

# AMSCO Maintenance Manual



**PULSTAR SERIES**  
**pulstar® 1200 ENDOSCOPE PROCESSOR**  
(11/85) **P-704316-002**

**pulstar® SERIES**

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## SAFETY PRECAUTIONS

The following are personnel (WARNINGS) and equipment (CAUTIONS) safety precautions to be observed when operating or servicing this Washer. The page or pages on which they appear in the text of this manual are indicated by the number in the lower right-hand corner of the precautions.

**WARNING:** REPAIRS AND ADJUSTMENTS, OTHER THAN THOSE DESCRIBED IN THE INSTRUCTIONS, SHOULD BE ATTEMPTED ONLY BY EXPERIENCED PERSONS FULLY ACQUAINTED WITH THIS EQUIPMENT. USE OF INEXPERIENCED, UNQUALIFIED PERSONS TO WORK ON THE EQUIPMENT OR THE INSTALLATION OF UNAUTHORIZED PARTS COULD CAUSE PERSONAL INJURY OR RESULT IN COSTLY DAMAGE.

**WARNING:** BEFORE PERFORMING ANY REPAIR OR MAINTENANCE PROCEDURES, DISCONNECT THE POWER CORD FROM THE ELECTRICAL OUTLET.

**WARNING:** PROTECTIVE CLOTHING, INCLUDING EYE PROTECTION, SHOULD BE WORN WHILE PERFORMING THIS PROCEDURE TO GUARD AGAINST ANY POSSIBLE PERSONAL INJURY.

**CAUTION:** Commercially available alkaline, 2% glutaraldehyde formulations (e.g., Cidex™ or Glutarex™) are the only recommended disinfectants for use with the endoscope processor.

**CAUTION:** All scopes should be vigorously brush cleaned, according to the manufacturer's recommendations, prior to their first use in the Pulstar 1200 Processor.

**CAUTION:** Never attach a washing adapter to a washer suction or water port without attaching the other end to an endoscope port. If this is done, water will run out of the unattached end of the adapter. Biopsy port on scope must be connected by an adapter to washer biopsy port.

**CAUTION:** NEVER use soap or detergent in the processor.

**CAUTION:** If during washing, any water leaks from the endoscope's air or suction valves or from the light guide connector, stop the cycle immediately.

**CAUTION:** DO NOT stop the cycle during the DISINFECT FILL or DISINFECT SOAK phase of the cycle, or a large amount of disinfectant will be lost to the drain.

**CAUTION:** When detaching the smoked panel (behind access door), be careful not to damage the three ribbon cables which are attached to the thumbwheel switches and the printed circuit board.

**CAUTION:** When removing the control panel faceplate, be careful not to damage wire connections on back of control panel faceplate.

**CAUTION:** Endoscopes can be damaged by excessive processor water pressure. Processor water pressure regulator must be adjusted to maintain 2.5 psig  $\pm$  0.5 psig pressure.

**CAUTION:** The piping must be as level as possible. Drain line tilt towards the disinfectant tank is unacceptable. Tilt towards the drain tank is acceptable only if not greater than 2°.

## SECTION 1 GENERAL INFORMATION



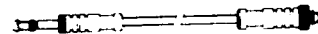
### 1.1 APPLICATION AND DESIGN

The product literature included in this section contains technical data relating to the principal descriptive and identifying characteristics for the PULSTAR 1200 Endoscope Processor. The literature is informational rather than instructional. It provides and conveys, textually and illustratively, a general concept of the equipment, its purpose, capabilities, limitations, and technical specifications.

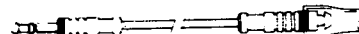
## 1.2 ENDOSCOPE PROCESSING ACCESSORIES

The following accessories are for use with the Pulstar® 1200 Endoscope Processor. All endoscopes to be washed in the processor will require adapters for connection of suction, air/water, and biopsy ports (as applicable). Listed in Figure 1-1 are the original style adapters for units with serial numbers 81001 through 82275. Figure 1-2 lists the new style quick disconnect type adapters for use with units having serial numbers 82276 through 82300. These adapters are cross-referenced with specific models and types of endoscopes listed in Table 1-1. Use the cross-reference list to match adapters with specific endoscopes. The first four adapters listed in each Figure are standard equipment; one of each is furnished with each Endoscope Processor.

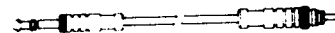
**Small Biopsy Port Adapter**  
Part No. P-56399-029



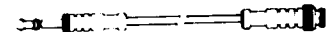
**Suction Port Adapter**  
Part No. P-56399-028



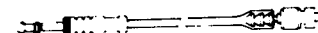
**Water Port Adapter**  
Part No. P-56399-027



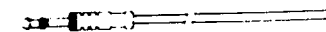
**Large Biopsy Port Adapter**  
Part No. P-56399-030



**Port Adapter - LUER Type**  
Part No. P-56399-059



**Multipurpose Adapter**  
Part No. P-56399-052



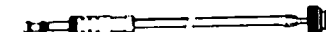
**Water Port Adapter**  
Part No. P-56399-060



**Water Port Adapter**  
Part No. P-56399-061



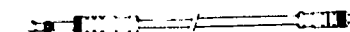
**Biopsy Port Adapter**  
Part No. P-56399-053



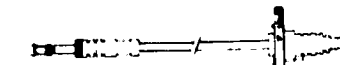
**Biopsy and Water Port Adapter**  
Part No. P-56399-054



**Biopsy Port Adapter**  
Part No. P-56399-055



**B-200 Adapter**  
Part No. P-56399-064

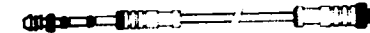


**Coupler Kit\***  
Part No. P-56399-071

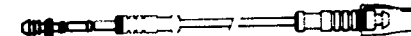
\*Same part no. for original and new style adapters. See Figure 1-2 for pictorial representation.

Figure 1-1. ORIGINAL STYLE ADAPTERS.

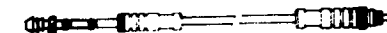
**Small Biopsy Port Adapter**  
Part No. P-56399-091



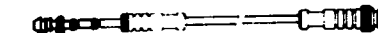
**Suction Port Adapter**  
Part No. P-56399-090



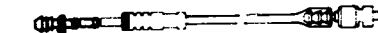
**Water Port Adapter**  
Part No. P-56399-089



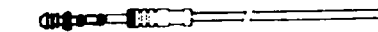
**Large Biopsy Port Adapter**  
Part No. P-56399-092



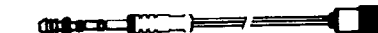
**Port Adapter - LUER Type**  
Part No. P-56399-096



**Multipurpose Adapter**  
Part No. P-56399-093



**Water Port Adapter**  
Part No. P-56399-094



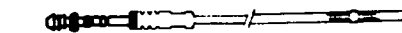
**Water Port Adapter**  
Part No. P-56399-098



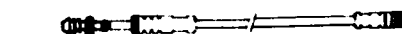
**Biopsy Port Adapter**  
Part No. P-56399-100



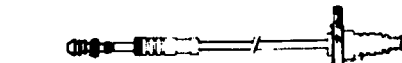
**Biopsy and Water Port Adapter**  
Part No. P-56399-094



**Biopsy Port Adapter**  
Part No. P-56399-095



**B-200 Adapter**  
Part No. P-56399-101



**Coupler Kit**  
Part No. P-56399-071

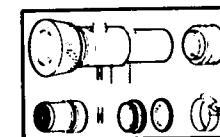


Figure 1-2. NEW STYLE ADAPTERS.

TABLE 1-1. TYPES OF ENDOSCOPES AND THEIR REQUIRED ADAPTERS.

OLYMPUS ENDOSCOPES	Require the following adapters:		
	Type of Adapters	Original Style	New Style
Gastrosopes GIF - Type D/D2/D3 GIF - Type K	Biopsy Port Suction Port Water Port	P-56399-029 P-56399-028 P-56399-027	P-56399-091 P-56399-090 P-56399-089
*GIF - Type P3 *GIF - Type 1T *GIF - Type 2T *GIF - Type D4 *GIF - Type HM *GIF - Type K2 *GIF - Type Q *GIF - Type XQ *GIF - Type P/P2	Suction Port Water Port Multipurpose	P-56399-028 P-56399-027 P-56399-052	P-56399-090 P-56399-089 P-56399-093
*TGF - Type 2D *TGF - Type 2S	Biopsy Port Suction Port Water Port Multipurpose	P-56399-029 P-56399-028 P-56399-027 P-56399-052	P-56399-091 P-56399-090 P-56399-089 P-56399-093
Colonoscopes CF - Type MB3/MB3R CF - Type LB/LB3/LB3R LB3W CF - Type 1B CF - Type 1BW CF - Type HM	Biopsy Port Suction Port Water Port	P-56399-029 P-56399-028 P-56399-027	P-56399-091 P-56399-090 P-56399-089
*CF - Type MB2 *CF - Type LB2	Suction Port Water Port Multipurpose	P-56399-028 P-56399-027 P-56399-052	P-56399-090 P-56399-089 P-56399-093
*TCF - Type 2L/2L2	Biopsy Port Suction Port Water Port Multipurpose	P-56399-029 P-56399-028 P-56399-027 P-56399-052	P-56399-091 P-56399-090 P-56399-089 P-56399-093
Sigmoidoscope *TCF - Type 1S *CF - Type 1TS/1TS2 *CF - Type 1TL *CF - Type 1TL	Suction Port Water Port Multipurpose	P-56399-028 P-56399-027 P-56399-052	P-56399-090 P-56399-089 P-56399-093
Duodenoscope JF - Type 1T	Biopsy Port Suction Port Water Port	P-56399-029 P-56399-028 P-56399-027	P-56399-091 P-56399-090 P-56399-089

TABLE 1-1. (cont'd)

OLYMPUS ENDOSCOPES	Require the following adapters:		
	Type of Adapter	Original Style	New Style
Duodenoscopes - cont'd JF - Type B4	Suction Port Water Port Large Biopsy Port	P-56399-028 P-56399-027 P-56399-030	P-56399-090 P-56399-089 P-56399-092
*JF - Type B/B2/B3	Suction Port Water Port Multipurpose	P-56399-028 P-56399-027 P-56399-052	P-56399-090 P-56399-089 P-56399-093
Esophagoscope EF - Type B3	Suction Port Water Port Biopsy Port	P-56399-028 P-56399-027 P-56399-059	P-56399-090 P-56399-089 P-56399-096
Bronchoscopes** BF - Type 1T BF - Type 1TR BF - Type 2T BF - Type 3C3/3C3R BF - Type 3C4 BF - Type 1B BF - Type 4B2 BF - Type 4C3 BF - Type B3R BF - Type 6C	Biopsy Port Multipurpose	P-56399-059 P-56399-052	P-56399-096 P-56399-093

\*Requires the use of cleaning adapter furnished by Olympus and attached to AMSCO's multipurpose adapter (P-56399-052 or -093). See Figure 1-3 for proper type and attachment.

\*\*See Figure 1-4 for adapter connections.

TABLE 1-1. (cont'd)

ACMI ENDOSCOPES	Require the following adapters:		
	Type of Adapter	Original Style	New Style
Gastrosopes TX-7 TX-8 TX-SLM AG-R AG-RF AG-TZ	Suction Port Water Port Biopsy Port	P-56399-028 P-56399-027 P-56399-055	P-56399-090 P-56399-089 P-56399-095
F5-A F8 FO-7089 FO-7089A FO-7089C FO-7089D	Suction Port Biopsy and Water Port 2 (req'd)	P-56399-028 P-56399-054	P-56399-090 P-56399-094
Duodenoscope	Suction Port Water Port Biopsy Port	P-56399-028 P-56399-027 P-56399-055	P-56399-090 P-56399-089 P-56399-095
Colonoscopes TX-91 (2 Channel) TX-92 (2 Channel)	Suction Port Water Port Biopsy Port	P-56399-028 P-56399-027 P-56399-055	P-56399-090 P-56399-089 P-56399-095
F9-A F9-L F9-P FO-9000L FO-9000P	Suction Port Biopsy and Water Port 2 Req'd	P-56399-028 P-56399-054	P-56399-090 P-56399-094
Sigmoidoscope T-91S	Suction Port Water Port Biopsy Port	P-56399-028 P-56399-027 P-56399-055	P-56399-090 P-56399-089 P-56399-095
Bronchoscope F3	Biopsy Port	P-56399-059	P-56399-096
Choledochoscope CDX-1 ACD-15	Biopsy Port	P-56399-059	P-56399-096

TABLE 1-1. (cont'd)

MACHIDA ENDOSCOPES	Require the following adapters:		
	Type of Adapter	Original Style	New Style
Gastrosopes PGS FGI TGS	Suction Port Biopsy Port Water Port	P-56399-028 P-56399-059 P-56399-060	P-56399-090 P-56399-096 P-56399-094
Bronchoscopes FBS - 6TII FBS - 6TL FBS - 6TLII	Biopsy Port	P-56399-059	P-56399-096
Duodenoscope FDS	Suction Port Biopsy Port Water Port	P-56399-028 P-56399-059 P-56399-060	P-56399-090 P-56399-096 P-56399-094
Choledochoscope FCH - 5T FCH - 7T	Port Adapter Port Adapter 3 Req'd	P-56399-059 P-56399-059	P-56399-096 P-56399-096

PENTAX ENDOSCOPES	Require the following adapters:		
	Type of Adapter	Original Style	New Style
Bronchoscopes	Port Adapter Suction Port	P-56399-059 P-56399-028	P-56399-096 P-56399-090
Nephroscope G960	Port Adapter	P-56399-059	P-56399-096
All Other Scopes	Suction Port Water Port Biopsy Port	P-56399-028 P-56399-027 P-56399-059	P-56399-090 P-56399-089 P-56399-096

TABLE 1-1 (cont'd)

FUJINON ENDOSCOPES	Require the following adapters:		
	Type of Adapter	Original Style	New Style
Gastroscope EGD - E105°	Suction Port Water Port Biopsy Port*	P-56399-028	P-56399-090
		P-56399-061	P-56399-098
		P-56399-064	P-56399-101
UGI - CT	Port Adapter 2 Req'd Biopsy Port*	P-56399-059	P-56399-096
		P-56399-064	P-56399-101
Colonoscope M2 - 1340 L2 - 1835 S2 - 1110 SG - E725	Suction Port Water Port Biopsy Port*	P-56399-028	P-56399-090
		P-56399-061	P-56399-098
		P-56399-064	P-56399-101
Bronchoscope	Biopsy Port*	P-56399-064	P-56399-101
Duodenoscope	Suction Port Water Port *Biopsy Port	P-56399-028	P-56399-090
		P-56399-061	P-56399-098
		P-56399-064	P-56399-101

\*Older Fujinon scopes may require Biopsy Port Adapter P-56399-053 (P-56399-100 New Style). To determine which adapter is required, visually compare the biopsy port opening of scope to a pictorial view of adapters P-56399-053 and P-56399-064 (P-56399-100 and P-56399-101 New Style).

## NOTE

1. Replacement "O" rings (P-150825-276) for Pulstar 1200 port adapters may be obtained from AMSCO Service Company.
2. Protective rubber caps (P-150825-105) for use over scope suction and air/water buttons may be obtained from AMSCO Service Company.

## 1.3 INSTRUCTIONS FOR USE AND CLEANING WITH OLYMPUS ENDOSCOPES

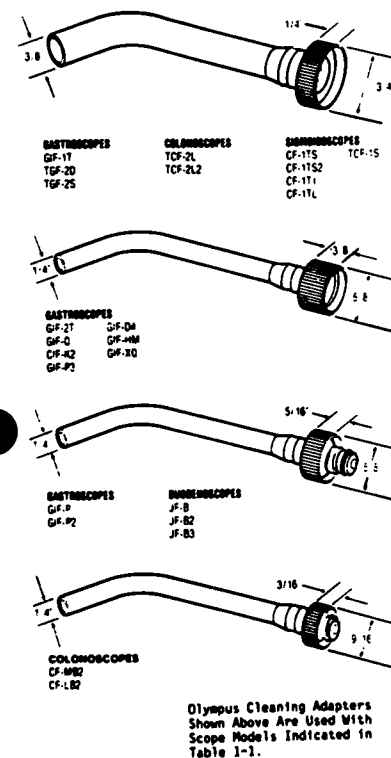


Figure 1-3. Olympus Cleaning Adapters.

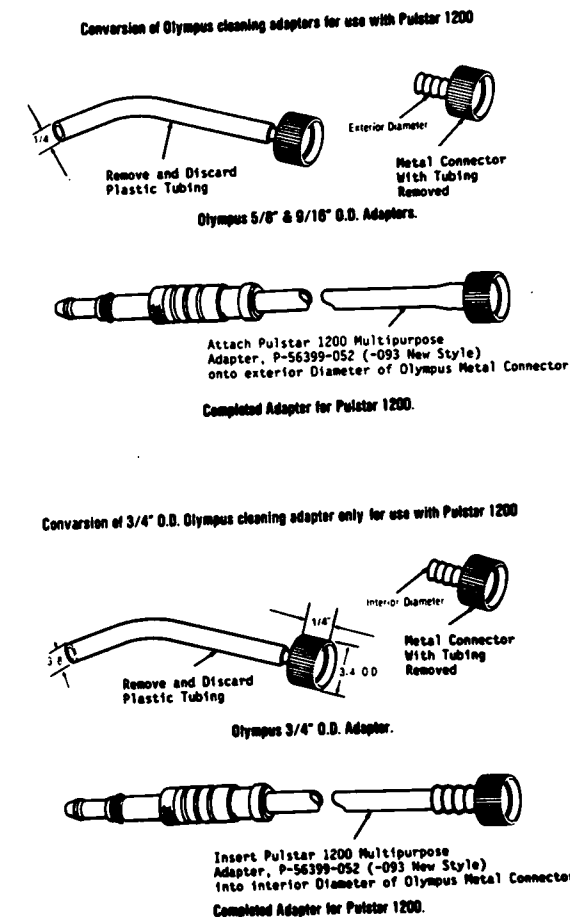


Figure 1-4. Conversion of Olympus Cleaning Adapters.

## 1.4 SPECIAL WASHING INSTRUCTIONS FOR SOME OLYMPUS ENDOSCOPES

### 1.4.1 Olympus Gastroscopes TGF-2S, 2D and Olympus Colonoscope TCF-2L2

- Each of the above scopes has two biopsy channels, a small and a large. These channels must be processed separately, one at a time.
- Wash the small biopsy channel first, using biopsy port adapter P-56399-029 (P-56399-091 New Style). Arrange the scope on the washer. Insert proper suction and water supply adapter and insert in washer ports.
- Set the suction button on the operating head to (S) and wash.
- After washing is complete, remove the small biopsy adapter from the biopsy port.
- Set the suction button on the operating head to (L). Connection of large biopsy port to washer connector can be made in either of two ways. Use the large biopsy port adapter, P-56399-030 (P-56399-092 New Style), or use the suction washing adapter (supplied with the scope) and the small biopsy port adapter P-56399-029 (P-56399-091 New Style).

### 1.4.2 Olympus Colonoscopes CF-LB2/MB2

Before inserting adapter, secure the scope on washer at all places. Since the biopsy port adapter for the scope does not rotate, place that adapter in position last. This will prevent damage to the scope.

### 1.4.3 Olympus Bronchoscopes

Attach the biopsy port washing adapter (supplied with the scope) to the "lock end" of biopsy port adapter P-56399-059 (P-56399-096 New Style). Then attach to the biopsy port of the scope, and the other end to the washer connector at the front of the machine. See Figure 1-5.

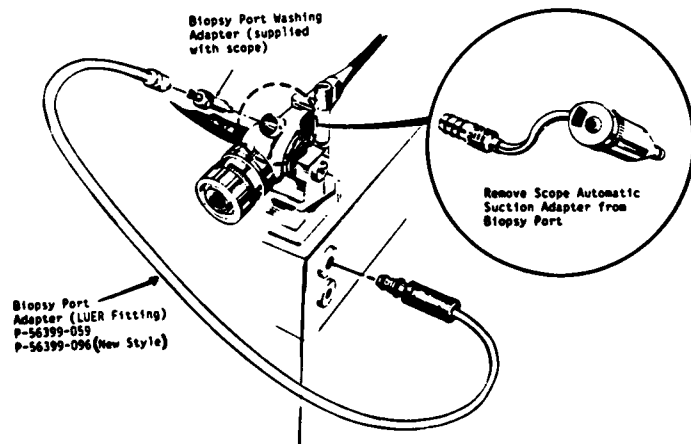


Figure 1-5. Adapter Connection to Olympus Bronchoscope.

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764316-682

B-1



## pulstar<sup>1200</sup> ENDOSCOPE PROCESSOR

## TECH DATA

### APPLICATION

Fully automatic, portable washer for flexible endoscopes. Uses foaming water and delivers disinfectant to clean the interior channels and exterior insertion tube of endoscopes, such as bronchoscopes, gastroscopes, and colonoscopes. Automatic processing minimizes the handling of delicate scopes during washing, provides rapid, and uniform, cleaning.\*

### DESCRIPTION

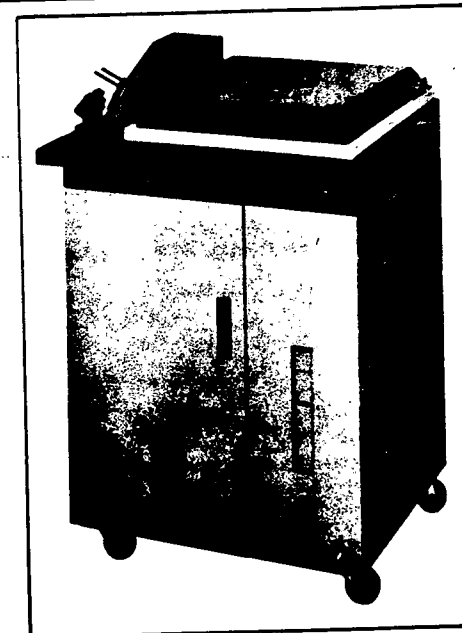
Processor design protects the endoscope control section and light guide connector during washing. After correctly securing the scope and selecting desired wash mode, operator merely touches START to initiate cycle. Electronic controls automatically cycle washer through rinse, wash, disinfectant delivery, and drying phases. Uses water to wash the exterior of the insertion tube and the interior of the irrigation, suction, and biopsy channels (as applicable). Air introduced into water provides gentle scrubbing action throughout washing phase.

### Design Features

Washer is designed to accomplish endoscope cleaning quickly and dependably. Its features are as follows:

- The endoscope operating head is clamped securely in position on a support cradle, safely away from the washing area.
- The light guide is secured in a separate clamp, also away from the washing area.

\*NOTE: Some pre-cleaning of scopes will be necessary.



Typical only — some details may vary.

THE SELECTION CHECKED BELOW  
APPLIES TO THIS EQUIPMENT

#### Accessories

- ☐ Endoscope Processing Accessories  
(see separate product literature)

Item No. \_\_\_\_\_  
Location(s) \_\_\_\_\_

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Endoscope Processor



- Transparent, waterproof, washer top serves dual purpose of protecting operating head and light guide while allowing operator to view washing action.

- While exterior of insertion tube is cleaned, interior of air/water, suction, and biopsy channels (as applicable) are also cleaned by the circulating solution. Channels are then dried by air.

- Most models and brands of flexible endoscopes can be cleaned by the washer, using special adapters. The four most commonly used adapters are supplied. Other adapters required for specialized scopes are available. (See separate product literature.)

- Controls offer two operating cycles: water wash and dry, and water wash/disinfectant delivery, rinse, and dry.

- Washer is portable. It is mounted on casters, and requires only a 115 VAC outlet and simple connection to a standard cold water faucet and drain.

- Once the washing cycle and phase times have been selected, they can be repeated exactly, as many times as desired without resetting controls. Solid state controls assure repeatability and dependability of cycles, minimize maintenance requirements.

- Three individually adjustable timers, located behind the front access door, allow operator great flexibility in processing cycles by selecting separate phase times for wash, disinfectant soak, and dry times. Timers are thumbwheel type, and adjustable from 1-999 seconds.

- Disinfectant reservoir tank has visible level control.

- Cycle counter is provided.

## TECHNICAL DATA

### Operator Controls

Once the endoscope has been positioned, operator merely turns on the control panel POWER switch, selects the DISINFECTANT DELIVERY or WATER WASH cycle, and presses the START pushbutton. Cycle then proceeds automatically to completion. As the cycle proceeds to completion, individual phases of the cycle are indicated by separate phase lights. STOP pushbutton may be used to discontinue the cycle at any point. DISCHARGE DISINFECTANT pushbutton is for pumping the disinfectant in the storage tank to drain, when reuse of the disinfectant is no longer desirable.

Control components are solid-state electronic and are contained on a printed circuit board, accessible from the front access door. Included are solid-state timer switches, by which the times for the wash, disinfectant and delivery and dry phases may be adjusted within the range of 1-999 seconds, to suit user requirements.

