AMSCO Maintenance Manual

PULSTAR SERIES

pulstar™ 2000 Cage and Rack Washer
pulstar™ 3000 Hospital Cart Washer

(8/86) **P-764174-001**

SV-5047

AMSCO | AMERICAN STERILIZER COMPANY • 8458 WEST 23rd STREET • AMSCO 4072 • ERIE • PENNSYLVANIA 16514

Printed in U.S.A.

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SUMMARY OF WARNINGS AND CAUTIONS

The following are personnel (WARNINGS) and equipment (CAUTIONS) **safety precautions** to be observed when operating or servicing this unit. This is a listing of all safety precautions appearing in the text. Carefully read them before proceeding to use or service the unit. Observance of these safety precautions will minimize the risk of personal injury or the possible use of improper maintenance methods which may damage the unit or render it unsafe. It is important to understand that these precautions are not exhaustive. AMSCO could not possibly know, evaluate and advise maintenance departments of all conceivable ways in which maintenance might be done or the possible hazardous consequences of each way.

The operation and maintenance procedures recommended by AMSCO are described in this manual. Only these recommended maintenance procedures should be followed.

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

WARNING: ALLOW UNIT TO COOL TO ROOM TEMPERATURE BEFORE STARTING INSPECTION AND MAINTENANCE WORK.

WARNING: HOT WATER MAY BE SPRAYED THROUGH DOOR OPENING WHEN CHECKING AUTOMATIC STOP SIGNAL OR OPENING DOOR FOR ANY REASON WHILE WASHER IS OPERATING. OPEN DOOR SLOWLY AND STAND AWAY FROM DOOR OPENING.

CAUTION: Turn power switch to OFF before proceeding with field test.

CAUTION: Electric shock hazard. Do not remove secondary control panel cover. Refer servicing to qualified service personnel.

CAUTION: Do not remove or replace printed circuit cards unless POWER switch on secondary control panel is positioned at OFF.

CAUTION: Use extreme care when removing panels to gain access to, and handling PC boards or other electronic components. Static electricity can damage certain electronic components resulting in total failure or shortened life of component or PC board.

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.

CAUTION: The pressure regulator for the recirculating water return (pinch) valve is factory preset at 35 to 40 psig. Water pressure in excess of 50 psig at pinch valve will damage the valve.

CAUTION: Verify that an adequate water supply is provided before making adjustments to pressure reducing valves to correct an inadequate level of fill.

CAUTION: Use of detergents with a high chloride content may be harmful to stainless steel.

SECTION 1

GENERAL INFORMATION

1.1 APPLICATION AND DESIGN

The product literature included in this section contains factual data relating to the principal descriptive and performance characteristics for AMSCO Cage and Rack, and Hospital Cart 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.

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AMSCO

pulstar® 2000
Cage and Rack Washer

TECH DATA

Cage and Rack Washer

DESCRIPTION

Microcomputer-controlled animal cage and rack washer, automatically proceeds through pre-wash, wash, rinse and vapor removal phases of cycle. The separate cycle **phase times**, except for **vapor removal** which is service adjustable, are **individually adjustable**, to compensate for widely varying soil conditions. For water and detergent conservation, the controls offer two basic cycles: Dump and No-Dump. If No-Dump cycle is selected, the wash water is retained in the storage tank for reuse during the wash phase of following cycles.

Size

Washer sizes are 105¼" x 83⅞"W x 112"H (2673 x 2130 x 2845 mm), or 105½" x 75⅞"W x 112"H (2680 x 1927 x 2845 mm). The door widths are 50" (1270 mm) or 42" (1067 mm), respectively. The chamber of the 50" washer accepts a load up to 49"W x 87"H x 89"L (1245 x 2210 x 2261 mm). The chamber of the 42" washer accepts a load up to 41"W x 87"H x 89"L (1041 x 2210 x 2261 mm).

Standards

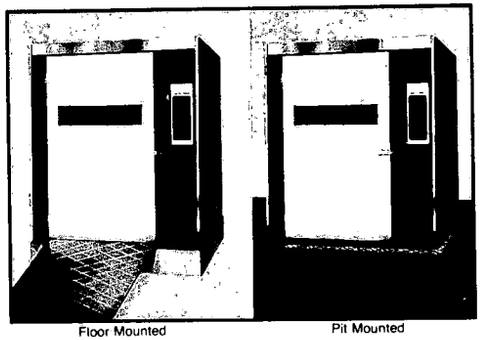
The washer meets applicable requirements of the following standards:

Underwriters Laboratories Incorporated.

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

National Plumbing Code.

ASTM Specification A240 for stainless steel, alloy 304.



Floor Mounted — Pit Mounted

Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Model
- ☐ Single Door
- ☐ Double Door

Options (Factory Installed)
- ☐ Steam Treatment Cycle
- ☐ Acid/Neutralize Cycle
- ☐ Water Temperature Booster

Door Width
- ☐ 42 Inches (1067 mm)
- ☐ 50 Inches (1270 mm)

Mounting
- ☐ Floor Level
- ☐ In Pit

Voltage*
- ☐ 200
- ☐ 230/460

Control Mounting (When facing door)
- ☐ Left Hand
- ☐ Right Hand

Shipping Mode
- ☐ Assembled
- ☐ Disassembled

Accessories
- ☐ Service Side Panels
- ☐ Non-Service Side Panels
- ☐ Rear Control Panel (Double Door Only)
- ☐ Barrier Wall Flanges
- ☐ Provisions for Bottle Washer Cart
- ☐ Universal Wash Rack
  - ☐ Basket: G.P. and Animal Cage: Qty.
  - ☐ Basket: Drop Pans: Qty.
- ☐ Bottle Washer Cart
  - ☐ 25 Compartment Rack (1 Pint Bottles), Qty.
  - ☐ 25 Compartment Rack (1 2 Pint Bottles) Qty.
  - ☐ 25 Compartment Rack Cover: Qty.
  - ☐ Basket: Sipper Tubes and Stoppers: Qty.
  - ☐ Covers: Sipper Tube Baskets Qty.
- ☐ Detergent Injection — Units with Acid/Neutralize Option
- ☐ Detergent Injection — Units without Acid/Neutralize Option
- ☐ Tipper Rail

*120 V, 1 phase secondary power supply required for controls.

Item No. _____

Location(s) _____

_____

_____

Because of American Sterilizer Company's continuing program of research and development, all specifications and descriptions are subject to change without notice.

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DESIGN FEATURES

Control Console

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

- **Quartz-crystal based timing.** Microcomputer inputs from thumbwheel 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(s) must be closed to initiate a cycle. If the door is open, status light DOOR OPEN alerts operator.
- **Temperature Monitoring.** If the water does not reach 180° F (82° C) during the rinse phase, the rinse time is automatically extended up to four minutes. If temperature still has not reached 180° F (82° C), the cycle continues to completion. An intermittent buzzer and flashing alarm signal that the 180° F (82° C) was not reached. Signals continue until STOP is pushed or door is opened.

Control panel is illuminated only when power is on. Top portion shows cycle status and warning signals. Lower portion has cycle phase indicators, digital readout, and cycle START and STOP selections. Time readout is by large, easy-to-see LEDs that first indicate set time and then, as cycle continues, count 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, 140° F (60° C) RINSE, 180° F (82° C) RINSE, are made individually on this panel by four thumbwheel timers. Set points are adjustable in increments of one minute, from 0-99. The RETAIN/DUMP switch provides for reuse of the wash water/detergent solution during the following wash cycle, if conditions permit. The HEAT ON/OFF switch is for washing heat-sensitive materials. In the OFF position, it prevents rinse or wash water temperature from rising above 140° F (60° C). EXTEND CYCLE ON/OFF switch is used to override the thumbwheel switches when extending the length of a rinse or wash phase. Drain switch provides for disposal of all water from the system. Available as **options**, the following three controls offer even greater flexibility for washing conditions:

- ACID/REGULAR allows the selection of an acid prewash phase for equipment contaminated by scale or animal urine.
- STEAM ON/OFF provides for the selection of a steam treatment phase. If this is chosen, the chamber will fill with steam for sixty seconds at the end of the last rinse phase.
- The CART ON/OFF switch is provided when the washer has been equipped with the piping connections for the bottle cart washer accessory. The cart washer is designed to wash one or one-half pint bottles.

Safety Features

Controls prevent start of cycle if the door (either door on pass-through units) is open. DOOR OPEN light will be on. Door can be opened from **inside the chamber.**

Under any stop conditions, all automatic valves revert to their normal, nonprocessing state. These valves are so positioned that they present no hazard to any personnel within or around the machine.

After any interruption which terminates the cycle before it is completed, the controls require that the operator restart the cycle from the beginning.

If the chamber door is opened while a cycle is in progress, the controls will instantly terminate the cycle.

Washing/Rinsing System

Washing and rinsing water is pumped through 10 rotating spray arms and one set of stationary spray nozzles. During each phase of the cycle, forceful jets of rinsing or detergent water are applied to the load at the rate of more than 30 gpm (114 lpm) through each rotating arm. Two rotating spray arms are located at the top of the chamber, four on each side. The spray nozzles on the bottom are fixed. Spraying action is controlled in such a way that spray arms on one side and the top operate for 20 seconds, then the other side and the bottom for 20 seconds. This pulsing action continues for each rinse and wash phase. All recirculatory piping is stainless-steel.

The washer is equipped with a stainless-steel wash tank which contains the recirculating water or solution. Water level is controlled by high and low level sensors, and water temperature is maintained at 140-180° F (60-82° C), according to cycle phase requirements, by the injection of steam into the tank. An optional **water temperature booster** is available where inlet water is not available at 140° F (60° C).

Discharge water flows through a drain tank where it is cooled by the addition of cold water to at least 140° F (60° C) before entering the building drain.

Filtration System

The filtration system removes soil which could be detrimental to the system. This is accomplished by the use of stainless-steel filter baskets in the bottom of the wash tank.

Vapor Removal System and Vent Relief

A vapor-removal phase is provided following the final rinse. At the top of the chamber is a 11¼ x 19½-inch (286x495 mm) vent opening. This should be connected, by ducting, to either the building exhaust system or the outside of the building. This vent relief will eliminate all visible hot vapors contained within the chamber prior to opening the door(s) thus preventing the operator from being exposed to these hot vapors.

Servicing

Microcomputer is exposed for service by the removal of four screws holding the front 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, electrical components (except computer) and wiring are in the service compartment, easily accessible through the two pairs of optional service doors on the control side of the machine. These design features are intended to reduce downtime for maintenance 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 Requirements 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

Chamber, door(s), and the jambs are of stainless-steel, double-wall construction, with sheet insulation to maintain exterior metal surfaces at no more than 25° F (14° C) above ambient room temperature. Chamber is bolted and sealed watertight. Chamber interior has **coved corners to eliminate soil traps** and seams have been kept to a minimum. Door is designed to channel water from door area to drain and has safety glass viewing window. A service light, which can be left on during washer operation, illuminates the chamber interior.

Mounting Arrangement

The cage and rack washer can be furnished for either floor-level mounting or for mounting in a pit. The model for floor-level mounting includes a ramp (or ramps, if a double-door model) from the structural floor to the chamber floor ... ramp is diamond-embossed aluminum and sized to match door width.

The model for pit mounting includes cover plate support angles bolted along the bottom perimeter of the machine. (Note: Owner must furnish and install cover plate support angles at the perimeter of the pit and provide one-fourth inch (6.5 mm) thick plates to bridge the gap between the washer and edge of the pit.)

Knockdown Assembly

If the purchaser chooses this option, the cage and rack washer will be broken down into sub-assemblies and shipped disassembled from the factory. The sub-assemblies for the 42" (1067 mm) model will fit through a 35" W x 83" H (889 x 2108 mm) doorway. The sub-assemblies for the 50" (1270 mm) model will fit through a 35 x 89" (889 x 2261 mm) doorway.

Universal Wash Rack (Accessory)

For washing small metal and plastic animal cages up to 10 inches (254 mm) maximum depth. Shelves are removable and adjustable. Solid shelves are sloped for drainage. The wash rack accommodates drop pans up to 36" x 48" (914 x 1219 mm) maximum. Constructed of stainless steel.

Bottle Washer Cart (Accessory)

For washing and rinsing the inside and outside of bottles. The cart is equipped with piping which connects to a quick-connect manifold in the washer without the use of tools. The cart can be used to process six 25-bottle baskets (8 oz. and 16 oz. sizes) at one time.

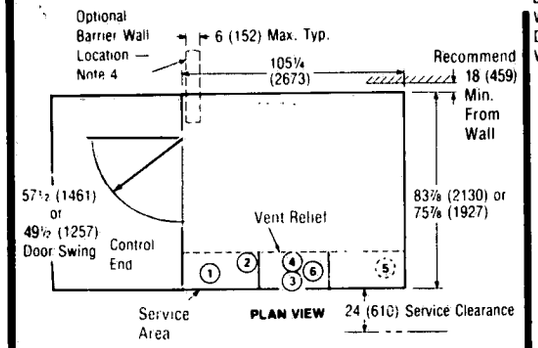
ENGINEERING DATA

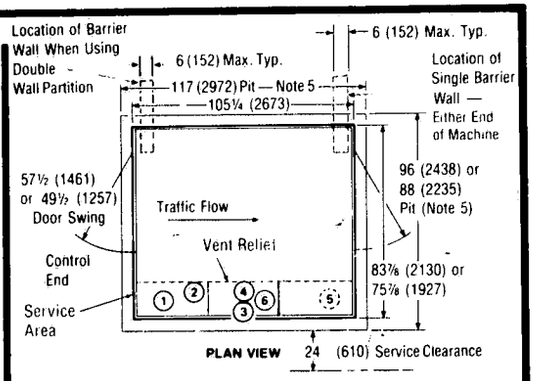
MODEL inches (mm)	SIZE inches (mm)	WEIGHT lbs (kg)	UTILITIES CONSUMPTION				HEAT LOSS
			Steam*† lbs/cycle (kg/cycle)	Hot Water gallons/cycle (l/cycle)	Cold Water ** gallons/cycle (l/cycle)	Electricity — Amps	
50 (1270)	105½ x 83⅞ x 112 (2680 x 2130 x 2845)	7000 (3175)	155 (70)	200 (757)	135 (511)	120 VAC — 15 Amps 200 3Ø — 33 Amps 230 3Ø — 28 Amps 460 3Ø — 14 Amps	20,000 BTU/hr (without steam treatment) 50,000 BTU/hr (with steam treatment)
42 (1067)	105½ x 75⅞ x 112 (2680 x 1927 x 2845)	6500 (2950)	135 (61)	175 (662)	125 (473)	120 VAC — 15 Amps 200 3Ø — 33 Amps 230 3Ø — 28 Amps 460 3Ø — 14 Amps	20,000 BTU/hr (without steam treatment) 40,000 BTU/hr (with steam treatment)

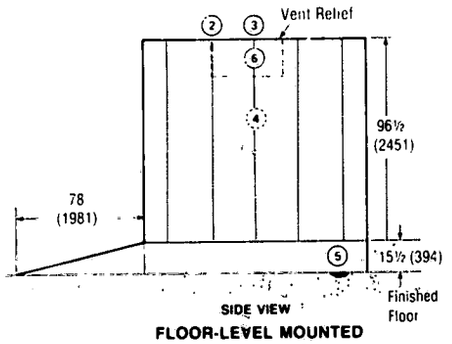
At 80 psig (5.63 kg per sq cm) with flow rate of 960 lb/hr (1300 lbs/hr with water temperature booster).

**Add 20 gallons/cycle (76 l/cycle) for ductless vent accessory.*

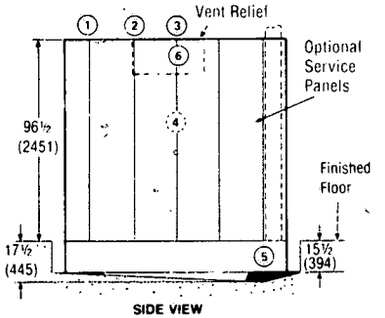
†Add 10 lbs (4.5 kg) per cycle if machine equipped with water temperature booster option.*







FLOOR-LEVEL MOUNTED
(Single-door Unit Shown)



PIT MOUNTED
(Double-door Unit Shown)

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

OPERATING REQUIREMENTS

1. HOT WATER — 1¼ NPT, 140° F (60° C) minimum (40-60 psig [2.81-4.32 kg per sq cm]; 28-30 psig [2.02-2.16 kg per sq cm] under flow condition)
2. STEAM — 1¼ NPT (50-80 psig [3.52-5.63 kg per sq cm], dynamic) with 20 lb/min flow rate
3. COLD WATER — 1 NPT (40-60 psig [2.81-4.32 kg per sq cm]; 28-30 psig [2.02-2.16 kg per sq cm] under flow condition)
4. TERMINAL BOX — 200 Volt, 230 Volt, or 460 Volt, 60 Hz, Three Phase. 120 VAC, 60 Hz, Single Phase for controls.
5. DRAIN — 2 NPT from cart washer to open drain (4 inch [102 mm] minimum drain is recommended)
6. VENT RELIEF CONNECTION — 11¼ x 19½ inch (286 x 495 mm) 250 CFM minimum at ½-inch water static pressure. opening is provided for connection, by ducting, either to the outside of the building or to the building exhaust system. Vent system is to be water tight and sloped to drain back into the vent relief connection.

... 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.
2. Eleven inches (279 mm) for vent connection. All washers have two 8" (203 mm) high vacuum breakers mounted on top of cabinet.
3. Units shown are with service compartment to the right when facing the operating controls; clearances for units with controls to the left are opposite, but identical.
4. Clearance between barrier wall and washer should be 1½ inches (38 mm) on all sides. If possible, unit should be installed before barrier wall is erected.
5. Pit dimensions shown provide a suggested 6-inch (152 mm) minimum clearance between edge of washer and pit. Cover-plates (¼-inch [6.5 mm] steel) are recommended to bridge the area between the pit and washer.
6. Approximate weight of 50" unit — 7000 lbs (3175 kg); approximate weight of 42" unit — 6500 lbs (2950 kg)
7. • 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.

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

AMSCO

pulstar® 3000
Hospital Cart Washer

TECH DATA

Hospital Cart Washer

DESCRIPTION

Microcomputer-controlled hospital cart washer, automatically proceeds through pre-wash, wash, rinse and vapor removal phases of cycle. The separate cycle **phase times** are **individually adjustable**, except for **vapor removal** which is service adjustable, to compensate for widely varying soil conditions. For water and detergent conservation, the controls offer two basic cycles: Dump and Retain. If Dump cycle is selected, the wash water is dumped to the drain. If Retain is selected, the wash water is retained for use in wash phase of following cycles.

Size

Washer size is 105½"L x 67⅞"W x 112"H (2680 x 1724 x 2845 mm). The door width is 34" (864 mm). The chamber accepts a load up to 33"W x 87"H x 89"L (838 x 2210 x 2261 mm).

Standards

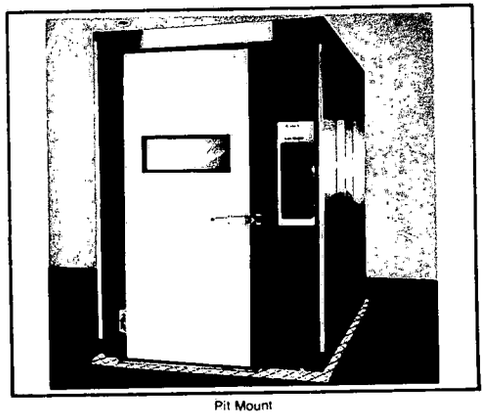
The washer meets applicable requirements of the following standards:

Underwriters Laboratories Incorporated.

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

National Plumbing Code.

ASTM Specification A240 for stainless steel, alloy 304.



Pit Mount
Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Model
☐ Single Door
☐ Double Door

Option (Factory Installed)
☐ Water Temperature Booster

Mounting
☐ Floor Level
☐ In Pit

Voltage*
☐ 200
☐ 230/460

Control Mounting (When facing door)
☐ Left Hand
☐ Right Hand

Shipping Mode
☐ Assembled
☐ Disassembled

Accessories
☐ Service Side Panels
☐ Non-service Side Panels
☐ Rear Control (Pass Thru Units)
☐ Barrier Wall Flanges
☐ Tipper Rail
☐ Detergent Injection Package

**120 V, 1 phase secondary control supply required for controls.*

Item No. _____
Location(s) _____

Because of American Sterilizer Company's continuing program of research and development, all specifications and descriptions are subject to change without notice.

Printed in U.S.A.

DESIGN FEATURES

Control Console

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

- **Quartz-crystal based timing.** Microcomputer inputs from thumbwheel 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(s) must be closed to initiate a cycle. If the door is open, status light DOOR OPEN alerts operator.

- **Temperature Monitoring.** If the water does not reach 180° F (82° C) during the rinse phase, the rinse time is automatically extended up to four minutes. If temperature still has not reached 180° F. (82° C) the cycle continues to completion. An intermittent buzzer and flashing alarm signal that 180° F (82° C) was not reached. Signals continue until STOP is pushed or door is opened.

Control panel is illuminated only when power is on. Top portion of panel shows cycle status and phase. Lower portion has digital readout, warning signals, and cycle START and STOP selections. Time readout is by large, easy-to-see LEDs that first indicate set time and then, as cycle continues, count 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 three cycle phases, PREWASH, WASH, RINSE are made individually on this panel by three thumbwheel timers. Set points are adjustable in increments of one minute, from 0 – 99. The RETAIN/DUMP switch provides for disposal of the wash water/detergent solution when reuse during the subsequent cycle is not desirable. The HEAT ON/OFF switch is for washing heat-sensitive materials. In the OFF position, it prevents rinse or wash water from rising above 140° F (60° C). EXTEND CYCLE ON/OFF switch is used to override the thumbwheel switches for manual control of the length of a rinse or wash phase. Drain switch provides for disposal of all water from the system.

Safety Features

Controls prevent start of cycle if the door (either door on pass-through units) is open. DOOR OPEN light will be on. Door can be opened **from inside the chamber.** Under any stop conditions, all automatic valves revert to their normal, nonprocessing state. These valves are so positioned that they present no hazard to any personnel within or around the machine.

After any interruption which terminates the cycle before it is completed, the controls require that the operator restart the cycle from the beginning.

If the chamber door is opened while a cycle is in progress, the controls will instantly terminate the cycle.

Washing/Rinsing System

Washing and rinsing water is pumped through 10 rotating spray arms and one set of stationary spray nozzles. During each phase of the cycle, forceful jets of rinsing or detergent water are applied to the load at the rate of more than 30 gpm (114 lpm) through each rotating arm. Two rotating spray arms are located at the top of the chamber, four on each side. The spray nozzles on the bottom are fixed. Spraying action is controlled in such a way that spray arms on one side and the top operate for 20 seconds, then the other side and the bottom for 20 seconds. This pulsing action continues for each rinse and wash phase. All recirculatory piping is stainless steel.

The washer is equipped with a stainless-steel wash tank which contains the recirculating water or solution. Water level is controlled by high and low level sensors, and water temperature is maintained at 140-180° F (60-82° C), according to cycle phase requirements, by the injection of steam into the tank. An optional water temperature booster is available where inlet water is not available at 140° F (60° C). Discharge water flows through a drain tank where it is cooled by the addition of cold water to at least 140° F (60° C) before entering the building drain. Final rinse water is retained for pre-wash of the following cycle. If drain is selected, it will be disposed of to waste.

Filtration System

The filtration system removes soil which could be detrimental to the system. This is accomplished by the use of stainless-steel filter baskets in the bottom of the wash tank.

Vapor Removal System and Vent Relief

A vapor-removal phase is provided following the final rinse. At the top of the chamber is a 11¼ x 19½-inch (286x495 mm) vent opening. This should be connected, by ducting, to either the building exhaust system or the outside of the building. This vent relief will eliminate all visible hot vapors contained within the chamber prior to opening the door(s) thus preventing the operator from being exposed to these hot vapors.

Servicing

Microcomputer is exposed for service by the removal of four screws holding the front 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, electrical components (except computer) and wiring are in the service side area, easily accessible on the control side of the machine. Microcomputer program contains a series of self-diagnosing alarms which alert the operator in the event of washer malfunction and indicate the probable source of the problem.

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

Chamber door(s), and jambs are of stainless-steel double wall and insulated construction so exterior surfaces are no more than 25° F (14° C) above ambient room temperature. Chamber is bolted and sealed watertight. Chamber interior has **coved corners to eliminate soil traps** and seams have been kept to a minimum. Door is designed to channel water from door area to drain and has safety glass viewing window. A service light, which can be left on during washer operation, illuminates the chamber interior.

Mounting Arrangement

The hospital cart washer can be furnished for either floor-level mounting or for mounting in a pit. The model for floor-level mounting includes a ramp (or ramps, if a double-door model) from the structural floor to the chamber floor. Ramp is full-width, diamond-embossed aluminum.

The model for pit mounting includes cover plate support angles bolted along the bottom perimeter of the machine. (Note: Owner must furnish and install cover plate support angles at the perimeter of the pit and provide one-fourth inch (6.5 mm) thick plates to bridge the gap between the washer and edge of the pit.)

Knockdown Assembly

If the purchaser chooses this option, the cart washer will be broken down into sub-assemblies and shipped disassembled from the factory. The sub-assemblies will fit through a 35" W x 83" H (889 x 2108 mm) doorway.

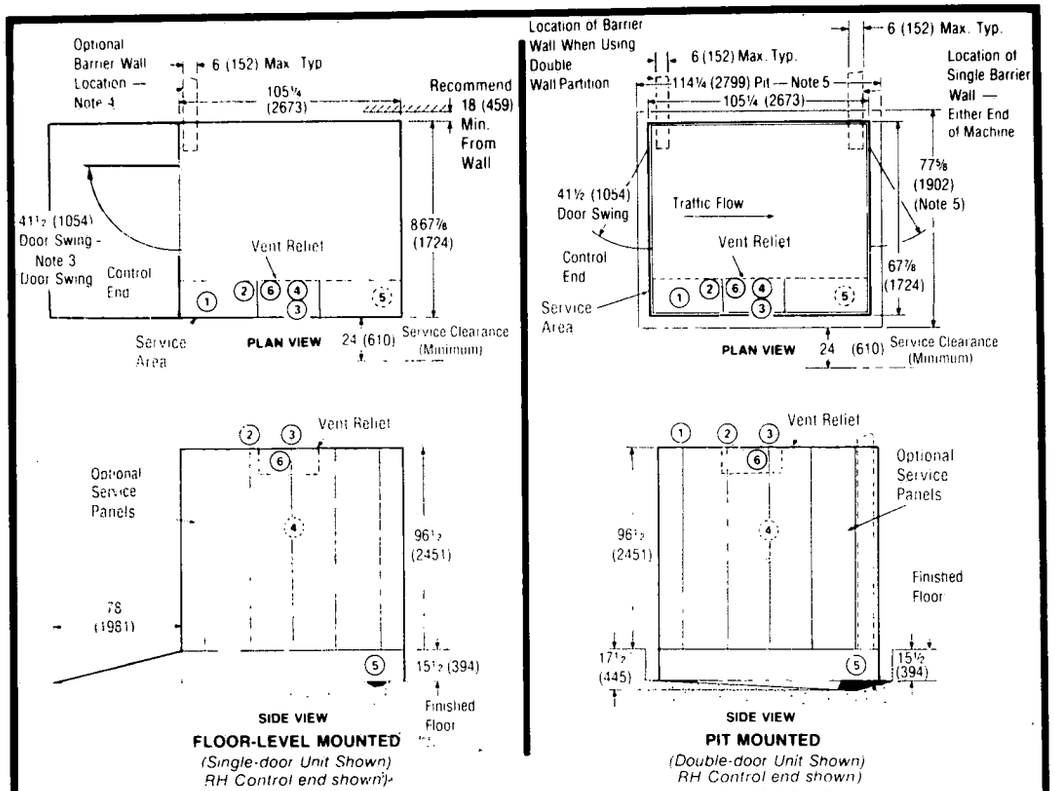
ENGINEERING DATA

SIZE inches (mm)	WEIGHT lbs (kg)	UTILITIES CONSUMPTION				HEAT LOSS
		Steam *† lbs/cycle (kg/cycle)	Hot Water gallons/cycle (l/cycle)	Cold Water ** gallons/cycle (l/cycle)	Electricity — Amps	
105½ x 67⅞ x 112 (2680 x 1724 x 2845)	6000 (2722)	62 (28)	80 (303)	105 (398)	120 VAC—15 Amps 200 3Ø — 33 Amps 230 3Ø — 28 Amps 460 3Ø — 14 Amps	20,000 BTU/hr

*At 80 psig (5.63 kg per sq cm) with a flow rate of 960 lb hr (1300 lb hr with water temperature booster option)

**Add 20 gallons cycle (76 l cycle) with ductless vent accessory

†Add 10 lbs (4.5 kg) per cycle if machine equipped with water temperature booster option



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

OPERATING REQUIREMENTS

(1) HOT WATER — 1" NPT, 140° F (60° C) minimum (40-60 psig [2 81-4 32 kg per sq cm]; 28-30 psig [2 02-2 16 kg per sq cm] under flow condition)

(2) STEAM — 1" NPT (50-80 psig [3 52-5.63 kg per sq cm], dynamic) with 20 lb/min flow rate

(3) COLD WATER — 1 NPT (40-60 psig [2 81-4 32 kg per sq cm], 28-30 psig [2 02-2 16 kg per sq cm] under flow condition)

(4) TERMINAL BOX — 200 Volt, 230 Volt, or 460 Volt, 60 Hz, Three Phase 120 VAC, 60 Hz, Single Phase for controls

(5) DRAIN — 2 NPT from cart washer to open drain (4 inch [102 mm] minimum drain is recommended)

(6) VENT RELIEF CONNECTION — 11¼ x 19" inch (286 x 495 mm) 250 CFM minimum at ½-inch water static pressure, opening is provided for connection, by ducting, either to the outside of the building or to the building exhaust system. Vent system is to be water tight and sloped to drain back into the vent relief connection

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.

2 Eleven inches (279 mm) for vent connection. All washers have two 8" (203 mm) high vacuum breakers mounted on top of cabinet.

3 Units shown are with service compartment to the right when facing the operating controls; clearances for units with controls to the left are opposite, but identical.

4 Clearance between barrier wall and washer should be 1½ inches (38 mm) on all sides. If possible, unit should be installed before barrier wall is erected.

5 Pit dimensions shown provide a suggested 6-inch (152 mm) minimum clearance between edge of washer and pit. Cover-plates (¼-inch [6.5 mm] steel) are recommended to bridge the area between the pit and washer.

6 Approximate weight — 6000 lbs (2722 kg)

7
- 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.

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

SECTION 2

SECTION 2

OPERATING INSTRUCTIONS: CAGE AND RACK WASHER

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 7, TROUBLESHOOTING, 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 4, PRINCIPLES OF OPERATION, before beginning actual operation.

2.2 BEFORE OPERATING THE EQUIPMENT

1. Open the chamber door. Lift the floor grating and make sure that the filter baskets on the wash tank are clean. For cleaning procedure, see Section 5.3. Replace the baskets.

2. Be sure the tipper rail (if used) on loading track is at side opposite air inlet vent.

3. Remove gross soil from cages and racks before placing them in the chamber. Place the items to be cleaned in center of chamber. If the cages or racks to be washed are enclosed, open the doors and position the items so that the open side faces the inlet vent side of the washer and are at an angle which will insure adequate drainage and aid in drying. (The inlet vent is on the side of the washer which has the service access doors.)

4. Close the chamber door(s).

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

NOTE: Electrical power for controls and pump(s) must be as specified on "Equipment Drawing."

6. Check that house water and steam supply valves are on.

NOTE: Water quality to be as follows: hardness not to exceed 170 ppm; total dissolved solids not to exceed 500 ppm; alkalinity not greater than 150 ppm. Supply water of lesser quality should be treated or conditioned prior to entering the washer.

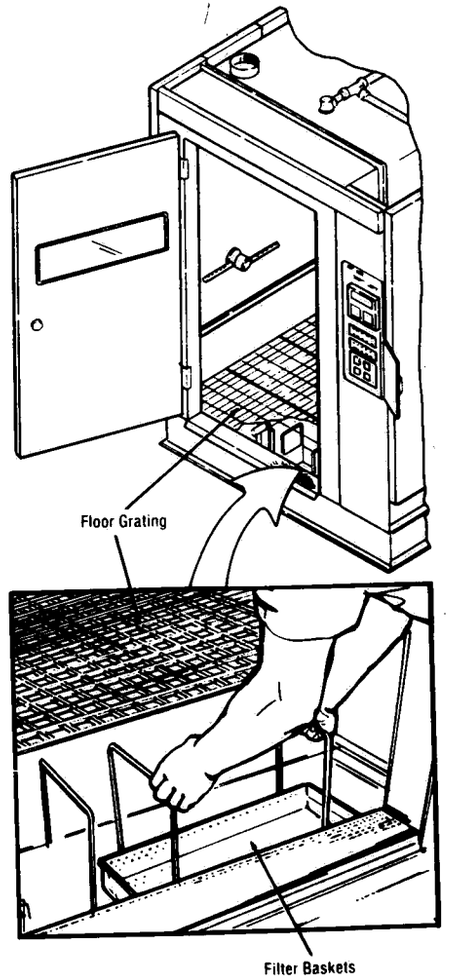


Figure 2-1. LIFT FLOOR GRATING AND CLEAN FILTER BASKETS.

2.3 WASHER OPERATION: PREPARATORY ACTIONS

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

2. Position HEAT switch to ON for washing water temperature at 160° F and last rinse water at 180° F. Position the HEAT switch OFF for washing and rinsing temperature at approximately 140° F.

3. If it is desired to drain the recirculating water tank and the detergent water storage tank, press DRAIN switch. When tank is empty, panel light TANK EMPTY will come on. If DRAIN switch is **not** pressed, the water in the recirculating tank (from the last rinse of previous cycle) will be used for PREWASH phase. If the wash water has been retained from the previous cycle (WASH switch was on RETAIN during previous cycle), that water will be used during the WASH phase.

2.4 STANDARD CYCLE: DUMP

1. For the STANDARD cycle, place cycle switches on the secondary panel in the following positions:

PREWASH — REGULAR (OPTION)
WASH — DUMP
STEAM — OFF (OPTION)
CART — OFF (OPTION)
EXTENDED CYCLE — OFF

2. STD CYCLE panel light on primary panel will come on.

3. Dial the desired cycle phase times on the four thumbwheel switches on the secondary panel. All time settings are adjustable 0-99 minutes. Adjust times for actual soil conditions. Typical time settings for **both** Dump (Standard) and Retain (Alternate) cycles are as follows:

	Minutes
PREWASH:	01
WASH:	02
140° RINSE:	01
180° RINSE:	01

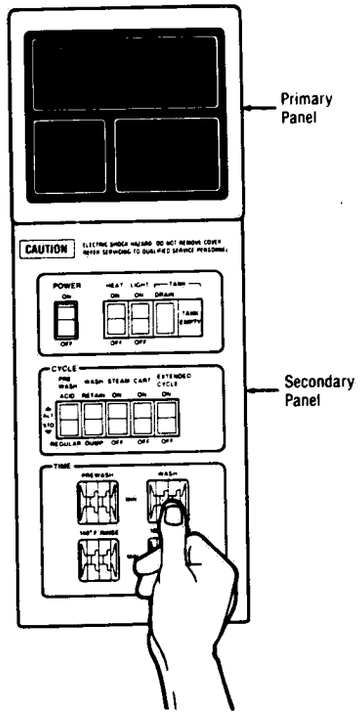


Figure 2-2. DIAL TIMES ON THUMBWHEEL SWITCHES.

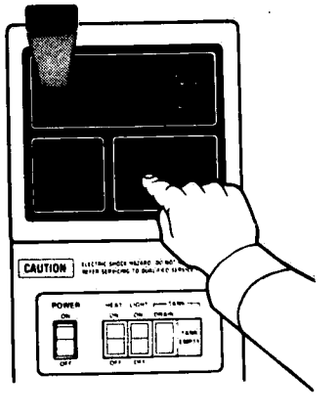


Figure 2-3. PRESS START PUSHBUTTON.

4. Close chamber door. Check that DOOR OPEN light is off.

5. Press START pushbutton. PREWASH light on primary panel will come on, and cycle will begin. If empty, wash tank will fill. Prewash will begin when tank is full.

NOTE: Recommend AMSCO Sparkle Jet Detergent. Available as follows:

One gallon container — P-757292-001
Five gallon pail — P-761573-001
Thirty gallon drum — P-761574-001

Also recommend AMSCO automatic detergent injection system part B-150477-068 or B-150477-067 for injection system with acid/neutralize option.

6. If the washer is **not** equipped with an automatic detergent dispenser, it will be necessary to stop the cycle and add the detergent after the PREWASH phase is complete. Do this by following the steps below:

a. Wait until WASH light comes on.

b. Press STOP pushbutton.

c. Open door. Cycle will stop and automatically reset.

d. Add AMSCO Sparkle Jet Detergent to wash tank in the recommended amounts. For 50" washer use 75 ounces and for 42" washer use 66 ounces. Close the door.

NOTE: Quantities of detergent specified apply to start up of machine or when wash water is not reused after each cycle.

e. Reset PREWASH thumbwheel switch to 00. Press START pushbutton again. Cycle will omit PREWASH and proceed to WASH phase.

7. After PREWASH is completed, WASH light on primary panel will come on. The inlet water (140° F) will be heated to 160° F. Washing action will continue for time setting on thumbwheel switches.

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

9. Fresh water is admitted into wash tank. Rinse water temperature is 140° F. Panel light RINSE comes on and rinsing action continues for time setting on 140° RINSE thumbwheel switch.

10. After first rinse time setting has elapsed, the water will be drained from the machine. Fresh water is admitted into the wash tank. Water is heated from 140° F to 180° F. Rinsing action begins and continues for time setting on 180° RINSE thumbwheel switch. After the set time has elapsed, the second rinse water will remain in the wash tank and will be reused for the pre-wash phase of the next cycle.

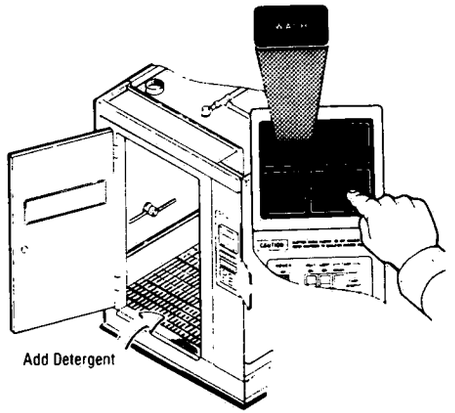


Figure 2-4. ADD DETERGENT TO WASH TANK.

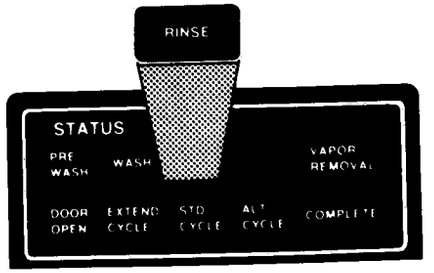


Figure 2-5.

11. The final phase of the cycle is the vapor removal phase which lasts for the fixed time of two and one-half minutes. Panel light VAPOR REMOVAL will come on.

12. At the conclusion of the cycle, panel light COMPLETE comes on and buzzer sounds for 10 seconds or until door is opened.

2.5 ALTERNATE CYCLES

The RETAIN/DUMP cycle switch and the EXTENDED CYCLE switch are standard on all AMSCO cage and rack washers. As optional equipment, the washer may be equipped with the following alternate cycle switches: PREWASH: ACID /REGULAR; STEAM: ON/OFF; CART: ON/OFF. These alternate cycle switches may be used individually or in combination to suit the washing requirements for particular conditions or individual cases. The alternate cycles function as follows:

2.5.1 Acid Prewash

1. This cycle is to be used for removing scale and animal urine from racks and cages. Follow instructions above in paragraphs 2.2, BEFORE OPERATING THE EQUIPMENT, and 2.3, WASHER OPERATION: PREPARATORY ACTIONS.

2. Place ACID/REGULAR switch in ACID position. ALT CYCLE panel light will come on.

3. Follow operational instructions in paragraph 2.4, STANDARD CYCLE. beginning with step 3. During the prewash phase. a fixed amount of acid will be injected into the prewash water. At the end of the prewash phase. neutralizer is added to the solution to neutralize the acid before it is discharged to drain. Cycle then progresses as with STANDARD CYCLE.

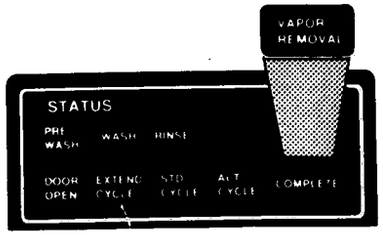


Figure 2-6.

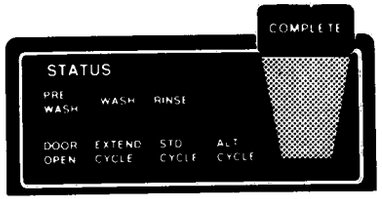


Figure 2-7.

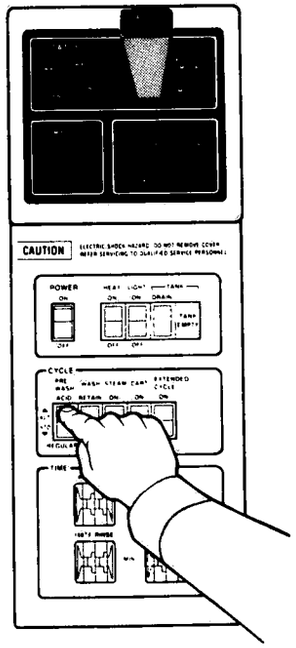


Figure 2-8.

2.5.2 Steam Treatment

1. This cycle will inject steam into the chamber for 60 seconds after the last rinse. Follow instructions above in paragraphs 2.2, BEFORE OPERATING THE EQUIPMENT, and 2.3, AUTOMATIC OPERATION: PREPARATORY ACTIONS.

2. Place STEAM switch in ON position. ALT CYCLE panel light will come on.

3. Follow operational instructions in paragraph 2.4, STANDARD CYCLE, beginning with step 3. Cycle will progress as STANDARD cycle, except steam will be injected into the chamber between the end of the rinse phase and the beginning of the vapor removal phase. RINSE light will stay on.

2.5.3 Bottle Washer Cart

1. This cycle is to be used with the bottle washer cart for the washing and rinsing of 8 oz. and 16 oz. bottles. The cart can hold six baskets, each with a capacity of 25 bottles.

2. Connect one end of the hose assembly to the adaptor inside the chamber and the other to the manifold on the bottle washer cart.

3. Follow applicable instructions above in paragraph 2.2. BEFORE OPERATING THE EQUIPMENT. and 2.3. WASHER OPERATION: PREPARATORY ACTIONS.

4. Place CART switch in ON position. ALT CYCLE panel light will come on.

5. Follow operational instructions in paragraph 2.4. STANDARD CYCLE. beginning with step 3. Cycle will progress as STANDARD cycle does.

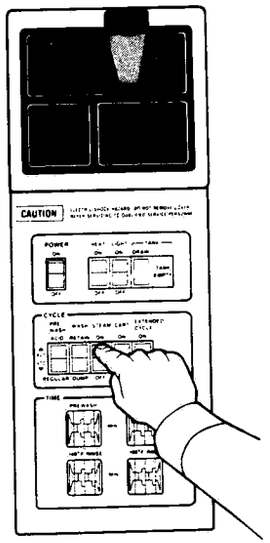


Figure 2-9.

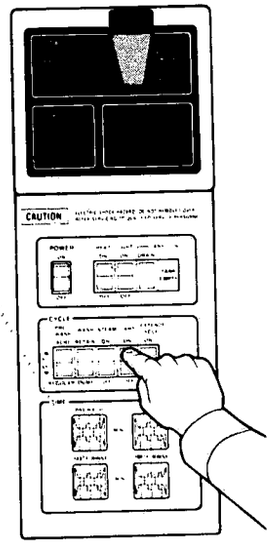


Figure 2-10.

2.5.4 Retain Cycle

1. The retain cycle is to be used when washing conditions permit the reuse of wash water and detergent for a subsequent cycle or cycles.

2. Follow instructions above in paragraphs 2.2, BEFORE OPERATING THE EQUIPMENT, and 2.3, WASHER OPERATION: PREPARATORY ACTIONS.

3. Place WASH switch in RETAIN position. ALT CYCLE light will come on.

4. Follow operational instructions in paragraph 2.4, STANDARD CYCLE, beginning with step 3. The cycle will progress as the STANDARD cycle, except that at the end of the wash phase, the washing solution will be pumped to the storage tank for reuse during the next cycle.

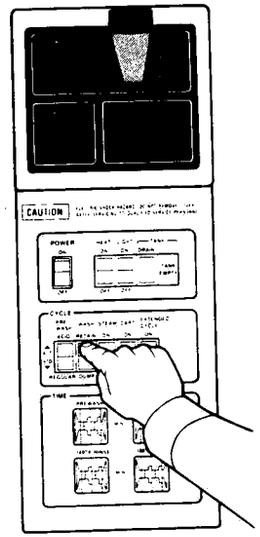


Figure 2-11.

2.5.5 Extended Cycle

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

2. To extend 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 0). EXTEND CYCLE panel light will come on, digital readout shows 0, and phase will continue as long as EXTENDED CYCLE switch is on.

3. To reduce the cycle, place the EXTENDED CYCLE switch in the ON position. When the digital readout shows 0, return EXTENDED CYCLE switch to OFF position. Cycle will continue through phases.

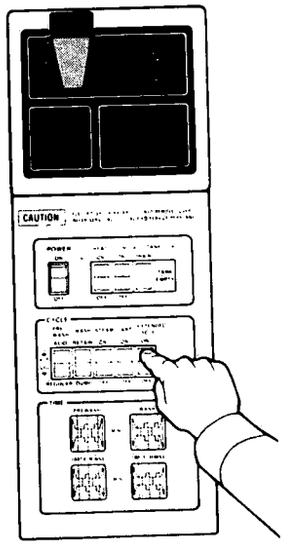


Figure 2-12.

2.6 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.

This alarm indicates that, during the WASH phase of a cycle, the return time for detergent water (from storage to wash tank) has exceeded a preset maximum allowable length. See Troubleshooting Chart, Section 7, for possible causes and remedies.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the high water level probe in the wash tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the low water level probe in the wash tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the low water level probe in the storage tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the low water level in the drain tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

*NOTE: During any of the alarms, the buzzer can be shut off by pressing START pushbutton. The digital display will continue flashing until the problem is corrected. If the problem persists two minutes after START is pushed, buzzer will again start to sound.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the wash tank drain time, for any one of the cycle phases, has exceeded a preset maximum allowable length. Pump will turn off automatically. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

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 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

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 7, for possible causes and corrections.

OPERATOR ACTION: NOTE WHICH PHASE LIGHT IS ON. PRESS **STOP** SWITCH ON PANEL.

This alarm indicates the steam supply valve (to heat water) has been open for an excessive period during any phase of a cycle. Cycle will automatically proceed to vapor removal cycle phase, and then completion. Panel status light will be on to indicate during which phase malfunction occurred. COMPLETE light will also be on. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: NOTE ALARM. PRESS **STOP** SWITCH ON PANEL.

This alarm indicates that the temperature of the final rinse water did not reach 180° F by the end of the second rinse phase, as set on the thumbwheel switches. Panel phase light will show COMPLETE. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the maximum allowable time for wash water to be pumped back to the storage tank (after the wash phase of a "retain" cycle) has been exceeded. See Troubleshooting Chart, Section 7, for possible causes and corrections.

SECTION 3

SECTION 3

OPERATING INSTRUCTIONS: HOSPITAL CART WASHER

3.1 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 7, TROUBLESHOOTING, 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 4, PRINCIPLES OF OPERATION, before beginning actual operation.

3.2 BEFORE OPERATING THE EQUIPMENT

1. Open the chamber door. Lift the floor grating and make sure that the filter baskets on the wash tank are clean. For cleaning procedure, see Section 5.3. Replace the baskets.

2. Be sure the tipper rail (if used) on loading track is at side opposite air inlet vent.

3. Remove gross soil from carts before placing them in the chamber. Place the items to be cleaned in center of chamber. If the cart to be washed is a closed one, open the doors and position the cart so that the open side faces the inlet vent side of the washer and is at an angle which will insure adequate drainage and aid in drying. (The inlet vent is on the side of the washer which has the service access doors.)

4. Close the chamber door(s).

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

NOTE: Electrical power for controls and pump(s) must be as specified on "Equipment Drawing."

6. Check that house water and steam supply valves are on.

NOTE: Water quality to be as follows: hardness not to exceed 170 ppm; total dissolved solids not to exceed 500 ppm; alkalinity not greater than 150 ppm. Supply water of lesser quality should be treated or conditioned prior to entering the washer.

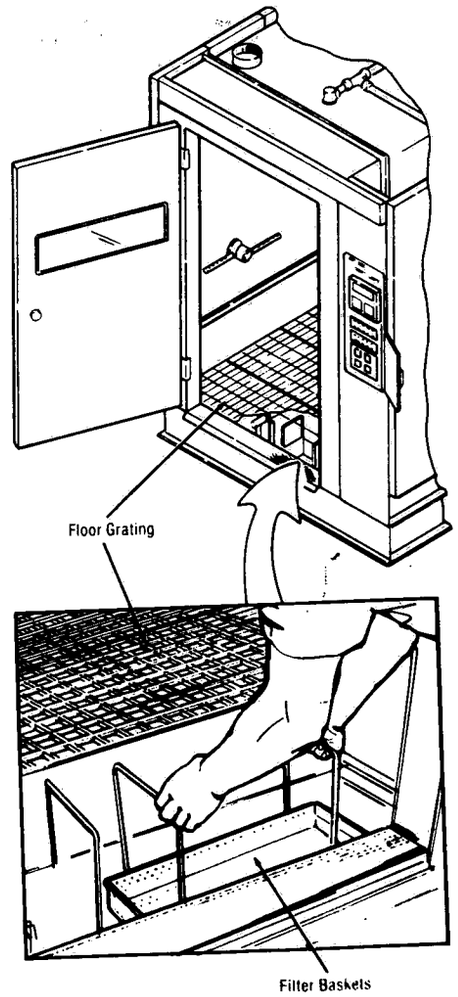


Figure 3-1. LIFT FLOOR GRATING AND CLEAN FILTER BASKETS.

3.3 WASHER OPERATION: PREPARATORY ACTIONS

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

2. Position HEAT switch ON for washing water temperature at 160° F and rinse water at 180° F. Position the HEAT switch OFF for washing and rinsing temperature at approximately 140° F.

3. If it is desired to drain the recirculating water tank and the detergent water storage tank, press DRAIN switch. When tank is empty, panel light TANK EMPTY will come on. If DRAIN switch is **not** pressed, the water in the recirculating tank (from the last rinse of previous cycle) will be used for PREWASH phase. If the wash water has been retained from the previous cycle (WASH switch was on RETAIN during previous cycle), that water will be used during the WASH phase.

3.4 STANDARD CYCLE: RETAIN

1. For the STANDARD cycle, place cycle switches on the secondary panel in the following positions:

WASH — RETAIN
EXTENDED CYCLE — OFF

2. STD CYCLE panel light on primary panel will come on.

3. Dial the desired cycle phase times on the three thumbwheel switches on the secondary panel. All time settings are adjustable 0-99 minutes. Adjust times for actual soil conditions. Typical time settings for **both** Retain (standard) and Dump (alternate) cycles are as follows:

	Minutes
PREWASH:	01
WASH:	02
RINSE:	02

4. Close chamber door. Check that DOOR OPEN light is off.

5. Press START pushbutton. PREWASH light on primary panel will come on, and cycle will begin. If empty, wash tank will fill. Prewash will begin when tank is full.

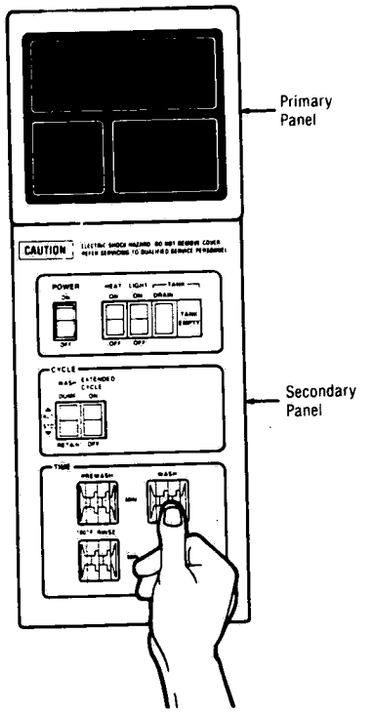


Figure 3-2. DIAL TIMES ON THUMBWHEEL SWITCHES.

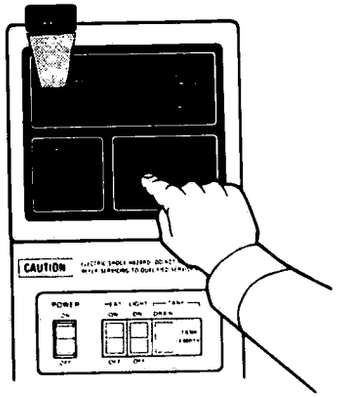


Figure 3-3. PRESS START PUSHBUTTON.

NOTE: Pressing STOP button on primary panel during a cycle will instantly terminate the cycle. Cycle must then be restarted from beginning.

NOTE: Recommend AMSCO Sparkle Jet Detergent. Available as follows:

One gallon container — P-757292-001
Five gallon pail — P-761573-001
Thirty gallon drum — P-761574-001

Also recommend AMSCO automatic detergent injection system part B-150477-068.

6. If the washer is **not** equipped with an automatic detergent dispenser, it will be necessary to stop the cycle and add the detergent after the PREWASH phase is complete. Do this by following the steps below:

a. Wait until WASH light comes on.

b. Press STOP pushbutton.

c. Open door. Cycle will stop and automatically reset.

d. Add 57 ounces of AMSCO Sparkle Jet Detergent to wash tank. Close the door.

NOTE: Quantity of detergent specified applies to startup of machine or when wash water is not to be reused after each cycle.

e. Reset PREWASH thumbwheel switch to 00. Press START pushbutton again. Cycle will omit PREWASH and proceed to WASH phase.

7. After PREWASH is completed, WASH light on primary panel will come on. The inlet water (140° F) will be heated to 160° F. Washing action will continue for time setting on thumbwheel switches.

8. At the end of the WASH phase, the detergent wash water will be pumped to the storage tank for reuse during the next cycle.

9. Fresh water is admitted into wash tank. Rinse water temperature is 180° F. Panel light RINSE comes on and rinsing action continues for time setting on 140° RINSE thumbwheel switch.

10. The final phase of the cycle is the vapor removal phase which lasts for the fixed time of two and one-half minutes. Panel light VAPOR REMOVAL will come on.

11. At the conclusion of the cycle, panel light COMPLETE comes on and buzzer sounds for 10 seconds or until door is opened.

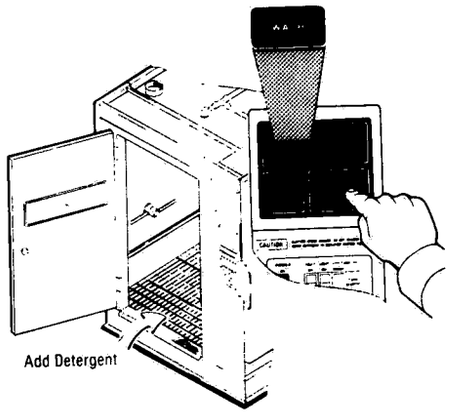


Figure 3-4. ADD DETERGENT TO WASH TANK.

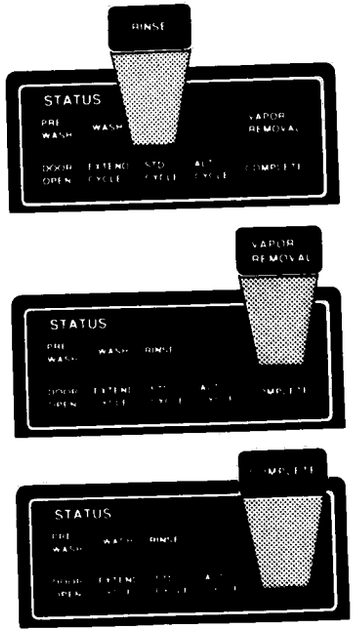


Figure 3-5. CYCLE PHASES INDICATED.

3.5 ALTERNATE CYCLES

The RETAIN/DUMP cycle switch and the EXTENDED CYCLE switch may be used individually or in combination to suit the washing requirements for particular conditions or individual cases. The alternate cycles function as follows:

3.5.1 Dump Cycle

1. The dump cycle is to be used when reuse of wash water and detergent for a subsequent cycle or cycles is **not** desired.

2. Follow instructions above in paragraphs 3.2, BEFORE OPERATING THE EQUIPMENT, and 3.3, WASHER OPERATION: PREPARATORY ACTIONS.

3. Place WASH switch in DUMP position. ALT CYCLE light will come on.

4. Follow operational instructions in paragraph 3.4, STANDARD CYCLE, beginning with step 3. The cycle will progress as the STANDARD cycle, except that at the end of the wash phase, the washing solution will be disposed of to the drain.

3.5.2 Extended Cycle

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

2. To extend 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). EXTEND CYCLE panel light will come on, digital readout shows 0, and phase will continue as long as EXTENDED CYCLE switch is on.

3. To reduce the cycle, place the EXTENDED CYCLE switch in the ON position. When the digital readout shows 0, return EXTENDED CYCLE switch to OFF position. Cycle will continue through remaining phases.

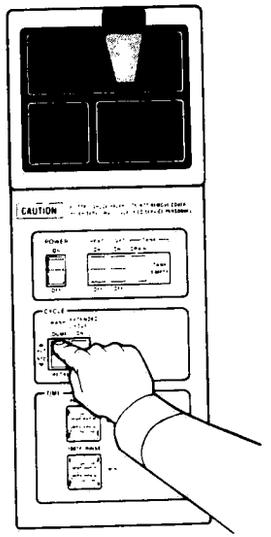


Figure 3-6. PLACE WASH SWITCH IN DUMP POSITION.

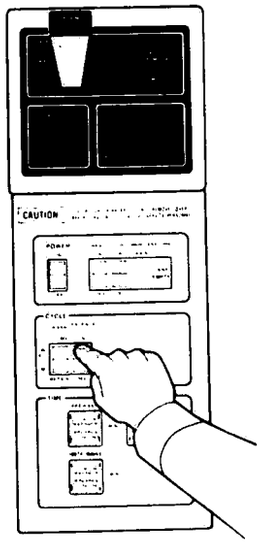


Figure 3-7. PLACE EXTENDED CYCLE SWITCH ON.

3.6 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.

This alarm indicates that, during the WASH phase of a cycle, the return time for detergent water (from storage to wash tank) has exceeded a preset maximum allowable length. See Troubleshooting Chart, Section 7, for possible causes and remedies.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the high water level probe in the wash tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the low water level probe in the wash tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the low water level probe in the storage tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the low water level in the drain tank is not functioning. See Troubleshooting Chart, Section 7, for possible causes and corrections.

*NOTE: During any of the alarms, the buzzer can be shut off by pressing START pushbutton. The digital display will continue flashing until the problem is corrected. If the problem persists two minutes after START is pushed, buzzer will again start to sound.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the wash tank drain time, for any one of the cycle phases, has exceeded a preset maximum allowable length. Pump will turn off automatically. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

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 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

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 7, for possible causes and corrections.

OPERATOR ACTION: NOTE WHICH PHASE LIGHT IS ON. PRESS **STOP** SWITCH ON PANEL.

This alarm indicates the steam supply valve (to heat water) has been open for an excessive period during any phase of a cycle. Cycle will automatically proceed to vapor removal cycle phase, and then completion. Panel status light will be on to indicate during which phase malfunction occurred. COMPLETE light will also be on. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: NOTE ALARM. PRESS **STOP** SWITCH ON PANEL.

This alarm indicates that the temperature of the final rinse water did not reach 180° F by the end of the second rinse phase, as set on the thumbwheel switches. Panel phase light will show COMPLETE. See Troubleshooting Chart, Section 7, for possible causes and corrections.

OPERATOR ACTION: TURN OFF MACHINE.

This alarm indicates that the maximum allowable time for wash water to be pumped back to the storage tank (after the wash phase of a "retain" cycle) has been exceeded. See Troubleshooting Chart, Section 7, for possible causes and corrections.

SECTION 4

PRINCIPLES OF OPERATION

4.1 GENERAL

Wash and rinse water is pumped through 10 rotating spray arms and one set of stationary nozzles. The control system has two basic cycles. Dump and Retain. The purpose of the Retain cycle is to conserve water and detergent when conditions permit. The flexibility of the cleaning cycles can be increased by the addition of optional, accessory controls and equipment. These controls are described later in this section.

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 washing cycles from beginning to end, once the preparatory actions have been taken.

4.2 CONTROLS

The microcomputer monitors system operations and controls system functions. Input signals are from the control panel's pushbuttons and switches, from the timer settings and from the temperature switch and water level probes. Output signals from the controller are to the panel display lights to indicate status or warning signals, to the pump and blower motor starters, and to the piping solenoid valves, to operate the washer through the phases of each cycle. The printed circuit boards have LEDs to indicate the presence of an electrical signal to the associated valve.

During the cycles, the controller automatically switches on and off the appropriate solenoid valves to maintain correct water level and temperature, and to maintain the current pulsing action of the rotary spray arms. Water to the drain is automatically cooled to maintain its temperature below 140° F. At the completion of the washing cycle, the panel light COMPLETE comes on and the buzzer sounds for 90 seconds or until the door is opened. Opening the door automatically resets the controls for the next cycle.

4.3 CYCLE DESCRIPTIONS

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

4.3.1 STANDARD CYCLE FOR CAGE AND RACK WASHER

4.3.1.1 Prewash Phase

All cycle selector switches are in STANDARD position. Operator touches START pushbutton. Solenoid valves V11 (prime for pump), V6 (pulsator 1), and V1 (hot water to wash tank) open. PREWASH lamp comes on (and IN PROCESS for double-door units). Normally, the wash tank retains the water from the last rinse of the previous cycle for reuse during PREWASH phase. For drain of wash tank prior to cycle beginning, see description of DRAIN TANK phase below.

As soon as wash tank high water level sensor senses full, valve V1 (hot water to wash tank) and valve V11 (prime for pump) close, pump starts, and PREWASH time is displayed. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating operation continues for duration of timed PREWASH phase. When pulsators begin alternating operation, if temperature switch TS-1 does not sense 140° F for wash tank water, valve V3 (steam supply to wash tank) opens until 140° F is reached. Valve V3 cycles with TS-1 to maintain 140° F water throughout remainder of prewash phase. Valve V-1 (hot water to wash tank) cycles with high water level sensor to maintain correct level in wash tank throughout prewash phase.

When PREWASH timer times out, pulsators stop (V6 or V7). At the same time, valve V2 (dump) and V8 (chill water to drain) opens until wash tank low level water sensor senses low. V2, V8 and pump are turned off. PREWASH lamp goes off and WASH lamp comes on.

4.3.1.2 Wash Phase

If the washer does not have automatic detergent injection, detergent must be added manually to wash tank. During the fill portion of the WASH phase, valves 1 (hot water to wash tank), V11 (prime for pump), and V6 (pulsator 1) are open. Pump is off. As soon as wash tank high water level sensor senses full, valve V1 (hot water to wash tank) and valve V11 (prime for pump) close, WASH time is displayed, and pump starts. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating action continues for duration of timed WASH phase. When pulsators begin alternating operation, valve V3 (steam supply to wash tank) opens to heat wash water. Valve V3 remains open until temperature switch TS-2 senses 160° F. Valve V3 cycles with TS-2 to maintain 160° F water throughout remainder of wash phase. Valve V1 (hot water to wash tank) cycles with high water level sensor to maintain correct level in wash tank throughout prewash phase.

When WASH timer times out, pulsators stop (V6 or V7). At the same time, valve V2 (dump) and V8 (chill water to drain) open until wash tank low water sensor senses low. V2, V8 and pump are turned off. WASH lamp goes out and RINSE lamp comes on.

4.3.1.3 140° F Rinse Phase

During the fill portion of the first rinse phase, valves V1 (hot water to wash tank), V11 (prime for pump), and V6 (pulsator 1) are open. Pump is off. As soon as wash tank high level sensor senses full, valve V1 (hot water to wash tank) and valve V11 (prime for pump) close, and pump starts. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating action continues for duration of timed 140° F RINSE phase. When pulsators begin alternating operation, valve V3 (steam supply to wash tank) opens to heat water, if water is not at 140° F. Valve V3 cycles with TS-1 to maintain 140° F water throughout remainder of first rinse phase. Valve V1 (hot water to wash tank) cycles to keep wash tank water at high level, as sensed by level detector.

When 140° F RINSE timer times out, pulsators stop (V6 or V7). At the same time, valve V2 (dump) and V8 (chill water to drain) open until wash tank low level sensor senses low. V2, V8, and pump are turned off.

4.3.1.4 180° F Rinse Phase

The 180° F rinse is identical to the 140° F rinse until the drain part of the phase, **except** that the steam supply valve will heat the water to 180° F, cycling with temperature switch TS-3. When the 180° F RINSE timer times out, pulsators stop (V6 or V7). RINSE lamp goes out and VAPOR REMOVAL lamp comes on. Rinse water is retained in wash tank for PREWASH phase of next cycle.

4.3.1.5 Vapor Removal Phase

Cooling water valve, V12, is on for one minute after VAPOR REMOVAL phase begins. Blower also turns on. After two and one-half minutes, buzzer sounds and COMPLETE light comes on. Blower will remain on for 30 minutes, or until door is opened or STOP pushbutton is pressed.

4.3.2 STANDARD CYCLE FOR HOSPITAL CART WASHER

4.3.2.1 Prewash Phase

All cycle selector switches are in STANDARD position. Operator touches START pushbutton. Solenoid valves V11 (prime for pump), V6 (pulsator 1), and V1 (hot water to wash tank) open. PREWASH lamp comes on (and IN PROCESS for double-door units). Normally, the wash tank retains the water from the last rinse of the previous cycle for reuse during PREWASH phase. For drain of wash tank prior to cycle beginning, see description of DRAIN TANK phase below.

As soon as wash tank high water level sensor senses full, valve V1 (hot water to wash tank) and valve V11 (prime for pump) close, pump starts, and PREWASH time is displayed. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating operation continues for duration of timed PREWASH phase. When pulsators begin alternating operation, if temperature switch TS-1 does not sense 140° F for wash tank water, valve V3 (steam supply to wash tank) opens until 140° F is reached. Valve V3 cycles with TS-1 to maintain 140° F water throughout remainder of prewash phase. Valve V-1 (hot water to wash tank) cycles with high water level sensor to maintain correct level in wash tank throughout prewash phase.

When PREWASH timer times out, pulsators stop (V6 or V7). At the same time, valve V2 (dump) and V8 (chill water to drain) open until wash tank low level water sensor senses low. V2, V8 and pump are turned off. PREWASH lamp goes out and WASH lamp comes on.

4.3.2.2 Wash Phase

If the washer does not have automatic detergent injection, detergent must be added manually to wash tank. During the fill portion of the WASH phase, valve V13 (return) is open to allow water to flow from the storage tank to wash tank. Return valve V13 closes when low level sensor in storage tank senses low. When V13 closes, valve V1 (hot water to wash tank), V11 (prime for pump), and V6 (pulsator 1) open until high water level sensor in wash tank senses full. As soon as wash tank high water level sensor senses full, valve V1 (hot water to wash tank) and valve V11 (prime for pump) close. WASH time is displayed, and pump starts. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating action continues for duration of timed WASH phase. When pulsators begin alternating operation, valve V3 (steam supply to wash tank) opens to heat wash water. Valve V3 remains open until temperature switch TS-2 senses 160° F. Valve V3 cycles with TS-2 to maintain 160° F water throughout remainder of wash phase. Valve V1 (hot water to wash tank) cycles with high water level sensor to maintain correct level in wash tank throughout prewash phase.

When the WASH timer times out, valve V4 (storage) opens and the wash water is pumped to the storage tank. If there is water in the wash tank 16 seconds after V4 opens, then V4 closes and V2 (dump) opens. When the wash tank low level sensor senses no water, RINSE phase begins.

4.3.2.3 180° F Rinse Phase

During the fill portion of the first rinse phase, valves V1 (hot water to wash tank), V11 (prime for pump), and V6 (pulsator 1) are open. Pump is off. As soon as wash tank high level sensor senses full, valve V1 (hot water to wash tank) and valve V11 (prime for pump) close, and pump starts. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating action continues for duration of timed 180° F RINSE phase. When pulsators begin alternating operation, valve V3 (steam supply to wash tank) opens to heat water, if water is not at 180° F. Valve V3 cycles with TS-1 to maintain 140° F water throughout remainder of first rinse phase. Valve V1 (hot water to wash tank) cycles to keep wash tank water at high level, as sensed by level detector.

