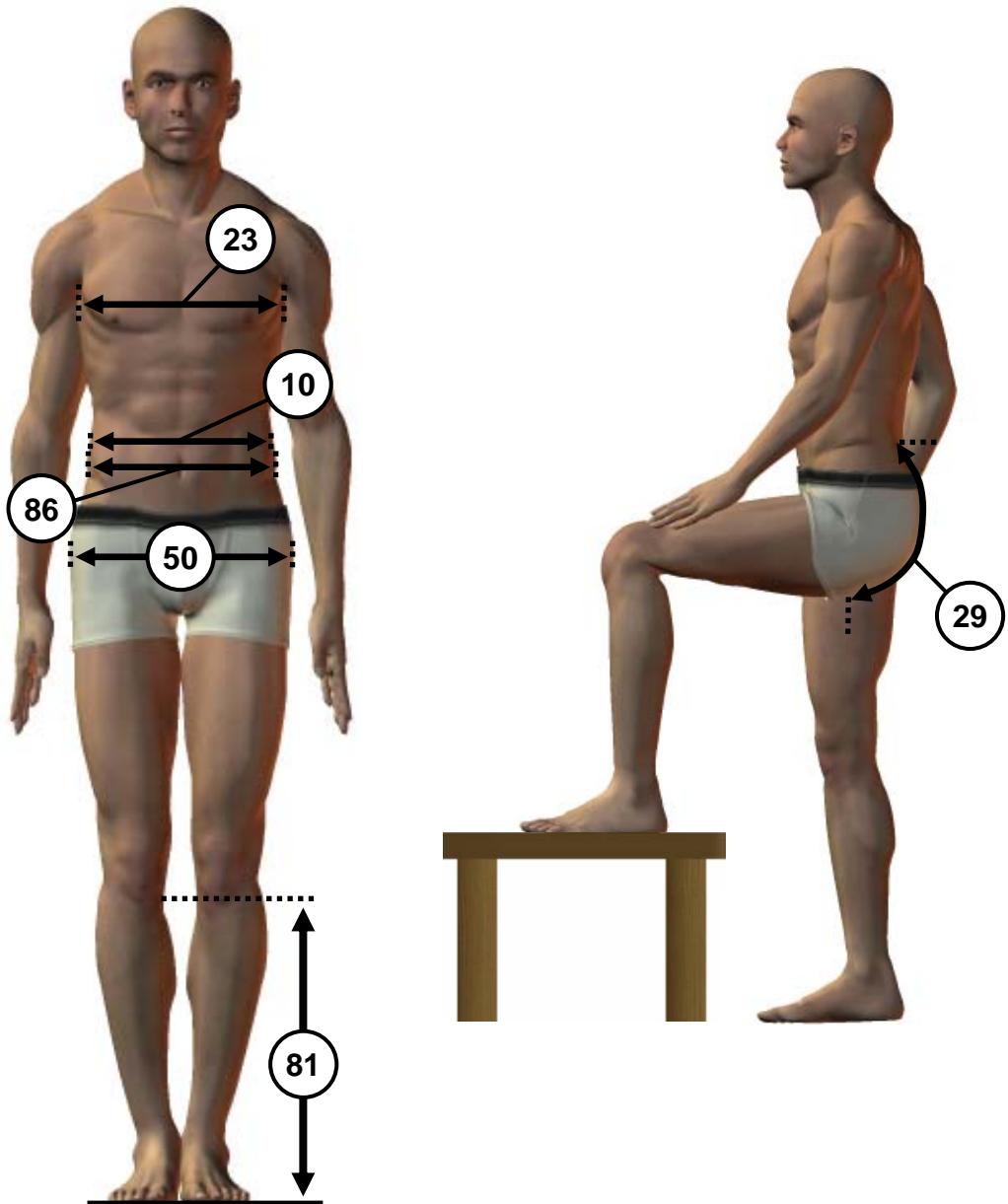
(52) ILOCRISTALE HEIGHT

(76) SUPRASTERNALE HEIGHT

(77) TENTH RIB HEIGHT

(83) TROCHANTERION HEIGHT

(90) WAIST HEIGHT (OMPHALION)



(10) BICRISTAL BREADTH

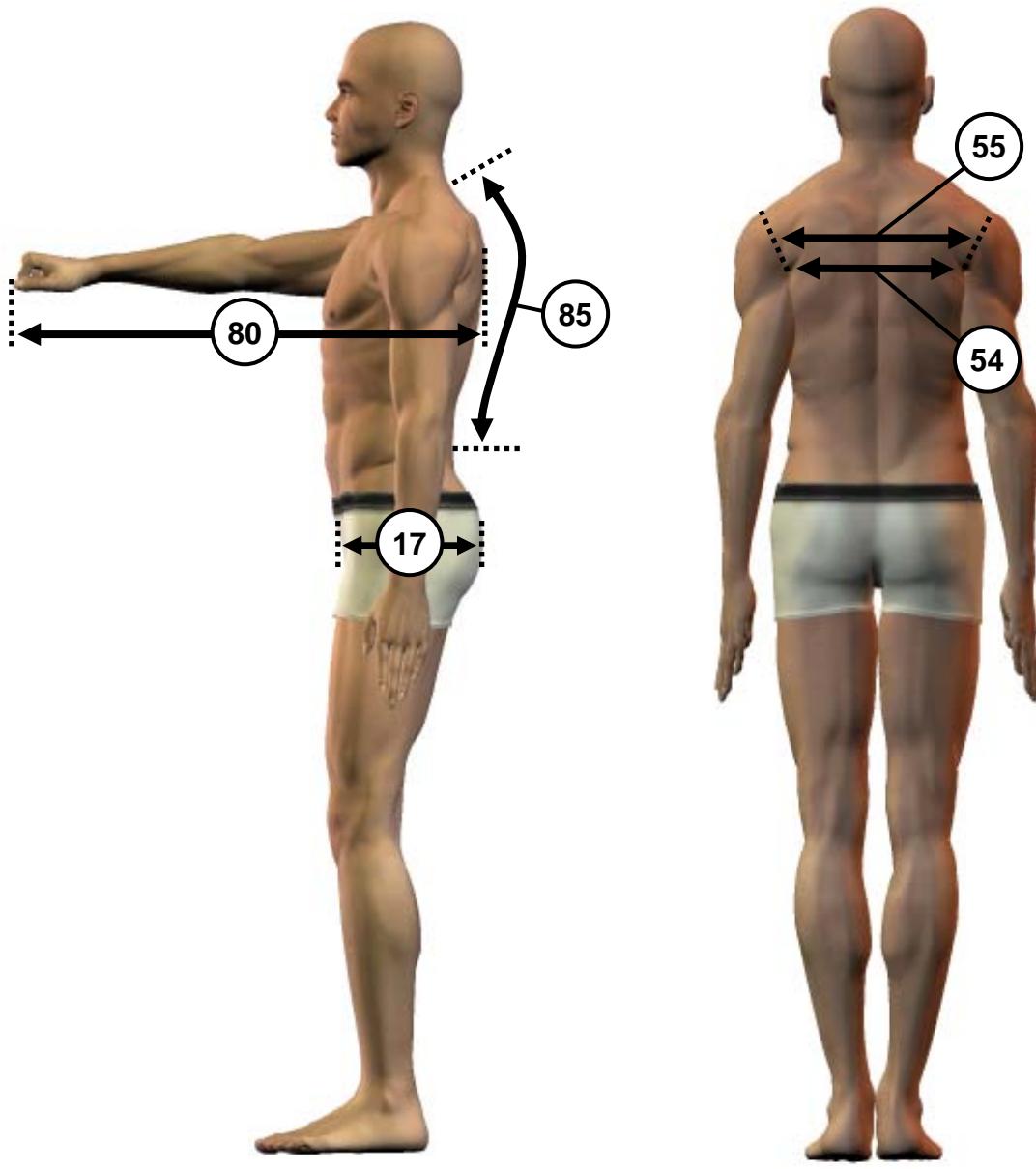
(23) CHEST BREADTH

(29) CROTCH LENGTH, POSTERIOR (OMPHALION)

(50) HIP BREADTH

(81) TIBIAL HEIGHT

(86) WAIST BREADTH



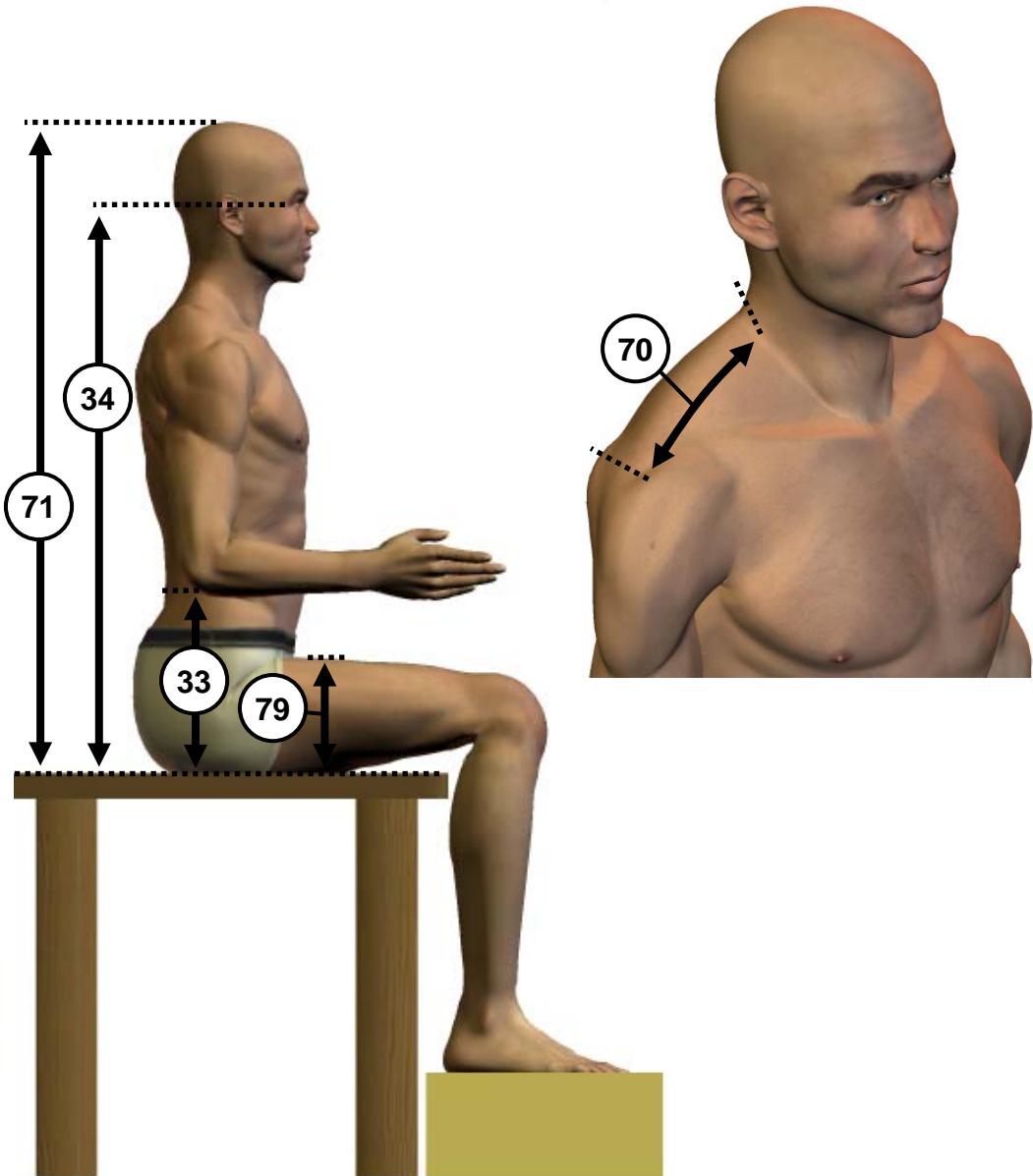
(17) BUTTOCK DEPTH

(54) INTERSCYE I

(55) INTERSCYE II

(80) THUMBTIP REACH

(85) WAIST BACK LENGTH (OMPHALION)



