DIONEX

Installing the
ICS-1500 Ion Chromatography System

TRADEMARKS

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PRINTING HISTORY

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Contents

Installation

This document provides instructions for the initial installation of the ICS-1500 Ion Chromatography System.

> **NOTE** **The order of the steps is important. It is especially important to install Chromeleon® before connecting the USB cable and turning on the ICS-1500 power.**

1 Facility Requirements

- Make sure the ICS-1500 installation site meets the following environmental specifications:

  Operating Temperature: 4 °C to 40 °C (40 °F to 104 °F)

  Humidity: 5% to 95% relative humidity, noncondensing

- Provide a sturdy workbench for the ICS-1500 of a height that ensures convenient access to the interior.

- Allow at least 15 cm (6 in) behind the ICS-1500 for power connections and ventilation. For optimal performance, install the ICS-1500 in a draft-free location, out of the path of air conditioning and heating vents.

- (Optional) Provide a clean gas source regulated to between 0.55 and 0.83 MPa (80 and 120 psi) for pressurization of the eluent reservoir.

- Use ASTM filtered, Type I (18-megohm) deionized water when preparing eluent and regenerant.

2   Unpacking the ICS-1500 System

1. After removing the ICS-1500 from the shipping box and removing the top
    layer of foam, remove the next layer of foam (see Figure 1).
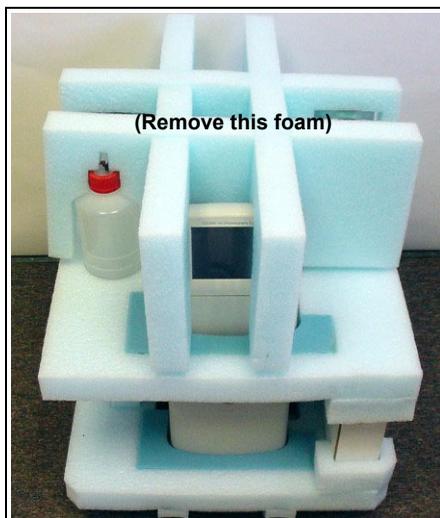
Figure 1. ICS-1500 After Removing Shipping Box and First Layer of Foam

2. Set the eluent bottle on top of the ICS-1500 (see Figure 2).
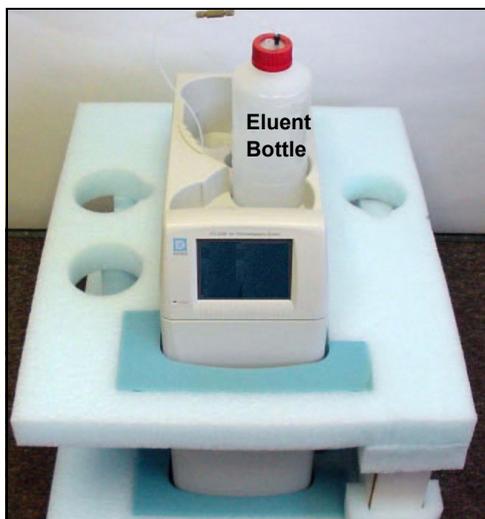
Figure 2. ICS-1500 with Eluent Bottle

3. Remove the next layer of foam and remove the Ship Kit box (see Figure 3).
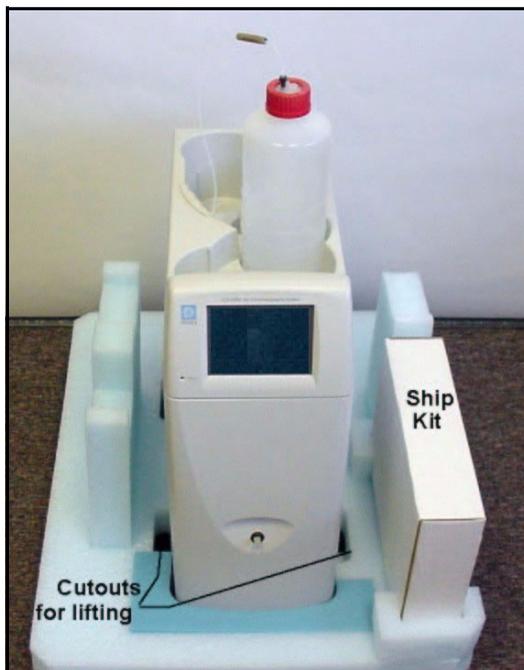
Figure 3. ICS-1500 with Ship Kit

4. The bottom foam layer has two cutouts on either side of the ICS-1500 module; use these as hand holds when lifting the module (see Figure 3).

5. Lift the ICS-1500 out of the bottom layer of foam and set it on a workbench. Inspect the ICS-1500 for any shipping damage.

⚠ CAUTION

Two or more persons should lift the ICS-1500, which weighs 30 kg (66 lb). Lift the ICS-1500 only from each side of the cabinet bottom. Lifting from the front door will damage the door hinges.

⚠ MISE EN GARDE

Au moins deux personnes peuvent soulever le ICS-1500: il pèse 30 kg (66 lb). Ne soulevez le ICS-1500 que par chaque côté du fond de l'armoire. Son soulèvement par la porte du panneau avant endommagera les charnières de la porte.

⚠ VORSICHT

Der ICS-1500 wiegt über 20 kg. Daher sollte das Gerät nur von zwei oder mehr Personen angehoben werden. Greifen Sie dazu an beiden Seiten unter das Gerät. Heben Sie den Autosampler nicht an der Vordertür an, da dadurch die Türangeln beschädigt werden könnten.

2.1   Unpacking the Computer (North America only)

> **NOTE** **These instructions assume that Chromeleon software and the software license were installed on the computer before shipping.**

1. Remove the central processing unit (CPU), keyboard, mouse, and all documentation from the computer box and place these items on a workbench.

2. Remove the monitor from its box and place it on the workbench.

3. Follow the instructions in the computer installation guide to hook up the monitor, mouse, keyboard, and CPU.

4. Go on to Section 4, "Installing the Chromeleon Software License.".

2.2   Unpacking the Computer (outside North America)

1. Refer to *Installing the Chromeleon IC System* (Document No. 031883) to verify that the computer being used meets Chromeleon specifications. The manual is on the Dionex Reference Library CD-ROM (P/N 053891).

2. Remove the central processing unit (CPU), keyboard, mouse, and all documentation from the computer box and place these items on a workbench.

3. Remove the monitor from its box and place it on the workbench.

4. Follow the instructions in the computer installation guide to hook up the monitor, mouse, keyboard, and CPU.

5. If Chromeleon is not installed on the computer, go on to Section 3, "Installing Chromeleon."

6. If Chromeleon is already installed on the computer, go on to Section 4, "Installing the Chromeleon Software License."

3   Installing Chromeleon

NOTES

- **Windows® 2000 or Windows XP is required for controlling the ICS-1500 with Chromeleon.**

- **To install Chromeleon, you must log onto Windows 2000 or XP with administrator privileges. Administrator privileges are not required to run Chromeleon.**

1. Turn on the computer power.

2. Follow the Windows setup steps as they appear on the screen.

3. Verify that the monitor display is set to a minimum of 1024 x 768 with 16 bit color.

4. Insert the Chromeleon CD-ROM into the CD-ROM drive.

5. The Chromeleon Setup menu appears.

6. If the Setup menu does not appear automatically, go to the Autorun folder on the Chromeleon CD-ROM and double-click **autorun.exe**.

7. Select **Launch Chromeleon Setup**.

8. Setup now guides you through the installation procedure; follow the on-screen instructions as they appear.

9. When prompted, select whether to add the Chromeleon Server Monitor to the Startup group. If you select yes, the Server Monitor starts automatically when the computer is started, and the program icon appears in the taskbar.

10. When complete, go on to Section 4, "Installing the Chromeleon Software License."

IMPORTANT

Installing DX-LAN Devices

If you will also be installing a module that requires a DX-LAN interface connection, verify that the following steps are completed before continuing:

1. If it is not already installed, install the DX-LAN card in the module. Refer to the operator's manual for the module for installation instructions.

2. Install the DX-LAN card in the computer.

3. Connect the module to the DX-LAN.

4. Install the DX-LAN card driver.

Instructions for Steps 2 through 4 are in *Installing the Chromeleon IC System* (Document No. 031883).

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4   Installing the Chromeleon Software License

For the Chromeleon computer to control the ICS-1500, a valid software license must be installed. To install the license, you first install a dongle on the computer and then enter a license "Key Code" in Chromeleon. (A dongle is an adapter that is connected to the parallel PC interface or USB port. The dongle stores the serial number of a Chromeleon computer.)

> **NOTE If the software license is managed via a License Server, a dongle is not required.**

1. Plug the dongle into the appropriate port on the computer (either the parallel or USB port, depending on the type of dongle). Tighten the connector screws on a parallel port dongle.

2. If it is not already running, start the Chromeleon Server Monitor (select **Start>Programs>Chromeleon>Server Monitor**). The Server Monitor window opens.

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3. Check the server status:

   - If "Chromeleon Server is running idle" is displayed, the license Key Code was entered before shipping the computer, and you can omit the remaining steps in this section. Click **Close** and go on to .

   - If "Chromeleon Server is running idle (Evaluation Mode)" is displayed (see), the license Key Code has not yet been entered. If this is the case, go on to Step 4.
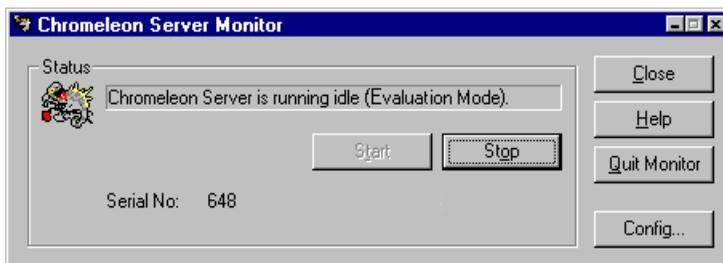
Figure 4. Server Evaluation Mode

4. Open Chromeleon (select **Start>Programs>Chromeleon>Chromeleon**).

5. Select **File>Preferences** to open the Preferences dialog box (see Figure 5). Select the **License** tab and click **Dongle**. Enter the **Key Code** exactly as it appears on the Chromeleon Software License key code sheet. Click **OK**.
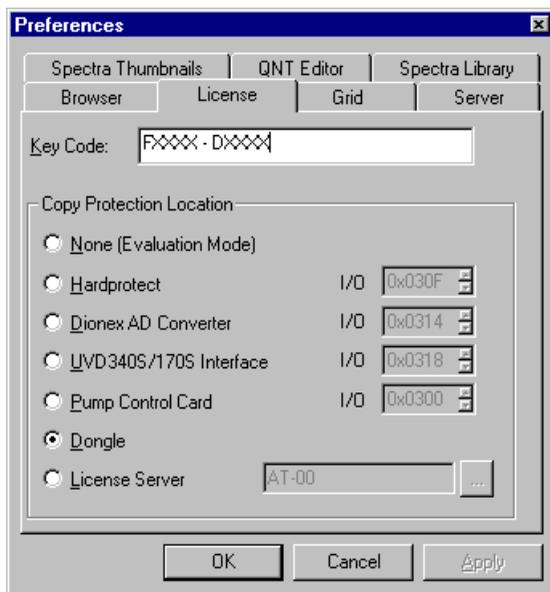
Figure 5. Preferences: License Page

6. Check the Server Monitor status. It should now display "Chromeleon Server is running idle." (see Figure 6).
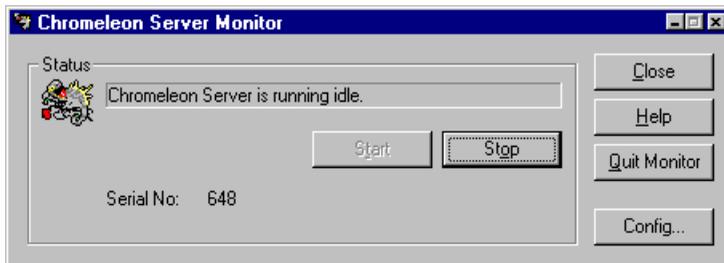
Figure 6. Server Running

7. Click **Close** to close the Server Monitor window.

8. Go on to Section 5.

5   Connecting the ICS-1500 to the Chromeleon PC

The ICS-1500 rear panel provides a USB receptacle for connecting the ICS-1500 to a USB port on the Chromeleon PC. The rear panel also provides two USB ports for connecting other Dionex USB-compliant modules to the system.

IMPORTANT   **Do not turn on the power to the ICS-1500 or other USB module(s) until after you connect the USB cable.**

Before connecting the USB cable, verify that Chromeleon is installed. If not, Windows will be unable to identify the new USB device when the power is turned on. See Section 3 to install Chromeleon.

5.1   Connecting the ICS-1500 to the PC

1. Locate the USB cable (P/N 960779) in the ICS-1500 Ship Kit (P/N 057905).

2. Plug the cable's "A" connector into a USB port on the Chromeleon PC and plug the cable's "B" connector into the USB receptacle (labeled **FROM PC**) on the ICS-1500 rear panel (see Figure 7).

B

ICS-1500

USB Cable

A

Chromeleon PC

Plug the USB cable's "B" connector into the FROM PC receptacle on the ICS-1500.

Plug the USB cable's "A" connector into the USB port on the Chromeleon PC.