When RINSE timer times out, pulsators stop (V6 or V7). At the same time, valve V2 (dump) and V8 (chill water to drain) open until wash tank low level sensor senses low. V2, V8, and pump are turned off.

4.3.2.4 Vapor Removal Phase

Cooling water valve, V12, is on for one minute after VAPOR REMOVAL phase begins. Blower also turns on. After two and one-half minutes, buzzer sounds and COMPLETE light comes on. Blower will remain on for 30 minutes, or until door is opened or STOP pushbutton is pressed.

4.3.3 DRAIN CYCLE

After preparatory actions, described above in STANDARD CYCLE, are taken, DRAIN pushbutton may be pressed if it is desired to drain wash and storage tanks. When DRAIN is pushed, the machine will go through the following actions:

DRAIN lamp comes on. Valve V2 (dump), V8 (chill water to drain), and V11 (prime for pump) open. Pump comes on. When low water level in wash tank is reached, valves V2, V8, and V11 close. Pump stops. Valve V13 (return) opens to drain detergent water from storage tank. (If storage tank is empty, cycle proceeds to completion.) When low water level in storage tank is reached, valves V2 (dump), V8 (chill water to drain), and V11 (prime for pump) open. Pump comes on. When low water level in wash tank is reached, pump stops, all valves close and TANK EMPTY lamp comes on.

4.3.4 STANDARD CYCLE WITH STEAM BOOSTER OPTION

This cycle operates exactly as the STANDARD cycle, except that during the "fill" parts of the cycle (valve V1 is open), steam booster valve V5 is on to heat the inlet water. Valve V5 cycles with temperature switch TS-1 to maintain inlet water at 140° F.

4.3.5 ACID PREWASH OPTIONAL CYCLE (CAGE AND RACK WASHER ONLY)

When the ACID PREWASH selector is pressed, ALT CYCLE lamp comes on, STD CYCLE lamp goes off, and the prewash phase of the cycle will be as follows.

When START pushbutton is pressed, ALT. CYCLE and PREWASH lamps come on. Valves V1 (hot water to wash tank), V6 (pulsator 1), and V11 (prime for pump) come on. When wash tank high water level sensor senses full, valves V1 (hot water to wash tank) and V11 (prime for pump) close. Pump comes on, valve V20 (acid) opens for 32 seconds and V6 opens for 16 seconds. After 16 seconds, V6 closes, V7 opens. After the second 16 second period, V20 (acid) closes. Prewash time is displayed. Pulsators 1 and 2 (V6 and V7, respectively) start alternating operation, beginning with pulsator 1 for twenty seconds, then pulsator 2 for twenty seconds. Alternating operation continues for duration of timed PREWASH phase. When pulsators begin alternating operation, if temperature switch TS-1 does not sense 140° F for wash tank water, valve V3 (steam supply to wash tank) opens until 140° F is reached. Valve V3 cycles with TS-1 to maintain 140° F water throughout remainder of prewash phase. Valve V1 (hot water to wash tank) cycles with high water level sensor to maintain correct level in wash tank throughout prewash phase.

When PREWASH timer times out, valve V19 (neutralizer) opens for 52 seconds. At the same time, pulsator 1 (V6) operates for 26 seconds, then pulsator 2 (V7) for 26 seconds. V19 closes, but pulsator 2 (V7) continues operating for 7 seconds. Then V7 closes, and pulsator 1 (V6) operates for 7 seconds. V6 then closes and drain begins: Valves V2 (dump) and V8 (chill water to drain) open until the low level sensor in the drain tank senses no water. Pump stops. PREWASH lamp goes out and WASH lamp comes on. Cycle then proceeds as described under standard cycle for Cage and Rack Washer.

4.3.6 STANDARD CYCLE WITH DETERGENT INJECTION

Detergent is automatically injected into the wash tank during the WASH phase of the cycle. Five seconds after the high water level sensor senses full, pulsators V6 and V7 begin alternating operation, steam valve V3 opens to begin heating the wash water, and detergent injector opens for 18 seconds. After the 18 seconds, the detergent controller is de-energized. When at least 30 seconds have elapsed after controller is de-energized **and** 160° F is reached in the wash tank, detergent controller continues automatic operation to maintain detergent level in wash tank. Detergent controller will automatically open and close detergent injector valve V25 for remainder of wash period, as sensed by detergent probes. (See also para. 4.7.)

4.3.7 BOTTLE WASHER CART ALTERNATE CYCLE (CAGE AND RACK WASHER ONLY)

If the washer is furnished with the bottle washer cart accessory, the control panel will have a CART ON/OFF switch and the chamber will have a quick disconnect for use with the cart. If the CART SWITCH is in the ON position, the ALTERNATE CYCLE lamp will come on when the START pushbutton is pressed. The cycle operates the same as the STANDARD cycle, except that the pulsing wash and rinse spray adds a 20 second spray period for the cart washer. During the wash and rinse periods, first pulsator 1 (V6) operates for 20 seconds, then the cart washer (V17), then pulsator 2 (V7). The sequence repeats until the set times have elapsed.

4.3.8 RETAIN/DUMP ALTERNATE CYCLE SWITCH

For the Cage and Rack Washer, the STANDARD cycle operates with the WASH switch in the DUMP position. If the switch is placed in the RETAIN position, the ALT CYCLE lamp will come on and the detergent wash water will be pumped to the storage tank at the end of the wash phase, for reuse during the wash phase of the following cycle. This RETAIN wash phase is the same as described under the STANDARD CYCLE of the Hospital Cart Washer.

For the Hospital Cart Washer, the STANDARD cycle operates with the WASH switch in the RETAIN position. If the switch is placed in the DUMP position, the ALT CYCLE lamp will come on and the detergent wash water will be dumped to drain at the end of the wash phase of the cycle. During the following cycle, fresh detergent water will be pumped into the wash tank for the wash phase of the cycle. This DUMP wash phase is described under the STANDARD CYCLE of the Cage and Rack Washer.

4.3.9 STANDARD CYCLE WITH HEAT SWITCH OFF

With the HEAT switch in the OFF position, the cycle will operate the same as the STANDARD cycle, except that during all rinse and wash phases, the water will be heated to a maximum of 140° F.

4.3.10 STEAM TREATMENT ALTERNATE CYCLE

If the washer is furnished with the steam treatment accessory, the control panel will have a STEAM ON/OFF switch. If the STEAM switch is in the ON position, the ALT lamp will come on. The cycle operates the same as the STANDARD cycle, except that after the last rinse, valve V23 will open and fill the chamber with steam for sixty seconds.

4.3.11 EXTEND — ALTERNATE CYCLE

The EXTEND switch is for use after a cycle has started. When the EXTEND switch is placed in the ON position, time displayed will be zero, and the cycle phase in operation will continue for as long as the switch remains on. When the switch is placed again in the OFF position, cycle will proceed.

4.3.12 STANDARD CYCLE WITH DUCTLESS VENT (Vapor Eliminator) OR ELECTRIC DAMPER ACCESSORY

If the washer is furnished with ductless vent accessory, the cycle will operate the same as the STANDARD cycle until the vapor removal phase. When the VAPOR REMOVAL phase begins, cooling water valve V12 will open for one minute. At the same time, vapor condenser valve V16 (ductless vent only) will open for one minute and forty-five seconds, and then close for fifteen seconds, and then again open for a final fifteen seconds. The blower (ductless vent only) or electric damper will also come on at the beginning of the VAPOR REMOVAL phase and will remain on for thirty minutes or until the door is opened.

4.4 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 and PCB-146590. To better understand the operation of the control, a functional description of each module and each of the printed circuit boards follows.

4.4.1 Power Supply

The power supply provides the control with 4 amps — 5 volts direct current (VDC) and 2 amps — 28 VDC required by the system. This power supply can be shown as eight blocks for the 5-VDC supply (Figure 4-1), and five blocks for the 28-VDC supply (Figure 4-2).

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.

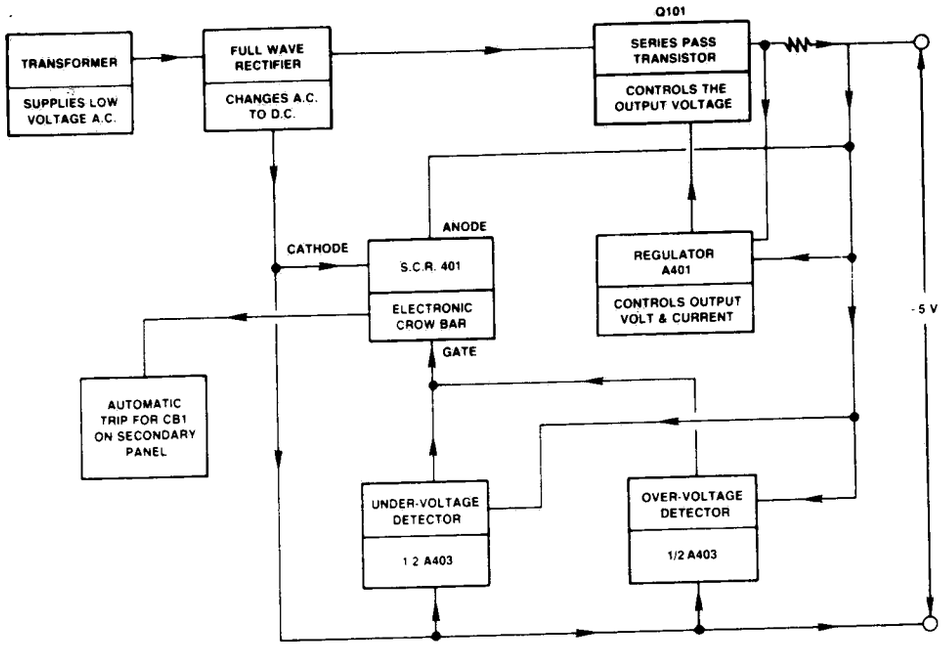


Figure 4-1. 5 VOLT POWER SUPPLY.

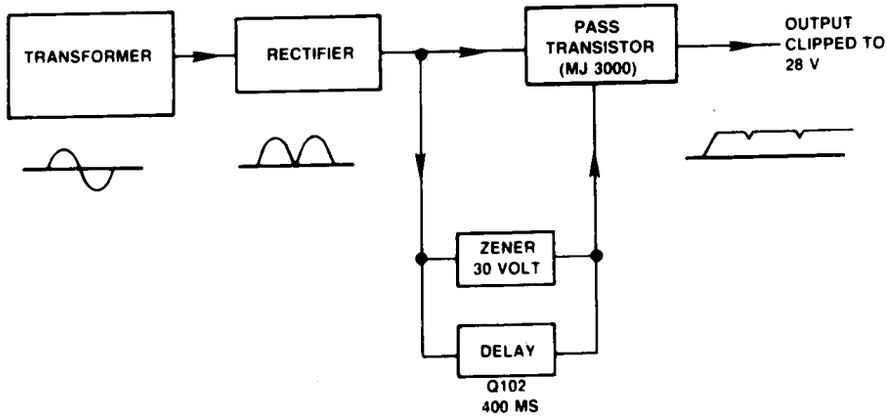


Figure 4-2. 28 VOLT POWER SUPPLY.

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.

4.4.2 Mother Board

The mother board assembly contains a large printed circuit board (PCB) that provides the base for the connectors (J1A, J1B, J2A, J2B, J3A, J3B) 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.

4.4.3 Printed Circuit Board 1 — 146586

The CPU printed circuit board (PCB) 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 the CPU printed circuit board.

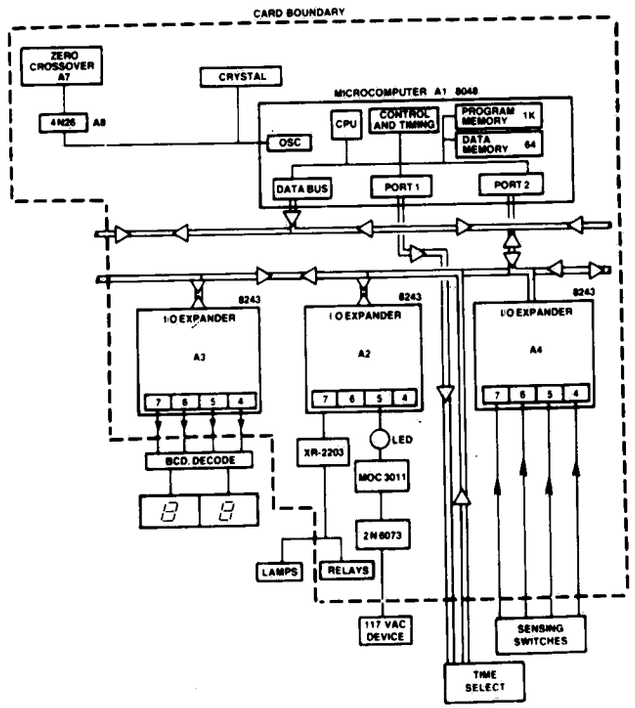


Figure 4-3. PRINTED CIRCUIT BOARD 146586.

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.

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 operation.

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 at the zero voltage points of the sine wave, it enables the computer output. The ZCN's function is to reduce line 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.

4.4.4 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 4-4 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 the Board 1.

4.4.5 Printed Circuit Board 3 — 146590

This PCB increases the program capability by an additional 2,000 program instructions, and the input /output capacity by adding 16 more channels. Figure 4-5 is a functional diagram of this board. Note that it is basically the same as the 8355 portion of PCB 2.

The input/output drivers function the same as those on the other two boards.

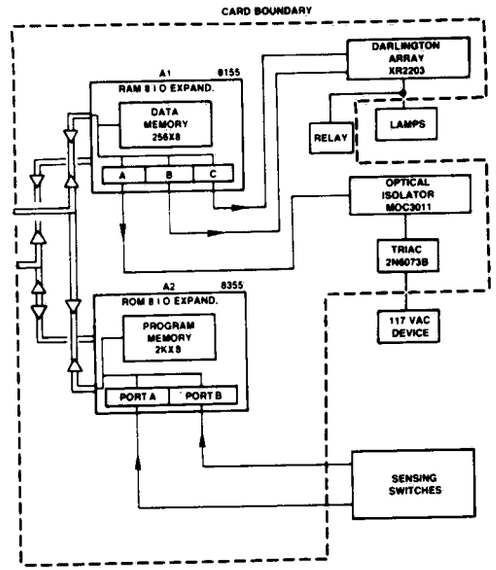


Figure 4-4. PRINTED CIRCUIT BOARD 146588.

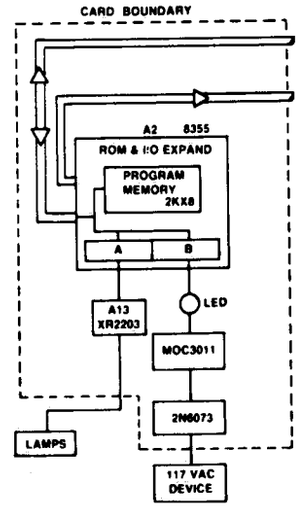


Figure 4-5. PRINTED CIRCUIT BOARD 146590.

4.5 FUNCTIONAL DESCRIPTION OF WATER LEVEL SENSING PROBE (REF. FIG. 7-9 SHEET 3 OF 3)

The probe senses water level using a small internal electronic circuit. The circuit senses capacitance change occurring in the presence of water with respect to the frame of the machine. The probe requires 28 volts power supply on its "+" (pos.) and "-" (neg.) 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 volts D.C. to 0 volts D.C.

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 volts D.C. The microcomputer will pull this terminal to 0 volts D.C. (grounding it out) and, if probe functions properly, the signal terminal will switch from 5 volts D.C. to 0 volts D.C. (close).

4.6 FUNCTIONAL DESCRIPTION OF TEMPERATURE CONTROLLER (REF. FIG. 7-9 SHEET 3 OF 3)

Temperature of the wash tank water is sensed by a resistive temperature probe (RTD type). Nominal resistance of the probe -1% @ 77°F is 676 ohms. The probe has a positive temp. coef. of 1.6 ohms/°F. The working resistances of the probe are as follows:

140°F — 784 ohms
160°F — 820 ohms
180°F — 856 ohms

The probe forms part of a voltage divider on the temperature controller module (TB-1 junction box). The probe voltage is compared against three adjustable set points as follows.

140°F — "LO ALARM"
160°F — "OFFSET"
180°F — "HI ALARM"

The three outputs of this module are **normally closed** until respective set points are achieved, then they **open.** The respective outputs will measure 0 volts D.C. until set points are achieved, then outputs will switch to 5 volts D.C. Power supply voltage is 28 volts D.C. to the controller module.

4.7 FUNCTIONAL DESCRIPTION OF DETERGENT INJECTOR (SEE ALSO PARA. 4.3.6)

The detergent injector control is designed to automatically dispense the correct amount of detergent into the wash chamber.

The injector operation is affected by the microprocessor control, storage tank water level sensor, and wash chamber temperature control of the basic machine.

The correct level of detergent concentration is monitored by measuring the resistivity of the wash water as it flows past two fixed probes.

In the wash phase, within 5 seconds following the start of the wash pump, the microprocessor control will energize the injector control. The blue (power) and white (feeder) lights on the detergent injector will come on. The blue light will remain on for 18.5 seconds. The **white** light will come on, but **may go on and off,** as detergent passes by the probes in the wash pump discharge line.

An exception to the above occurs if any water remains in the wash water storage tank when the wash cycle starts. If the storage tank low water sensor detects any water at all, the microprocessor will cancel the initial 18.5 second injection period. After the wash pump has been on for 23 to 25 seconds, the butterfly valves will begin transferring the wash water from one side of the machine to the other. After an additional 30 seconds has elapsed **and** the wash water temperature has reached 160°F (as recorded by TS-1), power will be supplied to the detergent injector control. At this time the blue light will come on and the white light will go on and off until the two probes sense the correct detergent concentration in the wash water. At this point, the white light will remain off, the blue light will remain on and detergent injection ceases.

If the wash water fails to reach 160°F, then the second phase of detergent injection described above will not take place. If temperature sensor (TS-1) does not sense 160°F, then power will not be supplied to injector control.

SECTION 5

INSPECTION AND MAINTENANCE

SECTION 5

5.1 GENERAL

Maintenance procedures described in paragraphs 5.2 through 5.4 should be performed at regular intervals, as indicated. The frequency indicated is the minimum, and should be increased if usage of the washer demands. Should a problem occur, refer to Section 7, TROUBLESHOOTING. Figure 5-2 is a sample maintenance record which we suggest the Maintenance Department keep. Such a record will prove helpful in assuring regular maintenance.

WARNING: ALLOW UNIT TO COOL TO ROOM TEMPERATURE BEFORE STARTING WORK.

5.2 INSPECTION

5.2.1 Daily

1. Check hubs on rotary spray arms for free rotation. If rotation is not free, remove rotary hubs on spray arms. Clean bearings and reassemble hubs.

2. Open and close chamber door(s). Be sure operation is smooth and door switch on upper part of door jamb is activated when door is closed.

3. Check that steam supply to the machine is between 50-80 psig (dynamic).

4. Check that hot and cold water supplies to the machine are 40 to 60 psig and that hot water temperature is approximately 140° F.

NOTE: To insure proper operation of the hydraulically operated actuators for the butterfly valves, cold water supply to washer should meet the following standards:

- Total water hardness should not exceed 170 ppm.
- Total dissolved solids should not exceed 500 ppm.
- Alkalinity should not exceed 150 ppm.
- Use of detergents with a high chloride content may be harmful to stainless steel.

NOTE: Cold water temperature should be maintained below 75°F for proper operation of the ductless fan option.

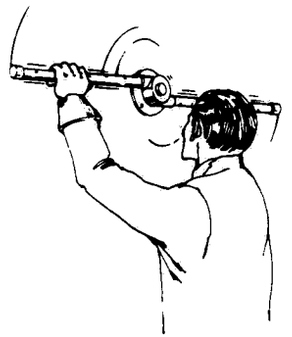


Figure 5-1. CHECK HUBS FOR FREE ROTATION.

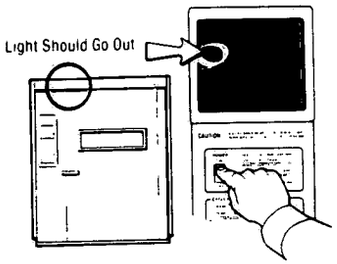


Figure 5-2. CHECK DOOR SWITCH OPERATIONS.

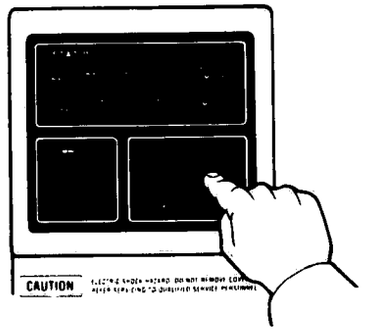


Figure 5-3. CHECK OPERATION OF STOP SWITCH.

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

5.2.2 Weekly

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

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

3. Check for ease of operation of inside door latch release.

4. 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 8.9.

5. Inspect plumbing connections for leaks.

6. Be sure building-vent system is 1000 cfm at 3 8" static pressure and that damper opens at beginning of vapor removal phase (units without ductless vent system only).

7. Check pressure on discharge side of pump.

5.3 CLEANING

5.3.1 Daily

1. Open the chamber door. Lift the floor grating and make sure that the filter baskets in the wash tank are clean. Remove any sediment with a high pressure hose.

2. Visually inspect the spray nozzles. If necessary, remove hard water deposits from the nozzles by soaking them 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. Carefully clean the nozzle openings with a 3/32 inch diameter wire. **Do not** pound on spray pipes or nozzles.

3. Rinse unit interior with clean water. If necessary, remove hard water deposits from equipment interior. Wipe the interior clean with a cleaning solution such as one cup of AMSCO Descaler to one quart of water. Then rinse with fresh tap water. **Do not** use abrasive cleaning compounds, wire or steel wool on surfaces.

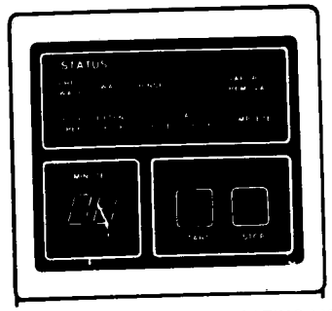


Figure 5-4. CHECK THAT ALL INDICATING LIGHTS ARE WORKING.

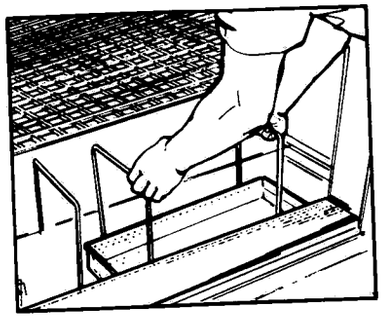


Figure 5-5. LIFT FLOOR GRATING AND CLEAN FILTER BASKETS.

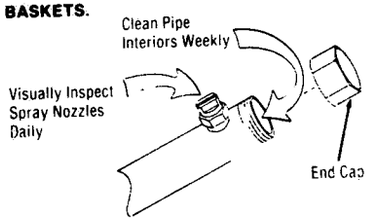


Figure 5-6. INSPECT SPRAY NOZZLES AND SPRAY PIPES.

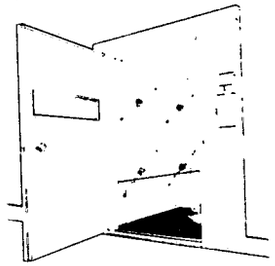


Figure 5-7. CLEAN UNIT INTERIOR WEEKLY.

5.3.2 Weekly

1. Remove end caps from spray pipes. Using brush provided, clean the pipe interiors with a solution of one cup AMSCO Descaler and one quart of water.

2. Clean the unit interior with AMSCO STAINLESS STEEL CLEANER & POLISH or PRY Cleaner, rub in a back-and-forth motion (in the same direction as the grain). Do not rub with a rotary or circular motion. Do not use either cleaner on painted surfaces.

5.4 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 5-8.

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 thumbwheel switches for the PREWASH, WASH, 140° F RINSE (CRW only — HCW will display 00) and 180° F 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 Troubleshooting Chart for these alarms.

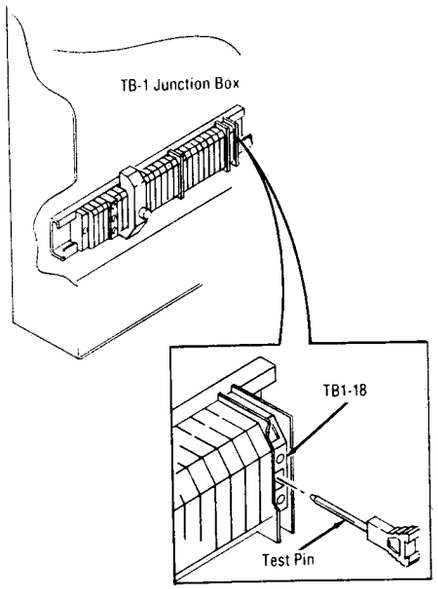


Figure 5-8. INSERTION OF TEST PIN FOR SERVICE ROUTINE.

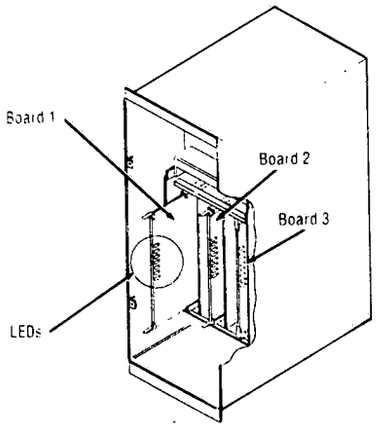


Figure 5-9. PRINTED CIRCUIT BOARDS WITH LEDs IN CONTROL BOX.

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 8, page 8-8.

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
140° RINSE (CRW only)*
180° 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 (HOT WATER)
D13-V2 (DUMP)
D14-V3 (STM SUPPLY)
D15-V4 (STORAGE)
D16-V5 (STM BOOSTER)
D17-V6 (PULS. 1)
D18-V7 (PULS. 2)

b. PCB 2

D23 MTR STRT (PUMP)
D22 (COUNTER)
D21-V13 (RETURN)
D20-V12 (COOLING WTR.)
D19-V11 PRIME (PUMP)
D18 (DETERGENT CONTR.)
D17 (BUZZER)
D16-V8 (CHILL WATER)

*If the washer is a Hospital Cart Washer. 00 will be displayed on the readout at this step.

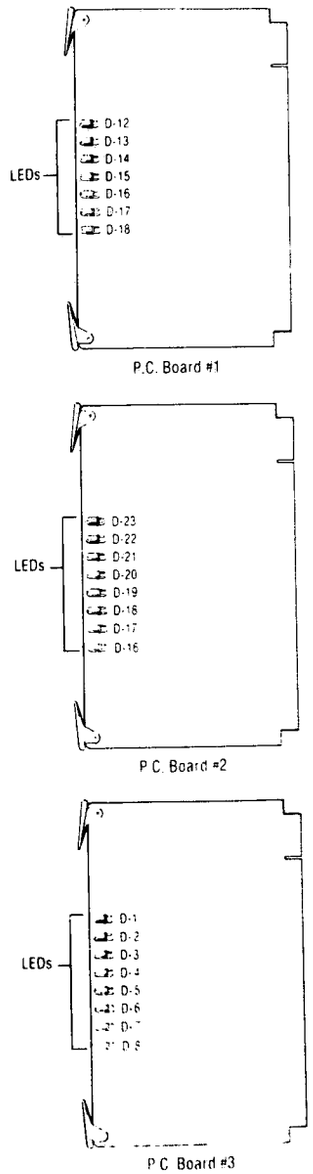


Figure 5-10. CIRCUIT BOARDS WITH LEDs.

c. PCB 3

D1-V16 (VAP. CONDNSR)
D2-V17 (CART WASH)
D3-V18 — NOT USED
D4-V19 (NEUTR)
D5-V20 (ACID)
D6 (BLOWER)
D7 — NOT USED
D8-V23 (STEAM PURGE)

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 8, "Component Repair, Replacement, and Adjustment."

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

PREWASH
WASH
RINSE
VAPOR REMOVAL
COMPLETE
IN PROCESS (Double Door Units Without Rear Control)
MINUTES
TANK EMPTY
DRAIN
00 on digital display
08 on digital display

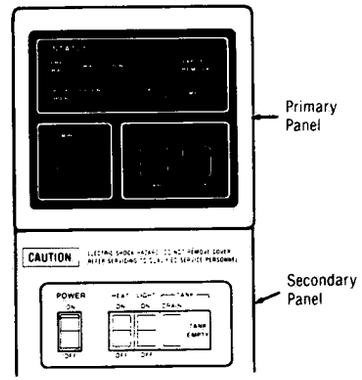


Figure 5-11. LEGENDS ON PRIMARY PANEL WILL LIGHT IN SEQUENCE.

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PREVENTIVE MAINTENANCE RECORD

Page 1 of 4

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						
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. Perform standard test cycle.	X	X	X	X	X	X
2. Perform alternate cycle with heat switch off and wash at retain (CRW only).	X	X	X	X	X	X
3. Perform alternate cycle with acid prewash phase (CRW only).	X	X	X	X	X	X
4. Perform alternate cycle with steam injection after final rinse phase (CRW only).	X	X	X	X	X	X
5. Perform alternate cycle for bottle cart washer (CRW only).	X	X	X	X	X	X
6. Perform alternate cycle with heat switch off (HCW only).	X	X	X	X	X	X
7. Perform extended 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
3. Lubricate door.	X	X	X	X	X	X
4.0 Check Valves						
1. Make external inspection of each check valve.	X	X	X	X	X	X

EQUIPMENT PULSTAR 2000/3000 Serial No. _____

Figure 12. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 1 of 4).

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PREVENTIVE MAINTENANCE RECORD

Page 2 of 4

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
a. Check around pipe joints for leaks.	X	X	X			
b. Inspect valve for proper operation.	X	X	X			
2. Make internal inspection of each check valve.	X	X	X			
5.0 Solenoid Valves						
1. Check valve for proper operation.	X	X	X	X	X	X
2. Check valve for leaks.	X	X	X	X	X	X
3. If available, check manual operation of valve.	X	X	X			
4. Rebuild solenoid valve.						X
6.0 Vacuum Breaker						
1. Inspect for proper seal between float and seat.	X	X	X	X	X	X
2. Check vacuum breaker for proper operation.	X	X	X	X	X	X
3. Check around pipe joints for leaks.	X	X	X	X	X	X
4. Disassemble vacuum breaker.					X	
5. Inspect and replace components of vacuum breaker.			X			
6. Reassemble vacuum breaker.					X	
6.0 Detergent Injector						
1. Check that plastic tubing from detergent injector is clean.	X	X	X	X	X	X

EQUIPMENT PULSTAR 2000/3000 Serial No. _____

Figure 12. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 2 of 4).

PREVENTIVE MAINTENANCE RECORD
Page 3 of 4

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
7.0 Water Pressure Regulator						
1. Inspect strainer for debris.			X			X
8.0 Water Level Sensors						
1. Inspect and clean each sensor probe.	X	X	X	X	X	X
9.0 Each Rotary Spray Arm						
1. Inspect and clean each spray arm.	X	X	X	X	X	X
2. Inspect nylon bearings.	X	X	X	X	X	X
10. Final Test						
NOTE: During test cycles, check for and repair any leaks. If cycle is stopped due to defective component, replace the defective component and reinitiate test cycle. Also adjust, repair or replace any component that does not operate properly.						
1. Perform standard test cycle.	X	X	X	X	X	X
2. Perform alternate cycle with heat switch off and wash at retain (CRW only).	X	X	X	X	X	X
3. Perform alternate cycle with acid prewash phase (CRW only).	X	X	X	X	X	X
4. Perform alternate cycle with steam injection after final rinse phase (CRW only).	X	X	X	X	X	X
5 Perform alternate cycle for bottle cart washer (CRW only).	X	X	X	X	X	X
6. Perform alternate cycle with heat switch off (HCW only).	X	X	X	X	X	X
7. Perform extended cycle.	X	X	X	X	X	X

EQUIPMENT PULSTAR 2000/3000 Serial No._____

Figure 12. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 3 of 4).

PREVENTIVE MAINTENANCE RECORD
Page 4 of 4

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
8. Remove all test equipment installed for this inspection.	X	X	X	X	X	X
9. Install any panel or cover that was removed during the inspection.	X	X	X	X	X	X

EQUIPMENT PULSTAR 2000/3000 Serial No._____

INSPECTOR: Sign For Each Inspection and Fill In Date:

Date						
Date						
Date						
Date						
Date						
Date						

Figure 12. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 4 of 4).

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SECTION 6

FIELD TEST PROCEDURE

Every 34" HCW and 42" and 50" CRW unit must be tested and inspected according to this procedure. Each unit tested must meet the requirements set forth in this procedure.

CAUTION: **Turn power switch to "OFF."**

6.1 TEST INSTRUMENTATION REQUIRED

1. Stop watch (to check timing of cycle steps).

2. Calibrated test gauge (0-100 psig). Locate at pump discharge. Plugged connection in tee at pump discharge is provided for test gauge.

3. Potentiometer with thermocouple extension. Route under door and locate inside at Temp. Probe in wash tank.

4. Calibrated test gauge (0-100 psig). Plugged connection is provided in tee location between valve V-13 and pressure regulator located upstream of valve V-13.

5. Calibrated test gauge (0-100 psig). Install in hot water supply line.

6. Calibrated test gauge (0-100 psig). Install in cold water supply line.

7. Calibrated test gauge (0-150 psig). Install in steam supply line.

6.2 PRELIMINARY CHECK

1. Examine pipes, valves, fittings, and fasteners for good workmanship and completeness of assembly.

2. Examine door gaskets (both front and rear if pass thru unit) for correct installation and fit.

3. Examine gasket installation between panels, between panels and jambs, and between panels, jambs and base to prove gaskets were installed at these points and appear to be installed correctly.

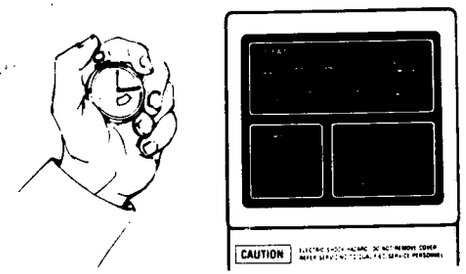

Figure 6-1. CHECK TIMING OF CYCLE STEPS.

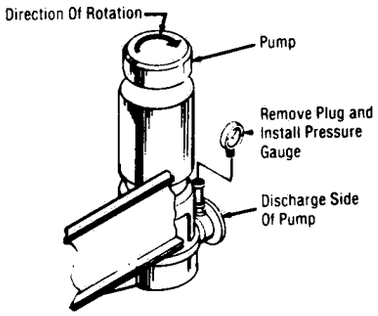

Figure 6-2. INSTALL TEST GAUGE IN TEE AT PUMP DISCHARGE.

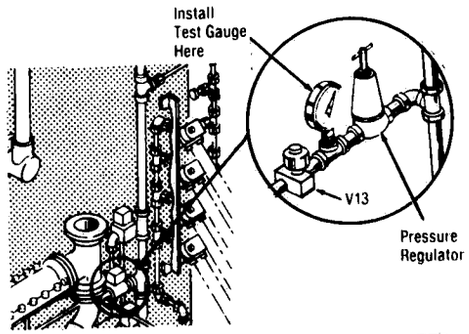

Figure 6-3. INSTALL TEST GAUGE IN COLD WATER SUPPLY.

4. Turn all rotating spray rotors by hand to assure virtually frictionless rotation.

5. Check to see that correct heaters are installed in magnetic starter for pump drive based on operating voltage available for test. Appropriate heaters are P/N 150476-441 (E72) for 200-208 volts; P/N 150476-440 (E70) for 230 volts; and P/N 150476-437 (E60) for 460 volts.

6. Check to see that all actuators for butterfly valves are mechanically connected to valves.

7. **Preparation Prior to Test and Connection to Utilities**

Blow out building utility water and steam lines to remove chips, scale, etc., before connecting to washer.

8. Check for proper hook-up to required services, i.e., steam, water and electrical.

NOTE: Steam and Water Supply Lines should be one size larger than the nominal pipe sizes on the washer.

Plumbing Connections

Service	Pipe Size (NPT)	Pressure
Hot Water (140° F Min.)	1-1/4"	40-60 psig (dynamic)
Cold Water*	1"	40-60 psig (dynamic)
Steam	1-1/2"	50-80 psig (dynamic)
Drain	2"	

***NOTE:** To insure proper operation of the hydraulically operated actuators for the butterfly valves, cold water supply to washer should meet the following standards:

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

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

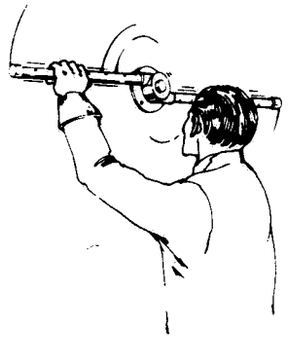

Figure 6-4. TURN ALL ROTATING SPRAY ROTORS.

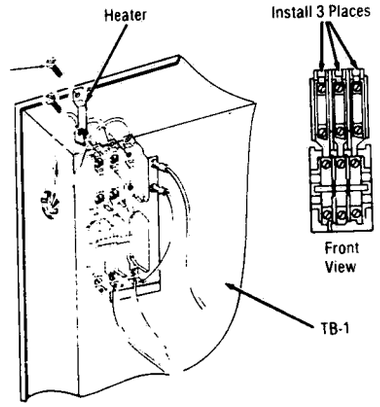

Figure 6-5. CHECK FOR CORRECT HEATERS.

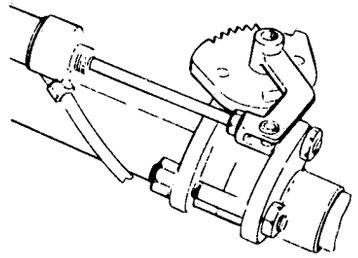

Figure 6-6. CHECK ACTUATORS FOR BUTTERFLY VALVES.

Electrical Connections

Service	Volts	Freq.	Phase
Pump	200-208 or 230/460	60 Hz.	3
Controls	115	60 Hz.	1

6.3 COMPONENT CHECKS

1. Door(s) switch adjustment. (Assuming a new door gasket is on door.)

a. Adjust bracket above door(s) to "make" all switches with door in closed position.

b. Open **front** door (rear door closed in pass thru unit). Door open light should come on. If no light, check switch and wiring. Then close door. Door open light goes out.

c. If pass thru unit, open **rear** door. Check same in (b) above.

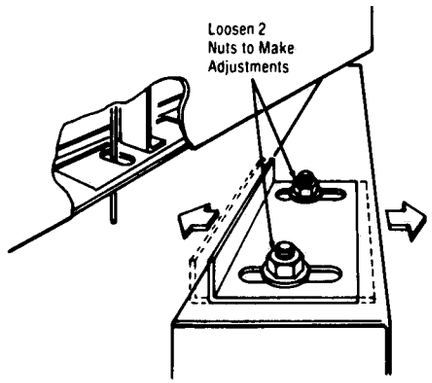

Figure 6-7. DOOR SWITCH ADJUSTMENT.

2. Inspect Pump Rotation.

a. Remove cover from motor.

b. Momentarily start pump followed immediately by stopping pump. Observe the rotation as pump slows down by viewing exposed end of motor. Rotation must be **clockwise** when looking down on exposed motor end. If rotation is counterclockwise, turn power supply OFF and switch any two of wires 135, 136 and 137 connected to L1, L2 and L3 at TB2. Turn power supply ON and check pump rotation as before.

c. Replace motor cover.

3. Other Component Checks.

a. **Open hot and cold water and steam supply valves.** Note the static and dynamic pressure gauge indication in hot water, cold water, and steam supply lines at appropriate times in factory testing. The dynamic pressures for hot water, cold water, and steam should be 40-60 psig, 40-60 psig, and 50-80 psig respectively. Refer to Section 8 for adjustment of hot and cold pressure regulating valves.

b. Note pressure gauge indication on water supply line between pinch valve, solenoid valve V-13 and the pressure regulating valve located immediately upstream of valve V-13. Adjust the PRV as required for 50 psig maximum reading on the pressure gauge.

c. If any water is discharging from the 2-inch drain, examine chill water valve V-8 for leakage and take appropriate action.

d. Open door(s) and observe if water (hot or cold) and/or steam is leaking into wash tank. If so, examine hot water supply valve V-1, cold water supply valve V-12, and steam supply valve V-3 for leakage and take appropriate action. Close door(s).

6.4 TEST FOR AUTOMATIC OPERATION

NOTE: Starting status should be no water in storage tank, no water in wash tank (syphon out previous water in wash tank) and retain cycle.

1. Set controller as follows:

Depress power ON switch. Primary panel should light.

Depress heat ON switch.

Depress Wash RETAIN. **For CRW, ALT. CYCLE light comes on. For HCW, STD. LIGHT comes on.**

Depress light ON. Chamber light comes on.

Depress Extended Cycle OFF switch.

Set prewash timer to 10 minutes.

Set wash timer to 10 minutes.

Set 140° Rinse timer to one minute. (CRW has both 140° and 180° rinse phases; HCW has only 180° rinse phase.)

Set 180° Rinse timer to one minute.

Close door(s). **Door open light goes out.**

NOTE: Operating instructions inside controller door explain alarm code.

NOTE: Press cycle START.

2. Prewash phase (10 minutes)

a. Simultaneously the following occurs:

Prewash light comes on the primary panel.

In-process light on rear display comes on.

Wash tank fill valve V-1 opens. Pump prime valve V-11 opens. Solenoid valve V-6 butterfly valve opens.

b. When water level reaches high level probe. the following occurs and **prewash timing starts:**

Preset time is displayed. Wash tank fill valve V-1 **closes.** Pump comes on (note time). Pump prime valve V-11 closes. Steam supply valve V-3 **opens and closes** as required to maintain water temperature at approximately 140°F (check this with test potentiometer). Adjust "Lo Alarm" potentiometer on temperature controller (in TB1 junction box). for 140°F as necessary.

c. With start of (2) above, sprays pulse. First 20 seconds solenoid valve V-6 butterfly valve **opens** and solenoid valve V-7 butterfly valve **closes.** Second 20 seconds, valve positions reverse. Final 20 seconds, valve reverts to original position. (Check these times.)

d. At end of ten (10) minute prewash period, the following occurs simultaneously:

Solenoid valve V-2 dump butterfly valve **opens.**

Solenoid valve V-6 butterfly valve **closes.**

Chill water valve V-8 **opens.**

Water in wash tank pumped to drain tank.

e. Approximately 15 seconds after start of (d) above, the following occurs simultaneously (note time interval):

Chill water valve V-8 **closes** only after actuated by level probe in drain tank.

Pump stops.

Prewash light goes out.

Solenoid valve V-2 dump butterfly valve closes.

3. Wash Phase (2 minutes)

a. Simultaneous with completion of step 2.e., the following occurs:

Wash light comes on.

Wash tank fill valve V-1 **opens.**

Pump prime valve V-11 **opens.**

Solenoid valve V-6 butterfly valve **opens.**

b. Approximately 60 seconds after start of (a) above, the high level probe in the wash tank will detect high level and the following occurs simultaneously and wash timing starts:

Preset time is displayed.

Pump starts.

Pump prime valve V-11 **closes.**

Wash tank fill valve V-1 **closes.**

c. 23.5 seconds after action in (b) above starts, the sprays pulse alternating with each 20 second period. First non-service side and top sprays (solenoid valve V-6 butterfly valve open), then the service side and bottom (solenoid valve V-7 butterfly valve open).

d. Coincident with (c) above, the steam valve V-3 opens and closes as required to raise wash temperature to approximately 160°F. Adjust "Offset" potentiometer on temperature controller for 160°F as necessary. (Check this temperature with potentiometer.) Wash tank fill valve V-1 also opens if water level drops below high level probe and will close when water level reaches high level probe.

e. At termination of pre-set wash period (10 minutes) the following occurs:

For the first 16 second period — V-6 and V-7 butterfly valve closes.

V-4 butterfly valve **opens** (water to storage tank).

After above 16 second period — V-2 butterfly valve **opens** (water flows to drain tank).

V-4 butterfly valve **closes.**

Chill water valve V-8 **opens** and closes only when actuated by low level probe in **drain tank.**

f. When water level in drain tank drops to low level probe in wash tank:

Pump stops.

Pump prime valve V-11 **opens.**

V-2 butterfly valve **closes.**

Wash light goes **out.**

4. 140° Rinse (1 Minute)

Rinse light comes **on.**

V-6 butterfly valve **opens.**

Wash tank fill valve V-1 **opens.**

a. After approximately 60 seconds from start of step 3.f., the high level probe in wash tank detects high level, the **rinse timing starts** and the following occurs:

Pump starts , pumping water to sprays.

Pump prime valve V-11 **closes.**

Wash tank fill valve V-1 **closes.**

Steam valve V-3 opens and closes as required to maintain approximate 140° F rinse temperature.

b. When action in (a) above starts, the sprays pulse as in step 3.c., for 1 minute. During this period, fill valve V-1 and steam valve V-3 open and close to maintain proper water level and temperature (approximately 140° F) in wash tank. Check with potentiometer.

c. At termination of pre-set first rinse period (1 minute) the following occurs:

V-6 and V-7 butterfly valves **close.**

V-1 fill valve **closes,** if open.

V-3 steam valve **closes,** if open.

V-2 butterfly valve **opens** (pumping water to drain).

V-8 chill water valve **opens** and closes only when actuated by low level probe in drain tank.

All above continue for approximately 15 seconds.

d. At the end of (c) above:

V-2 butterfly valve **closes.**

Pump stops.

5. 180° Rinse (10 minutes) — This is the single HCW rinse.

Pump prime valve V-11 **opens.**

V-6 butterfly valve **opens.**

V-8 chill water valve **closes,** if open.

V-1 fill valve **opens.**

a. After approximately 60 seconds from start of step 4.d., the high level probe in wash tank detects high level, the **second rinse timing starts** and the following occurs:

Pump starts, pumping water to sprays.

Pump prime valve V-11 **closes.**

Wash tank fill valve V-1 **closes.**

Steam valve V-3 opens and closes as required to maintain approximate 180°F rinse temperature. Adjust "Hi Alarm" potentiometer on temperature controller for 180° as necessary.

b. When action in (a) above starts, the sprays pulse as in step 6.3.c. for 10 minutes. During this period, fill valve V-1 and steam valve V-3 open and close to maintain proper water level and temperature (approximately 180°F) in wash tank. Check with potentiometer.

c. At termination of pre-set second rinse (10 minutes), the following occurs:

V-6 and V-7 butterfly valves **close.**

V-1 fill valve **closes,** if open.

V-3 steam valve **closes,** if open.

Pump stops.

Rinse light goes out.

NOTE: If temperature did not reach 180°F during preset time, four minutes will be provided to achieve 180°F. If 180°F is achieved within the four minutes, the cycle will continue.

6. Vapor Removal (2.5 minutes)

Vapor removal light comes on and vapor removal phase starts.

a. Coincident with 5.c., above, the following occurs:

V-12 cold water valve opens, delivering water to wash tank for 1 minute to cool hot wash water.

b. At termination of Vapor Removal period, the following occurs:

Buzzer sounds indicating end of cycle. Complete light comes on.

c. Open door. Cycle complete light should go off and buzzer stops.

NOTE: Correct any leaks, functional or operational problems, before proceeding with performance tests in next step.

NOTE: Rotation of vapor removal blower fan is to be clockwise when viewed from inside chamber. (Ductless vent option only.)

6.5 FINAL PERFORMANCE TEST

1. Run a **second complete cycle** with controller switches positioned as described in step 6.4.1. A **third and last cycle** shall be run with the exception that the "Wash Dump" switch shall be depressed with all other switches in the position noted in Step 6.4.1.

2. At the end of the third cycle (Dump Cycle) above and after the vapor removal phase is complete and the **Complete** light comes on, depress **Stop** switch and then **Drain** switch. This will eliminate most of the water from the tanks.

3. **Close hand shut off valves upstream of unit in hot water, cold water, and steam supply lines.**

4. Drain all water out of wash tank.

5. Disconnect all test equipment and replace plugs and dial type thermometer.

6.6 HCW AND CRW OPTIONS

1. Water Temperature Booster (CRW and HCW Units).

a. Test for this option is same as test for standard unit except that whenever fill water to wash tank is below 140° F, valve V-5 opens to raise temperature to 140° F. Above 140° F valve V-5 is closed.

2. Acid/Neutralizer (CRW Only).

The pre-wash phase in this option is the only phase that differs from the standard procedure. **The following should replace standard step 6.4.2 in its entirety:**

Step 6.4.2 Pre-Wash Phase (1 Minute).

a. Simultaneously the following occurs:

Pre-wash light comes on.

In-process light on rear display comes on.

Wash tank fill valve V-1 opens.

Pump prime valve V-11 opens.

Solenoid valve V-6 butterfly valve **opens.**

b. When water level reaches high level probe, the following occurs:

Pump **starts.**

Acid valve V-20 **opens** (for 32 seconds).

Solenoid valve V-6 butterfly valve remains open for 16 seconds, then closes. Solenoid valve V-7 butterfly valve then opens for 16 seconds.

Pump prime valve V-11 **closes.**

Wash tank fill valve V-1 **closes.**

c. 32 seconds after start of (b) above, the following occurs:

Acid valve V-20 **closes.**

Spray pulsing **starts.**

Pre-set wash timing **starts.**

Steam supply valve V-3 **opens and closes as required to maintain 140° F water temperature.**

d. At completion of pre-set pre-wash timing period, the following occurs:

Neutralizer valve V-19 **opens (for 52 seconds).**

Spray pulsing interval **changes** to 26 seconds pulsator 1, then 26 seconds pulsator 2.

Pre-wash light goes out.

e. At completion of 52 second period in (d) above the following occurs:

Neutralizer valve V-19 **closes.**

Solenoid valve V-7 butterfly valve remains open for 7 seconds, then closes. Solenoid valve V-6 then opens for 7 seconds.

When draining begins, valve V-2 dump and V-8 chill water **open.**

f. When level in wash tank drops to low level probe, the following occurs:

Pump **stops.**

Wash light comes **on.**

Dump valve V-2 butterfly valve **closes.**

g. The cycle will now continue as in steps 6.4.3, 6.4.4, 6.4.5, and 6.4.6 of a standard cycle.

3. Steam Treatment (CRW Only)

a. Standard factory test procedure to be followed. In step 6.4.1, depress steam switch ON in addition to the others listed.

b. With steam switch in the ON position, the cycle will proceed same as the standard except that after the last rinse, valve V-23 will open and fill the chamber with steam for a fixed period of 60 seconds.

4. Automatic Detergent Injector Accessory

Test per procedure described in para. 8-11.

The white feeder light depends on the following conditions occurring at the correct time:

a. Water storage tank empty at beginning of cycle.

b. Concentration of detergent in wash water is above set point.

c. Temperature of wash water is 160°F (as determined by TS-1).

Refer to Section 4 para. 4.7. for functional description of operation.

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SECTION 7

TROUBLESHOOTING

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

7.1 HELPFUL HINTS

1. Use the operating procedures in Section 2 or Section 3 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 7.3) 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 7-1), after the symptom has been verified.

4. Use the operational descriptions (Section 4) and schematics (Figures 7-8 through 7-14) 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

CAUTION: Verify that an adequate water supply is provided before making adjustments to pressure reducing valves to correct an inadequate level of fill. Pressure reducing valves on the Hot and Cold water supply are factory preset to obtain the proper water level during the timed fill. Excessive pressure may result in overfill of the wash tank while inadequate pressure may result in insufficient filling of tank. Excessive cold water pressure may cause harsh operation of the butterfly valve. Adjustment of the cold water supply pressure reducing valve may affect pinch valve water pressure regulator output.

CAUTION: The pressure regulator for the recirculating water return (pinch) valve is factory preset at 35 to 40 psig. Water pressure in excess of 50 psig at pinch valve will damage the valve.

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.

7.2 HOW TO USE THE CYCLE GRAPHS (FIGURES 7-1 THROUGH 7-7)

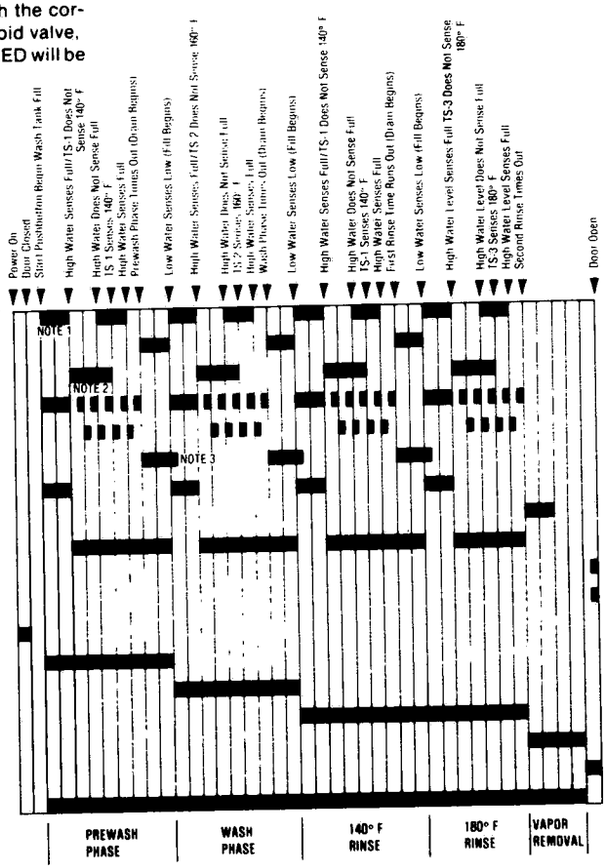
The cycle graphs are representations of the operations of the cycles available with the washer. They are intended to be used for two main purposes: (1) as an aid in understanding how the various cycles work; (2) as an aid in troubleshooting. The bar graph is a representation of which output devices (valves, 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.

7.3 CYCLE DESCRIPTIONS

7.3.1 STANDARD CYCLE FOR CAGE AND RACK WASHER (FIGURE 7-1).

BOARD	LED. NO.		
1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D20	Cooling Water To Wash Tank	V12
2	D23	Pump	
2	D22	Cycle Counter	
2	D17	Buzzer	
		Door Open Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	



NOTE 1: Wash tank fills only if DRAIN pushbutton has been pushed prior to cycle start. Otherwise, last rinse water from previous cycle is used for prewash. During fill periods, V1 cycles to maintain level as sensed by high water level sensor in wash tank.

NOTE 2: During washing and rinsing, pulsators operate alternately for 20 seconds, beginning with pulsator 1, top and nonservice side.

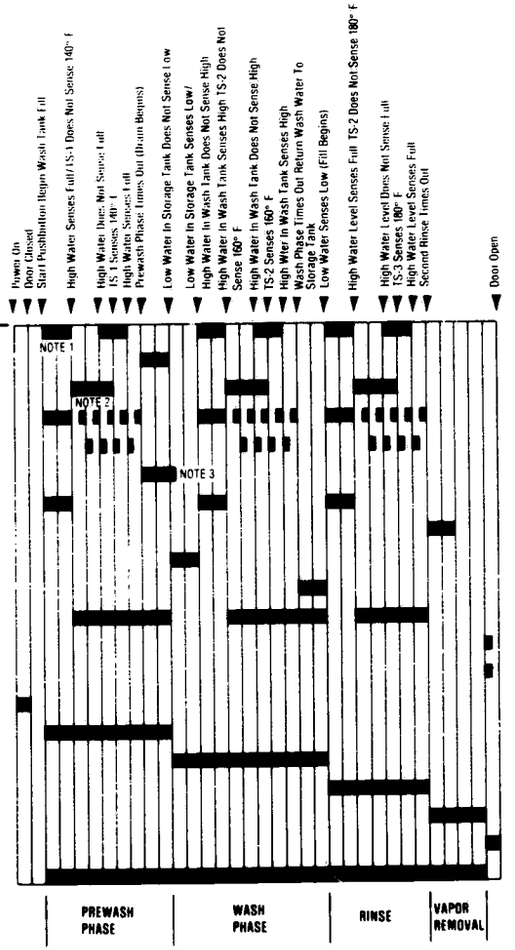
NOTE 3: Chill water to drain, V8, is on any time during cycle when drain tank low level sensor senses water.

Figure 7-1. STANDARD CYCLE FOR CAGE AND RACK WASHER.

7.3.2 STANDARD CYCLE FOR HOSPITAL CART WASHER (Figure 7-2).

MODE SETTINGS
Retain/Dump: Retain
Heat: On

BOARD	LED. NO.		
1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D20	Cooling Water To Wash Tank	V12
2	D21	Return To Wash Tank From Storage	V13
1	D15	Storage	V4
2	D23	Pump	
2	D22	Cycle Counter	
2	D17	Buzzer	
		Door Open Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	



NOTE 1: Wash tank fills only if DRAIN pushbutton has been pushed prior to cycle start. Otherwise, last rinse water from previous cycle is used for prewash. During fill periods, V1 cycles to maintain level as sensed by high water level sensor.

NOTE 2: During washing and rinsing operation, pulsators operate alternately for 20 seconds, beginning with pulsator 1, top and nonservice side.

NOTE 3: Chill water to drain, V8, is on any time during cycle when drain tank low level sensor senses water.

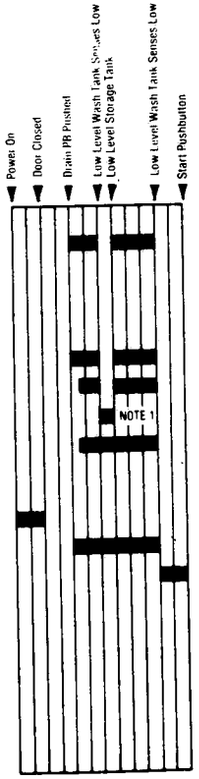
Figure 7-2. STANDARD CYCLE FOR HOSPITAL CART WASHER.

7.3.3 ALTERNATE CYCLES, ACCESSORY PACKAGES AND OPTIONS

7.3.3.1 Drain Tank (Operator Option)

Normally, the last rinse water of each cycle will be reused as the prewash water for the following cycle. If it is desired to drain the wash tank prior to a wash cycle, the prewash phase of the cycle will be as shown in the Figure 7-3.

BOARD	LED. NO.		
1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D21	Return	V13
2	D23	Pump	
2	D22	Cycle Counter	
2	D17	Buzzer	
		Door Open Lamp	
		Drain Lamp	
		Tank Empty Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	



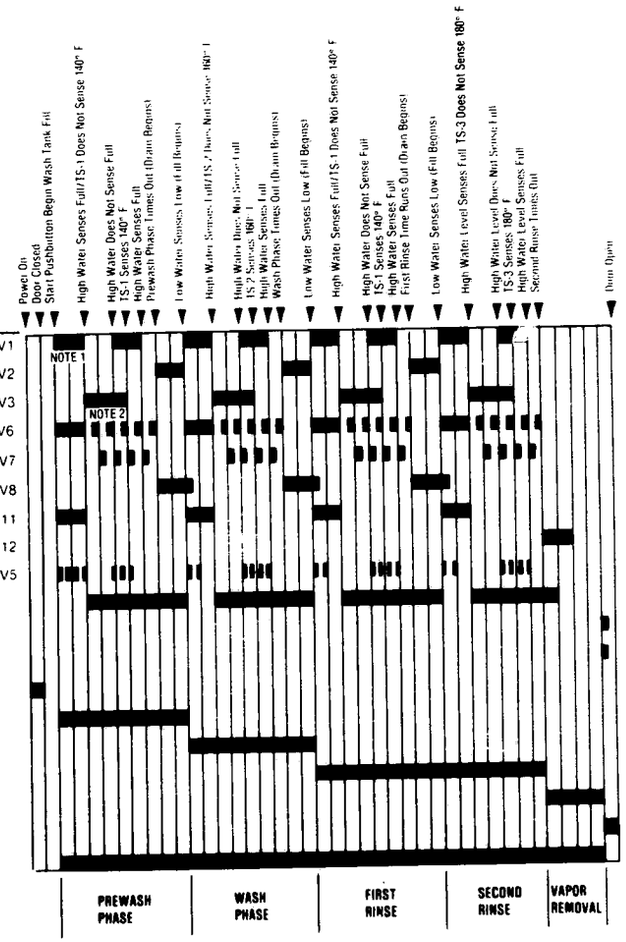
NOTE 1: Storage tank drains if detergent water has been retained during previous cycle.

Figure 7-3. DRAIN TANK CYCLE.

7.3.3.2 Steam Booster Accessory Package

If the steam booster accessory is installed, the controller will automatically heat and maintain the inlet water at 140°F by cycling the steam booster valve, V24, on and off during the "fill" parts of the cycle (Figure 7-4). Otherwise, the cycle is the same as the standard cycle.

BOARD	LED. NO.		
1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D20	Cooling Water To Wash Tank	V12
1	D16	Steam Booster	V5
2	D23	Pump	
2	D22	Cycle Counter	
2	D17	Buzzer	
		Door Open Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	



NOTE 1: Wash tank fills only if drain pushbutton has been pushed prior to cycle start. Otherwise, final rinse water from prewash cycle is used. For prewash, valve V1 cycles, during fill periods, to maintain level as sensed by high water level sensor.

NOTE 2: During wash and rinsing operation, pulsators operate alternately for 20 seconds, beginning with pulsator 1, top and nonservice side.

Figure 7-4. STANDARD CYCLE WITH STEAM BOOSTER

7.3.3.3 Acid Prewash Alternate Cycle (Figure 7-5).

BOARD	LED. NO.		
1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D20	Cooling Water To Wash Tank	V12
3	D5	Acid	V20
3	D4	Neutralize	V19
2	D23	Pump	
2	D22	Cycle Counter	
2	D17	Buzzer	
		Door Open Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	
		Alt. Cycle Lamp	

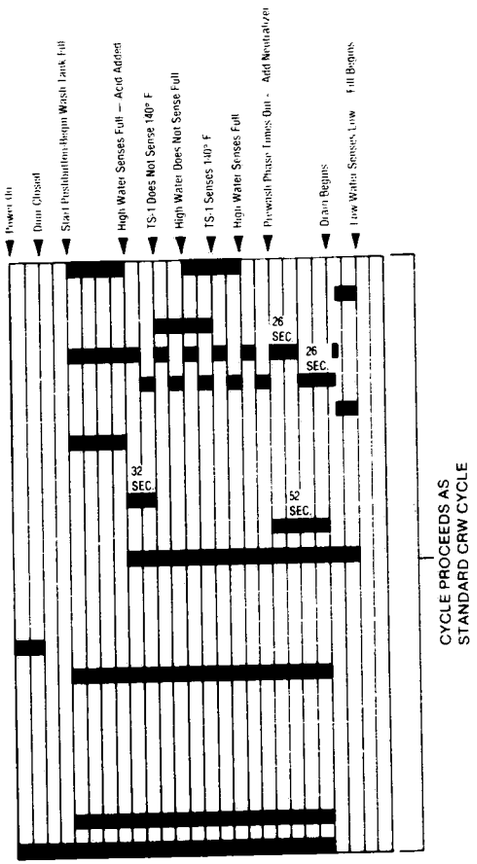
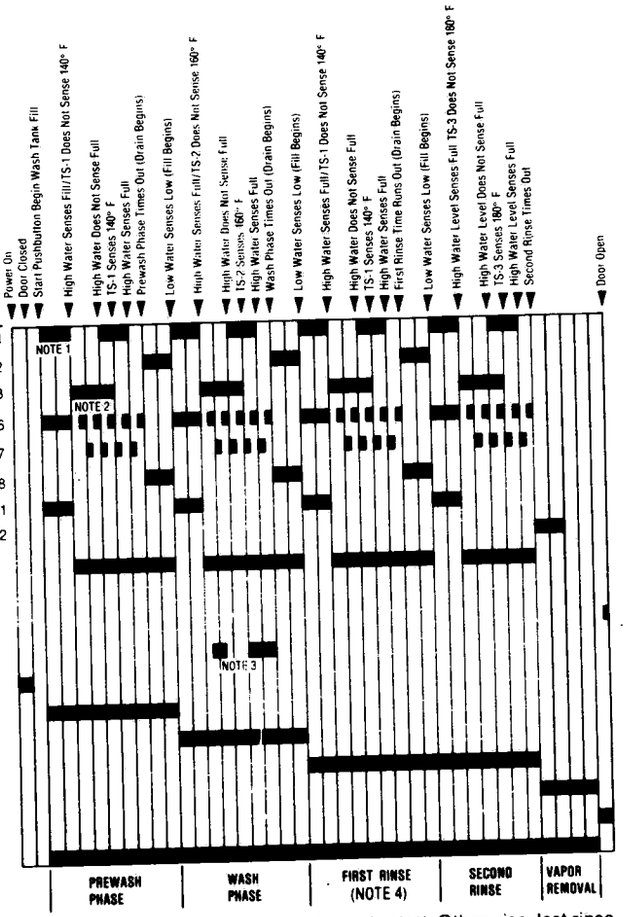


Figure 7-5. ACID PREWASH ALTERNATE CYCLE (CAGE AND RACK WASHER ONLY).

7.3.3.4 CYCLE WITH DETERGENT INJECTION (FIGURE 7-6).

BOARD	LED. NO.		
1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D20	Cooling Water To Wash Tank	V12
2	D23	Pump	
2	D22	Cycle Counter	
2	D17	Buzzer	
2	D18	Detergent Controller	
		Door Open Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	



NOTE 1: Wash tank fills only if DRAIN pushbutton has been pushed prior to cycle start. Otherwise, last rinse water from previous cycle is used for prewash. During fill periods, V1 cycles to maintain level as sensed by high water level sensor in wash tank.

NOTE 2: During washing and rinsing, pulsators operate alternately for 20 seconds, beginning with pulsator 1, top and nonservice side.

NOTE 3: Five seconds after pump starts, detergent control is energized for 18 seconds, then closes. When at least 30 seconds have elapsed, **and** when wash water reaches 160°F, detergent control comes on again to maintain correct detergent level. However, the initial 18 second detergent injection does not occur if the "Retain/Dump" switch is in the "Retain" position.

NOTE 4: Hospital Cart Washer deletes the 140° first rinse.

Figure 7-6. CYCLE WITH DETERGENT INJECTION.

7.3.3.5 Bottle Cart Washer Accessory Package (Cage And Rack Washer Only)

If the washer is furnished with this accessory, it will have a quick disconnect connection inside the chamber for use with a bottle cart washer. When the controls are set for CART WASH, the cycle operates the same as the standard cycle, except that the pulsing wash and rinse spray adds a spray period for the cart washer. During the wash and rinse periods, first pulsator 1 (V6) operates for 20 seconds, then the cart washer (V17), then pulsator 2 (V7). The sequence repeats until the set times have elapsed.

7.3.3.6 Cycle With Heat Switch Off

With the HEAT switch in the OFF position, the cycle will operate the same as the standard cycle, except that during all rinse and wash phases, the water will be heated to a maximum of 140° F.

7.3.3.7 Steam Switch On (Cage And Rack Washer Only)

If the washer is equipped with this option, the operator can select a steam injection phase at the end of the rinse phase. With the **STEAM** switch in the ON position, the cycle will proceed the same as the standard cycle, except that after the last rinse, valve V23 (LED 3D8) will open and fill the chamber with steam for a fixed period of sixty seconds.

7.3.3.8 Extend Cycle Switch On

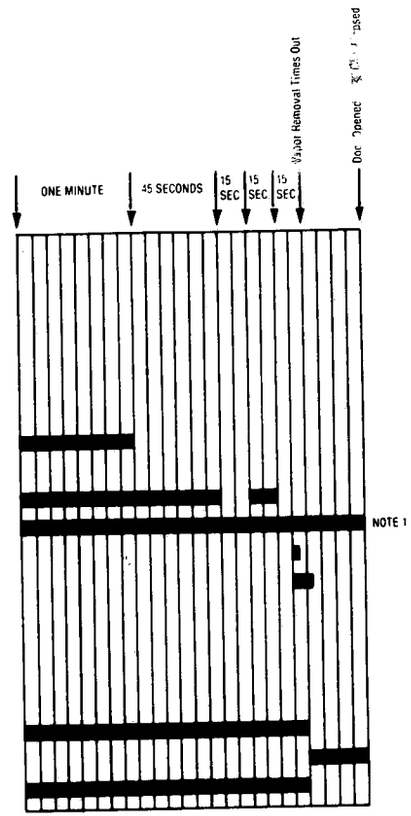
When the EXTEND switch is placed in the ON position, the cycle phase in operation will continue for as long as the switch remains ON. Digital readout displays 0. When the switch is placed against in the OFF position, cycle will proceed to next cycle phase.

