CETAC *ASXPRESS*
Rapid Sample Introduction System

Operator's Manual

Manual Part Number **480166** Rev 4

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REPRODUCTION

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ORIGINAL PACKAGING

Retain original factory packaging for moves and factory return shipments. Shipping in anything other than the original fitted foam and container can result in incidental damage from which the purchaser will not be protected under warranty.

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WARNING

Under all conditions the user must observe safe laboratory procedures during the operation of this product.

Contents

1 Contents

1

Introduction

1 Introduction

Overview

The CETAC Technologies *ASXPRESS* Rapid Sample Introduction System is designed to increase autosampler throughput by reducing the sample delivery, stabilization, and washout time (See Figure 1-1 and Figure 1-2 for cycle diagrams). The CETAC *ASXPRESS* uses a combination of a metal-free 6-port injection valve with an inert high-speed vacuum pump to enable rapid sample loading and probe wash out. The small footprint allows placement in close proximity to the nebulizer to provide quick sample input. The system is sturdy, reliable, and easy to use.

The complete *ASXPRESS* system is comprised of 4 components:

- The *ASXPRESS* valve/pump module
- The *ASXPRESS* electronics module
- A CETAC ASX-260, ASX-520, ASX-520HS or EXR-8 autosampler with specialized firmware
- Windows-based software to allow the configuration of the system

The *ASXPRESS* system is connected to, powered, and controlled by a CETAC autosampler. The *ASXPRESS* system is operated by the autosampler executing a macro automatically when the probe is placed into the sample. The macro ends when the probe is lifted out of the rinse station. .

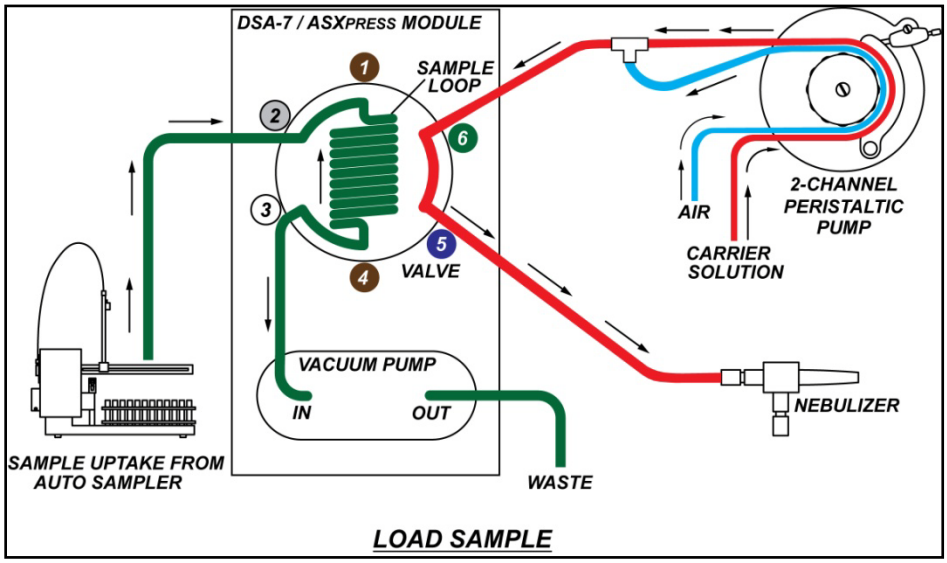

Figure 1-1 "Load Sample" Cycle Diagram

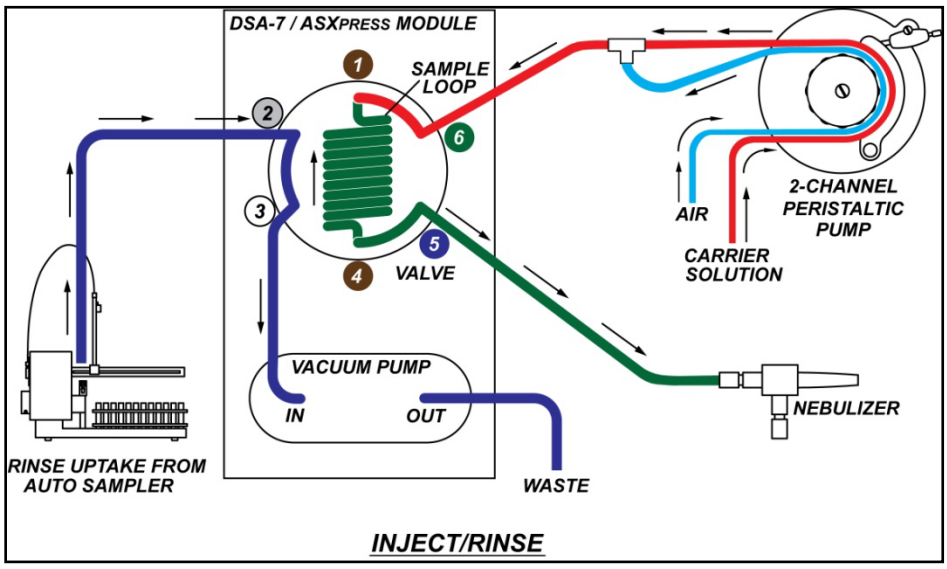

Figure 1-2 "Inject/Rinse" Cycle Diagram

1.1 Rapid Sample Introduction System Standard Components

The *ASXPRESS* Rapid Sample Introduction System module cases are made of a high-strength aluminum alloy with an epoxy powder coating finish. The 6-port injection valve is constructed of polyphenylene sulphide (PPS), an inert and dimensionally stable material. The tubing is all inert PTFE (waste tubing materials may vary by application).

The *ASXPRESS* system operates reliably under a wide variety of conditions. Components in the sample flow path are inert, non-metallic materials; when used at temperatures less than 135°C, they can withstand repeated exposure to the following substances:

- Predominantly aqueous solutions of strong acids (less than 40%).
- Common organic solvents such as acetone, alcohols, ethyl acetate, Methylethylketone (MEK), petroleum oils and derived fuels, tetrachloroethylene, toluene, and xylene.

CAUTION

Prolonged or repeated exposure to temperatures greater than 135°C and to the following substances can cause failure of the flow path components:

- Solutions of concentrated acids (greater than 40%).
- Partially halogenated hydrocarbons or extremely aggressive organic solvents (chloroform, methylene dichloride, 1,1,2-trichloroethane).

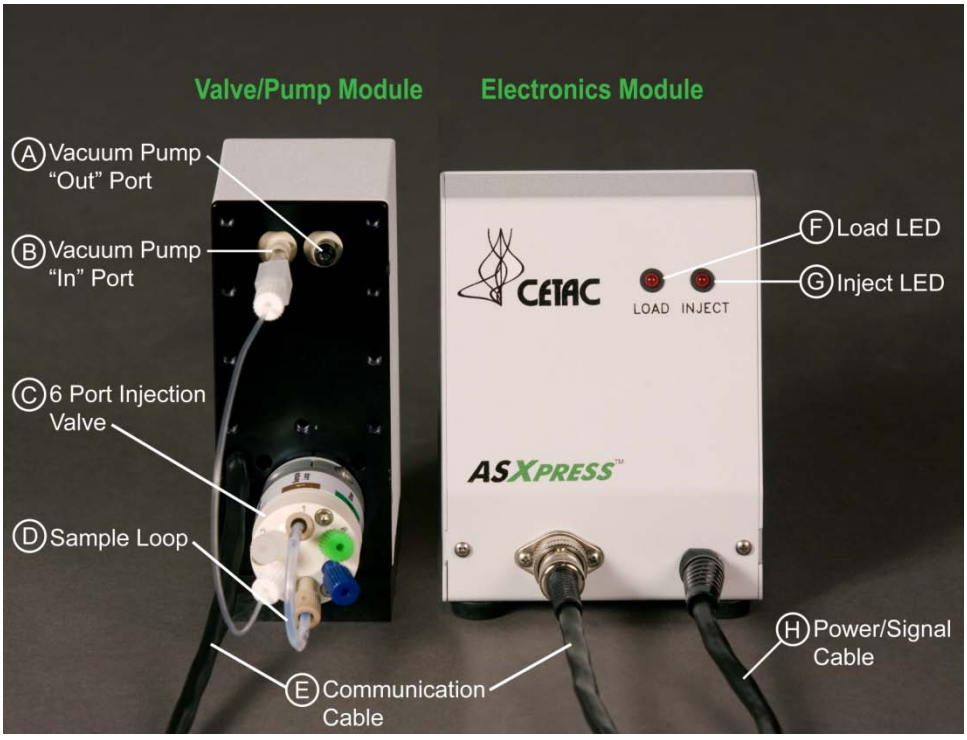

Figure 1-3 *ASXPRESS* Rapid Sample Introduction System—Front View.

The following standard components are located on the *ASXPRESS* system and are shipped with the system. Each lettered item listed below corresponds with a feature in Figure 1-3.

A. Vacuum Pump "Out" Port
B. Vacuum Pump "In" Port
C. 6-Port Injection Valve
D. Sample Loop
E. Communication Cable (interconnects the Valve/Pump and Electronics Modules)
F. Load LED
G. Inject LED
H. Power/Signal Cable (connects *ASXPRESS* system to the ASX series Autosampler)

The following standard components are also shipped with the *ASXPRESS* system:

- **Sample Loops.** Six standard sized sample loops are provided: 1.00mL, 1.50mL, 2.00mL, 2.50mL, 3.00mL, and 4.00mL. Additional loops are available..
- **1.0mm Sample Probe**. A 1.0mm ID sample probe must be used on the connected CETAC autosampler to operate properly with the *ASXPRESS* system.
- **Standard-bowl Rinse Station.** A standard-bowl rinse station MUST be used to accommodate the special design requirement of the *ASXPRESS* system. All *ASXPRESS* full systems (autosampler sample introduction system) will come complete with the correct rinse station. If upgrading an existing autosampler, the standard-bowl rinse station will be included in the kit, as this version rinse station MUST be used. (The CETAC *ASX-520HS* includes a large-bowl rinse station, which must be replaced with the standard-bowl unit which is included in the upgrade version of the *ASXPRESS* system, as mentioned above.) However, if the *ASX-520* or *ASX-260* autosamplers are used, the existing standard-bowl rinse station may be retained.
- ***ASXpress* CD**. The CD contains:
  - Firmware for the autosampler with *ASXPRESS* recognition.
  - Rabbit Firmware Upgrade program (RFU)
  - Firmware upgrade instructions
  - I/O board installation instructions
  - Driver installation instructions for the RS-232 to USB adapter
  - *ASXpress* software (Configuration Tool)
  - This manual
  - Quick Installation Guide
  - Spare parts catalog

1.2 Optional Accessories/Components

Although full systems and upgrade kit versions of the *ASXPRESS* system include the Rabbit Module and Female I/O Auxiliary Daughter board, some customers may wish to purchase these components individually to allow for conversion of additional autosamplers for a single *ASXPRESS* interface. Therefore, these components are available as well as the items listed below. Refer to the *ASXPRESS Rapid Sample Introduction System Accessories and Supplies Catalog* for a full listing of accessories and spare parts.

- **Articulating Mounting System.** This mounting system allows for stable and secure, close proximity placement and mounting of the Valve/Pump Module near the instrument nebulizer.
- **Rabbit Module with Pre-loaded Firmware.** The Rabbit Module processor with pre-loaded firmware is included with upgrade kit versions of the *ASXPRESS* system, and is pre-installed in the autosampler on full-system versions. This component provides the necessary control of the *ASXPRESS* system via the autosampler.
- **Female I/O Auxiliary Daughter Board.** The female I/O auxiliary daughter board is included in the upgrade kit versions, and is pre-installed in the autosampler on full-system versions. This component provides the necessary power and signal connection point between the autosampler and *ASXPRESS* module.
- **Alternate Sample Loops.** Alternate sample loop sizes are available as spares. Available sizes include:
    - 0.70mL
    - 1.0mL
    - 1.25mL
    - 1.5 mL
    - 2.0 mL
    - 2.5 mL
    - 3.0 mL
    - 3.5 mL
    - 4.0 mL
    - 4.5 mL
    - 5.0 mL
    - 5.25 mL

Note

Please refer to the *ASXPRESS Rapid Sample Introduction System* Accessories *and Supplies Catalog* or contact CETAC Technologies if you need additional accessories not listed, need added features to integrate the *ASXPRESS* Rapid Sample Introduction System into your analytical system, or have unique requirements. Research and development of new features and accessories for the *ASXPRESS* Rapid Sample Introduction System, often inspired by customer requests, is a continuing activity of CETAC Technologies.

1.3 About This Book

This document describes the procedures for installing, using, and maintaining the CETAC *ASX*PRESS Rapid Sample Introduction System. It also provides information about troubleshooting minor *ASX*PRESS problems and describes the design of the rapid sample introduction system.

1.3.1 Who Should Read This Book

The primary audience for the *ASX*PRESS *Rapid Sample Operator's Manual* consists of analytical chemists and lab technicians. To use this manual effectively, you should have a basic knowledge of chemistry, a basic knowledge of electronic sampling equipment, at least a beginning level of computer experience, and working knowledge of the analytical instrument used with the sample introduction system.

Where to Go for More Information

In addition to this manual, you can refer to the following resources:

- The *ASX*PRESS *Quick Installation Guide*
- The software manual for the ICP/ICP-MS instrument you are using
- The operator's manual for the CETAC autosampler you are using
- The CETAC Technologies Website: www.cetac.com
- CETAC Technologies Customer Service and Support:

  1 (800) 369-2822

  1 (402) 733-2829

  1 (402) 733-1932 (Fax)

  E-mail: custserv@cetac.com

2

Preparing for Installation

2 Preparing for Installation

Installing the *ASXPRESS* system requires preparation. Before you install the *ASXPRESS* Rapid Sample Introduction System, you should evaluate the physical arrangement of the laboratory to choose a suitable location which allows placement of the *ASXPRESS* valve/pump module as close to the nebulizer as possible. Once you choose a location, you must carefully unpack the system prior to beginning the installation.

This chapter discusses what requirements must be met when you choose a location for the *ASXPRESS* Rapid Sample Introduction System. It also describes how to unpack the system before installation.

2.1 Choosing a Location

Choosing a location for system involves evaluating the lab environment for the availability of space, liquid waste routing and power (power to the system is provided via the autosampler). For the system to function optimally, the location you select must meet specific requirements associated with each of these items. The following sections discuss space, water, and power requirements.

2.1.1 Space Requirements

Most analytical applications benefit from utilizing the shortest sample flow path. Therefore, you should place the valve/pump module in close proximity to the nebulizer of the analytical instrument. The required space for *ASXPRESS* system installation includes separate accommodations for both the valve/pump module and for the electronics module as follows:

	Valve/Pump Module	**Electronics Module**
Height	**12.8 cm**	**13.5 cm**
Width	**5.8 cm**	**10.6 cm**
Depth	**21.7 cm**	**12.8 cm**

The above listed dimensions allows for space to accommodate the sample loop and connection tubing, as well as cabling. The *ASXPRESS* valve/pump module weighs 1.30 kg and the electronics module weighs 0.75 kg.

2.1.2 Liquid Waste Routing Requirements

Ensure that there is a liquid waste receptacle within two meters of the *ASXPRESS* valve/pump module. The waste receptacle inlet should be at least 30 to 60 centimeters lower than the *ASXPRESS* Rapid Sample Introduction System vacuum pump outlet and set up so that the rinse drain tubing drops directly into the waste receptacle with no coiling and without being submerged below the liquid level of the waste receptacle.

2.1.3 Power Requirements

The *ASXPRESS* system receives 24VDC power through the connection to the CETAC autosampler. Place the *ASXPRESS* electronics interface module within 1.5 meters of the CETAC autosampler.

WARNING

The *ASXPRESS* system is intended to operate from DC power supplied through the CETAC autosampler, which is provided power through an AC power source that will not apply more than 240VAC between the supply conductors and ground. A protective ground connection by way of the grounding connector in the autosampler power cord is required for safe operation. In case of hazard, the autosampler should be disconnected from the power source as well as from the *ASXPRESS* system. See the autosampler operator manual for more specific power and safety information. .

Ensure that you position the autosampler so that the location where the power supply cord plugs into it is easily accessible (is not blocked) and it can be quickly disconnected if needed.

2.2 Unpacking the ASXpress Rapid Sample Introduction System

Inspect external packaging upon receipt for holes, tears, smashed corners, or any other outward signs of damage from rough handling or abuse during shipment. Inspect all items during unpacking and notify the carrier immediately of any concealed damage.

If the system is shipped or removed from storage during cold weather, allow the packaged equipment to equilibrate to room temperature before opening and exposing to warm, humid air. It is usually sufficient to provide four to eight hours for this purpose.

CAUTION

If condensation forms on or inside the *ASXPRESS* Rapid Sample Introduction System, allow it to dry thoroughly before connecting it to a power source and operating it. Failure to do so may cause equipment damage. .

Remove the packing checklist from the shipping container, and check off items against it. Leave accessories in the packing until you are ready to install them.

Check for kinked tubing in the sample loops or other tubing. Loops or other plumbing with kinked tubing will impede sample flow, affecting performance, and therefore should not be used.

Note:

Do not throw away the factory packaging. . Keep it for possible future use. This is one of the warranty conditions.

3

Installing the Rapid Sample Introduction System

3 Installing the *ASXPRESS* Rapid Sample Introduction System

The *ASXPRESS* Rapid Sample Introduction System is designed for easy installation. Installation consists of two parts: preparing the autosampler and connecting the *ASXPRESS* plumbing and electronic cabling to the autosampler and analytical instrument.

The plumbing connections should be made without using tools. In fact, using tools such as screwdrivers or pliers to perform installation tasks may result in a damaged or unusable instrument. Do not tighten fittings with anything other than your fingers.

To install the *ASXPRESS* Rapid Sample Introduction System, you must complete the following tasks (Each of these tasks will be discussed in detail later in this chapter):

- Prepare the autosampler. If an autosampler and *ASXPRESS* are purchased as a system, it will already be prepared. If an existing autosampler is being upgraded for use with an *ASXPRESS* system, some preparation of the autosampler for *ASXPRESS* interface/compatibility will be required.
- Connect the *ASXPRESS* system to the autosampler and nebulizer.

WARNING **Ensure that AC power to the autosampler is off before proceeding with installation.**

3.1 Prepare the CETAC Autosampler

A CETAC *ASX-520, ASX-520HS,* or *ASX-260* autosampler may be used with the *ASXPRESS* system. If the autosampler and *ASXPRESS* Rapid Sample Introduction System was purchased as a system, the autosampler will already be prepared to recognize and operate the *ASXPRESS* system. However, if the autosampler was purchased without the *ASXPRESS* system, it will require preparation.

Note:

The *ASXPRESS* is compatible with the EXR-8 autosampler. Since the EXR-8 utilizes the ASX-520 or ASX-520HS head, this manual will refer to the ASX-520 or ASX-520HS rather than the EXR-8.

Note:

Full *ASXPRESS* systems (which include autosampler and sample introduction system) do not require autosampler preparation. However, the *Xpress* Configuration Tool Software does require installation onto the host computer for *both ASXPRESS* full systems *and ASXPRESS* upgrade systems. See Section 3.1.2 for detailed information.

To work properly with the *ASXPRESS* system, the CETAC autosampler will require:

- A 37-pin female Auxiliary I/O connector card
- *ASXPRESS* compatible firmware [pre-loaded onto a furnished processor (Rabbit) module]
- Peristaltic pump speed adjustment increase
- Dual-channel peristaltic pump plumbed for *ASXPRESS*-specific operation
- Standard-bowl rinse station
- 1.0mm ID sample probe

3.1.1 Install the Auxiliary I/O Connector Card and Processor (Rabbit) Module

The proper processor module (with *ASXPRESS* functionality firmware pre-loaded) and auxiliary board (daughter board) with female I/O connector are furnished with the *ASXPRESS* system, either installed in the autosampler for full systems, or included as components of the upgrade kit version. (The I/O board connector as it appears as viewed at the rear panel of the *ASX-520* autosampler is shown in Figure 1-25.) Follow the instructions in this section to install the "Rabbit" processor module and auxiliary board (daughter board) in the autosampler to be upgraded to *ASXPRESS* functionality. Auxiliary board installation instructions are provided in hard copy and on the CD provided in the *ASXPRESS* completion kit of upgrade versions.)

This guide describes the necessary steps for adding an Auxiliary I/O board, and to replace the "Rabbit" module to the main board on the ASX-260, ASX-520 and ASX-520HS autosamplers. Steps 1-8 are similar for the ASX-260, ASX-520 and ASX-520HS autosamplers. Steps 9 through completion steps of the I/O board/rabbit processor module installation instructions are split into two sections, applying to ASX-260 and ASX-520/520HS models, respectively. See the appropriate section of this manual that applies to your CETAC autosampler.

> **Note:**
>
> The photos in this manual depict instrument components that may differ in appearance to your actual equipment, as those components may have seen update/revision. Every effort has been made to depict components as accurately as possible, as will apply to customers using CETAC instruments from a varying range of eras.

3.1.1.1 Accessing the Interior of the Autosampler

1. **Place the autosampler on a flat surface (Figure 1-4/Figure 1-5) and ensure that the unit is powered off.**

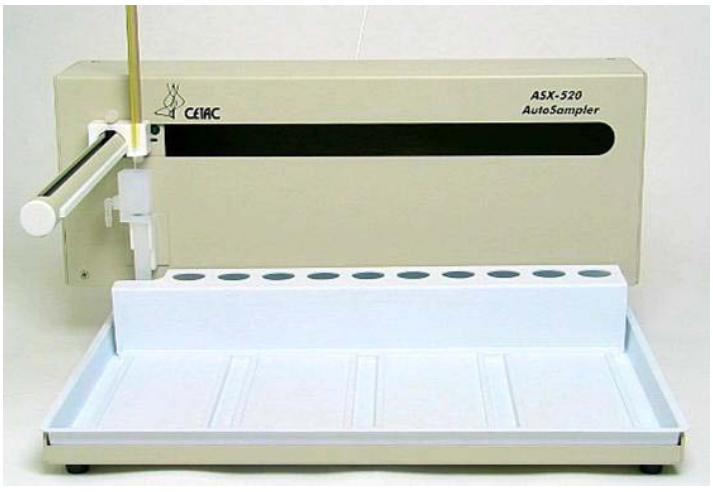

Figure 1-4 Front view of *ASX-520* Autosampler.

Figure 1-5 Front view of *ASX-260* Autosampler.

2. **Remove the two Kynar thumbscrews from the Y-axis home block (Figure 1-6).**

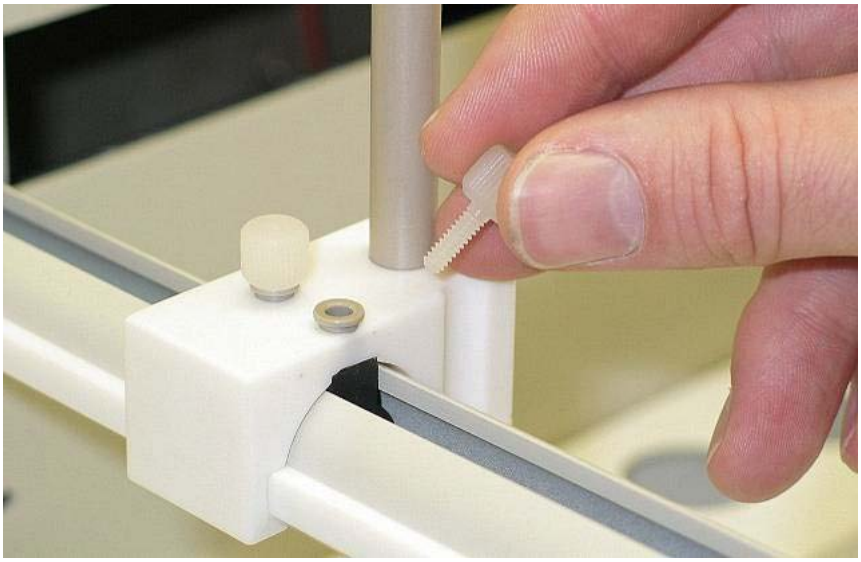

Figure 1-6 View of Y-axis home block with Kynar thumbscrews (*ASX-260* and *ASX-520*).

3. **Remove the entire Z-drive assembly from the Y-arm by pulling the Z-drive assembly forward and off of the autosampler arm as shown (Figure 1-7 and Figure 1-8).**

Figure 1-7 Z-drive removed from arm assembly (*ASX-520*).

Figure 1-8 Z-drive removed from arm assembly (*ASX-260*).

4. **Once the Z-drive assembly is removed, remove the rinse station (Figure 1-9/Figure 1-10). Turn the rinse station ¼ turn counter-clockwise while pulling it upward. Also, the tubing located at the bottom of rinse station will have to be disconnected from the pump at the rear of the autosampler.**

Figure 1-9 View of rinse station (*ASX-260* and *ASX-520*).

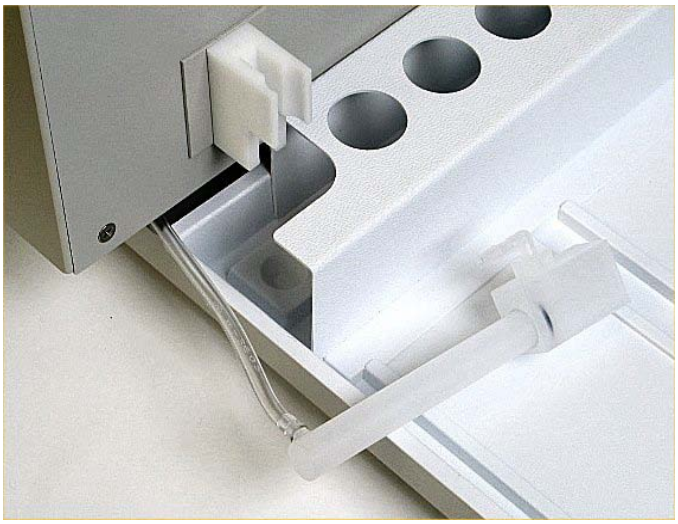

Figure 1-10 View of rinse station removed from the front cover (*ASX-260*).

