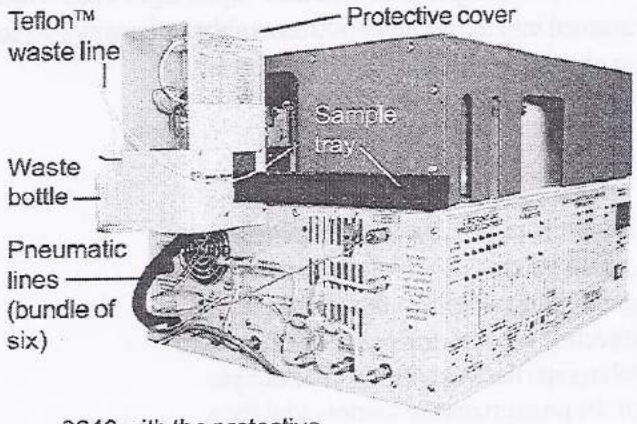
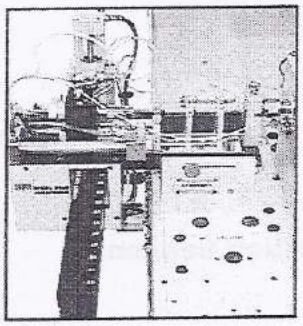
Overview

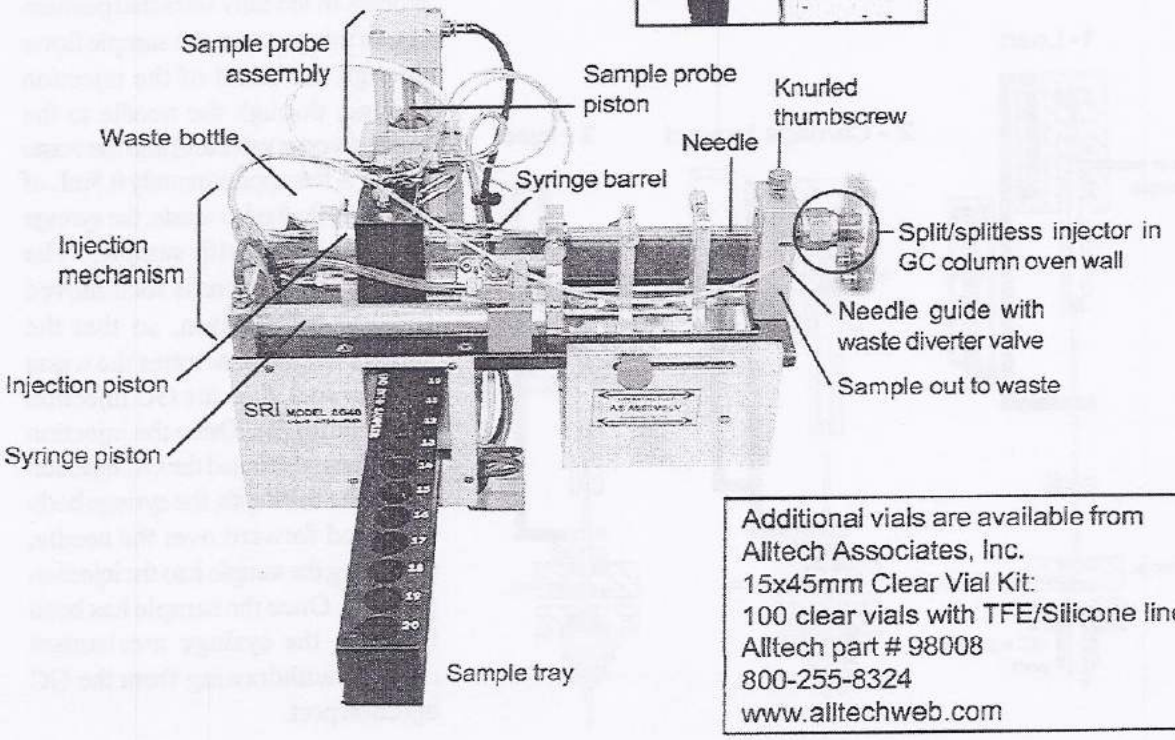
The SRI Model 8640 20-vial liquid autosampler is installed on the left-hand side of the SRI 8610C GC. The 8640 connects to an additional injector on the left side of the column oven. This additional injector may be on-column, heated, or split/splitless. It uses a sample tray to hold up to twenty 2mL vials, a sample probe to transfer the sample from the vials into the syringe barrel, and an injection mechanism to deliver the sample from the syringe barrel, through the needle, into the injector in the GC column oven wall. The 8640 uses 60psi of air or nitrogen to actuate its moving parts. The 8640 functions are assigned relays so that the autosampler may be operated automatically using a PeakSimple event table.