7.3.3.9 Cycle With Blower Accessory Package

If the blower accessory package is installed, the controller will automatically turn on the blower at the end of the last rinse phase. Blower will remain on during vapor removal and then for 30 minutes, or until the door is opened.

7.3.3.10 VAPOR REMOVAL PHASE (FIGURE 7-7)

1	D12	Hot Water To Wash Tank	V1
1	D13	Dump Valve	V2
1	D14	Steam Supply Valve	V3
1	D17	Pulsator 1 (Top & Nonservice Side)	V6
1	D18	Pulsator 2 (Bottom & Service Side)	V7
2	D16	Chill Water To Drain	V8
2	D19	Prime For Pump	V11
2	D20	Cooling Water To Wash Tank	V12
2	D23	Pump	
3	D1	Vapor Condenser (Vapor Eliminator) or Electric Damper	V16
3	D6	Blower (Vapor Eliminator Only)	
2	D22	Cycle Counter	
2	D17	Buzzer	
		Door Open Lamp	
		Prewash Lamp	
		Wash Lamp	
		Rinse Lamp	
		Vapor Removal Lamp	
		Complete Lamp	
		In Process Lamp (Double Door Units)	



NOTE 1: After completion of a cycle, blower will remain on for 1/2 hour or until door is opened.

Figure 7-7. VAPOR REMOVAL PHASE WITH DUCTLESS VENT (VAPOR ELIMINATOR) OR ELECTRIC DAMPER ACCESSORY.

TABLE 7-1: 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.	Fig. 9-20
	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. 9-17
		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. 9-18, 22 Fig. 9-16, 26
		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. 9-17
		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. 9-17
		5. Short is between P1A/P1B and a solenoid valve, the buzzer, or the counter. Isolate and repair short.	Fig. 9-17

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.B., cont.)	6. If circuit breaker does not reset with P1A and P1B removed, then make the following check. Remove printed circuit boards B1, B2, B3. If, after removal of these three boards, the short disappears, replace the boards one at a time to determine which board was defective. Replace defective board. If short does not disappear after removal of the three boards, then short is in card cage. Replace card cage.	Fig. 9-30 Fig. 9-16, 8, 15, 18 Fig. 9-16, 4
		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. 9-17 Fig. 9-16, 4
		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. 9-17 Fig. 9-16, 1
	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. 9-16, 23
		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. 9-16, 23 Fig. 9-16, 26
		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. 9-18, 16 Fig. 9-19, 16
		4. Check fuse F401 on power supply. If defective, replace. If OK, go to next step.	Fig. 9-16, 1

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.C., cont.)	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. 9-16, 1
		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. 9-17
	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. 9-17, 20
		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. 9-17, 20
	1.E. After turning POWER on, intermittent buzzer sounds and digits 01, 02, 03, or 04 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 03 — low level sensor, storage tank 04 — low level sensor, drain tank	Fig. 9-10, 26 Fig. 9-9, 21
		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.	

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(1.E., cont.)	b. Voltage should be 0 to 0.8 volts D.C. at appropriate level sensor between "signal" and "-" terminals. If voltage is present, see next step, "c". If voltage is zero, 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. 9-10, 26 Fig. 9-9, 21 Fig. 9-16, 8
		c. Voltage should be 0 to 0.8 volts D.C. 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 PB board 3. If continuity is not present, repair wire.	Fig. 9-10, 26 Fig. 9-9, 21 Fig. 9-16, 18
	1.F. One or more legends on primary panel fail to light.	1. Lamp burned out. Check with ohmmeter, and replace if necessary.	Para. 8-9
		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.	Para. 8-9 Fig. 9-18, 35
		2. b) Reinstall lamp and check voltage from lamp socket to DC ground. If it is 28 VDC, replace primary panel. If it is zero, see step below, 2.F.2c.	Fig. 9-18, 35
		2. c) Disconnect P3 from controller. Check voltage between J3, pin 28 and pin applicable for malfunctioning lamp. If it is 28 VDC, see step below, 1.F.3.	Fig. 9-16, 1
		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. 9-17 Fig. 9-18, 35

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	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 out, replace appropriate board or light remains on, see next step, 1.G.3.	Fig. 9-18, 35 Fig. 9-19, 26
		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.	Fig. 9-18, 35 Fig. 9-19, 35
	1.H. Unable to start cycle.	1. No door closed signal.	
		a) Adjust or replace door closed switch as required.	Para. 8-7
		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.	Fig. 9-17 Fig. 9-16, 8
		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.	Fig. 9-17 Para. 8-7
		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.	Fig. 9-16, 8
		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. 9-17 Fig. 9-18, 35 Fig. 9-19, 35

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. During a "prewash," "wash," or "rinse" portion of a cycle.	2.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. Pump will automatically stop. Possible causes are as follows:	
		1. No power to the pump — correct.	Fig. 9-21, 8
		2. No cold water pressure to operate butterfly valve actuators — correct.	Fig. 9-12, 33
		3. Solenoid valve V2 (dump) stuck closed — correct.	Fig. 9-13, 2
		4. Wiring to solenoid valve V2 defective — repair or replace.	Fig. 9-22
		5. Check for correct operation of solenoid valve V2 and PC board 1 by initiating "service routine," as instructed in Section 5.4.	
		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 voltage between "-" and "TEST" terminals. If voltage is present, then level sensor is shorted — replace. **NOTE:** "No Voltage" condition is 0 to 0.8 volts DC.	Fig. 9-10, 26
	2.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 valve V1 (hot water) stuck closed — correct.	Fig. 9-12, 28

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(2.B., cont.)	3. Wiring to solenoid valve V1 defective — repair or replace.	Fig. 9-22, 19
		4. Check for correct operation of solenoid valve V1 and PC board 1 by initiating "service routine," as instructed in Section 5.4.	
		5. 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 voltage between "SIG" and "-" terminals. If voltage is not present, then sensor is functioning correctly — recheck preceding steps. **NOTE:** "No Voltage" condition is 0 to 0.8 volts DC.	Fig. 9-10, 26
	2.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. Pump will automatically stop. Possible causes are as follows:	
		1. Water supply not open — check.	
		2. Water pressure low — check.	
		3. Wiring to solenoid valve V1 defective — repair or replace.	Fig. 9-22, 19
		4. Check for correct operation of solenoid valve V1 and PC board 1 by initiating "service routine," as instructed in Section 5.4.	
		5. 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. 9-10, 26
During "wash" phase of a retain cycle.	2.D. Intermittent buzzer and 0c flashing on display.	This alarm indicates that the maximum allowable time for wash water to be pumped back to the storage tank (after the wash phase of a "retain" cycle) has been exceeded. Possible cause are as follows:	

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	(2.D., cont.)	1. No power to the pump — correct.	
		2. No cold water pressure to operate butterfly valve actuators — correct.	
		3. Solenoid valve V4 (storage) stuck closed — correct.	Fig. 9-13, 2
		4. Wiring to solenoid valve V2 defective — repair or replace.	Fig. 9-22, 15
		5. Check for correct operation of solenoid valve V4 and PC board 1 by initiating "service routine," as instructed in Section 5.4.	
		6. Butterfly valve not opening because of broken shear pin — repair.	Para. 8.6
		7. 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 voltage between "-" and "TEST" terminals. If voltage is present, then level sensor is shorted — replace. **NOTE:** "No Voltage" condition is 0 to 0.8 volts DC.	Fig. 9-10, 26
During "wash" portion of any cycle phase.	2.E. Pump running but no water spray through rotary arms.	1. Cold water supply, to operate butterfly valve operators, not on — turn on.	
		2. Butterfly valve malfunctioning or broken — repair.	Para. 8.6
		3. Solenoid valve V6 or V7 stuck closed — correct.	Fig. 9-13, 2
		4. Wiring to solenoid valve V6 or V7 defective — repair or replace.	Fig. 9-22, 15
		5. Check for correct operation of solenoid valves V6 and V7 and PC board 1 by initiating "service routine," as instructed in Section 5.4.	

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	2.F. Unable to reset system by pushing STOP pushbutton or by opening door.	1. If cycle does not stop when door is opened, check door closed switch wiring.	Para. 8.7
		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 38 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. 9-17 Fig. 9-16, 8
		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. 9-18, 35 Fig. 9-17
3. At end of cycle. COMPLETE light on.	3.A. Intermittent buzzer, and 08 flashing on display — another phase light indicator (PRE-WASH, WASH, RINSE) will be on to indicate where in the cycle the problem occurred.	This alarm indicates that steam valve V3 has remained on for an excessive amount of time (more than five minutes). Cycle automatically goes to vapor-removal phase. Possible causes are as follows:	
		1. Steam supply inadequate — check.	
		2. Temperature probe (RTD) malfunction (shorted). The correct probe resistances are as follows: 140°F — 783 ±7.8 ohms 160°F — 820 ±8.2 ohms 180°F — 856 ±8.6 ohms	Fig. 9-10, 23
		3. Check for correct operation of solenoid valve V3 (steam) and PC board 1 by initiating "service routine," as instructed in Section 5.4.	
		4. Temperature controller malfunctioning — check wiring. If wiring is OK, replace temperature controller.	Fig. 9-20, 4
	3.B. Intermittent buzzer and 09 flashing on display.	This alarm indicates that final rinse water did not reach 180° F. Cycle will continue to completion automatically. Possible causes are the same as those for the preceding alarm (08).	

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	3.C. Buzzer does not sound when COMPLETE light is on.	1. Buzzer defective — check voltage across buzzer, replace if necessary.	Fig. 9-18, 15 Fig. 9-19, 15
		2. Open wire — disconnect P1A from control and check continuity between pin R and TB3-3. Isolate and repair.	Fig. 9-17
		3. PC board 2 defective. Initiate "service routine," as instructed in section 5.4 and replace board if LED D17 does not come on at end of cycle.	Fig. 9-16, 15
	3.D. Cycle counter fails to update on cycle completion.	1. Counter defective — check voltage across counter and replace if necessary.	Fig. 9-20, 6
		2. Open wire. Disconnect P26 from TB1 and check continuity between pin 16 and TB4-1. Isolate and repair open.	Fig. 9-22, 9
		3. PC board 2 defective. Initiate "service routine," as instructed in Section 5.4 and replace board if LED D22 does not come on at end of cycle.	Fig. 9-16, 15
4. Miscellaneous, detergent injector accessory	4.A. Blue "Power" light does not illuminate	1. Blown fuse.	Fig. 8-17
		2. Burned out bulb.	
		3. No input power, check power connections.	
		4. Controller has bypassed detergent injection due to the following: a) Water level in storage tank is above low water sensor at start of cycle. Check storage tank fill control butterfly valve for leakage. b) Wash water not reaching 160°F. Check steam/water temperature booster for proper operation.	

TABLE 7-1: Troubleshooting Chart (cont.)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	4.B. White "Feeder" light does not illuminate.	1. Burned out bulb. 2. Cell circuit shorted. Check leads and connections to cells and mounts. 3. Detergent concentration in wash water is above controller setting. Water was retained in storage tank from previous cycle. 4. Wash water temperature not reaching 160° F. or temp. control switch is not operating. 5. Temperature control switch not operating.	Fig. 8-17
	4.C. Red "Warning" light and buzzer activate.	1. Detergent container empty. 2. Tube not inserted in drum or not floating on detergent in drum. 3. Cell circuit open. Check leads and connections. 4. Dirty cell electrodes. 5. Inoperative feeder. Check for open circuit to solenoid coil. Refer to feeder instructions for parts replacement and procedures.	
5 Miscellaneous. upon closing either front or rear door	5.A. Erratic display or incorrect condition displayed on controller front panel. Possible momentary activation of relays and solenoid valves.	1. Excessive triac leakage in the control causes a current to be present across the door switch. Closing door interrupts current flow causing voltage spikes which result in erroneous signals to be generated by the controller. Correction as follows: a) On single door units, place a 1.0 mfd. 135 VAC capacitor across the door switch Connect to wires 9 and 86 at the switch b) On double door units, place a 1.0 mfd. 135 VAC capacitor across each door switch. Connect to wires 12 and 86 at the switches.	

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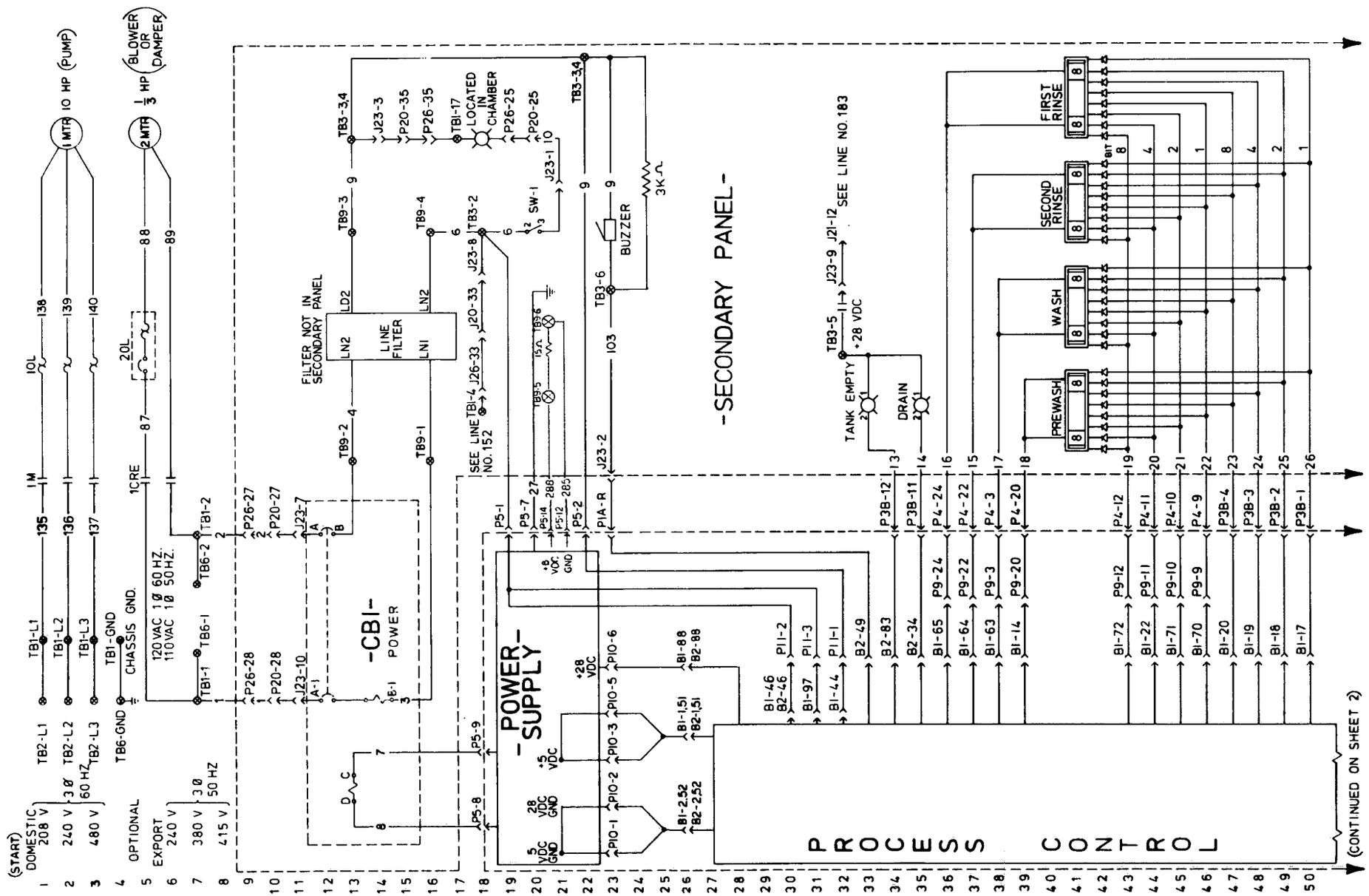

Figure 7-8. CAGE AND RACK WASHER ELECTRICAL SCHEMATIC. (1 of 4)

DWG. NO. 150475-685

(3-3-86)

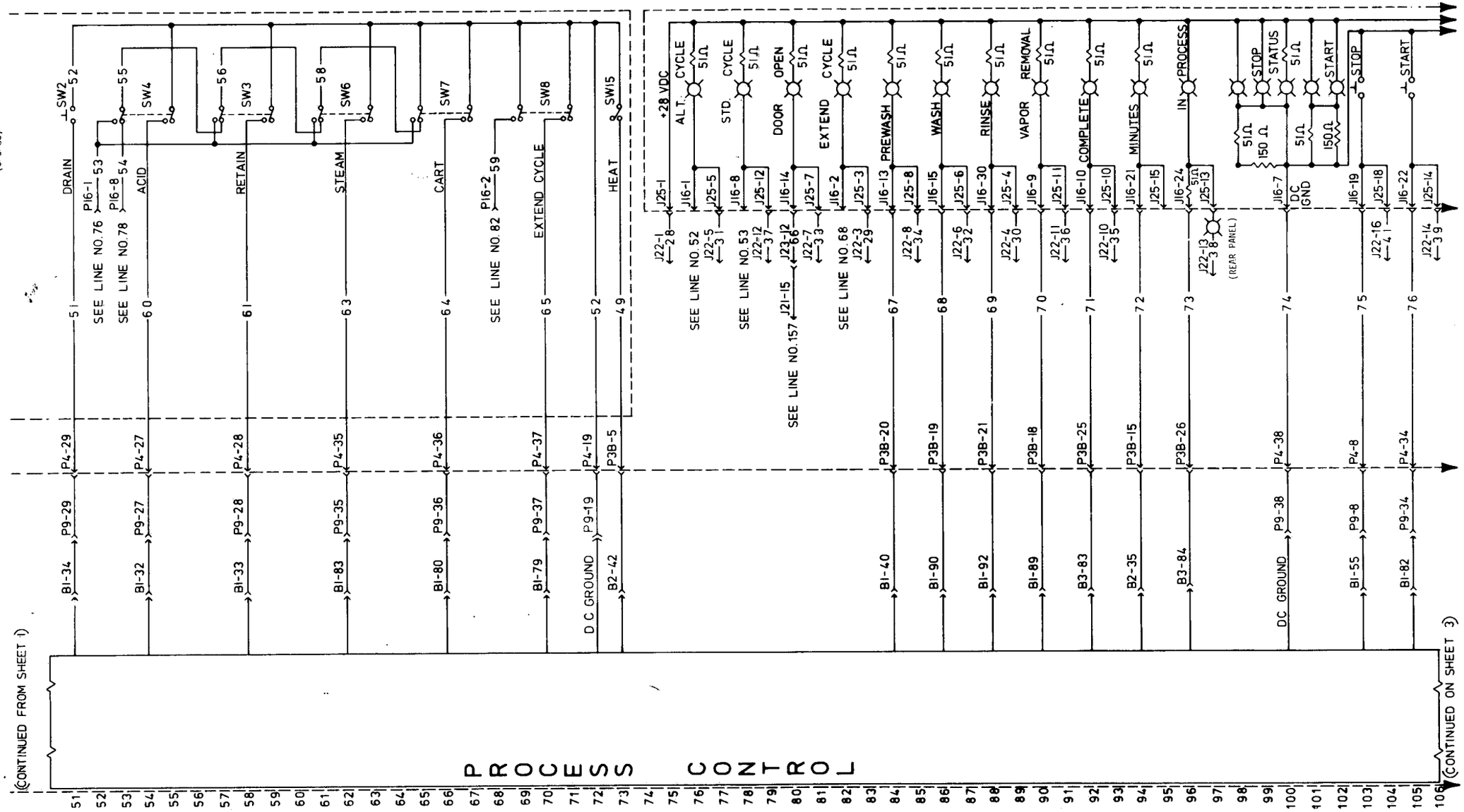

Figure 7-8. CAGE AND RACK WASHER ELECTRICAL SCHEMATIC. (2 of 4)

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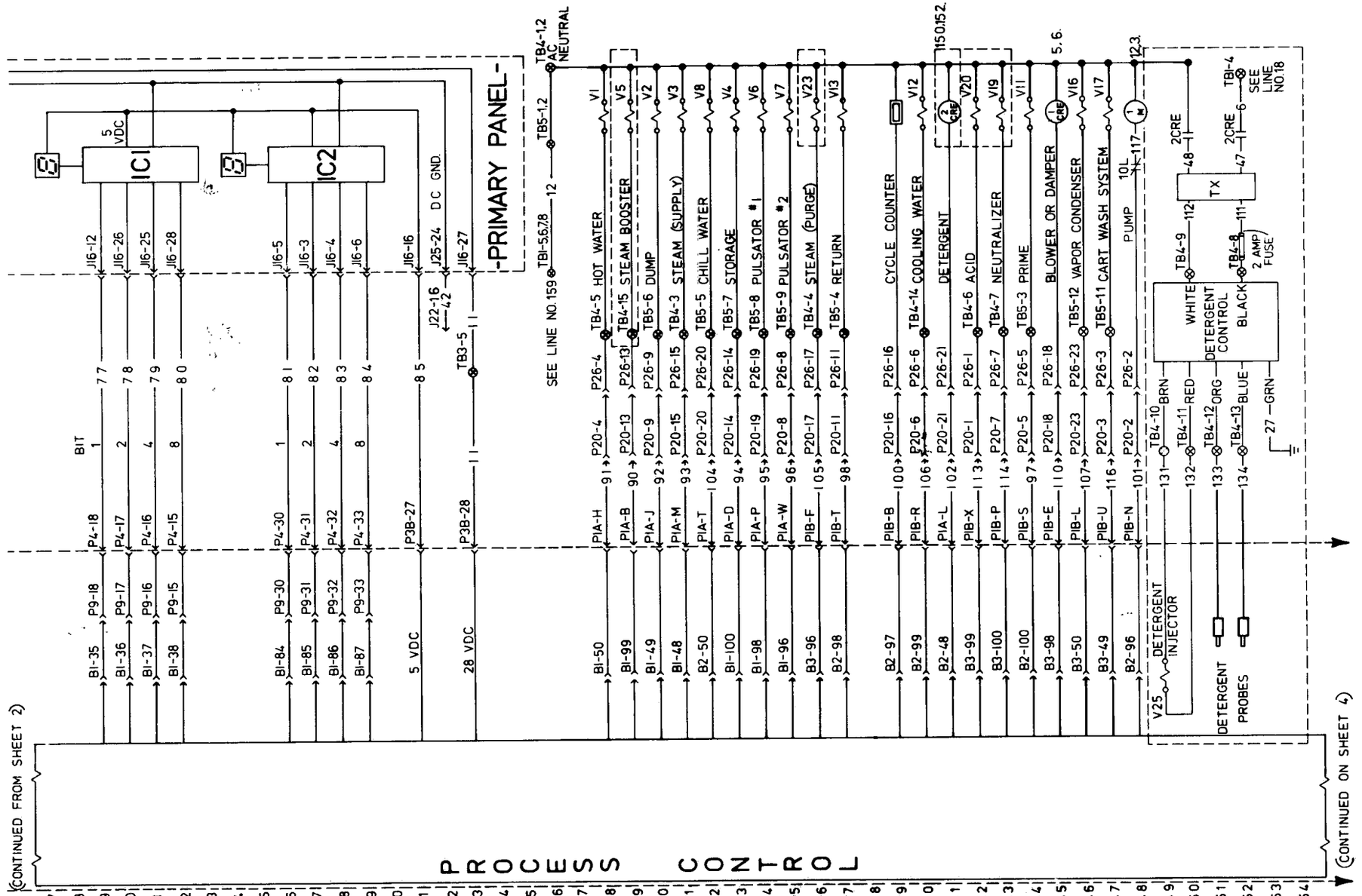
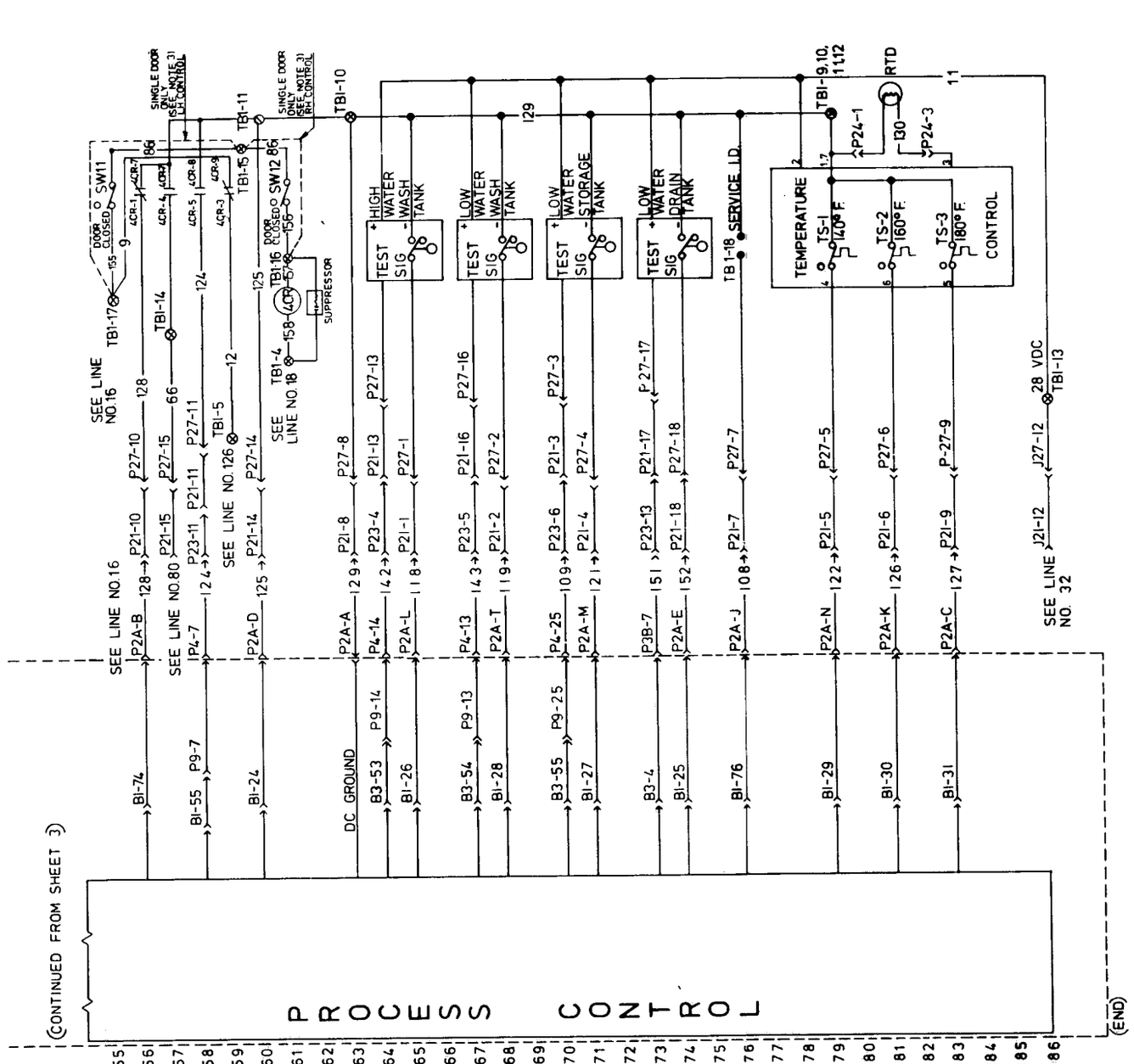


Figure 7-8. CAGE AND RACK WASHER ELECTRICAL SCHEMATIC. (3 of 4)



NOTES:

1. J22 CONNECTOR IS USED FOR DOUBLE DOOR ONLY.
2. ACID/NEUTRALIZER INJECTION, STEAM BOOSTER, & STEAM PURGE ARE OPTIONS.
3. SINGLE DOOR UNITS —

   LEFT HAND CONTROL: * CONNECT WIRE NO. 86 FROM TB1-15 TO TB1-17.

   RIGHT HAND CONTROL, CONNECT WIRE NO. 86 FROM TB1-15 TO TB1-16.
4. DETERGENT INJECTION, BLOWER/VENT, VAPOR CONDENSER, & BOTTLE CART WASHER ARE FIELD INSTALLED ACCESSORIES.

Figure 7-8. CAGE AND RACK WASHER ELECTRICAL SCHEMATIC. (4 of 4)

DWG. NO. 150475-699
(3-3-86)

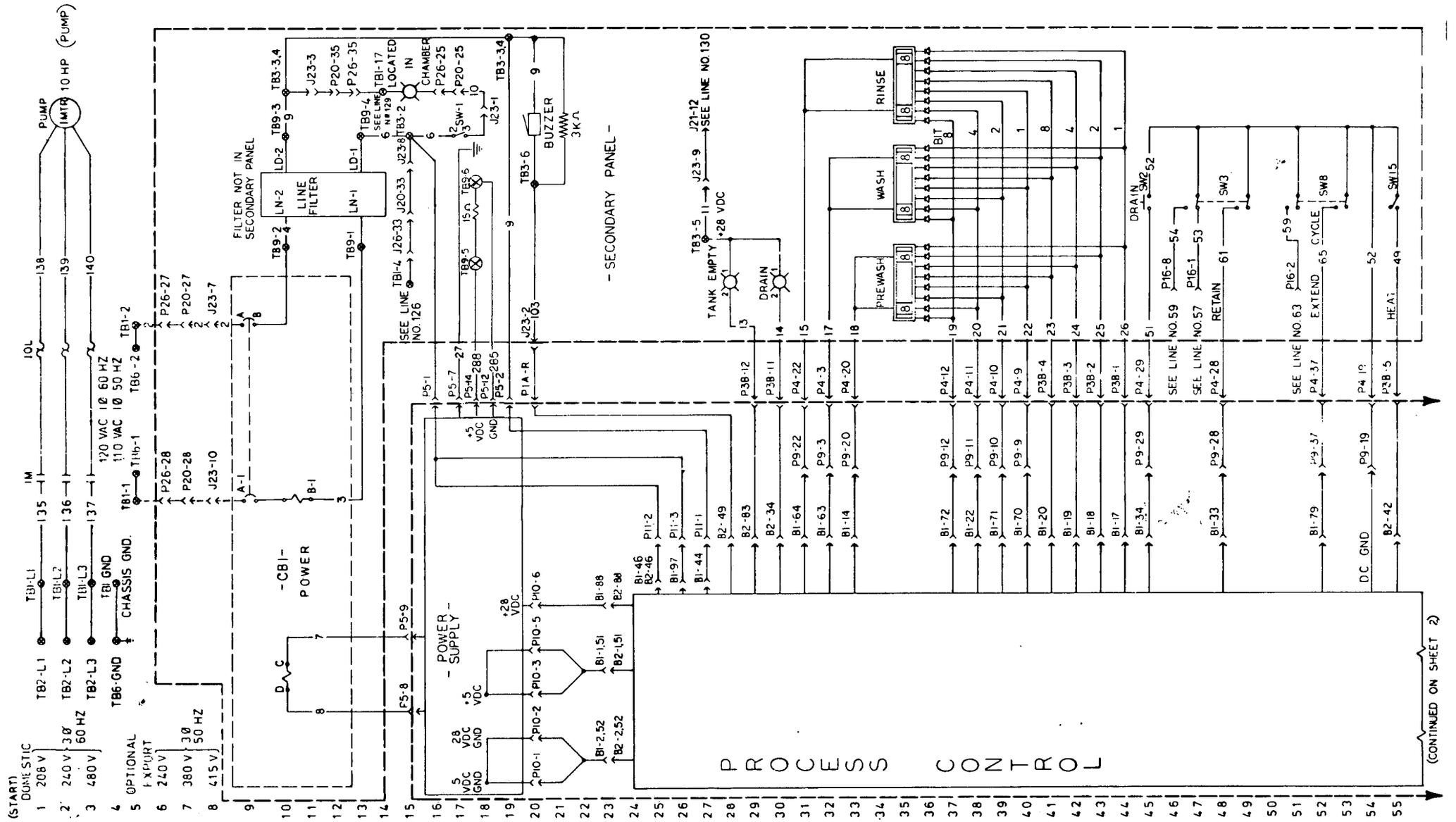


Figure 7-9. HOSPITAL CART WASHER ELECTRICAL SCHEMATIC. (1 of 3)

DWG. NO. 150475-699
(3-4-83)

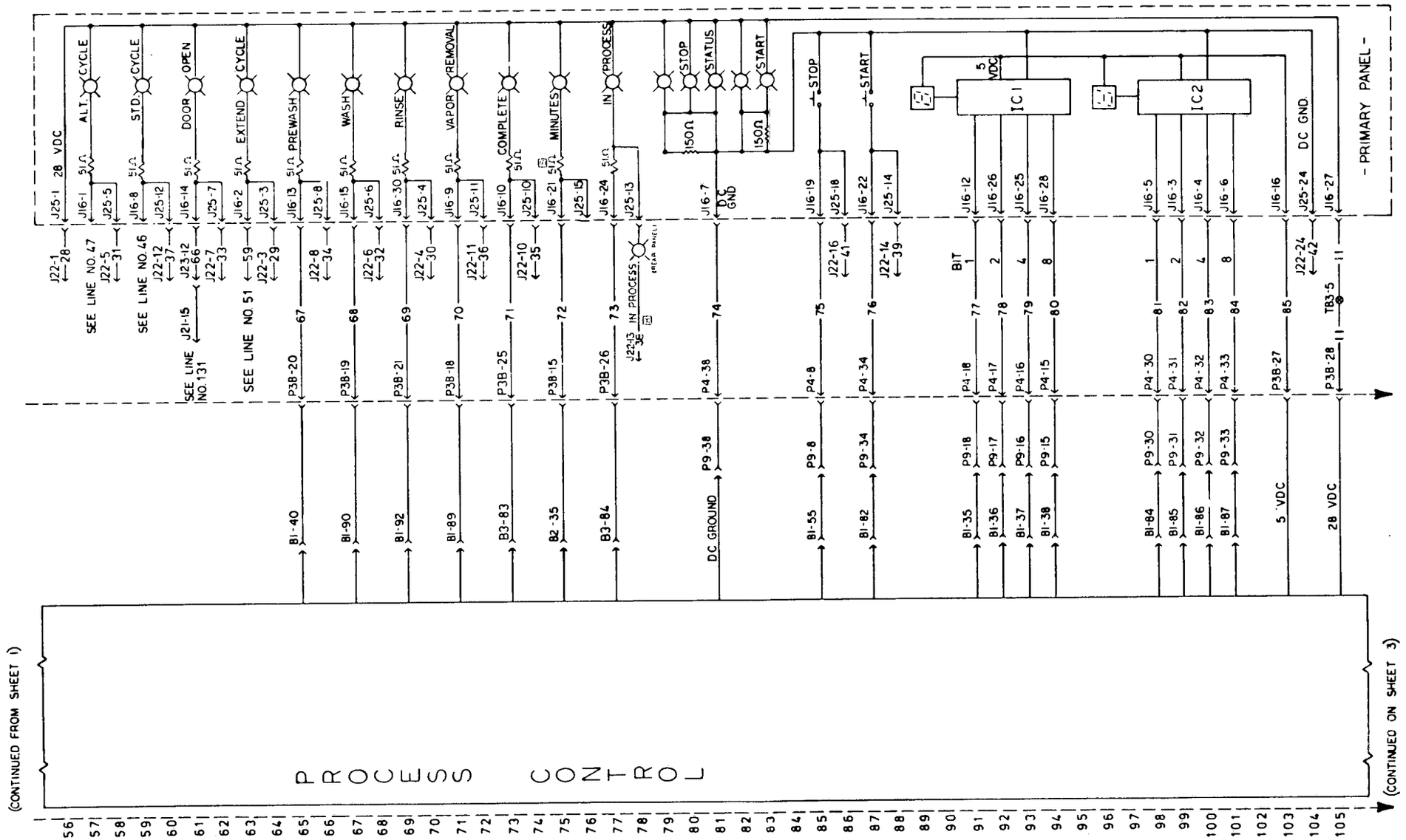
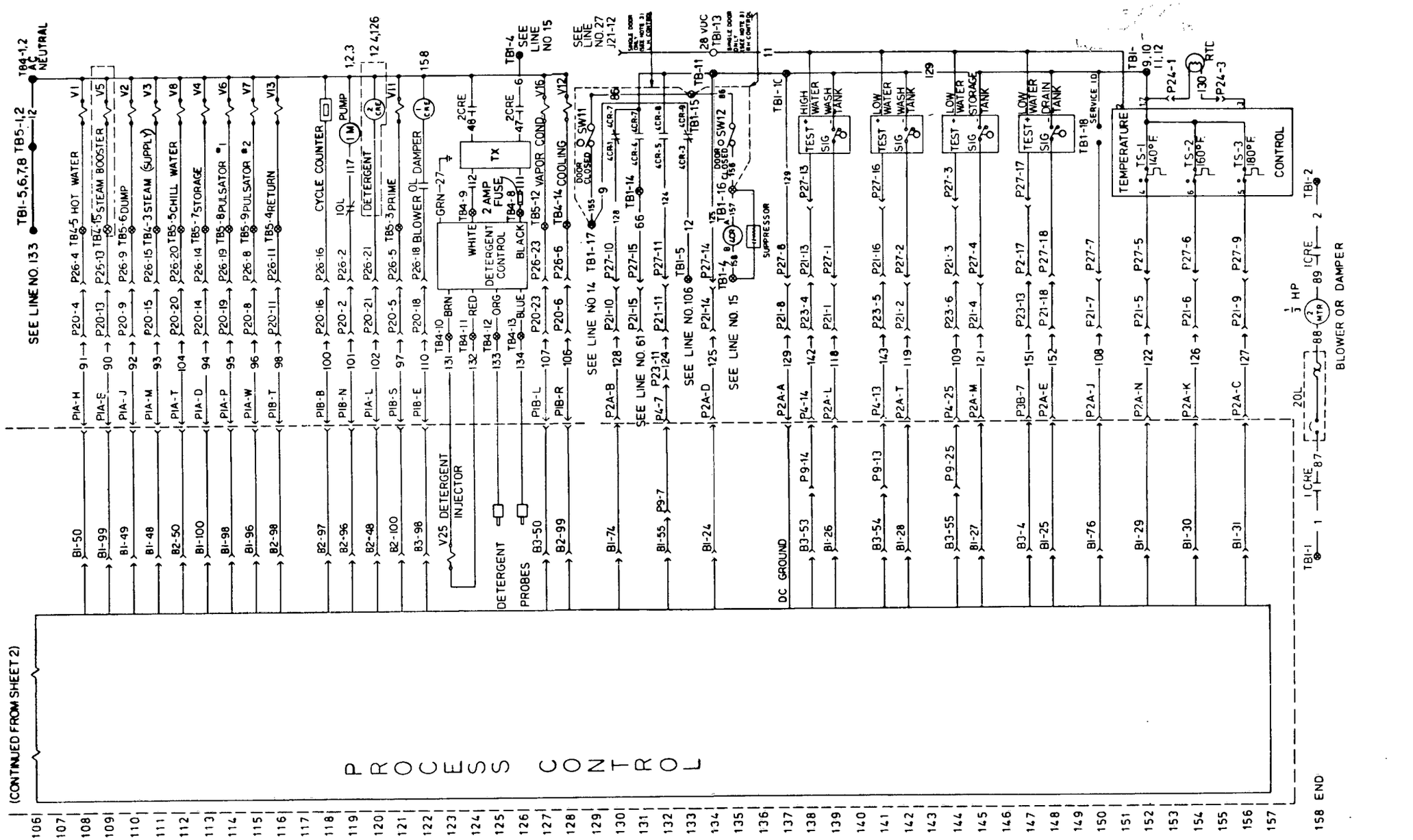


Figure 7-9. HOSPITAL CART WASHER ELECTRICAL SCHEMATIC. (2 of 3)

DWG. NO. 150475-699

(3-3-86)



NOTES:

1- Steam Booster is an option.

2- J22 Connector is used for double door only.

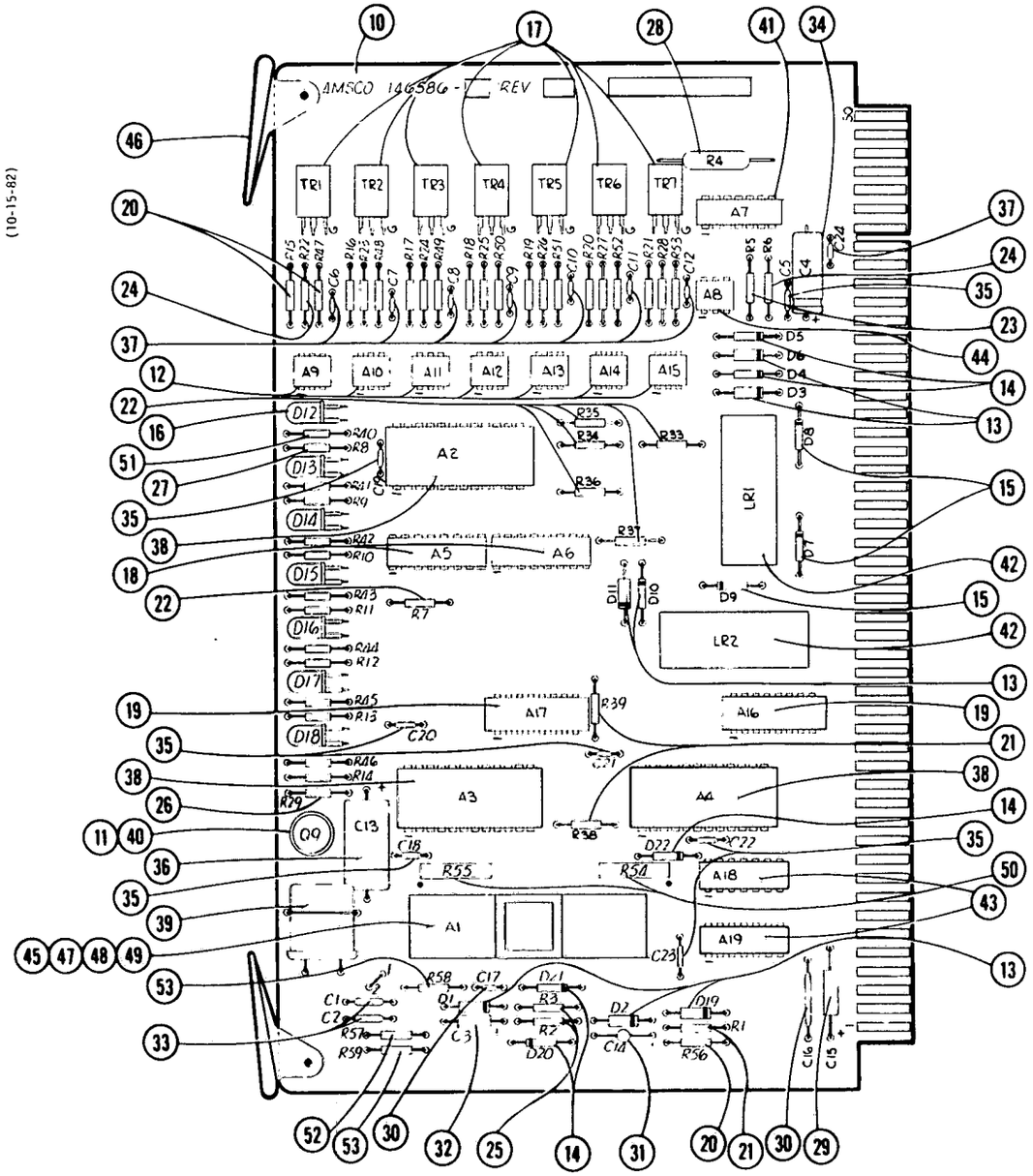
3- SINGLE DOOR UNITS-
Left Hand Control. Connect Wire No.86 from TBI-15 to TBI-17.
Right Hand Control. Connect Wire No.86 from TBI-15 to TBI-16.

4- Delergent Injection, Blower/Vent, Vapor Condenser, and Bottle Cart Washer are field installed access.

Figure 7-9. HOSPITAL CART WASHER ELECTRICAL SCHEMATIC. (3 of 3)

Rev. 8/86

DWG. NO. 146586
(10-15-82)



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 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	R4, CARBON
1	29	CAPACITOR	22µf @ 15V TANTALUM-C15
2	30	CAPACITOR	0.1µf @ 12V CERAMIC DISC-C16, C17
1	31	CAPACITOR	1.0µf @ 50V TANTALUM-C14
1	32	CAPACITOR	1.0µf @ 10V TANTALUM-C3
2	33	CAPACITOR	20pf @ 500V CERAMIC DISC-C1, C2
1	34	CAPACITOR	47µf @ 25V TANTALUM, C4
7	35	CAPACITOR	0.01µf @ 25V CERAMIC DISC-C5, C18, C23
1	36	CAPACITOR	850µf @ 8V TANTALUM-C13
8	37	CAPACITOR	0.1µf @ 500 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	8048/8748-A1
1	48	MICROCOMPUTER	8048/8748-A1
1	49	MICROCOMPUTER	8048/8748-A1
2	50	RESISTOR NETWORK	15K BY 5 R54, R55
7	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 7-10. PRINTED CIRCUIT BOARD #1. (1 of 2)

AMSCO SERVICE

PULSTAR SERIES-PULSTAR 2000 CAGE AND RACK WASHER, PULSTAR 3000 HOSPITAL CART WASHER

P-764174-002

8/86

DWG. NO. 146586
(10-15-82)

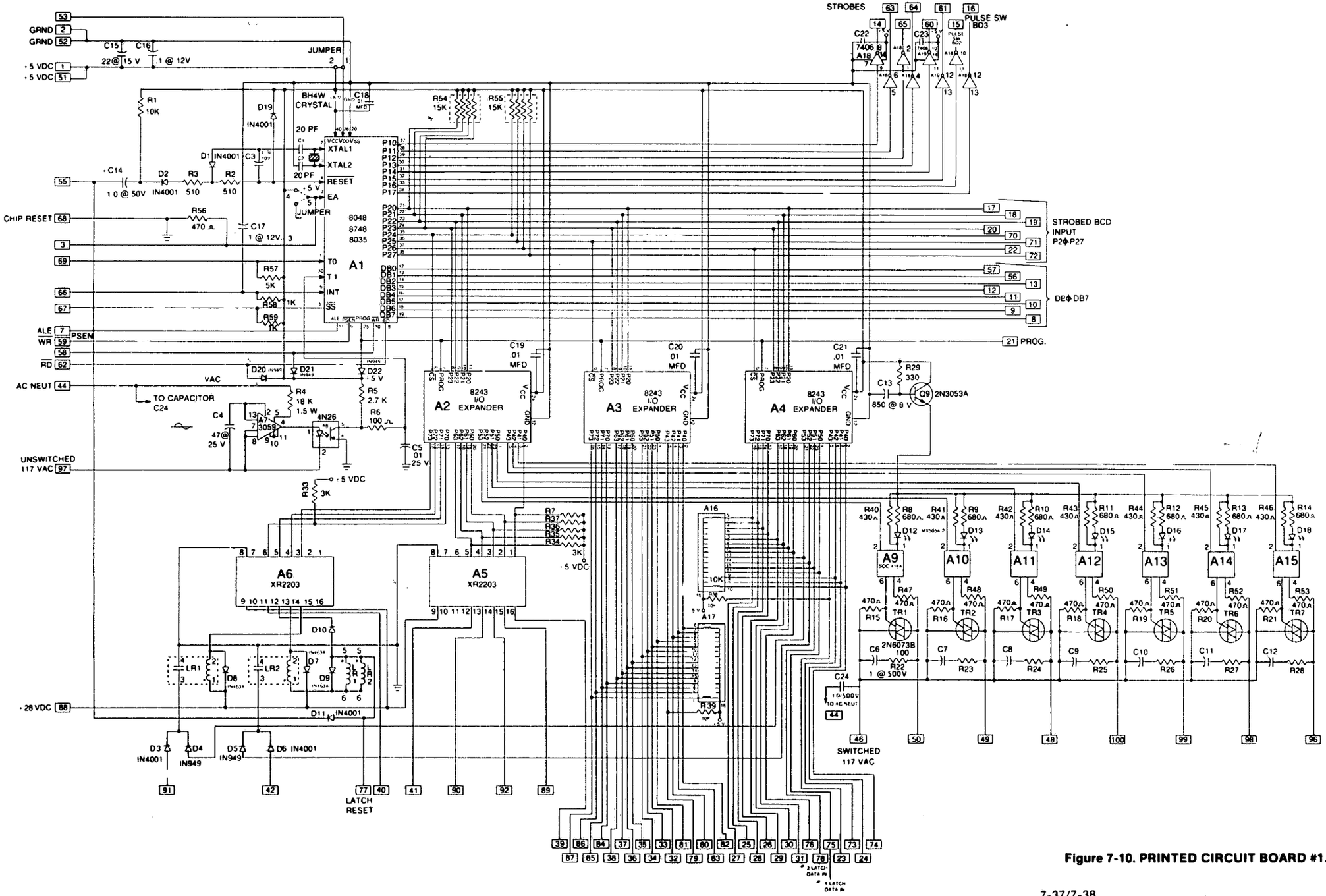
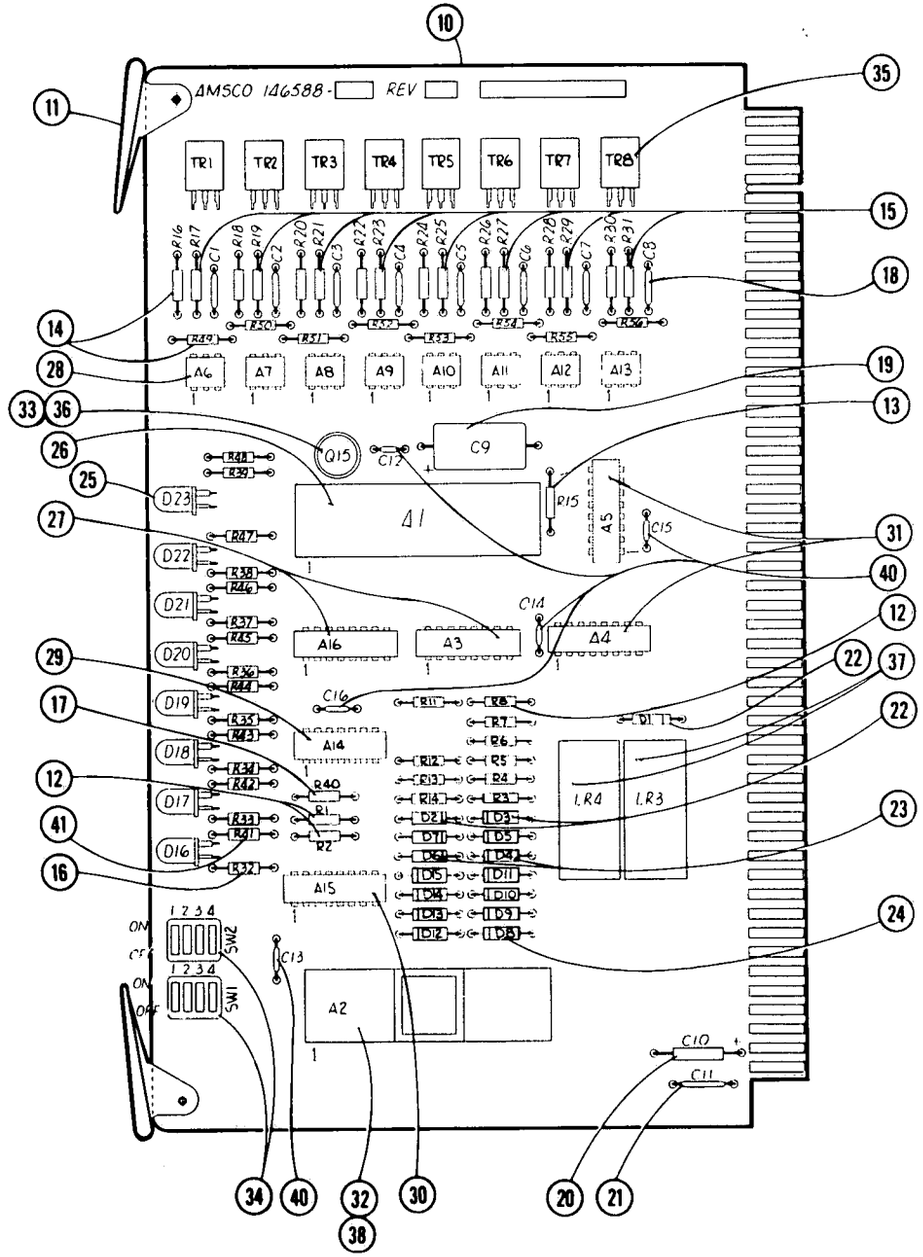


Figure 7-10. PRINTED CIRCUIT BOARD #1. (2 of 2)

DWG. NO. 146588
(10-15-82)



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, .1μf, 200V	C1-C8
1	19	CAPACITOR, 850μf, 8V	C9
1	20	CAPACITOR, 22μf, 15V	C10
1	21	CAPACITOR, .1μf, 12V	C11
3	22	DIODE	IN463A, D1, D2, D3
2	23	DIODE	IN4001, D4, D6
10	24	DIODE	IN949, 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	TR1-TR8
1	36	PAD, TRANSISTOR	Q15
2	37	RELAY, LATCH	LR3, LR4
1	38	BIT ROM	8355/8755 A2
	39	NOT USED	
5	40	CAPACITOR	0.01 MF @ 25V C12-C16
8	41	RESISTOR	430 OHMS 1/4W 5% R41-R48

Figure 7-11. PRINTED CIRCUIT BOARD #2. (1 of 2)

DWG. NO. 146588
(10-15-82)

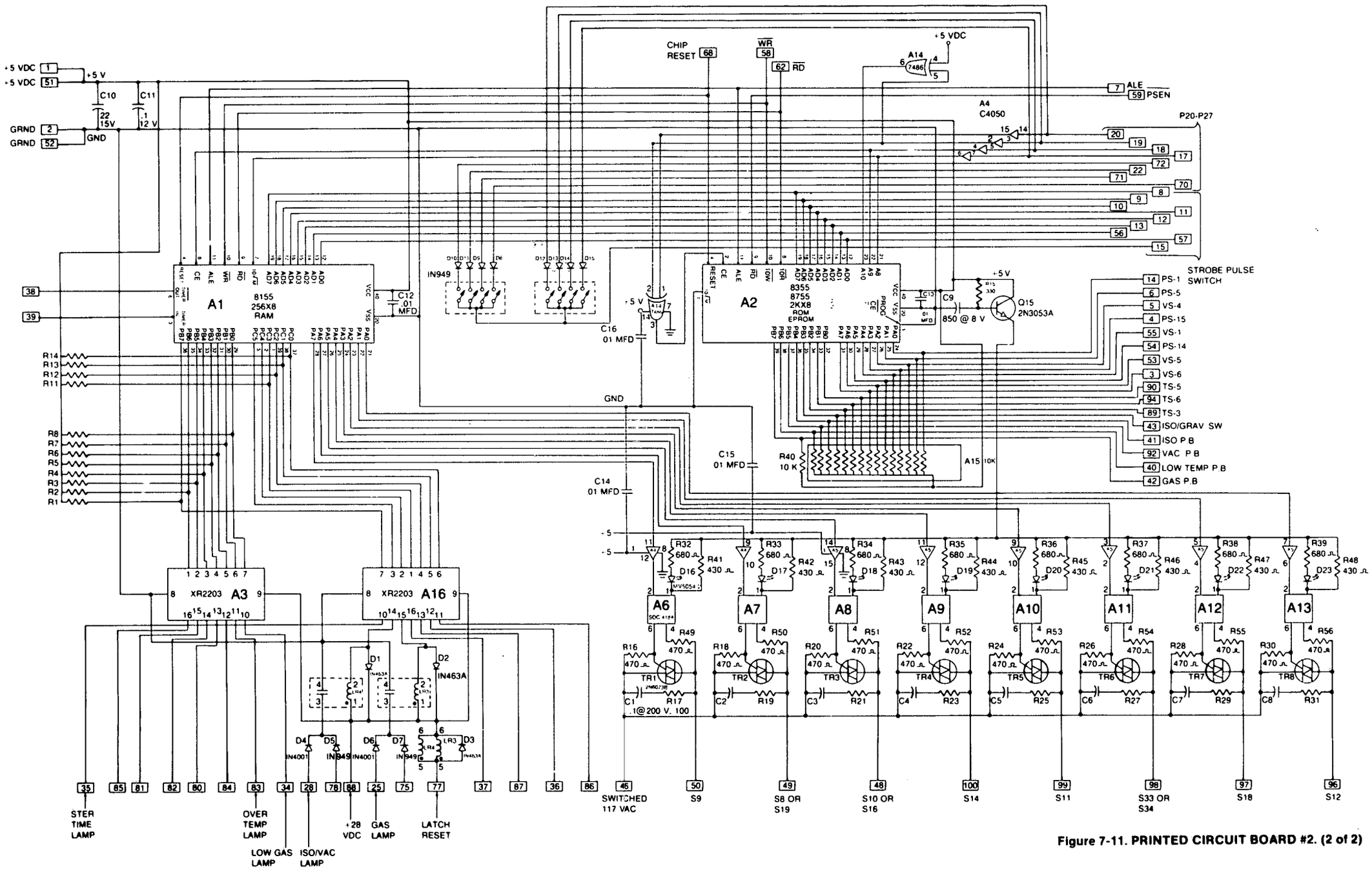
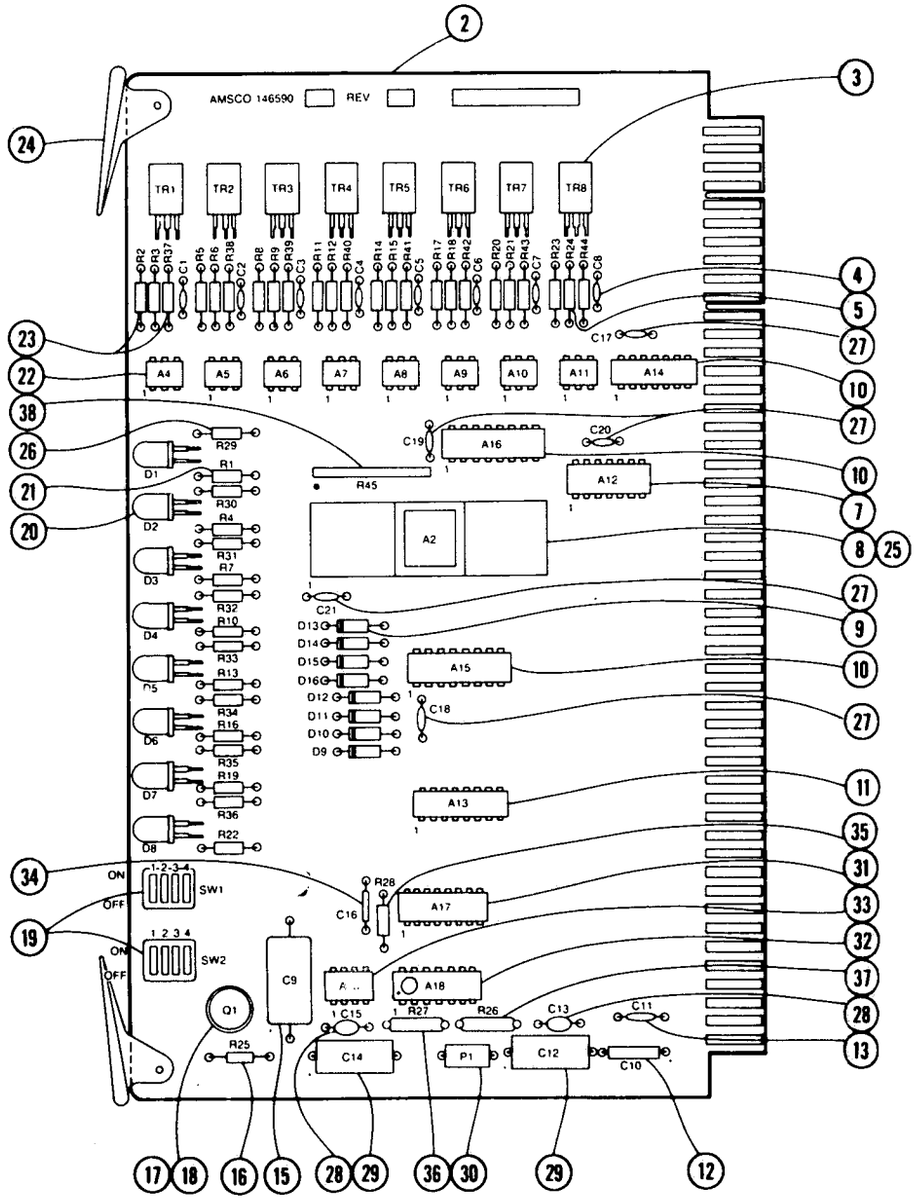


Figure 7-11. PRINTED CIRCUIT BOARD #2. (2 of 2)

DWG. NO. 146590
(12-27-84)



QTY	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	P.C. ASSY.	COMBINATION STEAM & GAS
1	2	P.C. CARD & DRILL	SCHEDULE
8	3	TRIAC,2N6073B	TR1 - TR8
8	4	CAPACITOR	.1 uf, 200V., C1 - C8
8	5	RESISTOR,100 OHMS	1/4W 5% R3, R6, R9, R12, R15, R18, R21, R24
	6		
1	7	QUAD 7408	A12
1	8	EXPANDER, ROM	8355 A2
8	9	DIODE IN949	D9 - D16
3	10	HEX BUFFER	C4050 A15, A16, A14
1	11	DARLINGTON	XR2203 A13
1	12	CAPACITOR	22uf, 15V., C10
1	13	CAPACITOR	.1uf, 12V., C11
	14		
1	15	CAPACITOR	850uf, 8V., C9
1	16	RESISTOR, 330 OHMS	1/4W 5%, R25
1	17	TRANSISTOR	2N3053A Q1
1	18	PAD, TRANSISTOR	Q1
2	19	SWITCH, 16 POS.	HEX SW1, SW2
8	20	LAMP, MV5054-2	L.E.D. D1 - D8
8	21	RESISTOR, 680 OHMS	1/4W. 5%, R1, R4, R7, R10, R13, R16, R19, R22
8	22	TRAIC, OPTO. ISO	SOC418A A4 - A11
16	23	RESISTOR, 470 OHMS	1/4W. 5%, R2, R5, R8, R11, R14, R17, R20, R23, & R37 - R44
2	24	PULL, CARD	
1	25	SOCKET, LOW PROFILE	40 PIN D.I.P.
8	26	RESISTOR, 430 OHMS	1/4W.C.C. 5% R29 - R36
5	27	CAPACITOR	.01 uf @25V. C17 - C21
2	28	CAPACITOR	0.1 uf @100V. C13, C15
2	29	CAPACITOR	22 uf @25V. C12, C14
1	30	POTENTIOMETER	1K OHMS P1
1	31	DA CONVERTER	MC 1408 L8 A17
1	32	QUAD OP AMP	LM 324 N A18
1	33	REFERENCE, 5V.	MC 1403 P1 A19
1	34	CAPACITOR	15 PF @100V. C16
1	35	RESISTOR	1.2K OHMS 1/4W.C.C. 5% R28
1	36	RESISTOR	619 OHMS 1/4W.M.F. 5% R27
1	37	RESISTOR	121 OHMS 1/4W.M.F. 5% R26
1	38	RESISTOR, NETW'K	3.3K OHMS BY 9 R45

Figure 7-12. PRINTED CIRCUIT BOARD #3. (1 of 2)

DWG. NO. 146590
(12-27-84)

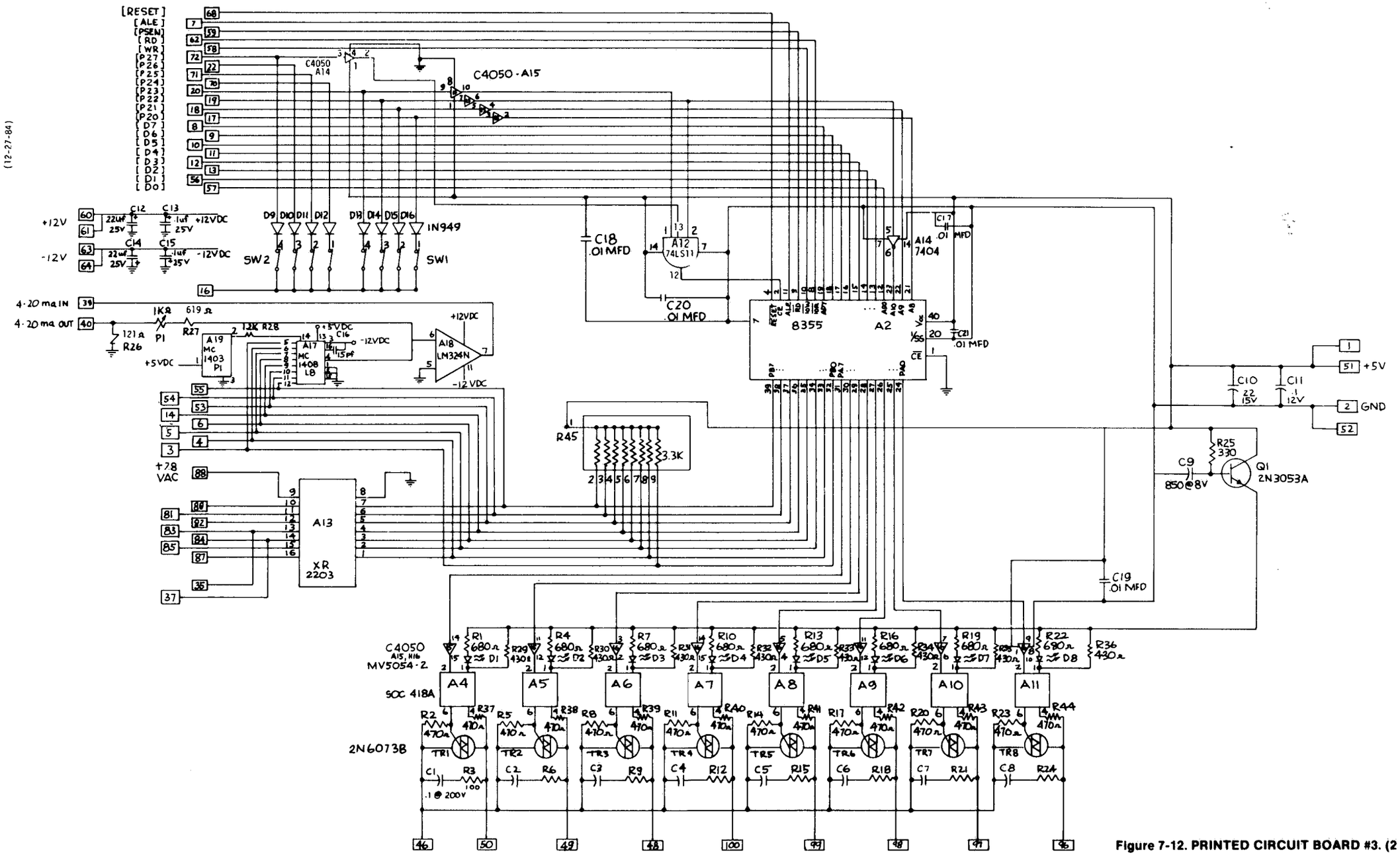
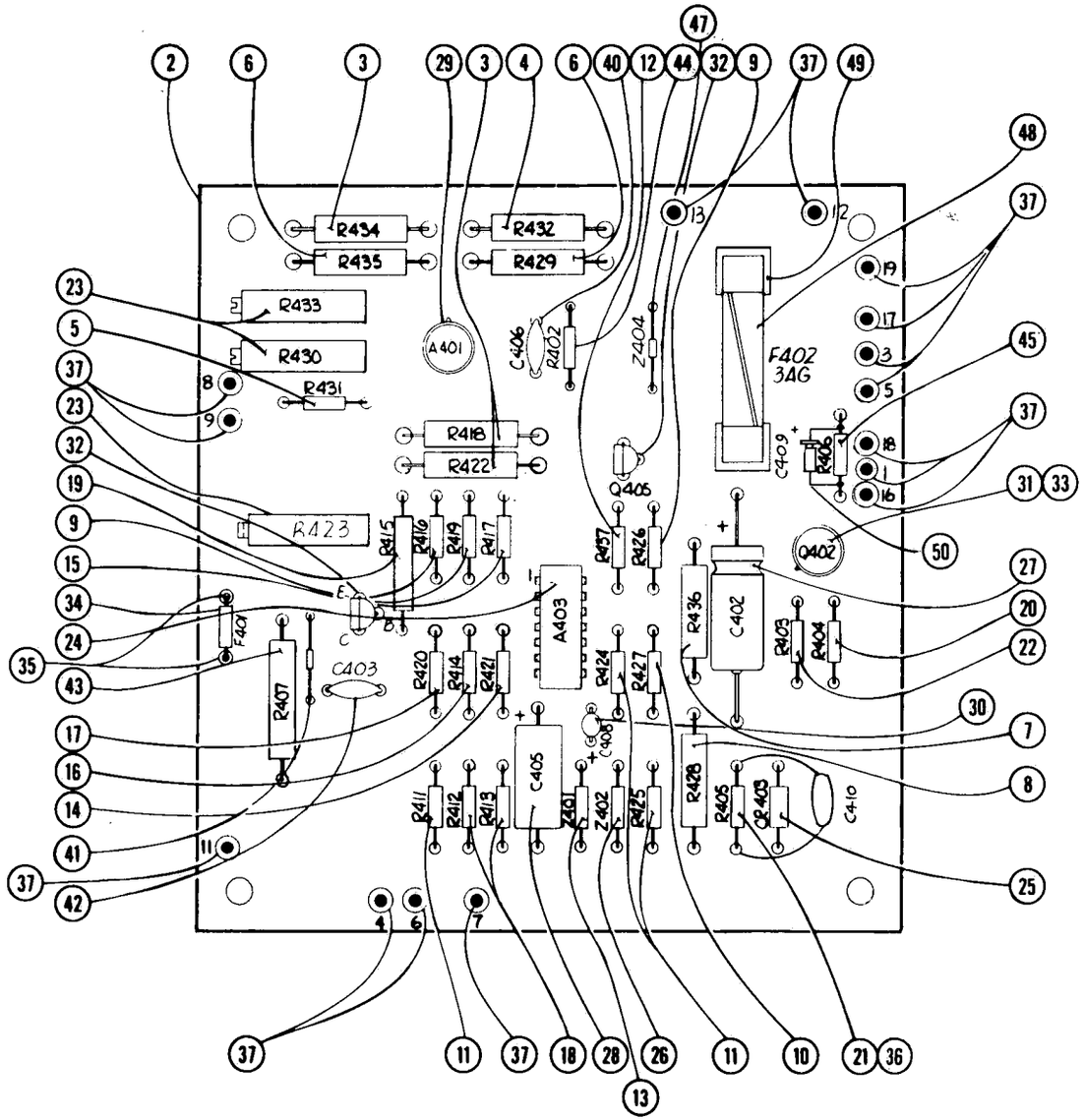


