Method 30B

APEX INSTRUMENTS, INC.

Method 30B Automated Mercury Source Sampler – Model XC-30B

Operator's Manual

AUTOMATED MERCURY SOURCE SAMPLER - MODEL XC-30B

Operator's Manual



Apex Instruments, Inc. 204 Technology Park Lane Fuquay-Varina, NC 27526 Phone 919-557-7300 • Fax 919-557-7110 Web: <u>www.apexinst.com</u> E-mail: <u>info@apexinst.com</u>

Published 05/28/2010

Introduction	4
MercSampler Console Description	4
Plumbing Subsystem	
Electrical Subsystem	
Console Connection Diagrams	
XC-30B Front Panel Connections	
XC-30B Internal Components	
Loading Software	
Driver Installation	12
Software Operation	16
Software Communication	
Test Profile	
Alarm Actions	
Test Setup	
Test Parameters:	
Flow and Moisture:	
Sampling Options: Pre-Test Leak Check	
Set Probe	
Select Memory	-
Test Start	
Pause Test	
Adjust Buttons	
Auto Pause	
End Test.	-
Post-Test Leak Check	
Export Data	
Multi-File Export	
Multiple File Export (cont.)	
Config/Utils Screen	
Stats	
Set Clock	
Console Audit	
Sorbent Traps	
Appendix 1	36
REPLACEMENT PARTS	
CONSOLE	
COOLER	
PROBE	43
CONSUMABLES	45
CONSOLE	15
COOLER	45
PROBE	47
Appendix 2	49
Upgrading Firmware	
Important Notes About Upgrading Firmware:	
Programming the XC-30B Firmware	
After a successful upgrade:	

Introduction

The purpose of this manual is to provide a basic understanding of the Apex Instruments automated sampling console available for EPA Method 30B Mercury Sampling. The MercSampler Model XC-30B console is applicable for Mercury Emissions Sampling Using Iodinated Charcoal Traps. For additional information on the applicable Appendix K and Method 30B, please visit <u>http://www.epa.gov/air/mercuryrule/</u>. Individual states may have additional requirements for Mercury emissions monitoring and reporting, please contact your state government for further information.

MercSampler Console Description

The MercSampler Console is the operator's control station that controls and captures data necessary for paired sorbent tube sampling according to EPA Method 30B. The basic principle of the console is to sample stack gas flow at a constant rate and determine the standardized volume extracted through each sorbent trap. To capture the samples, a pair of diaphragm vacuum pumps works in concert with proportional valves and mass flow sensors. Optical encoders are mounted inside the gas meters to provide digital feedback for the volume sampled. From additional temperature and pressure measurements the sample volume at standard conditions (USEPA 20°C and 760mmHg) is calculated. Figure 1-1 illustrates the Apex Instruments Model XC-30B.



Figure 1-1. Model XC-30B MercSampler Console

Shown with SC-30B sample conditioner, Heated Sample Return Line and Probe.

Features	XC-30BEPC MercSampler Console
Gas Meter	Positive displacement diaphragm meter, 45 Lpm maximum and 0.17 Lpm starting flow rate, 0.7L/revolution
Sample Pump	Internal Hargraves miniature diaphragm pump. Brushless DC (BLDC) Motor rated at 12VDC. >20inHg Maximum Vacuum. ~4Lpm maximum unrestricted flow.
Proportional Valve	Pneutronics Voltage Sensitive Orifice (VSO) Series. 470hm, 12VDC
Mass Flow Sensor	Honeywell AWM Series. 100-4000ccm.
Barometric Sensor	AllSensors 600-1000mBar, 5VDC Supply
Vacuum Sensor	SMC 0-30"Hg
Umbilical Connections	Electrical: 4-pin locking Amphenol connectors <u>Sample Line:</u> ¹ / ₄ " Stainless Steel Quick-Connect or Swagelok fittings
Dimensions	23 in x 21 in x 12 in (W x H x D)
Power Requirements	120VAC/60Hz standard 2 or more 15A circuits depending upon configuration (230VAC/50Hz optional)
Weight	35 lbs (16 kg)

Table 1-2. Features and Specifications of Apex Instruments Model XC-30B MercSampler Console

The MercSampler Console is comprised of plumbing and electrical (including thermocouple and electronic circuits) subsystems that work together to give appropriate control and feedback.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Plumbing Subsystem

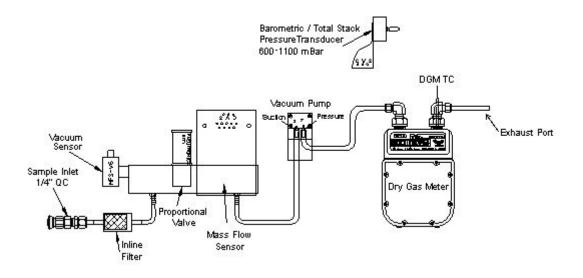


Figure 1-4. Plumbing Flow Diagram of XC-30B MercSampler Console.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Electrical Subsystem

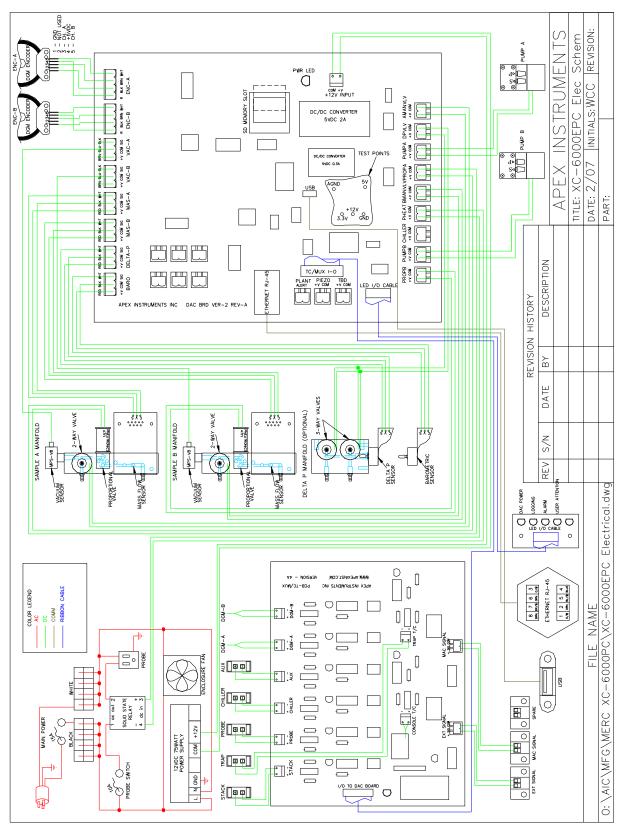
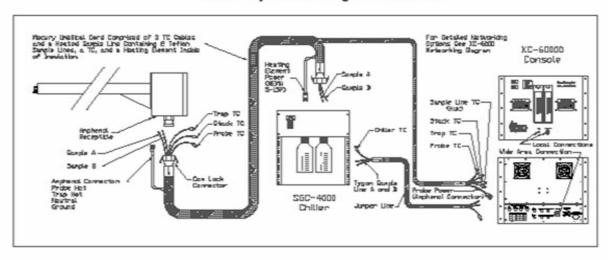


Figure 1-5. Electrical Diagram of XC-30BC MercSampler Console.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Console Connection Diagrams

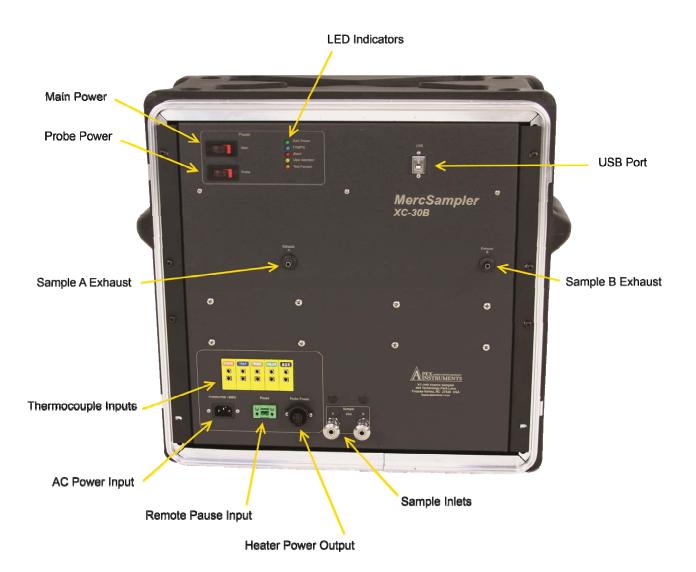


XC6000 System I/O Diagram 8U Portable

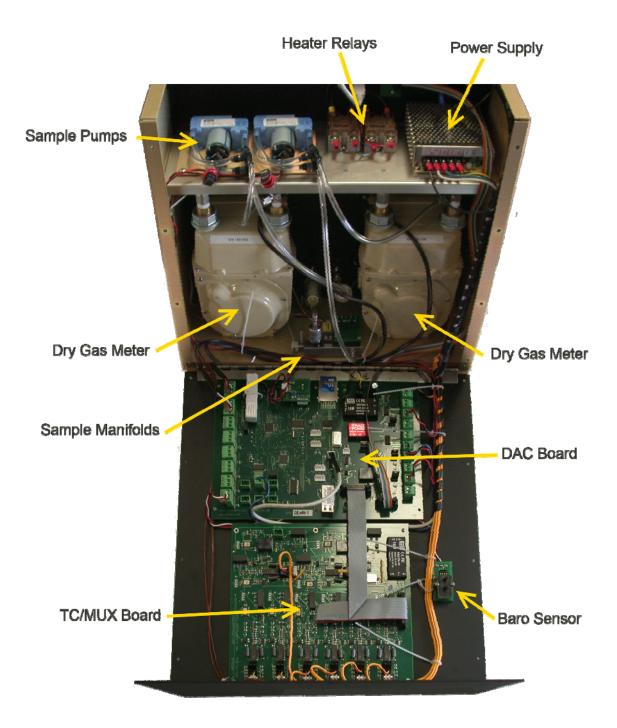
Figure 1-5a. Connection Diagram for XC-30B in Portable Enclosure

