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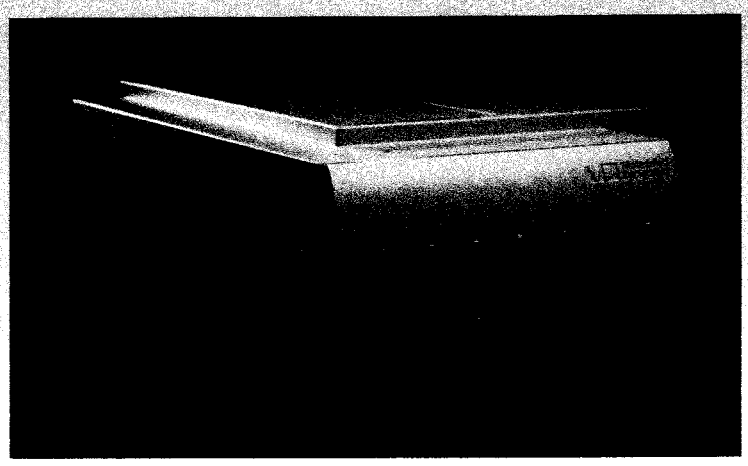
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Personal Densitometer SI™

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Molecular Dynamics

Personal Densitometer SI

USER'S GUIDE

for APPLE® MACINTOSH®
and MICROSOFT® WINDOWS NT™

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Part 1

Introduction and Procedures

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Chapter 1 Introduction to the Personal Densitometer SI

The Personal Densitometer SI scanning instrument is a compact, laser-based densitometer that scans films, wet gels, dry gels, and blots. It connects to the following computers:

- A Microsoft® Windows NT™-based computer containing ImageQuaNT™ and Scanner Control software.
- An Apple® Macintosh® computer containing image analysis software and Scanner Control software.

1.1 What You Can Do with the Personal Densitometer SI

With the Personal Densitometer SI, you can—

- Scan a full 20 x 25 cm sample in six minutes using 100µ resolution or in 15 minutes using 50µ resolution.
- Use image analysis software to analyze and manipulate the data generated by the scans.
- Create image files that can be transferred to compatible graphics programs on Macintosh, Windows™, and Windows NT computers.

1.2 How the Personal Densitometer SI Works

During a scan, the tray in the Personal Densitometer SI moves the sample past a helium-neon laser beam. A five-phase stepper motor controls a mirror and directs the beam from side to side, moving the beam over the sample in a uniform fashion.

The light passing through the sample is collected by a cylinder and passed to a photomultiplier tube (PMT). The PMT converts the light to an electrical current that varies with the intensity of the light hitting the PMT. The current from the PMT is converted into digital information, which is passed to the hard disk on the computer.

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The information is mapped to the appropriate pixel location on the computer screen. The result is an image of the sample, with pixel values linearly proportional to the optical density in the sample.

1.3 Important Safety Information

Section 5.2 provides important information on the safety precautions you should follow when using the Personal Densitometer SI.

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Chapter 2 Scanner Setup Procedures

This chapter provides step-by-step instructions for setting up the instrument to scan a sample. Instructions for scanning the sample are located in chapter 3 for a Windows NT-based computer and in chapter 4 for a Macintosh computer.

2.1 Turn on the Personal Densitometer SI

You must turn on the Personal Densitometer SI and wait 10 seconds before you turn on the computer. To turn on the instrument, press the ON/OFF switch on the back of the densitometer (figure 2-1). The power indicator light on the top of the densitometer turns on. (If you have more than one instrument connected to the host computer, turn them all on before turning on the computer.)

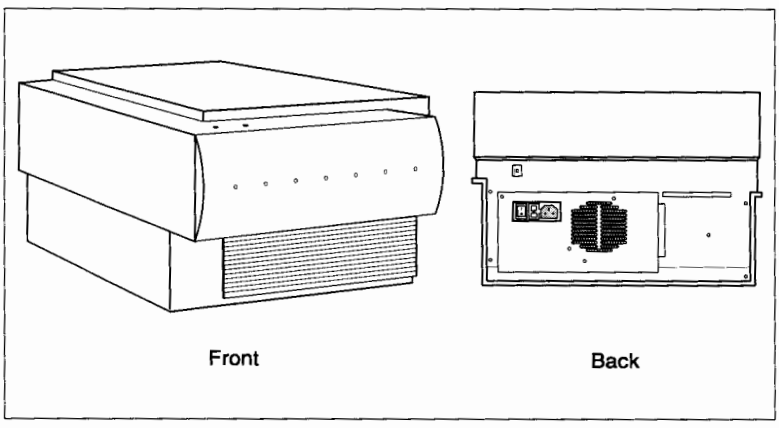


Figure 2-1. Front and back views of the Personal Densitometer SI.

2.2 Turn on the Computer and Open Scanner Control

Use the following instructions to turn on the computer and open the Scanner Control software. (You must open the Scanner Control software to begin the instrument warmup.)

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2.2.1 Windows NT-Based Computer

Turn on the computer and monitor according to the manufacturer's directions. When directed, press **CTRL+ALT+DEL** to access the Windows NT Welcome window. If necessary, enter a user name and/or password and click on **OK.** After the Program Manager window opens, double-click on the MD Apps icon, then double-click on the Scanner Control SI icon in the MD Apps window. (See the *ImageQuaNT User's Guide* for more detailed instructions.)

2.2.2 Macintosh Computer

Turn on the computer and monitor according to the manufacturer's directions. Double-click on the hard disk icon to display the contents of the hard disk. Double-click on the Scanner Control SI icon or name in the window.

2.3 Warm Up the Personal Densitometer SI

The Personal Densitometer SI needs 20 minutes to warm up before you can calibrate the instrument and scan a sample. The warm-up process does not begin until you open the Scanner Control window.

2.4 Clean and Install the Sample Tray

For best results, the sample tray must be clean and unscratched. Before you scan or calibrate, remove the sample tray and clean it. Spraying the tray with cleaning solution while it is in the densitometer can damage the instrument.

To clean and install the sample tray—

1. Open the instrument door.
2. Pull the sample tray out until it stops.
3. Hold down the release button (figure 2-2) near the front right corner of the stage and pull the sample tray all the way out. Move the sample tray gently. Stop if moving the tray is difficult.

   Note: Hold the sample tray only on the plastic frame. Do not leave fingerprints on the glass. Avoid scratching the glass while washing and drying the tray.

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4. Wash the tray with distilled water containing a mild detergent. Do not use a strong detergent, which may loosen the tray sealant.

5. Rinse the tray thoroughly in distilled water and dry it with a lint-free cloth.

6. Holding the sample tray by its frame, place the end without the handle in the grooves of the stage (figure 2-2) and push the tray in until it stops.

7. Press the release button on the right side of the stage and slide the sample tray all the way in.

8. Close the instrument door.

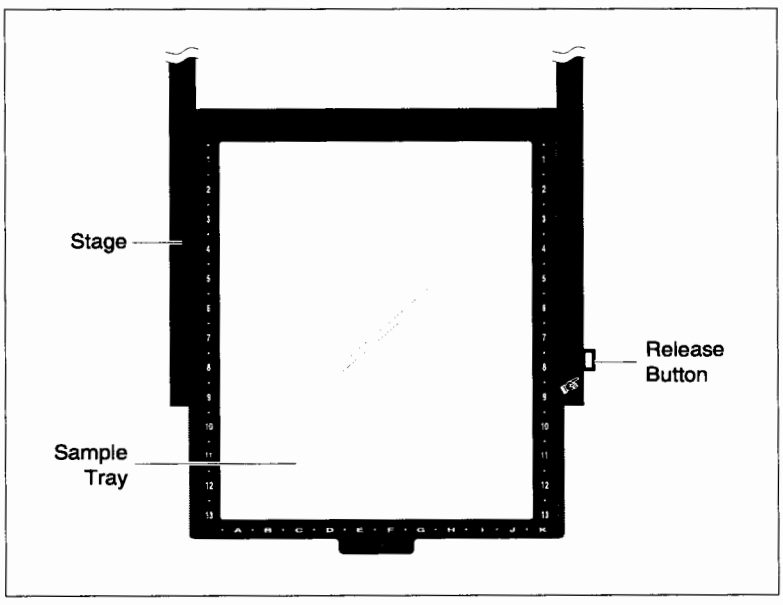


Figure 2-2. Removing and installing the sample tray.

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2.5 Calibrate the Instrument

You calibrate the Personal Densitometer SI after the instrument has warmed up for 20 minutes (warmup does not begin until you open the Scanner Control software). Before starting the calibration, make sure the sample tray is clean and dry, does not contain any samples or hold-down bands, and is installed in the instrument. Make sure the instrument door is closed. Calibration will not start if the door is open.

Click on **Calibrate** in the Scanner Control window to start the calibration. The Personal Densitometer SI displays a "Calibration in Progress" message on the screen. Calibration takes about four minutes. If you open the door during calibration, the instrument aborts the calibration.

2.6 Load the Sample

The maximum sample thickness is 3 mm for the Standard tray and 5 mm for the Wet Gel tray. (A larger sample may become damaged and drop into the densitometer.)

With wet gels, be careful not to splash liquid inside the densitometer. Because liquids can damage the instrument, remove excess liquid from the sample tray before sliding it into the instrument. Make sure the sample tray is intact and does not leak.

2.6.1 Loading a Flat Sample

Use the following steps to load a flat sample into the densitometer:

1. Pull out the sample tray until it stops. If necessary, remove and clean the tray using the steps in section 2.4.

2. Place the top of the sample at the low-numbered end of the sample tray (figure 2-3). The low-numbered end becomes the top of the image when displayed by the image analysis software.

3. Place the sides of the sample parallel to the sides of the sample tray. This ensures that the resulting scan image appears straight when displayed by the image analysis software.

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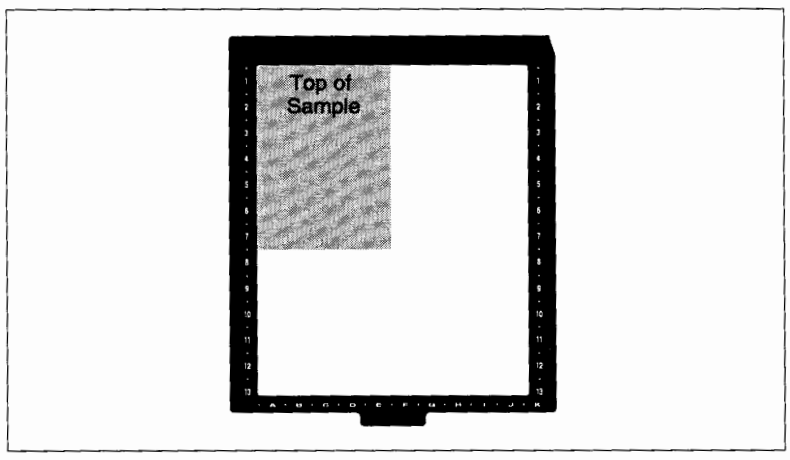


Figure 2-3. Place the top of the sample at the top (low-numbered end) of the sample tray. The sides of the sample should be parallel to the sides of the sample tray.

4. Note the scan coordinates of the two diagonal corners that define the area you want to scan (figure 2-4). You can scan either all or part of a sample.

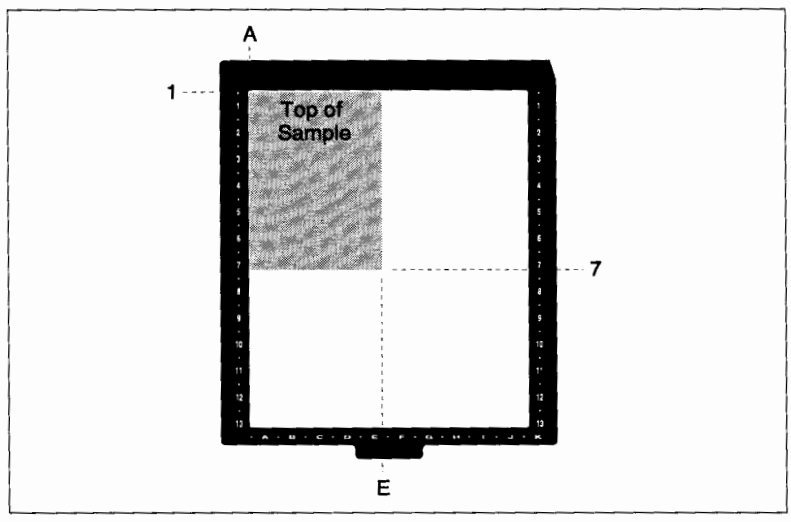


Figure 2-4. Note the coordinate pairs that indicate the diagonal corners of the scan area. In this example they are A1 and E7.