Figure 7-12. PRINTED CIRCUIT BOARD #3. (2 of 2)

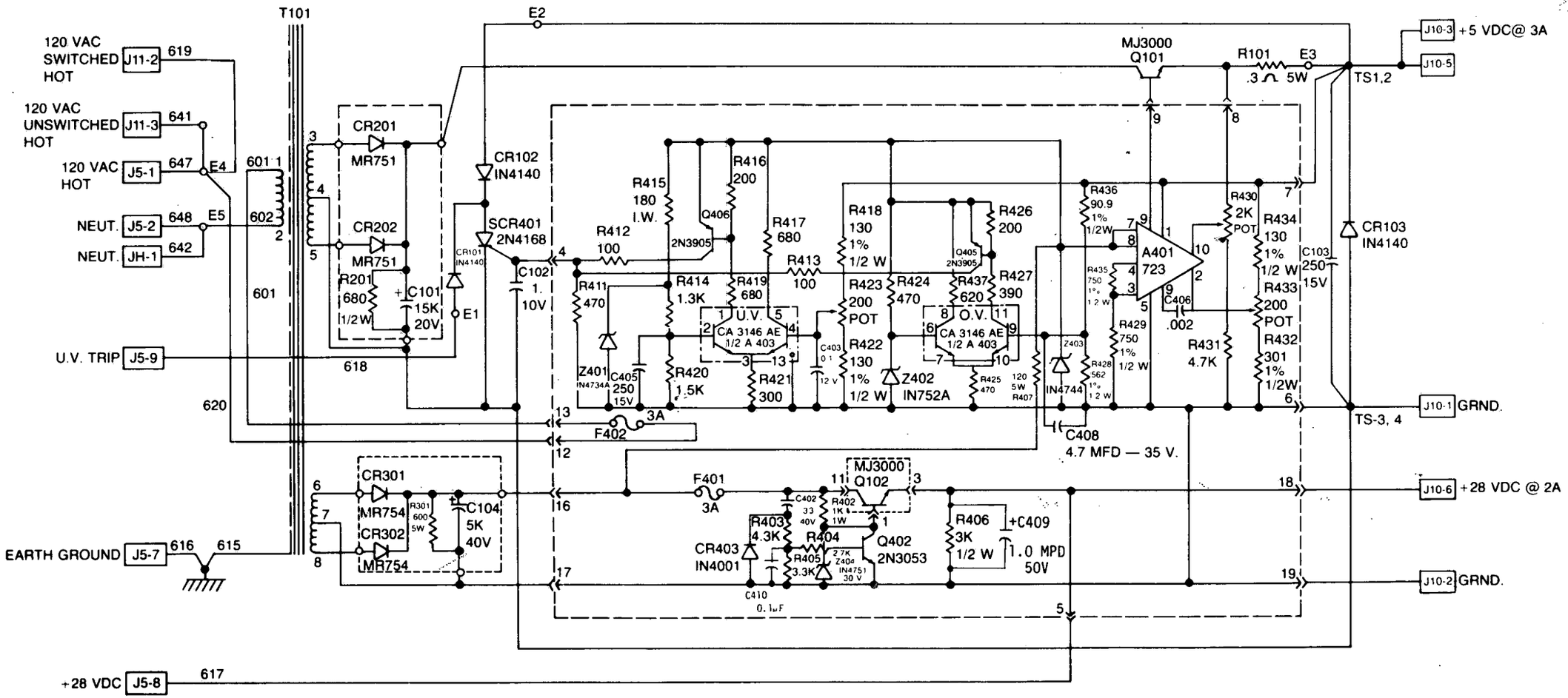
DWG. NO. 146599
(7-22-85)



QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	2	P/C CARD	
1	3	RESISTOR, 130 OHMS	1% 1/2 W.M.F., R434
1	4	RESISTOR, 301 OHMS	1% 1/2 W.M.F., R432
1	5	RESISTOR, 47K OHMS	5% 1/4 W.C.C., R431
2	6	RESISTOR, 750 OHMS	1% 1/2 W.M.F., R429, R435
1	7	RESISTOR, 9.09 OHMS	1% 1/2 W.M.F., R436
1	8	RESISTOR, 562 OHMS	1% 1/2 W.M.F., R428
2	9	RESISTOR, 200 OHMS	5% 1/4 W.C.C., R416, R426
1	10	RESISTOR, 390 OHMS	5% 1/4 W.C.C., R427
3	11	RESISTOR, 470 OHMS	5% 1/4 W.C.C., R411, R424, R425
1	12	RESISTOR, 430 OHMS	5% 1/4 W.C.C., R437
1	13	DIODE, ZENER	IN4734A, Z401
1	14	RESISTOR, 300 OHMS	5% 1/4 W.C.C., R421
2	15	RESISTOR, 680 OHMS	5% 1/4 W.C.C., R419
1	16	RESISTOR, 1.3K OHMS	5% 1/4 W.C.C., R414
1	17	RESISTOR, 1.5K OHMS	5% 1/4 W.C.C., R420
2	18	RESISTOR, 100 OHMS	5% 1/4 W.C.C., R412, R413
1	19	RESISTOR, 180 OHMS	5% 1 W., C.C., R415
1	20	RESISTOR, 2.7K OHMS	5% 1/4 W.C.C., R404
1	21	RESISTOR, 3.3K OHMS	5% 1/4 W.C.C., R405
1	22	RESISTOR, 4.3K OHMS	5% 1/4 W.C.C., R403
2	23	POTENTIOMETER	200 OHMS, R423, R433
1	24	I.C.	CA3146AE. A403
1	25	DIODE	IN4001, CR403
1	26	DIODE, ZENER	IN752A, 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	2N3053A 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	1% 1/2 W.M.F., R422
1	39	RESISTOR, 82.5 OHMS	1% 1/2 W.M.F., R418
1	40	CAPACITOR, DISC.	.002 MFD 1KV, C406
1	41	DIODE, ZENER	IN4744, Z403
1	42	CAPACITOR	.1MFD 12VDC C403
1	43	RESISTOR	750 OHMS 3W R407
1	44	RESISTOR	1K 1W R402
1	45	RESISTOR	3K 1/2W R406
1	46	POTENTIOMETER	2K R 430
1	47	DIODE, ZENER	IN4751A 30V Z404
1	48	FUSE	3AG F402
2	49	CLIP, FUSE	
1	50	CAPACITOR	1,0 MFD, 50V, C409

Figure 7-13. POWER SUPPLY. (1 of 2)

DWG. NO. 146599 (7-22-85)



NOTE:

1. Potentiometer functions are as follows:

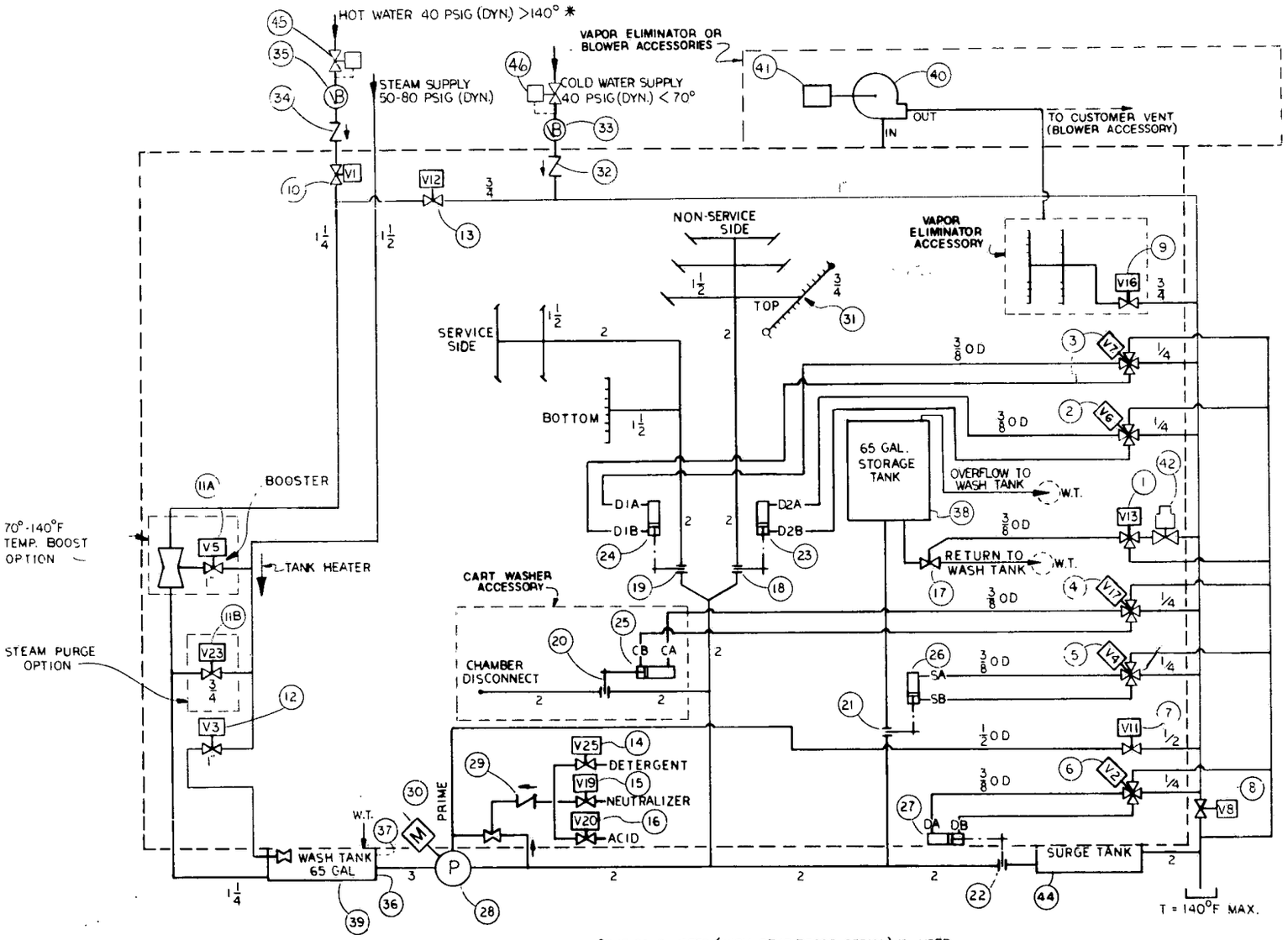
   R433; 5 volt output
   R423; undervoltage (4.75 V) circuit breaker trip.
   R430; 3 amp current limit trip of circuit breaker.

Figure 7-13. POWER SUPPLY. (2 of 2)

DWG. NO. 150476-488

ITEM NO.	NAME	SERVICE
17	PINCH VALVE	CONTROLLED BY V-13
18	BUTTERFLY VALVE	CONTROLLED BY V-6
19	BUTTERFLY VALVE	CONTROLLED BY V-7
20	BUTTERFLY VALVE	CONTROLLED BY V-17
21	BUTTERFLY VALVE	CONTROLLED BY V-4
22	BUTTERFLY VALVE	CONTROLLED BY V-2
23	ACTUATOR	CONTROLLED BY V-6
24	ACTUATOR	CONTROLLED BY V-7
25	ACTUATOR	CONTROLLED BY V-17
26	ACTUATOR	CONTROLLED BY V-4
27	ACTUATOR	CONTROLLED BY V-2
28	PUMP	
29	CHECK VALVE	DETERGENT, ACID/NEUTRALIZER
30	MOTOR, PUMP DRIVE	
31	BEARING, ROTOR	
32	CHECK VALVE	COLD WATER
33	VACUUM BREAKER	COLD WATER
34	CHECK VALVE	HOT WATER
35	VACUUM BREAKER	HOT WATER
36	LOW LEVEL PROBE	WASH TANK
37	HIGH LEVEL PROBE	WASH TANK
38	LOW LEVEL PROBE	STORAGE TANK
39	TEMP. SENSOR	WASH TANK
40	BLOWER	VAPOR ELIMINATOR (ACCESS.)
41	MOTOR, BLOWER	VAPOR ELIMINATOR (ACCESS.)
42	PRESS. REGULATOR VALVE	CONTROL WATER TO PINCH VALVE
43	DOOR SWITCH	
44	LOW LEVEL PROBE	DRAIN TANK
45	VALVE, PRESSURE REDUCING	
46	VALVE, PRESSURE REDUCING	

ITEM NO.	SOL. VALVE	SERVICE
1	V13	PINCH VALVE - WATER RETURN FROM STRG. TANK
2	V6	NON-SVC. SIDE & TOP SPRAY
3	V7	SVC. SIDE & BOTTOM SPRAY
4	V17	BOTTLE CART WASHER (ACCESS.)
5	V4	WASH TO STORAGE TANK
6	V2	WASH TO DRAIN
7	V11	PUMP PRIME
8	V8	CHILL WATER
9	V16	VAPOR ELIMINATOR (OPTION)
10	V1	HOT WATER
11A	V5	STEAM BOOSTER (OPTION)
11B	V23	STEAM PURGE (OPTION)
12	V3	STEAM TO WASH TANK
13	V12	COLD WATER TO WASH TANK
14	V25	DETERGENT (ACCESS.)
15	V19	NEUTRALIZER (ACCESS.)
16	V20	ACID (ACCESS.)

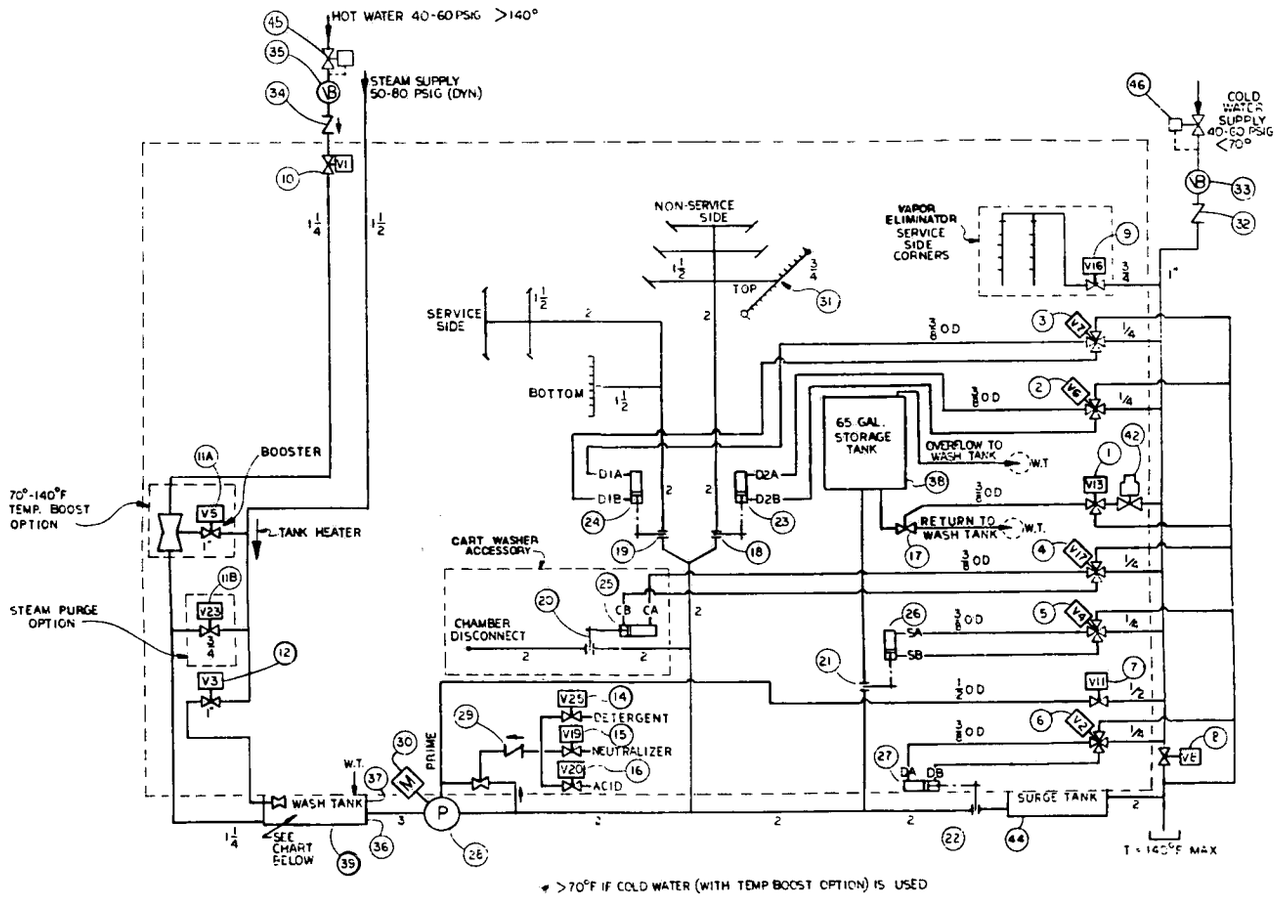


* >70°F IF COLD WATER (WITH TEMP BOOST OPTION) IS USED

SIZE	CHAMBER VOLUME	WASH TANK CAPACITY STD.	WASH TANK CAPACITY MAX.
50"	352 FT^3	65	75
42"	308 FT^3	55	65
34"	263 FT^3	50	57

Figure 7-14. PIPING SCHEMATIC. (Units Before 2/84).

DWG. NO. 150476-488
(3-3-86)



* >70°F IF COLD WATER (WITH TEMP BOOST OPTION) IS USED

ITEM NO.	SOL VALVE	AMSCO PT. NO	SERVICE
1	V 13	150476-175	PINCH VALVE - WATER RETURN FROM STRG. TANK
2	V 6	" -176	NON-SVC. SIDE & TOP SPRAY
3	V 7	" -176	SVC. SIDE & BOTTOM SPRAY
4	V 17	" -176	BOTTLE CART WASHER (ACCESS.)
5	V 4	" -176	WASH TO STORAGE TANK
6	V 2	" -176	WASH TO DRAIN
7	V 11	" -177	PUMP PRIME
8	V 8	" -183	CHILL WATER
9	V 16	" -183	VAPOR ELIMINATOR
10	V 1	" -181	HOT WATER
11A	V5	42108-091	STEAM BOOSTER (OPTION)
11B	V23	150476-357	STEAM PURGE (OPTION)
12	V 3	42108-091	STEAM TO WASH TANK
14	V25	" -178	DETERGENT (ACCESS.)
15	V19	" -179	NEUTRALIZER (ACCESS.)
16	V20	" -173	ACID (ACCESS.)

ITEM NO.	NAME	AMSCO PT. NO.	SERVICE
17	PINCH VALVE	150476-167	CONTROLLED BY V-13
18	BUTTERFLY VALVE	" -174	" " V-6
19	BUTTERFLY VALVE	" -174	" " V-7
20	BUTTERFLY VALVE	" -174	" " V-17
21	BUTTERFLY VALVE	" -174	" " V-4
22	BUTTERFLY VALVE	" -174	" " V-2
23	ACTUATOR	" -168	" " V-6
24	ACTUATOR	" -168	" " V-7
25	ACTUATOR	" -168	" " V-17
26	ACTUATOR	" -168	" " V-4
27	ACTUATOR	" -168	" " V-2
28	PUMP	150475-947 -948	
29	CHECK VALVE	41998-091	DETERGENT, ACID/NEUTRALIZER
30	MOTOR, PUMP DRIVE	150475-947 -948	
31	BEARING, MOTOR	150476-494 150473-039	
32	CHECK VALVE	43101-091	COLD WATER
33	VACUUM BREAKER	51757-091	" "
34	CHECK VALVE	43520-091	HOT WATER
35	VACUUM BREAKER	150476-453	" "
36	LOW LEVEL PROBE	150475-994	WASH TANK
37	HIGH LEVEL PROBE	" -994	" "
38	LOW LEVEL PROBE	" -994	STORAGE TANK
39	TEMP. SENSOR	129133-001	WASH TANK
42	PRESS. REGULATOR VALVE	150476-607	CONTROL WATER TO PINCH VALVE
43	DOOR SWITCH	150476-473 -474	
44	LOW LEVEL PROBE	150475-994	DRAIN TANK
45	VALVE, PRESSURE REDUCING	150476-734	
46	VALVE, PRESSURE REDUCING	150476-733	

Figure 7-15. PIPING SCHEMATIC. (Units After 2/84).

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TABLE 7-2. WIRE LIST: COMMON WIRES, ALL MACHINES (1 OF 6)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	6	16	J20-28	P23-10
1	BLACK	126	16	P20-28	P26-28
1	BLACK	13	16	TB1-1	J26-28
1	BLACK	28	14	TB1-1	TB6-1
1	BLACK	6	14	TB1-1	1CRE-7
2	WHITE	6	16	J20-27	P23-7
2	WHITE	126	16	P20-27	P26-27
2	WHITE	14	16	TB1-2	J26-27
2	WHITE	28	14	TB1-2	TB6-2
2	BLACK	6	14	TB1-2	1CRE-9
3	BLACK	10	16	LN-1	TB9-1
3	BLACK			SEC. PANEL	TB9-1
4	WHITE	10	16	LN-2	TB9-2
4	WHITE			SEC. PANEL	TB9-2
6	BLACK	6	16	J20-33	P23-8
6	BLACK	10	16	LD-1	TB9-4
6	BLACK			SEC. PANEL	TB9-4
6	BLACK	126	16	P20-33	P26-33
6	BLACK	8	16	TB1-4	J26-33
6	BLACK	6	18	TB1-4	2CRE-4
9	WHITE	6	16	J20-35	P23-3
9	WHITE	10	16	LD-2	TB9-3
9	WHITE			SEC. PANEL	TB9-3
9	WHITE	126	16	P20-35	P26-35
9	RED	6	18	J26-35	TB1-17
9	RED			SW-11	J26-35
10	BLACK	6	16	J20-25	P23-1
10	GRAY	126	18	P20-25	P26-25
10	GRAY	55	18	LIGHT	J26-25
11	BLACK	8	22	J21-12	P23-9
11	RED	126	22	P21-12	P27-12
11	RED	8	18	TB1-13	TEMP. CONTROL 2
11	RED			TB1-13	LOW STORAGE
11	RED	6	18	TB1-13	J27-12
11	RED			LLD	TB1-13
11	RED			LOW H2O DRAIN	TB1-13
12	BLACK			COUNTER	TB1-5
12	WHITE	9	18	TB1-7	MTR. START COIL
12	WHITE			TB4	TB1-5
12	WHITE			TB5	TB1-6
12	WHITE			LIGHT	TB1-7
12	GRAY			SW12	TB1-8
12	WHITE	27	18	TB5-2	V17
12	WHITE	70	18	TB4-1	V1
12	WHITE	34	18	V1	V12
12	WHITE	51	18	TB4-1	V3
12	WHITE	43	18	TB4-2	V19

COMMON WIRES, ALL MACHINES (2 OF 6)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
12	WHITE	54	18	TB4-2	V20
12	WHITE	38	18	TB4-1	V23
12	WHITE	27	18	TB4-1	V5
12	WHITE	106	18	TB5-2	V16
12	WHITE	4	18	TB1-6	1CRE-B
12	WHITE	5	18	TB1-8	2CRE-A
12	WHITE	5	18	TB1-8	2CRE-6
12	WHITE	34	18	TB5-C	V6
12	WHITE	20	18	V6	V7
12	WHITE	20	18	V7	V4
12	WHITE	21	18	V4	V2
12	WHITE	42	18	TB5-A	V13
12	WHITE	20	18	V13	V11
12	WHITE	23	18	V11	V8
27	BLACK	8	14	TB6-GND	TB6 GND. SCREW
27	GREEN	101	14	TB1 GRD	BLOWER MOTOR
27	GREEN			DETER. CONTR.	TB4-GRD
28	RED	127	22	P22-1	
38	RED	127	22	P22-13	
41	RED	129	22	P22-18	
42	RED	129	22	P22-24	
47	BLACK	15	18	TRANS H-1	2CRE-7
48	BLACK	13	18	TRANS H-4	2CRE-9
66	BLACK	8	22	J21-15	P23-12
66	RED	126	22	P21-15	P27-15
66	GRAY			SW12	TB1-14
66	RED			SW11	TB1-14
66	RED	8	18	TB1-14	J27-15
86	RED			SW-11	TB1-16
86	GRAY			SW-12	TB1-16
87	BLACK	5	18	TB1 CIR BRK	1CRE-4
88	RED	101	14	TB1 CIR BRK	BLOWER MOTOR
88	RED			TB1-CIR BRK	DAMPER MOTOR
89	RED	101	14	1 CRE-6	BLOWER MOTOR
89	RED			TB1-CRE 6	DAMPER MOTOR
90	BLACK	8	22	J20-13	P1A-B
90	GRAY	126	22	P20-13	P26-13
90	RED			TB4	J26-13
90	RED	27	18	TB4-15	V5
91	BLACK	8	22	J20-4	P1A-H
91	GRAY	126	22	P20-4	P26-4
91	RED			TB4	J26-4
91	RED	70	18	TB4-5	V1
92	BLACK	8	22	J20-9	P1A-J
92	GRAY	126	22	P20-9	P26-9
92	GRAY			TB5	J26-9
92	GRAY	74	18	TB5-C	V2

COMMON WIRES, ALL MACHINES (3 OF 6)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
93	BLACK	8	22	J20-15	P1A-M
93	GRAY	126	22	P20-15	P26-15
93	RED			TB4	J26-15
93	RED	52	18	TB4-3	V3
94	BLACK	8	22	J20-14	P1A-D
94	GRAY	126	22	P20-14	P26-14
94	GRAY			TB5	J26-14
94	GRAY	60	18	TB5-C	V4
95	BLACK	8	22	J20-19	P1A-P
95	GRAY	126	22	P20-19	P26-19
95	GRAY			TB5	J26-19
95	GRAY	34	18	TB5-C	V6
96	BLACK	8	22	J20-8	P1A-W
96	GRAY	126	22	P20-8	P26-8
96	GRAY			TB5	J26-8
96	GRAY	47	18	TB5-C	V7
97	BLACK	11	22	J20-5	P1B-S
97	GRAY	126	22	P20-5	P26-5
97	GRAY			TB5	J26-5
97	GRAY	55	18	TB5-A	V11
98	BLACK	11	22	J20-11	P1B-T
98	GRAY	126	22	P20-11	P26-11
98	GRAY			TB5	J26-11
98	GRAY	42	18	TB5-A	V13
99	BLACK	11	22	J20-10	P1B-K
99	GRAY	126	22	P20-10	P26-10
99	GRAY			TB5	J26-10
100	BLACK	11	22	J20-16	P1B-B
100	GRAY	126	22	P20-16	P26-16
100	RED	9	18	COUNTER	J26-16
101	BLACK	11	22	J20-2	P1B-N
101	GRAY	126	22	P20-2	P26-2
101	RED	20	18	MTR. START. X2	J26-2
102	BLACK	8	22	J20-21	P1A-L
102	GRAY	126	22	P20-21	P26-21
102	BLACK	8	18	J26-21	2CRE-B
103	BLACK	8-1/2	22	P23-2	P1A-R
104	BLACK	8	22	J20-20	P1A-T
104	GRAY	126	22	P20-20	P26-20
104	GRAY			TB5	J26-20
104	GRAY	71	18	TB5-A	V8
105	BLACK	11	22	J20-17	P1B-F
105	GRAY	126	22	P20-17	P26-17
105	RED			TB4	J26-17
105	WHITE	38	18	TB4-4	V23
106	BLACK	11	22	J20-6	P1B-R
106	GRAY	126	22	P20-6	P26-6

COMMON WIRES, ALL MACHINES (4 OF 6)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
106	RED			TB4	J26-6
106	RED	95	18	TB4-14	V12
107	BLACK	11	22	J20-23	P1B-L
107	GRAY	126	22	P20-23	P26-23
107	GRAY			TB5	J26-23
107	RED	106	18	TB5-12	V16
108	BLACK	14	22	J21-7	P2A-J
108	RED	126	22	P21-7	P27-7
108	RED	6	18	TB1-18	J27-7
109	BLACK	8	22	J21-3	P23-6
109	RED	126	22	P21-3	P27-3
109	RED			LOW STORAGE	J27-3
110	BLACK	11	22	J20-18	P1B-E
110	GRAY	126	22	P20-18	P26-18
110	BLACK	14	18	J26-18	1CRE-H
111	RED			TB4	TB1-3
111	BLACK			DETERG. CONTR.	TB4-8
112	RED			TB4	TB1-3
112	WHITE			DETERG. CONTR.	TB4-9
113	BLACK	11	22	J20-1	P1B-X
113	GRAY	126	22	P20-1	P26-1
113	RED			TB4	J26-1
113	RED	54	18	TB4-6	V20
114	BLACK	11	22	J20-7	P1B-P
114	GRAY	126	22	P20-7	P26-7
114	RED			TB4	J26-7
114	RED	43	18	TB4-7	V19
115	BLACK	11	22	J20-12	P1B-H
115	GRAY	126	22	P20-12	P26-12
116	BLACK	11	22	J20-3	P1B-U
116	GRAY	126	22	P20-3	P26-3
116	GRAY			TB5	J26-3
116	GRAY	27	18	TB5-10	V17
118	BLACK	14	22	J21-1	P2A-L
118	RED	126	22	P21-1	P27-1
118	RED			LLD	J27-1
119	BLACK	14	22	J21-2	P2A-T
119	RED	126	22	P21-2	P27-2
119	RED			LLD	J27-2
121	BLACK	14	22	J21-4	P2A-M
121	RED	126	22	P21-4	P27-4
121	RED			LOW STORAGE	J27-4
122	BLACK	14	22	J21-5	P2A-N
122	RED	126	22	P21-5	P27-5
122	GRAY	16	18	TEMP. CONTROL 4	J27-5
124	BLACK	8	22	J21-11	P23-11
124	RED	126	22	P21-11	P27-11

COMMON WIRES, ALL MACHINES (5 OF 6)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
124	GRAY			SW12	TB1-15
124	RED			SW11	TB1-15
124	RED	6	18	TB1-15	J27-11
125	BLACK	14	22	J21-14	P2A-D
125	RED	126	22	P21-14	P27-14
125	GRAY			SW12	J27-14
126	BLACK	14	22	J21-6	P2A-K
126	RED	126	22	P21-6	P27-6
126	GRAY	18	18	TEMP. CONTROL 6	J27-6
127	BLACK	14	22	J21-9	P2A-C
127	RED	126	22	P21-9	P27-9
127	GRAY	17	18	TEMP. CONTROL 5	J27-9
128	BLACK	14	22	J21-10	P2A-B
128	RED	126	22	P21-10	P27-10
128	RED			SW11	J27-10
129	BLACK	14	22	J21-8	P2A-A
129	RED	126	22	P21-8	P27-8
129	RED	6	18	TB1-10	TEMP. CONTROL 1
129	RED	3	18	TB1-12	TB1-18
129	RED			SW11	TB1-9
129	GRAY			SW12	TB1-11
129	RED			LOW STORAGE	TB1-12
129	RED			LLD	TB1-11
129	RED	6	18	TB1-10	J27-8
129	RED			LOW H2O DRAIN	TB1-11
130	RED			LLD	TEMP. CONTROL 3
131	RED	41	18	TB4-10	V25
131	BROWN			DETER. CONTR.	TB4-10
132	RED	41	18	TB4-11	V25
132	RED			DETER. CONTR.	TB4-11
133	RED	59	18	TB4-12	DETER. PROBE
133	ORANGE			DETER. CONTR.	TB4-12
134	RED	59	18	TB4-13	DETER. PROBE
134	BLUE			DETER. CONTR.	TB4-13
135	BLACK	6	8	TB1-L1	MTR. START. L1
135	BLACK	31	8	TB1-L1	TB2-1
136	BLACK	5	8	TB1-L2	MTR. START. L2
136	BLACK	31	8	TB1-L2	TB2-2
137	BLACK	6	8	TB1-L3	MTR. START. L3
137	BLACK	31	8	TB1-L3	TB2-3
138	BLACK			PUMP	MTR. START. T1
139	BLACK			PUMP	MTR. START. T2
140	BLACK			PUMP	MTR. START. T3
142	BLACK	8	22	J21-13	P23-4
142	RED	126	22	P21-13	P27-13
142	RED			LLD	J27-13
143	BLACK	8	22	J21-16	P23-5

COMMON WIRES, ALL MACHINES (6 OF 6)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
143	RED	126	22	P21-16	P27-16
143	RED			LLD	J27-16
151	BLACK	6	22	J20-24	P2A-E
151	GRAY	126	22	P20-24	P26-24
151	RED			LOW H2O DRAIN	J26-24
152	BLACK	13	22	J20-29	P23-13
152	GRAY	126	22	P20-29	P26-29
152	RED			LOW H2O DRAIN	J26-29

TABLE 7-3. WIRE LIST:
SECONDARY PANEL HARNESS — HCW (1 OF 3)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	24	16	CB1-A1	J23-10
2	WHITE	24	16	CB1-A	J23-7
3	BLACK	23	16	CB1-B1	TB9-1
4	WHITE	22	16	CB1-B	TB9-3
6	BLACK	27	16	TB3-2	TB9-4
6	BLACK	4	18	SW1-2	TB3-2
6	BLACK	64	16	TB3-1	P5-1
6	BLACK	29	16	TB3-2	J23-8
7	BLACK	60	18	CB1-C	P5-9
8	BLACK	60	18	CB1-D	P5-8
9	BLACK	5	18	BUZZER	TB3-1
9	BLACK	4	18	RESISTOR	TB3-3
9	BLACK	27	16	TB3-4	TB9-3
9	WHITE	64	16	TB3-3	P5-2
9	WHITE	29	16	TB3-4	J23-3
10	BLACK	26	18	SW1-3	J23-1
11	BLACK	72	24	TB3-5	P3B-28
11	BLACK	54	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
13	BLACK	71	24	LT-2	P3B-12
14	BLACK	71	24	SW2-2	P3B-11
15	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	SWH-8	P4-12
19	BLACK	3	24	SWH-8	SWB-8
19	BLACK	5	24	SWB-8	SWC-8
20	BLACK	54	24	SWH-4	P4-11
20	BLACK	3	24	SWH-4	SWB-4
20	BLACK	5	24	SWB-4	SWC-4
21	BLACK	54	24	SWH-2	P4-10
21	BLACK	3	24	SWH-2	SWB-2
21	BLACK	5	24	SWB-2	SWC-2
22	BLACK	54	24	SWH-1	P4-9
22	BLACK	3	24	SWH-1	SWB-1
22	BLACK	5	24	SWB-1	SWC-1
23	BLACK	62	24	SWK-8	P3B-4
23	BLACK	3	24	SWK-8	SWA-8
23	BLACK	5	24	SWA-8	SWD-8
24	BLACK	62	24	SWK-4	P3B-3
24	BLACK	3	24	SWK-4	SWA-4
24	BLACK	5	24	SWA-4	SWD-4
25	BLACK	62	24	SWK-2	P3B-2
25	BLACK	3	24	SWK-2	SWA-2

WIRE LIST FOR SECONDARY PANEL HARNESS — HCW (2 OF 3)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
25	BLACK	5	24	SWA-2	SWD-2
26	BLACK	62	24	SWK-1	P3B-1
26	BLACK	3	24	SWK-1	SWA-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
29	BLACK	41	24	P25-3	J22-3
30	BLACK	41	24	P25-4	J22-4
31	BLACK	41	24	P25-5	J22-5
32	BLACK	41	24	P25-6	J22-6
33	BLACK	41	24	P25-7	J22-7
34	BLACK	41	24	P25-8	J22-8
35	BLACK	41	24	P25-10	J22-10
36	BLACK	41	24	P25-11	J22-11
37	BLACK	41	24	P25-12	J22-12
38	BLACK	41	24	P25-13	J22-13
39	BLACK	41	24	P25-14	J22-14
41	BLACK	41	24	P25-18	J22-15
42	BLACK	41	24	P25-24	J22-16
49	BLACK	68	24	SW15-3	P3B-5
51	BLACK	61	24	SW2-NO	P4-29
52	BLACK	56	24	SW3-5	P4-19
52	BLACK	2	24	SW3-5	SW3-2
52	BLACK	4	24	SW3-2	SW8-5
52	BLACK	3	24	SW2-C	SW15-2
52	BLACK	2	24	SW8-5	SW8-2
52	BLACK	8	24	SW8-2	SW2-C
53	BLACK	27	24	SW3-6	P16-1
54	BLACK	27	24	SW3-4	P16-8
59	BLACK	30	24	SW8-6	P16-2
61	BLACK	56	24	P4-28	SW3-3
65	BLACK	59	24	SW8-3	P4-37
66	BLACK	39	24	P16-14	J23-12
67	BLACK	83	24	P16-13	P3B-20
68	BLACK	83	24	P16-15	P3B-19
69	BLACK	83	24	P16-30	P3B-21
70	BLACK	83	24	P16-9	P3B-18
71	BLACK	83	24	P16-10	P3B-25
72	BLACK	83	24	P16-21	P3B-15
73	BLACK	73	24	P16-24	P3B-26
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

WIRE LIST FOR SECONDARY PANEL HARNESS — HCW (3 OF 3)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
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	P3B-27
103	BLACK	5	18	BUZZER	TB3-6
103	BLACK	4	18	RESISTOR	TB3-6
103	BLACK	27	18	TB3-6	J23-2
109	BLACK	48-1/2	24	P4-25	J23-6
124	BLACK	48	24	P4-7	J23-11
142	BLACK	48-1/2	24	P4-14	J23-4
143	BLACK	48-1/2	24	P4-13	J23-5
151	BLACK	56	24	P3B-7	J23-13

TABLE 7-4. WIRE LIST:
SECONDARY PANEL HARNESS — CRW (1 OF 3)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
1	BLACK	24	16	CB1-A1	J23-10
2	WHITE	24	16	CB1-A	J23-7
3	BLACK	23	16	CB1-B1	TB9-1
4	WHITE	22	16	CB1-B	TB9-3
6	BLACK	27	16	TB3-2	TB9-4
6	BLACK	4	18	SW1-2	TB3-2
6	BLACK	64	16	TB3-1	P5-1
6	BLACK	29	16	TB3-2	J23-8
7	BLACK	60	18	CB1-C	P5-9
8	BLACK	60	18	CB1-D	P5-8
9	BLACK	5	18	BUZZER	TB3-4
9	BLACK	4	18	RESISTOR	TB3-3
9	BLACK	27	16	TB3-4	TB9-3
9	WHITE	64	16	TB3-3	P5-2
9	WHITE	29	16	TB3-4	J23-3
10	BLACK	26	18	SW1-3	J23-1
11	BLACK	72	24	TB3-5	P3B-28
11	BLACK	15	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
13	BLACK	71	24	LT-2	P3B-12
14	BLACK	71	24	SW2-2	P3B-11
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	SWE-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	P3B-4
23	BLACK	5	24	SWA-8	SWD-8
23	BLACK	3	24	SW	SWF-8

WIRE LIST FOR
SECONDARY PANEL HARNESS — CRW (2 OF 3)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
23	BLACK	5	24	SWF-8	SWK-8
24	BLACK	62	24	SWA-4	P3B-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	P3B-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	62	24	SWA-1	P3B-1
26	BLACK	5	24	SWA-1	SWD-1
26	BLACK	3	24	SWD-1	SWF-1
26	BLACK	5	24	SWF-1	SWK-1
27	GREEN	66	16	CHASS. GRD.	P5-7
28	BLACK	41	24	P25-1	J22-1
29	BLACK	41	24	P25-3	J22-3
30	BLACK	41	24	P25-4	J22-4
31	BLACK	41	24	P25-5	J22-5
32	BLACK	41	24	P25-6	J22-6
33	BLACK	41	24	P25-7	J22-7
34	BLACK	41	24	P25-8	J22-8
35	BLACK	41	24	P25-10	J22-10
36	BLACK	41	24	P25-11	J22-11
37	BLACK	41	24	P25-12	J22-12
38	BLACK	41	24	P25-13	J22-13
39	BLACK	41	24	P25-14	J22-14
41	BLACK	41	24	P25-18	J22-15
42	BLACK	41	24	P25-24	J22-16
49	BLACK	68	24	SW15-3	P3B-5
51	BLACK	61	24	SW2-NO	P4-29
52	BLACK	56	24	SW3-2	P4-19
52	BLACK	4	24	SW3-2	SW8-5
52	BLACK	3	24	SW2-C	SW15-2
52	BLACK	2	24	SW3-5	SW3-2
52	BLACK	2	24	SW8-5	SW8-2
52	BLACK	8	24	SW8-2	SW2-C
53	BLACK	27	24	SW3-6	P16-1
54	BLACK	27	24	SW3-4	P16-8
59	BLACK	28	24	SW8-6	P16-2
60	BLACK	56	24	P4-27	SW-4NO
61	BLACK	56	24	SW3-3	P4-28
63	BLACK	57	24	P4-35	SW-6NO
64	BLACK	58	24	P4-36	SW-7NC
65	BLACK	59	24	SW8-3	P4-37
66	BLACK	39	24	P16-14	J23-12
67	BLACK	83	24	P16-13	P3B-20

WIRE LIST FOR SECONDARY PANEL HARNESS — CRW (3 OF 3)

NO.	COLOR	LENGTH	GAUGE	FROM	TO
68	BLACK	83	24	P16-15	P3B-19
69	BLACK	83	24	P16-30	P3B-21
70	BLACK	83	24	P16-9	P3B-18
71	BLACK	83	24	P16-10	P3B-25
72	BLACK	83	24	P16-21	P3B-15
73	BLACK	83	24	P16-24	P3B-10
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	P3B-27
103	BLACK	5	18	BUZZER	TB3-3
103	BLACK	4	18	RESISTOR	TB3-6
103	BLACK	27	18	TB3-6	J23-2
109	BLACK	48-1/2	24	P4-25	J23-6
124	BLACK	48	24	P4-7	J23-11
142	BLACK	48-1/2	24	P4-14	J23-4
143	BLACK	48-1/2	24	P4-13	J23-5
151	BLACK	56	24	P3B-7	J23-13

TABLE 7-5. WIRE LIST: WIRE LIST FOR UNITS WITH REAR CONTROL PANEL

NO.	COLOR	LENGTH	GAUGE	FROM	TO
28	RED	128	22	P22-1	P25-1
29	RED	128	22	P22-3	P25-3
30	RED	128	22	P22-4	P25-4
31	RED	128	22	P22-5	P25-5
32	RED	128	22	P22-6	P25-6
33	RED	128	22	P22-7	P25-7
34	RED	128	22	P22-8	P25-8
35	RED	128	22	P22-10	P25-10
36	RED	128	22	P22-11	P25-11
37	RED	128	22	P22-12	P25-12
38	RED	128	22	P22-13	P25-13
39	RED	128	22	P22-14	P25-14
40	RED	128	22	P22-15	P25-15
41	RED	128	22	P22-16	P25-16
42	RED	128	22	P22-17	P25-17

TABLE 7-6. WIRE LIST: WIRE LIST FOR UNITS WITH STEAM TREATMENT OPTION

NO.	COLOR	LENGTH	GAUGE	FROM	TO
52	BLACK		24	SW8-5	SW6-1
52	BLACK		24	SW6-1	SW3-1
53	BLACK		24	SW3-6	SW6-6
63	BLACK		24	P4-35	SW6-3

TABLE 7-7. WIRE LIST: WIRE LIST FOR UNITS WITH ACID/NEUTRALIZER OPTION

NO.	COLOR	LENGTH	GAUGE	FROM	TO
52	BLACK		24	P4-19	SW4-2
52	BLACK		24	SW4-2	SW3-2
53	BLACK		24	P16-1	SW4-6
53	BLACK		24	SW4-6	SW3-6
54	BLACK		24	P16-8	SW4-4
55	BLACK		24	SW4-5	SW3-4
60	BLACK		24	P4-27	SW4-3

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SECTION 8

COMPONENT REPAIR, REPLACEMENT AND ADJUSTMENT

8.1 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 9.

8.2 SOLENOID VALVES

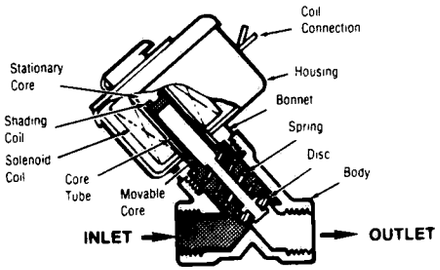
NOTE: When installing new valves in any line, note the arrow stamped on the valve body or the words IN and OUT stamped at the inlet and outlet ports. A reversed valve cannot operate properly. To rebuild a defective valve, order the appropriate valve repair kit. The repair kit part number is found on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

Principle of Operation

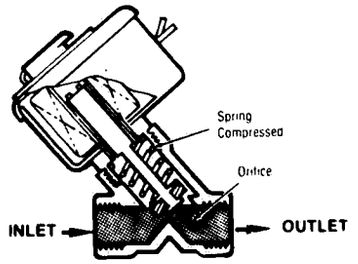
A solenoid valve is a combination of two basic functional units — (1) a solenoid (electro-magnet) with its plunger (or core); and (2) a valve containing an orifice in which a disc or plug is positioned to stop or allow flow. The valve is opened or closed by movement of the magnetic plunger (or core) 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. 8-1): 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. 8-2): 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 8-1. DIRECT-ACTING SOLENOID VALVE.

Testing

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.

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.

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

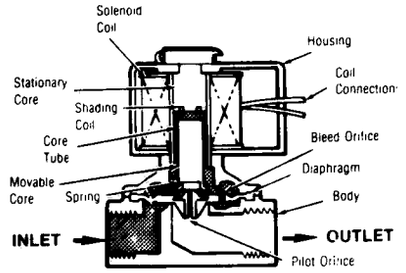
8.3 PUMP

Disassembly

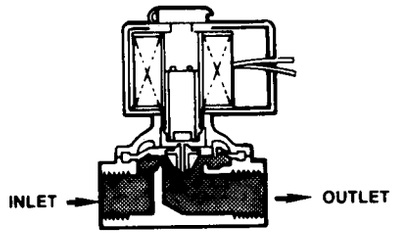
1. The rotating assembly can be removed while the pump casing remains in the line. To facilitate disassembly, refer to Figure 9-14.

2. Remove all cooling or lubrication lines; disconnect the power.

3. Remove capscrews (22) holding casing to the adapter (30).



De-energized



Energized

Figure 8-2. INTERNAL PILOT-OPERATED SOLENOID VALVE.

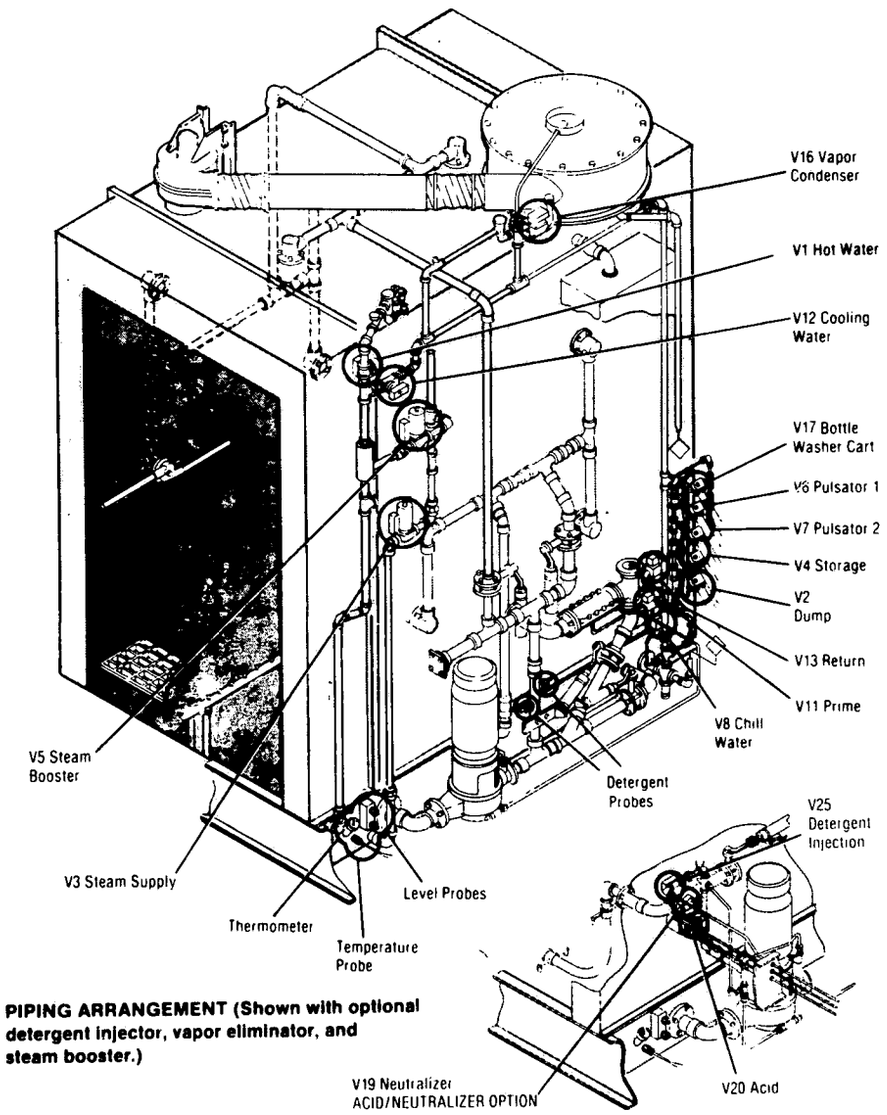
4. Remove the motor and rotating assembly.

5. Remove the impeller screw (11), washer (12), O-ring (9), and gasket (13). Pull the impeller (10) from the shaft. Remove the impeller key (16) and shaft gasket (17). If the casing wear ring (15) is scored or worn, it should be replaced.

6. Remove nuts (23) on seal gland studs (24).

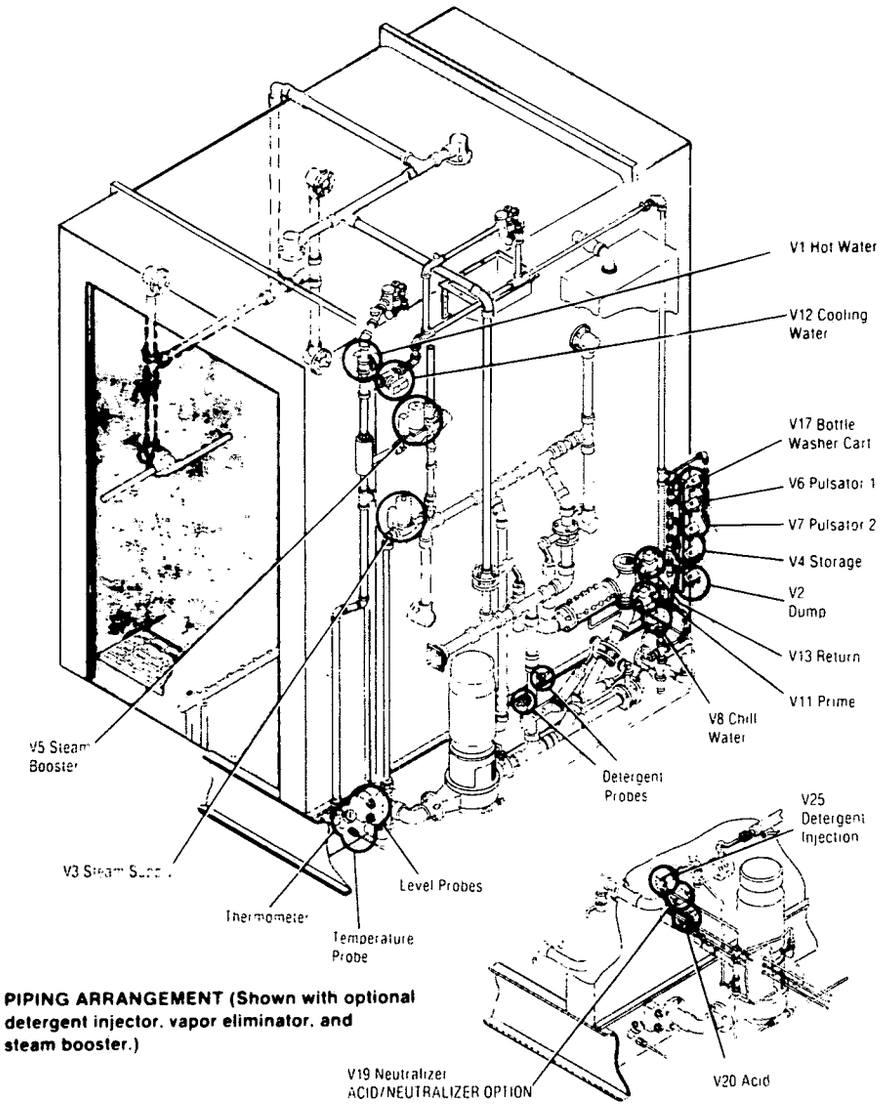
7. While holding shaft sleeve (3) in place, slip the packing box cover (21) off.

8. With seal assembly (5) on shaft sleeve, remove sleeve (3) and seal gland (28) from shaft.



PIPING ARRANGEMENT (Shown with optional detergent injector, vapor eliminator, and steam booster.)

Figure 8-3. LOCATION OF SOLENOID VALVES (Units Before 2/84).



PIPING ARRANGEMENT (Shown with optional detergent injector, vapor eliminator, and steam booster.)

Figure 8-3A. LOCATION OF SOLENOID VALVES (Units After 2/84).

9. Scribe a mark on sleeve at the spring holder of the seal assembly so the proper axial location will be maintained when the pump is reassembled.

10. See detail drawing of seal assembly. Loosen set screws in spring holder. Remove spring holder from sleeve.

11. Remove seat and seat o-ring.

12. The remaining components of the seal may now be removed from the sleeve: spring, bellows, retainer, drive band, disc, and sealing washer.

Reassembly

1. If wearing rings need replacement, press the packing box cover wearing ring (18) into the recess of the packing box cover (21), making certain that it is properly seated. The casing wearing ring (15) should be pressed into the casing (20) until it is flush with the edge of the casing.

2. If impeller (10) was equipped with wearing rings, press the rear ring (8) onto the shoulder at the rear of the impeller until it is flush with the rear face. Press the front ring (8) onto the front shoulder of the impeller so that it is flush with the front face.

3. Reposition the adapter (30) on the motor and replace the capscrews (2). Slide the deflector (29) onto the shaft.

4. Before installing new or used seal (5), inspect and clean all parts; remove all burrs, nicks, etc., from shaft sleeve.

5. See Figure 9-14, detail of mechanical seal. Lightly oil the inside of the spring holder and the outside of the sleeve (3). Slide the rotating portion of the seal over the sleeve.

6. Line up the spring holder to the premarked position on sleeve (see step 9 of disassembly instructions). Tighten the set screws.

7. Replace the seal gland gasket (27) in the seal gland (28). Oil the outer surface of the seal seat and seat o-ring and press into the seal gland (28).

8. Carefully slide the seal gland (28) with the gland gasket (27) over the motor shaft.

9. Place the shaft sleeve (3) on the shaft and line up the keyway in the sleeve with the keyslot in the shaft. Replace the impeller key (16).

10. Place the packing box cover (21) over the shaft and seal gland assembly, directing the seal gland studs into holes in seal gland. Replace seal gland nuts (23) on seal gland studs (24).

11. Place the shaft gasket (17) over the end of the shaft. Place the impeller (10) over the end of the shaft, with the keyway over the key. Tap impeller into position with a babbit or rawhide hammer. Replace impeller gasket (13), impeller washer (12), o-ring (9), and impeller screw. Tighten.

12. Make sure that seal gland is properly in place and tighten the hex nuts (23) on the gland studs (24).

13. Replace the casing gasket (19).

14. Replace the unit in the casing and replace capscrews (22) holding the adapter and cover to the casing. Tighten screws.

8.4 ROTARY SPRAY ARM BEARINGS

Disassembly — See Figure 8-4.

1. Unscrew the knurled knob from the rotary adapter spindle.

2. Remove rotary manifold from adapter spindle.

3. Remove synthetic bearing from rotary manifold.

4. Remove sleeve bearing from rotary adapter.

Reassembly

1. Place sleeve bearing in rotary adapter. Replace if worn or missing.

2. Place nylon washer on rotary adapter spindle.

3. Fit synthetic bearing into manifold. New bearing may require a light press fit into manifold. Care must be taken not to damage bearing.

4. Remove rough spots from adapter spindle. Install manifold onto spindle.

5. Screw the knurled knob into the tapped hole in the adapter.

8.5 WINDOW AND WINDOW GASKET

1. The window and window gasket are designed to fit securely into the window frame without the need for additional fasteners.

NOTE: Before applying sealant, contact surfaces of both stainless-steel frame opening and surface of rubber gasket should be cleaned and degreased. Apply primer only to stainless steel, do not use on rubber gasket. Apply a small (approximately 1/8-inch dia.) bead of RTV to inner corners of the rubber gasket, not to stainless steel. After assembly wipe off all excess sealant.*

**For further instructions on using RTV sealant refer to AMSCO RTV application instruction P-413653-000.*

2. When replacing gasket or window, apply GE-RTV 108 adhesive sealant to the areas indicated in Figure 8-5.

8.6 BUTTERFLY VALVE

Adjustment of Butterfly Valve Linkage

Adjust the butterfly valve linkage so that butterfly valves are in the normally closed position. Do this by following the steps below.

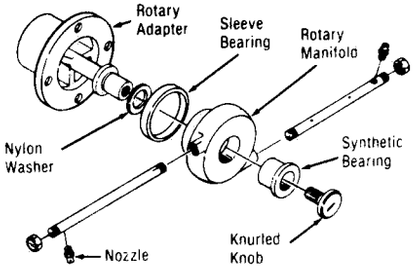


Figure 8-4. REVOLVING WASH SPRAY ASSEMBLY.

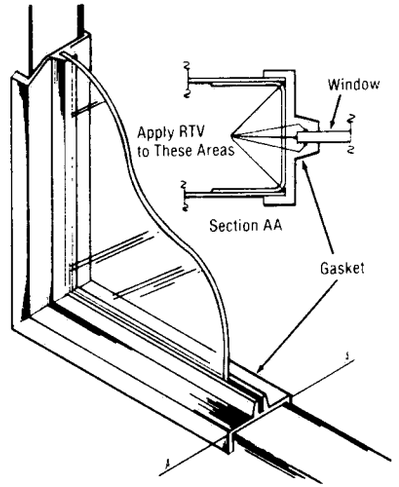


Figure 8-5. WINDOW AND WINDOW GASKET.

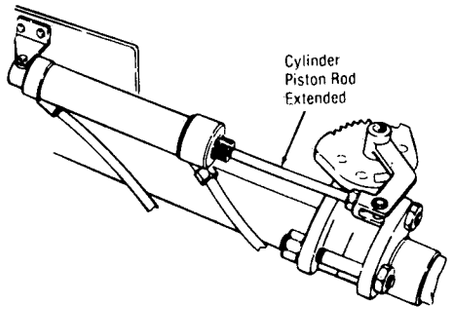


Figure 8-6. BUTTERFLY VALVE LINKAGE.

1. For the valve to be in the normally closed position, the cylinder piston rod must be fully extended from the cylinder. See Figure 8-6.

2. At the same time the piston rod is fully extended, the butterfly valve should be positioned so that the pin through the actuator arm and valve stem points to OPEN on the operator base: this places the valve in the closed position.

3. Adjust the clevis and/or cylinder mounting bracket to achieve the position described above.

Disassembly — Refer to Fig. 8-8

1. Place disc is closed position.

2. Using a drill about one-half the size of the disc welch plug drill a hole through the center of it.

3. Insert a screwdriver, pin punch or similar tool into the hole and pry out the plug.

4. Using a 5/32 drill bit (or smaller), drill a hole into the end of the pin to a depth of about 1/2".

5. Insert an "EZY-OUT" (Size No. 3) into the drilled hole. Using a tap wrench, remove pin by simultaneously turning and pulling.

6. Remove stem by extracting from top end of valve body.

7. Carefully push disc out of cartridge seat and remove cartridge seat from body.

Reassembly — Refer to Fig. 8-8 & 8-9

1. Using silicone grease, lightly lubricate the following areas:

   Inside face of cartridge seat liner (disc contact line);

   Face of seat liner flats;

   Seat liner stem holes;

   Seat insert o-rings;

   Sealing edge and flats of disc.

2. Insert cartridge seat, with seat insert o-rings, into the body. Align stem holes.

3. Push disc into cartridge seat. Align stem holes.

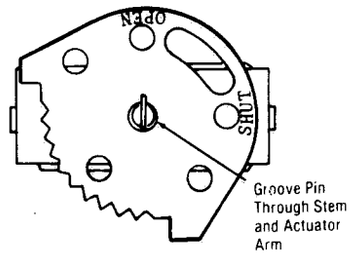


Figure 8-7. BUTTERFLY VALVE FROM TOP.

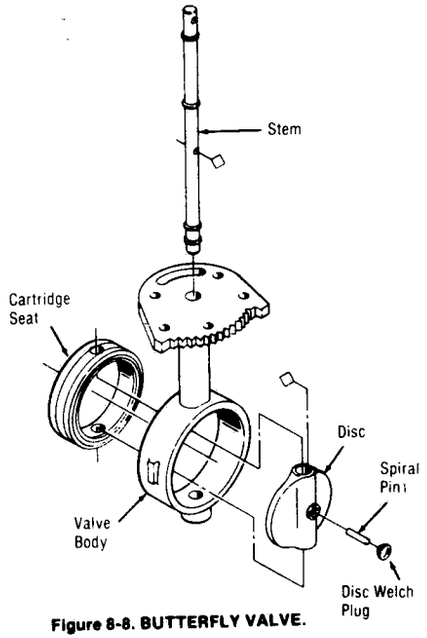


Figure 8-8. BUTTERFLY VALVE.

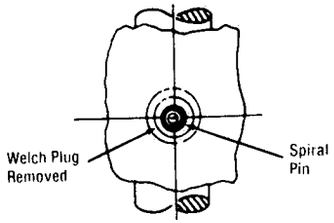


Figure 8-9. INSTALLATION OF SPIRAL PIN BUTTERFLY VALVE.

4. Insert stem through top of body, disc and cartridge seat.

5. Move disc to closed position. Align stem-disc pin holes.

NOTE: Pin must be installed with direction of coil as shown in Figure 8-9. Support back face of disc during hammering.

6. Insert stem-disc pin and hammer into hole until bottomed.

7. Insert welch plug into disc, convex face out. Using a round punch slightly smaller in diameter than the welch plug, hammer plug until periphery of plug is **firmly** secured (seal tight) in the disc.

8.7 DOOR OPEN SWITCH

1. Door switch is correctly positioned if panel light DOOR OPEN goes out when door is closed.

2. If adjustment of the trip bracket is necessary, loosen the hex head nuts securing the bracket to the door, and reposition as required, as shown in Figure 8-11.

3. If replacement of the door switch is necessary, remove the screws securing access plate to trim panel. Remove access plate and replace switch as shown in Figure 8-11.

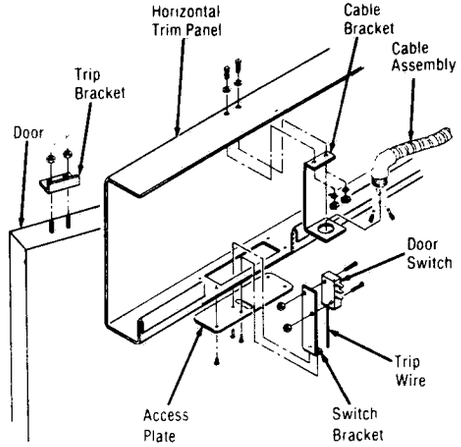


Figure 8-11. DOOR SWITCH

8.8 WATER LEVEL PROBES AND TEMPERATURE SENSOR

1. The level probes (wash tank) and temperature sensor are attached to the base of the service side, near the front of the washer.

2. To replace the water level probe, detach and tag the wires, and unscrew the probe from the base, as shown in Figure 8-12.

3. To replace the temperature detector, unscrew the fitting in which the detector is fitted and remove the detector, as shown in Figure 8-12.

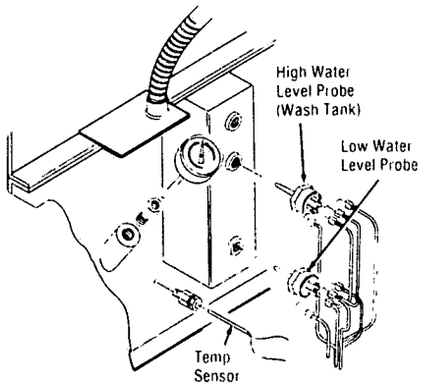


Figure 8-12. WATER LEVEL PROBES AND TEMPERATURE SENSOR.

8.9 CONTROL CONSOLE

CAUTION: Do not remove or replace printed circuit boards unless POWER switch on secondary control panel is positioned at OFF.

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 8-13.

2. The primary panel is held in place by four screws. Remove those if servicing is necessary. See Figure 8-14.

3. The bulbs in the primary panels are removed by moving the retainer aside and lifting out the bulb, as shown in Figure 8-14.

CAUTION: Use extreme care when removing panels to gain access to, and handling PC boards or other electronic components. Static electricity can damage certain electronic components resulting in total failure or shortened life of component or PC board.

4. New or replacement printed circuit boards should not be removed from the static proof bags until they are to be directly installed in control console. Defective board removed from the control console should then be placed in the static proof bag.

5. 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 8-15. Use both card pulls simultaneously, to insure starting the card straight. This prevents damage to the socket controls. Handle boards by the plastic card pulls.

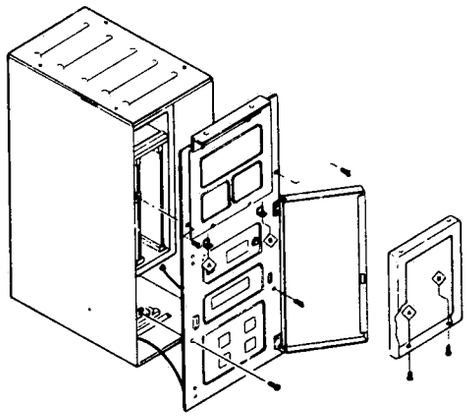


Figure 8-13. REMOVAL OF FRONT PANEL.

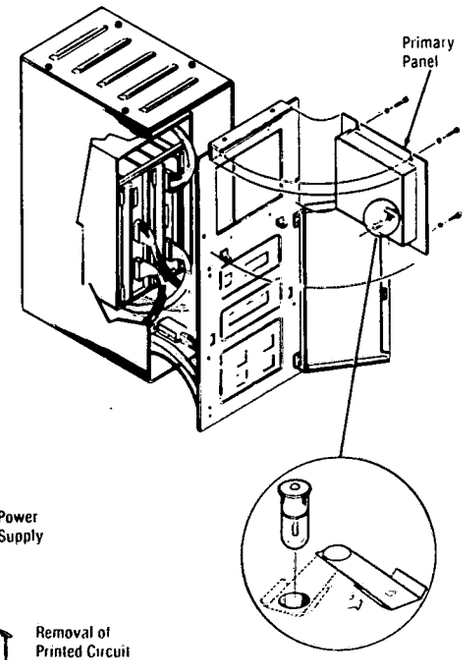


Figure 8-14. REMOVAL OF PRIMARY PANEL.