- The Source Sampler Console is factory-configured for 115 VAC / 60 Hz electrical power. Configuration for 220 VAC / 50 Hz operation is an available option.
- The AC electrical subsystem provides switch power to each circuit, controlled by two switches: MAIN and PROBE.
- All circuits are protected by a MAIN 15 Amp (10 Amp 220V) circuit breaker. Additionally, the probe is protected by a 10 Amp breaker. These circuit breakers detect and interrupt overload and short circuit conditions, providing an important safety factor. If the circuit breaker opens, or "trips," indicating interruption of the circuit, investigate and repair the electrical fault, and then reset the breaker by pressing the circuit breaker switch. The Electrical Schematic for the Source Sampler Console is presented in Figure 1-3.
- Two custom-designed and manufactured circuit boards, a Data Acquisition and Control (DAC) board and Thermocouple (TC-MUX) board, are utilized.

XC-30B Front Panel Connections



XC-30B Internal Components



MercSampler Software

The MercSampler includes firmware preloaded on its DAC and TC/MUX boards. Also included is Windows-based interface software. Apex Instruments recommends the purchase of a laptop or desktop computer directly through Apex to ensure computer compatibility and proper loading of software. However, if you prefer to use or purchase your own computer please ensure your computer has, as a minimum, the following specifications.

Item	Description	Capacity
СРИ	Processor Speed	1GHz+
RAM	Random Access Memory	>512MB
HDD	Hard Drive Capacity	~12MB for Software. Data file storage varies.
O/S	Operating System	Windows XP SP2 or Vista

Loading Software

To load MercSampler software on your laptop or desktop computer, follow these steps:

Insert the Apex XC-30B MercSampler CD-ROM into your computer CD-ROM drive. Open the drive letter of the CD-ROM drive (sometimes D:\ or E:\) and copy the "Apex" folder to the root directory of your system drive (C:\.)

The software must be installed in the C:\Apex directory on your computer. Please delete any files currently in the C:\Apex directory, and then copy the files from the CD-ROM or .zip file to the C:\ drive.

The software is now installed correctly.

To simplify running the XC-30B application, create a shortcut on your desktop buy opening the C:\Apex\A_XC6000\bin\. Locate the file "XC-6000.exe". Right click on the file and select "Send To" then Desktop. *This will create the shortcut on the desktop named Shortcut to XC-6000.exe. Double click the shortcut to start the application.*

The same software application is used for both the XC-6000 and the XC-30B. When the application is first launched it may display XC-6000 until the first time the console is connected.

Driver Installation

The Apex XC-30B includes a USB connection functionality, which is implemented using a virtual serial port on the connected PC. To install drivers for this serial port, please perform the following steps:

Power down the XC-30B MercSampler if it is not already powered off by switching the main Power switch to the "off" position.

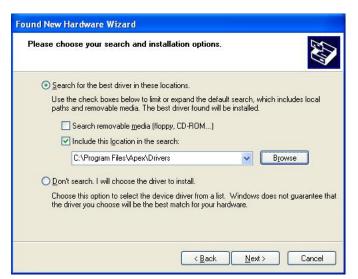
Connect the XC-30B to the PC using the included USB cable.



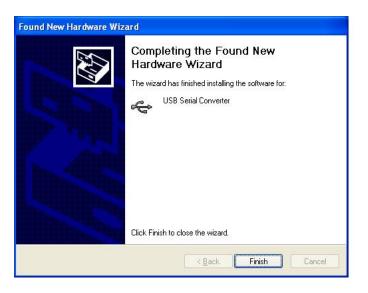
Windows will discover the XC-30B. The Windows "Found New Hardware Wizard" will appear onscreen.



Please select "Install from a list or specific location (Advanced.)



Use the "Browse" button to find the folder where the XC-30B application is installed (usually C:\ Apex) and then navigate to the "FT232_UART_Driver" subfolder. (C:\ Apex\FT232_UART_Driver) lick "Next."



The drivers for the serial converter (UART) will be installed. Press "Finish."



Windows will then discover the virtual serial port. The installation for the serial port drivers is the same as for the serial converter. The "Found New Hardware Wizard" will start:

Found New Hardware Wiz	zard
	Welcome to the Found New Hardware Wizard This wizard helps you install software for: USB Serial Port
	If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do?
	 ☐ Install the software automatically (Recommended) ④ [Install from a list or specific location (Advanced) Click Next to continue.
	< Back Next > Cancel

Select "Install from a list or specific location (Advanced,)" and press "Next."

^o lease cho	ose your search and installation options.
O Search	ch for the best driver in these locations
	he check boxes below to limit or expand the default search, which includes local and removable media. The best driver found will be installed.
	Search removable media (floppy, CD-ROM)
	Include this location in the search:
	C:\Program Files\Apex\Drivers Scores
O Don't	search. I will choose the driver to install.
	se this option to select the device driver from a list. Windows does not guarantee iver you choose will be the best match for your hardware.

Select the driver location (same as for the serial converter installed previously) and press "Next."

Found New Hardware Wiz	ard
	Completing the Found New Hardware Wizard The wizard has finished installing the software for: USB Serial Port
	Click Finish to close the wizard.
	< Back Finish Cancel

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

The wizard will complete. Press "Finish."

Open the System Properties control panel (either open Control Panel > System or right click on My Computer and select "Properties."

System Re	store Auto	matic Updates	Remote
General	Computer Name	Hardware	Advanced
Add Hardwar		d helps you install hardw.	
		Add <u>H</u> ardware	Wizard
Device Mana	aner		
🖾 🖌 on		all the hardware device: Device Manager to cha	
🖾 🖌 on	your computer. Use the		ange the
i on pro	your computer. Use the perties of any device. Driver <u>S</u> igning	Device Manager to cha	ange the
Hardware Pro	your computer. Use the perties of any device. Driver <u>Sig</u> ning ofiles	Device Manager to cha	ange the
Hardware Pro	your computer. Üse the perties of any device. Driver <u>Signing</u> ofiles rdware profiles provide	Device Manager to cha	ange the

Click the "Hardware" tab, and then click "Device Manager."



When the Device Manager opens, open up the "Ports (COM & LPT)" item and make sure that a "USB Serial Port" is installed. Please make a note of the COM number (in this case, it is COM4, but your installation may vary.)

Driver installation should only need to be performed once the first time the PC is connected to the XC-30B

Software Operation

To start the MercSampler software on your laptop or desktop computer follow these steps: Double click the "XC-6000" icon on your desktop. The following screen should appear. Please take a moment to note the version number of the software, which is printed on-screen in the center-right of the menu, near the top of the smokestack.



Figure 1-6. Initial Main Screen

If you have already setup the communication method single click the "Connect" button and skip the following section and go to the Test Profile section, otherwise follow the instructions that follow to setup the communication between the console and the computer.

Software Communication

The MercSampler software communicates via USB. To connect single click the "Config/Utilities" button.

The following screen should appear. The application will scan for the XC-30B and list the com port it is attached to.

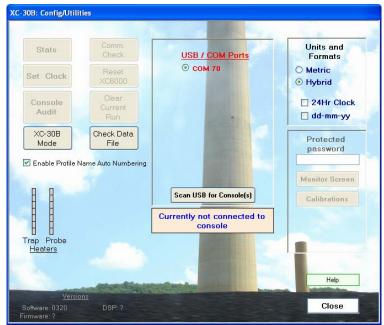


Figure 1-7. Config & Utilities Screen

To connect via USB follow these steps:

- 1. Single click the "Scan USB for console(s)".
- 2. The application should automatically fond and select the correct COM port. If multiple COM ports are located select an available COM Port make sure that this COM number is the same as the COM number for the USB Serial Port installed previously.
- 3. Single Click "Return" and the Main Screen will appear.
- 4. Single click the "Connect" button. The screen should indicate the console ID, communication method and console date/time.

When connected the main screen identifies the console and the communication method as shown below:



Figure 1-8. Main Screen Communication Connected

The following summarizes the steps involved in configuring and running a complete test with the MercSampler console.