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2.6.2 Loading a Curling Sample

If the sample tends to curl, place a piece of flat laboratory glass over it or use hold-down bands. The glass cover, if used, should completely cover the sample. Total sample-plus-glass thickness should not exceed 3 mm for the Standard tray or 5 mm for the Wet Gel tray.

To use hold-down bands—

1. Remove the sample tray and place it on a clean flat surface.

2. Place the top of the sample at the low-numbered end of the sample tray (figure 2-3). The low-numbered end becomes the top of the image when displayed by the image analysis software.

3. Place the sides of the sample parallel to the sides of the sample tray. This ensures that the resulting scan image appears straight when displayed by the image analysis software.

4. Insert one end of the hold-down band into the groove in the right side of the tray (figure 2-5).

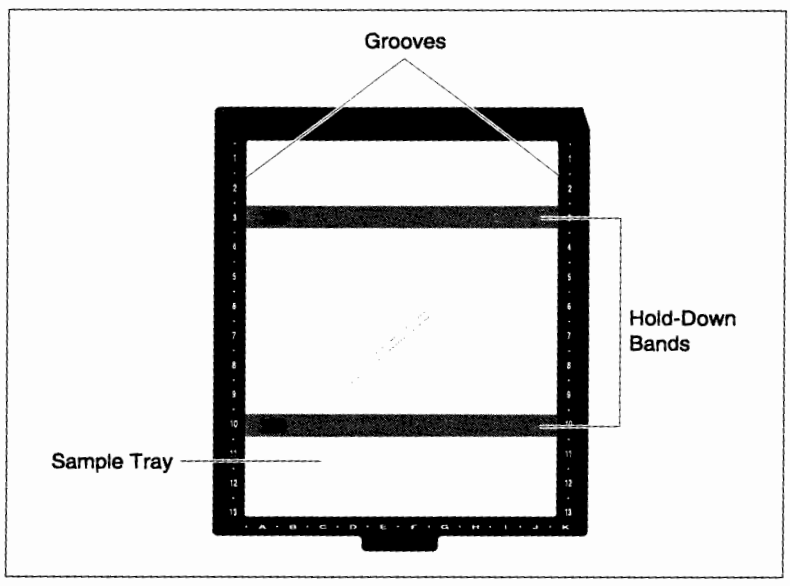


Figure 2-5. Installing hold-down bands.

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5. Align the band over the top or bottom of the sample.

6. While holding up the center of the band, insert the free end of the band into the groove in the left side of the tray.

7. Gently lower the band onto the sample.

8. Repeat steps 4 through 7 to place the second hold-down band on the other side of the sample.

9. Note the scan coordinates of the two diagonal corners that define the area you want to scan (figure 2-4). You can scan either all or part of a sample.

10. Reinstall the sample tray.

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Chapter 3 Windows NT Scanning Procedures

This chapter provides step-by-step instructions for scanning a sample on a Windows NT-based computer. The instructions assume you have performed the steps in chapter 2. You use the Scanner Control software (figure 3-1) to initiate the scan process.

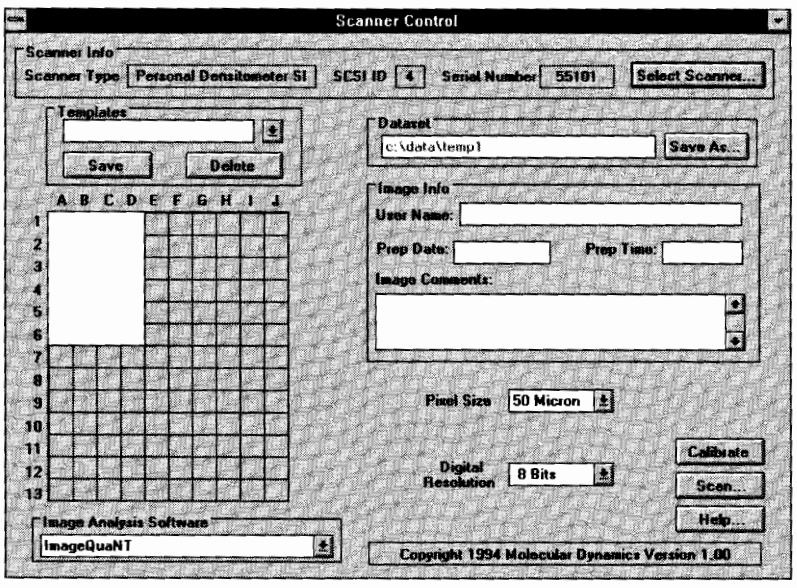


Figure 3-1. The Windows NT Scanner Control window.

3.1 Check Disk Space

The Scanner Control software automatically checks for sufficient disk space when you start the scan. However, you can check disk space manually before starting the scan. If necessary, you can then transfer or delete files to make room for your scan. To check the disk space, use the formula in section 7.12 or draw the Scan area (section 3.4), then click on the **Help** button to display the amount of space needed.

3.2 Use a Template

You can create a template that defines the Scan area, analysis software to use, digital resolution, pixel size, and scanner information.

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You can then use the template for subsequent scans of similar samples. To create or use a template, see section 7.11.

3.3 Select a Scanning Instrument

The top of the Scanner Control window displays the scanner currently accessed by the Scanner Control software. If you want to change to another instrument—

1. Click on the **Select Scanner** button. The Select Scanner window opens (figure 3-2).
2. Click on the correct instrument to highlight it.
3. Click on **OK.** The new scanner is selected and the Select Scanner window closes.

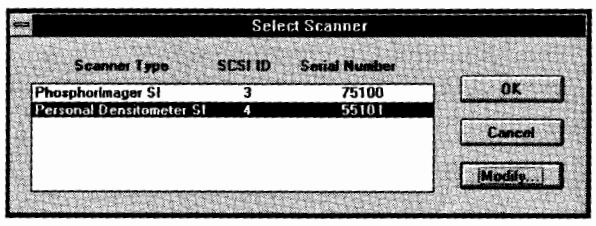


Figure 3-2. The Select Scanner window.

Note: If you need to change the serial number, use the Modify button. See section 6.1 for instructions.

3.4 Draw the Scan Area

The grid on the Scanner Control window represents the grid on the sample tray. The letter and number markings along the side and top of the grid correspond to the grid markings on the tray.

The white rectangle on the grid represents the area you want to record (the Scan area). To designate a Scan area—

1. Place the pointer in the grid square corresponding to the upper left corner of the area you want to record.

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2. Hold down the left mouse button and drag the pointer to the grid square corresponding to the lower right corner of the area you want to record.

3. Release the mouse button. The Save As window appears (figure 3-3).

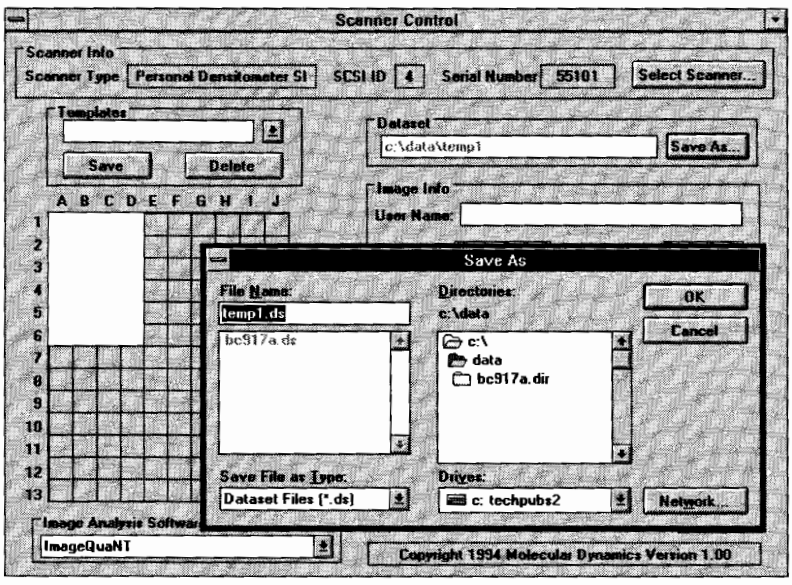


Figure 3-3. The Scanner Control window with a Scan area drawn and the Save As window displayed.

3.5 Name the Dataset

You use the Save As window to name the dataset—

1. Enter the dataset name in the File Name box. The software automatically adds the .DS extension or replaces any extension you add, except .GEL.

2. The default directory is DATA. If you want to change to a different directory, select the directory from the Directories box, or enter the entire path in the File Name box.

3. Click on **OK** to accept the dataset name. The Save As window closes. The complete path to the dataset appears in the Dataset box on the Scanner Control window.

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3.6 Select the Pixel Size

You select a pixel size to use when scanning the sample. To see the list of pixel sizes, click on the **Pixel Size** box, then select a pixel size from the list. If you have a normal sample, you can save time and disk space by selecting the 100µ pixel size. Use the 50µ pixel size for a high-resolution scan. For more information about pixel sizes, see section 7.7.

3.7 Select the Digital Resolution (Bits per Pixel)

You select a digital resolution value to use when scanning the sample. To see the list of digital resolution values, click on the **Digital Resolution** box, then select from the list. Use 12 bits (approximately 4096 levels of resolution) for quantitation purposes. Use 8 bits (256 levels of resolution) if you want to save space and are transferring the image directly to a graphics program for publication. You can convert 12-bit datasets to 8-bit images for publication later if necessary. See section 7.3 for more information about digital resolution.

3.8 Enter Image Information

In the Image Info area, enter a user name, preparation date and time, and comments. This information is for reference only. It does not affect the scan in any way.

3.9 Select the Image Analysis Software

Check that the **Image Analysis Software** box shows the analysis software you want to use at the end of the scan. A setting of **None** means the Scanner Control window remains open at the end of the scan so that you can perform another scan. If you select an application, the application opens and displays the image after the scan is complete.

To change the Image Analysis Software setting, click on the box. A list of available software appears. Click on the name of the software package you want to use to display and analyze the scan.

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3.10 Start the Scan

Ensure that the sample is in place, the instrument door is shut, and all the settings are correct in the Scanner Control window, then click on **Scan.** A Scan in Progress window appears. Click on the **Start** button to begin the scan and activate the Seconds Remaining counter. The Personal Densitometer SI scans the sample and stores the image on the computer hard drive.

Note: If the message, "Not enough disk space to store image" appears when you start the scan, it means your hard disk is too full to accept the scan size, pixel size, and/or digital resolution you selected. See the suggested solutions at the end of section 7.12.

3.11 Remove the Sample

After the scan is complete, you should remove the sample from the Personal Densitometer SI. To do this, open the densitometer door, slide the sample tray out until it stops, and remove your sample. Make sure the sample tray is clean before closing the densitometer door.

If you used hold-down bands, remove the sample tray from the densitometer and place it on a clean flat surface. Press on the black arrow at one end of the hold-down band. As you press down and toward the center of the tray, the band will bow up and slide out of the groove in the tray. Remove the other end of the band from the tray. Remove the second hold-down band, then remove the sample, clean the tray, and reinstall it in the densitometer.

3.12 Analyze the Scan

The software you selected in the Image Analysis Software box appears on the screen and displays the scanned image. You can use the software to adjust the image display and make quantitative measurements of your scan. Refer to the image analysis software documentation for more information on analyzing your scan.

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Chapter 4 Macintosh Scanning Procedures

This chapter provides step-by-step instructions for scanning a sample on a Macintosh computer. The instructions assume you have performed the steps in chapter 2. You use the Scanner Control software (figure 4-1) to initiate the scan process.

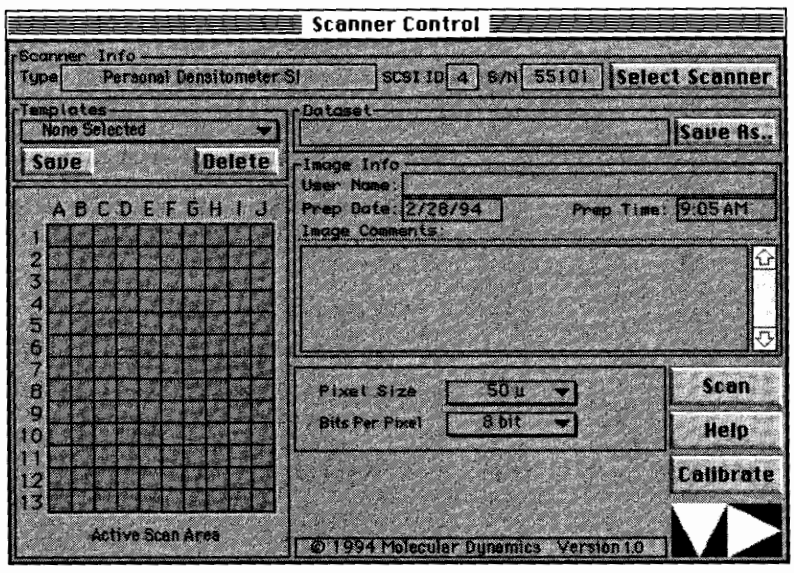


Figure 4-1. The Macintosh Scanner Control window.