5. The autosampler tray should then be removed. Lift up the tray and pull out (Figure 1-11).

Figure 1-11 Removing the tray (*ASX-520*).

6. **Next, the front cover is to be removed. Remove the four corner screws (Figure 1-12/Figure 1-13).**

Figure 1-12 Front view of *ASX-520* Autosampler showing front cover screws.

Figure 1-13 Front view of *ASX-260* Autosampler showing front cover screws.

7. **The front cover is removed by lifting it slightly and pulling forward (Figure 1-14/Figure 1-15).**

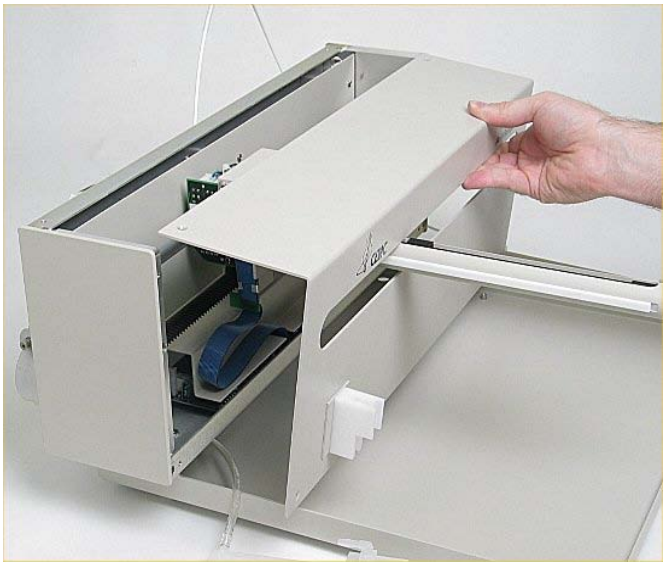

Figure 1-14 View of *ASX-520* Autosampler with the front cover being removed.

Figure 1-15 View of *ASX-260* Autosampler with the front cover being removed.

8. **The screws that hold the inner shield must be removed. Move the Y-axis assembly all the way to the left (Figure 1-16/ Figure 1-17 shows screw locations). Your autosampler may have a newer style shield with splashguard. These are removed in a similar manner.**

Figure 1-16 View of inner shield inside the *ASX-520* Autosampler.

Figure 1-17 View of inner shield inside the *ASX-260* Autosampler.

9. The inner shield can be removed by lifting it up while pulling forward (Figure 1-18/Figure 1-19).

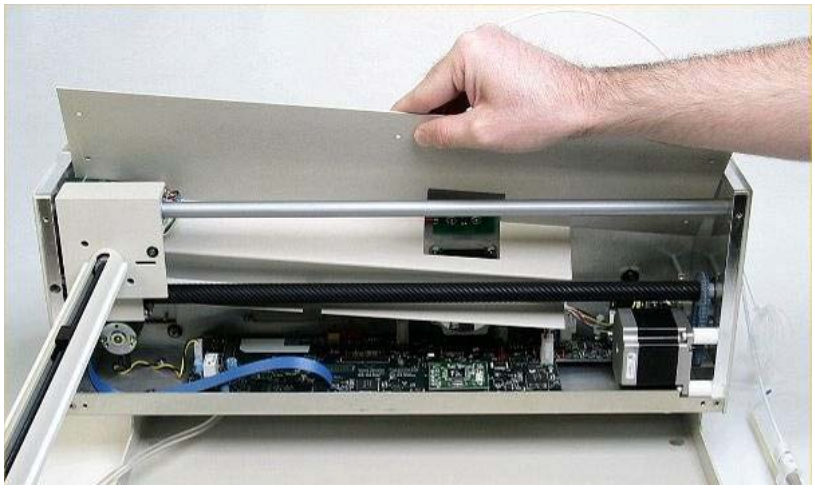

Figure 1-18 Removal of inner shield (*ASX-520*).

Figure 1-19 Removal of inner shield (*ASX-260*).

To complete I/O board/rabbit module installation for CETAC ASX-520/ ASX-520HS/EXR-8 autosamplers,
continue on the next page (32).

To complete I/O board/rabbit module installation for the CETAC ASX-260 autosampler,
continue on page 38.

3.1.2 Continuation of I/O board and "Rabbit" module installation for CETAC autosampler *ASX-520/ASX-520HS*

AUXILIARY BOARD INSTALLATION (ASX-520/520HS)

1. **Remove the Auxiliary cover plate and discard the plate and hardware (Figure 1-20).**

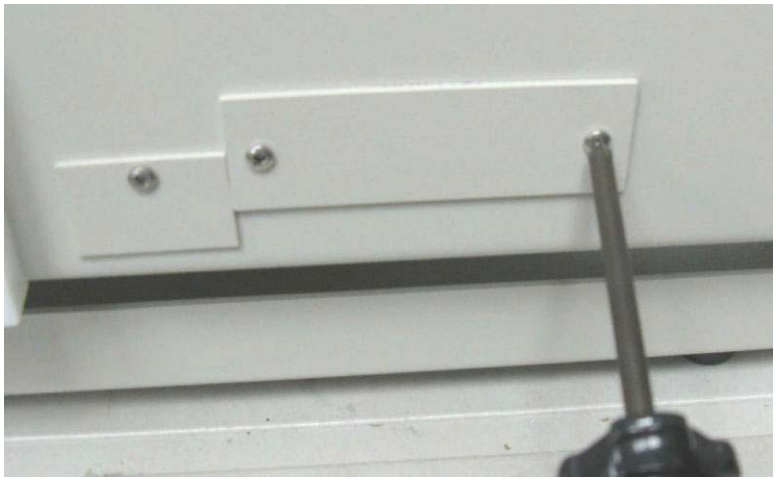

Figure 1-20 Removal of *ASX-520* auxiliary connector cover plate.

2. **The autosampler (Figure 1-21) is now ready for installation of the I/O daughter board.**

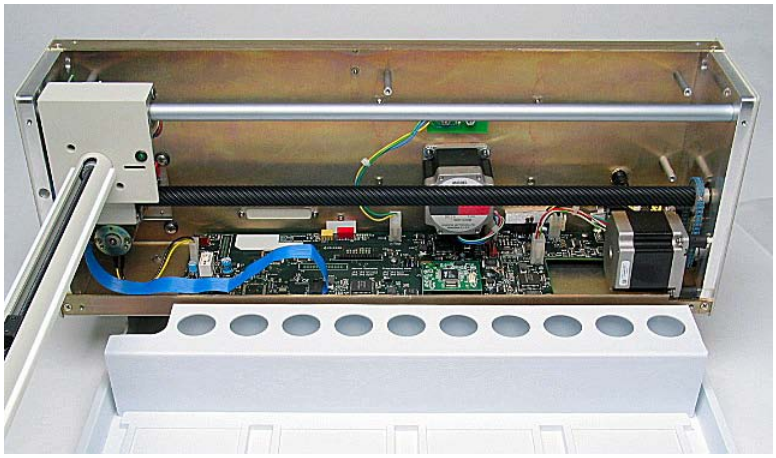

Figure 1-21 View of *ASX-520* with inner shield removed.

3. **Carefully install the daughter board so that the 37-pin female auxiliary connector inserts into the opening at the rear of the autosampler case, while at the same time the pins of the main board (denoted by the designation "P7" clearly marked on the main board at the array of pins as shown in Figure 1-22) are inserted fully into the socket of the daughter board connector (Figure 1-23). Use caution to ensure that pins mate fully and correctly to the socket (Figure 1-24 shows the I/O board installed into the correct position).**

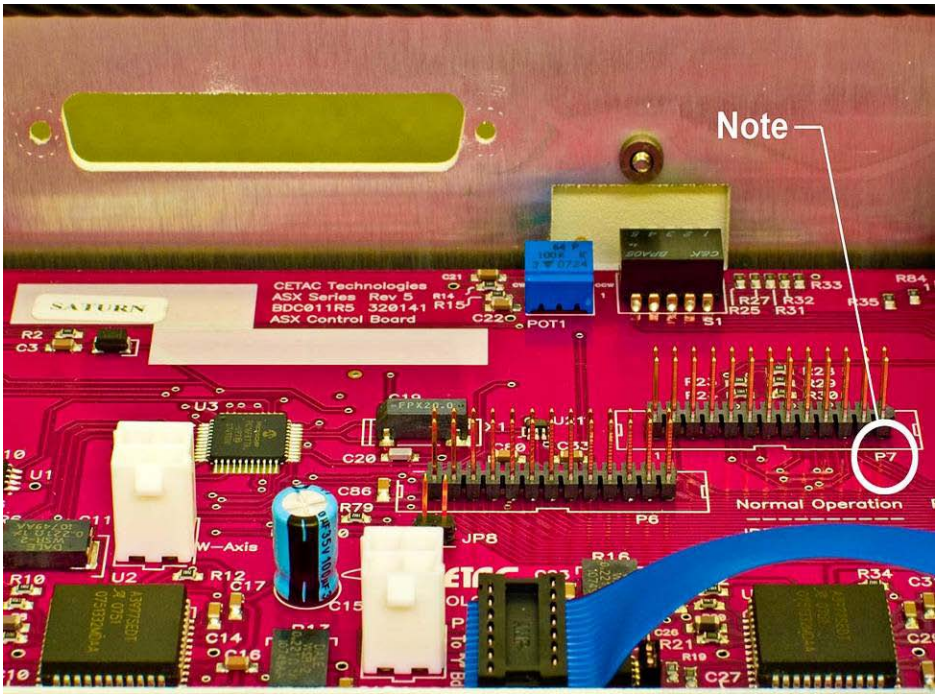

Figure 1-22 Note the location of the pin array marked "P7" utilized to mate to the I/O board (*ASX-520*).

Note:

It may be necessary to loosen screws that secure the main circuit board to the case to facilitate positioning/installation of the I/O board. Use caution and care when performing this operation. Be sure to replace/tighten any fasteners as necessary when I/O board installation has been completed.

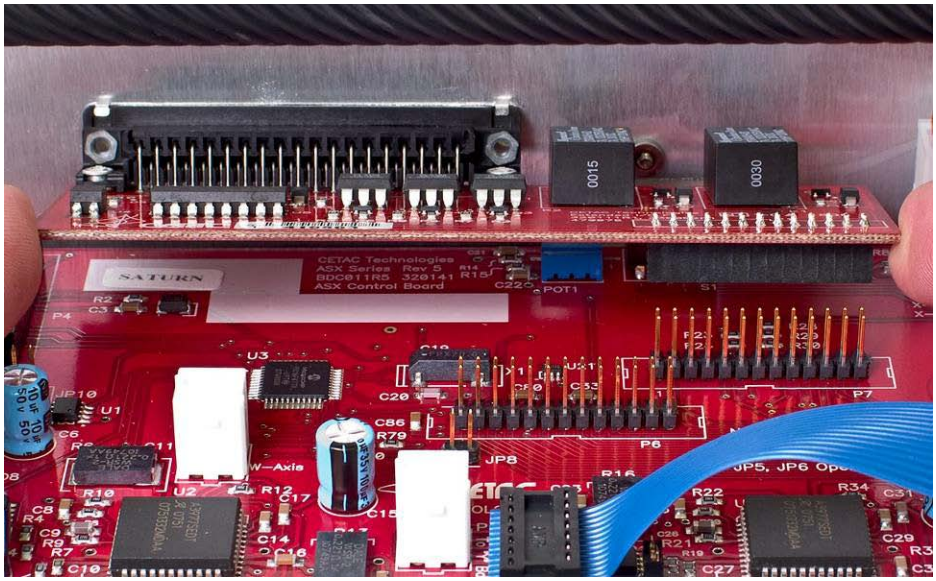

Figure 1-23 I/O board being placed into position to mated to the main board pin array (*ASX-520*)

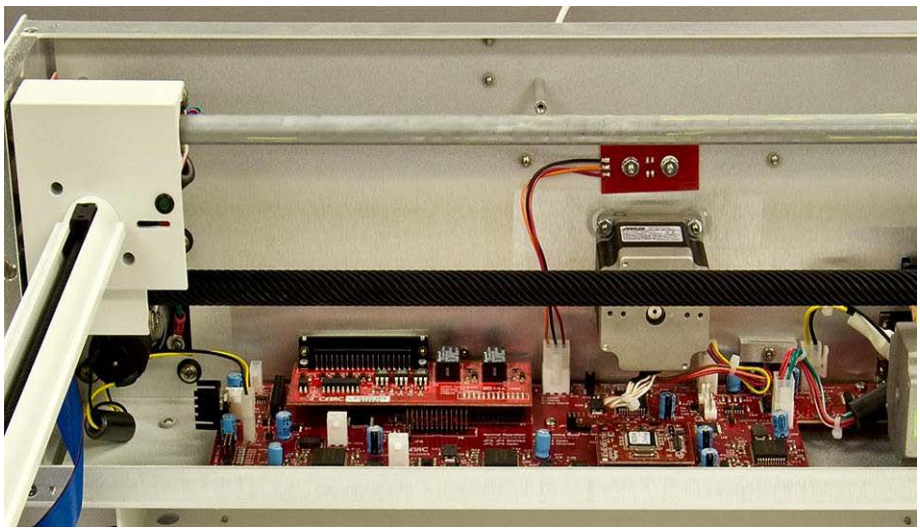

Figure 1-24 Main and Daughter board installed (*ASX-520*).

4. **Install Jackscrews through the autosampler case and into the 37-pin connector ears, threading and then fully tightening with a 3/16" nut driver to securely attach daughter board to the chassis (Figure 1-25).**

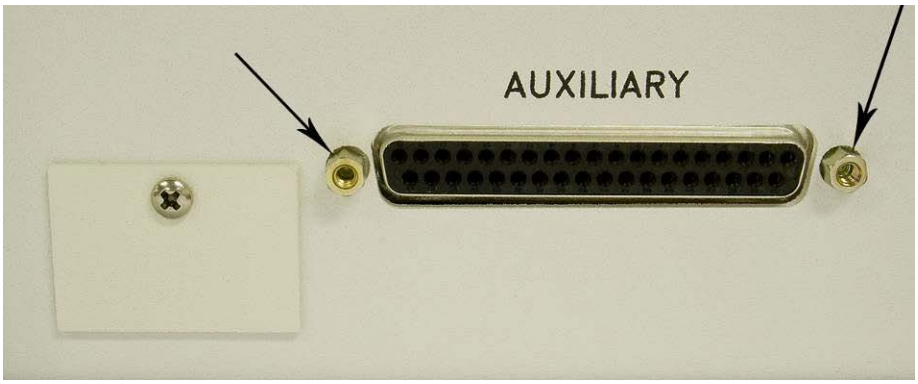

Figure 1-25 Jackscrews securing Daughter board (*ASX-520*).

Note:

Ensure that the Auxiliary I/O board pins are fully and correctly seated into the main circuit board socket before installing and securing the jackscrews as is outlined above.

PROCESSOR (RABBIT) MODULE INSTALLATION (ASX-520/ASX-520HS)

5. **Remove the existing Rabbit processor module from the main board (See Figure 1-26 for location of Rabbit module) by pulling straight upward and firmly on the Rabbit module, gripping it by the sides. Do not use any tools to remove the module, as damage to the module and/or main board WILL result. See Figure 1-27 for photo of Rabbit module removed from mainboard.**

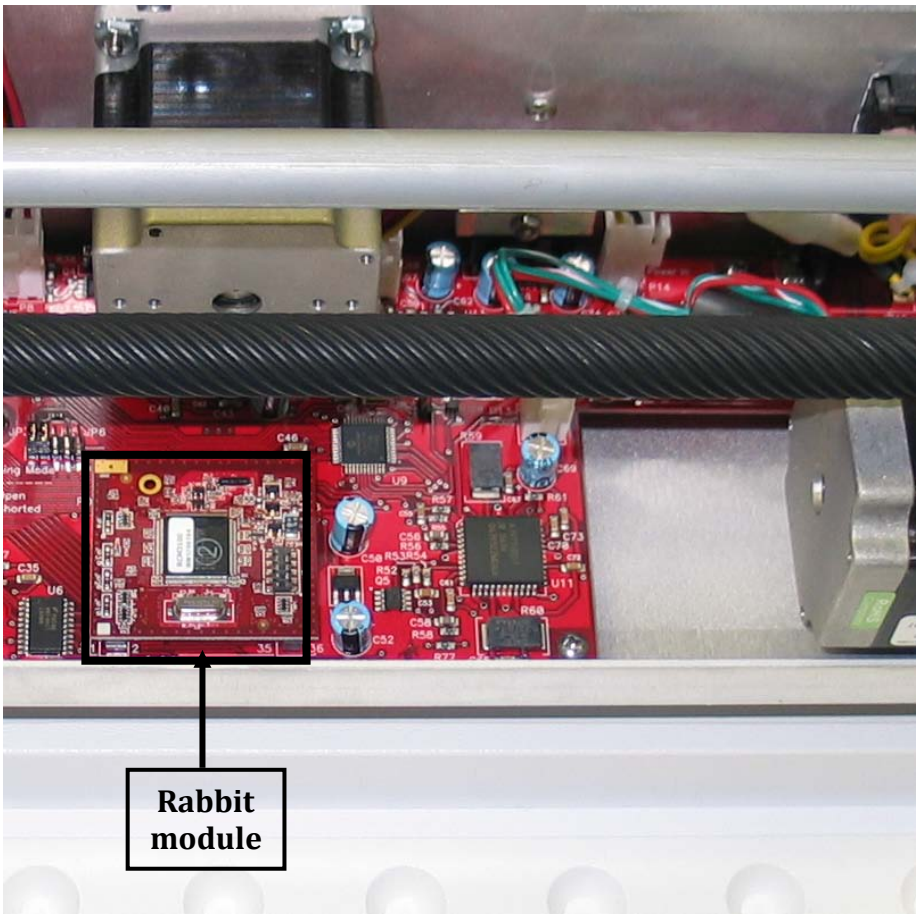

Figure 1-26 Rabbit module location on mainboard (*ASX-520/ASX-520HS*).

6. **Insert Rabbit module processor (supplied in the upgrade kit) in the same position/orientation as the removed unit had been installed. Be sure to align all pins to the proper socket hole location, using care to insert the module fully and securely.**

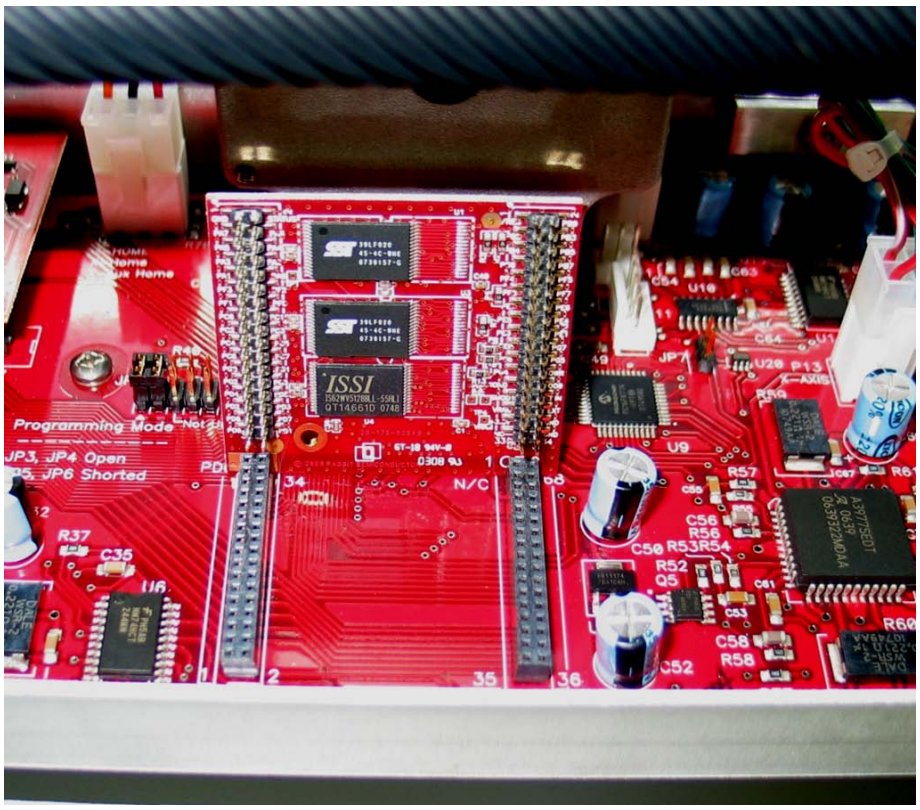

Figure 1-27 Rabbit shown removed and placed to show pin orientation (*ASX-520/ASX-520HS*).

Proceed to "Install the ***ASXPRESS*** Software" section of this manual ***(do not replace covers, etc., at this time).***

WARNING

When inserting or reinserting any connectors, such as the ribbon cable, auxiliary board or rabbit module, make certain that they are properly connected, ensuring that no pins are bent and all the pins are in their proper position in the connector. Improper connections could result in damage to the main board or other components.

3.1.3 Continuation of I/O board and "Rabbit" module installation for CETAC ASX-260 autosampler

1. **Remove the blue ribbon cable from the carriage assembly by first bending the retaining clamp out of the way, then grasp the cable firmly and give a sharp tug (Figure 1-28). You can straighten the pins prior to re-assembly.**

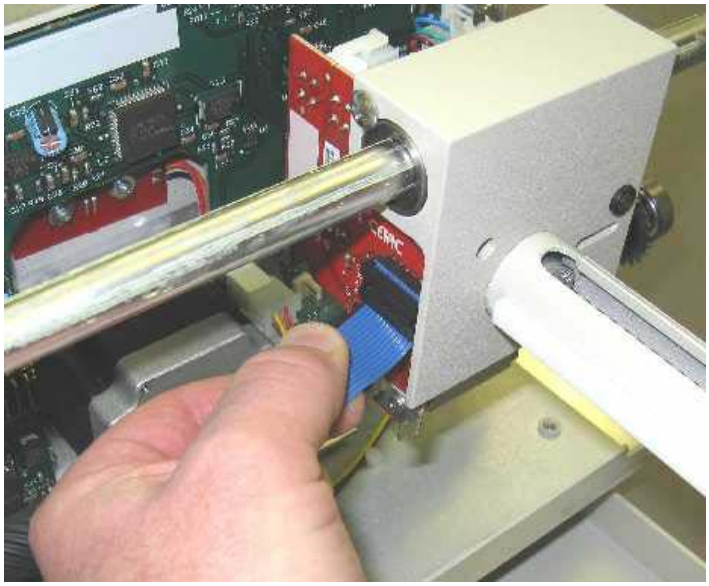

Figure 1-28 Removal of blue ribbon cable from carriage (*ASX-260*).

2. **Loosen the guide shaft set screws at <u>each end</u> of the guide shaft (Figure 1-29)**

Figure 1-29 Loosening of guide shaft set screws (*ASX-260*).

3. **Remove the three mounting screws for the right end plate (Figure 1-30). Two are counter sunk and one is a round head. The round head screw is used on the back of the chassis when re-assembled.**

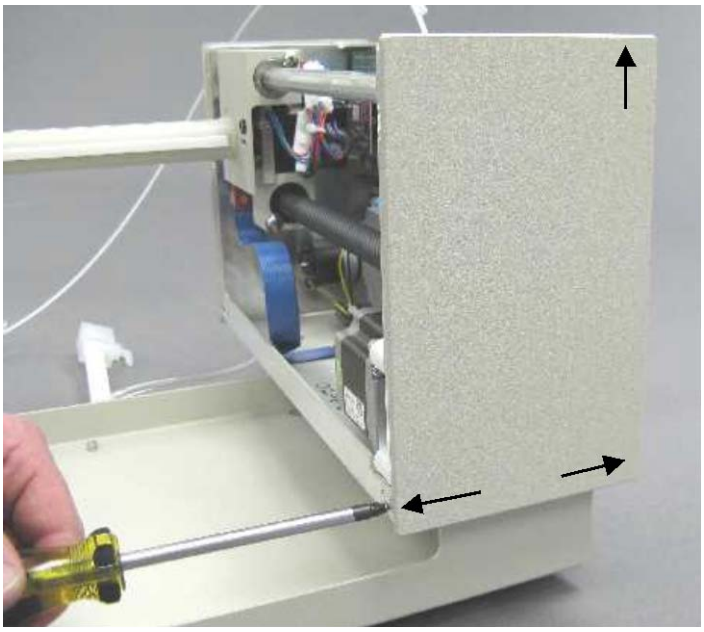

Figure 1-30 Right end plate with arrows indicating screw locations (*ASX-260*).

4. **Remove right end plate (Figure 1-31). It may be necessary to lightly tap with a small hammer or mallet as the fitting is sometimes quite snug. Underneath the lead screw end bearings is a wave washer. Set these components aside to replace during re-assembly.**

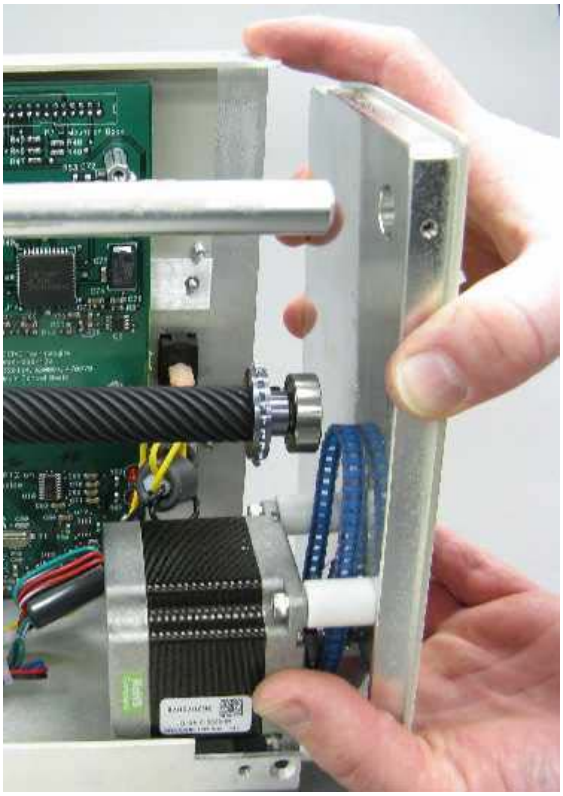

Figure 1-31 Removal of right end plate (*ASX-260*).