FROM PC USB receptacle on the ICS-1500 rear panel
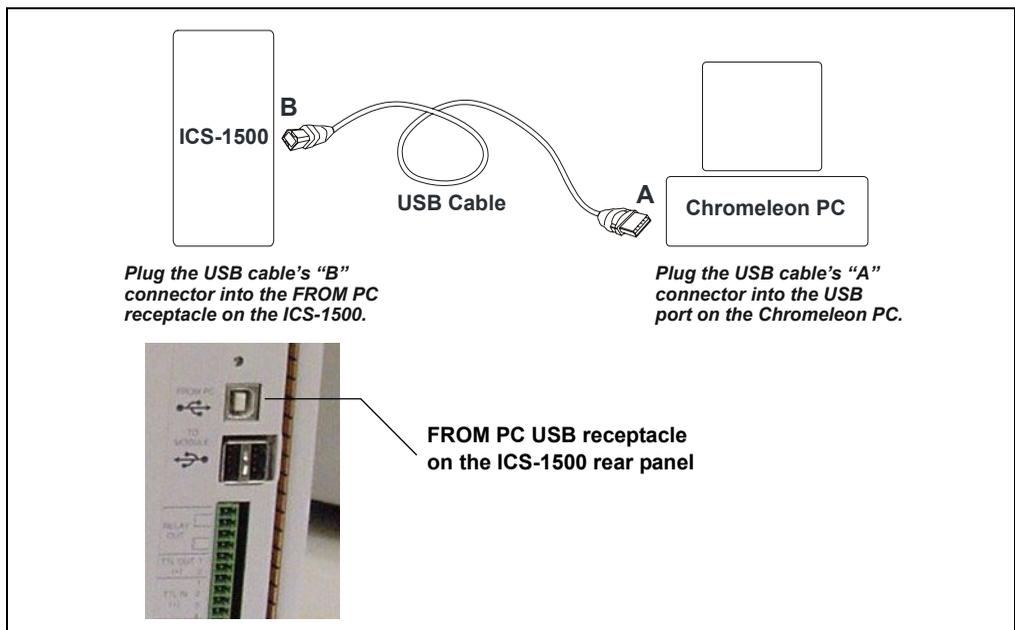
Figure 7. Example Connections: One ICS-1500 Connected to the Computer

5.2 Connecting Additional USB Devices

The ICS-1500 provides two USB ports for connecting additional Dionex USB-compliant modules to the system.

To connect an additional USB module, plug the "A" connector on a USB cable into an "A" port (labeled **TO MODULE**) on the ICS-1500 rear panel and plug the cable's "B" connector into the USB receptacle on the USB module (see Figure 8).
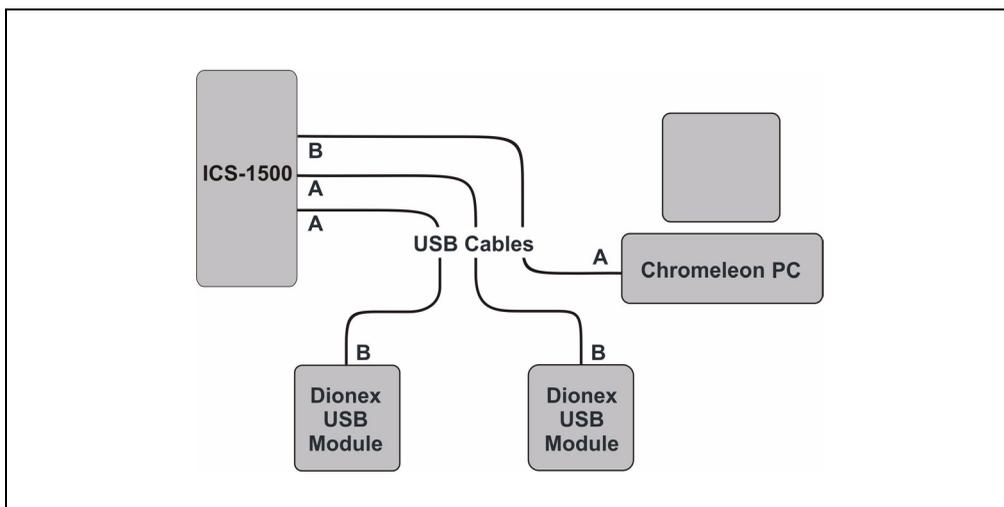
Figure 8. Example Connections: Two Dionex USB Modules Connected to the ICS-1500

NOTE   **If the number of USB devices in the system exceeds the number of available USB ports, connect the devices to the system with a USB-compliant, full-speed external hub. One or more hubs is also required if the ICS-1500 or other USB device is more than 5 meters (16 ft) from the PC. Refer to the manual provided by the hub vendor for complete installation instructions.**

IMPORTANT   **The USB standard limits the USB cable length to 5 meters (16 ft). Each USB device can be separated from the PC by no more than five hubs. Thus, each USB device can be located no more than 30 meters (32 yds) from the PC.**

6 Connecting the Power Cord

Connect the power cord (IEC 320 C13) (ordered separately) from the main power receptacle on the rear panel to a grounded power source. The ICS-1500 power supply is auto-sensing, so no adjustment is required to select the line voltage.

SHOCK HAZARD—To avoid electrical shock, use a grounded receptacle. Do not operate the ICS-1500 or connect it to AC power mains without an earthed ground connection.

The power supply cord is used as the main disconnect device. Make sure the socket-outlet is located near the ICS-1500 and is easily accessible.

Operation at AC input levels outside of the specified operating voltage range may damage the ICS-1500.

DANGER D'ÉLECTROCUTION—Pour éviter toute électrocution, il faut utiliser une prise de courant avec prise de terre. Ne l'utilisez pas et ne le branchez pas au secteur C.A. sans utiliser de branchement mis à la terre.

Le cordon d'alimentation principal est utilisé comme dispositif principal de débranchement. Veillez à ce que la prise de base soit située/installée près du module et facilement accessible.

STROMSCHLAGGEFAHR—Zur Vermeidung von elektrischen Schlägen ist eine geerdete Steckdose zu verwenden. Das Gerät darf nicht ohne Erdung betrieben bzw. an Wechselstrom angeschlossen werden.

Das Netzkabel ist das wichtigste Mittel zur Stromunterbrechung. Stellen Sie sicher, daß sich die Steckdose nahe am Gerät befindet und leicht zugänglich ist.

7   Turning On the ICS-1500 Power

IMPORTANT

Before turning on the ICS-1500 power, verify that Chromeleon software is installed. See Section 3 for installation instructions. If Chromeleon is not installed first, Windows will be unable to identify the new USB device.

1. If it is not already on, turn on the computer power and log onto Windows 2000 or Windows XP as an administrator.

2. Press the power switch on the ICS-1500 rear panel (see Figure 9) to turn on the power.

Figure 9. ICS-1500 Rear Panel

3. Windows automatically detects the new USB device. A message flashes on the screen to inform you that new hardware was found.
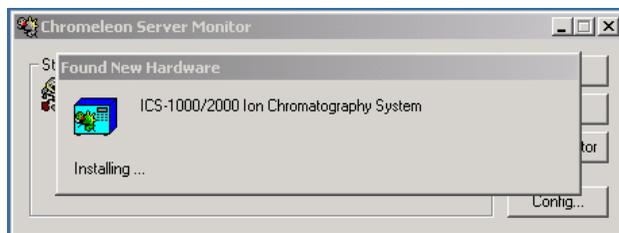
4. Go on to Section 8.

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8   Setting Up Chromeleon

NOTE **This section provides brief instructions for setting up Chromeleon. For details about any of these steps, refer to the Chromeleon user's guide or online Help.**

8.1   Assigning the ICS-1500 to a Timebase

1. If the Chromeleon Server is not running (the icon on the taskbar is crossed out in red), start the Server by right-clicking the icon and selecting **Start Server**. When the server starts, the icon changes to gray .

2. Open the Server Configuration program (select **Start>Programs>Chromeleon>Server Configuration**).

3. The Unassigned USB Devices dialog box appears (see Figure 10).
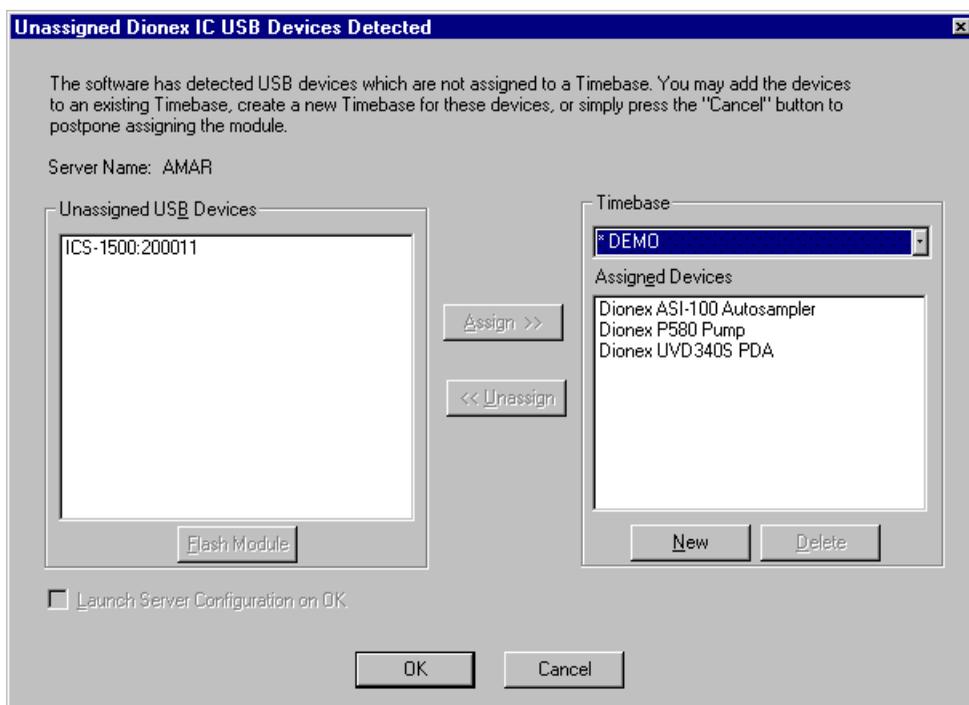
Figure 10. ICS-1500 Unassigned to Timebase

4. Click the **New** button.

5. The Timebase box displays a default name (the Server Configuration name). You can use the provided name or type a new one (for example, **ICS-1500**).

6. Press the **Enter** key.

7. In the Unassigned USB Devices box, select the ICS-1500 and then click the **Assign** button. The ICS-1500 is now assigned to the timebase (see Figure 11). If you are installing more than one ICS-1500, you can verify the serial numbers for each by checking the label on the component panel. The serial number is also shown on the **INFORMATION** touch screen page.

8. Repeat Step 7 if you are adding additional USB devices to this timebase.
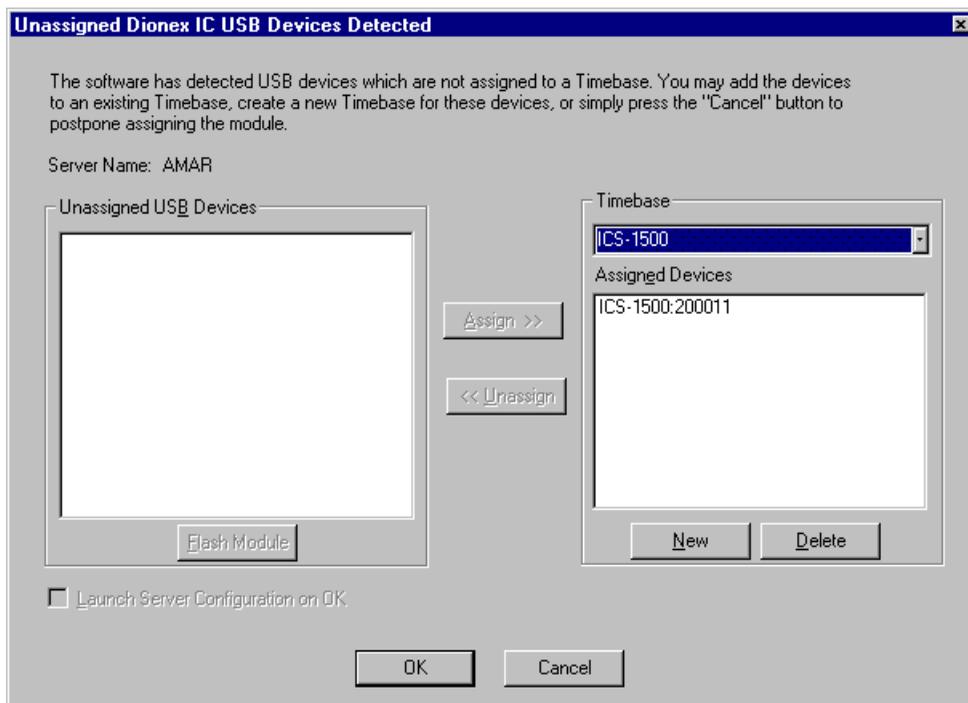
Figure 11. ICS-1500 Assigned to a Timebase

9. Click **OK** to close the dialog box. The Server Configuration program window appears.

10. Click the + icon next to the server name to expand the folder. The timebase you created is displayed (see).
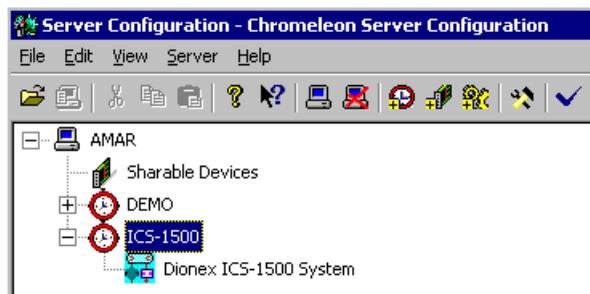
Figure 12. Server Configuration with ICS-1500 Timebase

11. To verify that the ICS-1500 is correctly connected to the timebase, double-click its name under the timebase. Click **Yes** if the following message appears: "Communication to the device will be stopped…Do you want to continue?"

