AMSCO Maintenance Manual

MEDALLION-M SERIES
Floor Loading Sterilizer
Vacamatic II
• steam • gas
• electrical

(7/89) R-7[illegible]-001

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SUMMARY OF SAFETY PRECAUTIONS

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

WARNING: SUDDEN FULL OPENING OF CHAMBER DOOR FOLLOWING A STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST.

2-3, 2-4

WARNING: UNITS ARE DESIGNED FOR USE WITH 12-88 GAS ONLY. THE ETHYLENE OXIDE STERILANT USED WITH A COMBINATION STEAM/GAS STERILIZER HAS TOXIC PROPERTIES. USE CARE IN HANDLING.

2-5

WARNING: SOME ETHYLENE OXIDE REMAINS IN GOODS FOLLOWING STERILIZATION. ASK YOUR SUPERVISOR FOR AERATION INSTRUCTIONS.

2-5

WARNING: OPENING CHAMBER DOOR DURING A POWER FAILURE COULD RESULT IN ETHYLENE OXIDE ESCAPING FROM THE CHAMBER. IF LOAD MUST BE REMOVED DURING A PROLONGED POWER FAILURE, EXTRA VENTILATION EQUIPMENT MUST BE INSTALLED OR OTHER GAS REMOVAL PROCEDURES MUST BE ESTABLISHED IN THE AREA PRIOR TO OPENING THE CHAMBER DOOR. SEE WARNING, PAGE 2-4, AND DOOR OPENING PROCEDURE, PAGE 2-6.

2-6

WARNING: WHERE APPLICABLE, SHUT OF BUILDING STEAM SUPPLY TO STERILIZER AND ALLOW CHAMBER AND STERILIZER PIPING TO COOL TO ROOM TEMPERATURE BEFORE PERFORMING INSPECTION, MAINTENANCE, REPAIR, AND REPLACEMENT PROCEDURES.

4-1, 6-1

WARNING: ANY ETHYLENE OXIDE REMAINING IN A SUPPLY HOSE COULD BE HARMFUL SHOULD IT COME IN CONTACT WITH THE BODY. HANDLE THE HOSE CAREFULLY WHEN REPLACING CYLINDERS SO AS NOT TO SPILL ANY RESIDUAL LIQUID STERILANT WHEN THE HOSE IS DISCONNECTED. ALSO, BE SURE TO READ THE WARNINGS AND OTHER INSTRUCTIONS IN SECTION 2 CONCERNING THE HAZARDS OF ETHYLENE OXIDE.

4-3, 6-13

WARNING: WHEN PERFORMING SAFETY VALVE TESTS BE CAREFUL OF STEAM ESCAPING FROM SAFETY VALVE. TO PREVENT BURNS, WEAR GLOVES OR USE AN EXTENSION DEVICE IF IT BECOMES NECESSARY TO OPERATE THE TRY LEVER.

4-3, 7-5

WARNING: DO NOT OPEN THE FILTER ASSEMBLY UNTIL IT IS CERTAIN THAT ALL GAS PRESSURE HAS BEEN BLED OUT.

6-14

WARNING: WHEN CHECKING FOR ETHYLENE OXIDE GAS LEAKS, DO NOT USE FLAME IF FROST HAS FORMED ON TUBING BETWEEN SUPPLY BOTTLES AND GAS CONDITIONER.

7-8

SUMMARY OF SAFETY PRECAUTIONS

CONTINUED

CAUTION: When using *AMSCO STAINLESS STEEL CLEANER & POLISH* or *AMSCO Pry Cleaner*, rub in a back-and-forth motion (in the same direction as the surface grain). Do not rub with a rotary or circular motion. Do not use these cleaners on painted surfaces. Follow directions on containers.

4-1

CAUTION: Never use a wire brush or steel wool on door and chamber assembly.

4-1

CAUTION: Take care to prevent grease from getting into motor windings. Never lubricate motor while it is operating.

4-4

CAUTION: Do not operate hydraulic system with manual return line valve closed.

4-4

CAUTION: Recorders should be handled with care. Caution must be exercised when making changes to insure against kinking or compressing capillary system. The bulb, tubing and pressure element are filled with fluid approved by Scientific Instrument Makers Association and form a sealed system. This system must not be broken; even the most minute leak renders it inoperative. Excess capillary tubing should be formed into an 8'' diameter coil and properly supported by taping to any smooth, unheated surface.

6-2

CAUTION: When removing or replacing the Indicator-Recorder, be careful not to crack or break tubing.

6-3

CAUTION: When replacing packing in vacuum pump, do not hammer packing into stuffing box.

6-4

CAUTION: Overtightening gland nuts on the vacuum pump can increase motor current as much as five amperes.

6-4

CAUTION: Allow thermostatic traps to cool to room temperature before removing cover. Since there is nothing to limit expansion, diaphragm may rupture or fatigue if trap is opened while hot.

6-6

CAUTION: Solenoid valves are equipped with a special diaphragm that can be damaged by hydrocarbons such as oils, grease, etc. When replacing internal parts, wipe threads clean of cutting oils and use Teflon tape to seal joints.

6-6

SUMMARY OF SAFETY PRECAUTIONS

CONTINUED

CAUTION: **When testing, adjusting, removing, replacing or cleaning steam control valve assembly, handle syiphon, bonnet assembly and bellows assembly gently to prevent damage.**

6-7, 6-11

CAUTION: **To prevent excessive discharge of steam in immediate area, vent safety valve to drain or to outside. Size discharge piping so as not to reduce valve discharge flow.**

7-5

SECTION 1

SECTION 1

GENERAL INFORMATION

1-1. APPLICATION AND DESIGN

The literature included in this section contains technical data relating to the principal characteristics of Medallion Vacamatic II Sterilizers. The literature is informational rather than instructional, and provides a general idea of the equipment, its purpose, capabilities, limitations, and technical specifications.

1-2. SPECIAL TOOLS, EQUIPMENT AND REFERENCES

1. **Torque Wrench** (for hydraulic solenoid valves) — maximum 100 inch-pounds, Sears, Roebuck & Co. (Chicago, Ill.) Catalog No. 9HT-44643 or equivalent.

2. **Jumper Cable Assemblies** (for control console slide-out drawers) — AMSCO Part A-760138-091 (2 required per Sterilizer).

1-3. INSTALLATION INSTRUCTIONS

For proper performance, sterilizer must be installed in accordance with the instructions provided (AMSCO Publication P-32444-001). After determining that installation is complete and correct, test procedures in Section 7 of this manual may be used to check for proper performance.

1-4. GUIDELINES FOR USE OF ETHYLENE OXIDE STERILIZERS AND AERATORS

PERSONNEL OPERATING THIS EQUIPMENT SHOULD HAVE COMPLETED INSTRUCTION IN ALL PHASES OF ETHYLENE OXIDE GAS STERILIZATION AND AERATION. RESPONSIBLE SUPERVISION MUST BE PROVIDED.

1. Follow the recommendations of the equipment manufacturer for proper operation and maintenance of the equipment.

2. **Be sure ventilation/exhaust system is working properly.**

   - Sterilizers and aerators should be installed in an area that has at least 10 air changes per hour as stipulated in most building codes, or provide a suitable equivalent exhaust system.
   - Sterilizers should be vented directly to the outside, if a suitable exhaust system is not provided.
   - Aerators should be vented directly to the outside.

3. **Avoid direct contact with sterilant or excessive inhalation of its vapors.**

   - When sterilizing cycle is complete, open door approximately 6 inches and wait at least 15 minutes before removing load from sterilizer.

   - Wear protective gloves if processed items must be handled (use loading car if possible).

4. When changing gas cylinders, **avoid contact with any liquid sterilant remaining in the connecting lines and avoid prolonged or acute exposure to the gas vapor.**

5. Insure gas cylinders (both in use and storage) are out of the way of traffic and securely fastened. Storage temperature should not exceed 100° F.

USE ONLY NONFLAMMABLE/NONEXPLOSIVE GAS MIXTURES.

AMSCO

Floor-Loading Sterilizer

MEDALLION-M SERIES
Floor Loading Sterilizer
Vacamatic II
• steam

TECH DATA

APPLICATION

Using saturated steam as the sterilant, Vacamatic II processes large volume of heat- and moisture-stable wrapped fabrics and hard goods by the mechanical air removal principle; bottled liquids, by the gravity air removal principle.

SIZE AND MODEL

The chamber is 28 x 67 x 52″ (711x 1702x1321mm) or 28 x 67 x 78″ (711x 1702x1981mm) (inside), as specified. Single- or double-door models are available in either size.

DESIGN AND CONSTRUCTION

General. The pressure vessel is steam-jacketed. The chamber withstands internal pressure of 45 psig (3.16 kg/cm²); also full chamber vacuum, even with simultaneous 45 psig (3.16 kg/cm²) jacket pressure. The vessel complies with applicable requirements of ASME's *Boiler and Pressure Vessel Code* and is so stamped; a copy of ASME Form U-1 is furnished.

Jacket and Chamber Assembly.

- **Inner (chamber) Shell** is nickel clad steel and features stainless-steel loading car support rollers.

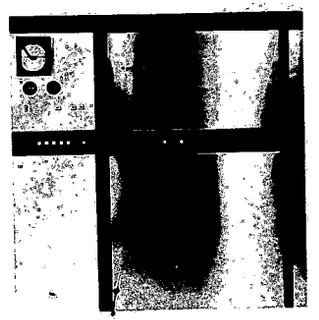
- **Insulation.** The exterior of the outer (jacket) shell is painted and then covered with a glass fiber blanket (1″ [25mm] thick, nominal), faced on both sides with aluminum foil. The insulation is held by pressure-sensitive tape.

Door (or doors) is of the same material as the inner shell and power driven; the inner side contains a silicone-rubber sealing gasket. A stainless-steel cover conceals the door exterior. Other features include:

- Door frame, of carbon steel. Surfaces in contact with the door gasket and sterilant are Monel.

- Bearing-mounted hinge ... on either the right or left side of the chamber as specified. Hinge is adjustable for accurate gasket alignment and easy door opening and closing.

- Door opening and closing mechanism, with automatic obstruction stop, powered by a motor-driven hydraulic pump. Motor has a remote controlled,



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Size
- ☐ 28x67x52″ (711x1702x1321mm)
- ☐ 28x67x78″ (711x1702x1981mm)

Model
- ☐ Single Door (for recessing into one wall)
- ☐ Double Door (for recessing into two walls)

Vacuum Pump Motor
- ☐ 200 Volts ☐ 230 Volts
- ☐ 460 Volts

Door Hinge Location
Single-door Model
- ☐ Left
- ☐ Right

Double-door Model (Control End First)
- ☐ Left/Left
- ☐ Right/Right
- ☐ Left/Right
- ☐ Right/Left

Materials Handling Accessories
- ☐ Surgical Instrument Trays
  Qty: Half-length_____
  Full-Length_____
  Emergency_____
- ☐ Loading Cart *(See separate product literature)*

Item No. _____
Location(s) _____

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ambient-compensated starter with overload protection.

- Hydraulically actuated, self-adjusting locking wedges to force the door and gasket tightly against the door frame to prevent steam leaks. The wedges must be engaged before a cycle can be initiated.
- Safety switch to prevent the door control system from allowing the door to be opened once chamber pressure exceeds 2 psig (0.14 kg/cm²). The switch is released only when chamber pressure is reduced to approximately atmospheric. After door is closed pressure-tight, the wedges maintain gasket seal to prevent steam leaks from the chamber.
- Door control system, in a service-oriented slide-out drawer, provides four modes of automatic operation as follows ... each actuated by a selector button and controlled by hydraulic cylinders.

  • "Lock" — to close the door, and lock it pressure-tight;

  • "Close" — to close the door without compressing the gasket;

  • "Open" — to unlock and open the door; and

  • "Unlock" — to unlock and position the door slightly ajar.

  In addition to the automatic obstruction stop feature, there's a separate "Stop" button by which the door can be halted at any point of its travel. The door also is fully operable by hand pump and valves in the event of electric power failure.
- Double-door models include an interlock to prevent simultaneous opening of both doors.

AUTOMATIC CONTROL

The automatic control operates on 120-volt, 60-Hz service. And it is also manually operable for processing goods by the gravity air removal principle.

After programming and starting the control, no further attention is necessary until completion of the selected cycle is indicated by an alarm and signal light. The automatic cycle sequences are as follows:

Wrapped Goods

- chamber is purged of air by pressure-vacuum excursions;
- chamber is charged with steam to the selected sterilizing temperature; (up to 285 F [141 C]);
- chamber is evacuated of steam vapor;
- fabrics are dried; and
- chamber is returned to atmospheric pressure by filtered air.

Bottled Liquids

- chamber is charged with steam to 252-258 F (122-126 C) for desired time, and then
- chamber is slowly evacuated of steam to prevent excessive boiling of liquids.

INSTRUMENTATION

Main Controls are conveniently located at the front of the sterilizer, adjacent to the door. The controls are protected in a service-oriented, slide-out drawer. Instrumentation includes • temperature indicator-recorder-controller • exposure and vacuum-drying timers • control power switch • cycle-program-selector and reset push buttons. The program-selector buttons glow when actuated and lock automatically to prevent alternate cycle selection unless the reset button is pressed or the selected cycle is completed. A chamber pressure/vacuum gauge and color-coded, cycle-phase-indicating lights are on the door cover.

The door control buttons are beneath the main controls, also in a slide-out drawer. Double-door models include a light that indicates whether the door opposite the control end is open or closed.

Secondary Controls are behind a side-hinged door beneath the main control panel. They include jacket-pressure gauge and manual door controls.

Indicator-Recorder-Controller controls the sterilizing exposure timer and automatically indicates and records temperature through each cycle. The recorder has a 6'' (152mm) diameter chart driven by a synchronous (24-hour) motor. The sensor is in the chamber drain line. This instrument also provides selection and control of the processing temperatures. The recording pen is the pressure-sensitive cartridge type; one hundred charts and six cartridges are furnished.

Exposure and Dry Timers (adjustable between 0-90 minutes) automatically reset upon completion of their selected time intervals, in the event of electric power failure, and if, while sterilizing, the chamber drops 2 F (1.1 C) below the set value.

Supplemental Instrumentation For Double-door Models. A console, opposite the control end of the sterilizer, contains a jacket-pressure gauge, wrapped goods cycle selector and reset buttons, plus the automatic and manual door controls. A chamber-pressure gauge and cycle-phase indicating lights are on the door cover.

COMPONENT OPERATING SYSTEMS

Vacuum System includes a motor-driven, water-ring pump. The pump and motor (7.5 hp) form a parallel vibrationless unit mounted on a platform behind the control console. The motor, operable on either 200-, 230- or 460-volt (as specified), 60-Hz, 3-phase electric power has a remotely controlled, ambient-compensated starter, overload protectors, and a (magnetic) coil-operated relay. The water supply line to the pump includes flow controls.

Power System. The sterilizer is regulated, valved, piped, and trapped for operation on steam from an independent source, delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). These lines terminate in fittings, ready for connection to building service lines. The supply line includes a strainer.

Exhaust System. Chamber effluent steam is automatically condensed and conducted to waste.

Air-filtering System. Air to the chamber, following each wrapped goods cycle, is through a bacteria-retentive filter.

Solution Exhaust System. This separate system functions through the automatic control to permit slow chamber pressure drop and prevent excessive solution boiling.

Drying. The sterilizer will so dry a standard surgical pack immediately following its sterilization that (a) there will be no visible wet spots and (b) retained moisture will not have increased the weight of the pack more than three percent.

MOUNTING ARRANGEMENT

The sterilizer is so arranged that when mounted in a pit the floor of the chamber is aligned with the floor of the adjacent work area. This allows a loading cart to be easily moved into and out of the chamber. A single-door model is additionally arranged for recessing into one wall; a double-door model for recessing into two walls. Epoxy-coated steel, wall opening concealment panels are included.

OTHER APPURTENANCES

- **Manual Valves** are bronze with renewable seats or equivalent high-quality parts. Each valve withstands a 350-psig (24.61 kg/cm²) hydrostatic test, or is leak-proof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Handles are low-heat conducting and easy to replace.
- **Baffle** shields the steam-to-chamber port to prevent wetting the load.
- **Sanitary Safeguards** prevent backflow of pollutants into the water-supply system and sterilizer.

MATERIALS HANDLING ACCESSORIES

Surgical Instrument Trays. Each of these trays is welded Monel with perforated bottom. A carrying handle on each end folds inward parallel to the top of the tray. A full-length tray is approximately 20½'' long x 10½'' wide x 3'' deep (521x267x76mm); a half-length tray, approximately 9'' long x 10½'' wide x 3'' deep (229x267 x76mm).

Emergency Instrument Mini Tray is 9½'' long x 4'' wide x 1¾'' deep (241x102x44mm) and constructed of stainless steel. It has a perforated bottom to allow efficient sterilant circulation and includes a (sterilizable) handle.

Loading Cart *(See Separate Product Literature.)*

MATERIAL SPECIFICATIONS

Stainless Steel conforms with ASTM Specification A 240 for alloy 302 or 304, if welded; alloy 201, 202, 302 or 304, if formed without welding.

Coated Panels are cold-rolled steel. Exposed surfaces have three sprayed-on coatings; surface primer, oven-baked intermediate coating, and textured epoxy.

Steam, Water and Waste Lines: black-iron pipe and copper tubing (ASTM Specification B 88); red-brass tubing (ASTM Specification B 135, alloy 1); and brass pipe (ASTM Specification B 43). Fittings are brass.

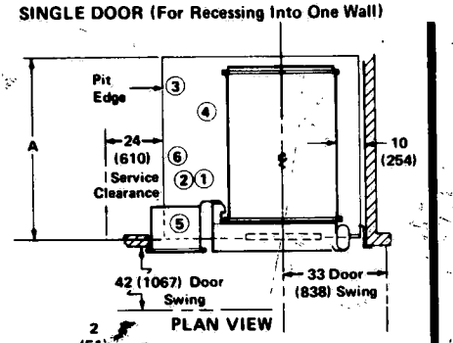
Finish. Exposed stainless-steel parts are polished.

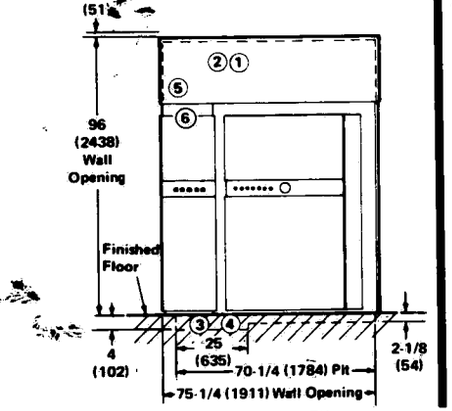
ENGINEERING DATA

SIZE (in.) (mm)	WEIGHT (lbs) (kg)		UTILITIES CONSUMPTION					HEAT LOSS (BTU/hr at 70 F)			
			Water (gpm)* (l/m)		Steam			Single Door (Thru One Wall)		Double Door (Thru Two Walls)	
	Single Door	Double Door	Peak	Average	Peak** (lbs/m) (kg/m)	Average** (lbs/hr) (kg/hr)	Total (lbs/cycle) (kg/cycle)	Front of Wall	Room Back of Wall	At Each End	Between Walls
28x67x52 (711x1702x1321)	9,500 (4313)	10,500 (4767)	45 (170)	25 (95)	25 (11.4)	320 (145.3)	115 (52.2)	6,000	15,680	6,000	12,620
28x67x78 (711x1702x1981)	11,000 (4994)	12,000 (5448)	45 (170)	25 (95)	28 (12.7)	400 (181.6)	141 (64.0)	6,000	22,040	6,000	18,980

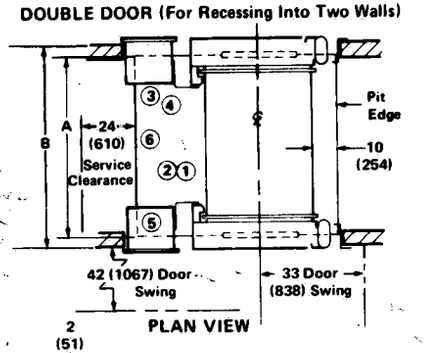
*At 70 F (21C) **During Processing

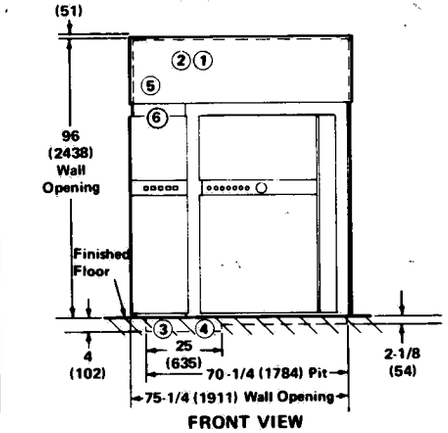
SINGLE DOOR (For Recessing Into One Wall)





DOUBLE DOOR (For Recessing Into Two Walls)





DIMENSIONS ARE INCHES (MILLIMETERS) – DRAWING IS NOT TO SCALE

CHAMBER SIZE	A	B
28 x 67 x 52 (711x1702x1321)	62-3/4 (1594)	70-3/4 (1797)
28 x 67 x 78 (711x1702x1981)	90 (2285)	98 (2489)

(1) **COLD WATER** – 1-1/2 NPT (50 to 80 psig [3.52 to 5.62 kg/cm^2], dynamic)

(2) **STEAM SUPPLY** – 1-1/2 NPT (50 to 80 psig [3.52 to 5.62 kg/cm^2], dynamic; condensate free, between 97 and 100 percent saturated vapor)

(3) **STEAM RETURN** – 1 NPT (discharge to waste)

(4) **DRAIN** – Open Floor, 3" minimum

(5) **TERMINAL BOX** – 120 Volt (21.7 Amp) 60 Hz – For Controls and Hydraulic Pump Motor

(6) **TERMINAL BOX** – 200 (22.9 Amp), 230 (20.6 Amp), or 460 (10.3 Amp) Volt, 60 Hz, 3 Phase – For Vacuum Pump Motor

. . . CHECK LOCAL CODES . . .

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Access to the recessing area from the control end of the sterilizer is recommended.
3. Clearances shown are minimal for installing and servicing the equipment.
4. If loading cart will be used, clearance in front of the sterilizer should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading cart from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
5. Units shown are with right-hand door swing at operating end. Dimensions, connections and clearances for left-hand door swing are identical, but reversed. Door-swing clearances opposite control end for double-door models are identical to those shown for control end.

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

AMSCO

MEDALLION-M SERIES
Floor Loading Sterilizer
Vacamatic II
Ethylene Oxide Gas

TECH DATA

SD—136R3
(6/84)

APPLICATION

AMSCO Vacamatic II is for sterilizing large volumes of sterilizable heat- and moisture-labile materials with a sterilant mixture of approximately 12% ethylene oxide and 88% dichlorodifluoromethane.

SIZE AND MODEL

The inside dimensions of the chamber are 28 x 67 x 52 inches (711 x 1702 x 1321 mm) or 28 x 67 x 78 inches (711 x 1702 x 1981 mm), as specified. Single- or double-door models are available in either size.

DESIGN AND CONSTRUCTION

General. The pressure vessel is steam-jacketed. The chamber withstands internal pressure of 45 psig (3.16 kg per sq cm); also full chamber vacuum, even with simultaneous 45 psig jacket pressure. The vessel complies with applicable requirements of ASME's *Boiler and Pressure Vessel Code* and is so stamped; a copy of ASME Form U-1 is furnished.

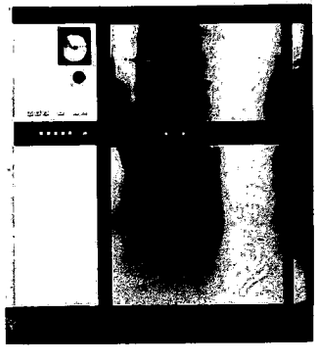
Jacket and Chamber Assembly.

- **Inner (chamber) Shell** is nickel clad steel and features stainless-steel loading car support rollers.
- **Insulation.** The exterior of the outer (jacket) shell is painted and then covered with (nominal) 1-inch (25 mm) thick glass fiber, faced on both sides with aluminum foil. The insulation is held by pressure-sensitive tape.

Door (or doors) is of the same material as the inner shell and power driven; the inner side contains a silicone-rubber sealing gasket. A stainless-steel cover conceals the door exterior. Other features include:

- Door frame, of carbon steel. Surfaces in contact with the door gasket and sterilant are Monel.
- Bearing-mounted hinge . . . on either the right or left side of the chamber as specified. Hinge is adjustable for accurate gasket alignment and easy door opening and closing.
- Door opening and closing mechanism, with automatic obstruction stop, powered by a motor-driven hydraulic pump. Motor has a remote controlled, ambient-compensated starter with overload protection.
- Hydraulically actuated, self-adjusting locking wedges to force the door and gasket tightly against the door frame to prevent leaks. The wedges must be engaged before a cycle can be initiated.
- Safety switch to prevent the door control system from allowing the door to be opened once chamber pressure exceeds 2 psig (0.14 kg per sq cm). The switch is released only when chamber pressure is reduced to approximately atmospheric. After door is closed pressure-tight, the wedges maintain gasket seal to prevent leaks from the chamber.
- Door control system, in a service-oriented slide-out drawer, provides four modes of automatic operation as follows . . . each actuated by a selector button and controlled by separate hydraulic cylinders.
  - "Lock" — to close the door, and lock it pressuretight;
  - "Close" — to close the door without compressing the gasket;
  - "Open" — to unlock and open the door; and
  - "Unlock" — to unlock and position the door slightly ajar.

In addition to the automatic obstruction stop feature, there's



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Size
☐ 28x67x52" (711x1702x1321 mm)
☐ 28x67x78" (711x1702x1981 mm)

Vacuum Pump Motor
☐ 200 Volts
☐ 230 Volts
☐ 460 Volts

Model
☐ Single Door (for recessing into one wall)
☐ Double Door (for recessing into two walls)

Door Hinge Location
Single-door Model
☐ Left ☐ Right
Double-door Model (Control End First)
☐ Left/Left ☐ Left/Right
☐ Right/Right ☐ Right/Left

Materials Handing Accessories
☐ Surgical Instrument Tray(s)
Qty: Half-length_____
Full-length_____
Emergency_____
☐ Loading Cart *(See separate product literature)*

Item No. _____
Location(s) _____
_____
_____

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

Printed in U.S.A.

a separate "Stop" button by which the door can be halted at any point of its travel. The door also is fully operable by hand pump and valves in the event of electric power failure.

Double-door models include an interlock to prevent simultaneous opening of both doors.

AUTOMATIC CONTROL

Automatic operation ensures sterilization in the shortest possible time. The control operates on 120-volt, 60-Hz service.

After programming and starting the control, no further attention is necessary until completion of the selected cycle is indicated by an alarm and signal light.

INSTRUMENTATION

Main Controls are conveniently located at the front of the sterilizer, adjacent to the door. The controls are protected in a service-oriented, slide-out drawer. Instrumentation includes • indicator-recorder • exposure timer • over-temperature button • cylinder changeover buttons • power switch • low-gas-pressure indicating light • cycle-program-selector and reset push buttons. The program-selector buttons glow when actuated and lock automatically to prevent alternate cycle selection unless the reset button is pressed or the selected cycle completed. A chamber pressure/vacuum gauge and color-coded, cycle-phase-indicating lights are on the door cover.

The door control buttons are beneath the main controls, also in a slide-out drawer. Double-door models include a light that indicates whether the door opposite the control end is open or closed.

Secondary Controls are behind a side-hinged door beneath the main control panel. They include jacket-pressure gauge, gas cylinder-pressure gauges and manual door controls.

Indicator-Recorder indicates chamber vacuum (in. Hg) and pressure (psi). It also records temperature, vacuum and pressure throughout each cycle. The recorder has a 6 inch (152 mm) diameter chart driven by a synchronous (24-hour) motor. The dual recording pens are pressure-sensitive cartridge type; one hundred charts and six cartridges for each pen are furnished.

Exposure Timer (adjustable between 0-18 hours) automatically resets upon completion of the selected time interval, in the event of electric power failure, and if, while sterilizing, the chamber drops 5 F (3 C) below the set value.

Supplemental Instrumentation For Double-door Models. A console, opposite the control end of the sterilizer, contains a jacket-pressure gauge, plus the automatic and manual door controls. A chamber-pressure gauge and cycle-phase indicating lights are on the door cover.

COMPONENT OPERATING SYSTEMS

Vacuum System includes a motor-driven, water-ring pump. The pump and motor (7.5 hp) form a parallel vibrationless unit mounted on a platform behind the control console. The motor, operable on either 200-, 230- or 460-volt (as specified), 60-Hz, 3-phase electric power has a remotely controlled, ambient-compensated starter, overload protectors, and a (magnetic) coil-operated relay. The water supply line to the pump includes a flow-control valve to compensate for supply pressure fluctuations.

Load-Conditioning System automatically injects steam into the chamber to maintain the required levels of heat and moisture. The system is regulated, valved and trapped for operation on steam from an independent source, delivered at 50-80 psig (3.52-5.62 kg per sq cm).

Exhaust System. Chamber effluent steam and sterilant are condensed or dissolved and automatically conducted to waste.

Sterilant System. Throughout the sterilizing cycle, sterilant (in its gaseous state) is automatically supplied to the chamber on demand as required by the cycle selected. The system, employing two supply cylinders, monitors supply pressure. In addition, when one of the cylinders is spent, the system will automatically switch it out and switch in the serviceable one ... without interrupting the cycle. And it will actuate a light on the main control panel to signal the presence of the spent cylinder.

Furthermore, should the chamber exceed 145 F (63 C) during a cycle, this system will (1) automatically actuate a warning light on the main control panel (2) stop the flow of gas to the chamber and (3) evacuate the chamber and flush it with filtered air.

MOUNTING ARRANGEMENT

The sterilizer is so arranged that when mounted in a pit the floor of the chamber is aligned with the floor of the adjacent work area. This allows a loading cart to be easily moved into and out of the chamber. A single-door model is additionally arranged for recessing into one wall; a double-door model for recessing into two walls. Epoxy-coated steel, wall opening concealment panels are included.

OTHER APPURTENANCES

- **Manual Valves** (angle) are bronze with renewable Monel seats and synthetic discs or equivalent high-quality parts. Each valve withstands a 350-psig (24.61 kg per cm sq) hydrostatic test, or is leakproof when tested at 100-psig (7.03 kg per cm sq) air pressure with valve body submerged in water. Handles are low-heat conducting and easy to replace.

MATERIALS HANDLING ACCESSORIES

- **Surgical Instrument Trays** are welded Monel with perforated bottoms. Each tray has a carrying handle which, when not in use, folds inward parallel to the top. A full-length tray is approximately 20½-inches long x 10½-inches wide x 3-inches deep (521x267x76 mm); a half-length tray, approximately 9-inches long x 10½-inches wide x 3-inches deep (229x267x76 mm).

- **Emergency Instrument Mini Tray** is 9½-inches long x 4-inches wide x 1¾-inches deep (241x102x44 mm) and constructed of stainless-steel. It has a perforated bottom to allow efficient sterilant circulation and includes a removable (sterilizable) handle.

MATERIAL SPECIFICATIONS

Stainless Steel conforms with ASTM Specification A 240 for alloy 302 or 304, if welded, alloy 201, 202, 302 or 304, if not welded.

Coated Panels are cold-rolled steel. Exposed surfaces have three sprayed-on coatings; surface primer, oven-baked intermediate coating, and textured epoxy.

Steam, Water and Waste Lines. Black-iron pipe and copper tubing (ASTM Specification B 88); red-brass tubing (ASTM Specification B 135, alloy 1); and brass pipe (ASTM Specification B 43). Fittings are brass.

Finish. Exposed stainless-steel parts are polished.

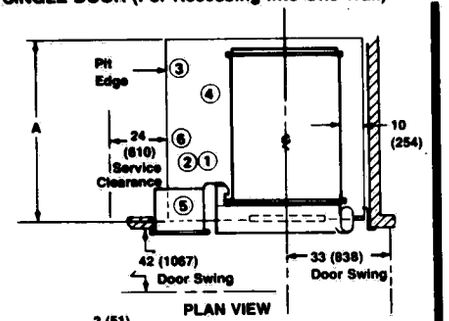
ENGINEERING DATA

SIZE — inches (mm)	WEIGHT — lbs (kg)		CONSUMPTION					HEAT LOSS — BTU/hr			
				Water*		Steam		Single Door		Double Door	
	Single Door	Double Door	Gas Sterilant† — lbs/cycle (kg/cycle)	Peak Flow — gpm (liter/min)	gallon/ cycle (liter/cycle)	Peak Flow — lbs/min (kg/min)	Average Flow — lbs/hr** (kg/hr)	front of wall	recessed area	front of wall††	between walls
28x67x52 (711x1702x1321)	9500 (4313)	10,500 (4767)	22 (10.0)	45 (170)	350 (1325)	22 (10)	50 (23)	5500	8100	5500	6900
28x67x78 (711x1702x1981)	11,000 (4994)	12,000 (5448)	36 (16.3)	45 (170)	350 (1325)	22 (10)	50 (23)	5500	13,100	5500	11,100

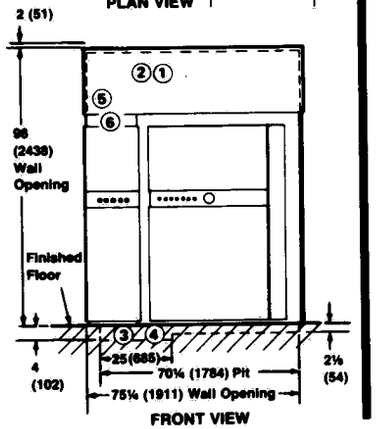
*At 70 F (21 C)
**During processing
†At 125-135 F (52-57 C)
††For each door

NOTE: For guidelines and recommendations on the control of occupational exposure to EtO in health industries, refer to AMSCO publication 08-3002: **Recommendations For Effective Use and Installation of Ethylene Oxide Sterilizers and Aerators.**

SINGLE DOOR (For Recessing Into One Wall)

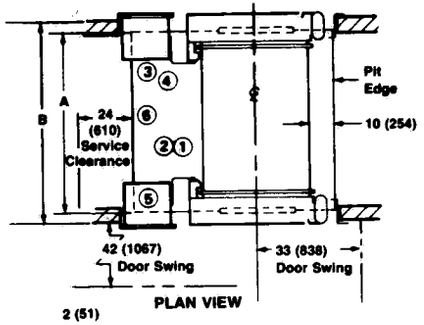


PLAN VIEW

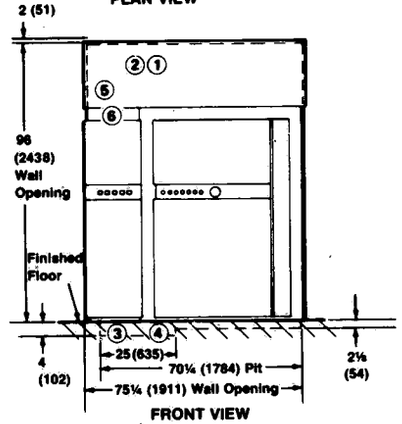


FRONT VIEW

DOUBLE DOOR (For Recessing Into Two Walls)



PLAN VIEW



FRONT VIEW

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

CHAMBER SIZE	A	B
28 x 67 x 52 (711x1702x1321)	62¾ (1594)	70¾ (1797)
28 x 67 x 78 (711x1702x1981)	90 (2285)	98 (2489)

OPERATING REQUIREMENTS

1. **COLD WATER** — 1½ NPT; 50 to 80 psig (3.52 to 5.62 kg per sq cm), dynamic
2. **STEAM SUPPLY** — 1½ NPT; 50 to 80 psig (3.52 to 5.62 kg per sq cm), dynamic; condensate free, between 97 and 100% saturated vapor
3. **STEAM RETURN** — 1 NPT (discharge to waste)
4. **DRAIN** — Open Floor, 3" minimum
5. **TERMINAL BOX** — 120 Volt (21.7 Amp) 60 Hz — For Controls and Hydraulic Pump Motor
6. **TERMINAL BOX** — 200 (23 Amp), 230 (20.6 Amp), or 460 (10.3 Amp) Volt, 60 Hz, 3 Phase — For Vacuum Pump Motor

... CHECK LOCAL CODES ...

NOTES

1. Pipe sizes shown indicate terminal outlets only. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Access to the recessing area from the control end of the sterilizer is recommended.
3. Clearances shown are minimal for installing and servicing the equipment.
4. If loading cart will be used, clearance in front of the sterilizer should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading cart from the chamber and allow convenient maneuverability to and from the sterilizer.
5. Units shown are with right-hand door-swing. Dimensions, connections and clearances for left-hand door swing are identical, but reversed. Door-swing clearances opposite control end for double-door models are identical to those shown for control end.
6. Gas cylinders (not by AMSCO) are to be remotely mounted. Gas supply piping to be stainless steel.
7. It is recommended that the Gas sterilizer equipment be maintained and operated in a 70 to 100 F (21 to 38 C) environment. The area should also have at least 10 air changes per hour.

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

AMSCO

MEDALLION-M SERIES
Floor Loading Sterilizer
Vacamatic II
Combination Steam/Ethylene Oxide Gas

TECH DATA

SD—136R4
(6/84)

APPLICATION

Vacamatic II is for sterilizing large volumes of materials with either saturated steam or a mixture of approximately 12% ethylene oxide and 88% dichlorodifluoromethane.

SIZE AND MODEL

The inside dimensions of the chamber are 28x67x52 inches (711x1702x1321 mm) or 28x67x78 inches (711x1702x1981 mm), as specified. Single- or double-door models are available in either size.

DESIGN AND CONSTRUCTION

General. The pressure vessel is steam jacketed. The chamber withstands internal pressure of 45 psig (3.16 kg per sq cm), also full chamber vacuum, even with simultaneous 45 psig (3.16 kg per sq cm) jacket pressure. The vessel complies with applicable requirements of ASME's *Boiler and Pressure Vessel Code* and is so stamped; a copy of ASME Form U-1 is furnished.

Jacket and Chamber Assembly.

- **Inner (chamber) Shell** is nickel clad steel and features stainless-steel loading car support rollers.
- **Insulation.** The exterior of the outer (jacket) shell is painted and then covered with 1-inch (25 mm) thick glass fiber (nominal) faced on both sides with aluminum foil. The insulation is held by pressure-sensitive tape.

Door (or doors) is of the same material as the inner shell and power driven; the inner side contains a silicone-rubber sealing gasket. A stainless-steel cover conceals the door exterior. Other features include:

- Door frame, of carbon steel. Surfaces in contact with the door gasket and sterilant are Monel.
- Bearing-mounted hinge ... on either the right or left side of the chamber as specified. Hinge is adjustable for accurate gasket alignment and easy door opening and closing.
- Door opening and closing mechanism, with automatic obstruction stop, powered by a motor-driven hydraulic pump. Motor has a remote controlled, ambient-compensated starter with overload protection.
- Hydraulically actuated, self-adjusting locking wedges to force the door and gasket tightly against the door frame to prevent leaks. The wedges must be engaged before a cycle can be initiated.
- Safety switch to prevent the door control system from allowing the door to be opened once chamber pressure exceeds 2 psig (0.14 kg per sq cm). The switch is released only when chamber pressure is reduced to approximately atmospheric. After door is closed pressure-tight, the wedges maintain gasket seal to prevent leaks from the chamber.
- Door control system, in a service-oriented, slide-out drawer, provides four modes of automatic operation, as follows ... each actuated by a selector button and controlled by separate hydraulic cylinders.

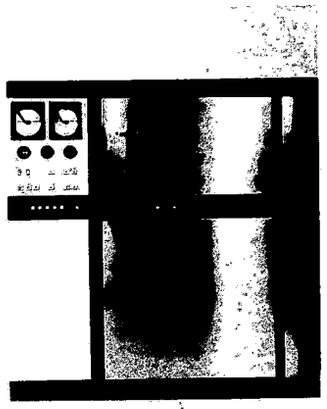
  • "Lock" — to close the door, and lock it pressuretight;

  • "Close" — to close the door without compressing the gasket;

  • "Open" — to unlock and open the door; and

  • "Unlock" — to unlock and position the door slightly ajar.

  In addition to the automatic obstruction stop feature, there's



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Size

☐ 28x67x52 inches (711x1702x1321mm)
☐ 28x67x78 inches (711x1702x1981mm)

Vacuum Pump Motor

☐ 200 Volts
☐ 230 Volts
☐ 460 Volts

Model

☐ Single Door (for recessing into one wall)
☐ Double Door (for recessing thru two walls)

Door Hinge Location

Single-door Model
☐ Left ☐ Right

Double-door Model (Control End First)
☐ Left/Left ☐ Left/Right
☐ Right/Right ☐ Right/Left

Materials Handling Accessories

☐ Surgical Instrument Trays
Qty: Half-length _____
Full-length _____
Emergency _____
☐ Loading Cart *(See separate product literature)*

Item No. _____
Location(s) _____

Because of American Sterilizer Company's continuing program of res [illegible] lopment, all specifications and descriptions are subject to change without notice.

Printed in U.S.A.

a separate "Stop" button by which the door can be halted at any point of its travel. The door also is fully operable by hand pump and valves in the event of electric power failure.

- Double-door models include an interlock to prevent simultaneous opening of both doors.

AUTOMATIC CONTROL

The automatic sterilizing control system (120 V — 60 Hz) provides alternate selection of any one of the different cycles. Regardless of the cycle selected, all the operator need do is program and start the control. No further attention is necessary until completion of the cycle, as indicated by an alarm and signal light. The cycles are as follows:

- **Steam high-temperature/prevacuum cycle** for heat- and moisture-stable wrapped and hard goods.

- **Steam cycle (by the gravity air removal principle)** — for bottled liquids. Sterilizes the load at 252-258 F (122-126 C) and then slowly evacuates the chamber to prevent excessive boiling of liquids.

- **Standard AMSCO Cycle (SAC)** for packaged or unpackaged heat- and moisture-labile materials.

INSTRUMENTATION

Main Controls are conveniently located at the front of the sterilizer, adjacent to the door. The controls are protected in a service-oriented, slide-out drawer. Instrumentation includes • indicator-recorders • exposure and vacuum-drying timers • gas overtemperature button • gas cylinder changeover buttons • low-gas-pressure indicating light • power switch • steam/gas cycle mode selection switch • cycle-program-selector and reset push buttons. The program-selector buttons glow when actuated and lock automatically to prevent alternate cycle selection unless the reset button is pressed or the selected cycle is completed. A chamber pressure/vacuum gauge and color-coded, cycle-phase-indicating lights are on the door cover.

The door control buttons are beneath the main controls, also in a slide-out drawer. Double-door models include a light that indicates whether the door opposite the control end is open or closed.

Secondary Controls are behind a side-hinged door beneath the main control panel. They include jacket-pressure gauge, gas cylinder-pressure gauges, manual valves and manual door controls.

Indicator-Recorders

- **For Steam Cycles,** this instrument controls the sterilizing exposure timer and provides selection and control of processing temperature. It also automatically indicates and records chamber temperature throughout each cycle.

- **For Gas Cycle,** it indicates chamber vacuum (in. Hg) and pressure (psi) and also automatically records temperature, vacuum and pressure throughout the cycle.

Each recorder has a 6 inch (152 mm) diameter chart driven by a synchronous (24-hour) motor. The sensors are in the chamber drain line. The recording pens are the pressure-sensitive cartridge type; one hundred charts and six cartridges for each pen are furnished.

Exposure Timers (adjustable between 0-90 minutes for steam cycles, 0-18 hours for gas cycle) automatically reset upon completion of their selected time intervals, in the event of electric power failure, and if, while sterilizing, the chamber drops 2 F (1.1 C) below the set value for steam cycles, 5 F (3 C) for gas cycles.

Supplemental Instrumentation For Double-door Models. A console, opposite the control end of the sterilizer, contains a jacket-pressure gauge, wrapped goods cycle selector and reset buttons, plus the automatic and manual door controls. A chamber-pressure gauge and cycle-phase indicating lights are on the door cover.

COMPONENT OPERATING SYSTEMS

Vacuum System includes a motor-driven, water-ring pump. The pump and motor (7.5 hp) form a parallel vibrationless unit mounted on a platform behind the control console. The motor, operable on either 200-, 230- or 460-volt (as specified), 60 Hz, 3-phase electric power has a remotely controlled, ambient-compensated starter, overload protectors, and a (magnetic) coil-operated relay. The water supply line to the pump includes a flow-control valve to compensate for supply pressure fluctuations.

Power System. The sterilizer is regulated, valved, piped, and trapped for operation on steam from an independent source, delivered at 50 to 80 psig (3.52 to 5.62 kg per sq cm). These lines terminate in fittings, ready for connection to building service lines. The supply line includes a strainer.

Load-Conditioning System for Gas Cycle automatically injects steam into the chamber to maintain the required levels of heat and moisture.

Exhaust System. Chamber effluent steam and gaseous sterilant are condensed or dissolved and automatically conducted to waste.

Air-filtering System. Air to the chamber, following each cycle, is through a bacteria-retentive filter.

Solution Exhaust System. This separate system functions through the automatic control to permit slow chamber pressure drop and prevent excessive solution boiling.

Drying System for Steam Cycles. The sterilizer will so dry a standard surgical pack, immediately following its sterilization, that (a) there are no visible wet spots and (b) retained moisture will not have increased the weight of the pack more than 3 percent.

Jacket-cooling System. When gas sterilization is the selected mode, this system automatically regulates the flow of water into the jacket to cool the chamber to 130 F (54 C) before the cycle starts.

Sterilant System for Gas Cycle. Throughout the sterilizing cycle, sterilant (in its gaseous state) is automatically supplied to the chamber as required by the cycle selected. The system, employing two supply cylinders, monitors supply pressure. In addition, when one of the cylinders is spent, the system will automatically switch it out and switch in the serviceable one . . . without interrupting the cycle. And it will actuate a light on the main control panel to signal the presence of the spent cylinder.

Furthermore, should the chamber exceed 145 F (63 C) during a cycle, this system will (1) automatically actuate a warning light on the main control panel, (2) stop the flow of gas to the chamber, and (3) evacuate the chamber and flush it with filtered air.

MOUNTING ARRANGEMENTS

The sterilizer is so arranged that when mounted in a pit the floor of the chamber is aligned with the floor of the adjacent work area. This allows a loading cart to be easily moved into and out of the chamber. A single-door model is additionally arranged for recessing into one wall; a double-door model for recessing thru two walls. Epoxy-coated steel, wall-opening concealment panels are included.

OTHER APPURTENANCES

- **Manual Valves** are bronze with renewable seats or equivalent high-quality parts. Each valve withstands a 350-psig (24.61 kg per sq cm) hydrostatic test, or is leakproof when tested at 100-psig (7.03 kg per sq cm) air pressure with valve body submerged in water. Handles are low-heat conducting and easy to replace.

- **Baffle** shields the steam-to-chamber port to prevent wetting the load.

- **Sanitary Safeguards** prevent backflow of pollutants into the water-supply system and sterilizer.

MATERIALS HANDLING ACCESSORIES

- **Surgical Instrument Trays** are welded Monel with perforated bottoms. Each tray has a carrying handle which, when not in use, folds inward parallel to the top. A full-length tray is approximately 20½ inches long x 10½ inches wide x 3 inches deep (521x267x76 mm); a half-length tray, approximately 9 inches long x 10½ inches wide x 3 inches deep (229x267x76 mm).

- **Emergency Instrument Mini Tray** is 9½ inches long x 4 inches wide x 1¾ inches deep (241x102x44 mm) and constructed of stainless steel. It has a perforated bottom to allow efficient sterilant circulation and includes a removable (sterilizable) handle.

Loading Cart *(See Separate Product Literature.)*

MATERIAL SPECIFICATIONS

Stainless Steel conforms with ASTM Specification A 240 for alloy 302 or 304, if welded, alloy 201, 202, 302 or 304, if not welded.

Coated Panels are cold-rolled steel. Exposed surfaces have three sprayed-on coatings; surface primer, oven-baked intermediate coating, and textured epoxy.

Steam, Water and Waste Lines: black-iron pipe and copper tubing (ASTM Specification B 88); red-brass tubing (ASTM Specification B 135, alloy 1); and brass pipe (ASTM Specification B 43). Fittings are brass.

Finish. Exposed stainless-steel parts are polished.

ENGINEERING DATA

SIZE — inches (mm)	WEIGHT — lbs (kg)		CONSUMPTION							
			Gas Sterilant† lbs/cycle (kg/cycle)	Maximum Water*		Steam				
						Steam Cycle			Gas Cycle	
	Single Door	Double Door		Peak — gpm (liters/m)	gpc (liters per cycle)	Peak**— lbs/m (kg/m)	Average**— lbs/hr (kg/hr)	Total — lbs/cycle (kg/cycle)	Peak Flow— lbs/m (kg/m)	Average Flow **— lbs/hr (kg/hr)
28x67x52 (711x1702x 1321)	9,500 (4313)	10,500 (4767)	22 (10.0)	45 (170)	350 (1325)	25 (11.4)	320 (145.3)	115 (52.2)	22 (10)	50 (23)
28x67x78 (711x1702x 1981)	11,000 (4994)	12,000 (5448)	36 (16.3)	45 (170)	350 (1325)	28 (12.7)	400 (181.6)	141 (64.0)	22 (10)	50 (23)

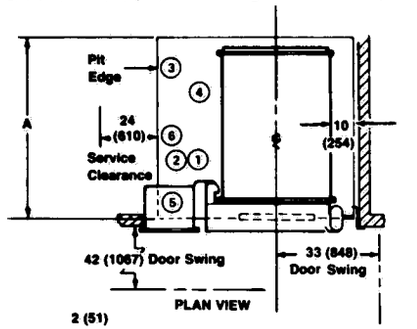
*At 70 F (21 C) **During processing †At 125-135 F (52-57 C)

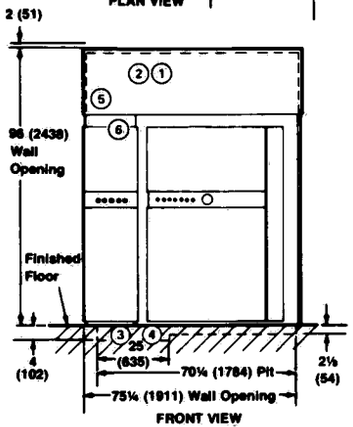
SIZE — inches (mm)	HEAT LOSS — BTU/hr*							
	Single Door				Double Door			
	Steam Cycle		Gas Cycle		Steam Cycle		Gas Cycle	
	front of wall	recessed area	front of wall	recessed area	front of wall††	between walls	front of wall††	between walls
28x67x52 (711x1702x1321)	11,300	16,100	5500	8100	11,300	13,700	5500	6900
28x67x78 (711x1702x1981)	11,300	26,200	5500	13,100	11,300	22,200	5500	11,100

††For each door

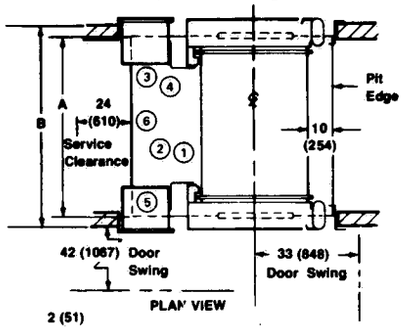
NOTE: For guidelines and recommendations on the control of occupational exposure to EtO in health industries, refer to AMSCO publication 08-3002: **Recommendations For Effective Use and Installation of Ethylene Oxide Sterilizers and Aerators.**

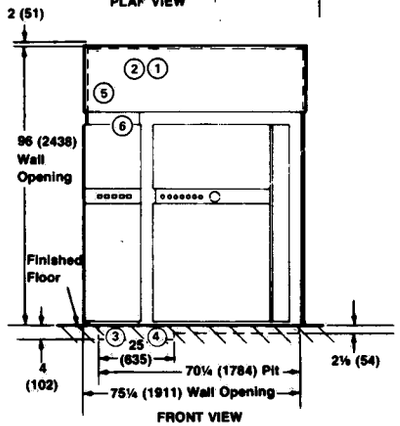
SINGLE DOOR (For Recessing Into One Wall)





DOUBLE DOOR (For Recessing Thru Two Walls)





CHAMBER SIZE	A	B
28x67x52 (711x1702x1321)	62¾ (1594)	70¾ (1797)
28x67x78 (711x1702x1981)	90 (2285)	98 (2489)

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

OPERATING REQUIREMENTS

1. **COLD WATER** — 1½ NPT; 50 to 80 psig (3.52 to 5.62 kg per sq cm), dynamic
2. **STEAM SUPPLY** — 1½ NPT; 50 to 80 psig (3.52 to 5.62 kg per sq cm), dynamic; condensate free, between 97 and 100% saturated vapor
3. **STEAM RETURN** — 1 NPT (discharge to waste)
4. **DRAIN** — Open Floor, 3" minimum
5. **TERMINAL BOX** — 120 Volt (21.7 Amp) 60 Hz — For Controls and Hydraulic Pump Motor
6. **TERMINAL BOX** — 200 (23 Amp), 230 (20.6 Amp), or 460 (10.3 Amp) Volt, 60 Hz, 3 Phase — For Vacuum Pump Motor

... CHECK LOCAL CODES ...

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Access to the recessing area from the control end of the sterilizer is recommended.
3. Clearances shown are minimal for installing and servicing the equipment.
4. If loading cart will be used, clearance in front of the sterilizer should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading cart from the chamber and allow convenient maneuverability to and from the sterilizer.
5. Units shown are with right-hand door swing. Dimensions, connections and clearances for left-hand door swing are identical, but reversed. Door-swing clearances opposite control end for double-door models are identical to those shown for control end.
6. Gas cylinders (not by AMSCO) are to be remotely mounted. Gas supply plumbing to be stainless steel.
7. It is recommended that the Gas sterilizer equipment be maintained and operated in a 70 to 100 F (21 to 38 C) environment. The area should also have at least 10 air changes per hour.

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

OPERATING INSTRUCTIONS

2-1. GENERAL

The following instructions are intended as a guide for: (1) instructing operators in techniques designed to insure optimum equipment performance; and (2) verifying the validity of operator complaints. These instructions should be performed in the order given. Reference should be made to Section 5, TROUBLESHOOTING if the Sterilizer is not operating properly. Refer to Section 1, GENERAL INFORMATION, for capabilities of the equipment.

Figures 2-1 and 2-2 show Sterilizer Controls and gages in their approximate locations. They are provided as guides to identification and location of the various items.

2-2. BEFORE OPERATING (AT BEGINNING OF EACH WORKDAY)

1. Raise top access panel.

2. **Gas and Combination Steam/Gas Models:** To operate a gas cycle, the Temperature Control knob (calibrated knob next to Main Power switch) should be set at desired chamber preheating temperature. This control is factory set at 130° F for recommended exposure period of four hours. For other temperature settings, the exposure times must be determined.

3. Press Main Power switch to ON ... this will energize the recorder(s) and door control circuits.

4. Open chamber door ... see door operating instructions in Paragraph 2-5, be sure chamber drain strainers are clean and in place, then close chamber door.

5. Check that air and exhaust valves (see Figure 2-3) are closed.

6. Open building steam and water valves if they were closed at end of previous workshift.

7. **Combination Steam/Gas Model:** Push Steam/Gas Selector switch to desired position. If gas cycle is selected, be sure that gas cylinders are properly connected and valves inside console are open. **NOTE:** Gas cycles should be run before switching to Steam cycles since heat up time is much shorter than cool down time. The chamber is cooled after a steam cycle by flushing the jacket with cooling water. The chamber temperature is lowered to approximately 120° F then raised to the proper operating temperature. This procedure is time consuming therefore it is recommended that gas cycles be run before steam cycles.

8. Press the Control Power switch to ON. The controls will be energized.

Steam and Combination Steam/Gas Models: For steam cycle, the jacket steam solenoid valve is energized and steam is allowed to enter sterilizer jacket. The jacket-pressure gauge (behind lower access door) should rise to 44 psig. Steam pressure should be maintained in jacket throughout the day, then it will not be necessary to "heat" the jacket before each processing cycle.

Gas and Combination Steam/Gas Models: For gas cycle, chamber is preheated to required temperature. Neither cylinder reset button (on control panel) should glow. If either reset button is glowing, see cylinder replacement instructions.

NOTE: Keep chamber door(s) closed during preheating period. The READY light will come on when chamber temperature has reached preset temperature.

9. Install a new paper chart on the Indicator-Recorder(s).

2-3. STEAM STERILIZATION

2-3.1 Automatic Operation — Wrapped Goods

1. Make certain you have followed instructions in Paragraph 2-2.

2. Set Yellow Pointer on Indicator-Recorder to 270-274° or 285-287° F (132-134° or 141-143° C).

3. Set STERILIZE timer for proper exposure period — four minutes at 270-274° F (132-134° C) or one minute at 285-287° F (141-143° C).

4. Set DRY timer at five minutes for average drying — longer, if desired.

5. Load Sterilizer — see door operating instructions. Use cart specially designed for this machine.

6. Press door LOCK button. READY light comes on when door (both doors if a double-door model) is locked.

7. Press WRAPPED button. (**NOTE:** A "WRAPPED" button, to start the cycle, is also provided opposite the control end of a double-door sterilizer.) The cycle starts and continues automatically to completion.

NOTE: Should you press the wrong selector button, merely press and release RESET button. The control will advance to "Exhaust" then "Ready" position. Make sure Chamber-Pressure Gage indicates 0 psig, then make correct selection. RESET and READY Lamps remain lit until cycle selection is made.

8. When cycle is complete (STERILE light comes on), open chamber door and remove goods from Sterilizer — STERILE light goes out and READY light comes on.

9. Shut off Control and Main Power Switches at end of each work day.

IMPORTANT: If electric power fails while an automatic cycle is in progress, the entire cycle must be repeated to insure sterility. Refer to Paragraph 2-3.3 and initiate a manual cycle, or wait until power is restored and then reinitiate the automatic cycle. (**NOTE:** The control system will automatically advance to the "Ready" position when power is restored and RESET and READY lamps will be lit.)

2-3.2 Automatic Operation — Liquids

1. Make sure you have followed instructions in Paragraph 2-2.

2. Set Yellow Pointer on Indicator-Recorder to 250-254° F (121-123° C).

3. Set STERILIZE timer for proper exposure period — see Table 2-1.

4. Load Sterilizer ... see door operating instructions. Use the cart specially designed for this machine.

5. Press the door LOCK button. The READY light comes on when door (both doors if a double-door model) is locked.

6. Press LIQUIDS button. Cycle will start and continue automatically to completion.

NOTE: Should you press the wrong selector button, merely press and release RESET button. The control will immediately advance to "Slow Exhaust" then to "Ready" position. Insure Chamber-Pressure Gage indicates 0 psig, then make correct selection. RESET and READY lamps remain lit until a new selection is made.

TABLE 2-1. MINIMUM STERILIZATION EXPOSURE PERIODS FOR LIQUIDS

Full Load of Square-Pak® Flasked Solutions 250-254° F (121-123° C)

Flask Capacity (ml)	Time (Minutes)
75	35
250-500	40
1000	45
1500	50
2000	55

WARNING: SUDDEN FULL OPENING OF CHAMBER DOOR FOLLOWING A LIQUID STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST.

7. When cycle is complete (STERILE light comes on), press UNLOCK button. (Door will unlock and open slightly.) Wait ten minutes, then press OPEN button. Remove load.

8. Shut off Control and Main Power Switches at the end of each work day.

IMPORTANT: If electric power fails while an automatic cycle is in progress, the entire cycle must be repeated to insure sterility. Wait until power is restored, then reinitiate automatic cycle, or refer to Paragraph 2-3.4. and initiate a manual cycle. (**Note:** The control system will automatically advance to "Ready" position when power is restored. RESET and READY lamps are lit.)

2-3.3 Manual Operation — Wrapped Goods

IMPORTANT: This procedure is for use if electric power fails. If power is lost during an automatic cycle, you must first determine both chamber drain line ball valve and air filter ball valve are closed before operating Sterilizer manually. When valve is closed, flat surface of valve stem (inside actuator coupling) is perpendicular to steam flow. To close valve, place wrench on coupling and turn 90° clockwise as viewed from top of actuator.

1. Press Control Power Switch OFF.

2. Open Water and Steam-To-Jacket By-Pass Valves (Fig. 2-3).

3. Observe Jacket-Pressure Gage (behind lower access door on operating end control console) and adjust Steam Pressure Regulator for 17 to 18 psig if sterilizing at 250-254° F (121-123° C) — 27 to 30 psig for sterilizing at 270-274° F (132-134° C). Turn adjustment screw on top of regulator (under brass cap) counter-clockwise to decrease steam pressure, clockwise to increase.

4. Manually open door — see operating instructions, and load Sterilizer. Use cart specially designed for this machine.

5. Manually close, lower and lock door.

TABLE 2-2. MINIMUM STERILIZATION EXPOSURE PERIODS FOR MANUALLY OPERATED WRAPPED GOODS CYCLE

ITEM	MINUTES AT 250-254° F (121-123° C)	MINUTES AT 270-274° F (132-134° C)
Brushes, in dispensers, in cans or individually wrapped	30	15
Dressings, wrapped in paper or muslin	30	15
Dressings, in canisters (on sides)	30	15
Glassware, empty, inverted	15	3
Instruments, metal only, any number (unwrapped)	15	3
Instruments, metal, combined with suture, tubing or other porous materials (unwrapped)	20	10
Instruments, metal only, in covered and/or padded tray	20	10
Instruments, metal, combined with other materials (in covered and/or padded tray)	30	15
Instruments, wrapped in double-thickness muslin	30	15
Linen, packs (maximal size: 12x12x20''; maximal weight: 12 pounds)	30	
Needles, individually packaged in glass tubes or paper (lumen moist)	30	15
Needles, unwrapped (lumen moist)	15	3
Rubber gloves, wrapped in muslin or paper	20	
Rubber catheters, drains, tubing, etc. (lumen moist), unwrapped	20	10
Rubber catheters, drains, tubing, etc., individually packaged in muslin or paper (lumen moist)	30	15
Treatment trays, wrapped in muslin or paper	30	
Utensils, unwrapped	15	3
Utensils, wrapped in muslin or paper	20	10
Syringes, unassembled, individually packaged in muslin or paper	30	15
Syringes, unassembled, unwrapped	15	3
Sutures, silk, cotton or nylon, wrapped in paper or muslin	30	15

6. Open Steam-To-Chamber By-Pass Valve.

NOTE: During a power failure, Indicator-Recorder indicates, but does not record, chamber temperature.

7. Wait until pointer on Indicator-Recorder (on control console) indicates temperature selected in Step 3 — 250-254° F (121-123° C) or 270-274° F (132-134° C).

8. Time desired exposure period — see Table 2-2.

9. At end of Exposure Period, close Steam-To-Chamber By-Pass Valve, then open Exhaust Valve.

10. When Chamber-Pressure Gage (in center of door) indicates zero, close Exhaust Valve, then open Air Supply Valve.

11. Manually place door in "unlocked" position. Wait 15 minutes (for goods to dry); open door and remove load.

12. When manual operation is complete, insure all manual valves are closed, press Control Power Switch ON and restore Pressure Regulator setting to 41 psig. (Turn adjustment nut on top of regulator clockwise to increase pressure.) Sterilizer is now ready for automatic operation.

2-3.4 Manual Operation — Liquids

IMPORTANT: This procedure is for use if electric power fails. If power is lost during an automatic cycle, determine both chamber drain line ball valve and air filter ball valve are closed before operating Sterilizer manually. When valve is closed, flat surface of valve stem (inside actuator coupling) is perpendicular to steam flow. To close valve, place wrench on coupling and turn 90° clockwise as viewed from top of actuator.

1. Press Control Power Switch OFF.

2. Open Water and Steam-To-Jacket By-Pass Valves (Fig. 2-3).

3. Observe Jacket-Pressure Gage (behind lower access door on operating end control console) and adjust Steam Pressure Regulator for 17 to 18 psig — sterilization at 250-254° F (121-123° C). Turn adjustment screw on top of regulator (under brass cap) counterclockwise to decrease steam pressure, clockwise to increase.

4. Manually open door and load Sterilizer. Use cart specially designed for this machine.

5. Manually close, lower and lock door.

6. Open Steam-To-Chamber By-Pass Valve.

NOTE: During a power failure, Indicator-Recorder indicates, but does not record, chamber temperature.

7. Wait until pointer on Indicator-Recorder (on control console) indicates 250-254° F (121-123° C).

8. Time desired exposure period — see Table 2-1.

9. At end of Exposure Period, close Steam-To-Chamber and Steam-To-Jacket By-Pass Valves. Open Exhaust Valve only slightly to allow steam to slowly leave chamber — as evidenced by a decreasing chamber pressure gage reading.

10. When Chamber Pressure Gage (in center of chamber door) reads zero, close Exhaust Valve, then open Air Supply Valve.

WARNING: SUDDEN FULL OPENING OF CHAMBER DOOR FOLLOWING A STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST.

11. Manually place door in unlocked position. Wait ten minutes; open door and remove load.

12. When manual operation is complete, insure all manual valves are closed, press Control Power Switch ON and restore Pressure Regulator setting to 41 psig. (Turn adjustment nut on top of regulator clockwise to increase pressure.) Sterilizer is now ready for automatic operation.

2-4. GAS STERILIZATION — AUTOMATIC OPERATION

WARNING: UNITS ARE DESIGNED FOR USE WITH 12-88 GAS ONLY. THE ETHYLENE OXIDE STERILANT USED WITH A COMBINATION STEAM/GAS STERILIZER HAS TOXIC PROPERTIES. USE CARE IN HANDLING.

A. AVOID SPRAYING STERILANT ON HANDS, FACE, EYES OR OTHER SKIN AREAS. IF CONTACT IS MADE, PROMPTLY WASH AFFECTED AREAS WITH WATER. GET MEDICAL ATTENTION AT ONCE IF STERILANT HAS CONTACTED EYES.

B. IF SPRAYED WITH THE STERILANT, WASH AFFECTED CLOTHING BEFORE REUSING.

C. AVOID BREATHING EXCESS AMOUNTS OF VAPORS. IF A SUFFICIENT QUANTITY IS INHALED, THESE VAPORS CAN CAUSE HEADACHE AND NAUSEA. IF THESE SYMPTOMS ARE EXPERIENCED, SEEK FRESH AIR. LIE DOWN UNTIL SYMPTOMS DISAPPEAR. DO NOT USE STIMULANTS.

D. AREA IN WHICH ETHYLENE OXIDE IS STORED AND USED SHOULD BE WELL VENTILATED AND MAINTAINED AT APPROXIMATELY 70 TO 100° F.

E. REFER TO MANUFACTURER'S RECOMMENDATIONS, SUPPLIED WITH GAS CYLINDERS.

1. Be sure that you have followed instructions on Paragraph 2-2.

2. Set Sterilize timer for the desired exposure time.

NOTE: An exposure period of 4 hours at 130° F is recommended. This recommendation assumes that articles to be sterilized are clean and properly wrapped.

