

AMSCO Maintenance Manual



PULSTAR SERIES

pulstar™ 5000 Glassware Washer

(1/85)

P-764175-001

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 INSPECTION AND MAINTENANCE 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!

4-1

WARNING: IN PERFORMING THE CHECK OF THE AUTOMATIC STOP, OPEN DOOR SLOWLY AND STAND AWAY FROM DOOR OPENING. IF SWITCH IS MALFUNCTIONING, HOT WATER MAY BE SPRAYED THROUGH DOOR OPENING.

4-2

CAUTION: Solenoid valves are equipped with a special material which can be attacked by oils and grease. When replacing entire valve, wipe threads clean of cutting oils and use Teflon tape to seal pipe joints.

7-2

CAUTION: Make sure wash tank is empty before removing water level detector.

7-2

CAUTION: Hand-tighten only the knurled knob in the adapter of the rotary spray arms.

7-5, 7-6

CAUTION: Before removing the thermoswitch, make sure sump is empty.

7-6

CAUTION: Do not use detergents with high chloride content which may be harmful to stainless steel.

2-2

SECTION 1

GENERAL INFORMATION

1

1.1 APPLICATION AND DESIGN

The product literature included in this section contains technical data relating to the principal descriptive and identifying characteristics for PULSTAR 5000 Laboratory Glassware Washers. 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.



AMSCO

Glassware Washer

pulstar®5000
GLASSWARE WASHER
• vertical sliding door

**TECH
DATA**

DESCRIPTION

Microcomputer-controlled laboratory glassware washer automatically washes and rinses laboratory equipment according to cycle selections. Pre-wash, wash, rinses, including purified-water rinse times are individually adjustable to compensate for widely varying soil conditions.

Application

For use in laboratories and hospital central processing departments for washing glassware, trays, patient utensils and other similar equipment.

Size and Type

Washer size is 44" W x 75" H x 31" L (1118 x 2605 x 787 mm). Door opening is 24" W x 23" H (610 x 564 mm). Chamber capacity accommodates a loading rack 20" sq (508 mm). Vertical sliding door(s) are designed as a space-saving feature. For pass-through operation, this series of washers offers a double-door model.

Standards

The washer meets applicable requirements of the following standards:

Underwriters Laboratories Incorporated

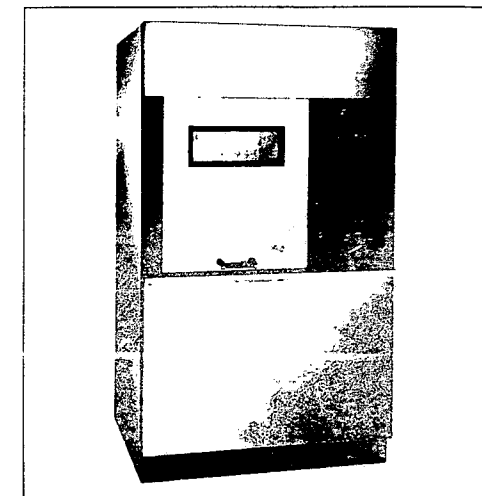
California Seismic Requirements — Title 24 (Division T-17 of Part 6) of the California Administrative Code

National Plumbing Code

DESIGN FEATURES

Control Panel

Microcomputer monitors and controls system operations and functions. Cycle proceeds automatically through pre-wash, wash, detergent-injection, and rinse phases. Completion of cycle is indicated visually and audibly.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Model

- ☐ Single Door
☐ Free Standing
☐ For Recessing Through One Wall
☐ Double Door

Wash/Rinse Tank Heating

- ☐ Steam (closed coil)
☐ Electric
☐ 200 Volt
☐ 230 Volt
☐ 460 Volt

Options (Factory Installed)

- ☐ Vapor Condenser
☐ Purified-Rinse Water Pump
☐ Purified-Rinse Water Pump with 20-Gallon Storage Tank

Accessories

- ☐ Water Temperature Booster (see separate product literature)
☐ Materials Handling Accessories (see separate product literature)

Item No. _____

Location(s) _____

● **Quartz-crystal based timing.** Microcomputer inputs from thumb-wheel switches accurately set pre-wash, wash, and rinse times. **Digital readout** shows time remaining for each phase of the selected cycle. Timing automatically resets upon completion or stopping of a cycle. Automatic reset eliminates need to reprogram times between repeated cycles.

● **Cycle Monitoring.** Chamber door must be closed to initiate a cycle. If the door is open, status light DOOR OPEN alerts operator

Control panel is illuminated only when power is on, and shows cycle status, warning signals, cycle phase indicators, digital readout, and cycle START and STOP selections. Time readout is by large, easy-to-see seven-segment digital display that first indicates set time and then, as cycle continues, counts down remaining phase time. Cycle selector requires positive force to actuate, cycle selected is clearly indicated.

Secondary Controls are behind a hinged door beneath the primary control panel. These controls allow the operator to select the type of washing cycle appropriate for different soil conditions. Timer settings for each of the four cycle phases, PREWASH, WASH, DETERGENT, and PURIFIED RINSE, are made individually on this panel by four thumbwheel timers. Set points for PREWASH and WASH are adjustable in increments of one minute, from 0-99. Set points for DETERGENT and PURIFIED RINSE are adjustable in increments of one second, from 0-99. Zero settings result in an individual phase being omitted from a cycle. In addition to the adjustable times, each cycle includes a one-minute "power rinse" followed by a two-minute fresh-water rinse. These rinse phases follow the wash phase and precede the purified-water rinse. The fixed times for the "power rinse" and fresh-water cannot be altered by an operator but may be changed within the range of 0-15 minutes by service personnel.

Also on the secondary panel are the POWER ON/OFF switch, TANK DRAIN switch, HEAT ON/OFF, LIGHT ON/OFF, and EXTENDED CYCLE switches. The DRAIN TANK switch is for draining the wash tank before a cycle is started. If the tank is not drained, the final rinse water will automatically be reused as the prewash water in the following cycle. The HEAT ON/OFF switch is for washing heat-sensitive materials. In the OFF position, it prevents rinse or wash water from rinsing above the temperature of the hot water supply or dropping below 120°F (49°C) during the wash and "power rinse." The pre-wash and final rinse water are maintained at 120° F (49° C). The chamber may be illuminated by the LIGHT ON/OFF switch. The EXTENDED CYCLE switch is for overriding the thumbwheel switch when extending or shortening the length of a pre-wash or wash phase.

Safety Features

Controls prevent start of cycle if the door(s) is open. DOOR OPEN light will be on.

If the chamber door is opened during a cycle, the controls will terminate the cycle. Cycle may be reinitiated only by pressing START selector

Recirculating Wash/Rinse System

For the pre-wash, wash and "power rinse" phases of the cycle, water is recirculated through the piping system by a pump driven by a 7½-hp motor. Rotating sprays in the chamber forcefully apply water to the load at the rate of approximately 125 gpm (473 lpm). Spray nozzles are designed to provide full, efficient coverage of the load during processing.

Recirculating water is contained in a stainless-steel wash tank with a fourteen-gallon (53-litre) capacity. Water level is controlled by low- and high-water level sensors, and correct water temperature is maintained either by a steam coil (steam-powered units) or by electric heaters (electrically powered units). For installation where inlet water is not available at 140° F (60° C), an optional water temperature booster is available (either steam or electric) — see separate product literature.

Discharge water from the wash tank is automatically cooled to at least 140° F (60° C) before entering the building drain.

Noncirculating Rinse Water System

For the tap-water rinse and purified-water rinse phases of the cycle water flows through a piping system independent of that used for the circulating water. This system provides protection against residual contamination from soil-laden wash water. The noncirculating piping terminates at a hydraulically operated rotary head in the bottom of the chamber and a stationary spray system in the top of the chamber.

Optional Equipment for Purified Water

Where the purified-water supply pressure is less than 25 psig (1.76 kg/cm²), the washer requires the optional stainless-steel pump. The pump is ½ hp, capable of delivering 10 gpm (38 lpm) and is mounted within the lower service compartment.

Where the purified-water supply is less than 15 gpm (57 lpm), the washer will require both the pump described above and a 20-gallon (76-litre) stainless-steel storage tank. The storage tank will be mounted on top of the washer, and will include cover, level control, and overflow stand pipe.

Coupler/Diverter Device

For use with the manifold dollies (see separate product literature) when it is desired to wash the inside and outside of various types of tanks, cylinders, bottles, or pipettes. Operates simultaneously with the upper and lower spray systems for thorough cleaning. The diverter is engaged manually by operating a handle below the control panel.

Venting

The washer has a 4-1/16 inch (103 mm) cuff at the top for connection to the building vent system. Available as an accessory is a totally self-contained ductless vent system. With this venting system, no connection to a building duct is required.

Filtration System

The filtration system is designed to protect washer components from damage or clogging. This is accomplished by screens and filters which are easily removable for cleaning. Also all water and steam supply lines are provided with strainers.

Servicing

Microcomputer is exposed for service by the removal of six screws and the front of the panel. For diagnostic purposes, light-emitting diodes (LEDs) on the printed circuit boards indicate presence of a signal to associated valve or other electrically operated device. Piping, valves, and other electrical components are in a service compartment, easily accessible through the access door at the lower front of the washer. These features should reduce downtime to a minimum.

TECHNICAL DATA

Controls

Microcomputer is a totally self-sufficient 8-bit parallel computer fabricated on a single silicon chip, using N-channel silicon gate metal-oxide semiconductor (MOS) process. This fabrication represents today's "state-of-the-art" technology in large scale integrated (LSI) circuits.

Control Power Supply Requirement is 120 volts, 60 Hz single phase. Integral power supply provides regulated 5 VDC for use in the microcomputer and unregulated 28 VDC for the cycle timing lamps. Solenoid valves operate on 120 VAC.

Door and Chamber Design

Walls, doors and chamber are of stainless steel, designed to maintain exterior metal surfaces at no more than 25° F (14° C) above standard ambient room temperature.

Door has tinted tempered glass viewing window. Door is designed to prevent water- or vapor-leakage during the cycle. A waterproof service light, which can be left on during washer operation, illuminates the chamber interior.

Mounting Arrangement

A single-door glassware washer can be furnished as a cabinet-enclosed free-standing unit or for recessing through one wall. The unit for recessing includes wall gaskets. Double-door washers come equipped with expandable side panels and can be used for freestanding or for recessing.

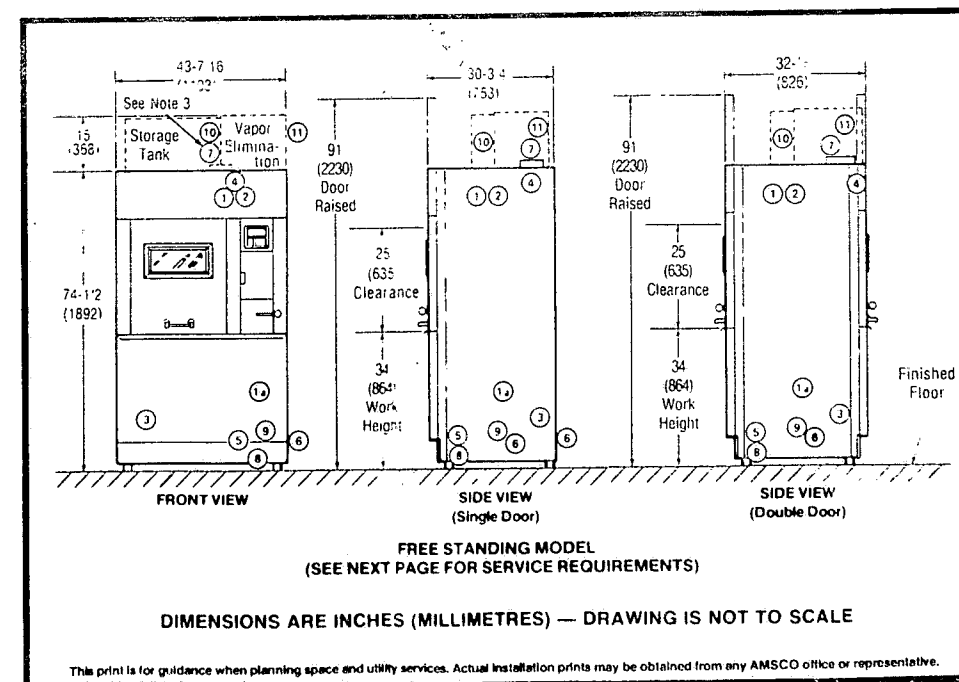
Materials Handling Accessories

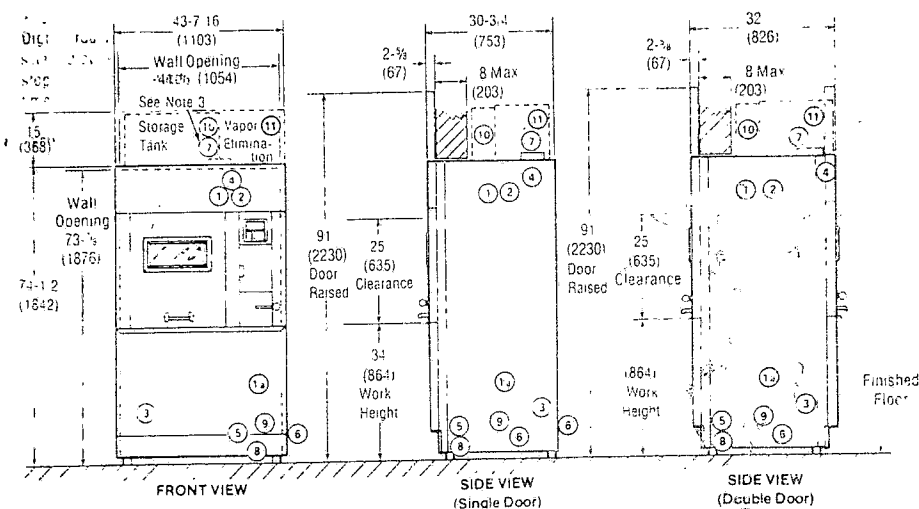
See separate product literature for details.

ENGINEERING DATA

SIZE Inches (millimetres)	WEIGHT lbs (kg)	AVERAGE UTILITIES CONSUMPTION					HEAT LOSS BTU/hr
		Cold Water gallons/cycle (litres/cycle)	Hot Water gallons/cycle (litres/cycle)	Steam lbs/cycle (kg/cycle)	Purified Water gallons/cycle (litres/cycle)	Electricity kW	
44W x 75H x 31L (1118W x 2625H x 787L)	1100 (498)	21 (79)	66 (250)	10 (4.5)	5-15 (19-57)	5.6 (wash pump) 0.37 (rinse pump option) 20.0 (elec. heat option)	10,000

*At 140° F condenser and 7 (26.5) gallons/cycle (litres/cycle)





RECESSED MODEL

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

OPERATING REQUIREMENTS

- ① COLD WATER — 3/4" NPT 40-60 psig (2.82 to 4.44 kg/cm²) 10 gpm 70°F max. 2" ga. cycle.
- ② PURIFIED WATER — 1" NPT 25 psig (1.76 kg/cm²) 15 GPM (57 m³/hr) 5-15 ga. cycle.
- ③ HOT WATER — 1" NPT 140°F (60°C) 40-60 psig (2.82 to 4.44 kg/cm²) 30 GPM 66 ga. cycle.
- ④ STEAM RETURN — 1" NPT — not required if electric tank heaters are specified.
- ⑤ STEAM SUPPLY — 1" NPT 20-80 psig (1.41-5.63 kg/cm²) with 10 lbs. min. flow rate cycle (250 lbs/hr) — Not required if electric heaters are required.
- ⑥ ELECTRICAL SERVICE CONTROLS 120 V 60 Hz 1 phase 15 amps.
- ⑦ DRAIN — 2" NPT from glassware washer (side and rear drain connections are available only one is required and 2" is recommended).
- ⑧ 4-1/2" ID VENT — see note 3 vent not required when dirt less vent is specified.
- ⑨ ELECTRICAL SERVICE PUMP (Steam-heated Units) — 200 Volt 60 Hz 3 Phase 20 Amps or 230 volt 60 Hz 3 Phase 15 Amps or 460 Volt 60 Hz 3 Phase 8 Amps.
- ⑩ ELECTRICAL SERVICE PUMP and HEATERS (Electric-heated Units) — 200 Volt 60 Hz 3 Phase 73 Amps, or 230 volt 60 Hz 3 Phase 64 Amps, or 460 Volt 60 Hz 3 Phase 32 Amps.

- ⑨ OPTIONAL RINSE PUMP — 1/2" NPT 25 psig (1.76 kg/cm²) below 25 psig and 15 GPM.
- ⑩ OPTIONAL STORAGE TANK — 3/4" NPT when purified water is below 25 psig and 15 GPM.
- ⑪ OPTIONAL VAPOR CONDENSER — water condenser.

CHECK LOCAL CODES

NOTES

- 1 Pipe sizes are nominal outlets. But direct connections must be made to the actual outlet size. The actual outlet size is shown in parentheses.
- 2 AMSCO recommends that all drains and vent lines be supplied with traps.
- 3 Vent required when the unit is installed in a room with a ceiling height of 12 feet or less. When the unit is installed in a room with a ceiling height of 12 feet or more, the vent can be connected flush to floor.

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

pulstar 5000

GLASSWARE WASHER

• single-door, bottom hinged

TECH
DATA

DESCRIPTION

Microcomputer-controlled laboratory glassware washer, automatically washes and rinses laboratory equipment according to cycle selections. Prewash, wash, rinses, including purified-water rinse times are individually adjustable to compensate for widely varying soil conditions.

Application

For use in laboratories and hospital central processing departments for washing laboratory glassware, trays, patient utensils and other similar equipment.

Size and Capacity

Washer size: 64" W x 75" H x 31" L (1626 x 2605 x 797 mm). Door opening is 24" W x 23" H (610 x 584 mm). Chamber capacity accommodates a loading rack 20" sq (508 mm).

Standards

The washer meets applicable requirements of the following standards:

Underwriters Laboratories Incorporated

Canadian Standards Association

California Seismic Requirements — Title 24 (Division T-17 of Part 6) of the California Administrative Code

National Plumbing Code

DESIGN FEATURES

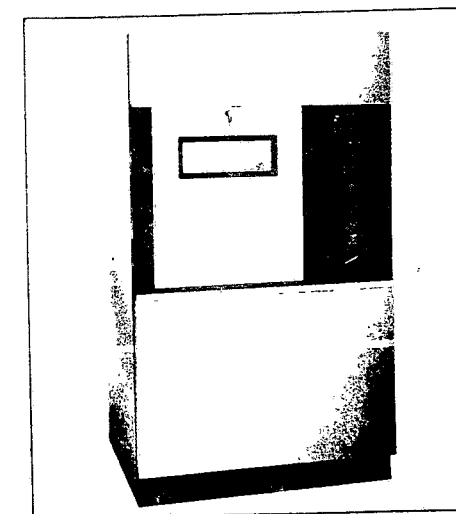
Control Panel

Microcomputer monitors and controls system operations and functions. Cycle proceeds automatically through pre-wash, wash, detergent injection, and rinse phases. Completion of cycle is indicated visually and audibly.

Because of American Sterilizer Company's continuing program of research and development, all specifications and descriptions are subject to change without notice. This data is intended for the exclusive use of AMSCO customers including architects or designers. Reproduction in whole or in part by others is prohibited.

AMSCO 1980-1983

Printed in U.S.A.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW
APPLY TO THIS EQUIPMENT

Mounting

- ☐ Free Standing
☐ For Recessing

Wash/Rinse Tank Heating

- ☐ Steam (closed coil)
☐ Electric
☐ 200 Volt
☐ 230 Volt
☐ 460 Volt

Options (Factory Installed)

- ☐ Vapor Condenser
☐ Purified-Rinse Water Pump
☐ Purified-Rinse Water Pump with 20-Gallon Storage Tank

Accessories

- ☐ Water Temperature Booster (see separate product literature)
☐ Materials Handling Accessories (see separate product literature)

Item No. _____
Location(s) _____

- **Quartz-crystal based timing.** Microcomputer inputs from thumb wheel switches accurately set pre-wash, wash, and rinse times. Digital readout shows time remaining for each phase of the selected cycle. Timing automatically resets upon completion or stopping of a cycle. Automatic reset eliminates need to reprogram times between repeated cycles.
- **Cycle Monitoring.** Chamber door must be closed to initiate a cycle. If the door is open, status light DOOR OPEN alerts operator.

Control panel is illuminated only when power is on and shows cycle status, warning signals, cycle phase indicators, digital readout, and cycle START and STOP selections. Time readout is by large easy-to-see seven-segment digital display that first indicates set time and then, as cycle continues, counts down remaining phase time. Cycle selector requires positive force to activate. Cycle selected is clearly indicated.

Secondary Controls are behind a hinged door beneath the primary control panel. These controls allow the operator to select the type of washing cycle appropriate for different soil conditions. Timer settings for each of the four cycle phases, PREWASH, WASH, DETERGENT, and PURIFIED RINSE, are made individually on this panel by four thumbwheel timers. Setpoints for PREWASH and WASH are adjustable in increments of one minute from 0-99. Set points for DETERGENT and PURIFIED RINSE are adjustable in increments of one second, from 0-99. Zero settings result in an individual phase being omitted from a cycle. In addition to the adjustable times, each cycle includes a one-minute "power rinse" followed by a two-minute fresh water rinse. These rinse phases follow the wash phase and precede the purified-water rinse. The fixed times for the "power rinse" and fresh-water rinse cannot be altered by an operator but may be changed within the range of 0-15 minutes by service personnel.

Also on the secondary panel are the POWER ON/OFF switch, TANK DRAIN switch, HEAT ON/OFF, LIGHT ON/OFF, and EXTENDED CYCLE switches. The DRAIN/TANK switch is for draining the wash tank before a cycle is started. If the tank is not drained, the final rinse water will automatically be reused as the prewash water in the following cycle. The HEAT ON/OFF switch is for wasting heat-sensitive materials. In the OFF position, it prevents rinse or wash water from rising above the temperature of the hot water supply. The pre-wash and final rinse water are maintained at 120° F. The chamber may be illuminated by the LIGHT ON/OFF switch. The EXTENDED CYCLE switch is for overriding the thumbwheel switch when extending the length of a rinse or wash phase.

Safety Features

Controls prevent start of cycle if the door is open. DOOR OPEN light will be on.

If the chamber door is opened during a cycle, the controls will terminate the cycle. Cycle may be reinitiated only by pressing START selector.

Recirculating Wash/Rinse System

For the prewash, wash, and "power rinse" phases of the cycle, water is recirculated through the piping system by a pump driven by a 7 1/2-hp motor. Rotating and fixed sprays in the chamber forcefully apply water to the load at the rate of approximately 125 gpm. Spray nozzles are designed to provide full, efficient coverage of the load during processing.

Recirculating water is contained in a stainless steel wash tank with a fourteen-gallon capacity. Water level is controlled by low- and high-water level sensors and correct water temperature is maintained either by a steam coil (steam-powered units) or by electric heaters (electrically powered units). For installations where inlet water is not available at 140° F (60° C), an optional water temperature booster is available (either steam or electric) — see separate product literature.

Discharge water from the wash tank is automatically cooled to at least 140° F (60° C) before entering the building drain.

Noncirculating Rinse Water System

For the tap-water rinse and purified-water rinse phases of the cycle, water flows through a piping system independent of that used for the circulating water. This system provides protection against residual contamination from soiled water. The noncirculating piping terminates at a hydraulically operated spray head in the bottom of the chamber and a stationary spray system in the top of the chamber.

Optional Equipment for Purified Water

Where the purified-water supply pressure is less than 25 psig (1.70 kg/cm²), the washer requires the optional stainless-steel pump. The pump is 1/2-hp, capable of delivering 10 gpm, and is mounted within the lower service compartment.

Where the purified-water supply is less than 15 gpm (57 lpm), the washer will require both the pump described above and a 20-gallon stainless-steel storage tank. The storage tank will be mounted on top of the washer, and will have the overflow level control, and overflow stand pipe.

Coupler/Diverter Device

For use with the manifold — see separate product literature when it is desired to wash a collection of glassware, flasks, cylinders, bottles, or pipettes. Operates simultaneously with the upper and lower spray systems for thorough cleaning. The diverter is engaged manually by operating a handle below the control panel.

Venting

The washer has a 4-1/16-inch (103 mm) cuff at the top for connection to the building vent system. Available as an accessory is a totally self-contained ductless vapor elimination system. With this venting system, no connection to a building duct is required.

Filtration System

The filtration system is designed to protect washer components from damage or clogging. This is accomplished by the use of screens and filters which are easily removed for cleaning. Also, all water and steam supply lines are provided with strainers.

Servicing

Microcomputer is exposed for service by the removal of six screws and the front of the panel. For diagnostic purposes, light emitting diodes (LEDs) on the printed circuit boards indicate presence of a signal to automatic valve or other electrically operated device. Piping, valves, and other electrical components are in a service compartment, easily accessible through the access door at the lower front of the washer. These features should reduce downtime to a minimum.

TECHNICAL DATA

Controls

Microcomputer is a totally self-sufficient 8-bit parallel computer fabricated on a single silicon chip using N-channel silicon gate metal-oxide semiconductor (MOS) process. This fabrication represents today's state-of-the-art technology in large scale integrated (LSI) circuits.

Control Power Supply requirement is 120 volts, 60 Hz, single phase. Integral power supply provides regulated 5 VDC for use in the logic circuits and unregulated 28 VDC for the cycle-indicating lamps. Solenoid valves operate on 120 VAC.

Door and Chamber Design

Walls, doors, and chamber are of stainless steel, designed to maintain exterior metal surfaces at no more than 25° F (14° C)

above standard ambient room temperature. Bottom chamber has tinted, safety glass viewing window, includes flange to accommodate material handling equipment, and is designed to support a 50-lb (23-kg) static load. Door gasket prevents water vapor leakage during the cycle. A waterproof service light, which can be left on during washer operation, illuminates the chamber interior.

Mounting Arrangement

The glassware washer can be furnished as a cabinet-enclosed free-standing unit or for recessing through one wall. The unit for recessing includes a wall gasket.

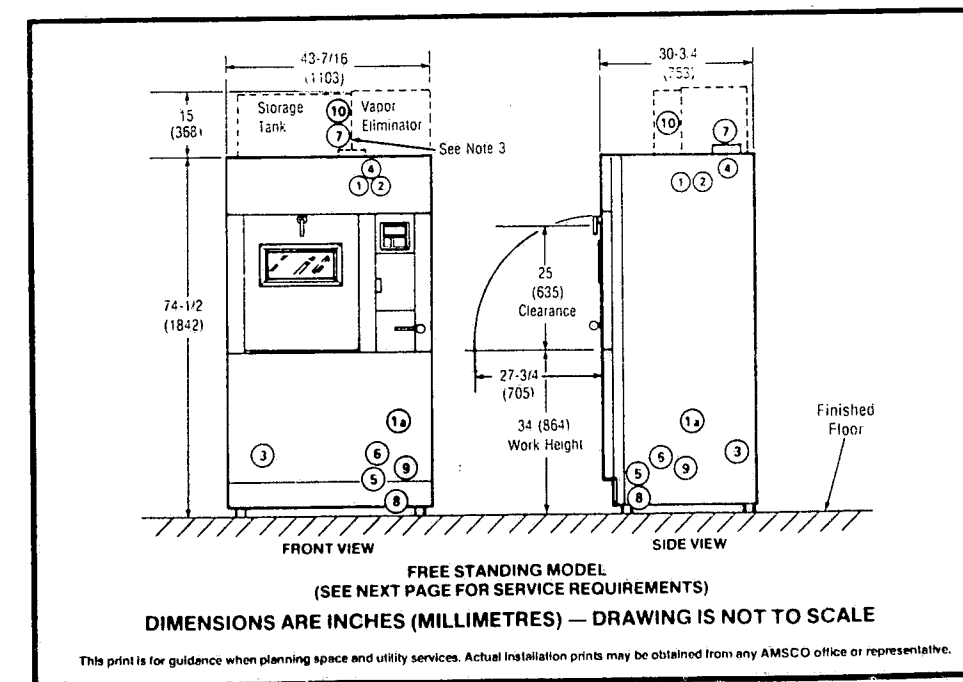
Materials Handling Accessories

See separate product literature for details.

ENGINEERING DATA

SIZE Inches (millimetres)	WEIGHT lbs (kg)	AVERAGE UTILITIES CONSUMPTION					HEAT LOSS BTU/hr
		Cold Water gallons/cycle (litres/cycle)	Hot Water gallons/cycle (litres/cycle)	Steam lbs/cycle (kg/cycle)	Purified Water gallons/cycle (litres/cycle)	Electricity kW	
44W x 75H x 31L (1118 x 2505 x 787)	1100 (498)	21 (79)	66 (250)	10 (4.5)	5-15 (19-57)	5.6 (wash pump) 0.37 (rinse pump option) 20.0 (elec. heat option)	10,000

* With vapor re-condenser add 7.26 lbs/gal. per cycle (litres/cycle).



SECTION 2

OPERATING INSTRUCTIONS

2.1 GENERAL

The following instructions are intended to guide maintenance personnel when: (1) instructing operators in techniques designed to ensure optimum equipment performance; and (2) verifying the validity of operator complaints. See Section 6, **TROUBLE-SHOOTING**, if the washer is not operating properly. Refer to Section 1, **GENERAL INFORMATION**, for capabilities of the equipment. If you are unfamiliar with this equipment, or you wish to review the principles by which the washer operates, you are urged to read Section 3, **PRINCIPLES OF OPERATION**, before beginning actual operation.

2.2 BEFORE OPERATING THE EQUIPMENT

1. Check that the two house power supply disconnect switches are on.

2. Check that house water and steam supply valves are open.

NOTE: Total water hardness should not exceed 170 ppm. Total dissolved solids should not exceed 500 ppm. Alkalinity should not exceed 150 ppm.

If available water contains higher amounts than the above, the water should be treated prior to entering the washer.

3. Open the door on the secondary panel and press **POWER** switch to ON. Primary panel should be lit.

4. Open the chamber door. Turn chamber light on. Make sure that the wash and rinse spray pipes, nozzles, refuse screens, and pump intake strainer are clean. If the tank contains water, press the **DRAIN** switch. If cleaning is necessary, refer to Section 4.3, **CLEANING**.

5. Be sure pump intake strainer is firmly inserted in the pump suction pipe. Position the refuse screens on top of the tank. Check the revolving spray arms to be sure they rotate freely.

6. Check the manifold coupler diverter handle; make sure it is positioned away from the chamber in the **DISENGAGE** position.

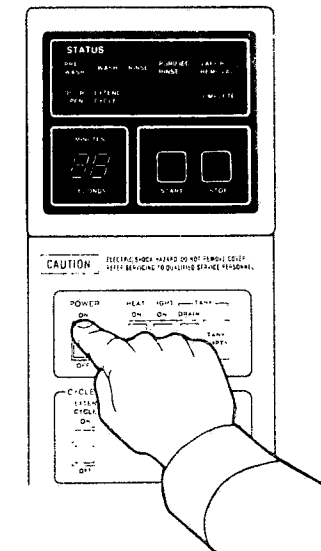


Figure 2-1. PRESS POWER SWITCH TO ON.

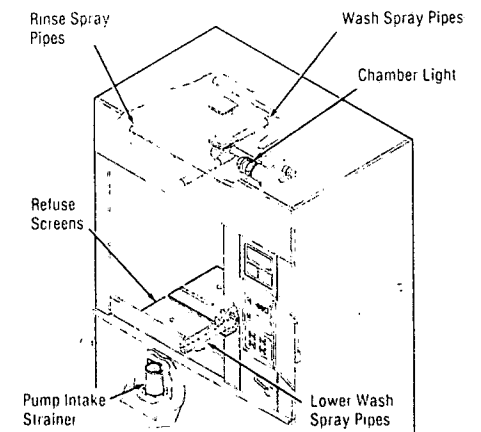
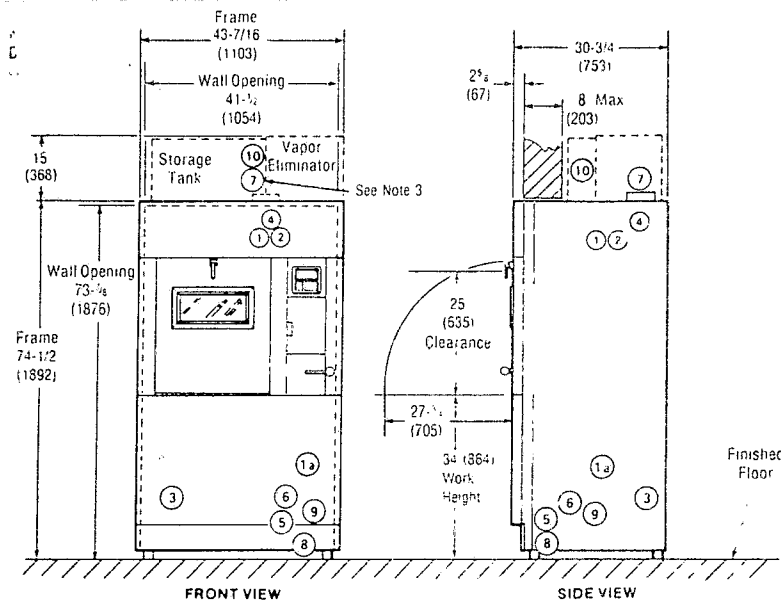


Figure 2-2. BE SURE ALL SPRAY PIPES, NOZZLES, SCREENS AND STRAINERS ARE CLEAN.



RECESSED MODEL

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

OPERATING REQUIREMENTS

- ① COLD WATER — 3/8 NPT (20-60 psig [2.82 to 4.44 kg/cm²], 10 GPM 70°F max, approximately 5 gr hardness)
- ② PURIFIED WATER — 1 NPT (25 psig [1.76 kg/cm²], 15 GPM [57 lpm])
- ③ HOT WATER — 1/2 NPT, 140°F (60°C), 40-60 psig (2.82 to 4.44 kg/cm²), 30 GPM
- ④ STEAM RETURN — 1/2 NPT — not required if electric tank heaters are specified
- ⑤ STEAM SUPPLY — 1/2 NPT (20-80 psig [1.41-5.63 kg/cm²]) with 10 lbs/min flow rate/cycle (250 lbs/hr) — not required if electric tank heaters are required
- ⑥ ELECTRICAL SERVICE, CONTROLS 120 V, 60 Hz, 1 phase, 15 amps
- ⑦ DRAIN — 2 NPT
- ⑧ 4-1/2 ID VENT — see note 3 (vent not required when vapor eliminator is specified)
- ⑨ ELECTRICAL SERVICE, PUMP and HEATERS (Electric-heated Units) — 200 Volt, 60 Hz, 3 Phase, 73 Amps, or 230 Volt, 60 Hz, 3 Phase, 64 Amps, or 460 Volt, 60 Hz, 3 Phase, 32 Amps
- ⑩ OPTIONAL RINSE PUMP — 1-1/4 NPT when purified water is below 25 psig and 15 GPM
- ⑪ OPTIONAL STORAGE TANK — 3-4 NPT when purified water is below 25 psig and 15 GPM
- ⑫ OPTIONAL VAPOR CONDENSER — water consumption is 7 gal/cycle

CHECK LOCAL CODES

NOTES

- 1 Pipe sizes are terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance. Piping between terminal and wall or floor outlets not furnished by AMSCO, except by written agreement.
- 2 AMSCO recommends shut-off valves not by AMSCO on service supply lines.
- 3 Vent requires watertight and noncorrosive vent to atmosphere, pitched toward machine for steam and to outside for air.
- 4 When service terminals are roughed in wall, unit requires 6 (152 mm) access. When terminals are roughed through floor, unit can be mounted flush to floor.

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

2.3 WASHER OPERATION: PREPARATORY ACTIONS

1. Open the door on the secondary control panel. Make sure POWER switch is ON.

2. Press DRAIN switch if it is desired to drain the recirculating water tank. When tank is empty, panel light TANK EMPTY will come on. If DRAIN switch is not pressed, the water in the recirculating tank (from last rinse of previous cycle) will be used for PREWASH phase of cycle.

3. Position HEAT switch to ON for washing and power rinse temperatures of 160 F. Position HEAT switch to OFF for washing and rinsing temperatures of approximately 120 F.

4. Open the service access door and check the detergent supply. Refill it if necessary.

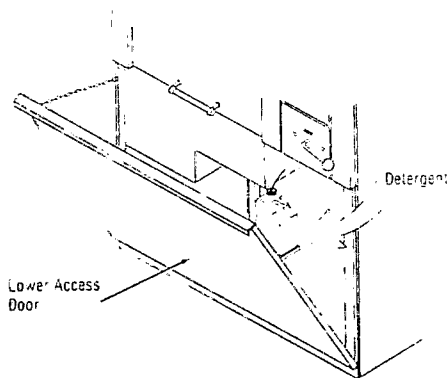


Figure 2-3. CHECK DETERGENT SUPPLY.

NOTE: We recommend AMSCO Sonic Detergent or AMSCO Liqui-jet Detergent. Both are specially formulated for use in mechanical washing equipment. (AMSCO Sonic Detergent is available from your local AMSCO representative. Order P-41591-091 for a case of four one-gallon containers. For AMSCO Liqui-jet, order P-753275-091 for a 5-gallon pail, or P-753815-091 for a 30-gallon drum.)

2.4 WASHER OPERATION

1. For standard cycle operation, press the EXTENDED CYCLE switch to the OFF position.

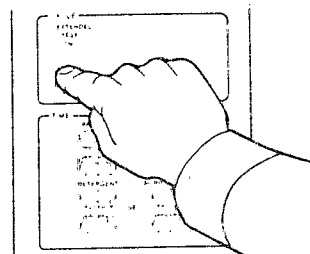


Figure 2-4. FOR STANDARD CYCLE PRESS EXTENDED CYCLE SWITCH TO OFF.

2. Dial the desired cycle phase times on the four thumbwheel switches on the secondary panel. Typical time settings for medium soil are as follows:

PREWASH	01 minute	Adjust these
WASH	03 minutes	times for
DETERGENT	10 seconds	actual soil
PURIFIED RINSE	30 seconds	conditions

TABLE 2-1. VOLUME OF DETERGENT INJECTED ACCORDING TO DETERGENT SWITCH SETTING*

SECS	ml
10	230
15	330
20	415
25	465
30	530

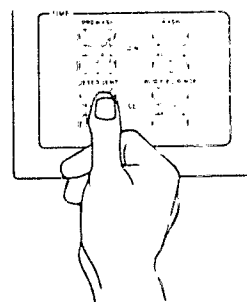


Figure 2-5. DIAL CYCLE PHASE TIMES ON FOUR THUMBWHEEL SWITCHES.

*Average amounts based on use of AMSCO Sonic Detergent or Liqui-jet.

3. Remove gross soil that might plug the filter from items to be cleaned. Load the items into or onto the proper rack or dolly ... see descriptions on pages ... Arrange the items so that all surfaces will receive maximum spray coverage. Loads should be uniform in height. Make sure that the hold-down screen is secured in place on the rack or dolly.

4. Position the loaded rack or manifold dolly in the center of the chamber.

5. If the optional manifold coupler is to be used, align the manifold dolly opening with the washer connector tube. Rotate the diverter handle toward the chamber far enough to be sure the tube and manifold are properly aligned; then continue rotating the handle toward the left (ENGAGE position) until it stops.

6. Close chamber door. Check that DOOR OPEN light is off. The chamber light will be off unless LIGHT switch on secondary panel is ON.

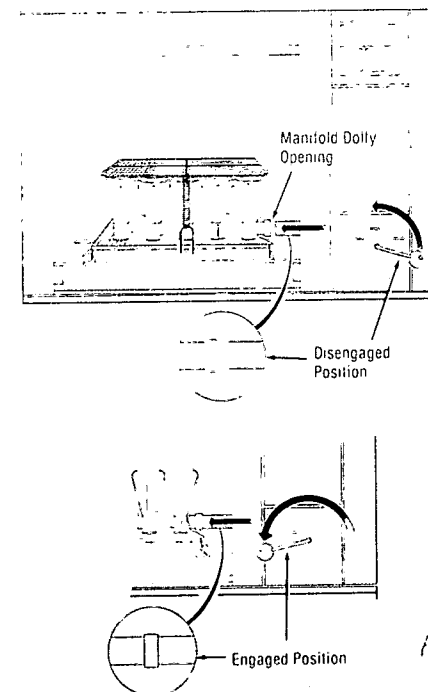
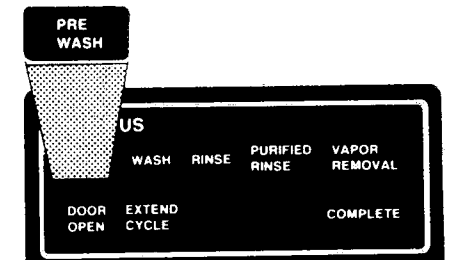


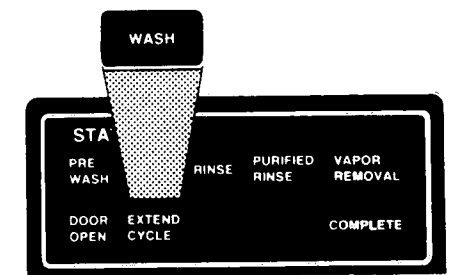
Figure 2-6. ALIGN MANIFOLD DOLLY OPENING WITH WASHER CONNECTOR TUBE.

7. Press START pushbutton. PREWASH light on primary panel will come on, time display will show dialed time, and cycle will begin. If empty, wash tank will fill with tempered (hot and cold mixed) tap water. Prewash will begin when tank is full and pump begins to circulate prewash rinse water. At the end of the prewash phase, tank will drain.

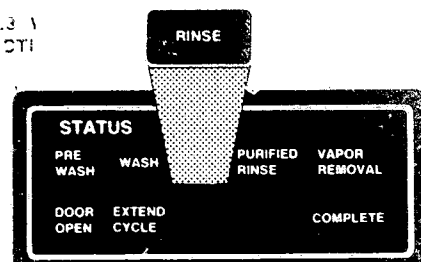


8. After prewash is completed, WASH light on primary panel will come on. The inlet water (140 F) will be heated to 160 F (if HEAT switch is on) and detergent will be added for the amount of time dialed on the DETERGENT thumbwheel switches. Pump begins to circulate wash water. Water is automatically heated to maintain proper temperature. Washing action continues for time setting on thumbwheel switches.

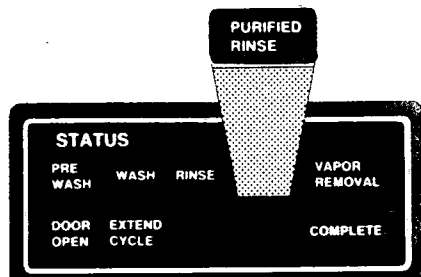
9. At the end of the wash phase, the detergent wash water will be drained.



10. Tank refills with hot tap water. RINSE light comes on, and "power rinse" phase begins. During this phase, pump recirculates rinse water through rinse piping system. The inlet water will be heated to 160 F. Power rinse lasts for the fixed time of one minute**, after which the tank drains for 20 seconds.

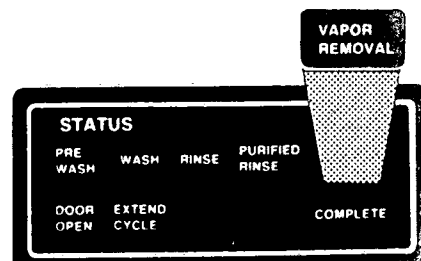
2.3
CTI


11 After "power rinse" is completed, "fresh rinse" phase begins. RINSE light remains on. During this phase, which lasts for the fixed time of two minutes, pump is off, drain valve is open. Load is rinsed with hot water from house supply.



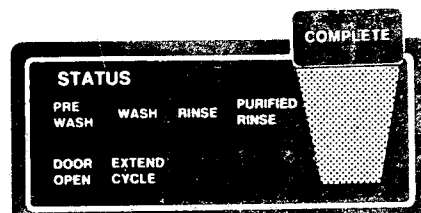
12 After "fresh rinse" phase is completed, purified rinse begins. Panel status light PURIFIED RINSE comes on and time display will show time dialed on thumbwheel switches. Purified water rinses the load for the selected time.

13 If the optional vapor condenser is installed the VAPOR REMOVAL light comes on after the purified rinse phase is completed or after the "fresh rinse" phase if purified rinse is by-passed by setting the thumbwheel switch to 00. The vapor removal phase lasts for a fixed period of two minutes.



**This time is adjustable by service personnel within the range 0-15 minutes.

14 At the end of the "purified rinse" phase, or at the end of the "fresh rinse" phase (if "purified rinse" phase is bypassed), panel light COMPLETE comes on and the buzzer sounds for ten seconds. If washer is equipped with optional vapor condenser, during the two minutes of the vapor removal phase the cold water to the vapor condenser will be on. After two minutes, the buzzer will sound for ten seconds and panel light COMPLETE will come on. Solenoid valve V8 (cold water to vapor condenser) will remain on for an additional fifty seconds (three minutes total time) or until the door is opened.



15 Open the chamber door. If the manifold coupler was used, rotate the handle away from the chamber (to DISENGAGE position) and allow the manifold to drain for a moment. To prevent the formation of condensate within the items, spindle type dollies should be promptly unloaded upon their removal from the chamber. These items should then be placed in a compartment type rack if they are to be processed in a glassware drier.

NOTE: Water in tank will be saved for prewash of next cycle unless it is drained by actuating the DRAIN switch (POWER switch must be OFF and door(s) must be closed). TANK EMPTY light will come on when tank is empty.

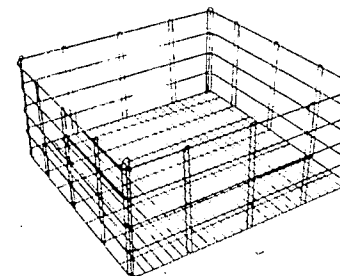
2.5 EXTENDED CYCLE SWITCH

1 The EXTENDED CYCLE switch is to be used when the operator wishes to override the time setting on the thumbwheel switch during any phase of the cycle.

2 To extend or reduce the time of a phase beyond the setting on the thumbwheel switch, place the EXTENDED CYCLE switch in the ON position before the phase ends (before digital readout shows 00). Phase in operation will continue as long as EXTENDED CYCLE switch is on.

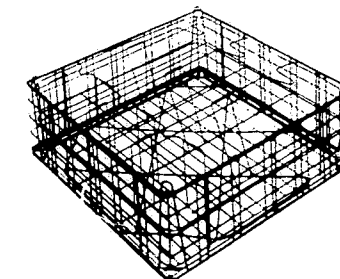
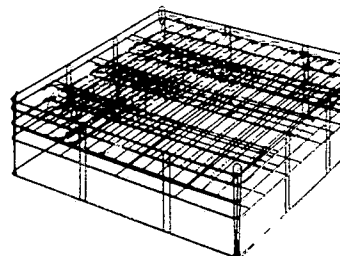
3 To resume the cycle as programmed with thumbwheel switches, return EXTENDED CYCLE switch to OFF. Cycle will continue through phases.

2.6 MATERIAL HANDLING ACCESSORIES



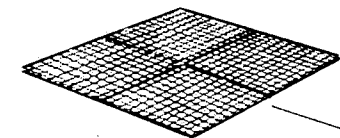
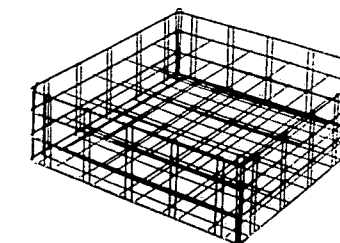
FLATWARE RACK - Accommodates various types of flatware. Mesh liner prevents items from slipping through open framework.

GENERAL PURPOSE RACK - Accommodates beakers, jars, utensils, test tube baskets, and other glass containers. Load items with bottoms up.



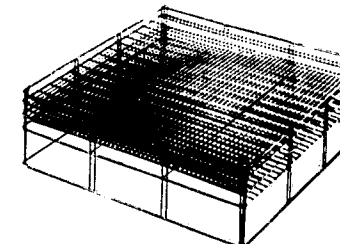
UTENSIL RACK - Accommodates three bedpans and three urinals or three hand basins and three emesis basins. Invert and insert utensils vertically in rack.

PETRI DISH RACK - Especially designed for washing petri dishes. Load all dishes in same direction, bottom-up. Position cover and secure it with hold-down springs.

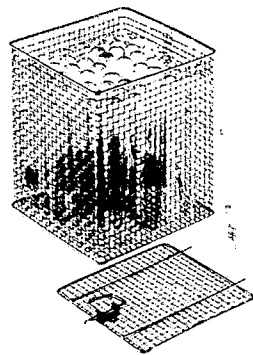


HOLD-DOWN SCREEN - To be used with all glassware loads, except pipette dolly. The screen fits inside the racks and dollies and is adjustable for the height of the load.

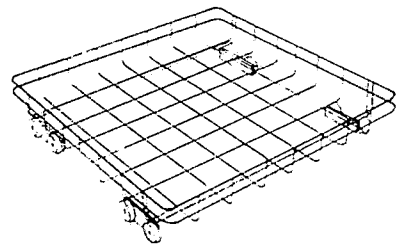
COMPARTMENT RACK - Accommodates AMSCO SquarePak flasks, small Erlenmeyer flasks and various small cylinders. Load items with bottoms up.



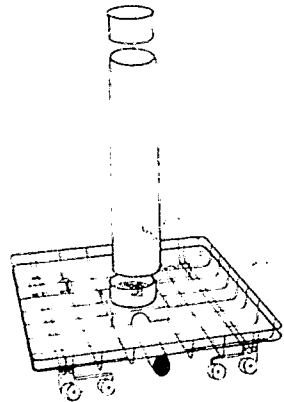
MICROSCOPE SLIDE RACK



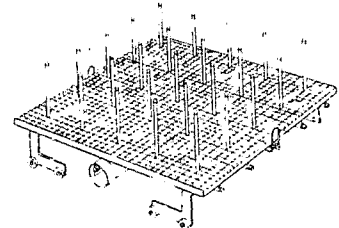
TEST TUBE BASKET, COVER, AND DIVIDER - Cover is adjustable to accommodate test tubes from 3" to 6" in height



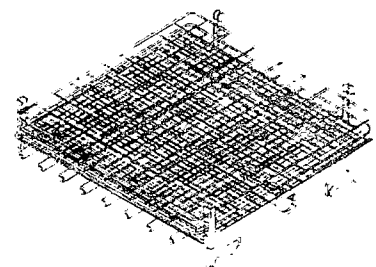
GENERAL PURPOSE DOLLY - For use with any of the previously mentioned racks or test tube baskets.



