



Operating Manual
LabPRO™ Column Selector
Rheodyne Control Number: 2320442C
November 1998

This manual is for the following model numbers:

Model Number	Control Option	Description
PR500-100	(-01, -02, -03 versions)	LabPRO 3 Column Selector, Stainless Steel
PR550-100	(-01, -02, -03 versions)	LabPRO 3 Column Selector, PEEK
PR500-104	(-01, -02, -03 versions)	LabPRO 6 Column Selector, Stainless Steel
PR550-104	(-01, -02, -03 versions)	LabPRO 6 Column Selector, PEEK



Rheodyne LLC • 600 Park Court • Rohnert Park, CA 94928 • USA
Phone 707-588-2000 • Fax 707-588-2020
www.labpro.com • www.rheodyne.com

Table of Contents

I. INTRODUCTION

A. Description	4
B. Customer Service	4
C. Warranty	4

II. UNPACKING

A. General	4
B. Supplied with LabPRO Column Selector	5
C. Terminology Appendix	5

III. IMPORTANT OPERATING NOTICES

A. Cautions	5
B. Warnings	6

IV. SPECIFICATIONS

A. Unit	6
B. Valve	6
C. Electrical Connections	7
D. Control and Communications	7

V. INSTALLATION

A. General Description	8
B. Electrical and Communications Connections	9

VI. OPERATION

A. Front Panel	17
B. Manual Operation	17
C. Self Test	18
D. Remote or Automatic Operation	18
E. Serial Communication	23
F. Maintenance and Troubleshooting	26
G. Suggested Applications	28
H. Troubleshooting	30
I. Appendix A - Electronic Definitions	37
J. Declaration of Conformity	38

I. INTRODUCTION

A. Description

1. The LabPRO™ Column Selector is available in both a 3-column and a 6-column Selector configuration. The Column Selector is used in-line with an injection and detection system, and is designed to select up to 3 or up to 6 columns depending on the model. The instruments are available in PEEK (polyetheretherketone) and stainless steel versions.

B. Customer Service

1. If you need assistance in sales, technical information, applications or repair please contact your local Rheodyne distributor. Authorized Rheodyne distributors are trained and knowledgeable in the Rheodyne product line.

C. Warranty

1. All Rheodyne products are warranted against defects in materials and workmanship for a period of one-year following the date of shipment by Rheodyne. Rheodyne will repair or replace any Rheodyne product that fails during the warranty period due to a defect in materials or workmanship at no charge to the customer.
2. The product must be returned to Rheodyne's factory in original packaging or equivalent, transportation prepaid. Damage occurring in transit is not covered by the warranty.
3. This limited warranty is Rheodyne's sole warranty of its products, and all other warranties of merchantability or fitness for any particular purpose are hereby disclaimed. Under no circumstances will Rheodyne be liable for any consequential or incidental damages attributable to a claimed failure of a Rheodyne product, even if Rheodyne has been placed on notice of possibility of such damages.

II. UNPACKING

A. General

1. The LabPRO Column Selector is shipped assembled and ready to use. The Column Selector and the accessories are shipped together.
2. Unpack the box using the illustrated directions enclosed at the top of the box.
3. Inspect for damage and/or shortage.
4. Keep the original packaging in case the unit must be returned to the factory.

B. Supplied With The LabPRO Column Selector

1. The following accessories are shipped with the unit:
 - a) Fitting sets for all the ports
 - b) Hex Key(s)
 - c) Jumper Wire(s)
 - d) 3.7 meters (12 feet) of 1/16-inch O.D. tubing (stainless steel tubing is in two, 6 feet lengths)
 - e) 1/4-5/16" open end wrench
 - f) Universal Power Supply
 - g) Power Line Cord
 - h) Interface Cable
 - i) Operating Manual

C. Terminology Appendix

1. All terms appearing in *italics* can be found in Appendix A: "Electronic Definitions in Non-Electronic Terms."

III. IMPORTANT OPERATING NOTICES



A. Cautions

1. For connections from your instrument to the Column Selector use only a *contact closure* or a *TTL switch*. Do not supply a voltage and current from your instrument to the Column Selector or it will damage the Column Selector circuitry.
2. Rinse the valve after using buffer solutions to prevent the formation of crystals that can scratch the sealing surfaces.
3. Use only the supplied Power Supply for connection to the Column Selector.
4. Operate within temperature range, 4°-40°C only.
5. When using the PEEK valve use only plastic ferrules in the stator ports. Metal ferrules can cause irreparable damage to the plastic stator.

B. Warnings



1. Do not submerge the LabPRO Column Selector in liquids.
2. Confirm there is adequate ground between your instrument and the LabPRO Column Selector. This is especially important with electrospray mass spectroscopy.
3. Plug Power Supply into LabPRO Column Selector first, then plug Power Supply into AC power source. When disconnecting, unplug at AC power source first.

IV. SPECIFICATIONS

A. Unit:

1. Temperature range: 4°-40° C, non-condensing.
2. Weight: 7.3 kg (16 lb.).
3. CE Mark represents:
 - a) EMC certification (EN50082-1) and
 - b) EMI certification (EN 50081-1).

B. Valve:

1. Maximum pressure: 35 MPa, or 345 bar, or 5000 p.s.i.
2. Wetted surfaces:
 - a) PEEK valves (Models PR550-100, PR550-104): PEEK.
 - b) Stainless Steel valves (Models PR500-100, PR500-104): Stainless Steel and PEEK.
3. Flow passages: 0.38 mm (0.015") and 0.61 mm (0.024").
4. Ports: accept 10-32 male threaded fittings.
5. Not recommended for use with concentrated HNO₃ or concentrated H₂SO₄.

C. Electrical Connections:

1. See Figure 3 for an illustration of the electrical connections.
2. Barrel connector for power input to the Column Selector (attached to power supply).
3. *Universal power supply* input is 100-240VAC, 50-60 Hz, output is 24VDC, 1.7A.
4. *Input/output* from the Column Selector is through a 25 pin d-subminiature connector.

D. Control and Communication

1. *Line Control*
 - a) *Input:*
 - (1) Models ending in –01 accept 1 or 2 line *level logic (TTL, contact closure)*.
 - (2) Models ending in –02 accept 1 or 2 line *pulse logic (TTL, contact closure)*.
 - (3) Models ending in –03 accept 4 line *BCD (TTL, contact closure)*.
 - b) *Output:* For all models it is 6 line *TTL*.
2. *Serial Communication* (bi-directional, including position number and error codes)
 - a) RS-232 is included with models ending in –01 and -02.
 - b) RS-485 is included with models ending in –03.
3. The following table summarizes the control options:

Table 1. Summary of Control Options.

Models Ending in	Inputs							Outputs		
	Line Control					Serial Control		Line	Serial	
	1-Line (1 event relay)		2-Line (2 event relays)		4-Line BCD (4 event relays)	RS-232	RS-485	6-line TTL	RS-232	RS-485
	Level	Pulse	Level	Pulse						
-01	Std	N/A	Std	N/A	N/A	Std	N/A	Std	Position #	N/A
-02	N/A	Std	N/A	Std	N/A	Std	N/A	Std	+ Errors	N/A
-03	N/A	N/A	N/A	N/A	Std	N/A	Std	Std	N/A	Position # + Errors

V. INSTALLATION

A. General Description

1. Figure 1 shows a front view of the Column Selector with the Cover (1) mounted.

- a) The Cover (1) is magnetically secured and is simply pulled off to give access to the columns.
- b) Positioned on either side of the main unit are five holes (2) designed to allow tubing at the valve IN/OUT ports to pass through while the cover remains on. The multiple positions of the holes, allow the user to minimize tubing connectors to the injector and the detector.
- c) The Numeric Display (3) is visible with or without the cover on the unit. The number of the column that is in-line is displayed here.
- d) The Local-Remote button (4) is located in this area. The button controls manual or remote column selection.

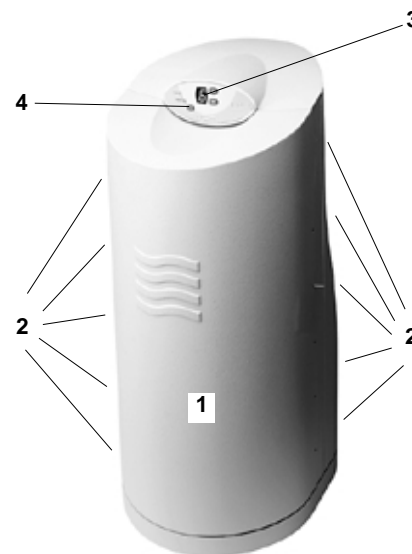


Fig. 1. Column Selector with cover.

2. Figure 2 shows a front view of the 6-column selector with the cover removed.

- a) The valve (1) is located to provide easy access to the liquid-end should servicing be required. The supplied Rheodyne fittings and tubing (2) match the valve's material of construction.
- b) The column clips (3) are spring loaded and hold columns from 3.2-25.4 mm (1/8-1") OD firmly in place. The Column Selector can accommodate both long and short columns, 5-35 cm (2-13.8").
- c) A built-in drip tray (4) safely contains any solvent spills. The drain tube connected to the hole drains solvents to waste. The tube can be adjusted to terminate to waste in any direction.

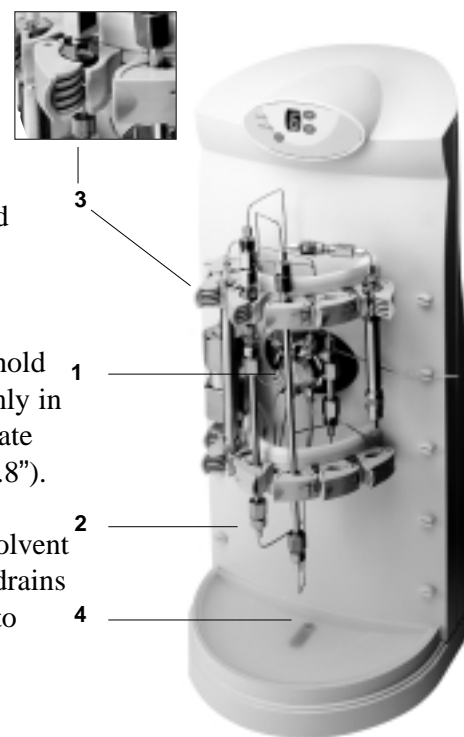


Fig. 2. Column Selector with cover removed.