Main Screen Profile Options Load from Flash Memory Load from File Load New/Default Edit Current Profile	Step 1 Load/Edit Profile Profile includes: Test Duration, Constant vs Proportional Flow Control Target Flow Rate Test Site Info Alarm Configuration Etc. Save Profile	Step 2 Pre-Test Leak Check Max Vacuum and Optional Variable Levels of 5" Hg and 10" Hg Troubleshoot/repair leaks Timeout Period Accept stores value	Step 3 Set Probe Insert Probe Confirm Location and Delta P Measurement Check Temperature Values and Settpoints
Step 4 Start Test Program Prompts the User to Enter Trap ID's and DGM Mechanical Index Readings.	Step 5 Real-time Data View Real-time Data and Check for Irregularities. Any Alarm Annuciations?	Step 6 End Test Enter Final Reading of DGM Index. Remove Probe from Stack. Prepare for Leak Check.	Step 7 Post-Test Leak Check Automatically Leak Checks to Max Vacuum Logged During Sampling. Optional Higher Vacuum Levels If Selected.
	File(s) to Sele such as Jum Hard Drive, N	Network, etc. Spreadsheet/	

Figure 1-9. Software Flow Summary

Test Profile

The Test Profile is how we configure the console for running a test. The profile contains all information about the specific job or test being performed, including sample location, job name, flow rate, and test duration. Once a profile has been created, it is stored in the XC-30B internal memory and may be retrieved for later use. Click the "From Memory" button on the Main screen to load a previously used profile from the console memory. In most cases, a new profile should be created for each sampling location or job. This helps to prevent confusion or errors in configuration when using the same console to sample from different sites.

Load	Existing Tests (profile names)	Completed	Delet
1	Const 600 - 10min.pro	12/11/06 - 09:16	×
2	500 Constant 3 Hr.pro	01/18/07 - 11:59	×
3	4HR Test 1 Min Data.pro	12/15/06 - 14:41	×
4	10 Min 500cc.pro	02/05/07 - 17:01	×
5	15 Hr Testpro	01/16/07 - 08:51	×
6	2 Hr 1Min.pro	01/20/07 - 19:44	
7	2 Hr RTC Update.pro	01/12/07 - 13:11	×
8	2HR 1MinTestpro	01/18/07 - 13:26	x
9	4 DayHeat Test Beta3.pro	02/05/07 - 13:55	
10	15Hr NewPump.pro		××××
11	Const 600 - 10min.pro	12/29/06 - 11:16	x
12	Console3-24hr.pro	01/09/07 - 08:41	×
13	Const 600 - 10min pro	01/04/07 - 14:43	
14	500 Constant 3 Hr.pro	01/04/07 - 15:09	×
15	ProTestRun1.pro	01/29/07 - 15:16	×
16	ProTestRun1.pro	01/29/07 - 17:29	
17	ConTest5hr01-30-07.pro		×
18			* * *
19			×
20			×

Figure 1-10. Load Profile from Internal Memory Screen

To create a new profile, click the "New Profile" button on the Main screen. The General Information screen will be shown as below. The information on this screen will be appended to the exported data at the conclusion of the test run. The General Information screen is optional but Apex Instruments recommends that all of this information be entered before sampling. Once this data has been added, press the "Next" button to continue.

XC	cury Sampler C-6000 Series	A CARDINE	AINSTRUMEN	<u>TS</u>
	Client	General	Testing Company	
Name	APEX TEST		, , ,	
Address 1				
Address 2				
city, ST, Zip	2			
		Testing Personne	el .	
	Manager			
	Operator			
	Assistant			
	Supervisor / QA		14 Martin 1/18/	
Current Pro	file: Apex Demo 1200const. 30	Imin.pro		
	Short Cuts			
	Varm Actions			

Figure 1-11. General Test Information Screen

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Mercury Sa XC-6000 Se	eries AR	X STRUMENTS
	Stack Information	
Sample Location		
Stack Geometry	Orcular Ports Available	
	O Rectangle/Square Port Used	
Fuel Source/Type		
Fuel F-Factor	(n.nnn)	
	Velocity Traverse	
Stack Far Wall Dista	ance (nri.nn) Distance Upstream (B) (r	inn.n)
Stack Near	Wall (nn nn) Distance Downstream (A) (n	inn.n)
	Traverse O Particulate	

Figure 1-12. Stack Information Screen

The Stack Information screen will be shown next. The fields on this screen are also optional, but are useful for maintaining thorough job records. If a stack traverse is required while performing Method 30B, it may be helpful to enter the traverse information and stack geometry on this screen. Press "Next" to continue.

Mercury Samp XC-6000 Series	ler	APEX
N/2	Test Equipment	
	XC30B	
Pitot ID		
Pitot Coefficent	8.84 (.nnn)	
Probe ID		
Cartridge A ID Cartridge B ID	1a 2b	-76776
(Require	 front-panel dry gas readings as backup es entering the Dry Gas Meter reading at the ng and at the end of the test.) 	
Current Profile: Apex Demo 1200cc	inst 30min pro	

Figure 1-13. Test Equipment Information Screen

The Test Equipment information screen will be shown next. This information is also optional. The Cartridge ID's may be entered here but the user may enter them during the Pre-Test sequence.

The XC-30B does not contain a pitot transducer, so leave the Pitot ID blank and the Pitot Coefficient should always be left at 0.84. The console does not have Front Panel Dry Gas Meter displays. The option to use the front-panel dry gas readings as backup should be left unchecked.

Press the "Next" button to continue.

Mercury Sampler XC-6000 Series	A LANK	Y	4	Area	RUMEN
	Alarm Actions	Delay (Sec.)	Auto Reset (Sec.)	Action	
High Vacuum Le	vel 🚺 (nn Inches)	20	10	Alurt	
MANG <u>LE AN</u>					
Thermocouples	Valid Range	20	10	Alert	
	Valid Range		10	Alert	~
	Valid Range	20		Presented II.	2

Figure 1-14. Alarm Actions Screen

Alarm Actions

The Alarm Actions screen is used to set Alarm points and actions.

Each alarm condition has several parameters that may be set. For each sensor input on the Alarm Actions screen, a valid range or upper limit may be set, depending on the sensor type. Additionally, most alarms feature an auto-reset function, which serves to return the XC-30B to a non-alarm state in the case of a non-critical alarm condition. For most testing conditions, the alarms may be left at their default values. If a Stirling Cooler (SGC-4000) is not in use, set the Chiller alarm to "Disable."

DELAY (sec.)	Length of time alarm condition must continue before alarm action is performed. For an instant alert, set to zero (0.)
AUTO-RESET (sec.)	Length of time elapsed before alarm condition resets. When alarm condition resets, Alarm Piezo output and dry contact will deactivate.
ALARM ACTION:	Action performed by XC-30B upon reaching an alarm condition. See table below. Only the Chiller Alarm may be disabled.

ALARM DELAY (Startup / Resume)

When a test run is started or resumed from a pause condition, the alarms will be disabled for a minimum of 60 seconds, in order to prevent false alarm conditions when establishing the flow baseline. This delay may be extended at the user's discretion.

ACTION	Description of Action
ALERT	Displays an Alarm Condition on the Monitor Screen
	May be Auto-Reset or reset manually by operator
DISABLE	No action

Press "Next" to continue.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Test Setup

This is where the user selects the test target flow rates, Trap and Probe Temperature setpoints, Chiller Alarm setpoint (if using the optional SGC-4000) and the Moisture value.

XC-30B: Test Setup	
Mercury Sampler XC-6000 Series Test Setu	APEX
Trap and Probe Heaters Temperature F° 250 (100-	999) Chiller Temperature F [*] 34 (nn)
	Stack Moisture
Use Constant -> Flow Rate (200 - 2000 ccm)	Use Constant Value 8 % (nn.nn)
or Use Proportional -> O Delta_P O External	
Current Profile: Apex Demo 1200const. 30min.pro	
Current Frome. Apox Donio 1200Const. Summipio	Hep Main Menu < Prev Cancel Next >

Figure 1-15. Test Setup Screen

Test Parameters:

Trap and Probe Heaters Temperature: Setpoint for the console-controlled heaters in the sample probe. This should be set high enough to keep any water vapor or other moisture entrained in the stack gas without condensing. In a "wet" stack (more than 10% moisture,) trap and probe heaters should be set to well above stack temperature.

Chiller Temperature: This parameter does not control the sample conditioner, but it does provide a reference temperature used in setting the alarm values. Typically 35° F.

Flow and Moisture:

The XC-30B is designed to operate at a constant sample flow rate. Enter the sample flow rate in cubic centimeters per minute (ccm.) The value entered into the Moisture will be recorded in the exported data. Moisture data is used during data analysis in order to determine dry basis and affects mercury output. Moisture data may be set to a constant value based on fuel type, depending on the local regulations. Please consult your regulatory body to determine requirements for moisture reporting.

Sampling Options:

The XC-30B Sampling Options allow for the setting for the duration of the sample test. Enter the amount of time for the test to run. The test can always be ended early or extended during the test run.

The Averaging period determines how often a Data Record is recorded.

The Sampling Options also allow for setting automatic pauses to allow for the relocation of a probe.

	Sampling (Options		
Test Duration: Days 0 (0-99) Hour 0	(0-23) Min	. 30 (0-59)	Averaging Period	1 (1-60 min)
			Pausing at each poi to displays a count d	
Sample Time Per Point: [1-9999 minutes]			ly Pause test befo new Port location	re
Time to notify you before the end of sample point: [0-88 seconds?] "Use "0" to disable		Automatical each sample	ly Pause test after a point.	
Number of Number Traverse of Ports Points Used (per Port) × =	Sample Time Per Point 9999		r Test Duration (mnutes) = 999999 0d 12h 23m] d 12h 23m]	

Figure 1-16. Test Setup Screen

		Samplin	g Options			
Test Duration: Days 0	(0-99) Hour 0	(0-23)	Min. 30 (0-59	Averaging P	eriod 1	(1-60 min)
Enable Auto-Pause				to-Pausing at eau also displays a c		
Sample Time Per Po 20 [1-9999 min Time to notify you b sample point: 60	utes]		moving to	ally Pause test a new <u>Port loca</u> ally Pause test <u>ble poin</u> t.	ation.	
Number of Number of Ports Used (per Port) 4 • × 5 •	Traverse Points Used 24	Samj Time Poir 20	Per Point It Used	s Duration	Use N Test Durati	

Figure 1-17. Auto Pause

Auto Pause

By selecting the Enable Auto Pause box parameters maybe entered to automatically pause the console at predetermined intervals. This may be helpful when performing a traverse, as the console may be paused at each traverse point or when performing port changes.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

The information entered will also be used to calculate the total duration of the test.

