

Standard Operating Procedure 3DpQCT

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CHARITÉ - UNIVERSITÄTSMEDIZIN BERLIN

Gemeinsame Einrichtung von Freier Universität und Humboldt-Universität zu Berlin

Campus Benjamin Franklin

Zentrum für Muskel und Knochenforschung

Magdalena Backström, Gabi Armbrecht and Dieter Felsenberg

Telephone +49(0)3084415813

Hindenburgdamm 30, 12200 Berlin, Germany

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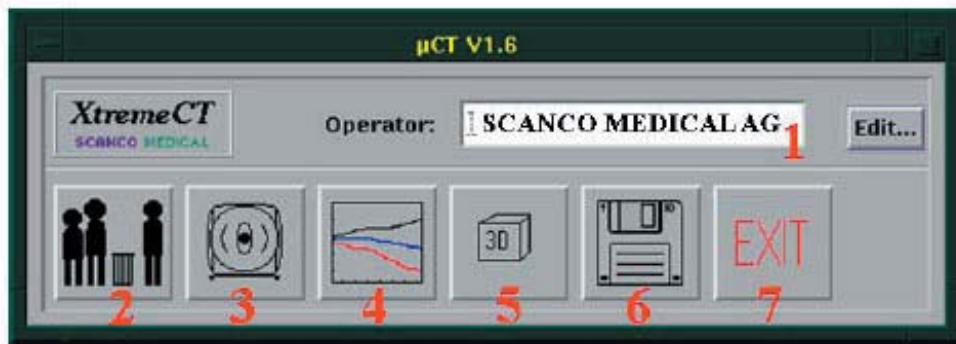
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1 General Information

The purpose of this standard operating procedure is to provide the user a „step-by-step“ guide in how to perform standard measurements with the XtremeCT from Scanco Medical AG.

The information in this user instruction does not replace the User's Guide for the XtremeCT, Revision 5.04.



1. Edit operator data
2. Edit patient data
3. Start the measurement program
4. Start the evaluation program
5. 3D-Display and 3D-Documentation
6. Start the Data-Management program
7. Exit MicroCT Main Program

- 01.** Start the scanner (XtremeCT) by turning the key. The power on lamp lights up (front top).
- 02.** Turn on the tape and the printer.
- 03.** Turn on the computer and the monitor. Now it takes approximately 5 minutes before the computer is ready to start.
- 04.** Log in:
 - 04.1. User name: MICROCT
 - 04.2. Password: No password is required. Click on OK.
- 05.** At every occasion that you use the XtremeCT device, make a note in the log-book:
 - 05.1. Date
 - 05.2. Who you are
 - 05.3. What you do with the device/in which study
Example: Measurements for the ADOQ study.
 - 05.4. Measurement Number (M-No)
 - 05.5. Comments, problems, special remarks etc.

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- 1) Every day: Daily phantom measurements.
- 2) Every 7 days: Weekly phantom measurements.

The phantom has to be measured to control the functionality and the stability of the system. The phantom is divided into two sections, one optimized for testing the density measurement (daily phantom) and the other for the stability of the architectural parameters (weekly phantom).

4.1 Daily Phantom Measurement

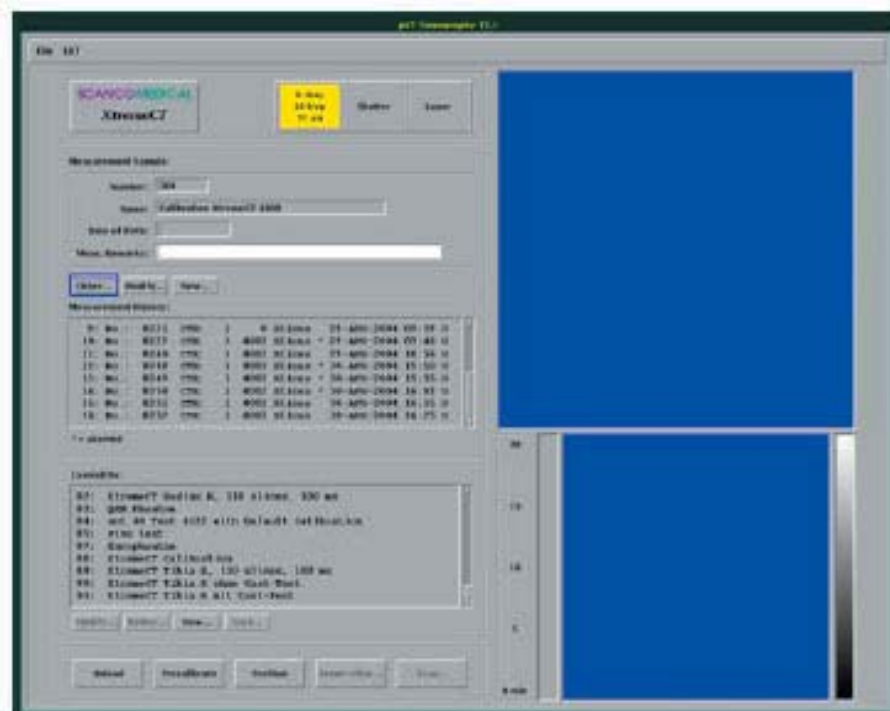
It is very important to run the daily phantom measurement prior to the first measurement of a patient every day and to compare the results with the reference phantom measurement. The whole procedure of the daily phantom measurement will take approximately 45 minutes (30 minutes warm up of the x-ray tube and about 15 minutes for measurement plus evaluation).

01. Start the system and start the measurement program. (You will have to wait or 30 minutes for the power up).

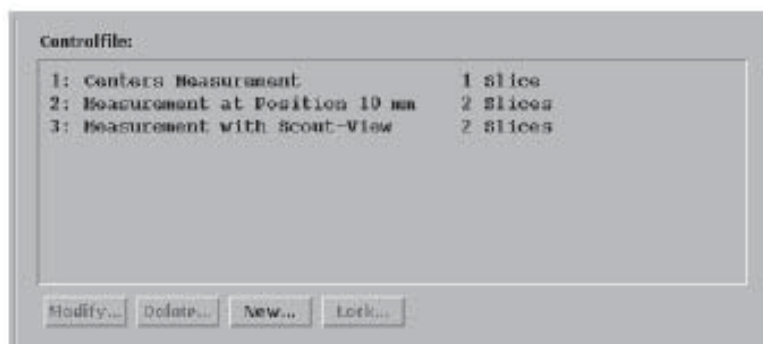


To start the measurement program, you must first enter „Customer/Research Institute“ in the Operator field. After that, start the measurement program from the main menu.

The main window of the measurement program opens.



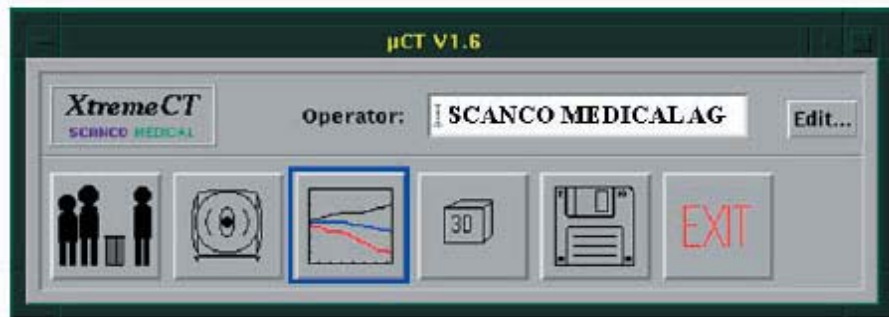
- 02.** Select the control file for the daily phantom measurement, QC1 (Daily).