B. Electrical and Communications Connections to Column Selector

1. All electrical and communications connections to the Column Selector are made in the rear of the unit (see Fig. 3):
2. Electrical Connections:
 - a) Plug the Power Supply (1) male-barrel terminal (2) into the Column Selector female port (3).
 - b) Plug the IEC 320 connector (4) of the Power Line Cord into the Power Supply box (1).
 - c) Plug the opposite end of the Power Line Cord into a properly grounded power source (5). The LabPRO *Universal Power Supply* can be operated from *inputs* of 100-240 VAC, 50-60 Hz. The *output* is 24VDC, 1.7A.

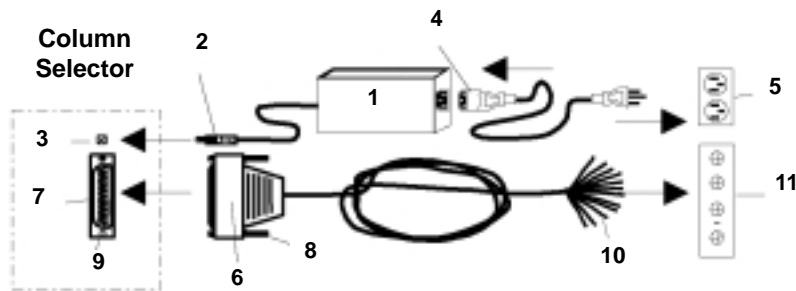


Fig. 3. Electrical and communications connections to Column Selector.

3. Remote Communication Cable Connections:
 - a) There are two ways to accomplish remote control of the Column Selector:
 - (1) *Line control* using the interface cable with *contact closures* or *TTL* relays.
 - (2) *Serial communication* using RS-232 or RS-485 cables and software.

- b) For *line control* use the supplied 25-pin *Interface Cable*. The Cable is plugged into the 25-pin terminal on the Column Selector. The loose wires on the opposite end of the Cable are wired to an appropriate *output* device on your instrument, such as an *External Event Relay* or a *Time Function Switch*. The *output* must be either *contact closure* or *TTL* in order to connect the Column Selector to your instrument (see **Caution - III A.1**). See Figure 3.

- (1) Plug the *Interface Cable* connector (6) into the 25-pin terminal (7) located on the rear of the Column Selector. Tighten the connector screws (8) into their mating terminal ports (9).
- (2) Connect the color coded *Interface Cable* wires (10) to the HPLC controller *contact closures* or *TTL* relay (11), as described in more detail in the next section “Input Line Control.”

- c) For *serial communication* the *interface cable* is replaced with RS-232 (P/N 5123-067) or RS-485 cable. The serial cable is connected between the 25-pin terminal on the Column Selector and the appropriate *output* on your computer. See Figure 3.

- (1) Plug the RS-232 or RS-485 *interface cable* connector (6) into the 25-pin terminal (7) located on the rear of the Column Selector. Tighten the connector screws (8) into their mating terminal ports (9).
- (2) Connect the opposite end of the RS-232 or RS-485 *interface cable* (not shown) into the HPLC controller computer port, as described in more detail in the next section.
- (3) The last two digits (-01, -02, -03) of the Column Selector part number specify the different *inputs* that can be used for remote control. See Table 1 for complete details on *inputs* and *outputs* for different Column Selector part numbers.

4. *Input Line Control* (controlling with a *contact closure* or *TTL* relay).

- a) This section outlines in detail the three options available for *line control*: 1 line, 2 line, or 4 line control.
- b) 1 or 2 *line control* with *level logic*. The instrument used to control this model must have either one [1] or two [2] *TTL* or *contact closure outputs*. The output must also be *level logic*. You can choose to control the Column Selector with one *event relay* (valve rotation only) or with two *event relays* (valve rotation and direction).

- (1) 1-Line *Level Logic* Control (valve rotation only, the simplest control):

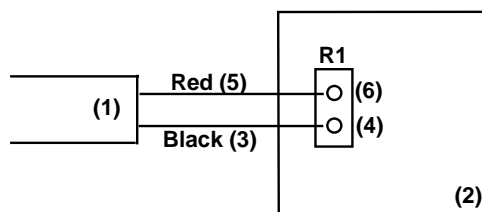


Fig. 4. One line control.

- (a) One *event relay* required.
- (b) Wiring the *interface cable* (1) to the HPLC (2) with 1-line control (see Fig. 4):
 - (i) Connect the black wire (3) to the *ground terminal* (4) of the HPLC event relay R1.
 - (ii) Connect the red wire (5) to the control line (6) *terminal* of the HPLC event relay R1.
 - (iii) See the Operation section (VI) for typical commands and examples of programming with this type of control.
- (2) 2-Line *Level Logic* Control (controls the rotation of the valve on the first line and direction on the second line):

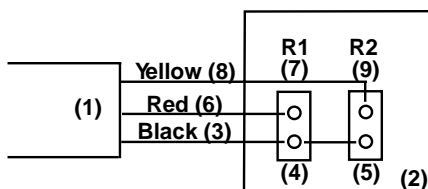


Fig. 5. Two line control.

- (a) Two *event relays* required.
- (b) Wiring the *interface cable* (1) to the HPLC (2) with 2-line control (see Fig. 5):
 - (i) Connect the black wire (3) to the *ground terminal* (4) of the HPLC event relay R1.
 - (ii) Connect the jumper wire (supplied) from the *ground terminal* (4) of the HPLC event relay R1 to the *ground terminal* (5) of the HPLC event relay R2.
 - (iii) Connect the red wire (6) to the control line (7) *terminal* of the HPLC event relay R1.
 - (iv) Connect the yellow wire (8) to the control line (9) *terminal* of the HPLC event relay R2.

- (c) See the Operation section (VI) for typical commands and examples of page numbering programming with this type of control.
- c) 1 or 2-line control with *pulse logic*. The instrument used to control this model must have either one [1] or two [2] *TTL* or *contact closure outputs*. The output must also be *pulse logic*. You can choose to control the Column Selector with one *event relay* (valve rotation only) or with two *event relays* (valve rotation and direction).
 - (1) 1-Line *Pulse Logic* Control (valve rotation only, the simplest control):
 - (a) One *event relay* required.
 - (b) Wiring the *interface cable* (1) to the HPLC (2) with 1-line control is exactly the same as in *level logic* control (see Fig. 4).
 - (i) Connect the black wire (3) to the *ground terminal* (4) of the HPLC event relay R1.
 - (ii) Connect the red wire (5) to the control line (6) *terminal* of the HPLC event relay R1.
 - (iii) See the Operation section (VI) for typical commands and examples of programming with this type of control.
 - (2) 2-Line *Pulse Logic* Control (controls the rotation of the valve on the first line and direction on the second line):
 - (a) Two *event relays* required.
 - (b) Wiring the *interface cable* (1) to the HPLC (2) with 2-line control is exactly the same as in *level logic* control (see Fig. 5).
 - (i) Connect the black wire (3) to the *ground terminal* (4) of the HPLC event relay R1.
 - (ii) Connect the jumper wire (supplied) from the *ground terminal* (4) of the HPLC event relay R1 to the *ground terminal* (5) of the HPLC event relay R2.
 - (iii) Connect the red wire (6) to the control line (7) *terminal* of the HPLC event relay R1.
 - (iv) Connect the yellow wire (8) to the control line (9) *terminal* of the HPLC event relay R2.
 - (c) See the Operation section (VI) for typical commands and examples of programming with this type of control.

- d) 4-line *BCD* control. The instrument used to control this model must have four (4) *TTL* or *contact closure outputs*. This method of control is the best means of controlling the Column Selector since it allows direct access to any chosen column position.

(1) 4-Line *BCD* Control (independent selection of any position):

- (a) Four *event relays* required. The relays must be capable of simultaneous operation. The position of the valve is dictated by the *states* of the four *event relays*.
- (b) Wiring the *interface cable* (1) to the HPLC (2) with 4-line *BCD* control (see Fig. 6):

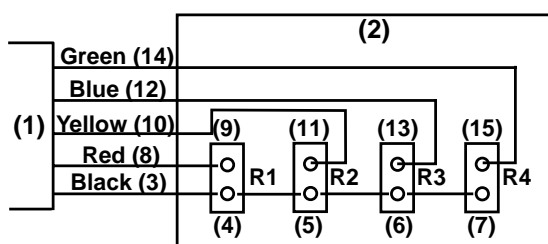


Fig. 6. Four line control.

- (i) Connect the black wire (3) to the *ground terminal* (4) of the HPLC event relay R1.
- (ii) Connect the jumper wire (supplied) from the *ground terminal* (4) of the HPLC event relay R1 to the *ground terminals* (5, 6, and 7) of the HPLC event relays R2, R3, and R4.
- (iii) Connect the red wire (8) to the control line *terminal* (9) of the HPLC event relay R1.
- (iv) Connect the yellow wire (10) to the control line *terminal* (11) of the HPLC event relay R2.
- (v) Connect the blue wire (12) to the control line *terminal* (13) of the HPLC event relay R3.
- (vi) Connect the green wire (14) to the control line *terminal* (15) of the HPLC event relay R4.
- (c) See the Operation section (VI) for typical commands and examples of programming with this type of control.

5. Column Plumbing Connections

- a) Locate the column connector fittings and tubing supplied with the Column Selector.
- b) Installing fittings:
 - (1) Using Rheodyne stainless steel fittings
 - (a) Cut the stainless steel tubing to the desired length assuring that the ends are deburred and straight, and that the inner passage is fully open.
 - (b) Bend the tubing to fit into the valve inlet and outlet. It is important to leave a minimum of 1.91 cm (0.75") straight section prior to any bends when using stainless tubing. This will allow you to conveniently remove the nuts.
 - (c) Place the nut (1) and ferrule (2) with the threaded portion of the nut and tapered portion of the ferrule onto the tubing (3) as shown in Figure 7A.

