BoSS-21

Automatic Body Measurement System

User Guide

Version 6.0
Standard Edition

VisImage Systems, Inc

7676 Woodbine Ave. Unit #14 • Markham, ON L3R 2N2 • Canada
Phone +1-905-946-0000 • Fax +1-905-946-1060 • www.vis.ca

End User License Agreement

Important: this End User License Agreement ("EULA") is a legal agreement between you (either an individual or, if purchased or otherwise acquired by or for an entity, an entity) and VisImage. Read it carefully before completing the installation and using the System. It provides a license to use the system and contains warranty information and liability disclaimers. By acquiring and using the system, you are agreeing to become bound by the terms of this agreement. If you do not agree to be bound by these terms, then do not install or use the system.

DEFINITIONS

- "VisImage" or VIS means VisImage Systems Incorporated and its licensors, if any.
- "BoSS XXI" and "BoSS-21" and all other variations refers to both the hardware and software of the system.
- "System" means the Hardware and Software that comprise BoSS-21, supplied by VisImage, and corresponding documentation, media, printed materials, and online or electronic documentation, and all updates or upgrades of the above that are provided to you.

LICENSE GRANTS

1. You may use the Software only on a single desktop or laptop computer that was provided by VisImage. A license for the Software may not be shared, installed or used concurrently on different computers.
2. You agree that VisImage may audit your use of the Software for compliance with these terms at any time, upon reasonable notice. In the event that such audit reveals any use of the Software by you other than in full compliance with the terms of this Agreement, you shall reimburse VisImage for all reasonable expenses related to such audit in addition to any other liabilities you may incur as a result of such non-compliance.

LICENSE RESTRICTIONS

1. You may not use the Software on any device that was not supplied by VisImage.
2. You may not make or distribute copies of the Hardware or Software, or electronically transfer the Software from one computer to another or over a network.
3. You may not alter, merge, modify, adapt or translate the System, or decompile, reverse engineer, disassemble, or otherwise reduce the System to a human-perceivable form.
4. You may not sell, rent, lease, or sublicense the System without explicit authorization from VisImage.
5. You may not modify the System or create derivative works based upon the System, or replace any parts unless specifically authorized by VisImage to do so.
6. In the event that you fail to comply with this EULA, VisImage may terminate the license and you must return the System to VisImage (with all other rights of both parties and all other provisions of this EULA surviving any such termination).
7. You shall not use the System to develop any software or other technology having the same primary function as the System, including but not limited to using the System in any development or test procedure that seeks to develop like hardware, software, or other technology, or to determine if such hardware, software, or other technology performs in a similar manner as the System.

OWNERSHIP

The foregoing license gives you limited license to use the System. VisImage and its suppliers retain all right, title and interest, including all copyright and intellectual property rights, in and to, the System and all copies thereof. All rights not specifically granted in this EULA, including Federal and International Copyrights, are reserved by VisImage and its suppliers.

WARRANTY DISCLAIMER

1. The software is provided to you free of charge, and on an "as-is" basis. VisImage provides no technical support, warranties or remedies for the software.
2. VisImage and its suppliers disclaim all warranties and representations, whether express, implied, or otherwise, including the warranties of merchantability or fitness for a particular purpose. Also, there is no warranty of non-infringement and title or quiet enjoyment. VisImage does not warrant that the system is error-free or will operate without interruption. No rights or remedies will be conferred on you unless expressly granted herein. The system is not designed, intended or licensed for use in hazardous environments. VisImage specifically disclaims any express or implied warranty of fitness for such purposes.
3. If applicable law requires any warranties with respect to the system, all such warranties are limited in duration to ninety (90) days from the date of delivery.
4. No oral or written information or advice given by VisImage, its dealers, distributors, agents or employees shall create a warranty or in any way increase the scope of any warranty provided herein.
5. VisImage shall have no responsibility if the system has been altered in any way, or for any failure that arises out of use of the system other than that recommended in the User Guide.

LIMITATION OF LIABILITY

1. Neither VisImage nor its suppliers shall be liable to you or any third party for any indirect, special, incidental, punitive, cover or consequential damages (including, but not limited to, damages for the inability to use equipment or access data, loss of business, loss of profits, business interruption or the like), arising out of the use of, or inability to use, the system and based on any theory of liability including breach of contract, breach of warranty, tort (including negligence), product liability or otherwise, even if VisImage or its representatives have been advised of the possibility of such damages and even if a remedy set forth herein is found to have failed of its essential purpose.
2. VisImage's total liability to you for actual damages for any cause whatsoever will be limited to the amount paid by you for the software that caused such damage.
3. The foregoing limitations on liability are intended to apply to all aspects of this EULA.

BASIS OF BARGAIN

The Warranty Disclaimer and Limited Liability set forth above are fundamental elements of the basis of the agreement between VisImage and you. VisImage would not be able to provide the System on an economic basis without such limitations. Such Warranty Disclaimer and Limited Liability inure to the benefit of VisImage's licensors.

The limitations or exclusions of warranties and liability contained in this EULA do not affect or prejudice the statutory rights of a consumer, i.e., a person acquiring goods otherwise than in the course of a business.

The limitations or exclusions of warranties, remedies or liability contained in this EULA shall apply to you only to the extent such limitations or exclusions are permitted under the laws of the jurisdiction where you are located.

THIRD PARTY HARDWARE AND SOFTWARE

The System may contain third party hardware or software which requires notices and/or additional terms and conditions. Such required third party hardware or software notices and/or additional terms and conditions are included with the System and are made a part of and incorporated by reference into this EULA. By accepting this EULA, you are also accepting the additional terms and conditions, if any, set forth therein.

GENERAL

This EULA shall be governed by the internal laws of Ontario, Canada, without giving effect to principles of conflict of laws. You hereby consent to the exclusive jurisdiction and venue of the courts sitting in Toronto, Ontario to resolve any disputes arising under this EULA. In each case this EULA shall be construed and enforced without regard to the United Nations Convention on the International Sale of Goods.

This EULA contains the complete agreement between the parties with respect to the subject matter hereof, and supersedes all prior or contemporaneous agreements or understandings, whether oral or written. You agree that any varying or additional terms contained in any purchase order or other written notification or document issued by you in relation to the System licensed hereunder shall be of no effect. The failure or delay of VisImage to exercise any of its rights under this EULA or upon any breach of this EULA shall not be deemed a waiver of those rights or of the breach.

No VisImage dealer, agent or employee is authorized to make any amendment to this EULA.

If any provision of this EULA shall be held by a court of competent jurisdiction to be contrary to law, that provision will be enforced to the maximum extent permissible, and the remaining provisions of this EULA will remain in full force and effect.

All questions concerning this EULA shall be directed to: VisImage Systems Incorporated, 3948 Chesswood Drive, Toronto, Ontario, Canada.

VisImage and other trademarks contained in the System are trademarks or registered trademarks of VisImage Systems Incorporated in Canada and/or other countries. Third party trademarks, trade names, product names and logos may be the trademarks or registered trademarks of their respective owners. You may not remove or alter any trademark, trade names, product names, logo, copyright or other proprietary notices, legends, symbols or labels in the System. This EULA does not authorize you to use VisImage's or its licensors' names or any of their respective trademarks.

PRIVACY OF PEOPLE MEASURED BY BOSS-21

Regardless of which version of BoSS-21 you have purchased, you agree to take full responsibility for guaranteeing the privacy rights of every person measured by BoSS-21, and to ensure that their images and measurements are never used without their express permission. You agree to hold VisImage Systems, Inc. blameless should any privacy issues arise through your use of the system.

Table of Contents

Table of Contents i

Table of Figures ii

Chapter 1: Introduction 1

What is BoSS-21? 1
What does BoSS-21 do? 1
How does BoSS-21 work? 2
Features of BoSS-21 2
Benefits of BoSS-21 2
BoSS-21 Portable Edition 2
BoSS-21 Hardware 2
BoSS-21 Software 3
BoSS-21 Standard versus BoSS-21 Portable 3
BoSS-21 Workflow 3
A Word about Passwords 4

Chapter 2: Software Setup 5

Launch BoSS-21 5
Adjusting Camera Settings: 6
When do I need to adjust the camera settings? 6
How do I adjust the advanced camera settings? 6
Adjust System Settings 8
Calibrate the Cameras 11

Chapter 3: Measuring People with BoSS-21 13

Introduce the Client to BoSS-21 13
Preparing the Client for Measurement 14
Instructing the Subject to Pose Correctly 16
Examine the Images for Posture Issues 18

Chapter 4: Accessing BoSS-21 Measurements 23

BoSS-21 Database is Automatically Updated 23
Backing up and Exporting the BoSS-21 Database 23
Accessing the Measurement Records 23
Retrieving a Record: Garment Sizes Only 24
Accessing Full Measurement Records 26

Chapter 5: Backup, Export, and Save As 28

Backup Procedure 29
Restore Procedure 30
Export Procedure 30
Import Procedure 32
Save All Records As… 33

Chapter 6: Troubleshooting 35

Chapter 7: Where to Get Help 37

Built-in Help 37
Website 37
Customer Support 37

Chapter 8: Direct Measures Provided by BoSS-21 38

Table of Figures

Figure 2-1: The BoSS-21 Main Interface 6

Figure 2-2 : The Designer Operations dialogue box. 7

Figure 2-3: The **Camera Advance Setting** dialogue box, as it appears on the screen. The only features we need consider at this point are the **White Balance** settings, the **Exposure Bias** settings, the **Zoom** settings, the **Capture** button, the **Default** button, and the **OK** button..... 7

Figure 2-4 : The System Settings dialogue box..... 8

Figure 2-5: With the Report Editor, you can select which body measurements and which garment size recommendations are displayed on the screen and included in the printed report. Note that garments set up for only one gender will not be displayed for the other gender. 10

Figure 2-6: The first of the two calibration windows. The images do not show your booth; they are sample images for comparison. Click **Acquire**, wait until the screen updates, and then click **Next**. 11

Figure 2-7: The second calibration window. Again, the images that this window shows are examples only. Click **Calibrate**, wait until the screen updates, and then click **Finish**. 12

Figure 3-1: Data entry area..... 14

Figure 3-2: The Detail Info dialogue box allows you to enter additional information that will be saved in your database. 15

Figure 3-3: Clothing and Pose Requirement 16

Figure 3-4: The handles have a button and cable connected allowing the subject to initiate the image capture. 16

Figure 3-5: Correct standing posture. Special attention is required to ensure that the arm and hand position is correct. 17

Figure 3-6: The updated screen, showing the front, side and top images. Examine the images to make certain there are no posture errors. When satisfied, click the **Process Images** button..... 18

Figure 3-7: Potential problems with the client posture that must be corrected before the measurements are calculated. 20

Figure 3-8: The results of the image processing. Assuming everything is satisfactory, the client's outline will be highlighted in bright green. 21

Figure 3-9: A BoSS-21 report. The first part includes the body measurements and body shape outlines; the client will generally keep this. The second part lists the garment size recommendations..... 22

Figure 4-1: **Open Measurement Records** lets you search through all or a subset of your records and display measurements and silhouettes on the screen. 26

Figure 4-2: Use **Next** and **Previous** to step through the measurement records. Use **Modify** to edit the identification information. Use **Open Record** to change which measurements are displayed, and to recalculate the garment size recommendations..... 27

Chapter 1: Introduction

What is BoSS-21?

BoSS-21 (Body Sizing System for the 21st Century) is an accurate, efficient and cost effective device that automatically measures the human body in seconds.

Why is this useful? Measuring people using traditional methods takes a great deal of time. Furthermore, the accuracy and reliability of the results depend upon the expertise of the people doing the measuring, and the measurements can vary significantly from expert to expert. When measured by untrained people, the measurements have such low precision and accuracy that they are meaningless for many applications. In addition, the standard measurements must be recorded by hand, meaning that errors inevitably creep into the database.

The automatic body measurement system BoSS-21 is consistent and reliable, and can measure hundreds of people in a day, each with the same precision and accuracy. The system never tires, and uses exactly the same measurement technique for every person. All measurements are automatically stored for later use and analysis.

BoSS-21, using the body measurements and customised garment sizing rules, also recommends correct garment and equipment sizes for each person measured.

Why is this useful? Even a small uniformed service can waste a lot of money and resources on uniforms that don't fit, through inventory ordering and management errors, unnecessary custom fitting, costly redesigns, and so on.

What does BoSS-21 do?

BoSS-21 combines the expertise of a skilled anthropometrist with the consistency and speed of a computer, making accurate measurement fast, efficient, and dependable.

When set up by expert garment designers, the sizing rules can embody their wisdom and experience, making this knowledge available to everyone when the expert is not available in person.

BoSS-21 helps reduce the guesswork from garment fitting, which can speed the entire process dramatically. The sizing recommendations of BoSS-21 are meant as a starting point when fitting a client with garments. Individual preferences and requirements vary greatly, and some people prefer garments that are snug, while other prefers garments that are loose.

By recording the garment size requirements of your personnel or customers in a database, inventory acquisition and management can be done much more accurately, without the guesswork.

By creating a complete database of body measurements, designers of garments, equipment, and workspaces finally have access to the anthropometric database they need. They can design specifically for the needs of their target market, rather than using population averages. The database can also provide useful data for health, fitness, and lifestyle surveys.

How does BoSS-21 work?

BoSS-21 simultaneously captures high-resolution images of a person from the front, side and top. In seconds, the proprietary image processing software measures the person's body, and records the data. Then, using sizing rules customised by your designers, BoSS-21 recommends the correct size of the garments and equipment you specify.

Features of BoSS-21

- **Fast**: image acquisition takes only a fraction of a second, measurement and sizing is completed in seconds
- **Accurate**: more reliable than measurements repeated by different anthropometric experts
- **Dependable**: no moving parts, requires little maintenance
- **Cost effective**: constructed using off-the-shelf readily available technology
- **Easy to operate**: requires no special knowledge or training
- BoSS-21 is a stand-alone turnkey solution that can operate independently, or as part of an IT network.

Benefits of BoSS-21

- Gathers many different anthropometric body measurements in seconds
- Automatically creates and maintains a database of body dimensions and garment requirements
- Optimizes inventory management and logistics: inventory is acquired based on the needs of the actual personnel on hand, inventory levels can be minimised, and costly last-minute acquisitions can be avoided
- Provides accurate data for the construction of custom garments and personal equipment
- Reduces fitting time by providing accurate sizing recommendations
- Reduces high rate of return of poorly-fitted garments
- Reduces rate of unnecessary alterations

BoSS-21 Portable Edition

BoSS-21 Portable Edition is a low-cost self-contained portable version of the BoSS-21 hardware. Without special training, you can transport the system to a new location and set it up in less than an hour. Taking the system down is equally easy. Everything you need is included.

BoSS-21 Hardware

The BoSS-21 System includes both hardware and software components. The hardware comes in a number of different configurations. The *Standard Edition* includes a transportable but sturdy posing platform, fixed camera mounts, a workstation, and the posing platform.

Additional hardware options include features for measuring hands, measuring feet, measuring weight, and assessing body fat content. The entire system can be customised to meet your specific needs.

BoSS-21 Software

The BoSS-21 software also comes in different editions. This User Guide only addresses the Standard Edition. The other editions, such as BoSS-21 Developer Edition and BoSS-21 SP, include other features and capabilities. And just like the hardware, the software can be customised to meet your specific needs.

