AMSCO Maintenance Manual



Eagle Series

EAGLE® 2000 SERIES
Universal Gravity/Isothermal
Medium Rectangular Sterilizer

(6/98) P-764087-001

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SUMMARY OF WARNINGS AND CAUTIONS

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

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

WARNING: WHEN OPERATING A LIQUIDS CYCLE YOU MUST OBSERVE THE PRECAUTIONS LISTED IN PARAGRAPH 2.5. FAILURE TO FOLLOW THESE PRECAUTIONS COULD RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING: SUDDEN FULL OPENING OF THE DOOR FOLLOWING A LIQUIDS STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST. TO PREVENT POSSIBLE PERSONAL INJURY, FOLLOW PROCEDURES COVERED IN THIS MANUAL.

WARNING: BE SURE TO PRESS THE POWER AND CONTROL SWITCHES TO OFF AND WAIT UNTIL CHAMBER COOLS TO ROOM TEMPERATURE BEFORE STARTING ANY MAINTENANCE OPERATIONS.

WARNING: WHEN CHECKING SAFETY VALVE(S), BE CAREFUL IF STEAM IS ESCAPING. TO PREVENT BURNS, WEAR GLOVES OR USE AN EXTENSION DEVICE IF IT BECOMES NECESSARY TO OPERATE THE TRY LEVER.

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

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

CAUTION: When troubleshooting and 28-VDC output is not present, make a short circuit test between pins 6 and 2 of receptacle J10 on Mother Board before connecting new power supply. If short circuit is found it must be isolated and repaired prior to connecting new power supply.

SAFETY PRECAUTIONS

CONTINUED

CAUTION: If a safety valve is found to be defective, do not attempt to repair it. Replace it with new valve.

CAUTION: Recorders should be handled with care, and caution should be exercised when making changes to ensure against kinking or compressing the capillary system. The bulb, tubing and pressure element are filled with fluid approved by the Scientific Instrument Makers Association and form a sealed system. This system must never be broken. Even the most minute leak will render it inoperative. Excess capillary should be formed into an 8-inch diameter coil and properly supported by taping to any smooth unheated surface.

CAUTION: When shimming chamber door, the hinge must not protrude beyond the end of the door. If hinge shims hang up on stud threads, the shims could prevent sufficient tightening of nuts, allowing the door to drop.

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

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

CAUTION: When servicing steam pressure regulator, handle syphon and bellows assembly gently, to avoid damage.

CAUTION: Use extreme care when opening a container of electronic parts. Avoid circumstances wherein a build-up of static electricity could discharge.

CAUTION: Take necessary precautions to keep washers or screws from dropping into the control column.

CAUTION: The main Printcon PC board contains static-sensitive components. Handle accordingly.

SECTION 1

SECTION 1

GENERAL INFORMATION

1.1 APPLICATION AND DESIGN

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

SD-257R6
(3/85)

AMSCO

Eagle® 2000 SERIES MEDIUM STERILIZERS
Gravity Laboratory/Isothermal
• *single door*

TECH DATA

Medium Steam Sterilizer (SINGLE DOOR)

DESCRIPTION

Microcomputer controlled sterilizer: two types, both use steam under pressure as the sterilizing agent and operate by the gravity air-removal principle.

Types and Uses

Gravity — for sterilizing liquids in flasks with vented closures at 212° to 250° F (100° to 121° C); also heat- and moisture-stabile goods at 212° to 280° F (100° to 138° C).

Laboratory/Isothermal — in addition to the above capabilities, offers a further option of processing heat-coagulable and heat-sensitive materials at the low temperatures of 170° to 212° F (78° to 100° C).

Chamber Sizes

Interior dimensions are 24x36x36 inches (610x914x914 mm), 24x36x48 inches (610x914x1219 mm) or 24x36x60 inches (610x 914x1524 mm), as specified.

Standards

Every sterilizer meets applicable requirements of the following standards and carries the appropriate symbol:

Underwriters Laboratories, Incorporated, and Canadian Standards Association.

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Inner shell, including door, is constructed to withstand working pressure of 40 psig (2.81 kg/cm²).

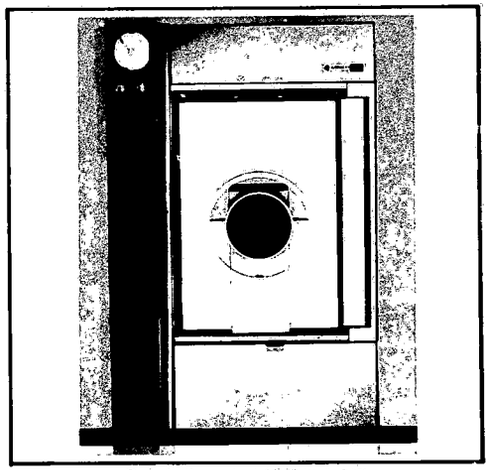
Federal Specification GG-S-1340A performance requirements for both high and low temperature processing.

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

ASTM Specification A240 for stainless steel, alloy 304 if welded; alloy 201, 202, or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

ASTM Specification B43 or B135, alloy 1 for seamless, red brass tubing.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Series
- ☐ **2031:** Gravity, 24x36x36"
- ☐ **2032:** Laboratory/Isothermal, 24x36x36"
- ☐ **2041:** Gravity, 24x36x48"
- ☐ **2042:** Laboratory/Isothermal, 24x36x48"
- ☐ **2051:** Gravity, 24x36x60"
- ☐ **2052:** Laboratory/Isothermal, 24x36x60"

Mounting
- ☐ For Recessing
- ☐ Cabinet Enclosed

Materials Handling Accessories*
- ☐ Rack and Shelves (36 and 48" Long Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

Door Operation
☐ Manual ☐ Power

Door Hinge
- ☐ Right Side
- ☐ Left Side

**Item No.* _____*

**Location(s)* _____*

See separate product literature

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

DESIGN FEATURES

Eagle-Eye™ Vertical Control Column

Controls are conveniently located . . . not exposed to the heat, vapor and condensate resulting from the sterilization process. For easy access, column is on side opposite door hinge.

Microcomputer monitors and controls system operations and functions. Cycle progresses automatically through conditioning, sterilizing, exhaust, (fast or if liquids, adjustable slow with accelerator) and drying phases. Completion of cycle indicated visually; also audibly for 90 seconds.

- **Quartz-crystal based timing.** Microcomputer uses inputs from thumbwheel switches to accurately set exposure and drying times. Set times are displayed as **digital readouts.** Selected times are not changeable once a cycle has started. Timing automatically resets upon completion or resetting of cycle. Automatic reset eliminates need to reprogram timers between repeated cycles. If chamber temperature drops 2° F (1.1° C) below set value during exposure period, timing resets and STERILIZE phase indicator blinks for remainder of phase.
- **Cycle Monitoring.** Chamber door must be locked pressure-tight to initiate a cycle. If unlocked, status light alerts operator. Once selected, cycle is **locked into** microcomputer. Should chamber fail to reach set sterilizing temperature, microcomputer **visually and audibly** alerts operator.

  Throughout entire liquids cycle, **WARNING** light alerts operator of **HOT LIQUIDS** in chamber. Following cycle, light **begins flashing** when chamber door is cracked open for cooling period. **Buzzer** again sounds to indicate end of required **10-minute** cooling period. Pressing RESET button eliminates warning signal.

  Microcomputer **maintains its memory** during power outages of up to 20 milliseconds . . . eliminates necessity of reinitiating cycle following routine power switchovers. After a power failure in excess of 20 milliseconds, operator must reset control power. Visual and audible signals will then indicate that a cycle was interrupted by the power failure.
- **Program boards** are keyed, plug-in type with printed circuits. Boards are **coated** for increased dielectric strength. Service is readily accomplished from front of sterilizer. For diagnostic purposes, light emitting diodes **(LEDs)** indicate presence of signal to associated valves or other electrically operated devices.

Auto-Lume panels light up only when power is on. Top panel gives **cycle status;** center panel, Sterilize and Dry time **digital readouts;** bottom panel features lighted **cycle selectors.** Time readouts are large, easy-to-see LEDs that first indicate set times and then, as the cycle progresses, count down remaining time. Cycle selectors require positive force to actuate, eliminates unintentional cycle selections. Selected cycle is clearly indicated, others locked out.

Indicator-Recorder-Controller provides **thermostatic temperature control.** Continually indicates chamber temperature. Signals microcomputer when temperature is at set point; also if chamber temperature drops below set value during exposure period. Indicating scale is reversible with Celsius and Fahrenheit markings. Sensor is in chamber drain line. Temperature is recorded on a synchronous motor-driven, 6-inch diameter chart using a **pressure-sensitive cartridge type pen.** The chart has both English and metric markings. Six cartridges and one hundred charts are furnished.

Gauges. Jacket pressure and chamber pressure/vacuum gauges are beneath the indicator-recorder-controller for easy viewing. Scales are graduated in both English and metric.

Secondary controls are behind a sliding door beneath the Auto-Lume panels. Included are **power switches,** one to isolate entire unit and a second to isolate only the controls; gravity or iso **cycle selector switch,** if applicable; **circuit breaker; thumbwheel switches** for Sterilize and Dry times; **cycle monitor (non-resettable)** to count number of sterilizing cycles for programming preventive maintenance; and **cycle reset** in case incorrect cycle is selected.

Isothermal Processing (Laboratory/Isothermal Model Only)

If isothermal mode is selected, chamber jacket is not heated. Chamber temperature is maintained by circulation of steam/air mix. Automatic cycle control and monitoring is same as for gravity cycles.

Chamber Drain System

Designed to **prevent pollutants** from entering the water-supply system and sterilizer. **Steam-condensate system with water saver** converts steam to condensate and disposes condensate to waste. Regulates waterflow consistent with amount of steam discharged. Water supply **shutoff valve** is behind service access door.

Drying System

Steam ejector reduces chamber pressure during drying phase, draws air into chamber through a **bacteria-retentive filter.** This filtered air entrains and conducts odors and vapors from chamber. Steam to ejector is controlled by the **microcomputer.**

Manual Control

Sterilizer is manually operable (without electric power) by a single programming wheel.

Optional Material Handling Accessories

Includes racks with shelves, instrument trays and loading cars . . . **all constructed of Monel;** and carriages with a painted-steel finish. See separate product literature for details.

TECHNICAL DATA

Controls

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

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

Jacket and Chamber Assembly

Monel door frame supports and conceals ends of door-holding arms when door is locked . . . presents a smooth surface for door gasket contact.

Hot-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell and chamber backhead are **nickel clad,** 0.025" (0.63 mm) thick. A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber assembly is 1-inch (25 mm) thick, nominal and double faced with aluminum foil. It is held in place by pressure-sensitive tape, aluminum straps and clips. Sterilizer jacket (including backhead) is painted prior to being insulated.

Door. Nickel-clad [0.025" [0.63 mm]], hot-rolled carbon steel. Manually operable or power driven. Stainless-steel, sound-deadened cover conceals holding arms and exterior parts. Stainless-steel, bearing-mounted hinge on either side of chamber, as specified. Door adjustable for accurate gasket alignment. Radial arms exert even pressure on silicone-rubber sealing gasket. Microswitch prevents inadvertent start of cycle before door is locked; **pressure lock** keeps door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

- **Manual Door.** Radial arms actuated by rotating a low-heat-conducting handwheel.
- **Power Door.** Opened and closed by a fused, motorized mechanism with magnetic slip clutch (for overload protection). Radial arms positioned by socket plate assembly run by motorized mechanism with gear reducer and overload protection. Door stops automatically if obstruction is encountered while operating, in addition a separate stop button is provided. Power-driven door is also manually operable.

Steam Source

Sterilizer is piped, valved and trapped to receive steam delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). Service lines terminate at fittings for connection to building service lines. Sterilizer steam supply line includes a strainer, shutoff and internal pressure regulator. Jacket condensate line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door.

Other Components

The following are furnished to obtain a complete working unit, ready for (but not including) connection to the building utility service lines.

Solenoid Valves to simplify sterilizer piping. Valves are placed where they are needed and can be serviced individually.

Manual Valves. Bronze, angle type with renewable Monel seats and synthetic discs or equivalent high-quality parts. Hydrostatically tested at 350 psig (24.61 kg/cm²) or proven leakproof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Low-heat-conducting, easily replaceable handles.

Steam Pressure Regulator operates on supply pressure of 50 to 80 psig (3.52 to 5.62 kg/cm²). Secondary pressure is adjustable and controlled by a phosphor-bronze, spring-loaded bellows. Adjustable stops are factory set for sterilizer operation at either 250° or 270° F (121° or 132° C).

Thermostatic Steam Traps pressure and temperature compensated. Renewable **Monel bellows** with matched stainless-steel plunger and seat.

Baffle shields steam supply opening inside the chamber.

Pipe and Electrical Connections terminate within the confines of the sterilizer. Piping used to support other components is rigid brass.

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model, or for recessing, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other (free-standing units), or front panel to wall partition (recessed units). Stainless-steel front panel has service access door and height-adjustable kickplate. Inside of the access door contains a rack for instructional materials. Top and side panels (only free-standing units) enclose the sterilizer body and piping. Top panel is louvered. All panels are stainless steel. **Casters and lifting lugs** facilitate transporting and positioning sterilizer.

WARRANTY

The American Sterilizer Company warrants that each sterilizer is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and 90 days on labor. AMSCO representatives can provide full details of the warranty program upon request.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.

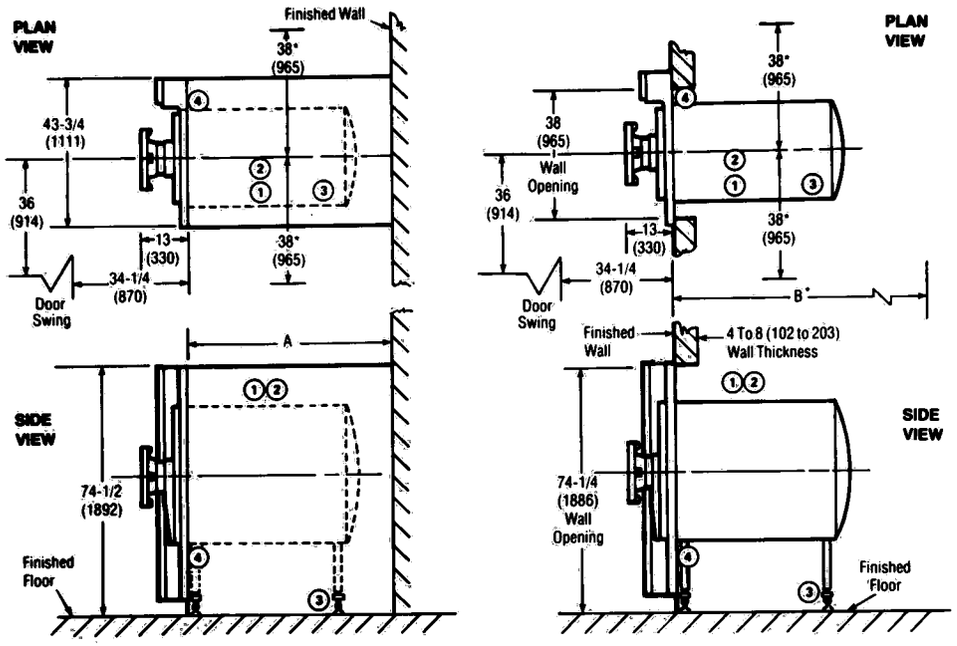
ENGINEERING DATA

SIZE In. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION						HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam††		Electricity — Amps (120 Volts, Single Phase)		Cabinet Enclosed	Recessed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Manual Door Model	Power Door Model		Front of Wall	Behind Wall
24x36x36 (610x914x914)	3700 (1680)	15 (57)	280 (1060)	112 (51)	112 (51)	3	20	12550	5000	7500
24x36x48 (610x914x1219)	4575 (2077)	15 (57)	284 (1075)	148 (67)	148 (67)	3	20	14650	5000	9600
24x36x60 (610x914x1524)	5250 (2384)	15 (57)	288 (1090)	185 (84)	185 (84)	3	20	16800	5000	11800

*†At 20-50 psig (1.41-3.52 kg/cm²) . ††At 50-80 psig (3.52-5.62 kg/cm²) *Based upon chamber filled with water*

SPECIFICATION WORKSHEET

Item _____: Furnish an AMSCO Eagle Series sterilizer per Tech Data Sheet SD-257. Construct chamber ☐ 24x36x36" or ☐ 24x36x48" or ☐ 24x36x60". Supply ☐ gravity model or ☐ laboratory/isothermal model. Design control with microcomputer to monitor system operations and control system functions. Equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ to be free standing or ☐ for recessing into a partition wall.



*Minimum Service Clearance

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

CHAMBER SIZE	A	B*
24x36x36 (610x914x914)	49-1/4 (1251)	62-1/8 (1578)
24x36x48 (610x914x1219)	62-1/2 (1587)	74 (1880)
24x36x60 (610x914x1524)	73-1/2 (1867)	89 (2261)

OPERATING REQUIREMENTS

① **COLD WATER** — 3/4 NPT, 20 to 50 psig (2.11 to 3.52 kg/ cm²) dynamic, approximately 5 gr. hardness

② **STEAM SUPPLY** — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor.

③ **DRAIN** — 2 ODT

④ **TERMINAL BOX** — 120-V, 60-Hz, Single-phase Service

... 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. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. Clearance in front of sterilizer, for loading purposes, should equal
   - length of sterilizer plus 12 inches (305 mm), if shelves will be used.
   - twice the length of sterilizer, if loading car and carriage will be used.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.
7. Floor drain should be provided within confines of sterilizer framework.

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

AMSCO

Eagle® 2000 SERIES MEDIUM STERILIZERS

Gravity Laboratory/Isothermal

• double door

TECH DATA

DESCRIPTION

Microcomputer controlled sterilizer: two types, both use steam under pressure as the sterilizing agent and operate by the gravity air-removal principle.

Types and Uses

Gravity — for sterilizing liquids in flasks with vented closures at 212° to 250° F (100° to 121° C); also heat- and moisture-stabile goods at 212° to 280° F (100° to 138° C).

Laboratory/Isothermal — in addition to the above capabilities, offers a further option of processing heat-coagulable and heat-sensitive materials at the low temperatures of 170° to 212° F (78° to 100° C).

Chamber Sizes

Interior dimensions are 24x36x48 inches (610x914x1219 mm) or 24x36x60 inches (610x914x1524 mm), as specified.

Standards

Every sterilizer meets applicable requirements of the following standards and carries the appropriate symbol:

Underwriters Laboratories Incorporated, and Canadian Standards Association.

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Inner shell, including doors, is constructed to withstand working pressure of 40 psig (2.81 kg/cm²).

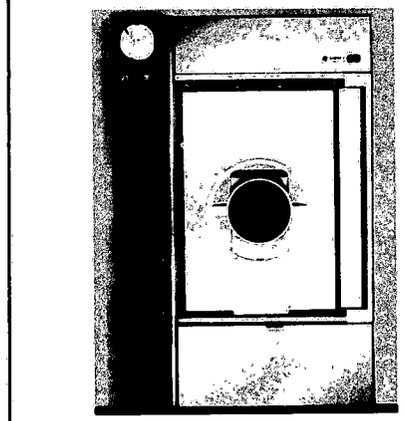
Federal Specification GG-S-1340A performance requirements for both high and low temperature processing.

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

ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202, or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

ASTM Specification B43 or B135, alloy 1 for seamless, red brass tubing.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Series
- ☐ **2041:** Gravity, 24x36x48"
- ☐ **2042:** Laboratory/Isothermal, 24x36x48"
- ☐ **2051:** Gravity, 24x36x60"
- ☐ **2052:** Laboratory/Isothermal, 24x36x60"

Door Operation
☐ Manual ☐ Power

Door Hinge (Operating End First)
- ☐ Right Side/Left Side
- ☐ Right Side/Right Side
- ☐ Left Side/Right Side
- ☐ Left Side/Left Side

Mounting
- ☐ For Recessing Through One Wall
- ☐ For Recessing Through Two Walls

Materials Handling Accessories*
- ☐ Rack and Shelves (48" Long Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____
Location(s) _____

Medium Steam Sterilizer (DOUBLE DOOR)

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

DESIGN FEATURES

Eagle-Eye® Vertical Control Column

Controls are conveniently located ... not exposed to the heat, vapor and condensate resulting from the sterilization process. For easy access, column is on side opposite door hinge.

Microcomputer monitors and controls system operations and functions. Cycle progresses automatically through conditioning, sterilizing, exhaust (fast or if liquids, adjustable slow with accelerator) and drying phases. Completion of cycle indicated visually; also audibly for 90 seconds.

- **Quartz-crystal based timing.** Microcomputer uses inputs from thumbwheel switches to accurately set exposure and drying times. Set times are displayed as **digital readouts.** Selected times are not changeable once a cycle has started. Timing automatically resets upon completion or resetting of cycle. Automatic reset eliminates need to reprogram timers between repeated cycles. If chamber temperature drops 2° F (1.1° C) below set value during exposure period, timing resets and STERILIZE phase indicator blinks for remainder of phase.
- **Cycle Monitoring.** Chamber doors must be locked pressure-tight to initiate a cycle. If unlocked, status lights alert operator. Once selected, cycle is **locked into** microcomputer. Should chamber fail to reach set sterilizing temperature, microcomputer **visually and audibly** alerts operator.

  Throughout entire liquids cycle, **WARNING** lights alert operator of **HOT LIQUIDS** in chamber. Following cycle, lights begin **flashing** when chamber door is cracked open for cooling period. **Buzzer** again sounds to indicate end of required **10-minute** cooling period. Pressing RESET button eliminates warning signal.

  Microcomputer **maintains its memory** during power outages of up to 20 milliseconds ... eliminates necessity of reinitiating cycle following routine power switchovers. After power failure in excess of 20 milliseconds, operator must reset control power. Visual and audible signals will then indicate that a cycle was interrupted by the power failure.

- **Program boards** are keyed, plug-in type with printed circuits. Boards are **coated** for increased dielectric strength. Service is readily accomplished from front of sterilizer. For diagnostic purposes, light emitting diodes **(LEDs)** indicate presence of signal to associated valves or other electrically operated devices.

Auto-Lume panels light up only when power is on. Top panel gives **cycle status;** center panel, Sterilize and Dry time **digital readouts;** bottom panel features lighted **cycle selectors.** Time readouts are large, easy-to-see LEDs that first indicate set times and then, as the cycle progresses, count down remaining time. Cycle selectors require positive force to actuate, eliminates unintentional cycle selections. Selected cycle is clearly indicated, others locked out.

Non-operating End Controls include **cycle selectors** through which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and hot liquids.

Indicator-Recorder-Controller provides **thermostatic temperature control.** Continually indicates chamber temperature. Signals microcomputer when temperature is at set point; also if chamber temperature drops below set value during exposure period. Indicating scale is reversible with Celsius and Fahrenheit markings. Sensor is in chamber drain line. Temperature is recorded on a synchronous motor-driven, 6-inch diameter chart using a **pressure-sensitive cartridge type pen.** The chart has both English and metric markings. Six cartridges and one hundred charts are furnished.

Gauges. Jacket pressure and chamber pressure/vacuum gauges are beneath the indicator-recorder-controller for easy viewing. Scales are graduated in both English and metric. A chamber pressure/vacuum gauge is on the non-operating end.

Secondary controls are behind a sliding door beneath the Auto-Lume panels. Included are **power switches,** one to isolate entire unit and a second to isolate only the controls; gravity or iso **cycle selector switch,** if applicable; **circuit breaker; thumbwheel switches** for Sterilize and Dry times; **cycle monitor (non-resettable)** to count number of sterilizing cycles for programming preventive maintenance; and **cycle reset** in case incorrect cycle is selected.

Isothermal Processing (Laboratory/Isothermal Model Only)

If isothermal mode is selected, chamber jacket is not heated. Chamber temperature is maintained by circulation of steam/air mix. Automatic cycle control and monitoring is same as for gravity cycles.

Chamber Drain System

Designed to **prevent pollutants** from entering water-supply system and sterilizer. **Steam-condensate system with Water Saver** converts steam to condensate and disposes condensate to waste. Regulates waterflow consistent with amount of steam discharged. Water supply **shutoff valve** is behind service access door.

Drying System

Steam ejector reduces chamber pressure during drying phase, draws air into chamber through a **bacteria-retentive filter.** This filtered air entrains and conducts odors and vapors from chamber. Steam to ejector is controlled by the **microcomputer.**

Manual Control

Sterilizer is manually operable (without electric power) by a single programming wheel.

Optional Material Handling Accessories

Includes racks with shelves, instrument trays and loading cars ... **all constructed of Monel;** and carriages with a painted-steel finish. See separate product literature for details.

TECHNICAL DATA

Controls

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

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

Jacket and Chamber Assembly

Monel door frames support and conceal ends of door-holding arms when doors are locked ... present a smooth surface for door gasket contact.

Hot-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell is **nickel clad,** 0.025" (0.63 mm) thick. A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber assembly is 1-inch (25 mm) thick, nominal and double faced with aluminum foil. It is held in place by pressure-sensitive tape, aluminum straps and clips. Sterilizer jacket is painted prior to being insulated.

Doors. Nickel-clad (0.025" (0.63 mm)), hot-rolled carbon steel. Manually operable or power driven. Stainless-steel, sound-deadened covers conceal holding arms and exterior parts. Stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Doors adjustable for accurate gasket alignment. Radial arms exert even pressure on silicone-rubber sealing gaskets. Microswitches prevent inadvertent start of cycle before doors are locked; **pressure locks** keep doors from being opened during cycle. **Doors may be tightened but not opened while pressure is in chamber.**

- **Manual Doors.** Radial arms actuated by rotating a low-heat-conducting handwheel.
- **Power Doors.** Each door opened and closed by a fused, motorized mechanism with magnetic slip clutch (for overload protection). Radial arms positioned by socket plate assembly run by motorized mechanism with gear reducer and overload protection. Doors stop automatically if obstruction is encountered while operating, in addition a separate stop button is provided. Power-driven doors are also manually operable.

Steam Source

Sterilizer is piped, valved and trapped to receive steam delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). Service lines terminate at fittings for connection of building service lines. Sterilizer steam supply line includes a strainer, shutoff and internal pressure regulator. Jacket condensate line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door.

Other Components

The following are furnished to obtain a complete working unit, ready for (but not including) connection to the building utility service lines.

Solenoid Valves to simplify sterilizer piping. Valves are placed where they are needed and can be serviced individually.

Manual Valves. Bronze, angle type with renewable Monel seats and synthetic discs or equivalent, high-quality parts. Hydrostatically tested at 350 psig (24.61 kg/cm²) or proven leakproof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Low-heat-conducting, easily replaceable handles.

Steam Pressure Regulator operates on supply pressure of 50 to 80 psig (3.52 to 5.62 kg/cm²). Secondary pressure is adjustable and controlled by a phosphor-bronze, spring-loaded bellows. Adjustable stops are factory set for sterilizer operation at either 250° or 270° F (121° or 132° C).

Thermostatic Steam Traps pressure and temperature compensated. Renewable **Monel bellows** with matched stainless-steel plunger and seat.

Baffle shields steam supply opening inside the chamber.

Pipe and Electrical Connections terminate within the confines of the sterilizer. Piping used to support other components is rigid brass.

INSTALLATION

Sterilizer arranged for mounting through one or two partition walls. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other and to wall partition(s) as required. All panels are stainless steel. Front and back panels have service access doors and height-adjustable kickplates. Inside of each access door contains a rack for instructional materials. A model for recessing through one wall has side panels and a louvered top panel. **Casters and lifting lugs** facilitate transporting and positioning sterilizer.

WARRANTY

The American Sterilizer Company warrants that each sterilizer is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and 90 days on labor. AMSCO representatives can provide full details of the warranty program upon request.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.

ENGINEERING DATA

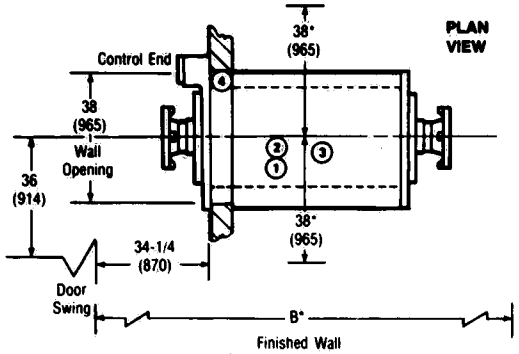
SIZE in. (mm)	WEIGHT* lbs (kg)	UTILITIES CONSUMPTION						HEAT LOSS BTU/hr at 70° F (21° C)			
		Water†		Steam††		Electricity — Amps (120 Volts, Single Phase)		Thru One Wall		Thru Two Walls	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Manual Door Model	Power Door Model	Front of Wall	Room Back of Wall	At Each End	Between Walls
24x36x48 (610x914x1219)	4875 (2213)	15 (57)	284 (1075)	148 (67)	148 (67)	3	20	5000	13800	5000	8600
24x36x60 (610x914x1524)	5550 (2520)	15 (57)	288 (1090)	185 (84)	185 (84)	3	20	5000	16500	5000	10600

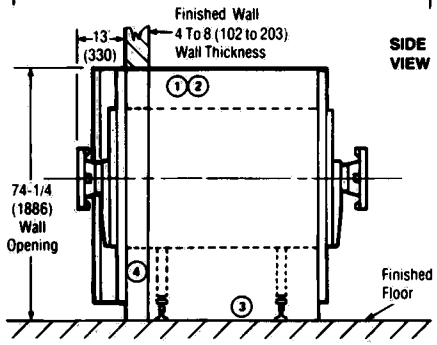
†At 20-50 psig (1.41-3.52 kg/cm²) ††At 50-80 psig (3.52-5.62 kg/cm²) *Based upon chamber filled with water.

SPECIFICATION WORKSHEET

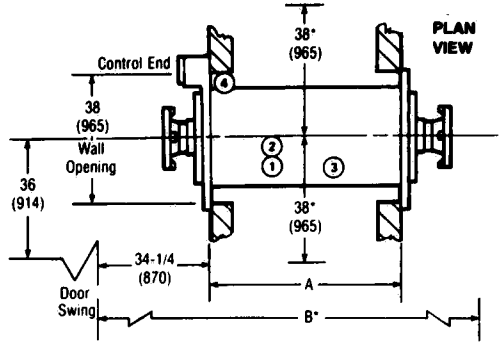
Item _____ : Furnish an AMSCO Eagle Series sterilizer per Tech Data Sheet SD-258. Construct chamber ☐ 24x36x48" or ☐ 24x36x60". Supply ☐ gravity model or ☐ laboratory/isothermal model. Design control with microcomputer to monitor system operations and control system functions. Equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ for recessing through one wall or ☐ for recessing through two walls.

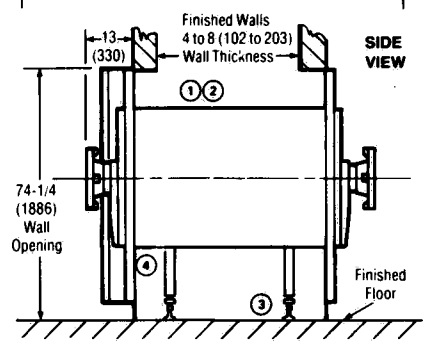
FOR RECESSING THRU ONE WALL





FOR RECESSING THRU TWO WALLS





*Minimum Service Clearance

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

CHAMBER SIZE	A	B*
24x36x48 (610x914x1219)	61-3/4 (1568)	130-1/4 (3308)
24x36x60 (610x914x1524)	76 (1930)	144-1/2 (3670)

OPERATING REQUIREMENTS

1. COLD WATER — 3/4 NPT, 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
2. STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
3. DRAIN — 2 ODT
4. TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

... 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. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. Clearance at each end of sterilizer, for purposes of loading it, should equal
   - length of sterilizer plus 12 inches (305 mm), if shelves will be used.
   - twice the length of sterilizer, if loading car and carriage will be used.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical. Door-swing clearances for non-operating end are identical.
7. Wall opening dimensions for non-operating end are identical to those for control end.
8. Floor drain should be provided within confines of sterilizer framework.

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

AMSCO

Medium Steam Sterilizer (SINGLE DOOR)

Eagle® 2000 SERIES MEDIUM STERILIZERS with Printcon™

Gravity **Laboratory/Isothermal**

• *single door*

TECH DATA

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system**; two types, both use steam under pressure as the sterilizing agent and operate by the gravity air-removal principle.

Applications and Uses

Gravity — for sterilizing liquids in flasks with vented closures at 212 to 254 F (100 to 122 C); also heat- and moisture-stabile goods at 212 to 280 F (100 to 138 C).

Laboratory/Isothermal — in addition to the above gravity cycles, offers a further option of processing heat-coagulable and heat-sensitive materials at the lower temperatures of 170 to 212 F (78 to 100 C).

Chamber Sizes

Interior dimensions are 24x36x36 inches (610x914x914 mm), 24x36x48 inches (610x914x1219 mm) or 24x36x60 inches (610x914x1524 mm), as specified.

Standards

Every sterilizer meets applicable requirements of the following listings and standards and carries the appropriate symbols:

Underwriters Laboratories Incorporated, and Canadian Standards Association listing.

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Inner shell, including door, is constructed to withstand working pressure of 40 psig (2.81 kg/cm²).

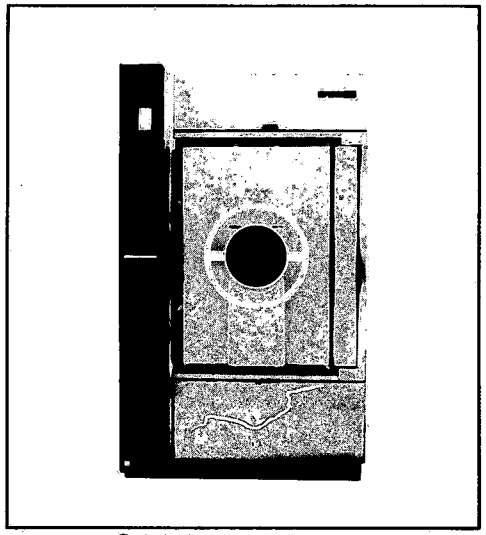
Federal Specification GG-S-1340A performance requirements for both high and low temperature processing.

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

ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202 or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

ASTM Specification B43 or B135, alloy 1 for seamless, red brass tubing.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Series
- ☐ **2031:** Gravity, 24x36x36"
- ☐ **2032:** Laboratory/Isothermal, 24x36x36"
- ☐ **2041:** Gravity, 24x36x48"
- ☐ **2042:** Laboratory/Isothermal, 24x36x48"
- ☐ **2051:** Gravity, 24x36x60"
- ☐ **2052:** Laboratory/Isothermal, 24x36x60"

Door Operation
- ☐ Manual ☐ Power

Door Hinge
- ☐ Right Side
- ☐ Left Side

Mounting
- ☐ For Recessing
- ☐ Cabinet Enclosed

Option
- ☐ Seismic Tie-down Kit

Materials Handling Accessories*
- ☐ Rack and Shelves (36 and 48" Long Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____

Location(s) _____

_____

_____

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Printed in U.S.A.

DESIGN FEATURES

Eagle® 2000 with Printcon™

Preprogrammed sterilizer with digital readouts and computer-generated printed records, Eagle microcomputers monitor and control system operations and functions. Cycle progresses automatically through conditioning, sterilizing, exhaust (fast or if liquids, adjustable slow with accelerator) and drying phases. Completion of cycle indicated visually; also audibly for 90 seconds.

Eagle-Eye™ Vertical Control Column (Figure 1)

Controls are neatly arranged in a vertical column conveniently located at the side of the sterilizer . . . not exposed to the continuous heat, vapor, and condensate resulting from the sterilization process. For easy access, column is on side opposite door hinge. Salient features include:

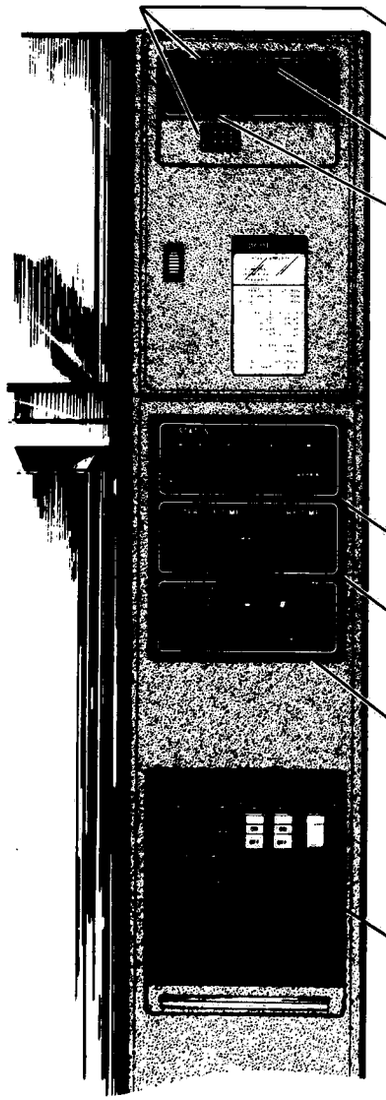


Figure 1. Eagle Eye Vertical Control Column.

1. **Printcon**, digital-printer-controller, controls, monitors, and records daily cycle number, chamber pressure, temperature, date, and time during sterilization, and provides **continuous LED display** of pressure and temperatures. (When control is turned on, all LEDs on the display board light momentarily for a **lamp test**.)

- **Temperature** is set on three-digit thumbwheel switch. During cycle actual temperature is displayed and printed. If selected temperature is outside allowable range, 150-295 F (65-146 C), buzzer sounds until an allowable temperature is selected. Temperature is locked in and cannot be changed once cycle is started.
- **Pressure** is continuously displayed and printed at programmed cycle transition points.
- **Time** (in hours and minutes, am/pm) and **Date** (month, day, year) are displayed by touching Time or Date switches.

Printcon provides easy-to-read **permanent printed record** of all pertinent cycle data, providing assurance to operator that cycle parameters have been met. **Alphanumeric printer** documents date, daily cycle number, starting time of each cycle, temperature selected, key transition points in cycle, and any deviations which might jeopardize sterilization process. One- or two-ply paper is available for the printer. With two-ply paper, an average day's record can be automatically stored, which can then be saved for future documentation; the second copy torn off and placed with each sterilizer load. (A sample printout is shown in **Figure 2.**)

2. **Auto-Lume panels** light when power is on. Top panel gives **cycle status**; center panel, **sterilize** and **dry times**; bottom panel, **cycle selectors.**

- **Status** lights show each phase of sterilizer operation. Light visually alerts operator if door is unlocked. Operator is visually and audibly alerted if temperature setpoint is not reached or if temperature drops below setpoint during Sterilize phase.
- **Sterilize Time** and **Dry Time** are locked in and cannot be changed once cycle is started. Timers automatically reset upon completion of cycle, eliminating need for resetting between repeated cycles. Timers also reset if sterilize temperature drops 2 F (1.1 C) below set point during exposure period.
- **Cycle Select** buttons require positive force to actuate, eliminating unintentional cycle selections. (Chamber door must be locked pressure-tight to initiate a cycle.) Selected cycle is clearly indicated, others locked out. Throughout entire liquids cycle, **WARNING** light alerts operator to **HOT LIQUIDS** in chamber. Following cycle, light **begins flashing** when chamber door is cracked open for cooling period. **Buzzer** again sounds to indicate end of required **10-minute** cooling period. Pressing RESET button eliminates warning signal.

3. **Secondary controls** are behind a sliding door beneath the Auto-Lume panels. Included are **power switches**, one to isolate entire unit and a second to isolate only the controls; gravity or iso **cycle selector switch**, if applicable; **circuit breaker**; **thumbwheel switches** for Sterilize and Dry times; **cycle monitor (non-resettable)** to count number of sterilizing cycles for programming preventive maintenance; **cycle reset** in case incorrect cycle is selected; and operating instructions.

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TECHNICAL DATA

Automatic Control

Programmed instructions (cycle and printer) are contained in 8-bit parallel **microcomputers**, each fabricated on a single silicon chip using N-channel silicon gate metal-oxide semiconductor (MOS) process. This fabrication represents today's "state-of-the-art" technology in large-scale integrated (LSI) circuits. **Cycle memory** is maintained during power outages of up to 20 milliseconds . . . eliminates necessity of reinitiating cycle following routine power switchovers. After 20 milliseconds operator must reset control power. Visual and audible signals then indicate that cycle was interrupted. Printout records failure (see **Figure 3**).

Inputs. Precision time (exposure and drying) and temperature settings are made on **thumbwheel switches.** Timing precision is maintained with the use of quartz crystals. Temperature is sensed by a **resistance thermal detector** (RTD) and pressure by a strain-gauge-type **pressure transducer.** These signals are then converted into electrical impulses to provide accurate control inputs and readings during entire cycle.

Pressure and vacuum set points are service adjustable. Pressure and temperature sensor failure will sound an alarm and a message will be printed. (See **Figure 3.**)

Display panels include large, easy-to-see **LED digital readouts,** visible legends and touch-sensitive switches. Time readouts first indicate set times and then, as cycle progresses, count down remaining time. Temperature readout can be in either Fahrenheit or Celsius. Display of pressure/vacuum can be in either English or metric. Temperature and pressure/vacuum can be shown with or without decimal places.

Alphanumeric Impact Printer produces characters within a **five-by-seven dot matrix.** Maximum 20 characters per line are printed on **2-3/8-inch-wide paper tape.** Tape exits from an opening flush with the surface of the control panel. Motorized take-up simplifies tape replacement and provides **automatic tape storage.** Maximum length of stored record is 15 feet. Black ink ribbon is contained in a compact, **easy-to-change cartridge.** Proper inking of ribbon is assured by a re-inking roll within the cartridge. Printer rated speed is 108 lines per minute. **Data is automatically printed** at the beginning and end of each cycle and at all transition points. Three tape rolls and two ink cartridges are furnished.