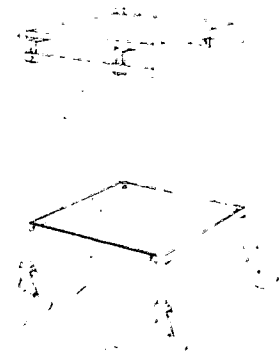
PIPETTE DOLLY - Remove holder from dolly. If a flooded system (shown), load pipettes in holder and insert hold-down screen over them. If a pressure system, load pipettes on insert and place insert in holder. Replace holder on dolly.



SPINDLE DOLLY - Accommodates miscellaneous narrow neck flasks, bottles, graduated cylinders and volumetric flasks



NOZZLE DOLLY - For small items of glassware, such as test tubes, narrow neck flask, graduated cylinders. Each dolly has two divider racks. Divider racks are adjustable in one-inch increments up to six inches in height. Dollies are available with 64, 81 and 144 nozzles



TRANSFER CART - For loading, unloading and transporting dollies and racks of glassware, etc

2.7 WASHING CYCLE MONITORS AND ALARMS

During washer operation the controls automatically monitor the performance of various functions and controls necessary for the correct operation of the cycles. In the event of malfunction an **intermittent buzzer** will sound and one of the following sets of numerals will flash on the digital display.



OPERATOR ACTION: TURN OFF MACHINE. CALL SERVICE.

This alarm indicates that the high water level probe in the wash tank is not functioning. See Troubleshooting Chart, Section 6, for possible causes and corrections.



OPERATOR ACTION: TURN OFF MACHINE. CALL SERVICE.

This alarm indicates that the low water level probe in the wash tank is not functioning. See Troubleshooting Chart, Section 6, for possible causes and corrections.



OPERATOR ACTION: TURN OFF MACHINE. CALL SERVICE.

This alarm indicates that the wash tank drain time, for any one of the cycle phases, has exceeded a preset maximum allowable time. Pump will turn off automatically. See Troubleshooting Chart, Section 6, for possible causes and corrections.



OPERATOR ACTION: TURN OFF MACHINE. CALL SERVICE.

This alarm indicates that the wash tank fill time, for any one of the cycle phases, has exceeded a preset maximum allowable length. See Troubleshooting Chart, Section 6, for possible causes and corrections.



OPERATOR ACTION: TURN OFF MACHINE. CALL SERVICE.

This alarm indicates that during washing or rinsing action, the make-up time (to refill water level to high level probe) has exceeded a preset maximum allowable length. Pump will automatically turn off. See Troubleshooting Chart, Section 6, for possible causes and corrections.

SECTION 3**PRINCIPLES OF OPERATION****3**

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3.1 GENERAL

The laboratory glassware washer is designed to efficiently wash a wide variety of glassware and other laboratory equipment. To accomplish this, the plumbing system incorporates into its design two separate piping arrangements, one for the washing and rinsing water which is recirculated during the cycle, and the other for the final rinse phases during which water is not recirculated. The special feature of this arrangement is that it prevents detergent residue or contamination from soil-laden water during the final rinse phases of the washing cycle.

The control system and piping arrangement, described below, are designed to perform the washing and rinsing action efficiently and reliably. The heart of the control system is a microcomputer which is preprogrammed to control all phases of the washing cycle, once the preparatory actions have been taken.

3.2 FUNCTIONAL DESCRIPTION OF THE MICROCOMPUTER CONTROLLER

The controller is built up from three major modules, a power supply assembly, a mother board assembly, and a printed circuit board set. The printed circuit board set consists of printed circuit boards PCB-146586 and PCB-146588. To better understand the operation of the control, a functional description of each module and of each of the printed circuit boards follows.

3.2.1 Power Supply

The power supply provides the control with 3 amps — 5 volts direct current (VDC) and 3 amps — 28 VDC required by the system. This power supply can be shown as eight blocks for the 5-VDC supply (Figure 3-1), and five blocks for the 28-VDC supply (Figure 3-2).

The 5-VDC supply operates as follows: voltage from the full wave rectifier (CR201 and CR202) is filtered by the RC network R201 and C101. This filter circuit supplies the bulk voltage (approximately 14 volts) to the series pass transistor Q101 which drops and regulates the output voltage to the required 5

volts. As the output voltage tries to vary from 5 volts, due to load and line variations, the regulating amplifier A401 senses this change and turns Q101 on or off as required to maintain the output at 5 volts.

If the output voltage rises above 5 volts, to an unsafe point of approximately 6.5 volts, the overvoltage circuit, comprised of 1/2 A403, Z402, R436, R428, R425, R427, R437, R426, and R424, feeds back an output to switch Q406 to turn it on. This transistor provides a gating current to SCR401 through R413. SCR401 switches the power switch (CB-1), on the secondary control panel, to off.

When the 5-VDC output drops below approximately 4.7 volts, the undervoltage circuit (comprised of 1/2 A403, Z401, C405, R414, R420, R421, R419, R417, R416, R418, C407, R422 and adjustment pot R423) feeds back an output to switch Q406 to turn it on. This transistor provides the current through R412 to gate SCR401. SCR401 switches the control switch (CB-1), on the secondary control panel, to off.

Three adjustable pots are mounted on the printed circuit board and sealed. They are as follows: R430 is a current limit level adjustment, R433 is an output voltage level adjustment, and R423 is the undervoltage setpoint adjustment.

The 28-volt supply is not a regulated supply, but does limit the output to approximately 28 volts. This is done to increase lamp life.

Operation of the 28-volt supply is as follows. Voltage from the full wave rectifier (CR301 and CR302) is filtered by the RC network of R301 and C104. This filtered voltage feeds the output through a time delay "slow-turn-on-circuit" comprised of Q102, Q402, R405, R404, R403, CR403 and C402. The time delay of about 400 milliseconds allows the microcomputer to gain control of the system before the 28 VDC is supplied to the display circuits. The 28 VDC is clipped (limited) at 28 volts by the Z404 zener diode. Thus the 28-volt supply will not be able to exceed approximately 28 VDC.

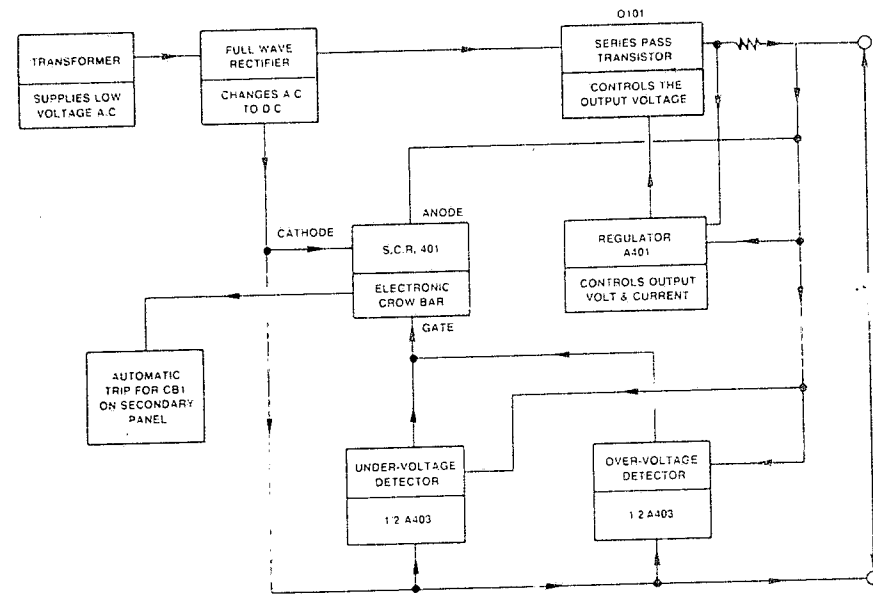


Figure 3-1. 5-VOLT POWER SUPPLY.

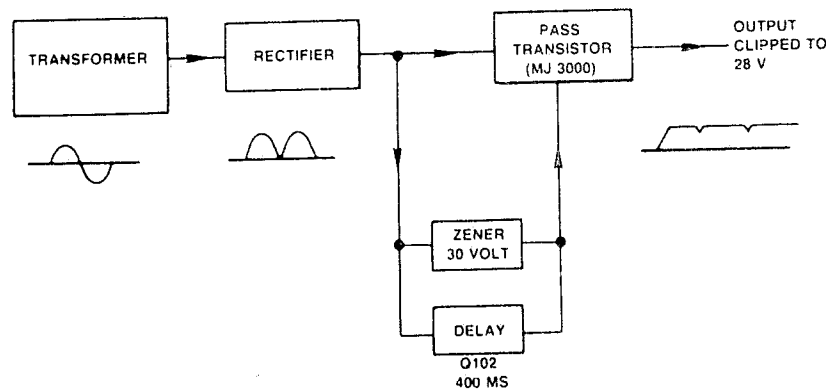


Figure 3-2. 28-VOLT POWER SUPPLY.

3.2.2 Mother Board

The mother board assembly contains a large printed circuit board (PCB) that provides the base for the connectors (J1, J2, J3, J4) and the interface to these connectors for communications with the rest of the washer. The mother board also contains the connectors (B1, B2, B3), as required, and the interboard interface connections for the plug-in printed circuit boards. Power, from the power supply, is brought into the assembly via J10 and J11 and distributed throughout the assembly by the main PCB.

3.2.3 Printed Circuit Board 1 - 146586

Printed circuit board 1 contains the microcomputer, A1, support circuits, input buffers and drivers,

output buffers and drivers, and the data bus required to communicate with the other two boards. Figure 4-3 is a diagram of printed circuit board 1.

The 8048 microcomputer is the heart of the control system. The system matches the beat of the 8048 oscillator or clock pulse generator (crystal controlled at 3 MHz). The program is contained, in part, in the 1K program memory of the 8048. This program is executed by the control and timing circuits of the 8048 microcomputer. While the program is running, the CPU in the microcomputer will make logical decisions based upon the input information that it receives from the data bus, port 1 or port 2.

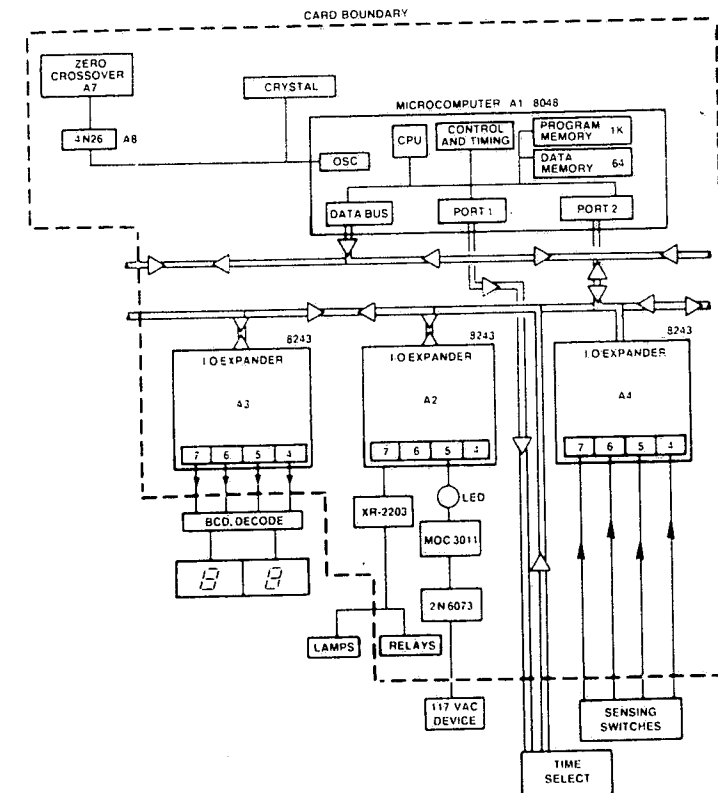


Figure 3-3. PRINTED CIRCUIT BOARD 146586.

Actions to be carried out by the washer originate in the microcomputer. These actions or signals are sent to the data bus, port 1 or port 2. Hence, as one can see, information can either enter or leave the ports and data bus under the precision guidance of the control and timing of the microcomputer. The computer also contains a data memory capable of storing 64 bytes of information. It is referred to as a RAM. It is a volatile memory which can be written into or read out. The RAM is used to store changeable data, i.e., timer inputs.

There are many elements to control and sense in the washer. The number exceeds the capability of the microcomputer alone; therefore, additional electronic components must be added to expand the following.

- (1) Program memory.
- (2) Data memory.
- (3) Input/output capacity of the 8048.

Input/Output (I/O) capacity is expanded by the use of an 8243. The I/O expanders only pass or accept signals when the microcomputer calls their attention; that is, enables them. On board one (1) there are three such 8243's, A2, A3 and A4.

A3 is used to pass the appropriate signals to a digital display (output) of the elapsed time during the separate phases of a cycle.

A2 operates in a similar fashion as A3. Its output signals drive Darlington pairs (XR2203) capable of passing 600 ma of current which are used to turn on the various incandescent lamps required by the washer. A2 also drives, via an LED, triac drivers (MOC3011). The drivers provide proper signals to turn on triacs which in turn operate AC loads (120 VAC) such as solenoid valves. The optical coupling found in these drivers also serves to isolate the 120-VAC power circuits from the low voltage logic circuits.

A4 is used as an input device for the various sensing switches in the system.

Desired wash and rinse times are set up by the use of thumbwheel switches which, upon request, provide input data to the microcomputer via ports 1 and 2.

The supporting circuits are an external crystal and a zero cross-over network. The crystal, C1 and C2, determines the frequency of the control's opera-

tion. This crystal is also the time base for the timers. The zero cross-over network (ZCN) consists of A7, C4, R4, A8, C5, R5, and R6. The ZCN prevents the computer from actuating a 120 VAC device during peak voltage of the sine wave. The ZCN monitors the 120 VAC and when the voltage level is of the zero voltage points of the sine wave, it enables the computer output. The ZCN's function is to reduce live transients from being generated which might interfere with the computer operation. These transients might generate false signals should they occur. Another supporting circuit consists of Q9, C13, and R29. This circuit delays the activation of the triac outputs until the computer has gained control. It serves the same function as the delay circuit in the 28-volt power supply.

3.2.4 Printed Circuit Board 2 - 146588

The control system is provided with further expansion capabilities by the addition of PCB 2. It expands the data memory (RAM) by 256 bytes and the input/output capacity by 16 with the addition of an 8155 (A1). The microcomputer can pull from an additional 2,000 program instructions from the 8355 (A2) which increases the program capability. Figure 3-4 is a functional diagram of this PCB. The 8355 (A2) also increases the number of input/output channels by 16.

The input and output drivers function the same as those on Board 1.

3.3 CYCLE DESCRIPTION

Preparatory actions: Water and steam supply valves (by others) must be opened. POWER switch must be ON, door(s) must be closed. DOOR OPEN lamp is out.

3.3.1 Standard Cycle

3.3.1.1 Prewash Phase

HEAT switch is ON, EXTENDED CYCLE switch is OFF, cycle phase times are dialed on thumbwheel switches. Operator touches START pushbutton. If wash tank is empty, solenoid valves V5 (hot fill water) and V1 open. PREWASH lamp comes on (and IN PROCESS for double-door units). Solenoid valves V5 and V1 remain open until wash tank high water level sensor senses full. After the fill period, valves V1 and V5 close. After a seven second pause, pump comes on and PREWASH time is displayed (in minutes).

Rinse water is pumped through the circulating rinse/wash piping system to the hydraulically rotated spray manifolds. Spraying operation continues for duration of timed PREWASH phase. When rinsing operation begins, if temperature switch TS-1 does not sense 120 F for wash tank water, valve V4 (steam for "steam-powered" units) or electric coils in wash tank (electrically heated units) will come on until water is heated to 120 F. Valve V4 (steam) or electric coils cycle with TS-1 to maintain 120 F water throughout prewash phase. Valves V5 (hot water) and V1 (cold water) cycle with high water level detector in wash tank to maintain correct level in wash tank throughout prewash phase.

When PREWASH timer times out, pump stops, spraying action stops, and drain solenoid valve V7 opens. When the low water level sensor in the wash tank senses no water, V7 closes, PREWASH lamp goes out and WASH lamp comes on.

3.3.1.2 Wash Phase

During the fill portion of the wash phase, valves V2 (hot rinse water) and V5 (hot fill water) are open. As soon as wash tank high water level sensor senses full, V2 and V5 close, pump starts, WASH time is

displayed (in minutes) and wash water is pumped through the circulating rinse/wash piping system. When washing operation begins, detergent valve V6 also opens for the amount of time dialed on the thumbwheel switches (seconds). During the wash portion of the phase, valve V4 (steam for "steam-powered" units) or electric coils in the wash tank (electrically heated units) will come on until TS-2 senses 160 F. Valve V4 or electric coils will cycle with TS-2 to maintain 160 F water throughout wash phase. Valve V5 (hot water) cycles with high water level detector in wash tank to maintain correct level in wash tank throughout wash phase.

When the wash timer times out, pump stops, and cold water valve V1 opens. Twenty-five seconds after the cold water valve opens, drain valve V7 opens. Five seconds after that, V1 (cold water) closes. Draining continues for 30 seconds, then hot rinse valve V2 opens for 5 seconds, to rinse down the chamber, then closes. Draining continues for another 20 seconds, then cold water valve V1 opens for 5 seconds to rinse down the chamber. When low level water sensor senses low, drain valve V7 closes, WASH lamp goes out and RINSE lamp comes on.

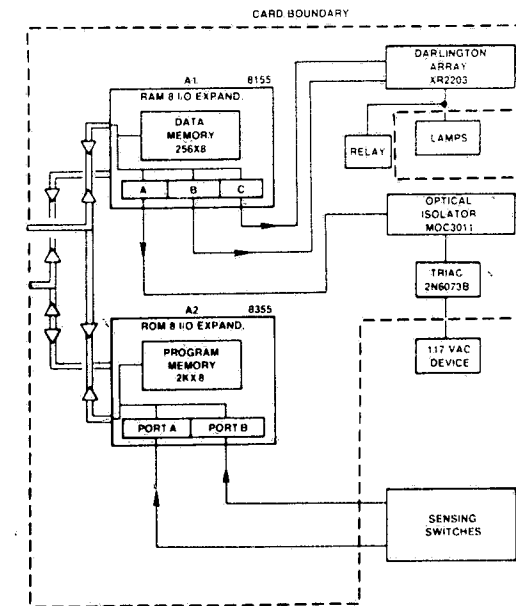


Figure 3-4. PRINTED CIRCUIT BOARD 146588.

SECTION 4

INSPECTION AND MAINTENANCE

4

3.3.1.3 Power Rinse

During the full portion of the power rinse phase valves V2 (hot rinse water) and V5 (hot fill water) are open. As soon as wash tank high water level sensor senses full, V2 and V5 close, pump starts, and rinse water is pumped through the circulating rinse/wash piping system. Rinse time is shown on digital time display. Valve V4 (steam for "steam-powered" units) or electric coils will come on until TS-2 senses 160 F. Valve V4 or electric coils will cycle with TS-2 to maintain 160 F throughout power rinse phase. Valve V5 (hot water) cycles with high water level detector in wash tank to maintain correct water level.

After the one minute power rinse*, pump stops, drain valve (V7) opens, and cold water valve (V1) opens for twenty seconds. After the twenty seconds, fresh rinse phase begins.

3.3.1.4 Fresh Rinse

During the two minute* fresh rinse phase, drain valve V7 remains open for previous phase, and V2 is open to rinse load with hot tap water through nonrecirculating rinse spray piping. Cold water valve V1 cycles on and off every 5 seconds in order to cool the water to the drain. At the end of the phase, hot rinse water valve V2 closes, drain valve V7 closes, cold water valve V1 closes. RINSE light goes out and PURIFIED RINSE light comes on.

3.3.1.5 Purified Rinse

When the purified rinse phase begins, valve V3 (purified rinse) opens, purified water from the nonrecirculating spray piping system rinses the load. If the washer is equipped with the purified rinse water pump, that will also be on during this phase. The phase will continue for the length of time (seconds) dialed on the thumbwheel switches. At the end of the phase, V3 closes, pump (if applicable) stops. PURIFIED RINSE light goes out, and VAPOR REMOVAL light comes on (if applicable).

3.3.1.6 Vapor Removal (Option)

Vapor removal phase lasts for the fixed period of two minutes. At the end of two minutes, VAPOR REMOVAL light goes out, COMPLETE light comes on, buzzer sounds for ten seconds. The cold water supply to the vapor condenser through valve V8 will remain on for an additional 1 minute after the COMPLETE light comes on or until the door is opened.

3.3.1.7 Complete (Standard Unit)

If the unit does not have the optional vapor removal system, COMPLETE light will come on immediately after purified rinse phase, or after the fresh water rinse if the purified rinse phase is bypassed.

3.3.1.8 Water Level Sensing Probe

Probe senses water level using a small internal electronic circuit. This circuit is sensitive to the change in capacitance occurring in the presence of water with respect to the frame of the machine.

The probe requires 28 VDC power supply on its "in" and "out" terminals.

The "signal" output denoting the presence of water is normally open. Water will cause the "signal" output to close and it will drop from 5 VDC to 0 VDC.

The "test" input terminal is used by the microcomputer controller to self-test the probe on power up and at other times. The "test" terminal voltage is normally 5 VDC. The microcomputer will pull this terminal to 0 VDC (grounding it out) and if the probe is working properly, the "signal" terminal will switch from 5 VDC to 0 VDC (close).

*This time is adjustable 0-15 minutes by service personnel.

4.1 GENERAL

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 5. TROUBLESHOOTING.

4.2 DAILY

1. Actuate the POWER and LIGHT switches on the secondary control panel. (Note: The POWER switch and building supply disconnect switch should remain on until the cleaning procedure is completed.)

2. Open the chamber door(s). Leave door(s) partially open during shutdown to permit airing of washer interior.

3. Clean the work tables, if your washer is so equipped.

4. Remove and clean the refuse screen(s) and pump intake strainer. Replace the pump intake filter after cleaning. Do not replace the refuse screens until after the tank is cleaned (Step 6).

5. Inspect the spray nozzles. If plugged, carefully clean the nozzle openings with a 3/32" diameter wire. Remove the end caps and turn washer on briefly to rinse soil from spray pipes. Replace the end caps. To remove hard-water deposits, soak the nozzles in a solution of one cup of AMSCO Descaler (order P-752042-091 for package containing four 5 lb cartons) and one quart of water.

NOTE: Descaler will saturate at 18% solution. If granules remain, add more hot water to the solution to dissolve them. Follow directions on the container.

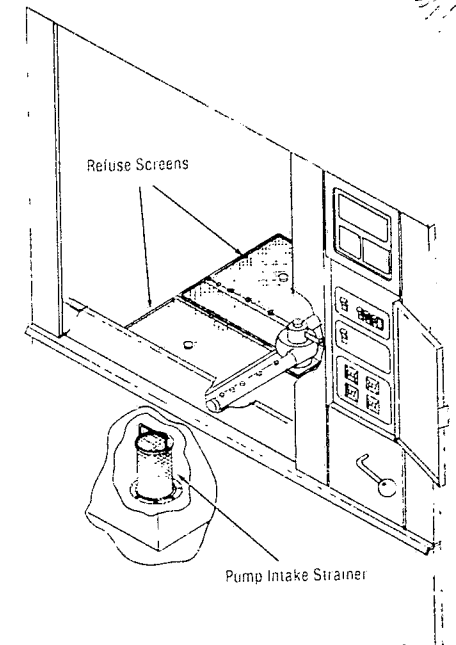


Figure 4-1. CLEAN REFUSE SCREENS AND PUMP INTAKE STRAINER DAILY.

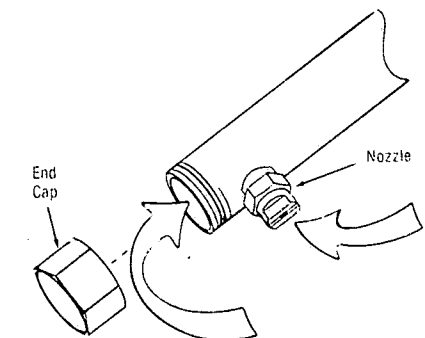


Figure 4-2. INSPECT AND CLEAN NOZZLES AND SPRAY PIPES.

6 Rinse tank and interior of the washer with clean water. If necessary, remove hard-water deposits by filling the tank with fresh water, adding two cups of AMSCO Descaler and operating the machine through several cycles to allow the solution to circulate. Do not use abrasive cleaning compounds, wire brushes or steel wool on washer surfaces. When the interior is clean, drain the tank and flush it well with clean water.

7. Replace the refuse screens.

8 Inspect the spindle dollies (if furnished) for damaged, missing or plugged nozzles; replace, if necessary. If plugged, carefully clear the nozzle openings with a stiff wire.

9 Turn off the LIGHT and POWER switches. Turn off the building-supply disconnect switch.

4.3 WEEKLY

1. Check operation of STOP switch on primary panel by initiating a cycle and then pressing STOP pushbutton. Machine operation should stop.

WARNING: IN PERFORMING THE FOLLOWING CHECK, OPEN DOOR SLOWLY AND STAND AWAY FROM DOOR OPENING. IF SWITCH IS MALFUNCTIONING, HOT WATER MAY BE SPRAYED THROUGH DOOR OPENING.

2. Check operation of automatic stop signal by opening door after initiating cycle. Machine operation should stop.

3 Watch the washer as it goes through each phase of a complete cycle and check that all indicating lights are working. If a lamp needs replacing, refer to paragraph 7-10

4 Unscrew the knurled retaining knob from the lower rinse arm manifold. Lift the spray arms from the rotary hub and remove the end caps from the wash-spray pipes. Thoroughly clean pipe interiors with a solution of AMSCO Descaler (1 cup to 1 quart of water); use the brush provided. Replace end caps, spray pipes and retaining knob. Repeat this procedure for the upper wash-spray arms.

5. Clean the washer exterior with **AMSCO Stainless Steel Cleaner and Polish** (order P-78602-091 for a 14-ounce spray can). Use **AMSCO Pry Cleaner** to remove stubborn stains (order P-43394-091 for case of twelve 12-oz jars; P-74971-091 for 40 lb drum with four free jars).

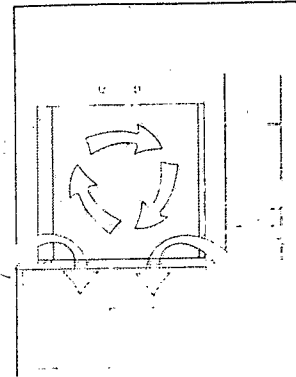


Figure 4-3. RINSE TANK AND INTERIOR OF WASHER WITH CLEAN WATER.

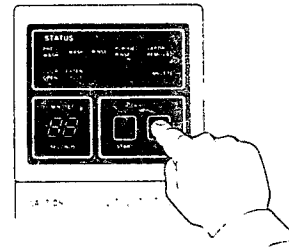


Figure 4-4. CHECK OPERATION OF STOP SWITCH.

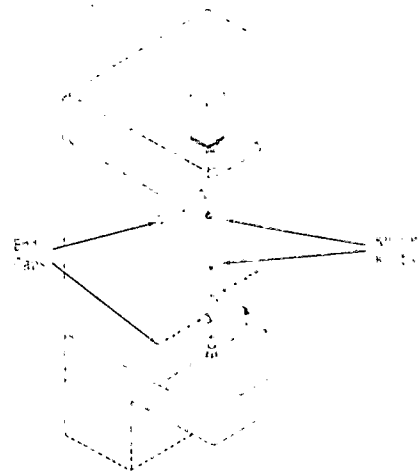


Figure 4-5. CLEAN WASH-SPRAY PIPES.

NOTE: When using **AMSCO Stainless Steel Cleaner and Polish** or **AMSCO Pry Cleaner**, rub in a back-and-forth motion (in the same direction as the surface grain). Do not rub with a rotary or circular motion. Do not use either cleaner on painted surfaces. Follow directions on the container.

4.4 MONTHLY

1. Check for leaks in the pump(s) shaft seal, replace seal(s), if necessary.

4.5 QUARTERLY

1. Check for possible drain valve seepage (i.e., tank water level drops 2" or more in 15 minutes); disassemble and clean solenoid valve, if necessary.

4.6 MICROCOMPUTER CONTROL SERVICE ROUTINE

The microcomputer control contains in its program a sequence of self-checking steps which can be utilized to check the operation of the control and the control panel. To actuate this "service routine" follow the steps below

- 1 Press POWER switch to OFF.
- 2 Open service access doors on side of washer.
- 3 Locate junction box TB-1 and open
4. Locate test pin taped to inside of TB-1 junction box.
5. Insert test pin into junction box at TB1-18, as indicated in Figure 4-7.

6 When the program is started, it will progress through a three part sequence. First, it will display on the digital readout the times set on the thumb-wheel switches for the PREWASH, WASH, DETERGENT, and PURIFIED RINSE phases of the cycles. Second, it will then light up in sequence the LEDs on the printed circuit cards. Third, it will light in sequence the legends on the primary panel. In each step, the display will be on for three seconds, and off for three seconds.

If the machine is experiencing a problem with one of the level sensors, the controls will indicate that with an alarm and the service routine won't take place. See Trouble-shooting Chart for these alarms.

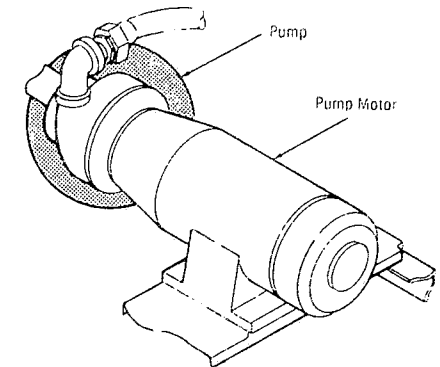


Figure 4-6. CHECK FOR LEAKS IN PUMP SHAFT SEAL.

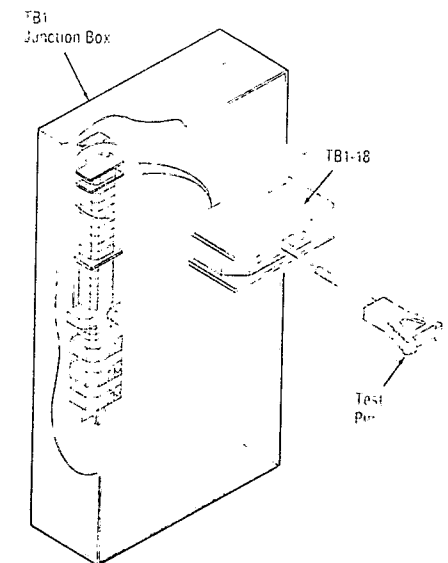


Figure 4-7. INSERT TEST PIN FOR SERVICE ROUTINE.

NOTE: The second part of the service routine will light, in sequence, the LEDs on the edges of the printed circuit boards, indicating that the circuits are operating correctly and energizing the appropriate solenoid valve or other device. In order to see the LEDs, it is necessary to remove the front control panel, as instructed in Section 7, p. 7-7.

7. To start the service routine, open the secondary panel door and press POWER switch to ON.

8. The first part of the program will display on the digital readout the times set for the phases in this sequence

PREWASH
WASH
DETERGENT
PURIFIED RINSE

9. The second part of the program will light the LEDs on the printed circuit boards in this sequence:

a. PCB 1

Valve or device

D12-V1 (COLD WATER)
D13-V2 (HOT RINSE WATER)
D14-V3 (PURIFIED RINSE)
D15-V4 or Electric Coils (TS-1, 120 F)
D16-V5 (HOT FILL WATER)
D17-V6 (DETERGENT)
D18-V7 (DRAIN)

b. PCB 2

Valve or device

D23-MTR STRT (WASH PUMP)
D22-CYCLE COUNTER
D21-RINSE PUMP (OPTION)
D20-(NOT USED)
D19-V4 or Electric Coils (TS-2, 160 F)
D17-(BUZZER)
D16-V8 (VAPOR CONDENSER OPTION)

NOTE: Valves or other devices should be actuated as corresponding LEDs come on. When the washer is not equipped with an option or accessory, LED should come on but no other action occurs in the machine. In the event of malfunction, see appropriate instructions in Section 7, **COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT.**

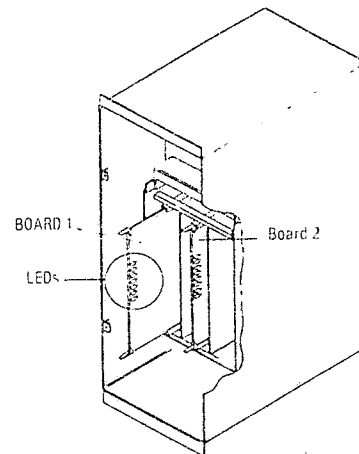


Figure 4-8. PRINTED CIRCUIT BOARDS WITH LEDs.

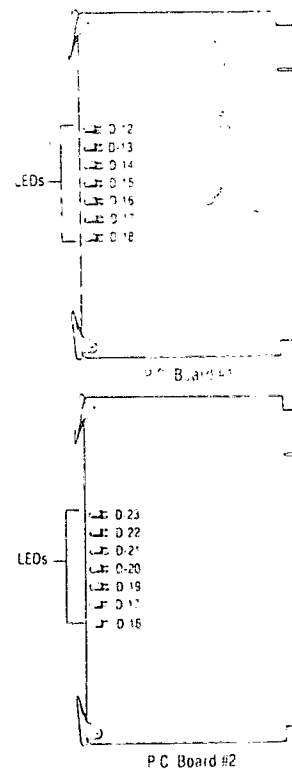


Figure 4-9. CIRCUIT BOARDS WITH LEDs.

10. The third part of the program will light the legends on the primary panel in the following sequence

PREWASH
WASH
RINSE
PURIFIED RINSE
VAPOR REMOVAL (OPTION)
COMPLETE
IN PROCESS (Rear Control Panel)
MINUTES
TANK EMPTY
DRAIN
00 on digital display
88 on digital display

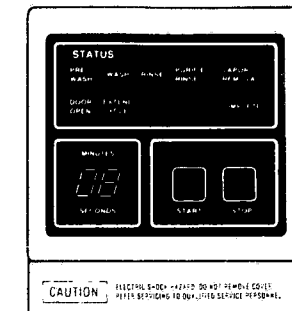


Figure 4-10. LEGEND ON PRIMARY PANEL WILL LIGHT IN SEQUENCE.

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)

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
1.0 Preparation for Preventive Maintenance						
1 Discuss operation of equipment with department personnel.	X	X	X	X	X	X
2 Install test equipment.	X	X	X	X	X	X
2.0 Control System						
1 Gain access to controls.	X	X	X	X	X	X
2 Clean lint and dirt from components	X	X	X	X	X	X
3 Inspect all terminals, wiring and connections	X	X	X	X	X	X
4 Inspect door switch for proper operation	X	X	X	X	X	X
5 Perform standard test cycle	X	X	X	X	X	X
6 Perform operator option test cycle	X	X	X	X	X	X
3.0 Door(s)						
1 Inspect each door gasket	X	X	X	X	X	X
2 Inspect each window and window gasket	X	X	X	X	X	X
4.0 Each Check Valve						
1 Make internal inspection of each check valve			X			
For steam heated unit only:						
5.0 Steam Trap						
1. Rebuild steam trap			X			

EQUIPMENT PULSTAR 5000 Serial No. _____

Figure 4-11. 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)

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
6.0 Each Rotary Spray Arm						
1. Inspect and clean each spray arm.	X	X	X	X	X	X
2. Inspect bearings.	X	X	X	X	X	X
7.0 Water Level Sensors						
1 Inspect and clean each sensor probe.	X	X	X	X	X	X
For electrically heated unit only:						
8.0 Electric Heating Elements						
1 Inspect heating elements	X	X	X	X	X	X
9.0 Each Input Strainer						
1. Inspect strainer for debris.			X			X
10.0 Each Vacuum Breaker						
1. Disassemble vacuum breaker.						X
2. Inspect and replace components of vacuum breaker						X
3. Reassemble vacuum breaker.						X
11.0 Each Solenoid Valve						
1. Rebuild solenoid valve.						X

EQUIPMENT PULSTAR 5000 Serial No. _____

INSPECTOR: Sign For Each Inspection and Fill In Date:

____ Date _____
 _____ Date _____
 _____ Date _____
 _____ Date _____
 _____ Date _____
 _____ Date _____

Figure 4-11. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 2 of 2).

SECTION 5

FIELD TEST PROCEDURE

5

Every washer must be tested and inspected according to this procedure. Each test must meet the standards of material, workmanship and performance set forth in this procedure.

5.1 TEST INSTRUMENTATION REQUIRED

1. Potentiometer and thermocouple leads.
2. Voltmeter or LED test light.

5.2 PRELIMINARY CHECK

1. Open and close door(s) to check:

For Sliding Door Only: that negator functions properly.

For Hinged Door Only: that springs and handle function properly.

2. Watching movement of shaft inside the chamber, move quick disconnect handle to engaged and disengaged positions. When handle is at engaged position, shaft extends inside chamber approximately 4 inches. When handle is at disengaged position, shaft extends inside chamber approximately 2-7/8 inches.

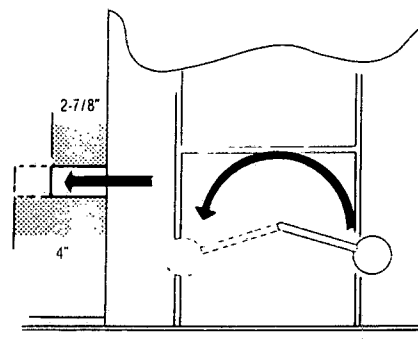


Figure 5-1. CHECK SHAFT DIMENSIONS OF DIVERTER VALVE.

3. Ensure that all rotating arms at top and bottom of chamber rotate smoothly.

4. Check for proper hookup to required services, i.e., steam, water and electrical.

NOTE: Steam and water supply lines should be of a size to insure adequate flow and pressure to washer connections.

PLUMBING CONNECTIONS

Service	Nominal at Connection Point Pipe Size	Pressure (under flow conditions)
140 to 142 F Hot Water	3/4" NPT	40-60 psig
70 ± 2 F Cold Water	1/2" NPT	40-60 psig
Steam Supply (Steam Heater Only)	3/4" NPT	20-80 psig
Drain	2" NPT	
Steam Return (Steam Heater Only)	3/4" NPT	
Distilled Supply (When Equipped)		2-5 psig

ELECTRICAL CONNECTIONS

Service	Volts	Frequency	Phase	Amps
Pumps	208/240/480	60 Hz	3	23/20/10
Controls	120	60 Hz	1	15
If electrical heater	208/240/480	60 Hz	3	

6. Install potentiometer leads in the sump. The thermocouple junction should be in contact with temperature switch.

5.3 COMPONENT CHECKS

1. Door switch adjustment (for each door of double door unit).

- a. Open door. DOOR OPEN light should be on.

- b. Close door. DOOR OPEN light should go off. If light does not go off, proceed as follows:

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Only Sliding Door

Adjust bracket toward the inside 1/32 inch at a time until the DOOR OPEN light goes off when door is closed. Then, move bracket another 1/32 inch toward the inside, and secure bracket.

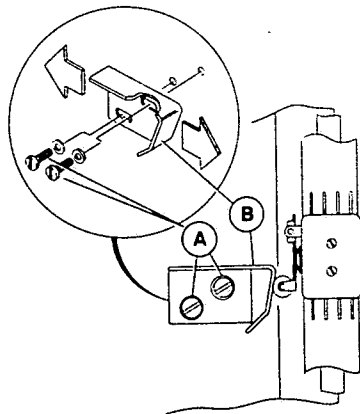
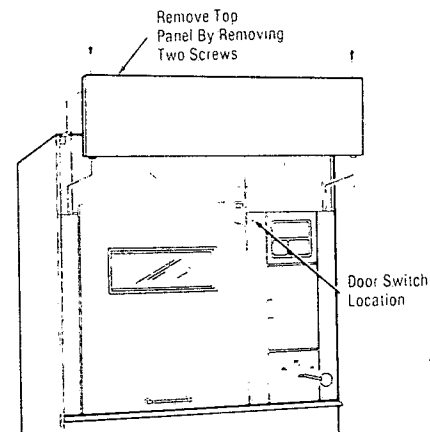


Figure 5-2. SLIDING DOOR SWITCH ADJUSTMENT.

Only Hinged Door

Remove decorative cover above the door. With door locked, move switches until contact with pawl causes DOOR OPEN light to go off. Then, move switch 1/32 to 1/16 inch and secure switches in place.

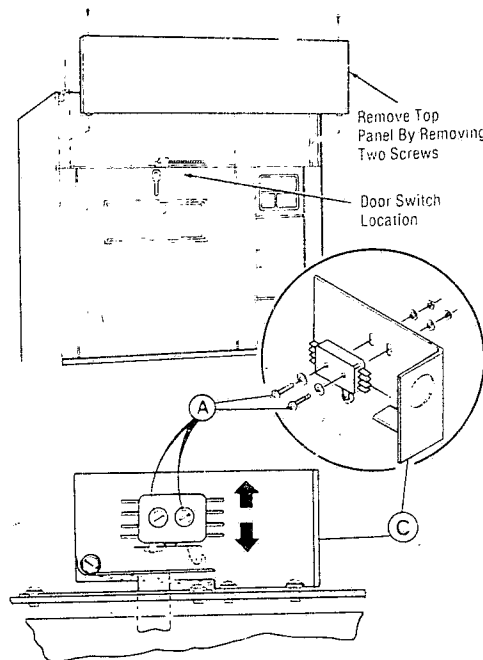


Figure 5-3. HINGED DOOR SWITCH ADJUSTMENT.

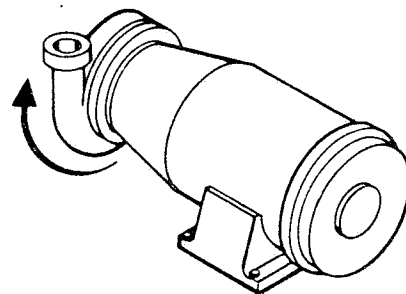


Figure 5-4. WASH PUMP ROTATION

2. Observe wash pump rotation by viewing exposed top of motor. Rotation must be clockwise when looking at exposed motor end (right hand side of unit). If rotation is counterclockwise, turn 3 phase power off at wall disconnect box and switch any two wires connected to L1, L2, or L3 at TB2

5.4 TEST FOR AUTOMATIC OPERATION

1. Place hose from detergent solenoid valve into container of water.

2. Set cycle phase timers as follows:

Prewash: 01
Wash: 02
Detergent: 10
Purified Rinse: 30

3. Close chamber door(s).

4. Check that POWER and HEAT switches are in ON position and EXTENDED CYCLE switch is in OFF position.

5. Press START pushbutton.

6. PREWASH status light is on during this phase and time counter displays the time. Cold water V1 (Board 1, LED-12) and hot water V5 (Board 1, LED-16) solenoid valves open.

7. When tank is full, wash pump starts.

Water level in tank is maintained by the opening and closing of hot water V5 (Board 1, LED 16) solenoid valve. The temperature of the water is maintained at 120 F as follows:

Steam heated unit:

TS1 controls opening and closing of steam V4 (Board 1, LED 15) solenoid valve.

Electrically heated unit:

TS1 controls operation of electric heaters.

NOTE: Wire No. 94 is connected to TS1. If necessary, adjust TS1 to control water temperature between 118 F and 122 F.

8. After prewash time has elapsed, pump stops, and drain V7 (Board 1, LED 18) solenoid valve opens.

9. When tank is empty, drain V7 (Board 1, LED 18) solenoid valve closes. PHEWASH status light goes off, WASH status light comes on, and time counter displays wash time. Hot rinse water V2 (Board 1, LED 13) and hot fill water V5 (Board 1, LED 16) solenoid valves open to fill tank.

10. When tank is full, wash pump starts. Detergent V6 (Board 1, LED 17) solenoid valve opens. **(NOTE:** After detergent time has elapsed, verify that 230 ml of water was removed from the container.)

Water level in tank is maintained by the opening and closing of hot water V5 (Board 1, LED 16) solenoid valve.

The temperature of the water is maintained at 160 F as follows:

Steam heated unit:

TS2 controls opening and closing of steam V4 (Board 2, LED 19) solenoid valve.

Electrically heated unit:

TS2 controls operation of electric heaters.

NOTE: Wire No. 97 is connected to TS2. If necessary, adjust TS2 to control water temperature between 158 F and 162 F.

11. After wash time has elapsed, pump stops, and cold water V1 (Board 1, LED 12) solenoid valve opens for 10 seconds. Then, drain V7 (Board 1, LED 18) solenoid valve opens. During the drain period, hot rinse water V2 (Board 1, LED 13) comes on for a few seconds, followed by cold water V1 again on for a few seconds.

12. When tank is empty, drain V7 (Board 1, LED 18) solenoid valve closes. WASH status light goes off and RINSE status light is on. Hot rinse water V2 (Board 1, LED 13) and hot fill water V5 (Board 1, LED 16) solenoid valves open to fill tank.

13. When tank is full, wash pump starts.

Water level in tank is maintained by the opening and closing of hot water V5 (Board 1, LED 16) solenoid valve.

The temperature of the water is maintained at 160 F as follows:

Steam heated unit:

TS2 controls opening and closing of steam V4 (Board 2, LED 19) solenoid valve.

Electrically heated unit:

TS2 controls operation of electric heaters.

14. After one minute, pump stops. Cold water V1 (Board 1, LED 12) solenoid valve opens for 20 seconds.

15. Drain V7 (Board 1, LED 18) solenoid valve opens and remains open for next rinse phase. Hot rinse water V2 (Board 1, LED 13) solenoid valve then opens. After the 20 second period, cold water V1 (Board 1, LED 12) solenoid valve cycles on for 5 seconds and off for 5 seconds for two minutes.

16. Hot rinse water V2 (Board 1, LED 13) and drain V7 (Board 1, LED 18) solenoid valves close after the two minute fresh rinse period.

17. RINSE status light goes off, PURIFIED RINSE status light is on, and time counter display shows purified rinse time. Purified rinse valve V3 (Board 1, LED 14) solenoid valve opens.

If equipped with rinse pump:

Rinse pump (Board 2, LED 21) starts.

18. After purified rinse time has elapsed, purified rinse valve V3 (Board 1, LED 14) solenoid valve closes; and PURIFIED RINSE status light goes off.

If equipped with rinse pump:

Rinse pump stops.

19. COMPLETE status light is on. Cycle counter counts one cycle. Buzzer sounds for 10 seconds.

5.5 TEST FOR OPERATOR OPTIONS

1. Set cycle phase timers as follows:

Prewash: 02
Wash: 10
Detergent: 0
Purified Rinse: 0

2. Close chamber door(s).

3. Check that POWER switch is in ON position and EXTENDED CYCLE switch is in OFF position. Position HEAT switch to OFF position.

4. Press DRAIN switch. Drain V7 (Board 1, LED 18) solenoid valve opens and tank drains.

5. Press START pushbutton.

6. During prewash phase when time display shows 01, position EXTENDED CYCLE switch to ON position.

7. Allow prewash cycle to continue for 3 minutes. Then, position EXTENDED CYCLE switch to OFF position. The pump stops. Drain V7 (Board 1, LED 18) solenoid valve opens until tank is emptied.

8. After tank is emptied, WASH status light is on, PREWASH status light goes off, and timer counter displays wash time. Hot rinse water V2 (Board 1, LED 13) and hot fill water V5 (Board 1, LED 16) solenoid valves open to fill tank.

9. When tank is full, wash pump starts. Note that detergent V6 (Board 1, LED 17) solenoid valve does not open.

10. When time display shows 06, position EXTENDED CYCLE switch to ON then OFF position. The wash pump stops. Cold water V1 (Board 1, LED 12) opens for 10 seconds. Then, drain V7 (Board 1, LED 18) solenoid valve opens.

11. When tank is empty, drain V7 (Board 1, LED 18) solenoid valve closes. WASH status light goes off and RINSE status light is on. Hot rinse water V2 (Board 1, LED 13) and hot fill water V5 (Board 1, LED 16) solenoid valves open to fill tank.

12. When tank is full, wash pump starts.

Water level in tank is maintained by the opening and closing of hot water V5 (Board 1, LED 16) solenoid valve.

13. After one minute, pump stops. Cold water V1 (Board 1, LED 12) solenoid valve opens for 20 seconds.

14. Drain V7 (Board 1, LED 18) solenoid valve opens and remains open for next rinse phase. Hot rinse water V2 (Board 1, LED 13) solenoid valve then opens. After the 20 second period, cold water V1 (Board 1, LED 12) solenoid valve cycles on for 5 seconds and off for 5 seconds for two minutes.

15. Hot rinse water V2 (Board 1, LED 13) and drain V7 (Board 1, LED 18) solenoid valves close after the two minute fresh rinse period. RINSE status light goes off.

16. COMPLETE status light is on. Cycle counter counts one cycle. Buzzer sounds for 10 seconds.

5.6 OPERATIONAL TEST OF DOOR SWITCH CYCLE ABORTING

1. Set cycle phase timers as follows:

Prewash: 01
Wash: 01
Detergent: 00
Purified Rinse: 15

2. Close chamber door(s).

3. Check that POWER switch is in ON position and EXTENDED CYCLE and HEAT switches are in OFF position.

4. Press START pushbutton.

5. After prewash phase starts, open door. The cycle should abort.

6. Close door and press START pushbutton.

7. After wash phase starts, open door. The cycle should abort.

8. Close door and press START pushbutton.

9. After rinse phase starts, open door. The cycle should abort.

10. Close door and press START pushbutton.

11. After purified rinse phase starts, open door. The cycle should abort.

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SECTION 6

TROUBLESHOOTING



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 6.3) 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.

Steam & Water Supplies

a. Be sure the building-supply valves are fully open.

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

c. Be sure the steam supply is of the proper quality and that the steam-supply line is well drained.

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

e. 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: temperature switches, liquid level detectors, time settings, door switch, cycle select.

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

System logic circuit boards of the controller.

b. In case of malfunctioning AC outputs, check the status of the light emitting diodes (LEDs), on the edge of the printed circuit boards. If the LED is on and the associated valve is off, the system logic is correct and the malfunction is in the wiring or output device.

c. If the LED is off, then check the input circuitry, i.e., liquid level detectors and temperature switches.

