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Star Chromatography Workstation
Version 6

Data Acquisition with LC Control

Operation Manual

QUALITY SYSTEM
ISO 9001
CERTIFIED

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Getting Started

About this Manual

This manual describes the operation of the Star Chromatography Workstation with Varian HPLC modules. It covers configuring an instrument for data acquisition, building a method, and running samples. For post-run data handling, peak integration, and standard report generation, please refer to the Data Handling and Reports Operation Manual.

Additional Manuals

Other sources of information are available to help you get the most from this product.

Data Handling and Reports Operation Manual

This manual describes post-run and interactive data handling, standard report generation and advanced application.

Data Handling and Reports Tutorial Manual

The tutorials provide a practical way to quickly learn how to perform basic tasks using the Star Chromatography Software. These Tutorials cover Star Workstation operation that is common to all instrument configurations.

PolyView2000™ Operation Manual (Optional)

This manual describes the PolyView2000™ spectral processing software, used to display and analyze LC-UV diode array data.

Star Toolbar

Star Chromatography Workstation is a suite of applications for controlling chromatographs, collecting data from chromatograph detectors, and analyzing that data. The Star Toolbar provides quick and easy access to the Star Chromatography Workstation applications. When activated the Star Toolbar behaves very much like the Windows Taskbar. It can be docked on any of the four sides of the display screen and other Windows programs will not cover or go behind it when they are opened in full screen mode.

If the Star Toolbar is not already opened on your Star Workstation, you can start it from the Windows Start Menu.
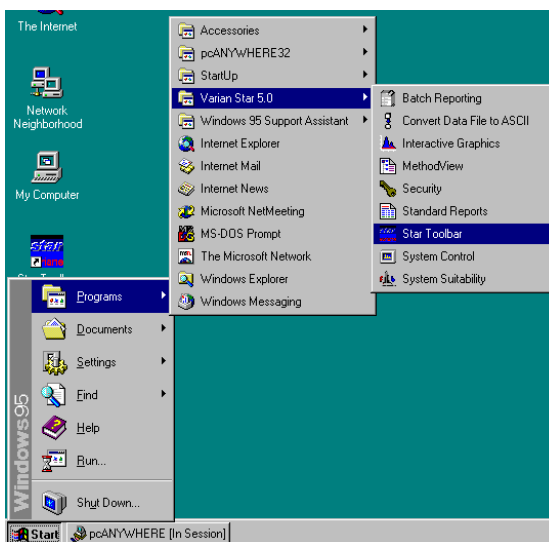
Elements of the Star Toolbar

Application Buttons for immediate access to the selected application.

ToolTip shows the application name when the cursor rests on the Application Button.

Quick Link Buttons provide menu selections of operations to be performed on the listed file.

Application Descriptions give a brief description of the application that will be opened when the cursor rests on the Application Button.

Application Buttons

Used to monitor instrument status, perform automated injections, and perform batch recalculations.

Used to view and edit instrument operation, data acquisition, and data handling methods.

Used to review chromatograms, interactively edit data handling parameters, and recalculate results.

Used to preview standard chromatogram and results reports.
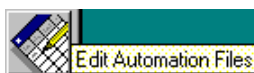
Used for offline editing of SampleLists, RecalcLists and Sequences.

Used to generate standard reports for a group of Data Files by dragging and dropping them on the Batch Report Window.

Used to set Star Workstation security options and passwords.

Other application buttons may be added to the Star Toolbar when you install additional Star Workstation Options, such as StarFinder, Star Custom Report Writer, and PolyView2000.

Quick Link Buttons

...default sample ▶

| View/Edit Chromatogram |
| View Standard Report |
| View Results Only |
| Print Standard Report |
| View Fraction Log |
| Convert Raw Data and Results to ASCII |
| Convert Raw Data and Results to AIA Format |
| AIA Import/Export |
| Produce System Suitability Report |
| View Custom Report |
| Print Custom Report |
| Pick a different Data File ▶ |

Most Recently Used Data File

Menu of operations that can be performed on the Most Recently Used Data File.

c:\star 5.5\data\default sample.run
C:\Star 5.5\Examples\Analys1.run
C:\Star 5.5\Data\overlay c016.run
C:\Star 5.5\Examples\Analys2.run
A:\test c016.run
C:\Star 5.5\Examples\paradc4.run
C:\Star 5.5\Examples\paradc3.run
C:\Star 5.5\Examples\paradc2.run

List of Most Recently Used Files

---

paradc.mth ▶

| View/Edit Method |
| Print Method |
| Pick a different Method ▶ |

C:\Star 5.5\Examples\paradc.mth

Most Recently Used Method

Menu of operations that can be performed on the Most Recently Used Method.

List of the Most Recently Used Methods

Star Toolbar Options

Right-click for options

| Move to Windows Task Bar |
| Show/Hide Applications on Toolbar... |
| Enable/Disable Instrument Modules... |
| ✔ Application Descriptions |
| Small Buttons on Toolbar |
| Run Application... ▶ |
| Help on... ▶ |
| Pick Data File for Quick Link Button ▶ |
| Pick Method for Quick Link Button ▶ |
| Help on Star Toolbar |
| Product Support Web Site |
| About Star Toolbar |
| Quit |

Menu of Star ToolBar configuration options and operations that may be performed.

Starting System Control the First Time

The first time that you use the Star Chromatography Workstation to control your instrument, collect chromatographic data and generate results, you must configure the communications and modules in the System Control application. The System Control Configuration Window allows you to set the communication parameters for each of your chromatograph modules and to drag the various modules into Star Workstation instrument areas to match the physical plumbing arrangement of your modules. Once the instruments are configured in System Control, the configuration is stored and you only need to reconfigure System Control when you change the physical hardware configuration of your chromatograph modules.

The Star HPLC Data Acquisition Workstation supports the Varian Star HPLC modules listed in the table below.

HPLC Module	Communication	Attributes
9001 pump	GPIB	Fully controllable from the Star LC Workstation, 0-5 mL/min, isocratic operation, 6 relays. Synchronization signals available*.
9002 pump	GPIB	Fully controllable from the Star LC Workstation, 0-10 mL/min, isocratic operation, 6 relays. Synchronization signals available*.
ProStar 220 SDM	GPIB	Fully controllable from the Star LC Workstation, 0-10 mL/min, isocratic operation, 6 relays. Synchronization signals available*.
9010 pump	GPIB	Fully controllable from the Star LC Workstation, 0-5 mL/min, ternary gradient operation, 6 relays. Synchronization signals available*.
9012 pump	GPIB	Fully controllable from the Star LC Workstation, 0-10 mL/min, ternary gradient operation, 6 relays. Synchronization signals available*.
ProStar 230 SDM	GPIB	Fully controllable from the Star LC Workstation, 0-10 mL/min, ternary gradient operation, 6 relays. Synchronization signals available*.
ProStar 230 Inert SDM	GPIB	Same as ProStar 230 except with titanium pump head and inert solvent path.
ProStar 240 SDM	GPIB	Fully controllable from the Star LC Workstation, 0-10 mL/min, quaternary gradient operation, 6 relays. Synchronization signals available*.

HPLC Module	Communication	Attributes
ProStar 240 Inert SDM	GPIB	Same as ProStar 240 except with titanium pump head and inert solvent path.
9050 UV-Vis single wavelength detector	GPIB	Fully controllable from the Star LC Workstation, single wavelength, single data channel detector, wavelength may be between 190 and 700 nm programmable during run, 5 time programmable relays, 1 relay driven by internal peak sensing software. Synchronization signals available*.
ProStar 310 UV-Vis single wavelength detector	GPIB	Fully controllable from the Star LC Workstation, single wavelength, single data channel detector, wavelength may be between 190 and 700 nm programmable during run, 5 time programmable relays, 1 relay driven by internal peak sensing software. Synchronization signals available*.
ProStar 325 UV-Vis detector	Ethernet	Fully controllable from the Star LC Workstation, single or dual channel detector, wavelength may be between 190 and 900 nm programmable during run, 4 time programmable relays, and 1 peak sensing relay. Synchronization signals available*.
9065 Polychrom® Detector	GPIB	Fully controllable from the Star LC Workstation, multiwavelength, 38 simultaneous channel detector between 190 and 360 nm. Synchronization signals available*.
ProStar 330 PDA	Dedicated GPIB (must use dedicated GPIB card in the PC). Start-In signal required from synchronization port.	Fully controllable from the Star LC Workstation, multiwavelength, up to 269 channels configurable between 190 and 800 nm. Synchronization signals available.
ProStar 335 PDA detector	Ethernet	Fully controllable from the Star LC Workstation, single or dual array, can monitor all wavelengths simultaneously from 190 and 950 nm, 4 time programmable relays, and 1 peak sensing relay. Synchronization signals available*.
ADC Board	Internal ISA/EISA slot	Must be controlled by the Star Workstation, 2 channel analog-to-digital signal converter for acquiring signals from detectors that do not communicate directly with the Varian Star Workstation. Synchronization signals available*.

HPLC Module	Communication	Attributes
ProStar/Dynamax System	Serial RS 422/485	Fully Controllable from the Star LC Workstation, up to four pumps may be configured to each instrument with flow rates between 0.01 mL/min to 200 mL/min depending on the pump heads installed on the pumps. The pumps that can be controlled by this system include the ProStar 210, ProStar 215, ProStar 218, SD-200, SD-300, SD-1, HPX and HPXL. ProStar 701 Fraction Collectors (FC-1) and Standalone CIM can also be controlled by this system. A single CIM data acquisition unit is allowed for each COMM port.
9100 AutoSampler	GPIB	Fully controllable by the Star LC Workstation control divided into a Configuration section in the Workstation's method and individual sample driven parameters in the SampleList. Synchronization signals available*.
9200 Sample Prep	Serial RS 232	Fully controllable by the Star LC Workstation, sample preparation/automated solid phase extraction device.
9300 AutoSampler	Serial RS 232	Controllable by the Star LC Workstation when the 9300 is correctly configured and set to run in its serial mode (F4). Control is divided between the Workstation's method and individual sample driven parameters in the SampleList.
ProStar 400, 410, 420 and 430 AutoSamplers	Serial RS 422/485	Controllable by the Star LC Workstation when the AutoSampler is correctly configured and set to run in its serial mode (refer to the operation manuals for selecting the Serial Mode from the front panel of each AutoSampler). Control is divided between the Workstation's method and individual sample driven parameters in the SampleList.
AI-200 AutoSampler	Serial RS 422/485	Controllable by the Star LC Workstation when the AI-200 is correctly configured and set to run in its serial mode (serial selection from the front panel). Control is divided between the Workstation's method and individual sample driven parameters in the SampleList.
ProStar 363 Fluorescence detector	Serial RS 422/485	Fully controllable from the Star LC Workstation when the detector is correctly configured, wavelength range between 200 and 730 nm. Time programmable excitation and emission

HPLC Module	Communication	Attributes
		wavelength changes.
ProStar 500 CVM	Serial RS 422/485	Fully controllable from the Star LC Workstation. Can Control up to two column Heaters, and Time Programmable to control up to four Valves.
ProStar 510 (Mistral) Column Oven	Serial	Controllable by the Star LC Workstation when the ProStar 510 is correctly configured.
ProStar 520 Column Oven	Ethernet	Controllable by the Star LC Workstation when the PS-520 is correctly configured. Oven temperature can be calibrated to 0.1C on site. Time programmable temperature control.
Star 800 MIB	Ethernet	Controllable by the Star Workstation. Provides up to 4 channels of analog-to-digital signal conversion (ADC) for acquiring signals from detectors that are not directly controlled by the Star Workstation.
*Synchronization signals are implemented as true-low contact closures. Consult individual module manuals for specifics of these signals operation.		

Configuring GPIB Devices

There are two types of GPIB devices supported by the Star Workstation; the pumps, 9065, and UV-Vis GPIB detectors represent one type while the ProStar 330 PDA is the other type of GPIB device.

Note: **Please refer to the PCI-GPIB Board Installation Instructions for information regarding the PCI-GPIB configuration.**

The older 9001, 9002, 9010, 9012, 9050, 9065, 9100 HPLC modules; the new ProStar 220, 230, 230 inert, 240, 240 inert, Solvent Delivery Modules and the ProStar 310 UV-Vis detector that communicate using the GPIB protocol require only that each module is assigned a unique address between 1 and 15, the module's power be turned on, and the appropriate cables installed between the Star HPLC Workstation and the modules. You will be prompted to identify what modules you have installed.

Select Module Name ✕

System Control needs to know the correct name of the Module
currently connecting at Module Address 01 so that it can use the
correct Module Driver. Please select the correct name, and press
'OK'. System Control will remember your selection for this Module
Address and use it each time that the Module connects.

ProStar 230 Inert SDM
ProStar 230 SDM
ProStar 240 Inert SDM
ProStar 240 SDM
Star 9012 SDS

OK

Select Module Name ✕

System Control needs to know the correct name of the Module
currently connecting at Module Address 01 so that it can use the
correct Module Driver. Please select the correct name, and press
'OK'. System Control will remember your selection for this Module
Address and use it each time that the Module connects.

ProStar 310 UV-Vis
Star 9050 UV-Vis

OK

The icons for each connected module will be displayed automatically
in the Available Modules section of the Configuration Window.
Configuring the modules into instruments will be covered later in this
chapter.

The PS-330 PDA requires a dedicated GPIB card. If you are using a PS-330 with one or more of the GPIB devices listed above, you will need to verify that you have both of the required GPIB cards installed in your Star Workstation's host PC. You may not have more than one PS-330 PDA installed with each Star Workstation. The PS-330 PDA must be set to the GPIB address 9 on the rear panel of the detector (Please refer to your *ProStar 330 Manual* for how to set the PS-330 GPIB address). The PS-330 PDA icon will be displayed at bus address 71 on your Star Workstation. The GPIB address 9 set on the detector will not conflict with other GPIB devices described above which may also be set to 9.

Configuring the Star 800 MIB

Please refer to the ***Ethernet Communication Setup***, and to ***Using the Star 800 MIB*** sections of this manual for information on the installation and configuration aspects of the Star 800 Module Interface Box.

Configuring ADC Boards

Start by running System Control.
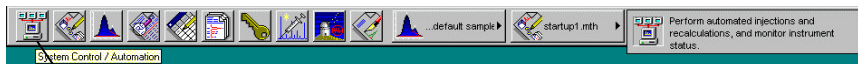
Click on the System Control / Automation button on the Star Toolbar to start System Control.

When System Control is started the first time, the Star Assistant Communication Configuration Wizard will appear to guide you through the setting of ADC Board I/O port addresses and serial devices if you have them.

Read the description presented in the Star Assistant window and click on the Next button to advance to the next step. The first time the Star Assistant guides you through the setup of your ADC Board I/O addresses, you will get the following message:

System Control dialog:

No valid ADC_Board_Base_Address in STAR32.INI, so System Control will search for installed ADC Boards at all valid Base Addresses!

OK   Cancel

Click on the OK button to let the System Control application search for any installed ADC Boards.

When System Control finishes searching for installed ADC Boards, you will see this screen.

Setup ADC Board I/O Ports

ADC Board Bus Address	ADC Board I/O Address	ADC Board Switch S1 Settings 1 2 3 4 5 6 7 8	I/O Port Status
16	280		ADC Board
18	284		ADC Board
20	288		Vacant
22	28c		Vacant

☑ Show Rocker Style (dark area shows depressed half of each switch)

☑ Prompt for Setup if needed   < Back   Next >   Cancel

Star Workstation Module number for the ADC Board at the specified I/O Address.

System Control finds all installed ADC Boards and indicates their addresses. 280 is the recommended base address.

Select the style that matches the S1 switch on your ADC Board.
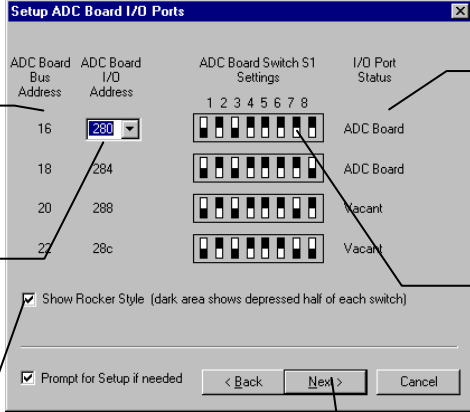
Shows which ADC Boards have been detected, if any.

ADC Board S1 switch settings for the specified I/O address. If an ADC Board was found, these settings will match the switch on the ADC Board. If the ADC Board was not found or is not installed, the S1 switch settings on the ADC Board should be set to match these.

Click on Next to continue with the Star Assistant.

Preparing and Configuring Serial Devices

Preparing the ProStar/Dynamax System: Includes the ProStar 210/215/218 and SD-200/300/SD-1 Pumps

After connecting the appropriate cable(s) to the back of each pump, you will need to turn on the power to each pump and enter its setup by pressing the Setup key on the ProStar 210/215/218 pumps or by pressing ~ on the Dynamax SD-200/300/ SD-1 pumps. Once in Setup you will be able to set the ID and CIM identifier. The Star Workstation constrains what values can be entered as identifiers. Up to four ProStar 210/215/218 and/or Dynamax SD-200/300/ SD-1 pumps may be combined to create gradient systems. In order for these pumps to be recognized by the Star Workstation as a gradient system, they must be assigned consecutive device identifiers. System Control will then use these identifiers to combine the pumps into a single entity that can be used for a wide range of gradient applications. In the table below, the numbers 24, 25, 26, …, 37, 38, and 39 are the effective addresses that the Star Workstation assigns. Each address may contain between one and four ProStar 210/215/218 and/or Dynamax SD-200/300/ SD-1 pumps.

For ProStar/Dynamax System modules, the address numbers are assigned as follows:

	COM1	COM2	COM3	COM4
A:	24	28	32	36
B:	25	29	33	37
C:	26	30	34	38
D:	27	31	35	39

The Star Workstation groups the consecutively numbered pump identifiers into each address according to the tables below.

The following table shows the IDs allocated to ProStar/Dynamax System connected to COM1 (Note that the identifiers for Pump, CIM, and Fraction Collector are set locally from the front panel and are not set from the Star Workstation):

Module Number	Pump	CIM	PS-701
A: ProStar/Dynamax.24	1-4	5-8	9-12
B: ProStar/Dynamax.25	17-20	21-24	25-28
C: ProStar/Dynamax.26	33-36	37-40	41-44
D: ProStar/Dynamax.27	49-52	53-56	57-60

IDs for COM2 - COM4 repeat the same pattern. If your ProStar/Dynamax System is attached to one of these ports, the following table lists the IDs associated with each port.

Module Number	Pump	CIM	PS-701
COM2:			
A: ProStar/Dynamax.28	1-4	5-8	9-12
B: ProStar/Dynamax.29	17-20	21-24	25-28
C: ProStar/Dynamax.30	33-36	37-40	41-44
D: ProStar/Dynamax.31	49-52	53-56	57-60
COM3:			
A: ProStar/Dynamax.32	1-4	5-8	9-12
B: ProStar/Dynamax.33	17-20	21-24	25-28
C: ProStar/Dynamax.34	33-36	37-40	41-44
D: ProStar/Dynamax.35	49-52	53-56	57-60
COM4			
A: ProStar/Dynamax.36	1-4	5-8	9-12
B: ProStar/Dynamax.37	17-20	21-24	25-28
C: ProStar/Dynamax.38	33-36	37-40	41-44
D: ProStar/Dynamax.39	49-52	53-56	57-60

HP/HPX Pumps: Use only 1-4 ID at "A" position of the COM Ports.

HPXL Pumps: Use 0-63 at any COM port, CIM ID is same as pump.

Standalone CIM: Use only 5-8 ID at "A" position of the COM ports.

Note: **For information on the Star Workstation control of the ProStar 420 and ProStar 430 AutoSamplers and the ProStar 701 Fraction Collector, see the corresponding section in this manual.**

Preparing the ProStar 400 and 9300 AutoSampler

After connecting the appropriate cables, for each PS-400 or 9300, press the "F" key, then the "4" key on the AutoSampler's front panel keypad. The display should read:

```
SERIAL MODE
PRESS F0 TO EXIT
```

Note that when communicating with the Workstation, the PS-400 or 9300 should always display SERIAL MODE from its front panel. Do not exit by pressing F0 unless you want to terminate communication with the Workstation.

This indicates that the AutoSampler is ready to communicate through its Serial Port. Now press the "Prog/End" key on the front panel keypad. The display should read:

```
DEVICE IDENTIFIER : 10
```

If the device identifier is not set to 10, set it by pressing "1", then "0" on the front panel keypad. Finally, press the "Prog/End" key again to put the PS-400 or 9300 into Serial Mode.

Preparing the 9200 Prospect

After connecting the correct cable(s) to the Star HPLC Workstation, turn on the 9200. The 9200 display should be similar to:

```
PROSPEKT (4.80)
```

This indicates that the 9200 is ready to communicate through its Serial Port.

Preparing the ProStar 510 Mistral Oven

After connecting the appropriate Serial Communication Kit, plug in and turn on power to the ProStar 510 Oven. The display should show "READY", then it should show the temperature and setpoint in a display similar to:

```
25.9 C  ->  25 C
```

Press the "menu enter" key. The display should show:

```
OFF   PROG   STOP
```

Press the ">" key to move the cursor to the word PROG, then press the "^" key to change the word PROG to the word COMM. The display should now show:

```
OFF   COMM  STOP
```

Press the "Menu Enter" key to enter the ProStar 510's Serial Communications Mode. The display should now be similar to:

```
SERIAL     25.9 C
```

Press the "^" key to check the Serial ID. The display should now show:

```
SERIAL ID: 50
```

All ProStar 510s must have their Serial ID set to 50, or they will be unable to communicate with the Star Workstation. If the Serial ID is set to 50, simply press the "^" key again to return to Serial Communications Mode.

If the Serial ID is NOT set to 50, press the ">" key to move the cursor to the ID number, then press the "^" or "v" key to change the ID number to 50. When the ID number is set to 50, press the "Menu Enter" key to confirm the ID number and return the cursor to the word "Serial". Then press the "^" key to return to Serial Communications Mode. The display should now be similar to:

```
SERIAL     25.9 C
```

This indicates that the ProStar 510 is ready to communicate through its Serial Port.

Preparing the ProStar 410 and AI-200

After connecting the serial communication cable, plug in and turn on the power to all PS-410 and/or AI-200 modules. From the front panel display press the <System> key followed by the <Menu> key to enter the System Settings for the Serial communications. Press the <Serial> soft function key. Using the keypad set the Device Identifier to 60, 61, 62 or 63(each AutoSampler connected by the same cable needs to have a unique device identifier number). Press the <E> key and select <19200> as the baud rate. Press <Escape> <Escape> to return to the main screen.

Press the <Serial> soft function key to put the PS-410 or AI-200 into serial communications mode (Pressing the <Exit> soft function key will take the AutoSampler out of serial mode.)

Configuring the Communications Ports for RS 422/485 Devices

The Star Workstation supports both RS-232 devices and RS-422/485 devices. The new ProStar/Dynamax System communicates with System Control using the RS-422/485 serial communications as do the AI-200 AutoSampler, the ProStar-400 AutoSampler and the ProStar 410 AutoSampler. Multiple devices may be attached to a single RS-422/485 cable (note that only one CIM may be configured for each COMM port, however). System Control allows one RS-422/485 cable to be attached to each RS-232 communications (serial) port on the Star Workstation computer. An RS-232 to RS-422/485 Converter, part number 03-935420-01, connects the Star Workstation computer's serial port to the RS-422/485 Communications cable, part number 03-935462-01. The instructions for connecting this hardware to the Star Workstation computer are included in the RS-422/485 Communications Kit. Attach the AutoSampler and/or ProStar 210/215/218 or Dynamax SD-200/300/ SD-1 pumps to the 9-pin connectors on the flat ribbon cable. The PS-320 UV-Vis detector or Dynamax UV-1 detector is connected to the CIM on one of the ProStar 210/215/218 or Dynamax SD-200/300/ SD-1 pumps. Do not connect the PS-320 or Dynamax UV-1 detector to the RS-422/485 Communications cable.

Note: **DO NOT TURN YOUR PUMPS ON YET!**

The first time you start System Control, the Star Assistant Communication Configuration "Wizard" will start automatically to guide you through the configuration setup. Read the description presented in the Star Assistant windows and click on *Next* to advance to the next steps and to the Setup COMM Ports window.

This window can also be displayed from the Instrument menu item.
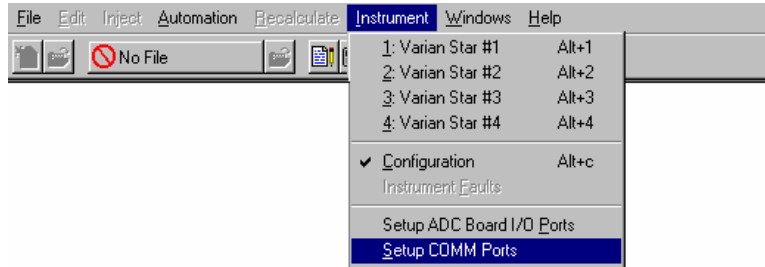
Select this for the ProStar/Dynamax System and/or RS422/485 AutoSamplers …

… then select a sub-port for each ProStar/Dynamax System connected to the COM port.
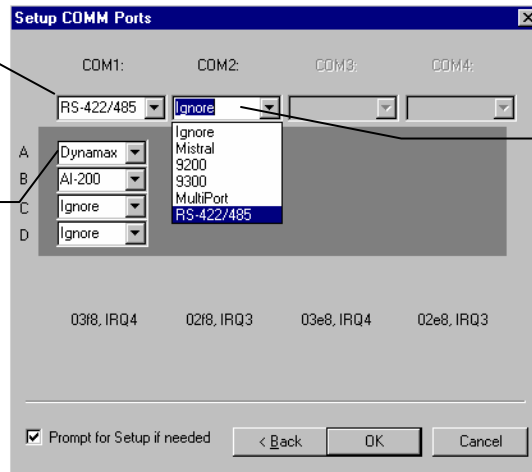
Select Ignore only if no modules are connected to the COM port.

Select "RS-422/485" in the Combo Box below each COM1, COM2, etc., that has an RS-422/485 cable attached. Depending on the load that these systems impose on the cable bandwidth, you can have up to four ProStar 210/215/218 or Dynamax SD-200/300/ SD-1 pump modules connected to each RS-422/485 cable as well as an AutoSampler. Please refer to the ProStar/Dynamax System Installation and Release Notes for a listing of acceptable ProStar/Dynamax System configurations.

For ProStar AutoSamplers and other serial modules connected via RS-422/485, the address numbers are assigned as follows according to their device identifiers:

	Device Identifier	COM1	Module Address	COM2	Module Address
400 AutoSampler					
	10	A	24	A	28
	11	B	25	B	29
	12	C	26	C	30
	13	D	27	D	31
420 (AI-1A) & 430 (AI-96) AutoSamplers					
	20	A	24	A	28
	21	B	25	B	29
	22	C	26	C	30
	23	D	27	D	31
410 (AI-200) AutoSampler					
	60	A	24	A	28
	61	B	25	B	29
	62	C	26	C	30
	63	D	27	D	31
363 Fluorescence Detector					
	90 (0)	A	24	A	28
	91 (1)	B	25	B	29
	92 (2)	C	26	C	30
	93 (3)	D	27	D	31
500 CVM (Column Valve Module)					
	13	A	24	A	28
	14	B	25	B	29
	15	C	26	C	30
	16	D	27	D	31

IDs for COM3 and COM4 repeat the same pattern.

When you press the OK button to close the Dialog Box, each device will connect and be represented by an icon in the Available Modules area of the Configuration Window.

Configuring RS-232 Communications

When all serial devices are connected, turned on, and properly prepared, start System Control. The first time you start System Control, the Star Assistant Communication Configuration "Wizard" will start automatically to guide you through the configuration setup.

Read the description presented in the Star Assistant windows and click on *Next* to advance to the next steps and to the Setup COMM Ports window. (This window can also be displayed from the Instrument menu item.)
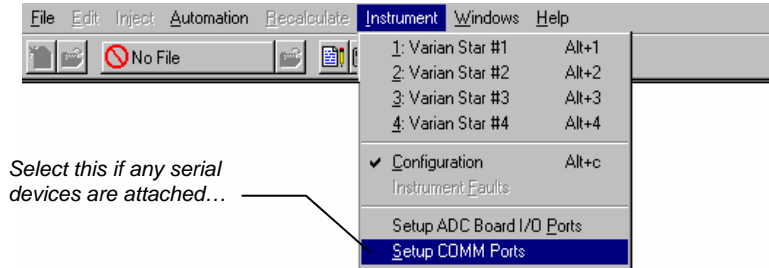
Select this if any serial devices are attached…

Select the device connected directly to the Com port.

Each COMM port that is installed will have an active Combo Box below its label. Uninstalled COMM ports will have a disabled Combo Box. Use the Combo Box to specify the device connected to the corresponding COMM port.

Setup COMM Ports ✕

COM1: COM2: COM3: COM4:

RS-422/485 ▼ MultiPort ▼ ▼ ▼

A AI-200 ▼ Mistral ▼
B AI-200 ▼ 9300 ▼
C Ignore ▼ 9200 ▼
D Ignore ▼ Ignore ▼

Ignore
Mistral
9200
9300

03f8, IRQ4 02f8, IRQ3 03e8, IRQ4 02e8, IRQ3

☑ Prompt for Setup if needed   < Back   OK   Cancel

Select this if modules are connected to a Smart Switch multi-port box…

…then assign each module to the sub-port to which it is attached on the Smart Switch box.

Select Ignore if no modules are connected directly to the Com port.

Windows assigned I/O address and IRQ for each Com port.

When you press the OK button to close the Dialog Box, each device will connect and be represented by an icon in the Available Modules area of the Configuration Window.
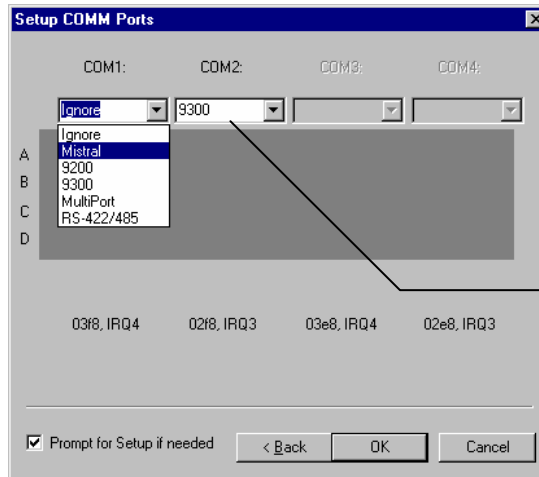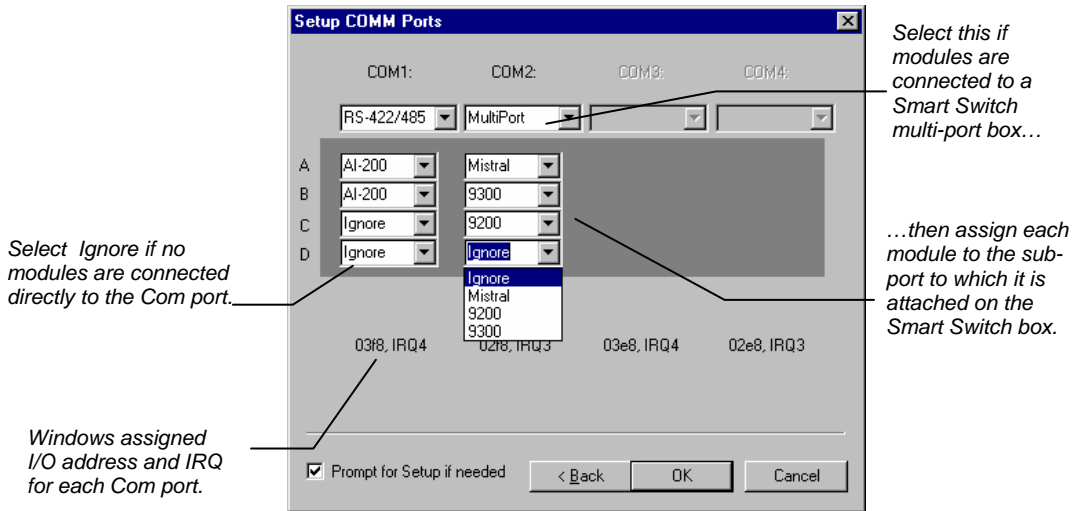
The icon will have a label reading, for example, *9300.24* or *AI-200.29.* The last two numbers are System Control communication addresses that correspond to the port or subport to which the device is connected.

For modules connected directly to the COMM port (9300, 9200, ProStar 510), the address numbers are assigned as follows:

| COM1	COM2	COM3	COM4
24	28	32	36

For modules connected to a MultiPort box, the address numbers are assigned as follows:

|	COM1	COM2	COM3	COM4
A:	24	28	32	36
B:	25	29	33	37
C:	26	30	34	38
D:	27	31	35	39

Note that if COM3 and COM4 are available, by default they normally share the interrupts of COM1 and COM2. System Control does not support interrupt sharing for serial communications. COM3 and COM4 must be assigned a unique interrupt.

After each serial module connects to System Control, configure it in an Instrument by moving its icon from the bottom of the Configuration Window into one of the four Instrument Areas. Only one autosampler module and only one 9200 module is allowed in each Instrument. System Control will remember where to put the icon the next time the module connects.

If a 9200 module is to be operated alone without a 9100, 9300, AI-200, PS-400, or PS-410 AutoSampler, make the 9200 the AutoControl Module, as shown next:
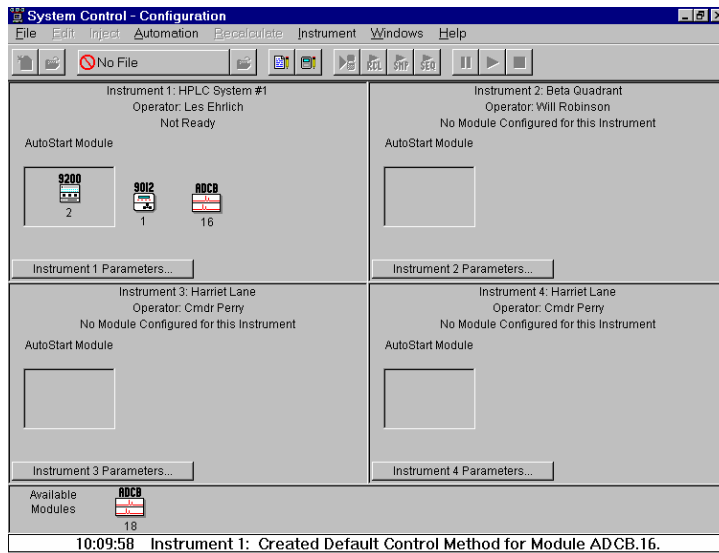
If the 9200 module is to be operated with a 9100, 9300, AI-200, PS-400, or PS-410 make the 9100, 9300 or other AutoSampler the AutoControl Module, as shown next:
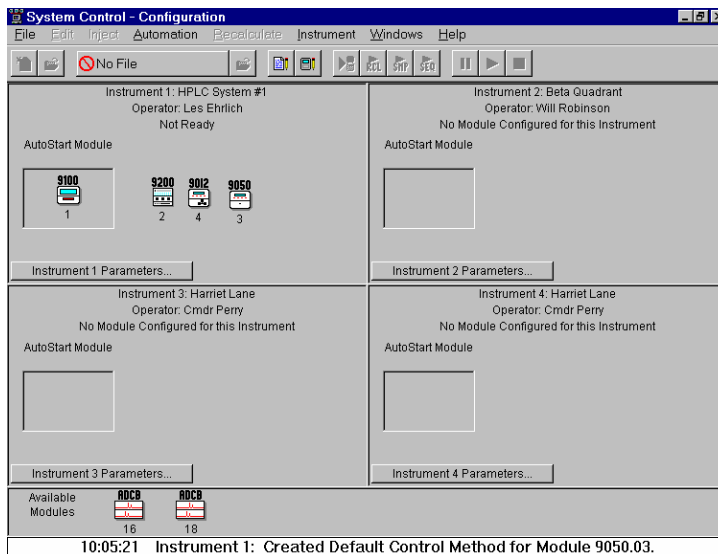
When the Star Assistant finishes, you will be at the System Control Configuration Screen.

Configuring an Instrument

Modules and Instruments Defined

System Control communicates with hardware *modules* that are used to perform chromatography. When you group these modules together in System Control (and physically connect together any necessary cables and plumbing), they form an *instrument*. All modules in an instrument are synchronized to run on the same time base.

Elements of the Configuration Screen

Instrument Parameters --
Instrument Name
Operator Name
Instrument status

Module icon showing that ADC Board Module 16 has been configured to Instrument #1.

AutoStart Module area. Place the AutoSampler Module icon in this box. If you want another module to provide the Start signal to the chromatograph, then it should be placed here.

Click on this button to enter or change the Instrument Name, Operator Name, and Maximum allowable error count..

Modules that have logged in and are available for configuration into an instrument are displayed here.

Instrument Window – drag modules from the available module area to add them to an instrument. Double-click in this area to view the System Control Status and Control Window for this instrument. For the Star Data Acquisition Workstation Single Instrument, there will only be one instrument window shown on this screen.

Setting Instrument Parameters

Some parameters used by the Instrument are set in the Instrument Parameters dialog accessed from the Configuration window.

When the maximum number of non-fatal errors is exceeded during automation, the automation sequence halts. Setting this value to zero disables this feature.

You are optionally prompted for this information when you start an automated sequence of injections or recalculations.

The instrument name appears on reports and in the instrument window.

The operator name appears on reports.

The Instrument Window

Once you have configured your instruments, you may view any instrument window.

Double-click in this area or select the instrument from the Instrument menu to view the System Control Status and Control Window for this instrument.
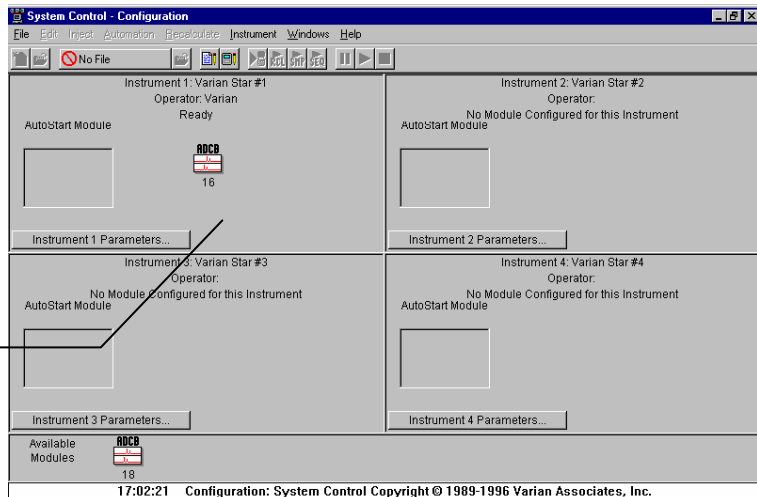
The instrument window allows you to monitor the status of all modules assigned to the instrument, perform injections of one or more samples, and perform batch recalculations.

Elements of the Instrument Window

Instrument Status display shows Operator and Instrument Names, free disk space, connected modules, open method, and the number of injections, calculations, recalculations, and reports.

ADC Board Status and Control Window

Data File Quick Link Button.

Data Files are added to this list box as they are generated. When a Data File is selected, the Quick Link button above provides access to additional operations.
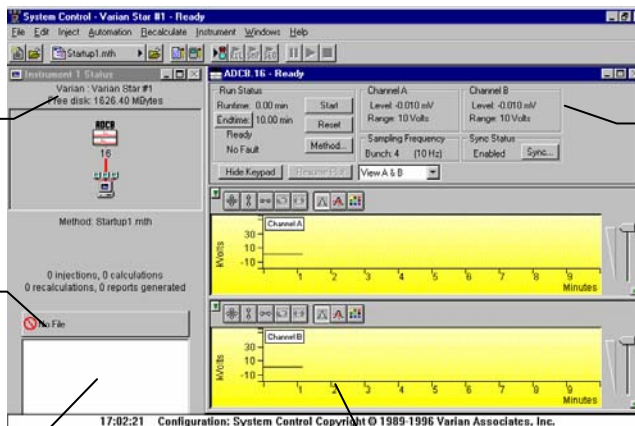
Real Time Chromatogram Displays

System Control Instrument Window positions are remembered the next time you start System Control.

Displaying Module Status and Control Window
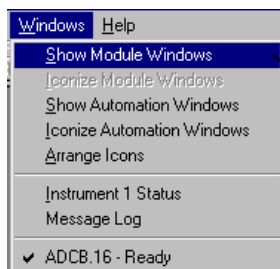
If the Status and Control Windows for the modules configured in the instrument are not currently displayed, you can select Show Module Windows from the Windows menu.

Configuring the Status and Control Window

Method parameters and synchronization signals can be configured in the ADC Board window.

Change the Method endtime.

Show only the chromatogram display.

```
┌─Run Status──────────────────┐  ┌─Channel A──────┐  ┌─Channel B──────┐
│ Runtime: 0.00 min    [Start] │  │ Level: -0.010 mV│  │ Level: 0.000 mV │
│ [Endtime:| 10.00 min  [Reset]│  │ Range: 10 Volts │  │ Range: 10 Volts │
│ Ready                        │  └─Sampling Frequency┐  ┌─Sync Status──┐
│ No Fault            [Method...]  │ Bunch: 4  (10 Hz) │  │ Enabled [Sync...]│
│ [Hide Keypad] [Resume Plot]  │  [View A & B    ▼]
```

Edit the active Method.

Select the channels to view.

Enable or disable synchronization signals.

Configuring the Real-Time Chromatogram Display

Use these buttons to move between stored scalings.

Enable/disable the Auto Scale feature.

Enable/disable the cursor display.

Select the background color for the display.

Hide/unhide the toolbar.

Set both the amplitude and time axes to full scale.

Set the amplitude axis to full scale.

Set the time axis to full scale.
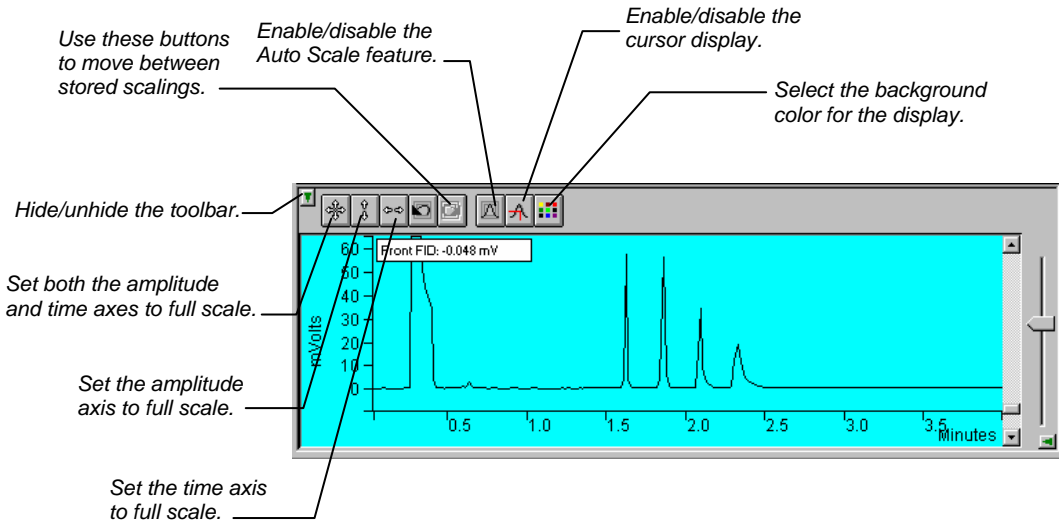
Drag an area of the display to view a more detailed section of the plot.
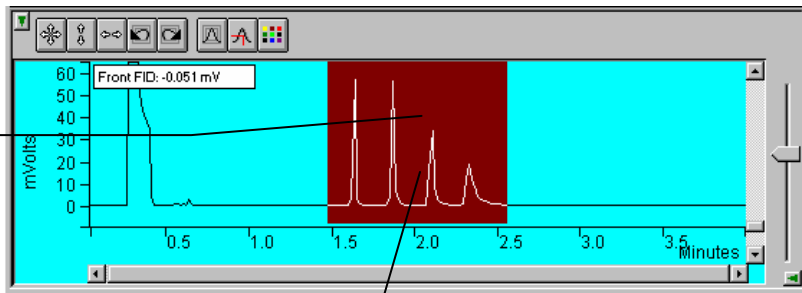
…or zoom in both axes by pressing and holding the left mouse button on the spot you wish to enlarge. (Holding the Ctrl key down will allow you to zoom out.)

Adjust amplitude scale.
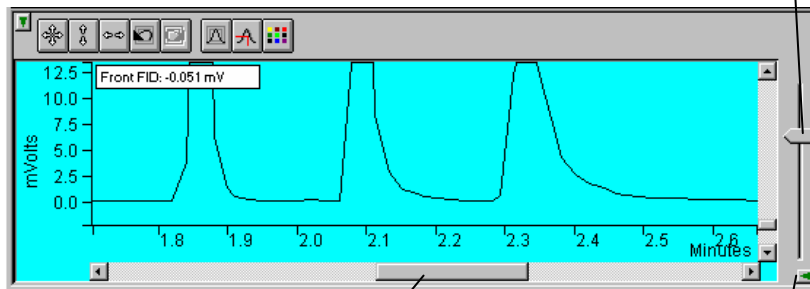
Adjust time scale.

Hide/unhide vertical amplitude scale slider.

Documenting Module Information

You may wish to document the configuration of your modules, their installation and most recent service dates, and other information pertinent to your instrument. To do so, use the Module Information Editor accessed from the Edit menu in the instrument window.

HPLC Module Status and Control Screens

Each module configured to an instrument will have its own Status and Control screen. These windows provide information on how your chromatogram is proceeding as well as imperative controls over module operation such as signaling the pump to begin pumping, starting a chromatographic run and turning lamps on and off.

Pump Status and Control

Each pump's Status and Control screen will display the pump's current operating conditions.
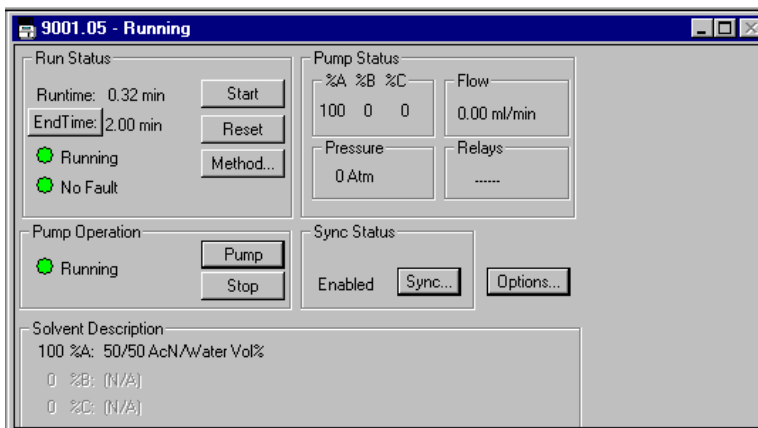
Detector Status and Control

The PS-310, 9050, and 9065 Status and Control screens are very similar to that for the ADC Board and operate identically to the discussion above. The detector windows do have controls to turn the lamp on and off, and in the case of the 9065 Polychrom an extra display to view the current spectrum in addition to the chromatogram.