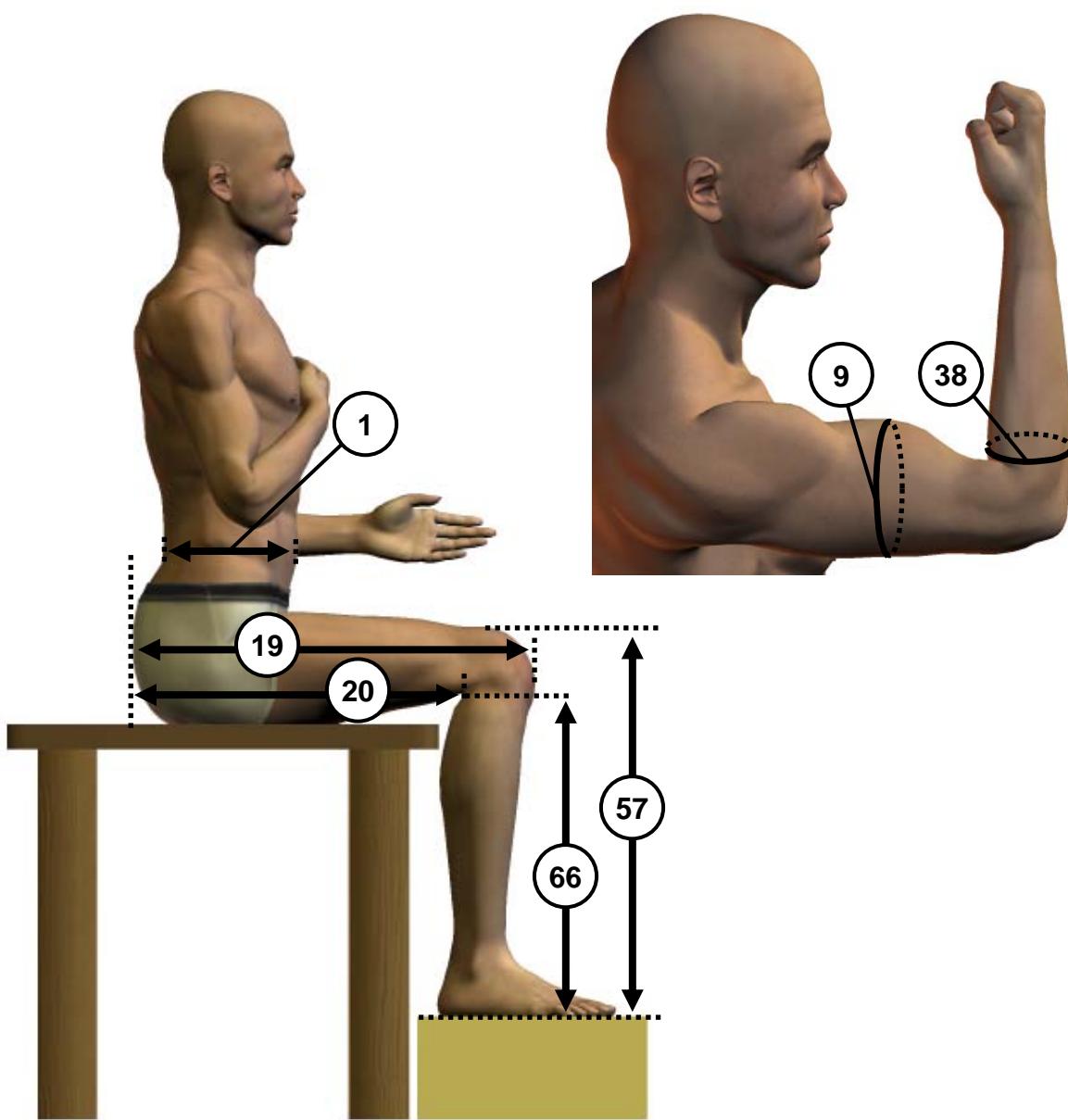
(33) ELBOW REST HEIGHT

(34) EYE HEIGHT, SITTING

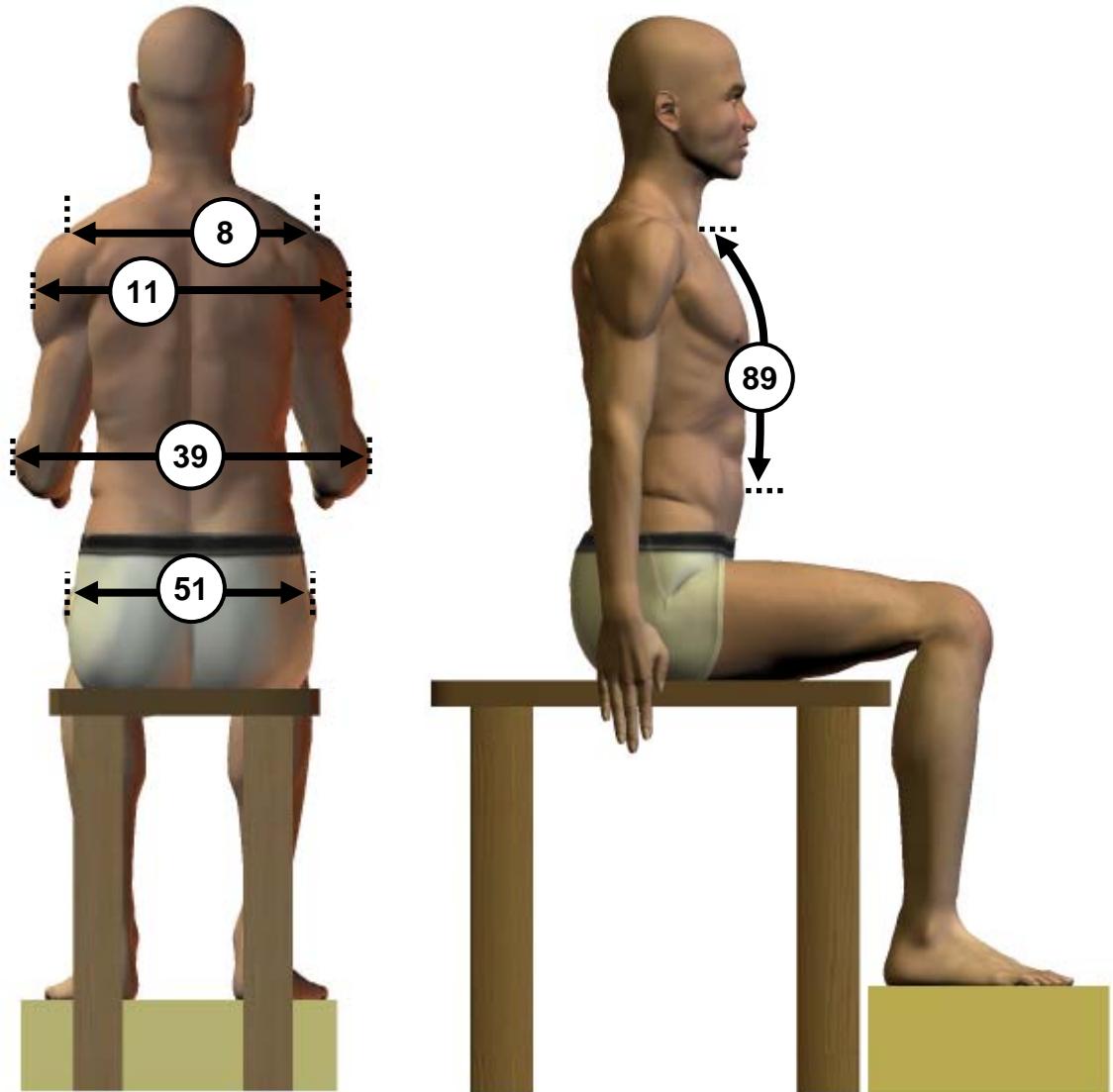
(70) SHOULDER LENGTH

(71) SITTING HEIGHT

(79) THIGH CLEARANCE



- (1) ABDOMINAL EXTENSION DEPTH, SITTING
- (9) BICEPS CIRCUMFERENCE, FLEXED
- (19) BUTTOCK-KNEE LENGTH
- (20) BUTTOCK-POPLITEAL LENGTH
- (38) FOREARM CIRCUMFERENCE, FLEXED
- (57) KNEE HEIGHT, SITTING
- (66) POPLITEAL HEIGHT