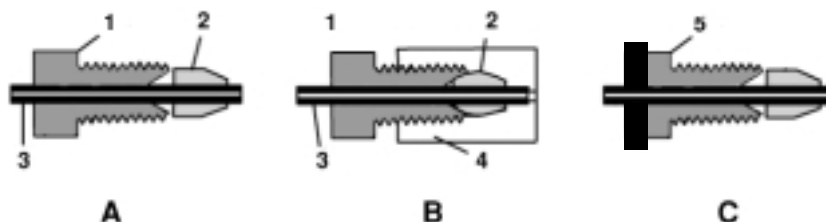


Fig. 7. Cut-away view of fittings installation.


- (d) Insert the tubing (3) into the valve port (4) as shown in Figure 7B.
 - (e) While firmly pressing the tubing, hand-tighten the nut as tight as possible.
 - (f) Use the supplied wrench to tighten the nut additional three, 90 degree turns. The ferrule will compress to form a seal as shown in Figure 7B.
 - (2) Using RheFlex® PEEK fittings
 - (a) PEEK RheFlex nuts and ferrules should be used with the PEEK Column Selector.
 - (b) Cut the PEEK tubing to the desired length assuring that the ends are clean and straight, and that the inner passage is fully open.
 - (c) Bend the tubing to fit into the valve inlet and outlet.

- (d) Place the nut (5) and ferrule (2, 6) with the threaded portion of the nut and tapered portion of the ferrule onto the tubing (3) as shown in Figure 7A and 7C.
- (e) Insert the tubing (3) into the valve port (4) as shown in Figure 7B.
- (f) While firmly pressing the tubing, hand-tighten as tight as possible using the knurled knob on the PEEK nut (see Fig. 7C).

(3) Non-Rheodyne fittings

- (a) We recommend using genuine Rheodyne fittings with the Column Selector.
- (b) If you plan to use any fittings or connectors from another manufacturer, assure that they are the correct types for the appropriate Column Selector valve. Using an incorrect type of fitting could result in dead volumes (causing loss of resolution due to band broadening) or damage to the valve.
- (c) When using the PEEK valve use only plastic ferrules in the stator ports. Metal ferrules can cause irreparable damage to the plastic stator.

c) Installing Columns onto the Column Selector:

- (1) Figure 8 shows the general locations for installing columns onto the Column Selector.
- (2) Open the upper column clip (1), insert the column (2), and close the upper column clip. Slide the column upward to allow opening of the lower column clip (3). Insert the column into and close the lower column clip. 
- (3) Install the inlet nuts, ferrules, and tubing (5) as previously described (see Fig. 7).
- (4) Install the outlet nuts, ferrules, and tubing (6) as previously described.
- (5) Connect the column inlet to the correct valve inlet (7) position (numbered 1-6 in the 6-column configuration [Figure 9] and 1-3 in the 3-column configuration [Figure 10]). Install the inlet nuts and ferrules.

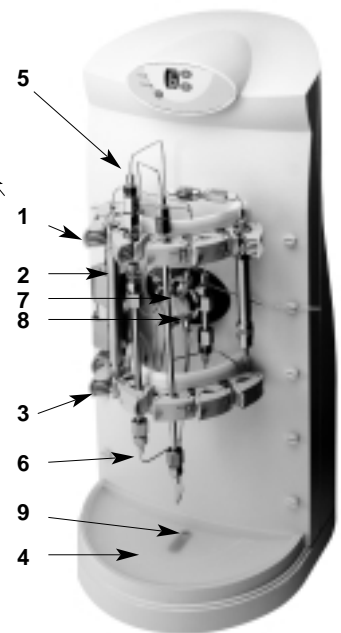


Fig. 8. Installing columns on Column Selector.

- (6) Connect the column outlet to the correct valve outlet (8) position (numbered 1'-3' in the 3-column configuration and 1'-6' in the 6-column configuration). Install the outlet nuts and ferrules.
- (7) The correct inlet and outlet plumbing is shown schematically in the inside of the Column Selector Cover. It may be convenient to turn the Cover around and place it next to the Column Selector during plumbing. Connections are also summarized in the following table:

Column Location in Clips	Left	1	2	3	4	5	6	Right
Top of Valve - Column Inlet Connection	Left	6	5	4	3	2	1	Right
Bottom of Valve - Column Outlet Connection	Left	1	2	3	4	5	6	Right

- (8) The correct inlet and outlet plumbing is also shown schematically in Figure 9 (6-column configuration) and Figure 10 (3-column configuration).
 - (a) The pump (1) and sample injector (2 [usually an autosampler]) are hooked up to the common valve inlet (3), through the columns (labeled 1-3 or 1-6) to the common valve outlet (4) to the detector (5).
- d) One pair of ports (e.g., 6 and 6') can be dedicated for a flush-out line. In place of a column, a piece of tubing is connected between the two ports. A flush-out line is especially useful when the various columns and solvents are not compatible.
- e) Solvent Spill Containment and Waste Tubing Routing.
 - (1) The plastic solvent drip tray located below the valve (4 in Figure 8) is designed to funnel any spilled liquids through the tray exit hole (9 in Figure 8) to a waste container.

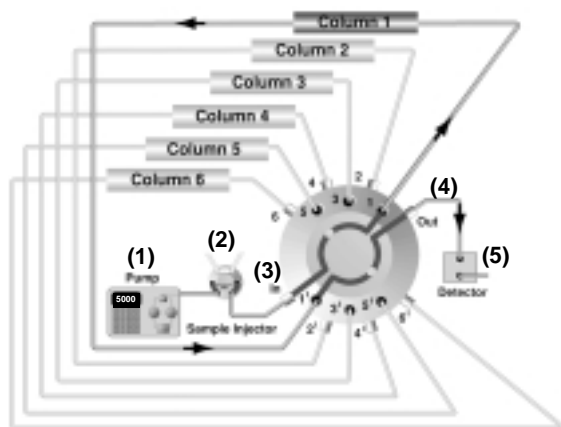


Fig. 9. 6-Column plumbing schematic.

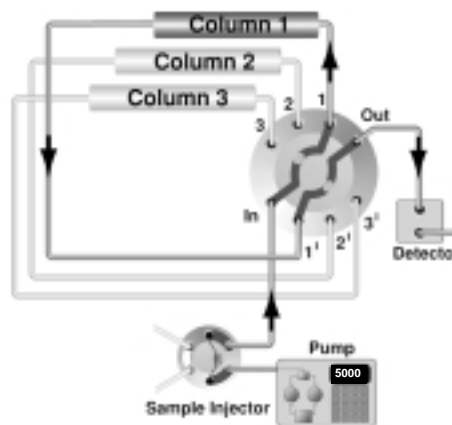


Fig. 10. 3-Column plumbing schematic.

- (2) The tray exit tubing should be routed into a waste container. Make sure there are no kinks in the tubing and that the end of the tube is secured to the waste container. Make sure that the Column Selector is located higher than the waste container to assure proper draining.

VI. OPERATION

A. Control Panel Overview

1. The Column Selector control panel is shown in Figure 11. Display and operations are:
 - a) Local-Remote button (1)
 - b) Remote indicator light (2)
 - c) Local indicator light (3)
 - d) Valve/column position [LED] (4)
 - e) Manual forward position selector button (5)
 - f) Manual reverse position selector button (6)

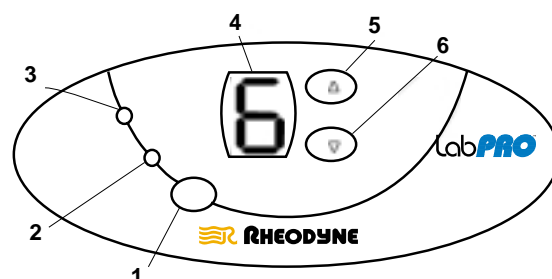


Fig. 11. Column Selector displays and manual selectors.

B. Manual Operation

1. To operate the Column Selector manually, connect the Power Supply to the Column Selector as described in the Installation section (V).
2. Pressing the Local-Remote button (1) selects either local (manual) or remote (automatic) operation.
 - a) The Column Selector must be in Local (manual) mode to use the manual (forward or backward) position selection buttons. Manual mode can be confirmed by observing that the local indicator light (3) is illuminated.
 - b) The Column Selector must be in Remote (automatic) mode to use any method of remote control (1 or 2 line *level logic*, 1 or 2 line *pulse logic*, 4 line *BCD*, RS-232, or RS-485). Remote mode can be confirmed by observing that the remote indicator light (2) is illuminated.

3. The LED display (4) indicates the active valve/column position.
4. Pressing the forward position selector button (5) moves the valve one position in the clockwise (or numerically higher) direction each time that the button is depressed.
 - a) If the valve is in highest position (six for 6-Column Selector or three for 3-Column Selector) pressing the forward button will not move the valve to position #1. The reverse button must be used to relocate to position #1.
5. Pressing the reverse position selector button (5) moves the valve one position in the counterclockwise (or numerically lower) direction each time that the button is depressed.
 - a) If the valve is in lowest position, pressing the reverse button will not move the valve to the highest valve position (Six for 6-Column Selector or three for 3-column selector). The forward button must be moved to relocate to higher positions.

C. Column Selector Self Test

1. To confirm proper operation, the Column Selector can be put through a “self test.” This test is a very valuable diagnostic help to help determine potential problems for remote and automatic operational control.
2. To perform a “self test,” put the Column Selector in Local mode and simultaneously press the two “arrow” buttons located near the numeric display for one second.
3. The Column Selector will move *slowly* to the number 1 (home) position then rapidly cycle through all available positions and *slowly* return to the number 1 position.
4. If an “E” (ERROR) shows in the numeric display, refer to Troubleshooting section in Operating section (VI.H.).