5. **Grasp the guide shaft, carriage assembly, and x-axis lead screw assembly and remove by pulling out of the left end plate. Set these aside for re-assembly.**

6. Remove the voltage regulator heat sink using a 1/4" nut driver (Figure 1-32). Set this aside for re-assembly.

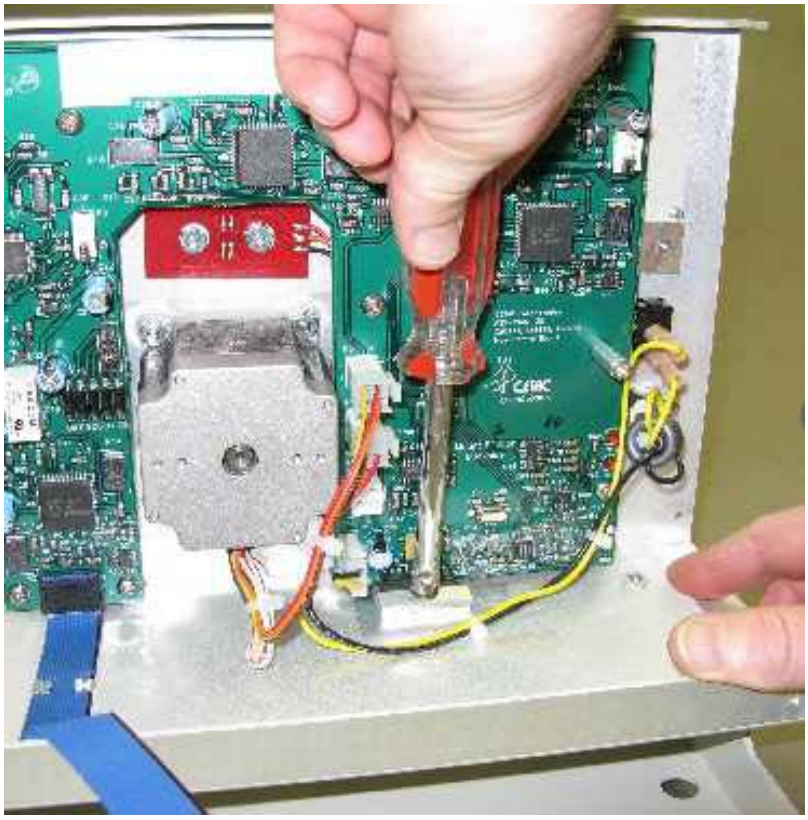

Figure 1-32 Removing the voltage regulator heat sink (*ASX-260*).

7. **Remove the four stand-offs with the 1/4" nut driver (Figure 1-33). Set these aside for re-assembly.**

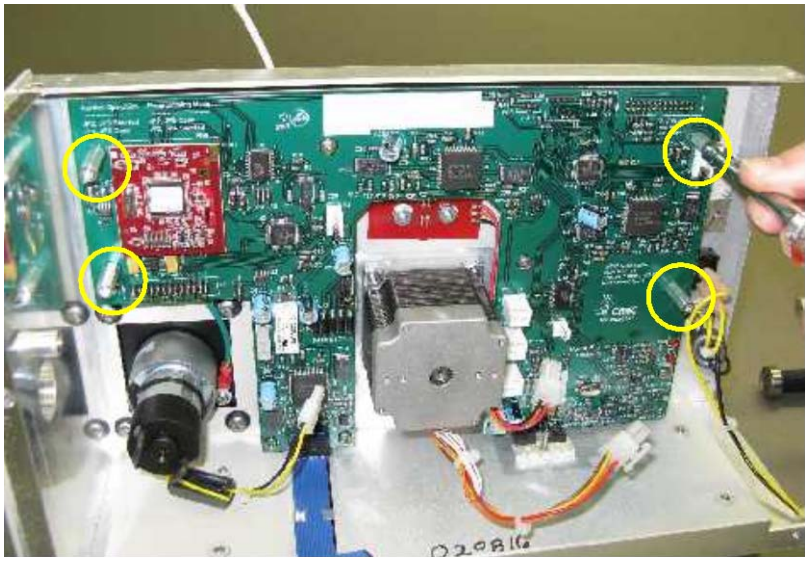

Figure 1-33 Removing the four stand-offs (*ASX-260*).

8. **Remove the 6 Phillips head screws holding the board in place (Figure 1-34). Unclasp the blue ribbon cable from the bottom clamp.**

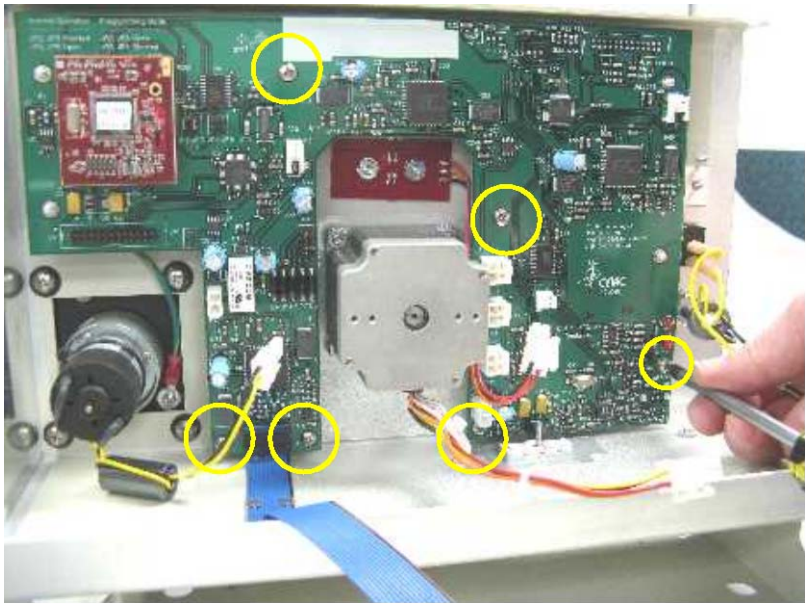

Figure 1-34 Removing the six screws holding the board in place (*ASX-260*).

9. Remove the board by pulling forward from the top (Figure 1-35).

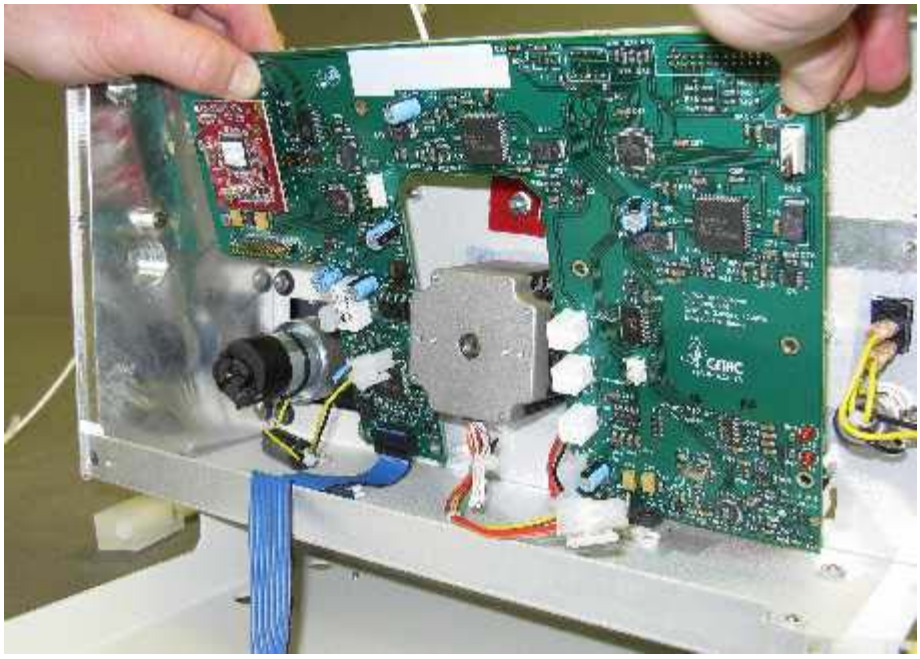

Figure 1-35 Removing the main board. Rabbit processor is the small **board in the top** left corner (*ASX-260*).

10. Remove the Auxiliary access cover plate and discard (Figure 1-36).

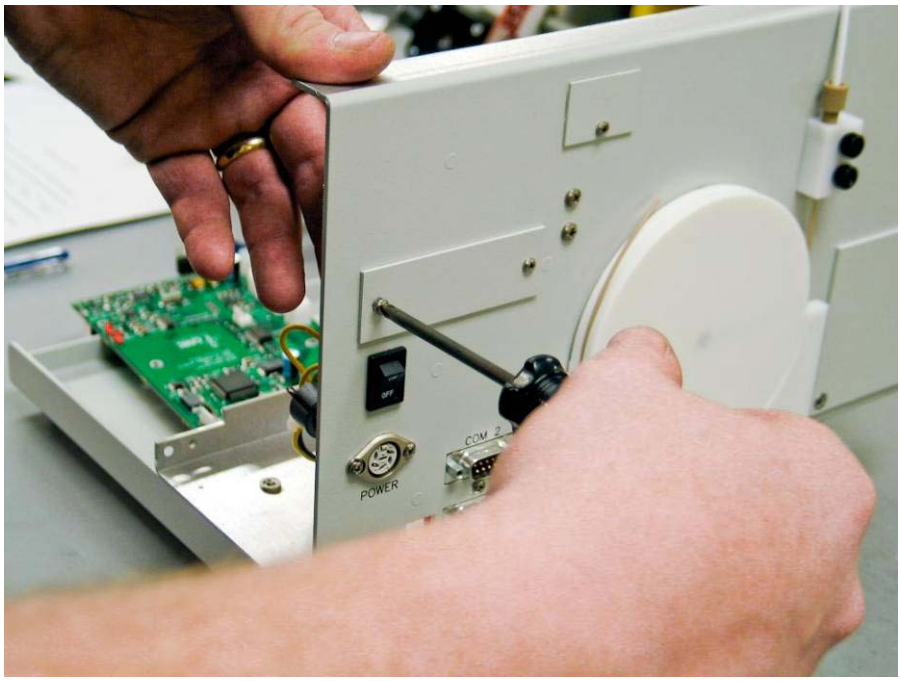

Figure 1-36 Removal of access plate (*ASX-260*).

11. **Remove stand-off with 1/4" nut driver and discard (Figure 1-37). Remove the spacer located under the stand-off and place with the other two spacers received with the installation kit.**

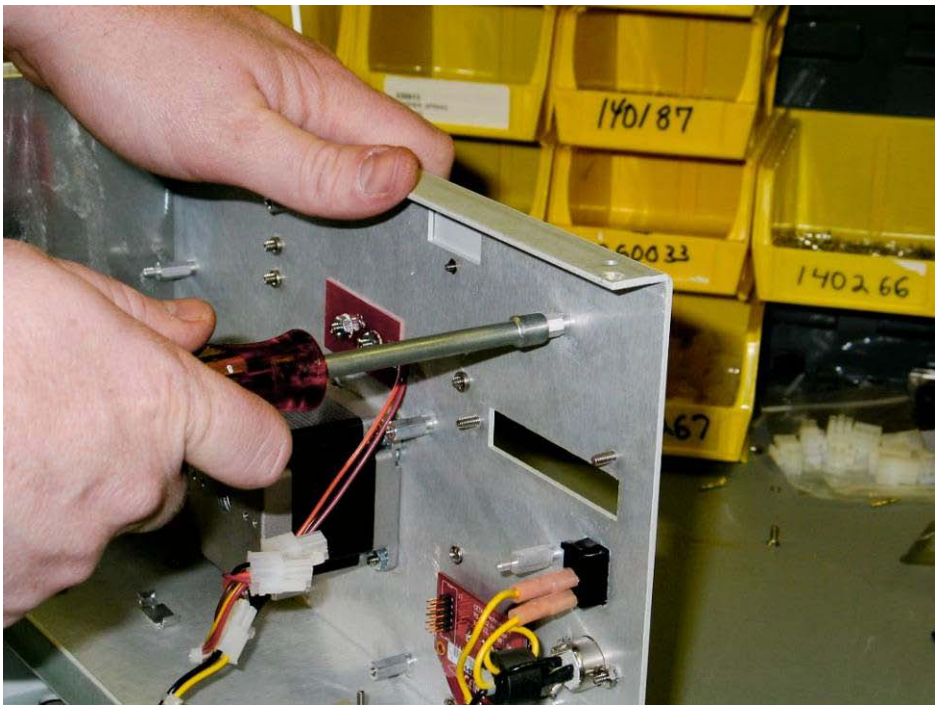

Figure 1-37 Removal of stand-off (*ASX-260*).

12. **Place a washer and then a spacer on the three mounting posts (Figure 1-38).**

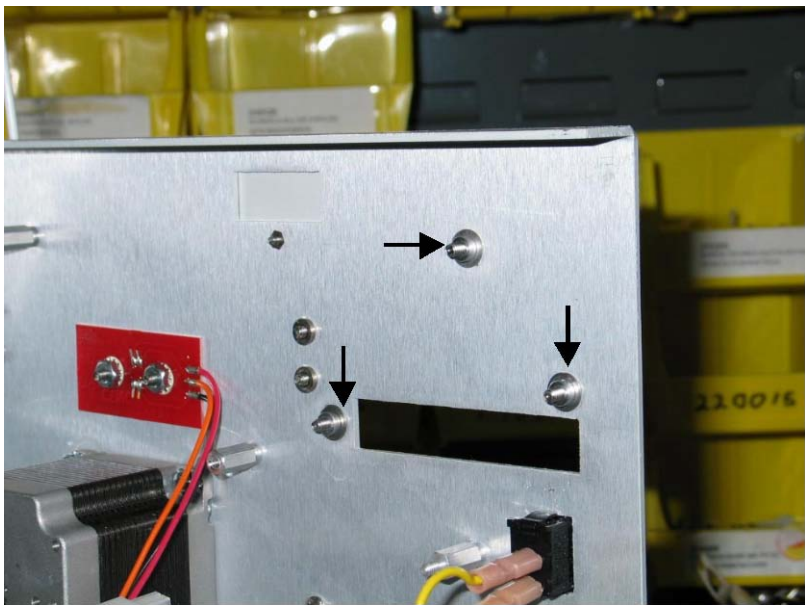

Figure 1-38 Washers and spacers installed (*ASX-260*).

13. Install the daughter board on the three studs. Secure to the bottom two posts with the 5/16" head nuts provided in the kit. Secure to the top post with the 3/8" standoff using 1/4" nut driver (Figure 1-39).

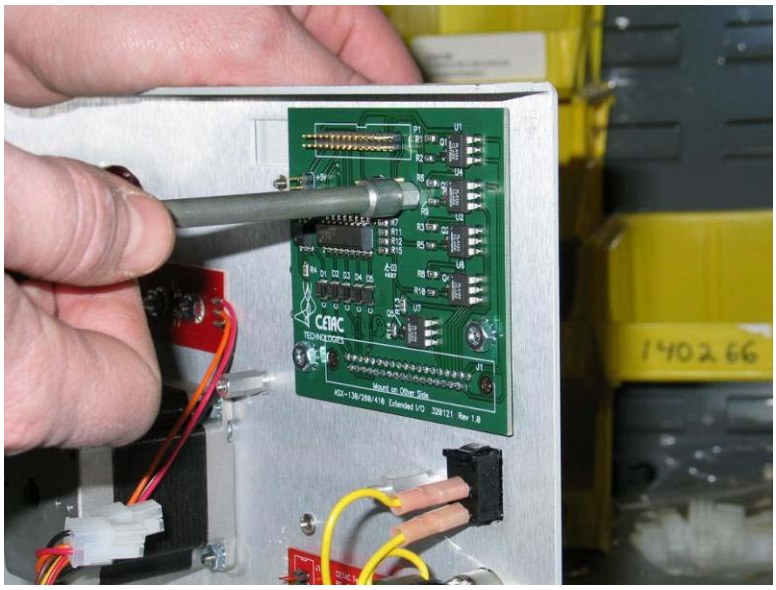

Figure 1-39 Securing Daughter board to chassis (*ASX-260*).

14. **Install the main board in the chassis. Ensure the 10 pin connector on the back of the board is seated correctly in the connector of the communications interface board mounted behind it (Figure 1-40). Also ensure the pins are seated correctly for the daughter board.**

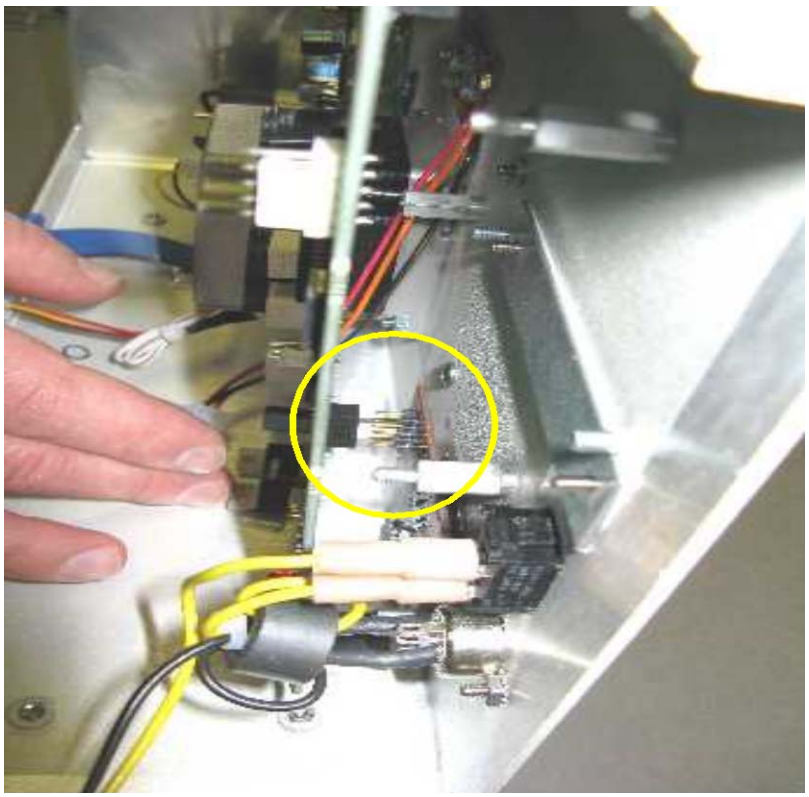

Figure 1-40 Installing the 10 pin connector to the communication interface board (*ASX-260*).

15. **Install the six mounting screws to secure the main board. Start all six before tightening them.**
16. **Install the four stand-off's. Take care not to over tighten as the studs can easily break.**
17. **Re-clamp the blue ribbon cable.**
18. **Re-connect all wiring harnesses to the main board, except the x-motor. This will be connected after installation of the right end plate.**
19. **Position the right end plate in place and line up the guide shaft and x-axis lead screw assembly. Ensure the x-axis drive belt is looped over the motor sprocket and lead screw sprocket. It's not necessary to get the belt onto the sprocket teeth at this point. It may be necessary to lightly hit the endplate with a mallet or plastic head hammer to seat the bearing. Also ensure the wave washer is in place under the bearing.**
20. **Secure the end plate with three screws beginning with the round head screw in the rear. Tighten the guide shaft set screw.**
21. **Position the x-axis drive belt over the motor sprocket. Start the belt on the lead screw sprocket, and then rotate the lead screw to get the**

belt in place.

PROCESSOR (RABBIT) MODULE INSTALLATION (ASX-260)

1. **Remove existing Rabbit processor module from the main board (See Figure 1-41 for location of Rabbit module) by pulling straight outward and firmly on the Rabbit module, gripping it by the sides. Do not use any tools to remove the module, as damage to the module and/or main board WILL result. See Figure 1-42 for photo of Rabbit module removed from mainboard.**
2. **Insert the replacement Rabbit module processor (supplied in the upgrade kit) in the same position/orientation as the removed unit had been installed (Figure 1-41). Align all pins to the proper socket hole location, using care to insert the module fully and securely.**

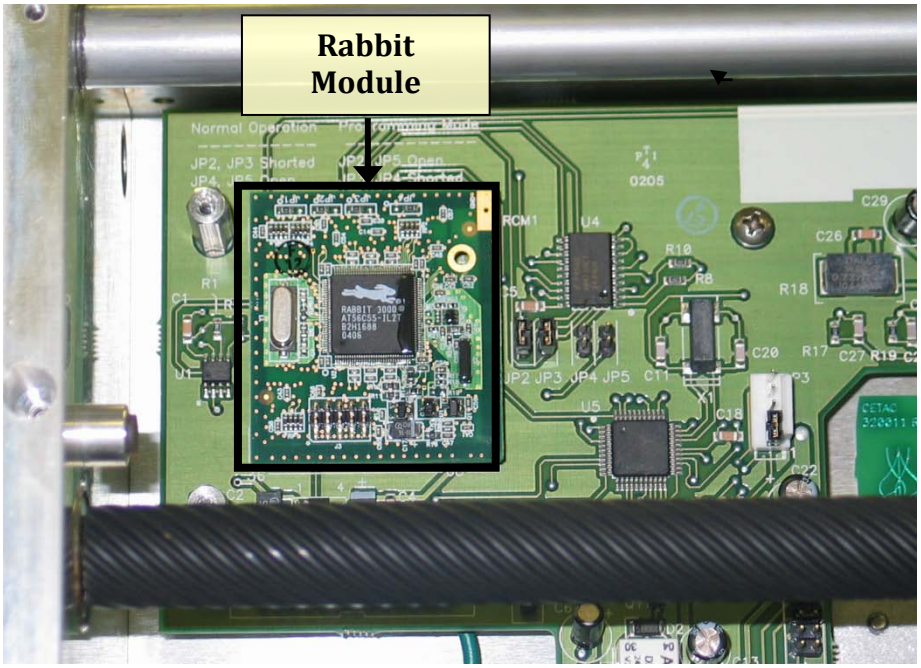

Figure 1-41 Rabbit module location on mainboard (*ASX-260*).

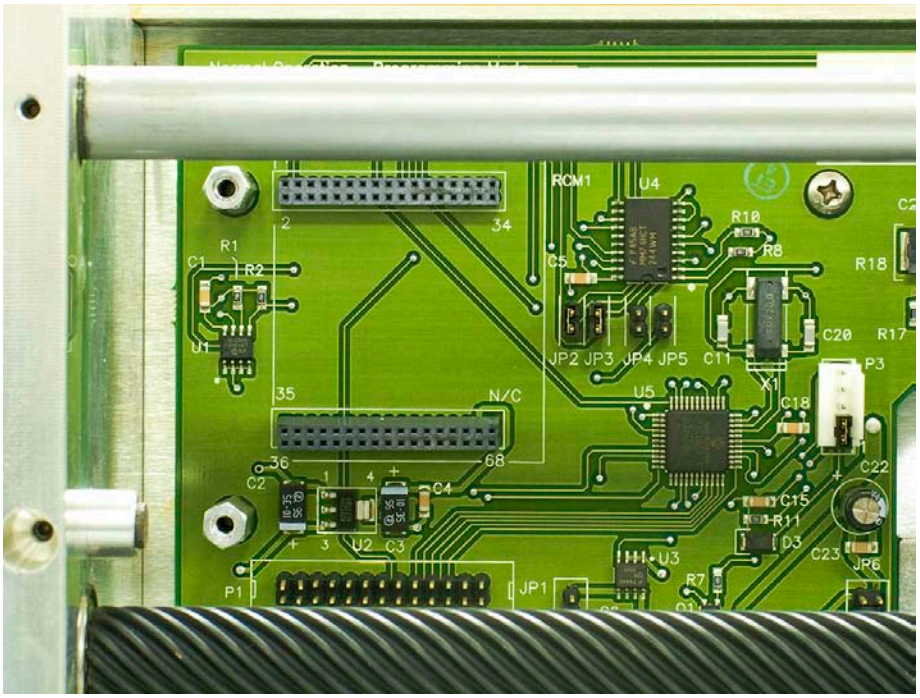

Figure 1-42 Mainboard shown with rabbit module removed

Proceed to the "Increase the Peristaltic Pump Speed" section of this manual (Do not replace covers, etc., at this time).

Note:

Do not replace the cover/shields/Z-drive assembly on the autosampler until the following pump speed increase operation is also completed.

3.1.4 Increase the Peristaltic Pump Speed Setting

In order to provide the necessary additional flow rate at the rinse station, the pump speed must be increased. This is achieved by changing the position of a jumper on the autosampler main board.

The jumper must be moved from its existing position to the position marked "Max RPM" (**Figure 1-43**), on the *ASX-520/ASX-520HS* board, and to the top position (see note below) of the bank of jumper pins marked J6 (Figure 1-44) on the *ASX-260* board. This jumper/pin arrangement is located on the left side of the *ASX-520/ASX-520HS* board, and near the center of the *ASX-260* board, as shown in Figure 3-41.