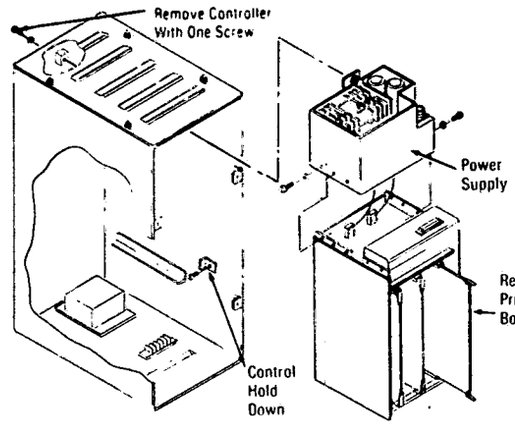


Figure 8-15. CONTROL CONSOLE ASSEMBLY.

8-9. CONTROL CONSOLE (Continued)

6. Enclose documentation (copy of Service Order) with the defective part being returned. The following minimum information is required by quality control:

a. Reason for return (failure mode of equipment).

b. General condition of the item(s) being returned.

c. Quantity of the item(s) being returned.

d. Individual item identification (part number, serial number, etc.)

e. Serial number of machine from which the part was removed.

f. Cycle count of machine from which the part was removed.

g. Date warranty started.

7. Return the bagged defective part to the original shipping carton and package with a protective wrap/cover (i.e., envelope, paper, box, etc.).

Return properly packaged defective micro-processor parts to AMSCO Service Company to the attention of Returned Goods Dept.

8. 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 8-15.

9. 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 8-15.

8-10. PINCH VALVE

Disassembly

1. Detach the nylon tubing from the pinch valve lower casing.

2. Remove casing capscrews.

3. Remove flange bolts, upper and lower casings, and rubber valve body. Discard casing gasket.

Assembly

1. Install rubber valve body in position first, and hold with drift pin on each flange.

2. Install lower and upper casings and hold with drift pin until flange bolts are in position.

3. Install new gasket.

4. Hand tighten flange bolts, then wrench tighten casing capscrews. Wrench tighten flange bolts and reinstall plastic tubing to lower casing.

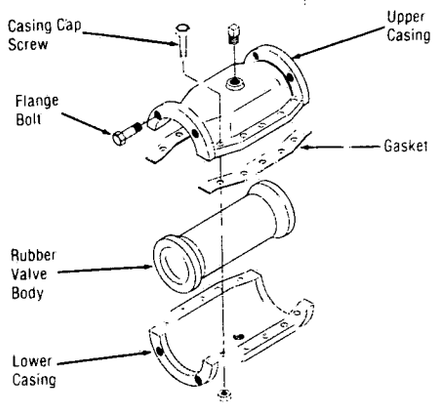


Figure 8-16. PINCH VALVE.

8-11. 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.

8-12. ADJUSTMENT PROCEDURE FOR PRESSURE REGULATING VALVES For Hot and Cold Water Supply (See Fig. 9-12A, Pt. 33 and 9-12D, Pt. 22)

NOTE: Verify that an adequate supply of water is being provided before making adjustments to pressure reducing valves.

1. Description: The valve is composed of two sections. The primary and largest section of the valve has an adjusting handle on top of it and is directly connected in the water supply line. The smaller section, connected by tubing to the larger section, is the pressure regulating sensor. This regulator has two adjustable features, an externally located needle valve, also an adjusting bolt and locknut located under the hex cover on top of the regulator. There is also an air bleed valve, which looks like a tire valve stem, mounted on the outside of the regulator.

2. Adjustment procedure (both hot and cold water pressures are to be set at 28 psig).

a. Turn both valves, the one on the primary section and the needle valve on the regulator section, CCW (full open).

b. If necessary, bleed air out of the regulating system by means of the air bleed valve.

c. Remove the hex cover on top of the regulator, loosen locknut on bolt, and turn bolt CCW to reduce the water pressure to the desired nominal setting. Tighten locknut and replace hex cover on regulator.

d. Further reduction of the water pressure may now be accomplished by turning the small needle valve CW.

8-13. ADJUSTMENT PROCEDURE FOR DETERGENT CONTROLLER (ACCESSORY)

Open service side access panels for total access to controller during adjustment procedure.

1. The detergent controller is located just above terminal box TB-4. Remove the front cover from the controller. This will expose, among other internal components, the warning delay and control point adjustment screws (see Fig. 8-17). These two components are the only ones requiring adjustment. The **red** warning light and the **white** feeder and **blue** power lights are used to indicate certain conditions which occur during and after adjustment and will be described later in this procedure. The toggle switch turns the controller on and off. This switch should be in the ON position.

2. Initial adjustment (toggle switch ON)

a. Warning delay:

This is adjustable from 40 seconds to 4 minutes.

Rotate the warning delay screw fully clockwise, then counterclockwise to determine the total range of rotation, then adjust to mid-point. This will provide about a 2 minute delay period.

In subsequent checks, if insufficient detergent is injected by the end of the preset time, a buzzer sounds and the **red** Warning light comes on.

Check the operation of this delay by operating machine with fresh clean water and no detergent in injector hose or reservoir.

b. Control points adjustment screw:

Rotate this **counterclockwise** until no more rotation possible.

3. With the chamber doors closed, set the CRW/HCW microprocessor controller as follows:

- Depress power ON switch
- Depress heat ON
- Depress wash DUMP
- Depress extended cycle OFF switch
- Set pre-wash timer to **Zero**
- Set wash timer to **3 minutes**
- Set first rinse timer to **1 minute**
- Set second rinse timer to **zero**
- Depress TANK DRAIN (Pump will run to drain tank)

4. Extend detergent supply tubing to source of water (not detergent) to prevent pump cavitation during the following test. The entire detergent accessory package should have been installed in accordance with AMSCO's instructions, 150477-093.

5. Explanation of lights on detergent controller:

- **Blue** POWER light — when ON, unit powered.
- **White** FEEDER light — when ON, solenoid Valve V-25, which permits feeding of detergent, should be energized.
- **Red** WARNING light — when ON, not enough detergent is being injected in the pre-set time as adjusted in Step 2).

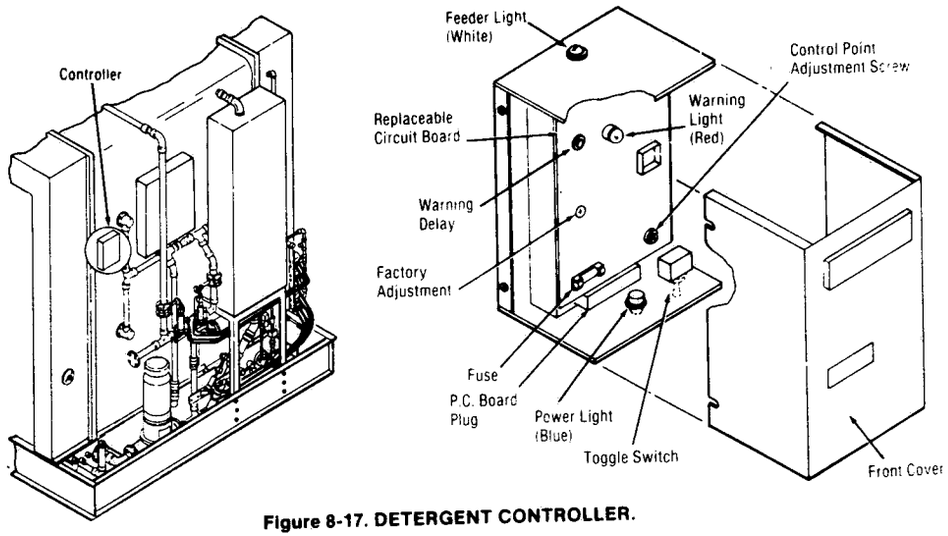


Figure 8-17. DETERGENT CONTROLLER.

6. Close the door(s) on the unit and then press cycle START. The unit will immediately go into the wash phase because of the zero setting of the pre-wash timer.

a. Wash tank will fill with water and then the pump will come on. Five seconds after the pump comes on, the blue and white lights in the detergent controller come on, and water (for this preliminary test only) will be injected into the system for 18.5 seconds. At the end of this 18.5 second period, the detergent controller is de-energized by the main controller and both the blue and white lights go out.

b. Immediately after the 18.5 second period discussed in the previous step, the sprays will pulse alternating with each 20 second period. Steam valve (V-3) will open and close as required to raise the wash temperature to approximately 160°F. The wash tank fill valve (V-1) will also open if water level drops below the high level probe in the wash tank and will close when water level reaches the high level probe.

c. Following the 18.5 second period when 30 seconds have elapsed and when the wash water temperature reaches 160°F, power will be restored to the detergent control and the blue light will come on. At this point, depress STOP, wait for the machine to stop, then open one door.

Manually add the correct amount of detergent to the water in the wash tank using the manufacturers recommendations on the detergent container. Wash tank capacities for the various machines are listed below:

- 34" — 57 Gal. (Use one oz. of detergent
- 42" — 66 Gal. for each gallon of
- 50" — 75 Gal. wash water.)

Close door and depress START.

d. When the blue light in the preceding step comes on the second time, after adding detergent and restarting machine, turn the extended cycle switch on. Then slowly turn the sensitivity potentiometer **clockwise** until the **white light comes on.** At this point, turn the sensitivity potentiometer **counter-clockwise one-quarter turn.** This represents final adjustment. The white light should go out when the sensitivity control is backed off.

e. Allow the unit to continue the wash phase and then rinse phase by turning EXTEND CYCLE switch off. When the vapor removal status light is displayed, push cycle STOP and end the cycle

f. Place the end of the detergent suction hose into a container of detergent. Start another wash cycle to prime the detergent supply line. If in the previous steps, the settings were properly made, the following events will occur in the wash phase **five seconds after the pump comes on:**

- Blue and white lights come on for 18.5 seconds
- After 18.5 seconds, blue and white lights go off
- When water temperature reaches approximately 160°F, the blue light comes on and white light should come on for a short period, then remain off for remainder of wash phase. Allow machine to complete remaining portion of this cycle.

7. To verify the accuracy of the setting made in the preceding step, perform the following:

a. Set the CRW/HCW microprocessor controller as follows:

- Close door(s)
- Depress power ON switch
- Depress heat ON
- Depress wash DUMP
- Depress extended cycle OFF
- Depress TANK DRAIN
- Set pre-wash timer to **zero**
- Set wash timer to **5 minutes**
- Set first rinse timer to **1 minute**
- Set second rinse timer to **zero**

b. Measure out an amount of detergent into a calibrated container. The amount should be slightly more (20-25%) than the amount established in Step (6) previously. Place the end of the detergent pickup tube into the calibrated container.

c. With the detergent injector toggle switch in the ON position, press the machine START. The machine should immediately begin to fill with hot water.

d. Five seconds after the wash pump starts, the blue and white lights should come on for 18-19 seconds. (NOTE that the white light may come on and off as detergent is injected.) The detergent level in the container should drop same amount. At the end of this 18-19 second period, both the blue and white lights should go out.

e. Not sooner than 30 seconds following the 18-19 second period and when the water temperature reaches 160°F, the blue light should come on. At this time, the white light should come on until the remaining detergent of the specified amount is injected.

Once again, the white light may go on and off as detergent is injected. When the wash phase is complete, check the detergent level in the container. NOTE that some detergent was placed in the container beyond the amount required by the manufacturer. Carefully determine the amount injected. If the remaining detergent is more than 10% above or below the specified (see Step 6) amount, adjust the sensitivity control as follows:

1) Too much detergent injected — adjust the sensitivity control 1/8 turn counterclockwise.

2) Not enough detergent injected — adjust the sensitivity control 1/8 turn clockwise.

f. After completing the rinse phase, repeat the above step (7) as required, starting with fresh water and detergent each time, until correct setting is obtained.

NOTE: Changes in manufacturer's brand or changes to other manufacturer's detergent will require readjustment of the injector control settings. It is recommended that one brand of product be used.

8.14 ADJUSTMENT PROCEDURE FOR VAPOR REMOVAL TIME

1. Check that the vapor removal time registers as 3 minutes at the beginning of vapor removal.

2. Observe the amount of vapor which escapes from the top of the door as it is opened.

3. Adjust the vapor removal time by resetting the dip switches on PC board 2 until visible vapor leaving the machine reaches approximately 15 seconds. (See Fig. 8-18)

NOTE: The maximum adjustment available is 15 minutes, in one minute increments.

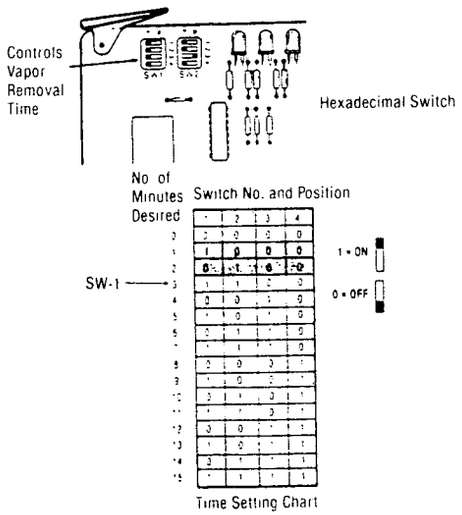


Figure 8-18. VAPOR REMOVAL TIME SETTING HEXADECIMAL SWITCHES AND UNITS FIELD FITTED WITH VENTURI VAPOR REMOVAL SYSTEM (Units After 2/84).

8.15 INSTALLATION OF NEW DOOR AND JAMB SEAL CHANNELS

8.15.1 Installing Door Seal Channel (Figs. 8-19, 8-20)

1. Drill out all POP rivets in door, which retains the inside panel around edges only. Use a 1/8" dia. drill bit (drill at a low R.P.M.; several drill bits will be required). Do not remove window assembly or door latch; these items will retain back panel in position.

2. Clean off surfaces where new door seal channel will be installed using acetone or freon degreaser (do not use M.E.K.).

3. Select and position each door seal channel against door, checking for proper alignment of holes and mitered corners.

4. Prime surfaces with RTV primer, apply a small (1/4" dia.) bead of RTV to back of door seal channels and install over back panel, fitting mitered corners together. Secure door seal channel to door at ends first, then work your way alogn securing seal channel to door using stainless steel POP rivets provided.

5. Clean off all excess RTV along edges and inside door seal channel.

6. Apply RTV primer to inside of door channel and allow to dry. Then apply a thin (1/32") film of RTV to bottom of the channel along its entire length. While RTV is still soft, install adhesive backed rubber gasket into door seal channel (adhesive toward RTV) after removing paper backing strip. These tubber gaskets will not require mitering in corners. Fit gaskets inside channels first using full length strips. Do not stretch rubber gaskets when installing in channels. (See Figures 8-19 and 8-20)

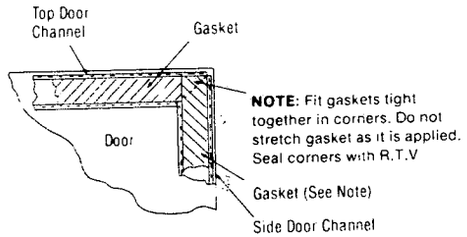


Figure 8-19. DOOR SEAL.

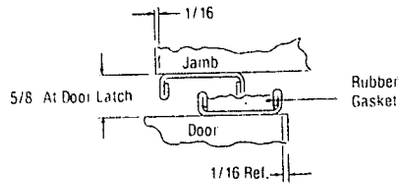


Figure 8-20. RUBBER GASKET INSTALLED.

8.15.2 Installing Jamb Seal Channel (Figs. 8-21, 8-22)

Remove all screws, retainer strips and rubber gaskets from face of jamb.

2. Clean off face of jamb, but keep from scratching face of jamb.

3. Select and position each jamb seal channel against jamb, checking for proper alignment of holes and mitered corners. These side jamp seal channels should reach from top of door opening to top of trough. Inside edge of channel should be nearly flush with the inside of the door opening. (See Figure 8-21)

4. New jamb seal channel will be installed to face of jamb, covering present threaded holes. Drill new 1/8" dia. holes in the jamb using the channel as a guide.

5. Once the door seal channel has been located against the jamb, but before it is fastened permanently into position, drill several 3/8" dia. holes at the point where the channel on the jamb meets the top of the trough. Join the holes together to form a slot approximately 3/8" by 1". (See Figure 8-22)

6. Apply a small (1/4" dia.) bead of RTV to back of jamb seal channel and install to face of jamb, fitting up mitered corners. Secure jamb seal channels to jamb at ends first, then work your way along securing to jamb using stainless steel POP rivets provided.

7. Clean off all excess RTV along edges and inside jamb seal channels.

NOTE: On pit mounted installations, remove the pipe plug from one side and the tubing compression fitting from the other side of the trough to increase the size of the drain opening out of the trough. (This may not be possible due to the floor being placed over the access plates to the trough.)

On floor mounted and those pit mounted installations where additional trough drain capacity is required, drill several 3/8" or larger diameter holes through the dividing partition inside the trough to allow water to flow from the front section of the trough back into the wash tank. Exercise care when drilling these holes so that the bottom of the trough is not punctured. Since these holes will be drilled at any angle through the partition, start with a small drill and work up to larger sizes. (See Fig. 8-23)

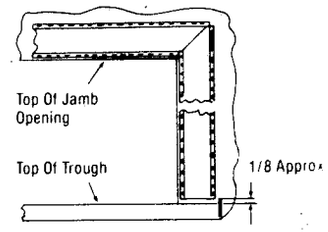


Figure 8-21. JAMB SEAL.

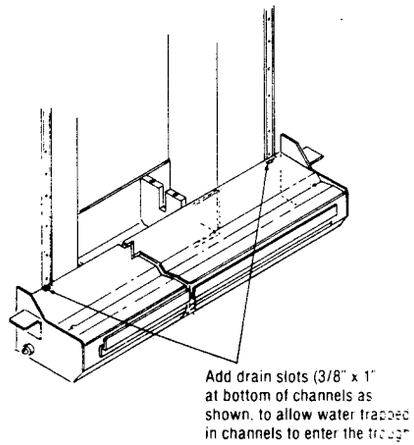


Figure 8-22. DRAIN SLOTS.

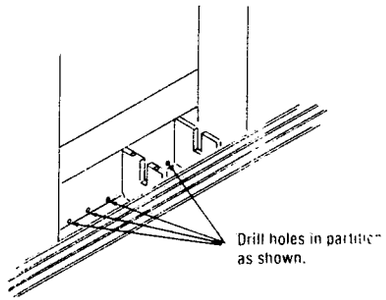


Figure 8-23. HOLES FOR ADDITIONAL TROUGH CAPACITY.

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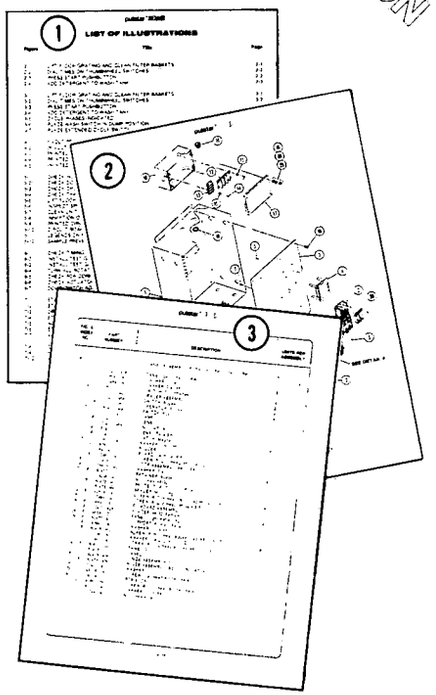
SECTION 9

EXPLODED VIEWS AND PARTS LISTS

Assemblies and components of Pulstar 2000/3000 washers are illustrated and identified on the following pages. The part number, the description and the quantity required for each usage is given. Each identification 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.

STEAM AND WATER LINES: Standard Unit .....
COLD WATER INLET .....
• UNION, 1 N.P.T. .....
• NIPPLE, 1 N.P.T. x 34-1/4 .....
• VALVE, Swing Check, 1 N.P.T. .....
• • DISC, Viton "A" .....
• NIPPLE, 1 N.P.T. x 2 .....

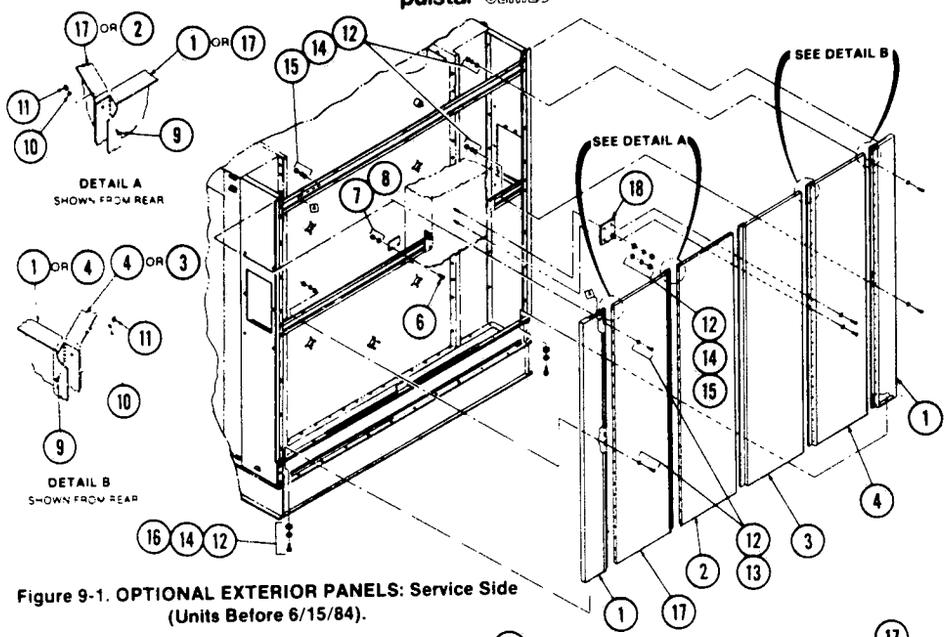


Figure 9-1. OPTIONAL EXTERIOR PANELS: Service Side (Units Before 6/15/84).

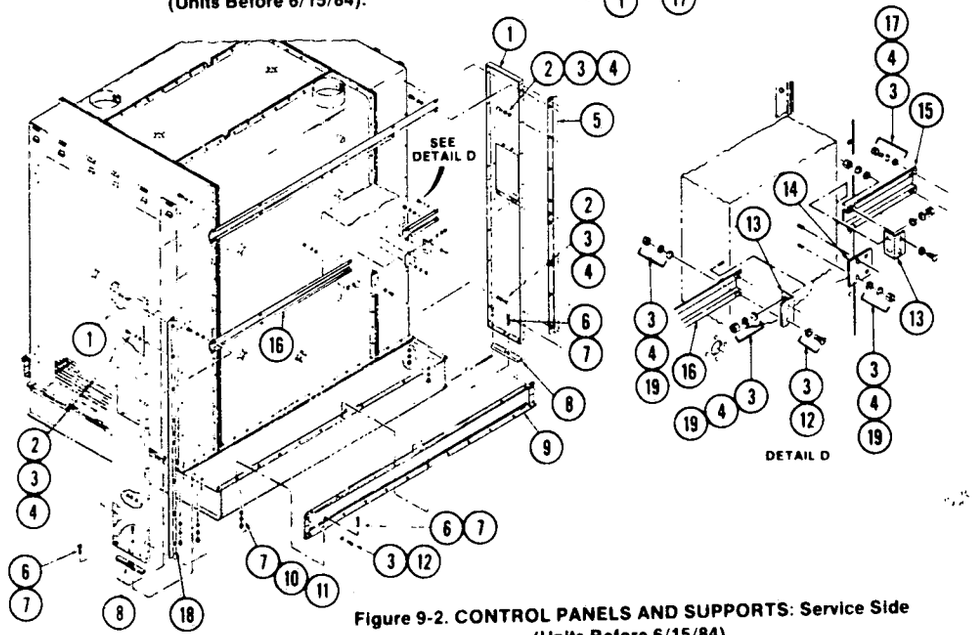


Figure 9-2. CONTROL PANELS AND SUPPORTS: Service Side (Units Before 6/15/84).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-1-					OPTIONAL EXTERIOR PANELS: Service Side (Units Before 6/15/84)	X
1	P	150476	937		PANEL ASSEMBLY, Corner	2
2	P	150476	932		PANEL, Door	1
3	P	150476	940		PANEL, Door	1
4	P	150476	955		PANEL, Door	1
5	P	150476	643		STRIKE, Upper	1
6	P	12535	061		SCREW, Round Head, #8-32 x 1/2	2
7	P	19690	061		WASHER, Lock, #8	2
8	P	8645	061		NUT, #8-32	2
9	P	150473	133		SCREW, Flat Head, #6-32 x 3/8	69
10	P	19684	061		WASHER, Lock	69
11	P	118432	061		NUT, Hex, #6-32	92
12	P	150473	295		WASHER, Flat, 1/4	12
13	P	51067	061		SCREW, Round Head, 1/4-20 x 3/8	4
14	P	19686	061		WASHER, Lock, 1/4	8
15	P	76239	061		NUT, Hex, 1/4-20	4
16	P	74117	061		CAPSCREW, Socket Head, 1/4-20 x 3/8	4
17	P	150476	954		PANEL, Door	1
18	P	150476	343		BLOCK, Tapping	1
9-2-					CONTROL PANELS AND SUPPORTS: Service Side (Units Before 6/15/84)	X
1	P	150475	274		ASSEMBLY, Control Panel	2
2	P	150473	154		CAPSCREW, Hex Head, 1/4-20 x 3/8	32
3	P	150473	295		WASHER, Flat, 1/4	77
4	P	19686	061		WASHER, Lock, 1/4	62
5	P	150475	265		ZEE ASSEMBLY, L.H.	1
6	P	27281	061		CAPSCREW, Hex Head, 3/8-16 x 3/4	8
7	P	150473	299		WASHER, Flat, 3/8	16
8	P	150475	283		SPACER	2
9	P	150477	182		ASSEMBLY, Toe Space	1
10	P	19687	061		WASHER, Lock, 3/8	8
11	P	150475	594		NUT, Hex, 3/8-16	8
12	P	150473	155		SCREW, Truss Head, 1/4-20 x 3/8	8
13	P	150476	339		SUPPORT	2
14	P	150476	343		BLOCK, Tapping	1
15	P	150477	171		SUPPORT, Side Channel, Short	1
16	P	150477	170		SUPPORT, Side Channel, Long	1
17	P	150473	146		CAPSCREW, 1/4-20 x 5/8	8
18	P	150475	266		ZEE ASSEMBLY, R.H.	1
19	P	76239	061		NUT, Hex, 1/4-20	4

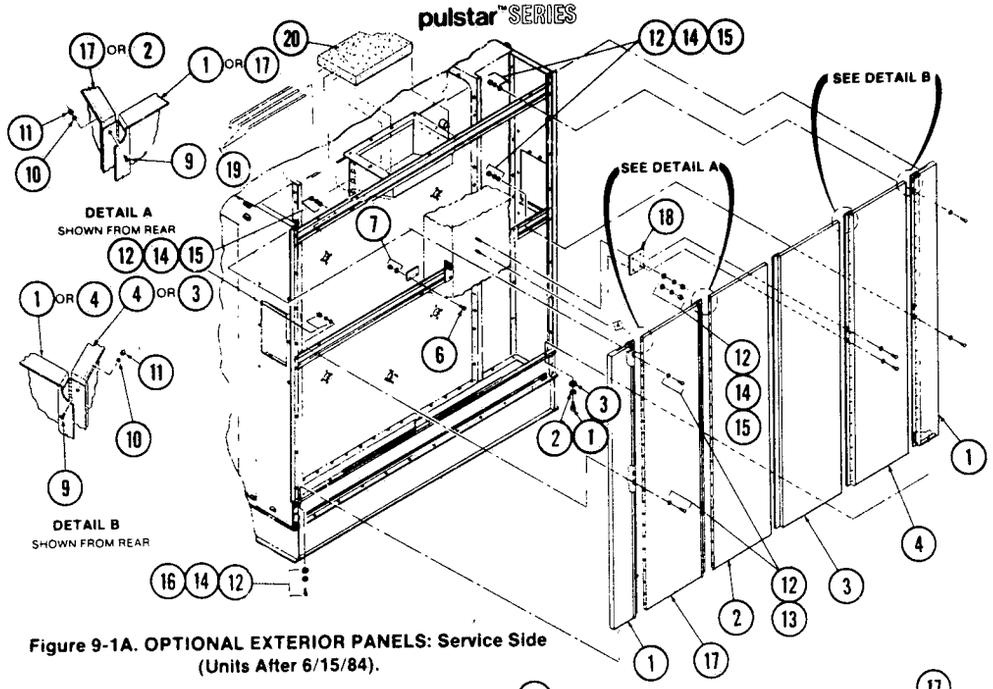


Figure 9-1A. OPTIONAL EXTERIOR PANELS: Service Side (Units After 6/15/84).

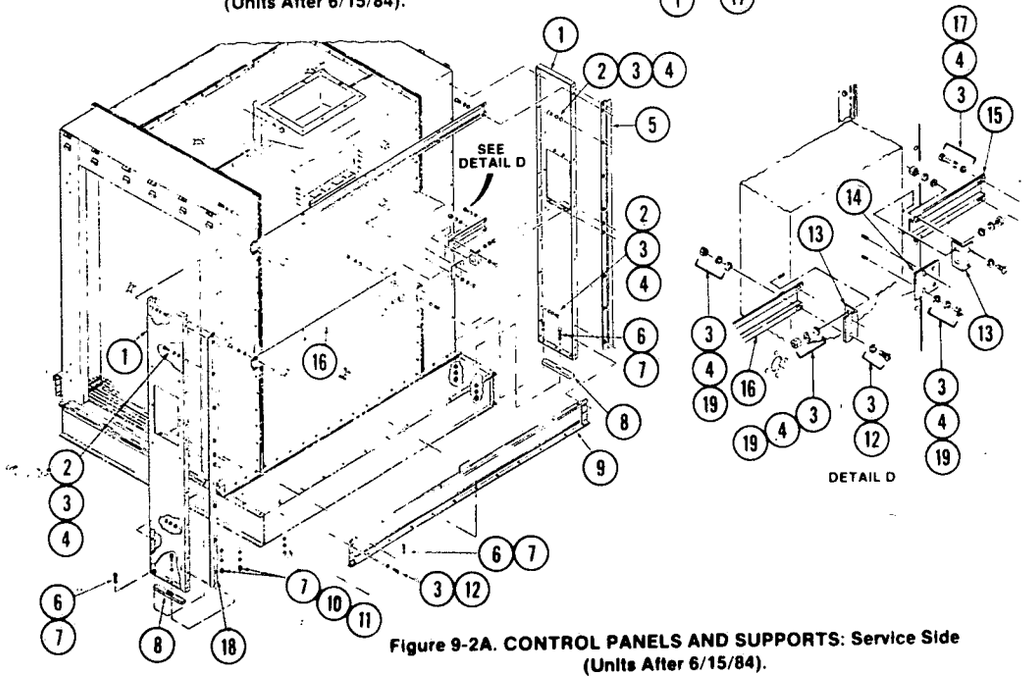


Figure 9-2A. CONTROL PANELS AND SUPPORTS: Service Side (Units After 6/15/84).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-1A-					OPTIONAL EXTERIOR PANELS: Service Side (Units After 6/15/84)	X
1	P	150476	937		PANEL ASSEMBLY, Corner	2
2	P	150476	932		PANEL, Door	1
3	P	150476	940		PANEL, Door	1
4	P	150476	955		PANEL, Door	1
5	P	150476	643		STRIKE, Upper	1
6	P	12535	061		SCREW, Round Head, #8-32 x 1/2	2
7	P	19690	061		WASHER, Lock, #8	2
8	P	8645	061		NUT, #8-32	2
9	P	150473	133		SCREW, Flat Head, #6-32 x 3/8	69
10	P	19684	061		WASHER, Lock	69
11	P	118432	061		NUT, Hex, #6-32	92
12	P	150473	295		WASHER, Flat, 1/4	12
13	P	51067	061		SCREW, Round Head, 1/4-20 x 3/8	4
14	P	19686	061		WASHER, Lock, 1/4	8
15	P	76239	061		NUT, Hex, 1/4-20	4
16	P	74117	061		CAPSCREW, Socket Head, 1/4-20 x 3/8	4
17	P	150476	954		PANEL, Door	1
18	P	150476	343		BLOCK, Tapping	1
20	P	150477	312		ROD, Retaining	3
21	P	157477	313		FILTER, Foam	1
9-2A-					CONTROL PANELS AND SUPPORTS: Service Side (Units Before 6/15/84)	X
1	P	150475	274		ASSEMBLY, Control Panel	2
2	P	150473	154		CAPSCREW, Hex Head, 1/4-20 x 3/8	60
3	P	150473	295		WASHER, Flat, 1/4	138
4	P	19686	061		WASHER, Lock, 1/4	113
5	P	150475	265		ZEE ASSEMBLY, L.H.	1
6	P	27281	061		CAPSCREW, Hex Head, 3/8-16 x 3/4	8
7	P	150473	299		WASHER, Flat, 3/8	18
8	P	150475	283		SPACER	2
9	P	150477	182		ASSEMBLY, Toe Space	1
10	P	19687	061		WASHER, Lock, 3/8	10
11	P	150475	594		NUT, Hex, 3/8-16	10
12	P	150473	155		SCREW, Truss Head, 1/4-20 x 3/8	16
13	P	150476	339		SUPPORT	2
14	P	150476	343		BLOCK, Tapping	1
15	P	150477	171		SUPPORT, Side Channel, Short	1
16	P	150477	170		SUPPORT, Side Channel, Long	1
17	P	150473	146		CAPSCREW, 1/4-20 x 5/8	17
18	P	150475	266		ZEE ASSEMBLY, R.H.	1
19	P	76239	061		NUT, Hex, 1/4-20	30
20	P	150477	227		DUCT ASSEMBLY, Air Inlet/Outlet	1
21	R				TREMCO TAPE	A R

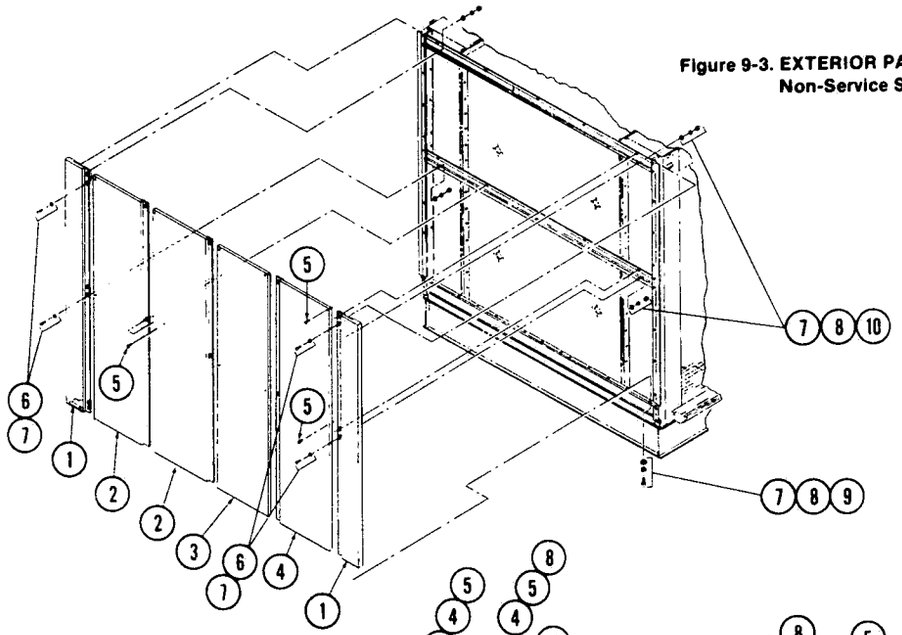


Figure 9-3. EXTERIOR PANELS. Non-Service Side.

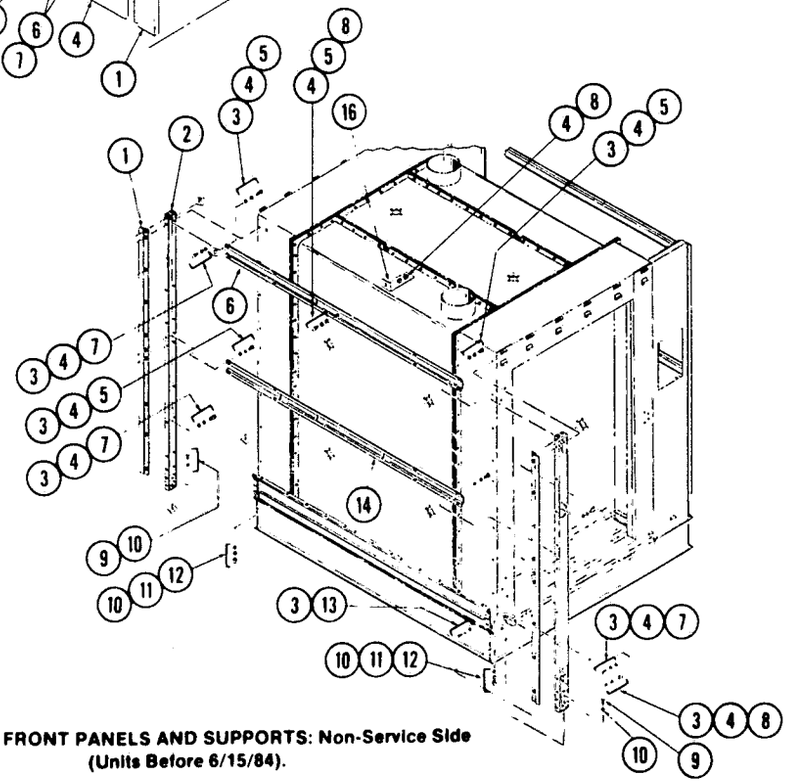


Figure 9-4. FRONT PANELS AND SUPPORTS: Non-Service Side (Units Before 6/15/84).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-3-					EXTERIOR PANELS: Non-service Side (Units Before 6/15/84)	X
1	P	150476	936		PANEL ASSEMBLY, Corner	2
2	P	150476	934		PANEL, Side	2
3	P	150476	935		PANEL, Side	1
4	P	150476	933		PANEL, Side	1
5	P	76061	061		SCREW, Truss Head, 1/4-20 x 1-1/2	10
6	P	51067	061		SCREW, Round Head, 1/4-20 x 3/8	8
7	P	150473	295		WASHER, Flat, 1/4	25
8	P	19686	061		WASHER, Lock, 1/4	21
9	P	74117	061		CAPSCREW, Socket Head, 1/4-20 x 3/8	17
10	P	76239	061		NUT, Hex, 1/4-20	4
9-4-					FRONT PANELS AND SUPPORTS: Non-service Side (Units Before 6/15/84)	X
1	P	150475	266		ZEE ASSEMBLY, R.H.	1
2	P	150475	202		PANEL, Vertical	2
3	P	150473	295		WASHER, Flat, 1/4	52
4	P	19686	061		WASHER, Lock, 1/4	41
5	P	150473	196		CAPSCREW, Hex Head, 1/4-20 x 5/8	9
6	P	150477	172		SUPPORT, Side Channel, Top	1
7	P	150473	154		CAPSCREW, Hex Head, 1/4-20 x 3/8	32
8	P	76239	061		NUT, Hex, 1/4-20	20
9	P	27281	061		CAPSCREW, Hex Head, 3/8-16 x 3/4	8
10	P	150473	299		WASHER, Flat, 3/8	16
11	P	19687	061		WASHER, Lock, 3/8	8
12	P	150475	594		NUT, Hex, 3/8-16	8
13	P	150473	155		SCREW, Truss Head, 1/4-20 x 3/8	8
14	P	150477	173		SUPPORT, Side Channel, Bottom	1
15	P	150475	265		ZEE ASSEMBLY, L.H.	1
16	P	150476	628		BRACKET, Support	1

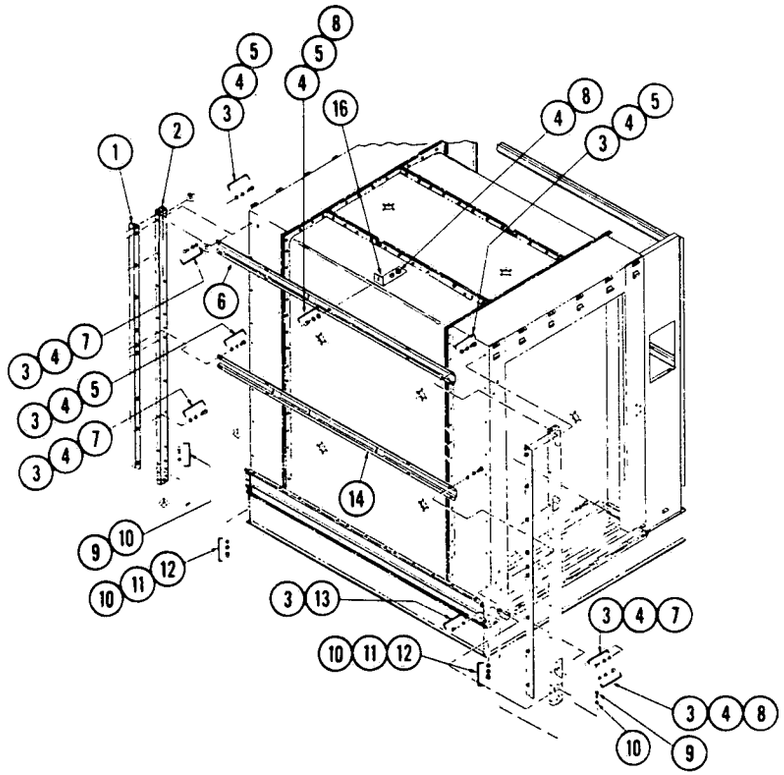


Figure 9-4A. FRONT PANELS AND SUPPORTS: Non-Service Side (Units After 6/15/84).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-4A-					FRONT PANELS AND SUPPORTS: Non-service Side (Units After 6/15/84)	X
1	P	150475	266		ZEE ASSEMBLY, R.H.	1
2	P	150475	202		PANEL, Vertical	2
3	P	150473	295		WASHER, Flat, 1/4	52
4	P	19686	061		WASHER, Lock, 1/4	41
5	P	150473	196		CAPSCREW, Hex Head, 1/4-20 x 5/8	9
6	P	150477	172		SUPPORT, Side Channel, Top	1
7	P	150473	154		CAPSCREW, Hex Head, 1/4-20 x 3/8	32
8	P	76239	061		NUT, Hex, 1/4-20	20
9	P	27281	061		CAPSCREW, Hex Head, 3/8-16 x 3/4	8
10	P	150473	299		WASHER, Flat, 3/8	16
11	P	19687	061		WASHER, Lock, 3/8	8
12	P	150475	594		NUT, Hex, 3/8-16	8
13	P	150473	155		SCREW, Truss Head, 1/4-20 x 3/8	8
14	P	150477	173		SUPPORT, Side Channel, Bottom	1
15	P	150475	265		ZEE ASSEMBLY, L.H.	1
16	P	150476	628		BRACKET, Support	1

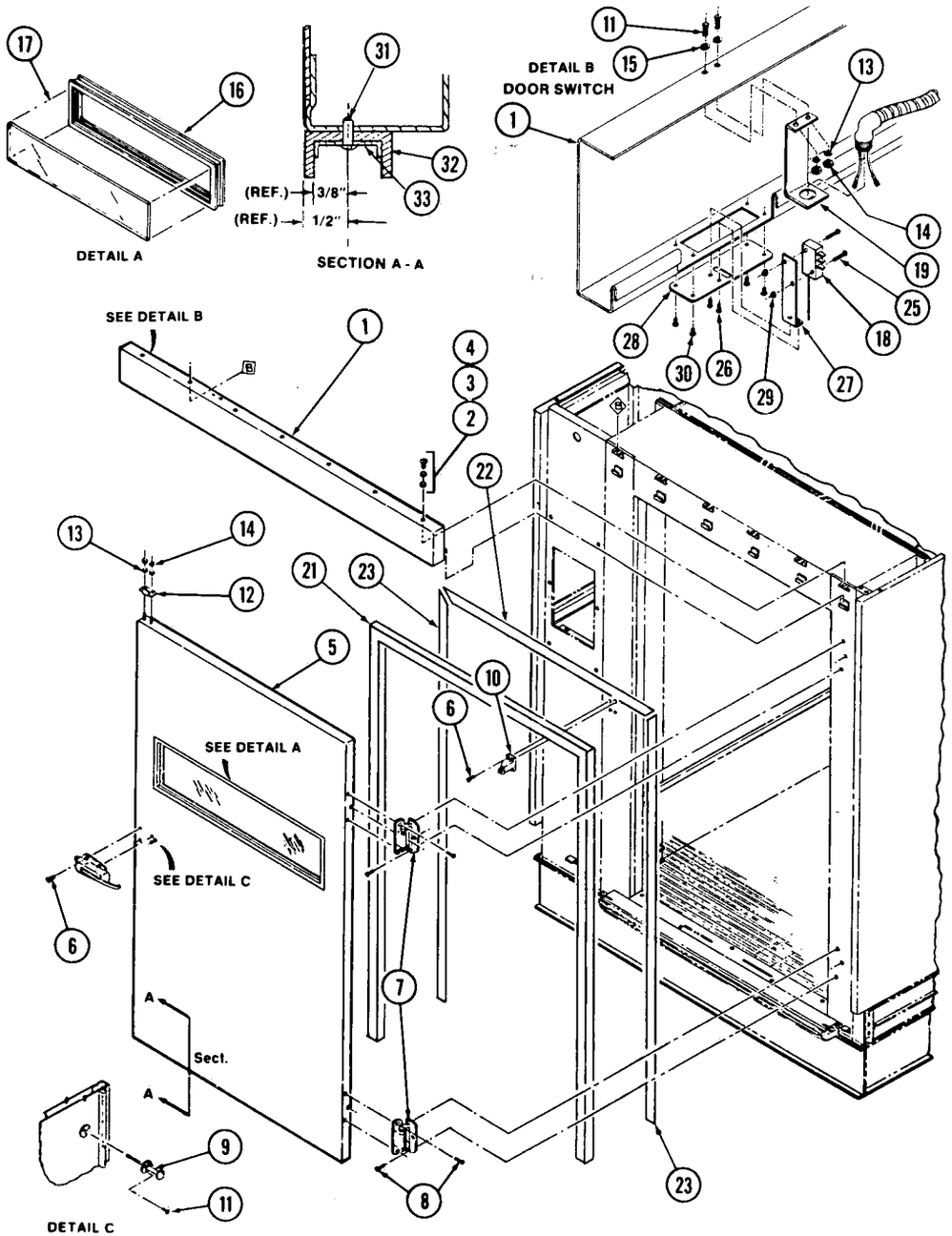


Figure 9-5. DOOR ASSEMBLY: Right Hand Shown. (Units Before 4/84).

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
9-5-					DOOR ASSEMBLY: 34 Hospital Cart Washer (Units Before 4/84)	X			
					DOOR ASSEMBLY: 42 Hospital Cart Washer (Units Before 4/84)		X		
					DOOR ASSEMBLY: 50 Hospital Cart Washer (Units Before 4/84)			X	
1	P	150476	905		TRIM, Top, Horizontal, 34 (R.H. Door)	1			
	P	150476	903		TRIM, Top, Horizontal, 42 (R.H. Door)		1		
	P	150476	911		TRIM, Top, Horizontal, 50 (R.H. Door)			1	
	P	150476	904		TRIM, Top, Horizontal, 34 (L.H. Door)	1			
	P	150476	902		TRIM, Top, Horizontal, 42 (L.H. Door)		1		
	P	150476	912		TRIM, Top, Horizontal, 50 (L.H. Door)			1	
2	P	150473	157		SCREW, Truss Head, 1/4-20 x 3/4	6	6	6	
3	P	150473	295		WASHER, Flat	6	6	6	
4	P	19686	061		WASHER, Lock	6	6	6	
5	P	150476	060		DOOR, R.H., 34	1			
	P	150476	053		DOOR, R.H., 42		1		
	P	150476	040		DOOR, R.H., 50			1	
	P	150476	061		DOOR, L.H., 34	1			
	P	150476	054		DOOR, L.H., 42		1		
	P	150476	041		DOOR, L.H., 50			1	
6	P	150475	418		SCREW, Flat Head, 1/4-20 x 3/4	8	8	8	
7	P	150476	043		HINGE, Cam Lift, R.H.	2	2	2	
8	P	150475	963		CAPSCREW, 3/8-16 x 3/4	12	12	12	
9	P	150476	961		HANDLE, Inside Release	1	1	1	
10	P	150475	980		LATCH AND STRIKE ASSEMBLY	1	1	1	
11	P	150473	163		SCREW, Truss Head, #10-32 x 1/2	5	5	5	
12	P	150477	165		BRACKET, Trip	1	1	1	
13	P	19685	061		WASHER, Lock, #10	4	4	4	
14	P	124354	011		NUT, Hex, #10-32	4	4	4	
15	P	150473	301		WASHER, Flat, #10	2	2	2	
16	P	150475	982		GASKET, Window	1	1	1	
17	P	150475	062		GLASS, Window	1	1	1	
18	P	150477	166		SWITCH	1	1	1	
19	P	150476	794		BRACKET, Cable Mount	1	1	1	
20	P	150476	044		HINGE, Cam Lift, L.H.	2	2	2	
21	P	150476	947		GASKET ASSEMBLY, Door, 34	1			
	P	150476	948		GASKET ASSEMBLY, Door, 42		1		
	P	150476	949		GASKET ASSEMBLY, Door, 50			1	
22	P	150476	951		RETAINER, Top, 34	1			
	P	150476	952		RETAINER, Top, 42		1		
	P	150476	953		RETAINER, Top, 50			1	
23	P	150476	950		RETAINER, Side	2	2	2	
24	P	124256	026		SCREW, Truss Hd, #10-32	72	75	77	
25	P	150476	169		SCREW #4-40 x 7/8	2	2	2	
26	P	150576	728		RIVET, Pop, 5-32	2	2	2	
27	P	150477	164		BRACKET, Switch	1	1	1	
28	P	150477	167		PLATE, Access	1	1	1	
29	P	81671	009		NUT, #4-40	2	2	2	
30	P	45455	061		SCREW, #4-40 x 1/4	4	4	4	
31	P	124256	026		SCREW, Truss Head, #10-32 S.S.	15	15	17	
32	R	3000	650		GASKET, Door Bottom	4	4	5	
33	P	150476	062		RETAINER, Bottom Door Gasket	1			
	P	150476	055		RETAINER, Bottom Door Gasket		1		
	P	150476	042		RETAINER, Bottom Door Gasket			1	

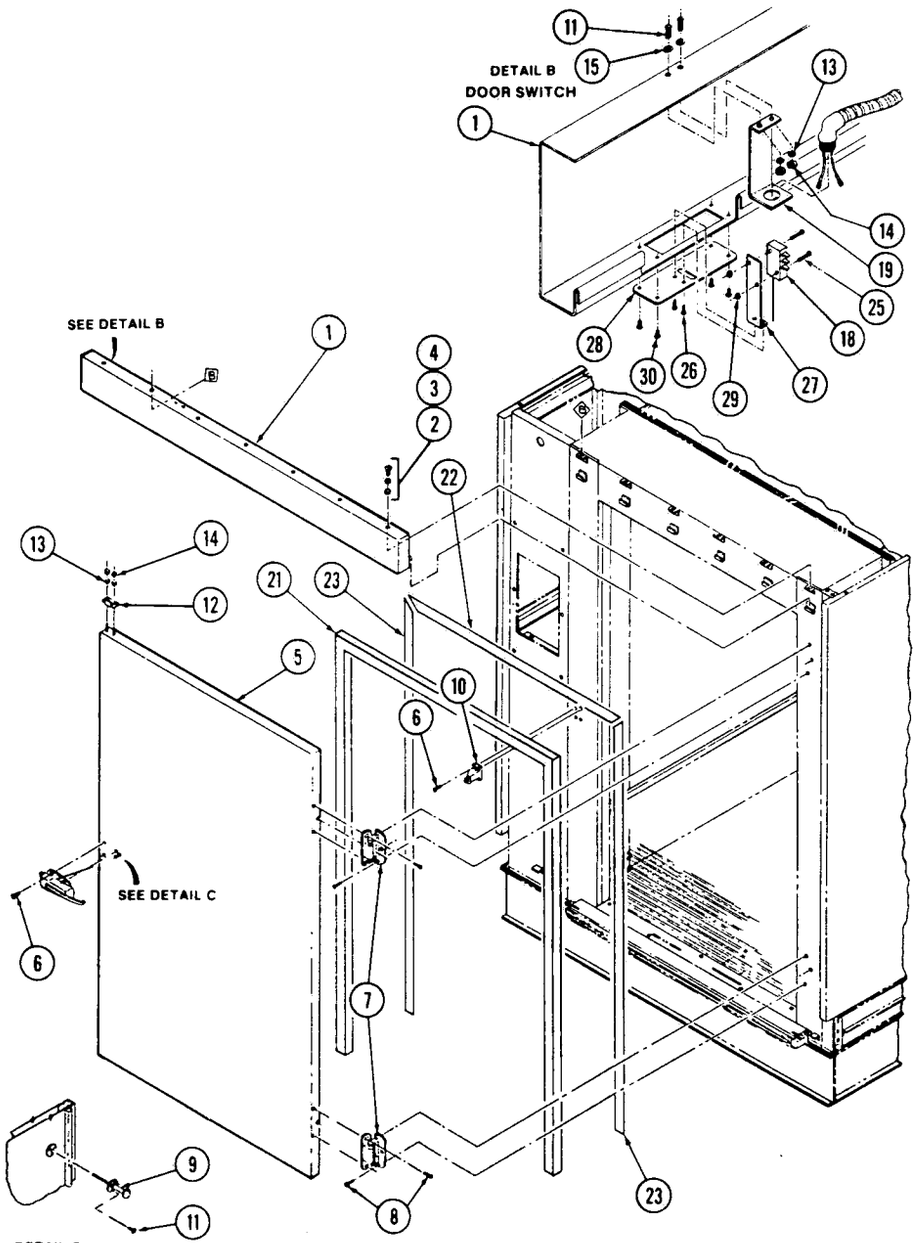


Figure 9-5A. DOOR ASSEMBLY: Right Hand Shown (Units After 4/84).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY		
9-5A-					DOOR ASSEMBLY: 34 Hospital Cart Washer (Units After 4/84)	X		
					DOOR ASSEMBLY: 42 Cage and Rack Washer (Units After 4/84)		X	
					DOOR ASSEMBLY: 50 Cage and Rack Washer (Units After 4/84)			X
1	P	150476	905		TRIM, Top, Horizontal, 34 (R.H. Door)	1		
	P	150476	903		TRIM, Top, Horizontal, 42 (R.H. Door)		1	
	P	150476	911		TRIM, Top, Horizontal, 50 (R.H. Door)			1
	P	150476	904		TRIM, Top, Horizontal, 34 (L.H. Door)	1		
	P	150476	902		TRIM, Top, Horizontal, 42 (L.H. Door)		1	
	P	150476	912		TRIM, Top, Horizontal, 50 (L.H. Door)			1
2	P	150473	157		SCREW, Truss Head, 1/4-20 x 3/4	6	6	6
3	P	150473	295		WASHER, Flat	6	6	6
4	P	19686	061		WASHER, Lock	6	6	6
5	P	150476	060		DOOR, R.H., 34	1		
	P	150476	053		DOOR, R.H., 42		1	
	P	150476	040		DOOR, R.H., 50			1
	P	150476	061		DOOR, L.H., 34	1		
	P	150476	054		DOOR, L.H., 42		1	
	P	150476	041		DOOR, L.H., 50			1
6	P	150475	418		SCREW, Flat Head, 1/4-20 x 3/4	8	8	8
7	P	150476	043		HINGE, Cam Lift, R.H.	2	2	2
8	P	150475	963		CAPSCREW, 3/8-16 x 3/4	12	12	12
9	P	150476	961		HANDLE, Inside Release	1	1	1
10	P	150475	980		LATCH AND STRIKE ASSEMBLY	1	1	1
11	P	150473	163		SCREW, Truss Head, #10-32 x 1/2	5	5	5
12	P	150477	165		BRACKET, Trip	1	1	1
13	P	19685	061		WASHER, Lock, #10	4	4	4
14	P	124354	011		NUT, Hex, #10-32	4	4	4
15	P	150473	301		WASHER, Flat, #10	2	2	2
16	P	150477	220		WINDOW ASSEMBLY	1	1	1
17	P	150477	211		FRAME, Window	1	1	1
18	P	150477	166		SWITCH	1	1	1
19	P	150476	794		BRACKET, Cable Mount	1	1	1
20	P	150476	044		HINGE, Cam Lift, L.H.	2	2	2
21	P	150477	200		CHANNEL, Door Seal (Top) 34" Door	1		
	P	150477	316		CHANNEL, Door Seal (Top) 42" Door		1	
	P	150477	317		CHANNEL, Door Seal (Top) 50" Door			1
22	P	150477	201		CHANNEL, Door Seal (Hinged Side)	1	1	1
23	P	150477	202		CHANNEL, Door Seal (Latch Side)	1	1	1
24	P	124256	026		SCREW, Truss Hd., #10-32	72	75	77
25	P	150476	169		SCREW, #4-40 x 7/8	2	2	2
26	P	150576	728		RIVET, Pop, 5/32	2	2	2
27	P	150477	164		BRACKET, Switch	1	1	1
28	P	150477	167		PLATE, Access	1	1	1
29	P	81671	009		NUT, #4-40	2	2	2
30	P	45455	061		SCREW, #4-40 x 1 1/4	4	4	4
31	P	124256	026		SCREW, Truss Head, #10-32 S.S.	13	15	17
32	R	3000	650		GASKET, Door Bottom	A/R	A/R	A/R
33	P	150476	062		RETAINER, Bottom Door Gasket*	1		
	P	150476	055		RETAINER, Bottom Door Gasket*		1	
	P	150476	042		RETAINER, Bottom Door Gasket*			1
34	P	150476	728		POP RIVET, S.S., 5/32 x 1/4 Long	16	14	12
35	P	150476	751		POP RIVET, S.S., 5/32 x 3/8 Long	43	43	43
36	P	150474	299		WASHER, Sealing	14	14	14
37	P	150477	221		ACORN NUT, High Crown, #10-34	14	14	14
38	R	4430	100		GASKET, Rubber, Self Adhesive*	A/R	A/R	A/R

*When ordering, specify required length in feet

Figure 9-6. BASE AND TOP SPRAY PIPING: Double Door Unit Shown.

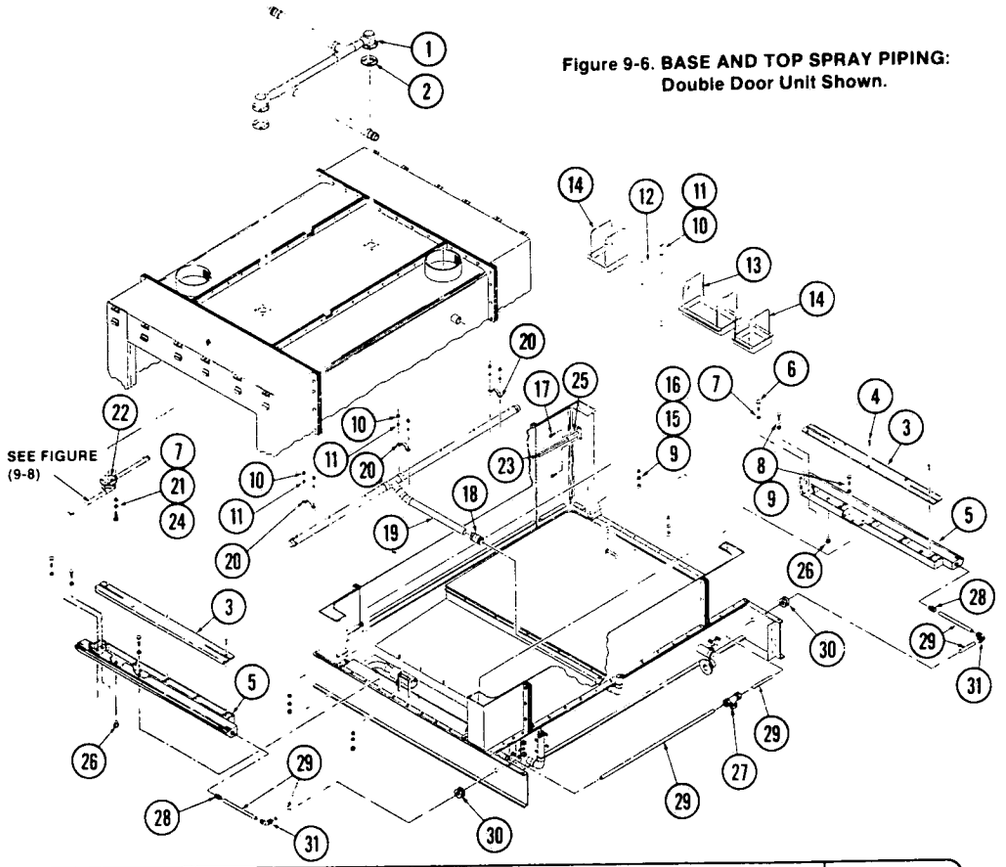


FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-6-			BASE AND TOP SPRAY PIPING: 34 Hospital Cart Washer	X			
			BASE AND TOP SPRAY PIPING: 42 Cage and Rack Washer		X		
			BASE AND TOP SPRAY PIPING: 50 Cage and Rack Washer			X	
1	P 150476 240		MANIFOLD, Top Spray, 34	1			
	P 150476 239		MANIFOLD, Top Spray, 42		1		
	P 150476 238		MANIFOLD, Top Spray, 50			1	
2	P 150475 953		GASKET	2	2	2	
3A	P 150475 730		COVER, Trough, 34 (Single Door)	1			
	P 150475 729		COVER, Trough, 42 (Single Door)		1		
	P 150475 694		COVER, Trough, 50 (Single Door)			1	

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
9-6-3B	P 150475 730		COVER, Trough, 34 (Double Door)	2				
	P 150475 729		COVER, Trough, 42 (Double Door)		2			
	P 150475 694		COVER, Trough, 50 (Double Door)			2		
4	P 150475 880		SCREW, Flat Head, 1/4-20 x 3/4	8	8	10		
5A	P 150476 888		TROUGH WELDMENT, 34 (L.H.)	1				
	P 150476 890		TROUGH WELDMENT, 42 (L.H.)		1			
	P 150476 892		TROUGH WELDMENT, 50 (L.H.)			1		
5B	P 150476 889		TROUGH WELDMENT, 34 (R.H.)	1				
	P 150476 891		TROUGH WELDMENT, 42 (R.H.)		1			
	P 150476 893		TROUGH WELDMENT, 50 (R.H.)			1		
6	P 150473 146		SCREW, Hex Head Cap, 1/4-20 x 5/8	2	2	2		
7	P 150473 295		WASHER, Flat	214	214	216		
8	P 150476 732		SCREW, Hex Head Cap, 3/8-16 x 1-1/4	50	52	56		
9	P 150473 299		WASHER, Flat	100	104	112		
10	P 150473 630		NUT, Hex, #10-32	10	10	10		
11	P 19685 061		WASHER, Lock	10	10	10		
12	P 150476 281		COVER, Steam Heater	1	1	1		
13	P 150476 270		BASKET, Long	1	1	2		
14	P 150476 269		BASKET, Short	1	2	1		
15	P 19687 061		WASHER, Lock	50	52	56		
16	P 150475 594		NUT, Hex, 3/8-16	50	52	56		
17	P 150473 156		SCREW, Truss Head, Slotted, 1/4-20 x 1/2	8	8	8		
18	P 150476 958		JOINT, Band Seal	1	1	1		
19	P 150476 194		SPRAY ASSEMBLY, Bottom, 34	1				
	P 150476 193		SPRAY ASSEMBLY, Bottom, 42		1			
	P 150476 192		SPRAY ASSEMBLY, Bottom, 50			1		
20	P 150477 192		CLAMP, Pipe	3	3	3		
21	P 75331 061		SCREW, Flat Head Socket Cap, 1/4-20 x 3/4	8	8	10		
22	P 150475 534		SPRAY ASSEMBLY, Revolving Wash	2	2	2		
23	P 150475 281		RAIL WELDMENT	2	2	2		
24	P 19686 061		WASHER, Lock	122	122	124		
25	P 150476 631		RAIL, End	2	2	2		
26	P 78821 061		PLUG, Pipe, 1 N.P.T. (Single Door)	1	1	1		
	P 78821 061		PLUG, Pipe, 1 N.P.T. (Double Door)	2	2	2		
27	P 150476 455		TEE, Comp., 1/2 O.D.	1	1	1		
28	P 81059 001		CONNECTOR, Male (Single Door)	1	1	1		
	P 81059 001		CONNECTOR, Male (Double Door)	2	2	2		
29	R 3500 817		TUBING, Nylon, 1/2 O.D.	A/R	A/R	A/R		
30	P 46042 091		GROMMET, Rubber	2	2	2		
31	P 150476 456		ELBOW, Comp., 1/2 O.D.T. (Single Door)	1	1	1		
	P 150476 456		ELBOW, Comp., 1/2 O D T (Double Door)	2	2	2		

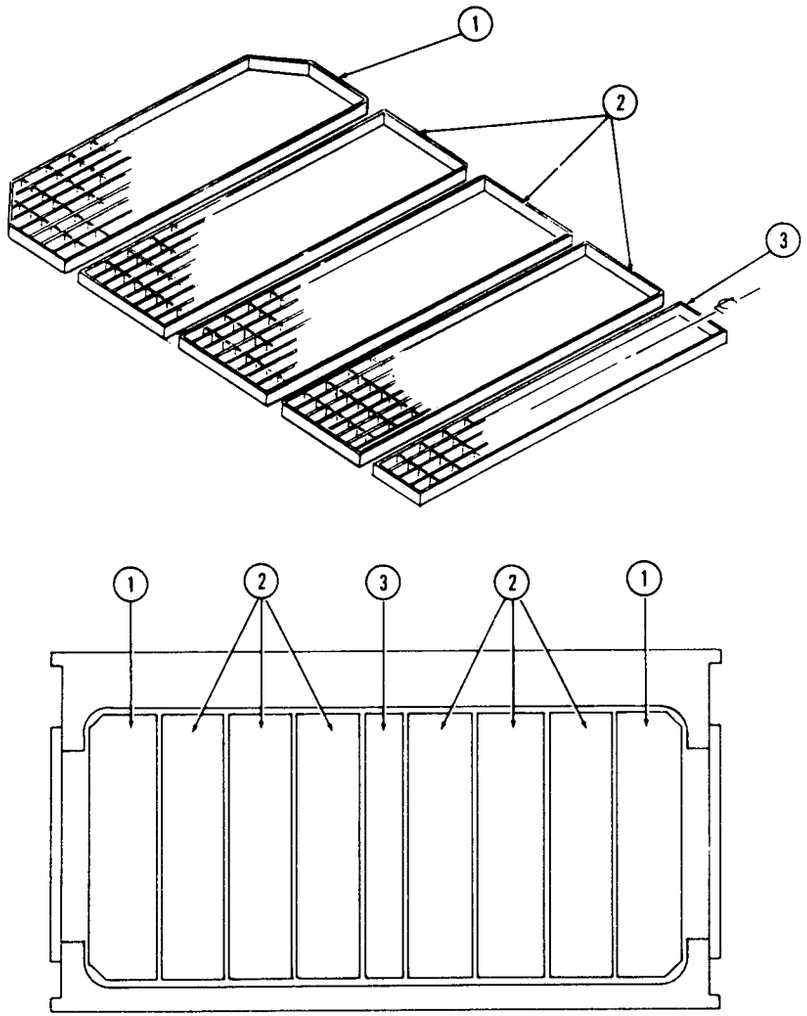


Figure 9-7. GRATING.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
9-7-	P 150476 556		GRATING PACKAGE: Galvanized, 34	X		
	P 150476 555		GRATING PACKAGE: Galvanized, 42		X	
	P 150476 554		GRATING PACKAGE: Galvanized, 50			X
1	P 150475 744		GRATE, End	2		
	P 150475 743		GRATE, End		2	
	P 150475 238		GRATE, End			2
2	P 150475 742		GRATE, Center	6		
	P 150475 741		GRATE, Center		6	
	P 150475 237		GRATE, Center			6
3	P 150476 485		GRATE, Filler	1		
	P 150476 484		GRATE, Filler		1	
	P 150476 483		GRATE, Filler			1
	P 150476 558		GRATING PACKAGE: Stainless Steel, 42*		X	
	P 150476 557		GRATING PACKAGE: Stainless Steel, 50*			X
1	P 150476 387		GRATE, End		2	
	P 150476 385		GRATE, End			2
2	P 150476 386		GRATE, Center		6	
	P 150476 384		GRATE, Center			6
3	P 150476 487		GRATE, Fillter		1	
	P 150476 486		GRATE, Filler			1

*NOTE: Stainless steel grating is furnished with Cage and Rack Washers which have the acid/neutralize prewash option.