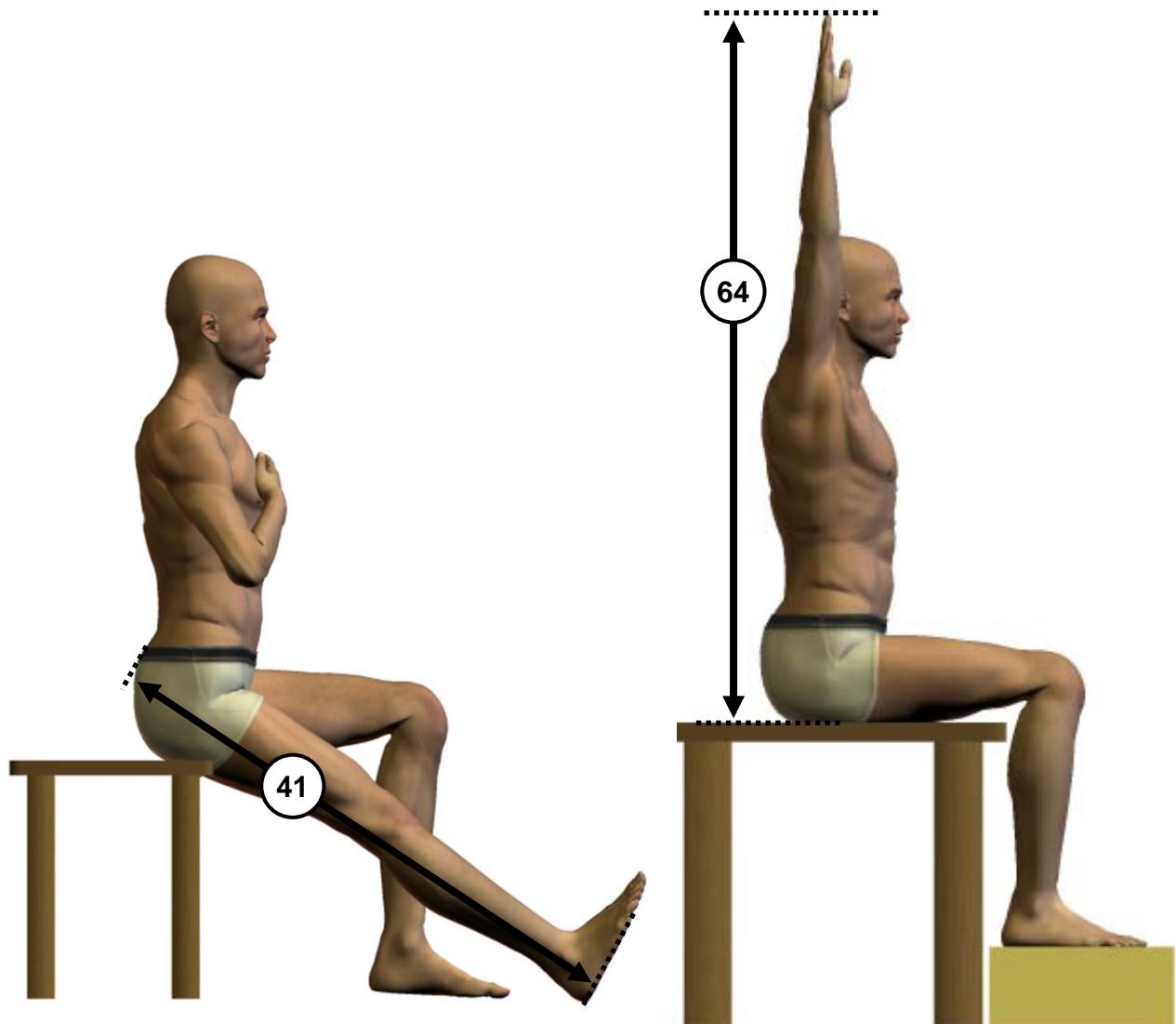
(8) BIACROMIAL BREADTH

(11) BIDELTOID BREADTH

(39) FOREARM-FOREARM BREADTH

(51) HIP BREADTH, SITTING

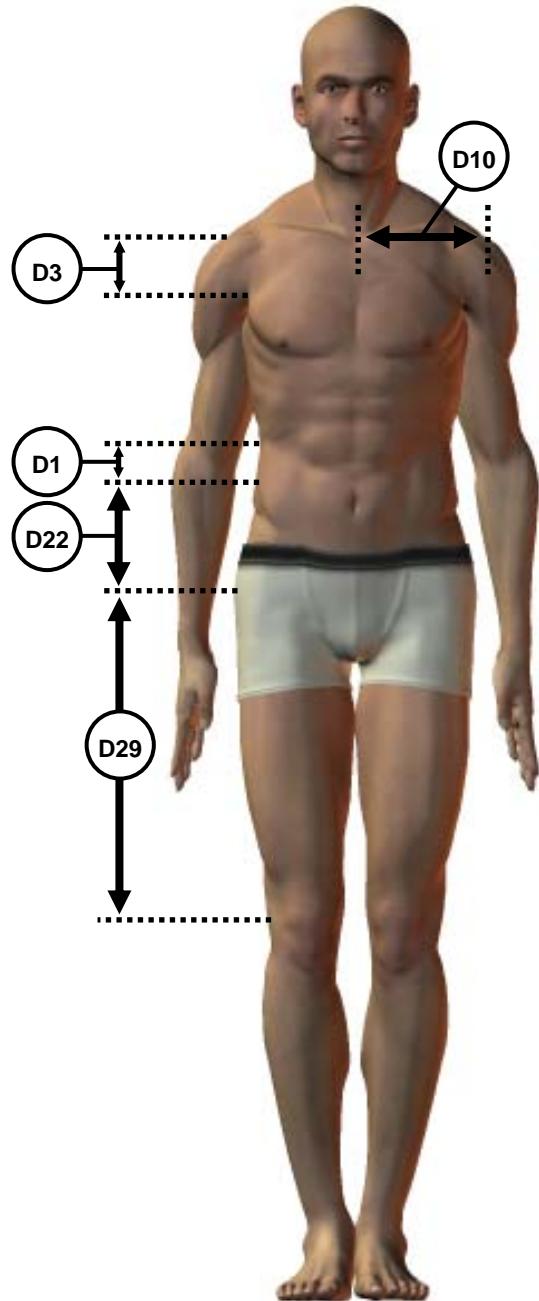
(89) WAIST FRONT LENGTH, SITTING



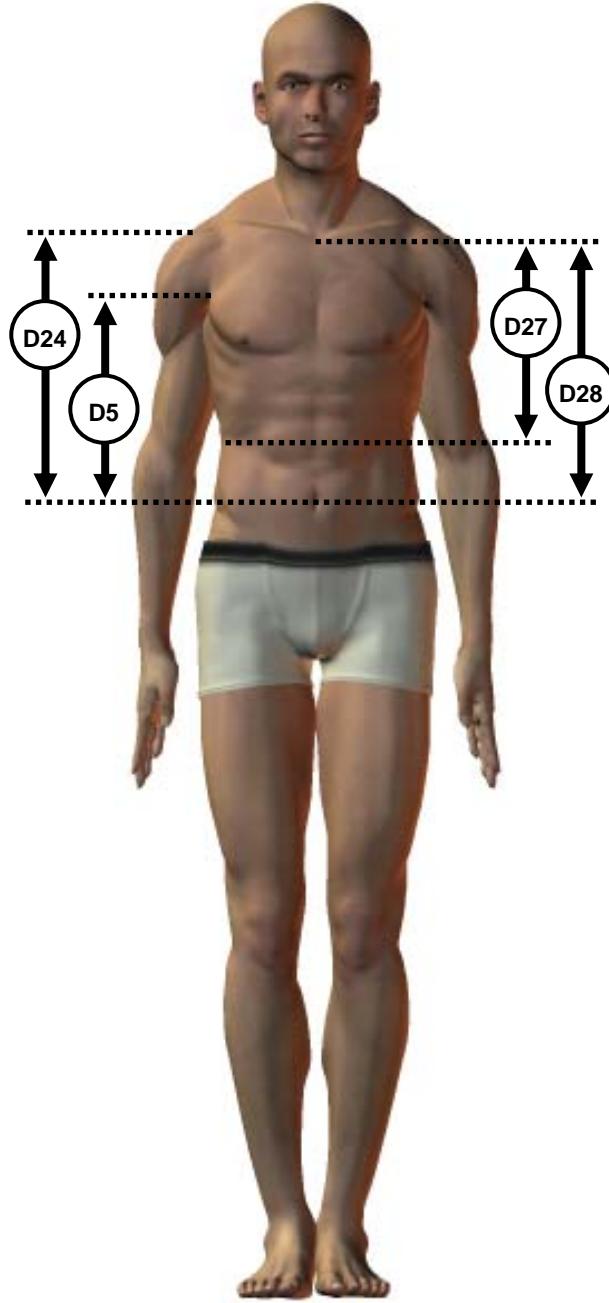
(41) FUNCTIONAL LEG LENGTH

(64) OVERHEAD FINGERTIP REACH, SITTING

APPENDIX D
VISUAL INDEX OF DERIVED DIMENSIONS



- (D1) ABDOMINAL LINK
(D3) ACROMION-AXILLA LENGTH
(D10) CLAVICLE LINK
(D22) PELVIC LINK
(D29) THIGH LINK₄₀₅

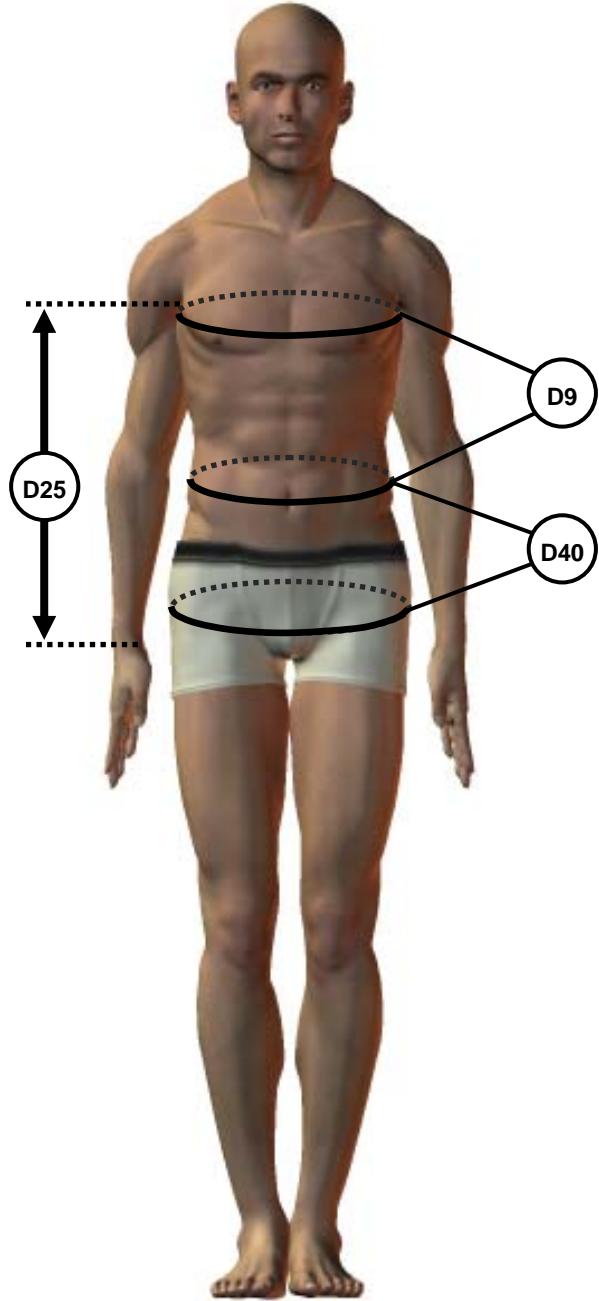


(D5) AXILLA-WAIST LENGTH (OMPHALION)

(D24) SHOULDER-WAIST LENGTH (OMPHALION)

(D27) SUPRASTERNALE-TENTH RIB LENGTH

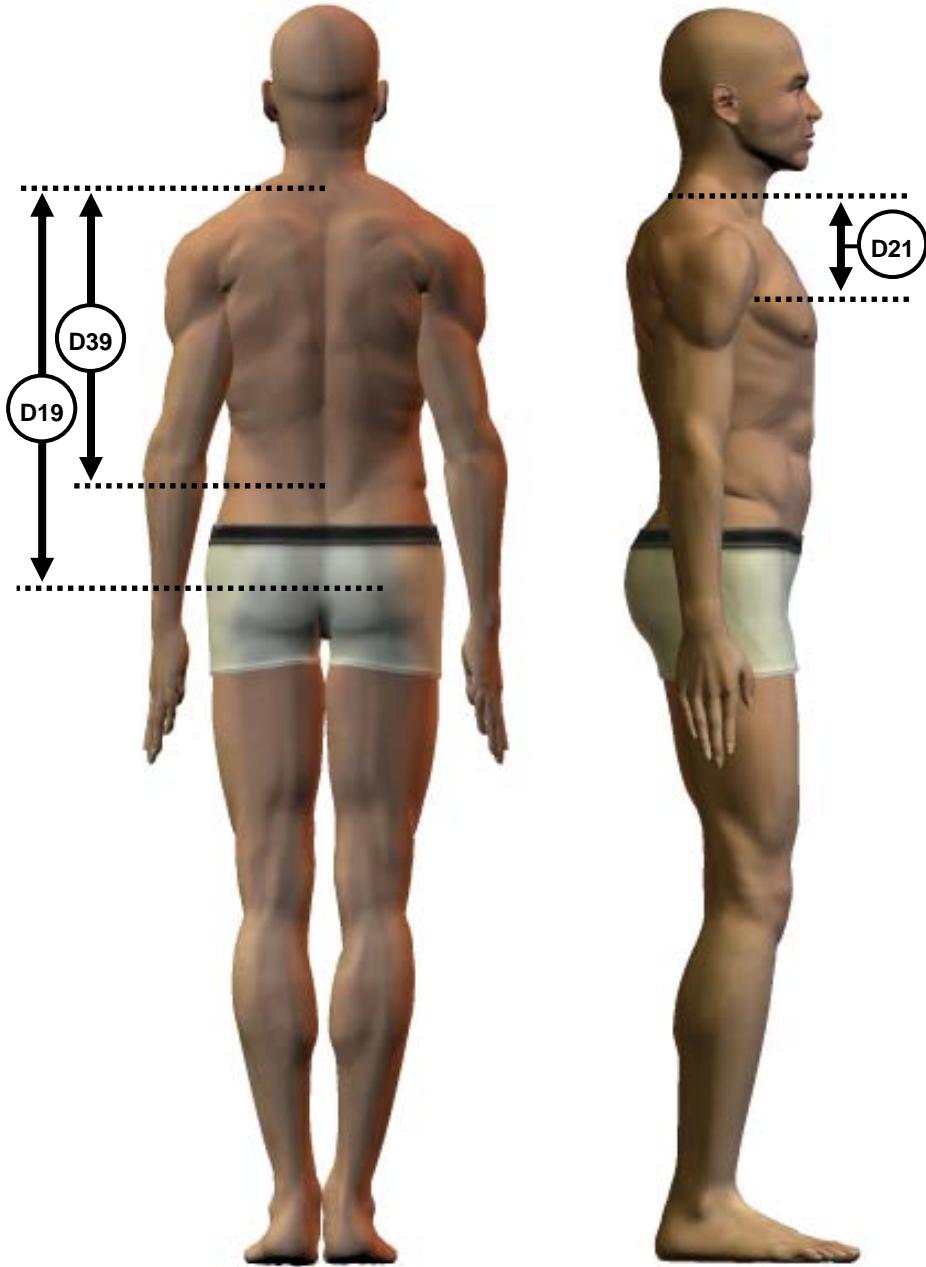
(D28) SUPRASTERNALE-WAIST LENGTH (OMPHALION)



(D9) CHEST-WAIST DROP (OMPHALION)

(D25) SLEEVE INSEAM

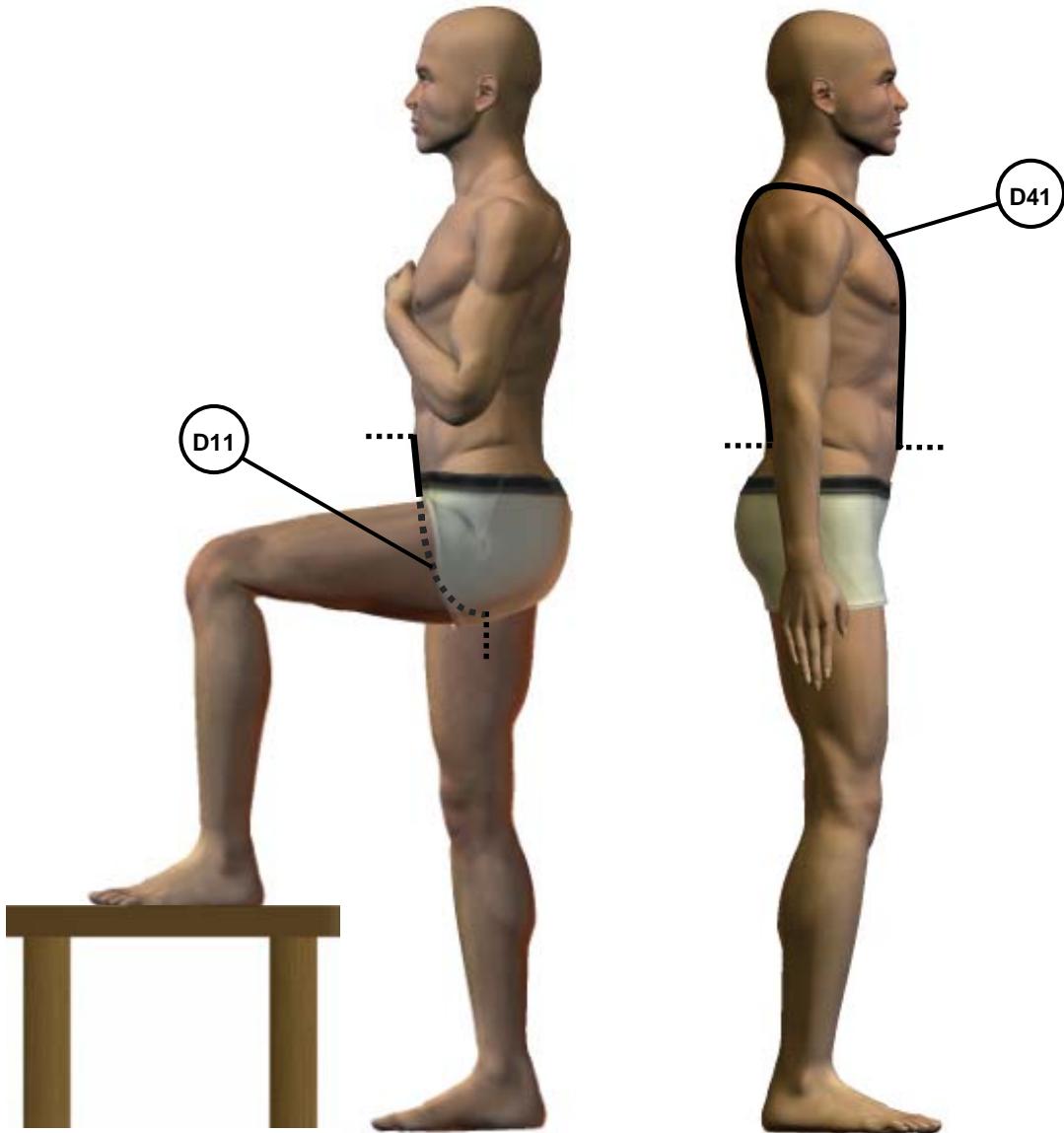
(D40) WAIST-BUTTOCK DROP (OMPHALION)