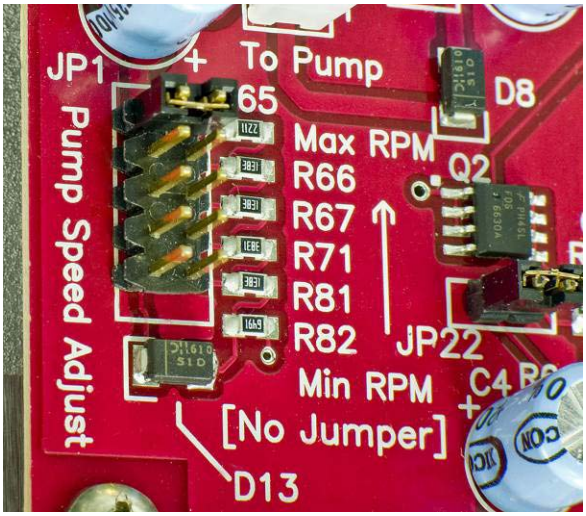

Figure 1-43 Jumper position utilized to increase pump speed (*ASX-520*)

Note:

ASX-520/ASX520HS main boards of differing eras/versions may have varying orientation of jumper positions. Follow the nomenclature present on the circuit board for proper jumper positioning.

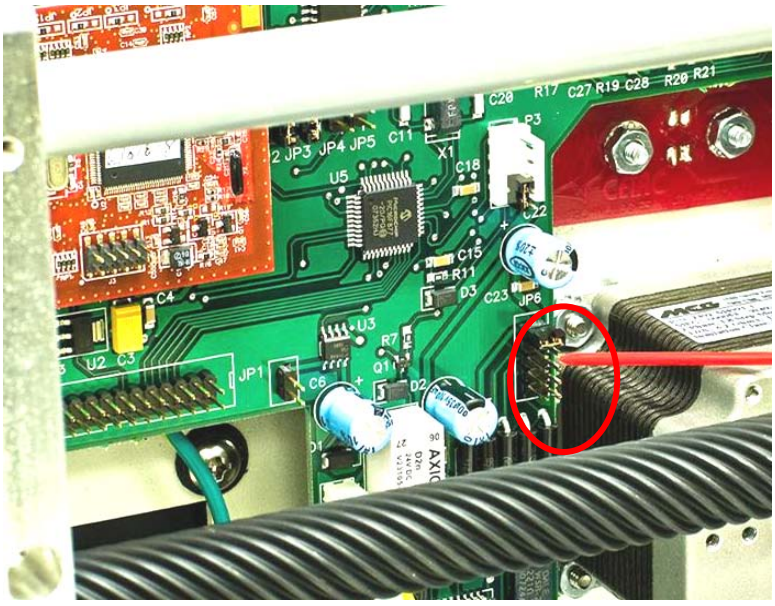

Figure 1-44 Red pointer and circle shows jumper position (top position) utilized to increase pump speed (*ASX-260*)

3.1.5 Internal work is complete; replace all covers, etc.

When all interior work has been completed as outlined in the previous sections:

- **Reinstall all shields**
- **Reinstall the front cover**
- **Reinstall the Z-drive assembly**

Note:

Only after the auxiliary I/O board has been installed, the Rabbit module replaced and the pump speed setting increase has been completed may the shields, cover and the Z-drive assembly be reinstalled.

3.1.6 Install the Standard-Bowl Rinse Station and Modified Rinse Tubing Arrangement

A Standard-Bowl Rinse Station (Figure 1-45) and associated modified tubing arrangement is required to accommodate the design requirements of the *ASXPRESS* system. Please note the following considerations:

- If you have purchased a full system, it will already be configured properly and this step will not be necessary.
- If you are connecting the *ASXPRESS* system to an existing *ASX-260* or *ASX-520* (standard speed) autosampler, the proper rinse station will already be in place, but tubing modifications (outlined in this section) will be required.
- If you are connecting the *ASXPRESS* system to an *ASX-520HS* (high speed autosampler), it will have the large-bowl rinse station installed, and you will need to replace it with the standard-bowl rinse station (supplied with the upgrade kit), as well as to make the tubing modifications (**Figure 1-46** and **Figure 1-47**) as are outlined in this section.

Figure 1-45 Standard-Bowl Rinse Station

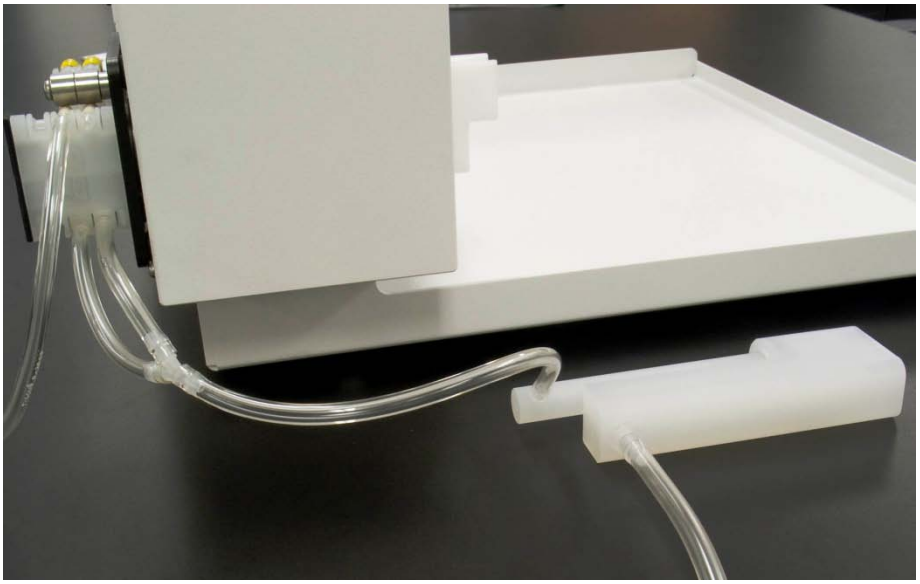

Figure 1-46 Rinse Tubing and Y-Connection Assembly Installed on Peristaltic Pump and Rinse Station (*ASX-520*)

To retrofit the rinse station on an *ASX-520HS* with existing Large Bowl Rinse Station to the Standard Bowl version, complete the following:

1. **Gently pull the rinse station away from the autosampler rinse block.**
2. **Remove the tubing connecting the rinse station to the peristaltic pump. Remove the tubing connecting the rinse station to the drain/waste container. Set the rinse station and all tubing aside, as those items will not be reinstalled.**
3. **Connect the Y-tubing assembly to the lowest fitting of the supplied standard-bowl rinse station (both provided in the upgrade kit), and to the discharge ports of the peristaltic pump (Figure 1-46).**
4. **Connect one end of the supplied drain tubing to the drain/overflow fitting (highest fitting) of the rinse station. Connect the drain tube from the rinse station to a suitable waste container, ensuring that the end of the drain tube does not become submerged below the waste liquid level, as that condition will impede proper drainage. Note: This length of tubing may be cut to accommodate your specific position/arrangement.**
5. **Gently push the Standard Bowl Rinse Station into place onto the rinse station holder block (mounted on the autosampler front cover) as shown in place in Figure 1-45.**
6. **Replace the peristaltic pump input rinse tubing (suction tubing connecting the input of the peristaltic pump to a rinse solution supply container) with a single length of tubing, found in the completion kit, as shown in Figure 1-46 and** Figure 1-47**. Leave one peristaltic pump channel input connection open to the atmosphere to allow air to be drawn in through one channel, while rinse solution is drawn in through the other channel (**Figure 1-47**).**

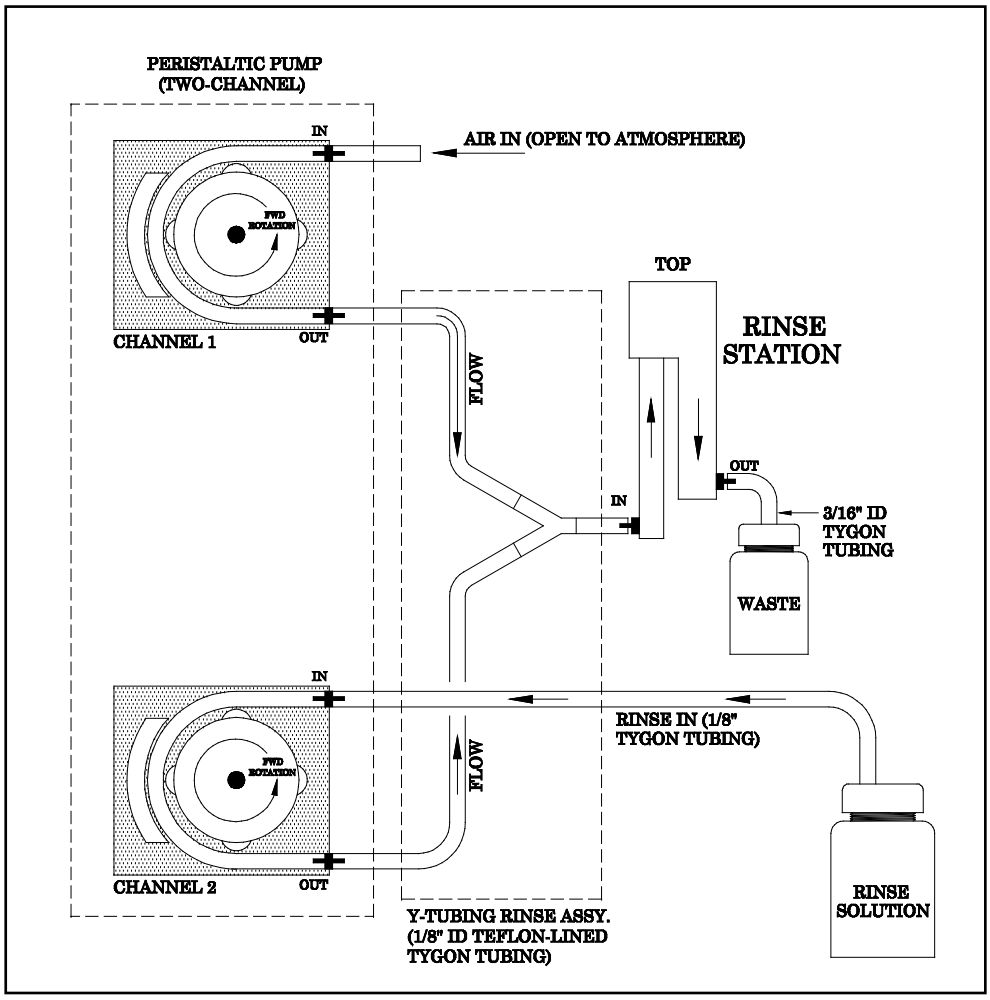

Figure 1-47 Rinse Tubing Diagram

To retrofit the rinse station plumbing on an ASX-520 or ASX-260, complete the following:

1. **Gently pull the existing rinse station away from the autosampler rinse block.**
2. **Remove the rinse tubing between the rinse station and the peristaltic pump and also remove the rinse solution suction tubing to the peristaltic pump.**
3. **Install the Y-tubing assembly (supplied in the upgrade kit) on the existing Standard Bowl Rinse Station, and onto the lower two connections of the peristaltic pump, as shown in Figure 3-43 and 3-44.**
4. **Connect one end of the supplied drain tubing to the drain/overflow fitting (highest fitting) of the rinse station. Connect the drain tube from the rinse station to a suitable waste container, ensuring that the end of the drain tube does not become submerged below the waste liquid level, as that condition will impede proper drainage. Note: This length**

of tubing may be cut to accommodate your specific position/arrangement.

5. **Gently push the Standard Bowl Rinse Station into place onto the rinse station holder block (mounted on the autosampler front cover) as shown in place in Figure 1-45.**
6. **Replace the peristaltic pump input rinse tubing (suction tubing connecting the input of the peristaltic pump to a rinse solution supply container) with a single length of tubing, found in the completion kit, as shown in Figure 1-46 and Figure 1-47. Leave one peristaltic pump suction channel input open to the atmosphere to allow air to be drawn in through one channel, while rinse solution is drawn in through the other channel (Figure 1-47).**

3.1.7 Install the 1.0mm ID Sample Probe on the Autosampler

A 1.0mm ID sample probe (**Figure 1-48**) is provided for use with the CETAC autosampler for proper operation with the *ASXPRESS* system. Follow the autosampler Operator Manual Instructions to replace the probe with the 1.0mm sample probe, which is attached to the *ASXPRESS* 6-Port Valve at Port #2.

> **Note:**
>
> The 1.0mm I.D. sample probe must be installed on the autosampler or the *ASXPRESS* Rapid Sample Introduction System will not perform properly. It is identified by double blue bands (Figure 1-48) installed on the probe tubing.

Figure 1-48 Double Blue Bands Identify the 1.0mm I.D. Sample Probe (*carbon fiber probe shown is standard equipment*)

3.2 Connect the *ASXPRESS* system

Once the autosampler is prepared for use, the *ASXPRESS* system should be connected to the host instrument and autosampler, and the autosampler should be connected to the host instrument's computer.

3.2.1 Connect the *ASXPRESS* Plumbing

All tubing (except sample loop and probe) is pre-connected to the *ASXPRESS* valve/pump module to allow convenient inter-connection to the autosampler and to the nebulizer per **Figure 1-49**. The 6-Port valve ports are numbered, color coded, and labeled with a descriptive definition providing clear identification of port functionality. The only connection required at the *ASXPRESS* 6-Port Valve is the customer-selected sample loop. All other *ASXPRESS* plumbing is prepared to be connected to the autosampler and ICP/ICP-MS as received in the shipping packaging.

Note:

All fitting connections on the 6-Port Valve are to be finger tightened only to prevent damage to the valve and tubing. Do not overtighten.

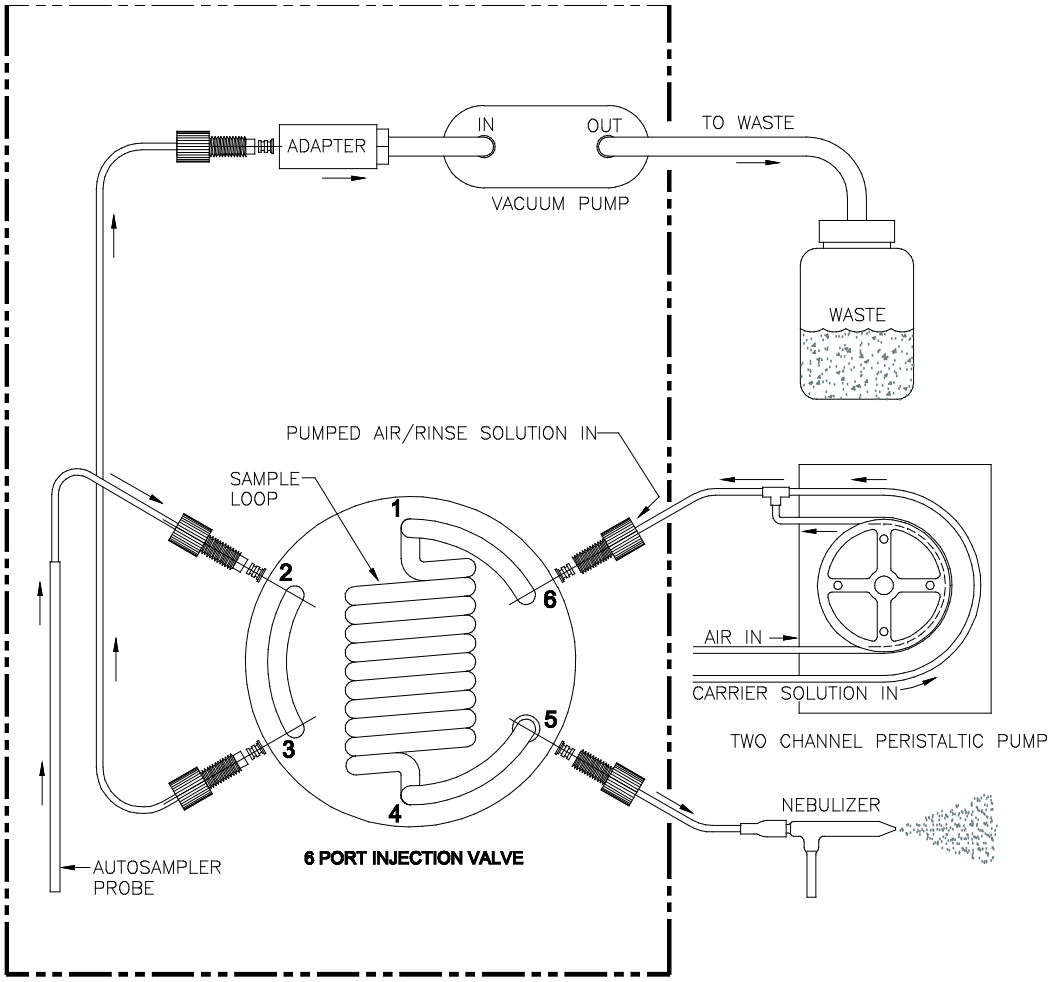

Figure 1-49 *ASXPRESS* Valve/Pump Module Tubing Connections

To make the plumbing connections to the *ASXPRESS* (**Figure 1-49**), perform the following:

1. **Remove the protective cover from the 6-port valve.**
2. **Install a sample loop between ports #1 and #4 of the 6-port valve (as labeled on the valve). *Use caution to prevent kinking of loop!***
3. **Ensure that the 60" length of 1/8" tubing (which is pre-connected to the "out" port of the vacuum pump) is inserted into a waste container. *Cut this length to fit your specific setup, ensuring that the discharge end is not placed so that it may become submerged below the liquid level of the waste container*.**
4. **Install the autosampler probe in the autosampler per instructions included with the autosampler.**
5. **Connect the tube from the probe to port #2 of the 6-port valve.**

6. **Connect the 14" length of 0.030" x 0.062" tubing (which is pre-installed to the green connector at port #6 of the 6-port valve) to the ICP / ICP-MS peristaltic pump. This length of tubing is fitted with a tee on its end which is intended to be connected to two individual output (discharge) channels of the ICP / ICP-MS peristaltic pump. The input (suction) ports of this peristaltic pump are connected as follows:**
   - **One channel to carrier/rinse solution**
   - **The other channel open to air**

   This plumbing configuration is crucial to the proper operation of the *ASXPRESS* system and must be followed.

7. **Connect the 14" length of 0.030" x 0.062" tubing (which is pre-installed to the blue connector at port #5 of the 6-port valve) to the nebulizer. *Place the ASXPRESS valve/pump module as close to the nebulizer as is possible, and cut the length of tubing to the shortest length possible which will allow connection of port #5 to the nebulizer without any kinking. The shortest length tubing at this connection is most desirable, as it provides the greatest time savings while operating the ASXPRESS system.***

> **Note:**
>
> The *ASXPRESS* system is designed to operate and interface with many manufacturers' instruments. To allow for the closest proximity placement of the *ASXPRESS* valve/pump module to the instruments nebulizer, CETAC Technologies offers a modular articulating support stand, which allows for stable mounting and flexible positioning of the valve/pump module. Contact CETAC Technologies for technical and ordering information.

3.2.2 Connect the Electronics Module to the Valve/Pump Module

The *ASXPRESS* system is comprised of two main components which include the electronics module and valve/pump module (Figure 3-47). The separate electronics and valve/pump components provide the smallest possible injection valve size which aids in the most convenient, close proximity placement of the injection valve to the instrument's nebulizer.

Figure 1-47 *ASXPRESS* system

The *ASXPRESS* valve/pump module connects to the electronics module via its integrated cable with DIN style connector as shown in Figure 3-48. To connect the electronics module to the valve/pump module, simply plug the valve/pump module's cable connector into the electronics module's jack (located at the lower left front corner of the electronics module case.

Figure 1-48 Connecting *ASXPRESS* Valve/Pump Module to Electronics Module

3.2.3 Connect the *ASXPRESS* system to the Autosampler

The *ASXPRESS* electronics module connects to the autosampler via an integrated cable with 37 pin male connector. Plug the *ASXPRESS* power/signal connector into the auxiliary I/O port connection on the back of the autosampler and secure the connection with the integrated jackscrews (Figure 3-49).

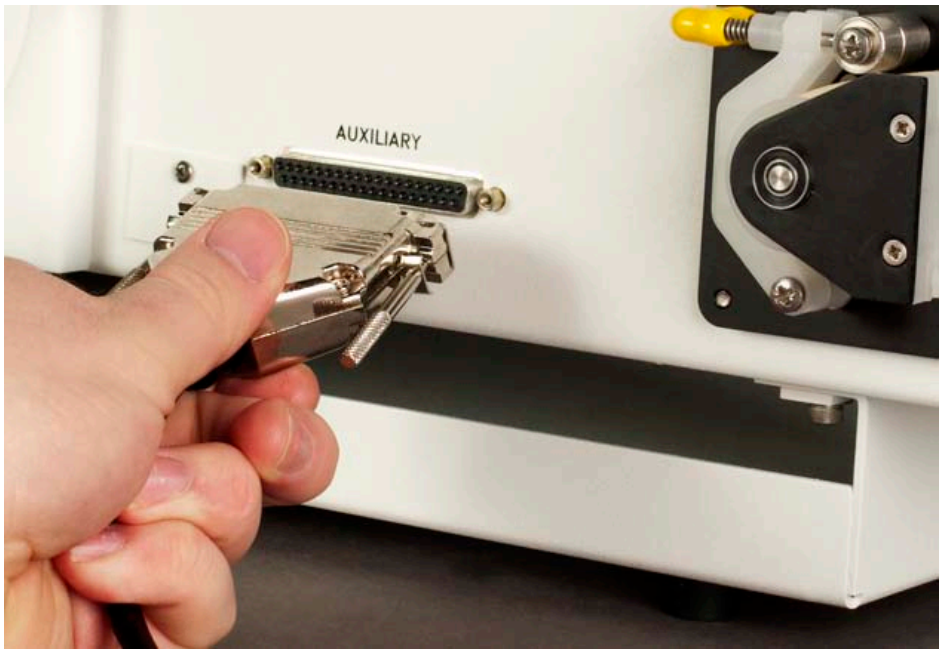

Figure 1-49 Connecting *ASXPRESS* Valve/Pump Module to ASX autosampler

3.2.4 Connect the Autosampler to the Host Computer

Connect the CETAC autosampler to the host computer and power source as directed in the CETAC Autosampler Operator Manual.

CAUTION

When interconnecting any computing devices, keep communications cables away from sources of electromagnetic or radio frequency (RF) interference, such as electric motors, transformers, fluorescent light ballasts, or RF energy sources. Limit cable runs for RS-232C to less than 16 meters. If these conditions cannot be met, use low impedance, fully shielded cables to provide satisfactory operation. The cables are available from many sources, but you will need to specify the correct mating connectors and "straight-through" (DTE-DCE) wiring.

3.3 Install the *ASXPRESS* Software

The *Xpress* Configuration Tool Program is used to enable/disable and configure the autosampler and its control of the *ASXPRESS* system, as well as providing access to manual functions of the *ASXPRESS* system and autosampler. The *ASXPRESS* system is controlled by the autosampler, which executes a macro automatically when the probe is placed into the sample.

Load the *Xpress* Configuration Tool software onto the host computer from the CD provided. The software will Auto-Run when the disc is loaded into the CD-ROM drive of the host computer. If it does not, use Windows Explorer to open the drive letter containing the disc, then select "Setup Launcher" (Figure 3-50) to begin the software installation.

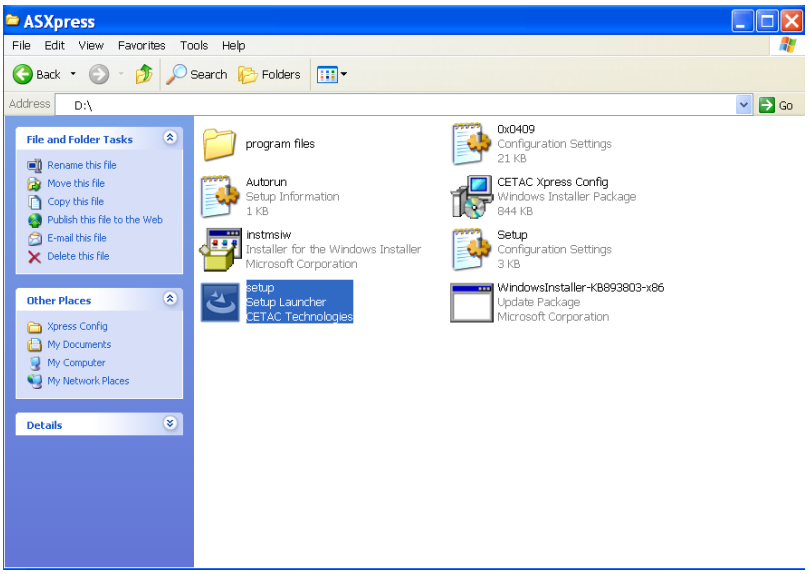

Figure 1-50 *ASXPRESS* Setup Launcher

Follow the prompts of the Installation Wizard to complete the installation of the *ASXPRESS* Configuration Tool software package as follows:

1. **When the *Xpress* Config Installation Wizard window opens, click the "Next" button to initiate the software installation process (Figure 3-51).**

Figure 1-51 *Xpress* Config Installation Wizard

1 The License Agreement appears. Click the "I accept the terms in the license agreement" radio button. Then click the "Next" button (Figure 3-52).