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

e. Check circuit breakers first when supply voltage does not appear.

6.2 HOW TO USE THE CYCLE GRAPH (FIGURE 6-1)

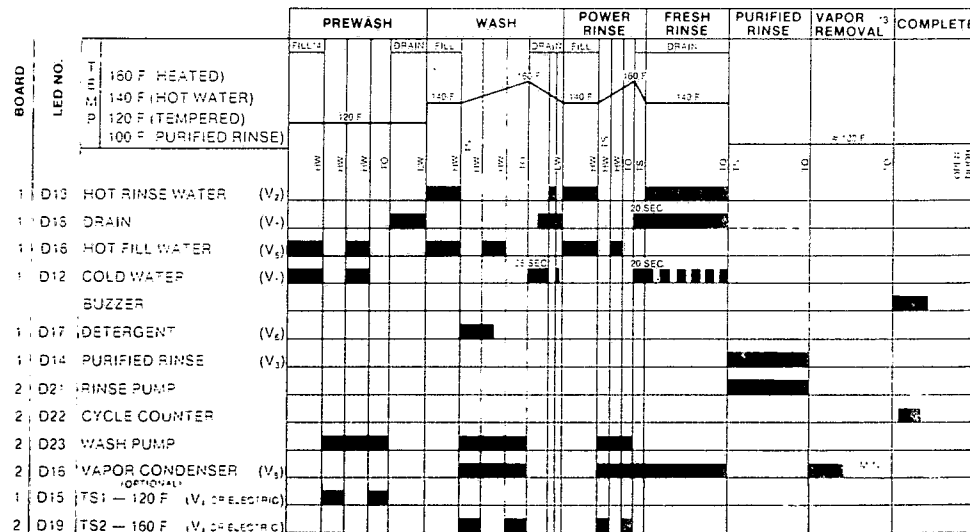
The cycle graph is a representation of the operations of the washer cycle. It is intended to be used for two main purposes: (1) as an aid in understanding how the cycle works; (2) as an aid in troubleshooting. The bar graph is a representation of which output devices (valves, lights, buzzer) are energized during the separate phases of the cycle. The LEDs (light emitting diodes), located on the printed circuit boards behind the front panel, are identified with the corresponding output device. When a solenoid valve, for example, is actuated (energized), the LED will be on.

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.

6.3 CYCLE GRAPH

NOTE: If washer does not include the optional vapor condenser, the COMPLETE light comes on at the end of the purified rinse or the fresh water rinse if purified rinse is by-passed. If washer is equipped with optional vapor condenser, the COMPLETE light comes on two minutes after the start of the vapor removal phase. Water to the vapor condenser through valve V8 will remain on for a maximum of three minutes from the start of the vapor removal phase or until the door is opened, whichever occurs first.



NOTES

1 TS — TIMER STARTS
TO — TIMES OUT
LW — LOW WATER DETECTOR WASH TANK
HW — HIGH WATER DETECTOR WASH TANK

2 ON
OFF

3 VAPOR REMOVAL IS AN OPTION

4 HEATERS OFF AND TANK DRAIN FILL
ARE OPERATOR'S OPTIONS

Figure 6-1. CYCLE GRAPH.

TABLE 6-1: Troubleshooting Chart

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Before beginning cycle.	1.A. No 120 facility power.	1. Check main power source or check 120 VAC on terminals 1 and 2 of TB1, wires no. 1 and 2. NOTE: If facility power does not turn on, isolate then repair short between facility power and washer.	Figs. 8-17, 8-18
	1.B. POWER switch (circuit breaker CB-1) will not set to ON.	1. Short circuit. Remove P5. Try to reset circuit breaker. If circuit breaker still does not reset, go to step 2. If circuit breaker does reset, go to step 3.	Fig. 8-19
		2. Short circuit in power line filter unit or breaker. Check breaker and replace if necessary. Check filter with ohmmeter for short across 9 and 6. If these lines are shorted, replace filter.	Fig. 8-21, 28 Fig. 8-20, 6
		3. If circuit breaker does reset with P5 removed, then make the following checks. First, replace P5, and remove P11. Try to reset circuit breaker again. If circuit breaker does reset with P11 removed and P5 replaced, go to step 4. If circuit breaker does not reset, go to step 7.	Fig. 8-19
		4. If circuit breaker does reset with P11 removed (P5 replaced), then make the following check. First, replace P11, and remove P1A and P1B. Try to reset circuit breaker again. If circuit breaker does reset with P1A and P1B removed, go to step 5. If circuit breaker does not reset, go to step 6.	Fig. 8-19
		5. Short is between P1A/P1B and a solenoid valve, the buzzer, or the counter. Isolate and repair short.	Fig. 8-19
		6. If circuit breaker does not reset with P1A and P1B removed, then make the following check. Remove printed circuit boards B1, B2. If, after removal of these two boards, the short disappears, replace the boards one at a time to determine which board was defective.	Fig. 8-20, 25, 26

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.B. cont.)	Replace defective board. If short does not disappear after removal of the two boards, then short is in card cage. Replace card cage.	Fig. 8-20, 27
		7. If circuit breaker does not reset with P11 removed (P5 replaced), then make the following check. First, remove P10 (P11 also removed). Try to reset circuit breaker. If circuit breaker does not reset, short is in power supply - go to step 8. If circuit breaker does reset, short is in card cage - replace card cage.	Fig. 8-19
		8. Short circuit is in power supply. Check for short across terminals 1 and 2 of J5, on power supply side, with J11 removed. A normal reading exceeds 3 ohms. Less than 3 ohms indicates a defective power transformer or a short in the wiring on J5-1 or J5-2 terminals. Repair wiring or replace power supply.	Fig. 8-20, 27
			Fig. 8-19
	1.C. POWER switch on but primary panel remains dark	1. Check for 120 VAC on TB9-1, 3. If no voltage is present, check facility power or repair or replace POWER switch (CB-1). If voltage is present go to next step.	Fig. 8-20, 8
		2. Check for 120 VAC on TB9-2, 4. If no voltage is present, replace power line filter. If voltage is present, go to next step.	Fig. 8-19, 11
		3. Check for 120 VAC on TB3-2, 3. If voltage is not present, check wiring between TB9 and TB3 for opens. If voltage is present, go to next step.	Fig. 8-21, 42 Fig. 8-19, 11
		4. Check fuse F401 on power supply. If defective, replace. If OK, go to next step.	Fig. 8-20, 15
		5. Check for 28 VDC on P10-2 and P10-6. If no voltage is present, replace power supply. If voltage is present, go to next step.	Fig. 8-20, 15

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.C. cont.)	6. Check for 28 VDC on P3-28 and P9-38. If no voltage is present, replace card cage. If voltage is present, unplug P16 and check for 28 VDC on P16-27 and P16-7. If no voltage is present, find open in harness and repair. If voltage is present, primary panel is defective. Replace.	Fig. 8-20, 15 Fig. 8-20, 27 Fig. 8-19, 13 Fig. 8-21, 9
	1.D. Washer begins cycle when power is applied - without pressing START pushbutton.	1. Cycle start switch defective or shorted wire. Disconnect P16 from primary panel and check continuity between J16-22 and DC ground. If continuity is present without pushing START, replace primary panel. If continuity is not present, go to next step.	Fig. 8-21, 9
		2. Check continuity between P16-22 and DC ground. If continuity is present, isolate short and repair wire harness. If harness is not defective, replace PC board #1.	Fig. 8-19, 13
	1 E. After turning POWER on, intermittent buzzer sounds and digits 01 or 02 flash on primary panel.	1. One or more level sensors not working or defective wiring. Flashing digit indicates which sensor is malfunctioning, as follows: 01 - high level sensor, wash tank 02 - low level sensor, wash tank Perform the following checks. a. Check voltage at appropriate level sensor between "-" and "+" terminals. It should be about 28 VDC. If voltage is present, go to next step. "b". If voltage is zero, check 28 VDC power supply and wiring to the level sensors. Repair if necessary. b. Check that there is 5 VDC at appropriate level sensor between "signal" and "-" terminals. If voltage is present, see next step, "c". If voltage is zero,	Fig. 8-20, 26 Fig. 8-16, 28 Fig. 8-16, 28

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.E. cont.)	then check for continuity between "Signal" terminal and P2A pin applicable to specific level sensor. If continuity is present, replace PC board #1. If continuity is not present, repair wire.	Fig. 8-20, 26
		c. Check for 5 VDC at appropriate level sensor between "Test" and "-" terminals. If voltage is present, replace level sensor. If voltage is not present, then check continuity between "Test" terminal and P4 pin applicable to specific level sensor. If continuity is present, replace PC board #1. If continuity is not present, repair wire	Fig. 8-16, 28 Fig. 8-20, 26
	1.F. One or more legends on primary panel fail to light.	1. Lamp burned out. Check with ohmmeter, and replace if necessary. 2. a. Primary panel logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see step below, 1.F.2b. b. Reinstall lamp and check VDC from lamp socket to DC ground. If it is 28 VDC, replace primary panel. If it is zero, see step below, 1.F.2c. c. Disconnect P3 from controller. Check VDC between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, check 28 VDC power supply. If it is 28 VDC, see step below, 1.F.3.	Para. 7-10 Fig. 8-21, 9 Fig. 8-21, 9 Fig. 8-20, 15
		3. Disconnect P16 from primary panel and check continuity between P16 and P3 on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 8-21, 9
	1.G. One or more legends on primary panel lit when should be off.	1. Control system did not reset - push STOP pushbutton 2. Primary panel logic card defective. Disconnect appropriate pin on P3 from controller. If light goes	Fig. 8-20, 15

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.G. cont.)	out, replace appropriate board or if light remains on, see next step, 1.G.3.	
	1.H. Unable to start cycle.	3. Short circuit. Isolate and repair short in either wire harness or primary panel. Disconnect P16 from primary panel as required. Replace primary panel if necessary. 1. No door closed signal. a. Adjust or replace door closed switch as required. b. Disconnect P2A from controller and check continuity between pins B and D and door switches. If continuity is present, replace PC board #1. If continuity is not present, see next step, 1.H.1c. c. Check continuity across contacts of door closed switch(es). If continuity is present, isolate and repair open in P2A wire harness. If continuity is not present, adjust or replace door closed switch as required. 2. Controller PC board #1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and door switches. If continuity is present, replace controller PC board #1. If continuity is not present, see next step, 1.H.3. 3. Cycle start switch defective or open wire. Disconnect P16 from primary panel and check continuity between P16 pin applicable to switch and pin P4-34. If continuity is not present, isolate and repair open in P4 wire harness. If continuity is present, replace primary panel.	Fig. 8-19, 13 Para. 7-4 Fig. 8-19, 5 Fig. 8-20, 26 Fig. 8-19, 5 Para. 7-4 Fig. 8-20, 25 Fig. 8-19, 12, 30 Fig. 8-21, 9
2. During a "Pre-wash," "Wash," or "Power Rinse" phase of a cycle.	2.A. Washer pump does not start.	1. Check that 3-phase voltage is connected (200, 230, or 460 volts).	Fig. 8-18

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. During a cycle.	2.B. Pump is running, but with low water pressure.	1. Check water level in wash tank. If water is low, it could be caused by suds on the high water level sensor giving a false signal. Correct.	Fig. 8-16, 28
		2. Check three-phase power leads to motor - they may be reversed. Correct.	Fig. 8-16, 1
		3. If the washer is operating without a manifold dolly, make sure the diverter is fully in the "disengage" position.	
	2.C. Water does not heat up properly - for steam-heated units, it should heat to 160 F one minute after beginning "Wash" and "Power Rinse"; for electrically heated units, 2 minutes.	1. Make sure HEAT switch on front panel is ON.	
		2. Steam-heated units - check that solenoid valve V4 is functioning correctly; electrically heated units - check electric heater connections and elements.	Fig. 8-14, 19 Fig. 8-15, 4
		3. Check that temperature switches TS-1 (120 F) and TS-2 (160 F) are set correctly and functioning correctly.	Para. 7-9
		4. Steam-heated units - check that steam supply pressure is correct; check that steam trap is functioning correctly.	Fig. 8-14, 14
		5. Electrically heated units - check that voltage to the heaters is correct. (If voltage is 10% below rated, additional heat-up time will be required.)	Fig. 8-15
		6. Electric units only — overtemp switch TS-3 (N.C.) is open or defective.	Fig. 8-15
	3.A. Intermittent buzzer and 05 flashing on display.	This alarm indicates that the maximum allowable drain time, for any one of the cycle phases, has been exceeded. Possible causes are as follows:	
		1. Dirty drain filter.	Fig. 8-6, 15
		2. Restricted drain line. Check and correct.	Fig. 8-6
		3. Solenoid valve V7 (DRAIN) stuck closed - correct.	Fig. 8-6, 8

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(3.A. cont.)	4. Wiring to solenoid valve V7 or CRE relay defective - repair or replace.	Fig. 8-16, 7
		5. Check for correct operation of solenoid valve V7 and PC board #1 by initiating SERVICE ROUTINE , as instructed in Section 4.6.	
		6. Open washer door and check for water in wash tank. If tank is empty, this indicates that low level sensor in wash tank is probably malfunctioning. Check level sensor for voltage between "SIG" and "-" terminals. If voltage is present, then sensor is functioning correctly - recheck preceding steps. If no voltage is present, check for 5 VDC between "-" and "TEST" terminals. If voltage is present, then level sensor is shorted - replace.	
	3.B. Intermittent buzzer and 06 flashing on display.	This alarm indicates that the maximum allowable fill time (5 minutes), for any one of the cycle phases, has been exceeded.	
		Possible causes are as follows:	
		1. Water supply not open - correct.	
		2. Solenoid valves V1 or V5 stuck closed - correct.	Fig. 8-4, 10 Fig. 8-4, 24
		3. Drain solenoid valve (V7) stuck open - correct.	Fig. 8-6, 8
		4. Wiring to solenoid valves V1 and V5 defective - repair or replace.	Fig. 8-16, 7 Fig. 8-16, 6
		5. Check for correct operation of solenoid valves V1, V5 and PC board #1 by initiating SERVICE ROUTINE , as instructed in Section 4.6.	
		6. Open washer door and check for water in wash tank. If tank is full, this indicates that high level sensor is probably malfunctioning. Check level sensor for 5 VDC between "SIG" and "-" ter-	

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(3.B. cont.)	minals. If voltage is not present, then sensor is functioning correctly — recheck preceding steps.	
	3.C. Intermittent buzzer and 07 flashing on display.	This alarm indicates that the maximum allowable "make-up" time (i.e., time allowed to refill wash tank after washing has begun) has been exceeded. Possible causes are as follows: 1. Water supply not open - check. 2. Water pressure low - check. 3. Drain solenoid valve V7 stuck open - correct. 4. Wiring to solenoid valves V1 or V5 defective - repair or replace. 5. Check for correct operation of solenoid valves V1, V5 and PC board #1 by initiating SERVICE ROUTINE , as instructed in Section 4.6. 6. Push STOP pushbutton. If 01 flashes on display and intermittent buzzer sounds, then the wash tank high water level sensor is malfunctioning - repair or replace.	Fig. 8-6, 8 Fig. 8-16, 7 Fig. 8-16, 6
	3.D. Unable to reset system by pushing STOP pushbutton or by opening door during "Wash" portion of any cycle phase.	1. If cycle does not stop when door is opened, check door closed switch wiring. 2. If cycle does not stop when STOP pushbutton is pushed, check for open circuit. Disconnect P4 from controller and make continuity check between pins 8 and 1 with STOP button pressed and released. If continuity is present with switch actuated, replace controller PC board #1. If continuity is not present, see next step.	Fig. 8-16, 8 Fig. 8-19, 26 Fig. 8-20, 26

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(3.D. cont.)	3. Make continuity check across contacts of STOP switch. If continuity is present, isolate and repair open in P4 harness. If continuity is not present, replace switch.	Fig. 8-19, 26
	3.E. "Purified Rinse" phase started but no spray inside chamber.	1. If the washer is connected to the house purified water supply, check (a) for correct pressure (20 psig or more) and flow; (b) purified rinse solenoid V3 is not stuck closed; (c) wiring to solenoid valve V3 is not defective. 2. If the washer is supplied with the optional rinse pump, check that pump is running - replace if necessary. Check also all items in #1, directly above. 3. If the washer is supplied with the optional storage tank and rinse pump, check that the float in the storage tank is operating correctly. Check also all items in #2, directly above.	Fig. 8-16, 35 Fig. 8-16, 6 Fig. 8-28 Fig. 8-29
4. At end of cycle, COMPLETE light on.	4.A. Buzzer does not sound when COMPLETE light is on.	1. Buzzer defective - check voltage across buzzer, replace if necessary. 2. Open wire - disconnect P1A from control and check continuity between pin R and TB3-3. Isolate and repair.	Fig. 8-21, 25 Fig. 8-19, 5
	4.B. Cycle counter fails to update on cycle completion.	3. PC board #2 defective. Initiate SERVICE ROUTINE , as instructed in Section 4.6 and replace board if LED D17 does not come on at end of cycle. 1. Counter defective - check voltage across counter and replace if necessary. 2. Open wire. Disconnect P26 from TB1 and check continuity between pin 16 and TB4-1. Isolate and repair open. 3. PC board #2 defective. Initiate SERVICE ROUTINE , as instructed in Section 4.6 and replace board if LED D22 does not come on at end of cycle.	Fig. 8-20, 25 Fig. 8-17, 36 Fig. 8-18, 36 Fig. 8-17 Fig. 8-20, 25

Table 6-1: TROUBLESHOOTING CHART (Cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Miscellaneous	5.A. Momentary activation of relays and solenoid valves immediately following closing of front or rear door. (May also be accompanied with an operational condition displayed on controller front panel.)	1. Excessive triac leakage in the control causes a current to be present across door switch. Place a 1.0 μ Fd, 135 VAC capacitor across door switch. Connect to wires 9 and 86 for single-door units or wires 12 and 86 for double-door units.	
	5.B. Cycle counter producing a false cycle count	1. Temperature sensor switch produces a circuit noise sufficient enough to actuate the cycle counter. Install a surge suppressor in terminal box TB1 between terminals TB1-3 and TB1-8.	Fig. 8-17, 56 Fig. 8-18, 61

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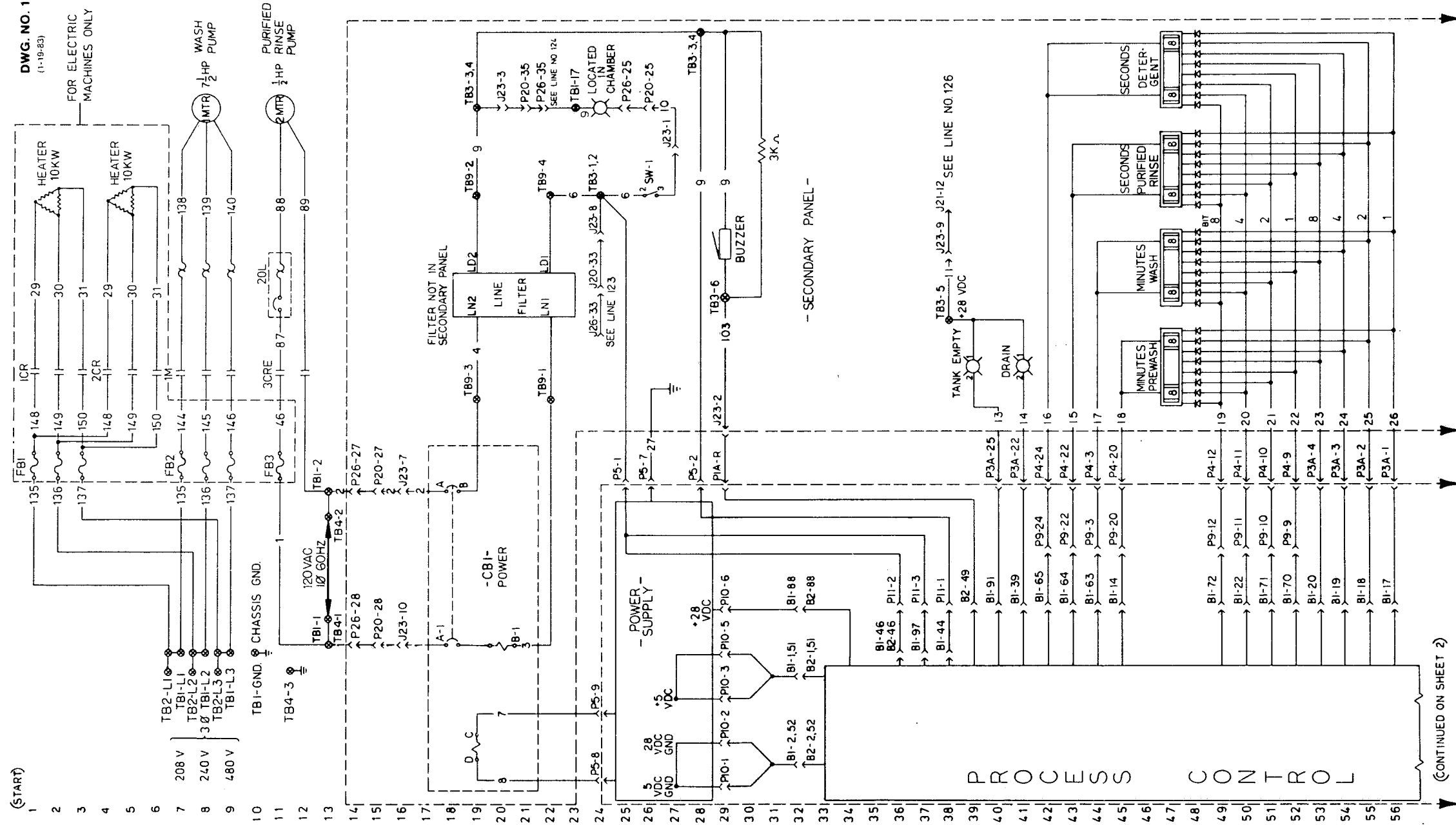
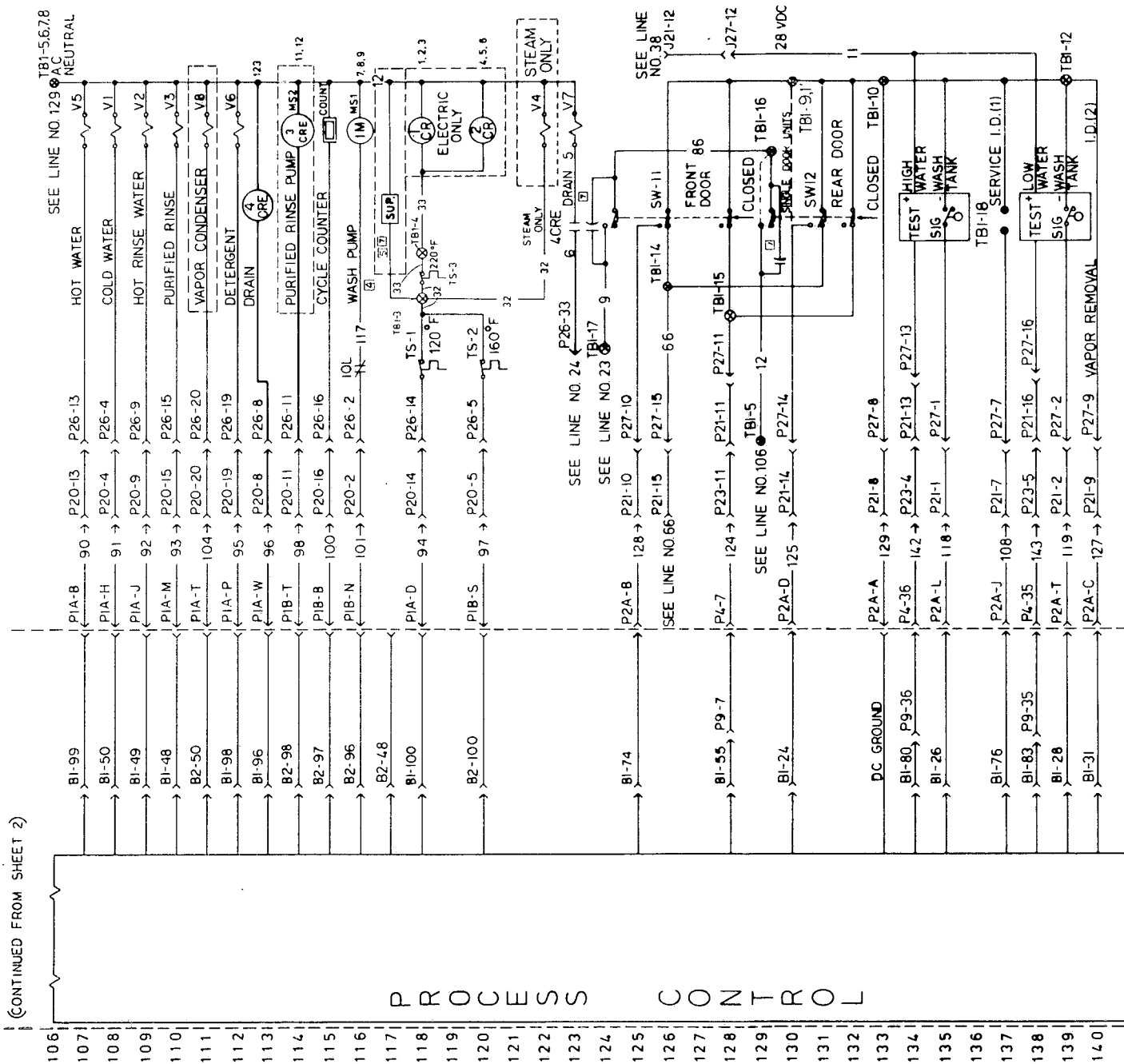


Figure 6-2. ELECTRICAL SCHEMATIC (1 of 3).



ARROWS POINT

(END)

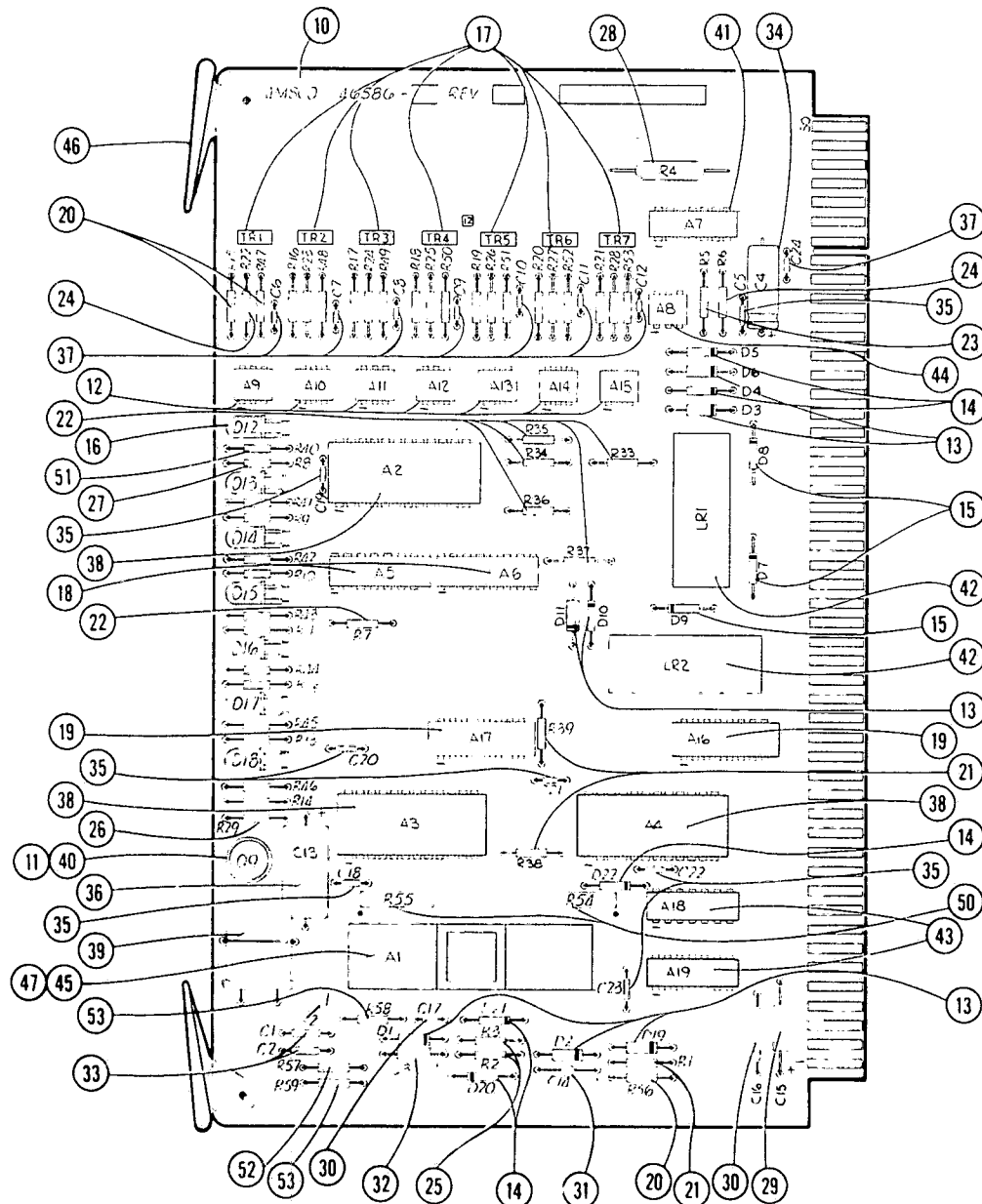


NOTES:

1. PURIFIED RINSE PUMP, VAPOR CONDENSER AND BLOWER ARE OPTIONS.
2. J22 CONNECTOR IS USED FOR DOUBLE DOOR ONLY.
3. SINGLE DOOR UNITS - CONNECT WIRE No. 86 TO TBI-5. CONNECT WIRE No. 125 TO TBI-12 (DC GROUND).

Figure 6-2. ELECTRICAL SCHEMATIC (3 of 3).

6-17/6-18
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QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
	9	NOT USED	
1	10	P/C CARD & DRILL ASSY.	
1	11	PAD, TRANSISTOR	
7	12	IC SOC 418 A	TRIAC DRIVER A9-A15
7	13	RECTIFIER, IN4001	D1, D2, D3, D6, D10, D11, D19
5	14	DIODE, IN949	D4, D5, D20-D22
3	15	RECTIFIER, IN463A	D7, D8, D9
7	16	LAMP, SOLID STATE	MV 5054-2 L.E.D., D12-D18
7	17	TRIAC, 2N6073B	TR1-TR7
2	18	TRANSISTOR, XR2203	DARLINGTON - A5, A6
2	19	RESISTOR, NETWORK	916C103X2PE A16, A17
15	20	RESISTOR	470 OHMS 1/4W 5% CARBON, R15-R21, R47-R53, R56
3	21	RESISTOR	10K 1/4W 5% CARBON, R1, R38, R39
6	22	RESISTOR	3K 1/4W 5% CARBON, R7, R33-R37
1	23	RESISTOR	2.7K 1/4W 5% CARBON, R5
8	24	RESISTOR	100 OHMS 1/4W 5% CARBON, R6, R22-R28
2	25	RESISTOR	510 OHMS 1/4W 5% CARBON, R2, R3
1	26	RESISTOR	330 OHMS 1/4W 5% CARBON, R29
7	27	RESISTOR	680 OHMS 1/4W 5% CARBON, R8-R14
1	28	RESISTOR	18K 1.5W 10%, CARBON, R4
1	29	CAPACITOR	22pf @ 15V TANTALUM-C15
2	30	CAPACITOR	0.1pf @ 12V CERAMIC DISC-C16, C17
1	31	CAPACITOR	1.0pf @ 50V TANTALUM-C14
1	32	CAPACITOR	1.0pf @ 10V TANTALUM-C3
2	33	CAPACITOR	20pf @ 500V CERAMIC DISC-C1, C2
1	34	CAPACITOR	47pf @ 25V TANTALUM, C4
7	35	CAPACITOR	0.01pf @ 25V CERAMIC DISC-C5, C18, C23
1	36	CAPACITOR	850pf @ 8V TANTALUM-C13
8	37	CAPACITOR	0.1pf @ 200 WVDC CERAMIC DISC-C6-C12, C24
3	38	EXPANDER, I/O	8243 A2, A3, A4
1	39	CRYSTAL, 3MHZ	
1	40	TRANSISTOR,	2N3053A Q9
1	41	IC 3059	A7
2	42	RELAY, LATCH	LR1, LR2
2	43	IC-7406	INVERTER HEX BUFFER/DRIVER-A18, A19
1	44	IC, 4N26	OPTO ISO TRANS., A8
1	45	DIP SOCKET	40 PIN A1
2	46	PULL, CARD	
1	47	MICROCOMPUTER	
	48	NOT USED	
	49	NOT USED	
	50	RESISTOR NETWORK	15K BY 5 R54, R55
2	51	RESISTOR	430 OHMS 1/4W 5% R40-R46
1	52	RESISTOR	5.1K OHMS 1/4W 5% R57
2	53	RESISTOR	1K OHMS 1/4W 5% R58, R59

Figure 6-3. P/C BOARD NO. 1 (1 of 2).

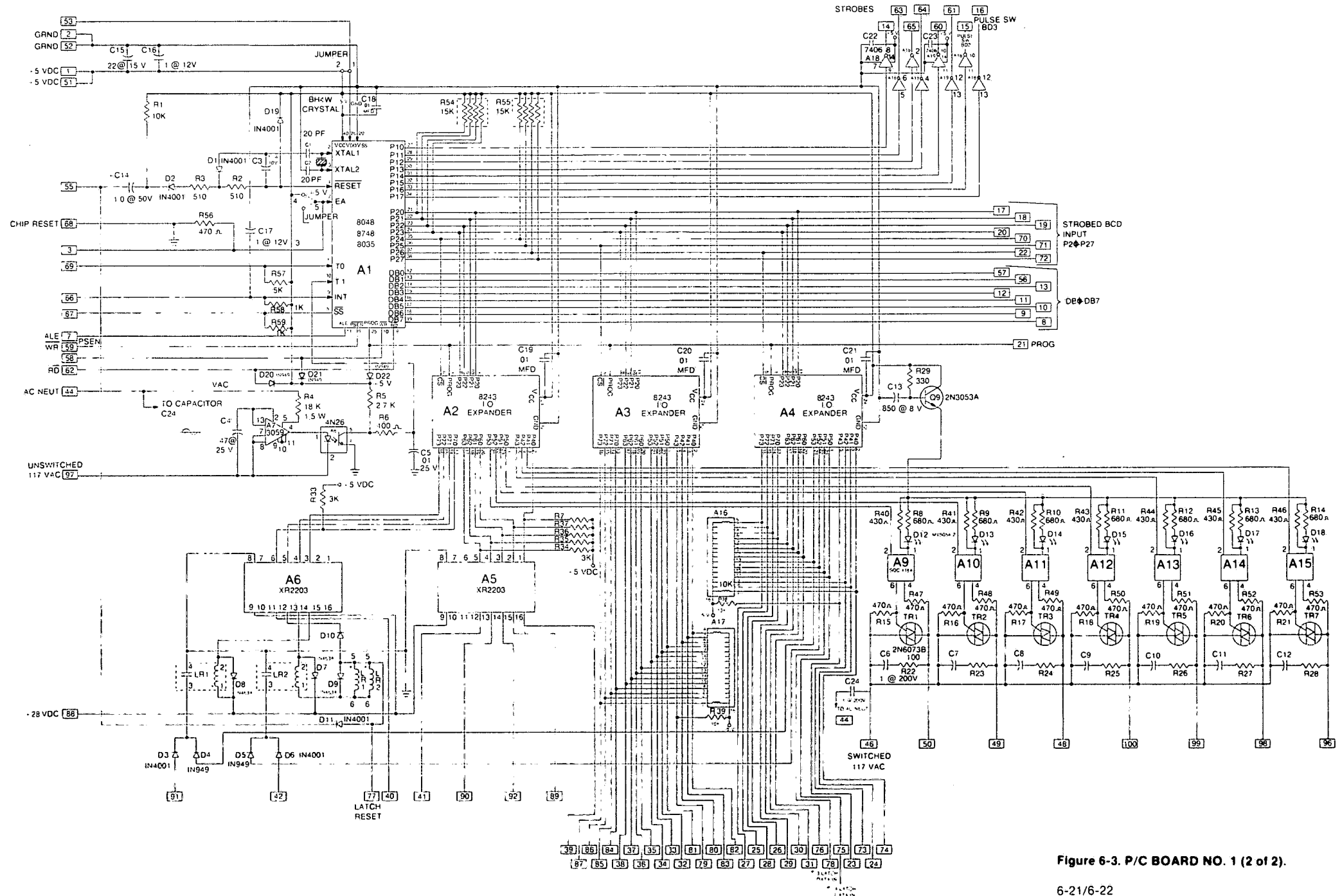
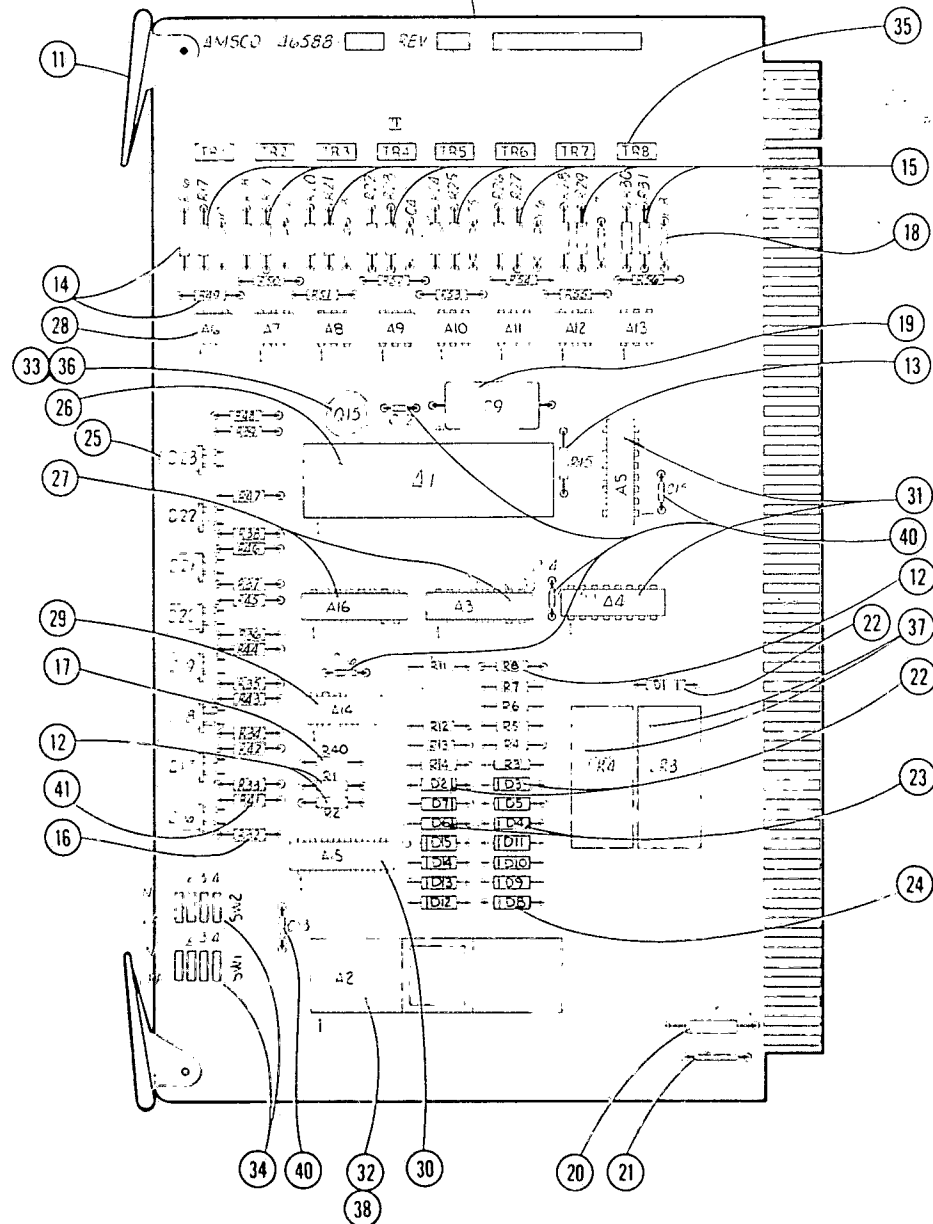


Figure 6-3. P/C BOARD NO. 1 (2 of 2).

pulstar



QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
1	10	P/C CARD & DRILL SCHD.	
2	11	PULL, CARD	
12	12	RESISTOR, 3K OHMS	1/4W 5%, R1-R8, R11-R14
1	13	RESISTOR, 330 OHMS	1/4W 5%, R15
16	14	RESISTOR, 470 OHMS	1/4W 5%, R16, R18, R20, R22, R24, R26, R28, R30, R49-R56
8	15	RESISTOR, 100 OHMS	1/4W 5%, R17, R19, R21, R23, R25, R27 R29, R31
8	16	RESISTOR, 680 OHMS	1/4W 5%, R32-R39
1	17	RESISTOR, 10K OHMS	1/4W 5%, R40
8	18	CAPACITOR, .1 μ f, 200V	C1-C8
1	19	CAPACITOR, 850 μ f, 8V	C9
1	20	CAPACITOR, 22 μ f, 15V	C10
1	21	CAPACITOR, .1 μ f, 12V	C11
3	22	DIODE	1N463A, D1, D2, D3
2	23	DIODE	1N4001, D4, D6
10	24	DIODE	1N949, D5, D7, D8-D15
8	25	L.E.D.	MV5054-2 D16-D23
1	26	MOS RAM, 8155	A1
2	27	DARLINGTON, XR2203	A3, A16
8	28	OPTOISO TRIAC	SOC 418A A6-A13
1	29	QUAD EX-OR, 7486	A14
1	30	RESISTOR, NETWORK	916C103X2PE A15
2	31	BUFFER, CMOS	CD4050BC A4, A5
1	32	DIP SOCKET, 40 PIN	A2
1	33	TRANSISTOR	2N3053A Q15
2	34	SWITCH, 16 POS HEX	SW1, SW2
8	35	TRIAC, 2N6073B	TRI-TR8
1	36	PAD, TRANSISTOR	Q15
2	37	RELAY, LATCH	LR3, LR4
1	38	BIT ROM	
	39	NOT USED	
5	40	CAPACITOR	0.01 MF @ 25V C12-C16
8	41	RESISTOR	430 OHMS 1/4W 5% R41-R48

Figure 6-4. P/C BOARD NO. 2 (1 of 2).

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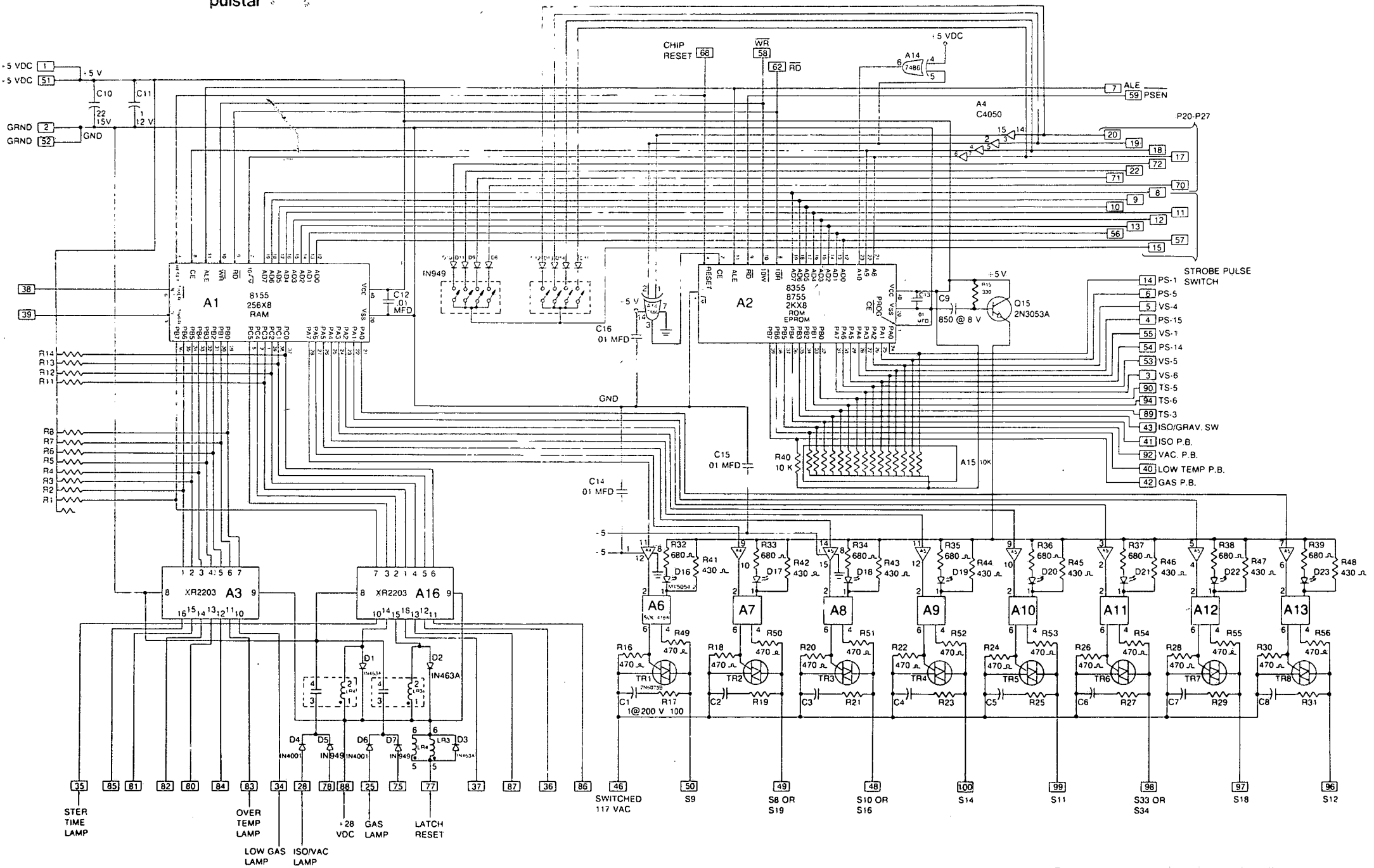
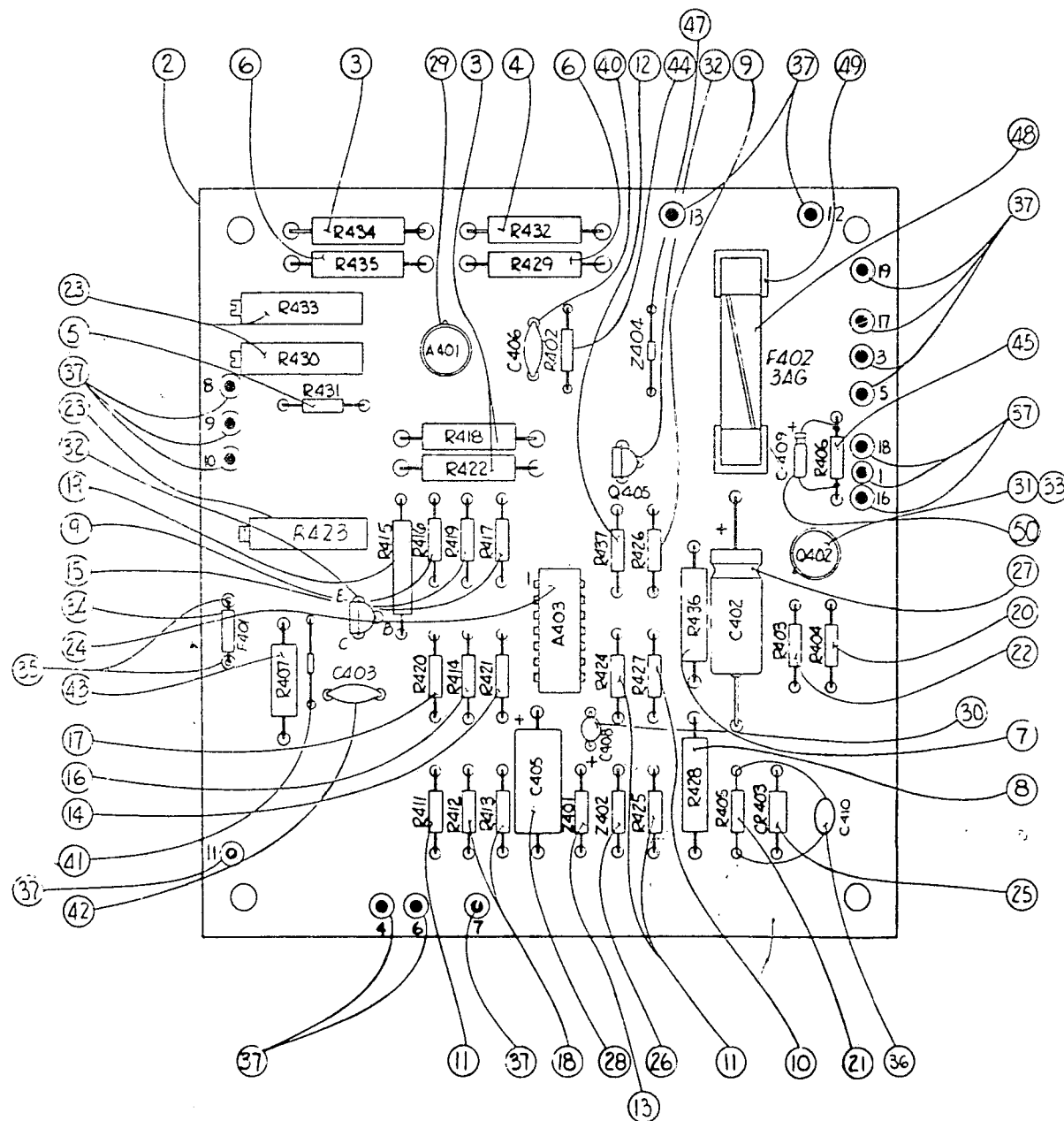


Figure 6-4. P/C BOARD NO. 2 (2 of 2).