D. Remote or Automatic Operation

1. *Input Line Control* (controlling with a *contact closure* or *TTL* relay)
 - a) Remote control can be accomplished via either discrete line (*TTL* or *contact closure*) or *serial communication* control. This section outlines in detail the three options available for *line control*; 1, 2, or 4 *line control*.
 - b) 1 or 2 *line control* with *level logic*. The instrument used to control this model must have either one [1] or two [2] *TTL* or *contact closure outputs*. The output must also be *level logic*. You can choose to control the Column Selector with one *event relay* (valve rotation only) or with two *event relays* (valve rotation and direction).
 - (1) 1-Line *Level Logic* Control (valve rotation only, the simplest control):

- (a) One *event relay* is required.
- (b) With *level logic* a change in state (either closed to open or open to closed, either On to Off or Off to On, either Lo to Hi or Hi to Lo) will rotate the valve one position in the clockwise direction.
- (c) Wiring the *interface cable* to the HPLC with 1-line *control* (see Fig. 4).
- (d) Important: when using 1-line *level logic control* you need to know which position the valve is in prior to starting an automated sequence. A simple way of accomplishing this is use the control panel to switch to local (manual) mode, move the valve to the desired initial condition, and then return the selector to remote (automatic) mode. If a power failure occurs the valve will remember it's previous position and stay in that position upon restoration of power.
- (e) 1-line *level logic* generic time programming examples follow. (Note: the actual programming will vary depending on the manufacturer of the HPLC used):

Program 1

Time	Relay 1	Comments
Initial	Open	Valve is in position #1
10	Closed	Moves to position #2
15	Open	Moves to position #3
20	Closed	Moves to position #2
25	Open	Moves to position #1
30	Closed	Moves to position #2

Program 2

Time	Relay 1	Comments
Initial	Open	Valve is in position #1
10	Closed	Moves to position #2
20	Open	Moves to position #3
30	Closed	Moves to position #4
40	Open	Moves to position #5
50	Closed	Moves to position #6
60	Open	Moves to position #5

- (f) Note: If the valve is in the last position (6 or 3), and a change of state command is received, the valve will reverse direction and move to the previous position (5 or 2).

(2) **2-Line *Level Logic Control*** (controls the rotation of the valve on the first line and direction on the second line):

- (a) Two *event relays* are required.
- (b) With *level logic*, the event relay R1 change in state (either Closed to Open/Open to Closed, or On to Off/Off to On, or Lo to Hi/Hi to Lo, will rotate the valve one position in the clockwise direction.
- (c) With *level logic*, the event relay R2 change in state (either Lo to Hi or Hi to Lo) will change the direction of the valve rotation to the opposite direction. If the contact is open (or Off or Hi) the direction will be clockwise. If the contact is closed (or On or Lo) the direction will be counterclockwise.
- (d) Wiring the *interface cable* to the HPLC with 2-line *control* (see Fig. 5).

- (e) Important: when you are using 2-line *level logic* control you need to know the position of the valve prior to starting an automated sequence. A simple way of accomplishing this is to use the control panel to switch local (manual) mode, move the valve to the desired initial condition, and then return the Column Selector to remote (automatic) mode. If a power failure occurs the valve will remember its previous position and stay in that position upon restoration of power.
- (f) 2-line *level logic* generic time programming examples follow. (Note: the actual programming will vary depending on the manufacturer of the HPLC used):
- (g) Note: it is advisable to make the change of direction using a separate program step prior to the actual positional activation. The change of direction and positional activation can be made using a single programming step – however both relays must activate **SIMULTANEOUSLY!**

Program 1

Time	Relay 1	Relay 2	Comments
Initial	Open	Open	Valve in position #1
30	Closed	Open	Moves to position #2
30.1	Closed	Closed	Changes direction
60	Open	Closed	Moves to position #1
75	Open	Open	Changes direction
90	Closed	Open	Moves to position #2
120	Open	Open	Moves to position #3
130	Open	Closed	Changes direction

Program 2

Time	Relay 1	Relay 2	Comments
Initial	Open	Open	Valve in position #1
30	Closed	Open	Moves to position #2
30.1	Closed	Closed	Changes direction
30.2	Open	Closed	Moves to position #1
30.8	Open	Open	Changes direction
30.9	Closed	Open	Moves to position #2
40	Open	Open	Moves to position #3
60	Closed	Open	Moves to position #4
80	Open	Open	Moves to position #5
120	Closed	Open	Moves to position #6
120.1	Closed	Closed	Changes direction

- c) 1 or 2-line *control* with *pulse logic*. The instrument used to control this model must have either one [1] or two [2] *TTL* or *contact closure outputs*. The output must also be *pulse logic*. You can choose to control the Column Selector with one *event relay* (valve rotation only) or with two *event relays* (valve rotation and direction).

(1) 1-Line *Pulse Logic* Control (valve rotation only, the simplest control):

- (a) With *pulse logic*, when the Column Selector is powered ON, the default is clockwise rotation. However, the battery protected memory will remember if rotation had last been in the counterclockwise direction. Therefore it is best to know the initial position and direction of rotation when using this type of logic.
- (b) The rotation of the valve is controlled by *event relay* R1. With *pulse logic* the valve will rotate one position in the clockwise direction when the state is

changed in a specific manner (Closed to Open, On to Off, or Lo to Hi). Nothing will happen when the state is changed in the opposite manner (Open to Closed, Off to On, or Hi to Lo). It is necessary to change the state once again prior to the next desired actuation of the valve. For example, to change the valve position twice, three changes are necessary.

- (c) Wiring the *interface cable* to the HPLC with 1-Line Control is exactly the same as in *level logic* control (see Fig. 4).
- (d) Important: when using 1-line *pulse logic* control you need to know which position the valve is in prior to starting an automated sequence. A simple way of accomplishing this is to use the control panel to switch to local (manual) mode, move the valve to the desired initial condition, and then return the selector to remote (automatic) mode. If a power failure occurs the valve will remember its previous position and stay in that position upon restoration of power.
- (e) 1-line *pulse logic* generic time programming examples follow. (Note: the actual programming will vary depending on the manufacturer of the HPLC used):

Program 1

Time	Relay 1	Comments
Initial	Closed	Valve is in position #1
10	Open	Moves to position #2
10.1	Closed	Cycles Pulse Logic
15	Open	Moves to position #3
15.1	Closed	Cycles pulse logic
20	Open	Moves to position #2
20.1	Closed	Cycles pulse logic
25	Open	Moves to position #1
25.1	Closed	Cycles pulse logic

Program 2

Time	Relay 1	Comments
Initial	Closed	Valve is in position #1
30	Open	Moves to position #2
30.1	Closed	Cycles Pulse Logic
60	Open	Moves to position #3
60.1	Closed	Cycles Pulse Logic
90	Open	Moves to position #4
90.1	Closed	Cycles Pulse Logic
120	Open	Moves to position #5
120.1	Closed	Cycles Pulse Logic

(2) 2-Line *Pulse Logic* Control (controls the rotation of the valve on the first line and direction on the second line):

- (a) The direction of the valve is controlled by event relay R1. With *pulse logic* the valve will rotate one position in the clockwise direction when the state is changed in a specific manner (Closed to Open, On to Off, or Lo to Hi). Nothing will happen when the state is changed in the opposite manner (Open to Closed, Off to On, or Hi to Lo). It is necessary to change the state once again prior to the next desired actuation of the valve. For example, to change the valve position twice, three changes in state are necessary.
- (b) The direction of rotation is controlled by event relay R2. With *pulse logic* the direction of valve rotation will reverse when the state is changed in a specific manner (Closed to Open, On to Off, or Lo to Hi). Nothing will happen when the state is changed in the opposite manner (Open to Closed, Off to On, or Hi to Lo). However if you desire to change direction, it is necessary to change the state once again prior to the next desired actuation of the valve.

- (c) Wiring the *interface cable* to the HPLC with *2-line control* is exactly the same as in *level logic* control (see Fig. 5).
- (d) Important: when you are using 2-line *pulse logic* control you need to know the position the valve is in prior to starting an automated sequence. A simple way of accomplishing this is use the control panel switch to local (manual) mode, move the valve to the desired initial condition, and then return the selector to remote (automatic) mode. If a power failure occurs the valve will remember its previous position and stay in that position upon restoration of power.
- (e) 2-line *pulse logic* generic time programming examples follow. (Note: the actual programming will vary depending on the HPLC used):

Program 1

Time	Relay 1	Relay 2	Comments
Initial	Closed	Closed	Valve is in position #1
15	Open	Closed	Moves to position #2
30	Closed	Closed	Cycles pulse logic
30.1	Closed	Open	Changes direction
40	Open	Closed	Moves to position #1
40.1	Closed	Closed	Cycles pulse logic
60	Open	Closed	Moves to position #2
60.1	Closed	Closed	Cycles pulse logic
80	Open	Closed	Moves to position #3
80.1	Closed	Closed	Cycles pulse logic
100	Open	Closed	Moves to position #2

- d) 4-line *BCD* control. The instrument used to control this model must have four (4) *TTL* or *contact closure outputs*. This method of control is the best means of controlling the Column Selector. This method of control allows direct access to any chosen column position. It is the most versatile and efficient means of controlling the selector with line control.

(1) 4-Line *BCD* Control (independent selection of any position):

- (a) Four *event relays* are required. The relays must be capable of simultaneous operation. The position of the valve is dictated by the *states* of the four *event relays*.
- (b) *BCD* outputs work using binary logic ($2^0=1$, $2^1=2$, $2^2=4$, $2^3=8$), therefore when activated the relays will produce the following outputs:

	External Event or Relay #			
	1	2	3	4
Number Produced	1	2	4	8

- (c) When numerous relays are turned on **SIMULTANEOUSLY** these numbers become additive, so they can be programmed, as follows:

Desired Valve Position #	External Event or Relay #			
	1	2	3	4
1	Open	Closed	Closed	Closed
2	Closed	Open	Closed	Closed
3	Open	Open	Closed	Closed
4	Closed	Closed	Open	Closed
5	Open	Closed	Open	Closed
6	Closed	Open	Open	Closed

- (d) A 4-line *BCD* generic time programming example follows. (Note: the actual programming will vary depending on the manufacturer of the HPLC used):

Program 1

Time	Relay 1	Relay 2	Relay 3	Relay 4	Comments
Initial	Closed	Open	Open	Closed	Valve is in position #6
10	Open	Closed	Closed	Closed	Moves to position #1
20	Closed	Open	Closed	Closed	Moves to position #2
30	Open	Open	Closed	Closed	Moves to position #3
40	Closed	Closed	Open	Closed	Moves to position #4
50	Open	Closed	Open	Closed	Moves to position #5
60	Closed	Open	Open	Closed	Moves to position #6
70	Open	Open	Closed	Closed	Moves to position #3
80	Open	Closed	Closed	Closed	Moves to position #1
90	Open	Closed	Open	Closed	Moves to position #5

- (e) Wiring the interface cable (1) to the HPLC (2) with 4-line *BCD* control (see Fig. 6).