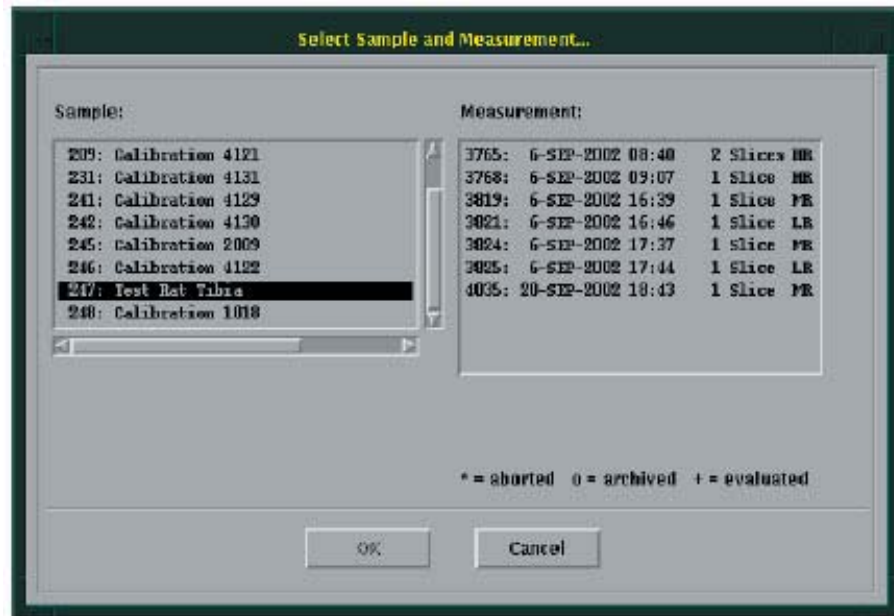
The control file is selected by clicking the desired item in the list.

- 03.** Select QC1 (Daily) as measurement sample. (By clicking on Other..., ok, select QC1 (Daily)).
- 04.** Insert the phantom and check that it is correctly positioned.
- 05.** Close the bore cover.
- 06.** Perform the calibration measurement by clicking the Precalibrate button, and then the Start Calibration button in the new window.
The precalibration is now performed.
- 07.** When the precalibration is ready, start the measurement by selecting Scan... and then click on the Start Measurement button in the new window.

- 08.** Start the evaluation program and load the actual phantom measurement: Start the evaluation program by clicking the button with the evaluation symbol.



After starting the evaluation program, the Select Sample and Measurement... window appears:



On the left hand side in the window there is a list of patients whose measurements has not yet been archived. Click on the QC1 (Daily), and all the measurements of this phantom will appear on the right hand side. Click on the desired measurement and confirm by clicking on the OK button. All images that belong to this measurement are now loaded and will appear on the screen.

If the Select Sample and Measurement... window by some reason does not appear, you can select the sample and measurement by clicking Select Measurement... button in the main window.

Check that all images are available. This is done by clicking the Density scaling button (button number 8 in the evaluation program overview). There should be 73 images. If not every image is available, an error message will appear. Wait some minutes and then try again.

09. Start the evaluation by selecting the Evaluation 3D button and then the StartEvaluation button in the new window. The result will now be printed.
10. Compare the parameter Mean5 with the reference value*.
 - 10.1. Warning rule: A phantom measure exceeds the mean $\pm 2SD$ of the baselinephantom measures. This occurrence should prompt additional inspection of control data with the following rules.
 - 10.2. Three SD rule: A control measure which exceeds the baseline mean $\pm 3SD$ indicates the need for instrument evaluation.**
 - 10.3. Two SD twice rule: Two consecutive phantom measures that exceeds the mean $+2SD$, or mean $-2SD$, dictate instrument evaluation.**
 - 10.4. Range of 4SD rule: When the difference between two consecutive phantom measures exceeds 4SD (specifically when one measure exceeds $+2SD$ and another exceeds $-2SD$) the instrument requires evaluation.**
 - 10.5. Four $\pm 1SD$ rule: When four consecutive measures exceed the same limit ($+1SD$ or $-1SD$) instrument evaluation** is required.
 - 10.6. Mean x 10 rule: When 10 consecutive phantom measures fall on the same side of the mean, instrument evaluation** is necessary.

Finally, put the printed sheet from the daily phantom measurement in the study documentation folder.

11. Exit the program by clicking File and Exit.

* Follow the description in the chapter „Reference Values for the Daily Phantom Measurements“ to calculate the reference values. This quality assurance method is taken from the paper „Accreditation Guidelines for Bone Densitometry“ see information below:

Prepared for the Australian and New Zealand Bone and Mineral Society, The Australian and New Zealand Association of Physicians in Nuclear Medicine, The Royal Australian and New Zealand College of Radiologists and The Australasian College of Physical Scientists and Engineers in Medicine by a joint panel comprising representatives of the above organisations.

** Instrument evaluation shall involve repeated (five to ten) control measures. With repeated failure, patient measures shall be suspended until the instrument is more thoroughly evaluated.

4.2 Reference Values for the Daily Phantom Measurement

To determine the reference values:

01. Perform 20 measures of the Phantom according to the chapter Daily Phantom Measurements. Skip point ten in the list (about the comparison). Do not do all measures on one day, try to spread the measurements into some days.
02. Calculate the mean value and standard deviation of all measurements of the parameter Mean5.
03. Calculate the value of 4SD.
04. Calculate the intervals mean $\pm 1SD$, mean $\pm 2SD$, mean $\pm 3SD$.

It is recommended to do a printout of the results and to keep the printout at the device so that comparisons easily can be made.

4.3. Weekly Phantom Measurement

Use the same procedure as for the daily phantom but select the control file and the measurement sample for the weekly phantom measurement, QC2(Weekly), instead.

The reconstruction of the measurement will take longer than that from the daily phantom measurement. Start the evaluation the same way as with the daily phantom measurement. For the weekly phantom measurement, 100 images are to be loaded. Do a printout.

Control if there are any artifacts in the image and check that the volume value differs less than $\pm 1.0\%$ from the reference value (The reference value is here the first measurement of the weekly phantom that was made).

Put the printed sheet from the weekly phantom measurement in the study documentation folder.

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5.1 General Measurement Procedure

1. Start the measurement program.
2. Enter the patient data.
3. Select the measurement parameters CONTROL FILE.
4. Perform the calibration measurement PRECALIBRATE.
5. Position the patient.
6. Define the exact location of the volume by setting the reference line in the SCOUT VIEW.
7. Start the measurement.

5.2 First Measurement

By the first measurement of the patient, the patient data needs to be registered. It is very important that the registration is consequently done. Follow the instructions in the section Edit Patient to fill in the fields.

The positioning of the patient is important to document, so that the positioning will be exactly the same for the follow up measurements. Follow the instructions in the section Positioning of the Patient.

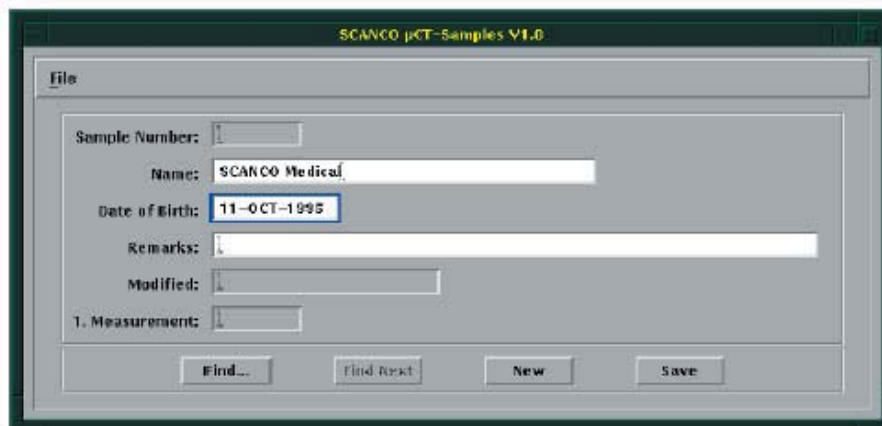
It is very important that the reference line in the scout view is set exactly at the same position in every measurement of the patient. Follow the instructions in the section The Scout View Measurement.

During the measurement the patient must not move at all, not even talk. It is very important that the patient is aware of this.

5.2.1 Edit New Patient



Select edit patient data from the main menu by clicking on the framed button. The SCANCO μ CT-Samples window opens.



Enter the patient data:

1. **Sample Number:** Is set automatically and can not be changed.
2. **Name:** Family name, Forename
3. **Date of Birth:** day.month.year (Example: 07.02.1979)
4. **Remarks:** Patient specific remarks.
5. **Modified:** Is set automatically and can not be changed.
6. **1,Measurement:** Is set automatically and can not be changed.

After the patient data is correctly entered, click SAVE. Now you can see the Sample Number.

To exit the patient program, click on the FILE button and EXIT.