If a value is entered the console will display a countdown until the next pause time.

After all parameters have been entered click "Save" to save this profile to a location on your hard drive. Please note that selecting "Save" does not write any information to the memory of the XC-30B. The XC-30B profile is not updated until all pre-test preparations are complete. Click "Main Menu" to start the testing protocol.

-	Name	Size	Туре	Date Modified	v
	sample1.pro	9 KB	PRO File	1/22/2007 7:1	17 PM
My Recent	sample.pro	9 KB	PRO File	1/22/2007 5:4	43 PM
Documents	10min-500cc.pro	9 KB	PRO File	1/20/2007 6:3	35 PM
	500 Constant 3 Hr.pro	9 KB	PRO File	1/17/2007 2:0	00 PM
Desktop	 ☑ 2 Hr RTC Update.pro ☑ 15Hr 1min Pitot.pro ☑ Console3-24hr.pro 	Type: PR Date Mod Size: 8.8	lified: 1/17	/2007 2:00 PM	108 AM 1 PM PM
	🛛 🔟 24Hr Heat Ramp.pro	9 KB	PRO File	1/3/2007 10:0	DO AM
	🗾 2.5Hr 1minpoint.pro	9 KB	PRO File	1/2/2007 2:03	3 PM
Documents	🗾 4 DayHeat Test Beta3.pro	9 KB	PRO File	12/22/2006 1	0:19 AM
	15Hr NewPump.pro	9 KB	PRO File	12/21/2006 9	:12 AM
E	22HR Heat test.pro	9 KB	PRO File	12/20/2006 4	:57 PM
y Computer	🔟 🔟 15 Hr Wireless 1min.pro	9 KB	PRO File	12/19/2006 5	:25 PM
ij compator	2HR 1MinTest.pro	9 KB	PRO File	12/18/2006 3	:21 PM
	IHr Test.pro	9 KB	PRO File	12/18/2006 1	
My Network	File name: 10min-500cc.	nro		-	Sav

Figure 1-18. Save Profile Screen

Pre-Test Leak Check

Once back at the "Main" screen single click the "Pre-Test Leak Check" button. The following screen will appear. Ensure the sorbent test tubes are inserted in the probe trap receptacles. Plug the ends of the sorbent tubes with clean stoppers. Click the two "Start Test" buttons to individually leak check Side A and B. This is a required leak check done at maximum vacuum. The leak check vacuum level and flow rate are stored with each test run. The test can be bypassed by checking the "Bypass" button and then selecting "Next>>>". However, this bypass will be logged and stored with the data.

t Make ours that all	200		ak Test	in a
			es are connected before continu set at: 1200 ccm	ing.
Sample A	Vac. in-Hg	Current Flow (ccm) 2000 –11	Sample B	Curren Vac. Flow in-Hg (ccm) 2000 -n
Testing	- 20 - 18 - 16	1600 -	Testing	- 20 - 18 - 16 - 16
- Testing Flow_Rate	- 14	1200 -	- Testing Flow_Rate	- 14 - 12 - 10 - 8 800 -
Flow (60 sec avg.): 10 ccm Max. Allowed: 48 ccm DGM: 0.011 L	- 10 - 8 - 6 - 4 - 2	400	Flow (60 sec avg.): 7 ccm Max. Allowed: 48 ccm DGM: 0,007 L	- 6 - - 4 400 - - 2 - 0 -
Minimal Time Remained: 51 Sec	22.5 Stop	0 Fest	Minimal Time Remained: 52 Sec	23.1 0 Stop Test

Figure 1-19. Pre-Leak Test Screen Running

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

	the sample line	ak Test is are connected before continuir	ng.
Sample A PASSED	Current Vac. Flow in-Hg (ccm)	Sample B PASSED	Curren Vac. Flow in-Hg (ccm
Passed >>> Sample A passed The Leak Test.	2000 - - 20 - - 18 1600 - - 16 - - 12 1200 - - 10 - - 8 800 -	Passed >>> Sample B passed The Leak Test.	2000 - - 20 - - 18 1600 - - 16 - - 14 1200 - - 10 - - 800 -
Flow (60 sec avg.): 2 ccm Max. Allowed: 48 ccm DGM: 0.013 L	- 8 000 - 6 - 4 400	Flow (60 sec avg.): 0 ccm Max. Allowed: 48 ccm DGM: 0,007 L Minimal Time Remained:	- 8 800 - - 6 - - 4 400 - - 2 - - 0 - 23.0
Bypass	Stop_Test	Help Cancel	Stop_Test

Figure 1-20. Passed Pre-Leak Test Screen

Once the test has passed click the "Next" button. The system prompts you to remove the caps. Click OK to continue. The system will automatically switch these off the pumps.

6000		
The numps are shi	ill running, please remove	both caps
at the end of the	traps, only then press Ok	K to contiue

Figure 1-21. Pre-Leak Test Pump off Prompt

Set Probe

The next screen to appear prompts the user to insert the probe when the temperatures are at/near set point. If the temperatures are approaching the setpoint you can select bypass. You will have an opportunity to verify the temperatures have reached the setpoint prior to starting the test. If you are not using SGC-4000 conditioner bypass the chiller temperature.

iet_Probe				
		Set Prol		
Note: I	Do not inse tempe	rt Probe u ratures a		and Chiller
	Current Temp.	Set Temp.	Status	
Тгар	71.1 F	250 F	Ready	
Probe	72.1 F	250 F	Ready	
Chiller	72.1 F	34 F	Ready	
		_		Help
		L	Cancel	Accept

Figure 1-22. Set Probe Screen

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Select Memory

The following prompts the user to select a storage location on the flash memory drive inside the box. Single click the number in the left column that corresponds to the data slot to be used. The user can select one of up to 99 slots. Click the "<<Previous" or "Next>>" buttons to scroll through the list. The system will prompt to confirm the case of overwriting data.

Select	Existing Tests (profile names)	Completed	Dele
Const 600 - 10min.pr	0	12/11/06 - 09:16	x
2 500 Constant 3 Hr.pr	0	01/18/07 - 11:59	x
3 4HR Test 1 Min Date	.pro	12/15/06 - 14:41	x
4 10 Min 500cc.pro		02/05/07 - 17:01	×
5 15 Hr Test pro		01/16/07 - 08:51	×
6 2 Hr 1 Min.pro		01/20/07 - 19:44	×
7 2 Hr RTC Update.pr	0	01/12/07 - 13:11	X
8 2HR 1MinTestpro		01/18/07 - 13:26	×
9 4 DayHeat Test Bet	a3.pro	02/05/07 - 13:55	×
10 15Hr NewPump.pro			×
11 Const 600 - 10min.pr	0	12/29/06 - 11:16	×
12 Console3-24hr.pro		01/09/07 - 08:41	x
13 Const 600 - 10min.pr	0	01/04/07 - 14:43	×
14 500 Constant 3 Hr.pr	0	01/04/07 - 15:09	x
15 ProTestRun1.pro		01/29/07 - 15:16	×
16 ProTestRun1.pro		01/29/07 - 17:29	×
17 ConTest5hr01-30-07	'.pro		x
18			×
19 20			X X X
20			x

Figure 1-23. Memory Slot Selection for Data Storage Screen

Trap ID's

Verify the Trap ID's are correct. The Profile Name may also be changed at this time. Press the Accept and Upload button to upload the test profile to the XC-30B

IDs and Volumes		
Merc X	ury Sampler C-6000D	- Hor
Pleas	e verify the Trap IDs	1 - Ste Vier
Cartridge A	1a	
Cartridge B	2b	
Profile Name	Apex Demo 1200const. 30min [00	1]
		NASO A
	Help Acce	ept and Upload Test

Figure 1-24. Trap ID Screen

Test Start

After clicking "Accept" the following screen appears. The system is ready to start the test. Verify temperatures are correct

	Current	Sample Avg.	Run Avg.	Unit	Apex Instruments, Inc. Ver: 0320-116			<u>Stats.</u>	
MassFlow	A 2	-?-	-?-	CCM	- Adjust Flow -		Time Started	?	
MassFlow	7.	-?-	-?-	CCM		200			
Targe	et 1200				< Accept 120	0	Elapsed	0d 0h 0m 00	
Тгар	70.5	-?-	-?-	°F			Actual	0d 0h 30m 0)1s
Probe	71.1	-?-	-?-	۴F	Adjust Temperatu	Adjust Temperature	Max Vac. A	0.31	Inc
Tai	get 250	Max 3	50 M	<i>lin.</i> 150	< Accept 250		Max Vac. B	0.31	Incl
Chiller	71.6	-?-	-?-	۴F			DGM-Vol-A	0.000	ļ
	get 34			<i>lin.</i> 30			DGM-Vol-B	0.000	1
Aux	70.5	-7-	-7-	۴F			Data Points C	ollected	4
DGM-A	82.1	-?-	-?-	°F			Avg. Period Re	emaining (sec.)	
DGM-B	78.4	-?-	-?-	۴F					a cart
Stack	72.6	-?-	-?-	۴F			Click RUN	below to start	
Internal	85.6	-?-	-?-	۴F			00 h		
Vac. A	0.06	-?-	-?-	Inch				e Remaining	
Vac. B	0.00	-?-	-?-	Inch					
Baro.	29.60	-?-	-?-	Inch			Run	End T	est
Friday - Ma Memory SI	A CONTRACTOR	10 02:4	40:23 P	м			Auto Pause: - Alarm Delay: 6	0	Close