4.1 Check Disk Space

The Scanner Control software automatically checks for sufficient disk space when you start the scan. However, you can check disk space manually before starting the scan. If necessary, you can then transfer or delete files to make room for your scan. To check the disk space, use the formula in section 8.11 or draw the Scan area (section 4.4), then click on the **Help** button to display the amount of space needed.

4.2 Use a Template

You can create a template that defines the Scan area, digital resolution, and pixel size. You can then use the template for

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subsequent scans of similar samples. To create or use a template, see section 8.10.

4.3 Select a Scanning Instrument

The top of the Scanner Control window displays the scanner currently accessed by the Scanner Control software. If you want to change to another instrument—

1. Click on the **Select Scanner** button. The Select Scanner window opens (figure 4-2).
2. Click on the **SCSI** button. All the instruments connected on the SCSI bus are displayed in the window.
3. Click on the correct instrument to highlight it, then click on **OK** to close the Select Scanner window.

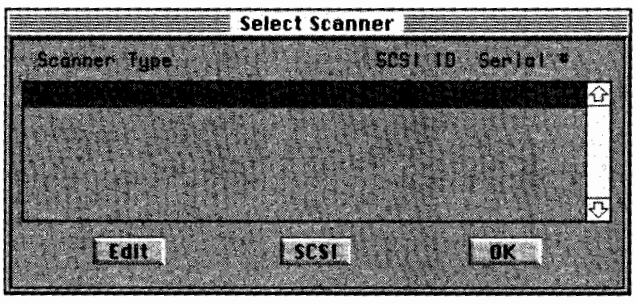


Figure 4-2. The Select Scanner window.

Note: If you need to change the serial number, use the Edit button. See section 6.2 for instructions.

4.4 Draw the Scan Area

The grid on the Scanner Control window represents the grid on the sample tray. The letter and number markings along the side and top of the grid correspond to the grid markings on the tray.

The rectangle on the grid represents the area you want to record (the Scan area). To designate a Scan area—

1. Place the pointer in the grid square corresponding to the upper left corner of the area you want to record.

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2. Hold down the mouse button and drag the pointer to the grid square corresponding to the lower right corner of the area you want to record.

3. Release the mouse button. The Save As window appears (figure 4-3).

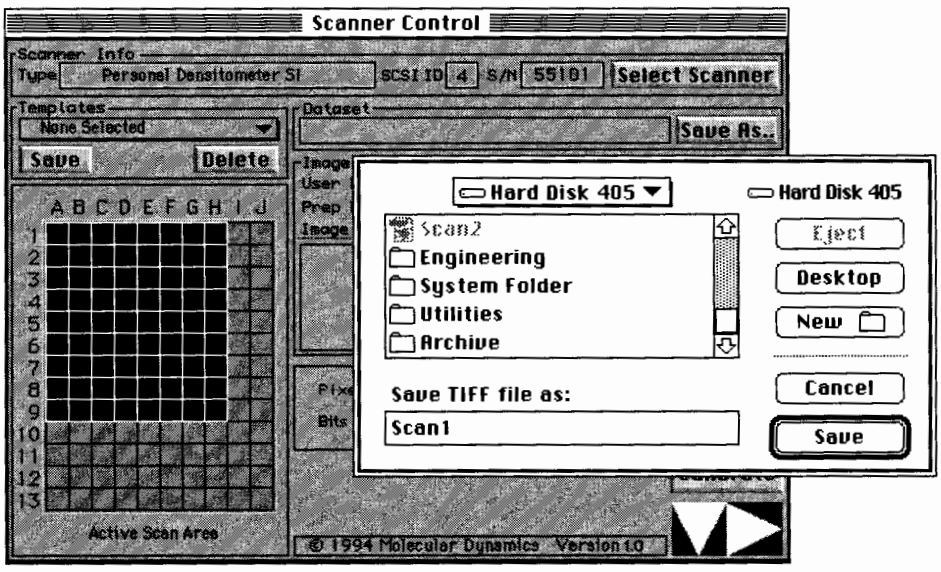


Figure 4-3. The Scanner Control window with a Scan area drawn and the Save As window displayed.

4.5 Name the Dataset

You use the Save As window to name the dataset—

1. Enter the dataset name in the **Save TIFF file as** box.

2. If you want to change to a different folder, select the desired folder from the hard disk list.

3. Click on **Save** to save the dataset. The Save As window closes. The dataset name appears in the Dataset box on the Scanner Control window.

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4.6 Select the Pixel Size

You select a pixel size to use when scanning the sample. To see the list of pixel sizes, move the pointer onto the Pixel Size box and hold down the mouse button, then select a pixel size from the list. If you have a normal sample, you can save time and disk space by using the 100µ pixel size. Use the 50µ pixel size for a high-resolution scan. For more information about pixel sizes, see section 8.6.

4.7 Select the Digital Resolution (Bits per Pixel)

You select a digital resolution value to use when scanning the sample. To see the list of digital resolution values, move the pointer onto the Digital Resolution box and hold down the mouse button, then select from the list. Use 12 bits (approximately 4096 levels of resolution) for quantitation purposes. Use 8 bits (256 levels of resolution) if you want to save space and are transferring the image directly to a graphics program for publication. See section 8.3 for more information about digital resolution.

4.8 Enter Image Information

In the Image Info area, enter a user name, preparation date and time, and comments. This information is for reference only. It does not affect the scan in any way.

4.9 Start the Scan

Ensure that the sample is in place, the instrument door is shut, and all the settings are correct in the Scanner Control window, then click on **Scan.** The Start Scan window appears. Click on the **Start Scan** button to begin the scan. The Personal Densitometer SI scans the sample and stores the image on the computer hard drive.

Note: If the message, "Not enough disk space to store image" appears when you start the scan, it means your hard disk is too full to accept the scan size, pixel size, and/or digital resolution you selected. See the suggested solutions at the end of section 8.11.

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4.10 Remove the Sample

After the scan is complete, you should remove the sample from the Personal Densitometer SI. To do this, open the densitometer door, slide the sample tray out until it stops, and remove your sample. Make sure the sample tray is clean before closing the densitometer door.

If you used hold-down bands, remove the sample tray from the densitometer and place it on a clean flat surface. Press on the black arrow at one end of the hold-down band. As you press down and toward the center of the tray, the band will bow up and slide out of the groove in the tray. Remove the other end of the band from the tray. Remove the second hold-down band, then remove the sample, clean the tray, and reinstall it in the densitometer.

4.11 Analyze the Scan

You can use the image analysis software to adjust the image display and make quantitative measurements of your scan. Refer to the image analysis software documentation for more information on analyzing your scan.

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Chapter 5 Personal Densitometer SI

5.1 Instrument Care and Maintenance

The following sections provide guidelines on protecting the instrument, the power up and down sequences, instructions on moving and reinstalling the instrument, and instructions for changing a fuse.

5.1.1 Protecting Your Instrument

To protect your instrument—

- Do not let liquids of any kind enter the Personal Densitometer SI. For wet gels, make sure excess moisture is removed from the sample tray.
- Do not place a sample thicker than 3 mm for the Standard tray or 5 mm for the Wet Gel tray in the Personal Densitometer SI. The sample may become damaged and drop into the instrument.
- Make sure no air is blowing on the Personal Densitometer SI. The airflow may carry dust or dirt particles into sensitive parts of the instrument.
- Do not place the Personal Densitometer SI in direct sunlight or in any other very bright light. Bright light may cause excessive heat or compromise the light-tight operation of the instrument.
- In general, leave the Personal Densitometer SI on. However, if it will be idle for more than a day—such as over the weekend—turn it off. You should not turn the instrument on and off for every scan.

5.1.2 Power Up and Power Down Sequences

The instrument(s) and computer should be turned on and off using the steps described below.

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Power Up

Always power up the instrument(s) and computer in the following order:

1. Turn on all the instruments and peripheral devices (if any).
2. Wait at least 10 seconds, then turn on the computer and the monitor.
3. Log in, if necessary.
4. Open the Scanner Control window (which begins the warm-up process for all instruments) using one of the following methods:
   - Windows NT-based computer—Double-click on the MD Apps icon, then double-click on the Scanner Control SI icon.
   - Macintosh computer—Double-click on the Scanner Control SI icon or name.
5. After the 20-minute warm-up period, click on **Calibrate.**

Power Down

Always power down the instrument(s) and computer in the following order:

1. Close the Scanner Control window and any other running applications using one of the following methods:
   - Windows NT-based computer—Double-click on the control menu button.
   - Macintosh computer—Highlight **Quit** on the File menu.
2. Shut down the computer using one of the following methods:
   - Windows NT-based computer—Select **Shutdown** on the Program Manager File menu.
   - Macintosh computer—Select **Shut Down** on the Special menu.
3. Turn off the computer and monitor.
4. Turn off all the instruments and peripheral devices (if any).

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5.1.3 Moving and Reinstalling the Instrument

In preparation for moving the instrument, power down the instrument and computer using the instructions in section 5.1.2. Next, disconnect the power cord and SCSI connection. When reinstalling, reconnect each item. Chapter 6 explains how to attach the SCSI devices.

After you reconnect the hardware, power up the instrument and computer using the instructions in section 5.1.2. Make sure that the serial number is displayed in the Scanner Info area. If it is not, see section 6.1 (Windows NT) or section 6.2 (Macintosh) for instructions on reentering the serial number.

Within a building, you can move the instrument on a cart. Over longer distances, move the instrument as gently as possible because the Personal Densitometer SI contains a diffuser. Tiny paint chips from the cylinder may fall onto the diffuser if the instrument is jostled extensively. These chips show up as lines on your scan. If lines appear consistently on your scans after moving the instrument, call your Molecular Dynamics representative.

5.1.4 Changing the Fuse

The fuse is located in the back of the Personal Densitometer SI next to the power outlet. For the type of fuse needed, see the label on the back of the instrument. To change the fuse—

1. Power down the instrument and computer using the instructions in section 5.1.2.

2. Remove the power cord from the back of the instrument.

3. Locate the small vertical groove in the left side of the power plug receptacle.

4. Place the end of a screwdriver into the groove and pry out the fuse holder (figure 5-1). When the fuse holder moves outward, grasp the holder and pull it all the way out.

5. Remove the fuse.

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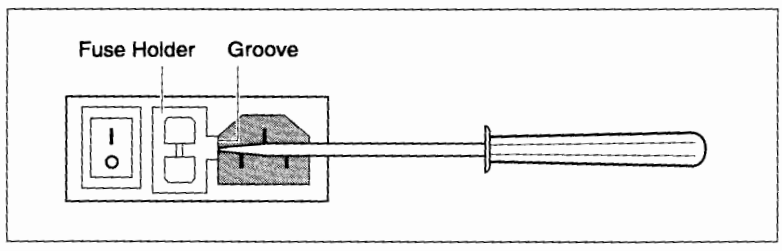


Figure 5-1. Opening the fuse box.

6. Install a new fuse of the same type and rating as on the label. (You can store an additional fuse in the drawer in the fuse holder.)

7. Return the fuse holder to its original location with the tab to the right.

8. Press the fuse holder all the way in until it is flush with the surface.

9. Reconnect the power cord.

10. Power up the instrument and computer using the instructions in section 5.1.2.

5.2 Important Safety Information

The Personal Densitometer SI and its accessories have been carefully designed for safety. Please follow the precautions below to ensure continued safe use of the equipment.

Warning **Using controls, making adjustments, or performing procedures other than those specified herein may result in hazardous laser light exposure.**

5.2.1 Laser Light Warning Label

The label shown in figure 5-2 warns of exposure to laser light. It is located on the right side of the Personal Densitometer SI near the back. The exact location is shown later in figure 5-4.

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Figure 5-2. Warning label.

If the label becomes illegible for any reason, please contact Molecular Dynamics for a free replacement label.

