

SERVICE MANUAL

renatron[®]

Dialyzer Reprocessing System
RS-8300, RS-8310, RS-8330 & RS-8335



MINNTECH[®]
renal systems

Equipment

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Dear Customer:

This manual contains documents of a highly technical nature. It is intended solely for the purpose of aiding in servicing the RS-8300, RS-8310, RS-8330 and RS-8335 Renatron[®] Dialyzer Reprocessing System.

Personnel attempting maintenance or repairs of this machine must be completely familiar with troubleshooting techniques, and the contents of this manual. Electronics training is essential for a complete understanding of the device operation. We recommend sending the Renatron Dialyzer Reprocessing System to Minntech Renal Systems for repair.

Minntech Renal Systems is not responsible for any damages or injuries resulting from the operation or performance of any machine which has been repaired improperly by non-Renal Systems personnel.

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We hope the enclosed information is helpful to you. Please feel free to contact our Technical Services Department or your Minntech Renal Systems Distributor with any technical questions you may have.

We look forward to continuing to be of service to you.

Sincerely,

Mike Neary
Technical Services Manager

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INTRODUCTION

1.0 Introduction

This service manual provides service and performance inspection information for the RS-8300 Renatron System, RS-8330 and RS-8335 Renatron II Systems.

1.1 Applicable Support Documents

The documents listed below are available through Renal Systems Technical Services Department.

- A. Renatron Instruction Manual(s)
 - 1. Renatron Instruction Manual, P/N: 50104-000
 - 2. Renatron 100 Instruction Manual, P/N: 50090-687
 - 3. Renatron II Instruction Manual, P/N: 50097-000
 - 4. Renatron II 100 Instruction Manual, P/N: 50090-680
- B. Renalog III Instruction for Use Manual, P/N: 50103-000
- C. Renalog RM Instruction Manual, P/N: 50090-859

Prior to attempting the servicing of the Renatron Dialyzer Reprocessing System, all of the above applicable documents should be read and understood thoroughly. A thorough understanding of this information will allow proper maintenance of the Renatron Dialyzer Reprocessing System.

- D. Additional manuals available from Minntech Renal Systems.
 - 1. Dialyzer Reprocessing Guidelines - this manual is used to help in assessment of procedural problems (non-machine related problems).
 - 2. Renalin Instructions for Use and Technical Notes - This manual outlines procedures for the use of the Renalin Concentrate and the basic laboratory testing performed.
 - 3. Renatron Operation Format and Program Step Outline - This manual will aid you in understanding how the Renatron Dialyzer Reprocessing System operates.

1.2 Terminology: For the purpose of clarity, the following terminology will be used throughout this manual.

- A. "Water" or "AAMI quality water" is the water that meets or exceeds the following requirements:
 - 1. AAMI/ANSI Standard for Hemodialysis Systems and AAMI Recommended Practice for the Reuse of Hemodialyzers.
 - 2. Containing no particles larger than 1 micron.
- B. "Renalin 100 Cold Sterilant" or "Renalin 100" is a concentrated solution for use with the Renatron II 100 Series System. It is supplied as 3 liters of Renalin Cold Sterilant in a 1 gallon container for use by the Renatron II 100 Series machine and for use in making a 1% Renalin mixture.
- C. "Renalin Cold Sterilant" or "Renalin" is the concentrated solution that will be diluted by the operator for use with the Renatron II System. It is supplied as 2 liters of Renalin Cold Sterilant in a 2.5 gallon container (9463 ml) for use by the Renatron II machine or in 1 quart bottles for use in making a 1% Renalin mixture.
- D. "Renalin Cold Sterilant solution" is a 21% solution (by volume) resulting from the operator's addition of AAMI quality water to Renalin Cold Sterilant and thoroughly mixing if following the Renalin Cold Sterilant Instruction for Use.
- E. "Proportioned Renalin solution" is the final diluted solution, which has been further proportioned by the Renatron II or Renatron II 100 machine. This is the solution actually used for cleaning and sterilizing the dialyzer and the Renatron machine.
- F. "1% Renalin solution" - 1 part Renalin Cold Sterilant to 99 part AAMI quality water.
- G. The terms "equipment", "machine", "device", "station", or "Renatron II" are synonymous with Renatron II Dialyzer Reprocessing Unit of the overall Renatron II System and may be used interchangeably throughout this manual.
- H. The term "Formula 409" is "For Institutional Use" Formula 409 which is a registered trademark of the Clorox Company.

The procedure on the following pages will help evaluate and maintain the peak performance of the Renatron Dialyzer Reprocessing System. If at any time during this process you have a question or concern, please contact Minntech Renal Systems Technical Service Department at 1-800-328-3324.

NOTE: All times and flow rates specified in this manual are approximate.

**RENATRON DIALYZER REPROCESSING SYSTEM
PERFORMANCE INSPECTION SCHEDULE**

Page #	Inspection Description	Month intervals			
		3	6	9	12
3	Calibration Verification	Performed daily by the operator.			
7	Renatron Exterior Inspection	Performed daily by the operator.			
8	Perform 409 cleaning procedure	Perform this procedure every 2 weeks or as needed.			
10	Inspect all external Quick Disconnects for defects and/or worn O-rings	X	X	X	X
12	Inspect Reprocessing Connections	X	X	X	X
12	Inspect Renalin 21% and 100 Uptake Tube Assembly		X		X
14	Inspect Valve Assembly (Large, Small and V15)				X
20	Inspect Hydraulic Compartment for any signs of fluid leakage				X
21	Test Jet Pump Assembly				X
23	Inspect Renatron II Scanner Gun	X	X	X	X
23	Inspect Barcode Labels for any visual defects	X	X	X	X
23	Inspect the Front Mask for any visual defects		X		X
24	Test Check Valve Water Hose Assembly				X
25	Replace Renalog Backup Disks				X

**RENATRON SYSTEM
PERFORMANCE
INSPECTION
PROCEDURES**

2.0 Calibration Verification

A. Calibration Verification for Control Board with Potentiometers P1, P2, and P3.

- Each day before reprocessing dialyzers, install the Calibrated Volume Cell between arterial and venous lines. Before checking calibration, make sure the machine is level. If the machine is not level, reset the measurement of Volume Cell after leveling the machine. If the displayed Renatron volume value is not within ± 3 ML of the Calibrated Volume Cell, proceed to step B.

NOTE: If the Renatron System continues to fail the calibration verification day after day, contact Minntech Renal Systems Technical Service Department for assistance.

B. Renatron Calibration

NOTE: Before removing the top cover, MAKE ABSOLUTELY CERTAIN there are no loose water connections or potential for fluid leakage. ANY FLUID DAMAGE to internal electronics is NOT COVERED by machine warranty.

- Insert Calibrated Volume Cell between arterial and venous lines.
- Remove the two screws from each side of the cover and lift off the cover. Place the cover where it will not be damaged.
- Press "ON" switch ("SEL" and "_ _" will be displayed).
- Press the "MUTE" and "RESET" switches together until the program "(00)" is displaced.
- Press the "HOLD TO SET" switch while adjusting the "SET" knob to display "255" in the "VOLUME" window.
- Press the "START PROCESS" switch. A light will appear in corner of the "START PROCESS" switch.

**CALIBRATION
VERIFICATION**

7. Immediately at the **end** of “Program Step 05”, press the “OFF” switch.

CAUTION: SHOCK HAZARD. WHEN ADJUSTING TRIM CONTROLS, BE CAREFUL NOT TO TOUCH ELECTRONIC CONNECTIONS.

8. On the hydraulic side, view the lower tank scribe line (zero line located about 1/8” above bottom gray gasket Figure 2.0.1). Water level should be even with the lower tank scribe line. If it is, proceed to step 9 in this procedure. If not, adjust P1 (Figure 2.0.2) and repeat steps 3-8 until water level is even with the lower tank scribe line.

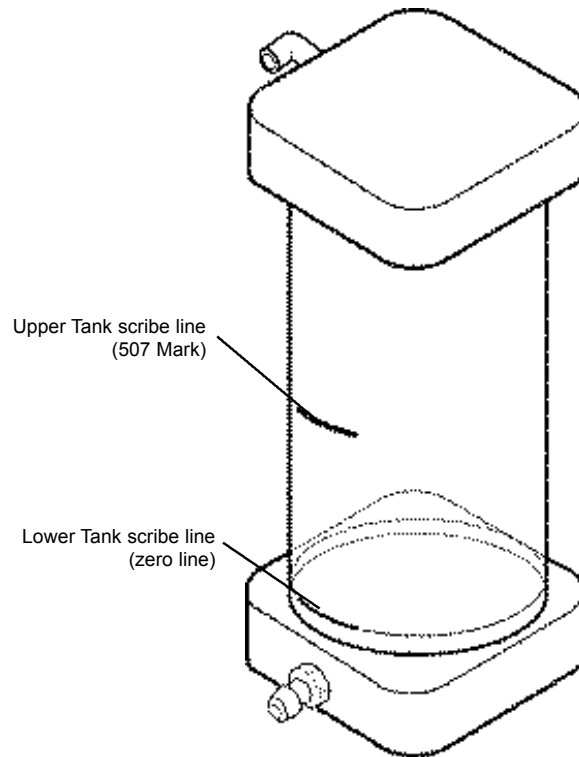


Figure 2.01.

NOTE: Adjust P1 (Figure 2.0.2) clockwise to raise level in tank (counter-clockwise to lower level) for zero line adjustment. Adjust one turn to change the level approximately 1/8”.

9. Press “ON” switch (“SEL” and “_ _” will be displayed).
10. Press the “MUTE” and “RESET” switches together until program “(00)” is displayed.
11. Press the “HOLD TO SET” switch while adjusting the “SET” knob to display “255” in the “VOLUME” window.
12. Press the “START PROCESS” switch. A light will appear in the corner of the “START PROCESS” switch.
13. Immediately, at the **end** of “Program Step 12”, press the “OFF” switch.
14. On the hydraulic side, view the upper tank scribe line (507 mark located approximately in the middle of the tank Figure 2.0.1). Water level should be even with the upper tank scribe line ($\pm 1/4$). If it is, proceed to Step 15 in this procedure. If not, adjust P2 (Figure 2.0.2) and repeat Steps 9-14 until water level is even with the upper tank scribe line.

NOTE: Adjust P2 (Figure 2.0.2) counter-clockwise to raise level in tank (Clockwise to lower level). Adjust one turn to change the level approximately 1/8”.

15. Press “ON” switch (“SEL” and “_ _” will be displayed).
16. Press “MUTE” and “RESET” switches together until program “(00)” is displayed.

17. Press the "HOLD TO SET" switch while adjusting the "SET" knob to display "255" in the "VOLUME" window.
18. Press the "START PROCESS" switch. A light will appear in the corner of the "START PROCESS" switch.
19. Allow the Renatron Station to continue operating until the "VOLUME FAIL" alarm has occurred in "Program Step 35". Push the "MUTE" switch to silence audio alarm. TAKE CARE NOT TO PRESS THE "RESET" SWITCH.
20. The displayed Renatron volume value must be within ± 3 mL of the Calibrated Volume Cell. If the Renatron System volume is not within ± 3 mL, adjust P3. Turn P3 clockwise to decrease displayed volume value. Turn P3 counter-clockwise to increase displayed volume value.