Figure 1-25. Test Ready to Run Screen

To start, click "Run" and the system should indicate Mass Flow in the top left of the screen and volume should be incrementing on the Dry Gas Meter (DGM) in the center right of the screen. The time to Auto Pause will also be displayed in the lower right corner of the screen

	Current	Sample Avg.	Run Avg.	Unit	Apex Instrumer	-30B nts, Inc. 0320-116		<u>Stats.</u>	
MassFlow /	1204	1143	1143	ССМ			Time Started	May 28, 2010	
MassFlow B	3 1200	1191	1191	CCM	— Adjust Fl			2:54:43 PM	
Targe.	1200				< Accept	1200	Elapsed	0d 0h 1m 09	S
Trap	70.5	70.0	70.0	°F			Actual	0d 0h 1m 10	S
Probe	71.1	71.1	71.1	۴F	Adjust Tempe	erature	Max Vac. A	0.25	Inch
Tar	get 250	Max 3	50 M	<i>in.</i> 150	< Accept	250	Max Vac. B	0.10	Inch
Chiller	71.6	71.6	71.6	۴F			DGM-Vol-A	1.415	L
Tarc			38 M				DGM-Vol-B	1.346	L
							Data Points C	ollected	4
Aux	71.1	70.5	70.5	°F			Avg. Period Re	emaining (sec.)	50
DGM-A	81.6	81.6	81.6	°F			and a second second	and the second second	a de la caracita de l
DGM-B	78.4	77.9	77.9	°F			Cold Providence	Mary and Provent	(0, 2)
Stack	72.6	72.6	72.6	۴F			F	RUNNING	
Internal	86.1	85.6	85.6	۴F			00 h	28 m 50 s	
Vac. A	0.24	0.24	0.24	Inch			Tim	ne Remaining	
Vac. B	0.06	0.07	0.07	Inch			-		
Baro.	29.59	29.59	29.59	Inch			Pause	End T	est
Friday - Ma	y 28, 20	10 02:	55:52 PI	м			Auto Pause: 7	130	

Figure 1-24. Test Running Screen

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Pause Test

To pause the test, single click the "Pause" button in the lower right of the screen. The button will change to a "Resume" button once the test has been paused. Click on the "Resume" button to resume the test.

	Current	Sample Avg.	Run Avg.	Unit	Apex Instrume	-30B nts, Inc. : 0320-116		<u>Stats.</u>	
MassFlow	A 2	1143	1143	CCM			Time Started	May 28, 2010	
MassFlow	B 0	1191	1191	CCM	— Adjust Fi	Chine Party		2:54:43 PM	
Targe	et 1200				< Accept	1200	Elapsed	0d 0h 5m 14	S
Trap	70.0	70.0	70.0	°F			Actual	0d 0h 1m 31	S
Probe	71.6	71.1	71.1	°F	Adjust Temp	erature	Max Vac. A	0.30	Incl
Ta	rget 250	Max 3	50 M	<i>lin.</i> 150	< Accept	250	Max Vac. B	0.10	Inch
Chiller	71.1	71.6	71.6	°F		CALCER !!	DGM-Vol-A	1.847	I
	raet 34			<i>lin.</i> 30			DGM-Vol-B	1.715	I
							Data Points C	ollected	20
Aux	70.5	70.5	70.5	°F			Avg. Period R	emaining (sec.)	53
DGM-A	82.1	81.6	81.6	°F			and margine and	Care and the second	and the second
DGM-B	78.9	77.9	77.9	۴F				Harris and the second	10.07
Stack	72.6	72.6	72.6	۴F			>>	PAUSED <<	
Internal	85.6	85.6	85.6	°F			00 h	28 m 29 s	
Vac. A	0.06	0.24	0.24	Inch			Click RUN	below to resume	
Vac. B	0.00	0.07	0.07	Inch					_
Baro.	29.59	29.59	29.59	Inch			Resume	? End T	est
Friday - M Memory Sl Profile Na	lot #: 60				. GUM		Auto Pause: 7 Alarm Delay: 6		Close

Click the ? beside the Resume button and the reason for the pause will be displayed.

Figure 1-26. Test Paused Screen

In addition, a remote pause functionality has been integrated into the software. The user may pause and resume the test by closing and opening a dry contact connected to the front panel Pause connector. The remote pause functionality is discussed in the Test Setup menu.

Adjust Buttons

The XC-30B is designed to offer flexibility during testing as well as when creating profiles. By entering a new value and pressing the **Accept** button the trap / probe heater set point or the target flow rate may be changed during testing,

Auto Pause

If Auto Pause was selected during test setup the following screen will be displayed indicating the amount of time until the Auto Pause is activated.

When the countdown reaches 0 the console will pause. Press the Close/Resume to close the dialog and resume the test or press the Close button to return to the Test Screen. From the Test Screen the Resume button may be pressed to resume the test.



End Test

To end the test there are two options. The user can wait until the system times out and automatically stops the test. Second, the user can end the test early by single clicking the "End Test" button in the lower right of the Test Screen. The system will prompt the user to confirm this action.

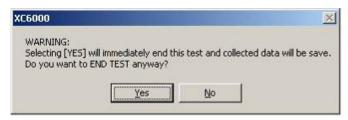


Figure 1-28. End Test Early Prompt

The following prompt informs the user the system will store the data.



Figure 1-29. End Test Confirmation Prompt

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

The following prompt informs the user the Post-Test Leak check is next and to remove the probe from the stack and plug the ends of the traps.



Figure 1-30. Initial Post-Test Leak Check Prompt

Post-Test Leak Check

The following screen displays the status of the leak check and allows the user to start/pause the leak check. The system has logged the highest vacuum achieved for both flow channels A and B as displayed in the center box and will control the vacuum level to just over those levels. Just like with the Pre-Test Leak Check, the user can bypass this step but no leak check data will be stored. But if no Post-Leak is performed the sample run data will be invalid.

Average Mas		ak lest st:A=1192 B=1194 ccm	
Sample A Test Vacuum in-Hg 5 Test for the maximum observed vacuum level of 0.3 Flow (60 sec avg.): 0 ccm Max. Allowed: 48 ccm DGM: 0.000 L Minimel Time Interval: Time Limit: 900 Sec	Current Vac. Flow in-Hg (ccm) 2000- -2 2000- -18 1600- -14 1600- -14 2 1200- -14 2 1200- -14 2 1200- -14 400- -2 4000- -2 -0 - 	Max. Allowed: 48 ccm DGM: 0.000 L Minimal Time Interval:	2000 - 1600 - 1200 -

Figure 1-30. Initial Post-Test Leak Test Screen

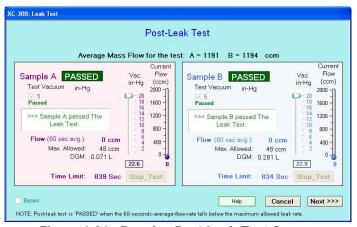


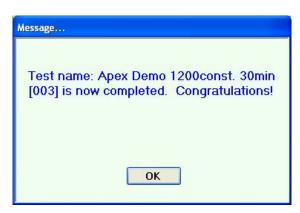
Figure 1-31. Running Post-Leak Test Screen

After both flow channels have passed. Click the "Next>>>" button and cycle off the pumps and the system will inform the user it is storing the leak check data.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com







Export Data

The system will now go back to the main screen. To export and view the data file(s), Click on the Export Data box.



Figure 1-33. Export Data to File from main screen

Now select test data to export, the bottom right of screen will indicate sample run just completed.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

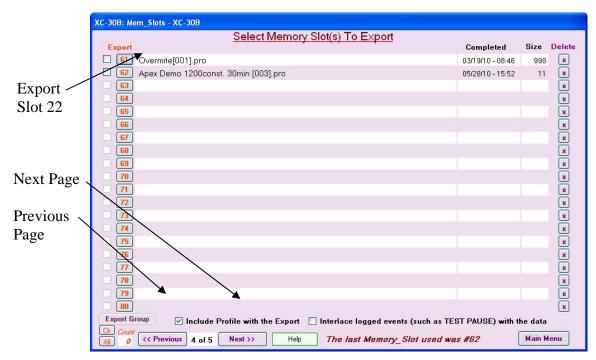


Figure 1-34. Export Data from memory slot

Click on the button corresponding to the slot number of the test to be exported. The XC-30B supports 99 memory slots, which may be accessed 20 at a time using the **Previous** and **Next** buttons.