5.2.2 Safety Precautions

As an operator, you are completely protected from the laser beam. Nevertheless, HeNe laser power up to 5 mW can be accessed from within the interior of the instrument. For this reason, please observe the following precautions:

- Do not remove the top cover of the instrument.

  Because there are no user-serviceable components inside the instrument, you never need to remove the top cover.

- Contact Molecular Dynamics if the cover or door becomes damaged.

  Do not continue to use the instrument if the cover or door becomes damaged and the instrument is no longer light-tight. Contact Molecular Dynamics immediately to arrange for repair. See section 9.2 for the number of your Molecular Dynamics representative.

- Do not send your Personal Densitometer SI elsewhere for service or attempt to service it yourself.

  To protect your warranty and ensure safe operation, the Personal Densitometer SI should be serviced only by Molecular Dynamics or its representatives. If the densitometer is not working correctly, please contact your Molecular Dynamics service representative.

- If the fuse must be replaced repeatedly, do not use the Personal Densitometer SI. Contact your service representative.

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When you call your representative, be prepared to give the serial number of your instrument. The serial number certification label, shown in figure 5-3, displays the model number, serial number, and CDRH compliance information. It is located on the back panel of the Personal Densitometer SI. Figure 5-4 shows the exact location of this label.

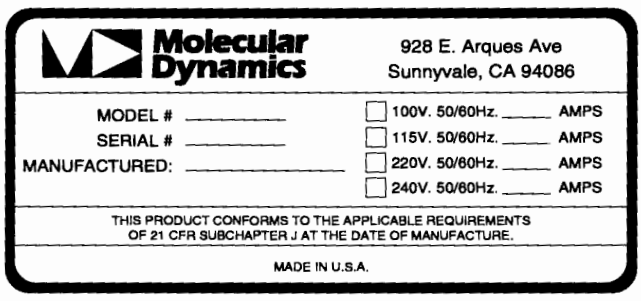


Figure 5-3. The serial number certification label.

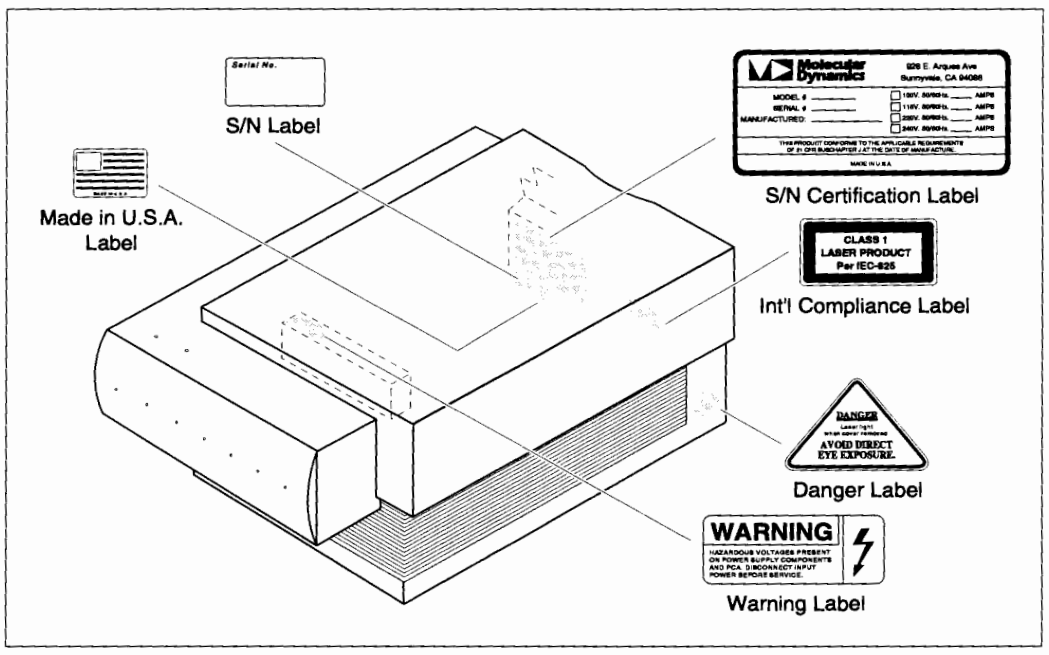


Figure 5-4. Location of important labels.

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Chapter 6 SCSI Ports

Two SCSI (Small Computer Systems Interface) ports are located on the back of the Personal Densitometer SI. Use these ports to connect the instrument to the computer. Section 6.1 provides instructions for a Windows NT-based computer; section 6.2 provides instructions for a Macintosh computer.

6.1 Connect the Instrument to a Windows NT-Based Computer

A SCSI ID number identifies each device connected to the SCSI bus. SCSI IDs 0 and 7 are reserved for the computer. The Personal Densitometer SI has been preset to SCSI ID 4. If your configuration includes a peripheral device, such as a disk drive, check the back of the hardware for the SCSI ID used by that device to ensure it uses a number that is different from those of the computer and the instrument. If it is not different, change the peripheral or instrument SCSI ID. SCSI peripherals supported by Molecular Dynamics include the Pinnacle Micro Optical™ magneto-optical disk drive, the SyQuest® disk drive, and the Archive Python™ DAT tape drive.

Each end of the SCSI chain must be terminated. The computer is at one end of the SCSI chain; the Personal Densitometer SI is next, followed by a peripheral device. The terminator is built into the computer; however, you must add a terminator to the other end. Figure 6-1 shows a sample configuration.

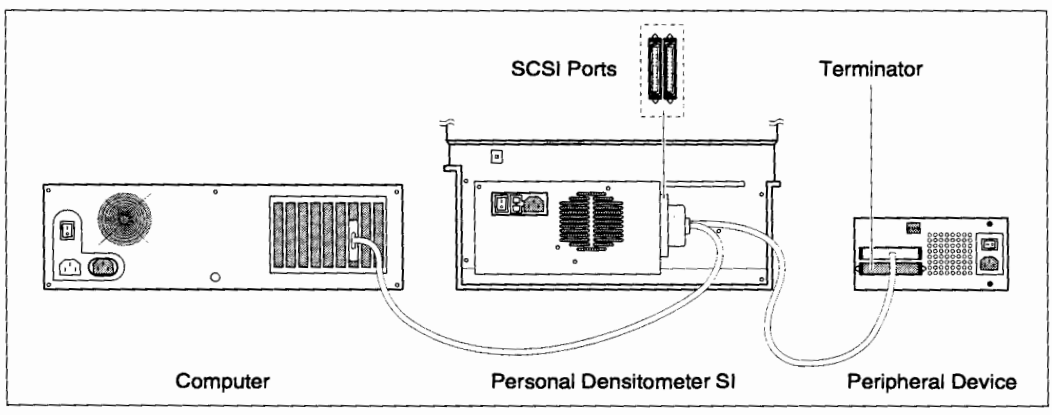


Figure 6-1. Connecting the Personal Densitometer SI, computer, and peripheral.

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6.1.1 Installing the SCSI Adapter

To establish the connection between the instrument and the computer, a SCSI adapter card must be installed in the computer and the Windows NT device drivers must be loaded. If you have not installed the SCSI adapter card, use the instructions provided with the card. If you did not load the device drivers when you installed Windows NT, see the Windows NT documentation for instructions on adding them.

Use the following instructions to complete the installation:

1. Log into Windows NT as the Administrator.
2. In the Windows NT Program Manager window, double-click on the Main icon.
3. In the Main window, double-click on the Windows NT Setup icon.
4. In the Windows NT Setup window, open the **Options** menu and click on **Add/Remove SCSI Adapters.** The SCSI Adapter Setup window opens displaying the SCSI adapters currently installed.
5. Click on **Add.** A Setup Warning message appears. Click on **OK.** The SCSI Adapter Option window appears.
6. Click on the **Adapter** box and select the **SCSI card adapter** from the list.

   Note: If the SCSI card is not listed, select Other, then insert the disk containing the Windows NT SCSI driver supplied by the manufacturer of the adapter card.
7. Click on **Install.** The SCSI Adapter Option window closes.
8. Click on **Close** to return to the Main window.
9. In the Main window, double-click on the Control Panel icon.
10. Double-click on the Devices icon to open the Devices window. All devices loaded with Windows NT are listed.

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11. Select **scsiscan** from the list, then click on **Startup** to open the Device Driver window.

12. Click on **Disable,** then click on **OK** to close the Device Driver window.

13. Click on **Close** to close the Devices window.

6.1.2 Connecting the SCSI Cable

Plug the SCSI cable into one of the SCSI ports on the Personal Densitometer SI, then plug the other end into the SCSI port on the computer. If you are not adding a peripheral device, plug a terminator into the remaining SCSI port on the Personal Densitometer SI. If you are adding a peripheral device, plug the SCSI cable into the remaining SCSI port on the instrument, then plug the other end into one of the SCSI ports on the peripheral. Plug a terminator into the second SCSI port on the peripheral. Ensure that the total length of all the SCSI cables does not exceed four meters.

If you need to change the SCSI ID on the instrument, use the pushbuttons on the rear panel of the Personal Densitometer SI to set the number. The upper pushbutton decreases the number; the lower pushbutton increases the number (figure 6-2).

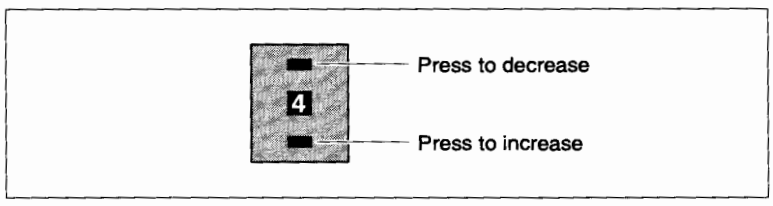


Figure 6-2. Setting the SCSI ID on the Personal Densitometer SI.

6.1.3 Entering the Instrument Serial Number

To complete the SCSI connection, you must enter the serial number that is printed on the back of the instrument. See figures 5-3 and 5-4 for the location of the serial number. To enter the serial number—

1. Turn on the instrument and computer using the procedure in section 5.1.2.

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2. In the Scanner Control window, click on the **Select Scanner** button. The Select Scanner window appears.

3. Click on the **Modify** button. The Modify window appears.

4. Enter the serial number in the serial number box, then click on **OK** to close the Modify window.

5. Click on **OK** to close the Select Scanner window.

The Scanner Info area displays the scanner type, SCSI ID number, and serial number.

6.1.4 Installing a Peripheral Device

The instructions below explain how to install the Molecular Dynamics supported peripheral devices. For information about configuring your instrument for other peripherals, contact the peripheral manufacturer.

Note: You must have the SCSI adapter card installed in the computer and the Windows NT device drivers loaded. If you did not install the SCSI adapters and device drivers with Windows NT, you will need to add them. See the Windows NT documentation.

To install the device driver—

1. In the Main window, double-click on the Control Panel icon.

2. Double-click on the Devices icon to open the Devices window. All devices loaded with Windows NT are listed.

3. Select the device name from the list.

4. Click on the **Startup** button to open the Device Driver window.

5. Click on the **System** button in the list of startup types, then click on **OK** to return to the Devices window.

6. Click on **Close** to close the Devices window.

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6.1.5 Partitioning a Removable Disk

Before you can use a new removable disk, you must partition and format it. To do this—

1. Log into Windows NT as the Administrator.
2. Insert the disk into the disk drive.
3. Double-click on the Administrative Tools icon.
4. Double-click on the Disk Administrator icon. A window appears indicating either that this is the first time the Disk Administrator has been run or that something has changed.
5. Click on **OK** to continue. The Disk Administrator window appears. It contains at least two Disk icons.

   Disk 0 is the C: drive (single partition).
   Disk 1 is the M-O or SyQuest drive.
6. Click on the rectangle to the right of Disk 1. **Note:** It displays Free Space and either 281 MB or 105 MB depending on the type of disk. If the display does not say Free Space, there may be information on the disk.
7. Click on the **Partition** selection in the top menu.
8. Click on **Create.** The Create Partition window appears with either 281 MB or 105 MB displayed as the Create partition of size selection.
9. Click on **OK.**
10. Double-click on the control menu button (▬) to close the Disk Administrator.
11. Click on **Yes** to save the changes.
12. Click on **OK** when the "Disks were updated successfully" message appears.
13. Double-click on the control menu button (▬) to close the Administrative Tools window.

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14. Double-click on the File Manager icon.