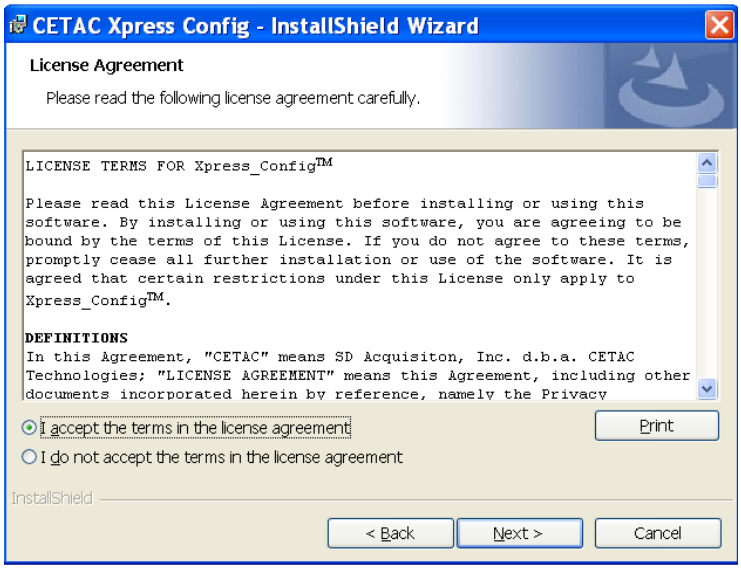

Figure 1-52 License Agreement

2 The "Readme" window appears. After reviewing the information, click the "Next" button (Figure 3-53).

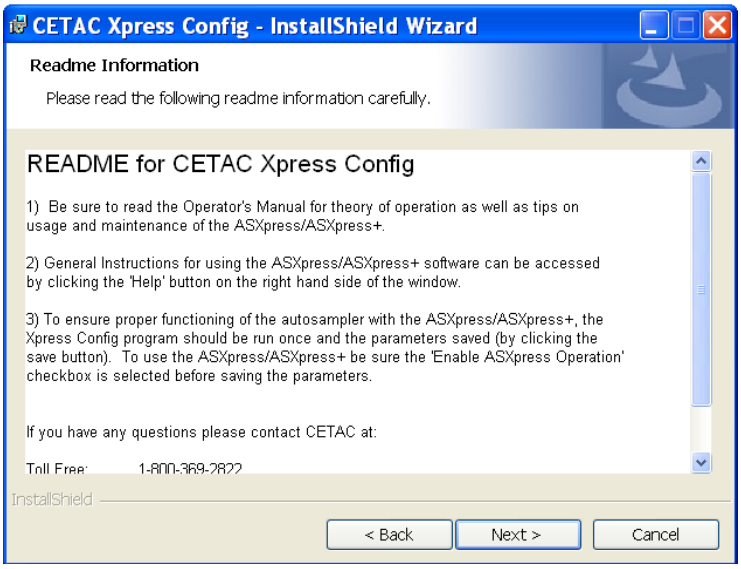

Figure 1-53 Readme information window

3 The "Destination Folder" window appears. Click the "Change" button to modify the folder name or location, or click "Next" to select the default location as depicted in Figure 3-54.

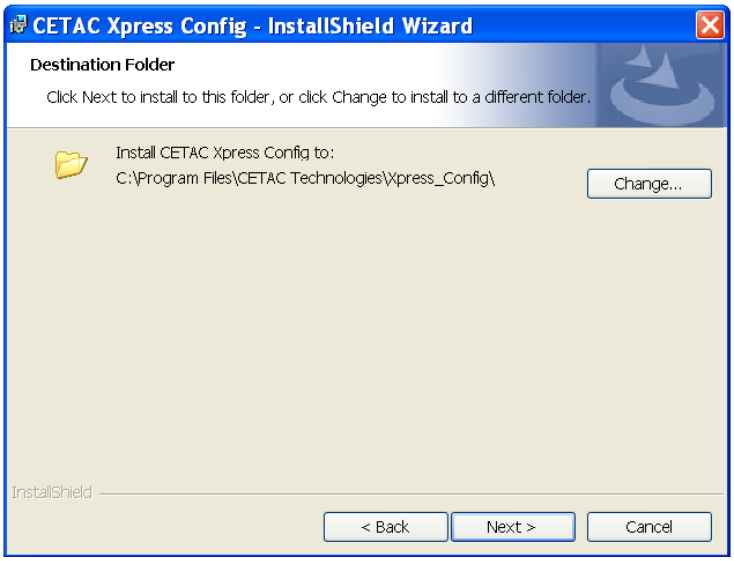

Figure 1-54 Destination Folder window

4 The "Ready to Install the Program" window appears (Figure 3-55). Review the selected settings. Click the "Back" button to change any selected settings. Click the "Install" button to begin the installation process with the selected settings.

Figure 1-55 "Ready to Install the Program" window

5 The "InstallShield Wizard Completed" window appears (Figure 3-56). Select the "Launch the program" box and then click the "Finish" button to complete the installation and launch the program.

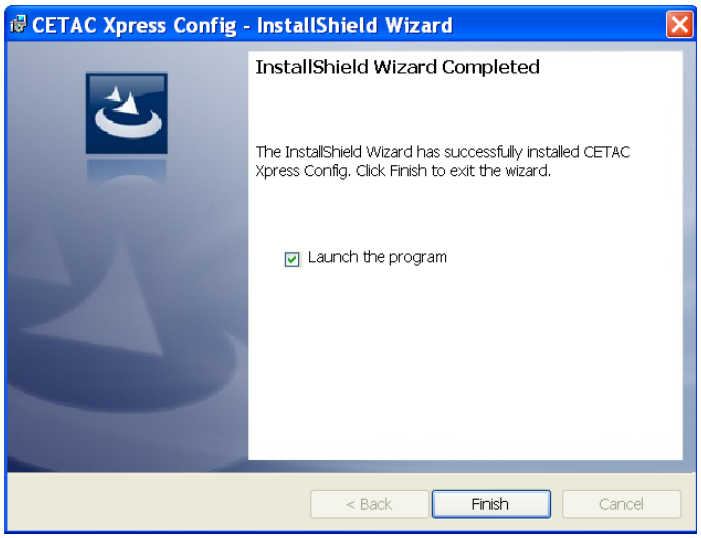

Figure 1-56 "InstallShield Wizard Completed" window

6 The *Xpress* Config Tool software loads and the main window appears. (Figure 3-57). The parameter labels, fields and select buttons will be grayed-out as shown until after the *ASXPRESS*/autosampler system is "queried". Figures 3-58 and 3-59 show the *Xpress* Config Tool window appearance after querying.

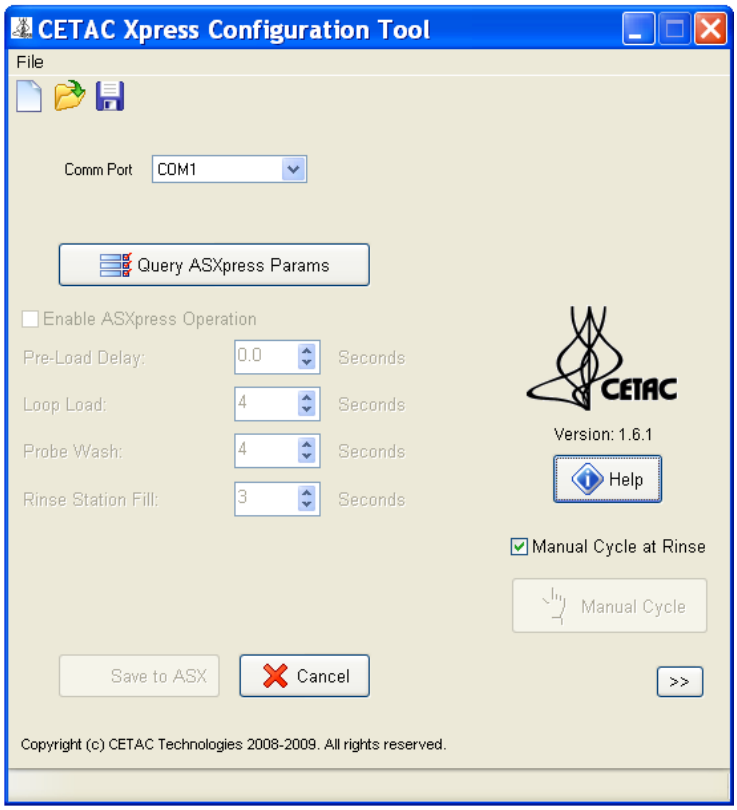

Figure 1-57 Configuration Tool software window (pre-query)

Note:

Querying the DSA parameters is performed *after* the *ASXPRESS* system is connected to the autosampler, and the autosampler is powered on. This process reads the parameters that are stored on the rabbit processor residing within the CETAC autosampler (the default settings will be read the first time the Query is performed), and displays them in the Configuration Tool parameter fields. At such time as the query has been completed, the grayed-out fields will become active, allowing access to those fields and functions. The following steps depict the appearance of the *Xpress* Config Tool software window after a Query has been performed. More information regarding use of the Configuration Tool software can be found in Chapter 4 of this manual, titled "Verifying Installation/Function Overview".

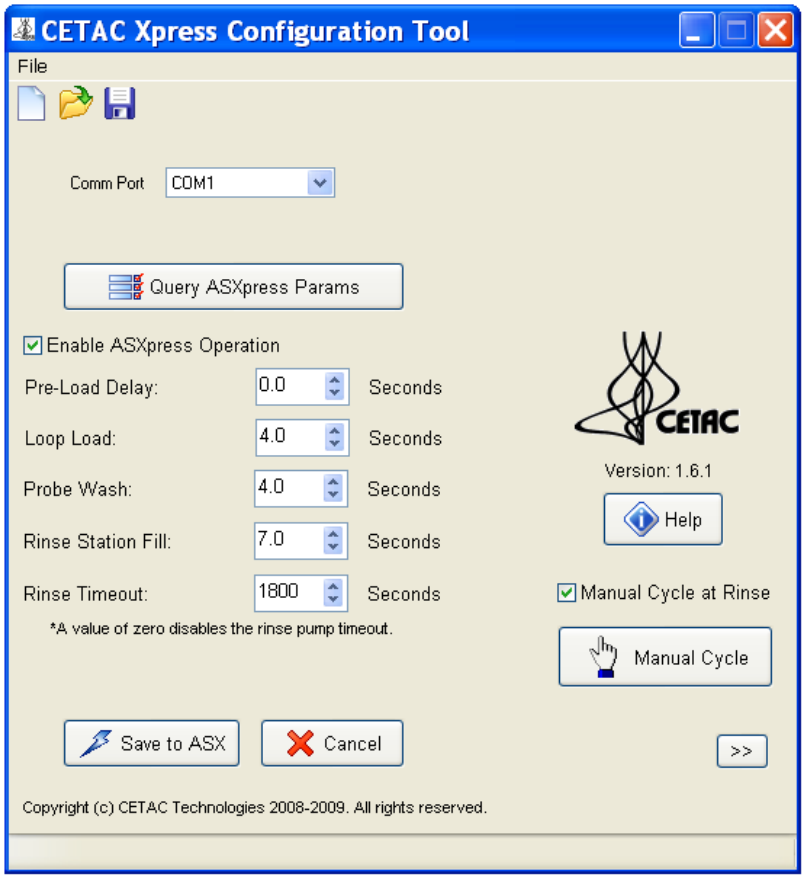

Figure 1-58 Configuration Tool software window (post-query)

7 Note the appearance of the Config Tool software window after querying (Figure 3-58). Clicking on the double arrow box in the lower right corner of the window expands the window (Figure 3-59) to reveal individual manual operation radio buttons allowing control of items such as switching the injection valve position, vacuum pump operation (*ASXPRESS* module), peristaltic rinse pump operation (autosampler) and homing of the autosampler.

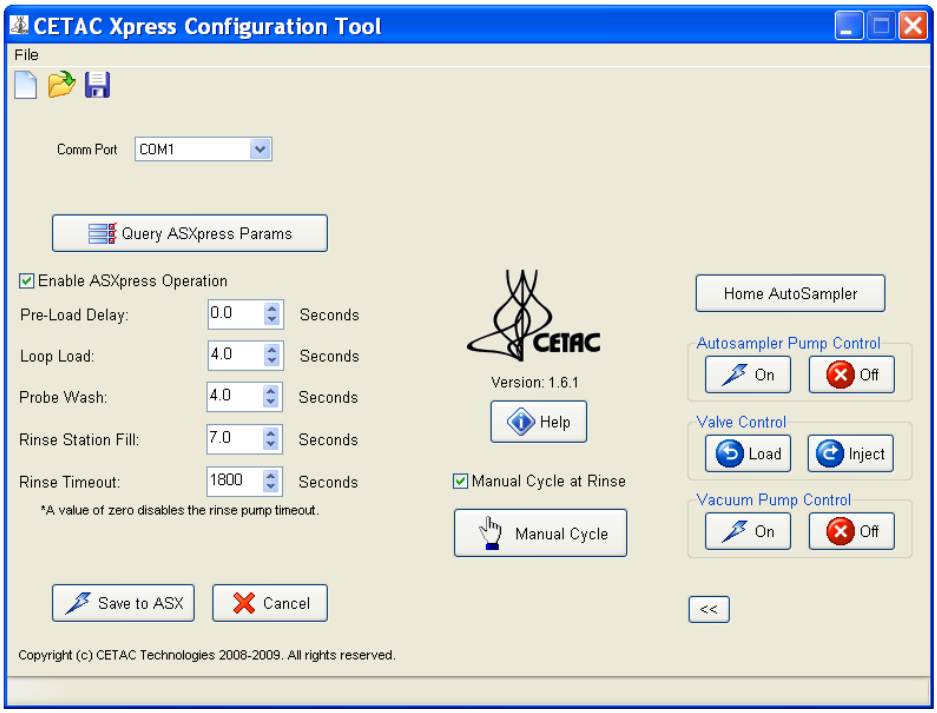

Figure 1-59 Config Tool software window--Expanded (post query)

Note:

Description of each function and parameter will be discussed in greater detail in Chapter 4 of this manual, titled "Verifying Installation/Function Overview".

8 Software installation is complete. Proceed to Chapter 4, titled "Verifying Installation/Function Overview".

Note:

The following manual section, "Upgrade the Firmware on the Autosampler" is included to provide instruction in the event that a customer requires to reload the *ASXPRESS* firmware, or to upgrade firmware to subsequent versions as CETAC advances its technology. To perform this procedure, all covers should be removed to access the interior of the autosampler as is outlined in section 3.1.1 of this manual.

3.4 Upgrade the Firmware on the Autosampler

The CETAC autosampler requires a firmware version which is compatible with the *ASXPRESS* system. The *ASXPRESS* full system versions are shipped with the firmware pre-loaded onto the Rabbit module which is pre-installed inside the autosampler. *ASXPRESS* upgrade versions (those which include the *ASXPRESS* system only, and are intended for upgrade of a customer's existing *ASX-520* series autosamplers) include a Rabbit processor module with firmware pre-loaded. This Rabbit processor module shall be installed in the autosampler to be upgraded, replacing the existing module. Replacement of this module is discussed in detail in prior sections within this chapter of this manual.

Note:

This manual section is included to provide instruction the event that a customer requires to reload the *ASXPRESS* firmware, or to upgrade firmware to subsequent versions as CETAC advances its technology. It is *not* necessary to load firmware on full system or upgrade version *ASXPRESS* instruments as shipped from the factory.

A compatible firmware version and Rabbit Firmware Utility (RFU) Upgrade program is included on the CD provided with the *ASXPRESS* completion kit. Complete instructions for loading the firmware is also provided on the CD. Follow the provided instructions to upgrade the firmware on the autosampler. See the CETAC Autosampler Operator Manual for any further instructions on autosampler set up.

The following guide describes the necessary steps for upgrading the firmware on the ASX-260/520 and ASX-520HS autosamplers.

3.4.1 Autosampler Programming Configuration

The autosampler's Rabbit processor module must be configured to receive the firmware. This is achieved by moving jumpers on the main board to place the system into "programming mode". Follow the instructions in the following section to complete the firmware upgrade.

1. **Ensure that the autosampler is powered off, and that all covers are removed as is outlined in Section 3.1.1.**
2. **On the *ASX-520*/520HS board, move jumper JP3 and JP4 to JP5 and JP6 (Figure 3-60 shows jumpers).**

Note:

Main boards of different versions may have varying locations/positions/quantities of available jumper positions. Follow nomenclature present on the board for proper jumper positioning.

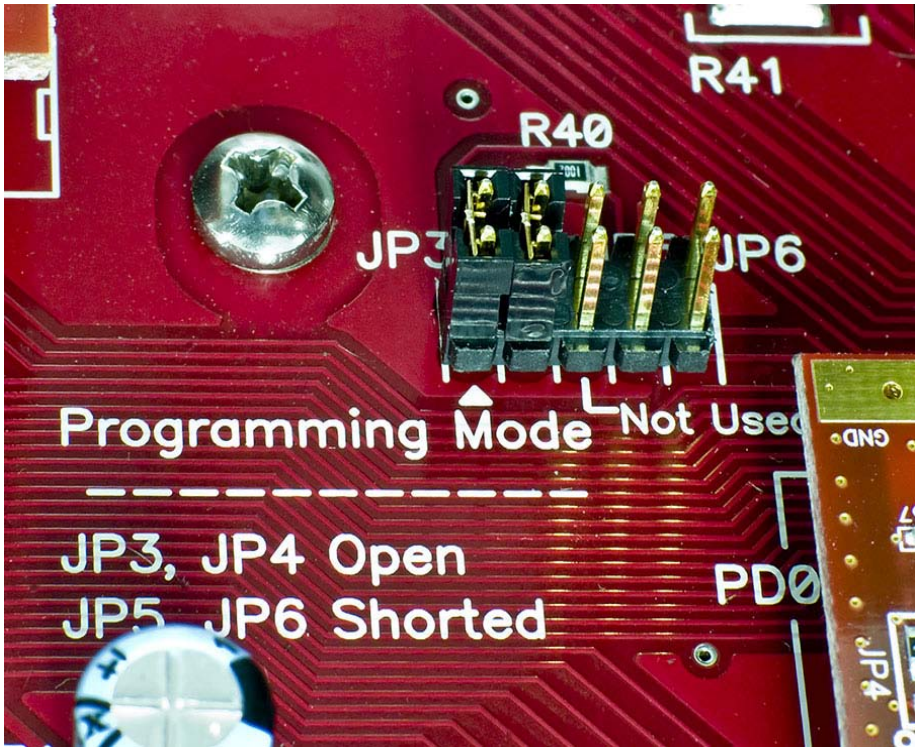

Figure 1-60 Jumpers on board in normal mode (*ASX-520*).

3. **On the *ASX-260* board, move jumper JP2 to JP4 and leave JP3 in place (Figure 3-61 shows jumpers).**

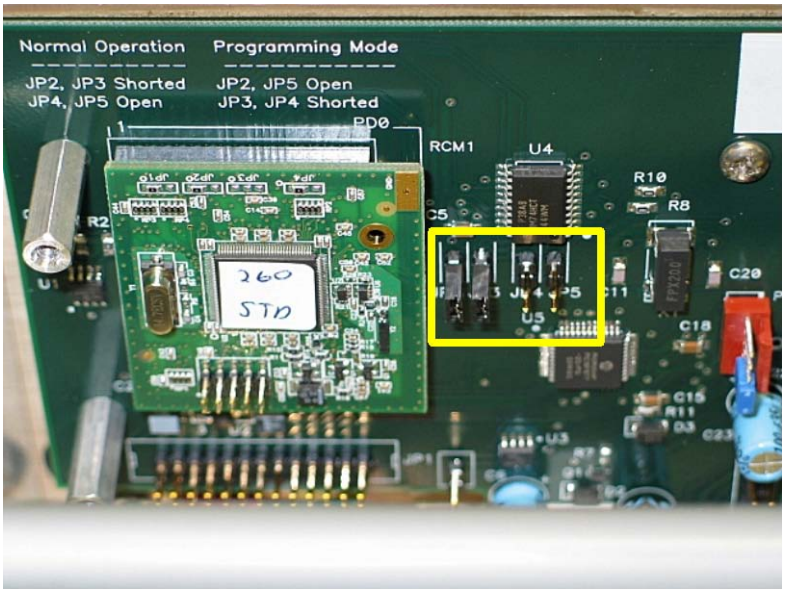

Figure 1-61 Jumpers on board in normal position (*ASX-260*)

3.4.2 Load the Firmware Upgrade, via the Rabbit Field Utility (RFU) program, from the CD provided.

The software required to upgrade/load the firmware on the autosampler and the firmware upgrade files are located on the installation CD provided with the *ASXPRESS* system. The overview of the following sections is as follows:

- Section 3.4.2.1 covers the process required to ensure that proper communication exists between the autosampler and host computer.
- Section 3.4.2.2 covers the process for setting up the Rabbit Field Utility and for choosing the proper file to be loaded to the rabbit module.
- Section 3.4.2.3 covers the process for loading (flashing) the selected firmware file to the rabbit module.
- Section 3.4.2.4 covers the process for returning the autosampler to normal operation.
- Section 3.4.2.5 covers verification of the firmware upgrade.

3.4.2.1 Establish Communications

1. **Ensure that the Z-drive assembly is properly installed on the autosampler Y-arm.**
2. **Connect the power cord to the autosampler power supply, connect the serial cable to the host computer and turn the autosampler on.**
3. **Start HyperTerminal. The path for starting HyperTerminal on a Windows XP equipped PC are as follows:**

Start»All Programs»Accessories»Communications»HyperTerminal

> **Note:**
>
> For additional instructions on using HyperTerminal, refer to the Guide to Operating a CETAC Autosampler using HyperTerminal located at the end of this manual. If your computer does not have HyperTerminal configured already, please refer to this section now.

4. **In HyperTerminal type VERSS. The system will respond with the current firmware version.**

Note it here._____

5. **In HyperTerminal type HOME. This is to verify that the system is communicating.**
6. **Close HyperTerminal.**

3.4.2.2 Setup of Rabbit Utility

- **Run the Rabbit Field Utility application, RFU.exe, from the CD provided (Figure 3-62). On a Windows XP equipped PC, this may be accessed via the path:**
  a. **Start»My Computer**
  b. **Right click on the drive letter containing the CD, and select open**
  c. **Select the folder named "ASX Firmware for *ASXPRESS*"**
  d. **Select "RFU" (This is the Rabbit Field Utility)**

Figure 1-62 Rabbit Field Utility Application

- **When the Rabbit Field Utility has opened, select "Setup", and then "Communications".**

- **On the Communications Options window (Figure 3-63), in the "Comm Port" field, select the COM port on the computer that is connected to the autosampler. Click the OK button.**

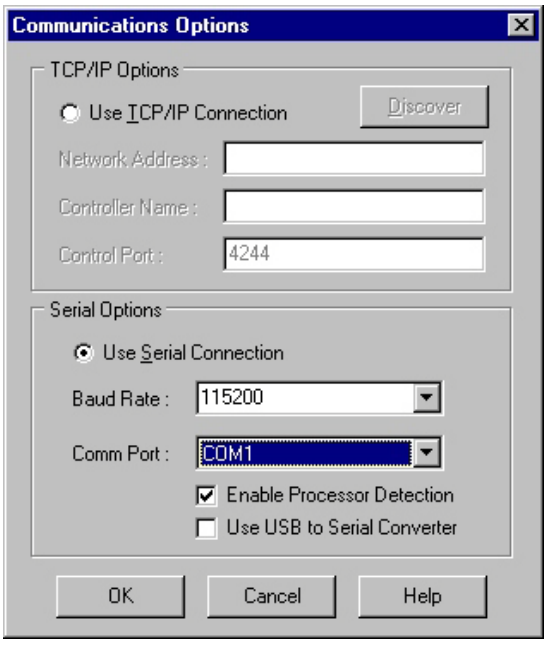

Figure 1-63 "Communications Options Window"

- **From the Rabbit Field Utility main window, select "Setup" again, and then "File Locations".**
- **The "Choose File Locations" window will appear (Figure 3-64).**

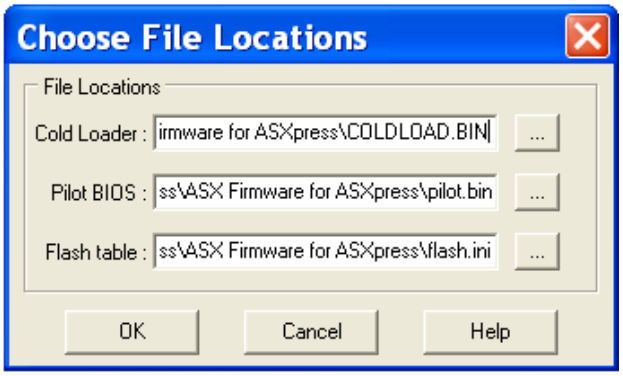

Figure 1-64 "Choose File Locations" Window.

- **Fill in each of the three fields by selecting the "browse" button to the right of each field (denoted by [...], Figure 3-64), and then selecting the correct file from the CD as depicted in Figure 3-65. The correlating file names for each field will be:**

  Cold Loader: (drive letter where CD is loaded):\ASX Firmware for ASXpress\COLDLOAD.BIN

  Pilot BIOS: (drive letter where CD is loaded):\ASX Firmware for ASXpress\pilot.bin

  Flash table: (drive letter where CD is loaded):\ASX Firmware for ASXpress\flash.ini

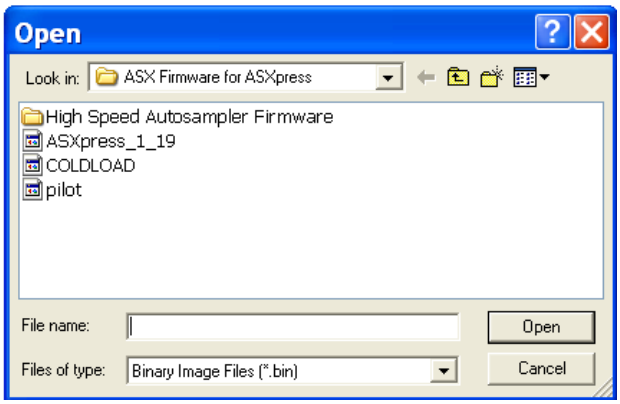

Figure 1-65 "Open" Window

Note:

The .bin file name in Figure 3-65 (i.e. ASXpress_1_19) will vary depending on which era *ASXpress* FW is being loaded. CETAC Technologies makes every effort to update the firmware as needed to ensure that the most beneficial functionality is provided to the customer.

As of December 2009, the most current firmware version file name for standard speed autosamplers is "ASXpress_1_19" and for high speed autosamplers is "ASXpress_HS_1_19.