3. Load Sterilizer ... see door operating instructions. Use the cart especially designed for this machine.

4. Press door LOCK button. READY light comes on when door (both doors if a double-door model) is locked.

5. Press the SAC button. The cycle will then start and continue automatically to completion.

During "Sterilize" phase, it may become necessary for Sterilizer to automatically make up gas losses caused by leakage or load absorption. If so ... CHARGE light will come on and STERILIZE light will go off, while pressure drop is automatically compensated. This is normal and timer will not reset. However; if temperature drops below 118° F, the timer will reset.

If a gas cylinder becomes unserviceable during a cycle: the line to that cylinder automatically closes; the line to the serviceable cylinder opens; and the RESET button, which corresponds to the unserviceable cylinder, glows. The unserviceable cylinder should be replaced as soon as possible.

If it is desirable to interrupt a gas cycle, press the "Gas" Reset button. The control will advance to the first "Exhaust" phase. After completing the two "Exhaust" and "Air" phases. the control will advance to the "Ready" position. The reset light will remain on until a new cycle is selected or the load is removed. The load will **not be sterile.**

Should an overtemperature condition occur during a processing cycle: Over Temp Reset button (on the control panel) will glow; gas supply to chamber will stop, and chamber will be evacuated and flushed with filtered air. However, load **will not be sterile.** Therefore, following a shutdown because of overtemperature, do the following:

- determine and correct cause
- press Over Temp Reset button
- start a new cycle.

6. When cycle is complete (STERILE light comes on), open chamber door and remove goods from Sterilizer — STERILE light goes off.

7. Aerate Goods

WARNING: SOME ETHYLENE OXIDE REMAINS IN GOODS FOLLOWING STERILIZATION. ASK YOUR SUPERVISOR FOR AERATION INSTRUCTIONS.

8. When Sterilizer is not in use, keep chamber door closed to maintain chamber at proper operating temperature. Should door be left open, an overtemperature condition could occur during the next cycle.

9. **Combination Steam/Gas Model:** If next cycle is a steam cycle, press Steam/Gas Selector switch to Steam and close but do not lock chamber door.

IMPORTANT

This sterilizer is **NOT** designed for a Manual Gas cycle. **If electric service fails** while a cycle is in progress, wait until power is restored. When power is restored, the control system will automatically start and continue through the cycle.

If power remains off for a prolonged period, the load can be removed as follows:

WARNING: OPENING CHAMBER DOOR DURING A POWER FAILURE COULD RESULT IN ETHYLENE OXIDE ESCAPING FROM THE CHAMBER. IF LOAD MUST BE REMOVED DURING A PROLONGED POWER FAILURE, EXTRA VENTILLATION EQUIPMENT MUST BE INSTALLED OR OTHER GAS REMOVAL PROCEDURES MUST BE ESTABLISHED IN THE AREA PRIOR TO OPENING THE CHAMBER DOOR. SEE WARNING, PAGE 2-4, AND DOOR OPENING PROCEDURE BELOW.

- Manually open the Water Bypass Valve (Figure 2-3) allowing water to flow to drain.
- Manually open Chamber Bypass Valve (Figure 2-3).
- Observe the Chamber Pressure Gauge (Figure 2-2).
- When Chamber Pressure Gauge indicates 0 psig, manually open the chamber door. (See door operating instructions, Paragraph 2-6.)
- Remove load from Sterilizer.

2-5. DOOR PUSH BUTTON OPERATION

NOTE: Make sure STERILE or READY light is on and FAR DOOR (if a double-door model) light is not lit.

1. To open door:

NOTE: Door will automatically stop if an obstruction is encountered. Following removal of the obstruction, reinitiate door movement by again pressing desired button.

a. Press UNLOCK button. Door will unlock and open slightly.

b. Press OPEN button. Door will unlock, raise and swing fully open.

2. To close door:

NOTE: The STOP button permits door to be stopped at any point during opening or closing. To reinitiate door movement, press desired button.

a. Press CLOSE button. Door will close and lower but not lock.

b. Press LOCK button. Door will close, lower and position itself with wedge locks engaged.

2-6. DOOR MANUAL OPERATION

If electric power fails or maintenance procedure on Sterilizer so requires, door may be operated manually as follows:

1. Open lower access door.

2. Place pump handle on manual pump by-pass valve then turn clockwise to insure it is closed. Remove handle and place on pump.

3. Press and hold desired function button (on end of hydraulic control valves) then operate pump. The correct sequence to close and lock the door is CLOSE, LOWER, and LOCK. To unlock and open the door, the correct sequence is UNLOCK, RAISE and OPEN.

NOTE: Leave door on operating end unlocked when Sterilizer is not in use, to extend gasket life.

4. Close access door and return to automatic operation when power is restored.

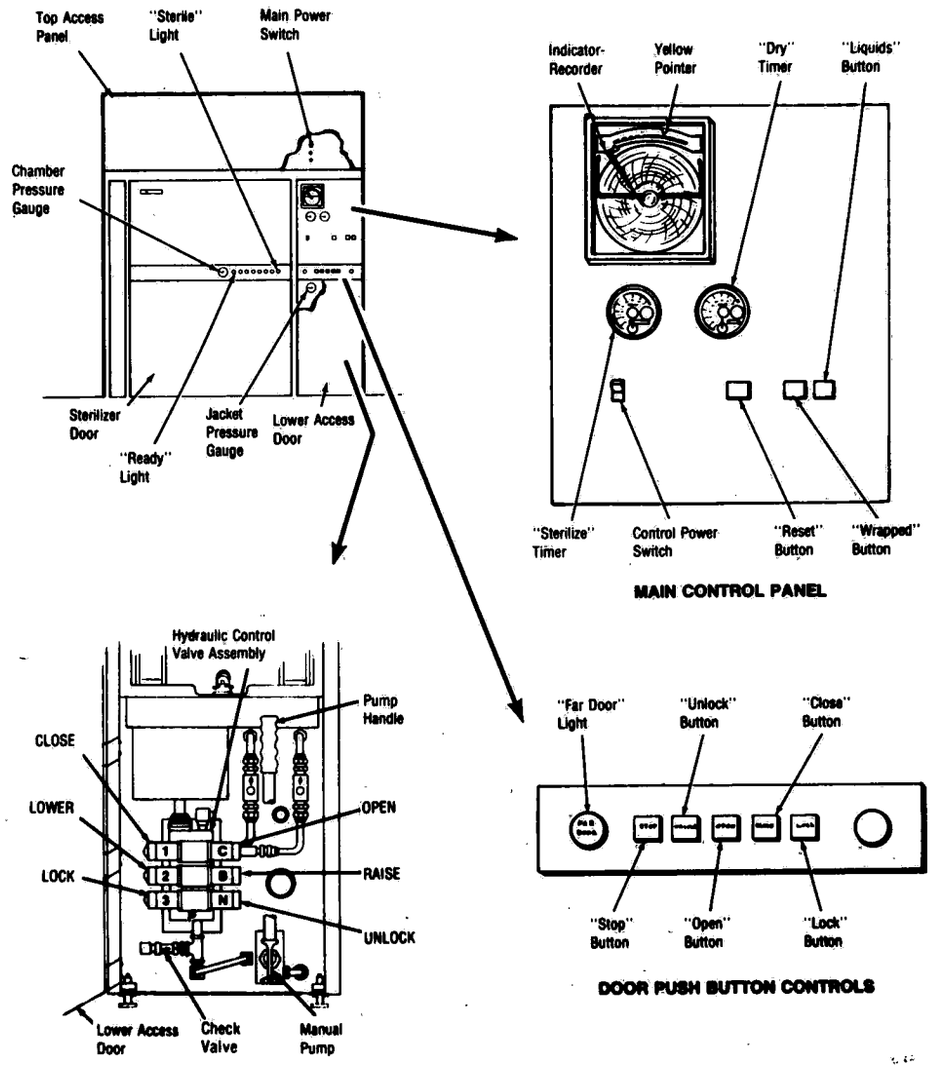


Figure 2-1. CONTROL LOCATIONS, STEAM ONLY MODEL.

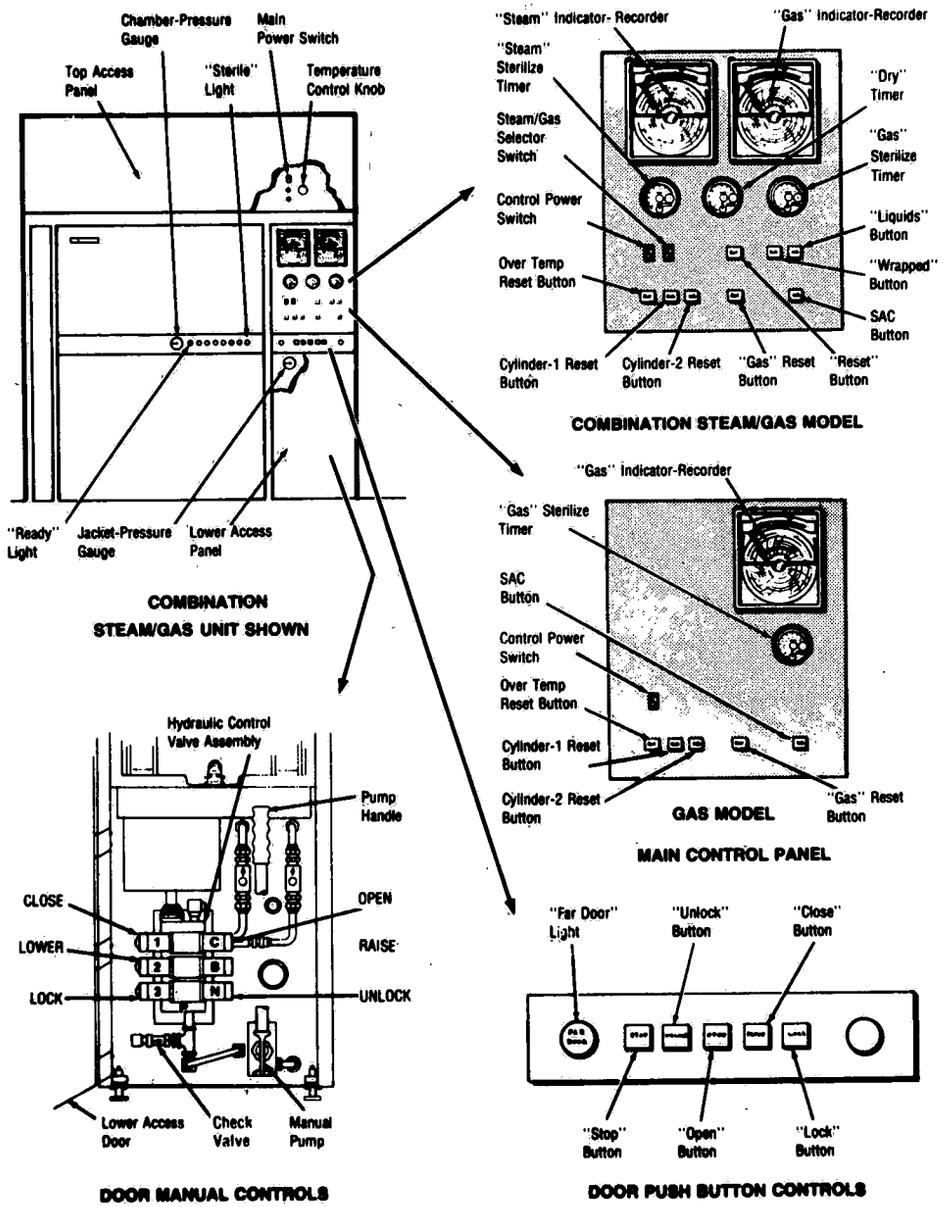


Figure 2-2. CONTROL LOCATIONS, GAS AND STEAM/GAS MODELS.

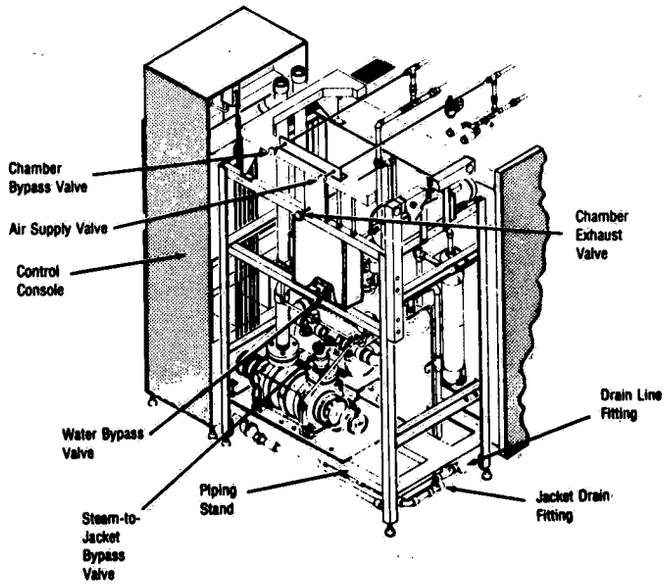


Figure 2-3. MANUALLY OPERATED VALVES.

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SECTION 3

CONTROL SYSTEMS

3-1. GENERAL

The Vacamatic II cycle control is a preprogrammed rotary solenoid unit which, in conjunction with various temperature, pressure and vacuum sensors and timers, regulates the Sterilizer throughout predetermined operational phases. When an automatically controlled cycle is begun, the Sterilizer proceeds thru the various cycle phases without further attention. Panel-mounted indicating lights show program sequences as the automatic cycle progresses.

The Vacamatic II power door is an electro-hydraulic assembly so arranged as to automatically open or close on operator command. The proper sequence for closing door is close, lower (into pit) and lock. The sequence for opening door is unlock, raise (to clear pit) and open. Door controls are interlocked with cycle controls so a cycle may not start unless chamber door (or doors) is closed and locked (LR4 latch coil has been energized — see Door Lock Circuit Description). Also, chamber door may not be unlocked unless STERILE or READY light is on (LR3 reset coil has been energized — see Cycle Circuit Descriptions).

The Sterilizer is equipped with an electrical disconnect, which isolates the unit from the general supply line in its "off" position. Fuses and safety valves prevent circuits and piping from becoming overloaded. Before checking a faulty or malfunctioning control system, make certain that: (1) all fuses and safety valves are in place and operable; (2) electric, water and steam supply line switches or valves are in correct operating position; and (3) electricity, water and steam are available at the prescribed capacities.

3-2. CYCLE OPERATION (STEAM)

3-2.1. Wrapped Goods Cycle

A "wrapped" cycle may be started when READY light is on and chamber door or doors are closed and locked. After selecting desired temperature and times and pressing WRAPPED button, the Sterilizer will automatically proceed thru the following cycle. (Refer to Figure 3-1 for the cycle graph.)

a. READY light goes out and CONDITION light comes on. Chamber is purged of air by the following pressure-vacuum excursions.

(1) Steam is admitted to chamber with chamber drain line open for approximately 60 seconds.

(2) Drain line closes and chamber is charged with steam to approximately 28 psig.

(3) At 28 psig, steam flow stops, drain line opens and vacuum pump starts.

(4) When chamber vacuum reaches approximately 2" Hg, timer TD2 (set for 12 to 15 seconds) starts. At the end of this time (regardless of the degree of vacuum obtained) vacuum pump stops, drain line closes and chamber is again pressurized to 28 psig.

(5) Steps 3 and 4 are repeated until accumulated vacuum phases are equal to approximately one minute (timer T1 setting).

b. Chamber is now charged with steam to selected recorder temperature (270 or 285° F) and thermostatically maintained at that temperature for time selected on STERILIZE timer (T2). CONDITION light goes out and STERILIZE light comes on.

c. At completion of exposure period, steam flow stops and chamber drain line opens. STERILIZE light goes out and EXHAUST light comes on. A vacuum is then drawn:

d. When chamber vacuum reaches approximately 2" Hg, DRY timer (T3) starts. EXHAUST light goes out and DRY light comes on.

e. At completion of selected drying time, DRY light goes out and AIR light comes on. Filtered air is admitted to chamber until chamber pressure is atmospheric.

f. AIR light goes out, STERILE light comes on and a buzzer sounds, indicating cycle is complete. Buzzer sounds for approximately 60 seconds or until chamber door is opened. STERILE light remains on until chamber door is opened.

3-2.2. Liquid Goods Cycle

Like the wrapped cycle, a liquids cycle may be started only when READY light is on and chamber door (or doors) is closed and locked. After preprograming cycle and pressing the LIQUIDS button, the Sterilizer will automatically proceed thru the following cycle.

a. READY light goes out and CONDITION light comes on.

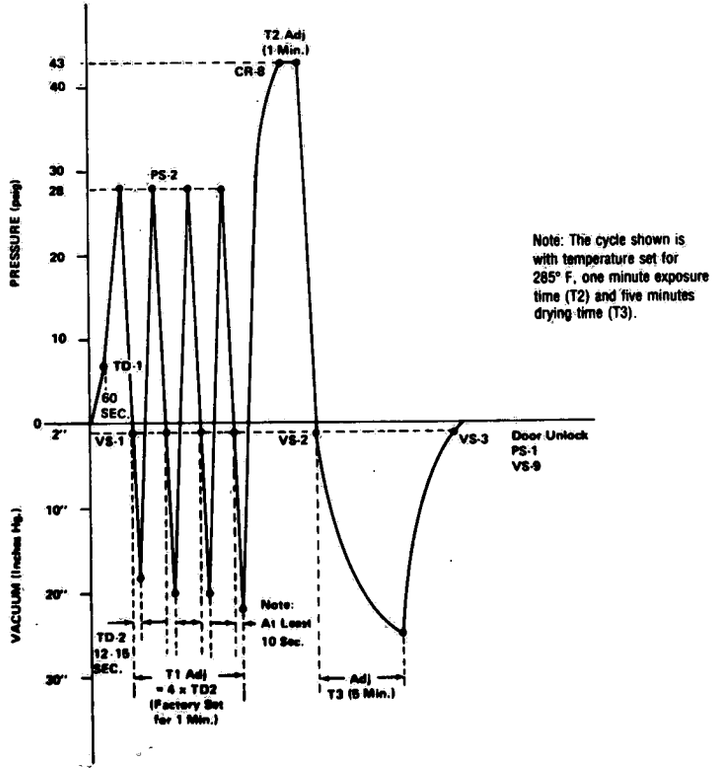
b. Chamber drain line is closed and steam is admitted to chamber.

c. When chamber temperature reaches selected recorder temperature (250° F), CONDITION light goes out and STERILIZE light comes on.

d. Chamber is thermostatically maintained at 250° F for the time selected on STERILIZE timer (T2).

e. At the completion of exposure period, steam flow stops and a slow exhaust period begins. STERILIZE light goes out and EXHAUST light comes on.

f. When chamber pressure reaches approximately atmospheric, EXHAUST light goes out, STERILE light comes on and a buzzer sounds, indicating cycle is complete. Buzzer sounds for approximately 60 seconds or until chamber door is opened. STERILE light remains on until chamber door is opened.



Note: The cycle shown is with temperature set for 265° F, one minute exposure time (T2) and five minutes drying time (T3).

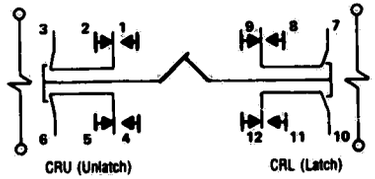
Figure 3-1. TYPICAL CYCLE GRAPH FOR A WRAPPED GOODS CYCLE.

3-3. CYCLE CONTROL CIRCUIT DESCRIPTIONS GENERAL CONDITIONS (STEAM)

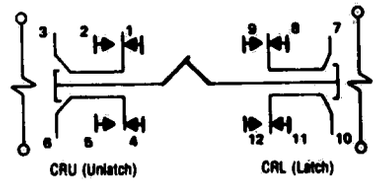
Before using the following cycle circuit descriptions (Par. 3-4 and 3-5), several conventions should be understood about the electrical schematic (Fig. 3-3), as follows:

1. The schematic is shown with power off and chamber door open. Also, mechanical latch relays CRU and CRL are positioned for a wrapped goods cycle, that is, current can flow from contact 3 to contact 2, as shown in Figure 3-2A. During a liquid goods cycle, current can flow from contact 3 to contact 1, as shown in Figure 3-2B.

2. The recorder and door control circuits are energized whenever S2 (main power switch, behind overhead access panel) is ON. The cycle control circuits are energized whenever S4 (control power switch on control panel) is ON.



A. Wrapped Goods Cycle



B. Liquids Cycle

Figure 3-2. POSITIONS OF LATCH RELAY CONTACTS.

3. With S4 ON, the jacket steam solenoid valve is energized thru NC contacts on CR5 and CR7. When chamber door (or doors) is closed and locked (LR4 latch coil is energized), the READY light is energized thru NC contacts on CR4, and CR2 is energized thru S1A actuated by rotary solenoid switch in the "off" position. CR2 NO contacts provide a holding circuit for CR2 and a circuit for the cycle light to be selected.

NOTE: NC means normally closed while NO means normally open.

4. In addition to the electrical schematic (Fig. 3-3), piping diagrams of steam flow (Fig. 3-4) and water flow and exhaust (Fig. 3-5) are also included to aid in understanding the circuit descriptions.

3-4. WRAPPED GOODS CYCLE CIRCUIT DESCRIPTION (STEAM)

NOTE: The following circuit description refers to Figure 3-3.

3-4.1. Condition Phase

a. With rotary switch in the "off" position contact 45 is energized and, when WRAPPED button is pressed, CRU-1 and CRU-2 are energized. A signal is also sent thru the lower contacts of WRAPPED button, S1B, on the rotary switch and PT1 on pulse timer to start the timer motor. As pulse timer revolves, PT1 throws, keeping timer motor energized. As timer continues to revolve a pulse of current is sent to AC input of rectifier, causing a current pulse at DC output of full-wave rectifier, which in turn energizes rotary solenoid coil. This action advances switch one position. The pulse timer is de-energized when, after one revolution of the pulse timer, PT1 returns to its NC position. However, in this case contacts 17 and 18 on rotary switch are now energized and as PT1 returns to its NC position it again energizes pulse timer motor. This action advances rotary switch two more positions until it is in "condition" phase where contacts 16, 26, 36 and 42 are energized.

b. As rotary switch advanced, CR4 was energized by contact 28. CR4 NO contacts provide a holding circuit for CR4 and also energize WRAPPED light. DR4 NC contacts de-energize READY light. Contact 43 provides a latch circuit for LR3 (see door circuits) to prevent chamber door or doors from being opened.

c. Initially, in conditioning phase, contact 26 energizes chamber steam solenoid valve thru NC contacts on CR1 and CR5 and CONDITION light thru NC contacts on CR8. Timer TD1 is energized by contact 36 thru contacts 6 to 5 on CRU-1; and chamber drain line vacuum exhaust ball valve is opened with a signal from contact 42 thru contacts 7 to 9 on CRL-1 and NC contacts on CR1 and TD1.

d. As TD1 (which is set for approximately 60 seconds) times out, TD1 contact throws to provide a signal to close vacuum exhaust ball valve. With drain line closed, chamber pressure rises rapidly.

e. When chamber pressure reaches 28 psig, PS2 actuates to energize CR1. CR1 NO contacts provide a holding circuit for CR1 and energize vacuum pump motor and pump water solenoid valve. CR1 NC contacts de-energize chamber steam solenoid valve and provide a signal to open vacuum exhaust ball valve.

f. As chamber vacuum reaches approximately 2'' Hg, VS1 actuates and energizes TD2 and T1 condition timer motor. (**Note:** The clutch on condition timer is energized during the condition phase by contact 36 on rotary switch.)

g. When TD2 times out after approximately 15 seconds, TD2 contacts throw to stop condition timer motor and to de-energize CR1. CR1 NO contacts de-energize vacuum pump motor and pump water solenoid valve. CR1 NC contacts energize chamber steam solenoid valve and provide a signal to close vacuum exhaust ball valve.

NOTE: Condition timer T1 does not reset when it is de-energized. Instead it accumulates time whenever energized until accumulated time equals T1 setting of approximately one minute. When T1 times out it signals the completion of conditioning phase (see step 8).

h. Pressure in chamber again rises to 28 psig at which point PS2 actuates and steps 5, 6 and 7 are repeated. These pressure-vacuum excursions are repeated (normally a total of four times) until condition timer T1 times out.

i. When T1 times out, its contacts throw providing a signal from contact 36 thru PT1 to the pulse timer. This advances rotary switch thru PT2 one position to "sterilize" phase. In sterilize position, contacts 41, 15, 25 and 35 on rotary switch are energized. (**Note:** Contact 36, which was energized in conditioning phase, is now de-energized; therefore, the rotary switch will not advance more than one position.)

3-4.2. Sterilize Phase

a. Contact 25 keeps CONDITION light energized thru CR8 NC contacts and energizes chamber steam solenoid valve thru CR1 and CR5 NC contacts. Contact 15 provides the signal which closes vacuum exhaust ball valve. Chamber is now charged with steam to the preselected recorder temperature (270-274 or 285-287° F).

b. At preselected temperature, the recorder LOW temperature switch closes and energizes CR8. CR8 NC contacts open and de-energize CONDITION light. CR8 NO contacts close and energize the T2 (STERILIZE) timer motor and clutch and the STERILIZE light.

c. Chamber temperature continues to rise approximately six more degrees until recorder HI temperature switch closes and energizes CR7. CR7 NC contacts open and de-energize jacket steam solenoid valve, thereby stopping steam flow to chamber. When chamber temperature falls approximately three degrees below the HI setting, CR7 is de-energized and jacket steam solenoid valve is energized. Thereafter, CR7 is continuously energized and de-energized as chamber temperature fluctuates between HI and LOW settings. Chamber temperature is thus thermostatically controlled throughout the exposure period.

d. After the preselected exposure time expires, T2 NO contacts close and signal the pulse timer from contact 35 and thru PT1 to advance rotary switch one position to "exhaust and dry" phase. Contacts 14, 24, 34 and 48 are now energized.

3-4.3. Exhaust and Dry Phase

a. Contact 48 energizes EXHAUST light thru VS2. Contact 34 provides the signal thru contacts 6 to 5 on CRU-2 to open vacuum exhaust ball valve. Contact 24 energizes vacuum pump motor and pump water solenoid valve thru contacts 3 to 2 on CRU-2.

b. VS2 contacts actuate at approximately 2'' Hg to de-energize EXHAUST light and to energize DRY light and T3 (DRY) timer motor and clutch.

c. Chamber vacuum continues to be drawn for the preselected drying time. When DRY timer (T3) times out, T3 NO contacts close and signal pulse timer from contact 48 and thru PT1 to advance rotary switch one position to "air" phase. DRY light goes out, contacts 13, 23, 33 and 47 are now energized. VS3 NC contacts, which are open because there is a vacuum in chamber, prevent rotary switch from advancing any further at this time.

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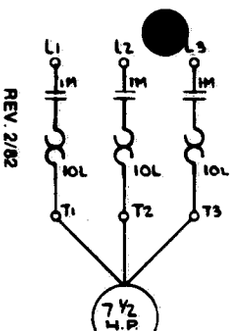


208 - 220/460 VOLT
60 CYCLE 3 PHASE
VACUUM PUMP/MOTOR

1- SWITCH (S2) MAIN POWER SUPPLY FOR DOOR(S) AND CYCLE CONTROL

2- SWITCH (S4) POWER SUPPLY FOR CYCLE CONTROL ONLY

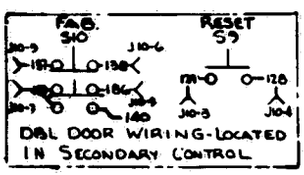
3- SCHEMATIC SHOWN WITH
A- ROTARY SOL IN "OFF" POSITION
B- SWITCH 1A & 1B ACTUATED BY ROTARY SOL. AT OFF
C- LATCH RELAYS 1 & 2 IN FABRIC SELECTION
D- RELAYS IN NORMAL (DE-ENERGIZED) POSITION
E- TIMERS & TIME DELAYS IN RESET POSITION

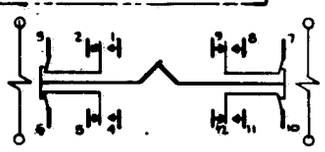
4- LATCH RELAY(S) (LR4) CONTACT CLOSE WHEN DOOR(S) IS LOCKED

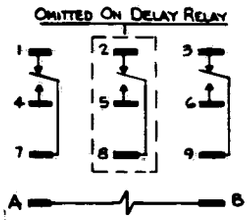
5- TIME DELAY 1 & 2 - DELAY UPON ENERGIZATION

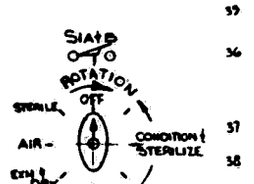
⑥ - THE FOLLOWING TERM. (TB) POINTS ARE JUMPERED FOR
A- STRAIGHT STM. SGL DOOR
+ TB1-4 TO TB1-5
+ TB2-11 TO TB2-16
+ TB2-13 TO TB2-17.
+ TB2-14 TO TB2-18
X TB30-6 TO TB32-1
X TB31-14 TO TB31-6
X TB34-5 TO TB34-7
X TB36-11 TO TB36-14

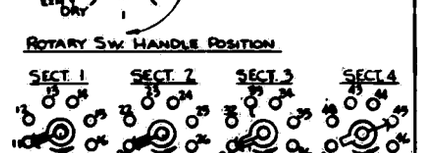
+ LOCATION - DOOR TRAY ASSEM.
X LOCATION - MAIN ELEC. BOX











ROTARY SWITCH CONTACT SEQUENCE SHOWN IN "OFF" POSITION
VIEWED FROM SOLENOID END OF SWITCH

Figure 3-3. ELECTRICAL SCHEMATIC, Steam Unit.

C-11

C-12

3-5/3-6

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3-4.4. Filtered Air Phase

Contact 47 provides the signal to open vacuum break ball valve and to energize AIR light. As chamber vacuum approaches 2'' Hg, VS3 closes and signals the pulse timer to advance rotary switch one position to "sterile" phase. AIR light goes out, and contacts 12, 22, 32 and 46 are energized.

3-4.5. Sterile Phase

a. Contact 22 energizes STERILE light, TD3, cycle complete buzzer, cycle counter and CR6. Contact 32 provides a signal to door circuit (latch relay LR3) so door or doors may be opened. Contact 12 signals pulse timer to advance rotary switch to off.

b. CR6 NO contacts, which were closed when CR6 was energized, provide a holding circuit for CR6, STERILE light and TD3. When TD3 times out after approximately 60 seconds, the buzzer stops.

c. When chamber door is opened, LR4 opens to de-energize wire number 51, CR4, CR2 holding circuit and the WRAPPED light. LR4 also de-energizes wire number 125, CR6 holding circuit and STERILE light.

3-5. LIQUIDS CYCLE CIRCUIT DESCRIPTION (STEAM)

NOTE: The following circuit description refers to Figure 3-3.

3-5.1. Condition Phase

a. With rotary switch in the "off" position, contact 45 is energized and, when LIQUIDS button is pressed, CRL-1 and CRL-2 are energized. A signal is also sent thru the lower contacts on LIQUIDS button, S1B on rotary switch and PT1 on pulse timer. The pulse timer advances rotary switch three positions (same as Wrapped Cycle) to condition phase where contacts 16, 26, 36 and 42 are energized.

b. As rotary switch advances, CR4 is energized by contact 28. CR4 NO contacts provide a holding circuit for CR4 and also energize LIQUIDS light. CR4 NC contacts de-energize READY light. Contact 43 provides a latch circuit for LR3 (see door circuits) to prevent chamber door or doors from being oepned.

c. With rotary switch positioned for conditioning phase, contact 26 energizes chamber steam solenoid valve thru NC contacts on CR1 and CR5 and CONDITION light thru CR8 NC contacts. Contact 42 provides a signal thru contacts 7 to 8 on CRL-1 to close vacuum exhaust ball valve. Contact 16 closes Vacuum Break Ball Valve. Contact 36 supplies power to Sterilizer Timer.

3-5.2. Sterilize Phase

a. Chamber is now charged with steam to preselected recorder temperature (250-254° F). At 250° F recorder LOW temperature switch closes and energizes CR8. CR8 NC contacts open and de-energize the CONDITION light. CR8 NO contacts close and energize T2 (STERILIZE) timer motor and clutch and STERILIZE light.

b. Chamber temperature continues to rise approximately six degrees until recorder HI temperature switch closes and energizes CR7. CR7 NC contacts open and de-energize jacket steam solenoid valve, thereby stopping steam flow to chamber. When chamber temperature falls approximately three degrees below HI setting, CR7 is de-energized and jacket steam solenoid valve is energized. Thereafter, CR7 is continuously energized and de-energized as chamber temperature fluctuates between HI and LOW settings. Chamber temperature is thus thermostatically controlled throughout the exposure period.

c. After the preselected exposure time expires, T2 NO contacts close and signal pulse timer from contact 36 and thru PT1 to advance rotary switch one position. STERILIZE light goes out, and contacts 41, 15, 25 and 35 are energized.

3-5.3. Slow Exhaust Phase

a. Contact 35 immediately signals pulse timer thru contacts 10 to 11 on CRL-1 to advance rotary switch one more position to "slow exhaust" phase. Contacts 14, 24, 34 and 48 are now energized.

b. Contact 24 energizes CR5 thru contacts 3 to 1 on CRU-2. CR5 NO contacts close to provide a holding circuit for CR5 thru LS1 on chamber door. CR5 NC contacts de-energize jacket steam solenoid valve. Contact 34 energizes slow exhaust and condenser water solenoid valves thru contacts 6 to 4 on CRU-2 and PS3, which is actuated because chamber is pressurized. Contact 48 energizes the EXHAUST light thru VS2.

c. When chamber pressure nears atmospheric (approximately 2 psig), PS3 returns to its normal position and signals pulse timer from contact 34 thru contacts 6 to 4 on CRU-2 to advance rotary switch one position. Contact 13, which is energized, immediately signals pulse timer thru VS3 to advance rotary switch to "sterile" phase. Contacts 12, 22, 32 and 46 are energized.

3-5.4. Sterile Phase

a. Contact 22 energizes STERILE light, TD3, cycle complete buzzer, cycle counter and CR6. Contact 32 provides a signal to door circuit (latch relay LR3) so door or doors may be opened. Contact 12 signals pulse timer to advance rotary switch to off.

b. CR6 NO contacts, which were closed when CR6 was energized, provide a holding circuit for CR6, STERILE light and TD3. When TD3 times out after approximately 60 seconds, the buzzer stops.

c. When chamber door is opened, LR4 opens to de-energize wire number 51, CR4, CR2 holding circuit and LIQUIDS light. LR4 also de-energizes wire number 125, CR6 holding circuit and STERILE light.

3-6. CYCLE RESET CIRCUIT DESCRIPTION (STEAM)

NOTE: The following circuit description refers to Figure 3-3.

If an electric power failure occurs with a cycle in progress, control circuits are automatically reset to "ready" position. A cycle in progress may also be manually aborted by pressing RESET button.

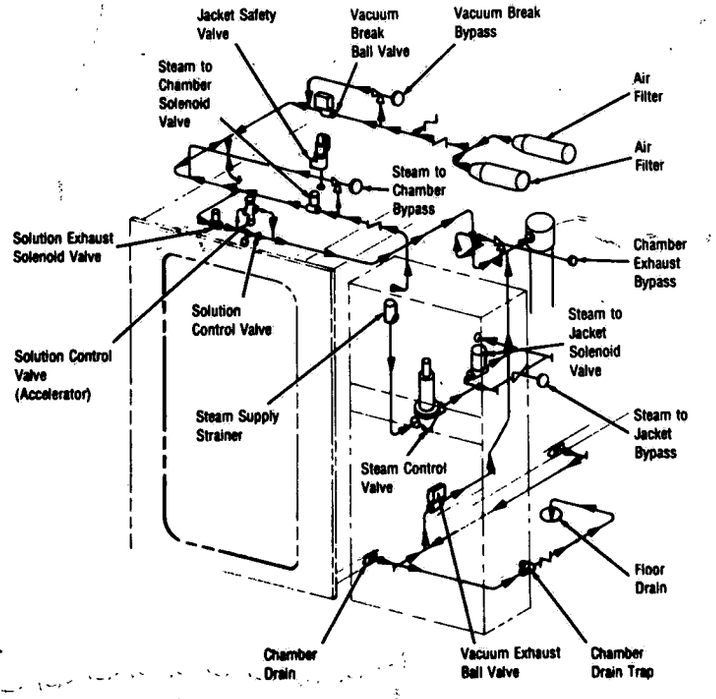

Figure 3-4. STEAM FLOW PIPING DIAGRAM.

1. Before the cycle starts and with chamber door or doors closed and power on, CR2 is energized. CR2 NO contacts provide a holding circuit. CR2 NC contacts open to prevent CR3 from becoming energized.

2. When the cycle starts, S1A (on rotary switch) transfers and supplies power to RESET button. S1B (also on rotary switch) transfers and isolates cycle buttons.

- **In event of a power failure,** CR2 is de-energized. When power is restored, CR2 NC contacts energize CR3 and RESET light S1A, still in transferred position, which prevents CR2 from becoming re-energized.

- **If RESET button is pressed,** CR3 and RESET light are energized via the RESET button.

3. When CR3 is energized, CR3 NO contacts provide a holding circuit for CR3. CR3 NC contacts de-energize cycle light (if still lit). A set of CR3 contacts transfer and provide a continuous signal (thru 5 to 8) to the pulse timer to advance rotary switch until it is at EXHAUST position. At this point S1A returns to its NC position and de-energizes CR3, after which the sterilizer moves to the OFF position. The Sterilizer is now ready to start a new cycle.

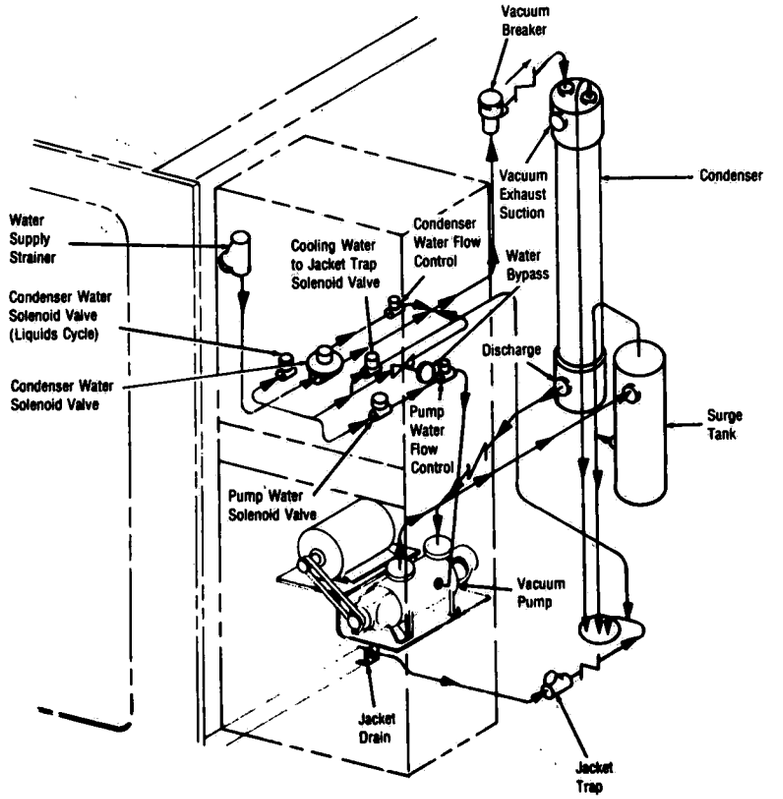

Figure 3-5. WATER FLOW AND EXHAUST PIPING DIAGRAM.

3-7. CYCLE OPERATION (GAS)

A "SAC" cycle may be started when READY light is on and chamber door or doors are closed and locked. After selecting desired exposure time and pressing the SAC button, cycle starts and continues automatically to completion. The following is the cycle sequence.

a. READY light goes out and CONDITION light comes on. Chamber is purged of air and load is conditioned with steam.

b. Chamber is charged with gas. CONDITION light goes off and CHARGE light comes on.

c. When the "Gas" Indicator-Recorder indicates 8 psig chamber pressure, CHARGE light goes off, STERILIZE light comes on, and "Gas" Sterilize timer starts.

NOTE: During "Sterilize" phase, it may become necessary for Sterilizer to automatically make up gas losses caused by leakage or load absorption. If so — CHARGE light comes on and STERILIZE light goes out while pressure drop is automatically compensated for. This is normal and timer will not reset. However, if temperature drops below 118° F, timer will reset.

d. STERILIZE light goes out and EXHAUST light comes on. Chamber is purged of gas and a vacuum is drawn.

e. EXHAUST light goes out and AIR light comes on. Air is admitted into chamber thru a filter until vacuum reaches 1 inch Hg.

f. AIR light goes out and EXHAUST light comes on as second vacuum is drawn.

g. EXHAUST light goes out and AIR light comes on. Air is admitted into chamber thru a filter until vacuum reaches 1 inch Hg.

h. Finally AIR light goes out, STERILE light comes on and a buzzer sounds, indicating that cycle is complete. Buzzer will sound for approximately 60 seconds or until chamber door is opened.

3-8. GAS CYCLE CONTROL CIRCUIT DESCRIPTION

NOTE: The following circuit description refers to Figures 3-6 and 3-7.

Control Circuit Description (Paragraphs 1 thru 3)

1. L1, the main power switch, supplies power to control console thru the ON/OFF switch. L1 also supplies power to the recorder motor. When the ON/OFF switch is in the "ON" position, power is supplied to the STEAM/GAS selector switch. With the selector set to Steam, CRL-5 is energized so Sterilize and Condition light can function during a steam cycle. CR-21 is also energized, which opens chamber drain ball valve, closes gas to chamber ball valve and opens steam to chamber ball valve. Also, with gas cycle select, reset power passes thru LR-9 contacts to CR-4 (cycle complete control relay), CR-2 (door closed control relay) and CR26 to light the Ready light. L1 also supplies power to the gas charging package. When cylinder No. 1 is pressurized, PS-5 opens and LR-6 latches in thru the contacts of LR-7 and CR-22. When pressure in cylinder No. 1 drops below 30 psig, PS-5 closes, CR-22 energizes, LR-6 resets and the resulting circuit is held in by the contacts of CR-22 until reset by S-10. The resetting of LR-6 enables LR-7 to latch thru PS-6 and CR-23, providing cylinder No. 2 is above 30 psig. Cylinder No. 2 now supplies the gas charge. When pressure in cylinder No. 2 drops below 30 psig, PS-6 closes, energizing CR-33, resetting LR-7, then CR-33 holds itself in until reset with the S-11 pushbutton. Gas containers must be replaced and circuits must be reset before operation can continue. L1 also supplies power to the recorder drive motor.

NOTE: With power on, Gas Recorder operates even though Gas cycle has not been selected.

2. When STEAM/GAS selector is switched to gas, and if jacket temperature is above 160° F, TS-3 energizes jacket cooling solenoid and CR-24 to prevent the cycle from starting. With temperature at 160° F, TS-3 also supplies power thru the other contact of TS-3 (set at 145° F), which lights the overtemperature lamp. CR-25 is also energized, which keeps the overtemperature lamp on until it is reset. When the temperature falls below 145° F, the overtemperature lamp goes out and CRU-5 is energized to reset latch relay CRL-5 which, in turn resets the motorized ball valves and condition and sterilize lamps as listed in paragraph No. 1. If the sterilizer was cold at start up, power would be supplied to the jacket heat valve thru temperature switch TS-4, which brings the machine up to operating temperature.

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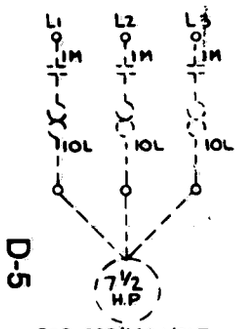


208-220/460 VOLT
60 CYCLE 3 PHASE
VACUUM PUMP MOTOR

1 SWITCH (S2) MAIN POWER SUPPLY FOR DOOR(S) AND CYCLE CONTROL

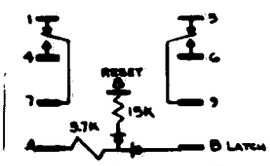
2- SWITCH (S4) POWER SUPPLY FOR CYCLE CONTROL ONLY

3- SCHEMATIC SHOWN WITH
A- ROTARY SOL. IN "OFF" POSITION
B- SWITCH 5A & 5B ACTUATED BY ROTARY SOL. AT OFF
C- LATCH RELAYS 5 & 8 IN GAS CYCLE & SAC SELECTION
D- RELAYS IN NORMAL (DE-ENERGIZED) POSITION
E- ALL TIMERS IN RESET POSITION

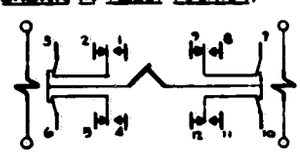
4- LATCH RELAY(S) LR4 CONTACTS CLOSE WHEN DOOR(S) IS LOCKED

5- ALL SOLENOID VALVES(-Vr) ARE NORMALLY CLOSED AND OPEN UPON ENERGIZATION

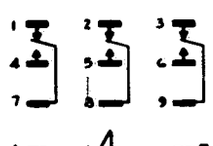
6- ALL COMPONENTS SHOWN IN PHANTOM ARE COMMON TO STM & STM/GAS UNITS



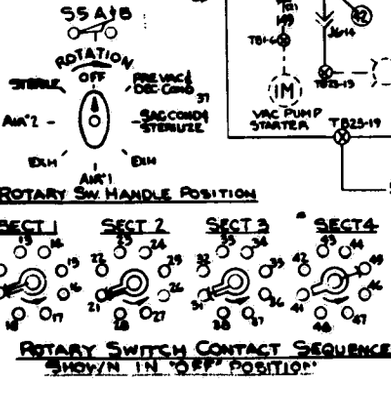
CIRCUIT DIAGRAM FOR LATCH RELAY LR6 & LR7 (SHOWN IN RESET POSITION)



CRU CRL
CIRCUIT DIAGRAM FOR MECHANICAL LATCH RELAY 5 & 8



CIRCUIT DIAGRAM FOR CONTROL RELAY



ROTARY SWITCH CONTACT SEQUENCE
SHOWN IN "OFF" POSITION

Figure 3-6. ELECTRICAL SCHEMATIC, Steam/Gas Unit

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3. Power is also supplied to the rotary selector switch contacts 11, 21, 31 and 45. Contact 45 supplies power thru N.C. contacts of CR-26 and CRU-5 to close the vacuum break valve. When temperature reaches 125° F CR9, located inside recorder, energizes enabling contact No. 45 to supply power thru N.C. of CR-24 (160° F control relay) and CR-10 (135° F control relay) to gas cycle select button. When the gas cycle select button "SAC" is pressed ("DEC" cycle is non-functional) CRU-8 is energized to light the "SAC" cycle indicator lamp. Power is also supplied to latch relay LR-9 which removes power from the Ready lamp (steam cycle) and control relays CR-5 and CR-21, which in turn set motorized ball valves and timing circuits for a gas cycle. Power is also applied to reset LR-10, which turns off the Reset lamp, if on. Power from the GAS selector switch also passes thru S5B switch to PT-1 switch to Pulse Timer motor and Rectifier bridge which pulse the Rotary solenoid to its next position.

3-9. SAC CYCLE CIRCUIT DESCRIPTION

NOTE: Refer to Figures 3-6 and 3-7.

3-9.1. Pre-Vac Phase

Contacts 18, 28, 38, 41 (thru jumper) and 44 have power applied. Power from terminal No. 18 energizes CR-26, which turns the Ready light off. A holding circuit is also set up which holds CR-26 energized thru the remainder of the cycle. Contact No. 44 opens the vacuum exhaust ball valve and energizes the vacuum pump motor. Contact No. 38 supplies power to VS-4, which is set at 27 in. Hg vacuum. When VS-4 closes, the Pulse Timer and Rectifier Bridge are energized, advancing the rotary selector. Contact No. 28 is used if an overtemperature condition arises.

3-9.2. Conditioning and Sterilize Phase

Contacts 17, 27, 37 and 43 have power applied. Contact 37 closes vacuum exhaust ball valve. Contact No. 27 is used only if an overtemperature condition exists. Contact No. 17 supplies power thru TS-3 (120° F) to VS-6 (now closed) energizing the conditioning steam solenoid valve.

NOTE: Adjust conditioning steam solenoid valve per test procedure.

When VS-6 opens at 24'' Hg vacuum, power is supplied thru PS-7 (N.C.), which supplies power to gas charging solenoid valves, charge light and gas conditioning steam solenoid valve.

When sterilizing pressure is achieved in chamber, PS-7 closes, charge light goes out, sterilize light comes on and sterilization timer starts.

NOTE: With sterilization timer clutch energized, if pressure make up are necessary during the sterilization cycle, sterilization timer will not reset unless temperature drops below 120° F (TS-3 setting). When sterilization timer times out, T-5 closes and power is applied to Pulse Timer and Rectifier Bridge to advance the Rotary Selector.

3-9.3. Exhaust Phase

Contacts 16, 26, 36 and 42 have power applied. Contact No. 26 lights the exhaust lamp. Contact No. 36 opens vacuum exhaust ball valve and energizes vacuum pump motor starter. Contact No. 42 keeps CR-26 energized if an overtemperature condition occurs. Contact No. 16 supplies power to vacuum switch VS-7 (set at 27'' Hg vacuum). When the proper vacuum level is achieved, VS-7 closes, supplying power to the Pulse Timer and Rectifier Bridge to advance the Rotary Selector.

3-9.4. Air No. 1 Phase

Contacts 15, 25 and 35 have power applied. Contact No. 25 closes vacuum exhaust ball valve. Contact No. 35 opens vacuum breaker ball valve. Contact No. 15 supplies power to VS-8 (held closed). When vacuum level reduces to VS-8 setting, VS-8 opens to its normal position and supplies power to the Pulse Timer and Rectifier Bridge to advance the Rotary Selector.

3-9.5. Exhaust Phase

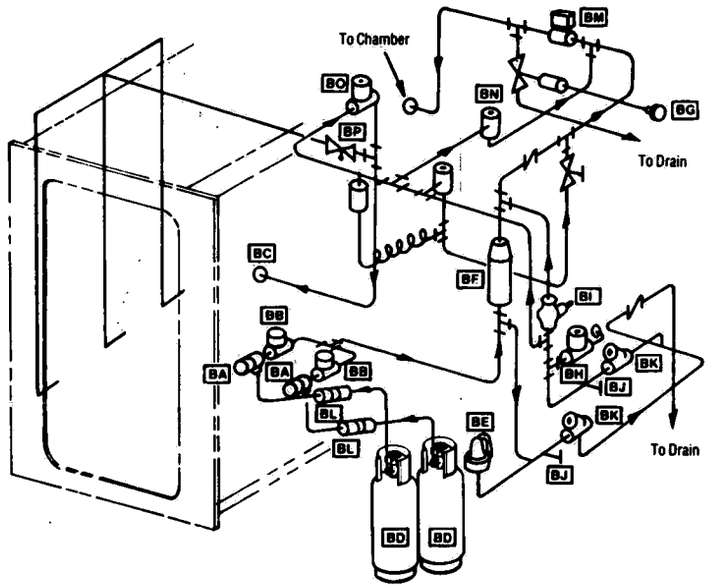
Contacts 14, 24, 34 and 48 have power applied. Contact No. 24 lights exhaust lamp. Contact No. 34 opens vacuum exhaust ball valve and energizes vacuum pump motor starter. Contact No. 48 is not used. Contact No. 14 supplies power to VS-7. When the correct vacuum level is achieved VS-7 closes, supplying power to the Pulse Timer and Rectifier Bridge to advance the Rotary Selector.

3-9.6. Air No. 2 Phase

Contacts 13, 23, 33 and 47 have power applied. Contact No. 23 closes vacuum exhaust valve. Contact No. 33 opens vacuum break valve. Contact No. 47 is not used. Contact No. 13 supplies power to VS-8, held open by the vacuum. When vacuum level reduces to VS-8 setting, power is supplied to the Pulse Timer and Rectifier Bridge to advance the Rotary Selector.

3-9.7. Sterile Phase

Contacts 12, 22, 32 and 46 have power applied. Contact No. 22 lights Sterile lamp and energizes Buzzer in Steam Tray. Contact No. 46 resets latch relay LR-9. Contact No. 32 is not used. Contact No. 12 pulses the Rotary Selector to "OFF" position. When door is opened, CR-26 is reset thru door interlocks.



BA—Gas Supply Valves	**BI**—Steam Regulator Valve
BB—Gas Charge Solenoid Valves	**BJ**—Steam Line Strainers
BC—Jacket Heat Line	**BK**—Steam Trap
BD—Gas Cylinders	**BL**—Gas Line Filters
BE—Safety Valve (Conditioner)	**BM**—Gas To Chamber Ball Valve
BF—Gas Conditioner	**BN**—Steam To Chamber Valve
BG—Chamber Exhaust Valve	**BO**—Jacket Heat Solenoid Valve
BH—Steam Solenoid Valve	**BP**—Jacket Heat Needle Valve

Figure 3-7. GAS FLOW PIPING DIAGRAM.

NOTE: If an overtemperature condition occurs in the Pre-Vac, Condition or Sterilize Phase, the sterilizer automatically advances to the exhaust phase, then follows a normal gas cycle to completion.

3-10. CYCLE RESET CIRCUIT DESCRIPTION (GAS)

NOTE: The following circuit description refers to Figure 3-6.

If an electric power failure occurs with a cycle in progress, operator must wait until power is restored. When power is restored, control system will automatically start and continue thru cycle. A cycle in progress may also be manually aborted by pressing RESET button.

NOTE: If CYCLE RESET button is pushed after a cycle has started, the Rotary Selector is automatically pulsed to the first exhaust position, then follows a normal gas cycle to completion.

a. During cycle, but before final phases of exhaust and air, if RESET button is pressed, RESET lamp comes on.

b. The rotary switch will advance cycle to final two phases of exhaust and air, then move to "OFF" position. The sterile lamp does not come on during a reset.

c. The RESET lamp remains on until a new cycle is initiated or the load is removed.

3-11. DOOR CONTROL CIRCUIT DESCRIPTION

The following illustrations are provided in this section to aid in understanding power door operation: Figure 3-9, Electrical Schematic; Figure 3-10, Hydraulic Schematic; and Figure 3-11, Location of Limit Switches. However, before using the circuit descriptions, several conventions should be understood about the electrical and hydraulic schematics. These items are general conditions applicable to all door operations. This first set applies to the electrical schematic.

3-11.1. General Conditions (Electrical)

a. Should the door encounter an obstruction while opening or closing, the applicable pressure switch will energize TD4 thru NO contacts on CR28 — door close or CR29 — door open. (CR28 and CR29 are only energized during the swing segment of door operation and they prevent TD4 from energizing during other segments of operation.) Failure to remove the obstruction before TD4 times out de-energizes the control relay (CR14 — lock, CR15 — close, CR16 — open or CR17 — unlock). Also, should the STOP button be pressed at any time during door operation the control relay (CR14, CR15, CR16 or CR17) is immediately de-energized. In either case the desired button must be pressed again to re-energize the control relay and resume door operation.

b. In a double-door model, only one door may be electrically unlocked at a time. This protection is provided thru NO contacts on the far door CR18. The CR18 at either end is energized only when that door is locked. Except for the above distinctions, the following descriptions are the same for each door in a double-door model.

c. The schematic is shown with the door open.

3-11.2. General Conditions (Hydraulic)

a. The hydraulic pump/motor and sump assembly provides pressurized flow of hydraulic fluid required for automatic operation of Sterilizer door (or doors). An internal regulator and external bypass regulator control pump pressure. All fluid is returned to the sump via the oil filter.

b. A manual pump (one required for each door) provides pressurized flow of hydraulic fluid for manual operation of Sterilizer door when electricity is shut off. The check valve in the pressure line prevents fluid under pressure from entering the automatic pump when the manual pump is used.

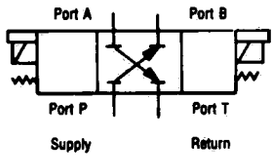
c. The hydraulic directional control valves are mounted on a manifold block to provide connection of fluid lines from pump to hydraulic cylinders. Port P is pump supply, port T is sump return and ports A and B are directional depending on which solenoid is energized.

d. Each control valve has a dual flow regulator on its cylinder side to regulate cylinder operating speed. The regulator for the swing cylinder controls supply of fluid to the cylinder, and regulator for the lift cylinder control the return. Each regulator has a check valve to permit return (swing cylinder) or supply (lift cylinder) line to bypass the regulator.

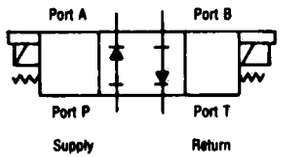
e. The directional control valves are shown in Figure 3-8 in their center or "off" position with both solenoids de-energized. When the RHS solenoids are energized, ports are connected as shown in Figure A, but when LHS solenoids are energized, ports are connected as shown in Figure B.

NOTE: Refer to Figure 3-8.

f. The swing cylinder is not always pressurized. When its control valve is in "off" position both cylinder ports (A and B) are open from the pressure and return ports T (P is blocked). Because both cylinder ports on lift are blocked and wedge and swing cylinder control valves are connected to return port (T) in "off" position, a pilot-type check valve is used in the lock circuit to maintain pressure in these cylinders. With pilot-type check valve, bleedoff from supply line during cylinder operation opens a valve in the return line. Without pressure in the supply line, the valve blocks return of fluid to the sump and thereby prevents the loss of cylinder pressure.



A. Direction with Unlock, Lift or Open Solenoid Energized.



B. Direction with Close, Lower or Lock Solenoid Energized.

Figure 3-8. DIRECTION OF FLOW FOR HYDRAULIC CONTROL VALVES WHEN ENERGIZED.

g. A double-door Sterilizer has only one pump/motor and sump assembly. The remainder of the system, including the manual pump, is repeated for each door. The electric control permits only one door at a time to be opened electrically, otherwise system operation is identical at each end.

h. The schematic is shown with the door open.

NOTE: The following descriptions refer to Figure 3-9 for electrical and Figure 3-10 for hydraulic information.

3-11.3. Door Close

a. Press CLOSE button; CR15 is energized thru the STOP, OPEN, UNLOCK and CLOSE buttons and TD4 NC contacts.

(1) **Electrical:** CR15 NO contacts provide a holding circuit for CR15 thru LS3 and energize "close" solenoid valve and CR28 thru LS1. CR15 NO contacts energize hydraulic pump motor. CR15 NC contacts prevent the "lock" solenoid from energizing. CR-28 energizes the "lift" solenoid.

(2) **Hydraulic:** With pump operating, fluid is pumped from sump thru pressure line to port P on control valve manifold block. With "close" and "lift" solenoids energized, port P is connected to port A. Fluid is pumped thru port A and pressure regulator (regulates door swing speed) to the swing cylinder. The piston then extends to close the door. The lift cylinder is also actuated. Fluid from the cylinder is returned thru flow regulator check valve to port B on manifold block. Port B is connected to port T (with "close" solenoid energized) thru which fluid returns to the sump. The regulator on the pressure side of control valve (port P) controls supply pressure to swing cylinder based on cylinder operating pressure.

b. Door is shut.

(1) **Electrical:** LS1 is actuated and de-energizes "close" and "lift" solenoid valve and energizes "lower" solenoid valve.

(2) **Hydraulic:** With "close" solenoid valve de-energized, it returns to the "off" position. "Lower" solenoid, which is now energized, connects port P to port B on lift cylinder control valve which is blocked off. The lift cylinder extends by gravity to lower door into the pit. Fluid from lift cylinder is returned thru pilot-type check valve and flow regulator (regulates lowering speed) to port A on manifold block. Port A is connected to port T and fluid is again returned to the sump.

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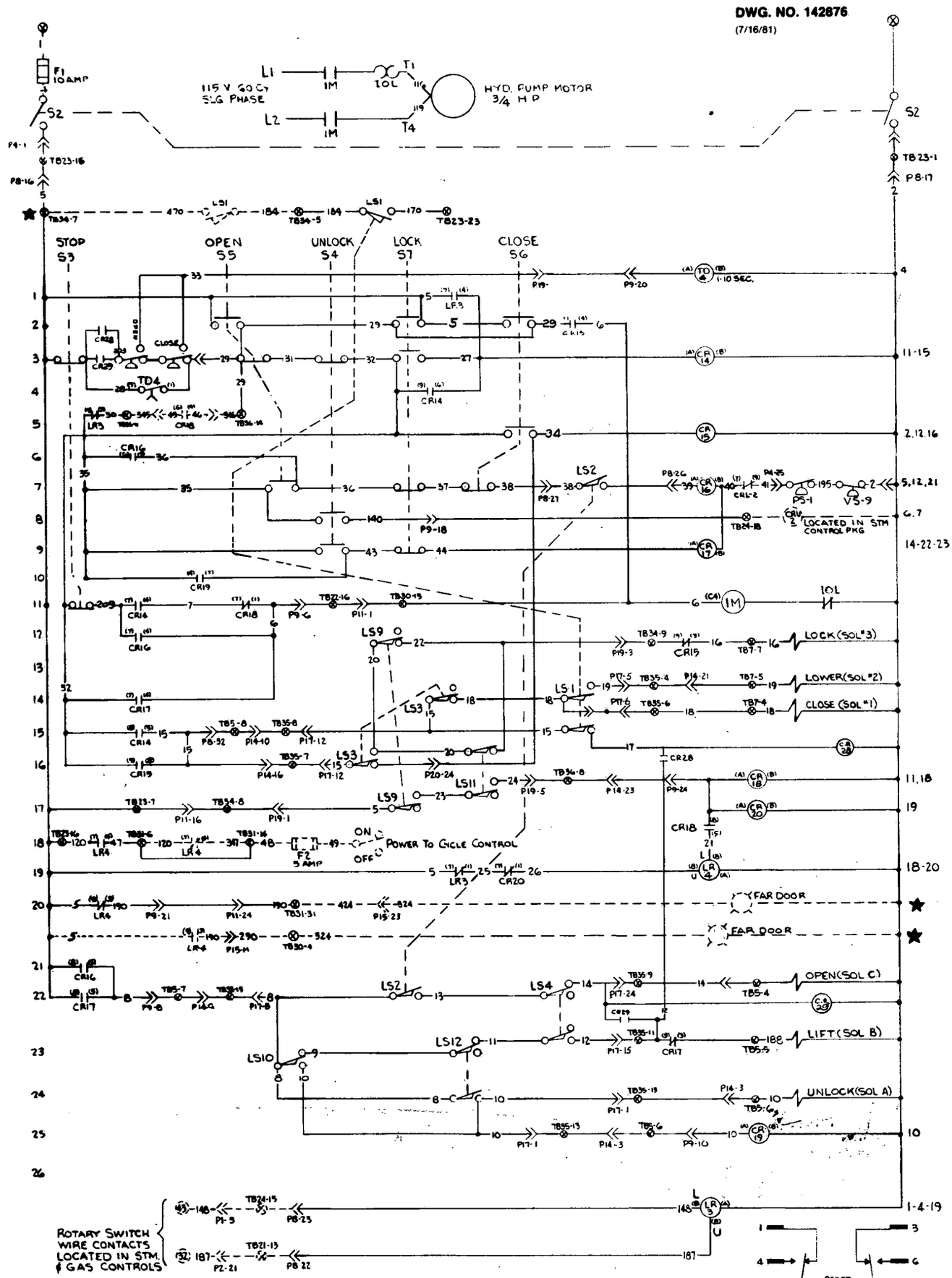

LEGEND

DOOR POSITION	ACTION	SW. ACTUATED	RELAY ENERGIZED	ACTION COMPLETE
CLOSE	CLOSE & LOWER	LS-1, 3, 10 & 12	CR15	LS3 DE-ENERGIZES CR15
LOCK	CLOSE, LOWER & LOCK	LS-1, 3, 9 & 11	CR14	LS9, 11 ENERGIZES CR18, 20 & LR4(LATCH)
UNLOCK	UNLOCK	LS-12, 10, 3 & 1	CR17, CR19 THRU LS10	LS10 DE-ENERGIZES CR19, CR17 & LR4(RESET)
OPEN	UNLOCK, LIFT & OPEN	LS-12, 10, 4 & 2	CR16-LR4(RESET)	LIGHT ON

STERILIZE PHASE (43) LR3 (LATCH) ENERGIZED - POWER TO DOOR (OPEN & UNLOCK) CIRCUIT LOCKED OUT

STERILE PHASE (32) LR3 (RESET) ENERGIZED - POWER TO DOOR CIRUIT RESUMED

DOOR UNLOCKED - LR4 (RESET) ENERGIZED - POWER TO CYCLE CONTROL CIRCUIT LOCKED OUT

DOOR LOCKED - LR4 (LATCH) ENERGIZED - POWER TO CYCLE CONTROL CIRCUIT RESUMED

DOOR OBSTRUCTION - TD4 ACTUATED, DOOR OPERATION INTERUPTED

FAR DOOR LAMP - INDICATES WHEN FAR DOOR IS UNLOCKED AND OPEN
REQ'D ON DOUBLE DOOR UNITS ONLY

Figure 3-9. ELECTRICAL SCHEMATIC, Door Control.

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c. Door is completely lowered.

(1) **Electrical:** LS3 is actuated and de-energizes CR15 and "lower" solenoid valve. CR15 NO contacts de-energizes hydraulic pump motor.

(2) **Hydraulic:** With "lower" solenoid de-energized, lift cylinder control valve returns to its "off" position.

3-11.4. Door Lock

NOTE: Pressing LOCK button, with door open, closes and locks door as described below. If LOCK button is pressed with door closed but not locked (see Door Close Circuit Description), steps a and b below with the exception of energizing CR14 are not required.

a. Press LOCK button; CR14 is energized thru STOP, OPEN, UNLOCK and LOCK buttons and door obstruction pressure switches.

(1) **Electrical:** CR14 NO contacts provide a holding circuit for CR14 when LOCK button is released; energize the "close" solenoid valve thru LS1; and energize hydraulic pump motor.

(2) **Hydraulic:** With pump operating, fluid is pumped from the sump thru pressure line to port P on control valve manifold block. With "close" and "lift" solenoids energized, port P is connected to port A. Fluid is pumped thru port A and pressure regulator check valve and flow control valve to swing cylinder. The piston then extends to close the door. Fluid from cylinder is returned thru flow regulator by-pass port to port B on manifold block. Port B is connected to port T (with "close" solenoid energized) thru which fluid returns to the sump. Regulator on pressure side of control valve (port P) controls supply pressure to swing cylinder as determined by cylinder operating pressure.

b. Door is shut.

(1) **Electrical:** LS1 is actuated and de-energizes "close" and "lift" solenoid valves and energizes "lower" solenoid valve.

(2) **Hydraulic:** With "close" solenoid valve de-energized, it returns to "off" position. "Lower" solenoid, which is energized, connects port P to blocked port B on lift cylinder control valve. The cylinder then extends to lower door by gravity into pit. Fluid from lift cylinder is returned thru a flow regulator to port A on manifold block. Port A is connected to port T and fluid is again returned to the sump.

c. Door is completely lowered.

(1) **Electrical:** LS3 is actuated and de-energizes "lower" solenoid valve and energizes "lock" solenoid valve thru LS11 or LS9.

(2) **Hydraulic:** The lift cylinder control valve returns to its "off" position and "lock" solenoid, which is now energized, connects port P to port A on wedge cylinder control valve. Fluid travels from port A thru dual pilot check valve to wedge cylinders, which extend and lock the door. Fluid returns thru port B to port T on control valve to the sump. The two cylinders (one for right-hand vertical and one for the left-hand vertical) do not operate in unison. One cylinder may be almost completely extended before the other starts to move.

d. Door is locked.