Once the slot number button is pressed, the following dialog box will prompt the user to save the file to a local or network location. A text file (.txt) and a comma separated value (.csv) file will be generated at this user-specified location. The text file can be viewed in various applications such as Notepad, Word Pad, Word, Excel, etc. The CSV file is formatted to be opened in a spreadsheet application such as Excel.

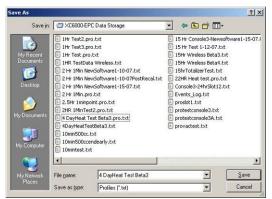


Figure 1-35. Export Data Path Screen

Multi-File Export

The XC-30B also supports multi-file export, which will export a group of completed test profiles to a folder on the local hard drive. To use multi-file export, select the Multiple Slot Export check boxes next to the slots desired. To select all available slots, press the **ALL** button. To clear all selected slots, press the **CLR** button.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

	XC-30B: Mem_Slots - XC-30B		
	Select Memory Slot(s) To Export		
Multiple elet	Export	Completed	Size Delete
Multiple slot	0vermite[001].pro	03/19/10-08:46	998 💌
export check	Geometric Const. 30min [003].pro	05/28/10 - 15:52	11 × × × × × × × × × × × × × × × × × ×
boxes 🔍	63		×
00403	65		×
	□ (30) □ [66]		×
	□ 67		×
	68		×
	69		×
			×
	71		×
	72		×
Export Group	74		×
Export Group	75		×
\backslash	76		×
Clear All			×
	□ 78		×
			×
Select All			_
	Export Group Include Profile with the Export Interlace logged events (such as TES	T PAUSE) with th	ne data
	Count Count All 0 V Yerevious 4 of 5 Next >> Help The last Memory_Slot used was	s #62	Main Menu

Multiple File Export (cont.)

After the slots are selected, press the **Export Group** button. The XC6000 application will prompt the user for a directory as in single file export. With a multiple file export, all slots will be exported to the directory selected for the first slot. Exported files will be named based on their profile name, and all will be given unique filenames.

XC6000		
Please select the directory fo directory, Click YES to contin	or the first memory slot to be exported. The rest of the memory slots will be exported to the nue, or NO to cancel. Yes No	same
Save As		
	Savejn: 🔁 XC-30B Data 🔍 🚱 🌮 🖽 -	
	ecent ments	
Dest	ktop	
My Doc	Juments	
My Cor	mputer	
	File name: Overmite(001) (61) 03-19-10 Save	
My Ne	etwork Save as type: (".txt) Cancel	

Config/Utils Screen

The Config/Utils screen is used to carryout non-test activities



Stats

Stats displays current operating statistics of the console and looks the same as the Test Screen

Set Clock

The Config/Utilities screen has various other functions built-in. The "Set Clock" button automatically synchronizes the MercSampler Console time with the clock time of the computer connected.

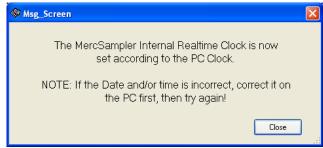


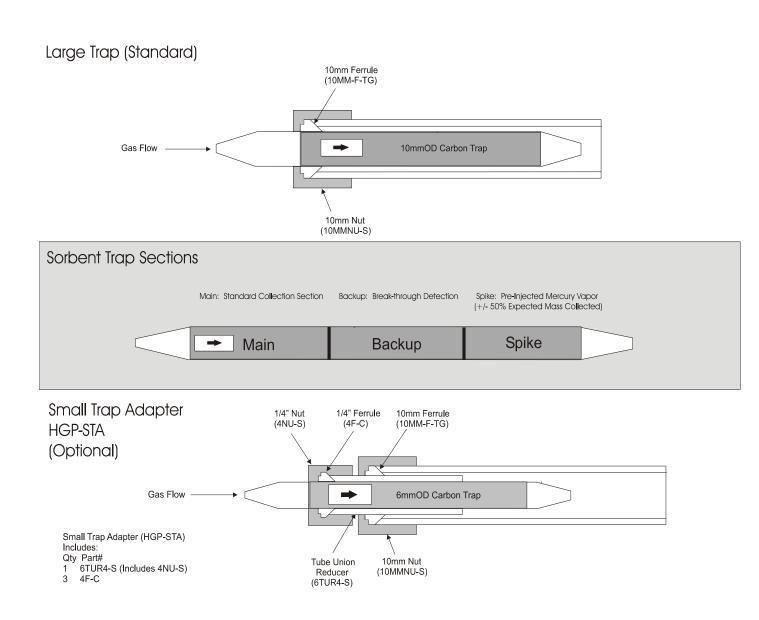
Figure 1-36. Set Console Clock Confirmation Screen

Console Audit

The Console Audit performs required QA/QC verifications per the EPA Method. Barometer sensor, Vacuum sensors, Thermocouples and DGMs are verified to be within tolerance.

Detailed procedures for performing the Console Audit can be found in Console Audit document located in C:\Apex Documentation.

Sorbent Traps



Appendix 1

REPLACEMENT PARTS						
CONSOLE						
M-PCB-DAC- V3A	POPULATED Printed Circuit Board for Data Acquisition & Control (DAC) Board for XC- 6000EPC Dual PC-Based Hg Console Series					
PCB-TC/MUX	POPULATED TC/Mux Board for use in XC-6000EPC Mercury Console Series. 8 Type K TC Channels with External Signal and Moisture Analyzer Inputs.					
PCB-LED-HG	BOARD, LED DISPLAY					
EL-PCB- MODBUS	BOARD, TCP/IP MODBUS INTERFACE					
EL-SDCARD	A-DATA Speedy 1GB Secure Digital (SD) Flash Card Model SDC-1G0	Ten Ten				

Т

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

EL-EBR-2310	D-LINK ROUTER, IEEE 802.3/3u, IEEE 802.11b/g Wired- G Broadband Router	
EL-WBR-1310	D-LINK ROUTER, WBR-1310 Wireless G Router - 54Mbps, 802.11g, 4-Port, used in Meter Consoles in SKB, Environmental Enclosures	
GP-C131-11	PUMP, BTC DIAPHRAGM PUMP, BRUSHLESS MOTOR, 10,000 HR, MAX VACUUM 20"HG, 12VDC, 3900 RPM, MAX PSIG 24", 6 lpm max free flow, 900cc @15" Hg	
DGM-SK25- 5701	DRY GAS METER, MODEL SK- 25, METRIC, with optical encoder (no mechanical index)	
DGM-SK25EN	DRY GAS METER,MODEL SK- 25, METRIC, with optical encoder (for XC-6000EPC)	

TOT4-36X72	QUADRATURE PULSE DIGITAL TOTALIZER	
AK-6000	Deluxe Mercury Audit Kit for Appendix K/Method 30B System includes:SK25 DGM with 15-pt calibration, quadrature totalizer,vaccum gauge, 4U black polyethylene molded case, Handheld type K Thermocouple Simulator with Certificate, Hand- held digital barometer, Digital Thermometer, Vacuum Bottle	
EL-670-OA938	FAN, AC Fans 92mm 115VAC 50CFM	
AWM-4360	Airflow Sensor, Signal Conditioning: Amplified; Flow/Pressure Range: + 6000 sccm (6.0 SLPM); Linear Range 1LPM; Port Style: Manifold	
XC-6K-PGMC	Programming Cable for XC- 6000EPC Automated Mercury Sorbent Trap Metering Console.	
M-AM2312	VALVE, 3-WAY, .055/.048 ORIFICE, 12V	

VSO-1SV	VALVE, SOLENOID, PROPORTIONAL Model VSONC-3S11-IC-FO MANIFOLD MOUNT WITH WIRE LEADS AND 11.5VDC	
SP-PSE541-M5	SENSOR, PRESSURE, 0-30" Hg, 1 NPN/PNP OPEN COLLECTOR TRANSISTOR OUTPUT, 30VDC, 125mA	
BARO-A-4V	Barometric Pressure sensor, 600 to 1100 mbar, temperature compensated, amplified output	The second s
M-CBR10A-M	Magnetic Type Circuit Breaker Rocker Switch, 10 Amp. Horizontal Mount. Typically Used in 120V Consoles as Probe/Oven Breaker Switch.	
M-CB15A-M	Magnetic Type Circuit Breaker, 15 Amp., Typically Used in 120V Consoles as Main Breaker.	
D-60A	POWER SUPPLY, 5V@6A, 12V@ 4A, Meanwell	

EL-P1082-031	CONNECTOR, A TO B USB, PANEL MOUNT	
EL-TL5242W	Memory Backup Lithium Batteries 3.6V 2.1Ah BATT PACK	
PCB-BATTERY	Battery interface board with short- term capacitor backup	
ТС-РЈК	THERMOCOUPLE JACK, TYPE K, PANEL, SNAP-IN	
AM-T3107000	AMP. CONN, 7P FEMALE, PNL, C16 C16-1 Series Amphenol Circular Connector. High Grade Plastic for Harsh Environmental Conditions. Panel-Mount Straight Female Slots, 7 Slot (6 + Ground (First Mate/Last Break)) – Hardigg Case external input connector	
AM-T3108	AMP. CONN, 4 PIN (MALE),CBL,C16 – Probe / Trap Heater power connection, console side	
AM-T3109	AMP. CONN, 4 SCKT (FEMALE),CBL – Probe / Trap Heater power connection, probe	

	side	
XC-6K-MANI	MANIFOLD SUBASSY, XC- 6000EPC Includes vac sensor, mass-flow sensor, manifold valve, proportional valve, ss hose barb fittings. Assembly calibration data to be provided with this unit.	
COOLER		
SSR-330-25	RELAY, SSRT, 25A 110/240V	
SGC-TR4/7-SCR	HEAT EXCHANGE ASSEMBLY FOR STIRLING GAS CONDITIONER Heat Exchange Assembly, 4 inch inner Tube, 7 inch overall with outer tube.	JAR A
26840	CARTRIDGE, Aluma-Sorb Gas Drying Unit with 1/8" SS FNPT Fittings. 2-5/8"x11-3/8". 50g H2O Capacity. <.01psi@200lph press drop. 90psig working press. Polycarbonate	
26809	MOUNTING CLIP FOR ALUMA-SORB CARTRIDGE	