The 8640 is shipped with 100 screw-top vials and septa, replacements for which are available from a variety of suppliers. Extra sample trays and cooled sample trays are available. The cooled sample trays require an external refrigerated lab circulator.



8640 with the protective cover removed





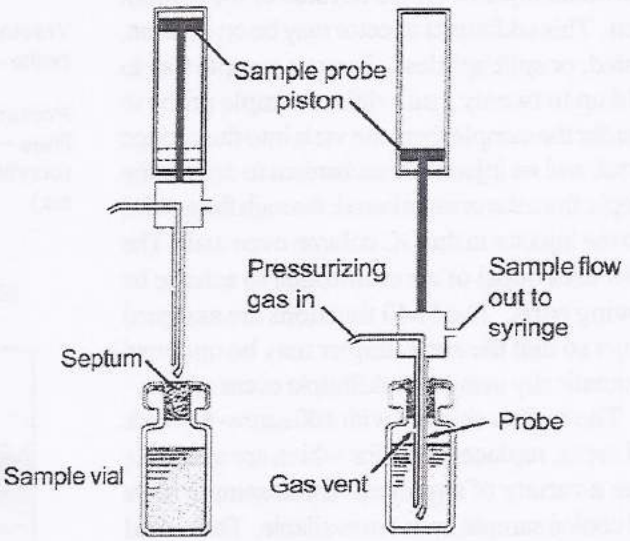
Additional vials are available from
Alltech Associates, Inc.
15x45mm Clear Vial Kit:
100 clear vials with TFE/Silicone liners
Alltech part # 98008
800-255-8324
www.alltechweb.com

Theory of Operation

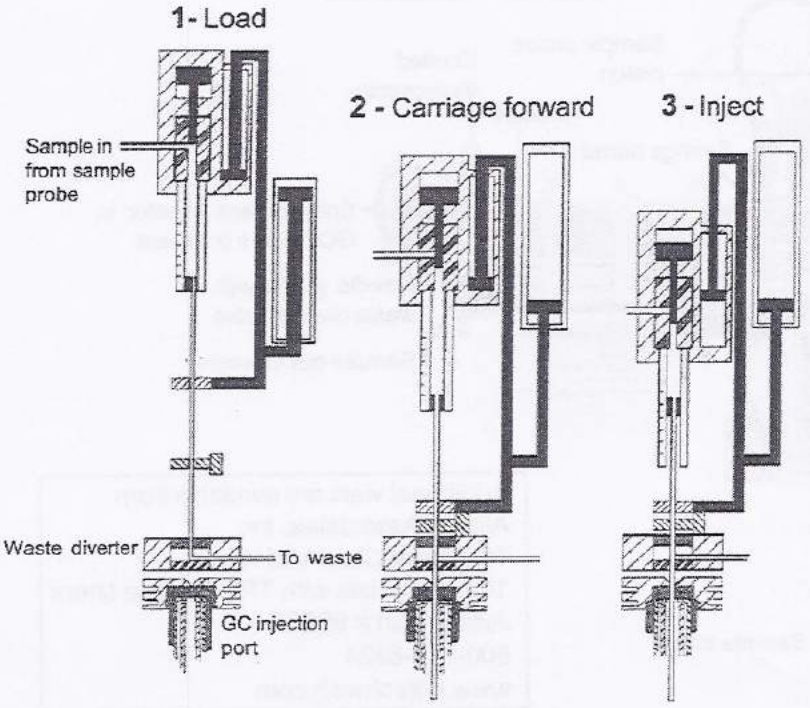
Liquid sample is sealed into vapor-tight vials which are inserted into the sample tray. The tray is then inserted into the Model 8640 assembly and positioned for the sampling sequence. The 8640 uses 60psi of air or nitrogen to actuate its moving parts.