Also note that firmware is not the same for standard and high speed autosampler models. Be sure to load the correct firmware for your autosampler. Contact CETAC Technologies with any questions.

- **Press the OK button. Leave the "Rabbit Field Utility" open.**

3.4.2.3 Upgrading (loading) the Firmware

1 Ensure that the autosampler is still powered on.

2 In the Rabbit Field Utility, select "File", and then "Load Flash Image".

3 The "Choose Flash Image" window will appear (Figure 3-66).

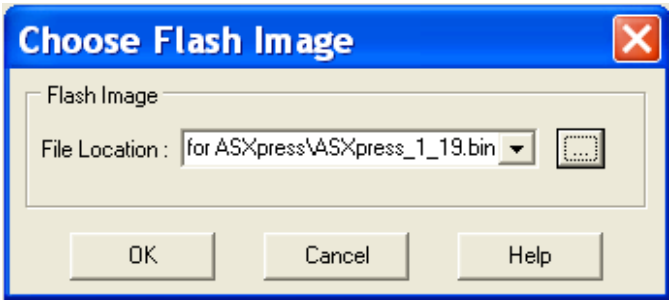

Figure 1-66 "Choose Flash Image" Window.

4 Select the firmware file by filling in the field by selecting the "browse" button to the right of the field (denoted by [...]) (Figure 3-66), and then selecting the correct file from the CD as depicted in Figure 3-67 or Figure 3-68. The correlating file name for the field is:

5 For *ASX-520*, *ASX-260* Autosampler

File Location/Name: (drive letter where CD is loaded):\ASX Firmware for ASXpress\ASXpress_1_19.bin

6 For *ASX-520HS* (High Speed) Autosampler

File Location/Name: (drive letter where CD is loaded):\ASX Firmware for ASXpress\High Speed Autosampler Firmware\ASXpress_HS_1_19.bin

Note:

The .bin file name shown in Figure 3-63 (i.e. ASXpress_1_19 or ASXpress_HS_1_19) will vary depending on which era *ASXPRESS* FW is being loaded. CETAC Technologies makes every effort to update the firmware as needed to ensure that the most beneficial functionality is provided to the customer.

As of December 2009, the most current firmware version file name is "ASXpress_1_19" for standard speed autosamplers or "ASXpress_HS_1_19" for High Speed autosamplers.

Note:

Ensure that the correct firmware file (applying to your specific autosampler) is selected as illustrated in Figure 3-64 and Figure 3-65, to ensure correct interface/operation of the *ASXPRESS* system and autosampler.

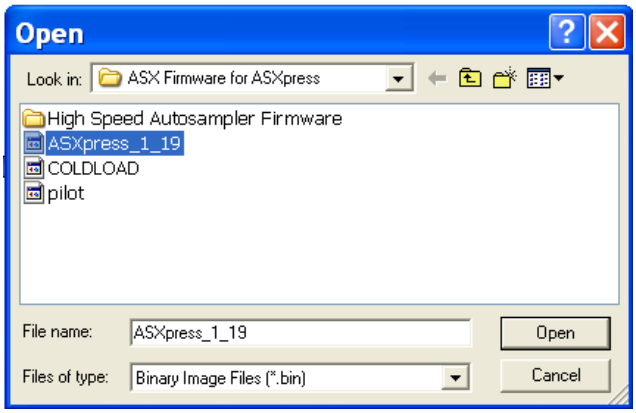

Figure 1-67 "Open" Window (*ASX-260, ASX-520*)

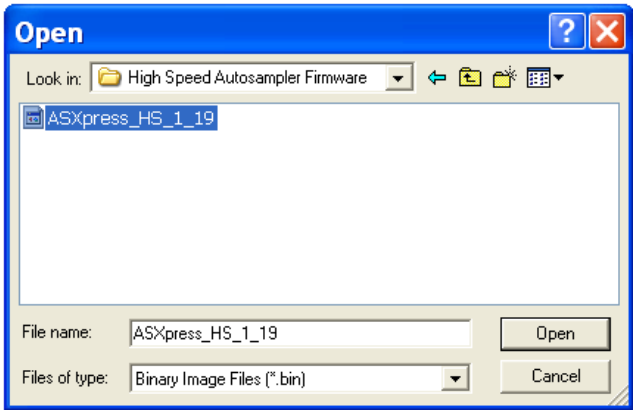

Figure 1-68 "Open" Window (*ASX-520HS*)

7 Click the Open button to select the appropriate file (Figure 3-67 and Figure 3-68). The "Choose Flash Image" window reappears.

8 Click the OK button (Figure 3-66). A progress bar will appear indicating loading of the selected firmware file.

NOTE:

The .bin file name shown in Figure 3-63 (i.e. ASXpress_1_19 or ASXpress_HS_1_19) will vary depending on which era *ASXPRESS* FW is being loaded. CETAC Technologies makes every effort to update the firmware as needed to ensure that the most beneficial functionality is provided to the customer.

As of December 2009, the most current firmware version file name is "ASXpress_1_19" for standard speed autosamplers or "ASXpress_HS_1_19" for High Speed autosamplers.

9 When the status bar completes its movement, indicating completion of the firmware load to the rabbit module within the autosampler, the Rabbit Field Utility can be closed.

3.4.2.4 Return the Autosampler to Normal (Non-Programming Mode) Configuration

1. **Turn off the autosampler.**
2. **On the *ASX-520*/520HS board, move jumper JP5 and JP6 back to JP3 and JP4, or**
   On the *ASX-260* board, move jumper JP4 back to JP2 and leave JP3 in place.
3. **Turn the autosampler back on. The autosampler should go to the home position.**

3.4.2.5 Verification of Firmware Upgrade

1 **Start HyperTerminal. (For instructions on using HyperTerminal, refer to the Guide to Operating a CETAC Autosampler using HyperTerminal).**

2 **In HyperTerminal type VERSS. The system should respond with the new firmware version.**

Note it here:_____

Note:

For additional instructions on using HyperTerminal, refer to the Guide to Operating a CETAC Autosampler using HyperTerminal located at the end of this manual. If your computer does not have HyperTerminal configured already, please refer to this section now.

4

Verifying Installation/ Function Overview

4 Verifying Installation/ Function Overview

Once installation of the *ASXPRESS* Rapid Sample Introduction System is complete, it is important to verify that you have installed it correctly, so that it functions as intended. Attempting to use it before ensuring that it is installed correctly may result in damage.

Verifying installation consists of testing the interface between the host computer, autosampler and *ASXPRESS* system.

This chapter explains how to test the above items before using the *ASXPRESS* Rapid Sample Introduction System, and how each function operates.

Note:

The procedures given in this chapter are for use in a Windows NT/2000/XP environment.

Testing the Interface

If the communications interface between the *ASXPRESS* Rapid Sample Introduction System and the autosampler/host computer is not established correctly, the rapid sample introduction system will not function. Before you test the interface, ensure that the communication port connectors are properly attached between the host computer and autosampler, and also between the autosampler and the rapid sample introduction system.

Note:

The following procedures assume that you have opened Windows NT/2000/XP and the Program Manager window is showing. *It also assumes that the autosampler and ASXPRESS* system *are connected to each other, to the host instrument, and all are powered on, ready for operation.*

4.1.1 To test the communications interface, complete the following steps:

Test the operation of the *ASXPRESS* system, and its interface with the Autosampler, by switching modes via the Configuration Tool.

1 Open the *Xpress* Configuration Tool Software (Figure 1-50).

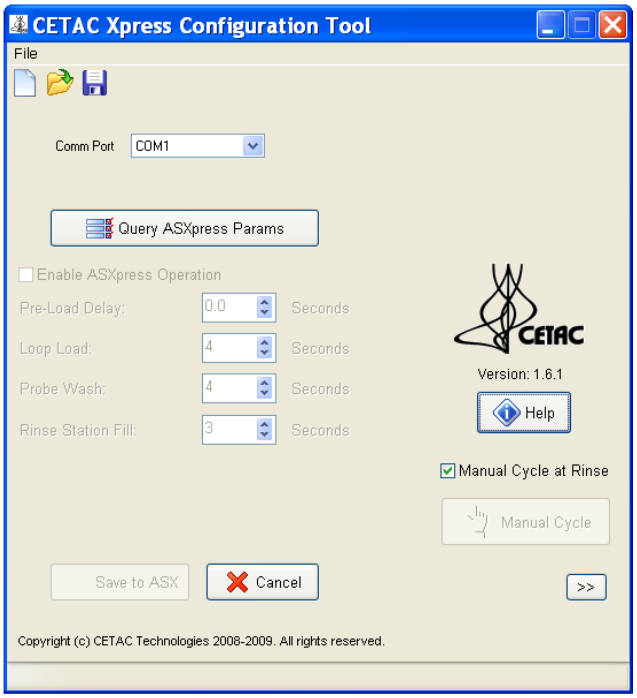

Figure 1-50 *Xpress* Configuration Tool Software Window (pre-query)

2 Click on the "Query ASXpress Params" button (this will communicate with the autosampler/*ASXpress*, returning default values in selection boxes, and will make the "Manual Cycle" and "double arrow" arrow buttons available for selection (Figure 1-50).

3 Check the "Enable ASXpress Operation" box (Figure 1-51). Unchecking this box would allow the autosampler to run independently of the *ASXpress* system, as if the autosampler were connected directly to the host PC. (Note that a different tubing arrangement would be required to run the autosampler without the *ASXpress* system.)

4 Click on the "double arrow" button at bottom right of the window, expanding it to reveal the manual commands (Figure 1-52).

5 Click on the "Load" button (Figure 4-3); doing so will position the *ASXPRESS* 6-port valve into the mode which loads the sample loop, and will illuminate the "Load" Led on the front panel of the *ASXpress* electronics module (no autosampler operation takes place at this time).

6 Click the "Save to ASX" button once. This will load an initial set of

timing parameters.

7 **Click on the "Inject" button (Figure 4-3); doing this so will position the *ASXPRESS* 6-port valve into the mode in which sample injection into the ICP takes place (via the Peristaltic pump on the ICP), and will illuminate the "Inject" Led on the front panel of the *ASXPRESS* electronics module (no autosampler operation takes place at this time).**

8 **Click the "Manual Cycle" button (Figures 4-2 and 4-3); doing this will perform one complete cycle of system operation, operating each component on the *ASXPRESS* system and autosampler, using the saved or queried parameters of the Configuration Tool software settings (See "Principal of Operation" located on the CD provided with the *ASXPRESS* system). This is also a useful function for loading the tubing and priming the rinse pump.**

9 **Click on the other manual function radio buttons (autosampler pump control and vacuum pump control), (Figure 4-3) cycling them on and off to verify proper operation.**

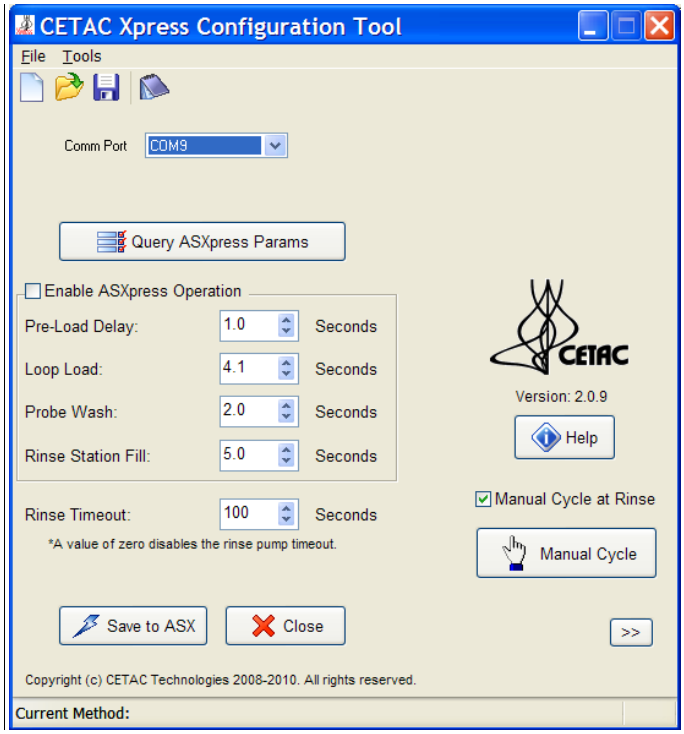

Figure 1-51 *Xpress* Configuration Tool—"Query ASXpress Params" (post-query)

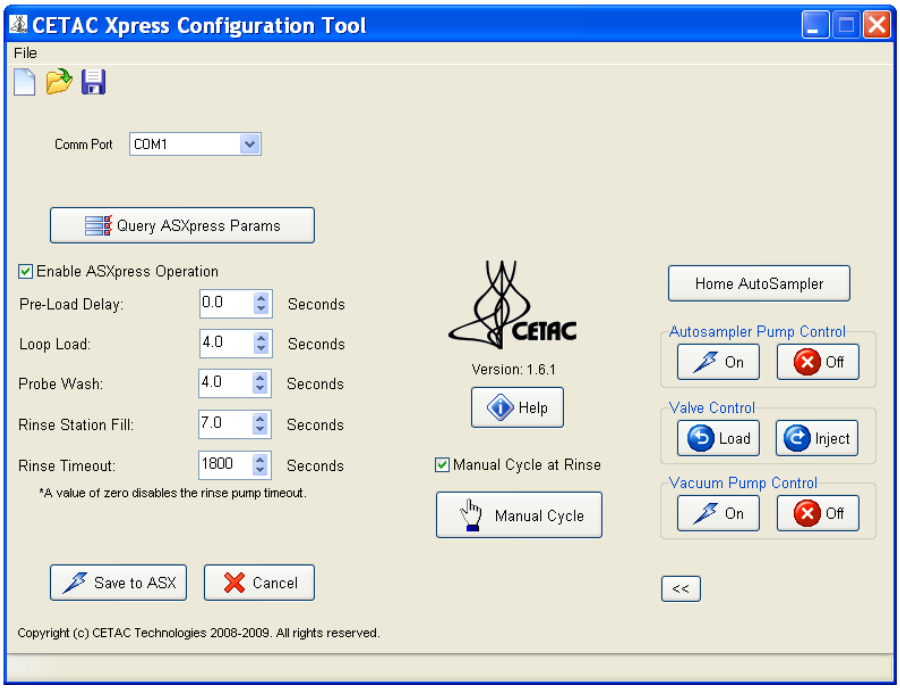

Figure 1-52 *Xpress* Configuration Tool—Expanded Window

Note:

At any time that parameter changes are made within the Xpress Configuration Tool software, the user must save those settings by clicking the "Save to ASX" button for them to be used and retained for future use. Clicking on this button saves the currently selected settings to the Rabbit processor module in the autosampler.

4.2 Function Overview

The following chart lists the available user-adjustable parameter fields and corresponding functions within the *Xpress* Configuration Tool.

SW Setting	Function
Pre-Load Delay Time	This time setting provides delay time before the next sample is loaded. The 6-port valve is retained in the "load" position. The probe remains in the up position while the vacuum pump is running. This delay time allows for additional purging of the sample loop and uptake path.
Loop Load Time	After a command is processed by the autosampler to move to a sample position, the 6-port valve is switched to the "load" position, the vacuum pump is turned on and the Loop Load timer begins. The sample loop is loaded with sample for the time duration selected.
Probe Wash Time	With the expiration of the Loop Load Time, the 6-port valve is switched to the "inject/rinse" position, the vacuum pump is turned off, and the sample, which has been loaded into the loop, is pumped (pushed) to the nebulizer by the ICP/ICP-MS peristaltic pump. At the same time, the autosampler probe is moved to the rinse station to be washed and the vacuum pump is turned on for the amount of time set in the software for Probe Wash Time.
Rinse Station Fill Time	With the expiration of the Probe Wash Time, the autosampler probe is raised and the *ASXPRESS* vacuum pump continues to run. The autosampler peri pump also continues to run and fills the rinse station for the amount of time set in the SW for Rinse Fill. When this time expires, the autosampler peri pump and *ASXPRESS* vacuum pump are turned off and the system waits for a command to move to the next sample.
Rinse Timeout	This function is utilized to minimize the waste of rinse solution utilized at the Large Profile Rinse Station by raising the probe out of the rinse station, thereby shutting off the rinse pump when a user-defined length of time has expired. This timeout period begins whenever the probe is placed into the rinse station. A value of 0 disables the timeout (the rinse pump will run continuously).

4.3 Operation Controls

4.3.1 Enable ASXpress Operation

Enable ASXpress operation for normal operation.

Disable ASXpress operation if you want to test how the autosampler would respond to commands without the *ASXPRESS PLUS* system. (Note that a different tubing arrangement is required to run the autosampler without the *ASXPRESS PLUS* system.) This setting does not affect the rinse timeout.

4.3.2 Enable Vacuum Pump Timeout

When the vacuum pump timeout is not enabled, the vacuum pump will continue running indefinitely after sampling has stopped. This introduces wear which can reduce the lifespan of the vacuum pump. Enable the vacuum Pump Timeout to specify a limit for how long the vacuum pump should continue running.

4.4 Additional Xpress Configuration Tool Features

4.4.1 Notes Window

You can display a very simple note-taking window alongside the Xpress Configuration Tool.

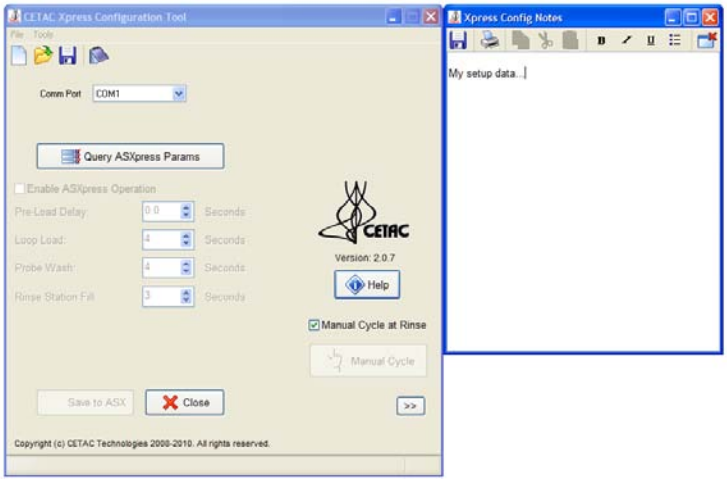

Figure 1-53 Notes Window

Use the Notes window if:

- You would like to see the notes every time the Xpress Configuration Tool window is opened.
- You would like to dock the Notes window so it is always visible next to the Xpress Configuration Tool window.

Use a word processor or text editor instead of the Notes window if:

- You need advanced editing features.
- You need to use the notes somewhere else (email, in a report, etc.).
- You need several different notes files.

To display the Notes window:

1. **On the Tools menu, click Notes.**
2. **Resize the Notes window.**
3. **Drag the Notes window to the right edge of the Xpress Configuration Tool window to dock it.**

To save the notes:

1. **Click the floppy disk icon at the top of the Notes window.**

The notes will be saved to a predefined file.

4.5 Regular Inspection of *ASXPRESS* Components

It is important to verify that all system components are in good working order and are undamaged prior to operation of the *ASXPRESS* system. It is unlikely that the liquid carrying components will be damaged during shipping. However, as part of standard operation procedure, you should regularly inspect all components for damage prior to operating the rapid sample introduction system.

Note:

Visually inspect the Six Port Injection Valve, Three Port Valve, Vacuum Ports, and all other components, such as cabling, enclosure, tubing, etc., for any signs of damage. Pay special attention to all tubing to ensure that no kinks exist, as this condition will impair proper performance of the *ASXPRESS* system by reducing flow rates.

If you detect a leak or other damage to any *ASXPRESS* Rapid Sample Introduction System component, you must replace it. For more information, refer to the appropriate section in Chapter 6, "Maintaining the Rapid Sample Introduction System."

5

Using the Rapid Sample Introduction System

5 Using the Rapid Sample Introduction System

The *ASXPRESS* Rapid Sample Introduction System is both reliable and easy to use. Before using it, however, ensure that your lab environment provides operating conditions that will prolong the life of the *ASXPRESS* system. Once the proper operating conditions are met, you can operate the rapid sample introduction system. When you finish using the *ASXPRESS* system, it may be necessary to flush the rinse station and flow path before shutting the system down.

This chapter explains how to create the proper operating conditions for using the *ASXPRESS* Rapid Sample Introduction System. It also explains how to start and shut down the system, and how to flush the rinse station and flow path.

5.1 Establishing Optimal Operating Conditions

The *ASXPRESS* Rapid Sample Introduction System operates reliably under virtually the same operating conditions described in the autosampler Operator's Manual. However, it is *not* indestructible. Malfunction or damage can occur if specific operating conditions are not met. Meeting these conditions requires that you create the proper lab environment, replace *ASXPRESS* Rapid Sample Introduction System components that wear out under normal use, and purchase the appropriate supplies. The following sections explain how to meet these conditions.

Note:

Damage or malfunction that results from exposure to inappropriate operating conditions may constitute misuse and abuse and be excluded from warranty coverage.

5.1.1 Creating the Lab Environment

To create satisfactory operating conditions in your lab environment, follow these guidelines:

- Operate the *ASXPRESS* Rapid Sample Introduction System in a conventional lab environment where the temperature is 55°F to 85°F (13°C to 30°C), the humidity is 0% to 60% non-condensing and the unit is not exposed to excessive flammable or corrosive materials.
- Avoid rough handling of the *ASXPRESS* Rapid Sample Introduction System. If possible, do not expose the system to vibration or shock.
- Protect the system from long-term exposure to condensation, corrosive materials, solvent vapor, continual standing liquids, or any spills into the system cabinet. Exposures of this type can damage the internal mechanism components as well as the electronics.

- Observe the same general electrostatic discharge precautions as with any other integrated circuit electronic devices. Low humidity environments, especially when combined with static-generating materials, require the use of maximum care.

WARNING

Discharge static buildup and ground to the *ASXPRESS* Rapid Sample Introduction System base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts.

Avoid using the *ASXPRESS* Rapid Sample Introduction System if strong electromagnetic interference, radio frequency interference, or radioactivity is present. Interference fields can cause erratic. The *ASXPRESS* Rapid Sample Introduction System will not function properly if the level of radioactivity is above background.

5.1.2 Replacing Rapid Sample Introduction System Components

The following *ASXPRESS* Rapid Sample Introduction System components wear out under normal use and must be replaced periodically. These components are consumables and replacement is not covered under warranty. The lifecycle of these components vary considerably depending upon the application and solids content of the sample being transported. Approximate lifecycle ranges are listed as follows:

- 6-Port Injection Valve (5K – 60K cycles – dependant on solids levels)
- Vacuum Pump (10k – 500K cycles – dependant on solids levels)
- Tubing (user/application determined)
- Sample Loop (user/application determined)

If you fail to replace these components when/before they deteriorate, the system will not function properly. For information about replacing components, see Chapter 6, "Maintaining the Rapid Sample Introduction System."

5.1.3 Purchasing Supplies

When you need to purchase additional supplies, it is extremely important that you choose the appropriate sizes and materials.

To order additional supplies, refer to the *CETAC Accessories and Supplies Catalog* for the *ASXPRESS* Rapid Sample Introduction System.

5.1.4 Starting the *ASXPRESS* Rapid Sample Introduction System

To start the *ASXPRESS* Rapid Sample Introduction System, complete the following steps:

1 Ensure that the *ASXPRESS* system is connected to the autosampler and host instrument equipment.

Ensure that all fluid delivery tubing, etc., is connected as discussed in Chapter 3. Also be sure that the *ASXPRESS* electronics module is connected to the valve/pump module and that the signal/power cable is connected to the autosampler.

2 Ensure that the autosampler and host instrument are powered on.

3 Launch the *Xpress* Configuration Tool program.

Configure the settings as per the specific laboratory application requirements (See note below). The system is now ready to operate.

4 Close the *ASXPRESS* Configuration Tool program.

If using the "null-modem" adapter, the program may be left open. Refer to the *ASXPRESS* Quick Installation Guide for more information.

5 Operate/run the Method at the ICP/ICP-MS

The methods, through trial and adjustment, shall be modified for maximum performance, which is afforded by the utilization of the *ASXPRESS* Rapid Sample Introduction System (See note below).

Note:

Each laboratory analytical process is uniquely specific to the method utilized, sample under analysis, and laboratory conditions under which the *ASXPRESS*/Autosampler/host instrument system operates. Therefore, the settings utilized within the *ASXPRESS* and ICP software packages will require determination through a series of trials, or test runs, to fully provide the maximum optimization benefit to the user and method utilized. Time taken to fully assess and "tune" the settings to the actual process will yield the maximum benefit of the *ASXPRESS* Rapid Sample Introduction System's ability to affect positive impact on laboratory productivity. Contact CETAC Technologies for further information regarding optimal setup and operation of the *ASXPRESS* system and associated parameters.

5.2 Shutting Down the *ASXPRESS* Rapid Sample Introduction System

To shut down the *ASXPRESS* Rapid Sample Introduction System, complete the following steps:

1. **Drain the system by removing the rinse solution uptake tubing from the rinse solution sources (autosampler and ICP/ICP-MS). Operate the autosampler peristaltic pump and *ASXPRESS* vacuum pump by operating the "manual cycle" function or by using the manual function for operating the autosampler peristaltic pump (both from within the *Xpress* Configuration Tool software) and manually running the ICP/ICP-MS peristaltic pump until all solution drains from the tube attached to the rinse station outlet, the vacuum pump waste discharge, and from the ICP/ICP-MS nebulizer drain.**

   Note:

   If using a rinse solution other than deionized water, flush the rinse system with deionized water before shutting down and/or draining the *ASXPRESS* discrete Sampling Accessory. For more information, see the following section, "Flushing the Rinse Station and Flow Path".

2. **Switch the power switch on the back of the autosampler to "Off."**

5.3 Flushing the Rinse Station and Flow Path

The rinse station and flow path should be flushed in the following two circumstances:

- Flush the Rinse Station and Flow Path at Initial Startup

  Flushing the rinse system during initial startup of the *ASXPRESS* Rapid Sample Introduction System removes any contaminants that could cause interference during sample analysis.