BoSS-21 Standard versus BoSS-21 Portable

BoSS-21 Portable is a low-cost self-contained mobile version of the BoSS-21 hardware. Without special training, you can transport the system to a new location and set it up in less than an hour. Taking the system down is equally easy. Everything you need is included.

The standard version of BoSS-21 hardware includes a custom-designed privacy enclosure that features a private changing area and posing platform. While this version can readily be disassembled and transported to a new location, the privacy enclosure is big, and assembly and disassembly is best handled by trained personnel.

BoSS-21 Workflow

There are three distinct stages to working with BoSS-21:

- Part 1: Software Setup.
- Part 2: Measurement Procedure.

These two stages can be summarized as follows.

Stage 1: Software Setup: Chapter 2	**Standard**
1. Turn the computer on, launch BoSS-21 software	✓
2. **Calibrate** the cameras every time the BoSS software starts up.	✓

Stage 2: Measurement Procedure: Chapter 3	Standard
3. Enter the client identity information	✓
4. Guide the client to dress and pose correctly	✓
5. When client is ready, **Acquire** the images	✓
a. Carefully examine the images for problems	✓
b. If required, ask the client to correct their pose, and return to step 5	✓
6. Click the **Calculate** button, which measures the client, recommends correct garment sizes, records the data, and optionally generates the printed report	✓
7. Click the **Finish** button. This clears the screen, ready to begin the next measurement at Step 3	✓

A Word about Passwords

Depending on the environment in which you use your BoSS-21 system, you may be more or less concerned about the security of your system and the privacy of your data.

In some environments it is very important to separate different functionality, and to restrict these tasks to different people by using passwords. In other environments these distinctions are irrelevant and you may find the password requirements intrusive.

If this is the case, then you can modify the passwords, but leave the new password fields empty. You will still be asked for passwords at different times, but if you have replaced the passwords with nothing, then you can simply press the Enter key or click on "OK" to continue.

The default Operator password is "operator".
The default "Administrator" or "Designer" password is "designer".

Chapter 2: Software Setup

Once set up, BoSS-21 is designed to be easy to use with little or no training. In the following sections we describe each step in detail. You can successfully run the system by following the sequence described below.

The setup sequence, described in the previous chapter, consists of turning the system on and launching the BoSS-21 application, adjusting system settings (you will rarely need to do this, if ever), and calibrating the system. These are usually only done once each day, when the system is first turned on. It doesn't need to be repeated until the next time the system is started up.

The measuring procedure described in the next chapter is what needs to be performed each time someone is measured.

Launch BoSS-21

BoSS-21 Standard, with its semi-permanent installation, can begin measuring less than 10 minutes after the system is turned on. Typically the system is turned on and calibrated at the beginning of each day, so it is always available for use. The computer is typically powered down at the end of each day, though it could be put into Sleep or Hibernate modes instead.

Once the system is up and running, the total measuring time per person can be less than 5 minutes.

1. If necessary, turn the main power bar on.
2. Power-up the computer by pressing the Power button on the computer. After Windows has finished starting up, log in to the BoSS-21 account if necessary
3. Launch BoSS-21 by double-clicking the **BoSS-21** icon on the desktop. This brings up the main BoSS interface screen, shown in Figure 2-1 below.

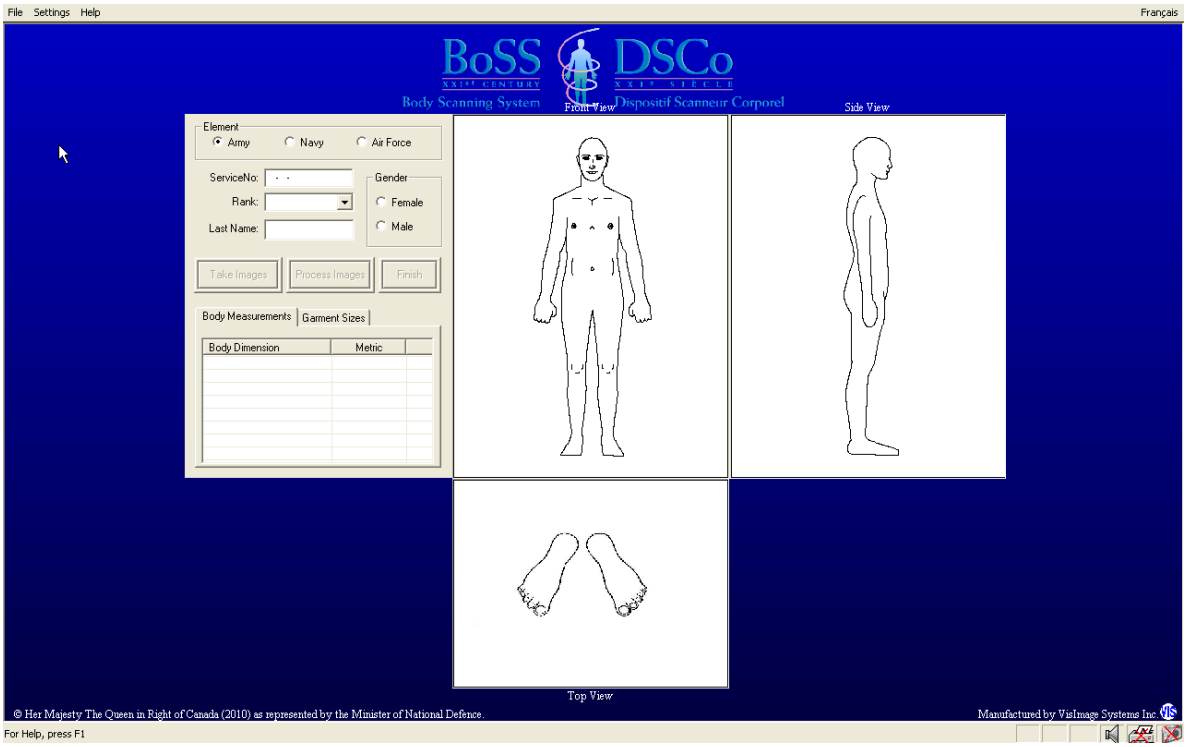


Figure 2-1: The BoSS-21 Main Interface

Adjusting Camera Settings:

When do I need to adjust the camera settings?

With the BoSS-21 Standard, the advanced camera settings may need to be adjusted every time the lighting conditions are changed. Whether or not you adjust the camera zoom settings, however, you may have to adjust the White Balance and/or Exposure Bias and you will certainly have to verify the direction of the cameras to ensure that all of the calibration dots are visible for each camera view, and that they fill most of the field of view of each camera. While this can be done during the Camera Calibration process, we recommend doing it at this stage.

How do I adjust the advanced camera settings?

There are several steps to this procedure:

1. Open the **Designer Operations** dialogue box, shown below in Figure 2-4, by selecting the **Settings → Designer Operations** menu item. Enter the designer password when required (or leave it blank, if that is what the password was changed to), and click **OK** or press **Enter.**

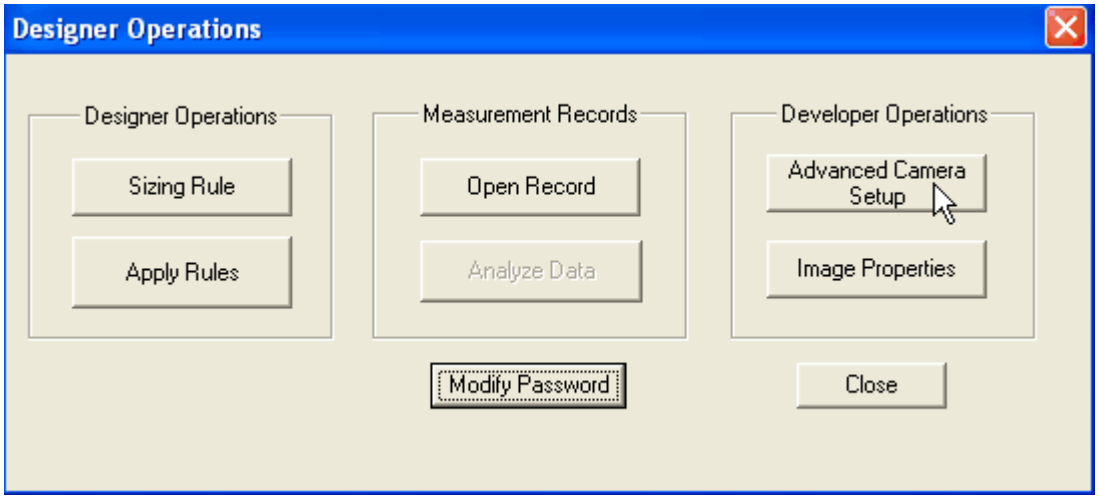


Figure 2-2 : The Designer Operations dialogue box.

2. Click on the **Advanced Camera Setup** button.

3. You will get a warning that "Modifying advanced camera properties will affect system performance." Click **OK**.

4. This will open the Camera Advance Setting dialogue box, shown below in Figure 2-3.

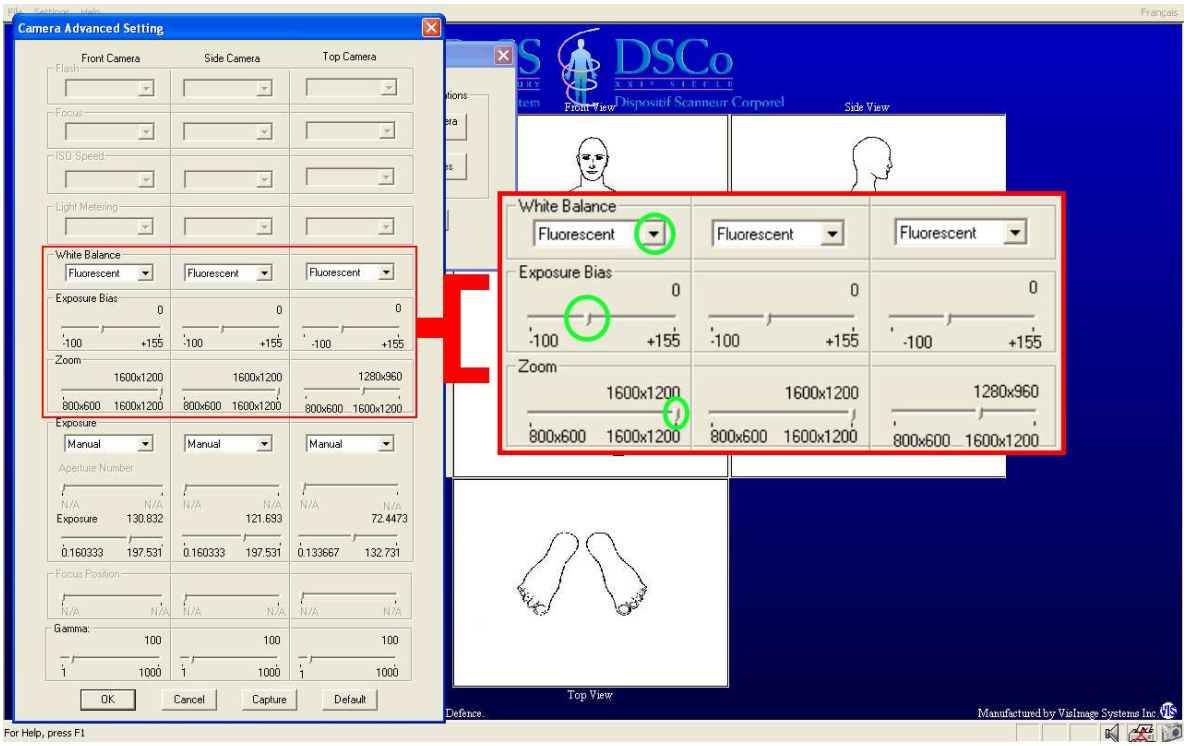


Figure 2-3: The **Camera Advance Setting** dialogue box, as it appears on the screen. The only features we need consider at this point are the **White Balance** settings, the **Exposure Bias** settings, the **Zoom** settings, the **Capture** button, the **Default** button, and the **OK** button.

The **White Balance** Settings are used to select the type of light used in the environment to allow the camera's to better understand the colors it sees.

The **Exposure Bias** allows the designer to adjust the pictures brightness by clicking and dragging the slider (right for a higher brightness and left for a lower brightness).

The **Zoom** settings are set correctly as default but if the cameras are setup further than the recommended setting then the Zoom setting can be utilised. If found necessary, the easiest way to adjust the Zoom settings is to click once with the left mouse button on the tiny slider shown inside the circle in Figure 2-3, and then use the left and right arrow keys on your keyboard to select a new value. Press Enter or click elsewhere on your screen to continue.

You can also click and drag the slider, but it is difficult to be precise that way.

Adjust System Settings

You can adjust these settings at any time, but only the calibration step is required each time the system is started up.

5. Select language: BoSS-21 can operate in both English and French. To change the current language, click on the **Français** or **English** button on the top-right of the display. You can also use the **Settings → English Interface** or **Settings → French Interface** menu items.

6. Select metric or imperial units: click on the **Value (Imperial)** or **Value (Metric)** button below the data entry area.

7. Open the **System Settings** dialogue box, shown below in Figure 2-4, by selecting the **Settings → System Settings** menu item. Enter the operator password when required, and click **OK**.

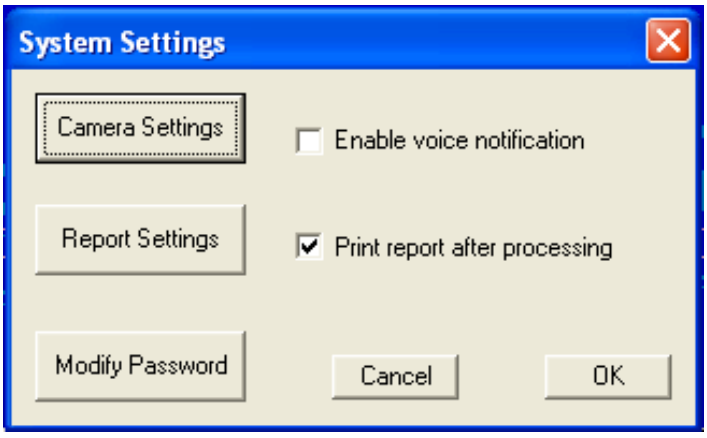


Figure 2-4 : The System Settings dialogue box.

8. The **Enable voice notification** setting controls whether the computer tells the client that they are finished. Normally this should be unselected.

9. The **Print report after processing** setting controls whether or not a report is printed automatically every time an image is processed. Normally this should be selected.

10. Click on the **Report Settings** button. This brings up a dialogue box that lets you adjust what information appears on the printed report.

    a) Initially the **Body Measurement** tab is selected. This shows all of the different body measurements that can be included in the printed report. Click on the "Select All" box to include all body measurements in the report. Clicking again clears all items.

    Note the two columns of checkmarks. The first column indicates whether or not the measure will appear onscreen and in the printed report. The second column indicates whether or not the corresponding landmarks will be displayed on the image.