(1) **Electrical:** LS9 and LS11 de-energize "lock" solenoid valve. LS9 and LS11 energize CR18 and CR20. CR18 NC contacts de-energize hydraulic pump motor. CR18 NO contacts energize latch coil on LR4. LR4 NO contacts provide power to the cycle control circuits. LR4 contacts, if a double door, also operate FAR DOOR lights. CR20 NC contacts isolate LR4 reset coil to prevent any possible interruption of power to the cycle control circuits.

(2) **Hydraulic:** With "lock" solenoid de-energized, wedge cylinder control valve returns to its "off" position. Dual pilot check valve on output side of control valve prevents loss of pressure in wedge cylinders, and, helps maintain their locked position.

e. During cycle, any drift in the locking mechanism will de-actuate LS9 and LS11. LS9 and LS11 in turn de-energize CR18 and CR20 and re-energize "lock" solenoid valve. CR18 NC contacts start hydraulic pump motor and step 4 is repeated. However, LR3 latch coil, which is energized throughout the cycle, (see Cycle Circuit descriptions) prevents LR4 from resetting thru LR3 NC contacts; and thereby prevents interruption of power to the cycle control circuits. CR14 remains energized throughout cycle thru LR3 NO contacts.

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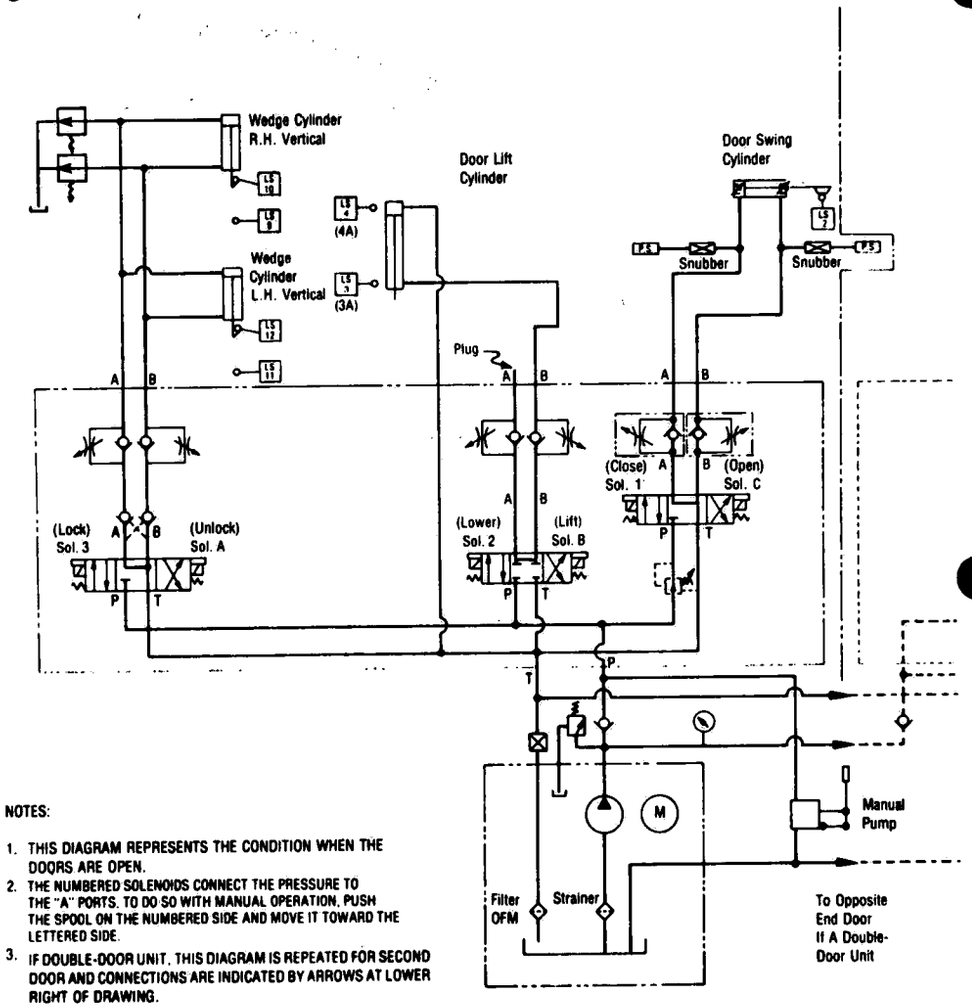

NOTES:

1. THIS DIAGRAM REPRESENTS THE CONDITION WHEN THE DOORS ARE OPEN.
2. THE NUMBERED SOLENOIDS CONNECT THE PRESSURE TO THE "A" PORTS. TO DO SO WITH MANUAL OPERATION, PUSH THE SPOOL ON THE NUMBERED SIDE AND MOVE IT TOWARD THE LETTERED SIDE.
3. IF DOUBLE-DOOR UNIT, THIS DIAGRAM IS REPEATED FOR SECOND DOOR AND CONNECTIONS ARE INDICATED BY ARROWS AT LOWER RIGHT OF DRAWING.

Figure 3-10. POWER DOOR HYDRAULIC SCHEMATIC (Single Door).

3-11.5. Door Unlock

a. Press UNLOCK button; CR17 is energized thru STOP, OPEN and UNLOCK buttons, door obstruction pressure switches and LR3 NC contacts.

(1) **Electrical:** CR17 NO contacts energize "unlock" solenoid valve thru LS12 and CR19 thru LS10. CR19 NO contacts provide a holding circuit for CR17. CR17 NC contacts prevent "lift" solenoid valve from energizing thru LS12. CR17 NO contacts energize hydraulic pump motor.

(2) **Hydraulic:** With pump operating, fluid is pumped from the sump thru pressure line to port P on control valve manifold block. With "unlock" solenoid energized, port P is connected to port B on wedge cylinder control valve. Fluid is pumped thru port B, dual pilot check valve to wedge cylinders. Wedge cylinders retract and unlock door. Fluid returns to the sump via port A to port T on control valve.

NOTE: Schematics are shown with door open, however, the condition described is with door closed. Therefore, initially limit switches and cylinders are positioned opposite the schematics. Also, for CR17 to be energized, chamber pressure must be atmospheric, that is, PS1 and VS9 must be in their NC positions).

b. Door is unlocked:

(1) **Electrical:** LS10 and LS12 are actuated and de-energize CR19 and "unlock" solenoid valve. CR19 contacts de-energize CR17 and consequently hydraulic pump motor thru CR17 NC contacts. LS9 and LS11 return to their NC positions and de-energize CR18 and CR20. CR20 NC contacts energize LR4 unlatch (reset) coil thru LR3 NC contacts. LR3 was reset when cycle ended (see Cycle Circuit descriptions). LR4 NO contacts isolate the cycle control circuits.

(2) **Hydraulic:** With "unlock" solenoid de-energized, wedge cylinder control valve returns to its "off" position. Dual pilot check valve (on output of control valve) maintains pressure in wedge cylinders to keep them unlocked.

3-11.6. Door Open

NOTE: Pressing OPEN button, if door is locked, unlocks and opens the door as described below. If OPEN button is pressed with door closed but unlocked (see Door Close Circuit description), step 1 below, with the exception of energizing CR16, is not required.

a. Press OPEN button; CR16 is energized thru STOP and OPEN buttons and door obstruction pressure switches LR3 NC contacts OPEN, LOCK and CLOSE buttons and LS2 (NC with door closed).

(1) **Electrical:** CR16 NO contacts provide the holding circuit for CR16, and energize "unlock" solenoid valve thru LS12. CR16 NO contacts also energize hydraulic pump motor.

(2) **Hydraulic:** With pump operating, fluid is pumped from the sump thru pressure line to port P on control valve manifold block. With "unlock" solenoid energized, port P is connected to port B on wedge cylinder control valve. Fluid is pumped thru port B, dual pilot check valve to wedge cylinders. The wedge cylinders retract and unlock door. Fluid returns to the sump via port A to port T on control valve.

b. Door is unlocked:

(1) **Electrical:** LS10 and LS12 are actuated, which in turn de-energizes "unlock" solenoid valve and energizes "lift" solenoid valve thru LS4 (NC with door closed). LS9 and LS11 return to their NC positions and de-energize CR18 and CR20. CR20 NC contacts energize LR4 unlatch (reset) coil thru LR3 NC contacts. LR3 was reset when the cycle ended (see Cycle Circuit descriptions). LR4 NO contacts isolate the cycle control circuits.

(2) **Hydraulic:** With pump still operating and "lift" solenoid now energized, fluid is pumped from port P to port A on lift cylinder control valve thru pressure regulator check valve to lift cylinder, which retracts and raises door so it will clear the pit. Upper cylinder port is connected to sump directly. Once door is raised, blocked center lift solenoid valve prevents loss of pressure in lift cylinder to maintain door in position.

c. Door is raised.

(1) **Electrical:** LS4 is actuated and de-energizes "lift" solenoid valve and energizes "open" solenoid valve and CR29 thru LS2. CR29 contacts actuate the lift solenoid valve.

(2) **Hydraulic:** Lift cylinder control valve remains in its "on" position and with "open" solenoid now energized, fluid is pumped from port P to port B on swing cylinder control valve. Fluid travels from port B thru pressure regulator to swing cylinder, which retracts and opens door. Fluid returns to the sump thru the pressure regulator check valve and port A to port T on control valve. The regulator on pressure side of control valve (port P) again controls supply pressure to swing cylinder as determined by cylinder operating pressure.

d. Door is fully opened.

(1) **Electrical:** LS2 is actuated and de-energizes "open" and "lift" solenoids and CR16. CR16 NO contacts de-energize hydraulic pump motor.

(2) **Hydraulic:** Swing cylinder control valve ("open" solenoid de-energized) returns to "off" position.

NOTE: With door open and power off, leakage thru lift cylinder causes door to lower. When power is restored, lift cylinder is energized and door is raised before any door swing movements are initiated.

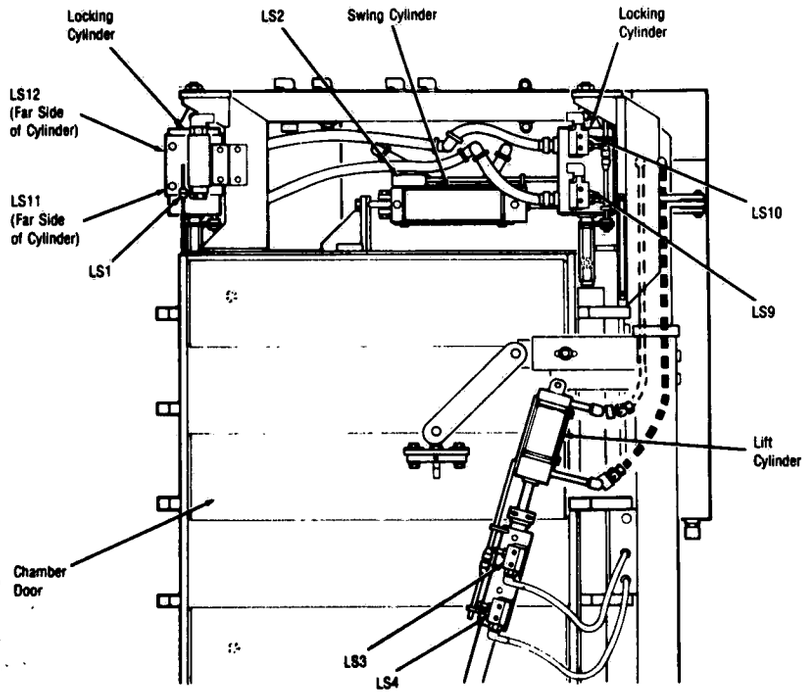

Figure 3-11. DOOR LIMIT SWITCH LOCATIONS (VIEW WITH PANELS REMOVED).

SECTION 4

SECTION 4

INSPECTION AND MAINTENANCE

4-1. GENERAL

Maintenance procedures described in paragraphs 4-2 through 4-4 should be performed at regular intervals, as indicated. The frequency indicated is the minimum, and should be increased if usage of the sterilizer demands. Should a problem occur, refer to Section 5, TROUBLESHOOTING. Figures 4-1 and 4-2 are sample maintenance records which we suggest the Maintenance Department keep. Such records will prove helpful in assuring proper maintenance.

WARNING: WHERE APPLICABLE, SHUT OFF BUILDING STEAM SUPPLY TO STERILIZER AND ALLOW CHAMBER AND STERILIZER PIPING TO COOL TO ROOM TEMPERATURE BEFORE PERFORMING THE FOLLOWING.

4-2. CLEANING

4-2.1. Daily

1. Remove chamber drain strainers. Clean out lint and sediment, reverse-flush strainers under running water. Flush drain — see As Necessary instructions below.

2. Wash chamber interior and loading equipment with a mild detergent solution such as Calgonite® (Calgon Corp.).

CAUTION: Never use a wire brush or steel wool on door and chamber assembly.

3. Rinse items with tap water and dry with a lint-free cloth. Replace strainers.

4-2.2. Monthly

1. Clean gasket sealing surface on chamber door frame(s) with *AMSCO Pry Cream* (included in Door Frame Cleaning kit, AMSCO Part 753377). Wipe off *Pry Cream* with damp cloth.

2. Clean the door gasket(s) with alcohol or mild detergent. **Do not** clean gaskets with carbon tetrachloride, kerosene, gasoline or other hydrocarbons.

3. Spray sealing surface on door frame(s) with *AMSCO Fluorocarbon Spray* (also included in Door Frame Cleaning Kit, see above) to prevent gasket(s) from sticking.

4. Open steam and water supply line strainers and clean out sediment.

4-2.3. As Necessary

1. Use *AMSCO STAINLESS STEEL CLEANER & POLISH* on all Sterilizer and loading equipment stainless-steel exterior surfaces. Apply the cleaner with a damp cloth or sponge, thoroughly wipe off and then polish with a clean, dry cloth. Use *AMSCO Pry Cleaner* to remove stubborn stains.

CAUTION: When using *AMSCO STAINLESS STEEL CLEANER & POLISH* or *AMSCO Pry Cleaner*, rub in a back-and-forth motion (in the same direction as the surface grain). Do not rub with a rotary or circular motion. Do not use these cleaners on painted surfaces. Follow directions on containers.

2. Use a mild detergent solution such as Calgonite® (Calgon Corp.) to wash non-stainless-steel surfaces. Rinse with tap water using a sponge or damp cloth. Wipe dry with a lint-free cloth.

3. Flush chamber drain if drain line becomes clogged or if spillage occurs during a liquids processing cycle.

a. Remove chamber drain strainers.

b. Rinse drain openings with hot solution of trisodium phosphate (two tablespoons to one quart of tap water).

or

If the use of phosphate is objectionable, use a substitute solution of 1/2 cup of *AMSCO Sonic Detergent* and one quart of hot tap water. In either case, wait five minutes before proceeding to step c.

c. Replace strainers.

4-3. INSPECTION

4-3.1. Daily

1. Check recorder chart for inked record after each cycle. Refer to paragraph 6-2 if recorder is not operating properly.

2. Inspect cabinetry for any sign of damage or misaligned parts.

3. Inspect control panels for loose or missing parts; cracked or broken glass, lenses or buttons; and other obvious defects.

4. Open and close chamber door(s); insure hinge pins do not bind. Check door gasket(s); replace gasket if it has become deformed, brittle or cracked.

NOTE: Carefully examine gasket over its entire length for variations in compression. If there are appreciable variations in gasket compression in different areas, the door swing arm should be realigned. Refer to alignment procedure (Par. 7-1).

4-3.2. Weekly

1. Watch the Sterilizer while it goes thru each phase of a complete automatic cycle to insure all indicating lights and gages are working properly.

2. Check breather passages in bottom of hydraulic pump filler cap to insure they are open.

3. Remove cap plug from top center of hydraulic sump and check oil level; it should not be more than 1'' below top of sump. If required, remove cap from sump, fill tube and add oil until level is even with top of hose fitting. Recommended oils are:

NOTE: Mixing oils of different manufacture by more than 10 percent is not recommended. Also, air trapped in sump may cause oil to prematurely squirt out of opening. If so, stop filling and allow air to escape before resuming fill.

- Mobile DTE 25
- Shell — Tellus 29 — 55 gallon drums
- Sun Oil Company — Sunzis 747
- Gulf Oil Corporation — Harmony 46 AW
- Arco (Atlantic Richfield Co.) — DURO S-215
- Kendall Refining Company — RNO 47 EP

4. After filling sump with oil, operate chamber door(s) several times to remove any air from the hydraulic system.

4-3.3. Quarterly

1. Perform visual check of hydraulic system for leakage. Examine area around chamber door, control console and/or piping stand. Correct any cause of leakage; check level of oil in hydraulic sump (see Weekly instructions above).

2. Check leakage thru packing on vacuum pump. Tighten gland packing nuts if leakage is more than a few drops per minute.

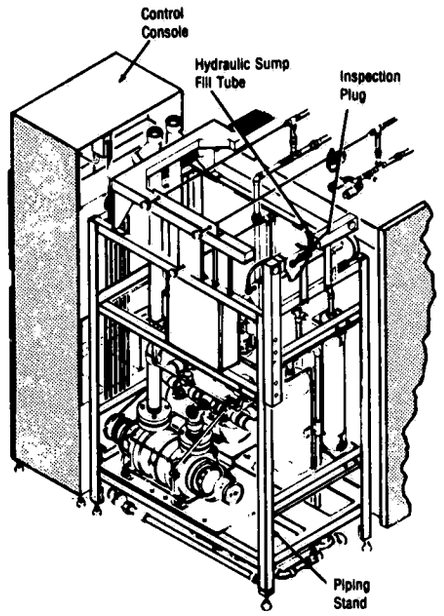

Figure 4-1. LOCATION OF HYDRAULIC SUMP.

3. Check chamber, jacket and gas conditioner (if applicable) safety valves as follows:

a. Be sure sterilizer is cool.

b. Inspect each safety valve for accumulations of rust, scale or other foreign substances which would prevent free operation of the valve. The opening of any discharge piping must be clear and free from restrictions.

c. Operate try lever (or pull ring) several times. The lever should move freely and return to its closed position after each operation.

d. Follow operating instructions in Section 2 for a steam cycle and allow chamber to reach operating pressure.

WARNING: BE CAREFUL OF STEAM ESCAPING FROM SAFETY VALVE. TO PREVENT BURNS, WEAR GLOVES OR USE AN EXTENSION DEVICE IF IT BECOMES NECESSARY TO OPERATE THE TRY LEVER.

e. Check safety valves for steam leakage. If valve is leaking, operate the try lever several times to see if the leakage will stop. **Avoid letting moisture get under insulation on chamber as it will cause rusting of the outer jacket.**

f. If leakage continues, discontinue operation of sterilizer and replace the leaky safety valve.

4. **Gas Sterilizers Only — Using CAUTION,** disconnect gas cylinders (Par. 6-12) and bleed all pressure from system.

WARNING: ANY ETHYLENE OXIDE REMAINING IN THE HOSE COULD BE HARMFUL SHOULD IT COME IN CONTACT WITH THE BODY. HANDLE THE HOSE CAREFULLY SO AS NOT TO SPILL ANY RESIDUAL LIQUID STERILANT. ALSO, BE SURE TO READ THE WARNINGS AND OTHER INSTRUCTIONS IN SECTION 2 CONCERNING THE HAZARDS OF ETHYLENE OXIDE.

a. Remove cover plates from gas filters (Par. 6-13), if applicable. Inspect filter elements; replace, if necessary. Install a new "O" ring with each element change.

NOTE: Replace the element more often if the amount of dirt in the gas cylinders warrants it. Excessive charging time indicates the need for replacement of the filter elements.

b. Inspect charging line for deposits of polymer. Clean as required.

c. Check solenoid and check valves for proper operation; repair or replace, if necessary.

d. Reconnect cylinders and pressurize gas system. Check lines and valves for leaks.

e. Zero cylinder changeover and main gauges.

4-3.4. Annually

1. Remove cover from each air filter. Clean or replace filter cartridges. Inspect and, if necessary, replace. Filter cartridges require replacement more often when unit is installed in an area with a high dust level.

2. Open and inspect thermostatic steam traps (Par. 6-5).

CAUTION: Allow thermostatic traps to cool to room temperature before removing cover. Since there is nothing to limit expansion, they may rupture or fatigue if opened while hot.

3. Apply steam pressure and inspect lines and valves for leaks or malfunction. Repair or replace valves or piping as required. Make sure steam supply is between 50 and 80 psig (dynamic).

4. Check water supply system for leaks. Open solenoid valves and flush system. Repair or replace valves or piping as required. Make sure water supply is between 50 and 80 psig (dynamic).

5. Refer to Paragraph 7-1 and check chamber door travel speed for various phases of operation. Also check settings and operation of door obstruction pressure switches.

6. Before checking oil sump level (see Quarterly instructions above), clean hydraulic supply line strainer and replace return line filter cartridge. (Note: The filter should also be checked, and if necessary replace after every 100 hours of operation.)

CAUTION: Do not operate hydraulic system with manual return line valve closed.

7. Check operation of solenoid valves (Par. 6-6). As a minimum procedure, replace valve seats on MAGNATROL valves.

4-4. LUBRICATION

4-4.1. Monthly

Carefully remove covers from chamber track rollers. Pack Dow Corning Compound 111 (manufactured by Dow Chemical Co.) or equivalent into bearing cups and replace caps.

4-4.2. Quarterly

1. Clean door lock wedges; then apply a thin film of Neptune 7 (AMSCO Part 385220, manufactured by Ore-Lube Corp.) or equivalent high-temperature grease. Wipe away excess grease.

2. Place a few drops of heavy machine oil (SAE 20 or 30 motor oil) on chamber door hinge and linkage pins. Work oil into hinge blocks and linkage by opening and closing door several times. Make sure door closes easily and centers properly. Adjust if necessary, refer to Paragraph 7-1.

4-4.3. Annually

1. Inject Plastilube "EP" (AMSCO Part 75439, manufactured by Warren Refining Co), Neptune 7 (AMSCO Part 385220), or equivalent grease into the two pump fittings.

2. Remove top and bottom plugs from each end of motor. Screw 1/8-inch angle grease fitting in top opening at each end. Inject Neptune 7 (AMSCO Part 385220) or equivalent grease until visible at bottom opening. With bottom plugs still removed, run motor for 15 minutes. (Use DRY phase.) Shut motor off. Wipe off excess grease and replace all plugs.

CAUTION: Take care to prevent grease from getting into motor windings. Never lubricate motor while it is operating.

PREVENTIVE MAINTENANCE RECORD

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

Department _____

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
1. Discuss operation with department personnel.	X	X	X	X	X	X
2. A. If machine is hot, operate through a test cycle.	X	X	X	X	X	X
B. If machine is cold, commence routine PMA.	X	X	X	X	X	X
3. Door Assembly:						
A. Check oil level in sump, add oil.	X		X		X	
B. Inspect breather passages in pump filter cap.	X	X	X	X	X	X
C. Bleed system if necessary.	X		X		X	
D. Lubricate wedges, hinge pins, linkage.	X		X		X	
E. Test safety requirement, door stall.	X	X	X	X	X	X
F. Operate door through all functions, checking smoothness of operation.	X	X	X	X	X	X
G. Inspect door gasket, gasket bar, screws.	X	X	X	X	X	X
H. Inspect limit switches, adjust as required.		X		X		X
I. Check for oil leaks from cylinders.	X	X	X	X	X	X
J. Inspect hydraulic hoses.	X		X		X	
K. Replace panels.	X	X	X	X	X	X
4. Inspect manual mode, operate door through all functions.	X	X	X	X	X	X
5. Replace oil filter element.	X					
6. Control Console:						
A. Lubricate slide drawer brackets.	X					
B. Inspect push buttons.	X	X	X	X	X	X
C. Check all plug and socket connectors.	X	X	X	X	X	X
D. Inspect all lamps, fuses, replace as required.	X	X	X	X	X	X

VACAMATIC II — FLOOR LOADER (Steam) Serial No. _____

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD, Steam Only Unit (Sheet 1 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

VACAMATIC II — FLOOR LOADER (Steam) Serial No. _____

(Circle "X" In Column When Service Is Performed)	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
E. Clean lint from components.	X		X		X	
F. Tighten all wire connections, terminals.	X		X		X	
G. Lubricate switch actuators.	X					
H. Inspect timers, check switches.	X	X	X	X	X	X
I. Check all vacuum pressure switches for proper operation at correct settings.	X	X	X	X	X	X
J. Zero all gauges.	X	X	X	X	X	X
7. Steam Supply and Return:						
A. Inspect manual valves, repack, redisc.	X					
B. Check jacket solenoid valve.	X		X		X	
C. Clean steam strainer.	X					
D. Check pressure regulator, adjust as required.	X	X	X	X	X	X
E. Inspect safety valve for freeness of operation.		X		X		X
F. Inspect piping for leaks, tighten fittings.	X		X		X	
G. Rebuild solenoid valve.			X			
8. Water Supply:						
A. Check solenoid valve.	X		X		X	
B. Clean strainer.	X					
C. Inspect piping for leaks.			X			
D. Check vacuum breaker for leaks, rebuild as required.	X					
E. Rebuild solenoid valve.			X			
9. Vacuum System:						
A. Inspect pump, tighten packing, adjust needle valve for proper operation.	X		X		X	

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD, Steam Only Unit (Sheet 2 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

VACAMATIC II — FLOOR LOADER (Steam) Serial No. _____

(Circle "X" In Column When Service Is Performed)	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
B. Check drive belt tension, check for wear and alignment.	X	X	X	X	X	X
C. Lube motor.	X					
D. Check poppet check valves for leakage.	X	X	X	X	X	X
E. Perform vacuum leak test, use absolute gauge.	X	X	X	X	X	X
F. Inspect motor starter, tighten connections.	X					
10. Miscellaneous Components:						
A. Check fresh air filters, replace elements.	X					
B. Motorized ball valves, check micro switches and proper seating.	X		X		X	
C. Lube bearings on support assembly in the chamber.	X		X		X	
D. Inspect all "wire ways", tighten electrical connections.	X					
11. Recorder:						
A. Clean door glass.	X	X	X	X	X	X
B. Clean inking system.	X		X		X	
C. Calibrate recorder with potentiometer.	X	X	X	X	X	X
D. Adjust Reed switches as required.	X	X	X	X	X	X
12. Final Test:						
A. Pressurize system and check for leaks.	X	X	X	X	X	X
B. Run test cycle, make any final adjustments.	X	X	X	X	X	X
C. Attach test chart to inspection form.	X	X	X	X	X	X
D. Replace all panels.	X	X	X	X	X	X
E. Clean area of any used parts, remove oil film on panels, install new chart on recorder.	X	X	X	X	X	X

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD, Steam Only Unit (Sheet 3 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

(Circle "X" In Column When Service Is Performed)	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
F. Police work area to assure removal of all materials used during inspection.	X	X	X	X	X	X

INSPECTOR: Sign For Each Inspection and Fill In Date:

_____ *Date*
_____ *Date*
_____ *Date*
_____ *Date*
_____ *Date*
_____ *Date*

VACAMATIC II — FLOOR LOADER (Steam) Serial No. _____

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD, Steam Only Unit (Sheet 4 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

(Circle "X" In Column When Service Is Performed)	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
1. Discuss operation with department personnel.	X	X	X	X	X	X
2. A. If machine is hot, operate through a test cycle.	X	X	X	X	X	X
B. If machine is cold, commence routine PMA.	X	X	X	X	X	X
3. Door Assembly:						
A. Check oil level in sump, add oil.	X		X		X	
B. Inspect breather passages in pump filter cap.	X	X	X	X	X	X
C. Bleed system if necessary.	X		X		X	
D. Lubricate wedges, hinge pins, linkage.	X					
E. Test safety requirement, door stall.	X	X	X	X	X	X
F. Operate door through all functions, checking smoothness of operation.	X	X	X	X	X	X
G. Inspect door gasket, gasket bars, screws.	X	X	X	X	X	X
H. Inspect limit switches, adjust as required.	X		X		X	
I. Check for oil leaks from cylinders.	X	X	X	X	X	X
J. Inspect hydraulic hoses.	X	X	X	X	X	X
K. Replace panels.	X	X	X	X	X	X
4. Inspect manual mode, operate door through all functions.	X	X	X	X	X	X
5. Replace oil filter element.	X		X		X	
6. Control Console:						
A. Lubricate slide drawer brackets.	X					
B. Inspect push buttons.	X	X	X	X	X	X
C. Check all plug and socket connectors.		X		X		X
D. Inspect all lamps, fuses, replace as required.	X	X	X	X	X	X

VACAMATIC II — FLOOR LOADER (Gas, Steam/Gas) Serial No. _____

Figure 4-3. SAMPLE PREVENTIVE MAINTENANCE RECORD, Gas and Steam/Gas Units (Sheet 1 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

VACAMATIC II — FLOOR LOADER (Gas, Steam/Gas) Serial No. _____

(Circle "X" In Column When Service Is Performed)	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
E. Clean lint from components.	X		X		X	
F. Tighten all wire connections, terminals.	X		X		X	
G. Lubricate switch actuators.	X					
H. Inspect timers, check switches.	X	X	X	X	X	X
I. Check all vacuum, pressure switches for proper operation at correct settings.	X	X	X	X	X	X
7. Steam Supply and Return:						
A. Inspect manual valves, repack, redisc.	X					
B. Check jacket heat solenoid valve.	X		X		X	
C. Clean steam strainer.	X					
D. Check pressure regulator, adjust 3-5 lb.	X	X	X	X	X	X
E. Inspect safety valve on gas conditioner.	X	X	X	X	X	X
F. Inspect piping for leaks, tighten fittings.	X					
8. Water Supply:						
A. Check jacket cooling solenoid valve. Rebuild.	X					
B. Inspect jacket "vent" valve.	X	X	X	X	X	X
C. Clean strainer.	X					
D. Inspect jacket cool down piping.	X					
9. Gas Supply:						
A. Inspect supply valves, rebuild.	X					
B. Check charging solenoid valves, rebuild.	X					
C. Test cylinder changeover, adjust as required.	X	X	X	X	X	X
D. Inspect gas filters, replace elements.	X					

Figure 4-3. SAMPLE PREVENTIVE MAINTENANCE RECORD, Gas and Steam/Gas Units (Sheet 2 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

VACAMATIC II — FLOOR LOADER (Gas, Steam/Gas) Serial No. _____

(Circle "X" In Column When Service Is Performed)	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
E. Inspect tubing for obstructions from polymers.	X	X	X	X	X	X
F. Zero Gauges.	X	X	X	X	X	X
10. Vacuum System:						
A. Inspect pump, tighten packing, adjust needle valve for proper operation.	X		X		X	
B. Check drive belt tension, check for wear.	X	X	X	X	X	X
C. Lube motor.	X					
D. Check poppet check valves for leakage.	X	X	X	X	X	X
E. Perform vacuum leak test, use absolute gauge.	X	X	X	X	X	X
F. Inspect motor starter, tighten connections.	X					
11. Miscellaneous Components:						
A. Check fresh air filters, replace elements.	X					
B. Motorized ball valves, check micro switches, and proper seating.	X		X		X	
C. Lube bearings on support assembly in the chamber.	X		X		X	
D. Inspect all "wire ways", tighten electrical connections.	X		X		X	
12. Recorder:						
A. Clean door glass.	X	X	X	X	X	X
B. Clean inking system.	X		X		X	
C. Calibrate recorder with potentiometer.	X	X	X	X	X	X
D. Adjust Reed switches as required.	X	X	X	X	X	X
13. Final Test:						
A. Pressurize ETO system and check for leaks.	X	X	X	X	X	X
B. Turn on jacket heat, check for proper heat-up time.	X	X	X	X	X	X

Figure 4-3. SAMPLE PREVENTIVE MAINTENANCE RECORD, Gas and Steam/Gas Units (Sheet 3 of 4).

PREVENTIVE MAINTENANCE RECORD

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

Department _____

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
C. Check cylinder changeover pressure.	X	X	X	X	X	X
D. Run test cycle, make any final adjustments.	X	X	X	X	X	X
E. Attach test chart to inspection form.	X	X	X	X	X	X
F. Replace all panels.	X	X	X	X	X	X
G. Clean area of any used parts, remove oil film on panels, install new chart on recorder.	X	X	X	X	X	X
H. Police work area to assure removal of all materials used during inspection.	X	X	X	X	X	X

INSPECTOR: Sign For Each Inspection and Fill In Date:

_____ *Date* _____
_____ *Date* _____
_____ *Date* _____
_____ *Date* _____
_____ *Date* _____
_____ *Date* _____

VACAMATIC II — FLOOR LOADER (Gas, Steam/Gas) Serial No. _____

Figure 4-3. SAMPLE PREVENTIVE MAINTENANCE RECORD, Gas and Steam/Gas Units (Sheet 4 of 4).

SECTION 5

SECTION 5

TROUBLESHOOTING

This section contains detailed information for locating and correcting Sterilizer malfunctions.

5-1. HELPFUL HINTS

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

2. Refer to paragraph 5-2 and the TROUBLESHOOTING CHARTS after symptom has been verified.

3. Use control system descriptions, electrical schematics, hydraulic schematic, piping diagrams and limit switch illustration in Section 3 as aids in understanding system operation and how malfunction of a specific component affects system operation. To confirm and correct suspected pressure, vacuum or temperature sensing malfunctions, refer to Section 7 for operational and leak tests.

4. For troubleshooting cycle and door control circuits on control console slide-out drawers jumper cable assemblies (Part P-760138-091) are required.

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

a. Steam and Water Supplies

(1) Insure building-supply valves are fully open.

(2) Insure supply pressure is at proper value and does not fluctuate. Insure gage readings are correct.

(3) Insure steam supply is of proper quality.

(4) Check all valves and adjust, repair or replace as necessary.

(5) Clean supply, drain and return line strainers.

(6) Check drain and return line thermostatic traps; replace elements if necessary.

(7) Inspect entire system and eliminate all leaks.

b. Electrical System

(1) Use electrical schematics and circuit descriptions to determine circuit and component functions. Refasten all loose wires or improper connections.

(2) Inspect individual components and adjust, repair or replace as necessary.

c. Hydraulic System

(1) Check oil level in sump and fill if necessary.

(2) Use hydraulic schematic to determine flow paths and component function. Repair or replace components not operating properly or that leak internally.

(3) Check all valves and adjust, repair or replace as necessary.

(4) Inspect oil filter and replace cartridge if necessary.

(5) Clean supply line strainer.

(6) Inspect entire system and eliminate all leaks.

d. Drain and Exhaust System

(1) Clean chamber drain strainers.

(2) Insure drain line is clear and clean if necessary.

(3) Insure the Sterilizer is steam- and vacuum-tight and perform leak test if necessary.

(4) Check all valves and adjust, repair or replace as necessary.

(5) Check thermostatic trap and replace element if necessary.

(6) Insure the Sterilizer is properly leveled. Consult Installation Instructions.

(7) Check air filter and replace cartridges if necessary.

5-2. THE TROUBLESHOOTING CHART — EXPLANATION OF ITS CONTENTS

COLUMN HEADING	EXPLANATION
STERILIZER OPERATIONAL STATUS	Select a symptom most nearly corresponding with the position the Sterilizer cycle progressed before the trouble occurred.
TROUBLE	Select the problem most appropriate to the particular trouble. The examples are presented in cycle sequence.
ARE CONDITIONS AS FOLLOWS?	This column lists specific conditions to check to isolate and correct the malfunction. The conditions are presented in the order most likely to have caused the malfunction. Check in the order given. Refer to Paragraph 5-1 for instructions if the conditions are not as described. **NOTE:** If the symptom for a malfunction is established as mechanical, the electrical components may be omitted and vice versa.
WHERE TO FIND ITEMS IN MANUAL	Illustrations from Section 8 on which given components can be found are provided in this column. An index number after a figure number denotes a specific component.

NOTE: Connection points of the circular electrical connectors shown on the schematics have been changed from an Alphabetical to a Numerical Designation, i.e., P19-A will become P19-1, P11-R will become P11-16, etc. Use the chart below for conversion, if necessary.

OLD DESIGNATION	NEW DESIGNATION	OLD DESIGNATION	NEW DESIGNATION	OLD DESIGNATION	NEW DESIGNATION
A	1	J	9	S	17
B	2	K	10	T	18
C	3	L	11	U	19
D	4	M	12	V	20
E	5	N	13	W	21
F	6	P	14	X	22
G	7	Q	15	Y	23
H	8	R	16	Z	24

TABLE 5-1.

STERILIZER TROUBLESHOOTING CHART (STEAM)

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
1. Sterilizer in READY position waiting to be loaded	A. Jacket pressure does not rise to required (approximately 44 psig) level	(1) Power input (120 volt) hot (2) Main power switch S2 on (3) Control power switch S4 on (4) Steam supply pressure as specified (5) Supply line strainer clean (6) Jacket steam solenoid valve energized (7) Steam control valve properly adjusted (8) Jacket return trap properly seating	8-34, 36 8-34, 16 8-29, 34 8-4, 1 8-4, 13 8-4, 7 8-20, 7
2. Sterilizer in READY position, load in chamber, door(s) closed and locked	A. READY light is not on	(1) Door switches made (2) Bulb not burned out (3) Socket energized (4) 5-amp fuse F2 not burned out	 8-38 8-38, 34 8-34, 27
	B. Control does not start when cycle button is pushed	(1) Relay LR4 latch coil energized — see Table 5-3 (2) Circuit continuity thru WRAPPED S7 and LIQUIDS S8 pushbutton assemblies (3) Rotary solenoid switches S1A and S1B closing (4) Pulse timer motor energized and contacts PT1 and PT2 closed (5) Rotary solenoid energized thru full-wave rectifier	8-37, 8 8-29 8-29 8-29 8-29
	C. Control starts, but WRAPPED or LIQUIDS light does not come (or stay) on	(1) Relay CRU1 latch coil energized for wrapped cycle; CRL1 latch coil energized for liquids cycle (2) Relay CR4 energized (3) Bulb not burned out (4) Socket energized	8-29 8-29
	D. Cycle light on, but CONDITION light does not come (or stay) on	(1) Rotary switch positioned for "condition" phase (contacts 16, 26, 36 and 42 energized) (2) Bulb not burned out (3) Socket energized	8-29 8-38 8-38, 34
3. **Wrapped cycle only:** Sterilizer in "condition" phase	A. Chamber pressure does not rise, or rises but does not reach 28 psig	(1) Chamber steam solenoid valve energized (2) Timer TD1 operating (3) Vacuum exhaust ball valve (4) Piping and door gasket not leaking	8-19, 45 8-29 8-22, 3

TABLE 5-1: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
3. Continued	B. Chamber pressure reaches 28 psig, but vacuum portion of condition phase does not occur	(1) Pressure switch PS2 actuated	8-34, 29
		(2) Relay CR1 energized	8-29
		(3) Vacuum pump motor is operating	8-2, 17
		(a) Overload is reset	
		(b) Three-phase power input hot	
		(c) Starter coil energized	8-10, 17
		(4) Pump-motor drive belt not broken	8-2, 8
		(5) Water supply pressure as specified	
		(6) Pump water solenoid valve energized	8-4, 11
		(7) Chamber drain line open	
		(a) Vacuum exhaust ball valve open	8-22, 3
		(b) Chamber drain strainers clean	8-42, 1
		(8) Manual exhaust valve closed	8-12, 51
	C. Vacuum is drawn, but control does not advance to again pressurize chamber	(1) Vacuum switch VS1 actuated	8-34, 28
		(2) Timer TD2 operating	8-29
		(3) Relay CR1 de-energized	8-29
	D. Vacuum purges are not normal — see Figure 3-1	(1) Piping and door gasket not leaking	
		(2) Pump-motor drive belt properly adjusted	8-2, 8
		(3) Pump rotation correct	8-6, 24
		(4) Water temperature and flow as recommended	
	E. Rotary switch does not advance to "sterilize" position	(1) Timer T1 operating	8-29
		(2) Pulse timer motor energized and contacts PT1 and PT2 closing	8-29
		(3) Rotary solenoid energized through full-wave rectifier	8-29
	F. Rotary switch advances, but STERILIZE light does not come (or stay) on	(1) Chamber at preselected temperature on recorder? If not, is	
		(a) Steam supply pressure and quality as recommended	
		(b) Piping and door gasket not leaking	
		(c) Chamber drain trap properly seating	8-22, 12
		(d) Chamber drain line strainers clean	8-42, 1
		(2) If chamber is at preselected temperature on recorder, is	
		(a) Recorder LOW temperature switch actuated	8-32, 5
		(b) Relay CR8 energized	
		(c) Bulb not burned out	8-38
		(d) Socket energized	8-38, 34

TABLE 5-1: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
4. **Liquids cycle only:** Sterilizer in "condition" phase	A. Chamber pressure does not rise	(1) Chamber steam solenoid valve energized	8-19, 45
		(2) Relay CRL1 latch coil	8-29, 71
		(3) Vacuum exhaust valve closed	8-22, 3
	B. Chamber pressure rises, but STERILIZER light does not come (or stay) on	(1) Chamber at preselected temperature on recorder? If not, is	
		(a) Steam supply pressure and quality as recommended	
		(b) Piping and door gasket not leaking	
		(c) Chamber drain trap properly seating	8-22, 12
		(d) Chamber drain line strainers clean	8-42, 1
		(2) If chamber is at preselected temperature on recorder, is	
		(a) Recorder LOW temperature switch actuated	8-32, 5
		(b) Relay CR8 energized	
		(c) Bulb not burned out	8-38
		(d) Socket energized	8-38, 34
5. Sterilizer in "sterilize" phase (either cycle)	A. Chamber temperature is not maintained within required limits (wrapped cycle, 270-274 or 285-287° F; Liquids cycle, 250-254° F)	(1) Steam supply pressure as specified	8-4, 7
		(2) Recorder HI and LOW temperature control operating properly	
		(3) Relays CR7 and CR8 energized	
		(4) Steam control valve operating properly	8-4, 7
	B. Chamber temperature is properly maintained, but rotary switch will not advance to "exhaust" position	(1) Timer T2 operating	8-29
		(2) Pulse timer motor energized and contacts PT1 and PT2 closing	8-29
		(3) Rotary solenoid energized thru full-wave rectifier	8-29
		(4) Liquids cycle only: Relay CRL1 in latched position	8-29, 71
	C. Rotary switch advances, but EXHAUST light does not come (or stay) on	(1) Vacuum switch VS2 in its NC position	8-34, 28
		(2) Bulb not burned out	8-38
		(3) Socket energized	8-38, 34
6. **Wrapped cycle only:** Sterilizer in "exhaust" phase	A. Chamber pressure is not relieved	(1) Vacuum exhaust ball valve open	8-22, 3
	B. EXHAUST light does not go out and/or DRY light does not come on	(1) Vacuum pump motor operating	8-2, 17
		(a) Overload reset	
		(b) Three-phase power input hot	
		(c) Starter coil energized	8-10, 17
		(2) Pump-motor drive belt not broken	8-2, 8
		(3) Water supply pressure as specified	
		(4) Pump water solenoid valve energized	8-5, 11
		(5) Vacuum exhaust ball valve open	8-12, 3
		(6) Vacuum switch VS2 actuated	8-34, 28
		(7) Bulb for DRY light not burned out and socket energized	8-38, 34
		(8) Manual exhaust valve closed	8-12, 51

TABLE 5-1: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
6. Continued	C. Rotary switch will not advance to "air" position	(1) Timer T3 operating (2) Pulse timer motor energized and contacts PT1 and PT2 closing (3) Rotary solenoid energized thru full-wave rectifier	8-29 8-29 8-29
	D. Rotary switch advances, but AIR light does not come on	(1) Bulb not burned out (2) Socket energized	8-38 8-38, 34
7. **Liquids cycle only:** Sterilizer in "exhaust" phase	A. Chamber pressure is not relieved	(1) Pressure switch PS3 actuated (2) Slow exhaust solenoid valve energized	8-34, 29 8-19, 37
	B. Chamber pressure is relieved, but jacket pressure is not	(1) Relay CR5 energized (2) Jacket steam solenoid valve closed	8-29 8-4, 13
	C. Rotary switch will not advance to "sterile" position	(1) Pressure switch PS3 returned to its NC position (2) Pulse timer motor energized and contacts PT1 and PT2 closing (3) Rotary solenoid energized thru full-wave rectifier (4) Vacuum switch VS3 at its NC position	8-34, 29 8-29 8-29 8-34, 28
	D. Rotary switch advances, but STERILE light does not come (or stay) on	(1) Relay CR6 energized (2) Bulb not burned out (3) Socket energized	8-29 8-38 8-38, 34
8. **Wrapped cycle only:** Sterilizer in "air" phase	A. Chamber vacuum is not broken	(1) Vacuum break ball valve open (2) Bacteria-retentive filters clean	8-19, 8 8-19, 23
	B. Chamber vacuum is broken, but rotary switch does not advance to "sterile" position	(1) Vacuum switch VS3 returned to its NC position (2) Pulse timer motor energized and contacts PT1 and PT 2 closing (3) Rotary solenoid energized thru full-wave rectifier	8-34, 28 8-29 8-29
	C. Rotary advances, but STERILE light does not come (or stay) on	(1) Relay CR6 energized (2) Bulb not burned out (3) Socket energized	8-29 8-38
9. Sterilizer in "sterile" phase	A. Buzzer does not sound for proper time	(1) Timer TD3 operable (2) Buzzer coil energized	8-29 8-29
	B. Rotary switch does not advance to "off" position	(1) Pulse timer motor energized and contacts PT1 and PT2 closing (2) Rotary solenoid energized thru full-wave rectifier	8-29 8-29

TABLE 5-1: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
10. Cycle complete and load removed from chamber	A. Wrapped goods come out wet	(1) Goods were properly loaded so air could circulate between and moisture drain from them (2) Preselected drying time was sufficient	
	B. Liquids cycle exhaust was too quick causing bottles or flasks in the load to "boil over" and bottle stoppers to "blow"	(1) Solution exhaust accelerator valve adjusted to actuate at 8 psig (2) Solution exhaust needle valve properly adjusted	8-19, 31 8-19, 34
	C. Steam enters chamber when door is open	(1) Chamber steam solenoid valve properly closing (2) Chamber steam manual bypass	8-19, 45 8-12, 53
	D. There is water in chamber at end of cycle	(1) Jacket and chamber drain line strainers clean (2) Jacket and chamber drain line traps operable (3) No back pressure on jacket return line (4) Chamber properly leveled	8-18, 5 8-42, 1 8-20, 7 8-22, 12
11. Miscellaneous	A. Control skips a phase or phases	(1) Pulse timer contact PT1 is returning to its NC position after each revolution of motor (2) Relay CR3 is not energized	8-29 8-29
	B. Steam leaks from around chamber door(s)	(1) Door gasket not deformed, brittle or cracked (2) Door operation properly adjusted	8-39, 37
	C. There is excessive steam in area when Sterilizer is operating	(1) Water supply pressure and temperature as recommended (2) Water supply line strainer clean (3) Condenser water solenoid valve opening (4) Chamber safety valve not leaking (a) Steam control valve properly adjusted (b) Safety valve not defective	 8-5, 1 8-5, 27 8-4, 7 8-12, 64
	D. Vacuum pump motor starter overload switches cut out	(1) Voltage not low due to undersized supply (2) Motor not overloaded (a) Equal current on each leg of three-phase system (b) Pump bearings properly lubricated (c) Pump packing gland not too tight (pump shaft should turn by hand) (3) Correct heaters being used for 200-, 230- or 460-volt systems, as applicable	 8-8, 6 8-8, 1 8-10, 12
	E. Vacuum pump operation is noisy	(1) Pump air bleed line needle valve properly adjusted (2) Water flow control valve properly adjusted (3) Pump bearing properly lubricated (4) Pump/motor drive belt properly adjusted	8-6, 2 8-5, 19 8-8, 6 8-2, 8

TABLE 5-2

STERILIZER TROUBLESHOOTING CHART (GAS)

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
1. Sterilizer in READY position waiting to be loaded	A. Chamber does not preheat	(1) Power input (120 volt) hot (2) Main power switch S2 on (3) Control power switch S4 on (4) 5-amp fuse F2 not burned out	8-34, 6 8-34, 16 8-29, 34 8-34, 27
	B. Steam conditioning pressure does not rise to required level (5 psig)	(1) Steam supply pressure as specified (2) Supply line strainer clean (3) Steam control valve properly adjusted	8-4, 1 8-15, 35
2. Sterilizer in READY position, load in chamber, door(s) closed and locked	A. READY light is not on	(1) Door switch(es) made (2) Bulb not burned out (3) Socket energized (4) Chamber up to temperature (5) Over temp switches tripped (6) Steam supplied to jacket	8-39 8-38 8-38, 34 8-35, 24 8-35, 31
	B. Control does not start when cycle button is pushed	(1) Rotary solenoid energized through full-wave rectifier (2) Pulse timer motor energized and contacts PT1 and PT2 closed (3) Rotary solenoid switches S5A and S5B closing	8-29, 5 8-29, 5 8-29, 75
	C. Control starts, but CONDITION light does not come (or stay) on	(1) Bulb not burned out (2) Socket energized	8-38 8-38, 34
	D. Insufficient or no vacuum	(1) Vacuum pump motor operating (a) Overload reset (b) Starter energized (c) Three phase power hot (2) Water supply as specified (3) Water supply solenoid valve energized (4) Chamber drain line open (a) Vacuum exhaust ball valve open (b) Chamber drain strainers clean (5) Piping and door gasket not leaking (6) Pump rotation correct (7) Pump air bleed adjusted (8) Vacuum switches adjusted	8-2, 17 8-10, 17 8-4, 11 8-22, 3 8-42, 1 8-6, 2 8-35, 25 & 26
	E. Excessive vacuum	(1) Vacuum switches in adjustment	8-35,25&26
	F. Vacuum drawn, but control does not advance	(1) VS-4 vacuum switch actuated (2) Pulse timer operating (3) Rotary Solenoid energized	8-35, 25 8-29, 57 8-29, 75

TABLE 5-2: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
3. Sterilizer in CONDITION phase	A. Chamber vacuum does not achieve 24" Hg	(1) Conditioning steam solenoid valve not operating (2) Needle valve properly adjusted	8-15 8-15, 55
	B. Rotary switch does not advance to "STERILIZE" position	(1) Pulse timer motor energized and contacts PT1 and PT2 closing (2) Rotary solenoid energized through full-wave rectifier	8-29, 57 8-29, 75
4. Sterilizer in "STERILIZE"	A. CHARGE light not on	(1) Bulb burned out (2) Charge pressure switches operating properly (3) Rotary switch contacts operating properly (4) Adequate gas pressure (5) Gas cylinder and gas supply hand valves open (6) Cylinder pressure in at least one cylinder over 30 psig (7) Gas solenoid valve energized (8) Auto changeover working (9) Gas filters clean (10) Chamber pressure switch operable	8-38 8-35, 27 8-29, 75 8-31 8-31 8-31 8-31 8-35, 27
	B. STERILIZE light not on	(1) Pressure switch contact (NO) closing (2) Exposure timer NC contacts open	8-35, 27 8-29, 43
	C. Does not cycle to "Post VAC 1"	(1) Exposure timer operating (2) Charge pressure switches making contact (3) Clutch engaged (4) Rotary switch making contact	8-29, 43 8-35, 27 8-29, 75 8-29, 75
5. Sterilizer in "Post VAC 1"	A. AIR light not on	(1) Rotary switch operating (2) Exposure timer NO contacts closing (3) Solenoid receiving power from rectifier (4) Contact 35 (Rot. Sw) closing	8-29, 75 8-29, 43 8-29, 75 8-29, 75
	B. Vacuum low	(1) See Item 2D	
	C. Does not cycle to "AIR 1"	(1) Rotary switch operating (2) VS-7 vac. switch closing (3) Pulse timer operating (4) Solenoid receiving power	8-29, 75 8-35, 25 8-29, 57 8-29, 75
6. Sterilizer in "AIR 1"	A. Rotary switch advances, but AIR light does not come on	(1) Bulb not burned out (2) Socket energized	8-38 8-38, 34
	B. Vacuum is not relieved	(1) Vacuum break ball valve open (2) Filter clean	8-19, 8 8-19, 23
	C. Does not cycle to "VAC 2"	(1) VS-8 vac. switch closing (2) Pulse timer operating (3) Rotary switch operating	8-35, 25 8-29, 57 8-29, 75

TABLE 5-2: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
7. Sterilizer in "Post VAC 2"	A. See item 5A & B		
	B. Does not cycle	(1) Pulse timer and rotary solenoids operating	8-29, 57 8-29, 75
8. Sterilizer in "AIR 2"	A. See 6 A, B & C		
9. Sterilizer in "STERILE" phase	A. Buzzer does not sound for proper time	(1) Timer TD3 operable (2) Buzzer coil energized	8-29 8-29
	B. Rotary switch does not advance to "OFF" position	(1) Pulse timer motor energized and contacts PT1 and PT2 closing (2) Rotary solenoid energized through full-wave rectifier	8-29, 57 8-29, 75
10. Miscellaneous	A. Control skips a phase or phases	(1) Pulse timer contact PT1 is returning to its NC position after each revolution of motor (2) Relay CR27 is not being energized	8-29, 57 8-29, 6
	B. Vacuum pump motor starter overload switches cut out	(1) Voltage not low due to undersized supply lines (2) Motor not overloaded (3) Equal current on each leg of three-phase system (4) Pump bearings properly lubricated (5) Pump packing gland not too tight (pump shaft should turn by hand) (6) Correct heaters being used for 200-, 230- or 460-volt systems, as applicable	8-2, 17 8-8, 6 8-8, 1 8-10, 12
	C. Vacuum pump operation is noisy	(1) Pump air bleed line needle valve properly adjusted (2) Pump bearing properly lubricated (3) Pump/motor drive belt properly adjusted	8-6, 2 8-8, 6 8-2, 8
	D. Heat is excessive	(1) Door closed between cycles (2) Temp. switches in adjustment	8-35, 24 & 31
	E. Excessive vacuum	(1) Pre Vac/Final Vac switches in adjustment	8-35, 25&26

TABLE 5-3

POWER DOOR TROUBLESHOOTING CHART

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
1. Door either open or closed	A. Hydraulic pump does not operate	(1) Main power switch S2 on (2) 10-amp fuse F1 not burned out (3) Overload reset (4) Starter coil energized (a) Door obstruction pressure switches in their NC position (b) Circuit continuity thru door push-button assemblies (c) Relay CR15 (close), CR14 (lock), CR17 (unlock) or CR-16 (open) energized	8-34, 16 8-34, 26 8-10, 13 8-37 8-37, 7
	B. Pump runs but pressure in system is not 750 psig	(1) Pump regulator properly adjusted (2) Pump bypass regulator properly adjusted	8-3, 1 8-3, 37
2. Door fully open	A. Door will not close when CLOSE or LOCK button is pushed	(1) Pump motor operating (see item 1) (2) Hydraulic sump full (3) No air in system (4) Limit switch LS1 not actuated (5) "Close" solenoid valve energized	8-3, 1 8-3, 1 8-34, 30 8-31, 32
	B. Door closes, but only partially	(1) Door movement not obstructed (2) Door obstruction pressure switch properly adjusted (3) Timer TD4 not set too low (4) Hinge assembly not binding	8-40 8-37, 9 8-39, 56
	C. Door closes, but time required is not within 10-15 seconds	(1) Pressure regulator properly adjusted	8-31, 32
	D. Door closes, but either rebounds or stops too abruptly at end of swing	(1) Swing cylinder cushion adjustment properly set	8-41, 78
	E. Door closes, but does not lower into pit	(1) Limit switch LS3 not actuated (2) Limit switch LS1 actuated (3) "Lower" solenoid valve energized	8-39, 78 8-39, 30 8-31, 37
	F. Door lowers, but time required is not within 5-10 seconds	(1) Dual flow regulator properly adjusted	8-31, 32
	G. Door is closed and lowered, but pump is not de-energized (only CLOSE button pushed)	(1) Limit switch LS3 actuated (2) Relay CR15 de-energized	8-39, 78 8-37, 7

TABLE 5-3: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
3. Door closed and lowered (but not locked); LOCK button pushed	A. Door will not lock	(1) Pump motor operating (see item 1) (2) Hydraulic sump full (3) No air in system (4) Limit switch LS3 actuated (5) Limit switches LS9 and LS11 not actuated (6) "Lock" solenoid valve energized	8-3, 1 8-3, 1 8-39, 78 8-39, 5 8-31, 32
	B. As door is locked, a squealing noise is emitted from the hydraulic pump	(1) Pump and pump bypass regulator properly adjusted	8-3, 37
	C. Door locks, but time required is not within 5-10 seconds	(1) Dual flow regulator properly adjusted	8-31, 32
	D. Door is locked, but pump is not de-energized	(1) Limit switches LS9 and LS11 actuated (2) Relay CR18 energized	8-39, 5 8-24, 7
4. Door closed and locked	A. Signal is not sent to cycle control circuits (Relay LR4 latch coil not energized)	(1) Limit switches LS9 and LS11 actuated (2) Relay CR18 energized	8-39, 5 8-37, 7
	B. Door gasket seal is not maintained throughout cycle	(1) Door gasket not deformed, brittle or cracked (2) Relay LR3 latch coil energized when Sterilizer was in "condition" phase (3) Relay CR14 energized (4) Limit switches LS9 and LS11 not actuated and relay CR18 de-energized if door is not fully locked	8-39, 37 8-37, 8 8-37, 7 8-39, 5 8-37, 7
	C. Door will not unlock when UNLOCK button is pushed	(1) Chamber pressure atmospheric (i.e., pressure switch PS1 and vacuum switch VS9 are NC) (2) Relay LR3 reset coil energized when Sterilizer was in "sterile" phase (3) Pump motor operating (see item 1) (4) Hydraulic sump full (5) No air in system (6) Limit switch LS12 not actuated	8-31, 30 8-39, 5 8-37, 7 8-3, 1 8-39, 5
	D. Door unlocks, but time required is not within 5-10 seconds	(1) Dual flow regulator properly adjusted	8-31, 32
	E. Door is unlocked, but pump is not de-energized	(1) Limit switch LS10 actuated (2) Relay CR17 de-energized	8-39, 5 8-37, 7

TABLE 5-3: CONTINUED

STERILIZER OPERATIONAL STATUS	TROUBLE	ARE CONDITIONS AS FOLLOWS?	WHERE TO FIND ITEMS IN MANUAL
5. Door closed and lowered (but not locked); OPEN button is pushed	A. Door will not raise	(1) Pump motor operating (see item 1) (2) Hydraulic sump full (3) No air in system (4) Limit switches LS10 and LS12 actuated (5) Limit switch LS3 not actuated (6) "Lift" solenoid valve energized	8-3, 1 8-39, 5 8-39, 78 8-31, 32
	B. Door raises, but time required is not within 5-10 seconds	(1) Dual flow regulator properly adjusted	8-31, 32
	C. Door raises, but will not swing open	(1) Limit switch LS4 actuated (2) Limit switch LS2 not actuated (3) "Open" solenoid valve energized	8-39, 78 8-39, 113 8-31, 32
	D. Door opens, but only partially	(1) Door movement not obstructed (2) Door obstruction pressure switch properly adjusted (3) Timer TD4 not set too low (4) Hinge assembly not binding	 8-37, 8 8-39, 56
	E. Door opens, but time required is not within 10-15 seconds	(1) Pressure regulator properly adjusted	8-31, 32
	F. Door opens, but either rebounds or stops too abruptly at end of swing	(1) Swing cylinder cushion adjustment properly set	8-41, 8
	G. Door is fully opened, but pump is not de-energized	(1) Limit switch LS2 is actuated (2) Relay CR16 de-energized	8-39, 113 8-37, 7

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SECTION 6

COMPONENT REPAIR AND REPLACEMENT

6-1. GENERAL

This section includes instructions for disassembly, repair and replacement of selected Sterilizer components. Exploded views and assembly drawings showing various parts and assemblies referred to in this section are included in Section 8.

WARNING: WHERE APPLICABLE, SHUT OFF BUILDING STEAM SUPPLY TO STERILIZER AND ALLOW CHAMBER AND STERILIZER PIPING TO COOL BEFORE STARTING THE FOLLOWING PROCEDURES.

6-2. INDICATOR-RECORDER (STEAM AND GAS) (Figure 8-32)

NOTE: Access to internal components such as ink bottle, reed switches, drive motor, and temperature pen is achieved in the following manner: loosen knurled screw at lower right corner of chart backup plate. Pull bottom of plate outward to open.

1. Filling Inking System

NOTE: Omit step 1 when filling inking system for **first time** or **after cleaning.** See instructions below if inking system requires cleaning.

a. Before removing cap from ink bottle, squeeze bottle between thumb and middle finger leaving vent hole in cap open; then close vent hole with index finger and release pressure on bottle. (Ink in tubing will be drawn into bottle. This prevents dripping when cap assembly is removed and air bubbles from forming when ink is forced into tubing.)

b. Remove cap (with capillary tubing attached), then fill bottle with ink to level of line on bottle. Replace cap and tighten firmly.

c. Place finger over vent hole in cap and squeeze bottle between thumb and middle finger until ink flows thru tubing and a few drops flow freely from tip of pen. Place blotter under pen to absorb ink.

IMPORTANT: Remove finger from vent hole before relaxing pressure on bottle. Do not release suddenly as ink could be drawn back from pen tip.

d. Pen is now ready for operation.

2. Changing The Chart

a. Unscrew hub cap. Hub cap retains a spring-loaded wire bracket, which acts as a pen lifter; hold bracket while unscrewing cap.

b. With hub cap and pen away from chart, remove chart and slip new one over chart hub.

c. Turn chart by hand until pen rests on proper time arc. Replace and tighten hub cap.

3. Cleaning The Inking System

NOTE: The inking system should be cleaned periodically with warm water. This is done as follows:

a. Squeeze ink bottle between thumb and middle finger, leaving vent hole in cap open; then close vent hole with index finger and release pressure on bottle to draw ink from tubing into bottle. Unscrew bottle from cap.

b. Empty ink from bottle and rinse it with warm tap water. Reinstall empty bottle and tighten firmly.

c. Immerse pen tip in warm tap water using a spare ink bottle or similar container. Squeeze empty recorder ink bottle between thumb and middle finger leaving vent hole in cap open; then cover vent hole with index finger and release pressure on bottle. Water will be drawn from container into recorder bottle thru pen tip.

d. Repeat step 3 until water drawn thru capillary is clear. Remove container from pen tip.

e. Remove and clean recorder ink bottle. Fill ink bottle with warm tap water; replace it on cap and tighten firmly. Place index finger over vent hole in cap and squeeze bottle between thumb and middle finger to force water thru capillary and pen to insure system is clear. Place blotter under pen to absorb water.

f. Repeat step 1 to draw water out of capillary. Remove and empty ink bottle when system cleanliness is satisfactory; clean bottle, if necessary.

g. Refer to preceding instructions and fill inking system.

4. Adjustment of Temperature Control

a. Turn adjusting screw on front reed switch clockwise to increase recorder LOW temperature switch point; counterclockwise to decrease.

b. Turn adjusting screw on rear reed switch clockwise to increase recorder HI temperature switch points; counterclockwise to decrease.

c. Use adjusting screw to make minor adjustments of temperature pen setting.

NOTE: Steam and Gas Sterilizer has an additional pressure recording pen, which is adjusted in a similar manner.

5. Removal and Replacement (Steam)

CAUTION: Recorders should be handled with care. Caution must be exercised when making changes to insure against kinking or compressing capillary system. The bulb, tubing and pressure element are filled with fluid approved by Scientific Instrument Makers Association and form a sealed system. This system must not be broken; even the most minute leak renders it inoperative. Excess capillary tubing should be formed into an 8" diameter coil and properly supported by taping to any smooth, unheated surface.

a. Open chart backup plate. (See previous NOTE.)

b. Disconnect incoming leads from recorder terminal board.

c. Disconnect capillary tube from chamber drain tee located behind control console.

d. Remove two screws at rear of case.

e. Remove recorder.

To replace recorder perform steps 6 thru 9, as follows:

f. Replace recorder, then install two screws at rear of case.

g. Connect capillary tube from chamber drain tee located behind control console.

h. Connect incoming leads from recorder terminal board.

i. Close chart backup plate.

6. Removal and Replacement (Gas)

a. Disconnect power to sterilizer at the hospital's main panel.

b. To remove recorder, disconnect all wiring at the terminal block inside recorder case, disconnect sample line at compression fitting located at the rear of case, then remove temperature bulb from fitting on top of chamber. Roll bulb and tube into an eight-inch roll, then tape to recorder case. Use care and do not damage bulb or tube. Remove two screws which hold recorder to brackets at the back of control panel, then slide unit out of panel to the front.

c. To install a recorder, locate it in space provided and secure to panel with mounting screws provided. Connect sample line to back of case. Check wiring diagram and make all necessary connections to terminal block at the back of case. Uncoil tubing and straighten without twisting or bending.

d. Do not bend tube at less than a 3-inch radius. Tubing must be protected from crushing, abrasion, strain or movement at all times. For support it may be tied or taped to unheated pipes or frame members. It is relatively unaffected by surrounding temperatures. Coil excess tubing in an 8-inch coil and tape out of the way. Do not cut off any excess tubing. Insert sensing bulb in the fitting on top of chamber.

CAUTION: Be careful not to crack or break tubing.

NOTE: The helical pressure element in the vacuum-pressure system reacts directly to changes in chamber pressure, causing the element to coil for negative pressures (vacuum) and to uncoil for positive pressures.

6-3. CHAMBER DOOR ASSEMBLY

Most repairs can be made without removing door from Sterilizer. Disassemble door only where necessary to make the repairs. Clean all working parts with solvent (such as Stoddard solution). Remove all gum and grease from bearing and wear surfaces. Wipe all parts with a clean lint-free cloth. Dry bearings with low-pressure, compressed air and inspect for wear and damage. Wrap or protect polished and painted components after removal.

1. Replacement of Door Gasket (Fig. 8-39, 37)

a. Remove gasket and gasket bars from door.

NOTE: Carefully examine gasket over its entire length for variations in compression. If variations in gasket wear indicate an appreciable difference in different areas, gasket is not properly positioned on door frame; and door swing arm should be adjusted. Refer to paragraph 7-1.

b. Clean gasket contact surfaces with *AMSCO Pry Cleaner* (included in Door Frame Cleaning Kit, AMSCO Part 753377). Make certain surfaces are free of foreign matter.

c. Run a 1/4"-28 tap thru gasket bar holes in door to clean threads.

d. Replace gasket bars. Leave bars loose enough to allow insertion of gasket.

e. Insert new gasket under gasket bars, tightening gasket bar retaining screws just enough to hold gasket. **Do not compress gasket to a great extent in any one area.**

f. Tighten gasket bars alternately to almost snug.

g. If gasket appears firmly seated under gasket bars and is flat on door, snug gasket bar retaining screws.

h. Check four spring-loaded plungers on door face to insure they are operable and adjusted so distance between gasket and door frame is 1/16" when door is closed but not locked. (This protects gasket when door is raising or lowering.)

i. After gasket is installed, spray sealing surfaces of door frame with *AMSCO Fluorocarbon Spray* (also included in Door Frame Cleaning Kit, see above) to prevent gasket from sticking.