Printed Circuit Boards. Program boards are keyed, plug-in type. Service is accomplished from front of sterilizer. For diagnostic purposes, light emitting diodes (LEDs) indicate presence of signal to associated valves or other electrically operated devices. All PC boards are **coated** for increased dielectric strength and humidity protection.

Power Supply. Sterilizer requires 120 VAC, 50/60 Hz, single phase. Integral power supply provides regulated voltage levels for lamps, printer, take-up motor, analog circuits, and digital circuits. Solenoid valves operate on 120 VAC. The Printcon system includes a three-volt **lithium coin cell battery** to continuously maintain correct time and date without external power. Battery life is approximately one year.

Manual Control (Gravity Cycles Only)

Sterilizer is manually operable (without electric power) by a single programming wheel. (Printcon function is not operational in this mode.)

Jacket and Chamber Assembly

Monel door frame supports and conceals ends of door-holding arms when door is locked . . . presents a smooth surface for door gasket contact.

Hot-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell and chamber backhead are **nickel clad,** 0.025-inch (0.63 mm) thick (nominal). A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber assembly is 1-inch (25 mm) thick (nominal), and double faced with aluminum foil. It is held in place by pressure-sensitive tape, aluminum straps and clips. Sterilizer jacket (including backhead) is painted prior to being insulated.

Door. Nickel-clad (0.025-inch [0.63 mm] thick, nominal), hot-rolled carbon steel. Manually operable or power driven, as specified. Stainless-steel, sound-deadened cover conceals holding arms and exterior parts. Stainless-steel, bearing-mounted hinge on either side of chamber, as specified. Door adjustable for accurate gasket alignment. Radial arms exert even pressure on silicone-rubber sealing gasket. Microswitch prevents inadvertent start of cycle before door is locked; **pressure lock** keeps door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

- **Manual Door.** Radial arms actuated by rotating a low-heat-conducting handwheel.
- **Power Door.** Opened and closed by a fused, motorized mechanism with magnetic slip clutch (for overload protection). Radial arms positioned by socket plate assembly run by motorized mechanism with gear reducer and overload protection. Door stops automatically if obstruction is encountered while operating, in addition a separate stop button is provided. Power-driven door is also manually operable.

Isothermal Processing (Laboratory/Isothermal Model Only)

If isothermal mode is selected, chamber jacket is not heated. Chamber temperature is maintained by circulation of steam/air mix. Automatic cycle control and monitoring is same as for gravity cycles.

Chamber Drain System

Designed to prevent pollutants from entering into the water-supply system and sterilizer. **Steam-condensate system with water saver** converts steam to condensate and disposes condensate to waste. Regulates waterflow consistent with amount of steam discharged. Water supply **shutoff valve** is behind service access door. A constant steam bleed across the temperature sensing element (RTD) in the chamber line provides improved air elimination and more accurate temperature sensing.

Drying System

System ejector reduces chamber pressure during drying phase, draws air into chamber through a **bacteria-retentive filter.** This filtered air entrains and conducts odors and vapors from chamber to drain. Steam to ejector is microcomputer-controlled.

Steam Source

Sterilizer is piped, valved and trapped to receive steam delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). Service lines terminate at fittings for connection to building service lines. Sterilizer steam supply line includes a strainer, shutoff and internal pressure regulator. Jacket condensate line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door. Jacket pressure and chamber pressure/vacuum **gauges** are mounted in the valve panel, behind the upper access door. Scales are graduated in both English and metric.

Other Components

The following are furnished to obtain a complete working unit, ready for (but not including) connection to the building utility service lines.

Solenoid Valves to simplify sterilizer piping. Valves are placed where they are needed and can be serviced individually.

Manual Valves. Bronze, angle type with renewable Monel seats and synthetic discs or equivalent high-quality parts. Hydrostatically tested at 350 psig (24.61 kg/cm²) or proven leakproof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Low-heat-conducting, easily replaceable handles.

Steam Pressure Regulator operates on supply pressure of 50 to 80 psig (3.52 to 5.62 kg/cm²). Secondary pressure is adjustable and controlled by a phosphor-bronze, spring-loaded bellows. Adjustable stops are factory set for sterilizer operation at either 253 or 273 F (122 or 134 C).

Thermostatic Steam Traps pressure and temperature compensated. Renewable **Monel bellows** with matched stainless-steel plunger and seat.

Baffle shields steam supply opening inside the chamber.

Pipe and Electrical Connections terminate within the confines of the sterilizer. Piping used to support other components is rigid brass.

Optional Material Handling Accessories

Include racks with shelves, instrument trays and loading cars . . . **all constructed of Monel;** and carriages with a painted-steel finish. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model, or for recessing, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other (freestanding units), or front panel to wall partition (recessed units). Stainless-steel front panel has service access door and height-adjustable kickplate. Inside of the access door contains a rack for instructional materials. Top and side panels (only freestanding units) enclose the sterilizer body and piping. Top panel is louvered. All panels are stainless steel. **Casters and lifting lugs** facilitate transporting and positioning sterilizer. A **Seismic Tie-down Kit** is available for seismic installation of all medium Eagle sterilizers, if required.

WARRANTY*

The American Sterilizer Company warrants that each sterilizer is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and labor. AMSCO representatives can provide full details of the warranty program on request. The ASME pressure vessel is further warranted to the original owner against structural failure for a period of 15 years from the date of initial operation under normal use, operation and maintenance. This warranty does not extend to normal repairs, maintenance or adjustments required for the door closure mechanism.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.

**Applies only to units sold in the USA and Canada. For details of the warranty on units sold elsewhere, contact the AMSCO International Regional Office serving your area.*

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION				ELECTRICAL REQUIREMENTS		HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam††		Amps (120 Volts, Single Phase)		Cabinet Enclosed	Recessed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Manual Door Model	Power Door Model		Front of Wall	Behind Wall
24x36x36 (610x914x914)	3700 (1680)	15 (57)	280 (1060)	112 (51)	112 (51)	3	20	12550	5000	7500
24x36x48 (610x914x1219)	4575 (2077)	15 (57)	284 (1075)	148 (67)	148 (67)	3	20	14650	5000	9800
24x36x60 (610x914x1524)	5250 (2384)	15 (57)	288 (1090)	185 (84)	185 (84)	3	20	16800	5000	11800

**Based upon chamber filled with water*
†At 20-50 psig (1.41-3.52 kg/cm²)
††At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item ____: Furnish an AMSCO Eagle Series sterilizer with Printcon per Tech Data Sheet SD-357. Construct chamber □ 24x36x36" or □ 24x36x48" or □ 24x36x60". Supply □ gravity model or □ laboratory/isothermal model. Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Equip sterilizer to operate on steam from an independent source. Arrange sterilizer □ to be freestanding or □ for recessing into a partition wall.

```
CYCLE COMPLETE

  LOAD(03) _________
STERILIZER _________
  OPERATOR _________

  STERILIZE   30 MIN
TOTAL CYCLE   32 MIN

Z 12:34P  78.3  0.1P
E 12:34P  78.3  0.1P
S 12:04P  78.0  1.8P
C 12:02P  36.2  0.1P

    TIME TEMP. PRES.
         °C   ENG.

ISOTHERMAL  AT 078°C
CYCLE START  2-1-82
```

to be filled in by operator

phase times run

cycle complete
exhaust: pressure
sterilize phase
condition phase

temperature in Celsius, pressure in English

cycle type and temperature selected

Figure 2. Typical Printout.

```
POWER ON AT  2-1-82
  9:01A  68.4  0.0P
```

Power On Message

```
POWER ON AT  2-1-82
  9:34A 120.5 10.4P
```

Power Restored After Power Failure

```
ABORT:  RESET BUTTON
* 12:12A 279.4 22.2P
```

Reset Button Pressed

```
ALARM:      TOO LONG
*  1:45P 265.9 20.4P
```

Condition Phase Too Long

```
*11:05A 266.4 25.5P
ALARM:    UNDER TEMP
*11:04A 269.9 27.3P
```

Temperature drops 2 F Below Setpoint

```
ABORT:    DOOR OPEN
*  9:58A 243.3 12.7P
```

Door Opened During Cycle

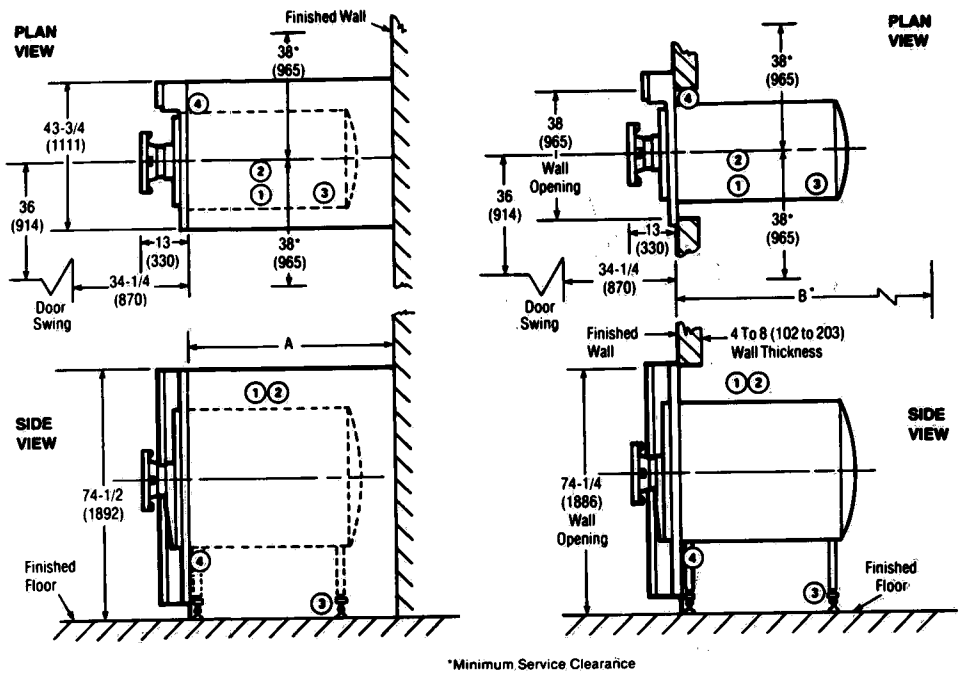
```
ABORT:   TEMP SENSOR
*  3:45A 306.8 10.0P
```

Temperature Sensor Failure

```
ABORT:   PRES SENSOR
*11:55A 270.0 41.3P
```

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



*Minimum Service Clearance

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

CHAMBER SIZE	A	B*
24x36x36 (610x914x914)	49-1/4 (1251)	63-1/8 (1603)
24x36x48 (610x914x1219)	62-1/2 (1587)	74 (1880)
24x36x60 (610x914x1524)	73-1/2 (1867)	89 (2261)

OPERATING REQUIREMENTS

(1) COLD WATER — 3/4 NPT, 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness

(2) STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor

(3) DRAIN — 2 ODT

(4) TERMINAL BOX — 120-V, 60-Hz, Single-phase Service for controls and, if furnished, power door

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. Disconnect switches (by others) should be installed in electric supply lines near the equipment.

3. Access to the recessing area from the control end of the sterilizer is recommended.

4. Clearances shown are minimal for installing and servicing the equipment.

5. Clearance in front of sterilizer, for loading purposes, should equal

   • length of sterilizer plus 12 inches (305 mm), if shelves will be used.

   • twice the length of sterilizer, if loading car and carriage will be used.

6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.

7. Floor drain should be provided within confines of sterilizer framework.

. . . CHECK LOCAL CODES . . .

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

AMSCO

Eagle® 2000 SERIES MEDIUM STERILIZERS with Printcon™

Gravity Laboratory/Isothermal

• *double door*

TECH DATA

Medium Steam Sterilizer (DOUBLE DOOR)

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system**; two types, both use steam under pressure as the sterilizing agent and operate by the gravity air-removal principle.

Types and Uses

Gravity — for sterilizing liquids in flasks with vented closures at 212 to 254 F (100 to 122 C); also heat- and moisture-stabile goods at 212 to 280 F (100 to 138 C).

Laboratory/Isothermal — in addition to the above gravity cycles, offers a further option of processing heat-coagulable and heat-sensitive materials at the low temperatures of 170 to 212 F (78 to 100 C).

Chamber Sizes

Interior dimensions are 24x36x48 inches (610x914x1219 mm) or 24x36x60 inches (610x914x1524 mm), as specified.

Standards

Every sterilizer meets applicable requirements of the following listings and standards and carries the appropriate symbols:

Underwriters Laboratories Incorporated, and Canadian Standards Association listing.

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Inner shell, including doors, is constructed to withstand working pressure of 40 psig (2.81 kg/cm²).

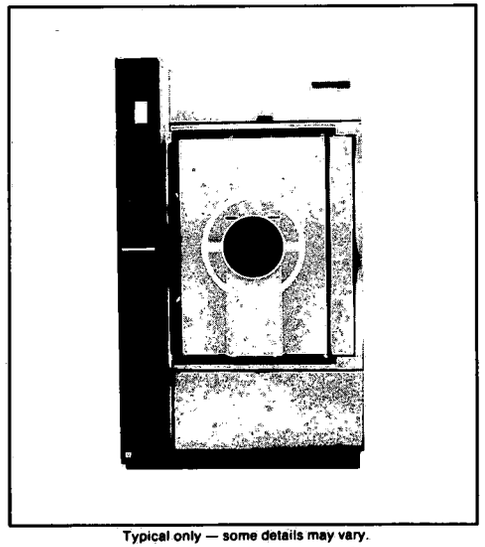
Federal Specification GG-S-1349A performance requirements for both high and low temperature processing.

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

ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202 or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

ASTM Specification B43 or B135, alloy 1 for seamless, red brass tubing.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Series
- ☐ **2041:** Gravity, 24x36x48"
- ☐ **2042:** Laboratory/Isothermal, 24x36x48"
- ☐ **2051:** Gravity, 24x36x60"
- ☐ **2052:** Laboratory/Isothermal, 24x36x60"

Door Operation
- ☐ Manual ☐ Power

Door Hinge (Operating End First)
- ☐ Right Side/Left Side
- ☐ Right Side/Right Side
- ☐ Left Side/Right Side
- ☐ Left Side/Left Side

Mounting
- ☐ For Recessing Through One Wall
- ☐ For Recessing Through Two Walls

Option
- ☐ Seismic Tie-down Kit

Materials Handling Accessories*
- ☐ Rack and Shelves (48" Long Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____

Location(s) _____

_____

_____

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DESIGN FEATURES

Eagle® 2000 with Printcon™

Preprogrammed sterilizer with digital readouts and computer-generated printed records, Eagle microcomputers monitor and control system operations and functions. Cycle progresses automatically through conditioning, sterilizing, exhaust (fast or if liquids, adjustable slow with accelerator) and drying phases. Completion of cycle indicated visually; also audibly for 90 seconds.

Eagle-Eye™ Vertical Control Column (Figure 1)

Controls are neatly arranged in a vertical column conveniently located at the side of the sterilizer . . . not exposed to the continuous heat, vapor, and condensate resulting from the sterilization process. For easy access, column is on side opposite door hinge. Salient features include:



Figure 1. Eagle Eye Vertical Control Column.

1. **Printcon,** digital-printer-controller, controls, monitors, and records daily cycle number, chamber pressure, temperature, date, and time during sterilization, and provides **continuous LED display** of pressure and temperatures. (When control is turned on, all LEDs on the display board light momentarily for a **lamp test.**)

- **Temperature** is set on three-digit thumbwheel switch. During cycle actual temperature is displayed and printed. If selected temperature is outside allowable range, 150-295 F (65-146 C), buzzer sounds until an allowable temperature is selected. Temperature is locked in and cannot be changed once cycle is started.

- **Pressure** is continuously displayed and printed at programmed cycle transition points.

- **Time** (in hours and minutes, am/pm) and **Date** (month, day, year) are displayed by touching Time or Date switches.

Printcon provides easy-to-read **permanent printed record** of all pertinent cycle data, providing assurance to operator that cycle parameters have been met. **Alphanumeric printer** documents date, daily cycle number, starting time of each cycle, temperature selected, key transition points in cycle, and any deviations which might jeopardize sterilization process. One- or two-ply paper is available for the printer. With two-ply paper, an average day's record can be automatically stored, which can then be saved for future documentation; the second copy torn off and placed with each sterilizer load. (A sample printout is shown in **Figure 2.**)

2. **Auto-Lume panels** light when power is on. Top panel gives **cycle status;** center panel, **sterilize** and **dry times;** bottom panel, **cycle selectors.**

- **Status** lights show each phase of sterilizer operation. Light visually alerts operator if a door is unlocked. Operator is visually and audibly alerted if temperature setpoint is not reached or if temperature drops below setpoint during Sterilize phase.

- **Sterilize Time** and **Dry Time** are locked in and cannot be changed once cycle is started. Timers automatically reset upon completion of cycle, eliminating need for resetting between repeated cycles. Timers also reset if sterilize temperature drops 2 F (1.1 C) below set point during exposure period.

- **Cycle Select** buttons require positive force to actuate, eliminating unintentional cycle selections. (Chamber doors must be locked pressure-tight to initiate a cycle.) Selected cycle is clearly indicated, others locked out. Throughout entire liquids cycle, **WARNING** light alerts operator to **HOT LIQUIDS** in chamber. Following cycle, light **begins flashing** when chamber door is cracked open for cooling period. **Buzzer** again sounds to indicate end of required **10-minute** cooling period. Pressing RESET button eliminates warning signal.

3. **Secondary controls** are behind a sliding door beneath the Auto-Lume panels. Included are **power switches,** one to isolate entire unit and a second to isolate only the controls; gravity or iso **cycle selector switch** if applicable; **circuit breaker; thumbwheel switches** for Sterilize and Dry times; **cycle monitor (non-resettable)** to count number of sterilizing cycles for programming preventive maintenance; **cycle reset** in case incorrect cycle is selected; and operating instructions.

Non-operating End Controls include Gravity and Liquids **cycle selectors** by which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and hot liquids.

C- 1

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C- 2

TECHNICAL DATA

Automatic Control

Programmed instructions (cycle and printer) are contained in 8-bit parallel **microcomputers,** each fabricated on a single silicon chip using N-channel silicon gate metal-oxide semiconductor (MOS) process. This fabrication represents today's "state-of-the-art" technology in large-scale integrated (LSI) circuits. **Cycle memory** is maintained during power outages of up to 20 milliseconds . . . eliminates necessity of reinitiating cycle following routine power switchovers. After 20 milliseconds operator must reset control power. Visual and audible signals then indicate that cycle was interrupted. Printout records failure (see **Figure 3**).

Inputs. Precision time (exposure and drying) and temperature settings are made on **thumbwheel switches.** Timing precision is maintained with the use of quartz crystals. Temperature is sensed by a **resistance thermal detector** (RTD) and pressure by a strain-gauge-type **pressure transducer.** These signals are then converted into electrical impulses to provide accurate control inputs and readings during entire cycle.

Pressure and vacuum set points are service adjustable. Pressure and temperature sensor failure will sound an alarm and a message will be printed. (See **Figure 3.**)

Display panels include large, easy-to-see **LED digital readouts,** visible legends and touch-sensitive switches. Time readouts first indicate set times and then, as cycle progresses, count down remaining time. Temperature readout can be in either Fahrenheit or Celsius. Display of pressure/vacuum can be in either English or metric. Temperature and pressure/vacuum can be shown with or without decimal places.

Alphanumeric Impact Printer produces characters within a **five-by-seven dot matrix.** Maximum 20 characters per line are printed on **2-3/8-inch-wide paper tape.** Tape exits from an opening flush with the surface of the control panel. Motorized take-up simplifies tape replacement and provides **automatic tape storage.** Maximum length of stored record is 15 feet. Black ink ribbon is contained in a compact, **easy-to-change cartridge.** Proper inking of ribbon is assured by a re-inking roll within the cartridge. Printer rated speed is 108 lines per minute. **Data is automatically printed** at the beginning and end of each cycle and at all transition points. Three tape rolls and two ink cartridges are furnished.

Printed Circuit Boards. Program boards are keyed, plug-in type. Service is accomplished from front of sterilizer. For diagnostic purposes, light emitting diodes (LEDs) indicate presence of signal to associated valves or other electrically operated devices. All PC boards are **coated** for increased dielectric strength and humidity protection.

Power Supply. Sterilizer requires 120 VAC, 50/60 Hz, single phase. Integral power supply provides regulated voltage levels for lamps, printer, take-up motor, analog circuits, and digital circuits. Solenoid valves operate on 120 VAC. The Printcon system includes a three-volt **lithium coin cell battery** to continuously maintain correct time and date without external power. Battery life is approximately one year.

Manual Control (Gravity Cycles Only)

Sterilizer is manually operable (without electric power) by a single programming wheel. (Printcon function is not operational in this mode.)

Jacket and Chamber Assembly

Monel door frames support and conceal ends of door-holding arms when doors are locked . . . present a smooth surface for door gasket contact.

Hot-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell is **nickel clad,** 0.025-inch (0.63 mm) thick (nominal). A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber assembly is 1-inch (25 mm) thick (nominal), and double faced with aluminum foil. It is held in place by pressure-sensitive tape, aluminum straps and clips. Sterilizer jacket is painted prior to being insulated.

Doors. Nickel-clad (0.025-inch [0.63 mm] thick, nominal), hot-rolled carbon steel. Manually operable or power driven, as specified. Stainless-steel, sound-deadened covers conceal holding arms and exterior parts. Stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Doors adjustable for accurate gasket alignment. Radial arms exert even pressure on silicone-rubber sealing gasket. Microswitches prevent inadvertent start of cycle before doors are locked; **pressure lock** keeps doors from being opened during cycle. **Doors may be tightened but not opened while pressure is in chamber.**

- **Manual Doors.** Radial arms actuated by rotating a low-heat-conducting handwheel.
- **Power Doors.** Each door opened and closed by a fused, motorized mechanism with magnetic slip clutch (for overload protection). Radial arms positioned by socket plate assembly run by motorized mechanism with gear reducer and overload protection. Doors stop automatically if obstruction is encountered while operating, in addition a separate stop button is provided. Power-driven doors are also manually operable.

Isothermal Processing (Laboratory/Isothermal Model Only)

If isothermal mode is selected, chamber jacket is not heated. Chamber temperature is maintained by circulation of steam/air mix. Automatic cycle control and monitoring is same as for gravity cycles.

Chamber Drain System

Designed to prevent pollutants from entering into the water-supply system and sterilizer. **Steam-condensate system with water saver** converts steam to condensate and disposes condensate to waste. Regulates waterflow consistent with amount of steam discharged. Water supply **shutoff valve** is behind service access door. A constant steam bleed across the temperature sensing element (RTD) in the chamber line provides improved air elimination and more accurate temperature sensing.

Drying System

System ejector reduces chamber pressure during drying phase, draws air into chamber through a **bacteria-retentive filter.** This filtered air entrains and conducts odors and vapors from chamber to drain. Steam to ejector is microcomputer-controlled.

Steam Source

Sterilizer is piped, valved and trapped to receive steam delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). Service lines terminate at fittings for connection to building service lines. Sterilizer steam supply line includes a strainer, shutoff and internal pressure regulator. Jacket condensate line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door. Jacket pressure and chamber pressure/vacuum **gauges** are mounted in the valve panel, behind the upper access door. Scales are graduated in both English and metric.

Other Components

The following are furnished to obtain a complete working unit, ready for (but not including) connection to the building utility service lines.

Solenoid Valves to simplify sterilizer piping. Valves are placed where they are needed and can be serviced individually.

Manual Valves. Bronze, angle type with renewable Monel seats and synthetic discs or equivalent high-quality parts. Hydrostatically tested at 350 psig (24.61 kg/cm²) or proven leakproof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Low-heat-conducting, easily replaceable handles.

Steam Pressure Regulator operates on supply pressure of 50 to 80 psig (3.52 to 5.62 kg/cm²). Secondary pressure is adjustable and controlled by a phosphor-bronze, spring-loaded bellows. Adjustable stops are factory set for sterilizer operation at either 253 or 273 F (122 or 134 C).

Thermostatic Steam Traps pressure and temperature compensated. Renewable **Monel bellows** with matched stainless-steel plunger and seat.

Baffle shields steam supply opening inside the chamber.

Pipe and Electrical Connections terminate within the confines of the sterilizer. Piping used to support other components is rigid brass.

Optional Material Handling Accessories

Include racks with shelves, instrument trays and loading cars . . . **all constructed of Monel;** and carriages with a painted-steel finish. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting through one or two partition walls. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other and to wall partition(s) as required. All panels are stainless-steel. Front and back panels have service access doors and height-adjustable kickplates. Inside of each access door contains a rack for instructional materials. A model for recessing through one wall has side panels and a louvered top panel. **Casters and lifting lugs** facilitate transporting and positioning sterilizer. A **Seismic Tie-down Kit** is available for seismic installation of all medium Eagle sterilizers, if required.

WARRANTY*

The American Sterilizer Company warrants that each sterilizer is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and labor. AMSCO representatives can provide full details of the warranty program on request. The ASME pressure vessel is further warranted to the original owner against structural failure for a period of 15 years from the date of initial operation under normal use, operation and maintenance. This warranty does not extend to normal repairs, maintenance or adjustments required for the door closure mechanism.

**Applies only to units sold in the USA and Canada. For details of the warranty on units sold elsewhere, contact the AMSCO International Regional Office serving your area.*

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.

ENGINEERING DATA

SIZE in. (mm)	WEIGHT* lbs (kg)	UTILITIES CONSUMPTION				ELECTRICAL REQUIREMENTS		HEAT LOSS BTU/hr at 70° F (21° C)			
		Water†		Steam††		Amps (120 Volts, Single Phase)		Thru One Wall		Thru Two Walls	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Manual Door Model	Power Door Model	Front of Wall	Room Back of Wall	At Each End	Between Walls
24x36x48 (610x914x1219)	4875 (2213)	15 (57)	284 (1075)	148 (67)	148 (67)	3	20	5000	13600	5000	8800
24x36x60 (610x914x1524)	5550 (2520)	15 (57)	288 (1090)	185 (84)	185 (84)	3	20	5000	16500	5000	10500

**Based upon chamber filled with water.*
†At 20-50 psig (1.41-3.52 kg/cm²)
††At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item _____: Furnish an AMSCO Eagle Series sterilizer with Printcon per Tech Data Sheet SD-358. Construct chamber ☐ 24x36x48" **or** ☐ 24x36x60". Supply ☐ gravity model **or** ☐ laboratory/isothermal model. Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ for recessing through one wall **or** ☐ for recessing through two walls.

```
--------------------
   CYCLE COMPLETE

  LOAD(03) ----------
STERILIZER ----------
  OPERATOR ----------

  STERILIZE   30 MIN
TOTAL CYCLE   32 MIN

Z 12:34P  78.3  0.1P
E 12:34P  78.3  0.1P
S 12:04P  78.0  1.8P
C 12:02P  36.2  0.1P

    TIME TEMP. PRES.
         °C   ENG.

ISOTHERMAL  AT 078°C
CYCLE START  2-1-82
--------------------
```

to be filled in by operator

phase times run

cycle complete
exhaust: pressure
sterilize phase
condition phase

temperature in Celsius, pressure in English

cycle type and temperature selected

Figure 2. Typical Printout.

```
--------------------
POWER ON AT  2-1-82
   9:01A  68.4  0.0P
--------------------
```

Power On Message

```
--------------------
POWER ON AT  2-1-82
   9:34A 120.5 10.4P
--------------------
```

Power Restored After Power Failure

```
--------------------
ABORT:  RESET BUTTON
* 12:12A 279.4 22.2P
--------------------
```

Reset Button Pressed

```
--------------------
ALARM:      TOO LONG
*  1:45P 265.9 20.4P
--------------------
```

Condition Phase Too Long

```
--------------------
* 11:05A 266.4 25.5P
ALARM:   UNDER TEMP
* 11:04A 269.9 27.3P
--------------------
```

Temperature drops 2 F Below Setpoint

```
--------------------
ABORT:    DOOR OPEN
*  9:58A 243.3 12.7P
--------------------
```

Door Opened During Cycle

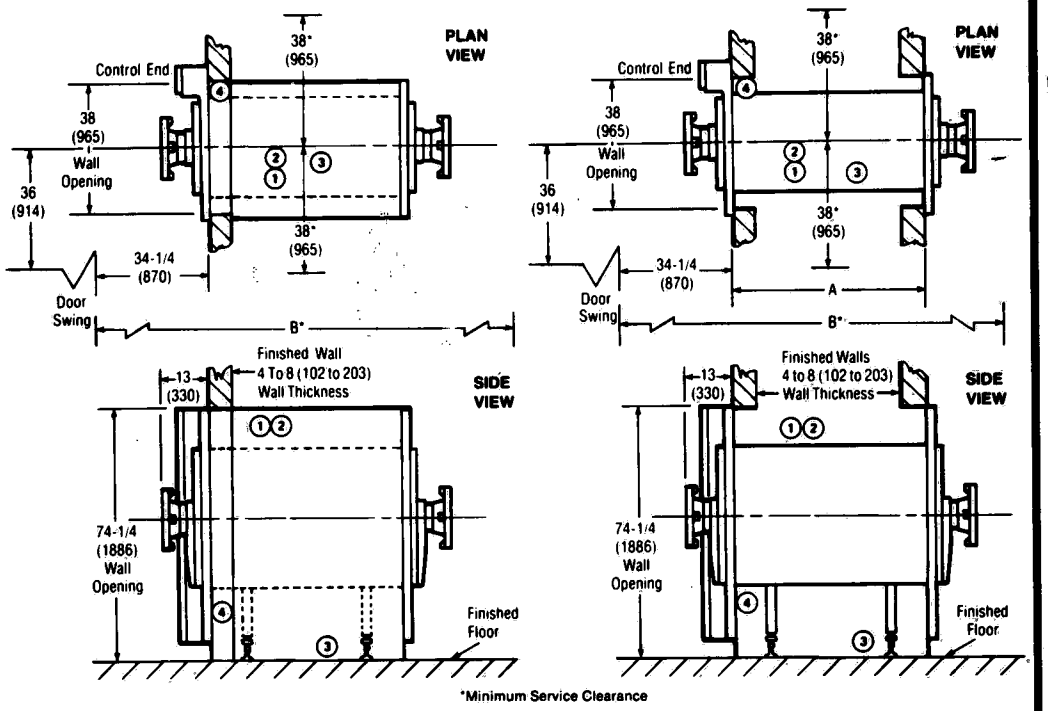
```
--------------------
ABORT:   TEMP SENSOR
*  3:45A 386.8 10.0P
--------------------
```

Temperature Sensor Failure

```
--------------------
ABORT:   PRES SENSOR
* 11:55A 270.0 41.3P
--------------------
```

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



*Minimum Service Clearance

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

CHAMBER SIZE	A	B*
24x36x48 (610x914x1219)	61-3/4 (1568)	130-1/4 (3308)
24x36x60 (610x914x1524)	76 (1930)	144-1/2 (3670)

OPERATING REQUIREMENTS

1. COLD WATER — 3/4 NPT 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
2. STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
3. DRAIN — 2 ODT
4. TERMINAL BOX — 120-V, 60-Hz, Single-phase Service for controls and, if furnished, power doors

. . . 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. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. Clearance at each end of sterilizer, for loading purposes, should equal
   - length of sterilizer plus 12 inches (305 mm), if shelves will be used.
   - twice the length of sterilizer, if loading car and carriage will be used.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.
7. Wall opening dimensions for non-operating end are identical to those for control end.
8. Floor drain should be provided within confines of sterilizer framework.

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

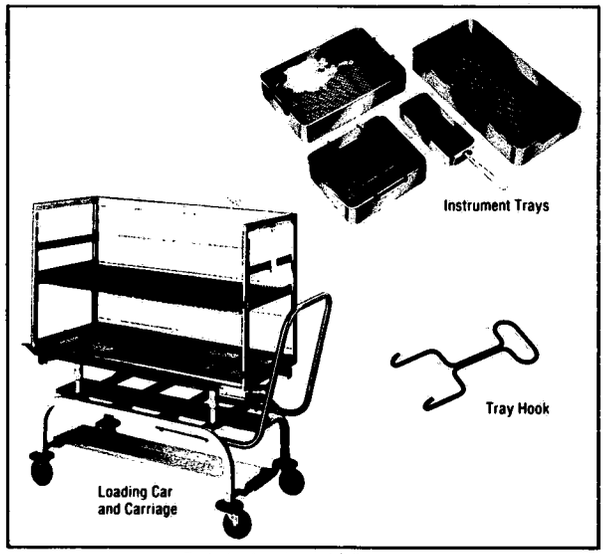
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AMSCO

Material Handling Accessories

MATERIAL HANDLING ACCESSORIES
• *for medium sterilizers and aerators*

TECH DATA



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THE EQUIPMENT BEING SPECIFIED.

Sterilizer Size
- ☐ 24x36x36" (610x914x914 mm)
- ☐ 24x36x48" (610x914x1219 mm)
- ☐ 24x36x60" (610x914x1524 mm)

Accessories
- ☐ Rack and 2 Shelves
  - ☐ Additional Shelves Qty: ___
- ☐ Loading Car Qty: ___
  - ☐ Additional Shelves Qty: ___
- ☐ Carriage Qty: ___
- ☐ **Instrument Tray(s)**

Qty:
- ___ 9" (229 mm) Long Instrument Tray
- ___ 15" (381 mm) Long Instrument Tray
- ___ 20-1/2" (521 mm) Long Instrument Tray
  - ___ Tray Hooks (Pair)
- ___ Emergency Tray
  - ___ Extra Handle for Emergency Tray
- ___ 9-1/2" (241 mm) Long x 3-1/2" (89 mm) Deep Instrument (Container Inner) Tray
- ___ 9-1/2" (241 mm) Long x 1-3/4" (44 mm) Deep Instrument (Container Inner) Tray
- ___ 20-1/2" (521 mm) Long x 3-1/2" (89 mm) Deep Instrument (Container Inner) Tray
- ___ 20-1/2" (521 mm) Long x 1-3/4" (44 mm) Deep Instrument (Container Inner) Tray

Item No. _____
Location(s) _____
_____
_____

LOADING CAR* AND CARRIAGE

For loading and unloading sterilizers and ethylene oxide gas aerators, and transferring goods to and from processing areas.

- **Loading Car:** All-welded **Monel** frame with shelves, load-retaining bearing-mounted wheels. Wheels are flanged to fit tracks in chamber of a sterilizer or aerator and on a carriage.

  Two full-width, full-length shelves are provided if car is for a 36-inch (914-mm) or 48-inch (1219-mm) long sterilizer chamber. Four full-width, half-length shelves, if for a 60-inch (1524-mm) long chamber. Bottom shelf is stationary; others are removable and adjustable to eight heights. The easy-to-remove, load-retaining gate is secured to the car by clips which engage slots in the frame.

  Shelves are made of Monel wire welded to Monel frames. The load-retaining gate is constructed of Monel wire. The car wheels are brass; axles, Monel.

*patent pending

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over ▶

- **Carriage.** Welded, tubular-steel frame with swivel height-adjustable loading car tracks on the top. The frame has a push-bar handle and is supported by two fixed and two swivel casters with neoprene, nonmarking tires. A revolving, neoprene protective bumper is installed above each wheel.

  A hand-operated latch holds the carriage against the sterilizer or aerator door frame while the loading car is being placed into or removed from the chamber. While in position on the carriage, the loading car is secured there by a spring-loaded latch. Both latches are operated from the handle end of the carriage.

  Carriage handle is stainless steel; frame is painted for corrosion protection. Both the car and carriage will support 1000 pounds (454 kg).

RACK AND SHELF SET (STERILIZERS ONLY)

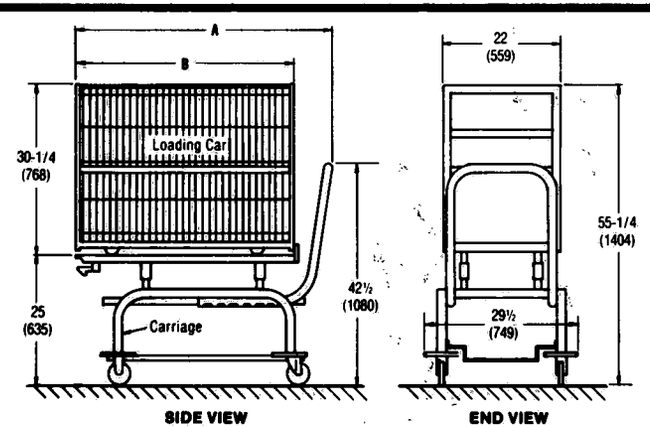
For 24x36x36" (610x914x914 mm) or 24x36x48" (610x914x1219 mm) sterilizers. Provides loading efficiency for a variety of mixed or single item loads. Shelves are completely removable for processing bulk loads. Rack has roller guides to accommodate either two or three equally spaced shelves. Two shelves are furnished as standard. Additional shelves are available.

Rack is welded Monel. Angle guides support the shelves. Stops allow each shelf to be withdrawn approximately halfway. Each shelf is welded Monel, suitably reinforced and designed to allow free passage of sterilant.

INSTRUMENT TRAYS

For sterilizing, storing and transporting individual or sets of instruments. Perforated bottoms allow sterilant penetration and prevent trapped air. Bottoms are recessed to reduce wetting of outer wrappers.

- **Surgical Trays:** Welded Monel with perforated bottoms. Each tray has carrying handles which, when not in use, fold inward parallel to the top of the tray. All trays are 10-1/2" (267 mm) wide x 3" (76 mm) deep. Three lengths are available: 20-1/2" (521 mm), 15" (381 mm), or 9" (229 mm). Optional hooks fasten to tray handles for ease of transporting trays.
- **Emergency Tray:** For sterilizing and transporting "forgotten," dropped, or emergency surgical instruments. Tray is 9-1/2" long x 4" wide x 1-3/4" deep (241x102x44 mm). Stainless-steel construction with a wire-mesh bottom. Furnished with an easily removed, sterilizable handle which can be attached without touching the tray.
- **Surgical Instrument (Container Inner) Trays:** Trays are constructed of welded Monel with perforated bottoms (1/8" perforations accommodate use of Instrument Fixation System) and can be used as surgical instrument or sterilization container inner trays. Unique handle design allows aseptic presentation of contents. All trays are 9-1/2" (241 mm) wide and are available in four length/depth combinations: 9-1/2" long x 3-1/2" deep (241x89 mm), 9-1/2" long x 1-3/4" deep (241x44 mm), 20-1/2" long x 3-1/2" deep (521x89 mm), 20-1/2" long x 1-3/4" deep (521x44 mm).



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

NOTES:

1. Car has 2 full-width, full-length shelves (adjustable to 8 heights).
2. Car has 4 full-width, half-length shelves (adjustable to 8 heights).

STERILIZER SIZE	SEE NOTE	A	B
24x36x36 (610x914x914)	1	47½ (1206)	37½ (952)
24x36x48 (610x914x1219)	1	59½ (1511)	49½ (1257)
24x36x60 (610x914x1524)	2	73¼ (1861)	63¼ (1607)

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

SECTION 2

OPERATING INSTRUCTIONS (IRC)

2.1 GENERAL

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

Figure 2-2 shows the location of the various controls.

For Printcon units, refer to paragraphs 2.10 through 2.16.

2.2 BEFORE OPERATING THE EQUIPMENT

1. Be sure that chamber drain strainer is clean and in place and that chamber interior is clean (para. 4.5).

2. Open the upper access door.

   a. If sterilizer has manual control, make sure it is turned to OFF.

   b. Turn STEAM and WATER valves to ON. Steam is admitted to the jacket (if a steam-powered unit) and will begin to warm chamber. If HI-LO valve is on HI, jacket pressure will stabilize at 32 psig; if on LO, it will stabilize at 20 psig.

3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel will light up. If electrically heated unit, the steam generator will begin to heat. If door(s) is open, status light DOOR UNLOCKED (and OPPOSITE DOOR UNLOCKED, for double-door units) will be on. STERILIZE TIME and DRY TIME digital readouts will agree with settings on thumbwheel switches on secondary panel. Cycle selectors will be dimly lit.

4. If the sterilizer is a Laboratory/Isothermal model, position GRAVITY/ISOTHERMAL switch to desired function. GRAVITY for Gravity or Liquids cycle; ISO for Laboratory/Isothermal cycle.

5. Install a new paper chart on the Indicator-Recorder-Controller at the beginning of each day.

6. Review paragraph 2.8, "Control Monitoring and Communication," in order to identify the cause of any abnormal condition during a sterilization cycle.

7. If a double-door unit, review paragraph 2.9 to become familiar with the controls on the non-operating end.

8. If a Gravity sterilizer, or if a GRAVITY function was selected on a Laboratory/Isothermal sterilizer, wait until jacket pressure, as indicated by jacket pressure gauge, has stabilized before starting a cycle. (**NOTE:** Steam does not enter jacket when GRAVITY/ISO switch is in ISO position.)

NOTE: In case of inadvertent, incorrect cycle selection, operator should press cycle RESET pushbutton on secondary panel. Overload circuit breaker, RE-CIRK-IT, is also located on the secondary panel, beside cycle RESET. Other abnormal conditions which require cycle reset are described in paragraph 2.8, "Control Monitoring and Communications Systems."