## Washing and Rinsing Cycles

### Water Only

**Fill:** Cold tap water flows into the scope-holding tray to cover the exterior of the insertion tube (40 seconds).

**Wash:** Air bubbles through running water (drain open) in the scope-holding tray to wash exterior of scope: interior of air/water, suction, and biopsy channels (as applicable) washed with running water (adjustable 1-999 seconds).

**Dry:** Water is drained from channels and tray; air circulates through interior of channels for drying (adjustable 1-999 seconds).

### Water and Disinfectant Delivery

**Fill:** Cold tap water flows into the scope-holding tray to cover the exterior of the insertion tube (40 seconds).

**Wash:** Air bubbles through running water (drain open) in the scope-holding tray to wash exterior of scope: interior of air/water, suction, and biopsy channels (as applicable) washed with running water (adjustable 1-999 seconds).

**Drain:** Water is drained from the tray to waste (60 seconds).

**Disinfectant Delivery:** Chemical disinfectant is pumped to scope-holding tray and through interior of air/water, suction, and biopsy channels (as applicable) — soak period adjustable, 1-999 seconds.

**Recovery of Disinfectant:** Disinfectant is returned to storage tank (60 seconds).

**Rinse:** Air bubbles through running water (drain open) in the scope-holding tray to rinse the exterior of scope: interior of air/water suction, and biopsy channel (as applicable) rinsed with running water (140 seconds).

**Dry:** Water is drained from channels and tray, and air circulates through interior of channels for drying (adjustable 1-999 seconds).

## Washing and Rinsing System

Washing, rinsing and disinfectant delivery cycle phases operate according to the preprogrammed solid-state controls. These controls operate the washer through the cycle by actuating a series of solenoid valves, as well as the air blower, chemical disinfectant pump, and water discharge pump. Water pressure to the scope and holding tray is maintained by a pressure regulator. The controls are so programmed that, unless the discharge disinfectant pushbutton is pressed, the disinfectant will automatically be returned to the storage tank for reuse during subsequent cycles. Operation of the waste-water discharge pump is governed by a

float and three level-sensors located in the waste water tank. Included in the tank level controls is a safety switch which will turn off the washer automatically to prevent overflow. The disinfectant storage tank is also protected against overflow. The attachments for washing the biopsy, air/water, and suction channels of a scope are so arranged that water and disinfectant are pumped in the opposite direction from the normal flow when the scope is used during procedures. This feature provides a "backwashing" flow for improved cleaning.

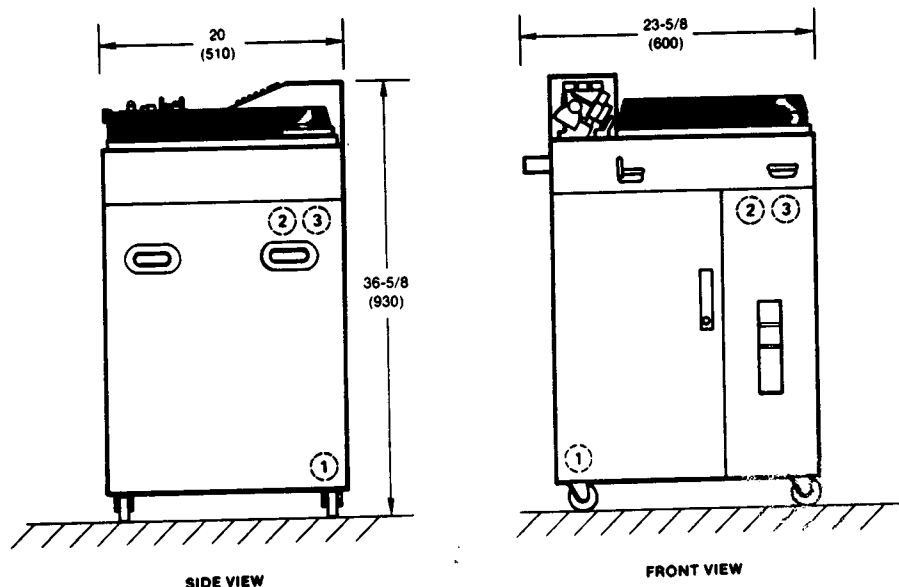
## ENGINEERING DATA

APPROXIMATE CONSUMPTIONS		
Water — Disinfectant Feedlines	Pressure (PSI)	Flow (GPM)
Suction and Irrigation	3.2	.16
Channel Faucet to Tray	5.0	1.0
Line at Inlet	7.0	
Air Feedlines	Pressure	Flow (CFM)
Suction and Irrigation	1.35	.35
Blower Output	1.50	10.00
Cycle Consumption	Time (Min.)	Water Consumed (Gal.)
Average Cycle (5 minute wash, 10 minute disinfectant soak, 2 minute dry)	20	10
Maximum Cycle Time (based on wash, disinfectant soak, and dry times of 999 seconds i.e., 16 minutes, 39 seconds each)	55	25

Operating Current Demand — 5 amps

Dimensions — 23-5/8 W x 20 L x 36-5/8 H inches

Weight — approximately 200 lbs.



DIMENSIONS ARE INCHES (MILLIMETRES) — DRAWING IS NOT TO SCALE

#### OPERATING REQUIREMENTS

- ① ELECTRIC — 115 Volts, 60 Hz, 15 Amp
- ② COLD WATER — 20-80 psi (1.4-5.6 kg/cm<sup>2</sup>)
- ③ DRAIN

NOTE: Approximate weight is 200 lbs (90 kg)

This print is for guidance when planning space and utility services. Actual installation prints may be obtained from any AMSCO office representative.

## SECTION 2 OPERATING INSTRUCTIONS

SECTION 2

### 2.1 BEFORE STARTING A CYCLE

1. Check that the disinfectant level is above the minimum allowable level. See Figure 2-1.

**CAUTION:** Commercially available alkaline, 2% glutaraldehyde formulations (e.g., Cidex™ or Glutarex™) are the only recommended disinfectants.

2. The thumbwheel timers are located behind the front access door. Adjust these to suit actual soil conditions; suggested typical times are: WASH - 300 secs; DISINFECTANT SOAK - 600 secs (follow disinfectant manufacturer's instructions); DRY - 150 secs. (Dry times will vary according to the length of the scope - adjust accordingly.)

3. Open the sink cold water faucet.

### 2.2 PRECLEANING AND POSITIONING THE ENDOSCOPE

**NOTE:** Inefficient or ineffective processing could result if these precleaning instructions are not followed before every cycle.

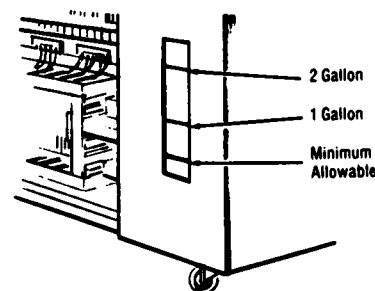


Figure 2-1. CHECK DISINFECTANT LEVEL.

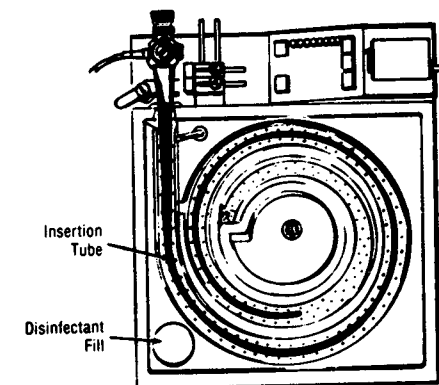


Figure 2-2. PLACE INSERTION TUBE IN POSITION.

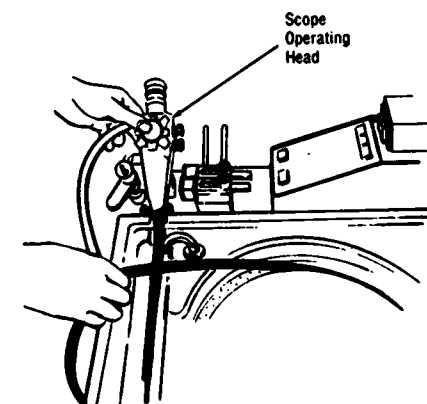


Figure 2-3. POSITION SCOPE OPERATING HEAD.

1. Place the insertion tube in the washing tray. See Figure 2-2. Place the scope operating head in the support and secure by rotating upward the endoscope head clamp designated "1" until it is resting against the control section. See Figures 2-3 and 2-4.

**CAUTION:** All scopes should be vigorously brush cleaned, according to scope manufacturer's recommendations, prior to their first use in the Pulstar 1200 Processor.

2. Place the light guide tube on the two supports on the front of the washer so that the light guide connector is suspended from the support closest to the operating head support. See Figure 2-5.

**NOTE:** Certain types of scopes require a Light Guide Plug. Part No. 150825-106.

3. Wipe down insertion tube with damp gauze to remove gross soil.

4. Clean each of the following areas with a clean, damp cotton swab.

a. insertion tube tip

b. biopsy channel port on operating head after removal of biopsy valve. (On bronchoscopes, it is necessary to remove the suction valve adapter before the biopsy port can be cleaned. The suction valve adapter should be cleaned separately.) See Figure 2-6.

c. the suction valve housing for those scopes with removable valves

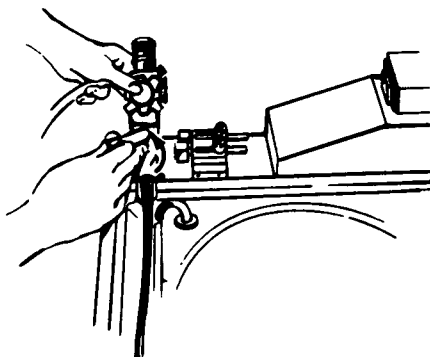


Figure 2-4. SECURE SCOPE OPERATING HEAD.

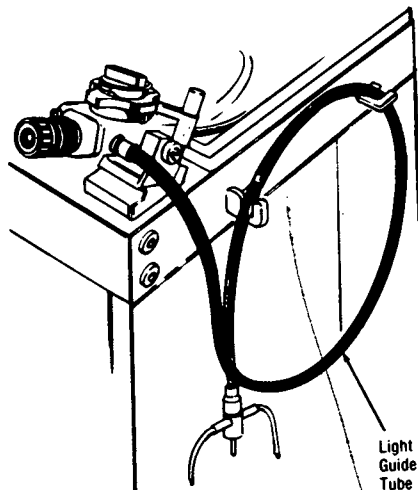


Figure 2-5. POSITION LIGHT GUIDE TUBE.

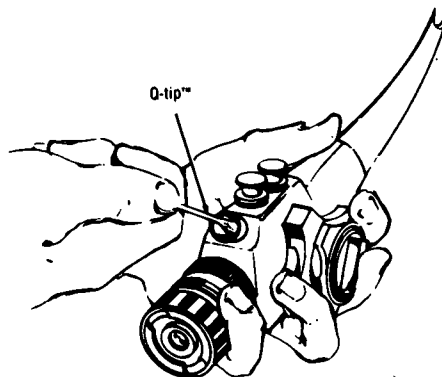


Figure 2-6. CLEAN BIOPSY PORT.

2-2  
764316-002

6. Arrange the insertion tube in the washing tray so that the tube is in the center of the circular channel, away from the sides. This will permit uniform cleaning of all sides of the tube. See Figure 2-2.

7. Turn the clamp designated "2" clockwise until it is resting against the side of the operating head. See Figure 2-7.

8. Place the protective caps (P-150825-105) over the suction and air/water buttons on the side of the operating head. See Figure 2-8. Slide the pressure pad up the support until it is aligned with the scope suction button, then push the pressure pad against the button until the button is fully depressed. Tighten the clamp in place by turning the screw "3" clockwise. (This will keep the channel open for washing.) Repeat this procedure for the air/water button with clamp "4" (if the scope has an air/water channel.) See Figures 2-9, 2-10.

**CAUTION:** Never attach a washing adapter to a washer suction or water port without attaching the other end to an endoscope port. If this is done, water will run out of the unattached end of the adapter. Biopsy port on scope must be connected by an adapter to washer biopsy port.

**NOTE:** Apply a small amount of Vaseline Petroleum Jelly to a clean soft cloth and wipe around adapter plug. Remove any excess. This should facilitate adapter acceptance into ports. O-Ring replacement is required if leakage continues.

9. Select the correct washing adapters (see Section 2.5) and attach the biopsy port adapter at the top of the operating head and the top of the control console. See Figure 2-11. Attach the suction and water port adapters to the light guide channel connections and to the washer ports on the front of the machine. See Figure 2-12.

For special adapter connection to some bronchoscopes, refer to Figure 6 in Tech Data SD-286 in front of manual.

### 2.3 WATER WASH CYCLE (NO DISINFECTANT)

**CAUTION:** NEVER use soap or detergent in the processor.

1. Close washer lid. Make sure POWER panel light is on - press to turn on.

2. Press the DISINF BY-PASS pushbutton. The pushbutton light will come on.

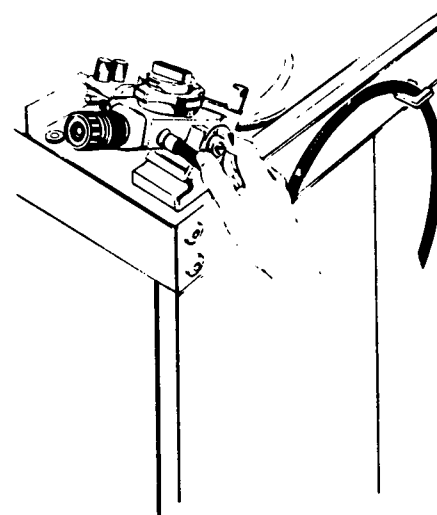


Figure 2-7. SECURE SCOPE OPERATING HEAD.

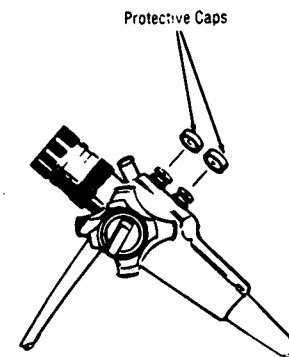


Figure 2-8. PLACE PROTECTIVE CAPS OVER SUCTION AND AIR/WATER BUTTONS.

5. Run the cleaning brush provided by the scope manufacturer through the full length of the biopsy channel(s). Heavily soiled scopes may require several passes of the brush.

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764316-002

3. Press START pushbutton.

4. Pressing the STOP pushbutton will stop the cycle in progress. When the processor is restarted, it will start from the beginning of the cycle.

**CAUTION:** If during washing, any water leaks from the endoscope's air or suction valves or from the light guide connector, stop the cycle immediately.

Such leakage indicates one or more of the following problems.

a. Endoscope's O-ring or valves are worn, or seals are ruptured. The endoscope must be repaired before it can be washed in the processor.

b. The washing adapter's O-rings are worn or damaged. Replace the adapter.

c. The protective caps for the suction or air/water buttons are not in place securely. Secure.

d. The pressure pads "3" and "4" are not correctly positioned. They must fully depress the suction and air/water pushbuttons and then be tightened in place. Correct.

5. Once the START pushbutton is pressed, the cycle will proceed as follows:

a. **FILL** light comes on. Water is admitted to scope-holding tray through the channel faucet. Simultaneously, air is admitted to the tray through holes in the tray bottom to provide water-bubbling action. Water also flows through the suction and irrigation channels. This phase lasts 40 seconds.

b. **WASH** light comes on. Water is admitted to the scope-holding tray, and also through the suction, irrigation, and biopsy ports (as applicable) of the scope. Simultaneously, air is admitted through holes in the tray bottom to provide water-bubbling action. The main wash drain is open to allow a continuous flow of fresh water. This phase is variable 1-999 seconds (operator selected time).

c. **DRAIN** light comes on. Water is drained through the main wash drain while air is delivered through the scope channels. This phase lasts 140 seconds.

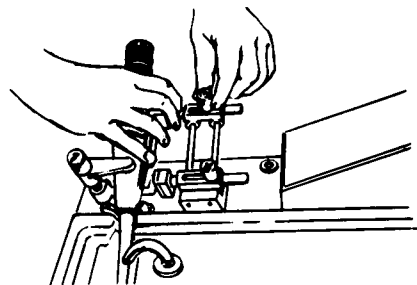


Figure 2-9. SECURE SCOPE SUCTION BUTTON IN OPEN POSITION.

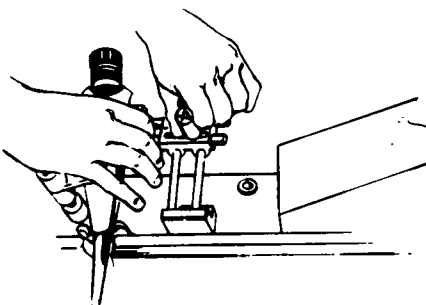


Figure 2-10. SECURE SCOPE AIR/WATER BUTTON IN OPEN POSITION.

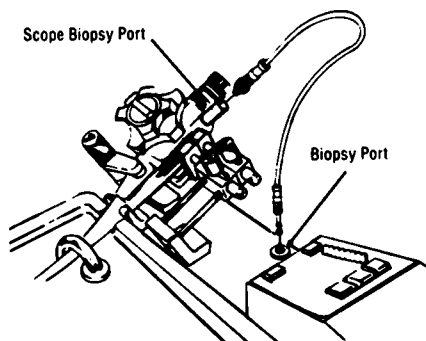


Figure 2-11. ATTACH BIOPSY PORT ADAPTER.

**CAUTION:** DO NOT stop the cycle during the **DISINFECT FILL** or **DISINFECT SOAK** phase of the cycle, or a large amount of disinfectant will be lost to the drain.

5. Pressing the STOP pushbutton will stop the cycle in progress. When the processor is restarted, it will start from the beginning of the cycle.

**CAUTION:** If during washing, any water leaks from the endoscope's air or suction valves or from the light guide connector, stop the cycle immediately.

Such leakage indicates one or more of the following problems.

a. Endoscope's O-ring or valves are worn, or seals are ruptured. The endoscope must be repaired before it can be washed in the processor.

b. The washing adapter's O-rings are worn or damaged. Replace the adapter.

c. The protective caps for the suction or air/water buttons are not in place securely. Secure.

d. The pressure pads "3" and "4" are not correctly positioned. They must fully depress the suction and air/water pushbuttons and then be tightened in place. Correct.

6. Once the START pushbutton is pressed, the cycle will proceed as follows:

a. **FILL** light comes on. Water is admitted to scope-holding tray through the channel faucet. Simultaneously, air is admitted to the tray through the holes in the tray bottom to provide water-bubbling action. Water also flows through the suction and air/water channels. This phase lasts 40 seconds (factory preset time).

b. **WASH** light comes on. Water is admitted to the scope-holding tray, and also through the suction, air/water, and biopsy ports (as applicable) of the scope. Simultaneously, air is admitted through holes in the tray bottom to provide water-bubbling action. The main wash drain is open to allow a continuous flow of fresh water. This phase is adjustable 1-999 seconds (operator selected time).

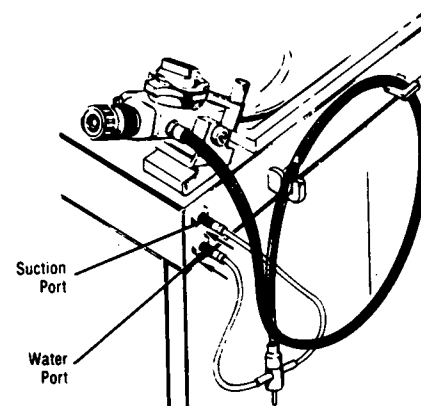


Figure 2-12. ATTACH SUCTION AND WATER PORT ADAPTERS.

d. **DRY** light comes on. The blower circulates air through the suction, air/water, and biopsy ports of the endoscope. This phase is variable 1-999 seconds (operator selected time).

## 2.4 WATER WASH AND DISINFECTANT SOAK CYCLE

**CAUTION:** NEVER use soap or detergent in the processor.

1. AMSCO has documented the rate of dilution of the glutaraldehyde disinfectant in the PULSTAR 1200. Because of this dilution, the disinfectant should be changed at least every 18 cycles per gallon. However, it may be necessary to change the disinfectant more often as some brands of glutaraldehyde are less stable than others after activation.

2. Make sure **POWER** panel light is on - press to turn on.

3. Make sure the **DISINF BY-PASS** switch is off. Test that the lamp is not burned out by pressing on and off.

4. Press the **START** pushbutton.

c. DRAIN light comes on. Water is drained through the main wash drain while air is delivered through the scope channels. This phase lasts 60 seconds.

d. DISINFECT FILL light comes on. The disinfectant pump comes on to fill the tray through the channel faucet. Disinfectant also is pumped through the suction, water, and biopsy channels (as applicable) of the scope. This phase lasts for 21 seconds.

e. DISINFECT SOAK light comes on. The interior channels of the endoscope and the exterior of the insertion tube are soaked in solution. This phase is variable 1-999 seconds. (Operator selected time -refer to disinfectant manufacturer's recommendations.)

f. DISINFECTANT RETURN light comes on. The main wash drain is open and disinfectant is returned to storage tank. This phase lasts for 60 seconds.

g. RINSE light comes on. Running water rinses the exterior of the scope, and the interior of the water, suction, and biopsy channels (as applicable). This phase lasts 140 seconds.

h. DRAIN light comes on. Water is drained through the main wash drain and the air supply outlet in the tray while air is circulated through the suction and air/water channels of the scope. This phase lasts 140 seconds.

i. DRY light comes on. The blower circulates air through the suction, water, and biopsy channels (as applicable) of the endoscope. This phase is variable 1-999 seconds. (Operator selected time.)

## 2.5 ENDOSCOPE WASHING ADAPTERS

All endoscopes to be washed in the processor will require adapters for connection of suction, air/water, and biopsy ports (as applicable). Refer to pages 1-2 through 1-10 for illustrations of the available adapters. Also included are recommendations for application of adapters to specific scopes.

## SECTION 3

## PRINCIPLES OF OPERATION

SECTION 3

### 3.1 FUNCTIONAL DESCRIPTION OF CONTROLLER

The Pulstar 1200 is designed to work and deliver disinfectant to various flexible endoscopes. The electrical components used to accomplish the task of the Pulstar 1200, i.e., ten solenoid valves, blower, drain pump and disinfectant pump, are controlled by the use of solid state relays and limit switches.

The block diagram is shown below.

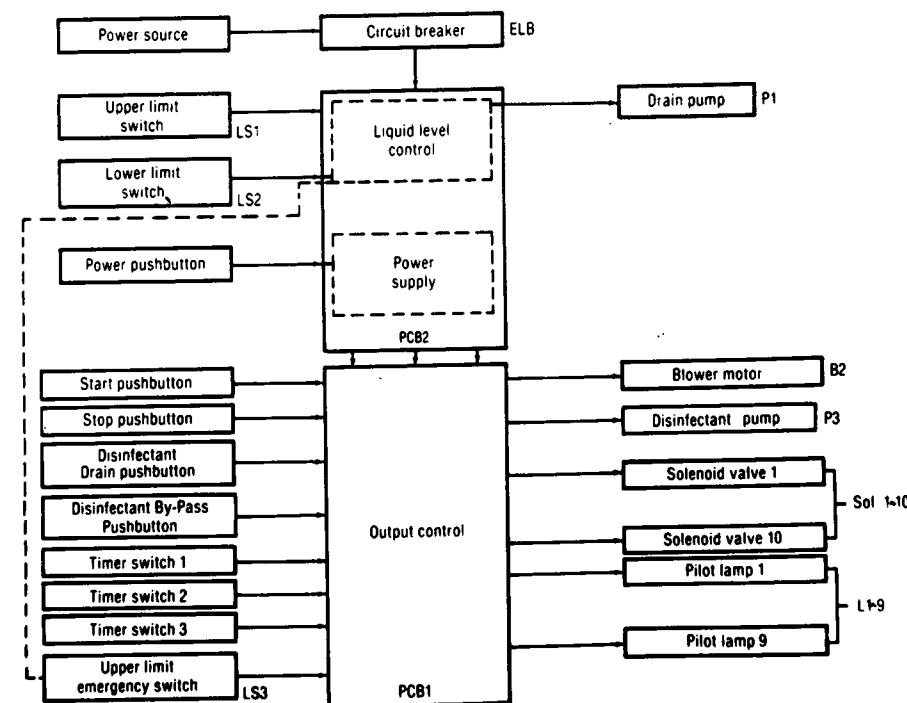


Figure 3-1. BLOCK DIAGRAM.

As shown in the block diagram, inputs to the drain pump are initiated by the limit switches and routed through the "Liquid Level Control" section of PCB-2. The limit switches are actuated by a magnetic float which moves up or down in the drain tank, depending on the amount of liquid waste entering the drain tank, or being pumped out of it.

When the magnetic float causes the contacts of LS-1 to close, the coil of relay MN becomes energized. The contacts of MN close, as a result of the energized coil, allowing the drain pump to operate. When the float closes the contacts of LS-2, relay MF is energized which in turn de-energizes relay MN. When relay MN is de-energized, the drain pump will stop operating. (Reference the Pulstar 1200 wiring diagram.)