2. Replacement of Load Carrying Bearings, Thrust and Race (Fig. 8-39, 61 and 62)

a. Refer to Figure 8-38. Remove upper and lower door panels; also remove hinge cover from Sterilizer.

b. Open chamber door. Place blocking under bottom of door so when hinge assembly is disconnected, door does not drop.

c. Press Sterilizer main power switch OFF.

d. Remove roll pin from upper hinge pin only. Remove hinge pin from hinge bracket. **Do not** remove upper and lower hinge pins simultaneously.

e. Back off adjusting nut until thrust bearing and bearing race are removable, then remove bearing assembly from hinge.

f. Slide new bearing (thrust and race) in place and tighten adjusting nut until zero play on bearing results. Reinstall hinge and roll pins.

g. Repeat Steps 4, 5 and 6 for lower hinge bearing.

h. Remove support blocking from door.

i. Press Sterilizer main power switch ON and test door operation.

j. Reinstall door panels and hinge cover on Sterilizer.

6-4. VACUUM PUMP AND MOTOR ASSEMBLY

1. Elimination of Pump Noise

Adjust air bleed line needle valve (Fig. 8-6) until noise stops. Carefully, open valve only enough to reduce pump noise. Too much air reduces pump efficiency and increases motor amps.

2. Adjustment or Replacement of Drive Belt (Fig. 8-2, 8)

NOTE: Proper tension is necessary to insure quiet operation and prevent bearing damage. Proper shaft alignment is necessary to prevent uneven tension and extreme edge wear on belt.

a. Remove belt guard from piping stand.

b. Inspect belt for wear, distortion and breaks. If necessary, replace belt as follows:

(1) Loosen motor mounting bolts and back off on tension-adjustment bolts, located on underside of motor mounting plate.

(2) Slide motor toward pump and lift belt off drive sprockets.

(3) Slip new belt over sprockets. (It should not be necessary to force or pry belt onto sprockets.) Refer to step 4 to adjust drive belt tension.

c. Place a straightedge across top of sprockets, check deflection in belt at midpoint between motor and pump; should be 1/4" to 1/2". If adjustment is necessary, loosen motor mounting bolts, then refer to step 4.

d. To adjust drive belt tension:

(1) Insure motor mounting bolts are loose, then alternately tighten adjustment bolts, located on underside of motor mounting plate, until belt deflection at midpoint between motor and pump is 1/4 to 1/2".

(2) Using a straightedge, check alignment of belt sprockets to insure motor and pump shafts are parallel. If necessary, tighten and/or loosen front and rear adjusting bolts, then recheck drive belt tension.

(3) When belt tension is properly adjusted, hold each adjustment bolt and tighten its associated lock nut. Also, tighten motor mounting bolts.

e. Replace belt guard.

3. Replacement of Pump Packing (Fig. 8-8, 5)

a. Turn gland nut loose from packing gland; slide gland nut and gland spacer along shaft until it is well clear of packing gland.

NOTE: To prevent damage to pump shaft, remove old packing using special packing removal tool available from AMSCO Service Company.

b. Remove packing from stuffing box. Do not attempt to remove lantern ring. Clean stuffing box thoroughly to remove any packing residue.

CAUTION: Do not hammer packing into stuffing box.

c. Wrap two packing rings around shaft and slide into position with gland spacer and gland nut. Packing should wrap around shaft with little or no overlapping of ends.

CAUTION: Overtightening gland nuts can increase motor current as much as five amperes.

d. Remove spacer and nut. Insert remaining packing rings, one at a time, into stuffing box in a similar manner. Install gland spacer and gland nut and gently tighten. If gland nut is too close to stuffing box casing to allow for future take-up when tightened, insert another piece of packing.

e. Loosen gland nut and hand tighten.

f. Run pump with normal water flow. A few drops per minute of leakage thru packing is desirable to lubricate and cool shaft. If leakage is less, loosen packing nut. If leakage is greater, tighten packing nut carefully.

NOTE: The usual cause of internal corrosion is insufficient water in pump when not in use. This water shortage can be caused by excessive leakage at shaft packing, plugging of water-return tube, or long idle periods which allow a significant amount of water to evaporate. Determine, and if possible, correct the cause of any water shortage.

4. Cleaning Pump

a. Remove pipe plug near top right side of surge tank.

b. Disconnect air bleed tube at pump and drain pump to this level; then reconnect tube.

c. Pour a mixture of one pint of Sanipro "H" and five pints of water into pump, then replace plug.

d. Rotate pump three turns by hand to insure circulation. (Pump holds 13 pints.) Allow solution to stand in pump for 1/2 hour.

e. Drain pump by operating electrically for one minute. Remove pipe plug and repeat procedure.

f. Again drain pump by operating electrically for one minute. Fill pump with 1-1/2 quarts of a 5-percent solution of baking soda (about eight level teaspoons of sodium bicarbonate to one quart of water). Rotate pump three turns by hand. Allow this solution to stand in pump for ten minutes.

g. Operate pump in DRY phase of a WRAPPED cycle to insure thorough rinsing. While running, check adjustment of air bleed line needle valve.

5. Release of a Corrosion-bound Pump Shaft

a. Remove bottom plug and drain all water from pump body.

b. Replace plug and pour one quart of penetrating oil into pump inlet or exhaust opening. Allow pump to soak for one hour.

c. Rotate motor-pump drive belt coupling in direction of pump rotation until shaft is free. Penetrating oil will wash out during normal pump operation.

6. Removal and Replacement of Pump and Motor

a. Press Sterilizer main power switch OFF. Turn off building steam and water supplies to the Sterilizer.

b. Disconnect water supply line at pump. Disassemble piping between pump and heat exchanger, also between pump and chamber drain line. Remove any other piping preventing pump from being slid off piping stand.

c. Disconnect electric supply line at motor starter box.

d. Remove trim shield from area between control console and piping stand. Remove belt guard from front of piping stand.

e. Remove pump and motor mounting bolts. Slide drive belt off of pump and motor sprockets. Lift pump and motor off piping stand.

To replace pump, perform steps f thru j, as follows:

f. Place pump and motor on piping stand. Install drive belt on motor sprockets and pump. Fasten motor and pump mounting bolts.

g. Place belt guard on front of piping stand and adjust tension. Place trim shield in area between piping stand and control console.

h. Connect electric supply line at motor start box.

i. Reinstall any piping removed during disassembly. Connect piping between chamber drain line and pump, also between heat exchanger and pump. Connect water supply line at pump.

j. Turn on building water and steam supplies to Sterilizer. Press Sterilizer main power switch ON.

6-5. STEAM TRAP

CAUTION: Allow thermostatic traps to cool to room temperature before removing cover. Since there is nothing to limit expansion, diaphragm may rupture or fatigue if trap is opened while hot.

1. Unscrew and remove cap and diaphragm assembly. Use hex socket wrench to unscrew and remove seat.

2. Wipe parts clean, taking care to avoid damage to diaphragm, seat and pointed diaphragm stem. A very fine grade of sandpaper may be used cautiously to smooth mating surfaces of seat and stem.

3. Wipe out bowl, taking care loose material does not enter piping.

4. Test diaphragm for flexibility. Examine solder joints for cracks or leaks; dip diaphragm in boiling water and look for noticeable expansion. An element in good condition is difficult to stretch by hand and quickly returns to its original condition when released.

To reassemble steam trap, perform steps 5 thru 7, as follows:

5. Install a new diaphragm assembly if required.

6. Install seat using hex socket wrench, then install diaphragm assembly and cap.

7. Make certain all pipe fittings are tight after assembly.

6-6. SOLENOID VALVES

NOTE: When installing new valves in any line, note arrow stamped on valve body or the words "In" and "Out" stamped at inlet and outlet ports respectively. A reversed valve will not operate properly.

1. Disassembly and Reassembly

a. Check valve for proper operation.

b. Check valve for leaks and repair any leaks found.

c. If possible, check manual operation of valve.

d. Rebuild solenoid valve, as follows:

e. Remove screw and cover from coil of solenoid valve.

f. Insure coil is not grounded or open.

g. While energizing and de-energizing the coil, check that valve opens and closes respectively.

h. Replace coil if defective.

i. Install cover on coil and secure with screw.

j. Remove four screws that secure solenoid to valve, then disassemble solenoid from valve.

k. Check valve for leaks and repair any leaks found.

l. Inspect valve seat for evidence of damage or wear. If valve seat is damaged or worn, replace entire solenoid valve.

CAUTION: Solenoid valves are equipped with a special diaphragm that can be damaged by hydrocarbons such as oils, grease, etc. When replacing internal parts, wipe threads clean of cutting oils and use Teflon tape to seal joints.

m. Replace all internal parts of the solenoid valve.

n. Reassemble valve and coil.

o. Check valve for proper operation.

p. Check valve for leaks and repair any leaks found.

2. Testing

a. Energize solenoid coil. A metallic "click" signifies solenoid operation. Absence of "click" indicates loss of power supply, defective coil or improper connection. Proceed as follows to correct:

(1) Check voltage across coil leads; it should be approximately 120 volts.

(2) Check solenoid coil for open circuit or ground. Use multimeter.

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

c. Inspect valve for evidence of leakage. A worn valve seat allows valve to leak when closed.

6-7. VALVE ASSEMBLY — STEAM PRESSURE REGULATOR

1. Test and Adjustment

a. Refer to Paragraph 2-3 and operate Sterilizer thru a complete cycle. Check regulation of jacket pressure (observe gage located behind console access door) throughout the cycle; pressure should be 44-46 psig.

b. If necessary, remove brass cap from top of valve and adjust regulator as follows:

(1) Loosen lock nut and turn adjustment screw counterclockwise to decrease steam pressure; clockwise to increase.

(2) Tighten lock nut and replace brass cap.

2. Removal and Replacement of Valve

a. Turn off building steam supply to the Sterilizer.

b. Check valve for proper setting of stops.

c. Check valve for proper operation.

d. Check valve for leaks and repair any leaks found.

e. Rebuild steam control valve.

CAUTION: Handle sylphon, bonnet assembly and bellows assembly gently to prevent damage.

f. Disassemble valve.

g. Clean each component of the valve.

h. Examine sylphon, bonnet assembly and bellows assembly for cracks.

i. Inspect valve seat and valve stem for evidence of damage or wear.

j. If internal components are worn, replace them.

k. Inspect all other parts for evidence of damage or wear and replace if necessary.

l. Reassemble the valve.

m. Adjust high and low settings.

n. Check for leaks and repair any leaks found.

o. Turn on building steam supply. Adjust pressure regulation per previous instructions.

6-8. AIR FILTER ASSEMBLY (Figure 8-26)

NOTE: The purpose of bacterial air filters is to purify incoming air. The system is exposed to contamination whenever a filter or air lines below filter are opened. Keep these components as clean as possible when servicing.

1. Cleaning and Inspection

a. Remove cover from end of filter tube by unscrewing two 10-32 screws.

b. Remove and inspect filter cartridge.

c. Clean filter cover and tube assembly by wiping with a soft cloth.

d. Reassemble air filter. Replace filter cartridge if necessary.

NOTE: Pointed end of filter element must be installed in air inlet side.

6-9. MOTORIZED BALL VALVES

1. Inspection

a. Press Sterilizer main power switch OFF and operate valve manually (use wrench on coupling between valve and actuator and turn clockwise). Check for obstructions to ball valve operation. Disassemble and inspect valve if operating torque is excessive — refer to **Seal Replacement.**

NOTE: If unit is hot and actuator does not operate, wait until unit has cooled sufficiently to automatically reset thermal overload. Overheating may indicate too frequent operation, mechanical obstruction to ball valve movement or improper alignment between actuator and valve.

b. If actuator does not operate, remove actuator cover and check continuity of motor coils and switches.

(1) Look for evidence of shorting, for example, marks on cover, gear case or other metallic components. Check for loose wires and improper connections.

(2) Test continuity on non-actuated limit switch. There should be an electrical path between "C" and "NC" terminals. There should be no path between "C" and "NO". Test actuated limit switch, results should be opposite.

(3) If actuator components are mechanically free but motor does not operate, capacitor may be defective. A new capacitor must be installed to verify this point. (**NOTE:** Capacitors are mechanically secured to motor cap bracket by folding over two ears. These ears must be securely folded down to prevent capacitor movement, which could allow terminals to short against other metal components.)

(4) Insure motor pinion turns freely. There should be little or no resistance. If motor bearing is out of line, loosen screws holding bearing and rotate motor to realign bearing. Tighten screws.

(5) If motor operates, but does not transmit torque to output shaft, train is defective. Replace actuator.

c. If valve operates erratically, remove actuator cover and check the following:

(1) Insure cams are not slipping and limit switches are securely fastened to gear case. Also check uniformity of cam striking switch leaf. (A short point on a cam may cause actuator to occasionally skip a position.)

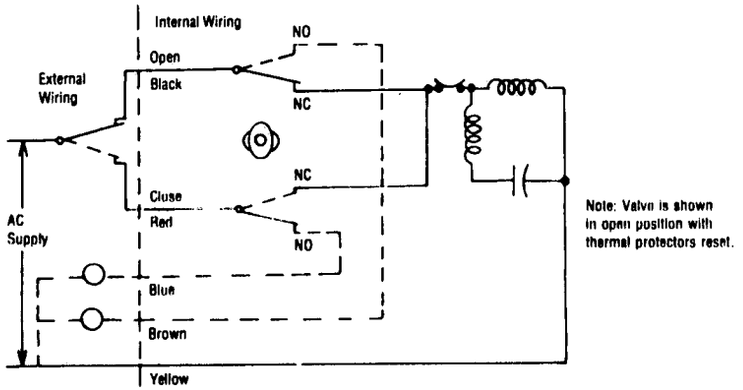

Figure 6-1. WIRING DIAGRAM FOR MOTORIZED BALL VALVES.

(2) Check wiring for loose connections.

(3) Check limit switches for position control. Lower switch is for "close" position and has a red lead. With valve at "close" position, loosen lower cam and index it until lower switch is actuated. Position upper (open) cam at 90° to lower (close) cam. Refer to **Actuator Cam Adjustment,** for final adjustment.

d. Check ball valve for seal leakage; replace seals (see **Seal Replacement**) if necessary.

2. Removal and Replacement of Valve

a. Press Sterilizer main power switch OFF and disconnect wiring from ball valve actuator.

b. If fault is in motorized mechanism, actuator can be removed from ball valve without removing valve from Sterilizer.

c. If ball valve requires repair or replacement, proceed as follows:

(1) Insure building steam supply to Sterilizer is off and steam has been bled from chamber and jacket.

(2) Break union on one side of valve, then unscrew valve from line. (**NOTE:** If vacuum exhaust ball valve in chamber drain line requires removal, vacuum pump may have to be removed for access to union.)

(3) Inspect ball valve.

(4) Check electrical conductivity of limit switches.

(5) Check ball valve for leakage at seal and, if necessary, replace seal.

(6) Inspect ball valve for proper operation. If valve does not operate properly, perform the following:

(7) Check for obstructions. Inspect gear train actuator for proper operation. If actuator does not operate properly, check electrical conductivity of motor coils and switches.

(8) Inspect wiring for loose or improper connections and for evidence of shorting to cover, gear or case.

(9) Insure motor pinion turns freely.

(10) Inspect limit switch for position control and slippage.

(11) Inspect and lubricate internal parts of ball valve.

(12) Remove fitting from top hexagon adapter.

(13) Remove bracket holding valve to actuator.

(14) Unscrew pipe from adapter, then unscrew valve.

(15) Unscrew one adapter.

(16) Turn handle to CLOSED position.

(17) Remove ball from valve.

(18) Clean and inspect ball.

(19) If deep scratches exist on ball surface, replace ball.

(20) Pry seat out of each adapter.

(21) Remove stop nut and gland ring.

(22) Remove upper and lower stem seals and grounding washer.

(23) Inspect internal components and replace damaged components.

(24) Apply a small amount of grease to lower stem seal.

(25) Make sure raised outer edge of lower stem seal faces counterbore, then press seal into counterbore.

(26) Lubricate stem, then insert stem thru body of valve.

(27) Press grounding washer into upper counterbore with fingers facing upward.

(28) Apply grease to upper stem seal.

(29) Make sure raised outer edge of upper stem seal points into valve, then press seal into counterbore.

(30) Tamp upper stem seal down with gland ring.

(31) Replace stop nut, then tighten nut until a noticeable torque increase is required to turn stem.

(32) Apply a thin coat of grease to each seat.

(33) With the flat side of each seat positioned against adapter, and bevel facing body cavity, press each seat into the recess of each adapter.

(34) Lightly grease adapter gasket, then slip gasket onto adapter.

(35) Turn step perpendicular to valve.

(36) Apply a small amount of grease to ball, then insert ball into body in CLOSED position.

(37) Carefully replace and tighten adapters. Do not pinch gaskets.

(38) Install valve in pipe line.

(39) Check around piping and ball valve for leaks and repair any leaks found.

(40) Adjust the alignment of actuator cam.

(41) Turn off power to sterilizer.

(42) Remove actuator cover.

(43) If valve does not open fully, loosen set screw and adjust top cam.

(44) If bottom valve does not close fully, loosen set screw and adjust bottom cam.

3. Replacement of Ball Valve Seals (Figure 6-2)

a. Disassembly

NOTE: Minor seal leakage may be corrected by tightening stop nut. If leakage continues to valve operating torque becomes excessive, replace seals.

(1) Disassemble piping (as required), then remove fitting from top hexagon adapter.

(2) Remove bracket holding valve to actuator.

(3) Hold valve by hexagon piece (adapter) nearest pipe to be disengaged. Unscrew pipe from adapter.

(4) Unscrew valve by applying wrench to adapter, still in pipe line.

(5) Hold valve in a vise by one adapter and unscrew the other adapter. Since both adapters are identical, loosen either.

(6) Turn handle to "closed" position, then remove ball.

(7) Clean and inspect ball and valve parts. If there are deep scratch marks on its surface, replace ball.

(8) Pry seats out of adapters.

(9) If stem seals leaked in service, replace. Remove stop nut and gland ring. Push stem thru body and out one end. Remove upper and lower stem seals and grounding washer.

b. Reassembly

NOTE: Lubrication will aid in assembly and reduce initial operating torque. G.E. Versilube G-341M or a similar high-temperature silicone grease is recommended.

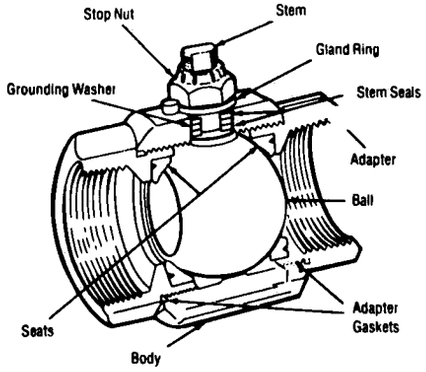

Figure 6-2. BALL VALVE SEAL REPLACEMENT.

(1) Apply a small amount of grease to lower stem seal and press into counterbore. The raised outer edge should face into counterbore. Lubricate stem and insert thru body. Press grounding washer into upper counterbore with its fingers up. Grease upper stem seal and press into counterbore with its raised outer edge pointing into valve. Tamp down with gland ring. Add stop nut and tighten until a moderate but noticeable torque increase is required to turn stem.

(2) Apply thin coating of grease onto each seat and press into recess of adapter with flat side against adapter and with spherical bevel facing body cavity.

(3) Discard old adapter gasket if adapter has been removed or loosened. Lightly grease new gasket and slip onto adapter making sure it is not twisted or cut. If both adapters have been removed, lightly grease threads of one adapter and screw in by hand.

(4) Turn stem perpendicular to valve. Apply a small amount of grease to ball and insert into body in "closed" position so ball slot lines up with stem tag.

(5) Lightly grease threads of second adapter. Screw adapter into body with ball in place in fully open or closed position. Tighten adapters until adapter shoulders hit body, metal to metal. Make sure adapter gaskets ("O" ring or TFE ring) are not pinched during tightening. Hold second adapter in vise or with wrench, but do not apply wrenches to body. Operate valve several times before installing in line.

(6) Reinstall valve in pipe line and secure it to adapter. Connect remaining piping.

(7) It may be necessary to adjust stem seal tightness after installing valve in line. If so, tighten stop nut until leakage stops. If seam seals do not leak, but operating torque seems excessive, back off stop nut slightly.

4. Adjustment of Actuator Cam (Figure 6-3)

a. Press main power switch on Sterilizer OFF.

b. Remove actuator cover.

c. Loosen setscrew and adjust top cam if valve does not fully open. Refer to Figure 6-3 and rotate cam in direction "A" to correct overtravel; "B" to correct undertravel. Tighten setscrew.

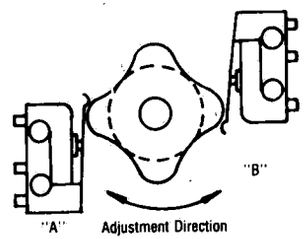

Figure 6-3. ACTUATOR CAM ADJUSTMENT.

d. Loosen setscrew, then adjust bottom cam if valve does not close fully. Refer to Figure 6-3 and rotate cam in direction "A" to correct overtravel; "B" to correct undertravel. Tighten setscrew.

e. Replace actuator cover.

6-10. VALVE ASSEMBLY — SOLUTION EXHAUST ACCELERATOR (Figure 8-27)

1. Cleaning and Inspection

CAUTION: Handle sylphon assembly with care at all times to avoid damage.

a. Remove valve cover and gasket. Carefully remove sylphon assembly and needle valve.

b. Remove valve cap and gasket. Remove plug, spring and pilot.

c. Use a 1-1/8" hex socket wrench to remove valve seat and gasket from valve body.

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d. Clean all components and remove any rust or deposits. **Do not** scrape sylphon assembly. Buff needle valve, valve seat, and pilot with crocus cloth to polish and remove foreign matter. Use care to avoid removing surface metal.

e. Examine all parts for wear or damage and replace as required. Insure all parts fit without sticking. Check spring for deformation.

To reassemble valve perform steps f. thru g. as follows:

f. Install new gasket and valve seat using a 1-1/8" hex socket wrench.

g. Install pilot, spring and plug, then install new gasket and valve cap.

h. Carefully install needle valve and sylphon assembly, then install new gasket and valve cover. Adjust valve as follows:

2. Adjustment

a. Remove valve cap to expose plug.

b. Initiate an automatically controlled LIQUIDS cycle.

c. When cycle reaches EXHAUST phase, observe chamber pressure gage. As pressure drops to near 8 psig, turn plug clockwise very slowly until valve suddenly opens.

d. Repeat this action several times to insure valve repeatedly opens at 8 psig +1, -0.

6-11. HYDRAULIC CYLINDERS

1. Inspection (Figure 8-41)

a. Examine area where piston rod enters cylinder. Evidence of leakage indicates need to replace piston rod packing — see instructions below.

b. With piston rod fully extended, disconnect hose fitting from rod end of cylinder. Oil leaking out of cylinder port (with rod fully extended), indicates need to replace piston packing — see instructions below.

2. Replacement of Cylinder Packing (Figure 8-41)

a. Note (mark if necessary) piston and alignment of cylinder on Sterilizer. (When reinstalling cylinder position exactly the same.) Remove cylinder from Sterilizer. Plug hose ends to prevent loss of oil.

b. Push piston rod fully "in". Rod end port should be open to atmosphere.

c. Unscrew rod packing nut using a pin-type spanner wrench. Slide nut out of head on piston rod.

NOTE: Cylinders manufactured before 5/73 have a rod bearing and bolt-on retainer instead of a packing nut. If applicable, remove these items for access to rod packing rings.

d. Force rod packing rings out of head (packing nut may be used to catch packing as it is forced out of head).

e. Remove tie rod nuts and disassemble both heads from cylinder body. Push piston rod assembly out of cylinder by pressing (with your hand) on the rod end.

NOTE: Always check piston rod O.D. and body I.D. for score marks and pits. Such defects will cause premature packing failure. Replace cylinder if such defects exist.

f. Clamp piston rod (in vise equipped with brass jaws to prevent damage to rod surface) then remove piston locknut and piston. Remove piston "O" ring. Lubricate new seal and install on piston rod. Replace piston on rod and tighten locknut.

NOTE: Use plastic or metal "thimble" (such as a thread protector) to install new "O" ring over threads on piston rod. Push thimble over threads, then push resilient "O" ring over thimble and into groove of fitting. Pushing "O" ring carelessly over threads might nick surface and lead to leakage.

g. Remove two synthetic cup piston packings by placing flat screwdriver in back of packing and prying up, actually stretching packing.

h. Lubricate new piston packings with a good grade of hydraulic fluid and install, making sure cup side of each packing is facing toward **outside** of piston.

i. Remove head to body "O" rings from each head and swab a small amount of oil into each "O" ring groove to facilitate proper seating of the new seal and body. Lubricate new "O" ring seals and install in each head.

j. Lubricate body I.D. and piston O.D. with hydraulic fluid and replace piston in body by leading cup edge of packing into body I.D. making sure it does not fold back.

k. Check if "O" ring seal is properly seated in each head, then assemble heads and body making sure end of body and inside face of heads are free from dirt or foreign material. Tighten tie rod nuts sufficiently to insure proper head to body seal.

l. Lubricate new piston rod packing rings with a good grade of hydraulic fluid. If removed, reinsert male packing adapter into packing cavity in the cylinder head. Insert the first chevron-shaped packing rings into cavity until it is snug against male adapter. Insert remaining two packing rings (one at a time) in the same manner.

m. Replace packing nut (or bearing and retainer, if applicable), then tighten snugly against shoulder on head. Packing nut should be in full contact with head initially, since chevron packings are self-adjusting for wear and do not require subsequent tightening.

n. If swing cylinder is undergoing repair, remove cushion adjusting screw and "O" ring from each cylinder head. Install new screws and "O" rings, furnished with seal repair kit.

To replace cylinder perform steps o. thru u., as follows:

o. Install two synthetic cup piston packings.

p. Reassemble cylinder body, two heads, then fasten with toe rod nuts.

q. Place rod packing rings in head.

r. Slide rod packing nut onto head of piston rod. Tighten rod packing nut using a pin-type spanner wrench.

NOTE: Cylinders manufactured before 5/73 have a rod bearing and bolt-on retainer instead of a packing nut. If applicable, remove these items for access to rod packing rings.

s. Push piston rod fully "out". Rod end port should not be open to atmosphere.

t. Unplug hose ends, then install cylinder on Sterilizer. Note piston and alignment of cylinder on sterilizer and position exactly the same.

u. Refer to Section 7 and bleed hydraulic system; then check pressure and limit switch adjustments.

6-12. GAS CYLINDER REPLACEMENT

1. Close the corresponding gas supply valve (inside lower access door on control console) by turning it clockwise. Close the valve on top of the cylinder to be replaced.

2. Remove flexible charging hose from the cylinder by turning connector handwheel **clockwise** until threads are disengaged. **Exercise caution** during this procedure, as any liquid sterilant remaining in the hose may escape.

WARNING: ANY ETHYLENE OXIDE REMAINING IN THE HOSE COULD BE HARMFUL SHOULD IT COME IN CONTACT WITH THE BODY. HANDLE THE HOSE CAREFULLY SO AS NOT TO SPILL ANY RESIDUAL LIQUID STERILANT. ALSO, BE SURE TO READ THE WARNINGS AND OTHER INSTRUCTIONS IN SECTION 2 CONCERNING THE HAZARDS OF ETHYLENE OXIDE.

3. After disconnecting the hose, remove the depleted cylinder and replace it with a serviceable one. When connecting the hose to the cylinder, note that the connector has a left-hand thread and must be turned **counterclockwise.** The connector provides a gastight seal without requiring a wrench. Tighten the connector snugly by hand, then open the cylinder and gas supply valves.

4. Press the corresponding Reset Button, CYLINDER 1 RESET or CYLINDER 2 RESET, on front of control console.

6-13. GAS SUPPLY FILTER ASSEMBLY

NOTE: The gas supply filters are used to eliminate malfunctioning of valves and trouble with dirt accumulations on product loads due to dirt in gas cylinders. If the filter resistance to flow increases to where charging time is excessive, replace the filter element.

Replacement

1. Close the cylinder supply valve and wait for the cylinder pressure gauge to indicate 0.

WARNING: DO NOT OPEN THE FILTER ASSEMBLY UNTIL IT IS CERTAIN THAT ALL GAS PRESSURE HAS BEEN BLED OUT.

2. Remove the snap ring from the end of the filter assembly.

3. Insert a 10-32 screw in the cover plate tapped hole. Slide the cover plate out of the filter body.

4. Remove the filter element and "O" ring from the body.

5. Reassemble the filter in reverse order. (**NOTE:** A new "O" ring should be installed with each filter element change.)

SECTION 7

TEST PROCEDURES AND ADJUSTMENTS

NOTE: The procedures in this Section will verify that sterilizer operation is equal to what it was when the sterilizer left the factory. However, before running these tests, be sure the sterilizer is installed in accordance with the installation instructions and that the services are as specified.

7-1. CHAMBER DOOR ADJUSTMENT

7-1.1. Limit Switches

NOTE: To check the adjustment of the limit switches, the door must be positioned using the manual operating controls. The following is a review of the manual operating procedure:

- **To close door** — fully depress the CLOSE button and operate manual pump to its limit.
- **To lower door,** it must be completely closed before it is lowered, then fully depress LOWER button, and door will lower by its own weight.
- **To lock door,** it must be completely closed and lowered before it is locked, then fully depress LOCK button and operate manual pump to its limit.

NOTE: The lock cylinder pressure relief valves bypass above 750 psig.

- **To unlock door** — fully depress UNLOCK button and operate manual pump to its limit.
- **To raise door** — it must be unlocked before it is raised, then fully depress RAISE button and operate manual pump to its limit.
- **To open door** — it must be unlocked and completely raised before it is opened, then fully depress OPEN button and operate manual pump to its limit, or pull open by hand.

Verify the following limit switch adjustments by manually opening and then closing the door. Refer to Figure 7-1 for limit switch locations. Adjust limit switch actuators if necessary.

a. Limit switch LS-2 actuates when door is fully open at 95°.

b. Limit switch LS-1 actuates just before door gasket makes contact with end ring (approximately 1/16" gap between gasket and shell end ring).

c. Vlier pins (spring plungers) are not bottomed out during door lowering and raising.

d. Limit switch LS-3 actuates when door has lowered to the point where door hook is 1/32-1/16" above pads on top of shell face plate.

e. A minimum of eight threads must be engaged at each end of coupling nut which connects wedge cylinder shaft with wedge block shaft.

f. Limit switches LS-10 and LS-12 actuate when locking wedge cylinders are fully retracted.

g. Limit switches LS-9 and LS-11 actuate when locking wedge cylinders are extended so gasket bar on door is tight against shell and frame gasket surface.

h. Limit switch LS-4 actuates when door is raised so it clears bottom of wedge cylinder by a minimum of 1/8".

i. The collar on shaft of door lift cylinder allows LS-4 to actuate, but prevents door from being raised manually to the point where it would hit some part of the Sterilizer during opening or closing. Shim as required to maintain this dimension.

7-1.2. Pressure Relief Valve

Listen for squealing noise from vicinity of hydraulic pump during door wedging on automatic operation. If noise is heard, built-in relief valve on hydraulic pump has not been set to a higher adjustment, such that external relief valve controls. If no noise is noted, or after built-in relief valve is set, confirm gage located next to external relief valve shows 725 +25 psi during door wedging on automatic. Set internal relief to a setting just above external relief pressure, to eliminate squeal.

a. Close and lock door. (Both doors on a double door sterilizer.)

b. Disconnect hose from pressure side of pump at "C", then plug to prevent oil loss. Plug fitting where hose was removed.

c. Disconnect union at "D", then put container under the by-pass line.

d. Press UNLOCK button. Pump starts but with pressure side blocked at "C", pressure increases until relief valve opens to discharge oil into container. Gage indicates relief valve pressure setting.

e. To change setting, vent pressure, then remove Allen pipe plug from end of relief valve. Insert a 3/8 inch Allen wrench. Turn clockwise slightly to increase pressure relief setting. Turn counterclockwise to decrease.

f. Replug the setting hole and repeat step (d). After each relief valve operation, return oil from container to the sump thru oil fill line. When desired setting is achieved, return piping to its original configuration.

INSURE ALL OIL IS RETURNED TO THE SUMP.

7-1.3. Door Operation Tests

Test door by opening and closing. The final operating times of door in seconds at various phases of operation are given in Table 7-1. Adjustment procedures for individual components are given in Paragraphs 7-1.4 thru 7-1.10.

a. If door motion stops during close swing, adjust pressure switch (PS9) on close side counterclockwise in increments of 1/16 turn until normal operation is achieved.

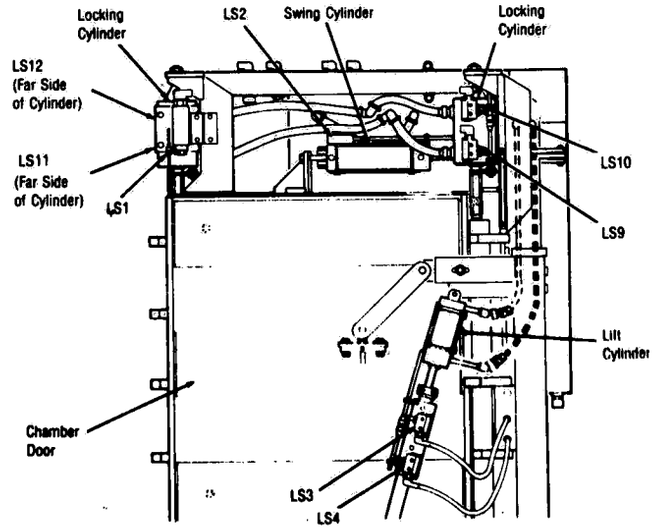

Figure 7-1. DOOR LIMIT SWITCH LOCATIONS (VIEW WITH PANELS REMOVED).

b. If door motion stops during open swing, adjust pressure switch (PS8) on open side counterclockwise in increments of 1/16 turn until normal operation is achieved. Move time delay clockwise to No. 2.

c. Block door midway in its swing. Door must not apply more than 20 pounds force at any angle of its swing, and the door should stop within two seconds after hitting obstruction.

1) If door does not stop within two seconds after blockage, adjust time delay relay counterclockwise to a lower time lapse setting.

2) If door does not stop within two seconds after blockage and after time delay relay has been adjusted, then corresponding pressure switch is still set too high. Adjust clockwise to reduce corresponding pressure switch strip setting with time delay relay (TD4) adjusted back to its #1 position.

d. Lift to swing checkout. Door must not settle to its down position, with power off, in less than ten minutes.

1) With door half-way open, manually depress lower solenoid. Door will lower.

2) Press OPEN button, door will lift and swing open.

3) Lower door by depressing lower solenoid.

4) Press CLOSE button, door will raise and swing closed.

TABLE 7-1. DOOR OPERATING TIMES.

MOTION	MINIMUM	MAXIMUM
SWING	12 Seconds	16 Seconds
RAISE OR LOWER	2 Seconds	7 Seconds
LOCK OR UNLOCK	15 Seconds	20 Seconds

7-1.4. Flow Control Regulator (Door Lowering)

A flow regulator is located on one of the hydraulic solenoid valves, which controls door speed during lowering phase of operation. There is no adjustment to raise speed. Make door adjustments when oil temperature in sump is at least 95° F. To adjust lowering speed:

a. Loosen Allen screws on left side flow regulator.

b. Turn adjusting screw clockwise to decrease speed or counterclockwise to increase speed.

c. Hold adjusting screw in position and tighten Allen screws.

7-1.5. Time Delay Relay (TD4)

This control may be initially adjusted to full clockwise position to give maximum time delay while pressure adjustments are made. It will be necessary, however, to readjust this time delay later. It should be adjusted counterclockwise to approximately the number one position.

7-1.6. Pressure Switches (PS-8 and PS-9)

The pressure switches should be set to trip at 80 psig. If necessary, adjust pressure switches as follows:

a. Turn both pressure switches counterclockwise 4 or 5 turns, which makes their trip points very high.

b. Set maximum door force at 20 lbs., as explained in No. 4, then block door midway on closing, which causes pressure on closing side pressure switch to rise to maximum available pressure output of pressure regulator.

c. Turn adjustment on closing side (F line) pressure switch clockwise until system stops, then add approximately 1/16 turn more. The pressure switch trip point should now be in the proper range.

d. Block door midway on opening and repeat same adjustment, but this time use opening side (C line) pressure switch.

7-1.7. Flow Control Orifices

a. Adjust flow controls on both open and close side to full clockwise position. In this position, orifices are closed.

b. Adjust door opening orifice (left side of valve package) counterclockwise two full turns.

c. Adjust door closing orifice (right side of valve package) counterclockwise one and one-half turns.

d. If necessary, readjust these orifices later.

7-1.8. Pressure Regulator: XM1-3F1-10

a. With oil temperature at 75 to 95° F, pressure regulator can now be adjusted by turning counterclockwise until door does not operate. Then adjust clockwise until a maximum force of 20 lbs at mid door position is reached. This is maximum allowable force. It is now necessary to check the door opening time.

b. If door opens in less than 14 ±2 seconds, adjust opening orifice clockwise to increase time (reduce flow).

c. If door takes longer than 14 ±2 seconds to open, adjust opening orifice counterclockwise to reduce time (increase flow).

d. The door now opens in approximately 14 seconds. This is nominal operating time. If a longer swing time is desired, adjust pressure regulator counterclockwise. Both opening and closing times increase at about the same rate.

7-1.9. Hydraulic Cylinder

Adjust cylinder stroke with door closed for 8-3/16'' +1/16''.

7-1.10. Actuator Snubbers (Cushion Control)

These cushions are an integral part of the actuator. They must first be turned to full clockwise position.

a. Adjust cushion on clevis end of actuator counterclockwise 1 to 1-1/2 turns.

b. Adjust cushion on rod end of actuator counterclockwise 1/4-1/2 turn.

c. Door rebounds at either stroke end, adjust respective cushion counterclockwise until stable operation is achieved.

d. Door strikes end of stroke too hard, adjust respective cushion clockwise until a well damped stop is achieved.

NOTE: It may be necessary to balance cushion with cylinder stroke adjustment. Adjust to 8-3/16 inches with door closed, using uniball screw.

7-2. VACUUM TIGHTNESS TEST

1. Attach absolute pressure gage and close all doors to seal chamber.

2. Turn power OFF, then disconnect open side of air filter ball valve (wire #178 located next to filtered air ball valve).

3. Shut off steam supply valve. All manual hand valves should be tightly closed, water supply valve open.

4. Set Dry timer to 30 minutes.

5. Turn power ON and press WRAPPED button.

6. Check vacuum pump rotation to confirm it is in the same direction as arrow on end of pump housing and water is flowing thru pump. Flow must be a minimum of 2-1/4 GPM. Adjust flow to shut off vacuum breaker in pump feed line.

7. Actuate switch PS-2 manually and hold in long enough for rotary switch to actuate. (This allows vacuum pump to start.)

8. When chamber reaches 5'' Hg vacuum (as read on chamber gage), on first pulse, manually advance rotary solenoid (located on steam side of control drawer) clockwise until dry or exhaust light comes on.

9. Allow vacuum to reach 40 mm Hg absolute.

10. Turn rotary solenoid clockwise until air light comes on. Then, chamber drain valve closes, vacuum pump water solenoid closes, and vacuum pump stops.

11. Using absolute pressure gage, determine rate of air leakage. Maximum leakage rate must not exceed 5 mm Hg over a 5-minute test period.

12. Restore machine to original condition, that is, reconnect wire #178 to air filter ball valve.

13. Advance rotary solenoid clockwise to READY position.

14. Open steam line.

7-3. DOOR SAFETY TEST

1. Close and lock door(s).

2. Open manual steam-to-chamber valve and allow pressure to rise slowly to 5 psig. Shut off valve and allow pressure to drop thru a slightly opened exhaust valve. Adjust pressure switch PS-1 to actuate at 2, to, -1/2 psig. Raise pressure to 5 psig, then allow pressure to drop again. Press OPEN button. Door(s) must not unlock above 2 psig. Close steam-to-chamber valve, then open exhaust valve.

3. Open door. Check cycles do not start when door is unlocked.

4. Actuate vacuum pump and draw 10'' Hg on vacuum gage. The door should not open at any vacuum greater than 4'' Hg. Adjust vacuum switch VS-9 to break at 4'' +0 -1 Hg, then check door, which should open at approximately 2'' vacuum or less.

5. For double door units, set both pressure switches. Check a cycle cannot start when one door is closed and locked but opposite door is open. Reverse position of doors and check again.

6. For double door units, check far door light is lit on locked end when door on other end is open. Check both lights.

7-4. SAFETY VALVE TESTS

WARNING: BE CAREFUL OF STEAM ESCAPING FROM SAFETY VALVE. TO PREVENT BURNS, WEAR GLOVES OR USE AN EXTENSION DEVICE WHEN OPERATING TRY LEVER.

CAUTION: To prevent excessive discharge of steam in immediate area, vent safety valve to drain or to outside. Size discharge piping so as not to reduce valve discharge flow.

7-4.1. Jacket

a. Adjust jacket and chamber gages to zero psig, then install master vac-pressure gage.

b. Check safety valve name plate rating, which should be 45 psig.

c. Open steam supply valve, then remove regulator cap on steam regulator.

d. Turn power switch ON.

e. Allow jacket pressure to rise high enough to pop safety valve. Turn steam pressure regulator, adjusting screw clockwise to raise pressure. Safety valve must pop between 45 and 47 psig. Jacket safety blow down should prevent jacket pressure from rising beyond 50 psig.

f. Record time for jacket to rise to 40 psig during this test.

g. Reduce jacket pressure until safety valve has reseated, then repeat Step E.

h. Adjust pressure regulator to 41 ±1 psig. Refer to 7-12 PERFORMANCE TEST for regulator adjustment procedure.

7-4.2. Chamber

a. Shut steam supply valve off and turn power switch off. Check name plate rating, which should be 45 psig.

b. Remove jacket safety valve and plug its opening.

c. Open jacket to chamber manual bypass valve.

d. Open steam supply.

e. Switch power to "ON".

f. Allow jacket and chamber pressure to rise. Chamber safety valve must pop between 45 and 47 psig. Replace, if necessary. Chamber safety valve blowdown should prevent pressure from rising above 50 psig.

g. Reduce pressure and repeat Step F.

h. After this test, INSTALL JACKET SAFETY VALVE BACK IN PLACE.

I. Adjust pressure regulator to 41 ±1 psig. Refer to 7-12 PERFORMANCE TEST for regulator adjustment procedure.

TABLE 7-2. DELAY AND MOTORIZED TIMER SETTINGS.

Symbol	Component	Dial Settings
TD-1	Purge Timer	6
TD-2	Pulse Vac Timer	2
TD-3	Buzzer	6
T-1	Accumulation Timer (Motorized)	1 Minute

7-5. ADJUSTMENTS

1. Set delay and motorized timers initially as shown in Table 7-2. These adjustments are approximate. Further adjustments must be made during test cycles.

2. Accumulation Timer is used to control number of vacuum pulses in the machine. Its final setting should be 1 to 5 seconds less the number of vacuum pulses times TD-2 pulse vacuum timer setting (four vacuum pulses required).

3. Automatic Control Reset Functions — The automatic subsystem controls steam and vacuum sterilizing cycles for wrapped goods and liquids.

Automatic operation is achieved by a combination of timed and sensed event signals to insure complete sterilization. Pushbuttons are provided for cycle selection. After variable adjustments are set, the cycle selection button locks in program so an alternate selection cannot be made without first depressing RESET Button or having completed the programmed cycle. The RESET light remains on until a new cycle is selected, except on non-operating side.

Timers are of the reset type, so they reset on a power failure, 2° F temperature drop below set exposure temperature for a steam cycle, 5° F temperature drop for a gas cycle or upon completion of a cycle.

After selection of a cycle, no further operator attention is necessary until completion of cycle is indicated by audible alarm and a signal light.

7-6. OPERATIONAL TEST & ADJUSTMENT FOR WRAPPED CYCLE

1. Wrapped Cycle Description — The sequence of cycle operations is as follows:

a. Variable sterilizing time and temperature; operator selected.

b. Variable dry time; operator selected.

c. Steam admitted to chamber with chamber drain open for a 60-second interval; service adjustable.

d. Chamber drain closes, chamber is pressurized with steam to 26 +2, -0 psig; service adjustable.

e. Chamber exhausts to 1-2″ Hg vacuum. Vacuum is drawn for 15 seconds; both service adjustable.

f. Pressure and vacuum are alternately repeated for a total of four excursions. Number of excursions is service adjustable.

g. At completion of final excursion, steam is admitted to chamber until temperature setting is reached.

h. Temperature is maintained for period of time selected.

i. Chamber is exhausted and final vacuum drawn.

j. At 2 inches Hg vacuum, service adjustable, dryer timer starts and vacuum is maintained for a period of time selected on dry timer.

k. Vacuum is relieved thru a bacteria retentive filter. Audible and visible signals are given when pressure reaches 2 inches Hg vacuum, service adjustable.

l. Audible signal continues for 60 seconds.

m. The bacteria retentive filter remains open and visible signal is maintained until seal is broken on door of a single door unit or either door of a double door unit.

2. Adjustment and Test is begun by opening water and steam valves.

3. Set IRC pointer for 285° F. Initially, set STERILIZE and DRY timers for 10 minutes each.

4. Close and lock door(s). READY light comes on.

NOTE: As machine proceeds thru cycle, check that lights come on in proper sequence. Check all doors.

5. Press WRAPPED button. Light should come ON behind WRAPPED button. Reset and ready lights should go OFF. Condition light should come ON. Chamber drain ball valve, steam-to-chamber solenoid valve and condenser water solenoid valve should open. Purge time (TD-1) starts when condition light comes ON. Check time with a stopwatch. Delay must be 60 ±6 seconds, after which chamber drain ball valve must close.

6. Chamber pressure must rise to 26, +2, -0 psig. Adjust PS-2 pressure switch for this pressure. When it actuates, chamber drain ball valve opens, vacuum pump starts and vacuum pump water solenoid valve opens.

7. When vacuum reaches 2″ ±1″ Hg vacuum, vacuum switch (VS-1) actuates. Adjust VS-1, if necessary. VS-1 actuates pulse vac timer (TD-2) and accumulation timer (T-1). Time TD-2 with a stopwatch, beginning when vacuum switch VS-1 actuates. Adjust as required for 12 to 15 seconds. Accumulation timer (T-1) should now be reset to a time slightly less than four times the time of pulse vacuum timer (TD-2), which should be from 48 to 60 seconds.

8. When TD-2 actuates, vacuum pump stops, chamber drain ball valve closes, and vacuum pump water solenoid valve closes. Steam-to-chamber solenoid valve opens and pressure rises to 26 +2, -0 psig and cycle repeats.

9. At completion of the fourth vacuum, accumulation timer (T-1) actuates. Adjust T-1 to allow a minimum of 10 seconds of operation on the fourth vacuum.

10. After T-1 actuates, chamber drain ball valve closes, vacuum pump stops, vacuum pump water solenoid closes, steam-to-chamber solenoid opens and temperature and pressure of chamber increases. Condenser water solenoid valve closes.

11. When chamber temperature reaches 285, +1, -0° F, condition light goes out, Sterilize light comes ON, and Sterilize timer starts. Check timer with stopwatch. Time must be 10, +2, -0 minutes.

12. Chamber temperature continues to rise until it reaches 287° F ±1° F. This temperature is fairly constant, since it is controlled by pressure regulation.

13. Check for steam leaks around door gasket and pipe joints.

14. After sterilize timer has timed out, steam-to-chamber solenoid valve closes, chamber drain ball valve opens, sterilize light goes out, and exhaust light goes on. Sterilize timer resets. Vacuum pump starts and vacuum pump water solenoid valve opens. Condenser water solenoid valve opens.

15. Chamber pressure drops. When chamber pressure reaches a vacuum of 2″ Hg ±1″ gage, vacuum switch (VS-2) actuates. Adjust VS-2 if required. When VS-2 actuates, exhaust light goes out, Dry light comes ON, and Dry timer starts. Check dry timer with stopwatch. Time must be 10 +1, -0 minutes.

16. When Dry timer times out, vacuum pump stops, chamber drain ball valve closes, vacuum pump water solenoid valve closes, and condenser water solenoid valve closes. Air filter ball valve opens, dry light goes out and air light comes on.

17. When chamber pressure reaches 2″ Hg ±1″ gage, vacuum switch (VS-3) actuates. Adjust VS-3, if necessary. Air light goes OFF and Sterile light comes ON. The buzzer sounds for 60 seconds. Time buzzer with a stopwatch and adjust time delay (TD-3) for 60 ±6 seconds. Air filter ball valve remains open and Sterile light remains ON until door is unlocked.

18. Push OPEN button only after buzzer has stopped. The Wrapped light goes out after door unlocks. Far door light comes on when far door unlocks on a double door sterilizer.

19. Operate sterilizer thru another wrapped cycle and check all adjustments made during the first test cycle.

20. Operate another wrapped cycle, and during Sterilize phase depress RESET button, cycle should advance to exhaust phase and continue to Ready position. Reset and Ready lights should remain on until a new cycle is selected. Resetting should not activate blow down of pressure thru abort piping, but door circuit should be activated so door may be opened.

7-7. OPERATIONAL TEST & ADJUSTMENT FOR LIQUID CYCLE

1. The steam solution cycle operates as follows:

a. Variable sterilizing time and temperature are selected by operator.

b. Steam is admitted to chamber until preselected temperature setting is reached.

c. Chamber temperature is maintained for preselected period of time.

d. Jacket and chamber are exhausted at a service adjustable metered rate so solution loss does not exceed 5 percent.

e. Audible and visible signals are given when pressure reaches 1 psig; service adjustable. Audible signal continues for 60 seconds, but visible signal is maintained until seal is broken on door of a single door unit or on either door of a double door unit. Verify OPEN button has no effect on door operation until door is unlocked.

f. Door is then unlocked by pressing UNLOCK button and solutions are left to cool for 10 minutes by operator.

2. Adjustment and Test for liquids cycle is begun by setting IRC pointer for 250° F. Set sterilizer timer for 30 minutes.

3. Close solution exhaust needle valve (set pointer on "0"), then open to six.

4. Close and lock door(s). Ready light should be ON. (Check lights on all doors and make certain they stay in sequence.)

5. Press LIQUIDS button. Light should come ON behind LIQUIDS button. Ready light should go OFF. Reset light, if lit, should go off. Condition light comes ON. Steam-to-chamber solenoid valve opens. Water saver solenoid valve opens. Measure flow of water in water saver, which should be 1 ±1/4 GPM.

6. Chamber temperature rises. When it reaches 250 +1, -0° F Condition light goes out and Sterilize light comes ON. Sterilize timer starts. Check its time with stopwatch, which must be 30 +1, -0 minutes.

7. Chamber temperature continues to rise until it reaches 256 ±1° F. Steam-to-jacket solenoid valve then closes. When temperature drops to 253 ±1° F, steam-to-jacket solenoid valve opens. This temperature makeup continues throughout Sterilize cycle. Should chamber temperature fall below 250° F, timer resets and Sterilize light goes out. When chamber temperature returns to 250° F, timer starts from zero and Sterilize light comes ON. This action is normal.

8. Check for steam leaks around door gasket and pipe joints.

9. After Sterilize timer has timed out, steam-to-chamber and steam-to-jacket solenoid valves close. Sterilize light goes out and Exhaust light comes ON. Slow exhaust condenser water solenoid valve opens. Solution exhaust solenoid valve opens, and water saver solenoid valve closes. Adjust solution exhaust needle valve and solution accelerator valves for a total exhaust time of 20 +5, -0 minutes. Solution accelerator valve should open between 7 and 8 psig. Adjust, if necessary.

10. When its pressure reaches 2 +1, -0 psig, pressure switch (PS-2) actuates. Exhaust light goes out and Sterile light comes ON. Slow exhaust condenser water solenoid valve closes. (NOTE: Air filter ball valve opens briefly as sterilizer cycles from Exhaust to Sterile.)

11. Press OPEN button, door should not unlock or open. At completion of Liquid cycle, press UNLOCK button. Door unlocks and Sterile light goes out.

12. Press OPEN button; door should open.

13. Operate sterilizer thru another Liquid cycle and check all adjustments made during first test cycle.

14. Operate sterilizer thru another Liquid cycle. Press RESET button when in Sterilize phase. Cycle should advance to slow exhaust position and continue with a normal cycle, to Ready position. Reset and Ready lights should remain lit until another cycle is selected.

7-8. OPERATIONAL TEST AND ADJUSTMENT FOR STANDARD AMSCO (S.A.C.) GAS STERILIZING CYCLE

1. The Standard AMSCO Cycle operates as follows:

a. Variable sterilizing time is operator selected.

b. Chamber is evacuated to approximately 27" Hg vacuum.

c. Evacuation is halted and steam is admitted to chamber to supply a relative humidity of 30% to 70%.

d. Chamber is charged with sterilant to 8 psig.

e. Load is exposed for a time, which is selected by operator, up to 18 hours.

f. Chamber is evacuated by vacuum pump to 27" Hg vacuum.

g. Vacuum is pressurized thru a bacteria retentive filter to 2" Hg vacuum.

h. Chamber is exhausted and evacuated to 27" Hg vacuum.

i. The vacuum is pressurized thru a bacteria retentive filter to 2" Hg vacuum again.

j. Audible and visible indicators signal completion of cycle. Audible signal continues for 60 seconds.

k. The bacteria retentive filter remains open and visible signal continues until seal is broken on door of a single door unit, or either door of a double door unit.

2. Adjustment and Test Procedure is begun by performing the following:

a. Turn machine off using switch S2 then open water and steam manual supply valves on main supply lines, leading to machine.

b. Check all manual bypass valves are closed.

c. Initially set sterilizer exposure timer for 1 hour.

d. Attach cylinders of test gas or air to each charging hose. Open gas cylinder valves and check for gas leakage, then open gas supply valves. Use soap and water solution when using air. A flame is a suitable indicator for 12/88 gas mixture.

WARNING: DO NOT USE FLAME IF FROST HAS FORMED ON TUBING BETWEEN SUPPLY BOTTLES AND GAS CONDITIONER.

e. Set regulator which controls flow of steam to gas conditioner at 5 psig.

f. Open needle valve downstream of regulator by three turns.

g. Bypass regulator with needle valve then charge gas conditioner with steam. Safety valve must open at 25 +2, -0 psig. Replace safety valve if this requirement is not met.

h. Set up machine for temperature switch adjustment as follows:

(1) Press switch S-2 on then press mode selector switch (located on operating end control console) to gas.

(2) Press power switch (S-4) located on operating end control console, to on.

(3) Jacket heat solenoid valve S-9 opens and admits steam to jacket. Open the valve downstream of S-9 to a setting of four.

i. Set TS-4, adjustable temperature switch, to 145° F and when recorder indicates 145° F, jacket heat solenoid valve S-9 should close. Make fine adjustments if required. With chamber temperature at 145° F, adjust temperature switch TS-3-1 (main adjustment) light overtemperature lamp. Adjust temperature switch TS-3-2 to actuate jacket cooling solenoid valve S-13 and admit water to jacket of machine when chamber temperature reaches 160° F.

j. Wait until temperature recorder indicates chamber temperature of 125° F. Actuate "overtemperature reset" switch located on operating end console. "Overtemperature" lamp should be unlit because temperature switch TS-3-1 has opened.

k. Chamber temperature decreases and should bottom out at 112 to 116° F, then rise to 125 to 135° F. Make fine adjustments to chamber temperature switch TS-4 if necessary.

NOTE: Cooling water lamp remains on until overtemperature is reset.

l. Ready light is off during gas cycles at any temperature from ambient to 125° F. At 125° F the "Ready" light comes on and stays on until chamber temperature exceeds 135° F, at which time it goes off. Ready light stays off until temperature in chamber falls below 135° F.

m. Set temperature switch TS-4 to shut off solenoid valve S-9 at 130° F.

n. Machine is now ready for adjustment of vacuum and pressure switches.

o. Connect 30'' vacuum gage along with 60 psi master test gage at chamber, using unused chamber opening.

p. With chamber temperature controlling at 125 to 135° F, and Ready light on, press "SAC" cycle.

q. Rotary switch in operating end control console turns to "Pre-vac" step, "Ready" light goes out, and "SAC" light comes on. Vacuum pump starts.

r. When chamber is evacuated to 27'' Hg vacuum minimum, adjust vacuum switch VS-4 so rotary switch advances to "SAC Condition and Sterilize".

s. Vacuum pump shuts down. Solenoid Valve S-10 opens and charges chamber with steam. Adjust needle valve to provide 15 ±2 minutes before S-10 shuts off.

t. Adjust vacuum switch VS-6 to close valve S-10 off at 24 ±1'' Hg vacuum.

u. "Charge" light comes on. Actuate cylinder reset switches one and two located on operating end console, which actuates solenoid valves S-6 and S-7.

v. While gas is charging, adjust cylinder changeover pressure switches according to procedures outlined below:

(1) Determine which cylinder is in use by observing cylinder pressure gages.

(2) Meter gas flow by slowly closing appropriate gas supply valve until gage drops to 30 psig.

(3) Adjust changeover pressure switches (PS-5 and PS-6) to light lamp behind appropriate reset button. Gas should stop charging from original cylinder and begin charging from alternate cylinder.

(4) Repeat above procedure on alternate side. Both reset buttons then indicate "empty" and no gas charges.

(5) Open both gas supply valves.

(6) Repeat entire procedure (Steps 1 thru 5) to make certain adjustment is correct.

w. When chamber pressure reaches 8 +1-1/2, -0 psig, adjust switch PS-7 to close gas charging valve. "Charge" lamp goes out, and "Sterilize" lamp comes on. Readjust TS-3 to 118 ±2° F.

x. When sterilize exposure timer T-5 times out, rotary switch turns to "Exhaust" position. Sterilize lamp goes out, exhaust light comes on and vacuum pump starts. Adjust vacuum switch VS-7 to actuate rotary switch solenoid when 27'' Hg vacuum is achieved.

y. Rotary switch turns to "Air", exhaust light goes out, air light comes on, and vacuum pump stops. Vacuum is pressurized thru bacteria retentive filter to 2'' Hg vacuum.

z. Rotary switch turns to "Exhaust" position and paragraphs (x) and (y) must be repeated.

aa. Buzzer sounds for approximately 60 ±6 seconds, and Sterile light comes on.

ab. Rotary switch advances to "OFF", "Sterile" light remains on. Unlock door. Sterile light goes out, and counter advances one cycle.

ac. Repeat as many cycles as necessary to check system functions properly.

7-9. S.A.C. CYCLE RESET — ABORT

Cycle sterilizer thru S.A.C. cycle as explained previously, then check reset function as follows:

1. During cycle, but before final phases of exhaust and air, press RESET button. Reset lamp comes on.

2. Rotary switch should advance cycle to final two phases of exhaust and air, then move to off position. Sterile lamp does not come on during a reset.

3. Run cycle again, RESET button during final exhaust and air phase. Reset lamp comes on.

4. Rotary switch should advance to off position, then S.A.C. light comes on.

5. Reset lamp remains on until a new cycle is initiated. After door is opened and locked; ready, reset, and S.A.C.

7-10. ADJUSTMENT AND TESTING OF CHAMBER COOLDOWN (FROM 287° F to 138° F)

1. Close four jacket cooling valves, located on top of chamber, completely, then open 1-1/2 to 2 turns.

2. Open steam and water supply lines.

3. Switch mode selector control to STEAM.

4. Switch power on, then adjust regulator to 41 psig.

5. Allow steam to heat jacket and sterilizer for 5 minutes.

6. To insure sterilizer is completely hot, operate it thru a 285° F fabric cycle.

7. On completion of fabric cycle, turn mode selector button to GAS. Overtemperature light will not come on.

8. Jacket cooling water is admitted to jacket. Water should drain from trap.

9. When chamber temperature is reduced to 120° F as observed on recorder, jacket cooling water is shut down and jacket heat solenoid valve opens.

10. Chamber temperature continues to drop until it reaches approximately 116° F, after which it starts to increase.

11. Ready light should come on when chamber temperature, as observed on recorder, reaches 125° F.

The total time elapsed from switching to gas mode to lighting ready lamp should be approximately 2 hours.

12. Set vacuum breaker to relieve at atmospheric pressure.

7-11. PERFORMANCE REQUIREMENTS

1. Maximum Jacket Heat-up Times

TABLE 7-3. MAXIMUM JACKET HEAT-UP TIMES.

SIZE	MAXIMUM TIME FROM 0 PSIG TO 40 PSIG
28x67x52	15 Minutes
28x67x78	20 Minutes

NOTE: Times specified in Table 7-3 are not applicable unless measuring with jacket at an ambient temperature of 70-80° F.

2. Maximum Chamber Heat-up Times

TABLE 7-4. MAXIMUM CHAMBER HEAT-UP TIMES.

SIZE	250° F	285° F
28x67x52	1 Minute	2 Minutes
28x67x78	1-1/2 Minutes	3 Minutes

NOTE: The times specified in Table 7-4 are not applicable unless measuring commences when recorder indicates 200° F or less.

7-12. PERFORMANCE TEST

Upon satisfactory completion of previous tests, perform the following charting cycles to insure conformance to applicable performance requirements. The words "charting cycles" shall be written on recorder chart to indicate start of performance test. Refer to Table 7-5.

1. The cycles are to be conducted in the following sequence:

1 Fabrics cycle, 2 Liquid cycles, 1 Manual cycle.

1 Fabrics cycle, 1 Liquid cycle. The door or doors are to be unlocked and opened between each cycle.

2. Manual Cycle Operation, Initial

a. Disconnect all electric power to the machine;

b. Set pressure regulator at 20 ±1 psig;

TABLE 7-5. CHARTING CYCLES.

Type	Temperature	Sterilize Time	Dry Time	Cycles
Fabrics	285° F	3 Minutes	5 Minutes	6
Liquids	250° F	45 Minutes		2
Manual	250° F			1
Sac Gas	130° F	20 Minutes		1

c. Close all Manual Valves;

d. Open, close and lock all doors manually.

3. Open steam-to-jacket bypass valve.

4. Open steam-to-chamber bypass valve.

5. Allow chamber to reach pre-set pressure.

6. Temperature should be a minimum of 250° F.

7. After IRC reaches 250° F time machine for 15 minutes to see if pressure and temperature are maintained.

8. Shut off steam-to-chamber valve and steam-to-jacket valve, then allow chamber to cool down.

9. Crack exhaust valve, then allow chamber to exhaust as slowly as possible for 15 minutes.

10. If 0 psig is not reached, open valve and exhaust steam.

11. Unlock door, and keep unlocked for 15 minutes.

12. Close all manual valves tightly.

13. Apply power to machine, then open main steam valve

14. Reset regulator to 41 ±1 psig. Refer to Tables 7-6 and 7-7 for elapsed times.

15. Continue testing.

7-13. TABLES (EMPTY CHAMBER)

TABLE 7-6. FABRIC CYCLE TIMES.

Event	Time Minimum	Time Maximum
Purge	0:54	0:66
Start of Sterilize Timer at 285° F	4:54	6:06
Completion of Sterilize Time	8:54	10:12
Exhaust to Start of Dry Timer at 2" Hg Vac	8:20	9:52
Completion of Dry Time	13:10	15:08
Buzzer	15:10	18:08

TABLE 7-7. LIQUID CYCLE TIMES.

Event	Time Minimum	Time Maximum
Start of Sterilize Timer at 250° F	0:20	1:00
Completion of Sterilize Time	45:20	46:30
Buzzer	62:20	63:30

7-14. STEAM PRESSURE REGULATOR ADJUSTMENT

1. Install a calibrated pressure gage directly into jacket, which should be installed close enough to read while making regulator adjustments.

2. Place temperature recorder controller at its maximum setting (300° F) to override steam-to-jacket solenoid valve.

3. Place machine in liquid cycle.

4. Adjust regulator to 41 ±1 psig on initial adjustment. Bleed off some steam, readjust regulator, then allow pressure to rise again. Repeat as often as necessary to achieve 41 psig pressure regulation.

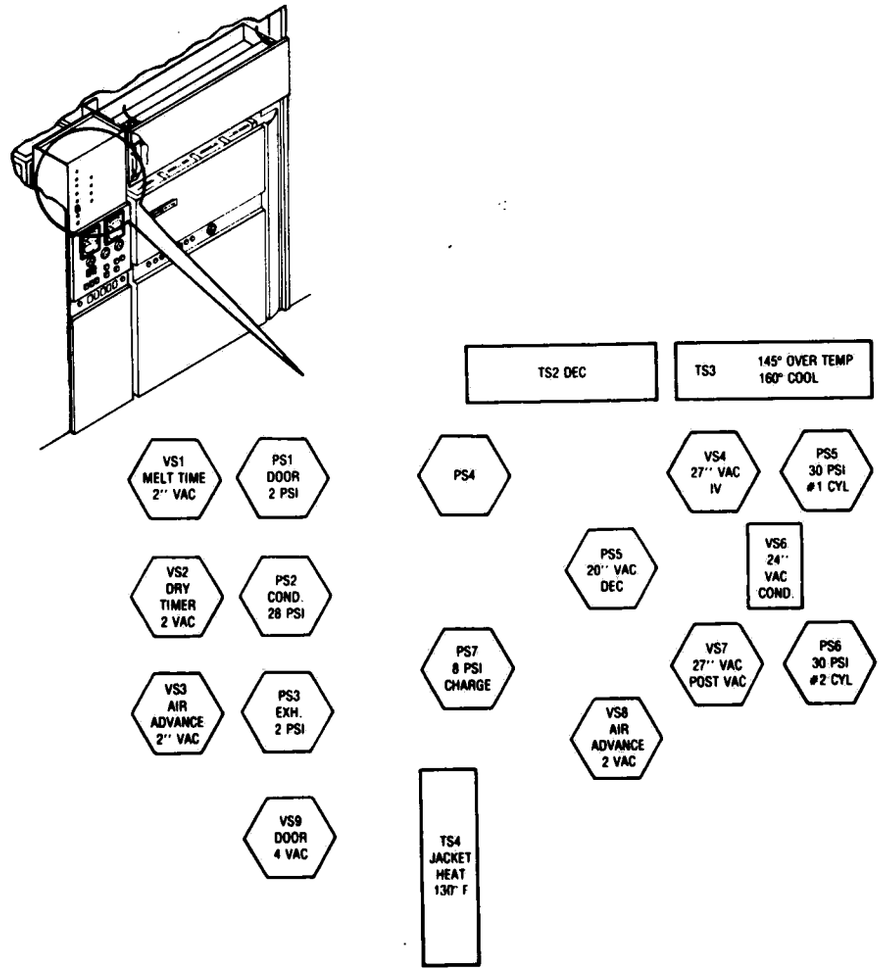

Figure 7-3. VACUUM, PRESSURE AND TEMPERATURE SWITCH LOCATIONS.