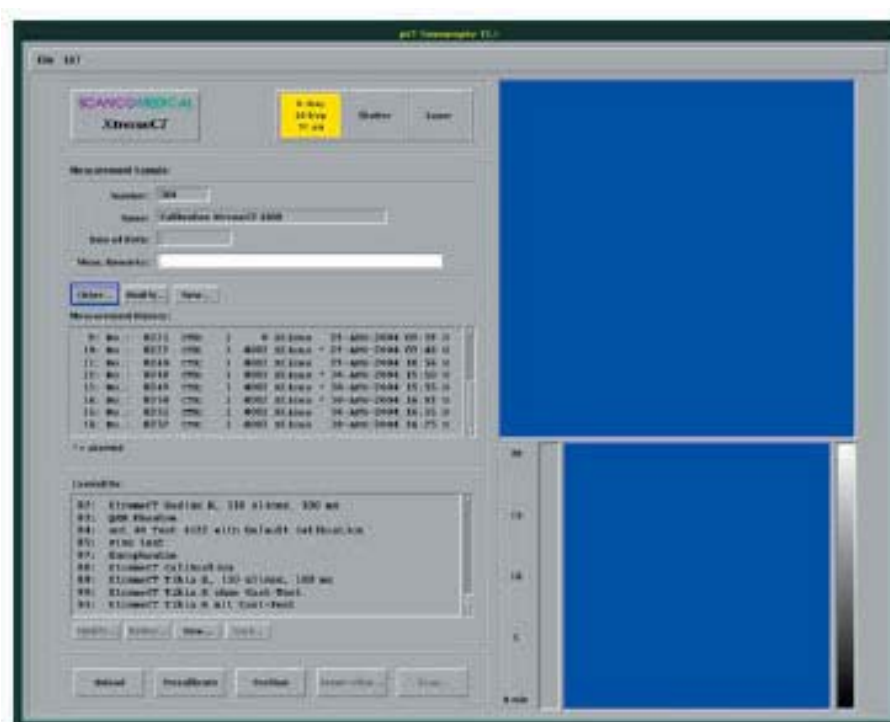
The patient data is now registered.

5.2.2 Start the Measurement Program



To start the measurement program, you must first enter „Customer/Research Institute“ in the OPERATOR field. After that, start the measurement program from the main menu by clicking the framed button.

The main window of the measurement program opens.



5.2.3 Select the patient

When the measurement program opens, the Select Sample window appears. If the Select Sample window by some reason should not appear, click on Other... and the Select Sample window will appear.



Now you can select the registered patient:

1. Click OK.
2. A list of all registered patients now appears.
3. Click on the patient you wish to measure and confirm with OK.

If you type the name:

Note that the system is case sensitive which means that the system separates lower and uppercase letters. You therefore have to be careful when typing the Name so that you write it exactly as it was registered.

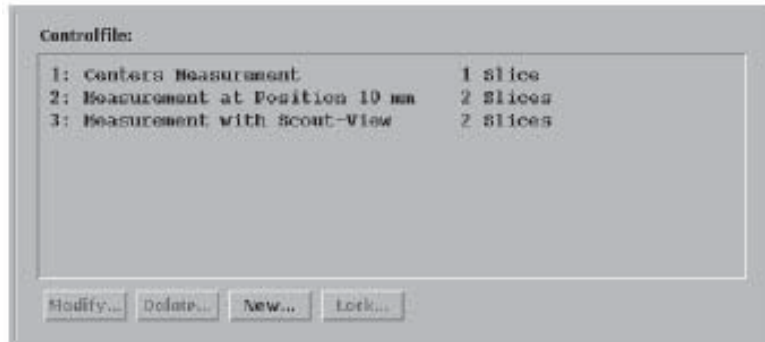
If the patient does not appear in the presented list, the registration of the patient was not successfully saved. Click cancel to return to the main measurement program. In the Measurement Sample area, click New... The SCANCO μ CT-Samples window opens. Register the patient according to section Edit Patient and the patient will automatically be selected.

5.2.4 Select Control File

The control file is a predefined measurement protocol that includes settings for the Scout view, the resolution, the number of slices to be measured and the voltage and current combination.

For measurement of the leg, select control file **Tibia L** or **Tibia R**.

For measurement of the arm, select control file **Radius L** or **Radius R**.



The control file is selected by clicking the desired item in the list.

5.2.5 The Precalibration

When the control file is selected, the system needs to be calibrated. This is done with the button Precalibrate and then by clicking Start Calibration in the new window. This should be done for every patient, before each measurement!

It is very important that the patient is completely out of the gantry during the calibration measurement!

5.2.6 Instruct the Patient

It is very important to instruct the patient of the following before the measurement starts:

- Once the measurement has started (the measurement starts with the scout view) the patient is not allowed to move anymore and not allowed to talk.
- Once the real scan has started, also the operator should not talk anymore and should also keep still, in order not to distract the patient.
- The measurement must be comfortable for the patient, if it is not comfortable or something hurts, the patient must immediately inform the operator about this.
- There is a blue light at the front of the machine as long as the measurement is performed.

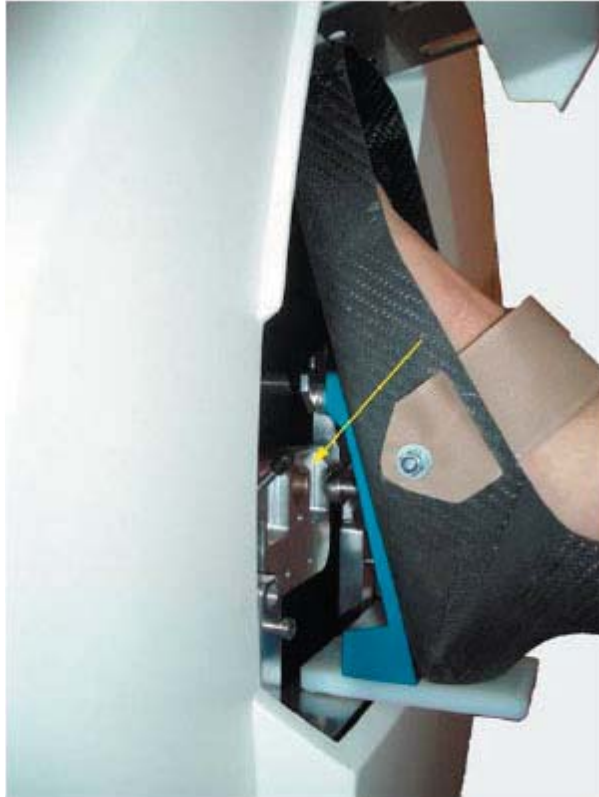
5.2.7 Positioning of the Patient in Bed

Leg Measurement



- 01)** Put the patient with the hip just inside the edge of the bed.
- 02)** The bed should be about the same height as the gantry opening. This needs to be individually adjusted to make it comfortable for the patient.
- 03)** Test the sole. Check that it fits the heel, that is, the foot must be stable in the sole. Tape the sole to the foot. Put the sole and the foot in the leg cast. Check that the foot and the sole is correctly positioned in the leg cast.

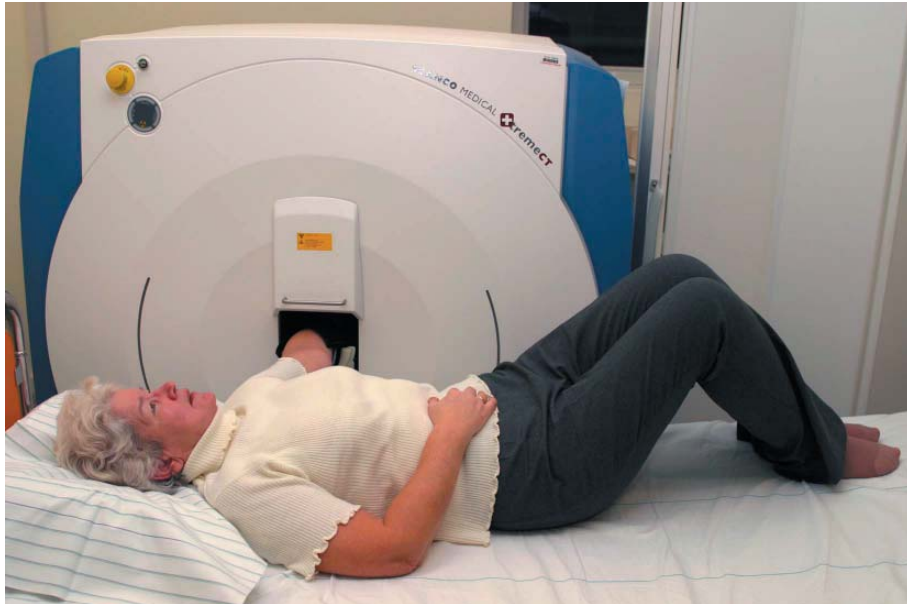
04) Fixate the cast in the cast slider:



- 05)** Move the bed so that the leg of the patient is gently moved into the bore until the outer leg cast edge is almost at the gantry opening.
- 06)** Move the leg cast completely in position and snap in the cast at the gantry.
- 07)** Check that the cast is positioned correctly.
- 08)** Check with the patient that it is comfortable (Can the patient lie like this for 3 minutes without moving?).
- 09)** Close the bore cover.