15. Click on **Disk** in the main menu.

16. Click on **Format Disk.**

17. Click on the down arrow (▼) next to the Disk In list box in the Format Disk Window.

18. Click on **Drive D.**

19. Click on the **Quick Format** check box.

20. Click on **OK.**

21. Click on **Yes** to confirm that you want to format the disk. The Percent Complete window appears.

22. When the Format Complete window appears asking to format another disk, click on **No.**

23. Double-click on the control menu button (▬) to close the File Manager.

24. If you want to partition the second side of a 600-MB M-O disk, remove the disk, turn it over, and reinsert it into the drive. Repeat the procedure starting with step 3.

Note: Remove the disk from the disk drive if you will not be using it.

6.2 Connect the Instrument to a Macintosh Computer

A SCSI ID number identifies each device connected to the SCSI bus. SCSI IDs 0 and 7 are reserved for the computer. The Personal Densitometer SI has been preset to SCSI ID 4. Ensure that the length of the SCSI cable does not exceed four meters.

Each end of the SCSI chain must be terminated. The terminator is built into the computer; however, you must add a terminator to the other end. Figure 6-3 shows a sample configuration.

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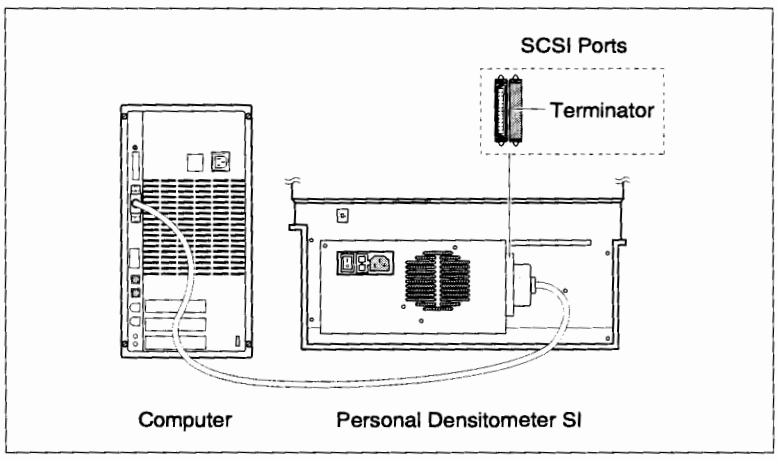


Figure 6-3. Connecting the Personal Densitometer SI and Macintosh computer.

Plug the SCSI cable into the SCSI ports on the Personal Densitometer SI, then plug the other end into the SCSI port on the Macintosh. Plug a terminator into the remaining SCSI port on the Personal Densitometer SI.

After installing the Personal Densitometer SI, you must enter the serial number that is printed on the back of the instrument. See figures 5-3 and 5-4 for the location of the serial number. To enter the serial number—

1. Turn on the instrument and computer using the procedure in section 5.1.2.

2. In the Scanner Control window, click on the **Select Scanner** button. The Select Scanner window appears.

3. Click on the **Edit** button. The Edit window appears.

4. Enter the serial number in the serial number box, then click on **OK** to close the Edit window.

5. Click on **OK** to close the Select Scanner window.

The Scanner Info area displays the scanner type, SCSI ID number, and serial number.

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Chapter 7 Windows NT Scanner Control

The Windows NT Scanner Control window (figure 7-1) has the following functions:

- **Calibrate button**—Initiates the calibration process (section 7.1).
- **Dataset box**—Displays the name of the current dataset (section 7.2).
- **Digital Resolution box**—Establishes the digital resolution (bits per pixel) for the image (section 7.3).
- **Help button**—Displays the disk space available on the computer hard disk (section 7.4).
- **Image Analysis Software box**—Selects the software to activate after scanning (section 7.5).
- **Image Info area**—Contains fields for entering the user name, preparation date, preparation time, and comments pertaining to the sample (section 7.6).
- **Pixel Size box**—Establishes the pixel size for the scan (section 7.7).
- **Scan area (grid)**—Determines the scan size and location, then activates the Save As window (section 7.8).
- **Scan button**—Begins the scan (section 7.9).
- **Scanner Info area**—Displays the scanner type, SCSI ID, and serial number for the currently selected instrument (section 7.10).
- **Templates area**—Selects, saves, and deletes templates (section 7.11).

Each of these areas is discussed in the following sections. In addition, section 7.12 describes how to determine disk space requirements.

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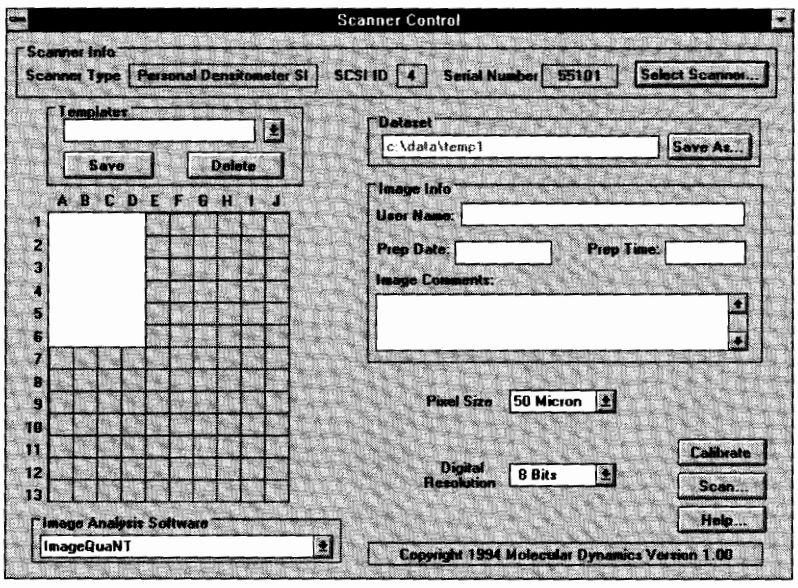


Figure 7-1. The Windows NT Scanner Control window.

7.1 Calibrate Button

You should calibrate the Personal Densitometer SI at least 20 minutes after you open the Scanner Control software. You may also want to calibrate the Personal Densitometer SI before scanning samples that require very high resolution.

To calibrate—

1. Remove the sample tray, then clean and dry it.

2. Return the sample tray to the Personal Densitometer SI and close the door. Do not calibrate with a sample on the tray.

3. Click on **Calibrate** in the Scanner Control window. A "Calibration in Progress" message appears. The calibration takes about four minutes.

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7.2 Dataset Box

The Dataset box displays the name of the dataset (including the path) that you are about to create. The Save As button opens the Save As window so that you can create a new dataset without changing the Scan area.

7.3 Digital Resolution Box

The quantitative scan mode of 12 bits per pixel provides 4096 levels of digital resolution. At this setting, the instrument can distinguish between adjacent bands of similar optical density on minigels and also detect extremely faint bands.

When you use a scan mode of 8 bits per pixel, the Personal Densitometer SI records 256 levels of digital resolution. You can use these lower resolution datasets to transfer images to compatible graphics programs. An 8-bit file is approximately half the size of a 12-bit file.

7.4 Help Button

You use the **Help** button to display the amount of disk space available on the computer hard drive and the amount of disk space required to store the current Scan area at the selected pixel size and digital resolution.

7.5 Image Analysis Software Box

You use the Image Analysis Software box to indicate what software to open after the scan is complete. If you select None, the Scanner Control window remains open so that you can scan additional samples.

7.6 Image Info Area

The Image Info area allows you to create notes to store with the image. To enter information, click on any box you want to use and type the information.

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7.7 Pixel Size Box

Pixel size refers to the size of each individual "spot" (or picture element) that is recorded and, together with the thousands of other pixels, forms the image. The Personal Densitometer SI allows you to select either a 100µ pixel size (1000 data points/cm^2) for normal-resolution images or a 50µ pixel size (4000 data points/cm^2) for high-resolution images.

You can save time and disk space by using the 100µ setting instead of the 50µ setting. The scan time is two times faster and the dataset size is approximately one-fourth as large.

7.8 Scan Area

You identify the scan coordinates and enter a dataset name from the Scan area.

7.8.1 Selecting the Scan Area

The grid on the Scanner Control window (figure 7-1) represents the grid on the sample tray. You designate the area to scan by using the mouse to draw a white rectangle on the grid.

When drawing the rectangle, select only those grid squares that are covered by the sample. Selecting an area larger than the sample increases the scan time and the size of the image file. Section 3.4 provides step-by-step instructions.

7.8.2 Entering a Dataset Name

You must enter a dataset name in the Save As window each time you create an image. If you draw a new Scan area, the Save As window opens automatically when you finish (figure 7-2). (If you want to use the existing Scan area, click on the **Save As** button in the Dataset area to open the Save As window.)

Enter the name for the dataset in the File Name box.

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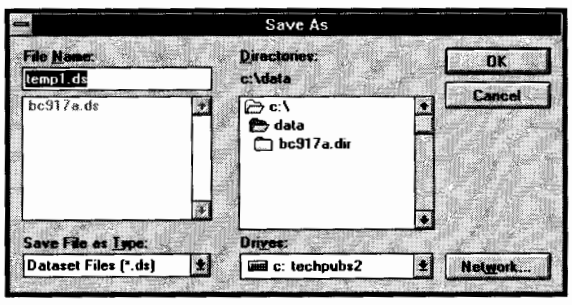


Figure 7-2. The Save As window.

If you want to store the dataset in other than the default DATA directory on the current drive, select a new directory from the Directories box, select a new drive from the Drives list, or click on the Network button to select a shared directory on another workstation.

Note: On a Windows NT-based computer, do not use the following characters: ." / \ :<>+=;, and space. You can use the underline character. The dataset name can be up to 8 characters if you are using the FAT file system or up to 255 characters if you are using the NTFS file system.

When you click on **OK,** the Save As window closes and the directory path and dataset name appear in the Dataset box.

7.9 Scan Button

After you enter all the information for the scan, click on the **Scan** button. (The sample tray must be in the Personal Densitometer SI and the door must be closed.) A Scan in Progress window appears. Click on the **Start** button to begin the scan and activate the Seconds Remaining counter. The scan is saved under the file name entered in the Save As window. When the scan is finished, either the selected image analysis software opens or the Scanner Control window remains open for more scanning, depending on your entry in the Image Analysis Software box.

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7.10 Scanner Info Area

The Scanner Info area displays the instrument currently accessed by the Scanner Control. The scanner type, SCSI ID number, and serial number are displayed. If more than one instrument is connected to the host computer, you can switch to a different instrument.

To change instruments, click on the **Select Scanner** button, which opens the Select Scanner window (figure 7-3). Click on the name of the instrument you want to use.

To modify or enter the serial number, click on **Modify.** The Modify window opens. Enter or select the serial number of the instrument and click on **OK.**

Note: After installing the Personal Densitometer SI, you must enter the serial number that is printed on the back of the instrument. See section 6.1 for instructions.

Click on **OK** to close the Select Scanner window. The Select Scanner Info area reflects the new configuration of the instrument.

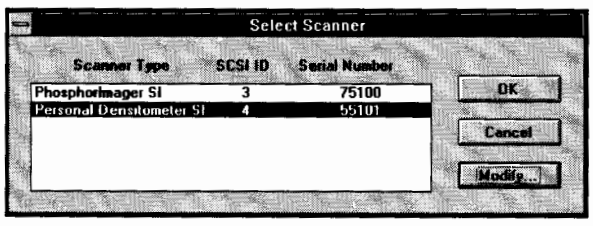


Figure 7-3. The Select Scanner window.

7.11 Templates Area

A template contains settings for the area to scan, the pixel size, the digital resolution, the Image Analysis Software, and the scanner information. It does not include the dataset name.

7.11.1 Using a Template

To use an existing template, click on the down arrow (▼) in the Templates box, then click on the template in the list. The settings for the template appear in the Scanner Control window. You need only add a dataset name and, if desired, image information.

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7.11.2 Creating a Template

To create a new template, you modify an existing template by changing the settings in the Scanner Control window, entering a new template name, and saving the template.

1. Click on the **Templates** box to display the list of templates, then select the template you want to modify.

2. Change the settings as follows:

   - In the **Scan area,** draw the rectangular area you want to record. (When the Save As window opens, click on the **Cancel** button because you do not want to specify a dataset name in the template.)

   - Select the digital resolution and the pixel size.

   - In the **Image Analysis Software** box, select the software you want to use.

3. Double-click on the **Templates** box of the Scanner Control window and type the new name, then click on the **Save** button. The new template is saved under the new name and the old template remains unchanged.

   Instead of creating a new template, you can modify the existing template. To do this, click on **Save** without changing the template name. A message appears asking if you want to delete the original template and replace it with the new one, click on **Yes.**

7.11.3 Deleting a Template

You can delete a template that is no longer useful.