The sampling probe, a concentric needle, is moved down by a piston to pressurize the vial with helium or other gas, causing sample to flow through the injection syringe and out the Teflon™ tubing into the waste bottle. The sample probe pressurizes the sample vial for a period of time long enough to rinse the previous sample to waste and fill the syringe with sample.

Sampling Probe Sequence



Injection Sequence

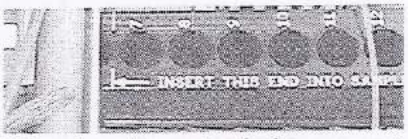


The syringe mechanism begins the process in the fully retracted position (1). In this position, the sample flows through the barrel of the injection syringe, through the needle to the waste diverter valve and into the waste bottle. After approximately 0.5mL of sample is flushed to waste, the syringe barrel is filled with sample. The syringe mechanism is then moved forward by a piston, so that the syringe needle penetrates the waste diverter seal, then the GC injection port septum (2). Once the injection needle has penetrated the GC injection port to the full depth, the syringe body is pushed forward over the needle, displacing the sample into the injection port (3). Once the sample has been injected, the syringe mechanism retracts, withdrawing from the GC injection port.

General Operating Procedures

1. Fill each 2mL vial at least 75% full with liquid sample. Close the vials so that they are vapor-tight, with the Teflon side of the vial septa facing downward into the vial.

2. The sample tray is inserted and removed from the 8640 in one direction only. To remove the sample vial tray, push it away from you, toward the back of the GC, until it is free of the autosampler assembly. Place the filled sample vials in the tray. Reinsert the sample tray into the 8640 assembly from the front. Push it gently toward the back of the GC until the white lines at the tip of the white arrow on the sample tray are aligned with the front edge of the 8640. The sample tray is then in the ready position, with vial number one in place under the sample probe. The sample tray shown below, right is almost in the ready position (it was left partially out for visibility of the lines and arrow).



3. Activate and heat the GC detector(s).

4. Load or create a column oven temperature program.

5. Load or create an event table. Version 2.74 (and higher) of the PeakSimple software includes an event table file called "8640as.evt" as a general event table for use with the 8640 autosampler. When you load this event file, the default relay descriptions will not match the actual 8640 autosampler relay descriptions. These autosampler-specific descriptions must be entered by you, the user. The relays assigned to the autosampler are as follows:

Relay A - moves the sample probe DOWN
Relay B - moves the sample probe UP.
Relay C - moves the syringe carriage FORWARD
Relay D - INJECTS the contents of the syringe
Relay E - ADVANCES the tray one position
Relay F - PRESSURIZES the sample vial

WARNING!
To avoid injury, keep your hands clear of the 8640 during operation.

See the event table shown at right for appropriate descriptions. The 8640 relay descriptions are also labeled on the right-hand side of the GC.

8640.evt		
EVENT TIME	EVENT	EVENT FUNCTION
0.000	ZERO	Zero data system signal
0.050	A ON	Sample probe DOWN
0.100	F ON	Vial pressure ON (pressurize the sample vial)
0.650	A OFF	Release pressure holding sample probe DOWN
0.700	F OFF	Vial pressure OFF
0.750	B ON	Sample probe UP
0.800	C ON	Syringe carriage FORWARD
0.850	D ON	Sample syringe INJECT
1.000	C OFF	Syringe carriage RETRACT
1.050	D OFF	Sample syringe RETURN
1.100	E ON	Tray advance ON
1.200	E OFF	Tray advance OFF
1.300	B OFF	Release pressure holding sample probe UP