12. The ICS-1500 System dialog box opens (see Figure 13). The **General** page shows the Device Name (**Pump_ECD)**, the Mode (**Live**), and the Module Serial No.
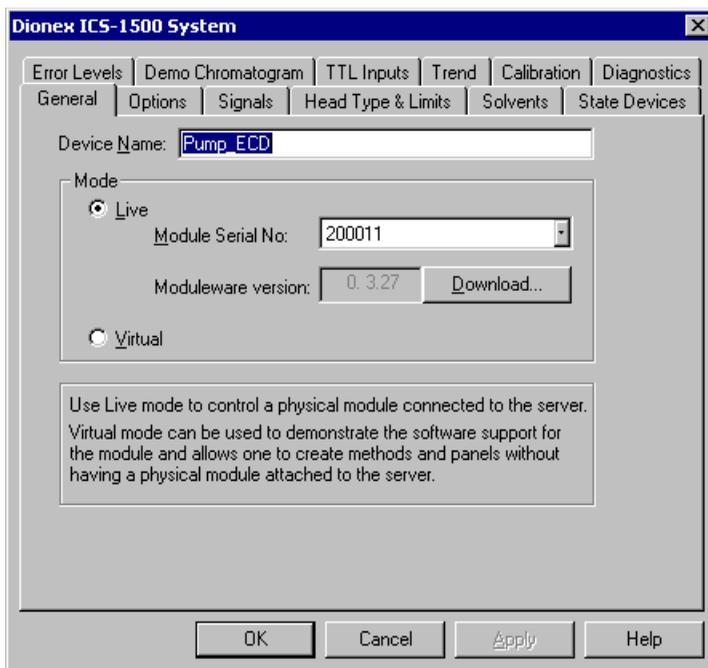
Figure 13. ICS-1500 System Properties

13. Close the dialog box and then save the configuration (select **File>Save Installation**).

14. If you are going to add one or more DX-LAN devices to the timebase, go on to Section 8.2. Otherwise, exit the Server Configuration program and then go on to Section 9.

8.2 Assigning DX-LAN Devices to the Timebase (Optional)

Follow the instructions in this section if you are adding one or more devices to the timebase that are connected to the PC through a DX-LAN interface (not through USB connections).

1. Follow the instructions in *Installing the Chromeleon IC System* (Document No. 031883) to add the DX-LAN card to the server configuration as a sharable device.

2. Select the timebase that was created for the ICS-1500 (see <u>Figure 14</u>);

    then, click the **Add device** icon ![icon] on the toolbar (or select
    Edit>Add Device).
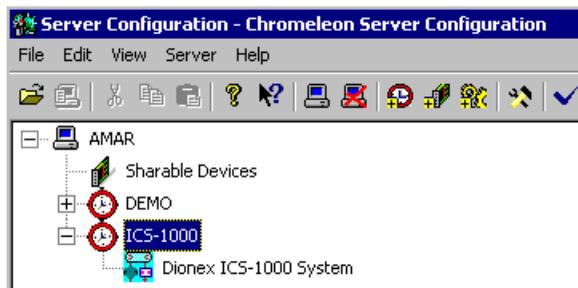
Figure 14. Example: ICS-1500 Timebase

The Add device to timebase dialog box appears.

3. If it is not already selected, select **Dionex** under Manufacturers and
    then select the device from the Devices list.
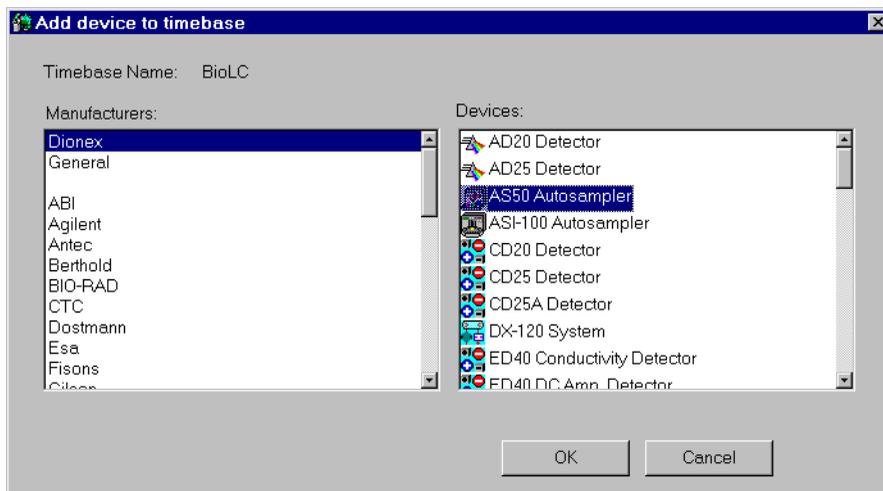
Figure 15. Add Device to Timebase Dialog Box

4. Click **OK**. A configuration properties dialog box for the device appears. Figure 16 shows an example of the properties for an AS50 Autosampler.

Figure 16. AS50 Configuration Properties

5. On the **General** tab page, clear the Demo Mode check box if it is currently selected, and then select the DX-LAN Device ID number. **Note**: Devices display their DX-LAN ID numbers when their power is turned on.

6. Click **OK** to close the dialog box.

7. Save the configuration (select **File>Save Installation**).

8. Exit the Server Configuration program.

9. Go on to Section 9

9   Installing and Plumbing the Columns and Suppressor

> **NOTE** **This section provides brief installation and plumbing instructions for the columns and suppressor. Before beginning the installation, refer to the column and suppressor manuals for detailed start-up and installation instructions. The manuals are provided on the Dionex Reference Library CD-ROM (P/N 053891), which is located in the ICS-1500 Ship Kit (P/N 057905).**

Before beginning:

*   Remove the guard column, separator column, and suppressor from their boxes.

*   Remove the fitting plugs from the ends of each column and from all ports on the suppressor.

*   Discard any tubing temporarily connecting the suppressor ports.

9.1   Column Heater Setup

1. Cut off the two shipping ties from the column heater and remove them (see Figure 17).

2. Loosen the two thumbscrews on the heater cover (they remain attached to the cover).

3. Pull the heater cover straight out to remove it.
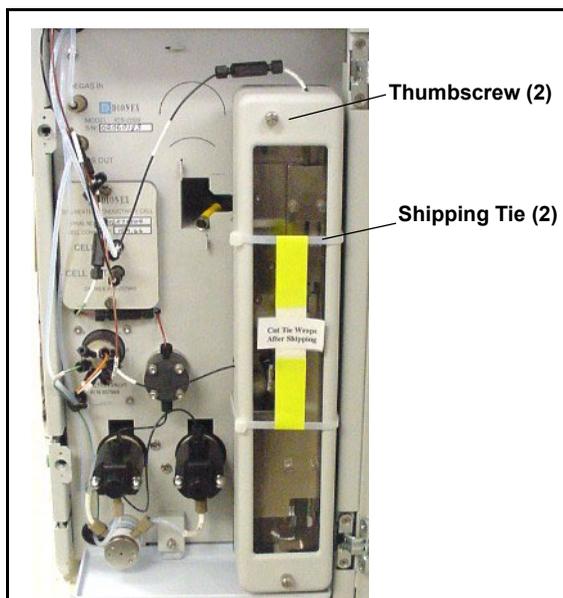
Figure 17. ICS-1500 Column Heater Setup

4. Unscrew the six thumbscrews on the top metal plate (see Figure 18) and remove the plate.

5. Go on to Section 9.2.

Thumbscrew (6)
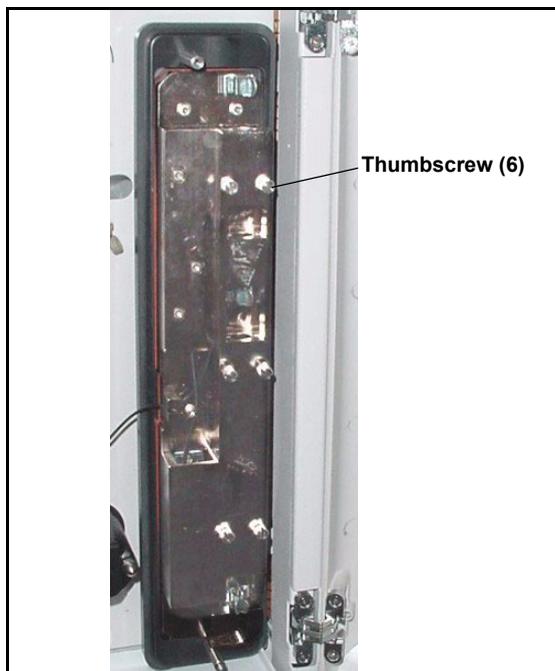
Figure 18. ICS-1500 Column Heater Cover Removed

9.2   Installing the Columns

1. Remove the union connecting **GUARD IN** and **GUARD OUT**.

2. Connect **GUARD IN** to the guard column inlet. Check the arrow on the column label; it should point down (flow away from the injection valve).

3. Connect **GUARD OUT** to the guard column outlet.

4. Push the guard column onto the back column clip.

5. Remove the union connecting **COL IN** and **COL OUT** and

6. Connect **COL IN** to the separator column inlet. Connect **COL OUT** to the separator column outlet. Check the arrow on the column label. It should point up (flow toward the cell).

7. Push the separator column onto the front column clips.

8. Replace the top metal plate on the column heater.

9.3   Installing the Suppressor

1. Locate the suppressor
    mounting tabs on the
    component panel (see
    Figure 19). Reach into
    the opening between the
    tabs and pull the yellow
    connector and attached
    cable slightly out of the
    opening.

2. Connect this cable to the
    cable from the
    suppressor (align the
    pins on the two
    connectors and push
    them together).

1 Suppressor
Mounting Tabs

2 Suppressor Cable
Connector

3 Guideline for AES

4 Guideline for SRS
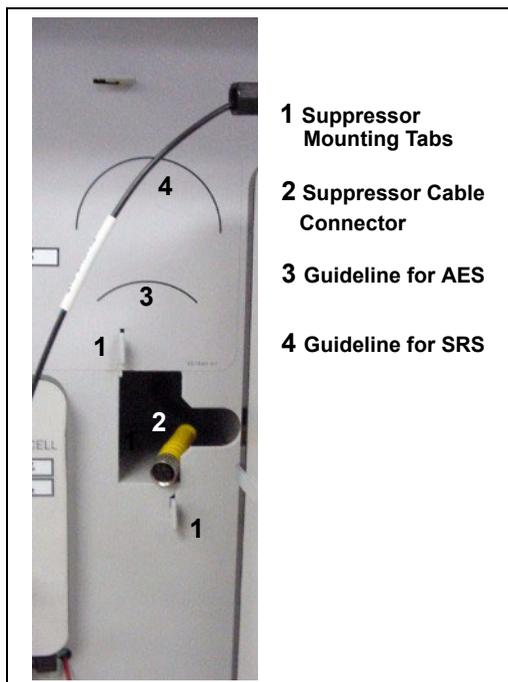
*Figure 19. Suppressor Mounting Tabs
and Guidelines*

3. Orient the suppressor with the **REGEN OUT** fitting on top and the
    cable to the right.

4. Feed the cable into the opening in the component panel.

5. Align the top of the suppressor with the guideline printed on the
    component panel (see Figure 19) and align the slots on the rear of the
    suppressor with the tabs on the panel.

6. Press the suppressor onto the tabs and then slide it down to lock it in place. Pull slightly on the center of the suppressor to verify that it is securely fastened. Figure 20 shows an SRS suppressor installed on the component panel.

7. Remove the union connecting **ELUENT IN** and **ELUENT OUT** and connect these lines to the corresponding ports on the suppressor.

*Figure 20. Suppressor Installed
(SRS Shown)*

8. Remove the fitting plug from **REGEN IN** and connect it to the **REGEN IN** port on the suppressor. Connect the **TO SRS/AES REGEN OUT** line to the **REGEN OUT** port on the suppressor.

9. Replace the cover on the column heater, making sure the **GUARD IN** line is aligned with the slot on the side of the heater cover.

10. Go on to Section 10.

10   Connecting the Waste Lines

The ICS-1500 has the following waste lines:

- **PUMP WASTE** carries prime waste from the pump.

- **TO WASTE OUT** carries sample overflow from the injection valve.

- **WASTE, GAS SEPARATOR** carries system waste from the suppressor.

Untape the coiled waste lines from the rear panel. Place the ends of the **PUMP WASTE** and **TO WASTE OUT** lines into a waste container.

Direct the **WASTE, GAS SEPARATOR** line from the top of the ICS-1500 to the rear panel. Snap the line onto one of the tubing clips on the rear panel. Connect the line to the gas separator waste tube (see Section 10.1).

> **NOTE**   **To prevent waste from siphoning back into the system,**
> **check the lines periodically to be sure they are not bent,**
> **pinched, or elevated at any point.**

10.1   Installing the Gas Separator Waste Tube

1. Locate the gas separator waste tube assembly (see Figure 21) in the ICS-1500 Ship Kit (P/N 057905).

2. Connect the **WASTE, GAS SEPARATOR** line to the 3-mm (1/8-in) ID white Teflon tubing on the gas separator waste tube assembly.

Connect the WASTE, GAS SEPARATOR line here

Figure 21. Gas Separator Waste Tube Assembly

3. Place the gas separator waste tube assembly into the waste container. Make sure the tubing junction (where the white Teflon tubing meets the black polyethylene tubing) is above the top of the container and

that the gas separator waste tube and the waste container are open to the atmosphere (see Figure 22).