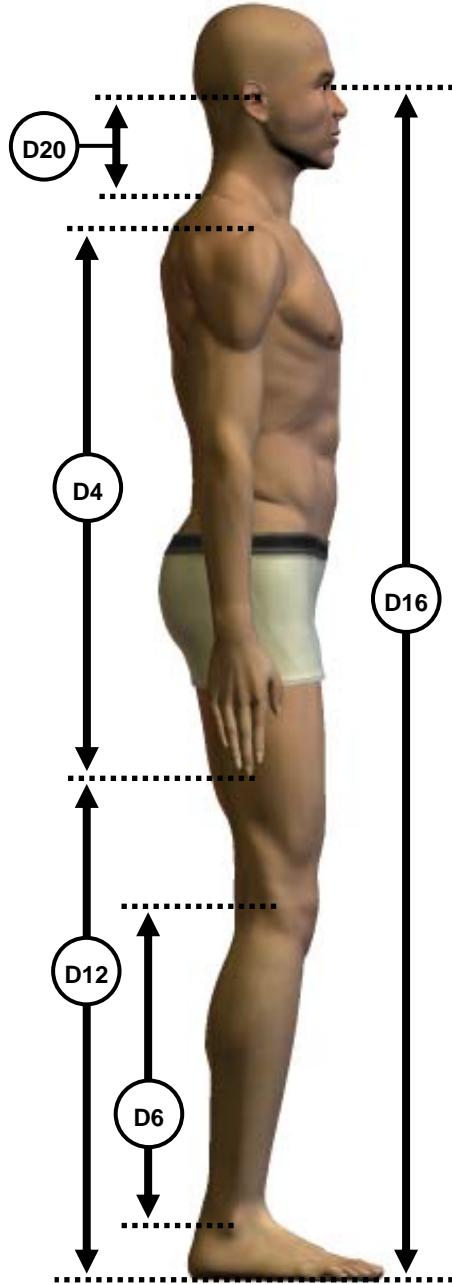
(D19) NECK-BUTTOCK LENGTH

(D21) NECK-SCYE LENGTH

(D39) WAIST BACK, VERTICAL (OMPHALION)