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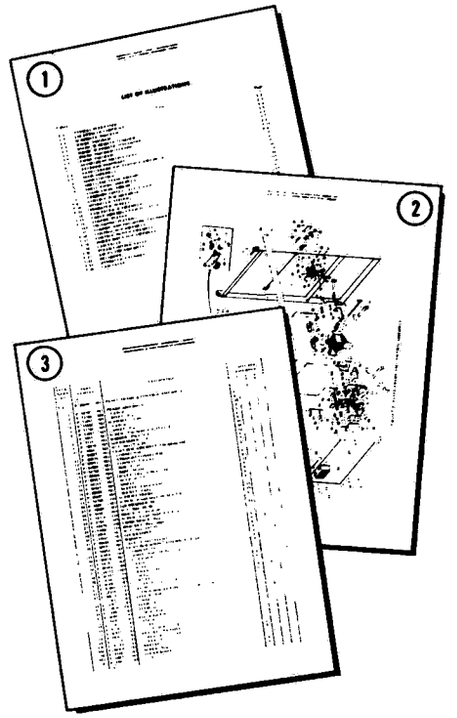
SECTION 8

SECTION 8

EXPLODED VIEWS AND PARTS LISTS

Assemblies and components of Vacamatic II sterilizers are illustrated and identified on the following pages. The part number, the description and the quantity required for each usage is given. Each indentation in the description represents the assembly level (see following page). The UNITS PER ASSEMBLY column is specific for the given assembly or 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 1st subassembly

RELAY, Adjustable, time delay . . . . . .
WIRING ASSEMBLY, Buzzer. . . . . .
. ASSEMBLY, Buzzer tray . . . . . .
. . CHASSIS, Buzzer . . . . . .
. . SOCKET, Relay mounting . . . . . .

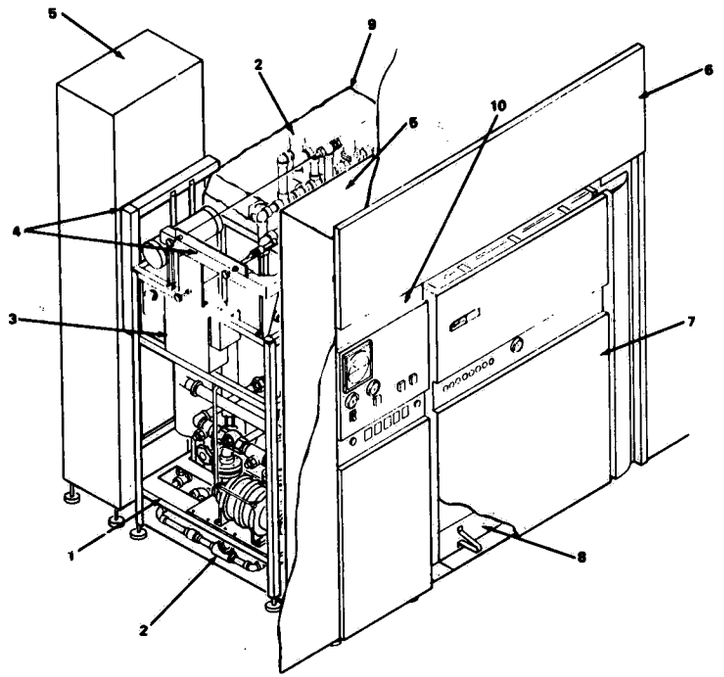


Figure 8-1. TYPICAL VACAMATIC II STERILIZER INSTALLATION.

INDEX NO.	DESCRIPTION
1	Piping Stand (See Figure 8-2)
2	Piping Package, Module (See Figure 8-12, 13)
3	Box, Terminal, Piping Stand (See Figure 8-10)
4	Wireways, Piping Stand (See Figure 8-9)
	Panel and Console Assembly
5	• Control Console, Primary and Secondary (See Figure 8-28)
6	• Header Panel and Mounting Assembly (See Figure 8-36)
7	• Door Panel Assembly (See Figure 8-38)
8	• Power Wedge Door Assembly, Wiring and Hydraulics (See Figure 8-40)
9	Shell Assembly (See Figure 8-42)
	Loading Cart (Not Shown) (See Figure 8-43)
10	Instrument Panel (P-92127-001)

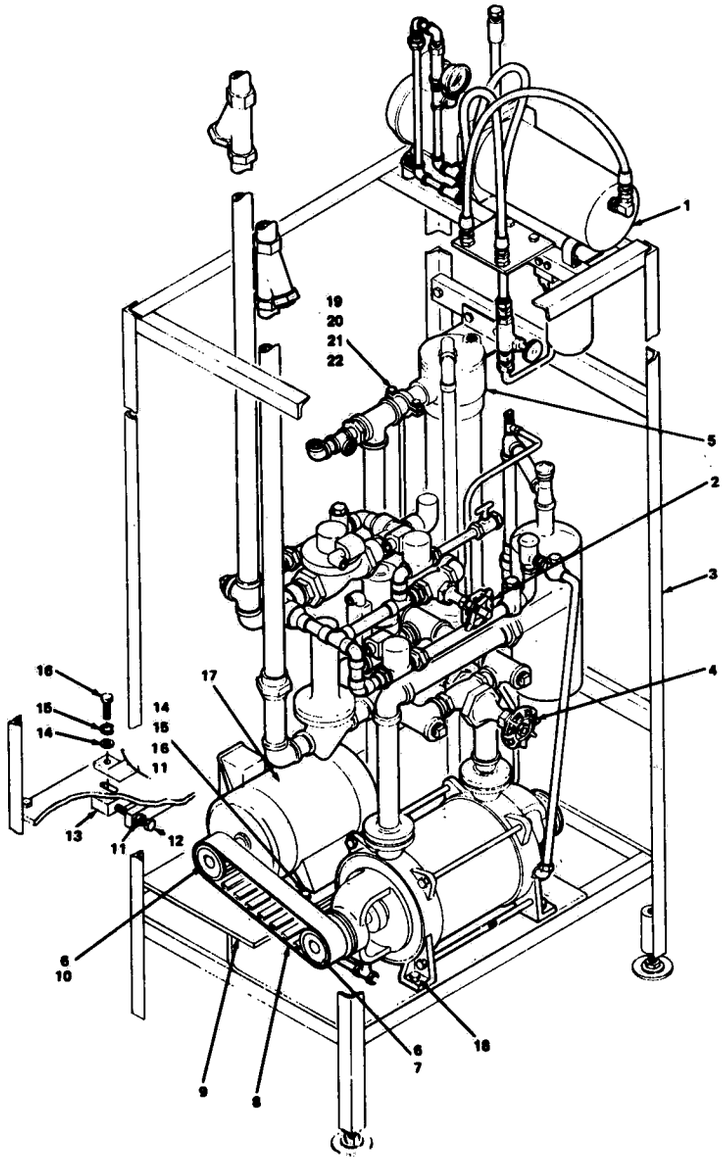


Figure 8-2. STAND, Piping.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-2-	P 142735 001		STAND, Piping, L.H., 230/460 V	1			
	P 142735 002		STAND, Piping, L.H., 200 V		1		
	P 142831 001		STAND, Piping, R.H., 230/460 V			1	
	P 142831 002		STAND, Piping, R.H., 200 V				1
1			PUMP ASSEMBLY/PIPING, Hydraulic (See Figure 8-3)	1	1	1	1
2			WATER SUPPLY PIPING ASSEMBLY (See Figure 8-5)	1	1	1	1
3			STAND, Piping support (See Figure 8-5)	1	1	1	1
4			STEAM SUPPLY PIPING ASSEMBLY (See Figure 8-4)	1	1	1	1
5			VACUUM PUMP/HEAT EXCHANGER ASSEMBLY (See Figure 8-6)	1	1	1	1
6	P 81951 001		SPROCKET	2	2	2	2
7	P 81952 001		BUSHING (0.876 ID)	1	1	1	1
8	P 81950 001		BELT, Drive	1	1	1	1
9	P 135755 001		PLATE ASSEMBLY, Motor and pump, L.H.	1	1		
	P 135756 001		PLATE ASSEMBLY, Motor and pump, R.H.			1	1
10	P 81953 001		BUSHING (1.376 ID)	1	1	1	1
11	P 3099 042		NUT, Hex (3/8-16)	10	10	10	10
12	P 82270 001		SCREW, Hex head (3/8-16 x 2-3/4)	2	2	2	2
13	P 82067 001		BAR, Motor	1	1	1	1
14	P 17263 042		WASHER (3/8)	8	8	8	8
15	P 19860 041		WASHER, Lock (3/8)	8	8	8	8
16	P 3903 042		SCREW, Hex head (3/8-16 x 1-1/4)	8	8	8	8
17	P 92260 001		MOTOR, 200 V, R.H.				1
	P 75784 091		MOTOR, 200 V, L.H.		1		
	P 92260 002		MOTOR, 230/460 V, R.H.			1	
	P 75785 091		MOTOR, 230/460 V, L.H.	1			
18	P 29479 061		PIN, Groove, 3/16	4	4	4	4
19	P 10333 091		CLAMP, Pipe, 1-1/2	2	2	2	2
20	P 28984 091		NIPPLE, 1/4 NPT x 17-3/4	1	1	1	1
21	P 13411 091		SCREW, Socket Head Cap, 1/4-20 x 5/8	4	4	4	4
22	P 3900 048		SCREW, Hex Head, 5/16-18 x 1	2	2	2	2

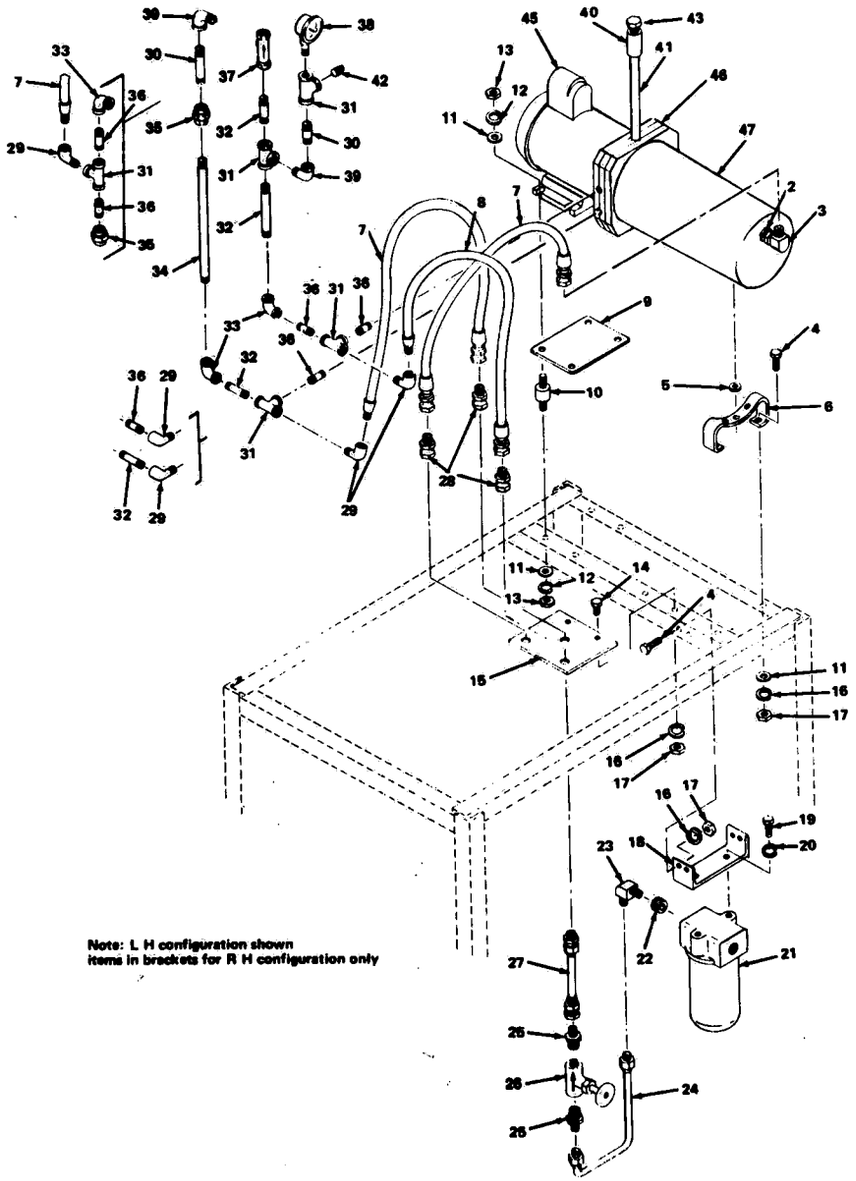


Figure 8-3. PUMP ASSEMBLY, Piping/Hydraulic.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-3-				PUMP ASSEMBLY/Piping, Hydraulic, L.H.	1			
				PUMP ASSEMBLY/Piping, Hydraulic, R.H.		1		
1	P	92328 001		PUMP ASSEMBLY, Hydraulic	1	1		
	P	92225 001		• PUMP, Hydraulic (60 Hz)	1	1		
	P	616500 001		• PUMP, Hydraulic (50 Hz)	1	1		
2	P	82059 001		• NUT, Tube	1	1		
	P	82092 001		• ELL, Bulkhead (Not Shown)	1	1		
	P	82059 002		• SLEEVE, Tube (Not Shown)	1	1		
	P	82049 001		• TUBE (Not Shown)	1	1		
3	P	82093 001		• NUT, Swivel Ell	1	1		
4	P	3848 051		SCREW, Hex Head, 1/4-20 x 3/4	10	10		
5	P	76866		BUTTON, Rubber (SUB: P-79776-001)	3	3		
6	P	92259 001		SUPPORT	1	1		
7	P	150314 001		HOSE ASSEMBLY (38 lg)	2	2		
8	P	82091 002		HOSE ASSEMBLY (29 lg)	1	1		
9	P	82274 001		PLATE, Pump	1	1		
10	P	82275 001		MOUNTING, Motor	4	4		
11	P	3515 041		WASHER	10	10		
12	P	19679 041		WASHER, Lock (5/16)	6	6		
13	P	3045 091		NUT, Hex (5/16-18)	6	6		
14	P	37321 051		SCREW, Hex Head, 1/4-20 x 1	2	2		
15	P	82075 001		PLATE, Coupling	1	1		
16	P	19678 045		WASHER, Lock	10	10		
17	P	24987 041		NUT, Half Hex	10	10		
18	P	81988 001		BRACKET, Oil Filter	1	1		
19	P	3858 041		SCREW, Hex Head, 3/8-16 x 7/8	2	2		
20	P	19680 041		WASHER, Lock	28	28		
21	P	81854 001		FILTER, Oil	1	1		
	P	757711 091		• CARTRIDGE, Filter	1	1		
22	P	82095 001		BUSHING, Reducing	2	2		
23	P	82094 00		ELBOW	1	1		
24	P	92267 001		TUBE ASSEMBLY	1	1		
25	P	82282 001		ADAPTER, Male	2	2		
26	P	49690 061		VALVE	1	1		
27	P	92244 001		TUBE ASSEMBLY	1	1		
28	P	82090 001		UNION, Bulkhead	3	3		
29	P	82116 001		ELBOW	2	2		
30	P	82587 003		NIPPLE (1/4 x 5)	2	2		
31	P	42092 091		TEE (1/4 NPT)	4	4		
32	P	82587 001		NIPPLE (1/4 x 3-1/4)	2	2		
33	P	42090 091		ELBOW, 90° (1/4 NPT)	4	4		
34	P	42395 091		NIPPLE (1/4 x 2-1/2)	1	1		
35	P	5267 091		UNION (1/4 NPT)	1	1		
36	P	82587 001		NIPPLE (1/4 x 7/8)	4	4		
37	P	80920 045		VALVE, Relief	1	1		
38	P	82325 001		GAUGE	1	1		
39	P	82289 001		ELL, Street (1/4 NPT)	2	2		
40	P	1312 051		COUPLING (3/8 NPT)	1	1		
41	P	32827 091		NIPPLE (3/8 x 7-3/4)	1	1		
42	P	11761 091		PLUG (1/4 NPT)		1		
43	P	759520 001		CAP, Breather	1	1		
44				NOT USED				
45	P	755690 001		MOTOR, 60 Hz	1	1		
46	P	755690 002		PUMP	1	1		
	P	762018 001		• GASKET, "O" Ring	2	2		
47	P	755690 003		TANK	1	1		

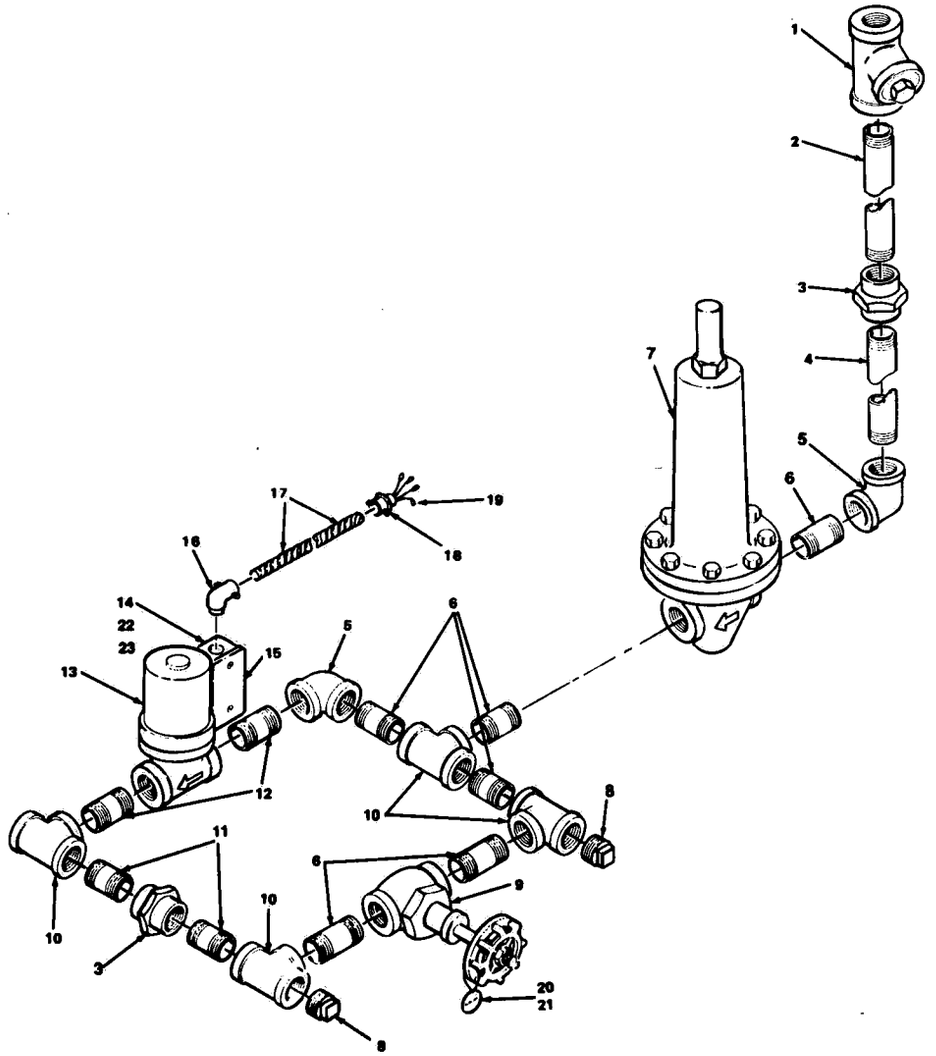


Figure 8-4. PIPING ASSEMBLY, Steam Supply Line.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-4-	P	142704	002		PIPING ASSEMBLY, Steam Supply Line, R.H.	1	
	P	142704	001		PIPING ASSEMBLY, Steam Supply Line, L.H.		1
1	P	42113	091		STRAINER, Steam (1-1/2 NPT)	1	1
2	P	82268	001		NIPPLE (1-1/2 x 35-1/8)	1	1
3	P	5285	091		UNION (1-1/2 NPT)	2	2
4	P	82267	001		NIPPLE (1-1/2 x 16-7/8)	1	1
5	P	7475	091		ELBOW (1-1/2 NPT)	2	2
6	P	29416	091		NIPPLE (1-1/2 x 2-1/2)	6	6
7	P	80975	001		VALVE, Pressure Reducing	1	1
	P	759217	001		KIT, Diaphragm Repair	A/R	A/R
	P	759218	001		KIT, Seal Repair	A/R	A/R
8	P	16074	091		PLUG, Pipe (1-1/2 NPT)	2	2
9	P	39602	091		VALVE (1-1/2 NPT)	1	1
10	P	7515	091		TEE (1-1/2 NPT)	4	4
11	P	37852	091		NIPPLE (1-1/2 x 1-3/4)	2	2
12	P	29414	091		NIPPLE (1-1/2 x 2)	2	2
13	P	81930	001		VALVE, Solenoid (1-1/2 NPT) — 60 Hz	1	1
	P	758673	091		• KIT, Repair	A/R	A/R
	P	752344	091		• COIL, 110/120 Vac. 60 Hz	A/R	A/R
	P	610720	001		VALVE, Solenoid (1-1/2 NPT) — 50 Hz	1	1
14	P	23345	091		BOX, Conduit	1	1
15	P	23346	091		COVER, Box	1	1
16	P	90625	091		CONNECTOR, Conduit (90°)	1	1
17	P	91627	091		CONDUIT (3/8 x 22)	1	1
18	P	90331	091		CONNECTOR, Conduit	1	1
19	P	90619	091		TERMINAL, Wire	4	4
20	P	82516	001		DISC	1	1
21	P	44331	091		DECAL	1	1
22	P	91702	091		NIPPLE, Chase (Not Shown)	1	1
	P	18538	091		NUT, Wire (Not Shown)	2	2
23	P	8681	091		NUT, Conduit Lock (Not Shown)	1	1

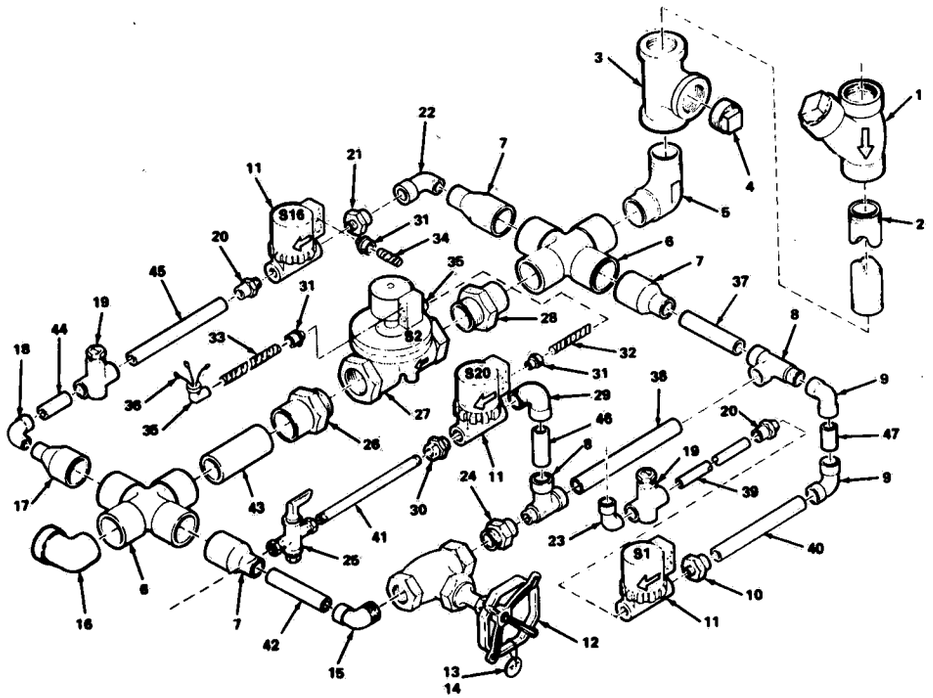


Figure 8-5, PIPING ASSEMBLY, Water Supply Line.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-5-	P 142698 002		PIPING ASSEMBLY, Water Supply Line, R.H.	1			
	P 142698 001		PIPING ASSEMBLY, Water Supply Line, L.H.		1		
1	P 82412 001		STRAINER	1	1		
2	P 82260 001		NIPPLE (1-1/2 x 35-3/4)	1	1		
3	P 78760 091		TEE	1	1		
4	P 3445 091		PLUG, Pipe	1	1		
5	P 81984 001		ELBOW, Street	2	2		
6	P 81958 001		CROSS	3	3		
7	P 81959 001		BUSHING, Ext. (1-5/8 ODT x 7/8 ODT)	2	2		
8	P 91994 091		TEE, Street	2	2		
9	P 44495 091		ELBOW	1	1		
10	P 91156 091		ADAPTER, Male (7/8 ODT x 1/2 NPT)	3	3		
11	P 42288 091		VALVE, Solenoid (1/2 NPT)	A/R	A/R		
	P 762485 001		• KIT, Repair	A/R	A/R		
	P 752018 091		• COIL, 110/120 Vac. 60 Hz		1	1	
12	P 5354 091		VALVE, Globe (1 NPT)	1	1		
13	P 82516 001		DISC	1	1		
14	P 44331 091		DECAL (Bypass)	1	1		
15	P 89996 091		ELBOW (7/8 ODT x 1 NPT)	1	1		
16	P 118944 091		ELBOW, Street (1-5/8 ODT)	1	1		
17	P 81960 001		BUSHING, Ext. (1-5/8 ODT x 5/8 ODT)	1	1		
18	P 90216 091		ELBOW, Street (5/8 ODT)	2	2		
19	P 78658 091		VALVE, Flow Control	2	2		
20	P 90227 091		UNION (5/8 ODT x 1/2 NPT)	1	1		
21	P 91160 091		ADAPTER, Male (7/8 ODT x 3/8 IPS)	1	1		
22	P 44507 091		ELBOW, Street	1	1		
23	P 89725 091		ELBOW, 90°	1	1		
24	P 91221 091		ADAPTER, Male (7/8 ODT x 1 NPT)	1	1		
25	P 30720 091		VALVE, Shutoff (3/8 ODT)	1	1		
26	P 39552 091		ADAPTER, Male (1-5/8 ODT x 1-1/2 NPT)	1	1		
27	P 80977 001		VALVE, Solenoid (1-1/2 NPT)	A/R	A/R		
	P 759626 001		• KIT, Repair	1	1		
28	P 37004 091		ADAPTER, Male (1-5/8 OD to 1-1/2 NPT)	1	1		
29	P 89539 091		ELBOW (7/8 ODT x 1/2 NPT)	1	1		
30	P 89947 091		COUPLING (1/2 NPT x 3/8 ODT)	4	4		
31	P 90331 091		CONNECTOR, Conduit Straight	1	1		
32	P 89804 091		CONDUIT (3/8 x 10)	1	1		
33	P 91814 091		CONDUIT (3/8 x 16)	1	1		
	P 91657 091		CONDUIT (3/8 x 14)	1	1		
34	P 90654 091		CONDUIT (3/8 x 22)	4	4		
35	P 90625 091		FITTING, Conduit (90°)	3	3		
36	P 90619 091		TERMINAL, Wire	10	10		
	P 18538 091		NUT, Wire (Not Shown)	1	1		
37			TUBE, 7/8 OD x 3	1	1		
38			TUBE, 7/8 OD x 5-3/4	1	1		
39			TUBE, 5/8 OD x 7-3/16	1	1		
40			TUBE, 7/8 OD x 5	1	1		
41			TUBE, 3/8 OD x 6	1	1		
42			TUBE, 7/8 OD x 3-1/16	1	1		
43			TUBE, 1-5/8 OD x 2-7/8	1	1		
44			TUBE, 5/8 OD x 1-5/16	1	1		
45			TUBE, 5/8 OD x 5-1/4	1	1		
46			TUBE, 7/8 OD x 1-5/8	1	1		
47			TUBE, 7/8 OD x 3	1	1		

NOTE: All copper tubing used in the above assemblies is ASTM B-88 type L hard drawn.

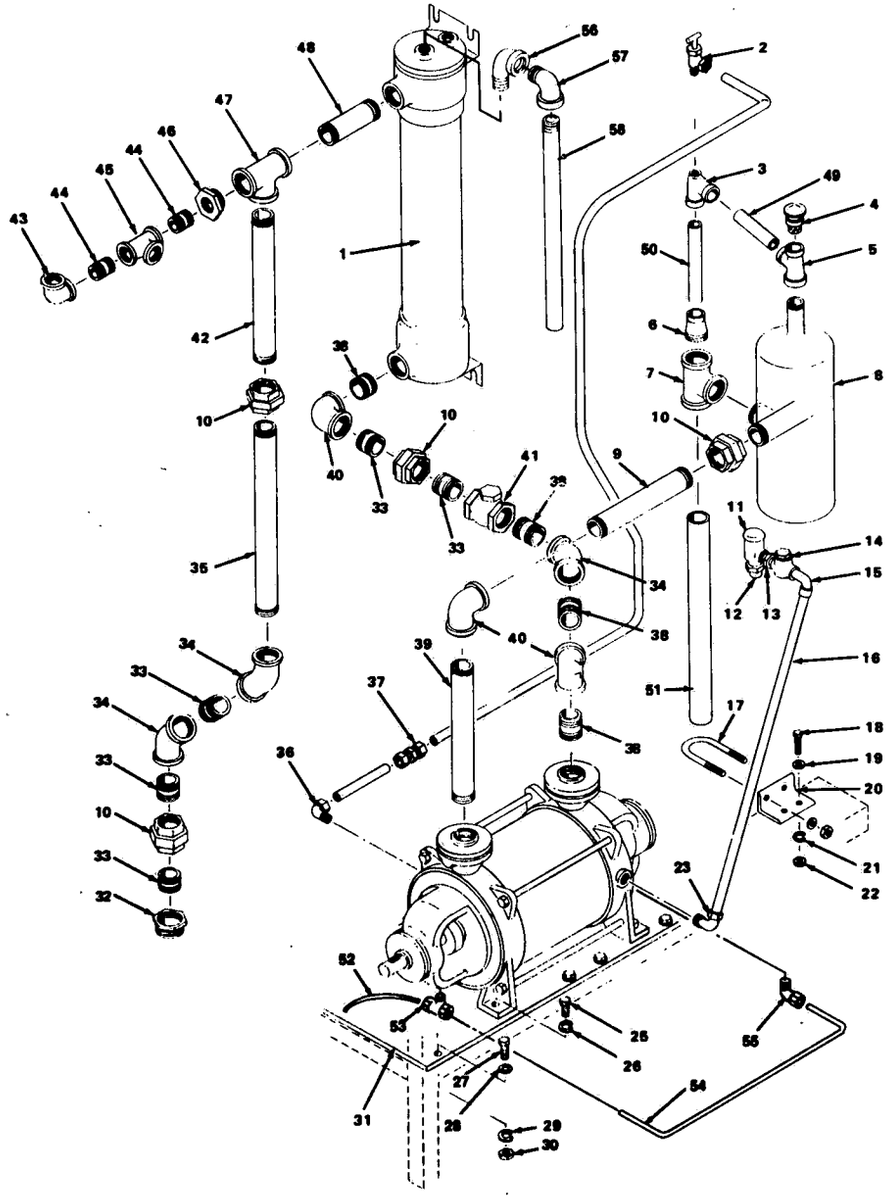


Figure 8-6. VACUUM PUMP, Heat Exchanger Assembly.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-6-					VACUUM PUMP/HEAT EXCHANGER ASSEMBLY, L.H.	1			
					VACUUM PUMP/HEAT EXCHANGER ASSEMBLY, R.H.		1		
1	P	81954	001		HEAT EXCHANGER	1	1		
2	P	6758	044		VALVE, Petcock (1/8 NPT x 5/16 ODT)	1	1		
3	P	89720	091		TEE	1	1		
4	P	76286	091		VENT, Air	1	1		
5	P	89968	091		TEE	1	1		
6	P	82044	001		BUSHING, Reducing (1-5/8 OD x 1-1/8 OD)	1	1		
7	P	82043	001		TEE	1	1		
8	P	92518	001		TANK, Surge	1	1		
9	P	82047	001		NIPPLE (1-1/2 x 11-3/4)	1	1		
10	P	5285	091		UNION (1-1/2 NPT)	4	4		
11	P	92246	001		WATERLINE ASSEMBLY, Pump, L.H.	1	1		
	P	92261	001		WATERLINE ASSEMBLY, Pump, R.H.		1		
	P	90233	091		• BREAKER, Vacuum	1	1		
	P	752477	091		• • KIT, Repair	A/R	A/R		
12	P	90208	091		• ADAPTER, Male	1	1		
13	P	90209	091		• ADAPTER, Male	1	1		
14	P	90235	091		• VALVE, Check	1	1		
15	P	90214	091		• ELBOW, Street	1			
16	P	92246	007		• TUBE, L.H. (5/8 ODT x .040 Wall x 26-1/4)		1		
	P	92261	007		• TUBE, R.H. (5/8 ODT x .040 Wall x 26-1/4)	1			
17	P	37757	045		U-BOLT	2	2		
18	P	3848	051		SCREW, Hex Head (1/4-20 x 3/4)	2	2		
19	P	3515	041		WASHER, Flat	1	1		
20	P	82441	001		BRACKET, Angle	2	2		
21	P	19678	045		WASHER, Lock (1/4)	2	2		
22	P	24987	041		NUT, Half Hex (1/4-20)	1	1		
23	P	23972	091		ELL, Comp. Fitting	1	1		
24	P	55924	001		PUMP, Vacuum (See Figure 8-8)	A/R	A/R		
	P	46011	091		• KIT, Repair	4	4		
25	P	3872	045		SCREW, Hex Head	4	4		
26	P	19681	045		WASHER, Lock (1/2)	13	13		
27	P	3903	042		SCREW, Hex Head (3/8-16 x 1-1/4)	13	13		
28	P	17263	042		WASHER, Flat	13	13		
29	P	19680	041		WASHER, Lock (3/8)	13	13		
30	P	3099	042		NUT, Hex (3/8-16)	1			
31	P	135755	001		PLATE ASSEMBLY, Motor and Pump, L.H.		1		
	P	135756	001		PLATE ASSEMBLY, Motor and Pump, R.H.	1	1		
32	P	39611	091		BUSHING, Reducing	5	5		
33	P	37852	091		NIPPLE (1-1/2 x 1-3/4)	3	3		
34	P	82097	001		ELBOW, 45° (1-1/2 NPT)	1	1		
35	P	82048	001		NIPPLE (1-1/2 x 19-5/8)	1	1		
36	P	7033	091		ELL (1/4 NPT x 5/16 ODT)	1	1		
37					TUBE, 5/16 OD x 52	4	4		
38	P	29414	091		NIPPLE (1-1/2 x 2)	1	1		
39	P	41812	091		NIPPLE (1-1/2 x 11-1/2)	3	3		
40	P	7475	091		ELBOW (1-1/2 NPT)	1	1		
41	P	150822	016		VALVE, Check (1-1/2 NPT)	1	1		
42	P	41814	091		NIPPLE (1-1/2 x 13-1/4)	1	1		
43	P	1729	091		ELBOW (1/2 NPT)	2	2		
44	P	40519	061		NIPPLE (1/2 x 1-1/4)	1	1		
45	P	40525	061		TEE				

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-6-46	P 78851 061		BUSHING, Reducing (1-1/2 x 1/2)	1	1
47	P 7515 091		TEE (1-1/2 NPT)	1	1
48	P 36271 091		NIPPLE (1-1/2 x 4-3/4)	1	1
49			TUBE, 1-1/8 OD x 6	1	1
50			TUBE, 1-1/8 OD x 11	1	1
51			TUBE, 1-5/8 OD x 25	1	1
52			TUBE, 3/8 OD x 20	1	1
53	P 7032 044		TEE, 3/8 x 3/8 ODT x 1/4 NPT	1	1
54	P 52274 091		TUBE, Drain, 3/8 OD	1	1
55	P 6786 091		ELL, 3/8 ODT x 1/4 NPT	1	1
56	P 44490 091		ELL, 1-1/8 ODT X 1 NPT	1	1
57	P 91475 091		ELL, 1-1/8 ODT	1	1
58			TUBE, 1-1/8 OD x 50	1	1

NOTE: The 1-5/8'' and 1-1/8'' tubing used in the above assemblies is ASTM B88 type "L" hard drawn. The 5/16'' tubing is ASTM B88 soft copper.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-7-	P 135498 001		PIPING ASSEMBLY, Heat Exchanger	1
1	P 81985 001		VACUUM BREAKER (1-1/2 NPT)	1
	P 762234 001		• KIT, Repair	A/R
2	P 33738 091		BUSHING, Reducing (1-1/2 to 1)	1
3	P 1639 091		ELBOW, Street (1)	2
4	P 29368 091		NIPPLE (1 x 5)	1
5	P 43101 091		VALVE, Check (1)	1
	P 48468 091		• DISC, Renewal	1
6	P 51759 091		UNION (1-1/8 ODT x 1 NPT)	1
7	P 44492 091		ELBOW, 90° (1-1/8 ODT)	1
8	P 39552 091		ADAPTER, Male (1-5/8 ODT x 1-1/2 NPT)	1
9			TUBE, 1-5/8 OD x 14	1
10			TUBE, 1-1/8 OD x 2-5/8	1
11			TUBE, 1-1/8 OD x 5-5/16	1
			NOTE: All copper tubing used in the above assemblies is ASTM B-88 type "L" hard drawn.	

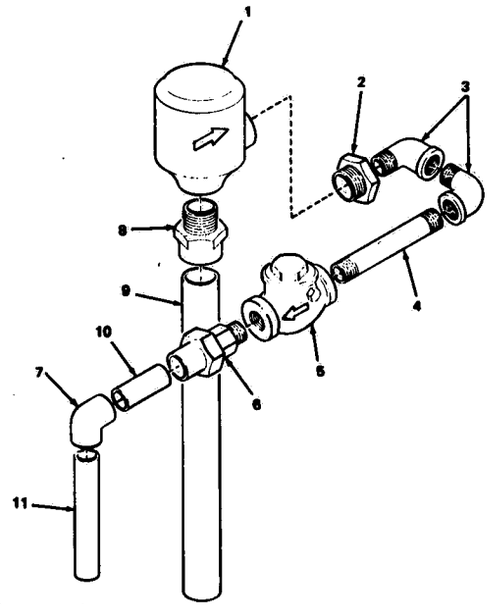


Figure 8-7. PIPING ASSEMBLY, Heat Exchanger.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-8-	P	55924	001		PUMP, Vacuum	1
1	P	44635	091		NUT, Gland	2
2	P	46004	091		SPACER, Gland	2
3	P	44642	091		RING, Lantern	2
4	P	44644	091		GASKET	2
5	P	46011	091		STUFFING BOX PACKING (Set of 12)	1
6	P	44661	091		BALL BEARING	2
7	P	46008	091		SAFETY DISC	1
8	P	46009	091		SPACER	1
9	P	46000	091		COVER, Bearing	1
10	P	46010	091		NUT, Shaft	1
11	P	753634	091		GASKET, Flange	2

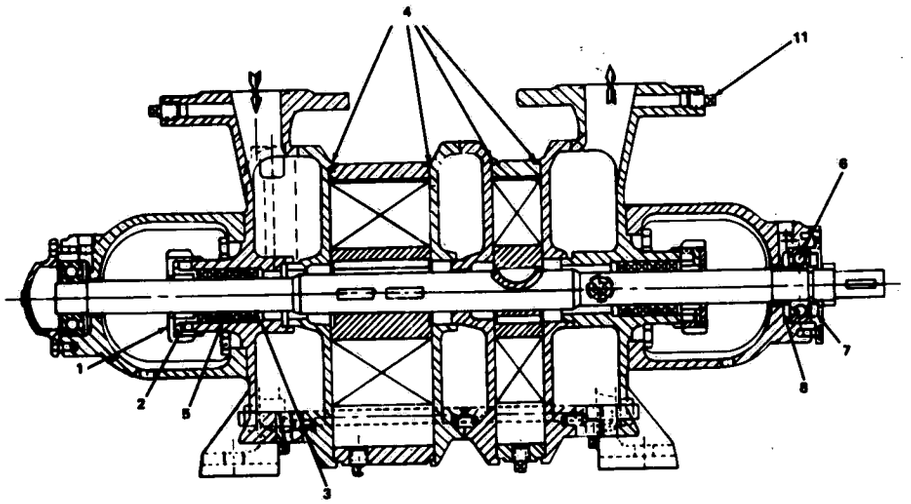


Figure 8-8. VACUUM PUMP.

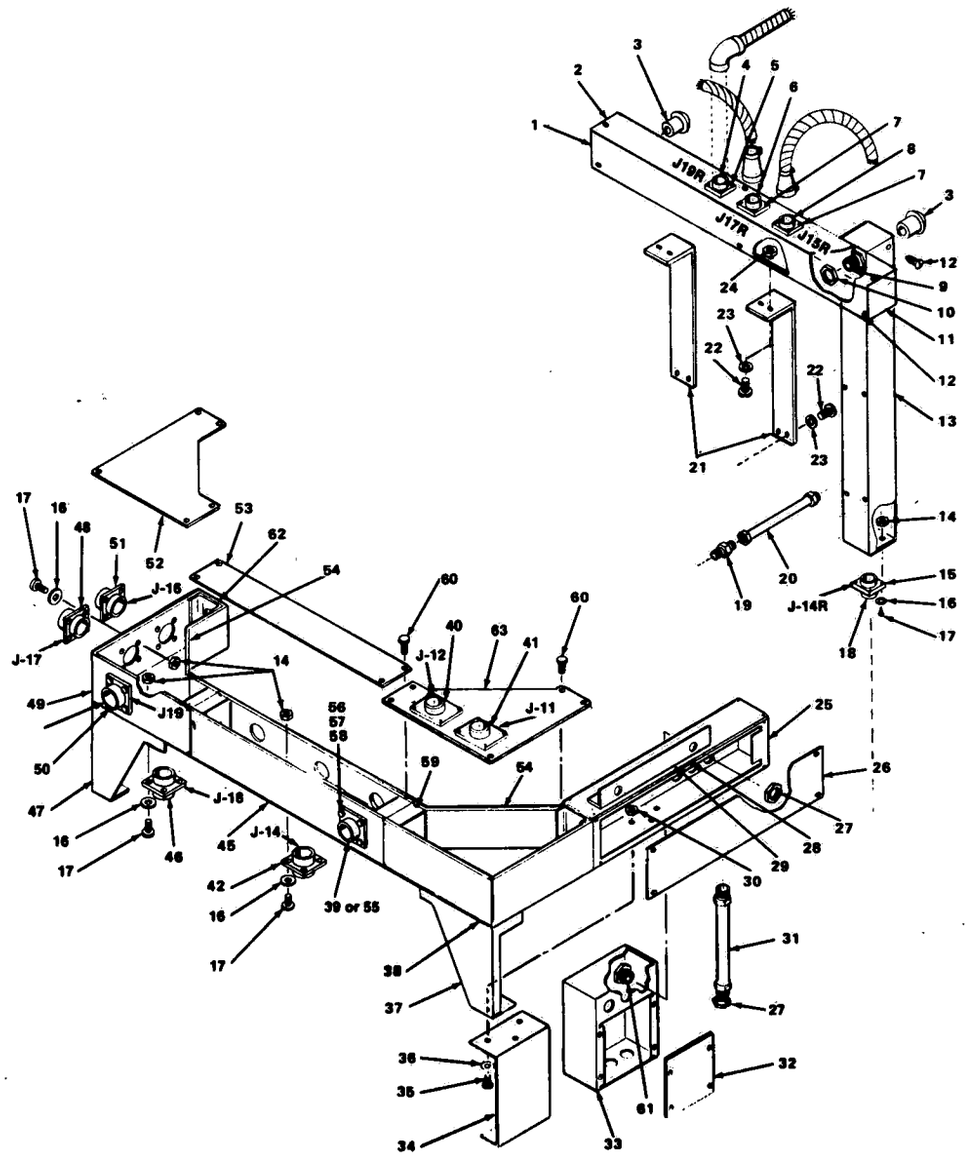


Figure 8-9. WIREWAYS, Piping Stand.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-9-					WIREWAYS, Piping Stand, Single Door	1				
					WIREWAYS, Piping Stand, Double Door		1			
	P	56396	003		WIREWAY ASSEMBLY		1			
1	P	134468	027		• WIREWAY		1			
2	P	76896	091		• PLATE, Closing		1			
3	P	82266	003		• BUTTON, Plug (1-3/4)		2			
4	P	134468	030		• CONNECTOR ASSEMBLY, J-19R		1			
5	P	13334	091		• SCREW (4-40 x 3/8)		4			
	P	13794	041		• NUT (4-40) (Not Shown)		4			
	P	90713	061		• WASHER, Lock (4) (Not Shown)		4			
6	P	134468	028		• CONNECTOR ASSEMBLY, J-17R		1			
7	P	3960	041		• SCREW (6-32 x 1/2)		8			
	P	3037	041		• NUT (6-32) (Not Shown)		8			
	P	19684	061		• WASHER, Lock (6) (Not Shown)		8			
8	P	134468	024		• CONNECTOR ASSEMBLY, J-15R		1			
9	P	37308	091		• CHASE NIPPLE (1-1/4)		6			
10	P	37312	091		• NUT, Lock (1-1/4)		6			
11	P	76896	091		• PLATE, Closing		1			
12	P	91022	045		• SCREW, Pan Head (8-32 x 5/16)		6			
13	P	135880	001		WIREWAY	1	1			
14	P	3037	041		NUT, Hex (6-32)	32	4			
15	P	150822	007		PLATE, Connector	1	1			
16	P	19675	041		WASHER, Lock (6)	42	4			
17	P	4672	041		SCREW, Round Head (6-32 x 5/16)	32	4			
18	P	134468	029		CONNECTOR AND WIRE ASSEMBLY, J-14R		1			
19	P	74842	091		CONNECTOR, Straight (1)	6	6			
20	R	808	520		CONDUIT, EMT (1 x 8-1/4 Long)	3	3			
21	P	92036	001		SUPPORT, Raceway	2	2			
22	P	15324	042		SCREW, Round Head (1/4-20 x 3/8)	10	8			
23	P	19678	045		WASHER, Lock (1/4)	19	8			
24	P	3040	042		NUT, Hex (1/4 x 20)	4	4			
25	P	135860	001		WIREWAY	1	1			
26	P	76896	091		PLATE, Closing	2	2			
27	P	37312	091		NUT, Lock (1-1/4)	6	7			
28	P	135870	003		COVER, Wireway	1	1			
29	P	92037	001		SUPPORT, Rod	1	1			
30	P	3040	042		NUT, Hex (1/4 x 20)	7	7			
31	P	90331	091		CONNECTOR, Straight (1/2)	4	4			
32	P	81604	001		COVER	1	1			
33	P	135343	001		WIREWAY, Weldment	1	1			
34	P	135877	001		SUPPORT, Wireway	1	1			
35	P	15324	042		SCREW, Round Head (1/4-20 x 3/8 Long)	8	10			
36	P	19678	045		WASHER, Lock (1/4)	19	19			
37	P	142827	001		SUPPORT, Corner, R.H.	1	1			
38	P	134468	025		CORNER	1	1			
39	P	82311	001		PLATE, Cover	1	1			
40	P	134468	017		CONNECTOR, J-12	1	1			
41	P	134468	016		CONNECTOR, J-11	1	1			
42	P	134468	019		CONNECTOR, J-14	1	1			
43					NOT USED					
44					NOT USED					
45	P	141198	000		WIREWAY	1	1			

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-9-46	P	134468	022		CONNECTOR, J-18	1	1			
47	P	142827	002		SUPPORT, Corner, L.H.	1	1			
48	P	134468	021		CONNECTOR, J-17	1	1			
49	P	134468	026		CORNER	1	1			
50	P	134468	023		CONNECTOR, J-19	1	1			
51	P	134468	020		CONNECTOR, J-16	1	1			
52	P	92447	001		COVER, Corner	1	1			
53	P	135870	002		COVER, Wireway	1	1			
54	P	92446	001		CORNER, Inside	2	2			
55	P	134468	018		CONNECTOR, J-13 (STM/GAS),	1	1			
56	P	4672	041		SCREW (6-32 x 5/16)	20	20			
57	P	19675	041		WASHER, Lock (6) (Not Shown)	30	30			
58	P	3037	041		NUT, Hex (6-32) (Not Shown)	20	20			
59	P	76895	091		"U" CONNECTOR	3	3			
60	P	91022	045		SCREW (8-32 x 5/16)	94	12			
61	P	37308	091		CHASE NIPPLE (1-1/4)	6	7			
62	P	76896	091		PLATE, Closing	2	2			
63	P	134468	008		COVER, Corner	1	1			

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-10-					BOX, Terminal, Piping Stand, 200 V	1			
					BOX, Terminal, Piping Stand, 230/460 V		1		
1	P	135858	001		WIREWAY	1	1		
2	P	41560	091		TERMINAL BLOCK	6	6		
3	P	78881	045		SCREW (#6-32 x 1/2)	12	12		
4	P	19675	041		WASHER, Lock (6)	12	12		
5	P	135876	001		COVER	1	1		
6	P	82674			DECAL, Caution (SUB: P-150369-001)	2	2		
7	P	91022	045		SCREW, Pan (8-32 x 5/16)	10	10		
8					SCREW	4	4		
9					WASHER, Lock (1/4)	4	4		
10	P	90850	091		CONDUIT, Flex (1/2 x 45 Long)	1	1		
11	P	90331	091		CONNECTOR, Straight	1	1		
12	P	82740	001		HEATER, 230 V		3		
	P	150061	001		HEATER, 460 V		3		
	P	150064	001		HEATER, 200 V	3			
13	P	56098	001		STARTER, Hydraulic Pump	1	1		
	P	150060	001		HEATER, 120 V	1	1		
14	P	37793	091		CONNECTOR, Ell	1	1		
15	P	32657	091		NIPPLE, Conduit	1	1		
16	P	150122	001		BUSHING	2	2		
17	P	92677	001		STARTER, Vacuum Pump Motor	1	1		
18	P	90613	091		CONDUIT, Flex (3/8 x 28)	1	1		

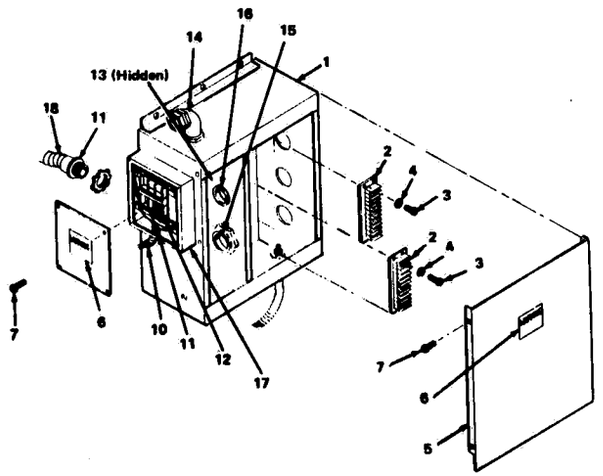


Figure 8-10. BOX, Terminal.

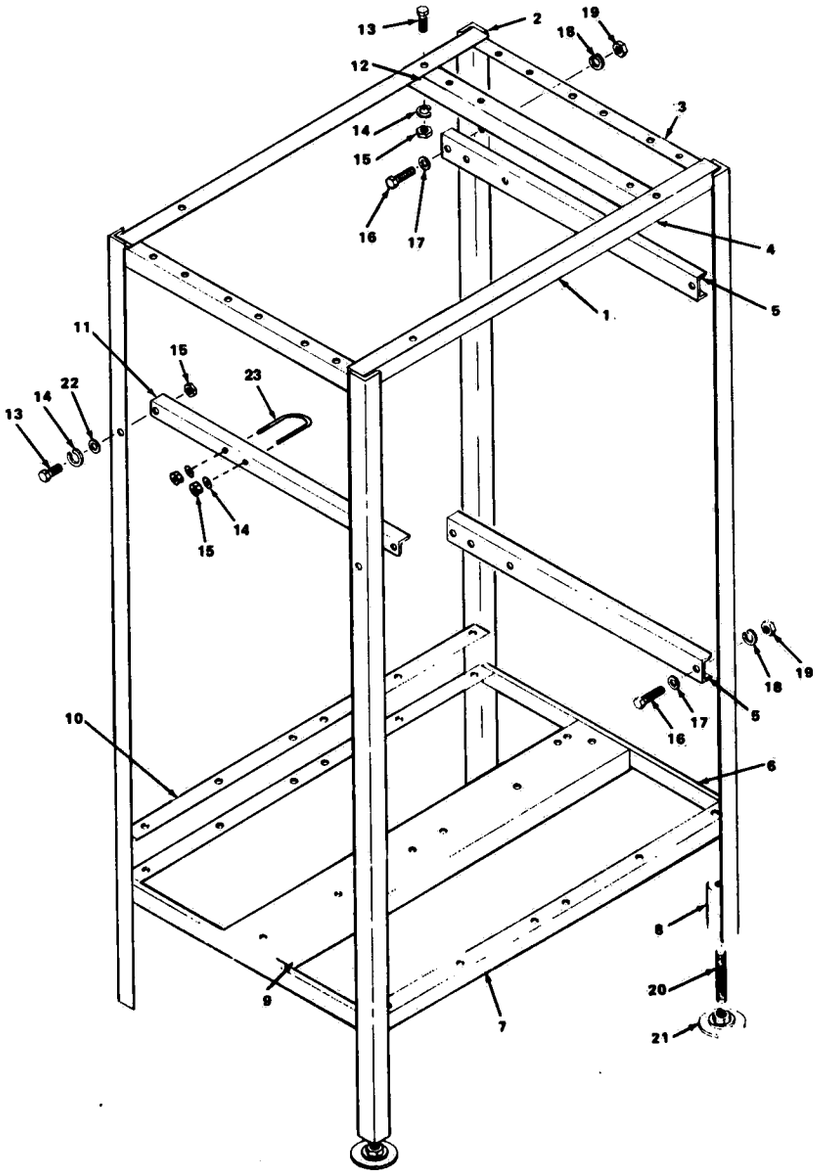


Figure 8-11. STAND, Piping Support.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-11-					STAND, Piping Support	1
1	P	142717	001		STAND, Piping and Hydraulic Support	1
2	P	82068	001		• LEG, Vertical	4
3	P	82069	001		• ANGLE, Cross	2
4	P	82070	001		• ANGLE, Side Upper	2
5	P	82074	001		• CHANNEL, Cross	2
6	P	82163	001		• BAR, End	2
7	P	82072	001		• ANGLE, Side Lower	2
8	P	90006	091		• BLOCK, Leveling Screw	2
9	P	82073	001		• CHANNEL, Middle	1
10	P	82071	001		• ANGLE, Side Middle	1
11	P	82276	001		• SUPPORT, Pipe	1
12	P	82069	002		• ANGLE, Cross	1
13	P	3848	051		SCREW, Hex Head (1/4-20 x 3/4)	4
14	P	19678	045		WASHER, Lock (1/4)	4
15	P	24987	041		NUT, Half Hex (1/4-20)	4
16	P	3905	091		SCREW, Hex Head (3/8-16 x 1-3/4)	4
17	P	17263	042		WASHER, Flat	4
18	P	19680	041		WASHER, Lock (3/8)	4
19	P	3099	042		NUT, Hex (3/8-16)	4
20	P	90407	045		SCREW, Square Head	2
21	P	90423	091		FOOT, Weldment	2
22	P	3515	041		WASHER, Flat	2
23	P	82120	001		"U" BOLT, 1/4-20	2

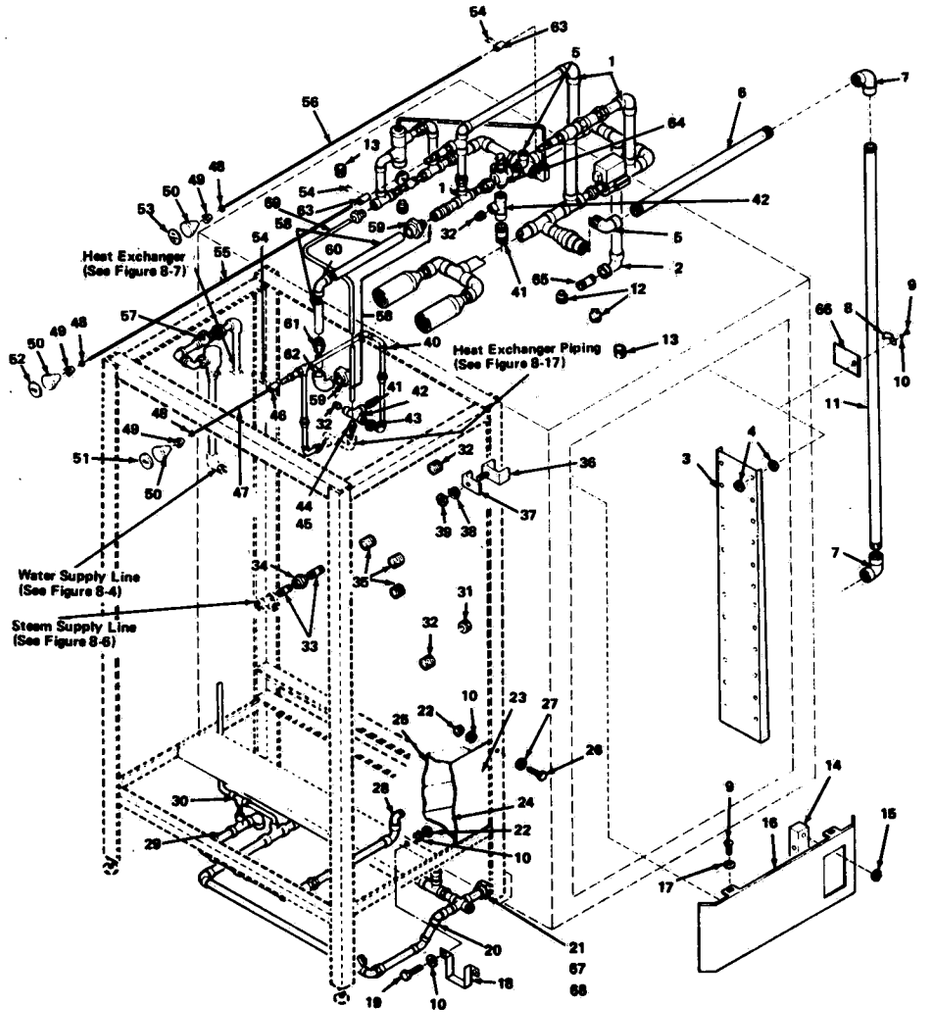


Figure 8-12. PIPING PACKAGE, Module, Steam.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-12-	P 142832 001		PIPING PACKAGE, Module (52" Long, R.H.) Steam	1			
	P 142796 001		PIPING PACKAGE, Module (52" Long, L.H.) Steam		1		
	P 142831 001		PIPING PACKAGE, Module (78" Long, R.H.) Steam			1	
	P 142845 001		PIPING PACKAGE, Module (78" Long, L.H.) Steam				1
1	P 142695 003		PIPING ASSEMBLY, Steam to Chamber (See Figure 8-19)	1		1	
	P 142695 004		PIPING ASSEMBLY, Steam to Chamber (See Figure 8-19)		1		1
2	P 150131 001		ELBOW, 90° (1-5/8 ODT x 1-1/2 NFPT)	1	1	2	2
3	P 92602 001		BAFFLE, Steam (Slotted) (52 x 6)	2	2	2	2
	P 92262 001		BAFFLE, Steam (9 x 6)	2	2	2	2
	P 33281 061		WASHER, Flat			2	2
4	P 8647 061		NUT, Hex (10-32)	24	24	36	36
5	P 82155 001		ELL, Street (1-1/2 NPT)	2	2	2	2
6	P 82583 001		NIPPLE (1-1/2 x 18-7/8)	1	1	1	1
7	P 7475 091		ELL	2	2	2	2
8	P 37160 010		CLAMP, Pipe	2	2	2	2
9	P 12544 061		SCREW, Round Head	10	10	7	7
10	P 19678 045		WASHER, Lock (1/4)	12	12	10	10
11	P 82583 002		NIPPLE (1-1/2 x 70-5/8)	1	1	1	1
12	P 11761 091		PLUG, Pipe (1/4 NPT)	4	4	4	4
13	P 42566 091		PLUG, Pipe (1/8 NPT)	2	2	2	2
14	P 82423 001		CLAMP, Temperature Bulb	1	1	1	1
15	P 8648 061		NUT	2	2	2	2
16	P 92507 001		GUARD ASSEMBLY, Temperature Bulb	1	1	1	1
17	P 32380 061		WASHER	4	4	4	4
18	P 82425 001		BRACKET, Ball Valve Support	1	1		
19	P 3847 042		SCREW, Hex Head (1/4-20 x 5/8)	2	2		
20	P 163840 002		PIPING ASSEMBLY, Chamber Drain Line (See Figure 8-22)	1			
	P 142684 002		PIPING ASSEMBLY, Chamber Drain Line (See Figure 8-22)		1		
	P 142833 002		PIPING ASSEMBLY, Chamber Drain Line (See Figure 8-22)			1	
	P 163839 002		PIPING ASSEMBLY, Chamber Drain Line (See Figure 8-22)				1
21	P 51759 091		UNION	3	3	5	5
22	P 3097 041		NUT, Hex (1/4-20)	6	6	4	4
23	P 135972 001		GUARD, Front Belt	1	1	1	1
24	P 92579 001		GUARD ASSEMBLY, Lower Belt	1		1	
	P 92575 001		GUARD ASSEMBLY, Lower Belt		1		1
25	P 135971 001		GUARD ASSEMBLY, Upper Belt	1		1	
	P 135969 001		GUARD ASSEMBLY, Upper Belt		1		1
26	P 3848 051		SCREW, Hex Head (1/4-20 x 3/4)	4	4	4	4
27	P 10445 091		WASHER, Flat (1/4)	10	10	10	10
28	P 81955 001		ELL, Street 45° (1 ODT x 1 IPS)	2	2	4	4
29	P 135445 001		PIPING ASSEMBLY, Steam Return Line (See Figure 8-20)	1			
	P 135485 001		PIPING ASSEMBLY, Steam Return Line (See Figure 8-20)		1		
	P 135450 001		PIPING ASSEMBLY, Steam Return Line (See Figure 8-21)			1	
	P 135449 001		PIPING ASSEMBLY, Steam Return Line (See Figure 8-21)				1
30	P 6991 091		TEE, Compression (3/8 ODT)	1	1	1	1
31	P 3446 091		PLUG, Pipe (1/2 NPT)	3	3	3	3
32	P 18991 091		PLUG, Pipe (1-1/2 NPT)	4	4	4	4
33	P 29419 091		NIPPLE (1-1/2 x 3-1/4)	2	2	2	2
34	P 5285 091		UNION (1-1/2 NPT)	1	1	1	1
35	P 39335 061		PLUG, Pipe (3/4 NPT)	5	5	5	5
36	P 81987 001		SPACER	6	6	6	6
37	P 81986 001		SUPPORT	6	6	6	6

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
				6	6	6	6
8-12-38	P 19680 041		WASHER, Lock (3/8)	6	6	6	6
39	P 3099 042		NUT, Hex (3/8-16)	1			
40	P 92266 001		PIPING ASSEMBLY, Chamber Exhaust (See Figure 8-24)		1		
	P 92265 001		PIPING ASSEMBLY, Chamber Exhaust (See Figure 8-24)			1	1
	P 92520 001		PIPING ASSEMBLY, Chamber Exhaust (See Figure 8-24)	2	2	1	1
41	P 29418 091		NIPPLE (1-1/2 x 3)	2	2	1	1
42	P 7515 091		TEE (1-1/2 NPT)	1	1	1	1
43	P 78851 061		REDUCER, Bushing (1-1/2 NPT x 1/2 NPT)	2	2	2	2
44	P 118209 091		FITTING, Flare (1-1/2 NPT x 5/8 ODT)	2	2	2	2
45	P 118202 091		NUT, Flare (5/8 ODT)	1	1	1	1
46	P 45524 045		COUPLING	1	1	1	1
47	P 45496 043		ROD, Valve Extension (13-3/4 long)	3	3	3	3
48	P 45690 091		BUTTON, Plug	3	3	3	3
49	P 8605 091		NUT, Handwheel	3	3	3	3
50	P 44330 091		HANDWHEEL	1	1	1	1
51	P 44333 091		DECAL (Exhaust)	1	1	1	1
52	P 52486 091		DECAL (Air Supply)	1	1	1	1
53	P 44881 091		DECAL (Steam to Chamber Bypass)	6	6	6	6
54	P 46038 061		PIN, Cotter	1	1	1	1
55	P 45506 043		ROD, Valve Extension (31-3/4 long)	1	1	1	1
56	P 45514 043		ROD, Valve Extension (47-3/4 long)	1	1	1	1
57	P 135498 001		PIPING ASSEMBLY, Heat Exchanger (See Figure 8-7)	1	1		
58	P 92245 001		PIPING ASSEMBLY, Jacket to Chamber Steam			1	
	P 92245 003		PIPING ASSEMBLY, Jacket to Chamber Steam				1
	P 92245 002		PIPING ASSEMBLY, Jacket to Chamber Steam	2	2	2	2
59	P 39552 091		• ADAPTER, Male (1-1/2 NPT x 1-5/8 ODT)	1	1	1	1
60	P 81944 001		• ELBOW (1-5/8 ODT)	1	1	1	1
61	P 81902 001		• UNION (1-5/8 ODT)	1	1	1	1
62	P 82122 001		• ELL, Street (1-5/8 ODT)	2	2	2	2
63	P 82159 001		COUPLING	1	1	1	1
64	P 82286		VALVE, Safety (SUB: P-83194-001)	1	1	2	2
65	P 32667 091		NIPPLE (1-1/2 x 2)	2	2	2	2
66	P 82585 001		BRACKET, Support	1	1	2	2
67			TUBE, 1-1/8 OD x 2	1	1	2	2
68	P 81956 001		ELL, 45°, 1-1/8 ODT	1		1	1
69			TUBE, 5/8 OD x 48		1		
			TUBE, 5/8 OD x 42				

NOTE: The 3/8" tubing used in the above assemblies is ASTM B-88 soft copper. The 5/8" tubing is ASTM B-75 DPH light annealed.