EXAMPLE 1

Volume Cell value equals 70 (etched value). Volume displayed by machine equals 66. Difference in milliliters equals 4 mL. Adjust P3 (Figure 2.0.2) 1 turn counter-clockwise per mL difference in volume value to eliminate the volume error. Therefore, a 4 mL difference will require 4 turns counter-clockwise.

EXAMPLE 2

Volume Cell value equals 70 (etched value). Volume displayed by machine equals 74. Difference in milliliters equals 4 mL. Adjust P3 (Figure 2.0.2) 1 turn clockwise per mL difference in volume value to eliminate the volume error. Therefore, a 4 mL difference will require 4 turns clockwise.

NOTE: If P3 is adjusted while the volume is being displayed, no change will be shown in the display. The change in volume value will be evident only after pressing the "RESET", "HOLD TO SET", and "START PROCESS" switches to retest the volume.

21. Repeat Steps 15-20 until displayed Renatron System volume is within ± 3 mL of the Calibrate Volume Cell.
22. Replace the Renatron System cover, securing it with the two screws on each side.

NOTE: If the Renatron Station will not calibrate, please call Minntech Renal Systems Technical Service Department at 1-800-328-3324 for assistance.

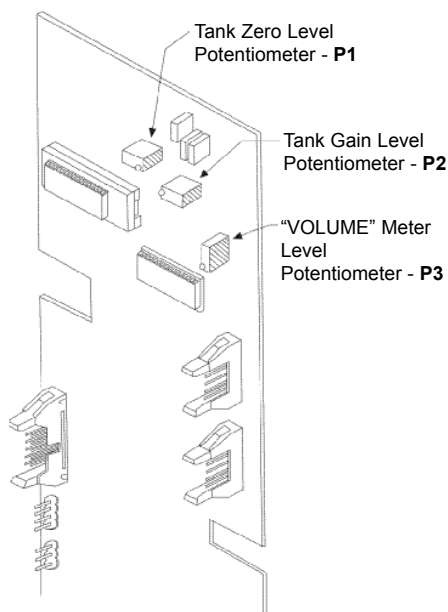


Figure 2.0.2

C. Renatron II Station Calibration Procedure for Single Board Controller.

NOTE: You should complete steps 4-6 within 60 seconds. If you do not complete the sequences within 60 seconds, the Renatron Station will return to an idle mode. You can terminate calibration and return to the idle mode by pressing "RESET" at anytime, except during the calibration cell measurement test. If the process is terminated, the new calibration parameters are voided and the previous calibration parameters are valid. You will need to start the calibration procedure from the beginning and complete it for the new calibration parameters to become valid.



WARNING: SHOCK HAZARD - WHEN PRESSING SWITCHES BE CAREFUL NOT TO TOUCH ELECTRONIC CONNECTIONS.

NOTE: Before removing the top cover, MAKE ABSOLUTELY CERTAIN there are no loose water connections or potential for fluid leakage. ANY FLUID DAMAGE to internal electronics is NOT COVERED by machine warranty.

1. Insert Calibrated Volume Cell between arterial and venous lines.
2. Remove the two screws from each side of the cover and lift off the cover. Place the cover where it will not be damaged.
3. Press "ON" switch ("SEL" and "_ _" will be displayed).
4. Press and hold the "SETUP" switch (S3 on the microprocessor board) for 4 seconds until you hear the second "chirp". The "PROGRAM STEP" will display "c1" and "CAL" will be displayed on the Volume Display (Figure 2.0.4).
5. Pressing and holding the "INCR" switch (S2) or the "DECR" switch (S1) adjust the liquid level in the tank to the "0" reference line (lower tank scribe line).
6. Press and release the "SETUP" switch (S3) (Figure 2.0.4). You will hear one chirp. The "PROGRAM STEP" will display "cA".
7. Using the "INCR" switch (S2) and the "DECR" switch (S1) adjust the liquid level in the tank to the 507 reference line (upper tank scribble) (Figure 2.0.3).
8. Press and release the "SETUP" switch (S3). You will hear one chirp. The Renatron Station will then begin to run through Steps 1-15. This will fill and test the calibration cell. When the Renatron Station has completed the cycle, "cb" will be displayed in the "PROGRAM STEP" and the calibration cell volume will be displayed in the "VOLUME" display.
9. Using the "INCR" switch (S2) and the "DECR" switch (S1) adjust the 3-digit "VOLUME" display to match the reference volume of the calibration cell.
10. Press and release the "SETUP" switch (S3). The Renatron Station will exit the calibration mode.

NOTE: The new calibration values are not saved until you complete Step 10 and exit the calibration mode.

11. Press the "HOLD-TO-SET" switch and use the silver "SET KNOB" to adjust the volume display to 255, then press the "MUTE" and "RESET" switches together until program "00" is displayed.
12. Press the "START PROCESS" switch. A light will appear in the corner of the "START PROCESS" switch.
13. Allow the Renatron II Station to continue operating until it enters "Program Step 8".
14. Press the "OFF" switch.
15. Verify that the liquid level in the tank is at the zero reference line (lower tank scribe line).
16. If the liquid level is above or below the zero reference line repeat Steps 3-15.
17. Press the "ON" switch.
18. Press the "HOLD-TO-SET" switch and use the silver "SET KNOB" to adjust the volume display to 255, then press the "MUTE" and "RESET" switches together until program "00" is displayed.
19. Press the "START PROCESS" switch. A light will appear in the corner of the "START PROCESS" switch.

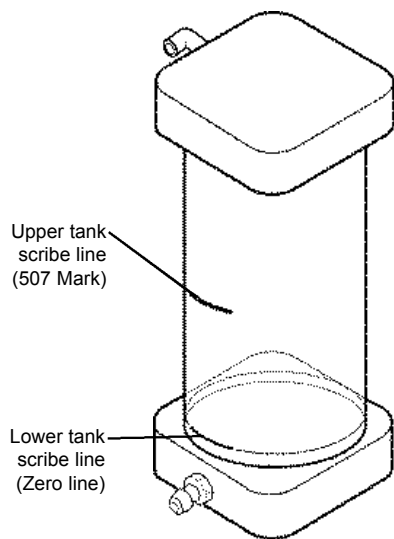


Figure 2.0.3

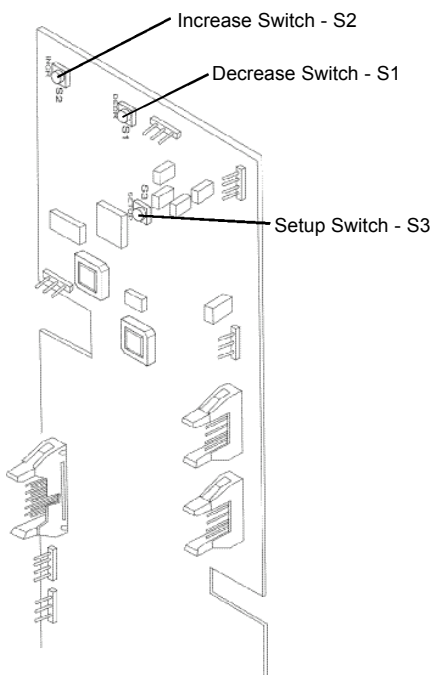


Figure 2.0.4

20. Allow the Renatron II Station to continue operating until it enters "Program Step 14".
21. Press the "OFF" switch.
22. Verify that the liquid level in the tank is at the 507 reference line (upper tank scribe line) Figure 2.0.3.
23. If the liquid level is above or below the 507 reference line repeat Steps 3-22.
24. Press the "ON" switch.
25. Press the "MUTE" and "RESET" switches together until program "(00)" is displayed.
26. Press the "HOLD TO SET" switch while adjusting the "SET" knob to display "255" in the "VOLUME" window.
27. Press the "START PROCESS" switch. A light will appear in the corner of the "START PROCESS" switch.
28. Allow the Renatron II Station to continue operating until the "VOLUME FAIL" alarm has occurred in "Program Step 35". Push the "MUTE" switch to silence the audio alarm.
DO NOT PRESS THE "RESET" SWITCH.
29. The displayed Renatron II Station volume value must be within ± 3 mL of the Calibrated Volume Cell. If the Renatron II volume is not within ± 3 mL, press reset and repeat Steps 4-28.
30. Replace the Renatron II Station cover, securing it with the two screws on each side. The screw should be thumb tightened.

CAUTION: THE COVER SHOULD ALWAYS BE ON THE RENATRON II STATION FOR NORMAL OPERATION.

NOTE: If Renatron II Station will not calibrate, please call Minntech Renal Systems Technical Services Department at 1-800-328-3324 for assistance.

2.1 Exterior Inspection

- A. The Renatron System should be inspected periodically for any defects such as the following list:
 1. Bent or broken switches
 2. Cracks in the cover
 3. Corroded metal parts

4. Loose or missing hardware
5. Cut or frayed hoses or electrical cords.
6. Excessive protein deposits in the tubing. If necessary, see the Formula 409 Service Cleaning Procedure.

CAUTION: USE OF A RENATRON II DIALYZER REPROCESSING STATION ON WHICH ONE OR MORE OF THE ABOVE CONDITIONS EXIST SHOULD BE DISCONTINUED UNTIL THE DEFECT IS CORRECTED AND THE SYSTEM OPERATION IS VERIFIED.

CAUTION: CARE SHOULD BE TAKEN TO AVOID EXCESS MOISTURE WHICH COULD FLOW INTO THE RENATRON II DIALYZER REPROCESSING STATION CASE ASSEMBLY. BLOOD MAY BE REMOVED FROM THE EXTERIOR OF THE RENATRON II WITH FRESH 1% RENALIN SOLUTION OR FULL STRENGTH ACTRIL® SOLUTION. DO NOT USE ANY OTHER CLEANERS, AS THEY MAY BE INCOMPATIBLE WITH THE MATERIALS IN THE MACHINE.

- B. **Cleaning:** The exterior of the Renatron II Station should be cleaned as often as operating conditions require.

CAUTION: ANY LIQUID SPILLED ON THE MACHINES EXTERNAL SURFACES SHOULD BE WIPED OFF IMMEDIATELY TO REDUCE THE POSSIBILITY OF MOISTURE ENTERING THE MAIN CASE ASSEMBLY. IF SUCH A CONDITION WERE TO EXIST, IT COULD CREATE AN ELECTRICAL CONDUCTIVE PATH WHICH COULD RESULT IN INSTRUMENT FAILURE. NO LIQUID(S) SHOULD BE USED NEAR THE COMPUTER KEYBOARD AND MONITOR.