An upper limit switch LS-3 is installed as an emergency shutoff switch. If for some reason the flow of fluid into the drain tank is greater than the output of the drain pump, the magnetic float will eventually cause the LS-3 contacts to close. Once the LS-3 contacts close, all functions of the Pulstar 1200 will cease except for the drain pump. The drain pump will continue to operate until the float reaches the LS-2 limit switch.

The drain pump can operate as long as power is being supplied to the circuit breaker and the circuit breaker is in the "on" position even through the power switch has not been depressed. This means that power is being supplied to PCB-2 when the power supply switch is in the "off" position.

PCB-1 is designed to provide various output signals to the blower, disinfectant pump and the ten solenoid valves depending upon the type of input signal being received, i.e., the start switch, stop switch, the thumbwheel switch timer and the upper limit emergency switch. PCB-1 receives its power through PCB-2 once the power switch has been depressed.

PCB-2 also supplies PCB-1 with a time base derived from incoming line power. Where 60 Hz power is used, there is 1 pulse per second which can be observed by the once per second flashing of LED D7 located on PCB-1. All timing functions processed by PCB-1 are based on this once per second pulse.

A description of each of the input signals to PCB-1 follows:

### 3.2 CONTROLS

#### Start Pushbutton

ROMs 1 and 2 contain the time data information which allows each of the solenoid valves, disinfectant pump and blower to operate for the specified amount of time. The instructions containing the operational data are stored in ROMs 3 and 4.

The time data stored in ROMs 1 and 2 is retrieved simultaneously with the operational data stored in ROMs 3 and 4 once the start pushbutton is depressed. ROM 4 is also used along with ROM 5 to light the LED status lights on the control panel of the Pulstar 1200.

Each ROM address is sequentially followed as specified in the programmed timing. Once a cycle has been completed or power has been interrupted to the Pulstar 1200, the program will return to the first address designed in the ROMs.

#### Stop Pushbutton

When the stop pushbutton is depressed, the program will return to the first address designed in the ROMs regardless of the progression of the cycle of the machine. All operation will immediately cease except possibly for the drain pump which operates independently of the programed information on the ROMs.

#### Disinfectant Drain Pushbutton

When the disinfectant drain pushbutton is pressed, the information stored in the ROMs is retrieved which allows the disinfectant to be discarded via the waste tank. Once the cycle is completed the program will return to the first address designed in the ROMs.

#### Disinfectant By-Pass Pushbutton

When the disinfectant by-pass pushbutton is pressed, the disinfectant deliver portion of the program is bypassed. The cycle progresses from the completion of the wash phase directly to the final rinse phase and is completed with the dry phase.

#### Thumbwheel Timer Switches

The timing of the wash phase, disinfectant soak phase, and dry phase of the cycle can be determined by the operator by positioning the thumbwheels on the timer. The program will then retrieve the timer selected on the thumbwheel switches for proper operation.

### 3.3 DESCRIPTION OF MECHANICAL FUNCTIONS

Ref. Piping Schematic, p. 6-25.

#### Drain Pump

The drain pump is used to pump the waste entering the drain tank into the building drainage system.

The pump is controlled by a float and three level switches. As the float reaches LS-1 the drain pump is energized. The waste is then pumped out of the drain tank. As soon as the float reaches LS-2 the pump will shut off.

If for some reason the pump cannot keep up with the incoming flow of waste, the float will rise to the LS-3 position causing all functions of the Pulstar 1200 to cease except for the drain pump. Once the float drops below LS-3, the machine can be restarted.

If the drain pump malfunctions, the float will rise to the LS-3 position causing the Pulstar 1200 to shut down.

#### Blower

The blower provides a source of pressurized air to aid in the draining of fibroscope channels as well as providing the air bubbling action through the perforations in the bottom of the aquacradle.

If the blower malfunctions, the source of pressurized air will be lost.

#### Disinfectant Pump

The disinfectant pump delivers the disinfectant to the aquacradle from the disinfectant storage tank. Disinfectant is also delivered to the scope through the suction, water and biopsy ports of the Pulstar 1200.

#### Solenoid Valve 1

Solenoid valve 1 allows pressurized air from the blower to enter the aquacradle through the perforation in the bottom of the aquacradle. The bubbles aid the washing and rinsing of the exterior of the scopes.

#### Solenoid Valve 2

Solenoid valve 2 allows pressurized air from the blower to enter the suction and water ports. This aids in drying the interior of the scope and in the removal of residual fluids within the interior of the scope.

#### Solenoid Valve 3

Solenoid valve 3 allows delivery of the disinfectant from the disinfectant storage tank into the aquacradle.

#### Solenoid Valve 4

Solenoid valve 4 allows fresh water from the utility water supply to be delivered into the aquacradle.

#### Solenoid Valve 5

Solenoid valve 5 allows fresh water from the utility water supply to be delivered into the suction and water ports.

#### Solenoid Valve 6

Solenoid valve 6 allows the disinfectant to be returned to the disinfectant storage tank at the completion of the disinfectant soak phase of the cycle.

#### Solenoid Valve 7

Solenoid valve 7 allows waste water to enter the drain tank.

#### Solenoid Valve 8

Solenoid valve 8 allows the drainage of the residual liquid trapped in the interior of the aquacradle through solenoid valve 7. It also maintains air pocket beneath aquacradle during disinfectant soak phase which prevents disinfectant from draining through perforations at aquacradle bottom.

#### Solenoid Valve 9

Solenoid valve 9 allows water, disinfectant and air to travel from the biopsy port of the fiberoptic scope to the drain tank of Pulstar 1200.

### Solenoid Valve 10

Solenoid valve 10 allows delivery of the disinfectant from the disinfectant storage tank into the suction and water ports of the Pulstar 1200.

### Check Valve 1

Located upstream of solenoid 3, LC-1 prevents backflow in the disinfectant line.

### Check Valve 2

Located upstream of solenoid 2, LC-2 prevents backflow in the air line.

## 3.4 CYCLE DESCRIPTIONS

Preparatory actions: Water supply hose must be connected and water source on. Electrical power cord must be plugged into power source and POWER light on control panel must be on (depress to turn ON).

### Water Wash and Disinfectant Soak Cycle

1. The first phase of the cycle is the fill phase. FILL light comes on, and solenoid valves 1 (air to aquacradle), 4 (water to aquacradle), and 5 (water to suction/water ports) open. The blower is also on. Twenty seconds after this phase begins, solenoid valve 9 (water to biopsy port) also opens. After another twenty seconds, this phase ends.

2. The second phase of the cycle is the wash phase. WASH light comes on. The following solenoid valves are open: 1 (air to aquacradle), 4 (water to aquacradle), 5 (water to suction/water ports), 7 (drain tank\*), 9 (water to biopsy port.) The blower is also on. This phase is variable (operator selected) from 0 to 999 seconds.

3. The third phase of the cycle is the first drain phase. DRAIN light comes on. The following solenoid valves are open: 2 (air to suction/water port), 7 (drain tank), 8 (aquacradle drain). The blower is also on. This phase lasts 60 seconds.

\*Drain pump will automatically come on when level sensor actuates limit switch 1. See section 3.1 for a description of how this mechanism works.

4. The fourth phase of the cycle is the disinfectant fill phase. DISINFECT FILL light comes on. The disinfectant pump is on. The following solenoid valves are open: 3 (disinfectant to aquacradle), 7 (drain tank - open for first 11 seconds only), 10 (disinfectant to suction/water ports). After the first 11 seconds, valve 7 closes and valve 9 (disinfectant to biopsy port) opens. This phase lasts a total of 21 seconds.

5. The fifth phase of the cycle is the disinfectant soak phase. DISINFECT SOAK light comes on. No solenoid valves are on. The length of this phase is 0 to 999 seconds (operator selectable).

6. The sixth phase of the cycle is the disinfectant return phase. DISINFECTANT RETURN light is on. Solenoid valves 2 (air to suction/water ports) and 6 (disinfectant return) are open. The blower is also on. This phase lasts 60 seconds.

**NOTE:** A quantity of disinfectant is lost in each disinfectant soak cycle. The amount lost is approximately 140 to 175 ml. It is normal to see the disinfectant level drop after a number of cycles are run.

7. The seventh phase of the cycle is the rinse phase. RINSE light comes on. For the first forty seconds of this phase, the following solenoid valves are open: 4 (water to aquacradle), 5 (water to suction/water ports), 8 (aquacradle drain). After the first forty seconds, solenoid valve 5 closes (water to suction/water ports), and the following valves open: 2 (air to suction/water ports), 7 (waste water to drain tank), and 9 (water to biopsy port). The blower also comes on. This part of the phase lasts 40 seconds also. After the first eighty seconds, solenoid valve 1 opens (air to aquacradle), 2 closes (air to suction/water ports), 5 opens (water to suction/air ports), 8 closes (aquacradle drain).

8. The eighth phase of the cycle is the second drain phase. Second DRAIN light comes on. For the first forty seconds of this phase, the following solenoid valves are open: 2 (air to suction/water ports), 7 (waste water to drain tank), 8 (aquacradle drain). The blower is also on. After the first forty seconds, the blower stops, solenoid valve 2 closes (air to suction/water ports), and solenoid valves 5 (water to suction/water ports) and 9 (water to biopsy port) open. This part of the phase lasts 60 seconds. After the first 100 seconds, the blower comes back on, solenoid valves 5 (water to suction/water ports) and 9 (water to biopsy port) close, and solenoid valve 2 opens (air to suction/water port). This final part of the phase lasts 40 seconds.

9. The ninth phase of the cycle is the dry phase. DRY light comes on. The blower is on, and the following solenoid valves are open: 2 (air to suction/water ports), 7 (waste water to drain tank), 8 (aquacradle drain), and 9 (air to biopsy port). The length of this phase is 0 to 999 seconds (operator selectable).

### Water Wash Cycle (No Disinfectant)

1. The first phase of the cycle is the fill phase. FILL light comes on, and solenoid valves 1 (air to aquacradle), 4 (water to aquacradle), and 5 (water to suction/water ports) open. The blower is also on. Twenty seconds after this phase begins, solenoid valve 9 (water to biopsy port) also opens. After another twenty seconds, this phase ends.

2. The second phase of the cycle is the wash phase. WASH light comes on. The following solenoid valves are open: 1 (air to aquacradle), 4 (water to aquacradle), 5 (water to suction/water ports), 7 (drain tank\*), 9 (water to biopsy port.) The blower is also on. This phase is variable (operator selected) from 0 to 999 seconds.

3. The third phase of the cycle is the drain phase. The DRAIN light, DISINFECTANT FILL light, DISINFECTANT RETURN light, and 2nd DRAIN light come on. For the first forty seconds of this phase, the following solenoid valves are open: 2 (air to suction/water ports), 7 (waste water to drain tank), 8 (aquacradle drain). The blower is also on. After the first forty seconds, the blower stops, solenoid valve 2 closes (air to suction/water ports), and solenoid valves 5 (water to suction/water ports) and 9 (water to biopsy port) open. This part of the phase lasts 60 seconds. After the first 100 seconds, the blower comes back on, solenoid valves 5 (water to suction/water ports) and 9 (water to biopsy port) close, and solenoid valve 2 opens (air to suction/water port). This final part of the phase lasts 40 seconds.

4. The fourth phase of the cycle is the dry phase. DRY light comes on. The blower is on, and the fol-

lowing solenoid valves are open: 2 (air to suction/water ports), 7 (waste water to drain tank), 8 (aquacradle drain), and 9 (air to biopsy port). The length of this phase is 0 to 999 seconds (operator selectable).

### Disinfectant Drain Cycle

1. POWER switch is on (lit). When the DISINF DRAIN pushbutton is pushed (lit), the following occurs: disinfectant pump comes on and the following solenoid valves are open: 3 (disinfectant to aquacradle), 7 (waste water to drain tank), 10 (disinfectant to suction/water ports). This part of the cycle lasts 60 seconds.

2. After the first 60 seconds, the disinfectant pump stops and valves 3, 7 and 10 close. Simultaneously, solenoid valves 4 (water to aquacradle) and 5 (water to suction/water ports) open. This part of the cycle lasts 60 seconds also.

3. After the first 120 seconds, valves 4 and 5 close, the disinfectant pump comes on and valves 3 (disinfectant to aquacradle) and 10 (disinfectant to suction/water ports) come on. This part of the cycle lasts 20 seconds.

4. After 140 seconds, pump stops, and valves 3 and 10 close. Simultaneously, the following valves open: 4 (water to aquacradle), 5 (water to suction/water ports), 7 (waste water to drain tank), and 8 (aquacradle drain). This part of the cycle lasts 160 seconds.

5. After 300 seconds, valves 4 and 5 close. Valves 7 and 8 remain open for 30 seconds, then close. This completes the cycle.

\*Drain pump will automatically come on when level sensor actuates limit switch 1. See section 3.1 for a description of how this mechanism works.

# SECTION 4

## INSPECTION AND MAINTENANCE

SECTION 4

**WARNING:** REPAIRS AND ADJUSTMENTS, OTHER THAN THOSE DESCRIBED IN THESE INSTRUCTIONS, SHOULD BE ATTEMPTED ONLY BY EXPERIENCED PERSONS FULLY ACQUAINTED WITH THIS EQUIPMENT. USE OF INEXPERIENCED, UNQUALIFIED PERSONS TO WORK ON THE EQUIPMENT OR THE INSTALLATION OF UNAUTHORIZED PARTS COULD CAUSE PERSONAL INJURY OR RESULT IN COSTLY DAMAGE.

The following procedures should be performed at regular intervals, as indicated. This frequency is the minimum and should be increased if usage of the washer demands. Should a problem occur, refer to Section 6, "Troubleshooting." Figure 4-2 is a sample maintenance record which we suggest the Maintenance Department keep. Such a record will prove helpful in assuring proper maintenance.

### 4.1 AS NECESSARY

1. AMSCO has documented the rate of dilution of the glutaraldehyde disinfectant in the PULSTAR 1200. Because of this dilution, the disinfectant should be changed at least every 18 cycles per gallon. However, it may be necessary to change the disinfectant more often as some brands of glutaraldehyde are less stable than others after activation.

**NOTE:** The following procedure (steps 2-13) should be performed when the machine is initially installed and every time the disinfectant is discarded.

**WARNING:** PROTECTIVE CLOTHING, INCLUDING EYE PROTECTION, SHOULD BE WORN WHILE PERFORMING THIS PROCEDURE TO GUARD AGAINST ANY POSSIBLE PERSONAL INJURY.

2. Place the end of one adapter in the suction port and the end of another adapter in the water port on the front of the processor. Place the other ends of these adapters into the Aquacradle (endoscope holding tray). Drain disinfectant tank using the DISINFECTANT DRAIN CYCLE (lower right-hand button) as follows:

- Press DISINF DRAIN button.

- Wait one minute.
- Depress STOP button.
- Press DISINF button.\*
- Wait one minute.\*
- Depress STOP button.\*
- Add one gallon of tap water to disinfectant tank.
- Press DISINF DRAIN button and allow cycle to go to completion.

\*If disinfectant tank was filled with disinfectant above the two gallon mark, repeat steps d, e and f.

3. At the end of cycle, disconnect or shut off tap water inlet to processor.

4. To three gallons of tap water in a plastic bucket, add 1-1/2 cups (approx. 350ml) of Clorox® (5.25% sodium hypochlorite) and mix.

5. Pour approximately one gallon of this solution into disinfectant tank. Fill Aquacradle with solution until it overflows into center overflow drain (save rest of solution for subsequent steps).

6. Using a brush, scrub all parts of Aquacradle and interior of Aquacradle cover using this solution.

7. Close cover. Set wash timer to zero (leave disinfectant and drain settings as they are). start standard Water Wash and Disinfectant Soak cycle (tap water supply remains off).

8. Shut off the processor by depressing the STOP button at Disinfectant Soak phase of cycle.

9. Add remaining solution from the bucket to the Aquacradle, allowing it to overflow to center overflow drain; allow it to soak for at least 30 minutes, but not more than one hour.

**NOTE:** If this is the first time the machine has been disinfected, or if the machine has not been in use for a long period of time, repeat steps 4 through 9.

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2. Remove the pressure regulating valve strainer and the disinfectant filter and clean out deposits. Replace if necessary. See Figure 4-1.

#### 4.5 Quarterly

1. After draining disinfectant, open side door and clean out any sediment in drain/disinfectant tank. Use a damp lint-free cloth. Do not use detergent or soap of any kind.

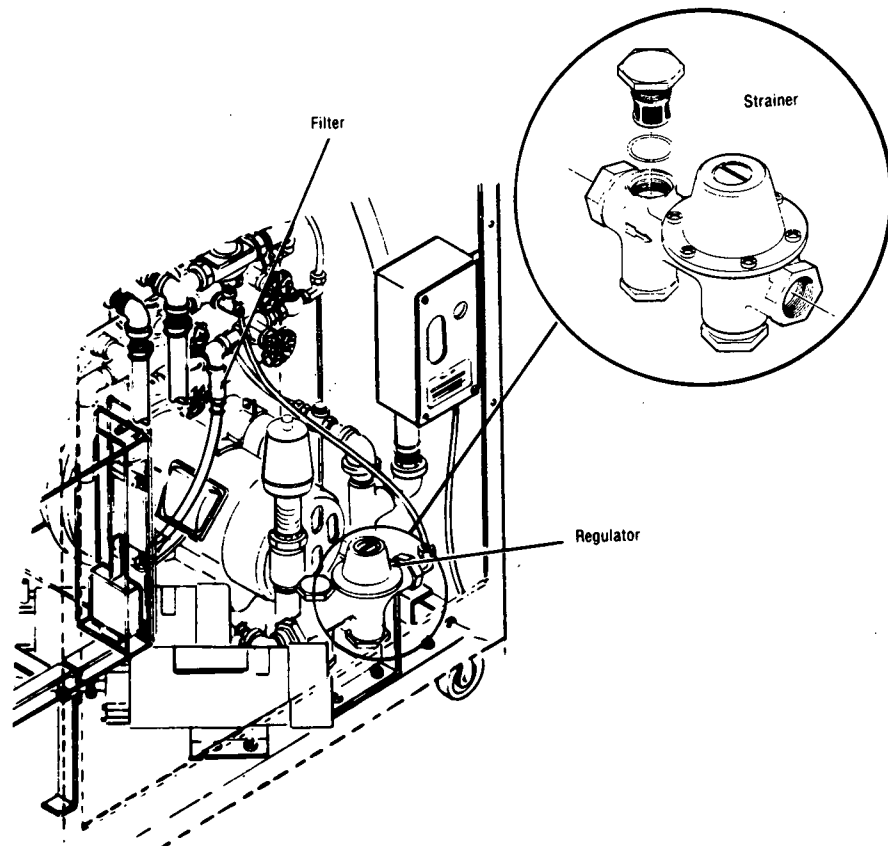


Figure 4-1. CLEAN FILTER AND STRAINER.

### PREVENTIVE MAINTENANCE RECORD

Page 1 of 2

Department \_\_\_\_\_

This form to be utilized for preventive maintenance record only and is not to be used as a guide to perform maintenance.

(Circle "X" in Column When Service Is Performed)

	INSPECTION					
	1	2	3	4	5	6
1. Discuss operation with department personnel.	X	X	X	X	X	X
2. Operate through a wash cycle operation noting any discrepancies in cycle phase.	X	X	X	X	X	X
3. Operate through a disinfectant by-pass cycle operation noting any discrepancies in cycle phase.	X	X	X	X	X	X
4. Operate a disinfectant drain cycle noting any discrepancies. Re-cycle disinfectant back to tank if fresh.	X	X	X	X	X	X
5. Aquacradle — Inspect for proper bubble action during cycle operation.	X	X	X	X	X	X
6. Inspect headclamp assembly for proper operation.	X	X	X	X	X	X
7. Water supply.						
A. Install test equipment.	X		X		X	
B. Test for proper pressure.	X		X		X	
C. Remove and clean PRV strainer, replace if necessary.		X		X		X
8. Disinfectant supply.						
A. Remove and clean disinfectant filter, replace if necessary.		X		X		X
9. Piping						
A. Check all piping for leaks.	X	X	X	X	X	X
B. Inspect check valves for seal and freedom of movement.	X		X		X	

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 1 of 2).

## PREVENTIVE MAINTENANCE RECORD

Page 2 of 2

Department \_\_\_\_\_

This form to be utilized for preventive maintenance record only and is not to be used as a guide to perform maintenance.

(Circle "X" in Column When Service Is Performed)

	INSPECTION					
	1	2	3	4	5	6
9. Piping (continued)						
C. Verify operation of all solenoid valves.	X	X	X	X	X	X
D. Rebuild all solenoid valves.			X			
E. Check all hose clamps for tightness.	X		X		X	
F. Replace air filter.						X
10. Control System.						
A. Check all switches for operation.	X	X	X	X	X	X
B. Replace burned out bulbs.	X	X	X	X	X	X
C. Replace blown fuses.	X	X	X	X	X	X
D. Replace burned out LEDs.	X	X	X	X	X	X
E. Check circuit breaker for operation.	X	X	X	X	X	X
11. Adapters.						
A. Check adapters and hoses for bad O-rings or cracks.		X		X		X
12. Final Check.						
A. Replace any covers removed.	X	X	X	X	X	X
B. Police work area to assure removal of all materials used during inspection.	X	X	X	X	X	X

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 2 of 2)

## SECTION 5

## FIELD TEST PROCEDURE

SECTION 5

## 5.1 TEST EQUIPMENT REQUIRED

1. 1 — 20cc syringe or equivalent to be used as a biopsy container.
2. 3 — multipurpose adapters part number P-56399-052 (P-56399-093 New Style).
3. Green food coloring.
4. 1 — Calibrated Pressure Gauge, AMSCO PN 764317-627.
5. 1 — Stop Watch.

2. Remove the rear panel from the machine. Retain screws to re-install panel at the end of the test procedure.

3. Check that the interior components and structure are free from damage. Particular attention should be given to the following components:

- a. Disinfectant and drain tanks.
- b. Plastic Piping.
- c. Bottom of the aquacradle.
- d. Circuit breaker box cover.

4. Examine pipes, valves, fittings, and fasteners for completeness of assembly. Ensure that they are mechanically connected.

## 5.3 PREPARATION PRIOR TO TEST

1. Install pressure gauge to utility water supply. Pressure is to be 20-80 psi.

2. Attach one end of the water supply hose, AMSCO P/N 150825-109 to the utility water supply and the other end to the water supply port in the rear of the washer.

3. Attach one end of the drain hose, AMSCO P/N 150825-110 to the discharge port in the rear of the washer and allow the other end to empty into a drain.

(Use of AMSCO coupler kit Part No. P-56399-071 is acceptable to connect the washer to the water supply).

4. Install pressure gauge as follows (reference Figure 5-2):

a. Locate the tee on the downstream side of the pressure regulator installed in the Endoscope Processor.

## 5.2 PRELIMINARY CHECK

1. Check the operation of the endoscope head clamp (see Figure 5-1 for location of clamp).

a. Rotate clockwise and counterclockwise, the knurled clamps labeled "1", "2", "3", and "4" back and forth on their respective shafts. Check that they slide freely without binding.

b. Slide Clamp "3" and Clamp "4" back and forth on their respective shafts. Check that they slide freely without binding.

c. Tighten knurled Clamps "3" and "4" until they lock with a firm grip. The padded portion of the clamp must not move from front to back with respect to the machine after tightening.

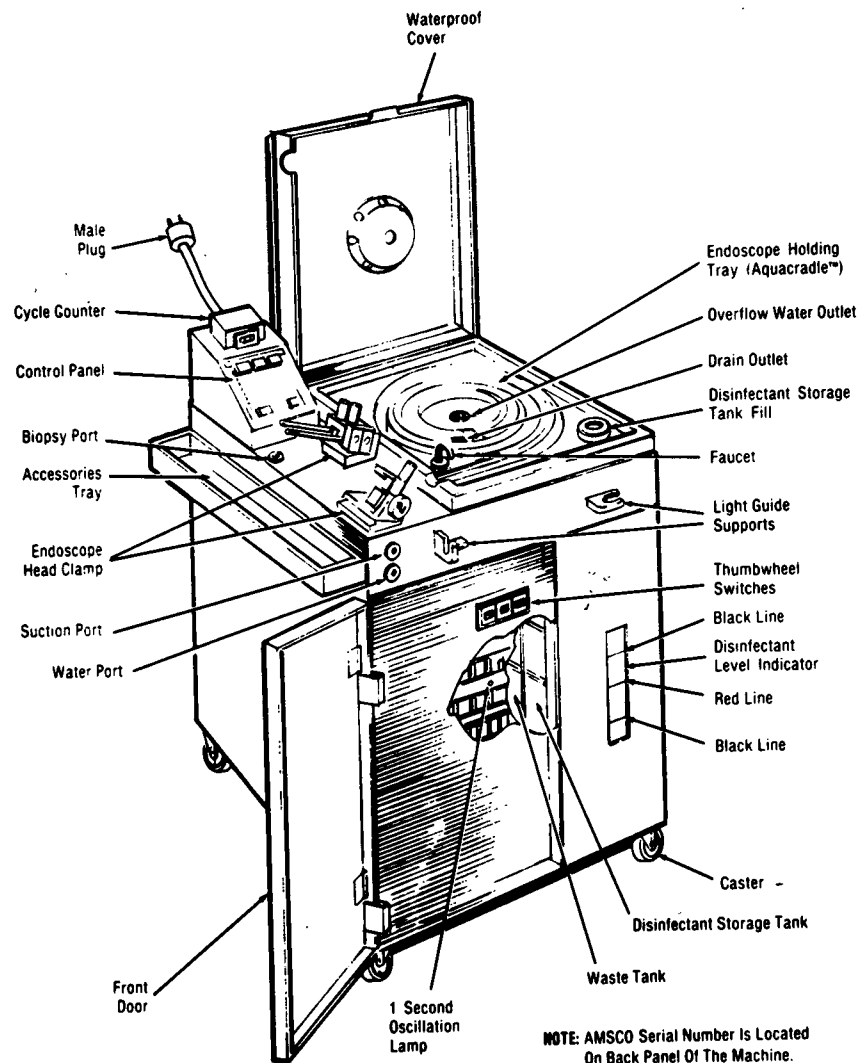


Figure 5-1. LOCATION OF EXTERNAL COMPONENTS.