4.   Go on to Section 11.
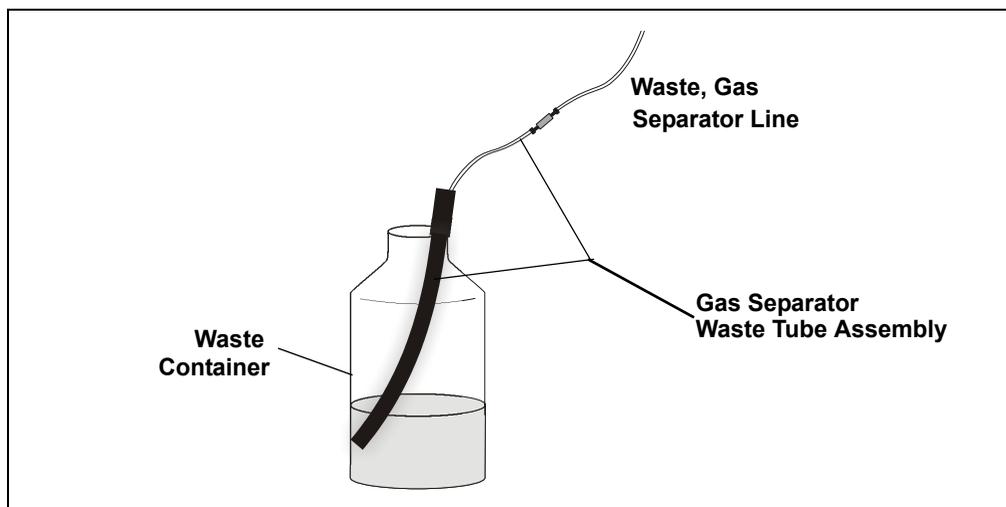
Figure 22. Gas Separator Waste Tube Installation

⚠ **CAUTION**

DO NOT CAP THE WASTE CONTAINER: The ICS-1500 uses an electrolytic process that results in the production of small amounts of oxygen or hydrogen gas. To ensure that the gas is not trapped in a closed container and allowed to concentrate, install a 1.3-cm (0.52-in) ID black gas separator waste tube (P/N 045460) in an uncapped waste container. Connect the Waste, Gas Separator line to the waste tube (see Figure 22).

⚠ **MISE EN GARDE**

NE FERMEZ PAS LE CONTENEUR DE GAZ RÉSIDUEL L : Le ICS-1500 travaille avec un proces d´électrolyse, qui produit des petites quantités de gaz d´oxygène ou d´hydrogène. Afin de garantir que le gaz ne soit pas enfermé dans un conteneur fermé et puisse s´y concentrer, connectez un tube noir à gaz résiduel (diamètre intérieur = 1,3 cm ; n° de commande 045460) à un conteneur ouvert (non fermé). Connectez le conteneur résiduel au tube résiduel/gaz séparateur (désigné: « Waste, Gas Separator»).

⚠ **VORSICHT**

VERSCHLIESSEN SIE DEN ABFALLBEHÄLTER NICHT: Der ICS-1500 verwendet einen Elektrolyseprozess, wodurch kleine Mengen an Sauerstoff und Wasserstoff entstehen. Führen Sie einen schwarzen Gasabscheiderschlauch (ID = 1,3 cm; Bestell-Nr. 045460) in einen offenen (unverschlossenen) Abfallbehälter, damit sich das Gas nicht in einem geschlossenen Behälter sammelt und aufkonzentriert. Verbinden Sie die mit Waste, Gas Separator bezeichnete Leitung mit dem Abfallschlauch.

11   Setting Up the Eluent Reservoir

1. Rinse the eluent reservoir.

2. Prepare the eluent as instructed in the manual for the column being installed. The column manual is included on the Dionex Reference Library CD-ROM (P/N 053891), located in the Ship Kit.

3. Fill the reservoir with the prepared eluent.

4. Place the reservoir on top of the ICS-1500.

5. Install the cap and hand tighten.

> **NOTE** **The ICS-1500 does not require pressurized reservoirs. However, if eluent is manually degassed or is sensitive to contamination, Dionex recommends pressurizing the reservoir with helium or nitrogen. See Section 20 for instructions.**

6. Go on to Section 12.

12   Setting Up a Chromeleon Application

Chromeleon provides application templates, which you can use to quickly get started running. To use the application templates, you need to know the type of column and suppressor you will be using. This section shows how to create a list of samples to be processed (a sequence) and how to use an application template.

1.   Identify the type of column and suppressor installed in the ICS-1500.

2.   Start Chromeleon (select **Start>Programs>Chromeleon>Chromeleon**). The Chromeleon main window and Browser appear (see Figure 23).
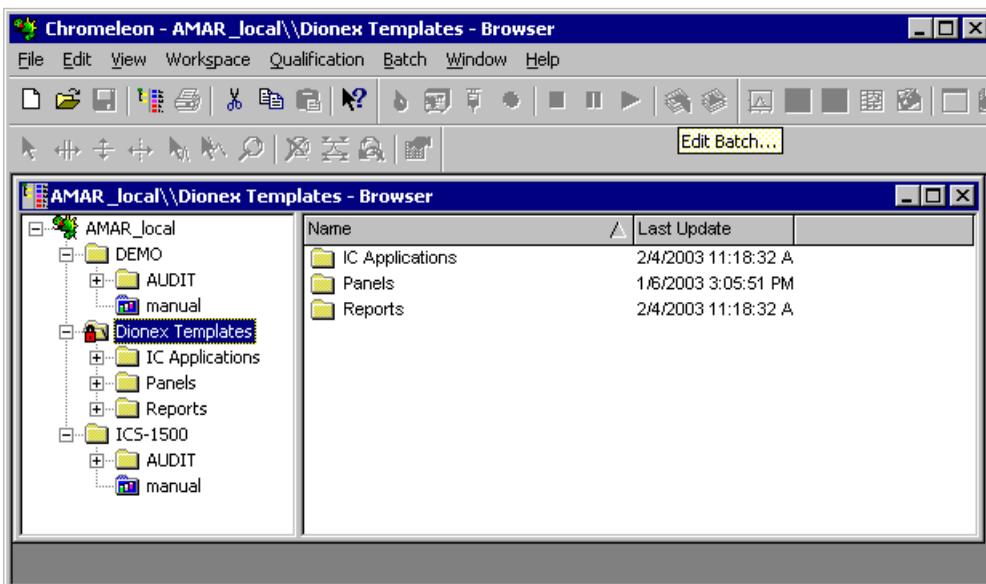
Figure 23. Chromeleon Main Window and Browser

3. In the Browser, select **File>New** and select **Sequence (using Wizard)** (see Figure 24).
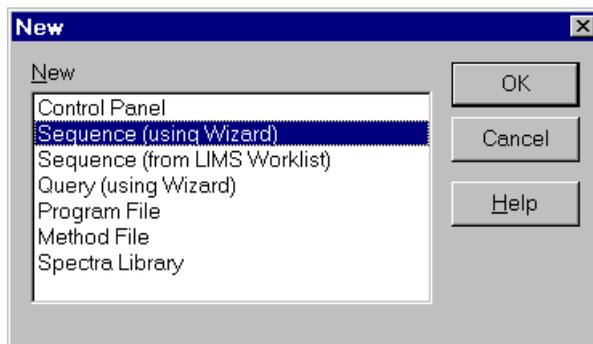
Figure 24. Creating a New Sequence

The Sequence Wizard Welcome page appears (see Figure 25).
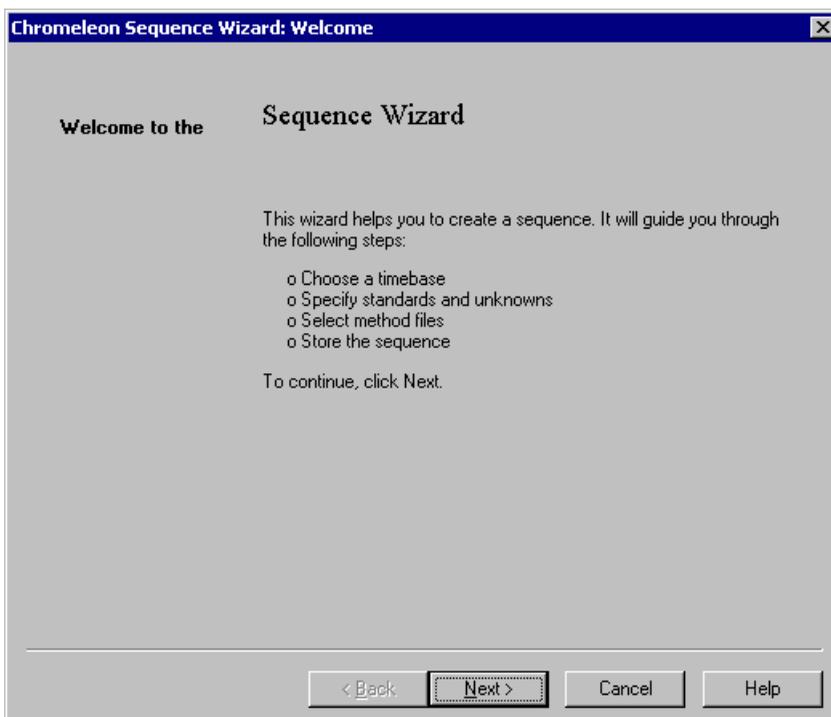
Figure 25. Sequence Wizard Welcome Page

> **NOTE** **For details about a Sequence Wizard step, click the Help
> button on the Sequence Wizard page.**

4. Click **Next>**.

   The Sequence Wizard Timebase page appears (see <u>Figure 26</u>).
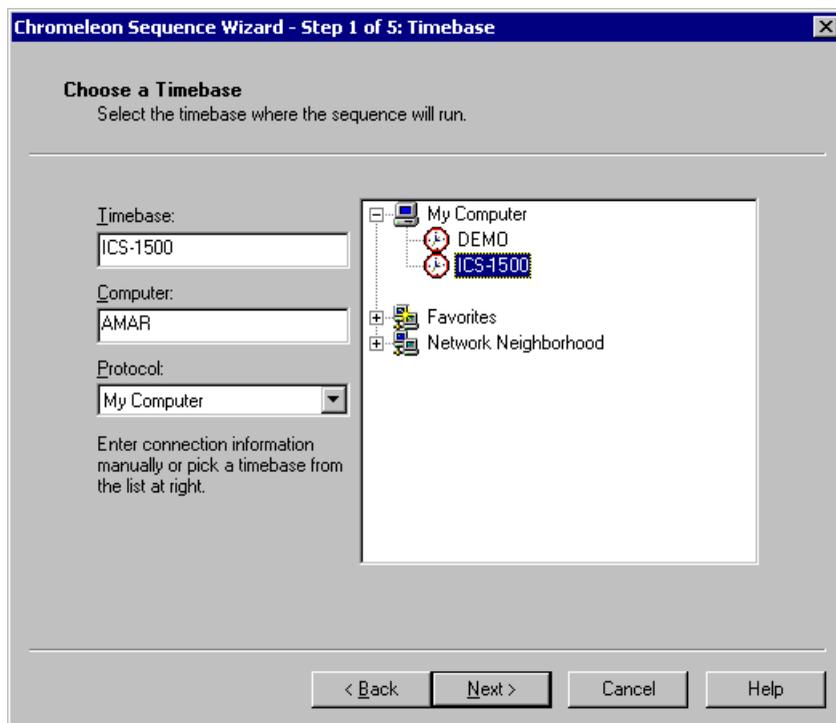
Figure 26. Example: Sequence Wizard Step 1

5. Select the ICS-1500 timebase and click **Next>**.

The Unknown Samples page appears (see).
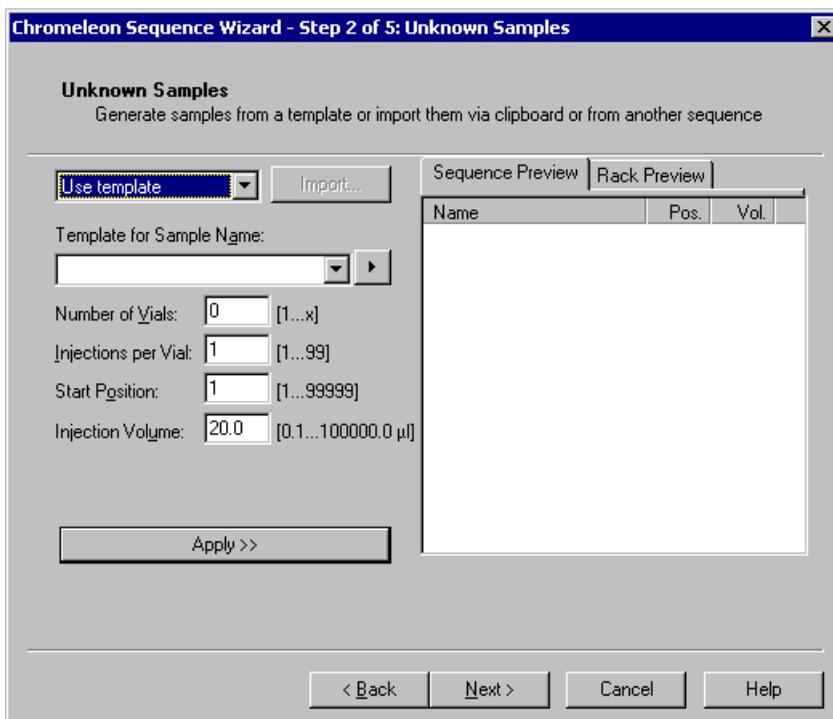
Figure 27. Example: Sequence Wizard Step 2

6. Select **Use Template** from the drop-down list.

7. In the **Template for Sample Name field**, type **Sample**, click the right arrow, and select **Sample Number #n**.

8. In the **Number of Vials** field, type **1**.

9. Use default settings for the remaining parameters on the page.

> **NOTE** **You can edit the sequence later, to add more samples and select the injection parameters appropriate for your application.**