CAUTION: DO NOT USE CHEMICAL CLEANING AGENTS THAT COULD DAMAGE THE PLASTICS USED IN THIS MACHINE. AVOID CHEMICALS WHICH CONTAIN ALCOHOL, BENZENE, TOLUENE, XYLENE, ACETONE OR OTHER AROMATIC OR KETONE SOLVENTS. **DO NOT USE BLEACH.**

2.2 Formula 409 Service Cleaning Procedure

- A. The internal fluid pathways must be cleaned periodically (typically every 2 weeks) as outlined below:

Renatron II machines experience deposits which gradually build up inside the blood lines with continued machine use. The amount of build up is proportional to the extent of machine use, the number of dialyzers reprocessed, and such factors as heparin regime and rinse back method. This build up is a waxy, denatured substance with a slight yellow tint. If the build is allowed to continue, the machine may give erroneous blood volume readings (low) and may stop operating altogether. Before this substance becomes visually evident in the blood lines, the procedure outlined below should be performed to remove the deposits.

CAUTION: THIS PROCEDURE CALLS FOR USE OF INSTITUTIONAL FORMULA 409. THIS LIQUID CHEMICAL IS AN EYE IRRITANT. AVOID CONTACT WITH EYES OR SKIN. REFER TO LABEL INSTRUCTIONS CAUTIONS AND REMEDY. **DO NOT USE** SUBSTITUTE CHEMICAL SOLUTIONS IN THIS PROCEDURE.

Institutional Formula 409 will not react with trace levels of Renalin Cold Sterilant Concentrate/Renalin 100. To ensure Formula 409 contact with Renalin concentrate is minimized and to ensure Formula 409 is rinsed completely from the Renatron station, this procedure should be performed in the order as listed.

1. Remove uptake tube from Renalin container and make sure excess Renalin concentrate drains back into the container. Cover the open Renalin container.
2. Place uptake tube into a container of purified water (1 gallon or more).
3. Press the "ON" switch, and select program "00". Connect the external hoses in the sanitize configuration.
4. Press the "START SANITIZE" switch. Allow machine to operate to completion of "Program Step 75" and press "OFF" switch. (No problems will occur if machine operates past Step 75, before turning off).
5. Press "ON" switch and repeat procedure Steps 3 and 4 above. This action clears the Renalin concentrate from uptake hose and replaces it with pure water.
6. Remove the uptake tube from pure water and allow excess water to drain out of uptake tube.
7. Place the uptake tube into the container of Formula 409. The 64 U.S. fl. oz. (1.89 liter) size will work conveniently.
8. Press the "ON" switch and repeat the procedures in Steps 3 and 4 above. This action clears the water from the uptake hose and replaces it with Formula 409.
9. Press "ON", select program "(00)", and press the "START SANITIZE" switch. Allow the machine to continue operating to "SANITIZE COMPLETE" in "Program Step 83".
10. Press the "OFF" switch and turn off the water supply to the machine. Leave the machine overnight.

NOTE: Minimum contact time is 8 hours. Optimal contact time is several days (over the weekend). The maximum contact time is 7 days.

11. Remove the uptake tube from the container of Formula 409 and make sure the excess 409 drains from the tube back into the container. Place the uptake tube in a container of pure water (1 gallon or more). Turn the water supply on.
12. Press "ON", select program "(00)", and press the "START SANITIZE" switch. Allow the machine to operate to completion of "Program Step 75", and press the "OFF" switch. (No problems will occur if the machine operates past Step 75 before turning off.) This action clears the Formula 409 from the uptake hose and replaces it with water.
13. Press "ON", select program "(00)", and press the "START SANITIZE" switch. Allow the machine to operate to "Program Step 83" and when machine completes Step 83, press "START PROCESS" switch. The machine will then enter Step 84, and after a ten minute hold in Step 84, will proceed with flushing and draining. The flushing and draining will continue until the machine enters "Program Step 97" and the "SANITIZE COMPLETE" message reappears.
14. Press the "OFF" switch when the "SANITIZE COMPLETE" message appears in "Program Step 97".
15. Remove the uptake tube from the container of pure water and allow the excess water to drain from the uptake tube.
16. Place the uptake tube in a container of properly diluted, non-expired Renalin Solution or non-expired Renalin 100 container.
17. Press "ON", select program "(00)", and press the "START SANITIZE" switch. Allow the machine to operate to completion of "Program Step 75" and press the "OFF" switch. This action clears the water from the uptake hose and replaces it with Renalin Cold Sterilant solution.
18. Press "ON", select program "(00)", and press the "START SANITIZE" switch. Allow machine to operate to "Program Step 83". When the machine completes Step 83, press "START PROCESS" switch. The machine will then enter Step 84 and after a ten minute hold time will proceed to "Program Step 97". The "SANITIZE COMPLETE" message will reappear.

19. Your Renatron station is now ready for normal use.

NOTE: Formula 409 is a registered trademark of the Clorox Co., Oakland, CA. It is available as Minntech Renal Systems P/N: 93250-092. Minntech Renal Systems' International Distributors should contact Minntech Renal Systems to obtain this product if not available locally.

2.3 Quick Disconnect Inspection - Hansen Connectors

- A. Quick Disconnect Inspection-Hansen Connectors - 47702-000 and 47875-000:
1. Inspect the inside and outside of the quick disconnects for any corrosion/deterioration.
 2. Inspect ball bearings inside of quick disconnects for any flatness or corrosion/deterioration.
 3. Inspect outside collar for smooth sliding action.
 4. Inspect for missing ball bearings.
 5. Inspect Quick Disconnect o-ring for the following defects:
 - a. Worn/Disfigured
 - b. Chipped/Pitted
 - c. Deteriorating
- B. If replacement is needed, use the following steps:
1. Replacement for Female Socket P/N: 47702-000

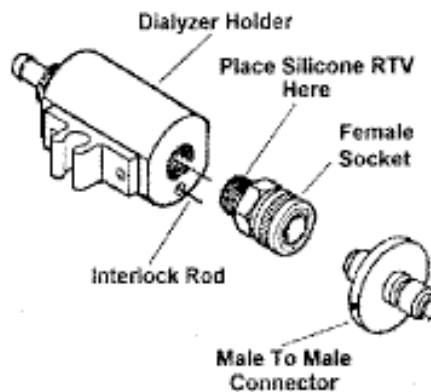


Figure 2.3.1

- a. Remove Female Socket from dialyzer holder using a 1-1/16" open end wrench.
- b. Remove old silicone from dialyzer holder.
- c. Place a small amount of silicone RTV, P/N: 17512-000, on the threads of the new Female Socket, P/N: 47702-000.
- d. Tighten the Female Socket with the male to male connector installed. With interlock rod pushed in, leave a gap of 1/8" between the male to male connector and the rod.

2. Replacement for the Dialysate Connector P/N: 47875-000

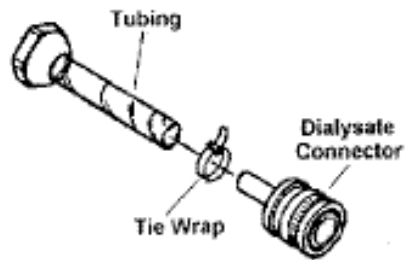


Figure 2.3.2

- a. Cut the tie wrap off of the tubing.
 - b. Remove Dialysate Connector from tubing.
 - c. Push new Dialysate Connector into tubing.
 - d. Secure with a new tie wrap around the tubing.
- C. A defect in the Hansen Quick Disconnect Connector can cause the following symptoms:
1. Fluid leakage at Quick Disconnect
 2. Pressure Failure Alarms
 3. Tank Volume Alarms
- D. Quick Disconnect Inspection - Female Swivel Connector, P/N: 47502-022.
1. Verify the Reprocessing Connector/ISO assembly “snaps” into the Female Swivel Connector and is firmly held in place.
 2. Run the Renatron System through Step 14 in the “00” mode with the Renatron Station in sanitize configuration. Check for leaks at the female swivel connector.
 3. Replace the Female Swivel Connector if leaks are detected.

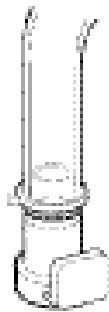


Figure 2.3.3

- E. A defective Female Swivel Connector can cause:
1. Leakage during Step 14.
 2. Tank volumes in Step 4.
 3. Low volumes in Step 35.

2.4 Reprocessing Connector Inspection

A. Reprocessing Connector Inspection

1. Inspect the Reprocessing Connector for the following defects:
 - a. Worn O-ring
 - b. Bent connector body
 - c. Cracking
2. Replace the reprocessing connector if any defects are noted.



Figure. 2.4.1

B. A defective Reprocessing Connector can cause the following symptoms:

1. Fluid leakage at the reprocessing connector connections
2. Tank Volume Alarm in Step 4.
3. Volume Fail Alarm in Step 35.

2.5 Uptake Tube Assembly Inspection

A. Use the following to properly inspect the Renalin 21% uptake tube assembly:

1. Inspect the ball check valve to insure the ball is moving freely.
2. Inspect the male connector O-ring for the following defects:
 - a. Flatness
 - b. Brittleness/CracksIf any of the above defects exist, replace the O-ring.
3. Inspect the male connector for the following defects:
 - a. Discoloration
 - b. Brittleness
 - c. CracksIf any of the above defects exists, replace the O-ring.
4. Inspect the modified cap to insure the vent hole is not plugged, replace if necessary.
5. Inspect the tube fitting assembly for any cracks, replace if necessary.
6. Inspect the suction tube for the following defects:
 - a. Discoloration
 - b. Brittleness
 - c. CracksIf any of the above defects exist, replace the O-ring.

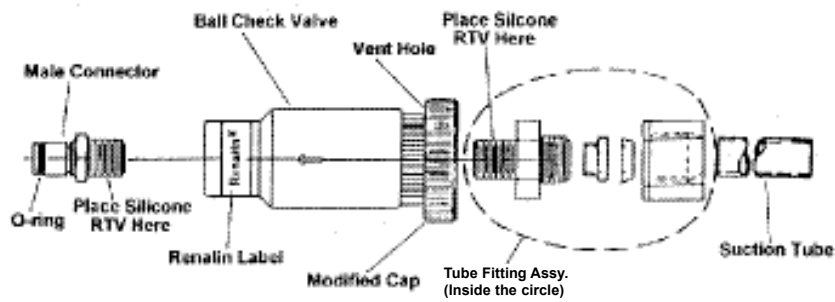


Figure 2.5.1

- B. If replacement is needed, use the following steps:
1. Remove the male connector from the ball check valve.
 2. Remove the tube fitting assembly and modified cap from ball check valve.
 3. Place a small amount of silicone RTV, P/N: 17512-000 on the male threads of the new male connector, P/N: 47502-003.
 4. Tighten the male connector into the top of the new ball check valve, P/N: 41005-001.
 5. Place a small amount of silicone RTV, P/N:17512-000 on the male threads of the new tube fitting assembly, P/N: 47885-000.
 6. Make sure modified cap is placed over the top of the tube fitting assembly.
 7. Place the new suction tube, P/N: 47606-001 inside of the tube fitting assembly.
 8. Tighten the tube fitting assembly into the bottom of the ball check valve.
- C. A defect in the Renalin Uptake Tube Assembly can cause the following symptom:
1. Add Chemical Alarm
- D. Renalin 100 Uptake Tube Assembly Inspection

NOTE: Use the following steps too properly inspect the Renalin 100 uptake tube assembly.