More 9065 Detector Status

Analog Outputs

Peak Use	Offset	TimeConst.	BandWidth
A- Upper-Half	10	0.500	4
B- Upper-Half	10	0.500	4

Peaksensing Status

Wavelength	StoreMode	HeightLimit	PeakWidth
254	No Store	0.200	8
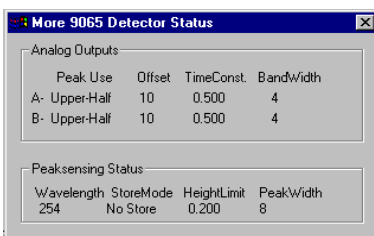
Click on the More Status button on the 9065 Status and Control screen to view the module's internal peaksensing status.

Click on the lamp button to access the parameters to turn the lamp on or off and set the day and time the lamp will be turned on and off automatically.

9065.03 - Running

Run Status

Runtime: 1.68 min   Start
EndTime: 2.00 min   Reset
● Running   Method...
● No Fault

Lamp Operation
Lamp...   ●

Hide Keypad   Resume Plot

Detector Status
Scan:Bunch:Freq
11 : 4 : 2.75   More Status...

Analog
Outputs:---Wavelength------Scale----------Value
A-Absorb.   254nm   0.100AU   -0.00330AU
B-Purity   220-311nm   370 nm   230.28 nm

Sync Status
Enabled   Sync...   Options...

AutoZero

Set Lamp

☑ Lamp On

Fault Response
○ Turn Lamp Off
⦿ Leave Lamp On

On: OFF / OFF
Off: OFF / OFF

OK   Cancel

Click on the Options button to set module options.

Set Options

☑ Beeper Active
☐ AutoStart Enabled
☐ AutoStop Enabled

OK   Cancel
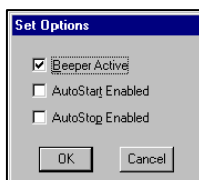
ProStar/Dynamax Status and Setup Screens

Your ProStar/Dynamax System Status and Control Window should look similar to this:

Clicking on this button causes the composition and response displays to be overlayed.

Clicking on this button causes the composition and response displays to be tiled as shown.
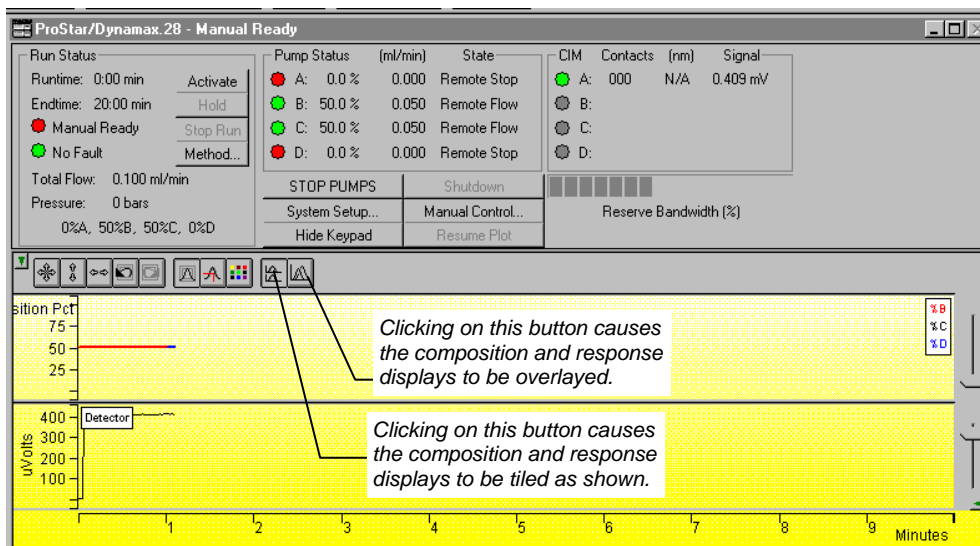
You will see colored indicators by the letter for each Pump and CIM that is connected and communicating status. In the example above, Pumps A, B, C and D, and CIM A are connected.

When all of the Pumps and CIMs are successfully connected, press the "System Setup" button to complete the setup of the far/Dynamax System. The System Setup should now look similar to:

System Setup

Pump	Pump Type	Pump ID	Pump Version	Head Type	Head Size	Pressure Module	Min Pressure	Max Pressure	Refill Time		Solvent	Compress ibility (x)	HPC (L)
A: Solvent	SD-200	33	HPXLV2.0SD200V1.4	metal	200 ml	absent			125 ms		Water	46 /Mbar	2996 bar
B: Solvent	SD-200	34	HPXLV2.0SD200V1.4	metal	200 ml	absent			125 ms		Ethyl Acetate	46 /Mbar	2996 bar
C: Solvent	SD-200	35	HPXLV2.0SD200V1.4	metal	200 ml	installed	0 psi	1000 psi	125 ms		THF	46 /Mbar	2996 bar
D: Injector ▼	SD-200	36	HPXLV2.0SD200V1.0	metal	200 ml	absent			125 ms			46 /Mbar	2996 bar

CIM	CIM Type	CIM ID	CIM Version	Detector Type	Integ A Label	Contact 1 Label	Contact 2 Label	Contact 3 Label	
A	CM-200	37	CM200V1.4	Other ▼	C'gram	Inject	Mark	Hold	
B	none	38		None					
C	none	39		UV-1					
D	none	40		Other					
				▼					

Pulse Width: 3.0 sec   Pressure Units: psi ▼   ☑ Compensation Enabled   ☑ Show Composition Graph

[Save] [Cancel]   [Select Solvent]

Notice that a large amount of the Setup information is supplied by the Pumps and CIMs and is filled in automatically. The spreadsheet cells shown in white are the only ones that need to be manually configured. The online help contains detailed descriptions of the entries for Star Workstation.

The Contact Label column allows you to give each contact a meaningful name. The names of these contacts will be used in the table headings for time programming these contacts in the Method. If the contact labels are changed, all Methods that will subsequently be used must be edited to match the new contact labels.

The Solvent Select button opens the Select Solvent Window. When you select a solvent from this window, the solvent name and compressibility data will be entered onto the selected pump line.

You may display or hide the solvent composition graph by checking or unchecking the "Show Composition Graph" check box. Composition and response may be displayed tiled or overlayed on the ProStar/Dynamax status screen.

Select Solvent

```
Water
Acetonitrile
Methanol
Acetone
Benzene
Carbon Tetrachloride
Chloroform
Cyclohexane
Dichloroethane
Diethyl Ether
Dimethylformamide
Dioxane
Ethanol
Ethyl Acetate
Methyl Chloride
n-heptane
n-hexane
o-dichlorobenzene
Propanol
Tetrahydrofuran
```

OK   Cancel
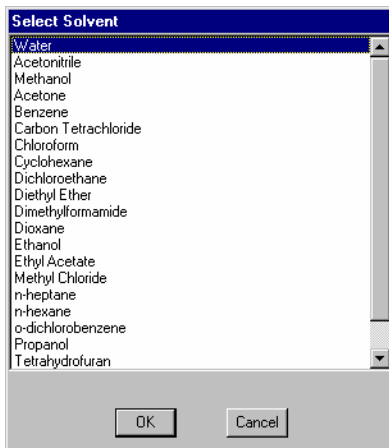
The Status and Control Screen shown below allows you to control the ProStar/Dynamax module to perform such tasks as starting a run, entering Manual Control mode, and setting up the system configuration. The Reserve Bandwidth on the ProStar/Dynamax System Status and Control Screen dynamically shows the unused capacity of the RS-422/485 Communication port used by this instrument. If more than three segments are visible, it is safe to add more pumps to this communication port, or to operate the CIM at a higher sampling rate. Conversely, if fewer than three segments are consistently visible, either the number of pumps on this communication port should be reduced or the CIM should be operated at a lower sampling rate.

ProStar/Dynamax.28 - Manual Ready

| Run Status		Pump Status (ml/min)		State	CIM Contacts (nm) Signal	
Runtime: 0:00 min	Activate	● A: 0.0 %	0.000	Remote Stop	● A: 000 N/A 0.409 mV	
Endtime: 20:00 min	Hold	● B: 50.0 %	0.050	Remote Flow	● B:	
● Manual Ready	Stop Run	● C: 50.0 %	0.050	Remote Flow	● C:	
● No Fault	Method...	● D: 0.0 %	0.000	Remote Stop	● D:	
Total Flow: 0.100 ml/min		STOP PUMPS	Shutdown			
Pressure: 0 bars		System Setup...	Manual Control...		Reserve Bandwidth (%)	
0%A, 50%B, 50%C, 0%D		Hide Keypad	Resume Plot			

AutoSampler Status and Control Screen

Each AutoSampler will have a graphical display of its carrousel along with an indication of which vials are listed in the SampleList and whether they are yet to be sampled, currently being sampled, or that vial has finished.
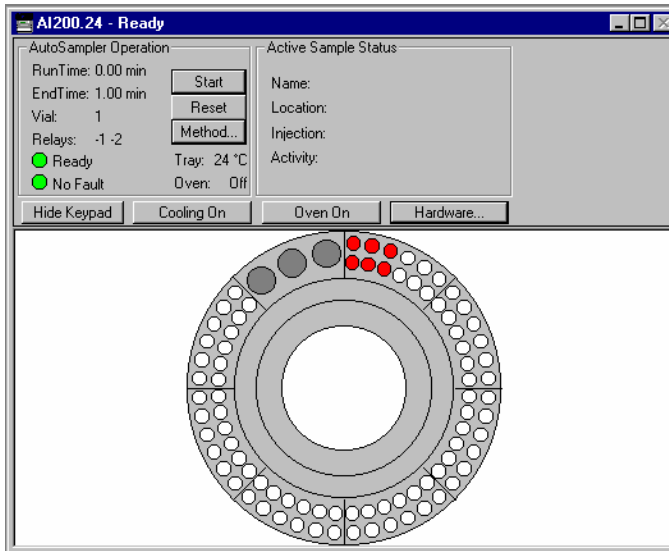
9100 AutoSampler
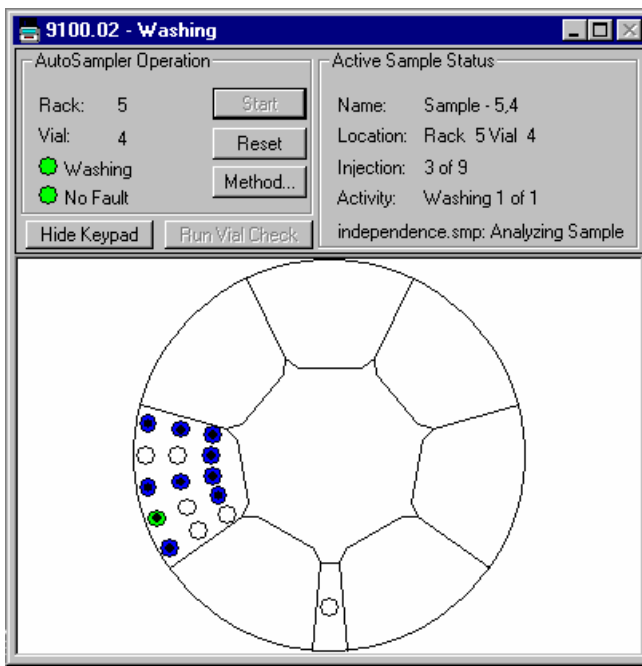
Clicking once on a vial will cause the rack and vial location to be displayed. Double clicking on a vial will cause the Inject Single Sample dialog to appear (discussed later in this manual).

9300 and ProStar 400 AutoSampler
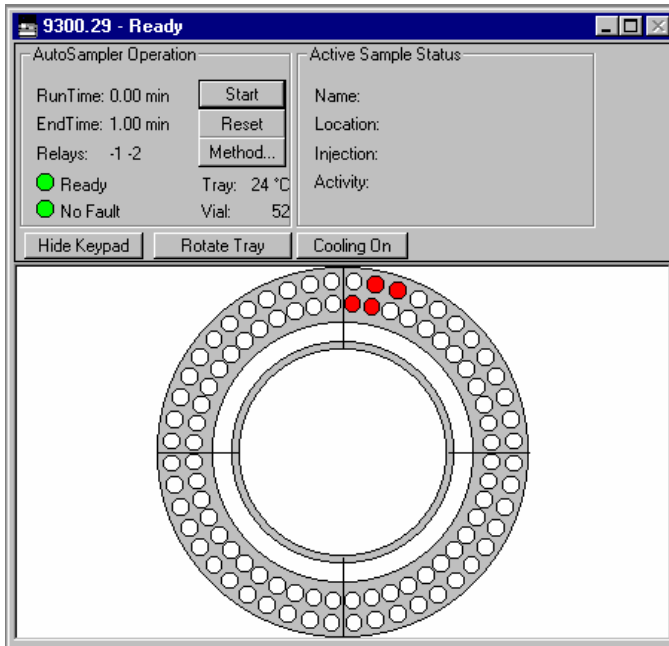
AI-200 and ProStar 410 AutoSampler

Building Methods

Overview

In the *Getting Started* section, you configured your hardware for an instrument and opened the System Control Window for the instrument. At this point, you could simply inject a sample, as described in the following sections. However, it is not likely that the default Method will have the method settings that are appropriate for your analysis. Therefore, the default Method will need to be edited to enter the settings appropriate for your analysis. Method Builder is used to view and edit methods. It can be accessed from:

This button on the Star Toolbar opens Method Builder and prompts you to create a new method or open and existing one.
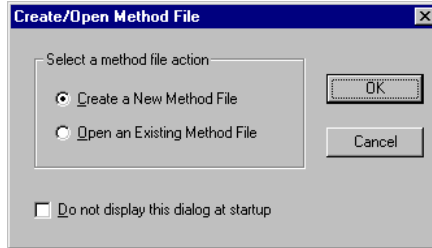

This button on the System Control Toolbar allows you to view and edit the method file shown on the button.
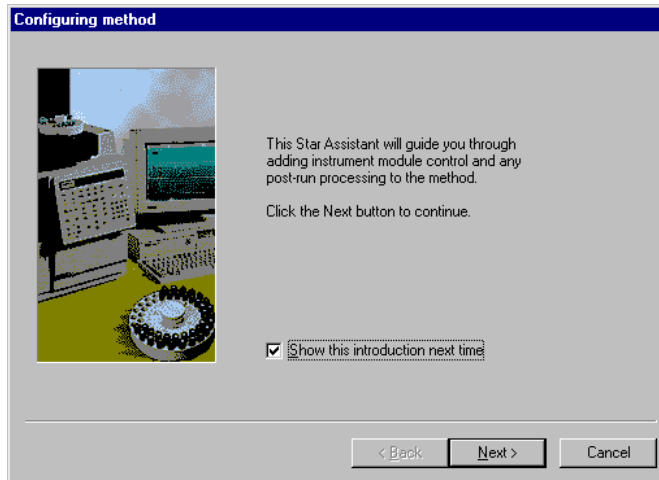
This button on the Star Toolbar allows you to view and edit the method file shown on the button.

Using Star Assistant to Create a New Method

If you click on the Method Builder button on the Star Toolbar, you will get this dialog box.

If you choose *Create a New Method File*, the Star Assistant Wizard will guide you in building this new method.

You will first be asked to select the instrument configuration for which you want to create a method.

Select Custom to create a Method for an instrument that is not attached to the Star Workstation.

Select an instrument to create a method for the hardware currently configured for that instrument in System Control.
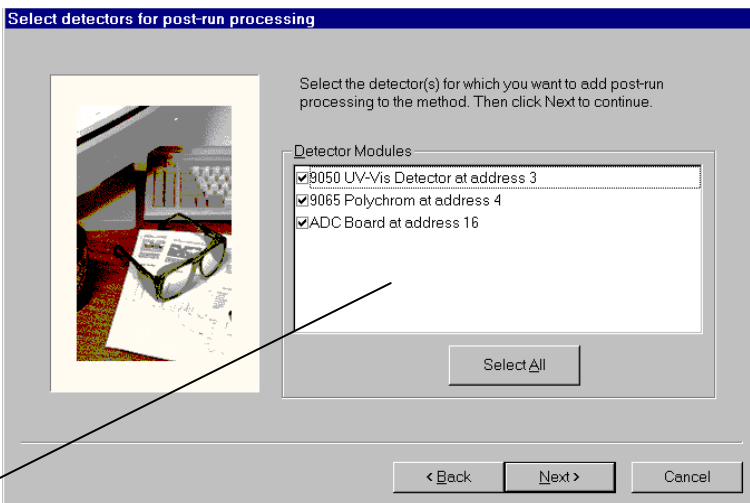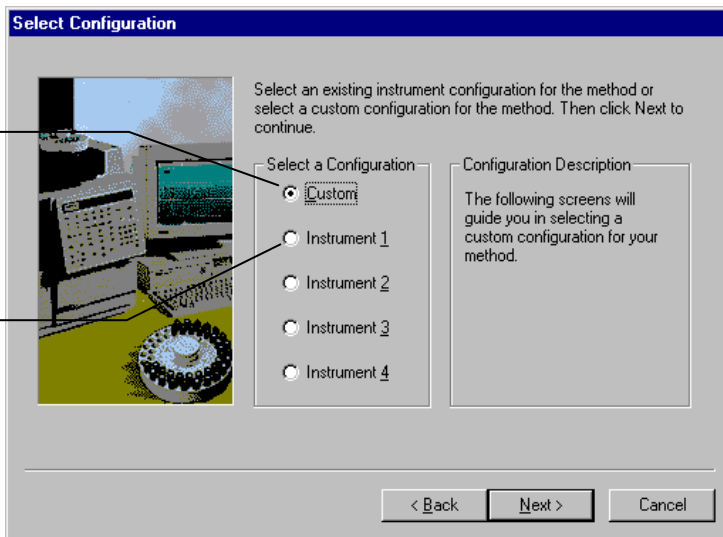
If the instrument has more than one detector configured, all of the configured detectors will be shown here. You may build a Method for any detector or combination of detectors shown in this box.

For each detector in the Method, you will be asked to select the channels on which post run-processing will be performed. The PS-310 UV-Vis and 9050 detectors will have a single channel, the ADC Board will have 2 channels, the 9065 Polychrom detector will have 38 channels, and the PS-330 PDA may have up to 5 channels.

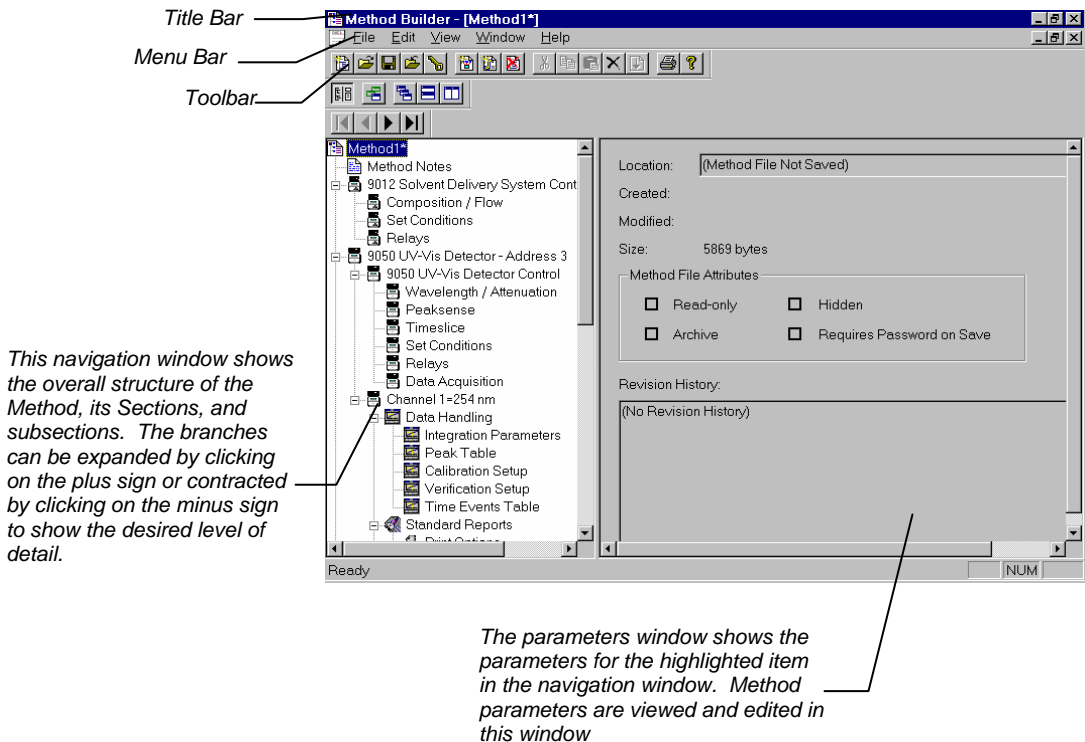When you have selected the data channels and type(s) of post-run processing to be run for each detector, the Star Assistant will create a Method containing all of the sections that are needed to control the hardware, collect data and do the post-run processing specified. These Method sections will contain default values for all of the parameters. These parameters will need to be edited to match your analysis.

Editing Module Method Sections

The Varian Star HPLC system is composed of a series of modules. Each module can be programmed through its method; consequently, each module can have its own unique end time. If you know that all of your peaks of interest will be eluted before the pump's gradient is finished, you may wish to set a shorter end time for your detector than for your pump. A good rule of thumb, initially, is to use the same end time for all of the modules.

The Method View Window

Title Bar

Menu Bar

Toolbar

This navigation window shows the overall structure of the Method, its Sections, and subsections. The branches can be expanded by clicking on the plus sign or contracted by clicking on the minus sign to show the desired level of detail.

The parameters window shows the parameters for the highlighted item in the navigation window. Method parameters are viewed and edited in this window
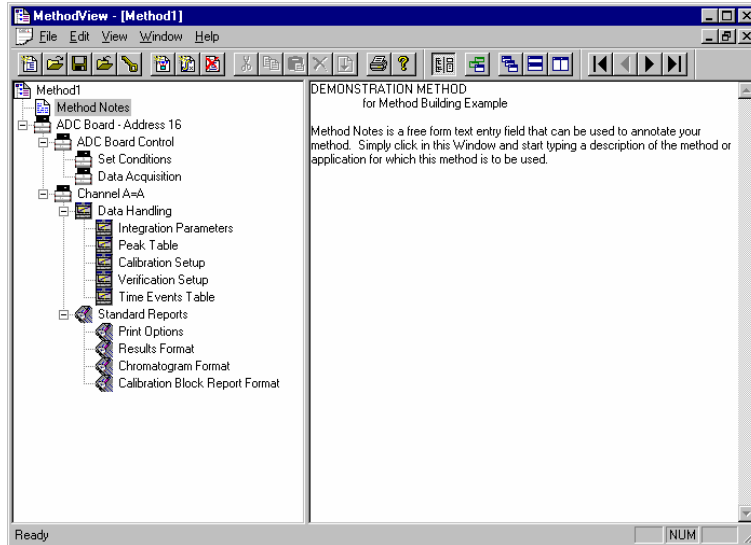
Detailed information about the menu items and Toolbar buttons can be found in the online help.

Editing a Method

As you step down through the Method tree, the parameters associated with each section of the Method are displayed for editing.

Method Notes

The first item in the Method is the Method Notes section. Method Notes is a free form text field where information about the Method or the application can be entered. Method Notes are displayed in the File Open dialog boxes used whenever you select a Method.

Method Notes can help explain to the operator when a Method should be used. They can also be used to convey sample preparation information and reminders to refer to specific items in the lab's Standard Operating Procedures.

Editing an HPLC Pump Method

There are numerous HPLC pumps supported by the Star Chromatography Workstation. The PS-220, the 9001, and 9002 pumps are isocratic and do not support gradient operation. The PS-230, PS-230 Inert, PS-240, PS-240 Inert, 9010, and 9012 pumps support ternary or quaternary gradient programming. The operation and programming of all these pumps are similar. Programmed changes to composition and flow occur linearly between set points.

ProStar and Star GPIB Pumps

Set the time which the conditions will be met.

Use scroll bar to view/edit relays 2-6.

Enter solvent descriptions either from the listed solvents or by entering your own.

Click on Add to create a new line in the pump's composition or flow program. Flow and composition change linearly between set points.

Use the Set Conditions section to enter the pump's program end time, the end action, minimum and maximum operating pressure limits and the time the pump will use to equilibrate from one run to the next.

Each of the pumps have 6 relays that may be time programmed to control other devices such as injectors or auxiliary pumps. Click on the Add button, set the time you wish the action to occur, and click on the relay(s) you wish to energize.
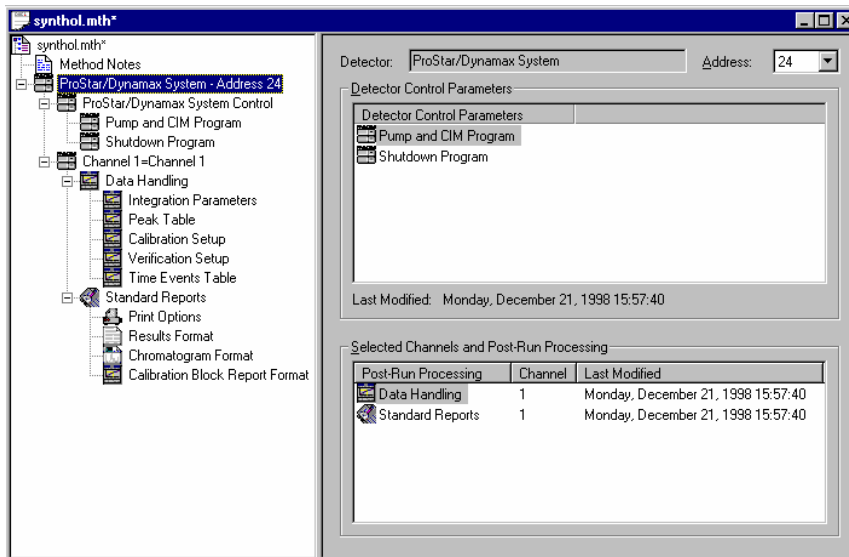
The ProStar/Dynamax System

The PS-210, PS-215, PS-218, Dynamax SD-200, Dynamax SD-300 pumps, and Dynamax SD-1, while isocratic pumps, may be combined together in the ProStar/Dynamax System to support gradient programming. Up to four pumps may be configured in the ProStar/Dynamax System thus allowing quaternary gradients. Alternatively, one of the pumps may be designated an injection pump.

The ProStar/Dynamax System is different from other Star Workstation LC modules in that it incorporates both pump modules and a detector module. Each ProStar 210/215/218, Dynamax SD-200/300, or SD-1 pump contains a CIM analog to digital converter. Configuration of the CIM is performed locally in the pump's Setup screen.

You may want to enable only the CIMs that you will actually be using in the instrument. Only 2 detector channels can be configured per Instrument. These 2 channels can be on one SD-1 pump CIM, or on 2 CIMs belonging to 2 ProStar 210/215/218 pumps. Other CIMs can be used only for contact closures.

Note:	**Star Workstation version 6.2 or higher is required to control dual CIM's on the PS-210/215 and 218 pumps. The firmware version for the PS-210 and 215 pumps must be 1.72 or higher and for PS-218 pumps it must be 1.03+ or higher.**

Use the Method Builder Application to create and modify ProStar/Dynamax System Methods. From System Control press the "Method..." pushbutton in the Run Status Section of the ProStar/Dynamax System Window to edit the currently Active ProStar/Dynamax System Method. The Method Builder Window will appear similar to the following example:

Click on the "Pump and CIM Program" line to see the ProStar/Dynamax System Method, similar to the example below:


The ProStar/Dynamax System Method contains a spreadsheet for the time program that controls the Pumps and CIMs. It also specifies Ramp and Hold times on Activation and Ramp and Hold times on Completion of the method. These ramp and hold times can be used to prevent shocking the column by abruptly changing operating parameters.

The Configuration section contains ProStar/Dynamax System hardware configuration information. The entries in this section must match the settings shown in the ProStar/Dynamax System Setup screen in System Control. If they do not match, this method cannot be activated and used for analysis of samples. You can manually edit this section to match the hardware configurations or let the Star Assistant for Method Builder modify the method for you. To use the Star Assistant, close the Method in Method Builder. Open System Control and go to the instrument where this Method will be used. Open the Method from System Control and when prompted, allow the Method to updated to match the hardware on this instrument. Review the Method parameters and edit any values that need to be changed.

Post-Run Processing
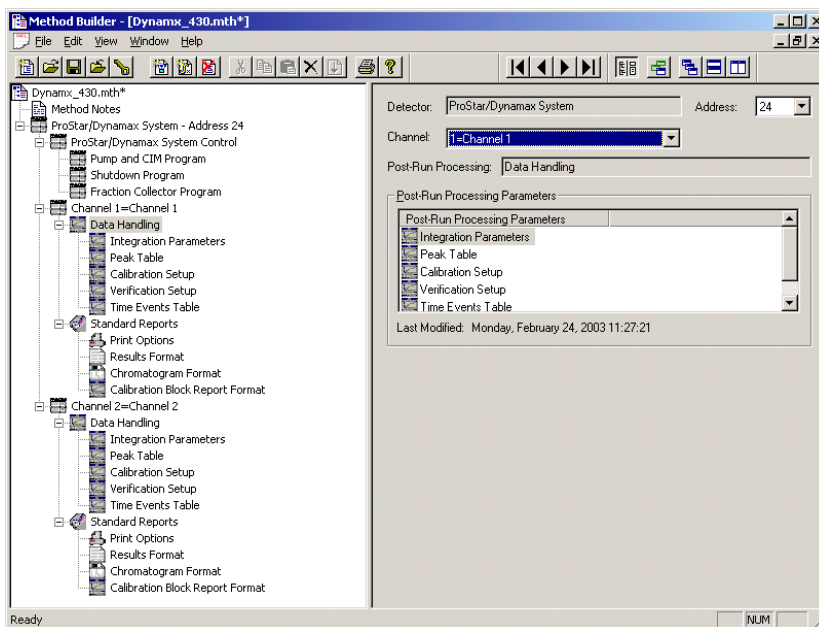
The ProStar/Dynamax System Module can be configured with up to 2 detector channels per Instrument and can have a post run processing section for these two channels. The post-run processing for each Channel includes both Data Handling (peak detection and integration) and Standard Reports (numerical results and chromatogram).

Editing an AutoSampler Method Section
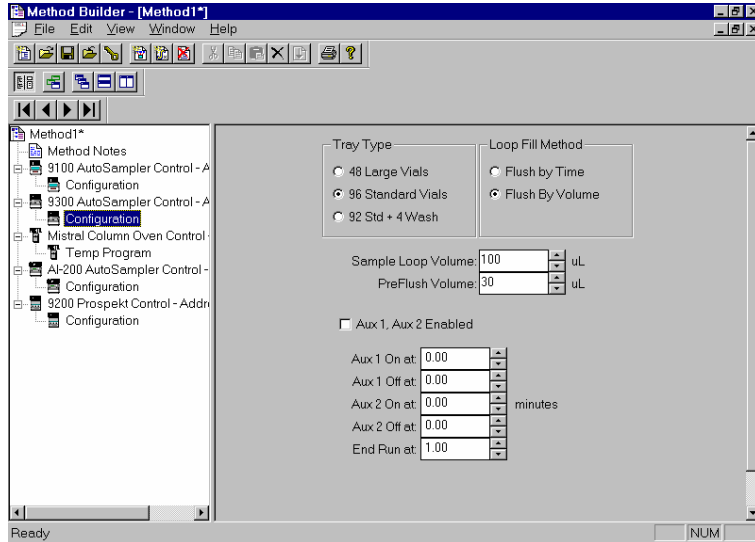
The AutoSampler Method sections contain configuration information for different carrousels if supported and for auxiliary operations if available. Programming of AutoSampler operations is performed through the SampleList in the System Control application. Consult the sections on Injecting a Single Sample and Injecting Multiple Samples for a description of SampleLists.
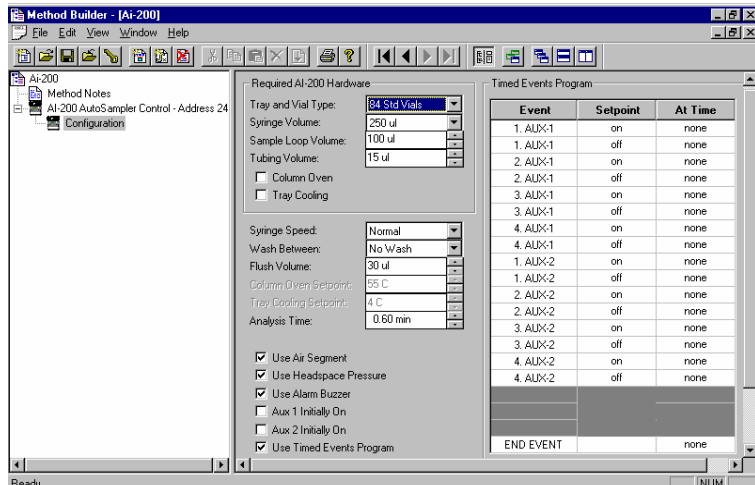
The PS-410 and AI-200 AutoSampler's required hardware will not download from the Star Workstation. The required hardware settings must, however, match what is set-up and entered into your AutoSampler.

Editing a Detector Method Section

All Varian Star HPLC detectors utilize the same design philosophy; data is collected from channels at a set sampling frequency . The PS-310 and 9050 UV-Vis monochromator based detector has a single channel of data from the wavelength the detector is set to between 190 and 700 nm. The ADC Board acquires data from two analog inputs mounted on the back of the board. The 9065 Polychrom detector collects data from 38 channels covering the wavelength range of 190 to 367 nm simultaneously. The PS-330 PDA has up to 512 diodes of data which can be grouped and combined to create fewer data channels.

Each detector has a sampling frequency known as a *Detector Bunch Rate* and a *Noise Monitor Length* that allows the HPLC system's inherent noise to be determined before each injection is performed. The *Detector Bunch Rate* will determine how many data points will be collected and saved every second. A good rule of thumb is to set the *Detector Bunch Rate* to a value that will give you at least 20 data points across the narrowest peak of interest. As you increase the *Detector Bunch Rate*, you collect fewer data points each second. As you change the detector bunch rate, the system will calculate and display the sampling frequency for you automatically.

The *Noise Monitor Length* defines the number of data points that will be used to calculate a noise value for your system before each run. Generally, the larger the value of the Noise Monitor Length, the lower the noise value you will get. Larger numbers of points take longer to process and reduce and consequently will decrease throughput if you are performing a large number of runs. You may elect to use the monitored noise for each run, the noise value monitored at the beginning of a SampleList, or you may set an arbitrary noise value for your system to use. These selections are covered later in this manual in the Post Run Processing section as well as in the Data Handling and Reports Manual. The Star HPLC Data Acquisition Workstation will always monitor the noise and save it with the data file it was generated for whether you elect to use it or not.

ADC Board Data Acquisition Settings
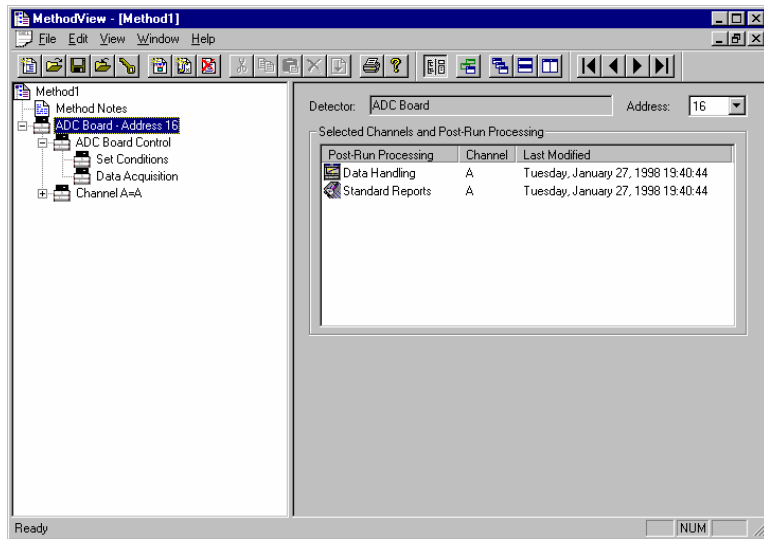
The ADC Board entry specifies the Star Workstation module address of the ADC Board that the Method uses. The module address in the parameters window can be changed so that a Method developed for an instrument using one module address can be easily modified for use on another instrument at a different module address.
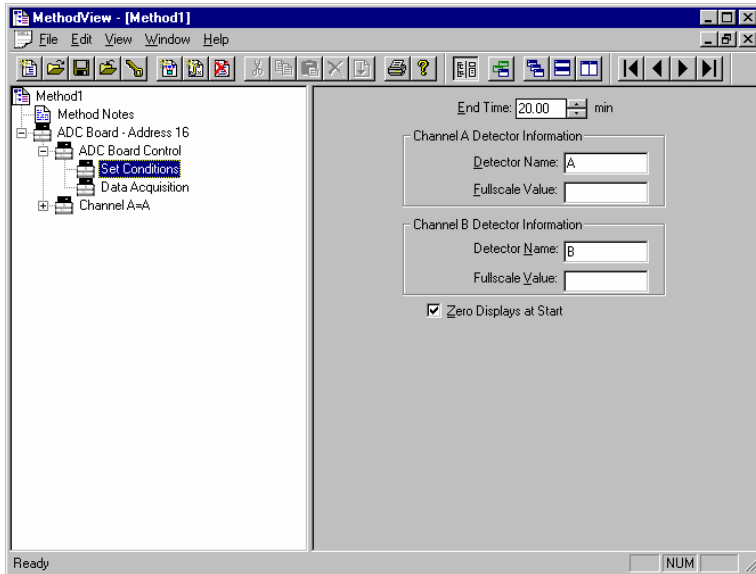
The ADC Board Set Conditions screen allows the user to set the end time for the ADC Board Data Acquisition. This end time can also be set from the ADC Board Status and Control Window End time… button in System Control. Names for the detectors associated with Channel A and Channel B and their full scale values can be entered for annotation on the printed reports.

This is the length of time that the ADC Board will stay in monitor mode.
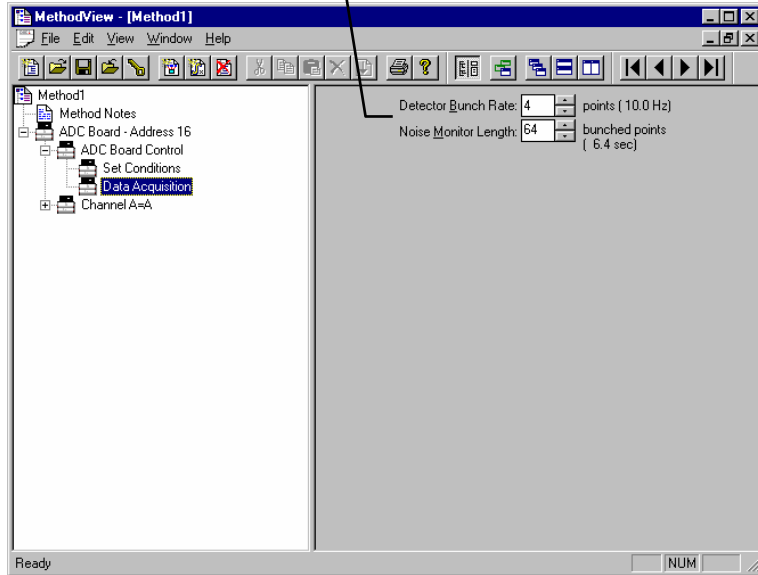
The ADC Board Data Acquisition screen allows you to change the Detector Bunch Rate and Noise Monitor Length. The Detector Bunch Rate sets the frequency of the raw data points stored in the Data File. The Noise Monitor Length specifies how many of the data points will be used to calculate the noise value. The length of time that the ADC Board spends in monitor mode is the product of the frequency of data points and the Noise Monitor Length.

ProStar 310 and 9050 Method Special Considerations

The PS-310 and 9050 are single wavelength programmable detectors with built in features to support fraction collectors and other auxiliary devices.

Wavelength and attenuation may be time programmed by clicking on the Add button and entering the time and new conditions that you wish to use. You may wish to program changes in the wavelength if you know that some of your analytes have maximum absorption at very different wavelengths. The PS-310 and 9050 will stay at a set wavelength until the time of the next change programmed into this table. The attenuation value is only applied to the analog chart recorder output located at the rear of the detector. The data sent to the Star Workstation across the GPIB bus will always be sent as unattenuated full-scale values.

The Peaksense section defines parameters that are used within the PS-310 and 9050 to determine if a peak has been detected. The detectors have 5 relays, 4 of these may be time programmed, the remaining relay may be used with the Peaksense parameters or Timeslice parameters to control a fraction collector or other peak dependent device. Consult your PS-310 or 9050 manual for more information regarding these capabilities.

The Timeslice section allows you to set parameters to control relay dedicated to Peaksense and Timeslice actions. Timeslice and Peaksense are designed to work together to trigger fraction collectors, valves or other devices that operate conditionally on the detection of an analyte. Consult the PS-310 or 9050 manual for more information regarding these functions.

You set the detector's end time, end action and the time constant for the analog output which is on the rear of the detector. The Analog Output Time Constant has no effect on the data sent from the PS-310 or 9050 to the Star Workstation over the GPIB bus.

The PS-310 and 9050 have four time-programmable relays to control other devices such as injectors. You build a relay program by clicking on the Add button, setting the time when the relay is to change state and then checking (or unchecking to turn the relay off) the relay that you want to change state.

9065 Method Special Considerations

The 9065 Polychrom is a 38 channel photodiode array detector. In addition to the Detector Bunch Rate mentioned above, the 9065 has a Scan Frequency. This setting determines how many times each second the 38 diode array will be read. The Detector Bunch Rate will then be applied to the set scan frequency to determine the actual sampling frequency. In practice, the Scan Frequency should be left at its default value of 11 for most applications.
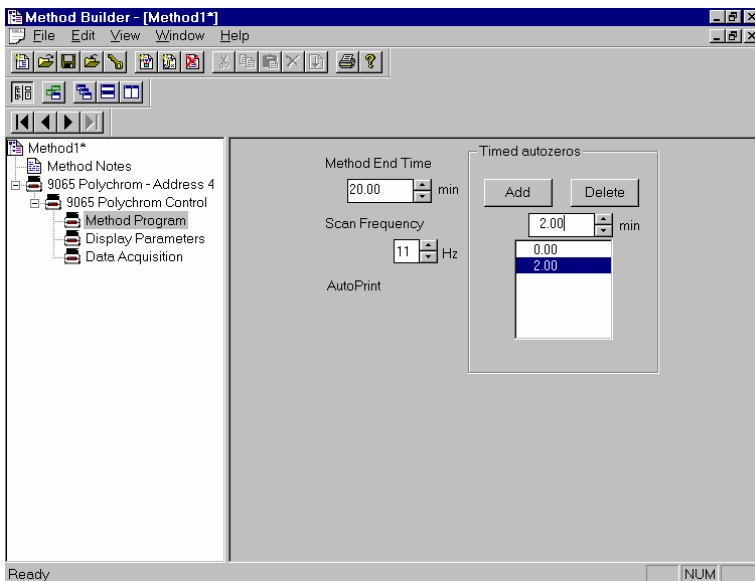
Use the Method Program section to set the Scan Frequency and 9065 Method End Time.
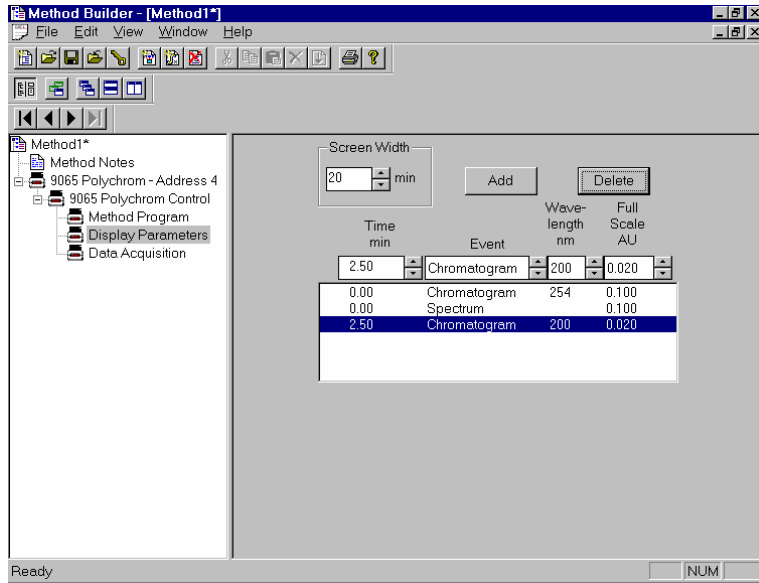
Use the Display Parameters section to set the wavelength for the chromatogram displayed in System Control's real time chromatogram display and set the fullscale attenuation for that display.

Post-Run Processing
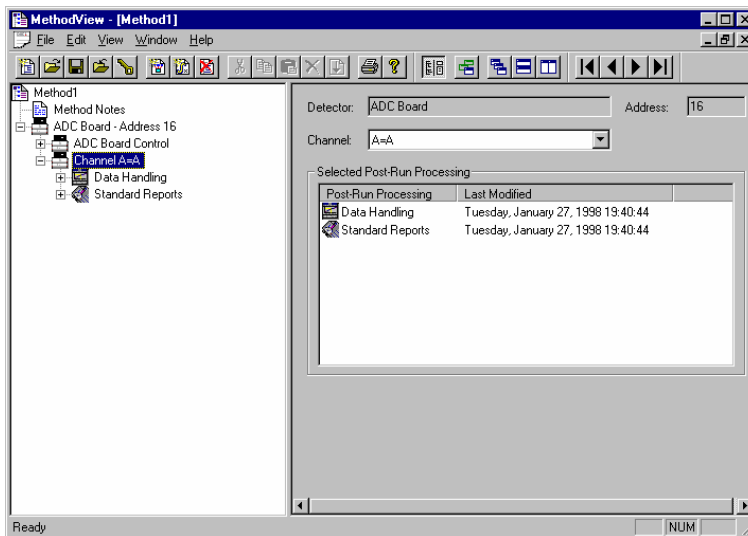
Multichannel detectors can have postrun processing sections for any or all of their channels. For the Method shown above, postrun processing was chosen for ADC Board Channel A only. The post-run processing for Channel A includes both Data Handling (peak detection and integration) and Standard Reports (numerical results and chromatogram).
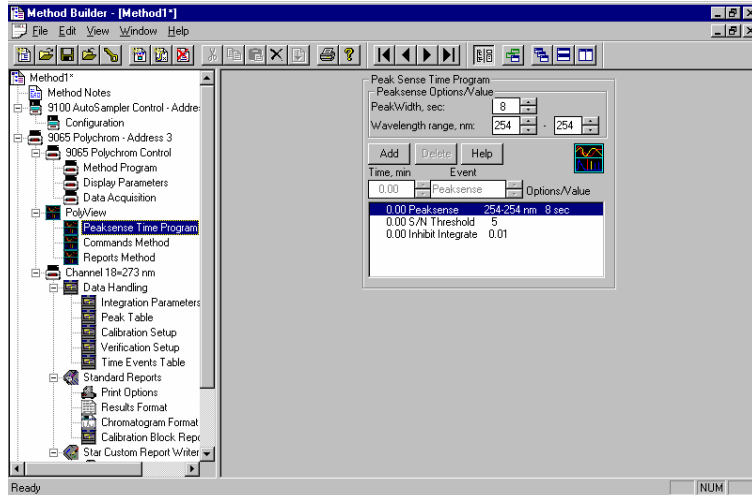
In addition to the Star Workstation data handling and report options, the PS-330 PDA is supported by the optional PolyView2000 spectral processing software. You may add PolyView2000 to any method or you may use as an independent interactive application. Refer to the *PolyView2000 Operation Manual* for more information regarding its operation.
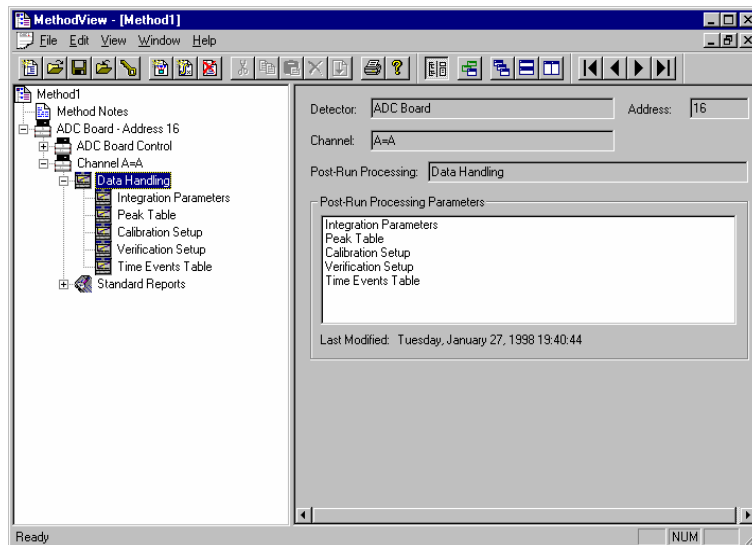
You may add or delete post run processing for any or all data channels available for your detector.