5-2  
764316-002

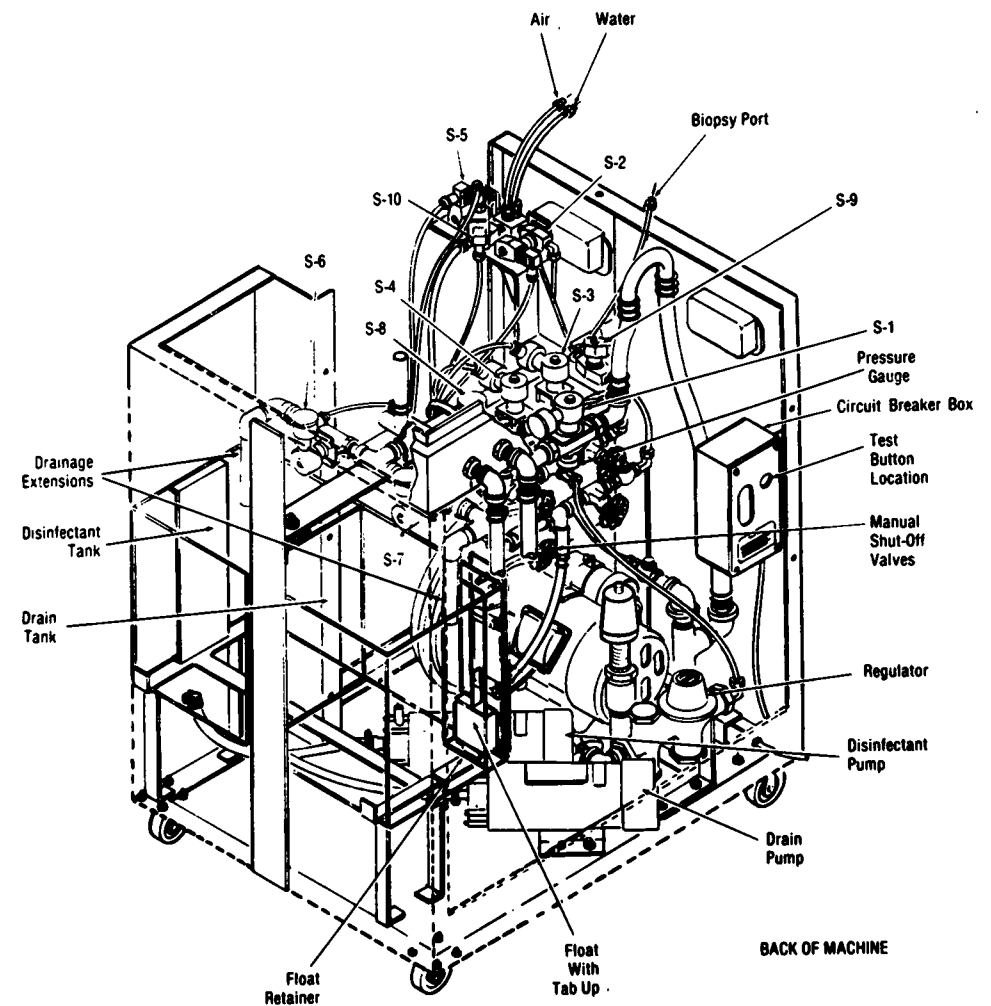


Figure 5-2. LOCATION OF INTERNAL COMPONENTS.

5-3  
764316-002

- b. Remove the pipe plug in the tee.
- c. Install the 0-15 psig water pressure gauge in the place of the plug.
5. Locate the float shipped loose with the machine. Insert the float in the channel with the magnetic switch facing down and the plastic rectangular extension up (reference Figure 5-2).
6. Locate the cycle counter shipped loose with the machine. Connect the male plug of the cycle counter to the female plug of the machine located in the rear of the machine (reference Figure 5-1).
7. Connect the port adapters, referenced in Step 5.1 to the biopsy port, suction port, and water port as shown in Figure 5-4. Allow the free ends of the suction and water port adapters to rest in the aquacradle.
8. Locate the four manually operated shut-off valves in the rear of the machine. Check that these valves are in the fully open position. (Moving the handle of the valve counterclockwise opens the valve.)

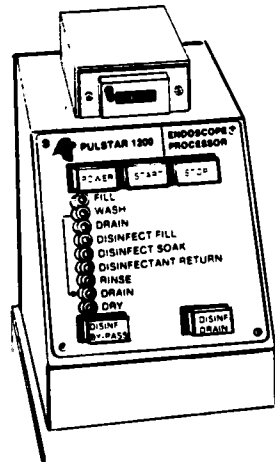


Figure 5-3. CONTROL PANEL.

5-4

784316-082

Figure 5-4. TEST CYCLE SET-UP.

#### 5.4 COMPONENT CHECKS

##### 1. Drain Pipe Level Check

**NOTE:** This is a critical step in the set up procedure. It affects the amount of disinfectant loss.

- a. Place the washer on a level floor. Check the levelness of the floor with a level.
- b. Remove the aquacradle.
- c. Locate solenoid valves 6 and 7. Remove coils and bonnets from both.
- d. Place level across flat portion of valve. Valve must be perpendicular to floor. See Figure 5-5. Check both valves in this manner.
- e. Place level across the side of solenoid valves 6 and 7. See Figure 5-6. Bubble in the level must be between the two black marks. To adjust, loosen clamp 1.

**CAUTION:** The piping must be as level as possible. Drain line tilt towards the disinfectant tank is unacceptable. Tilt towards the drain tank is acceptable only if not greater than 2°.

- f. Replace bonnets and coils.
- g. Replace aquacradle.

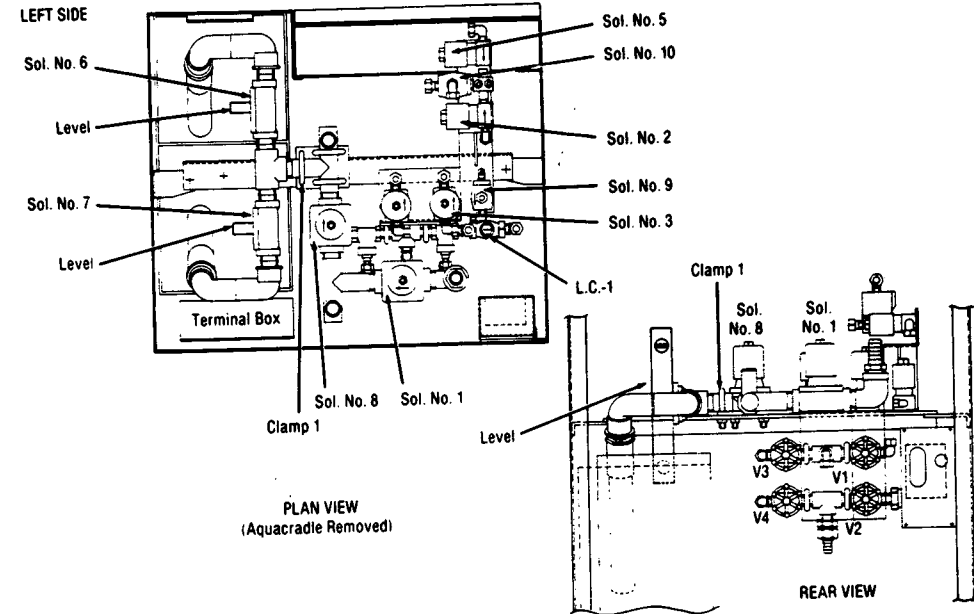
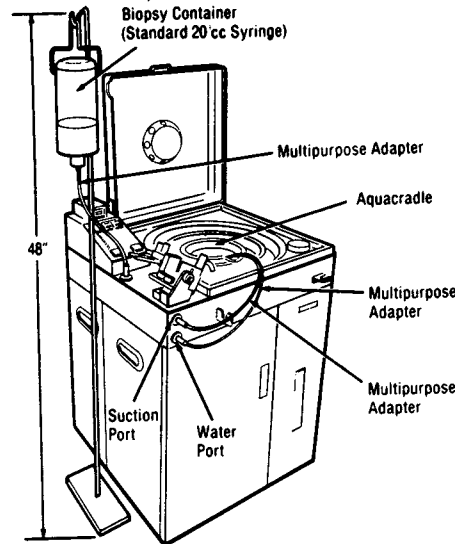


Figure 5-5. LEVELING THE PROCESSOR.

##### 2. Circuit Breaker and Printed Circuit Board (PCB) Circuit Test:

- a. Plug the washer into a 115 V receptacle. Locate the circuit breaker in the rear of the washer (reference Figure 5-2). Ensure that the circuit breaker is in the "on" position. Press the test button on the circuit breaker and check that the breaker trips to the "off" position. Reset the circuit breaker to the "on" position.
- b. On the control panel of the Endoscope Processor, press the "power" switch. Note that the "power" switch is lighted (reference Figures 5-1 and 5-3).
- c. Open the front door and observe the one-second oscillation lamp located in the PCB circuit. Using a stop watch, check that the lamp flashes on and off for 60 pulses  $\pm$  three pulses in 60 seconds (reference Figure 5-1). This is the case for 60 cycle utility power. If 50 cycle utility power is to be used, remove the front cover and locate the switch next to the oscillation lamp. Move switch to other position. The lamp will oscillate 50 pulses  $\pm$  three pulses indicating the unit is set on 50 cycle operation.

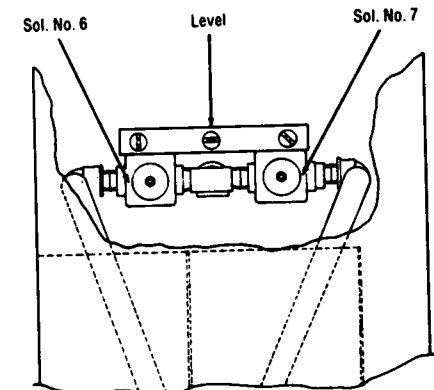


Figure 5-6. LEVELING THE PROCESSOR.

5-5

784316-082

### 3. Initial Drain Operation and Leak Test:

a. Pour two gallons of water in the overflow water outlet. Check for the following conditions:

- 1) Water flows into the waste tank.
- 2) The float rises in the waste tank (observe the float by looking in the side access door).
- 3) The drain pump begins to operate.
- 4) Water is being pumped through the drain line.

b. Once the water is pumped out of the waste tank, check for the following conditions:

- 1) The drain pump shuts off.
- 2) The float is at the bottom of the waste tank.

### 4. Leak Testing of Solenoid Valves S6, S7, and S8 (Reference Figures 5-1 and 5-2):

a. Open the side access door to the machine and remove the drainage extensions downstream of solenoid valves S6 and S7.

b. With a beaker, pour water into the drain outlet from the top of the aquacradle. This will fill the drainage lines with water. Allow the water to fill to the drain outlet.

c. Let the water stand in the drainage system for 5 minutes. During the 5 minute time period, use a 50 ml beaker to collect any water that may be drained into the waste or disinfectant tank. Any leakage indicates the seat of the valve is leaking. The leaking valve must be repaired or replaced.

d. Observe the clear plastic tubing that connects the aquacradle with the inlet side of Solenoid Valve 8. Water should not enter the tubing during the 5 minute time interval referenced in Step b.

e. At the expiration of the 5 minute time interval, reinstall the drainage extensions removed in step a.

### 5. Adjusting the Pressure Regulator in the Endoscope Washer:

a. Press the START pushbutton. Note that the START pushbutton is lighted (reference Figure 5-3).

b. Observe that the pressure on the 0-15 psig water pressure gauge is  $2.5 \pm 0.5$  psig. If the pressure is not  $2.5 \pm 0.5$  psig, adjust the machine pressure regulator by turning the adjusting screw on top of the pressure regulator clockwise to increase the pressure, and counterclockwise to decrease the pressure.

c. Press the STOP pushbutton. Observe that the static water pressure downstream of the machine PRV is  $7 \pm 0.5$  psig. If the static water pressure is not  $7 \pm 0.5$  psig, repeat Steps 5.a. and 5.b. (Note: All lamps on the control panel extinguish except for the power lamp when the "stop" pushbutton is pressed.)

d. Note any leakage and repair, if possible.

### 5.5 PRE-CYCLE TEST SET-UP

1. Mix 1 ml of green food coloring to 1 gallon of water and empty the mixture into the disinfectant tank through the disinfectant storage tank fill (reference Figure 1). Note any leakage in the disinfectant tank.

2. Observe that the mixture reaches the first black line from the bottom of the disinfectant level indicator.

3. Set the thumbwheel switches located in the front of the machine to the following settings:

- a. Wash - 30 seconds.
- b. Disinfectant Soak - 60 seconds.
- c. Dry - 15 seconds.

4. Fill biopsy container with water (reference Figure 5-4).

### 5.6 TEST FOR AUTOMATIC OPERATION

#### 1. Wash Cycle Operation (reference Figures 5-1, 5-3 and 5-4):

a. Note the following:

1) All light indications are on the control panel of the Endoscope Processor.

2) As soon as the START pushbutton is pressed, start timing the wash cycle with the stop watch.

b. Fill Phase - Press the START pushbutton and stop watch simultaneously.

1) Observe the following:

a) START pushbutton is lighted.

b) FILL light is lighted.

c) Water flows from faucet into aquacradle.

d) Water flows from suction and water ports.

e) Level of water in biopsy container remains constant.

f) Bubbles appear in aquacradle.

g) Drain remains closed.

2) 20 seconds  $\pm$  3 seconds after the START pushbutton is pressed, observe the following:

a) Level of water in biopsy container decreased. (Note: Water must manually be poured into the biopsy container until the level remains constant.)

b) Water flows from faucet into aquacradle.

c) Water flows from suction and water ports.

d) Air bubbles are evident in aquacradle.

e) Drain remains closed.

f) FILL light remains lighted.

c. Wash Phase - Begins 40 seconds  $\pm$  3 seconds after START pushbutton is pressed.

1) Observe the following:

a) WASH light is lighted.

b) Drain opens to waste tank.

c) Water flows from faucet into aquacradle.

d) Water flows from suction and water ports.

e) Air bubbles are evident in aquacradle.

f) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the level in the container remains constant.)

g) FILL light remains lighted.

d. Drain Phase - Begins 1 minute, 10 seconds  $\pm$  3 seconds after the START pushbutton is pressed.

1) Observe the following:

a) DRAIN light is lighted.

b) Air is blown through suction and water port.

c) Water ceases to flow from faucet into aquacradle.

d) Water drains from aquacradle into waste tank.

e) Level of water in biopsy container remains constant.

f) Air bubbles are no longer evident in aquacradle.

g) FILL and WASH lights remain lighted.

e. Disinfectant Fill Phase - Begins 2 minutes, 10 seconds  $\pm$  5 seconds after START pushbutton is pressed.

1) Observe the following:

- a) DISINFECT FILL light is lighted.
- b) Colored water flows from faucet, suction and water ports.
- c) Drain is open to waste tank in machine.
- d) Level of water in biopsy container remains constant.
- e) Cycle counter indexes.
- f) Air bubbles are not present.
- g) FILL, WASH, and DRAIN lights remain lighted.

2) 2 minutes, 21 seconds  $\pm$  2 seconds after the START pushbutton is pressed, observe the following:

- a) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the level remains constant.)
- b) Drain is closed.
- c) Colored water flows from faucet, suction and water ports.
- d) Air bubbles are not present.
- e) FILL, WASH, and DRAIN lights remain lighted.

f. Disinfectant Soak Phase - Begins 2 minutes, 31 seconds  $\pm$  2 seconds after START pushbutton is pressed.

1) Observe the following:

- a) DISINFECT SOAK light is lighted.
- b) Colored water ceases to flow from faucet, suction and water ports.

c) Level of water in biopsy container remains constant.

d) Air bubbles are not present.

e) FILL, WASH, DRAIN, and DISINFECT FILL lights remain lighted.

g. Disinfectant Return Phase - Begins 3 minutes, 31 seconds  $\pm$  5 seconds after START pushbutton is pressed.

1) Observe the following:

- a) DISINFECT RETURN light is lighted.
- b) Air is blown through suction and water ports.
- c) Drain is open to the disinfectant storage tank.
- d) Level of water in biopsy container remains constant.
- e) FILL, WASH, DRAIN, DISINFECT FILL, and DISINFECT SOAK lights remain lighted.

h. Rinse Phase - Begins 4 minutes, 31 seconds  $\pm$  5 seconds after START pushbutton is pressed.

1) Observe the following:

- a) RINSE light is lighted.
- b) Water flows from faucet into aquacradle.
- c) Water flows from suction and water ports.
- d) Level of water in biopsy container remains constant.
- e) Air bubbles are not present.
- f) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, and DISINFECTANT RETURN lights remain lighted.

2) 5 minutes, 11 seconds  $\pm$  3 seconds after the START pushbutton is pressed, observe the following:

a) Air is blown through suction and water ports.

b) Water flows from faucet into aquacradle.

c) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the water level stops dropping in the container.)

d) Drain is open to waste tank.

e) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, and RINSE lights remain lighted.

3) 5 minutes, 51 seconds  $\pm$  3 seconds after the START pushbutton is pressed, observe the following:

- a) Air bubbles appear in aquacradle.
- b) Water flows from suction and water ports.
- c) Water flows from faucet into aquacradle.
- d) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the water level stops dropping in the container.)

e) Drain is open to waste tank.

f) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, and RINSE lights remain lighted.

i. Drain Phase - Begins 6 minutes, 51 seconds  $\pm$  5 seconds after the START pushbutton is pressed.

1) Observe the following:

- a) DRAIN light is lighted.
- b) Air is blown through suction and water ports.
- c) Water ceases to flow from faucet.
- d) Air bubbles are not present in aquacradle.

e) Level of water in biopsy container remains constant.

f) Drain is open to the waste tank.

g) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, and RINSE lights remain lighted.

2) 7 minutes, 31 seconds  $\pm$  3 seconds after the START pushbutton is pressed, observe the following:

- a) Water flows from suction and water port adapters.
- b) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the water level stops dropping in the container.)

c) There is no water flow from faucet.

d) Air bubbles are not present.

e) Drain is open to waste tank.

f) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights remain lighted.

3) 8 minutes, 31 seconds  $\pm$  5 seconds after the START pushbutton is pressed, observe the following:

- a) Air is blown through suction and water ports.
- b) Level of water in biopsy container remains constant.
- c) Drain is open to waste.
- d) There is no water flow from faucet.

e) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights remain lighted.

j. Dry Phase - Begins 9 minutes, 11 seconds  $\pm$  3 seconds after the START pushbutton is pressed.

1) Observe the following:

- a) DRY light is lighted.
- b) Air is blown through suction and water ports.
- c) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the water level stops dropping in the container.)
- d) Drain is open to waste tank.
- e) There is no water flow from faucet.
- f) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights remain lighted.
- k. End of Cycle - Ends 9 minutes, 26 seconds  $\pm$  3 seconds after START pushbutton is pressed.

1) Observe the following:

- a) All functions of the machine stop. (Note: Drain pump may or may not be operating. Either is normal since the drain pump is independent of the cycle and is actuated by the float in the waste tank.)
- b) All lights are not lighted except for the power light.

2. Disinfectant By-Pass Cycle Operation (Reference Figures 5-1, 5-2, and 5-4):

a. Note the following:

- 1) All light indications are on the control panel of the Endoscope Processor.
- 2) As soon as the START pushbutton is pressed, start timing the disinfectant by-pass cycle with the stop watch.
- b. Fill Phase - First press the DISINF BY-PASS pushbutton, then press the START pushbutton and stop watch simultaneously.

1) Observe the following:

- a) DISINF BY-PASS pushbutton is lighted.
- b) START pushbutton is lighted.
- c) FILL light is lighted.

- d) Water flows from faucet into aqua-cradle.
- e) Water flows from suction and water ports.
- f) Level of water in biopsy container remains constant.
- g) Bubbles appear in aquacradle.
- h) Drain remains closed.

2) 20 seconds  $\pm$  3 seconds after the START pushbutton is pressed, observe the following:

- a) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the level remains constant.)
- b) Water flows from faucet into aqua-cradle.
- c) Water flows from suction and water ports.
- d) Air bubbles are evident in aquacradle.
- e) Drain remains closed.
- f) FILL light remains lighted.

c. Wash Phase - Begins 40 seconds  $\pm$  3 seconds after START pushbutton is pressed.

1) Observe the following:

- a) WASH light is lighted.
- b) Drain opens to waste tank.
- c) Water flows from faucet into aqua-cradle.
- d) Water flows from suction and water ports.
- e) Air bubbles are evident in aquacradle.
- f) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the level remains constant.)

- g) FILL light remains lighted.
- d. Drain Phase - Begins 1 minute, 10 seconds  $\pm$  3 seconds after START pushbutton is pressed.

1) Observe the following:

- a) DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights light simultaneously.
- b) Air is blown through suction and water ports.
- c) Water ceases to flow from faucet.
- d) Air bubbles are not present in aqua-cradle.
- e) Level of water in biopsy container remains constant.
- f) Drain is open to the waste tank.
- g) FILL and WASH lights remain lighted.

2) 1 minute, 50 seconds  $\pm$  3 seconds after START pushbutton is pressed, observe the following:

- a) Water flows from suction and water port adapters.
- b) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the water level stops dropping in the container.)

c) There is no water flow from faucet.

d) Air bubbles are not present.

e) Drain is open to the waste tank.

f) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights remain lighted.

3) 2 minutes, 50 seconds  $\pm$  5 seconds after START pushbutton is pressed, observe the following:

- a) Air is blown through suction and water port adapters.

- b) Level of water in biopsy container remains constant.

c) Drain is open to waste.

d) There is no water flow from faucet.

e) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights remain lighted.

e. Dry Phase - Begins 3 minutes, 30 seconds  $\pm$  3 seconds after START pushbutton is pressed.

1) Observe the following:

- a) DRY light is lighted.
- b) Air is blown through suction and water ports.
- c) Level of water in biopsy container decreases. (Note: Water must manually be poured into the biopsy container until the water level stops dropping in the container.)
- d) Drain is open to waste.
- e) There is no water flow from faucet.
- f) FILL, WASH, DRAIN, DISINFECT FILL, DISINFECT SOAK, DISINFECTANT RETURN, RINSE, and DRAIN lights remain lighted.
- f. End of Cycle - Ends 3 minutes, 45 seconds  $\pm$  3 seconds after START pushbutton is pressed.

1) Observe the following:

- a) All functions of the machine stop. (Note: Drain pump may or may not be operating. Either is normal since the drain pump is independent of the cycle and is actuated by the float in the waste tank.
- b) All lights are unlit except for the POWER light and DISINF BY-PASS light.
- c) Press the DISINF BY-PASS pushbutton to de-energize the disinfectant by-pass cycle. Note that the DISINF BY-PASS pushbutton is not lighted.

### 3. Disinfectant Drain Cycle Operation (Refer- ence Figures 5-1, 5-3, and 5-4):

#### a. Note the following:

1) DISINF DRAIN pushbutton initiates the disinfectant drain cycle. This pushbutton lights when pressed.

2) The only lights lit during this phase of the cycle are POWER and DISINF DRAIN.

3) As soon as the DISINF DRAIN pushbutton is pressed, start timing the disinfectant drain cycle with a stop watch.

b. Press the DISINF DRAIN pushbutton and stop watch simultaneously. (Note that the DISINF DRAIN pushbutton lights.) Observe the following:

1) Colored water flows from faucet, suction and water ports.

2) Drain is open to waste.

3) Water level in biopsy container remains constant.

4) Air bubbles are not present.

5) Cycle counter indexes.

c. 60 seconds  $\pm$  5 seconds after DISINF DRAIN pushbutton is pressed, observe the following:

1) Water flows from faucet.

2) Water flows from suction and water ports.

3) Drain is closed.

4) Water level in biopsy container remains constant.

5) Air bubbles are not present.

d. 2 minutes  $\pm$  5 seconds after DISINF DRAIN pushbutton is pressed, observe the following:

1) Colored water flows from faucet.