(D11) CROTCH LENGTH, ANTERIOR (OMPHALION)
(D41) WAIST-WAIST (OMPHALION) OVER SHOULDER



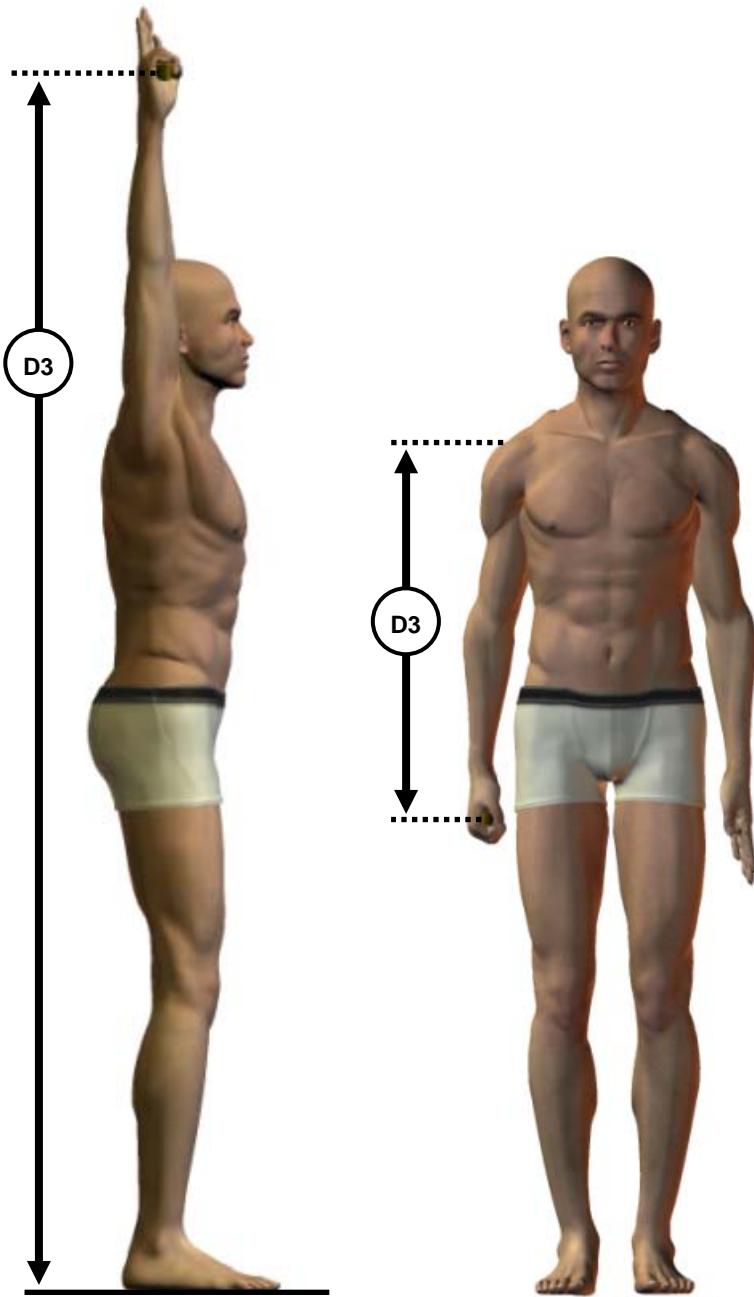
(D4) ARM LENGTH

(D6) CALF LINK

(D12) DACTYLION HEIGHT

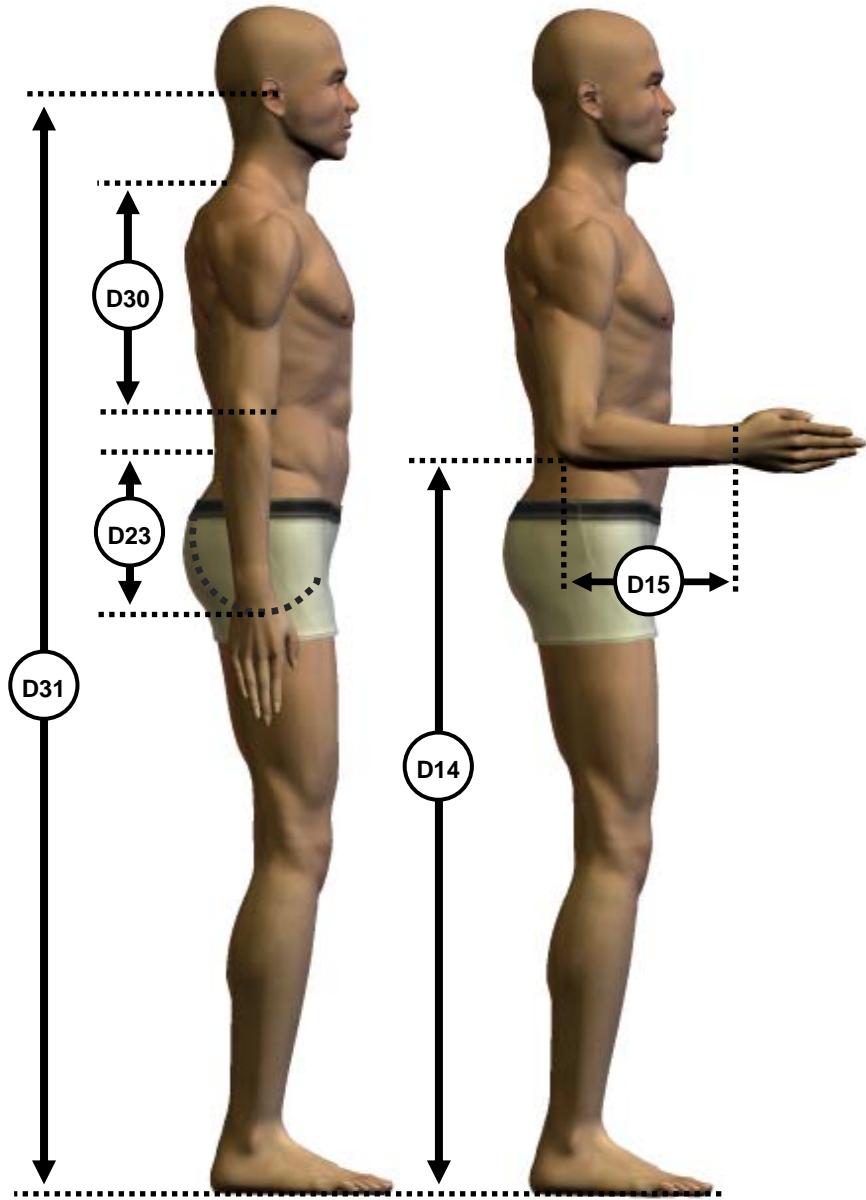
(D16) EYE HEIGHT

(D20) NECK LINK



(D33) VERTICAL GRIP REACH

(D34) VERTICAL GRIP REACH DOWN



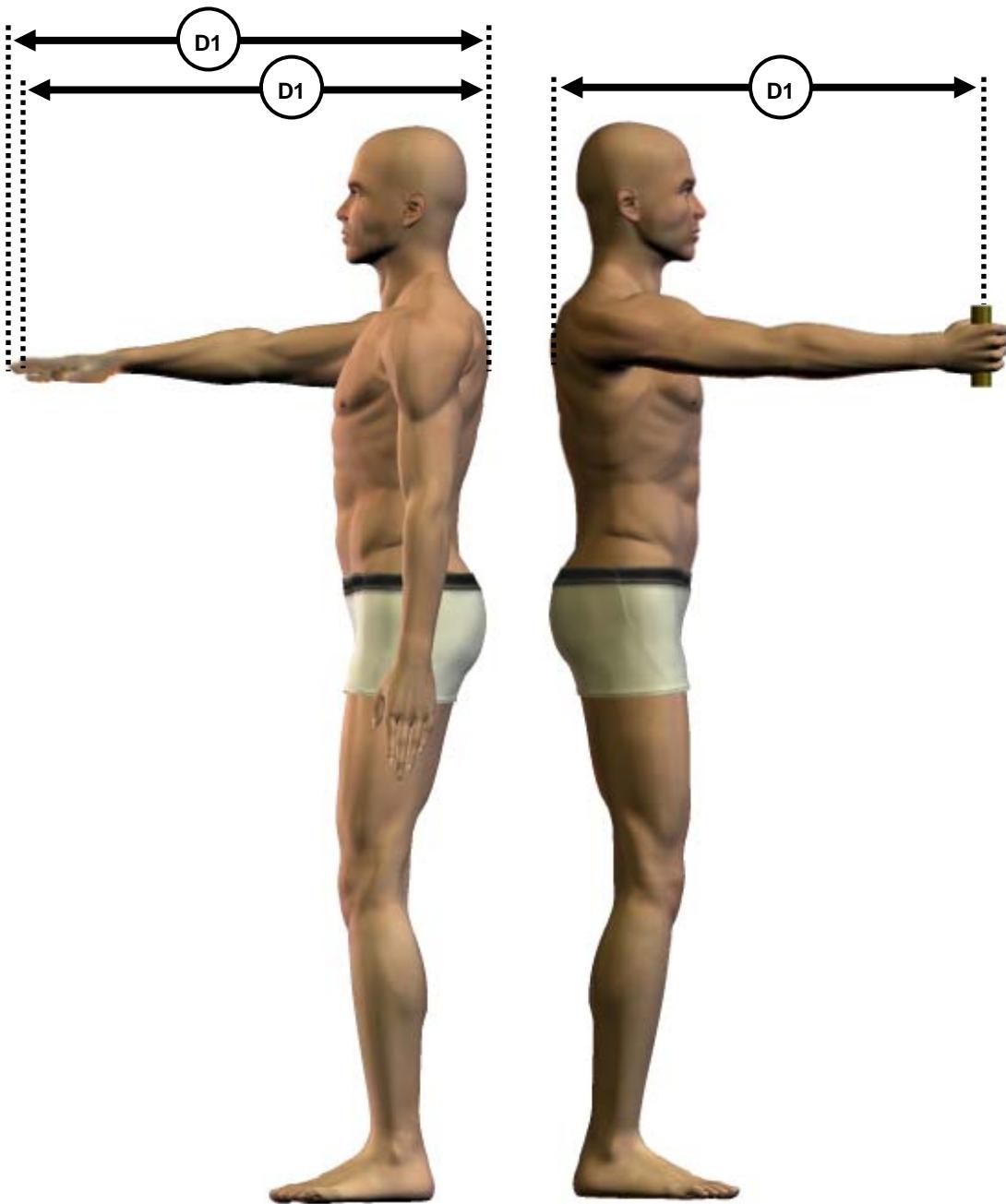
(D14) ELBOW REST HEIGHT, STANDING

(D15) ELBOW-WRIST LENGTH

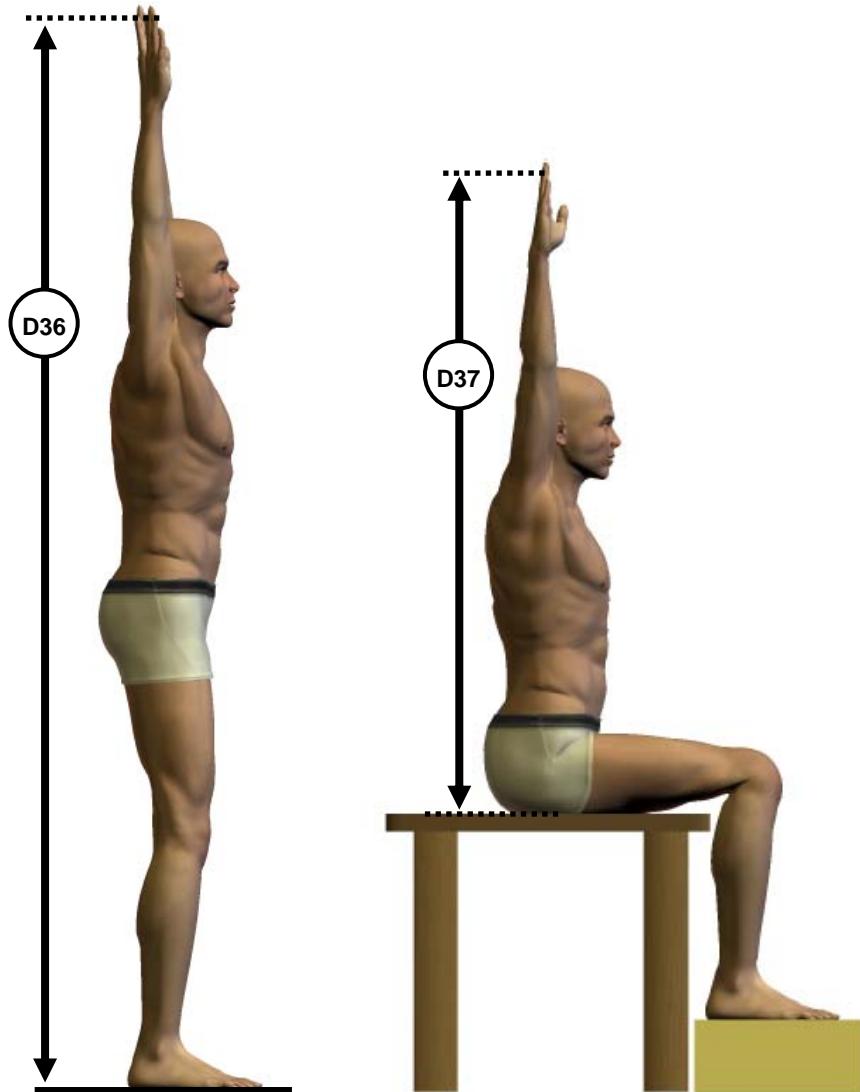
(D23) RISE (OMPHALION)

(D30) THORAX LINK

(D31) TRAGION HEIGHT

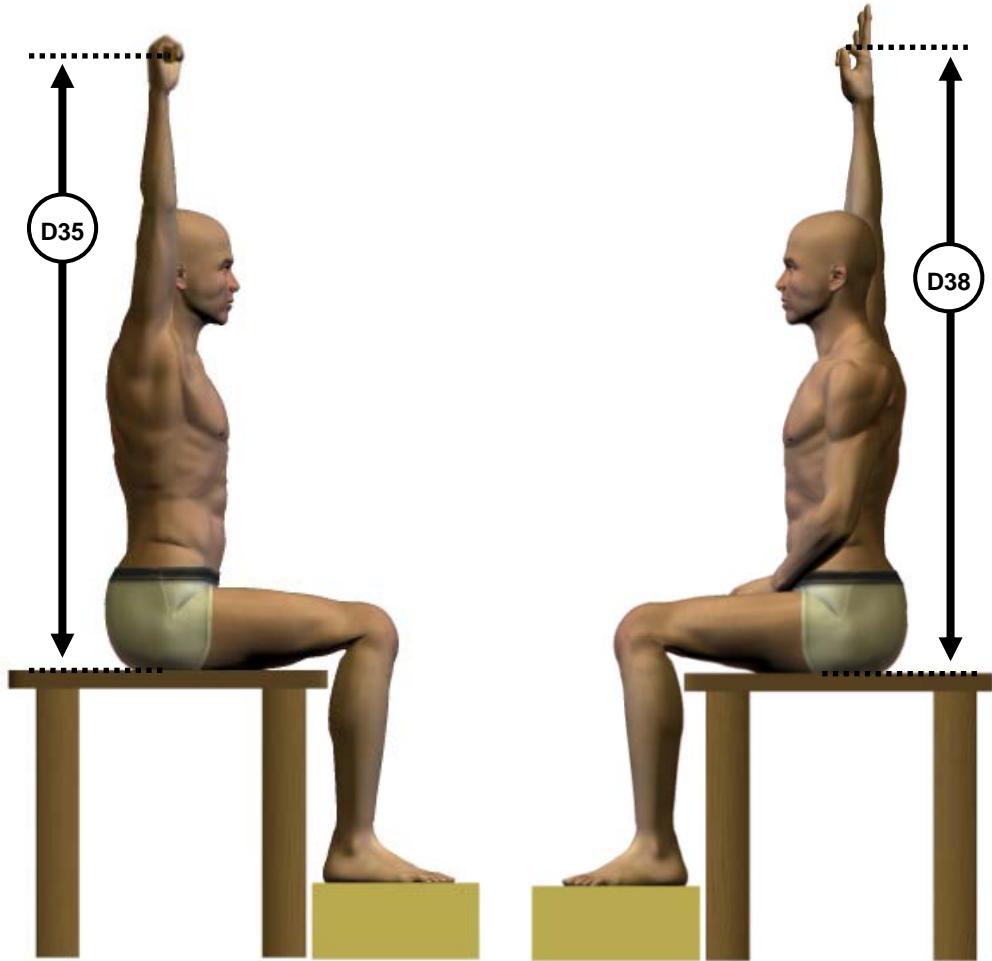


(D13) DACTYLION REACH FROM WALL
(D17) FUNCTIONAL GRIP REACH
(D18) INDEX FINGER REACH



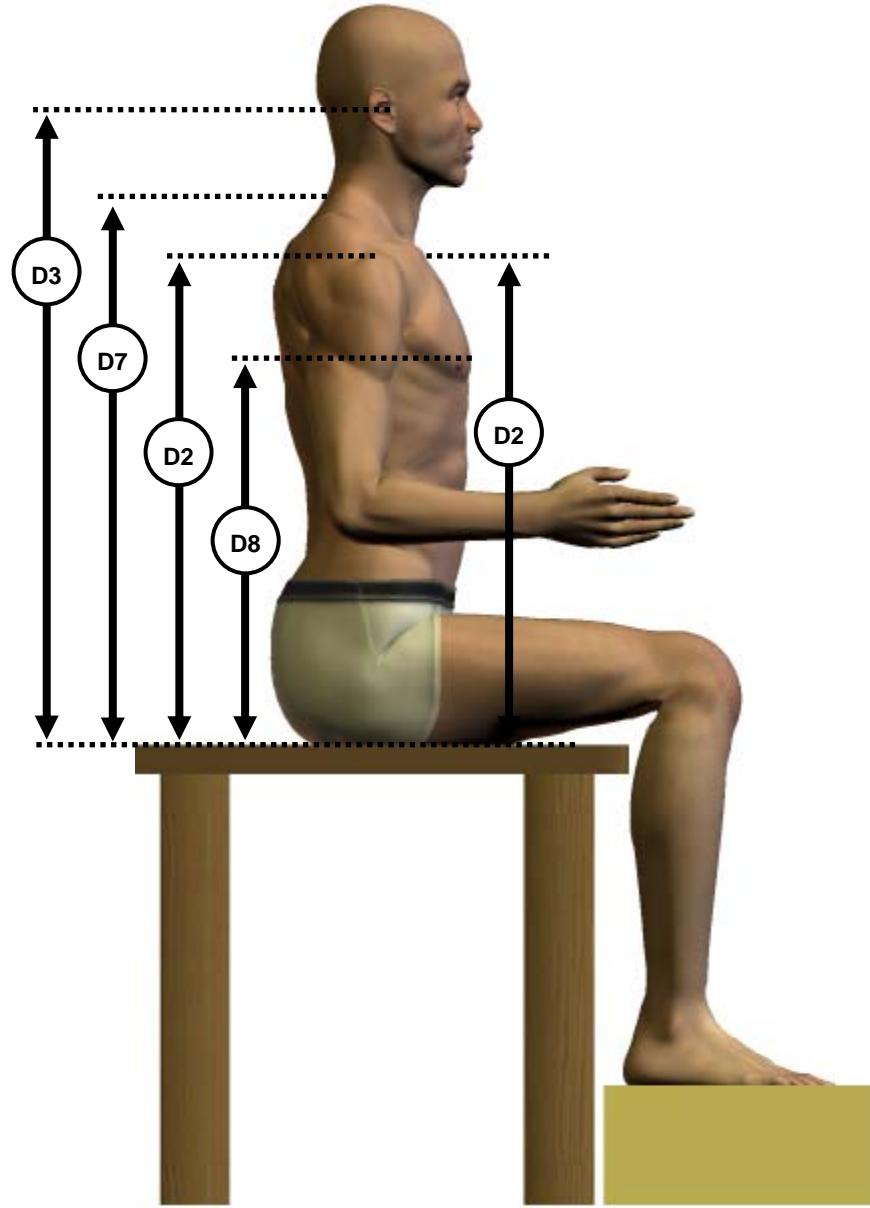
(D36) VERTICAL INDEX FINGERTIP REACH

(D37) VERTICAL INDEX FINGERTIP REACH, SITTING



(D35) VERTICAL GRIP REACH, SITTING

(D38) VERTICAL THUMBTIP REACH, SITTING



(D2) ACROMIAL HEIGHT, SITTING

(D7) CERVICALE HEIGHT, SITTING

(D8) CHEST HEIGHT, SITTING

(D26) SUPRASTERNALE HEIGHT, SITTING

(D32) TRAGION HEIGHT, SITTING

APPENDIX E

STATISTICAL MEASURES

The statistical measures used in this report to summarize the survey data are univariate statistics selected to provide potential users with a maximum of useful information. They are also the statistics used in other anthropometric reports prepared by the U.S. Army as well as other military services.

The statistics provided for each variable are the following:

1. The arithmetic mean (\bar{x}). This is the arithmetic average and is computed as the sum of the values divided by the number of values:

$$\bar{x} = \frac{\sum X}{N}$$

where X is the individual measurement and N is the sample size.

2. The standard error of the mean ($Se_{\bar{x}}$). This is a standard deviation type of statistic and is an estimate of the sampling error of the mean. It is computed as:

$$Se_{\bar{x}} = \frac{SD}{\sqrt{N}}$$

where SD is the standard deviation for that variable and N is the sample size.

3. The standard deviation (SD). This is a measure of variability and is computed as:

$$SD = \sqrt{\frac{\sum (X - \bar{x})^2}{N}}$$

where X is the individual measurement, \bar{x} is the mean value for that measurement, and N is the sample size.

4. The standard error of the SD (Se_{SD}). This is another measure of variability and is an estimate of the sampling error of the SD. It is computed as:

$$Se_{SD} = \frac{SD}{\sqrt{2N}}$$

where SD is the standard deviation of the variable of interest and N is the sample size.