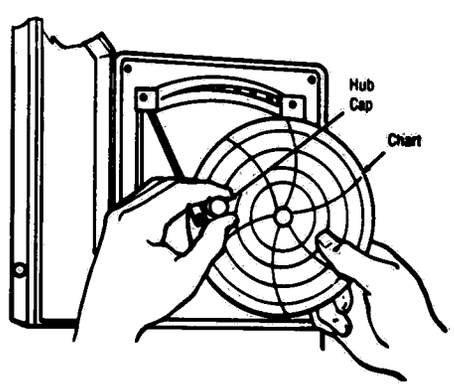


Figure 2-1. CHANGING THE CHART.

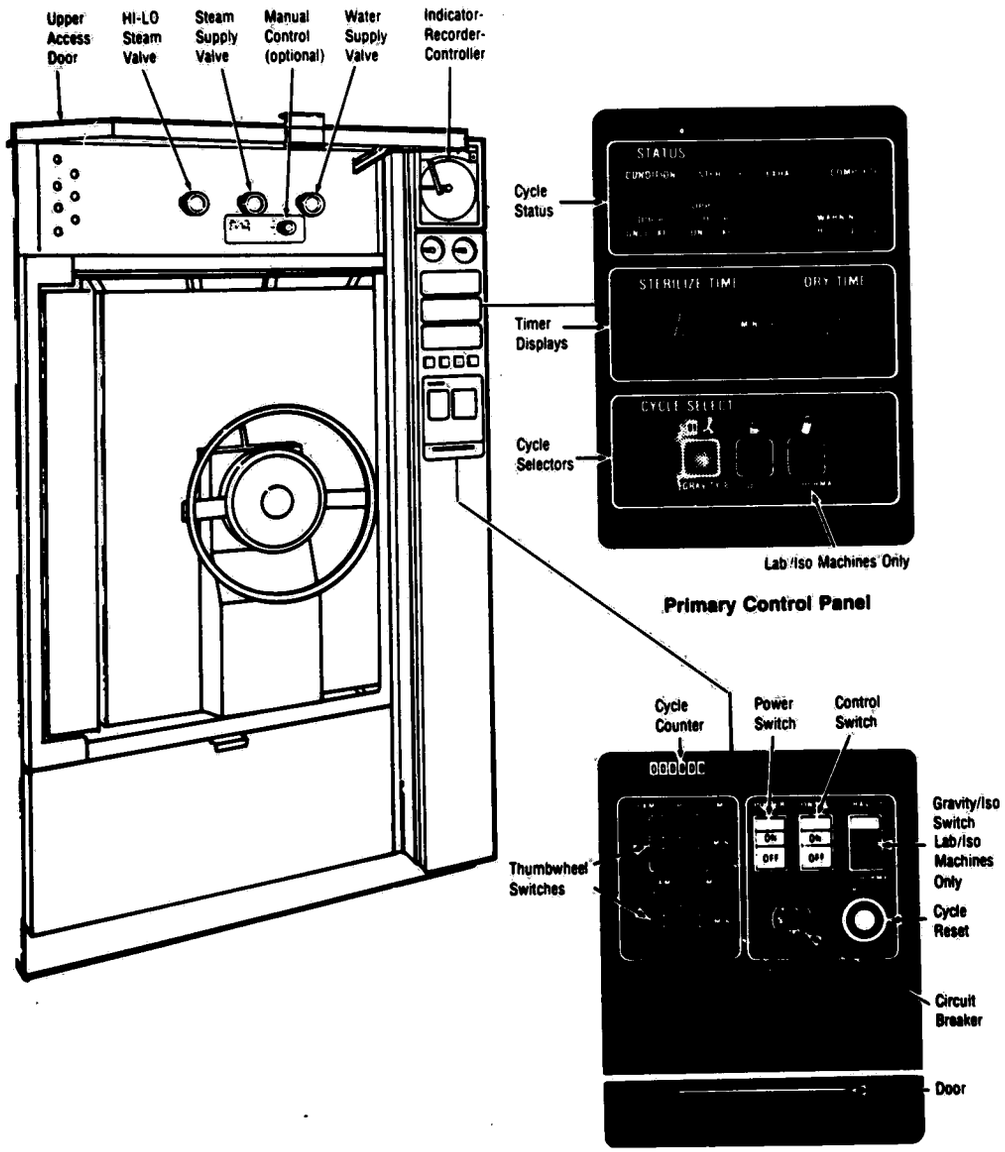
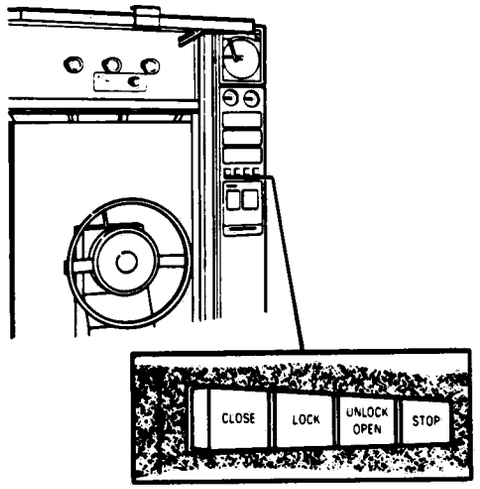
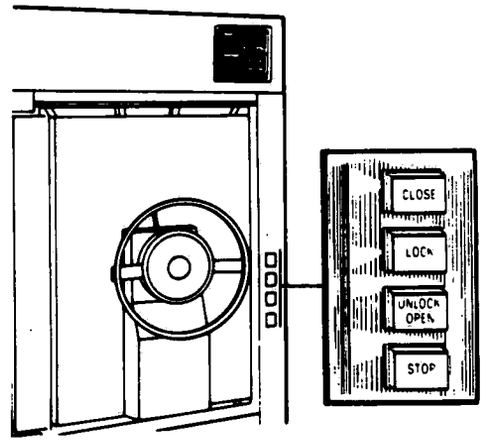


Figure 2-2. CONTROL LOCATIONS: Operating End.



Power Door Controls: Operating End.



Power Door Controls: Non-Operating End.

Figure 2-3. CONTROLS FOR POWER DOOR.

2.3 DOOR OPERATING INSTRUCTIONS

To lock door manually

1. Turn handwheel to extreme left to bring the ends of the holding arms inward so that they will not strike the door frame when door is closed.

2. Close door.

To unlock door manually

1. Turn door wheel to left as far as it will go. Open door.

2. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open.

To operate power door (optional equipment)

See Figure 2-3 for location of controls.

1. Press CLOSE button to close, but not lock, the door.

2. Press LOCK button to close and lock the door pressure-tight.

3. Press UNLOCK/OPEN button to unlock the door; press the button again to open the door.

4. Press STOP button to stop the door at any time during power operation.

2.4 AUTOMATIC OPERATION: GRAVITY CYCLE

1. Follow instructions in paragraph 2.2, "Before Operating The Equipment."

2. Refer to Table 2-1 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to HI for the 270° F (132° C) sterilizing cycle, or to LO for the 250° F (121° C) sterilizing cycle.

NOTE: For cycle temperatures below 250° F (121° C), refer to paragraph 7.14.

3. Open the door on the secondary control panel.

a. Be sure CONTROL and POWER switches are ON. Primary control panel should be lit.

NOTE: Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

b. Dial the correct exposure period (Table 2-1) on STERILIZE TIME thumbwheel switches.

NOTE: For items not listed in Table 2-1, time required will depend upon material and wrapping (if applicable). If there is any question, contact manufacturer of the material for the recommended procedure.

c. Dial the desired drying period on DRY TIME thumbwheel switches. For wrapped goods, dry time can vary (usually between 5 and 20 minutes depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures. For unwrapped goods, drying time is not required, however, a minimum of 02 minutes will eliminate excess steam vapors prior to opening chamber door.

4. Set the yellow pointer on the indicator-recorder-controller to 270° F (132° C) or to 250° F (121° C).

5. Open chamber door and load sterilizer. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

6. Close and lock the door ... turn handwheel to the right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, as indicated by chamber pressure gauge, an integral pressure-actuated lock will prevent door from being opened.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin.

7. Touch GRAVITY cycle selector. Light comes on to full brightness. Status light CONDITION comes on.

8. After condition phase is complete, STERILIZE light comes on and stays on for the duration of the sterilize phase. STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached.

9. When STERILIZE timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure. If a drying period was selected, DRY TIME digital readout begins to count down when chamber is exhausted to 3 psig. Chamber continues to be exhausted until a vacuum is drawn in the chamber. If zero DRY TIME was selected, cycle proceeds to next step.

10. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds for 90 seconds or until door is opened. Open chamber door (see step 5), load may be removed from the sterilizer.

11. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on.

TABLE 2-1. MINIMUM STERILIZATION EXPOSURE PERIOD — WRAPPED AND UNWRAPPED GOODS GRAVITY CYCLE ONLY

ITEMS	TEMPERATURE SETTING	
	250° F (121° C) MINUTES	270° F (132° C) MINUTES
Dressing, wrapped in paper or muslin	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, wrapped in double thickness muslin or equivalent	30	15
Linen packs (maximal size 12"x12"x20"; maximal weight 12 pounds)	30	—
Treatment trays, wrapped in muslin or equivalent	30	15
Utensils, unwrapped	15	3
Utensils, wrapped in muslin or equivalent	30	15

2.5 AUTOMATIC OPERATION: LIQUIDS CYCLE

WARNING: TO PREVENT POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE RESULTING FROM BURSTING BOTTLES AND HOT FLUID, YOU MUST FOLLOW THE PROCEDURE LISTED BELOW.

1. Use only vented closures – do not use screw caps or rubber stoppers with crimped seal.

2. Use only Type I borosilicate (Pyrex) glass bottles – do not use ordinary glass jugs or any container not designed for sterilization.

3. Use sterilizer "Liquids" cycle. No other cycle is safe for liquid sterilization.

4. At end of cycle, open sterilizer door, no more than 1/2 inch. Wait 10 minutes before unloading sterilizer.

5. Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.

6. Bottles should be cool to touch before attempting to move them from sterilizer loading car or shelves to the storage area.

1. Follow instructions in paragraph 2.2, "Before Operating The Equipment."

NOTE: For cycle temperatures below 250° F (121° C), refer to paragraph 7.14.

2. Open the upper access door and turn HI-LO valve to LO. Verify that STEAM and WATER valves are on.

3. Open the door on the secondary control panel.

a. Be sure the POWER and CONTROL switches are ON. Primary control panel should be lit.

b. Set STERILIZE timer thumbwheels to appropriate time ... see Table 2.2. (**NOTE:** For a laboratory process, the time required will depend upon the specific preparation and volume ... larger volumes normally require longer processing times.)

NOTE: Set time will be displayed on the primary control panel; however, during a LIQUIDS cycle, controller automatically disregards any DRY time setting and blanks out that portion of the display. Once the cycle is started, the STERILIZE time will be locked in and cannot be changed.

4. Set the yellow pointer on the indicator-recorder-controller to 250° F (121° C).

5. Open chamber door and load sterilizer. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring the ends of the holding arms inward so that they will not strike the door frame when door is opened or closed.

6. Close and lock the door. Turn handwheel to right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin.

7. Touch LIQUIDS cycle selector. Light comes on to full brightness. Status light CONDITION comes on; also WARNING HOT LIQUIDS light comes on.

8. After condition phase is completed, STERILIZE panel light comes on and stays on for the duration of the sterilize phase. STERILIZE time digital readout begins to count down when sterilizing temperature is reached.

9. When STERILIZE timer times out, EXHAUST light comes on and chamber exhausts slowly.

10. When exhaust phase is completed. COMPLETE light comes on and buzzer begins to sound.

WARNING: SUDDEN FULL OPENING OF THE DOOR FOLLOWING A STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST. TO PREVENT POSSIBLE PERSONAL INJURY, PROCEED AS FOLLOWS.

11. Crack the door open (see step 5) about 1/2" and leave it cracked for at least 10 minutes.

12. Unlocking the door will stop buzzer and cause DOOR UNLOCKED light to come on. WARNING HOT LIQUIDS light will remain on, but will begin to flash ... continuing for 10 minutes. At the end of 10 minutes, buzzer will again sound and WARNING HOT LIQUIDS light will stay on, but will stop flashing. Buzzer sounds for two minutes or until RESET button is pushed.

13. Open chamber door, load may now be removed from sterilizer. Pressing RESET button on secondary control panel resets control and turns WARNING HOT LIQUIDS light off.

TABLE 2-2. MINIMUM RECOMMENDED EXPOSURE TIMES FOR FULL LOAD OF SQUARE-PAK[3] FLASKED SOLUTIONS 250° F (121° C) TEMPERATURE SETTING

ASPF SIZE	TIME (MINUTES)
75 ML	25
250 ML	30
500 ML	40
1000 ML	45
1500 ML	50
2000 ML	55

2.6 AUTOMATIC OPERATION: LABORATORY/ISOTHERMAL CYCLE (Models 2032, 2042, 2052 only)

1. Follow instructions in paragraph 2.2, "Before Operating The Equipment."

2. Open the door on the secondary control panel.

a. Be sure the POWER and CONTROL switches are ON. Primary control panel should be lit. If the jacket is pressurized from an earlier Gravity or Liquids cycle, wait until the jacket pressure reduces to approximately 0 psig before proceeding.

b. Dial the desired exposure period on STERILIZE TIME thumbwheel switches.

NOTE: Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

3. Set the yellow pointer on the indicator-recorder-controller to desired temperature (range is 170° to 212° F [78° to 100° C]).

4. Open chamber door and load sterilizer. Should the door not at first unlock, turn door wheel slightly clockwise; press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

5. Close and lock the door ... turn handwheel to the right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin.

6. Touch ISOTHERMAL cycle selector. Light comes on to full brightness. Status light CONDITION comes on.

7. After condition phase is completed, STERILIZE panel light comes on and stays on for the duration of the STERILIZE phase. STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached.

8. When STERILIZE timer times out, EXHAUST light comes on and chamber exhausts slowly.

9. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds for 90 seconds or until door is opened. Load may be removed from the sterilizer.

10. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on.

2.7 MANUAL OPERATION: GRAVITY (WRAPPED OR UNWRAPPED GOODS) OR LIQUIDS CYCLE

NOTE: Manual control is an optional feature on this sterilizer. The following procedure can be performed only if this sterilizer is so equipped. (An isothermal cycle cannot be achieved manually.)

1. Follow steps 1, 2 and 8 in paragraph 2.2, "Before Operating The Equipment." If there is electricity to the sterilizer, positioning POWER switch on secondary control panel at ON will energize the Recorder. The CONTROL switch, however, must be positioned at OFF when using manual operation.

2. Open the upper access door.

NOTE: For wrapped or unwrapped goods not listed in Table 2-1, time required will depend upon material and wrapping (if applicable). If there is any question, contact manufacturer of the material for the recommended procedure. For laboratory processing of liquids, the time required will depend upon the specific preparation and volume ... larger volumes normally require longer processing times.

3. Determine desired processing temperature (270° F [132° C] or 250° F [121° C] for Gravity cycle; 250° F [121° C] for Liquids cycle). As a reminder, the yellow pointer on the indicator-recorder-controller may be positioned to this temperature.

4. Set HI-LO valve as follows:

a. **For 250° F (121° C) operation** — refer to paragraph 7.14 for instructions on loosening front stop on pressure regulator; then turn valve counterclockwise until jacket pressure gauge reads between 15 and 18 psig (1.056 and 1.267 kg/cm²).

NOTE: If normal "LO" setting is used for manual operation, chamber temperature will be approximately 258° F (126° C).

b. **For 270° F (132° C) operation** — set HI-LO valve so that pressure gauge reads between 28 and 30 psig (1.971 and 2.112 kg/cm²).

WARNING: WHEN OPERATING A LIQUIDS CYCLE YOU MUST OBSERVE THE PRECAUTIONS LISTED IN PARAGRAPH 2.5. FAILURE TO FOLLOW THESE PRECAUTIONS COULD RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

5. Open chamber door and load sterilizer. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring the ends of the holding arms inward so that they will not strike the door frame when door is opened or closed.

6. Close and lock the door. Turn handwheel to right as far as it will go using normal hand pressure. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

7. a. For **Laboratory/Isothermal** model sterilizers, turn Manual Operation selector to Jacket Charge and wait for jacket pressure to stabilize.

7. b. For Gravity model sterilizers, wait for jacket pressure to stabilize.

8. Turn the Manual Operation selector to Condition and wait for sixty seconds. Proceed to step 9.

9. After Condition phase, turn selector to Sterilize. When chamber temperature reaches desired temperature, begin timing. After correct sterilization period, proceed to next step.

WARNING: SUDDEN FULL OPENING OF THE DOOR FOLLOWING A LIQUIDS STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST. TO PREVENT POSSIBLE PERSONAL INJURY, PROCEED AS FOLLOWS.

9. a. **If a Liquids cycle, turn selector to Slow Exhaust and keep it in this position until chamber pressure is atmospheric (0 psig).** Then turn selector to Off position, omitting the Dry phase. Crack the door open about 1/2'' and wait for at least 10 minutes.

b. **If a Gravity cycle,** you may either (1) turn the selector to the Fast Exhaust position until chamber pressure is atmospheric and then turn to Off; or (2) turn selector to the Dry position, if a drying period for wrapped goods is desired, and then to Off.

10. Load may be removed from the sterilizer.

2.8 CONTROL MONITORING AND COMMUNICATION SYSTEMS

To ensure the validity of the sterilizing process, the automatic control continually monitors the cycle. Should one of the following conditions occur, you will be notified as indicated.

CONDITION NO. 1: Sterilizer did not complete conditioning phase in preset time.

INDICATION: CONDITION light on primary control panel flashes and buzzer sounds intermittently.

OPERATOR SHOULD:

1. Touch cycle selector to stop buzzer (sterilizer will continue to operate).

2. Refer to Section 6, TROUBLESHOOTING, to see if problem can be determined and corrected without interrupting cycle (e.g., HI-LO valve is incorrectly set).

3. If problem cannot be corrected so that conditioning phase can be completed (i.e., chamber reaches set sterilizing temperature), press cycle RESET button on secondary control panel to abort cycle. **Do not** proceed further until chamber is at atmospheric pressure.

4. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open ½'' and wait for at least 10 minutes.

b. Correct problem.

c. Reprocess load.

CONDITION NO. 2: Temperature drops 2° F below set point after initially reaching set point.

INDICATION: STERILIZE light on primary control panel flashes and STERILIZE timer display resets.

OPERATOR SHOULD:

1. Let cycle continue to completion if sterilizing temperature is reestablished.

2. If condition happens repeatedly, refer to Section 6, TROUBLESHOOTING, to see if problem can be determined and corrected without interrupting cycle.

3. If problem cannot be corrected so that sterilizing phase can be completed, press cycle RESET button on secondary control panel to abort cycle. **Do not** proceed further until chamber is at atmospheric pressure.

4. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open ½'' and wait for at least 10 minutes.

b. Correct problem.

c. Reprocess load.

CONDITION NO. 3: Cycle started, but chamber door not sufficiently tightened to keep door lock switch actuated.

INDICATION: DOOR UNLOCKED light(s) on primary control panel comes on and buzzer sounds intermittently.

OPERATOR SHOULD:

1. Press cycle RESET button on secondary control panel. **Do not** proceed further until chamber is at atmospheric pressure.

2. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open about 1/2'' and wait for at least 10 minutes.

b. Check door and door switch operation.

c. Reprocess load.

CONDITION NO. 4: Loss of electricity.

INDICATION: Primary control panel goes dark.

OPERATOR SHOULD:

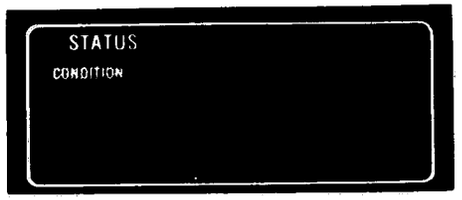
1. Wait until power is restored to sterilizer; then position CONTROL switch (on secondary control panel) to ON. Buzzer will sound intermittently.

2. Press cycle RESET button, but **do not** proceed until chamber is at atmospheric pressure.

3. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open about 1/2'' and wait for at least 10 minutes, then reprocess load.

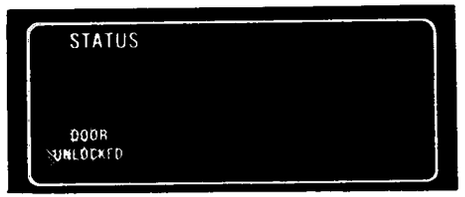
b. Other cycles, load may be reprocessed right away.



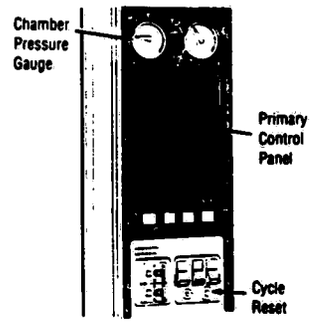
No. 1 — Condition Phase Too Long.



No. 2 — Sterilizing Temperature Drops.



No. 3 — Chamber Door Switch Not Made.



No. 4 — Loss of Electricity.

Figure 2-4. MONITORS AND ALARMS.

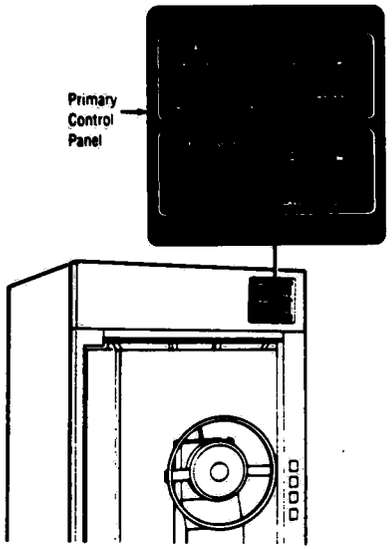


Figure 2-5. NON-OPERATING END PRIMARY CONTROL PANEL.

2.9 CONTROLS AND SIGNALS FOR DOUBLE-DOOR STERILIZERS

The following controls will be found on the non-operating end of the sterilizer:

1. Cycle selectors: **GRAVITY** and **LIQUIDS.** If you wish to repeat the previous gravity or liquids cycle, and all preparatory actions (para. 2.2) have been made, you may do this from the non-operating end by touching the appropriate selector.

2. Status lights: These indicate the cycle phase which is currently in progress: CONDITION, STERILIZE, EXHAUST, COMPLETE.

3. Warning lights: DOOR UNLOCKED, OPPOSITE DOOR UNLOCKED, WARNING HOT LIQUIDS.

4. Power door controls (if available): STOP, LOCK, UNLOCK/OPEN, CLOSE.

OPERATING INSTRUCTIONS (PRINTCON)

2.10 BEFORE OPERATING THE EQUIPMENT (PRINTCON)

Figure 2-6 shows the location of the various controls.

1. Be sure that chamber drain strainer is clean and in place and that chamber interior is clean.

2. Open the upper access door.

   a. Be sure manual control is turned to OFF.

   b. Turn STEAM and WATER valves to ON.

3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel lights up and all LEDs on the Printcon display light momentarily for a lamp test to assure the operator that the system is functioning. The printer records the time and date when the power is turned ON. If electrically heated unit, the steam generator will begin to heat.

4. Check for correct time and date by pressing the "Time" or "Date" pushbutton. To change either, press the "Forward" or "Reverse" pushbutton while holding the "Time" or "Date" pushbutton, until the correct time/date is displayed.

5. Check paper roll. A colored warning stripe will appear on the paper when the roll is near its end. A single ply roll lasts approximately two months and double ply rolls one month. See paragraph 7.15 "Changing Paper," if replacement is necessary.

6. Check the printout to assure that the inked ribbon cartridge is providing adequate ink. A fresh cartridge should last approximately 3 to 4 months. See paragraph 7.15 "Changing The Inked Ribbon Cartridge," if replacement is necessary.

NOTE: The visual display of printer can optionally be set to indicate temperature in degrees Fahrenheit or Celsius and pressure can be either in English (PSI gauge and inches Hg) or metric (kg/cm² gauge and mm Hg). LEDs on display indicate which units are being displayed. The display of temperature and (English) pressure can be either single precision (no decimal) or extended precision (one decimal). Metric pressure shows one or two decimal places. Metric vacuum shows no decimal places. See paragraph 7.17, "Changing Units of Display" if change is desired.

7. If the sterilizer is a Laboratory/Isothermal model, position GRAVITY/ISO switch to desired function. GRAVITY for Gravity or Liquids cycle; ISO for Laboratory/Isothermal cycle.

8. Review paragraphs 2.8 and 2.15, "Control Monitoring and Communication System," in order to identify the cause of any abnormal condition during a sterilization cycle.

9. If a double-door model, refer to paragraph 2.9 to become familiar with controls on the non-operating end.

10. If GRAVITY function was selected, wait until jacket pressure has stabilized before starting a cycle. (**Note:** Steam does not enter jacket when GRAVITY/ISO switch is in ISO position.)

11. Pressure display should read zero when the sterilizer door is open. If it does not, simply press the RESET button on the secondary control panel.

2.11 AUTOMATIC OPERATION: (PRINTCON) GRAVITY CYCLE

1. Follow instructions in paragraph 2.10, "Before Operating The Equipment."

2. Refer to Table 2-1 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to HI for the 270 F (132 C) sterilizing cycle, or to LO for the 250 F (121 C) sterilizing cycle.

NOTE: For cycle temperature below 250 F (121 C), refer to paragraph 7.14.

3. Open the door on the secondary control panel.

   a. Be sure the POWER and CONTROL switches are ON. Primary control panel and Printcon display should be lit.

   b. Dial the correct exposure period (Table 2-1) on STERILIZE TIME thumbwheel switches.

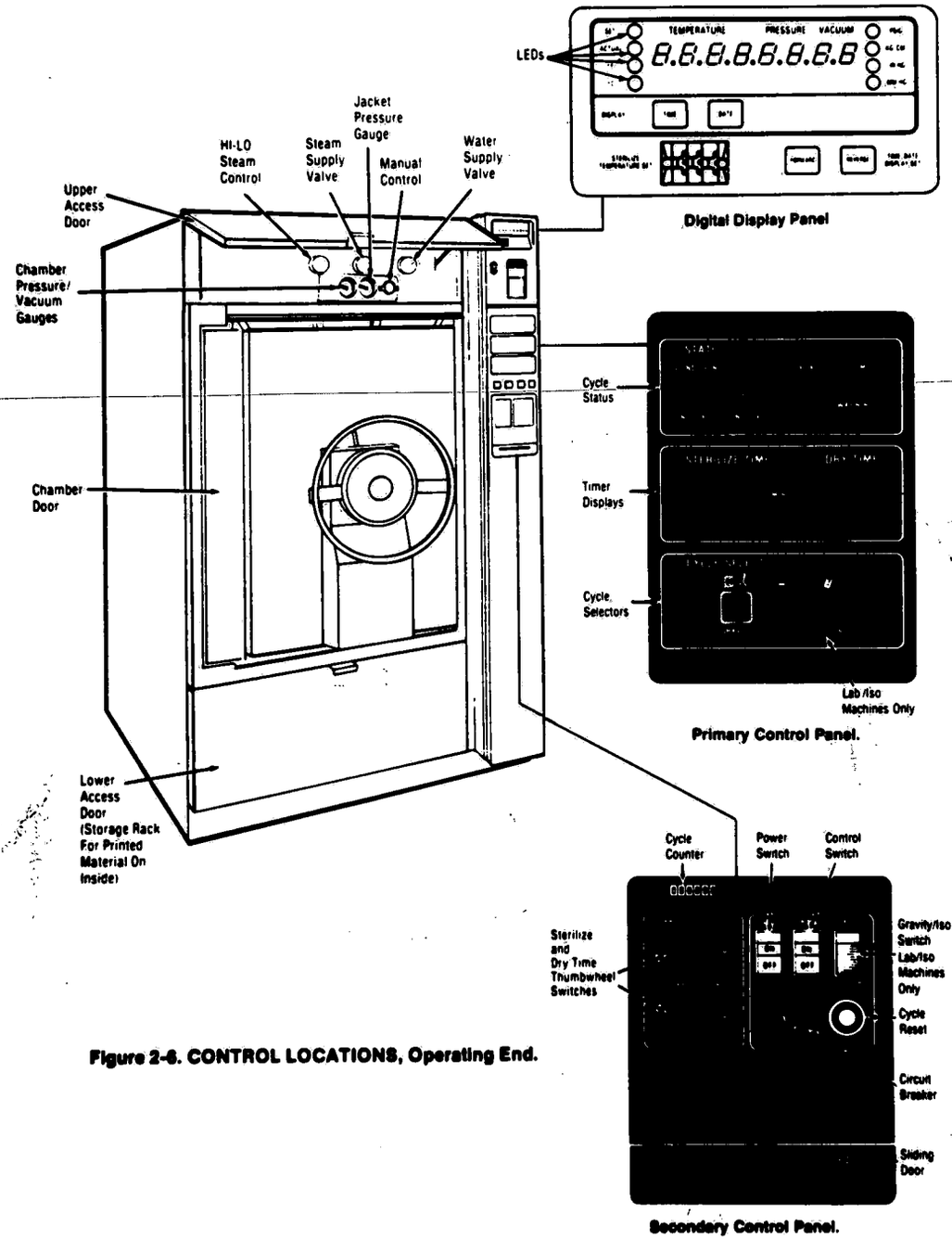


Figure 2-6. CONTROL LOCATIONS, Operating End.

c. Dial the desired drying time on the thumbwheel switches. For wrapped goods, dry time can vary (usually between 5 and 20 minutes) depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures. For unwrapped goods, drying time is not required, however, a minimum of 02 minutes will eliminate excess steam vapors prior to opening chamber door. Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 270 F (132 C) or to 250 F 9121 C). This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), a buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to paragraph 7.17, "Adjusting the Sterilize Temperature Overdrive."

5. Open chamber door and load sterilizer. The printer records the time the door is opened and prints "DOOR OPEN."

a. Power Door (if double-door unit, opposite door must be locked) — press UNLOCK/OPEN button . . . once to unlock the door, a second time to open it.

b. Manual Door — turn handwheeel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

6. Close and lock the door . . . panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

a. Power Door — press LOCK button.

b. Manual Door — turn handwheel to the right as far as it will go using normal hand pressure.

NOTE: Pressing the STOP button **during** power door operation will immediately stop the door. Refer to paragraph 2.3 if it becomes necessary to shift from power to manual operation.

7. Touch GRAVITY cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins, and the temperature and pressure transition points. It will also show the time, temperature, and pressure at the end of the purge in the CONDITION phase of the cycle. See Figure 3-23.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when selected temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure.

9. When sterilizer timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure. If a drying period was selected, DRY TIME digital readout begins to count down. If zero DRY TIME was selected, cycle proceeds to next step. The printed record will show the time the EXHAUST phase begins and the temperature and pressure transition points. It will also show the time, temperature, and pressure at the end of the DRY TIME.

10. When exhaust phase is completed, panel light COMPLETE comes on, and buzzer sounds. Open chamber door. Load may be removed from the sterilizer. The printed record will show the time the cycle finished, the sterilize and dry time, and the total cycle time.

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11. When chamber door is opened, controls will automatically reset and DOOR/UNLOCKED light will come on. The printer records the time the door is opened and prints "DOOR OPEN."

12. If two ply paper is used in the printer, tear off the top copy of the printout and place with the completed load.

2.12 AUTOMATIC OPERATION: LIQUIDS CYCLE

WARNING: TO PREVENT THE POSSIBILITY OF PERSONAL INJURY FROM BURSTING BOTTLES AND HOT FLUID, USE ONLY BOROSILICATE (PYREX) FLASKS WITH VENTED CLOSURES FOR STERILIZING LIQUIDS.

• SEE PARAGRAPH 2.5 FOR FURTHER INFORMATION.

1. Follow instructions in paragraph 2.10, "Before Operating The Equipment."

2. Open the upper access door and turn HI-LO valve to LO.

NOTE: For cycle temperature below 250 F (121 C), refer to paragraph 7.14.

3. Open the door on the secondary control panel.

a. Be sure the POWER and CONTROL switches are ON. Primary control panel and Printcon display should be lit.

b. Set STERILIZE timer thumbwheels to appropriate time . . . see Table 2-2. (**Note:** For a laboratory process, the time required will depend upon the specific preparation and volume . . . larger volumes normally require longer processing times.) Set time will be displayed on the primary control panel; however, during a LIQUIDS cycle, controller automatically disregards any DRY time setting and blanks out that portion of the display. Once the cycle is started, the STERILIZE time will be locked in and cannot be changed.

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 250 F (121 C). This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), a buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to paragraph 7.17, "Adjusting the Sterilize Temperature Overdrive."

5. Open chamber door and load sterilizer. The printer records the time the door is opened and prints "DOOR OPEN."

a. Power Door (if double-door unit, opposite door must be locked) — press UNLOCK/OPEN button . . . once to unlock the door, a second time to open it.

b. Manual Door — turn handwheeel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

6. Close and lock the door . . . panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

a. Power Door — press LOCK button.

b. Manual Door — turn handwheel to the right as far as it will go using normal hand pressure.

NOTE: Pressing the STOP button **during** power door operation will immediately stop the door. Refer to paragraph 2.3 if it becomes necessary to shift from power to manual operation.

7. Touch LIQUIDS cycle selector. Light comes on to full brightness. Status light CONDITION comes on; also WARNING HOT LIQUIDS light comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points. It will also show the time, temperature, and pressure at the end of the purge in the CONDITION phase of the cycle. See Figure 3-21.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure transition points.

9. When sterilizer timer times out, EXHAUST light comes on and chamber exhausts slowly. The printed record will show the time the EXHAUST phase begins, the temperature and pressure.

10. When exhaust phase is completed, COMPLETE light comes on and buzzer begins to sound. The printed record will show the time the cycle finished, the sterilize time, and the total cycle time.

WARNING: SUDDEN FULL OPENING OF THE DOOR FOLLOWING A STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST. TO PREVENT POSSIBLE PERSONAL INJURY, PROCEED AS FOLLOWS.

11. Crack the door open (see step 5) **about 1/2"** and leave it cracked for at least 10 minutes. (If a power door, press the UNLOCK/OPEN button **only once.** This will **unlock, but not open** the door.) The printer records the time the door is opened and prints "DOOR OPEN."

12. Unlocking the door will stop buzzer and cause DOOR UNLOCKED light to come on. WARNING HOT LIQUIDS light will remain on, but will begin to flash . . . continuing for 10 minutes. At the end of 10 minutes, buzzer will again sound and WARNING HOT LIQUIDS light will stay on, but will stop flashing.

13. Open chamber door, load may now be removed from sterilizer. Press RESET button on secondary control panel to reset control and turn WARNING HOT LIQUIDS light off. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

14. If two ply paper is used in the printer, tear off the top copy of the printout and place with the completed load.

2.13 AUTOMATIC OPERATION: LABORATORY/ ISOTHERMAL CYCLE (PRINTCON)

(Models 2032, 2042 and 2052 only)

1. Follow instructions in paragraph 2.10, "Before Operating the Equipment."

2. Open the door on the secondary control panel.

a. Be sure the POWER and CONTROL switches are ON. Primary control panel and Printcon display should be lit. If the jacket is pressurized from an earlier Gravity or Liquids cycle, wait until the jacket pressure reduces to approximately 0 psig before proceeding.

b. Dial the desired exposure period on the STERILIZE TIME thumbwheel switches. Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

3. Using the thumbwheel switch on the Printcon unit, set the desired temperature. This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If the selected temperature is outside the allowable range, 150-295 F (65-146 C), a buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

4. Open chamber door and load sterilizer. The printer records the time the door is opened and prints "DOOR OPEN."

a. Power Door (if double-door unit, opposite door must be locked) — press UNLOCK/OPEN button . . . once to unlock the door, a second time to open it.

b. Manual Door — turn handwheeel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

5. Close and lock the door . . . panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

a. Power Door — press LOCK button.

b. Manual Door — turn handwheel to the right as far as it will go using normal hand pressure.

NOTE: Pressing the STOP button **during** power door operation will immediately stop the door. Refer to paragraph 2.3 if it becomes necessary to shift from power to manual operation.

6. Touch ISOTHERMAL cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

7. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the EXPOSURE phase begins, the temperature and pressure.

8. When sterilizer timer times out, EXHAUST light comes on and chamber exhausts slowly. The printed record will show the time the EXHAUST phase begins and the temperature and pressure transition points.

9. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Open chamber door. Load may be removed from the sterilizer. The printed record will show the time the cycle finished, the exposure time, and the total cycle time.

10. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on. The printer records the time the door is opened and prints "DOOR OPEN."

11. If two ply paper is used in the printer, tear off duplicate record and place with the completed load.

2.14 MANUAL OPERATION: GRAVITY (WRAPPED OR UNWRAPPED GOODS) OR LIQUIDS CYCLE (PRINTCON)

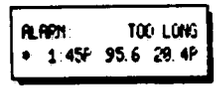
NOTE: Manual control is a feature on this sterilizer. However, if the sterilizer has an integral steam generator, a manual cycle cannot be operated without electrical power.

If the sterilizer does not have an integral steam generator, it may be operated during electrical power failure by following the instructions in paragraph 2.7, "Manual Operation." Begin STERILIZE phase timing when the desired chamber pressure as indicated by the chamber pressure gauge is reached. Refer to Figure 7-21 for pressure and temperature relationships.

In cases where it is necessary to operate the sterilizer manually because it will not automatically advance to the next phase and electric power is available, the POWER and CONTROL switches may be left ON. The digital display of temperature and pressure can then be used for STERILIZE phase timing.

2.15 CONTROL MONITORING AND COMMUNICATIONS SYSTEMS (PRINTCON)

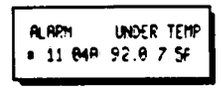
In addition to the monitors and messages outlined in paragraph 2.8 and Figure 2-4, Printcon units print the following messages:



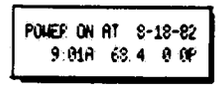
No. 1 — Condition Phase Too Long.



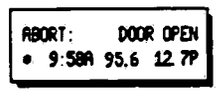
The RESET button is pressed.



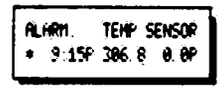
No. 2 — Sterilizing Temperature Drops.



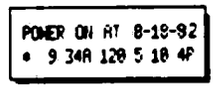
The power is turned on.



No. 3 — Chamber Door Switch Not Made.



Temperature sensor failure is detected.



No. 4 — Power Restored After Power Failure.



Pressure sensor failure is detected.

Figure 2-8. PRINTCON MESSAGES.

2.16 CONTROL AND SIGNALS FOR DOUBLE-DOOR STERILIZERS (PRINTCON)

See paragraph 2.9 and Figure 2-5.

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SECTION 3

SECTION 3

PRINCIPLES OF OPERATION

3.1 GENERAL

The Gravity and Laboratory/Isothermal model sterilizers are designed to efficiently sterilize single and full loads of fabrics, wrapped and unwrapped hard goods, and solutions. To accomplish this, the sterilizers use steam, regulated at the most effective temperature and pressure for the particular load. The Laboratory/Isothermal model has the additional capability, by means of the isothermal cycle, of processing heat-sensitive loads.

The control system and the piping packages, described below, are designed to accomplish the work of sterilization efficiently and reliably. The heart of the control system is a microcomputer which is preprogrammed to control all sterilizing cycles from beginning to end, once the preparatory actions have been taken.

All sterilizers are equipped with manually operated steam and water supply valves and electrical disconnects. These isolate the unit from the general supply lines when in an off position.

3.2 PRINCIPLES OF OPERATION: MECHANICAL

PRINTCON: The material in paragraphs 3.2 through 3.6 applies to Printcon units except that the temperature switch has been replaced with a resistance thermal detector (RTD), the pressure switches have been replaced with a pressure transducer, and the recorder (IRC) has been replaced with the Printcon Digital Printer Controller unit. See also paragraphs 3.7 and 3.8.

Gravity Cycle

In the Gravity cycle, air is removed from the sterilizer chamber and its load by displacing it with steam. The greater density of the steam gradually forces the air downward and out of the chamber.

During the "purge" at the beginning of the cycle, the air in the chamber is quickly displaced by steam. On the Laboratory/Isothermal model sterilizer, the isothermal piping is sealed off by keeping closed solenoid valves S-8 (steam-to-ejector), S-10 (ejector bypass) and opening solenoid valve S-9 (steam-to-jacket). On both Gravity and Isothermal sterilizers, steam-to-chamber (S-2) and fast exhaust (S-3) valves are open. At the same time, the water supply valve S-4 to the drain is open, which condenses the steam and keeps the drain temperature below 140° F. Flow control valve FC-2 is manually adjusted to permit water flow at the optional rate for the system. Because of flow resistance incorporated into the system design, the chamber pressure will rise to between 5 and 15 psig during this phase of the cycle.

During the "charge" and "sterilize" phases, fast exhaust (S-3), exhaust cooling (S-4), and vacuum water (S-7) valves are closed. The chamber is thus effectively sealed and steam is forced in until desired pressure is reached. Steam-to-chamber valve S-2 is thermostatically controlled by temperature switch TS-2 to maintain correct temperature/pressure in the chamber.

The exhaust phase of the cycle is initiated by closing steam-to-chamber valve (S-2), and opening the fast exhaust (S-3) and exhaust cooling (S-4) valves. The effect of these actions is to condense the exhaust steam and maintain the drain temperature below 140° F.

The dry phase of the cycle is initiated by opening the steam-to-ejector (dry) valve (S-8). All other valves remain as they were during the exhaust phase. Because of the evacuating action of the ejector, air is continuously drawn through the vacuum break line and through the chamber to the drain. A vacuum level of 1-2" Hg is maintained in the chamber.

At the completion of the cycle, all valves are deenergized. All valves, except S-1, filtered air, are normally closed. Thus valve S-1 is the only one open. Filtered air enters the chamber through S-1 to break the vacuum.