- Flush the Rinse Station and Flow Path after Using Strong Rinse Agents

  Flushing the rinse system after using strong rinse agents prolongs the life of the flow path components.

To flush the rinse station and flow path, complete the following steps:

1 **Insert the rinse uptake tubing (autosampler sample probe) and the ICP/ICP-MS Peristaltic pump uptake tubing into a deionized water source.**

2 **With the autosampler/ *ASXPRESS* system powered on, open the Xpress Config software, utilizing the time settings for Loop Load, Probe Wash, Rinse Station Fill and Rinse Timeout that are normal operating parameters specific to your own process.**

3 **Click on the "Query ASXpress Params" button, and then click on the "Manual Cycle" button. This will run the *ASXPRESS* system through a complete cycle of operation, including "load" and "inject" modes.**

4 **Allow the host instrument Peristaltic pump to run throughout this process. Doing so will rinse the "inject" flow path.**

5 **Repeat this process three to five times to ensure a complete flushing of the system.**

6 **Return all systems to normal configuration.Note:**

> If you are flushing the rinse system during initial startup, first use a 2% nitric acid solution as the rinse agent, followed by deionized water.

Once you flush the rinse system, you can proceed with the sampling sequence, as dictated by your specific laboratory circumstance/method, or drain the rinse system as part of the shutdown procedure. For information about running the sampling sequence, see **"Starting the Rapid Sample Introduction System"** earlier in this chapter. For more information about draining the rinse system, see the previous section, **"Shutting Down the Rapid Sample Introduction System."**

6

Maintaining the Rapid Sample Introduction System

6 Maintaining the *ASXPRESS* Rapid Sample Introduction System

Routine maintenance of the *ASXPRESS* Rapid Sample Introduction System consists of daily and weekly cleaning of specific components. Routine maintenance also includes checking *ASXPRESS* components for leaks or other damage. Additional periodic maintenance tasks may be required, including replacement of the following components: peristaltic pump tubing, rinse tubing, and sample probe.

This chapter explains how to clean the *ASXPRESS* Rapid Sample Introduction System, inspect it for leaks, and replace damaged components.

WARNING

Discharge static buildup and ground to the *ASXPRESS* Rapid Sample Introduction System base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts, COM, USB, or auxiliary ports.

6.1 Cleaning the Rapid Sample Introduction System

Cleaning the *ASXPRESS* Rapid Sample Introduction System is the primary maintenance task you perform. Failure to do so regularly causes increased wear and reduces the system's life.

You must clean the *ASXPRESS* Rapid Sample Introduction System both daily and weekly to protect the instrument, prevent damage and extend its life. It is especially important to clean up spills which may infiltrate the instrument case/cabinet whereby damage to components may result. It may also be necessary to chemically neutralize spills. The following sections explain daily and weekly cleaning procedures.

6.1.1 Daily External Cleaning

The *ASXPRESS* Rapid Sample Introduction System is often operated in environments where spills and exposure to vapors is common. Good maintenance requires that you clean the system daily. To do so, complete the following steps:

1. **Unplug the *ASXPRESS* Rapid Sample Introduction System power/signal cable from the autosampler.**
2. **Wipe the cabinets (electronics module and valve/pump module) using a clean-room wipe dampened with deionized water.**

Avoid scratching the cover while drying. The *ASXPRESS* system must be thoroughly dry before you turn the power on again.

6.1.2 6-Port Valve Cleaning

It will be necessary to periodically remove the 6-port valve from the pump module and clean the inside to prolong the life of the valve. Cleaning must be done in a clean area to prevent contamination of the valve.

Note:

It is recommended to clean the 6-port valve every 20,000 cycles. However, the frequency of cleaning interval will vary depending on application.

Materials required:

- dust-free work surface
- hex key wrench (provided)
- lint-free clean room wipes
- low-pressure compressed clean air (such as a canned air duster product)

To clean the valve, complete the following steps:

1 **Unplug the *ASXPRESS* Rapid Sample Introduction System.**

2 **Remove all tubing and connectors from the 6-port valve.**

3 **Use the hex key wrench provided to remove the three screws on the front of the 6-port valve**

Do *not* remove the valve body from the actuator as it will lose its position and will require retraining if removed. Valve retraining will be discussed in detail on page **Error! Bookmark not defined.**.

4 **Note the orientation of valve body components prior to removal.**

5 **Gently remove the stator of the valve.**

6 **Use a clean-room wiper to gently clean the channels and surfaces of the stator and rotor of any debris.**

7 **Use low-pressure, canned clean air to blow the channels and ports free of any remaining debris.**

8 **Very carefully replace the stator of the valve, in the proper orientation noted in step 4, and tighten the three screws to set firmly in place.**

9 **Reinstall all tubing and check for leaks using the *Xpress* Config Tool to "Manual Cycle" the *ASXPRESS* system as described in Section 4 of this manual.**

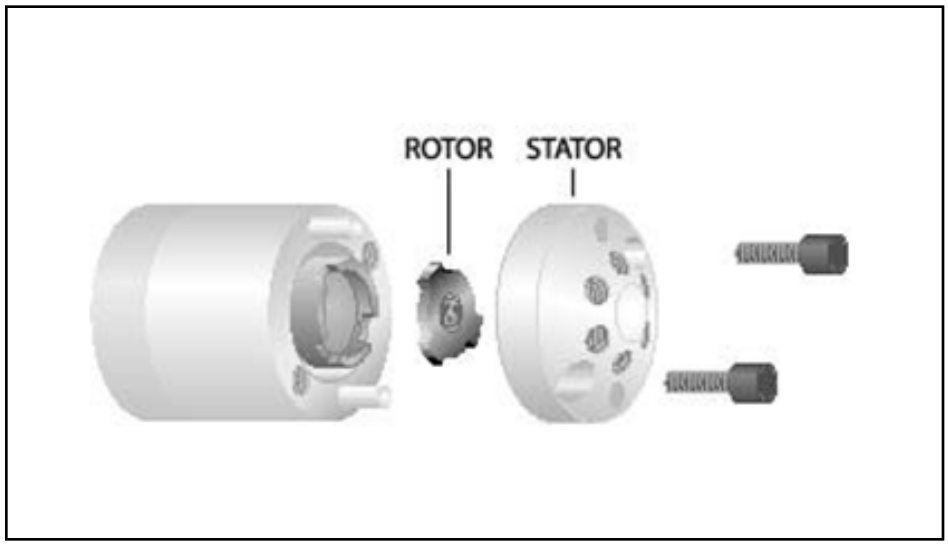

Figure 6-1 6-port valve assembly – exploded view of components

6.2 Checking for Leaks

The tubing has a finite lifespan, and will wear out under normal use. Standard maintenance procedures require that you periodically check for leaks. To do so, complete the following steps:

1 **Unplug the *ASXPRESS* Rapid Sample Introduction System power/signal cable from the autosampler.**

2 **Visually inspect all tubing and valves for leaks or signs of deterioration.**

3 **isually inspect the surfaces below all tubing for signs of liquid.**

If you detect a leak or other damage to any component, you must replace it. For more information, see the appropriate section in this chapter.

6.3 Replacing the Tubing

To replace the tubing, complete the following steps:

1 **Unplug the *ASXPRESS* Rapid Sample Introduction System power/signal cable from the autosampler.**

2 **Remove and replace all tubing as necessary, using care to remove/replace tubing at barb fittings and at compression type fittings without damaging those fittings to which they connect (refer to Figure 3-46 for tubing diagram).**

See Chapter 3, "Installing the Rapid Sample Introduction System" for more information on how to install the rinse tubing.

6.4 6-Port Valve Replacement or Reorientation

The 6-Port valve Assembly has a finite lifespan that is dependent upon the conditions/sample media to which it is exposed. Exposure to higher sample solids levels reduces the valve lifespan.

To determine whether the 6-Port valve requires replacement, inspect the unit for these conditions:

- Valve dripping/leaking from overflow hole behind port #4 at bottom of valve body
- With no other apparent problems, air present in the lines (indicating a leak/poor seal).

The valve can also be reoriented so that the nebulizer port is as close as possible to the nebulizer.

Note that any time the 6-port valve body is removed from its actuator, the valve will require retraining (reinitialization).

To replace or reorient the 6-port valve:

1 **Unplug the valve/pump module cable from the electronics module.**

Do not turn off or unplug the electronics module.

2 **Remove the tubing/connectors on the 6-port valve.**

3 **Using the provided hex key, loosen the hex nut which secures the valve to the body of the valve/pump module.**

4 **Place the pump/valve module on its back, on a tabletop.**

5 **Firmly but carefully pull the valve straight up.**

Now, before you reinstall the valve, retrain the valve actuator:

6 **In the Xpress Config software, select the "Load" button then the "Inject" button. Do this twice.**

7 **Plug the valve/pump module cable back into the electronics module.**

8 **In the Xpress Config software, select the "Load" button then the "Inject" button.**

9 **Insert the new valve, or reinsert the existing valve, at the desired angle. Rotate it so that the nebulizer port will be as close as possible to the nebulizer.**

10 **Press down on the valve so that it is completely seated.**

11 **Inspect the valve to verify that there is no gap between the valve and the collar on the valve/pump module.**

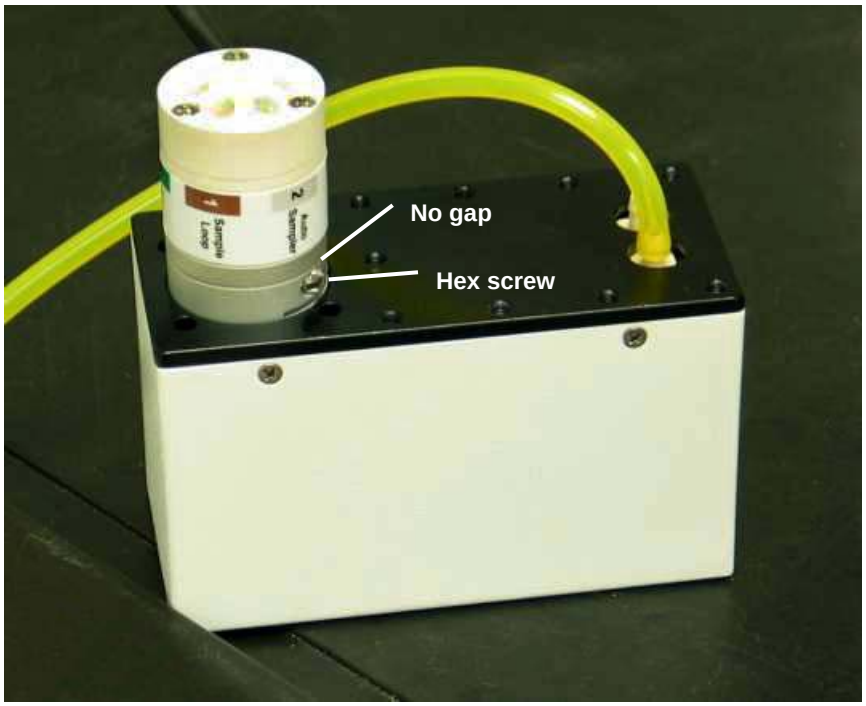

Figure 6-2 Reseating the 6-Port Valve

12 **Tighten the hex screw.**

13 **Repeatedly cycle the actuator via the software "Load" and "Inject" buttons.**

For the next few cycles the valve will operate at half its normal speed (noted by a low pitch sound emitted as the actuator moves) while the "smart" electronics locates the internal valve stops. Once it determines the proper stroke, the actuator will return to normal speed (when the valve is fully "trained", the sound emitted will be of a higher pitch).

14 **Return the valve/pump module to its operating position.**

15 **Reconnect all tubing.**

16 **Check for leaks using the Xpress Config Tool to "Manual Cycle" the *ASXPRESS* system.**

7

Troubleshooting the Rapid Sample Introduction System

7 Troubleshooting the Rapid Sample Introduction System

In the event that the *ASXPRESS* Rapid Sample Introduction System does not function properly, isolate the problem to determine if it originates in the host computer, the analytical instrument, or the *ASXPRESS* Rapid Sample Introduction System. If you determine the problem is in the *ASXPRESS* system, check the power system, communications interface, or software to find the cause of the problem and resolve it.

This chapter explains how to troubleshoot *ASXPRESS* Rapid Sample Introduction System problems. If you cannot solve a problem using the steps given in this chapter, you should contact CETAC Technologies Customer Service and Support.

7.1 Power System Problems

A possible cause of *ASXPRESS* Rapid Sample Introduction System malfunction is a problem in the power system. If the system is not functional, it is possible that it is not receiving power (since the *ASXPRESS* system receives its power and signal from the ASX series autosampler, troubleshooting will cover topics related to both instruments, as they might affect operation). If this is the case, both of the LED status indicator lights will be off. To troubleshoot this problem, complete the following steps in sequence until the problem is solved:

1 **Ensure that the power/signal cord is firmly plugged in between the *ASXPRESS* electronics module and the autosampler.**

If the cable is plugged in, ensure that it is tightened properly and not damaged in any way.

2 **Ensure that the *ASXPRESS* valve/pump module cable is connected to the *ASXPRESS* electronics module.**

If the cable is plugged in, ensure that it is tightened properly and not damaged in any way.

3 **Check that the power cords are plugged in firmly between the power input on the autosampler and the external power supply and also between the power supply and the wall outlet.**

4 Check the external power supply (autosampler). The green LED on the power supply should be illuminated.

a. If the power supply LED is not illuminated, check the wall outlet:

- Using a Volt-Ohm meter or equivalent, check the wall outlet for 100-240VAC, +/- 10%, 50/60 Hz.
- The power supply has a green LED which should be lit if the power supply is plugged into a wall outlet that is active.

b. If the voltage is acceptable, the cord is plugged in properly and the external power supply green LED is still not illuminated, unplug the external power supply from the autosampler, but leave it plugged into the wall.

- If the green LED is not lit, the power supply is faulty and requires replacement.
- If the green LED is lit when unplugged from the autosampler but turns off when plugged into the autosampler, the autosampler may have an internal short and requires repair.

5 If the external power supply LED is illuminated while plugged into the autosampler, cycle the autosampler power switch. The autosampler sample probe should move up and the autosampler should initialize. After initialization, the status LED on the front of the autosampler should light up.

- If the cords are properly connected, power is available, the external power supply is good, and the unit still does not initiate, continue troubleshooting.

7.2 Interface Problems

Operation of the *ASXPRESS* system is directed by the host computer and autosampler. A malfunction of the *ASXPRESS* Rapid Sample Introduction System can indicate a problem with the RS-232 or USB cable (connected between the host computer and the autosampler, with the power/signal cord (between the autosampler and the *ASXPRESS* system) or with the configuration of the software on the host computer. The following sections explain how to troubleshoot these problems.

7.2.1 RS-232 Cable Problems

The first step in troubleshooting interface problems is to check the RS-232 cable. To do so, complete the following steps (See Autosampler manual for further troubleshooting information):

1 **Check the RS-232 cable to ensure it is plugged in to the COM1 port on the Autosampler.**

If the cable is plugged in, ensure that it is tightened properly and not damaged in any way.

2 **Check the host computer to ensure that the RS-232 cable is connected to the appropriate COM port.**

If the cable is plugged in, ensure that it is tightened properly and not damaged in any way.

7.2.2 USB cable Problems

An option to using RS-232 communications protocol is to use USB protocol. The USB port located on the back of the autosampler is an alternate connection protocol option to the RS-232 port at Com 1. Either RS-232 or USB may be used at that port, but not both at once. To troubleshoot a problem with the USB cable, complete the following steps:

1 **Check the USB cable to ensure it is plugged in to the COM1 port on the Autosampler.**

If the cable is plugged in, ensure that it is connected properly and not damaged in any way.

2 **Check the host computer to ensure that the USB cable is connected to the appropriate USB port.**

If the cable is plugged in, ensure that it is connected properly and not damaged in any way.

3 **Check the host computer to ensure that the USB drivers are installed for USB operation of the autosampler.**

Load the proper USB drivers to the host computer from the CD that was provided with the autosampler.

7.2.3 Software Configuration Problems

If the cords are connected properly and the system is still not functioning, ensure that the software is communicating correctly with the autosampler and

ASXPRESS system. To do so, verify proper operation of all manual functions by completing the following steps:

1 Operate manual features of the *Xpress* Config Tool software.

With the *ASXPRESS* system connected to the autosampler/ICP/ICP-MS systems, the autosampler "queried" (Chapters 3 and 4), and the manual functions showing in the *Xpress* Config software window:

- Click the "Manual Cycle" button. The *ASXPRESS* system should run through a complete cycle ("Load" and "Inject"), operating the autosampler peristaltic pump and the *ASXPRESS* components (6-Port Valve and Vacuum Pump).
- Click the "Load" button. The *ASXPRESS* system should move the 6-Port Valve to the "Load" position (no other apparatus operates).
- Click the "Inject" button. The *ASXPRESS* system should move the 6-Port Valve to the "Inject" position (no other apparatus operates).
- Click the "On" (autosampler pump control) button. The autosampler peristaltic rinse pump should turn on (no other apparatus operates).
- Click the "Off" (autosampler pump control) button. The autosampler peristaltic rinse pump should turn off (no other apparatus operates).
- Click the "On" (***ASXPRESS*** vacuum pump control) button. The *ASXPRESS* vacuum pump should turn on (no other apparatus operates).
- Click the "On" (***ASXPRESS*** vacuum pump control) button. The *ASXPRESS* vacuum pump should turn on (no other apparatus operates).

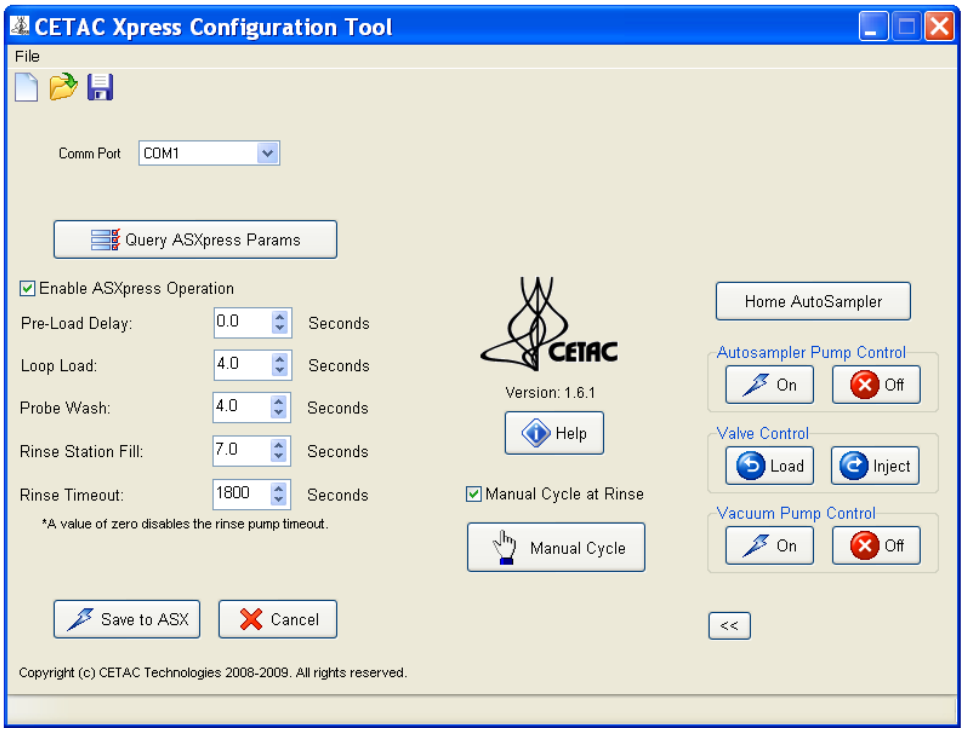

Figure 1-54 *Xpress* Config Tool—Expanded to access manual functions

2 Ensure that ICP software is not conflicting with *ASXPRESS* system operation.

Disable ICP software and run the *ASXPRESS* system from host computer. If conflict is no longer present, troubleshoot ICP software per its own troubleshooting procedure.

7.3 Returning the Product to CETAC for Service

Refer to the following information if you need to return the product to CETAC Technologies for service.

7.3.1 Shipping the Product

Follow these guidelines when shipping the product:

- **Use the original packing materials.** If the original shipping materials are not available, place a generous amount of shock-absorbing material around the instrument and place it in a box that does not allow movement during shipping. Seal the box securely.
- Contact CETAC Technologies before shipping the product.
- Write the following information on a tag and attach it to the product:
  - Name and address of the owner
  - Product model number and serial number
  - Description of service required or failure indications
- Mark the shipping container as FRAGILE.
- In all correspondence, refer to the instrument by model name or number and full serial number.
- **Do not return products which are contaminated by radioactive materials, infectious agents, or other materials constituting health hazards to CETAC employees.**

7.3.2 Product Warranty Statement

Note:

Contact CETAC Technologies or refer to the warranty card which came with your product for the exact terms of your warranty. The following copy is provided for your convenience, but warranty terms may be different for your purchase or may have changed after this manual was published.

CETAC TECHNOLOGIES warrants automation instruments for (2) two years from the date of shipment. Any CETAC manufactured unit sold directly to the End-User found in reasonable judgment of CETAC to be defective in material or workmanship will be repaired by CETAC without charge for parts and labor. Only CETAC manufactured automation instruments are covered by the (2) two year warranty. For a complete listing of our Automation products please visit our web site at www.cetac.com and follow the Automation link.

The unit, including any defective part, must be returned to CETAC within the warranty period. The expense of returning the unit to CETAC for warranty service will be paid for by the buyer. CETAC's responsibility in respect to warranty claims is limited to making the required repairs or replacements, and no claim of breach of warranty shall be cause for cancellation or recession of the contract of sale of any unit.

Products may not be returned which are contaminated by radioactive materials, infectious agents or other materials constituting health hazards to CETAC employees.

This warranty does not cover any unit that has been subject to misuse, neglect, negligence or accident. The warranty does not apply to any damage to the unit that is the result of improper installation or maintenance, or to any unit that has been operated or maintained in any way contrary to the operating or maintenance instructions as specified in the CETAC Instruction and Operations Manual. The warranty does not cover any unit that has been altered or modified so as to change its intended use. Any attempt to repair or alter any CETAC unit by anyone other than by CETAC authorized personnel or agents will void this warranty.

In addition, the warranty does not extend to the repairs made necessary by the use of parts, accessories, or fluids which are either incompatible with the unit or adversely affect its operation, performance or durability.

CETAC reserves the right to change or improve the design of any unit without assuming any obligation to modify any unit previously manufactured.

THE FOREGOING EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

CETAC'S OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DE-FECTIVE PARTS, AND CETAC DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR THEM ANY OTHER OBLIGATION.

CETAC ASSUMES NO RESPONSIBILITY FOR INCIDENTAL CONSEQUENTIAL OR OTHER DAMAGES (EVEN IF ADVISED OF SUCH POSSIBILITY), INCLUDING BUT NOT LIMITED TO, LOSS OR DAMAGE OF PROPERTY, LOSS OF REVENUE, LOSS OF USE OF THE UNIT, LOSS OF TIME, OR INCONVENIENCE.

This warranty and all matters arising pursuant of it shall be governed by the laws of the State of Nebraska, United States.

7.3.3 Returned Product Procedures

Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. CETAC must be notified within ninety (90) days of shipment of incorrect materials. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from CETAC. No replacements will be provided, nor repairs made, for products returned without such approval. Any returned product must be accompanied by a return authorization number. The expense of returning the unit to CETAC for service will be paid by the buyer. The status of any product returned later than thirty (30) days after issuance of a return authorization number will be subject to review. Shipment of repaired products will generally be made forty-eight (48) hours after the receipt.

Do not return products which are contaminated by radioactive materials, infectious agents, or other materials constituting health hazards to CETAC employees.

7.3.4 Returned Product Warranty Determination

After CETAC's examination, warranty or out of warranty status will be determined. If a warranted defect exists, the product will be repaired at no charge and shipped prepaid back to the buyer. If the buyer desires an air freight return, the product will be shipped collect. Warranty repairs do not extend the original warranty period.

If an out of warranty defect exists, the buyer shall be notified of the repair cost. At such time the buyer must issue a valid purchase order to cover the cost of repair and freight, or authorize the products to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number approval within fifteen (15) days of notification will result in the products being returned as is, at the buyer's expense.

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8

Glossary

8 Glossary

Analytical Instrument: The instrument, typically an ICP or ICP-MS, to which the *ASXPRESS* Rapid Sample Introduction System is connected.

ETFE: Ethylenetetraflouroethylene (Tefzel®).

FEP: Fluorinated Ethylene Propylene.

Host Computer:The computer that controls operation of the ICP / ICP-MS instrument to which the CETAC autosampler is attached, and through which the ASXPRESS PLUS is controlled.

Hz: Hertz

I/O Auxiliary Port: The connector used for establishing communication and power between the *ASXPRESS* system and the autosampler.

ICP/ICP-MS: Inductively Coupled Plasma/Inductively Coupled Plasma-Mass Spectrometer.

ID: Inside Diameter.

LED: Light-Emitting Diode.

Peristaltic Pump: An on-board pump controlling the movement of the rinse solution to the rinse station o the autosampler.

PTFE: Polytetraflouroethylene.

Rinse Solution: The solution used to clean the sample probe.

Sample Loop: The loop of tubing, of predetermined length/volume, which holds the precise sample volume specific to the users unique analytical system requirements.

Sample Probe: The tube that moves the analyte from the sample vial to the sample transfer tubing.

Rinse Station: The autosampler component used to clean the sample probe with a rinse solution.

Six-Port Valve: The valve which provides the switching action between "Load Sample" and "Inject/Rinse" modes of the *ASXPRESS* Rapid Sample Introduction System.