5. Minimum. The smallest observed value for a particular variable.
6. Maximum. The largest observed value for a particular variable.
7. N. The number of subjects measured for a particular variable.
8. Skewness (β_1). A dimensionless statistic that is an indicator of whether a set of data is symmetrically distributed. It is computed as:

$$\beta_1 = \frac{\sum(X - \bar{x})^3}{N \times SD^3}$$

where X is the individual measurement, \bar{x} is the mean of that measurement, N is the sample size, and SD is the standard deviation of the measurement. In a normal distribution the value of β_1 is 0.

9. Kurtosis (β_2). A dimensionless statistic that indicates the level of agreement between a normal distribution and the actual distribution of the data.

$$\beta_2 = \frac{\sum(X - \bar{x})^4}{N \times SD^4}$$

where X is the individual measurement, \bar{x} is the mean of that measurement, N is the sample size, and SD is the standard deviation of the measurement. In a normal distribution the value for β_2 is 3. It should be noted that some commercially available statistical packages automatically center kurtosis around 0.

10. The coefficient of variation. A statistic that restates the standard deviation as a percent of the mean and is computed as:

$$CV = 100 \times \frac{SD}{\bar{x}}$$

where \bar{x} is the mean and SD is the standard deviation of a measurement.

11. The frequency tables. These tables group the data for a variable into a series of intervals. The intervals used in this output are 1 mm, 2 mm, 2.5 mm, 5 mm, 10 mm, 15 mm, and 20 mm. For each interval, the tables list the start and end point of the interval, the number of participants who fall within the interval (frequency or F), the cumulative frequency (CumF), and,

the values of F and CumF expressed as a percentage of the total number of measurements for that variable (FPct and CumFPct).

12. The percentiles. This group of statistics represents measures of order or position. These measures can be thought of as being obtained by arranging the data in order from the smallest to the largest and then observing the value of the datum which lies at a specified position in the array. The 99 percentiles—ranging from the first to the 99th—are the values at the points which separate consecutive blocks or units of 1% of the data in the ordered array. The first percentile is the value that separates the smallest 1% of the data from the 99% of the data with larger values; the second percentile separates the smallest 2% from the larger 98% and so on. Twenty-five of these percentiles which are believed to be the most useful to designers and engineers have been included for each measurement. When distributions are normally distributed, percentiles can be estimated from the mean and standard deviation. However, these estimates are just that – estimates. Exact percentiles calculated from the data are generally preferable, and that is the approach that has been taken here.

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APPENDIX F
DIMENSION-NUMBER CROSS-REFERENCE TABLE

Many users of the ANSUR II database will be familiar with the ANSUR database from 1988-1989. To assist users familiar with ANSUR dimension numbers, a cross-reference table has been provided for the new and old dimension numbers (Table F-1). The table includes all of the measured and derived dimensions in ANSUR and ANSUR II. A blank in the column means that that dimension was not measured in that survey. If a dimension retained the same name but was changed in such a way that it is no longer comparable, then that dimension is listed twice (e.g. Functional Leg Length).

TABLE F-1

Cross Reference of Dimension Numbers from ANSUR II and ANSUR

ANSUR II Number	Dimension Name	ANSUR Number
1	Abdominal Extension Depth, Sitting	1
D1	Abdominal Link	D1
2	Acromial Height	2
D2	Acromial Height, Sitting	3
D3	Acromion-Axilla Length	D2
3	Acromion-Radiale Length	4
4	Ankle Circumference	5
D4	Arm Length	D3
5	Axilla Height	6
	Axilla-Waist Length (Natural Indentation)	D4
D5	Axilla-Waist Length (Omphalion)	D5
	Axillary Arm Circumference	7
6	Ball of Foot Circumference	8
7	Ball of Foot Length	9
8	Biacromial Breadth	10
9	Biceps Circumference, Flexed	11
10	Bicristal Breadth	
11	Bideltoid Breadth	12
12	Bimalleolar Breadth	13
	Bispinous Breadth	14
13	Bitragion Chin Arc	15
	Bitragion Coronal Arc	16
	Bitragion Crinion Arc	17
	Bitragion Frontal Arc	18

TABLE F-1 Continued

ANSUR II Number	Dimension Name	ANSUR Number
14	Bitragion Submandibular Arc	19
	Bitragion Subnasale Arc	20
15	Bizygomatic Breadth	21
	Bustpoint/Thelion-Bustpoint/Thelion Breadth	22
16	Buttock Circumference	23
17	Buttock Depth	24
18	Buttock Height	25
19	Buttock-Knee Length	26
20	Buttock-Popliteal Length	27
21	Calf Circumference	28
	Calf Height	29
D6	Calf Link	D6
22	Cervicale Height	
	Cervicale Height	30
D7	Cervicale Height, Sitting	
	Cervicale Height, Sitting	31
23	Chest Breadth	
	Chest Breadth	32
24	Chest Circumference	33
	Chest Circumference at Scye	34
	Chest Circumference below Breast	35
25	Chest Depth - Females	36
25	Chest Depth - Males	
	Chest Depth - Males	36
26	Chest Height - Males	
26	Chest Height - Females	37
	Chest Height - Males	37
D8	Chest Height, Sitting - Females	D7
D8	Chest Height, Sitting - Males	
	Chest-Waist Drop (Natural Indentation)	D8
D9	Chest-Waist Drop (Omphalion) - Females	D9
D9	Chest-Waist Drop (Omphalion) - Males	
D10	Clavicle Link	D10
27	Crotch Height	38
	Crotch Length (Natural Indentation)	39

TABLE F-1 Continued

ANSUR II Number	Dimension Name	ANSUR Number
28	Crotch Length (Omphalion)	40
	Crotch Length, Anterior (Natural Indentation)	D11
D11	Crotch Length, Anterior (Omphalion)	D12
	Crotch Length, Posterior (Natural Indentation)	41
29	Crotch Length, Posterior (Omphalion)	42
D12	Dactylion Height	D13
D13	Dactylion Reach From Wall	D14
	Dactylion Reach From Wall, Extended	D15
30	Ear Breadth	43
31	Ear Length	44
	Ear Length above Tragion	45
32	Ear Protrusion	46
	Elbow Circumference	47
33	Elbow Rest Height	48
D14	Elbow Rest Height, Standing	D16
D15	Elbow-Wrist Length	D18
D16	Eye Height	D19
34	Eye Height, Sitting	49
	Eye-Tragion Link	D20
35	Foot Breadth, Horizontal	50
36	Foot Length	51
37	Forearm-Center Of Grip Length	D17
38	Forearm Circumference, Flexed	52
39	Forearm-Forearm Breadth	53
40	Forearm-Hand Length	54
D17	Functional Grip Reach	D21
	Functional Grip Reach, Extended	D22
41	Functional Leg Length	
	Functional Leg Length	55
	Gluteal Furrow Height	56
42	Hand Breadth	57
43	Hand Circumference	58
44	Hand Length	59
45	Head Breadth - Females	
45	Head Breadth - Males	60
46	Head Circumference - Females	

TABLE F-1 Continued

ANSUR II Number	Dimension Name	ANSUR Number
46	Head Circumference - Males	61
47	Head Length - Females	
47	Head Length - Males	62
48	Heel-Ankle Circumference	63
49	Heel Breadth	64
50	Hip Breadth	65
51	Hip Breadth, Sitting	66
52	Iliocristale Height	67
D18	Index Finger Reach	D23
	Index Finger Reach, Extended	D24
53	Interpupillary Breadth	68
54	Interscye I	69
55	Interscye II	70
	Knee Circumference	71
56	Knee Height, Midpatella	72
57	Knee Height, Sitting	73
58	Lateral Femoral Epicondyle Height	74
59	Lateral Malleolus Height	75
60	Lower Thigh Circumference	76
61	Menton-Sellion Length	77
	Midshoulder Height, Sitting	78
	Neck-Bustpoint/Thelion Length	79
D19	Neck-Buttock Length	D26
	Neck-Gluteal Furrow Length	D27
62	Neck Circumference	80
63	Neck Circumference Base	81
	Neck Height, Lateral	82
D20	Neck Link	D25
D21	Neck-Scye Length	D28
	Overhead Fingertip Reach	83
	Overhead Fingertip Reach, Extended	84
64	Overhead Fingertip Reach, Sitting	85
65	Palm Length	
D22	Pelvic Link	D29
66	Popliteal Height	86
67	Radiale-Styliion Length	87

TABLE F-1 Continued

ANSUR II Number	Dimension Name	ANSUR Number
	Rise (Natural Indentation)	D30
D23	Rise (Omphalion)	D31
	Scye Circumference	88
	Scye Depth	89
68	Shoulder Circumference	
	Shoulder Circumference	90
69	Shoulder-Elbow Length	91
70	Shoulder Length	92
	Shoulder Slope	D32
	Shoulder-Waist Length (Natural Indentation)	D33
D24	Shoulder-Waist Length (Omphalion)	D34
71	Sitting Height	93
D25	Sleeve Inseam	D35
	Sleeve Length: Spine-Elbow	94
	Sleeve Length: Spine-Scye	95
72	Sleeve Length: Spine-Wrist	96
73	Sleeve Outseam	97
74	Span	98
75	Stature	99
	Strap Length	100
76	Suprasternale Height	101
D26	Suprasternale Height, Sitting	D36
D27	Suprasternale-Tenth Rib Length	
D28	Suprasternale-Waist Length (Omphalion)	
77	Tenth Rib Height	102
78	Thigh Circumference	103
79	Thigh Clearance	104
D29	Thigh Link	D37
D30	Thorax Link	D38
	Thumb Breadth	105
80	Thumbtip Reach	106
	Thumbtip Reach, Extended	D39
81	Tibial Height	
D31	Tragion Height	D40
D32	Tragion Height, Sitting	D41
82	Tragion-Top Of Head - Females	

TABLE F-1 Continued

ANSUR II Number	Dimension Name	ANSUR Number
82	Tragion-Top of Head - Males	H44
83	Trochanterion Height	107
D33	Vertical Grip Reach	D42
D34	Vertical Grip Reach Down	D43
	Vertical Grip Reach, Extended	D44
D35	Vertical Grip Reach, Sitting	D45
D36	Vertical Index Fingertip Reach	D46
	Vertical Index Fingertip Reach Down	D47
	Vertical Index Fingertip Reach, Extended	D48
D37	Vertical Index Fingertip Reach, Sitting	D49
	Vertical Thumtip Reach Down	D50
D38	Vertical Thumtip Reach, Sitting	D51
	Vertical Trunk Circumference (ASCC)	108
84	Vertical Trunk Circumference (USA)	109
	Vertical Wrist Height	D52
	Vertical Wrist Height, Extended	D53
	Vertical Wrist Height, Sitting	D54
	Waist Back Length (Natural Indentation)	110
85	Waist Back Length (Omphalion)	
	Waist Back Length (Omphalion)	111
	Waist Back, Vertical (Natural Indentation)	D55
D39	Waist Back, Vertical (Omphalion)	
	Waist Back, Vertical (Omphalion)	D56
86	Waist Breadth	112
	Waist-Buttock Drop (Natural Indentation)	D57
D40	Waist-Buttock Drop (Omphalion)	D58
	Waist Circumference (Natural Indentation)	113
87	Waist Circumference (Omphalion)	114
88	Waist Depth	115
	Waist Front Length (Natural Indentation)	116
	Waist Front Length (Omphalion)	117
89	Waist Front Length, Sitting	
	Waist Height (Natural Indentation)	118
90	Waist Height (Omphalion)	119
	Waist Height, Sitting (Natural Indentation)	120
	Waist Height, Sitting (Omphalion)	121

TABLE F-1 Continued

ANSUR II Number	Dimension Name	ANSUR Number
	Waist-Hip Length	122
	Waist (Natural Indentation)-Waist (Omphalion) Length	123
	Waist-Waist (Natural Indentation) Over Shoulder	D59
D41	Waist-Waist (Omphalion) Over Shoulder	D60
91	Weight	124
	Wrist-Center of Grip Length	125
92	Wrist Circumference	126
93	Wrist Height	127
	Wrist Height, Sitting	128
	Wrist-Index Finger Length	129
	Wrist-Thumbtip Length	130
	Wrist-Wall Length	131
	Wrist-Wall Length, Extended	132

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APPENDIX G

COMPARABILITY OF ANSUR II DIMENSIONS WITH DIMENSIONS OF OTHER LARGE-SCALE SURVEYS

The primary objective of this appendix is to document the comparability of ANSUR II dimensions with like or similarly named dimensions measured in other large-scale anthropometric surveys. Data from surveys are frequently used to compare body size distributions among and between populations (e.g., males and females, occupational groups, racial groups, age categories). A particularly vexing problem in drawing conclusions from such comparisons is whether differences between the data reflect real population differences or are the result of using different techniques to measure what may be described or named as the same dimension. Differences in landmark definitions, subject positioning, instruments, and measuring techniques can and do lead to significantly different results.