1. Inspect the barbed adapter for the following defects:
 - a. Discoloration
 - b. Brittleness
 - c. Cracks

If any of the above defects exist, replace the barbed adapter.
2. Inspect the modified cap to insure the vent hole is not plugged, replace if necessary.
3. Inspect the female tube fitting for any cracks, replace if necessary.
4. Inspect the suction tube for the following defects:
 - a. Discoloration
 - b. Brittleness
 - c. Cracks

If any of the above defects exist, replace the suction tube
5. Replace Renalin 100 Check valve annually.

E. Renalin 100 Check Valve Replacement Procedure

NOTE: The uptake tube assembly and check valve contain 100% Renalin concentrate. Personal protective equipment is required when performing the following procedure.

1. Inspect the entire length of red Renalin hose. If the hose is brittle or bleached white, it may be necessary to replace the entire length of hose (P/N: 47509-249).
 2. Disconnect both ends of the check valve from the Renalin hose. It may be necessary to cut the Renalin hose to remove the check valve.
 3. Insert new check valve (P/N: 41600-113) into the red Renalin hose. Make sure that the curved side of the check valve is in the up position (see Figure 2.5.2)
- E. A defect in the Renalin 100 Uptake Tube Assembly can cause the following problem:
1. Add chemical alarm

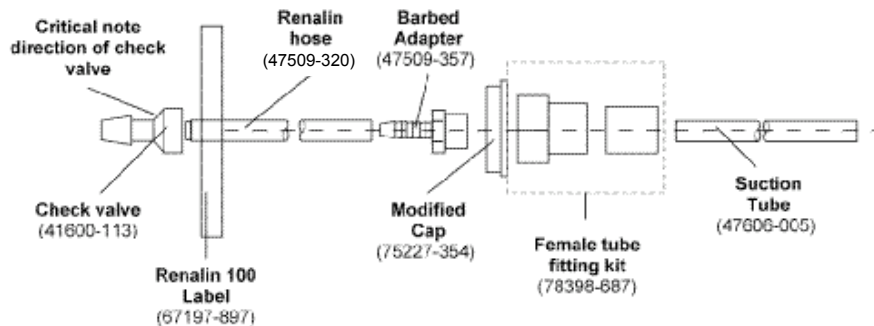


Figure 2.5.2

2.6 Valve Assembly Inspection for Large, Small, and V15 Valves

CAUTION: TURN THE POWER OFF, UNPLUG THE UNIT FROM THE WALL OUTLET, AND TURN THE WATER OFF

- A. Use the following steps to properly inspect the small valve assemblies V2, V10, V12, and V13:
1. Remove the nut from the small valve coil using pliers.
 2. Remove the small valve coil from the small valve stem.
 3. Remove the washer from the small valve stem.
 4. Remove the small valve stem with a flat bladed screw driver.
 5. Remove the O-ring from the manifold and inspect it for following defects:
 - a. Flatness
 - b. Brittleness/Cracks
 - c. DeteriorationIf any of the above defects exist, replace the O-ring.
 6. Inspect the small valve plungers for the following defects:
 - a. Rubber seat
 1. Circle impression off center on the rubber seat

2. Chips in the rubber seat
3. Unlevel rubber seat
4. Deteriorating rubber seat
5. Swollen rubber seat
6. An incomplete circular impression in the rubber seat

b. Spring

1. Bent
2. Corroded
3. Broken

If any of the above defects exist, replace the small valve plunger.

7. Inspect the small valve stems for the following defects:

- a. Corrosion
- b. Crimp marks in the valve stem
- c. Damaged thread
- d. Valve plunger does not move freely inside of the small valve stem.

If any of the above defects exist, replace the small valve stem.

8. Inspect the small valve coil for the following defects:

- a. Corrosion
- b. Frayed or cut wires

If any of the above defects exist, replace the small valve coil.

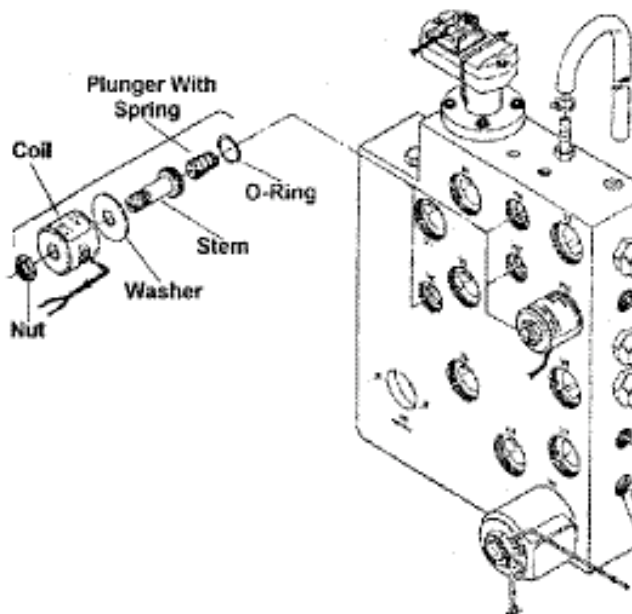


Figure 2.6.1

- B. If replacement is needed, use the following steps:
1. Insert the O-ring, P/N: 41014-015, into the manifold.
 2. Insert the small valve plunger, P/N: 41014-004, into the small valve stem, P/N: 41014-003. Check for spring action.
 3. Insert the small valve stem and plunger into the manifold. Hand-tighten the valve stem into the manifold and then gently tighten it with a flat-bladed screwdriver.

CAUTION: USE CARE WHILE INSTALLING THE VALVE STEM BECAUSE THE MANIFOLD VALVE PORT IS SENSITIVE TO CROSS-THREADING, STRIPPING AND OVERTIGHTENING.

4. Place the washer onto the small valve stem. The groove in the washer should be facing away from the manifold.
5. Install the small valve coil.
 - a. Using existing small valve coil
 1. Slide small valve coil onto the small valve stem.
 2. Replace the nut making sure not to over-tighten.
 - b. Using a new small valve coil
 1. Slide small valve coil onto the small valve stem.
 2. Replace the nut making sure not to over-tighten.

CAUTION: OVERTIGHTENING THE NUT COULD CAUSE DAMAGE TO THE MANIFOLD VALVE PORT.

3. Route the coil wires through the wiring harness and secure the coil wires to the wiring harness.
4. Plug the wires into the appropriately labeled connectors on the power board.

EXAMPLE 1

If you are replacing the coil on valve number 2, the coil wires would be plugged onto the connectors labeled V2 on the power board.

- C. A defect in the small valve assembly can cause the following symptoms:
1. Tank Volume Alarm
 2. Add Chemical Alarm
 3. Volume Failure Alarm
 4. Pressure Failure Alarm

CAUTION: TURN THE POWER OFF, UNPLUG THE UNIT FROM THE WALL OUTLET, AND TURN THE WATER OFF.

- D. **Use the following steps to properly inspect the large valve assemblies V1, V3, V4, V5, V6, V7, V8, V9, and V11:**
1. Remove the nut from the coil using a pliers.
 2. Pull the large valve coil off of the large valve stem.
 3. Remove the washer from the large valve stem.
 4. Remove the large valve stem with the valve removal tool, P/N: 78207-000.

5. Remove the O-ring from the manifold and inspect it for the following defects:
 - a. Flatness
 - b. Brittleness/Cracks
 - c. DeteriorationIf any of the above defects exist, replace the O-ring.
6. Inspect the large valve plungers for the following defects:
 - a. Circle impression off center on the rubber seat
 - b. Chips in the rubber seat
 - c. Unlevel rubber seat
 - d. Deteriorating rubber seat
 - e. Swollen rubber seat
 - f. An incomplete circular impression in the rubber seatIf any of the above defects exist, replace the large valve plunger.
7. Inspect the large valve spring for the following defects:
 - a. Bent
 - b. Corrosion
 - c. BrokenIf any of the above defects exist, replace the large valve spring.
8. Inspect the large valve stems for the following defects:
 - a. Corrosion
 - b. Crimp marks in the valve stem
 - c. Damaged threads
 - d. Valve plunger does not move freely inside of the large valve stem.If any of the above defects exist, replace the large valve stem.
9. Inspect the large valve coil for the following defects:
 - a. Corrosion
 - b. Frayed or cut wiresIf any of the above defects exist, replace the large valve coil.

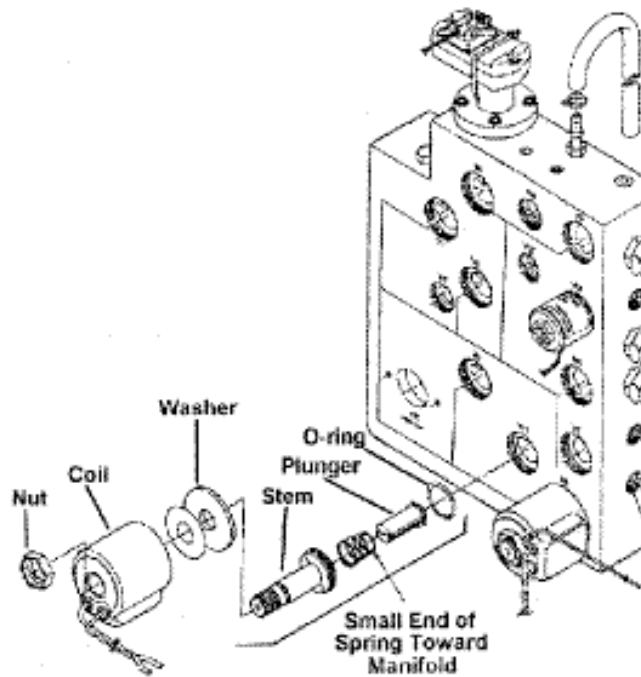


Figure 2.6.2

E. If replacement is needed, use the following steps:

1. Insert the new O-ring, P/N: 41015-015, into the manifold.
2. Insert the new plunger, P/N: 41015-004, into the valve stem, P/N: 41015-003. Check to make sure that the tapered end of the spring is facing the rubber tip of the plunger.
3. Insert the large valve stem and large valve plunger into the manifold. Hand tighten the large valve stem into the manifold and then gently tighten it with the valve removal tool.

CAUTION: USE CARE WHILE INSTALLING THE VALVE STEM BECAUSE THE MANIFOLD VALVE PORTS AREA SENSITIVE TO CROSSTHREADING, STRIPPING, AND OVERTIGHTENING.

4. Place the washer onto the large valve stem.
5. Install the large valve coil.
 - a. Using existing large valve coil.
 1. Slide large valve coil onto the large valve stem.
 2. Replace the nut making sure not to over-tighten.
 - b. Using a new large valve coil.
 1. Slide large valve coil onto the large valve stem.
 2. Replace the nut making sure not to over-tighten.

CAUTION: OVERTIGHTENING THE NUT COULD CAUSE DAMAGE TO THE MANIFOLD VALVE PORT.

3. Route the coil wires through the wiring harness and secure the coil wires to the wiring harness.
4. Plug the wires into the appropriately labeled connectors on the power board.