UHMW-PE: Ultra-High Molecular Weight PolyEthylene.

Vacuum Pump: The pump by which the sample is drawn into the sample loop, and by which rinse solution is passed through the sample loop and associated tubing.

VDC: Volts Direct Current.

9

Guide to Operating a CETAC Autosampler Using a Terminal Program

9 Guide to Operating a CETAC Autosampler Using a Terminal Program

CETAC autosamplers can be controlled using a serial communications protocol. You can use any terminal emulation program, including:

C-Term. This program is installed with the Xpress Configuration Tool software, and runs on Windows 2000 and later. (recommended)

HyperTerminal. This program was supplied with versions of the Windows operating system through Windows XP.

This chapter explains how to operate a CETAC autosampler using either of the two programs.

9.1 Using C-Term™

C-Term is a simple terminal program developed to validate the installation and functionality of various CETAC devices. C-Term communicates through a serial (RS-232) port on the host computer. If the device is connected to a USB port, the device driver will create a virtual serial port.

C-Term is provided on the CETAC software CD and is automatically installed with the Xpress Configuration Tool software.

9.1.1 Starting C-Term

1 Check that the communication port connectors are properly attached between the host computer and the CETAC device.

If the communications interface between the CETAC device and the host computer is not established correctly, the device will not function.

2 On the Start Menu, click All Programs, then CETAC Xpress Config, then Support Tools, then C-Term.

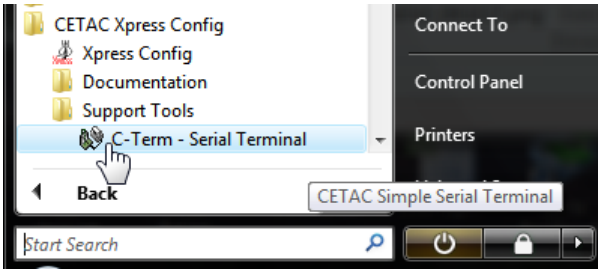

Figure 9-1 Starting C-Term

9.1.2 Overview of the C-Term Window

Once C-Term is loaded, the window shown in Figure 9-2 will open. The majority of C-Term's functions are available from this window.

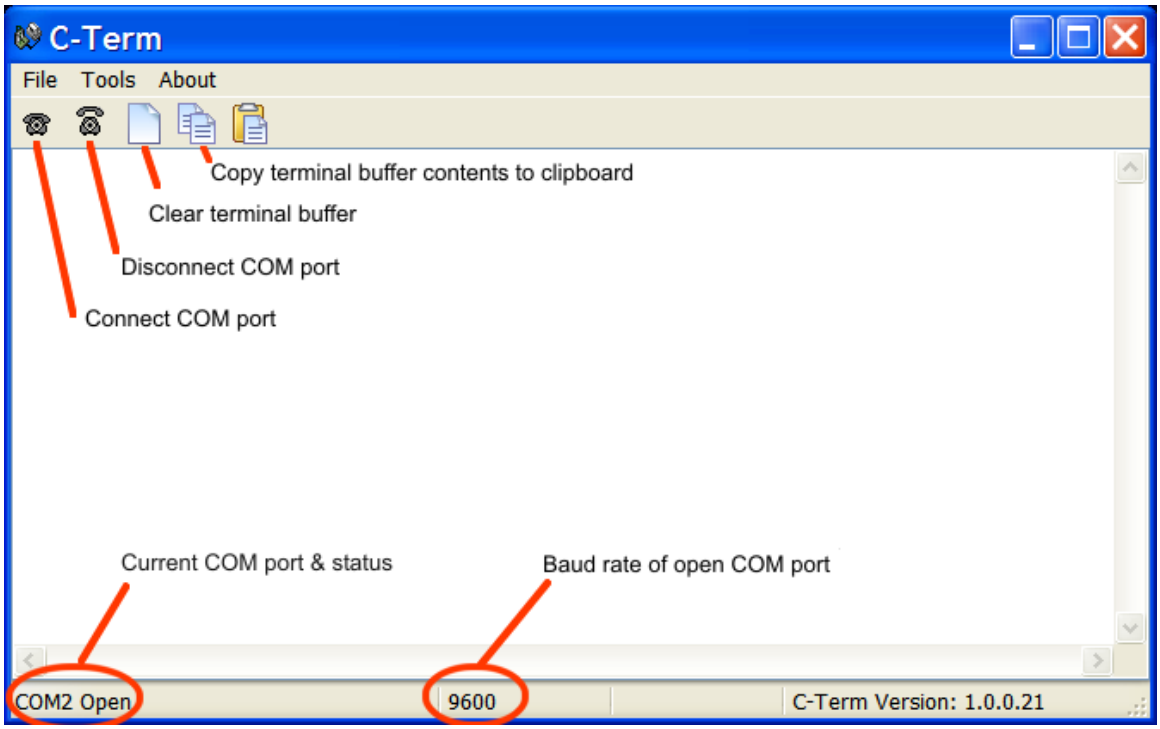

Figure 9-2 C-Term Window

By default, typed commands are sent to the CETAC device connected to the opened port. The typed commands will appear in light green in the terminal buffer. Responses from the device will appear in red. Non-printing characters such as carriage returns will appear as ASCII hexadecimal numbers surrounded by square brackets, for example, **[0D]** is the carriage return character**.**

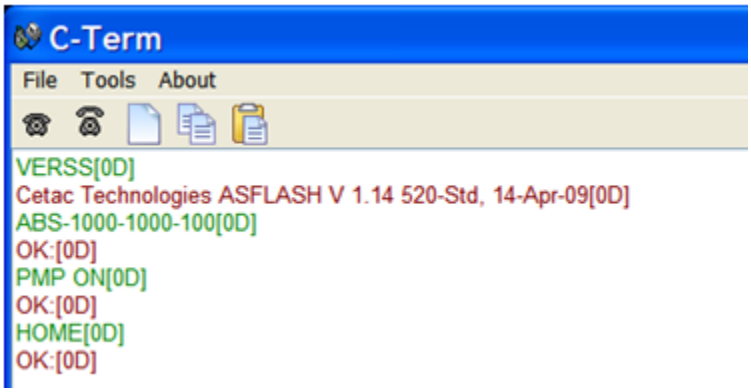

Figure 9-3 Outgoing commands shown in green and incoming responses shown in red

9.1.3 Configuring C-Term

By default, C-Term attempts to open COM1 the first time it is executed. If the COM port that the CETAC device is connected to is not the default (COM1), then it will be necessary to configure C-Term to use the desired port.

The default communications configuration is appropriate for use with the vast majority of CETAC devices. Exceptions are the ASX-8000 which requires a baud rate change and the AS300 emulator which uses non-printing characters are part of its command protocol. Modifying the default settings is described below.

> **NOTE**
>
> If COM1 (or the currently selected COM port) is in use by another program or is otherwise unavailable, a warning dialog box will pop up when C-Term starts stating that the COM port could not be opened.

1 On the Tools menu, click Setup Serial Port.

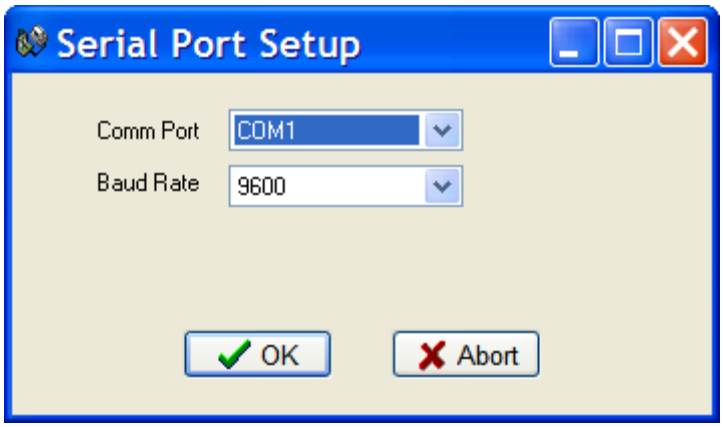

Figure 9-4 Serial Port Setup Window

2 Select the desired COM port and, if necessary, the Baud rate used by the connected device then click OK.

The window will close and the settings will be saved. These new settings will be applied immediately and used thereafter unless changed again.

> **NOTE**
>
> Except for the ASX-8x00, all CETAC devices communicate at 9600 baud (which is the default.)
>
> Only installed COM ports, including USB virtual COM ports, will appear in the **Comm Port** menu.

9.1.4 Setting Preferences

If desired, the size of the scrollback buffer or the color of the outgoing and incoming texts can be changed (to work around color blindness, for example).

1 On the Tools menu, click Preferences.

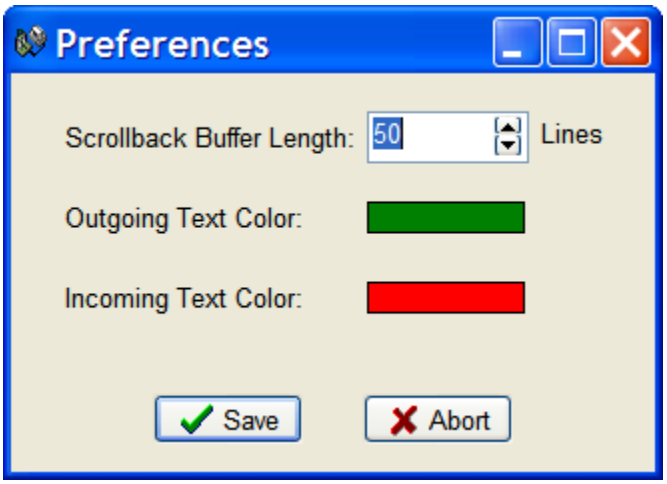

Figure 9-5 Preferences Window

To change the Scrollback Buffer Length, either type the new value in the field or use the arrows adjust the value up or down.

To change text color, click on the color bar and a color selection dialog box will appear. Select the new color and click **OK.**

2 **Click Save to apply your settings and close the window.**

9.2 Using HyperTerminal

1 **Using a serial cable, connect the CETAC autosampler with the computer. Plug each end of the serial cable into the COM 1 port of the autosampler and the computer, respectively.**

2 **Turn on the computer and select the Accessories folder. Select the HyperTerminal folder and then the HyperTerminal program.**

3 **A window will appear as in** Error! Reference source not found.**. Enter COM 1 in the name box. Press the OK button.**

Figure 9-6 "Connection Description" Window

4 In the Connect To window, set Connect Using to COM 1, then click OK.

Figure 9-7 "Connect To" Window

5 In the Properties window, set Bits per second to 9600 and Flow control to None.

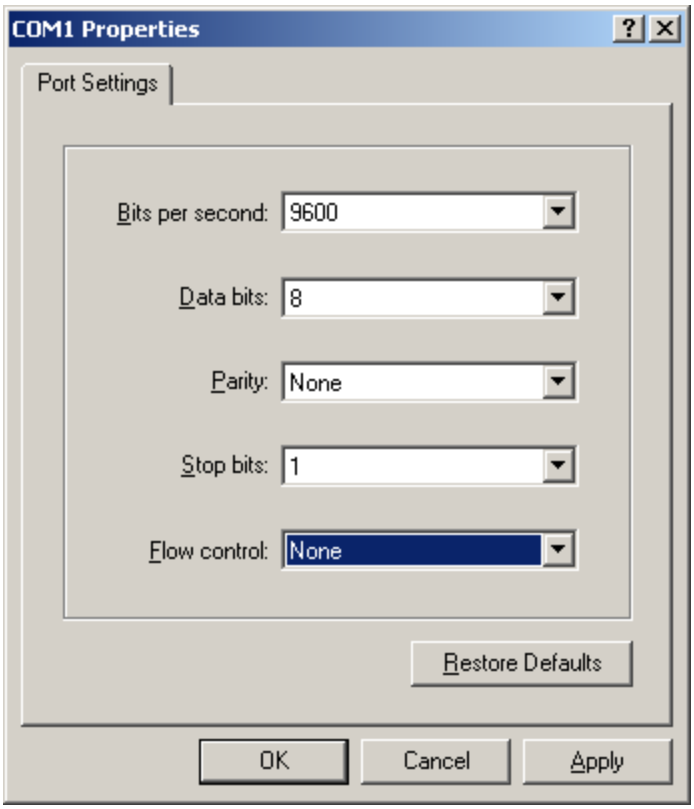

Figure 9-8 "COM1 Properties" Window

6 Click OK.

The HyperTerminal window will open.

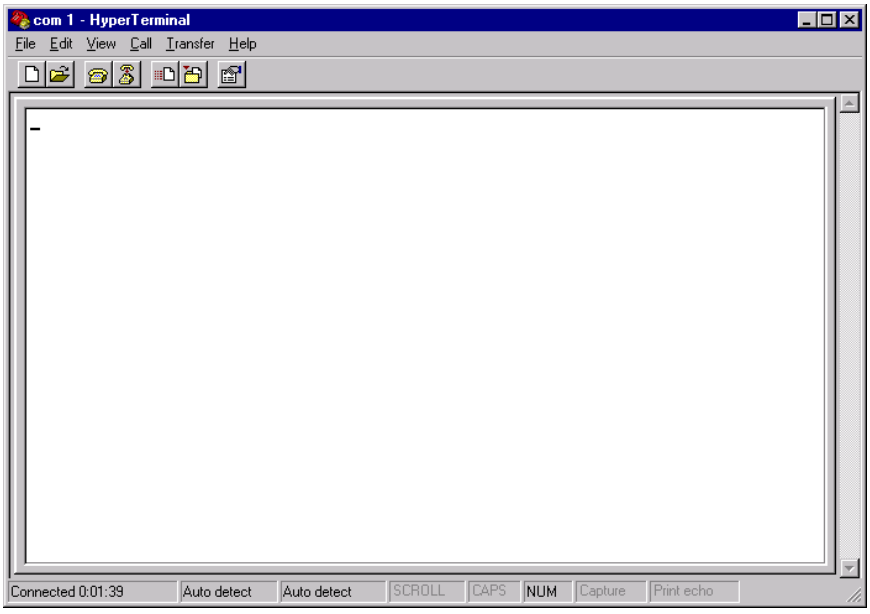

Figure 9-9 "Com 1 Hyperterminal" Window

7. On the File menu, click Properties.

8. On the Settings tab, click ASCII Setup

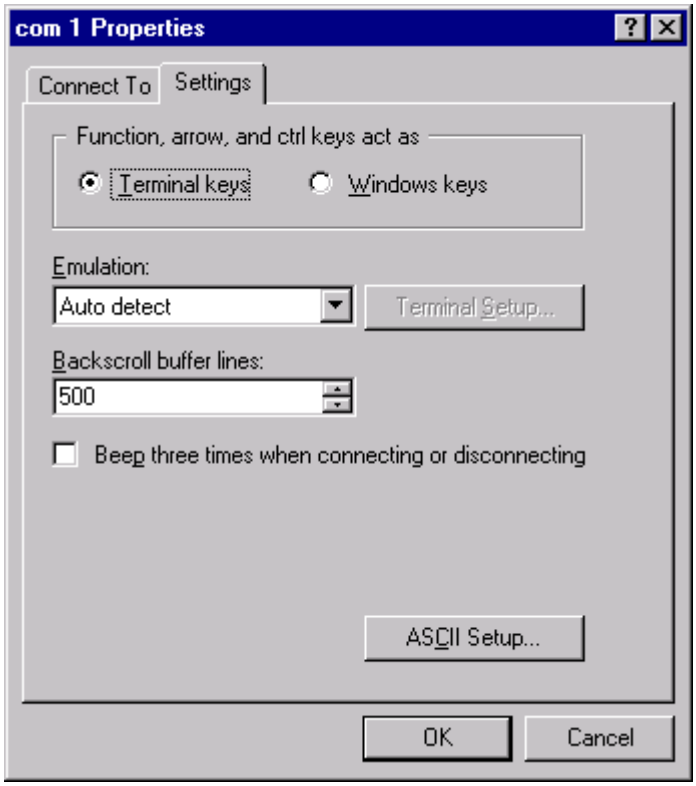

Figure 9-10 "Com 1 Properties" Window

9 Click ASCII Setup.

10 Enable "Echo typed characters locally" and "Append line feeds to incoming line ends," then click OK.

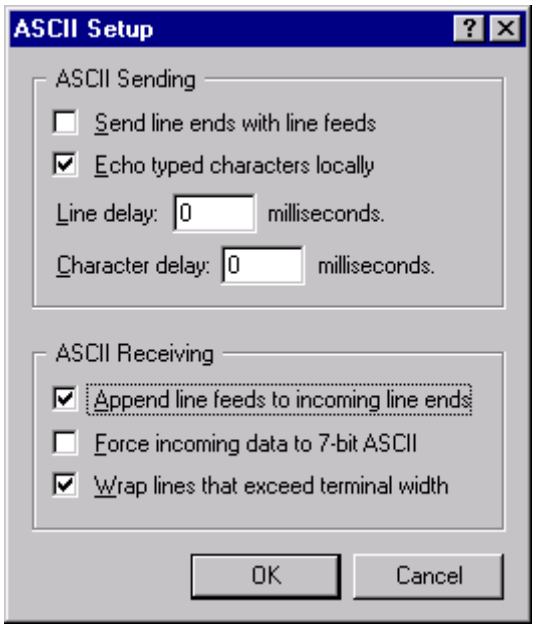

Figure 9-11 "ASCII Setup" Window

10. Turn on the autosampler.

The HyperTerminal window should display an OK.

9.3 Autosampler Commands

The following commands will produce various responses of the autosampler.

Command	Description
Ver	Returns firmware version.
Home	Returns all axis to home position, same as power up.
Tray=*n*	Defines tray size and *n*= #of positions. Legal values are 21, 24, 40, 60, and 90.
Tube=*row-col-down*	Tube=row-column-down as defined by tray command. Example: `Tube=3-4-150`
Pmp on	Pump on if unit has a pump.
Pmp off	Pump off if unit has a pump.
Rinse	Moves sipper to the rinse position, extends and retracts the sipper 3 times and starts rinse pump. Stays in down position with pump running. `up,pmp off` stops the pump.
Down=*n*	Moves the z-axis down by the parameter(*n*) in mm. Do not run `Down` command if sipper is not all the way up on up position or damage may occur to sipper or z-axis.
Up	Moves z-axis to upper most postion.

Table 9-1 Autosampler Commands

You can use these commands to determine if the CETAC autosampler is communicating and functioning properly. If more assistance is needed, please contact CETAC customer service.

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10

Safety and Regulatory Information

10Safety and Regulatory Information

Review this product and related documentation to familiarize with safety markings and instructions before you operate the instrument.

10.1Characteristics

10.1.1 Environmental Characteristics

Operating Temperature	+13° C to +30° C (+55° F to +85° F)
Non-Operating Temperature	+0° C to +55° C (+32° to +131° F)
Operating Altitude	Up to 2,000 m (6,562 ft)
Relative Humidity	0% to 60% non-condensing
Pollution Degree	Pollution Degree 2 Normally no pollution or only dry, non-conductive pollution occurs. The pollution has no influence. Occasionally, however, a temporary conductivity caused by condensation may be expected.

Table 9-2: Environmental Characteristics

For indoor use only.

Avoid sudden, extreme temperature changes which could cause condensation on circuit boards in the product.

See page 10 for information on chemical compatibility.

10.1.2 Electrical Characteristics

10.1.2.1 Power requirements

Electronics Module	**Input**: Power is provided by the CETAC autosampler through the power/signal cable which is attached to the electronics module. DC Voltage and Current ⎓ 24 V 2.5 A Installation Category: CAT I (Mains isolated) **Output**: Connector for the valve/pump module.
Valve/Pump Module	**Input**: Use only with the provided electronics module. Installation Category: CAT I (Mains isolated)

Table 9-3: Power Requirements

10.1.2.2 Input and output connectors

All terminals allow a maximum current of 500MA @ 24VDC, unless otherwise noted.

Auto Sampler	Power and signal connection to a CETAC autosampler.
V/P Module	Control and 0-24 V DC power for the valve/pump module. Connect only to the provided CETAC valve/pump module, using the provided cable.

Table 9-4: Electrical Input and Output Connectors on the Electronics Module

10.2 Safety Notices

WARNING

If the equipment is used in a manner not specified by CETAC Technologies, the protection provided the equipment may be impaired.

Repair or service that this not covered in this manual should only be performed by qualified personnel.

10.2.1 Mains Disconnect

The autosampler is the disconnect. To remove power in an emergency, disconnect the autosampler. Ensure the autosampler is positioned to allow easy disconnection.

WARNING

SHOCK HAZARD

Ensure that power is disconnected before removing any covers.

10.2.2 Cleaning Instructions

For additional cleaning information, see "cleaning" in the index.

To clean the exterior surfaces of the instrument, complete the following steps:

1. **Shut down and unplug the instrument.**
2. **Wipe the instrument exterior surfaces only using a towel dampened with a lab-grade cleaning agent.**
3. **Repeat step 2, using a towel dampened with clear water.**
4. **Dry the instrument exterior using a dry towel.**

WARNING

SHOCK HAZARD

Do not allow any liquid to enter the instrument cabinet other than as intended through the specified tubing, or come into contact with any electrical components. The instrument must be thoroughly dry before you reconnect power, or turn the instrument on.

10.2.3 Operating Environment

WARNING

SHOCK HAZARD

To reduce the risk of fire hazard and electrical shock, do not expose the unit to rain or humidity. To reduce the risk of electrical shock, do not open the cabinet. All maintenance is to be performed by an Authorized CETAC Service Provider.

Protection provided by the equipment may be impaired if the equipment is used in a manner not specified by the manufacturer.

WARNING

SHOCK HAZARD

Equipment is not intended for wet locations. Miscellaneous liquids in the equipment could cause hazardous conditions.

WARNING

EXPLOSION HAZARD

Do not operate in an explosive atmosphere.

10.2.4 Explanation of Caution and Warning Notices

Warning symbol marked on equipment. This symbol means "Attention! Refer to the manual."

WARNING

The WARNING notice denotes a hazard. It calls attention to a procedure, practice, or the like, that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood

CAUTION

The CAUTION notice denotes a hazard. It calls attention to a procedure, practice, or the like, that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

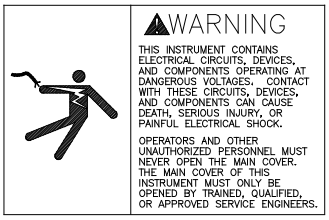
10.3 Avertissements en Français

This section provides French translations of notices which may appear on the instrument or on other instruments used as part of the measurement system.

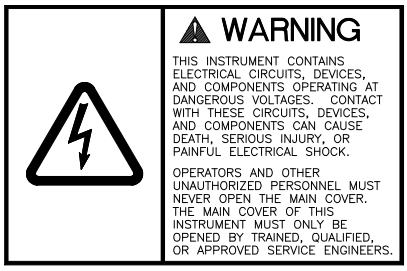
WARNING
FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH FUSES OF THE SPECIFIED TYPE AND CURRENT RATING.

FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH FUSES OF THE SPECIFIED TYPE AND CURRENT RATING.

⚠ AVERTISSEMENT
POUR UNE PROTECTION CONTINUÉ CONTRE LES RISQUES D'INCENDIE, REMPLACER UNIQUEMENT PAR DES FUSIBLES DE MÊME TYPE ET AMPÈRAGE.



⚠ AVERTISSEMENT
TOUT CONTACT AVEC LES HAUTES TENSIONS PEUT ENTRAINER LA MORT OU DES BLESSURES SÉVÈRES. CE PANNEAU NE DOIT ÊTRE ENLEVE QUE PAR UN RÉPARATEUR QUALIFIÉ.



⚠ AVERTISSEMENT
TOUT CONTACT AVEC LES HAUTES TENSIONS PEUT ENTRAINER LA MORT OU DES BLESSURES SÉVÈRES. CE PANNEAU NE DOIT ÊTRE ENLEVE QUE PAR UN RÉPARATEUR QUALIFIÉ.

⚠ **WARNING**

⚠ AVERTISSEMENT
TOUT CONTACT AVEC LES HAUTES TENSIONS PEUT ENTRAINER LA MORT OU DES BLESSURES SÉVÈRES. CE PANNEAU NE DOIT ÊTRE ENLEVE QUE PAR UN RÉPARATEUR QUALIFIÉ.

⚠ AVERTISSEMENT
TOUT CONTACT AVEC LES HAUTES TENSIONS PEUT ENTRAINER LA MORT OU DES BLESSURES SÉVÈRES. CE

HIGH LEAKAGE CURRENT
ENSURE PROPER GROUNDING

PANNEAU NE DOIT ÊTRE ENLEVE QUE PAR UN RÉPARATEUR QUALIFIÉ.

⚠ AVERTISSEMENT
COURANT DE FUITE ÉLEVÉ — FORNIR UNE MISE À LA TERRE EFFICACE.

10.4 Electromagnetic Interference

FEDERAL COMMUNICATIONS COMMISSION (FCC) NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential environment is likely to cause harmful interference, in which case the user will be required to correct the interference at his expense.

MODIFICATIONS

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by CETAC Technologies may void the user's authority to operate the equipment.

CABLES

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods to maintain compliance with FCC Rules and Regulations.

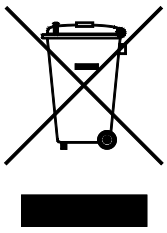
CANADIAN NOTICE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus" ICES-001 of the Department of Communications.

AVIS CANADIEN

Cet appareil numerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Classe A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-001 edictee par le ministre des Communications.

10.5 Explanation of Regulatory Marks



Do not dispose in domestic household waste.

The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste, in compliance with the European Waste Electrical and Electronic Equipment Directive (WEEE, 2002/96/EC).

For instructions on how to return end-of-life equipment, producer-supplied electrical accessories, or auxiliary items for proper disposal please contact the supplier or importer. In the event a supplier cannot be reached, contact CETAC Technologies customer service department at 1 (800) 369 2822.

CE

The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.

Index

11 Index

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