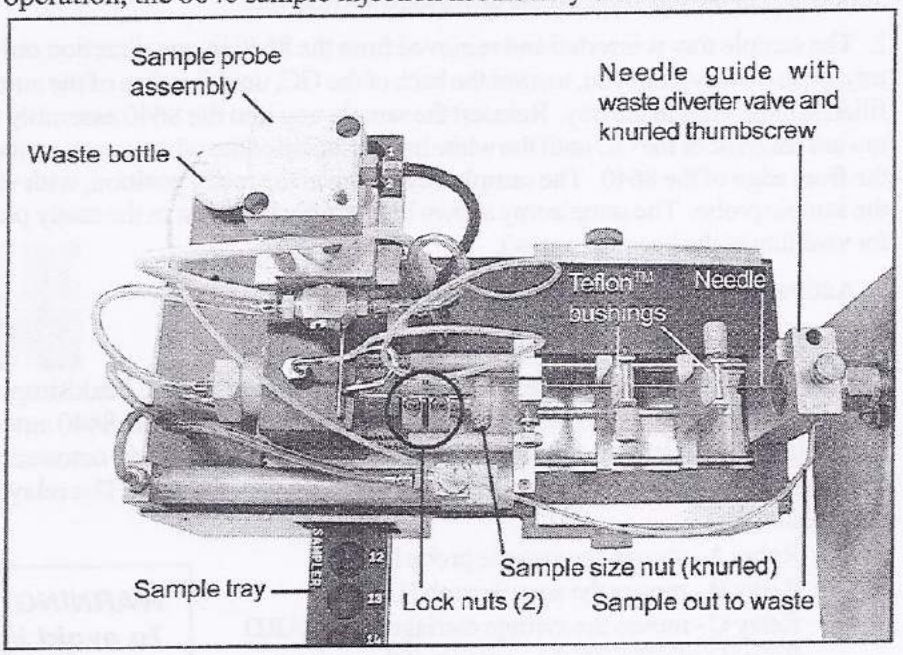
6. Set the autosampler air or nitrogen tank to 60psi. Set the carrier gas to 10mL/minute (the equivalent psi setting for your machine is labeled on the right panel of the GC). The amount of sample used to flush the needle can be adjusted by varying the pressure of the gas used to force the sample from the vial. This gas pressure is adjusted with the EPC trimpot on the top edge of the GC's front control panel, located directly above the vertical label "VIAL PRESSURE" on the front control panel. Using the event table at right, you should count 25 drops during the time that the gas is pressurizing the sample (0.600 minutes).

7. The injection volume is factory set at 1µL, but is adjustable to 0-3µL. Loosen the 2 hex-head lock nuts, then turn the knurled nut while observing the needle in the syringe barrel to achieve the desired injection volume (please see the picture on the ***Changing the Needle*** page to locate the lock nuts and knurled nut).

Changing the Needle

In the course of normal operation, the 8640 sample injection needle may become bent or otherwise damaged and require replacing. Make sure the syringe mechanism is fully retracted before starting; this is the default position to which it should return after a sample injection sequence.

Replacement needles are available from Central Instruments under part number 502743. Syringe barrel and needle sets are available under part number 503188. Call Central Instruments at:
225-261-1917
Or write to:
P.O. Box 337
Greenwell Springs, LA 70739
USA.



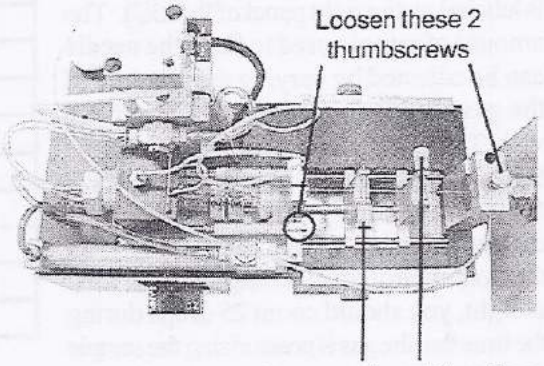
1. To remove the needle, loosen the thumbscrew on the top of the waste diverter and the thumbscrew on the needle guide closest to the syringe barrel. Loosen and remove the two bushing retainers. Carefully lift out the needle, the two Teflon™ bushings and the waste diverter valve together. You will have to push the waste diverter valve out of the needle guide, and angle the needle tip out through the slot in the side of the waste diverter needle guide as you pull the needle from the syringe barrel.

2. Slide the waste diverter valve and the two Teflon™ bushings off the old needle and onto the replacement needle.

3. Place the needle into the thumbscrew needle guide and the syringe barrel, and carefully angle the needle with the bushings and waste diverter valve into place, using the slot in the waste diverter needle guide to get the tip of the needle into alignment with the syringe barrel.