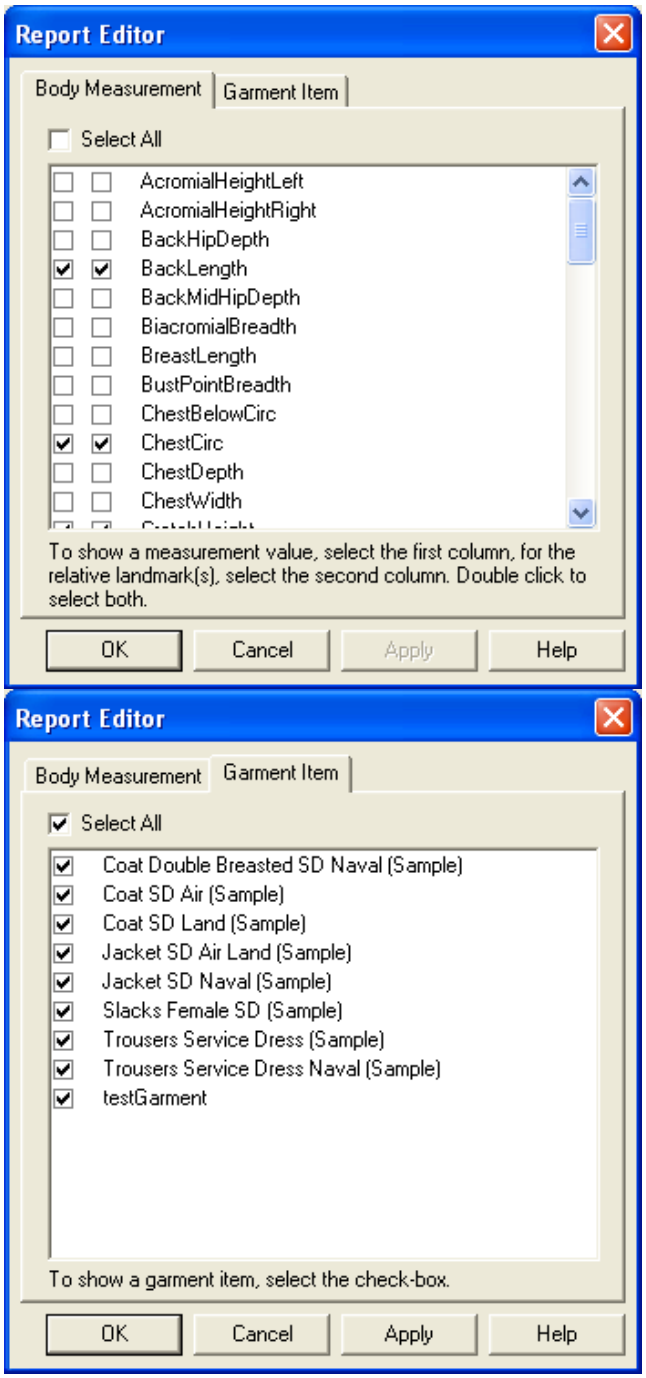


Figure 2-5: With the Report Editor, you can select which body measurements and which garment size recommendations are displayed on the screen and included in the printed report. Note that garments set up for only one gender will not be displayed for the other gender.

b) Click on the Garment Item tab to select from the available garments.

c) Click **OK** when you have finished adjusting the report-related settings, or **Cancel** to abandon all changes.

Calibrate the Cameras

1. Open the **Settings → System Settings** menu item. Enter the operator **System Settings** dialogue box if required by selecting password when required, and click **OK**.

2. In the **System Settings** dialogue box, click on the **Camera Settings** button. There is a pause while the computer reconfigures the cameras, and then the **Camera Setup: Capture Images** dialogue box opens. Three small images of how the posing platform should appear are included in this box. These are samples only; they do not show the current state of the posing platform.

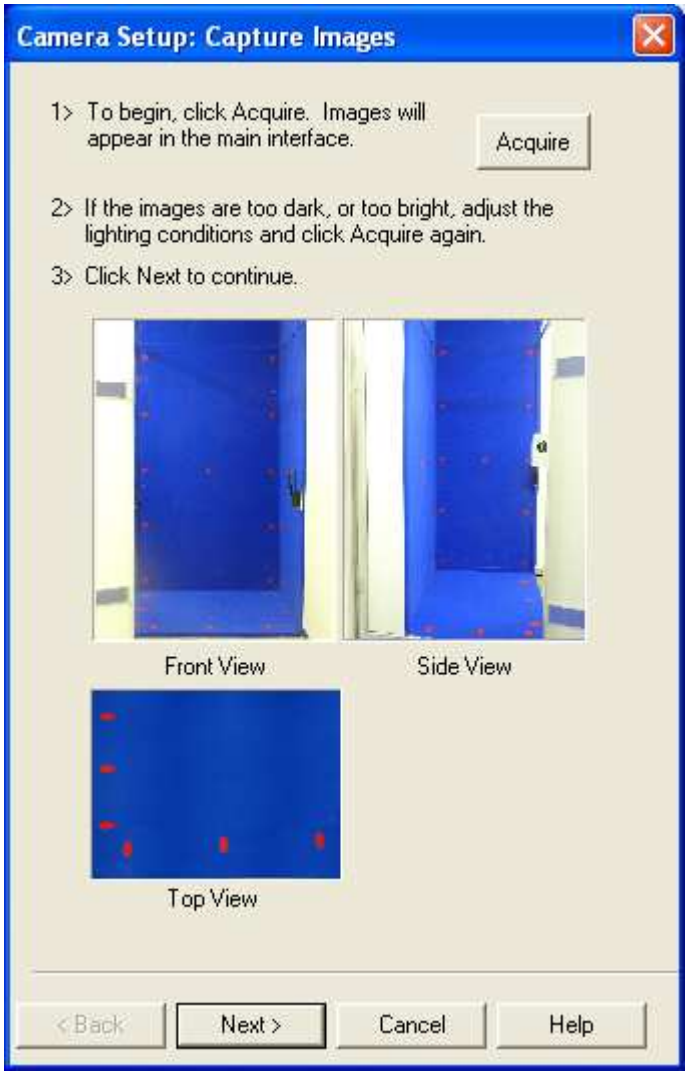


Figure 2-6: The first of the two calibration windows. The images do not show your booth; they are sample images for comparison. Click **Acquire**, wait until the screen updates, and then click **Next**.

3. Click on the **Acquire** button. There is another pause, and then the front, side, and top images of the posing platform appear on the main display. Assuming all the appropriate fourteen calibration dots are visible in both the front and side views, and all appropriate six calibration dots are visible on the top view, click on the **Next** button. This causes the dialogue box to change to the **Camera Setup: Calibrate Cameras** box.

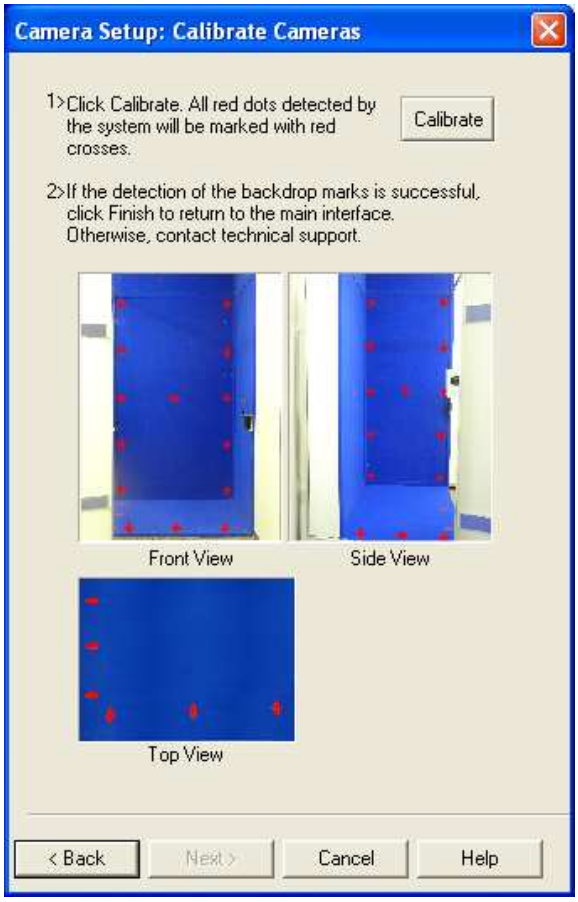


Figure 2-7: The second calibration window. Again, the images that this window shows are examples only. Click **Calibrate**, wait until the screen updates, and then click **Finish**.

4. Click on the **Calibrate** button. There is a brief pause, then the main screen updates to show all fourteen calibration dots marked with red crosses on each of the images for the front and side cameras, and all six calibration dots marked with red crossed on the image for the top camera.

5. Assuming all the red dots are marked with crosses on each image for the front, side, and top cameras, click on the **Finish** button. If any of these red crosses are missing, then the calibration will not be as reliable as it should be. Contact Technical Support for more information.

6. Click OK in the System Settings dialogue box.

At this point, the system is running, configured, and calibrated. In other words, it is ready to begin measuring any number of clients.

Chapter 3: Measuring People with BoSS-21

Introduce the Client to BoSS-21

Assuming this is the first time the client (the person being measured) has had any experience with BoSS-21, you will need to explain why they are being measured, how their privacy is protected, and then walk them through the process of being measured.

1. **Purpose**: BoSS-21 is used instead of a tape measure to determine a person's body dimensions. Using those measurements it then recommends garment sizes using the garments and sizing rules programmed into the system.

2. **Privacy**: In BoSS-21, all images are automatically deleted. We suggest that you offer complete confidentiality to all of your clients, and guarantee that the data will be used for specific purposes only. It is up to you to secure whatever permissions and releases are necessary for your purposes.

3. **Privacy enclosure**: For the standard version of BoSS-21, show the client the booth. Point out the disposable footwear. Additionally, point out whatever privacy provisions you have prepared for changing.

4. **Demonstrate** the required pose. Point out the front camera. Describe the arm position, hand grip, and elbow position.

5. **Practice**: Before they change, ask the client to step onto the platform and to adopt the correct pose. Examine their pose for problems, and correct them. Since their arm position is the most critical, especially for thin clients, you must examine that in more detail:

    a) **Elbow**: Check the side camera view. You can check their position from the side camera's position. Make certain their arm does not block the camera's view of their back or thigh.

    b) **Wrist**: Check the wrist position. All fingers should be closed, the wrist should be bent slightly sideways so the handle is parallel to the floor, and the front of the wrist should be straight.

6. **Clothing**: Quickly describe how the client will dress. You can use the poster provided to help.

Preparing the Client for Measurement

Once you have finished introducing the client to BoSS-21 and demonstrated and practiced the pose they will adopt, return to the workstation while they undress, and enter their personal ID.

Note that the information required here has been designed for the Canadian Forces. VisImage Systems can customise the data requirements to suit your purposes.

1. In BoSS-21 there are five fields that must be completed as follows. The current interface is customised for the Canadian Forces. If these do not suit your purposes, the interface can be customised to suit your specific needs.

    a. Element (Army, Navy, Air Force)

    b. Service Number
    The service number must begin with a letter, followed by 8 digits. You must click on the left side of this field for the cursor to be positioned correctly.

    c. Rank (drop-down menu). At the bottom of the list is a **Civilian** "rank" to indicate non-military personnel.

    d. Last Name

    e. Gender (Male, Female)

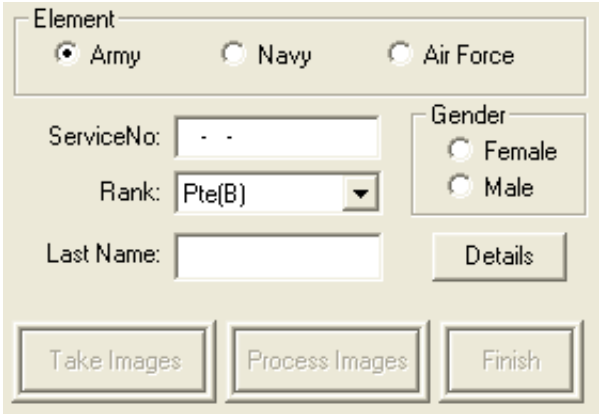


Figure 3-1: Data entry area.

NOTE: There are times when you will measure people who you do not intend to enter into your database. For example, measurements made during training, practice, or demonstrations are generally not included in your database. At these times, select the special rank **Test. Doing so will automatically fill out the rest of the information, and will use the fake service number A00-000-000.**

Following this recommendation will help keep your database clean.

Clicking on the **Details** button opens the **Detail Info** dialogue box. The labels on these fields are suggestions only; you can use these fields for whatever purpose you choose.

You can also leave all of these fields blank.

If you do enter a weight, clicking on the **Kg** button will convert the metric kilograms into Imperial pounds, with the button changing to **lbs** to indicate that the measurement is in imperial pounds. Clicking on **lbs** will convert the weight back to metric units.

Figure 3-2: The Detail Info dialogue box allows you to enter additional information that will be saved in your database.

2. Tell the client to remove watches and large jewellery. Small rings, earrings, body piercings, and other small pieces of jewellery can be left on, but you will need to verify that they do not cause a problem.

3. If they wear glasses, tell the client that eyeglasses may be worn.

4. Hair: If the client has long hair, tell them it must be worn up, at the back of the head, as shown on the poster. Loose hair hanging down will make the neck seem much larger than it should. Hair tied on top of the head will cause the client's height to be exaggerated.

5. Tell the client to remove all of their clothing except for their underwear, which should be a light colour, and not any shade of blue. If the client is a woman, she must also wear a snug-fitting bra. The bra should also be light in colour, and not any shade of blue. You must carefully verify that the underwear and bra colours do not cause problems with the measurements by examining the green outline or silhouette that appears after you process the images. It should trace the outside edge of the client's body.

Instructing the Subject to Pose Correctly

Correct posture is important for ensuring an accurate measurement. By demonstrating the correct posture for the client, and getting them to practice it under your supervision, you can speed the measurement process considerably.

The required posture is shown below:

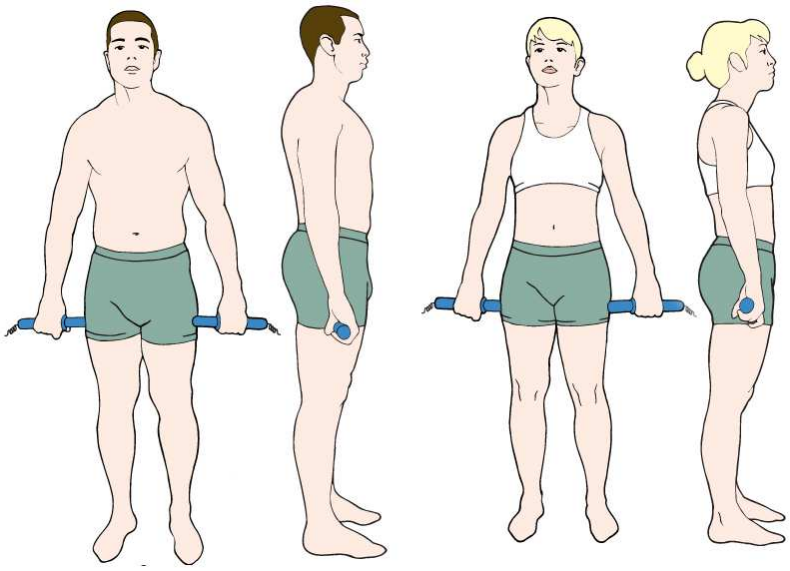


Figure 3-3: Clothing and Pose Requirement

When the client is dressed correctly, tell them to:

1. "Stand with your feet in the footprints on the blue platform."
2. "Hold the handles firmly, but not tightly, with all of your fingers. Make sure they are parallel to the floor. Make sure your wrists do not bend to the front or the back."