10. Click **Apply**.

Figure 28 shows Sequence Wizard Step 2 after a sample is defined.
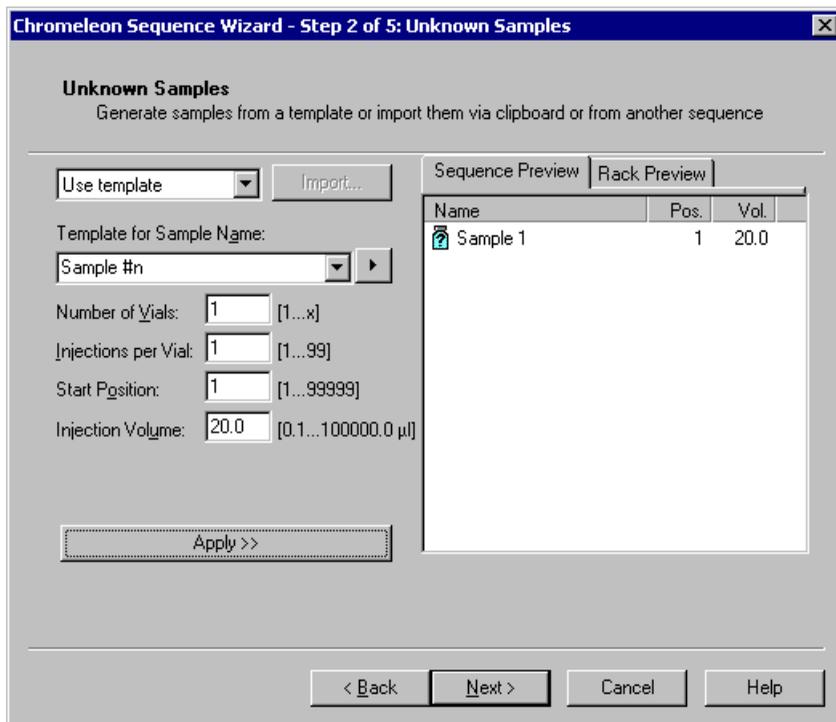
Figure 28. Example: Sequence Wizard Step 2 with Sample Defined

11. Click **Next>**.

The Standard Samples page appears (see Figure 29).
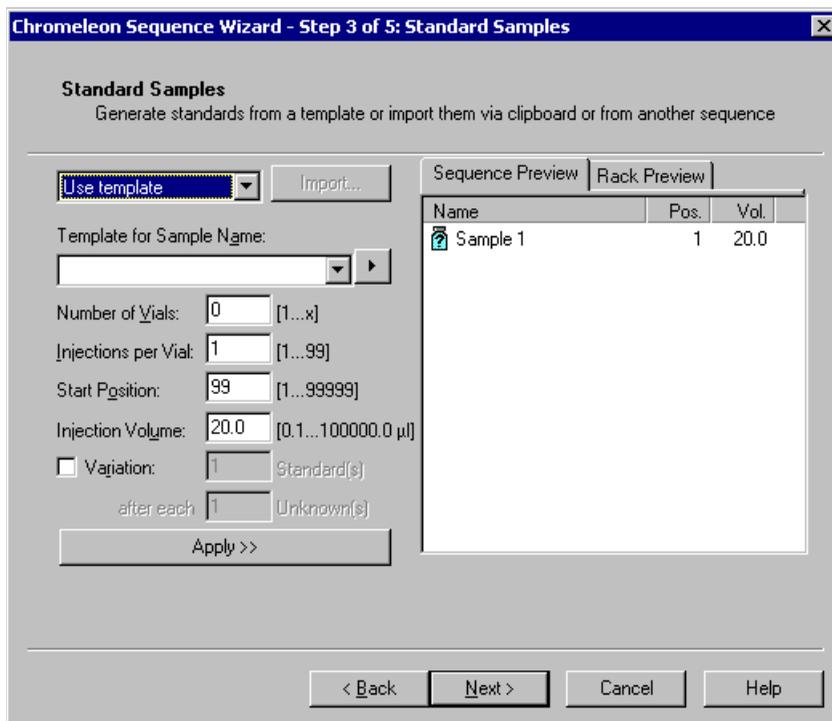
Figure 29. Example Sequence Wizard Step 3

12. Click **Next>** to omit this step and define standard injections later. Or, define one or more standard injections, and then click **Next>**.

The Methods & Reporting page appears

13. Select the **Use Application Template** check box.

14. From the drop-down lists, select the type of suppressor to be installed and then select the column.

     In the example in Figure 30, the 4-mm ASRS suppressor and AS17 column are selected.
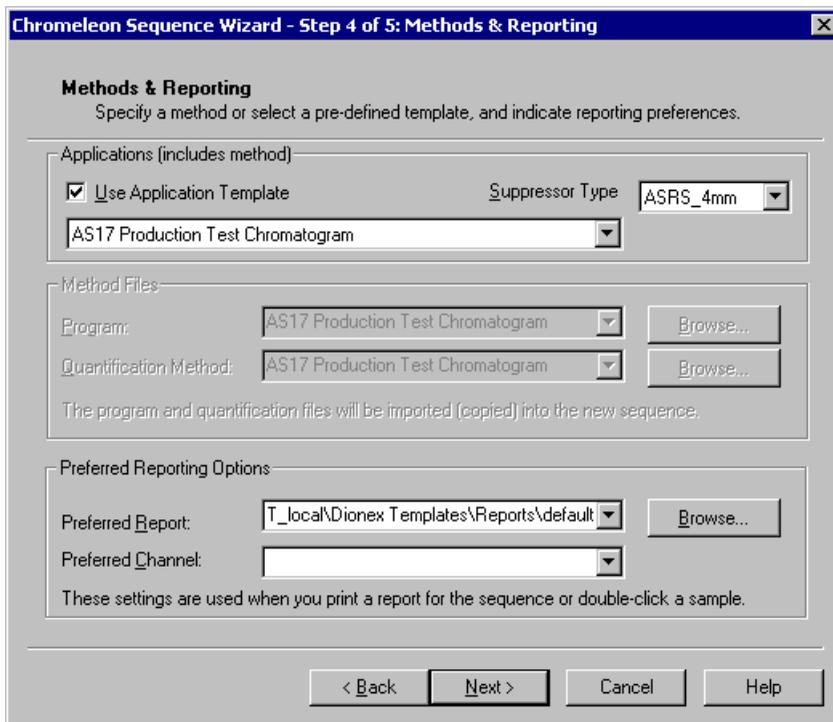
Figure 30. Example: Sequence Wizard Step 4

15. To select a report template, click the **Browse** button, go to the Dionex Templates/Reports folder, and select a template (for example, **default_letter)**.

16. Click **Next>**.

     The Saving the Sequence page appears.

17. Enter a name for the sequence and a location (see the example in Figure 31).
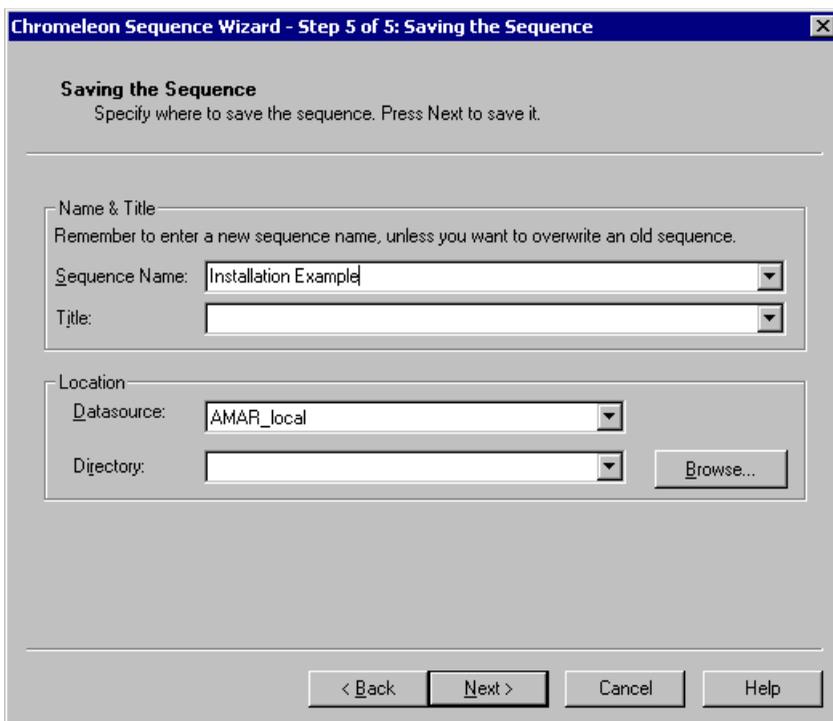
Figure 31. Example: Sequence Wizard Step 5

18. Click **Next>** and then click **Done** on the last page of the Sequence Wizard.

    The Browser appears, displaying the sequence you created (see Figure 32). Notice the three files in the top pane of the Browser window.
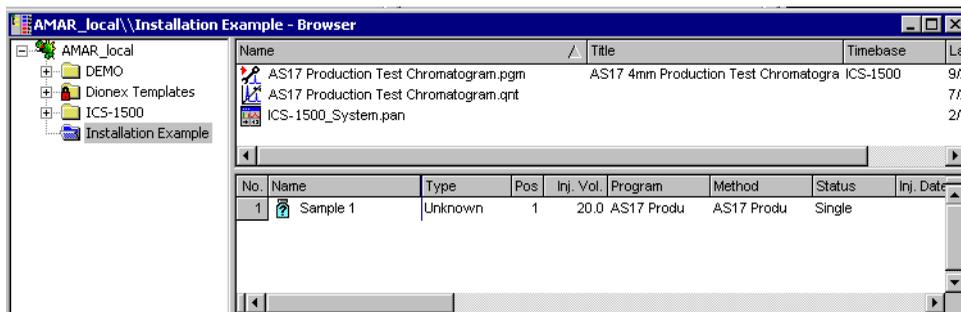
Figure 32. Example Browser with Open Sequence

- The .pgm file (program) contains commands and parameters for controlling the ICS-1500, controlling the autosampler (if used), and acquiring sample data.

- The .qnt file (quantification method) contains peak identification and area determination parameters.

- The .pan file (Control Panel) lets you control and/or monitor the ICS-1500 and other modules that are connected to the timebase.

> **NOTE** **The sequence that you create here is intended as a starting point only. You can add additional samples to the sequence, change injection parameters, and edit the .pgm and .qnt files. Refer to the Chromeleon online Help for details.**

> **NOTE** **After completing the installation, see Chapter 3 in the ICS-1500 operator's manual (Document No. 031857) for how to process the samples and standards in the sequence. The manual is on the Dionex Reference Library CD-ROM (P/N 053891).**

19. Double-click the .pan file to open the Control Panel for your system (see the example in Figure 33).
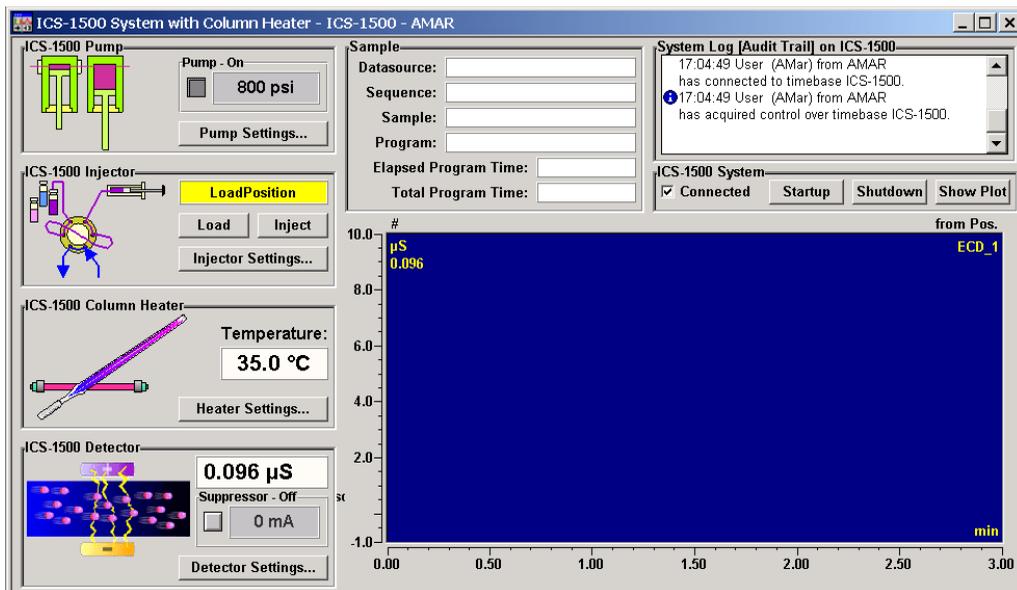
Figure 33. ICS-1500 System Control Panel Example

NOTE **If the Connected check box is not selected, click the box to connect the ICS-1500 to the Control Panel.**

12.1 Verifying Chromeleon Communication

Verify that Chromeleon is communicating with the ICS-1500 by clicking the **Inject** and then the **Load** button on the Control Panel. If communication is occurring, you will hear the valve actuate as it changes position.

Go on to Section 13.

13   Setting the Eluent Level

After filling the reservoir, open the **HOME** page and enter the volume of liquid in the reservoir in the **Eluent Level** field (see Figure 34), or enter the volume in the **Eluent Bottle** field on the Chromeleon Control Panel (see Figure 35). The ICS-1500 determines the eluent usage, by monitoring the flow rate and the length of time the pump is on, and updates the field as the eluent is used up. A warning is displayed if the level falls below 200 mL. The warning is repeated at 100 mL and at 0 mL.

