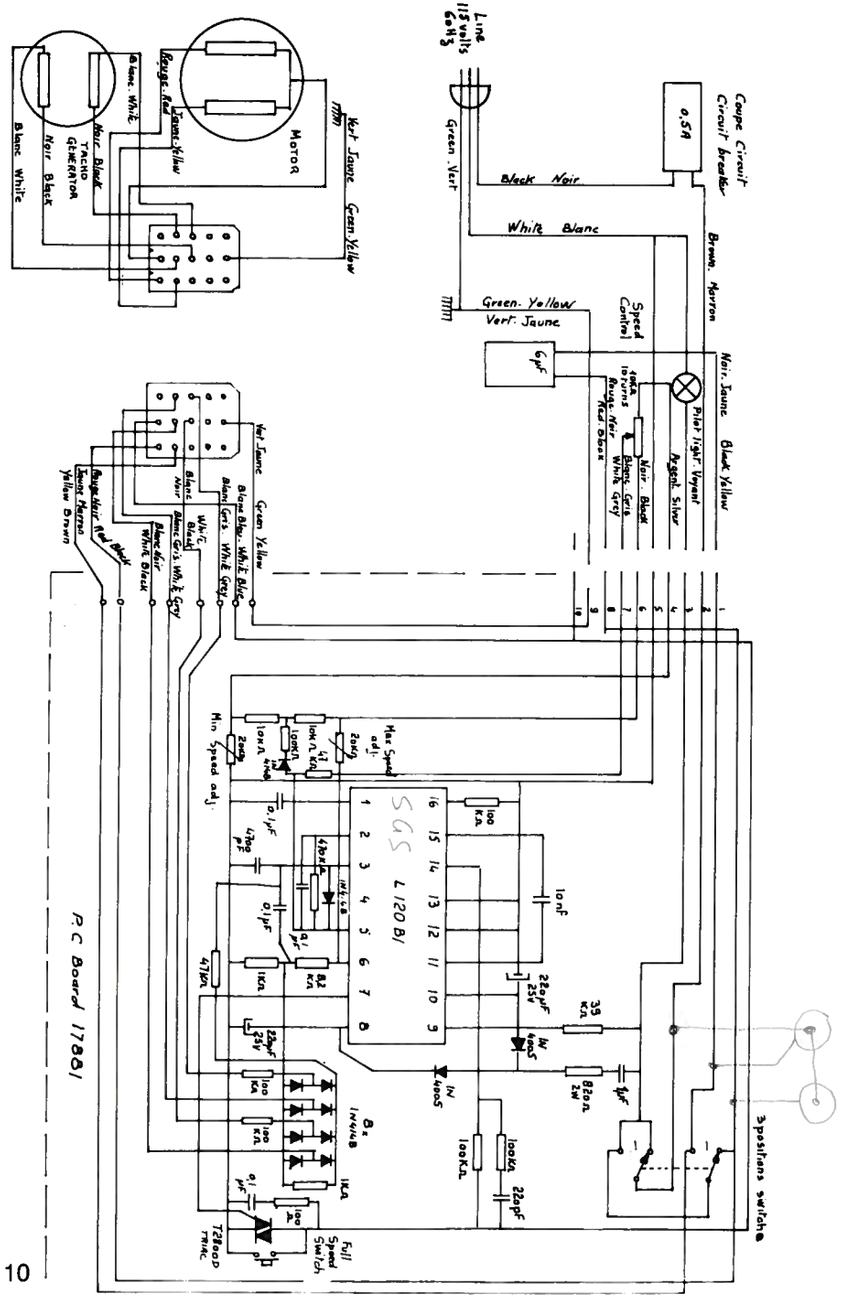
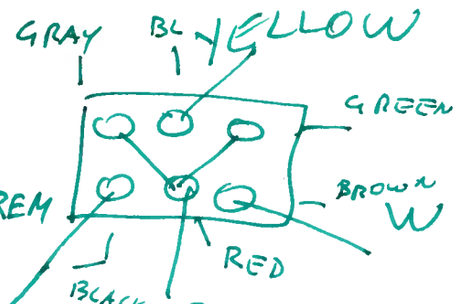
Section X CIRCUIT DIAGRAM



1) NEW MAIN BOARD

2) ADD LOCAL/REM SWITCH.