6-25/6-26



QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	2	P/C CARD	
1	3	RESISTOR, 130 OHMS	12 1/2 W.M.F., R434
1	4	RESISTOR, 301 OHMS	12 1/2 W.M.F., R432
1	5	RESISTOR, 47K OHMS	52 1/4 W.C.C., R431
2	6	RESISTOR, 750 OHMS	12 1/2 W.M.F., R429, R435
1	7	RESISTOR, 9.09 OHMS	12 1/2 W.M.F., R436
1	8	RESISTOR, 562 OHMS	12 1/2 W.M.F., R428
2	9	RESISTOR, 200 OHMS	52 1/4 W.C.C., R416, R426
1	10	RESISTOR, 390 OHMS	52 1/4 W.C.C., R427
3	11	RESISTOR, 470 OHMS	52 1/4 W.C.C., R411, R424, R425
1	12	RESISTOR, 430 OHMS	52 1/4 W.C.C., R437
1	13	DIODE, ZENER	1N4734A, Z401
1	14	RESISTOR, 300 OHMS	52 1/4 W.C.C., R421
2	15	RESISTOR, 680 OHMS	52 1/4 W.C.C., R419
1	16	RESISTOR, 1.3K OHMS	52 1/4 W.C.C., R414
1	17	RESISTOR, 1.5K OHMS	52 1/4 W.C.C., R420
2	18	RESISTOR, 100 OHMS	52 1/4 W.C.C., R412, R413
1	19	RESISTOR, 160 OHMS	52 1/4 W.C.C., R415
1	20	RESISTOR, 2.7K OHMS	52 1/4 W.C.C., R404
1	21	RESISTOR, 3.3K OHMS	52 1/4 W.C.C., R405
1	22	RESISTOR, 4.3K OHMS	52 1/4 W.C.C., R403
2	23	POTENTIOMETER	200 OHMS, R423, R433
1	24	I.C.	CA3146AE, A403
1	25	DIODE	1N4001, CR403
1	26	DIODE, ZENER	1N752A, Z402
1	27	CAPACITOR, ELEC.	33 MFD 40V, C402
1	28	CAPACITOR, ELEC.	250 MFD 15 VDC, C405
1	29	I.C.	723, A401
1	30	CAPACITOR	4.7 MFD, 35V, C408
1	31	TRANSISTOR	2N3053, Q402
2	32	TRANSISTOR	2N3905, Q405, Q406
1	33	PAD, TRANSISTOR	
1	34	FUSE, 3 AMP	F401
2	35	TERMINAL, SOCKET	
1	36	CAPACITOR	C410
15	37	PIN, FORMED	
1	38	RESISTOR, 178 OHMS	12 1/2 W.M.F., R422
1	39	RESISTOR, 82.5 OHMS	12 1/2 W.M.F., R418
1	40	CAPACITOR, DISC.	.002 MFD 1KV, C406
1	41	DIODE, ZENER	1N4744, Z403
1	42	CAPACITOR	.1MFD 12VDC C403
1	43	RESISTOR	750 OHMS 3W R407
1	44	RESISTOR	1K 1/4W R402
1	45	RESISTOR	3K 1/2W R406
1	46	POTENTIOMETER	2K R 430
1	47	DIODE, ZENER	1N4751A 30V Z404
1	48	FUSE	3AG F402
2	49	CLIP, FUSE	
1	50	CAPACITOR	1.0 MFD, 50V, C409

Figure 6-5. P/C ASSEMBLY : Power Supply (1 of 2).

6-27/6-28

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NOTE:
1. ALL RESISTORS $\frac{1}{4}$ W UNLESS OTHERWISE NOTED

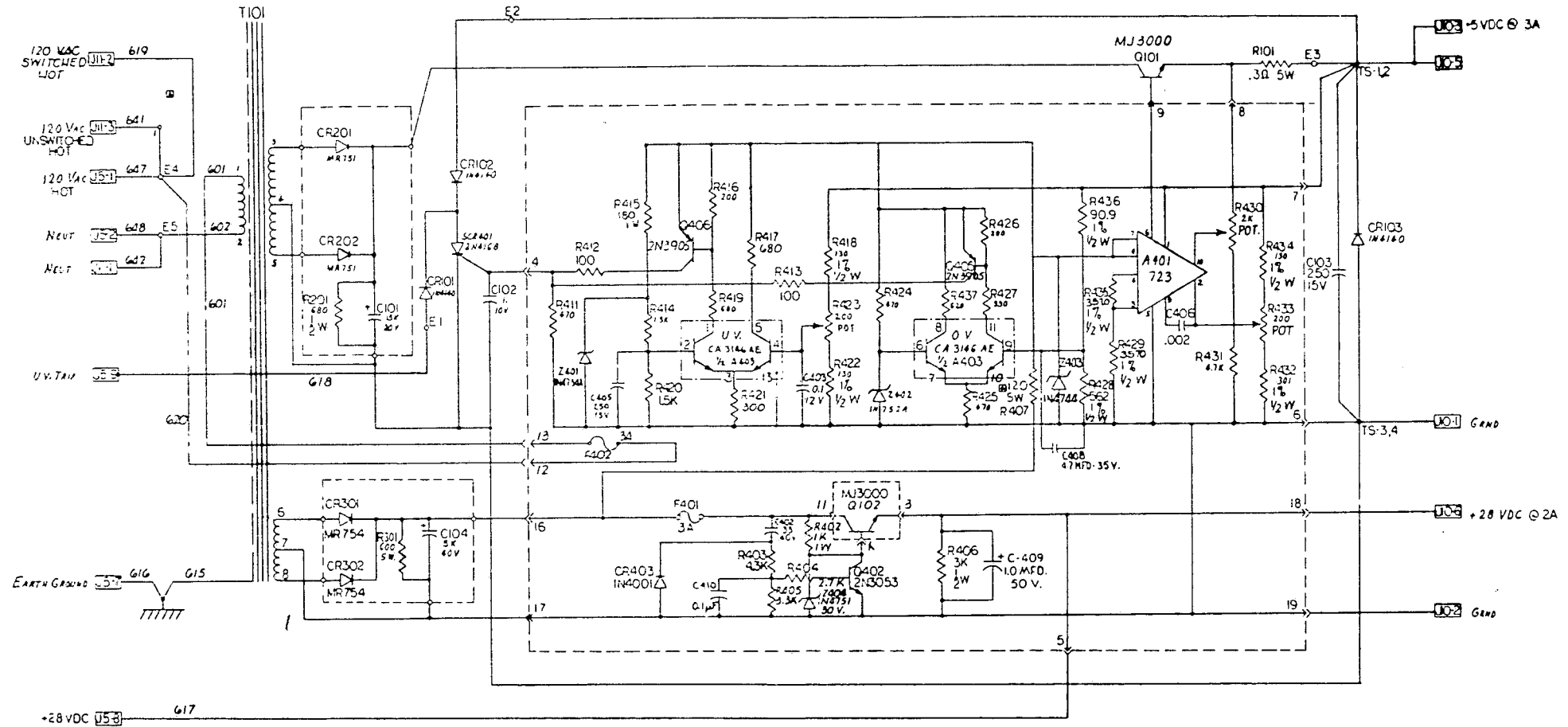
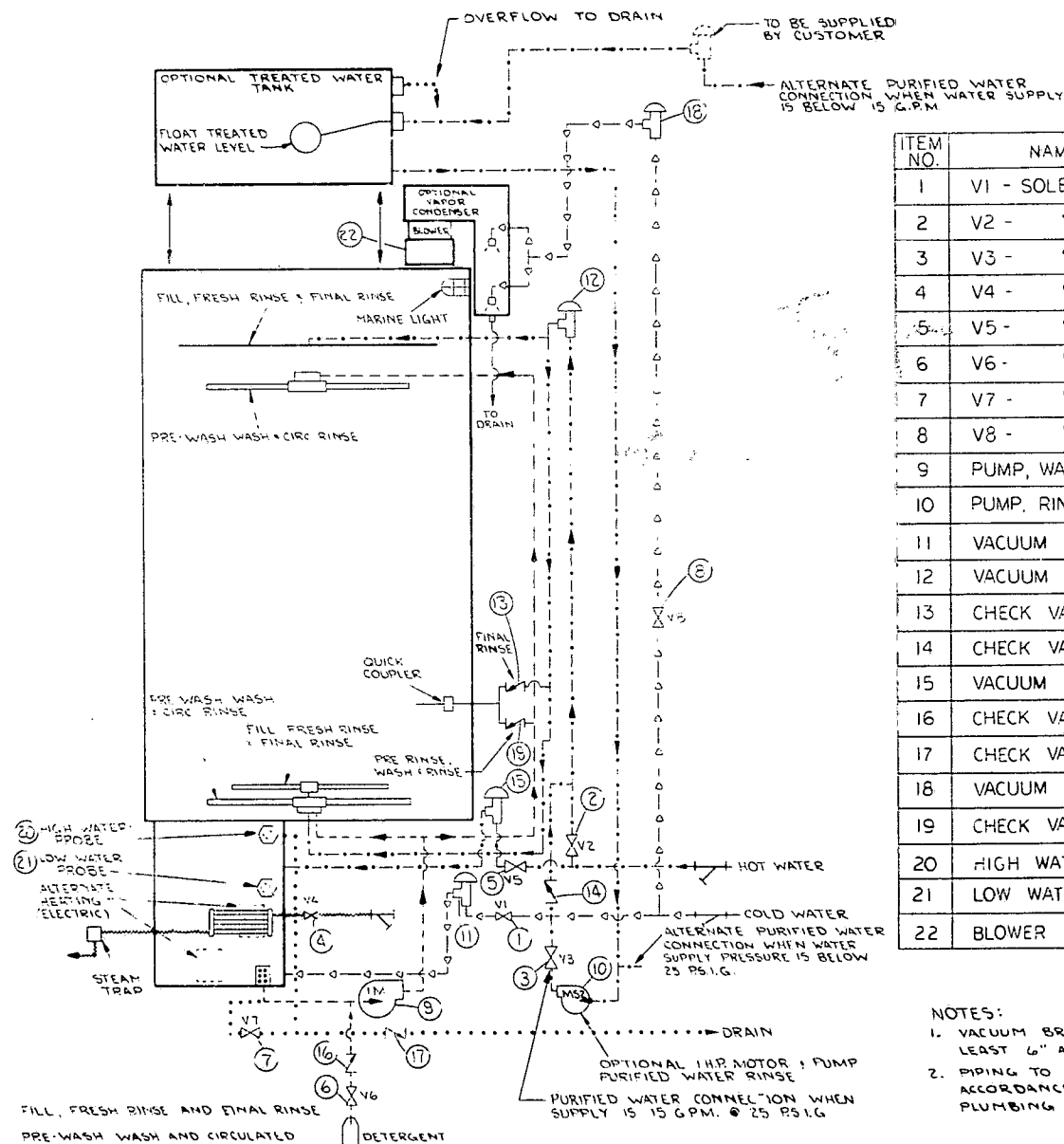


Figure 6-5. P/C ASSEMBLY : Power Supply (2 of 2).