Arm Measurement

The patient can either have its legs bent (like in the figure below) or stretched. Stretched legs are recommended since the patient lies more stable in this position.



- 01)** Put the patient with the hip just inside the edge of the bed.
- 02)** The bed should be about the same height as the gantry opening. This needs to be individually adjusted to make it comfortable for the patient.
- 03)** Test the size of the arm pad. The arm must lie stable in the hand cast. Position the hand and arm in the hand cast. Try to get the hand as far in as possible.
- 04)** Fixate the cast in the cast slider.
- 05)** Move the bed so that the arm of the patient is gently moved into the bore until the outer arm cast edge is almost at the gantry opening.
- 06)** Move the hand cast completely in position and snap in the cast at the gantry.
- 07)** Check that the cast is positioned correctly.

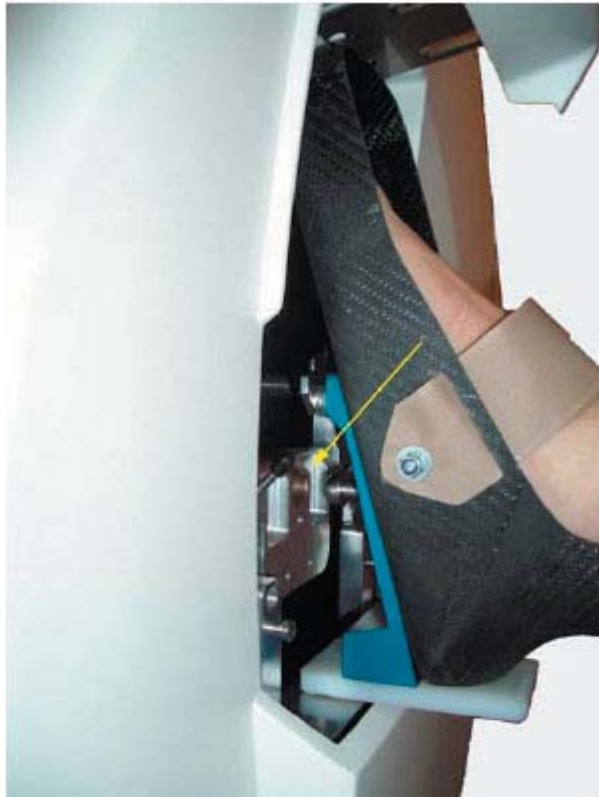


- 08)** Check with the patient that it is comfortable (Can the patient lie like this for 3 minutes without moving?).
- 09)** Close the bore cover.

5.2.8 Positioning of the Patient in Chair

Leg Measurement

- 01)** Put the patient in the chair.
- 02)** The seat of the chair should be about the same height as the gantry opening. This needs to be individually adjusted to make it comfortable for the patient.
- 03)** Test the sole. Check that it fits the heel, that is, the foot must be stable in the sole. Tape the sole to the foot. Put the sole and the foot in the leg cast. Check that the foot and the sole is correctly positioned in the leg cast.
- 04)** Lift the leg into a horizontal position, take use of the leg support.
- 05)** Fixate the cast in the cast slider:



- 06)** Fold the leg support down into a vertical position (as vertical as possible).



- 07)** Move the bed/chair so that the leg of the patient is gently moved into the bore until the outer leg cast edge is almost at the gantry opening.
- 08)** Move the leg cast completely in position and snap in the cast at the gantry.
- 09)** Check that the cast is positioned correctly.



- 10)** Check with the patient that it is comfortable (Can the patient sit like this for 3 minutes without moving?).
- 11)** Close the bore cover.

Arm Measurement



- 01)** Put the patient in the chair.
- 02)** The armrest of the chair should be about the same height as the gantry opening. This needs to be individually adjusted to make it comfortable for the patient. For some patients it is more comfortable to sit closer to the gantry opening, in this case the armrest can be folded back and this way the chair can be moved closer to the gantry.
- 03)** Test the size of the arm pad. The arm must lie stable in the hand cast. Position the hand and arm in the hand cast. Try to get the hand as far in as possible.
- 04)** Fixate the cast in the cast slider.
- 05)** Move the chair so that the arm of the patient is gently moved into the bore until the outer arm cast edge is almost at the gantry opening.

- 06)** Move the hand cast completely in position and snap in the cast at the gantry.



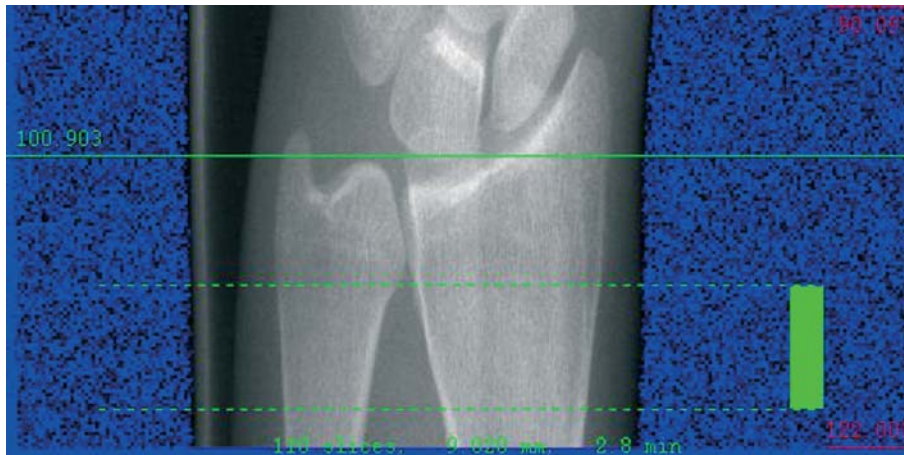
- 07)** Check that the cast is positioned correctly.
- 08)** Check with the patient that it is comfortable (Can the patient sit like this for 3 minutes without moving?).
- 09)** Close the bore cover.

5.2.9 The Scout View Measurement

After the precalibration is done and the patient is correctly positioned the scout view measurement has to be performed. The scout view is used to determine the measurement area.

On the scout view, a reference line has to be set. This reference line must be set very carefully. Here, ***the reference line should be positioned on the hump in the joint space*** (see figures). For the follow up measurements, the reference line has to be set exactly at the same location. Only in this way changes in the bone density and architecture can be reliable determined.

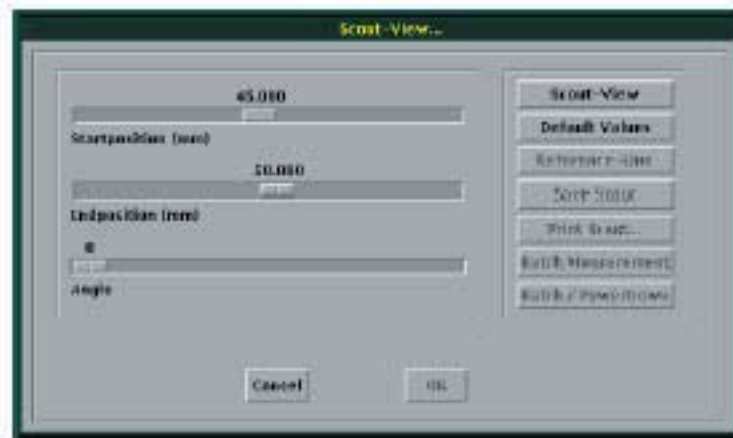
Scout view of the Radius:



Scout view of the Tibia:



Select SCOUT-VIEW... The following window will appear:



Click on Scout-View. A scout view measurement is now carried out. If you can see the joint space as in the figure above, set the reference line according to the instructions below.

If you can not see the correct area in the scout view, you have to do a new scout view with other start and end positions. In the Scout view window, adjust the start and end positions. ***Lower number means more distal and higher number means more proximal.*** While changing the start and end position, ***be sure that the distance between them is constant.*** This assures that the bones will appear in the same dimensions every time the scout view measurement is performed.