M-SD31 Temperature Controller, Red LED, Watlow M-SD31 Temperature Controller, Red LED, Watlow M-PSRS7512 POWER SUPPLY, 75W, 12V, 6 M-PSRS7512 POWER SUPPLY, 75W, 12V, 6 AMP, INPUT: 100-240VAC Image: Control of the second se	AM-SP100A	Fan, for Stirling Chiller, 115V, Sunon 95/115 Air Flow	
AMP, INPUT: 100-240VAC Image: Constraint of the second	M-SD31		
M-PCB-REG-A REGULATOR PCB ASSEMBLY,	M-PSRS7512		
	D-60A		
	M-PCB-REG-A		
M-CBR10A-M Magnetic Type Circuit Breaker Rocker Switch, 10 Amp. Horizontal Mount. Typically Used in Cooler as AUX breaker	M-CBR10A-M	Rocker Switch, 10 Amp. Horizontal Mount. Typically Used	

M-CB15A-M	Magnetic Type Circuit Breaker, 15 Amp., Typically Used in Cooler as Main breaker	
PROBE		
TC-SP-K	Thermocouple Plug, Mini, Type K, Male	
TC-LJ-KA	TC, CONNECTOR ASSY, TYP.K, F, CORD 7.200 7.20 Includes: Female Type K Thermocouple Plug Assembly, Cord-mount, with cover, screws and bushing.	
TC-LPS-KA	TC, CONNECTOR ASSY, TYP.K, M, CORD 5.500 5.50 Includes: Male Type K Thermocouple Plug Assembly, Cord-mount, with cover, screws and bushing.	
TC-MJ-KA	TC CONN. ASSY. MINI, TYP K, CORD, F 5.500 5.50 Mini-Thermocouple Assembly, Type K, Female, Cord Mount, includes Plug, Cover, Screws and Bushing	
TC-SP-KA	TC CONN. ASSY. MINI, TYP K, CORD, M 5.500 5.50 Mini-Thermocouple Assembly, Type K, Male, Cord Mount, includes Plug, Cover, Screws and Bushing	

WK-125CI	Replacement Thermocouple with Magnesium Oxide Insulation, Type K, 1/8" Dia, per ft	-
MPT-6-133H	Modular Pitot Tip, 'S' type	
HGH-4T463W	Replacement Probe Heater, 4-ft, 463 watt	
HGH-5T1650W	Replacement Probe Heater, 5-ft, 1650 watt	
HGH-STRI72	Replacement Probe Heater, 6-ft, 2000 watt	
HGH-2T144W	Replacement Probe Heater, 2-ft, 575 watt. (used on all probes, exit end of probe)	
HGH-9T838W	Replacement Probe Heater, 9-ft, 838W	

HGH-12T1000W	Replacement Probe Heater, 12-ft, 1000W	
HGP-STA	Small Trap (6mm) Adapter for Mercury Probes. Includes 10MTUR6M-S (with 10mm Nut and ferrule) and Three 1/4" Ceramic Ferrules	

CONSUMABLES CONSOLE

DIF-N70	FILTER , INLINE, DISPOSABLE, NYLON Disposable In-Line Filter, Nylon Housing with 1/4" tube stubs, 95%+ efficiency for 0.1 micron.	
COOLER		
GSB-1000SC	SAMPLE BOTTLE, CLEAR GLASS,GL-45 THREADED, 1000mL Safety Coated, for Condensate Collection	
GSB-400SC	SAMPLE BOTTLE, CLEAR GLASS,GL-45 THREADED, 500mL Safety Coated, for Condensate Collection, used in 16U shock mount rack chiller	

BOTTLE, SAMPLE, CLEAR GLASS, GL-45 THREAD, 250mL with Safety Coat Sample Bottle, 250mL, used in SC-40 condensate collection ice bath	
Seal for 1000 ml bottle	0
Cap for sample bottles – fits 1000mL, 500mL, 250mL bottles	
ACTIVATED ALUMINA DESSICANT, highly efficient adsorbent with high porosity and contact surface. 1/8" diameter beads, 2.5Kg (5.5 LB) container with 80% active alumina (>/= 92%) and 20% silica gel.	
DESSICANT AIR DRYER WITH INDICATOR, disposable drying canister	
QC, STIRLING GAS CONDITIONER, MALE, STRAIGHT CONNECTOR, ¹ /4" OD PTF, 1/8"ODX.170"ID (used on Drierite Cartridge outlet/top) – Threaded Male	
QC, STIRLING GAS CONDITIONER, FEMALE, FERRULLESS POLYTUBE FITTING, PTF (used on jumper from Stirling Cooler to sampling console) – Tube-Mount Female	
	GLASS, GL-45 THREAD, 250mL with Safety Coat Sample Bottle, 250mL, used in SC-40 condensate collection ice bath Seal for 1000 ml bottle Cap for sample bottles – fits 1000mL, 500mL, 250mL bottles ACTIVATED ALUMINA DESSICANT, highly efficient adsorbent with high porosity and contact surface. 1/8" diameter beads, 2.5Kg (5.5 LB) container with 80% active alumina (>/= 92%) and 20% silica gel. DESSICANT AIR DRYER WITH INDICATOR, disposable drying canister QC, STIRLING GAS CONDITIONER, MALE, STRAIGHT CONNECTOR, ¼" OD PTF, 1/8"ODX.170"ID (used on Drierite Cartridge outlet/top) – Threaded Male QC, STIRLING GAS CONDITIONER, FEMALE, FERRULLESS POLYTUBE FITTING, PTF (used on jumper from Stirling Cooler to sampling

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

QC-SGC-F3	QC, STIRLING GAS CONDITIONER, COUPLING BODY, 1/4"OD, FEMALE, 1.73" (on Stirling, sample-in connection) – Threaded Female	
QC-SGC-M2	QC, STIRLING GAS CONDITIONER, STRAIGHT CONNECTOR, FERRULESS POLYTUBE FITTING, PTF, 1/4"ODX.170"ID (Heated U-Cord Sample Line to Stirling, high-SO2 connector) – Tube-Mount Male	
HGU-10DJ	TUBING, PFA, 5/32ID X 1/4OD X .047 WALL (jumper from Stirling Cooler to sampling console), replace 10DJ with desired length (standard is 10ft.)	
PROBE		
9531K22	CAP, VINYL PROTECTIVE, used for capping sorbent traps during pre- and post-leak testing	
10MMNU-S- EXT	PARTICULATE SHIELD FOR 10MM SORBENT TRAP Stainless Steel Tube, 3/4" o.d. x 1.25" L with 10mm nut, welded	
10MMNU-C- EXT	PARTICULATE SHIELD FOR 10MM SORBENT TRAP,C276 Hastelloy C276 Tube, 3/4" o.d. x 1.25" L with 10mm nut, welded	

10MMNU-S	NUT, 10MM TUBE, Stainless Steel	
10MMBLP-S	PLUG, 10mm TU, SS – thread-on plug for end of probe, protects probe when not sampling	
SR-2.625	Neoprene square ring, 2" ID x 2 5/8" OD x 3/16" tk, for cam-lock connectors	
10M-F-TG	FERRULE, 10MM, Single, Glass filled Teflon	
4NU-S	NUT, 1/4 TUBE, Stainless Steel	

Appendix 2

Upgrading Firmware

From time to time, Apex Instruments may release updated device firmware for the XC-30B console. These firmware upgrades may add additional functionality or capabilities to the console, and may be required in order to use the latest version of the monitor / control client software. If the XC-30B software displays a message regarding your firmware revision number, please contact Apex Instruments to get more information.

Current software and firmware versions may be obtained from Apex Instruments.

The XC-30B firmware may be programmed using a PC and the Apex Firmware Programming Cable. PLEASE NOTE: The drivers for the programming cable and the version of the XC-30B firmware most current at the time of shipment are installed along with the Apex software. Please install the Apex XC-30B software before attempting to upgrade the firmware.

The Apex Firmware Programming Cable uses a USB Serial Converter similar to the one in the main console. When connecting the Firmware Programming Cable to the PC for the first time, the Found New Hardware Wizard may appear.

The programming cable is shipped with new consoles inside the XC-30B console.



Programming Cable

The programming cable has a 6-pin Molex connector and a 4-pin USB A connector. Please use the same steps as for connecting the XC-30B to the PC via USB. The programming cables use the same USB converter as the XC-30B so no additional drivers are necessary. The COM port installed may not be the same as the XC-30B virtual COM port, consult the Device Manager and note the COM number of the new serial port installed by the Apex Firmware Programming Cable.