The Data Handling section has parameter pages for Integration Parameters, Peak Table entries, Calibration Setup, Verification Setup and Time Events (integration control parameters). For the initial setup of a Method the default values are usually a good starting place. For information on these Data Handling parameters and setting them for your application, please refer to the *Data Handling and Report Operation Manual*.
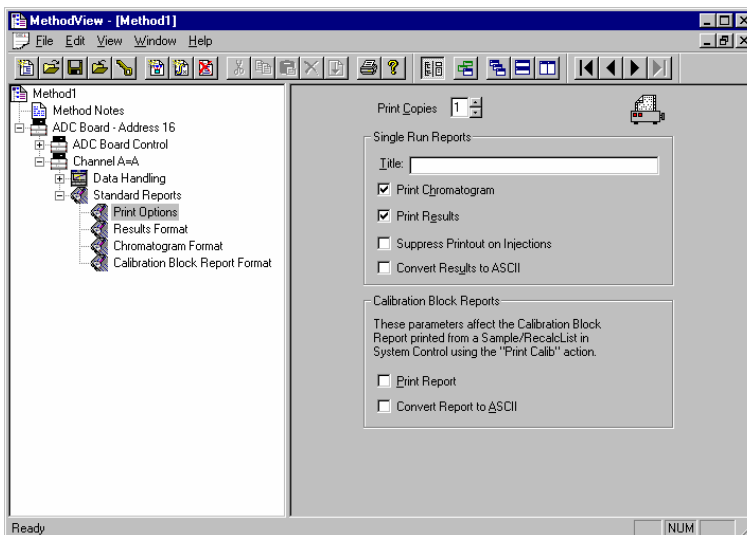
Refer to...

If you installed PS-330 PDA control software, PolyView spectral processing software was also installed. Refer to the *PolyView Operation Manual* for information regarding the use of PolyView.

Refer to...

If you purchased and installed the optional PolyView2000 software, refer to the *PolyView2000 Operation Manual* for information.

The Standard Reports section sets the parameters for the information that will be printed after Data Handling has been run. For a complete description of the Standard Report options, please refer to the *Data Handling and Report Operation Manual*. Until you get comfortable using the Star Workstation, you may want to always print the chromatogram and results (default options). To help identify the reports that are generated, you will probably want to give them a Method specific title. To do so simply, click in the *Title* box and type in the title to be used on the chromatogram and results report pages.
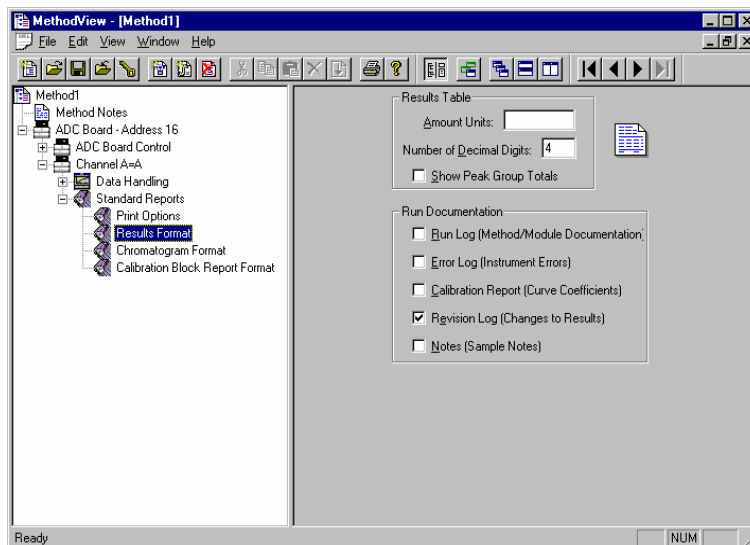
The Results Format page controls the format of the results table, the result units to be printed in the Amount column header and the number of decimal digits to print for the calculated amounts. It also controls what additional information is appended to the end of the results report.
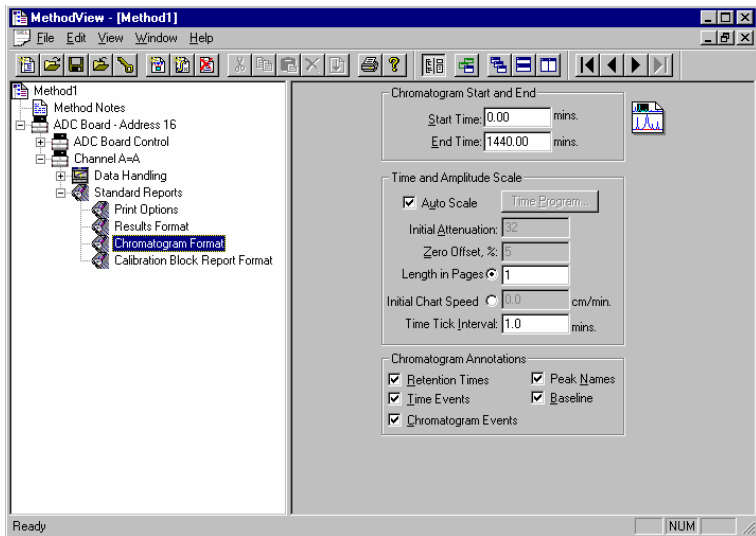
The Chromatogram Format page controls the formatting of the printed chromatogram. When the defaults are used, the chromatogram for the complete run will be printed and autoscaled to fit on one page. You may only want to print the portion of the chromatogram that contains the peaks of interest. This may be done by changing the start and end times to bracket the period of interest. Autoscale is often turned off and a fixed attenuation and zero offset chosen so that printed chromatograms from several runs may be visually compared. For more information about the Chromatogram Format parameters, please refer to *Data Handling and Report Operation Manual.*

Refer to...
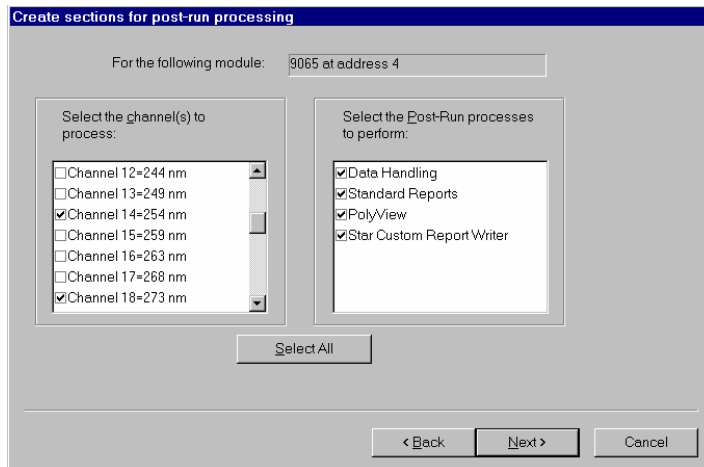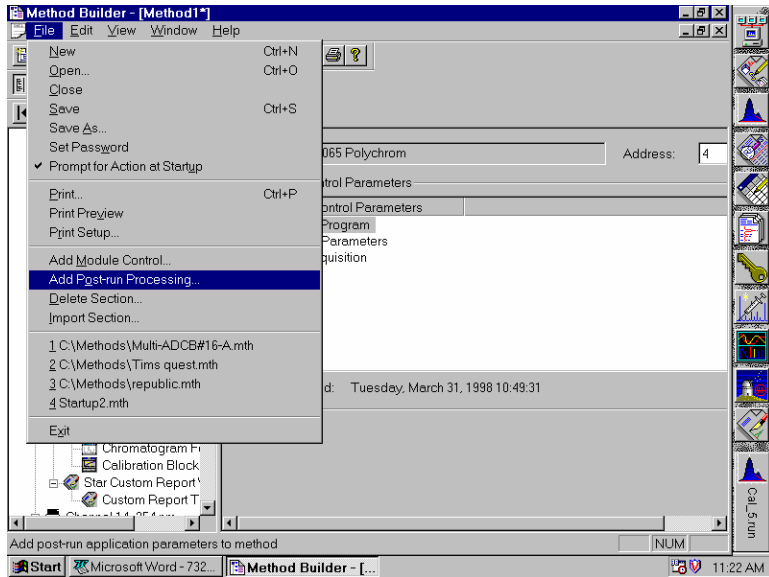
The Startup Method

When you start System Control and display an Instrument Window, the last active Method for that instrument is activated. When System Control is started, it will return to the initial settings in the Method that was last used on the instrument.

To change Methods, simply click on the activate method button on the System Control Toolbar or choose New Method from the File menu.

Editing Methods from Status and Control Windows

Status and Control Windows containing a Method… button allow you to directly edit the active Method corresponding to that Module. When you click on this button Method Builder is opened with active Method loaded and the corresponding Instrument Module selected. You can then edit that section or any other section of the Method as described previously.

Once you have edited the Method and closed the Method Builder window, you are prompted to reactivate the Method. Reactivating the Method downloads the changes to the Module.

Changing Method End time from Status and Control Windows

Status and Control Windows containing an End time… button allow you to immediately change the end time of the active Method Instrument Control section corresponding to that Module. If you have more than one module running, for instance a pump and a detector, you will need to update the end time for each module if you wish for them to end at the same time. This is useful if you wish to extend a run while the run is in progress. This end time will then be used until the Method end time is changed by again using the EndTime… button or editing the Method.

Click on EndTime to display Set Endtime dialog.
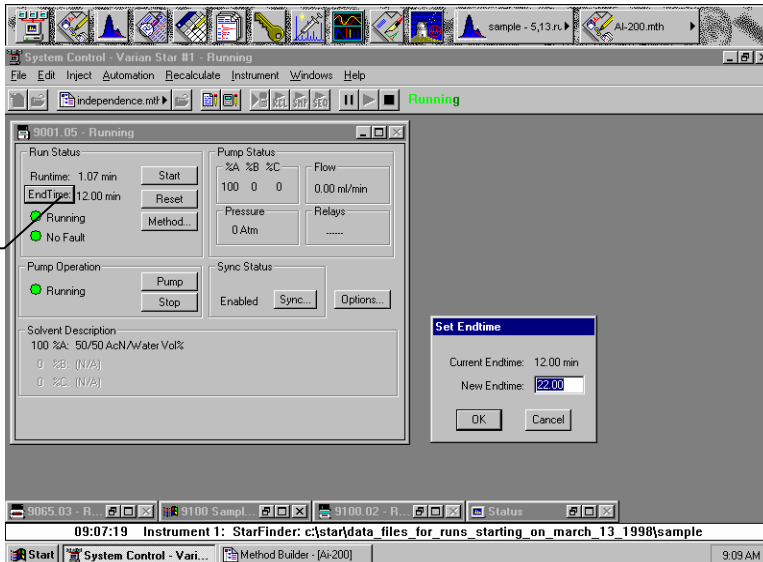
Importing Method Sections

You may wish to copy sections from one Method file to another. This can be done by opening the Method file that you want to edit in Method Builder. Then from the Method Builder File menu, select Import Section… The Import command prompts you to select the file containing the sections you wish to import. Once you have selected the file, a dialog box of sections contained in the Method file is displayed. Highlight the sections that you wish to import by clicking on them. If you click on one section and the hold down the shift key while clicking on another section, all of the sections in between will be selected. Holding down the control key while clicking on a section will add that selection to those files already selected. Clicking on a highlighted section while holding down the control key will remove that section from the list of selected files.
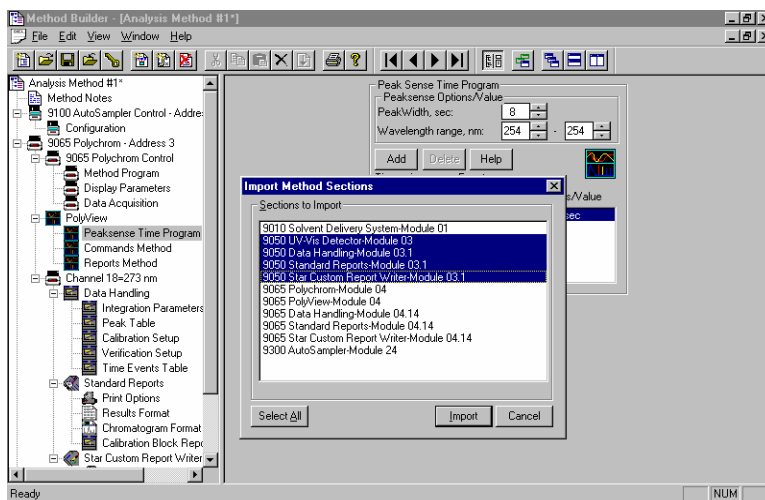
When the desired sections have been highlighted, click on the Import button to import them into the Method being edited. If the Method already has sections with the same module address and channel ID, you will be prompted to reassign a new module address and channel number to the imported section or overwrite the existing section in the current method.

Deleting Method Sections

To remove sections from a Method open the Method containing the sections you wish to remove in Method Builder. Click on the Delete Section button on the Method Builder Toolbar or select Delete Section from the File menu. A dialog box of sections contained in the Method file is displayed. Highlight the sections that you wish to delete by clicking on them. If you click on one section and the hold down the shift key while clicking on another section, all of the sections in between will be selected. Holding down the control key while clicking on a section will add that selection to those files already selected. Clicking on a highlighted section while holding down the control key will remove that section from the list of selected files.

When the desired sections have been highlighted, click on the Delete button to delete them from the Method being edited. You will prompted to confirm that you want to delete each section before it is deleted.

Printing the Method

To print a method from Method Builder, click on the Print button on the Toolbar and select the Method section or sections to be printed. The active Method can also be printed from the System Control Toolbar and the Star Toolbar. Click on the Active Method Options button on the System Control Toolbar or on the Method Operations button on the Star Toolbar and select Print Method.

Password Protecting a Method

A Method can be password protected from changes by clicking on the Set Password button on the Method Builder Toolbar or selecting *Set Password* from the File menu.
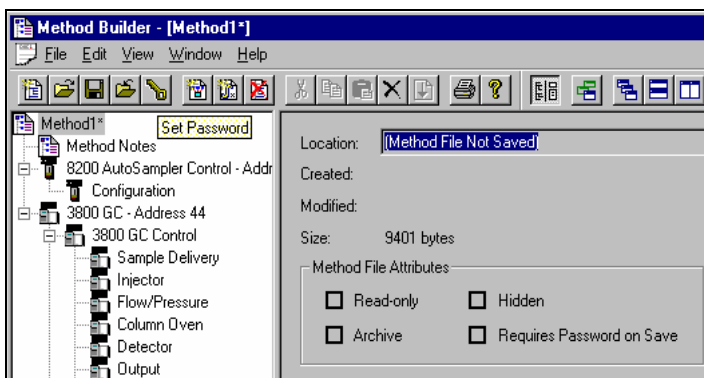
Enter the password and then re-enter it to verify that it was not mistyped.

After a Method has been password protected, the password will be required to save changes to the Method.

Once a Method is password protected, it can be activated and used for instrument control and data acquisition. It can also be viewed from Method Builder. Only the saving of changes to the Method will be inhibited unless the correct password is entered.

Injecting a Single Sample

By now you should have your instrument configured and a basic Method built for data acquisition. If this hasn't been done, please refer to the previous sections for instructions.

Using the Inject Single Sample Dialog Box

You can inject a single sample from System Control by using the Inject Single Sample dialog box.
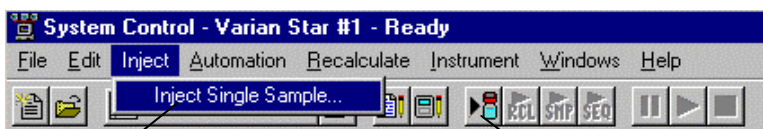
Display the Inject Single Sample dialog by selecting it from the Inject menu…

or by clicking on the Inject Single Sample button on the toolbar.

The Inject Single Sample dialog box is displayed.

Specifies the number of injections of this sample.

Enter notes about the sample.

Refer to Specifying Per-Sample Data Handling Parameters on page 67.

Enter information about the sample.

Click Inject to start the run.

Select the Method to use for the run.

Change the location and name of the Data Files.

The fields in the table change depending on the type of sampling device configured in the instrument.

Specifying the Data File Name and Path

Data File names can be up to 255 characters long. Sample ID, injection date, module name, and injection number can be embedded in the file name making the Data File name correlate with each sample injection. When you click on the *Data Files…* button, the Data Files Generation dialog box is displayed. This dialog box allows you to select the path and the filename "specification" for the data file.

The left side of the Data File Generation dialog box allows you to select the drive letter and subdirectory (path) where the data files are to be stored. The default directory is the data subdirectory of your Star directory.

The right side of this dialog box allows you to create a filename "specification". You can combine text entry with the "%" variable symbols shown to specify filenames that contain sample injection specific information. An example of the filename is dynamically updated as you type in the filename specification. This makes it easy to see how a Data File created with this filename specifications would appear.

Specifying Per-Sample Data Handling Parameters

Most Data Handling parameters are specified in the Method used during the injection. Some parameters may vary on a per-sample basis, and are therefore specified when you perform the injection. The following Data Handling parameters can be specified on a per-sample basis:

- Unidentified Peak Factor

- Multiplier

- Divisor

- Amount Standard when one Internal Standard is being used

Refer to the *Data Handling and Report Operation Manual* for a brief description of these parameters. Refer to the *Regulatory Compliance Manual* for a complete description of how these parameters are used to calculate results.

Not only can you specify these parameters on a per-sample basis, but you can specify them on a per-detector channel basis. This is useful if, for example, you have an ADC Board with channel A and channel B connected to two different detectors or a 9065 Polychrom detector with up to 38 channels. In addition, if you are using multiple internal standards, you can also specify their amounts on a per sample and per detector channel basis.

To access these extended Data Handling parameters, click on the button in the Multi-Channel Multi-Standard column in the Inject Single Sample dialog box. The Data Handling Channels dialog box is displayed. When you select the detector channel in the Data Handling Channels dialog box, the calculation type, internal standard peaks and amounts are read from the active Method. ***Be sure the Method you will be using is already active before you enter detector-specific parameters.***

Select specific detector channels here (up to 5).

Use these buttons to edit the corresponding sections of the active Method.

An amount may be entered for each internal standard peak in the Method.

Specifying a RecalcList

You can choose to create a new RecalcList, append to an existing RecalcList, or not create nor update a RecalcList. To select the RecalcList option that you want, click on the RecalcList button. The RecalcList Generation dialog box is displayed.

If you choose to create a new RecalcList, this automatically generated RecalcList will not overwrite an existing RecalcList unless you also specify "Overwrite the Recalc List each time the SampleList begins". If a RecalcList with the same filename exists, the newly created RecalcList will have number appended to its filename to make it unique and to prevent the older RecalcList from being overwritten.

Monitoring the Status of the Run

After an injection is performed, the status of the run can be monitored in the instrument window.

Module status is shown in the status and control windows and on the toolbar.

The total number of injections completed is shown in the Instrument Status window.

A list of data files generated will appear here with a Quick Link button to access the selected data file.

The chromatogram is displayed as it is acquired.

Automation actions and errors are logged in the Message Log.

When you double-click on the status bar at the bottom of the instrument window, the entire Message Log window is displayed.

All Message Log entries are stamped with the time they occurred.

Using Quick Start

QuickStart is a fast way to inject a single sample without having to use System Control directly. QuickStart can be customized and is ideal when setting up instruments for routine use. Refer to the on-line help in QuickStart for further details.

QuickStart first starts System Control and waits until all modules have logged in. When ready, the QuickStart window is displayed.
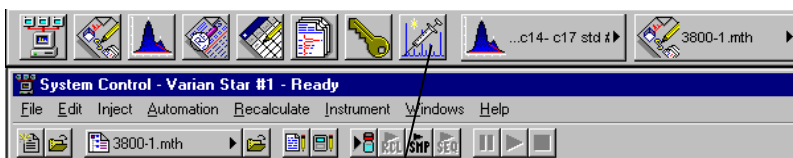
This button on the Star Toolbar opens QuickStart for doing injections of routine samples.

Choose the instrument for the injection.

Enter information about the sample.

Enter the name of the Method you wish to use.

Enter the name of the folder you wish to use for storing the Run files.

Star QuickStart - 3

File Screen Options

Instrument Number	3
Instrument Name	Instrument #3
Operator Name	N. Garas
Sample Name	UV Standard
Sample Description 1	specimen # 5
Sample Description 2	

Primary Method
C:\Star\HP_FC1_330.mth

Folder for Data File Storage
c:\Star\PS_430_4

Browse   430

Sample Type
- ○ Baseline
- ○ Calibration
- ● Analysis
- ○ Verification

☐ Clear Coefficients

AutoLink...

Well/Vial	A1
# Injects	2
Wash Vol.	300
Volume	20
Amount	1
Factor	1
Multiplier	1
Divisor	1
Level	1

Inj. Mode Partial Loopfill ▼

Hardware

Start   Stop   Help   Exit

Enter sampling information. This information is specific to the type of sampling device installed.

Refer to the on-line help for more details on the QuickStart screen.

Press Start to begin.

AutoSamplers and Using Inject Single Sample as a Priority Sample

Selecting a Vial from the AutoSampler Display

Each of the supported AutoSamplers will have a graphic representation of their carrousel displayed in System Control. You may perform an individual injection of any vial by simply double clicking on the appropriate vial in that display. The Inject Single Sample dialog will appear and, after entering the information, the injection will be performed.
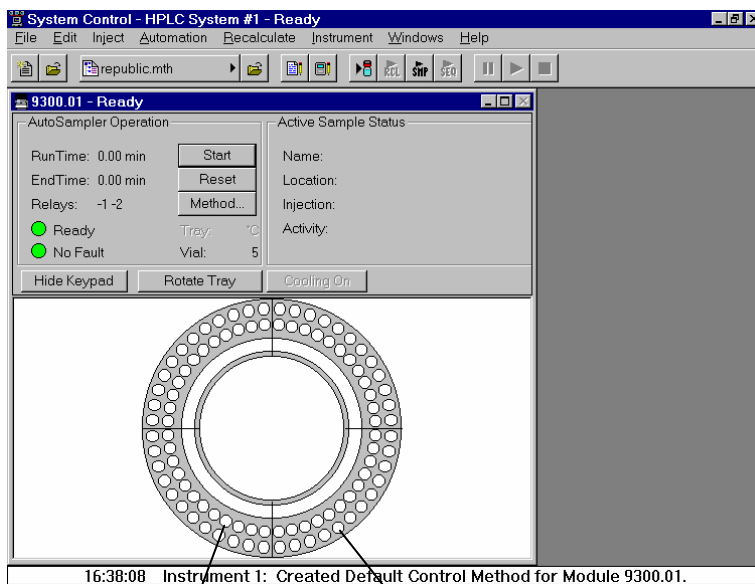
A single mouse click on a vial position will cause the number identifying that position in the AutoSampler's carrousel to be displayed.

A double click on a vial position will cause the Inject Single Sample dialog to be displayed.

Using Inject Single Sample for Priority Samples

You may use either the graphical selection of a vial described above or the Inject Single Sample dialog described earlier as a priority sample in conjunction with automated analyses. While automation is running, you may suspend the current active SampleList, double click on the vial position where you have placed your high priority sample or choose inject single sample as described above and perform your injection. Upon completion of the priority run, you can then resume the SampleList you were running by clicking on the *Resume* button on the bottom of the SampleList.

Click here to suspend the execution of the SampleList if one is currently running.

Double click on the vial position corresponding to the sample you wish to use for a single injection.
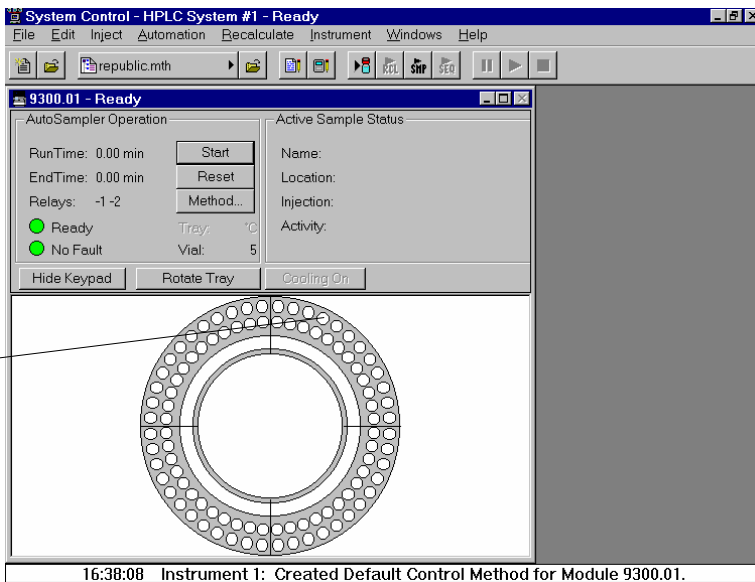
The Inject Single Sample dialog will be displayed.
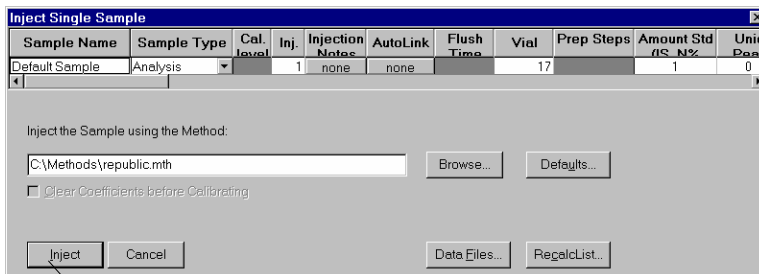
After entering the appropriate information, press Inject to start your chromatographic run.

System Control - HPLC System #1 - Suspended

File Edit Inject Automation Recalculate Instrument Windows Help

republic.mth

9300 SampleList: Analysis for Tuesday March 3, 1998.smp

		Sample Name	Sample Type	Cal. level	Inj.	Injection Notes	AutoLink	Flush Time	Vial
1	*	Blank Injection	Baseline		1	none	none		1
2		Calib. Standard #1	Calibration	1	3	none	none		2
3		Calib. Standard #2	Calibration	2	3	none	none		3
4		Calib. Standard #3	Calibration	3	3	none	none		4
5		Calib. Standard #4	Calibration	4	3	none	none		5
6		Calib. Standard #5	Calibration	5	3	none	none		6
7		Verification Lvl 2	Verification	2	1	none	none		7
8		Verification Lvl 4	Verification	4	1	none	none		8
9		Analysis aliquot 1a	Analysis		1	none	none		9
10		Analysis aliquot 1b	Analysis		1	none	none		10
11		Analysis aliquot 1c	Analysis		1	none	none		11
12		Verification Lvl 3	Verification	3	1	none	none		12
13		Analysis aliquot 2a	Analysis		1	none	none		13
14		Analysis aliquot 2b	Analysis		1	none	none		14
15		Analysis aliquot 2c	Analysis		1	none	none		15
16		Verification Lvl 3	Verification	3	1	none	none		16
17									
18									
19									

Add
Insert
Delete
Fill Down
Add Lines...
Defaults...

Begin Suspend Resume   Data Files... RecalcList...

17:06:26   Instrument 1: Automation Suspended

Click on Resume to continue with your SampleList from the point you suspended it.

Injecting Multiple Samples

By now you should have your instrument configured and a basic Method built for data acquisition. If this hasn't been done, please refer to the previous sections for instructions.

Using a SampleList in System Control

You can inject multiple samples from System Control by using the SampleList.
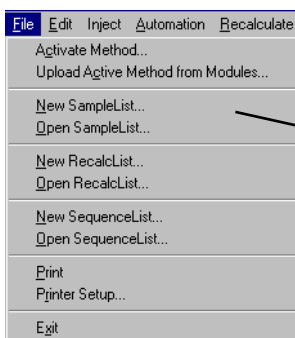
Choose to open either a New SampleList or an existing SampleList from the File menu.

…or by clicking on the New or Open Automation File button on the toolbar.

The SampleList window for the open SampleList is displayed. It contains fields that are specific to the sampling device configured in the instrument. In this case, since there is no sampling device configured, a generic SampleList is used (no vial positions or sampling options).

Spreadsheet columns can be sized by dragging their border using the left mouse button.

Move columns by dragging them using the right mouse button. Right click on column headers for formatting options.

Enter notes about the sample.

Enter postrun operations to be performed.

Enter information about the samples and the injections you wish to perform.
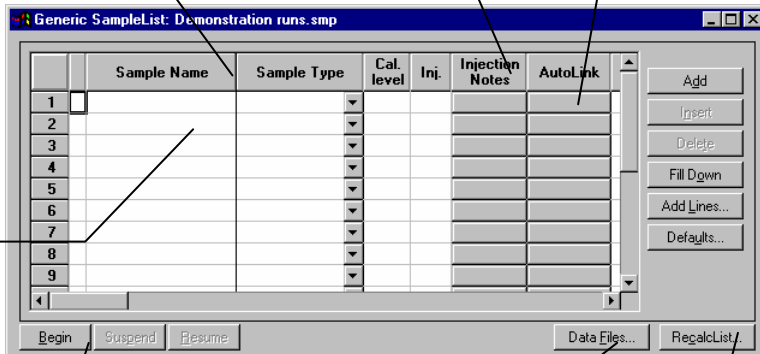
Press the Begin button to start injecting samples.

Select the location and name for the Data Files generated by the SampleList.

Used to specify RecalcList generation options.

When the table is scrolled to the right, the Sample Name column doesn't scroll so you can easily tell for which sample you are entering additional parameters. Commonly used data handling parameters, the amount for single internal standard calculations, the unidentified peak factor, a multiplier, and a divisor, can be entered directly into this table. If you have more complex requirements, such as multiple internal standards or multiple detectors requiring different entries for these data handling parameters, click on the button in MultiChannel MultiStandard column.

Each of the HPLC AutoSamplers; the 9100, the PS-400, the PS-410, the PS-420, and the PS-430 is supported by its own SampleList section. The 9200 sample preparation device may have its own SampleList section or, if it is used in conjunction with an AutoSampler, may have its Prep Steps included with the AutoSampler SampleList section to which it is assigned. A SampleList may have more than one AutoSampler section in it and thus may be used for different AutoSamplers. The information entered for one AutoSampler section of the SampleList will not be displayed or used in other AutoSampler sections. SampleLists are, in fact, the *Method* by which an AutoSampler program is created since AutoSamplers operate on a per sample basis as opposed to the time resolved Method for pumps and detectors.

9100 SampleList

Use AutoMix routines to add internal standards, dilute and mix samples just prior to injection, and to derivatize samples for better separations and/or detection.

Use Prep Steps when operating with a 9200 Sample Preparation device.

Use the Carrousel button to build a SampleList based on the vials entered and detected automatically in the 9100 carrousel.

9200 SampleList

You will use the 9200 SampleList if you have configured a 9200 SamplePreparation device with your HPLC system and have no other AutoSampler controlled by The Star Workstation configured in the same instrument.

Use the Sample Preparation Steps to control the unique features of the 9200.

ProStar 400 and 9300 SampleList

The PS-400 and 9300 may be used in conjunction with the 9200 SamplePreparation device; use the *Prep Steps* button to access these parameters.

ProStar 410 and AI-200 AutoSampler SampleList

In addition to support for the 9200 Sample Preparation device, the PS-410 and AI-200 support AutoMix functions.

Use the AutoMix Routines button to access the parameters for diluting, mixing, and transferring aliquots from one vial to another.

Click here to enter extended data handling parameters.

If you need to add several similar lines to the sample list, click on the Add Lines… button. You can then enter the common information in the dialog box.

For sequentially numbered Sample names, enter the starting number and the number of entries to add to the SampleList. The Sample Names will have these numbers appended to them.

Note that neither volume nor rack and vial number will be displayed in this screen even if an AutoSampler is present. When you press the Begin button, you are prompted for the Method to use.

Enter the Method to use for the run…

…or browse for the Method file.

After you click on OK, the run will begin. If you are using a manual injector or a sampling device that is not controlled by the Star Workstation, you will need to start the device manually.

Specifying the Data File Name and Path

Data File names can be up to 255 characters long. Sample ID, injection date, module name, and injection number can be embedded in the file name making the Data File name correlate with each sample injection. When you click on the Data Files… button, the Data Files Generation dialog box is displayed. This dialog box allows you to select the path and the filename "specification" for the data file.

The left side of the Data File Generation dialog box allows you to select the drive letter and subdirectory (path) where the data files are to be stored. The default directory is the data subdirectory of your Star directory.

The right side of this dialog box allows you to create a filename "specification". You can combine text entry with the "%" variable symbols shown to specify filenames that contain sample injection specific information.

An example of the filename is dynamically updated as you type in the filename specification. This makes it easy to see how a Data File created with this filename specifications would appear.

Specifying Per-Sample Data Handling Parameters

Most Data Handling parameters are specified in the Method used during the injection. Some parameters may vary on a per-sample basis, and are therefore specified when you perform the injection. The following Data Handling parameters can be specified on a per-sample basis:

- Unidentified Peak Factor

- Multiplier

- Divisor

- Amount Standard when one Internal Standard is being used

Refer to... Refer to the *Data Handling and Reports Operation Manual* for a brief description of these parameters.

Refer to... Refer to the *Regulatory Compliance Manual* for a complete description of how these parameters are used to calculate results.

Not only can you specify these parameters on a per-sample basis, but you can specify them on a per-detector channel basis. This is useful if, for example, you have an ADC Board with channel A and channel B connected to two different detectors on an LC. In addition, if you are using multiple internal standards, you can also specify their amounts on a per sample and per detector channel basis.

To access these extended Data Handling parameters, click on the button in the Multi-Channel Multi-Standard column in the SampleList. The Data Handling Channels dialog box is displayed. When you select the detector channel to in the Data Handling Channels dialog box, the calculation type, internal standard peaks and amounts are read from the active Method. ***Be sure the Method you will be using is already active before you enter detector-specific parameters.***

Select specific detector channels here (up to 4).

Use these buttons to edit the corresponding sections of the active Method.

An amount may be entered for each internal standard peak in the Method.

Specifying a RecalcList

You can choose to create a new RecalcList, append to an existing RecalcList, or not create nor update a RecalcList. To select the RecalcList option that you want, click on the RecalcList button. The RecalcList Generation dialog box is displayed.

If you choose to create a new RecalcList, this automatically generated RecalcList will not overwrite an existing RecalcList unless you also specify "Overwrite the Recalc List each time the SampleList begins". If a RecalcList with the same filename exists, the newly created RecalcList will have number appended to its filename to make it unique and to prevent the older RecalcList from being overwritten.

Changing Default SampleList Entries

When you add a new row into a SampleList, default values are used for each cell. To change the default values, click on the Defaults… button in the open SampleList window. The following dialog box will be displayed. Enter the desired default values and click on Save.

Note that neither volume nor rack and vial number will be displayed in this screen even if an AutoSampler is present.

Monitoring the Status of Runs

After an injection is performed, the status of the run can be monitored in the instrument window.

Module status is shown in the status and control windows and on the toolbar.

The total number of injections completed is shown in the Instrument Status window.

A list of data files generated will appear here with a QuickLink button to access the selected data file.

Automation actions and errors are logged in the Message Log.
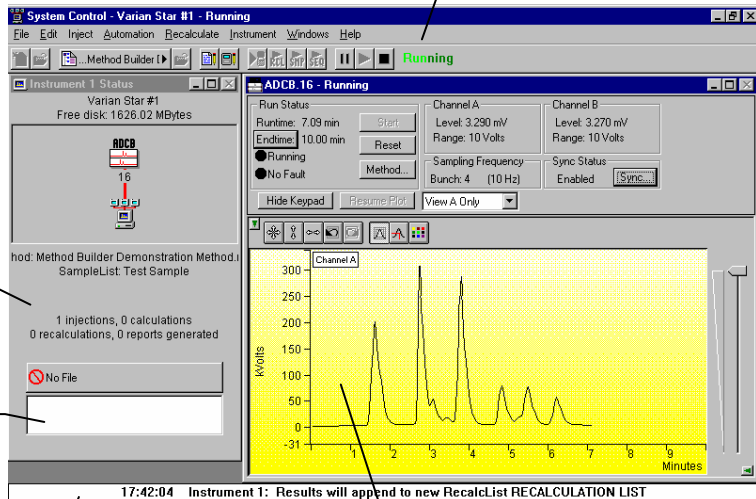
The chromatogram is displayed as it is acquired.

When you double-click on the status bar at the bottom of the instrument window, the entire Message Log window is displayed.

All Message Log entries are stamped with the time they occurred.

```
Message Log: MSGLOG1.MLG                                              _ □ ×
17:42:04   Instrument 1:  Single Sample Automation Began
17:42:04   Instrument 1:  Activating Single Sample 'Test Sample'
17:42:04   Instrument 1:  Method Method Builder Demonstration Method.mth Activated
17:42:04   Instrument 1:  Results will append to new RecalcList RECALCULATION LIST
17:52:42   Instrument 1:  Data File test sample 1.run created for 'Test Sample', Injection 1.
18:03:06   Instrument 1:  Data File test sample 1001.run created for 'Test Sample', Injection 1.
18:03:06   Instrument 1:  ADCB.16 Ch A Data Handling: No peaks
18:03:22   Instrument 1:  Completed 1 Inject Actions for Test Sample with 1 Errors
18:03:22   Instrument 1:  Completed 0 AutoLink Actions for Test Sample
18:03:22   Instrument 1:  Completed 0 New Calibration Block Actions for Test Sample
18:03:22   Instrument 1:  Completed 0 Calibration Block Report Actions for Test Sample
18:03:22   Instrument 1:  End of Automation  reached.
```

Saving SampleLists for Later Use

When you make changes to the open SampleList, the changes are automatically saved to the SampleList file and will be used for the automated runs that are in progress. If you want to edit a SampleList other than the open SampleList, use the offline Automation File Editor application described in the next section of this manual.

Using More Than One Method for Injections

The Star Workstation allows you to perform automated injections using more than one Method. There are two ways in which this can be accomplished. The first is by changing the active Method from within the SampleList. The second is by using a Sequence.

Changing the Method in the SampleList

You may change the Method used during injections by activating a Method in a SampleList row.

Select Activate Method from the Sample Type cell.

Click on the AutoLink button. The Activate Method dialog box is displayed.

Enter the name of the Method to use…

…or pick the Method from a list of files.

When this line is encountered during automated injections, the specified Method is activated.

You may specify any number of Methods to be used in the SampleList.

Using the Sequence Window

The Sequence window allows you to specify multiple Methods and SampleLists to be processed during automation.
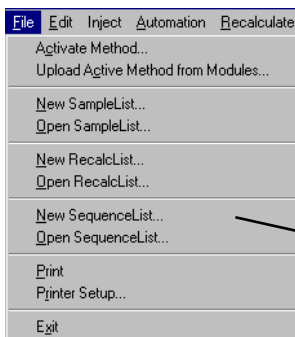
Choose to open either a New Sequence or an existing Sequence from the File menu..

…or by clicking on the New or Open Automation File button on the toolbar.

The Sequence window for the open Sequence is displayed.

Enter the Method and SampleList to use. You may enter any number of Sequence lines.

Choose the action to be done in that step of the Sequence from the drop down box.
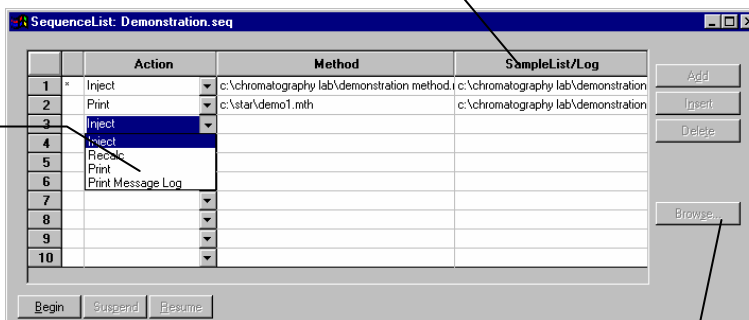
Press Begin to start automation.

Browse for a Method or SampleList file in the active cell.

Using the Combi PAL AutoSampler

This section describes the configuration and use of the Combi PAL Autosampler with the Varian Workstation. Please refer to the *Pre-Installation Instructions* for information on firmware version compatibility with the Varian Workstation software.

The Combi PAL is the most flexible AutoSampler controlled by the Varian Workstation. The CPAL driver and firmware are basically identical for the LC and GC configurations, and are differentiated only by their accessories and the mounting components. The driver is aware of the equipment installed and required by a given method.

Configuring the CPAL AutoSampler

1. **Connect the Combi PAL to Your Varian Workstation.**

    The Combi PAL AutoSampler communicates with the Varian Workstation computer using the 9-pin serial communications cable. This cable is included in the package that comes with the Combi PAL purchase.

    The cable connects to the Serial 1 position on the back of the Combi PAL and the RS232 port position of the controlling Workstation computer.

    There should also be a synchronization cable that is used to connect the Combi PAL **Interface 1** position to the **S.I.D.1** position in the 3800 GC.

    After making sure the communication cables are all installed, turn on the AutoSampler. You are now in a position to move to the next step, which is configuring the Communication Ports in the System Control application.

---

2. Configure the Communication Ports in System Control.

The first time you start System Control, the Communication Configuration "Wizard" will start automatically to guide you through the configuration setup. Read the description presented in the Varian Communication Configuration windows. Click on *Next* to advance to the next step until you get to the Setup COMM Ports window.

This window can also be displayed from the Instrument menu item, "Setup COMM Ports".
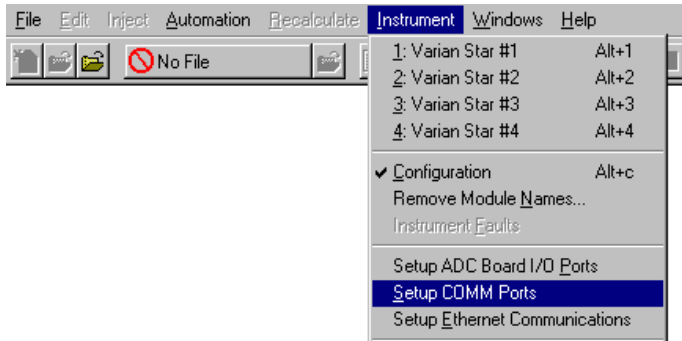
If the Combi PAL driver is installed, 'CombiPAL' is one of the choices available from the drop-down box below each available Serial COMM port. Select "CombiPAL" in the drop-down box below the port in which the 9-pin cable is attached to the Workstation's RS232 port (COM1-COM4).
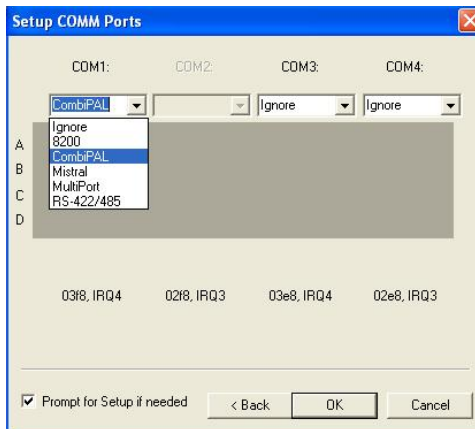
After you have completed your selections, the Setup COMM Ports Dialog should appear similar to the following figure. The selected serial port is dedicated to the CPAL and should not be used to connect any other serial device.
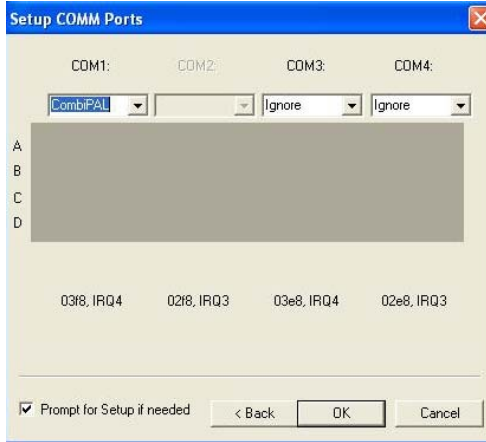
Now press the **OK** button to close the Dialog Box. The CPAL module address in System Control is derived from the serial slot number, as shown in the following table:

Slot / Port	Address
1 / COM1	24
2 / COM2	28
3 / COM3	32
4 / COM4	36

After the Combi PAL AutoSampler connects to System Control the following CPAL icon will be displayed in the Available Modules area.