3) ADD DIG. DRIVERS



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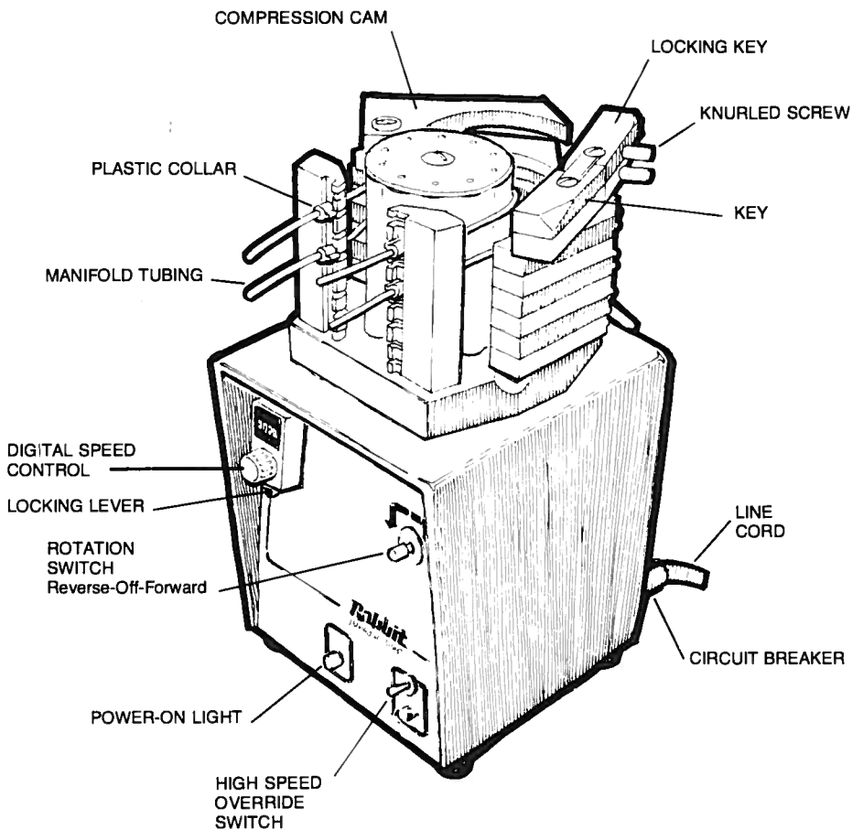


FIGURE 1

Section I GENERAL

Upon receipt of your Rainin Rabbit Pump, carefully unpack the unit. Cross-check the contents of the carton against the standard accessories list below to verify that all parts are included and undamaged. Contact Rainin Instrument Company with any problems.

STANDARD ACCESSORIES

1 Rainin Rabbit Pump Module with Head
1 Mains Power Lead
4 PVC Manifold Tubes (0.38, 0.76, 2.29, 3.16 mm I.D.)
1 Tube Connector (Cat. No. 200-51)

Section II FRONT PANEL CONTROLS

DIGITAL SPEED CONTROL

The three-digit potentiometer regulates the pumping speed. The speed is continuously adjustable from 1 to 25 RPM. The digital display on the potentiometer is intended as a means of reproducing motor speed settings. There is NO exact linear relationship between the number setting and the speed of the motor. The locking lever locks the setting. Do not attempt to adjust the control when the dial is locked. (See Figure 1).