To set the Reference Line

Click on the Reference-Line button and then move the pointer to the current Scout-View at the upper right. The green reference line now follows the pointer. As soon as the left mouse button is pressed, the line is fixed. You can correct the positioning of the line as often as you wish, by again clicking the Reference-Line button.

When the reference line is set, print the scout view (by clicking the Print Scout... button and then OK in the new window) and put the printout in the patient documentation folder.

The first measurement is automatically saved as a reference Scout-View. This reference Scout-View will be shown for every follow up measurement of the same patient.

Click OK and you will return to the main measurement program.

5.2.10 The Measurement

To start the measurement, click on the SCAN... button. The scan... window will appear:



During the measurement the patient must not move at all, not even talk. It is very important that you inform the patient about this and that the patient has understood this.

During the measurement the operator should not talk nor move in order not to distract the patient.

During the measurement, the operator is not allowed to do anything else on the computer.

Click on Start Measurement. The measurement now starts. The raw data of the measurement now appear consecutively, the most recent always being shown full size at the upper right.

5.2.11 Release the Patient

When the measurement is finished, open the bore cover. Then you have to release the cast by raising the end of the cast (which is pointing toward you) a little bit. Then pull gently the patient together with the cast out of the gantry. When the cast slider is in the most outer position you can release the cast using the cast release handle, then pull it out completely.

5.2.12 Validity of the Measurement

Control that the measurement is valid by looking at the reconstructed slice of the measurement. If no artifacts can be found in the image, the measurement is valid.

If artifacts can be found in the image, the measurement is not valid. Do a new measurement. This time no precalibration is needed (since the precalibration is valid for 2 hours), but everything else needs to be done again.

5.2.13 Exit the Measurement Program

Exit the main measurement program by clicking FILE and then EXIT. For the evaluation, follow the instructions in the Evaluation chapter.

5.3 Follow up Measurement

To do the follow up measurement:

01. Start the measurement program.

02. Select the patient:

To select the registered patient from the main measurement program window, click on Other... The Select Sample window appears.

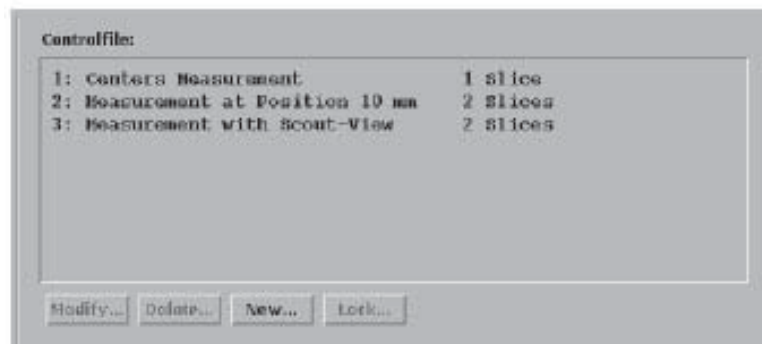


Click OK. A list now appears of all patients. Click on the patient you wish to measure and confirm with OK.

03. Select control file:

For measurement of the **leg**, select control file **Tibia L** or **Tibia R**.

For measurement of the **arm**, select control file **Radius L** or **Radius R**.



The control file is selected by clicking the desired item in the list.

04. Do a precalibration:

When the control file is selected, the system needs to be calibrated. This is done with the button Precalibrate. This should be done for every patient, before each measurement!

It is very important that the patient is completely out of the gantry during the calibration measurement!

05. Position the patient according to the first time measurement and your documentations. ***During the measurement the patient must not move at all, not even talk. It is very important that you inform the patient about this and that the patient has understood this.***

Make sure the patient does not move between the scout view measurement and the actual measurement. If the patient move, the measurement will not be carried out in the correct position.

06. Do a scout view measurement. Make sure that you clearly can see the joint space. On the lower right the reference scout view (the scout view from the first measurement) is presented. This constitutes a help to set the reference line at exactly the same position.

Set the reference line. ***Make sure the reference line is set at the same location as in the reference scout view.***

Click OK and you will return to the main measurement program.

07. Start the measurement:

Remind the patient of that it is very important that she/he does not move, not even speaks during the measurement.

Click SCAN... and then the Start Measurement button.

08. Release the patient according to the instructions for the first measurement.**09.** Check that the measurement is valid. Use the same criteria as in the first measurement. If the measurement is not valid, go back and make a new try. ***Remind the patient of that it is very important that she/he does not move, not even speaks during the measurement.*****10.** Exit the main measurement program by clicking FILE and then EXIT. For the evaluation, follow the instructions in the Evaluation chapter.

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6.1 Start the Evaluation Program

Start the evaluation program by clicking the button with the evaluation



Overview of the evaluation program:

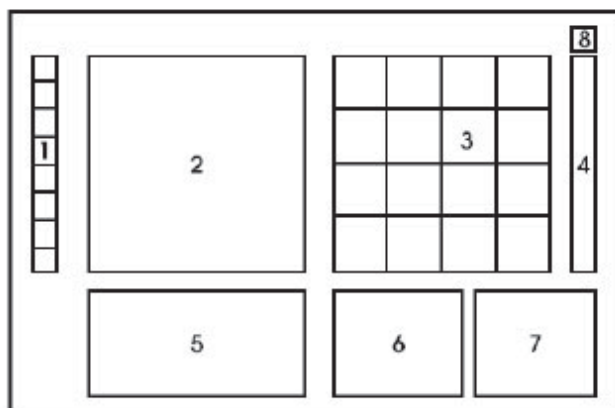
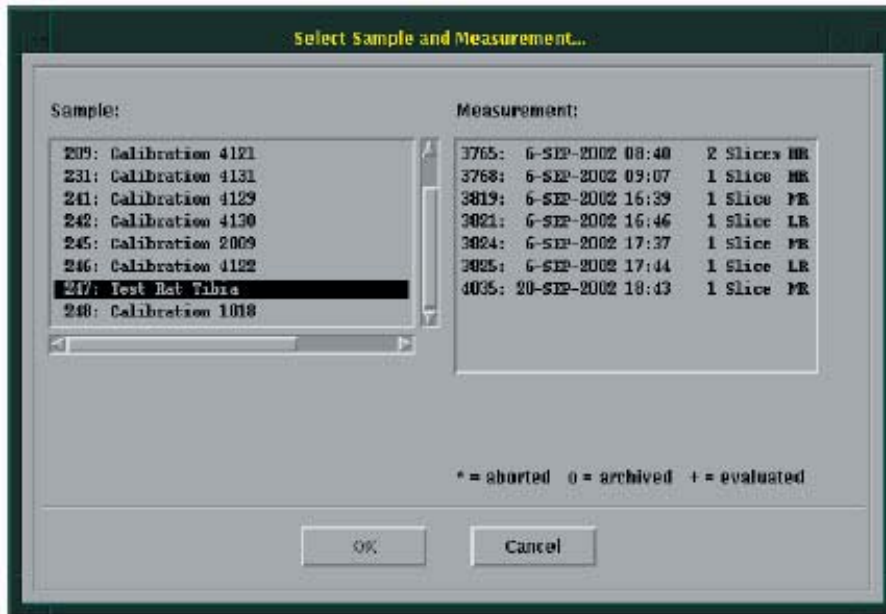


Figure 8-2 Evaluation Overview

1. *Drawing Symbols (Icon Box)*: By clicking on these symbols, the mouse function, which will be applied, is selected. These functions are only valid for inputs or clicks in input field 2.
2. *Drawing field*: In this field, the image being processed (current picture) is shown. As soon as the mouse pointer moves in this field, and MBI is pressed and/or is held down, the drawing function selected in field 1 takes place.
3. *Overview field*: In this field a certain number of tomograms are displayed: Clicking with MBI on an image in this field, it will become the current image and is displayed large in field 2
4. *Black & white/Color scale*: Click with MBI in this field to change the colors. By repeated mouse clicks with MBI you will return to the original black & white display.
5. *Image selection area*: Moving the cursor in this field and clicking with MBI causes the indicated image to be shown in field 2. You also can enter a slice number by using the keyboard or click on arrows to move through multiple slices one by one.
6. *2D-Evaluation Information*: Information window showing coordinates of cursor, size of ROI and distance, density and area calculations.
7. *Choose evaluation method*: Printing, 2D/3D histomorphometry, 3D distance measurements.
8. *Density scaling*: Clicking with MBI on this button causes all images to be reloaded. While being reloaded, all images are displayed at a fixed density scale, so you can compare density values visually. To return to the original display (all images at the most possible brightness), click on the button again.