The CPAL is now ready to be configured in an Instrument by dragging its icon from the Available Modules area of the Configuration Window into the Instrument Areas. System Control will remember where to put the icon the next time that the system connects.
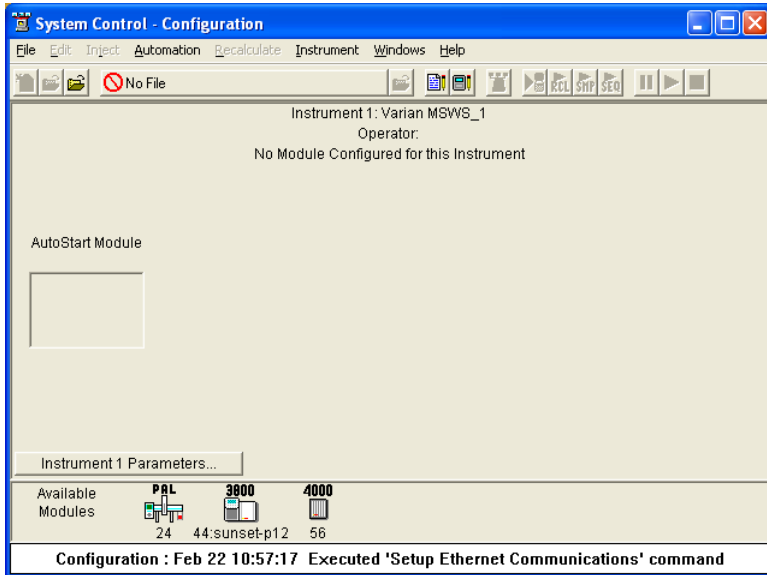
The following picture is an example of what the system should look
like if a CPAL AutoSampler is part of the Instrument.
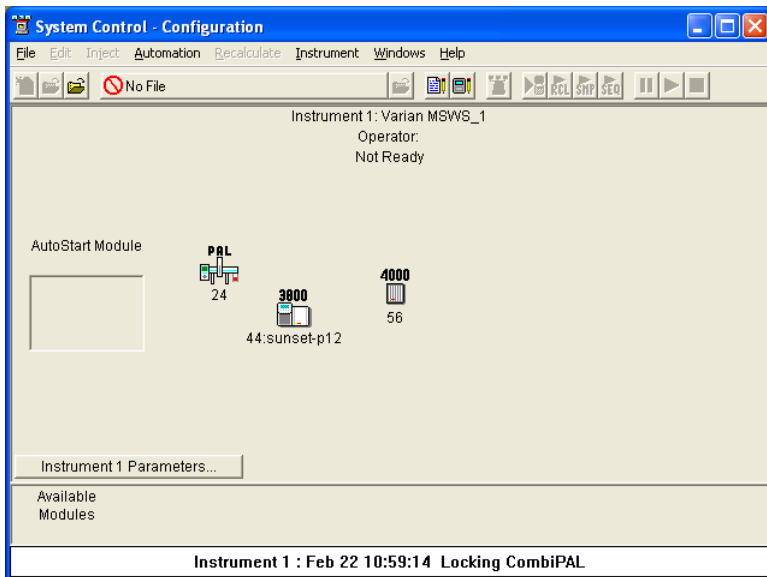
There can only be a single Combi PAL assigned to each instrument. If you wish the AutoSampler to begin sampling automatically when automation is started, place the Combi PAL icon in the AutoStart Module box for the Instrument. System Control will remember where to put the icon the next time that the AutoSampler connects.
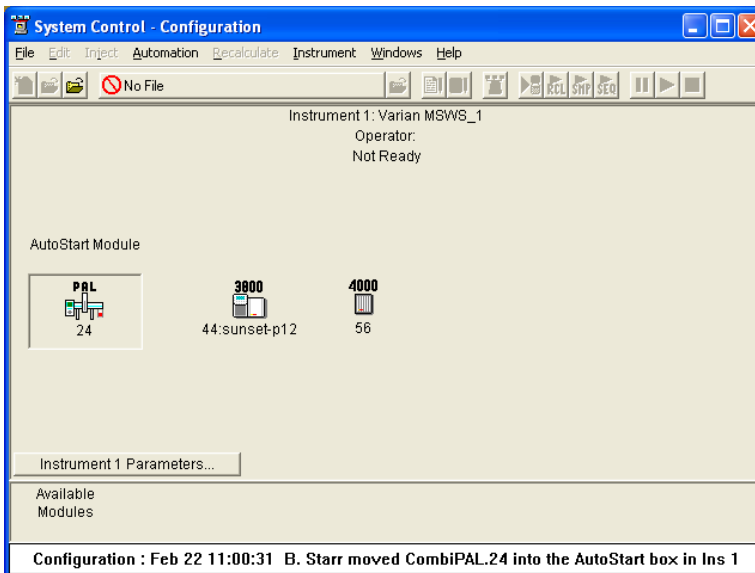
Now switch to the Instrument Window to view the Combi PAL Window. You are now ready to program the AutoSampler to perform fully automated sampling.

The CPAL Status Window

The Combi PAL AutoSampler Module Window will look similar to the Status Window shown below. The caption of the Window reflects the general module status: Ready, Not Ready, Running, etc.
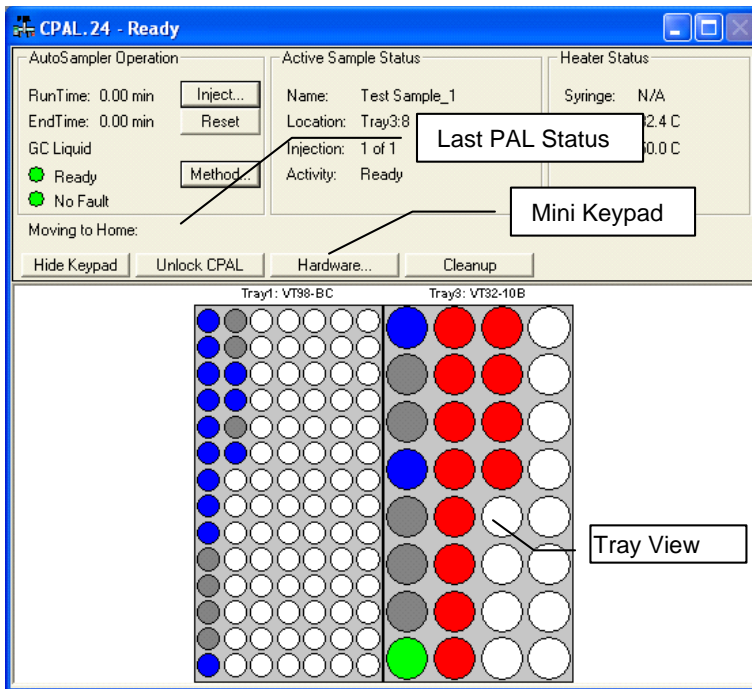
The AutoSampler Operation Parameters

The left side of the window shows the Autosampler Operation parameters: Run Time, End Time, Mode (i.e., Liquid, Headspace or SPME), Status LED and Fault/No Fault LED. The Inject and Reset pushbuttons control the AutoSampler's immediate operation. The Method pushbutton opens the Method Editor for editing the Autosampler method parameters.

The Active Sample Status Parameters

This is initially blank, and becomes active when the SampleList begins running. After the SampleList begins to run, this section of the window would show the status of each sample in turn, indicating the Name, Location, Injection, and the current sample status as it is processed by the AutoSampler.

Heaters Status

This group of parameters shows the status of the Syringe, Agitator and Bakeout (Heater Status). If any of these options were not relevant to the particular mode of your CPAL AutoSampler, then it would display N/A for Not Applicable.

Last CPAL Status

This field contains the last meaningful status received from the Combi PAL firmware.

Mini-Keypad Buttons

The following buttons are located between the AutoSampler Status Window and the sample Tray View window:

The Hide keypad button allows you to conceal the upper part "keypad" of the Status window and gain a larger view of the sample tray or plate layout.

The Unlock CPAL button allows you to release control of the AutoSampler, in order to re-establish manual control, e.g. to change syringes. When the PAL is unlocked, the button becomes 'Lock CPAL' and the Combi PAL state is set to 'Not Responding / Offline'.

The 'Lock CPAL' button, would regain control from the Star WS.

The Hardware button displays the detected Combi PAL AutoSampler hardware dialog, and would allow you to set standby values for heated zones if installed. Trays, Injector, Barcode, Agitator and Syringe would all indicate whether or not they are installed and if so, what type, name and position.

CPAL Hardware Configuration

Firmware Version:	2.4.0
Driver Version(s):	2.00.00
Injectors:	LC Vlv1
Barcode Reader:	LS-1220
Syringe:	100 ul Liquid
Agitator:	not present
Bakeout Station:	not present
Loop Volume:	20.0 uL

Standby Temp: (Syringe)
Standby Temp: (Agitator)
Standby Temp: (Bakeout Station)

Tray   Tray Type   (Tray Properties)

```
Cooler1   VT98C   ( 7 rows, 14 columns, no transport, no barcode, not cooled )
CStk1-01  DW96    ( 8 rows, 12 columns, no transport, no barcode, not cooled )
CStk1-02  DW96    ( 8 rows, 12 columns, no transport, no barcode, not cooled )
CStk1-03  MT384   ( 16 rows, 24 columns, no transport, no barcode, not cooled )
CStk1-04  MT96    ( 8 rows, 12 columns, no transport, no barcode, not cooled )
CStk1-05  DW96    ( 8 rows, 12 columns, no transport, no barcode, not cooled )
CStk1-06  DW96    ( 8 rows, 12 columns, no transport, no barcode, not cooled )
Tray1     VT98-BC ( 7 rows, 14 columns, transport, barcode, not cooled )
```

OK   Cancel

The Cleanup button is used to start a manual cleaning cycle that is appropriate for the current mode. It performs all the pre- and post-injection washes specified in the active method.

Tray View

The tray display reflects the number and type of trays and tray stacks found by reading the hardware configuration from the CPAL AutoSampler. This CPAL hardware configuration is read every time the AutoSampler connects to the Workstation.

The vial positions are color coded during sample processing. Red indicates vials listed in the active SampleList that have not yet been sampled. Green indicates the vial currently being sampled. Gray indicates vials programmed in the sample list that were not found

when the AutoSampler tried to sample or move them. Blue indicates the vials in the active SampleList that have been sampled.

Under automation, the active vial/tray will automatically be brought into view in the Tray View area.

Building a Combi PAL Method

For a detailed description of the CPAL AutoSampler Method parameters, please refer to the online help in the Method Builder application of the Varian Workstation.

Injection Mode:	Liquid
Required Syringe:	10 ul Liquid
Read Bar Codes:	Never
Use Bar Codes:	To Generate Samplenames
Pre-Inj Flushes Solvent 1:	0
Pre-Inj Flushes Solvent 2:	0
Pre-Inj Flushes Sample:	0
Sample Flush Volume Pct:	50
Vial Penetration Depth Pct:	95
Plunger Fill Speed:	5.000 ul/sec
Fill Strokes:	0
Viscosity Delay:	0.300 sec
Air Volume Below Sample:	1.000 ul
Injector:	Front
Pre-Injection Delay:	0.500 sec
Plunger Inject Speed:	5.000 ul/sec
Post Injection Delay:	0.500 sec
Post-Inj Flushes Solvent 1:	0
Post-Inj Flushes Solvent 2:	0
GC Cycle Time:	0 (OFF)

Modes of Operation

There are 4 modes of operation available in the current version of the CPAL driver: GC Liquid, GC Headspace, GC SPME and LC mode.

All modes of operation support the use of a barcode reader. The bar codes must be placed vertically on the sample vials. When the Read Bar Codes is enabled in the CPAL Method, the sample vial is transported to the reader for the code to be scanned. The transport mechanism uses magnets to transport vials with magnetic vial caps. Different magnet sizes are used for 2 mL and 10/20 mL vials and therefore these two types cannot be mixed if barcodes are to be read.

All modes of operation support the preparation of the next sample (if any) during the current analysis (Prep Ahead). A Cycle Time parameter is provided to allow the preparation to start at the appropriate time.

GC Liquid Mode

This mode uses relatively small syringes (1 - 100 µL) to Inject liquid sampled from tray vials into a GC Injector. The needle is cleaned via solvent flushes. This mode does not make use of the heated agitator accessory.

GC Headspace Mode

This mode is used for the Injection of vapor sampled above a liquid into a GC Injector. This mode uses relatively large volumes (up to 5 mL). The headspace syringes are typically heated to prevent condensation.

The sampling is either performed in the Tray (ambient temp) or in an agitator accessory, which can optionally be heated. When the agitator is used, vials are transported to the agitator and equilibrated before sampling, then returned to their original position after injection or if any error is encountered. The needle is cleaned via a gas flushing built into the heated syringe.

GC SPME Mode

This mode uses a Solid Phase Micro Extraction Fiber, which is dipped in a liquid sample or held in the vapor above the liquid (Headspace SPME). This extracts some of the components of the sample, which can then be desorbed by heat in the injector or in the bakeout station.

The sampling can be performed in the Tray (ambient temp) or in an agitator accessory, which can optionally be heated. When the agitator is used, vials are transported to the agitator and equilibrated before sampling, then returned to their original position after injection or if any error is encountered.

The optional bakeout station provides a mechanism for cleaning the SPME fiber after injection.

LC Mode

In this mode the CPAL samples a liquid from a tray vial and injects it in an HPLC Injection port. It is very similar to the GC Liquid mode, with the added provision of washing the injection port with one or two solvents after the injection.

LC Accessories include cooled trays, which have standalone temperature controller. The CPAL does not control or read-back the temperature for the cooled trays or tray stacks.

Building CPAL SampleList

Whenever you configure a Combi PAL AutoSampler Module in an Instrument as described above, the Instrument's SampleList is automatically reconfigured to the appropriate format for control of the CPAL including the specific hardware configuration. To create a SampleList in System Control, select the File→New SampleList… Menu Command.
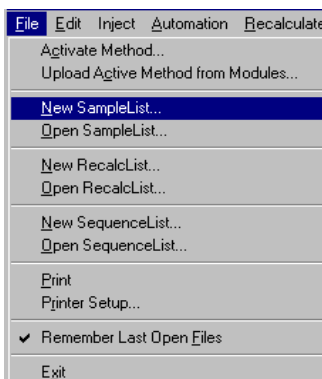
The 'Create a New System Control SampleList File' dialog is displayed and you are prompted to enter a File Name. Type a Name for your SampleList, select a "Save in:" directory and click on the Save button.
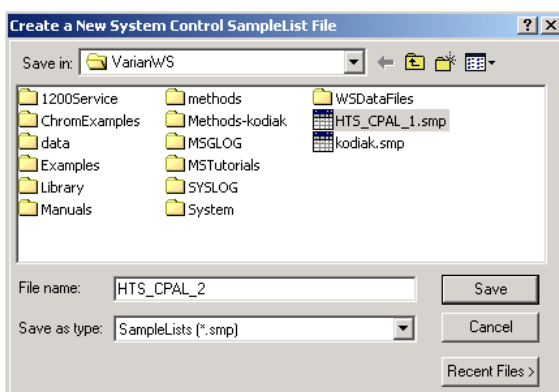
Next, maximize the SampleList Window so that all parts are visible. The Combi PAL SampleList is similar to the generic System Control SampleList, with additional columns to support operations specific to the CPAL.
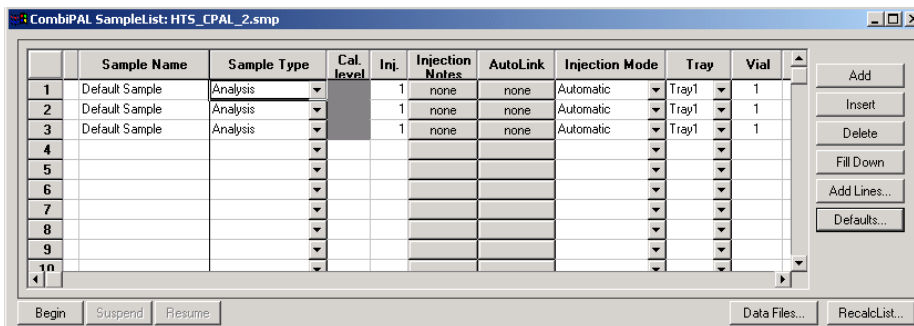
The Standard SampleList Columns are: Sample Name, Sample Type, Cal Level, Inj., Injection Notes, Autolink, Amount Std…,Unid. Peak Factor, Multiplier, Divisor, Internal Standard.

The Standard SampleList Buttons are:

- **Automation Group** (Begin, Suspend, Resume)

- **File Group** (Data Files…, Recalc List…)

- **Edit Group** (Add, Insert, Delete, Fill Down, Add Lines, Default).

Combi PAL Specific Features

Injection Mode: The Injection mode column in the CPAL SampleList is used to select one of the four different methods of injection that can be used by the CPAL:

Automatic: Automatic Injection using the CPAL.

No Injection: The CPAL will not inject, but will only send a start signal to the other modules in the Instrument. This is used, for example, to run a cleanup or shutdown method.

Manual Injection: This mode is used to do a manual injection. In LC mode, the driver will switch the CPAL LC Injector valve to the load position and will wait for you to trigger the Inject signal manually through a displayed dialog in System Control.
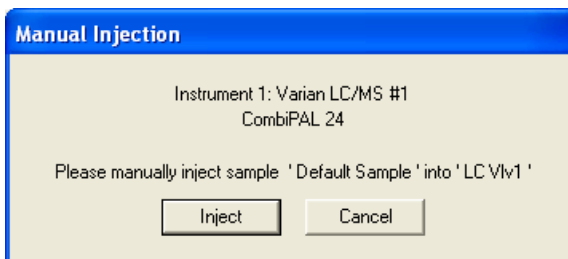
In GC mode, there is no Inject button in the Manual Injection dialog since the inject signal is triggered by the Automatic Start Switch that is part of the GC Injector.
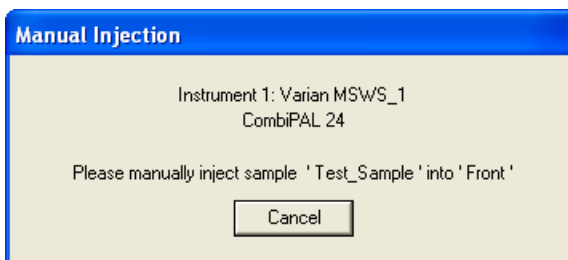
AutoMix Only*:* In this mode the CPAL will only execute the Automix steps specified in this line of the SampleList but will not do an injection. The SampleList will continue to the next line after executing the Automix steps.

Tray: The Tray column of the CPAL SampleList will contain a list of the actual Tray Names that were acquired from the Hardware and listed in the Hardware configuration dialog.

Vial: The Vial column will provide vial selection and range that is appropriate for the Tray that was selected for the same sample line. The CPAL Vial column specifies the well or vial from which you want to aspirate the sample for injection. For the titer plates, the location is specified as a combination of row letter and column number. The available rows and column numbers depend on the type of plate that is configured in the CPAL Hardware. For example, you can enter A1 through H12 for the 96 well plate and A1 through P24 for the 384 well plates. You can use the Well/Vial column to perform random access to any well or vial; for example you can periodically recalibrate using a single standard at a fixed location.

Automix Routines: The Automix Routines column allows you to define a specific automixing program to be performed before injecting the sample for the purpose of derivatization, tagging, dilution, etc.

When performing an Automix routine, you can program the CPAL AutoSampler to aspirate a specified amount of liquid from a Well, Vial, or a Reagent Vial, and then transfer that liquid to the sample Well or Vial from which an injection is to be made. You can mix the sample by aspirating and dispensing specified amounts of the mixture, and you can program the AutoSampler to wait for a specific period of time for a reaction to take place.

The Combi PAL Automix program is displayed as a list box with Commands formatted as meaningful sentences.
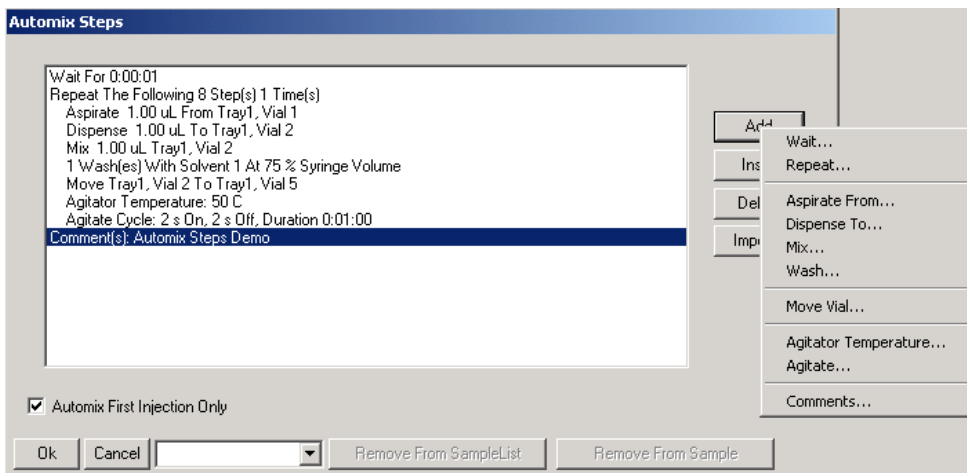
The Add and Insert buttons bring up a popup menu (above, right) showing the different commands that can be added. Based on the command selected, a dialog box is displayed to select its parameters.

Double-clicking on a line in the Automix steps will open the appropriate dialog to edit the command.

The "Wait" command allows you to program the CPAL to wait for a specific period of time before moving to the next step.
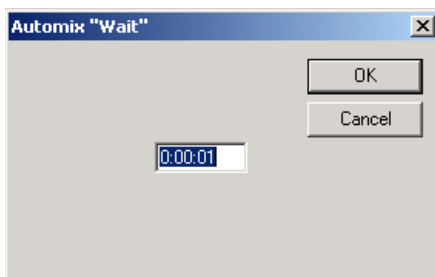
The "Repeat" command allows you to repeat the following N steps N times. Commands inside a 'Repeat' bracket are indented to readily identify the number of steps that are being repeated. The Repeat dialog for the above example is shown bellow.
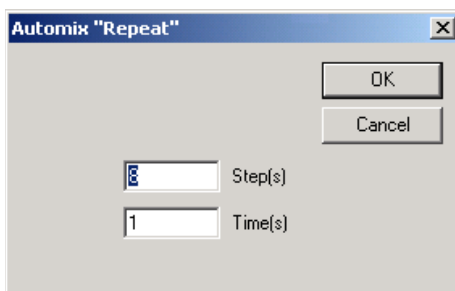
The sample command "Aspirate From" and "Dispense To" are shown below. You can specify the sampling vial as an "Absolute" vial number or as a "Relative" that is "Sample Vial + N".
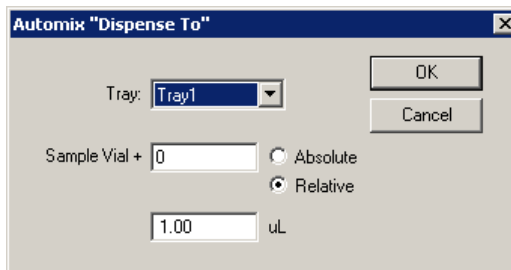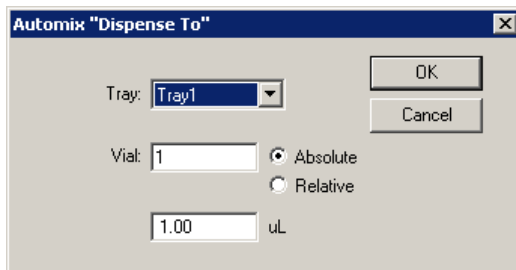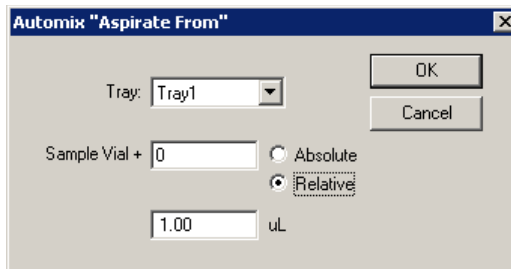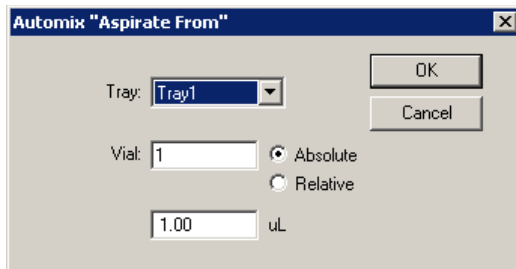
The "Mix" command performs mixing by aspirating and dispensing from the same vial. This command is to be used for trays that do not support transport, in particular the micro-titer plates.
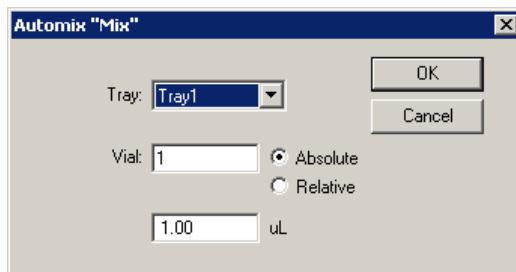
The "Wash" command allows you to specify the solvent to be used, the number of washes and the % of syringe volume.
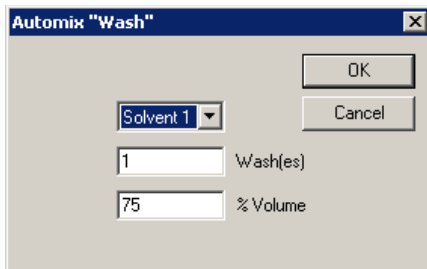
The "Move Vial" command deals with moving a vial mainly to and from the agitator. This applies to Trays that have the "transport" attribute.
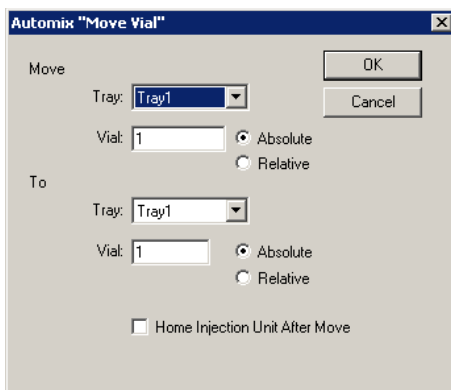
The "Agitator Temperature" command is used if the agitator is available and vials can be transported.
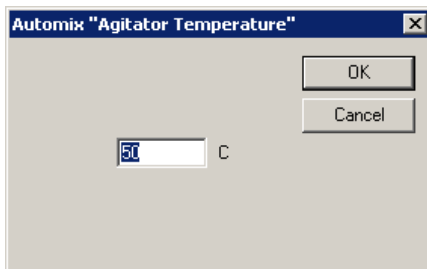
The "Agitate" command specifies the agitator Time on, the Agitator Time off, and the Total Duration of Agitation Cycle.
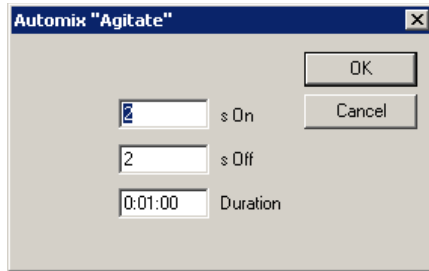
The Comments command provides a free form text field to enter a comment with a max length of 59 characters.
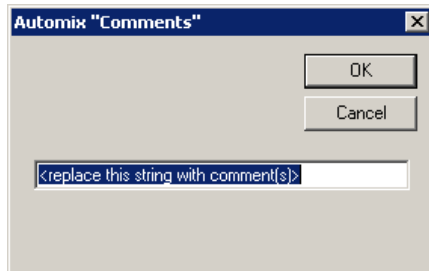
When doing multiple injections from the same sample vial you can choose to have the Automix routine done only once before the first injection. You can do that by checking the "Automix First Injection Only" box; otherwise the Automix routine will be performed before each injection from that sample vial.
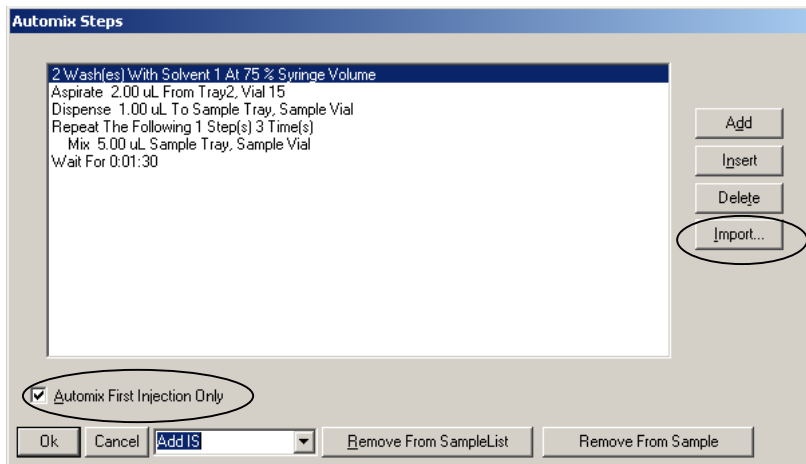
When you have finished creating an Automix routine you will need to give it a name by typing in the text box at the bottom of the Automix Steps screen. After pressing **OK**, this Automix routine will be added to the sample line and saved to the SampleList. Additional Automix routines can be saved to the same SampleList.

Injection Volume	Automix Routines
1.00	Add IS

To remove a Automix routine from the current sample line, press the **Remove From Sample** button. To permanently remove a saved Automix Routine from the SampleList, press the Remove From Samplelist button.
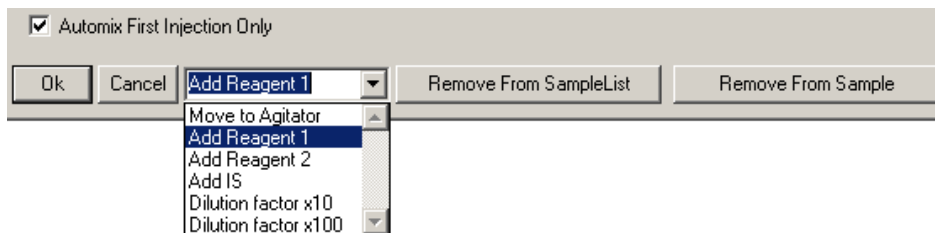
Saved Automix routines from other SampleLists can be retrieved and saved to the current Samplelist by pressing the Import… button and choosing the saved SampleList name from which you wish to import.

Editing or Creating CPAL SampleList Off-Line

When you create or edit a CPAL SampleList off-line in the Automation File Editor, there will be an additional 'Hardware' button displayed in the Sample List. This button brings up the following dialog:
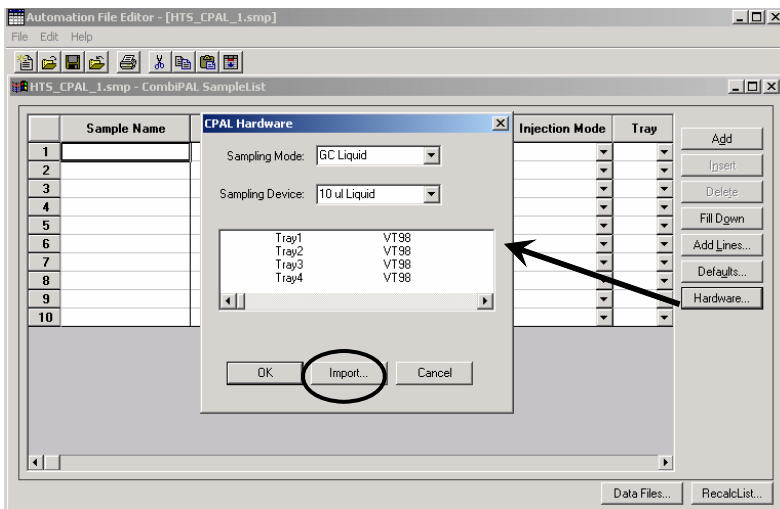
Because of the complexity of the CPAL Tray configurations, the sample list needs to be aware of all the hardware items, in particular the tray info and use this information to validate the sample location info. When the SampleList is edited in System Control (on-line), this information is automatically added to the SampleList.

If the SampleList is edited in the Automation File Editor (off-line) on the system to which the CPAL is attached, then you can use the **Import** button to load the tray configuration. If multiple CPALs are attached to the same Workstation, the **Import** button will let you select the appropriate configuration based on the unit's bus address.

Using the ProStar 420 and 430 AutoSamplers

Refer to...

This section describes the configuration and use of the PS-420 (AI-1A) AutoSampler and PS-430 (AI-96) AutoSampler with the Star Chromatography Workstation. Please refer to the *Pre-Installation Instructions* for information on firmware version compatibility with the Star Workstation software.

Configuring the AutoSamplers

3. Connect the AutoSampler to Your Star Workstation.

The AutoSampler communicates with the Star Workstation using the RS-422/485 serial communications. This allows multiple devices such as the PS-210, 215 or 218 pumps to be attached to a single RS-422/485 serial I/O cable (03-935462-91). An RS-232 to RS-422/485 converter connects the Star Workstation computer's serial port to the RS-422/485 Communications cable. The instructions for connecting this hardware to the Star Workstation computer are included in the RS-422/485 Communication Kit. Please refer to the LC Control Release Notes (03-914726-00) for a listing of acceptable system configurations.

4. Set the Device Identifier on the AutoSampler.

After completing communication cable installation, turn on the AutoSampler and press the System key, then press the <GENERAL> soft function on the AutoSampler front panel keypad. Press the Menu key to enter the General Menu field, and use the <COMM.> soft function to define a Device Identifier for communication with the Workstation. Press Enter (E) and use the up/down arrows to select an identifier. The identifier selected must be between 20 and 23.   Press Escape twice to return to the Ready Menu.

5. Put the AutoSampler in Serial Mode.

> The AutoSampler must be in Serial Mode to allow it to communicate with the Star Workstation through the AutoSampler's Serial Port. To select the Serial Mode, press the Menu key from the Ready Menu, then press the <SERIAL> soft key. The AutoSampler display should read:
>
> ```
> SERIAL MODE
> ```

Note: **When communicating with the Star Workstation, the AutoSampler should always display SERIAL MODE on its front panel. Do not exit by pressing the <EXIT> soft key unless you want to terminate communication with the Workstation.**

---

6. Configure the Communication Ports in System Control.

> The first time you start System Control, the Star Communication Configuration "Wizard" will start automatically to guide you through the configuration setup. Read the description presented in the Star Communication Configuration windows. Click on *Next* to advance to the next step until you get to the Setup COMM Ports window.
>
> This window can also be displayed from the Instrument menu item, "Setup COMM Ports"

Select "RS-422/485" in the Combo Box below COM1, COM2, etc., which you have an RS-422/485 cable attached. After you select "RS-422/485", four additional Combo Boxes will appear in the column: one each for subports A, B, C, and D, as indicated by the labels at the left side of the Dialog Box.

The Device Identifiers (20, 21, 22, and 23) are assigned to the COM Ports and subports as shown in the following table. System Control Module addresses that correspond to the port or subport to which the AutoSampler is connected are also listed.

Device Identifier	COM1	Module Address	COM2	Module Address
20	A	24	A	28
21	B	25	B	29
22	C	26	C	30
23	D	27	D	31

To attach the PS-420 or PS-430 AutoSampler to the Star Workstation, click on the Combo Box for the subport that corresponds to the Device Identifier set previously in the AutoSampler. Then select "ProStar 420" or "ProStar 430" according to the AutoSampler you are using. Select "Ignore" for the subports that you are not using.

After you have completed your selections, the Dialog Box should appear similar to the following figure.
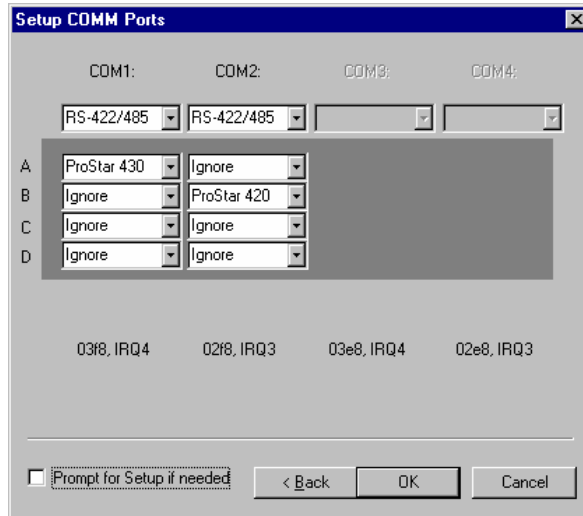
This example shows a PS-430 with its Device Identifier set to 20 that is connected to subport A of COM1. This AutoSampler will be assigned the address 24 in System Control, and its icon will have a label reading 430.24. This example also shows a PS-420 with its Device Identifier set to 21 that is connected to subport B of COM2. This AutoSampler will be assigned the address 29 in System Control, and its icon will have a label reading 420.29.

You can have up to four AutoSamplers or other modules connected to each RS-422/485 cable, depending on the load that these systems impose on the communication cable bandwidth.

Now press the OK button to close the Dialog Box. The AutoSamplers will connect and be represented by icons in the Available Modules area of the Configuration Window.

After each AutoSampler connects to System Control, configure it in a designated Instrument by dragging its icon from the Available Modules area of the Configuration Window into one of the four Instrument Areas. Only one AutoSampler is allowed per Instrument. If you wish the AutoSampler to begin sampling automatically when automation is started, place the AutoSampler icon in the AutoStart

Module box for the Instrument. System Control will remember where to put the icon the next time that the AutoSampler connects.

Now switch to the Instrument Window to view the Module Window for the AutoSampler configured in that Instrument. You are now ready to program the AutoSampler to perform fully automated liquid sampling.

The AutoSampler Status Window

Initially the AutoSampler Module Window will look similar to the PS-430 AutoSampler Status Window shown below. For a detailed description of the AutoSampler Status window and its controls, please refer to the online help in System Control.
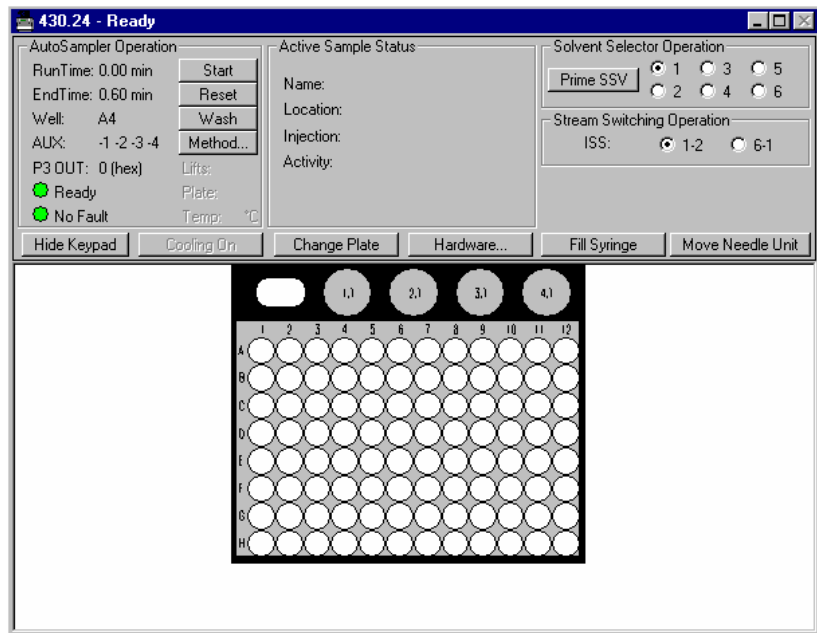
The left side of the window shows the AutoSampler Operation parameters: RunTime, EndTime, AUX State, Method State, Fault State, Plate/Tray Temperature (optional), and current Well/Vial location. The Start, Reset, and Wash pushbuttons control the AutoSampler's immediate operation. The Method pushbutton opens Method Builder for editing of the AutoSampler's method parameters. Below are the Hide Keypad, Cooling On, Change Plate, Hardware, Fill Syringe and Move Needle Unit pushbuttons. If no cooling option is installed on your AutoSampler, the Temperature display and Cooling On pushbutton will be disabled.

The middle section, to the right of the AutoSampler Operation section, of the AutoSampler window shows the Active Sample Status. This is initially blank, and becomes active when the SampleList begins running. After the SampleList begins to run, this section of the window will show the status of each sample in turn, indicating the Name, Location, Injection, and current Activity of each sample as it is processed by the AutoSampler.

The right side of the AutoSampler window shows the Solvent Selector Operation, such as the Solvent Selection Valve (SSV) or the Integrated Stream Switching valve (ISS). If any of these options are not installed on your AutoSampler, the corresponding operation will be disabled. If you are using a PS-430 AutoSampler with the Plate Feeder option installed, the buttons to control loading and unloading of the plate feeder lift are located below the Integrated Stream Switching valve controls.

A row of buttons separates the AutoSampler Status windows from the sample tray/plate layout window. The Hide Keypad button allows you to conceal the keypad display and gain a larger view of the sample tray or plate layout. If you have the Cooling option installed on your AutoSampler, the Cooling On/Cooling Off button will be enabled.

Use the Hardware button to set your AutoSampler hardware configuration. Some of the items in the Configuration dialog, such as the Tray Segments for the PS-420, Plate Type and Size for the PS-430, Syringe Volume, Sample Loop Volume, Needle Tubing Volume, First Transport Vial, and Last Transport Vial, can be edited. Other hardware options, such as Tray/Plate Cooling, Solvent Selector Valve, Integrated Stream Switching Valve, etc., are automatically listed in the Configuration dialog as Installed or Not Installed and can not be edited.

The following figures show the Hardware Configuration dialogs for both the PS-420 and the PS-430 AutoSamplers.

ProStar 420 Hardware Configuration

Tray Segments: A7,A2,B1,B2,C3,C2,D1,D5	
Syringe Volume:	250 ul
Sample Loop Volume:	100 ul
Needle Tubing Volume:	15 ul
First Transport Vial:	C9
Last Transport Vial:	C10
Tray Cooling:	Not Installed
Solvent Selector Valve (SSV):	Not Installed
Integrated Stream Switching Valve (ISS-A):	Not Installed
Integrated Stream Switching Valve (ISS-B):	Not Installed
Injector Valve PCB:	Installed
I/O PCB:	Installed

Update   Close

ProStar 430 Hardware Configuration

Plate Type and Size:	96 Well Low
Syringe Volume:	250 ul
Sample Loop Volume:	100 ul
Needle Tubing Volume:	15 ul
First Transport Vial:	None
Last Transport Vial:	None
Plate Cooling:	Not Installed
Solvent Selector Valve (SSV):	Installed
Integrated Stream Switching Valve (ISS):	Installed
Plate Feeder:	Not Installed
Injector Valve PCB:	Installed
I/O PCB:	Installed

Update   Close

The PS-420 AutoSampler Status window is shown in the following figure.
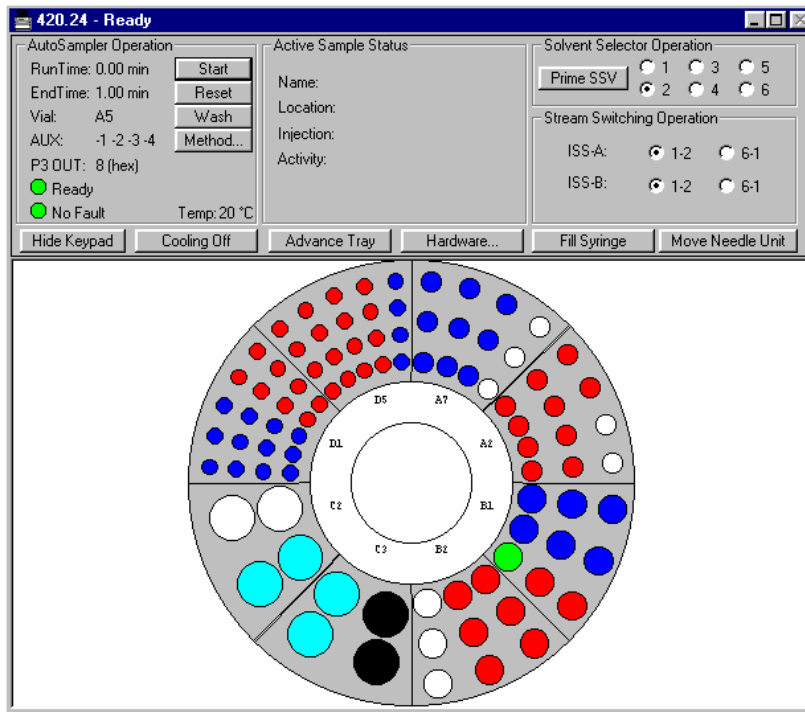
The bottom portion of this window displays the tray layout that is specified in the PS-420 Hardware Configuration. If a Vial location is referenced in the Active SampleList it is colored red, green, or blue, depending upon its status. Red indicates that there are injections of the sample remaining to be performed; green indicates an injection of the sample is currently running; and blue indicates that all injections of the sample have been completed. In addition, vials that are specified as Transport Vials will be colored dark gray (or black) and Reagent vials will be cyan.

The bottom portion of the PS-430 AutoSampler Status window, shown in the following figure, displays the PS-430 plate layout. If you have the Plate Feeder option installed on your PS-430 AutoSampler, you can select which plate to display; the Current Plate that is being sampled or any one of the additional plates that can be placed in the Feeder.
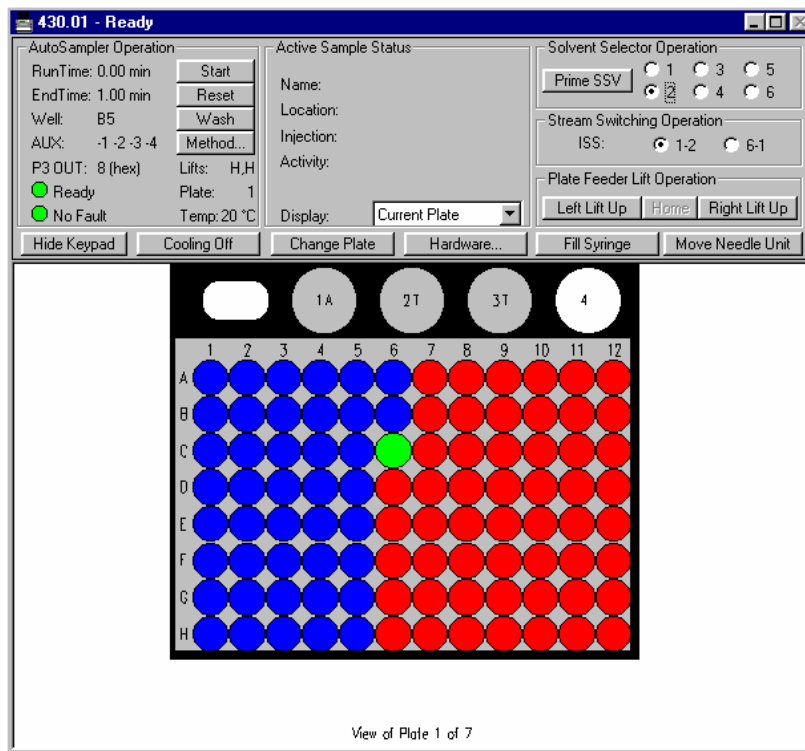
Depending upon the PS-430 Hardware Configuration, either a 48 Vial, 96 well, or 384 well layout is shown. It also shows the four Transport/Reagent vials at the top of the plate layout. If a Well/Vial location is referenced in the Active SampleList it is colored red, green, or blue, depending upon its status. Red indicates that there are injections of the sample remaining to be performed; green indicates an injection of the sample is currently running; and blue indicates that all injections of the sample have been completed. In addition, vials that are specified as Transport/Reagent Vials will be colored gray. The letter following the Transport/Reagent Vial number indicates how the vial is being used; T for Transport; A, B, C, or D for Reagent A, Reagent B, Reagent C, or Reagent D.

Building the AutoSampler Method

For a detailed description of the AutoSampler Method Builder parameters, please refer to the online help in Method Builder.

The ProStar 430 Method, shown in the following figure, contains all parameters that remain unchanged during the processing of samples in a SampleList. The Method should be configured to match the parameters that are selected in the Hardware Configuration, or installed as an option on your AutoSampler.

For the PS-430, the Plate Type and Size specifies which type of plate to use - the 48 Standard Vial holder, the 96 High or Low Well plate, the 384 Well plate, or the 96 Well User Defined.

Note: **When you select the 96 Well User Defined Plate Type, you must use the front panel of the ProStar 430 to select this option and enter the Max Number of Plates in the Instrument. You must also use the 'Plate Height Adjustment' on the front panel to calibrate the PS-430 for the type of plates you are using.**

For both the PS-420 and PS-430 AutoSamplers, the Syringe Volume, Sample Loop Volume and Needle Tubing Volume indicates the size of the installed hardware on the AutoSampler. Note that when the 10-mL syringe is selected, only the User Program can be used, and several Method parameters will be disabled.

The First and Last Transport Vial indicate whether or not you are using Transport vials during injection and the location of these vials.

The Transport vials need to be specified when the μL Pickup Injection method is used.

The Plate (Tray) Cooling, Solvent Selector Valve (SSV), Integrated Stream Switching (ISS) valve(s) and Plate Feeder for PS-430 indicate the hardware options that could be installed on the AutoSampler. Check the applicable options. Note that when the Plate (Tray) Cooling option is selected, the Plate (Tray) Cooling Setpoint temperature is enabled.

The Configuration Settings section of the Method enables you to enter values for Syringe Speed and Speed Factor, Needle Height, Flush Volume, Plate cooling Setpoint (if installed and enabled), and End Time for the AutoSampler Method.