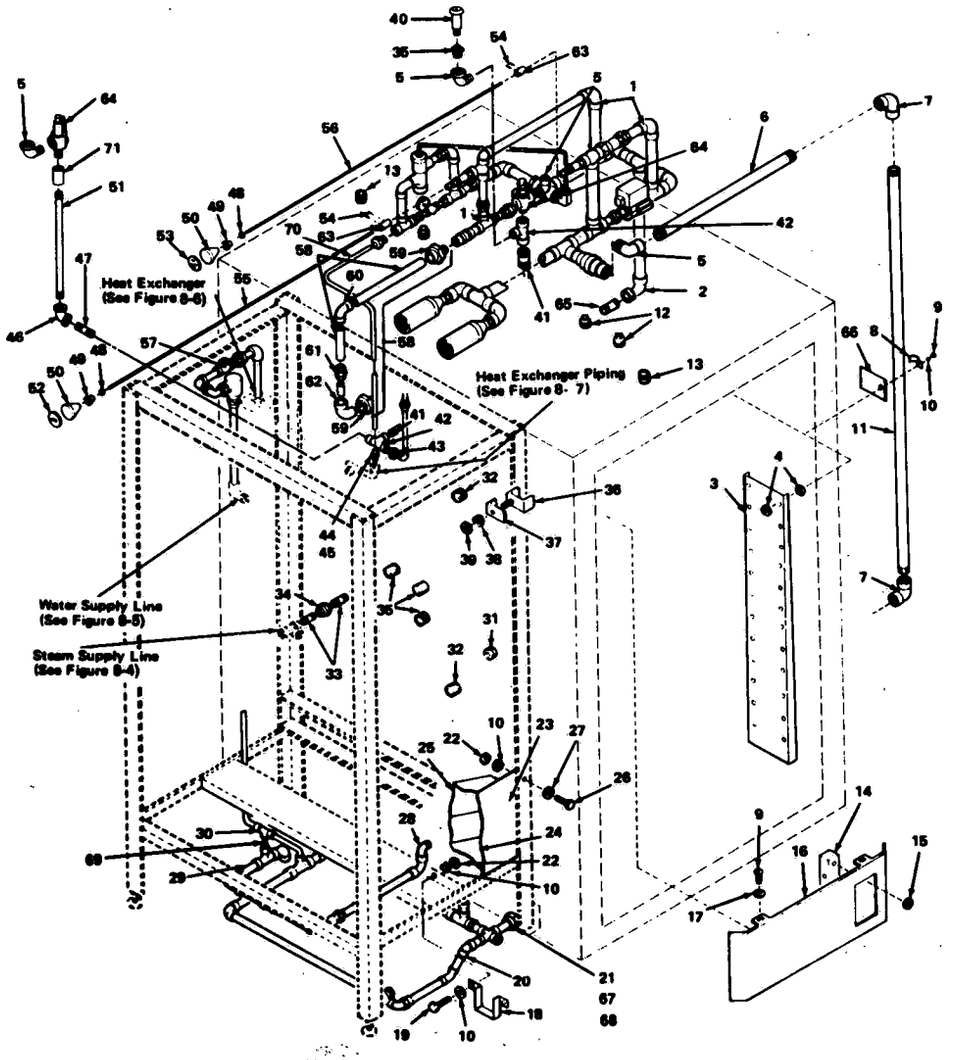


Figure 8-13. PIPING PACKAGE, Module, Steam/Gas.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-13-	P	142832	002		PIPING PACKAGE, Module (52'' long, R.H.) Steam/Gas	1			
	P	142796	002		PIPING PACKAGE, Module (52'' long, L.H.) Steam/Gas		1		
	P	142831	002		PIPING PACKAGE, Module (78'' long, R.H.) Steam/Gas			1	
	P	142845	002		PIPING PACKAGE, Module (78'' long, L.H.) Steam/Gas				1
1	P	142695	001		PIPING ASSEMBLY, Steam to chamber (See Figure 8-19)	1	1		
	P	142695	002		PIPING ASSEMBLY, Steam to chamber (See Figure 8-19)			1	1
2	P	150131	001		ELBOW, 90° (1-5/8 ODT x 1-1/2 NPT)	1	1	2	2
3	P	92602	001		BAFFLE, Steam (slotted) (52 x 6)	2	2	2	2
	P	92262	001		BAFFLE, Steam (9 x 6)	2	2	2	2
	P	33281	061		WASHER, Flat			2	2
4	P	8647	061		NUT, Hex (10-32)	24	24	36	36
5	P	82155	001		ELL, Street (1-1/2 NPT)	4	4	5	5
6	P	82583	001		NIPPLE (1-1/2 x 18-7/8)	1	1	1	1
7	P	7475	091		ELL	2	2	2	2
8	P	37160	010		CLAMP, Pipe	2	2	2	2
9	P	12544	061		SCREW, Round Head	10	10	7	7
10	P	19678	045		WASHER, Lock (1/4)	12	12	10	10
11	P	82583	002		NIPPLE (1-1/2 x 70-5/8)	1	1	1	1
12	P	11761	091		PLUG, Pipe (1/4 NPT)	4	4		
13	P	42566	091		PLUG, Pipe (1/8 NPT)	2	2	2	2
14	P	82423	001		CLAMP, Temperature Bulb	1	1	1	1
15	P	8648	061		NUT	2	2	2	2
16	P	92507	001		GUARD ASSEMBLY, Temperature Bulb, (11-1/4 x 27-15/16)	1	1	1	1
17	P	32380	061		WASHER	4	4	4	4
18	P	82425	001		BRACKET, Ball Valve Support	1	1		
19	P	3847	042		SCREW, Hex Head (1/4-20 x 5/8)	2	2		
20	P	163840	001		PIPING ASSEMBLY, Chamber drain line (See Figure 8-23)	1			
	P	142684	001		PIPING ASSEMBLY, Chamber drain line (See Figure 8-23)		1		
	P	142833	001		PIPING ASSEMBLY, Chamber Drain Line (See Figure 8-23)			1	
	P	163839	001		PIPING ASSEMBLY, Chamber Drain Line (See Figure 8-23)				1
21	P	51759	091		UNION	4	4	6	6
22	P	3097	041		NUT, Hex (1/4-20)	3	3	4	4
23	P	135972	001		GUARD, Front Belt	1	1	1	1
24	P	92579	001		GUARD ASSEMBLY, Lower Belt	1		1	
	P	92575	001		GUARD ASSEMBLY, Lower Belt		1		1
25	P	135971	001		GUARD ASSEMBLY, Upper Belt	1		1	
	P	135969	001		GUARD ASSEMBLY, Upper Belt		1		1
26	P	3848	051		SCREW, Hex Head (1/4-20 x 3/4)	4	4	4	4
27	P	10445	091		WASHER, Flat (1/4)	10	10	10	10
28	P	81955	001		ELL, Street 45° (1 ODT x 1 IPS)	2	2	4	4
29	P	135445	002		PIPING ASSEMBLY, Steam Return Line (See Figure 8-20)	1			
	P	135485	002		PIPING ASSEMBLY, Steam Return Line (See Figure 8-20)		1		
	P	135450	002		PIPING ASSEMBLY, Steam Return Line (See Figure 8-21)			1	
	P	135449	002		PIPING ASSEMBLY, Steam Return Line (See Figure 8-21)				1
30	P	6991	091		TEE, Compression (3/8 ODT)	1	1	1	1
31	P	3446	091		PLUG, Pipe (1/2 NPT)	3	3	3	3
32	P	18991	091		PLUG, Pipe (1-1/2 NPT)	4	4	4	4
33	P	29419	091		NIPPLE (1-1/2 x 3-1/4)	2	2	2	2
34	P	5285	091		UNION (1-1/2 NPT)	1	1	1	1
35	P	82156	001		BUSHING, Reducing, 1-1/2 NPT x 3/8 NPT	1	1	1	1

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-13-36	P	81987 001		SPACER	6	6	6	6
37	P	81986 001		SUPPORT	6	6	6	6
38	P	19680 041		WASHER, Lock (3/8)	6	6	6	6
39	P	3099 042		NUT, Hex (3/8-16)	6	6	6	6
40	P	82126 001		VACUUM BREAKER	1	1	1	1
41	P	29418 091		NIPPLE (1-1/2 x 3)	2	2	1	1
42	P	7515 091		TEE (1-1/2 NPT)	2	2	1	1
43	P	78851 061		REDUCER, Bushing (1-1/2 NPT x 1/2 NPT)	1	1	1	1
44	P	118209 091		FITTING, Flare (1-1/2 NPT x 5/8 ODT)	2	2	2	2
45	P	118202 091		NUT, Flare (5/8 ODT)	2	2	2	2
46	P	82162 001		ELL, Union, 1-1/2 NPT	1	1	1	1
47	P	37852 091		NIPPLE, 1-1/2 NPT x 1-3/4	1	1	1	1
48	P	45690 091		BUTTON, Plug	3	3	3	3
49	P	8605 091		NUT, Handwheel	3	3	3	3
50	P	44330 091		HANDWHEEL	3	3	3	3
51	P	82162 001		ELL, Union, 1-1/2 NPT	1	1	1	1
52	P	52486 091		DECAL (Air Supply)	1	1	1	1
53	P	44881 091		DECAL (Steam to Chamber Bypass)	1	1	1	1
54	P	46038 061		PIN, Cotter				
55	P	45506 043		ROD, Valve Extension (31-3/4 Long)	1	1	1	1
56	P	45514 043		ROD, Valve Extension (47-3/4 Long)	1	1	1	1
57	P	135498 001		PIPING ASSEMBLY, Heat Exchanger (See Figure 8-7)	1	1	1	1
58	P	92245 001		PIPING ASSEMBLY, Jacket to Chamber Steam	1	1		
	P	92245 003		PIPING ASSEMBLY, Jacket to Chamber Steam			1	
	P	92245 002		PIPING ASSEMBLY, Jacket to Chamber Steam				1
59	P	39552 091		• ADAPTER, Male (1-1/2 NPT x 1-5/8 ODT)	2	2	2	2
60	P	81944 001		• ELBOW (1-5/8 ODT)	1	1	1	1
61	P	81902 001		• UNION (1-5/8 ODT)	1	1	1	1
62	P	82122 001		• ELL, Street (1-5/8 ODT)	1	1	1	1
63	P	82159 001		COUPLING	2	2	2	2
64	P	83194 001		VALVE, Safety	2	2	2	2
65	P	32667 091		NIPPLE (1-1/2 x 2)	1	1	2	2
66	P	82585 001		BRACKET, Support	2	2	2	2
67				TUBE, 1-1/8 OD x 2	1	1		
68	P	81956 001		ELL, 45°, 1-1/8 ODT	1	1		
69				TUBE, 3/8 OD x 66	1	1	1	1
70				TUBE, 5/8 OD x 48	1		1	1
				TUBE, 5/8 OD x 42		1		
71	P	82160 001		COUPLING, 1-1/2 NPT	1	1	1	1

NOTE: The 3/8" tubing used in the above assemblies is ASTM B-88 soft copper. The 5/8" tubing is ASTM B-75 DPH light annealed.

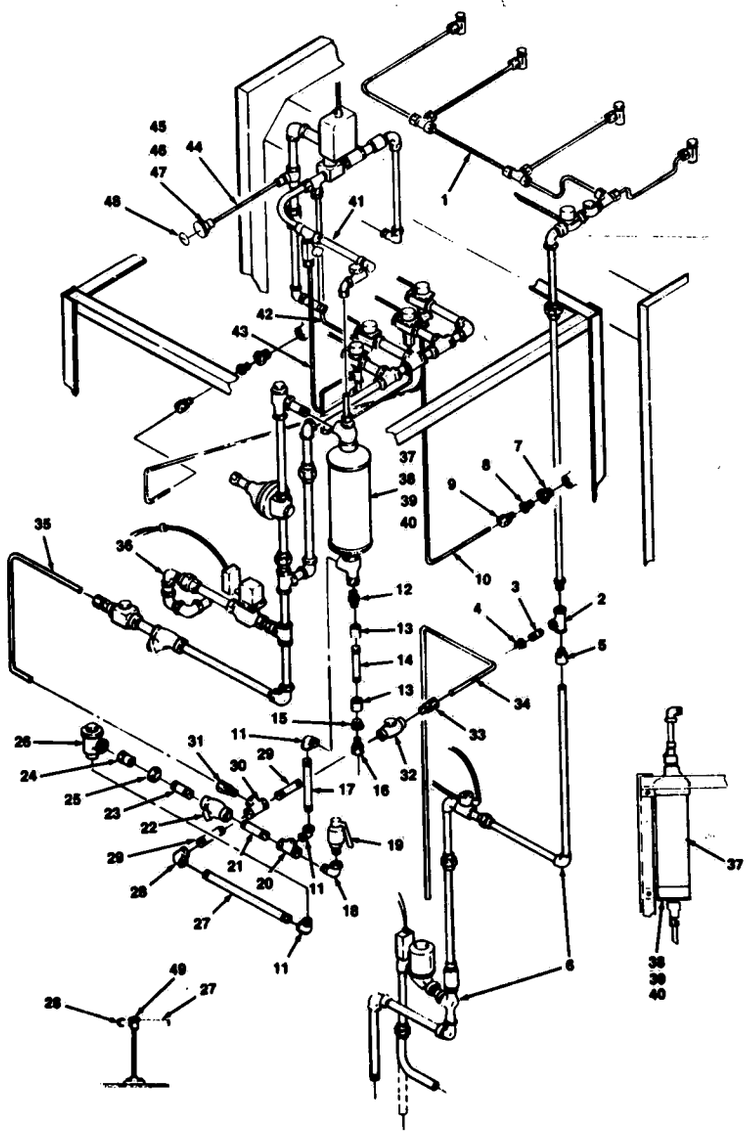


Figure 8-14. PIPING PACKAGE, Gas.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-14-	P	142838	001		PIPING PACKAGE, Gas, 52 R.H.	1			
	P	142822	001		PIPING PACKAGE, Gas, 52 L.H.		1		
	P	142838	002		PIPING PACKAGE, Gas, 78 R.H.			1	
	P	142822	002		PIPING PACKAGE, Gas, 78 L.H.				1
1	P	135447	001		PIPING, Jacket Cooling (See Figure 8-17)	1			
	P	135429	001		PIPING, Jacket Cooling (See Figure 8-17)		1		
	P	135906	001		PIPING, Jacket Cooling (See Figure 8-17)			1	
	P	135905	001		PIPING, Jacket Cooling (See Figure 8-17)				1
2	P	4939	091		TEE, 3/4 x 3/4 x 1 NPT	1	1	1	1
3	P	29355	091		NIPPLE, 1 NPT x 1-3/4	1	1	1	1
4	P	33738	091		BUSHING, Reducing, 1-1/2 x 1 NPT	1	1	1	1
5	P	91158	091		ADAPTER, Male, 7/8 ODT x 3/4 NPT	1	1	1	1
6	P	135446	001		WATER EJECTOR PIPING (See Figure 8-18)	1			
	P	135428	001		WATER EJECTOR PIPING (See Figure 8-18)		1		
	P	135446	002		WATER EJECTOR PIPING (See Figure 8-18)			1	
	P	135428	002		WATER EJECTOR PIPING (See Figure 8-18)				1
7	P	49123	091		BUSHING, Reducing, 1-1/2 x 1/2 NPT	1	1	1	1
8	P	76053	042		BUSHING, Reducing, 1/2 x 1/4 NPT	1	1	1	1
9	P	6785	091		FITTING, Compression, 3/8 ODT x 1/4 NPT	1	1	1	1
10	P	82212	001		TUBE, 3/8 OD	1	1		
	R	915	210		TUBE, 3/8 OD x 48			1	1
11	P	1631	091		ELL, Street, 3/8 NPT	3	3	3	3
12	P	32410	061		FITTING, Compression, 3/8 ODT x 1/4 NPT	1	1	1	1
13	P	82272	001		COUPLING, Pipe, 1/4 NPT	2	2	2	2
14	P	46656	061		NIPPLE, Special	1	1	1	1
15	P	72258	061		BUSHING, Reducing, 1/4 x 1/8 NPT	1	1	1	1
16	P	82273	001		FITTING, Compression, 3/16 ODT x 1/8 NPT	1	1	1	1
17	P	29099	091		NIPPLE, 3/8 NPT x 22-1/2	1	1	1	1
18	P	1634	091		ELL, Street, 1/2 NPT	1	1	1	1
19	P	22096	091		VALVE, Safety, 1/2 NPT	1	1	1	1
20	P	4915	091		TEE, 1/2 x 3/8 x 3/8 NPT	1	1	1	1
21	P	29017	091		NIPPLE, 3/8 NPT x 2	1	1	1	1
22	P	47671	091		STRAINER, 3/8 NPT	1	1	1	1
23	P	29021	091		NIPPLE, 3/8 NPT x 3	1	1	1	1
24	P	4201	091		SPUD, Female, 3/8 NPT	1	1	1	1
25	P	2901	091		NUT, Union	1	1	1	1
26	P	45038	091		TRAP, 3/8 NPT	1	1	1	1
	P	754357	005		KIT, Repair	1	1	1	1
27	P	29050	091		NIPPLE, 3/8 NPT x 10-1/4	1	1	1	1
28	P	1630	091		ELBOW, 3/8 NPT	1	1	1	1
29	P	29013	091		NIPPLE, 3/8 NPT x 1	2	2	2	2
30	P	4928	091		TEE, 3/8 NPT	1	1	1	1
31	P	13658	091		FITTING, Compression, 1/2 ODT x 3/8 NPT	1	1	1	1
32	P	5424	091		VALVE, Check, 3/8 NPT	1	1	1	1
33	P	39072	091		FITTING, Compression, 5/8 ODT x 3/8 NPT	1	1	1	1
34	P	82214	001		TUBE, 5/8 OD	1	1	1	1
35	P	82213	001		TUBE, 1/2 OD	1	1	1	1
36	P	142839	001		PIPING, Gas Conditioner (See Figure 8-15)	1		1	
	P	142809	001		PIPING, Gas Conditioner (See Figure 8-15)		1		1
37	P	42747	091		GAS CONDITIONER	1	1	1	1
38	P	82209	001		CLAMP	2	2	1	2

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-14-39	P	36929	091		STUD	2	2	1	2
40	P	2947	048		NUT, 5/16-18	6	1	6	6
41	P	135448	001		PIPING, Gas to Chamber (See Figure 8-16)	1		1	
	P	135430	001		PIPING, Gas to Chamber (See Figure 8-16)		1		1
42	P	82211	001		TUBE, 3/8 OD	1	1	1	1
43	P	82210	001		TUBE, 3/8 OD	1	1	1	1
44	P	45499	043		ROD, Valve Extension, 19-3/4	1	1	1	1
45	P	45690	091		BUTTON, Plug	1	1	1	1
46	P	8605	091		NUT, Handwheel	1	1	1	1
47	P	44330	091		HANDWHEEL	1	1	1	1
48	P	44333	091		DECAL, Exhaust	1	1	1	1
49	P	75376	010		CLAMP, Extension	1	1	1	1
50	P	28963	091		NIPPLE, 1/4 NPT x 12-1/4	1	1	1	1
51	P	9613	091		SUPPORT, Lower	2	2	2	2
52	P	4002	041		SCREW, Round Head, 1/4-20 x 1	2	2	2	2
53	P	19678	045		WASHER, Lock	2	2	2	2
54	P	31599	041		WASHER, Flat				

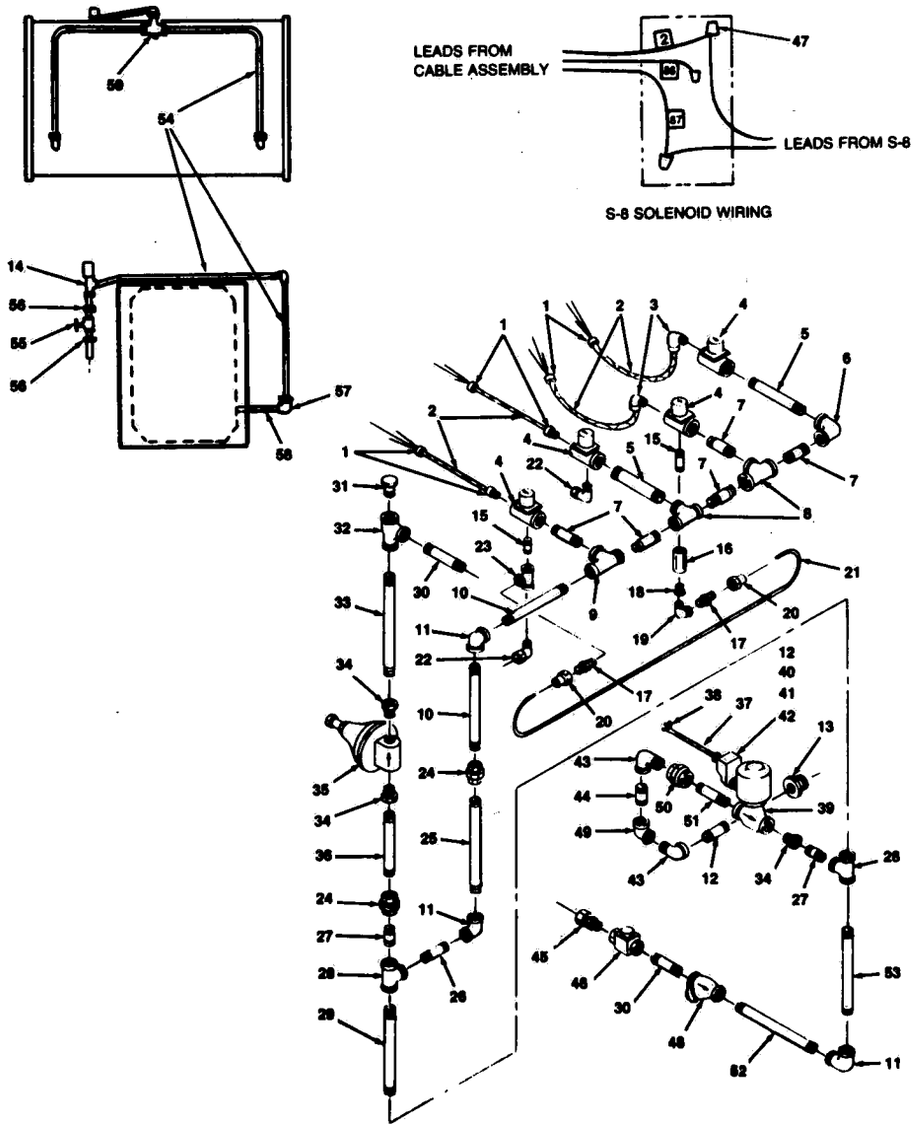


Figure 8-15. PIPING PACKAGE, Gas Conditioner.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-15-	P	142839	001		PIPING ASSEMBLY, Gas Conditioner, R.H.	1			
	P	142809	001		PIPING ASSEMBLY, Gas Conditioner, L.H.		1		
1	P	90331	091		FITTING, Conduit, Straight, 3/8	6	6		
2	P	91815	091		CONDUIT, Flexible, 3/8 x 11	4	4		
3	P	90625	091		ELBOW, Conduit, 3/8	2	2		
4	P	42347	091		VALVE, Solenoid, 1/4 NPT	4	4		
	P	752779	001		• KIT, Repair	A/R	A/R		
	P	752232	001		• COIL, 115 V, 60 Hz	A/R	A/R		
5	P	28927	091		NIPPLE, 1/4 NPT x 3-1/2	2	2		
6	P	1618	091		ELBOW, 1/4 NPT	1	1		
7	P	28919	091		NIPPLE, 1/4 NPT x 1-1/2	5	5		
8	P	4906	091		TEE, 1/4 NPT	2	2		
9	P	4907	091		TEE, 3/8 x 1/4 x 1/4 NPT	1	1		
10	P	29029	091		NIPPLE, 3/8 NPT x 5	2	2		
11	P	1630	091		ELBOW, 3/8 NPT	3	3		
12	P	29164	091		NIPPLE, 1/2 NPT x 1-1/2	4	4		
13	P	49123	091		BUSHING, Reducing, 1-1/2 x 1/2 NPT	1	1		
14	P	6992	091		TEE, Male Run, 3/8 ODT x 1/4 NPT	1	1		
15	P	28917	091		NIPPLE, 1/4 NPT x 1	2	2		
16	P	41305	091		VALVE, Check	2	2		
17	P	47940	091		HALF UNION	2	2		
18	P	939	042		BUSHING, Reducing, 1/4 x 1/8 NPT	1	1		
19	P	1619	091		ELL, Street, 1/4 NPT	1	1		
20	P	47959	091		FITTING, Capillary	2	2		
21	P	51393	091		TUBE, Capillary	1	1		
22	P	32409	063		ELL, Compression, 3/8 ODT x 1/4 NPT	2	2		
23	P	4913	091		TEE, 1/4 x 1/4 x 1/8 NPT	1	1		
24	P	5266	051		UNION, 3/8 NPT	2	2		
25	P	29089	091		NIPPLE, 3/8 NPT x 20	2	2		
26	P	29016	091		NIPPLE, 3/8 NPT x 1-3/4	1	1		
27	P	29013	091		NIPPLE, 3/8 NPT x 1	1	1		
28	P	4928	042		TEE, 3/8 NPT	2	2		
29	P	29025	091		NIPPLE, 3/8 NPT x 4	2	2		
30	P	29018	091		NIPPLE, 3/8 NPT x 2-1/4	1	1		
31	P	3442	091		PLUG, 1/2 NPT	1	1		
32	P	4915	091		TEE, 1/2 x 3/8 x 3/8	1	1		
33	P	29058	091		NIPPLE, 3/8 NPT x 12-1/4	3	3		
34	P	837	091		BUSHING, Reducing, 1/2 x 3/8 NPT	1	1		
35	P	82451	001		REGULATOR, Pressure	A/R	A/R		
	P	764135	001		• KIT, Repair				
36	P	29043	091		NIPPLE, 3/8 NPT x 8-1/2	1	1		
37	P	91627	091		CONDUIT, Flexible, 3/8 x 22	1	1		
38	P	90619	091		TERMINAL, Ring	3	3		
39	P	48793	091		VALVE, Solenoid, 1/2 NPT (S-8)	1	1		
40	P	8681	091		NUT, Lock	3	3		
41	P	23345	091		BOX	1	1		
42	P	23346	091		COVER, Box	1	1		
43	P	1634	091		ELL, Street, 1/2 NPT	2	2		
44	P	29162	091		NIPPLE, 1/2 NPT x 1	1	1		
45	P	13658	091		FITTING, Compression, 3/8 ODT x 3/8 NPT	1	1		
46	P	41067	091		TRAP, 3/8 NPT	1	1		
47	P	18536	091		WIRE NUT	3	3		

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-15-48	P 47671 091		STRAINER, 3/8 NPT	1	1
49	P 1633 091		ELBOW, 1/2 NPT	1	1
50	P 89990 091		UNION, 1/2 NPT	1	1
51	P 29169 091		NIPPLE, 1/2 NPT x 2-3/4	1	1
52	P 29046 091		NIPPLE, 3/8 NPT x 9-1/4	1	1
53	P 29024 091		NIPPLE, 3/8 NPT x 3-3/4	1	1
54	R 915 210		TUBING, 3/8 ODT x .032 Wall x 16-1/2'	1	1
55	P 89076 091		VALVE, Needle, 1/4 NPT	2	2
56	P 6785 091		FITTING, Compression, 3/8 ODT x 1/4 NPT	2	2
57	P 78167 042		ELL, Compression, 3/8 ODT x 3/8 NPT	2	2
58	P 32806 091		NIPPLE, 3/8 NPT x 2-1/2	1	1
59	P 6991 091		TEE, Compression, 3/8 ODT		

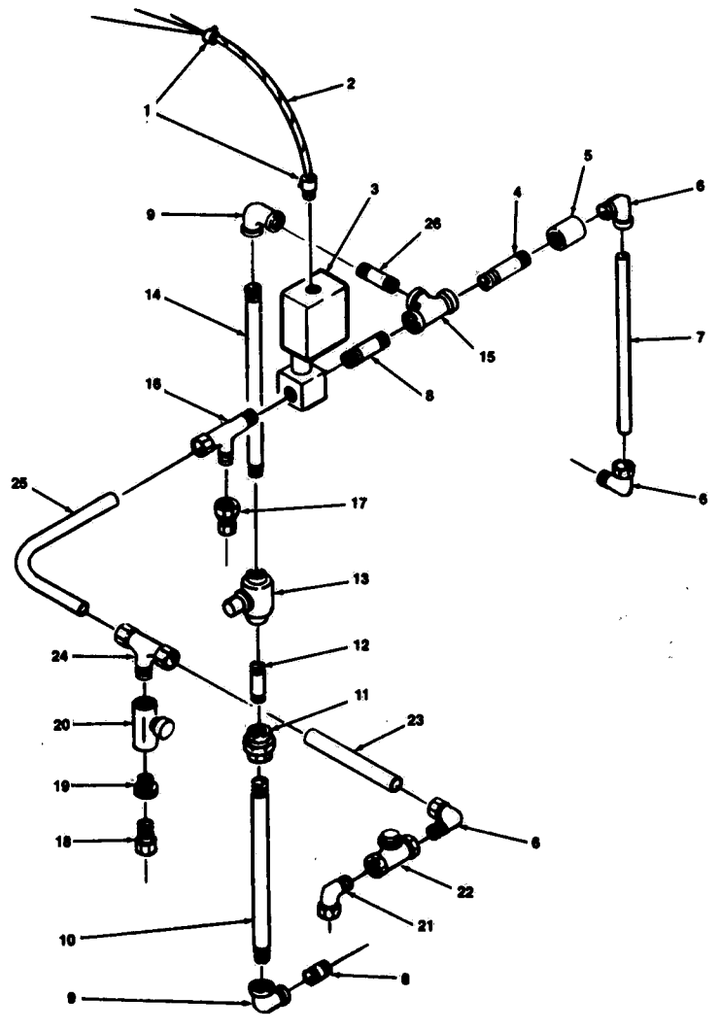


Figure 8-16. PIPING PACKAGE, Gas to Chamber.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-16-	P 135448	001	PIPING ASSEMBLY: Gas to Chamber, R.H.	1	
	P 135430	001	PIPING ASSEMBLY: Gas to Chamber, L.H.		1
1	P 90331	091	FITTING, Conduit, Straight, 3/8	2	2
2	P 91657	091	CONDUIT, Flexible, 3/8 x 14	1	1
3	P 82171	001	VALVE, Motor Operated Ball, 1/2 NPT	1	1
4	P 82277	001	NIPPLE, 1/2 NPT x 2-1/4	1	1
5	P 74666	061	COUPLING, 1/2 NPT	1	1
6	P 82168	001	ELL, Compression, 5/8 ODT x 1/2 NPT	3	3
7	R 2615	330	TUBE, 5/8 OD x 14-1/2	1	1
8	P 40519	061	NIPPLE, 1/2 NPT x 1-1/4	2	2
9	P 40524	063	ELBOW, 1/2 NPT	2	2
10	P 82204	001	NIPPLE, 1/2 NPT x 9-1/2	1	1
11	P 40526	063	UNION, 1/2 NPT	1	1
12	P 82203	001	NIPPLE, 1/2 NPT x 2-3/4	1	1
13	P 92254	001	VALVE	1	1
14	P 74114	061	NIPPLE, 1/2 NPT x 4-3/4	1	1
15	P 40525	061	TEE, 1/2 NPT	1	1
16	P 82167	001	TEE, 5/8 ODT x 1/2 NPT x 5/8 ODT	1	1
17	P 82170	001	REDUCER, 5/8 x 3/8 ODT	1	1
18	P 32410	061	FITTING, Compression, Straight, 3/8 ODT x 1/4 NPT	1	1
19	P 74661	061	BUSHING, Reducing, 1/2 x 1/4 NPT	1	1
20	P 49690	061	VALVE, Needle, 1/2 NPT	1	1
21	P 79333	061	ELL, Compression, 3/8 ODT x 1/2 NPT	1	1
22	P 76947	061	VALVE, Check, 1/2 NPT	1	1
23	R 2615	330	TUBE, 5/8 OD x 4-3/8	1	1
24	P 82169	001	TEE, 5/8 x 5/8 ODT x 1/2 NPT	1	1
25	P 82205	001	TUBE, 5/8 OD	1	1
26	P 74115	061	NIPPLE, 1/2 NPT x 1-1/2	1	1

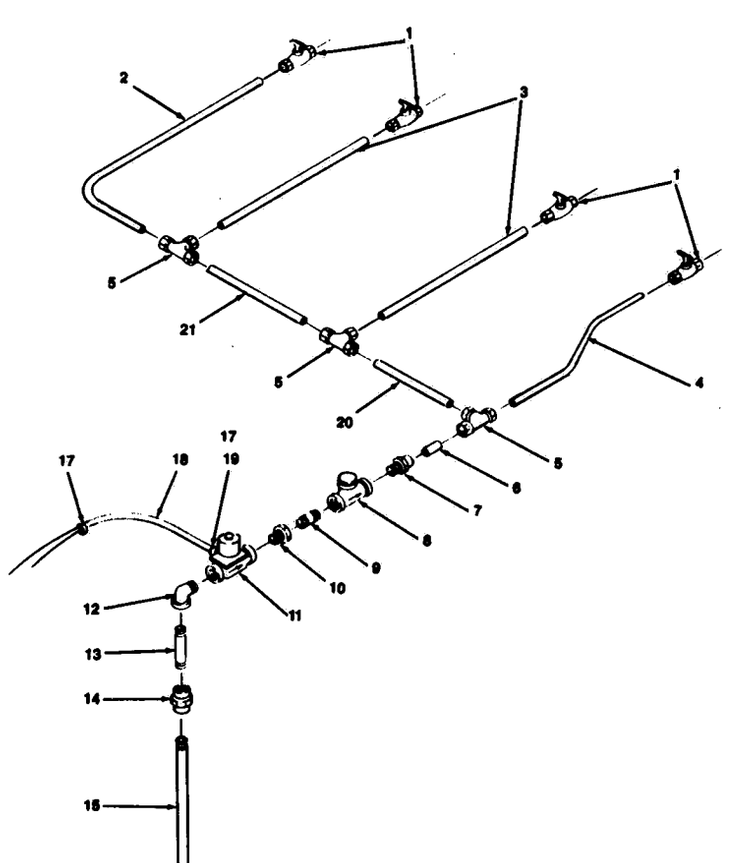


Figure 8-17. PIPING PACKAGE, Jacket Cooling.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-17-					PIPING ASSEMBLY: Jacket Cooling, 52	1				
					PIPING ASSEMBLY: Jacket Cooling, 78		1			
1	P	24705	091		VALVE, Petcock, 3/8 ODT x 1/4 NPT	4	4			
2	P	82202	001		TUBE, 3/8 OD	1				
	P	82279	001		TUBE, 3/8 OD		1			
3					TUBE, 3/8 OD x 14-5/16	2	2			
4	P	82201	001		TUBE, 3/8 OD	1				
	P	82278	001		TUBE, 3/8 OD		1			
5	P	6991	091		TEE, Compression, 3/8 ODT	3	3			
6	R	915	210		TUBE, 3/8 OD x 1-3/4	1	1			
7	P	91175	091		ADAPTER, 3/8 ODT x 3/8 NPT	1	1			
8	P	5424	091		VALVE, Check, 3/8 NPT	1	1			
9	P	29013	091		NIPPLE, 3/8 NPT x 1	1	1			
10	P	837	091		BUSHING, Reducing, 1/2 x 3/8 NPT	1	1			
11	P	42286	091		VALVE, Solenoid, 1/2 NPT	1	1			
	P	762485	001		• KIT, Repair	A/R	A/R			
	P	752018	091		• COIL	A/R	A/R			
12	P	1634	091		ELL, Street, 1/2 NPT	1	1			
13	P	29166	091		NIPPLE, 1/2 NPT x 2	1	1			
14	P	89990	091		UNION, 1/2 NPT	1	1			
15	P	29226	091		NIPPLE, 1/2 NPT x 17	1	1			
16	P	940	091		BUSHING, Reducing, 3/4 x 1/2 NPT	1	1			
17	P	90331	091		FITTING, Conduit, Straight, 3/8	2	2			
18	P	91857	091		CONDUIT, Flexible, 3/8 x 20	1	1			
19	P	18538	091		NUT, Wire (Not Shown)	2	2			
20	P	82271	001		TUBE, 3/8 OD	1				
	P	82280	001		TUBE, 3/8 OD		1			
21	R	915	210		TUBE, 3/8 OD x 13-5/16	1				
					TUBE, 3/8 OD x 6-7/8		1			

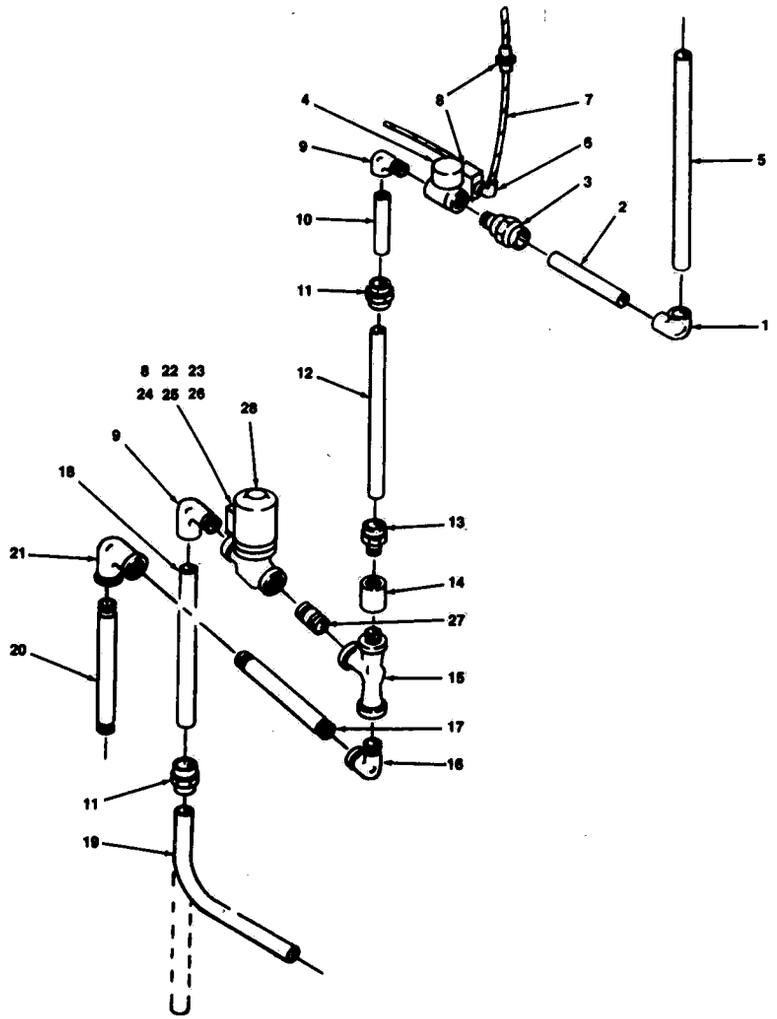


Figure 8-18. PIPING ASSEMBLY, Water Ejector.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-18-	P	135446	001		PIPING ASSEMBLY, Water Ejector, 52 R.H.	1			
	P	135428	001		PIPING ASSEMBLY, Water Ejector, 52 L.H.		1		
	P	135446	002		PIPING ASSEMBLY, Water Ejector, 78 R.H.			1	
	P	135428	002		PIPING ASSEMBLY, Water Ejector, 78 L.H.				1
1	P	28103	091		ELL, 7/8 ODT	1	1	1	1
2	R	915	473		TUBE, 7/8 OD x 9-1/2	1	1	1	1
3	P	44846	091		UNION	1	1	1	1
4	P	37627	091		VALVE, Solenoid, 3/4 NPT	1	1	1	1
	P	751449	091		• KIT, Repair	A/R	A/R	A/R	A/R
5	R	915	473		TUBE, 7/8 OD x 15-1/8	1	1	1	1
6	P	90625	091		CONNECTOR, Ell, Conduit, 3/8	1	1	1	1
7	P	91814	091		CONDUIT, Flexible, 3/8 x 16	1	1	1	1
8	P	90331	091		CONNECTOR, Straight, Conduit, 3/8	3	3	3	3
9	P	44500	091		ELBOW, 7/8 ODT x 3/4 NPT	2	2	2	2
10	R	915	473		TUBE, 7/8 OD x 2	1	1	1	1
11	P	91226	091		UNION, 7/8 ODT	2	2	2	2
12	R	915	473		TUBE, 7/8 OD x 6-3/8	1	1	1	1
13	P	91158	091		ADAPTER, 7/8 ODT x 3/4 NPT	1	1	1	1
14	P	1314	091		COUPLING, 3/4 NPT	1	1	1	1
15	P	51616	091		EJECTOR	1	1	1	1
16	P	1636	091		ELL, Street, 3/4 NPT	1	1	1	1
17	P	29324	091		NIPPLE, 3/4 NPT x 9-1/2	1	1	1	1
18	R	915	473		TUBE, 7/8 OD x 7-1/8	1	1	1	1
19	P	82284	001		TUBE	1	1		
	R	915	473		TUBE, 7/8 OD x 5-5/8			1	1
20	P	29302	091		NIPPLE, 3/4 NPT x 4	1	1	1	1
21	P	1635	091		ELBOW, 3/4 NPT	1	1	1	1
22	P	23345	091		BOX, Junction	1	1	1	1
23	P	23346	091		COVER, Box	1	1	1	1
24	P	29164	091		NIPPLE, Conduit	1	1	1	1
25	P	8681	091		NUT, Conduit Lock	2	2	2	2
26	P	18538	091		NUT, Wire	4	4	4	4
27	P	29290	091		NIPPLE, 3/4 NPT x 1	1	1	1	1
28	P	41520	091		VALVE, Solenoid, 3/4 NPT	1	1	1	1
	P	752326	091		• PISTON ASSEMBLY	A/R	A/R	A/R	A/R
	P	750056	091		• GASKET	A/R	A/R	A/R	A/R
	P	74352	091		• COIL	A/R	A/R	A/R	A/R

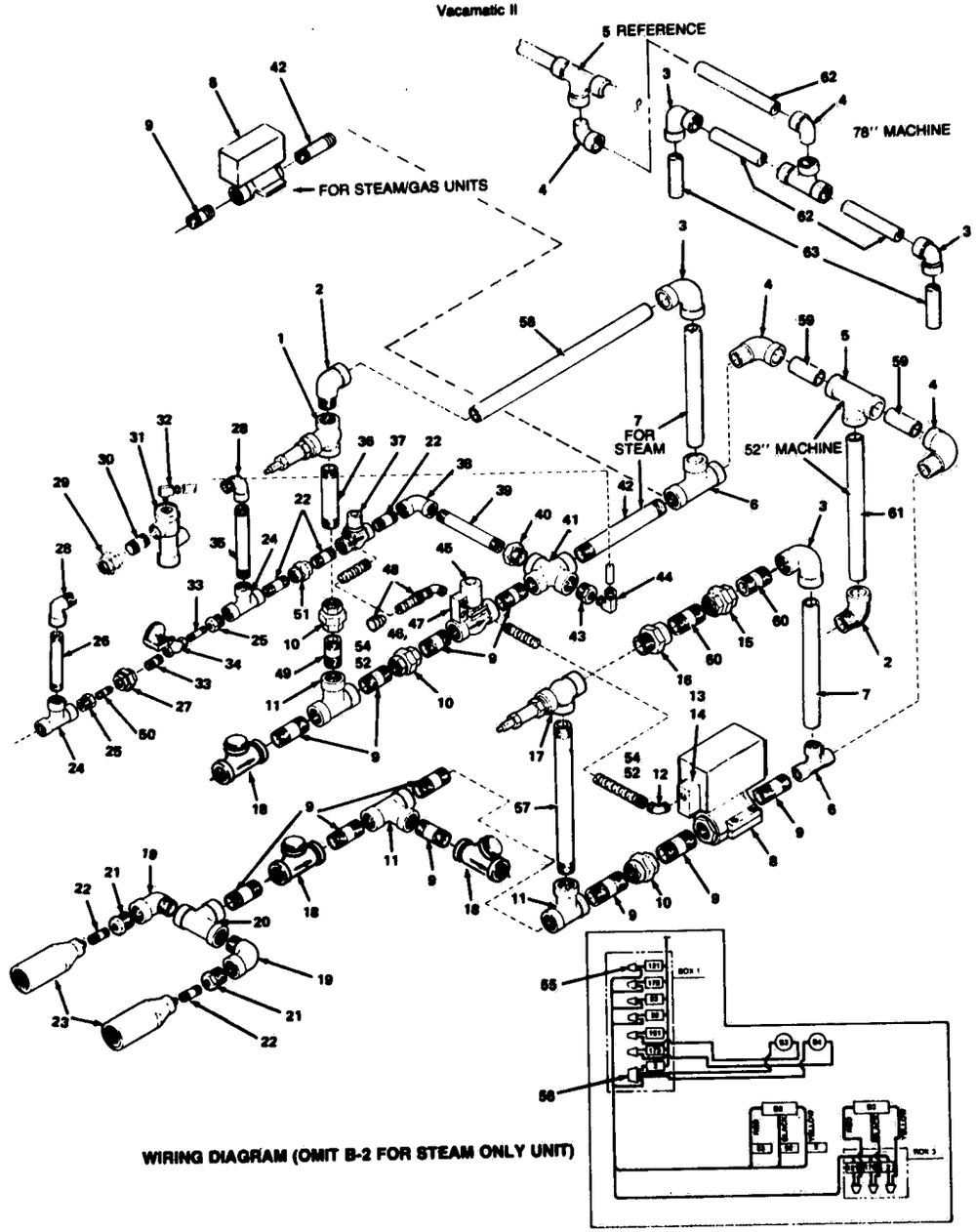


Figure 8-19. PIPING ASSEMBLY, Steam to Chamber.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-19-	P 142695 001		PIPING ASSEMBLY, Steam to Chamber (52") Steam/Gas	1			
	P 142695 002		PIPING ASSEMBLY, Steam to Chamber (78") Steam/Gas		1		
	P 142695 003		PIPING ASSEMBLY, Steam to Chamber (52") Steam			1	
	P 142695 004		PIPING ASSEMBLY, Steam to Chamber (78") Steam				1
1	P 82475 001		VALVE, Gate	1	1	1	1
2	P 81945 001		ELBOW, Street (1-5/8 ODT x 1-1/2 FIP)	2	3	2	3
3	P 81944 001		ELBOW (1-5/8 ODT)	2	4	2	4
4	P 81946 001		ELBOW, Street (1-5/8 ODT)	2	3	2	3
5	P 81943 001		TEE (1-5/8 ODT)	1	2	1	2
6	P 81948 001		TEE (1-5/8 ODT x 1-1/2 FIP x 1-5/8 ODT)	2	2	2	2
7			TUBE (1-5/8 OD x 12-9/16)	2	2	2	2
8	P 77073 091		VALVE, Motorized Ball (1-1/2 NPT) — 60 Hz	2	2	1	1
	P 610723 001		VALVE, Motorized Ball (1-1/2 NPT) — 50 Hz	2	2	1	1
	P 757055 091		• KIT, Seal	A/R	A/R	A/R	A/R
	P 757058 061		• KIT, Ball	A/R	A/R	A/R	A/R
	P 757062 061		• KIT, Stem	A/R	A/R	A/R	A/R
9	P 32667 091		NIPPLE (1-1/2 x 2)	12	12	11	11
10	P 30003 091		UNION (1-1/2 NPT)	3	3	3	3
11	P 78760 091		TEE (1-1/2 NPT)	3	3	3	3
12	P 90625 091		FITTING, Conduit (90°)	2	2	2	2
13	P 23345 091		BOX, Conduit	1	1	1	1
14	P 23346 091		COVER, Box	1	1	1	1
15	P 81902 001		UNION (1-5/8 ODT)	1	1	1	1
16	P 39552 091		ADAPTER (1-5/8 ODT x 1-1/2 MIP)	1	1	1	1
17	P 82161 001		VALVE, Angle, 1-1/2 NPT	1	1	1	1
18	P 42111 091		VALVE, Check (1-1/2 NPT)	3	3	3	3
19	P 1639 091		ELL, Street (1 NPT)	2	2	2	2
20	P 42281 091		TEE (1 x 1 x 1-1/2 NPT)	1	1	1	1
21	P 6263 091		BUSHING, Reducer (1 x 1/2 NPT)	2	2	2	2
22	P 29163 091		NIPPLE (1/2 x 1-1/4)	4	4	4	4
23	P 23944 091		FILTER, Air (See Figure 8-11)	2	2	2	2
24	P 4929 091		TEE (1/2 x 1/2 x 3/8 NPT)	2	2	2	2
25	P 76053 042		REDUCER (1/2 x 1/4)	2	2	2	2
26	P 29037 091		NIPPLE (3/8 x 7)	1	1	1	1
27	P 5263 091		UNION (1/4)	1	1	1	1
28	P 1631 091		ELL, Street (3/8 NPT)	2	2	2	2
29	P 5266 091		UNION (3/8 NPT)	1	1	1	1
30	P 29015 091		NIPPLE (3/8 x 1-1/2)	1	1	1	1
31	P 30542 091		VALVE, Solution Exhaust Accelerator (See Figure 8-27)	1	1	1	1
32	P 7030 091		ELBOW, Compression (1/8 NPT x 3/8 ODT)	1	1	1	1
33	P 28917 091		NIPPLE (1/4 x 1)	2	2	2	2
34	P 89076 091		VALVE, Needle (1/4 NPT)	1	1	1	1
35	P 29030 091		NIPPLE (3/8 x 5-1/4)	1	1	1	1
36	P 75012 091		NIPPLE (1-1/2 x 4)	1	1	1	1
37	P 48793 091		VALVE, Solenoid (1/2 NPT)	1	1	1	1
	P 750057 091		• PISTON ASSEMBLY	A/R	A/R	A/R	A/R
	P 750056 091		• GASKET	A/R	A/R	A/R	A/R
	P 74352 091		• COIL	A/R	A/R	A/R	A/R
38	P 1633 091		ELBOW (1/2 NPT)	1	1	1	1
39	P 29172 091		NIPPLE (1/2 x 3-1/2)	1	1	1	1
40	P 636 042		BUSHING, Reducer (3/4 x 1/2)	1	1	1	1
41	P 1362 091		CROSS (1-1/2 x 1-1/2 x 3/4 x 2/4)	1	1	1	1

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-19-42	P 150132 001		NIPPLE (1-1/2 x 3-3/8)	1	1		
	P 150133 001		NIPPLE (1-1/2 x 8-3/4)			1	1
43	P 6209 091		BUSHING, Reducer (3/4 x 3/8)	1	1	1	1
44	P 30940 091		ELL, Compression (3/8 MIP x 3/8 ODT)	1	1	1	1
45	P 81930 001		VALVE, Solenoid (1-1/2 NPT) — 60 Hz	1	1	1	1
	P 758673 091		• KIT, Repair	A/R	A/R	A/R	A/R
	P 752344 091		• COIL	A/R	A/R	A/R	A/R
	P 610720 001		VALVE, Solenoid (1-1/2 NPT) — 50 Hz	1	1		
46	P 23780 091		BOX, Conduit	1	1	1	1
47	P 23910 091		COVER, Box	1	1	1	1
48	P 134468 002		CABLE ASSEMBLY (P-16)	1	1		
	P 134468 003		CABLE ASSEMBLY (P-16)			1	1
	P 93838 005		PLUG, Housing	1	1	1	1
	P 129261 003		SOCKET, Contact	5	5	5	5
49	P 51246 091		NIPPLE (1-1/2 x 3-3/4)	1	1	1	1
50	P 28921 091		NIPPLE (1/4 x 2)	1	1	1	1
51	P 89990 091		UNION (1/2 NPT)	1	1	1	1
52	P 8681 091		NUT, Conduit Lock (Not Shown)	6	6	6	6
53	P 90331 091		FITTING, Conduit Straight (Not Shown)	4	4	2	2
54	P 29164 042		NIPPLE, Conduit (Not Shown)	2	2	2	2
55	P 18538 091		NUT, Wire — Small (Not Shown)	9	9	9	9
56	P 17691 091		NUT, Wire — Large (Not Shown)	1	1	1	1
57	P 81957 001		NIPPLE, 1-1/2 x 12-1/4	1	1	1	1
58			TUBE, 3/8 OD x 30	1	1	1	1
59			TUBE, 1-5/8 OD x 3-3/16	2	2	2	2
60			TUBE, 1-5/8 OD x 4-3/8	2	2	2	2
61			TUBE, 1-5/8 OD x 11-3/4	1		1	
62			TUBE, 1-5/8 OD x 9-3/8			3	3
63			TUBE, 1-5/8 OD x 5-1/4			2	2

NOTE: All copper tubing used in the above assemblies is ASTM B-88 type "L" hard drawn.

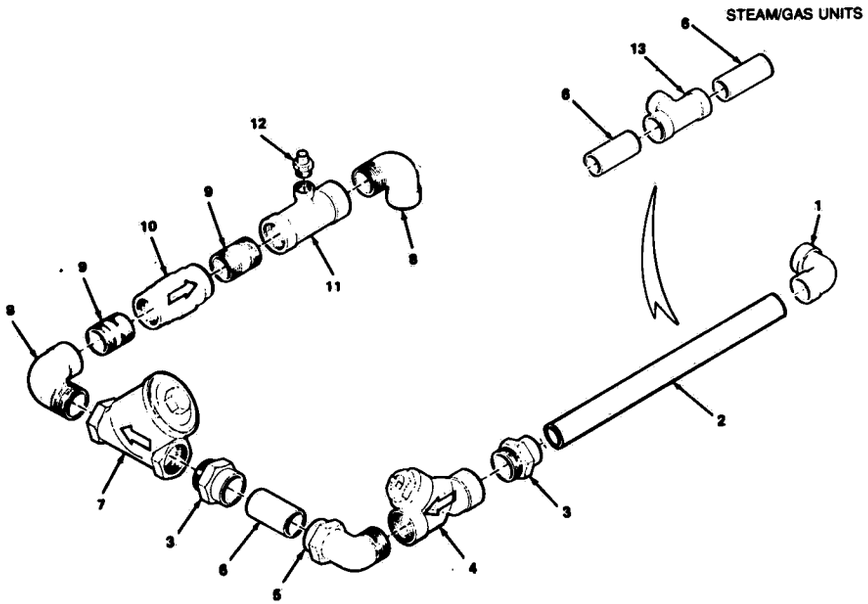


Figure 8-20. PIPING ASSEMBLY, Steam Return Line, 52 Inch.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-20-	P	135445 001		PIPING ASSEMBLY, Steam Return Line (52" Long, R.H.) Steam	1			
	P	135485 001		PIPING ASSEMBLY, Steam Return Line (52" Long, L.H.) Steam		1		
	P	135445 002		PIPING ASSEMBLY, Steam Return Line (52" Long, R.H.) Steam/Gas			1	
	P	135485 002		PIPING ASSEMBLY, Steam Return Line (52" Long, L.H.) Steam/Gas				1
1	P	81956 001		ELBOW, 45° (1-1/8 ODT)	1	1	1	1
2				TUBE, 1-1/8 OD x 5-1/2	1	1		
3	P	51761 091		ADAPTER, Male (1-1/8 ODT x 1 NPT)	2	2	2	2
4	P	82411 001		STRAINER, Steam (1)	1	1	1	1
5	P	82288 001		UNION ELL, 90° (1-1/8 ODT x 1 NPT)	1	1	1	1
6				TUBE, 1-1/8 OD x 2	1	1	3	3
7	P	80976 001		TRAP, Steam (1)	1	1	1	1
	P	758748 091		♦ KIT, Repair	A/R	A/R	A/R	A/R
8	P	1639 091		ELBOW, Street (1)	2	2	2	2
9	P	29380 091		NIPPLE (1 x 1-1/4)	2	2	2	2
10	P	51770 091		VALVE, Check (1)	1	1	1	1
11	P	4935 091		TEE (1 x 1 x 1/2)	1	1	1	1
12	P	89947 091		COUPLING (1/2 NPT x 3/8 ODT)	1	1	1	1
13	P	82125 001		TEE, 1-1/8 x 1-1/8 x 7/8 ODT			1	1

NOTE: All copper tubing used in the above assemblies is ASTM B-88 type "L" hard drawn.

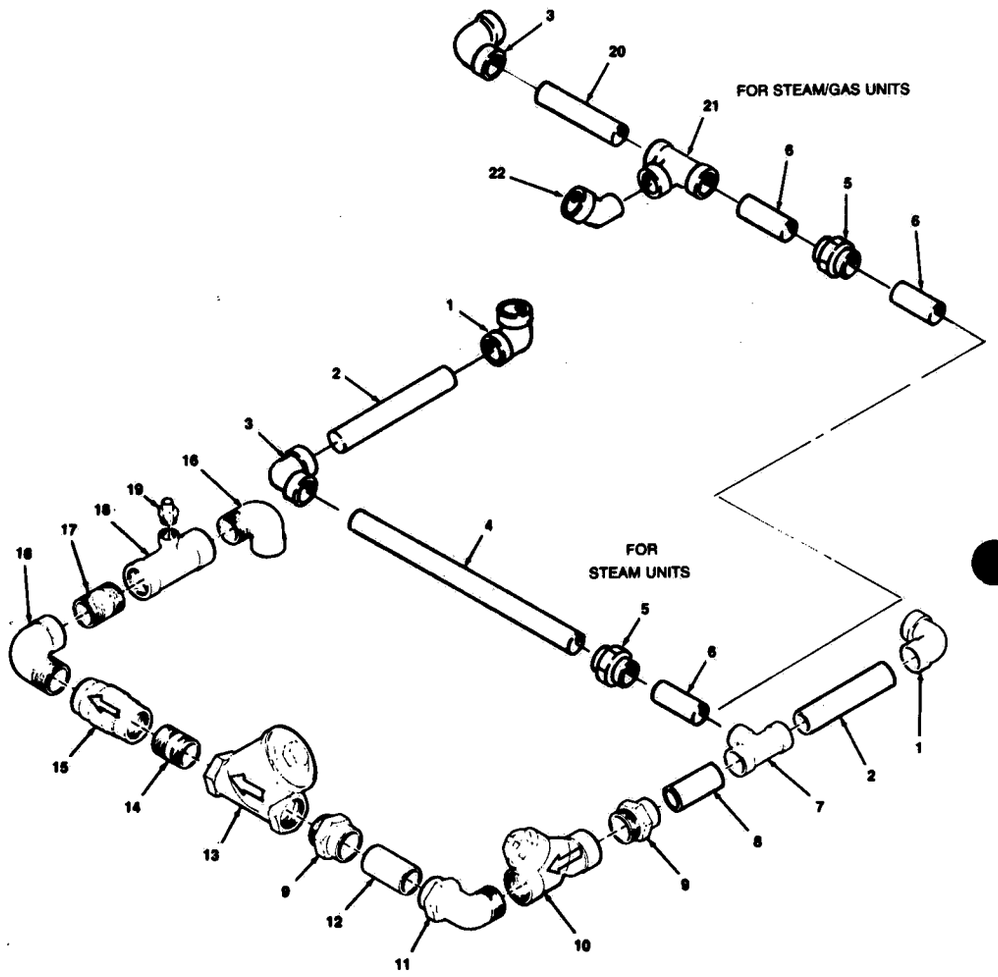


Figure 8-21. PIPING ASSEMBLY, Steam Return Line, 78 Inch.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-21-	P	135450	001		PIPING ASSEMBLY, Steam Return Line, 78" Long, R.H., Steam	1			
	P	135449	001		PIPING ASSEMBLY, Steam Return Line, 78" Long, L.H., Steam		1		
	P	135450	002		PIPING ASSEMBLY, Steam Return Line, 78" Long, R.H. Steam/Gas			1	
	P	135449	002		PIPING ASSEMBLY, Steam Return Line, 78" Long, L.H., Steam/Gas				1
1	P	81956	001		ELL, 45°, 1-1/8 ODT	2	2	2	2
2					TUBE, 1-1/8 OD x 4-1/4	2	2	2	2
3	P	44492	091		ELBOW, 1-1/8 ODT	1	1	1	1
4					TUBE, 1-1/8 OD x 26	1	1		
5	P	44491	091		UNION, 1-1/8 ODT	1	1	1	1
6					TUBE, 1-1/8 OD x 10-3/4	1	1	2	2
7	P	89713	091		TEE, 1-1/8 ODT	1	1	1	1
8					TUBE, 1-1/8 OD x 4	1	1	1	1
9	P	51761	091		ADAPTER, 1-1/8 ODT x 1 NPT	2	2	2	2
10	P	82411	001		STRAINER, Steam, 1 NPT	1	1	1	1
11	P	82288	001		UNION ELL, 1-1/8 ODT x 1 NPT	1	1	1	1
12					TUBE, 1-1/8 OD x 2	1	1	1	1
13	P	80976	001		TRAP, Steam, 1 NPT	1	1	1	1
	P	758748	091		• KIT, Repair	1	1	1	1
14	P	29360	091		NIPPLE, 1 NPT x 3	1	1	1	1
15	P	51770	091		VALVE, Check, 1 NPT	1	1	1	1
16	P	1639	091		ELL, Street, 1 NPT	2	2	2	2
17	P	29354	091		NIPPLE, 1 NPT x 1-1/2	1	1	1	1
18	P	4935	091		TEE, 1 x 1 x 1/2 NPT	1	1	1	1
19	P	89947	091		COUPLING, 3/8 ODT x 1/2 NPT	1	1	1	1
20					TUBE, 1-1/8 OD x 14			1	1
21	P	82125	001		TEE, 1-1/8 x 1-1/8 x 7/8 ODT			1	1
22	P	44507	091		ELL, Street, 7/8 ODT			1	1

NOTE: All copper tubing used in the above assemblies is ASTM B-88 type "L" hard drawn.

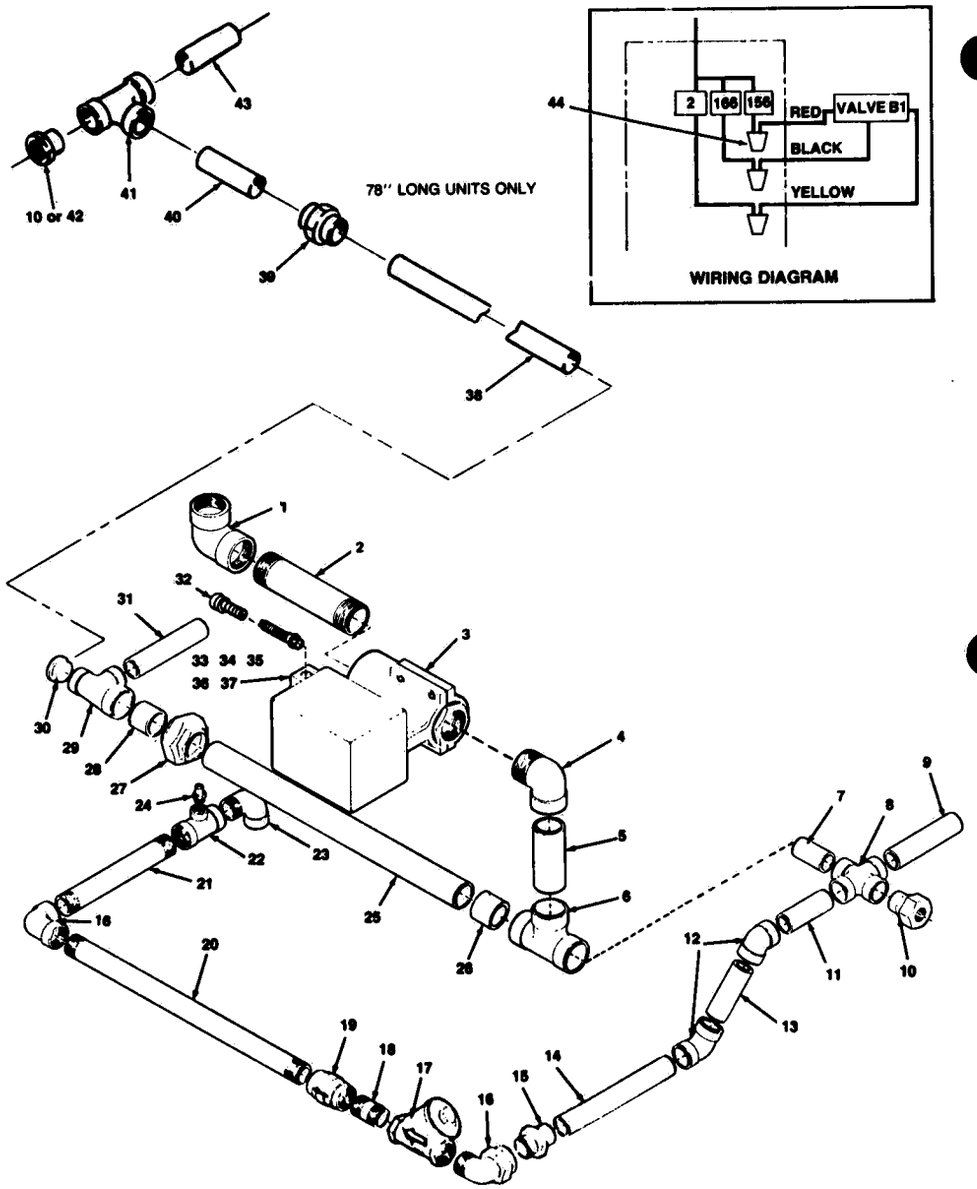
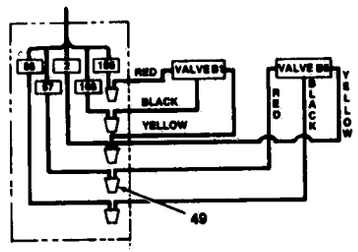


Figure 8-22. PIPING ASSEMBLY , Chamber Drain Line, Steam.

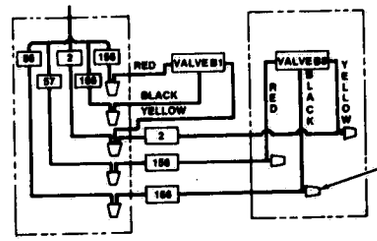
FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-22-	P	163840	002		PIPING ASSEMBLY: Chamber Drain, 52", R.H., Steam	1			
	P	142684	002		PIPING ASSEMBLY: Chamber Drain, 52", L.H., Steam		1		
	P	142833	002		PIPING ASSEMBLY: Chamber Drain, 78", R.H., Steam			1	
	P	163839	002		PIPING ASSEMBLY: Chamber Drain, 78", L.H., Steam				1
1	P	7476	091		ELBOW, 2 NPT	1	1	1	1
2	P	81904	001		NIPPLE, 2 NPT x 5	1	1		
	P	150179	001		NIPPLE, 2 NPT x 23-1/2			1	1
3	P	82427	001		VALVE, Motorized Ball, 2 NPT (60 Hz)	1	1	1	1
	P	610722	001		VALVE, Motorized Ball, 2 NPT (50 Hz)	1	1	1	1
	P	752810	091		• KIT, Seal Repair	A/R	A/R	A/R	A/R
	P	757059	061		• KIT, Ball Repair	A/R	A/R	A/R	A/R
	P	757062	061		• KIT, Stem Repair	A/R	A/R	A/R	A/R
4	P	82207	001		ELBOW, 2-1/8 ODT x 2 NPT	1	1	1	1
5					TUBE, 2-1/8 OD x 3	1	1	1	1
6	P	81901	001		TEE, 2-1/8 x 1-1/8 x 2-1/8 ODT	1	1	1	1
7					TUBE, 1-1/8 OD x 2	1	1		
					TUBE, 1-1/8 OD x 3			1	1
8	P	51760	091		CROSS, 1-1/8 ODT	1	1	1	1
9					TUBE, 1-1/8 OD x 3-7/8	1	1		
					TUBE, 1-1/8 OD x 4			1	1
10	P	89277	091		ADAPTER, 1-1/8 ODT x 3/4 NPT	1	1	2	2
11					TUBE, 1-1/8 OD x 2-1/2	1	1		
					TUBE, 1-1/8 OD x 2			1	1
12	P	81956	001		ELL, 45", 1-1/8 ODT	2	2	2	2
13					TUBE, 1-1/8 OD x 8-3/8	1	1		
					TUBE, 1-1/8 OD x 2-1/2			1	1
14	P	41646	091		NIPPLE, 1 x 9	1	1		
					TUBE, 1-1/8 OD x 8-5/8			1	1
15	P	51761	091		ADAPTER, 1-1/8 ODT x 1 NPT			1	1
16	P	82288	001		ELL, Union, 1-1/8 ODT x 1 NPT	1	1		
	P	1638	091		ELBOW, 1 NPT	1	1	2	2
17	P	80976	001		TRAP, Steam, 1 NPT	1	1	1	1
	P	758748	091		• KIT, Repair	1	1	1	1
18	P	29354	091		NIPPLE, 1 NPT x 1-1/2	1	1	2	2
19	P	51770	091		VALVE, Check, 1 NPT	1	1	1	1
20	P	34398	091		NIPPLE, 1 NPT x 16-1/4	1	1		
	P	33588	091		NIPPLE, 1 NPT x 17-1/2			1	1
21	P	29375	091		NIPPLE, 1 NPT x 6-3/4	1	1		
	P	29369	091		NIPPLE, 1 NPT x 5-1/4			1	1
22	P	4935	091		TEE, 1 x 1 x 1/2 NPT	1	1		
23	P	1639	091		ELL, Street, 1 NPT	1	1	1	1
24	P	89947	091		COUPLING, 3/8 ODT x 1/2 NPT	1	1	1	1
25					TUBE, 1-5/8 OD x 17	1	1		
					TUBE, 1-5/8 OD x 6-7/8			1	1
26	P	37003	091		BUSHING, 2-1/8 x 1-5/8 ODT	1	1	1	1
27	P	81902	001		UNION, 1-5/8 ODT	1	1	1	1
28					TUBE, 1-5/8 OD x 3-7/8	1	1		
					TUBE, 1-5/8 OD x 12-3/16			1	1
29	P	81900	001		TEE, 1-5/8 x 1-1/8 x 1-1/8 ODT	1	1	1	1
30	P	89453	091		PLUG, 1-1/8 ODT	1	1		

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-22-31					TUBE, 1-1/8 OD x 3-3/8	1	1		
					TUBE, 1-1/8 OD x 3-7/16			1	1
32	P	134468	005		CABLE ASSEMBLY, P-18	1	1	1	1
	P	93838	005		• PLUG, Housing	1	1	1	1
	P	129261	003		• SOCKET, Contact	3	3	3	3
33	P	23345	091		BOX, Junction	1	1	1	1
34	P	23346	091		COVER, Box	1	1	1	1
35	P	29164	091		NIPPLE	1	1	1	1
36	P	8681	091		NUT, Lock	3	3	3	3
37	P	90331	091		CONNECTOR, Straight	1	1		
38					TUBE, 1-1/8 OD x 20-5/8			1	1
39	P	44491	091		UNION, 1-1/8 ODT			1	1
40					TUBE, 1-1/8 OD x 3-7/8			1	1
41	P	89713	091		TEE, 1-1/8 ODT			1	1
42	P	3443	091		PLUG, 3/4 NPT			1	1
43					TUBE, 1-1/8 OD x 3-3/4			1	1
44	P	18538	091		WIRE NUT	3	3	3	3

NOTE: All copper tubing used in the above assemblies is ASTM B-88 type "L" hard drawn.