Figure 3-4: The handles have a button and cable connected allowing the subject to initiate the image capture.

3. "Your arms should be straight and down, holding the handles against your thighs, parallel to the floor. Use a gun grip, not a bicycle grip. The front of your wrists should be straight, not bent. Your knuckles should be parallel to the floor."

4. "Are your arms straight? Hands closed?"

5. "Relax your shoulders. Do not tense your body, or stand at attention. Do not suck in your belly."

6. "Face the front camera. Please hold your position until I tell you we are done."

Figure 3-5: Correct standing posture. Special attention is required to ensure that the arm and hand position is correct.

Examine the Images for Posture Issues

When the client clicks the red button, there is a brief pause, and then their front and side images appear on the BoSS-21 display. You must verify that there are no posture problems before proceeding.

If there are posture problems, they must be corrected *before* you click on the **Process Images** button. Otherwise, the measurements will not be correct, and the sizes recommended by BoSS-21 will likely be wrong.

Furthermore, the incorrect data resulting from posture or preparation problems will be stored in database, which may be used for a number of purposes, including research, garment design, and inventory management. This could affect the results

Most measurement problems are due to arm position, particularly for thin clients, and those with a large curvature of the back.

The next most likely problem area is the hand and wrist position. Be explicit when demonstrating and practicing the pose, and these problems can mostly be avoided.

The final potential trouble area is the placement of the feet. Make certain their feet are placed in the footprints on the floor of the posing platform.

Figure 3-6: The updated screen, showing the front, side and top images. Examine the images to make certain there are no posture errors. When satisfied, click the **Process Images** button.

You must carefully examine the images for the following issues:

Posture Checklist

1. Does the client's elbow block the side view of the back? It can sometimes be difficult to detect. This kind of error will cause the waist measurement to be larger than it should be. If you are not certain, then instruct the client to adjust their arm position appropriately, and to click the red button again when ready.
2. Is the client's hand too far forward? Does it block the front of their thigh? If it does, you must instruct them to adjust their arm position appropriately, and then click the red button again.
3. Is the client's elbow bent? If it is, you must instruct them to adjust their arm position appropriately, and then click the red button again.
4. Are their hands open, or their wrists bent? If so, you must instruct them to adjust their hand position appropriately, and then click the red button again.
5. Does their hair obscure their neck in any way? This will exaggerate the neck measurement. Is it piled too high on their head? If so, this will make them appear taller than they are. In either case you must instruct them to fix their hair so that it is up and at the back of their head, and then to click the red button again.

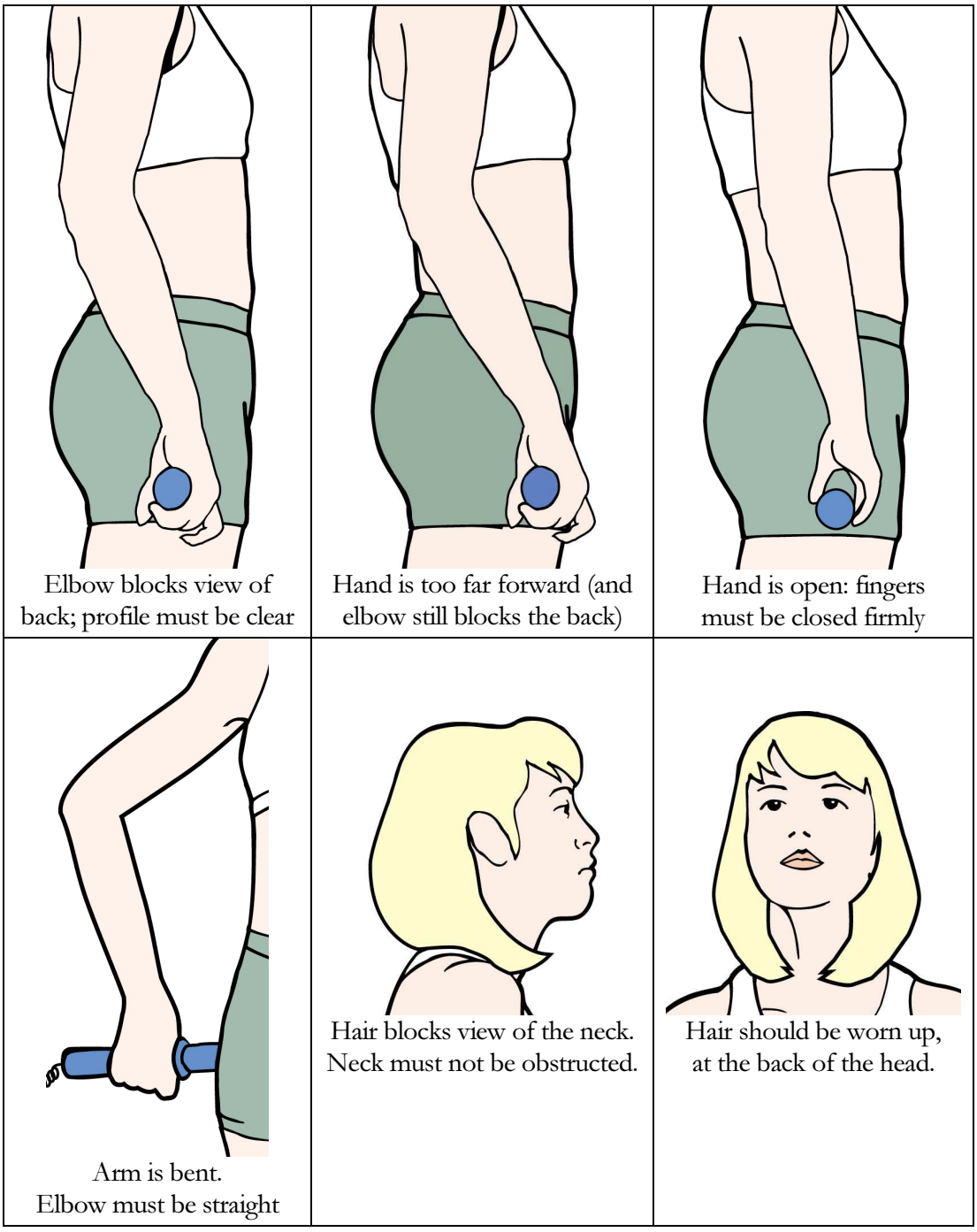


Figure 3-7: Potential problems with the client posture that must be corrected before the measurements are calculated.

When you are satisfied that the client's pose is correct, click the **Process Images** button. There will be a pause, and then the screen will update to show the client's body measurements and garment sizes, and the client's outline will be highlighted with a bright green line:

Figure 3-8: The results of the image processing. Assuming everything is satisfactory, the client's outline will be highlighted in bright green.

Examine the green outline. If there are any significant errors in it, this usually indicates a problem with lighting or garment colour. It is not unusual for minor incursions to occur in the region of the ankle; this can safely be ignored. However, if the garments worn by the clients are too dark, or some shade of blue, then the outline can be very wrong. If this occurs, you must correct the source of the problem and then capture and process the images again.

In order to indicate that a measurement record is not correct and should not be included in any later data analysis, use the **Rank** selector to choose "Test", and then click on the **Process Images** button again. This way any later analysis of the data can deliberately exclude this record.

Depending on the System Settings, the report may be automatically printed at this time. If it is not printed automatically, you can do it manually using the **File → Print...** menu item.

The printed report consists of two parts. The first part shows the client's body outlines, and their measurements. The second part does not include any of this personal information. It only lists the recommended garment sizes for that individual.

Printing Two Copies: A second copy of the report can be printed manually using the **File → Print...** menu item if desired, or the system can be set to automatically print two copies of the report by using the **File → Print Settings...** menu item.

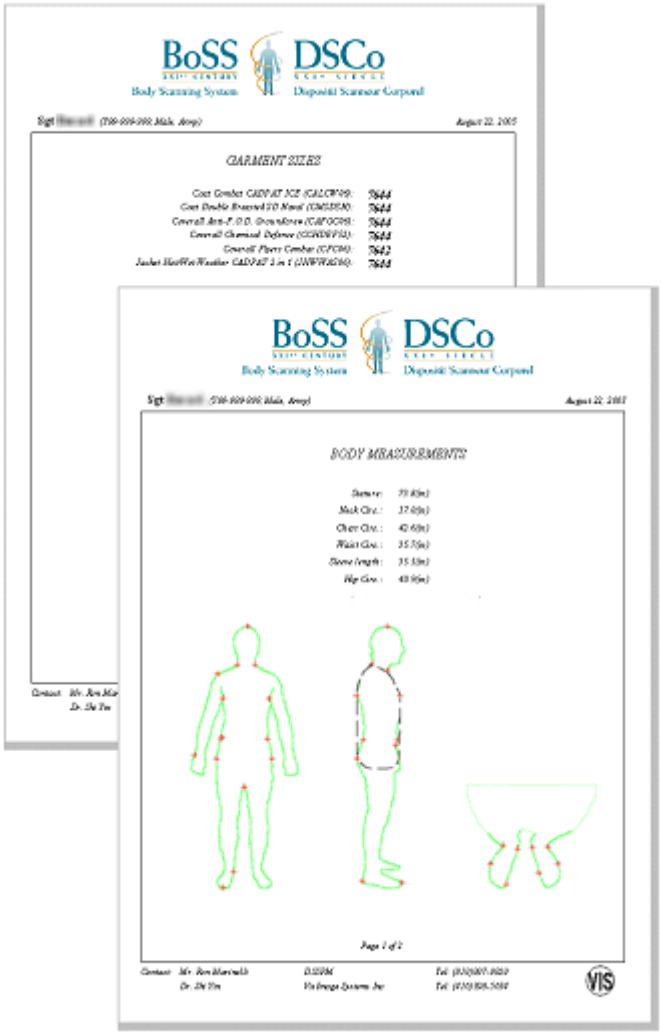


Figure 3-9: A BoSS-21 report. The first part includes the body measurements and body shape outlines; the client will generally keep this. The second part lists the garment size recommendations.

When you are satisfied with the results of the measurement procedure, click on the **Finish** button. This will clear the display in preparation for the next individual. Assuming you leave the program running, the next person can be measured without any of the setup steps.

Chapter 4: Accessing BoSS-21 Measurements

BoSS-21 Database is Automatically Updated

Every time a person is measured and the **Process Images** button is clicked, the data is recorded. This collection of data is known as a *record*. Each record describes a single measurement process only, but it includes all of the information relating to that measurement process, including:

- All of the identification information, including any information entered in the Details section
- The date and time of the measurement process
- The outline of the person from each camera view
- All of the body measurements
- All of the garment sizes

Each record is identified by the serial number corresponding to that person. In the current configuration, this is the Canadian Forces Service Number, which has a very specific format. If this does not suit your purposes, it can be modified.

The BoSS-21 database is automatically updated and saved each time the images are processed. There is no need for the user to explicitly save the database for normal operations. The BoSS-21 database and settings are stored in a proprietary manner and are not directly accessible by the user.

Backing up and Exporting the BoSS-21 Database

Although the main database is automatically maintained by BoSS-21 and is not accessible by the user, there are times when you may want to make a backup of the database, to export all or some of the data from one BoSS-21 workstation to another, or to save the BoSS-21 data in a different format for analysis with other software. Currently BoSS can save the database in *MS Excel* or *MS Access* format.

These functions are all discussed in greater detail in the next section.

Accessing the Measurement Records

Once a person has been measured, their data continues to reside on the BoSS-21 system, and it can be retrieve at a later date by authorised personnel. There are two methods for doing this, each designed for different purposes. The first method, **Open Measurement Record**, is intended for use in a garment sizing environment where protecting the privacy of the clients who were measured is very important. This method allows the user to retrieve only the garment size information, and records can only be found for a specified *Service Number*. None of the body measurement data is included. This function is useful for clothing stores who can look up client sizing records without needing to measure the client again.

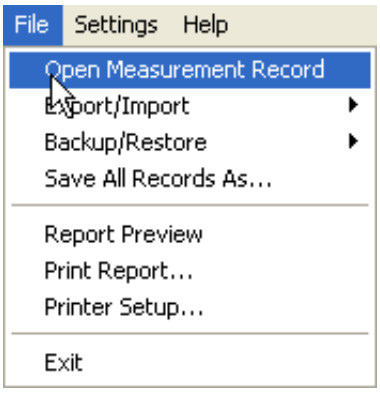
The second method, **Open Records**, is intended for use in a secure environment where only authorised personnel will use the data. This function requires the *Administrator* password. It allows

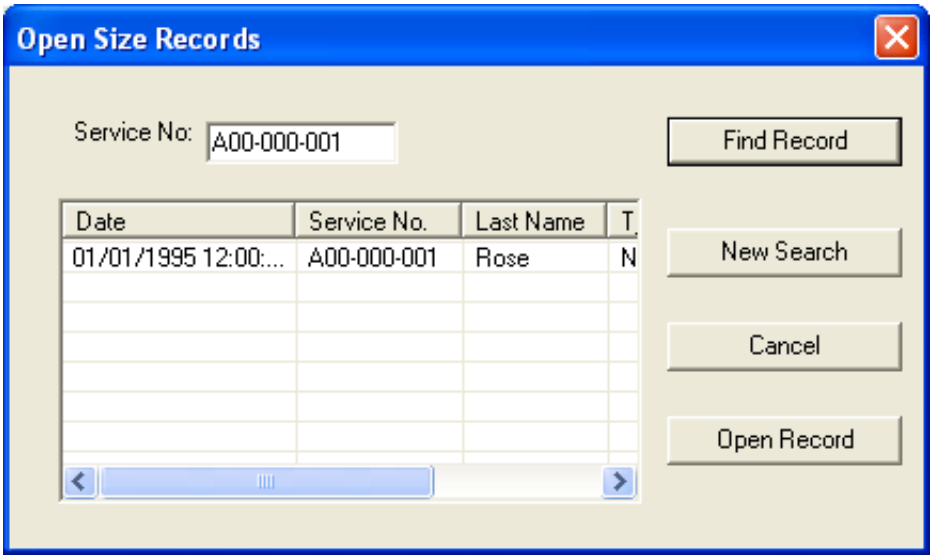
the user to view all or a subset of the records, and to quickly step through all the records. It retrieves the body shape outlines, the body measurements, and the garment sizes.

Retrieving a Record: Garment Sizes Only

Once a person has been measured, their data continues to reside on the BoSS-21 system, and it can be retrieve at a later date by authorised personnel. Under the BoSS-21 security setup, users with the *Operator* password can only use this method for retrieving records, and can only access the garment size information. Retrieving the full record requires the *Administrator* password, and is discussed in the next section.

- Click **File → Open Measurement Record** in the BoSS-21 main program interface.
- Enter the client's service number in the **Open Size Records** dialogue box, and click **OK**.
- A new window will open offering all records that the system has for that client.
- Select one and click on **Open Record** to display the record.