E. Serial Communication

1. *Serial communication* (RS-232 and RS-485) allows random access positioning and feedback (position and error messages) through standard communication protocols.
2. A computer equipped with the proper interface (usually COM1 or COM2 or an additional communications board containing more communications ports) is required for serial bi-directional control and feedback.
3. Additionally, communications software is required to run a *serial communications* device. Software available to run the Column Selector will be posted on the LabPRO WEB site (www.labpro.com).

4. RS-232 serial communication.

- a) RS-232 is a standard 4-line communication protocol requiring no hardware handshaking. To control the Column Selector with RS-232 communication use a standard 25-pin female to female serial cable with a null modem (Rheodyne P/N 5123-067) as described in the Installation section (V) (see Fig. 3).
- b) Interface requirements are as follows:
 - (1) Terminal Emulation: VT100
 - (2) BAUD rate: 9600
 - (3) # Data Bits: 8
 - (4) # Stop Bits: 1
 - (5) Parity: None
 - (6) Hardware Handshaking: None
- c) Using a standard terminal emulator, the Column Selector will return a menu, which indicates the current status and acceptable commands for controlling the valve. An example of the RS-232 menu is shown in Figure 12.
- d) Lines 1 and 2 in Figure 12 show the firmware version and the valve type. Line 3 indicates the valve position or an “E” for error. Lines 4 through 8 describe the available commands for controlling the valve. Command descriptions follows:

Rheodyne Valve Control Unit Ver. X	
Valve Type:	6Ps 18dg 25:1
Current Port:	1
Port #:	1-6
Home:	H
BIT:	T
CW:	>
CCW:	<
Enter Selection:	

Fig. 12. Example RS-232 terminal communications protocol.

- (1) Sending a number corresponding to any available position will rotate the valve to the designated position.
- (2) Sending “H” or “h” will command the valve to find the “home” position at a reduced speed (this is useful after an error has occurred).
- (3) Sending “T” or “t” will indicate a “self test.” This test cycles through all available positions to confirm proper operation.
- (4) Sending “>” or “.” will rotate the valve one position in the clockwise (CW) direction.
- (5) Sending “<” or “,” will rotate the valve one position in the counter-clockwise (CCW) direction.

5. RS-485 serial communication.

- a) To control the Column Selector with RS-485 communication use a standard 25-pin female to female serial cable with a null modem as described in the Installation section (V). The serial cable is connected to the 25-pin terminal at the back of the unit (see Fig. 3). **RS-485 is available only in Column Selector models with part numbers ending in –03.**
- b) Communication with the Column Selector unit through RS-485 is similar to the RS-232 scheme except a different cable is required. The interface requirements and return menu are identical to RS-232 as described in preceding sections VI. E. Serial Communication. The RS-485 cables are not standard but must conform to the pin outs, as follows:

<u>Host Computer</u>	<u>LabPRO Function</u>	<u>LabPRO J2 Connector Pin Outs</u>
Receive +	Transmit +	J2-20
Receive -	Transmit -	J2-19
Transmit +	Receive +	J2-4
Transmit -	Receive -	J2-5
Ground	Ground	J2-7
CTS -	Detect	J2-6

- c) All pin numbers refer to the 25-pin d-subminiature connector on the rear of the Column Selector enclosure.

F. Maintenance and Troubleshooting

1. Electrical Maintenance

- a) There is no maintenance required for electronic components.
- b) If an electrical problem is encountered, please consult the electrical installation and troubleshooting sections of the manual. If the problem persists contact your authorized Rheodyne dealer for assistance.

2. Valve Maintenance

- a) With normal use the valve will give many thousands of actuations without trouble. The main cause of early failure, which is seen as valve leakage, is abrasive particles in the sample and/or mobile phase or crystallization of buffer solutions. Either can cause scratches on the rotor seal and stator face assembly.
- b) Valve Disassembly
 - (1) To disassemble the valve, refer to Figures 13 and 14 and proceed as follows:
 - (2) With the Hex Key provided, remove the Stator Screws (1) [four in 6-column and 5 in 3-column version] from the Stator (2).
 - (3) Remove the Stator and Stator Face Assembly (3) from the Stator Ring (5). The Stator Face Assembly usually remains on the Stator.
 - (4) Using the Hex Key, remove three Stator Ring Screws (4) from the Stator Ring.
 - (5) Remove the Stator Ring (5).
 - (6) Remove the Rotor Seal (6) from the valve Body (8). The Rotor Seal is mounted on three pins, and can be pulled off. The Gap Ring (7) should stay in place on the Body (8).
- c) Valve Reassembly
 - (1) Refer to Figures 13 and 14 and proceed as follows:

- (2) Mount the new Rotor Seal (6) with the slots facing the Stator (2). The three pins (9) on the Shaft Assembly fit into the mating holes (10) in the Rotor Seal only one way. Replace the Gap Ring (7), if it was removed.

- (3) Replace the Stator Ring (5) so the two short pins on the ring enter the mating holes in the Body.

- (4) Replace and tighten the three Stator Ring Screws (4). Tighten each an equal amount until the Screws are finger-tight, then turn another half turn.

- (5) Mount the new Stator Face Assembly (3) onto the Stator (2). On 3-column Column Selectors (Models PR500-100 and PR550-100) the assembly is symmetrical and has only two pins and it can be mounted either of two ways. On the 6-column Column Selectors (Models PR500-104 and PR550-104) the assembly is not symmetrical. The two pins on the assembly have different diameters, and can only mount on the stator one way.

- (6) Replace the Stator (2) and Stator Face Assembly (3) on the valve so that the pin in the Stator Ring enters the mating hole in the Stator.

- (7) Replace the Stator Screws (1) [four in 6-column and five in 3-column version] into the Stator. Tighten each an equal amount until the screws are finger-tight, then turn another half turn.

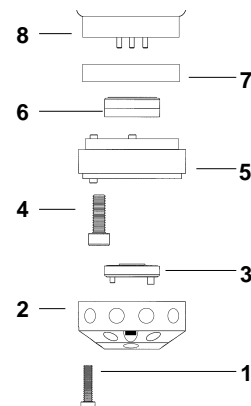


Fig. 13. Exploded view of valve.

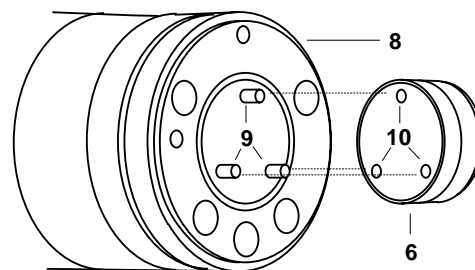


Fig. 14. Mounting new rotor seal.

3. Valve Spare Parts

- a) All parts needed to maintain the valve are contained in a Rheodyne RheBuild™ Kit. The kit includes: rotor seal, stator face assembly, and hex key. Note: -01, -02, -03 versions of the same model number all use the same RheBuild Kit. The kit part numbers are:

<u>RheBuild Kit P/N</u>	<u>Use for Column Selector Model</u>
5100-999	PR500-100 and PR550-100
5104-999	PR500-104 and PR550-104

G. Suggested Applications

1. The Column Selector can be used in a variety of applications, as follows:
 - a) Methods Development
 - (1) When the Column Selector is used with a LabPRO Solvent Selector (PR100-105 or PR100-106) operating parameters can be tested and optimized with a minimum of the researcher's time.
 - b) Column Selectivity Optimization
 - (1) Sample separation can be optimized by varying the solvents (e.g., H₂O/CAN, H₂O/methanol, H₂O/tetrahydrofuran) and solvent ratios (e.g., 75%/25%, 50%/50%, 25%/75%).
 - (2) Sample separation can be further optimized by varying the pH, buffer ionic strength, use of ion pairing agents, and other additives.
 - (3) Column type can also be varied (e.g., C₁₈ vs. C₈ vs. C₃ vs. Cyano).
 - c) Column Lengths - vary the column lengths (5-30 cm)
 - d) Column Diameter - vary the column diameters (2, 4.6, 10 mm).
 - e) Flow Rate - vary the column flow rate (0.2 – 3 mL /min. for analytical, 3–25 mL/min. for semi-preparative).
 - f) Column Loading Capacity - vary the column loading capacity (sample volume 1- 10 µL for 2 mm, 5-200 µL for 4.6 mm, 100 µL-10 mL for semi-preparative) to optimize peak shape.
 - g) Column Quality Control
 - (1) Newly packed (or purchased) columns can be tested quickly and easily, up to six at a time.

h) Validation Studies

- (1) The importance of pharmaceuticals has made validation studies of prime importance in many labs.
- (2) Method reproducibility can be studied by reinjecting the samples of interest.
- (3) Method ruggedness parameters can be tried on 6 different column sequentially (variations in solvent ratios, pH, buffer ionic strength, column length, column diameter - vary the column diameters (2, 4.6, 10 mm).
 - (a) Flow Rate - vary the column flow rate (0.2 – 3 mL /min. for analytical, 3–25 mL/min. for semi-preparative).
 - (b) Column Loading Capacity - method ruggedness and reproducibility can be quickly studied from one column to another, and from one system to another. Simply move the entire Column Selector from one system to another.

i) Multidimensional Chromatography

The sample of interest can be separated on a size exclusion column and then separated further by plumbing the outlet of the first column separation into the Column Selector. Various other types of columns can be plumbed to the Column Selector to obtain a separation using a different mode of selectivity (e.g., DEAE and SP ion exchangers, large pore reverse phase).