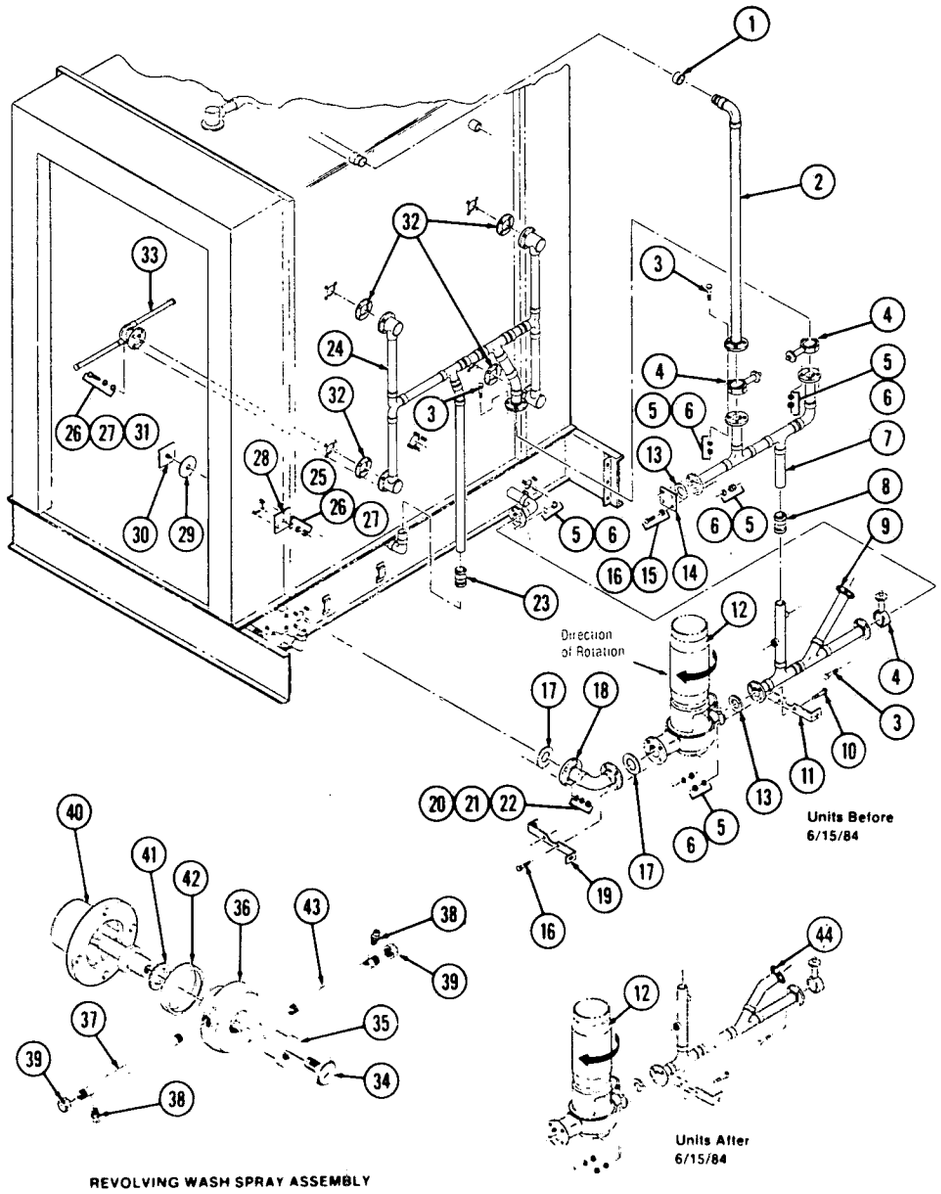


Figure 9-8. PIPING: Pump Discharge Line and Spray Manifolds.

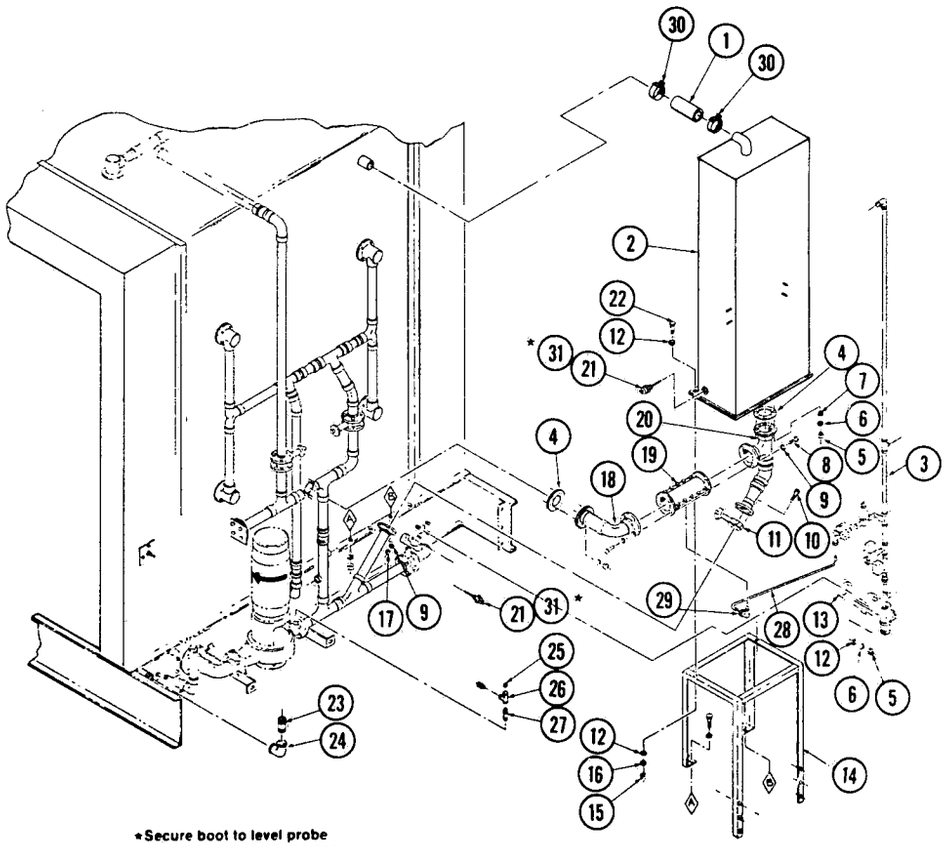
FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-8-					PIPING, Steel Flanged, 208 V. Pump	X			
					PIPING, Steel Flanged, 230/460 V. Pump		X		
					PIPING, Stainless Steel Flanged*, 208 V. Pump			X	
					PIPING, Stainless Steel Flanged*, 230/460 V. Pump				X
1	P	150476	151		COUPLING, 2	1	1	1	1
2	P	150476	256		SUPPLY ASSEMBLY, Top Spray, Steel	1	1		
	P	150476	257		SUPPLY ASSEMBLY, Top Spray, Stainless			1	1
3	P	150476	338		BOLT, Hex Head, 5/8-11 x 4-1/2	12	12	12	12
4	P	150476	174		VALVE, Butterfly (Crane 42-SS-Z)	3	3	3	3
5	P	19692	061		WASHER, Lock, 5/8	20	20	20	20
6	P	150475	593		NUT, Hex, 5 8-11	36	36	36	36
7	P	150476	246		MANIFOLD ASSEMBLY, Pulse Spray, Steel	1	1		
	P	150476	247		MANIFOLD ASSEMBLY, Pulse Spray, Stainless			1	1
8	P	150476	166		JOINT, Flexmaster, 2	1	1	1	1
9	P	150476	236		MANIFOLD ASSEMBLY, Pump Exhaust Steel (Units Before 6/15/84)	1	1		
	P	150476	237		MANIFOLD ASSEMBLY, Pump Exhaust, Stainless (Units Before 6/15/84)			1	1
10	P	150476	337		BOLT, Hex Head, 5/8-11 x 2-3/4	8	8	8	8
11	P	150476	280		SUPPORT, Pump, 2 Pipe	1	1	1	1
12	P	150475	946		PUMP, Cast Iron, 208 V. (See Fig. 9-14)	1			
	P	150475	568		PUMP, Cast Iron, 230/460 V. (See Fig. 9-14)		1		
	P	150475	947		PUMP, Stainless Steel, 208 V. (See Fig. 9-14)			1	
	P	150475	948		PUMP, Stainless Steel, 230/460 V. (See Fig. 9-14)				1
13	P	150476	265		GASKET, Flange, 2	2	2	2	2
14	P	150476	356		PLATE, Sealing	1	1	1	1
15	P	17285	045		WASHER Plain, 5/8	4	4	4	4
16	P	3879	051		BOLT, Hex Head, 5 8-11 x 1-1/2	4	4	4	4
17	P	150476	266		GASKET, Flange, 3	2	2	2	2
18	P	150476	248		INLET ASSEMBLY, Pump, Steel	1	1		
	P	150476	249		INLET ASSEMBLY, Pump, Stainless			1	1
19	P	150476	279		SUPPORT, Pump, 3 Pipe	1	1	1	1
20	P	150475	594		NUT, Hex 3 8-16	4	4	4	4
21	P	19687	061		WASHER, Lock, 3'8	4	4	4	4
22	P	150473	299		WASHER Plain, 3 8	4	4	4	4
23	P	150476	165		JOINT Flexmaster, 1-1/2	1	1	1	1
24	P	150476	242		MANIFOLD ASSEMBLY, Spray, Service Side, Steel	1	1		
	P	150476	243		MANIFOLD ASSEMBLY, Spray, Service Side, Stainless			1	1

*NOTE: Stainless steel flanges are used on Cage and Rack Washers supplied with the acid neutralizer prewash option

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-8-							
25	P 76239 061		NUT, Hex, 1/4-20	1	1	1	1
26	P 19686 061		WASHER, Lock, 1/4	41	41	41	41
27	P 150473 295		WASHER, Plain, 1/4	41	41	41	41
28	P 150476 354		PLATE, Back-up	1	1	1	1
29	P 150476 355		GASKET	1	1	1	1
30	P 150476 353		PLATE, Sealing	1	1	1	1
31	P 150475 418		SCREW, Flat Head Socket, 1/4-20 x 3/4	41	41	41	41
32	P 150475 953		GASKET, Manifold	10	10	10	10
33	P 150475 534		SPRAY ASSEMBLY, Revolving	8	8	8	8
34	P 150473 380		• KNOB, Knurled, 7/16-14 x 7/8	1	1	1	1
35	P 150473 039		• BEARING	1	1	1	1
36	P 150475 540		• MANIFOLD, Rotary	1	1	1	1
37	P 150475 749	*	• ARM, Spray	1	1	1	1
38	P 150475 745		• NOZZLE	2	2	2	2
39	P 150475 750		• CAP, Pipe	2	2	2	2
40	P 150475 034		• ADAPTER, Rotary	1	1	1	1
41	P 150475 069		• WASHER	1	1	1	1
42	P 150476 494		• BEARING, Strip	1	1	1	1
43	P 150475 748	*	• ARM, Spray	1	1	1	1
44	P 150476 236		MANIFOLD ASSEMBLY, Steel Flanges	1	1	1	1
	P 150477 300		• LINE STRAINER	1	1	1	1
	P 150476 236		MANIFOLD ASSEMBLY, Stainless Steel Flanges	1	1	1	1
	P 150477 300		• LINE STRAINER	1	1	1	1

*NOTE: If overall length is 18", replace both spray arms.

NOT USED

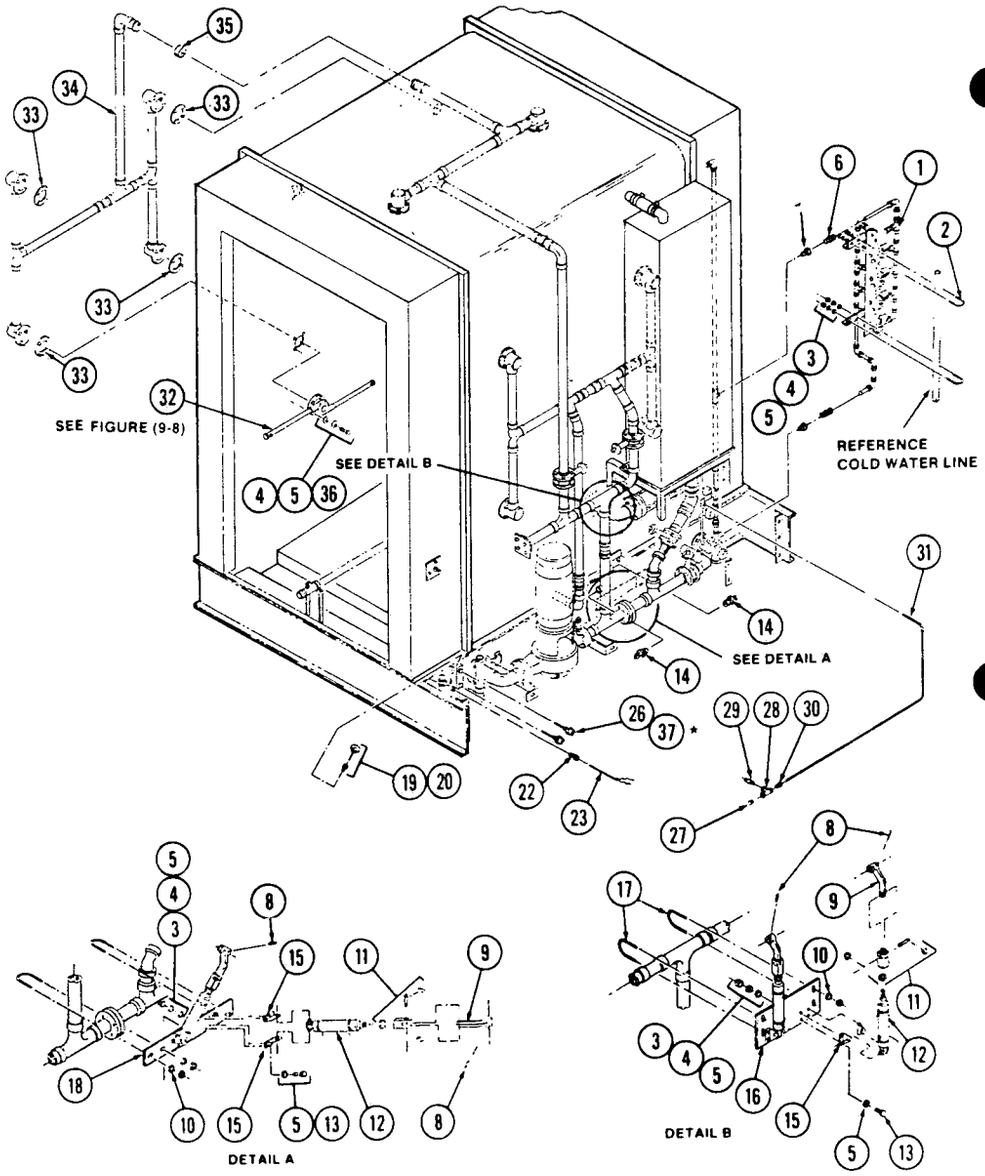


*Secure boot to level probe with GE 108 RTV. R-5300-563

Figure 9-9. STORAGE TANK INLET AND DISCHARGE PIPING.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY	
9-9-					STORAGE TANK INLET/DISCHARGE, Steel Flanges	X	
					STORAGE TANK INLET/DISCHARGE, Stainless Steel Flanges*		X
1	P	150476	844		HOSE, Tank Overflow	1	1
2	P	150476	345		TANK ASSEMBLY	1	1
3	P	150476	323		COLD WATER SUPPLY: See Figure 9-12	1	1
4	P	150476	260		GASKET	2	2
5	P	76239	061		NUT, Hex, 1/4-20	8	8
6	P	19686	061		WASHER, Lock, 1/4	8	8
7	P	150473	295		WASHER, Plain, 1/4	4	4
8	P	150476	337		BOLT, Hex Head, 5/8-11 x 2-3/4	8	8
9	P	19692	061		WASHER, Lock, 5/8	12	12
10	P	150476	338		BOLT, Hex Head, 5/8-11 x 4-1/4	4	4
11	P	150476	174		VALVE, Butterfly (Crane 42-SS-Z)	1	1
12	P	150473	299		WASHER, Plain, 3/8	6	6
13	P	150476	265		GASKET, Flange, 2	1	1
14	P	150475	739		SUPPORT, Tank	1	1
15	P	150475	594		NUT, Hex, 3/8-16	6	6
16	P	19687	061		WASHER, Lock, 3/8	6	6
17	P	150475	593		NUT, Hex, 5/8-11	4	4
18	P	150476	330		ELBOW ASSEMBLY, Pinch Valve	1	
	P	150476	331		ELBOW ASSEMBLY, Pinch Valve		1
19	P	150476	167		VALVE, Pinch, 3	1	1
	P	764315	495		• BODY, Valve	1	1
	P	764315	496		• GASKET, Casing	1	1
20	P	150476	346		DRAIN, Tank	1	
	P	150476	347		DRAIN, Tank		1
21	P	150475	994		DETECTOR, Liquid Level	1	1
22	P	27281	061		BOLT, Hex Head, 3/8-16 x 3/4	2	2
23	P	29395	091		NIPPLE, 1-1/4 N.P.T. x 2	1	1
24	P	7474	091		ELBOW, 1-1/4 N.P.T.	1	1
25	P	42282	061		PLUG, Pipe 1/4 N.P.T.	1	1
26	P	76859	061		TEE, 1/4 N.P.T.	1	1
27	P	77378	061		NIPPLE	1	1
28	R	3500	817		TUBING, Nylon, 1/2 O.D. x .062 Wall	A/R	A/R
29	P	81063	001		ELBOW, Compression	1	1
30	P	150476	845		CLAMP, Hose, 3-1/2 I.D.	2	2
31	P	150477	311		BOOT	2	2

*NOTE: Stainless steel flanges are used on Cage and Rack Washers supplied with the acid neutralizer prewash option.



*Secure boot to level with GE 108 RTV, R-5300-563

Figure 9-10. PIPING: Solenoid Actuator Assembly, Butterfly Valve Actuators, Non-Service Side Spray Manifold.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY	
9-10-				PIPING, Steel Flange	X	
				PIPING, Stainless Steel Flange*		X
1	P	150476 335		ACTUATOR, Solenoid (See Fig. 9-13)	1	1
2	P	150476 460		"U" BOLT, 1/4-20	2	2
3	P	76239 061		NUT, Hex, 1/4-20	12	12
4	P	19686 061		WASHER, Lock, 1/4	28	28
5	P	150473 295		WASHER, Plain, 1/4	36	36
6	P	81059 001		CONNECTOR, Male, 1/2 O.D.T. x 1/2 N.P.T.	2	2
7	P	940 091		BUSHING, Reducing, 3/4 x 1/2 N.P.T.	2	2
8	P	41510 061		PIN, Roll, 5/32 x 7/8	4	4
9	P	150476 296		ARM ASSEMBLY, Level	4	4
10	P	24282 091		WASHER, Lock, External Tooth, 5/16	8	8
11	P	150476 154		CLEVIS, Piston Rod	4	4
12	P	150476 168		CYLINDER, Air	4	4
13	P	150473 148		SCREW, Hex Hd. Cap, 1/4-20 x 1	32	32
14	P	150476 712		PROBE ASSEMBLY, Detergent	2	2
15	P	150476 153		BRACKET, Pivot	4	4
16	P	150476 263		PLATE, Mounting (Units Before 6/15/84)	1	1
17	P	44790 045		"U" BOLT, With Nuts & Bar, 5/16-18	4	4
18	P	150476 264		PLATE, Mounting	1	1
19	P	13638 091		THERMOMETER (Temp. Gauge)	1	1
20	P	74661 061		BUSHING, Reducing, 1/2 x 1/4 N.P.T.	1	1
21	P	150476 188		GROMMET	2	2
22	P	150476 344		CONNECTOR ASSEMBLY, Union 1/8-27 N.P.T.	1	1
23	P	129133 001		PROBE, Temperature, Wash Tank	1	1
24	P	150476 185		WASHER, Pair, #20	2	2
25	P	150475 630		NUT, Hex, #10-32	4	4
26	P	150475 994		DETECTOR, Liquid Level (High/Low Water Wash Tank)	2	2
27	P	39334 061		PLUG, Pipe, 1/2 N.P.T.	1	1
28	P	40525 061		TEE, 1/2 N.P.T.	1	1
29	P	74115 091		NIPPLE, 1/2 N.P.T. x 1-1/2	1	1
30	P	78896 061		CONNECTOR, Male, 1/2 O.D.T. x 1/2 N.P.T.	1	1
31	R	3500 817		TUBE, 1/2 O.D.	A/R	A/R
32	P	150475 534		SPRAY ASSEMBLY, Revolving (See Fig. 9-8)	4	4
33		150475 953		GASKET, Manifold	4	4
34	P	150476 241		MANIFOLD ASSEMBLY, Spray, Nonservice Side	1	1
35	P	150476 151		COUPLING, 2	1	1
36	P	150475 418		SCREW, Flat Head Socket, 1/4-20 x 3/4	16	16
37	P	150477 311		BOOT	2	2

*NOTE: Stainless steel flanges are used on Cage and Rack Washers supplied with the acid/neutralizer prewash option.

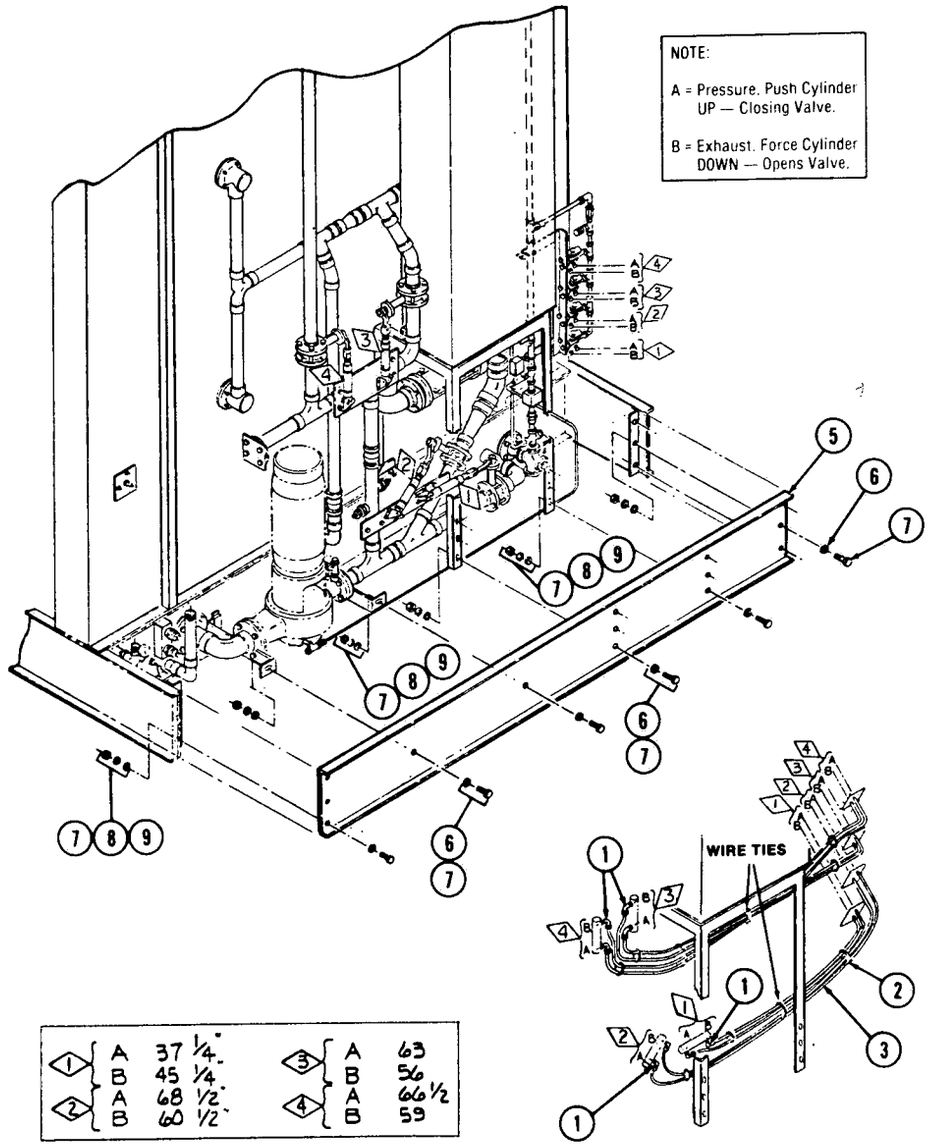


Figure 9-11. SUPPLY/EXHAUST LINES, BUTTERFLY VALVE ACTUATORS.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-11-				PIPING	X
1	P	80901 091		ELBOW, Compression, 3/8 O.D.T. x 1/8 N.P.T.	8
2	P	124713 002		TIE, Cable, Plastic	12
3	R	3500 815		TUBING, Nylon, 3/8 O.D. x .050 Wall	A/R
4	R	3500 817		TUBING, Nylon, 1/2 O.D. x .062 Wall	A/R
5	P	150476 070		CHANNEL	1
6	P	27281 061		BOLT, Hex Head, 3/8-16 x 3/4	14
7	P	150473 299		WASHER, Plain, 3/8	28
8	P	19687 061		WASHER, Lock, 3/8	14
9	P	150475 594		NUT, Hex, 3/8-16	6

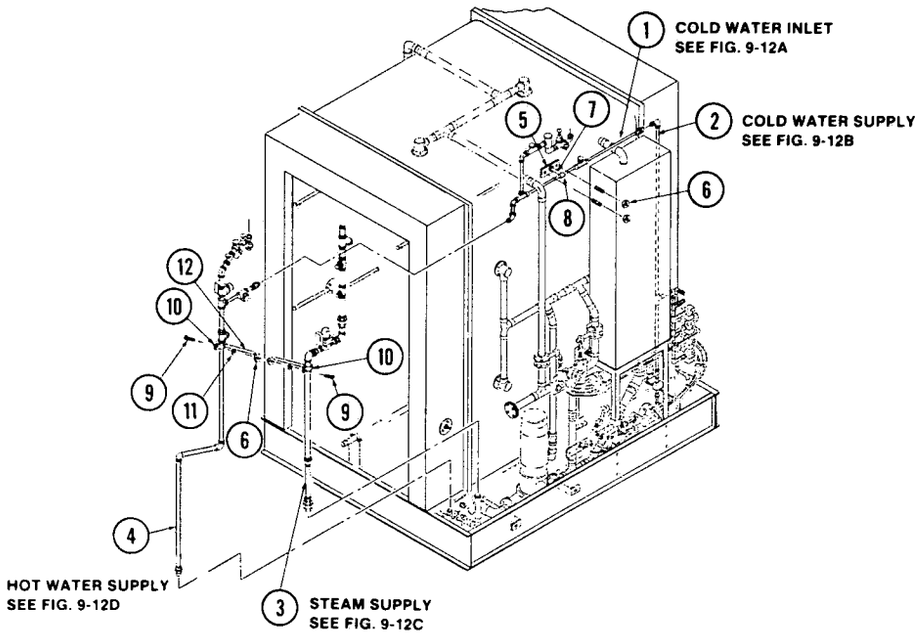


Figure 9-12. STEAM AND WATER LINES: Standard Unit.

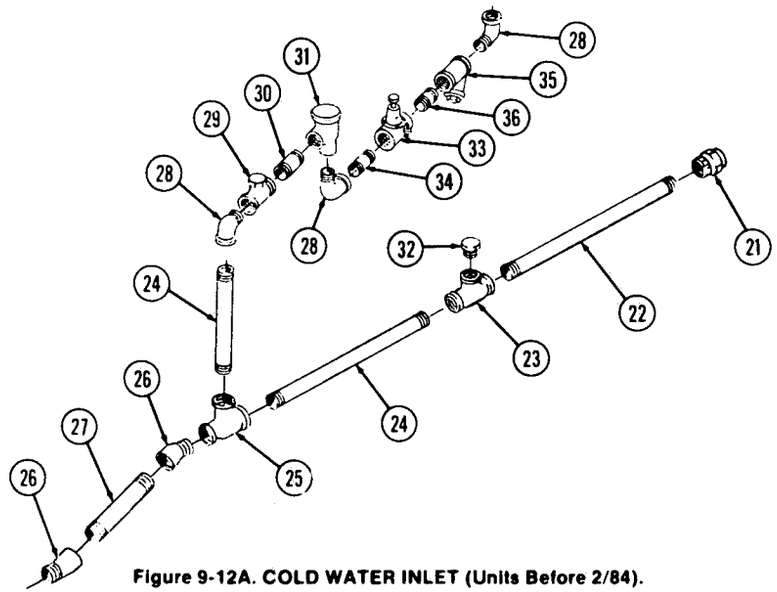


Figure 9-12A. COLD WATER INLET (Units Before 2/84).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-12-					STEAM AND WATER LINES: Standard Unit	X			
1					COLD WATER INLET (See Fig. 9-12A)				
2					COLD WATER SUPPLY (See Fig. 9-12B)				
3					STEAM SUPPLY (See Fig. 9-12C)				
4					HOT WATER SUPPLY (See Fig. 9-12D)				
5	P	9613	091		PIPE SUPPORT	1			
6	P	76239	061		NUT	6			
7	P	150474	973		NIPPLE, 1/4 x 4-1/2	1			
8	P	39591	091		CLAMP, Pipe 1	1			
9	P	3848	091		SCREW, 1/4-20 x 3/4	4			
10	P	10333	091		CLAMP, Pipe, 1-1/2	2			
11	P	19678	091		WASHER, Lock	4			
12	P	150474	972		NIPPLE, 1/4 x 2-3/8	1			
9-12A-	P	150476	452		COLD WATER INLET (Units Before 2/84)		X		
21	P	5283	091		UNION, 1 N.P.T.		1		
22	P	150477	148		NIPPLE, 1 N.P.T. x 34-1/4		1		
23	P	150476	990		TEE, 1 x 1 x 3/4 N.P.T.		2		
24	P	150477	150		NIPPLE, 1 N.P.T. x 8		2		
25	P	150476	999		TEE, 1 x 3/4 x 1 N.P.T.		1		
26	P	150476	397		ELBOW, Street, 45°		2		
27	P	150477	147		NIPPLE, 3/4 N.P.T. x 5-1/2		1		
28	P	1673	091		ELBOW, Street, 90°		3		
29	P	43101	091		VALVE, Swing Check, 1 N.P.T.		1		
	P	48468	091		• DISC, Viton "A"		1		
30	P	150477	149		NIPPLE, 1 N.P.T. x 2		4		
31	P	51797	091		VACUUM BREAKER, 1 N.P.T.		1		
	P	757589	091		• REPAIR KIT		1		
32	P	3443	091		PLUG, Pipe, 3/4 N.P.T.		1		
33	P	150476	733		VALVE, Pressure Reducing, 1 N.P.T.		1		
	P	764320	303		• REPAIR KIT		A/R		
34	P	150477	151		NIPPLE, 1 N.P.T. x 1-1/2		1		
35	P	42104	091		STRAINER, 1 N.P.T.		1		
36	P	150477	152		NIPPLE, 1 N.P.T. x 1-1/4 Lg.				

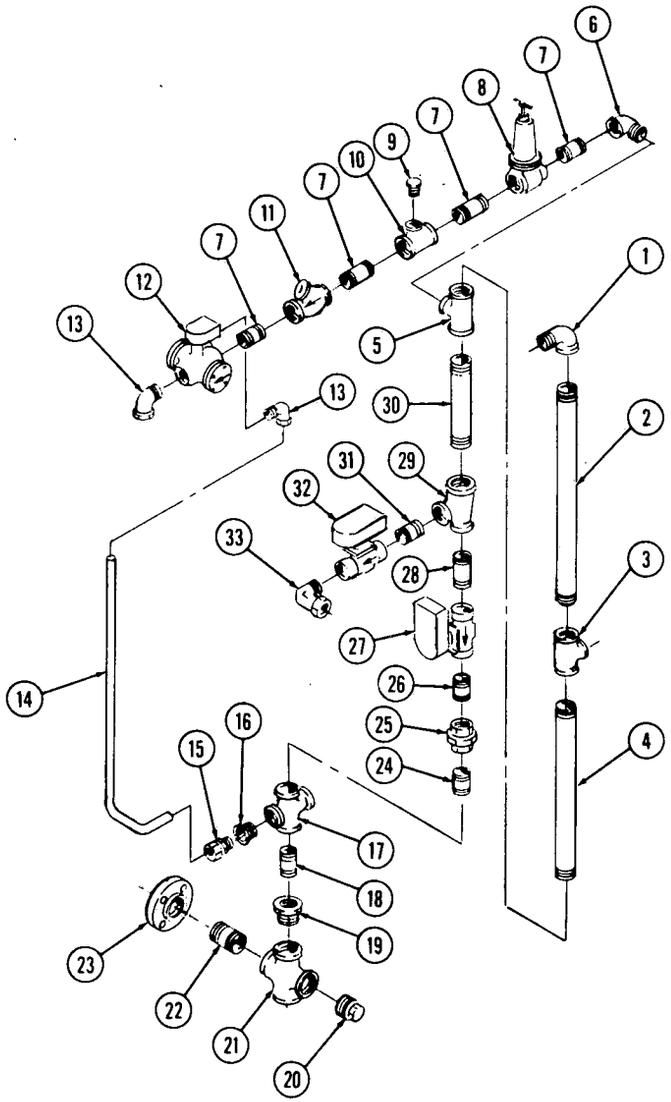


Figure 9-12B. COLD WATER SUPPLY (Units Before 2/84).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-12B-	P 150476 323		COLD WATER SUPPLY (Units Before 2/84)	X
1	P 1673 091		ELBOW, Street	1
2	P 150476 997		NIPPLE, 1 N.P.T. x 63-1/2	1
3	P 150476 990		TEE, Pipe, 1 x 1 x 3/4	1
4	P 150476 996		NIPPLE, 1 N.P.T. x 12-1/2	1
5	P 150476 989		TEE, Pipe 1 x 1 x 3/8	1
6	P 150477 055		ELBOW, Street, 3/8 N.P.T.	1
7	P 150476 995		NIPPLE, 3/8 x 1-1/2	4
8	P 150476 635		VALVE, Presure Regulating, 3/8 N.P.T.	1
9	P 150477 054		PIPE, Plug, 1/4 N.P.T.	1
10	P 150477 043		TEE, 3/8 x 3/8 x 1/4 N.P.T.	1
11	P 5424 091		VALVE, Check, 3/8 N.P.T.	1
12	P 150476 175		VALVE, Solenoid, 3/8 N.P.T. 3 Way	1
	P 764315 477		• REPAIR KIT	1
	P 764315 478		• COIL, 110 V.	1
13	P 81062 091		ELBOW, Male, 1/2 O.D.T. x 3/8 N.P.T.	2
14			TUBING, Nylon, 1/2 O.D. x .062 Wall	A/R
15	P 81059 001		CONNECTOR, Male, 1/2 O.D.T. x 1/2 N.P.T.	1
16	P 150476 985		BUSHING, Reducer, 3/4 N.P.T. x 1/2 N.P.T.	1
17	P 150477 056		CROSS, Pipe, 3/4 N.P.T.	1
18	P 150476 998		NIPPLE, 3/4 N.P.T. x 1-1/4	1
19	P 150476 986		BUSHING, Reducer, 2 N.P.T. x 3/4 N.P.T.	1
20	P 150476 984		PLUG, Pipe, 2 N.P.T.	1
21	P 150476 987		CROSS, Pipe, 2 N.P.T.	1
22	P 150476 992		NIPPLE, 2 N.P.T. x 3	1
23	P 150476 982		FLANGE, Threaded, 2 N.P.T.	1
24	P 150476 976		NIPPLE, 3/4 x 1-1/2	1
25	P 150476 966		UNION, 3/4 N.P.T.	1
26	P 150476 983		NIPPLE, Restrictor	1
27	P 150476 183		VALVE, Solenoid, 3/4 N.P.T. (V12 Cooling Water)	1
	P 764315 491		• REPAIR KIT	1
	P 764315 478		• COIL, 110 V.	1
28	P 150476 993		NIPPLE, 3/4 N.P.T. x 2	1
29	P 150476 988		TEE, Pipe, 1 x 3/4 x 1/2	1
30	P 150476 994		NIPPLE, 1 N.P.T. x 7	1
31	P 150476 991		NIPPLE, 1/2 N.P.T. x 1-1/2	1
32	P 81063 001		ELBOW, 90°, 1/2 O.D. x 1/2 N.P.T.	1
33	P 150476 177		VALVE, Solenoid, 1/2 N.P.T.	1
	P 764315 481		• REPAIR KIT	1
	P 764315 482		• COIL, 110 V.	1
	P 764315 492		• RED HAT	1

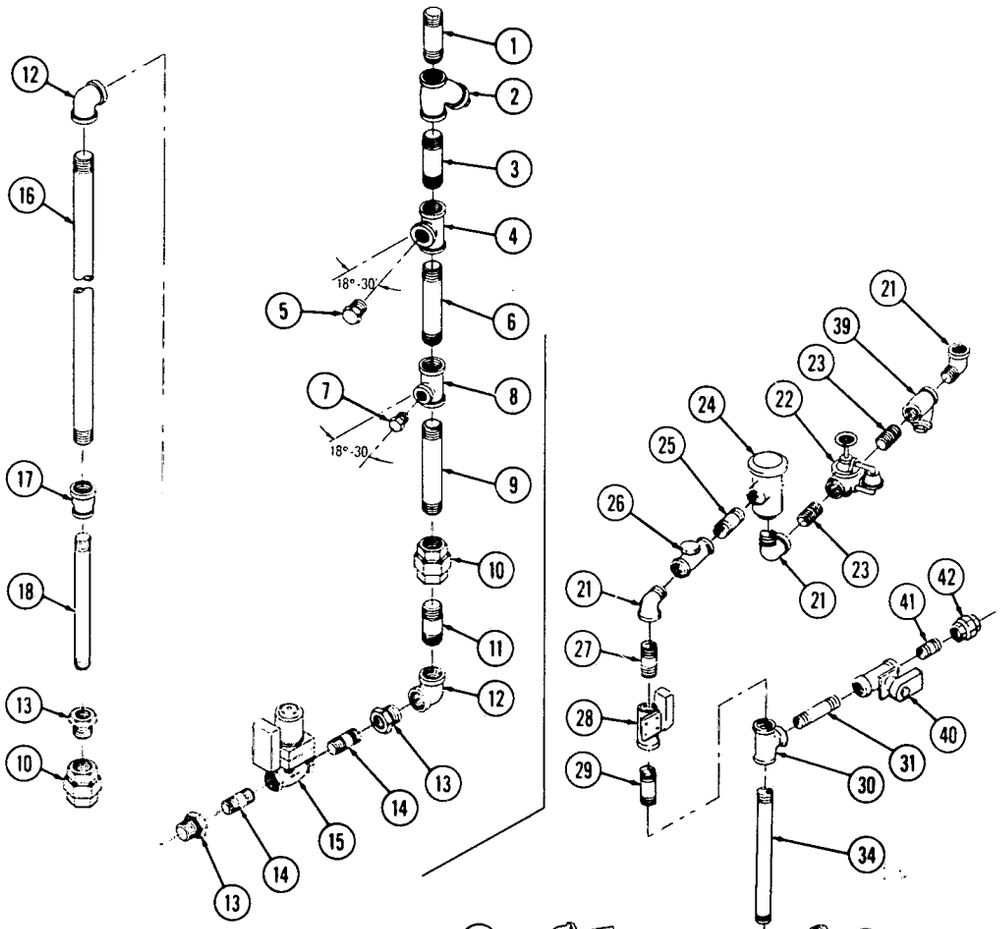


Figure 9-12C. STEAM SUPPLY (Units Before 2/84).

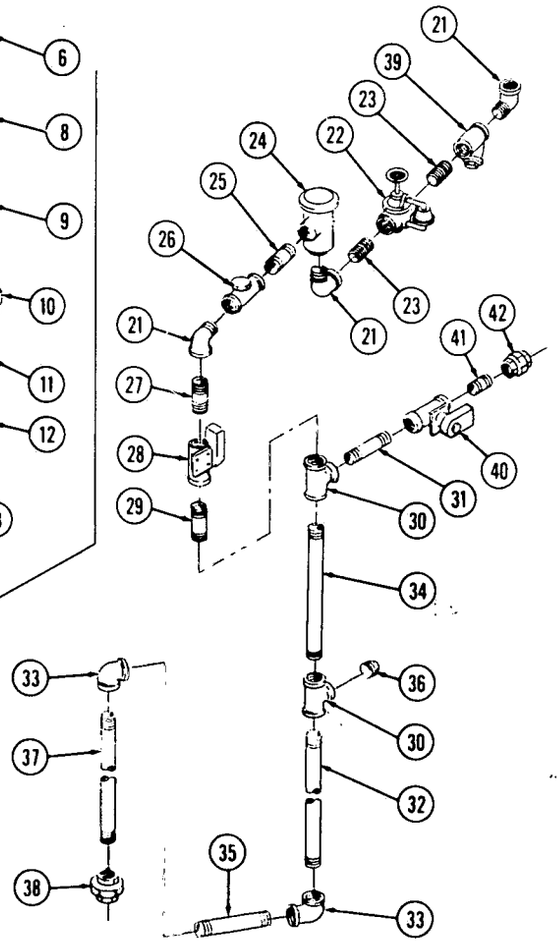


Figure 9-12D. HOT WATER SUPPLY (Units Before 2/84).

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
9-12C-	P	150476	308		STEAM SUPPLY (Units Before 2/84)	X			
1	P	36271	091		NIPPLE, 1-1/2 N.P.T. x 4-3/4 Lg.	1			
2	P	42113	091		STRAINER, Steam, 1-1/2 N.P.T	1			
3	P	29421	091		NIPPLE, 1-1/2 N.P.T. x 4 Lg.	1			
4	P	7559	091		TEE, Pipe, 1-1/2 x 1-1/2 x 1 N.P.T.	1			
5	P	3417	091		PLUG, Pipe, 1 N.P.T.	1			
6	P	41813	091		NIPPLE, 1-1/2 N.P.T. x 6-1/4 Lg.	1			
7	P	3443	091		PLUG, Pipe, 3/4 N.P.T.	1			
8	P	7558	091		TEE, Pipe, 1-1/2 x 1-1/2 x 3/4 N.P.T	1			
9	P	150477	145		NIPPLE, 1-1/2 N.P.T x 6-3/4 Lg.	1			
10	P	5285	091		UNION, 1-1/2 N.P.T.	2			
11	P	29416	091		NIPPLE, 1-1/2 N.P.T. x 2-1/2 Lg.	1			
12	P	7475	091		ELBOW, 1-1/2 N.P.T.	2			
13	P	33738	091		BUSHING, Reducing, 1-1/2 x 1 N.P.T	3			
14	P	32883	091		NIPPLE, 1 N.P.T. x 1-1/2 Lg	2			
15	P	42108	091		VALVE, Solenoid, 1 N.P.T. (V3)	1			
	P	752323	091		• PISTON AND PLUNGER ASSEMBLY	1			
	P	74352	091		• COIL, 110 V	1			
16	P	150477	144		NIPPLE, 1-1/2 N.P.T. x 46-1/2 Lg	1			
17	P	150477	141		COUPLING, Reducing, 1-1/2 x 1 N.P.T	1			
18	P	49982	091		NIPPLE, 1 N.P.T x 10-1/4 Lg.	1			
9-12D-	P	150476	312		HOT WATER SUPPLY (Units Before 2/84)		X		
21	P	1671	091		ELBOW, Street, 90° 1-1/4 N.P.T.		3		
22	P	150476	734		VALVE, Pressure Reducing, 1-1/4 N.P.T.		1		
	P	764320	303		• KIT, Valve Repair		AR		
23	P	150476	980		NIPPLE, 1-1/4 N.P.T. x 1-3/4		1		
24	P	150476	453		BREAKER, Vacuum, 1-1/4 N.P.T.		1		
25	P	150476	979		NIPPLE, 1-1/4 N.P.T. x 2-1/2		1		
26	P	43520	091		VALVE, Swing Check, 1-1/4 N.P.T.		1		
	P	49320	091		• DISC, Viton "A"		1		
27	P	150476	973		NIPPLE, 1-1/4 N.P.T. x 2		1		
28	P	150476	181		VALVE, Solenoid, 1-1/4 N.P.T. (V2)		1		
	P	764315	487		• REPAIR KIT		1		
	P	764315	478		• COIL, 110 V		1		
29	P	150476	978		NIPPLE, 1-1/4 N.P.T. x 5-1/4		1		
30	P	150476	965		TEE, Pipe, 1-1/4 x 1-1/4 x 3/4 N.P.T. C.T.		2		
31	P	150476	977		NIPPLE, 3/4 N.P.T. x 3-1/4		1		
32	P	150476	975		NIPPLE, 1-1/4 N.P.T. x 38-1/4		1		
33	P	150476	964		ELBOW, 90° 1-1/4 N.P.T.		2		
34	P	150476	972		NIPPLE, 1-1/4 N.P.T. x 15-1/4		1		
35	P	150476	974		NIPPLE, 1-1/4 N.P.T. x 9-3/4		1		
36	P	150477	058		PLUG, Pipe, 3/4 N.P.T.		1		
37	P	150476	968		NIPPLE, 1-1/4 N.P.T. x 31-1/2		1		
38	P	150476	967		UNION, 1-1/4 N.P.T.		1		
39	P	42107	091		STRAINER, 1-1/4 N.P.T.		1		
40	P	150476	183		VALVE, Solenoid, 3/4 N.P.T.		1		
	P	764315	491		• KIT, Valve Repair		AR		
	P	764072	002		• COIL		AR		
41	P	150476	976		NIPPLE, 3/4 N.P.T. x 1-1/2		1		
42	P	150476	966		UNION, 3/4 N.P.T.		1		

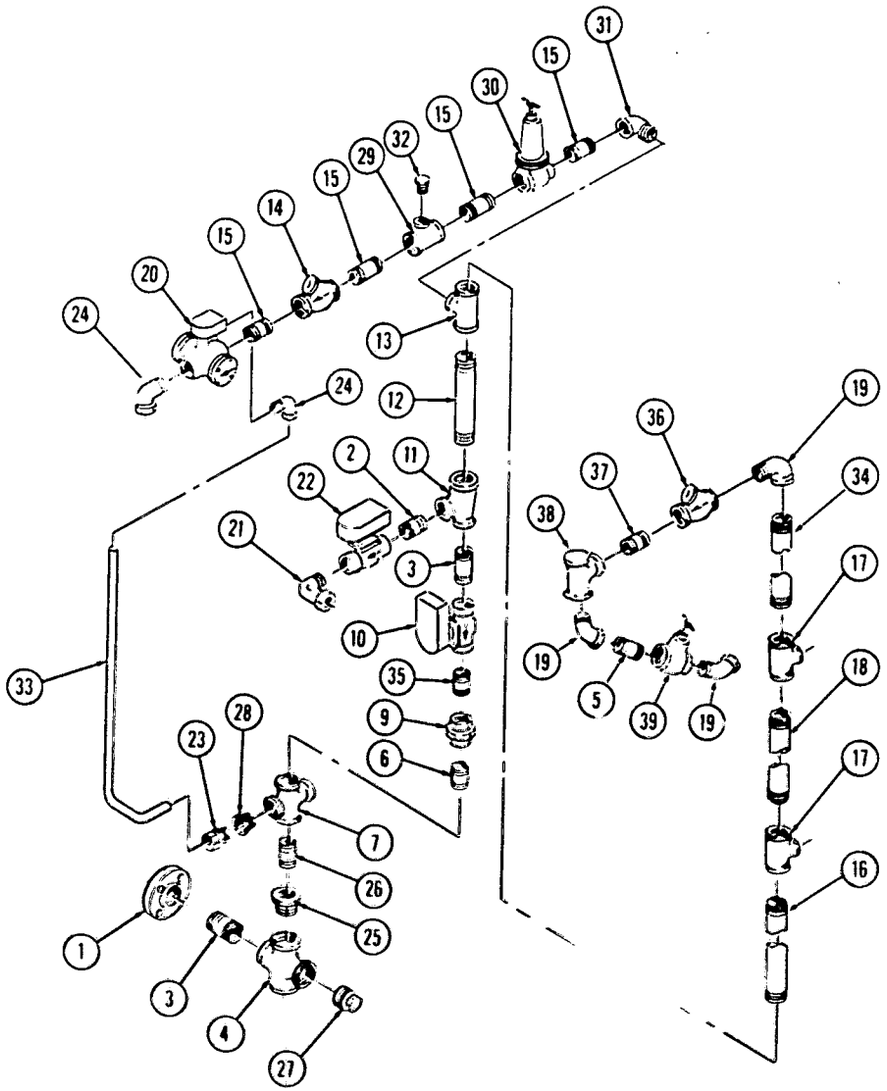


Figure 9-12E. COLD WATER INLET AND SUPPLY (Units After 2/84).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-12E-					COLD WATER INLET AND SUPPLY (Units After 2/84)	X
1	P	150476	982		FLANGE, Threaded, 2 NPT	1
2	P	150476	991		NIPPLE, 1/2 NPT x 1-1/2 Long	1
3	P	150476	992		NIPPLE, 2 NPT x 3 Long	1
4	P	150476	987		CROSS, Pipe, 2 NPT	1
5	P	150477	151		NIPPLE, 1 NPT x 1-1/2 Long	1
6	P	150476	976		NIPPLE, 3/4 NPT x 1-1 2 Long	1
7	P	150477	056		CROSS, Pipe, 3/4 NPT	1
8	P	150476	993		NIPPLE, 3/4 NPT x 2 Long	1
9	P	150476	966		UNION, 3/4 NPT	1
10	P	150476	183		VALVE, Solenoid, 3/4 NPT	1
11	P	150476	988		TEE, Pipe, 1 x 3/4 x 1/2	1
12	P	150476	994		NIPPLE, 1 NPT x 7 Long	1
13	P	150476	989		TEE, Pipe, 1 x 1 x 3/8	1
14	P	9424	091		VALVE, Check, 3/8 NPT	1
15	P	150476	995		NIPPLE, 3/8 x 1-1/2 Long	4
16	P	150476	996		NIPPLE, 1 NPT x 14-1 2 Long	1
17	P	150476	990		TEE, Pipe, 1 x 1 x 3/4	2
18	P	150476	997		NIPPLE, 1 NPT x 35-7 8 Long	1
19	P	1673	091		ELBOW, Street, 1 NPT	3
20	P	150476	175		VALVE, Solenoid, 3 8 NPT, 3 Way	1
21	P	81063	001		ELBOW, 90°, 1/2 OD x 1/2 NPT	1
22	P	150476	177		VALVE, Solenoid, 1/2 NPT	1
23	P	81059	001		CONNECTOR, Male, 1/2 ODT x 1/2 NPT	1
24	P	81062	091		ELBOW, Male, 1/2 ODT x 3/8 NPT	2
25	P	150476	986		REDUCER, Bushing, 2 NPT x 3/4 NPT	1
26	P	150476	998		NIPPLE, 3/4 NPT x 1-1/4 Long	1
27	P	150476	984		PLUG, Pipe, 2 NPT	1
28	P	150476	985		BUSHING, Reducing, 3/4 NPT x 1/2 NPT	1
	P	150477	043		TEE, 3/8 x 3/8 x 1/4 NPT	1
30	P	150476	635		VALVE, Pressure Regulating, 3/8 NPT	1
31	P	150477	055		ELBOW, Street, 3/8 NPT	1
32	P	150477	054		PIPE PLUG, 1/4 NPT	1
33					TUBING, Nylon	A/R
34	P	150477	288		NIPPLE, 1/4 NPT x 22 Long	1
35	P	150476	983		NIPPLE, RESTRICTOR	1
36	P	43101	091		VALVE, Swing Check, 1/4 NPT	1
37	P	150477	149		NIPPLE, 1/4 NPT x 2 Long	2
38	P	51797	091		VACUUM BREAKER, 1/4 NPT	1
39	P	150476	733		VALVE, Pressure Reducing, 1/4 NPT	1

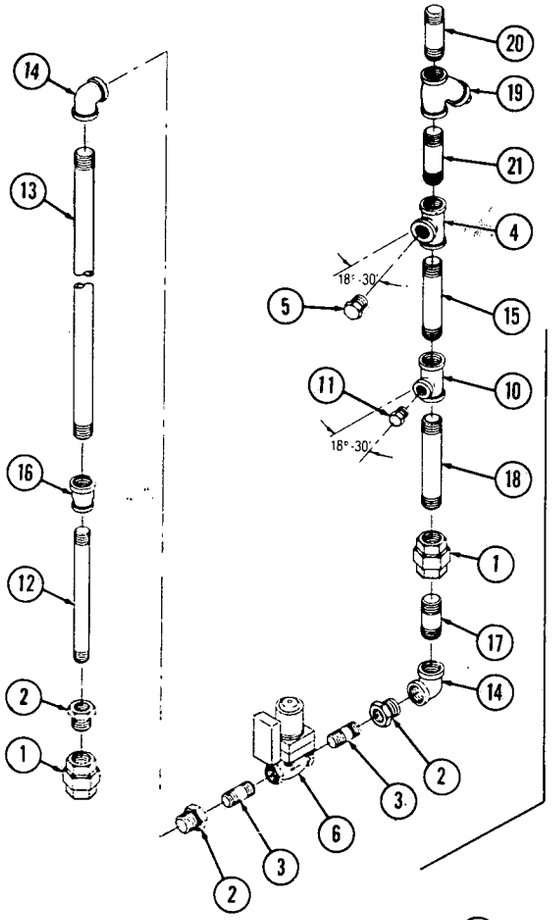


Figure 9-12F. STEAM SUPPLY (Units After 2/84).

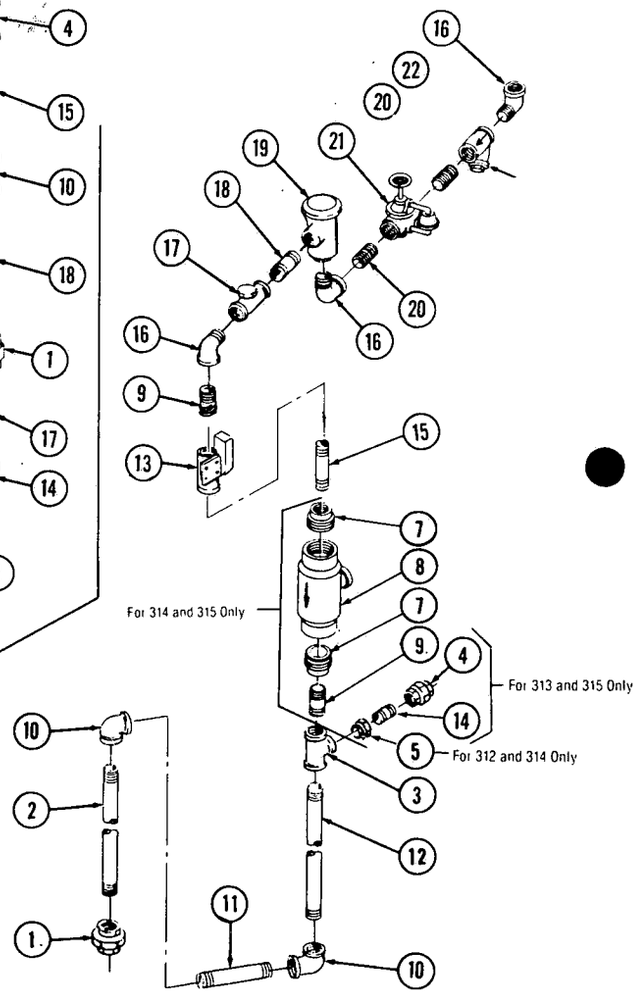


Figure 9-12G. HOT WATER SUPPLY (Units After 2/84).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-12F-					STEAM SUPPLY (Units After 2/84)	X			
1	P	5285	091		UNION, 1-1/2 NPT	2			
2	P	33738	091		BUSHING, Reducing, 1-1/2 NPT x 1 NPT	3			
3	P	32891	001		NIPPLE, 1 NPT x 3-1/2 Long	2			
4	P	7559	091		TEE, Pipe, 1-1/2 x 1-1/2 x 1 NPT	1			
5	P	3417	091		PLUG, Pipe, 1 NPT	1			
6	P	42108	091		VALVE, Solenoid, 1 NPT	1			
7	P	23345	091		BOX, Junction	1			
8	P	23346	091		COVER, Box	1			
9	P	91702	091		NIPPLE, Chase	1			
10	P	7558	091		TEE, 1-1/2 NPT x 1-1/2 NPT x 3/4 NPT	1			
11	P	3443	091		PLUG, Pipe, 3/4 NPT	1			
12	P	49982	091		NIPPLE, 1 NPT x 10-1/4 Long	1			
13	P	150477	291		NIPPLE, 1-1/2 NPT x 37-1/2 Long	1			
14	P	7475	091		ELBOW, 1-1/2 NPT	2			
15	P	150477	289		NIPPLE, 1-1/2 NPT x 5-3/4 Long	1			
16	P	150477	141		COUPLING, Reducing, 1-1/2 x 1 NPT	1			
17	P	29416	091		NIPPLE, 1-1/2 NPT x 2-1/2 Long	1			
18	P	150477	145		NIPPLE, 1-1/2 NPT x 6-3/4 Long	1			
19	P	42113	091		STRAINER, Steam, 1-1/2 NPT	1			
20	P	36271	091		NIPPLE, 1-1/2 NPT x 4-3/4 Long	1			
21	P	29421	091		NIPPLE, 1-1/2 NPT x 4 Long	1			
9-12G-					HOT WATER SUPPLY (Units After 2/84)	X			
					HOT WATER SUPPLY, With Sanitized Steam (Units After 2/84)		X		
					HOT WATER SUPPLY, With Steam Heater (Units After 2/84)			X	
					HOT WATER SUPPLY, With Steam Heater and Sanitized Steam (Units After 2/84)			X	
1	P	150476	967		UNION, 1-1/4 NPT	1	1	1	1
2	P	150477	285		NIPPLE, 1-1/4 NPT x 31 Long	1	1	1	1
3	P	150476	965		TEE, Pipe, 1-1/4 x 1-1/4 x 3/4 NPT	1	1	1	1
4	P	150476	966		UNION, 3/4 NPT		1		1
5	P	150477	053		PLUG, Pipe, 3/4 NPT	1		1	
6	P	150477	283		NIPPLE, 1-1/4 NPT x 19-1/4 Long	1	1		
7	P	150476	258		BUSHING, Reducer, 3 NPT x 1-1/4 NPT			2	2
8	P	150476	155		HEATER, Steam			1	1
9	P	150476	973		NIPPLE, 1-1/4 NPT x 2 Long	1	1	3	3
10	P	150476	964		ELBOW, 90°, 1-1/4 NPT	2	2	2	2
11	P	150477	282		NIPPLE, 1-1/4 NPT x 9 Long	1	1	1	1
12	P	150477	284		NIPPLE, 1-1/4 NPT x 30-1/8 Long	1	1	1	1
13	P	150476	181		VALVE, Solenoid, 1-1/4 NPT	1	1	1	1
14	P	150477	280		NIPPLE, 3/4 NPT x 2-1/4 Long		1		1
15	P	150476	978		NIPPLE, 1-1/4 NPT x 5-1/4 Long	1	1	1	1
16	P	1671	091		ELBOW, Street 90°, 1-1/4 NPT	3	3	3	3
17	P	43520	091		VALVE, Swing Check, 1-1/4 NPT	1	1	1	1
18	P	150476	979		NIPPLE, 1-1/4 NPT x 2-1/2 Long	1	1	1	1
19	P	150476	453		BREAKER, Vacuum, 1-1/4 NPT	1	1	1	1
20	P	150476	980		NIPPLE, 1-1/4 NPT x 1-3/4 Long	2	2	2	2
21	P	150476	734		VALVE, Pressure Reducing, 1-1/4 NPT	1	1	1	1
22	P	42107	091		STRAINER, 1-1/4 NPT	1	1	1	1

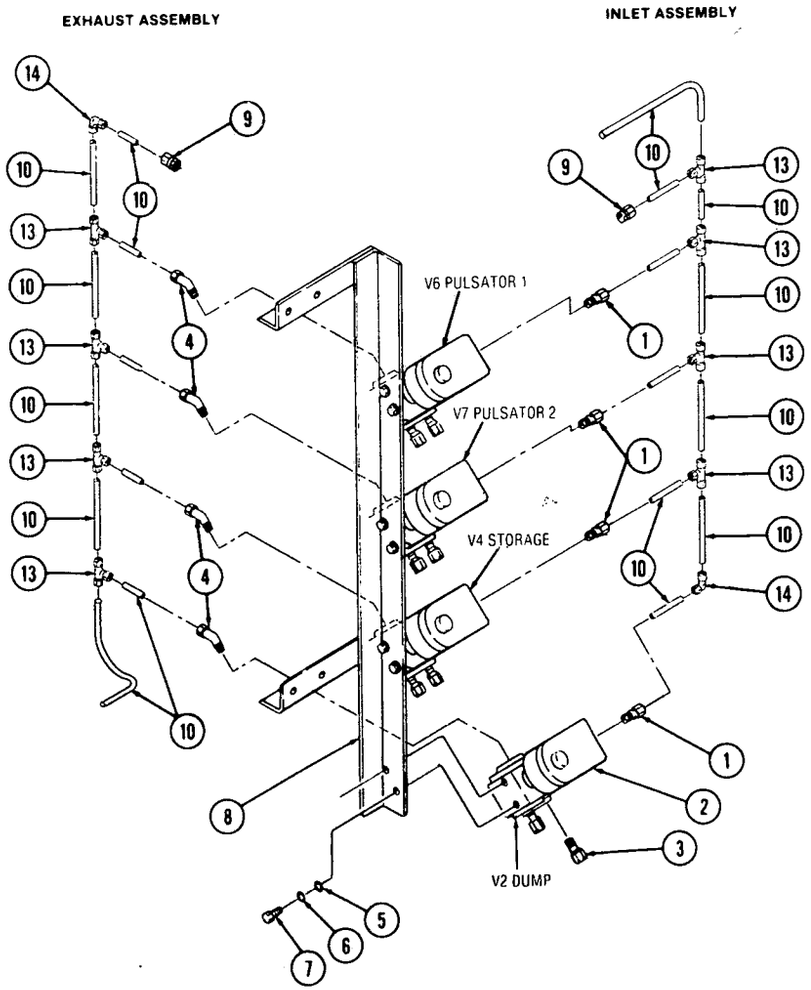


Figure 9-13. VALVE ACTUATOR ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-13-	P	150476 335		VALVE ACTUATOR ASSEMBLY	X
1	P	150476 454		CONNECTOR, Male, 1/2 O.D.T. x 1/4 N.P.T.	4
2	P	150476 176		VALVE, Solenoid, 1/4 N.P.T. (V2, V4, V6, V7)	4
	P	764315 479		• REPAIR KIT	1
	P	764315 480		• COIL, 110 V.	1
3	P	78292 091		CONNECTOR, Male, 3/8 O.D.T. x 1/4 N.P.T.	8
4	P	150476 463		ELL, 45°, 1/2 O.D.T. x 1/4 N.P.T.	4
5	P	150473 295		WASHER, Flat	8
6	P	19686 061		WASHER, Lock	8
7	P	150473 154		SCREW, Hex Head, 1/4-20 x 3/8	8
8	P	150476 457		VALVE BRACKET ASSEMBLY	1
9	P	150476 461		CAP, Tubing, 1/2 O.D.T.	2
10	R	3500 817		TUBING, Nylon #11, 1/2 O.D.T. x .062 Wall	A.R
11				NOT USED	
12				NOT USED	
13	P	150476 455		TEE, 1/2 O.D.T. x 1/2 N.P.T.	8
14	P	150476 456		ELBOW, 1/2 O.D.T.	2

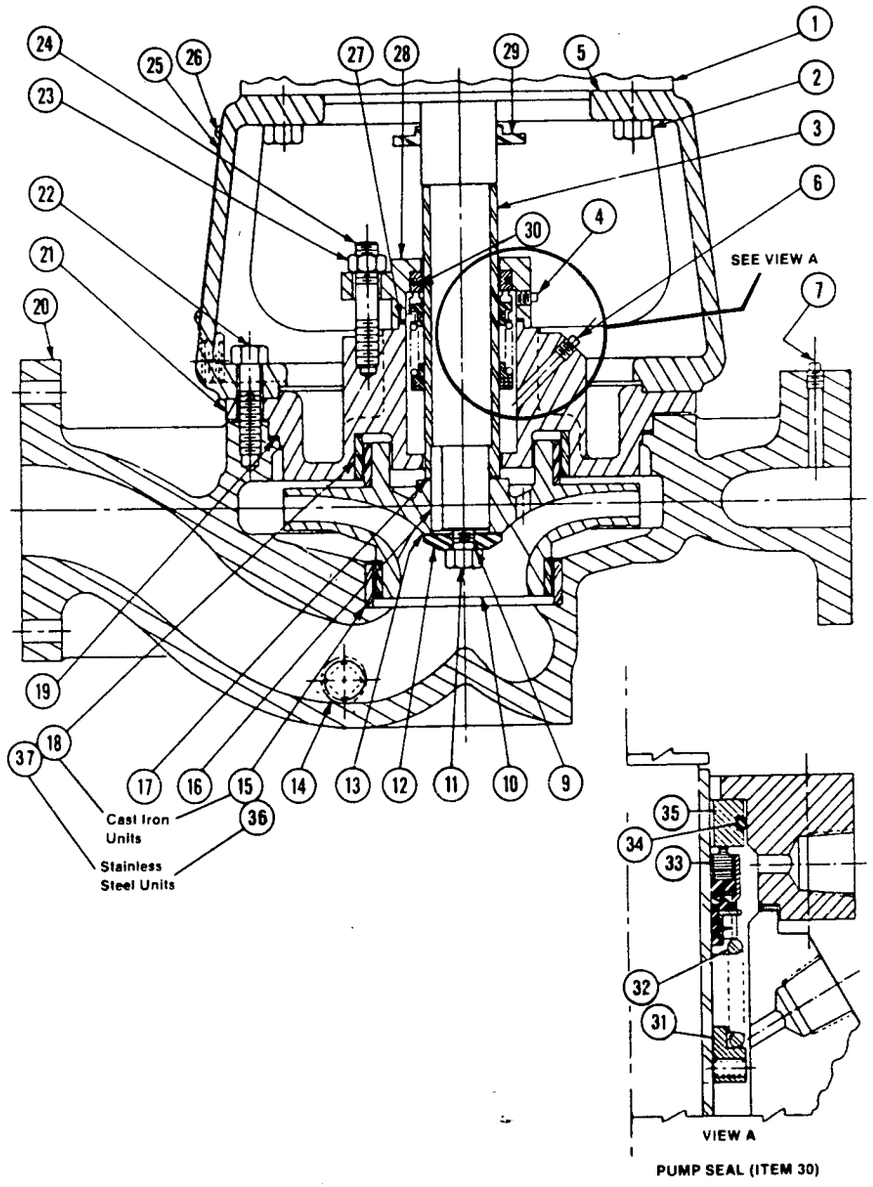


Figure 9-14. PUMP AND MOTOR ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-14-	P 150475 946		PUMP AND MOTOR ASSEMBLY: Cast Iron, 208 V.	X			
	P 150475 568		PUMP AND MOTOR ASSEMBLY: Cast Iron, 230/460 V.		X		
	P 150475 947		PUMP AND MOTOR ASSEMBLY: Stainless Steel*, 208 V.			X	
	P 150475 948		PUMP AND MOTOR ASSEMBLY: Stainless Steel*, 230/460 V.				X
	P 755715 050		KIT, Pump Repair (Cast Iron Only) (Incl. items 3, 9, 11, 13, 15, 17, 18, 19)	A/R	A/R		
1	P 764316 164		MOTOR, 208 V.	1		1	
	P 755715 049		MOTOR, 230/460 V.		1		1
2			SCREW, Cap				
3	P 755715 053		SLEEVE, Shaft (0094633)	1	1	1	1
4			PLUG, Pipe				
5			ADAPTER	1	1	1	1
6			PLUG, Pipe				
7			PLUG, Pipe				
8			NOT USED				
9	P 755715 061		"O" RING, Impeller Screw (0068365)	1	1	1	1
10	P 764319 410		IMPELLER, Cast Iron (66934)	1	1		
	P 764319 411		IMPELLER, Stainless Steel (66946)			1	1
11	P 755715 054		SCREW, Impeller (0053315)	1	1	1	1
12	P 755715 060		WASHER, Impeller (0068347)	1	1	1	1
13	P 755715 056		GASKET, Impeller Washer (0068363)	1	1	1	1
14			PLUG, Pipe				
15	P 755715 051		WEAR RING, Casing (0068090) C.I. Only	1	1		
16			KEY, Impeller	1	1	1	1
17	P 755715 057		GASKET, Shaft (0068367)	1	1	1	1
18	P 755715 055		WEAR RING, Packing Box (0068144) C.I. Only	1	1		
19	P 755715 058		GASKET, Casing (0088148)	1	1	1	1
20			CASING, Cast Iron (w/plugs 72443)	1	1		
			CASING, Stainless Steel (w/plugs 72445)			1	1
21			COVER, Packing Box	1	1	1	1
22			SCREW, Cap				
23			NUT, Hex				
24			STUD, Gland				
25			NAMEPLATE	1	1	1	1
26			SCREW, Drive	1	1	1	1
27	P 755715 059		GASKET, Gland Seal (66338)	1	1	1	1
28			GLAND, Seal	1	1	1	1
29			DEFLECTOR	1	1	1	1
30	P 755715 062		SEAL MECHANISM (0078883)	1	1	1	1
31			• SPRING HOLDER	1			
32			• SPRING	1			
33			• CARBON SEAL ASSEMBLY	1			
34			• SEAT RING	1			
35			• SEAT	1			
36	P 764319 506		WEAR RING, Casing (0068086) S.S Only			1	1
37	P 764319 507		WEAR RING, Packing Box (0068140) S.S. Only			1	1

*NOTE: Stainless steel pumps are furnished with Cage and Rack Washers which have the acid/neutralize prewash option.