Liquids Cycle

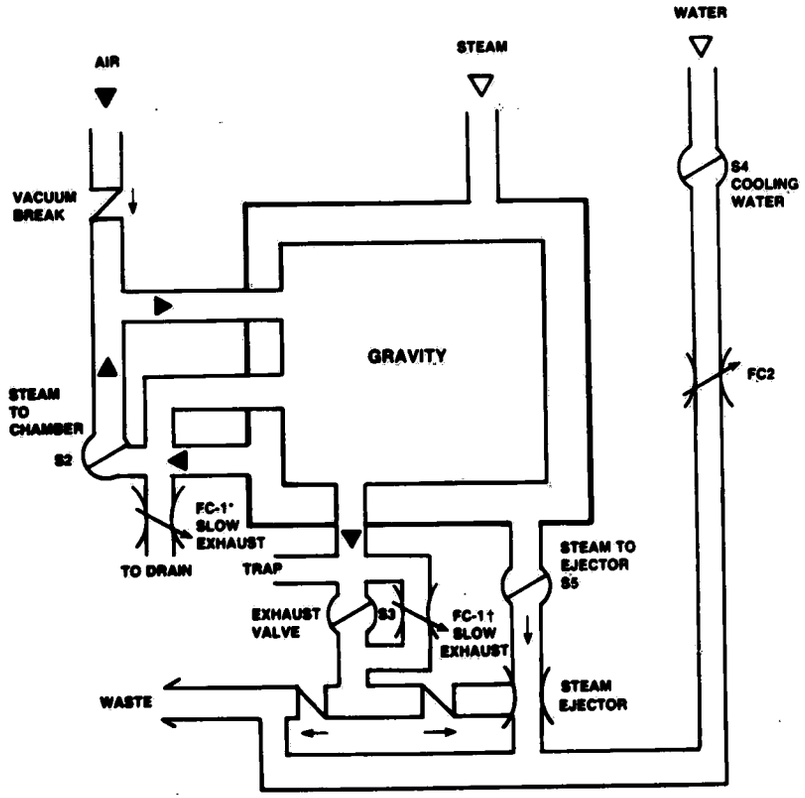
The Liquids cycle is identical to the Gravity cycle until the exhaust phase. When the sterilize phase of the cycle is complete, all solenoid valves are deenergized. Slow exhaust of the chamber is accomplished through the slow exhaust line (see diagram, Fig. 3-1), which allows a slow bleed out of the chamber. Slow exhaust rate is controlled by the manually set flow control valve, FC-1.

Isothermal Cycle (Models 2032, 2042 and 2052 only)

The Laboratory/Isothermal Model Sterilizer utilizes a special piping design to achieve processing of heat-sensitive and heat-coagulable materials at temperatures of 170 to 219 F (78 to 104 C).

At the beginning of the cycle, steam-to-jacket solenoid valve (S-9) is closed and steam-to-ejector valve (S-5) is opened. The jacket is therefore exhausted of steam. Steam-to-chamber (S-2), fast exhaust (S-3) and exhaust cooling (S-4) solenoid valves are also closed.

During the conditioning phase, steam-to-iso-ejector (S-8) and ejector bypass (S-10) valves are open. The function of S-10 is to decrease come-up time during this phase. Steam passes through the ejector to the chamber. As the steam passes through the chamber, a suction is created at the ejector throat. This suction draws the mixture of steam and condensate from the chamber drain, where the temperature-sensing bulb is located. The mixture of steam and condensate drawn from the chamber mixes with the incoming steam and is passed to the chamber. Ejector bypass valve (S-10), controlled by TS-1, closes at 10° F below set point.



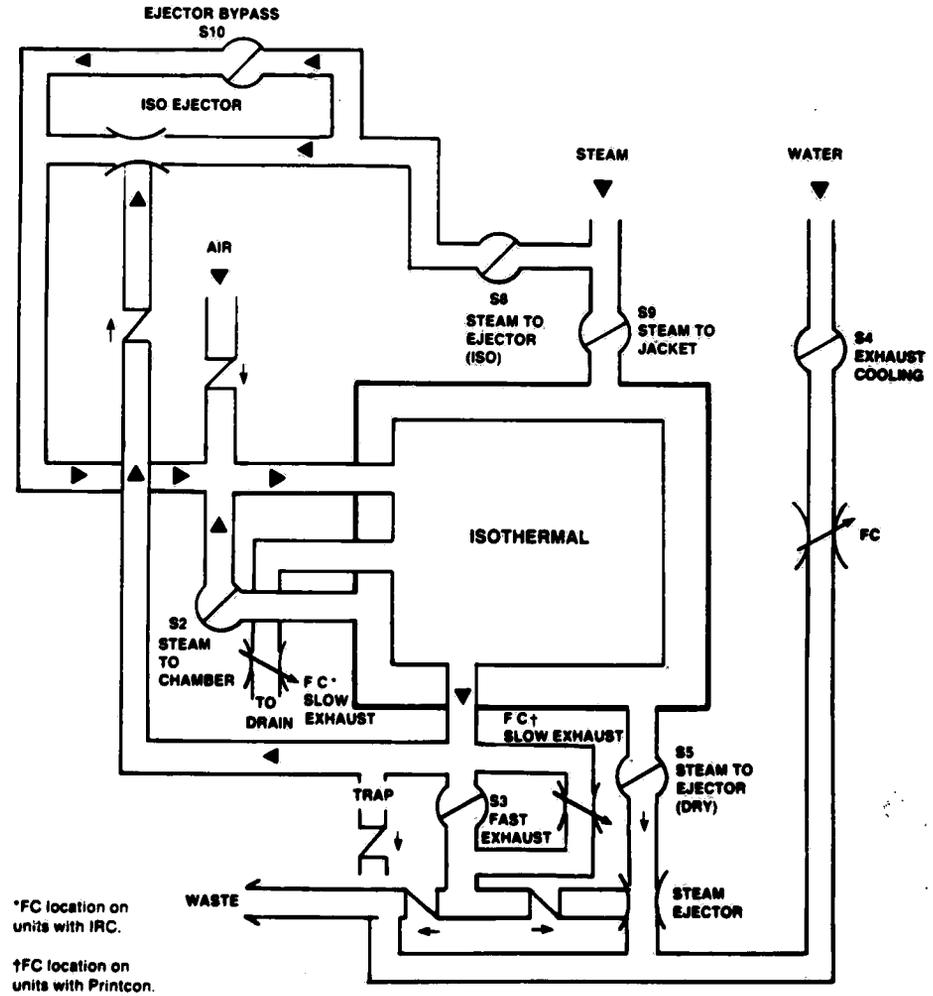
*FC-1 location on units with IRC.

†FC-1 location on units with Printcon.

Figure 3-1. PIPING DIAGRAM: Gravity Sterilizer.

Chamber temperature continues to increase until thermostatic control temperature, as sensed by the recorder bulb in the drain, is reached. TS-2 contacts close, and solenoid valve S-8 (steam-to-ejector) closes. Automatic control of S-8, between open and closed, continues throughout the cycle. The isothermal nozzle flow capacity, together with the steam and condensate flow from the chamber across the recorder bulb, gives the required temperature control in the chamber. The steam trap continuously removes condensate from the chamber when there is no suction action present.

At the completion of the sterilize phase, steam-to-ejector valve closes and fast exhaust valve S-3 opens. Chamber pressure is reduced to 1 psig, when buzzer sounds.



*FC location on units with IRC.

†FC location on units with Printcon.

Figure 3-2. PIPING DIAGRAM: Laboratory/Isothermal Sterilizer.

3.3 CONTROLS

The microcomputer monitors system operations and controls system functions. Input signals are from the control panel's pushbuttons and switches, from the timer settings and from the system temperature, pressure and vacuum switches. Output signals from the controller are to the panel display lights, to indicate status or warning signals, and to the piping solenoid valves, to operate the sterilizer through the phases of each cycle. The printed circuit boards have LEDs to indicate the presence of an output to the associated solenoid valve.

Temperature set point is made manually on the indicator-recorder-controller (IRC). Temperature switches within the IRC maintain chamber temperature for the duration of the sterilizing phase. During the cycles, the controller automatically switches on and off the appropriate solenoid valves to maintain correct chamber pressure/temperature. By means of the slow exhaust needle valve, which is open throughout every cycle, there is a constant bleed of steam from the chamber. At the end of the cycles, pressure switches provide inputs to the controller, which in turn actuates the fast exhaust system at the appropriate point. If a drying phase is selected a slight vacuum will be drawn in the chamber drain line. A vacuum switch senses when the chamber pressure is again near normal, and the output from the controller actuates the COMPLETE signal and sounds the buzzer. During the parts of the cycle when steam is being disposed to waste, water to the condenser is automatically turned on to convert the steam to condensate.

3.4 CYCLE DESCRIPTIONS

Preparatory actions: WATER and STEAM valves must be opened manually. HI-LO valve (steam regulator) must be set to HI or LO position. Main power switch and control power switch, both on the secondary panel, must be in the ON position. When power is on, the cycle selectors are dimly lit. (**NOTE:** For graphic representations of the cycles and operation of the solenoid valves, see the cycle graphs on pages 6-2 through 6-4).

Liquids Cycle

HI-LO valve must be set to LO. Operator selects sterilizing temperature, 250° F (121° C), on indicator-recorder-controller (IRC), sets STERILIZE time, and, if applicable, selects GRAVITY on GRAVITY/ISO-THERMAL switch. After loading machine, door(s) must be locked. Panel status light DOOR UNLOCKED goes off (limit switch LS-2 transfers). Operator touches LIQUIDS cycle selector. The cycle light will come on to full brightness.

1. During the condition (or purge) phase of the cycle, both steam-to-chamber solenoid valve (S-2) and fast exhaust (S-3) are open in order to quickly displace the air in the chamber with steam. The following sequence of actions occurs in the machine:

- Panel light CONDITION comes on; also WARNING HOT LIQUIDS light comes on. The following solenoid valves are energized (opened): S-2 (steam-to-chamber), S-3 (fast exhaust), S-4 (exhaust cooling). The sixty-second purge timer begins to time. Purge timer times out.

2. After the sixty-second condition phase is completed, the fast exhaust and exhaust cooling valves are closed and the sterilizer begins to build pressure in the chamber. After proper temperature and pressure are reached, the sterilizing phase of the cycle begins. The following sequence of actions occurs in the machine:

- Solenoid valves S-3 (fast exhaust) and S-4 (exhaust cooling) close. When sterilizing temperature (250° F) is reached, temperature switch TS-1 (normally open) closes, completing a circuit to the controller. CONDITION light goes out, STERILIZE light comes on. The STERILIZE timer begins to count down from the pre-set time. When the chamber temperature rises approximately 4 degrees above set point, temperature switch TS-2 (normally open) closes. The signal, processed by the controller, results in closing steam-to-chamber solenoid valve S-2. When the chamber temperature decreases to near set point, TS-2 contacts open, and S-2 (steam-to-chamber) again opens. S-2 and TS-2 cycle in this way for the duration of the sterilizing cycle. Recorded chamber temperature should not vary more than +4 from TS-2 set point.

3. After the sterilize phase is complete, the sterilizer goes into the exhaust phase. The following sequence of actions occurs in the machine:

- Solenoid valve S-2 (steam-to-chamber) closes. STERILIZE light goes out, EXHAUST light comes on. Chamber exhausts slowly through the slow exhaust needle valve. When the chamber has exhausted to 3 psig, pressure switch PS-3 drops out. As soon as this happens, the controller energizes fast exhaust solenoid valve S-3 to quickly empty the chamber of remaining steam.

4. When the chamber is exhausted of steam to 1 psig of pressure, this signals the end of the cycle. The following actions occur at the end of the cycle:

- At 1 psig, pressure switch PS-2 drops out. EXHAUST light goes out, COMPLETE light comes on, WARNING HOT LIQUIDS light stays on. Buzzer begins to sound and continues for 90 seconds or until door is opened. When door is opened (only cracked open 1/2" for the first ten minutes following sterilization), buzzer is turned off, DOOR UNLOCKED light turns on, and WARNING HOT LIQUIDS light starts flashing. After 10 minutes, buzzer again sounds and WARNING light stops flashing, but stays on. LIQUIDS cycle light, COMPLETE light, WARNING HOT LIQUIDS light and solenoid valve S-3 (fast exhaust) all stay on until control is reset.

Gravity Cycle

Operator selects GRAVITY on GRAVITY/ISO-THERMAL switch (if applicable), selects sterilizing temperature (usually 250° F[121° C] or 270° F[132° C] on indicator-recorder controller, and sets STERILIZE and DRY (if desired) timers.HI-LO valve must be set according to desired temperature. After loading the machine, door must be locked. Panel status light DOOR UNLOCKED goes off. Operator touches GRAVITY cycle selector. The cycle light will come on to full brightness.

1. During the condition (or purge) phase of the cycle, both steam-to-chamber solenoid valve (S-2) and fast exhaust solenoid valve (S-3) are open in order to quickly displace the air in the chamber with steam. The following sequence of actions occurs simultaneously in the machine:

- Panel light CONDITION comes on. The following solenoid valves are energized (opened): S-2 (steam-to-chamber), S-3 (fast exhaust), S-4 (exhaust cooling). The sixty-second purge timer begins to time. Purge timer times out.

2. After the sixty-second condition phase is completed, the fast exhaust (S-3) and exhaust cooling (S-4) valves are closed and the sterilizer begins to build pressure. After proper temperature and pressure are reached, the sterilizing phase of the cycle begins. The following sequence of actions occurs in the machine:

- Solenoid valves S-3 (fast exhaust) and S-4 (exhaust cooling) close. When sterilizing temperature is reached, temperature switch TS-1 contacts close, and the STERILIZE timer begins to count down from the pre-set time. When the chamber temperature rises approximately 4 degrees above set point, temperature switch TS-2 (normally open) closes. The signal, processed by the controller, results in closing steam-to-chamber solenoid valve S-2. When the chamber temperature decreases again to near set point, TS-2 contacts open, and S-2 (steam-to-chamber) again opens. S-2 (steam-to-chamber) and TS-2 cycle in this way for the duration of the sterilizing cycle.

3. After the sterilize phase is complete, the sterilizer goes into the exhaust phase. The following sequence of actions occurs in the machine:

If no DRY time was set ...

- Solenoid valve S-2 (steam-to-chamber) closes. STERILIZE light goes out, EXHAUST light comes on. Solenoid valves S-3 (fast exhaust) and S-4 (exhaust cooling) open for fast exhaust. At 1 psig, COMPLETE light comes on, EXHAUST light goes out, solenoid valves S-3 (fast exhaust) and S-4 (exhaust cooling) close.

If a DRY time was set ...

- Solenoid valve S-2 (steam-to-chamber) closes. STERILIZE light goes out, EXHAUST light comes on. Solenoid valves S-3 (fast exhaust) and S-4 (exhaust cooling) open for fast exhaust. When chamber pressure decreases to 3 psig, pressure switch PS-3 drops out. When this happens, the controller starts the DRY timer. At this same time, solenoid valve S-5 (steam-to-ejector) opens and begins to evacuate the chamber. Chamber pressure during the drying period will vary from 0-2" Hg (vacuum). During this period air is drawn into the chamber through the bacteria-retentive filter and check valve. When the DRY timer times out, solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling), S-5 (steam-to-ejector) close.

4. Buzzer sounds for 90 seconds or until door is opened. When door is opened, buzzer stops, COMPLETE light goes out, GRAVITY light goes out, solenoid valve S-3 (fast exhaust) closes, and DOOR UNLOCKED light comes on.

Isothermal Cycle (Laboratory/Isothermal Model Only)

Operator selects sterilizing temperature on indicator-recorder-controller, sets STERILIZE timer, and selects ISO on GRAVITY/ISOTHERMAL switch. (When ISO switch is pushed, solenoid S-9, steam-to-jacket valve, closes, and solenoid S-5, jacket steam-to-ejector, opens.) If the jacket is hot from an earlier gravity cycle, operator must wait until jacket cools to at least 140° F (60° C) before beginning cycle. After loading machine, door must be locked. Panel status light DOOR UNLOCKED goes off. Operator touches ISOTHERMAL cycle selector. The cycle light will come on to full brightness.

1. In order to heat the chamber quickly during the condition (or purge) phase of the cycle, both steam-to-ejector valve (S-8) and ejector bypass valve (S-10) are open. The following sequence of actions occurs in the machine.

• Panel light CONDITION comes on. Solenoid valve S-8 (steam-to-ejector) and S-10 (ejector bypass) remain open until chamber temperature is about 10° F below set point. When chamber reaches this temperature, temperature switch TS-1 contacts close.

2. When chamber temperature reaches set point, temperature switch TS-2 contacts close. When this happens, CONDITION light goes off, STERILIZE light comes on, and STERILIZE timer begins to time. Chamber temperature is maintained by cycling solenoid valve S-8 (steam-to-ejector) with temperature switch TS-2.

3. STERILIZE timer times out: STERILIZE panel light goes out, EXHAUST light comes on; steam-to-ejector valve, S-8, closes; fast exhaust solenoid valve, S-3, opens when chamber pressure reaches 3 psig, as sensed by pressure switch PS-3. When chamber pressure reaches 1 psig, pressure switch PS-2 drops out, EXHAUST light goes out and COMPLETE light comes on.

4. Buzzer sounds for 90 seconds or until door is opened. When door is opened, buzzer stops, COMPLETE light goes out, ISOTHERMAL light goes out, solenoid valve S-3 (fast exhaust) closes, and DOOR UNLOCKED light comes on.

Cycle Monitoring and Communications

1. If the sterilizer fails to reach sterilizing temperature within 75 minutes for isothermal cycle or within 60 minutes for gravity or liquids cycle, the operator will be notified as follows:

• When the internal timer times out, the CONDITION light flashes and the audible alarm sounds intermittently. The sterilizer, however, will continue to attempt to reach temperature. The buzzer will continue to sound until (1) a cycle selector is pressed (silences buzzer and resets 75-minute timer); or (2) temperature is finally reached (cycle continues normally); or (3) RESET button is pressed (cycle is aborted).

2. If the chamber temperature falls 2° F below set point (temperature switch TS-1 contacts open) during a sterilization cycle, the sterilizer will go through the following actions:

• STERILIZE timer (internal) resets to beginning. Panel status light STERILIZE blinks. If chamber temperature again rises to set point (TS-1 contacts close), STERILIZE light continues to blink to indicate normal cycle has been interrupted. Cycle will not continue if set temperature is not re-established.

3. If after a cycle has started, the door lock switch opens, the sterilizer will go through the following abort phase:

• DOOR UNLOCKED light comes on and audible alarm sounds intermittently. All solenoid valves will close, and any pressure in the chamber will bleed out through the slow exhaust needle valve. Alarm will continue sounding until RESET button is pushed.

4. If there is a loss of supply power to the sterilizer while a cycle is in progress and then a later restoration of power, the sterilizer will go through the following abort phase:

• When power is restored and CONTROL switch is reset, the audible alarm will sound. All solenoid valves will close, and any pressure in the chamber will bleed out through the slow exhaust needle valve. Alarm will continue sounding until RESET button is pushed.

3.5 POWER DOOR CYCLES

Power Door Cycle — Single Door: Close

Pressure switch PS2 and vacuum switch VS2 are in position, completing circuit to energize 9CR. The contacts on 9CR are closed, completing the power door circuit. Operator selects CLOSE pushbutton. The pushbutton light will come on.

1. The following actions occur:

• Coils 1DR, 3CR and 5CR are energized. Normally closed contacts open and normally open contacts close on 1CR and 3CR. When the CLOSE pushbutton is released, the pushbutton light and the coils remain energized through two sets of closed contacts on 3CR.

2. After one second, the contacts on 5TR close. Clutch and coil 1TR are energized.

3. After one second, the normally open contacts close and normally closed contacts open on 1TR. The hinge motor starts to close the door.

4. When the door is closed, the open contacts close and closed contacts open on switch LS1, and the following actions occur:

• The circuit to CLOSE pushbutton light and coils 1CR, 3CR and 5TR opens. The hinge motor and clutch stop, and circuit to coil 1TR opens.

Power Door Cycle — Single Door: Lock

Pressure switch PS2 and vacuum switch VS2 are in position, completing circuit to energize 9CR. The contacts on 9CR are closed, completing the power door circuit. Operator selects LOCK pushbutton. The pushbutton light will come on.

1. The following actions occur:

• Coils 1CR and 5TR are energized. Normally closed contacts open and normally open contacts close on 1CR. When the LOCK pushbutton is released, the pushbutton light and the coils remain energized through closed contacts on 1CR.

2. After one second, the contacts on 5TR close. Clutch and coil 1TR are energized.

3. After one second, the normally open contacts close and normally closed contacts open on 1TR. The hinge motor starts to close the door.

4. When the door is closed, the open contacts close and closed contacts open on switch LS1. Coils 2TR and 3TR are energized.

5. After three seconds, the contacts on 3TR close and contacts on 2TR open. Coil 8CR is energized and hinge motor stops. The contacts on 8CR close starting the lock motor. The door starts to lock.

6. When the door is locked, the open contacts close and closed contacts open on switch LS2, and the following actions occur:

• The circuit to LOCK pushbutton light and coils 1CR and 5TR opens. The circuits to coils 1TR, 2TR, 3TR and 8CR open, and lock motor and clutch stop.

Power Door Cycle — Single Door: Unlock/Open

Pressure switch PS2 must be in position completing circuit to energize 9CR. (**NOTE:** If a sterilizing cycle has ended and COMPLETE light is on, 9CR is energized.) The contacts on 9CR are closed completing the power door circuit. Operator selects UNLOCK/OPEN pushbutton. The pushbutton light will come on.

1. The following actions occur:

• Coils 4CR, 5CR, 15CR and 4TR are energized. Normally closed contacts open and normally open contacts close on 4CR, 5CR and 15CR. When the UNLOCK/OPEN pushbutton is released, the pushbutton light and the coils remain energized through two sets of closed contacts on 4CR.

2. After one second, the normally closed contacts open and normally open contacts close on 4TR. Coils 6CR and 7CR are energized. The normally closed contacts open and normally open contacts close on 6CR and 7CR. Coil 3TR is energized.

3. After three seconds, the 3TR contacts close. Coil 8CR is energized. The contacts on 8CR close, starting the lock motor. The door starts to unlock.

4. When the door is unlocked, the closed contacts open on switch LS3, and the following actions occur:

- The circuit to UNLOCK/OPEN pushbutton light and coils 4CR, 5CR, 15CR and 4TR opens. The lock motor stops, and circuits to coils 3TR, 6CR, 7CR and 8CR open.

NOTE: To open the door, the operator must again press the UNLOCK/OPEN pushbutton.

5. After the operator presses the UNLOCK/OPEN pushbutton, the following actions occur:

- The UNLOCK/OPEN pushbutton light comes on and remains on until the pushbutton is released. Coils 4TR, 5CR and 15CR are energized, and pushbutton light comes on. Normally open contacts close and normally closed contacts open on 5CR and 15CR. Coil 1TR is energized. When the UNLOCK/OPEN pushbutton is released, the pushbutton light and the coils 4TR, 5CR and 15CR remain energized through closed contacts on 15CR.

6. After one second, normally closed contacts open and normally open contacts close on 1TR and 4TR. The clutch and hinge motor start. The door starts to open.

7. When the door is open, the closed contacts on switch LS4 open, and the following actions occur:

- The circuit to pushbutton light and coils 4TR, 5CR and 15CR opens. The circuits to coils 1TR and 4TR open, and clutch and hinge motor stop.

Power Door Cycle — Double Doors: Close Door

The door on opposite side must be closed and locked. If it is not, the contacts on switch LS2 (B or F) that complete the circuit to the door pushbuttons are open. Pressure switch PS2 and vacuum switch VS2 are in position, completing circuit to energize 9CR. The contacts on 9CR are closed, completing the power door circuit. Operator selects the front door CLOSE pushbutton. The back door and front door CLOSE pushbutton lights come on.

1. The following actions occur:

- The coil (10CR) that enables the door circuit is energized closing normally open contacts and opening normally closed contacts on 10CR. Coils 1CR, 3CR and 5TR are energized. Normally closed contacts open and normally open contacts close on 1CR and 3CR. When the pushbutton is released, the circuit to the front door and back door CLOSE pushbutton lights and coils 1CR, 3CR and 5TR is maintained through two sets of closed contacts on 3CR.

2. After one second, the contacts on 5TR close. Clutch and coil 1TR are energized.

3. After one second, the normally open contacts close and normally closed contacts open on 1TR. The hinge motor starts to close the door.

4. When the door is closed, the open contacts close and closed contacts open on switch LS1 (F or B), and the following actions occur:

- The circuit to the front and the back CLOSE pushbutton lights and coils 1CR, 3CR and 5TR opens. The hinge motor and clutch stop, and circuit to coil 1TR opens.

Power Door Cycle — Double Doors: Lock Door

The door on opposite side must be closed and locked. If it is not, the contacts on switch LS2 (B or F) that complete the circuit to the door pushbuttons are open. Pressure switch PS2 and vacuum switch VS2 are in position, completing circuit to energize 9CR. The contacts on 9CR are closed, completing the power door circuit. Operator selects the door LOCK pushbutton. The back door and the front door LOCK pushbutton lights come on.

1. The following actions occur:

- The coil (10CR) that enables the door circuit is energized, closing normally open contacts and opening normally closed contacts on 10CR. Coils 1CR and 5TR are energized. Normally closed contacts open and normally open contacts close on 1CR. When the pushbutton is released, the circuit to the front door and back door LOCK pushbutton lights and coils 1CR and 5TR is maintained through closed contacts on 1CR.

2. After one second, the contacts on 5TR close. Clutch and coil 1TR are energized.

3. After one second, the normally open contacts close and normally closed contacts open on 1TR. The hinge motor starts to close the door.

4. When the door is closed, the open contacts close and closed contacts open on switch LS1 (F or B). Coils 2TR and 3TR are energized.

5. After three seconds, the contacts on 3TR close and contacts on 2TR open. Coil 8CR is energized and hinge motor stops. The contacts on 8CR close starting the lock motor. The door starts to lock.

6. When the door is locked, the open contacts close and closed contacts open on switch LS2 (F or B), and the following actions occur:

- The circuit to LOCK pushbutton lights and coils 1CR and 5TR opens. The circuits to coils 1TR, 2TR, 3TR and 8CR open, and lock motor and clutch stop.

Power Door Cycle — Double Doors: Unlock/Open Door

The door on opposite side must be closed and locked. If it is not, the contacts on switch LS5 (B or F) that complete the circuit to the door pushbuttons are open. Pressure switch PS2 must be in a position, completing circuit to energize 9CR. (**NOTE:** If a sterilizing cycle has ended and COMPLETE light is on, PS2 is in position and 9CR is energized.) The contacts on 9CR are closed, completing the power door circuit. Operator selects the door UNLOCK/OPEN pushbutton. The back door and front door UNLOCK/OPEN pushbutton lights come on.

1. The following actions occur:

- The coil (10CR) that enables the door circuit is energized, closing normally open contacts and opening normally closed contacts on 10CR. Coils 4CR, 15CR, 4TR and 5CR are energized. Normally closed contacts open and normally open contacts close on 4CR, 5CR and 15CR. When the UNLOCK/OPEN pushbutton is released, the front and back door UNLOCK/OPEN pushbutton lights and coils 4CR, 5CR, 15CR and 4TR remain energized through two sets of closed contacts on 4CR.

2. After one second, the normally closed contacts open and normally open contacts close on 4TR. Coils 6CR and 7CR are energized. The normally closed contacts open and normally open contacts close on 6CR and 7CR. Coil 3TR is energized.

3. After three seconds, the 3TR contacts close. Coil 8CR is energized. The contacts on 8CR close, starting the lock motor. The door starts to unlock.

4. When the door is unlocked, the closed contacts open on switch LS3 (F or B), and the following actions occur:

- The circuit to the front door and back door UNLOCK/OPEN pushbutton lights and coils 4CR, 5CR, 15CR and 4TR open. The front lock motor stops, and circuits to coils 3TR, 6CR, 7CR and 8CR open.

NOTE: To open the front door, the operator must again press the door UNLOCK/OPEN pushbutton.

5. After the operator presses the door UNLOCK/OPEN pushbutton, the following actions occur:

- The door UNLOCK/OPEN pushbutton light comes on and remains on until the pushbutton is re-

leased. Coils 4TR, 5CR and 15CR are energized, and front door and back door UNLOCK/OPEN pushbutton lights come on. Normally open contacts close and normally closed contacts open on 5CR and 15CR. Coil 1TR is energized. When the door UNLOCK/OPEN pushbutton is released, the front door and back door UNLOCK/OPEN pushbutton lights and the coils 4TR, 5CR and 15CR remain energized through closed contacts on 15CR.

6. After one second, normally closed contacts open and normally open contacts close on 1TR and 4TR. The clutch and hinge motor start. The door starts to open.

7. When the door is open, the closed contacts on switch LS4 (F or B) open, and the following actions occur:

- The circuit to front door and back door UNLOCK/OPEN pushbutton lights and coils 4TR, 5CR and 15CR opens. The circuits to coils 1TR and 14TR open, and clutch and hinge motor stop.

Stopping Power Door Cycle

Pressing STOP pushbutton when coil 1TR or 3TR is energized will stop the power door cycle as follows:

- Coil 2CR is energized. When the normally closed contacts on 2CR open, the power door circuit is open. The normally open contacts on 2CR close to maintain circuit to 2CR as long as STOP pushbutton is pressed.

3.6 FUNCTIONAL DESCRIPTION OF THE EAGLE MICROCOMPUTER CONTROLLER

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

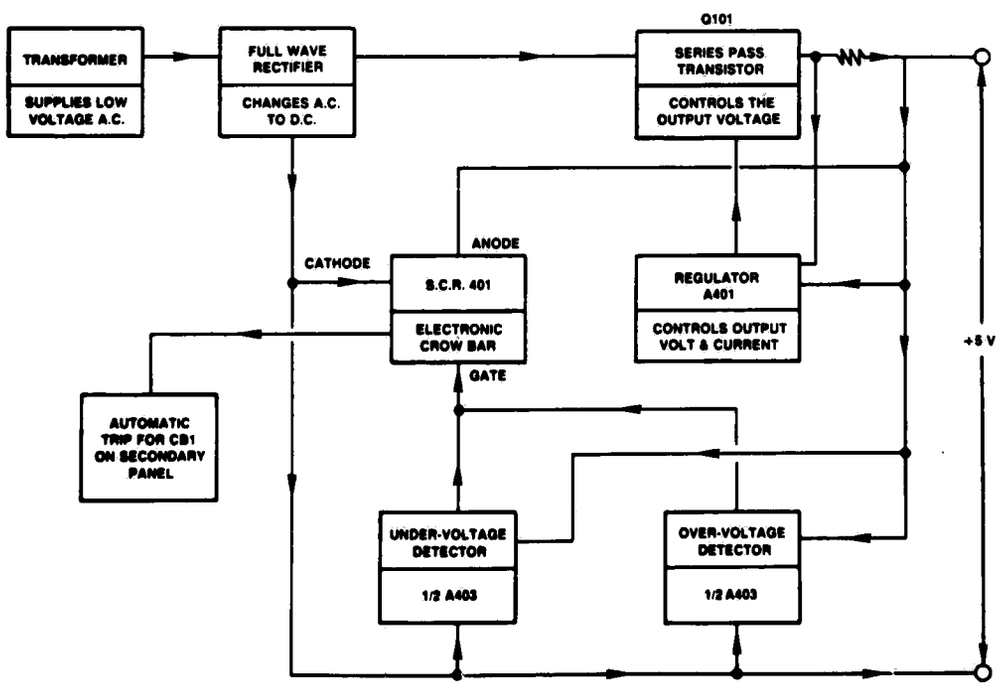


Figure 3-3. EAGLE 5-VOLT POWER SUPPLY.

Power Supply

The power supply used in the Eagle Series controls provides the control with 3 amps — 5 volts direct current (VDC) and 2 amp — 28 VDC required by the system. This power supply can be shown as eight blocks for the 5-VDC supply (Figure 3-3), and four blocks for the 28-VDC supply (Figure 3-4).

The 5-VDC supply operates as follows: voltage from the full wave rectifier (CR201 and CR202) is filtered by the RC network R201 and C101. This filter circuit supplies the bulk voltage (approximately 14 volts) to the series pass transistor Q101 which drops and regulates the output voltage to the required 5 volts. As the output voltage tries to vary from 5 volts, due to load and line variations, the regulating amplifier A401 senses this change and turns Q101 on or off as required to maintain the output at 5 volts.

If the output voltage rises above 5 volts, to an unsafe point of approximately 6.5 volts, the overvoltage circuit, comprised of 1/2 A403, Z402, R436, R428, R425, R427, R437, R426, and R424, feeds back an output to switch Q405 to turn it on. This transistor provides a gating current to SCR401 through R413. SCR401 switches the control switch (CB-1), on the secondary control panel, to off.

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

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

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

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

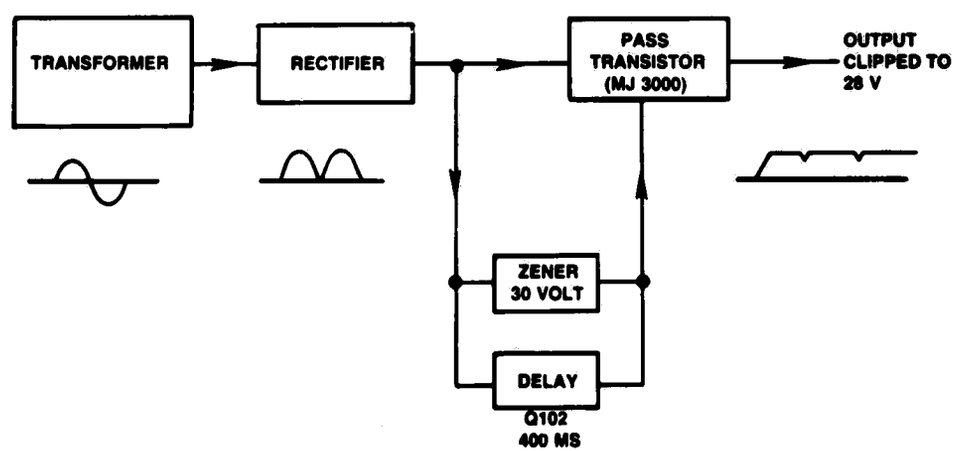


Figure 3-4. EAGLE 28-VOLT POWER SUPPLY.

Mother Board

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

CPU Printed Circuit Board — 146586 (Fig. 3-5)

The CPU printed circuit board (PCB) is required for all of the Eagle sterilizers. It contains the microcomputer, A1, support circuits, input buffers and drivers, output buffers and drivers, and the data bus required to communicate with the other two boards. Figure 3-5 is a diagram of the CPU printed circuit board.

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

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

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

(1) Program memory.

(2) Data memory.

(3) Input/output capacity of the 8048.

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

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

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

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

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

The supporting circuits are an external crystal and a zero cross-over network. The crystal, C1 and C2, determines the frequency of the control's operation. This crystal is also the time base for the sterilizer timers. The zero cross-over network (ZCN) consists of A7, C4, R4, A8, C5, R5, and R6. The ZCN prevents the computer from actuating a 120-VAC device during peak voltage of the sine wave. The ZCN monitors the 120 VAC and when the voltage level is of the zero voltage points of the sine wave, it enables the computer output. The ZCN's function is to reduce live transients from being generated which might interfere with the computer operation.

These transients might generate false signals should they occur. Another supporting circuit consists of Q9, C13, and R29. This circuit delays the activation of the triac outputs until the computer has gained control. It serves the same function as the delay circuit in the 28-volt power supply.

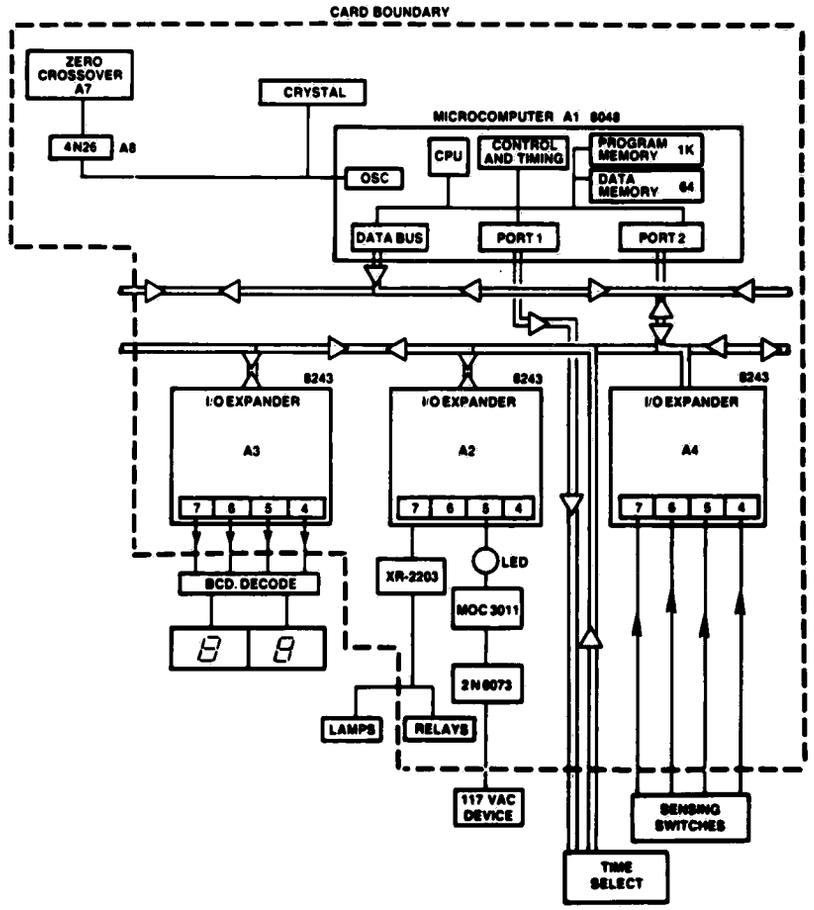


Figure 3-5. CPU PRINTED CIRCUIT BOARD 146586.

I/O #1 Printed Circuit Board — 146588 (Fig. 3-6)

The Eagle control system is provided with further expansion capabilities by the addition of the I/O #1 PCB. It expands the data memory (RAM) by 256 bytes and the input/output capacity by 16 with the addition of an 8155 (A1). The microcomputer can pull from an additional 2,000 program instructions from the 8355 (A2) which increases the program capability. Figure 3-5 is a functional diagram of this PCB. The 8355 (A2) also increases the number of input/output channels by 16.

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

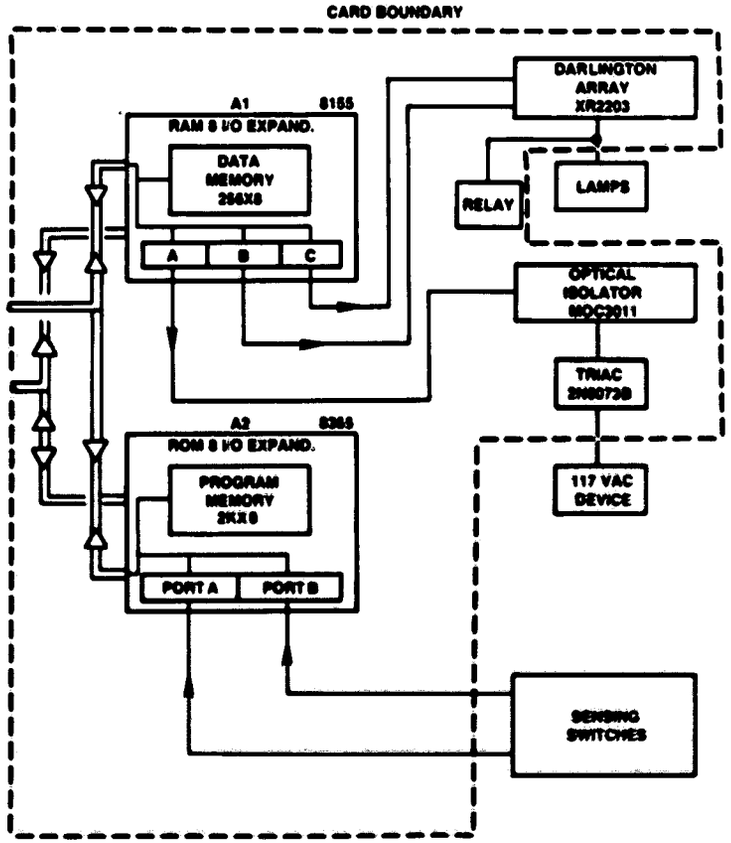


Figure 3-6. I/O #1 PRINTED CIRCUIT BOARD 146588.

PRINCIPLES OF OPERATION (PRINTCON)

3.7 GENERAL (PRINTCON)

The Eagle 2000 series with **Printcon** contains an enhanced version of the microcomputer control system previously described. State-of-the-art components and methods are used to measure temperature and pressure **in place of the round-chart recorder and pressure/vacuum switches.** This is the key difference between **Printcon** and the older system. Maintenance is reduced, and the accuracy of the control system is increased. Other than changes to accommodate these new measuring elements, the piping arrangement of the sterilizer remains the same.

Convenience of operation is increased by the digital display of temperature and pressure, the easily understood printed record, and thumbwheel selection of the sterilizing temperature.

Overview of the Printcon Control System

A comparison of the Eagle with PRINTCON system to the Eagle and Round chart recorder system will aid in understanding the Printcon control system. As shown in Fig. 3-7, both systems utilize the same Eagle card-cage control chassis. Note that in both systems, the card-cage control regulates the solenoid valves and monitors the cycle select pushbuttons, sterilize and dry times, door switch(es) and reset buttons. The Printcon system has an additional PC board with its own microcomputer and a stored program geared to interface with the card-cage controller.