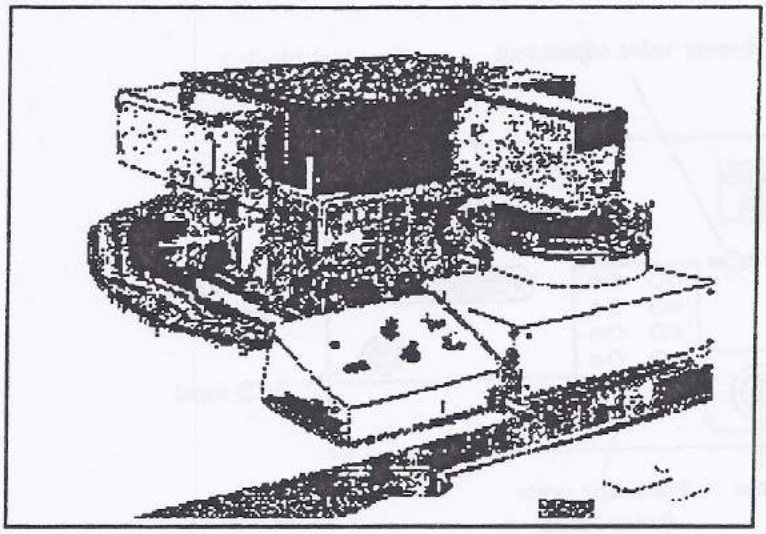
4. Position the two bushings in their cradles, then replace and tighten the bushing retainers. Tighten the thumbscrews on the needle guide and waste diverter.

5. Adjust the sample injection volume by loosening both hex-head lock nuts, then turning the knurled thumbscrew to achieve the desired volume. Tighten the lock nuts.



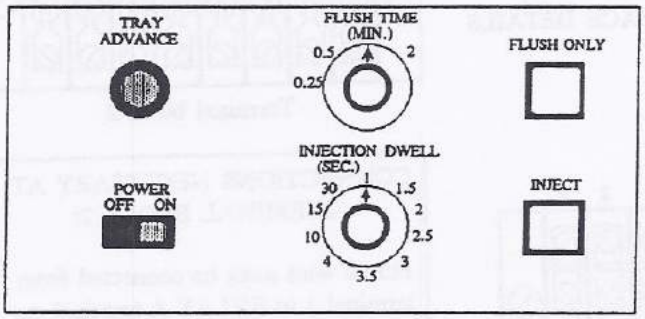
Chapter: INSTALLATION

Topic: Interfacing The Liquid Autosampling Carousel



SRI liquid autosampler connected to SRI 8610 gas chromatograph

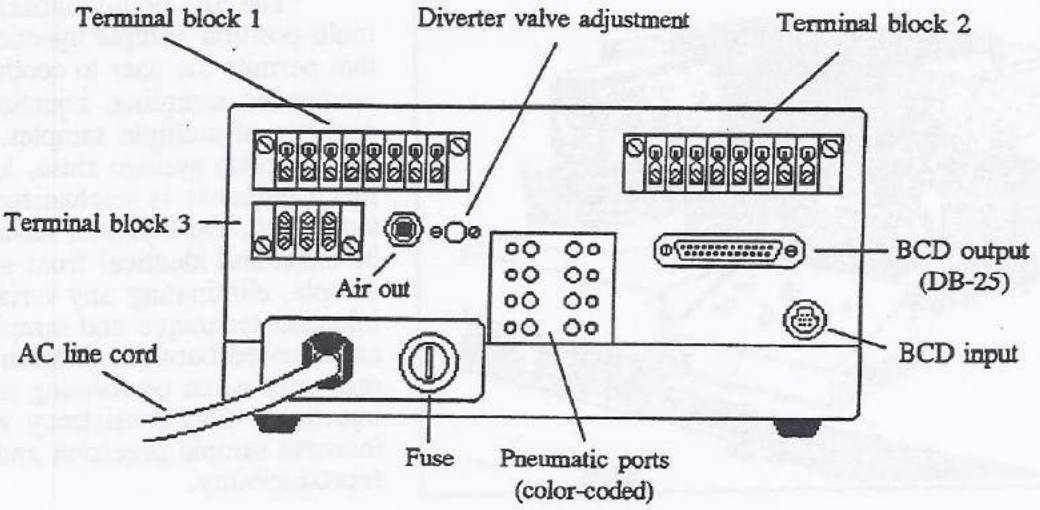
The SRI liquid autosampler is a multi-position sample injection system that permits the user to conduct unattended sampling, injection and analyses of multiple samples. Because the complete syringe rinse, load and inject sequence is mechanized and automated, the injection technique will be exact and identical from sample to sample, eliminating any variation in injection technique and sample delivery experienced between different operators when performing manual injections. This consistency will increase sample precision and reproducibility.