EXAMPLE 1

If you are replacing the coil on the valve number 1, the coil wires would be plugged on the connectors labeled V1 on the power board.

F. A defect in the large valve assembly can cause the following symptoms:

1. Tank Volume Alarm
2. Add Chemical Alarm
3. Volume Failure Alarm
4. Pressure Failure Alarm

CAUTION: TURN THE POWER OFF, UNPLUG THE UNIT FROM THE WALL OUTLET, AND TURN THE WATER OFF.

G. Use the following steps to properly inspect valve 15:

1. Connect the machine tubing in the sanitize configuration.
 - a. Connect the dialysate inlet and outlet connectors together using the male to male adapter.
 - b. Connect the arterial and venous hoses together using the calibration cell.
2. Run the machine in the "00" mode. Press the "START PROCESS" switch.
3. During Step 5, remove the dialysate inlet line from the male to male connector.
4. Feel for suction. It should pull in on the glove on your hand.
5. Replace the dialysate inlet line onto the male to male connector.
6. Run the machine up to Step 9.
7. Time how long it takes the Renatron Station to complete Step 9.
8. Step 9 should take between 10 to 12 seconds for the 21% Renatron System and 4 to 8 seconds for Renalin 100 to complete. If there is strong suction in Step 5 and Step 9 is longer than 20 seconds, replace the valve 15 diaphragm P/N: 41013-001.

H. If replacement is needed, use the following steps:

1. Remove two phillips head screws from the valve 15 assembly.
2. Remove the valve 15 assembly from the manifold block.
3. Look for the following defects in the valve 15 diaphragm:
 - a. Blistering
 - b. Leaking
 - c. Disfigured
4. Inspect the valve 15 coil for the following defects:
 - a. Corrosion
 - b. Frayed or cut wires

If any of the above defects exist, replace the valve 15 coil.

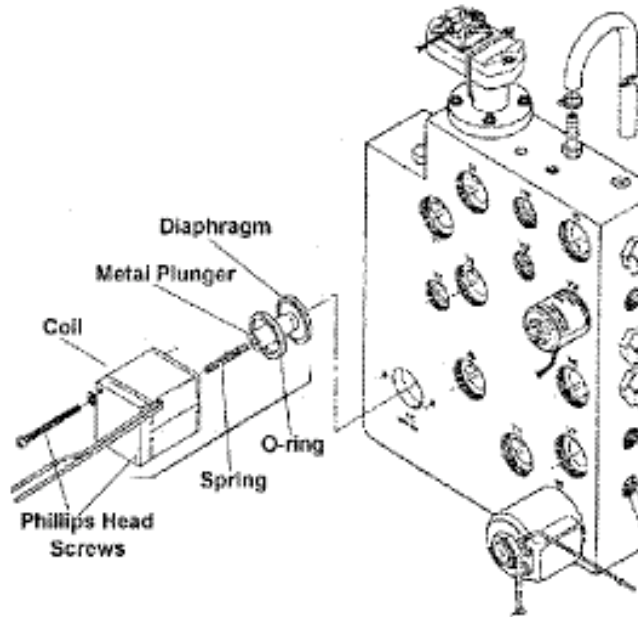


Figure 2.6.3

5. Inspect the valve 15 spring for the following defects:
 - a. Bent
 - b. Corrosion
 - c. Broken

If any of the above defects exist, replace the valve 15 assembly.
6. Insert the new valve 15 diaphragm P/N: 41013-001 on the metal plunger.
7. Place the metal plunger with diaphragm inside the coil. Make sure the spring is inside the metal plunger.
8. Insert the valve 15 assembly into the manifold block.
 - a. diaphragm goes into the manifold first.
 - b. O-ring goes between the diaphragm and the valve coil.
 - c. Place the metal plunger with spring inside.
 - d. The valve coil goes in last.
9. Tighten the phillips head screws evenly, making sure not to over-tighten.

CAUTION: OVERTIGHTENING OF THE SCREW(S) COULD CAUSE DAMAGE TO THE MANIFOLD. UNEVEN TIGHTENING MAY CAUSE THE DIAPHRAGM AND O-RING TO BE IMPROPERLY ALIGNED.

- I. A defect in the valve 15 Assembly can cause the following symptom:
 1. Add Chemical Alarms

2.7 Inspect Hydraulic Compartment for Fluid Leakage

CAUTION: POWER DOWN MACHINE AND UNPLUG FROM WALL OUTLET. TURN OFF WATER SUPPLY VALVE.

- A. Remove cover and inspect the hydraulic compartment, for any sign of moisture.
- B. Some areas where leaks may occur are:
 - 1. The pressure transducer/baffle assembly
 - 2. The quick connect fittings on the front of the manifold
 - 3. Any of the tank fittings, or the tank itself
 - 4. Any of the valve guides located on the manifold
- C. Leaks may be caused by any of the following problems:
 - 1. Defective valve guide
 - 2. Cracked/worn fitting or O-ring
 - 3. Defective manifold
- D. Internal leaks may cause the following alarms:
 - 1. Add Chemical
 - 2. Tank Volume
 - 3. Pressure Fail

2.8 Jet Pump Assembly Test Procedure

- A. Use the following steps to properly test the jet pump assembly:
 - 1. Place the Renatron Station into the sanitize configuration using the following steps:
 - a. Connect the dialysate inlet and outlet connectors together using the male to male adapter.
 - b. Connect the arterial and venous hoses together using the calibration cell.
 - 2. Run the machine in the "(00)" mode. Push the "START PROCESS" switch.
 - 3. During Step 5, remove the dialysate inlet line from the male to male connector.
 - 4. Feel for suction at the dialyzer holder. It should pull in on the glove on your hand.
 - 5. Replace the dialysate inlet line onto the male to male connector.
 - 6. Run the machine up to Step 9.
 - 7. Time how long it takes the Renatron Station to complete Step 9.
 - 8. Step 9 should take between 10 to 12 seconds for the 21% Renatron Station and 4 to 8 seconds for Renalin 100 to complete. If there is weak suction in Step 5 or if Step 9 is longer than 20 seconds, replace the jet pump nozzle spacer assembly, P/N: 78397-842. If there is strong suction in Step 5 and Step 9 is longer than 20 seconds, proceed to the Valve 15 Inspection procedure.
- B. If replacement is needed, use the following steps:
 - 1. Removal of jet pump assembly.
 - a. Turn off the incoming water.
 - b. Disconnect the incoming water and drain lines from the back of the machine.
 - c. Remove the drain fitting (jet pump retainer) from the back of the machine.
 - d. Remove the O-ring that is attached to the drain fitting.

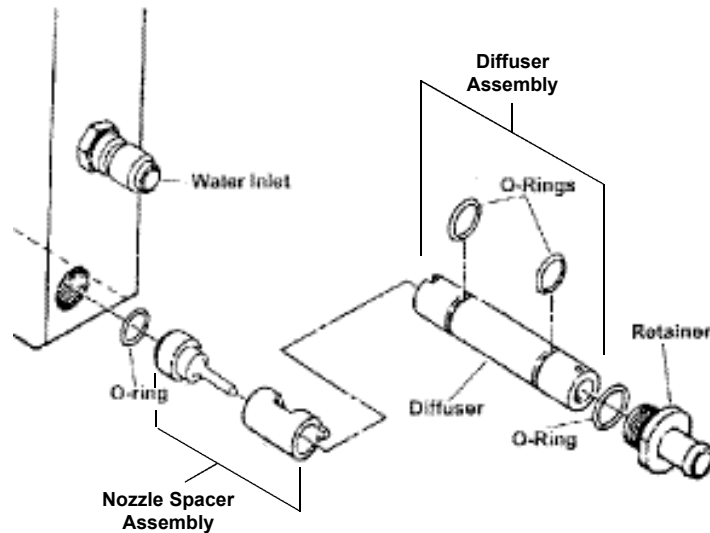


Figure 2.8.1

- e. Using the metal pin in the diffuser, pull out the diffuser shaft. This assembly has two O-rings attached to it. You will be looking for the following defects in the O-rings and diffuser:

1. Flatness
2. Swollen
3. Discolored
4. Brittleness/Cracks

If any of the above defects exist, replace the O-rings.

- f. Using the Jet Pump Removal Tool (P/N: 47048-001) insert the tool into the manifold hooking the jet pump spacer and nozzle at the 12:00 position. Pull the assembly straight out of the machine. Remove the O-ring from the end of the jet pump nozzle. If the O-ring is not on the end of the nozzle assembly, use the Jet Pump Removal Tool to remove the O-ring from the inside of the manifold. You will be looking for the following defects in the jet pump spacer and nozzle:

1. Nozzle spacer assembly can be separated into two pieces
2. Discolored
3. Brittleness/Cracks

If any of the above defects exist, replace the jet pump assembly.

- g. Inspect jet pump O-rings for the following defects:

1. Flatness
2. Swelling
3. Discoloration

If any of the above defects exist, replace the O-rings.

NOTE: A small amount of Dow Coming III (17542-000) can be applied to the Jet Pump O-rings to hold them in place while the Jet Pump is re-assembled.

2. Install the jet pump assembly.
 - a. Install the O-ring on the back of the jet pump assembly.
 - b. Connect the diffuser to the jet pump assembly by the male and female notches on the assemblies.

- c. Slide the assembly back into the manifold with the jet pump assembly going in first. Make sure that the metal pin in the diffuser matches up with the notch in the manifold at the 12:00 position.
 - d. Attach the O-ring to the back of the drain fitting.
 - e. Screw the drain fitting back into the manifold.
 - f. Reattach the drain hose and the incoming water line to the machine.
- C. A defect in the jet pump assembly could cause one or more of the following problems:
- 1. Tank Volume Alarm
 - 2. Add Chemical Alarm
 - 3. Volume Fail Alarm
 - 4. Pressure Fail Alarm

2.9 Renatron II System Scanner Gun

- A. Cleaning the Scan Window
- Scanning performance may degrade if the scan window is not clean. If the window is visibly dirty, or if the scanner isn't scanning well, clean the scan window with a soft cloth or facial tissue dampened with water (or a mild detergent-water solution). If a detergent solution is used, rinse with a clean tissue dampened with water only.
- B. Inspecting the Cords and Connectors
- Inspect the interface cable and connector for wear or other signs of damage. A badly worn cable or damaged connector may interfere with scanner operation. Contact Minntech Renal Systems for information about cable replacement.
- C. Examining the Scanner Housing
- Routinely examine the housing for signs of damage. A damaged housing may cause the internal components to move and may result in a malfunctioning scanner.

2.10 Inspect Serial Number and Preclean Barcode Labels

- A. Inspect the labels for the following:
- 1. Missing
 - 2. Torn
 - 3. Edges that are curling up
- B. Defects may cause the following problems:
- 1. Communication errors
 - 2. The scanner will not be able to complete the scan

2.11 Inspect Front Mask for Visual Defects

- A. Inspect the front mask for tears and cracks:
- 1. Any tears or cracks in the switch area of the front mask will eventually cause the switches to fail.

NOTE: It is recommended that Renatron Station be returned to Minntech Renal Systems for repair if the switches or mask are defective.