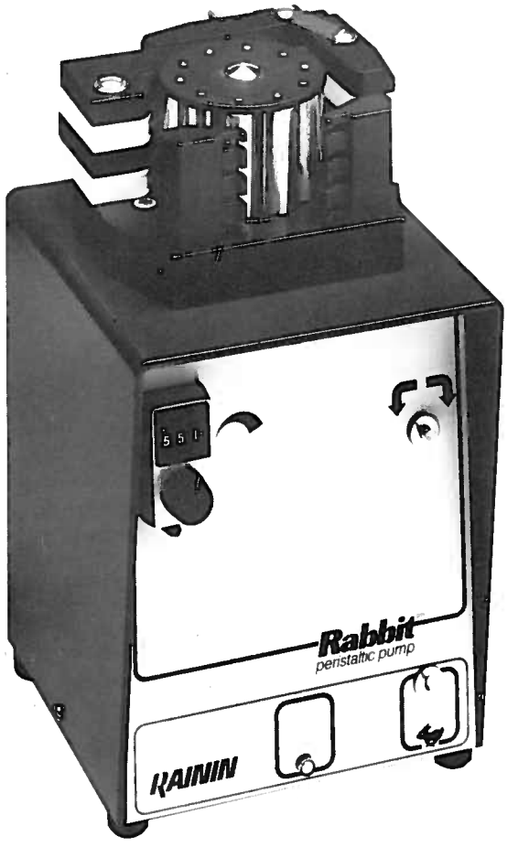
ROTATION SWITCH

The three-position toggle switch can be set to the right for clockwise pump head rotation (FORWARD), to the left for counter clockwise rotation (REVERSE) or in the center to stop pumping (See Figure 1).

HIGH SPEED OVERRIDE SWITCH

The "Rabbit High Speed" toggle switch allows fast filling or purging of the plumbing connected to the pump without disrupting the setting of digital speed control. The high speed override switch increases the motor speed to 36 RPM. (See Figure 1).

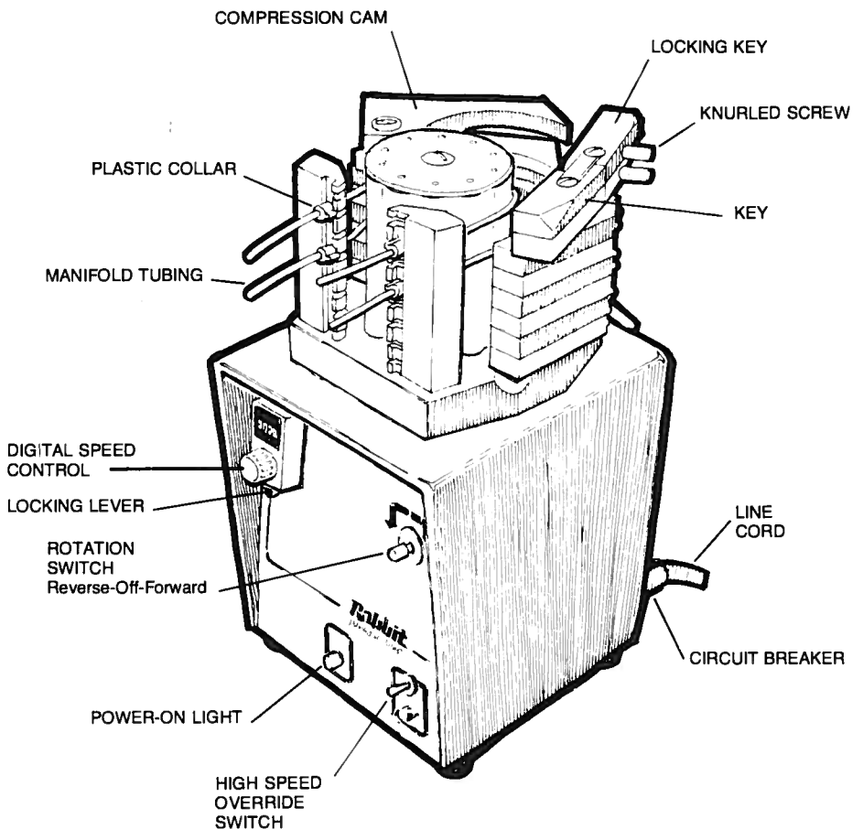
Instruction Manual



RAININ RABBIT™

Peristaltic Pump

RAININ
INSTRUMENT CO. INC



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Section III MANIFOLD TUBING—SELECTION AND INSTALLATION

SELECTION

Select the appropriate type of tubing for your application. Three types are offered:

Polyvinyl Chloride (PVC)—for most aqueous solutions
Silicone—for aqueous and polar solvents
Viton—for use with gases, oils, strong acids or solvents up to 200 °C