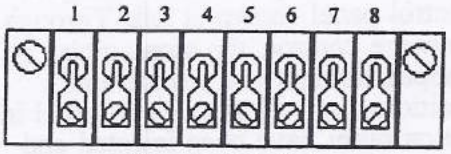
Front control panel of SRI autosampler controller

The autosampler is controlled automatically by PeakSimple software and/or manually at the autosampler control panel shown at left. Through software control, the autosampler is stepped through the sample vial positions until all samples inserted in the carousel have been injected and analyzed (without the need for operator intervention). A simple command in the event table (momentary activation of relay A) causes the autosampler to insert, flush, draw and inject the needle contents into the injection port. As soon as the needle has been withdrawn from the injection port, the autosampler is stepped to the next vial position to remain at the ready for the next actuation of relay A.

The sample vial tray may be manually advanced by hand or by pressing the TRAY ADVANCE actuator button. The amount of time (in minutes) that the syringe needle is flushed to clear the preceding sample is selectable using the FLUSH TIME control. The amount of solvent used to flush the syringe may also be varied by adjusting the sample pressurizing gas pressure. The actual volume of flush required will be dictated by the characteristics of the sample being injected. If not overly viscous, a sample flush volume of approximately 100 microliters should be adequate. If sample availability is limited to small volumes, then the flush may need to be reduced to economize on sample consumption. The amount of time that the needle remains in the injection port after the sample has been discharged from the syringe is also selctable using the INJECTION DWELL control. Selectable in seconds, the control permits the user to choose having the needle withdraw immediately upon having deposited its sample, or to maintain the needle in the injection port for an extended period, permitting any sample containing higher boiling or thermally labile components adequate time to exit the syringe and enter the injection port. High boiling components require longer needle-injection port dwell times than volatile components. A setting of 1 second signifies that the needle penetrates the septum, injects the sample and is withdrawn immediately, all within the duration of one second. A setting of 4 seconds permits the needle to dwell in the injection port for an additional 3.5 seconds.

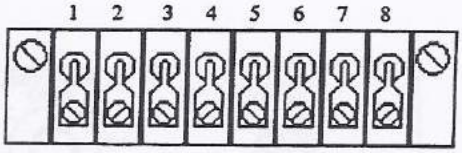


View of rear panel of SRI autosampler controller unit



Terminal block 1

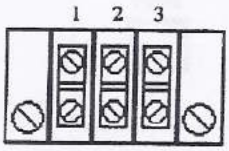
REAR PANEL INTERFACE DETAILS



Terminal block 2

CONNECTIONS NECESSARY AT TERMINAL BLOCK 1:

A jumper wire must be connected between terminals 7 and 8 of this terminal block (index enable position). Black wire provided.



Terminal block 3

CONNECTIONS NECESSARY AT TERMINAL BLOCK 2:

Purple wire must be connected from terminal 1 to RELAY A terminal on interface board. Black wire must be connected from terminal 2 to D.GND terminal on interface board.