2) Colored water flows from suction and water ports. (Note: The flow will stop when the disinfectant tank is empty.)

3) Drain is closed.

4) Water level in biopsy container remains constant.

5) Air bubbles are not present.

6) Cycle counter indexes.

e. 2 minutes, 20 seconds  $\pm$  3 seconds after DISINF DRAIN pushbutton is pressed, observe the following:

1) Water flows from faucet.

2) Water flows from suction and water ports.

3) Drain is open to waste.

4) Water level in biopsy container remains constant.

5) Air bubbles are not present.

f. 5 minutes  $\pm$  10 seconds after DISINF DRAIN pushbutton is pressed, observe the following:

1) Water ceases to flow from faucet.

2) Water ceases to flow from suction and water ports.

3) Drain is open to waste. (Note: Pour water into drain outlet to verify drain is open. Reference Figure 5-1 for location of drain outlet.)

4) Water level in biopsy container remains constant.

5) Air bubbles are not present.

g. End of Cycle — 5 minutes, 30 seconds  $\pm$  3 seconds after DISINF DRAIN pushbutton is pressed.

1) Observe the following:

a) All functions of the machine stop. **Note:** Drain pump may or may not be operating. Either is normal since the drain pump is independent of the cycle and is actuated by the float in the waste tank.

b) All lights are not lighted except for the POWER light.

## SECTION 6

## TROUBLESHOOTING

SECTION 6

This section contains detailed information for locating and correcting the cause of washer malfunctions.

### 6.1 HELPFUL HINTS

1. Use the operating procedures in Section 2 to verify the trouble symptom. If necessary, use the STOP button and operate washer more than once in case reported problem is being caused by periodic component malfunction.

2. Use the cycle descriptions (Paragraph 3.4) in order to follow the washer cycle through the various phases. The cycle descriptions may also be used to check for correct operation of the solenoid valves which control the various phases.

3. Refer to the TROUBLESHOOTING CHART (Table 6-1), after the symptom has been verified.

4. Use the operational descriptions (Section 3) and schematics (Figures 6-2 through 6-6) as aids in understanding system operation and how the malfunction of a specific component would affect it.

5. Refer to the following guides for examples of what to look for and what to do when troubleshooting.

#### Water Supply

a. Be sure the building-supply valve is fully open.

b. Be sure the supply pressure is the proper value and that it does not fluctuate.

c. Check all valves and adjust, repair or replace as necessary.

d. Inspect the entire system; correct all leaks.

#### Electronic/Electrical System

a. In general, for any electrical malfunction, first measure or observe the input or output voltage signal as an indicator of the failure. This should isolate the malfunction to:

- Input drives: liquid level detectors, time settings, cycle select.

- Output devices: solenoids, relays, panel lamps, etc.

- System-logic circuit boards of the controller.

b. All voltages are with respect to AC return and all DC voltages are with respect to DC ground.

c. Check circuit breaker first when supply voltage does not appear.

### 6.2 HOW TO USE THE CYCLE GRAPHS (Figures 6-1 and 6-2)

The cycle graph is a representation of the operation of the washer cycle. It is intended to be used for two main purposes: (1) as an aid in understanding how the cycle works; (2) as an aid in troubleshooting. The bar graph is a representation of which output devices (valves, pumps) are energized during the separate phases of the cycle.

As an aid in troubleshooting, the graph should be used to, first, identify the point in the cycle where a malfunction occurs, and, second, to check the operation of the valves which should be opened (energized) or closed (de-energized) during the phase where the problem occurs. If the malfunction is not in the valves, the Troubleshooting Chart should be used to check for other possible causes of the problem.



SOLENOID VALVE NO.		SECONDS		FILL	WASH	DRAIN	DISIN. FILL	DISIN. SOAK	DISIN. RETURN	RINSE			DRAIN			DRY
		20	20	0 ~ 999	60		11/10	0 ~ 999	60	40	40	60	40	60	40	0 ~ 999
1	Air to aquacradle															
2	Air to suction/water ports															
3	Disinfectant to aquacradle															
4	Water to aquacradle															
5	Water to suction/water ports															
6	Disinfectant return															
7	Waste water to drain tank															
8	Aquacradle drain															
9	Air water/disinfectant to biopsy port															
10	Disinfectant to suction water ports															
	Disinfectant pump															
	Blower															

THESE CYCLE PHASES ARE SKIPPED WHEN DISINFECTANT BY-PASS SWITCH IS PRESSED AND LIT.

Figure 6-1. PROCESSOR OPERATING CYCLE.

SOLENOID VALVE NO.		SECONDS		60	60	20	160	30
1	Air to aquacradle							
2	Air to suction water ports							
3	Disinfectant to aquacradle							
4	Water to aquacradle							
5	Water to suction/water ports							
6	Disinfectant return							
7	Waste water to drain tank							
8	Aquacradle drain							
9	Air water/disinfectant to biopsy port							
10	Disinfectant to suction/water ports							
	Disinfectant pump							
	Blower							

Figure 6-2. DISINFECTANT DRAIN CYCLE.

### 6.3 THE TROUBLESHOOTING CHART — AN EXPLANATION OF ITS CONTENTS

COLUMN HEADING	EXPLANATION
OPERATIONAL STATUS	Select a symptom from this column that most nearly corresponds with the position to which the processor cycle progressed before the trouble occurred.
TROUBLE	Select the problem you think is most appropriate to the particular trouble symptom. The examples are presented in cycle sequence.
POSSIBLE CAUSE AND/OR CORRECTION	<p><b>NOTE:</b> If the symptom for a malfunction is established as mechanical, the electrical components may be omitted and vice versa.</p> <p>This Column lists the specific conditions that should be checked to isolate and correct the one causing the malfunction. The conditions are presented in the order in which they should be checked.</p>
WHERE TO FIND ITEMS IN MANUAL	Location of applicable instructions and/or illustrations are provided in this area. The illustrations are identified by figure number, paragraph or table number.

**NOTE:** This Troubleshooting analysis assumes that facility power is being supplied to the unit and that all fuses are good.

TABLE 6-1: TROUBLESHOOTING CHART

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Before beginning a cycle	1.A. No power when POWER switch is pushed	1) Circuit breaker tripped or malfunctioning — reset or replace.	Fig. 6-5
	1.B. Unit doesn't start when START switch is pressed	1) Turn circuit breaker OFF. Disconnect ribbon cable at CN44S on PCB-1. Remove control panel cover and turn over to view wiring. With START switch depressed check for continuity between terminals 3 and 4 of the switch. If continuity present, proceed to step 1.B.2. If continuity not present, replace START switch.	Fig. 6-2

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		2) Check for continuity between pin 8 and 11 or 12 of CN44S on PCB-1. If continuity present, continue to step 1.B.3. If no continuity, replace PCB-1.	Fig. 8-2
		3) Check continuity of the ribbon cable going from CN44S of PCB-1 to the control panel. If continuity present, see step 1.B.4. If continuity not present, replace ribbon cable.	Fig. 8-2
		4) On PCB-1 check continuity between Pin 9 of CN44S and Pin 7 of CN55S. If continuity not present, replace PCB-1. If continuity present, proceed to Step 1.B.5.	Fig. 8-2
		5) On PCB-1 check continuity between Pin 11 of CN44S and Pin 5 of CN55S. If continuity not present, replace PCB-1. If continuity present, proceed to step 1.B.6.	Fig. 8-2
		6) On PCB-2, disconnect wire 43 from TB-4. Check for continuity between wire 43 and terminal 40 of TB-2 on PCB-1. If continuity present, go to step 1.B.7. If no continuity, proceed to step 1.B.8.	Fig. 8-2
		7) Check water level in drain tank. If tank is full, empty tank. If tank is not full, replace LS-3.	Fig. 8-5
		8) Re-attach wire 43 to TB-4 on PCB-2. With the ribbon cable disconnected at CN44S, depress the POWER switch and check for continuity across terminals 3 and 4 of the switch. If continuity present, proceed to step 1.B.9. If continuity not present, replace the POWER switch.	Fig. 8-2
		9) On PCB-1 check continuity between Pin 7 of CN44S and Pin 9 of CN55S. If continuity present, proceed to step 1.B.10. If continuity not present, replace PCB-1.	Fig. 8-2
		10) On PCB-1 check for continuity between Pin 15 of CN44S and Pin 1 of CN55S. If continuity present, proceed to step 1.B.11. If continuity not present, replace PCB-1.	Fig. 8-2

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		11) Check continuity of the ribbon cable connecting PCB-1 and PCB-2. If continuity present, reconnect all cables, turn on Circuit Breaker and power switch, insure that machine is hooked to utility power supply and proceed to step 1.B.12. If continuity is not present, replace ribbon cable.	Fig. 8-2
		12) Check AC voltage between terminals 10 and 11 on TB-3 of PCB-2. If voltage present, replace PCB-2. If voltage not present, proceed to step 1.B.13.	Fig. 8-2
		13) Check AC voltage on stepped down side of PT-1. If voltage present, replace wires 10 and 11. If voltage not present, proceed to step 1.B.14.	Fig. 8-2
		14) Check 115 VAC on input side of PT-1. If voltage present, replace transformer PT-1. If no voltage, check leads and input power to PT-1.	Fig. 8-2
	1.C. DISINFECTANT BY-PASS cycle push-button non-operational	1) Disconnect the ribbon cable at CN44S on PCB-1. Remove control panel cover and turn over to view wiring. With the DISINFECTANT BY-PASS switch depressed, check continuity between terminals 3 and 4 of the switch. If continuity present, proceed to step 1.C.2. If no continuity, replace DISINFECTANT BY-PASS switch.	Fig. 8-2
		2) Check continuity of cable between CN44S of PCB-1 to DISINFECTANT BY-PASS switch. If continuity present, replace PCB-1. If continuity not present, replace ribbon cable.	Fig. 8-2
2. Before beginning cycle: POWER switch ON	2.A. POWER switch light is out.	1) Turn CB to OFF position. Remove control panel cover and turn over to view wiring. Check for continuity at terminals A and B of the POWER switch by depressing switch. If continuity present at terminals turn circuit breaker to ON and proceed to 2.A.2. If continuity is not present, proceed to step 2.A.8.	Fig. 8-2

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) With circuit breaker ON and Power Switch ON check for DC voltage at pins 13 (positive) and 15 (negative) of CN44S on PCB-1. If voltage present, replace ribbon cable from CN44S on PCB-1 to control panel. If voltage not present, turn circuit breaker OFF and proceed to step 2.A.3.	Fig. 8-2
		3) On PCB-1, check continuity between Pin 13 of CN44S and Pin 3 of CN55S. If continuity present, turn circuit breaker ON and proceed to step 2.A.4. If continuity not present, replace PCB-1.	Fig. 8-2
		4) On PCB-2, check for DC voltage between Pins 1 (negative) and 3 (positive) of CN5. If voltage present, replace ribbon cable connecting PCB-1 with PCB-2. If voltage not present, proceed to step 2.A.5.	Fig. 8-2
		5) Check AC voltage on PCB-2 between terminals 10 and 11 of TB-3. If voltage present, replace PCB-2. If voltage not present, proceed to step 2.A.6.	Fig. 8-2
		6) Check for AC voltage on stepped down side of PT-1. If voltage present, replace leads connecting PT-1 with PCB-2. If voltage not present, proceed to step 2.A.7.	Fig. 8-2
		7) Check 115 AC voltage on input side of PT-1. If voltage present, replace transformer PT-1. If no voltage, check leads and input power to PT-1.	Fig. 8-2
		8) Check bulb in switch. If bulb good, replace switch. If bulb bad, replace bulb.	Fig. 8-2
3. Before beginning DISINFECT DRAIN cycle	3.A. DISINFECTANT DRAIN cycle pushbutton non-operational	1) Disconnect the ribbon cable at CN44S on PCB-1. Remove control panel cover to view wiring. With DISINFECTANT DRAIN switch depressed, check for continuity between terminals 3 and 4 of the switch. If continuity present, proceed to step 3.A.2. If no continuity, replace the DISINFECTANT DRAIN switch.	Fig. 8-2

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		2) Check for continuity of cable going from CN44S of PCB-1 to switch. If continuity present, replace PCB-1. If continuity not present, replace ribbon cable.	Fig. 8-2
4. During a cycle	4.A. Status light(s) on control panel remain dark as unit progresses through cycle	1) On PCB-1, disconnect the ribbon cable at CN66S. Remove control panel cover and turn over to view wiring. Check for continuity across the status light that will not light. If continuity present, proceed to step 4.A.2. If continuity not present, replace status light.	Fig. 8-2
		2) Check for continuity of the ribbon cable from CN66S of PCB-1 to status lights. If continuity present, replace PCB-1. If no continuity, replace ribbon cable.	Fig. 8-2
	4.B. No air flow through suction and water ports	1) During Fill phase of cycle, check the blower. If it is operating continue to next step. If not, proceed to step 4.B.8.	Fig. 8-5
		2) During first Drain phase of cycle check for air flow downstream of LC-2 and prior to solenoid valve 2. If air flow is present, continue to next step. If no air flow, proceed to step 4.B.17.	Fig. 8-5
		3) During first Drain phase of the cycle check for 115 VAC between terminal 22 and AC neutral* in the terminal box. If voltage present, repair or replace solenoid valve 2. If voltage not present, proceed to step 4.B.4.	Fig. 8-3
		4) During the first Drain phase of the cycle check for 115 VAC between AC neutral* on TB-4 of PCB-2 and terminal 22 on TB-1 of PCB-1. If voltage present, replace leads from PCB-1 and PCB 2 to the terminal box. If no voltage, proceed to step 4.B.5.	Fig. 8-2
		5) During first Drain phase check for 115 VAC between terminal 16 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace PCB-1. If voltage not present, proceed to step 4.B.6.	Fig. 8-2

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		6) Check for voltage between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace leads going from PCB-2 to PCB-1. If no voltage, proceed to step 4.B.7.	Fig. 8-2
		7) Check for 115 VAC between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If voltage not present, check input supply and power to the unit.	Fig. 8-2
		8) During the Fill phase of the cycle check for 115 VAC between terminals 4 and 5 in the terminal box. If voltage present, replace the blower. If voltage not present, proceed to step 4.B.9.	Fig. 8-3
		9) During the Fill phase check for DC voltage between terminals 3 and 4 on the solid state relay. If voltage present, continue to next step. If voltage not present, proceed to step 4.B.12.	Fig. 8-2
		10) Check for 115 VAC between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace the solid state relay. If no voltage, proceed to 4.B.11.	Fig. 8-2
		11) Check for 115 VAC between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If no voltage present, check supply and input power to unit.	Fig. 8-2
		12) During the Fill phase of the cycle check DC voltage between terminals 18 (negative) and P-5 (positive) on TB-2 of PCB-1. If voltage present, replace leads from PCB-1 to solid state relay. If voltage not present, proceed to step 4.B.13.	Fig. 8-2
		13) On CN55 of PCB-2, jumper Pin 9 (PR) with Pin 1 (G-1).	Fig. 8-2
		<b>NOTE:</b> Pins must remain jumpered through remainder of analysis.	
		On CN55 of PCB-2 check DC voltage between Pin 11 (P-5) and Pin 14 (G). If voltage present, replace PCB-1. If voltage not present, proceed to step 4.B.14.	Fig. 8-2

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		14) Check for AC voltage between Pins 12 and 13 on TB-3 of PCB-2. If voltage present, replace PCB-2. If no voltage, proceed to step 4.B.15.	Fig. 8-2
		15) Check for 115 VAC on the input side of PT-2. If voltage present, replace PT-2. If voltage not present, proceed to step 4.B.16.	Fig. 8-2
		16) Check for 115 VAC between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If voltage not present, check supply and input power to unit.	Fig. 8-2
		17) Check the air filter. If dirty, replace air filter. If filter is not dirty, replace LC-2.	Fig. 8-5
	4.C. No air bubbles in Aquacradle™	1) During Fill phase of cycle, check for blower operation. If blower is operational, continue to next step. If blower is not operational, proceed to step 4.C.8.	Fig. 8-5
		2) During Fill phase, check for air flow downstream of the blower and prior to solenoid valve 1. If air flow present, proceed to step 4.C.3. If no air flow, replace filter.	Fig. 8-5
		3) During first Fill phase, check for 115 VAC between terminals 22 and AC neutral* in the terminal box. If voltage present, repair or replace solenoid valve 1. If no voltage present, proceed to step 4.C.4.	Fig. 8-3
		4) During Fill phase check 115 VAC between terminal 21 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads going from PCB-1 and PCB-2 to the terminal box. If voltage not present, proceed to step 4.C.5.	Fig. 8-2
		5) During the Fill phase, check for 115 VAC between terminal 16 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace PCB-1. If voltage not present, proceed to step 4.C.6.	Fig. 8-2

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		6) Check for voltage between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace leads from PCB-2 to PCB-1. If no voltage, proceed to step 4.C.7.	Fig. 8-2
		7) Check for voltage between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If no voltage, check input supply and power to the unit.	Fig. 8-2
		8) During the Fill phase of the cycle check for 115 VAC between terminals 4 and 5 in the terminal box. If voltage present, replace blower. If voltage not present, proceed to step 4.C.9.	Fig. 8-3
		9) During Fill phase, check for DC voltage between terminals 3 and 4 on the solid state relay. If voltage present, continue to next step. If voltage not present, proceed to step 4.C.12.	Fig. 8-2
		10) Check for 115 VAC between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace the solid state relay. If no voltage, proceed to step 4.C.11.	Fig. 8-2
		11) Check for 115 VAC between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace relay on PCB-2. If voltage not present, check supply and input power to unit.	Fig. 8-2
		12) During Fill phase of cycle check DC voltage between terminals 18 (negative) and P-5 (positive) on TB-2 of PCB-1. If voltage present, replace leads from PCB-1 to solid state relay. If voltage not present, proceed to step 4.C.13.	Fig. 8-2
		13) On CN55 of PCB-2, jumper Pin 9 (PR) with Pin 1 (G-1).	Fig. 8-2
		<b>NOTE:</b> Pin must remain jumpered through remainder of analysis.	
		On CN55 of PCB-2 check DC voltage between Pin 11 (P-5) and Pin 14 (G). If voltage present, replace PCB-1. If no voltage, proceed to step 4.C.14.	Fig. 8-2

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		14) Check for AC voltage between Pins 12 and 13 on TB-3 of PCB-2. If voltage present, replace PCB-2. If voltage not present, proceed to step 4.C.15.	Fig. 8-2
		15) Check for 115 VAC on the input side of PT-2. If voltage present, replace PT-2. If voltage not present, proceed to step 4.C.16.	Fig. 8-2
	4.D. No water enters Aquacradle™ through faucet during normal operation.	16) Check for 115 VAC between terminal 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If voltage not present, check supply and input power to unit.	Fig. 8-2
		1) Check external water supply. If water is not being supplied to the unit, reattach unit to utility water supply. If water is being supplied, proceed to step 4.D.2.	
		2) Check for water flow downstream of the PRV and before the hand shutoff valve V-1. If flow present, continue to next step. If flow not present, proceed to step 4.D.9.	Fig. 8-3
		3) Check hand shutoff valve V-1 to ensure that it is open (full counterclockwise). If valve is open, proceed to step 4.D.4. If valve is closed, open.	Fig. 8-3
		4) During Fill phase of the cycle, check for 115 VAC between terminal 24 and AC neutral* in the terminal box. If voltage present, repair or replace solenoid valve 4. If voltage not present, proceed to step 4.D.5.	Fig. 8-3
		5) During Fill phase, check AC voltage terminal 24 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to the terminal box. If voltage not present, proceed to step 4.C.6.	Fig. 8-2
		6) During Fill phase, check for 115 VAC between terminal 16 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace PCB-1. If no voltage, proceed to step 4.D.7.	Fig. 8-2

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and on have terminal no. 3 as AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		7) Check for voltage between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace leads from PCB-2 and PCB-1 to the terminal box. If voltage not present, proceed to step 4.D.8.	Fig. 8-2
		8) Check for voltage between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If no voltage, check input supply and power to the unit.	Fig. 8-2
		9) Check the filter on PRV. If clogged, clean. If not clogged, replace PRV.	Fig. 8-3
	4.E. No water flow through suction and water ports.	1) Check water supply to the unit. If water is being supplied, proceed to step 4.E.2. If water is not being supplied, re-attach unit to utility water supply.	
		2) Check for water flow downstream of PRV and prior to hand shutoff valve V-3. If flow is present, continue to step 4.E.3. If flow is not present, proceed to step 4.E.9.	Fig. 8-3
		3) Check hand shutoff valve V-3 to ensure that it is open (full counterclockwise). If valve is open, proceed to step 4.E.4. If valve is closed, open.	Fig. 8-3
		4) During Fill phase of the cycle, check for 115 VAC between terminal 25 and AC neutral* in the terminal box. If voltage present, repair or replace solenoid 5. If voltage not present, proceed to step 4.E.5.	Fig. 8-3
		5) During Fill phase, check 115 VAC between terminal 25 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to terminal box. If voltage not present, proceed to step 4.E.6.	Fig. 8-2
		6) During Fill phase, check for 115 VAC between terminal 16 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace PCB-1. If voltage not present, proceed to step 4.E.7.	Fig. 8-2

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		7) Check for voltage between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace leads from PCB-2 and PCB-1 to the terminal box. If voltage not present, proceed to step 4.E.8.	Fig. 8-2
		8) Check for voltage between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If no voltage, check input supply and power to the unit.	Fig. 8-2
		9) Check the filter on the PRV. If filter clogged, clean. If filter is not clogged, replace PRV.	Fig. 8-3
	4.F. No waste water entering waste tank	1) Check Aquacradle™ for leaking of waste water into disinfectant tank. If leaking present, repair or replace solenoid valve 6. If leaking not present, proceed to step 4.F.2.	Fig. 8-1
		2) During Drain phase of cycle, check for 115 VAC between AC neutral* and terminal 27 in the terminal box. If voltage present, repair or replace solenoid valve 7. If voltage not present, proceed to step 4.F.3.	Fig. 8-3
		3) During Drain phase, check for 115 VAC between terminals 27 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to terminal box. If no voltage, replace PCB-1.	Fig. 8-2
	4.G. Drain pump will not operate	1) Check float, ensure magnetic field is present. If magnetic field present, proceed to step 4.G.2. If magnetic field is not present, replace float.	Fig. 8-5
		2) Remove float, jumper terminals 42 and 19 on TB-4 of PCB-2. If pump operates, replace LS-1. If pump does not operate, proceed to step 4.G.3.	Fig. 8-2, 8-5
		3) With 42 and 19 jumpered, check for 115 VAC between terminals 7 and 2 on TB-4 of PCB-2. If voltage present, repair or replace pump. If no voltage, relays 1508825-240 or PCB-2 may be bad.	Fig. 8-2, 8-5

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.H. Drain pump will not shut off when float reaches bottom of drain tank.	1) Check float, ensure magnetic field is present. If magnetic field is present, proceed to step 4.H.2. If magnetic field is not present, replace float.  2) Remove float, jumper terminals 42 and 20 on TB-4 of PCB-2. If pump continues to run, replace PCB-2. If pump shuts off, replace LS-2.	Fig. 6-5  Fig. 6-2, 8-5
	4.I No disinfectant admitted to Aquacradle™ through faucet.	1) Check disinfectant storage tank. If disinfectant present, proceed to step 4.I.2. If disinfectant not present, fill disinfectant storage tank with disinfectant.  2) Check hand shutoff valve V-2 to ensure open (full clockwise). If valve open, proceed to step 4.I.3. If valve closed, open.  3) During the Disinfectant Fill phase of the cycle, check for disinfectant flow downstream of check valve LC-1 and prior to solenoid valve 3. If flow present, continue to next step. If no flow, proceed to step 4.I.6.  4) During Disinfectant Fill, check for 115 VAC between terminal 23 and AC neutral* in the terminal box. If voltage present, repair or replace solenoid valve 3. If voltage not present, proceed to step 4.I.5.  5) During Disinfectant Fill, check for AC voltage between terminal 23 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads going from PCB-1 and PCB-2 to the terminal box. If no voltage, replace PCB-1.  6) During Disinfectant Fill phase of cycle check for disinfectant flow downstream of disinfectant pump and prior to disinfectant filter. If flow present, continue to next step. If flow not present, proceed to step 4.I.8.  7) Check disinfectant filter. If filter is clogged, clean or replace. If not clogged, replace check valve LC-1.	Fig. 8-5  Fig. 8-4  Fig. 8-4  Fig. 8-3  Fig. 8-2  Fig. 8-4  Fig. 8-4