1. In the Templates box, select the template you want to delete.

2. Click on the **Delete** button. The Delete Confirmation window opens and asks if you are sure you want to delete the selected template.

3. Click on **Yes** to delete the template and return to the Scanner Control window. (Click on **No** to close the window without deleting the template.)

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7.12 Check Available Disk Space

The Scanner Control software automatically checks for sufficient disk space when you start the scan. If not enough space is available, you will see an error message that displays the maximum allowable dimensions. To create free space, you can either change the dimensions of the Scan area, change the pixel size, change the digital resolution, transfer files, or delete files.

7.12.1 Calculating Disk Space Needed

To calculate the amount of disk space you need for the scan, use the following formula:

(number of grid squares) x (disk space per grid square)

The number of grid squares is the number of grid squares covered by the white rectangle in the Scan area of the Scanner Control window.

The disk space per grid square depends on the pixel size (50µ or 100µ) and the digital resolution (12 bits or 8 bits):

- 50µ pixel with 12 bits per pixel uses 320 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 40 MB.
- 50µ pixel with 8 bits per pixel uses 160 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 20 MB.
- 100µ pixel size with 12 bits per pixel uses 80 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 10 MB.
- 100µ pixel size with 8 bits per pixel uses 40 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 5 MB.

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7.12.2 Displaying Available Disk Space

To display the disk space currently available on the computer hard drive, click on the **Help** button in the Scanner Control window. A window (figure 7-4) appears, showing the disk space available in megabytes and the amount of space required to store the selected image size (Scan area) at the selected pixel size and digital resolution.

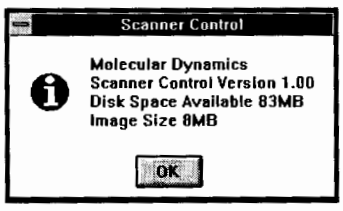


Figure 7-4. Displaying available disk space.

Compare the disk space available to the disk space needed for the scan. If not enough disk space is available, you can—

- Move files to another workstation or server (if your workstation is connected to a network).
- Transfer files to a backup disk or tape.
- Delete some files to free up disk space.
- Decrease the total area to be scanned.
- Select a larger pixel size.
- Select a smaller digital resolution.

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Chapter 8 Macintosh Scanner Control

The Macintosh Scanner Control window (figure 8-1) has the following functions:

- **Calibrate button**—Initiates the calibration process (section 8.1).
- **Dataset box**—Displays the name of the current dataset (section 8.2).
- **Digital Resolution box**—Establishes the digital resolution (bits per pixel) for the image (section 8.3).
- **Help button**—Displays the disk space available on the computer hard disk (section 8.4).
- **Image Info area**—Contains fields for entering the user name, preparation date, preparation time, and comments pertaining to the sample (section 8.5).
- **Pixel Size box**—Establishes the pixel size for the scan (section 8.6).
- **Scan area (grid)**—Determines the scan size and location, then activates the Save As window (section 8.7).
- **Scan button**—Begins the scan (section 8.8).
- **Scanner Info area**—Displays the scanner type, SCSI ID, and serial number for the currently selected instrument (section 8.9).
- **Templates area**—Selects, saves, and deletes templates (section 8.10).

Each of these areas is discussed in the following sections. In addition, section 8.11 describes how to determine disk space requirements.

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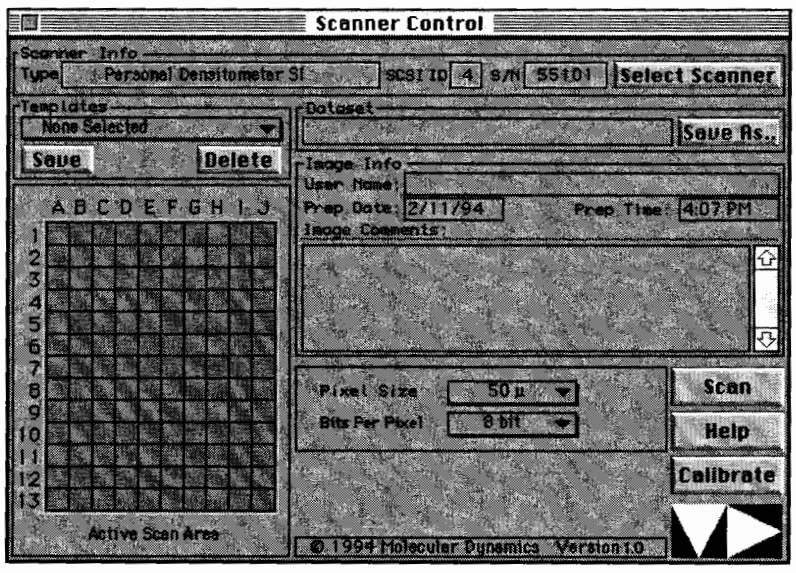


Figure 8-1. The Macintosh Scanner Control window.

8.1 Calibrate Button

You should calibrate the Personal Densitometer SI at least 20 minutes after you open the Scanner Control software. You may also want to calibrate the Personal Densitometer SI before scanning samples that require very high resolution.

To calibrate—

1. Remove the sample tray, then clean and dry it.
2. Return the sample tray to the Personal Densitometer SI and close the door. Do not calibrate with a sample on the tray.
3. Click on **Calibrate** in the Scanner Control window. A "Calibration in Progress" message appears. The calibration takes about four minutes.

8.2 Dataset Box

The Dataset box displays the name of the dataset that you are about to create. The Save As button opens the Save As window so that you can create a new dataset without changing the Scan area.

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8.3 Digital Resolution Box

The quantitative scan mode of 12 bits per pixel provides 4096 levels of digital resolution. At this setting, the instrument can distinguish between adjacent bands of similar optical density on minigels and also detect extremely faint bands.

When you use a scan mode of 8 bits per pixel, the Personal Densitometer SI records 256 levels of digital resolution. You can use these lower resolution datasets to transfer images to compatible graphics programs. An 8-bit file is approximately half the size of a 12-bit file.

8.4 Help Button

You use the **Help** button to display the amount of disk space available on the computer hard drive and the amount of disk space required to store the current Scan area.

8.5 Image Info Area

The Image Info area allows you to create notes to store with the image. To enter information, click on any box you want to use and type the information.

8.6 Pixel Size Box

Pixel size refers to the size of each individual "spot" (or picture element) that is recorded and, together with the thousands of other pixels, forms the image. The Personal Densitometer SI allows you to select either a 100µ pixel size (1000 data points/cm^2) for normal-resolution images or a 50µ pixel size (4000 data points/cm^2) for high-resolution images.

You can save time and disk space by using the 100µ setting instead of the 50µ setting. The scan time is two times faster and the dataset size is approximately one-fourth as large.

8.7 Scan Area

You identify the scan coordinates and enter a dataset name from the Scan area.

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8.7.1 Selecting the Scan Area

The grid on the Scanner Control window (figure 8-1) represents the grid on the sample tray. You designate the area to scan by using the mouse to draw a rectangle on the grid.

When drawing the rectangle, select only those grid squares that are covered by the sample. Selecting an area larger than the sample increases the scan time and the size of the image file. Section 4.4 provides step-by-step instructions.

8.7.2 Entering a Dataset Name

You must enter a dataset name in the Save As window each time you create an image. If you draw a new Scan area, the Save As window opens automatically when you finish (figure 8-2). (If you want to use the existing Scan area, click on the **Save As** button in the Dataset area to open the Save As window.)

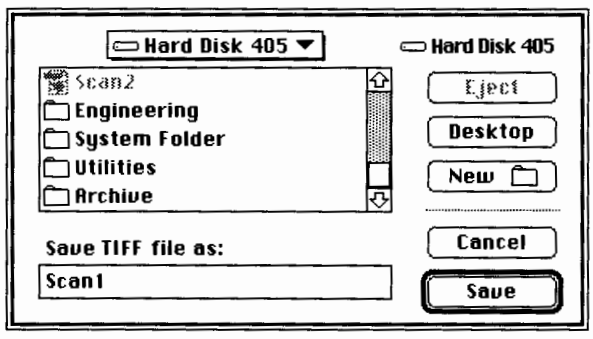


Figure 8-2. The Save As window.

If you want to store the dataset in other than the default folder, select a new folder from the hard disk list.

Enter the name of the dataset in the **Save TIFF file as** box. When you click on **Save,** the Save As window closes and the dataset name appears in the Dataset box.

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8.8 Scan Button

After you enter all the information for the scan, click on the **Scan** button. (The sample tray must be in the Personal Densitometer SI and the door must be closed.) The Start Scan window appears. Click on the **Start Scan** button to begin the scan. The scan is saved under the file name entered in the Save As window.

8.9 Scanner Info Area

The Scanner Info area displays the instrument currently accessed by the Scanner Control. The scanner type, SCSI ID number, and serial number are displayed. If more than one instrument is connected to the host computer, you can switch to a different instrument.

To change instruments, click on the **Select Scanner** button, which opens the Select Scanner window (figure 8-3). Click on the **SCSI** button. The window changes to display all the instruments connected to the SCSI bus. Click on the instrument name you want to use.

To modify or enter the serial number, click on **Edit.** The Edit window opens. Enter the serial number of the instrument and click on **OK.**

Note: After installing the Personal Densitometer SI, you must enter the serial number that is printed on the back of the instrument.

Click on **OK** to close the Select Scanner window. The Scanner Info area changes to reflect the new configuration of the instrument.

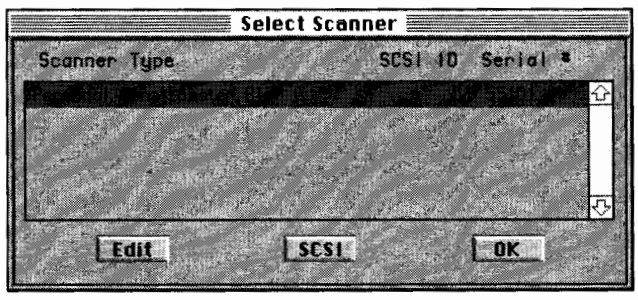


Figure 8-3. The Select Scanner window.

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8.10 Templates Area

A template contains settings for the area to scan, the pixel size, and the digital resolution. It does not include the image information or dataset name.

8.10.1 Using a Template

To use an existing template, move the pointer on the Templates box and hold down the mouse button, then highlight the template in the list. The settings for the template appear in the Scanner Control window. You need only add a dataset name and, if desired, image information.

8.10.2 Creating a Template

To create a new template, you modify an existing template by changing the settings in the Scanner Control window, entering a new template name, and saving the template.

1. Move the pointer onto the **Templates** box and hold down the mouse button to display the list of templates, then select the template you want to modify.

2. Change the settings as follows:

   - In the **Scan area,** draw the rectangular area you want to record. (When the Save As window opens, click on the **Cancel** button because you do not want to specify a dataset name in the template.)

   - Select the digital resolution and the pixel size.

3. To save the template, click on the **Save** button. A window appears. Enter the name for the new template and click on **OK.** If you enter—

   - A **new name**—The new template is saved under the new name. The old template remains unchanged.

   - The **original template name**—The old template is over-written by the new template settings.

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If you entered an existing template name, a message appears asking if you want to replace the existing template—

- If you want to delete the original template and replace it with the new template, click on **Yes**.
- If you want to keep the original template, click on **No** to return to the Scanner Control window. Repeat this step.

8.10.3 Deleting a Template

You can delete a template that is no longer useful.

1. In the Templates box, select the template you want to delete.
2. Click on the **Delete** button. The Delete Confirmation window opens and asks if you are sure you want to delete the selected template.
3. Click on **OK** to delete the template and return to the Scanner Control window. (Click on **Cancel** to close the window without deleting the template.)

8.11 Check Available Disk Space

The Scanner Control software automatically checks for sufficient disk space when you start the scan. If not enough space is available, you will see an error message that displays the maximum allowable dimensions. To create free space, you can either change the dimensions of the Scan area, transfer files, or delete files.

8.11.1 Calculating Disk Space Needed

To calculate the amount of disk space you need for the scan, use the following formula:

(number of grid squares) x (disk space per grid square)

The number of grid squares is the number of grid squares covered by the rectangle in the Scan area of the Scanner Control window.

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The disk space per grid square depends on the pixel size (50µ or 100µ) and the digital resolution (12 bits or 8 bits):

- 50µ pixel with 12 bits per pixel uses 320 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 40 MB.
- 50µ pixel with 8 bits per pixel uses 160 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 20 MB.
- 100µ pixel size with 12 bits per pixel uses 80 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 10 MB.
- 100µ pixel size with 8 bits per pixel uses 40 KB disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 5 MB.