WIRING DIAGRAM, 78" UNITS



WIRING DIAGRAM, 52" UNITS

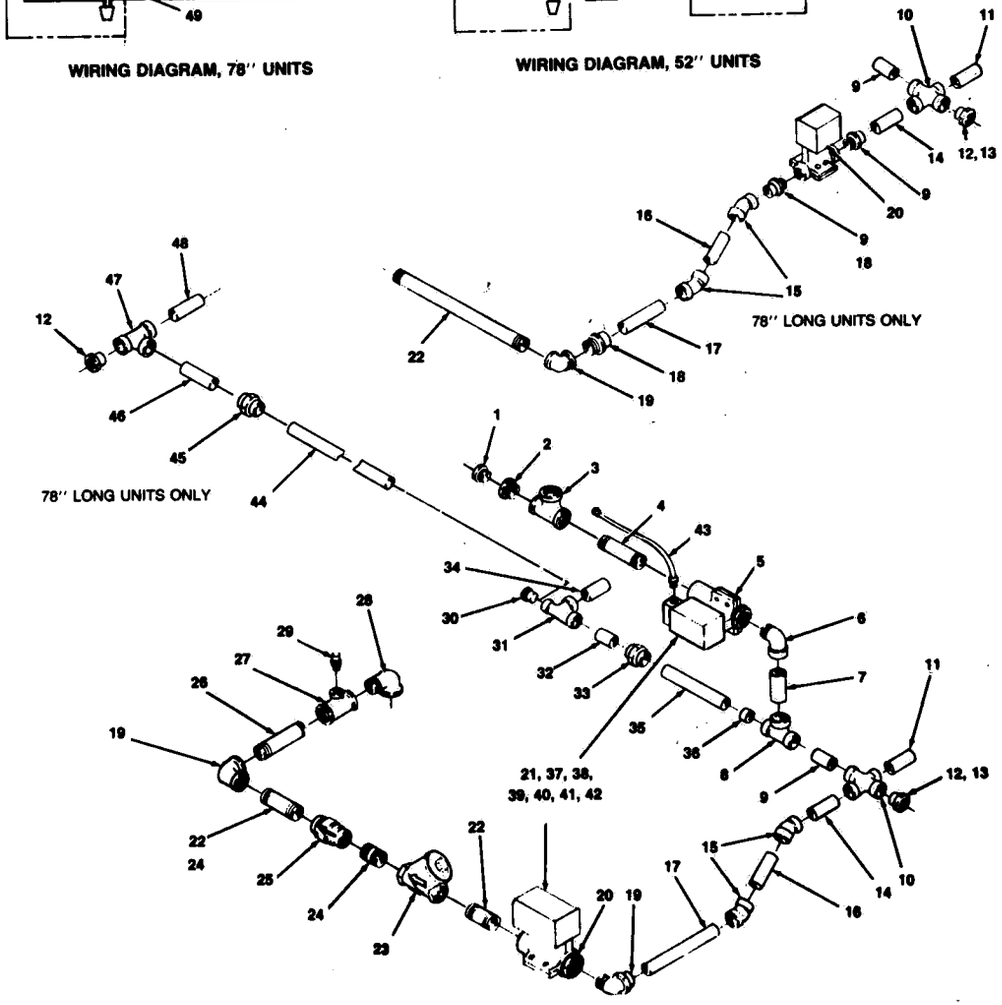


Figure 8-23. PIPING ASSEMBLY, Chamber Drain Line, Steam/Gas.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-23	P 163840 001		PIPING ASSEMBLY: Chamber Drain, 52", R.H., Steam/Gas	1			
	P 142684 001		PIPING ASSEMBLY: Chamber Drain, 52", L.H., Steam/Gas		1		
	P 142833 001		PIPING ASSEMBLY: Chamber Drain, 78", R.H., Steam/Gas			1	
	P 163839 001		PIPING ASSEMBLY: Chamber Drain, 78", L.H., Steam/Gas				1
1	P 49979 091		BUSHING, Reducing, 1-1/4 x 3/4 NPT	1	1	1	1
2	P 43042 091		BUSHING, Reducing, 2 x 1-1/4 NPT	1	1	1	1
3	P 7516 091		TEE, 2 NPT	1	1	1	1
4	P 81904 001		NIPPLE, 2 NPT x 5	1	1		
	P 150179 001		NIPPLE, 2 NPT x 23-1/4			1	1
5	P 82427 001		VALVE, Motorized Ball, 2 NPT (60 Hz)	1	1	1	1
	P 610722 001		VALVE, Motorized Ball, 2 NPT (50 Hz)	1	1	1	1
	P 752810 091		• KIT, Seal Repair	A/R	A/R	A/R	A/R
	P 757059 061		• KIT, Ball Repair	A/R	A/R	A/R	A/R
	P 757062 061		• KIT, Stem Repair	A/R	A/R	A/R	A/R
6	P 82207 001		ELBOW, 2-1/8 ODT x 2 NPT	1	1	1	1
7			TUBE, 2-1/8 OD x 3	1	1	1	1
8	P 81901 001		TEE, 2-1/8 x 1-1/8 x 2-1/8 ODT	1	1	1	1
9			TUBE, 1-1/8 OD x 2	1	1	1	1
			TUBE, 1-1/8 OD x 3			1	1
10	P 51760 091		CROSS, 1-1/8 ODT	1	1	1	1
11			TUBE, 1-1/8 OD x 3-7/8	1	1		
			TUBE, 1-1/8 OD x 4			1	1
12	P 89277 091		ADAPTER, 1-1/8 ODT x 3/4 NPT	1	1	1	1
13	P 3443 091		PLUG, Pipe, 3/4 NPT	1	1	1	1
14			TUBE, 1-1/8 OD x 2-1/2	1	1		
	P 82290 001		ADAPTER, 1-1/8 ODT x 1 NPT			1	1
15	P 81956 001		ELL, 45°, 1-1/8 ODT	2	2	2	2
16			TUBE, 1-1/8 OD x 8-3/8	1	1		
			TUBE, 1-1/8 OD x 3-7/16			1	1
17	P 41646 091		NIPPLE, 1 x 9	1	1		
			TUBE, 1-1/8 OD x 3-7/16			1	1
18	P 51761 091		ADAPTER, 1-1/8 ODT x 1 NPT			2	2
19	P 82289 001		ELL, Union, 1-1/8 ODT x 1 NPT	1	1		
	P 1638 091		ELL, 1 NPT	1	1	2	2
20	P 75398 091		VALVE, Motorized Ball, 1 NPT	1	1	1	1
	P 757054 091		KIT, Seal	A/R	A/R	A/R	A/R
	P 757056 061		BALL, 316 SS	A/R	A/R	A/R	A/R
	P 757061 061		STEM, 316 SS	A/R	A/R	A/R	A/R
21	P 90331 091		CONNECTOR, Straight, Flexible Conduit, 3/8	2	2	1	1
22	P 29372 091		NIPPLE, 1 NPT x 6	2	2		
	P 33568 091		NIPPLE, 1 NPT x 17-1/2			1	1
23	P 80976 001		TRAP, Steam, 1 NPT	1	1	1	1
	P 758748 091		• KIT, Repair	A/R	A/R	A/R	A/R
24	P 29354 091		NIPPLE, 1 NPT x 1-1/2	1	1	2	2
25	P 51770 091		VALVE, Check, 1 NPT	1	1	1	1
26	P 29375 091		NIPPLE, 1 NPT x 6-3/4	1	1		
	P 29369 091		NIPPLE, 1 NPT x 5-1/4			1	1
27	P 4935 091		TEE, 1 x 1 x 1/2 NPT	1	1	1	1
28	P 1639 091		ELL, Street, 1 NPT	1	1	1	1
29	P 89947 091		COUPLING, 3/8 ODT x 1/2 NPT	1	1	1	1
30	P 89453 091		PLUG, 1-1/8 ODT	1	1		
31	P 81900 001		TEE, 1-5/8 x 1-1/8 x 1-1/8 ODT	1	1	1	1
32			TUBE, 1-1/8 OD x 3-7/8	1	1		
			TUBE, 1-1/8 OD x 12-3/16			1	1

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
				1	1	1	1
8-23-33	P 81902 001		UNION, 1-5/8 ODT	1	1		
34			TUBE, 1-1/8 OD x 3-3/8			1	1
			TUBE, 1-1/8 OD x 3-7/16	1	1		
35			TUBE, 1-5/8 OD x 17			1	1
			TUBE, 1-5/8 OD x 6-7/8	1	1	1	1
36	P 37003 001		BUSHING, 2-1/8 x 1-5/8 ODT	2	2	1	1
37	P 23345 091		BOX, Junction	2	2	1	1
38	P 23346 091		COVER, Box	1	1	1	1
39	P 29164 091		NIPPLE	3	3	3	3
40	P 8681 091		NUT, Lock			2	2
41	P 90625 091		CONNECTOR, Ell, Flexible Conduit, 3/8	1	1	1	1
42	P 91657 091		CONDUIT, Flexible, 3/8 x 14	1	1	1	1
43	P 134468 004		CABLE ASSEMBLY P-18	1	1	1	1
	P 93838 005		• PLUG, Housing	3	3	3	3
	P 129261 003		• PIN, Contact			1	1
44			TUBE, 1-1/8 OD x 20-5/8			1	1
45	P 44491 091		UNION, 1-1/8 ODT			1	1
46			TUBE, 1-1/8 OD x 3-7/8			1	1
47	P 89713 091		TEE, 1-1/8 ODT			1	1
48			TUBE, 1-1/8 OD x 3-3/4	8	8	5	5
49	P 18538 091		WIRE NUT				

NOTE: All copper tubing used in the above assemblies is ASTM B-88 type "L" hard drawn.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-24-	P	92266 001		PIPING ASSEMBLY, Chamber Exhaust (52" Long, R.H.)	1			
	P	92265 001		PIPING ASSEMBLY, Chamber Exhaust (52" Long, L.H.)		1		
	P	92520 001		PIPING ASSEMBLY, Chamber Exhaust (78" Long)			1	
1	P	96111 091		VALVE ASSEMBLY, Angle (See Figure 8-16)	1	1	1	
2	P	90297 091		TUBE, 5/8 OD x 2-7/8	1	1		
	P	90271 091		TUBE, 5/8 OD x 2-3/4			1	
3	P	90212 091		ELBOW, 90°	1	1	1	
4	P	90216 091		ELBOW, Street, 5/8 ODT	2	2	2	
5	P	90283 091		TUBE	1	1		
	P	90335 091		TUBE, 5/8 OD x 8-1/2			1	
6	P	90225 091		UNION (5/8 ODT)	2	2	1	
7	P	90266 091		TUBE, 5/8 OD x 2	1	1		
8	P	44499 091		ELBOW (5/8 ODT x 1/2 NPT)	1	1		
9	P	90227 091		UNION (5/8 ODT x 1/2 IPS)			1	
10	P	90211 091		ADAPTER, Male 5/8 ODT x 1/2 NPT	1	1	1	
11	P	90267 091		TUBE, 5/8 OD x 2-1/4	1	1		
	P	90269 091		TUBE, 5/8 OD x 2-1/2			1	
12	P	89391 091		TUBE, 5/8 OD x 10	1	1	1	

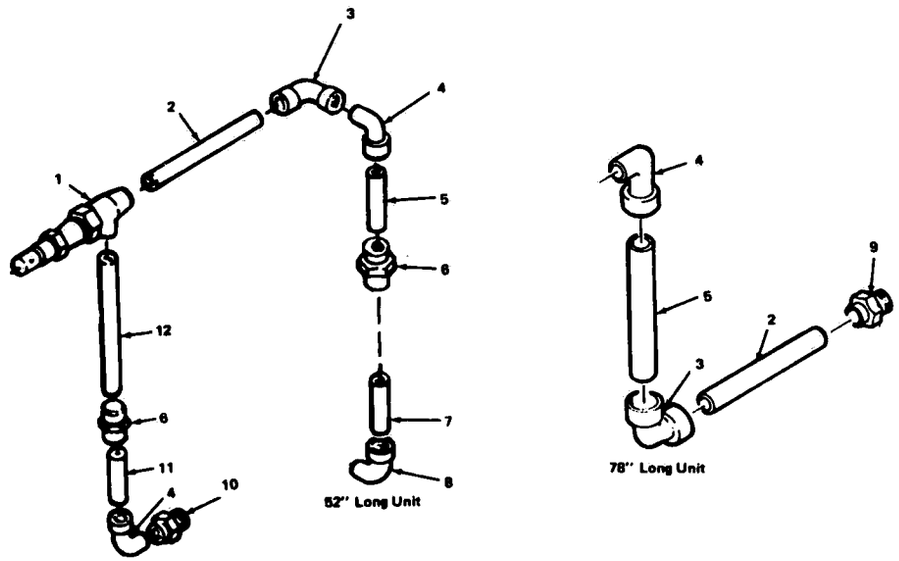


Figure 8-24. PIPING ASSEMBLY, Chamber Exhaust.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-25-	P	96111 091		VALVE ASSEMBLY, Angle	1
	Q	754361 001		RENEWAL PARTS PACKAGE (Includes Items 4, 7, 8 and 12)	A/R
1	P	53915 091		STEM AND BONNET ASSEMBLY	1
2	P	48431 091		• NUT, Packing	1
3	P	48432 091		• GLAND, Packing	1
4	P	8784 091		• PACKING	1
5	P	5683 091		• NUT, Bonnet	1
6	P	53912 091		• BONNET	1
7	P	53911 091		• STEM, Valve	1
8	P	25347 091		DISC HOLDER ASSEMBLY	1
9	P	11168		• HOLDER, Disc (SUB: P-150576-001)	1
10	P	25345 091		• DISC	1
11	P	5680 091		• NUT, Disc	1
12	P	5685 061		SEAT, Valve	1
13	P	96015 091		BODY, Valve	1
	P	754710 091		KIT, Repair	A/R

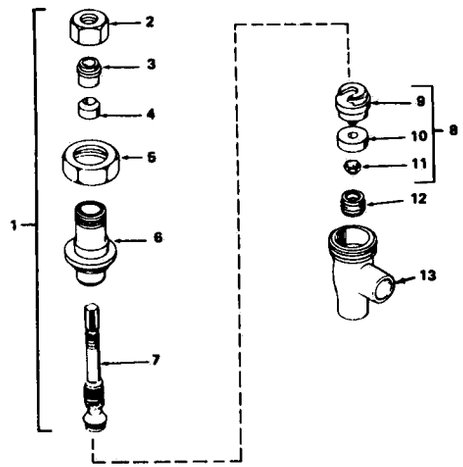


Figure 8-25. VALVE ASSEMBLY, Angle.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-26-	P	23944	091		FILTER ASSEMBLY, Air	1
1	P	23945	042		TUBE ASSEMBLY	1
2	P	12283	041		SCREW, Round Head (10-32 x 1/4)	2
3	P	23949	091		CARTRIDGE ASSEMBLY, Filter	1
4	P	3037	041		• NUT, Hex	2
5	P	5508	041		• WASHER, Bevel Finishing	2
6	P	23951	091		• SCREEN, Filter	17
7	P	23950	091		• DISC, Filter	16
8	P	23929	091		• SPACER, Rubber	16
9	P	23952	091		• ROD, Filter Cartridge	1
10	P	23948	042		COVER, Filter	1

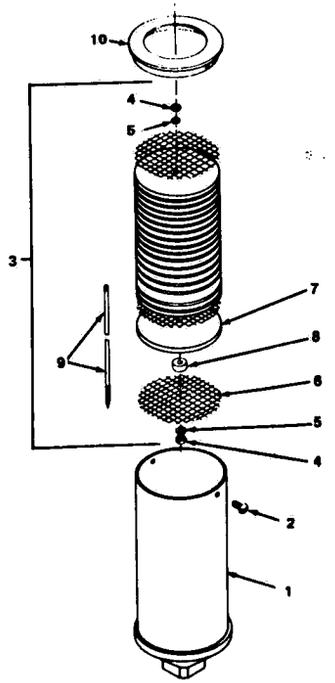


Figure 8-26. FILTER ASSEMBLY, Air.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-27-	P	30542	091		VALVE, Solution Exhaust Accelerator	1
1	P	30543	091		COVER, Valve	1
2	P	30544	091		GASKET	1
3	P	30546	091		SYLPHON ASSEMBLY	1
4	P	30549	091		VALVE, Needle	1
5	P	30550	091		SEAT, Valve	1
6	P	7831	091		GASKET	1
7	P	30545	091		BODY, Valve	1
8	P	30551	091		PILOT	1
9	P	30552	061		SPRING	1
10	P	30553	091		PLUG	1
11	P	33170	091		GASKET	1
12	P	30554	091		CAP, Valve	1
	P	758412	001		KIT, Major Repair	A/R
	P	758412	002		KIT, Minor Repair	A/R

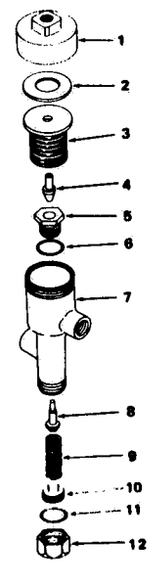


Figure 8-27. VALVE, Solution Exhaust Accelerator.

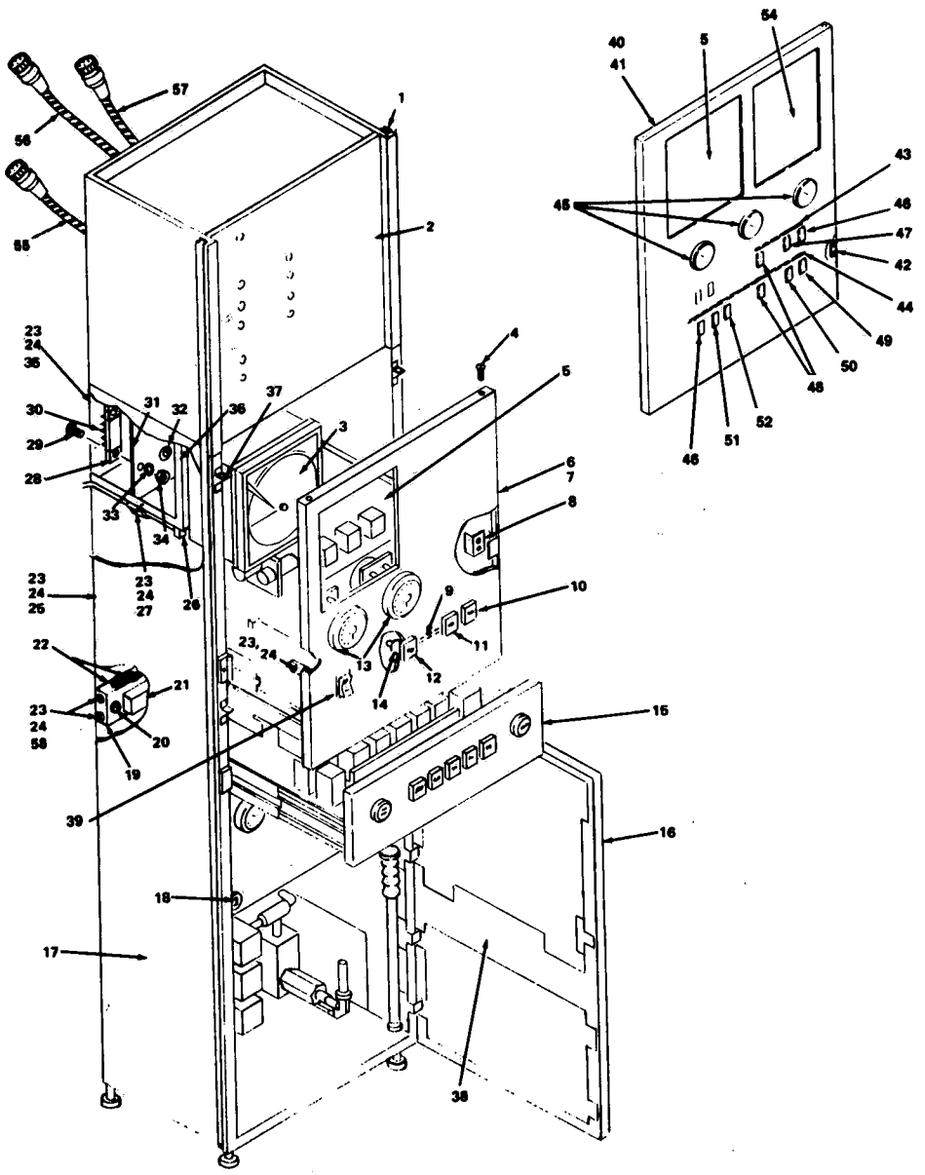


Figure 8-28. CONTROL CONSOLE, Primary and Secondary.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-28-	P	142732	001		CONTROL CONSOLE, Primary, Steam	1			
	P	142732	002		CONTROL CONSOLE, Primary, Steam/Gas		1		
	P	163709	001		CONTROL CONSOLE, Secondary			1	
1	P	92476	001		SEAL, Wall	2	2	2	
2					PRESSURE, VACUUM, TEMPERATURE SWITCH AND MOUNTING ASSEMBLY (See Figure 8-34 & 35)	1	1		
3	P	97170	001		RECORDER, Temperature Indicating and Controller (See Figure 8-32)	1	1		
4	P	36629	051		SCREW, Oval Head (8-32 x 7/8)	6	6		
5	P	142711	001		CHASSIS CONTROL ASSEMBLY, Primary, Steam (See Figure 8-29)	1			
5	P	142711	002		CHASSIS CONTROL ASSEMBLY, Primary, Steam/Gas		1		
					CHASSIS ASSEMBLY, Secondary (See Figure 8-30)			1	
	P	135836	001		CONTROL PANEL ASSEMBLY, Steam	1			
7	P	135835	001		• PANEL, Weldment	1			
8	P	82308	001		• CLIP, Panel	4			
	P	3997	041		• SCREW, Round Head (1/4-20 x 3/8)	8			
	P	19686	061		• WASHER, Lock	8			
9	P	135836	008		• ROD, Hinge	1			
10	P	90566	010		• BUTTON, Push, Liquids	1			
11	P	90565	010		• BUTTON, Push, Wrapped	1			
12	P	82263	001		• BUTTON, Push, Reset	1			
13	P	90062	033		• RING	2			
14	P	48111	NLA		LAMP (Sub: P-764317-709 Box of 10)	3	9		
	P	90345	040		SHIELD	3	9		
15	P	135781	003		DOOR CONTROL, Primary (See Figure 8-37)		1		
	P	135781	002		DOOR CONTROL, Primary	1			
	P	135781	001		DOOR CONTROL, Secondary (See Figure 8-37)			1	
16	P	135902	001		DOOR, Access	1	1	1	
17					CONSOLE SUBASSEMBLY (See Figure 8-31)	1	1	1	
18	P	90382	001		CATCH	1	1	1	
	P	90384	001		BRACKET, Catch	6	10	2	
	P	9374	041		SCREW, Round Head (10-32 x 3/8)	1	1	1	
19	P	135817	001		RECEPTACLE ASSEMBLY	1	1	1	
	P	135818	001		• SUPPORT, Receptacle	4	4	4	
20	P	13334	091		• SCREW (4-40-3/8)	4	4	4	
	P	90713	061		• WASHER, Lock (4)	4	4	4	
	P	13794	041		• NUT (4)	2	2	2	
21	P	92306	002		• RECEPTACLE	8	8	8	
22	P	77798	091		• BUSHING, Snap	42	43	42	
23	P	4682	041		SCREW, Round Head (8-32 x 3/8)	48	49	48	
24	P	90991	091		WASHER, Lock (8)	1	1		
25	P	135820	001		COVER, Rear	1	2		
26	P	91922	045		MOUNT, Recorder	7	10		
	P	90168	045		SCREW (10 x 5/16)	2	4		
	P	4003	051		SCREW, Round Head (1/4-20 x 1-1/4)	22	24		
	P	19678	045		WASHER, Lock (1/4)	1	2		
27	P	118153	091		CLAMP	1	2		
	P	135772	001		TERMINAL BOARD ASSEMBLY				

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
28	P 78048 091		• CAP, End Piece	3	3	3	
29	P 21711 042		• SCREW, Round Head	12	12	12	
30	P 78047 091		• TERMINAL	87	87	87	
31	P 135773 001		• PLATE, Mounting	1	1	1	
32	P 77798 091		• BUSHING, Snap	3	3	3	
33	P 19675 041		• WASHER, Lock	12	12	12	
34	P 44010 045		• NUT, Hex	12	12	12	
35	P 135819 001		COVER, Rear	1	1	1	
36	P 135487 001		SUPPORT, Recorder	1	1	1	
	P 37344 048		SCREW, Socket Head (6-24 x 3/8)	12	12	12	
	P 19677 041		WASHER, Lock (10)	12	12	12	
37	P 47161 091		NUT, Tinnerman (8-32)	6	6	6	
38	P 142879 001		DECAL, Manual Door Operating Instructions	1	1		
39	P 82076 001		SWITCH, Power Control	1	1		
40	P 135896 001		PANEL ASSEMBLY, Steam and Gas		1		
41	P 135895 001		• PANEL, Weldment		1		
42	P 82308 001		• CLIP, Panel		4		
	P 3997 041		• SCREW, Round Head, 1/4-20 x 3/8		8		
	P 19686 061		• WASHER, Lock		8		
43	P 135896 008		• ROD, Hinge		1		
44	P 135896 016		• ROD, Hinge		1		
45	P 90062 033		• RING		3		
46	P 90566 010		• BUTTON, Push, Liquids		1		
47	P 90565 010		• BUTTON, Push, Wrapped		1		
48	P 82263 001		• BUTTON, Push, Reset		2		
49	P 82264 001		• BUTTON, Push, DEC		1		
50	P 82265 001		• BUTTON, Push, SAC		1		
51	P 89028 010		• BUTTON, Push, Cylinder #1 Reset		1		
52	P 89029 010		• BUTTON, Push, Cylinder #2 Reset		1		
53	P 89027 010		• BUTTON, Push, Overtemperature Reset		1		
54	P 55329 091		• RECORDER, Gas (See Figure 8-33)		1		
55	P 134468 013		CABLE ASSEMBLY, P-11	1	1		
	P 93838 004		• PLUG, Housing	1	1		
	P 150734 002		• SOCKET, Contact	21	21		
56	P 134468 014		CABLE ASSEMBLY, P-12	1	1		
	P 93838 004		• PLUG, Housing	1	1		
	P 150734 002		• SOCKET, Contact	22	22		
57	P 134468 015		CABLE ASSEMBLY, P-13		1		
	P 93838 004		• PLUG, Housing		1		
	P 150734 002		• SOCKET, Contact		16		
58	P 3038 041		NUT, 8-32	4	4	4	

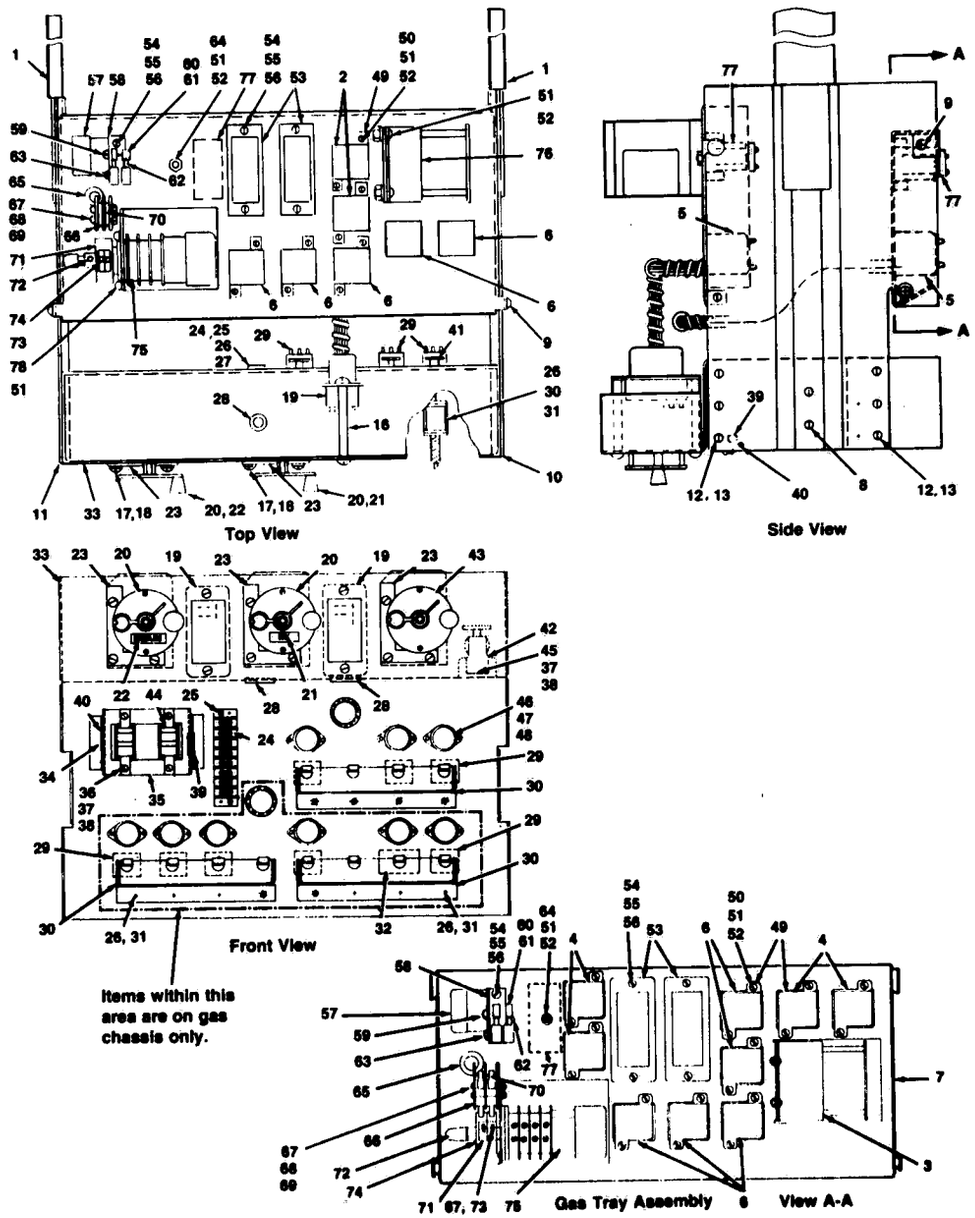


Figure 8-29. CHASSIS CONTROL ASSEMBLY, Primary.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-29-	P 142711 001		CHASSIS CONTROL ASSEMBLY: Primary, Steam	1				
	P 142711 002		CHASSIS CONTROL ASSEMBLY: Primary, Gas		1			
1	P 135486 001		SLIDE, Drawer, R.H. and L.H.	1	1			
2	P 81992 001		RELAY, Time Delay	2	2			
3	P 41056 091		TIMER, Model #472		1			
4	P 81993 001		RELAY, Latch		4			
5	P 79747 001		RECTIFIER	1	2			
6	P 81991 001		RELAY, Control, 3 PDT	5	10			
7	P 142715 001		CHASSIS WELDMENT, Gas		1			
8	P 38698 041		SCREW, Flat Head, 8-32 x 1/4	10	10			
9	P 34461 091		SCREW, Phillips Head (6-32 x 3/8)	2	4			
10	P 135496 001		WELDMENT, Chassis, R.H.	1	1			
11	P 135496 002		WELDMENT, Chassis, L.H.	1	1			
12	P 4682 041		SCREW, Round Head (8-32 x 3/8)	12	12			
13	P 19676 041		WASHER, Lock (8)	12	12			
14			(NOT USED)					
15			(NOT USED)					
	P 142723 001		WIRING ASSEMBLY, Steam Chassis	1				
	P 142724 001		WIRING ASSEMBLY, Gas Chassis		1			
	P 142705 001		• CHASSIS ASSEMBLY, Steam	1				
	P 142705 002		• CHASSIS ASSEMBLY, Gas		1			
16	P 82060 001		• • STAND OFF	2	4			
17	P 9374 041		• • SCREW, Round Head (10-32 x 3/8)	10	17			
18	P 46115 091		• • WASHER, Lock (10)	10	17			
19	P 82068 001		• • RECEPTACLE, 24 Pin	1	2			
20	P 135296 002		• • TIMER	2	2			
21	P 81197 001		• • NAME PLATE, Dry	1	1			
22	P 81195 001		• • NAME PLATE, Sterilize	1	1			
23	P 82061 001		• • BRACKET, Timer	2	3			
24	P 90627 091		• • TERMINAL BLOCK	1	1			
25	P 11241 041		• • SCREW, Round Head (8-32 x 5/8)	2	2			
26	P 19676 041		• • WASHER, Lock (8)	6	14			
27	P 3038 041		• • NUT, Hex (8-32)	2	2			
28	P 77799 091		• • BUSHING, Snap	2	4			
29	P 81603 001		• • SWITCH, Snap	3	8			
30	P 135492 001		• • ACTUATOR ASSEMBLY	1	3			
31	P 3967 041		• • SCREW, Round Head (8-32 x 1/4)	4	12			
32	P 82109 002		• • SWITCH, Snap		1			
33	P 135494 001		• • SWITCH SUPPORT, Weldment	1	1			
34	P 82076 001		• • SWITCH, Power	1	1			
35	P 92323 001		• • SUPPORT, Power Switch	1	1			
36	P 4672 041		• • SCREW, Round Head (6-32 x 5/16)	2	4			
37	P 19675 041		• • WASHER, Lock (6)	4	6			
38	P 3037 041		• • NUT, Hex (6-32)	4	6			
39	P 77798 091		• • BUSHING, Snap	1	1			
40	P 40357 045		• • SCREW, Pan Head (6-32 x 1/4)	4	4			
41	P 90465 091		• SOCKET, Lamp	3	9			
42	P 40828 091		• • RELAY, Latch	1	1			
43	P 55863 091		• • TIMER, 18 Hour		1			

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
					1			
8-29-44	P 82077 001		• • SWITCH, Steam/Gas	2	2			
45	P 3960 041		• • SCREW, Round Head (6-32 x 1/2)	3	9			
46	P 90466 091		• • SLEEVE, Lamp Socket	3	9			
47	P 90344 040		• • BASE, Shield	6	18			
48	P 90327 045		• • RIVET, Semi Tubular	7	16			
49	P 81990 001		• SOCKET, Relay Mounting	14	32			
50	P 3984 041		• SCREW, Round Head (6-32 x 3/8)	26	54			
51	P 19675 041		• WASHER, Lock (6)	22	46			
52	P 3037 041		• NUT, Hex (6-32)	2	4			
53	P 82088 001		• RECEPTACLE, 24 Pin	6	12			
54	P 4682 041		• SCREW, Round Head (8-32 x 3/8)	6	12			
55	P 19676 041		• WASHER, Lock (8)	6	12			
56	P 3038 041		NUT, Hex (8)	1	2			
	P 92325 001		• TIMER ASSEMBLY	1	1			
	P 29804 091		• • MICROSWITCH	1	2			
57	P 41269 091		• • MOTOR, Timer	1	2			
58	P 41268 045		• • BRACKET	2	4			
59	P 17659 041		• • SCREW, Round Head	1	2			
60	P 82064 001		• • CAM	1	2			
61	P 27429 091		• • SCREW, Set	2	4			
62	P 30745 091		• • ROLLER	2	4			
63	P 29811 091		• • SCREW, Round Head	4	6			
64	P 3960 041		SCREW, Round Head (6-32 x 1/2)	1	2			
65	P 77798 091		BUSHING, Snap	3	6			
66	P 90124 091		INSULATOR	2	4			
67	P 32528 091		SCREW, Round Head (4-40 x 1-1/4)	5	9			
68	P 30743 045		WASHER, Lock (4)	2	2			
69	P 13794 041		NUT, Hex (4-40)	2	4			
70	P 90520		SWITCH (SUB: P-76507-091)	3	6			
71	P 90684 061		ACTUATOR, Switch	2	4			
72	P 51176 091		SCREW, Set (8-32 x 1/8)	3	6			
73	P 17659 041		SCREW, Round Head (4-40 x 1/4)	1	2			
74	P 92326 001		BUSHING, Rotary Switch	1	1			
75	P 96910 091		SWITCH	1	1			
76	P 92327 002		TIMER	2	3			
77	P 40828 091		RELAY, Latch	8	16			
78	P 4672 041		SCREW, Round Head (6-32 x 5/16)					

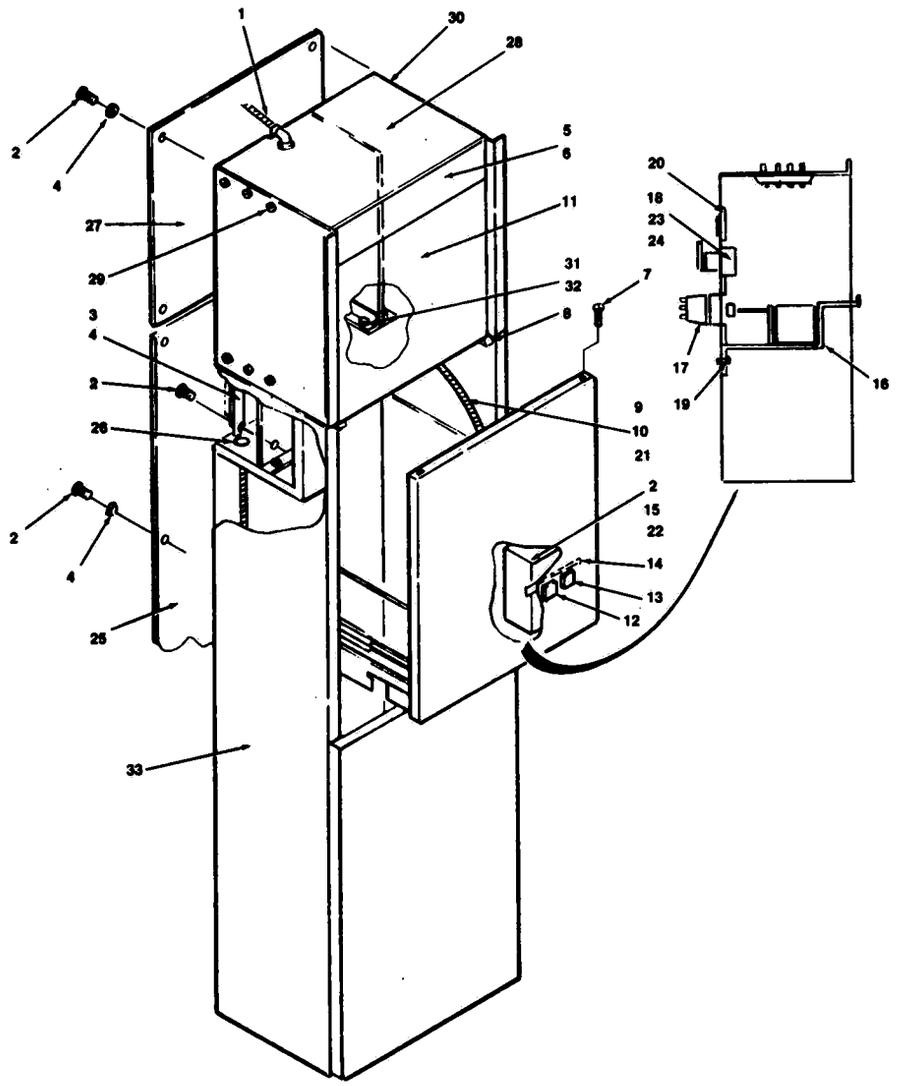


Figure 8-30. CHASSIS ASSEMBLY, Secondary.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-30-					CHASSIS ASSEMBLY, Secondary, Steam	1				
					CHASSIS ASSEMBLY, Secondary, Steam/Gas		1			
1	P	134468	010		CABLE ASSEMBLY, P-15	1	1			
	P	93838	004		• PLUG	1	1			
	P	150734	002		• SOCKET, Contact	22	22			
2	P	4682	041		SCREW, Round Head (8-32 x 3/8)	40	40			
3	P	135772	001		TERMINAL STRIP	1	1			
4	P	90991	091		WASHER, Lock (8)	40	40			
5	P	135968	001		PLATE, Face	1	1			
6	P	3967	041		SCREW, Round Head (8-32 x 1/4)	12	12			
7	P	36629	051		SCREW, Oval Head (8-32 x 7/8)	6	6			
8	P	47161	091		NUT, Tinnerman (8-32)	6	6			
9	P	30636	091		BUSHING, Strain Relief	1	1			
10	P	92382	001		PLUG ASSEMBLY, P-10	1	1			
11	P	92456	001		PANEL ASSEMBLY	1	1			
	P	135894	001		• PANEL, Weldment	1	1			
12	P	82263	001		• BUTTON, Push, Reset	1	1			
13	P	90565	010		• BUTTON, Push	1	1			
14	P	90172	061		• ROD, Hinge	1	1			
	P	135784	001		CHASSIS ASSEMBLY	1	1			
15	P	135783	001		• PANEL, Switch Support	1	1			
16	P	135492	001		• ACTUATOR ASSEMBLY	1	1			
17	P	81603	001		• SWITCH, Pushbutton	2	2			
18	P	90466	091		• SLEEVE, Lamp Socket	2	2			
	P	90344	040		• BASE, Shield	2	2			
	P	90327	045		• RIVET	4	4			
	P	90465	091		• SOCKET, Lamp	2	2			
19	P	3967	041		• SCREW, Round Head (8-32 x 1/4)	4	4			
20	P	77798	091		• BUSHING, Snap	1	1			
21	P	89068	091		• PLUG, Male	1	1			
22	P	19676	041		WASHER, Lock (8)	6	6			
23	P	48111	NLA		LAMP (Sub: P-764317-709 Box of 10)	2	2			
24	P	90345	040		SHIELD	2	2			
25	P	135820	001		COVER, Rear	1	1			
26	P	82306	001		BUSHING, Strain Relief	2	2			
27	P	135819	001		COVER, Rear	1	1			
28	P	135761	001		PARTITION ASSEMBLY	1	1			
29	P	42630	045		SCREW, Cap (10-24 x 1/2)	10	14			
	P	19685	061		WASHER, Lock (10)	8	12			
	P	3039	041		NUT, Hex (10-24)	8	12			
30	P	135760	002		WELDMENT, Sidewall, R.H.	1	1			
31	P	3846	041		SCREW, Hex Head (1/4-20 x 1/2)	16	16			
32	P	19678	045		WASHER, Lock (1/4)	16	16			
33	P	135760	001		WELDMENT, Sidewall, L.H.	1	1			

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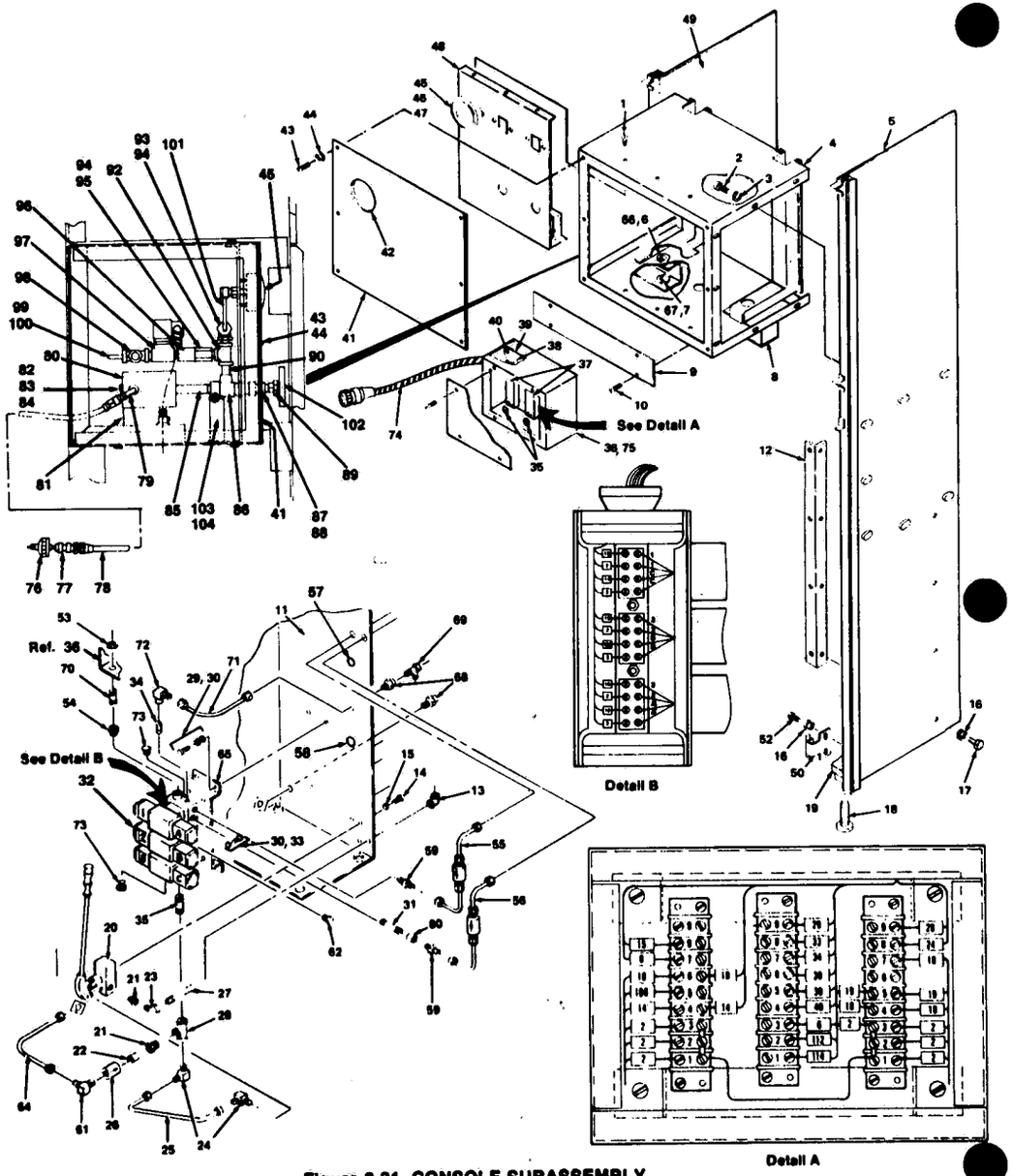

Figure 8-31. CONSOLE SUBASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-31-					CONSOLE SUBASSEMBLY, Steam	1				
					CONSOLE SUBASSEMBLY, Steam/Gas		1			
1	P	90168	045		SCREW (10 x 5/16)	7	7			
2	P	37344	048		• SCREW, Socket Head (10-24 x 5/8)	26	26			
3	P	19677	041		• WASHER, Lock (10)	26	26			
4	P	135778	001		• ENCLOSURE	1	1			
5	P	135489	001		• SIDE, Right	1	1			
6	P	37307	091		• CHASE NIPPLE, 1"	2	2			
7	P	37306	091		• CHASE NIPPLE, 3/4	2	2			
8	P	135797	001		• WIREWAY	1	1			
9	P	92375	001		• COVER, Wireway	1	1			
10	P	12529	061		• SCREW (6-32 x 1/4)	4	4			
11	P	56093	001		• PLATE	1	1			
12	P	92308	001		• ANGLE	2	2			
13	P	82113	001		• ELBOW (1/4 NPT to 3/8)	1	1			
14	P	3905	091		• SCREW, Hex Head (3/8-16 x 1-3/4)	2	2			
15	P	19680	041		• WASHER, Lock (3/8)	2	2			
16	P	19678	045		• WASHER, Lock (1/4)	32	32			
17	P	3847	042	a	• SCREW, Hex Head (1/4-20 x 5/8)	28	28			
18	P	27570	045		• FLANGE, Floor	4	4			
19	P	81762	001		• PLATE, Bottom	1	1			
20	P	81818	001		• PUMP, Hydraulic	1	1			
	P	764045	001		• • HANDLE, Pump	1	1			
	P	764044	001		• • KIT, Repair	1	1			
21	P	42346	091		• BUSHING, Reducing (3/8 x 1/4 NPT)	2	2			
22	P	42394	091		• NIPPLE (1/4 x 7/8)	1	1			
23	P	82289	001		• ELL, Street, 1/4 NPT	1	1			
24	P	82036	001		• ELBOW (3/8 NPT to 9/16-18 JIC)	2	2			
25	P	93291	001		• TUBE ASSEMBLY	1	1			
26	P	42087	091		• VALVE, Check (1/4 NPT)	1	1			
27	P	42397	091		• NIPPLE, 1/4 NPT x 3-1/4	1	1			
28	P	4993	091		• TEE (3/8 x 1/4 NPT)	1	1			
29	P	83779	001		• SCREW, Socket Head, 1/4-20 x 3-1/2	2	2			
30	P	10436	041		• WASHER, Lock, 1/4	4	4			
31	P	32809	091		• NIPPLE (1/4 x 3-1/4)	1	1			
32	P		NLA		• VALVE ASSEMBLY (Vickers)*	1	1			
	P	758676	091		• • BLOCK, Manifold	1	1			
	P	758677	091		• • REGULATOR, Dual Flow	2	2			
	P	758678	091		• • VALVE, Pilot Check	1	1			
	P	758679	091		• • VALVE, Solenoid, 4 Way	2	2			
	P	758680	091		• • VALVE, Pressure Reducing	1	1			
	P	758683	091		• • REGULATOR, Dual Flow	1	1			
	P	758681	091		• • VALVE, Solenoid, 4 Way	1	1			
	P	79991	001		• • KIT, "O" Ring, Viton	A/R	A/R			
	P	764315	410		• • COIL	1	1			
	P		NLA		• VALVE ASSEMBLY (Parker Hannifan) — 60 Hz (1st Generation)	1	1			
	P	761719			• • FLOW CONTROL, Dual (SUB: P-763888-001)	1	1			
	P	763891	001		• • VALVE, Sol., 4 Way, D1BW4CVY21 (Repl. 4MD-06-AC-10)	2	2			
	P	763892	001		• • VALVE, Sol., 4 Way, D1BW1CVY21 (Repl. 4MD-01-AC-10)	1	1			
	P	764315	411		• • • COIL, Solenoid	1	1			

• **NOTE:** If solenoid coil burns out, suggest replacement with complete wet plunger valves.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-31-	P 146204 001		• VALVE ASSEMBLY, Parker-Hannifin (2nd Generation)	1	1			
	P 763888 001		• • FLOW CONTROL, Dual	1	1			
	P 763886 001		• • VALVE, Pilot Check, Dual	1	1			
	P 763892 001		• • VALVE, Solenoid, 4 Way	2	2			
	P 763891 001		• • VALVE, Solenoid, 4 Way	1	1			
	P 763887 001		• • VALVE, Pressure Reducing	2	2			
	P 763879 001		• • COIL	A/R	A/R			
	P 763893 001		• • KIT, "O" Ring	1	1			
	P 626434 001		• VALVE ASSEMBLY (Parker Hannifan) — 50 Hz	1	1			
	P 759241 001		• • COIL, Solenoid — 110 Volts (Not Shown)	2	2			
33	P 11266 045		• SCREW, Socket Head, 1/4-20 x 1	1	1			
34	P 32800 091		• NIPPLE, 3/8 NPT x 1	1	1			
35	P 32804 091		• NIPPLE, 3/8 NPT x 2	1	1			
36	P 92376 001		• PULL BOX ASSEMBLY	1	1			
	P 82130 001		• • PULL BOX	3	3			
37	P 40830 091		• • TERMINAL STRIP	6	6			
38	P 3960 041		• • SCREW (6-32 x 1/2)	6	6			
	P 19675 041		• • WASHER, Lock (6)	2	2			
39	P 82150 001		• • BRACKET, Terminal Strip	4	4			
40	P 9313 041		• • SCREW, Round Head, 10-32 x 5/16	4	4			
	P 19677 041		• • WASHER, Lock #10	4	4			
	P 2959 041		• • NUT, Hex, 10-32	1				
	P 92253 002		PANEL ASSEMBLY, Gauge, Steam		1			
	P 92253 001		PANEL ASSEMBLY, Gauge, Steam/Gas	1				
41	P 82200 001		• PANEL, Steam		1			
	P 82199 001		• PANEL, Steam/Gas	1	3			
42	P 90062 034		• RING, Trim	6	6			
43	P 3967 041		SCREW, Round Head, 8-32 x 1/4	6	6			
44	P 90991 091		WASHER, Lock, #8	1				
	P 92252 002		GAUGE ASSEMBLY, Pressure, Steam		1			
	P 92252 001		GAUGE ASSEMBLY, Pressure, Steam/Gas	1	1			
45	P 90730 091		• GAUGE, Jacket Pressure		2			
	P 51309 091		• GAUGE, Cylinder Pressure	1	1			
46	P 91663 091		• COUPLING, 1/4 ODT x 1/8 NPT		2			
	P 51307 091		• ELL, Compression, 3/16 ODT x 1/8 NPT	1	3			
47	P 79070 091		• SPACER, Gauge	1	1			
48	P 92251 001		• BRACKET ASSEMBLY, Valve Support	1	1			
49	P 135488 001		SIDE, Left	4	4			
50	P 92462 001		HINGE	4	4			
51	P 90111 091		SPACER, Hinge	8	8			
52	P 3846 041		SCREW, Hex Head, 1/4-20 x 1/2	1	1			
53	P 2963 091		LOCKNUT, Conduit, 3/4	1	1			
54	P 828 091		BUSHING, Reducing, 1-1/4 x 3/4 NPT	1	1			
55	P 93308 001		TUBE ASSEMBLY, Flow Control Valve	1	1			
56	P 93308 002		TUBE ASSEMBLY, Flow Control Valve	2	2			
57	P 83770 001		BUSHING, 3/4	1	1			
58	P 83771 001		BUSHING, 1-1/2	5	5			
59	P 79947 001		ADAPTER, Male, 1/4 NPT x 9/16-18 Thread	1	1			
60	P 75711 091		COUPLING, 1/4	1	1			
61	P 82116 001		ELL, 90° 1/4 NPT x 9/16-18 Thread	1	1			
62	P 42282 061		PLUG, 1/4	4	4			
63	P 49134 061		WASHER, Flat	1	1			
64	P 93307 007		TUBE ASSEMBLY	1	1			
65	P 93304 001		PLATE, Mounting	2	2			
66	P 37311 091		LOCK NUT, Conduit, 1	2	2			
67	P 2963 091		LOCKNUT, Conduit, 3/4	7	7			
68	P 82090 001		UNION, Bulkhead, 9/16-18 x 9/16-18 JIC					

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-31-69	P 82033 001		TEE, Swivel	1	1			
70	P 29294 091		NIPPLE, 3/4 NPT x 2	1	1			
71	P 93307 001		TUBE ASSEMBLY, To Tank Fitting	1	1			
72	P 82035 001		ADAPTER, Elbow, Female, 9/16-18 JIC x 3/8 NPT	2	2			
73	P 5896 048		PLUG, 3/8 NPT	1	1			
74	P 134468 009		CABLE ASSEMBLY, P-14	1	1			
	P 93838 004		• PLUG, Housing	18	18			
	P 150734 002		• SOCKET, Contact	12	12			
75	P 90619 091		TERMINAL, Wire, Ring (Not Shown)		2			
76	P 50438 045		INLET, Gas Supply Hose		2			
77	P 45589 091		COUPLING, Hose		2			
78	P 74070 091		HOSE ASSEMBLY, Gas		2			
79	P 51079 061		ELL, Street		2			
80	P 47214 091		FILTER ASSEMBLY, Gas		2			
	P 47207 091		• SNAP RING		2			
	P 47209 045		• COVER PLATE		2			
	P 47208 091		• "O" RING		2			
	P 47206 091		• FILTER ELEMENT		2			
	P 47213 045		• BODY		2			
	P 79746 001		• LABEL, Identification		2			
81	P 81983 001		BRACKET, Support		4			
82	P 37694 091		WASHER, Flat		2			
83	P 46115 091		WASHER, Lock		2			
84	P 15287 041		CAPSCREW (10-32 x 1/2)		2			
85	P 42398 091		NIPPLE (1/4 x 4-3/4)		2			
86	P 150519 001		VALVE, Angle		2			
87	P 150520 001		ADAPTER		2			
88	P 34518 061		SCREW, Set (8-32 x 1/4)		2			
89	P 8605 043		NUT, Handwheel		2			
90	P 44798 091		NIPPLE (1/4 x 1-1/2)		2			
91	P 42092 091		TEE (1/4)		4			
92	P 40823 091		BUSHING, Reducing (1/4 x 1/8)		2			
93	P 51388 091		TEE (3/16 ODT x 3/16 ODT x 1/8 NPT)	2				
94	P 42394 091		NIPPLE (1/4 x 7/8)	2				
95	P 41305		VALVE, Check (1/4) (SUB: P-42094-061)	2				
96	P 77774 091		STRAINER (1/4)	2				
97	P 129289 001		VALVE, Solenoid (1/4)	A/R	A/R			
	P 764270 001		• KIT, Repair	A/R	A/R			
	P 764270 002		• COIL, 110/120 Vac 50/60 Hz	1				
98	P 49373 091		TEE (1/8 IPS x 3/16 NPT)	1				
99	P 46364 091		FITTING, Straight (1/8 IPS x 3/16 NPT)	2				
100	P 51303 061		TUBE (3/16 ODT)	2				
101	P 82198 001		TUBE (3/16 ODT)	1				
102	P 54899 091		HANDWHEEL	1				
	P 75737 091		DECAL (CYL NO. 1)	2				
	P 75738 091		DECAL (CYL NO. 2)	2				
103	P 150615 001		BRACKET	2				
104	P 89152 061		CLAMP	2	2			
105	*P 93292 001		HOSE ASSEMBLY (C, F) 50 Long (Not Shown)	3	3			
106	*P 93292 002		HOSE ASSEMBLY (H, A-2, J-1) 60 Long (Not Shown)	2	2			
107	*P 93292 003		HOSE ASSEMBLY (E, D) 69 Long (Not Shown)	1	1			
108	*P 93292 004		HOSE ASSEMBLY (B-1) 74 Long (Not Shown)	A/R	A/R			
109	**P 93292 005		HOSE ASSEMBLY, 45 Long (Not Shown)	A/R	A/R			
110	**P 93292 006		HOSE ASSEMBLY, 55 Long (Not Shown)	A/R	A/R			
111	**P 93292 007		HOSE ASSEMBLY, 80 Long (Not Shown)	A/R	A/R			
112	**P 93292 008		HOSE ASSEMBLY, 90 Long (Not Shown)					

*Hose assemblies are from the valve package to the piping stand.
**Interconnecting hoses on piping packages.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-32-	P	97170	001		RECORDER, Temperature Indicating and Controlling, Steam	1
1	P	764315	NLA		PEN, Temperature (Not Shown)	1
2					SCREW, Pen Adjustment	1
3	P	76966	091		MOTOR, Chart Drive	1
4	P	76965	NLA		BOTTLE, Ink (Not shown)	1
5	P	78878	091		SWITCH, Reed	2
6					SCREW, Reed Switch Adjustment	2
7	P	76960	091		DOOR, Glass	1
8	P	97171	001		SCALE (F and C)	1
	P	756585	091		RELAY, DPDT (Not Shown)	2
	P	NLA			INK, Red (1 oz)	A/R
	P	97172	001		CHART (Box of 100) (Not Shown)	A/R
	P	764315	403		KIT, Red Fibretip, Pen (Pack of 6) and (1) Arm (Not shown)	A/R
	P	76961	091		HUB, Chart (Not Shown)	1

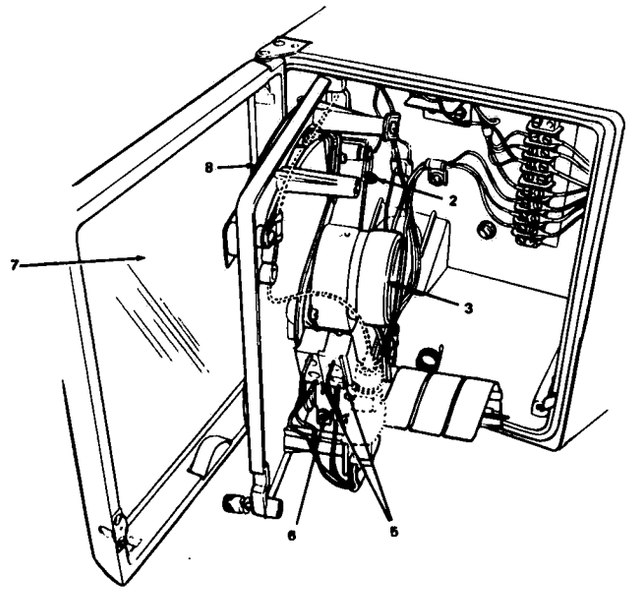

Figure 8-32. RECORDER, Temperature Indicating and Controlling.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-33-	P	55329	091		RECORDER, Gas	X
1	P	764315	NLA		KIT, Red, 6 Pens, 1 Arm (Not Shown)	1
2	P	764315	NLA		KIT, Blue, 6 Pens, 1 Arm (Not Shown)	1
3	P	76960	091		GLASS, Door	1
	P	96907	001		CHART, °F (Box of 100) (Not Shown)	A/R
4	P	76966	091		MOTOR, Chart Drive	1
5	P	76965	NLA		BOTTLE, Ink (Not Shown)	2
	P	76962	091		LIFTER, Pen (Not Shown)	1
	P	76961	091		HUB, Chart (Not Shown)	1
	P	96932	091		SCALE	1
	P	752395	NLA		TUBE, Capillary, 18 Long, For Ink Pens (Not Shown)	A/R
	P	754307	NLA		WIRE, Cleaning, For Ink Pens (Not Shown)	A/R
	P	764315	403		KIT, Red Fibretip Pen (Pack of 6) and (1) Arm (Not Shown)	A/R
	P	764315	404		KIT, Blue Fibretip Pen (Pack of 6) and (1) Arm (Not Shown)	A/R

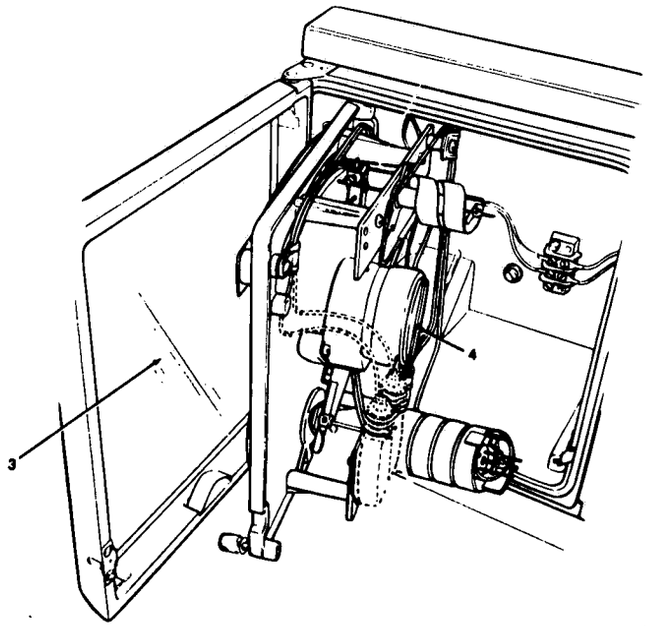

Figure 8-33. RECORDER, Temperature and Pressure.