2.12 Check Valve Water Hose Assembly Test Procedure

NOTE: If you do not have a Minntech Renal Systems pressure regulator with a pressure gauge, you must place a pressure gauge device between the water hose assembly and the Renatron water inlet fitting. Any one of the following items would be an acceptable device to use for this test.

CAUTION: THE RENATRON STATION MUST NOT BE OPERATED WITHOUT THE CHECK VALVE ASSEMBLY.

Water Pressure Gauge Assembly P/N: 78207-010
Single Pressure Regulator with Gauge P/N: 78327-020
Dual Pressure Regulator with Gauge P/N: 78327-021

- A. Use the following steps to properly test the Check Valve Water Hose assembly:
1. Insert Calibrated Volume Cell between arterial and venous lines.
 2. Press "ON" switch ("SEL" and "--" will be displayed).
 3. Press the "MUTE" and "RESET" switches together until program "(00)" is displayed.
 4. Press the "HOLD TO SET" switch while adjusting the "SET" knob to display "255" in the "VOLUME" window.
 5. Press the "START PROCESS" switch. A light will appear in corner of the "START PROCESS" switch.
 6. Observe pressure reading during Step 4. The Renatron water pressure specification is 20-55 psig, however the optimal dynamic water pressure is 30-55 psig in Step 4. If water pressure is a problem, check the following items:
 - a. Water system output pressure to reuse room.
 - b. If you have a pressure regulator in-line, check the setting and adjust if necessary.
 - c. Replace Check Valve Water Hose Assembly.
 7. Turn incoming water supply off.
 8. Disconnect the water hose assembly from the incoming water supply valve.
 9. Disconnect the other end of the water hose assembly.
 10. With the Check Valve flow arrow pointing upward, fill the water hose assembly with R.O. water through the Hansen connector.
 11. Place a mark on the water hose assembly to correspond to the water level.
 12. Monitor the water level for 2 minutes. If the water level has decreased replace the Check Valve Water Hose assembly.
 13. Reinstall the Check Valve Water Hose assembly.
 14. Turn on the incoming water supply valve.
- B. If replacement is needed, use the following steps:
1. Purchase Check Valve Water Hose assembly P/N: 78158-000
 2. Turn incoming water supply off.
 3. Disconnect the water hose assembly from the incoming water supply valve.
 4. Disconnect the other end of the water hose assembly.
 5. Reinstall the new Check Valve Water Hose assembly.
 6. Turn on the incoming water supply valve.
- C. A defect in the Check Valve Water Hose assembly can cause the following symptoms.
1. Tank Volume Alarm
 2. Add Chemical Alarm

3. Volume Failure Alarm
4. Pressure Failure Alarm

2.13 Replace Renalog Backup Disks

A. Renalog III

1. Once a year the Renalog III backup disks should be replaced. If the disk is used for more than one year it may become damaged, and all the information on the disk will be lost.
2. When replacing the disks it is advisable that you have one set of disks for each day of the week the clinic is in operation.
3. Mark each disk with a day of the week (Monday, Tuesday, ...)
4. Some clinics with large amounts of active data will require two or more disks for each day of the week. The disks should be marked: Monday Disk 1, Monday Disk 2, Tuesday Disk 1, and Tuesday Disk 2 and so on.
5. Discard old disks.

B. Renalog RM

1. Renalog RM performs its backup on Zip® Disks. These disks should be replaced every five years.
2. Follow the procedure outlined in Section 2.12A to properly label the replacement zip disks.
3. Discard used disks.

TROUBLESHOOTING

3.0 Troubleshooting Chart

NOTE: The Renatron Station must be connected in Sanitize Configuration (with a calibration cell), for troubleshooting purposes. Do not attempt troubleshooting with a dialyzer connected to the Renatron Station.

Verify that the water, temperature, and electrical requirements are within the specifications as outlined in the Renatron Instruction Manual.

Symptom	Procedure	Page
Add Chemical Alarm Step 9, 43, 45, 67 and 77	Verify the Renalin container is not empty.	N/A
	Renalin Uptake Tube Assembly Inspection	12
	Valve 15 Inspection	14
	Small Valve Assembly Inspection (Inspect valves 12 and 13)	14
	Jet Pump Assembly Test Procedure	21
Tank Volume Alarm Step 2	Verify that the water source to the machine is on and the drain line is not plugged	N/A
	Calibration Verification	3
	Test Valves 3, 6, 7, 11 and 12 for magnetism	14
	Inspect V13 valve seat	14
	Jet Pump Assembly Test Procedure	21
Tank Volume Alarm Step 3 and 12	Verify that the water source is turned on	N/A
	Test Valves 1 and 11 for magnetism	14
	Inspect 6 Liter Flow Washer	N/A
Tank Volume Alarm Step 4	Test Valves 4 and 5 for magnetism	14
	Check Female Swivel Assembly and Reprocessing Connectors for Leaks	11
Tank Volume Alarm Step 5	Check Valves 8 and 9 for magnetism	14
	Check for vacuum leaks at the Hansen connectors	10
Volume Failure Alarm Step 35	Calibration Verification	3
	Inspect V5 and V7 for proper seat	16
	Check V10 for magnetism in Steps 29, 31 and 33	14
	Inspect Reprocessing Connectors Jet Pump Assembly Test Procedure	12 21
Pressure Failure Alarm Step 36 and 38	Inspect V5 and V7 for proper seat	16
	Jet Pump Assembly Test Procedure	21
Pressure Failure Alarm Step 37 and 39	Quick Disconnect Inspection	10
	Large Valve Assembly Inspection (Inspect valves 4, 6, 9 and 11)	16
Improper Renalin Dilution, Step 47	The Renatron Station may have been bumped during Step 47. Reset the Renatron System and run another process.	N/A
Unable to Scan Barcodes	Renatron II Scanner Gun	23

4.0 Inputs - inputs to the logic circuitry operate as follows:

- A. "RESET" switch - this touch activated switch is located on the front panel of the Renatron Station in the "DIAGNOSTICS" sector.
 - 1. This switch is enabled (activated) when the "PROCESS" cycle or "SANITIZE" cycle is complete and when an alarm occurs.
 - 2. When this switch is enabled, all processing is stopped.
 - 3. When enabled and touched, the program will automatically jump to program step 00.
 - a. All program logic activated alarms are cleared. The "INTERLOCK" alarm, if occurring, is cleared.
 - b. The "START PROCESS" and "START SANITIZE" switches are enabled.
 - c. "PROCESS COMPLETE", "SANITIZE COMPLETE", "CLEAN", "TEST", "DISINFECT", "SANITIZE", "START PROCESS", and "START SANITIZE" lights are de-energized.
 - 4. Renatron II Dialyzer Reprocessing System will initiate printing of labels when in the automatic reprocessing cycle.
- B. "MUTE ALARM" switch - this touch activated switch is located on the front panel of the Renatron System in the "DIAGNOSTICS" sector.
 - 1. This switch is enabled upon all alarms.
 - 2. When enabled and touched, the audio alarm is silenced.
 - a. The visual alarm remains energized until the alarm condition is cleared or "START PROCESS", "START SANITIZE" or "RESET" is touched.
 - b. Immediately after switch activation, the audio alarm may be re-energized by any new alarm condition.
- C. "START PROCESS" switch - this touch activated switch is located on the front panel of the Renatron Station in the "CONTROLS" sector.
 - 1. This switch is enabled at program step **00** and whenever an alarm occurs while in the "CLEAN", "TEST", or "DISINFECT" modes. It is also enabled twice after the "PROCESS COMPLETE" message appears and when the first "SANITIZE COMPLETE" message appears (Blue RS-8300 Renatron Station only).
 - 2. When enabled and touched:
 - a. The "START SANITIZE" switch is disabled (locked out) its light is de-energized.
 - b. If at program step 00, the program will increment and start execution. In most other steps, the alarm is cleared and the current program step is repeated.
 - c. The "INTERLOCK" circuit is disabled.
 - d. The "RESET" and "MUTE" switches are disabled.
 - e. The "START PROCESS" switch indicator lights.
 - f. If an initial "SANITIZE COMPLETE" step, the Renatron Station will vent the system and dialyzer (Blue RS-8300 Renatron Station only).
 - g. If at initial "SANITIZE COMPLETE" step, the Renatron Station completes the cycle by flushing and purging the machine (Blue RS-8300 Renatron Station only).
- D. "START SANITIZE" switch - this touch activated switch is located on the front panel of the Renatron Station in the "CONTROLS" sector.
 - 1. This switch is enabled at program step **00**, at the completion of a "PROCESS" or "SANITIZE" cycle, and whenever an alarm occurs while in the "SANITIZE" mode.
 - 2. When enabled and touched:
 - a. The "START PROCESS" switch is disabled and its indicator light is de-energized.
 - b. If the machine is at program step **00** or at the completion of a "PROCESS" or "SANITIZE" cycle, the program goes to the beginning of the "SANITIZE" cycle and starts execution. At any other "SANITIZE" step, the alarm is cleared and the current program step is repeated.

- E. "DISPLAY" switch - this touch activated switch is located on the front panel of the Renatron Station in the "DIAGNOSTICS" sector.
 - 1. When off and touched, the number of the "PROGRAM STEP" being executed is displayed.
 - 2. When on and touched, the "PROGRAM STEP" displayed is de-energized.
- F. "HOLD TO SET" switch - this touch activated switch is located on the front panel of the Renatron System in the "CONTROLS" sector.
 - 1. When touched, the reference voltage controlled by the "SET" pot is converted to a volume (mL) measurement and displayed on the "VOLUME" display.
 - 2. When not touched, the "VOLUME" display is controlled by the machine's program.
 - 3. Initiates the manual reprocessing cycle selection.
- G. "SET" volume pot - this control pot is located on the front panel of the Renatron Station in the "CONTROLS" sector.
 - 1. When turned, the maximum acceptable reference volume voltage and therefore the minimum acceptable dialyzer volume are varied.
- H. "INTERLOCK" switch - this micro switch is located inside the Renatron Station on a bracket attached to the chassis face plate. It is activated by a rod through the dialyzer holder whenever the male to male interlock connector is in place between the dialysate inlet and outlet. The interlock is intended to prevent sanitizing of the Renatron Station with a dialyzer in place. Therefore, the interlock circuit is engaged only during the "SANITIZING" cycle.
 - 1. If the interlock rod (switch) become disengaged in the "SANITIZE mode":
 - a. The "INTERLOCK" light is energized in the "DIAGNOSTIC" sector.
 - b. The "ALARM" light is energized in the "DIAGNOSTICS" sector.
 - c. The "AUDIO ALARM" is energized.
 - d. The "MUTE ALARM" switch is enabled.
 - e. All valves are de-energized.
 - f. Logic processing and the internal clock stop.
 - g. The "RESET" switch is enabled.
 - h. The "START SANITIZE" switch is enabled.
 - 2. Upon correction of a disengaged interlock rod (switch) while in the "SANITIZE" mode, and either "START SANITIZE" or "RESET" is touched:
 - a. The "INTERLOCK" light and audio alarm are de-energized.
 - b. If "START SANITIZE" is touched, sanitizing continues depending upon what the current program step is. If "RESET" is touched, the program jumps to step 00.
 - 3. No interlock associated alarms occur, regardless of interlock rod (switch) position, in the "START PROCESS" mode.
- I. PRESSURE LEAK TEST - The dialysate compartment of each dialyzer is subjected to 250 mmHg negative pressure while the blood compartment remains at atmospheric pressure. A dialyzer that loses pressure at a rate equal to or greater than 0.83 mmHg \pm 10% per second fails the pressure leak test (low flux -00 and mid-range CH programs). A dialyzer that loses pressure at a rate equal to or greater than 1.25 mmHg \pm 10% per second fails the test for the high flux (HF) program.
- J. LOAD/WEIGH CELL - this bridge resistance device has excellent linearity, resolution, and off center performance. The Load/Weigh Cell is located internally on the hydraulic side of the chassis divider. It is attached directly to the chassis bottom and the internal mixing/measuring tank. It is used in the Renatron Station to measure volume by weight.