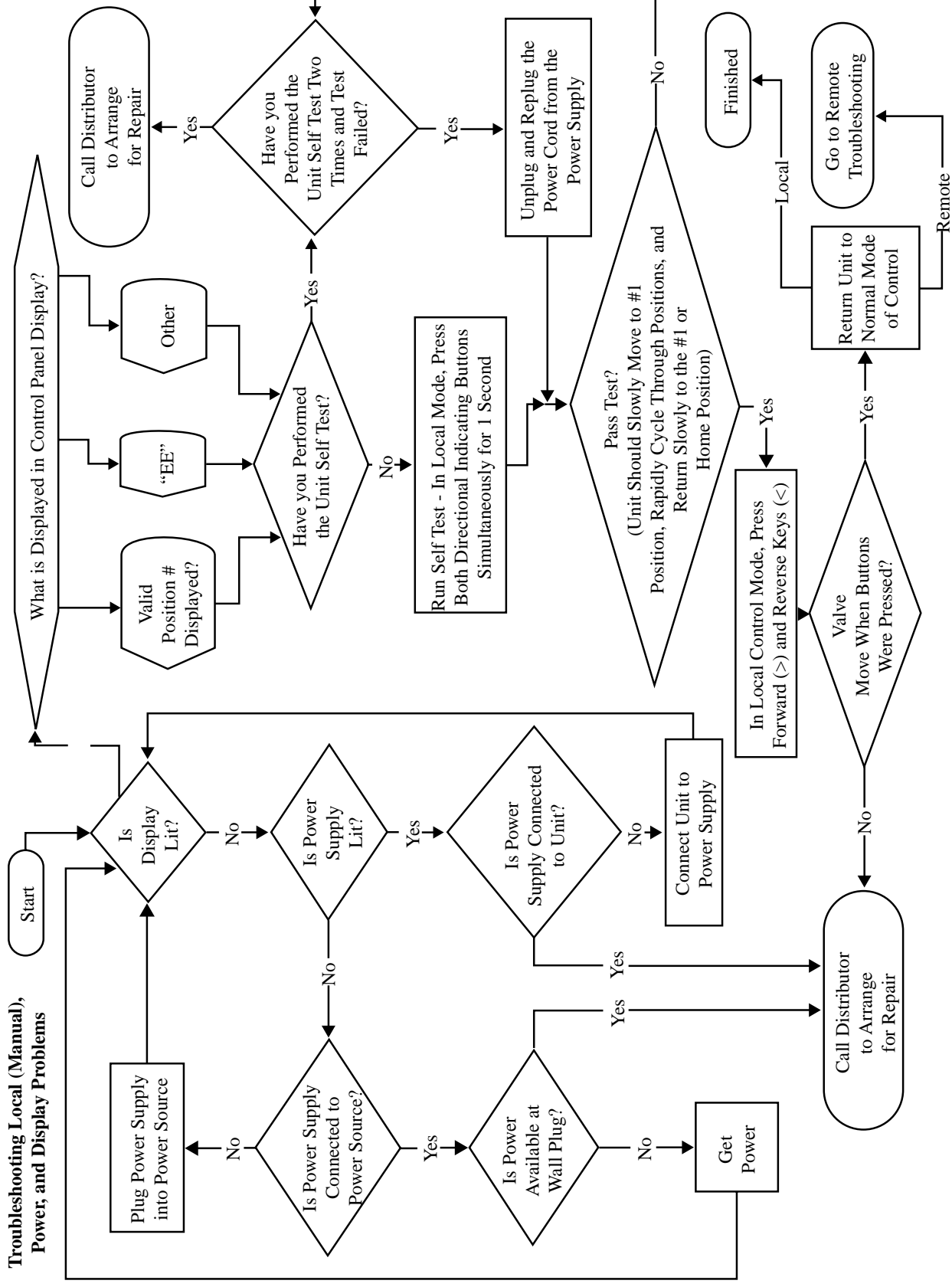
j) Fraction Collection

- (1) Peaks of interest eluting from a column prior to the Column Selector are further separated and collected at the Column Selector. If the first few minutes of the elution are not of interest the column effluent is diverted to a flush-out line on the Column Selector. The first peak of interest is eluting onto column one, second peak onto column two and so on.

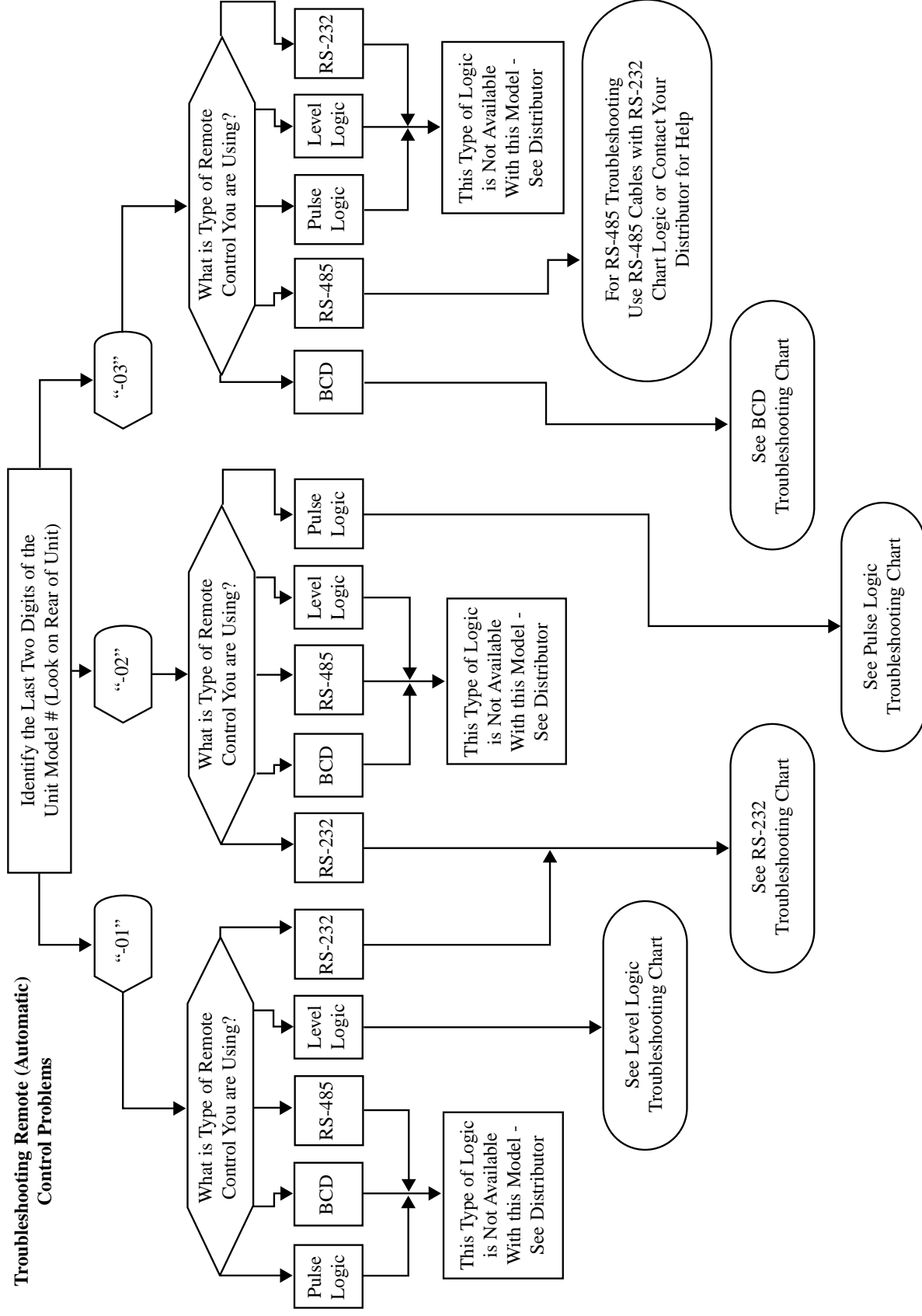
H. Troubleshooting

Symptom	Cause	Solution
1: Valve leaks between the stator and stator ring or from a port.	A: The rotor seal and stator face assembly have been damaged by abrasive particles in the sample and/or mobile phase or crystallization of buffer solutions.	Replace the rotor seal and stator face assembly. Filter sample and mobile phase. Flush the valve frequently to prevent crystallization of buffer solutions.
	B: The pressure rating of the valve has been exceeded.	Confirm that the pressure increase is not caused by a blockage in the flow path. If no blockage, lower the flow rate or change the column to decrease the pressure.
	C: The port is damaged and a nut and ferrule cannot seal correctly.	Replace the stator. Consult a Rheodyne distributor for part number.
2: Valve is not rotating.	A: There is no power to the Column Selector.	Confirm there is power at the source, and all electrical connections are secure.
	B: The program and/or wiring to control the Column Selector is incorrect.	Check the program used to control the Column Selector. Review the wiring as detailed in the installation section.
	C: Attempting to rotate the valve using the control panel positional selector keys - nothing happens.	Set the control panel control mode to local (manual) mode and press the appropriate positional selector key.
	D: Attempt to rotate the valve forward from position 6 to 1 or in reverse from 1 to 6 using the control panel positional selector keys - nothing happens.	In local (manual) mode you cannot rotate forward from 6 to 1 (must rotate in reverse direction) or from 1 to 6 (must rotate in forward direction).
	E: Attempting to rotate the valve using the computer control mode (with either TTL, contact closure, RS-232 or RS-485) - nothing happens.	Verify that the remote (automatic) mode is selected on control panel.
	F: Attempting to rotate the valve using the computer control mode (with either TTL, contact closure, RS-232 or RS-485) and remote (automatic) mode is selected on control panel - nothing happens.	Verify that you have programmed the computer or HPLC control software correctly and that the device is outputting a correct output (either TTL, contacts, RS-232 or RS-485) and type of logic (level, pulse, BCD) is available.
	G: Additional Problems.	See Troubleshooting Local (Manual), Power, and Display Problems (page 31) or Troubleshooting Remote Control Problems (page 32).
3: After running the Self Test (see Section VI. C) an "E" is displayed in the numeric display.	A: The electronics are not responding correctly.	See Troubleshooting flow charts on pages 31-36.
4: Remote Control Problems	A: Problems arise when attempting to use 1 line Level Logic Control.	See Flow Charts on Troubleshooting Remote Control 1 and 2 Line Level Logic (page 33).
	B: Problems arise when attempting to use 2 line Level Logic Control.	See Flow Charts on Troubleshooting Remote Control 1 and 2 Line Level Logic (page 33).
	C: Problems arise when attempting to use 1 line Pulse Logic Control.	See Flow Charts on Troubleshooting Remote Control 1 and 2 Line Pulse Logic (page 34).
	D: Problems arise when attempting to use 2 line Pulse Logic Control.	See Flow Charts on Troubleshooting Remote Control 1 and 2 Line Pulse Logic (page 34).
	E: Problems arise when attempting to use 4 line BCD Control.	See Flow Charts on Troubleshooting Remote Control 4 Line BCD Logic (page 35).
	F: Problems arise when attempting to use RS-232 Control.	See Flow Charts on Troubleshooting Remote Control RS-232 Logic (page 36).
	G: Problems arise when attempting to use RS-485 Control.	See Flow Charts on Troubleshooting Remote Control RS-232 Logic (page 36).