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		8) During Disinfectant Fill, check for 115 VAC between terminals 17 and 4 in the terminal box. If voltage is present, repair or replace disinfectant pump. If voltage not present, proceed to step 4.I.9.  9) During Disinfectant Fill, check for AC voltage between terminal 17 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to the terminal box. If voltage not present, proceed to step 4.I.10.  10) During Disinfectant Fill, check for 115 VAC between AC neutral* on TB-4 of PCB-2 and terminal 16 on TB-1 of PCB-1. If voltage present, replace PCB-1. If voltage not present, proceed to step 4.I.11.  11) Check for voltage between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace leads from PCB-2 to PCB-1. If voltage not present, proceed to step 4.I.12.  12) Check for voltage between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If voltage not present, check input and supply power to the unit.	Fig. 8-3, 8-5  Fig. 8-2  Fig. 8-2  Fig. 8-2  Fig. 8-2
	4.J. No disinfectant flow through the suction and water ports.	1) Check disinfectant storage tank for disinfectant. If disinfectant present, proceed to step 4.J.2. If no disinfectant present, fill tank with disinfectant.  2) Check hand shutoff valve V-4 to ensure that is open (full counterclockwise). If valve is open, proceed to step 4.J.3. If valve is closed, OPEN.  3) During Disinfectant Fill phase of the cycle, check for disinfectant flow downstream of valve V-4 and prior to solenoid valve 10. If flow present, continue to next step. If flow is not present, proceed to step 4.J.6.	Fig. 8-5  Fig. 8-4  Fig. 8-4

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		4) During Disinfectant Fill, check for 115 VAC between terminal 30 and AC neutral* in the terminal box. If voltage present, repair or replace solenoid valve 10. If voltage not present, proceed to step 4.J.5.	Fig. 8-3
		5) During Disinfectant Fill, check for AC voltage between terminals 30 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to the terminal box. If no voltage, replace PCB-1.	Fig. 8-2
		6) During Disinfectant Fill, check for disinfectant flow downstream of the disinfectant pump and prior to the disinfectant filter. If flow present, clean or replace disinfectant filter. If flow not present, proceed to step 4.J.7.	Fig. 8-4
		7) During Disinfectant Fill, check for 115 VAC between terminal 17 and AC neutral* in the terminal box. If voltage present, repair or replace disinfectant pump. If voltage not present, proceed to step 4.J.8.	Fig. 8-3, 8-5
		8) During Disinfectant Fill, check for 115 VAC between terminal 17 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads going from PCB-1 and PCB-2 to the terminal box. If voltage not present, proceed to step 4.J.9.	Fig. 8-2
		9) During Disinfectant Fill, check for 115 VAC between AC neutral* on TB-4 of PCB-2 and terminal 16 on TB-1 of PCB-1. If voltage present, replace PCB-1. If voltage not present, proceed to step 4.J.10.	Fig. 8-2
		10) Check for voltage between terminals 3 and 4 on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 to PCB-2. If voltage not present, proceed to step 4.J.11.	Fig. 8-2
		11) Check for voltage between terminals 1 and 2 on TB-4 of PCB-2. If voltage present, replace PCB-2. If no voltage, check input and supply power to the unit.	Fig. 8-2

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.K. No disinfectant or water flow through biopsy port.	1) During second phase of Wash cycle check for flow downstream of solenoid 9. If flow is present, clean plastic tubing from solenoid 9 to drain tank. If flow is not present, proceed to step 4.K.2.	Fig. 8-4
		2) During second phase of the Wash cycle, check for 115 VAC between AC neutral* and terminal 29 in the terminal box. If voltage present, repair or replace solenoid valve 9. If voltage not present, proceed to step 4.K.3.	Fig. 8-3, 8-4
		3) Check for 115 VAC between terminal 29 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to the terminal box. If voltage not present, replace PCB-1.	Fig. 8-2
	4.L. During Disinfectant Return Phase, no disinfectant returns to disinfectant storage tank.	1) Check Aquacradle™ for leaking of disinfectant into waste tank. If leaking present, repair or replace solenoid valve 7. If no leaking present, proceed to step 4.L.2.	Fig. 8-1, 8-4
		2) During Disinfectant Return phase of cycle, check for 115 VAC between AC neutral* and terminal 26 in the terminal box. If voltage present, repair or replace solenoid valve 6. If no voltage, proceed to step 4.L.3.	Fig. 8-3, 8-4
		3) During Disinfectant Return, check for 115 VAC between terminal 26 on TB-1 of PCB-1 and AC neutral* on TB-4 of PCB-2. If voltage present, replace leads from PCB-1 and PCB-2 to the terminal box. If voltage not present, replace PCB-1.	Fig. 8-2
	4.M. STOP pushbutton will not stop unit.	1) Disconnect the ribbon cable at CN44S on PCB-1. Remove control panel cover and turn over to view wiring. With the STOP switch depressed, check for continuity between terminals 3 and 4 of the switch. If no continuity, replace STOP switch. If continuity is present, proceed to step 4.M.2.	Fig. 8-2

\*On units numbered 81001 to 81100 (refer to manufacturers data plate) terminal no. 4 is AC neutral. On units numbered 82101 and up terminal no. 3 is AC neutral.



TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		2) Check continuity of ribbon cable between CN44S of PCB-1 and the STOP switch. If no continuity, replace ribbon cable. If continuity is present, replace PCB-1.	Fig. 8-2
	4.N. Excessive disinfectant consumption	1) Drain line slope incorrect.	Para. 5.4.1
	4.O. Cycle times through slower or faster than programmed.	1) Check flashing of LED D7, it should flash once per second. If flashing slower or faster, switches on PCB-1 may be set in wrong position (switch allows unit to run on 50 Hz or 60 Hz power; present on earlier unit only). Set switch to correct position.	Fig. 6-19
	4.P. Cycle times are inconsistent, not same as programmed.	1) Check flashing of LED D7, it should flash once per second. If not consistent rate, then replace PCB-2. 2) If LED D7 flashes consistently, replace PCB-1.	Fig. 8-2 Fig. 8-2

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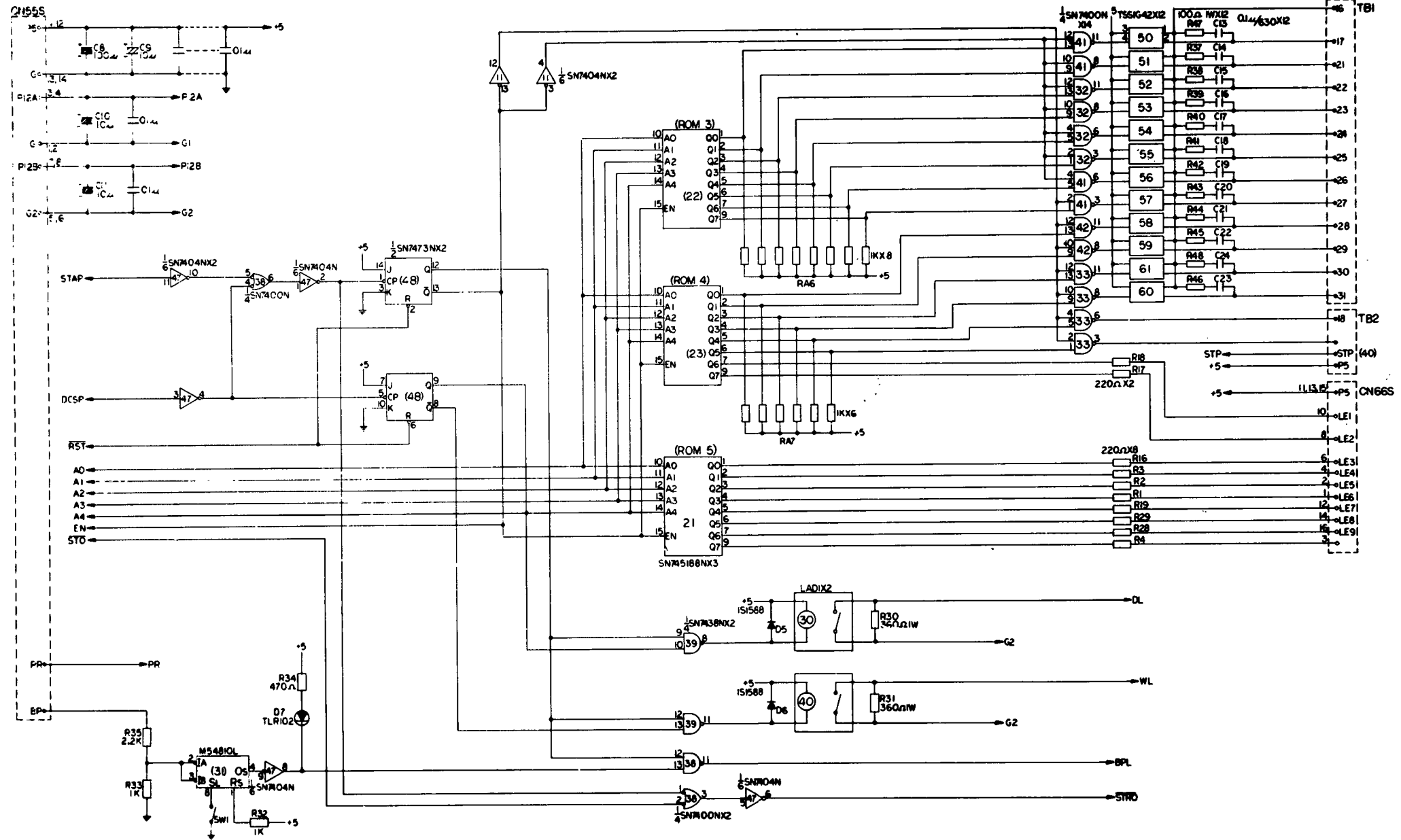
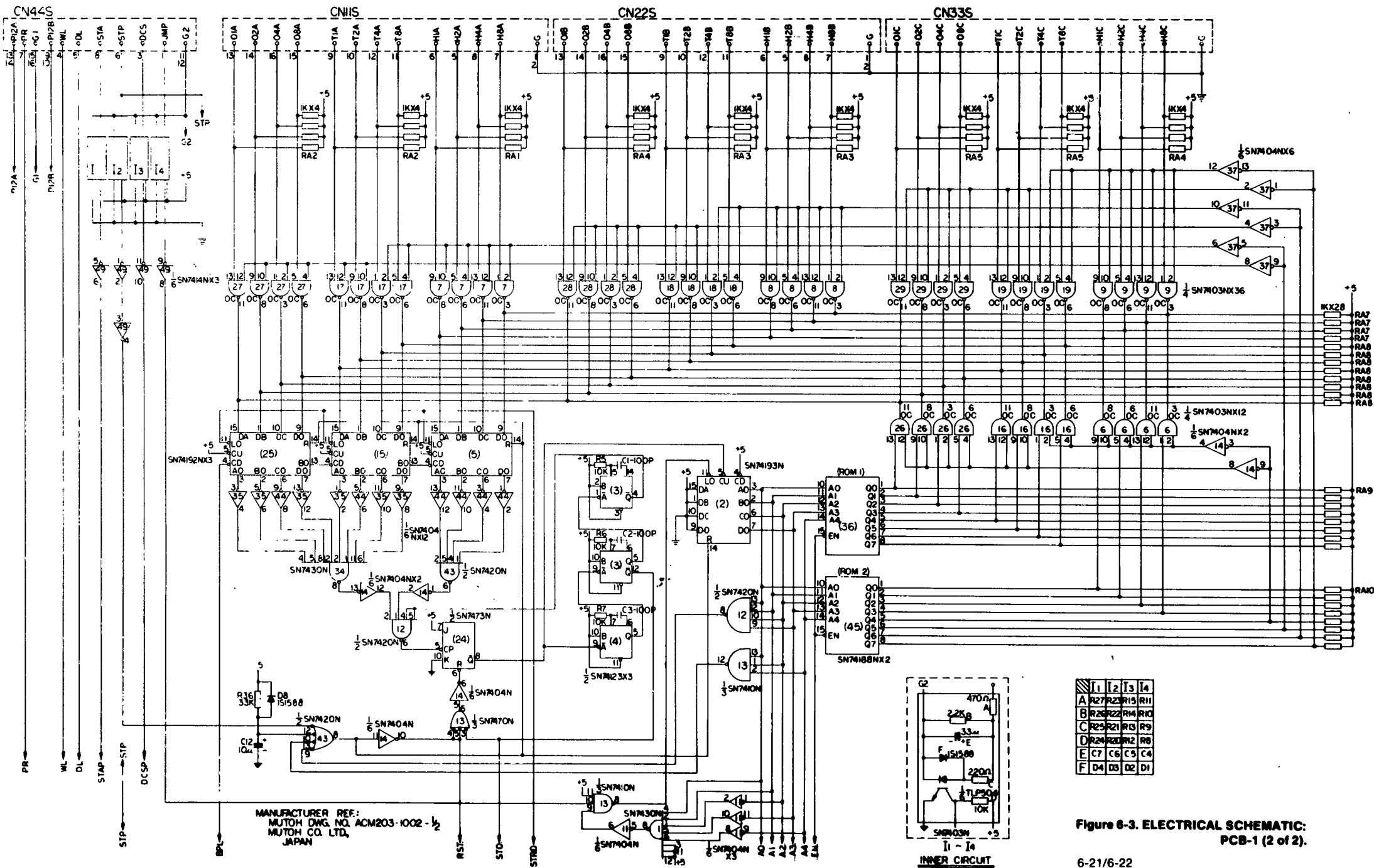


Figure 6-3. ELECTRICAL SCHEMATIC:  
PCB-1 (1 of 2).

6-19/6-20  
764316-682

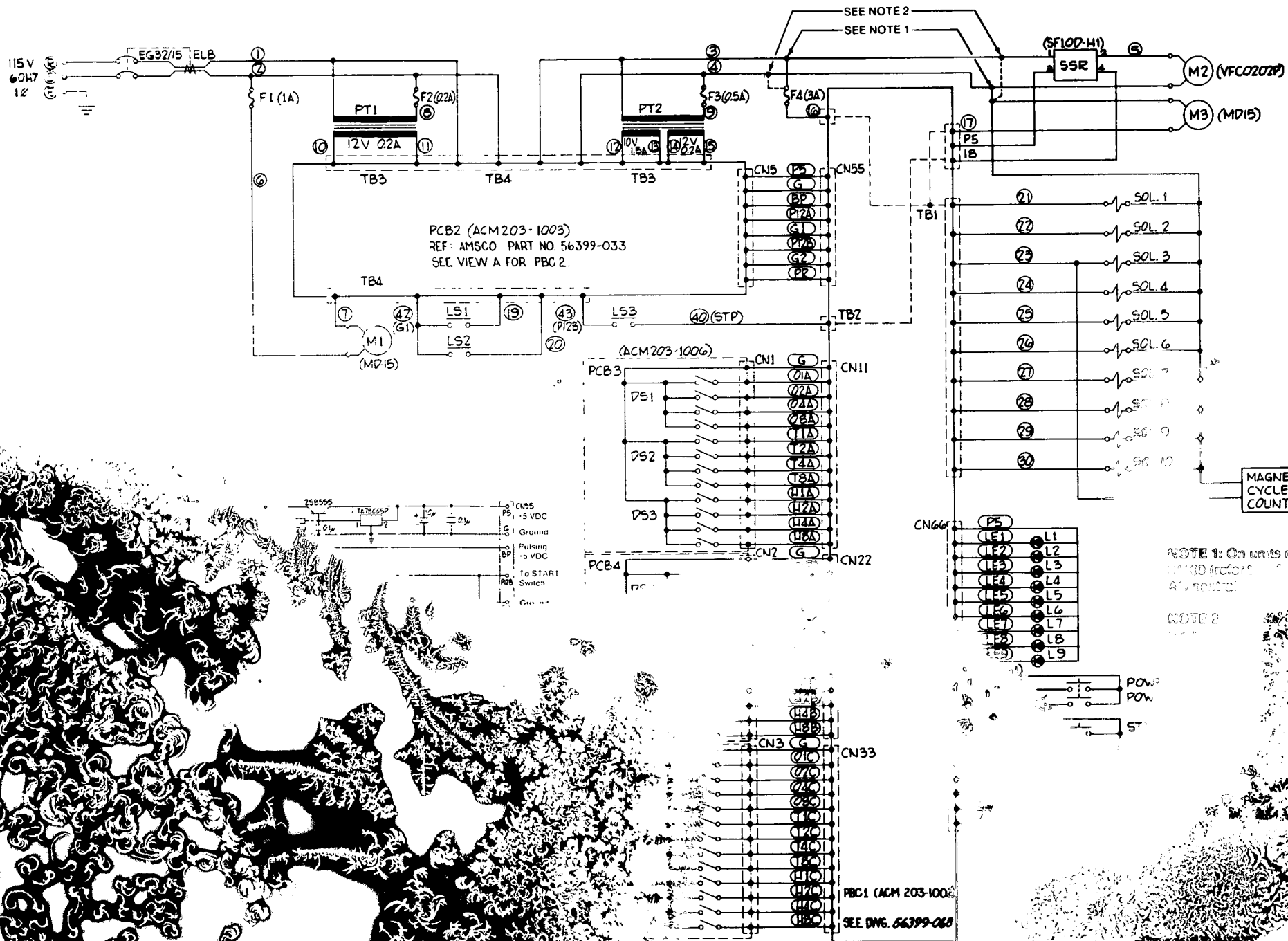
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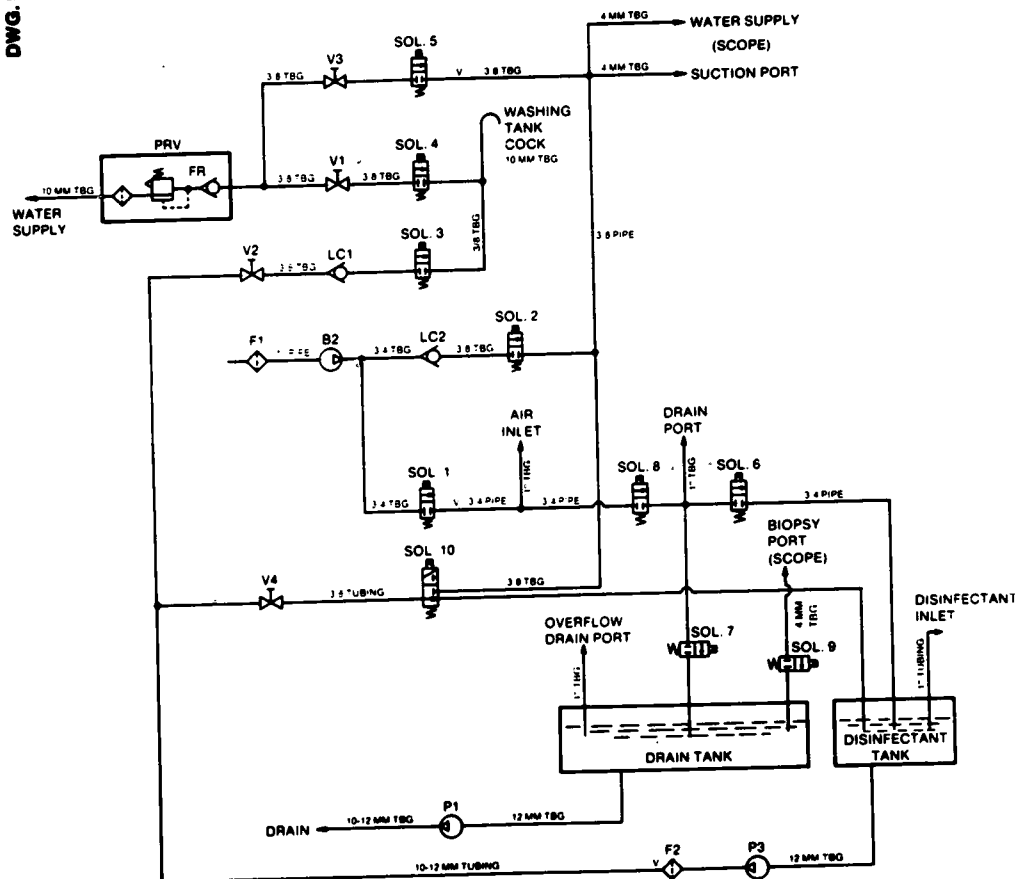


**Figure 6-3. ELECTRICAL SCHEMATIC:  
PCB-1 (2 of 2).**

6-21/6-22  
764316-682

REV. 3/84





**Figure 6-5. PIPING SCHEMATIC.**

**6-25**

764316-002

**F-3**

## SECTION 7

## COMPONENT REPAIR, REPLACEMENT AND ADJUSTMENT

**SECTION 7**

## 7.1 GENERAL

This section contains instructions for the disassembly, repair and replacement of selected processor components. Exploded views and assembly drawings showing the various parts and assemblies referred to are in Section 8.

Various procedures in this section may require use of the following special tools:

Metric socket, 8 mm — PN P-764317-301

Metric socket, 10 mm — PN P-764317-302

Metric socket, 14 mm — PN P-764317-303

**WARNING:** BEFORE PERFORMING ANY REPAIR OR MAINTENANCE PROCEDURES, DISCONNECT THE POWER CORD FROM THE ELECTRICAL OUTLET.

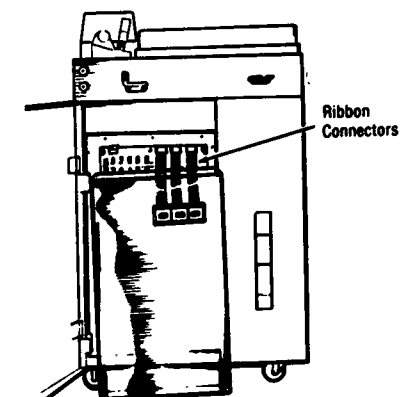
## 7.2 FUSE REPLACEMENT

1. Disconnect power cord.
2. Open the front access door to expose the smoked panel with the three thumbwheel switches.
3. Remove the smoked panel by removing the four Phillips head screws which secure it to the washer. See Figure 7-1.

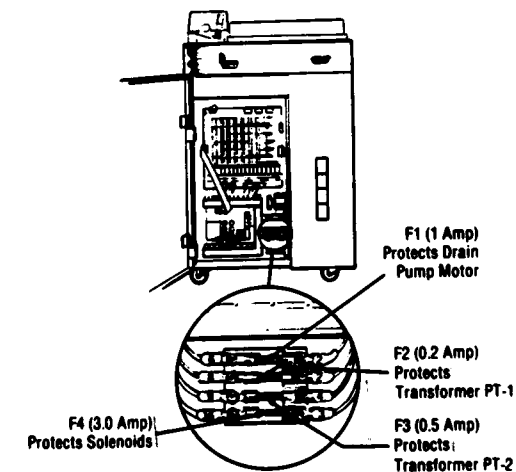
**CAUTION:** Be careful not to damage the three ribbon cables which are attached to the thumb-wheel switches and the printed circuit board.

4. Detach the ribbon connectors at the printed circuit board by unplugging from the sockets on the board.
5. See Figure 7-2. Locate the four fuses on the lower right hand portion of the printed circuit board. Replace any blown fuse.

- 6. Reassemble in reverse order.**



**Figure 7-1. REMOVE PANEL WITH THUMBWHEEL SWITCHES.**



**Figure 7-2. LOCATION OF FUSES.**

7-1  
784316-082

**F-4**

**REV. 9/83**

### 7.3 REPLACEMENT OF CONTROL PANEL LED:

1. Disconnect power cord.
2. See Figure 7-3. Remove the four screws which secure the control panel faceplate to the washer.

**CAUTION:** Be careful not to damage wire connections on back of control panel faceplate.

3. See Figure 7-4. Lift panel off of washer and carefully turn over.

4. Locate the defective LED and unsolder the wire connection. If more than one LED is to be replaced, tag the wires for correct reassembly.

5. See Figure 7-5. Unscrew the nut on the back of the LED connector, push connector upward through the panel, and pull defective LED out of connector.

6. Replace with new LED and reassemble in reverse order.

### 7.4 REPLACEMENT OF CONTROL PANEL PUSHBUTTON SWITCH BULB

1. Disconnect the power cord.
2. Remove the four screws which secure the control panel faceplate to the washer.

**CAUTION:** Be careful not to damage wire connections on back of control panel faceplate.

3. Lift panel off of washer and carefully turn over.
4. See Figure 7-6. Unscrew the nut which secures the defective switch to the faceplate and slide the switch up through the front of the faceplate until the cutaways on the switch are visible.
5. Press in on the retaining clips which hold the lens and bulb in place and remove.

6. Reassemble in reverse order.

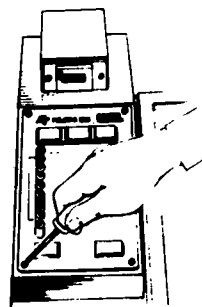


Figure 7-3. REMOVE CONTROL PANEL.

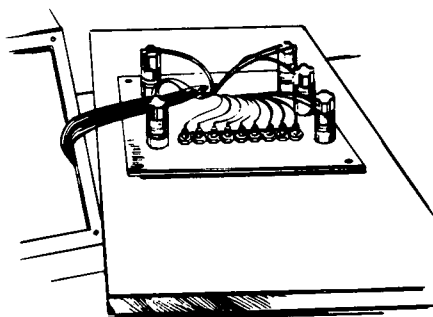


Figure 7-4. CONTROL PANEL REMOVED.