It is particularly important that the body-size comparability among U.S. military populations be known. Items of personal-protective equipment, clothing, and weapon systems are sometimes designed to be used by more than one U.S. military service and/or by allied services in other countries. In recent years, design for commonality of use among North Atlantic Treaty Organization (NATO) services has received increased emphasis. This kind of cooperative effort requires knowledge of population distributions of dimensions, which form the basis for sizing, procurement, and issue of protective equipment, and determination of the comparability of persons who may be called upon to use often-restrictive workspaces, as in the case of pilots from one country undergoing training in another nation's aircraft.

Dimensions measured in ANSUR II are compared to like or similarly named dimensions measured in various surveys (Table G-1). The U.S. military surveys compared include Navy aviators (Gifford et al., 1965); Air Force (Churchill et al., 1977); Marine Corps (Donelson and Gordon, 1996); Army in 1966 (White and Churchill, 1971), 1970 (Churchill et al., 1977), and 1988 (Gordon et al., 1989); and female-personnel-only surveys from the Air Force (Clauser et al., 1972) and Army (Churchill et al., 1977). In addition, surveys of the Canadian Forces (McCann et al., 1975) and the Royal Air Force (Bolton et al., 1973), as well as two civilian surveys, the National Health and Nutrition Examination (NHANES) (CDC, 2012), and Civilian American and European Surface Anthropometry Resources (CAESAR) (Blackwell et al., 2002), were compared.

Data from the earlier military surveys serve as the basis for the design of current equipment, clothing, and systems. Many of these, of course, will remain in military inventories for some time. The following means were used to judge the comparability of ANSUR II dimensions to other survey dimensions:

1. published descriptions of the dimensions and how they were measured.
2. published definitions of the landmarks used.
3. examination of summary statistics.

4. a comparability table published in the ANSUR final report (Gordon et al., 1989). Table G-1 presents the authors' judgment about the comparability of the ANSUR II data to data from the other surveys listed. The following codes are used:

C - COMPARABLE – The landmarks and measuring techniques used are of such comparability that differences between data from surveys can be considered to reflect real anthropometric differences between populations.

PC - PROBABLY COMPARABLE – Differences in landmark definitions and/or measuring techniques exist. However the differences are not large enough to exclude these data from most human engineering applications such as the sizing, design, procurement, and issuing of military equipment or assessing the suitability of assigning personnel to restrictive workspaces.

NC - NOT COMPARABLE – Landmark differences and measuring techniques are believed to be different enough so that dimensions so coded should not be used as the basis for answering any population comparison questions.

CU - COMPARABILITY UNKNOWN – Several dimensions that are listed as CU were determined in other surveys by means other than direct measurement. Data from other dimensions coded CU reflect discrepancies for which no explanation is readily apparent.

The comparability between derived dimensions in ANSUR II and like dimensions measured directly in other surveys is, and will remain, unknown without extensive analyses. Therefore, derived dimensions do not appear in this table.

TABLE G-1

ANSUR II Dimensions: Assessment of Comparability with Other Surveys

Dimension		U.S. Navy Aviators 1964 (Gifford et al., 1965)	U.S. Army 1966 (White and Churchill, 1971)	U.S. Army Aviators 1970 (Churchill et al., 1971)	U.S. Air Force 1967 (Churchill et al., 1977)	Royal Air Force 1970/1971 (Bolton et al., 1973)	Canadian Forces 1974 (McCann et al., 1975)	U. S. Air Force Women 1968 (Clause et al., 1972)	U.S. Army Women 1977 (Churchill et al., 1977)	U.S. Army 1988 (Gordon et al., 1989)	U.S. Marine Corps 1994 (Donelson and Gordon, 1996)	NHANES (CDC, 2012)	CAESAR (Blackwell et al., 2002)
Abdominal Ext Depth, Sit	C	NC	PC	PC	PC	NC	PC	PC	PC	PC	PC	PC	NC
Acromial Height		C	C	C	C	C	C	C	C	C	C	C	
Acromion-Radiale Length													
Ankle Circumference						C							
Axilla Height													
Ball of Foot Circumference													
Ball of Foot Length													
Biacromial Breadth	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Biceps Circumference, Flexed	C	C	C	C	C	C	C	C	C	C	C	C	
Bicristal Breadth	PC												
Bideltoid Breadth		C	C	C	C	C	C	C	C	C	C	C	C
Bimalleolar Breadth													
Bitragion Chin Arc													
Bitragion Submandibular Arc	C												
Bizygomatic Breadth	PC	C	C	C	C	C	C	C	C	C	C	C	C
Buttock Circumference	C	C	C	C	C	C	C	C	C	C	C	C	NC
Buttock Depth													
Buttock Height													
Buttock-Knee Length	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	PC
Buttock-Popliteal Length	NC	NC	NC	NC	NC	C	NC	NC	NC	NC	NC	NC	
Calf Circumference	C	C	C	C	C								
Cervicale Height	NC	NC	NC	NC	NC								
Chest Breadth	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
Chest Circumference	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	NC
Chest Depth	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
Chest Height	CU	PC	PC	PC	CU	PC	PC	CU	CU	PC	PC	PC	
Crotch Height	PC	PC	PC	PC	PC	NC	PC	PC	PC	PC	PC	PC	NC
Crotch Length (Omphalion)													NC
Crotch Length, Post. (Omph)													NC
Ear Breadth	C							C	C	C	C	C	
Ear Length	C							C	C	C	C	C	
Ear Protrusion													
Elbow Rest Height	PC	C	PC	C	PC	PC	PC	C	C	C	C	C	C
Eye Height, Sitting	C							C	C	C	C	C	C

TABLE G-1 Continued

Dimension	U.S. Navy Aviators 1964 (Gifford et al., 1965)										U.S. Army 1966 (White and Churchill, 1971)										U.S. Army Aviators 1970 (Churchill et al., 1971)										U.S. Air Force 1967 (Churchill et al., 1977)										Royal Air Force 1970/1971 (Bolton et al., 1973)										Canadian Forces 1974 (McCann et al., 1975)										U. S. Air Force Women 1968 (Clause et al., 1972)										U.S. Army Women 1977 (Churchill et al., 1977)										U.S. Army 1988 (Gordon et al., 1989)										U.S. Marine Corps 1994 (Doneilson and Gordon, 1996)										NHANES (CDC, 2012)										CAESAR (Blackwell et al., 2002)									
Foot Breadth, Horizontal	C	C	C	C	C	C	C	C	C	C	PC	PC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	PC																																																																																		
Foot Length	C	C	C	C	C	C	C	C	C	C	PC	PC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	PC																																																																																		
Forearm-Center of Grip Length	PC	PC	PC	PC	PC	C	C	C	C	C	PC	PC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	PC																																																																																		
Forearm Circ, Flexed																																																																																																																								
Forearm-Forearm Breadth																																																																																																																								
Forearm Hand Length	C	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	PC																																																																																		
Functional Leg Length	C	C	C	C	C	C	C	C	C	C	PC	PC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	PC																																																																																		
Hand Breadth	PC	PC	PC	PC	PC	C	C	C	C	C	PC	PC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	PC																																																																																		
Hand Circumference																																																																																																																								
Hand Length																																																																																																																								
Head Breadth	C	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Head Circumference	C	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Head Length	C	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Heel-Ankle Circumference	CU	NC	NC	NC	NC	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Heel Breadth		C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																	
Hip Breadth	PC	PC	PC	PC	PC	NC	NC	NC	NC	NC	PC	PC	NC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	C																																																																																												
Hip Breadth, Sitting	CU	C	C	C	C	NC	NC	NC	NC	NC	PC	PC	NC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC																																																																																												
Iliocristale Height																																																																																																																								
Interpupillary Breadth	NC	NC	NC	NC	NC	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Interscye I	C	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Interscye II	CU	CU	CU	CU	CU	NC	NC	NC	NC	NC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	C																																																																																					
Knee Height, Midpatella																																																																																																																								
Knee Height, Sitting																																																																																																																								
Lateral Fem Epicondyle Height																																																																																																																								
Lateral Malleolus Height																																																																																																																								
Lower Thigh Circumference	PC	PC	PC	PC	PC	NC	NC	NC	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Menton-Sellion Length	C	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																	
Neck Circumference																																																																																																																								
Neck Circumference, Base																																																																																																																								
Overhead Fingertip Reach, Sit																																																																																																																								
Palm Length	NC	NC	NC	NC	NC	C	C	C	C	C	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Popliteal Height	C	C	C	C	C	PC	PC	PC	PC	PC	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																																																																																		
Radiale-Stylin Length																																																																																																																								
Shoulder Circumference																																																																																																																								
Shoulder-Elbow Length																																																																																																																								

TABLE G-1 Continued

REFERENCES*

- Blackwell S, Robinette KM, Boehmer M, Fleming S, Kelly S, Brill T, Hoeferlin D, Burnsides D, Daanen H (2002) *Civilian American and European Surface Anthropometry Resource (CAESAR), Final Report, Volume II: Descriptions*. Technical Report AFRL-HE-WP-TR-2002-0173, Human Effectiveness Directorate, Crew Systems Interface Division, Wright-Patterson Air Force Base, OH.
- Bolton CB, Kenward M, Simpson RE, Turner GM (1973) *An Anthropometric Survey of 2000 Royal Air Force Aircrew 1970/1971*. Technical Report 73083, Royal Air Force Establishment, Farnborough, Hants, England.
- Centers for Disease Control and Prevention (CDC) 2012 National Center for Health Statistics (NCHS). *National Health and Nutrition Examination Survey Examination Protocol*. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. 2009-2010.
http://www.cdc.gov/nchs/data/nhanes_09_10/BodyMeasures_09.pdf.
- Churchill E, Churchill T, McConville JT, White RM (1977) *Anthropometry of Women of the U.S. Army--1977: Report No. 2 - The Basic Univariate Statistics*. Technical Report Natick-TR-77/024 (AD A044 806). U.S. Army Natick Research and Development Command, Natick, MA.
- Churchill E, Kikta P, Churchill T (1977) *The AMRL Anthropometric Data Bank Library: Volumes I-V*. Technical Report AMRL-TR-77-1(AD A047 314). Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, OH.
- Churchill E, McConville JT, Laubach LL, White RM (1971) *Anthropometry of U.S. Army Aviators - 1970*. Technical Report TR-72-52-CE (AD 743 528). U.S. Army Natick Laboratories, Natick, MA.
- Clauser CE, Tucker PE, McConville JT, Churchill E, Laubach L, Reardon J (1972) *Anthropometry of Air Force Women*. Technical Report AMRL-TR-70-5 (AD 743 113). Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, OH.
- Donelson SM, Gordon CC (1996) *Validation of a Statistical Matching Procedure Used to Create United States Marine Corps Anthropometric Databases*. Technical Report (TR-96-035) (ADA316645). U.S. Army Natick Research, Development and Engineering Center, Natick, MA.
- Gifford EC, Provost JR, Lazo J (1965) *Anthropometry of Naval Aviators - 1964*. Aerospace Crew Equipment Laboratory Report No. NAEC ACEL 533. U.S. Naval Air Engineering Center, Philadelphia, PA.

* The references for this appendix are included here for ease of use, but are also included in the main report References, Chapter 8.

Gordon CC, Bradtmiller B, Clauser CE, Churchill T, McConville JT, Tebbetts I, Walker RA (1989) *1987-1988 Anthropometric Survey of U.S. Army Personnel: Methods and Summary Statistics*. Technical Report (TR-89-044) (AD A225 094). U.S. Army Natick Research, Development and Engineering Center, Natick, MA.

McCann C, Noy I, Rodden E, Logan O (1975) *1974 Anthropometric Survey of Canadian Forces Personnel*. DCIEM Report No. 75-R-1114. Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada.

White RM, Churchill E (1971) *The Body Size of Soldiers*. U.S. Army Anthropometry - 1666. Technical Report 72-51-CE (AD 743 465). U.S. Army Natick Laboratories, Natick, MA.

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APPENDIX H

DEMOGRAPHIC/BIOGRAPHICAL FORM (Reprint of original)

FOR OFFICIAL USE ONLY WHEN COMPLETED. MAY CONTAIN PRIVACY ACT INFORMATION

US Army Anthropometric Survey (ANSUR II)

**Natick Soldier Research, Development & Engineering Center
Biographical Questionnaire**

Thank you for helping to update the Army's anthropometric database.

INSTRUCTIONS:

Please respond to the questions on the following pages by completely filling in the bubble that corresponds with your answer. Please do not use checkmarks or Xs.

Marking Instructions

Use a No. 2 pencil, only. Do not use ink, ballpoint pen, or felt tip pens.

Make solid marks that fill the response completely.

Erase cleanly any marks that you want to change.

Make any write-in responses on the lines or boxes provided.