IMPORTANT   **In order for the eluent level displayed on the screen to be accurate, the level must be entered by the user when the reservoir is filled. The ICS-1500 does not automatically detect when the reservoir is filled, nor when it is empty.**
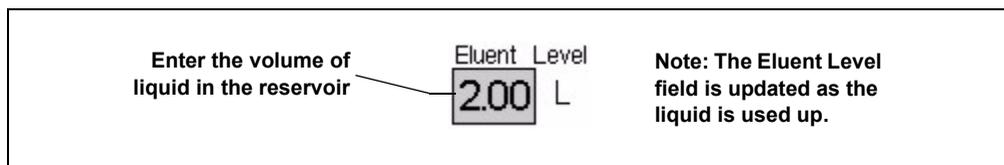
Figure 34. Home Page: Setting the Eluent Level
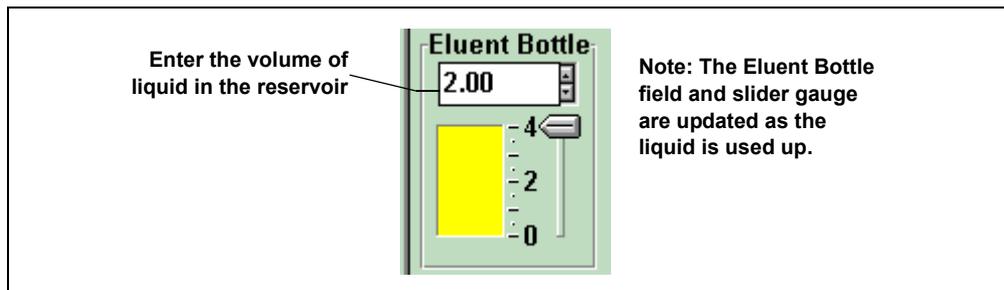
Figure 35. Chromeleon Control Panel: Setting the Eluent Level

14   Priming the Pump

1. Verify that the eluent reservoir is filled, the reservoir cap is installed and hand tightened, and the liquid line from the ICS-1500 to the reservoir cap is connected (see Section 11).

2. Verify that the waste lines are directed to a waste container.

3. The priming procedure consists of two parts:

    •   Priming the eluent lines with a syringe. Perform this procedure at initial installation, after changing eluents, or when eluent lines are empty.

    •   Priming the pump heads with the **Prime** button. Perform this procedure after the eluent lines are primed.

14.1   Priming the Eluent Lines with a Syringe

> **NOTE   Prime the eluent lines after initial installation, after changing eluents, or when eluent lines are empty.**

1. Verify that the pump is turned off.

2. Connect a 10 mL syringe (P/N 054578) to the port in the priming valve on the primary pump head (see Figure 36).
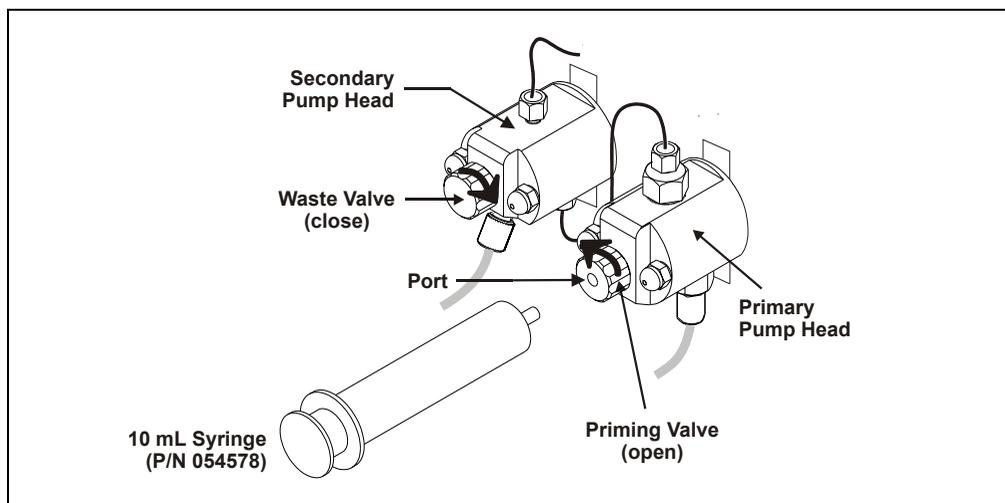
Figure 36. Priming the Eluent Lines

3. Open the priming valve by turning it one-quarter to one-half turn counterclockwise.

4. On the Chromeleon Control Panel, click **Pump Settings** and then click **Eluent Flow Valve Open** (see <u>Figure 37</u>).
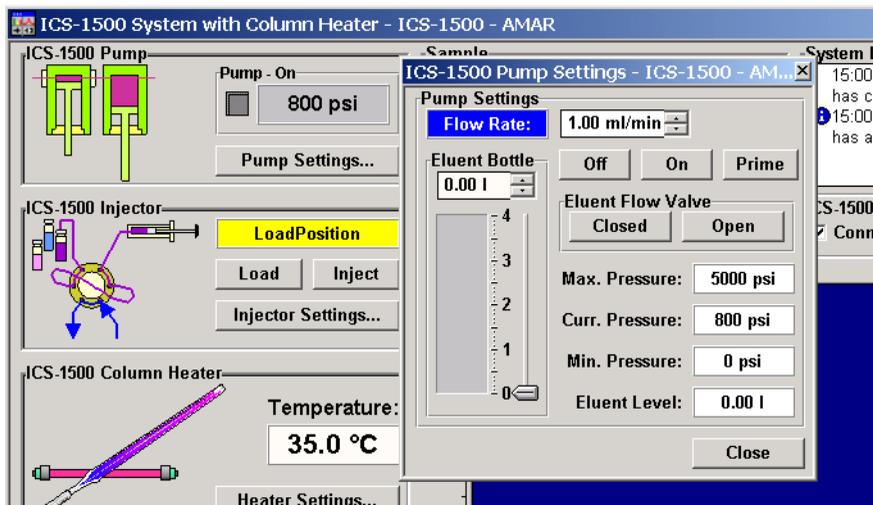
Figure 37. Chromeleon Control Panel: Pump Settings

5. Draw the syringe back to begin pulling eluent through the flow path. It may take several syringe draws to remove all air or previous eluent from the tubing.

> **NOTE** **If the vacuum degas assembly is installed, draw out an additional 20 mL of eluent.**

6. After priming the lines thoroughly, close the priming valve. **Do not overtighten the priming valve.**

7. Close the eluent valve (click **Eluent Flow Valve Closed** on the Control Panel).

14.2   Priming with the Prime Button

> **NOTE Perform this procedure after priming the eluent lines (see Section 14.1).**

1. Check that the priming valve on the primary pump head is closed (see Figure 38).
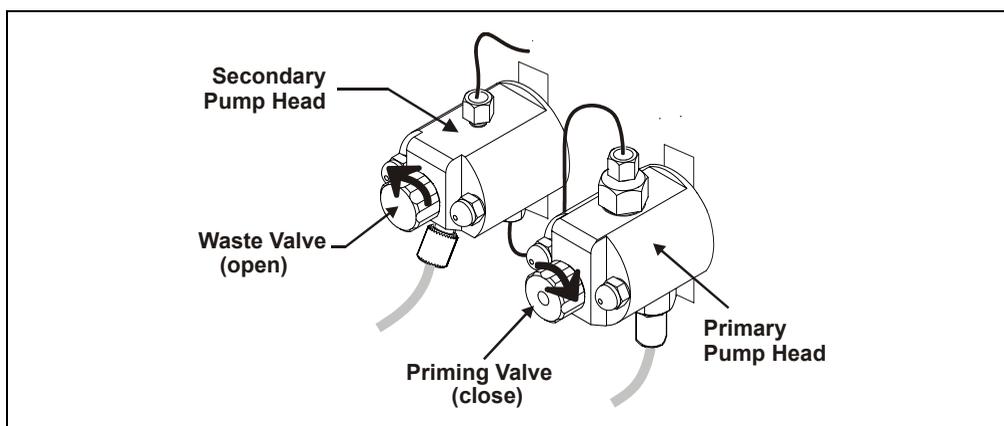
Figure 38. Priming the Pump

2. Open the waste valve on the secondary pump head by turning the knob one-quarter to one-half turn counterclockwise (see Figure 38). Opening the valve directs the eluent flow path to waste and eliminates backpressure.

3. Click **Prime** on the Chromeleon Control Panel (see Figure 37). The pump will begin pumping at approximately 3.0 mL/min.

4. Continue priming the ICS-1500 until no air bubbles are exiting the pump waste line.

5. Press **Pump Off**.

6. Close the waste valve. **Do not overtighten.** The pump is now ready for operation.

> **NOTE If the two standard priming procedures described above are unsuccessful, prime the pump with isopropyl alcohol. See "Chapter 5, Troubleshooting," in the ICS-1500 operator's manual for instructions.**

15 Equilibrating the System

1. After priming the pump, turn on the pump and set the flow to the operating rate.

2. Flush the system for about 5 minutes to equilibrate.

3. Monitor the system pressure from the Control Panel to make sure it is at the expected pressure for the installed column (refer to the column manual for details) and is stable. If the pressure is less than the expected amount, gas may be trapped in the system. Release the gas by removing the pump fitting on the injection valve. The fitting is labeled **P** (**2**). Allow the air to escape and then reconnect the fitting.

4. Check that liquid is flowing out of the suppressor **REGEN OUT** waste line and that the pressure is stable.

5. Monitor the baseline conductivity. In general, it should be <30 μS for a system set up for anion analyses, and <2 μS for a system set up for cation analyses. Equilibration time varies and it can take some time to reach these expected values.

16 Verifying Operational Status

After the system has equilibrated, verify the actual pump pressure and stability by monitoring the pump pressure reading on the Chromeleon Control Panel (or the touch screen **HOME** page). Write down the short-term pressure fluctuations; they should be less than 0.13 MPa (20 psi).

ICS-1500 installation is complete. For routine operation, refer to *ICS-1500 Ion Chromatography System Operator's Manual* (Document No. 031917). The manual is on the Dionex Reference Library CD-ROM (P/N 053891).

17   Connecting an AS50 Autosampler (Optional)

17.1   AS50 Configuration Requirements

To use an AS50 autosampler with the ICS-1500, the AS50 must meet the following requirements:

- An injection valve cannot be installed in the AS50

- The AS50 must have Moduleware version 1.11 or later installed

- Control of the ICS-1500 injection valve must be enabled in the AS50

The following AS50 models are configured at the factory to meet the above requirements:

- AS50 without injection valve (P/N 061309)

- AS50 without injection valve; with sample preparation (P/N 061310)

- AS50 without injection valve; with sample preparation and sample tray cooling (P/N 061311)

- AS50 without injection valve; with sample tray cooling (P/N 061312)

Notes

- To identify the version of Moduleware currently installed in the AS50, go to the AS50 **POWER UP** screen (press **Menu**, **8**, and **1**). If a Moduleware update is required, contact Dionex.

- In order to use an AS50 that has an injection valve installed, the valve must be disconnected from the AS50 electronics. Contact Dionex for assistance. The AS50 electronics components cannot be serviced by the user.

- If the AS50 is currently running with a Thermal Compartment (TC) or Chromatography Compartment (CC) and you are now going to use it with an ICS-1500, the injection valve is typically installed in the TC or CC, not in the AS50. If this is the case, verify that the correct Moduleware version is installed, and enable control of the ICS-1500 injection valve (see Section 17.3).

After the AS50 is configured for use with the ICS-1500, all AS50 modes of injection (full-loop, partial-loop, and partial-loop limited-sample) are supported. In addition, all AS50 injection valve commands (whether

issued from the AS50 front panel or from Chromeleon) will control the ICS-1500 injection valve. For Chromeleon control, the AS50 must be added to the ICS-1500 timebase (see <u>Section 8</u>). For front panel control, the AS50 and ICS-1500 can be set up for stand-alone operation. This requires a TTL cable connection between the AS50 and the ICS-1500. See the TTL appendix in the ICS-1500 operator's manual for stand-alone setup instructions.

17.2 AS50 Connections

1. Place the AS50 to the left of the ICS-1500 on the workbench.

2. Open the ICS-1500 and AS50 doors.

3. The needle seal line that extends from the inject port in the autosampler is coiled inside the AS50 door, on the right side. Route this line through the AS50 right side slot (see <u>Figure 39</u>) and the ICS-1500 left side slot to the ICS-1500 injection valve.