In the round chart recorder (RC) system, the card-cage control was fed by a number of pressure, vacuum and temperature switches, each switch having a separate input wire to this control. Since the integrated circuits within the control accept only TTL-COMPATIBLE input signals (0 volts = OFF, 5 volts = ON), each switch

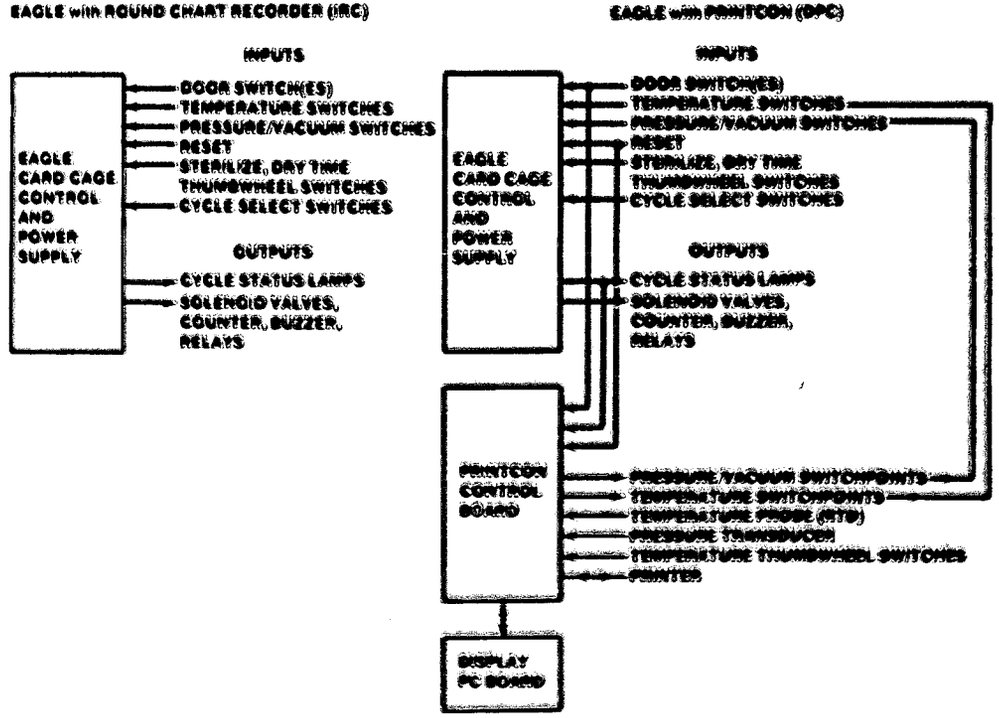


Figure 3-7. CONTROL COMPARISON.

was wired to the control as shown in Fig. 3-8. The control typically opens one or more solenoid valves and monitors a specific switch input line until that line changed from 5 volts to ϕ volts (or from ϕ volts to 5 volts). As an example, during the EXHAUST phase of a gravity steam cycle, the fast exhaust solenoid valve is energized to allow steam to evacuate the chamber. During the time when the chamber pressure is dropping, the control monitors the input line from PS-2 pressure switch to activate (open) at 1 psig. When the switch opens (and the input voltage rises to 5 volts), the control activates the buzzer to end the cycle.

On the Printcon system, the same switch input wires on the card-cage control are now wired to the main Printcon PC board. Instead of a mechanically activated switch opening and closing, however, a Printcon output transistor saturates (ϕ volts output) or cuts off (5 volts output) in response to a command from the microcomputer IC on the main Printcon PC board (Fig. 3-8). The microcomputer issues this command when it determines that the chamber pressure, vacuum or temperature is equal to the value selected for the setpoint (e.g., 1 psig).

Continuing to consider the Printcon control system as the combination of two microcomputer systems, the last important point to note in the overview is that the main Printcon PC board must be able to detect selection of a cycle, cycle phase changes (i.e. from STERILIZE to EXHAUST, etc.) and cycle irregularities (i.e. excessive CONDITION time, etc). This is accomplished by wiring certain card-cage outputs into the main Printcon PC board as shown in Fig. 3-8.

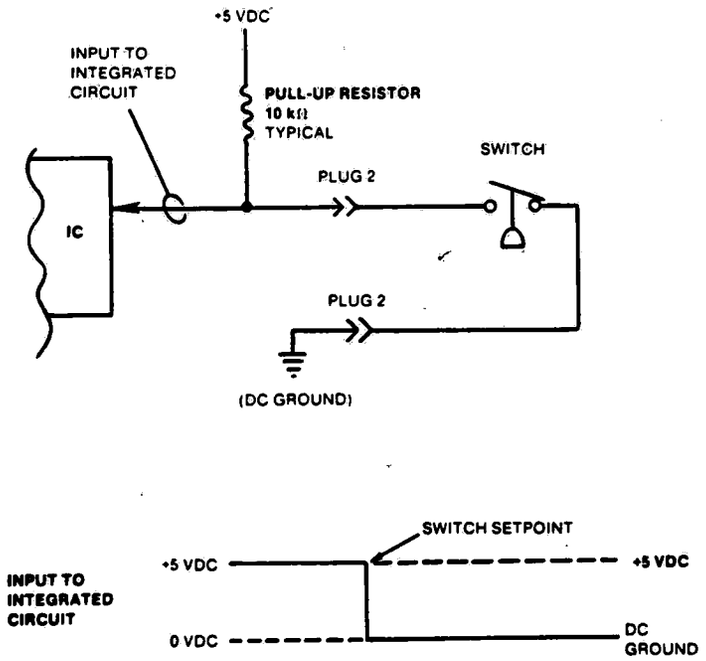


Figure 3-8. TYPICAL SWITCH INPUT.

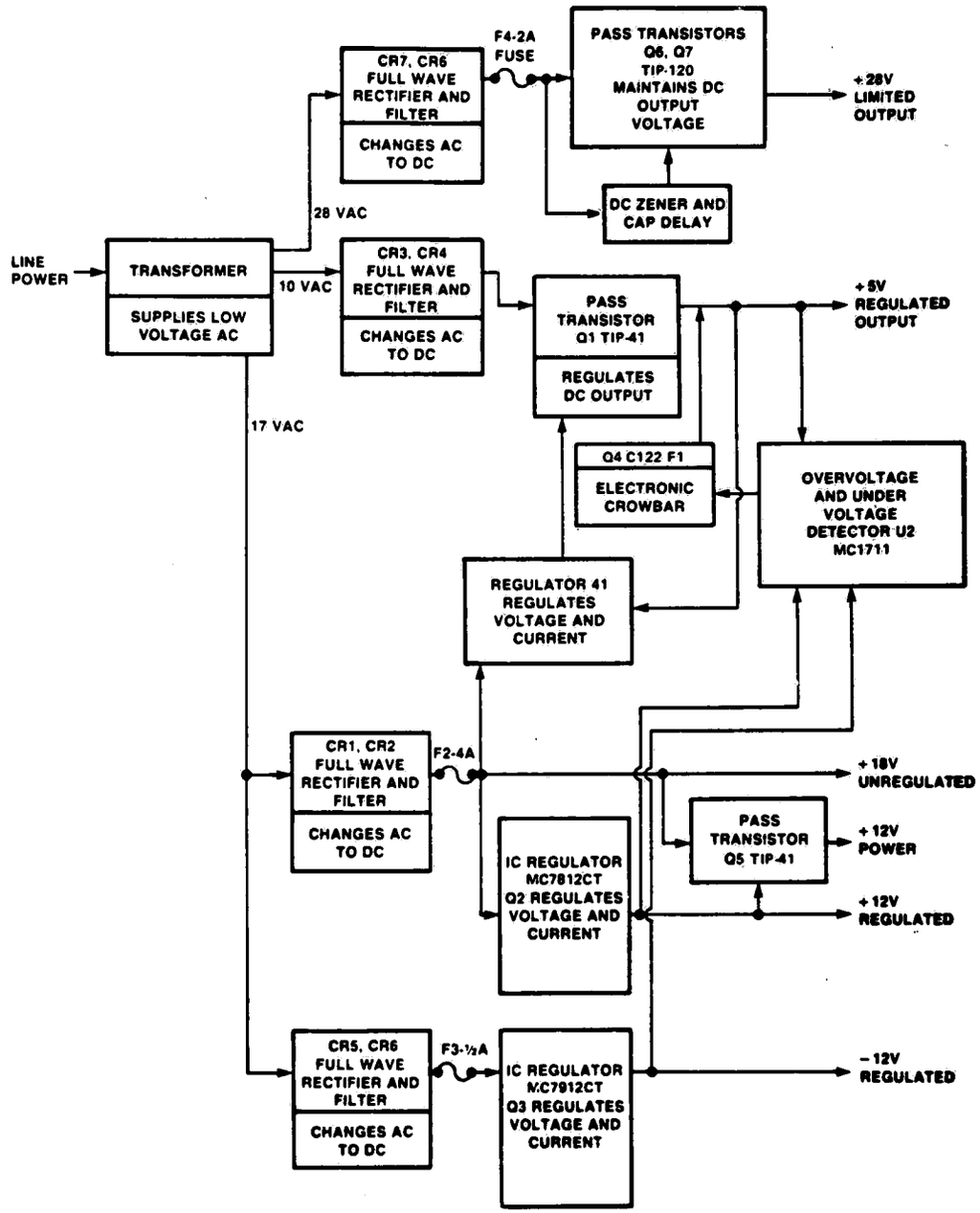


Figure 3-9. PRINTCON REGULATED POWER SUPPLY.

3.8 FUNCTIONAL DESCRIPTION OF THE PRINTCON MICROCOMPUTER CONTROLLER

The Printcon control system is built up from five major modules: a power supply assembly, a mother board/card cage assembly, a plug-in printed circuit board set, a display printed circuit assembly, and a digital printer controller assembly. The first three modules assemble into a controller nearly identical to that of earlier Eagle sterilizers. The only difference is in the power supply. The last two modules are in the Printcon assembly which replaces the round-chart recorder in the control column. A description by function of each component follows.

Printcon Power Supply (Figure 3-9)

The power supply for Eagle sterilizers with Printcon provides the Printcon controller with six separate outputs:

+5 volts direct current (VDC) at 2.5 amp voltage regulated with current limit and electronic crowbar over- and under-voltage protection (Figure 3-10).

+12 VDC at 0.1 amp, voltage regulated (Figure 3-11).

+12 VDC at 1.5 amp, voltage regulated (Figure 3-11).

-12 VDC at 0.1 amp, voltage regulated (Figure 3-12).

+18 VDC at 0.5 amp, unregulated (Figure 3-13).

+28 VDC at 1.5 amp, zener regulated (Figure 3-14).

These voltage outputs are generated as follows:

1. For the 5 VDC power supply, voltage from the full wave rectifier (CR3 and CR4) is filtered by C2. This filter circuit provides voltage to series pass transistor Q1 which drops the output voltage to 5 volts. Regulating amplifier U1 turns Q1 on and off as it senses voltage fluctuations due to load and line variations. An electronic crowbar (SCR Q4) provides protection from unsafe voltage levels. Dual comparator U2 fires SCR Q4 when the voltage level is greater than 6.5 volts or less than 4.7 volts. When SCR Q4 fires, the 5 VDC output is clamped to approximately 2 VDC by CR10 and Q4. The primary circuit breaker is also tripped by CR9 and Q4. Potentiometer (pot) R2 permits adjustment of the 5 VDC foldback current limit setpoint. Clockwise rotation of R2 lowers the current limit setpoint. Pot R7 permits adjustment of the 5 VDC output voltage. Clockwise rotation of R7 lowers the output voltage. (Figure 3-10.)

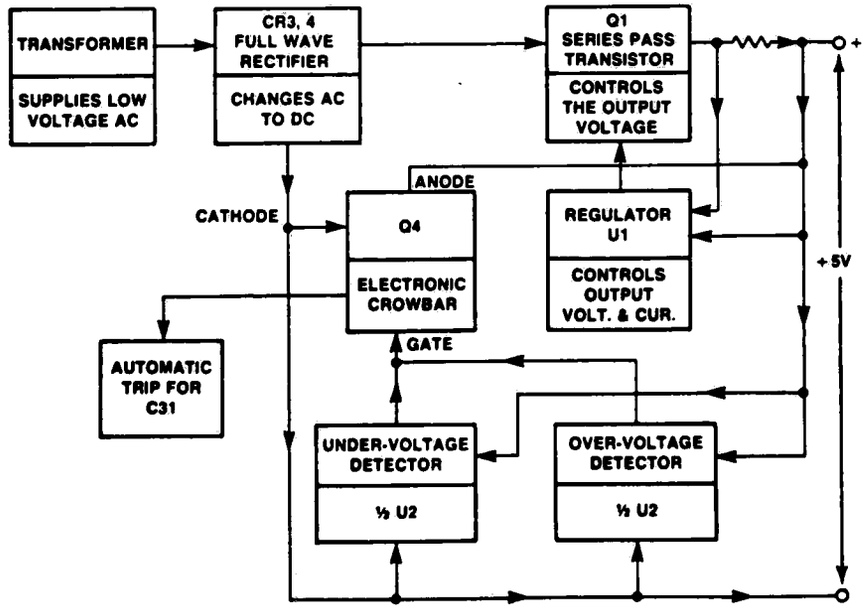


Figure 3-10. PRINTCON 5-VOLT POWER SUPPLY.

2. The +12 VDC regulated output is supplied by the +18 VDC unregulated circuit. The unregulated +18 VDC supplies the integrated circuit regulator Q2 which regulates the output voltage (Figure 3-11, Point B).

3. The +12 VDC power output is also supplied by the unregulated +18 VDC power supply. Series pass transistor Q5 uses the +12 VDC regulated supply as a reference to regulate the +12 VDC power output (Figure 3-11, Point A).

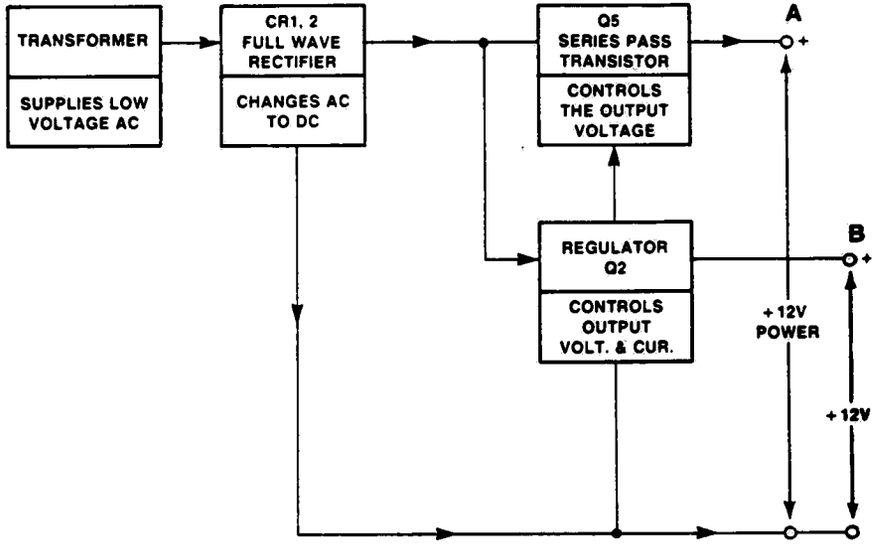


Figure 3-11. PRINTCON 12-VOLT POWER SUPPLY.

4. The -12 VDC power supply operates by using voltage from the full wave rectifier (CR5 and CR6) which is filtered by C4. This filter circuit provides voltage to integrated circuit regulator Q3, through fuse F3, which regulates the output voltage. (Figure 3-12.)

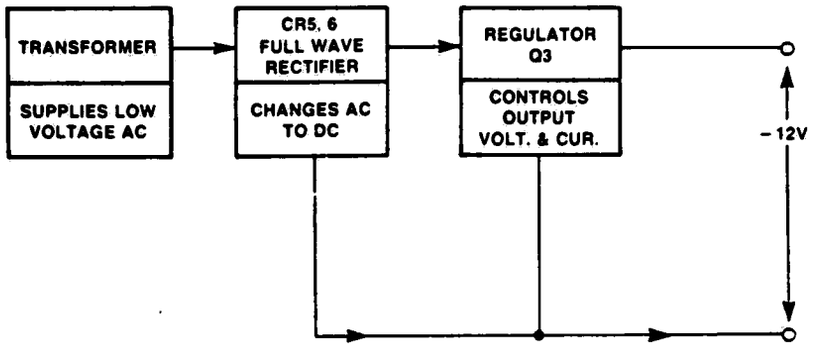


Figure 3-12. PRINTCON -12 VOLT POWER SUPPLY.

5. The +18 VDC unregulated power supply operates as follows: voltage from the full wave rectifier (CR1 and CR2) is filtered by C1. This filter circuit provides unregulated +18 VDC, through fuse F2, and is the supply for the +12 VDC regulated output, the +12 VDC power output, and the +5 VDC regulating amplifier U1. (Figure 3-13.)

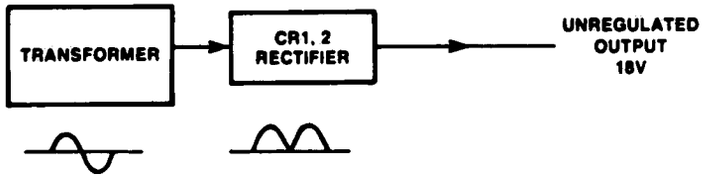


Figure 3-13. PRINTCON 18-VOLT POWER SUPPLY.

6. The +28 VDC power supply operates as follows: Voltage from the full wave rectifier (CR7 and CR8) is filtered by C5. This filtered circuit provides voltage to series pass transistors Q6 and A7 through fuse A4. The series pass transistors operate in parallel and are equalized by R11 and R12. The base reference voltage is provided by R13 and zener Z4, near 28 volts. R13 and C10 provide a slight delay on power turn on. (Figure 3-14.)

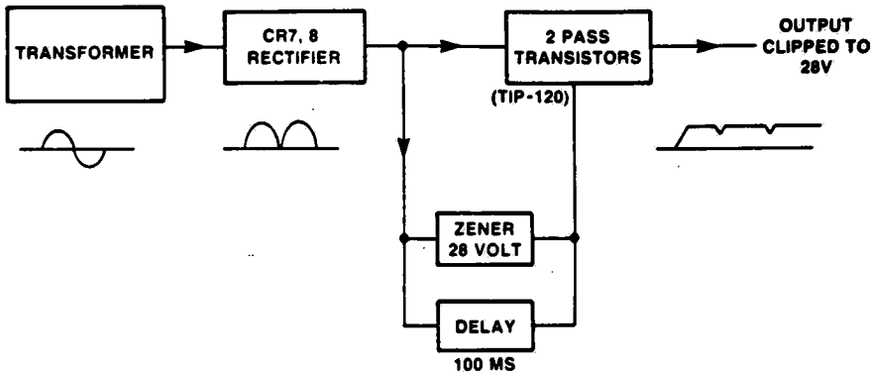


Figure 3-14. PRINTCON 28-VOLT POWER SUPPLY.

Motherboard/Card-Cage Assembly

This assembly is identical to that used on Eagles with round-chart recorders. Refer to Section 3.5 for a description.

CPU Printed Circuit Board — 146586

This assembly is identical to that used on Eagles with round-chart recorders. Refer to Section 3.6 for a functional description. For the **Printcon** application, some of the sensing switches shown in Fig. 3-5 are replaced by control lines from the **Printcon** assembly.

I/O #1 Printed Circuit Board — 146588

This assembly is identical to that used on Eagles with round-chart recorders. Refer to Section 3.6 for a functional description. For the **Printcon** application, some of the sensing switches shown in Fig. 3-5 are replaced by control lines from the **Printcon** assembly.

Main Printcon PC Board — 146651

The main Printcon printed circuit (PC) board contains the necessary circuitry to:

1. Translate the pressure transducer and temperature probe signals into digital (binary) values.

2. Monitor the **primary panel** signals to detect selection of a cycle and cycle status including alarms and aborts.

3. Control the alphanumeric printer.

4. Send temperature, pressure, time and date data to the Digital Display PC board.

5. Monitor vacuum, pressure and temperature settings on the Digital Display PC board.

6. Send the temperature, vacuum, and pressure transition point commands to the Eagle controller.

Figure 3-15 is a block diagram of the Digital Printer Control board. As on CPU printed circuit board 146586, **a microcomputer IC** is used to control the sequence of operation of this board. It pulls program instructions from IC's A1, A2 and A5. These last IC's also contain input and output lines for control and monitoring of various devices such as the temperature thumbwheels and digital display.

A Realtime Clock IC keeps track of the time and date and sends this information to the microcomputer for display or printing. A small on-board silver-oxide battery provides power to the REAL TIME CLOCK IC (only) when the sterilizer power is shut off. The battery is not rechargeable and lasts about one year.

The pressure transducer and the resistive temperature probe provide voltages to this board which vary in response to changes in pressure and temperature respectively. These voltages are fed to a **Multiplexer IC** which is the electronic equivalent of a rotary switch. The position of this rotary switch is controlled by the microcomputer so that either the pressure voltage or the temperature voltage is applied to the **Instrumentation Amplifier.**

The instrumentation amplifier is a precision IC which boosts the pressure or temperature voltages to levels convenient for the next IC, the **Analog/Digital (A/D) Converter.** This IC converts the varying pressure and temperature voltages (analog voltages) to a 12-level digital code (12 bit binary) which is proportional to the analog voltage.

This digital code is now in the form required for input to the microcomputer. As an indication of the extreme resolution of the A/D converter, the 12 level code allows 2^{12} or 4,096 distinct output combinations across the analog input range. The pressure transducer measures 0-50 psia, so that A/D converter resolution exceeds 0.04 psi.

Once in a digital form, the pressure and temperature data is easily compared by the microcomputer to the **pressure and vacuum set-points and the temperature set on the thumbwheels.**

Display option and temperature control switch bank S1 on the main Printcon PC board allows selection of Fahrenheit or Celsius temperature display/printing; selection of English (psig & inches Hg) or metric (kg/cm² & mm Hg) pressure for display/printing. In addition, an optional decimal point of resolution may be displayed for temperature and pressure (printing is always with extended precision). The next switch gives selection of pressure transducer. This switch should always be in the ON position. Three switches in this bank control the temperature overdrive function in the STERILIZE phase for GRAVITY and LIQUIDS cycles. These switches provide eight temperature settings varying from 0 F to 3.75 F above the sterilizing temperature set on the thumbwheels. Steam-to-chamber solenoid control is at this offset temperature, while STERILIZE timing begins at the temperature set into the thumbwheels. **BDC** (binary-coded decimal) **rotary switches S2 and S3** allow setting of the proper year for display and printing. If set to 80, no year will be used. See Section 7 for more information on setting these switches.

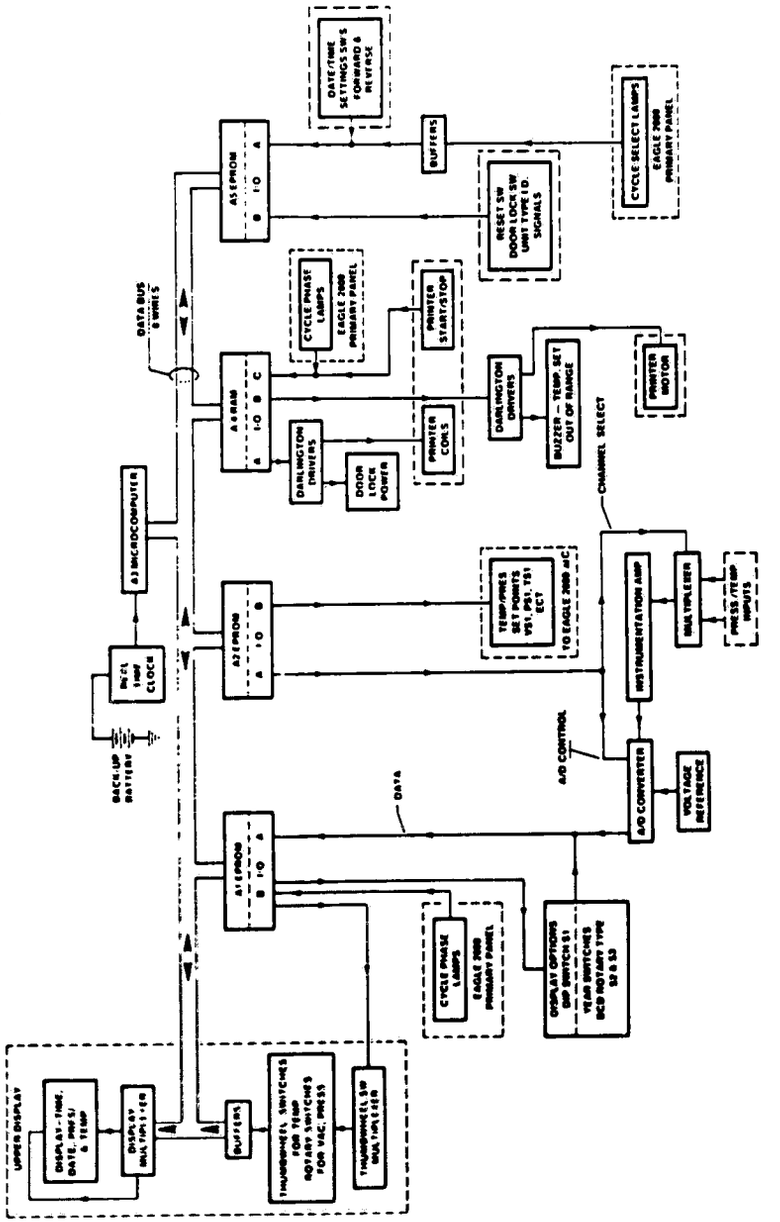


Figure 3-15. PRINTCON BLOCK DIAGRAM: Main Printcon P/C Board.

Via the input lines on IC's A1 and A5, this PC board will monitor for a cycle pushbutton (GRAVITY, LIQUIDS, etc.) to be pressed. This PC board will always provide the vacuum, pressure, and temperature set-point transitions which the card-cage controller needs to continue the cycle. It will monitor the cycle status lamps and print the time, temperature and pressure at each cycle transition. It also prints alarms and aborts if they occur. See Section 2 for typical cycle printouts, and alarm or abort messages.

The buzzer depicted on the block diagram will sound if an invalid sterilize temperature is dialed in, and also if an A/D converter or printer failure is detected.

The **Darlington driver** IC's boost up the drive signals generated by the microcomputer to a level sufficient to drive the printer motor and printer coils. The microcomputer, in order to print a message, will turn the printer motor on, wait for status signals from the printer, and selectively activate the printer solenoid coils. Letters and numbers are formed from patterns stored in the program chips.

Temperature and pressure input circuits: Temperature is sensed by a **resistive temperature probe.** The probe degree has a resistance of 100 ohms at 0 C, and increases about 0.39 ohms for every degree C that the temperature increases. By connecting the probe as part of a voltage divider circuit, an output voltage exactly related to temperature is obtained. (Figures 3-16 and 3-17.)

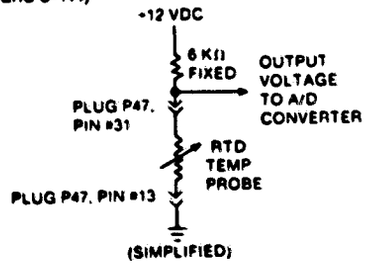


Figure 3-16. TEMPERATURE PROBE SCHEMATIC.

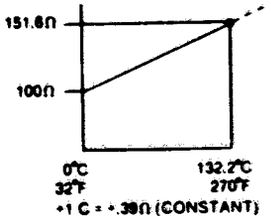


Figure 3-17. TEMPERATURE VS. RESISTANCE CHARACTERISTIC.

The pressure transducer also exhibits a resistance change in response to a pressure change, and is termed a **strain gauge** type. The illustration below shows the internal configuration and output voltage. (Figures 3-18 and 3-19.)

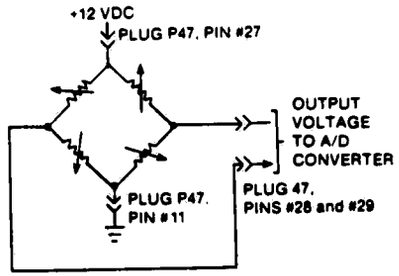


Figure 3-18. PRESSURE TRANSDUCER SCHEMATIC.

Figure 3-18 is an application of the **Wheatstone Bridge** configuration. The four resistors will vary in resistance in response to a pressure change, and are chosen so that at 0 psia, the output voltage is zero. At 50 psia (full scale) the output voltage is 36 millivolts.

NOTE: Printcon is programmed to measure and store the value of the pressure transducer output each time the RESET button is pressed **with the door(s) open.** The control will then use this value for gauge pressure and vacuum measurements in cycle. This same action will occur each time the power is turned ON **with the doors open.** If power is turned ON with the door(s) closed and locked, the control will assume an ambient pressure of 14.7 psia (29.92 in. Hg). The same applies if RESET is pressed with the door(s) closed and locked.

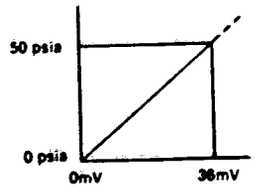


Figure 3-19. PRESSURE VS. TRANSDUCER OUTPUT CHARACTERISTICS.

DIGITAL DISPLAY PC BOARD 146633-081

A block diagram of this PC board is presented in Figure 3-20. The microcomputer presents changeable temperature, pressure, and other information for display to this PC board on the data bus. Note that the data bus is bi-directional, and the microcomputer from time to time will read the data bus for pressure, vacuum and temperature set-points. The control bus will activate the decoder/driver, latch, or switch select control IC when fresh data is at hand or needed. J45 connector also interfaces the time, date, forward and reverse touch switches on the display panel overlay.

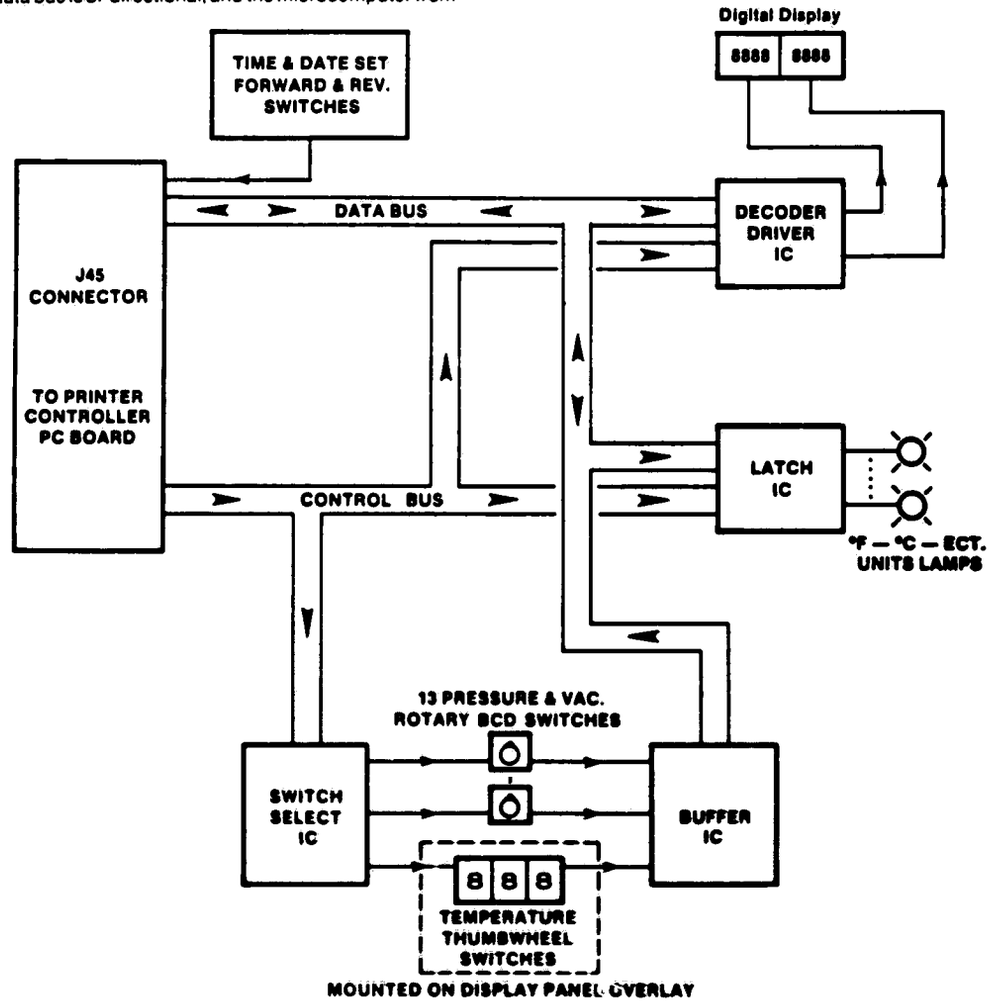


Figure 3-20. DIGITAL DISPLAY BLOCK DIAGRAM.

INTERPRETING THE PRINTED CYCLE RECORDS

Printed cycle records for normal steam sterilization cycles are presented in Figures 3-21, 3-22, and 3-23. The letters in the left hand most column represent the various phases of the cycle, as follows:

C — Condition
S — Sterilize
E — Exhaust
Z — Complete

Note how these printed lines correspond to changes in the cycle graph. This graph represents the pressure changes occurring in the chamber.

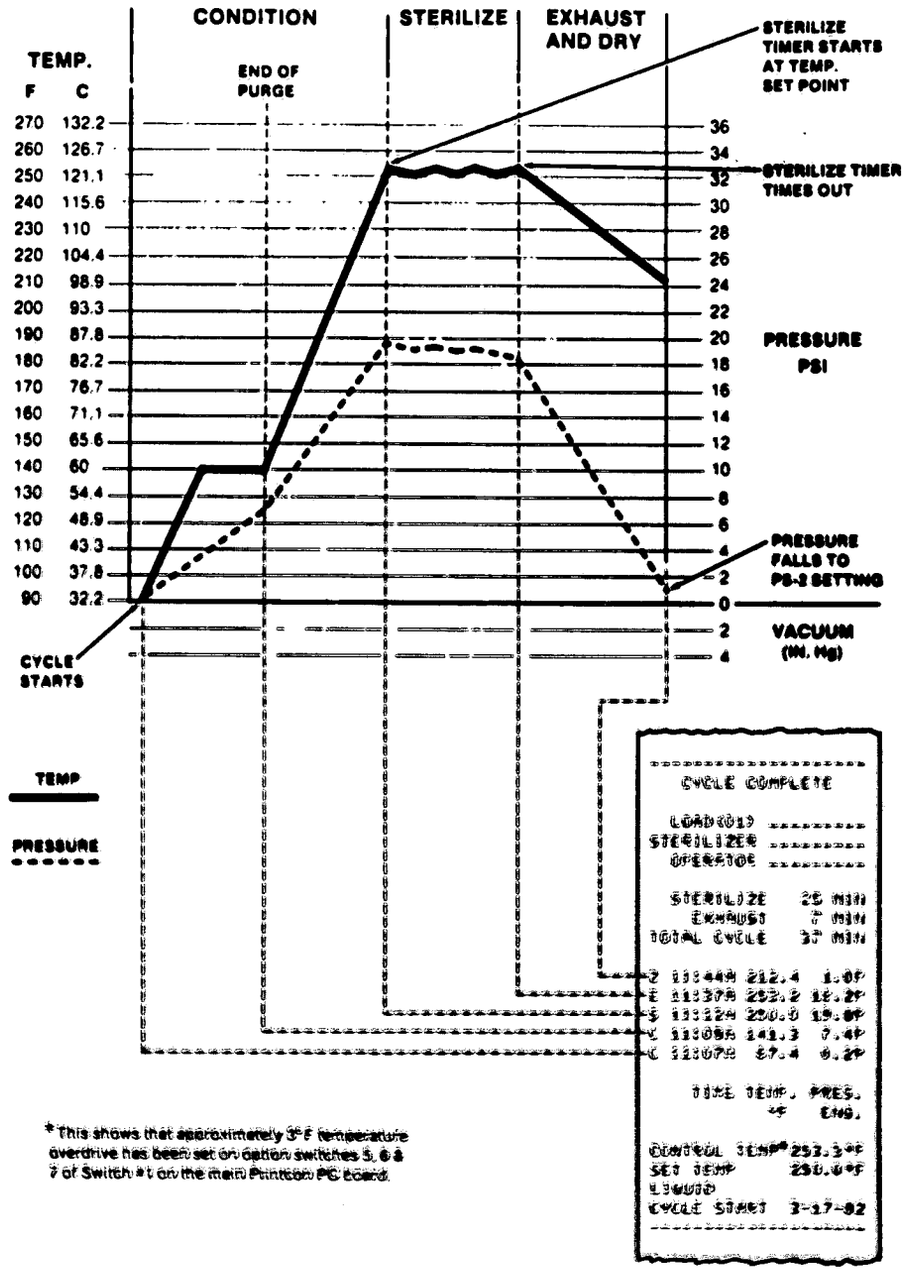
On a typical line: C 11:08A 141.3 7.4P

11:08A indicates the time at which this event occurred — 11:08 a.m.

141.3 is the temperature at this time.

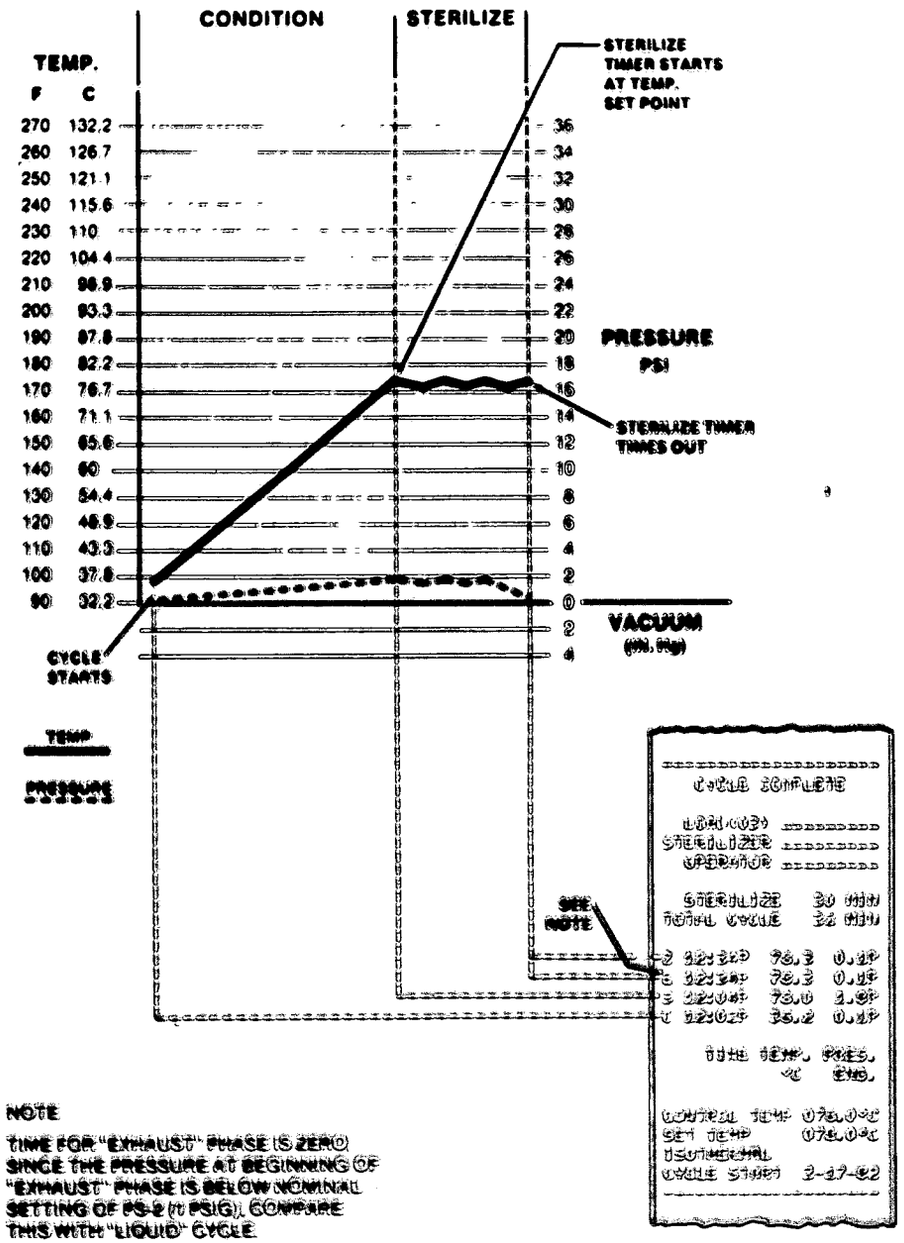
7.4P is the pressure achieved at this time.

The rest of the printed record is self-explanatory as are the printed cycle alarms. A summary of the proper and possible records printed out is presented in Section 2.



* This shows that approximately 3°F temperature overdrive has been set on option switches 5, 6 & 7 of Switch #1 on the main Printron PC board.