Correct: ●

Incorrect: ○ ✗ ○ ○

1. Last Name: _____ First Name: _____

2. What is your gender? Male Female

3. What is your current rank / grade?

Enlisted

Warrant Officer

Officer

- | | | |
|-----------|-------|--------|
| ① Private | ① W01 | ① 2LT |
| ② PV2 | ② CW2 | ② 1LT |
| ③ PFC | ③ CW3 | ③ CAPT |
| ④ CPL | ④ CW4 | ④ MAJ |
| ⑤ SPC | ⑤ CW5 | ⑤ LTC |
| ⑥ SGT | | ⑥ COL |
| ⑦ SSG | | ⑦ BG |
| ⑧ SFC | | ⑧ MG |
| ⑨ MSG | | ⑨ LTG |
| ⑩ 1SG | | ⑩ GEN |
| ⑪ SGM | | |
| ⑫ CSM | | |
| ⑬ SMA | | |

4. Today's date: (mm/dd/yyyy) ____ / ____ / ____

5. Installation: _____

6. Component: Regular Army Army Reserve Army National Guard

7. Branch you are in:

- Combat Arms Combat Service Support
 Combat Support (CSS incl: Med, Vet, Dental, JAG, Chaplain, etc.)

8. Please identify your UIC by number: (ex: WJM5BO, W1D1AA, W6DW04)

9. Please identify your primary MOS: (ex: 11B; 19D; 79R; 13B; 15P; 25X; 38B; 68A)

10. Please identify the state, territory, foreign country or military installation where you were born.

11. Your Population Subgroup: (please mark all that apply)

- White, not of Hispanic Origin
 Black, not of Hispanic Origin
 Hispanic (please mark all that apply)
 Mexican Latin American: _____
 Puerto Rican Other Hispanic: _____
 Cuban
 Asian or Pacific Islander (please mark all that apply)
 Chinese Japanese Korean
 Vietnamese Filipino Samoan
 Guamanian/Chamorro Melanesian Micronesian
 Polynesian Other Pacific Islander: _____
 Other Asian: _____
 Native American (please mark all that apply)
 Eskimo Aleut U.S./Canadian Tribe(s): _____
 Other (please mark all that apply)
 East / Asian Indian Arab or Middle Eastern
 Caribbean Islander Other: _____

What single group do you usually select on military questionnaires that offer only the following options?

White Black Hispanic Asian Pacific Islander Amer. Indian/Alaskan Native

12. Please identify the state, territory, foreign country or military installation where your MOTHER was born. _____

13. Your MOTHER'S Population Subgroup. (Please mark all that apply.)

- White, not of Hispanic Origin
- Black, not of Hispanic Origin
- Hispanic (please specify) _____
- Asian or Pacific Islander (please specify) _____
- Native American (please specify) _____
- Other (please specify) _____
- Don't know

14. Please identify the state, territory, foreign country or military installation where your FATHER was born. _____

15. Your FATHER'S Population Subgroup. (Please mark all that apply.)

- White, not of Hispanic Origin
- Black, not of Hispanic Origin
- Hispanic (please specify) _____
- Asian or Pacific Islander (please specify) _____
- Native American (please specify) _____
- Other (please specify) _____
- Don't know

16. When did you return from your last deployment?

- Never deployed
- Less than 1 month ago
- 1-3 months ago
- 4-6 months ago
- 7-12 months ago
- More than 1 year ago

17. Where were you last deployed?

- Iraq
- Other _____
- Afghanistan
- N/A (I have never deployed)

18. Are you scheduled for deployment in the near future?

- Not scheduled
- Less than 6 months from now
- More than 6 months from now
- Don't know

Continued on other side...

Write-in answers to the following questions on the lines provided.

Fill in the bubbles below each question to correspond to the numbers you enter on the line.

For numbers which are only 1 digit, fill in a zero in the first column. (See example)

<u>6</u>
<input checked="" type="radio"/> 0
<input type="radio"/> 1
<input type="radio"/> 2
<input type="radio"/> 3
<input type="radio"/> 4
<input type="radio"/> 5
<input type="radio"/> 6
<input type="radio"/> 7
<input type="radio"/> 8
<input type="radio"/> 9

19. Age _____

20. Birthdate:

Month (mm) _____	Day (dd) _____	Year (yy) _____
<input type="radio"/> 0 0	<input type="radio"/> 0 0	<input type="radio"/> 0 0
<input type="radio"/> 1 1	<input type="radio"/> 1 1	<input type="radio"/> 1 1
<input type="radio"/> 2 2	<input type="radio"/> 2 2	<input type="radio"/> 2 2
<input type="radio"/> 3 3	<input type="radio"/> 3 3	<input type="radio"/> 3 3
<input type="radio"/> 4 4	<input type="radio"/> 4 4	<input type="radio"/> 4 4
<input type="radio"/> 5 5	<input type="radio"/> 5 5	<input type="radio"/> 5 5
<input type="radio"/> 6 6	<input type="radio"/> 6 6	<input type="radio"/> 6 6
<input type="radio"/> 7 7	<input type="radio"/> 7 7	<input type="radio"/> 7 7
<input type="radio"/> 8 8	<input type="radio"/> 8 8	<input type="radio"/> 8 8
<input type="radio"/> 9 9	<input type="radio"/> 9 9	<input type="radio"/> 9 9

21. Height:

Feet _____

Inches _____

22. Weight:

Pounds _____

<input type="radio"/> 0	<input type="radio"/> 0 0
<input type="radio"/> 1	<input type="radio"/> 1 1
<input type="radio"/> 2	<input type="radio"/> 2 2
<input type="radio"/> 3	<input type="radio"/> 3 3
<input type="radio"/> 4	<input type="radio"/> 4 4
<input type="radio"/> 5	<input type="radio"/> 5 5
<input type="radio"/> 6	<input type="radio"/> 6 6
<input type="radio"/> 7	<input type="radio"/> 7 7
<input type="radio"/> 8	<input type="radio"/> 8 8
<input type="radio"/> 9	<input type="radio"/> 9 9

<input type="radio"/> 0 0 0
<input type="radio"/> 1 1 1
<input type="radio"/> 2 2 2
<input type="radio"/> 3 3 3
<input type="radio"/> 4 4 4
<input type="radio"/> 5 5 5
<input type="radio"/> 6 6 6
<input type="radio"/> 7 7 7
<input type="radio"/> 8 8 8
<input type="radio"/> 9 9 9

23. Writing preference:

Right hand

Left hand

Either hand (no preference)

Please do not write in the area below this line



. . .

4

APPENDIX I

GLOSSARY OF ANATOMICAL AND ANTHROPOMETRIC TERMS

Acromion - tip of the shoulder

Acromial process - an oblong portion of the shoulder blade at the top of the shoulder

Anatomical position - a standard position of the body to which all anatomical directions (e.g., superior, medial, anterior) are referenced (see figure I-1)

Anterior - pertaining to the front of the body; to the opposite of posterior

Axilla - armpit

Bi - a prefix denoting connection with or relation to each of two symmetrically paired parts

Biceps - used to refer to the two heads of a muscle; the term is most commonly used to refer to the large muscle on the anterior surface of the upper arm (biceps brachii).

Canthus - a corner or angle formed by the meeting of the eyelids

Coronal plane - any vertical plane at right angles to the midsagittal plane; divides the body into anterior and posterior divisions (see figure I-1)

Deltoid muscle - the muscle that forms the flesh of the lateral side of the upper third of the upper arm

Distal - farther from the trunk of the body, as opposed to proximal (see figure I-1)

Dorsal - pertaining to the back of the body or one of its parts [on the hand, its top surface as opposed to its palmar surface and on the foot, its top surface as opposed to its plantar (bottom) surface].

Epicondyle - the bony prominence at the distal end of the humerus and femur (bones)

Extend - to move adjacent segments of a limb so that the angle between them is increased, as when the leg is straightened; as opposed to flex

Femoral epicondyle - the bony projections on either side of the distal end of the femur

Femur - the thigh bone

Flex - to move adjacent segments of a limb in such a direction as to bring the two parts together, as when the elbow is bent; as opposed to extend

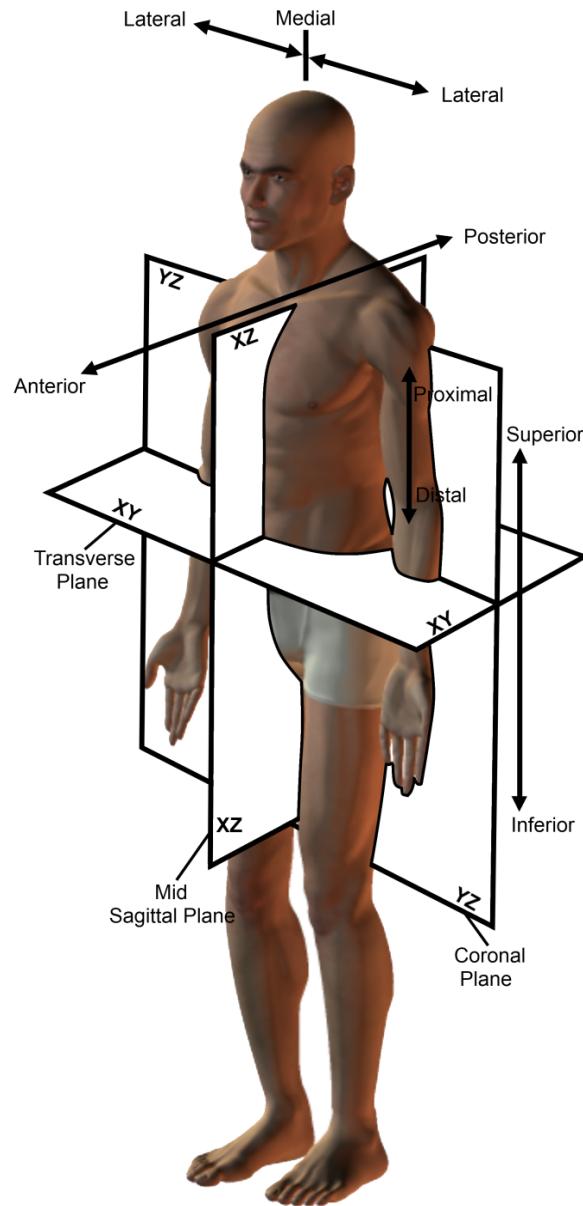


Figure I-1

Anatomical Position and Terminology

Frankfurt plane - the standard horizontal plane orientation of the head; the plane is established by a line passing through the right tragion (approximate earhole) and the lowest point of the right orbitale (eye socket)

Gluteal furrow - the crease at the juncture of the buttock and the thigh

Hyperextend - to overextend a limb or other part of the body

Iliac - pertaining to the ilium, one of the three fused bones that form one side of the pelvis

Iliac crest - the superior rim of the ilium

Inferior - below, in relation to another structure; lower (see figure I-1)

Lateral - away from the midline of the body; as opposed to medial (see figure I-1)

Malleoli - rounded bony projection on either side of the ankle; the lateral malleolus, on the outside of the ankle, is at the distal end of the fibula (one of the two bones of the calf); the medial malleolus, on the inside of the ankle, is at the distal end of the tibia (the shin bone)

Mandible - the lower jawbone

Mastoid process - lowest bony projection behind and below the ear—best felt immediately behind the earlobe

Medial - lying near or toward the midline of the body; as opposed to lateral (see figure I-1)

Metacarpophalangeal joint - a joint (knuckle) formed by the juncture of a finger bone (phalanx) with the palm bone (metacarpal)

Metatarsophalangeal joint - a joint formed by the juncture of a toe bone (phalanx) with the foot bone (metatarsal)

Midsagittal - the vertical plane that divides the body into equal right and left halves (see figure I-1)

Olecranon - the proximal end of the ulna (the elbow)

Omphalion - the navel

Orbit – the bony socket in which the eye rests

Palmar - pertaining to the palm side of the hand; as opposed to its dorsal surface

Patella - the kneecap

Phalanx - a finger or toe bone

Popliteal fossa - dorsal juncture of the calf and thigh; back of the knee

Posterior - pertaining to the back of the body; as opposed to anterior (see figure I-1)

Proximal - closer to the trunk of the body; as opposed to distal (see figure I-1)

Radius - the bone of the forearm on the thumb side of the arm

Scye - a tailoring term referring to the armhole of a garment

Sternum - the breast bone

Stylium - the lowest point at the bottom of the radius (bone)

Superior - above, in relation to another structure (see figure I-1)

Supra - prefix designating above or on

Supraorbital ridges - the brow ridges above the eye sockets at the bottom of the forehead

Thelion - the center of the nipple on men

Tibia - the shin bone

Tragion - the juncture of the top of the cartilaginous flap of the ear with the head

Tragus - the cartilaginous flap of the ear near the earhole

Trapezius - the large muscle that originates on the neck and the upper half of the back and converges on the shoulder between midshoulder and acromion

Trochanter - a point in the center of the lateral side of the large prominence at the top of the thigh bone (femur), located on a sitting subject

Ventral - the front or inside surface

Vertebra - a bone of the spine; in humans there are 7 cervical (neck), 12 thoracic (chest), 5 lumbar (lower back), 5 sacral (fused), and 4 caudal (tail, also fused) vertebrae

Zygomatic arch - the bony arch below and to the side of the orbit of the skull extending horizontally along the side of the head from the cheekbone (the zygomatic bone) nearly to the external ear

Zygomatic bone - a bone of the face underlying the upper part of the cheek