CONNECTIONS NECESSARY AT TERMINAL BLOCK 3:

Three-wire control cable from autosampler connects here. Black wire connects to terminal 1, red wire to terminal 2 and green wire to terminal 3

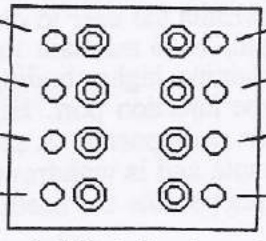
PNEUMATIC HOSE TERMINAL

White hose from autosampler

Green hose from autosampler

Red hose from autosampler

White hose from autosampler vial pressurization regulator



Clear hose from autosampler

Black hose from autosampler

Yellow hose from autosampler

Blue hose from tray rotation pneumatic pressure regulator

Terminal block is color-coded to match hose colors

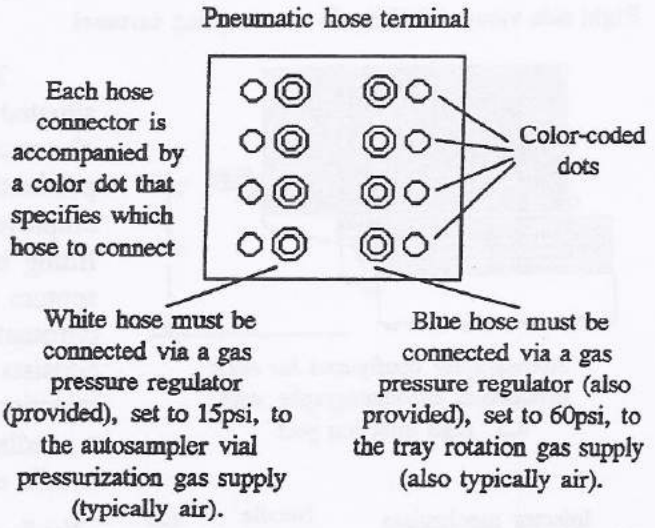
Chapter: INSTALLATION

Topic: Interfacing The Liquid Autosampling Carousel

The procedure for installation of the autosampling carousel is simple and straight-forward. Pneumatic and electrical connections must be made at the controller unit and at the data system interface board (if in use by the system). Once these connections have been made, the autosampler is inspected for proper docking height with the chromatograph injection port. If the autosampler is intended for use with an early version of the model 8610 chromatograph (low-profile chassis with an injection port 6.5" above the countertop), the carousel will be equipped with three rubber feet that elevate the injection needle axis to exactly 6.5". Current production models are mounted on a platform that elevates the injection needle axis to exactly 10". This corresponds to the injection port height of the current production model 8610 chromatograph. When proper unit height has been verified at the injection port, the autosampler is mated to the chromatograph and operation may begin.

PNEUMATIC CONNECTIONS

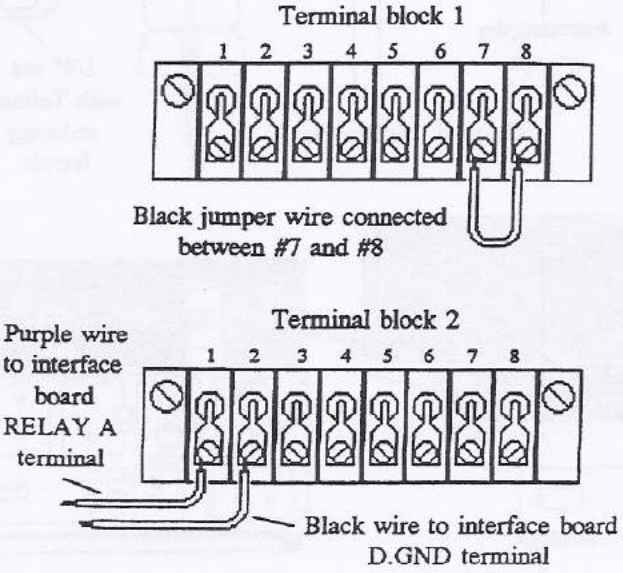
In addition to connecting the six color-coded hoses from the autosampler control harness to their respective pneumatic terminals on the rear of the autosampler controller unit, two gas connections must be made at the lower two pneumatic hose terminals on the bulkhead. The white hose provided must be connected to the autosampler vial pressurization gas supply, using the provided regulator. This regulator should be set to 15 psi. Gas (typically air or nitrogen) is injected into the vial by the outer sleeve of the concentric sampling needle (needle within a needle), forcing sample to flow out of the vial through the center needle and into the injection syringe. The blue hose should be connected to the tray rotation gas supply, set to 60psi with the other regulator provided with the unit. This gas enables the tray mechanism to rotate, advance the samples and operate the injection mechanism.