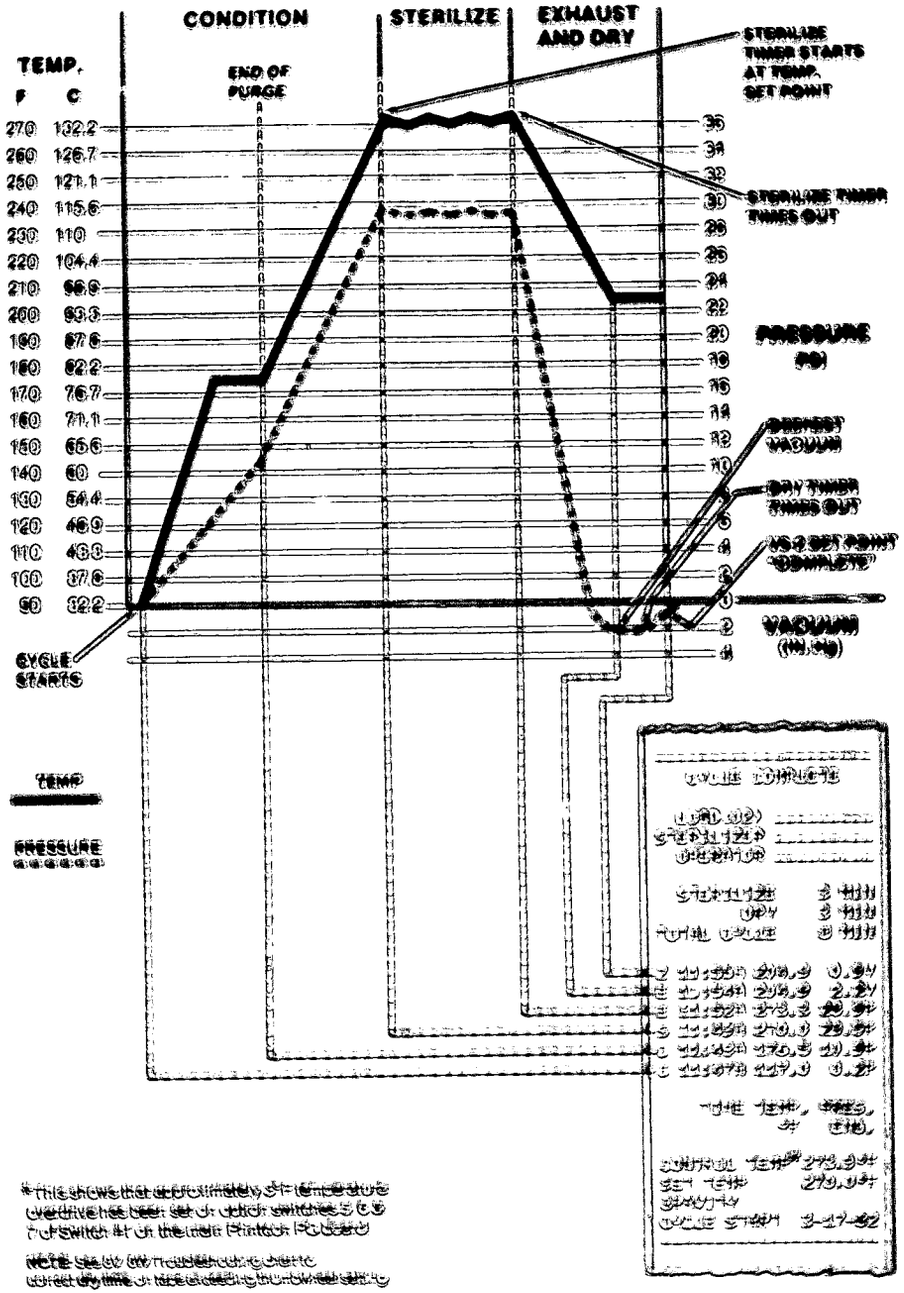
Figure 3-21. PRINTED CYCLE RECORD: Liquid Cycle (Units with Printron)



NOTE

TIME FOR "EXHAUST" PHASE IS ZERO SINCE THE PRESSURE AT BEGINNING OF "EXHAUST" PHASE IS BELOW NOMINAL SETTING OF PS-2 (1 PSIG). COMPARE THIS WITH "LIQUID" CYCLE

Figure 3-22. PRINTED CYCLE RECORD: Nonthermal Cycle (Units with Printer)



* This shows that approximately 5° F temperature overshoot has occurred which switches S5 & S6 to Switch #1 on the main Printed Circuit Board.

NOTE: See the Troubleshooting Chart for corrective measures.

Figure 3-23. PRINTED CYCLE RECORD: Gravity Cycle (Units with Printer)

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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 6, TROUBLESHOOTING. Figure 4-2 is a sample maintenance record which we suggest the Maintenance Department keep. Such a record will prove helpful in assuring proper maintenance.

WARNING: BE SURE TO PRESS THE POWER AND CONTROL SWITCHES TO OFF AND WAIT UNTIL CHAMBER COOLS TO ROOM TEMPERATURE BEFORE STARTING ANY MAINTENANCE OPERATIONS.

4.2 ROUTINE INSPECTION

1. Inspect cabinetry for signs of damage or misaligned parts.

2. Check the gauges and recorder or Printcon for cracked or broken glass or other obvious damage.

3. Open lower access door and check chamber piping for loose fittings or other obvious defects.

4. With manual steam and water valves open, check lines and valves for leaks.

5. Clean lint and dirt from control system components.

4.3 PREVENTIVE MAINTENANCE

Daily

1. Check recorder chart or printout for inked record after each cycle. Refer to Section 7.

2. Check the door gasket. Replace it if it has become deformed, brittle, or cracked. See paragraph 7.3.

Weekly

1. Watch the sterilizer as it goes through each phase of a complete cycle and check that all indicating lights are working. If a lamp needs replacement, refer to paragraph 7.12.

2. Flush chamber drain line as follows:

a. Remove chamber drain screen (Fig. 8-32).

b. Rinse drain with hot solution of trisodium phosphate (two tablespoons to one quart of water). If the use of trisodium phosphate is objectionable, use instead a solution of 1/2 cup of AMSCO Sonic Detergent (Part P-41591-091) and one quart of hot water.

c. Wait five minutes.

d. Then flush with one quart of hot water.

e. Place the strainer back in the chamber drain.

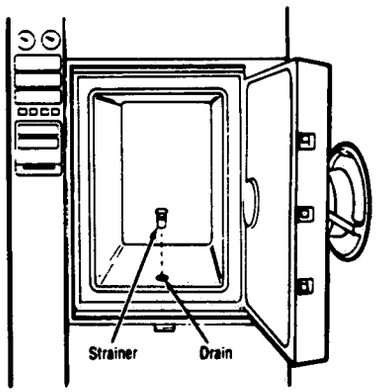


Figure 4-1. LOCATION OF CHAMBER DRAIN STRAINER.

PREVENTIVE MAINTENANCE RECORD
Page 1 of 3

Department _____

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

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
1. Discuss operation with department personnel.	X	X	X	X	X	X
2. Operate unit through abbreviated cycle noting pressure, temperature and any malfunction of phases.	X	X	X	X	X	X
3. Door Assembly:						
A. Inspect for ease of operation; lube bearings, door post and screw box.	X			X		
B. Inspect door gasket for proper seal, replace as required.	X	X	X	X	X	X
C. Check door alignment with end ring, lightly oil hinge assembly.	X			X		
D. Inspect door lock mechanism for proper operation and positive lock.	X	X	X	X	X	X
E. Disassemble, replace worn parts and lube lock mechanism.			X			
4. Steam Piping:						
A. Inspect manual valves for freedom of operation and closing. Tighten packing as required.	X	X	X	X	X	X
B. Rebuild manual valves. Include packing, stem, disc and seat.			X			
C. Inspect strainers, clean as required.		X		X		X
D. Inspect and clean jacket and chamber trap element.	X		X		X	
E. Check all gauges for leaks.	X	X	X	X	X	X
F. Inspect check valves for proper seal and freedom of internal movement.	X		X		X	
G. Verify operation of solenoid valves — S2, S3, S5 on GRAVITY units. Inspect for leakage. NOTE: On units with Isothermal control, also check solenoids S9, S8 and S10.	X	X	X	X	X	X
H. Rebuild solenoid valves S2, S3, S5 and/or S8, S9, and S10.			X			
I. Inspect HI-LO valves for any malfunction and maintaining proper pressure.	X		X		X	

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SAMPLE

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 1 of 3).

PREVENTIVE MAINTENANCE RECORD
Page 2 of 3

Department _____

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

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
5. Water Supply and Exhaust Piping:						
A. Inspect vacuum breaker for leaks, clean and/or replace float and disc as required.	X		X		X	
B. Inspect manual valves for freedom of operation and closing, tighten packing as required.	X	X	X	X	X	X
C. Rebuild manual valves.			X			
D. Inspect strainers, clean as required.		X		X		X
E. Flush flo-control needle valves and reset.	X		X		X	
F. Verify operation of solenoid valve S4. Inspect for leakage.	X	X	X	X	X	X
G. Rebuild solenoid valve S4.			X			
6. Control System:						
A. Clean lint and dirt from components.	X	X	X	X	X	X
B. Check chart drive and switches TS-1 and TS-2 in recorder for proper adjustment.	X		X		X	
C. Check inking system for proper marking.	X	X	X	X	X	X
D. Check settings on pressure and vacuum switches; readjust as required.	X	X	X	X	X	X
E. Inspect all wiring, terminals, socket connections for damage or fray.		X		X		X
F. Check all LEDs on control board for indication of solenoid signal.	X	X	X	X	X	X
G. Replace burned out lamps.	X	X	X	X	X	X
7. Miscellaneous Components:						
A. Inspect filter for sufficient air flow.	X	X	X	X	X	X
B. Replace filter element.			X			
C. Lift lever on safety valve to assure freeness and proper seal.	X	X	X	X	X	X

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SAMPLE

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 2 of 3).

PREVENTIVE MAINTENANCE RECORD
Page 3 of 3

Department _____

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

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
D. Verify that chamber drain strainer is clean and free of debris.	X	X	X	X	X	X
8. Final Check:						
A. Run test cycle verifying temperature, utilizing potentiometer.	X	X	X	X	X	X
B. Replace any covers removed.	X	X	X	X	X	X
C. 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 _____

SAMPLE

2436 GRAVITY AND LABISOTHERMAL Serial No. _____

Figure 4-2. SAMPLE PREVENTIVE MAINTENANCE RECORD (Sheet 3 of 3).

G- 5

Monthly

1. Place a few drops of heavy machine oil (SAE 20 or 30) on door hinge pin. Work oil into hinge by opening and closing the door several times.

Quarterly

1. Lubricate the door mechanism.

a. Unscrew the black button in the center of the chamber door wheel.

b. Remove the three socket head screws.

c. Remove coverplate.

d. Remove door handwheel.

e. Remove four socket head screws.

f. Remove clutch lock cap and shims (if power door).

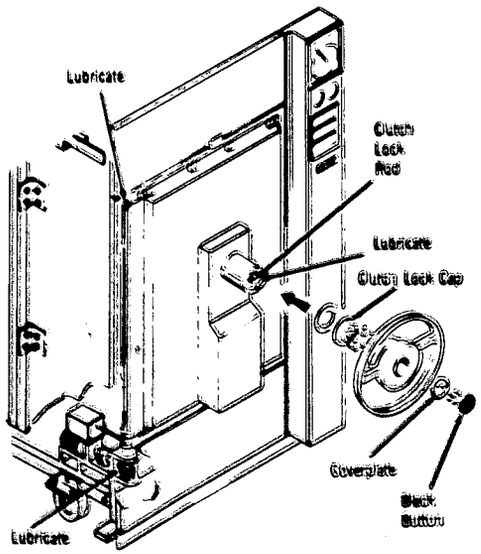


Figure 4-3. LUBRICATING CHAMBER DOOR.

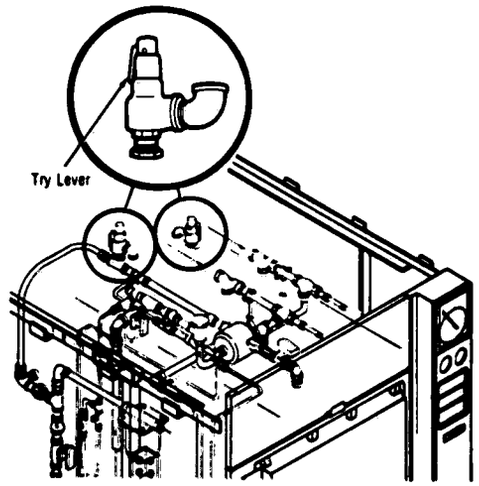


Figure 4-4. LOCATION OF JACKET AND CHAMBER SAFETY VALVES.

g. Inject a high-temperature grease such as Neptune 7* (Mfgr: Ore-Lube Corp., College Point, N.Y. 11356) or one of equal quality into cavity between nuts and screw shaft.

h. Reassemble in reverse order.

2. Check jacket and chamber safety valves (see Figure 4-4) as follows:

a. Be sure sterilizer is cool.

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

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

d. Follow operating instructions and allow chamber to reach operating pressure.

**Also available from your local AMSCO representative ... ask for part P-385220-091.*

G- 6

WARNING **WHEN CHECKING SAFETY VALVE(S), BE CAREFUL IF STEAM IS ESCAPING. 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 stops.

f. If leakage continues, discontinue operation of sterilizer until a qualified technician replaces the leaky safety valve.

Semiannually

1. Remove cover from air filter (Fig. 8-45) and inspect. Replace if necessary. Replacement may be required more often if sterilizer is in an area with high dust level.

Yearly

1. Open and inspect the thermostatic steam traps. See paragraph 7.6 for disassembly and cleaning instructions.

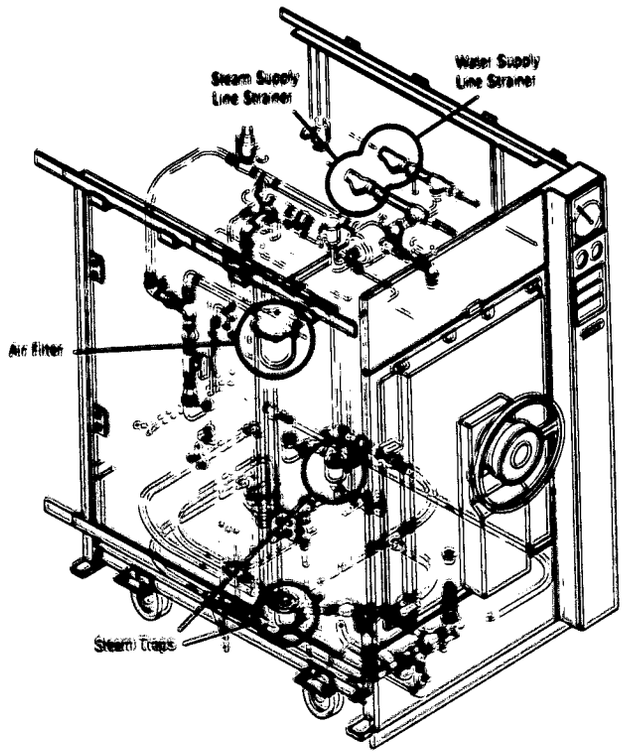


Figure 4-5. LOCATION OF AIR FILTER, STEAM TRAPS, AND STRAINERS.

4.4 PRINTCON PREVENTIVE MAINTENANCE FREQUENCY

1. Perform the following after the number of cycles indicated have been run:

a. Flush chamber drain ——— 100 cycles

b. Change ink cartridge ——— 300 cycles

c. Evaluate paper take-up ——— 300 cycles

d. Check calibration ——— 900 cycles

e. Change battery ——— Yearly

f. Set year switches ——— Yearly

4.5 CLEANING

Daily

1. Remove chamber drain strainer. Clean out all lint and sediment, then reverse flush strainer under running water.

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

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

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

Monthly

1. Clean gasket sealing surface on chamber door frame(s) with **AMSCO Pry Cream** (included in Door Frame Cleaning Kit, AMSCO Part P-753377-091). Wipe off Pry Cream with damp cloth.

2. Clean the door gasket(s) with alcohol or mild detergent. Do not clean 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 Kit, see above) to prevent gasket(s) from sticking.

4. Open steam and water supply line strainers (Figs. 8-38, 1 &, 21 respectively) and clean out sediment.

As Necessary

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

1. **Use AMSCO Stainless Steel Cleaner and Polish** on all stainless steel exterior surfaces of both the sterilizer and the loading equipment. 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.

2. Use a mild detergent such as **AMSCO Sonic Detergent (P-41591-091)** 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 the chamber drain strainer.

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

or

If the use of phosphate is objectionable, use a solution of 1/2 cup of **AMSCO Sonic Detergent** (P-41591-091) and one quart of hot tap water.

c. Wait five minutes, then flush drain with one quart of hot tap water.

d. Replace the strainer.

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SECTION 5

FIELD TEST PROCEDURE

5.1 GENERAL

Every sterilizer must be tested and inspected according to this procedure. Keep a record of the test on the recorder chart or printout. Each test must meet the standards of material, workmanship and performance set forth in this procedure. Potentiometer must be used on each test. Refer to Section 7 should mechanical problems arise or adjustments be required.

Upon completion of test, record is to be attached to the service order form.

For Printcom units, see also paragraph 5.11.

Install the compound pressure gauge to the opening on right front side of sterilizer shell. See Figure 5-3.

5.2 TEST INSTRUMENTATION REQUIRED

1. Potentiometer and thermocouple leads.
2. Calibrated compound test gauge (30" vacuum and 100 psig).
3. Voltmeter or LED test light.
4. Chamber drain thermocouple test fixture.
5. Spirit level.

5.3 CHECK FOR PROPER INSTALLATION

1. Assure sterilizer shell is level (front to back) by placing a level on the vertical face of the end ring (at the hinge side). Assure sterilizer shell is level (side to side) by placing a level on the horizontal surface of the end ring. Adjust leveling feet accordingly to achieve level conditions. See Figure 5-1.

2. Open door approximately half way. Until sterilizer shell level, door will remain in this position. If door swings open or closed, recheck for sterilizer being level.

NOTE: Steam and water supply lines should be one size larger than the nominal pipe sizes on the sterilizer.

3. Check for proper hookup of required services i.e. steam, water, and electrical.

TABLE 5-1. STERILIZER CONNECTIONS.

Plumbing Connections	Nominal at Connection Point Pipe Size	Pressure (Dynamic) Range
Steam Supply	3/8 N.P.T.	50-80 psig
Cold Water	3/8 N.P.T.	20-80 psig
Waste	1-1/2 O.D. Funnel	flow capacity

Electrical Connections	Phase	Volts	Amps	Frequency
Controls	1	115	5	60 Hz.

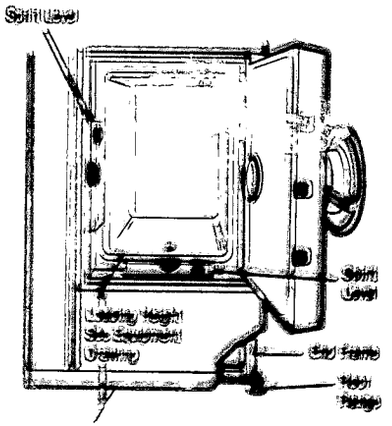


Figure 5-1. LEVELING THE STERILIZER.

5.4 ADJUSTMENT OF COOLING WATER VALVES AND SLOW EXHAUST VALVE — See Figure 5-2.

	Adjustable Valves	Valve Setting
A	Slow Exhaust Valve FC-3	4 Turns open.
B	Jacket Trap Cooling FC-2	3 Turns open.
C	Slow Exhaust Cooling	2 Turns open.
D	Exhaust Cooling FC-6	Approximately 45° from centerline of tube.
E	Chamber Trap Cooling FC-12	3 Turns open.
F	Steam bleed to FC in drain FC-7	1.75 Turns open.
G	Bleed Drain FC-8	2 Turns open.

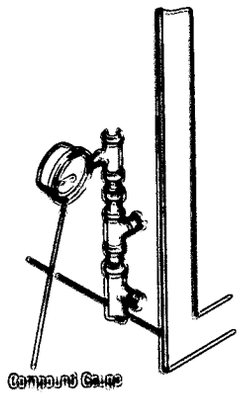


Figure 5-3. GAUGE INSTALLATION.

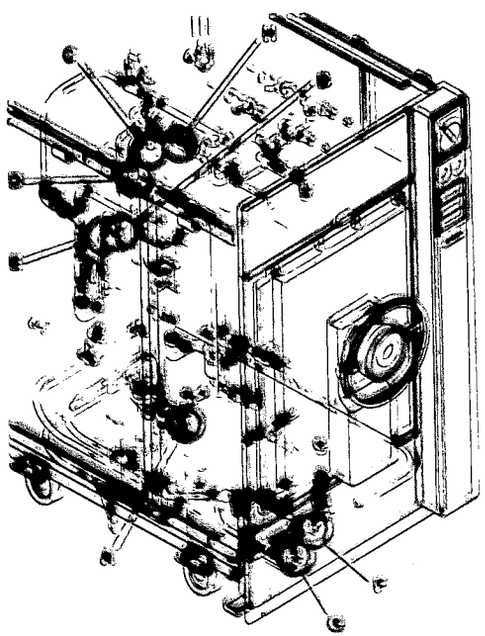


Figure 5-2. ADJUSTMENT OF COOLING WATER VALVES AND SLOW EXHAUST VALVE.

5.5 INSTALLATION OF POTENTIOMETER LEADS

Install potentiometer leads in chamber drain line through chamber drain screen fitting. The thermocouple junction should be in contact with the reorder bulb. Run leads through the door (between door gasket and sterilizer end ring).

5.6 INSTALLATION OF COMPOUND PRESSURE GAUGE

Install the compound pressure gauge to the opening on right front side of sterilizer shell. See Figure 5-3.

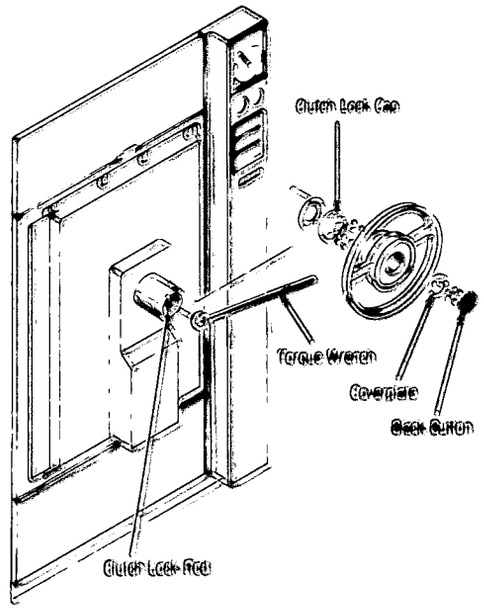


Figure 5-4. LOCKING DOOR TO CORRECT TORQUE.

5.7 DOOR SWITCH ADJUSTMENT FOR DOOR WITH NEW GASKET (Units before 5/30/80 have LS-2 two step switch)

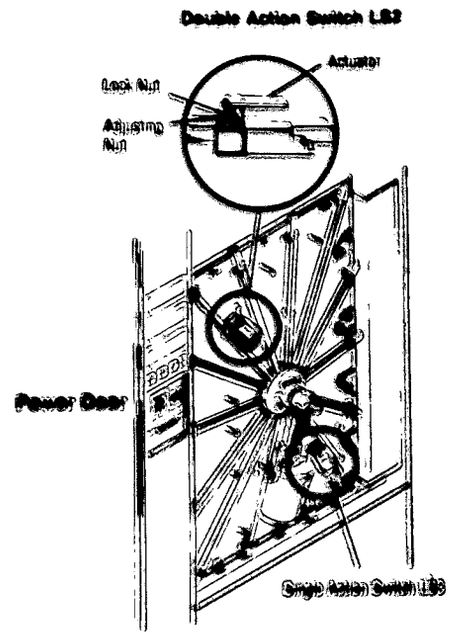
1. Using a torque wrench on the steam lock clutch rod, close and lock door to approximately 40 ft-lbs torque. The DOOR UNLOCKED light on primary panel should go out. See Figure 5-4.

2. If DOOR UNLOCKED light fails to go out use the following procedure to adjust the door switch. See Figure 5-5.

The double action limit switch (upper left corner LH door, lower right corner LH door) has the following functions:

When the door is sufficiently tightened, the first section of switch LS-2 actuates, "a" door to enable the controller to start the cycle. DOOR UNLOCKED light goes out. The door locking motor continues to run until the second section of switch LS-2 actuates, (2nd click), motor stops.

The single action switch LS-3 (lower right corner LH door, upper left corner LH door), stops the locking motor when the metal arms are fully engaged.



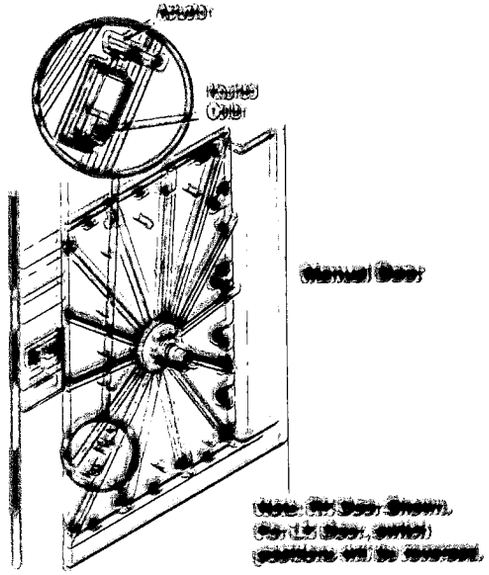


Figure 5-5. DOOR SWITCH ADJUSTMENT.

Adjustment (Fig. 5-5)

Double Action Switch (Units before 5/30/86 have LS-2 two-step switch.)

1. Close door and turn handwheel clockwise ten turns.

2. Loosen locknut and turn shaft all the way in (clockwise).

3. Turn shaft counterclockwise until the second click is heard. Tighten locknut.

Single Action Switch (LS-2, LS-4 and LS-5 after 5/30/86)

1. Loosen the screws which fasten the actuator to the radial arm. Loosen the screw in the knurled collar and turn the collar to position the plunger (the actuator in the center of its travel). Tighten screws.

LS-4 Adjustment

2. Turn handwheel counterclockwise until collar on screw-shaft assembly (Fig. 5-4) (F) contacts the roller (valve side (B)). Move actuator until it actuates switch. Tighten screws. Move shaft back to POWER position.

3. Turn handle clockwise to turn one cycle to LS-5.

4. Turn handle counterclockwise 2 turns and repeat for LS-2.

5.6 SAFETY VALVE TEST

WARNING BE CAREFUL IF STEAM ESCAPING FROM SAFETY VALVE TO PREVENT BURNS. WEAR GLOVES OR USE AN EXTENSION DEVICE WHEN OPERATING THE PAY LEVER.

NOTE: Jacket must be at operating pressure for proper safety valve test.

1. Operate by lever to actuate safety valve to snap shut.

2. Visually observe for leakage. If valve fails repeat step 1 above. If valve continues to fail, replace it.

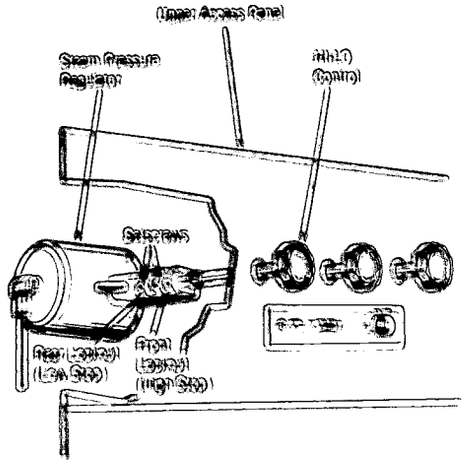


Figure 5-5 ADJUSTING PRESSURE REGULATOR.

5.7 ADJUSTMENT OF PRESSURE SWITCHES

1) Adjust steam pressure regulator to correct boiler pressure (2 psig) and adjustment is made, (see Figure 7-2).

2) Close slow exhaust valve and the open slow exhaust valve 2.5 turns.

3) Close door.

4) Set range (by) pointer on knobs to 20 psig (1.4 kg/cm²).

5) Set system (by) timer knob and (by) knob to [illegible]

NOTE: See [illegible]

6. Depress the LIQUIDS cycle button.

7. After the sterilize phase has completed and control has advanced to slow exhaust, observe calibrated compound pressure gauge. When chamber pressure reaches 3 psig adjust PS-1 (Figure 5-7) to open the exhaust valve (S-1) (LED-12). When chamber pressure is 1 psig adjust PS-2 to turn on the COMPLETE light and the buzzer (LED-16).

8. Press RESET button on control panel and initiate another Liquids cycle as in step 6.

9. When cycle advances to slow exhaust, observe the compound pressure gauge to assure proper setting of PS-1 at 3 psig and PS-2 at 1 psig.

NOTE: Make sure PS-1 and PS-2 function properly before proceeding.

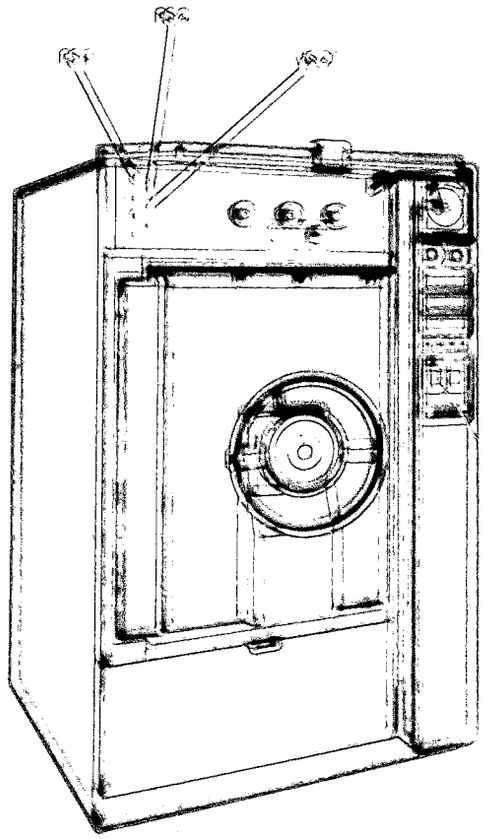
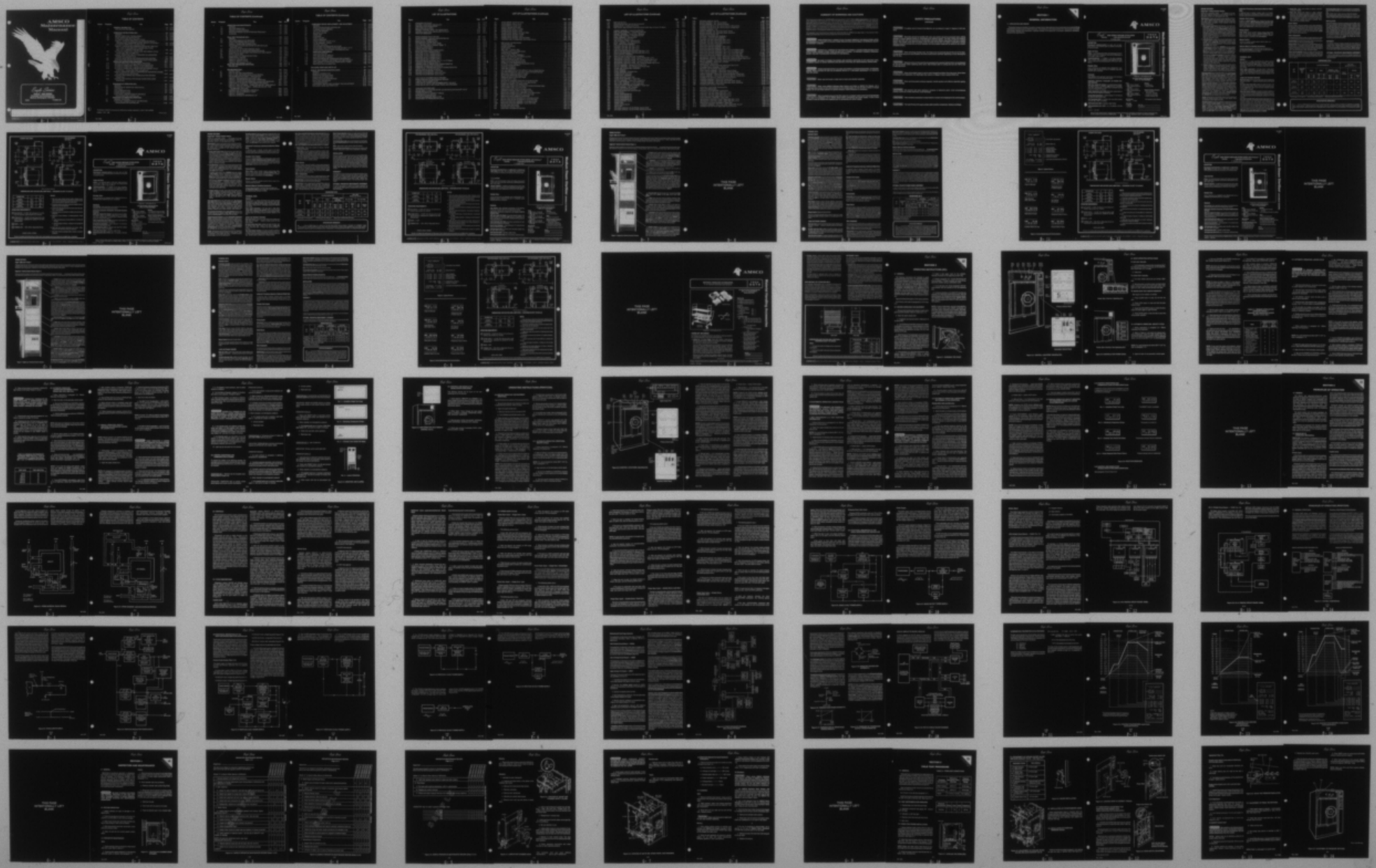


Figure 5-7 [illegible]

AMSCO SERVICE

EAGLE® 2000 SERIES - UNIVERSAL GRAVITY/ISOTHERMAL MEDIUM RECTANGULAR STERILIZER P-764087-002

6/88



5.10 OPERATIONAL CHECKS

TABLE 5-2: LIQUIDS CYCLE

This table is to be used as a quick reference in checking the operation of the Liquids cycle. Included are times of the various phases of the cycle, and chamber pressures and temperatures.

Initial Setup:

1. Make certain WATER and STEAM supply valves are on.
2. Adjust steam pressure regulator to the stop on the LO setting. Jacket pressure should be controlled at 20 (+1) psig.
3. Set the temperature to 250 F (121 C).
4. Laboratory/Isothermal model sterilizers **only:** Set GRAVITY/ISOTHERMAL switch (secondary panel) to GRAVITY.
5. Set STERILIZE timer to 5 minutes.
6. Check panel to assure that DOOR UNLOCKED light is on. On double door units, OPPOSITE DOOR UNLOCKED light must also be illuminated when rear door is opened.
7. Close and lock door(s). DOOR UNLOCKED light(s) must be extinguished when door is properly tightened.

NOTE: After cycle has started and has progressed to STERILIZE phase, wait for a minute and then test the operation of the chamber undertemperature monitor by moving the yellow IRC pointer to a position 2° F (1° C) above the temperature indicated by the orange pointer. STERILIZE timer should reset to time set on thumbwheel switches and STERILIZE light on the cycle status panel should begin to blink. Return yellow pointer to 250° F (121° C). Timer will start timing again. STERILIZE light will continue to blink.

8. Touch **LIQUIDS** cycle selector. Only minimal pressure should be required to actuate the switch. Cycle status should illuminate CONDITION. Begin timing.

Phase	Sterilizer Condition	TIME (Minutes)		
		24x36x36	24x36x48	24x36x60
Charge Jacket	Jacket must charge to 20 +1, -0 psig	N/A	N/A	N/A
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to about 10 psig. Solenoid valves S-2 (D-13)*, S-3 (D-12), S-4 (D-16) open.	1	1	1
Come-up time Panel Light: CONDITION	Solenoid valve S-3 (D-12), S-4 (D-16) close. Chamber temperature rises to 250° F, pressure to 20 +1, -0 psig.	1	1	2
Sterilize Panel Light: STERILIZE	Chamber temperature at 252-256° F, pressure at 20 psig. Solenoid valve S-2 (D-13) cycles to maintain pressure/temperature.	4*	4*	4*
Slow Exhaust Panel Light: EXHAUST	Solenoid valve S-2 (D-13) closes. Chamber exhausts slowly through slow exhaust valve. At chamber pressure 3 psig, S-3 (D-12) opens for fast exhaust for remaining steam.	4-6	4-1/2 to 7-1/2	5-9
Complete Panel Light: COMPLETE	At 1 psig, buzzer (D-18) sounds for 90 seconds or until door is opened. When door is opened, S-3 closes. WARNING HOT LIQUIDS light comes on and blinks for ten minutes.	1-1/2	1-1/2	1-1/2

*LED NO. ON CONTROL BOARD

TABLE 5-3: GRAVITY CYCLE

This table is to be used as a quick reference in checking the operation of the Gravity cycle. Included are times of the various phases of the cycle, chamber pressures and temperatures.

Initial Setup:

1. Follow steps for "Initial Setup" of Liquids Cycle, except set **both** STERILIZE and DRY times to 5 minutes.
2. Initiate a GRAVITY cycle.
3. This cycle should be identical to the Liquids cycle until the EXHAUST phase of the cycle is reached.

Phase	Sterilizer Condition	TIME (Minutes)		
		24x36x36	24x36x48	24x36x60
Charge Jacket	Jacket must charge to 20 +1, -0 psig.	N/A	N/A	N/A
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to about 10 psig. Solenoid valves S-2 (D-13)*, S-3 (D-12), S-4 (D-16) open.	1	1	1
Come-up time Panel Light: CONDITION	Solenoid valve S-3 (D-12), S-4 (D-16) close. Chamber temperature rises to 250° F, pressure to 20 +1, -0 psig.	1	1-1/2	2
Sterilize Panel Light: STERILIZE	Chamber temperature at 252-256° F, pressure at 20 psig. Solenoid valve S-2 (D-13) cycles to maintain pressure/temperature.	4*	4*	4*
Fast Exhaust Panel Light: EXHAUST	Solenoid valve S-2 (D-13) closes. Solenoid valves S-3 (D-12) and S-4 (D-16) open. Chamber pressure decreases to 3 psig, the DRY timer begins.	N/A	N/A	N/A
Dry Panel Light: EXHAUST	Solenoid valve S-5 (D-14) opens. Chamber continues exhausting until a vacuum is pulled on the chamber. Vacuum will be about 10" Hg. maximum.	5	5	5
Complete Panel Light: COMPLETE	Solenoid valves S-3 (D-12), S-4 (D-16) and S-5 (D-14) close. When chamber pressure reaches 1 Hg, buzzer (D-18) sounds for 90 seconds or until door is opened.	1 (filtered air) plus 1-1/2 buzzer	1-1/2 (filtered air) plus 1-1/2 buzzer	2 min. (filtered air) plus 1-1/2 buzzer

*LED NO. ON CONTROL BOARD.

TABLE 5-4: ISOTHERMAL CYCLE (LABORATORY/ISOTHERMAL MODEL STERILIZERS)

This table is to be used as a quick reference in checking the operation of the Isothermal cycle. Included are times of the various phases of the cycle, and chamber pressures and temperatures.

Initial Setup:

1. Make certain WATER and STEAM supply valves are on.
2. Set the GRAVITY/ISO switch (secondary panel) to GRAVITY. The steam-to-jacket solenoid S-9 (LED-16) will close. The steam-to-ejector solenoid S-5 (LED-14) will open and exhaust the steam from the jacket.
3. Let the jacket cool to 140° F (±5°).
4. Set STERILIZE time to 10 minutes.
5. Check panel to assure that DOOR UNLOCKED light is on. On double door units, OPPOSITE DOOR UNLOCKED light must also be illuminated when rear door is opened.
6. Set the temperature to 172° F (83° C).
7. Close and lock the door. DOOR UNLOCKED light must be extinguished when door is properly tightened.
8. Touch ISOTHERMAL cycle selector. Only minimal pressure should be required to actuate the switch. Cycle status should illuminate CONDITION. Begin timing.

Phase	Sterilizer Condition	Time (Minutes)
Condition Panel Light: CONDITION	Solenoid valves S-5 (D-14), S-8 (D-17), and S-10 (D-18) are open. Chamber begins heating and continues in CONDITION phase until temperature set point is reached. At about 10° F below set point, S-10 (D-18) closes.	2 max.
Sterilize Panel Light: STERILIZE	Chamber temperature reaches set point. Solenoid valve S-8 (D-17) cycles to maintain drain temperature at 172° F (78° C) +2.	10
Exhaust Panel Light: EXHAUST	Solenoid valve S-8 (D-17) closes, solenoid valve S-3 (D-12) opens.	N/A
Complete Panel Light: COMPLETE	At completion of cycle, solenoid valve S-3 (D-12) closes. Buzzer (D-18) sounds for 90 seconds or until door is opened.	1-1/2

FIELD TEST PROCEDURE (PRINTCON)

5.11 PROCEDURE

Gravity or Isothermal Models

1. Check for proper installation as per paragraph 5.3.

2. Adjust cooling water valves and slow exhaust valve as per paragraph 5.4 and Fig. 5-2. NOTE: The slow exhaust setting is preliminary.

3. Install potentiometer thermocouple lead in metal-to-metal contact with the temperature probe (from 1/2" to 1-1/2" of the tip). Run the lead through the door (between the door gasket and end ring).

4. Install a calibrated compound pressure gauge at the chamber gauge fitting after disconnecting the chamber gauge. This gauge should have 1/2 psig and 1/2 inch Hg. minimum resolution. Psig full scale should be 50 psig minimum.