> **IMPORTANT**
>
> **The needle seal line from the AS50 inject port to the ICS-1500 injection valve is calibrated for use with the ICS-1500. To ensure injection precision, do not shorten (by cutting) or lengthen this line, or replace it with a different (uncalibrated) line.**
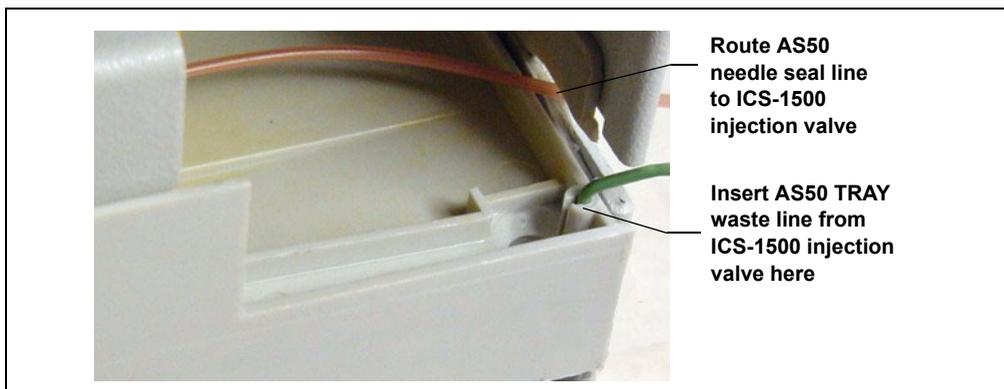
Figure 39. AS50 Drip Tray

4. Connect the needle seal line from the AS50 to port **S (5)** on the injection valve (see Figure 40).

    The green waste line that is connected to port **W (6)** on the injection valve (see Figure 40) is connected with a union to a Teflon waste line (see Figure 41) and routed through the tubing chase to the ICS-1500 rear panel.
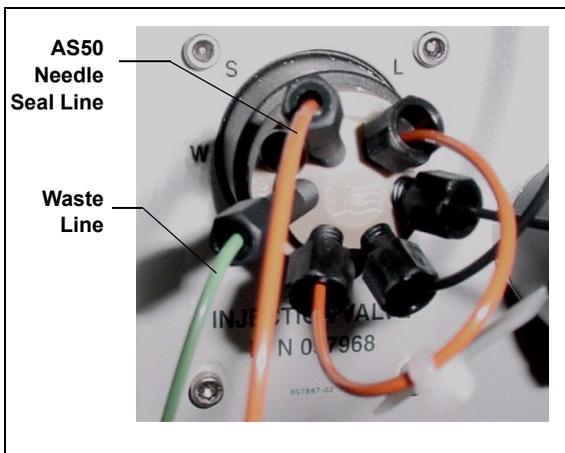
Figure 40. ICS-1500 Injection Valve

5. Disconnect the green waste line (labeled **AS50 TRAY**) from the union and route the line to the drip tray in the autosampler compartment.

    You can either leave the disconnected Teflon waste line and union in the tubing chase, or pull the line out from the front.
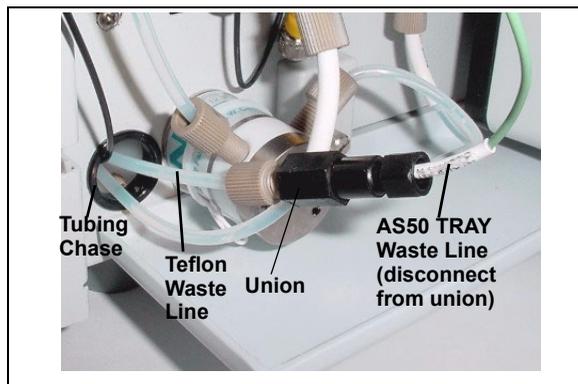
Figure 41. Injection Valve Waste Line Union

6. Push the end of the green **AS50 TRAY** line into the small round opening on the right side of the AS50 tray (see Figure 39).

IMPORTANT

Make sure the injection valve waste line is not elevated above the injection valve at any point between the valve and the AS50 drip tray.

> NOTE **For PEEK waste lines, sharply bend the waste line tubing about 5-mm from the end to ensure it stays in place in the opening in the drip tray. When bending the tubing, be sure not to restrict the inner diameter.**

7. If you have not already done so, add the AS50 to the Chromeleon timebase (see Section 8).

17.3 Enable AS50 Control of the Injection Valve

Follow the steps below if you are connecting an AS50 that was not configured at the factory for ICS-1500 support. Injection valve control is already enabled in pre-configured AS50 models (see the list in Section 17.1).

1. On the AS50 front panel, press **Menu** and **0** to go to the **TIME FUNCTION OUT** screen (see Figure 42). In the **LOAD/INECT VALVE: TTL 1** field, select **ENABLED**.
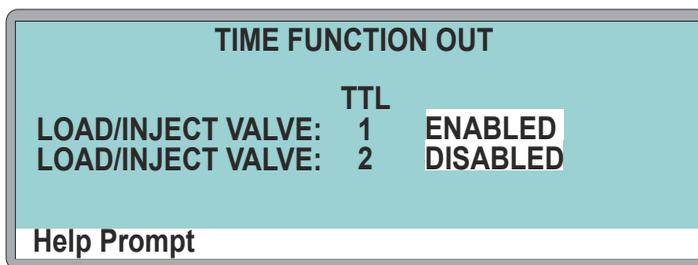
Figure 42. AS50 Time Function Out Screen

2. Turn the AS50 power off and then back on.

   All AS50 injection valve commands (whether issued from the AS50 front panel or from Chromeleon) will now control the ICS-1500 injection valve.

18   Connecting an AS40 Automated Sampler (Optional)

1. Place the AS40 to the left of the ICS-1500 on the workbench.

2. Open the front door of the ICS-1500 and thread the outlet line from the AS40 through the left side slot at the front of the ICS-1500.

3. Connect the outlet line from the AS40 to port **S (5)** of the injection valve (see Figure 43).

AS40 Sample Outlet Line
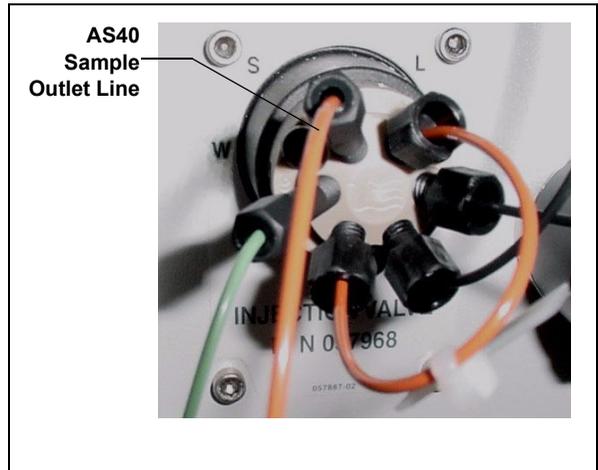
Figure 43. ICS-1500 Injection Valve

4. Locate the relay control cable (P/N 047946) supplied with the AS40.

5. Remove the 2-position connector plug from the pair of wires labeled **LOAD** on the relay control cable.

6. Locate the 12-position connector plug (P/N 923686) in the ICS-1500 Ship Kit (P/N 057905) (see Figure 44).

7. Attach the red wire from the relay control cable to position 1 on the plug, and attach the green wire to position 2. This will be used to connect the AS40 **LOAD** relay to **RELAY OUT 1** on the ICS-1500.

Position 1

Locking Screws
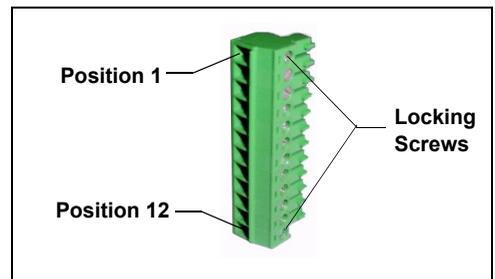
Position 12

Figure 44. 12-Position Connector Plug

To attach a wire to the plug, strip the end of the wire, insert it into the plug, and use a screwdriver to tighten the locking screw.

⚠ **CAUTION**

When attaching wires to the connector plug, be careful not to allow stray strands of wire to short to the adjoining position on the connector.

> **NOTE** **If RELAY OUT 1 is not available, you can connect to RELAY OUT 2 or to one of the TTL outputs. For RELAY OUT 2, connect the red wire to position 3 and the green wire to position 4. For TTL OUT 1, connect the red wire to position 5 and the green wire to position 11. For TTL OUT 2, connect the red wire to position 6 and the green wire to position 12.**

8. Connect the relay control cable's 10-position connector plug to the **RELAY CONTROL** connector on the AS40 rear panel (see Figure 45).

9. Plug the 12-position connector plug into the TTL and relay connector on the ICS-1500 rear panel (see Figure 45). Make sure the red wire connects to position 1 and the green wire connects to position 2.
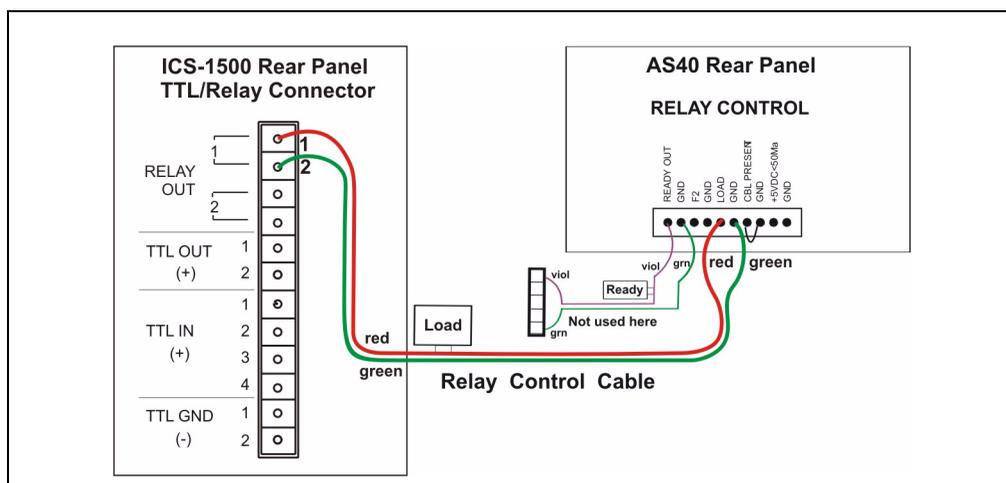
Figure 45. Example AS40 Autosampler Connection

The AS40 Load relay is now dedicated to the ICS-1500 **RELAY OUT 1**. Use this relay for running with Chromeleon. When you set up the ICS-1500 application (see Section 12), commands for controlling the AS40 Load relay and switching the ICS-1500 injection valve are included by default in the program file (see Figure 46).

```
S12A Production Test Chromatogram - Commands                                    _ □
m Production Test Chromatogram
         Suppressor_Current =           29
         Flow =                       1.50

 -2.300  Pump_ECD_Relay_1.Closed       Duration=138.00    ; For AS40 injection
```

> Relay 1 turned on to start the AS40 Load cycle and load the sample loop

> Relay 1 turned off after 138 seconds

```
  0.000  Pump_ECD.Autozero
         ECD_1.AcqOn
         Pump_InjectValve.InjectPosition           Duration=30.00
```

> Injection valve switched to Inject

> Injection valve switched back to Load

```
 15.000  ECD_1.AcqOff

         End
```
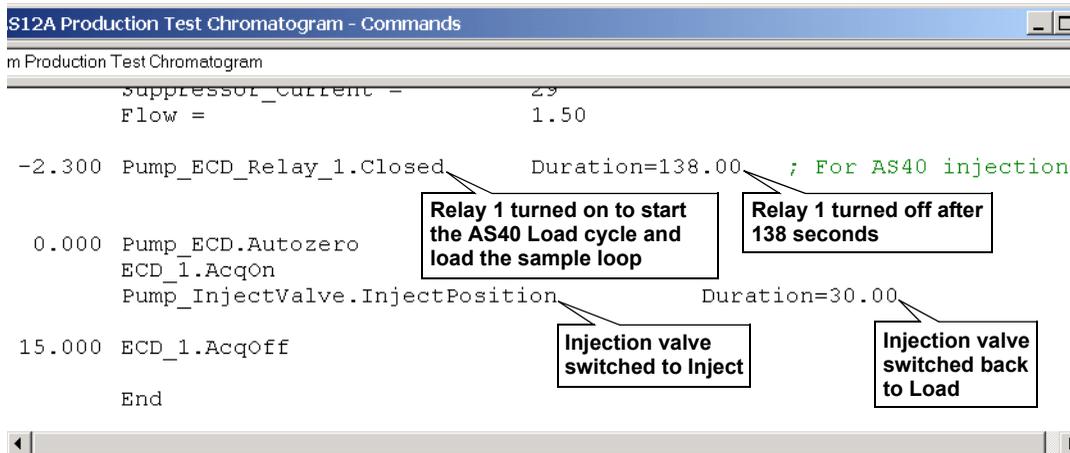
Figure 46. Example Program for AS40 Control

19   Analog Output Connection (Optional)

The analog output connector on the ICS-1500 rear panel outputs an analog voltage signal proportional to the conductivity measured by the cell. The output is filtered using the selected data rise time. The analog output can be connected to an analog-to-digital converter such as an integrator or other recording device. Refer to the documentation for the device for connection instructions.

Analog output is 0 to 1V, scaled to the selected range.

For an example setup for ICS-1500 stand-alone operation with an AS50 autosampler, see the TTL appendix in the ICS-1500 operator's manual.

20   Pressurizing the Eluent Reservoir (Optional)

The ICS-1500 does not require pressurized reservoirs. However, if eluent is manually degassed or is sensitive to contamination, Dionex recommends pressurizing the reservoir with helium or nitrogen. The air regulator accessory bracket and other items needed for pressurizing the eluent reservoir must be ordered separately (P/N 060054).

20.1   Connecting the Gas Source (Optional)

1. Locate the barbed fitting (P/N 030071), pipe thread reducer (P/N 030087), 3-mm (1/8-in) ID tubing (P/N 040793), and ICS-1500 air regulator accessory (P/N 060054). These parts must be ordered separately.

2. Use the barbed fitting and pipe thread reducer to connect the 3-mm (1/8-in) ID tubing to a clean gas source, regulated to between 0.55 and 0.83 MPa (80 and 120 psi).