When you check the Use Time Program function, the Timed Events Program section of the Method is displayed. Additional columns are displayed in the program if the Solvent Selector Valve (SSV) and the Integrated Stream Switching Valve (ISS) are enabled in the Required Hardware.

Use this part of the Method for time programming the auxiliary outputs (P5) and the Binary outputs (P3). You can also use the Timed Events Program to control the Solvent Selector Valve (SSV) and the Integrated Stream Switching valve (ISS) if these options are installed on your AutoSampler and enabled in the Required Hardware part of the Method. Refer to the on-line help in the Method Builder for details on the AutoSampler Method section.

Building the SampleList

Whenever you configure an AutoSampler Module in an Instrument as described above, the Instrument's SampleList is automatically reconfigured to the appropriate format for control of that AutoSampler. To create a SampleList in System Control, select the File→New SampleList… Menu Command.
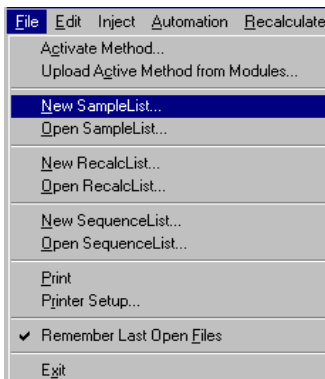
The 'Create a New System Control SampleList File' dialog is displayed and you are prompted to enter a File Name. Type a Name for your SampleList, select a "Save in:" directory and click on the Save button.
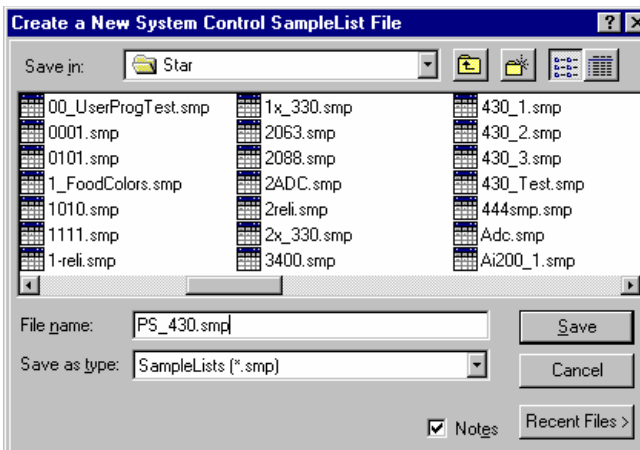
Next, maximize the SampleList Window so that all parts are visible. The PS-420 and PS-430 SampleLists are similar to the generic System Control SampleList, with additional columns to support operations specific to each AutoSampler.
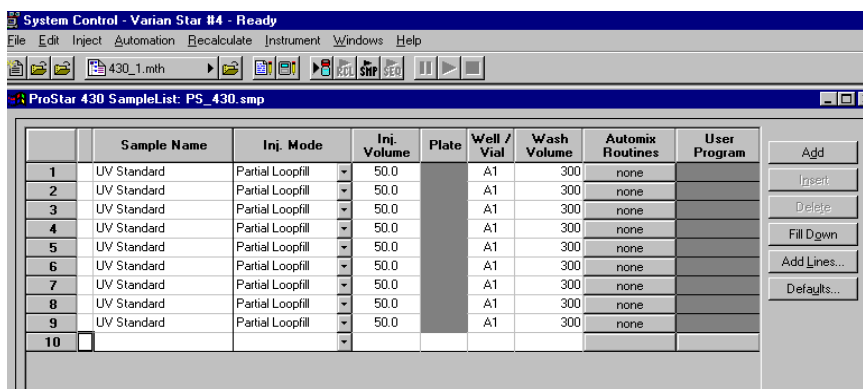
The Injection Mode column is used to select one of the three different methods of injection used by these AutoSamplers; Partial Loopfill, Full Loop, and μL Pickup. The User Program can also be selected from this column. Several columns of the SampleList will be disabled when the User Program is selected.
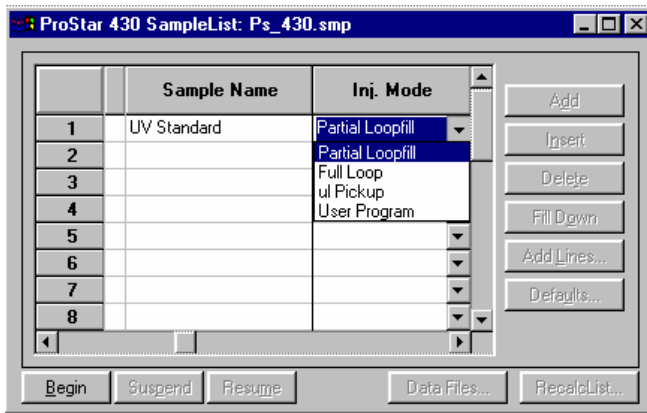
For the PS-430, the Plate column is used to specify the plate where a well/vial is located from which you want to aspirate a sample. You can enter a plate number between 1 and 7. This column is disabled unless the PS-430 is equipped with the Plate Feeder option.

The PS-430 Well/Vial column specifies the well or vial from which you want to aspirate the sample for injection. The location is specified as a combination of row letter and column number. The available rows and column numbers depend on the type of plate that is configured in the AutoSampler Hardware. You can enter A1 through F8 for the 48 standard vials, A1 through H12 for the 96 well plate and A1 through P24 for the 384 well plate. You can use the Well/Vial column to perform random access to any well or vial; for example you can periodically recalibrate using a single standard at a fixed location.

For the PS-420, the Vial column specifies the vial from which you want to aspirate the sample for injection. The location is specified as a combination of Tray type letter and Vial number. The available Tray types and Vial numbers depend on the Tray Segments configured in the PS-420 Hardware. You can use the Vial column to perform random access to any vial; for example you can periodically recalibrate using a single standard at a fixed location.

The Wash Volume column is used to specify a wash volume in the range of 300 to 9999 μL, or specify 0 for no wash.

The Automix Routines column allows you to define a specific automixing program to be performed before injecting the sample. When performing an Automix routine, you can program the

AutoSampler to aspirate a specified amount of liquid from a Well, Vial, or a Reagent Vial, and then transfer that liquid to the sample Well or Vial from which an injection is to be made. You can mix the sample by aspirating and dispensing specified amounts of the mixture, and you can program the AutoSampler to wait for a specific period of time for a reaction to take place. In the Automix Steps dialog you can select Action, Position, Amount, Speed of the syringe and Height of the needle. The following is an example of an automix routine.

Up to 240 steps can be programmed in one automix routine. After adding all the steps required for handling the sample, enter a name for this Automix Program in the box next to the "Cancel" button and press the "OK" button. The program is then saved in the SampleList, and can be exported to other SampleLists. Alternatively, Automix Programs from other SampleLists can be imported to the active SampleList using the "Import…" button.

The User Program column is enabled if you select the User Program in the Injection Mode column for this sample. The User Program is used to program all possible actions required for a sample handling and injection that can be executed by the AutoSampler in separate steps.

When the User Program is selected as the Injection Mode, the
following SampleList columns are disabled; Injection Volume, Wash
Volume and Automix Routines. In this mode, the User Program
steps are used instead of the parameters in the Method. Note that
the User Program must be used if the 10-mL syringe is selected in
the Hardware Configuration. The following figure shows a list of the
User Program Actions that can be specified. For each specified
Action there could be several available options such as; Position,
Amounts, Speed Setting and Height.

You can select when to Start the Run, either on Injection Mark
(step 9 in the above example), or at the End of User Program. Up to
240 steps can be programmed in one User Program. After adding
all the steps required for handling the sample, enter a name for this
User Program in the box next to the "Cancel" button and press the
"OK" button. This User Program is then saved in the SampleList,
and can be exported to other SampleLists. Alternatively, User
Programs from other SampleLists can be imported to the active
SampleList using the "Import…" button.

When you are ready to build a PS-420 SampleList or a PS-430
SampleList, you can use the "Add Lines…" button at the right side of
the SampleList to efficiently enter sample lines.

The Add Line dialog allows you to enter common information and to select the number of entries to be added sequentially to the SampleList. With the PS-420, you can specify the first and last vials to be added to the SampleList with the requirement that the first and last vial numbers start with the same Tray Type letter, either A, B, C, or D.

With the PS-430, you can specify the first and last Row and Column to be added to the SampleList. You can also select to have the entries added by Rows or Columns, which will determine whether to process the plate from left to right by Rows, or from top to bottom by Columns.

Using the AutoSampler to Refill Transport Vials

Certain applications may require refilling the Transport Vials during Automation. If you have the Solvent Selector Valve (SSV) option installed on your AutoSampler (PS-430 or PS-420) then you can use the User Program in the SampleList to do that for you automatically.

First you will need to calculate the total volume required for processing your samples, then divide the volume by the number of vials you are designating as Transport vials. For the PS-430, we recommend using all 4 vials if possible (the Workstation will consecutively use all vials specified in the Method section). Then determine when you will need to replenish the solvents to all vials, and add a separate line in the SampleList for the User Program to refill the vials. The following example is for refilling only one vial in the PS-430 AutoSampler with 2.25 mL of solvent, but you can repeat the refilling steps for additional volume or vials.

User Program Steps

	Action	Position	Amount	Speed / Setting	Height	Comment
1	Valve	Solvent		2		
2	Valve	Syringe		Wash		
3	Syringe	Load	250.0 ul	5		
4	Valve	Syringe		Waste		
5	Syringe	Unload	250.0 ul	5		
6	Valve	Syringe		Wash		
7	Syringe	Load	250.0 ul	5		
8	Valve	Syringe		Needle		
9	Dispense To	Reagent A	250.0 ul	5	5 mm	
10	Repeat		9 times		4 steps	

Destination Well: none   Destination Plate: Sample Plate

Reagent A Vial: T/R Vial 1   Reagent C Vial: None
Reagent B Vial: None   Reagent D Vial: None

○ Start Run on INJECT Marker
◉ Start Run at End of User Program   Save As Default Program Step

[Ok] [Cancel] [Refill ▼]   [Remove From SampleList] [Remove From Sample]

[Add] [Insert] [Delete] [Import...]

In the first step, the Solvent Selector valve is moved to position 2
where the appropriate solvent is connected. Steps 2 to 5 are used to
flush the Buffer tubing, and the remaining steps are for refilling one
Transport Vial designated as Reagent Vial A with 2.25 mL of solvent.

Using the ProStar 701 Fraction Collector

This section describes the configuration and use of the ProStar 701 (FC-1) Fraction Collector with the Star Chromatography Workstation. Please refer to the *Pre-Installation Instructions* for information on firmware version compatibility with the Star Workstation software.

Configuring the Fraction Collector

1. **Connect the Fraction Collector to Your Star Workstation.**

    The PS-701 communicates with the Star Workstation using the RS-422/485 serial communications. This allows multiple devices such as the PS-210, 215 or 218 pumps to be connected in a daisy chain arrangement with a single RS-422/485 serial I/O cable (03-935462-91). An RS-232 to RS-422/485 converter connects the Star Workstation computer's serial port to the RS-422/485 Communications cable. The instructions for connecting this hardware to the Star Workstation computer are included in the RS-422/485 Communication Kit. Please refer to the LC Control Release Notes (03-914726-00) for a listing of acceptable system configurations.

2. **Connect the Analog Signal.**

    The PS-701 build-in Peak detection allows fraction collection based on an analog signal from a detector. The detector instrument can be a PS-320 detector, fluorescence detector, or any instrument that produces analog voltage output signal. This signal is not communicated to the Fraction Collector through the Workstation. For fraction collection Programs that involve peak detection (Time, Slope, Level, or any combination of the three functions), you will need to connect the analog signal output from the detector that you are using to the CIM and to the External Signal Analog connectors on the rear panel of the PS-701.

3. **Set the Unit Identifier on the Fraction Collector.**

> After completing communication cable installation, turn on the power to the PS-701 and enter the Edit Menu of any Fraction Collector Program, then press softkey D (page 2), then press softkey D again (Page 3). Press softkey C (Serial) and select the 19200-Baud rate (softkey D). Once you select the Baud rate then you can enter the Unit ID.

> Since the Workstation treats the PS-701 as a sub module of the ProStar/Dynamax system, the Fraction Collector unit ID must be compatible with other modules in the Dynamax system. For the correct ID number for your unit, please refer to *Preparing and Configuring Serial Devices on page 12*.

> You can have up to four PS-701 Fraction Collectors connected to one ProStar/Dynamax system, each one must be assigned a unique unit ID. After connecting the serial communication cable and selecting the correct ID, restart your Fraction Collector(s) by pressing the POWER key.

4. **Configure the Communication Ports in System Control.**

> The first time you start System Control, the Star Communication Configuration "Wizard" will start automatically to guide you through the configuration setup. Please refer to *Configuring the Communications Ports for RS 422/485 Devices* on page 16, and configure your Fraction Collector(s) as part of a ProStar/Dynamax system.

> After the ProStar/Dynamax system connects to System Control, configure it in an Instrument by moving its icon from the bottom of the Configuration window into one of the four Instrument areas. System Control will remember where to put the ProStar/Dynamax icon the next time the system connects.
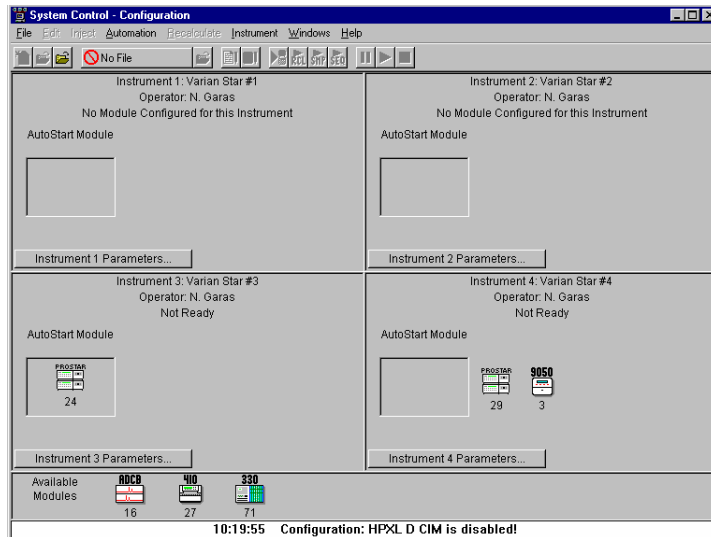
Once you have configured your instrument, you may view the PS-701 status in the ProStar/Dynamax instrument it is connected to.

The Fraction Collector Status

When the PS-701 connects, the ProStar/Dynamax window expands to show a Fraction Collector control panel and a display of the Racks and Tubes. Initially the PS-701 status in the Dynamax system will look similar to the Window shown below. For a detailed description of the PS-701 Status and its controls, please refer to the online help in System Control.
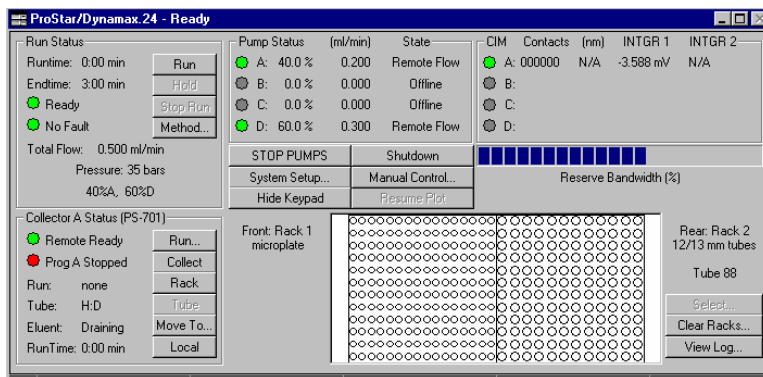
When all of the modules in the ProStar/Dynamax system are successfully connected, press the "System Setup" button to view and complete the setup. The System Setup should now display a section for the Fraction Collector as shown below.
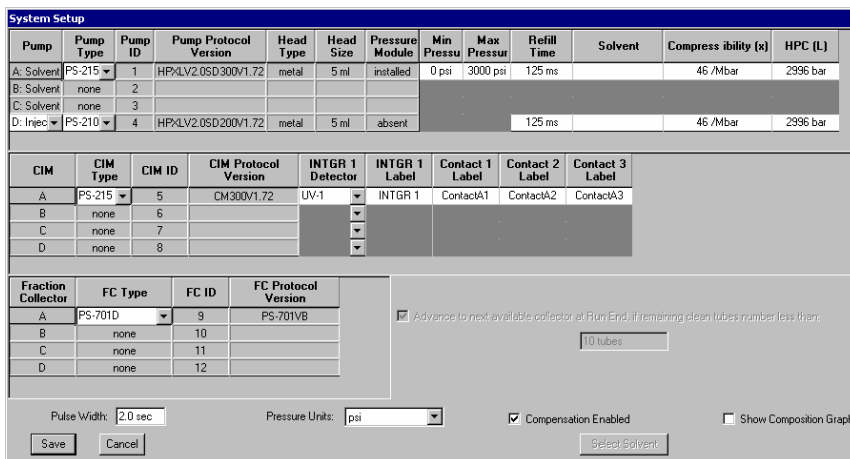
In the ProStar/Dynamax Status and Control screen, the left side of the PS-701 section shows the Status parameters: Remote status, active Program, Run, Rack, Tube, Eluent, and Run Time. The Run/Stop, Collect, Rack, Tube, Move To, and Local/Remote pushbuttons control the Fraction Collector immediate operation.

Manual Control Operation: You can operate the PS 701 in Manual Mode using the control panel buttons. The buttons duplicate the features available on the PS 701 front panel keypad. The "Collect" "Rack", "Next Tube" and "Move To…" buttons remain active during

the programmed run. This will allow you to collect fractions and change tubes, if necessary, during the run. Manual control actions are documented in the Fraction Log just like Automated actions.

Note:	**The PS-701 firmware must be upgraded to version G if you want to manually override the collection program during the run. PS-701G must also be selected as the FC Type in the System Setup screen.**

Manual Mode control buttons.

Press on Local to control the PS-701 from the front panel keypad.
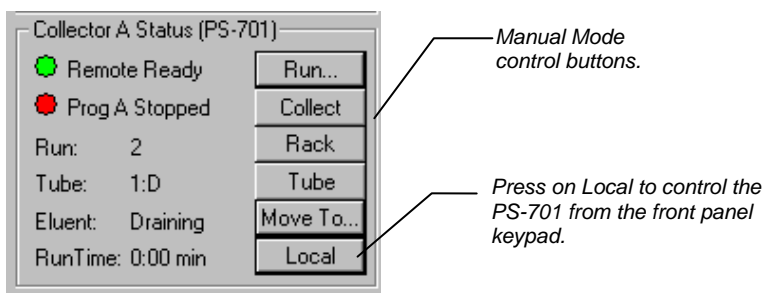
Remote and Local Operation: When you press the Local pushbutton, the PS-701 will show the Status as Local Ready and is now ready to be controlled from the front panel only. All other pushbuttons will become inactive except for the Local button that became Remote.

Note:	**When communicating with the Star Workstation, the Fraction Collector should always display <Remote> on its front panel. Do not exit by pressing the <Local> button in the Status window unless you want to terminate communication with the Workstation.**

When you are ready to control the Fraction Collector from the Workstation, press the Remote pushbutton. The Fraction Collector will show the status as Remote Ready and all pushbuttons will become active again.

Press on Remote to control the PS-701 from the Workstation.

Whenever the Fraction Collector(s) is switched from Local control to Remote control, the Workstation uploads automatically certain parameters from the connected fraction collector(s) and incorporates them into the Active Method in the Workstation.
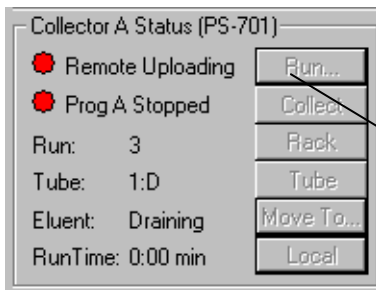
Fraction Collector Parameters are uploaded automatically to the Workstation.

The Status will show as Remote Uploading. For more information on this subject, please refer to *Creating Fraction Collector Programs* on page 139.

The right side of the Fraction Collector section of the window shows a display of the Front Rack and tubes, and the Rear Rack and Tubes. The display will change to reflect the rack type and tube size in the active Program. The Select pushbutton will become active only if more than one fraction collector is connected to the ProStar/Dynamax system.

Click on View Log to open the Fraction Log.
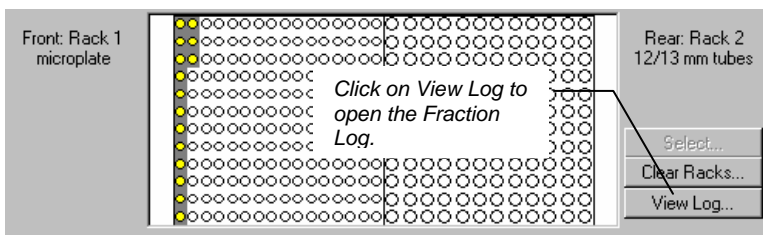
As fractions are collected, the display shows the status of the Racks and Tubes, and the Workstation builds a Fraction Log in the active .FCL file. A new Fraction Log is created each time a SampleList is started, or each time you press the "Clear" button to clear the display of Racks and Tubes.

When racks are full, Automation is suspended and a message is logged that says "Clear Racks, Activate Method and Resume Automation". When you press "Clear Racks", you have two choices, Begin New Fraction Log or Continue Current Fraction Log. If you continue the current Log, the run number continues which allows the runs to be correctly identified in the Fraction Log.
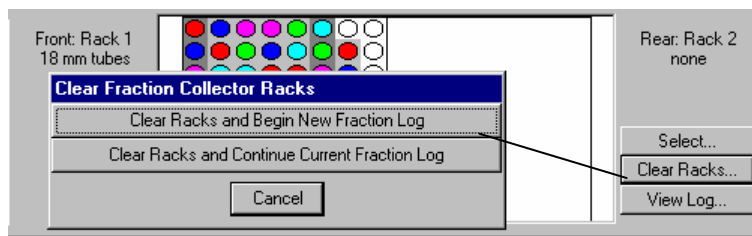
The Log files are named automatically with an embedded date and time to guarantee unique names. You can display the Fraction log by pressing the View Log… pushbutton at the right side of the display.
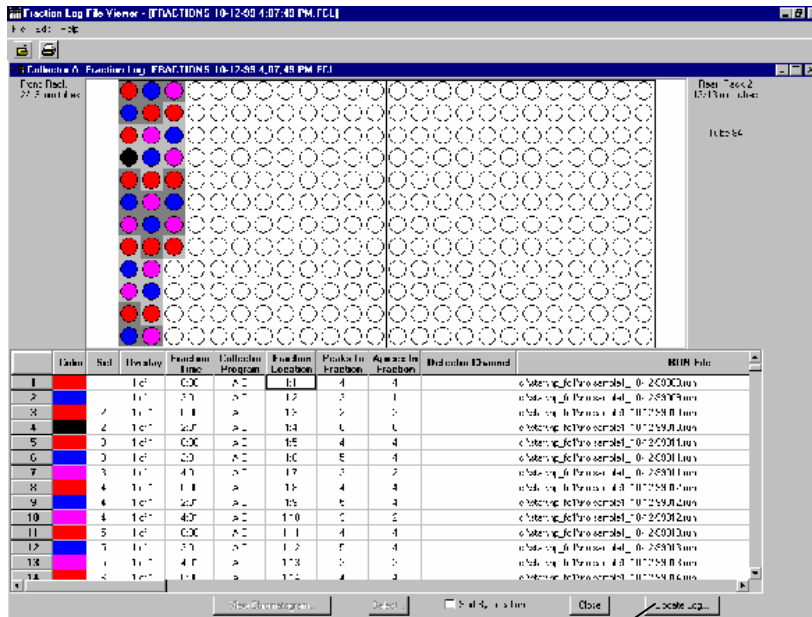
Click to update the Log after recalculating Run files.

The Fraction Log dialog box shows both a graphic displays of the color-coded Racks and Tubes, and a spreadsheet containing additional information. You can Sort the spreadsheet by tube location, or by chronology, and print it as it is sorted. If you click on a tube, the corresponding spreadsheet line is scrolled into view.

If you click on a Run file pathname, the corresponding tubes are highlighted in the graphic display. To view the chromatogram, double-click on the Run File pathname.

If any of the Run files in the Fraction Log has been recalculated, then you can use the 'Update Log…' button to update the color of the graphic display. This will also update the Color, Peaks and Peak Apices columns in the Fraction Log.

Each Run file in the Fraction Log knows which Fraction Log it was originally listed in. This back link allows you to access the Fraction Log file from the Run file both in System Control and in Interactive Graphics using the QuickLink menu.
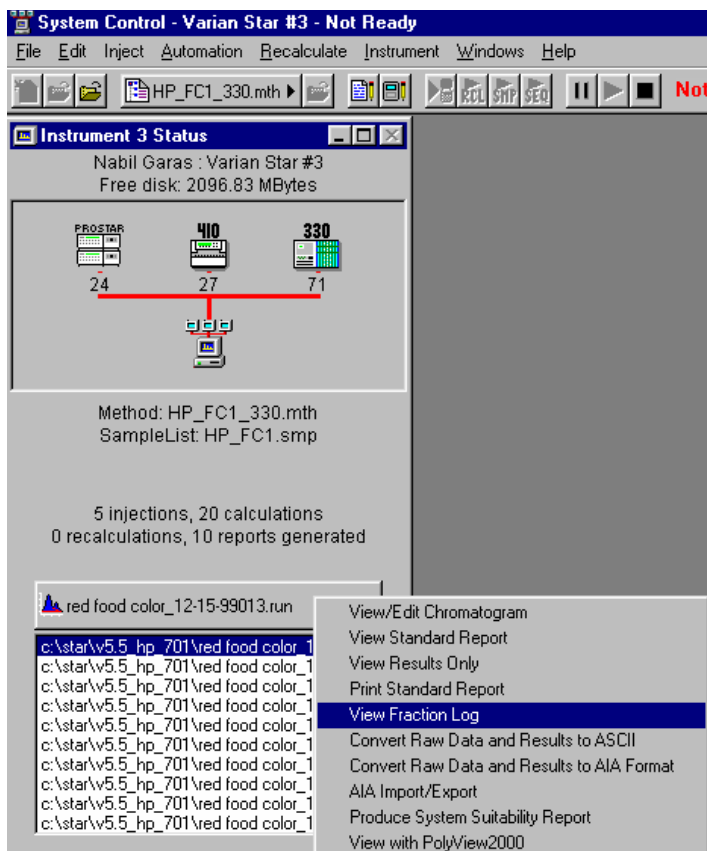
Creating Fraction Collector Programs

The PS-701 Fraction Collector calls its Methods Program A, Program B, Program C, and Program D. You can create and download fraction collector programs from the Star Workstation and select which program to run. In order to do this, the PS-701 must be upgraded to "Version D" or later firmware.

For more information on programming the PS-701 Fraction Collector from the front panel, please refer to the PS-701 (Dynamax FC-1) User Guide (9920-105 Rev A).

A limited number of parameters cannot be programmed from the Star Workstation. If you wish to edit these parameters, first press the 'Local' button on the PS-701 Status section, edit the Programs from the front panel keypad, then press the 'Run' key 2 times and the 'Stop' key 2 times to save your edits. Press the 'Remote' button on the PS-Status window to return the Fraction Collector to the Workstation control. Your Edits are uploaded automatically to the Active Method file in the Workstation.

Note: **Initial Waste Diversion can be programmed from the ProStar 701 front panel, however, this feature is not supported by the Star Workstation. Any fraction collection program with the Initial Waste Diversion set to a non-zero time will trigger a message when uploaded from the ProStar 701 or when the WS tries to start such program. The alternate way of getting initial waste diversion is by delaying the start of Fraction Collection and Data Acquisition in the ProStar Dynamax time program.**

Fraction Collector Method Section

You can create up to four Fraction Collector Programs in the active ProStar/Dynamax Method. The Status and Control window of the ProStar/Dynamax system contains a Method… button to allow you to directly access the Instrument Control section of the Active Method.
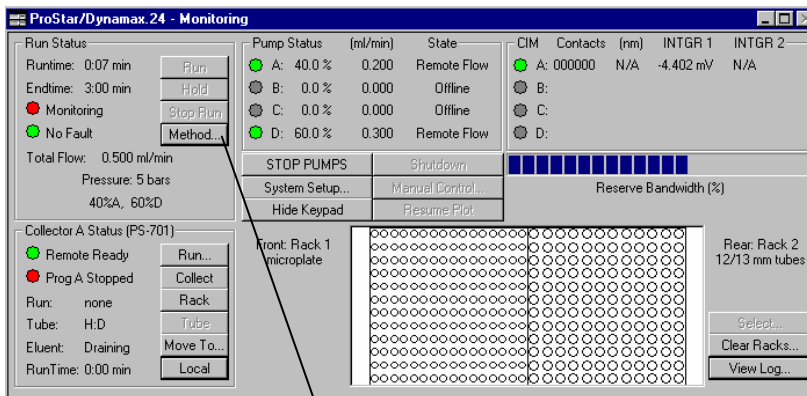
Click to view the ProStar/Dynamax Active Method.
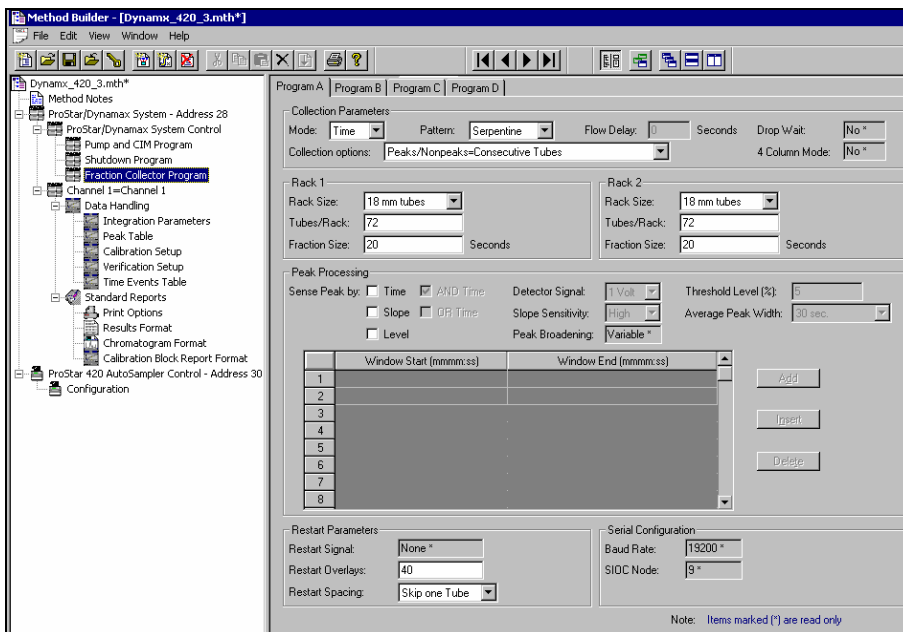
Select the Fraction Collector Program from the ProStar/ Dynamax Method section. This window contains 4 tabs, use these tabs to select which Program you wish to create or view.

The Fraction Collector Program window is divided into five sections.

Collection Parameters: Here you can select the collection Mode, Pattern, Flow Delay (active only with Peak Detection), and the Collection Options (Or Rack designation). Drop Wait and 4 Column Mode must be programmed from the SP-701 front panel.

Note:	If you collect fraction by Time only (no peak detection), then you must select "Consecutive Tubes" as your Collection Option.

Rack specification: Here you can specify the type of Racks, Number of Tubes and the Fraction Size.

Peak Processing: Here you can specify the parameters you wish to use for Peak Detection. You can also program Time Windows for Peak Processing in this section of the program. The Peak Broadening option (Fixed/Variable) must be selected from the front panel.

Restart Parameters: Use this section to select the method by which the collection will resume in the Next Tube or in the same tube depending on what is designated for number of Restart Overlays. The Restart Signal is not used by the Star Workstation.

Serial Configuration: The Baud Rate and the ID number are set from the front panel and uploaded to the active method.

To start the Fraction Collector program during Automation, you can use a "Run A", "Run B", "Run C", or "Run D" command in the Fraction Collector Column of the Pump and CIM Program. This is a Time Programmed command that you can start and stop at any time during the Run.
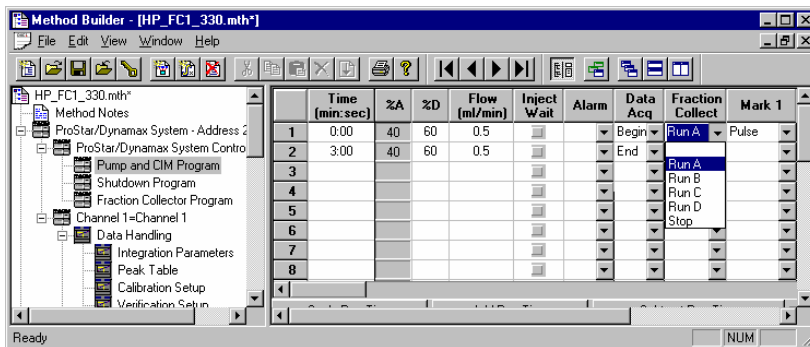
Only one "Run" command and only one "Stop" command can be used in the time program table, therefore only one Fraction Collector program can be used in one Run.

The Method Editor shows all Programs, but when you print the Method, only the Fraction Collector Program that is selected to run is printed. Programs that are not selected are not printed. This was done to avoid cluttering the Method Log with unused Fraction Collector Programs.

The Fraction Collector Program that is used during a Run is included
in the Run file as part of the Run Log. You can view and print the
Run Log from the Options menu in the Workstation Report
application.

```
Fraction Collector Program A Used

Fraction Collector Program A
============================

     Collection Mode              : Time
     4 Column Mode                : No
     Time Windows / Peak Sensing  : No
     Rack 1 Type                  : microplates
            Rows                  : 16
            Columns               : 12
            Max Tubes             : 96
            Fraction Size         : 5 Seconds
     Rack 2 Type                  : 12/13 mm tubes
            Rows                  : 12
            Columns               : 12
            Max Tubes             : 72
            Fraction Size         : 5 Seconds
     Peak Detection Mode          : Slope Detection Only
     Detector Signal Scale        : 1 Volt
     Average Peak Width           : 5 Sec
     Peak Broadening              : Variable
     Slope Sensitivity            : High
     Delay Time                   : 00:00:00
     Restart Signal               : Momentary
     Restart Overlays             : 0
     Restart Spacing              : Next Tube
     Initial Waste Diversion Time : 00:00:00
     Initial Waste Diverted To    : Drain
     Baud Rate                    : 19200
     SIOC Node                    : 9
     Drop Wait                    : No
     Pattern                      : Serpentine
```

Marks and Annotation

When you use a CIM (Standalone CIM or Pump CIM), the PS-701 marks that annotate the chromatogram are labeled with the rack and tube number. In the 4-column mode, they are labeled with 4 racks and tube numbers. The marks are shown on the real-time chromatogram display as they occur.
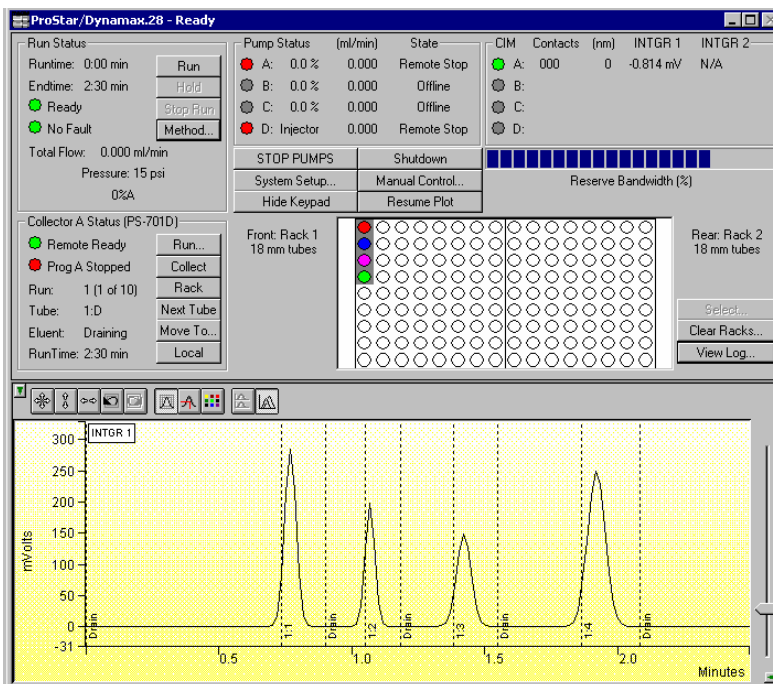
When the chromatogram is viewed in Interactive Graphics, the tube marks are displayed and each fraction is color-coded to match the color of its corresponding tube in the Fraction Log dialog box.
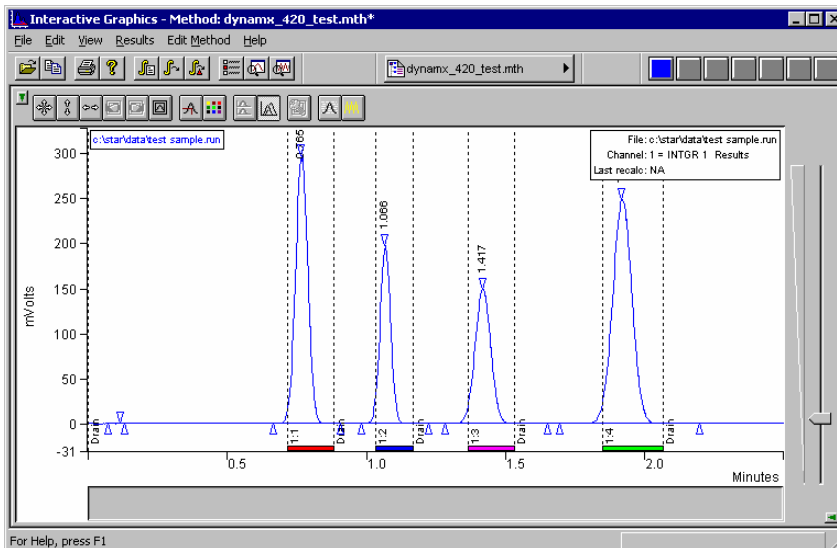
Using Multiple Fraction Collectors in one System

To use multiple fraction collectors in the same system, you must give each Fraction Collector a unique SIOC address in the range 9-12, 25-28, 41-44, or 57-60 depending on the ProStar system it will be connected to. There are two ways by which you can setup the system to switch the Fraction Collectors. The first is by using an external selector valve. The second is by using the optional PS-701 Drain Valve.

Note: **If you are using Peak Detection to collect fractions remember to supply detector signals to all fraction collectors.**

Using External Selector Valve

When multiple PS-701 are connected to a system using a standalone external valve, you must name two CIM contacts with the specific names: "FCValve1" and "FCValve2".

System Setup

Pump	Pump Type	Pump ID	Pump Protocol Version	Head Type	Head Size	Pressure Module	Min Pressure	Max Pressure	Refill Time
A: Solvent	SD-200 ▼	1	HPXLV2.0SD200V1.71	metal	10 ml	installed	0 psi	1000 psi	125 ms
B: Solvent	SD-200 ▼	2	HPXLV2.0SD200V1.71	metal	10 ml	absent			125 ms
C: Solvent	none	3							
D: Solvent ▼	none	4							

CIM	CIM Type	CIM ID	CIM Protocol Version	INTGR 1 Detector	INTGR 1 Label	Contact 1 Label	Contact 2 Label	Contact 3 Label
A	CM-200 ▼	5	CM200V1.71	UV-1 ▼	UV-1	FCValve1	FCValve2	ContactA3
B	none	6		▼				
C	none	7		▼				
D	none	8		▼				

Fraction Collector	FC Type	FC ID	FC Protocol Version
A	PS-701	9	PS-701VB
B	PS-701	10	PS-701VB
C	PS-701	11	PS-701VB
D	PS-701	12	PS-701VB

☑ Advance to next available collector at Run End, if remainin

[10 tubes]

Pulse Width: [1.0 sec]   Pressure Units: [bars ▼]   ☑ Compensation Enabled

[Save]   [Cancel]   [Select Solvent]

The contacts can be on any CIM, but it is recommended that they are both on the same CIM. When connected to an external selector valve, these two contacts will be automatically used to switch the valve according to the following table:

Fraction Collector	SIOC ID	FCValve1	FCValve2
A	9	Off	Off
B	10	On	Off
C	11	Off	On
D	12	On	On

You should not time-program these contacts, or use them for any other purpose.

Using ProStar 701 Drain Valve

If your fraction collectors are all equipped with Drain Valves, you could use these valves in place of the external selector valve. The Drain valves can be connected in a daisy-chain fashion to divert the eluent from the first fraction collector to the next one. This is done by connecting the Drain Out of the first valve to the In position of the next. The Collect position of each valve should always be connected to the Drop Counter assembly of the PS-701 it is mounted on.

Note: **If you use the Drain Valves to connect multiple Fraction Collectors you do not need to designate two CIM contacts for external valve switching operation since you are not using one. When you run this system, ignore the Workstation message indicating that it can not switch the valve.**

From the System Setup you can configure the ProStar/Dynamax Instrument to switch collectors automatically between runs when less than a specified number of empty tubes remain. You can also switch collectors manually using the "Select" button in the ProStar/Dynamax Status window.
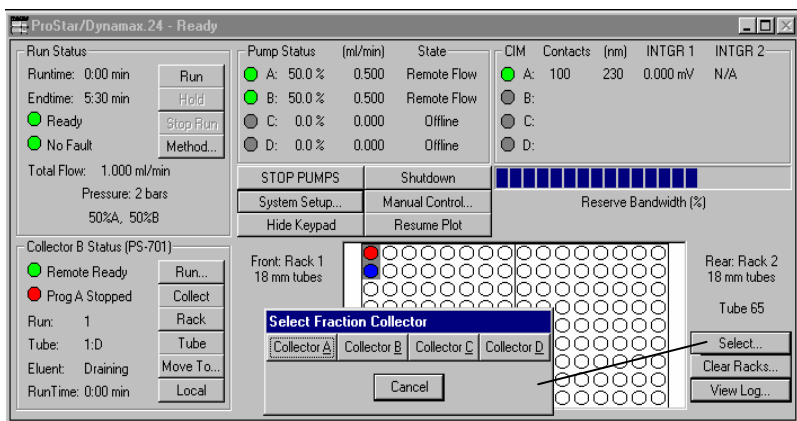
When the PS-701 switches from Local to Remote, parameters from up to 4 programs will be uploaded from each of up to 4 fraction collectors. This upload can take some time.

The Star Workstation software will download the specified Fraction Collector Program (A, B, C or D) to all fraction collectors that are connected and identified by the Instrument.

Note: **All fraction collectors must have identical Rack/Tube configuration. This setup simply allows you to extend the rack size.**

The Fraction Log should correctly indicate which fraction collector each fraction came from, and also allows you to look at the results for one fraction collector at a time.

The Runlog of the RUN files contains the Program that was specified
in the Method section.

Using the ProStar 363 Fluorescence Detector

This section describes the configuration and use of the PS-363 Fluorescence Detector with the Star Chromatography Workstation. For information on the operation of the Star Workstation, please refer to the earlier sections of this manual. Please refer to the *Pre-Installation Instructions* for information on firmware version compatibility with the Star Workstation software.

Configuring the 363 Detector

1. **Connect the Detector to Your Star Workstation.**

    The detector communicates with the Star Workstation using the RS-422/485 serial communications. This allows multiple devices such as the PS-210, 215 or 218 pumps to be attached to a single RS-422/485 serial I/O cable (03-935462-91). An R/S-422/485 converter connects the Star Workstation computer's serial port to the RS-422/485 Communications cable. The instructions for connecting this hardware to the Star Workstation computer are included in the RS-422/485 Communication Kit.

2. **Connect the Detector to your Star 800 MIB.**

    Please refer to the Ethernet Communication Setup, and Using the Star 800 MIB sections of this manual for information on how to setup and use the Star 800 MIB.

    The Processor/Data System analog output (top connector on back of the detector) is connected to the Star 800 MIB with cable part number 03-907938-06. If you purchased the PS-363 Detector with the Star 800 MIB, this cable is included in the package. The Channel A of the MIB should be set for 1 volt. The cable is used to connect the PS-363 to Channel A.

The cable used for the CIM (computer interface module) comes as standard with the PS-363. The CIM box, PS-210/215/218 pump CIM, or the PrepStar SD-1 pump CIM, can all be used to collect the analog output of the PS-363. Follow the instructions that came with the CIM instrument for its installation.

3. Set the Device Identifier on the Detector.

Power up the detector while holding down the "Utility/Setup" key on the front panel. This will cause the detector to go into a special mode where you can change the Device Identifier for that detector module. The display will show "SET UP   UNIT   ID" on the left side of the display with a number 0-9 directly under the D in ID. Press *Enter* and the display will show "UNIT ID: (0-9)" with a number 0-9 directly below the D in ID. Press a number on the keypad to select the UNIT ID. Press *Enter* to change the UNIT ID. Now power down the detector and power it back up to put the detector in the standard operating mode. Currently 0 is the default and only numbers 0-3 are used with this detector. If you selected 0 as the UNIT ID then the Device Identifier is 90. UNIT IDs 0, 1, 2, and 3 correspond to Device Identifiers 90, 91, 92, and 93. When powered up the Device Identifier is shown to the right of the display in brackets. Using Device Identifiers higher than 93 are not supported by the Star Workstation.

4. Configure the Communication Ports in System Control.

The first time you start System Control, the Star Communication Configuration "Wizard" will start automatically to guide you through the configuration setup. Read the description presented in the Star Communication Configuration windows. Click on Next to advance to the next step until you get to the Setup COMM Ports window. This window can also be displayed from the Instrument menu item, "Setup COMM Ports".

Select "RS-422/485" in the Combo Box below COM 1, COM 2, etc., which you have an RS-422/485 cable attached. After you select "RS-422/485", four additional Combo Boxes will appear in the column: one each for sub ports A, B, C, and D, as indicated by the labels at the left side of the Dialog Box.

The Device Identifiers (90, 91, 92, 93) are assigned to the COM Ports and sub ports as shown in the following table. System Control Module addresses that correspond to the port, or sub port to which the Detector is connected, are also listed. The Unit ID described above is also listed.

Device Identifier	Unit ID	COM1	Module Address	COM2	Module Address
90	0	A	24	A	28
91	1	B	25	B	29
92	2	C	26	C	30
93	3	D	27	D	31

To attach the PS-363 to the Star Workstation, click on the Combo Box for the sub port that corresponds to the Device Identifier set previously in the detector. Then select "ProStar 363". Select "Ignore" for the sub ports that you are not using.

After you have completed your selections, the Dialog Box should appear similar to the following figure.
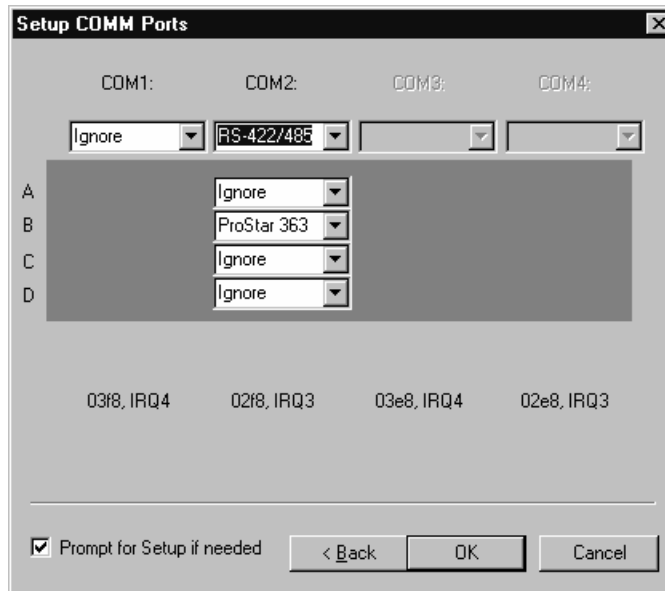
This example shows the PS-363 with its Device Identifier set to 91 that is connected to sub port B of COM 2. This detector will be assigned the address 29 in System Control, and its icon will have the label reading 363.29. You can have up to four detectors or other modules connected to each RS-422/485 cable, depending on the load that these systems impose on the communication cable bandwidth.