8.11.2 Displaying Available Disk Space

To display the disk space currently available on the computer hard drive, click on the **Help** button in the Scanner Control window. A window (figure 8-4) appears, showing the disk space available in kilobytes and the amount of space required to store the selected image size (Scan area) at the selected pixel size and digital resolution.



Figure 8-4. Displaying available disk space.

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Compare the disk space available to the disk space needed for the scan. If not enough disk space is available, you can—

- Move files to another workstation or server (if your workstation is connected to a network).
- Transfer files to a backup disk or tape.
- Delete some files to free up disk space.
- Decrease the total area to be scanned.
- Select a larger pixel size.
- Select a smaller digital resolution.

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Chapter 9 Troubleshooting and Assistance

If you are having problems with your Personal Densitometer SI, use the troubleshooting section below to locate the description that matches your problem. If you cannot find a solution, call Molecular Dynamics for assistance (see section 9.2 for locations and phone numbers).

9.1 Troubleshooting

Problems, in bold print below, are followed by possible causes and solutions.

The Personal Densitometer SI Will Not Turn On

- The instrument may be unplugged.
- The wall outlet may be faulty. Test the outlet or try another one.
- The fuse may be blown. To change the fuse see section 5.1.4.

The Personal Densitometer SI Is On But Cannot Communicate

- The Personal Densitometer SI may be set to a "bad" SCSI address or another SCSI device may have the same address as the Personal Densitometer SI. Change the address on the Personal Densitometer SI or on the conflicting SCSI device.
- The last peripheral on the SCSI bus may not be properly terminated. Add the terminator as discussed in section 6.1 (Windows NT) or section 6.2 (Macintosh).
- The SCSI cable may not be properly plugged in. Check the connections to make sure they are tight.
- The serial number entered in the Scanner Control window may be wrong or missing. Enter the number from the back of the densitometer. See section 6.1 (Windows NT) or section 6.2 (Macintosh) for instructions.
- The SCSI cables may be the wrong type or too long.

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The Instrument Will Not Calibrate

- The sample tray may not be in place. Ensure that the tray is positioned all the way back in the machine. (You should see an error message if the tray is not positioned correctly.)
- The door may not be closed.

The Instrument Will Not Scan

- The sample tray may not be in place. Ensure that the tray is positioned all the way back in the machine. (You should see an error message if the tray is not positioned correctly.)
- The door may not be closed.
- The instrument may not be properly calibrated. See section 2.5.

High Background or Inaccurate Readings

- The instrument may not have been warmed up for at least 20 minutes before the sample was scanned. See section 2.3.
- The instrument may not be properly calibrated. See section 2.5.
- The sample tray may not be clean.
- The Personal Densitometer SI may be damaged and no longer light tight. If so, do not continue to use the instrument. Contact your Molecular Dynamics representative to arrange for repair.

Cannot See or Quantitate Faint Bands

- The instrument may not have been warmed up for at least 20 minutes before the sample was scanned. See section 2.3.
- The instrument may not be properly calibrated. See section 2.5.
- The sample tray may not be clean.

Lines Consistently Appear on Your Scans

Particles may have fallen onto the diffuser. To clean the diffuser, call your Molecular Dynamics representative.

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Black-and-White, Splotchy Background

The instrument may not be properly calibrated. See section 2.5.

Incomplete Image

The scanning coordinates designated in the Scanner Control window may be incorrect. See section 3.4 (Windows NT) or section 4.4 (Macintosh) for instructions.

9.2 Assistance

When calling for assistance, be prepared to supply the serial number of your instrument. The serial number is located on the back panel (figures 5-3 and 5-4) or in the Scanner Info area of the Scanner Control window.

United States
Molecular Dynamics World Headquarters, Sunnyvale, CA.
Telephone 1-800-743-7782, 408-773-1222, Fax 408-773-8343. Ask for Technical Support.

England
Molecular Dynamics Ltd., Kemsing.
Telephone (0732) 762565, Fax (0732) 763422.

Germany
Molecular Dynamics GmbH, Krefeld.
Telephone 02151-8387.0, Fax 02151-8387.40.

France
Molecular Dynamics S.A., Paris.
Telephone (1) 60 86 65 13, Fax (1) 60 86 65 33.

Japan
Molecular Dynamics Japan, Inc., Tokyo.
Telephone (03) 3976 - 9692, Fax (03) 3976 - 8845.

Australia
Molecular Dynamics Pty. Ltd., Kew East, VIC.
Telephone (03) 810 - 9572, Fax (03) 859 - 7253.

Other Countries: Please call your Molecular Dynamics distributor or representative. If you need the name and number of your representative, please contact Molecular Dynamics World Headquarters at 408-773-1222, Fax 408-773-8343.

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Part 3

Appendices

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Appendix A Specifications

Standard Units of Computer Memory

- Bit = the basic on-off unit of information (shorthand for Binary digIT)
- 1 Byte = eight bits
- 1 Kilobyte (KB) = 2^{10} or 1024 bytes
- 1 Megabyte (MB) = 2^{20} or 1,048,576 bytes

Pixel Size

- 50µ pixel = 4000 data points/cm^2
- 100µ pixel = 1000 data points/cm^2

Digital Resolution

- 12 bits per pixel provides 4096 levels of digital resolution
- 8 bits per pixel provides 256 levels of digital resolution

Disk Space per Grid Square of Scan Area

- 50µ pixel with 12 bits per pixel uses 320 KB of disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 40 MB.
- 50µ pixel with 8 bits per pixel uses 160 KB of disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 20 MB.
- 100µ pixel with 12 bits per pixel uses 80 KB of disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 10 MB.
- 100µ pixel with 8 bits per pixel uses 40 KB of disk space per grid square. A full 20 cm x 25 cm image (130 grid squares) uses 5 MB.

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Disk Space Required for the Scan

The amount of disk space you will need for your scan is:

(number of grid squares) x (disk space per grid square)

The number of grid squares is the area on the sample tray you want to scan. For example, scanning an area from coordinates C2 to G6 is (5 x 6) or 30 grid squares.

Disk Space Available

To find the disk space available for your scan, open the Scanner Control window, then click on **Help.** A window opens displaying the available disk space.

Windows NT-Based Computer

The Windows NT-based computer must meet or exceed the following specifications:

486-66 MHz computer, preferably with built-in Local Bus graphics
Keyboard and mouse
1 MB VRAM
16 MB of RAM, 32 MB of RAM recommended
340-MB hard disk or larger
EtherLink® III 3C509 card, recommended but not required
Adaptec® 1520 SCSI card for peripheral devices
15-inch color monitor, 1024 x 768 capable
3.5-inch floppy drive
Windows NT v3.1 (build 528 or higher)
Excel 4.0 or higher
MS DOS recommended

Macintosh Computer

The Macintosh computer must meet or exceed the following specifications:

Quadra™ 650 computer with keyboard, mouse, and monitor
16 MB of RAM
230-MB hard disk
1 MB VRAM

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Appendix B Warranty Statement

Molecular Dynamics Personal Densitometer SI
U.S.A. only, 2/94

Note: Outside the United States this warranty varies; please contact your representative for the exact terms of your warranty.

Molecular Dynamics warrants to the Customer that the Molecular Dynamics Personal Densitometer SI ("the Instrument") purchased by the Customer will be free from defects in material and workmanship and will meet its performance specifications for a period of one year (365 days) from the date of shipment from the manufacturing site. This warranty covers parts, labor, and shipping costs when the instrument is returned to the factory. Labor and travel for on-site repair during the warranty period is covered.

Customers are encouraged to have a Molecular Dynamics service engineer replace or repair technically complex components of the Instrument. Molecular Dynamics warrants to the Customer that only parts installed by a Molecular Dynamics service engineer, including any engineering change initiated by Molecular Dynamics, will be free from defects in workmanship for a period of one year. During such one-year period, this warranty covers parts and labor when the Instrument is returned to the factory. All Customer-installed parts supplied by Molecular Dynamics are warranted only to be free from defects in workmanship.

When the Instrument is returned to the factory for repair under warranty, the Customer must call Molecular Dynamics for a return authorization number and packing information. All Instruments must be packed for return according to Molecular Dynamics specifications. Molecular Dynamics will not be responsible for damage to an Instrument incurred during shipping if the Instrument was not packed according to Molecular Dynamics specifications. Molecular Dynamics will pay for air freight in both directions during the warranty period.

A list of parts that are considered to be Customer-installable consumables is attached. These parts are not covered by this warranty.

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This warranty does not extend to any Instruments or parts thereof that have been subject to misuse, neglect or accident, or that have been modified by anyone other than Molecular Dynamics, or that have been affixed to any nonstandard accessory attachment or that have been used in violation of Molecular Dynamics instructions.

No agent, employee, or representative of Molecular Dynamics has any authority to bind Molecular Dynamics to any affirmation, representation, or warranty concerning the Instrument; and any affirmation, representation, or warranty made by any agent, employee or representative shall not be enforceable by the Customer.

This warranty is the sole and exclusive warranty as to the instrument and extends only to the customer and is expressly in lieu of any other expressed or implied warranties, including without limitation any implied warranty or merchantability or fitness for a particular purpose and of any other obligation on the part of molecular dynamics.

Molecular Dynamics shall not be liable for any incidental, special or consequential loss, damage, or expense directly or indirectly arising from the use of the Instrument. Molecular Dynamics makes no warranty whatsoever in regard to products or parts furnished by third parties, such being subject to the warranty of their respective manufacturers. Service under this warranty shall be requested by contacting the Molecular Dynamics service representative at 800-743-7782, or, outside the United States, by contacting your local representative. (If you need the name and number of your representative, please contact Molecular Dynamics at 408-773-1222; Fax 408-773-8343.)

A service contract is available on an annual basis. Information on the service contract may be obtained by contacting the Molecular Dynamics Service Department in Sunnyvale, California, or your local Molecular Dynamics representative.

List of Consumables

Sample Tray

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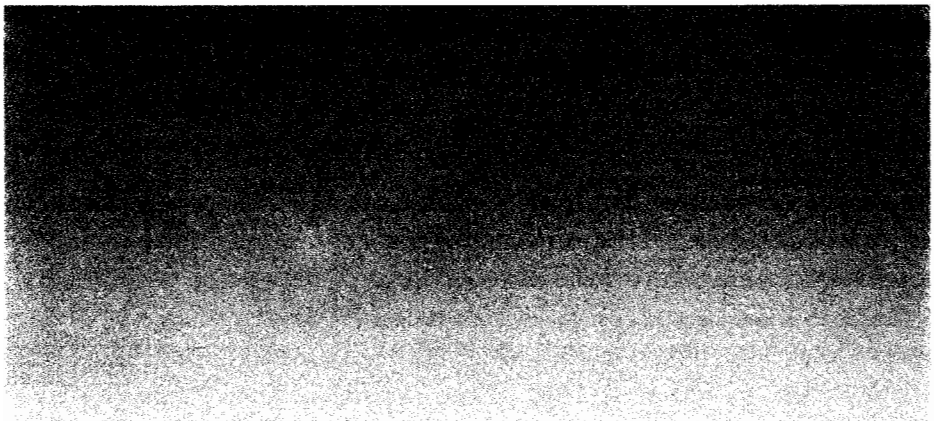
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Molecular Dynamics

Personal Densitometer™ SI

INSTALLATION INSTRUCTIONS

Apple® Macintosh®

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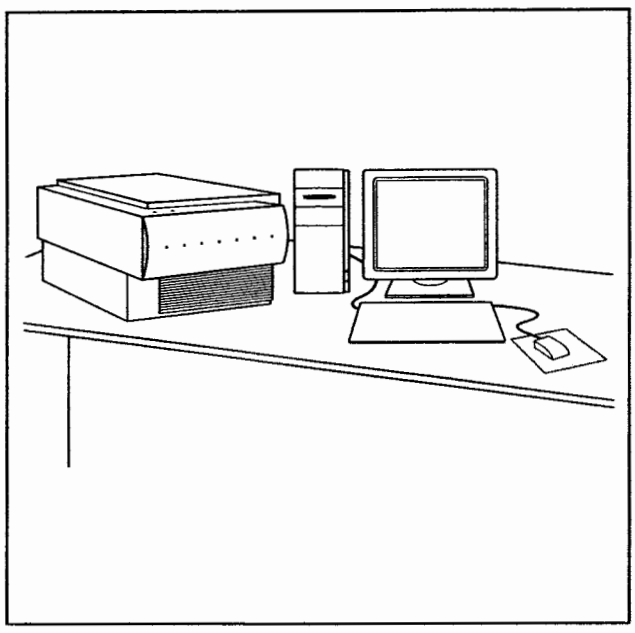
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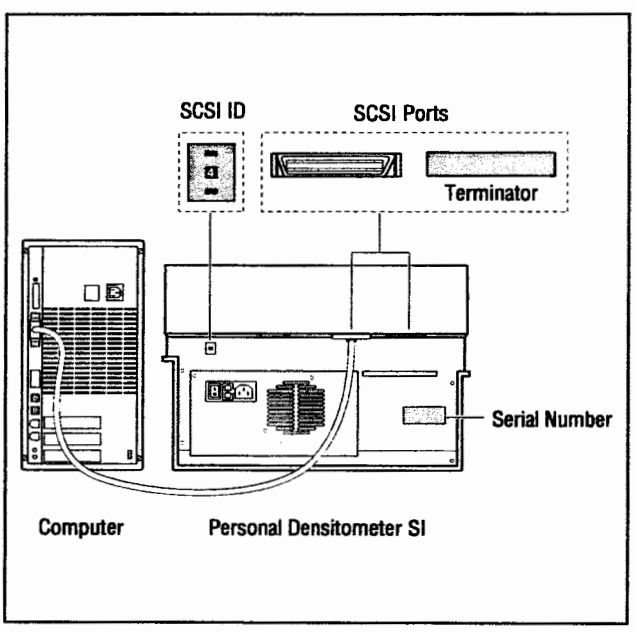
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Before you begin, check the following—

The computer is set up and the system software is installed.