The dry weight of the mixing/measuring tank is nulled or canceled in the Renatron calibration procedure. As fluid enters the tank, it adds weight to the tank which is measured as a positive D.C. voltage out of the cell. This voltage is translated by electronic circuitry, on the Microprocessor Control board, to represent volume.

In the "START PROCESS" cycle, all volumes measured in the mixing/measuring tank are between a zero level and a fixed peak level. Zero level is not an empty mixing/measuring tank. An

artificial zero level is created near the bottom of the tank (scribe line) by nulling the load/weight cell positive voltage, which is produced as a result of the small amount of fluid under the zero line and the mixing/measuring tank weight.

During the “START SANITIZE” cycle fluid levels in the mixing/measuring tank will overflow the tank and flow out the drain hose in certain program steps. This results from the need to sanitize the entire fluid pathway.

4.1 Outputs - Outputs controlled by the micro processor circuitry operate as follows:

A. FRONT PANEL LIGHTS

1. “START PROCESS” light - this is a LED light located in the corner of the touch activated “START PROCESS” switch; it is on the Front Panel Board Assembly. It lights whenever the “START PROCESS” switch is enabled and touched.
2. “CLEAN” light - this is a bar graph light located in line with the “START PROCESS” switch. It is on the Front Panel Board Assembly. It lights in the “START PROCESS” cycle when the machine is in the rinse and clean steps of its program.
3. “TEST” light - this is a bar graph light located in line with the “START PROCESS” switch. It is on the Front Panel Board Assembly. It lights in the “START PROCESS” cycle when the machine is in the test steps of its program (i.e., volume and pressure test).
4. “DISINFECT” light - this is a bar graph light located in line with the “START PROCESS” switch. It is on the Front Panel Board Assembly. It lights in the “START PROCESS” cycle, when the machine is in the program steps used to dilute and cycle chemical solution through the blood pathway.
5. “PROCESS COMPLETE” light - this is a bar graph light located in line with the “START PROCESS” switch. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights when the Renatron System completes the “START PROCESS” cycle. In addition, a three second continuous audio tone is emitted to signal the user that the process cycle is complete.
6. “START SANITIZE” light - this is a LED light located in the corner of the touch activated “START SANITIZE” switch. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights whenever the “START SANITIZE” switch is enabled and touched.
7. “SANITIZE COMPLETE” light - this is a bar graph light located in line with the “START SANITIZE” switch. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights when the Renatron System completes the “START SANITIZE” cycle. In addition, a three second continuous audio tone is emitted to signal the user that the sanitize cycle is complete.
8. “ALARM” light - this is a bar graph light located in the Front Panel “DIAGNOSTICS” sector. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights when an alarm condition is detected. It flashes continuously until the alarm state is corrected. It will always light whenever any additional message in the “DIAGNOSTICS” sector is lit (i.e.: “VOLUME FAIL”, “PRESSURE FAIL”, etc.).
9. “VOLUME FAIL” light - this is a bar graph light located in the Front panel “DIAGNOSTICS” sector. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights during the volume test step of the machine program if the measured priming volume of the dialyzer blood compartment or volume of the calibrated Volume Cell is less than the blood compartment reference value (“SET” value).
10. “INTERLOCK” light - this is a bar graph light located in the front panel “DIAGNOSTICS” sector. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights if the interlock rod is disengaged during the sanitize cycle.
11. “ADD CHEMICAL” light - this is a bar graph light located in the front panel “DIAGNOSTICS” sector. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights in the “START PROCESS” cycle and/or “START SANITIZE” cycle if the machine determines it has not drawn a sufficient amount of Renalin solution into the mixing/measuring tank. The user must replace the empty container of Renalin solution with a container of fresh Renalin solution.
12. “TANK VOLUME” light - this is a bar graph light located in the front panel “DIAGNOSTICS” sector. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights when the internal mixing/measuring tank does not empty as required in the appropriate program step. Each program step that requires the internal tank to empty is allotted a set amount of time to do so. If the tank is not emptied in the allotted time, this light will be energized. It will also light if an improper action has occurred within the tank.

13. "PRESSURE FAIL" light - this is a bar graph light located in the front panel "DIAGNOSTICS" sector. It is on the Front Panel side of the Microprocessor Control Board Assembly. It lights while in the pressure test function of the program if there is a leak in the dialyzer under test or if the machine develops a leak.
- B. AUDIO ALARM - this device is mounted to the bottom center of the chassis on the electronic side. It is controlled by circuitry on the Microprocessor Control Board Assembly. It will sound a one second pulsing tone (in sync with "ALARM" light) when the machine is in the alarm state. It will sound a three second non-pulsing tone when a cycle is completed.
- C. "PROGRAM STEP" display - this display consists of two 7 segment displays located near the bottom of the Front Panel "DIAGNOSTICS" sector. This display is on the Front Panel side of the Microprocessor Control Board Assembly. It can indicate any number between "00" and "99". This two digit allows the operator to read the actual program step the machine is in. The display is activated by touching the "DISPLAY" switch adjacent to it.
- D. "VOLUME" display - this display consists of three 7 segment displays located in the Front Panel "CONTROLS" sector. This display is on the Front Panel side of the Microprocessor Control Board Assembly. This "VOLUME" display has two functions:
1. It will indicate the minimum acceptable blood compartment priming volume, if the touch activated switch labeled "HOLD TO SET" is pressed.
 2. It will indicate blood compartment priming volume during the test and disinfect function of the machine program if the "HOLD TO SET" switch is not pressed.
- If the "HOLD TO SET" switch is not pressed and the machine program is not in the test or disinfect function, the display will be blank. The display is blank under these conditions because the data available to the display is not meaningful. This display is also used to measure the volume of the Calibrated Volume Cell when checking machine calibration. If the machine is connected in a sanitize configuration during the test and disinfect function, the display will indicate the volume of the internal blood pathway sanitize tubing connection (typically 3-6 mL).
- E. Energize Valves - all fourteen valves used to direct and regulate fluid flow are located internally in a manifold on the hydraulic side of the Renatron Station chassis. These valves utilize 115 volt coils to reduce overall current consumption. They are interfaced to the Microprocessor Control board low voltage circuit by opto-isolators. The opto-isolators drive triacs which switch AC voltage to turn the valve coils on or off. The AC voltage is rectified at each valve coil by a diode bridge which is soldered in place between each set of coil leads (wires). The opto-isolator/triac combination takes up very little space, is very reliable, and eliminates the need for electro-mechanical relays with their associated problems.

Circuit Board Assemblies

Renatron Type	Load Cell Type	Board Type	Board Part Number
Renatron II	Old	Control Board	E70136-003
Renatron II	New	Control Board	E70136-004
Renatron II	N/A	Expansion Board*	E70201-020
All	N/A	Power Board	E70141-000

* NOTE: The machine serial number must be supplied when ordering the expansion board.

Miscellaneous Parts

Part Number	Description
43031-000	Rubber Feet
47875-000	Dialyzer Connector
40088-002	Label - Bar Code S/N - PC

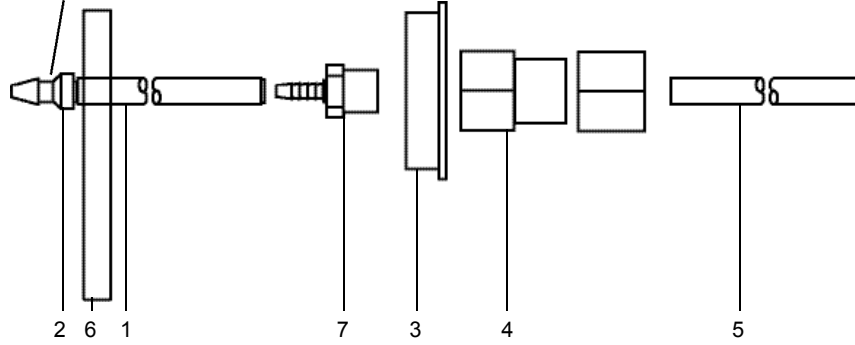
Preventative Maintenance Kit

Part Number	Description
78207-040	Preventative Maintenance Package

This kit contains the following items:

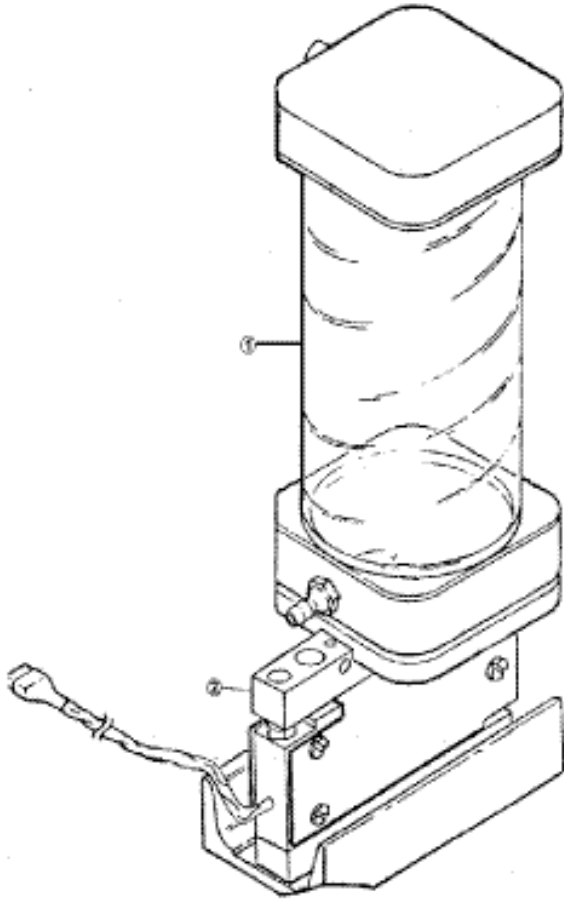
Qty.	Description
1	Diaphragm
4	Small Valve Plungers
9	Large Valve Plungers
1	Tubing Kit
10	Large Tie Wraps
20	Small Tie Wraps
16	O-rings (Dialysate connectors)
1	Large Valve Guide
1	Small Valve Guide
1	Jet Pump Nozzle Spacer Assembly
10 pk	Reprocessing connectors
4	O-ring - Large Valve
9	O-ring - Small Valve