INSTALLATION

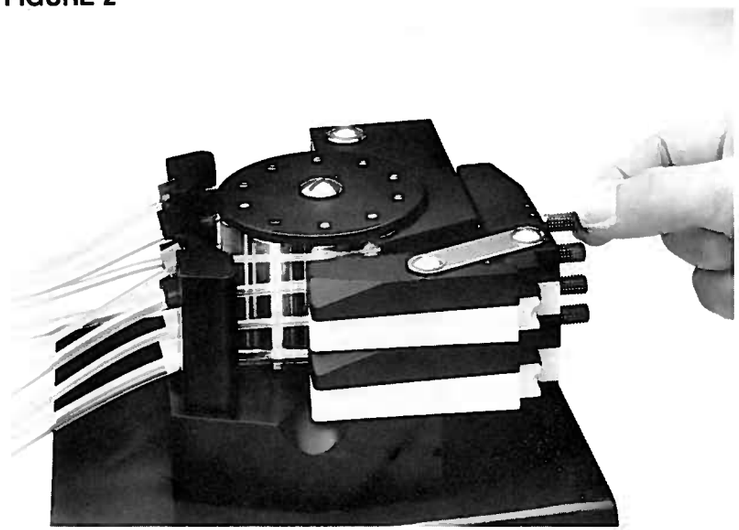
Each channel has an individual compression cam (see Figure 1) and the pressure against the tubing is adjusted by a spring-loaded knurled screw. To open the compression cam simply push the beveled spring latch (labeled KEY) toward the rollers.

Place each manifold tube around the rollers so that it fits into the groove in the compression cam. This groove prevents snaking of the tubing during operation. Tubing is held in place by special plastic collars bonded to the tubing. These collars ensure correct tube tension and tube diameter. (Note: The Rainin Rabbit Pump uses the same type of collared manifold tubes as those used with the Technicon Auto-Analyzer.™) Move the compression cam into contact with the tubing and close the key. Repeat the operation for each channel and loosen all of the knurled tension screws. Different diameter tubing can be placed on adjacent channels in order to achieve a variety of flow rates at any given pump speed.

In order to establish flow through the tubing, start the pump and slowly screw in each knurled tension screw until flow just begins. Then turn each screw ¼ turn farther. (Excessive screw tension will increase pulsation, shorten tubing life, and may also cause premature bearing wear). (See Figure 2).

It is possible to change individual tubes without stopping the flow through the remaining channels. To do so, simply release the compression cam, remove the old tubing, and thread the new manifold tubing through the pump head.

FIGURE 2

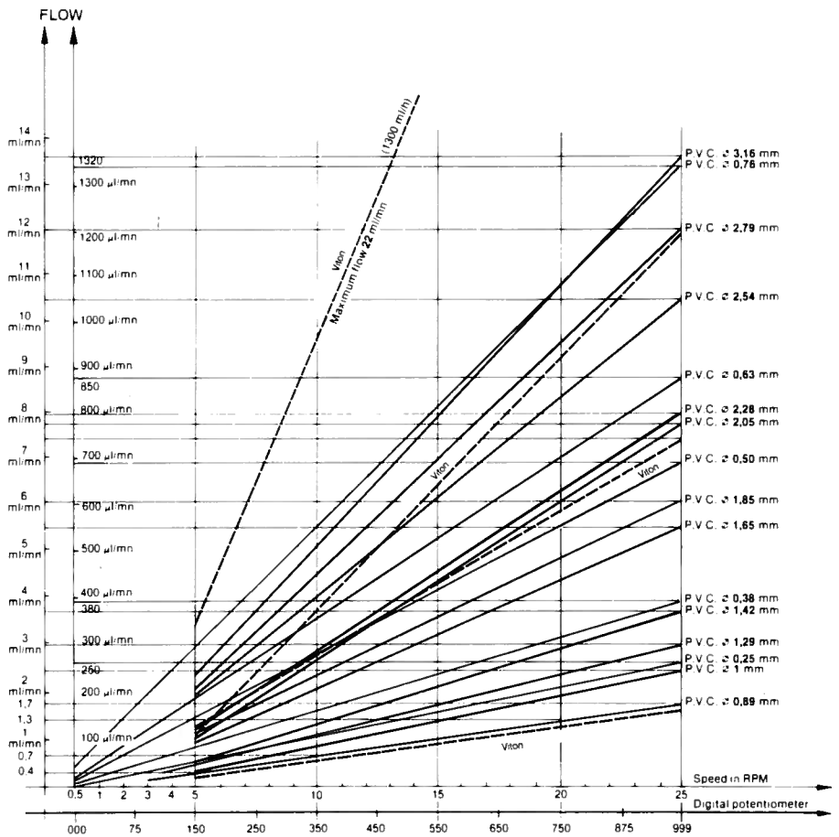


Section IV OPERATING INSTRUCTIONS

IMPORTANT: When connecting power to the pump, be certain that the power lead is plugged into a grounded outlet.