5. Verify door switch adjustment as per paragraph 5.7.

6. Test the safety valve as per paragraph 5.8.

7. Adjust the steam pressure regulator as per paragraph 5.9, step 1.

8. Set the HI-LO valve to HI. Adjust the rear stop ring so that the jacket maintains 33±1 psig pressure.

9. Open the display overlay door by unfastening the self-tapping screw at the top right of the door.

Check the pressure and vacuum rotary BCD switches for the following settings:

PS-2 : 02 (1 psig)
PS-3 : 06 (3 psig)
VS-2 : 04 (2 in. Hg)

Close the display overlay door and replace the screw.

10. Check the service switch on the main Printcon PC board for the following settings. (See Section 7, if necessary, for access instructions):

Temperature — °F (#1 OFF)
Pressure — English (#2 OFF)
Display precision — Extended (#3 ON)
Transducer — Strain gauge — (#4 ON)
Temperature overdrive — Normal (#5 OFF, #6 and #7 ON)

Check the alternate positions on #1, #2 and #3 for proper digital display. Set sterilize temperature to 270 F.

11. Open control end door. Turn POWER and CONTROL switches ON. All lamps and digits on the Printcon display panel will come on for a 3 second lamp test. DOOR UNLOCKED lamp must come on. Pressure display should read 0.0. Temperature display should read room temperature ±1.5 F with a cool chamber.

The following must be printed (with appropriate date, time, temperature, and pressure):

```
                DOOR OPEN
   2:37P  76.0   0.0P
--------------------
POWER ON AT  4-01-82
   2:37P  76.0   0.0P
--------------------
```

The following must be displayed:

a. Actual and F lamps ON.

b. Sterilize/dry time displays must match thumbwheel settings. The DOOR OPEN message will be printed as shown above.

Double door units — DOOR UNLOCKED lamp must be on at both ends. Open opposite door. OPPOSIDE DOOR UNLOCKED lamp must come on at both ends.

12. Try to start all cycles. No cycle should start with the door(s) open.

13. Rotate all time setting thumbwheels. The time displayed must match the thumbwheel setting.

14. Change the temperature setting by 1 F. The new set point must be displayed for 2 seconds and the SET lamp must be on. Check all temperature thumbwheel digits to insure that the display matches the setting.

15. Press the RESET button. The following must be printed (with appropriate time and physical data):

```
          RESET BUTTON
*  2:37P  76.0   0.5V
```

16. Set the time and date if not correct. Turn CONTROL switch OFF and then ON again. If battery is functioning correctly, time and date will be retained.

17. Check paper feed switch. Forward position continuously feeds paper through printer. Center position is off. Rear position (away from the operator) runs take up motor until the paper platen is depressed (microswitch activates).

18. Check paper take-up mechanism. Feed paper through pinch rollers. Paper must not wander side-to-side. Platen microswitch must activate and shut off take-up motor when the paper is drawn taut. Run at least 20 feet of paper into the take-up mechanism. Paper should feed smoothly and coil up in the coil.

19. Check printed record quality. Quality of print-out (or top copy) should conform to the examples in this procedure. Check for compressed digits (indicates printer motor speed too slow, or a drag on the paper roll).

20. Close and lock door(s). Start any cycle. Immediately abort it with the RESET button. This message must be printed.

```
ABORT:  RESET BUTTON
*  2:37P  76.1  0.0P
C  2:37P  76.0  0.0P
```

21. Start any cycle. Immediately turn the CONTROL power OFF and then ON again. The POWER ON message must be printed. An intermittent buzzer will sound.

```
--------------------
POWER ON AT  4-01-82
   2:38P  75.1  0.2V
--------------------
```

22. Set the sterilize temperature to 295 F. Initiate a GRAVITY cycle. Wait until the timed steam purge is completed and the pressure has risen to the regulator setting and stabilized. The temperature displayed should agree with the potentiometer to within ±1 F. The pressure displayed should agree with the pressure gauge to within 0.5 psig. If not, adjust potentiometer P3 on the main Printcon PC board until these pressures agree. Then, adjust P9 for temperature, if necessary.

Abort the cycle with the RESET button and exhaust the chamber through the manual control. When exhausted to less than 1 psig, open the door and let all vapors escape. **With the door open,** turn power OFF and then ON again. Restart a 295 F GRAVITY cycle. With the pressure and temperature stabilized as before, the pressure should agree with the gauge to within 0.5 psig. If not, a realignment of the main Printcon PC board is indicated. (See paragraph 7.21.)

NOTE: A properly calibrated Printcon control is likely to be more accurate than the measuring devices. Therefore, the measuring devices should be calibrated against NBS (National Bureau of Standards) traceable equipment and the inaccuracies of the measuring devices should be known (via a calibration report sheet).

23. Disconnect the measuring devices and reconnect the chamber gauge.

NOTE: If the above accuracy results are not obtainable, refer to the "Printcon Calibration Procedure" in Section 7 of this manual.

24. Close and lock the door(s). Set STERILIZE and DRY times to 5 minutes each. Set the temperature thumbwheels to 250 F. Initiate a GRAVITY cycle. Reference Table 5.3 for proper valve actuation and correct phase times. The printer must print cycle information at the following times:

a. Start of cycle.

b. End of 1 minute purge.

c. Start of STERILIZE phase.

d. Start of EXHAUST phase.

e. End of EXHAUST phase.

f. Door open.

Refer to Section 3 for the correct format.

25. Repeat for a 250 F Liquids cycle. Refer to Table 5.2.

Adjust the slow exhaust valve as necessary to obtain 4-6 minutes exhaust time from start of EXHAUST phase to PS-3 set-point (3 psig factory set). (S3 solenoid will open.)

26. Repeat for a 172 F Isothermal cycle except set a 10 minute sterilize time. Refer to Paragraph 5.4.

NOTE: Component degradation which may not cause an actual control alarm is evidenced by:

a. Slow charge time to temperature set-point.

b. Excessive temperature make-ups in the STERILIZE phase.

c. Excessively rapid or slow EXHAUST time.

d. Calibration inaccuracies in the Printcon control.

27. Start a 250 F GRAVITY cycle, with 5 minute sterilize time set. After the STERILIZE phase is achieved, turn off the steam supply (use knob on valve panel) at 247.9 F, the following must occur:

a. STERILIZE lamp flashes.

b. The timer resets.

c. The following format is printed:

```
5  2:41P 250.0 21.9P
*  2:41P 244.1 21.9P
ALARM:    UNDER TEMP
*  2:41P 247.9 21.9P
```

Temperature falls 0.1 F under 248 F. These two lines are printed.

Reopen steam valve. As soon as 250 F is re-established, the lowest temperature reached during the alarm condition is printed.

28. Check all positions of the Manual control knob for proper operation — door(s) closed and locked.

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SECTION 6

TROUBLESHOOTING

This section contains detailed information for locating and correcting the cause of sterilizer malfunctions. Table 6-1 is for sterilizers with IRC units. For sterilizers with Printcon (DPC) units, use Table 6-2.

6.1 HELPFUL HINTS

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

2. Use the cycle graphs, Figures 6-1 through 6-3, in order to follow the sterilization cycles through the various phases. The cycle graphs may also be used to check for correct operation of the solenoid valves which control the various phases.

3. Refer to paragraph 6.3 and the TROUBLESHOOTING CHARTS (Tables 6-1 and 6-2) after the symptom has been verified.

4. Use the operational descriptions (Section 3), electrical schematics as aids in understanding system operation and how the malfunction of a specific component would affect it.

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

Steam & Water Supplies

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

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

c. Be sure the steam supply is of the proper quality and that the steam-supply line is well drained. This will ensure condensate-free steam of between 97 and 100 percent saturated vapor.

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

e. Clean the supply strainers.

f. Check the drain thermostatic traps; replace the elements if necessary.

g. Inspect the entire system; correct all leaks.

Electronic/Electrical System

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

- Input drives: vacuum, pressure, temperature, time settings, reset, cycle select.
- Output devices: solenoids, ball valves, relays, panel lamps, etc.
- System logic circuit boards of the controller.

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

c. If the LED is off, then check the input circuitry, i.e., pressure and vacuum switches.

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

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

f. Should it become necessary to extract a pin from plugs P16, P23, P25, P40, P42, or P47, proceed as follows.

On the outside surface of the pin, there is a thin piece of metal sprung outward which locks the pin into the housing. Using a sharp-pointed object such as a pin or needle, push the metal spring inward while gently pulling on the appropriate wire. The pin will slide out of the socket. When installing a new pin, first give the metal spring a slight bend outward to assure its locking capacity.

Pins in plugs P1, P2, P5, P10, P11, P48, P53, and P54 seldom need replacement. However, if replacement of pins is necessary, a special pin extraction tool is required. Contact AMSCO Service Co. for details.

6.2 HOW TO USE THE CYCLE GRAPHS

The cycle graphs (Figs. 6-1, 6-2 and 6-3) are representations of the operations of the cycles available with the sterilizer. They are intended to be used for two main purposes: (1) as an aid in understanding how the various cycles work; (2) as an aid in troubleshooting. The upper graph on each page is a representation of chamber pressure variation during the separate phases of the cycle. The LEDs (light emitting diodes), located on the printed circuit boards behind the front panel, are identified with the corresponding output device. When a solenoid valve, for example, is actuated (energized), the LED will be on.

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

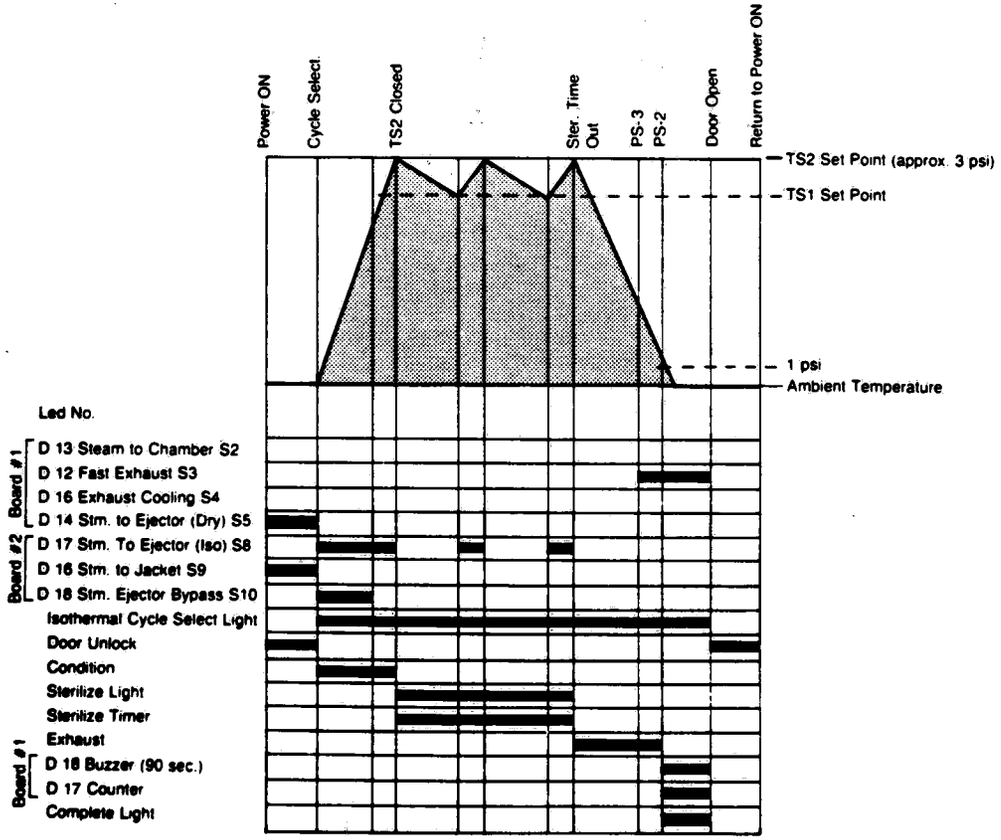
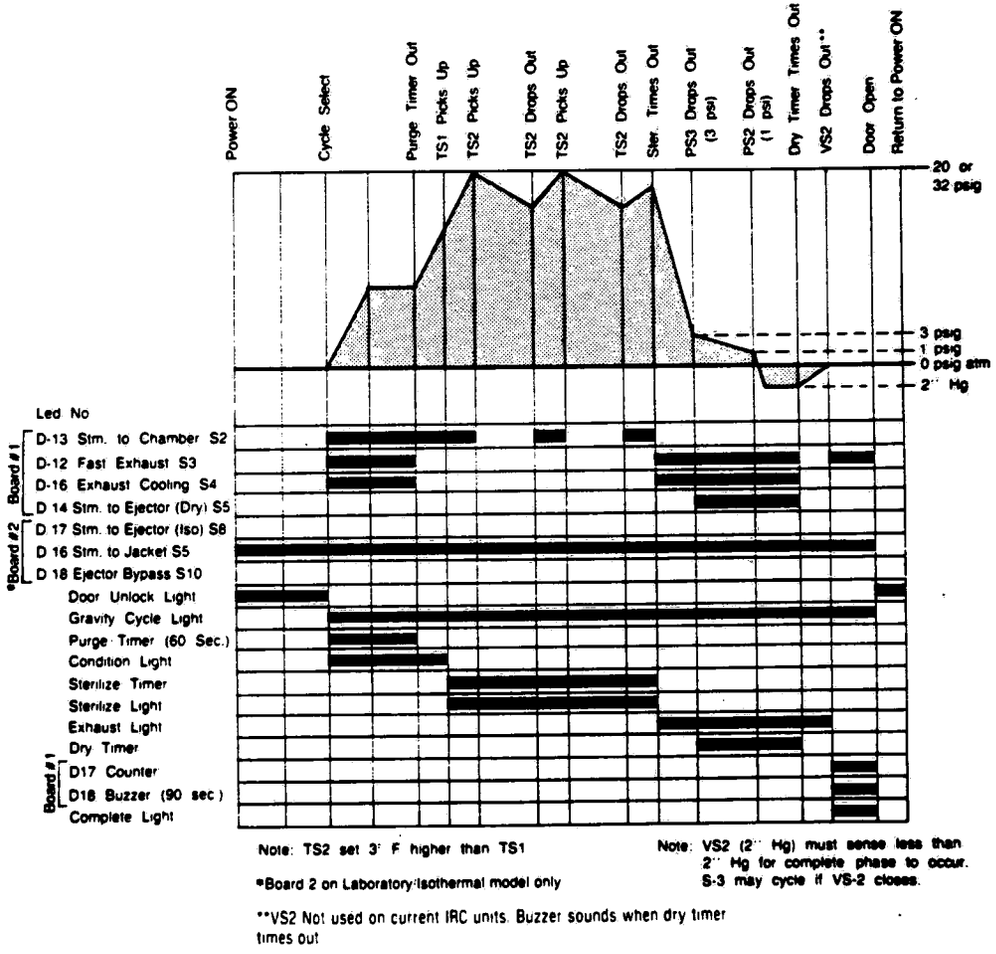


Figure 6-1. CYCLE GRAPH: Isothermal Cycle



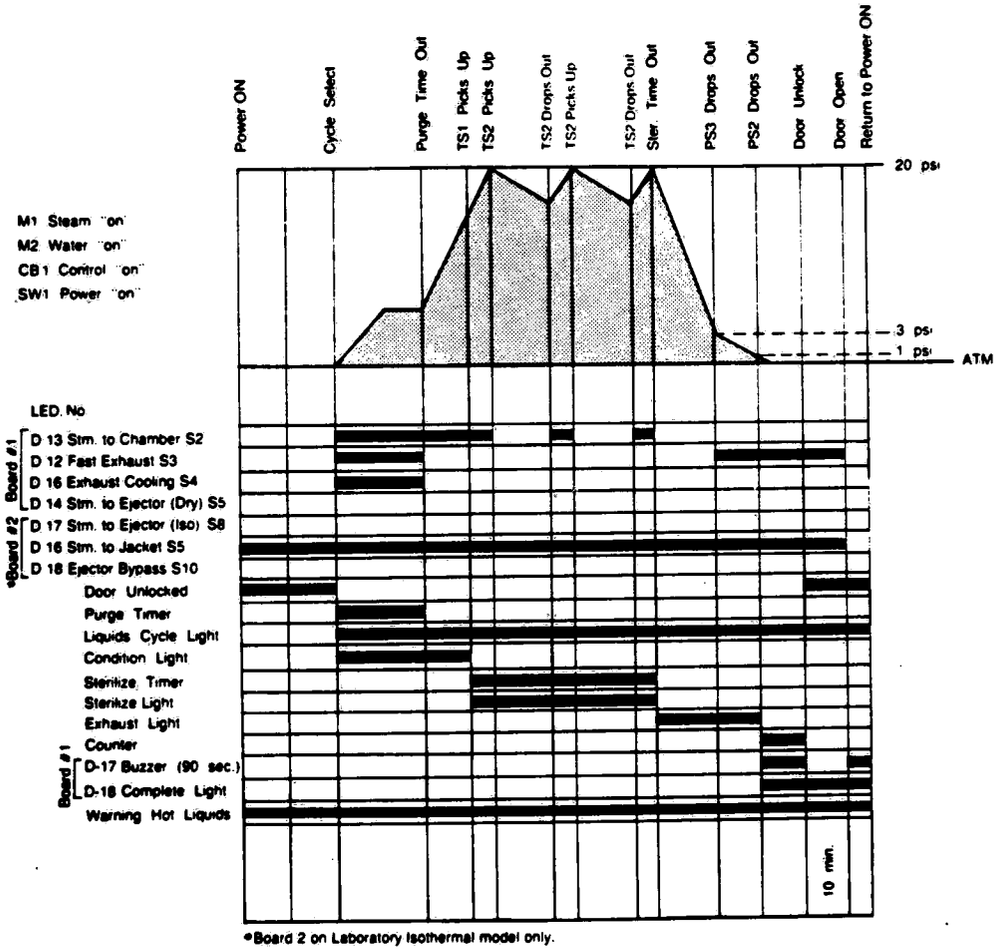
Note: TS2 set 3° F higher than TS1

Note: VS2 (2" Hg) must sense less than 2" Hg for complete phase to occur. S-3 may cycle if VS-2 closes.

*Board 2 on Laboratory-Isothermal model only

**VS2 Not used on current IRC units. Buzzer sounds when dry timer times out

Figure 6-2. CYCLE GRAPH: Gravity Cycle.



*Board 2 on Laboratory Isothermal model only.

Figure 6-3. CYCLE GRAPH: Liquids Cycle.

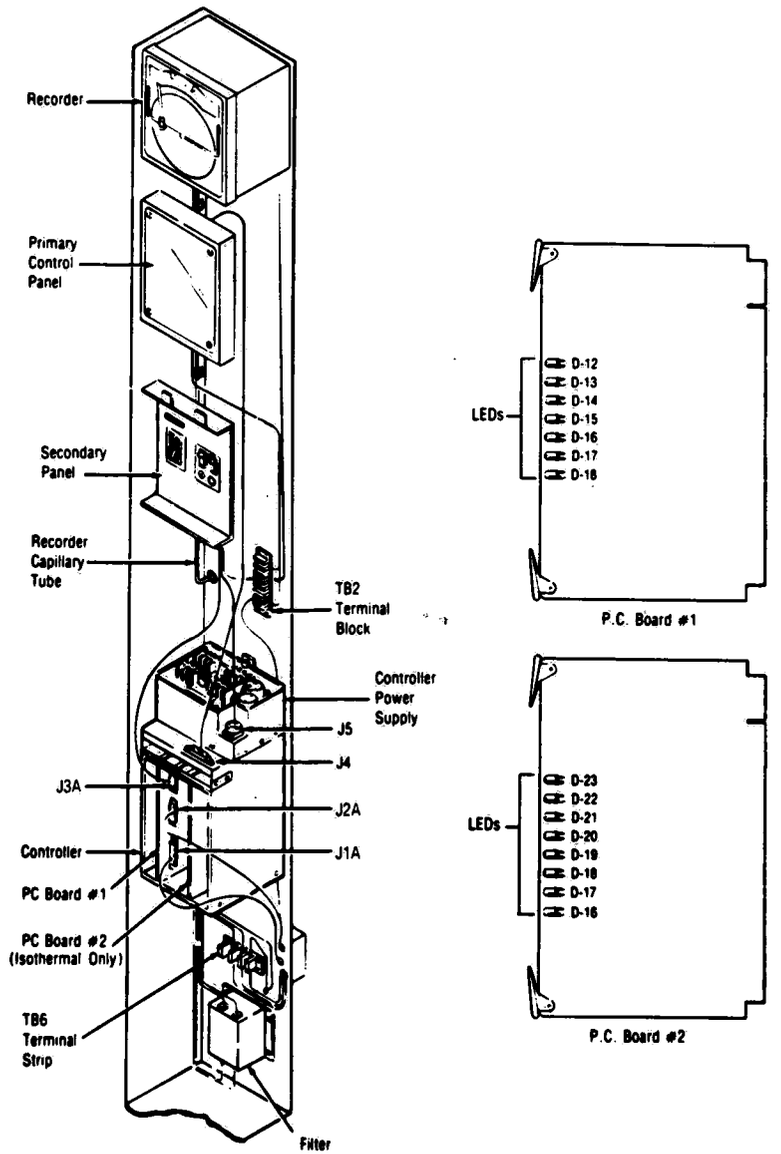


Figure 6-4. CIRCUIT BOARDS WITH LEDs.

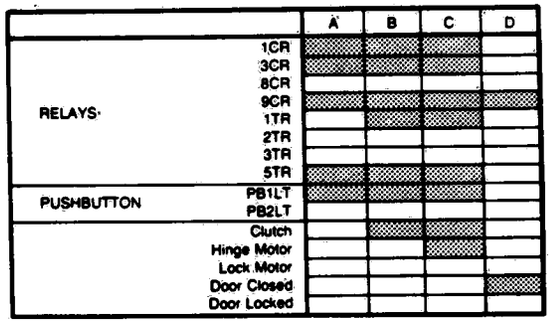
6.3 HOW TO USE THE POWER DOOR CYCLE GRAPHS

The power door cycle graphs on the pages following are intended to be used for the two main purposes: (1) as an aid in understanding how the power door(s) work; (2) as an aid in troubleshooting. The bar graph is a representation of which devices (lights, relays, hinge motor, clutch, lock motor) are energized during the cycle.

The various phases of the cycles are identified by letters and brief descriptions of the phases are given at the bottom of the page. As an aid in troubleshooting, the graph should be used to, first, identify the point in the cycle where a malfunction occurs, and, second, to check the components which should operate during the phase where the problem occurs. Also use the Troubleshooting Chart to check for possible causes of the problem.

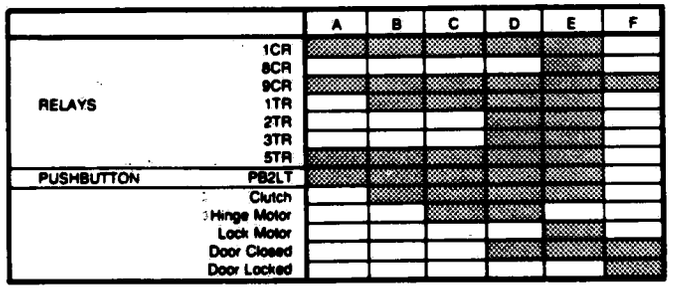
The positions of the switches shown on the electrical schematic for the power doors indicate the following state of the doors:

Switch	Door
LS1	Open
LS3	Unlocked
LS4	Closed
LS5	Locked



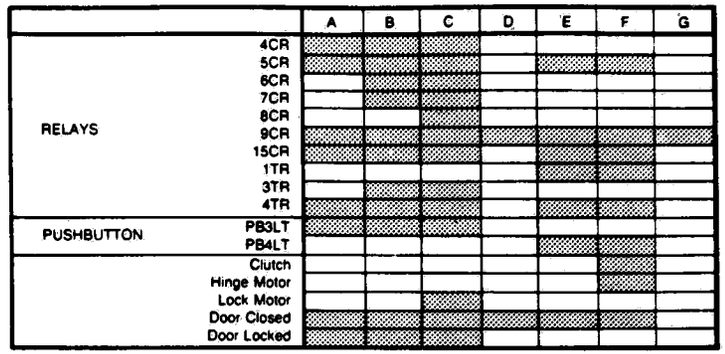
A. CLOSE pushbutton is pressed, starting closing part of cycle.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.

Figure 6-5. POWER DOOR, SINGLE: CLOSE.



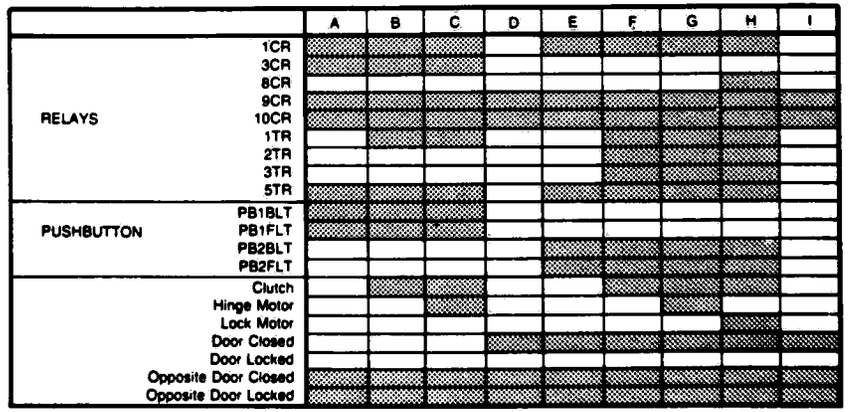
A. LOCK pushbutton is pressed, starting close and lock cycle.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.
E. After three seconds, lock motor locks door.
F. Door is locked.

Figure 6-6. POWER DOOR, SINGLE: LOCK.



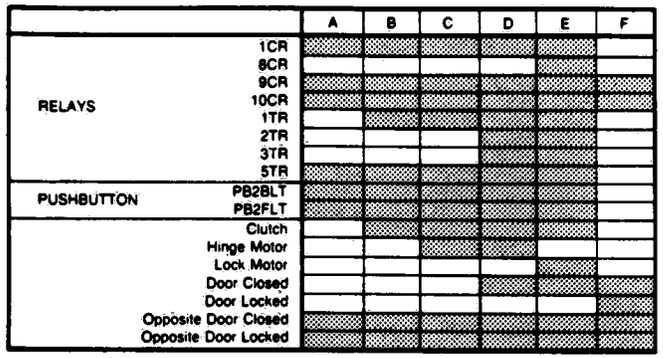
A. COMPLETE light is on. UNLOCK/OPEN pushbutton is pressed, starting unlocking part of cycle.
B. After one second, coils are energized, completing unlocking circuit.
C. After three seconds, lock motor unlocks door.
D. Door is unlocked.
E. UNLOCK/OPEN pushbutton is pressed, starting opening part of cycle.
F. After one second, clutch engages and hinge motor opens door.
G. Door is open.

Figure 6-7. POWER DOOR, SINGLE: UNLOCK/OPEN.



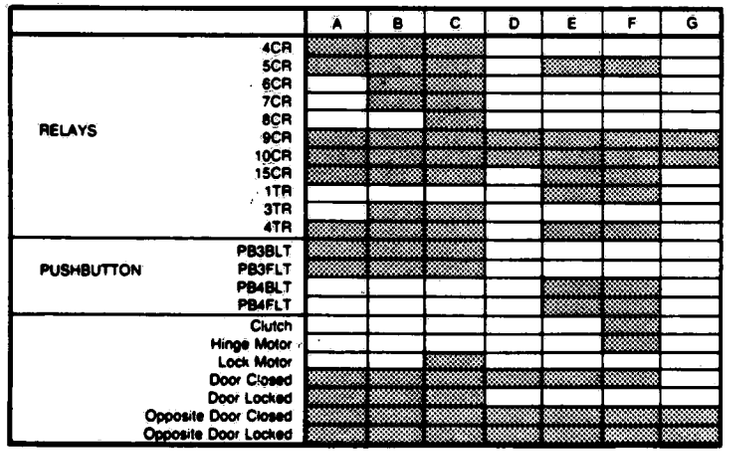
A. Opposite door is closed and locked. Door CLOSE pushbutton is pressed, starting closing part of cycle.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.
E. Door CLOSE pushbutton is pressed, starting locking part of cycle for door.
F. After one second, clutch engages.
G. After one second, hinge motor starts, in order to hold door tight against gasket.
H. After three seconds, lock motor locks door.
I. Door is locked.

Figure 6-8. POWER DOORS, DOUBLE: CLOSE.



A. Opposite door is closed and locked. Door LOCK pushbutton is pressed, starting close and lock cycle for front door.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.
E. After three seconds, lock motor locks door.
F. Door is locked.

Figure 6-9. POWER DOORS, DOUBLE: LOCK.



A. Opposite door is closed and locked, and COMPLETE light is on. Door UNLOCK/OPEN pushbutton is pressed, starting unlocking part of cycle for door.
B. After one second, coils are energized completing unlocking circuit.
C. After three seconds, lock motor unlocks door.
D. Door is unlocked.
E. Door UNLOCK/OPEN pushbutton is pressed, starting opening part of cycle for door.
F. After one second, clutch engages and hinge motor opens door.
G. Door is open.

Figure 6-10. POWER DOORS, DOUBLE: UNLOCK/OPEN.

6.4 THE TROUBLESHOOTING CHART — EXPLANATION OF ITS CONTENTS

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

TABLE 6-1: TROUBLESHOOTING CHART (IRC)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Before beginning cycle	1. A. No 120 facility power	1) Check main power source or check 120 VAC between TB6 terminals 1 and 2 — connect or turn on. **NOTE:** If facility power will not reset, isolate and repair short between facility power source and sterilizer.	Fig. 8-51
		2) Circuit breaker CB-2 (RESET circuit breaker on secondary panel) tripped — push to reset. **NOTE:** If breaker will not reset, see item 1.B under TROUBLE in this table.	Fig. 8-51
		3) Control switch CB-1 (CONTROL switch on secondary panel) tripped — reset to ON. **NOTE:** If switch will not remain on, see item 1.C in this table.	Fig. 8-51
		4) Power switch SW-1 (POWER switch on secondary panel) off or defective — turn on; with facility power removed, check switch with ohmmeter and replace if necessary.	Fig. 8-51 Fig. 8-16, 14
		5) Defective line filter (PF-1).	Fig. 8-51

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		5 a) Check 120 VAC between filter contacts Load 1 and Line 2 with CB-2 tripped. Replace filter if necessary.	Fig. 8-51 Fig. 8-11,11 Para. 7.12
		5 b) Check zero VAC between filter contacts Load-2 and Line-2 with CB-2 energized. Replace filter if necessary.	Fig. 8-51 Fig. 8-11,11 Para. 7.12
	1. B. Circuit breaker CB-2 (reset circuit breaker on secondary panel) will not reset	1) Short circuit. With CB-1 off, try to reset CB-2. If CB-2 resets, see next step below, 1.B.2. If CB-2 does **not** reset, see step 1.B.8.	Fig. 8-51
		2) With CB-1 on, remove P1 and try to reset CB-2. If CB-2 resets, see step 1.B.5. If CB-2 does **not** reset, see next step, 1.B.3. Replace P1.	Fig. 8-51
		3) With CB-2 off, remove PC board 1 from controller. Try to reset CB-2. If CB-2 resets, replace PC board 1. If CB-2 does **not** reset, see next step, 1.B.4.	Fig. 8-51 Fig. 8-15,8 Para. 7.12
		4) With CB-2 off, disconnect P5 from power supply. Try to reset CB-2. If CB-2 resets, replace power supply. If CB-2 does **not** reset, isolate and repair short between P5 and CB-1.	Fig. 8-51 Fig. 8-15,1
		5) With CB-2 off, disconnect P1 from controller. Try to reset CB-2. If CB-2 resets, isolate and repair short between P1 and a solenoid valve, the counter, or the buzzer. If CB-2 does **not** reset, see next step, 1.B.6.	Fig. 8-51 Fig. 8-16
		6) With CB-2 off, remove PC 1 board from the controller. Try to reset CB-2. If CB-2 resets, replace PC board 1. If CB-2 does **not** reset, reinstall PC board 1, and see next step, 1.B.7.	Fig. 8-51 Fig. 8-15,8 Para. 7.12
		7) With CB-2 off, remove PC board 2 from controller. Try to reset CB-2. If CB-2 resets, replace board 2. If CB-2 does **not** reset, replace controller power supply.	Fig. 8-51 Fig. 8-15,15 Fig. 8-15,1

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		8) Disconnect wire #1 connecting CB-2 and TB3 terminal 1. Try to reset CB-2 with CB-1 off. If CB-2 resets, isolate and repair short in recorder circuits. If CB-2 does **not** reset, replace CB-2.	Fig. 8-17 Fig. 8-16,7
	1. C. Control switch CB-1 will not set to ON, or trips intermittently	1) Control switch CB-1 defective. With CB-1 off, disconnect connector P5 from power supply. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace CB-1. If CB-1 can be positioned on, see 1.C.2 below, and reconnect P5 with CB-1 off.	Fig. 8-51 Fig. 8-16,13
		2) Short circuit on 5 VDC bus, or defective power supply or power supply out of adjustment.	
		2 a) With CB-1 off, disconnect PC boards 1 and 2 and disconnect connector P3 from controller. Try to position CB-1 on. If CB-1 **cannot** be positioned on, adjust or replace power supply. If CB-1 can be positioned on, see next step, 1.C.2b.	Fig. 8-51 Fig. 8-15,1 Para. 7-15.
		2 b) With CB-1 off, reinstall PC board 1. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace PC board 1. If CB-1 can be positioned on, see next step, 1.C.2c.	Fig. 8-51 Fig. 8-15,8 Para. 7.12
		2 c) With CB-1 off, reinstall PC board 2. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace PC board 2. If CB-1 can be positioned on, see next step, 1.C.2d.	Fig. 8-51 Fig. 8-15,15 Para. 7-12
		2 d) With CB-1 off, reconnect P3 to controller. Disconnect P16 from primary panel. Try to position CB-1 on. If CB-1 **cannot** be positioned on, isolate and repair short between P3 pin 27 and other wire in the same harness. If CB-1 can be positioned on, replace primary control panel.	Fig. 8-51 Fig. 8-10,24 Para. 7.12
2. Before beginning cycle; POWER & CONTROL switches on	2. A. Primary panel remains completely dark	1) Loss of all power — see TROUBLE item 1. A. for checks and remedies.	
		2) P5 on control power supply disconnected or pins loosely connected — check and reconnect.	Fig. 8-51

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) P16 on primary control panel disconnected or loosely connected — reconnect.	Fig. 8-10,24
		4) Control power supply defective — check for 5 VDC and 28 VDC and replace power supply if necessary.	Fig. 8-15,1
		5) Disconnect P16 from primary panel. Check 28 VDC between pins 35 and 14. Check 5 VDC between pins 24 and 14. If voltages check good, replace primary panel. If voltages are not present, repair P16 wire harness.	Fig. 8-51 Fig. 8-10,24 Para. 7.12
	2. B. Primary panel remains dark except for timer numbers	1) Loss of 28-VDC. Check 28-VDC power supply output. Check fuse.	Fig. 8-15, 1
		CAUTION: If output is not present, make short circuit test between pins 6 and 2 of receptacle J10 on Mother Board before connecting new power supply. If short circuit is found it must be isolated and repaired prior to connecting new supply.	Fig. 8-15,4
		2) Open circuit. Disconnect P16 from primary panel and check 28 VDC between pins 35 and 14. If voltage check good, replace primary panel. If voltage is not present, repair P16 wire harness.	Fig. 8-51 Fig. 8-10,24 Para. 7.12
	2. C. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary.	Para. 7.12
		2 a) Logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see step below, 2.C.2b.	Fig. 8-10,24 Para. 7.12
		2 b) Reinstall lamp and check VDC from lamp socket to TB2, terminals 3, 4, or 5. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.C.2c.	Fig. 8-51 Para. 7.12
		2 c) Disconnect P3 from controller. Check VDC between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, replace logic card. If it is 28 VDC, see step below, 2.C.3.	Fig. 8-51 Fig. 8-10,24 Para. 7.12

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) Disconnect P16 from primary panel and check continuity between P16 and P3 on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 8-51 Fig. 8-10,24 Para. 7.12
	2. D. One or more legends on primary panel lit when should be off	1) Control system did not reset — push cycle RESET pushbutton. **NOTE:** If system does not reset see TROUBLE symptom 2.F below.	Fig. 8-51
		2) Logic card defective. Disconnect P3 from controller. If light goes out, replace logic card. If light remains on, see next step, 2.D.3.	Fig. 8-51 Fig. 8-10,24 Para. 7.12
		3) Short circuit. Isolate and repair short in either wire harness or primary panel. Disconnect P16 from primary panel as required. Replace primary panel if necessary.	Fig. 8-51 Fig. 8-10,24 Para. 7.12
	2. E. Incorrect timer display	1) See Timer Display Checkout and Correction Charts paragraph 6.4, following this Troubleshooting Chart.	Para. 6.4
	2. F. Unable to reset system	1) Open circuit. Disconnect P4 from controller and make continuity check between pins 8 and 1 with RESET button pressed and released. If continuity is present with switch actuated, replace controller PC board 1. If continuity is **not** present, see next step, 2.F.2.	Fig. 8-51 Fig. 8-15,8 Para. 7.12
		2) Make continuity check across contacts of RESET switch. If continuity is present, isolate and repair open in P4 wire harness. If continuity is **not** present, replace switch.	Fig. 8-16,9
	2. G. Unable to select cycle	1) No DOOR LOCKED signal.	
		1 a) Adjust or replace door lock switch as required.	Fig. 8-23,22 Para. 7.3
		1 b) Disconnect P2 from controller and check continuity between Pin J and TB2 terminals 3, 4, or 5. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.G.1c.	Fig. 8-51 Fig. 8-15,8 Para. 7.12

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		1 c) Check continuity across contacts of door lock switch(es). If continuity is present, isolate and repair open in P2 wire harness. If continuity is not present, adjust or replace door lock switch as required.	Para. 7.3
		2) Controller PC board 1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and TB2 terminal 3, 4, or 5. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.G.3.	Fig. 8-51 Fig. 8-15,8 Para. 7.12
		3) Cycle select switch defective or open wire. Disconnect P16 from primary panel and check continuity between J16 pin applicable to specific switch and pin 34. If continuity is present, isolate and repair open in P3 wire harness. If continuity is not present, replace primary panel.	Fig. 8-51 Fig. 8-10, 24 Para. 7.12
	2. H. Jacket pressure does not rise to required level	1) Steam supply less than 50 psig minimum — check supply pressure and increase if necessary.	
		2) HI-LO steam control valve malfunctioning — adjust, repair, or replace as necessary.	Para. 7.14
		3) Manual STEAM supply valve malfunctioning — repair or replace, as necessary.	Para. 7.11
		4) Jacket return steam trap malfunctioning — replace.	Fig. 8-35,33 Para. 7.6
		5) Steam supply strainer plugged — clean.	Para. 7.7
		6) Lab/Iso model only—Jacket steam supply valve (S-9) not operating correctly (should be open) — repair or replace valve; check wiring to valve, repair if necessary; check D16 LED on PC board 2, replace board if light not on; if light is on, replace board 2, or complete control assembly.	Fig. 7-11 Para. 7.5 Fig. 8-15,15 Para. 7.12

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2. I. Steam enters chamber while door is open	1) Manual operating valve (if supplied) improperly adjusted or malfunctioning — turn valve to OFF; adjust, repair, or replace multiport valve.	Fig. 8-48
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — check valve for leak, replace if necessary; check D13 LED on PC board 1, replace board if LED on.	Fig. 7-11 Para. 7.5 Fig. 8-15,8 Para. 7.12
3. During a cycle	3. A. Jacket pressure not zero on an Isothermal cycle (Laboratory/Isothermal model only)	1) Jacket supply valve (S-9) not operating correctly (should be closed) — check valve for leak, repair or replace; check D16 LED on PC board 2, replace board if LED on; disconnect J1 from control assembly and observe valve: if valve closes, either replace circuit board or entire control assembly; if valve remains open, recheck (1) immediately above, or look for short in wiring to valve.	Fig. 7-11 Para. 7.5 Fig. 8-15,15 Para. 7.12
	3. B. Chamber temperature does not rise to recorder setting	1) Settings on recorder and HI-LO valve do not correspond — set recorder and valve properly.	Section 2
		2) Chamber drain solenoid valve (S-3) not operating correctly (should be closed). Repair or replace valve — check manual operation. Check LED D-12 — if on, replace PC board 1.	Fig. 7-11 Para. 7.5 Fig. 8-15,8 Para. 7.12
		3) Chamber drain line or strainer plugged — clean line or strainer.	Para. 4.3
		4) Chamber drain line trap not operating correctly — replace trap element.	Fig. 8-40,39 Para. 7.6
	3. C. Steam does not enter chamber in sterilize phase	1) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open).	Fig. 7-11
		1 a) Repair or replace valve.	Para. 7.5
		1 b) Check wiring to valve — repair or replace.	