6.2 Select Patient and Measurement

After starting the evaluation program, the Select Sample and Measurement... window appears:



On the left hand side in the window there is a list of patients whose measurements have not yet been archived. Click on the desired patient, and all the measurements of this patient will appear on the right hand side. Click on the desired measurement and confirm by clicking the OK button. All images that belong to this measurement are now loaded and will appear on the screen.

If the Select Sample and Measurement... window by some reason does not appear, you can select the sample and measurement by clicking Select Measurement... button in the main window.

6.3 Definition of Volume of Interest (Contouring)

1. Draw contour on the first image:



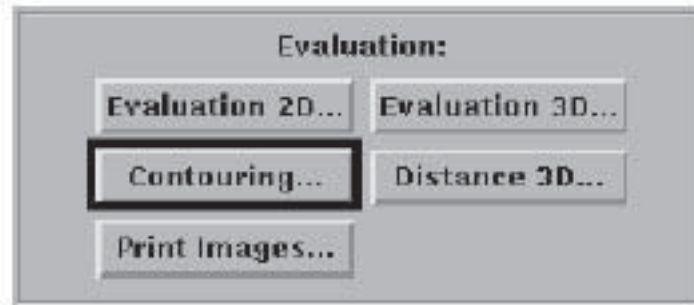
Drawing Icons

By clicking on the buttons shown alongside, you can:

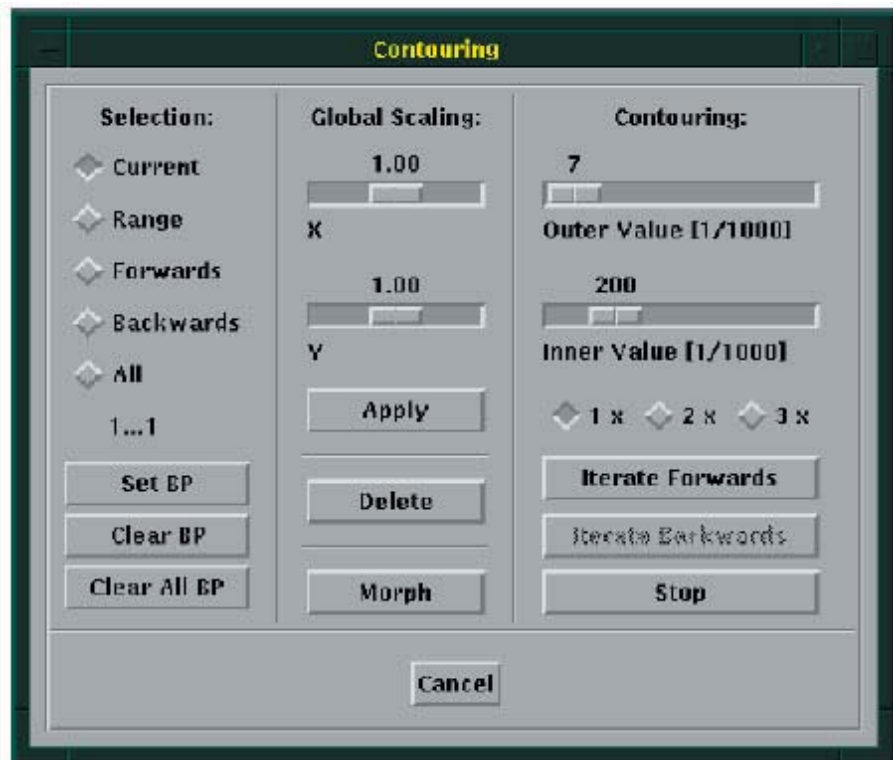
1. Draw Contour: Sketch contours in the *counter clockwise* direction. All contours are automatically closed!
2. Correct: The contour to be corrected must be crossed at two places. The part lying in between these crossing points will be replaced by a new contour. (*counter clockwise* drawing direction!)
3. Draw Rectangle/Square.
4. Draw Ellipse/Circle.
5. Delete Object: Deletes one contour/rectangle/ellipse of the current image.
6. Delete All Objects: Deletes all contours/rectangles/ellipses of the current image.
7. Delete Objects of All Images: Deletes all contours / rectangles / ellipses of all images.
8. Show attenuation coefficient at cursor position.
9. Distance measurement.
10. Show Profile
11. Move (MB1)/Scale (MB2) Objects

- 1.1. The first image is automatically chosen. You can also choose the images manually by entering the desired number of the slice in the box under the image.
- 1.2. Click the Draw Contour button and draw the contour in the image as close to the bone edge as possible. To draw: press the left mouse button as long as you are drawing. It is important that you draw in the counter clockwise direction around the bone.
- 1.3. If correction of the contour is needed, click on the Correct button and then draw over the contour you want to modify. Here you must also draw in the counter clockwise direction. The original contour has to be crossed at least twice. The part between the first and the last point of intersection will be replaced by the new drawing.

2. Start the automatic contour detection by clicking on the Contouring... button:



The following window appears:



2.1. Selection:

This part gives you the opportunity to choose from which slice you want to start the iteration. Select **Current**.

2.2. Global Scaling:

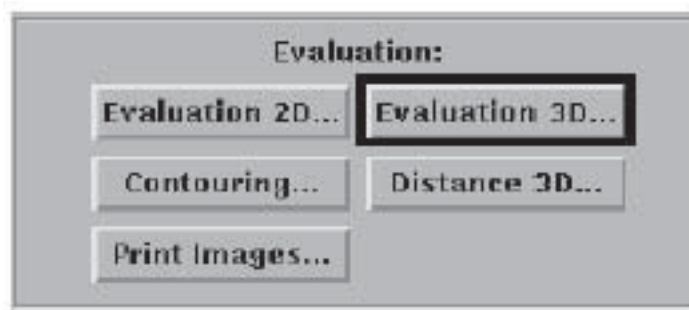
You do not have to select anything here.

- 2.3. Contouring: Here you can chose iteration method and the number of times the iteration should be performed. Select 1x and then ***Iterate Forward.***

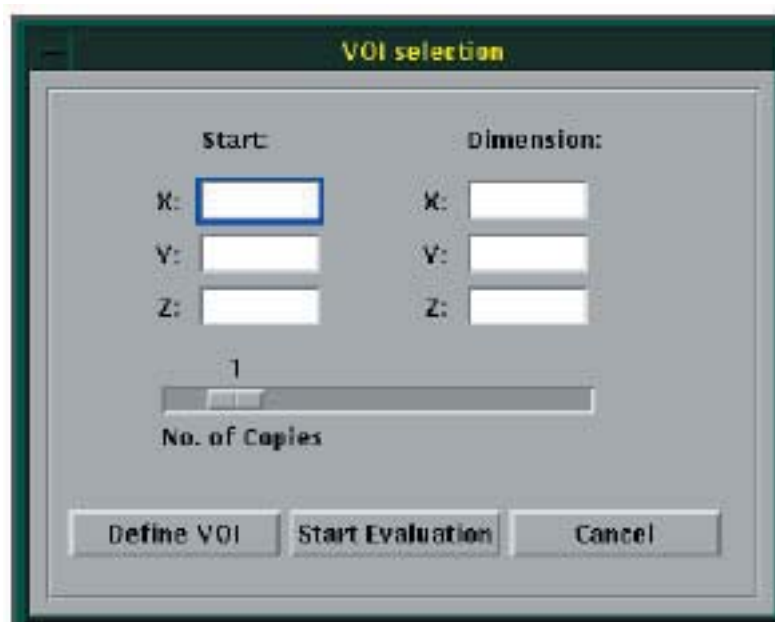
Control the contour of the slice. Correct if necessary according to the above written instructions. When the contour of the image is done, choose Forwards, 1x and Iterate Forwards in the Contouring window. This starts the automatic iteration for all images. Supervise the automatic contouring. Stop (by clicking Stop in the contouring window) and correct if necessary. For corrections, follow the above written instructions. When all images are correct contoured, press cancel in the Contouring window.

6.4 Evaluation of the 3D Image (Evaluation 3D)

1. Click on the Evaluation 3D button.



The following window appears:



Click on the **Start Evaluation** button.

A new window with the question: „Do you want to save the contour first?“ appears. Click on **Yes**.