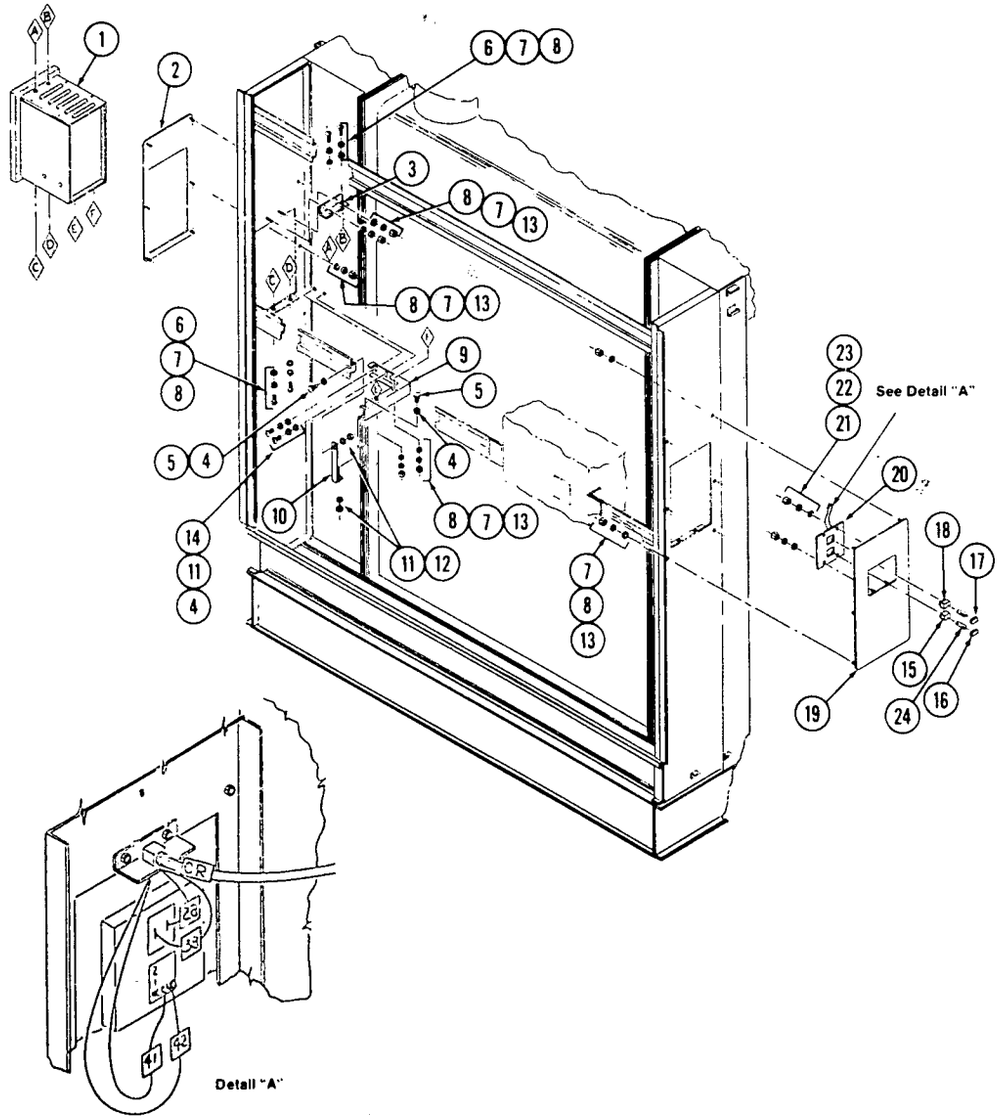


Figure 9-15. MOUNTING ARRANGEMENT: Controls.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
9-15-			MOUNTING ARRANGEMENT: Controls, HCW	X				
			MOUNTING ARRANGEMENT: Controls, CRW		X			
1	P 150475 961		ASSEMBLY, Control, HCW	1				
	P 150475 960		ASSEMBLY, Control, CRW		1			
2	P 150475 975		ASSEMBLY, Front Panel	1				
	P 150475 930		ASSEMBLY, Front Panel		1			
3	P 150475 921		BRACKET, Top Mounting	1	1			
4	P 150473 295		WASHER, Flat, 1/4	4	4			
5	P 150349 001		BOLT, Hex Head, 1/4-20 x 3/4	2	2			
6	P 150473 162		SCREW, Truss Head, Slotted, #10-32 x 3/8	2	2			
7	P 19685 061		WASHER, Lock, #10	18	18			
8	P 150473 301		WASHER, Flat, #10	18	18			
9	P 150475 927		SUPPORT, Control	1	1			
10	P 150476 606		STRAP, Control Box	1	1			
11	P 19686 061		WASHER, Lock, 1/4	4	4			
12	P 76239 061		NUT, Hex, 1/4-20	2	2			
13	P 150475 630		NUT, Hex, #10-32	14	14			
14	P 150473 156		SCREW, Truss Head, Slotted, 1/4-20 x 1/2	2	2			
15	P 150475 968		SWITCH, Pushbutton	1	1			
16	P 150475 943		LENS, Pushbutton	1	1			
17	P 150475 942		LENS, Indicator	1	1			
18	P 150475 969		INDICATOR	1	1			
19	P 150475 996		ASSEMBLY, Rear Panel, Pulstar 2000	1				
	P 150475 922		ASSEMBLY, Rear Panel, Pulstar 3000		1			
20	P 150475 973		PANEL, Display, Rear Control	1	1			
21	P 150475 631		NUT, Hex, #8-32	4	4			
22	P 19690 061		WASHER, Lock, #8	4	4			
23	P 150473 302		WASHER, Flat, #8	4	4			
24	P 150475 972		BULB, 28V, Wedge Base	2	2			

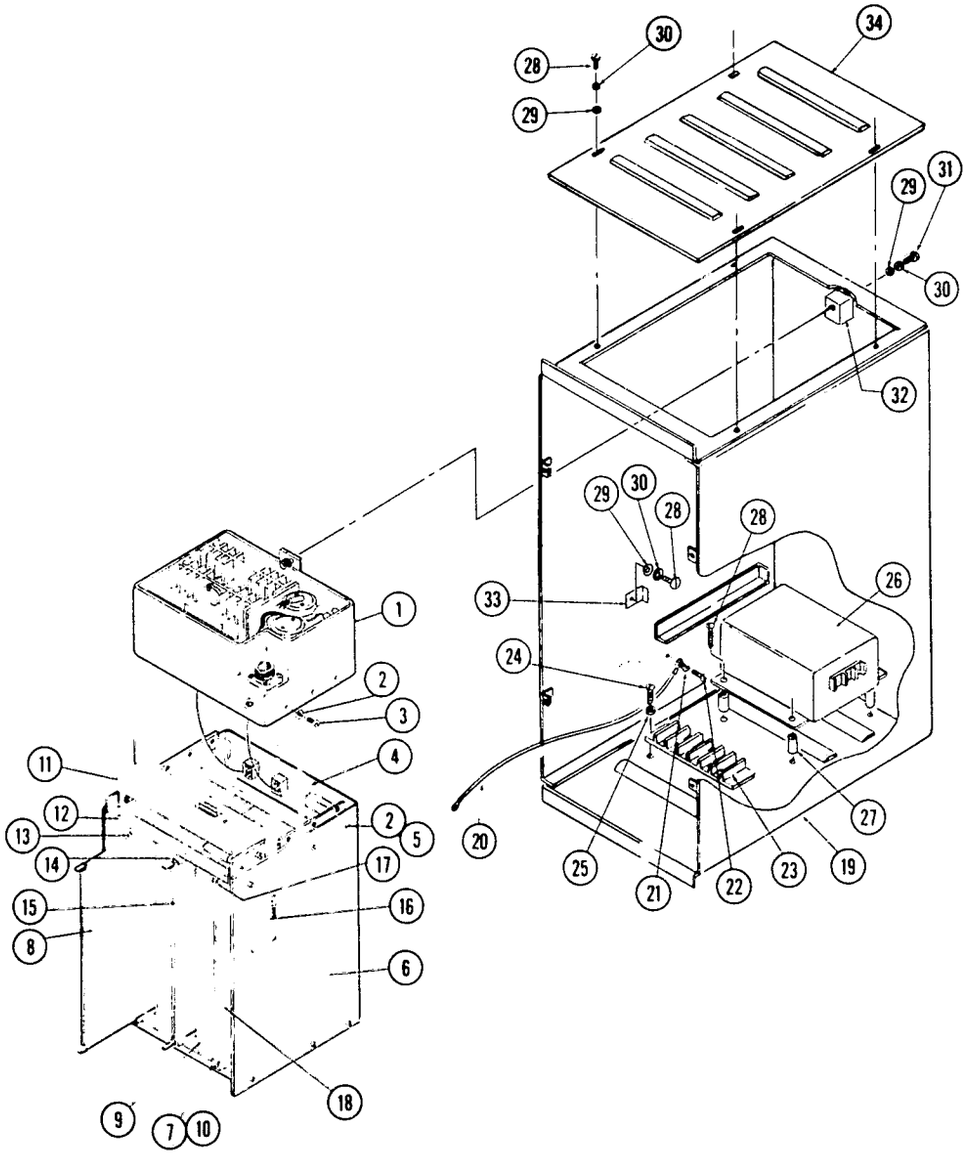


Figure 9-16. MAIN CONTROL ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-16-					MAIN CONTROL ASSEMBLY	X
1	P	146402	001		POWER SUPPLY ASSEMBLY (Repaired P-764193-004)	1
	P	82924	003		• FUSE, 3 Amp, 125 V (F401)	A/R
	P	129352	019		• FUSE, 3 Amp, 250 V (F402)	A/R
2	P	84116	002		LOCKWASHER, #6	22
3	P	40357	045		SCREW, Self Tapping, #6 x 1/4	10
4	P	760244	004		MOTHER BOARD ASSEMBLY (Repaired P-764193-009)	1
5	P	84117	002		SCREW, Pan Head, #6-32 x 5/16	12
6	P	93762	001		CHASSIS	1
7	P	84225	001		GUIDE, Card	6
8	P	146586	002		PC CARD, 1 (Repaired P-764193-020) (Units Before 2/84)	1
	P	146586	008		PC CARD, 1 (Repaired P-764193-041) (Units After 2/84)	1
9	P	84467	001		PLATE, Side	2
10	P	84226	001		TAB, Locking	9
11	P	136714	001		RECEPTACLE BRACKET ASSEMBLY	1
12	P	129030	001		BAR, PC Board, Guide	4
13	P	83528	001		TAB, ID Locking	1
14	P	83528	007		TAB, ID Locking	1
15	P	146588	002		PC CARD, 2 (Repaired P-764193-021) (Units Before 2/84)	1
	P	146588	008		PC CARD, 1 (Repaired P-764193-042) (Units After 2/84)	1
16	P	129352	050		PLATE, Identification	1
17	P	83528	008		TAB, ID Locking	1
18	P	146590	001		PC CARD, 3 (Repaired P-764193-003)	1
19	P	150475	940		HOUSING	1
20	P	150476	377		CABLE ASSEMBLY	2
21	P	90991	091		WASHER, Lock, #8	6
22	P	3967	041		SCREW, Round Head Slotted, #8-32 x 1/4	4
23	P	89174	091		BLOCK, Terminal, Phenolic, 6 Contact (TB-9)	1
24	P	3960	041		SCREW, Round Head, Slotted, #6-32 x 1/2	2
25	P	18131	045		WASHER, Lock, #6	14
26	P	93821	001		FILTER, Electric Line	1
27	P	150475	924		SPACER, #10-32	4
28	P	74308	061		SCREW, Truss Head	11
29	P	150473	301		WASHER, Flat, #10	8
30	P	31705	045		WASHER, Lock, #10	8
31	P	150475	587		SCREW, Hex Head, #10-32 x 3/8	1
32	P	150475	976		BLOCK, Mounting	1
33	P	150476	608		CLIP, Retaining	2
34	P	150476	605		COVER, Louvered	1

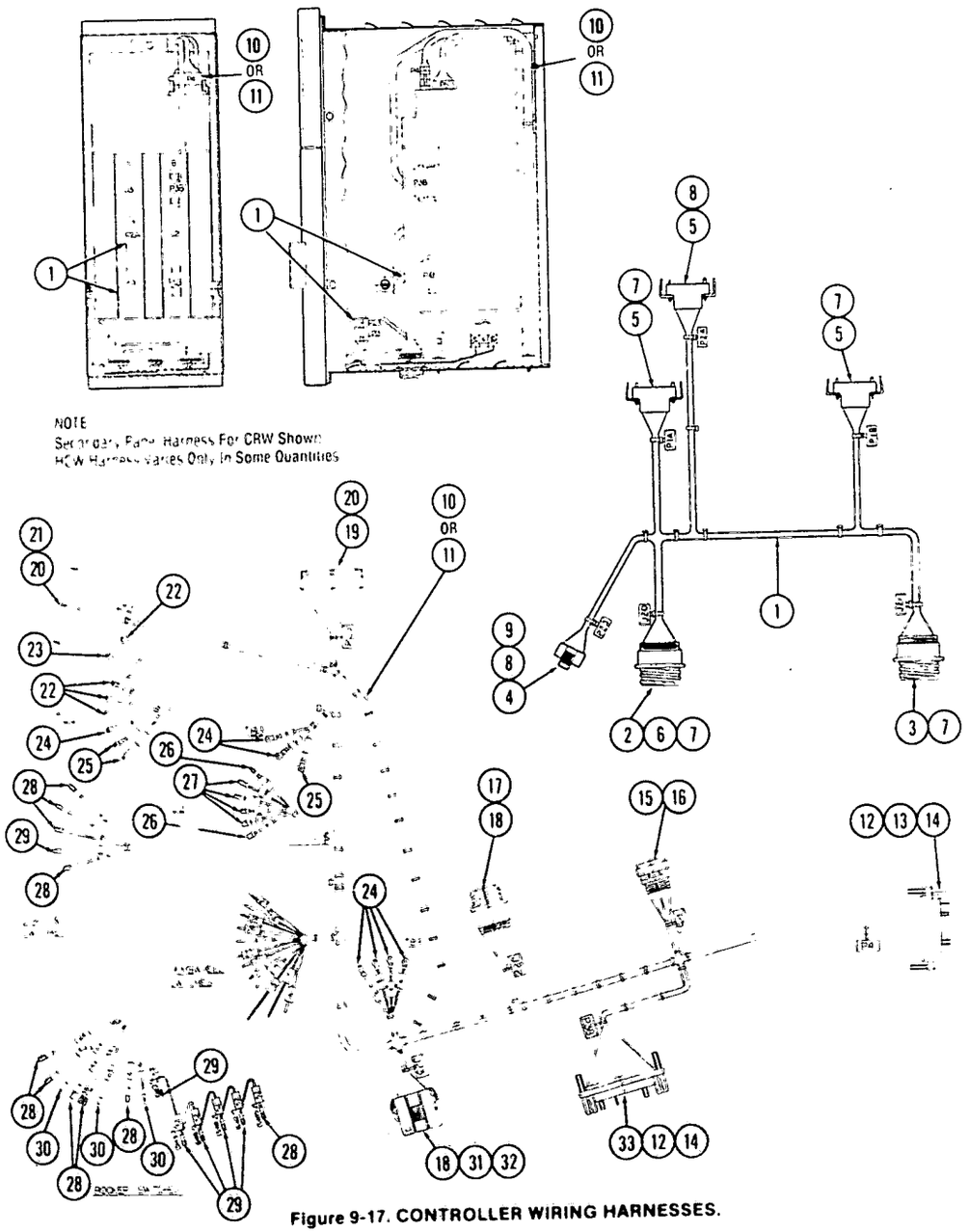


Figure 9-17. CONTROLLER WIRING HARNESSES.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
9-17-					CONTROLLER WIRING HARNESS				
					Cage and Rack Washer (50, 42)	X			
					Hospital Cart Washer (34)		X		
1	P	150475	993		HARNESS ASSEMBLY, Wiring	1	1		
2	P	93443	003		• RECEPTACLE, J20 (37 position)	1	1		
3	P	93443	004		• RECEPTACLE, J21 (24 position)	1	1		
4	P	93896	046		• PLUG, P23 (18 position)	1	1		
5	P	93829	001		• BLOCK ASSEMBLY, P1A, P1B, P2A (20 position)	3	3		
6	P	150822	043		• CONTACT PIN, J20	5	5		
7	P	150822	031		• CONTACT PIN, J20, P1A, P1B, J21	63	63		
8	P	84461	004		• CONTACT SOCKET, P2A, P23	19	19		
9	P	84198	004		• CONTACT SOCKET, P23	5	5		
10	P	150475	693		HARNESS ASSEMBLY, Secondary Panel		1		
11	P	150475	964		HARNESS ASSEMBLY, Secondary Panel	1			
12	P	84192	001		• JACKSCREW, Female, P38, P4	4	4		
13	P	84205	002		• HOUSING, Pin, P4 (38 position)	1	1		
14	P	84207	002		• CONTACT, Pin, P3B, P4	47	43		
15	P	93838	001		• PLUG, P5 (9 position)	1	1		
16	P	84198	004		• SOCKET, Contact, P5	5	5		
17	P	93443	002		• HOUSING, Receptacle, J22 (16 position)	1	1		
18	P	150822	029		• CONTACT, Pin, J22, J23	21	21		
19	P	84229	005		• HOUSING, Receptacle, P25 (24 position)	1	1		
20	P	84187	003		• CONTACT, Receptacle, P16, P25	38	38		
21	P	84229	001		• HOUSING, Receptacle, P16 (30 position)	1	1		
22	P	90619	091		• RECEPTACLE, #6 Stud x 22-18 Wire	8	8		
23	P	14865	091		• TERMINAL, #8 Stud x 22-18 Wire	1	1		
24	P	14590	091		• TERMINAL, #6 Stud x 16-14 Wire	8	8		
25	P	129278	001		• TERMINAL, #6 Stud x 24 Wire	4	3		
26	P	32119	091		• RECEPTACLE, 1/4 Lug x 16-14 Wire	2	2		
27	P	90695	091		• RECEPTACLE, 1/4 Lug x 22-18 Wire	4	4		
28	P	150475	977		• TERMINAL, 1/8 Lug x 26-24 Wire	11	11		
29	P	150475	978		• TERMINAL, 1/8 Lug x 22-18 Wire	8	8		
30	P	150475	647		• WIRE CAP, Spare	3	0		
31	P	93895	045		• HOUSING, Receptacle J23 (18 position)	1	1		
32	P	150822	043		• CONTACT, Pin, J23	6	6		
33	P	84205	001		• HOUSING, Pin, P3B (28 position)	1	1		

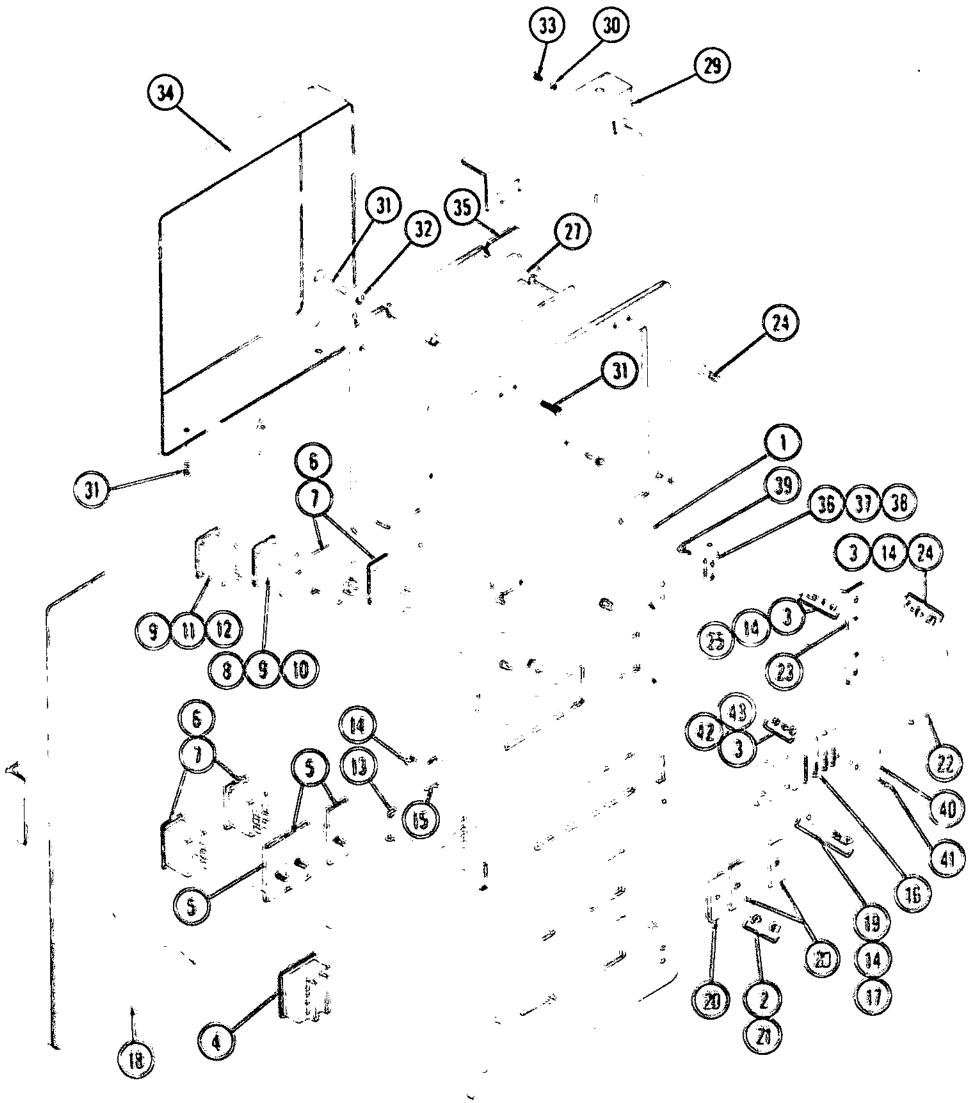


Figure 9-18. PANEL ASSEMBLY: Primary and Secondary, Cage and Rack Washer.

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-18-					PANEL ASSEMBLY Primary and Secondary CRW	X
1	P	150475	936		PANEL Secondary CRW	1
2	P	19690	061		WASHER Lock	8
3	P	5463	041		WASHER Flat #6	7
4	P	136915	002		SWITCH Thumbwheel	4
5	P	150475	945		SPACER ASSEMBLY	3
6	P	150475	956		SWITCH Rocker	4
7	P	150475	955		OPERATOR Rocker	4
8	P	150475	968		SWITCH Pushbutton	1
9	P	150475	972		LAMP 28 Volt	2
10	P	150475	971		LENS	1
11	P	150475	969		INDICATOR	1
12	P	150475	970		LENS "Tank Empty"	1
13	P	150475	014		CATCH Magnetic	2
14	P	19675	041		WASHER Lock #6	7
15	P	86903	002		BUZZER	1
16	P	69174	091		BOARD Terminal 6 Point (TB-3)	1
17	P	3960	041		SCREW Round Head #6-32 x 1 2	2
18	P	150475	912		DOOR ASSEMBLY Secondary	1
19	P	76818	042		WASHER Flat	4
20	P	150475	974		RETAINER Spacer	3
21	P	3038	041		NUT Hex #8-32	3
22	P	150475	991		PROTECTOR Circuit 2 Pole	1
23	P	150475	990		SPACER Mounting	1
24	P	42618	045		SCREW Button Head Soc Cap #6-32 x 1/4	4
25					NOT USED	
26					NOT USED	
27	P	150475	939		SPACER #8-32 Female	4
28					NOT USED	
29	P	150475	981		SUPPORT Primary Panel	1
30	P	96691	091		WASHER Lock #8	2
31	P	150475	962		SCREW Button Head Socket Cap #8-32 x 3/8	10
32	P	17796	091		WASHER 3/8 O.D. x .172 I.D.	4
33	P	3967	041		SCREW Round Head Slotted #8-32 x 1/4	2
34	P	150475	982		PANEL Front	1
35	P	150475	878		PANEL (Replaced P-76479-024)	1
	P	[illegible]	536		* BULB (Box of 10 ea)	A/R
36	P	150475	908		HINGE ASSEMBLY Top	1
37	P	150475	909		HINGE ASSEMBLY Bottom (Not Shown)	1
38	P	150475	913		WASHER	2
39	P	45176	044		SCREW Flat Head Slotted #4-40 x 1/4	4
40	P	129878	001		RESISTOR	1
41	P	90998	091		SCREW Round Head Slotted #4-40 x 3	1
42	P	90713	061		WASHER Lock #4	1
43	P	13794	041		NUT Hex #4-40	1

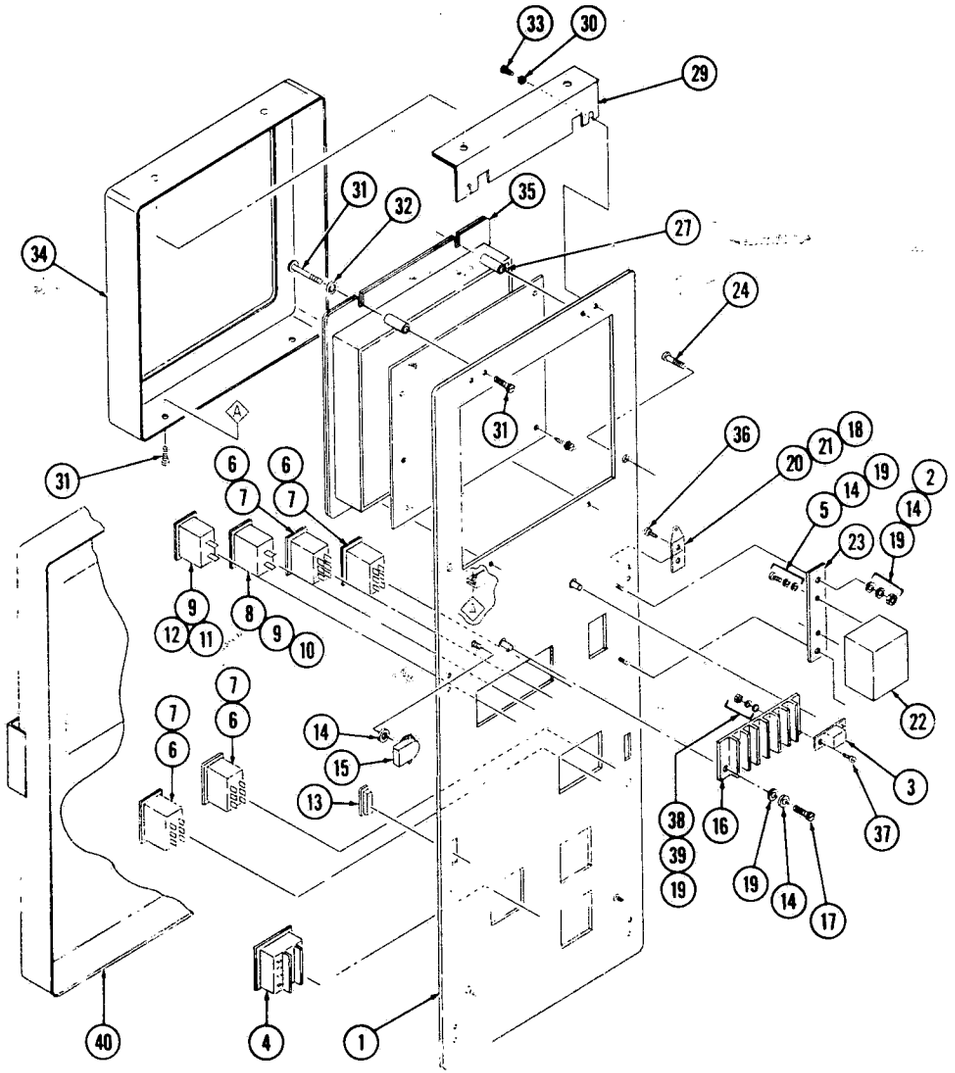


Figure 9-19. PANEL ASSEMBLY: Primary and Secondary, Hospital Cart Washer.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-19-					PANEL ASSEMBLY: Primary and Secondary, HCW	X
1	P	150475	390		PANEL, Secondary, HCW	1
2	P	3037	041		NUT, Hex, #6-32	2
3	P	129318	001		RESISTOR	1
4	P	136315	002		SWITCH, Thumbwheel	3
5	P	3984	041		SCREW, Round Head, #6-32 x 3/8	2
6	P	150475	956		SWITCH, Rocker	4
7	P	150475	955		OPERATOR, Rocker	4
8	P	150475	968		SWITCH, Pushbutton	1
9	P	150475	972		LAMP, 28 Volt	2
10	P	150475	971		LENS	1
11	P	150475	969		INDICATOR	1
12	P	150475	970		LENS, "Tank Empty"	1
13	P	150475	014		CATCH, Magnetic	2
14	P	19675	041		WASHER, Lock #6	7
15	P	83933	002		BUZZER	1
16	P	89174	091		BOARD, Terminal, 6 Point (TB-3)	1
17	P	3960	041		SCREW, Round Head, #6-32 x 1/2	2
18	P	150475	913		WASHER	2
19	P	5469	041		WASHER, #6	7
20	P	150475	908		HINGE ASSEMBLY, Top	1
21	P	150475	909		HINGE ASSEMBLY, Bottom (Not Shown)	1
22	P	150475	991		PROTECTOR, Circuit, 2 Pole	1
23	P	150475	990		SPACER, Mounting	1
24	P	42618	045		SCREW, Button Head, Soc. Cap #6-32 x 1/4	4
25					NOT USED	
26					NOT USED	
27	P	150475	928		SPACER, #8-32, Female	4
28					NOT USED	
29	P	150475	931		SUPPORT, Primary Panel	1
30	P	90991	091		WASHER, Lock, #8	2
31	P	150475	962		SCREW, Button Head Socket Cap, #8-32 x 3/8	10
32	P	17796	091		WASHER, 3/8 O.D. x .172 I.D.	4
33	P	3967	041		SCREW, Round Head Slotted, #8-32 x 1/4	2
34	P	150475	932		PANEL, Front	1
35	P	150475	878		PANEL (Repaired P-764193-024)	1
	P	764317	536		• BULB (Box of 10 ea.)	A/R
36	P	45176	044		SCREW, Flat Head Slotted, #4-40 x 1/4	4
37	P	90993	091		SCREW, Round Head Slotted, #4-40 x 3/4	1
38	P	90713	061		WASHER, Lock, #4	1
39	P	13794	041		NUT, Hex, #4-40	1
40	P	150475	912		DOOR ASSEMBLY, Secondary	1

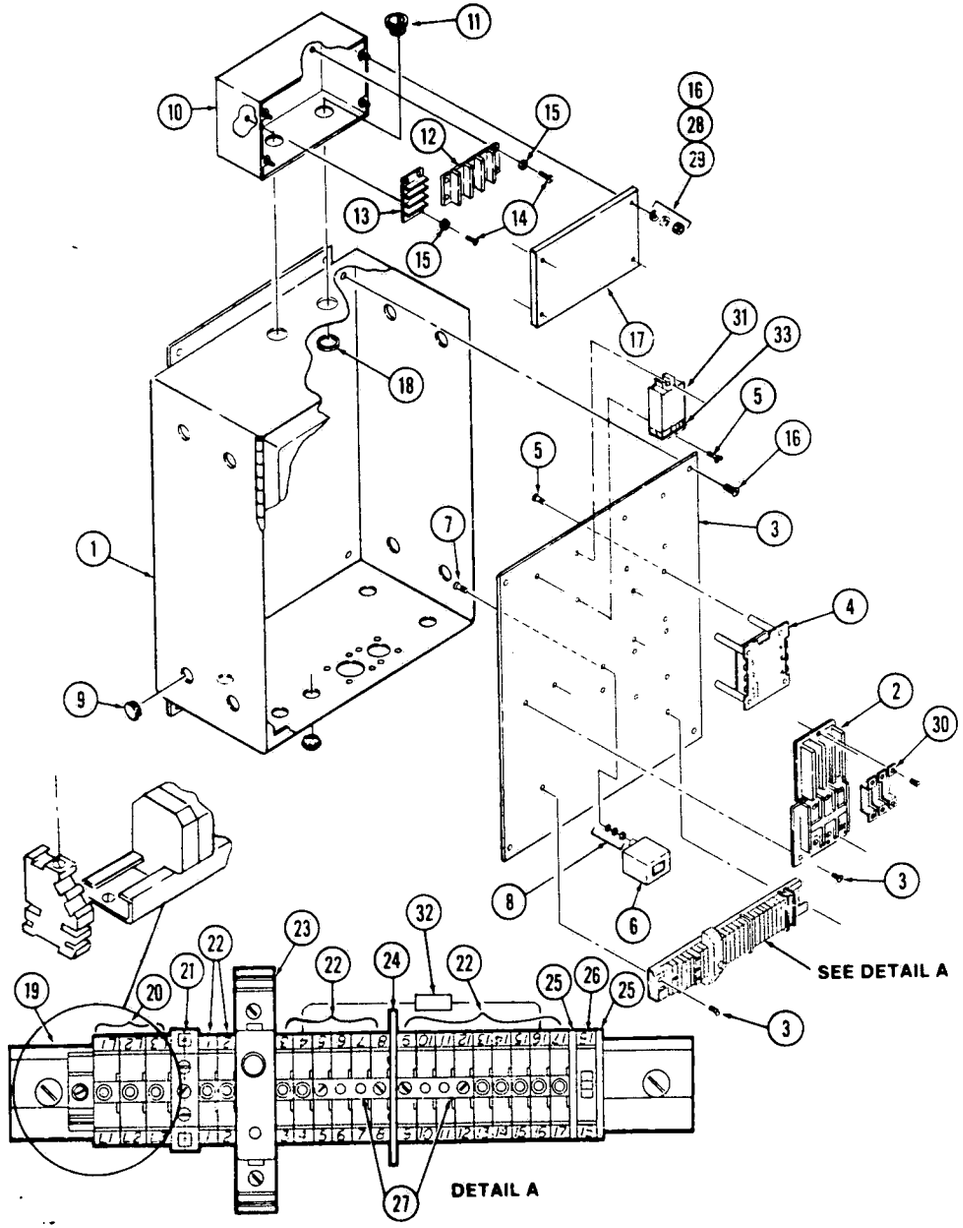
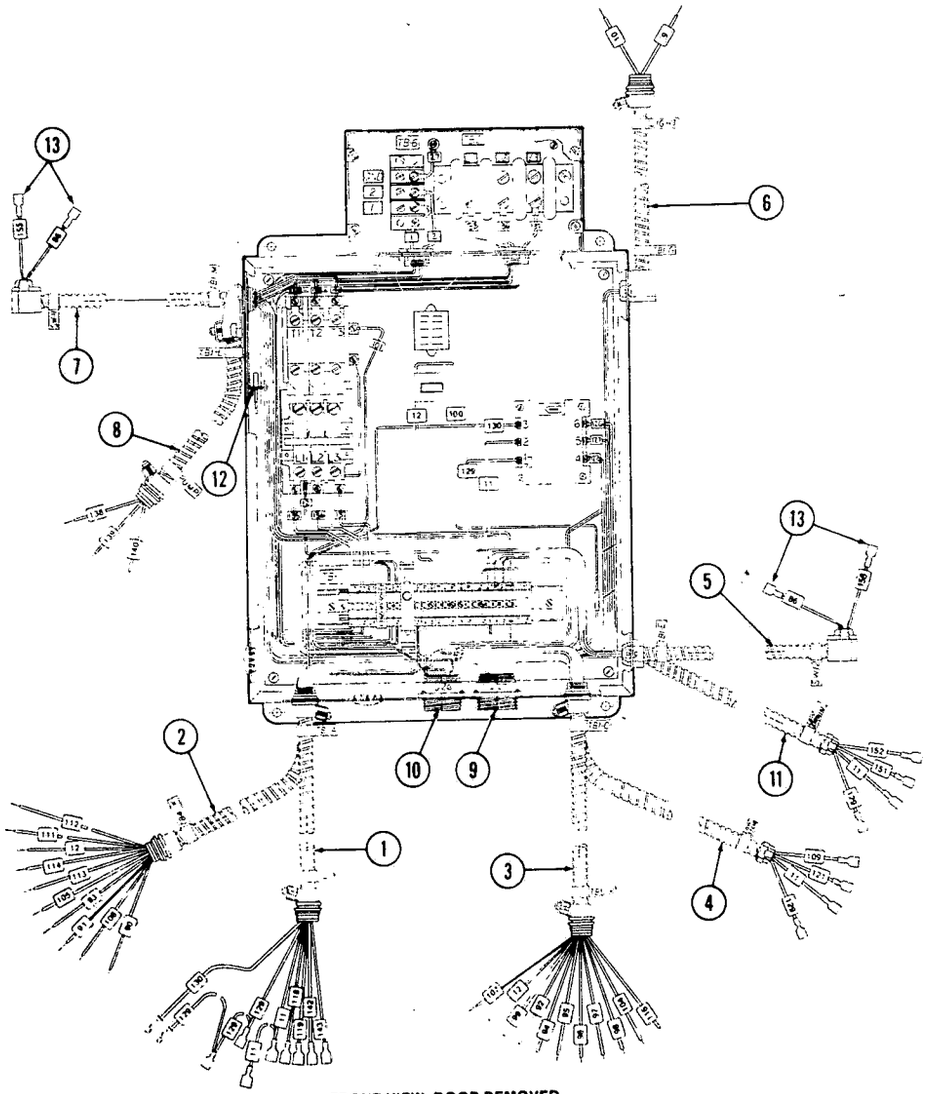


Figure 9-20. TB-1 JUNCTION BOX ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-20-			TB-1 JUNCTION BOX ASSEMBLY	X
1	P 150476 839		PANEL, Enclosure	1
2	P 150474 244		STARTER, Magnetic	1
3	P 33742 041		SCREW, Round Head, #10-24 x 1/4	5
4	P 150475 302		TEMPERATURE CONTROL	1
5	P 12451 041		SCREW, Round Head, #6-32 x 1/4	10
6	P 84362 002		COUNTER	1
7	P 13334 091		SCREW, Round Head, #4-40 x 3/8	2
8	P 42460 091		WASHER, Flat, 3/8 O.D. x 9/64 I.D. x 1/16	6
9	P 24563 091		PLUG, Button	4
10	P 150476 894		BOX	1
11	P 37306 091		NIPPLE, Chase, 3/4	2
12	P 150474 916		BLOCK, Terminal	1
13	P 90746 091		STRIP, Terminal Barrier	1
14	P 10347 091		SCREW, Machine Round Head, #10-32 x 7/8	2
15	P 46115 091		WASHER, Lock, #10	2
16	P 76239 061		NUT, Hex, 1/4-20	4
17	P 79586 001		COVER	1
18	P 2963 091		NUT, Lock, 3/4	2
19	P 150475 888		RAIL	1
20	P 150475 883		SECTION, Terminal Block	3
21	P 150475 884		SECTION, Terminal Block, Ground	1
22	P 150475 882		SECTION, Terminal Block	17
23	P 150475 889		BREAKER, Circuit	1
24	P 150475 887		PLATE, Partition	1
25	P 150475 886		PLATE, End	2
26	P 150475 885		SECTION, Terminal Bloc. Test	1
	P 764317 804		• PIN, Test	1
27	P 150475 890		UNIT, Connecting	2
28	P 19686 061		WASHER, Lock	4
29	P 150473 295		WASHER, Flat	4
30			PUMP MOTOR STARTER HEATERS: Acc. to Motor Voltage	
	P 150476 441		• HEATER, 200 V	3
	P 150476 440		• HEATER, 230 V	3
	P 150476 437		• HEATER, 460 V	3
31	P 150477 168		RELAY, 3 PDT	1
32	P 413716 518		SUPRESSOR, Surge	1
33	P 129357 049		TERMINAL	9



FRONT VIEW, DOOR REMOVED

Figure 9-21. TB-1 CABLE ASSEMBLIES.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-21-				TB-1 CABLE ASSEMBLIES	X
1	P	150476 430		CABLE ASSEMBLY: High/Low Water Sensors, Wash Tank, and Temperature Probe	1
2	P	150476 421		CABLE ASSEMBLY: TB4 Junction Box	1
3	P	150476 408		CABLE ASSEMBLY: TB5 Junction Box	1
4	P	150476 411		CABLE ASSEMBLY: Low Water, Storage Tank	1
5	P	150476 425		CABLE ASSEMBLY: Rear Door Switch (Optional)	1
6	P	150476 426		CABLE ASSEMBLY: Light	1
7	P	150476 424		CABLE ASSEMBLY: Front Door Switch	1
8	P	150476 403		CABLE ASSEMBLY: Pump	1
9	P	93443 004		RECEPTACLE: 16 Pin	1
10	P	93443 006		RECEPTACLE: 37 Pin	1
11	P	150476 498		CABLE ASSEMBLY: Low Water Sensor, Drain Tank	1
12	P	150476 792		BRACKET, Test Pin	1
13	P	91694 091		CONNECTOR	4

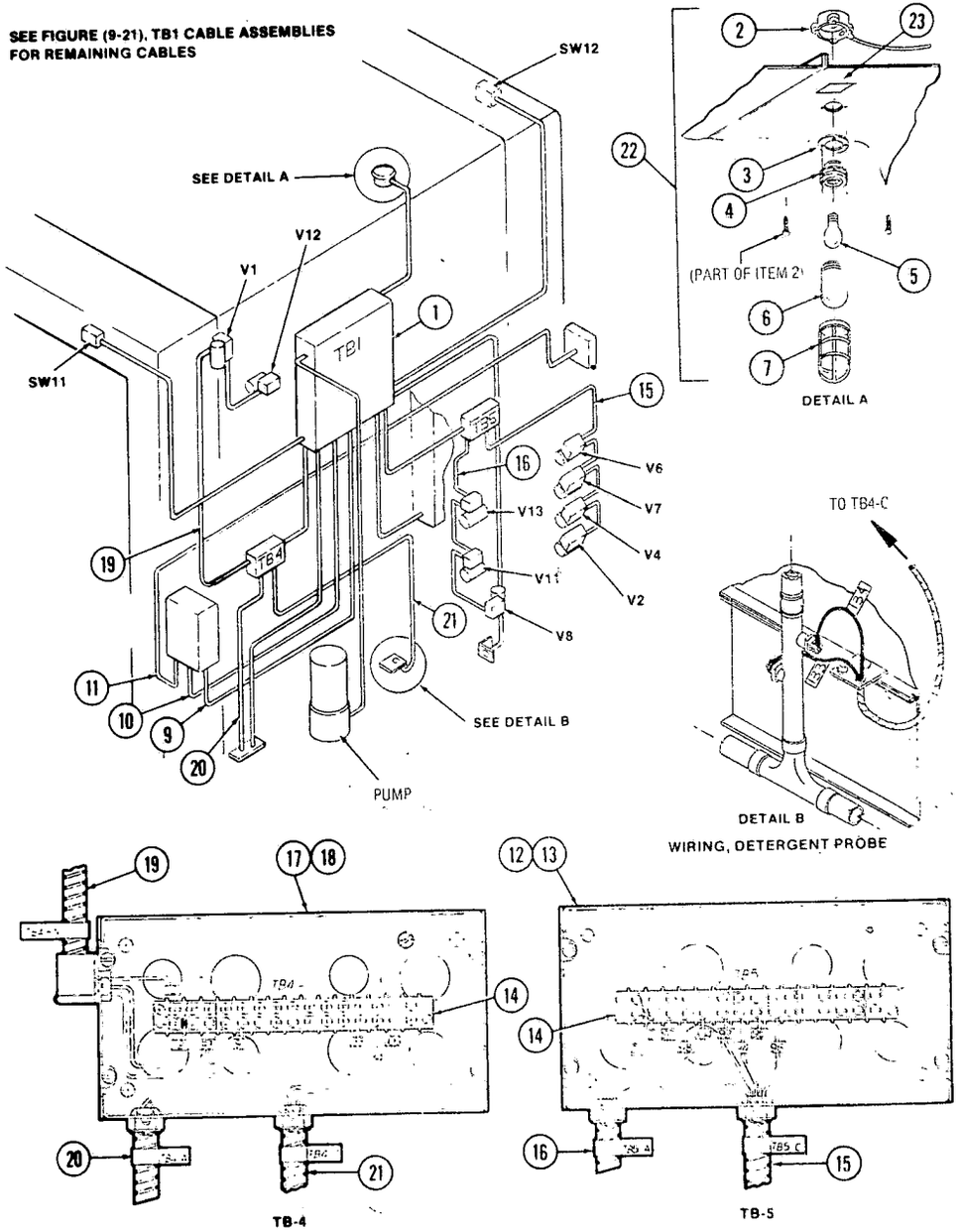


Figure 9-22. WIRING ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-22-			WIRING ASSEMBLY	X
1			TB-1 JUNCTION BOX	1
2	P 150475 751		COMPARTMENT, Wiring	1
3	P 150475 752		GASKET, Junction Box	1
4			LAMPHOLDER, Shockproof	1
5	P 150475 258		BULB, 100 Watt	1
6	P 150475 761		GLOBE, Glass	1
7	P 150475 762		GUARD	2
8	P 150476 443		BRACKET, Mounting	1
9	P 150476 417		CABLE, Interconnect "A" (J20 on control to J26 on TB-1)	1
10	P 150476 420		CABLE, Interconnect "B" (J21 on control to J27 on TB-1)	1
11	P 150476 445		CABLE, Interconnect "D" (J22 on control to rear control/display)	1
12	P 150476 429		BOX	1
13	P 79586 001		COVER	1
14	P 150476 422		TERMINAL STRIP, 15 Position	2
15	P 150476 407		CABLE ASSEMBLY (TB-5 to V6, V7, V4, V2)	1
16	P 150476 402		CABLE ASSEMBLY (TB-5 to V13, V11, V8)	1
17	P 150476 429		BOX	1
18	P 79586 001		COVER	1
19	P 150476 427		CABLE ASSEMBLY (TB-4 to V1, V12)	1
20	P 150476 401		CABLE ASSEMBLY (TB-4 to V3)	1
21	P 150476 406		CABLE ASSEMBLY (TB-4 to Detergent Probe)	1
22	P 150477 296		LAMP ASSEMBLY (Includes items 2-7)	1
23	P 150784 001		DECAL, Caution: Electrical Shock Hazard	1

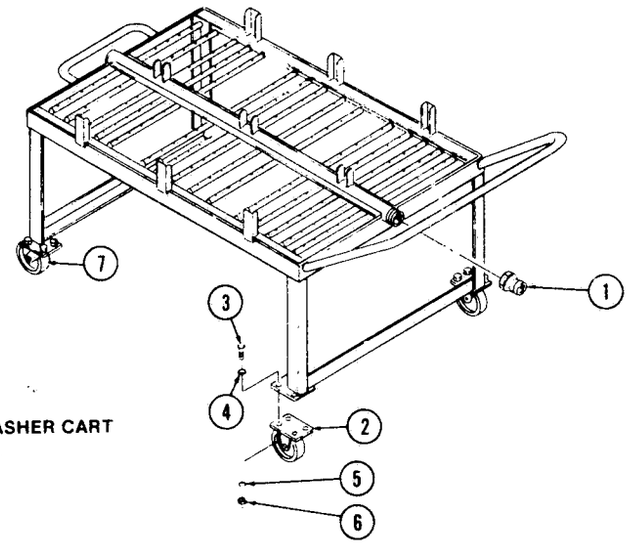


Figure 9-23. BOTTLE WASHER CART ASSEMBLY.

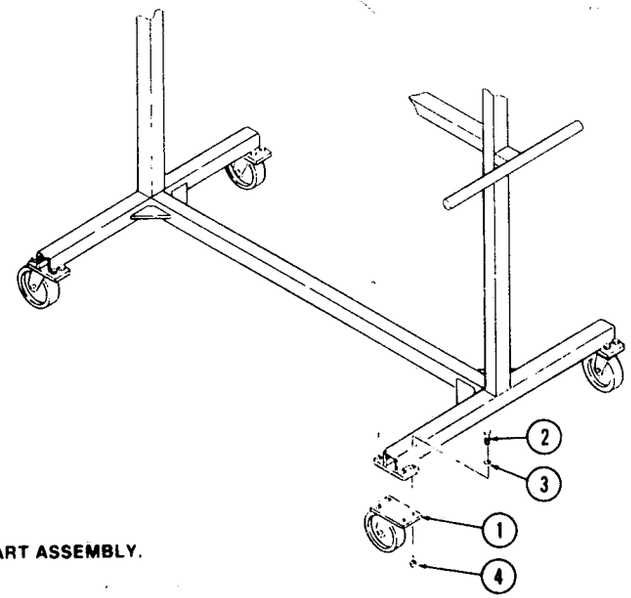


Figure 9-24. CART ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-23-					LOADING CART ASSEMBLY	X
1	P	150477	042		COUPLING, Adapter "A", "Evertite", 1-1/2 N.P.T.	1
2	P	422781	002		CASTER, Rigid, 6 Wheel	2
3	P	150475	586		BOLT, Hex Head Cap, 5/16-18 x 1	16
4	P	150473	296		WASHER, Plain	16
5	P	19691	061		WASHER, Lock	16
6	P	36545	061		NUT, Hex, 5/16-18	16
7	P	422782	002		CASTER, Swivel, 6 Wheel	2
9-24-					CART ASSEMBLY	X
1	P	422782	002		CASTER, Swivel	4
2	P	150475	586		BOLT, Hex Head Cap, 5/16-18 x 1	16
3	P	150473	297		WASHER, Flat, 5/16	16
4	P	36545	061		NUT, Hex, 5/16-18	16

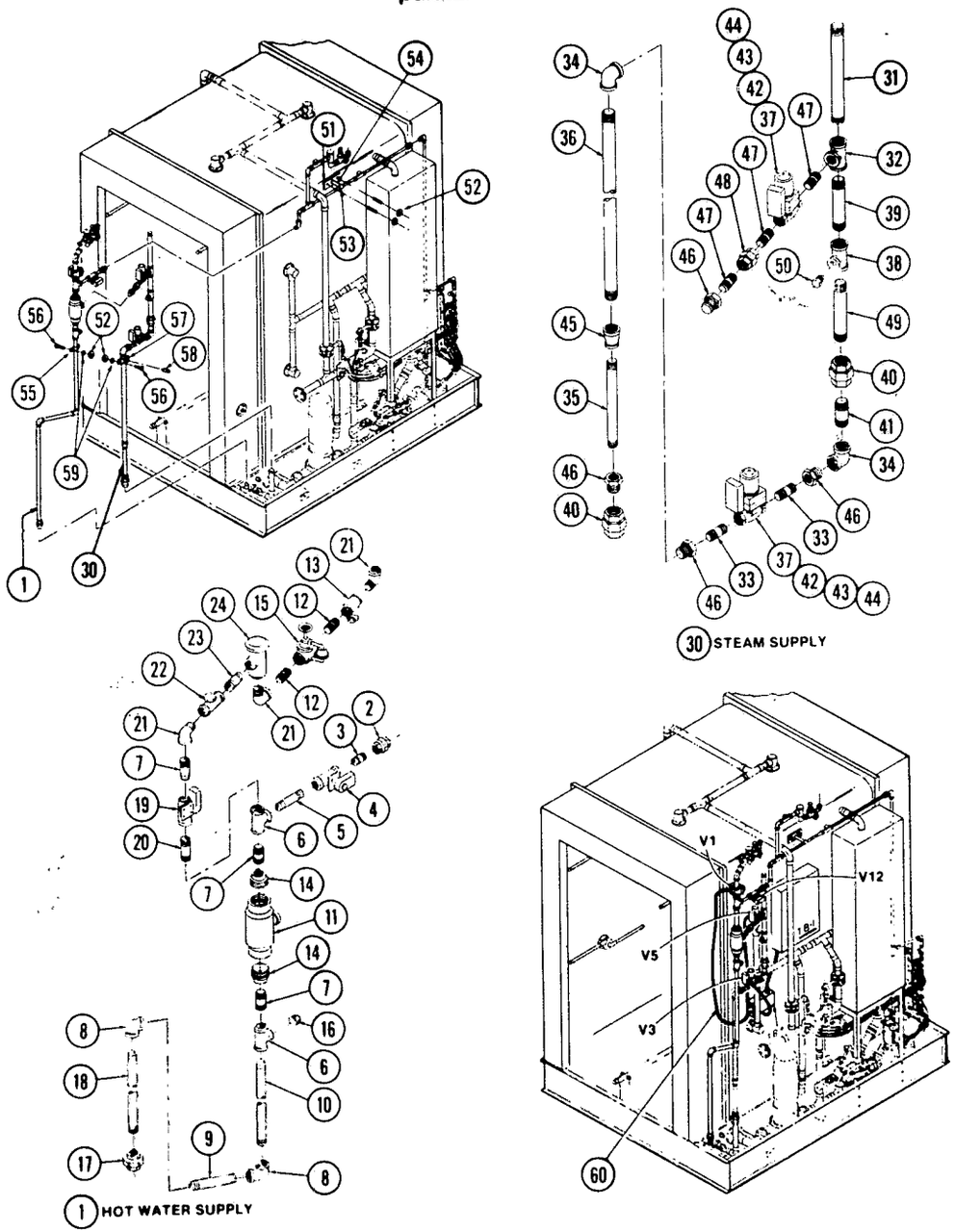


Figure 9-25. WATER TEMPERATURE BOOSTER OPTION.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-25-	P	150476	546		WATER TEMPERATURE BOOSTER OPTION	X
1	P	150476	314		SUPPLY, Hot Water	1
2	P	150476	966		• UNION, 3/4 N.P.T.	1
3	P	150476	976		• NIPPLE, 3/4 N.P.T. x 1-1/2	1
4	P	150476	183		• VALVE, Solenoid, 3/4 N.P.T.	1
	P	764315	491		• • REPAIR KIT	1
	P	764315	478		• • COIL, 110 V	1
5	P	150476	977		• NIPPLE, 3/4 N.P.T. x 3-1/4	1
6	P	150476	965		• TEE, 1-1/4 x 1-1/4 x 3/4 N.P.T.	2
7	P	150476	973		• NIPPLE, 1-1/4 N.P.T. x 2	3
8	P	150476	964		• ELBOW, 1-1/4 N.P.T.	2
9	P	150476	974		• NIPPLE, 1-1/4 N.P.T. x 9-3/4	1
10	P	150476	975		• NIPPLE, 1-1/4 N.P.T. x 38-1/4	1
11	P	150476	155		• HEATER, Steam	1
12	P	150476	980		• NIPPLE, 1-1/4 N.P.T. x 1-3/4	2
13	P	42107	091		• STRAINER, 1-1/4 N.P.T.	1
14	P	150476	258		• BUSHING, Reducing, 3 x 1-1/4 N.P.T.	2
15	P	150476	734		• VALVE, Pressure Reducing, 1-1/4 N.P.T.	1
	P	764320	303		• • REPAIR KIT	A/R
16	P	150477	053		• PLUG, Pipe, 3/4 N.P.T.	1
17	P	150476	967		• UNION, 1-1/4 N.P.T.	1
18	P	150476	968		• NIPPLE, 1-1/4 N.P.T. x 31-1/2	1
19	P	150476	181		• VALVE, Solenoid, 1-1/4 N.P.T.	1
	P	764315	487		• • REPAIR KIT	1
	P	764315	478		• • COIL, 110 V	1
20	P	150476	978		• NIPPLE, 1-1/4 N.P.T. x 5-1/4	1
21	P	1671	091		• ELL, Street, 1-1/4 N.P.T.	3
22	P	43520	091		• VALVE, Swing Check, 1-1/4 N.P.T.	1
	P	49320	091		• • DISC, Viton "A"	1
23	P	150476	979		• NIPPLE, 1-1/4 N.P.T. x 2-1/2	1
24	P	150476	453		• VACUUM BREAKER, 1-1/4 N.P.T.	1
30	P	150476	311		SUPPLY, Steam	1
31	P	150476	861		• NIPPLE, 1-1/2 N.P.T., 13-3/4	1
32	P	7559	091		• TEE, 1-1/2 N.P.T. x 1-1/2 N.P.T. x 1 N.P.T.	1
33	P	32891	001		• NIPPLE, 1 N.P.T. x 3-1/2	2
34	P	7475	091		• ELL, 1-1/2 N.P.T.	2
35	P	49982	091		• NIPPLE, 1 N.P.T. x 10-1/4	1
36	P	150477	144		• NIPPLE, 1-1/2 N.P.T. x 46-1/2	1
37	P	42108	091		• VALVE, Solenoid, 1 N.P.T.	2
	P	752323	091		• • PISTON AND PLUNGER ASSEMBLY	1
	P	74352	091		• • COIL, 110 V	1
38	P	7558	091		• TEE, 1-1/2 x 1-1/2 x 3/4 N.P.T.	1
39	P	41813	091		• NIPPLE, 1-1/2 N.P.T. x 6-1/4	1
40	P	5285	091		• UNION, 1-1/2 N.P.T.	2
41	P	29416	091		• NIPPLE, 1-1/2 N.P.T. x 2-1/2	1
42	P	23345	091		• BOX, Junction	2
43	P	23346	091		• COVER, Box	2
44	P	91702	091		• CHASE, Nipple	2
45	P	150477	141		• COUPLING, Reducing, 1-1/2 N.P.T. to 1 N.P.T.	1
46	P	33738	091		• BUSHING, Reducing, 1-1/2 N.P.T. x 1 N.P.T.	4

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-25-47	P 32885 091		• NIPPLE, 1 N.P.T. x 2	3
48	P 5283 091		• UNION, Female, 1 N.P.T.	1
49	P 150477 145		• NIPPLE, 1-1/2 N.P.T. x 6-3/4	1
50	P 3443 091		• PLUG, Pipe, 3/4 N.P.T.	1
51	P 9613 091		SUPPORT, Pipe	1
52	P 76239 061		NUT, 1/4-20	6
53	P 39591 010		CLAMP, Pipe, 1	1
54	P 150474 973		NIPPLE, 1/4 x 4-1/4	1
55	P 10332 091		CLAMP, Pipe, 1-1/4	1
56	P 3848 091		SCREW	4
57	P 10333 091		CLAMP, Pipe, 1-1/2	1
58	P 150474 972		NIPPLE, 1/4 x 2-3/8	1
59	P 19678 091		WASHER, Lock, 1/4	4
60	P 150476 416		CABLE ASSEMBLY, Steam Heater	1

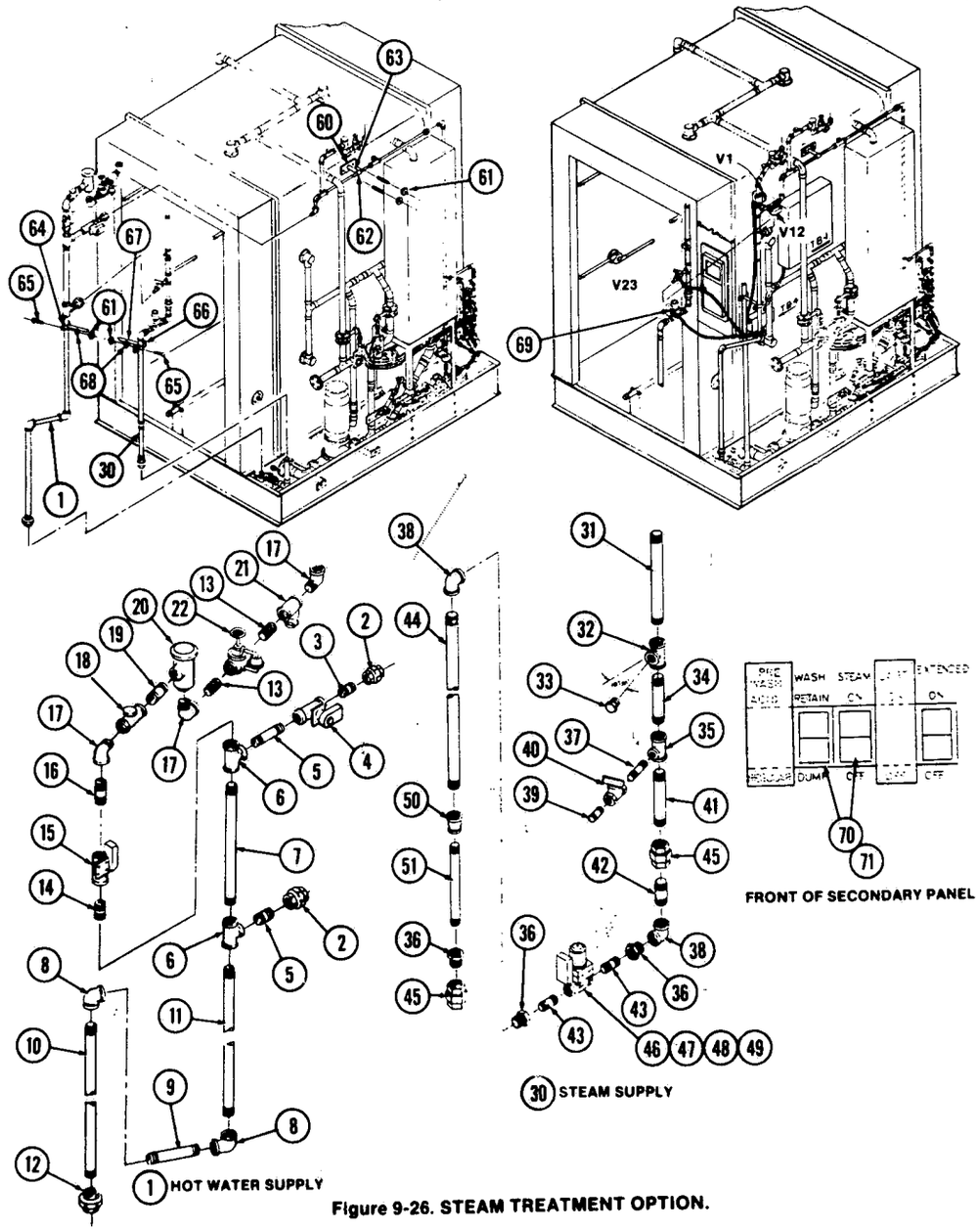


Figure 9-26. STEAM TREATMENT OPTION.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-26-	P 150476 545		STEAM TREATMENT OPTION	X
1	P 150476 313		HOT WATER SUPPLY	1
2	P 150476 966		• UNION, 3/4 N.P.T.	2
3	P 150476 976		• NIPPLE, 3/4 N.P.T. x 1-1/2	1
4	P 150476 183		• VALVE, Solenoid, 3/4 N.P.T.	1
	P 764315 491		• • REPAIR KIT	1
	P 764315 478		• • COIL, 110 V	1
5	P 150476 977		• NIPPLE, 3/4 N.P.T. x 3-1/4	2
6	P 150476 965		• TEE, 1-1/4 x 1-1/4 x 3/4 N.P.T.	2
7	P 150476 972		• NIPPLE, 1-1/4 N.P.T. x 15-1/4	1
8	P 150476 964		• ELBOW, 1-1/4 N.P.T.	2
9	P 150476 974		• NIPPLE, 1-1/4 N.P.T. x 9-3/4	1
10	P 150476 968		• NIPPLE, 1-1/4 N.P.T. x 31-1/2	1
11	P 150476 975		• NIPPLE, 1-1/4 N.P.T. x 38-1/4	1
12	P 150476 967		• UNION, 1-1/4 N.P.T.	1
13	P 150476 980		• NIPPLE, 1-1/4 N.P.T. x 1-3/4	2
14	P 150476 978		• NIPPLE, 1-1/4 N.P.T. x 5-1/4	1
15	P 150476 181		• VALVE, Solenoid, 1-1/4 N.P.T.	1
	P 764315 487		• • REPAIR KIT	1
	P 764315 478		• • COIL, 110 V	1
16	P 150476 973		• NIPPLE, 1-1/4 N.P.T. x 2	1
17	P 1671 091		• ELL, Street, 1-1/4 N.P.T	3
18	P 43520 091		• VALVE, Swing Check, 1-1/4 N.P.T.	1
	P 49320 091		• • DISC, Viton "A"	1
19	P 150476 979		• NIPPLE, 1-1/4 N.P.T. x 2-1/2	1
20	P 150476 453		• VACUUM BREAKER	1
21	P 42107 091		• STRAINER, 1-1/4 N.P.T.	1
22	P 150476 734		• VALVE, Pressure Reducing, 1-1/4 N.P.T.	1
	P 764320 303		• • REPAIR KIT	A/R
30	P 150476 309		STEAM SUPPLY	1
31	P 150476 861		• NIPPLE, 1-1/2 N.P.T. x 13-3/4	1
32	P 7559 091		• TEE, 1-1/2 N.P.T. x 1-1/2 N.P.T. x 1 N.P.T.	1
33	P 3417 091		• PLUG, 1 N.P.T.	1
34	P 41813 091		• NIPPLE, 1-1/2 N.P.T. x 6-1/4	1
35	P 7558 091		• TEE, 1-1/2 x 1-1/2 x 3/4 N.P.T.	3
36	P 33738 091		• BUSHING, Reducer, 1-1/2 N.P.T. x 1 N.P.T.	1
37	P 32866 091		• NIPPLE, 3/4 N.P.T. x 4-1/4	2
38	P 7475 091		• ELL, 1-1/2 N.P.T.	1
39	P 32855 091		• NIPPLE, 3/4 N.P.T. x 1-1/2	1
40	P 150476 357		• VALVE, Solenoid, 3/4 N.P.T.	1
	P 764315 493		• • REPAIR KIT	1
	P 764315 490		• • COIL, 110 V	1
41	P 150477 145		• NIPPLE, 1-1/2 N.P.T. x 6-1/4	1
42	P 29416 091		• NIPPLE, 1-1/2 N.P.T. x 2-1/2	1
43	P 32891 001		• NIPPLE, 1 N.P.T. x 3-1/2	2
44	P 150477 144		• NIPPLE, 1-1/2 N.P.T. x 46-1/2	1
45	P 5285 091		• UNION, 1-1/2 N.P.T.	2
46	P 42108 091		• VALVE, Solenoid, 1 N.P.T.	1
	P 752323 091		• • PISTON ASSEMBLY	1
	P 74352 091		• • COIL	1

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-26-				
47	P 23346 091		• COVER, Box	1
48	P 23345 091		• BOX, Junction	1
49	P 91702 091		• CHASE, Nipple	1
50	P 150477 141		• COUPLING, Reducing, 1-1/2 N.P.T. to 1 N.P.T.	1
51	P 49982 091		• NIPPLE, 1 N.P.T. x 10-1/4	1
60	P 9613 091		SUPPORT, Pipe	1
61	P 76239 061		NUT, 1/4-20	6
62	P 39591 010		CLAMP, Pipe, 1	1
63	P 150474 973		NIPPLE, 1/4 x 4-1/4	1
64	P 10332 091		CLAMP, Pipe, 1-1/4	1
65	P 3848 091		SCREW, 1/4-20 x 3/4	4
66	P 10333 091		CLAMP, Pipe, 1-1/2	1
67	P 150474 972		NIPPLE, 1/4 x 2-3/8	1
68	P 19678 091		WASHER, Lock, 1/4	1
69	P 150476 405		CABLE ASSEMBLY, Steam Sanitize Valve	1
70	P 150475 956		SWITCH, Rocker	1
71	P 150475 955		OPERATOR, Rocker	1