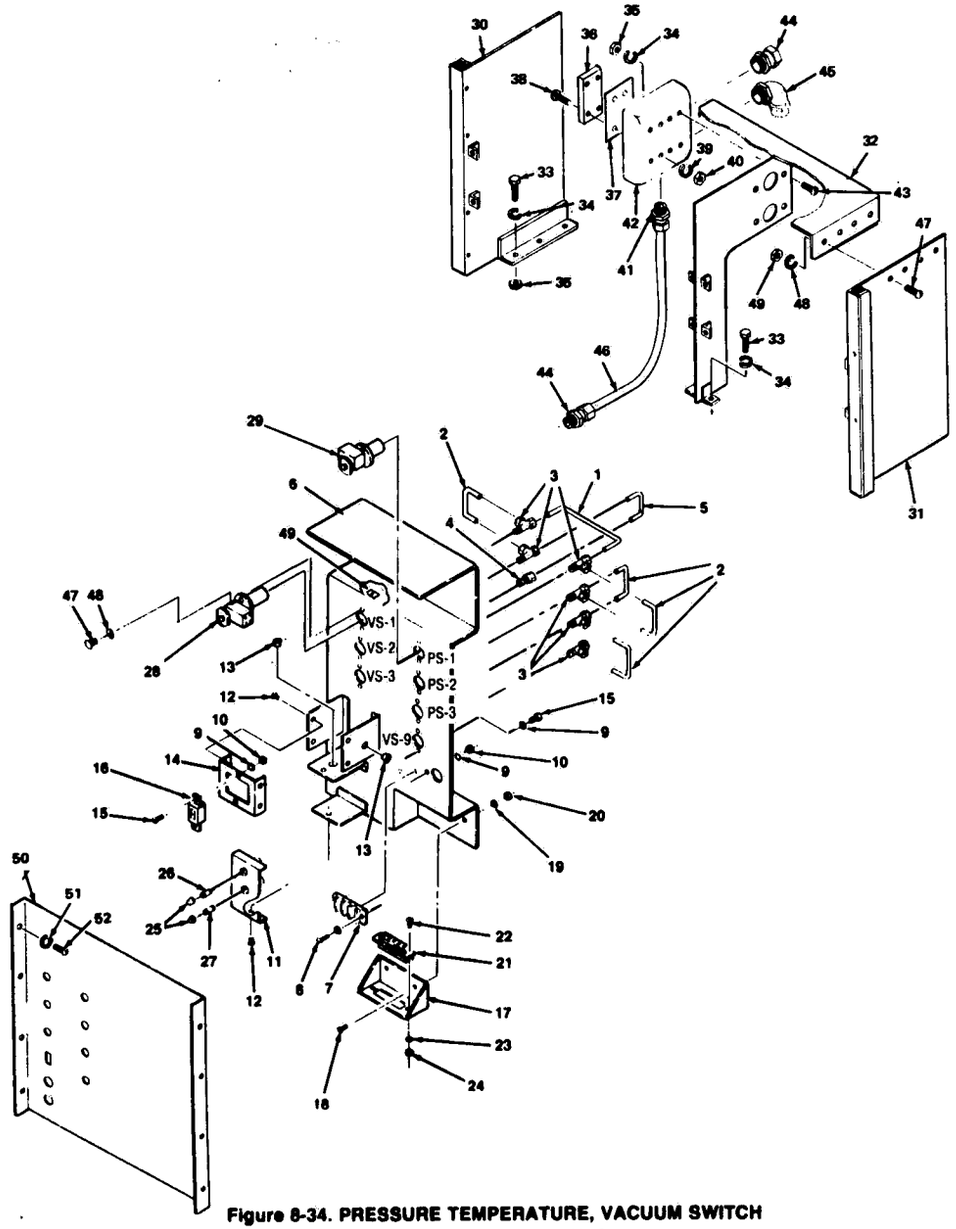

Figure 8-34. PRESSURE TEMPERATURE, VACUUM SWITCH AND MOUNTING ASSEMBLY: Steam.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-34-			PRESSURE, TEMPERATURE, VACUUM SWITCH AND MOUNTING ASSEMBLY, Primary, Steam	1				
			PRESSURE, TEMPERATURE, VACUUM SWITCH AND MOUNTING ASSEMBLY, Secondary		1			
	P 142710 001		PRESSURE, TEMPERATURE, VACUUM SWITCH ASSEMBLY	1				
1	P 92342 002		• TUBE	1				
2	P 92342 001		• TUBE	4				
3	P 78285 091		• FITTING, Tee	6				
4	P 19514 091		• FITTING, Straight	2				
5	P 92342 003		• TUBE	1				
6	P 135765 001		• PLATE	1				
7	P 90746 091		• TERMINAL STRIP (3)	1				
8	P 3964 041		• SCREW (6-32 x 5/8)	2				
9	P 19675 041		• WASHER, Lock (6)	20				
10	P 3037 041		• NUT, Hex (6-32)	4				
11	P 92343 001		• SUPPORT, Fuses	1				
12	P 40357 045		• SCREW (6-32 x 1/4)	8				
13	P 77798 091		• BUSHING, Snap	2				
14	P 92323 001		• SUPPORT, Power Switch	1				
15	P 4672 041		• SCREW (6-32 x 5/16)	18				
16	P 82076 001		• SWITCH, Main Power	1				
17	P 92345 001		• BRACKET	1				
18	P 12574 061		• SCREW (10-32 x 5/16)	2				
19	P 19685 061		• WASHER, Lock (10)	2				
20	P 8647 061		• NUT, Hex (10-32)	2				
21	P 92306 001		• PLUG, 32 Pin	1				
22	P 13334 091		• SCREW (4-40 x 3/8)	2				
23	P 90713 061		• WASHER, Lock (4)	2				
24	P 13794 041		• NUT, Hex (4-40)	2				
25	P 20340 091		• FUSE HOLDER	2				
26	P 33811 NLA		• FUSE, 10 Amp (Sub: P-764317-772 Box of 5)	1				
27	P 118142 NLA		• FUSE, 5 Amp (Sub: P-764317-463 Box of 5)	1				
28	P 39389 091		• SWITCH, Vacuum	4				
29	P 39393 091		• SWITCH, Pressure	3				
30	P 135760 001		SIDEWALL, L.H.	1	1			
31	P 135760 002		SIDEWALL, R.H.	1	1			
32	P 135761 001		PARTITION ASSEMBLY	1	1			
33	P 3846 041		BOLT, Hex (1/4-20 x 1/2)	16	16			
34	P 19678 045		WASHER, Lock (1/4)	22	16			
35	P 3040 042		NUT, Hex (1/4-20)	10				
	P 96279 091		BOX, Power Inlet Assembly	1				
36	P 90746 091		• TERMINAL STRIP	1				
37	P 82647 001		• STRIP, Marker	1				
38	P 3967 041		• SCREW (8-32 x 3/4)	4				
39	P 19676 041		• WASHER, Lock (8)	4				
40	P 3038 041		• NUT, Hex (8-32)	4				
41	P 22456 091		• CONNECTOR, Conduit	1				
42	P 90754 091		• BOX, Power	1				
43	P 3998 041		SCREW (1/4-20 x 1-1/4)	4				

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-34-44	P	22456 091		CONNECTOR, Straight	2	
45	P	22396 091		CONDUIT, Ell	1	
46				CONDUIT (1/2 x 14)	1	
47	P	42630 045		SCREW, Hex Cap (10-24 x 1/2)	10	8
48	P	19685 061		WASHER, Lock (10)	10	8
49	P	3039 041		NUT, Hex (10-24)	10	8
50	P	135767 001		PLATE, Face, Steam	1	
	P	135968 001		PLATE, Face, Secondary		1
51	P	90991 091		WASHER, Lock (8)	14	14
52	P	3987 041		SCREW, Round Head (8-32 x 1/4)	14	14

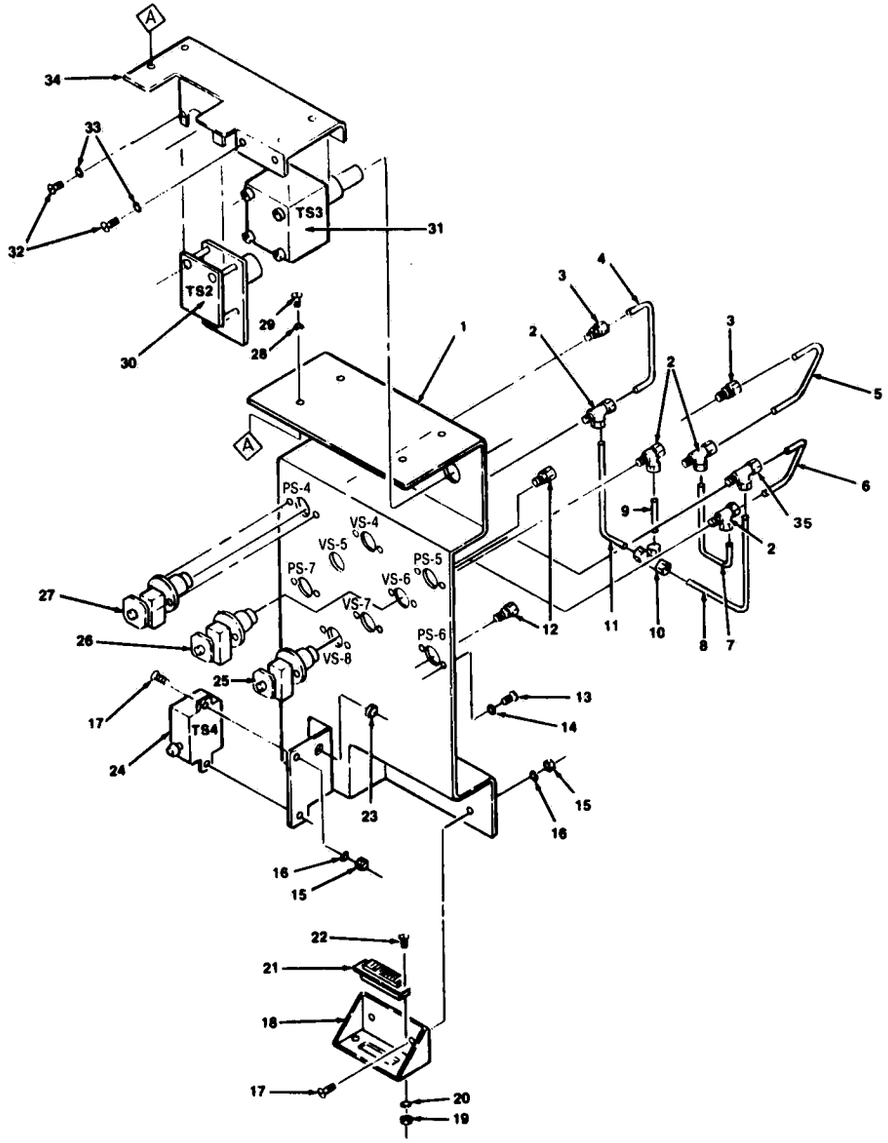

Figure 8-35. PRESSURE TEMPERATURE, VACUUM SWITCH AND MOUNTING ASSEMBLY: Gas.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-35-					PRESSURE, TEMPERATURE, VACUUM SWITCH AND MOUNTING ASSEMBLY, Gas	1
1	P	135850	001		PLATE	1
2	P	78285	091		FITTING, Tee, 1/4 ODT x 1/8 NPT	4
3	P	19514	091		FITTING, Straight, 1/4 ODT x 1/8 NPT	2
4	P	92435	003		TUBE, Copper, 1/4 OD	1
5	P	92435	001		TUBE, Copper, 1/4 OD	1
6	P	92435	002		TUBE, Copper, 1/4 OD	1
7	P	92435	004		TUBE, Copper, 1/4 OD	1
8	P	92436	002		TUBE, Copper, 1/4 OD	1
9	P	142814	021		TUBE, Copper, 1/4 OD x 1-7/8	1
10	P	46097	091		FITTING, Tee, 1/4 ODT	1
11	P	92436	001		TUBE, Copper, 1/4 OD	1
12	P	42088	091		FITTING, Straight, 3/16 ODT x 1/8 NPT	2
13	P	4672	041		SCREW, Machine, Round Head, #6-32 x 5/16	18
14	P	19675	041		LOCK WASHER, #6	18
15	P	2959	041		NUT, Hex, #10-32	4
16	P	19685	061		LOCKWASHER, #10	4
17	P	9374	041		SCREW, Machine, Round Head, #10-32 x 3/8	4
18	P	92345	001		BRACKET, Rug	1
19	P	13794	041		NUT, Hex #4-40	2
20	P	30713	061		LOCKWASHER, #4	2
21	P	92306	001		PLUG, 32 Pin	1
22	P	13334	091		SCREW, Machine, Round Head, #4-40 x 3/8	2
23	P	77798	091		BUSHING, Snap	1
24	P	92458	001		SWITCH, Temperature Control (TS4)	1
25	P	39389	091		SWITCH, Vacuum	4
26	P	82586	001		SWITCH, Vacuum	1
27	P	39393	091		SWITCH, Pressure	4
28	P	19678	045		LOCKWASHER	4
29	P	3952	041		SCREW, Machine, Round Head, 1/4-20 x 1/2	4
30	P	42393	091		SWITCH, Temperature Control (TS2)	1
31	P	78379	091		SWITCH, Temperature Control (TS3)	1
32	P	3967	041		SCREW, Machine, Round Head, #8-32 x 1/4	4
33	P	19676	045		LOCKWASHER	4
34	P	92344	001		WELDMENT, Bracket, Temperature Control	1
35	P	129089	001		TEE, 1/4 x 1/4 x 1/4	1

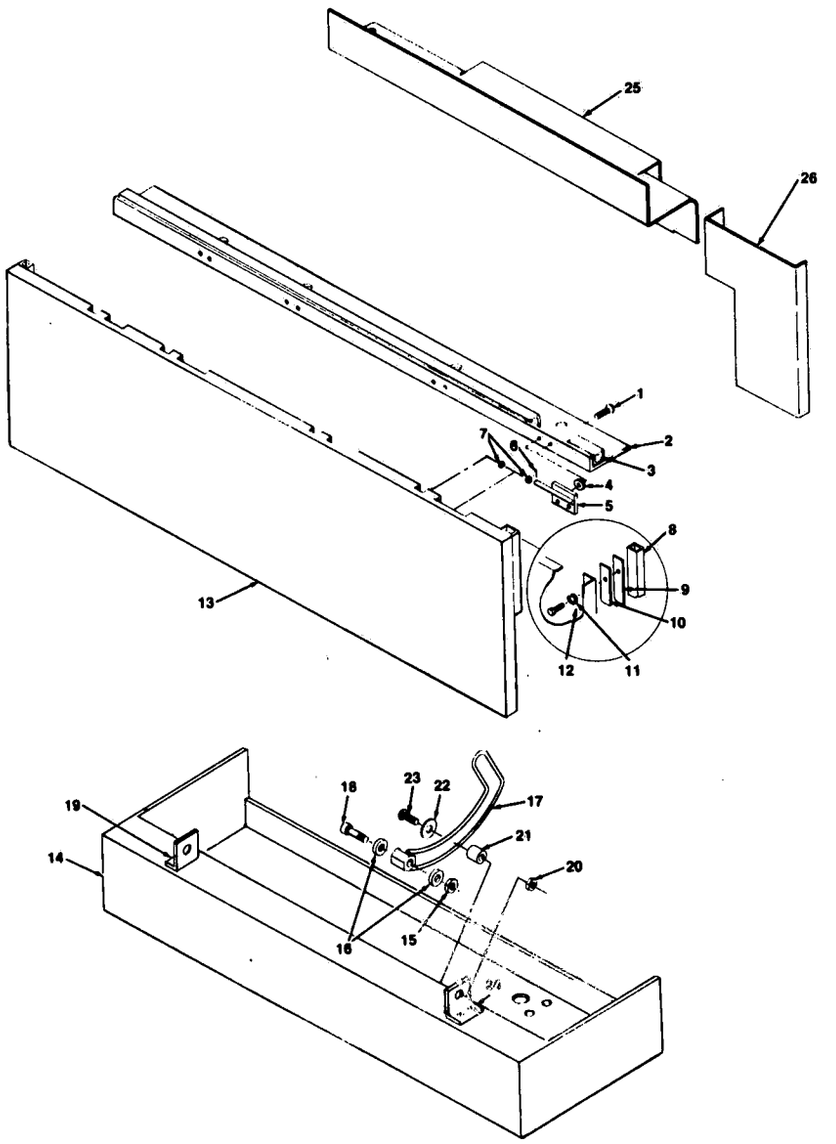

Figure 8-36. HEADER PANEL AND MOUNTING ASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-36-					HEADER PANEL AND MOUNTING ASSEMBLY, L.H.	1			
					HEADER PANEL AND MOUNTING ASSEMBLY, R.H.		1		
	P	142860	001		HEADER PANEL ASSEMBLY	1	1		
1	P	31788	043		• SCREW (10-24 x 1/2)	8	8		
2	P	135936	001		• ANGLE	1	1		
3	P	92476	002		• SEAL (73-1/2 Long)	2	2		
4	P	17589	045		• WASHER, Flat	8	8		
5	P	91004	061		• PIN, Weldment	4	4		
6	P	32269	091		• PIN, Cotter	4	4		
7	P	91007	091		• WASHER, Hinge	8	8		
8	P	92476	003		• SEAL (10 Long)	2	2		
9	P	82338	001		• FILLER	2	2		
10	P	82337	001		• SPACER	2	2		
11	P	19678	045		• WASHER, Lock (1/4)	4	4		
12	P	36686	045		• SCREW, Hex Head (1/4-28 x 3/8)	4	4		
13	P	135935	001		• PANEL	1	1		
14	P	142898	001		PANEL, Overhead, L.H.	1			
	P	142898	002		PANEL, Overhead, R.H.		1		
15	P	3039	041		NUT (10-24)	2	2		
16	P	49353	061		WASHER	4	4		
17	P	92477	001		ARM	2	2		
18	P	45739	091		SCREW, Socket (10-24 x 3/4)	2	2		
19	P	81588	001		SUPPORT, Hinge	2	2		
20	P	3040	042		NUT (1/4-20)	4	4		
21	P	81589	001		ROLLER, Hinge	2	2		
22	P	5575	045		WASHER	2	2		
23	P	21580	061		SCREW (1/4-20 x 1)	2	2		
24	P	9298	041		SCREW (10-32 x 1/2)	8	8		
	P	2959	041		NUT (10-32)	6	6		
	P	19685	061		WASHER, Lock (10)	12	12		
25	P	142899	001		PANEL, End Frame, L.H.	1			
	P	142899	002		PANEL, End Frame, R.H.		1		
26	P	142900	001		COVER, Locking Cylinder, L.H.	1			
	P	142900	002		COVER, Locking Cylinder, R.H.		1		

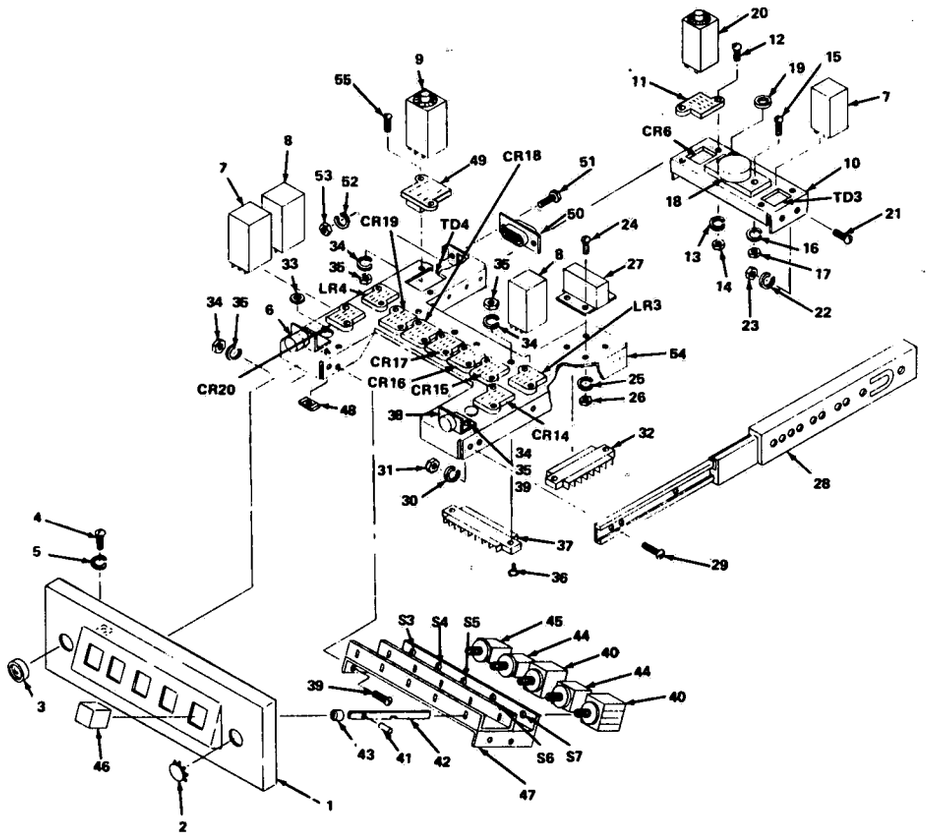

Figure 8-37. DOOR CONTROL, Primary and Secondary.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-37-	P	135781	002		DOOR CONTROL, Primary, Steam	1			
	P	135781	001		DOOR CONTROL, Secondary		1		
	P	135781	003		DOOR CONTROL, Primary, Gas			1	
1	P	135899	001		CONTROL PANEL	1	1	1	
2	P	82266	001		BUTTON, Plug	1	1	1	
3	P	81879	001		LENS	1	1	1	
4	P	3998	041		SCREW, Round Head (1/4-20 x 1/2)	4	4	4	
5	P	19686	061		WASHER, Lock	4	4	4	
6	P	90345	040		SHIELD	1	1	1	
	P	48111	NLA		LAMP (Sub: P-764317-709 Box of 10)	1	1	1	
7	P	81991	001		RELAY	8	7	10	
8	P	81993	001		RELAY, Latch	2	2	2	
9	P	82450	001		RELAY, Adjustable, Time Delay	1	1		
	P	135780	001		WIRING ASSEMBLY, Buzzer	1		1	
	P	135775	001		• ASSEMBLY, Buzzer Tray	1		1	
10	P	135774	001		• • CHASSIS, Buzzer	1		1	
11	P	81990	001		• • SOCKET, Relay Mounting	2		2	
12	P	3984	041		• • SCREW (6-32 x 3/8)	4		4	
13	P	19675	041		• • WASHER, Lock (6)	4		4	
14	P	3037	041		• • NUT, Hex (6-32)	4		4	
15	P	4682	041		• • SCREW (8-32 x 3/8)	2		2	
16	P	19676	041		• • WASHER, Lock (8)	2		2	
17	P	3153	041		• • NUT, Hex (8-32)	2		2	
18	P	79739	001		• • BUZZER ASSEMBLY	1		1	
19	P	77799	091		• • BUSHING, Snap	1		1	
20	P	81992	001		RELAY, Adjustable, Time Delay	1		1	
21	P	4682	041		SCREW (8-32 x 3/8)	4		8	
22	P	19676	041		WASHER, Lock (8)	4		8	
23	P	3038	041		NUT, Hex (8-32)	4		8	
24	P	4672	041		SCREW, Round Head (6-32 x 5/16)	4		4	
25	P	19675	041		WASHER, Lock (6)	4		4	
26	P	3037	041		NUT, Hex (6-32)	4		4	
27	P	51884	091		COUNTER	1		1	
	P	142713	001		TRAY ASSEMBLY, Door Control	1	1	1	
28	P	135486	001		• SLIDE, Drawer, R.H. and L.H.	1	1	1	
29	P	4617	041		• SCREW (8-32 x 3/8)	12	12	12	
30	P	19676	041		• WASHER, Lock (8)	12	12	12	
31	P	3153	041		• NUT, Hex (8-32)	12	12	12	
32	P	40830	091		• TERMINAL STRIP (9)	2	2	2	
33	P	77797	091		• BUSHING, Snap	2	2	2	
34	P	19675	041		• WASHER, Lock (6)	34	34	34	
35	P	3037	041		• NUT, Hex (6-32)	34	34	34	
36	P	3960	041		• SCREW (6-32 x 1/2)	8	8	8	
37	P	91941	091		• TERMINAL STRIP (12)	2	2	2	
38	P	92358	001		• LIGHT ASSEMBLY	2	2	2	
39	P	4672	041		• SCREW (6-32 x 5/16)	8	8	8	
	P	135770	001		• SWITCH ASSEMBLY, Door	1	1	1	
40	P	82109	002		• • SWITCH, 4-Pole	2	2	2	
41	P	43224	061		• • ROLL PIN	5	5	5	
42	P	91675	045		• • ACTUATOR, Switch	5	5	5	

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-37-									
43	P	89612	091		• • KNOB, Retainer	5	5	5	
	P	91671	061		• • SPRING, Switch (Not Shown)	5	5	5	
44	P	81603	001		• • SWITCH, 3-Pole	2	2	2	
45	P	82109	001		• • SWITCH, 2-Pole	1	1	1	
46	P	91698	010		• • PUSHBUTTON, Lock	1	1	1	
	P	91697	010		• • PUSHBUTTON, Close	1	1	1	
	P	91695	010		• • PUSHBUTTON, Open	1	1	1	
	P	91696	010		• • PUSHBUTTON, Unlock	1	1	1	
	P	92354	001		• • PUSHBUTTON, Stop	1	1	1	
47	P	135771	001		• • BRACKET, Support	4	4	4	
48	P	91924	091		• NUT, Speed Grip (1/4-20)	10	10	10	
49	P	81990	001		• SOCKET, Relay	2	2	2	
50	P	92306	001		• PLUG, 32 Pin	4	4	4	
51	P	13334	091		• SCREW (4-40 x 3/8)	4	4	4	
52	P	90713	061		• WASHER, Lock	4	4	4	
53	P	13794	041		• NUT (4-40)	1	1	1	
54	P	142742	001		• DOOR TRAY, Weldment	18	18	18	
55	P	3984	041		• SCREW (6-32 x 3/8)				

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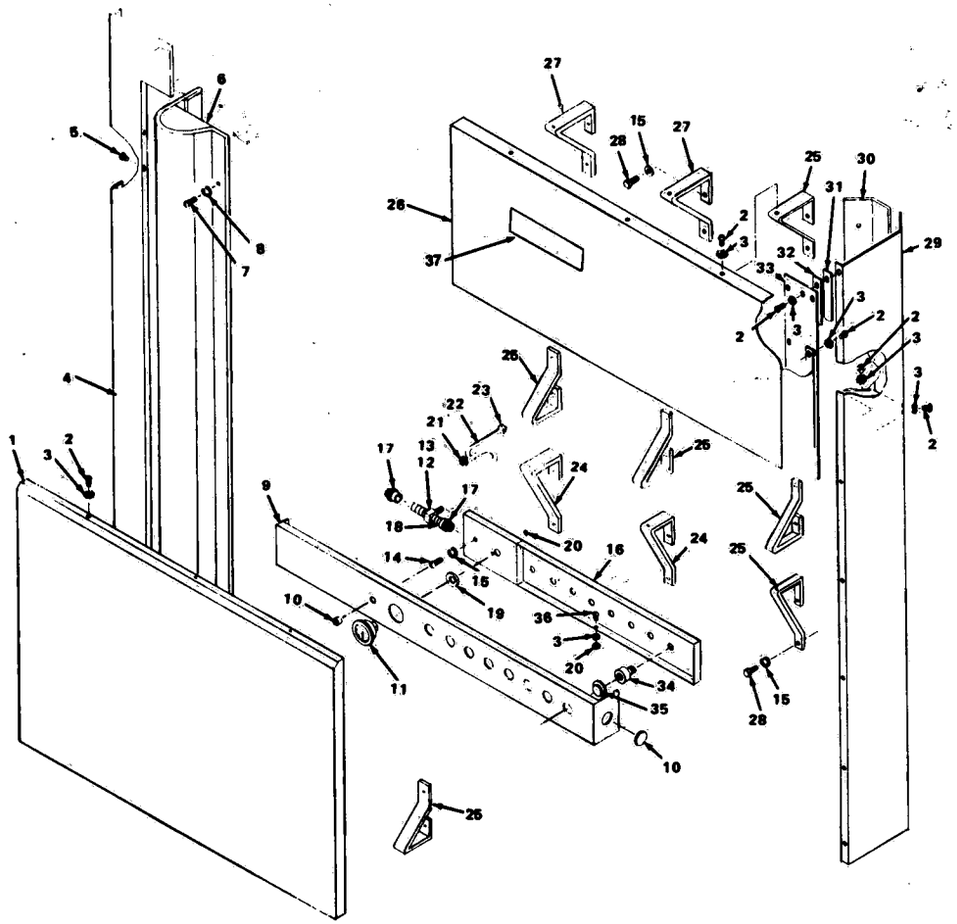

Figure 8-38. DOOR PANEL ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-38-	P	142848	001	DOOR PANEL ASSEMBLY, L.H.	1			
	P	142849	001	DOOR PANEL ASSEMBLY, R.H.		1		
1	P	142846	001	DOOR PANEL, Lower, L.H.	1			
	P	142847	001	DOOR PANEL, Lower, R.H.		1		
2	P	49136	061	SCREW, Button Head Socket (10-24 x 5/16)	43	43		
3	P	76801	045	WASHER, Lock (10)	37	37		
4	P	163750	001	PANEL, Curtain, L.H.	1			
	P	163750	002	PANEL, Curtain, R.H.		1		
5	P	48783	091	SCREW, Socket Head (10-32 x 5/8)	4	4		
6	P	135921	001	COVER, Hinge, L.H.	1			
	P	135924	001	COVER, Hinge, R.H.		1		
7	P	9306	061	SCREW, Truss Head (1/4-28 x 5/16)	2	2		
8	P	19686	061	WASHER, Lock (1/4)	24	24		
9	P	92470	001	PANEL ASSEMBLY, Cycle Light	1	1		
10	P	82320	001	PLUG, Button	2	2		
11	P	90525	091	GAUGE, Chamber	1	1		
12	P	91316	091	CLAMP	1	1		
13	P	3039	041	NUT (10-24)	2	2		
14	P	3998	041	SCREW, Round Head (1/4-20 x 1/2)	2	2		
15	P	76230	091	WASHER, Lock (1/4)	26	26		
16	P	135930	001	WIRING ASSEMBLY, Cycle Lights	1	1		
	P	135928	001	• CHASSIS	1	1		
17	P	90625	091	• CONNECTOR	2	2		
18	P	90903	091	• CONDUIT, Flex (1/2 x 24 Long)	1	1		
19	P	10445	091	WASHER	2	2		
20	P	2959	041	NUT, Hex (10-32)	6	6		
21	P	81067	001	COUPLING, Compression	1	1		
22				TUBING, Copper (1/4 x 18)	1	1		
23	P	43289	091	COUPLING, Compression	1	1		
24	P	135927	001	BRACKET, Support	2	2		
25	P	92412	001	BRACKET, Support	6	6		
26	P	135925	001	DOOR PANEL, Upper, L.H.	1			
	P	135926	001	DOOR PANEL, Upper, R.H.		1		
27	P	92569	001	BRACKET, Support	2	2		
28	P	3847	042	SCREW, Cap (1/4-20 x 5/8)	22	22		
29	P	92445	001	COVER, Hook, L.H.	1			
	P	92445	002	COVER, Hook, R.H.		1		
30	P	92469	001	COVER, Hook, L.H.	1			
	P	92469	002	COVER, Hook, R.H.		1		
31	P	92572	001	SHIM (.093)	A/R	A/R		
32	P	92572	002	SHIM (.031)	A/R	A/R		
33	P	92468	001	SUPPORT, Cover and Panel	1	1		
34	P	48111	NLA	LAMP (Sub: P-764317-709 Box of 10)	8	8		
	P	90345	040	SHIELD, Lamp	8	8		

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-38-35	P	90532	010		LENS, Ready	1	1		
	P	82321	001		LENS, Condition	1	1		
	P	89024	010		LENS, Charge	1	1		
	P	90534	010		LENS, Sterilize	1			
	P	90535	010		LENS, Exhaust	1	1		
	P	90536	010		LENS, Dry	1	1		
	P	89023	010		LENS, Air	1	1		
	P	90537	010		LENS, Sterile	1	1		
36	P	9298	041		SCREW, Round Head (10-32 x 1/2)	4	4		
37	P	92129	001		NAME PLATE, Logo	1	1		

NOTE: Tubing used in above assemblies is ASTM B-88 soft copper.

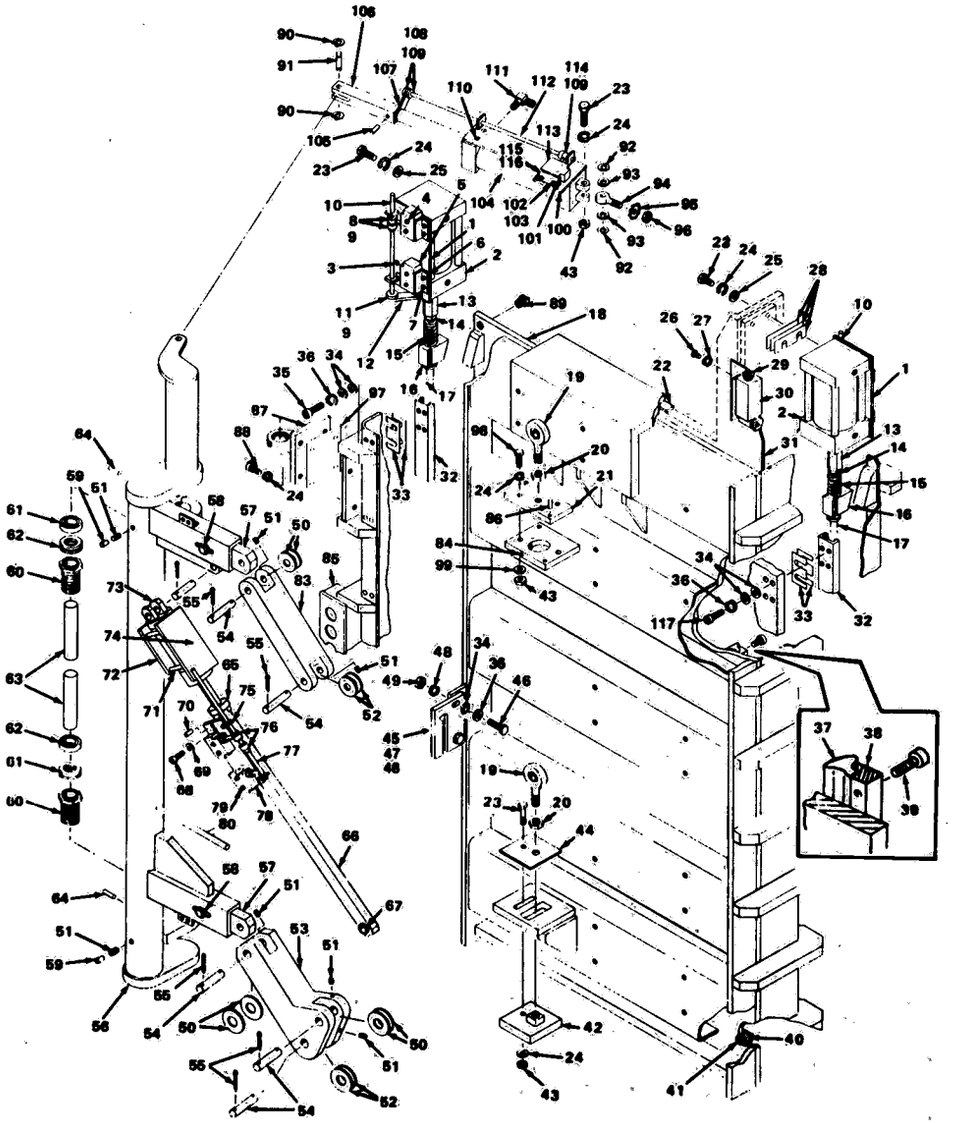

Figure 8-39. POWER WEDGE DOOR ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-39-	P 163835 001		POWER WEDGE DOOR ASSEMBLY, L.H.	1			
	P 163836 001		POWER WEDGE DOOR ASSEMBLY, R.H.		1		
	P 142889 002		CYLINDER AND WEDGE ASSEMBLY, R.H.	1	1		
	P 142889 001		CYLINDER AND WEDGE ASSEMBLY, L.H.	1	1		
1	P 92541 001		• BRACKET ASSEMBLY, R.H.	1	1		
	P 92540 001		• BRACKET ASSEMBLY, L.H.	1	1		
2	P 92535 001		• CYLINDER, Hydraulic (See Figure 8-41)	1	1		
3	P 3953 041		• SCREW, Flat Head (1/4-20 x 1/2)	4	4		
4	P 3966 041		• SCREW, Round Head (6-32 x 1-1/4)	4	4		
	P 19684 061		• WASHER, Lock (6)	4	4		
5	P 80961 001		• SWITCH, Micro	2	2		
6	P 82504 001		• RETAINER, Switch	2	2		
7	P 9313 041		• SCREW, Round Head (10-32 x 5/16)	4	4		
	P 76801 045		• WASHER, Lock (10)	4	4		
8	P 80959 003		• CAM	2	2		
9	P 10583 091		• SCREW, Set (10-32 x 3/16)	8	8		
10	P 82513 001		• ROD	1	1		
11	P 80951 003		• COLLAR	2	2		
12	P 81772 001		• GUIDE	1	1		
13	P 82506 001		• NUT, Coupling	1	1		
	P 15359 042		• NUT, Hex (5/8-18) (Not Shown)	1	1		
14	P 81770 001		• NUT, Hex (3/4-16)	1	1		
	P 92537 001		• WEDGE AND SHAFT ASSEMBLY	1	1		
15	P 80764 001		• • SPRING	8	8		
	P 80955 001		• • COLLAR	16	16		
	P 80971 001		• • PIN, Drive	16	16		
16	P 82514 002		• • WEDGE	8	8		
17	P 92222 001		• • SHAFT	1	1		
18	P 163822 001		DOOR ASSEMBLY, L.H.	1			
	P 163821 001		DOOR ASSEMBLY, R.H.		1		
19	P 81873 001		ROD END	2	2		
20	P 82031 001		NUT, Hex Jam (3/4-16)	3	3		
21	P 82030 001		PLATE, Adjusting	1	1		
22	P 82571 001		PAD, Register	A/R	A/R		
	P 82571 002		PAD, Register	A/R	A/R		
	P 82571 003		PAD, Register	A/R	A/R		
23	P 83105 001		SCREW, Hex Head (1/2-13 x 2-1/4)	10	10		
24	P 19681 045		WASHER, Lock (1/2)	20	20		
25	P 17264 042		WASHER	8	8		
26	P 9374 041		SCREW, Round Head (10-32 x 3/8)	2	2		
27	P 19677 041		WASHER, Lock (10)	2	2		
28	P 82498 001		SHIM (.010)	A/R	A/R		
	P 82498 002		SHIM (.015)	A/R	A/R		
	P 82498 003		SHIM (.029)	A/R	A/R		
	P 82498 004		SHIM (.059)	A/R	A/R		
	P 82498 005		SHIM (.119)	A/R	A/R		

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-39-29	P 150655 001		BRACKET, Switch	1	1		
30	P 80978 091		SWITCH, Limit	1	1		
31	P 81748 001		ACTUATOR	1	1		
32	P 92555 002		GUIDE, Wedge	2	2		
33	P 82543 001		SHIM (.010)	A/R	A/R		
	P 82543 002		SHIM (.015)	A/R	A/R		
34	P 10455 091		WASHER (5/16)	76	76		
35	P 82512 001		SCREW, Socket (5/16-18 x 1-1/2)	34	34		
36	P 19691 061		WASHER, Lock (5/16)	76	76		
37	P 92229 001		GASKET	1	1		
	P 757710 091		• KIT, Gasket Repair	A/R	A/R		
38	P 81797 001		BAR, Gasket Side	2	2		
	P 48778 091		BAR, Gasket Corner (Not Shown)	4	4		
	P 81798 001		BAR, Gasket Top, Bottom (Not Shown)	2	2		
39	P 75076 061		SCREW, Socket (1/4-28 x 3/8)	44	44		
40	P 33961 045		NUT, Hex (5/8-11)	3	3		
41	P 80790 001		PLUNGER, Spring	3	3		
42	P 82026 001		SLIDE, Block	1	1		
43	P 3101 091		NUT, Hex (1/2-13)	4	4		
44	P 82027 001		PLATE, Keeper	1	1		
45	P 92829 001		BRACKET, Support	2	2		
46	P 3900 048		SCREW, Hex Head (5/16-18 x 1)	8	8		
47	P 92813 001		STABILIZER SUPPORT	2	2		
48	P 92828 001		STABILIZER GUIDE	2	2		
49			NOT USED				
50	P 82016 001		WASHER, Thrust	12	12		
51	P 40402 091		SCREW, Set (1/4-20 x 7/16)	7	7		
52	P 82017 001		WASHER, Thrust	12	12		
53	P 92239 001		LINK, Lower	1	1		
54	P 82012 001		PIN, Clevis	5	5		
55	P 15277 091		PIN, Cotter (1/8 x 1-1/4)	10	10		
	P 92257 001		HINGE ASSEMBLY, L.H.	1			
	P 92258 001		HINGE ASSEMBLY, R.H.		1		
56	P 135416 001		• HINGE, L.H.	1			
	P 135417 001		• HINGE, R.H.		1		
57	P 82014 001		• PLATE ASSEMBLY	2	2		
58	P 3872 045		• SCREW, Cap (1/2-13 x 1-1/4)	2	2		
	P 25296 044		• WASHER (1/2)	2	2		
59	P 82032 001		PLUG	2	2		
60	P 82019 001		NUT, Adjusting	2	2		
61	P 52206 091		RACE, Bearing	4	4		
62	P 52205 NI A		BEARING, Thrust (Sub: P-48267-091)	2	2		
63	P 82020 001		PIN, Hinge	2	2		
64	P 82042 001		PIN, Roll	2	2		
65	P 92506 001		COLLAR ASSEMBLY	1	1		
	P 82421 001		SHIM	A/R	A/R		
	P 34144 091		• SCREW, Cap (10-24 x 3/4)	2	2		

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-39-	P	92506 002		• COLLAR, Split	1	1		
	P	92255 001		CYLINDER ASSEMBLY, Door, L.H.	1			
	P	92256 001		CYLINDER ASSEMBLY, Door, R.H.		1		
66	P	92234 001		• EXTENSION, Lift	1	1		
67	P	82015 001		• BUSHING	1	1		
68	P	13411 091		• SCREW, Socket (1/4-20 x 5/8)	2	2		
69	P	19678 045		• WASHER, Lock (1/4)	2	2		
70	P	47979 061		• PIN, Roll	1	1		
71	P	81852 001		• STUD	4	4		
	P	19677 041		• WASHER, Lock (10)	4	4		
	P	2960 042		• NUT, Hex (10-32)	4	4		
72	P	82008 001		• PLATE, Bottom	1	1		
73	P	81853 001		• CYLINDER, Hydraulic (See Figure 8-41)	1	1		
74	P	82009 001		• PLATE, Top	1	1		
	P	92236 001		• BRACKET ASSEMBLY, L.H.	1			
	P	92237 001		• BRACKET ASSEMBLY, R.H.		1		
75	P	82005 001		• • BRACKET, L.H.	1			
	P	82006 001		• • BRACKET, R.H.		1		
76	P	80959 003		• • CAM	2	2		
	P	10583 091		• • SCREW, Set	4	4		
77	P	82010 001		• • ROD	1	1		
78	P	80961 001		• • SWITCH, Limit	2	2		
79	P	3966 041		• • SCREW, Round Head	4	4		
80	P	19684 061		• • WASHER, Lock	4	4		
81				• NOT USED				
82				• NOT USED				
83	P	92238 001		LINK, Upper	1	1		
84	P	51963 045		SCREW, Set (5/16-18 x 1-1/4)	1	1		
85	P	135823 001		BOX, Junction	1	1		
	P	92407 001		COVER	1	1		
	P	23437 041		SCREW, Self-tapping (8-32 x 1/4) (Not Shown)	4	4		
86	P	28865 045		PIN, Groove	2	2		
87	P	92232 001		BRACKET, Hinge, L.H.	2			
	P	92233 001		BRACKET, Hinge, R.H.		2		
88	P	82215 001		SCREW, Socket (1/2-13 x 1-3/8)	8	8		
89	P	82569 002		PLUNGER, Spring	1	1		
90	P	42639 091		RING, Retainer	2	2		
91	P	51639 061		PIN	1	1		
92	P	82582 001		WASHER	2	2		
93	P	16952 091		SPACER	2	2		
94	P	81872 001		ROD END	1	1		
95	P	52148 045		WASHER, Lock (9/16)	1	1		
96	P	16055 045		NUT, Hex (1/2 x 20)	1	1		
97	P	82158 001		SHIM	A/R	A/R		
98	P	3842 051		SCREW, Hex Head (1/2 x 13-2)	2	2		
99	P	82023 001		WASHER	2	2		
	P	135414 002		CYLINDER SWING ASSEMBLY, L.H.	1			

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-39-	P	135415 002		CYLINDER SWING ASSEMBLY, R.H.		1		
100	P	92619 001		• BRACKET, L.H.	1			
	P	92620 001		• BRACKET, R.H.		1		
101	P	82504 001		• RETAINER, Switch	1	1		
102	P	9313 041		• SCREW, Round Head (10-32 x 5/16)	2	2		
103	P	76801 045		• WASHER, Lock (10)	2	2		
104	P	92618 001		• CYLINDER, Hydraulic (See Figure 8-41)	1	1		
105	P	36565 061		• PIN, Roll	1	1		
106	P	82448 002		• CLEVIS	1	1		
107	P	81845 002		• GUIDE	1	1		
108	P	80951 003		• COLLAR	2	2		
109	P	10583 091		• SCREW, Set (10-32 x 3/16)	6	6		
110	P	82644 001		• SCREW, Flat Head (1/4-28 x 3/8)	4	4		
111	P	82036 001		• ADAPTER, Male Ell (3/8 x 9/16)	2	2		
112	P	81850 001		• ROD	1	1		
113	P	80961 001		• SWITCH, Micro	1	1		
114	P	80959 003		• CAM	1	1		
115	P	3966 041		SCREW, Round Head, #6-32 x 1-1/4	2	2		
116	P	19684 061		WASHER, Lock, #6	2	2		
117	P	12264 042		SCREW, Socket (5/16-18 x 5/8)	34	34		
	P	82991 001		DOOR REST PLATE, Floor (Not Shown)	A/R	A/R		

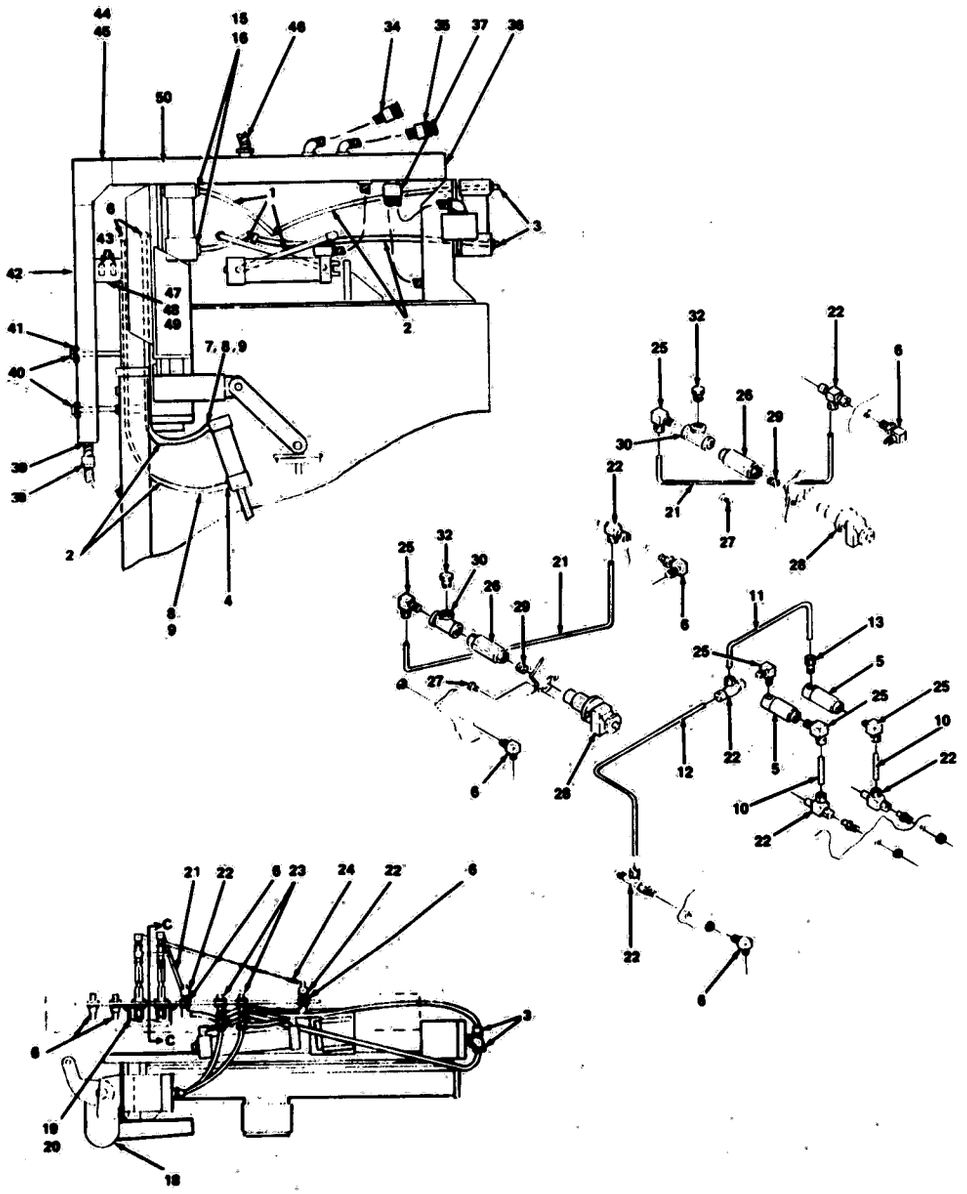

Figure 8-40. POWER WEDGE DOOR: Wiring and Hydraulics.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-40-			POWER WEDGE DOOR, Wiring/Hydraulics, L.H.	1				
			POWER WEDGE DOOR, Wiring/Hydraulics, R.H.		1			
	P 163837 001		DOOR ASSEMBLY WITH HYDRAULIC COMPONENTS, L.H.	1				
	P 163838 001		DOOR ASSEMBLY WITH HYDRAULIC COMPONENTS, R.H.		1			
1	P 82091 004		• HOSE ASSEMBLY (16 Long)	3	3			
2	P 150314 001		• HOSE ASSEMBLY (38 Long)	4	4			
3	P 82041 001		• ADAPTER, Male Elbow (1/2 MPT x 9/16 JIC)	2	2			
4	P 75487 061		• NIPPLE, (3/8 x 5)	1	1			
5	P 80920 045		• VALVE, Relief	2	2			
6	P 82092 001		• ELL, Bulkhead	4	4			
7	P 74112 061		• NIPPLE (3/8 x 3)	1	1			
8	P 76241 061		• STREET ELL (3/8)	2	2			
9	P 82035 001		• ELL, 3/8	2	2			
10	P 92636 001		• TUBE ASSEMBLY	2	2			
11	P 92637 001		• TUBE ASSEMBLY	1	1			
12	P 92638 001		• TUBE ASSEMBLY	1	1			
13	P 79947 001		• ADAPTER, Male	1	1			
14			• NOT USED					
15	P 82282 001		• ADAPTER, Male	2	2			
16	P 82091 003		• HOSE ASSEMBLY (19 Long)	1	1			
17			• NOT USED					
18	P 163835 001		• POWER WEDGE DOOR, L.H. (See Figure 8-39)	1				
	P 163836 001		• POWER WEDGE DOOR, R.H. (See Figure 8-39)		1			
19	P 82442 001		• COVER, Switch	1	1			
20	P 15324 042		• SCREW, Round Head (1/4-20 x 3/8)	2	2			
21	P 92512 001		• TUBE ASSEMBLY	1	1			
22	P 82033 001		• TEE, Swivel	8	8			
23	P 82090 001		• UNION, Bulkhead	2	2			
24	P 92512 002		• TUBE ASSEMBLY	1	1			
25	P 82116 001		• ELBOW, Male Adapter	4	4			
26	P 150822 090		• SNUBBER	2	2			
	P 764316 358		• • SNUBBER, Replacement Kit	1	1			
	P 150822 090		• • • SNUBBER	1	1			
	P 92512 001		• • • TUBE ASSEMBLY	1	1			
	P 92512 002		• • • TUBE ASSEMBLY	1	1			
27	P 3960 041		• SCREW, Round Head (6-32 x 1/2)	4	4			
28	P 79628 001		• SWITCH, Pressure	2	2			
29	P 77345 063		• NIPPLE (1/4 x 1)	2	2			
30	P 76859 061		• TEE	2	2			
31			NOT USED					
32	P 42282 061		• PLUG (1/4 NPT)	2	2			
33			NOT USED					
	P 163711 001		• DOOR WIRING ASSEMBLY, L.H., R.H.	1	1			
34	P 134468 006		• • CABLE ASESMBLY, P-19	1	1			
	P 93838 005		• • • PLUG, Housing	1	1			
	P 129261 003		• • • PIN, Contact	10	10			
35	P 134468 001		• • CABLE ASSEMBLY, P-17	1	1			
	P 93443 004		• • • PLUG, Housing (Female)	1	1			
	P 150734 001		• • • SOCKET, Contact	17	17			

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-40- 36	P 76896 091		• • PLATE, Closing	1	1
37	P 18000 091		• • CONNECTOR	1	1
38	P 134468 012		• • CABLE ASSEMBLY, P-20	1	1
	P 93838 004		• • • PLUG, Housing (Male)	1	1
	P 150734 002		• • • PIN, Contact	17	17
39	P 134468 007		• • SOCKET ASSEMBLY, J-20	1	1
40	P 32853 091		• • NIPPLE, Steel (1/2 NPT)	2	2
41	P 8681 091		• • NUT, Lock	14	14
42	P 76891 091		• • WIREWAY, 24	1	1
43	P 41294 091		• • RELAY, CR28, CR29	2	2
44	P 76895 091		• • U-CONNECTOR	2	2
45	P 76893 091		• • ELBOW	1	1
46	P 90654 091		• • CONDUIT, Flex (3/8 x 22)	1	1
47	P 22615 091		• • BOX, Junction	1	1
48	P 37306 091		• • NIPPLE, Chase	1	1
49	P 32828 091		• • NIPPLE, Steel (1/2 x 1-1/2)	1	1
50	P 76890 091		• • WIREWAY, 36	1	1
			Stainless Steel braided interconnecting hydraulic piping package hoses (not shown):		
	P 93292 001		HOSE ASSEMBLY, 50 Long	A/R	A/R
	P 93292 002		HOSE ASSEMBLY, 63 Long	A/R	A/R
	P 93292 003		HOSE ASSEMBLY, 69 Long	A/R	A/R
	P 93292 004		HOSE ASSEMBLY, 74 Long	A/R	A/R
	P 93292 005		HOSE ASSEMBLY, 45 Long	A/R	A/R
	P 93292 006		HOSE ASSEMBLY, 55 Long	A/R	A/R
	P 93292 007		HOSE ASSEMBLY, 80 Long	A/R	A/R
	P 93292 008		HOSE ASSEMBLY, 90 Long	A/R	A/R

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-41-	P 92618 001		CYLINDER, Hydraulic Swing (1-1/2 Bore)	1		
	P 81853 001		CYLINDER, Hydraulic Lift (2-1/2 Bore)		1	
	P 92535 001		CYLINDER, Hydraulic Lock (4 Bore)			1
	P 759075 091		KIT, Seal Repair (Includes Items 1, 9, 15 and 18)	1		
	P 759076 091		KIT, Seal Repair (Includes Items 1, 14, 15 and 18)		1	
	P 759053 091		KIT, Seal Repair (Includes Items 1, 14, 15 and 18)			1
1			PACKING, Piston Rod	3	3	3
2			NUT, Packing	1	1	1
3			ROD, Piston	1	1	1
4			ADAPTER, Packing	1	1	1
5			ROD, Tie	4	4	4
6			NUT, Tie Rod	4	4	4
7			PLATE	1	1	1
8	P 764317 246		SCREW ASSEMBLY	1		
			• SCREW, Cushion Adjusting	2		
			• "O" RING, Cushion Adjusting Screw	2		
			• LOCKNUT, Cushion Adjusting Screw	2		
9			Not Used			
10			Not Used			
11			SLEEVE, Cushion	2		
12			BODY, Cylinder	1	1	1
13			PISTON	1	1	1
14			"O" RING, Piston	1	1	1
15			PACKING, Piston	2	2	2
16			LOCKNUT, Piston	1	1	1
17			HEAD, Cylinder (Blind End)	1	1	1
18			"O" RING, Body	2	2	2
19			HEAD, Cylinder (Rod End)	1	1	1

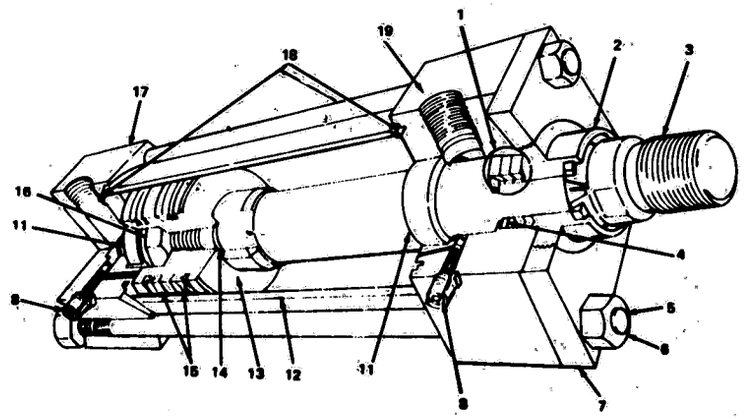

Figure 8-41. CYLINDER, Hydraulic.

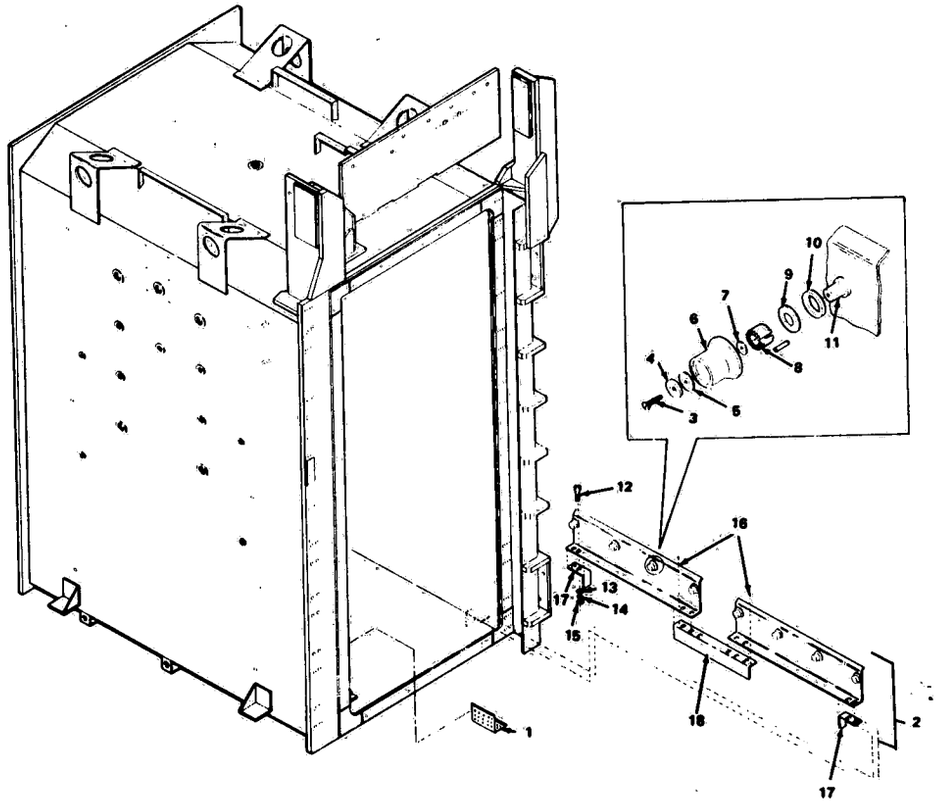

Figure 8-42. SHELL ASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-42-					SHELL ASSEMBLY, 52" Long, Single Door	1			
					SHELL ASSEMBLY, 52" Long, Double Door		1		
					SHELL ASSEMBLY, 78" Long, Single Door			1	
					SHELL ASSEMBLY, 78" Long, Double Door				1
1	P	82285	001		STRAINER, Drain	2	2	3	3
2	P	142875	001		SUPPORT ASSEMBLY, Loading Cart, L.H.	1			
	P	142875	002		SUPPORT ASSEMBLY, Loading Cart, R.H.	1			
	P	142875	003		SUPPORT ASSEMBLY, Loading Cart, L.H. or R.H.		2		
	P	142875	004		SUPPORT ASSEMBLY, Loading Cart, L.H.			1	
	P	142875	005		SUPPORT ASSEMBLY, Loading Cart, R.H.			1	
	P	142875	006		SUPPORT ASSEMBLY, Loading Cart, L.H. or R.H.				2
3	P	12549	061		• SCREW, Flat Head (1/4-20 x 5/8)	8	8	12	12
4	P	82242	001		• WASHER, Countersunk	8	8	12	12
5	P	82241	001		• SPACER	8	8	12	12
6	P	82237	001		• ROLLER	8	8	12	12
7	P	33281	061		• WASHER	8	8	12	12
8	P	82405	001		• NEEDLE BEARING	176	176	264	264
9	P	81590	001		• SPACER	12	12	8	8
10	P	82467	001		• SPACER	8	8	12	12
11	P	135907	001		• SUPPORT	2	2		
	P	135907	002		• SUPPORT			2	2
12	P	74854	061		• SCREW, Socket Head (3/8-16 x 1-1/4)	8	8	8	8
13	P	76666	061		• WASHER, Flat	16	16	16	16
14	P	19687	061		• WASHER, Lock	8	8	8	8
15	P	13606	061		• NUT, Hex (3/8-16)	8	8	8	8
16	P	45741	061		• ROLL, Pin	2	2	2	2
	P	92262	001		BAFFLE, Short, 9 x 6 Inches (Not Shown)	A/R	A/R	A/R	A/R
	P	92602	001		BAFFLE, Long; 52 x 6 Inches (Not Shown)	A/R	A/R	A/R	A/R
17	P	82404	001		• BRACKET	2	2	2	2
18	P	92473	001		• BRACKET	1	1		
	P	92473	002		• BRACKET			1	1

NOTE: When servicing roller support assemblies lubricate needle bearings with special high temperature silicone grease P/N P-759426-091 (5.3 oz. tube).

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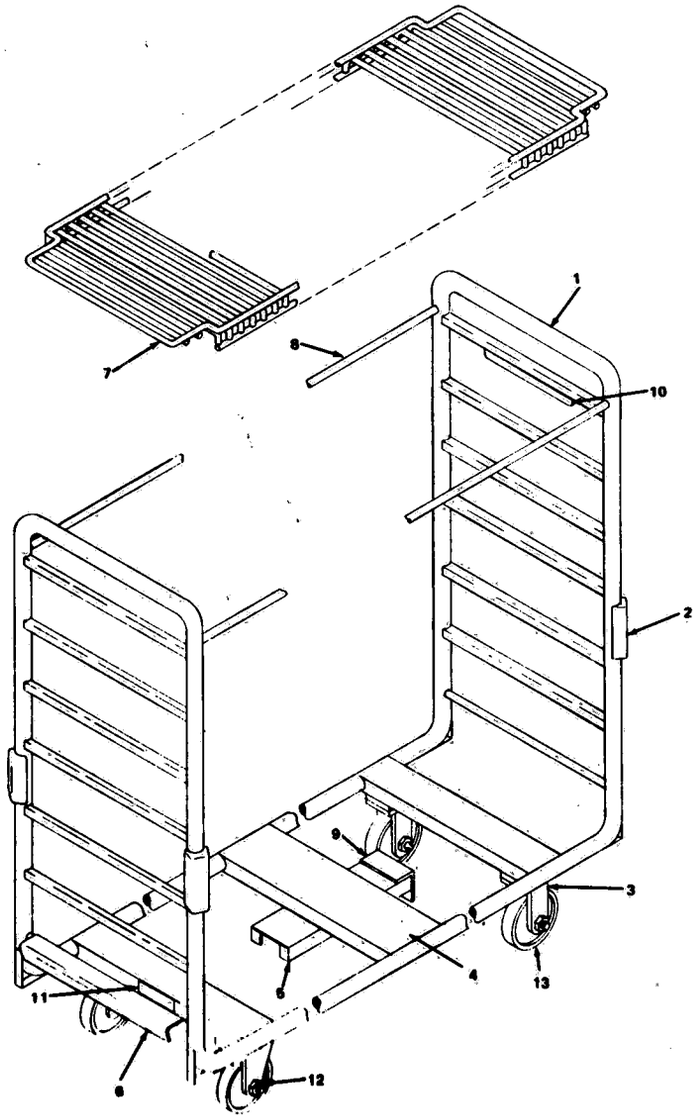

Figure 8-43. LOADING CART, Vacamatic II.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-43-	*				LOADING CART, Vacamatic II 36-1/2 x 46)	1			
					LOADING CART, Vacamatic II (36-1/2 x 55-15/16)		1		
					LOADING CART, Vacamatic II (51-1/2 x 46)			1	
					LOADING CART, Vacamatic II 51-1/2 x 55-15/16)				1
					LOADING CART, Vacamatic II (36-1/2 x 46) with Guilbert Coupling	1			
					LOADING CART, Vacamatic II (36/1/2 x 55-15/16) with Guilbert Coupling		1		
					LOADING CART, Vacamatic II (51-1/2 x 46) with Guilbert Coupling			1	
					LOADING CART, Vacamatic II (51-1/2 x 55-15/16) with SFD Coupling and Swivel Lock Casters				1
					LOADING CART, Vacamatic II (36-1/2 x 46) with SFD Coupling and Swivel Lock Casters	1			
					LOADING CART, Vacamatic II (36-1/2 x 55-15/16) with SFD Coupling and Swivel Lock Casters		1		
					LOADING CART, Vacamatic II (51-1/2 x 46) with SFD Coupling and Swivel Lock Casters			1	
					LOADING CART, Vacamatic II (51-1/2 x 55-15/16) with SFD Coupling and Swivel Lock Casters				1
1	P	422918	489		FRAME, Weldment (36-1/2 x 46)	1			
	P	422918	487		FRAME, Weldment (36-1/2 x 55)		1		
		422918	490		FRAME, Weldment (51-1/2 x 46)			1	
		422918	488		FRAME, Weldment (51-1/2 x 55)				1
2	P	92546	001		BUMPER	4	4	4	4
3	P	92814	001		CASTER, Swivel, Non-Locking	2	2	2	2
	P	92631	001		CASTER, Swivel, Locking	2	2	2	2
	P	92815	001		CASTER, Non-swivel	2	2	2	2
4	P	142891	018		SUPPORT, Coupling	1	1	1	1
5	P	142891	019		COUPLING, Guilbert	1	1	1	1
6	P	142891	027		COUPLER (36-1/2) (Optional)	1			
7	*				SHELF, Bottom (51-1/2)			1	1
					SHELF, Bottom (36-1/2)	1	1		
					SHELF, Top (51-1/2)			2	2
					SHELF, Top (36-1/2)	2	2		
8	*				ROD, Retaining (36-1/2) (Optional)	A/R	A/R		
					ROD, Retaining (51-1/2) (Optional)			A/R	A/R
9	P	142891	034		COUPLING, SFD	1	1	1	1
10	P	82487	001		SIGN	1	1	1	1
11	P	82510	001		PLATE, Name	1	1	1	1
12	P	759426	091		LUBRICANT, Tube of Dow Corning III Molykote	A/R	A/R	A/R	A/R
13	P	762393	001		WHEEL, Caster Replacement (5 Inch Diameter)	A/R	A/R	A/R	A/R

*Complete Loading Carts, Shelves and Retaining Rods are Sales Items.

AMSCO SERVICE

MEDALLION-M SERIES FLOOR LOADING STERILIZER VACAMATIC II

P-759063-002

(7/84)