2. Take the sheet from the printer and put in in the *patient documentation folder*.

6.5 Exit the Evaluation 3D program

Exit the program by clicking FILE and then EXIT.

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Backups of the raw data, image data and of the program, database, scout view etc need to be done to assure no data get lost in case of a breakdown of the system.

To assure all files get saved, terminate all other programs or applications, like measurement program, evaluation program etc. before you start the backup procedure.

Before a tape can be used for backup, it needs to be initialized (formatted). To initialize a tape, follow the instructions below:

1. Start the archiving (backup) program by clicking the marked button:



2. Insert the tape you wish to initialize in the tape drive.
3. Click the Initialize... button in the tape field on the right side of the archiving program.
4. A window with the question „Do you really want to initialize the tape?“ is shown. Click on Yes to continue.

5. A new window appears. Give a name to the tape. ***This part is very important!*** Suggestion for names of the backup tapes are:

Table 7.1: Suggestion for Names of the Backup Tapes.

Tape Name	Explanation	
RAW101	RAW = Raw Data	1 = Copy to tape, 01 = Number of the tape
RAW201	RAW = Raw Data	2 = Move to tape, 01 = Number of the tape
IMA101	IMA = Image Data	1 = Copy to tape, 01 = Number of the tape
IMA201	IMA = Image Data	2 = Move to tape, 01 = Number of the tape
BACK1	BACK = Weekly Backup	1 = Tape to use odd weeks
BACK2	BACK = Weekly Backup	2 = Tape to use even weeks
PHANT1	PHANT1 PHANT = Phantom	Raw and Image data, 1 = Number of the tape

After entering the suitable name, click on OK. The tape is now initialized.

It is very important that the backup procedures are consequently made. Before you start with the backups:

1. Control that you have the right tape for your purpose.
2. Document your backup procedure in the log-book. Note what you do (copy or move, ISQ (image data), RSQ (raw data) or weekly backup), when you do it (date and time) and to which tape you copy or move data.

7.1 Backup of Raw and Image Data:

7.1.1 Backup of the Raw Data (RSQ):

These instructions tell you how to copy and how to move the raw data of each measurement to the backup tape.

Note that there is a difference between the copy and the move command:

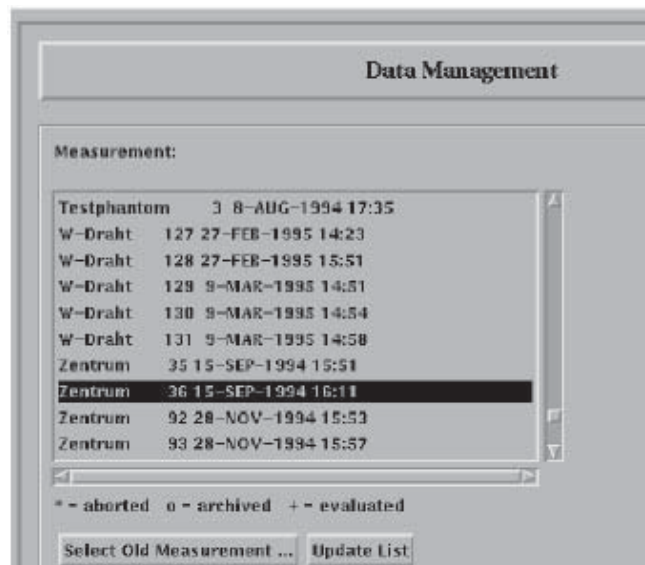
With the copy command, only a copy of the data will be created on the tape whereas with the move command, the data will be moved from the hard disk to the tape. After using the move command, the data are no longer existing on the hard disk. To get the data back to the hard disk, perform either the copy or move command from the tape back to the hard disk.

Copy to tape

01. Enter the tape *RAW101* in the tape drive.

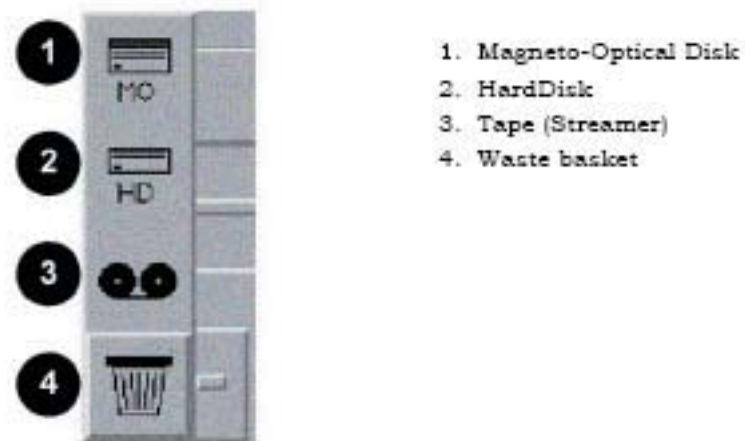


02. Mount the tape by clicking on the Mount button in the tape section to the right on the screen. The tape is now ready for receiving data.



03. In the upper left corner a list of measurements is shown. Click on the measurement that you want to copy to the tape.

- 04.** Under the list there are icons for the raw (RAW) data and the image (IMA) data. Click on the RAW data icon.



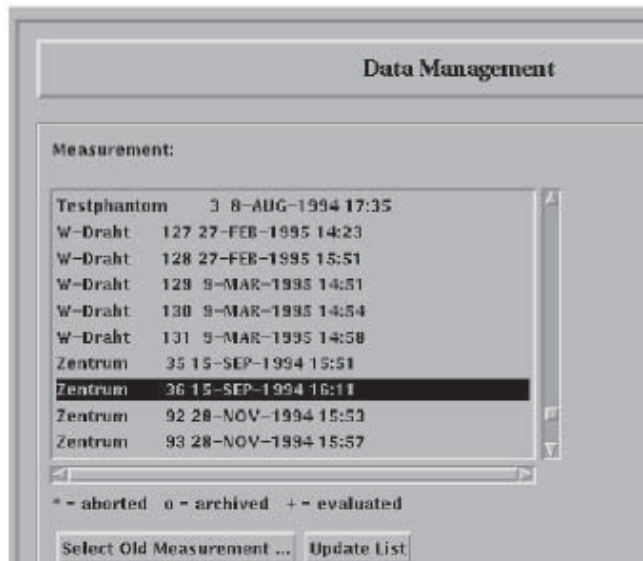
- 05.** Under these icons there is a button where you can choose to copy to tape or move to tape . Click on copy to and then choose the tape symbol on the button (see figure) to the right.
- 06.** Click on the Start... button.
- 07.** A new window appears with the question: „Do you really want to execute the move/copy command?“ Click on Yes.
- 08.** Click on the „Update List“ button to update the list, since this is not done automatically.
- 09.** Repeat the steps 3-8 for all measurements you wish to copy to the tape.
- 10.** When you have copied all measurements that you wanted to, dismount the tape by clicking the Dismount button in the tape section to the right on the screen.
- 11.** The tape is now ejected.

Move to tape

01. Enter the tape *RAW201* in the tape drive.

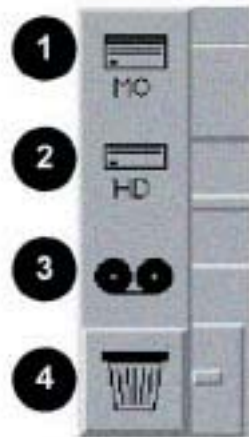


02. Mount the tape by clicking on the Mount button in the tape section to the right on the screen. The tape is now ready for receiving data.



03. In the upper left corner a list of measurements is shown. Click on the measurement that you want to copy to the tape.

- 04.** Under the list there are icons for the raw (RAW) data and the image (IMA) data. Click on the RAW data icon.



- 1. Magneto-Optical Disk
- 2. HardDisk
- 3. Tape (Streamer)
- 4. Waste basket

- 05.** Under these icons there is a button where you can choose to copy to tape or move to tape. Click on move to and then choose the tape symbol on the button (see figure) to the right.
- 06.** Click on the Start... button.
- 07.** A new window appears with the question: „Do you really want to execute the move/copy command?“ Click on Yes.
- 08.** Click on the „Update List“ button to update the list, since this is not done automatically.
- 09.** Repeat the steps 3-8 for all measurements you wish to move to the tape.
- 10.** When you have moved all measurements that you wanted to, dismount the tape by clicking the Dismount button in the tape section to the right on the screen.
- 11.** The tape is now ejected.

7.1.2 Backup of the Image Data (ISQ):

These instructions tell you how to copy and how to move the image data of each measurement to the backup tape.