Important Notes About Upgrading Firmware:

The older versions of the XC-30B firmware lack several important new features of the current consoles. These include the ability to set alarms based on test conditions, the optional ability to sample at flow rates above 1Lpm, and the provision for communication with the optional ModBus module. In addition, the calibration tables for the older versions may not be immediately compatible with the newer versions, and some conversion must be performed.

AUTOMATED MERCURY SOURCE SAMPLER

Before upgrading your XC-30B firmware, please connect the console to your current software and make a note of the application and firmware version.

This can be found on the Config/Utils screen in the lower left corner.

Console Audit	Comm. Check Reset XC6000 Clear Current Run heck Data File	<u>USB / COM</u>	Ports	Units and Formats Metric Hybrid 24Hr Clock dd-mm-yy Protected password
Console Audit	XC6000 Clear Current Run heck Data File			 Hybrid 24Hr Clock dd-mm-yy Protected
Audit	Current Run heck Data File			D dd-mm-yy Protected
Enable Profile Name /	File			
Trap Probe	Auto Numbering			
				Monitor Screen
				Calibrations
		Currently Connect USB: COM		
1100.010				
	and the second second			Help
<u>Versions</u> Software: 0320	DSP: E			Close

Make a note of these version numbers. The new software CD will list the version included.

Once connected, enter the Config / Utilities screen and then the Calibration screen. Enter the word "enable" (no quotes all lowercase) into the protected password space on the Calibration screen. Press the "Save to File" button. Choose a location for your saved table, and give it a unique name.

IMPORTANT NOTE: Always save the XC-30B calibration table to a file before upgrading the console firmware.

AUTOMATED MERCURY SOURCE SAMPLER

	Calibration: Apex Demo - 020	0		
Thermocouple		Vacuum	*Protected	- Password
	iller Aux DGM A B Trap Console 188 176 178 174 164 179	CurrentCH ACH BValue15251461 (xx.xx)	Password:	
0 °F 46 40	60 46 45 42 39 46	Lo 2 1535 0 2 1473 0 inHg		
30 °F 100 94 1	14 100 99 97 93 100	Hi > 6110 22.1 > 6027 22.18 inHg	DAC Board ID	
60 °F 156 150 1	70 157 156 153 149 156	Mass Flow	536F-6D65-	
100 °F 232 225 2	46 233 232 228 225 231	Current CH A CH B	7468-696E	Calibration
300 °F 618 609 6	30 621 618 612 611 616	Value > <u>1663</u> <u>1686</u> (xxx)	Monitor Scr.	
500 °F 995 983 10	06 999 995 987 988 990	0 > 1677 0 > 1684 0 sccm		Screen 2
700 °F 1385 1370 13	94 1391 1385 1375 1378 1378	200 2976 261 3324 261		
1000 °F 1982 1963 19	88 1990 1982 1969 1974 1971	400 > 3600 433 > 4016 429		
1300 °F 2577 2554 25	81 2588 2576 2561 2569 2563	600 > 4205 666 > 4696 662		
1600 °F 3155 3128 31	56 3168 3153 3135 3146 3137	800 > 4463 776 > 4917 770		
2000 °F 3888 3856 38	85 3903 3886 3864 3878 3865	1000 > 4765 924 > 5163 896		
Click on button to set	Value to the current reading for that	1100 5104 1106 5515 1107	Print Screen	
Serial Numbers	Pumps Propor. Valves	1300 > 5416 1363 > 5771 1302	Save To File	
Console XC6KEPC-020	CHA + CHB + CHA + CHB +	1500 > 5710 1503 > 5992 1503	Restore_TCs_Only	
DGM-A 8002530		1700 > 5972 1701 > 6212 1701	Restore From	
DGM-B 8002507		1900 6190 1901 6431 1910	Save	Save To File
DGM Gamma		A Valve Close B Valve Close	Exit / RESET	Restore from File
DGM-A 1			Reset Console on Exit	Restore from the
DGM-В 1	0 - 0 - 20 - 20 -	Apex Demo - 020		
	Propor. Vals. Adj> 💿 Coarse 🔿 Fine			
OGM Gamma	Calibratio	n Screen		

Programming the XC-30B Firmware

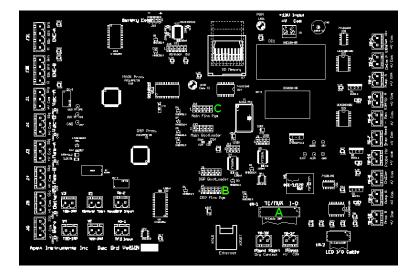
1. Ensure XC-30B console is powered off. Disconnect any connecting cables from the console, and remove the console from its rack enclosure. Remove the screws from the top of the unit and the on the outside left and right edges of the rear panel, and open the lid of the console by pulling the top/back cover towards the rear. The cover is mounted on a hinge at the back bottom of the console

Programming the DSP Processor – SKIP THIS STEP IF DSP IS ALREADY AT THE **CURRENT VERSION!**

2. Remove the 20-pin ribbon cable coming from the XC-30B TC/MUX board. Reference: Figure DAC-1 below, item A.

Calibration Screen

3. Connect the 6-pin Molex connector on the end of the programming cable to the DAC board header labeled DSP Firm Pgm Reference: Figure DAC-1 below, item B.



- 4. Power on XC-30B console
- 5. Navigate to the install location *default: C:\Apex\Firmware*
- 6. Execute **dl.exe**
- 7. The Tiny Bootloader window will launch

NC Tiny Bootlo	ader	
	▼	<u>B</u> rowse
Comm 115200 - COM1 -	Log Options Terminal Code sent by PC for activation: C1h Reset List of codes (eg: 128–80h) to send first:	
<u>₩</u> rite Flash	Reset PIC using RTS line 🔲 and RTS remains ac	tive
CheckPIC	SearchDelay: 5 🗲 Timeout(ms): 300 🗲	fter Write

DL.EXE - Tiny Bootloader

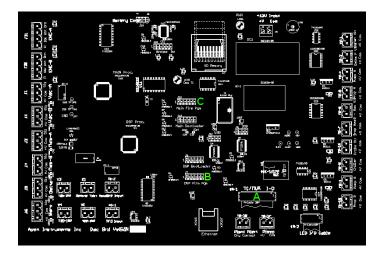
- 8. Click Browse and select ApexDSP_XX.hex (XX is the version) from the current directory
- 9. Select the following options:
 - Comm: 115200
 - Comm (use the COM number noted earlier)
 - Enable Options -> Reset PIC using RTS line
- 10. Click Write Flash
- 11. When update is complete, Log window will read **Write OK.** The writing process should take between 3 and 6 seconds. If you receive an "**Error**" power off the console then back on again then press the write button.
- 12. Power off XC-30B console and remove 6-pin Molex connector on the end of the programming cable from the DAC board.

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

Programming the Main Processor

13. Connect the 6-pin Molex connector on the end of the programming cable to DAC board header labeled **Main Firm Pgm**

Reference: Figure DAC-1 below, item C.



- 14. If the Tiny Bootloader is already open skip to step 17. Navigate to the install location *default: C:\Apex\Firmware*
- 15. Execute dl.exe
- 16. The Tiny Bootloader window will launch

PIC Tiny Bootk	pader _ 🗌 🗙
	<u>B</u> rowse
Comm	Log Options Terminal Code sent by PC for activation: C1h
COM1 Write Flash	Reset List of codes (eg: 128–80h) to send first: ✓ Reset PIC using RTS line and RTS remains active
CheckPIC	SearchDelay: 5 🔹 Timeout(ms): 300 🚖

DL.EXE - Tiny Bootloader

- 17. Click Browse and select ApexMAIN_XX.hex (XX is the version) from the current directory
- 18. Select the following options: (same as for DSP Processor)
 - Comm: 115200
 - Comm (use the COM number noted earlier)
 - Enable Options -> Reset PIC using RTS line
- 19. Power on XC-30B console
- 20. Click Write Flash

Apex Instruments, Inc. | Phone: 919.557.7300 | Fax: 919.557.7110 | Web: www.apexinst.com | e-mail: info@apexinst.com

AUTOMATED MERCURY SOURCE SAMPLER

- 21. When update is complete, Log window will read **Write OK.** The writing process should take between 45 and 60 seconds. If you receive an "**Error**" power off the console then back on again then press the write button.
- 22. Power off XC-30B console and remove 6-pin Molex connector on the end of the programming cable from the DAC board.
- 23. Replace the 20-pin ribbon cable from the TC/MUX board (item A above)
- 24. Power on the XC-30B console and connect using the XC-30B MercSampler application. The version number of the console should appear in the upper right of the application window once connected. Ensure that the version number that the console reports matches the version number of the supplied firmware update.

After a successful upgrade:

Once the console has been upgraded, the calibration table will need to be converted to the new format. Connect to the console and enter the Config / Utilities screen. Press the "Set Clock" button to ensure that the XC-30B has the correct time and date set. Close the Config / Utilities screen and observe the date and time on the Main screen to make sure the time and date are correct and that the time is advancing. Then re-enter the Config / Utilities screen and go to the Calibration screen.

Enter "enable" (no quotes) in the password field and press the "Save" button. Once the table is saved, press "Save to File" and save a copy of the new table with a new filename. Press the Exit / Reset button to reset the console and apply the new calibration factors.

Older test profiles may cause errors when used with newer firmware. To avoid this, create new profiles for performing sample runs. If an older profile must be used, please step through the profile one screen at a time (press the "Next" button) and save the profile with a new filename. The profile should be automatically converted to the newest version.