Now press the *OK button* to close the Dialog Box. The detector will connect to System Control, and be represented by an icon in the Available Modules area of the Configuration Window.

After each detector connects to System Control, configure it in a designated Instrument by dragging its icon from the Available Modules area of the Configuration Window into one of the four Instrument Areas. Maximums of four PS-363 detectors are allowed per workstation.

Now switch to the Instrument Window to view the Module Window for the detector configured in that instrument. You are now ready to program the Detector Excitation and Emission wavelengths and other detector settings.

The ProStar 363 Detector Status Window

Below is shown the status window for the PS-363 detector along with the status window of the Star 800 MIB to which is connected.
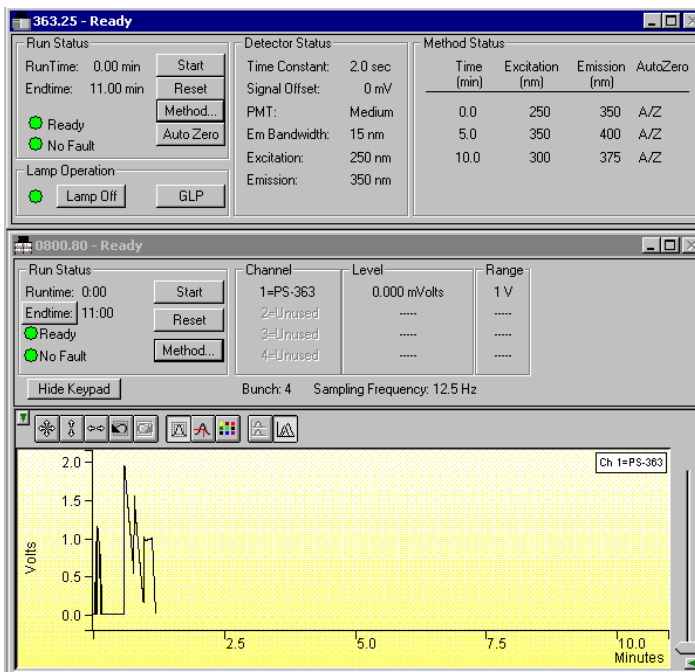
Description of the ProStar 363 Detector Status Window

On the left of the PS-363 status window is the Run Status that includes the usual Workstation buttons (Start, Reset, Method Edit, Autozero). Below that window is the Lamp Operation window which has a button for turning the lamp off and on, and a GLP (Good Laboratory Practice) button. When the *GLP* button is pressed another window opens which shows lamp hours, how many times the lamp has been turned off and on, and the date of the last lamp change. This information is passed onto the Workstation at the end of each run and when the Detector initially connects with the Workstation.

```
┌─ ProStar 363 GLP Info ──────────── ⊠ ┐
│              GLP Data                 │
│  ┌─ Lamp Data ───────────────────┐    │
│  │                               │    │
│  │  Lamp Hours:        971 hrs   │    │
│  │  Lamp On/Off Count:  131      │    │
│  │  Lamp Change Date:   9/ 5/00  │    │
│  └───────────────────────────────┘    │
│              ┌────────────┐            │
│              │    OK      │            │
│              └────────────┘            │
└───────────────────────────────────────┘
```

The center section of the Status window shows the Detector Status, which includes how the detector parameters are currently set. If you press the Escape button on the PS-363 detector, it will go to local control and you will be able to make changes from the front panel. When the Escape key is pressed, a Remote button appears in the bottom of the Detector Status section of the PS-363 Status Window in the Workstation. The Detector Status is cleared also. Clicking on the Remote button restores Remote control and Detector Status. To the right is the Method status window, which shows a listing of the current method and how far the method has progressed. As the method line is executed an arrow appears to the left of the Time column pointing to that line.

```
┌─ 363.29 - Ready ──────────────────────────────────────────────────────── _ □ ⊠ ┐
│ ┌─ Run Status ──────────────┐ ┌─ Detector Status ──┐ ┌─ Method Status ──────────────┐
│ │                           │ │                    │ │                              │
│ │ RunTime:  0.00 min  Start │ │ Time Constant: ---- │ │  Time  Excitation Emission AutoZero │
│ │                           │ │                    │ │ (min)    (nm)      (nm)     │
│ │ Endtime: 11.00 min  Reset │ │ Signal Offset: ---- │ │                              │
│ │                    Method.│ │ PMT:           ---- │ │  0.0     250       350    A/Z │
│ │ ● Ready         Auto Zero │ │ Em Bandwidth:  ---  │ │  5.0     350       400    A/Z │
│ │ ● No Fault                │ │ Excitation:    ---- │ │ 10.0     300       375    A/Z │
│ │ ┌─ Lamp Operation ──────┐ │ │ Emission:      ---- │ │                              │
│ │ │ ● Lamp Off    GLP     │ │ │   ┌ Remote ┐        │ │                              │
│ │ └───────────────────────┘ │ │   └────────┘        │ │                              │
│ └───────────────────────────┘ └────────────────────┘ └──────────────────────────────┘
└────────────────────────────────────────────────────────────────────────────────────┘
```
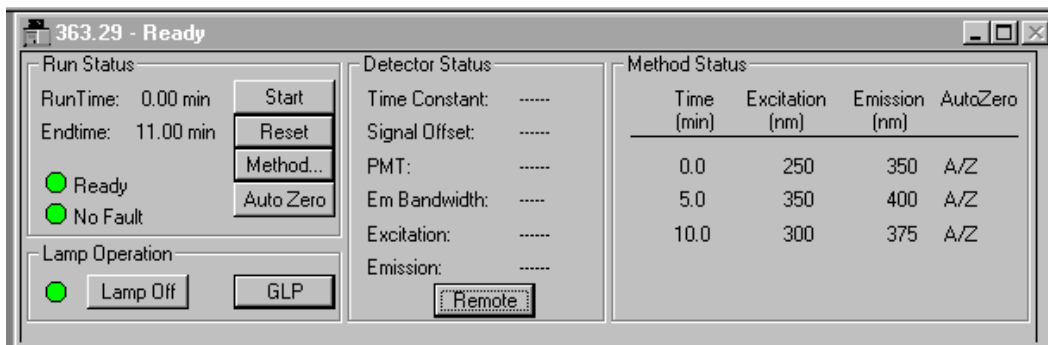
Detector Status with Remote Button displayed. Detector is in Local mode.

Data Acquisition with LC Control   **155**

Star 800 MIB Window

The Star 800 MIB window is shown directly under the PS-363 Detector Status window as this is a convenient location to position it so the Detector Status and Detector output signal can be viewed simultaneously.

If the PS-363 Detector output (Processor/Data System) is connected to a CIM, it would be part of the ProStar/Dynamax window as shown below.
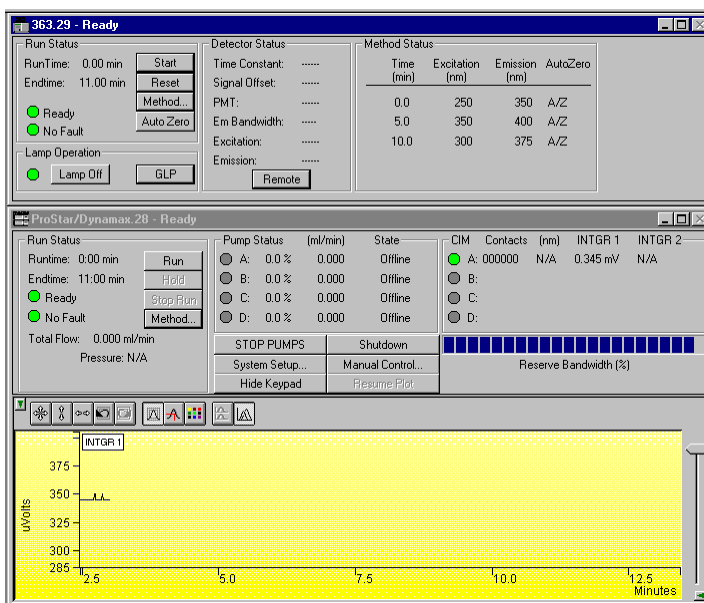
Building a ProStar 363 Detector Method
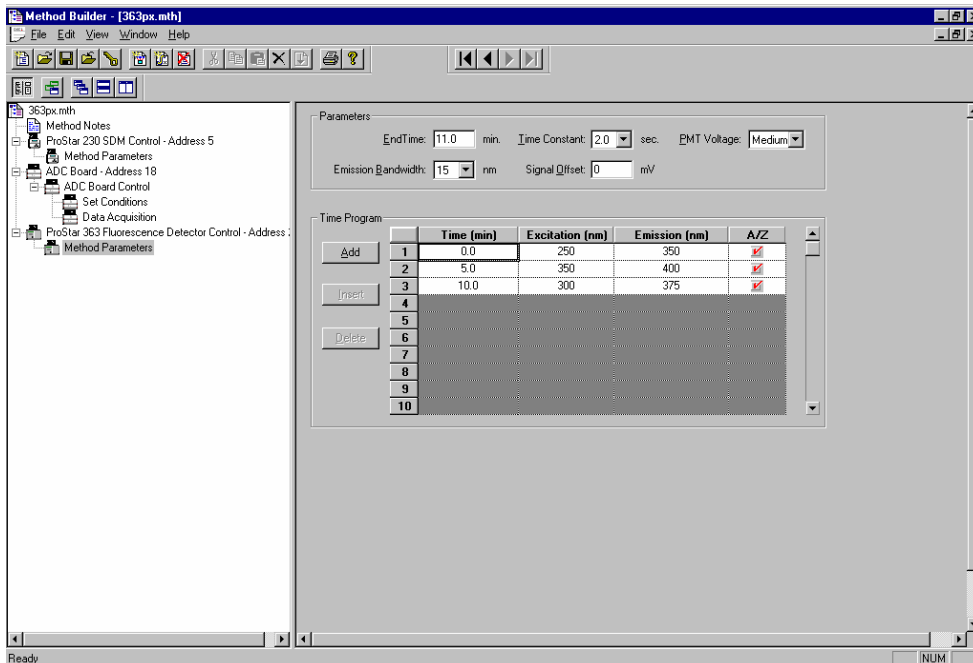
Above is the Workstation Method Builder window. The window consists of two distinct areas: the Parameters and the Time Program. The Parameters includes non-time programmable settings. The Time Program includes the Time, Excitation Wavelength, Emission Wavelength and A/Z (Autozero). Three buttons (Add, Insert and Delete) are also included in this area to help in editing. There are 99 lines available in the time program. A minimum of 0.3 minutes between lines is recommended to allow time for the monochromators in the Detector to change and stabilize at a new wavelength. An Autozero (adjusts the output to 0 Volts) is recommended after each wavelength change if the change causes a large offset in the baseline. Refer to the PS-363 Operation Manual (03-914875-00) for more information about adjusting the Parameters shown in this window. By time programming the Excitation and Emission wavelengths you can maximize the sensitivity for each fluorescent component.

Wavelength Scanning to Star 800 MIB

In order to maximize the sensitivity of the PS-363 detector it is necessary to use the optimal Excitation and Emission wavelengths. Those optimal wavelengths will give the largest signal for a specific compound. In most cases literature research of the molecules of interest will provide this information or at least a starting point based on molecules of similar structure. In some cases it will be necessary to determine the optimal wavelengths by scanning each the Excitation and Emission monochromators of the PS-363. The PS-363 Fluorescence detector is capable of Excitation or Emission scanning with storage of up to eight spectra.

Setting up and initiating scanning takes place from the front panel of the detector while in local mode. Read the PS-363 Fluorescence Detector Operation Manual for details of how to scan and store fluorescent spectra. Following is an explanation on outputting the fluorescence spectra to the Star 800 MIB so that wavelength maxima can be determined using the Workstation Interactive Graphics Program.

Before a scan is initiated it is important to have the mobile phase in the detector flow cell static. There are two ways of accomplishing a no flow condition in the flow cell. First, you can make up a solution of the compound of interest and use a syringe to put it into the flow cell. Second, you can stop the peak of interest in the flow cell during a chromatographic run by stopping pump flow. In this second case it will be necessary to wait a period of time until flow is completely stopped. A no flow condition is usually indicated by zero pressure in the system and a level baseline on the PS-363 detector. This stop flow scanning technique is best used on peaks that are at least thirty seconds wide at the baseline.

Now that you have successfully made a scan it is now time to output the scan to the Star 800 MIB. The Processor/Data System Output of the detector should be connected to the Star 800 MIB. The PS-363 should be in local mode (press *Escape* to go to the local mode).

Press the *Output Param key* and select RCD SPEED of 60 nm/min. Press *Output Param* again and then select SPECT RCD. Under RECORD SPECTRUM NO. (1-8) pick the number of your stored spectrum and press *Enter*. For BACKGROUND SPECTRUM NO. (0-8) select 0 and press *Enter* unless you have stored a background spectrum of your mobile phase that you would prefer to use. The 0

means no background subtraction. The PS-363 display now indicates that pressing the *Start* button will begin the output of the spectrum. On the Workstation click on the Star 800 MIB window Start button. Have the End Time set at about 10 minutes and a bunch rate of 4(12.5 hz). This action also starts the PS-363 scan output. The PS-363 display will show the emission wavelength and fluorescence output as the spectrum is output. The output is from the lowest wavelength to the highest wavelength while the actual scan is from high to low wavelength. When the output is complete there will be a beep. To end the data collection, click on the Reset button in the Star 800 MIB window. Use the Workstation Interactive Graphics program to look at the data.

As an example we will use anthracene in MeOH (~2 μg/liter). This was an emission scan from 450-350 nm with an excitation wavelength of 250 nm. The Star 800 MIB run is shown in Interactive Graphics and is annotated to indicate the time for the end of scan and the time of the maximum signal.
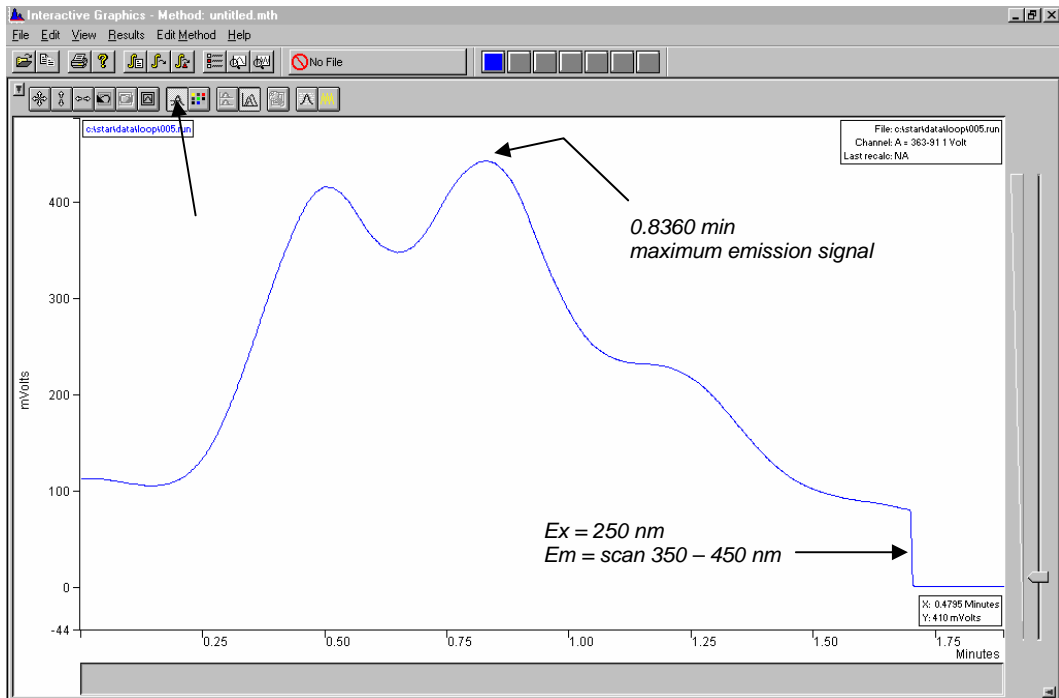
Click the Cursor Display button as shown in the above window so that you can read out time and mVolts at the cursor position. Use the cursor to determine the time of the maximum signal and the time of the end of scan step. Using this information and knowing the output rate of the scan (60 nm/min) you can now determine the maximum signal wavelength. The end of scan was at 1.7025 min (@450 nm). The highest signal was at 0.8360 min. Find the difference in minutes between these two times and convert it into nm difference (1.7025 – 0.8360 = 0.8665 min X 60 nm/min = 52 nm). Now subtract this difference from the end wavelength of 450 nm and you have 450 – 52 nm = 398 nm. This is the maximum emission output wavelength for anthracene in MeOH.

Using the ProStar 500 CVM

This section describes the configuration and use of the ProStar 500 Control Valve Module (CVM) with the Star Chromatography Workstation. For more information on the operation of the ProStar 500, please refer to the ProStar 500 Column Valve Module Operation manual.

For information on the operation of the Star Workstation, please refer to the earlier sections of this manual. Please refer to the *Pre-Installation Instructions* for information on firmware version compatibility with the Star Workstation software.

Note: **If you are updating from the PS-500 PC Software to the Star Workstation PS-500 Control driver, the CVM Configuration and Methods are not updated automatically into the new driver. You must print your Methods and Configuration, located in (Star\CVM\working.cfg and xxxx.met), and enter the information in the new Setup dialog or in the new CVM Method sections that you will be creating.**

Configuring the 500 CVM

1. **Connect the CVM to Your Star Workstation.**

   The PS-500 CVM communicates with the Star Workstation using the RS-422/485 serial communications. This allows multiple devices such as the PS-210 or 215 pumps to be attached to a single RS-422/485 serial I/O cable (P/N 03-935462-91). An R/S-422/485 converter connects the Star Workstation computer's serial port to the RS-422/485 Communications cable. The instructions for connecting this hardware to the Star Workstation computer are included in the RS-422/485 Communication Kit.

2. Set the Unit Identifier on the CVM.

After completing communication cable installation, turn on the CVM and press the <Setup> key on the front panel. Select MODULE and press the <Enter> key. For CVM Module A, scroll to the UNIT ID field, and use the up/down arrows to select an ID. Press <Enter> to save your selection. The identifier selected must be between 13 and 16. Using Device Identifiers out of this range are not supported by the Star Workstation. Press <Back> twice to return to the Ready Menu. Repeat the above steps for Module B if you wish to use the CVM as two separate Modules.

The CVM is configured with factory defaults of Module A =13 and Module B=14. All installed resources (valves and heaters) are assigned to Module A by default.

3. Configure the Communication Ports in System Control.

The first time you start System Control, the Star Communication Configuration "Wizard" will start automatically to guide you through the configuration setup. Read the description presented in the Star Communication Configuration windows. Click on Next to advance to the next step until you get to the Setup COMM Ports window. This window can also be displayed from the Instrument menu item, "Setup COMM Ports".

Select "RS-422/485" in the Combo Box below COM 1, COM 2, etc., which you have an RS-422/485 cable attached. After you select "RS-422/485", four additional Combo Boxes will appear in the

column: one each for sub ports A, B, C, and D, as indicated by the labels at the left side of the Dialog Box.

The Unit Identifiers (13,14,15,16) are assigned to the COM Ports and sub ports as shown in the following table. System Control Module addresses that correspond to the port, or sub port to which the Detector is connected, are also listed. The Unit ID described above is also listed.

Unit Identifier	COM 1	Module Address	COM 2	Module Address
13	A	24	A	28
14	B	25	B	29
15	C	26	C	30
16	D	27	D	31

To attach the PS-500 to the Star Workstation, click on the Combo Box for the sub port that corresponds to the Unit Identifier set previously in the CVM. Then select "PS-500". Select "Ignore" for the sub ports that you are not using.

After you have completed your selections, the Dialog Box should appear similar to the following figure.
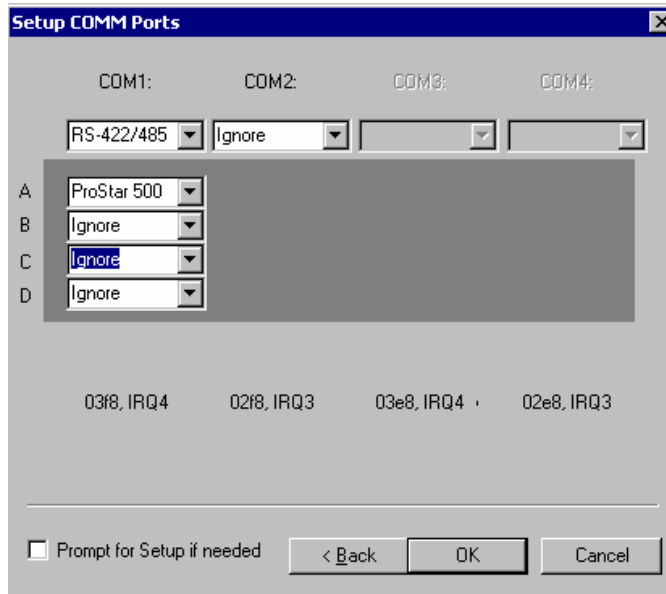
This example shows the PS-500 with its Device Identifier set to 13 that is connected to subport A of COM 1. This CVM will be assigned the address 24 in System Control, and its icon will have the label reading 500.24. You can have up to four CVM or other modules connected to each RS-422/485 cable, depending on the load that these systems impose on the communication cable bandwidth.

Now press the *OK button* to close the Dialog Box. The CVM will connect to System Control, and be represented by an icon in the Available Modules area of the Configuration Window.

After the CVM connects to System Control, configure it in a designated Instrument by dragging its icon from the Available Modules area of the Configuration Window into one of the four Instrument Areas. Maximum of four CVMs are allowed per workstation.

Now switch to the Instrument Window to view the Module Window for the CVM configured in that instrument. You are now ready to configure the CVM valves and heaters.

The ProStar 500 CVM Status Window

The status window for the PS-500 CVM is shown below.
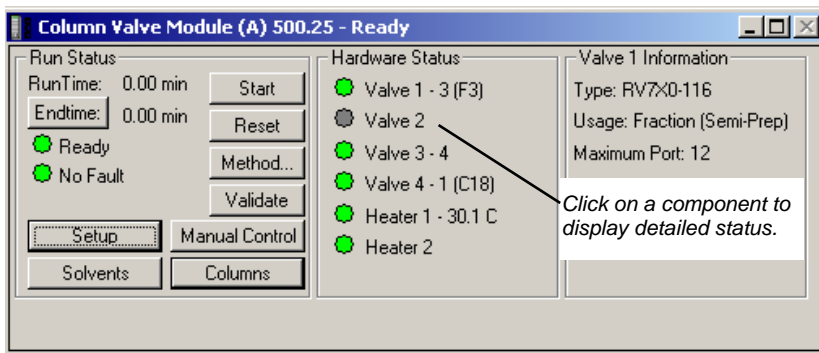
On the left of the PS-500 status window is the Run Status that includes the usual Workstation buttons (Start, Reset, Method Edit, Endtime). This window also includes the Validate, Setup, Manual Control, Solvents and Columns buttons. These buttons open dialogs that can help you setup and annotate Valves, Solvents and Columns that are connected to and controlled by the CVM.

Setup: When the *Setup* button is pressed another window opens which shows the CVM configuration, how many valves and heaters are installed, and the type of valves and their use. The software uploads the hardware configuration from the CVM into the Setup page.

The configuration dialog allows the user to set Max Temp for Heaters, and to split the PS-500 into two, modules A and B, to be configured and controlled from 2 independent LC systems.

The Configuration dialog also allows you to Assign/Unassign Valves or Heaters to the CVM module, and to edit the attributes of each valve position. Some of this information is passed onto the Setup dialog from the "Column" and from the "Solvents" dialogs. When the OK button is clicked, the configuration is saved in the cvm.ini file, downloaded to the CVM, and the status is updated to reflect the new configuration.

ProStar 500 Valve Select/Configuration

Heater 1
Max Temp: 90
Unassign   Status : Assigned to Module A

Heater 2
Max Temp: 90
Unassign   Status : Assigned to Module A

Valve 1
Name: Fraction Collector   Type: RV7X0-116
Use: Fraction

	Annotation	Abbr.	Color
1	Fraction_1	F1	Red
2	Fraction_2	F2	Green
3	Fraction_3	F3	Blue
4	Fraction_4	F4	Yellow
5			

Unassign   Status : Assigned to Module A

Valve 2
Name: Type:
Use:

	Annotation	Abbr.	Color

Assign   Status : Not Present

Valve 3
Name: Solvents   Type: RV100-106
Use: Solvent Selector

	Annotation	Color
1	Acetonitrile	Red
2	Methanol	Green
3	Water	Yellow
4		
5		

Unassign   Status : Assigned to Module A

Valve 4
Name: Columns   Type: RV7X0-112
Use: Column Selector

	Annotation	Color
1	SP-C18-5 4.0 mm	Blue
2	Microsorb C18 Prep	Red

Unassign   Status : Assigned to Module A

Enable B Module   OK   Cancel

Once the valves and heaters are correctly detected by module A, these resources can be assigned to Module A or Module B to satisfy the Laboratory needs. To split the PS-500 into 2 independently operated and controlled modules click on the "Enable B Module" button in the Configuration screen of Module A.
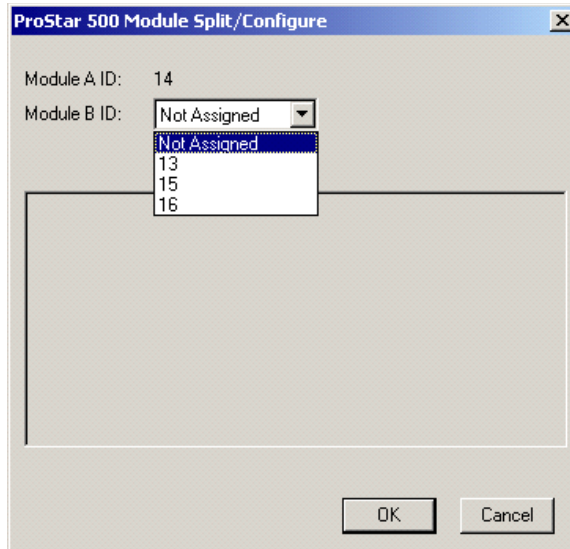
After you select an ID for Module B from the available IDs, an important message is displayed to guide you through the proper steps of splitting the unit into A and B.
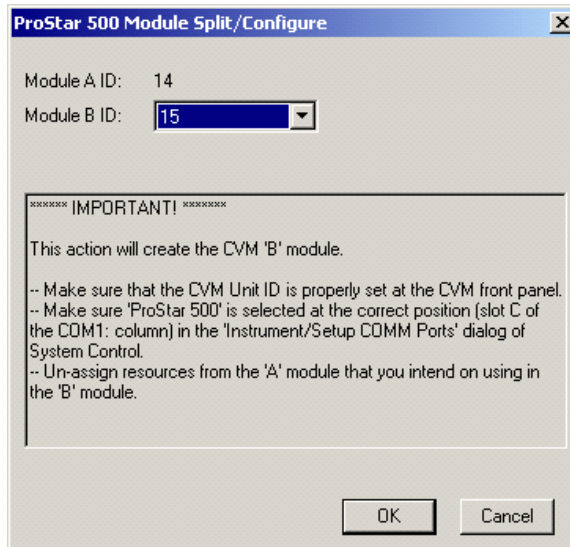
When the OK button is clicked, the configuration is saved in the cvm.ini file, downloaded to the CVM, and the status is updated to reflect the new configuration. Until you complete this process, the CVM driver will not detect the B Module.

Solvents: When the *Solvents* button is pressed, the solvent matrix dialog is opened. Some illustrative solvent database has already been entered on five lists of solvents (tabs). Each list represents a group of solvents with similar miscibility and other qualities of compatibility. The user can edit and add to the list.

ProStar 500 Solvent Database Editor				
Type 1	Type 2	Type 3	Type 4	Type 5

Name: Hydrophobic

	Solvent Name	Conc.	Abbr.
1	Hexane		C6
2	Isooctane		i-C8
3	Octane		C8
4	Toluene		Me-C6H6
5	Ethyl Ether		Et2O
6	Dichloromethane		MeCl2
7			
8			

☑ Permit to 2   ☐ Permit to 3   ☐ Permit to 4   ☐ Permit to 5

Delete		OK	Cancel

This dialog also allows you to setup solvent compatibility checks that can be used in Validating methods involving solvent or column switching.

Validate: The is a process to validate methods and report possible problems that could interrupt automation, cause the loss of valuable samples, or result in hardware problems. It is an important final step before running automated sample analyses that involve switching columns and solvents. To initiate the Validate process, click on the *Validate* button in the CVM status window, or in the CVM Method section.
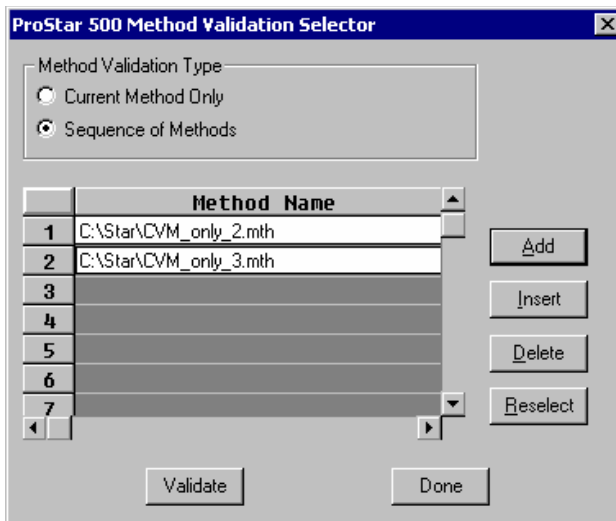
You can Validate the current Method only, or a sequence of Methods. The process will check number of properties, most importantly the following:

■   Valve position changes meet solvent compatibility requirements set in the solvent matrix and column database.

■   Stepping from one Method to another in a sequence involves only compatible solvent changes.

When finished with adding Methods to the list, click on the *Validate* button to process or the *Done* button to abort. The Validate window expands to show the tests being processed. If an error is found, it will be listed. Correct the errors in the message and then revalidate the Method.

ProStar 500 Method Validation Selector

Method Validation Type
- ○ Current Method Only
- ● Sequence of Methods

	Method Name
1	C:\Star\CVM_only_2.mth
2	
3	
4	
5	
6	
7	

Add
Insert
Delete
Reselect

Validate   Clear   Done

Validating Method List
Checking C:\Star\CVM_only_2.mth configuration
Valve 4 - Configuration
    Warning - Model: RV7X0-112 (in setup) is unused by method
    Warning - Usage: Column Selector (in setup) is unused by method
Done

Columns: Click on the *Column* button to open the CVM Column Database editor. This dialog stores information about the columns mounted in the CVM. The data is required for full operation of the Column Selector Valves and Method Sequence Validation feature of the CVM control software. The data is otherwise optional, but provides a very useful resource when multiple columns are mounted on the CVM or when multiple users operate the system.

The run Count tabulates the number of runs that occurred on a given column. This feature can help to determine the life span of a column.

Manual Control: When you press on the *Manual Control* button, the PS-500 status window expands to show a graphic display of the installed components. Manual Control allows you to change Valve positions or Heater temperatures immediately and without constructing a method. It also provides the flexibility to quickly change valve positions during a run. This is particularly useful in fraction collection and other situations where an immediate change of valve positions is required.

Any valve changes made through Manual Control during a "Run" are documented in the Run Log as part of the Method that was in use during the run.

The valve ports are labeled on the computer graphics for enhanced manual control. The abbreviated annotations on the graphics are extracted from the Setup, Solvents, and Columns dialogs. Click on End Manual Control to close the extended window.

Note:	While the Manual Control window is displayed, you can examine the **PS-500 Configuration but you cannot change and save the CVM setup. The OK button in the Setup dialog is disabled.**

Building a ProStar 500 Method

After the PS-500 is configured, the CVM methods for programmed operation can be built in the Star Workstation Method Editor. The ProStar 500 Method section is shown in the following figure. The window consists of two distinct areas: the module Parameters and the Valve Time Program.

The Module Parameters includes non-time programmable settings for End Time, End of Run actions, and initial Temperature for Column Heaters. There are three different types of delays built into the CVM Method section, these are:

Transition Delay: Once the CVM Method is downloaded, the initial valves position in the Time Program (time zero) are executed immediately, without waiting for a start signal. The Transition Delay provides a delay time period before the Ready status signal is sent to System Control. This allows for solvent flushing and conditioning.

End of Run Equilibration: An equilibration period at the end of the run is executed before the CVM Method advances to the Ready state.

Column Heater Stabilization: Specifies the column heater Stabilization time after the temperature reaches ±2 °C of the Setpoint Temperature.

Valve Time Program: The Valve Time Program includes a Time column, and a column for each of the Valves configured in the module. Four buttons (Add, Insert, Delete and Validate) are also included in this area to help in editing and Validating the method. Once the Start signal is received by the CVM, the valve commands are executed as specified in the Valve Time Program

Set Configuration: The Method Configuration must match the settings in the PS-500 Setup screen in System Control. If it does not, this method can not be activated and used in System Control. You can manually edit the method configuration from the <**Set Configuration**> button. You can also let the Star Assistant for Method Builder modify the method configuration for you. To do that, open the Method in System Control and follow the prompts to automatically update the Method configuration.

Column/Solvent Switching between Runs

Column or Solvent switching before sample analysis can be performed using a series of Method activation in the Star Workstation SampleList. This approach can be used to automatically setup the LC system for analyses when it is necessary to switch columns, change solvents, or change column heater's temperature.

In the following example, a new column and solvent selection is established before the Star Workstation processes samples. The first line in the SampleList is to activate the Switch.mth. The next line in the SampleList is to activate the Analysis.mth that will be used for processing the samples. The analytical method does not have to have a Transition Delay time. These methods can also be included in a Star Workstation sequence.

		Sample Name	Sample Type	Cal. level	Inj.	Injection Notes	AutoLink	
1			Activate Method ▾				switch.mth	
2			Activate Method ▾				analysis.mth	
3		Sample# 123	Analysis ▾		1	none	none	
4		Sample # 456	Analysis ▾		1	none	none	
5		Sample # 789	Analysis ▾		1	none	none	
6			▾					
7			▾					

Generic SampleList: Switch_Analysis.SMP

Buttons: Add, Insert, Delete, Fill Down, Add Lines..., Defaults...

Begin, Suspend, Resume, Data Files..., RecalcList...

The CVM section of the Switch.mth will perform the following actions:

- Switch the Solvent valve to the port connected to Acetonitrile.

- Switch the Column to C18-5 4.0-mm column.

- Provides a Transition Delay of 10.0 min to allow the LC system to equilibrate.

When switching column selector valves, it is often desirable to have no solvent flow. In this case, the first line in the Sample List would activate a pump method with no pump flow, the second line would be to activate the Switch.mth to change the valve positions, and the third line would activate a method to start the pump flow.

Ethernet Communication Setup

This section describes the procedure for configuring your computer for use with the Star Chromatography Workstation LC modules that communicate with the Star Workstation over standard Ethernet connection.

The PS-325, PS-335, Star 800 MIB and the PS-520 oven (referred to as Ethernet modules) communicate with the Star Workstation over a standard 10BaseT Ethernet connection. Your system can easily be expanded from a single module on a single Star Workstation configuration to multiple modules on a single Star Workstation. In a fully networked lab, it is possible to have several Ethernet modules connected to any one of several Star Workstation systems located anywhere on the network.

The term *Ethernet* refers to the cables and interface cards that are used to connect devices on the network. Several types of Ethernet cables exist, and if you are connecting your Ethernet modules to an existing Ethernet network, you will need to use cables compatible with 10BaseT Ethernet connections. Generally these will be Ethernet category 3 or Ethernet category 5 cables with RJ45 connectors.

What Do I need to Know about Networks

The PS-325, PS-335 Star 800 MIB and the PS-520 oven use *TCP/IP* (Transmission Control Protocol / Internet Protocol) to communicate over the Ethernet network. Ethernet is a set of hardware specifications that govern the way a device is connected to the network. This section of the manual describes the Ethernet connections used to connect these modules to Star Workstations.

The term TCP/IP refers to the software protocol that allows various devices to communicate with each other over a network. Communications over the Internet and the World Wide Web use TCP/IP. Since these Ethernet modules use TCP/IP to communicate with the Star Workstation, the Star Workstation PC and any one of these modules need to be given unique *IP addresses*—the addresses that are used to identify each networked TCP/IP device. The process used to assign IP addresses to the PC and to the Modules is also covered in this section of the manual.

Isolated Network

If you have one Ethernet module to connect directly to the Star Workstation PC and the Star Workstation PC is NOT connected to a company network, then you may connect your Star Workstation to this module directly to each other using the Ethernet crossover cable supplied with the PS-325, PS-335, Star 800 MIB or PS-520 oven.
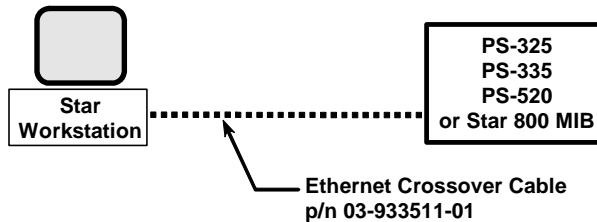
If you want to connect several Ethernet modules to one or more Star Workstations, then you will need to use an Ethernet switch and Ethernet Category 3 or 5 patch cables to connect the modules and the Star Workstation PCs to the Ethernet switch.
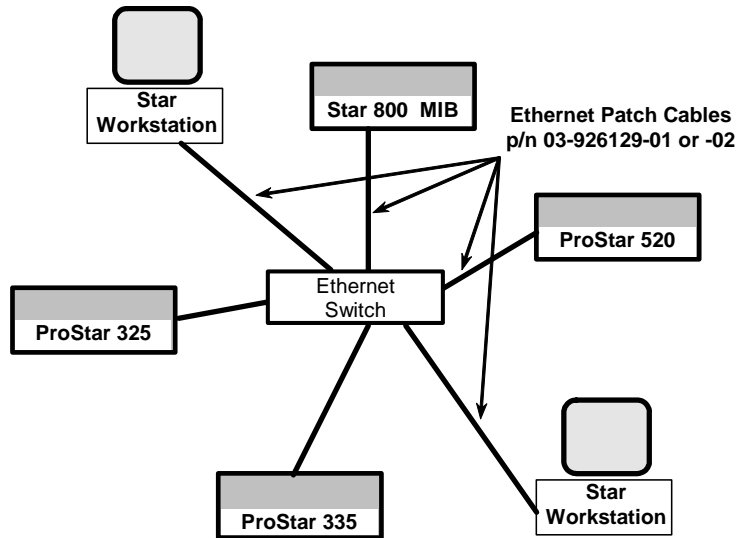
We refer to this type of special purpose network as an **Isolated Network** (one that does not have IP addresses provided by a Network Administrator).

Company Network

You may also connect your Star Workstations and the Ethernet modules to a company Ethernet network used for purposes other than instrument control (such as Internet access or file server access).
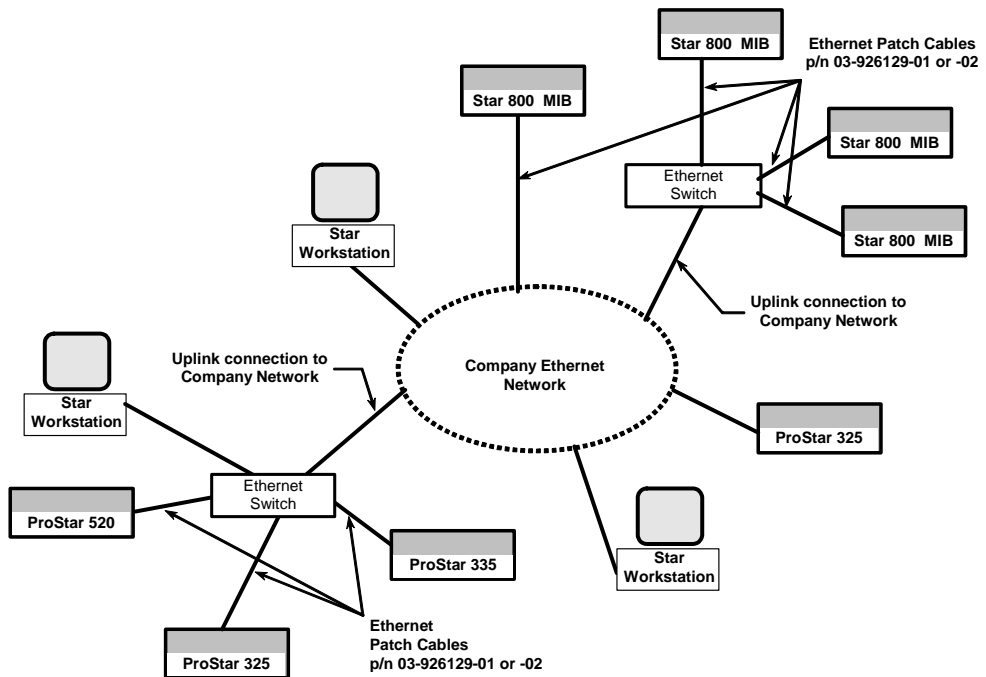
We refer to this type of multi-purpose network as a **Company Network**, and a Network Administrator in your company will typically manage it. If this is the case, then some of the settings needed to configure your Star 800 MIB, PS-520 oven, and Star Workstation PC will need to be provided by your Network Administrator.

The Ethernet modules are provided their IP addresses either by the BOOTP server included with Star Workstation or by BOOTP software running on your network. The software used to send IP addresses to TCP/IP devices is called a *BOOTP Server* (Bootstrap Protocol Server). You will see the term BOOTP Server mentioned in this manual. If you are connecting your modules and Star Workstation to a company network, your Network Administrator should be made aware that the Ethernet modules will require a BOOTP Server for IP address assignment.

Where to Begin

Before beginning the configuration process, you should know whether you will be attaching your Star Workstation PC, the Ethernet modules to a company network (as described in the previous section) or as an isolated network only used for instrument control. If you have a Network Administrator on site, you may wish to ask which configuration is recommended.

Use this information to determine the order in which you should read the following sections.

■ "Setting the Network Properties for Isolated Network" describes the procedure for configuring the TCP/IP parameters of your Star Workstation PC for use with No Company Network.

■ "Setting the Network Properties for Company Network" describes the procedure for configuring the TCP/IP parameters of your Star Workstation PC for use on a Company Network.

■ "Setting the Star WS BOOTP Server to Assign IP Addresses" describes the process of getting the Star Workstation to assign IP Addresses for the modules connected to the network.

■ "Adding Star 800 MIB or PS-520 oven to Instruments in System Control" describes the process of configuring and adding the modules to instruments.

Setting the Network Properties for Isolated Network

Note: **The following section describes a procedure specific to Windows 2000. If you are running Windows NT 4.0 or Windows 98, the Windows and dialog boxes shown will differ from those you see on your system, but the procedure described here is essentially the same as the one for Windows NT 4.0 or Windows 98.**

If you will be connecting your Star Workstation PC directly to one or more Ethernet modules with **no connection to the company network**, then you can use the following network properties on your PC:

Subnet mask   255.0.0.0

Gateway

DNS

To access the TCP/IP network properties click on the Windows Start button and select Settings → Network and Dial-up Connection → Local Area Connection → Properties.
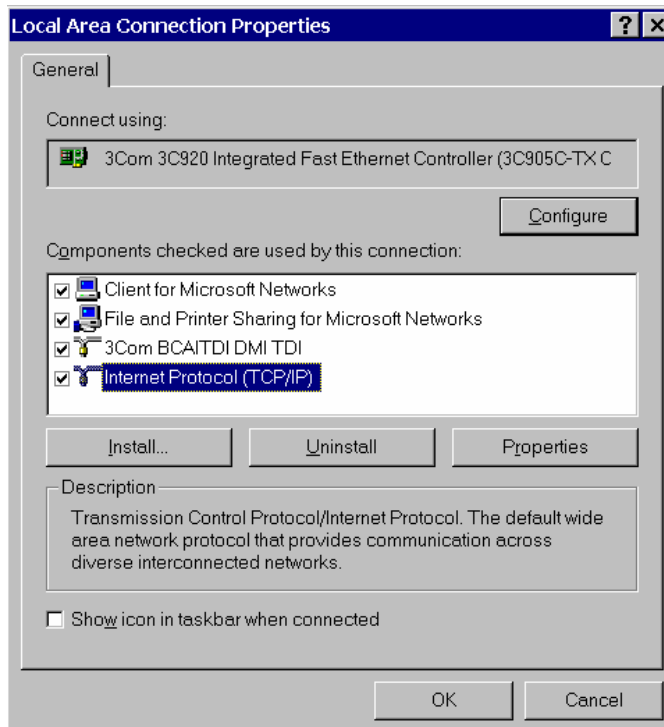
From the installed component list, click on the TCP/IP protocol and select properties. Since your Star Workstation PC is only connected to the Ethernet modules, you can set the IP Address to any value, for example 10.2.128.1.
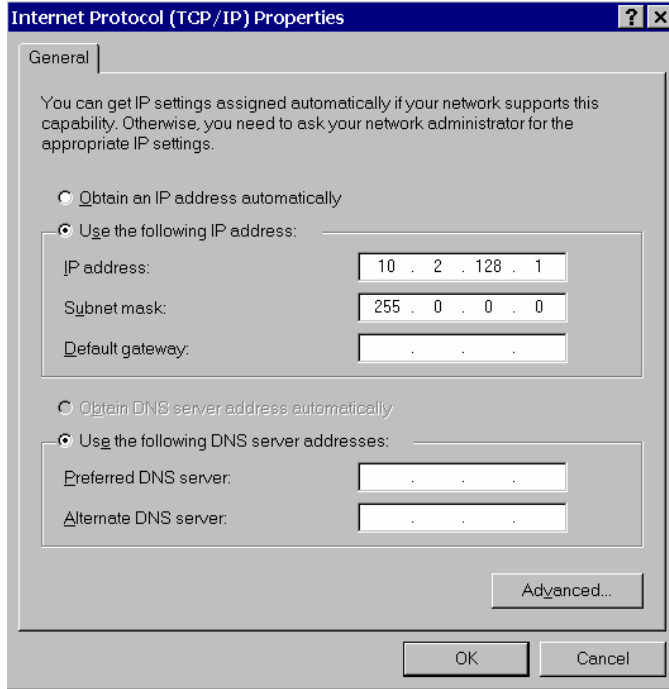
If the TCP/IP is not listed in the list of Network components, then click on the Install button and select Protocol from the list of Network Components Type, and select Microsoft as the manufacturer and TCP/IP as the Protocol.
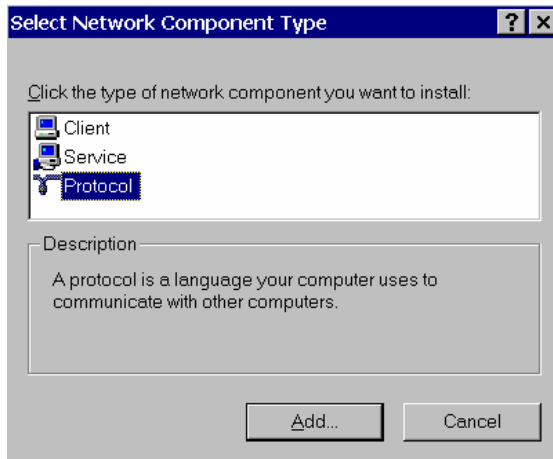
If your **isolated network** contains multiple Ethernet modules and Star Workstation PCs or a combination of these, then each device on the network will need a unique IP address assigned to it. You will need to keep track of which IP addresses have been used to avoid assigning duplicates.