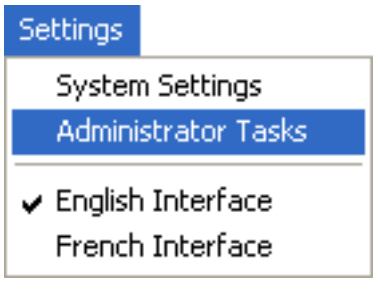
When a record is opened, it only includes the garment sizes for those items selected in the Report Editor settings. If you want to determine the size recommendations for other garments, click the **Re-Calculate** button. This will display size recommendations for all the garments currently selected in the Report Editor using the current sizing rules. The newly selected garments will be shown after the calculation, and the record will be updated with the current garments. The garment report, without body measurement data, can then be printed using the **File → Print** command if desired.

NOTE: In order to safeguard the client's privacy, only the garment size data can be retrieved in this manner.

Once a measurement record is opened, the user can view or print a Garment Size report.

- Click **File → Report Preview** to display the report
- Click **File → Print Report** to obtain a hard copy of the report

Accessing Full Measurement Records



Once a person has been measured, their data continues to reside on the BoSS-21 system in the form of a *record*. That record can be retrieved at a later date by authorised personnel. Hidden in the **Settings** menu item, using the **Administrator Tasks** menu item, is the **Open Records** command. Using all *Administrator* tasks requires the *Administrator* password.

The Open Records dialogue box allows you to search through the database using a variety of criteria, as shown below. Note that the labels used were designed for the Canadian Forces. VisImage Systems can customise the interface to suit your needs.

When the *Administrator Tasks* dialogue box opens, you may wish to drag it to the corner of your screen before clicking **Open Measurement Records**. You may wish to do the same with the *Open Measurement Records* dialogue box so you can view the records on screen without closing the dialogue boxes.

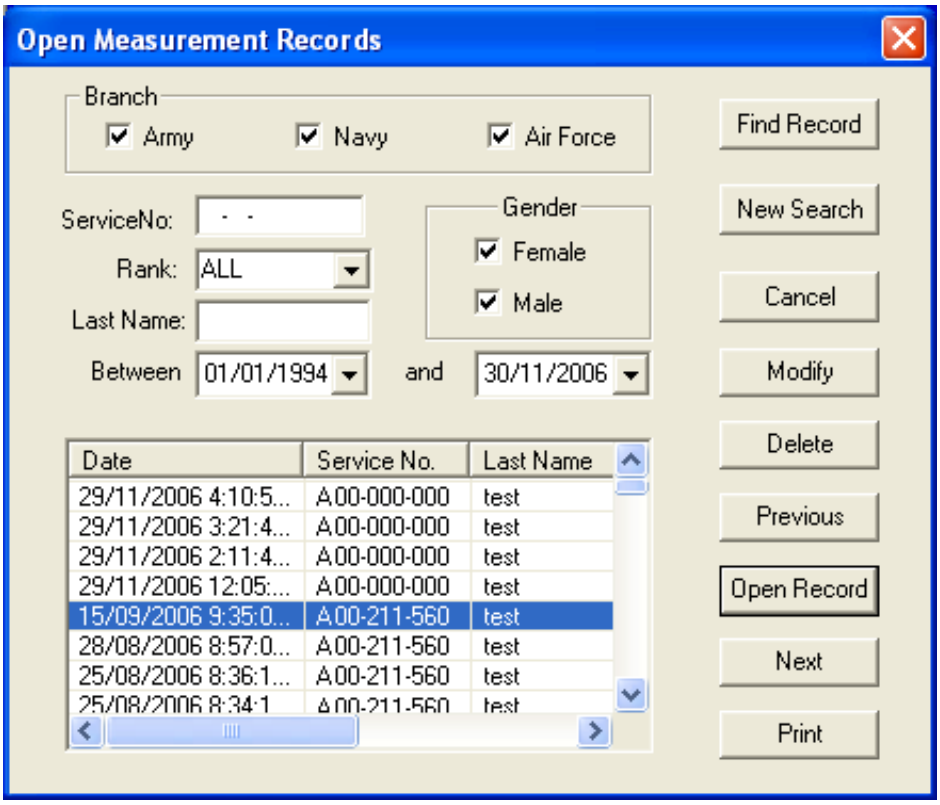


Figure 4-1: **Open Measurement Records** lets you search through all or a subset of your records and display measurements and silhouettes on the screen.

If you leave the *Service Number* blank, all records that meet the other criteria will be found. Specifying a *Service Number* will find all records corresponding to that service number only. *Last Name* can be used to search for all individuals sharing that family name.

Use the *Branch* (or *Element*) item to select records in that section of your population. Use *Rank* and *Gender* in the same way. And finally, use the *Between* settings to restrict the search results to those measurement records done between the specified dates.

Once you have set your search parameters, or left them untouched to retrieve all measurement records, clicking on the **Find Record** button will bring up a list of all the records matching the search parameters. If you change the search parameters, click **New Search** to update list of matching records.

To view a measurement record, select one from the list and click on **Open Record**, or simply double-click on a record. This updates the display, as shown below in Figure 4-2. Use the **Previous** and **Next** buttons to move back and forth through the database.

Modify lets you edit the identification information of a record.

Print prints the selected record.

Delete permanently removes a record from the database. Use with caution.

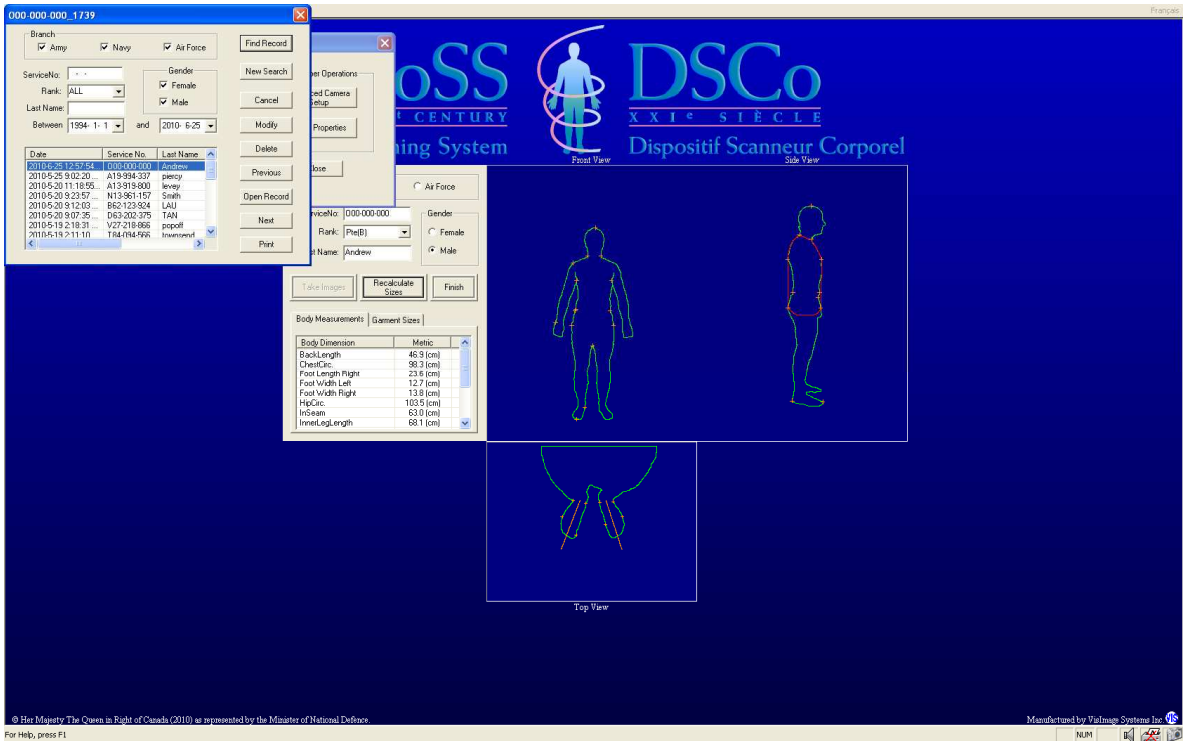


Figure 4-2: Use **Next** and **Previous** to step through the measurement records. Use **Modify** to edit the identification information. Use **Open Record** to change which measurements are displayed, and to recalculate the garment size recommendations.

Chapter 5: Backup, Export, and Save As

The data you collect using BoSS-21 is valuable, and it is prudent to save a copy of your database on a regular basis to prevent loss, should anything happen to the computer. This copy is referred to as a "backup".

A backup remains exactly as it was at the time it was made, regardless of how many other measurement processes you have done using BoSS-21. This is why you need to perform backups on a regular basis. You can store backups on CD-ROM or other devices for long-term storage, or to share them with another BoSS-21 installation.

These are the various ways you can preserve, transfer, and merge your BoSS-21 database:

- **Backup** saves the entire BoSS-21 database in its native format, which contains several folders and many files.

- **Restore** overwrites your current database with the one you are restoring. Any changes you have made, and any new measurements you have made, will be lost.

- **Export**: packages the database into a single file with a .bos extension. This makes it easier to transfer the data to another BoSS-21 installation. You can also choose to export only a subset of the database based on gender and on the dates the records were made. With the Administrator password, you can include the current *System Settings* and *Sizing Rules* in the package.

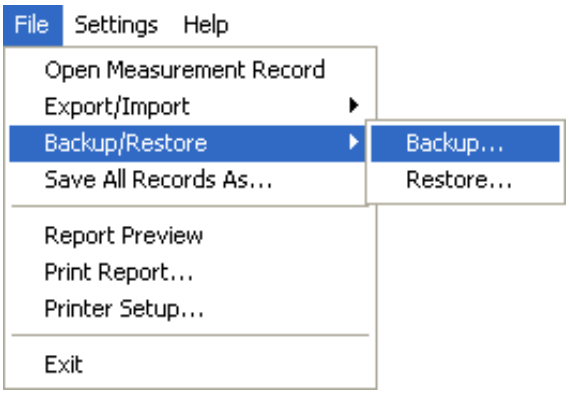
- **Import** allows you to merge the data from a BoSS-21 export file with your existing data. Rather than overwriting your database, importing adds to it. Any duplicate records are ignored; only new records are imported. If the package contains a new set of *sizing rules*, or *system settings*, you can choose to import these as well. These will overwrite your existing sizing rules and system settings.

- **Save All Records As** allows you to save your measurement data in either *Microsoft Excel* or *Microsoft Access* file format so you can transfer the data to another application. You can then use *Excel* or *Access* to convert the files to another format if you wish.

Backup Procedure

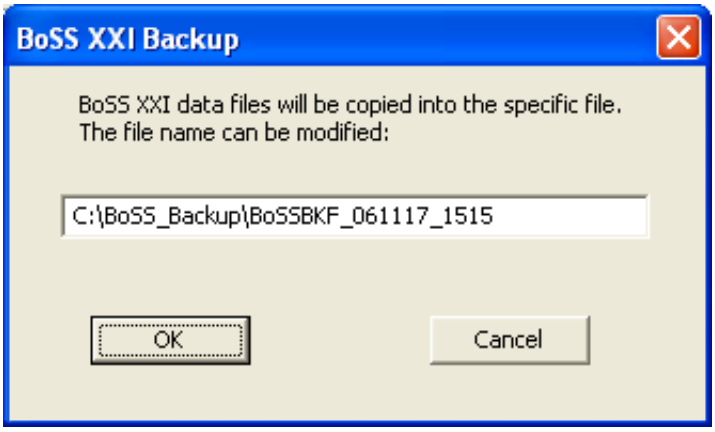
Doing a full backup of the BoSS-21 database saves the entire BoSS-21 database in its native format, which contains several folders and many files.

1. Select **File → Backup / Restore → Backup…**



2. Enter the operator password if required.

3. Specify the location for the backup. It must be a new folder name that does not already exist. The folder name automatically generated includes the current date (in this case 2006/11/17) and time (3:15pm). You can modify the name provided, or specify your own name if you wish.



4. Click OK.

5. A backup progress window opens.

6. When the backup is complete, a status report is given. Click "Finish".

The length of time required for the backup depends upon how much data you have collected, and the speed of the device onto which you are making the backup.

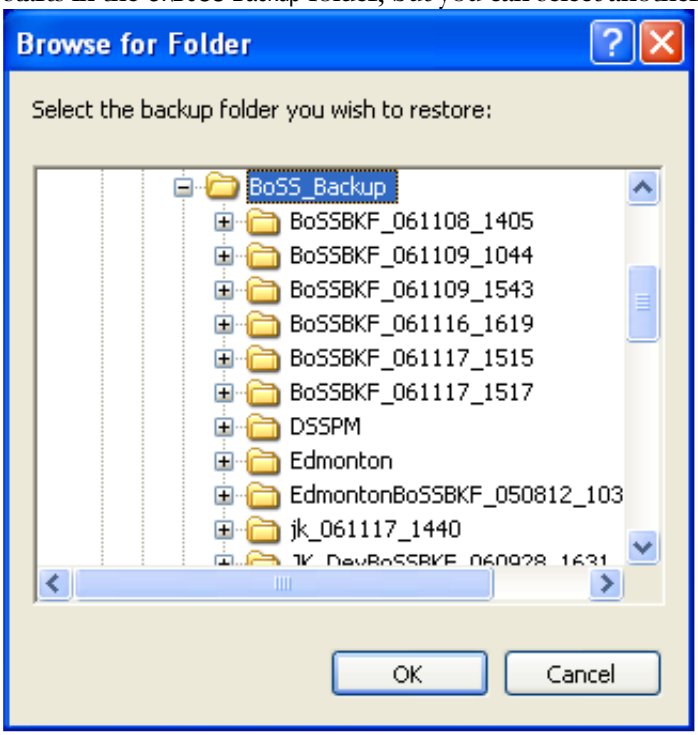
Restore Procedure

Warning: Restoring a backup of the BoSS-21 database overwrites your existing database. You will lose any changes or new records you have made since the backup was created. Using the restore command requires the Administrator password.

7. Select **File → Backup / Restore → Restore…**

8. Enter the Administrator password.

9. Select the backup folder using the Windows *Browse for Folder* dialogue box. It automatically starts in the C:\BoSS-Backup folder, but you can select another location if you wish



10. Click OK.

11. You get a warning saying the restore operation will over-write your existing data, and asking if you want to proceed. If you do, click OK.

12. When the restoration is complete, a status report is given. Click "Finish".

Export Procedure

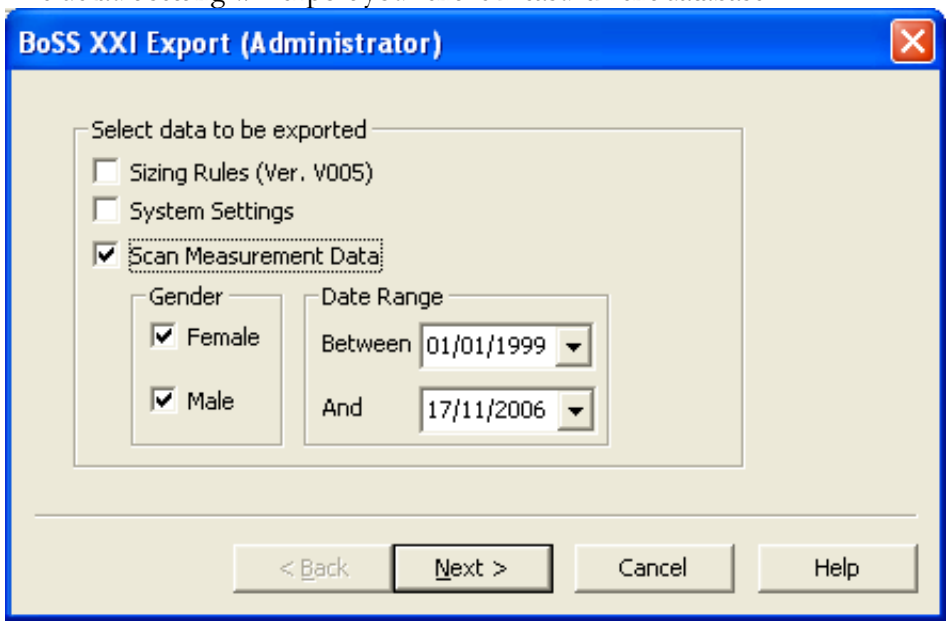
The **Export** function packages the database into a single file with a .bos extension. This makes it easier to transfer the data to another BoSS-21 installation, and merge it with another data set. You

can also choose to export only a subset of the database based on gender and on the dates the records were made. With the Administrator password, you can include the current *System Settings* and *Sizing Rules* in the package.