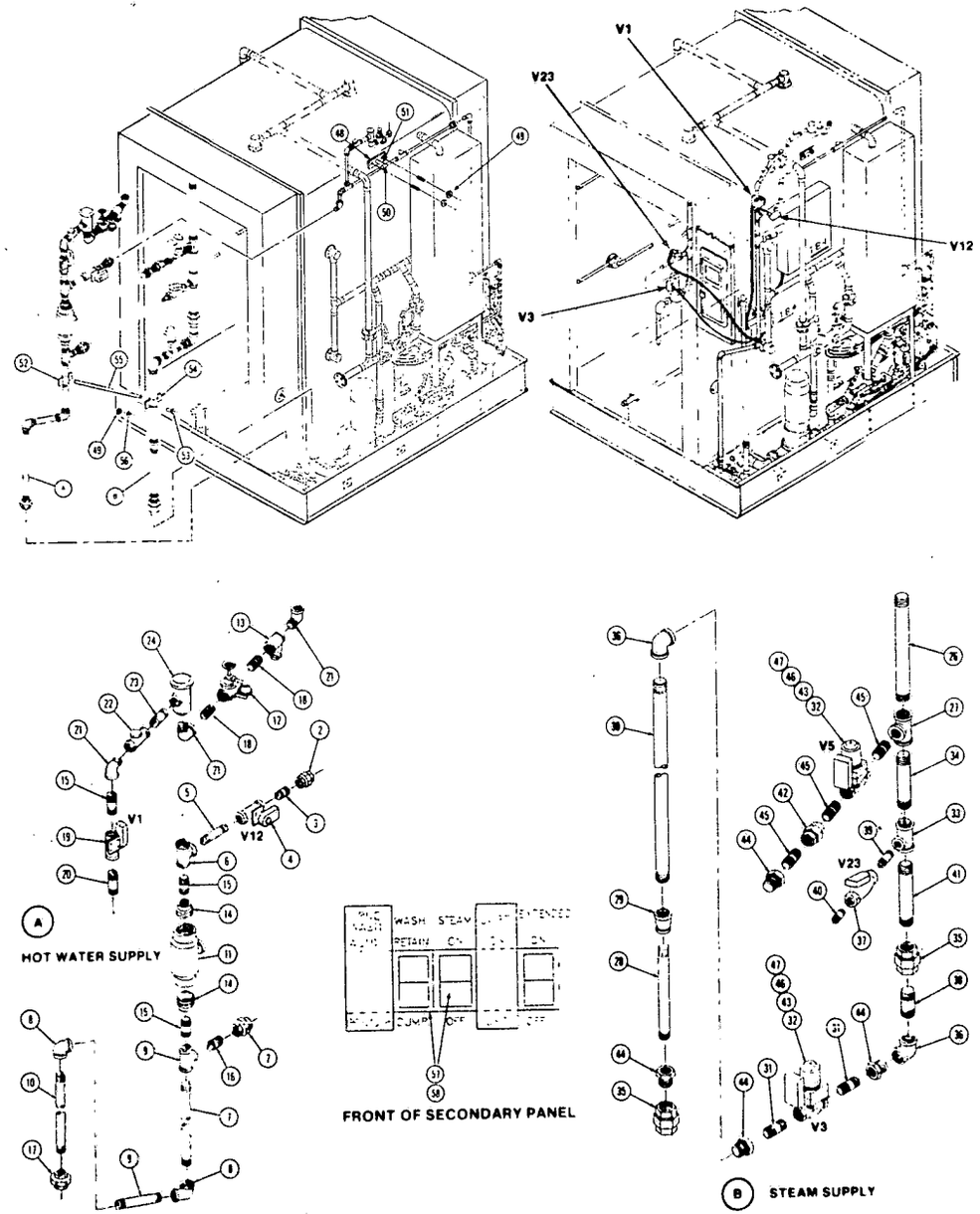


Figure 9-27. WATER TEMPERATURE BOOSTER WITH STEAM TREATMENT OPTION.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-27-	P	150476	547		WATER TEMP BOOSTER WITH STEAM TREATMENT OPTION	X
1	P	150476	315		HOT WATER SUPPLY	1
2	P	150476	966		• UNION, 3/4 N.P.T.	2
3	P	150476	976		• NIPPLE, 3/4 N.P.T. x 1-1/2	1
4	P	150476	183		• VALVE, Solenoid, 3/4 N.P.T.	1
	P	764315	491		• • REPAIR KIT	1
	P	764315	478		• • COIL, 110 V	1
5	P	150476	977		• NIPPLE, 3/4 N.P.T. x 3-1/4	1
6	P	150476	965		• TEE, 1-1/4 x 1-1/4 x 3/4 N.P.T.	2
7	P	150476	975		• NIPPLE, 1-1/4 N.P.T. x 38-1/4	1
8	P	150476	964		• ELBOW, 1-1/4 N.P.T.	2
9	P	150476	974		• NIPPLE, 1-1/4 N.P.T. x 9-3/4	1
10	P	150476	968		• NIPPLE, 1-1/4 N.P.T. x 31-1/2	1
11	P	150476	155		• HEATER, Steam	1
12	P	150476	734		• VALVE, Pressure Reducing, 1-1/4 N.P.T.	1
	P	764320	303		• • REPAIR KIT	A/R
13	P	42107	091		• STRAINER, 1-1/4 N.P.T.	1
14	P	150476	258		• BUSHING, Reducing, 3 x 1-1/4 N.P.T.	2
15	P	150476	973		• NIPPLE, 1-1/4 N.P.T. x 2	3
16	P	150476	977		• NIPPLE, 3/4 N.P.T. x 3-1/4	1
17	P	150476	967		• UNION, 1-1/4 N.P.T.	1
18	P	150476	980		• NIPPLE, 1-1/4 N.P.T. x 1-3/4	2
19	P	150476	181		• VALVE, Solenoid, 1-1/4 N.P.T.	1
	P	764315	487		• • REPAIR KIT	1
	P	764315	478		• • COIL, 110 V	1
20	P	150476	978		• NIPPLE, 1-1/4 N.P.T. x 5-1/4	1
21	P	1671	091		• ELL, Street, 1-1/4 N.P.T.	3
22	P	43520	091		• VALVE, Swing Check, 1-1/4 N.P.T.	1
	P	49320	091		• • DISC, Viton "A"	1
23	P	150476	979		• NIPPLE, 1-1/4 N.P.T. x 2-1/2	1
24	P	150476	453		• VACUUM BREAKER, 1-1/4 N.P.T.	1
25	P	150476	311		STEAM SUPPLY	1
26	P	150476	861		• NIPPLE, 1-1/2 N.P.T. x 13-3/4	1
27	P	7559	091		• TEE, 1-1/2 N.P.T. x 1-1/2 N.P.T. x 1 N.P.T.	1
28	P	49982	091		• NIPPLE, 1 N.P.T. x 10-1/4	1
29	P	150477	141		• COUPLING, Reducing, 1-1/2 N.P.T. to 1 N.P.T.	1
30	P	150477	144		• NIPPLE, 1-1/2 N.P.T. x 46-1/2	1
31	P	32891	001		• NIPPLE, 1 N.P.T. x 3-1/2	2
32	P	41208	091		• VALVE, Solenoid, 1 N.P.T.	2
	P	752323	091		• • PISTON AND PLUNGER ASSEMBLY	1
	P	74352	041		• • COIL, 110 V	1
33	P	7558	091		• TEE, 1-1/2 x 1-1/2 x 3/4 N.P.T.	1
34	P	41813	091		• NIPPLE, 1-1/2 N.P.T. x 6-1/4	1
35	P	5285	091		• UNION, 1-1/2 N.P.T.	1
36	P	7475	091		• ELBOW, 1-1/2 N.P.T.	2
37	P	150476	357		• VALVE, Solenoid, 3/4 N.P.T.	1
	P	764315	493		• • REPAIR KIT	1
	P	764315	490		• • COIL, 110 V	1
38	P	29416	091		• NIPPLE, 1-1/2 N.P.T. x 2-1/2	1
39	P	32866	091		• NIPPLE, 3/4 N.P.T. x 4-1/4	1

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-27-40	P 32855 091		• NIPPLE, 3/4 N.P.T. x 1-1/2	1
41	P 150477 145		• NIPPLE, 1-1/2 N.P.T. x 6-3/4	1
42	P 5283 091		• UNION, 1 N.P.T.	1
43	P 91702 091		• CHASE, Nipple	2
44	P 33738 091		• BUSHING, Reducing	3
45	P 32885 091		• NIPPLE, 1 N.P.T. x 2	3
46	P 23345 091		• BOX, Junction	2
47	P 23346 091		• COVER, Box	2
48	P 9613 091		SUPPORT, Pipe	1
49	P 76239 061		NUT, 1/4-20	6
50	P 39591 091		CLAMP, Pipe, 1	1
51	P 150474 973		NIPPLE, 1/4 x 4-1/4	1
52	P 10332 091		CLAMP, Pipe, 1-1/4	1
53	P 3848 091		SCREW, 1/4-20 x 3/4	4
54	P 10333 091		CLAMP, Pipe, 1-1/2	1
55	P 150474 972		NIPPLE, 1/4 x 2-3/8	1
56	P 19678 091		WASHER, Lock, 1/4	4
57	P 150475 955		OPERATOR, Rocker	1
58	P 150475 956		SWITCH, Rocker	1
59	P 150476 405		CABLE ASSEMBLY, Steam Booster	1
60	P 150476 416		CABLE ASSEMBLY, Steam Treatment	1

NOT USED

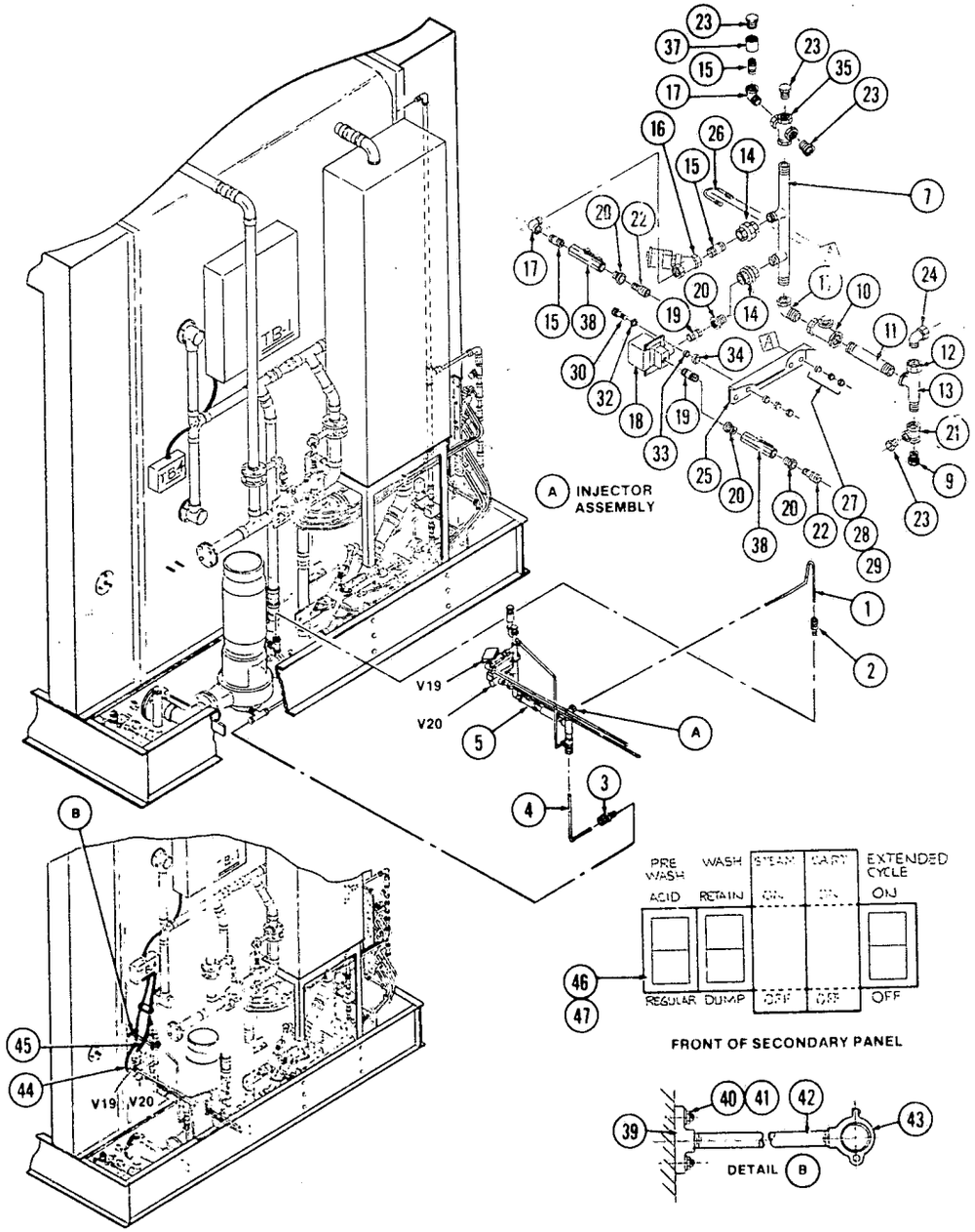


Figure 9-28. ACID/NEUTRALIZER OPTION (CRW ONLY).

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-28-	P	150476	548		ACID/NEUTRALIZER OPTION (CRW ONLY)	X
1	P	150476	394		TUBE, 1/2 O.D.T.	1
2	P	77220	061		FITTING, Compression, 1/2 O.D.T. x 1/4 N.P.T.	1
3	P	78896	061		FITTING, Compression, 1/2 O.D.T. x 1/2 N.P.T.	1
4	P	150476	395		TUBE, 1/2 O.D.T.	1
5	P	150476	234		INJECTOR ASSEMBLY	1
6					NOT USED	
7	P	150476	267		• MANIFOLD ASSEMBLY, 1/2 N.P.T.	1
8					NOT USED	
9	P	78896	061		• FITTING, Compression, 1/2 O.D.T. x 1/2 I.P.S.	1
10	P	76947	061		• VALVE, Swing Check	1
11	P	40523	063		• NIPPLE, 1/2 N.P.T. x 4	1
12	P	150476	392		• NOZZLE	1
13	P	150476	390		• EJECTOR	1
14	P	40526	063		• UNION, 1/2 N.P.T.	2
15	P	40519	061		• NIPPLE, 1/2 N.P.T. x 1-1/4	3
16	P	150476	179		• VALVE, Solenoid, 1/2 N.P.T.	1
	P	764315	485		• • REPAIR KIT	1
	P	764315	486		• • COIL	1
17	P	150476	393		• ELL, Street, 1/2 N.P.T.	3
18	P	150476	173		• VALVE, Solenoid, 1/4 N.P.T. x 1	1
19	P	77345	061		• NIPPLE, 1/4 N.P.T. x 1	2
20	P	74661	061		• BUSHING, Reducing, 1/2 N.P.T. x 1/4 N.P.T.	4
21	P	40525	061		• TEE, 1/2 N.P.T.	1
22	P	77220	061		• CONNECTOR, Male, 1/2 O.D. x 1/4 N.P.T.	2
23	P	39334	061		• PLUG, Pipe	4
24	P	51080	061		• ELL, Compression, 3/8 I.P.S. x 1/2 O.D.T.	1
25	P	150476	477		• BRACKET, Valve Support	1
26	P	75297	061		• CLAMP, U Bolt, 1/4-20	1
27	P	150473	295		• WASHER, Flat, 1/4	2
28	P	19686	061		• WASHER, Lock, 1/4	2
29	P	76239	061		• NUT, Hex, 1/4-20	2
30	P	33061	061		• SCREW, Socket Hd. Cap, #10-32 x 5/8	2
31	P	150473	301		• WASHER, Flat, #10	6
32	P	49353	061		• WASHER, Flat, #10	2
33	P	19685	061		• WASHER, Lock, #10	2
34	P	8647	061		• NUT, Hex, #10-32	2
35	P	44733	061		• CROSS, 1/2 N.P.T.	1
36					NOT USED	1
37	P	74666	061		• COUPLING	1
38	P	40521	061		• VALVE, Ball, 1/2 N.P.T.	2
	P	754265	091		• • KIT: Seals, Seat, Gaskets	1
39	P	9613	091		SUPPORT, 1/4 N.P.T.	1
40	P	19686	061		WASHER, Lock, 1/4	2
41	P	76239	061		NUT, Hex, 1/4-20	2
42	P	28931	091		NIPPLE, 1/4-20 x 4-1/2	1
43	P	39589	010		CLAMP, 1/4 N.P.T.	1
44	P	150476	413		CABLE ASSEMBLY, V20 (Acid) to TB4	1
45	P	150476	414		CABLE ASSEMBLY, V19 (Neutralizer) to TB4	1
46	P	150475	956		SWITCH, Rocker	1
47	P	150475	955		OPERATOR, Rocker	1

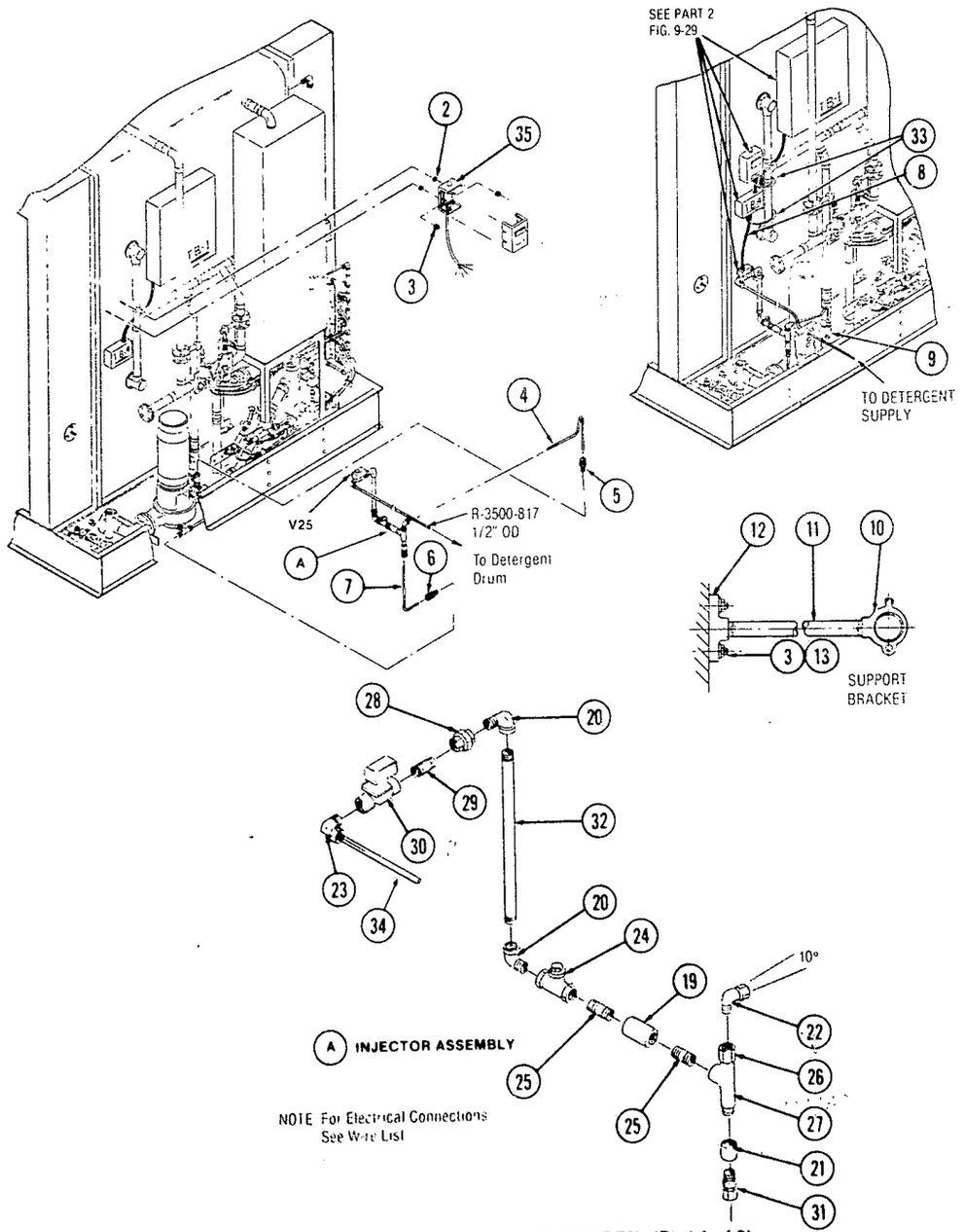


Figure 9-29. DETERGENT INJECTOR ACCESSORY. (Part 1 of 2)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-29-	B 150477 068		DETERGENT INJECTOR ACCESSORY (Part 1 of 2)	X
1				2
2	P 150473 295		WASHER, Flat, 1/4	4
3	P 76239 061		NUT, Hex, 1/4-20	1
4	P 150476 394		TUBE, 1.2 O.D.T.	1
5	P 20229 091		FITTING, Compression, 1/2 O.D.T. x 1/4 N.P.T.	1
6	P 20173 091		FITTING, Compression, 1/2 O.D.T. x 1/2 N.P.T.	1
7	P 150476 395		TUBE, 1/2 O.D.T.	1
8	P 150476 415		CABLE ASSEMBLY, Detergent	1
9	P 150476 479		BUSHING, Snap	1
10	P 39589 010		CLAMP	1
11	P 28931 091		NIPPLE, 1/4 N.P.T. x 4-1/2	1
12	P 9613 091		SUPPORT, 1/4 N.P.T.	2
13	P 19686 061		WASHER, Lock, 1/4	
14			NOT USED	
15			NOT USED	
16			NOT USED	
17			NOT USED	1
18	P 150476 233		INJECTOR ASSEMBLY, Detergent	1
19	P 150476 389		• VALVE, Flow control, 1/2 N.P.T.	2
20	P 1634 091		• ELL, Street, 1/2 N.P.T.	1
21	P 1313 091		• CONNECTOR, Female, 1/2 N.P.T.	1
22	P 30718 091		• ELBOW, Compression, 1/2 N.P.T. x 3/8 O.D.T.	1
23	P 49631 091		• ELBOW, Compression, 1/2 O.D.T. x 1/2 N.P.T.	1
24	P 41998 091		• VALVE, Swing Check, 1/2 I.P.S.	1
	P 44727 091		• • DISC	2
25	P 74115 091		• NIPPLE, 1/2 Pipe x 1-1/2	1
26	P 150476 392		• NOZZLE	1
27	P 150476 390		• EJECTOR	1
28	P 89990 091		• UNION	1
29	P 29163 091		• NIPPLE, 1/2 N.P.T. x 1-1/4	1
30	P 150476 178		• VALVE, Solenoid, 1/2 N.P.T. (V25)	1
	P 764315 489		• • REPAIR KIT	1
	P 764315 484		• • COIL, 24 V.	1
31	P 20173 091		• FITTING, Compression, 1/2 N.P.T. x 1/2 O.D.T.	1
32	P 29197 091		• NIPPLE, 1/2 N.P.T. x 9-3/4	A/R
33	P 84104 001		TIE, Wire	*
34	R 3500 817		TUBING, 1/2 O.D.T. Nylon	1
35	P 150477 092		DETERGENT CONTROLLER	1
	P 761743 001		• PC BOARD	A/R
	P 761741 001		• KIT, Repair (Bulbs, Fuses, Lenses)	

*When ordering, specify required length in feet.

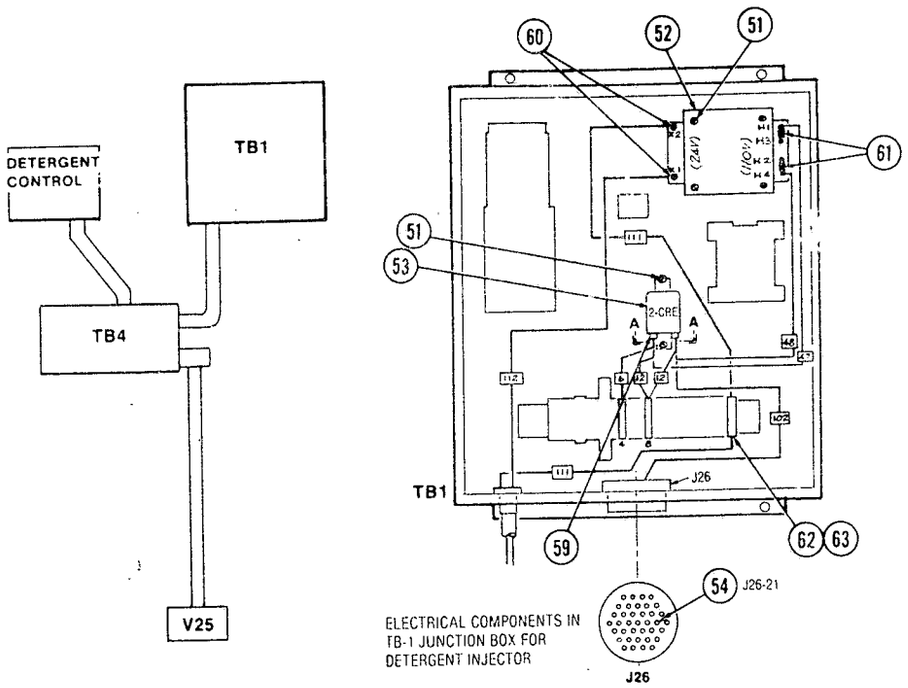


Figure 9-29A. DETERGENT INJECTOR ACCESSORY (Part 2 of 2)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-29A-	B	150477	068		DETERGENT INJECTOR ACCESSORY (Part 2 of 2)	X
50					NOT USED	
51	P	12451	091		SCREW, Rd. Hd., 6-32 x 1/4	6
52	P	150474	248		TRANSFORMER	1
53	P	150475	740		RELAY, 3 P.D.T.	1
54	P	84352	002		SOCKET (J26-21)	1
55	P	18538	091		NUT, Wire	2
56	P	19522	091		TERMINAL, Ring	1
57	P	82675	001		SCREW, Ground	1
58	P	30627	091		BUSHING, Strain Relief	1
59	P	91694	091		TERMINAL, Quick Disconnect	6
60	P	90619	091		TERMINAL, Ring	2
61	P	89590	041		JUMPER, Brass	2
62	P	150476	907		FUSEHOLDER	1
63	P	764317	776		FUSE, Cartridge, 2 amp, Box of 5	A/R
	P	150477	093		INSTALLATION INSTRUCTIONS	

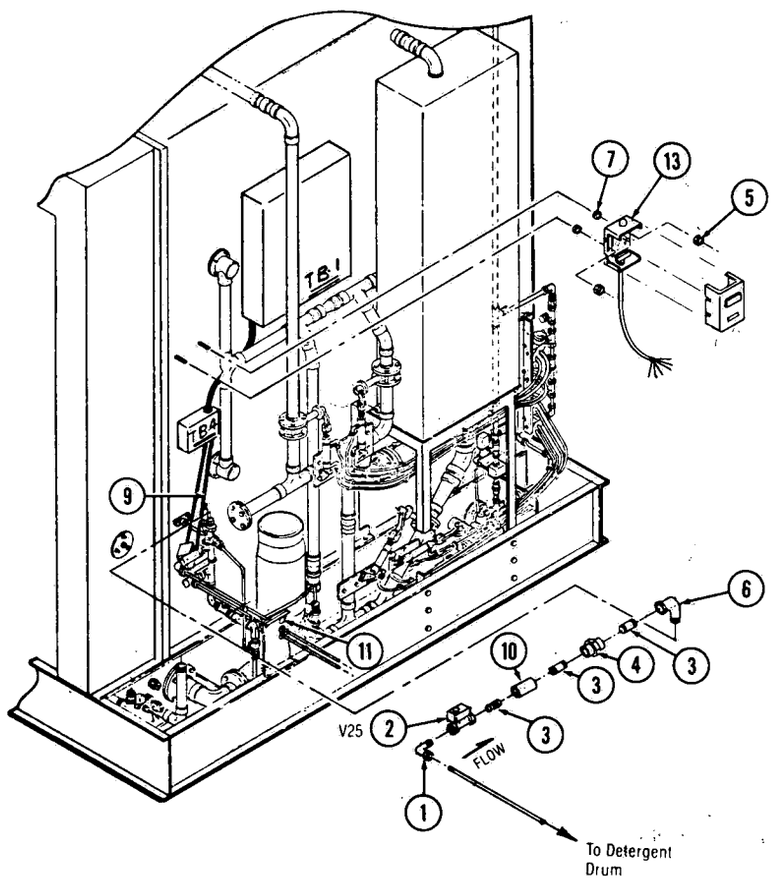
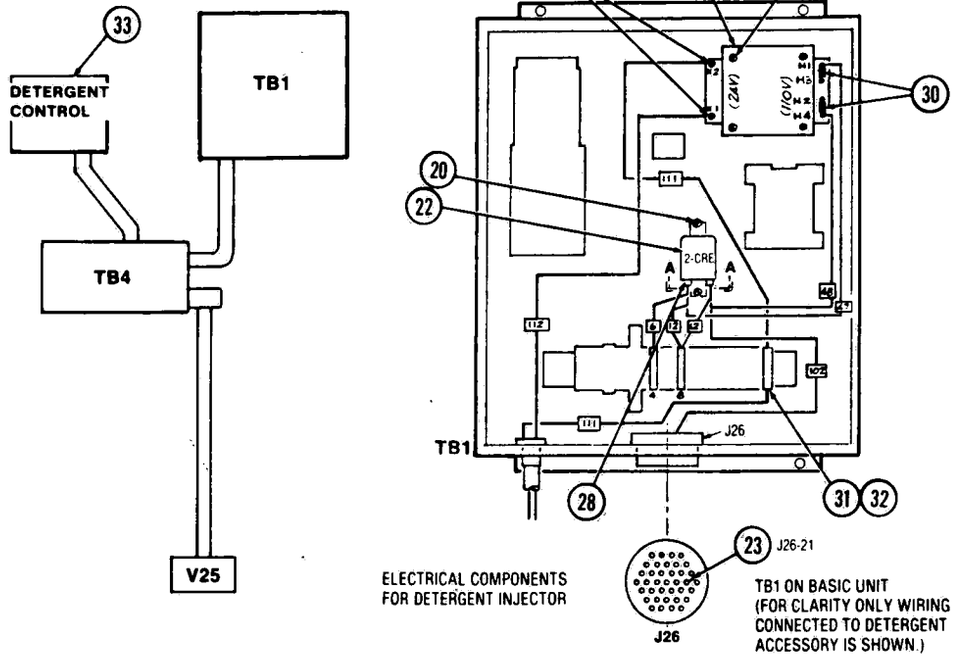


Figure 9-30. DETERGENT INJECTOR ACCESSORY: (For Cage and Rack Washers Equipped With Acid/Neutralizer Option). (Part 1 of 2)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-30-	B	150477	067		DETERGENT INJECTOR FOR CRW WITH ACID/NEUTRALIZE OPTION (Part 1 of 2)	X
1	P	81063	001		ELBOW, Male, 1/2 N.P.T. x 1/2 O.D.T.	1
2	P	150476	178		VALVE, Solenoid	1
	P	764315	489		• REPAIR KIT	1
	P	764315	484		• COIL, 24 V	1
3	P	29162	091		NIPPLE, 1/2 N.P.T. x 1	3
4	P	89990	091		UNION, 1/2 N.P.T.	1
5	P	76239	061		NUT, Hex, 1/4-20	4
6	P	1634	091		ELBOW, Street, 1/2 N.P.T.	1
7	P	150473	295		WASHER, Flat, 1/4	2
8					NOT USED	
9	P	150476	415		CABLE SSEMBLY, Detergent	1
10	P	150476	389		VALVE, Flow Control, 1/2 N.P.T.	1
11	P	77799	091		BUSHING, Snap	1
12	R	3500	817		TUBING, 1/2 O.D.T. Nylon	*
13	P	150477	092		DETERGENT CONTROLLER	1
	P	761743	001		• PC BOARD	1
	P	761741	001		• KIT, Repair (Bulbs, Fuses, Lenses)	A/R

*When ordering, specify required length in feet.



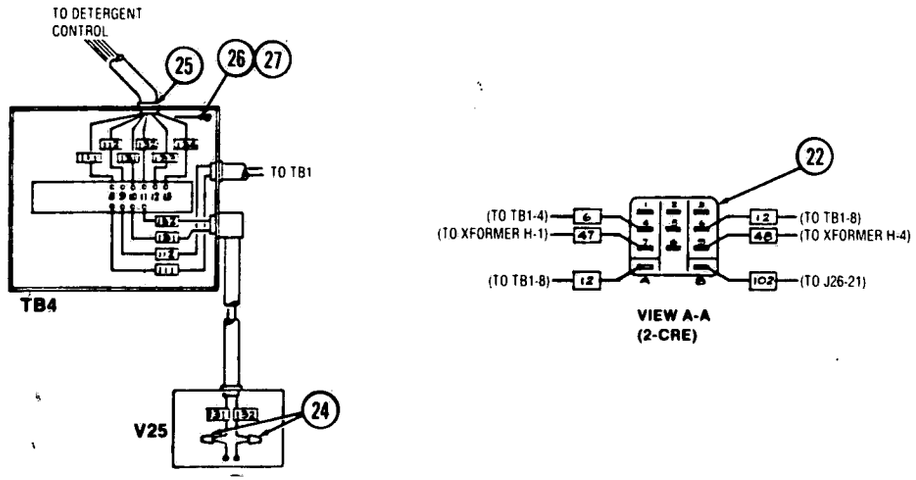
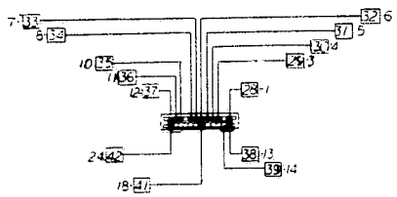
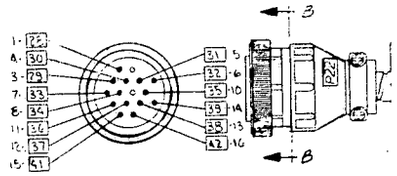


Figure 9-30A. DETERGENT INJECTOR ACCESSORY: For Cage and Rack Washers Equipped with Acid/Neutralizer Option (Part 2 of 2).

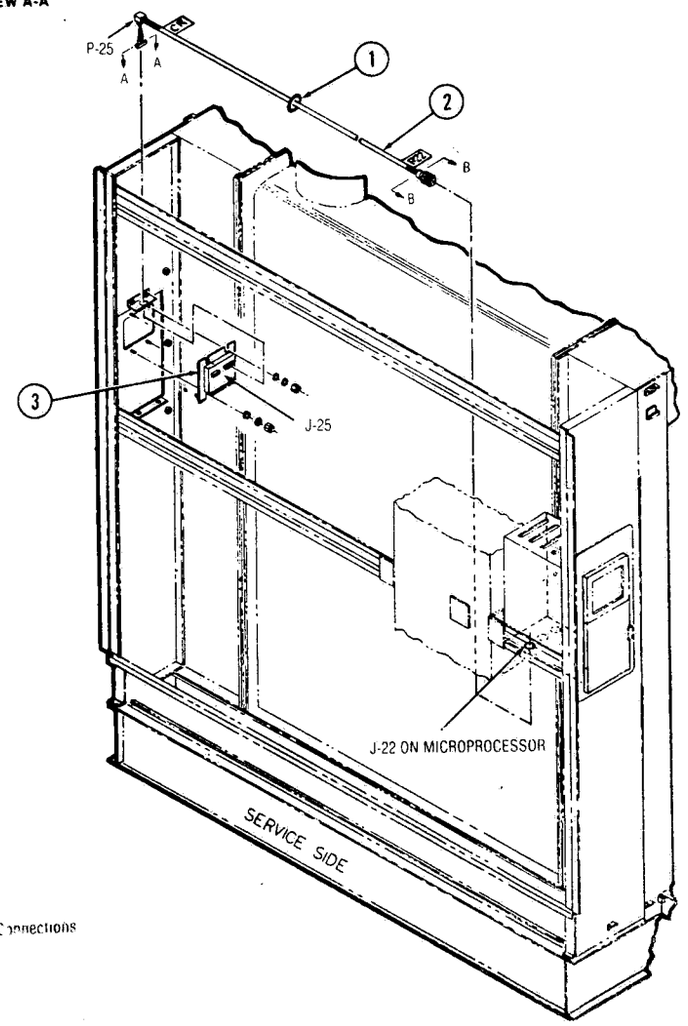
FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-30A-	B	150477	067		DETERGENT INJECTOR FOR CRW WITH ACID/NEUTRALIZE OPTION (Part 2 of 2)	X
20	P	12451	091		SCREW, Rd. Hd., 6-32 x 1/4	6
21	P	150474	248		TRANSFORMER	1
22	P	150475	740		RELAY, 3 P.D.T.	1
23	P	84352	002		SOCKET (J26-21)	1
24	P	18538	091		WIRENUT, Small	2
25	P	30627	091		BUSHING, Strain Relief	1
26	P	19522	091		TERMNAL, Ring, #10	1
27	P	82675	001		SCREW, Ground	1
28	P	91694	091		TERMINAL, Quick Disconnect	6
29	P	90619	091		TERMINAL, Ring	2
30	P	89590	041		JUMPER, Brass	2
31	P	150476	907		FUSEHOLDER	1
32	P	764317	776		FUSE, Cartridge, 2 amp, Box of 5	A/R
	P	150477	083		INSTALLATION INSTRUCTIONS	



VIEW A-A



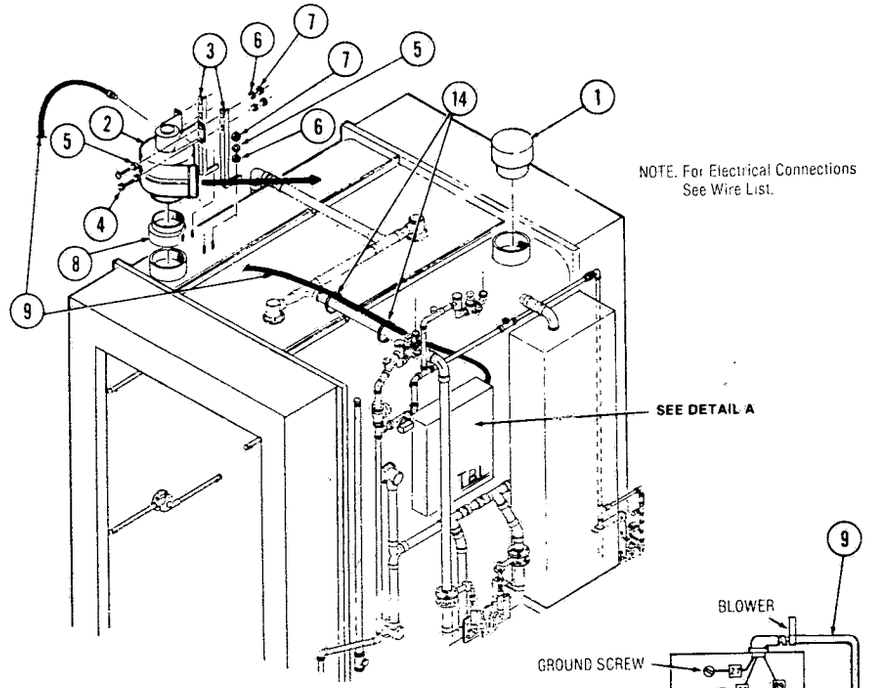
VIEW B-B

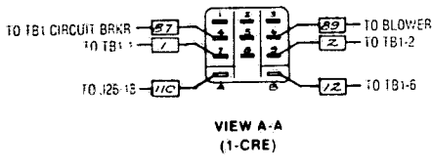


NOTE For Electrical Connections
See Wire List

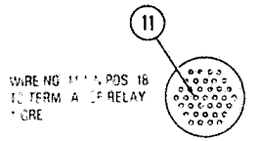
Figure 9-31. REAR CONTROL ACCESSORY PACKAGE.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-31-	B	150477	064		REAR CONTROL PACKAGE	X
1	P	84104	001		WIRE TIE, Plastic	6
2	P	150476	444		CABLE, Interconnect "C"	1
3	P	150475	078		PANEL, Primary Control	1
	P	150477	065		INSTALLATION INSTRUCTIONS	

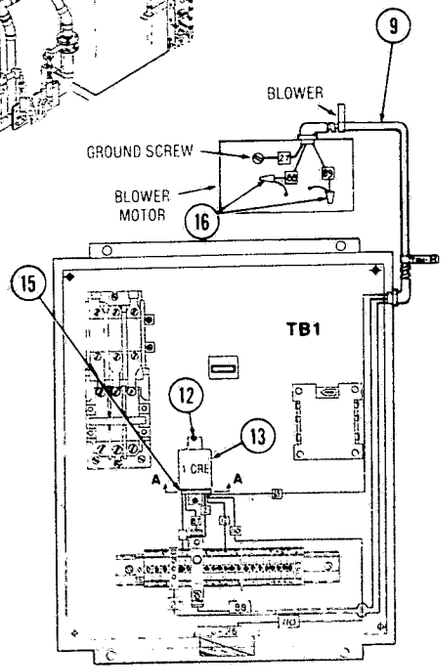




VIEW A-A
(1-CRE)



VIEW OF
J26 IN TB1



DETAIL A

Figure 9-32. ELECTRIC BLOWER ACCESSORY.

ELECTRICAL COMPONENTS IN JUNCTION BOX TB-1
ELECTRICAL BLOWER ACCESSORY

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-32-	B	150477	118		ELECTRIC BLOWER ACCESSORY	X
1	P	150476	926		VENT, Relief	1
	P	150477	161		• FOAM INSERT	2
2	P	150477	094		BLOWER	1
	P	764316	740		• IMPELLER	1
	P	764319	888		MOTOR	1
3	P	150477	082		BRACKET, Mounting	2
4	P	4685	051		BOLT, Hex Hd., 1/4-20 x 1-1/4	4
5	P	19678	041		WASHER, Lock, 1/4	8
6	P	150473	295		WASHER, Flat, 1/4	8
7	P	3097	041		NUT, Hex, 1/4-20	8
8	P	150477	075		ADAPTER, Blower (2" to 12")	1
9	P	150476	423		CABLE ASSEMBLY, Blower	1
10					NOT USED	
11	P	84352	002		SOCKET (J26-18)	1
12	P	12451	091		SCREW, Round Head, 6-32 x 1/4	2
13	P	150475	740		RELAY	1
14	P	84104	001		TIE, Wire	A/R
15	P	91694	091		TERMINAL, 18-14 A.W.G., .187 Tab	6
16	P	17691	091		WIRENUT, Small	2
	P	150477	140		INSTALLATION INSTRUCTIONS	

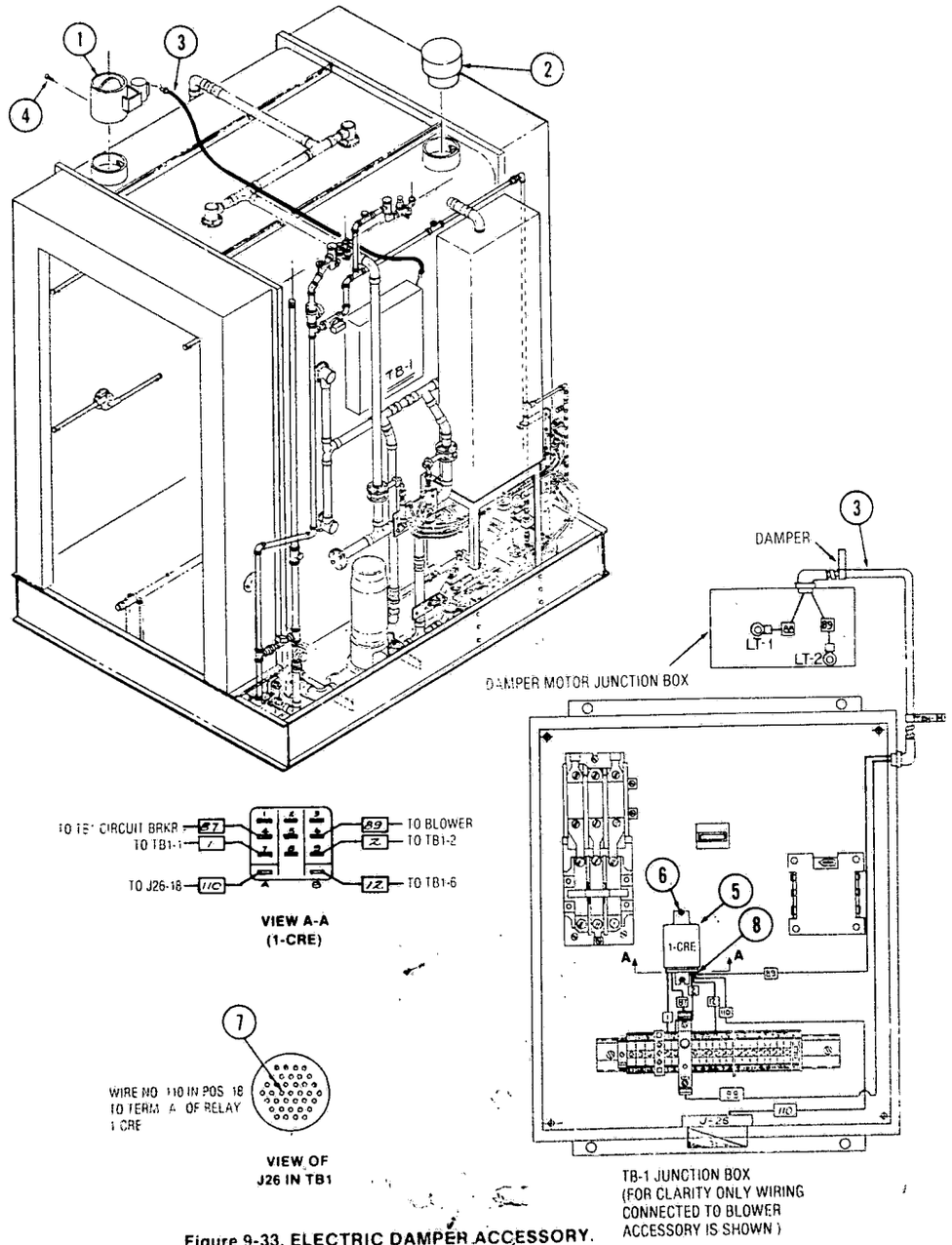


Figure 9-33. ELECTRIC DAMPER ACCESSORY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-33-	B	150477	119		ELECTRIC DAMPER ACCESSORY	X
1	P	150477	136		DAMPER ASSEMBLY, Motorized	1
	P	150477	121		• ACTUATOR	1
2	P	150476	926		VENT, Relief	1
	P	150477	161		• FOAM INSERT	2
3	P	150477	138		CABLE ASSEMBLY, Electric Damper	1
4	P	38097	061		SCREW, Flat Head, #8-32 x 3/8	1
5	P	150475	740		RELAY	1
6	P	12451	091		SCREW, Round Head, #6-32 x 1/4	2
7	P	84352	002		SOCKET (J26-18)	1
8	P	91694	091		TERMINAL, 18-14 A.W.G., .187 Tab	6
	P	150477	139		INSTALLATION INSTRUCTIONS	

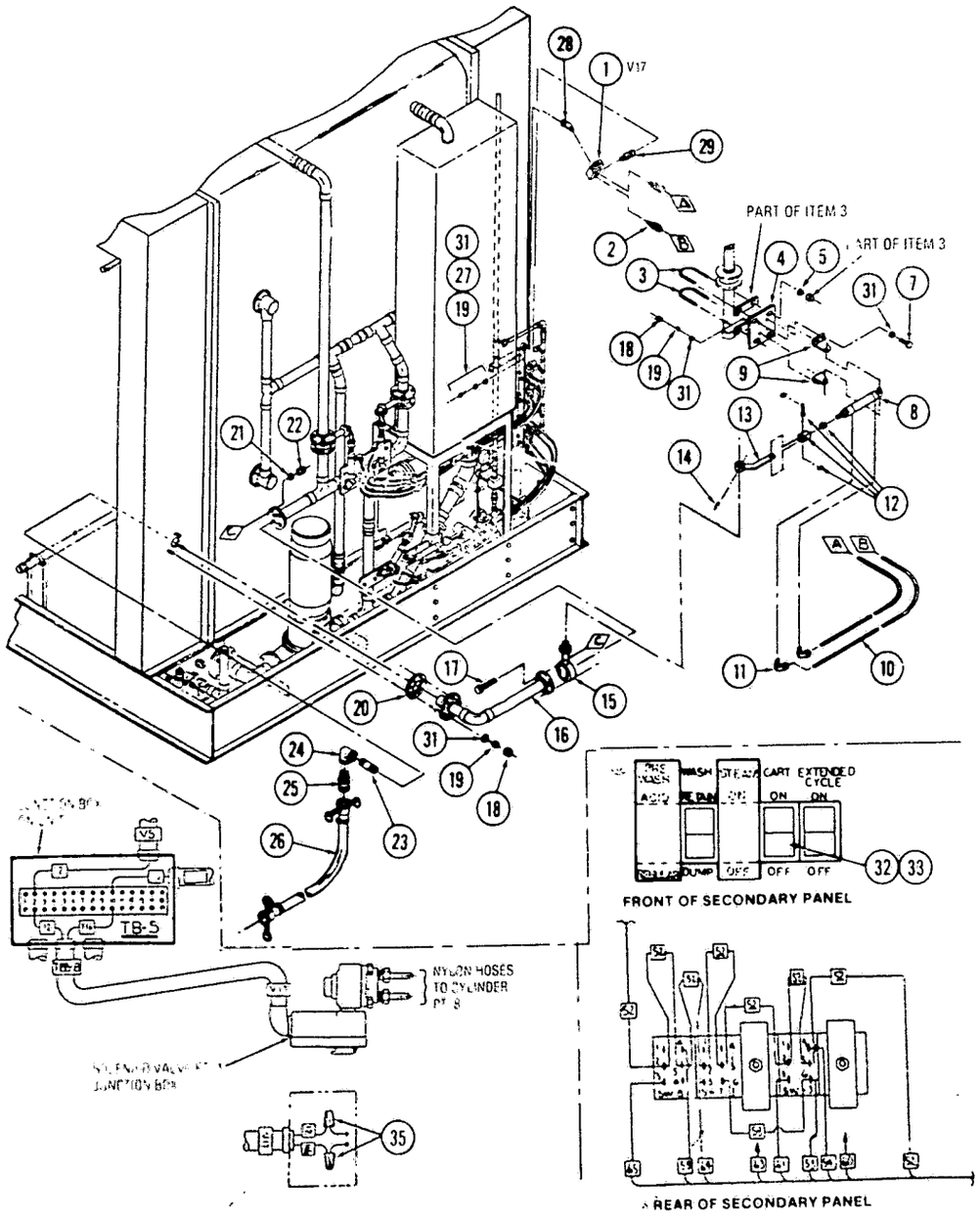


Figure 9-34. BOTTLE WASHER CART ACCESSORY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
9-34-	P	150477	009		BOTTLE WASHER CART, Steel Flanges	X				
	P	150477	010		BOTTLE WASHER CART, Stainless Steel Flanges*		X			
1	P	150476	176		VALVE, Solenoid (V17)	1	1			
	P	764315	479		• REPAIR KIT	1	1			
	P	764315	480		• COIL, 110 V.	1	1			
2	P	78292	091		CONNECTOR, Tube, 3/8 O.D.T. x 1/4 N.P.T.	2	2			
3	P	44790	045		"U" BOLT, With Nuts & Bars, 5/16-18	2	2			
4	P	150476	262		PLATE, Mounting	1	1			
5	P	91147	061		WASHER, Lock, External Tooth, 5/16	4	4			
6					NOT USED					
7	P	150473	148		BOLT, Hex Head, 1/4-20 x 1	4	4			
8	P	150476	168		CYLINDER, Air, 1-1/2 Bore	1	1			
9	P	150476	153		BRACKET, Pivot	2	2			
10					TUBING, Nylon, 3/8 O.D. x 60	1	1			
11	P	80901	091		ELBOW, Compression, 3/8 O.D.T. x 1/8 N.P.T.	2	2			
12	P	150476	154		CLEVIS, Piston Rod	1	1			
13	P	150476	296		ASSEMBLY, Level Arm	1	1			
14	P	150476	629		PIN, Groove, 1/8 x 3/4	1	1			
15	P	150476	174		VALVE, Butterfly (Crane 42-SS-Z)	1	1			
16	P	150476	333		ELBOW ASSEMBLY, Steel Flange	1				
	P	76239	334		ELBOW ASSEMBLY, Stainless Steel Flange		1			
17	P	19686	338		BOLT, Hex Head, 5/8-11 x 4-1/4	4	4			
18	P	150476	061		NUT, Hex, 1/4-20	7	7			
19	P	19692	061		WASHER, Lock, 1/4	9	9			
20	P	150475	351		GASKET	1	1			
21	P	150476	061		WASHER, Lock, 5/8	4	4			
22	P	32467	061		NUT, Hex, 5/8-11	4	4			
23	P	150476	398		NIPPLE, 1-1/2 N.P.T x 2-1/2	1	1			
24	P	150476	399		ELBOW, 1-1/2 N.P.T.	1	1			
25	P	150473	158		ADAPTER, Male, 1-1/2 N.P.T.	1	1			
26	P	150476	332		HOSE ASSEMBLY	1	1			
27	P	150476	154		SCREW, Hex Head Cap, 1/4-20 x 3/8	2	2			

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
9-34 (Cont'd)										
28	P	150476	463		ELBOW, Male, 45°, 1/2 O.D.T. x 1/4 N.P.T.	1				
29	P	150476	454		CONNECTOR, Male, 1/2 O.D.T. x 1/4 N.P.T.	1				
30	P	150476	412		CABLE ASSEMBLY (V17 to Junction Box TB-5), not shown	1				
31	P	150473	295		WASHER, Flat, 1/4	13	13			
32	P	150475	956		SWITCH, Rocker	1	1			
33	P	150475	955		OPERATOR, Rocker	2	2			
34	P	43893	061		PIN, Groove, 1/8 Dia. x 3/8	1	1			
35	P	18538	091		WIRE NUT, Small	2	2			
36	P	84104	001		TIE, Wire	4	4			
37	P	150475	977		TERMINAL	2	2			
38	P	150475	978		TERMINAL	3	3			
	P	150477	001		INSTALLATION INSTRUCTIONS					

NOT USED

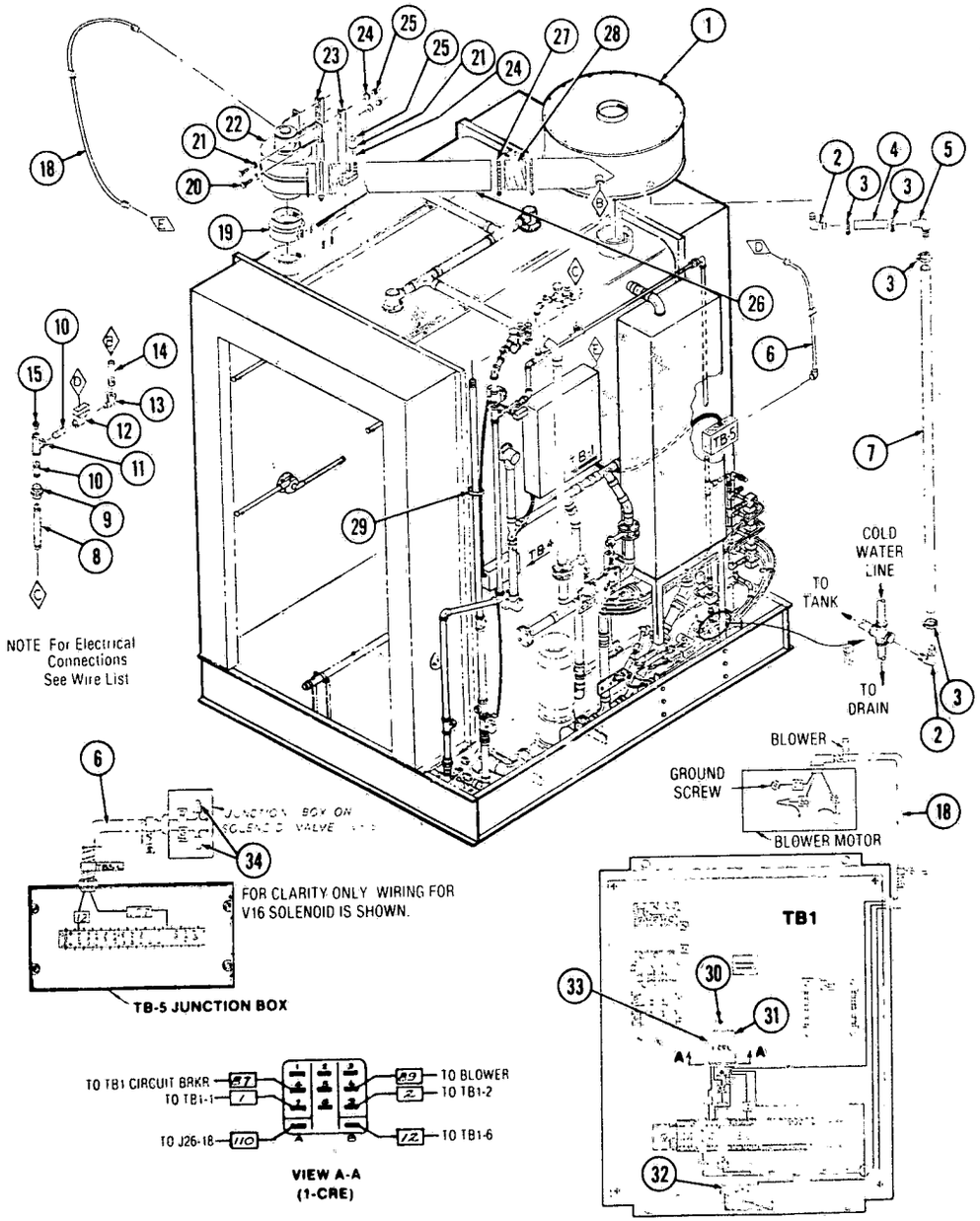


Figure 9-35. DUCTLESS VENT (VAPOR ELIMINATOR) ACCESSORY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-35-	B	150477	106		VAPOR ELIMINATOR ACCESSORY PACKAGE	X
1	P	150477	101		CONDENSER ASSEMBLY, Vapor	1
	P	150477	100		• GASKET, Top Cover	1
	P	150477	161		• FOAM INSERT	2
2	P	150477	107		ELBOW, Insert, 2 N.P.T. to 2	2
3	P	150477	113		CLAMP, Hose, 2-3/4 Dia.	4
4	P	150477	110		HOSE, Drain, Top, 2 I.D. x 8	1
5	P	150477	108		ELBOW, Insert, 2	1
6	P	150476	358		CABLE ASSEMBLY, Vapor Eliminator Solenoid V-16	1
7	P	150477	111		HOSE, Drain, Side, 2 I.D. x 110	1
8	P	150477	154		NIPPLE, 3/4 N.P.T. x 5-3/4	1
9	P	150476	966		UNION, 3/4 N.P.T.	1
10	P	150476	993		NIPPLE, 3/4 N.P.T.	2
11	P	150477	153		TEE, 3/4 N.P.T.	1
12	P	150476	183		VALVE, Solenoid, 3/4 N.P.T. (V16)	1
	P	764315	491		• REPAIR KIT	1
	P	764315	478		• COIL, 110 V.	1
13	P	150476	397		ELL, Street, 45°, 3/4 N.P.T.	1
14	P	150477	155		NIPPLE, 3/4 N.P.T. x 4-3/4	1
15	P	3443	091		PLUG, Pipe, 3/4 N.P.T.	1
16					NOT USED	
17					NOT USED	
18	P	150476	423		CABLE ASSEMBLY, Blower	1
19	P	150477	075		ADAPTER, Blower	1
20	P	4685	051		BOLT, Hex Head, 1/4-20 x 1-1/4	4
21	P	19678	041		WASHER, Lock, 1/4	8
22	P	150477	094		BLOWER	1
	P	764316	740		• IMPELLER	1
	P	764319	888		• MOTOR	1
	P	764317	604		• SHAFT, Extension	1
23	P	150477	082		BRACKET, Mounting	2
24	P	150473	295		WASHER, Flat, 1/4	8
25	P	3097	041		NUT, Hex, 1/4-20	8
26	P	150477	112		DUCT	1
27	P	150477	095		CLAMP, Hose, 8 Dia.	4
28	P	150477	093		HOSE, Flexible, 8 Dia.	A/R
29	P	84104	001		WIRETIE	6
30	P	12451	091		SCREW, Round Head, #6-32 x 1/4	2
31	P	150475	740		RELAY	1
32	P	84352	002		SOCKET	1
33	P	91694	091		TERMINAL, 18-14 A.W.G., .187 Tab	5
34	P	17691	091		WIRE NUT, Small	2
	P	762650	108		KIT, To Replace Blower With Venturi Vapor Removal System (Pulstar 3000 only)	A/R
	P	150477	117		INSTALLATION INSTRUCTIONS	

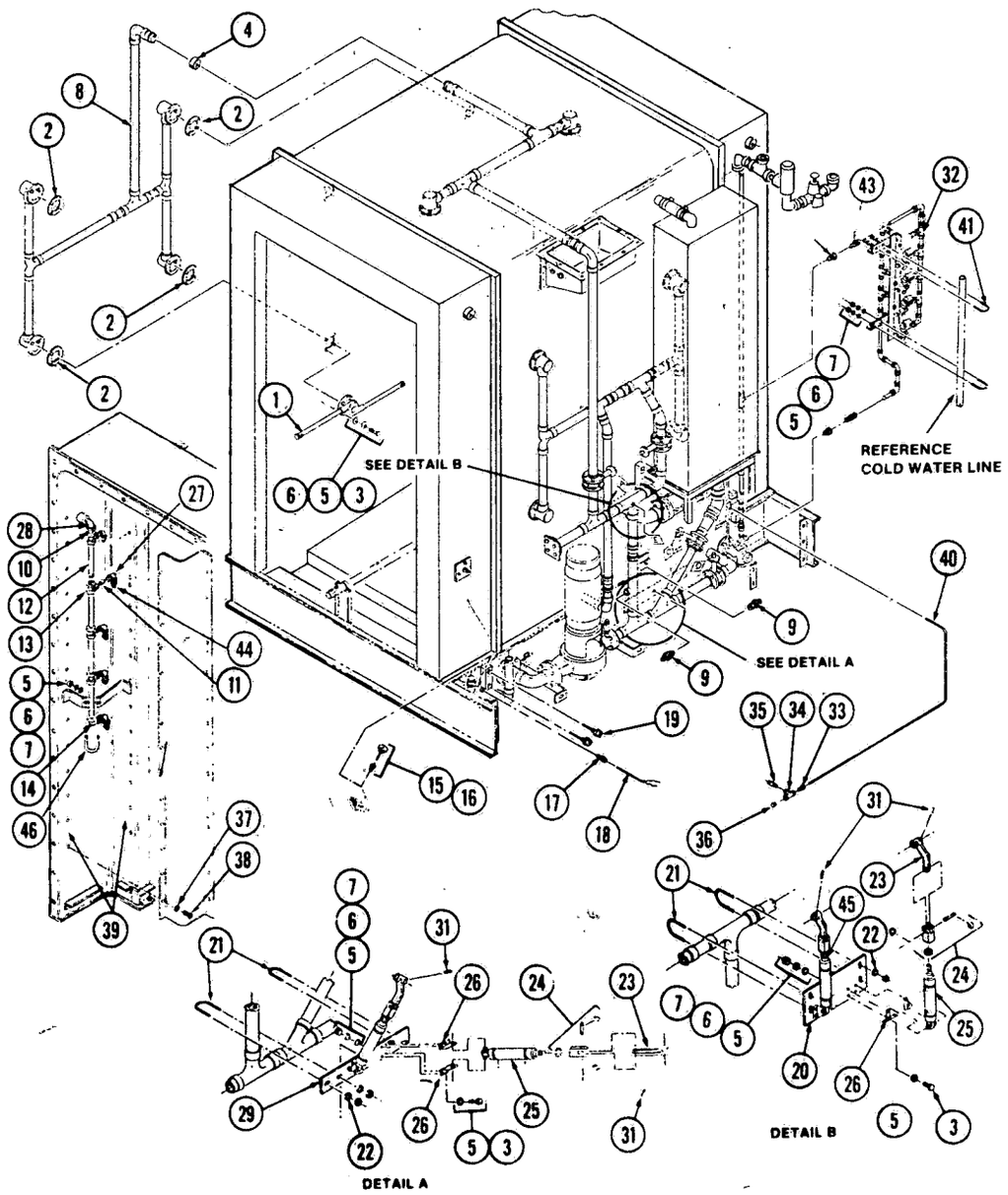


Figure 9-36. INTERNAL VAPOR REMOVAL SYSTEM.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-36-					INTERNAL VAPOR REMOVAL SYSTEM	X
1	P	150475	534		SPRAY ASSEMBLY	8
2	P	150475	953		GASKET, Manifolds	8
3	P	150473	148		CAPSCREW, Hex Head, 1/4-20 x 1	48
4	P	150476	151		COUPLING, 2 inch	2
5	P	150473	295		WASHER, Plain, 1/4	73
6	P	19686	061		WASHER, Lock, 1/4	61
7	P	76239	061		NUT, Hex, 1/4-20	29
8	P	150476	241		MANIFOLD ASSEMBLY, Spray, Non-Service Side	1
9	P	150476	712		PROBE ASSEMBLY, Detergent	2
10	P	29163	091		NIPPLE, 1/2 NPT x 1-1/4 Long	2
11	P	28916	091		NIPPLE, 1/2 NPT x 7/8 Long	10
12	P	29202	091		NIPPLE, 1/2 NPT x 11 Long	8
13	P	4912	091		TEE, 1/2 NPT x 1/2 x 1/4 NPT	8
14	P	37863	091		ELBOW, 90° Reducing, 1/2 NPT x 1/4 NPT	4
15	P	13638	091		THERMOMETER	1
16	P	74661	061		BUSHING, Reducing, 1/2 NPT x 1/4 NPT	1
17	P	150476	344		CONNECTOR, Union Assembly, 1/8-27 NPT	1
18	P	150822	341		PROBE, Temperature	1
19	P	150475	994		DETECTOR, Liquid Level	4
20	P	150476	263		PLATE, Mounting	1
21	P	44790	045		U-BOLT, 5/16-18 with nuts and bar	4
22	P	24282	091		WASHER, Lock, 5/16 external tooth	8
23	P	150476	296		LEVEL ARM ASSEMBLY	4
24	P	150476	154		CLEVIS, Piston Rod	4
25	P	150476	168		CYLINDER, Air, 1-1/2 Bore	4
26	P	150476	153		BRACKETS, Pivot (Pair for #25)	4
27	P	1616	091		ELBOW, 90°, Reducing, 1/4 NPT x 1/8 NPT	10
28	P	150476	393		ELL, Street, 1/2 NPT	2
29	P	150476	264		PLATE, Mounting	1
30	P	150477	293		COVER, Vapor Eliminator	2
31	P	150476	629		PIN, Groove, 1/8 Diameter x 3/4 Long	4
32	P	150476	335		ACTUATOR (4-Solenoids)	1
33	P	78896	061		CONNECTOR, Male, 1/2 ODT x 1/2 NPT	1
34	P	40525	061		TEE, 1/2 NPT	1
35	P	74115	091		NIPPLE, 1/2 NPT x 1-1/2 NPT	1
36	P	39334	061		PLUG, Pipe, 1/2 NPT	2
37	P	150474	300		WASHER, Sealing, 5/16 I.D.	60
38	P	150473	156		SCREW, Truss Head Slotted, 1/4-20 x 1/2 Long	120
39	P	150476	354		PLATE, Back-Up	1
40	R				TUBING, Nylon (Approx. Total Length: 8 Ft.)	A/R
41	P	150476	460		U-BOLT, 1/4-20	2
42	P	50240	061		REDUCER, Bushing, 1/2 NPT x 3/4 NPT	2
43	P	81059	001		CONNECTOR, Male, 1/2 ODT x 1/2 NPT	2
44	P	150474	221		NOZZLE, Spray	10
45	P	150477	297		PIPE	1
46	P	83021	001		U-BOLT, 1/4-20	2

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P-764174-002