Note:	**After making changes to the network properties in the PC, save the changes and then shutdown and power off the PC. This will ensure that the Ethernet board is reset and communication is restarted with the new properties.**

Setting the Network Properties for a Company Network

If you will be connecting your Star Workstation PC to your **company network**, you should contact your Network Administrator to obtain the static IP addresses for each device, the gateway, domain, DNS settings, and WINS settings that should be used. Note that each Workstation PC must have a unique IP address.

To access the TCP/IP network properties click on the Windows Start button and select Settings → Network and Dial-up Connection → Local Area Connection → Properties. The following is only an example of the Network TCP/IP properties for the Star Workstation PC when connected to a company network.
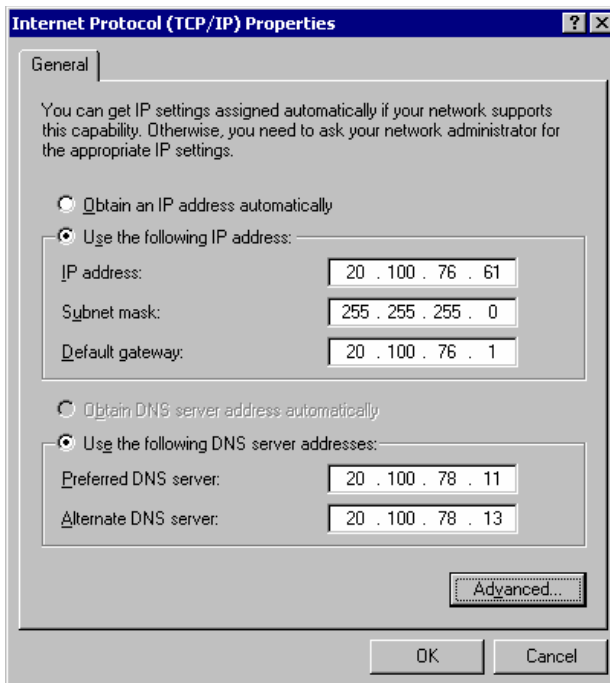
Setting the Star WS BOOTP Server to Assign IP Addresses

If you are using a ***Company Network*** and the Network Administrator has a BOOTP Server on the network that will be providing the IP Addresses for the chromatography instruments connected to the network, you should skip to the next section. For all other installations, choose one Star Workstation PC to be the BOOTP server.

Note: It is good practice to have only one BOOTP server on a network.

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1. Power up your Star Workstation PC that will be the BOOTP server. The Ethernet module connected to the network should still be powered down.

2. When System Control has started for the first time, the Star Assistant Communication Configuration Wizard will appear to guide you through the Ethernet communication setup.

Otherwise, start System Control and choose Setup Ethernet Communications from the Instrument drop down menu. Click on the Next button. The Setup Ethernet Ports dialog will display a table of module Addresses (44, 45, 46, 47), Module Type, and IP Address or Domain Name.

3. Click on the Setup button located at the right side of the window. The "Setup BOOTP Server" dialog box will display a table with the headings Ethernet Address, IP Address, and Host Name.

4. Check the box labeled "Manage IP Addresses from this Workstation" and select that you want to manually assign IP Addresses or enter the number of IP Addresses you wish to have automatically assigned if you have a sequential block of IP addresses to assign. If you are on a *Company Network*, your Network Administrator will provide the IP Addresses to be entered. Now OK each of the dialog screens that are displayed.

5. Close System Control.

Assigning IP Addresses from Star WS BOOTP Server

1. Invoke (or re-invoke) System Control on the Star Workstation and choose Setup Ethernet Communications from the Instrument drop down menu. Click on the Next key. Click on the Next button. The Setup Ethernet Ports dialog will display a table of module Addresses (44, 45, 46, 47), Module Type, and IP Address or Domain Name.

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2. Click on the Setup button located at the right side of the window. The Setup BOOTP Server dialog box will display a table with the headings Ethernet Address, IP Address, and Host Name.

    Verify that the PC IP address in the title bar and Ethernet settings at the bottom of the dialog box are correct before proceeding.

3. Power-up one of your Ethernet modules.

4. Within a couple of minutes, the Ethernet address will appear in the table for the Star 800 MIB that you just turned on. If you are in a network environment, this could take longer. If you have chosen to manually assign IP Addresses, you should enter one now, otherwise, it should appear automatically in this dialog box. If you are on a *Company Network*, your Network Administrator should provide this IP address.

5. Enter a descriptive name in the Host Name field for your Ethernet module. If you are on a *Company Network*, your Network Administrator may provide this name.

6. Repeat steps 3, 4, and 5 for each additional Ethernet module connected to your network.

7. When all of the chromatographic devices have been powered up and had their IP Address and Host Name entered into the table, click OK.

The following is an example for Isolated Network IP addresses that were assigned to a Star 800 MIB and to a PS-520 oven. These IP addresses are not provided by a Network Administrator, However, the IP addresses must be on the same segment as your Star Workstation PC that was assigned an IP address of 10.2.128.1 in this section of the manual.

Setup BOOTP Server at 10.190.76.156

☑ Manage IP addresses from this Workstation

☐ Require password entry for this dialog box

	Ethernet Address	IP Address	Host Name	
1	00.50.c2.00.12.ae	10.2.128.2	Star800_NG	
2	00.e0.4b.00.8b.54	10.2.128.3	NG_520	
3				
4				
5				
6				
7				

[Add] [Insert] [Delete]

Manually enter an IP Address and Host Name corresponding to each Ethernet Address in the table. Use this feature when individual IP Addresses and Host Names have been reserved for use by each Module, but IP Address and Host Name management is not performed by a Network Administrator.

◉ Assign IP addresses manually

○ Assign: [0] IP addresses starting from: [0.0.0.0]

This Workstation will assign these settings to each Ethernet Module
- Subnet Mask: 255.255.255.0
- Gateway: 10.190.76.1
- Domain: csb.varianinc.com

[Ok] [Advanced...] [Cancel]

The following is an example for Company Network IP addresses that were assigned to a Star 800 MIB and to a PS-520 oven. A Network Administrator provided these IP addresses.

Setup BOOTP Server at 10.190.76.61

☑ Manage IP addresses from this Workstation

☐ Require password entry for this dialog box

	Ethernet Address	IP Address	Host Name	
1	00.e0.4b.00.8b.54	20.100.76.171	NG_520	
2	00.50.c2.00.12.ae	20.100.76.172	Star800_NG	
3				
4				
5				
6				
7				

[Add] [Insert] [Delete]

Manually enter an IP Address and Host Name corresponding to each Ethernet Address in the table. Use this feature when individual IP Addresses and Host Names have been reserved for use by each Module, but IP Address and Host Name management is not performed by a Network Administrator.

◉ Assign IP addresses manually

○ Assign: [ ] IP addresses starting from: [0.0.0.0]

┌─ This Workstation will assign these settings to each Ethernet Module ─┐
│ Subnet Mask: 255.255.255.0 │
│ Gateway: 10.190.76.1 │
│ Domain: <unnamed> │
└──┘

[Ok] [Advanced...] [Cancel]

Allow a couple of minutes for the Star 800 MIB and the PS-520 to get their IP Addresses and finish booting.

Adding Star 800 MIB or ProStar 520 Oven to Instruments in System Control

Once you have configured your Star Workstation computer and the Star 800 MIB or the PS-520 for network communication, you may select up to four Ethernet modules to be controlled from each Star Workstation. If it is not already running, start System Control. The Star Assistant Communication Configuration Wizard will be displayed if you have not yet configured your PS-520 Ethernet connections. Click on the Next button to advance to the *Setup Ethernet Ports* dialog box.

Star 800 MIB

1. In the Setup Ethernet Ports Dialog box, click on the Module Type drop down box for one of the lines and select 800.

2. Press the TAB key and type in the IP Address or Host Name of the Star 800 MIB that you wish to control.
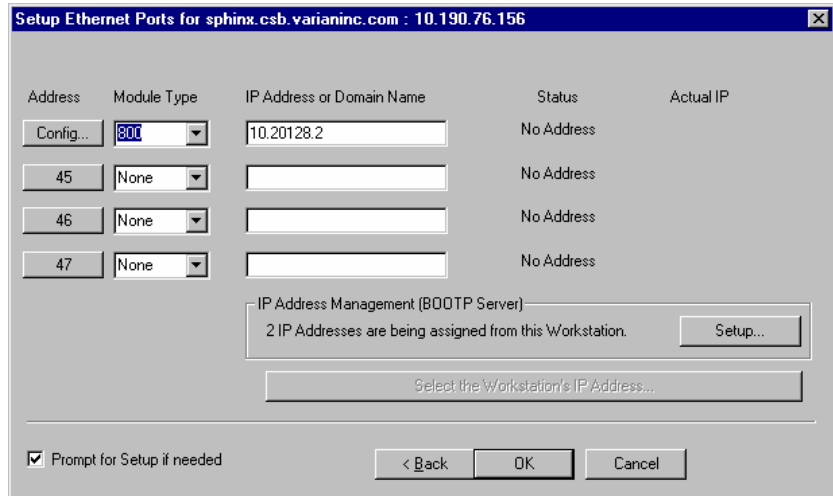
3. Click on the "Config…" button located to the left of the Star 800 MIB that you want to configure. The Assign ADC Channels dialog box will be displayed. Each Star 800 MIB channel can be configured for the analog signal level and synchronization signal polarity.

Assign ADC Channels to ProStar 800 Systems

	ADC System	Address	ADC Module	Channel 1	Channel 2	Channel 3	Channel 4	Start In	System Ready Out
1	1	84							
2	2	85	800	+-10V	+-1V			when closing	when closed
3	3	86							
4	4	87							

	Serial Port	Address	Serial Module	Linked ADC System
1	1	104		
2	2	105		
3	3	106		
4	4	107		

Serial Number and Firmware Version for this Box: 0664.0400.H2.0100__v2.1.7

Save   Cancel

4. The top half of this dialog box is a table for the settings of the analog and synchronization signals. The different rows allow the configuration of analog channels connected to different instruments. ONLY the analog channels connected to detectors in the same instrument should have their settings on the same row. There will be one 800 MIB icon created for each row that has an analog signal setting. Multiple analog signal settings in the same row are different channels in the same ADCB.

   Select the analog input signal range from the drop down box for each channel that is being used.

5. Next select the Start In and System Ready Out synchronization signal settings from the drop down boxes for each row that has channel entry. The bottom half of this dialog box allows the optional serial ports to be configured. For Varian detectors, Start In should be set to "when closing" and Ready Out should be set to "when closed".

6. When the entries are complete, click on Save.

7. Click OK on the dialog box reminding you to restart System Control for the changes to be implemented.

8. Click OK to close the Setup Ethernet dialog box.

9. Close and restart System Control.

10. When System Control is restarted, 800 icons corresponding to the analog channels just configured for the Star 800 MIB will appear. These icons can now be configured into the instruments and used like any other module in Star Workstation.

ProStar 520 Oven

1. In the Setup Ethernet Ports Dialog box, click on the Module Type drop down box for one of the lines and select 520.

2. Press the Address button to display the Module Selection dialog box.

3. Select the PS-520 oven that you wish to connect to the address (44). Note that if you are running on a company network, only PS-520 ovens on the same local subnet appear in the Select Available Module dialog box. To connect to a PS-520 oven in a different subnet, type its IP Address directly into the IP address field in the Setup Ethernet Ports dialog box. Consult your Network Administrator about subnets on your network.

Select an Available Module from these found on the Network

3800	<unnamed>	Available	10.190.76.150
3800	George	In Use By jjag2	10.190.76.82
3800	seth	Available	10.190.76.44
3800	Varian 1200	In Use By greg	10.190.76.49
3900	Galileo_MP#1	Available	10.190.76.48
39XL	3900_s/n_0187	In Use By stevea2	10.190.76.141
39XL	Copernicus_MP2	Available	10.190.76.84
520	PS520_NG	Online	10.190.76.171

OK   Cancel
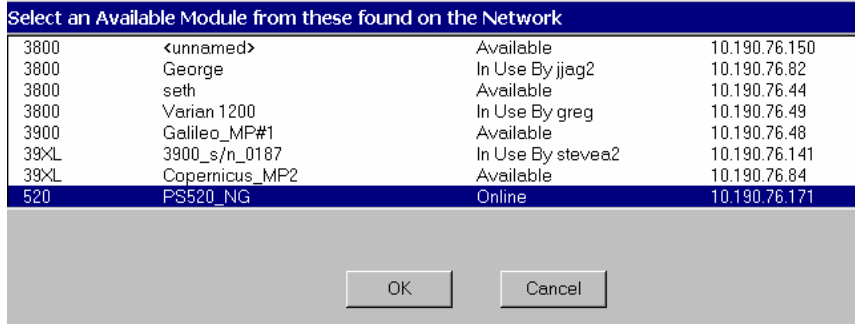
4. After you have completed your selection, the *Setup Ethernet Ports* Dialog Box shows the PS-520 ovens connected to your Workstation.

Setup Ethernet Ports for Delphinus : 10.190.76.61

Address	Module Type	IP Address or Domain Name	Status	Actual IP
44	520	PS520_NG	Online	10.190.76.171
45	None		No Address	
46	None		No Address	
47	None		No Address	

IP Address Management (BOOTP Server)
1 IP Address is being assigned from this Workstation.   Setup...

Select the Workstation's IP Address...

☐ Prompt for Setup if needed   ‹ Back   OK   Cancel

5. When each PS-520 oven connects to System Control, an icon at the bottom of the configuration window will represent it. The icon will have a label reading (520: 44) and will include the Host Name of the ProStar 520 oven appended to the label. The numbers 44 – 47 are System Control communication addresses that correspond to the Ethernet port connected to the device.

Using the ProStar 325 UV-Vis Detector

This section describes the configuration and use of the ProStar 325 UV-Vis Detector with the Star Chromatography Workstation. For information on the operation of the Star Workstation, please refer to the earlier sections of this manual.

Note: **For detail information on the Ethernet configuration, please refer to the *Ethernet Communication Setup* section of this manual.**

Configuring the 325 Detector

1. Connect the Detector to Your Star Workstation

The detector communicates with the Star Workstation using Ethernet communications. Up to 4 ProStar 325 detectors can be attached to one Star workstation PC. If the detector is attached directly to the PC, the crossover cable that is shipped with the ProStar 325 detector must be used. If the detector is attached to an Ethernet switch, a patch cable must be used. Both raw data and synchronization signals for starting and stopping the detector are sent through the Ethernet connection.

2. Connecting the ProStar 325 Detector to your Varian ProStar 210/218 CIM or ProStar 701 Fraction Collector

In order to get the detector signal into the Dynamax modules for display and to properly assign fraction log entries, you will need to attach one of the analog output channels to the input of the ProStar 701 Fraction Collector and the other to the pump CIM. The analog signal cable, part number 110744200, plugs into the detector analog out and provides outputs for the CIM and the fraction collector.

3. Setting up Ethernet Communications

For general information about setting up the Ethernet communications, please see the *Ethernet Communications Setup* section of the Star Workstation Data Acquisition with LC Control manual. In addition, the following steps should be used to establish communications between the ProStar 325 and the Star Workstation.

a. Start with the ProStar 325 detector powered off. Check the back of the instrument so you know the MAC address of the detector. Make sure that detector is attached to the workstation either directly or through a network.

b. On the System control screen, pull down the Instrument menu and select **Setup Ethernet Communications**. You will see the following screen.
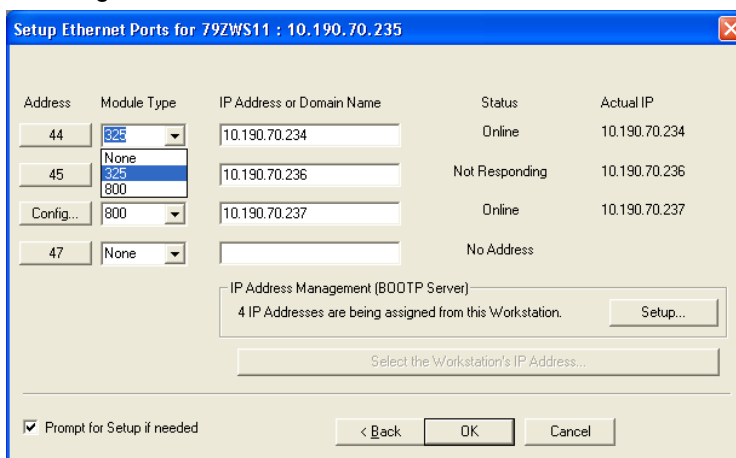
c. Select 325 from the **Module Type** menu and enter the IP address that you want to assign to this module.
d. Press the **Setup** button on the right side of this menu and you will see the following screen.
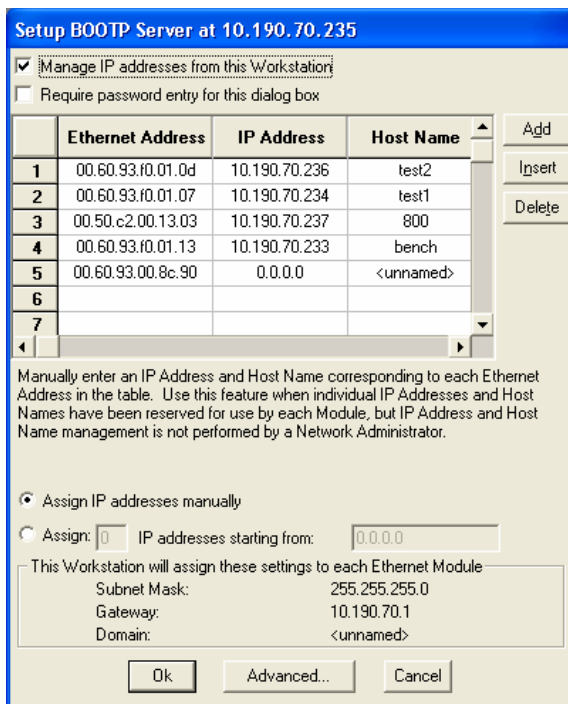
e. Make sure that **Manage IP Addresses from this Workstation** is checked.

f. Turn detector power on. Watch this screen until the Ethernet address that corresponds with the MAC address on the rear of the instrument appears.

g. On the line with the appropriate Ethernet address, type in the IP address that you entered on the previous page.

h. Type in a host name for the detector and then click on any other entry on the screen.

i. Click the **OK** button on the bottom of this screen and the **OK** button at the bottom of the previous screen.

j. Close system control and turn off the ProStar 325.

k. Re-start system control and turn on the ProStar 325. You should see the ProStar 325 icon with the assigned address appear on the configuration screen.

I. Drag the ProStar 325 icon from the *Available Module area* to an instrument. Double-click in the Instrument area to view the System Control Status Window.

The ProStar 325 Detector Status Window

Shown below is the Status Window for the ProStar 325 detector.
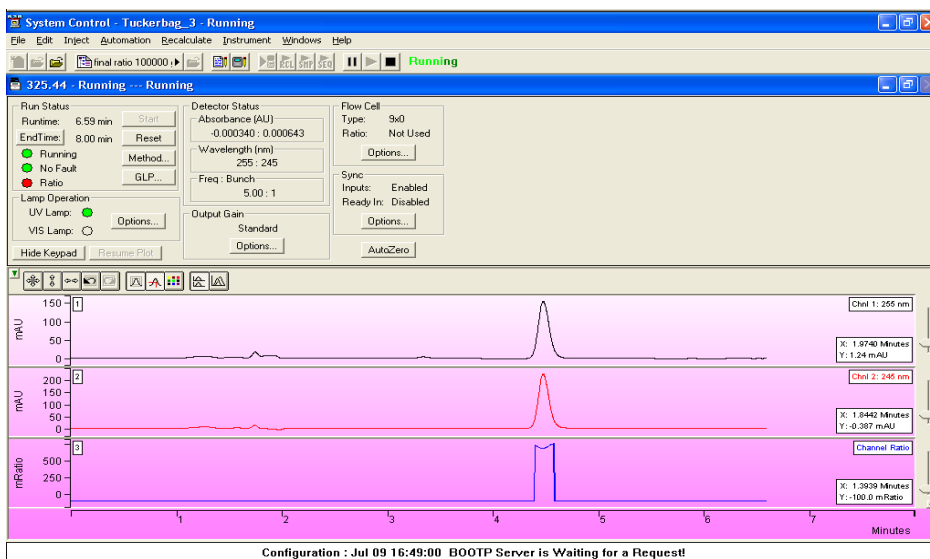
ProStar 325 Status Screen

Description of the ProStar 325 Detector Status Window

■ On the bottom of the ProStar 325 detector is the chromatogram display window. This window will display the real time out of the detector both during a run and between runs. It will not display anything during the initial detector calibration phase when the lamp is first turned on. The detector will display a single chromatogram, two chromatograms or two chromatograms and a wavelength ratio depending on what was selected in the active method. The detector can sequence between single, dual and ratio modes in any series of methods.

■ On the left of the ProStar 325 status window is the **Run Status** that includes the usual Workstation buttons (Start, Reset, Method Edit).

■ The **End Time** button can be used to change the end time for the current run after you have activated the Method. The software will not let you set the end time to a time exactly equal to a line in the detector time programmed table.

■ The Status lights visually show the state of the detector. If wavelength ratio mode is activated in the method currently running, the Ratio light will indicate whether the detector is presently calculating a wavelength ratio. The software will only calculate a ratio when it detects a peak. (See the method editor section of this document for more information.

■ The **GLP** button will display the GLP information as shown below. This information will be appended to the data file in the instrument run log for every run.
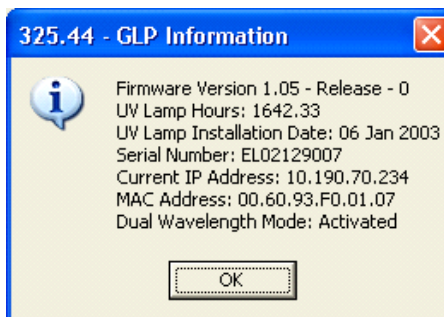
GLP Status Screen

■ Numerical Detector Status information is displayed in the Detector status box. If the instrument is operating in dual channel mode, there will be two wavelengths and two absorbance readings. In dual channel mode, the absorbances are designated channel 1 and 2 in the ProStar 325 method. Also listed in Detector status section is the frequency of data acquisition per channel in points per second and the bunch rate.

Lamp Operation Options Screen

- The status of the UV and Visible lamp is displayed in the lamp operation section of the status screen. If the circle is a dark gray, the lamp is installed but not on. If the button is green, the lamp is on. When the lamp is first turned on, the button will flash for a while before going completely green.

- Pushing the **Options** button in the Lamp Operation section displays the above screen. The status of the lamps is displayed. To turn a lamp on, click on the lamp on box next to the lamp. When the lamp is first turned on, the detector will go through a calibration at all of the wavelength ranges. These will be reflected in changes in the Absorbance and Wavelength sections of the Detector Status display. This will take 2 to 4 minutes. During this time, the detector will not take any inputs.

- The **Lamp Operation Options** screen also has a check box for New Lamp. When this is checked, the lamp hours will be reset to 0 and the date when the lamp was installed will be set to the current date. This is displayed in the **GLP** screen and put in the run log for every run.

- The user can select the detector action in case of a fault. The fault could be an internal fault within the detector or a fault generated by another instrument and conveyed to the detector through the fault sync signal.

Output Gain Control Screen

- Clicking the **Output Gain** button will display the Output Gain
  control screen. This screen operates only for the 9x0 analytical
  flow cell. The user can select either the standard output or an
  output normalized to a 10 mm flow cell path length. This will
  multiply the output signal by 1.111. This makes it easy to
  compare peaks seen on the ProStar 325 detector with peaks
  generated on a detector with a 10 mm flow cell. Selecting the
  normalized mode does not improve the signal to noise because
  the entire signal is multiplied by 1.111. Normally this is set to
  Standard.
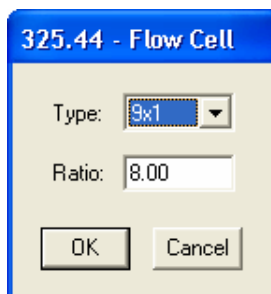
Flow Cell Options Screen

- The user must select the flow cell that they are using from the
  Flow Cell Option button. All 4 flow cell types, 9x0, 9x1, 4x0 and
  4x0.15 as well as 0x0, are selectable. The information selected
  here is recorded in the instrument run log in the Star data file. If
  a prep flow cell is selected, the user will be able to enter a ratio.
  The ratio is used for extended range operation. (Please see the
  detector Operator's manual for more information on extended
  range operation.) The ratio for each prep flow cell is determined
  at the factory and is included with the flow cell. The detector will
  always operate in extended range mode with a prep flow cell.
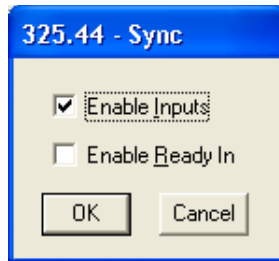
Sync Options Screen

- The hardware sync signals on the rear panel of the detector can be controlled using the **Sync Options** screen. If the general inputs are enabled, the detector could be started from a contact closure and could receive a fault signal directly from another instrument. If the Enable Ready In is active, the detector will not go to the ready state until the ready inputs are shorted together. This is only used if the detector must wait for another instrument, which is not controlled by the Star workstation, to get ready before the detector becomes ready. See the ProStar 325 Operator's manual for more information on Sync signals.

- The button to **AutoZero** the detector signal going to the workstation and the analog outputs is located on the right side of the Status screen.

Building a ProStar 325 Detector Method
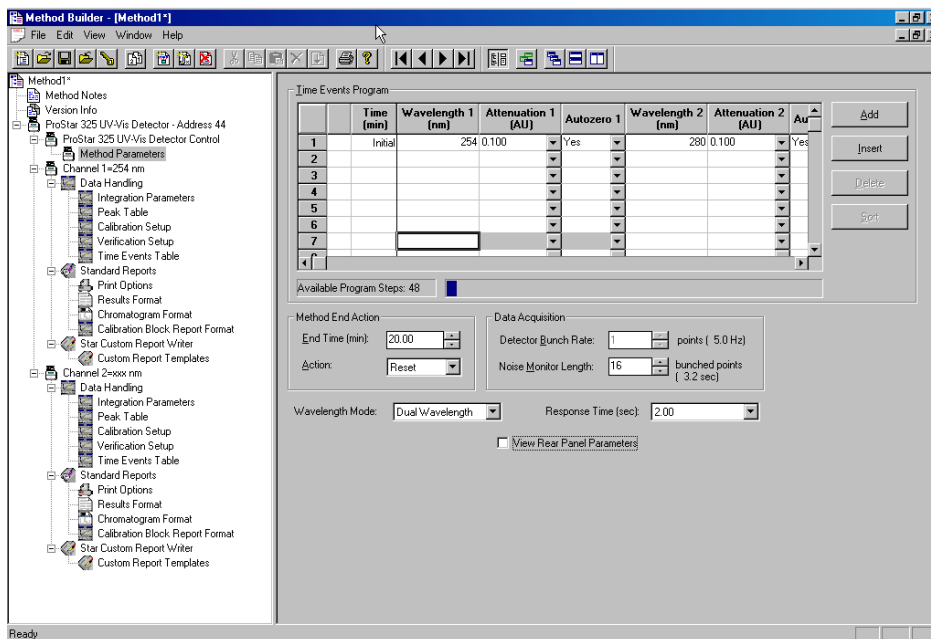
Above is the Workstation Method Builder window for the ProStar 325. Since the ProStar 325 can acquire data from two different wavelengths at the same time, the method can have two data handling sections as shown here.

The window consists of two distinct areas: The **Parameters** and the **Time Events Program**. The **Timed Events Program** will allow you to enter up to 48 time-programmed steps. The maximum time is 1440 minutes. All programmed steps must be at least 0.01 minutes apart.

Time Events Program consist of the following parameters:

- Time (min): This is the time when a time-programmed event will take place. The units are minutes to a resolution of 0.01 minutes from 0.01 minutes to 1440 minutes. There is always an Initial line.

- Wavelength 1: This is the wavelength for data collection in single channel mode. It is the first wavelength in dual channel mode and it is the wavelength used as the numerator for absorbance ratioing.

- Attenuation 1: This is the number of Absorbance units per volt for the 1 volt full scale output on the rear of the detector.

- AutoZero 1: This tells the detector to AutoZero the signal at the set time. This is usually used in conjunction with a time programmed wavelength change.

- Wavelength 2, Attenuation 2, AutoZero 2: These parameters are used for the second channel when the detector is operated in either dual channel or wavelength ratio mode.

Also shown on this screen is the first level of detector parameters. These parameters are used and are visible all of the time.

- Method End Action – End Time (min): The method end time can be set at any time from 0.01 to 1440 min. It cannot be set to one of the time-programmed lines. It cannot be earlier than the last time-programmed line. The detector end is not dependent on the end time of any of the other modules associated with the instrument.

- Method End Action - Action: At the end of a method, the detector can be set to either stay on the final wavelength or reset to the initial wavelength of the method. Reset is the preferred entry and the default.

- Data Acquisition – Detector bunch rate: The detector will collect data at 20 points per second (20 Hz) in single channel mode. The detector bunch rate can reduce the amount of data stored for each run, by adding individual points together in the final RUN file. This is only active in single wavelength mode. In dual wavelength mode, the detector bunch rate is fixed at either 5 point per second per channel for a method which doesn't have wavelength differences greater than 200 nm at any one time, or 2.5 points per second per channel for a method which has wavelength differences greater than 200 nm at any one time. In general, the bunch rate should yield at least 15 data point per peak for good quantitation.

- Data Acquisition – Noise Monitor Length: The noise monitor length is the number of points being used to monitor the noise in the detector for the purposes of chromatographic data handling.

A large number of points will give a slightly lower noise level but a longer monitor time. The default is 16 is usually best.

- Wavelength mode – Single, Dual or Ratio: The wavelength mode determines the number of channels of data that are acquired and whether a real time ratio of the absorbances of the two wavelengths is calculated. In single wavelength mode, only one time programmed channel of data is gathered. In dual wavelength mode, two time programmed channels of data are gathered. In ratio mode, two time programmed channels of data are gathered and a ratio of absorbances is calculated as described later in this document.

- Response time (sec): 2 sec, 1 sec, 0.5 sec, and 0.05 sec. The response time controls the digital filtering done on the data. A response time of 2 sec will result in the least noise while 0.05 sec will result in the most noise.
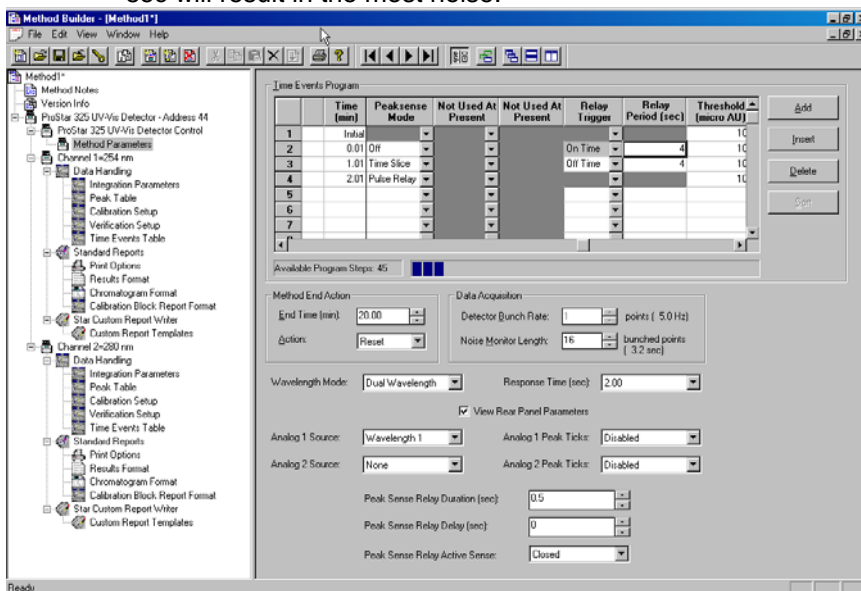
- By clicking on the **View Rear Panel Parameters** check box, entries that control the peak sense relay and the analog outputs are displayed. If you will not be using these parameters, you do not need to display the entry fields.

- Analog Source1 and 2: Wavelength 1, Wavelength 2, none: These entries specify the output signal for the two analog outputs on the rear panel of the detector. Wavelength 2 is only useful if the detector is operating in dual channel mode. The same signal can be output (e. g. Wavelength 1) can be output from the two analog channels even if the detector is operating in single wavelength mode.

- Analog 1 and 2 Peak Tics – Disabled and Enabled: IF enabled is selected, the detector will output a decreased detector signal whenever the peak sense relay is triggered.

- Peak sense relay duration time (sec) – 0.1 to 99.9 sec: This is the length of time that the peak sense relay will be on when it is triggered.

- Peak Sense Relay Delay (sec) – 0 to 99 sec: This is the length of time that the peak sense relay will be delayed between the time that it is triggered and the time that the relay is actually activated.

- Peak Sense Relay Active Sense – Open or Closed: When the peak sense relay is active, it will either be shorted (closed) or it will be open.

The **Time Events Program** table can be scrolled over to reveal more detector options.

- Peak sense mode – Time slice, Pulse Relay, Off: If Time Slice is activated; the peak sense relay will be activated starting at the time on the relay trigger entry. The relay will be pulsed based on the entries in the parameters section and the Relay period. If the relay period is 10 sec and the peak sense duration is 1 sec, the peak sense relay will be activated every 10 seconds and stay activated for 1 sec. This will start when the On Time relay trigger is activated and will stop either when the peak sense mode is turned off or when the Relay Trigger is set to Off Time. If Pulse Relay is activated, the peak sense relay will be activated once at that time.

- Relay Trigger – On Time, Off Time. If the Time Slice Peak Sense entry is activated, the Relay trigger will control when the relay starts pulsing and when it stops pulsing.

- Relay Period (sec) 1 to 999 sec: The Relay Period is the period of time between pulses of the peak sense relays when the Time Slice mode is turned on.

The last entries in the Time Programmed table are shown above.

■ Threshold (micro AU) 1 to 100,000,000: The threshold is the value in micro AU above which the software will calculate the ratio of absorbances of the two wavelength channels if the detector is in Ratio mode. See the section below for more information on absorbance ratioing.

■ Relay 1, 2, 3, and 4: The 4 relays on the back of the ProStar 325 can be turned on and off independently. In the On setting, the relay is closed, in the Off setting, the relay is open.

Absorbance Ratioing on the ProStar 325 Detector

The ProStar 325 detector has the ability to ratio the absorbance from two different channels as the peaks are eluted from the column. If you are collecting the peaks, this can be used to estimate the purity of a peak. If the purity of the peak begins to change, you can shift the collection of the peak into another vessel.

In order to successfully use absorbance ratioing to estimate peak purity, you must carefully set several parameters including the wavelengths to monitor, and the peak threshold.

In order to get a meaningful absorbance ratio, you must select the two wavelengths carefully. The compound you are looking at and the potential impurities must absorb at the two wavelengths. If they do not, you may not see much of a change of ratio as the impurity is eluted.

You must also choose the threshold level carefully. The threshold level is used to limit the calculation of the ratio to the times when the

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ProStar 325 driver has detected peaks on channel 1. If the software would calculate and display a ratio continuously, the display would be very confusing. Most of the time, the software would be ratioing the noise. This ratio could vary significantly with minimal signal variation, making it very difficult to interpret the ratio.

The threshold is the detector signal in microAU above which the software will calculate the absorbance ratio. This is shown below
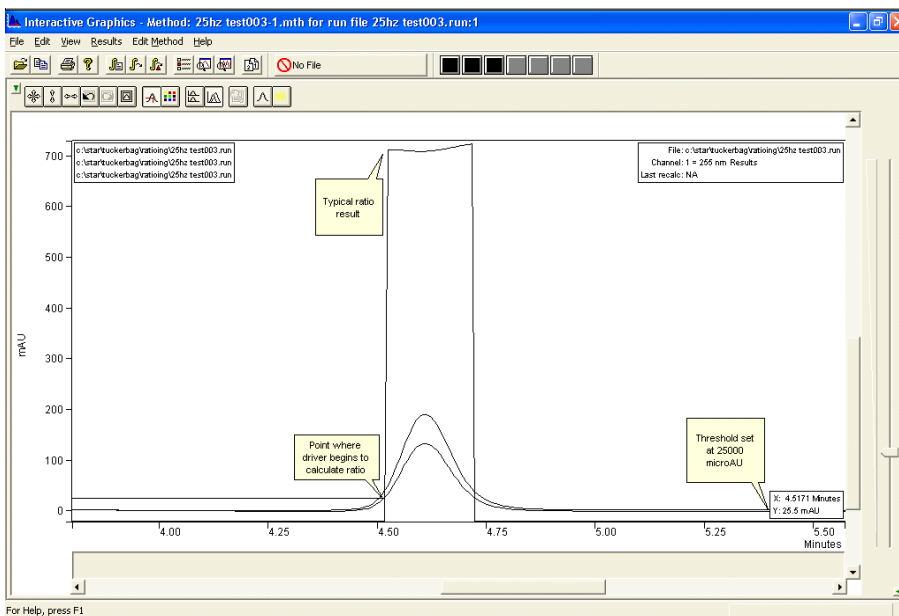
Here a threshold of 25000 microAU is used to detect the presence of a peak and start the ratioing process. Note that the cursor in Interactive Graphics is set at the start of the ratio and the signal reading is 25 mAU (25000 microAU).

In order to calculate the ratio, the driver has to correct for potential baseline offsets. Therefore, after the peak is detected using the threshold, the software will look back 40 points on channel 1 to find the lowest point. Once it has found the position of the lowest absorbance point on channel 1, it will take that value and subtract it from the channel 1 signal across the peak. It will also take the absorbance value on channel 2 at that time and use it as the

baseline, subtracting it from the absorbance values that are used for the ratio.

Although this baseline correction improves the resultant ratio, it is not ideal. It would be better if the entire change of signal across the peak could be used to correct the ratio. However, because ratios are calculated as the peaks are eluting, it is only possible to use the information at the start of the peak to correct for baseline offsets. A typical real time ratio is shown in the figure above. Although there are some changes in the ratio across the peak, this peak should probably be considered pure.

The ratio is calculated as the absorbance on channel 1 divided by the absorbance on channel 2. As long as the absorbance on channel 1 is less than the absorbance on channel 2, the ratio will vary between 0 and 1. If the absorbance on channel 2 becomes less than the absorbance on channel 1, the ratio will become greater than 1. The ratio can become very large. In order to make it easier to display and interpret the ratio, the Star software will compress the calculated ratio using the following rule.

If the calculated Ratio (R) is less than 1, then the displayed ratio (R_d) is set as follows:

$$\text{Eq.1} \quad R_d = R$$

If the calculated Ratio (R) is greater than 1, then the displayed ratio (R_d) is set as follows:

$$\text{Eq.2} \quad R_d = 2 - 1/R$$

Using the ProStar 335 Photodiode Array Detector

This section describes the configuration and use of the ProStar 335 Photodiode Array with the Star Chromatography Workstation. For information on spectral processing, please refer to the PolyView spectral processing software manual.

Note: For detail information on the Ethernet configuration, please refer to the *Ethernet Communication Setup* section of this manual.

Configuring the 335 Detector

1. Connect the Detector to Your Star Workstation

The detector communicates with the Star Workstation using Ethernet communications. Up to 2 ProStar 335 detectors can be attached to one Star Workstation PC. If the detector is attached directly to the PC, the crossover cable that is shipped with the ProStar 335 detector must be used. If the detector is attached to an Ethernet switch, a patch cable must be used. It is recommended that you connect both, your ProStar 335(s) and your Star Workstation, to an Ethernet switch if you are having network performance problems. Both raw data and synchronization signals for starting and stopping the detector are sent through the Ethernet connection.

2. Connecting the ProStar 335 Detector to your Varian ProStar 210/218 CIM or ProStar 701 Fraction Collector

In order to get the detector signal into the Dynamax modules for display and to properly assign fraction log entries, you will need to connect one of the analog output channels to the input of the ProStar 701 Fraction Collector and the other to the pump CIM. The analog signal cable, part number 110744200, plugs into the detector analog out and provides connections to the CIM and the fraction collector. In the 335 method, set the source for both channels to the same wavelength that you want to monitor.

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3. Setting up Ethernet communications

For general information about setting up the Ethernet communications, please see the *Ethernet Communications Setup* section of the Star Workstation Data Acquisition with LC Control manual. In addition, the following steps should be used to establish communications between the ProStar 335 and the Star Workstation.

a. Start with the ProStar 335 detector powered off. Check the back of the instrument so you know the MAC address of the detector. Make sure that the detector is connected to the Workstation either directly or through a network.

b. On the System control screen, pull down the Instrument menu and select the Setup Ethernet Communications entry. You will see the following screen:

c. Select 335 from the Module Type menu and enter the IP address that you want to assign to this module.

d. Press the Setup button on the right side of this menu and you will see the following screen.

e. Make sure that **Manage IP Addresses from this Workstation** is checked.

f. Turn on the power on the 335 detector. The detector will start broadcasting its MAC address.

g. Watch this screen until the Ethernet address that corresponds with the MAC address on the rear of the instrument appears.

h. On the line with the appropriate Ethernet address, type in the IP address that you entered on the previous page.

i. Type in a host name for the detector and then click on any other entry on the screen.

j. Click the OK button on the bottom of this screen and the OK button at the bottom of the previous screen.

k. Close system control and power off the ProStar 335.

l.   Activate system control and power on the ProStar 335. You should see the ProStar 335 icon with the assigned address appear on the configuration screen.

m.   Drag the ProStar 335 icon from the Available Module area to an instrument. Double-click in the Instrument area to view the System Control Status Window.

4.   Using a Fixed IP address

It is possible to use a fixed IP address in your ProStar 335. You implement this through the Status Window as described in the section below. You should only use a fixed IP address when required by your network administrator.

The ProStar 335 Detector Status Window

Shown below is the Status Window for the ProStar 335 detector.
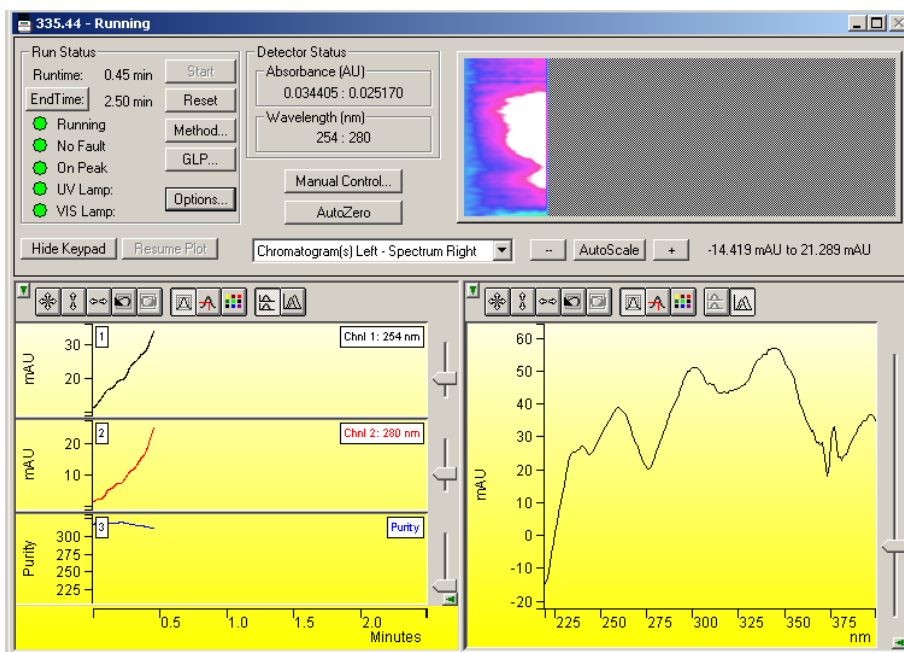
ProStar 335 Status Screen

Description of the ProStar 335 Detector Status Window

- On the bottom of the ProStar 335 Detector Status window is the chromatogram and spectrum display window. This window will display the real time output of the detector both during a run and between runs. It will not display anything during the detector calibration phase or when the lamp is first turned on. At the end of a run, the display will hold the chromatogram until the reset button is pressed. The detector will display up to two chromatograms, a spectrum and a real time plot of the purity parameter depending on the settings selected in the method. The detector can display the spectrum and chromatograms either above each other or next to each other. The combo-box at the top of the display controls this display selection.

- On the upper right side of the display is the real time Isoabsorbance plot. The run time is plotted on the horizontal axis, the wavelength is plotted on the vertical axis and the absorbance is represented by the color on the plot. Clicking anywhere on the plot will activate the Aurora application and display the chromatogram being acquired. For more information about the Aurora application see the PolyView Operator's manual.

- On the left of the ProStar 335 Status window is the **Run Status** that includes the usual Workstation buttons (Start, Reset, Method Edit).

The status of the detector is displayed in the first field. The states of the detector include the following:

Power On	The detector is starting up.
Connecting	The Workstation is connecting to the detector.
Initializing	The detector is going through its initialization phase.
Not Ready	The detector is not ready for operation.
Monitoring	The detector and the Workstation are monitoring the noise.
Ready	The detector is ready.
Running	The detector is running.
Stopped	The detector has stopped the run. This only occurs if the end action in the method is hold. If the end action is reset the detector will return to ready.
Calibrating	The detector is calibrating.
Offline	The detector is not communicating with the workstation.

- The Run Status window will also display the status of the lamps (on is green, off is gray) and whether the software has detected a peak (on peak is green, off peak is red). Peak detection is used to trigger the display of the real time purity parameter. (See the PolyView manual for more information on the Purity Parameter.)

- The **Start** button will start running the method when the detector is in the Ready state.

- The **Reset** button will stop the run and reset the detector to time zero. If a fault signal from another instrument has come into the detector through the fault in connection on the rear of the instrument, the reset button will reset the instrument to the Not Ready state.

- The **Method** button will access the Method Editor program and bring up the currently running method for editing.

- The **End Time** button can be used to adjust the time for the end of the run to another time. The software will not let you set the end time to a time exactly equal to a line in the detector time programmed table. The end time button is functional only if a run is in progress.

- The **GLP** button will display the GLP information as shown below. This information will be appended to the data file in the instrument run log for every run.

GLP Status Screen

- Numerical **Detector Status** information is displayed in the Detector status box. If two wavelengths are selected in the method, there will be two wavelengths and two absorbance readings.

- Clicking on the **Options** button accesses all of the other controls for the 335. This will display a series of buttons and the present status of some of those functions.
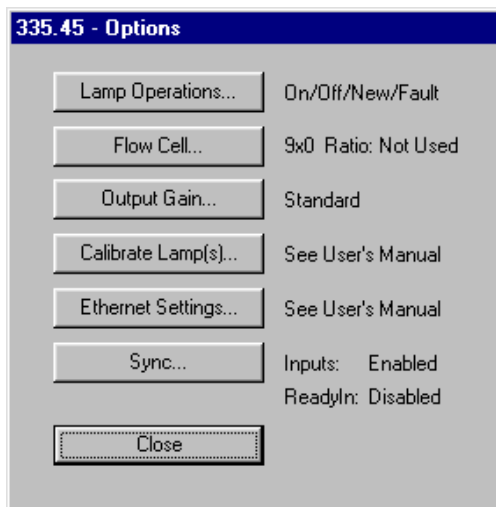
Options screen

■ Clicking on the **Lamp Operation** button will display the Lamp
Operation screen.