1. Plug the mains power lead, which is supplied with a three-prong plug, into a grounded power source.
2. Select the type of flow tubes to be used. (See Section 3).
3. Using the chart on page 4, select a specific diameter tube and then determine the digital potentiometer setting required to provide the desired flow rate.
4. Unlock the digital potentiometer and adjust to desired setting.
5. Open each channel of the pump head by pressing on the beveled corners of the keys toward the rollers.
6. Place the flow tubes on the pump head.
7. Swing the pressure cams back into place and lock.

APPROXIMATE FLOW RANGES FOR MANIFOLD TUBING



When using silicone tubing, refer to the PVC ranges.

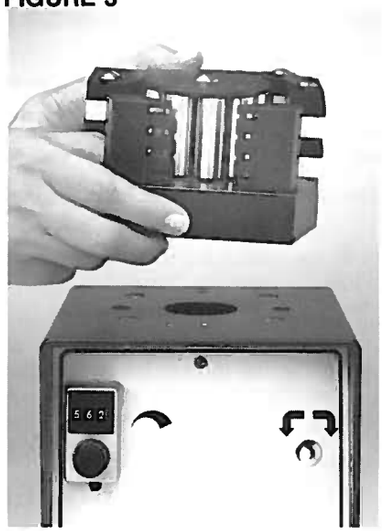
8. Switch the pump on with the Rotation Switch (LEFT — Counter clockwise, RIGHT — Clockwise).
9. Adjust the pressure of the cams by slowly screwing in each tension screw until flow just begins. Then turn each screw approximately ¼ turn farther. Check the flow after 15 minutes to ensure cam pressure is sufficient. Tighten if required.
10. Readjust the digital potentiometer to achieve desired flow. Lock the setting.
11. When pump is not in use, unlock the compression cams by pushing the keys. Relax each tube by releasing one collar from the holder.

    NOTE: Relaxing the tubing will improve start-up performance by eliminating the flat spots on the tubing which result from pressing against the rollers. These flat spots are eventually worked out of the tubing after a period of operation, but can initially cause excessive pulsation and uneven flow rates.

Section V OPERATING SUGGESTIONS

- To obtain very accurate slow flow rates, you will achieve better results by using a small diameter tubing at faster motor speeds.
- To extend tubing life, a slow to middle range motor speed should be used with the appropriate diameter tubing.
- Change manifold tubes as soon as they show any signs of wear or cracking. This is an easy and economical means of preventive maintenance.
- Locate the Rainin Rabbit Pump at a level equal to, or higher than, the liquid supply to help minimize the possibility of liquids running onto the pump in event of a tubing break.
- The piece of black tubing mounted on the back of the pump head is a drain tube for liquid which may accidentally spill on the head in case of a manifold tube break. This helps prevent liquids from contacting the electronics of the control module.

FIGURE 3



Section VI PUMP HEAD REPLACEMENT

Your pump was shipped fully assembled, with the pump head mounted on the control module. Pump head installation is required only if you want to replace the factory-installed head.

To replace the factory-mounted pump head, press the beveled spring latch locking keys, which in turn free the compression cams. Rotate the compression cams to the left away from the rollers. Two Allen head machine screws, which secure the head to the control module, are now visible from the top. With an Allen wrench, loosen the screws until you can lift the pump head off the control module.

Remove the small, white coupling from the base of the pump head. This plastic coupling has a "tongue" on top which attaches to the shaft of the pump head and a slot on the bottom which attaches to the shaft of the control module. Coat the coupling "tongue" with stopcock or silicone grease, and place it in the slot at the base of the pump head shaft. Apply grease to the cover of the control module in the area surrounding the opening. This helps prevent spillage from seeping into the control module.

With the coupling attached to the pump head, orient the coupling seat so it fits over the motor shaft in the control module. Place the pump head on the module and slightly rotate the head so it rests flush against the control module top. Replace and tighten the Allen screws.