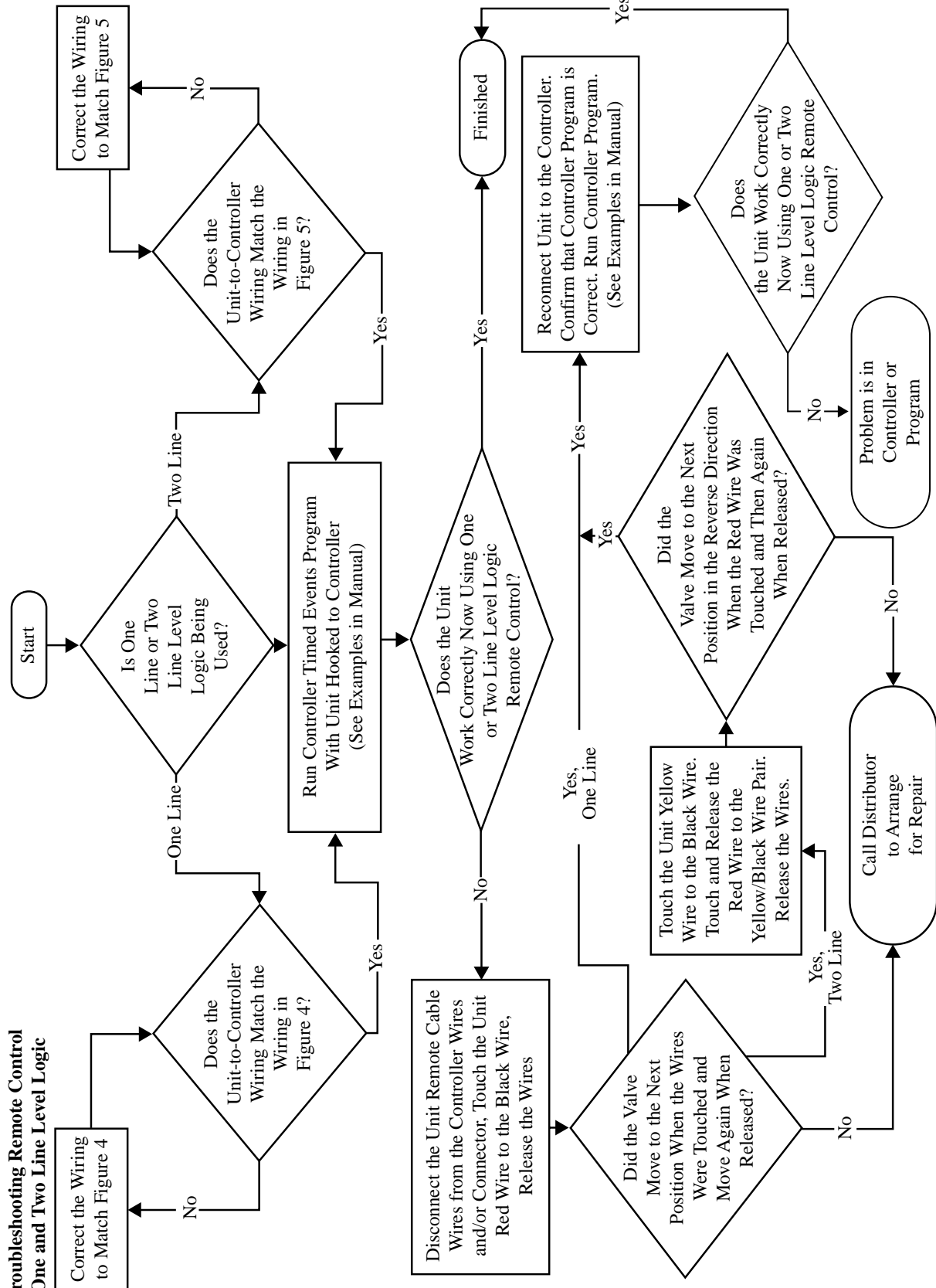
Troubleshooting Local (Manual), Power, and Display Problems



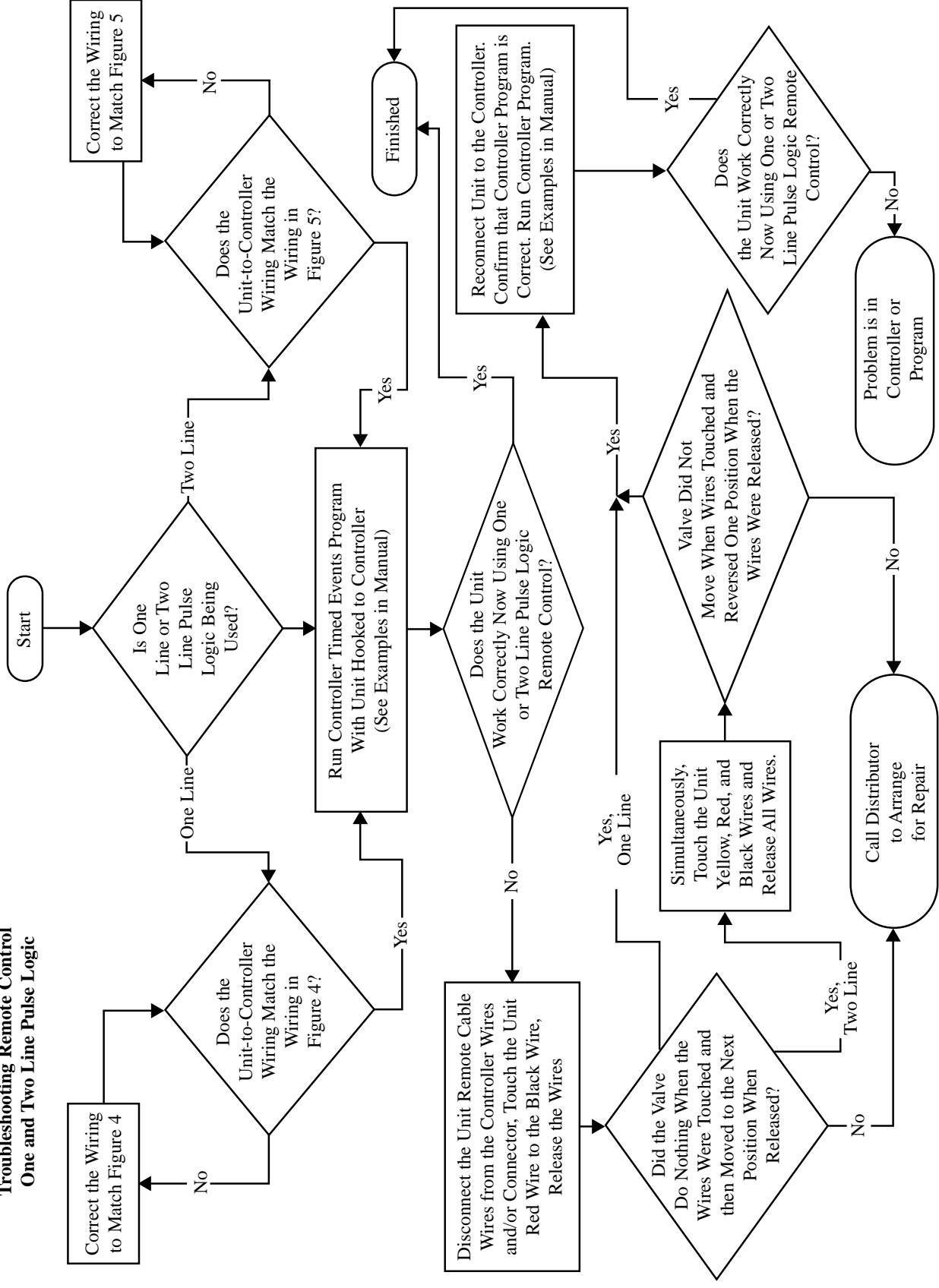
Troubleshooting Remote (Automatic) Control Problems