Lamp Operation Options Screen

The status of the lamps is displayed. To turn a lamp on, click on
the lamp on box next to the lamp. When the lamp is first turned
on, the detector will go through a calibration. During this time,
the detector will not take any inputs. To turn the lamps off,
uncheck the On box. When you turn the UV lamp off, you should
not try to turn it on again for at least 5 minutes. Older lamps may
not light again until they are fully cooled.

The Lamp Operation Options screen also has a check box for
New Lamp. When this is checked, the lamp hours will be reset to
0 and the date when the lamp was installed will be set to the
current date. This is displayed in the GLP screen and put in the
run log for every run.

The user can select the detector action in case of a fault. The
fault could be an internal fault within the detector or a fault
generated by another instrument and conveyed to the detector
through the fault sync signal.

Output Gain Control Screen

■ Clicking the **Output Gain** button will display the Output Gain control screen. This screen operates only for the 9x0 analytical flow cell. The user can select either the standard output or an output normalized to a 10 mm flow cell path length. This will multiply the output signal by 1.111. This makes it easy to compare peaks seen on the ProStar 335 detector with peaks generated on a detector with a 10 mm flow cell. Selecting the normalized mode does not improve the signal to noise because the entire signal is multiplied by 1.111. Normally this is set to Standard.
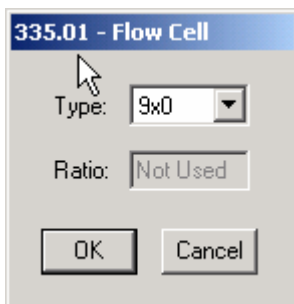
Flow Cell Options Screen

■ The **Flow Cell** button will display the Flow Cell Options Screen. The user must designate the flow cell in use. All four flow cell types, 9x0, 9x1, 4x0 and 4x0.15 as well as 0x0, are selectable. The information selected here is recorded in the instrument run log in the Star data file. If a prep flow cell is selected, the user will be able to enter a ratio of the long path length to the short path length. The ratio is used for extended range operation. (Please see the detector Operator's manual for more information on extended range operation.) The ratio for each prep flow cell is determined at the factory and is included with the flow cell. The

detector will always operate in extended range mode with a prep flow cell.
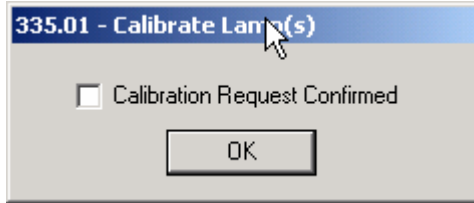
Lamp Calibration

■ The **Calibrate Lamp** button starts the process of setting the output gain for the diode arrays at different wavelengths to maximize sensitivity and minimize noise. Lamp calibration should be performed only when a new lamp is installed or when the noise has increased significantly under controlled conditions. Carefully read the section in the ProStar 335 Operator's Manual on lamp calibration before performing a lamp calibration.
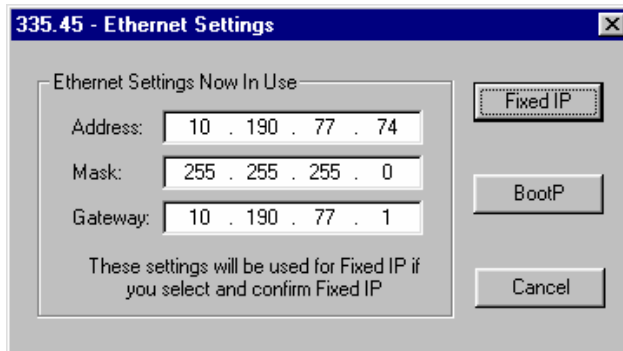
Fixed IP Setting

■ Clicking on the **Ethernet Settings** button will allow the user to set a fixed IP address. Usually, the ProStar 335 interconnects to the Star Workstation using a dynamically allocated IP address through a process called BOOTP. Setting this up is described in the Configuring the ProStar 335 detector in this manual. When using a dynamically allocated IP address, the IP address in the ProStar 335 is deleted every time the instrument is powered down and is reloaded when the instrument reconnects with the Star Workstation.

Some network administrators may want the ProStar 335 to always have the same IP address. When this is the case, the Fixed IP function can be used. To use this, the ProStar must first be connected to the Star Workstation through the BOOTP function. Once communications are established, click on the Fixed IP button and enter the address mask and gateway. Your network administrator should have decided what address, mask, and gateway you should use. A typical entry is shown in the figure above. When you click on Fixed IP, you will download the IP address into nonvolatile memory in the ProStar 335. When power is next cycled on the ProStar 335, it will still have the fixed IP address present in the detector. You will connect with it using the fixed IP address.

If you want to revert to the BOOTP process, (where you can assign any IP address to the module at the time of first connection with the Star Workstation after power up), click on the Ethernet Setting button in the Options screen and click on the BOOTP button. This will delete the fixed IP in the ProStar 335 and revert to the BOOTP process for connection once you restart the ProStar 335.

If you are using a Fixed IP address and forget the IP address, you will not be able to reconnect to the module. If this is the case, you will need to manually reset the IP address to 0,0,0,0 (BOOTP default). See the ProStar 335 Operator's manual for details on this procedure.
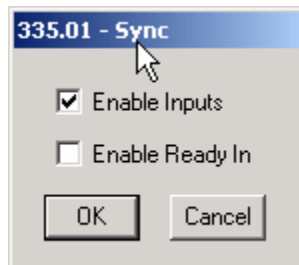
Sync Options Screen

- Pressing the **Sync** button will allow the user to activate the sync signals. The hardware sync signals on the rear panel of the detector can be controlled using the Sync Options Screen. If the general inputs are enabled, the detector can be started from a contact closure, start another instrument through a contact closure, and receive a fault signal directly from another instrument. If the Enable Ready In is active, the detector will not go to the ready state until the ready inputs are shorted together. This is only used if the detector must wait for another instrument, which is not controlled by the Star Workstation, to get ready before the detector becomes ready. See the ProStar 335 Operator's manual for more information on Sync signals.

- The **AutoZero** button is located in the center of the Status screen. This button will only zero the analog output(s) and the chromatogram display, and also resets the spectrum.

Manual Control Screen

- The **Manual Control** button allows the operator to insert a line into the detector method as soon as it is downloaded to the detector. When you press the Manual Control button, you will see the screen displayed above. You can enter any Wavelength, Attenuation and AutoZero (Yes or No) for either channel 1 or 2 in the method (see the ProStar 335 method entries below). You

can also enter the state (On/closed or Off/open) for any of the four relays.

To make an entry for Wavelength, Attenuation or Relays, click on the box labeled Specify next to the entry. When this box is selected, the entry will be activated and you will be able to enter a valid entry.

When you have made the entries and clicked on the Insert Now button, the method line will be immediately downloaded to the ProStar 335, inserted into the method and executed. If a Wavelength, Attenuation, or AutoZero is entered, ONLY the **analog output** and the **screen display** will be affected. The data being generated in the ProStar 335 and sent to the Star Workstation will not be affected because it is spectral data. The new line will be entered into the Run Log for this data file.

IMPORTANT!! When you have inserted a line in the ProStar 335, the line is not inserted in the Star Workstation method. To permanently load this line into the Star method, click on the File menu in System Control and select Upload Method from Modules. This will load the method in the ProStar 335 into the Star method and the inserted line will become a part of the Star method.

IMPORTANT!! When you have inserted a line in the ProStar 335, it will remain in the ProStar 335 method until a method is activated on the Star Workstation. Under normal operation, if the same method is run on the Star Workstation as was run in the previous run, the Star Workstation does NOT download the method again. Only when a new method is run or when the current method is reactivated will a method be downloaded into the modules. Therefore, if you want to run the method with the inserted line, you should either upload the method from the modules or make more runs without reactivating the same method. If you want to run the original method without the inserted line, reactivate the method.

> **IMPORTANT!! Because of the above two considerations, if
> you enter a new line during automation using either a
> sample list or a sequence, that line will be used not only in
> the present run, but in all subsequent runs until a new
> method is activated. Once a new method is activated, the
> inserted line will be lost. Therefore, when you insert a line
> during automation, you should immediately suspend
> automation. This will not stop the present run. Once the
> present run is over, you can either upload the method from
> the module so that the new line is a permanent part of the
> method or you can reactivate the current method so that
> the inserted line will not be used again. Then you can
> resume automation.**

Building a ProStar 335 Detector Method

ProStar 335 Method Screen

Above is the Workstation Method Builder window for the ProStar 335.

The window consists of two distinct areas: The Parameters and the Time Events Program.

The Time Events Program will allow you to enter up to 48 time-programmed steps. The maximum time is 1440 minutes. All programmed steps must be at least 0.01 minutes apart.

Time Events Screen 1

Time Events consist of the following parameters:

Time (min): This is the time when a time programmed event will take place. The units are minutes to a resolution of 0.01 minutes from 0.01 minutes to 1440 minutes. There is always an Initial line. When a line is Added, a time will be entered that is 0.01 minutes after the last time.

WL 1 (nm): This is the wavelength for data display, analog output, and data storage through PolyView channel data. (See the PolyView manual for information about channel data.) This is also the wavelength at which peaks are detected for peak sensing and the display of the Purity Parameter on the status display

Attn 1 (AU): This is the number of Absorbance units per volt for the 1 volt full scale output on the rear of the detector.

AZ 1: This tells the detector to AutoZero the signal at the set time. This is usually used in conjunction with a time programmed wavelength change.

WL 2 (nm), Attn 2 (AU), AZ 2: These parameters are used for the second channel for display, analog output and the second PolyView channel.

Peaksense Mode – Time Slice, Peaksense, Level Sense, Pulse Relay, Off, Peaksense is typically used to trigger a valve or a simple fraction collector in order to collect fractions eluting during the run. It can be useful for chromatographers who want to do fraction collecting only occasionally. Peaksense mode in the detector is NOT related to peak detection for quantitation in the Star software or peak detection in the ProStar 701 fraction collector.

Peaksense Mode determines what function will trigger the peaksense relay. The peaksense relay will be triggered by the presence of a peak (peaksense or level sense) or by time (time slice or pulse relay).

If **Time Slice** is activated, the peaksense relay will be activated starting at the time on the relay trigger entry. The relay will be pulsed based on the entries in the parameters section and the Relay period. If the relay period is 10 sec and the peaksense duration is 1 sec, the peaksense relay will be activated every 10 seconds and stay activated for 1 sec. Peaksense Trigger controls the start of time slice.

If **Peaksense** is activated, the peaksense relay will be activated when a peak is detected. The relay will stay on for the length of time specified in the peaksense relay duration setting. Peak detection parameters include the peak width and peak signal to noise (S/N). The peaksense relay will again be triggered when the peak is no longer being sensed.

If **Level Sense** is activated, the peaksense relay will be activated when the detector signal exceeds the set absorbance threshold. The peaksense relay will also be activated when the absorbance goes below the threshold.

If **Pulse Relay** is activated, the peaksense relay will be activated once at that time.

The control buttons on the right side of the screen allow you to Add a line, Delete a line, Insert a line and Sort the lines.

Timed Events Screen 2

If you scroll the timed events table to the right, you will see the screen shown above.

The time program table can be scrolled over to reveal more detector options.

Peaksense Width (sec) – This is used when either peaksense is chosen as the Peaksense Mode or On Peak or Off Peak is chosen as the Relay Trigger. This affects how peaks are detected. The width should be set to the peak width at ½ the peak height of the peaks of interest. If the peak width is too small, many noise peaks might be detected. If the peak width is too large, the peaks of interest may not be detected.

Peaksense S/N Ratio – This is used when either peaksense is chosen, or the Peaksense Mode or On Peak or Off peak is chosen as the Relay Trigger. This should be set so that only the peaks of interest are detected. If it is set too low, too many peaks will be detected. If it is set too high, smaller peaks of interest may be missed. Typical values should be 10 or higher unless you are trying to detect very small peaks.

Relay Trigger – On Time, Off Time, On Peak, Off Peak, On Level, Off Level. If the Time Slice Peaksense entry is activated, the Relay Trigger will control when the relay starts pulsing and when it stops pulsing. If it is programmed to start On time or Off time, the relay will start to pulse when at the On time and will stop at the Off time. If the relay trigger is programmed to start On peak, it will start when a peak is detected and will stop when a peak is no longer detected. It will stop being triggered by a peak when it is programmed to Off peak. If

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it is programmed to start On level, it will pulse when the signal exceeds the threshold and whenever the signal is above the threshold level. If it is programmed to pulse Off level, it will no longer pulse when it is above the threshold level.

Relay Period (sec) 1 to 999 sec: The Relay Period is the period of time between pulses of the Peaksense Relay when the Time Slice mode is turned on.

Threshold (micro AU) 1 to 100,000,000: The threshold is absorbance in micro AU above which the Peaksense relay will be activated if the Peaksense mode is Level. If the Peaksense mode is Time slice and the Relay Trigger is Level, the threshold is the absorbance above which the peaksense relay will begin to pulse.

Relay 1, 2, 3, 4: The 4 relays on the back of the ProStar 335 can be turned on and off independently. In the On setting, the relay is closed, in the Off setting, the relay is open.

Lower Half of the 335 Method

Method End Action – **End Time (min):** The method end time can be set at any time from 0.01 to 1440 min. It cannot be set to one of the time-programmed lines. It cannot be earlier than the last time-programmed line. The detector end is not dependent on the end time of any of the other modules associated with the instrument.

Method End Action - **Action**: At the end of a method, the detector can be set to either stay on the final wavelength or reset to the initial wavelength of the method. Reset is the preferred entry and the default.

Data Acquisition – **Detector bunch rate**: The detector will collect spectral data at 10 spectra per second (10 Hz). The detector bunch rate can reduce the amount of data stored for each run, by adding individual points together in the final RUN file. In general, the bunch rate should yield at least 15 spectra per peak for good quantitation.

Data Acquisition – **Noise Monitor Length**: The noise monitor length is the number of spectra being used to monitor the noise in the detector for the purposes of chromatographic data handling. A large number of points will give a slightly lower noise level but a longer monitor time. The default is 26 and is usually best.

Display Mode – Single WL, Single WL + Purity, Dual WL, Dual WL + Purity: The display mode determines what will be displayed on the status screen. This does not determine what is sent out the analog output or what is transmitted to the Star Workstation.

Single WL – Display the absorbance for the time-programmed wavelengths listed in the WL 1 column

Single WL + Purity – Displays the absorbances for the time programmed wavelengths listed in the WL 1 column plus the Purity Parameter.

Dual WL - Display the absorbances for the time-programmed wavelengths listed in both the WL 1 and WL 2 columns.

Dual WL + Purity - Displays the absorbances for the time programmed wavelengths listed in the WL 1 + WL 2 columns plus the Purity Parameter.

Response time (sec) - 2 sec, 1 sec, 0.5 sec, 0.05 sec. The response time controls the digital filtering done on the data. A response time of 2 sec will result in the least noise while 0.05 sec will result in the most noise.

Slit width (nm) – 1, 2, 4, 8, 16. This setting controls the optical slit in the ProStar 335. Smaller slit widths give better optical resolution. Larger slit widths can reduce the noise levels. Because most UV and visible spectra have very small natural bandwidths, larger slit widths will not significantly change the spectral resolution while possibly improving noise. The preset of 4 nm is usually a good choice.

Min Wavelength (nm) – 190 to 949. This is the lowest wavelength of the spectra taken by the Star Workstation. It must be lower than the Max Wavelength.

Max Wavelength (nm) – 191 to 950. This is the highest wavelength of the spectra taken by the Star Workstation. It must be higher than the Min Wavelength.

Min Purity WL (nm) – 190 to 949. This is the lowest wavelength for the Purity Parameter calculation that is displayed in real time on the status screen. It must be equal to or higher than the Min Wavelength and lower than the Max Purity Wavelength. See the PolyView manual for detailed information on the Purity Parameter.

Max Purity WL (nm) – 191 to 950. This is the highest wavelength for the Purity Parameter calculation that is displayed in real time on the status screen. It must be equal to or lower than the Max Wavelength and higher than the Min Purity Wavelength. See the PolyView manual for detailed information on the Purity parameter.

Sampling Wavelengths – All nm, every 2, every 4, every 8, every 16 – This parameter can be used to reduce the amount of data taken during a run by sampling a subset of all of the wavelengths coming over from the ProStar 335. The ProStar 335 produces a data point at every wavelength. This can produce very large data files (as large as 5 to 10 Mbytes). Data file sizes can be reduced by either bunching data in the time domain using the bunch parameter or in the wavelength domain using this sampling wavelengths parameter. You should experiment with this parameter to see what settings are best for your application.

No Run File check box – If you check this box, no run file will be produced by the data system. This can be used when the analog output is going into an ADC and the data is being stored and processed in this way. This is usually left unchecked.

By clicking on the **View Rear Panel Parameters** check box, entries that control the peaksense relay and the analog outputs are displayed. If you will not be using these parameters, you do not need to display the entry fields.

Analog Source 1 and 2: Wavelength 1, Wavelength 2, none: These entries specify the output signal for the two analog outputs on the rear panel of the detector. The same signal can be output (e.g., Wavelength 1) can be output from the two analog channels. If the ProStar 335 is interfaced with the ProStar 701 fraction collector and the ProStar 210/215 pumps, then the same wavelength can be output to Analog 1 and 2 to provide signals to the fraction collector and to the CIM on the pump.

Analog 1 and 2 Peak Tics – Disabled and Enabled: If enabled is selected, the detector will output a decreased detector signal whenever the peaksense relay is triggered.

Peaksense Relay Duration (sec) – 0.1 to 99.9 sec: This is the length of time that the peaksense relay will be on when it is triggered.

Peaksense Relay Delay (sec) – 0 to 99 sec: This is the length of time that the peaksense relay will be delayed between the time that it is triggered and the time that the relay is actually activated.

Peaksense Relay Active Sense – Open or Closed: When the peaksense relay is active, it will either be shorted (closed) or it will be open.

Using the Star 800 MIB

This section describes the use of the Star 800 Module Interface Box (MIB) with the Star LC Chromatography Workstation. For information on the operation of the Star Workstation, please refer to the earlier sections of this manual.

Note: **For information on the Star 800 MIB setup and configuration, please refer to the *Ethernet Communication Setup* section of this manual.**

A maximum of four Star 800 MIBs can be configured in one computer for use with the Star Chromatography Workstation software.

Connecting to an Instrument

The Star 800 MIB provides up to four channels of analog-to-digital signal conversion (ADC) with chromatographic module synchronization contacts for each analog channel. The ADC channels must be used to collect data from any chromatographic detector that provides a voltage output signal of less than 10 volts. The synchronization signals are contact closures for START IN and READY OUT signals that must be used to synchronize the Star Chromatography Workstation operation with the chromatographic modules connected to it.

All of the instrument interface connections are on the right side of the Star 800 MIB.

Extension Ports

4 Analog Inputs 3

Relays   Starts

4 3 2 1

Extension Ports

2 Analog Inputs 1
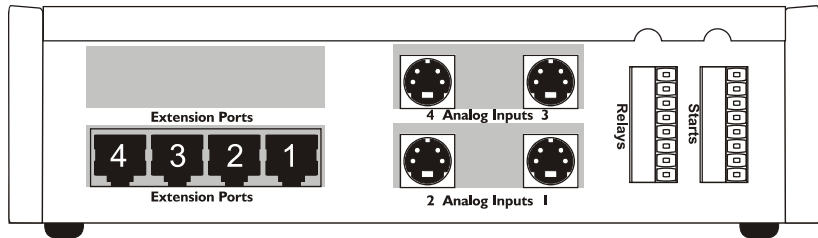
Output signals from the PS-310, PS-320, PS-340, PS-345, PS-350 and PS-363 can be connected to the ADC channels of the Star 800 MIB for data processing by the Star Workstation.

Analog Signals

The analog signals connect to the Star 800 MIB using a 4-pin mini DIN (round) connector that attaches to one of the analog signal input ports in the middle of the right side of the Star 800 MIB. Depending on how the Star 800 MIB was ordered, there will either be two or four analog input ports on the Star 800 MIB.

Analog cables are sold separately and they are available with various end configurations to match the Varian detector analog output connectors. Included with each analog signal cable is the corresponding synchronization cables. The following analog signal cables are available and the cables appropriate for your installation should have been purchased and be available to complete this installation.

Description	Part Number
Analog Cable with 3-pin Molex Connector For use with LC detectors that have a 3-pin molex analog connection.	03-907938-04
Analog Cable from ProStar 363 Special end connector for use only with ProStar 363 Fluorescence detector.	03-907938-06
Analog Cable with tinned ends, 3 meters long Generic cable for use with detectors with screw terminals.	03-907938-02
Analog Cable with tinned ends, 5 meters long Generic cable for use with detectors with screw terminals.	03-907938-03

Synchronization Signals

Two orange screw terminal strips are provided for synchronization signals to the Star 800 MIB. One of the terminal strips is labeled "Start" and is used for the Start Inputs to the Star 800 MIB. The other terminal is labeled "Relays" and is used for the Ready Outputs to the instrument(s) whose analog signal is being collected by the Star 800 MIB. The synchronization signals are contact closures and the polarity of the signal is set in the Star 800 MIB configuration from Star Workstation System Control.

Connect the tinned ends of the Start synchronization cable to the pair of terminals that correspond to the analog input port being used for that instrument.

Analog Port	Relay & Start Terminals
1	1, 2
2	3, 4
3	5, 6
4	7,8

The Star 800 MIB Status Window

Below is shown the status window for the Star 800 MIB that is configured with 2 ADC channels, one connected to a PS-320 detector and one connected to a PS-363 detector.
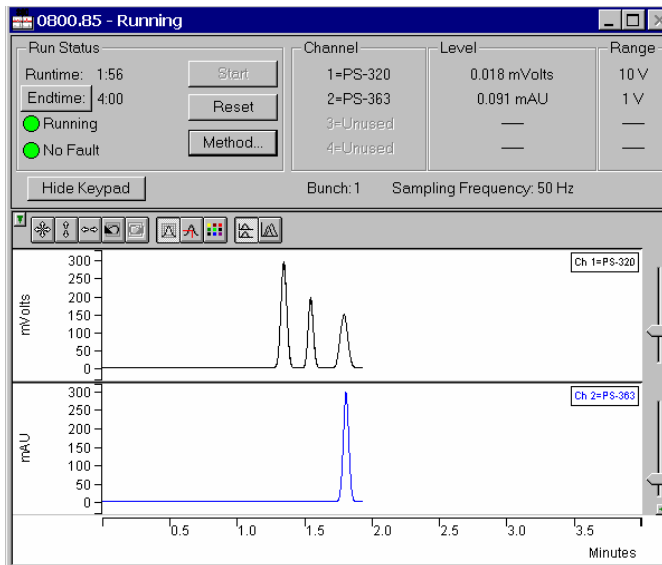
On the left of the Star 800 MIB status window is the Run Status that includes the usual Workstation buttons (Start, Reset, Method Edit and Endtime).

The center section of the Status window shows the Channel Status, which includes the number of channels and the Detector Name for each channel as specified in the currently active Method. To the right is the Level status window, which shows the signal level during the run. The far right section shows the Range of the signal that is specified during the Configuration process of the Star 800 MIB (refer to the Ethernet Communication Setup section of this manual). The lower part of the Status window shows the Real Time chromatogram displays. Refer to the Star 800 MIB help file for more information about the parameters shown in this window.

Star 800 MIB Method

From the Star Workstation Method Builder window select the Star 800 MIB Set Condition Method section. The Parameter Entry pan will be displayed. The top section of the window contains data acquisition and display settings. The table at the bottom of the window allows entry of Star 800 MIB labeling and scaling information including a Data Units column to specify the Units for the detector signal that is being digitized. Please refer to the Method Editor Help files for more information on the Star 800 MIB Method section.

Using the ProStar 520 Column Oven

This section describes the configuration and use of the ProStar 520 Column Oven with the Star Chromatography Workstation. For information on the operation of the Star Workstation, please refer to the earlier sections of this manual. Please refer to the *Pre-Installation Instructions* for information on firmware version compatibility with the Star Workstation software.

Note: **For information on the ProStar 520 oven setup and configuration, please refer to the *Ethernet Communication Setup* section of this manual.**

A maximum of four PS-520 ovens can be configured in one computer for use with the Star Chromatography Workstation software.

ProStar 520 Column Oven Status Window

The PS-520 oven status screen is shown below.

On the left of the status window are buttons to Start the oven method, Reset the oven method to the initial conditions, modify the existing oven Method and Setup the configuration of the oven. There are also controls for turning the oven off (or on) and ending the stabilization process.

On the right side are the oven temperature and the status. The oven offset indicates whether the oven has been calibrated. The vapor sensor status tells whether the vapor sensor is OK, whether it has detected vapor in the oven or whether it is functioning properly. If the vapor sensor has been activated, the vapor sensor status information will blink and an audible alarm will sound. Clicking on the Alarm Off button will turn off the alarm. However, to restart the oven,

you will have to turn the oven off and back on. (See the troubleshooting section for more information about what to do if the vapor sensor is activated.)
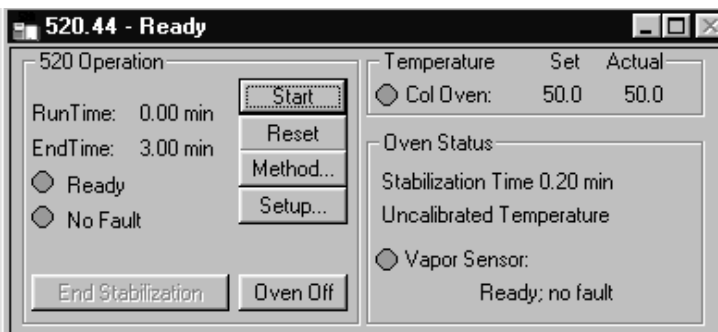
ProStar 520 Setup

When you push the Setup button on the Status screen the following screen will appear.
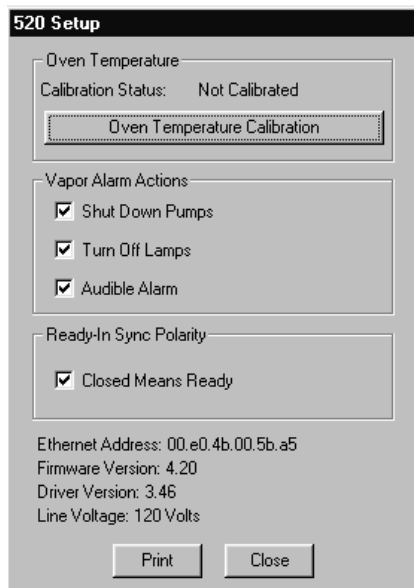
There are four sections of the set, the oven temperature calibration section, the vapor alarm section, the ready in sync polarity and the general information about the oven.

The sync polarity is presently not used.

The Vapor Sensor

The vapor sensor is located in the column oven. It is designed to detect leaks of organic chemicals such as the acetonitrile in the mobile phase in the column oven. If it detects a leak, it will automatically turn off the column heaters, open the column oven vent, and keep the vent fan running. This will help to clear the oven of any solvent.

The vapor sensor only responds to organic chemicals. It does not respond water or buffer. If there is a water only leak in the column oven, there will be no alarm triggered. Therefore, the PMIN should always to set on the pumps in order to detect any leaks from the buffer pump.

Besides shutting down the oven, the vapor alarm can trigger three other actions at the users discretion. It can shut down the pumps, turn off the lamp in the PS-310 detector and sound an audible alarm in the PC.

When you first access the setup screen, the Update Actions button is grayed out because nothing has changed. If you change an alarm action, the button will be activated. If you want to accept the action, push the Update Actions button.

Not only can the vapor sensor detect any organic vapor in the oven, but it can also detect if it is malfunctioning. If the vapor sensor is malfunctioning, there will be an error message describing this.

If a vapor sensor alarm or failure occurs, it can only be cleared by turning the oven off and turning it back on. If the cause of the alarm was a spill in the oven, the oven should be carefully cleaned of all spilled material and the vapors should be allowed to dissipate. This is aided by the fan continuing to run when there is an alarm. If the alarm turns on after it has been restarted, the procedure should be repeated. Note, if the atmosphere in the laboratory is so full of vapor that the alarm continues to go on, the instrument should be moved to a safer environment.

If the vapor alarm has been triggered because of a failure of the vapor sensor, the instrument should be turned off and back on. If this does cure the problem, call Varian Service.

Temperature Calibration

The temperature of the oven can be calibrated to 0.1 °C in the lab. Calibrating the temperature has three basic uses:

- If you want to adjust the temperature to the exactly correct temperature, you can calibrate the oven using a high accuracy temperature-measuring device.

- If you want to adjust the temperature set in and read from the oven based on results for a particular set of compounds published in the scientific literature.

- If you want to adjust the temperature of many different ovens in the same lab to the same temperature.

The PS-520 Column Oven comes form the factory calibrated to within 1 °C.

The temperature calibration procedure can be based on either temperature standard or a particular separation. The procedure for determining the temperature calibration described below is for a separation.

To begin either an initial calibration or to make a recalibration, you must first remove the present calibration. On the PS-520 setup page press the Remove Oven Temperature Calibration button in the Oven Temperature section. If the button says Oven Temperature Calibration, there is no calibration for this oven.

1. Once the Oven calibration has been removed, run one or more standards with setting the temperature to several values in the range where the separation should occur. This can be in 0.1 or 0.2 °C increments.

2. By looking at the chromatograms, decide what the actual temperature should be for a particular separation.

3. Press the Calibration Oven Temperature button. The following screen will appear:
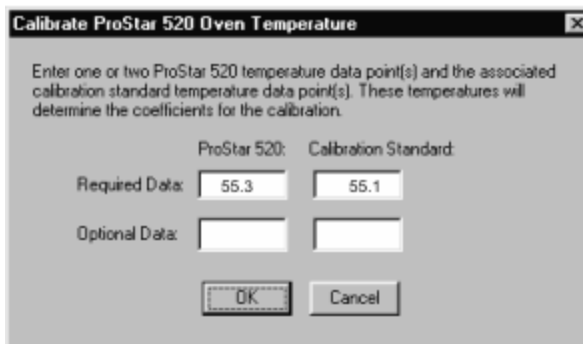
4. Enter the temperature that you set in the column oven under the PS-520 heading as required data.

5. Enter the temperature at which this separation should occur in the Calibration standard entry as required data.

You can perform the calibration at either one point or two points. You will be running only one set of samples at one temperature, use single point calibration. If you are going to be running sample at several different temperatures, you can use a two point calibration. For this you run two different standards at the two extremes of your temperature range of interest and fill both the required and optional data entry fields.

When you press the OK button, the software will perform the calibration.

The calibration is in the form of a linear curve with the equation

Calibrated Temperature = (Oven Temperature x a) + b

Where the coefficients, a and b, are derived from two point calibration; if a one point calibration was done, a is equal to 1 and b is the only coefficient used.

This calibration curve is displayed in the run log for every sample so that information on the calibration is always available.

Automation File Editor

The Automation File Editor is used for editing and creation of automation files, SampleLists, RecalcLists, and Sequences offline (outside of Star Workstation's System Control application). The Automation File Editor allows access to these files without disrupting automated runs that may be occurring in System Control.
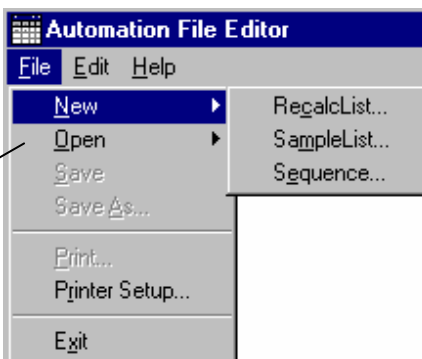
Accessing the Automation File Editor

Click on the Automation File Editor icon on the Star Toolbar.

Editing or Creating a RecalcList

Choose either a New RecalcList or Open an existing RecalcList from the File menu..
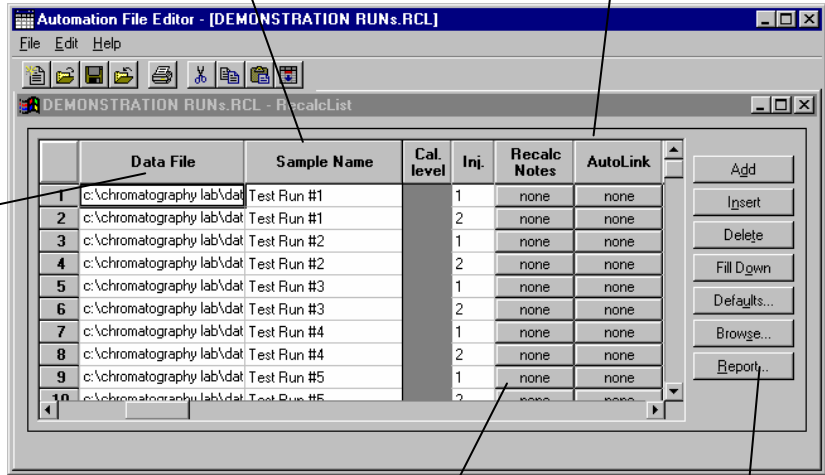
Automation File Editor

File   Edit   Help

The RecalcList window for the open RecalcList is displayed. It contains most of the same fields contained in the SampleList. Where the SampleList may contain AutoSampler and sample specific data handling information, the RecalcList contains the Data File name and data file specific data handling information. The fields that are common to both the RecalcList and the SampleList are described in the sections following the creation of the SampleList.

As the table is scrolled to reveal additional columns, the Data File and Sample Name column do not scroll. They remain visible so that you can see for which data file and sample you are entering parameters.
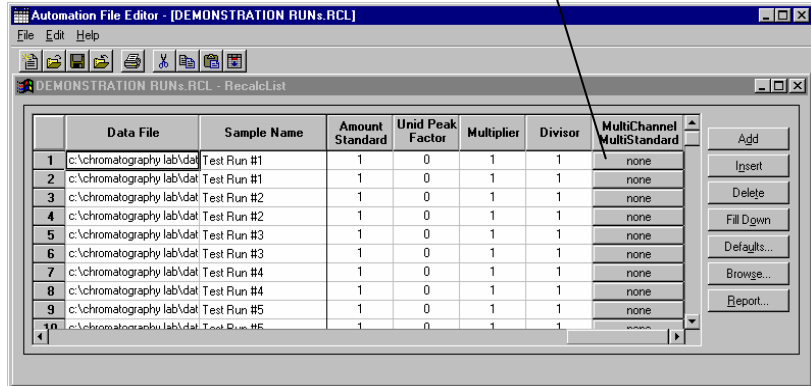
Enter postcalculation operations to be performed.

Spreadsheet columns can be sized by dragging their border using the left mouse button. Right-click on column headers for formatting options.

Automation File Editor - [DEMONSTRATION RUNs.RCL]

File   Edit   Help

DEMONSTRATION RUNs.RCL - RecalcList

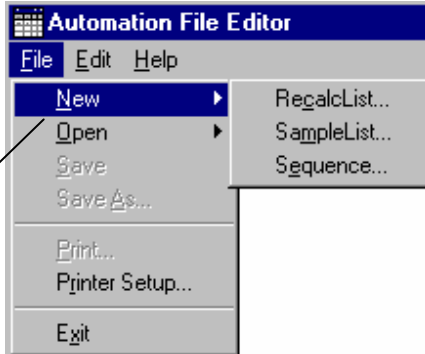|	Data File	Sample Name	Cal. level	Inj.	Recalc Notes	AutoLink	
1	c:\chromatography lab\dat	Test Run #1		1	none	none	Add
2	c:\chromatography lab\dat	Test Run #1		2	none	none	Insert
3	c:\chromatography lab\dat	Test Run #2		1	none	none	Delete
4	c:\chromatography lab\dat	Test Run #2		2	none	none	
5	c:\chromatography lab\dat	Test Run #3		1	none	none	Fill Down
6	c:\chromatography lab\dat	Test Run #3		2	none	none	Defaults...
7	c:\chromatography lab\dat	Test Run #4		1	none	none	Browse...
8	c:\chromatography lab\dat	Test Run #4		2	none	none	Report...
9	c:\chromatography lab\dat	Test Run #5		1	none	none	
10	c:\chromatography lab\dat	Test Run #5		2	none	none	

Enter notes about the recalculation of the Data File.

Provides quick access to the Standard Report for viewing the results.

*Click here to enter extended data handling parameters.*

Automation File Editor - [DEMONSTRATION RUNs.RCL]

File   Edit   Help

DEMONSTRATION RUNs.RCL - RecalcList

	Data File	Sample Name	Amount Standard	Unid Peak Factor	Multiplier	Divisor	MultiChannel MultiStandard	
1	c:\chromatography lab\dat	Test Run #1	1	0	1	1	none	Add
2	c:\chromatography lab\dat	Test Run #1	1	0	1	1	none	Insert
3	c:\chromatography lab\dat	Test Run #2	1	0	1	1	none	Delete
4	c:\chromatography lab\dat	Test Run #2	1	0	1	1	none	Fill Down
5	c:\chromatography lab\dat	Test Run #3	1	0	1	1	none	Defaults...
6	c:\chromatography lab\dat	Test Run #3	1	0	1	1	none	Browse...
7	c:\chromatography lab\dat	Test Run #4	1	0	1	1	none	Report...
8	c:\chromatography lab\dat	Test Run #4	1	0	1	1	none	
9	c:\chromatography lab\dat	Test Run #5	1	0	1	1	none	
10	c:\chromatography lab\dat	Test Run #5	1	0	1	1	none	

Editing or Creating a SampleList

Automation File Editor

File   Edit   Help

New	▶	RecalcList...
Open	▶	SampleList...
Save		Sequence...
Save As...		

Print...
Printer Setup...

Exit

Automation File Editor

File   Edit   Help

After choosing the SampleList to open the "Select SampleList Section Type" dialog box is displayed. This dialog box allows you to choose a SampleList that is appropriate for the AutoSampler that will be used. The Star Data Acquisition Workstation does not include AutoSampler control, therefore Generic is the only available choice.

Select SampleList Section Type

Please select a SampleList Section Type

Generic

☑ Only Display Existing SampleList Types

| OK | Cancel |
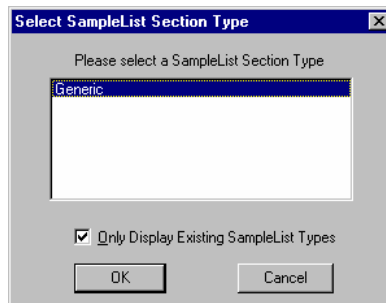
The SampleList window for the open SampleList is displayed.

Spreadsheet columns can be sized by dragging their border using the left mouse button. Right-click on column headers for formatting options.

Enter notes about the sample.

Enter postrun operations to be performed.

As the table is scrolled to reveal additional columns, the Sample Name column does not scroll. It remains visible so that you can see for which sample you are entering parameters.

Enter information about the samples you plan to inject.

Select the location and name for the Data Files generated by the SampleList.

When the table is scrolled to the right, the Sample Name column doesn't scroll so you can easily tell for which sample you are entering additional parameters. Commonly used data handling parameters, the amount for single internal standard calculations, the unidentified peak factor, a multiplier, and a divisor, can be entered directly into this table.

If you have more complex requirements, such as multiple internal standards or multiple detectors requiring different entries for these data handling parameters, click on the button in Multi-Channel Multi-Standard column.

If you need to add several similar lines to the SampleList, click on
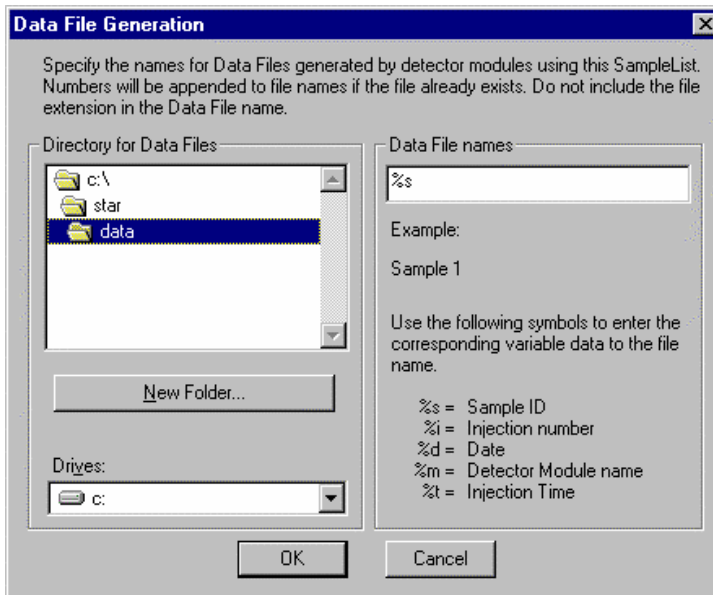the Add Lines… button. You can then enter the common information
in the dialog box.

*For sequentially numbered
Sample names, enter the
starting number and the
number of entries to add to
the SampleList. The
Sample Names will have
these numbers appended
to them.*

Specifying the Data File Name and Path

Data File names can be up to 255 characters long. Sample ID,
injection date, module name, and injection number can be
embedded in the file name making the Data File name correlate with
each sample injection. When you click on the Data Files… button,
the Data Files Generation dialog box is displayed. This dialog box
allows you to select the path and the file name "specification" for the
data file.

The left side of the Data File Generation dialog box allows you to select the drive letter and subdirectory (path) where the data files are to be stored. The default directory is the data subdirectory of your Star directory.

The right side of this dialog box allows you to create a file name "specification". You can combine text entry with the "%" variable symbols shown to specify file names that contain sample injection specific information. An example of the file name is dynamically updated as you type in the file name specification. This makes it easy to see how a Data File created with this file name specifications would appear.

Specifying Per-Sample Data Handling Parameters

Most Data Handling parameters are specified in the Method used during the injection. Some parameters may vary on a per-sample basis, and are therefore specified when you perform the injection. The following Data Handling parameters can be specified on a per-sample basis:

- Unidentified Peak Factor

- Multiplier

- Divisor

- Amount Standard when one Internal Standard is being used

Refer to the *Data Handling and Reports Operation Manual* for a brief description of these parameters.

Refer to the *Regulatory Compliance Manual* for a complete description of how these parameters are used to calculate results.

Not only can you specify these parameters on a per-sample basis, but you can specify them on a per-detector channel basis. This is useful if, for example, you have an ADC Board with channel A and channel B connected to two different detectors on a GC. In addition, if you are using multiple internal standards, you can also specify their amounts on a per sample and per detector channel basis.

To access these extended Data Handling parameters, click on the button in the Multi-Channel Multi-Standard column in the Inject Single Sample dialog box. You will be prompted for the Method that will be used when this SampleList is run. Then Data Handling Channels dialog box is displayed. When you select the detector channel in the Data Handling Channels dialog box, the calculation type, internal standard peaks and amounts are read from the Method that you just selected. The values entered for internal standard peaks and amounts will be entered into the peak table of this method.

*An amount may be entered for each
internal standard peak in the Method.*

*Select specific
detector channels
here (up to 4).*

*Use these buttons to edit the
corresponding sections of the
active Method.*

Specifying a RecalcList

From the SampleList RecalcList… button, you can choose to create
a new RecalcList, append to an existing RecalcList, or not create nor
update a RecalcList. Clicking on the RecalcList button displays the
RecalcList Generation dialog box.

If you choose to create a new RecalcList, this automatically
generated RecalcList will not overwrite an existing RecalcList unless
you also specify "Overwrite the Recalc List each time the SampleList
begins". If a RecalcList with the same file name exists, the newly
created RecalcList will have number appended to its file name to
make it unique and to prevent the older RecalcList from being
overwritten.

Changing Default SampleList Entries

When you add a new row into a SampleList, default values are used for each cell. To change the default values, click on the Defaults… button in the open SampleList window. The following dialog box will be displayed. Enter the desired default values and click on *Save*.
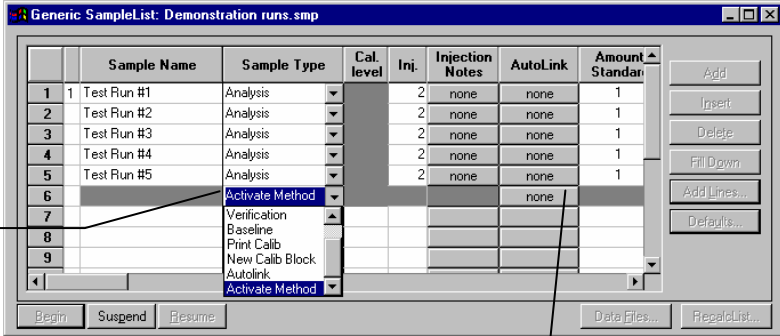

Using More Than One Method for Injections

The Star Workstation allows you to perform automated injections using more than one Method. There are two ways in which this can be accomplished. The first is by changing the active Method from within the SampleList. The second is by using a Sequence.

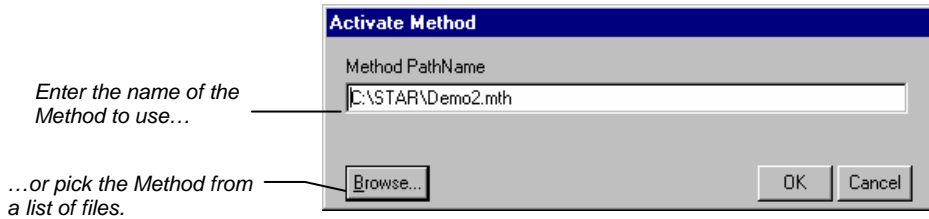You may change the Method used during injections by activating a Method in a SampleList row.

Select Activate Method from the Sample Type cell.

Click on the AutoLink button. The Activate Method dialog box is displayed.

*Enter the name of the
Method to use…*

*…or pick the Method from
a list of files.*

Activate Method

Method PathName

C:\STAR\Demo2.mth

Browse...   OK   Cancel

*When this line is
encountered during
automated injections,
the specified Method
is activated.*

		Sample Name	Sample Type	Cal. level	Inj.	Injection Notes	AutoLink	Amount Standar
1	1	Test Run #1	Analysis ▼		2	none	none	1
2		Test Run #2	Analysis ▼		2	none	none	1
3		Test Run #3	Analysis ▼		2	none	none	1
4		Test Run #4	Analysis ▼		2	none	none	1
5		Test Run #5	Analysis ▼		2	none	none	1
6			Activate Method ▼				demo1.mth	
7			▼					
8			▼					
9			▼					

You may specify any number of Methods to be used in the
SampleList.

Editing or Creating a Sequence

Choose either a New Sequence or Open an existing Sequence from the File menu..
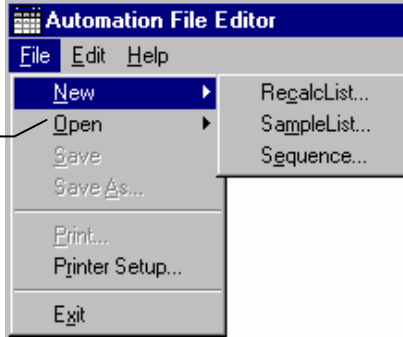
…or by clicking on the New or Open Automation File button on the toolbar.

The Sequence window for the open Sequence is displayed.

Enter the Method and SampleList to use. You may enter any number of Sequence lines.

Browse for a Method or SampleList file in the active cell.

Choose the action to be done in that step of the Sequence from the drop down box.