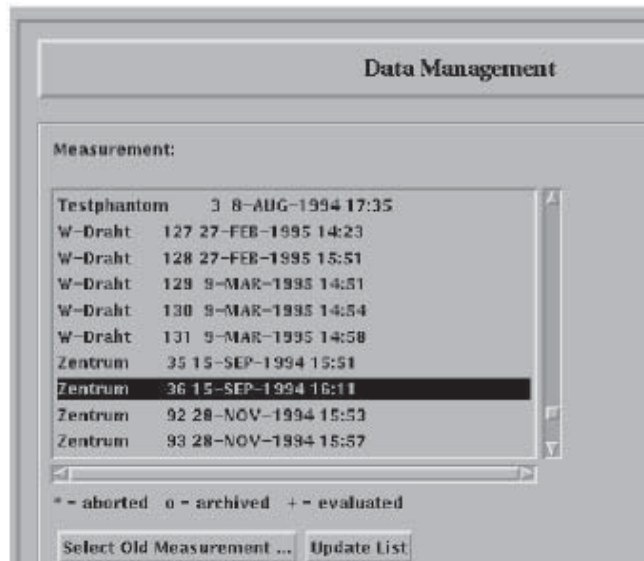
Note that there is a difference between the copy and the move command: With the copy command, only a copy of the data will be created on the tape whereas with the move command, the data will be moved from the hard disk to the tape. After using the move command, the data are no longer existing on the hard disk. To get the data back to the hard disk, perform either the copy or move command from the tape back to the hard disk.

Copy to tape

01. Enter the tape *IMA101* in the tape drive.

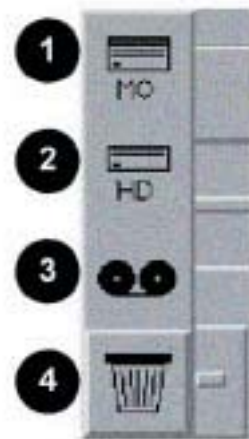


02. Mount the tape by clicking on the Mount button in the tape section to the right on the screen. The tape is now ready for receiving data.



03. In the upper left corner a list of measurements is shown. Click on the measurement that you want to copy to the tape.

- 04.** Under the list there are icons for the raw (RAW) data and the image (IMA) data. Click on the IMA data icon.



- 1. Magneto-Optical Disk
- 2. HardDisk
- 3. Tape (Streamer)
- 4. Waste basket

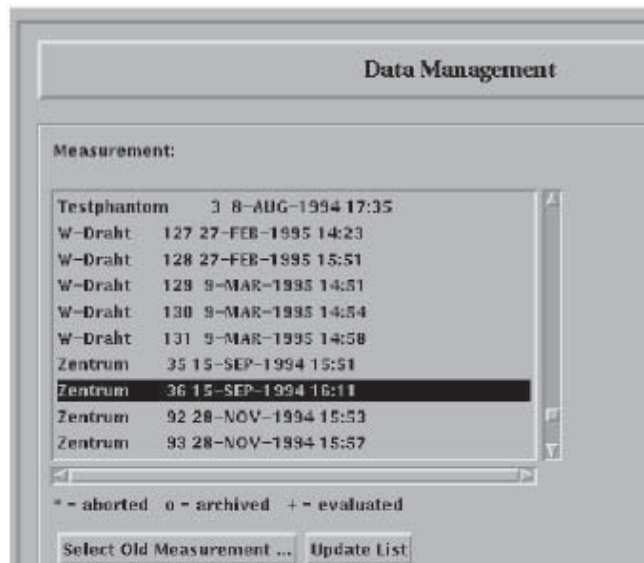
- 05.** Under these icons there is a button where you can choose to copy to tape or move to tape. Click on copy to and then choose the tape symbol on the button (see figure) to the right.
- 06.** Click on the Start... button.
- 07.** A new window appears with the question: „Do you really want to execute the move/copy command?“ Click on Yes.
- 08.** Click on the „Update List“ button to update the list, since this is not done automatically.
- 09.** Repeat the steps 3-8 for all measurements you wish to copy to the tape.
- 10.** When you have copied all measurements that you wanted to, dismount the tape by clicking the Dismount button in the tape section to the right on the screen.
- 11.** The tape is now ejected.

Move to tape

01. Enter the tape *IMA201* in the tape drive.

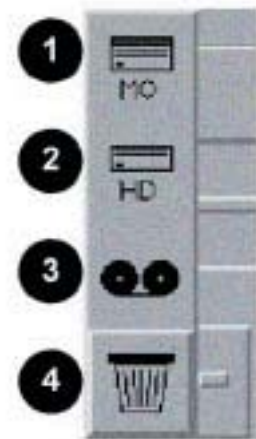


02. Mount the tape by clicking on the Mount button in the tape section to the right on the screen. The tape is now ready for receiving data.



03. In the upper left corner a list of measurements is shown. Click on the measurement that you want to move to the tape.

- 04.** Under the list there are icons for the raw (RAW) data and the image (IMA) data. Click on the IMA data icon.



- 1. Magneto-Optical Disk
- 2. HardDisk
- 3. Tape (Streamer)
- 4. Waste basket

- 05.** Under these icons there is a button where you can choose to copy to tape or move to tape. Click on move to and then choose the tape symbol on the button (see figure) to the right.
- 06.** Click on the Start... button.
- 07.** A new window appears with the question: „Do you really want to execute the move/copy command?“ Click on Yes.
- 08.** Click on the „Update List‘ button to update the list, since this is not done automatically.
- 09.** Repeat the steps 3-8 for all measurements you wish to move to the tape.
- 10.** When you have moved all measurements that you wanted to, dismount the tape by clicking the Dismount button in the tape section to the right on the screen.
- 11.** The tape is now ejected.

7.2 Weekly Routines

Follow the instructions below:

Every odd week:

01. Insert tape BACK1.



02. Mount the tape by clicking on the Mount button in the tape section to the right on the screen. The tape is now ready for receiving data.



03. In the Weekly Backup section, click on the Full Backup to Tape button.
04. Dismount the tape by clicking on the Dismount button in the tape section to the right on the screen.
05. The tape is now ejected.

Every even week:**01.** Insert tape BACK2.

02. Mount the tape by clicking on the Mount button in the tape section to the right on the screen. The tape is now ready for receiving data.



03. In the Weekly Backup section, click on the Full Backup to Tape button.

04. Dismount the tape by clicking on the Dismount button in the tape section to the right on the screen.

05. The tape is now ejected.

The weekly backup procedure backups all programs, databases, scout-view etc.. but no images and no raw data.

7.3 Phantom Measurement

It is recommended to have a special tape for the phantom measurements:
PHANT1.

Further recommendations for backups of the phantom measurements:

- Backup one measurement of the Daily phantom per week.
- Backup one measurement of the Weekly phantom per Month.
- Old measurements can be deleted but make sure that you always keep all daily phantom measurements from the last week and all weekly measurements from the last month on the computer.

Raw data have higher priority for backup than image data, since the image data always can be reconstructed from the raw data.

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8. How to Shut Down the System

8.1 Turn Off the Equipment

8.1.1 Daily Turn Off Procedures

01. In the Session Manager window, click on Session and then End Session. This means that you log out of the system. From this mode Scanco Medical AG can reach the computer if updates or service is needed.
02. Turn off the Monitor
03. Turn off the Scanner

8.1.2 Complete Shut Down of XtremeCT

01. In the Session Manager, click on Session and then End Session.
02. Enter SHUTDOWN as user name and click on OK.
03. When „SYSTEM SHUTDOWN COMPLETE - USE CONSOLE TO HALT SYSTEM“ or the prompt > > > appears, you can turn off the equipment according to:
 - 03.1. Monitor
 - 03.2. Computer
 - 03.3. Tape drive (and/or optical disk)
 - 03.4. Printer
 - 03.5. Scanner

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CHARITÉ - UNIVERSITÄTSMEDIZIN BERLIN
Gemeinsame Einrichtung von Freier Universität und Humboldt-Universität zu Berlin
Campus Benjamin Franklin
Zentrum für Muskel und Knochenforschung
Magdalena Backström, Gabi Ambrecht and Dieter Felsenberg
Telephone +49(0)3084415813
Hindenburgdamm 30, 12200 Berlin, Germany
All figures except photograph´s of patient positioning copyright: Scanco Medical AG

Layout Constanze Gutwasser, ZMK

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