3. Push the other end of the tubing onto the inlet of the air regulator (see Figure 47).

4. Remove the eluent reservoir cap.

5. Connect the gas line from the eluent reservoir cap to the gas line on the air regulator outlet.

6. Slip the air regulator accessory bracket over the neck of the eluent reservoir (see Figure 47).
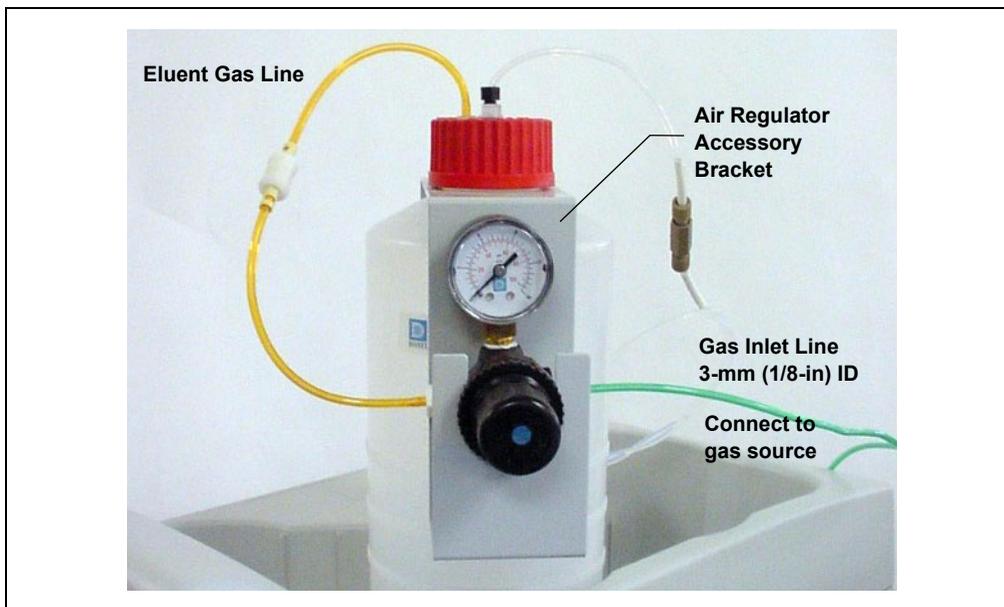
Figure 47. ICS-1500 Pressurized Eluent Reservoir Connections (Optional)

20.2   Pressurizing the Eluent Reservoir (Optional)

> **NOTE Do not pressurize the ICS-1500 until after the reservoir is plumbed.**

1. Pull out the air regulator knob and turn it fully counterclockwise to ensure there is no pressure to the reservoir when the gas source is turned on.

2. Turn on the gas source.

3. Pull out the air regulator knob and turn it clockwise to pressurize the eluent reservoir.

4. Adjust the pressure to between 30 and 40 kPa (5 and 6 psi). Push the regulator knob back in.

⚠ **CAUTION**   **Do not pressurize the eluent reservoir above 70 kPa (10 psi).**

⚠ **MISE EN GARDE**   **Ne mettez jamais les réservoirs d'éluants sous une pression supérieure à 0,07 MPa (10 lb/po²).**

⚠ **VORSICHT**   **Setzen Sie den Eluentbehälter auf keinen Fall einem Druck über 0,07 MPa aus.**

21   Pump Continuous Seal Wash Connections (Optional)

The pump includes a seal wash assembly that can be set up to continuously rinse the back of the piston seals to remove salt crystals and prolong the life of the seals. Follow the steps below to set up this feature.

1. Fill a flush bottle with either deionized water or a combination of deionized water and 10% or 20% isopropyl alcohol. (Isopropyl alcohol will inhibit bacterial growth in the water.)

2. Place the flush bottle on top of the ICS-1500. During operation, gravity maintains flow through the pump heads.

3. The flush solution is carried to the piston seal wash assembly and out to waste via 1.5-mm (0.06-in) ID tubing (P/N 055847). Locate this tubing in the ICS-1500 Ship Kit and cut the tubing into three unequal pieces in the following lengths:

   • 117 cm (46 in)

   • 152 cm (60 in)

   • 15 cm (6 in)

4. Install the tubing as follows (see Figure 48 and Figure 49):

   a. Push the 117-cm (46-in) piece of clear tubing onto the drain tube on the bottom of the *secondary* pump head. Place the free end of this tubing in the flush bottle. Make sure the end of the tubing is near the bottom of the bottle.
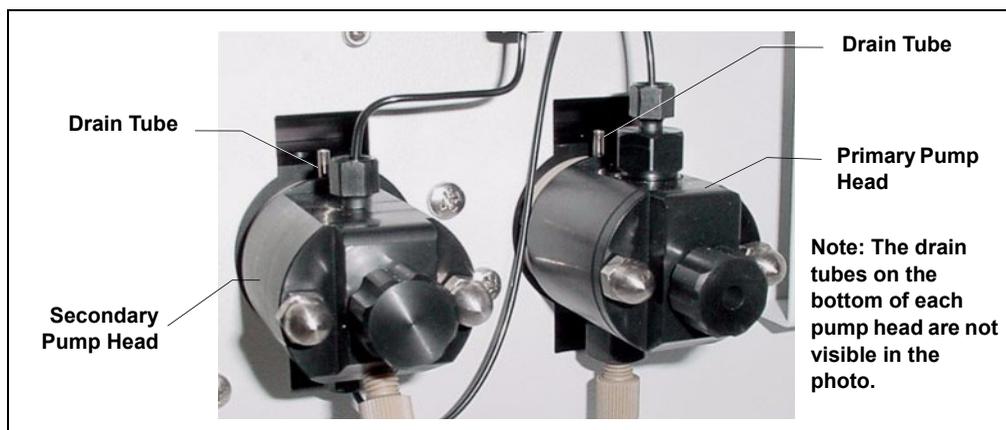
Figure 48. Primary and Secondary Pump Heads with Drain Tubes

b. Push the 152-cm (60-in) piece of clear tubing onto the drain tube on the top of the *primary* pump head. This is the waste line. Route this waste line through the lower tubing chase and out the back of the ICS-1500.

c. Push the 15-cm (6-in) piece of clear tubing over the drain tube on the top the *secondary* pump head. Push the other end of the tubing over the drain tube on the bottom of the *primary* pump head.

d. Place a 10 mL syringe (P/N 054578) at the end of the waste line, press the syringe against the line to form a seal, and draw out all of the air.

e. Push approximately 5 cm (2 in) of black 0.25-mm (0.01-in) ID tubing (P/N 057057) into the end of the waste line.

> **NOTE**   **The black tubing creates a flow restriction. Assuming a height difference of about 76 cm (30 in) between the flush bottle and the waste container, this setup provides a flow of one drop of flush solution every 5 to 30 seconds.**

f. Place the end of the waste line in a waste container.

g. This completes the piston seal wash installation. Periodically refill the flush bottle and empty the waste container as required.
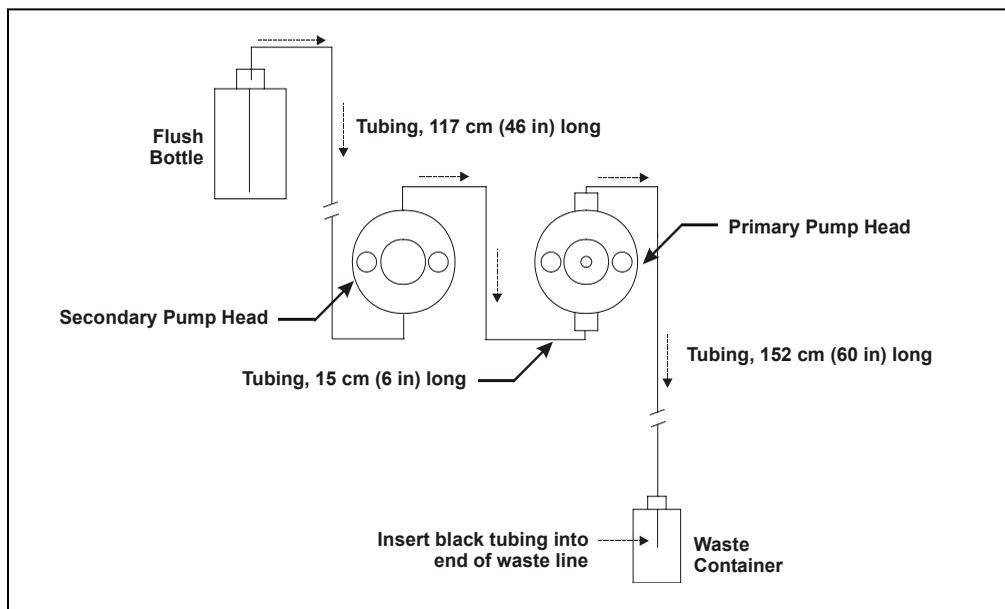
Figure 49. Piston Seal Wash Flow Schematic

22   Manually Connecting to a Control Panel

This section describes how to manually connect the ICS-1500 to a Control Panel if you do not use the application templates described in .

1. In the Browser, expand the **Dionex Templates\Panels\Dionex_IC\ICS-1500** folder. Several System Control Panels, corresponding to various system configurations, are provided.

2. Open the panel for your system configuration by double-clicking its name in the list. For example, if your system includes an ICS-1500 and an AS50 autosampler, double-click either **ICS-1500_System_AS50.pan** or **ICS-1500_Traditional_System_AS50.pan**.

> **NOTE**   **The two types of panels (system and traditional system) are similar in function, but have different "looks." You can select either style, depending on your personal preference.**

When the Control Panel opens, the controls on the panel are not enabled (see).
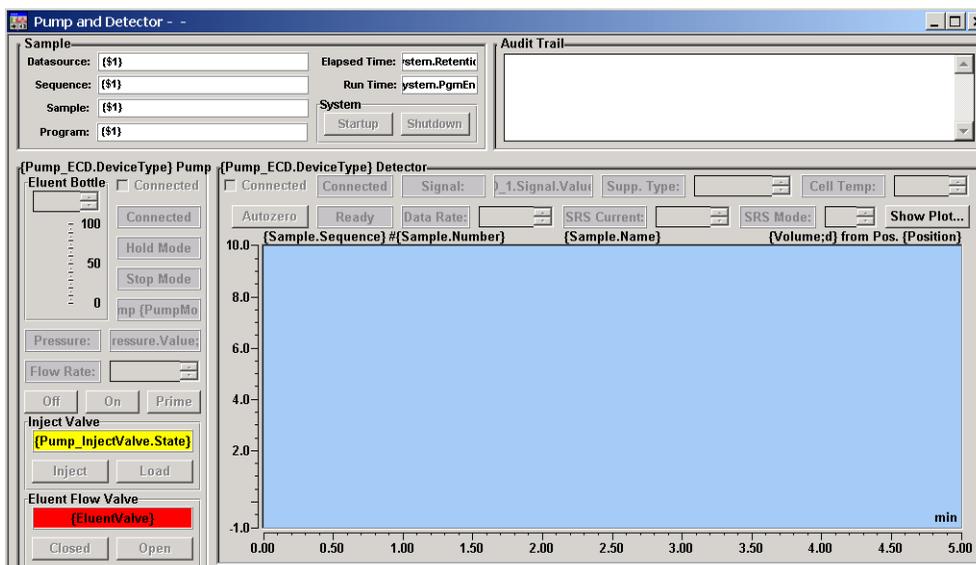
Figure 50. ICS-1500 Traditional System Control Panel (Unconnected)

3. To connect the Control Panel to the ICS-1500, open the **Control** menu and click the name of the ICS-1500 timebase at the bottom of the menu.

   The Control Panel is now connected to the ICS-1500 and the controls are enabled (see Figure 51).
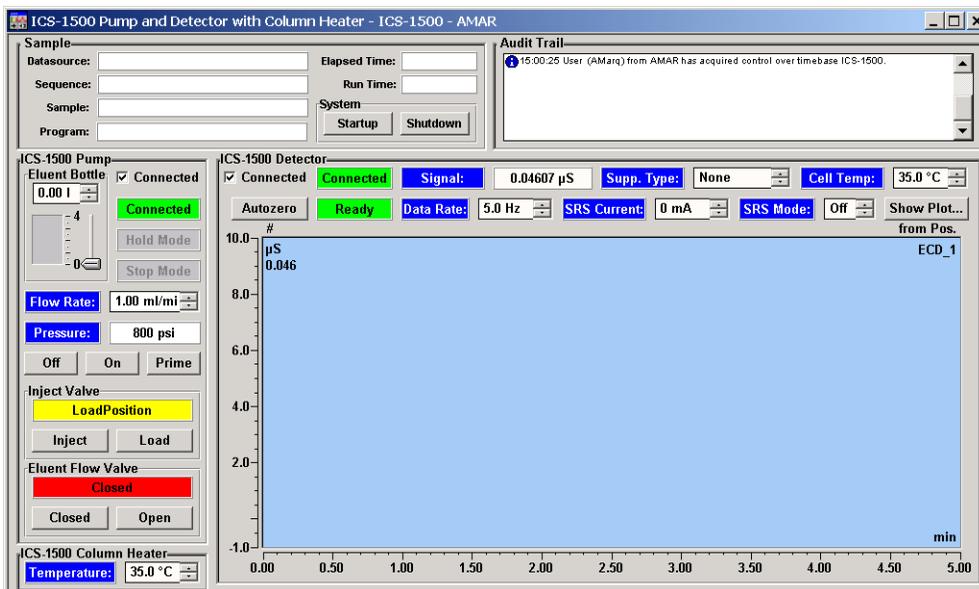
Figure 51. ICS-1500 Traditional System Control Panel (Connected to the ICS-1500)

23   Installation Troubleshooting

Problem: When the ICS-1500 power is turned on for the first time, a Windows message box appears asking for a USB configuration file (cmwdmusb.inf).

Possible Cause: The USB cable was connected and the power turned on before Chromeleon was installed.

Solutions:

Use one of the methods below to resolve the problem:

- Click the **Cancel** button on the Windows message box. Turn off the ICS-1500 power and unplug the USB cable. Then, install Chromeleon, reconnect the USB cable and turn on the ICS-1500 power. Windows will now automatically recognize the new USB device.

- Leave the message box open and insert the Chromeleon CD into the CD-ROM drive. Click the **Browse** button on the message dialog box. The cmwdmusb.inf file is located in the **Drivers** folder on the CD.