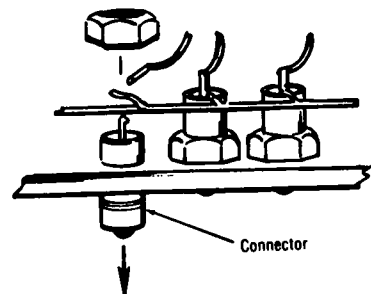


Figure 7-5. REMOVE AND REPLACE LED.

7-2  
764316-002

### 7.7 SOLENOID VALVE 2, 5 OR 10 REMOVAL

1. Remove back panel.
2. Remove the aquacradle.
3. Remove solenoid 2, 5, and 10 as a unit.
4. Remove yellow hose from desired valve.
5. Remove coil from desired valve.
6. Solenoid 2 or 5 can now be removed.
7. To remove solenoid 10, rotate solenoid 2 and 5 90 degrees relative to solenoid 10.

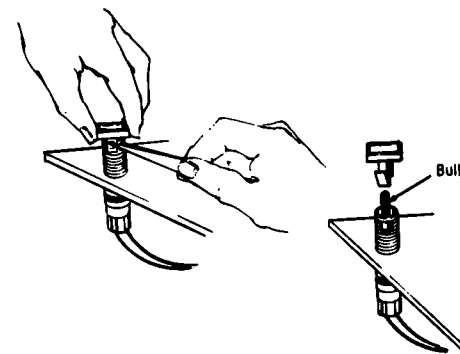


Figure 7-6. REMOVAL AND REPLACEMENT OF PUSHBUTTON SWITCH BULB.

### 7.5 AQUACRADLE REMOVAL

1. Remove the back panel.
2. Remove 2 each of the 4 mm screws holding the waterproof cover hinge.
3. Loosen the top hose clamps for the two hoses between the aquacradle and manifolds.
4. Loosen the compression fitting connecting the yellow hose to the bottom of faucet.
5. Remove the aquacradle.

### 7.6 SOLENOID VALVE 1 REMOVAL

1. Remove the back panel.
2. Loosen the hose clamp and remove hose connecting solenoid 1 to the blower.
3. Remove the serrated hose fitting.
4. Remove the coil from solenoid 1.
5. Remove the 4 hexagonal screws holding the cover to the body of solenoid 1.
6. Remove the solenoid body from manifold.

### 7.8 SOLENOID 3, 4, 9 REMOVAL

1. Remove back panel.
2. Remove the aquacradle.
3. Remove the hoses to solenoid.
4. Remove solenoid coil.
5. Remove the 2 screws fastening solenoid.

### 7.9 SOLENOID 6, 7 REMOVAL

1. Remove back panel.
2. Remove aquacradle.
3. Remove the coils from solenoids 6, 7 and 8.
4. Remove the hose connecting solenoid 1 to blower.
5. Remove the three clamps fastening the manifold to the washer chassis.
6. Remove the drain pipe of desired valve and remove valve.

### 7.10 SOLENOID 8 REMOVAL

1. Remove back panel.
2. Remove aquacradle.

7-3  
764316-002

3. Remove solenoid 1.
4. Remove the coils from solenoids 6, 7 and 8.
5. Remove the three clamps fastening the manifold to the washer chassis.
6. Remove solenoid 8 after rotating solenoids 6 and 7 to clear.

#### 7.11 DRAIN/DISINFECTANT PUMPS REMOVAL

1. Remove the back panel.
2. Remove the power cord of desired pump from terminal box.
3. Remove terminal box from bottom of washer.
4. Disconnect hoses at desired pump.
5. Remove bolts fastening pump and remove pump.

#### 7.12 BLOWER REMOVAL

1. Remove back panel.
2. Remove the pressure regulating valve.
3. Remove the hoses from blower outlet.
4. Remove the power cord from the terminal box.
5. Remove the bolts fastening blower and take out blower.

#### 7.13 DISINFECTANT/DRAIN TANK REMOVAL

1. Remove back panel.
2. Remove terminal box.
3. Remove hose to pump at pumps.

**CAUTION:** Do not remove hoses at tank at this time. Outlets at tank are easily damaged. Remove with tank out.

4. Remove drain extension tubes.
5. Completely loosen tank hold down bracket.
6. Gently slide tank out being careful not to break off outlets.
7. Remove hoses at outlets at bottom of tank.

**NOTE:** If outlet breaks off clean up broken area and allow to dry completely. Glue back with a plastic glue and seal with RTV on exterior of tank.

#### 7.14 PUSH PAD AND PUSH ROD ASSEMBLY REPLACEMENT (Fig. 7-7)

Two different pad and push rod assemblies have been produced. The original style has a pad with a 23/64 in. dia. push rod hole. The new style has a 15/32 in. dia. hole in the pad. Obviously the individual pad and rod parts are not interchangeable, however, as an assembly, they are interchangeable.

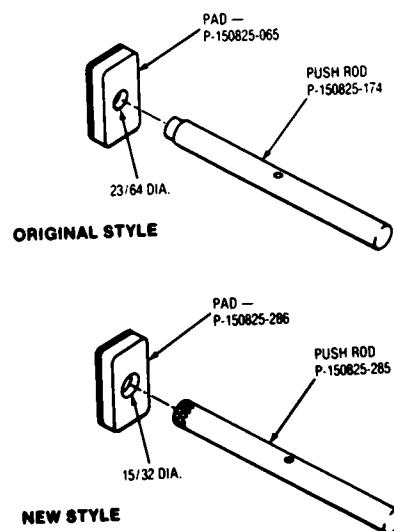


Figure 7-7. PUSH PAD AND PUSH ROD ASSEMBLY.

#### 7.15 ADAPTER PORT ASSEMBLY REPLACEMENT (Fig. 7-8)

Two different styles of adapter port assemblies have been produced.

The original style required the use of plug PN P-150825-158 and an "O" ring PN P-150825-276.

The new style requires use of a different plug PN P-150825-281. Original style plugs are not compatible with the new style adapters.

If an original style adapter is replaced by the new style adapter, then all scope adapters must have their plug portion changed accordingly.

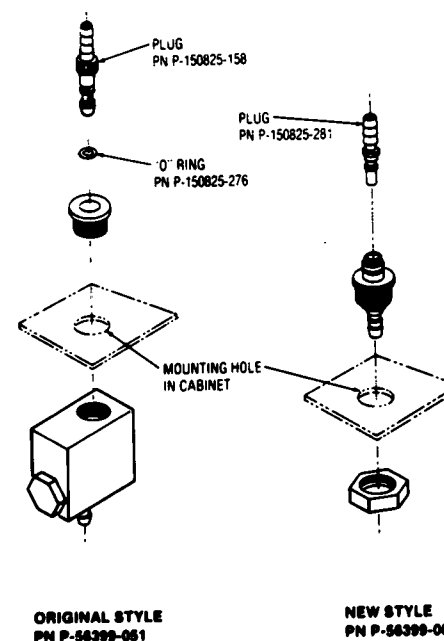


Figure 7-8. ADAPTER PORT ASSEMBLIES, Original and New Styles.

# SECTION 8

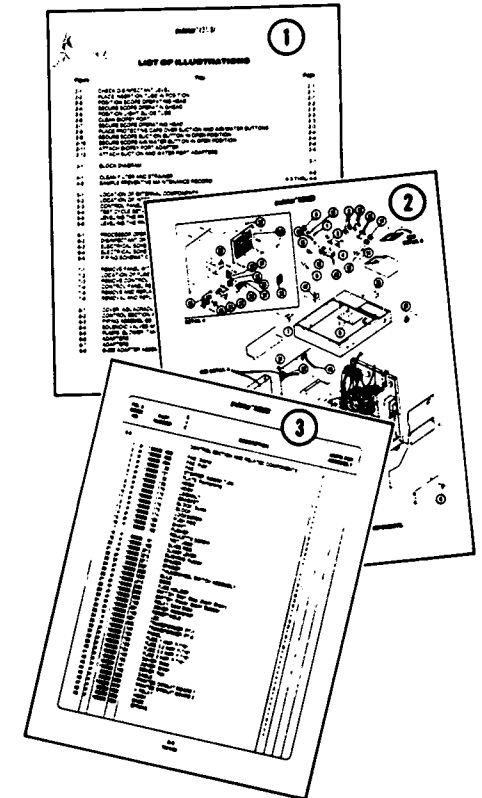
## EXPLODED VIEWS AND PARTS LISTS

# SECTION 8

Assemblies and components of Pulstar 1200 Endoscope Processor are illustrated and identified on the following pages. The part number, the description and the quantity required for each are given. Each indentation in the description represents the assembly level. The **UNITS PER ASSEMBLY** column is specific for the given assembly or subassembly level.

### HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN

- 1 Determine the function and application of the part required. Turn to the List of Illustrations and select the most appropriate title. Note the illustration page number.
- 2 Turn to the page indicated and locate the desired part on the illustration.
- 3 From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.



### TY. ICAL INDENTATION EXAMPLE

No Indentation —  
part of top  
assembly

One Indentation —  
(1st subassembly)  
Part of above item  
with no indentation

COVER, Red	.....
CABLE	.....
PRINTED CIRCUIT BOARD 1	.....
PRINTED CIRCUIT BOARD 2	.....
• RELAY	.....
HOOK	.....
BASE	.....
SPRING	.....

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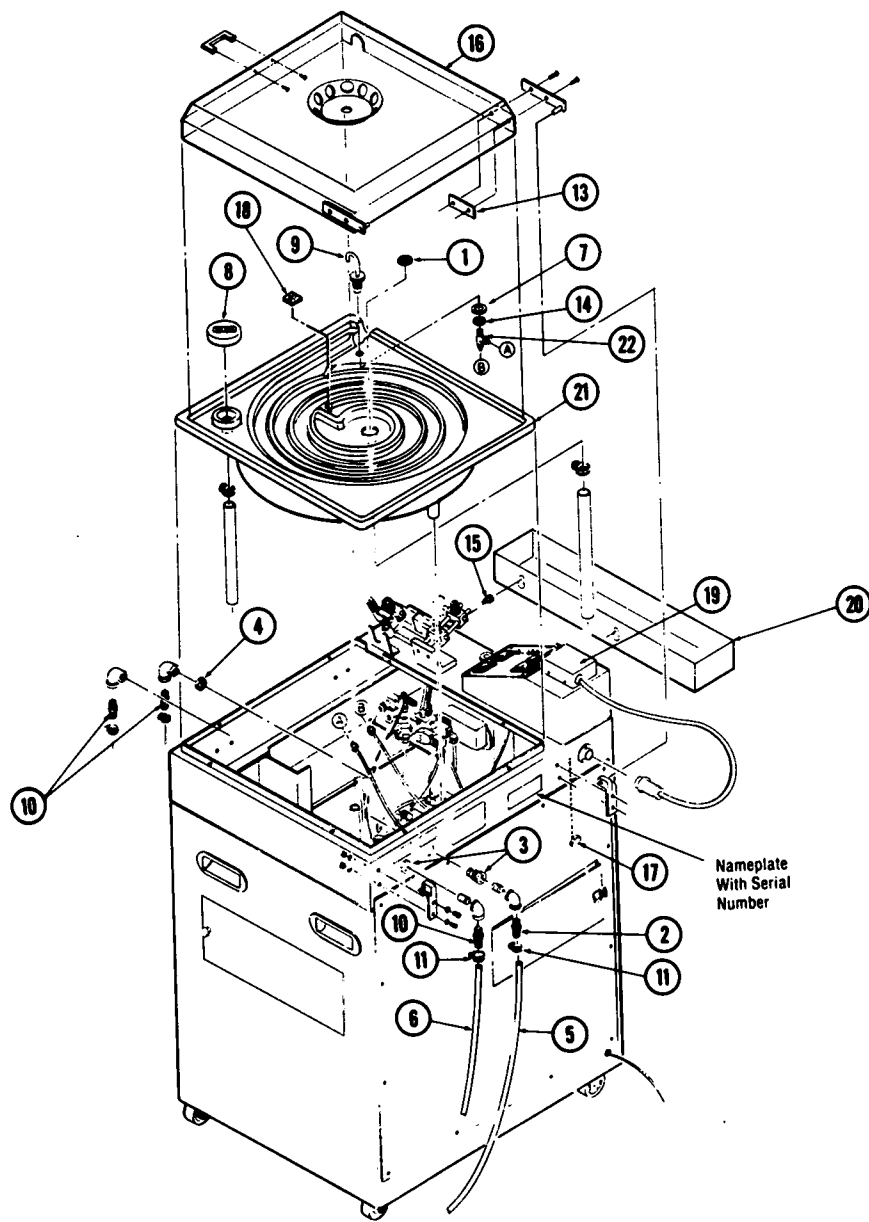


Figure 8-1. COVER, AQUACRADLE™, RELATED COMPONENTS.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-1-			COVER, AQUACRADLE™, RELATED COMPONENTS .....	X
1	P 150825	120	COVER, Drain .....	1
2	P 150825	138	NIPPLE, Hose (Water Supply) .....	1
3	P 150825	136	JOINT .....	2
4	P 150825	135	NUT .....	1
5	P 150825	109	HOSE, Water Supply (ID 3/8") .....	1
6	P 150825	110	HOSE, Discharge (ID 5/8") .....	1
7	P 150825	133	GASKET .....	1
8	P 150825	119	CAP, Disinfectant Tank .....	1
9	P 150825	129	FAUCET .....	3
10	P 150825	137	NIPPLE, Hose .....	1
11	P 150825	112	CLAMP, Hose (for 7/8 OD Hose) .....	1
12	P 150825	111	CLAMP, Hose (for 5/8 OD Hose) .....	2
13	P 150825	139	NUT .....	1
14	P 150825	134	NUT .....	2
15	P 150825	140	BUTTON .....	1
16	P 56399	039	COVER, Aquacradle™ .....	1
17	P 150825	202	COVER .....	1
18	P 150825	121	COVER, Drain .....	1
19	P 56399	066	CYCLE COUNTER .....	1
20	P 150825	113	TRAY, Convenience .....	1
21	P 141212	012	AQUACRADLE™ .....	1
22	P 45477	091	FITTING, 3/8 O.D.T. x 1/4 N.P.T. x 3/8 O.D.T. ....	1
NOTE: Accessories required for processing endoscopes —				
1) Light guide plug (P-150825-106)				
2) Protective caps for air/water and suction buttons (P-150825-105)				
Refer to pgs. 2-2 and 2-3.				

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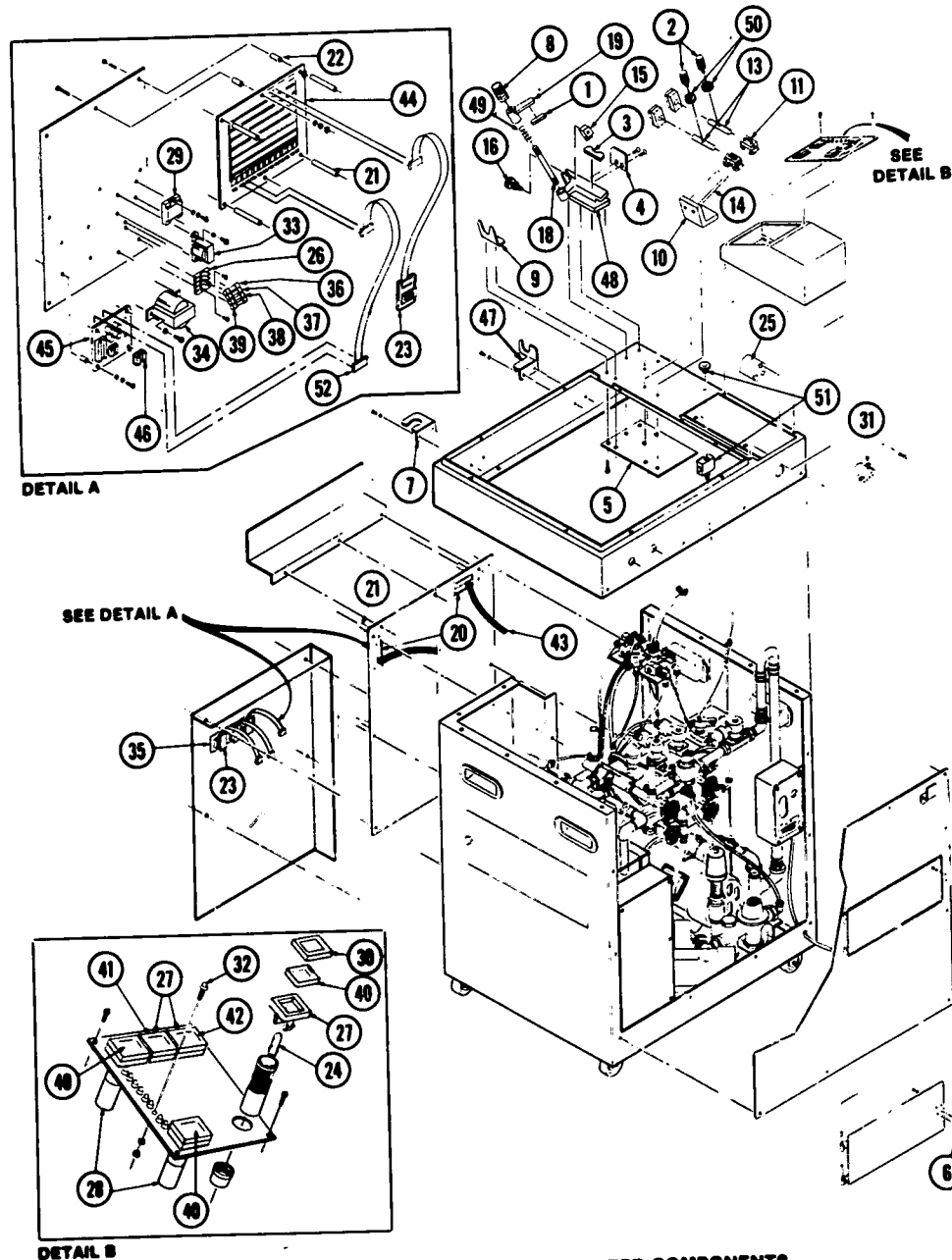


Figure 8-2. CONTROL SECTION AND RELATED COMPONENTS.

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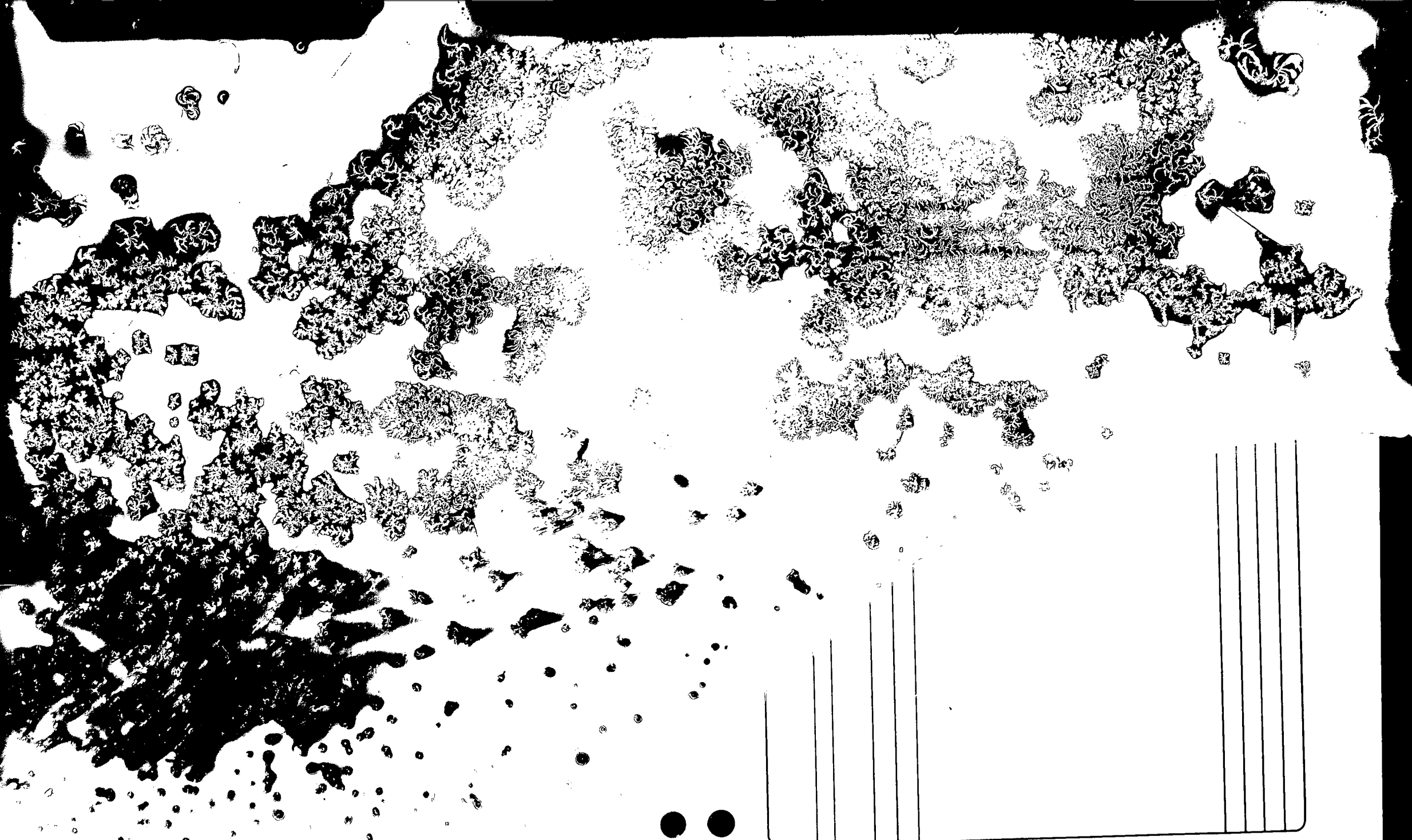
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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-2-			CONTROL SECTION AND RELATED COMPONENTS .....	X
1	P 150825 066		PAD, Clamp .....	1
2			PAD, Push (See Section 7.14) .....	2
3	P 150825 064		PAD .....	1
4	P 150825 132		STOPPER, Adapter Tube .....	1
5	P 150825 131		PLATE, Reinforcing .....	1
6	P 150825 130		HOOK .....	1
7	P 150825 122		HOOK .....	1
8	P 150825 179		LOCKNUT .....	1
9	P 150825 178		BRACKET .....	1
10	P 150825 177		BLOCK, Guide .....	2
11	P 150825 176		BLOCK .....	2
12	P 150825 175		LOCKSCREW .....	2
13			PUSH ROD (See Section 7.14) .....	2
14	P 764319 178		SHAFT, 10" Lg. ....	1
15	P 150825 184		PUSHER .....	1
16	P 150825 183		ROULETTE SCREW .....	1
17	P 150825 182		PIN (Not Shown) .....	1
18	P 150825 181		GUIDE ROD .....	1
19	P 150825 180		CLAMP LEVER .....	2
20	P 150825 213		BUSHING, Rubber .....	4
21	P 150825 212		SPACER .....	6
22	P 150825 211		SPACER .....	3
23	P 56399 067		THUMBWHEEL SWITCH ASSEMBLY .....	5
24	P 150825 040		BULB .....	1
25	P 150825 203		BOSS .....	1
26	P 150825 215		FUSE HOLDER .....	3
27	P 150825 035		SWITCH (Start, Stop, Disinf. Drain) .....	2
28	P 150825 036		SWITCH (Power, Disinf. Bypass) .....	1
29	P 150825 039		RELAY, Solid State .....	5
30	P 150825 152		COVER, Waterproof .....	1
31	P 150825 201		RECEPTACLE .....	9
32	P 150825 148		LED .....	1
33	P 150825 061		TRANSFORMER, PT-1 .....	1
34	P 150825 060		TRANSFORMER, PT-2 .....	1
35	P 150825 144		PANEL .....	1
36	P 756737 091		FUSE, 1 AMP, F-1 .....	1
37	P 150825 125		FUSE, 0.2 AMP, F-2 .....	1
38	P 764319 447		FUSE, 0.5 AMP, F-3, Box of 5 .....	1
39	P 764317 778		FUSE, 3 AMP, F-4, Box of 5 .....	3
40	P 150825 149		COVER, Clear .....	1
41	P 150825 150		COVER, Green .....	1
42	P 150825 151		COVER, Red .....	1
43	P 150825 145		CABLE .....	1
44	P 56399 068		PRINTED CIRCUIT BOARD 1 (Repaired P-764319-369) .....	1
45	P 56399 069		PRINTED CIRCUIT BOARD 2 (Repaired P-764319-370) .....	2
46	P 150825 240		• RELAY .....	1
47	P 56399 038		HOOK .....	1
48	P 56399 062		BASE .....	1
49	P 150825 229		SPRING .....	2
50	P 90111 091		WASHER, Flat .....	1
51			ADAPTER PORT ASSEMBLY (See Section 7.15) .....	1
52	P 150825 146		CABLE .....	1

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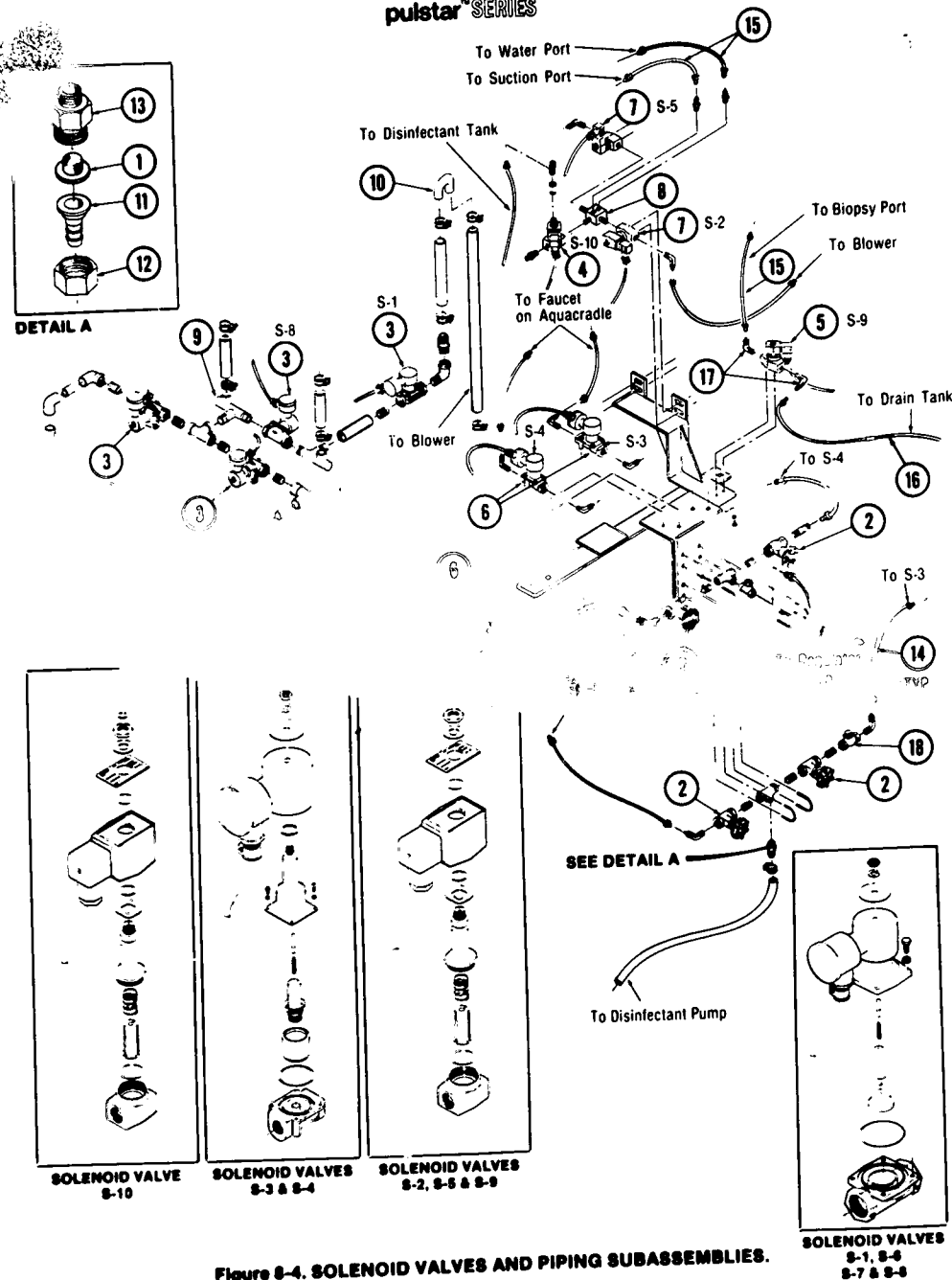


Figure 8-4. SOLENOID VALVES AND PIPING SUBASSEMBLIES.