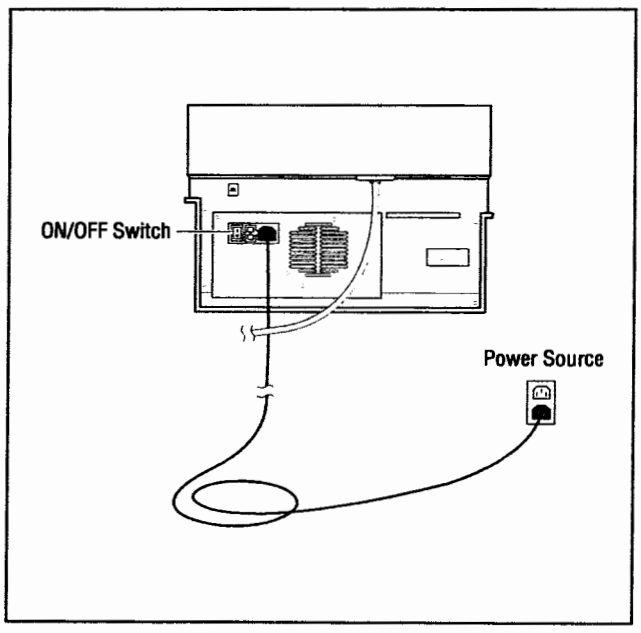
You should be familiar with the Macintosh graphical user interface. If you are not, refer to the Macintosh documentation.



Connect the PDSI to the computer through the SCSI interface—

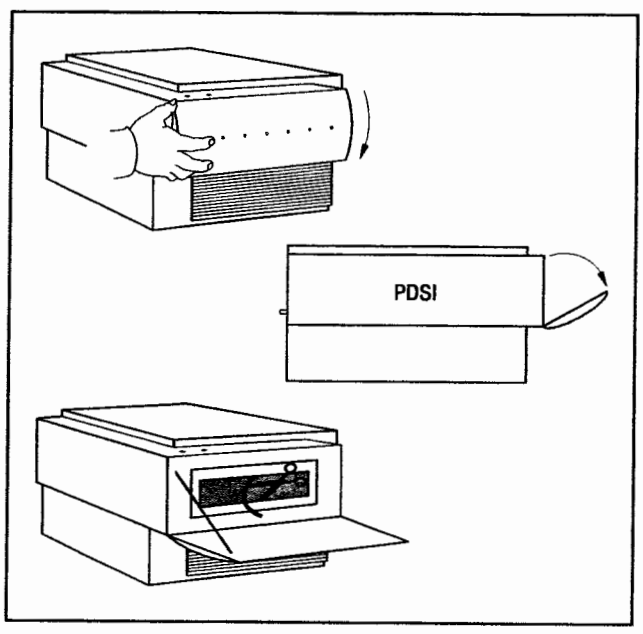
1. Shut down the computer.
2. Connect one end of the SCSI cable to the computer.
3. Connect the other end to one of the SCSI ports on the PDSI.
4. The SCSI ID number is preset to 4. Change the number only if 4 is used by another device. Do not use SCSI IDs 0 or 7.
5. Add a terminator to the second SCSI port on the PDSI.
6. Make a note of the serial number printed on the back of the PDSI. **You will use it later in the installation.**

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Connect the power cord—

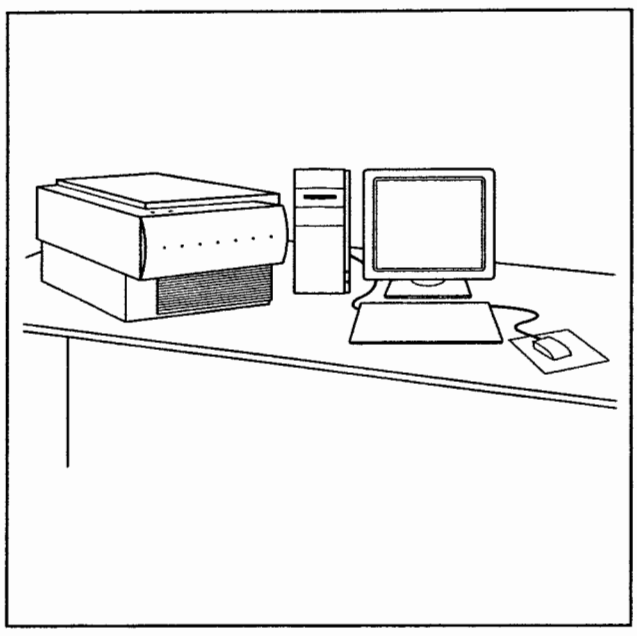
1. Connect the appropriate power cord (U.S. or International) to the PDSI.
2. Plug the cord into the power source.
   Note: The unit automatically switches voltages as required to meet line conditions.
3. Turn the PDSI so that the front faces forward.



Release the stage—

1. Grasp the densitometer door as shown.
2. Rotate the densitometer door open.
3. Using scissors, cut the plastic loop holding the stage.
4. Turn on the PDSI. Check that the red power indicator light on the top of the instrument is on. If it is not, recheck the connections.

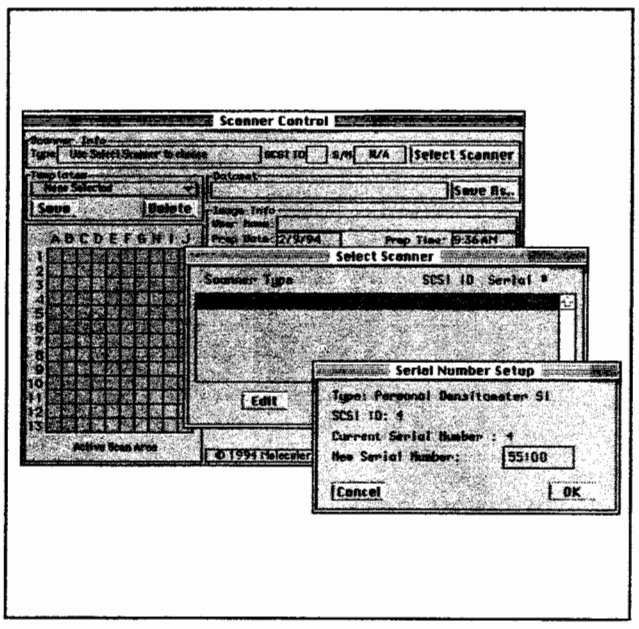
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Install the software—

First, install the ImageQuant software, then the Scanner Control software. The ImageQuant installation disks are located in the ImageQuant User's Documentation box. The Scanner Control SI software is located in the back of the *Personal Densitometer SI User's Guide.*

1. Turn on the monitor. Turn on the computer with the extensions off by holding down the SHIFT key when you start the computer.
2. Insert the first ImageQuant disk in the disk drive and double-click the Installer icon.
3. Follow the instructions on the screen. The installer creates an MD Apps folder. Inside the folder is the ImageQuant folder, which contains the ImageQuant software.
4. When the installation is complete, remove the last ImageQuant disk.
5. Double-click the MD Apps folder.
6. In the MD Apps folder, create a new folder and label it Scanner Control SI.
7. Insert the disk labeled Scanner Control SI for Macintosh in the disk drive. Double-click the Scanner Control disk icon.
8. Drag the contents of the Scanner Control SI disk to the Scanner Control SI folder.
9. Remove the disk and restart the computer.

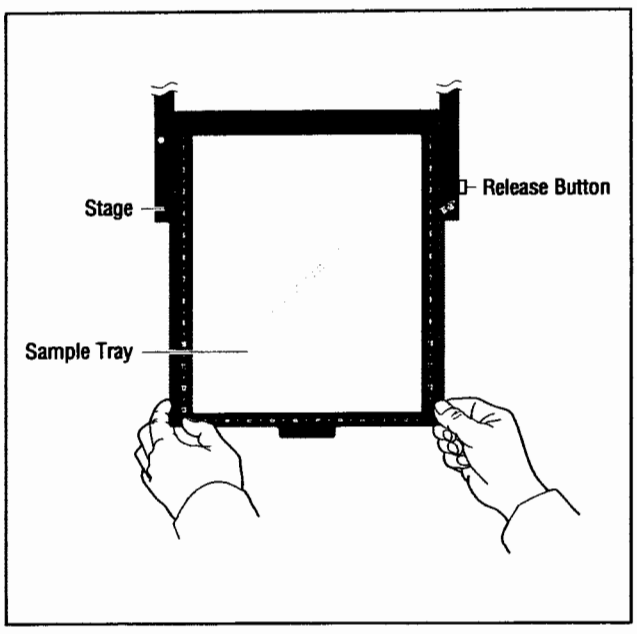


Enter the PDSI serial number—

1. Double-click the Scanner Control SI icon. The Scanner Control window appears.
2. Click the Select Scanner button. The Select Scanner window appears. (If more than one Scanner Type is displayed, click the scanner being installed.)
3. Click the Edit button. The Serial Number Setup window appears.
4. Type the serial number in the serial number box, then click OK to close the Serial Number Setup window.
5. Click OK to close the Select Scanner window.

Leave the Scanner Control window open.

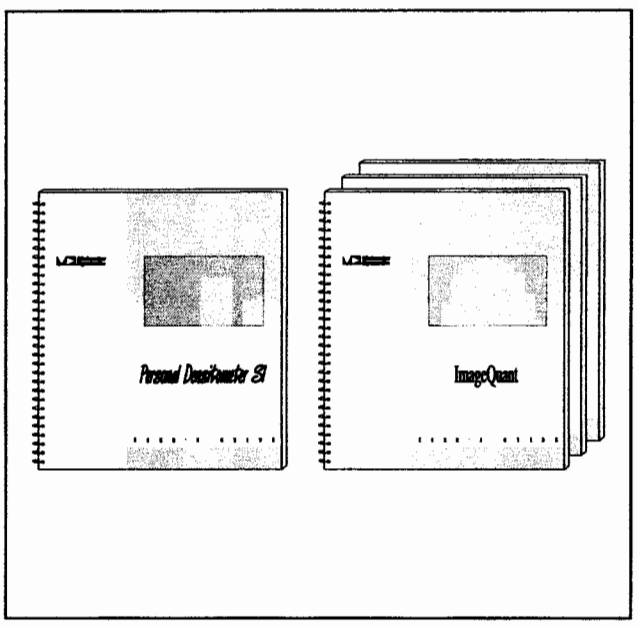
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Sample Tray—

Note: The Personal Densitometer SI should be running.

1. Unwrap the sample tray.
2. Hold the sample tray as shown.
3. Place the end of the sample tray in the grooves of the stage.
4. Push the tray in until it stops.
5. Press the release button and slide the sample tray in completely.
6. Close the densitometer door.



Start using the Personal Densitometer SI—

See the *Personal Densitometer SI User's Guide* and the ImageQuant User's Documentation to begin using the instrument and software.

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Compatibility of any computers not tested and approved by Molecular Dynamics is the responsibility of the user. See your Molecular Dynamics representative for the specifications of the approved computers.

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