Critical: Note direction
of check valve



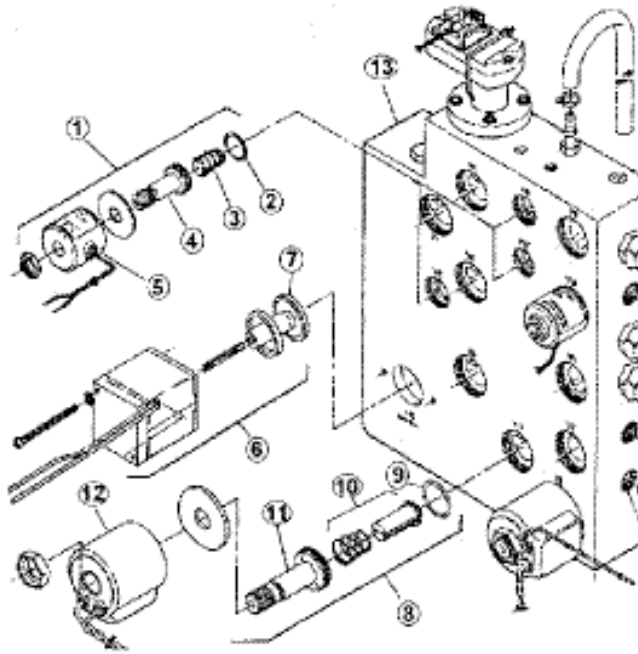
78397-847 Uptake Tube Assembly Renalin 100

Item	Part Number	Description
1	47509-320	Renalin Hose
2	41600-113	Check Valve
3	75227-354	Cap
4	47509-358	Tube Fitting - Female
5	47606-005	Suction Tube
6	67197-897	Label Renalin 100 Hose
7	47509-357	Adapter 3/8" MNPT x 1/4" barb



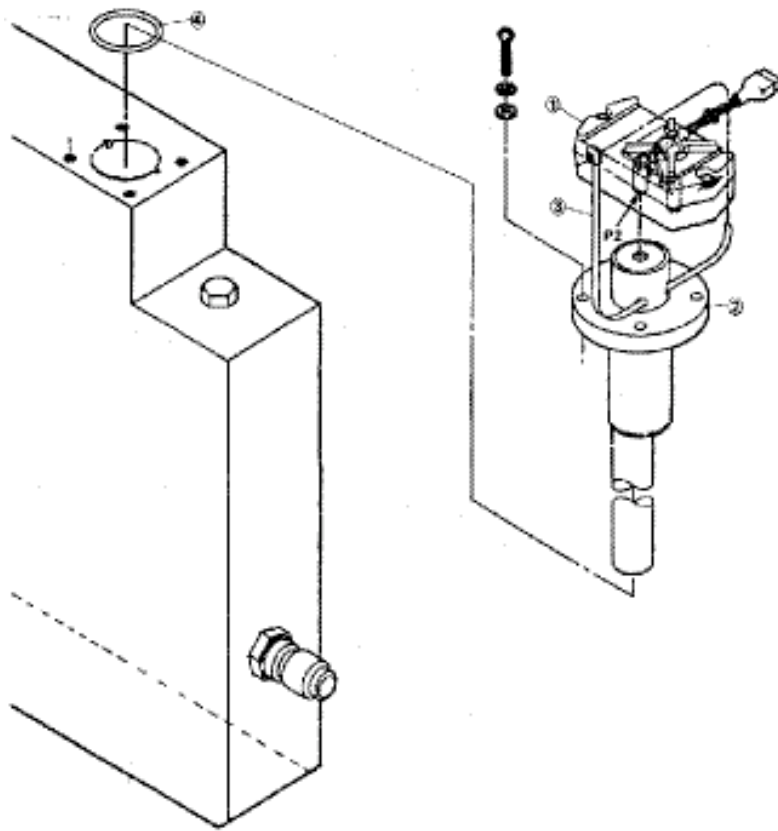
Tank Load Cell Assembly Pa rts Listing

Item	Part Number	Description
1	78398-636	Tank Assembly
2	45005-026	Load Cell



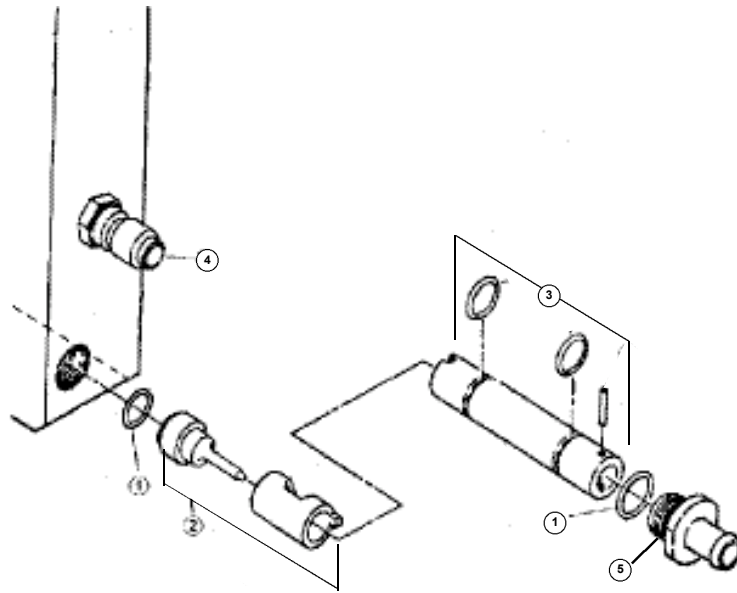
Manifold / Valve Assembly Pa rts Listing

Items	Pa r t Number	Description
1	41014-001	Solenoid Valve Assembly
2	41014-015	O-ring
3	41014-004	Small Valve Plunger
4	41014-003	Small Valve Guide
5	41014-002	Small Valve Coil
6	41013-003	Solenoid Valve Assembly
7	41013-001	Diaphragm
8	41015-001	Solenoid Valve Assembly
9	41015-015	O-ring
10	41015-004	Large Valve Plunger
11	41015-003	Large Valve Guide
12	41015-002	Large Valve Coil
13	75071-001	Manifold
Not Shown	78207-000	Large Valve Removal Tool



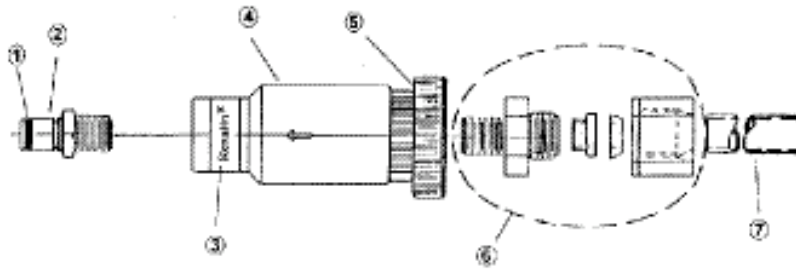
Transducer/Baffle Assembly Pa rts Listing

Item #	Part Number	Description
1	45006-001	Pressure Transducer
2	78202-000	Baffle Assembly
3	37509-004	Large Tie Wrap
4	43044-001	O-ring



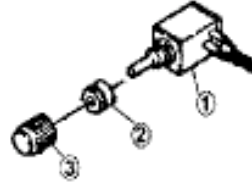
Water Inlet / Jet Pump Assembly Parts Listing

Item #	Part Number	Description
1	43034-000	O-ring
2	78397-842	Jet Pump Nozzle/Spacer
3	78397-843	Jet Pump Diffuser Assembly
4	47801-001	Inlet Water Connector
5	75100-000	Drain Fitting
Not Shown	47048-001	Jet Pump Removal Tool



78147-003 Renalin Uptake Tube Assembly 21% Parts Listing

Item #	Part Number	Description
1	43044-003	O-ring
2	47502-003	Connector
3	40053-000	Label - Renalin Conn.
4	41005-001	Ball Check Valve
5	75072-002	Cap - Modified
6	78397-814	Tube Fitting Assembly
7	47606-001	Suction Tube
Not Shown	47502-002	Colder Coupler (In-line Female)
Not Shown	47611-000	PVC Tubing - Red
Not Shown	40065-000	Label - Renalin Hose



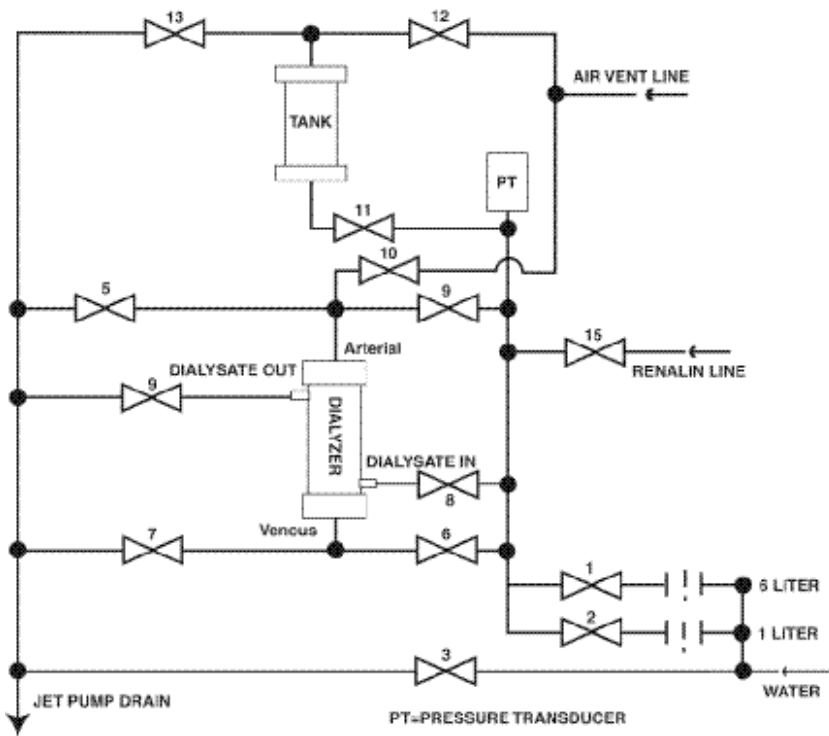
Hold To Set Assembly Parts Listing

Item #	Part Number	Description
1	35523-002	Mod-Pot (Wired)
2	43035-000	Grommet 7/8 ID
3	41512-000	Knob



78398-584 - Interlock Cable Kit

6.0 - Hydraulic Tank/Manifold Schematic



7.0 - Long-term Storage When Not in Use

The Renatron Station should be stored in a protected location. Avoid high-traffic areas where the system might get damaged and avoid high humidity.

The Renatron Dialyzer Reprocessing System is a high-quality precision medical system and should be treated as such. The system has been designed to withstand the rigors of normal use and, with reasonable care and maintenance, should provide many hours of trouble-free operation.



MINNTECH[®] **renal systems**



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