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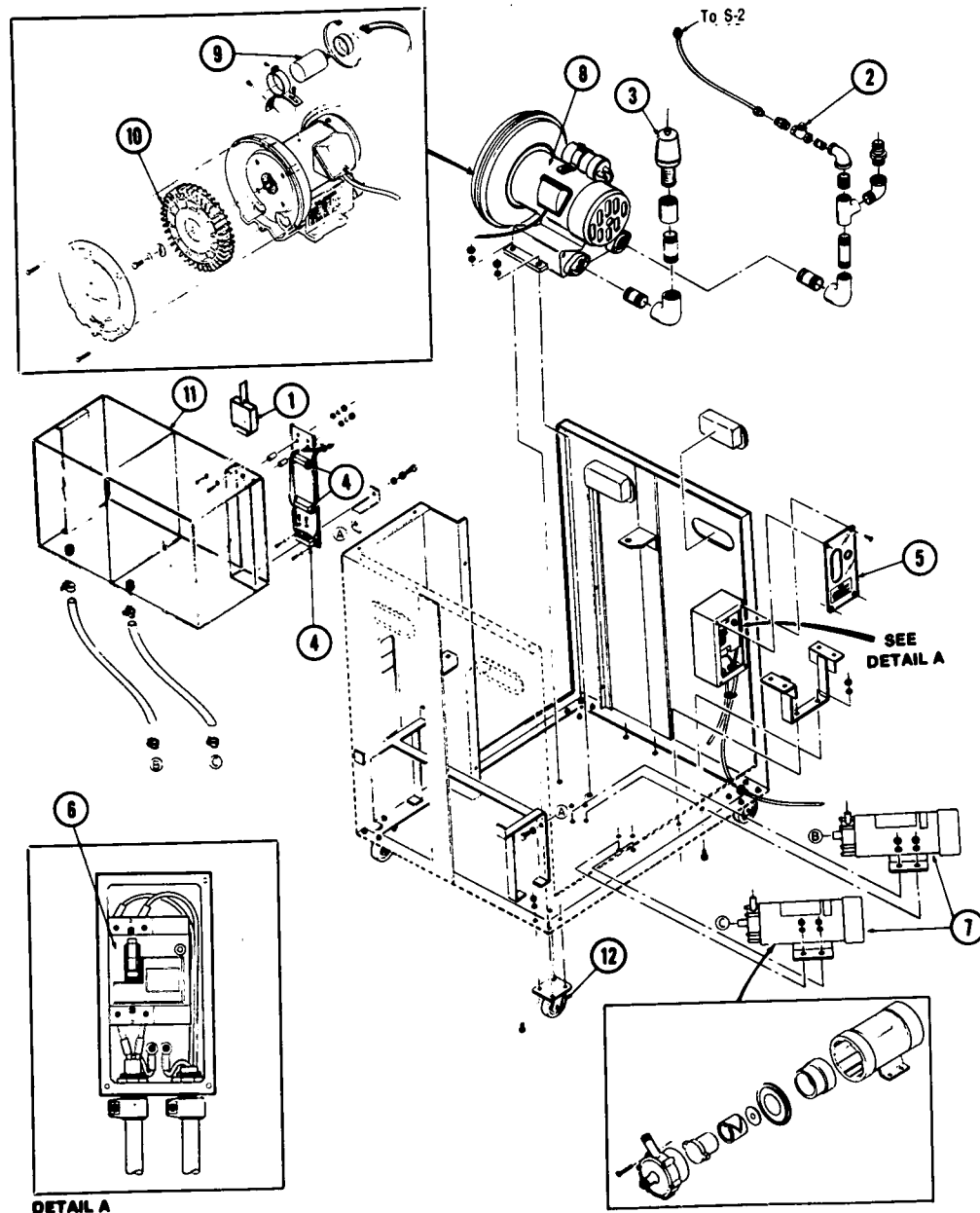
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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-4-			SOLENOID VALVES AND PIPING SUBASSEMBLIES .....	X
1	P 150825 107		FILTER, Disinfectant .....	1
2	P 150825 048		VALVE, Gate .....	4
3	P 150825 050		VALVE, Solenoid (Nos. 1, 6, 7, 8) .....	4
	P 150825 232		• Coil .....	1
	P 56399 070		• Repair Kit .....	1
4	P 150825 055		VALVE, Solenoid (No. 10) .....	1
	P 150825 235		• Coil .....	1
	P 56399 058		• Repair Kit .....	1
5	P 150825 054		VALVE, Solenoid (No. 9) .....	1
	P 150825 233		• Coil .....	1
	P 56399 057		• Repair Kit .....	1
6	P 150825 052		VALVE, Solenoid (Nos. 3, 4) .....	2
	P 150825 234		• Coil .....	1
	P 56399 042		• Repair Kit .....	1
7	P 150825 051		VALVE, Solenoid (Nos. 2, 5) .....	2
	P 150825 233		• Coil .....	1
	P 56399 057		• Repair Kit .....	1
8	P 150825 118		MANIFOLD, Small .....	1
9	P 150825 117		MANIFOLD, Large .....	1
10	P 150825 141		JOINT .....	1
11	P 150825 206		JOINT, Hose .....	1
12	P 150825 205		NUT .....	1
13	P 150825 204		JOINT .....	12
14	P 150825 153		TUBE (Yellow) 3/8 x 48 .....	3
15	P 764319 122		TUBE, 6 mm O.D. x 4 mm I.D. x 280 mm .....	1
16	P 764319 123		TUBE, 6 mm O.D. x 4 mm I.D. x 710 mm .....	1
17	P 764319 125		FITTING, 90° Elbow, 6 mm O.D.T. x 1/8 N.P.T. ....	5
18	P 150825 047		CHECK VALVE, 3/8 N.P.T. ....	1

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DETAIL A

Figure 8-5. PUMPS, BLOWER, TANKS.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-5-			PUMPS, BLOWER, TANKS .....	X
1	P 56399 063		FLOAT ASSEMBLY, Magnetic .....	1
2	P 150825 047		VALVE, Check (LC1) .....	1
3	P 56399 099		FILTER ASSEMBLY .....	1
	P 150825 287		• Filter .....	1
	P 150825 289		• Tube .....	1
	P 150474 685		• Adapter .....	1
	P 841 042		• Bushing .....	1
4	P 150825 043		SWITCH, Magnetic .....	3
5	P 150825 116		COVER, Circuit Breaker .....	1
6	P 56399 037		CIRCUIT BREAKER .....	1
7	P 56399 024		PUMP (Drain & Disinfectant) .....	2
	P 56399 056		• Repair Kit .....	1
8	P 56399 025		BLOWER .....	1
9	P 150825 220		• Capacitor .....	1
10	P 150825 219		• Impeller .....	1
11	P 56399 040		DISINFECTANT/DRAIN TANK .....	1
12	P 134471 014		CASTER .....	4

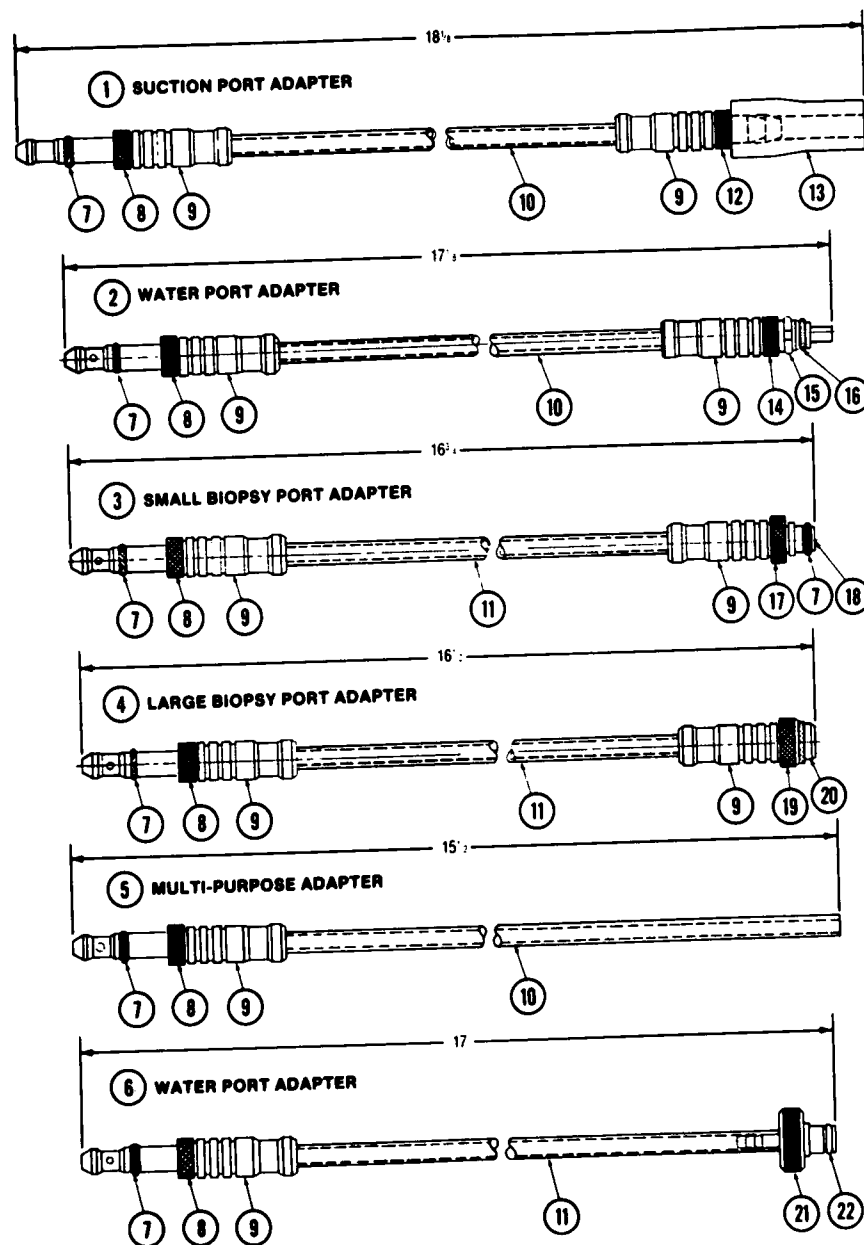


Figure 8-6. ADAPTERS.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-6-			ADAPTERS (1) .....	X
1 P			SUCTION PORT ADAPTER (Complete) .....	
2 P			WATER PORT ADAPTER (Complete) .....	
3 P			SMALL BIOPSY PORT ADAPTER (Complete) .....	
4 P			LARGE BIOPSY PORT ADAPTER (Complete) .....	
5 P			MULTI-PURPOSE ADAPTER (Complete) .....	
6 P			WATER PORT ADAPTER (Complete) .....	
7 P	150825	276	O-RING .....	A/R
8 P	150825	158	PLUG .....	A/R
9 P	150825	159	CAP .....	A/R
10 P	150825	160	TUBE .....	A/R
11 P	150825	166	TUBE .....	A/R
12 P	150825	164	SUCTION TUBE .....	A/R
13 P	150825	165	SILICONE TUBE .....	A/R
14 P	150825	161	PLUG, Water Inlet .....	A/R
15 P	150825	162	SPRING RING .....	A/R
16 P	150825	163	O-RING .....	A/R
17 P	150825	167	NUT .....	A/R
18 P	150825	168	PLUG .....	A/R
19 P	150825	169	PLUG .....	A/R
20 P	150825	170	O-RING .....	A/R
21 P			PLUG .....	A/R
22 P			O-RING .....	A/R
** THESE PARTS ARE FOR USE WITH THE ORIGINAL STYLE ADAPTER PORT. THE NEW STYLE ADAPTER PORT REQUIRES USE OF PLUG PN P-150825-281 (SEE FIG. 7-8 AND PARA. 7.15).				

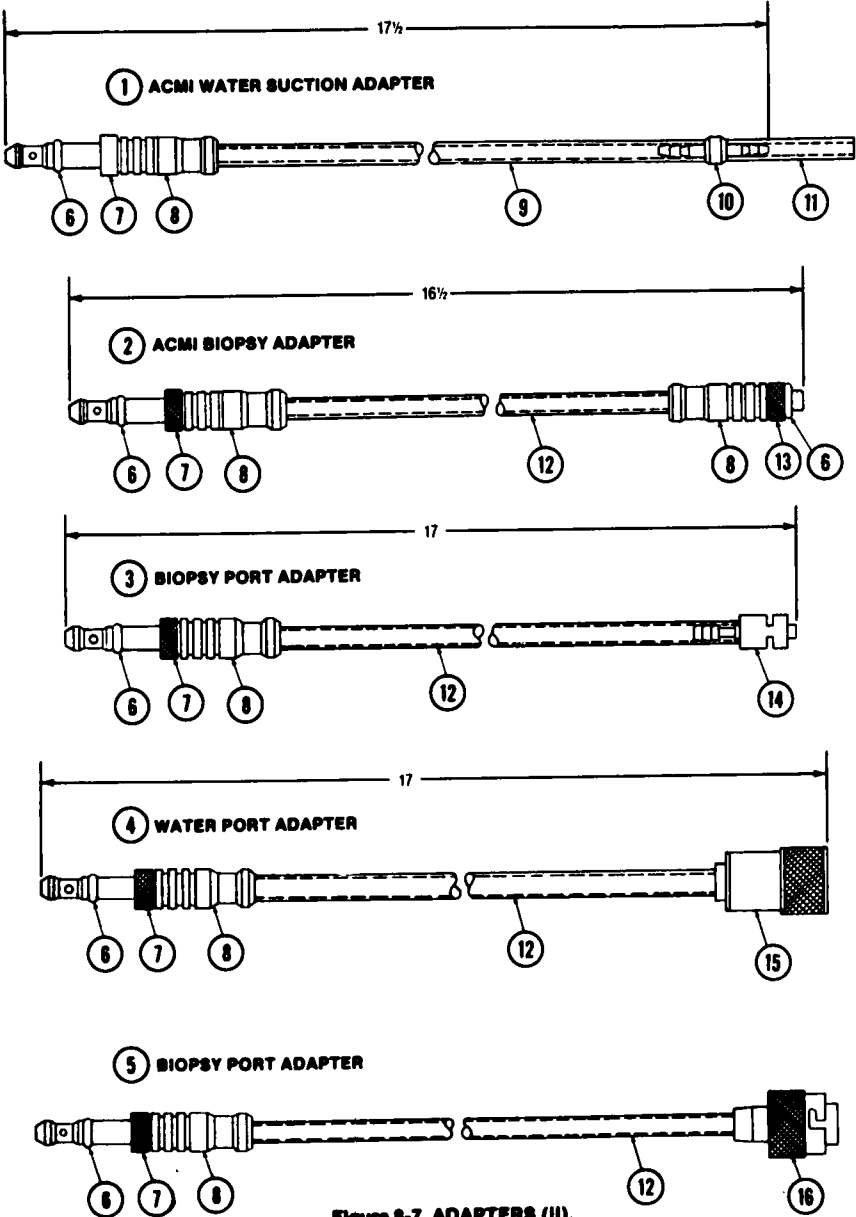


Figure 8-7. ADAPTERS (II).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-7-			ADAPTERS (2) .....	X
1	P 56399	054	ACMI WATER SUCTION ADAPTER (Complete) .....	
2	P 56399	055	ACMI BIOPSY ADAPTER (Complete) .....	
3	P 56399	059	BIOPSY PORT ADAPTER (Complete) .....	
4	P 56399	060	WATER PORT ADAPTER (Complete) .....	
5	P 56399	061	BIOPSY PORT ADAPTER (Complete) .....	
6	P 150825	276	O-RING .....	A/R
7	P 150825	158	PLUG .....	A/R
8	P 150825	159	CAP .....	A/R
9	P 150825	160	TUBE .....	A/R
10	P 150825	217	PLUG .....	A/R
11	P		TUBE .....	A/R
12	P 150825	166	TUBE .....	A/R
13	P 150825	216	PLUG .....	A/R
14	P 150825		PLUG .....	A/R
15	P 150825		PLUG .....	A/R
16	P 150825		PLUG .....	A/R
THESE PARTS ARE FOR USE WITH THE ORIGINAL STYLE ADAPTER PORT. THE NEW STYLE ADAPTER PORT REQUIRES USE OF PLUG PN P-150825-281 (SEE FIG. 7-8 AND PARA. 7.15).				

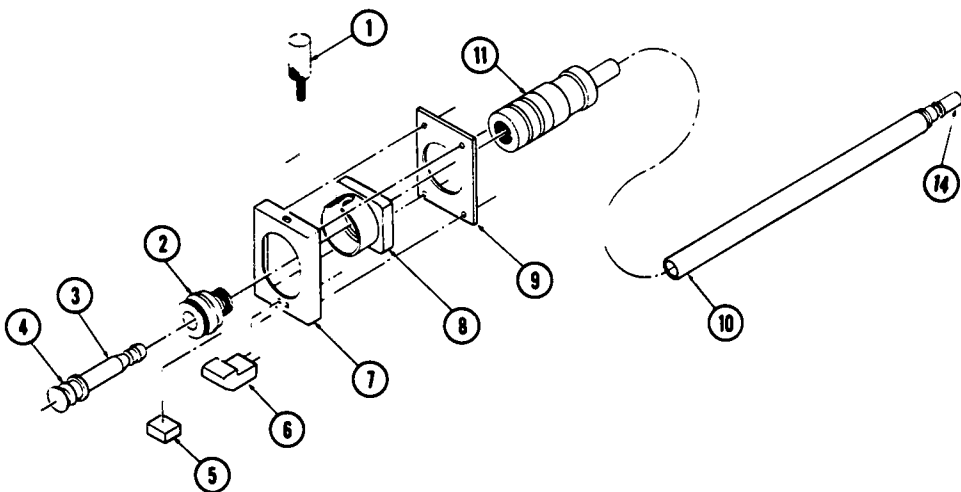


Figure 8-8. B-200 ADAPTER ASSEMBLY.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-8-	P 56399	064	B-200 ADAPTER ASSEMBLY, ORIGINAL STYLE .....	X			
	P 56399	101	B-200 ADAPTER ASSEMBLY, NEW STYLE .....		X		
1	P 150825	187	BOLT .....	1	1		
2	P 150825	193	NUT .....	1	1		
3	P 150825	195	PLUG .....	1	1		
4	P 150825	191	O-RING .....	1	1		
5	P 150825	189	PAD .....	1	1		
6	P 150825	190	BLOCK .....	1	1		
7	P 150825	188	BOX .....	1	1		
8	P 150825	192	SLIDE BLOCK .....	1	1		
9	P 150825	194	COVER .....	1	1		
10	P 150825	160	TUBE .....	1	1		
11	P 150825	159	CAP .....	2			
12	P 150825	276	O-RING .....	1			
13	P 150825	158	PLUG .....	1			
14	P 150825	281	PLUG .....			1	

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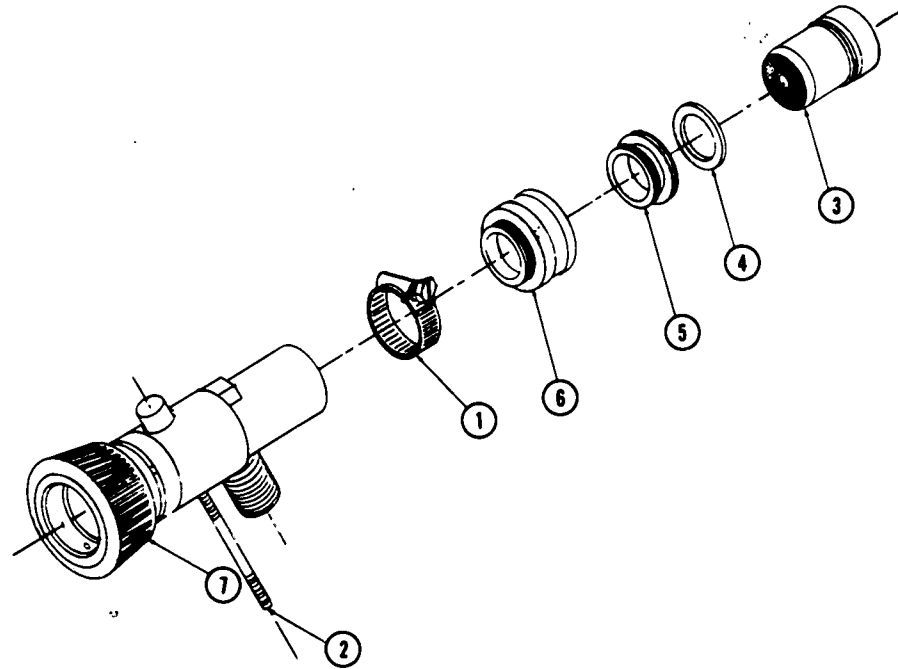


Figure 8-9. COUPLER ASSEMBLY.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-9-	P 56399	071	COUPLER KIT .....	X
1	P 33043	091	CLAMP, Hose, 29/32 Dia. ....	2
2	P 76721	061	NIPPLE, 1/8 x 2-1/4 .....	1
3	P 56399	079	NIPPLE, Deluxe Aerator .....	1
4	P 150825	262	WASHER .....	1
5	P 150825	263	ADAPTER, 15/16" Brass .....	1
6	P 56399	078	ADAPTER, Hose .....	1
7	P 56399	080	COUPLER, Deluxe .....	1
NOTE: Installation instructions P/N 150825-259.				

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**AMSCO  
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## PULSTAR SERIES

### PULSTAR 1200 ENDOSCOPE PROCESSOR

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