Section VII TROUBLESHOOTING

Excessive or premature tube wear	Check to see if too much pressure is being applied to the tubing by the compression cams. If so, back off the knurled adjusting screw.
Pump will not run	■ Check to see if unit is plugged in. ■ Check to see if there is power to the wall outlet. ■ Reset the circuit breaker on the rear panel.
Pump will run at one speed only (no matter what setting is on the potentiometer).	■ Possibly a loose connection or broken wire to the digital potentiometer or the digital potentiometer may be broken internally. ■ A problem with the circuit board.
Other problems	■ Contact Rainin for replacement parts or repair.

Section VIII SPECIFICATIONS

COMPLETE PUMPS

Cat. No.	Model	Size	Weight
39-601	Single Channel	14x14x21 cmH (5.5x5.5x8.5 inH)	4.5 kg (10 lbs)
39-602	Two Channel	14x14x22 cmH (5.5x5.5x9.0 inH)	5.0 kg (11 lbs)
39-604	Four Channel	14x14x24 cmH (5.5x5.5x9.5 inH)	5.5 kg (12 lbs)
39-608	Eight Channel	14x14x28 cmH (5.5x5.5x11 inH)	6.4 kg (14 lbs)
Voltage		115V, 60Hz	
Temperature Range		0° to 50°C	
Flow Range		1 to 1300 ml/hr	
Speed Range		1 to 25 rpm	
Speed Stability		1% for a 10% voltage variation	
Pressure		71 psi maximum (5 kg/cm²) for each flow tube	

Section IX ACCESSORIES

MANIFOLD TUBING

Cat. No.	I.D. (mm)	Flow Range (ml/min) Min.	Max.	Color Code
Polyvinyl Chloride (14 in. long): For most aqueous solutions. Pkg. of 12.				
39-620	0.25	.02	.27	Orange/Blue
39-621	0.38	.03	.40	Orange/Green
39-622	0.50	.05	.70	Orange/Yellow
39-623	0.63	.06	.90	Orange/White
39-624	0.76	.1	1.32	Black
39-625	1.52	.4	5.0	Yellow/Blue
39-626	2.29	.6	8.0	Purple/Black
39-627	2.80	1.0	12.0	Purple/White
39-628	3.16	1.2	14.0	Black/White
Silicone (14 in. long): For aqueous and polar solvents. Pkg. of 6.				
39-660	0.25	.02	.27	Orange/Blue
39-661	0.38	.03	.40	Orange/Green
39-662	0.50	.05	.70	Orange/Yellow
39-663	0.63	.06	.90	Orange/White
39-664	0.76	.1	1.32	Black
39-665	1.52	.4	5.0	Yellow/Blue
39-666	2.29	.6	8.0	Purple/Black
39-667	2.80	1.0	12.0	Purple/White
Viton (7 in. long): For gases, oils, strong acids, or solvents up to 200°C. Pkg. of 12.				
39-640	0.50	.06	.75	Orange/Yellow
39-641	0.63	.07	1.0	Orange/White
39-642	0.76	.1	1.25	Black
39-643	1.42	.3	4.5	Yellow
39-644	2.28	.7	9.0	Purple/Black
39-645	2.79	.9	11.5	Purple/White
39-648	4.0	2.0	22.0	—

REMOVABLE HEADS

Cat. No.	Description
39-610	Single Channel Head (Delrin Rollers)
39-611	Two Channel Head (Stainless Steel Rollers)
39-612	Four Channel Head (Stainless Steel Rollers)
39-613	Eight Channel Head (Stainless Steel Rollers)

CONNECTORS AND UNIONS

Cat. No.	Description
200-51	Tefzel Tube Connector

Fits elastic tubing with I.D. of 5/32" - 1/16" for simple connection of peristaltic tubing to chemically inert 1/4 - 28 thread flanged connections

47-022	Polypropylene Barbed union — 1/16 to 1/16" Pkg of 5
47-044	Polypropylene Barbed Union — 1/8 to 1/8" Pkg of 5
47-024	Polypropylene Barbed Union — 1/16 to 1/8" Pkg of 5

Designed for convenient connection of flexible plastic tubing with I.D. of 1/16" and 1/8".

CONTACT RAININ INSTRUMENT COMPANY FOR INFORMATION ON PARTS AND PRICES.