LEGEND

- FILL, FRESH RINSE AND FINAL RINSE
- PRE-WASH WASH AND CIRCULATED RINSE
- DRAIN
- ~~~~~ STEAM
- - - - - COLD WATER

SYMBOLS

ITEM NO.	NAME	AMSCO PART NO.	SERVICE
1	V1 - SOLENOID VALVE	83263-002	COLD WATER
2	V2 - " "	150474-170	HOT RINSE WATER
3	V3 - " "	150474-169	PURIFIED RINSE
4	V4 - " "	150474-171	STEAM
5	V5 - " "	150474-170	HOT WATER
6	V6 - " "	150474-241	DETERGENT
7	V7 - " "	150474-235	DRAIN
8	V8 - " "	150474-168	VAPOR CONDENSER (OPTION)
9	PUMP, WASH	150474-366 150474-377	
10	PUMP, RINSE	150474-449	PURIFIED WATER (OPTION)
11	VACUUM BREAKER	90233-091	COLD WATER
12	VACUUM BREAKER	118025-051	HOT RINSE WATER
13	CHECK VALVE	90235-091	FINAL RINSE
14	CHECK VALVE	43101-091	PURIFIED RINSE
15	VACUUM BREAKER	118025-051	HOT WATER
16	CHECK VALVE	10278-091	DETERGENT
17	CHECK VALVE	75396-091	DRAIN
18	VACUUM BREAKER	150474-172	VAPOR CONDENSER (OPTION)
19	CHECK VALVE	89971-091	PRE-RINSE, WASH & RINSE
20	HIGH WATER PROBE	150475-994	HEATER TANK
21	LOW WATER PROBE	150475-994	HEATER TANK
22	BLOWER (FAN)	150474-654	VAPOR CONDENSER (OPTION)

NOTES:

1. VACUUM BREAKERS MUST BE INSTALLED AT LEAST 6" ABOVE FLOOD LEVEL RIM.
2. PIPING TO SUPPLY LINES MUST BE IN ACCORDANCE WITH LOCAL PLUMBING CODES. PLUMBING PARTS NOT BY AMSCO.

Figure 6-6. PIPING SCHEMATIC.

TABLE 6-2. WIRE LIST: COMMON WIRES, ALL MACHINES

NO	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	6	16	J20-28	P23-10
1	BLACK	21	16	P20-28	P26-28
1	BLACK	24	16	CB1-A1	J23-10
2	WHITE	6	16	J20-27	P23-7
2	WHITE	21	16	P20-27	P26-27
2	WHITE	24	16	CB1-A	J23-7
3	BLACK	10	16	LN-1	TB9-1
3	BLACK			SEC. PANEL	TB9-1
3	BLACK	23	16	CB1-B1	TB-9
4	WHITE	10	16	LN-2	TB9-2
4	WHITE			SEC. PANEL	TB9-2
4	WHITE	22	16	CB1-B	TB-9
6	BLACK	6	16	J20-33	P23-8
6	BLACK	10	16	LD-1	TB9-4
6	BLACK			SEC. PANEL	TB9-4
6	BLACK	27	16	TB3-1	TB-9
6	BLACK	4	18	SW1-2	TB3-2
6	BLACK	64	16	TB3-1	P5-1
6	BLACK	29	16	TB3-2	J23-8
6	RED	21	22	P20-33	P26-33
7	BLACK	60	18	CB1-C	P5-9
8	BLACK	60	18	CB1-D	P5-8
9	BLACK	4	18	RESISTOR	TB3-3
9	BLACK	5	18	BUZZER	TB3-3
9	RED	60	18	SW11-2	TB1-17
9	RED	82	18	SW11-2	TB1-17
9	RED	67	18	LIGHT	TB1-7
9	WHITE	6	16	J20-35	P23-3
9	WHITE	10	16	LD-2	TB9-3
9	WHITE			SEC. PANEL	TB9-3
9	WHITE	27	16	TB3-4	TB-9
9	WHITE	64	16	TB3-3	P5-2
9	WHITE	29	16	TB3-4	J23-3
10	BLACK	6	16	J20-25	P23-1
10	BLACK	23	18	SW1-3	J23-1
10	RED	66	18	LIGHT	J26-25
10	RED	21	22	P20-25	P26-25
11	BLACK	10	22	J21-12	P23-9
11	BLACK	72	24	TB3-5	P3A-28
11	BLACK	51	24	P16-27	TB3-5
11	BLACK	2	24	LT-1	SW2-1
11	BLACK	4	24	SW2-1	TB3-5
11	BLACK	29	24	TB3-5	J23-9
11	RED	12	18	LLD UPPER (+)	LLD LOWER (+)
11	RED	41	18	LLD LOWER (+)	J27-12
11	RED	19	22	P21-12	P27-12
12	WHITE	21	18	V2	V5
12	WHITE	30	18	V5	V3

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TABLE 6-2. WIRE LIST: COMMON WIRES, ALL MACHINES (Cont.)

NO	COLOR	LENGTH	GAUGE	FROM	TO
52	BLACK	56	24	SW8-5	P4-19
52	BLACK	2	24	SW8-5	SW8-2
52	BLACK	8	24	SW8-2	SW2-C
52	BLACK	4	24	SW2-C	SW15-2
59	BLACK	52	24	SW8-6	P16-2
62	BLACK	83	24	P16-23	P3A-14
63	BLACK	83	24	P16-11	P3A-23
65	BLACK	59	24	SW8-3	P4-37
66	BLACK	10	22	J21-15	P23-12
66	BLACK	39	24	P16-14	J23-12
66	RED	60	18	SW11-3	TB1-14
66	RED	82	18	SW11-3	TB1-14
66	RED	19	22	P21-15	P27-15
67	BLACK	83	24	P16-13	P3A-20
68	BLACK	83	24	P16-15	P3A-19
69	BLACK	83	24	P16-30	P3A-21
70	BLACK	83	24	P16-9	P3A-18
71	BLACK	83	24	P16-10	P3A-13
72	BLACK	83	24	P16-21	P3A-15
73	BLACK	83	24	P16-24	P3A-24
74	BLACK	74	24	P16-7	P4-38
75	BLACK	74	24	P16-19	P4-8
76	BLACK	74	24	P16-22	P4-34
77	BLACK	74	24	P16-12	P4-18
78	BLACK	74	24	P16-26	P4-17
79	BLACK	74	24	P16-25	P4-16
80	BLACK	74	24	P16-28	P4-15
81	BLACK	74	24	P16-5	P4-30
82	BLACK	74	24	P16-3	P4-31
83	BLACK	74	24	P16-4	P4-32
84	BLACK	74	24	P16-6	P4-33
85	BLACK	83	24	P16-16	P3A-27
86	RED	60	18	SW11-1	TB1-5
86	RED	82	18	SW11-1	TB1-5
90	BLACK	8	22	J20-13	P1A-B
90	RED	51	18	V5	JB1
90	RED	21	22	P20-13	P26-13
91	BLACK	8	22	J20-4	P1A-H
91	RED	21	22	P20-4	P26-4
92	BLACK	8	22	J20-9	P1A-J
92	RED	64	18	V2	JB1
92	RED	21	22	P20-9	P26-9
93	BLACK	8	22	J20-15	P1A-M
93	RED	34	18	V3	JB1
93	RED	21	22	P20-15	P26-15
94	BLACK	8	22	J20-14	P1A-D
94	RED	21	22	P20-14	P26-14
95	BLACK	8	22	J20-19	P1A-P

TABLE 6-2. WIRE LIST: COMMON WIRES, ALL MACHINES (Cont.)

NO	COLOR	LENGTH	GAUGE	FROM	TO
95	RED	21	22	P20-19	P26-19
96	BLACK	8	22	J20-8	P1A-W
96	RED	21	22	P20-8	P26-8
97	BLACK	11	22	J20-5	P1B-S
97	RED	21	22	P20-5	P26-5
98	BLACK	11	22	J20-11	P1B-T
98	RED	21	22	P20-11	P26-11
99	BLACK	11	22	J20-10	P1B-K
100	BLACK	11	22	J20-16	P1B-B
100	RED	21	22	P20-16	P26-16
101	BLACK	11	22	J20-2	P1B-N
101	RED	21	22	P20-2	P26-2
102	BLACK	8	22	J20-21	P1A-L
102	RED	66	18	LIGHT	J26-21
102	RED	21	22	P20-21	P26-21
103	BLACK	10	22	P23-2	P1A-R
103	BLACK	5	18	BUZZER	TB3-6
103	BLACK	27	18	TB3-6	J23-2
103	BLACK	4	18	RESISTOR	TB3-6
104	BLACK	8	22	J20-20	P1A-T
104	RED	21	22	P20-20	P26-20
105	BLACK	11	22	J20-17	P1B-F
106	BLACK	11	22	J20-6	P1B-R
107	BLACK	11	22	J20-23	P1B-L
108	BLACK	16	22	J21-7	P2A-J
108	RED	19	22	P21-7	P27-7
109	BLACK	10	22	J21-3	P23-6
110	BLACK	11	22	J20-18	P1B-E
113	BLACK	11	22	J20-1	P1B-X
114	BLACK	11	22	J20-7	P1B-P
115	BLACK	11	22	J20-12	P1B-H
116	BLACK	11	22	J20-3	P1B-U
118	BLACK	16	22	J21-1	P2A-L
118	RED	47	18	LLD UPPER (SIG)	J27-1
118	RED	19	22	P21-1	P27-1
119	BLACK	16	22	J21-2	P2A-T
119	RED	47	18	LLD LOWER (SIG)	J27-2
119	RED	19	22	P21-2	P27-2
121	BLACK	16	22	J21-4	P2A-M
122	BLACK	16	22	J21-5	P2A-N
124	BLACK	10	22	J21-11	P23-11
124	BLACK	48	24	J23-11	P4-7
124	RED	60	18	SW11-7	TB1-15
124	RED	82	18	SW11-7	TB1-15
124	RED	19	22	P21-11	P27-11
125	BLACK	16	22	J21-14	P2A-D
125	RED	19	22	P21-14	P27-14
126	BLACK	16	22	J21-6	P2A-K

TABLE 6-2. WIRE LIST: COMMON WIRES, ALL MACHINES (Cont.)

NO	COLOR	LENGTH	GAUGE	FROM	TO
127	BLACK	16	22	J21-9	P2A-C
127	RED	19	22	P21-9	P27-9
128	BLACK	16	22	J21-10	P2A-B
128	RED	63	18	SW11-6	J27-10
128	RED	85	18	SW11-6	T27-10
128	RED	19	22	P21-10	P27-10
129	BLACK	16	22	J21-8	P2A-A
129	RED	12	18	LLD UPPER (-)	LLD LOWER (-)
129	RED	40	18	LLD LOWER (-)	TB1-11
129	RED	60	18	SW11-4	TB1-9
129	RED	3	18	SW11-5	TB1-9
129	RED	3	18	SW11-8	TB1-9
129	RED	82	18	SW11-4	TB1-9
129	RED	3	18	SW11-5	TB1-9
129	RED	3	18	SW11-8	TB1-9
129	RED	19	22	P21-8	P27-8
138	BLACK	54	8	PUMP	MOTOR STARTER - T1
139	BLACK	54	18	PUMP	MOTOR STARTER - T2
140	BLACK	54	8	PUMP	MOTOR STARTER - T3
142	BLACK	10	22	J21-13	P23-4
142	BLACK	48-1.2	24	P4-36	J23-4
142	RED	47	18	LLD UPPER TEST	J27-13
142	RED	19	22	P21-13	P27-13
143	BLACK	10	22	J21-16	P23-5
143	BLACK	48-1.2	24	P4-35	J23-5
143	RED	47	18	LLD LOWER TEST	J27-16
143	RED	19	22	P21-16	P27-16
151	BLACK	16	22	J21-17	P23-13
152	BLACK	10	22	J21-18	P2A-E

TABLE 6-3. WIRE LIST FOR ELECTRIC UNITS.

NO	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	18	14	TB4-L1	TB1-1
1	BLACK	9	14	FS. HOLD	TB1-1
1	BLACK	9	16	TB1-1	J26-28
2	WHITE	18	14	TB4-L2	TB1-2
2	WHITE	8	14	CRE 3-9	TB1-2
2	WHITE	5	16	TB1-2	J26-27
6	RED	15	18	CRE 4-7	J26-33
9	RED	8	18	J26-35	TB1-17
12	BLACK	9	16	COUNTER	TB1-8
12	WHITE	11	18	CRE 4-B	TB1-6
12	WHITE	11	18	CRE 3-B	TB1-5
12	WHITE	13	18	TB1-7	MTR. START COIL
12	WHITE	6	18	2CR-D	1CR-D
12	WHITE	43	18	2CR-D	TB1-5
27	GREEN	18	10	TB4-GND	TB1-GND
27	GREEN	6	10	TB4-GND	GND
29	BLACK	53		HEATER	1CR-A & 2CR-A
30	BLACK	53		HEATER	1CR-B & 2CR-B
31	BLACK	53		HEATER	1CR-C & 2CR-C
32	RED	9	18	TS1-NC	TB1-3
32	RED	6	18	2CR-E	1CR-E
32	RED	43	18	2CR-E	TB1-3
46	RED	8	14	CRE 3-7	FS. HOLD
66	RED	6	18	TB1-14	J27-15
87	BLACK	13	14	CRE 3-4	CIR. BRK.
96	RED	15	18	CRE 4-A	J26-8
98	RED	15	18	CRE 3-A	J26-11
101	RED	11	18	MTR. START X2	J26-2
108	RED	10	18	TB1-18	J27-7
124	RED	6	18	TB1-15	J27-11
125	RED	10	18	TB1-12	J27-14
127	RED	6	18	TB1-12	J27-9
129	RED	3	18	TB1-12	TB1-18
129	RED	8	18	TB1-10	J27-8
135	BLACK	13	4	TB2-L1	TB1-L1
135	BLACK	13	8	FUSE BLOCK-C	TB1-L1
135	BLACK	37	8	FB1-A	TB1-L1
136	BLACK	14	4	TB2-L2	TB1-L2
136	BLACK	13	8	FUSE BLOCK-B	TB1-L2
136	BLACK	37	8	FB1-B	TB1-L2
137	BLACK	15	4	TB2-L3	TB1-L3
137	BLACK	13	8	FUSE BLOCK-A	TB1-L3
137	BLACK	37	8	FB1-C	TB1-L3
138	BLACK	6	18	W PUMP	MOTOR STARTER T1
141	RED	20	18	CRE 4-7	TB1-9
144	BLACK	20	8	MTR. START L1	FUSE BLOCK-C
145	BLACK	20	8	MTR. START L2	FUSE BLOCK-B
146	BLACK	20	8	MTR. START L3	FUSE BLOCK-A

TABLE 6-3. WIRE LIST FOR ELECTRIC UNITS. (Cont.)

NO	COLOR	LENGTH	GAUGE	FROM	TO
12	WHITE	30	18	V3	JB1
12	WHITE	67	18	LIGHT	TB1-7
12	WHITE	21	16	P20-35	P26-35
13	BLACK	70	24	LT-2	P3A-25
14	BLACK	70	24	SW2-2	P3A-22
15	BLACK	57	24	SWE-C	P4-22
16	BLACK	55	24	SWH-C	P4-24
17	BLACK	56	24	SWC-C	P4-3
18	BLACK	54	24	SWB-C	P4-20
19	BLACK	54	24	SWB-8	P4-12
19	BLACK	5	24	SWB-8	SWC-8
19	BLACK	3	24	SWC-8	SWE-8
19	BLACK	5	24	SWE-8	SWH-8
20	BLACK	54	24	SWB-4	P4-11
20	BLACK	5	24	SWB-4	SWC-4
20	BLACK	3	24	SWC-4	SWE-4
20	BLACK	5	24	SWH-4	SWH-4
21	BLACK	54	24	SWB-2	P4-10
21	BLACK	5	24	SWB-2	SWC-2
21	BLACK	3	24	SWC-2	SWE-2
21	BLACK	5	24	SWE-2	SWH-2
22	BLACK	54	24	SWB-1	P4-9
22	BLACK	5	24	SWB-1	SWC-1
22	BLACK	3	24	SWC-1	SWE-1
22	BLACK	5	24	SWE-1	SWH-1
23	BLACK	62	24	SWA-8	P3A-4
23	BLACK	5	24	SWA-8	SWD-8
23	BLACK	3	24	SWD-8	SWF-8
23	BLACK	5	24	SWF-8	SWK-8
24	BLACK	62	24	SWA-4	P3A-3
24	BLACK	5	24	SWA-4	SWD-4
24	BLACK	3	24	SWD-4	SWF-4
24	BLACK	5	24	SWF-4	SWK-4
25	BLACK	62	24	SWA-2	P3A-2
25	BLACK	5	24	SWA-2	SWD-2
25	BLACK	3	24	SWD-2	SWF-2
25	BLACK	5	24	SWF-2	SWK-2
26	BLACK	3	24	SWD-1	SWF-1
26	BLACK	5	24	SWF-1	SWK-1
26	BLACK	62	24	SWA-1	P3A-1
26	BLACK	5	24	SWA-1	SWD-1
27	GREEN	66	16	CHASS GRD.	P5-7
28	BLACK	41	24	P25-1	J22-1
38	BLACK	41	24	P25-13	J22-13
41	BLACK	41	24	P25-18	J22-15
42	BLACK	41	24	P25-24	J22-16
49	BLACK	60	24	SW15-3	P4-28
51	BLACK	61	24	SW2-NO	P4-29

TABLE 6-3. WIRE LIST FOR ELECTRIC UNITS. (Cont.)

NO	COLOR	LENGTH	GAUGE	FROM	TO
148	BLACK	9	8	FB1-A	1CR-A
148	BLACK	13	8	FB1-A	2CR-A
149	BLACK	12	8	FB1-B	1CR-B
149	BLACK	16	8	FB1-B	2CR-B
150	BLACK	14	8	FB1-C	1CR-C
150	BLACK	18	8	FB1-C	2CR-C

TABLE 6-4. WIRE LIST FOR STEAM UNITS.

NO	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	18	14	TB4-L1	TB1-1
2	WHITE	8	14	CRE3-9	TB1-2
2	WHITE	18	14	TB4-L2	TB1-2
6	RED	15	18	CRE4-7	J26-33
9	RED	8	18	J26-35	TB1-17
12	WHITE	11	18	CRE4-B	TB1-6
12	WHITE	11	18	CRE3-B	TB1-5
12	WHITE	24	18	JB1	V1
12	WHITE	29	18	V1	V7
12	WHITE	24	18	V7	V6
12	WHITE	34	18	V4	TB1-8
27	GREEN	18	10	TB4-GND	TB1-GND
27	GREEN	6	10	TB4-GND	GND
32	RED	34	18	V4	TB1-3
46	BLACK	9	14	CRE3-7	TB1-1
87	BLACK	13	14	CRE3-4	CIRCUIT BREAKER
91	RED	27	18	JB1	V1
95	RED	65	18	JB1	V6
96	RED	15	18	CRE4-A	J26-8
98	RED	15	18	CRE3-A	J26-11
125	RED	10	18	TB1-12	J27-14
127	RED	6	18	TB1-12	J27-9
135	BLACK	13	4	TB2-L1	TB1-L1
136	BLACK	14	4	TB2-L2	TB1-L2
137	BLACK	15	4	TB2-L3	TB1-L3
142	RED	58	18	CRE4-4	V7

TABLE 6-5. WIRE LIST FOR UNITS WITH REAR CONTROL PANEL.

NO	COLOR	LENGTH	GAUGE	FROM	TO
12	WHITE	84	18	SW12-2	B1-5
28	RED	55	22	P22-1	INDICATOR TERMINAL
38	RED	55	22	P22-13	INDICATOR TERMINAL
41	RED	57	22	P22-15	REAR DOOR SWITCH (COMMON)
42	RED	57	22	P22-16	REAR DOOR SWITCH (N.O.)
66	RED	84	18	SW12-3	TB1-14
86	RED	84	18	SW12-1	TB1-16
124	RED	84	18	SW12-7	TB1-15
125	RED	86	18	SW12-6	J27-14
129	RED	84	18	SW12-4	TB1-9
129	RED	3	18	SW12-5	TB1-9
129	RED	3	18	SW12-8	TB1-9

TABLE 6-6. WIRE LIST FOR UNITS WITH RINSE PUMP.

NO.	COLOR	LENGTH	GAUGE	FROM	TO
88	BLACK	40	14	RINSE PUMP	CIRCUIT BREAKER
89	WHITE	37	14	RINSE PUMP	CRE3-6

TABLE 6-7. WIRE LIST FOR UNITS WITH STEAM BOOSTER ASSEMBLY.

NO	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	3	18	SW1	TB1-1
2	WHITE	4	18	SW1	TB1-2
3	BLACK	18	18	SOL	TS1-NC
4	BLACK	8	18	SW1	TS1-C
5	BLACK	18	18	SOL	SW1

SECTION 7 COMPONENT REPAIR, REPLACEMENT AND ADJUSTMENT

7.1 GENERAL

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

7.2 SOLENOID VALVES

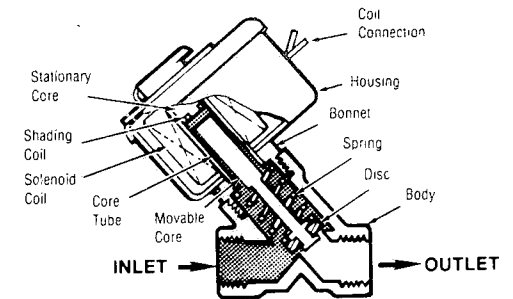
NOTE: When installing new valves in any line, note the arrow stamped on the valve body or the words IN and OUT stamped at the inlet and outlet ports. A reversed valve cannot operate properly. To rebuild a defective valve, order the appropriate valve repair kit. The repair part number is found on the same parts list as the solenoid valve.

Principle of Operation

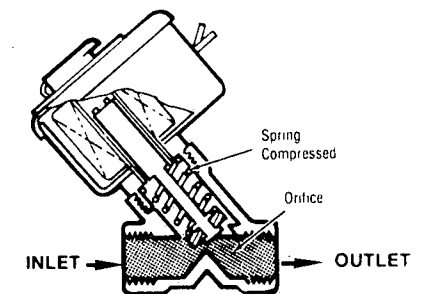
A solenoid valve is a combination of two basic functional units - (1) a solenoid (electro-magnet) with its plunger (or core); and (2) a valve containing an orifice in which a disc or plug is positioned to stop or allow flow. The valve is opened or closed by movement of the magnetic plunger (or core) which is drawn into the solenoid when the coil is energized. The solenoid valves have the solenoid mounted directly on the valve body with the solenoid core attached to the valve stem.

Direct-acting Valve (Fig. 7-1): In direct-acting valves, the solenoid core is mechanically connected to the valve disc and directly opens or closes the orifice, depending on whether the solenoid is energized or de-energized.

Internal pilot-operated Valve (Fig. 7-2): This valve has a pilot, a bleed orifice, and utilizes the line pressure for operation. When the solenoid is energized, it opens the pilot orifice and releases pressure from the top of the valve piston or diaphragm to the outlet side of the valve. This results in an unbalanced pressure which causes the line pressure to lift the piston or diaphragm off the main orifice, thereby opening the valve. When solenoid is de-energized the pilot orifice is closed and full line pressure is applied to the top of the piston or diaphragm through the bleed orifice, thereby providing a sealing force for tight closure.



De-energized



Energized

Figure 7-1. DIRECT-ACTING SOLENOID VALVE.

1. Energize the solenoid coil. A metallic click signifies solenoid operation. Absence of the click can indicate loss of power supply, defective coil or improper connection. Proceed as follows to correct:

- a. Check voltage across the coil leads. When energized by the controller, it should be approximately 120 volts. When de-energized, it will be approximately 2 volts.

- b. Check solenoid coil for open circuit or ground.

2. Energize and de-energize the coil. Check valve operation for proper opening and closing. A loud hum and sluggish operation indicate the coil is probably defective.

To replace a solenoid coil, disconnect the terminal wires and remove the top screw and cover. Lift off the coil and salvage any shim material around the pole piece. Shim must be replaced in new coil or vibration noise will occur. Slip new coil in place and shim so it fits tightly on the pole piece.

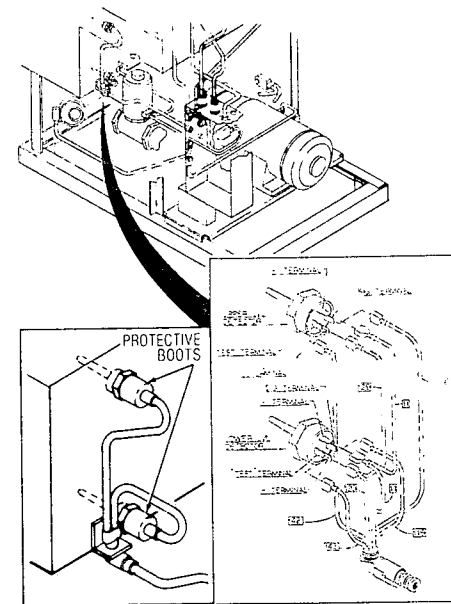


Figure 7-3. WATER LEVEL DETECTORS.

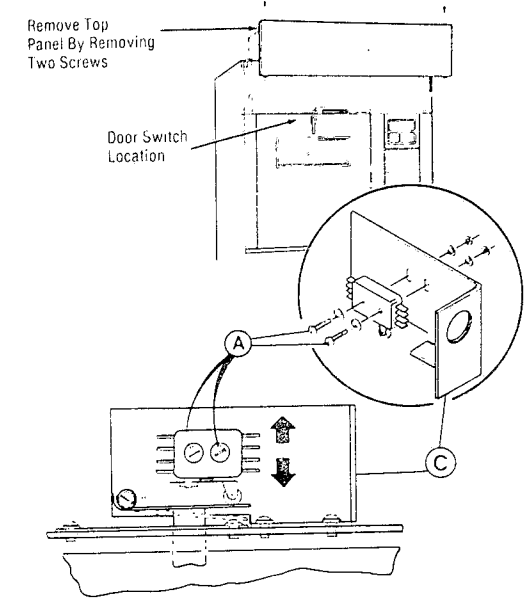


Figure 7-4. HINGED DOOR SWITCH ADJUSTMENT.

3. Inspect the valve for evidence of leakage. A worn valve seat will allow the valve to leak when closed. A damaged or worn seat cannot be repaired; the valve must be replaced if it leaks.

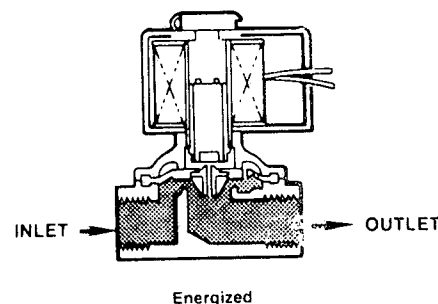


Figure 7-2. INTERNAL PILOT-OPERATED SOLENOID VALVE.

7.3 WATER LEVEL DETECTORS

1. The water level detectors in the wash tank are accessible through the lower service access door.

CAUTION: Make sure wash tank is empty before removing probe.

2. To replace a water level detector, detach and tag the wires, and unscrew the probe from the tank, as shown in Figure 7-3.

7.4 ADJUSTMENT OF DOOR OPEN SWITCH

Hinged Door

1. Remove the top panel above the door in order to expose the door switch.

2. Locate the two screws, (A), which secure the switch to the switch mounting plate, (C). Loosen the screws.

3. With door in locked position, move switch until contact with the lever causes the switch to actuate, then move switch another 1/32" to 1/16" for over-travel. Tighten screws.

Sliding Door

1. Remove the top panel above the door in order to expose the door switch.

2. Loosen the two screws, (A), which secure the door switch actuator, (B), to the door.

3. With the door in the locked position, move the actuator until the switch is actuated, then move the actuator another 1/32" to 1/16" for overtravel. Tighten screws.

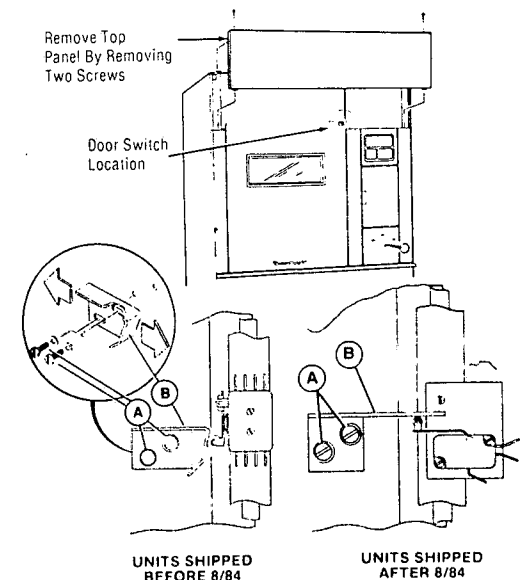


Figure 7-5. SLIDING DOOR SWITCH ADJUSTMENT.

7.5 REMOVAL AND REPLACEMENT OF DOOR GASKET (BOTTOM-HINGED DOORS ONLY)

1. Door gasket is held in place by twenty-two screws which fasten the inside lip of the gasket to the door frame. See illustration.
2. Remove the screws, then remove the gaskets.
3. Replace gasket in door frame, aligning holes in gasket with holes in door frame. Replace screws.

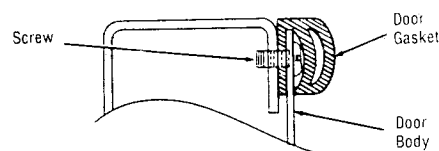


Figure 7-6. CROSS SECTION OF DOOR GASKET (HINGED DOOR ONLY).

7.6 REMOVAL AND REPLACEMENT OF WINDOW AND WINDOW GASKET

1. The window and the window gasket are designed to fit securely into the window frame without the need for additional fasteners.
2. When replacing gasket or window, apply GE-RTV 108 adhesive sealant to the areas indicated in illustration.

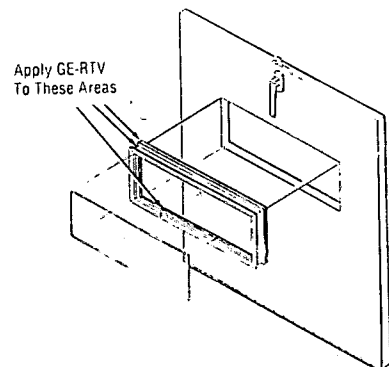


Figure 7-7. REPLACEMENT OF WINDOW AND WINDOW GASKET.

7.7 MANIFOLD COUPLER DIVERTER ASSEMBLY

1. Shut off water to the machine.
2. Remove side panel.
3. Disassemble handle coupling from diverter shaft by loosening the set screws in the coupling.
4. Disassemble diverter wash and rinse lines at unions in front of the check valves.
5. Remove the four bolts which secure diverter assembly to washer chamber wall. Carefully remove diverter assembly and gasket from washer.
6. Slide out rear body assembly with plunger and camshaft in place. Remove O-rings from the front body assembly.

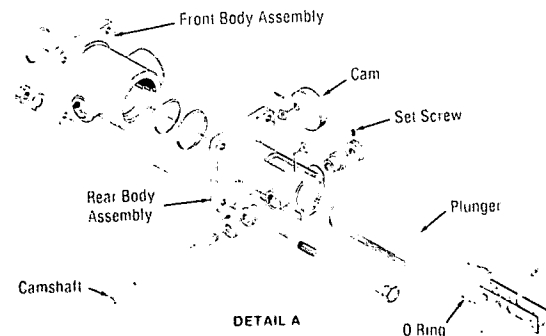
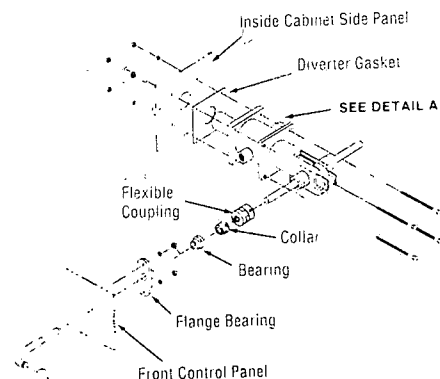


Figure 7-8. DIVERTER VALVE.

7. Loosen set screws from collars on camshaft and remove camshaft. Carefully pull plunger from rear body assembly. Remove plunger O-ring.

8. Clean all parts. Be sure to remove scale and hard-water deposits from O-ring grooves.

9. Install new O-rings on front body and plunger.

10. Reassemble, using new diverter gasket or chamber wall.

7.8 ROTARY SPRAY ARMS AND BEARINGS

Lower Rotary Arms

DISASSEMBLY

1. Unscrew the knurled knob from the adapter.
2. Remove the spray manifold with spray arms from the adapter.
3. Remove the flange bearings from the manifold.
4. Lift the lower rotary manifold and spray arms from the adapter.
5. Remove the flange bearing from the lower rotary manifold.
6. Unscrew the spray arms from the two rotary manifolds.
7. Unscrew the nozzles from the arms.

REASSEMBLY

1. Screw the nozzles into the lower rotary arms, making sure that the slots in the nozzles are parallel to the arms. Repeat with nozzles for upper spray arms. See Figure 7-9.
2. Screw the upper and lower spray arms into their respective manifolds, making sure the drive holes in the arms are perpendicular to the vertical centerline of the manifold and are facing towards the inside of the manifold.
3. Replace the flange bearing in the lower rotary manifold, and replace the manifold in the adapter.
4. Replace the flange bearings in the upper rotary manifold and replace the manifold on the adapter.

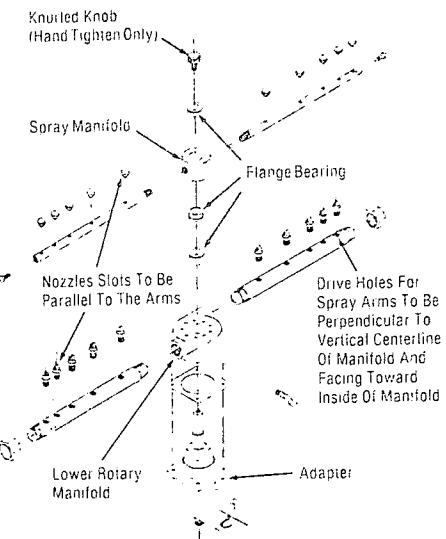


Figure 7-9. LOWER SPRAY ARMS.

CAUTION: Hand-tighten only the knurled knob in the adapter.

5. Screw the knurled knob in the adapter.

Upper Rotary Arms

Disassembly.

1. Unscrew the knurled knob from the rotary adapter.
2. Remove the spray manifold with spray arms from the adapter.
3. Remove the flange bearing from the manifold.
4. Unscrew the spray arms from the manifold.
5. Unscrew the nozzles from the arms.

Reassembly.

1. Screw the nozzles into the arms, making sure the slots in the nozzles are parallel to the arms.
2. Screw the spray arms into the manifold, making sure the drive holes in the arms are perpendicular to the vertical centerline of the manifold and are facing towards the inside of the manifold. See Figure 7-10.
3. Replace the flange bearing in the spray manifold.

CAUTION: Hand-tighten only the knurled knob in the adapter.

4. Place the spray manifold on the adapter and screw the knurled knob into the adapter.

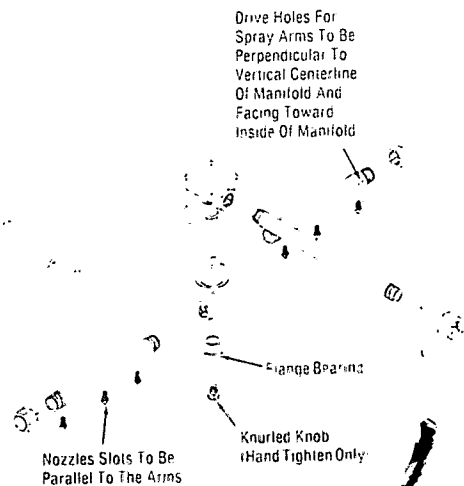


Figure 7-10. UPPER SPRAY ARMS.

7.9 TEMPERATURE CONTROL AND TEMPERATURE SENSOR

Adjustment

1. The temperature switches are accessible by opening the lower access panel, locating the switch on the outside of the sump.

2. Remove the cover from the switch.

3. TS-1 is to be set at 120 F, the temperature of the rinse water during the "prewash" phase. If TS-1 requires adjustment (wire #94 is connected to TS-1), adjust the screw located on TS-1 until solenoid valve V4 (steam-powered units) or contactors in the electric heaters cycle on and off at $120\text{ F} \pm 5\text{ F}$. Turning the screw clockwise increases the temperature setting.

4. TS-2 is to be set at 160 F, the temperature of the wash and "power rinse" phase. If TS-2 requires adjustment (wire #97 is connected to TS-2), adjust the screw located in TS-2 until solenoid valve V4 (steam-powered units) or contactors in the electric heaters cycle on and off at $160\text{ F} \pm 2\text{ F}$. Turning the screw clockwise increases the temperature setting.

Replacement

CAUTION: Before removing switch, make sure sump is empty.

1. Disconnect wires to switch.
2. Remove the entire switch by unscrewing it from the fitting on the outside of the sump.

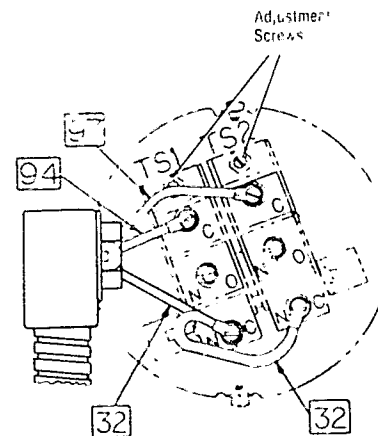


Figure 7-11. INSIDE THERMOSWITCH.

7.10 CONTROL CONSOLE

1. Primary and secondary control panels, controller, and other components in the control console are made accessible by removing six screws from the front panel, as shown in Figure 7-12.

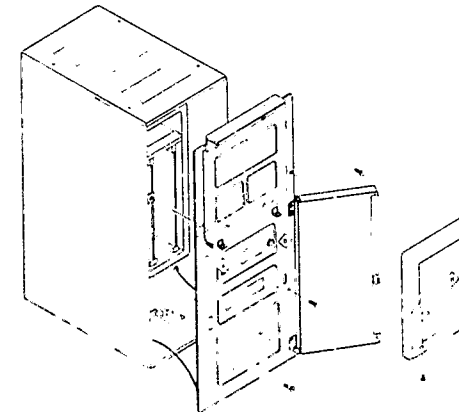