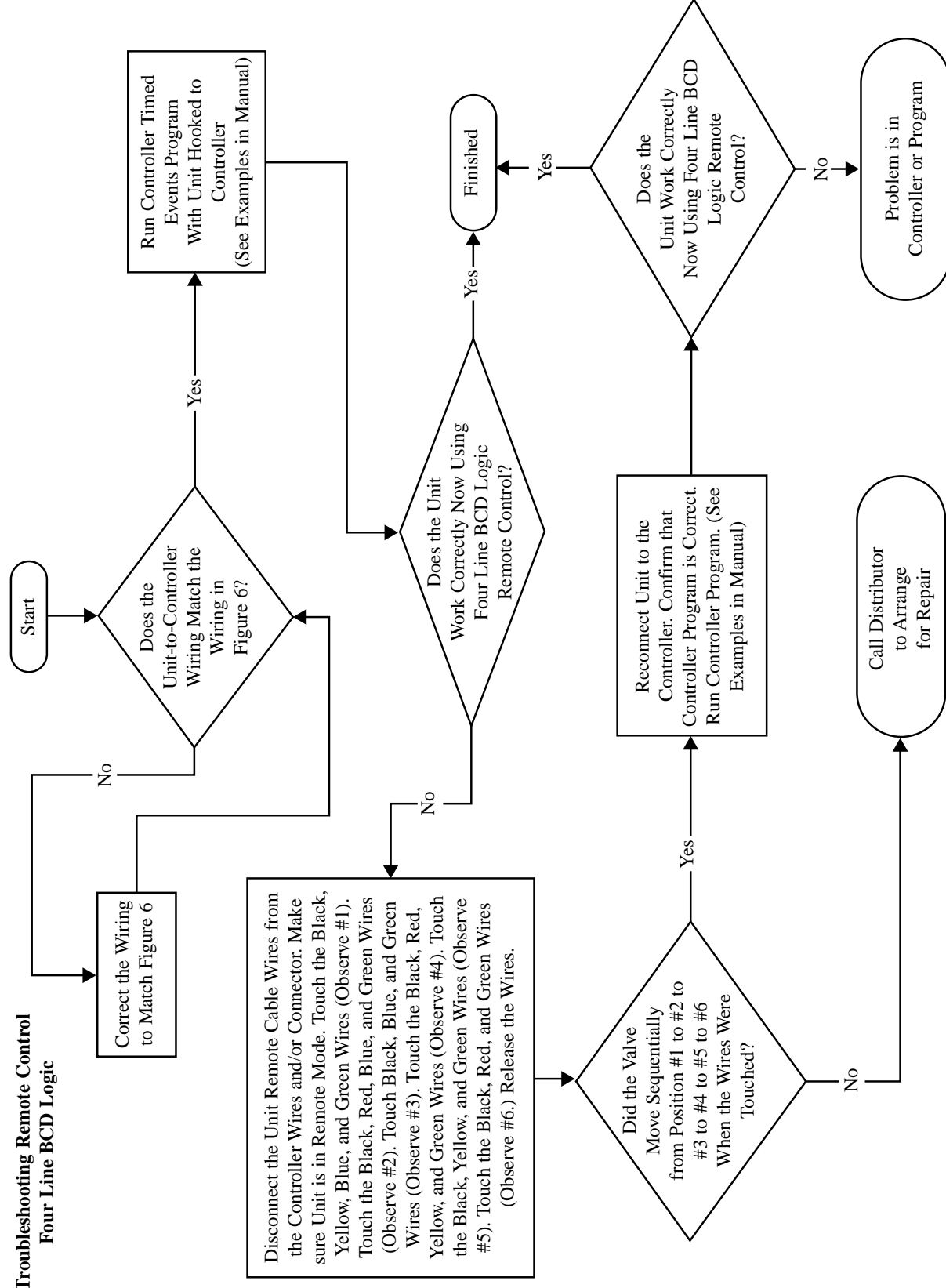
Troubleshooting Remote Control One and Two Line Level Logic



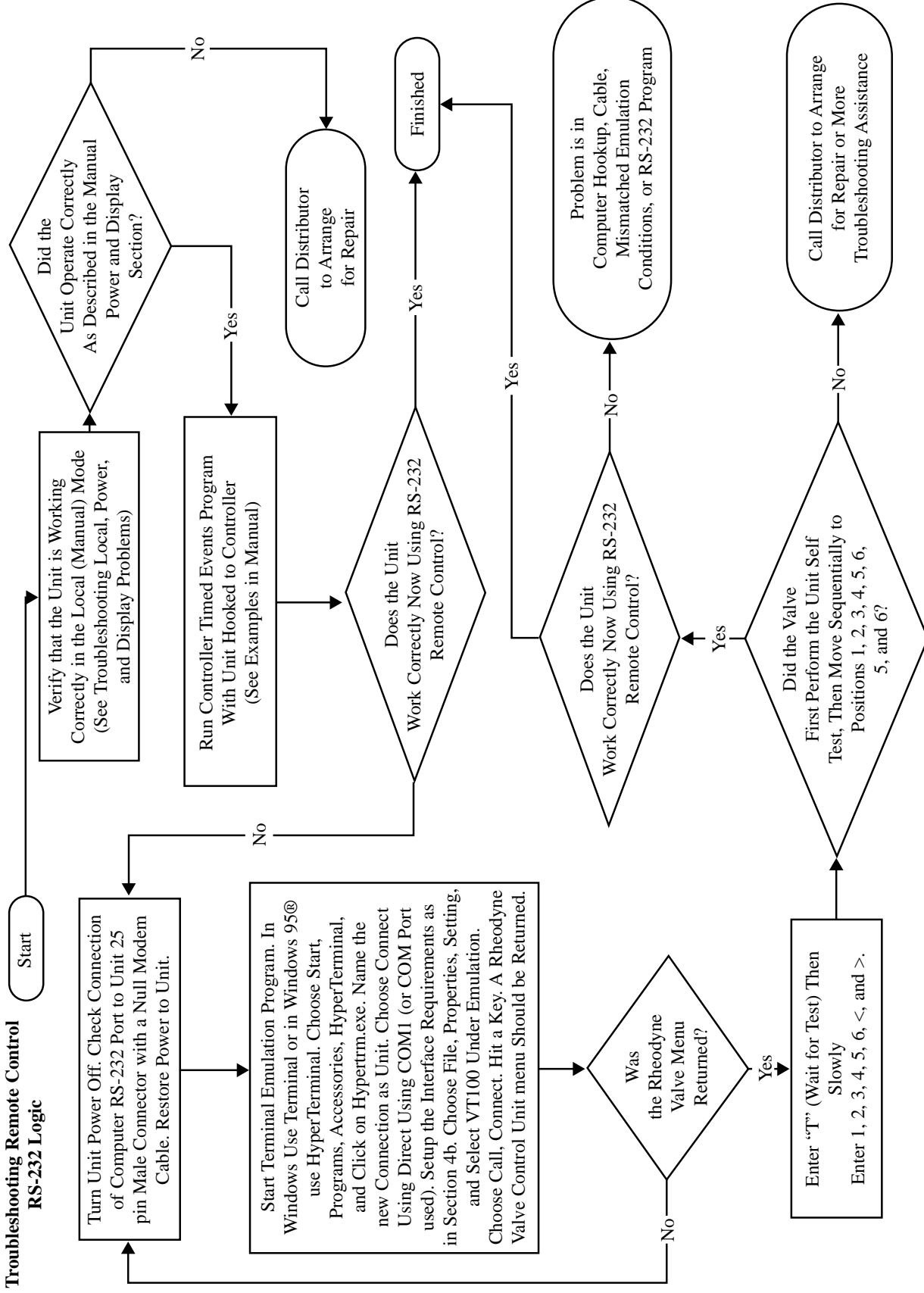
Troubleshooting Remote Control One and Two Line Pulse Logic



Troubleshooting Remote Control Four Line BCD Logic



Troubleshooting Remote Control RS-232 Logic



Appendix A. Electronic Definitions in Non-Electronic Terms

BCD

Abbreviation for Binary Coded Decimal. A system of representing numbers in a code using 0 and 1. For example, in a 4 bit code, the number 5 would be 0101.

CCW

Abbreviation for counterclockwise.

Contact Closure

The correct term is open collector or relay. It simply means there is no connection when the circuit is open. The line is either grounded (LO) or not (OPEN).

Cord Set

The electrical power cord to connect the power supply to an electrical wall outlet. The one provided with the LabPRO is for North America.

CW

Abbreviation for clockwise.

Event Relay

See External Event Relay.

External Event Relay

These are the terminals on the instrument where the interface cable is wired. They are also known as Timed Event Terminals, External Event Terminals or Time Functions Switches. Each relay has two terminals. When the relay is a TTL, one is ground, the other is HI/LO (+5 volts/0 volts). When the relay is a contact closure either terminal can be ground, the other is to the control line.

Ground

Common reference point required between two or more devices.

Input

The electrical communication coming into a device. For example, the LabPRO requires either a TTL, contact closure or serial communication.

Interface Cable

The multi-wire cable connecting the LabPRO to the controlling instrument.

Level Logic

Type of electrical signal. In reference to the LabPRO, any change in the control signal's logic state will cause the valve to move one position.

Line Control

A remote control scheme employing separate wires. Each wire is used with a common ground to send signals controlling the instrument.

Logic State

The terminal at the Event Relay is in either one or the other state in the following pairs, HI/LO, OPEN/CLOSE, OFF/ON, GROUND/OPEN. For example, in a contact closure switch the relay is either grounded (GROUND) or not (OPEN).

Output

The electrical communication coming out of a device. For example, the LabPRO has two outputs available, they are serial communication or five feedback lines. The serial communication is via a special cable. The five feedback lines are via the provided interface cable. Four of the lines on the interface cable are BCD position feedback lines and are represented by the following wire colors:

Grey - Feedback 3
White - Feedback 2
Purple - Feedback 1
Orange - Feedback 0

The fifth line is brown and is the Busy/Done feedback (LO=Busy, HI=Done).

Pulse Logic

Different from level logic in that in pulse mode the position of the valve changes only on the rising edge of a change in the control signal, i.e., from LO to HI or Closed to Open.

Random Access

The valve can be programmed to move directly to the designated position. For example, from position 1 to position 4 in one step rather than move sequentially requiring three program steps. This is available with 4 Line BCD and with Serial Communication.

Serial Communication

A way of communicating with a computer. LabPRO offers both RS-232 and RS-485 options. A special cable is required to connect the LabPRO to your computer if you are using serial communication. RS-232 cable (P/N 5123-067) is different than RS-485 cable.

State

See Logic State

Terminal

The position at the Event Relay where the wire is connected. Each Event Relay has two terminals.

TTL

Abbreviation for Transistor-Transistor-Logic, also called digital logic. A control line is either HI (+5 volts) or LO (0 volts). Typical OFF state of an instrument's TTL switch is HI.

Universal Power Supply

A "black box" or adaptor that converts electrical power from a wall socket to usable power to run the LabPRO. In the case of the LabPRO power supply, the input required is 100-240 VAC, 50-60 Hz. The output of the power supply to run the LabPRO is 24 VDC.



Declaration of Conformity

**Rheodyne, L.P., located at
600 Park Court
Rohnert Park, California 94928
Phone: (707) 588-2000, Fax (707) 588-2020**

**declares under our sole responsibility that the product LabPRO
Column Selector, a multiple position motorized valve unit, to which
this declaration relates is in conformance with the following standards:**

**EN 50081-1: 1992
EN 50082-1: 1997**

**following the provisions of the 89/336/EEC
Electromagnetic Compatibility Directive.**

Models: PR500-100, PR550-100, PR500-104, PR550-104

Options: All

Approved by:

James C. Noonan, President and CEO

date



Rheodyne LLC • A Unit of IDEX Corporation
600 Park Court, Rohnert Park, CA 94927-1909 • USA
Phone 707-588-2000 • Fax 707-588-2020
www.labpro.com • www.rheodyne.com