If air is used by both regulators, the main air supply pressure should be regulated to (at least) 75psi in order to maintain a stable gas supply.

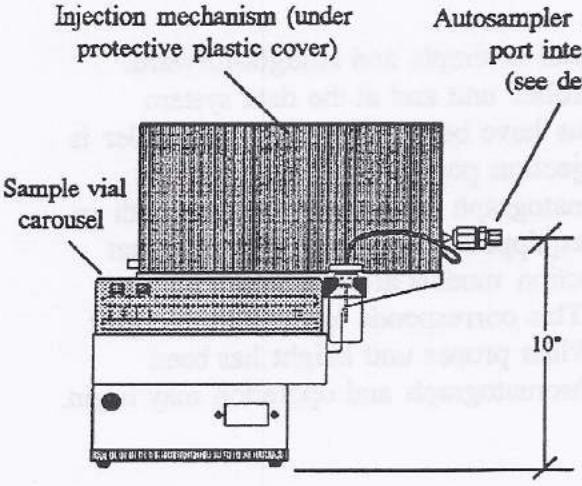
ELECTRICAL CONNECTIONS

There are only three connections to be made by the user. A black jumper wire (provided) must be connected between terminals 7 and 8 of terminal block 1. The purple and black wires (also provided) must be connected to the interface board terminals labeled RELAY A and D.GND, respectively. These two wires provide the remote activation of the autosampler advance and sample circuitry (same as INJECT on the controller unit) by the data system or other remote device.



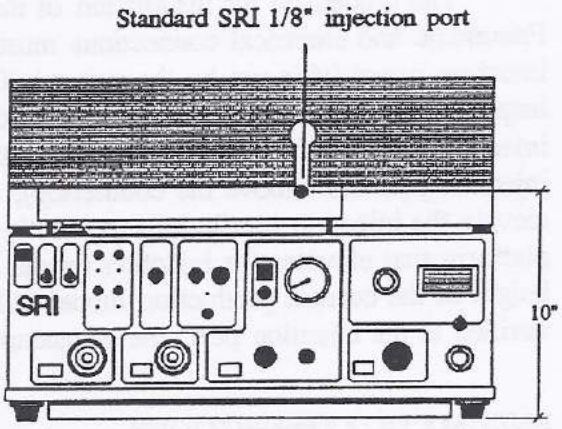
Chapter: INSTALLATION

Topic: Connecting The Autosampler To The Chromatograph Injection Port

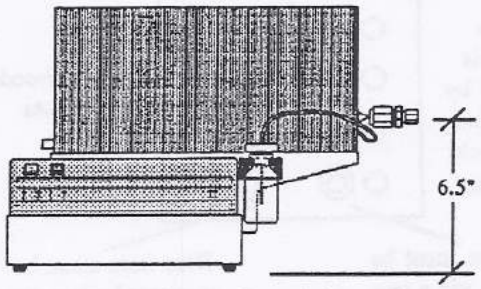


Right side view of SRI liquid autosampling carousel

Autosampler injector extends from injection mechanism (under cover) at a height of 10" from the countertop, equal to the SRI chromatograph injection port height



Front view of SRI model 8610 gas chromatograph



Autosampler configured for early production chromatographs with 6.5" high injection port

The SRI liquid autosampler injector mechanism is situated at a height equal to the injection port of the chromatograph. The injection port height of current production units is 10" (25.4cm). Previous models (pre-1992) employed an injector height of 6.5" (16.5cm). A special fitting is supplied with the autosampler that replaces the septum nut normally used to seal the injection port of the chromatograph. This fitting, also containing a septum, consists of a 1/8" to 1/4" adapter that is connected to the injection port. A special cylindrical brass fitting, employed as a needle guide and waste solvent diverter, is inserted into the needle end of the injector mechanism frame and secured by a thumbscrew. From this cylindrical fitting, a 1/8" metal tube protrudes. This tube, an extension of the needle guide, is secured to the chromatograph's injection port adapter by means of a 1/4" nut with a 1/4" to 1/8" Teflon® reducing ferrule. Once both fittings are in place, the units are docked together and the 1/4" nut is secured. Then the autosampler controller unit is located in a convenient location and normal operation can begin.