Figure 7-12. REMOVAL OF FRONT PANEL.

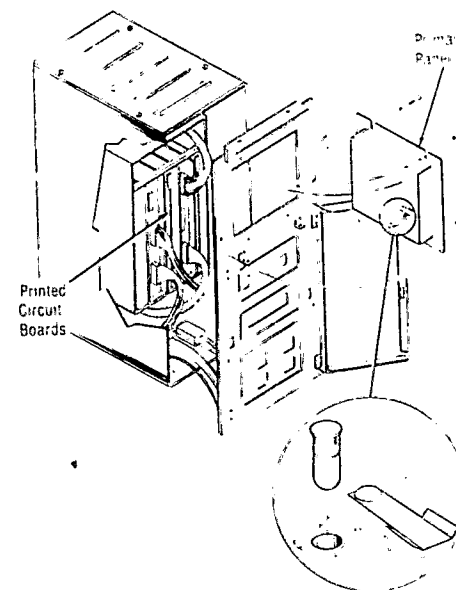


Figure 7-13. REMOVAL OF PRIMARY PANEL.

2. The primary panel is held in place by four screws. Remove those if servicing is necessary. See Figure 7-13.

3. The bulbs in the primary panels are removed by moving the retainer aside and lifting out the bulb, as shown in Figure 7-13.

4. The three printed circuit boards in the controller are removed by lifting the card pulls to disengage the contacts from the socket, and pulling the card straight out. See Figure 7-14. Use both card pulls simultaneously, to insure starting the card straight. This prevents damage to the socket controls.

5. The controller itself is held in position by a single screw, located at the top. Unplug the cables from the controller, remove screw, and slide the controller forward on its rails. See Figure 7-14.

6. The power supply is secured to the top of the controller with six screws. To remove the power supply, unplug the cables attached to it and remove the six screws. See Figure 7-14.

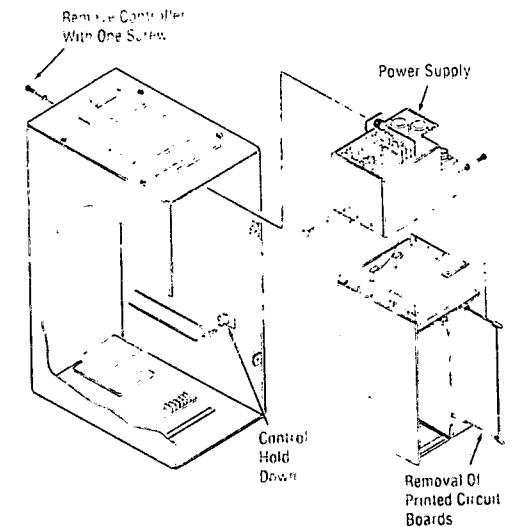


Figure 7-14. CONTROLLER ASSEMBLY.

7. The length of time of the "power rinse" phase has been factory-set at one minute, and the length of the "fresh rinse" has been set at two minutes. These times may be changed, within the range of 0-15 minutes, by following these steps:

a Locate the time-setting hexadecimal switches on printed circuit board #2 (Fig. 7-15). Refer to Figure 7-15 for location of the switch.

b From the left-hand column of the time-setting chart, select the length of time you want for either the "power rinse" phase or the "fresh rinse" phase. Switch SW1 controls the "power rinse" phase, switch SW2 controls the "fresh rinse" phase. Reading the chart left to right, note the positions of the individual switches for the time you want.

c Use a pencil or similar object to position the individual switches according to

Example: If you wish the "power rinse" phase to last three minutes, you will have to reset hexadecimal switch SW1. Locate 3 in the left-hand column of the time-setting chart. Reading the chart from left to right, note that switch #1 is to be positioned "on" (1 = on), switch #2 is to be positioned "on", switch #3 is to be positioned "off" (0 = off), and switch #4 is to be positioned "off"

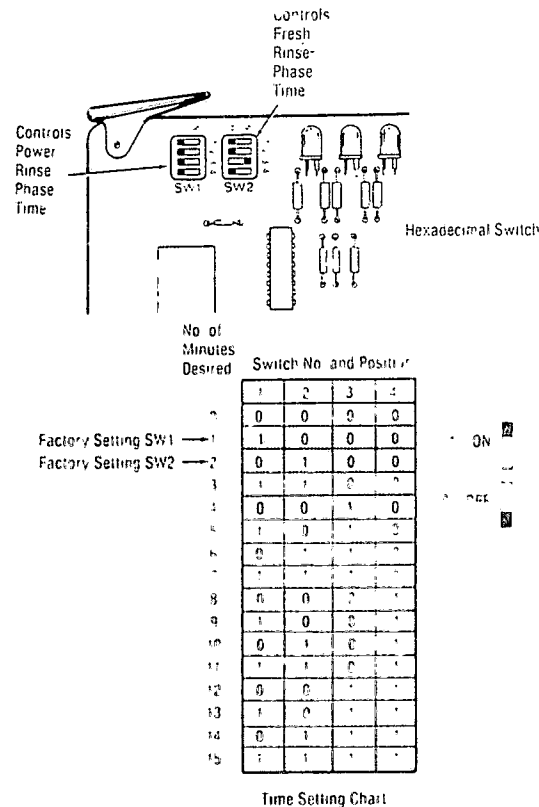


Figure 7-15. TIME SETTING HEXADECIMAL SWITCHES.

7.11 VACUUM BREAKER

Disassembly

- 1 Unscrew and remove bonnet assembly.
- 2 Remove friction ring and air valve seat.
- 3 Remove assembled ballast and float.
- 4 Separate ballast and float.

Clean all rust and sediment from valve. Clean out drain holes in the float and ballast, and inspect for breaks or leaks. Replace parts as required. If the friction ring and air valve seat are not in perfect condition, they should be replaced.

Reassembly

- 1 Assemble ballast and float.
- 2 Slide float ballast assembly into valve body, making sure that the assembly moves freely in valve body.
- 3 Insert air valve seat and friction ring.
- 4 Screw on bonnet assembly.
- 5 Test for leaks. No water leakage at bonnet is permissible.

7.12 OPTIONAL STEAM-HEATED WATER TEMPERATURE BOOSTER

Disassembly

- 1 Shut off electrical power, water, and steam to booster.
- 2 Disconnect piping to booster at the base plate.
- 3 Remove nuts which secure base plate and casing.
- 4 Remove casing from base plate. Be careful not to damage gasket.
- 5 Remove manifold holding nuts. Coil assembly may now be removed from base plate. Inspect and clean exterior of steam coils; replace coil manifold assembly, if necessary.

Reassembly

1. Using **new** gaskets between manifold collars and base plate, reassemble manifold coil assembly to base plate.
2. Reassemble base plate with coil assembly to casing, making sure gasket is in place.
3. Secure base plate to casing with nuts earlier removed.

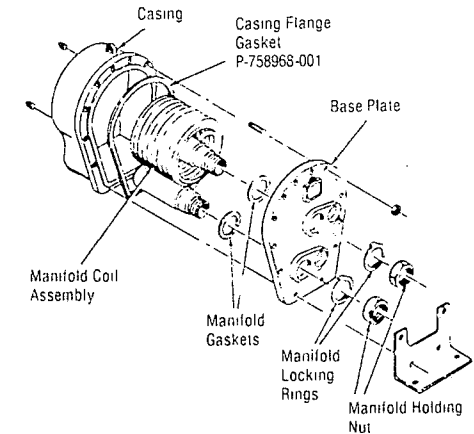


Figure 7-16. BOOSTER ASSEMBLY, STEAM HEATED.

7.13 POWER SUPPLY ADJUSTMENT.

NOTE: During this adjustment procedure when the 5 VDC supply is adjusted close to the undervoltage trip point (+0.05 volt or less), nearby machinery switching may cause CB-1 to trip. To insure that this does not occur, shut down nearby machinery for the duration of this procedure.

This procedure requires a digital voltmeter with 0.01 volt DC resolution.

- 1 Turn control power (CB-1) off

2 Connect the DVM to ground post of capacitor C101 (-) and to terminal post E2 (-). Refer to Figure 7-17

3 Using pot R433 on power supply printed circuit board, lower voltage output until CB-1 trips. Note the trip voltage

4 Turn pot R433 two turns in the opposite direction

5 If trip voltage was higher than 4.74 to 4.76 volts, turn pot R423 two turns clockwise

a Reset CB-1 and using pot R433, lower output voltage until CB-1 trips. Note trip voltage

b Repeat steps 3 through 5 until CB-1 trips within the range of 4.74 to 4.76 volts

6 If trip voltage is lower than 4.74 to 4.76 volts, adjust pot R433 for 4.75 volts and turn pot R423 counterclockwise until CB-1 trips

a Turn pot R433 two turns counterclockwise and reset CB-1

b Adjust pot R433 for an output of 5.15 volts

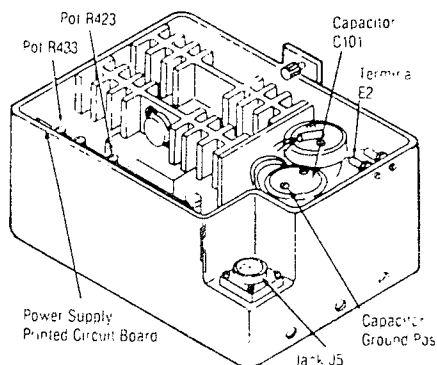


Figure 7-17. POWER SUPPLY

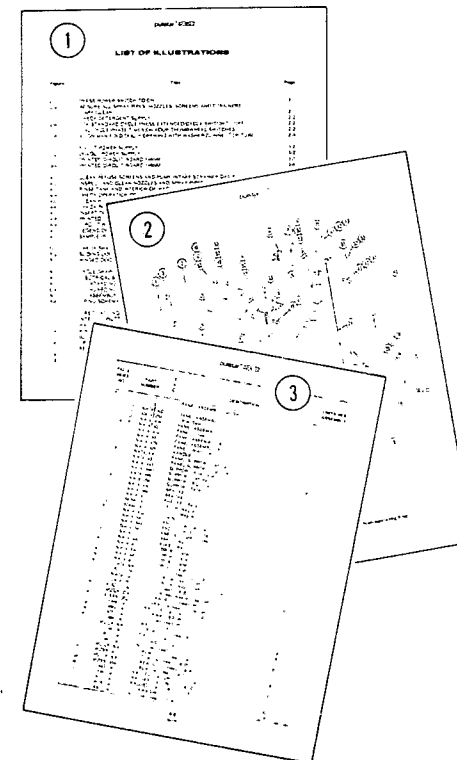
SECTION 8

EXPLODED VIEWS AND PARTS LISTS

Assemblies and components of Pulstar 5000 Glassware Washer 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 sub-assembly 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.



TYPICAL INDENTATION EXAMPLE

No indentation —
part of top
assembly

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

Two indentations —
(2nd subassembly)
Part of first
subassembly

WASH TANK HEATER, Electric, 480 V	
HEATER, Electric, 208 V	
HEATER, Electric, 240 V	
HEATER, Electric, 480 V	
• WIRING, Heater, 208 V	
• WIRING, Heater, 240 V	
• WIRING, Heater, 480 V	
• HEATER, Electric, Immersion, 208 V	



**AMSCO
SERVICE**

**PULSTAR SERIES
PULSTAR 5000 GLASSWARE WASHER
P-764175-002**

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pulstarSM SERIES

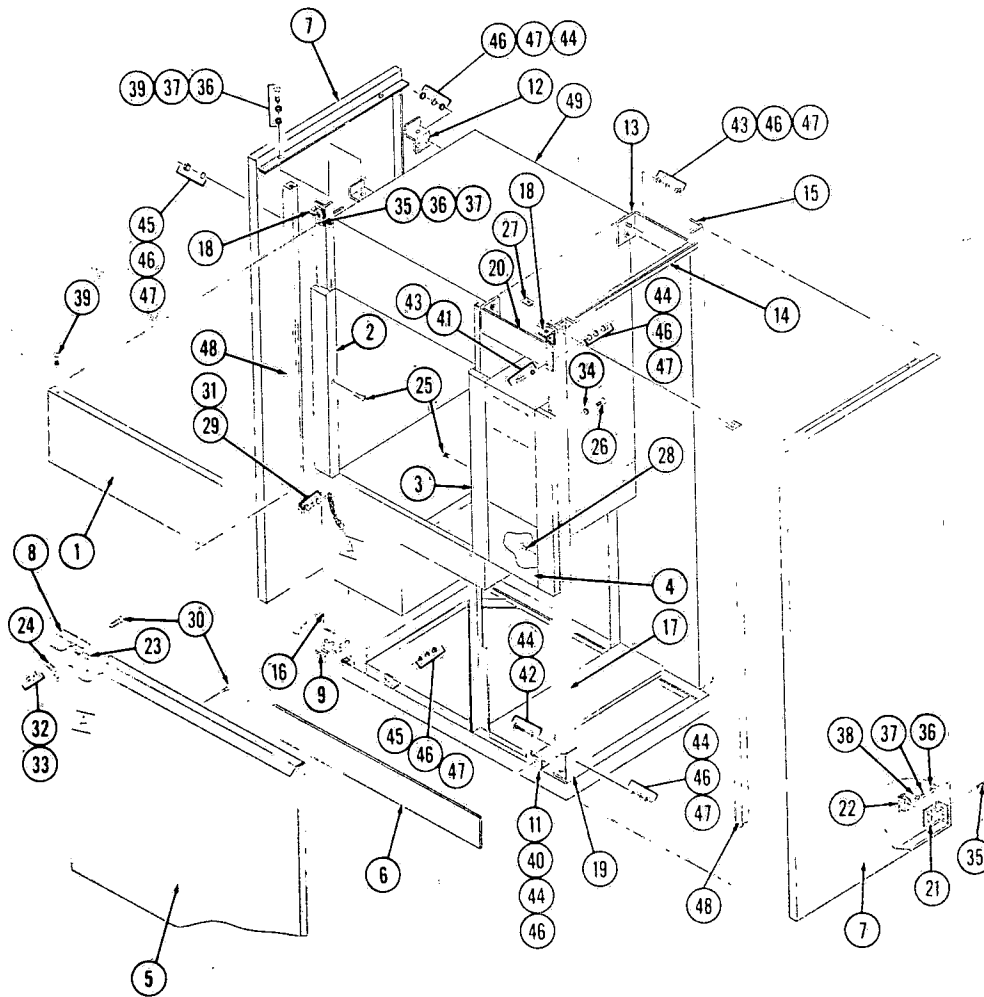


Figure 8-1. PANEL ASSEMBLY: Single Door.

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pulstarSM SERIES

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-1-			PANEL ASSEMBLY: Single Door, Free Standing	X	
			PANEL ASSEMBLY: Single Door, Recessed		X
1	P 150474 302		PANEL ASSEMBLY, Top	1	1
2	P 150474 254		TRIM Side	1	1
3	P 150474 439		PANEL ASSEMBLY, Control Housing	1	1
4	P 150474 427		PANEL Lower Control	1	1
5	P 150474 434		PANEL ASSEMBLY, Bottom	1	1
6	P 150474 457		PANEL ASSEMBLY, Kick	1	1
7	P 150474 484		PANEL, Side	2	
8	P 150474 429		HANDLE	1	1
9	P 150474 430		SUPPORT, Left Hand Panel	1	1
10	P 150474 431		SUPPORT, Right Hand Panel (Not Shown)	1	1
11	P 150474 445		SUPPORT, Kick Panel	2	2
12	P 150474 486		SUPPORT, Panel	2	
13	P 150474 490		SUPPORT, Angle	1	
14	P 150474 492		SUPPORT, Panel	1	
15	P 150474 493		ANGLE Corner	1	1
16	P 150474 498		SUPPORT, Left Hand	1	1
17	P 150474 499		SUPPORT, Right Hand	2	2
18	P 150474 256		SUPPORT, Panel	2	1
19	P 150474 450		BRACKET, Support	1	1
20	P 150474 468		BRACKET	4	
21	P 150474 485		BRACKET, Panel	4	
22	P 84298 001		CATCH Magnetic	2	2
23	P 83494 001		CATCH Magnetic	2	2
24	P 150474 432		CHAIN	8	8
25	P 418311 200		SCREW Self-tap, #6-32 x 1/4, Type F	10	10
26	P 462326 364		SCREW Self-tap, #8 x 3/8, Type B	2	2
27	P 150474 251		NUT Speed, 1/4-20	4	4
28	P 418237 50		SCREW Hex Washer Head, #6-32 x 1/4	6	6
29	P 462326 204		SCREW, Round Head, #6-32 x 3/8	2	2
30	P 418309 202		SCREW, Slotted Flat Head, #6-32 x 1/2	8	8
31	P 5469 041		WASHER, Flat, 1/4 I.D. x 3/8 O.D.	6	6
32	P 19684 061		LOCKWASHER, #6	2	2
33	P 3034 041		NUT, Hex Head, #6-32	8	8
34	P 31688 091		WASHER, Flat, .250 I.D. x 3/8 O.D.	16	4
35	P 462326 506		SCREW, Round Head, #10-32 x 1/2	16	4
36	P 11149 091		WASHER, Flat, 1/4 I.D. x 1/2 O.D.	16	4
37	P 19677 041		LOCKWASHER, #10	8	
38	P 2960 042		NUT Hex Head, #10-32	2	2
39	P 462328 604		SCREW, Round Head, 1/4-20 x 3/8	6	6
40	P 462009 452		SCREW, Hex Head, 1/4-20 x 1/2	12	6
41	P 462328 608		SCREW Round Head, 1/4-20 x 3/4	12	6
42	P 462009 454		SCREW Hex Head, 1/4-20 x 3/4	6	4
43	P 10445 091		WASHER, Flat, .260 I.D. x 11/16 O.D.	52	30
44	P 31599 041		WASHER, Flat, .260 I.D. x 9/16 O.D.	3	3
45	P 3515 041		WASHER, Flat, 5/16 I.D. x 3/4 O.D.	44	28
46	P 19678 045		LOCKWASHER, 1/4	32	28
47	P 3097 041		NUT, Hex Head, 1/4-20	2	
48	P 150474 925		GASKET	A/R	A/R
49	P 150474 516		CHAMBER AND FRAME WELDMENT Hinged Door	A/R	A/R
50	P 150474 517		CHAMBER AND FRAME WELDMENT Single Sliding Door	2	
	P 150474 480		GASKET, Wall (Not Shown)		

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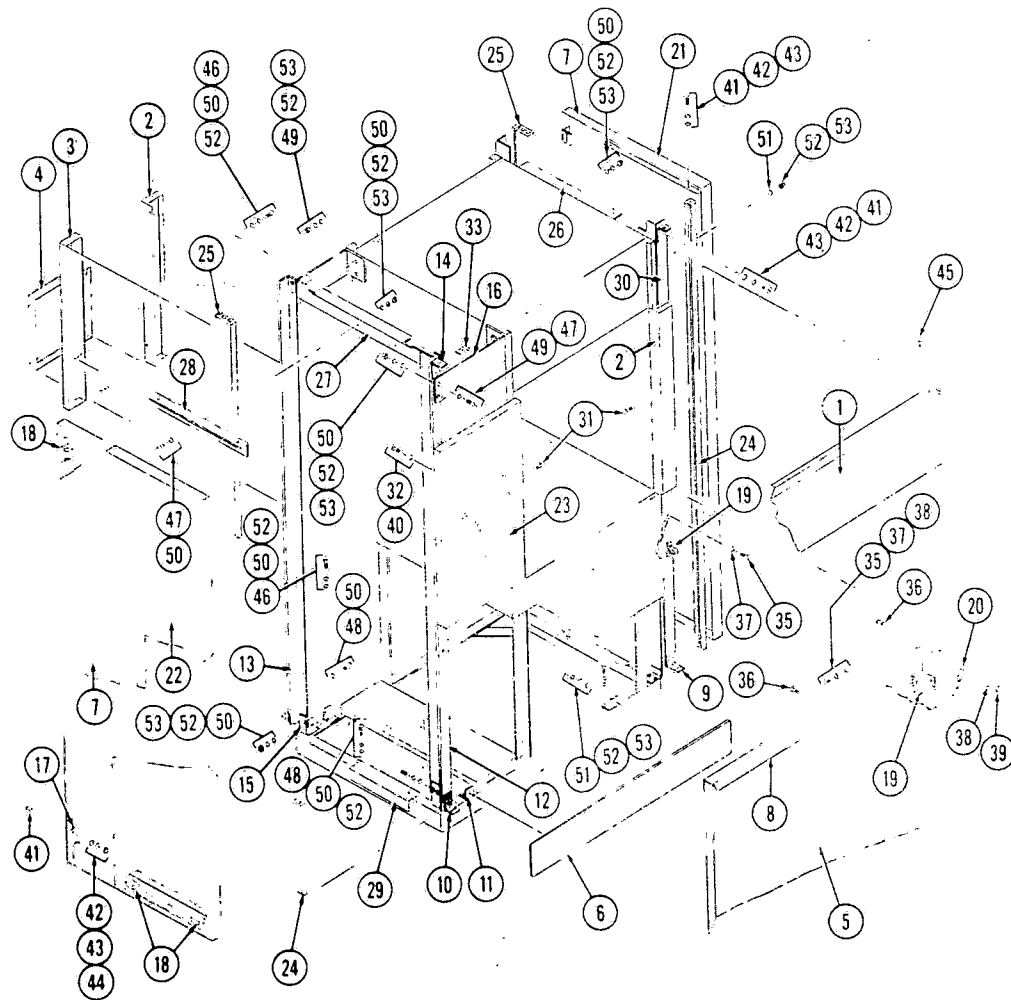


Figure 8-2. PANEL ASSEMBLY: Double Door (Viewed from Non-operating End).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-2-			PANEL ASSEMBLY: Double Door.....	X
1	P 150474 302		PANEL ASSEMBLY, Top	2
2	P 150474 254		TRIM, Side	2
3	P 150474 439		PANEL ASSEMBLY, Control Housing	1
4	P 150474 427		PANEL, Lower Control	1
5	P 150474 434		PANEL ASSEMBLY, Bottom	2
6	P 150474 457		PANEL ASSEMBLY, Kick	2
7	P 150474 479		PANEL, Inner Side	2
8	P 150474 429		HANDLE	2
9	P 150474 430		PANEL SUPPORT, Left Hand	2
10	P 150474 431		PANEL SUPPORT, Right Hand	2
11	P 150474 445		SUPPORT, Kick Panel	4
12	P 150474 498		SUPPORT, Left Hand	2
13	P 150474 499		SUPPORT, Right Hand	1
14	P 150474 256		SUPPORT, Panel	4
15	P 150474 450		BRACKET, Support	4
16	P 150474 468		BRACKET	2
17	P 150474 475		BRACKET, Panel	4
18	P 84298 001		CATCH, Magnetic	8
19	P 150473 769		CATCH AND LATCH ASSEMBLY	4
20	P 150474 432		CHAIN	4
21	P 150474 645		PANEL, Outer, Left Hand	1
22	P 150474 644		PANEL, Outer, Right Hand	1
23	P 150474 641		PANEL ASSEMBLY, Rear Control	1
24	P 150474 925		GASKET, Wall	2
25	P 150474 480		GASKET, Wall	2
26	P 150474 474		SUPPORT, Panel	1
27	P 150474 646		SUPPORT, Panel, Right Hand	1
28	P 150474 483		SUPPORT, Panel, Right Hand	1
29	P 150474 473		SUPPORT, Panel	2
30	P 150474 605		SUPPORT, Rear, Right Hand	1
31	P 418311 200		SCREW, Self-tapping, #6-32 x 1/4 Type F	8
32	P 150474 340		SCREW, Self-tapping, #8 x 3/8, Type B	10
33	P 150474 251		NUT, Speed, 1/4-20	4
34	P 418237 150		SCREW, Hex Washer Head, #6-32 x 1/4	4
35	P 462328 204		SCREW, Round Head, #6-32 x 3/8	6
36	P 418309 202		SCREW, Flat Head Slotted, #6-32 x 1/2	2
37	P 5469 041		WASHER, Flat, .147 I.D. x 3/8 O.D.	8
38	P 19684 061		LOCKWASHER, #6	6
39	P 3037 041		NUT, Hex Head, #6-32	2
40	P 31688 091		WASHER, Flat, .250 I.D. x 3/8 O.D.	8
41	P 462328 506		SCREW, Round Head, #10-32 x 1/2	16
42	P 11149 091		WASHER, Flat, 1/4 I.D. x 1/2 O.D.	16
43	P 19677 041		LOCKWASHER, #10	16
44	P 2960 042		NUT, Hex Head, #10-32	8
45	P 462328 604		SCREW, Round Head, 1/4-20 x 3/8	4
46	P 462009 452		SCREW, Hex Head, 1/4-20 x 1/2	6
47	P 462328 608		SCREW, Round Head, 1/4-20 x 3/4	8
48	P 462009 454		SCREW, Hex Head, 1/4-20 x 3/4	12
49	P 10445 091		WASHER, Flat, .260 I.D. x 11/16 O.D.	8
50	P 31599 041		WASHER, Flat, .260 I.D. x 9/16 O.D.	62
51	P 3515 041		WASHER, Flat, 5/16 I.D. x 3/4 O.D.	6
52	P 19678 045		LOCKWASHER, 1/4	62
53	P 3097 041		NUT, Hex Head, 1/4-20	36

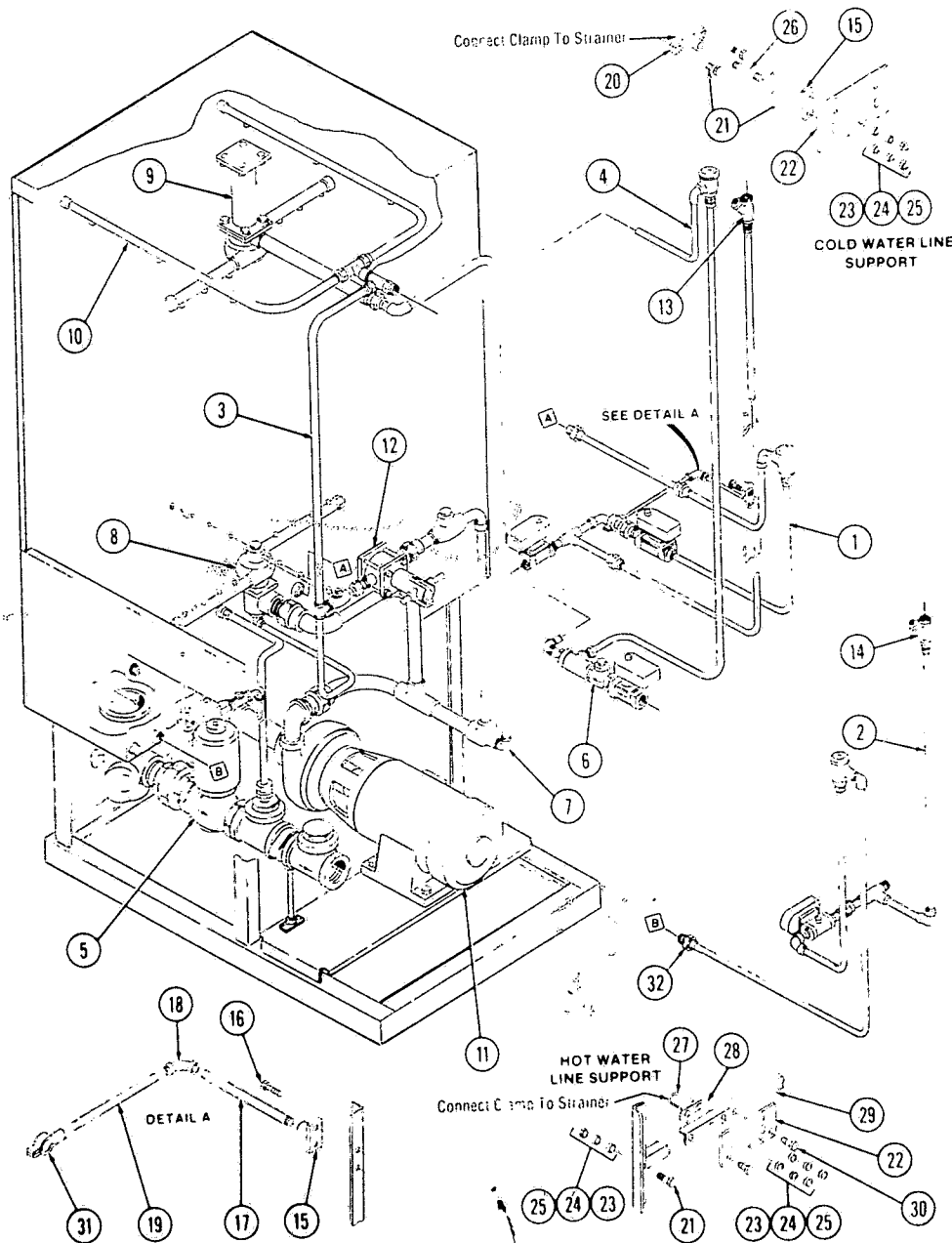


Figure 8-3. PIPING ASSEMBLY: Overall.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-3-			PIPING ASSEMBLY, Overall	X
1	P 150474	310	HOT WATER INLET (See Figure 8-4)	1
2	P 150474	309	COLD WATER INLET (See Figure 8-4)	1
3	P 150474	311	PURIFIED WATER RINSE LINE Bottom Sprayer and Diverter (See Figure 8-5)	1
4	P 150474	312	PURIFIED WATER RINSE LINE Top Sprayer (See Figure 8-5)	1
5			DRAIN LINE ASSEMBLY (See Figure 8-6)	1
6			PURIFIED WATER INLET PIPING (See Figure 8-6)	1
7	P 150474	308	WASH PUMP DISCHARGE PIPING (See Figure 8-7)	1
8			LOWER SPRAY ARM (See Figure 8-8)	1
9			UPPER SPRAY ARM (See Figure 8-9)	1
10			PURIFIED WATER RINSE TUBE Upper (See Figure 8-10)	1
11			WASH PUMP (See Figure 8-11)	1
12			DIVERTER ASSEMBLY (See Figure 8-12)	1
13	P 47709	091	STRAINER Hot Water, 1/2 NPT	1
14	P 47670	139	STRAINER Cold Water, 3/4 NPT	1
15	P 9513	109	SUPPORT Lower	2
16	P 462328	606	SCREW Pan Head, 1/4-20 x 1/2	1
17	P 150474	968	ROD Support 6-3/4	1
18	P 42090	129	ELL 1/4	1
19	P 150474	969	ROD Support 5-5/8	1
20	P 3959	101	CLAMP Pipe	6
21	P 3648	35	SCREW Hex Cap, 1/4-20 x 3/4	1
22	P 150473	591	PLATE Mounting	1
23	P 32380	091	WASHER Flat 1/4	6
24	P 19578	045	LOCKWASHER 1/4	6
25	P 3097	041	NUT Hex 1/4-20	6
26	P 150474	973	SUPPORT Pipe 1/4 NPT x 4-1/4 Lg	1
27	P 150473	589	U-BOLT	1
28	P 150473	592	CHANNEL Mounting	1
29	P 150473	566	SUPPORT Angle	1
30	P 462328	304	SCREW Pan Head, #8-32 x 3/8	2
31	P 75376	091	CLAMP Pipe	1
32	P 39072	091	CONNECTOR Male	1

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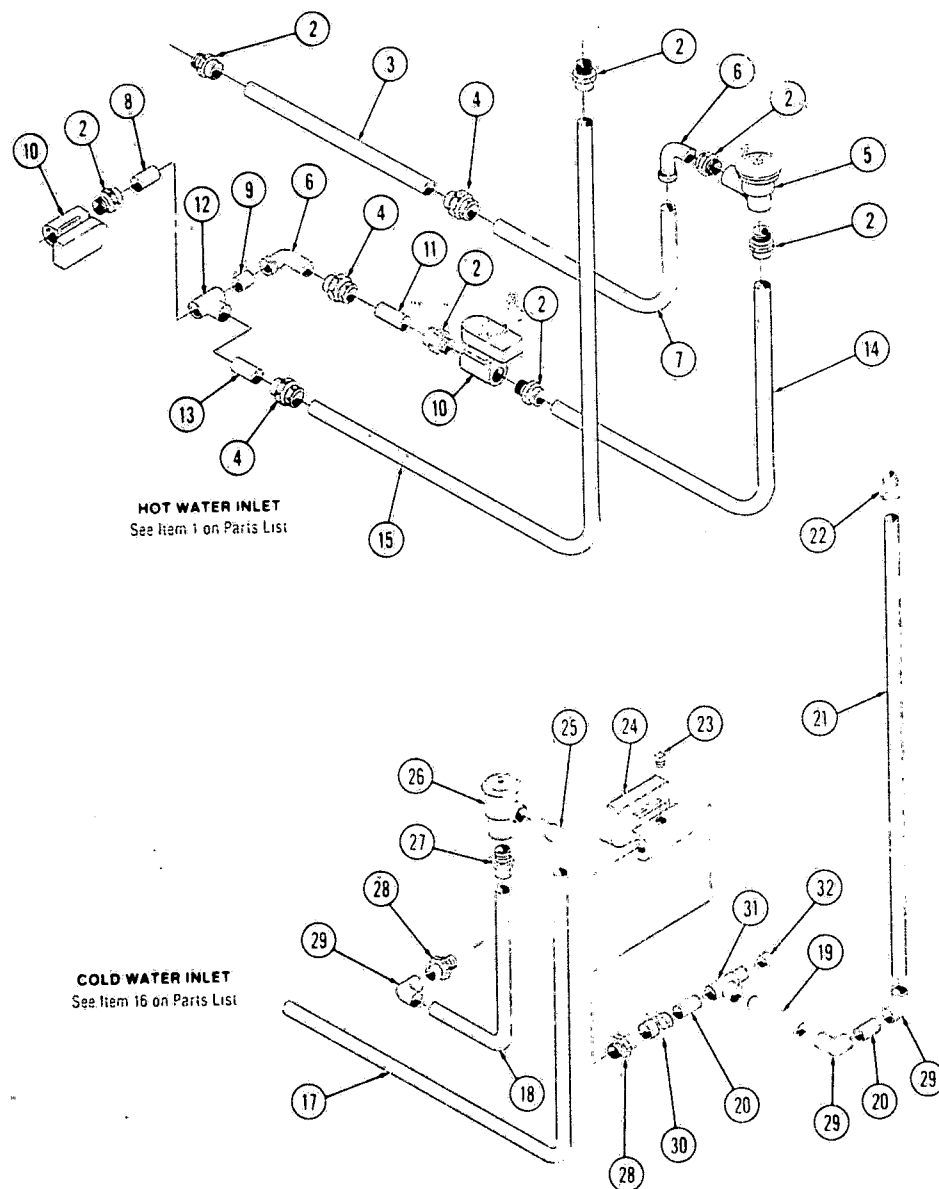


Figure 8-4. WATER SUPPLY LINES: Hot and Cold Inlet.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-4-			WATER SUPPLY LINES Hot and Cold Inlet	X
1	P 150474	310	HOT WATER INLET	1
2	P 150474	164	• ADAPTER, 3/4 O.D.T x 1/2 N.P.T.	7
3	P 150474	287	• TUBE, 3/4 O.D.T x 12-3/4	1
4	P 150474	158	• UNION, 3/4 O.D.T	3
5	P 118025	051	• BREAKER, Vacuum, 1/2 N.P.T.	1
6	P 752775	091	• KIT, Repair	1
7	P 150474	157	• ELBOW, 3/4 O.D.T	2
8	P 150474	276	• TUBE, Hot Water, 3/4 O.D.T.	1
9	P 150474	294	• TUBE, 3/4 O.D.T x 1-7/8	1
10	P 150474	296	• TUBE, 3/4 O.D.T x 1-1/4	1
11	P 150474	170	• VALVE, Solenoid, 1/2 N.P.T.	2
12	P 764315	147	• KIT, Repair	1
13	P 764315	478	• COIL	1
14	P 150474	285	• TUBE, 3/4 O.D.T x 1-5/8	1
15	P 129059	001	• TEE, 3/4 O.D.T	1
16	P 150474	286	• TUBE, 3/4 O.D.T x 2-3/4	1
17	P 150474	277	• TUBE, Hot Water, 3/4 O.D.T	1
18	P 150473	564	• TUBE, Hot Water	1
19	P 150474	309	COLD WATER INLET	1
20	P 150474	278	• TUBE, Cold Water	1
21	P 150474	282	• TUBE, Cold Water	1
22	P 150474	297	• TUBE, 5/8 O.D.T x 4-1/2	2
23	P 150474	283	• TUBE, 5/8 O.D.T x 1-1/8	1
24	P 150473	576	• TUBE, 5/8 O.D.T x 42-3/4	1
25	P 150474	370	• ADAPTER, 5/8 O.D.T x 3/8 N.P.T.	2
26	P 3439	091	• PLUG, Pipe, 1/8 N.P.T.	1
27	P 83263	002	• VALVE, Solenoid, 3/8 N.P.T.	1
28	P 764073	001	• KIT, Repair	1
29	P 764072	002	• COIL	1
30	P 90217	091	• ELBOW, 5/8 O.D.T x 3/8 N.P.T.	1
31	P 90233	091	• BREAKER, Vacuum, 3/8 N.P.T.	1
32	P 752477	091	• KIT, Repair	1
33	P 90208	091	• ADAPTER, 5/8 O.D.T x 3/8 N.P.T.	1
34	P 90209	091	• ADAPTER, 5/8 O.D.T x 3/8 N.P.T.	2
35	P 90212	091	• ELBOW, 90°, 5/8 O.D.T x 5/8 O.D.T	3
36	P 90225	091	• UNION, 5/8 O.D.T	1
37	P 150474	368	• TEE, 5/8 O.D.T	1
38	P 150474	981	• CAP, 5/8 O.D.T	1

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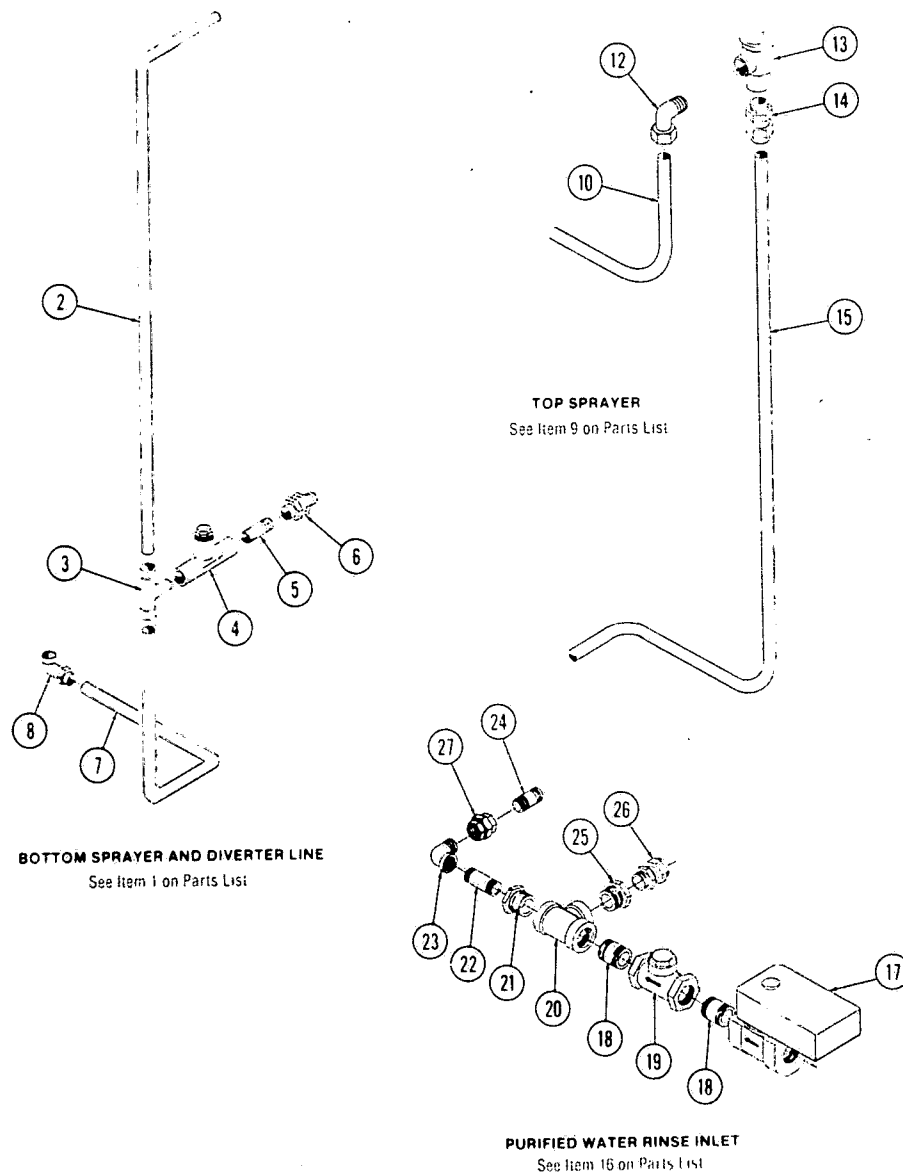


Figure 8-5. PIPING: PURIFIED WATER RINSE LINES AND INLET

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-5-			PURIFIED WATER RINSE LINES	X
1	P 150474	311	BOTTOM SPRAYER AND DIVERTER LINE	1
2	P 150474	273	• TUBE, Upper Rinse, 5/8 O.D.T.	1
3	P 150474	155	• TEE, 5/8 O.D.T.	1
4	P 90235	091	• VALVE, Check, 5/8 O.D.T.	1
5	P 150473	686	• NIPPLE, 5/8 Dia. x 2	1
6	P 150474	137	• CONNECTOR, Male, 5/8 I.D. x 3/8 N.P.T.	1
7	P 150474	274	• TUBE, Upper Rinse, 5/8 O.D.T.	1
8	P 150474	142	• ELBOW, Female, 5/8 O.D.T. x 3/8 N.P.T.	1
9	P 150474	312	TOP SPRAYER	1
10	P 150474	272	• TUBE, Upper Rinse, 5/8 O.D.T.	1
11			NOT USED	
12	P 82168	001	• ELBOW, Male, 5/8 O.D.T. x 1/2 N.P.T.	1
13	P 118025	051	• VACUUM BREAKER, 1/2 N.P.T.	1
14	P 752775	091	• KIT, Repair	1
15	P 150474	138	• CONNECTOR, Male, 3/4 O.D.T. x 1/2 N.P.T.	1
16	P 150474	169	PURIFIED WATER RINSE INLET	1
17	P 764315	487	• VALVE, Solenoid, 1 N.P.T.	1
	P 764315	478	• KIT, Repair	1
	P 764315	478	• COIL	1
18	P 150474	324	• NIPPLE, Stainless-steel, 1 N.P.T. x 1-3/4	2
19	P 43101	091	• VALVE, Check, 1 N.P.T.	1
20	P 78820	061	• TEE, Pipe, Stainless-steel, 1 N.P.T.	1
21	P 48687	061	• BUSHING, Reducing, 1 N.P.T. x 1/2 N.P.T.	1
22	P 40607	063	• NIPPLE, Stainless-steel, 1/2 N.P.T. x 2	1
23	P 1634	091	• ELBOW, Street, 90° , Stainless-steel, 1/2 N.P.T.	1
24	P 29163	091	• NIPPLE, Stainless-steel, 1/2 N.P.T. x 1-1/4	1
25	P 78648	061	• BUSHING, Reducing, 1 N.P.T. x 3/4 N.P.T.	1
26	P 150474	139	• FITTING, Compression, 3/4 N.P.T. x 3/4 O.D.T.	1
27	P 89990	091	• UNION, 1/2 N.P.T.	1

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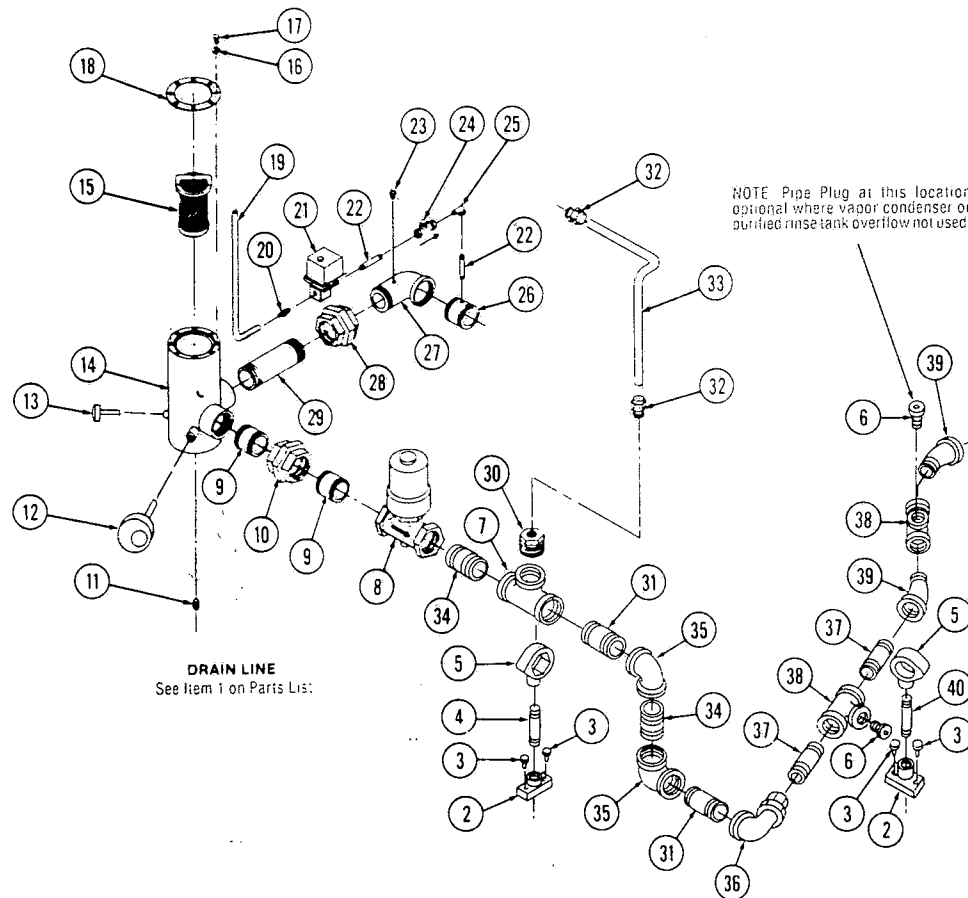


Figure 8-6. PIPING: Drain Line.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
			PIPING: Drain Lines (Units manufactured prior to 9/1/83)	X	
			PIPING: Drain Lines (Units manufactured after 9/1/83)		X
			DRAIN LINE ASSEMBLY		
1	P 9613 091		• SUPPORT, Lower	4	1
2	P 462328 606		• SCREW, Pan Head, 1/4-20 x 1/2	8	2
3	P 28927 091		• NIPPLE, 3-1/2	1	
4	P 150474 966		• ROD, Support, 3-1/2	1	
5	P 150473 735		• CLAMP, Pipe, 1-1/2	2	
6	P 319231 091		• CLAMP, Pipe, 2	1	
7	P 150473 734		• PLUG, Pipe, 1-1/2 N.P.T.	2	
8	P 150473 729		• TEE, Reducing, 1-1/2 N.P.T. x 1-1/2 N.P.T. x 3/4 N.P.T.	1	
9	P 150474 165		• TEE, Street, 2 N.P.T.	1	
10	P 81930 001		• VALVE, Solenoid, 1-1/2 N.P.T.	1	
11	P 764316 648		• ASSEMBLY, Piston	1	
12	P 752344 091		• COIL	1	
13	P 764320 295		• GASKET	1	
14	P 150474 235		• VALVE, Solenoid, 2 N.P.T.	1	
15	P 756728 091		• ASSEMBLY, Piston	1	
16	P 758778 091		• COIL	1	
17	P 32667 091		• NIPPLE, Steel, 1-1/2 N.P.T. x 2	2	
18	P 3785 091		• NIPPLE, 2 N.P.T. x 2	2	
19	P 30003 091		• UNION, 1-1/2 N.P.T.	1	
20	P 5266 091		• UNION, 2 N.P.T.	1	
21	P 3444 091		• PLUG, 1 N.P.T.	1	
22	P 150474 406		• THERMOSWITCH	1	
23	P 13638 091		• THERMOMETER	1	
24	P 150474 184		• SUMP	1	
25	P 150474 358		• STRAINER	1	
26	P 76230 091		• LOCKWASHER, 1/4	14	14
27	P 462009 443		• SCREW, Hex Head, 1/4-20 x 5/8	8	8
28	P 150474 357		• GASKET	1	
29	P 150474 903		• TUBE, Detergent, 3/8 O.D. x 1/4 I.D. x 24	1	
30	P 150474 902		• ADAPTER	1	
31	P 150474 241		• VALVE, Solenoid, 1/4 N.P.T.	1	
32	P 764316 148		• KIT, Repair	1	
33	P 764316 149		• COIL	1	
34	P 28923 091		• NIPPLE, 1/4 N.P.T. x 2-1/2	2	2
35	P 3440 091		• PLUG, Pipe, 1/4 N.P.T.	2	2
36	P 10276 091		• VALVE, Check, 1/4 N.P.T.	1	
37	P 1619 091		• ELBOW, Street, 1/4 N.P.T.	1	
38	P 150474 407		• NIPPLE, Brass, 2 N.P.T. x 4	1	
39	P 150474 237		• ELBOW, Street, 2 N.P.T.	1	
40	P 78574 091		• UNION, 2 N.P.T.	1	
41	P 150474 322		• NIPPLE, Brass, 2 N.P.T. x 6-1/4	1	
42	P 39611 091		• BUSHING, Reducing, 2 N.P.T. x 1-1/2 N.P.T.	1	
43	P 150473 726		• NIPPLE, 1-1/2 N.P.T. x 3-1/2	2	2
44	P 30005 091		• COUPLING, Compression, 1/8 O.D.T. x 3/4 I.P.S.	2	2
45	P 150474 271		• TUBE, Overflow	1	
46	P 150473 727		• NIPPLE, 1-1/2 N.P.T. x 2	1	
47	P 150473 731		• ELBOW, 45°, 1-1/2 N.P.T.	2	
48	P 150473 733		• ELBOW, 90°, Union, 1-1/2 N.P.T.	1	
49	P 150473 728		• NIPPLE, 1-1/2 N.P.T. x 3-7/8	2	
50	P 150473 730		• TEE, 1-1/2 N.P.T.	2	
51	P 150473 732		• ELBOW, 45°, Street, 1-1/2 N.P.T.	2	
52	P 50591 091		• LEG, 2-1/8 LG.	1	

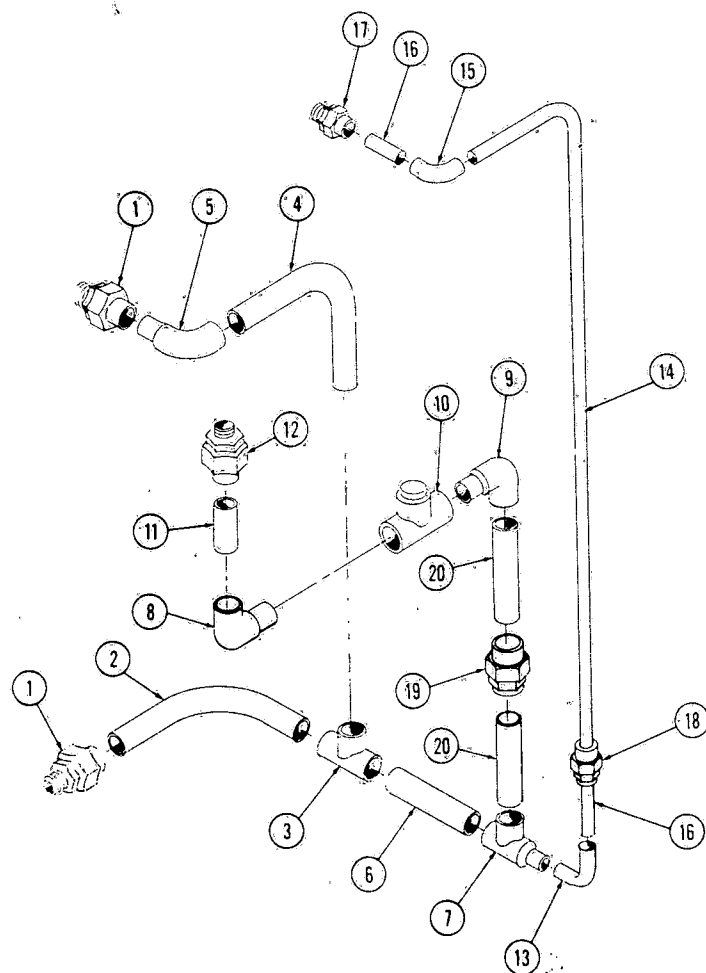


Figure 8-7. PIPING: Wash Pump Discharge.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-7-	P 150474	308	PIPING: Wash Pump Discharge.	X
1	P 150474	153	UNION, 1-5/8" O.D.T. x 1-1/2" N.P.T.	2
2	P 150474	267	TUBE, 1-5/8" O.D.T.	1
3	F 81943	001	TEE, 1-5/8" O.D.T.	1
4	P 150474	266	TUBE, 1-5/8" O.D.T.	1
5	F 81946	001	FITTING, Ell. 1-5/8" O.D.T.	3
6	P 150474	290	TUBE, 1-5/8" O.D.T. x 6-13/16"	1
7	P 150474	175	TEE, 1-5/8" O.D.T. x 7/8" O.D.T. x 1-3/8" O.D.T.	1
8	P 49214	091	FITTING, Ell. 1-3/8" O.D.T.	1
9	P 150474	151	FITTING, Ell. 1-3/8" O.D.T.	1
10	P 89971	091	VALVE, Check, 1-3/8" O.D.T.	2
11	P 150473	715	TUBE, 1-3/8" O.D.T. x 6-7/16"	1
12	P 150474	152	UNION, 1-3/8" O.D.T. x 1-1/4" N.P.T.	1
13	P 150474	314	FITTING, Ell. 7/8" O.D.T.	1
14	P 150474	265	TUBE, 7/8" O.D.T.	1
15	P 28103	091	FITTING, Ell. 7/8" O.D.T.	1
16	P 150474	293	TUBE, 7/8" O.D.T. x 1-3/4"	2
17	P 44846	091	UNION, 7/8" O.D.T. x 3/4" N.P.T.	1
18	P 31226	091	UNION, 7/8" O.D.T.	1
19	P 150473	717	UNION, 1-3/8" O.D.T.	1
20	P 150473	716	TUBE, 1-3/8" O.D.T. x 3-9/16" Lg.	2

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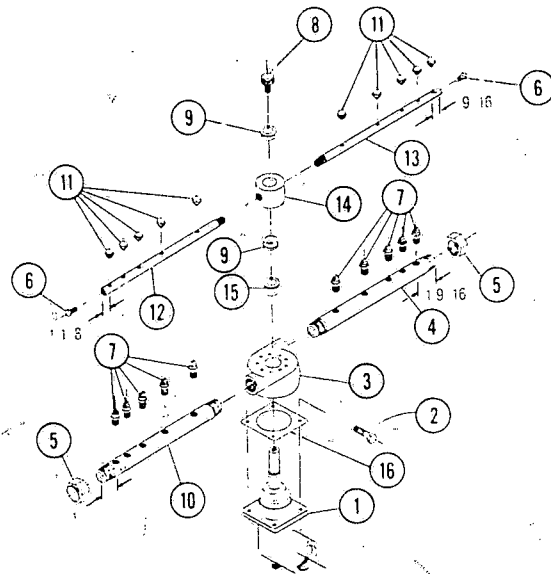


Figure 8-8. LOWER SPRAY ARM: Wash/Purified Water Rinse.

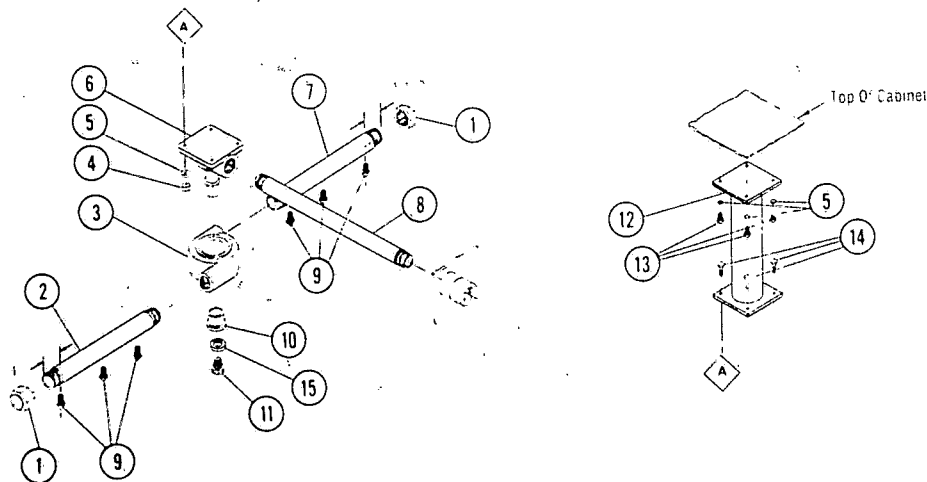


Figure 8-9. UPPER SPRAY ARM: Wash.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-8-			LOWER SPRAY ARM: Wash/Purified Water Rinse	X
1	P 150474	178	ADAPTER, Wash/Purified Water Rinse	1
2	P 462009	744	SCREW, Hex Head, 300 Series SST, 3/8-16 x 3/4	4
3	P 150474	907	MANIFOLD, Rotary, Lower	1
4	P 150474	186	ARM, Spray	1
5	P 150475	750	CAP, Pipe, Nylon	2
6	P 150474	134	PLUG, Pipe, 1/8 N.P.T.	2
7	P 150474	219	NOZZLE, Spray	10
8	P 150474	225	KNOB	1
9	P 150474	231	BEARING, Flange	2
10	P 150474	185	ARM, Spray	1
11	P 150474	230	NOZZLE, Fan Spray	10
12	P 150474	228	ARM, Lower Rinse	1
13	P 150474	227	ARM, Lower Rinse	1
14	P 150474	226	MANIFOLD	1
15	P 150474	224	BEARING, Flange	1
16	P 150474	405	GASKET	1
8-9-			UPPER SPRAY ARM: Wash	X
1	P 150475	750	CAP, Pipe, Nylon	2
2	P 150474	197	ARM, Spray, Upper	1
3	P 150474	222	MANIFOLD, Rotary	1
4	P 76239	061	NUT, Hex, 1/4-20	4
5	P 76230	091	LOCKWASHER, 1/4	8
6	P 150474	183	ADAPTER, Rotary	1
7	P 150474	196	ARM, Upper Spray	1
8	P 150474	319	NIPPLE, 3/4 N.P.T. x 12-3/8	1
9	P 150474	220	NOZZLE, Spray	6
10	P 150474	224	BEARING, Flange	1
11	P 150474	225	KNOB	1
12	P 150474	270	SUPPORT, Upper Washer Arm	1
13	P 462009	443	SCREW, Hex Head, 1/4-20 x 5/8	4
14	P 462009	444	SCREW, Hex Head, 1/4-20 x 3/4	4
15	P 413716	501	WASHER, Flat	1