1. Select **File → Export / Import → Export…**

2. Enter the operator or administrator password. Using the administrator password allows you to export the *sizing rules* and *system settings* in addition to the measurement records. Using the operator password disables this feature.

3. In the Export dialogue box, select which data you wish to include in the export. You can choose to include records for only a single gender, or records made between specified dates. The default setting will export your entire measurement database.



4. Specify the location and name of the export file, which ends in ".bos". The default file name provided includes the current date and time, but you can modify this if you wish.
5. Click **Next**.

6. When the export is complete, a status report is given. Click "Finish".

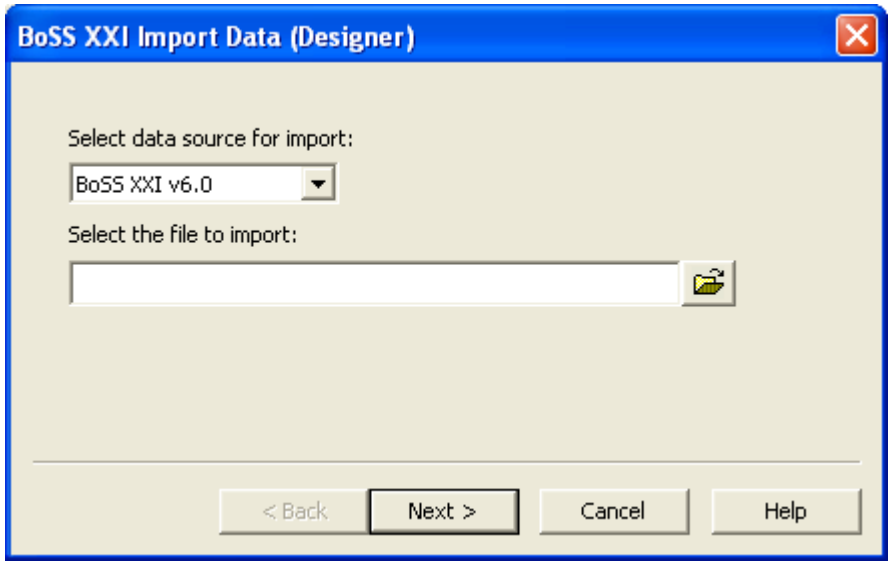
Import Procedure

The Import procedure allows you to merge the data from a BoSS-21 export file with your existing data. Rather than overwriting your database, importing adds to it. Any duplicate records are ignored; only new records are imported. If the package contains a new set of *sizing rules*, or *system settings*, you can choose to import these as well. These will overwrite your existing sizing rules and system settings.

Importing using the Operator password allows you to import only the measurement records from a "*.bos" export file. You cannot import Sizing Rules with the Operator password. Importing using the Administrator password allows you to import the sizing rules and system settings. It also allows you to import data from a BoSS backup folder created by BoSS version 3.2.

1. Select **File → Export / Import → Import...**

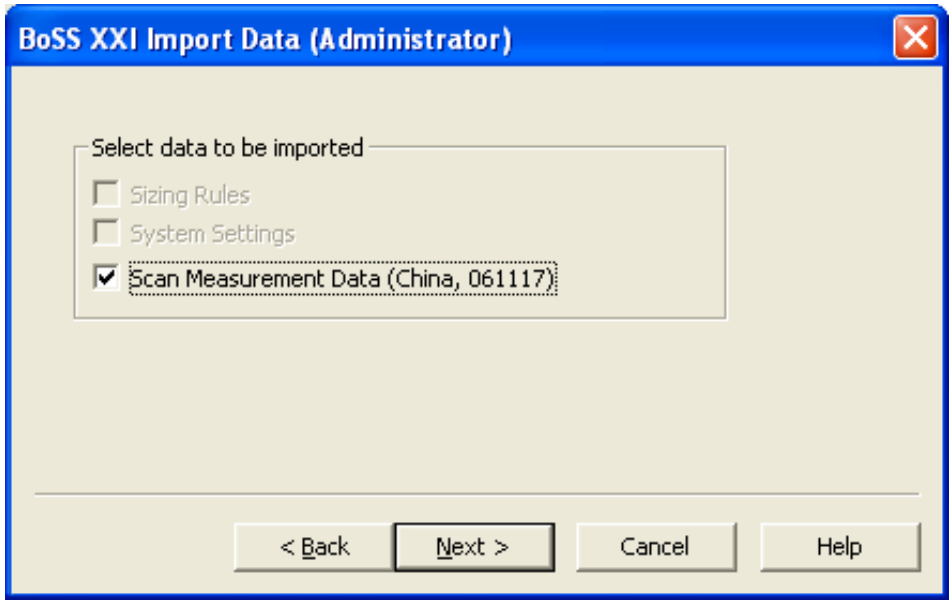
2. Enter the *Administrator* or *Operator* password. Using the *Operator* password allows you to import measurement records from BoSS export files only. Using the *Administrator* password also allows you to import sizing rules, system settings, and to import data from BoSS version 3.2 backup folders.



3. Click on the *Open Folder* icon to the right of the *Select the file to import* field to use the standard Windows Open File dialogue box. It automatically starts in the C:\BoSS_Backup folder. You can also type the full path to the file if you wish.

4. Click **Next**. The system will automatically examine the import file to determine its contents, and to weed out any duplicate records. Any duplicates are automatically ignored when restoring the data.

5. In the Import Data window, select whether you wish to import the *Sizing Rules*, *System Settings*, and/or measurement data. If any of these components is not including in the export file, those options will not be available. Click **Next** to continue.



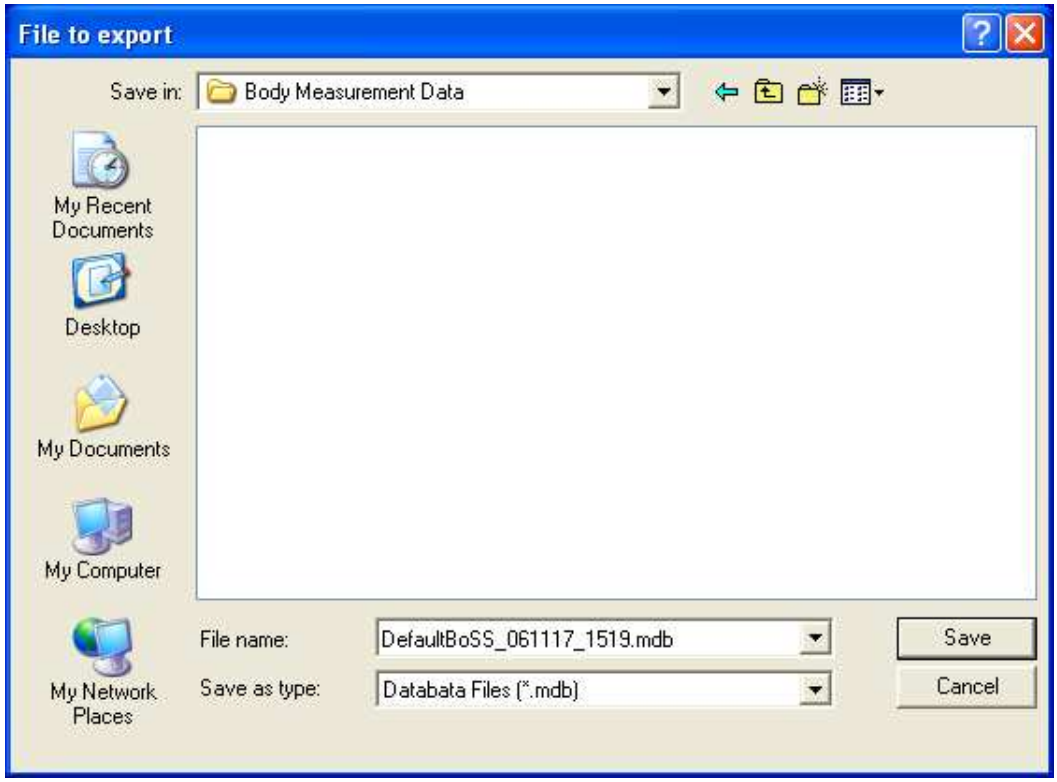
6. When the import is complete, a status report is given. Click "Finish".

Save All Records As…

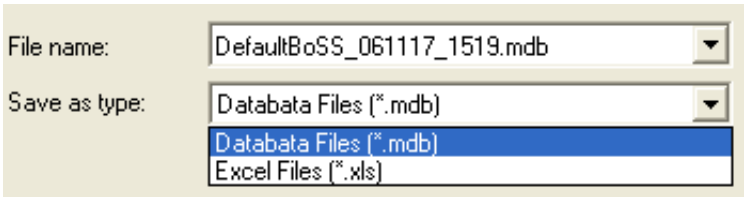
Save All Records As allows you to save your measurement data in either *Microsoft Excel* or *Microsoft Access* file format so you can transfer the data to another application. You can then use *Excel* or *Access* to convert the files to another format if you wish.

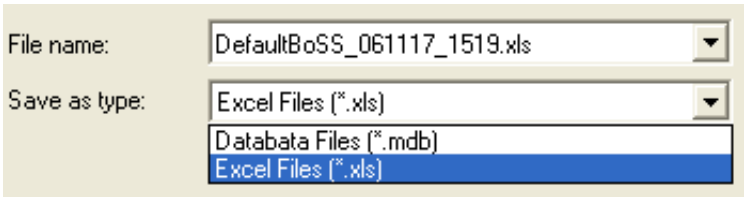
7. Select **File → Save All Records As…**

8. Use the standard Windows Save File dialogue box called "File to export" to choose the location and name of the file, as well as the format of the file.



9. Use the *Save as type* selector to choose which file format you wish.





10. Click **Save**.

11. A confirmation dialogue box opens stating the full path to the Save As file. Click **Export**.

12. When the backup is complete, a status report is given. Click "Finish".

Chapter 6: Troubleshooting

BoSS-21 was designed to be a reliable tool with a long-term field life. If you are experiencing difficulties with it, check the following possible solutions. If the problem persists, refer to the next chapter.

Problems During Operation

Problem	Cause	Solutions
Warning report from the program about handle-holding pasture	The outer end of the right handle was aligned to one side (front or back). The blue tip of the flexible wire connection was merged with the blue background in the image.	The cause can be verified by viewing the side image taken. Refer to Figure 3.3 to correct the handle placement. Have the client acquire the pictures again.
The Waist Circumference measurement is not correct	Arm blocked the profile of the waist.	Instruct the client to adjust their arm position so that their elbow does not block the side view of their back, and their hand does not block the side view of their thigh.
The program is not responding. The program locked up.	The computer's memory was used up by other Windows applications.	Manually close all the programs (Ctrl-Alt-Del) and restart the computer.
Image is too dark	The lighting in the room has changed since the system was installed.	Increase the brightness of the lighting in the room.

Problems During Calibration

Problem	Cause	Solutions
"I can see the 14 red dots for each camera, but some crosses are missing."	1. Low light levels 2. Mirrors are dirty 3. Fabric is dirty	1. Increase room lighting 2. Clean the mirrors with glass cleaner and lint-free cloths 3. Clean the fabric. The fabric is delicate, so avoid harsh chemicals.
"I cannot see all of the red dots."	1. Cameras are out of alignment 2. Mirrors are out of alignment 3. Cameras are zoomed in too much	1. Cameras need to be adjusted. Contact Technical Support. 2. Mirrors need to be adjusted. Contact Technical Support. 3. Cameras should be reset. Contact Technical Support.
"When I click on Acquire Images during	1. Cameras are without power	1. Check power connections for the camera transformer and the

calibration, nothing happens."	2. Cameras have suffered a software failure. 3. Cameras have suffered a hardware failure.	cameras 2. Cameras need to be reset. Contact Technical Support. 3. Cameras require service. Contact Technical Support.

System Will Not Start Up

Problem	Cause	Solutions
"The appears to be no power to the system, even though it is plugged in."	A power failure tripped the Belkin Uninterruptible Power Supply (UPS)	Press and hold the power button on the UPS for two seconds. Repeat if necessary until the green power light comes on.

Problems with Backup

Problem	Cause	Solutions
"Windows complains when I try to burn my backups to a CD."	The CD is not writable, or does not have enough room on it for the backup	Use a fresh, blank CD

Chapter 7: Where to Get Help

You can get help with the BoSS-21 system from the following four sources:

- Refer to the BoSS-21 User's Manual
- See the BoSS-21 built-in Help function
- Visit the VisImage Systems Inc. website
- Contact a VisImage Systems Inc. representative

Built-in Help

BoSS-21 has a built-in context-sensitive help manual. You can conveniently consult it while using the program by clicking the help button on the menu bar.

Website

For more information, visit the BoSS-21 product home page at http://www.vis.ca/product.htm

Customer Support

If you have questions concerning the operation of BoSS-21, you may contact VisImage Systems Inc. customer support. E-mail your questions to: support@vis.ca, or send them by fax to 905-946-1060. A customer service representative will reach you within 24 hours.

If you want to speak to us directly, please call 1 905-946-0000. Within Canada and the USA, a toll-free number is also available: 1-866-VIS-IMAGE (1-866-847-4624).