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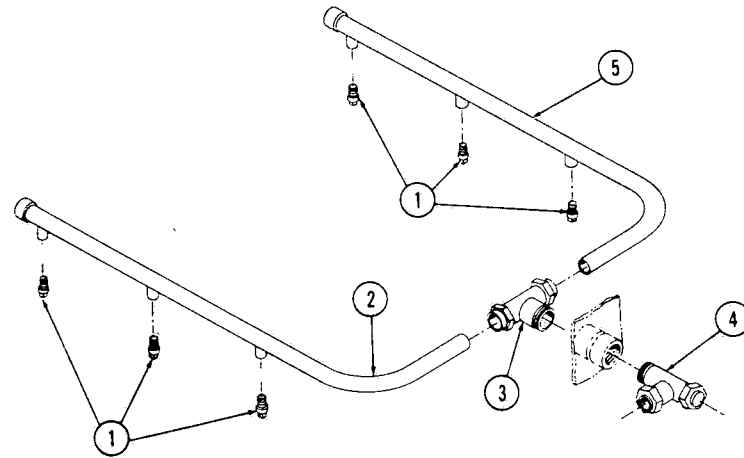


Figure 8-10. PURIFIED WATER RINSE TUBE: Upper.

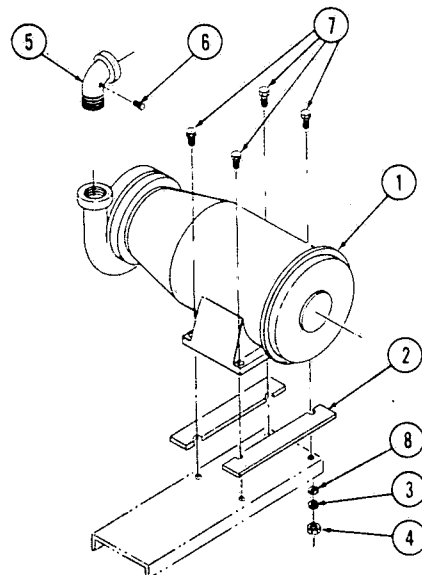


Figure 8-11. WASH PUMP.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-10-			PURIFIED WATER RINSE TUBE: Upper.....	X			
1	P 150474	221	NOZZLE, Spray	6			
2	P 150474	188	TUBE ASSEMBLY, Rinse	1			
3	P 82169	001	TEE, Compression, 5/8 O.D.T. x 1/2 I.P.S.	1			
4	P 82167	001	TEE, Male Run, 5/8 O.D.T. x 1/2 N.P.T.	1			
5	P 150474	187	TUBE ASSEMBLY, Rinse	1			
8-11-			PUMP ASSEMBLY, Wash, 208 V.....	X			
			PUMP ASSEMBLY, Wash, 240/480 V.		X		
1	P 150474	377	PUMP, Wash, 1-1/2 N.P.T. x 2 N.P.T., 208 V (See Figure 8-13)	1			
	P 150474	366	PUMP, Wash, 1-1/2 N.P.T. x 2 N.P.T., 230 460 V (See Figure 8-13)		1		
2	P 150474	413	SHIM, Pump, .031 (22 gauge)	A/R	A/R		
	P 150474	414	SHIM, Pump, .0625 (16 gauge)	A/R	A/R		
	P 150474	415	SHIM, Pump, .125 (11 gauge)	A/R	A/R		
3	P 39809	061	LOCKWASHER, 3/8	4	4		
4	P 3099	042	NUT, 3/8-16	4	4		
5	P 150474	236	ELBOW, Street, 1-1/2 N.P.T.	1	1		
6	P 3440	091	PLUG, Pipe, 1/4 N.P.T.	1	1		
7	P 462009	768	SCREW, Hex Head, 3/8-16 x 1-3/4	4	4		
8	P 430486	045	WASHER, 3/8	4	4		

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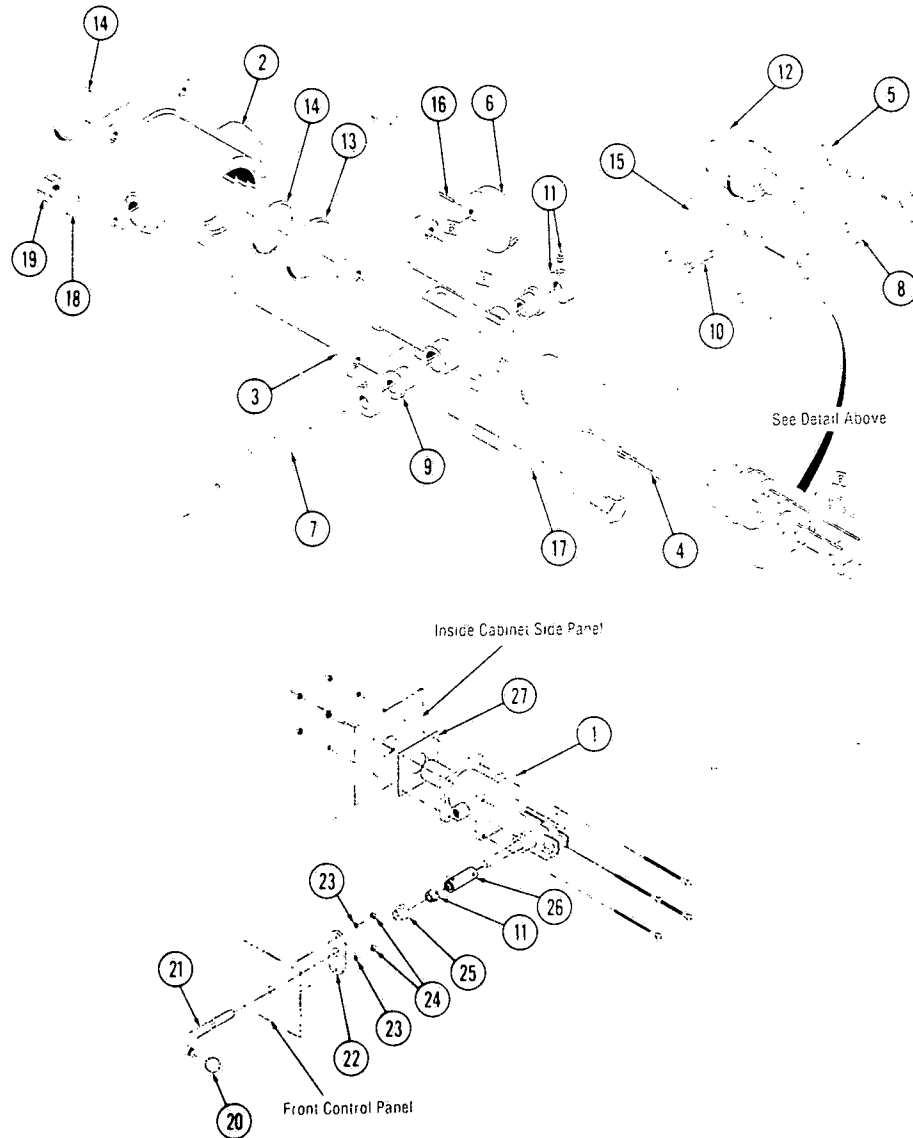


Figure 8-12. DIVERTER ASSEMBLY.

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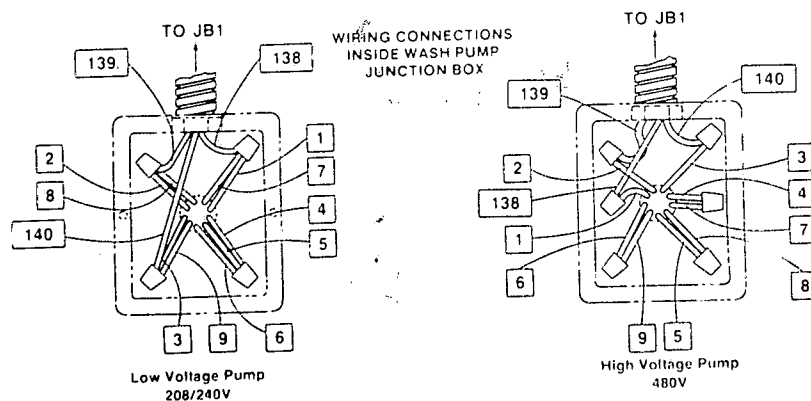
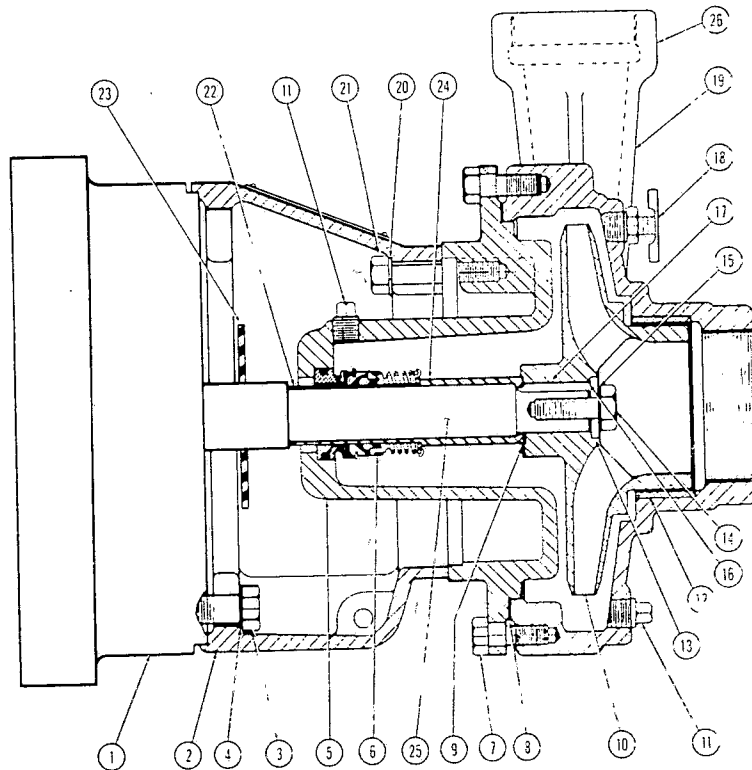
FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-12-			DIVERTER ASSEMBLY Single Door Units	X			
			DIVERTER ASSEMBLY Double Door Units		X		
1	P 150474	232	DIVERTER	1	1		
2	P 150474	181	• BODY, Front	1	1		
3	P 150474	182	• BODY, Rear	1	1		
4	P 150474	180	• PLUNGER ASSEMBLY	1	1		
5	P 150474	216	• LINK, Cam Actuator	2	2		
6	P 150474	215	• CAM	1	1		
7	P 150473	685	• SHAFT	1	1		
8	P 150474	213	• ROLLER	2	2		
9	P 150474	210	• BEARING, Flange	2	2		
10	P 150474	212	• PIN, Clevis	3	3		
11	P 150474	211	• COLLAR	3	4		
12	P 150474	233	• O-RING	1	1		
13	P 150474	234	• O-RING	1	1		
14	P 150474	129	• O-RING	2	2		
15	P 3200	091	• PIN, Cotter 1/16 x 3/4	3	3		
16	P 25355	045	• PIN, Groove 1/4 x 1	1	1		
17	P 150474	217	• SCREW, Hex Head Cap 1/4-20 x 4	4	4		
18	P 19386	061	• LOCKWASHER, 1/4	4	4		
19	P 76239	061	• NUT, Hex 1/4-20	4	4		
20	P 150474	418	KNOB	1	2		
21	P 150474	417	HANDLE	1	2		
22	P 150474	406	FLANGE, Bearing	1	2		
23	P 91991	091	LOCKWASHER #8	2	4		
24	P 3153	041	NUT, Hex #8-32	2	4		
25	P 150474	210	BEARING	1	2		
26	P 150473	743	COUPLING	1	1		
27	P 76437	553	• KIT, Replacement	1	1		
27	P 150474	364	GASKET, Diverter	1	1		

(Includes items 26 and 27 in each)

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NOTE
ALL WIRES EXCEPT #138, #139 & #140 ARE INTERNAL PUMP WIRES
WHICH ARE LABELED WITH NUMERALS SHOWN

Figure 8-13. WASH PUMP AND MOTOR.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-13-	P 150474 377		PUMP AND MOTOR ASSEMBLY, Wash, 208 V	X			
	P 150474 366		PUMP AND MOTOR ASSEMBLY, Wash, 240/480 V		X		
1	P 764316 073		MOTOR, 208 V	1			
	P 764316 072		MOTOR, 240/480 V		1		
2			ADAPTER	1	1		
3			CAPSCREW	1	1		
4			WASHER	1	1		
5			PLATE, Seal	1	1		
6			SEAL, Shaft	1	1		
7			CAPSCREW	2	2		
8	P 764319 1814		GASKET	1	1		
9			GASKET, Sleeve	1	1		
10	P 764316 077		IMPELLER	1	1		
11			PLUG, Pipe	2	2		
12	P 764316 078		RING, Wear	1	1		
13	P 764319 479		WASHER, Impeller	1	1		
14	P 764319 480		CAPSCREW, Impeller	1	1		
15	P 764319 481		SEAL, Washer, Impeller	1	1		
16	P 764319 478		GASKET, Impeller	1	1		
17			KEY, Shaft	1	1		
18			VALVE, Air Relief	1	1		
19			VOLUTE	1	1		
20			WASHER	1	1		
21			CAPSCREW	1	1		
22			O-RING	1	1		
23			SLINGER, Water	1	1		
24	P 764316 079		SLEEVE, Shaft	1	1		
25	P 764316 078		SHAFT	1	1		
26	P 764316 079		PUMP ASSEMBLY (No Motor)				
27	P 764316 074		Kit Repair Seal				
Includes items 6, 9, 15 and 22							

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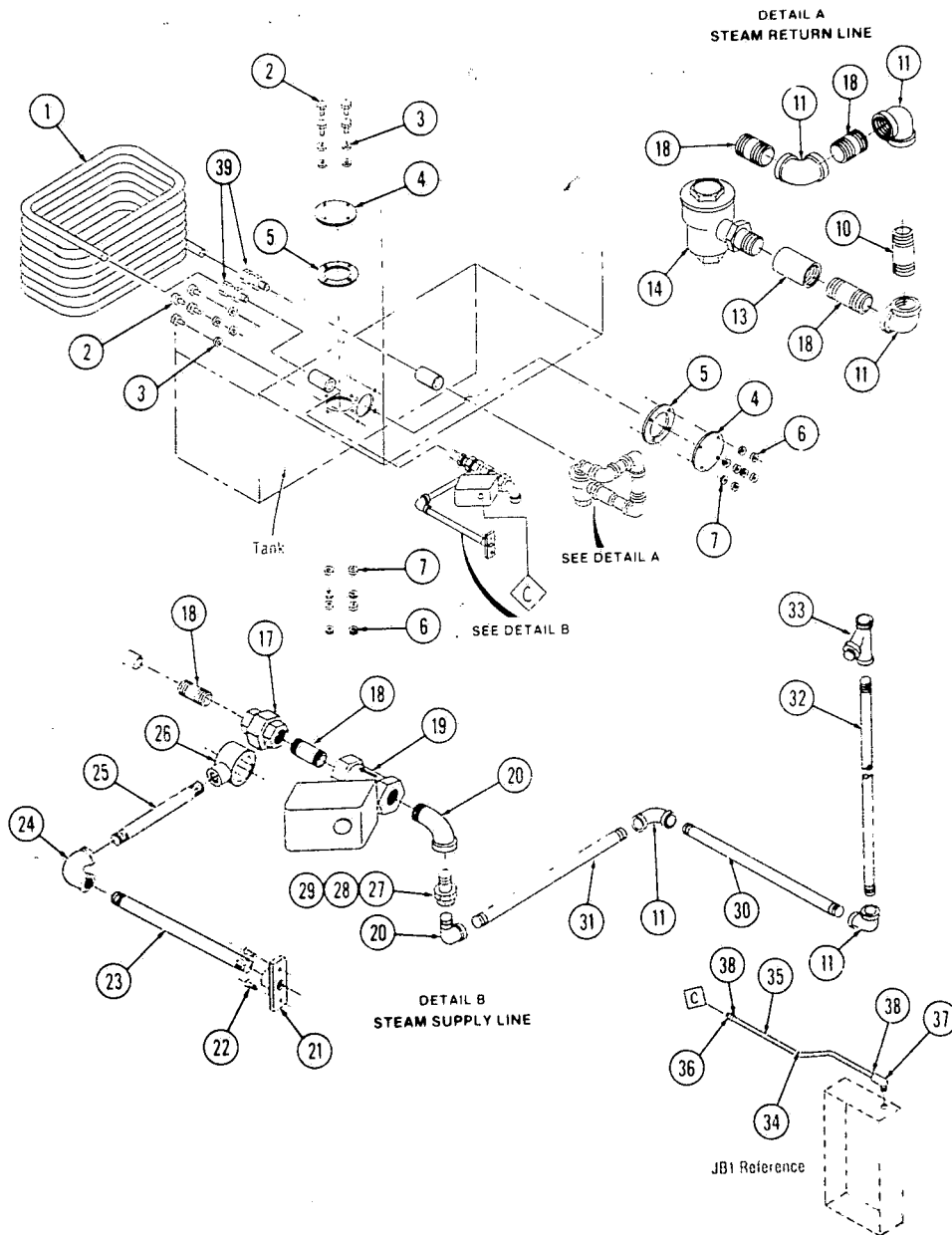


Figure 8-14. WASH TANK HEATING: Steam.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-14-			WASH TANK HEATING: Steam	X
1	P 150474 198		COIL, Heater, 3/4 O.D.T.	1
2	P 462328 466		SCREW, Pan Head, #10-24 x 1/2	8
3	P 150474 298		WASHER, Sealing	8
4	P 150474 361		COVER	2
5	P 150474 360		GASKET	8
6	P 56381 320		NUT, Hex, #10-24	8
7	P 10863 091		LOCKWASHER, #10	8
8			Not Used	
9			Not Used	
10	P 29170 091		NIPPLE, 1/2 N.P.T. x 3	1
11	P 1633 091		ELBOW, 90°, 1/2 N.P.T.	5
12	P 29168 091		NIPPLE, 1/2 N.P.T. x 2-1/2	1
13	P 1313 091		COUPLING, 1/2 N.P.T.	1
14	P 129222 001		TRAP, Steam, 1/2 N.P.T.	1
15	P 764175 001		• KIT, Repair	
16			Not Used	
17	P 89990 091		UNION, 1/2 N.P.T.	1
18	P 29164 091		NIPPLE, 1/2 N.P.T. x 1-1/2	5
19	P 150474 171		VALVE, Solenoid, 1/2 N.P.T.	1
20	P 764175 493		• KIT, Repair	
21	P 764175 493		• COIL	1
22	P 1634 091		ELBOW, Street, 1/2 N.P.T.	2
23	P 9613 091		SUPPORT, Lower	1
24	P 462328 606		SCREW, Pan Head, 1/4-20 x 1/2	2
25	P 150474 970		ROD, Support	1
26	P 42090 091		ELL, 1/4 N.P.T.	1
27	P 150474 967		ROD, Support	1
28	P 39590 010		CLAMP, Pipe, 3/4	1
29	P 1738 091		UNION THREAD END, 1/2 N.P.T.	1
30	P 2902 091		UNION NUT, 1/2 N.P.T.	1
31	P 202 091		UNION SPUD, 1/2 N.P.T.	1
32	P 29208 091		NIPPLE, 1/2 x 12-1/2	1
33	P 29210 091		NIPPLE, 1/2 x 13	1
34	P 150473 586		NIPPLE, 1/2 x 44	1
35	P 46820 091		STRAINER, 1/2 I.P.S.	1
36	P 150474 487		CABLE ASSEMBLY: Steam	1
37	P 91857 091		• CONDUIT, 3/8, Extra-flexible	1
38	P 150475 267		• CONNECTOR, Straight, 3/8	1
39	P 150475 337		• CONNECTOR, Ell, 3/8	1
	P 24748 091		• BUSHING	4
	P 150473 683		CONNECTOR, Compression 3/4 O.D.T. x 1/2 N.P.T.	2

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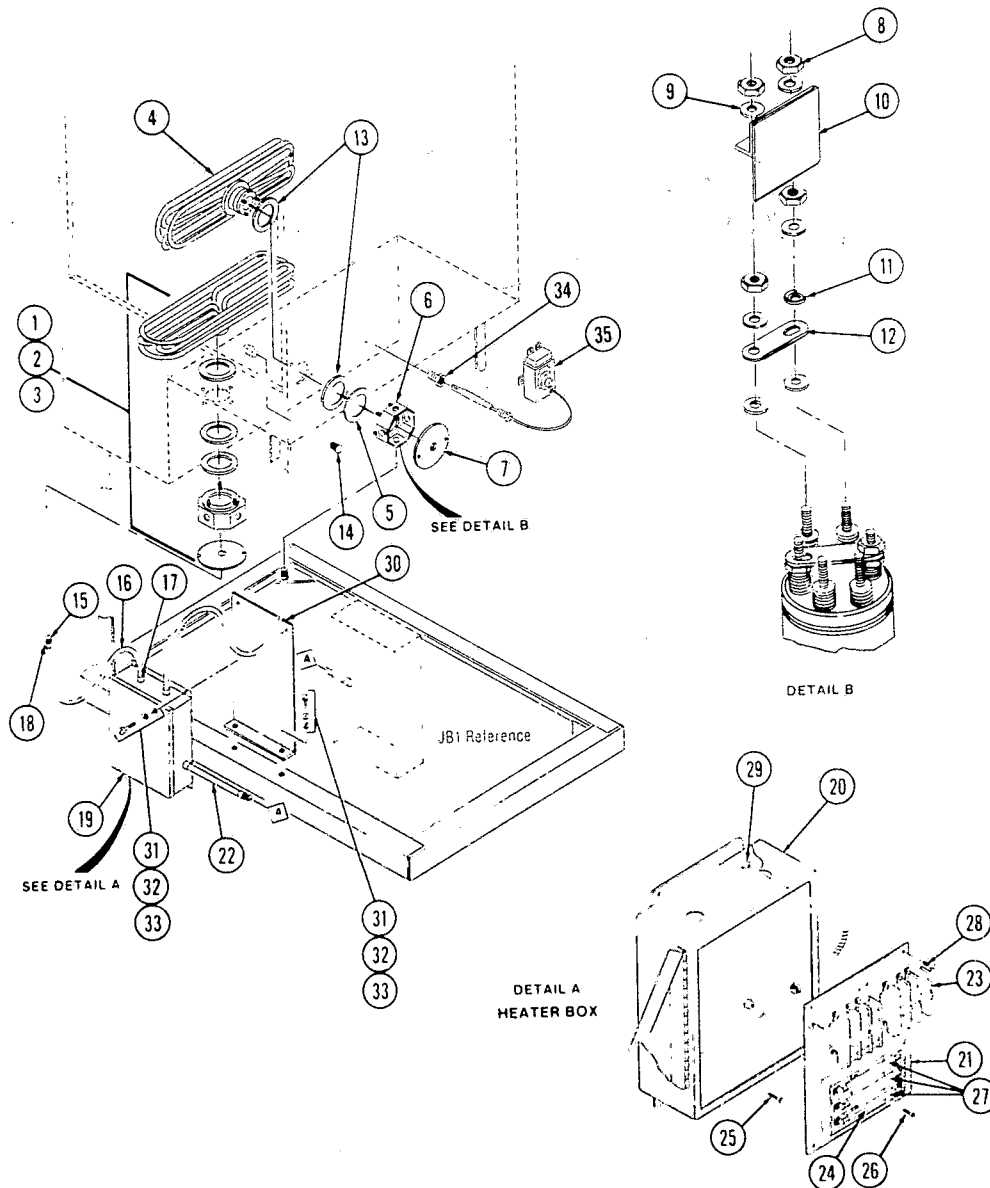


Figure 8-15. WASH TANK HEATER: Electric.

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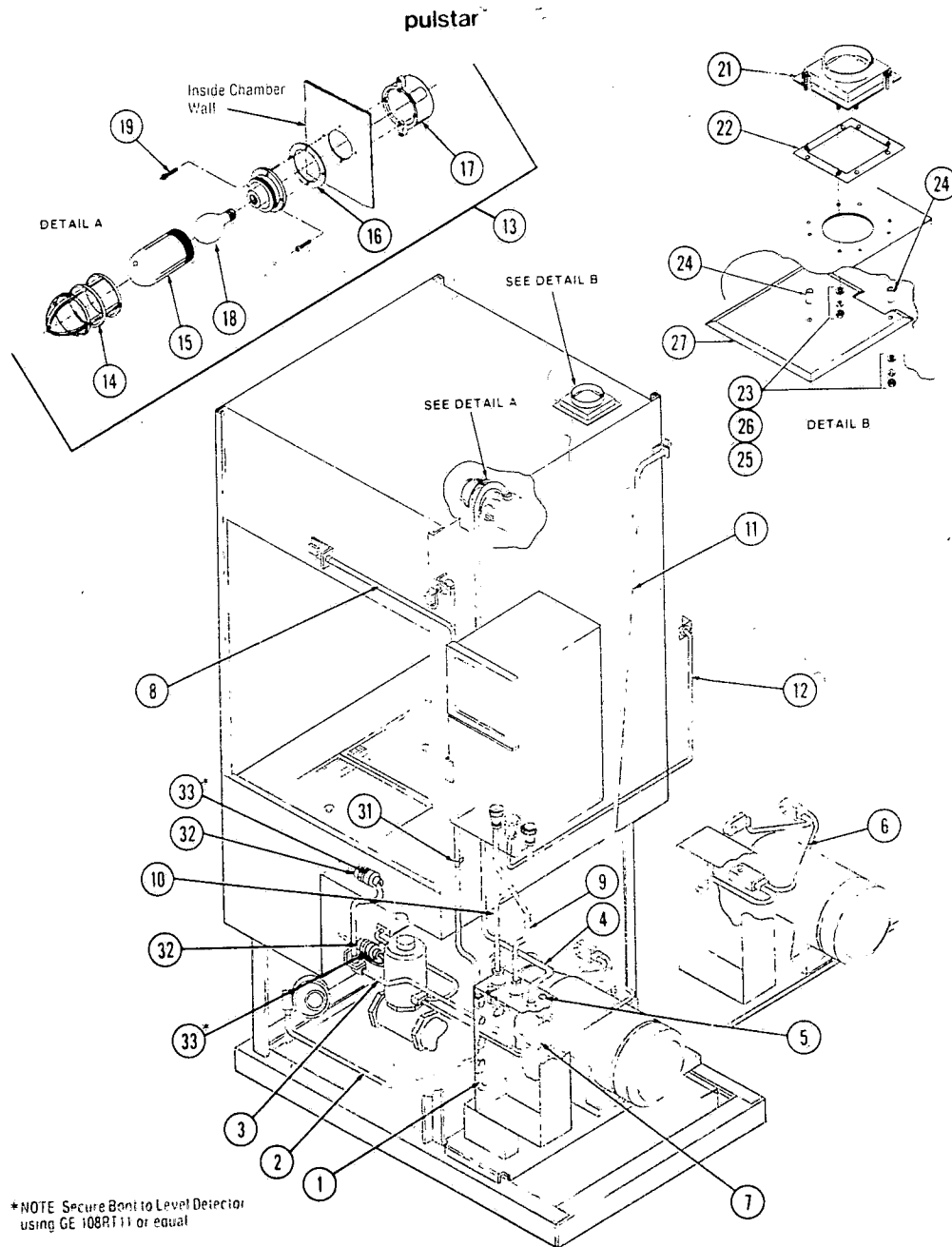
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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-15-			WASH TANK HEATER: Electric, 208 V.	X		
			WASH TANK HEATER: Electric, 240 V.		X	
			WASH TANK HEATER: Electric, 480 V.			X
1	P 150474 400		HEATER, Electric, 208 V.	1		
	P 150474 401		HEATER, Electric, 240 V.		1	
	P 150474 402		HEATER, Electric, 480 V.			1
2	P 150474 419		• WIRING, Heater, 208 V.	2		
	P 150474 420		• WIRING, Heater, 240 V.		2	
	P 150474 421		• WIRING, Heater, 480 V.			2
3	P 150474 327		• HEATER, Electric, Immersion, 208 V.	2		
	P 150474 328		• HEATER, Electric, Immersion, 240 V.		2	
	P 755715 529		• HEATER, Electric, Immersion, 380 V.			2
	P 150474 329		• HEATER, Electric, Immersion, 480 V.			2
4			• ELEMENTS	2	2	2
5			• RINGS, Clamp	2	2	2
6			• BOX, Conduit	2	2	2
7			• COVER, Conduit Box	2	2	2
8			• NUT	12	12	12
9	P 5511 091		• WASHER	14	14	14
10	P 150474 422		• INSULATOR, Heater	4	4	4
11			• ADAPTER, Terminal Ring	6	6	6
12			• BRIDGE, Electric	2	2	2
13	P 150474 359		• GASKET	4	4	4
14	P 34402 091		• PLUG, Fitting	1	1	1
15	P 453590 001		• CONNECTOR, 3 4	2	2	2
16	P 50126 045		• CONDUIT, 3 4 x 40	2	2	2
17	P 79587 001		• CONNECTOR, EII 3 4	2	2	2
18	P 150474 594		• BUSHING	8	8	8
19	P 150474 595		BOX ASSEMBLY, Heater, 208 V.	1		
	P 150474 596		BOX ASSEMBLY, Heater, 240 V.		1	
	P 150474 597		BOX ASSEMBLY, Heater, 480 V.			1
20	P 150474 593		• ENCLOSURE COVER	1	1	1
21	P 150474 588		• ENCLOSURE	1	1	1
22	P 150474 584		• CABLE ASSEMBLY, Heater Box	1	1	1
23	P 150474 604		• CONTACTOR, Magnetic (1CR, 2CR)	2	2	2
24	P 150474 587		• BLOCK, Fuse	1		
	P 150474 519		• BLOCK, Fuse		1	
	P 150474 521		• BLOCK, Fuse			1
25	P 418329 500		• SCREW, Round Head, #10-32 x 1	4	4	4
26	P 4682 041		• SCREW, Round Head, #8-32 x 3/8	4		
	P 9374 041		• SCREW, Round Head, #10-32 x 3/8		4	
	P 462328 604		• SCREW, Round Head, 1/4-20 x 3/8			4
27	P 150474 603		• FUSE, 70 A.	3		
	P 150474 602		• FUSE, 60 A.		3	
	P 764317 820		• FUSE, 40 A. (Box of 10)			3
28			• SCREW	4	4	4
29			• SPACER	4	4	4
30	P 150474 583		SUPPORT, Fuse Box	1	1	1
31	P 462328 606		SCREW, Machine, Pan Head, 1/4-20	6	6	6
32	P 19678 045		LOCKWASHER, 1/4	6	6	6
33	P 32380 061		WASHER, Flat, 1/4	6	6	6
34	P 118380 091		BUSHING	1	1	1
35	P 47322 091		SAFETY CONTROL	1	1	1

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*NOTE Secure Bolt to Level Detector using GE 108RT111 or equal

Figure 8-16. JB-1 CABLE ASSEMBLIES, VENT PACKAGE AND INTERIOR LIGHT.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-16-			JB-1 CABLE ASSEMBLIES: Steam Units	X	
			JB-1 CABLE ASSEMBLIES: Electric Units		X
1	P 150474 514		CABLE ASSEMBLY: JB-1 to Wash Pump	1	1
2	P 150474 596		CABLE ASSEMBLY: JB-1 to Thermo-switch	1	1
3	P 150474 510		CABLE ASSEMBLY: JB-1 to Liquid Level Detector	1	1
4	P 150474 511		CABLE ASSEMBLY: JB-1 to Light	1	1
5	P 150474 487		CABLE ASSEMBLY: JB-1 to Steam Solenoid V-4	1	1
6	P 150474 496		CABLE ASSEMBLY: JB-1 to Solenoids V-2, V-3 & V-5	1	1
7	P 150474 512		CABLE ASSEMBLY: JB-1 to Solenoids V-1, V-6 & V-7	1	1
8	P 150474 508		CABLE ASSEMBLY: JB-1 to Front Door Switch	1	1
9	P 150474 495		CABLE ASSEMBLY: Interconnect A (JB-1 to Control)	1	1
10	P 150474 489		CABLE ASSEMBLY: Interconnect B (JB-1 to Control)	1	1
11	P 150474 509		CABLE ASSEMBLY: Rear Door Switch (Double door units only)	1	1
12	P 150474 683		CABLE ASSEMBLY: Interconnect D (Control to Rear Control Panel — Double Door Units Only)	1	1
13	P 150477 296		LAMP ASSEMBLY (Without Bulb)	1	1
14	P 150475 762		• GUARD	1	1
15	P 150475 761		• GLOBE, Glass	1	1
16	P 150475 752		• GASKET, Junction Box	1	1
17	P 150475 751		• COMPARTMENT, Wiring	1	1
18	P 150475 258		BULB	1	1
19	P 18409 061		SCREW, Pan Head, #10-24 x 3 #	4	4
20	P 150474 914		VENT ASSEMBLY	1	1
21	P 150473 670		• CUFF, Vent	1	1
22			• TAPE, Tremco 440	A	A/R
23	P 49353 021		• WASHER, Flat, 1/4 ID x 3/8 OD	8	8
24	P 150473 562		• SPACER	2	2
25	P 76239 061		• NUT, 1/4-20	8	8
26	P 90575 061		• LOCKWASHER, 1/4	8	8
27	P 150473 563		• BAFFLE	1	1
28	P 150473 711		• ASSEMBLY, Plate Cover (Lower	1	1
29	P 8547 061		• NUT, 8-32	8	8
30	P 150473 301		• WASHER, Flat	8	8
31	P 90513 091		CLAMP, Conduit	2	2
32	P 150475 994		DETECTOR, Liquid Level	2	2
33	P 150477 311		BOOT	2	2
			*Door switch capacitor P-150476-929 (1)		
			Door switch tubing P-150476-928 (2)		
			(order double quantity for double-door units)		
			**Not Shown		

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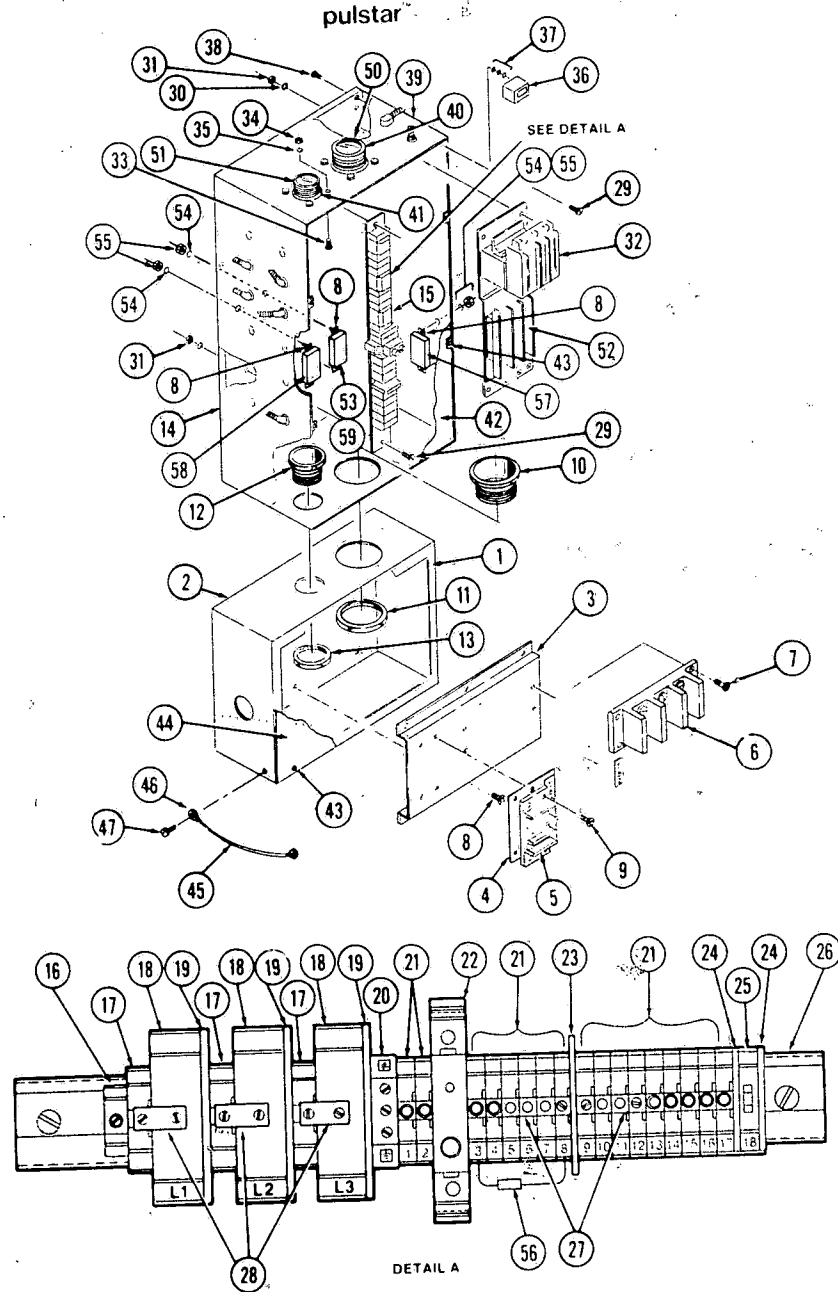


Figure 8-17. JUNCTION BOX ASSEMBLY — Steam Units.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-17-			JB-1 JUNCTION BOX ASSEMBLY — Steam Units.			
			208 V. Pump	X		
			JB-1 JUNCTION BOX ASSEMBLY — Steam Units.		X	
			240 V. Pump			
			JB-1 JUNCTION BOX ASSEMBLY — Steam Units.			X
			480 V. Pump			
1	P 150474	918	BOX ASSEMBLY, Junction (JB-2)	1	1	1
2	P 150474	908	• BOX, Junction	1	1	1
3	P 150474	905	• PLATE, Mounting	1	1	1
4	P 90755	091	• INSULATOR, Terminal Strip	1	1	1
5	P 90746	091	• STRIP, Barrier Terminal	1	1	1
6	P 150474	916	• BLOCK, Terminal	4	4	4
7	P 462328	508	• SCREW, Machine, Pan Head, #10-32 x 3/4	6	6	6
8	P 462328	204	• SCREW, Machine, Pan Head, #6-32 x 3/8	4	4	4
9	P 462328	507	• SCREW, Machine, Pan Head, #10-32 x 5/8	1	1	1
10	P 37308	091	NIPPLE, Chase, 1-1/4	1	1	1
11	P 37312	091	LOCKNUT, 1-1/4	1	1	1
12	P 37306	091	NIPPLE, Chase, 3/4	1	1	1
13	P 2963	091	LOCKNUT, 3/4	1	1	1
14			CONTROL HOUSING ASSEMBLY	1	1	1
15	P 150475	892	• TERMINAL BLOCK ASSEMBLY	1	1	1
16	P 150475	891	• BRACKET, End	2	2	2
17	P 150475	883	• SECTION, Terminal Block	3	3	3
18	P 150475	893	• SECTION, Terminal Block	3	3	3
19	P 150475	894	• PLATE, End	1	1	1
20	P 150475	884	• SECTION, Terminal Block Ground	17	17	17
21	P 150475	882	• SECTION, Terminal Block	1	1	1
22	P 150475	889	• BREAKER, Circuit	1	1	1
23	P 150475	887	• PLATE, Partition	1	1	1
24	P 150475	886	• PLATE, End	1	1	1
25	P 150475	885	• SECTION, Terminal Block Test	1	1	1
26	P 150475	896	• RAIL	1	1	1
27	P 150475	891	• UNIT, Connecting	2	2	2
28	P 150475	895	• UNIT, Connecting	3	3	3
29	P 3990	042	• SCREW, Round Head, #10-24 x 3/8	5	5	5
30	P 31705	045	• LOCKWASHER, #10	5	5	5
31	P 3039	041	• NUT, Hex, #10-24	1	1	1
32	P 150474	244	• STARTER, Magnetic	8	8	8
33	P 462328	206	• SCREW, Round Head, #6-32 x 1/2	10	10	10
34	P 3037	041	• NUT, Hex, #6-32	8	8	8
35	P 18131	061	• LOCKWASHER, #6	1	1	1
36	P 84362	002	• COUNTER	6	6	6
37	P 42460	091	• WASHER, Flat, 3/8 O.D. x 9/64 I.D. x 1/16	2	2	2
38	P 13334	045	• SCREW, Round Head Machine, #4-40 x 3/8	1	1	1
39	P 150474	502	• HOUSING, Control	1	1	1
40	P 93443	006	• RECEPTACLE, 37-Pin	1	1	1
41	P 93443	004	• RECEPTACLE, 24-Pin	1	1	1
42	P 150474	505	COVER, Box	8	8	8
43	P 462328	204	SCREW, Round Head, #6-32 x 3/8	1	1	1
44	P 150474	909	COVER, Box	1	1	1
45	P 150473	596	STRAP, Ground	1	1	1

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY		
46	P 462338	320	TERMINAL, Ring, #8	5	5	5
47	P 462328	306	SCREW, Round Head, Machine, #8-32 x 1/2	1	1	1
48	P 19679	041	LOCKWASHER, #8 (Not Shown)	1	1	1
49	P 3153	041	NUT, Hex, #8-32 (Not Shown)	1	1	1
50	P 84352	002	SOCKET	7	7	7
51	P 84352	001	PIN	4	4	4
52	P 150476	439	HEATER, 208 V.	3		
	P 150476	438	HEATER, 240 V.		3	
	P 150476	436	HEATER, 480 V.			3
53	P 150475	740	RELAY, DPDT (CRE4) (Solenoid V-7 Control)	1	1	1
54	P 19675	041	LOCKWASHER, #6	2	2	2
55	P 3037	041	NUT, Hex, #6-32	2	2	2
56	P 41316	518	SURGE SUPPRESSOR	1	1	1
57	P 150477	168	RELAY, 3 PDT (CRE5) (Door Control)	1	1	1
58	P 150475	740	RELAY, DPDT (CRE3) (Optional Rinse Pump)	1	1	1
59	P 418332	463	CAPACITOR ASSEMBLY	1	1	1

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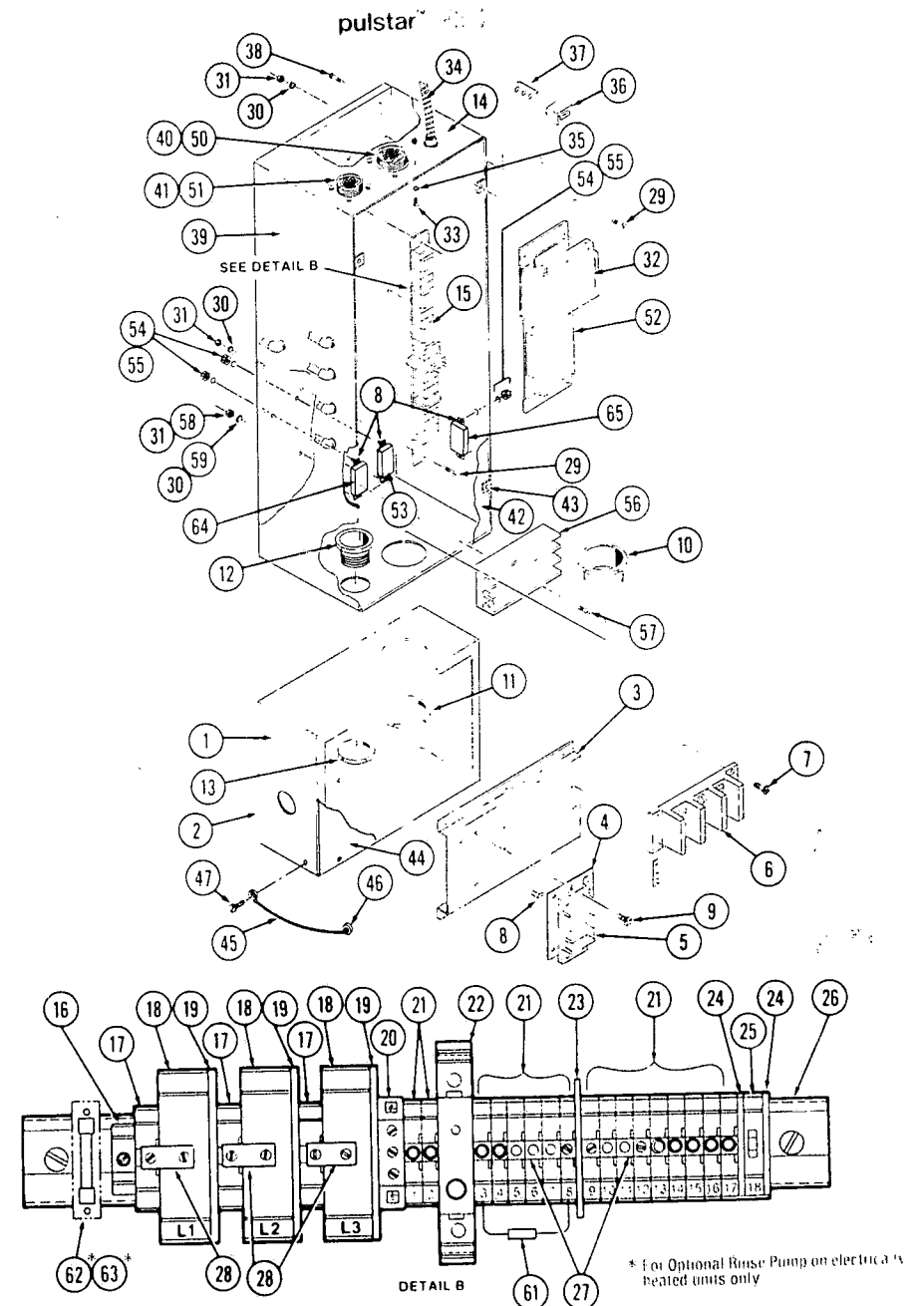


Figure 8-18. JUNCTION BOX ASSEMBLY — Electric Units.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-18-			JUNCTION BOX ASSEMBLY: Electric Units. 208 V. Pump	X
			JUNCTION BOX ASSEMBLY: Electric Units. 240 V. Pump	X
			JUNCTION BOX ASSEMBLY: Electric Units. 480 V. Pump	X
1	P 150474	918	BOX ASSEMBLY, Junction (JB-2)	1 1 1
2	P 150474	908	• BOX, Junction	1 1 1
3	P 150474	905	• PLATE, Mounting	1 1 1
4	P 90755	091	• INSULATOR, Terminal Strip	1 1 1
5	P 90746	091	• STRIP, Barrier Terminal	1 1 1
6	P 150474	916	• BLOCK, Terminal	4 4 4
7	P 462328	508	• SCREW, Machine, Pan Head, #10-32 x 3/4	6 6 6
8	P 462328	204	• SCREW, Machine, Pan Head, #6-32 x 3/8	4 4 4
9	P 462328	507	• SCREW, Machine, Pan Head, #10-32 x 5/8	1 1 1
10	P 37303	091	NIPPLE, Chase, 1-1/4	1 1 1
11	P 37312	091	LOCKNUT, 1-1/4	1 1 1
12	P 37306	091	NIPPLE, Chase, 3/4	1 1 1
13	P 2963	091	LOCKNUT, 3/4	1 1 1
14			CONTROL HOUSING ASSEMBLY	1 1 1
15	P 150475	892	• TERMINAL BLOCK ASSEMBLY	1 1 1
16	P 150475	891	• • BRACKET, End	2 2 2
17	P 150475	883	• SECTION, Terminal Block	3 3 3
18	P 150475	893	• SECTION, Terminal Block	3 3 3
19	P 150475	894	• • PLATE, End	3 3 3
20	P 150475	884	• SECTION, Terminal Block Ground	1 1 1
21	P 150475	882	• SECTION, Terminal Block	17 17 17
22	P 150475	889	• • BREAKER, Circuit	1 1 1
23	P 150475	887	• • PLATE, Partition	1 1 1
24	P 150475	886	• • PLATE, End	1 1 1
25	P 150475	885	• • SECTION, Terminal Block Test	1 1 1
	P 76431	804	• • • PIN Test	1 1 1
25	P 150475	896	• • RAIL	2 2 2
27	P 150475	890	• • UNIT, Connecting	3 3 3
28	P 150475	895	• • UNIT, Connecting	5 5 5
29	P 3990	042	• SCREW, Round Head, #10-24 x 3/8	9 9 9
30	P 31705	045	• LOCKWASHER, Internal Tooth, #10	9 9 9
31	P 3039	041	• NUT, Hex, #10-24	1 1 1
32	P 150474	244	• STARTER, Magnetic	8 8 8
33	P 462328	206	• SCREW, Round Head, #6-32 x 1-2	10 10 10
34	P 3037	041	• NUT, Hex, #6-32	8 8 8
35	P 18131	091	• LOCKWASHER, Internal Tooth	1 1 1
36	P 84362	002	• COUNTER	6 6 6
37	P 42460	091	• WASHER, Flat, 3/8 O.D. x 9/14 I.D. x 1/16	2 2 2
38	P 13334	045	• SCREW, Round Head, #4-40 x 3/8	1 1 1
39	P 150474	600	• HOUSING, Control	1 1 1
40	P 93443	006	• RECEPTACLE, 37-Pin	1 1 1
41	P 93443	004	• RECEPTACLE, 24-Pin	1 1 1
42	P 150474	590	COVER, Box	4 4 4
43	P 12451	041	SCREW, Machine, Pan Head, #6-32 x 1/4	1 1 1
44	P 150474	909	COVER, Box	1 1 1
45	P 80541	091	STRAP, Ground	1 1 1

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
46	P 462338	320	TERMINAL, Ring, #8	5 5 5
47	P 462328	306	SCREW, Round Head Machine, #8-32 x 1/2	1 1 1
48	P 19679	041	LOCKWASHER, #8 (Not Shown)	1 1 1
49	P 3153	041	NUT, Hex, #8-32 (Not Shown)	1 1 1
50	P 84352	002	SOCKET	7 7 7
51	P 84352	001	PIN	9 9 9
52	P 150476	439	HEATER, 208 V.	3
	P 150476	438	HEATER, 240 V.	3
	P 150476	436	HEATER, 480 V.	3
53	P 150475	740	RELAY, DPDT (CRE4)	1 1 1
54	P 19675	041	LOCKWASHER, #6	2 2 2
55	P 3037	041	NUT, Hex, #6-32	2 2 2
56	P 150474	521	BLOCK, Fuse	1 1 1
	P 150474	519	BLOCK, Fuse	1 1 1
57	P 3949	042	SCREW, Round Head, 1/4-20 x 3/4	4 4 4
	P 3930	045	SCREW, Round Head, #10-24 x 5/8	4 4 4
58	P 3040	042	NUT, Hex, 1/4-20	4 4 4
59	P 26962	061	LOCKWASHER, Internal Tooth, 1/4	3 3 3
60	P 150474	601	FUSE, 35 A. (Not Shown)	3
	P 150474	609	FUSE, 50 A. (Not Shown)	3
	P 413716	513	SURGE SUPPRESSOR	1 1 1
62	P 150474	597	FUSE, 15A (For Optional Rinse Pump)	1 1 1
63	P 150474	589	HOLDER, Fuse (For Optional Rinse Pump)	1 1 1
64	P 150475	740	RELAY, DPDT (CRE3) (Optional Rinse Pump)	1 1 1
65	P 150477	168	RELAY 3 PDT (CRE5) (Door Control)	1 1 1

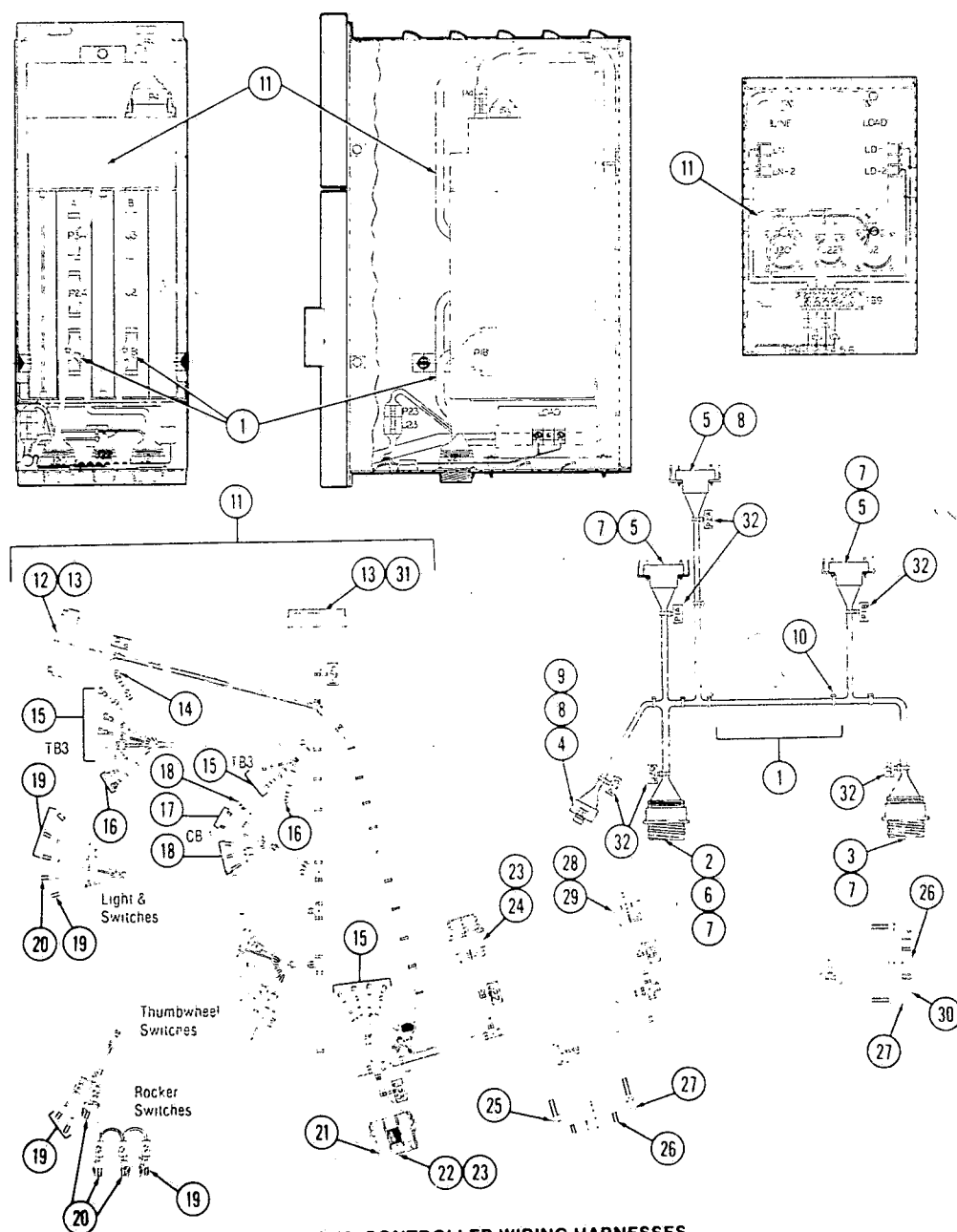


Figure 8-19. CONTROLLER WIRING HARNESSSES.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-19-			CONTROLLER WIRING HARNESSSES	X
1	P 150475	993	HARNESS ASSEMBLY, Wiring	1
2	P 93443	003	• RECEPTACLE, 37-Position (J20)	1
3	P 93443	004	• RECEPTACLE, 24-Position (J21)	1
4	P 93896	046	• PLUG, 12-Position (P23)	1
5	P 93829	001	• BLOCK ASSEMBLY, 20-Position (P1A, P1B, P2A)	3
6	P 150822	043	• PIN, Contact	5
7	P 150822	031	• PIN, Contact	63
8	P 150822	032	• SOCKET, Contact	19
9	P 84198	004	• SOCKET, Contact	5
10	P 84104	001	• TIE, Cable	6
11	P 150474	250	WIRING ASSEMBLY: Secondary Panel	1
12	P 84229	001	• HOUSING, Receptacle, 30-Position (P16)	1
13	P 84187	003	• CONTACT, Receptacle (P16 P25)	28
14	P 90619	091	• TERMINAL, #6 Stud	8
15	P 14590	091	• TERMINAL, #6 Stud	8
16	P 129278	001	• TERMINAL, #6 Stud	4
17	P 90695	091	• RECEPTACLE, 1/4 Lug	2
18	P 32119	091	• RECEPTACLE, 1/4 Lug	4
19	P 150475	977	• TERMINAL, 1/8 Lug	8
20	P 150475	978	• TERMINAL, 1/8 Lug	6
21	P 93896	045	• HOUSING, Receptacle, 18-Position (J23)	1
22	P 150822	043	• PIN, Contact	6
23	P 150822	029	• PIN, Contact	9
24	P 93443	002	• HOUSING, Receptacle, 16-Position (J22)	1
25	P 84205	001	• HOUSING, Pin, 28-Position (P3A)	1
26	P 84207	002	• PIN, Contact	43
27	P 84192	001	• JACKSCREW, Female	4
28	P 93838	001	• PLUG, 9-Position (P5)	1
29	P 84198	004	• SOCKET, Contact	5
30	P 84205	002	• HOUSING, Pin, 38-Position	1
31	P 84229	005	• HOUSING, Receptacle 24-Position (P25)	1
32	P 150822	003	MARKER Tie	6

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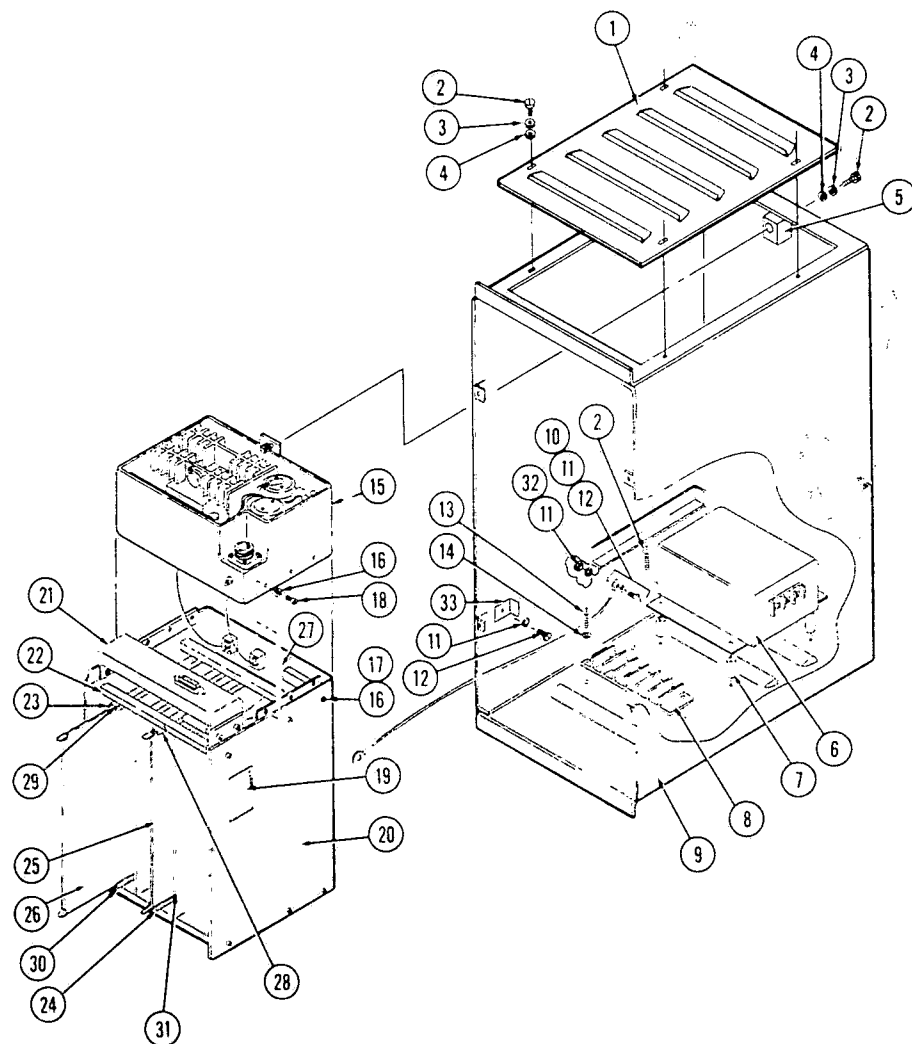


Figure 8-20. MAIN CONTROL AND BOX HOUSING ASSEMBLY.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-20-			MAIN CONTROL AND BOX HOUSING ASSEMBLY	X
1	P 150476	605	COVER, Louvered	1
2	P 74308	061	SCREW, Truss Head Slotted, #10-32 x 5/16	11
3	P 31705	045	LOCKWASHER, #10	8
4	P 150473	301	WASHER, Flat, #10	8
5	P 150475	976	BLOCK, Mounting	1
6	P 93821	001	FILTER, Line	1
7	P 150475	924	SPACER	4
8	P 89174	091	BLOCK, Terminal, 6-Contacts	1
9	P 150475	940	HOUSING ASSEMBLY, Control	1
10	P 150476	377	CABLE ASSEMBLY	2
11	P 90991	091	LOCKWASHER, #8	6
12	P 3967	041	SCREW, Round Head Slotted, #8-32 x 1/4	4
13	P 3960	041	SCREW, Round Head Slotted, #6-32 x 1/2	2
14	P 18131	091	LOCKWASHER, #6	14
15	P 146402	001	POWER SUPPLY ASSEMBLY (Repaired P-764193-004)	1
	P 764317	835	• FUSE, 3 A, 125 V (F401), Box of 5	A/R
	P 764317	778	• FUSE, 3 A, 250 V (F402), Box of 5	A/R
16	P 84116	002	LOCKWASHER, #6	22
17	P 84117	002	SCREW, Pan Head, #6-32 x 5/16	12
18	P 40357	045	SCREW, Self-tapping, #6 x 1/4	10
19	P 129352	050	PLATE, Identification	1
20	P 93762	001	CHASSIS, Welded	1
21	P 136714	001	BRACKET ASSEMBLY, Receptacle	1
22	P 129030	001	BAR, Card Guide	4
23	P 84225	001	GUIDE, Card	6
24	P 84226	001	TAB, Locking	9
25	P 146588	004	PC CARD #2 (Repaired P-764193-023)	1
26	P 146586	004	PC CARD #1 (Repaired P-764193-022)	1
27	P 760244	004	MOTHER BOARD & CHASSIS ASSEMBLY (Repaired P-764193-009)	1
28	P 83528	001	TAB, D Locking, CPU	1
29	P 83528	007	TAB, D Locking, I/O	1
30			(NOT USED)	
31	P 84467	001	PLATE, Side	2
32	P 3038	041	NUT, Hex, #8-32	2
33	P 150476	608	CLIP, Retaining	2

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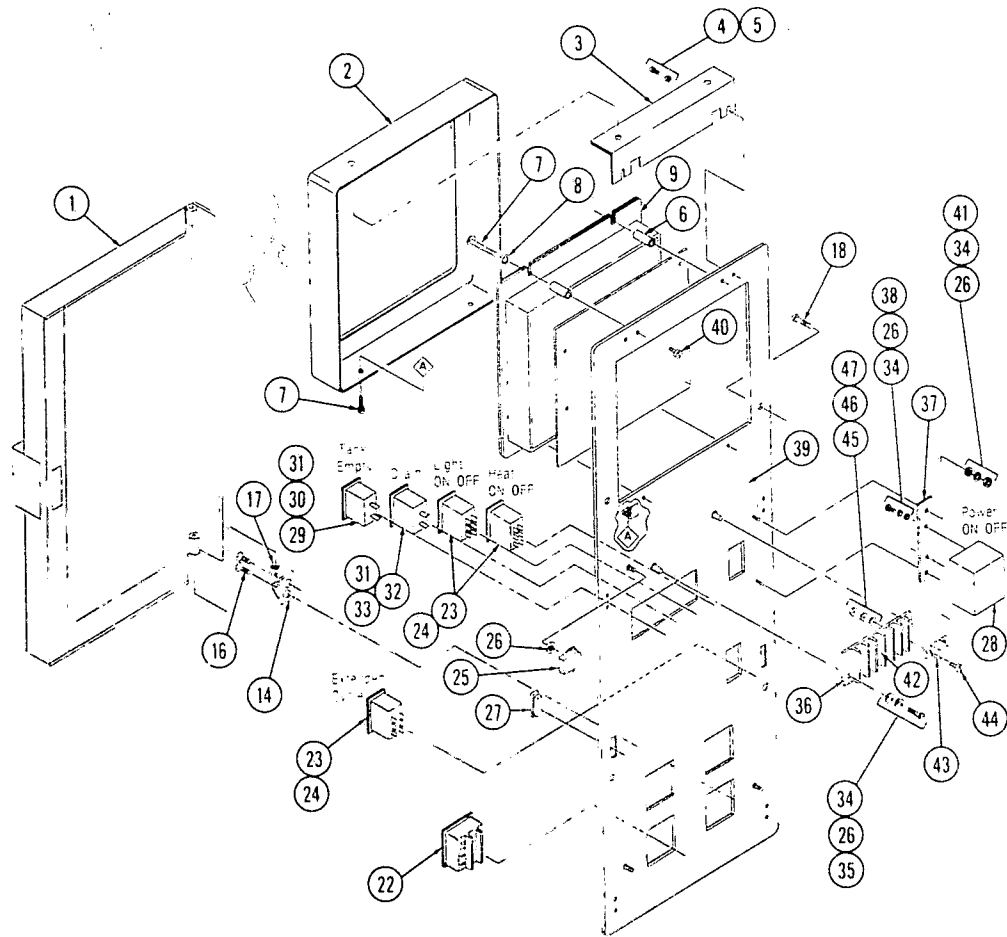


Figure 8-21. PANEL ASSEMBLY: Primary and Secondary.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-21-			PANEL ASSEMBLY: Primary and Secondary	X
1	P 150475 912		DOOR ASSEMBLY, Secondary	1
2	P 150475 932		PANEL, Front	1
3	P 150475 931		SUPPORT, Primary Panel	1
4	P 90991 091		LOCKWASHER, #8	6
5	P 3967 041		SCREW, Round Head Slotted, #8-32 x 1/4	4
6	P 150475 928		SPACER	4
7	P 45323 091		SCREW, Button Head Socket Cap, #8-32 x 3/8	10
8	P 17796 091		WASHER, 3/8 O.D. x .172 I.D.	4
9	P 150475 878		PANEL, Primary Control (Repaired P-764193-024)	1
	P 764317 536		• LAMP (Box of 10)	A/R
10			NOT USED	
11			NOT USED	
12			NOT USED	
13			NOT USED	
14	P 150475 909		HINGE ASSEMBLY, Bottom	1
15	P 150475 908		HINGE ASSEMBLY, Top (Not Shown)	1
16	P 45176 044		SCREW, Flat Head Slotted, #4-40 x 1/4	4
17	P 150475 913		WASHER	2
18	P 42618 045		SCREW, Button Head Socket Cap, #6-32 x 1/4	4
19			NOT USED	
20			NOT USED	
21			NOT USED	
22	P 136315 002		SWITCH ASSEMBLY, Thumbwheel	4
23	P 150475 955		OPERATOR, Rocker	3
24	P 150475 956		SWITCH, Rocker	3
25	P 83933 002		BUZZER	1
26	P 19675 041		LOCKWASHER, #6	7
27	P 150475 014		CATCH, Magnetic	2