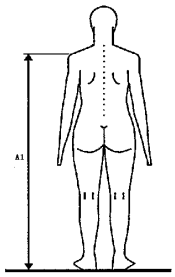
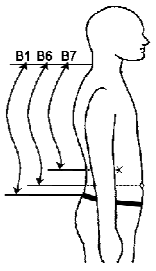
VisImage Systems Inc.
7676 Woodbine Ave. Unit #14
Markham, ON L3R 2N2

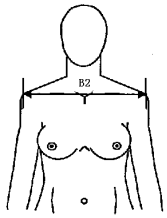
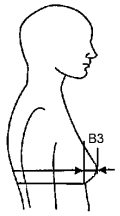
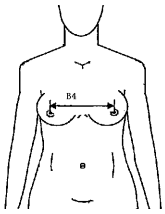
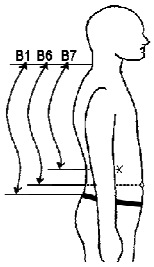
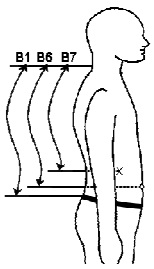
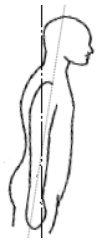
Phone 905-946-0000 • Fax 905-946-1060
www.vis.ca

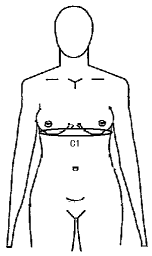
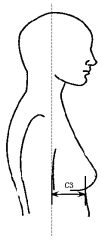
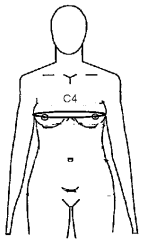
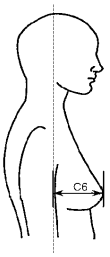
Chapter 8: Direct Measures Provided by BoSS-21

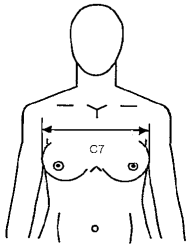
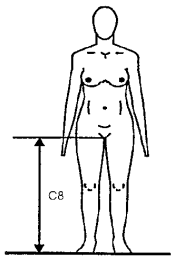
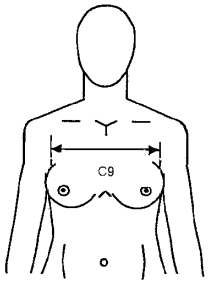
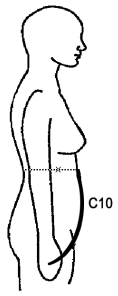
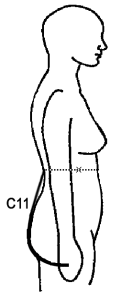
BoSS-21 is an automatic anthropometric body dimension measurement system. It can provide up to 77 direct human body measurements, from both standing and sitting postures. The following table describes all the direct body measures. Please note that:

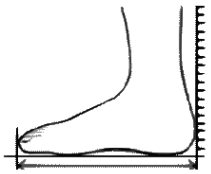
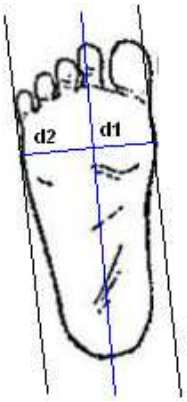
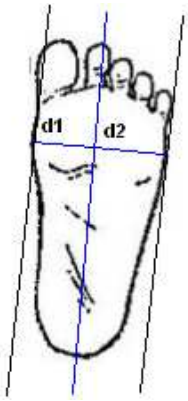
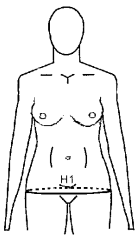
1. Indirect body measurements are not listed here. These include all measurements that can be calculated from a single or multiple direct measurements
2. Certain versions of the software may not provide all the body measurements.
3. *LF97:13* in the correspondence column indicates that this measurement is the same as *Measurement 13* as defined in the Canadian 1997 Land Force Survey
4. *ISO:4.1.4* in the correspondence column indicates that this measurement is the same as measurement 4.1.4 defined in ISO(1996)
5. *~ LF97:29* in the correspondence column indicates that this measurement is similar to *Measurement 29* as defined in the Canadian 1997 Land Force Survey
6. Breast Length is provided for female subjects only.
7. Manual landmark adjustment may be required to provide accurate Bustpoint Breadth measurements. Additionally, women may need to use special adhesive markers (black disks about 1cm in diameter) that can be temporarily stuck to their bras to mark the position of their nipples. Depending on your system, bustpoint breadth measurements may be provided only for women.

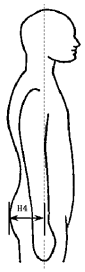
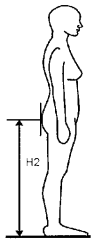
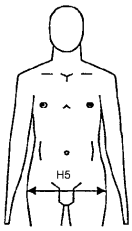
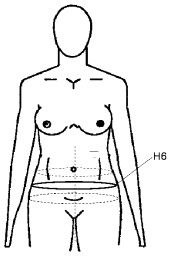
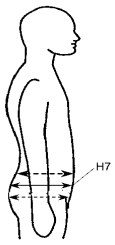
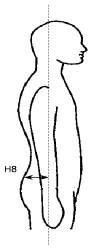
Index	Measurement	Description	Correspondence	
A1	Acromial Height, Left	The vertical distance between the standing surface and the acromion landmark on the tip of the left shoulder.		
A2	Acromial Height, Right	The vertical distance between the standing surface and the acromion landmark on the tip of the right shoulder.	LF97:13[1]; ISO:4.1.4[2]	
B1	Back Length	**Back Length (belt):** The surface distance between the cervicale landmark at the back of the neck and the posterior-waist (belt) landmark.	~ LF97:29[3]	

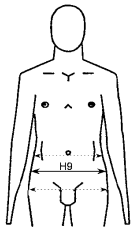
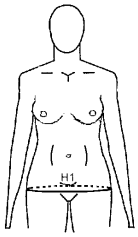
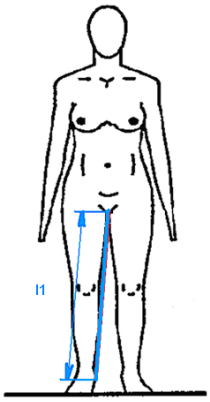
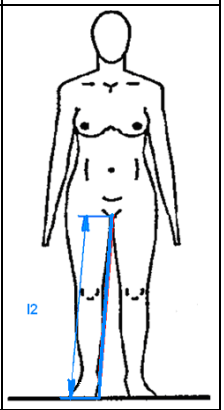
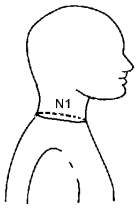
B2	Biacromial Breadth	**Biacromial Width**: The straight-line distance (width) between the right and left acromion landmarks.	LF97:47	
B3	Breast Length[6]	The maximum depth of the breast compared to the anterior surface of the chest immediately below the breast. Breast Length is provided for female subjects only, and may not be available on all systems.		
B4	Bustpoint Breadth[7]	**Bustpoint Width**: The distance between the right and the left bustpoint landmarks on women. This measurement requires the subject to place adhesive bustpoint markers (black circles about 1cm in diameter) that can be temporarily stuck to their bras to mark the outermost point of their bra cups, and may not be available on all systems.	LF97:51	
B6	Back (navel) Length	**Back Length (navel):** The surface distance along the outermost contour of the back, measured between the heights of neck base back (cervicale) and the navel. Requires the use of the navel marker.		
B7	Back (waist nat) Length	**Back Length (waist):** The surface distance along the outermost contour of the back, measured between the heights of neck base back (cervicale) and the waist (natural indentation).		
B9	Body Axis Angle	The angle between true vertical and the coronal plane that divides the body into anterior and posterior portions.		

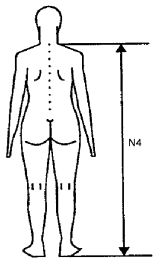
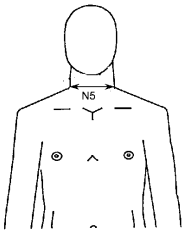
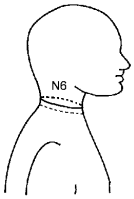
C1	Chest (below) Circ	The horizontal circumference of the chest at the level of the juncture of the lowest breast with the chest contour.	LF97:63	
C2	Chest (below) Depth	The horizontal distance between the anterior-chest (below breast) and the posterior chest (below breast) landmarks	LF97:55 ISO:4.1.9	
C3	Chest (below) Depth, F	**Chest (below) Depth, Ant**: The horizontal distance between the central line of the side view to the anterior-chest (below breast) landmark		
C4	Chest Circ.	The maximum horizontal circumference of the torso at the deepest part of the chest.	LF97:62 ~ISO:4.4.9	
C5	Chest Depth	The depth of the deepest part of the chest.	LF97:55 ISO:4.1.9	
C6	Chest Depth, F	**Chest Depth, Ant**: The horizontal distance between the central line of the side view to the anterior-chest landmark		

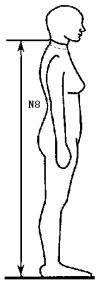
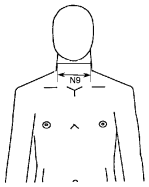
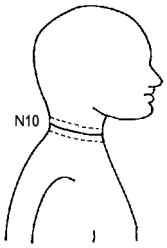
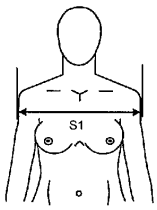
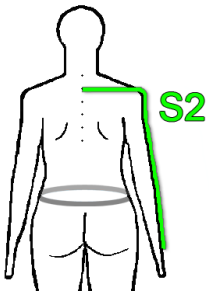
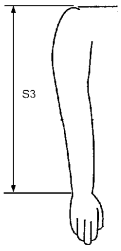
C7	Chest Width	The horizontal width of the chest at the level of the deepest part of the chest.	LF97:50; ISO:4.1.11	
C8	Crotch Height	The vertical distance between the standing surface and the crotch.	LF97:22; ISO:4.1.7	
C9	Chest (armfold) Width	**Chest Width (armfold):** The straight-line distance between the right and the left armfold landmarks.		
C10	Crotch (waist nat) Length, Ant.	**Crotch Length, Ant (waist):** The tape measure distance from the crotch to the anterior (front) waist-nature landmark, along the front of the trunk, to the height of the natural waist, spanning any concave contours of the body. The crotch landmark is placed half-way between the anterior and posterior contours of the body.		
C11	Crotch (waist nat) Length, Post.	**Crotch Length, Post (waist):** The tape measure distance from the crotch to the anterior (front) waist-nature landmark, along the back of the trunk, to the height of the natural waist, spanning any concave contours of the body. The crotch landmark is placed half-way between the anterior and posterior contours of the body.		

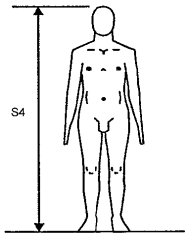
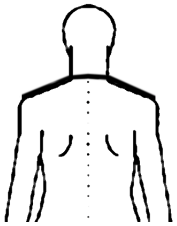
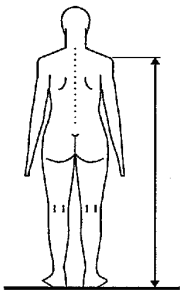
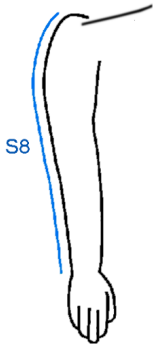
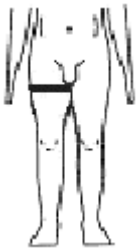
F1	Foot Length, Right	The distance between the tip of the longest toe and the back of the heel.		
F2	Foot width Right	d1: the distance between the first metatarsophalangeal-protrusion to the foot central line. d2: the distance between the fifth metatarsophalangeal-protrusion to the foot central line. Right Foot Width = d1 + d2		
F3	Foot width Left	d1: the distance between the first metatarsophalangeal-protrusion to the foot central line. d2: the distance between the fifth metatarsophalangeal-protrusion to the foot central line. Left Foot Width = d1 + d2		
H1	Hip Circ.	The horizontal circumference of the truck at the level of the maximum protrusion of the right buttock。	LF97:66	
H2	Hip Depth	The horizontal distance between the anterior-hip and posterior-hip landmarks	LF97:57	

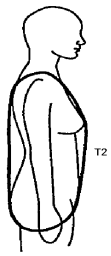
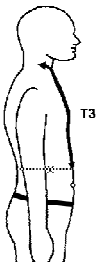
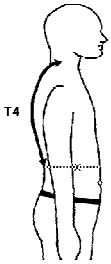
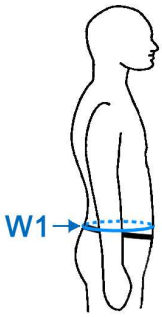
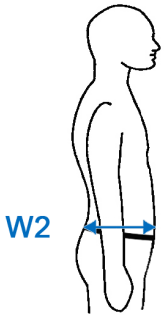
H3	Hip Depth, Back	**Hip Depth, Post**: The horizontal distance between the central line of the side view to the posterior-hip landmark		
H4	Hip Height	The vertical distance between the standing surface and the level at hip	LF97:21	
H5	Hip Width	The breadth of the torso at the level of the hip	LF97:54; ISO:4.1.12	
H6	Hip (midwaist) Circ	**Mid-Hip Circ**: The horizontal circumference at the level of mid point between hip landmarks and waist (belt) landmarks, taking the average height if the waist (belt) landmarks are not on a horizontal plane		
H7	Hip (midwaist) Depth	**Mid-Hip Depth**: The horizontal distance between posterior-hip (mid waist) and the anterior-hip (mid waist) landmarks		
H8	Hip (midwaist) Depth, Back	**Mid-Hip Depth, Post**: The horizontal distance between the central line of the side view to the posterior-hip (mid waist) landmark		

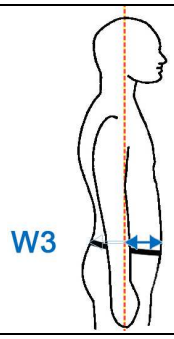
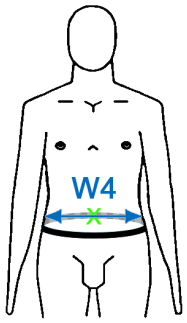
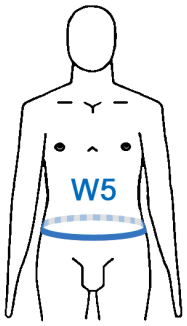
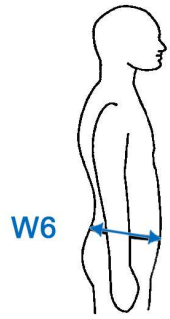
H9	Hip (midwaist) Width	**Mid-Hip Width**: The horizontal breadth at the level of hip (mid waist)		
H10	Hip Circ, Front	**Hip Circ, Front**: The anterior portion of the horizontal circumference of the truck at the level of the maximum protrusion of the right buttock		
I1	Inseam	The length of the straight line, along Inner side of the right leg, between the standing surface and the crotch, subtracted by 2 inches.		
I2	Inner Leg Length	The length of the straight line, along Inner side of the right leg, between the standing surface and the crotch.		
N1	Neck (base) Circ	The minimum circumference of the base of the neck, passing over the drawn lateral and anterior neck landmarks.	LF97:147	

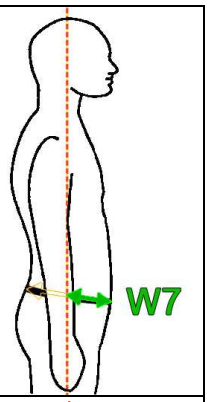
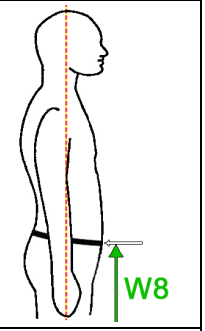
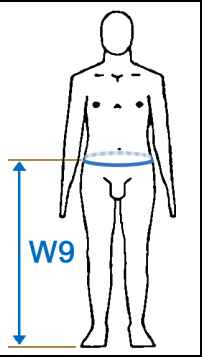
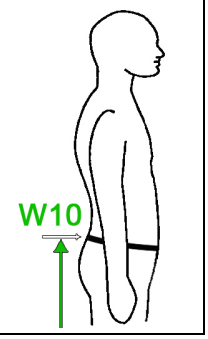
N2	Neck (base) Depth	The straight-line distance between anterior-neck (base) and posterior-neck (base) landmarks		
N3	Neck (base) Height, Ant.	The vertical distance between the standing surface and the anterior-neck (base) landmark	LF97:14	
N4	Neck (base) Height, Lat.	**Neck (base) Height, Right.** The vertical distance between the standing surface and the trapezius landmark on the right side of the neck.	LF97:12	
N5	Neck (base) Width	The width of the base of the neck.		
N6	Neck (nature) Circ	**Neck (nat) Circ:** The minimum circumference of the neck. This circumference is probably perpendicular to the long axis of the neck.	~ISO:4.4.8	
N7	Neck (nat) Depth	**Neck (nat) Depth:** The shortest distance between the front and back neck contours. This distance is probably perpendicular to the long axis of the neck.		