28	P 150475 991		PROTECTOR, Circuit, 2 Pole	1
29	P 150475 969		INDICATOR	1
30	P 150475 970		LENS, "Tank Empty"	1
31	P 150475 972		LAMP, 28 V.	2
32	P 150475 968		SWITCH, Pushbutton, "Drain Tank"	1
33	P 150475 971		LENS	1
34	P 5469 041		WASHER, #6	6
35	P 3960 041		SCREW, Round Head, #6-32 x 1/2	2
36	P 89174 091		BOARD, Terminal, 6-point	1
37	P 150475 990		SPACER, Mounting	1
38	P 3984 041		SCREW, Round Head, #6-32 x 3/8	2
39	P 150474 177		PANEL, Secondary	1
40	P 45323 042		SCREW, Ground, #8-32 x 3/8	1
41	P 3037 041		NUT, Hex, #6-32	2
42	P 91945 041		JUMPERS	2
43	P 129318 001		RESISTOR	1
44	P 90993 091		SCREW, Round Head Slotted, #4-40 x 3/4	1
45	P 90713 061		LOCKWASHER, #4	1
46	P 13794 041		NUT, Hex, #4-40	1
47	P 5469 041		WASHER, Flat, .147 I.D. x 3.8 O.D.	1

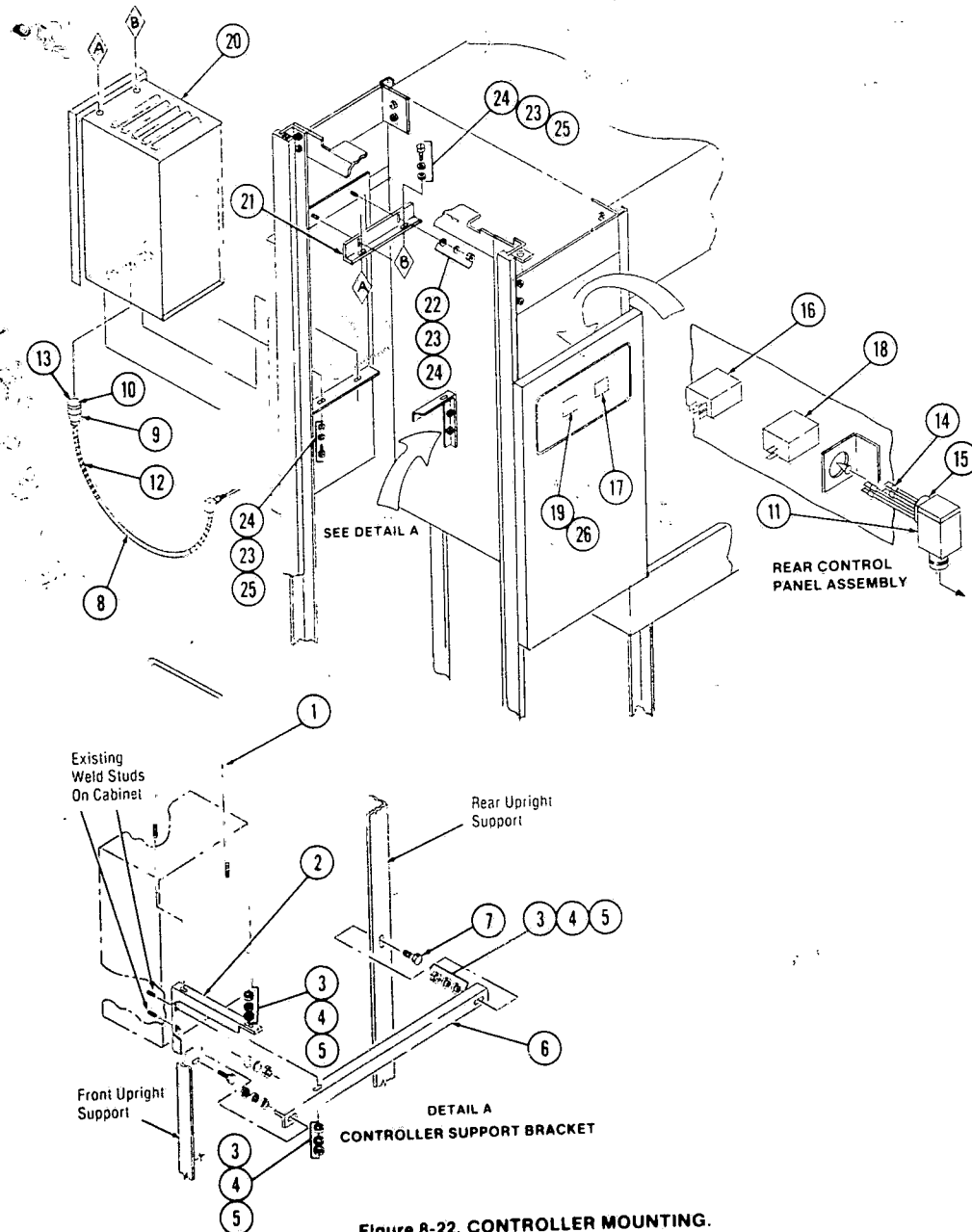


Figure 8-22. CONTROLLER MOUNTING.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-22-			CONTROLLER MOUNTING, Single Door Units	X	
			CONTROLLER MOUNTING, Double Door Units		X
1	P 150473	565	BRACKET, U-Bolt, 1/4-20	1	1
2	P 150474	440	SUPPORT, Control Box	1	1
3	P 32380	061	WASHER, Flat, 1/4	11	11
4	P 19678	045	LOCKWASHER, 1/4	13	13
5	P 3097	041	NUT, Hex, 1/4-20	7	7
6	P 150473	566	ANGLE, Support	1	1
7	P 3848	051	SCREW, Hex Head, 1/4-20 x 3/4	2	2
8	P 150474	683	CABLE, Interconnect D, JB-1 to Rear Control Panel	1	1
9	P 150475	986	CLAMP, Cable	1	1
10	P 93838	002	PLUG	1	1
11	P 150475	337	CONNECTOR, EII, 3/8	1	1
12			CONDUIT, Extra Flexible, 3/8 x 48	4	4
13	P 84461	002	SOCKET, Contact	6	6
14	P 150475	978	TERMINAL	4	4
15	P 24748	091	BUSHING	1	1
16	P 150475	968	SWITCH, Pushbutton	1	1
17	P 150475	943	LENS, Pushbutton, "STOP"	1	1
18	P 150475	969	INDICATOR	1	1
19	P 150475	942	LENS, IN PROCESS	1	1
20			BOX ASSEMBLY, Control (See Figure 8-20)	1	1
21	P 150474	317	BRACKET	2	2
22	P 2960	042	NUT, Hex, #10-32	6	6
23	P 19677	041	LOCKWASHER, #10	6	6
24	P 17589	045	WASHER, Flat, #10	4	4
25	P 462328	504	SCREW, Pan Head Machine, #10-32 x 3/8	2	2
26	P 150475	972	PLUG		

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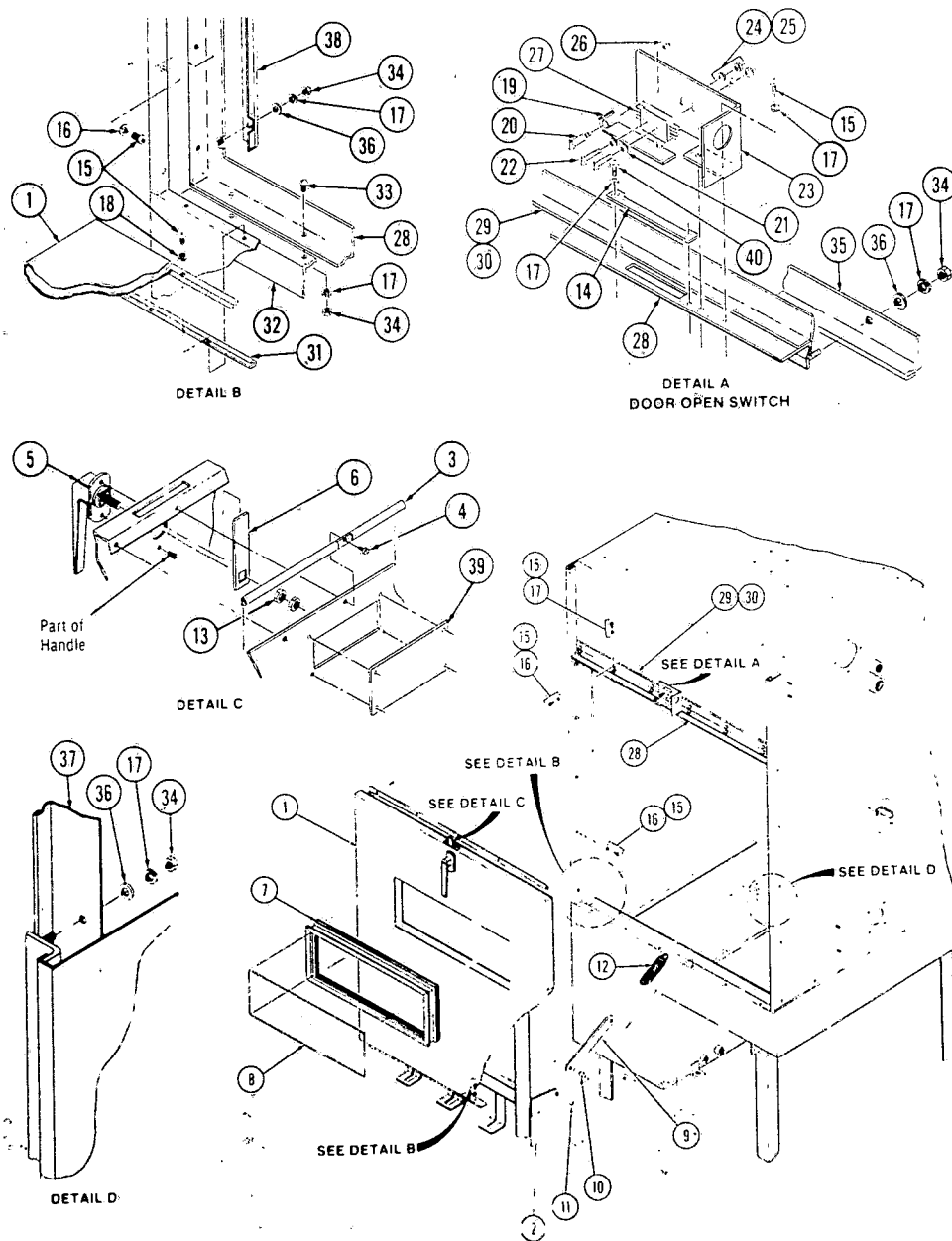


Figure 8-23. DOOR ASSEMBLY: Hinged. (Units shipped before 8/84)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-23-	P 150474	372	DOOR ASSEMBLY, Hinged (Units shipped before 8/84)	X
1	P 150474	349	DOOR	1
2	P 150474	330	• DOOR ASSEMBLY, Back	1
3	P 150474	337	• GASKET, Door	32
4	P 430384	091	• SCREW, Pan Head, #8 Type B	1
5	P 150474	424	• HANDLE	1
6	P 150474	347	• PAWL	1
7	P 150474	262	• GASKET, Door Glass	1
8	P 150474	264	• GLASS, Door	1
9	P 150473	619	• LINK, Door, Right Hinge	1
	P 150473	620	• LINK, Door, Left Hinge	1
10	P 150474	339	• PIN	2
11	P 42641	091	• RING, Retaining	4
12	P 150474	344	• SPRING, Door	2
13	P 24496	061	• NUT, Jamb	1
14	P 150474	448	• PLATE, Adjusting	32
15	P 49136	061	SCREW, Button Head, #10-24 x 5/16	18
16	P 150474	298	WASHER, Sealing	34
17	P 19685	061	LOCKWASHER, #10	6
18	P 31705	045	LOCKWASHER, .204 I.D. x .381 O.D.	1
19	P 150473	552	SWITCH LEVER ASSEMBLY	1
20	P 150473	555	SCREW, Shoulder, #8-32	2
21	P 5469	041	WASHER, Flat, .147 I.D. x 3/8 O.D.	2
22	P 90993	041	SCREW, Round Head, #4-40 x 3/4	1
23	P 150473	551	PLATE, Switch Mounting	2
24	P 30743	045	LOCKWASHER, #4	2
25	P 13794	041	NUT, #4-40	1
26	P 8645	061	NUT, #8-32	1
27	P 150474	906	SWITCH	1
28	P 150474	353	FRAME ASSEMBLY	1
29	P 150474	355	GASKET, Door	1
30	P 150474	354	PLATE, Sealing	1
31	P 150473	679	GASKET, Door	1
32	P 150473	671	BAFFLE, Water	4
33	P 18151	061	SCREW, Round Head, 10-24 x 7/16	24
34	P 8646	061	NUT, Hex, 10-24	1
35	P 150473	725	ANGLE, Top Trim	20
36	P 150473	301	WASHER, Flat	1
37	P 150473	724	ANGLE, R.H. Trim	1
38	P 150473	723	ANGLE, L.H. Trim	1
39	P 150473	623	COVER, Access	1
40	P 430349	045	SCREW, Button Head, #10-24 x 5/16	2

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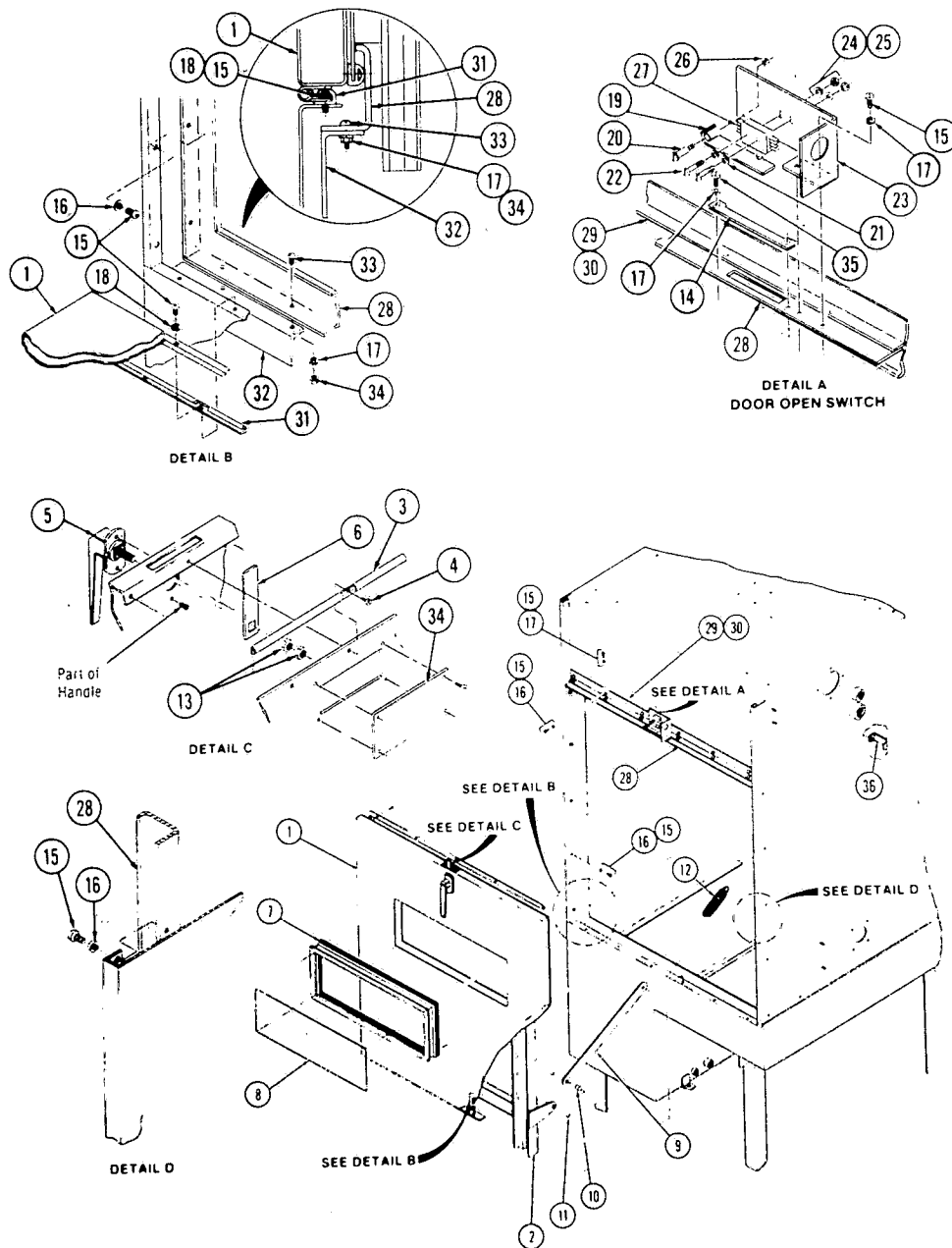


Figure 8-23A. DOOR ASSEMBLY: Hinged. (Units shipped after 8/84)

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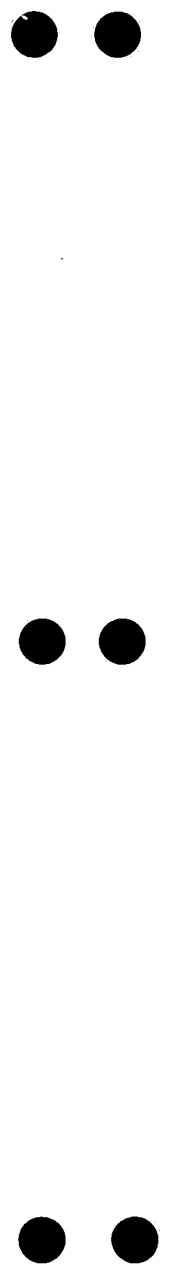
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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-23-	P 150474 372		DOOR ASSEMBLY, Hinged (Units shipped after 8/84).....	X
1	P 150474 349		DOOR	1
2	P 150474 330		• DOOR ASSEMBLY, Back	1
3	P 150474 337		• GASKET, Door	1
4	P 430364 091		• SCREW, Pan Head #8 Type B	32
5	P 150474 424		• HANDLE	1
6	P 150474 347		• PAWL	1
7	P 150474 262		• GASKET, Door Glass	1
8	P 150474 264		• GLASS, Door	1
9	P 418332 457		• SUPPORT ASSEMBLY, Door, R.H.	1
	P 418332 456		• SUPPORT ASSEMBLY, Door, L.H.	1
10	P 150474 339		• PIN	2
11	P 42641 091		• RING, Retaining	4
12	P 150474 344		• SPRING, Door	2
13	P 22496 061		• NUT, Jamb	2
14	P 150474 448		• PLATE, Adjusting	1
15	P 49136 061		SCREW, Button Head #10-24 x 5/16	32
16	P 150474 298		WASHER, Sealing	18
17	P 19685 061		LOCKWASHER, #10	10
18	P 31705 045		LOCKWASHER, .204 I.D. x .381 O.D.	6
19	P 150473 552		SWITCH LEVER ASSEMBLY	1
20	P 150473 555		SCREW, Shoulder, #8-32	1
21	P 5469 041		WASHER, Flat, .147 I.D. x 3/8 O.D.	2
22	P 90993 041		SCREW, Round Head, #4-40 x 3/4	2
23	P 150473 551		PLATE, Switch Mounting	1
24	P 30743 045		LOCKWASHER, #4	2
25	P 13794 041		NUT, #4-40	2
26	P 8645 061		NUT, #8-32	1
27	P 150474 906		SWITCH	1
28	P 150474 801		FRAME ASSEMBLY,	1
29	P 150474 355		GASKET, Door	1
30	P 150474 354		PLATE, Sealing	1
31	P 150473 679		GASKET, Door	1
32	P 150473 671		BAFFLE, Water	1
33	P 18151 061		SCREW, Round Head 10-24 x 7/16	4
34	P 150473 623		COVER, Access	1
35	P 430349 045		SCREW, Button Head, #10-24 x 5/16	2
36	P 764319 852		BRACKET	2

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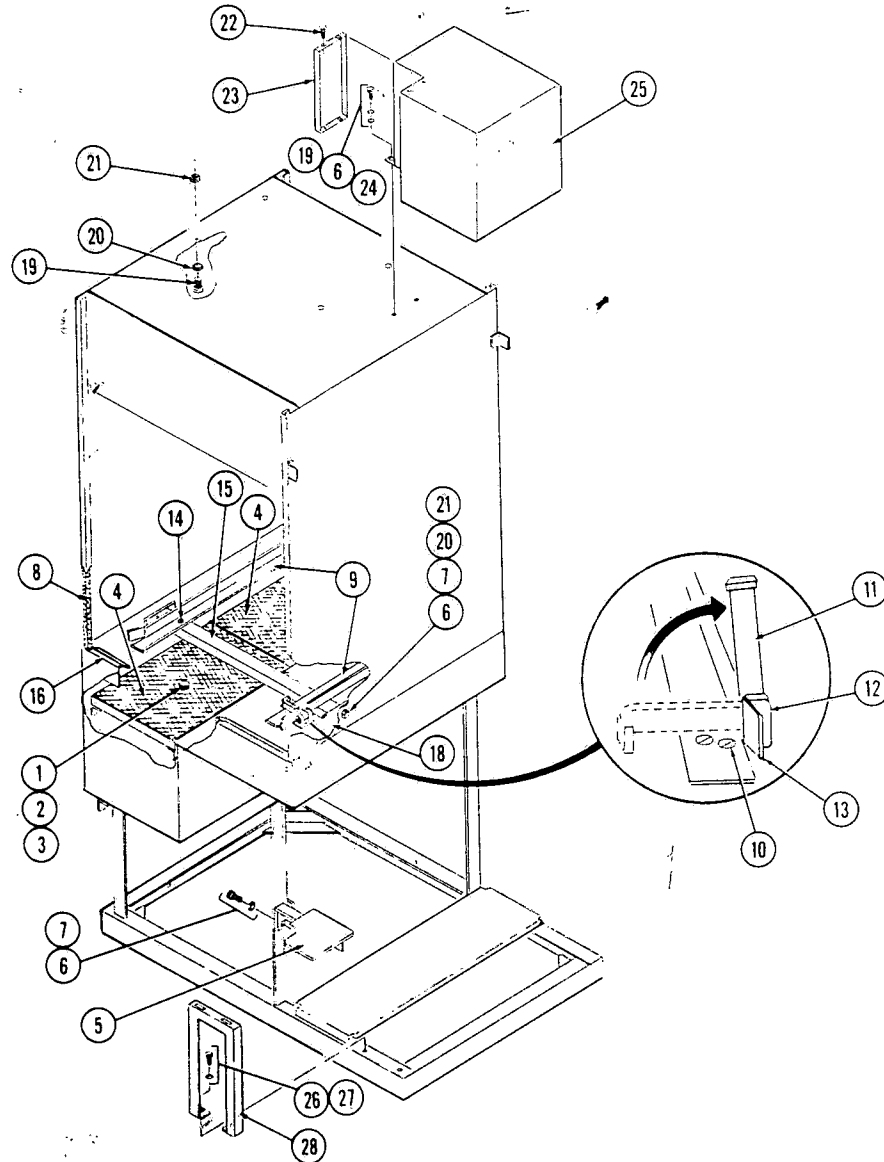


Figure 8-25. SUPPORT BRACKETS.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-25-			SUPPORT BRACKETS, Single Sliding Door Units	X			
			SUPPORT BRACKETS, Single Hinged Door Units		X		
			SUPPORT BRACKETS, Double Sliding Door Units			X	
1	P 150474	301	KNOB	2	2	2	
2	P 462328	364	SCREW, Pan Head, #8-32 x 3/8	8	2	16	
3	P 90991	091	LOCKWASHER, #8	2	2	4	
4	P 150474	305	SCREEN, Refuse	2	2		
	P 150474	649	SCREEN, Refuse			2	
5	P 150473	559	BRACKET, Support (Detergent Bottle)	1	1	1	
6	P 76230	091	LOCKWASHER, 1/4	2	2	2	
7	P 462009	442	SCREW, Hex Head, 1/4-20 x 1/2	6	6	10	
8	P 150474	477	STRIP, Sponge		2		
9	P 150474	551	TRACK	2	2	2	
10	P 75666	061	SCREW, Flat Head, #8-32 x 1/2	4	4	4	
11	P 150473	681	LATCH	2	2	2	
12	P 150473	682	CLEVIS	2	2	2	
13	P 43238	061	PIN, Roll	4	4	4	
14	P 418309	662	SCREW, Flat Head, 1/4-20 x 1/2	2	2	2	
15	P 150474	549	SUPPORT, Track	1			
16	P 150474	992	DEFLECTOR, Water			1	
17	P 150474	993	DEFLECTOR, Water (Not Shown)	2	4		
18	P 150474	994	SPACER	16	15	16	
19	P 418237	602	SCREW, Machine, Hex Head, 1/4-20 x 1/2	12	12	12	
20	P 150474	299	WASHER, Sealing	16	16	20	
21	P 150473	718	NUT, Lock	3	3	3	
22	P 150276	001	SCREW, Self-tapping, #8 x 3/8 Type B	1	1	1	
23	P 150474	913	FILLER, Cover	2	2	2	
24	P 31688	091	WASHER, Flat	1	1	1	
25	P 150474	910	COVER	2	2	2	
26	P 19678	045	LOCKWASHER, 1/4	2	2	2	
27	P 3846	091	SCREW, Hex Head, 1/4-20 x 1/2	1	1	1	
28	P 150474	461	SUPPORT, Starter Box				

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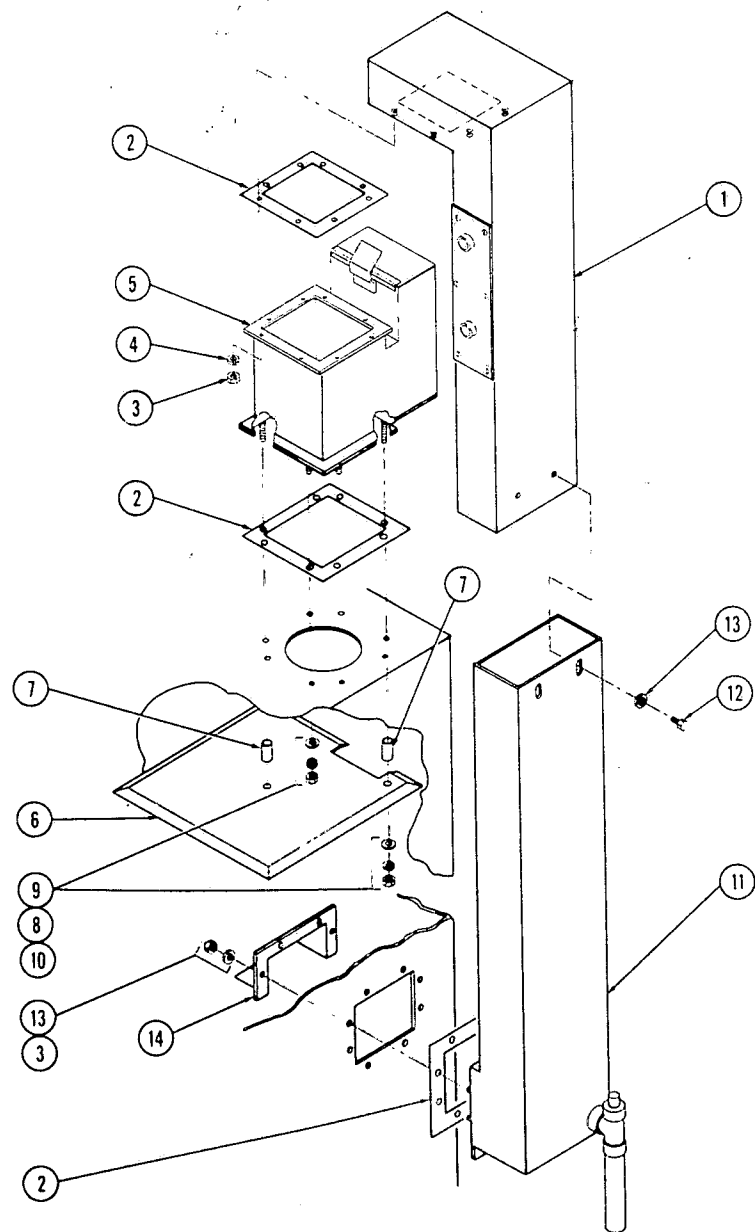


Figure 8-26. VAPOR CONDENSER ASSEMBLY: Chamber Vent.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-26-	P 150473	629	VAPOR CONDENSER ASSEMBLY	X
1	P 156473	628	CONDENSER Vapor	1
2			TAPE, Tremco	A R 16
3	P 8647	061	NUT, Hex. #10-32	8
4	P 19685	061	LOCKWASHER, #10	1
5	P 150473	637	CHAMBER, Vent.	1
6	P 150473	563	BAFFLE	2
7	P 150473	562	SPACER	4
8	P 90575	061	LOCKWASHER, 1/4	4
9	P 49353	061	WASHER, Flat, .250 I.D. x 3/8 O.D.	4
10	P 76239	061	NUT, Hex. 1 4-20	1
11	P 150473	694	CONDENSER ASSEMBLY, Lower	2
12	P 91620	061	SCREW, Hex Hd., 10-16 x 3 8 Lg.	10
13	P 150473	301	WASHER Flat #10	1
14	P 150473	700	DEFLECTOR	

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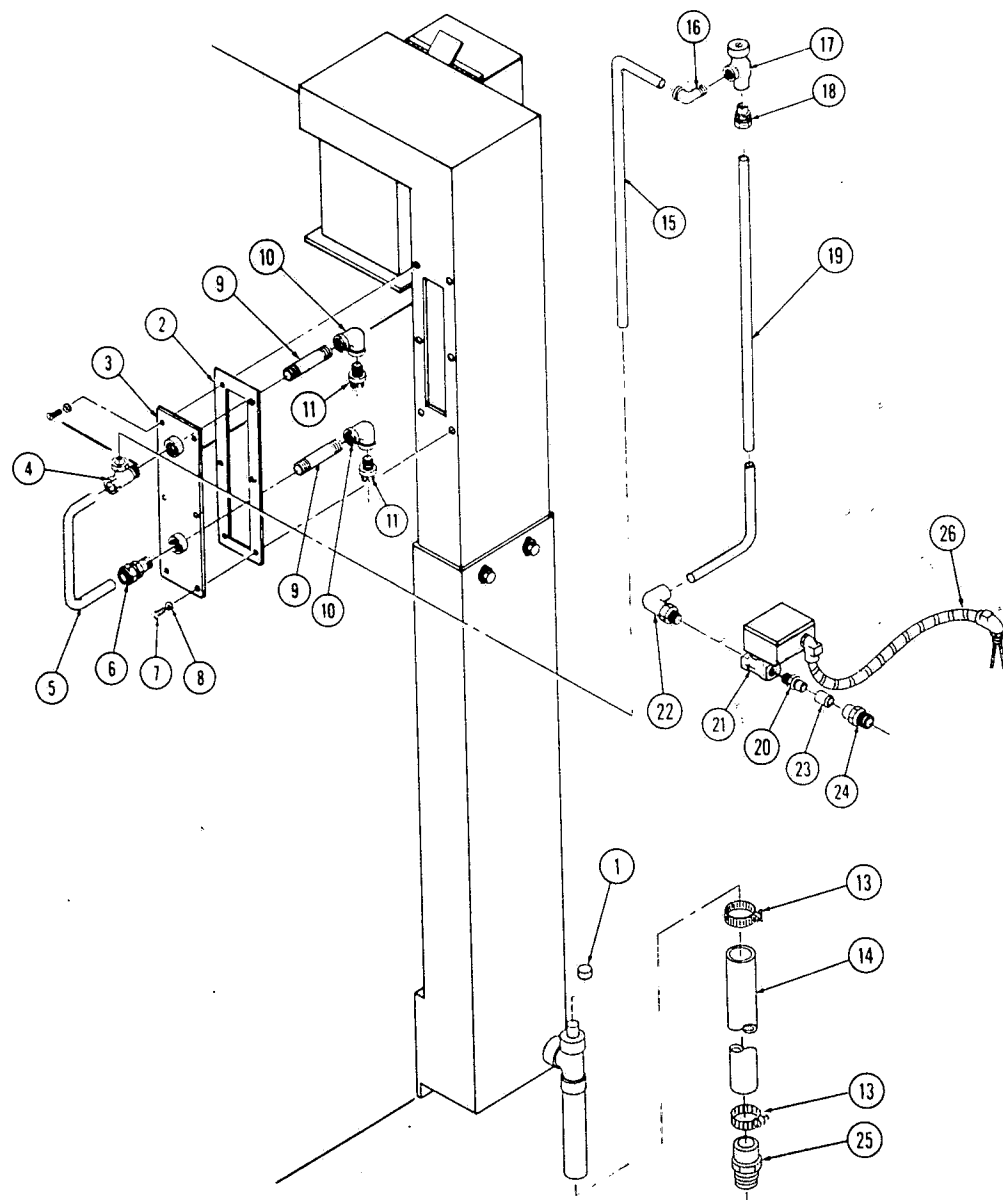


Figure 8-27. VAPOR CONDENSER ASSEMBLY: Piping.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-27-			VAPOR CONDENSER ASSEMBLY: Piping	X
1	P 150473	712	CAP, Plug	1
2	P 150474	665	GASKET, Cover	1
3	P 150474	673	PLATE, Cover	1
4	P 6992	091	TEE, Compression, 3/8 O.D.T. x 1/4 I.P.S.	1
5	P 150474	659	TUBE	1
6	P 46365	091	COUPLING, Compression, 3/8 O.D.T. x 1/4 I.P.S.	1
7	P 462328	566	SCREW, Round Head Slot, #10-32 x 1/2	6
8	P 19685	061	LOCKWASHER, #10	2
9	P 28924	091	NIPPLE, Brass	2
10	P 1616	091	ELBOW, 1/4 x 1/8	2
11	P 150474	221	NOZZLE, Spray	2
12			NOT USED	
13	P 150476	316	CLAMP, Hose	2
14	P 150473	713	HOSE, Drain	1
15	P 150474	660	TUBE	1
16	P 46366	091	ELL, Compression, 3/8 O.D.T. x 1/4 I.P.S.	1
17	P 150474	172	BREAKER, Vacuum, Anti-siphon, 1/4 N.P.T.	1
18	P 20229	091	COUPLING, Compression, 1/2 O.D.T. x 1/4 I.P.S.	1
19	P 150474	675	TUBE	1
20	P 89723	091	ADAPTER	1
21	P 150474	168	VALVE, Solenoid, 1/4 N.P.T.	1
	P 764316	146	• KIT, Repair	1
	P 764315	480	• COIL	1
22	P 89740	091	ELBOW, 90°, 1/2 O.D.T. x 1/4 I.P.S.	1
23	P 150474	161	BUSHING, Flush	1
24	P 90225	091	UNION	1
25	P 150473	739	ADAPTER	1
26	P 150474	515	CABLE ASSEMBLY, Vapor Condenser	1

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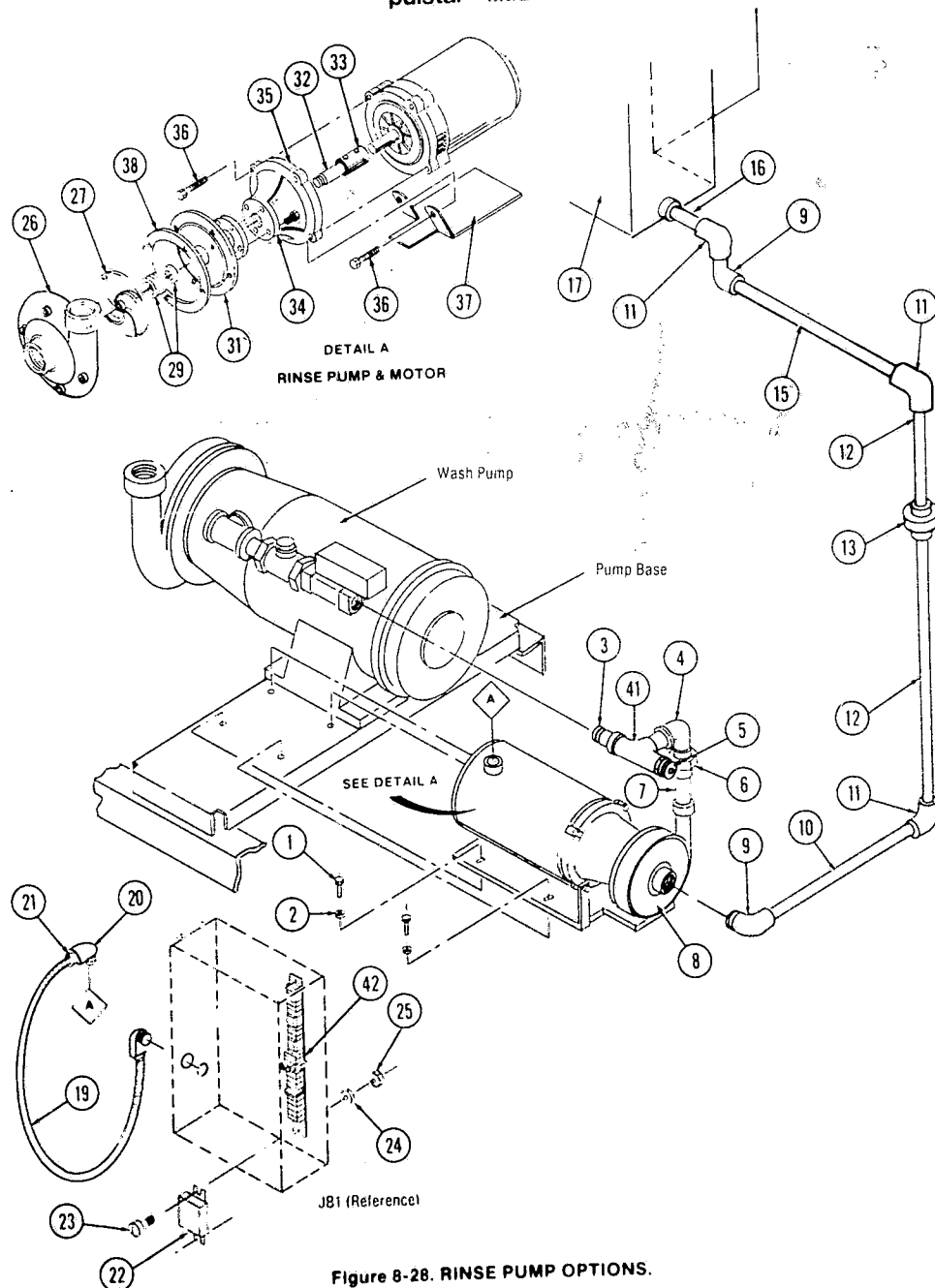


Figure 8-28. RINSE PUMP OPTIONS.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-28-			RINSE PUMP OPTIONS: Pump Only	X		
			RINSE PUMP OPTIONS: Pump With Storage Tank		X	
1	P 462009	663	SCREW, Hex Head, 5/16-8 x 5/8	4	4	
2	P 19679	041	LOCKWASHER, 5/16	4	4	
3	P 150474	324	NIPPLE, Stainless-steel, 1 N.P.T. x 1-3/4	2	2	
4	P 150474	147	ELBOW, Street, 1 N.P.T.	1	1	
5	P 3442	091	PLUG, Pipe, Br., 1/2 N.P.T.	1	1	
6	P 150474	344	UNION, 1 N.P.T.	1	1	
7	P 150474	323	NIPPLE, Stainless-steel, 1 N.P.T. x 3-3/8	1	1	
8	P 150474	449	PUMP, Rinse	1	1	
	P 764316	071	• PUMP	1	1	
	P 764316	049	• MOTOR	1	1	
9	P 150474	901	ELBOW, Street, 1-1/4 N.P.T.		2	
10	P 150474	698	NIPPLE, PVC, 1-1/4 N.P.T. x 13-1/4		1	
11	P 79318	091	ELBOW, 1-1/4 N.P.T.		3	
12	P 150474	696	NIPPLE, PVC, 1-1/4 N.P.T. x 28-3/4		2	
13	P 79101	091	UNION, 1-1/4 N.P.T.		1	
14			NOT USED			
15	P 150474	697	NIPPLE, PVC, 1-1/4 N.P.T. x 10		1	
16	P 150474	700	NIPPLE, PVC, 1-1/4 N.P.T. x 3-1/4		1	
17			TANK ASSEMBLY, Storage (See Figure 8-29)		1	
18	P 150474	515	CABLE ASSEMBLY, Rinse Pump	1	1	
19			• CONDUIT, 1/2, Extra Flexible, 24 long	1	1	
20	P 91060	091	• CONNECTOR, EII, 1 2	2	2	
21	P 150122	001	• BUSHING	4	4	
22	P 150475	740	RELAY, DPDT, CRE-3	1	1	
23	P 462328	204	SCREW, Round Head, #6-32 x 3/8	2	2	
24	P 19675	041	LOCKWASHER, #6	2	2	
25	P 3037	041	NUT, Hex, #6-32	2	2	
			RINSE PUMP COMPONENTS			
26			VOLUTE	1	1	
27	P 764316	050	IMPELLER	1	1	
28			PIPE PLUG	2	2	
29	P 764316	051	SEAL WITH SEAT	1	1	
30			VOLUTE BOLTS (Not Shown)			
31			ADAPTER PLATE	1	1	
32	P 764316	052	SHAFT	1	1	
33	P 764316	053	IMPELLER LOCKING SCREW WITH WASHER			
34			ADAPTER BOLTS	1	1	
35			MOTOR BRACKET	2	2	
36			MOTOR BOLTS	1	1	
37			BASE	1	1	
38	P 764316	070	GASKET	1	1	
39	P 150474	589	HOLDER, Fuse (Not Shown)	1	1	
40	P 150474	597	FUSE, 15-Amp	1	1	
41	P 48687	061	TEE, 1 N.P.T.	1	1	
42	P 150475	889	CIRCUIT BREAKER, Rinse Pump	1	1	
			• Electrically heated units only			

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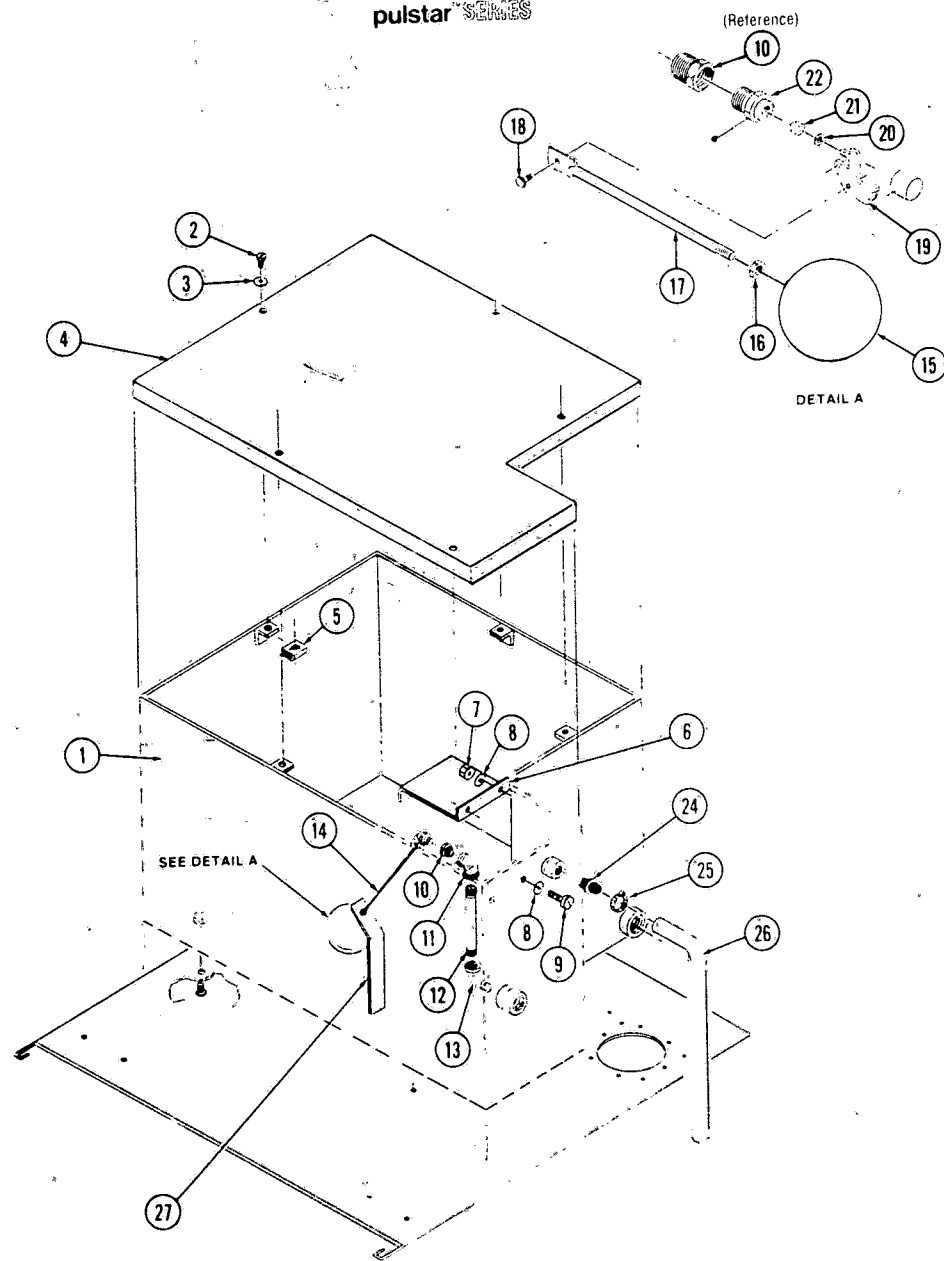


Figure 8-29. TANK, Storage Option.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-29-			TANK, Storage Option	X
1	P 150474 691		TANK, Storage	1
2	P 462328 666		SCREW, Pan Head, 1/4-20 x 1/2	5
3	P 49353 061		WASHER, Flat, .251 I.D. x .562 O.D.	5
4	P 150474 695		COVER, Storage Tank	1
5	P 150474 251		NUT, Speed, 1/4-20	5
6	P 150474 688		DEFLECTOR, Water	1
7	P 8647 061		NUT, Hex	2
8	P 150474 298		WASHER, Sealing	4
9	P 462328 566		SCREW, Cross Recessed, Pan Head, #10-32 x 1/2	2
10	P 48699 061		BUSHING, Reducing, 3/8 N.P.T. x 1/4 N.P.T.	1
11	P 76858 061		ELBOW, 3/8 N.P.T.	1
12	P 48703 061		NIPPLE, Stainless-steel, 3/8 N.P.T. x 4-1/2	1
13	P 76241 061		ELBOW, Street, 3/8 N.P.T.	1
14	P 150473 654		FLOAT ASSEMBLY	1
15			• BALL, Stainless-steel, 3 diameter	1
16			• LOCKNUT, Stainless-steel	1
17			• ROD, Stainless-steel	1
18			• SCREW, Knurled-head, Stainless-steel, #8-32 x 3/8	1
19			• SUPPORT, Rod, Stainless-steel	1
20			• WASHER, Flat, Stainless-steel	1
21			• DISC, Viton Rubber	1
22			• ADAPTER, Stainless-steel	1
23			• PIN, Cotter, Stainless-steel	1
24	P 150474 655		ADAPTER	1
25	P 32110 091		CLAMP, Worm Drive	1
26	P 150474 694		TUBE, Overflow	1
27	P 150474 693		STOP, Float	1

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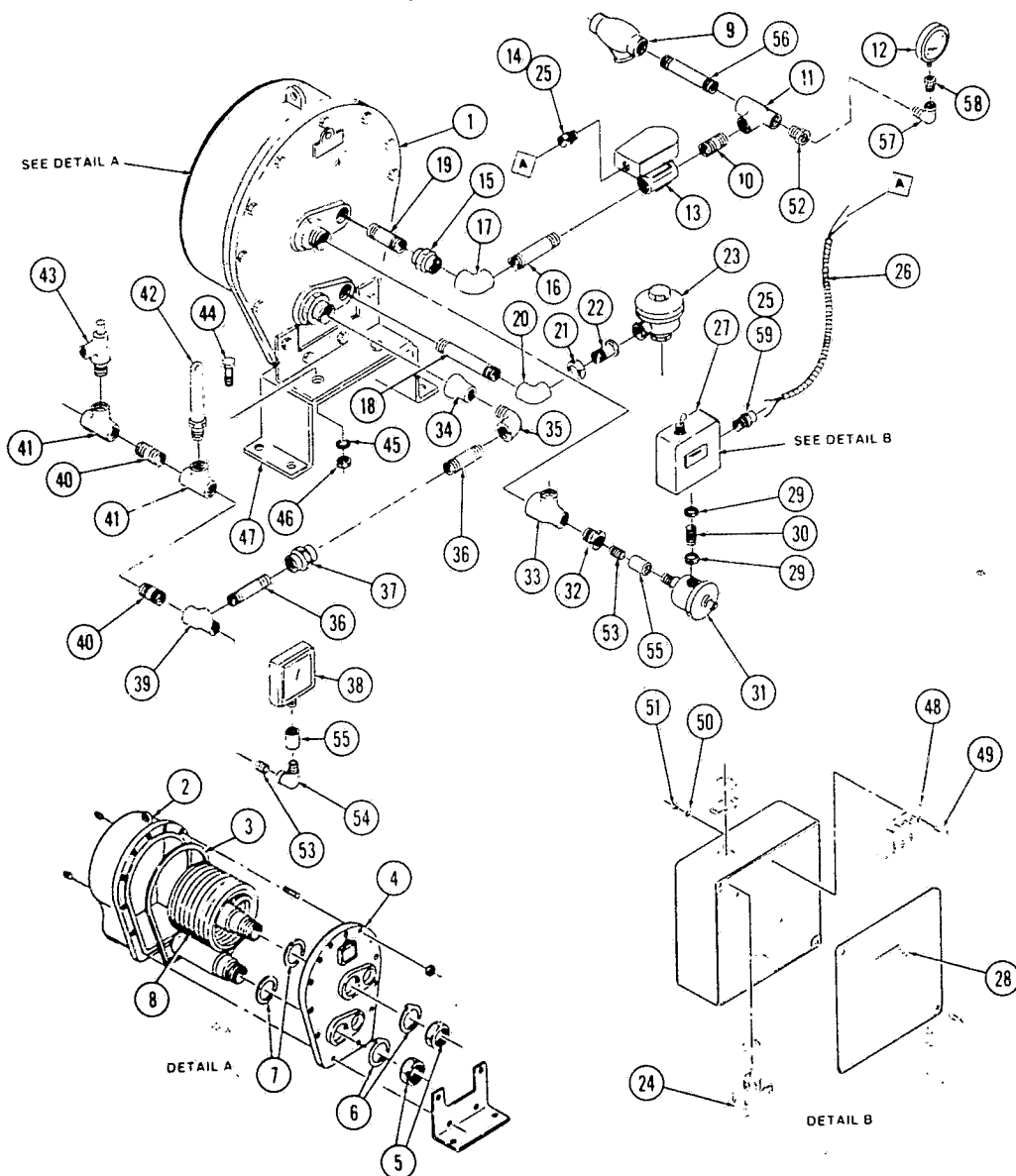


Figure 8-30. WATER TEMPERATURE BOOSTER: Steam.

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-30-	P 150474	651	WATER TEMPERATURE BOOSTER: Steam	X
1	P 150474	620	BOOSTER, Steam	1
2			• CASING	1
3			• GASKET, Casing Flange	1
4			• PLATE, Base	1
5			• NUT, Manifold Holding	2
6			• RING, Manifold Locking	2
7			• GASKET, Manifold	1
8			• COIL ASSEMBLY, Manifold	1
9	P 42104	091	STRAINER, Steam, 1 N.P.T.	1
10	P 29354	091	NIPPLE, 1 x 1-1/2	1
11	P 4941	091	TEE, Reducing, 1 x 3/4 x 1 N.P.T.	1
12	P 77452	051	GAUGE, Pressure, 0-60#, 1 8	1
13	P 150474	652	VALVE, Solenoid, 1 N.P.T.	1
	P 764316	150	• KIT, Repair	A R
	P 764316	493	• COIL	1
14	P 43033	045	CONNECTOR, 3 8 Straight	1
15	P 5283	091	UNION, N.P.T.	1
16	P 29364	091	NIPPLE, 1 x 4	1
17	P 1639	091	ELBOW, N.P.T. Street	1
18	P 29374	091	NIPPLE, 1 x 6-1 2	1
19	P 29362	091	NIPPLE, 1 x 3-1 2	1
20	P 1637	091	ELBOW, 1 x 3/4 N.P.T.	1
21	P 4247	091	SPUD, Male, 3/4 Union	1
22	P 2903	091	NUT, Union, 3/4 Union	1
23	P 19000	091	STEAM TRAP, 3/4	1
	P 30397	091	KIT, Repair	1
24	P 37115	091	SWITCH	1
25	P 24748	091	BUSHING	4
26	P 80699	091	CONDUIT, Flexible, 3/8 x 7	1
27	P 150474	621	BOX, Conduit	1
28	P 82674	091	LABEL, Warning	1
29	P 8681	091	NUT, Cond.	4
30	P 31299	091	NIPPLE, Cond.	1
31	P 150474	623	THERMOSWITCH, 1/2 N.P.T.	1
32	P 6263	091	BUSHING, Reducing, 1 x 1 2	1
33	P 41645	091	TEE, Reducing, 1-1/4 x 3/4	1
34	P 3571	091	BUSHING, Reducing, 1-1/4 x 3/4	1
35	P 1636	091	ELBOW, Street, 3/4 N.P.T.	1
36	P 32859	091	NIPPLE, 3/4 x 2-1/2	2
37	P 43524	091	UNION, 3/4 N.P.T.	1
38	P 150474	615	GAUGE, Dual, 1/2 N.P.T.	1
39	P 4925	091	TEE, Reducing, 3/4 x 1/2 x 3 4	1
40	P 32854	091	NIPPLE, 3/4 x 1-1/4	2
41	P 4932	091	TEE, 3/4 N.P.T.	1
42	P 150474	617	CHAMBER, Air, 3/4 N.P.T.	1
43	P 150150	001	VALVE, Safety, 3/4 N.P.T., 80#	1
44	P 46149	045	SCREW, Hex Head, 5/8-11 x 1-1/4	2
45	P 19682	041	LOCKWASHER	2
46	P 3104	045	NUT, Hex	2
47	P 150474	622	STAND	1
48	P 90746	091	STRIP, Terminal	1
49	P 3987	041	SCREW, Round Head, #8-32 x 3/4	2

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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-30- (cont'd)				
50	P 19676	041	LOCKWASHER, #8	2
51	P 3038	041	NUT, Hex; #8-32	2
52	P 22472	091	BUSHING, Reducing, 3/4 x 1/4 N.P.T.	1
53	P 29162	091	NIPPLE, Close, 1/2 N.P.T.	2
54	P 1634	091	ELBOW, Street, 1/2 N.P.T.	2
55	P 1613	091	COUPLING, 1/2 N.P.T.	1
56	P 29370	091	NIPPLE, 1 N.P.T. x 5-1.2	1
57	P 1619	091	ELBOW, Street, 1/4 N.P.T.	1
58	P 939	091	BUSHING, Reducing, 1/4 x 1/8 N.P.T.	1
59	P 430039	045	CONNECTOR, Ell (Not Shown)	1

(NOT USED)

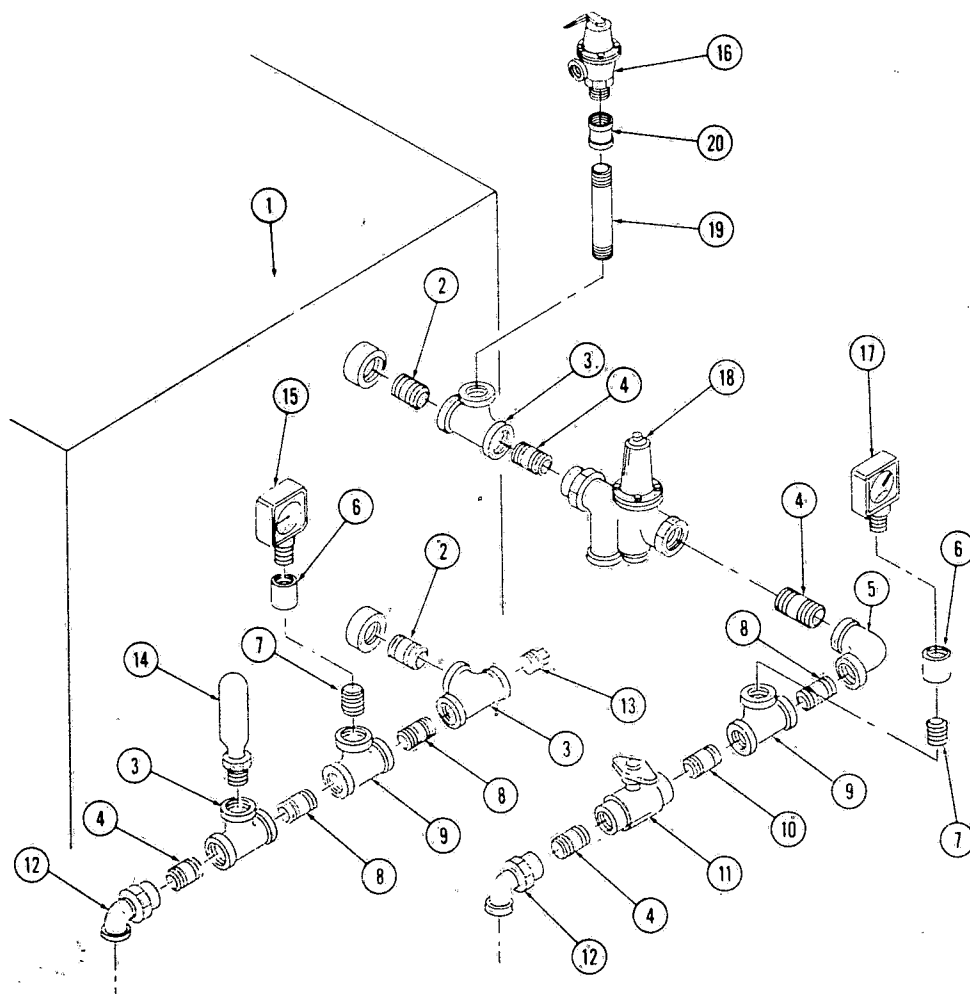


Figure 8-31. WATER TEMPERATURE BOOSTER: Electric.

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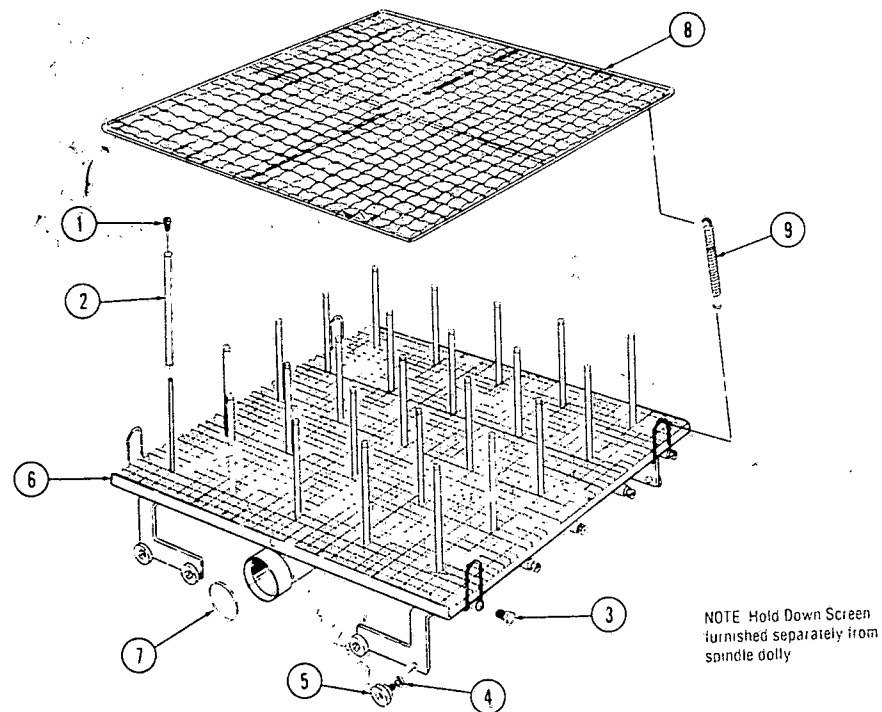
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FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-31-			WATER TEMPERATURE BOOSTER: Electric, 208 V.	X		
			WATER TEMPERATURE BOOSTER: Electric, 240 V.		X	
			WATER TEMPERATURE BOOSTER: Electric, 480 V.			X
1	P 150474	612	BOOSTER, Electric, 208 V.	1	1	1
	P 150474	613	BOOSTER, Electric, 240 V.			
	P 150474	614	BOOSTER, Electric, 480 V.			
2	P 29292	091	NIPPLE, 3/4 N.P.T. x 1-1/2	2	2	2
3	P 4932	091	TEE, 3/4 N.P.T.	3	3	3
4	P 29291	091	NIPPLE, 3/4 N.P.T. x 1-1/4	4	4	4
5	P 1635	091	ELL, 3/4 N.P.T.	1	1	1
6	P 1313	091	COUPLING, Pipe, 1/2 N.P.T.	2	2	2
7	P 29162	091	NIPPLE, 1/2 N.P.T. x 1	2	2	2
8	P 29294	091	NIPPLE, 3/4 N.P.T. x 2	3	3	3
9	P 4923	091	TEE, 3/4 x 3/4 x 1/2 N.P.T.	A/R	A/R	A/R
10	P 29293	091	NIPPLE, 3/4 N.P.T. x 1-3/4	1	1	1
11	P 47601	091	VALVE, Ball, 3/4 N.P.T.	1	1	1
	P 764076	091	• KIT, Seal	A/R	A/R	A/R
	P 756639	061	• BALL	A/R	A/R	A/R
	P 756640	061	• STEM	A/R	A/R	A/R
12	P 89986	091	ELL, Union, 3/4 N.P.T.	2	2	2
13	P 3443	091	PLUG, Pipe, 3/4 N.P.T.	1	1	1
14	P 150474	617	CHAMBER, Air	1	1	1
15	P 150474	615	GAUGE, Pressure/Temperature	1	1	1
16			VALVE, Relief, Pressure/Temperature	1	1	1
17			GAUGE, Pressure/Temperature	1	1	1
18			VALVE, Pressure Reducing	1	1	1
19	P 29302	091	NIPPLE, 3/4 N.P.T. x 4	1	1	1
20	P 1314	091	COUPLING, Pipe, 3/4 N.P.T.	1	1	1
* Supplied with electric boosters						

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NOTE: Hold Down Screen furnished separately from spindle dolly

Figure 8-32. SPINDLE DOLLY WITH HOLD DOWN SCREEN. (Units shipped before 6/83)

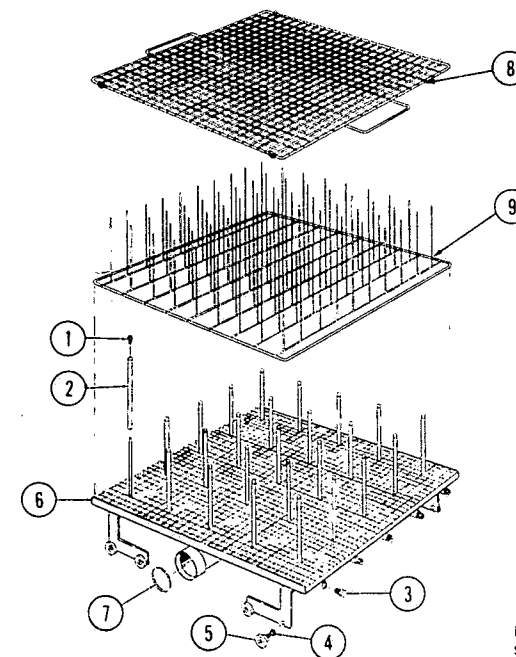
FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-32-	P 150474 044		DOLLY, Spindle, 4-Spindle	X				
	P 150474 045		DOLLY, Spindle, 9-Spindle		X			
	P 150474 046		DOLLY, Spindle, 16-Spindle			X		
	P 150474 047		DOLLY, Spindle, 25-Spindle				X	
	P 150474 048		DOLLY, Spindle, 49-Spindle					X
1	P 150474 127		• SCREW, Hex Head Nozzle	4	9	16	25	49
	P 150474 133		• SCREW, Hex Head Nozzle	4	9	16		
2	P 150474 136		• TUBE, Nylon				25	49
	P 150474 437		• TUBE, Nylon	4	6	8	10	14
3	P 150474 134		• PLUG, Pipe, 1/8 N P T	8	8	8	8	8
4	P 49134 061		• WASHER, Flat, 1/2 O D x 17/64 I D x 1/32	8	8	8	8	8
5	P 150474 024		• WHEEL	1	1	1	1	1
6	P 150474 135		• PANEL, Grid	1	1	1	1	1
7	P 150474 129		• O-RING	1	1	1	1	1
8	P 150474 467		• SCREEN, Hold-down (See Note)	A/R	A/R	A/R	A/R	A/R
9	P 150474 425		• SPRING, Extension	4	4	4	4	4

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NOTE: Support Rack furnished separately from spindle dolly

Figure 8-33. SPINDLE DOLLY WITH HOLD DOWN SCREEN AND SUPPORT RACK (Units shipped after 6/83)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-33-1	P 150474 044		DOLLY, Spindle, 4-Spindle	X				
	P 150474 045		DOLLY, Spindle, 9-Spindle		X			
	P 150474 046		DOLLY, Spindle, 16-Spindle			X		
	P 150474 047		DOLLY, Spindle, 25-Spindle				X	
	P 150474 048		DOLLY, Spindle, 49-Spindle					X
1	P 150474 127		• SCREW, Hex Head Nozzle	4	9	16	25	49
2	P 150474 133		• SCREW, Hex Head Nozzle	4	9	16		
3	P 150474 136		• TUBE, Nylon				25	49
	P 150474 437		• TUBE, Nylon	4	6	8	10	14
4	P 150474 134		• PLUG, Pipe, 1/8 N P T	8	8	8	8	8
5	P 49134 061		• WASHER, Flat, 1/2 O D x 17/64 I D x 1/32	8	8	8	8	8
6	P 150474 024		• WHEEL	8	8	8	8	8
7	P 150474 135		• PANEL, Grid	1	1	1	1	1
8	P 150474 129		• O-RING	1	1	1	1	1
9	P 150473 768		• SCREEN, Hold-down	1	1	1	1	1
9	P 150473 765		RACK, Support, 4-, 9- and 16-Spindle (See note)	A/R	A/R	A/R	A/R	A/R
	P 150473 766		RACK, Support, 25-Spindle (See note)					A/R
	P 150473 767		RACK, Support, 49-Spindle (See note)					A/R

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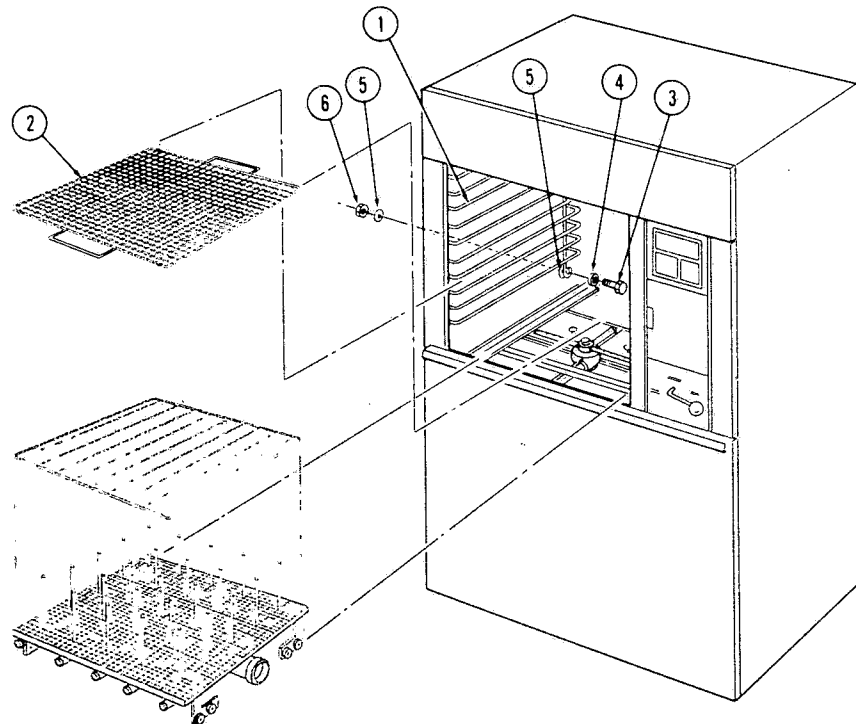


Figure 8-34. CHAMBER ARRANGEMENT WITH SPINDLE DOLLY AND HOLD DOWN SCREEN
(Units shipped after 6/83)

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-34			CHAMBER ARRANGEMENT	
1	P 150473 763		SUPPORT, Glassware	2
2	P 150473 768		SCREEN, Hold-down	1
3	P 21580 061		SCREW, Truss Head 1/4-20 x 1 LG	8
4	P 150473 295		WASHER, Flat, 1/4	8
5	P 150474 299		WASHER, Sealing	16
6	P 76239 061		NUT, Hex, 1/4-20	8

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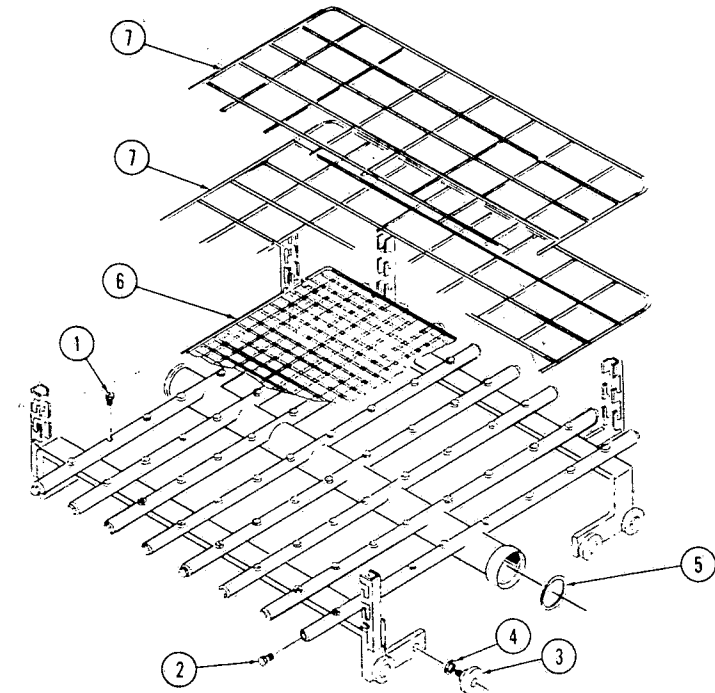


Figure 8-35. NOZZLE DOLLY.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-33-	P 150474 378		DOLLY, Nozzle, 64-Nozzles	X
	P 150474 379		DOLLY, Nozzle, 81-Nozzles	X
	P 150474 380		DOLLY, Nozzle, 144-Nozzles	X
1	P 150474 127		SCREW, Hex Head Nozzle	64
2	P 150474 134		PLUG, Pipe, 1/8 N.P.T	16
3	P 150474 024		WHEEL	8
4	P 49134 061		WASHER, Flat, 1/2 O.D x 17 64 I.D x 1/32	8
5	P 150474 129		O-RING	1
6	P 150474 393		RACK ASSEMBLY, Bottom	1
	P 150474 394		RACK ASSEMBLY, Bottom	1
	P 150474 395		RACK ASSEMBLY, Bottom	1
7	P 150474 442		RACK, Divider	2
	P 150474 443		RACK, Divider	2
	P 150474 444		RACK, Divider	2

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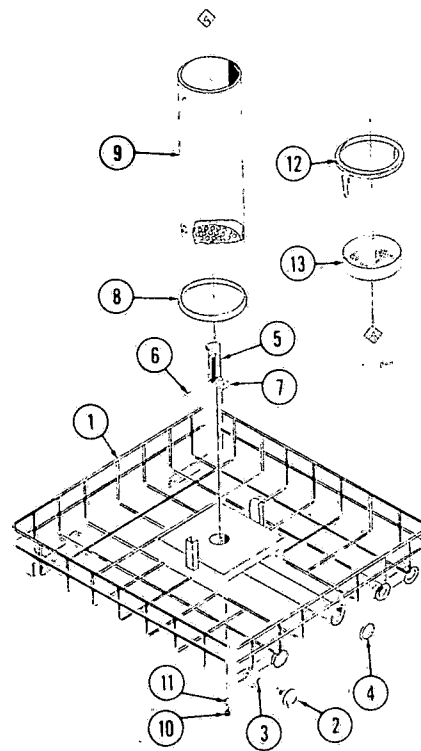
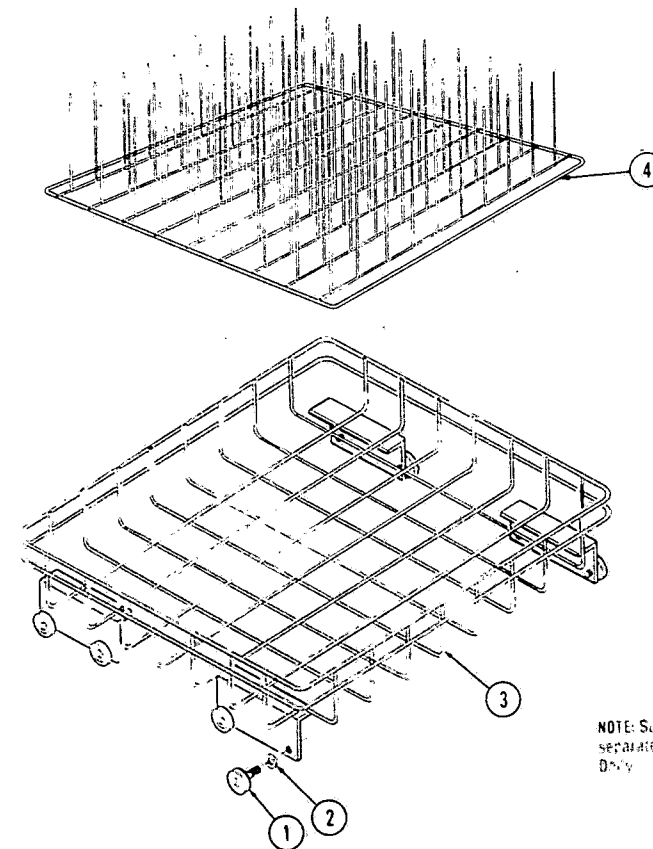


Figure 8-36. PIPETTE CLEANER ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-34-	P 150474 120		PIPETTE CLEANER ASSEMBLY: Flooded System	X
1	P 150474 117		CANISTER ASSEMBLY, Dolly	1
2	P 150474 024		WHEEL	8
3	P 49134 061		WASHER, Flat	8
4	P 150474 129		O-RING	1
5	P 150474 097		COVER ASSEMBLY	1
6	P 36683 061		• PIN, Roll	1
7	P 150474 099		• ROD	1
8	P 150474 096		GASKET	1
9	P 150474 094		CANISTER	1
10	P 12531 061		SCREW, Round Head, #6-32 x 3/8	2
11	P 19684 061		LOCKWASHER, #6	2
12	P 150474 126		RING ASSEMBLY	1
13	P 150474 125		RETAINER, Pipette	1

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NOTE: Support rack furnished separately from General Purpose Dolly.

Figure 8-37. GENERAL PURPOSE DOLLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-35-	P 150474 148		DOLLY, General Purpose	X
1	P 150474 024		WHEEL	8
2	P 49134 061		WASHER, Flat	8
3			DOLLY	1
4	P 150473 765		RACK, Support, 4-, 9- and 16-Spindle (See note)	A/R
	P 150473 766		RACK, Support, 25-Spindle (See note)	A/R
	P 150473 767		RACK, Support, 49-Spindle (See note)	A/R

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