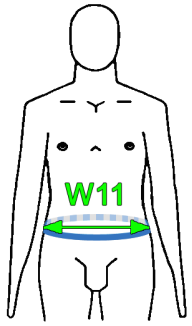
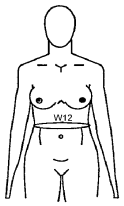
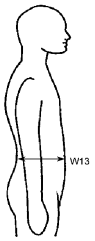
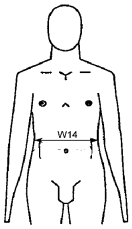
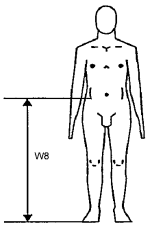
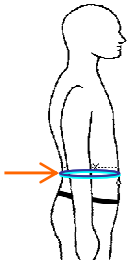
N8	Neck Height, Post.	**Neck (nat) Height, Post:** The height of the back of the next at the level of the shortest distance between the front and back neck contours.		
N9	Neck (nat) Width	The shortest distance between the left and right neck contours. This distance need not be horizontal.		
N10	Neck Collar Circ.	The circumference of the neck at the median of the neck base and nature circumferences.		
S1	Shoulder Breadth	**Shoulder Width**: The maximum horizontal distance between the lateral margins of the deltoid muscles on the upper arms.	LF97:49	
S2	Sleeve Length	The horizontal distance from the centre line of the body to the acromial landmark at right shoulder, plus the surface distance along the right arm to the dorsal wrist landmark.	~LF97:126	
S3	Sleeve Outseam	The straight-line distance between the acromion landmark on the tip of the right shoulder and the stylion landmark on the right wrist.	~LF97:122	

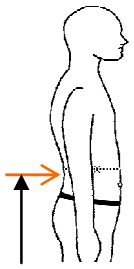
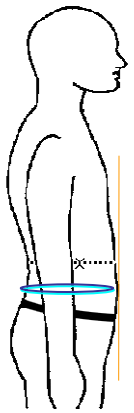
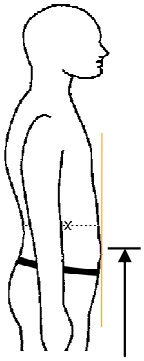
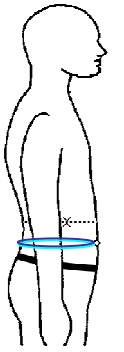
S4	Stature	The vertical distance from the standing surface to the top of the head.	LF97:2; ISO:4.1.2	
S6	Shoulder (cervicale) Length	**Shoulder over Neck Length:** The surface distance between the two lateral shoulder landmarks, where the contour rises to the landmark at the back of the neck (base). The lateral shoulder landmarks are at the point where the curvature of the shoulder has a tangent of 45 degrees.		
S7	Shoulder Height, Right	**Shoulder Height, Right:** The height of the right shoulder landmark, where the curvature of the shoulder contour has a tangent of 45 degrees.		
S8	Sleeve (arm) Length	**Arm Length:** The surface distance from the right shoulder landmark (where the curvature of the shoulder contour has a tangent of 45 degrees), along the right arm to the dorsal wrist landmark.		
T1	Thigh Circ	The circumference of the right thigh, measured perpendicular to the long axis of the thigh, at the crotch landmark.		

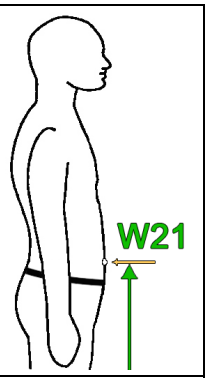
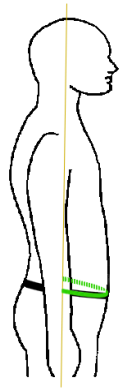
T2	Trunk (vert) Circ	The vertical circumference of the torso: with a tape passing between the buttocks, to the right of the genitalia, over the right bustpoint landmark on women or the nipple (thelion) on men, and across the neck (base) right landmark.	LF97:69	
T3	Trunk (waist nat) Length, Ant.	**Trunk Length, Anterior (waist):** The tape measure distance down the front of body from the neck (base) right landmark, measuring down to the level of the waist (natural indentation). This is the shortest distance measured with a tape. It does not follow any concave contours of the body.		
T4	Trunk (waist nat) Length, Post .	**Trunk Length, Posterior (waist):** The tape measure distance down the back of body from the neck (base) right landmark, measuring down to the level of the waist (natural indentation). This is the shortest distance measured with a tape. It does not follow any concave contours of the body.		
W1	Waist (abdomen) Circ	**Belt Circ (horiz.):** The horizontal circumference at the level of posterior belt height.		
W2	Waist (ab.) Depth	**Belt Depth (horiz.):** The horizontal depth of the torso measured at the height of the posterior belt.		

W3	Waist (ab.) depth, Front	**Belt Depth, Ant:** The anterior portion of the horizontal depth of the torso measured at the height of the posterior belt, measured from the central line of the side view to the anterior landmark at the height of the posterior belt.		
W4	Waist (ab.) width	**Belt Width (horiz.):** The horizontal width of the torso measured at the height of the posterior belt.		
W5	Waist (belt) Circ .	**Belt Circ:** The minimum circumference of the waist at the level of the belt for a pair of trousers. This circumference might not be horizontal.		
W6	Waist (belt) Depth	**Belt Depth:** The distance between the anterior-waist (belt) and posterior-waist (belt) landmarks.		

W7	Waist (belt) Depth, Front	**Belt Depth, Ant:** The anterior portion of the distance between the anterior-waist (belt) and posterior-waist (belt) landmarks.		
W8	Waist (belt) Height, Ant	**Belt Height, Ant.:** The vertical distance between the standing surface and the anterior-waist (belt) landmark.		
W9	Waist (belt) Height, Lat	**Belt Height, Right.:** The vertical distance between the standing surface and the right belt landmark.		
W10	Waist (belt) Height, Post	**Belt Height, Post.:** The vertical distance between the standing surface and the posterior belt landmark.		

W11	Waist (belt) Width	**Belt Width:** The distance between the left and right belt landmarks.		
W12	Waist (nature) Circ	**Waist Circ:** The horizontal circumference of the torso at the average height of the natural lateral indentations of the waist.	LF97:64; ~ISO:4.4.10	
W13	Waist (nat) Depth	**Waist Depth:** The depth of the torso at the average height of the natural lateral indentations of the waist.		
W14	Waist (nat) Width	**Waist Width:** The width of the torso at the average height of the natural lateral indentations of the waist.		
W15	Waist (nat) Height, Lat.	**Waist Height:** The average of the heights of the natural indentations of the waist on the left and right sides of the body when viewed from the front. For most people the natural indentations are higher than the indentations caused by the belt (or waistband) of the shorts.		
W16	Waist (back indent) Circ	**Lumbar Indent Circ:** The horizontal circumference of the torso at the level of the greatest indentation of the lumbar region of the back as seen from the side view of the subject.		

W17	Waist (back indent) Height	**Lumbar Indent Height:** The height of the greatest indentation of the lumbar region of the back as seen from the side view of the subject.		
W18	Waist (front outdent) Circ	**Abdomen (max) Circ:** The horizontal circumference of the torso at the level of the greatest protrusion of the abdomen as seen from the side view of the subject. BoSS-21 finds the greatest protrusion of the abdomen between the high point (one-third of the distance between the belt front and the chest heights, below the chest) and low point (half way between the hip and belt front heights).		
W19	Waist (front outdent) Height	**Abdomen (max) Height:** The height of the waist at the level of the greatest protrusion of the abdomen as seen from the side view of the subject. BoSS-21 finds the greatest protrusion of the abdomen between the high point (33% of the distance between the belt front and the chest heights, below the chest) and low point (half way between the hip and belt front heights).		
W20	Waist (navel) Circ.	**Navel Circ:** The horizontal circumference of the waist at the level of the navel. Requires that a special adhesive blue marker be placed on or beside the navel. The marker should be 2cm in diameter, and approximately the same blue as used on the platform.		

W21	Waist (navel) Height.	**Navel Height:** The height of the waist at the level of the navel. Requires that a blue marker be placed on or beside the navel. The marker should be 1.5 to 2.5cm in diameter, and approximately the same blue as used on the platform.		
W22	Waist (belt) Circ, Front	**Belt Circ, Front**: The anterior portion of the minimum circumference of the waist at the level of the belt for a pair of trousers. This circumference might not be horizontal.		

Index

A

abdomen (max) circ 52
abdomen (max) height 52
acceptable colour 15
Acquire images 12
acromial height 38
additional info 15
address 15
Administrator Operations 6
Administrator password 4
arm length 47
automatic printing 9

B

back (navel) length 39
back (waist nat) length 39
back length 38
back length (belt) 38
back length (navel) 39
back length (waist) 39
Backing Up the database 28
belt circ 49
belt circ (horiz) 48
belt depth 49
belt depth (horiz) 48
belt height, ant 50
belt height, post 50
belt height, right 50
belt width 51
belt width (horiz) 49
biacromial breadth 39
blank password 4
blue platform 16
body axis angle 39
Body Measurement tab 9
BoSS-21
    Standard Edition 2
    Workflow 3
bra 15
breast length 39
bustpoint breadth 39

C

Calibrating the Cameras 11
camera
    settings 6
Camera Settings 11
Capture Images 11
chest (armfold) width 41
chest (below) circ. 40
chest (below) depth 40
chest (below) depth, front 40
chest circ 40
chest depth 40
chest depth, front 40
chest width 41
chest width (armfold): 41
circ
    abdomen (max) 52
    belt 49
    belt, front 53
    belt, horizontal 48
    chest 40
    chest below 40
    hip 42
    hip, front 44
    hip, mid-waist 43
    lumbar indent 51
    navel 52
    neck (base) 44
    neck (nat) 45
    thigh 47
    vertical trunk 48
    waist 51
civilian 14
Client Preparation 14
cost effective 1
crotch (waist nat) length, ant 41
crotch (waist nat) length, post 41
crotch height 41
crotch length, anterior (waist) 41
crotch length, posterior (waist) 41

D

Database backup 23
Database management 23
default passwords 4
delete password 4
depth
    belt 49
    belt, front 50
    belt, post 48
    belt, post, front 49
    chest 40
    chest below 40
    chest below, front 40
    chest, front 40
    hip, back 43

hip, mid-waist 43
hip, mid-waist, back 43
neck (base) 45
neck (nat) 45
waist 51
details information 15

E

Element 14
Error Message
Handle holding posture 35
exporting the database 30
Exporting the database....28
Exposure Bias 6

F

Features of BoSS XXI 2
Foot Length Right 42
Foot width....42
footprints....16

G

garment size....25
Garment Size 24
Gender 14
glasses....15

H

Hair....15
Handle holding posture error....35
height
abdomen (max) 52
acromial 38
belt, ant 50
belt, lat 50
belt, post 50
crotch 41
hip 43
lumbar indent 52
navel 53
neck (base) ant 45
neck (base), right 45
neck (nat) post 46
shoulder 47
stature 47
waist, lat 51
Help 37
hip (mid-waist) circ....43
hip (mid-waist) depth 43
hip (mid-waist) depth, back....43
hip (mid-waist) width....44
hip circ, front 44
Hip Circ.....42
Hip Depth 42
hip depth, back....43
hip height....43
hip width 43

I

identification details 15
Image Acquisition....12
imperial units 8
Import
Procedure 32
Inner Leg Length 44
Inseam 44
Instructions
Clothing 14
Posture 16

J

jewellery 15

L

Launching BoSS XXI 5
length
back 38
back (navel) 39
back (waist) 39
breast 39
crotch (waist) ant 41
crotch (waist) length 41
foot 42
inner leg 44
shoulder over neck 47
sleeve 46
sleeve (arm) 47
sleeve outseam 46
trunk (waist) ant 48
trunk (waist) post 48
long hair....15
Looking up a measurement record.....23, 26
lumbar indent circ....51
lumbar indent height....52

M

Measurement Procedure 4
measurement record....25
measurement units 8
measuring a person 4
metric units 8

N

Name 14
navel circ 52
navel height....53
neck (base) circ....44
neck (base) depth 45
neck (base) height, ant....45
neck (base) height, right 45
neck (base) height, right. 45
neck (base) width....45
neck (nat) circ....45
neck (nat) depth 45
neck (nat) height, post....46
neck (nat.) width....46
neck circ, minimum 45
neck depth, minimum 45, 46

O

Open Measurement Record 24
Operator password....4

P

password....4
phone number 15
Posture Checklist....19
Posture Problems....18
Preparing the Client 14
Preview....25
Print 25
print two copies 21
printing the report automatically 9
printing the report manually 21
Privacy....13
Process Images 21

R

Rank....14
Record Retrieval....23, 26
remove password....4
Report Settings 9
Restore Procedure....30

S

Save All Records As Procedure....33
Saving the database 28
Service Number....14
shoulder (cervicale) length 47
shoulder breadth 46
shoulder height....47
shoulder height, right....47
shoulder over neck length....47
sleeve (arm) length....47
sleeve length....46
sleeve outseam 46
Software Setup....3
Standard Edition 2
stature....47
support....37

T

thigh circ. 47
Troubleshooting....35
trunk (vert.) circ. 48
trunk (waist nat) length, ant....48
trunk (waist nat) length, post....48
trunk length, anterior (waist)....48
trunk length, posterior (waist)....48

U

underwear 15
units 8

V

voice notification 8

W

waist (ab.) depth....48
waist (ab.) depth, front 49
waist (ab.) width 49
waist (back belt) circ....48
waist (back indent) circ. 51
waist (back indent) height....52
waist (belt) circ 49
waist (belt) circ, front 53
waist (belt) depth....49
waist (belt) depth, front....50

waist (belt) height, ant. 50
waist (belt) height, lat. 50
waist (belt) height, post. 50
waist (belt) width 51
waist (front outdent) circ....52
waist (front outdent) height....52
waist (nat.) depth....51
waist (nat.) width 51
waist (nature) circ....51
waist (navel) circ 52
waist (navel) height....53
waist circ....51
waist depth....51
waist height....51
waist height, lat....51
waist width....51
warning
Handle holding posture 35
Restoring a backup overwrites your current database 30
website....37
weight 15
White Balance 6
width
belt 51
belt, post 49
biacromial 39
bustpoint 39
chest 41
chest (armfold) 41
foot 42
hip 43
hip, mid-waist 44
neck (base) 45
neck (nat) 46
shoulder 46
waist 51

Z

zoom settings 6