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		1 c) Check LED D-13 on PC board 1 — should be on. Replace board if light not on.	Fig. 8-15,8
		1 d) 1b and 1c ok — replace PC board 1.	Fig. 8-15,8
		2) Steam-to-ejector solenoid valve (S-8) not operating correctly (Laboratory/Isothermal model only) — valve should be open.	Fig. 7-11
		2 a) Repair or replace valve.	Para. 7.5
		2 b) Check wiring to valve — repair or replace.	
		2 c) Check LED D-17 on PC board 1 — should be on. Replace board if light not on.	Fig. 8-15,8
		2 d) 1b and 1c ok — replace PC board 1.	Fig. 8-15,8
		3) No pressure in chamber jacket (check pressure gauge) — see 2. H. above, "Jacket pressure does not rise ..."	
		4) Isothermal ejector plugged — repair or replace.	Fig. 8-37,16
	3. D. Chamber pressure does not rise during sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. Repair or replace valve — check manual operation. Check LED-12 — if on, replace PC board 1.	Fig. 7-11 Para. 7.5 Fig. 8-15,8 Para. 7.12
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). See 3.C.1, above.	Fig. 7-11
		3) No pressure in jacket. See 2.H, above.	
	3. E. Chamber pressure and temperature drop during cycle	1) Steam supply pressure erratic — check steam supply.	
		2) Chamber drain line trap not operating correctly — replace trap element.	Fig. 8-40 Para. 7.6
		3) Chamber drain solenoid valve (S-3) not operating correctly (should be closed). Repair or replace valve — check manual operation. Check LED-12 — if on, replace PC board 1.	Fig. 7-11 Para. 7.5 Fig. 8-15,8 Para. 7.12

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3. F. Pressure too high, temperature too low during sterilize phase	1) Air trapped in chamber because of clogged strainer or drains — clean strainer inside chamber, flush and clean drain line and traps.	Para. 4.3
		2) Chamber trap defective — replace element.	Para. 7.6
	3. G. Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-22,1 Para. 7.3
	3. H. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean.	Fig. 8-38,21 Para. 7.7
		2) Insufficient flow through cooling water flow control valve — clean, adjust, repair or replace flow control valve.	Para. 5.4
		CAUTION: If safety valve is found to be defective, do not attempt to repair it. Replace it with new valve.	
		3) Safety valve popping or bleeding — check for source of excessive pressure.	Para. 4.3
		4) Leaking steam valve — check valves and piping for leaks, repair.	
		5) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry).	Fig. 7-11
		5 a) Repair or replace valve.	Para. 7.5
		5 b) Check wiring to valve — repair or replace.	
		5 c) Check LED D-16 on PC board 1 — should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15,8
		5 d) 5b and 5c ok — replace PC board 1.	Fig. 8-15,8
	3. I. Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — replace diaphragm or gasket.	Fig. 8-23,5,6 Para. 7.3

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3. J. Safety valve pops or bleeds excessively	1) HI-LO steam control valve improperly adjusted or malfunctioning – adjust, repair, or replace valve. 2) Safety valve defective – replace.	Fig. 8-42 Para. 7.14
	3. K. Intermittent buzzer sounds, temperature drops during sterilize phase	1) Door switch defective – replace.	Fig. 7-10 Para. 7.3
4. During "DRY" part of Exhaust phase – Gravity cycle only	4. A. DRY timer does not start and cooling water valve (S-4) does not close in Exhaust phase	1) Pressure switch PS-3 defective or malfunctioning – reset to 4 psig or replace. 2) Disconnect P2 from controller and check continuity between pin L and TR2 terminals 3, 4, or 5–If ok, replace PC board 1. Otherwise, isolate and repair wiring or replace switch.	Para. 5.9 Fig. 8-51 Fig. 8-15,8 Para. 7.12
	4. B. DRY timer starts and cooling water valve closes immediately after Sterilize phase	Same as 4.A, immediately above.	
5. During Exhaust phase of Liquids cycle	5. A. Slow exhaust too rapid – solutions spill or pop caps	1) Chamber drain line trap not operating correctly – relace trap element. 2) Slow exhaust valve malfunctioning – clean, adjust, repair or replace valve. 3) Pressure switch PS-3 misadjusted or defective – reset to 4 psig or replace. 4) Open or shorted wire – disconnect P2 from controller, check continuity between pin L and TB2 terminals 3, 4, or 5. If okay, replace PC board 1. Otherwise isolate and repair wiring or replace switch.	Fig. 8-40 Para. 7.6 Para. 5.4 Para. 5.9 Fig. 8-51 Fig. 8-15,8 Para. 7.12
6. At end of cycle	6. A. Cycle fails to reach COMPLETE after exhaust completed, or signals COMPLETE too soon	1) Pressure switch PS-2 or vacuum switch VS-2 defective – reset, respectively, to 2 psig or 2" Hg or replace. (VS-2 not on current IRC units.)	Para. 5.9

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		2) Open or shorted wire – diconnect P2 from controller and check continuity of pressure and vacuum switch circuits, i.e., between pins T and K and applicable TB-2 terminals. See electrical schematic for test points.	Fig. 8-51
	6. B. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective – check voltage across buzzer, replace if necessary. 2) Open wire – disconnect P1 from control and check continuity between pin W and TB3 terminal 2. Isolate and repair. 3) PC board defective – check D-18 LED on board; replace PC board 1 if LED does not come on at end of cycle.	Fig. 8-16, 4 Fig. 8-51 Fig. 8-15,8 Para. 7.12
	6. C. Doors can be unlocked but cannot be opened when the buzzer sounds	1) Vacuum in chamber caused by faulty check valve in vacuum break line – replace check valve. 2) Vacuum break line plugged – clean or replace plugged components in line. 3) Vacuum switch VS-2 out of adjustment or defective – reset VS-2 to 0-1" Hg, or replace. (Not on current IRC units.)	Fig. 8-39,25 Para. 5.9
	6. D.Excessive steam when door is opened or excessive effort needed to unlock door when buzzer sounds	1) Pressure switch PS-2 out of adjustment or defective – reset PS-2 to 1-2 psig or replace.	Para. 5.9
	6. E. Goods are wet after completion of "Gravity" cycle, or excessive vapor in chamber when door is opened	1) Vacuum break line plugged – clean or replace filter. 2) Check valve in drain line defective – replace. 3) Steam ejector solenoid valve (S-5) not operating correctly (should be open for drying time). 3 a) Repair or replace valve.	Fig. 8-39,21 Fig. 8-40,25 Fig. 7-11 Para. 7.5

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		3 b) Check wiring to valve – repair or replace.	
		3 c) Check LED D-14 on PC board 1 – should be on for drying time. Replace board if light not on.	Fig. 8-15,8
		3 d) 3b and 3c ok – replace PC board 1.	Fig. 8-15,8
		4) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry).	Fig. 7-11
		4 a) Repair or replace valve.	Para. 7.5
		4 b) Check wiring to valve – repair or replace.	
		4 c) Check LED D-16 on PC board 1 – should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15,8
		4 d) 4b and 4c ok – replace PC board 1.	Fig. 8-15,8
	6. F. Water in chamber or door channel at end of cycle	1) Chamber drain valve (S-3) not operating correctly (should be open during exhaust and dry).	Fig. 7-11
		1 a) Repair or replace valve.	Para. 7.5
		1 b) Check wiring to valve – repair or replace.	
		1 c) Check LED D-12 on PC board 1 – should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15,8
		1 d) 1b and 1c ok – replace PC board 1.	Fig. 8-15,8
		2) Steam ejector solenoid valve (S-5) not operating correctly (should be open for drying time). See 6.E.3, above.	Fig. 7-11

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		3) Cold chamber floor caused by condensate accumulating in lower jacket – check return line strainer and clean if necessary; check operation of jacket return trap and replace trap if necessary; check for back pressure on return steam line, locate source and eliminate.	Fig. 8-41 Para. 7.7 Fig. 8-41,10 Para. 7.6
		4) Chamber floor not pitched toward drain – level sterilizer frame.	
		5) Drains plugged or clogged – see drain cleaning procedure, Section 4.	
		6) Chamber steam trap does not open – replace trap element.	Para. 7.6
		7) Steam not "dry" – check steam quality.	
		8) Drain line check valve defective – replace.	Fig. 8-40,25
	6. G. Cycle counter fails to update on cycle complete	1) Counter defective – check voltage across counter and replace, if necessary.	Fig. 8-16,4
		2) Open wire – disconnect P1 from control and check continuity between pin P and TB3 terminal 2. Isolate and repair open.	Fig. 8-51
		3) PC board 1 defective – check D-17 LED on board; replace board if LED does not come on at end of cycle.	Fig. 8-15,8
7. Miscellaneous	7. A. Continuous sounding buzzer whenever machine is turned on	1) Excessive current leakage from triac – bend buzzer clapper away from coil until buzzing stops.	Fig. 8-18,5
		2) Order and install kit P/N P-764316-608. Kit includes instructions and components to add a 3000 OHM resistor in parallel with the buzzer coil.	
	7. B. Non-function of "Isothermal" cycle.	1) Pulse switch SW2 on board #2 set at zero. Adjust switch to any non-zero setting.	
	7. C. Solenoid valves "chattering"	1) Faulty reed switch in recorder, replace switch.	Fig. 8-14,3

TABLE 6-2: TROUBLESHOOTING CHART (PRINTCON)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Before beginning cycle	1. A. No 120 facility power — primary panel and digital display completely blank	1) Check main power source or check 120 VAC between TB6 terminals 1 and 2 — connect or turn on. **NOTE:** If facility power will not reset, isolate and repair short between facility power source and sterilizer.	Fig. 8-78
		2) Circuit breaker CB-2 (RESET circuit breaker on secondary panel) tripped — push to reset. **NOTE:** If breaker will not reset, see item 1. B under TROUBLE in this table.	Fig. 8-78
		3) 125 volt fuse in power supply (F402) blown — check.	Fig. 8-15, 1 Fig. 7-37
		4) Power switch SW-1 (POWER switch on secondary panel) off or defective — turn on; with facility power removed, check switch with ohmmeter and replace if necessary.	Fig. 8-16, 14 or Fig. 8-18, 21
		5) Defective line filter (PF-1).	Fig. 8-60, 10
		5 a) Check 120 VAC between filter contacts Load 1 and Line 2 with CB-2 tripped. Replace filter if necessary.	Fig. 8-78
		5 b) Check zero VAC between filter contacts Load-2 and Line-2 with CB-2 energized. Replace filter if necessary.	Fig. 8-78
	1.B. Circuit breaker CB-2 (reset circuit breaker on secondary panel) will not reset	1) Short circuit. With CB-1 off, try to reset CB-2. If CB-2 resets, see next step below, 1.B.2. If CB-2 does **not** reset, replace CB-2.	Fig. 8-78
		2) With CB-1 on, remove P1 and try to reset CB-2. If CB-2 resets, see step 1.B.5. If CB-2 does **not** reset, see next step, 1.B.3. Replace P1.	Fig. 8-78
		3) With CB-2 off, remove PC board 1 from controller. Try to reset CB-2. If CB-2 resets, replace PC board 1. If CB-2 does **not** reset, see next step, 1.B.4.	Fig. 8-78 Fig. 8-15, 8 Para. 7.12
		4) With CB-2 off, disconnect P5 from power supply. Try to reset CB-2. If CB-2 resets, replace power supply. If CB-2 does **not** reset, isolate and repair short between P5 and CB-1.	Fig. 8-78

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		5) With CB-2 off, disconnect P1 from controller. Try to reset CB-2. If CB-2 resets, isolate and repair short between P1 and a solenoid valve, the counter, or the buzzer. If CB-2 does **not** reset, see next step, 1.B.6.	Fig. 8-78 Fig. 8-16 or 8-18
		6) With CB-2 off, remove PC board 1 from the controller. Try to reset CB-2. If CB-2 resets, replace PC board 1. If CB-2 does **not** reset, reinstall PC board 1, and see next step, 1.B.7.	Fig. 8-78 Fig. 8-15, 8 Para. 7.12
		7) Lab/Iso Model Only — With CB-2 off, remove PC board 2 from controller. Try to reset CB-2. If CB-2 resets: replace board 2. If CB-2 does **not** reset, replace controller power supply.	Fig. 8-78 Fig. 8-15, 15 Para. 7.12
	1.C. Control switch CB-1 will not set to ON. or trips frequently	1) Control switch CB-1 defective. With CB-1 off disconnect connector P5 from power supply. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace CB-1. If CB-1 can be positioned on, see 1.C.2 below, and reconnect P5 with CB-1 off.	Fig. 8-78 Fig. 8-16, 13 or Fig. 8-18, 12
		2) Short circuit on 5 VDC bus, or defective power supply.	Fig. 8-78
		2a) With CB-1 off, disconnect PC boards 1 and 2 (Isothermal Model only) and disconnect connector P3 from controller. Try to position CB-1 on. If CB-1 **cannot** be positioned on, see next step, 1.C.2b.	Fig. 8-78 Fig. 8-15 Para. 7.12
		2b) With CB-1 off, replace PC board 1. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace PC board 1. If CB-1 can be positioned on, see next step, 1.C.2c.	Fig. 8-78 Fig. 8-15, 8 Para. 7.12
		2c) Lab/Iso Model Only — With CB-1 off, reconnect PC board 2. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace PC board 2. If CB-1 can be positioned on, see next step, 1.C.2d.	Fig. 8-78 Fig. 8-15, 15

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		2d) With CB-1 off, reconnect P3 to controller. Disconnect P16 from primary panel. Try to position CB-1 on. If CB-1 **cannot** be positioned on, isolate and repair short between P3 pin 27 and other wire in the same harness. If CB-1 can be positioned on, replace primary panel.	Fig. 8-78 Fig. 8-59, 13 Para. 7.12
		2e) Short circuit on 5 VDC bus within digital display PC board. Disconnect plug P45 at main Printcon PC board. If CB-1 will set to on, replace the display PC board; If CB-1 will **not** be positioned to on, see next step, 1.C.2f.	Fig. 8-62, 3 and 11 Para. 7.16
		2f) Short circuit on 5 VDC bus within main Printcon PC board. Unplug plug P48 from main Printcon board. If CB-1 will set to on, replace this board.	Fig. 8-62, 3 Para. 7.17
		2g) 5 volt output misadjusted. Adjust pot. R7 for 5.1-5.2 volts at test point TP7.	
		2h) Fuse F3, 1/2 amp fuse blown in power supply. (see 2.T.1a)	Fig. 8-15, 1 Fig. 7-38
2. Before beginning cycle; POWER & CONTROL switches on	2.A. Primary panel remains completely dark	1) Loss of all power — see TROUBLE item 1.A. for checks and remedies.	
		2) P5 on control power supply disconnected or pins loosely connected — check and reconnect.	Fig. 8-78
		3) P16 disconnected or loosely connected — reconnect.	Fig. 8-59, 13
		4) Control power supply defective — check output voltages and replace power supply if necessary.	Fig. 8-15, 1
		5) Disconnect P16 from primary panel. Check 28 VDC between pins 35 and 14. Check 5 VDC between pins 24 and 14. If voltages check good, replace primary panel. If voltages are not present, repair P16 wire harness.	Fig. 8-59, 13
	2.B. Primary panel remains dark except for timer	1) Loss of 28 VDC. Check 28 VDC power supply output at test-point 4 (TP-4) in power supply. Check fuse F4 in power supply and replace if necessary.	Fig. 8-15, 1 Fig. 7-38
		CAUTION: If output is not present, make short circuit test between pins 6 and 2 of receptacle J10 on Mother Board before connecting new power supply. If short circuit is found it must be isolated and repaired prior to connecting new supply.	Fig. 8-15, 4

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) Open circuit. Disconnect P16 from panel and check 28 VDC between pins 35 and 14. If voltage check good, replace primary panel. If voltage is not present, repair P16 wire harness.	Fig. 8-59, 13 Para. 7.12
		3) Defective power supply. Replace.	
	2.C. Printcon display is dark, and Printcon buzzer sounds	1) J45 connector on display PC board disconnected or loosely connected — reconnect.	Fig. 8-62, 3 and 11
	2.D. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary.	Fig. 8-59, 13 Para. 7.12
		2a) Primary panel logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see step below, 2.D.2b.	Fig. 8-59, 13 Para. 7.12
		2b) Reinstall lamp and check voltage from lamp socket to TB2, terminals 3, 4, or 5. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.D.2c.	Fig. 8-78
		2c) Disconnect P3 from controller. Check voltage between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.D.3.	Fig. 8-78 Fig. 8-59, 13 Para. 7.12
		3) Disconnect P16 from primary panel and check continuity between P16 and P3 on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 8-59, 13 Para. 7.12
	2.E. One or more legends on primary panel lit when should be off	1) Control system did not reset — push cycle RESET pushbutton. **NOTE:** If system does not reset, see TROUBLE symptom 2.F below.	Fig. 8-78
		2) Primary panel logic card defective. Disconnect P3 from controller. If light goes out, replace primary panel. If light remains on, see next step, 2.E.3.	Fig. 8-78 Fig. 8-59, 13 Para. 7.12

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) Short circuit. Isolate and repair short in either wire harness or primary panel. Disconnect P16 from primary panel as required. Replace primary panel if necessary.	Fig. 8-78 Fig. 8-59, 13 Para. 7.12
	2.F. Missing segment of digital LED on digital display panel on "power up" lamp test.	1) Burned out. Replace display PC board.	Fig. 8-62, 11 Para. 7.16
	2.G. Digital display is blank, printer is inoperative, and cycle will not run.	2) P45 unplugged from main Printcon PC board — reconnect.	Fig. 8-62, 3 and 11
	2.H. Incorrect timer display ("Sterilize" or "Dry")	2) See Timer Display Checkout and Correction Charts, paragraph 6.5, following this Troubleshooting Chart.	Para. 6.5
	2.I. Temperature display does not match thumbwheel switch when changed	1) Temperature thumbwheel(s) shorted or open, or series diode open or shorted. See Temperature Thumbwheel checkout. 2) Component failure on display PC board.	Para. 6.6 Fig. 8-62, 11 Schematics
	2.J. Buzzer sounds and set temperature is continuously displayed	1) Temperature setting incorrect — reset temperature thumbwheel switches. 2) J52/P52 connector on the display PC board disconnected or loosely connected — reconnect. 3) If display does not match thumbwheel setting, see 2.I above.	Section 2 Schematics
	2.K. ALARM: TEMP SENSOR printed when power is turned on and buzzer sounds intermittently	1) Temperature probe or cable shorted — unplug P47 from jack on main Printcon PC board. Measure resistance between pins 13 and 31 on the plug. At 70-80 F, resistance should be 115-120 ohms. If okay, see 2.K.1b next page.	Schematics Fig. 8-62, 3 Note #1 Pg. 6-41

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		1a) Plug P47 is miswired. 1b) Same as 2.L.4 immediately below. 1c) Component failure on main Printcon PC board — replace.	 Fig. 8-62, 3 Para. 7.17
	2.L. ALARM: TEMP SENSOR printed when power is turned on, buzzer sounds intermittently, and and 306.8 F is displayed	1) Temperature probe or cable open. See 2.K.1 above. 2) J47 unplugged from main Printcon PC board. 3) Component failure on main Printcon PC board — replace. 4) Extreme misalignment of main Printcon PC board — check alignment.	Fig. 8-74, 9 Note #2, Pg. 6-41 Fig. 8-62, 3 Para. 7.17 Para. 7.21
	2.M. ALARM: PRES SENSOR printed when power is turned on and buzzer sounds intermittently	1) Pressure sensor or cable shorted — check measure output. 1a) Plug 47 is miswired. 1b) Same as 2.L.4. above 1c) Component failure on main Printcon PC board — replace.	Fig. 8-72, 10 Note 2, Pg. 6-41 Para. 7.21 Para. 7.17
	2.N. ALARM: PRES SENSOR printed when power is turned on and buzzer sounds intermittently	1) Pressure sensor or cable open. 1a) Plug 47 is miswired. 1b) P47 unplugged from main Printcon PC board — reconnect. 1c) same as 2.L.4	Fig. 8-72 Note 2, Pg. 6-41 Fig. 8-62, 3 Para. 7.21
	2.O. Unable to reset system	1) Open circuit. Disconnect P4 from controller and make continuity check between pins 8 and 1 with RESET button (CB-2) pressed and released. If continuity is present with switch actuated, replace controller PC board 1. If continuity is not present, see next step, 2.O.2.	Fig. 8-78 Fig. 8-15, 8 Para. 7.12

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) Make continuity check across contacts of RESET switch (CB-2). If continuity is present, isolate and repair open in P4 wire harness. If continuity is **not** present, replace switch.	Fig. 8-65 or Fig. 8-66
		3) Printer malfunction.	Para. 7.15
		4) Temperature probe or pressure transducer malfunction.	Para. 7.18 or 7.19
	2.P. Unable to select cycle	1) See 2.J. above.	
		2) No DOOR LOCKED signal.	
		2a) Adjust or replace door lock switch as required.	Fig. 8-67 Para. 5.7
		2b) Disconnect P2 from controller and check continuity between Pin J and TB2 terminals 3, 4, or 5. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.P.2c.	Fig. 8-78 Fig. 8-15, 8
		2c) Check continuity across contacts of door lock switch(es). If continuity is present, isolate and repair open in P2 wire harness. If continuity is not present, adjust or replace door lock switch as required.	Fig. 8-67 Para. 7.3
		3) Controller PC board 1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and TB2 terminal 3, 4, or 5 while pressing switch. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.P.4.	Fig. 8-78 Fig. 8-15, 8 Para. 7.12
		4) Cycle select switch defective or open wire. Disconnect P16 from primary panel and check continuity between J16 pin applicable to specific switch and pin 34 while pressing switch. If continuity is present, isolate and repair open in P3 wire harness. If continuity is not present, replace primary panel.	Fig. 8-78 Para. 7.12
		5) See 2.K. through 2.N. above.	

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.Q. Cycle will not run. Reset not printed out.	1) P40 unplugged from main Printcon PC board — reconnect.	Schematics
	2.R. Jacket pressure does not rise to required level	1) Steam supply less than 50 psig minimum — check supply pressure and increase if necessary.	
		2) HI-LO steam control valve malfunctioning — adjust, repair, or replace as necessary.	Fig. 8-42
		3) Manual STEAM supply valve malfunctioning — repair or replace, as necessary.	Fig. 8-48
		4) Jacket return steam trap malfunctioning — replace.	Fig. 8-41, 17 Para. 7.6
		5) Steam supply strainer plugged — clean.	Fig. 8-38, 1 Para. 7.7
		6) Lab/Iso Model Only — Jacket steam supply valve (S-9) not operating correctly (should be open) — repair or replace valve; check wiring to valve, repair if necessary; check D16 LED on PC board 2, replace board if light not on; if light is on, replace board 2. **NOTE:** GRAVITY/ISOTHERMAL switch must be in the GRAVITY position.	Fig. 8-70 Fig. 8-15, 8 Para. 7.12
	2.S. Steam enters chamber while door is open	1) Manual operating valve improperly adjusted or malfunctioning — turn valve to OFF; adjust, repair, or replace multiport valve.	Fig. 8-48
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — check check valve for leak, replace if necessary; check D13 LED on PC board 1, replace board if LED on.	Fig. 8-68 Para. 7.5 Fig. 8-15, 8 Para. 7.12
	2.T. "ERROR 1" message is printed when power is turned on	1) A/D converter failure on main Printcon PC board.	Fig. 8-62, 3
		1a) F3, -12 VDC fuse is open in power supply — check fuse continuity and replace if necessary. If fuse is ok, see 2.T.1b.	Fig. 8-15, 1 Fig. 7-38
		1b) Component failure on main Printcon PC board — replace board.	Fig. 8-62, 3

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.U. "ERROR 2" message is displayed momentarily on each attempt to print. and intermittant buzzer sounds	1) Printer status signal lost.	
		1a) Drag on paper roll — check.	Para. 7.15
		1b) F2, +18 volt fuse open in power supply — check fuse for continuity and replace if necessary. If fuse is ok, see 2.U.1b.	Fig. 8-15, 1 Fig. 7-38
		1c) J42 printer connector unplugged or poor contact — check connector on both ends for proper contact and solid connections. If ok, see 2.U.1c.	Schematics
		1d) Printer defective — replace.	Para. 7.15
		2) Printer motor speed adjustment incorrect — adjust potentiometer P10 on main Printcon PC board fully clockwise.	Fig. 7-38
3. During a cycle	3.A. Jacket pressure not zero on an isothermal cycle (Laboratory/Isothermal model only)	1) Jacket supply valve (S-9) not operating correctly (should be closed) — check valve for leak, repair or replace; check D16 LED on PC board 2, replace board if LED on; disconnect J1 from control assembly and observe valve: if valve closes, either replace circuit board or entire control assembly; if valve remains open, recheck (1) immediately above, or look for short in wiring to valve.	Fig. 7-11 Fig. 8-68 Para. 7.5 Fig. 8-15, 15 Para. 7.12
		2) Jacket trap defective — check.	Fig. 8-69, 11
		3) Jacket strainer plugged — check.	Fig. 8-68, 3
	3.B. Chamber temperature does not rise to Printcon setting, proper message is printed at the start of the cycle.	1) Settings on Printcon and HI-LO valve do not correspond — set Printcon and valve properly.	Section 2
		2) Chamber drain solenoid valve (S-3) not operating correctly (should be closed). Repair or replace valve — check manual operation. Check LED D-12 — if on, replace PC board 1.	Fig. 7-11 Para. 7.5 Fig. 8-15, 8 Para. 7.12
		3) Slow exhaust bleed valve too far open — check and reset if necessary.	Fig. 8-71, 7
		4) Chamber drain line or strainer plugged — clean line or strainer.	Fig. 8-71

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		5) Chamber drain line trap not operating correctly — replace trap element.	Fig. 8-40, 9 Para. 7.6
		6) Loss of continuity in wire #131 (TS-1).	
		7) TS-1 output drive failure on main Printcon PC board. Wire #131 should switch from 5 VDC to 0 VDC when setting on temperature thumbwheels is achieved.	Schematics Fig. 3-8
		8) Temperature circuitry on main Printcon PC board not correctly adjusted — check.	Para. 7.17
		9) TS-1 input failure on Eagle CPU PC board. Check step 7 above before replacing.	Fig. 8-15, 8
		10) Faulty temperature probe — replace.	Fig. 8-72 or 8-73
	3.C. Chamber temperature does not rise to Printcon setting. no message is printed at the start of the cycle.	1) Component failure on main Printcon PC board — replace.	Para. 7.17
	3.D. Steam does not enter chamber in sterilize phase	1) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open).	Fig. 7-11
		1a) Repair or replace valve.	Para. 7.5
		1b) Check wiring to valve — repair or replace.	Para. 7.5
		1c) Check LED D-13 on PC board 1 — should be on if TS-1 is at 5VDC. Replace board if LED not on. See 3.B.8 and 3.B.10 above.	Fig. 8-15, 8 Para. 7.12
		1d) 1b and 1c ok — replace PC board 1.	Fig. 8-15, 8
		2) Steam-to-ejector solenoid valve (S-8) not operating correctly (Laboratory/Isothermal model only) — valve should be open.	Fig. 7-11
		2a) Repair or replace valve.	Para. 7.5
		2b) Check wiring to valve — repair or replace.	Para. 7.5

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		2c) Check LED D-17 on PC board 2 — should be on. Replace board if light not on. (Iso only)	Fig. 8-15, 8 Para. 7.12
		2d) 1b and 1c ok — replace PC board 1.	Fig. 8-15, 8
		3) No pressure in chamber jacket (check pressure gauge) — see 2.S. above, "Jacket pressure does not rise . . ."	
		4) Isothermal ejector plugged — repair or replace.	Fig. 8-70, 16
	3.E. Chamber pressure does not rise during sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. Repair or replace valve — check manual operation. Check LED-12 — if on, replace PC board 1.	Fig. 7-11 Para. 7.5 Fig. 8-15, 8 Para. 7.12
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). See 3.C.1, above.	Fig. 7-11 Para. 7.5
		3) No pressure in jacket. See 2.S, above.	
		4) See 3.B and 3.D above.	
	3.F. Chamber pressure and temperature drop during cycle. "ALARM: UNDER TEMP" is printed	1) Steam supply pressure erratic — check steam supply.	
		2) Chamber drain line trap not operating correctly — replace trap element.	Fig. 8-40, 9 Para. 7.6
		3) Chamber drain solenoid valve (S-3) not operating correctly (should be closed). Repair or replace valve — check manual operation. Check LED-12 — if on, replace PC board 1.	Fig. 7-11 Para. 7.5 Fig. 8-15, 8 Para. 7.12
		4) TS-2 output failure on main Printcon PC board. See 3.L.3 and 3.M.3.	
		5) TS-2 input failure on Eagle PC board #1. See 3.L.4.	
	3.G. Pressure too high, temperature too low during sterilize phase	1) Air trapped in chamber because of clogged strainer or drains — clean strainer inside chamber, flush and clean drain line and traps.	Fig. 8-71 Para. 4.3

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		2) Chamber trap defective — replace element.	Fig. 8-40, 9 Para. 7.6
		3) Improper loading technique or equipment.	
	3.H. Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-22, 1 Para. 7.3
	3.I. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean.	Fig. 8-38, 21 Para. 7.7
		2) Insufficient flow through cooling water flow control valve — clean, adjust, repair or replace flow control valve.	Para. 5.4 Fig. 8-34, 8
		CAUTION: If safety valve is found to be defective, do not attempt to repair. Replace with new valve.	Fig. 8-33, 8
		3) Safety valve popping or bleeding — check for source of excessive pressure.	Fig. 8-33, 8
		4) Leaking steam valve — check valves and piping for leaks, repair.	Fig. 8-68 Para. 7.11
		5) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry).	Fig. 7-11
		5a) Repair or replace valve.	Para. 7.5
		5b) Check wiring to valve — repair or replace.	
		5c) Check LED D-16 on PC board 1 — should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15, 8 Para. 7.12
		5d) 5b and 5c ok — replace PC board 1.	Para. 7.12
	3.J Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — replace diaphragm or gasket.	Fig. 8-23, 6 Para. 7.3

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3.K. Safety valve pops or bleeds excessively	1) HI-LO steam control valve improperly adjusted or malfunctioning — adjust, repair, or replace valve. 2) Safety valve defective — replace.	Fig. 8-42 Para. 7.14 Para. 7.10 Fig. 8-33, 8
	3.L. Chamber temperature will not reach CONTROL TEMP. SET TEMP is achieved and CONTROL TEMP is properly printed	1) Regulator on steam line set too low — adjust. 2) Short to DC Common in Wire #133 (TS-2) — check. 3) TS-2 output short on main Printcon PC board. Pin 4, plug 40 should be at 5 VDC until CONTROL TEMP is reached. 4) TS-2 input short on Eagle CPU board.	Fig. 8-33, 16 Schematics Fig. 3-8 Schematics Fig. 8-15, 8
	3.M. Chamber is not controlled at CONTROL TEMP ±2 F. CONTROL TEMP is properly printed.	1) Loss of continuity in wire #133 (TS-2). 2) TS-2 output failure on main Printcon PC board. Pin 4, plug 40 must switch from 5 VDC to 0 VDC when CONTROL TEMP is achieved, and LED 22, board 1 (S2) will go off.	Schematics Fig. 3-8 Schematics
4. During "DRY" part of Exhaust phase — Gravity cycle only	4.A. Dry timer does not start and cooling water valve (S-4) does not close in exhaust phase	1) PS-3 setting incorrect — should be 6. 2) Loss of continuity in wire #114 (PS-3).	Fig. 7-32 Schematics
	4.B. Dry timer starts and cooling water valve closes immediately after sterilize phase	Same as 4.A, immediately above.	
5. During Exhaust phase of Liquids cycle	5.A. Slow exhaust too rapid — solutions spill or pop caps	1) Chamber drain line trap not operating correctly — replace trap element. 2) Slow exhaust valve malfunctioning — clean, adjust, repair or replace valve. 3) PS-3 setting incorrect — should be 6.	Fig. 8-40, 9 Para. 7.6 Para. 5.4 Fig. 7-32

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Continued		4) Open or shorted wire — Disconnect P2 from controller, check continuity between pin L and TP7 in power supply. If okay, replace PC board 1. Otherwise isolate and repair wiring.	Fig. 8-78 Fig. 8-15, 8 Para. 7.12
	5.B. Slow exhaust too fast or too slow (Liquids and Isothermal Cycles only)	1) Clogged slow exhaust valve — flush drain line thoroughly. 2) Slow exhaust valve malfunctioning or plugged — adjust, repair or replace valve. 3) PS-3 setting incorrect — should be 6. 4) Loss of continuity in wire #114 (PS-3). 5) PS-3 output drive failure on main Printcon PC board. Wire #114 should be at 5 VDC until pressure is below 3 psi, should drop to 0 VDC at 3 psi and below. Extract wire #114 from P40-7 and touch to DC ground. If cycle now advances, replace main Printcon PC board. If cycle does not advance, see 5.B.6 below. 6) PS-3 input failure on Eagle CPU PC boards — replace board.	Para. 4.3 Fig. 8-71, 7 Fig. 7-32 Schematics Schematics Fig. 3-8 Fig. 8-62, 3 Para. 7.17 Fig. 8-15, 8
	5.C. Cycle stuck in exhaust phase	1) PS-2 setting incorrect — should be 2. 2) PS-2 output drive failure on main Printcon PC board. Wire #113 should be at 5 VDC until pressure is below 1 psi, should drop to 0 VDC at 1 psi and below. Extract wire #113 from P40-5 and touch to DC ground. If cycle now advances, replace main Printcon PC board. If cycle does not advance, see 5.C.3 below. 3) PS-2 input failure on Eagle CPU PC boards — replace board.	Fig. 7-32 Schematics Fig. 3-8 Fig. 8-62, 3 Para. 7.17 Fig. 8-15, 8
6. At end of cycle	6.A. Cycle fails to reach COMPLETE after exhaust completed, or signals COMPLETE too soon (liquids cycle or gravity with no dry time or isothermal cycle)	1) PS-2 setting incorrect (set too low) — should be 2. 2) See 5.C.2 and 5.C.3 above.	Fig. 7-32

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued	6.B. Buzzer and Cycle COMPLETE will not come on at end of dry time (Gravity cycle only)	1) VS-2 setting incorrect — should be 4.	Fig. 7-32
		2) VS-2 output drive failure on main Printcon PC board. Wire #116 should be at 0 VDC until 2 inches or less vacuum attained — switches to 5 VDC.	Schematics Fig. 3-8 Fig. 8-62, 3 Para. 7.17
		3) VS-2 input failure on Eagle CPU PC board.	Fig. 8-15, 8
	6.C. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective — check voltage across buzzer, replace if necessary.	Fig. 8-16, 4 or Fig. 8-18, 5
		2) Open wire — disconnect P1 from control and check continuity between pin W and TB3 terminal 2. Isolate and repair.	Fig. 8-78
		3) PC board defective — check D-18 LED on board; replace PC board if LED does not come on at end of cycle.	Fig. 8-15, 8 Para. 7.12
	6.D. Doors can be unlocked but cannot be opened when the buzzer sounds	1) Vacuum in chamber caused by faulty check valve in vacuum break line — replace check valve.	Fig. 8-39, 25
		2) Vacuum break line plugged — clean or replace plugged components in line.	Fig. 8-39
		3) VS-2 setting incorrect — should be 4.	Fig. 7-32
	6.E. Excessive steam when door is opened or excessive effort needed to unlock door when buzzer sounds	1) PS-2 setting incorrect (set too high) — should be 2.	Fig. 7-32
		2) Pressure circuitry on main Printcon PC board out of calibration — check.	Para. 7.17
	6.F. Goods are wet after completion of "Gravity" cycle, or excessive vapor in chamber when door is opened.	1) Vacuum break line plugged — clean or replace filter.	Fig. 8-39 Para. 7.4
		2) Check valve in drain line defective — replace.	Fig. 8-39, 25
		3) Wet steam — check quality.	

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		4) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry).	Fig. 7-11 Fig. 8-68
		4a) Repair or replace valve.	Para. 7.5
		4b) Check wiring to valve — repair or replace.	
		4c) Check LED D-16 on PC board 1 — should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15, 8 Para. 7.12
		4d) 4b and 4c ok — replace PC board 1.	Para. 7.12
	6.G. Water in chamber or door channel at end of cycle	1) Chamber drain valve (S-3) not operating correctly (should be open during exhaust and dry).	Fig. 7-11 Fig. 8-68
		1a) Repair or replace valve.	Para. 7.5
		1b) Check wiring to valve — repair or replace.	
		1c) Check LED D-12 on PC board 1 — should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15, 8 Para. 7.12
		1d) 1b and 1c ok — replace PC board 1.	
		2) Steam ejector solenoid valve (S-5) not operating correctly (should be open for drying time). See 6.F.4, above.	Fig. 7-11
		3) Cold chamber floor caused by condensate accumulating in lower jacket — check return line strainer and clean if necessary; check operation of jacket return trap and replace trap if necessary; check for back pressure on return steam line, locate source and eliminate.	Fig. 8-41, 10 & 17 Para. 7.6 Para. 7.7
		4) Chamber floor not pitched toward drain — see leveling procedure.	Para. 5.3
		5) Drains plugged or clogged — see drain cleaning procedure.	Para. 4.3
		6) Chamber steam trap does not open — replace trap element.	Fig. 8-40, 9 Para. 7.6

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		7) Steam not "dry" — check steam quality.	
		8) Drain line check valve defective — replace.	Fig. 8-39, 25
	6.H. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace, if encessary.	Fig. 8-16, 15 or Fig. 8-18, 20
		2) Open wire — disconnect P1 from control and check continuity between pin P and TB3 terminal 2. Isolate and repair open.	Fig. 8-78
		3) PC board 1 defective — check D-17 LED on board; replace board if LED does not come on at end of cycle.	Fig. 8-15, 8 Para. 7.12
7. Miscellaneous	7.A. Continuous sounding "cycle complete" buzzer whenever machine is turned on	1) Excessive current leakage from triac — replace PC board #1.	Fig. 8-15, 8 Para. 7.12
	7.B. Pressure displayed is more than ±2 PSI different than chamber gauge	1) Pressure circuitry on main Printcon PC board out of alignment — check.	Para. 7.17
		2) Faulty chamber pressure gauge — replace.	Fig. 8-72 or 8-73
		3) Faulty sensor — replace.	Fig. 8-72 or 8-73
	7.C. Pressure and temperature readings are non-linear (i.e. accurate at certain points but not others.)	1) P2, gain adjustment setting incorrect.	Fig. 7-38
		2) P1, converter refrence setting incorrect.	Fig. 7-38
	7.D. Two or more adjacent columns on printed record are blank	1) Printer hammer coil(s) open or shorted — replace printer.	Fig. 8-63, 22 Para. 7.15
	7.E. Illegible printed record	1) Binding of mechanical linkage in printer — replace printer.	Fig. 8-63, 22 Para. 7.15

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
7. Continued	7.F. Paper is advanced but is entirely blank	1) Printer coil connector is unplugged from P20/J20 connector — reconnect.	Fig. 8-63, 23
	7.G. Time or date not displayed	1) J51/P51 connector unplugged from display panel overlay — reconnect.	Fig. 8-62, 16
	7.H. Continuous display of time or date	1) Time or date display pushbutton on display panel shorted — replace.	Fig. 8-62, 11
	7.I. Automatic advance of display when time or date pressed.	1) FORWARD switch on display panel shorted — replace panel.	Fig. 8-62, 11
	7.J. Automatic reverse of display when time or date pressed.	1) REVERSE switch on display panel shorted — replace panel.	Fig. 8-62, 11
	7.K. Cannot advance time or date.	1) FORWARD switch on display panel open — replace panel.	Fig. 8-62, 11
	7.L. Cannot reverse time or date.	1) REVERSE switch on display panel open — replace panel.	Fig. 8-62, 11
	7.M. Paper will not be taken up. (Units Before 6/85 Only)	1) Misalignment of take-up assembly — check.	Para. 7.15
		2) Take-up motor open or shorted — replace motor.	Fig. 8-63, 12 Fig. 7-31
		3) Paper advance toggle switch in wrong position or failure — check position or replace toggle switch.	Fig. 8-63, 28 Fig. 7-31
		4) Platen switch failure (open) — replace platen switch.	Fig. 8-63, 14
		5) Take-up motor fuse blown — check.	Fig. 8-63
	7.N. Pinch rollers run continuously. (Units Before 6/85 Only)	1) Platen switch out of adjustment — check.	Para. 7.15
		2) Misalignment of take-up assembly — check.	Para. 7.15
		3) Platen switch failure (closed) — replace	Fig. 8-63, 14

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
7. Continued	7.O. Continuous paper feed	1) Paper advance toggle switch is in "paper advance" position — turn off paper advance.	Fig. 7-31
		2) Paper advance toggle switch failure — replace switch.	Fig. 7-31 Para. 7.15
	7.P. Display and printout show incorrect date (wrong year)	1) Year switch incorrectly set — check setting.	Fig. 6-9
		2) Year switch failure on main Printcon PC board — replace board.	Fig. 7-36 and Para. 7.17
	7.Q. Temperature indication is incorrect, pressure is correct	1) Calibration misalignment or component failure on main Printcon PC board — recalibrate or replace board.	Para. 7.17 Fig. 8-62, 3
		2) Faulty temperature sensor — replace.	Note 1, Pg. 6-41
	7.R. "ALARM: PRESS SENSOR" is printed and intermittent buzzer sounds	1) Switch #4 on the service switch (Main Printcon PC Board) is in the OFF position. Set to ON.	Fig. 7-34 and 7-35 Table 7-1
	7.S. Non-function of "Isothermal" cycle.	1) Pulse switch SW2 on board #2 set at zero. Adjust switch to any non-zero setting.	Fig. 8-51 Fig. 8-52 and 8-78
	7.T. Time and date settings not retained when power turned off.	1) Faulty battery on main Printcon PC board, install new battery.	Para. 7.18
	7.U. Erratic Printcon Display and Printouts	1) Excessive moisture entering Printcon. Install sponge strip inside console.	Fig. 8-59
	7.V. Drytime on printer tape exceeds thumbwheel setting	1) EAGLE (lower controller) and Printcon controls start DRY timing at PS-3 set point (3 psig).	Fig. 3-23
		2) EAGLE control operates solenoid valves drawing a vacuum for thumbwheel switch (DRY) set time.	

TABLE 6-2: CONTINUED

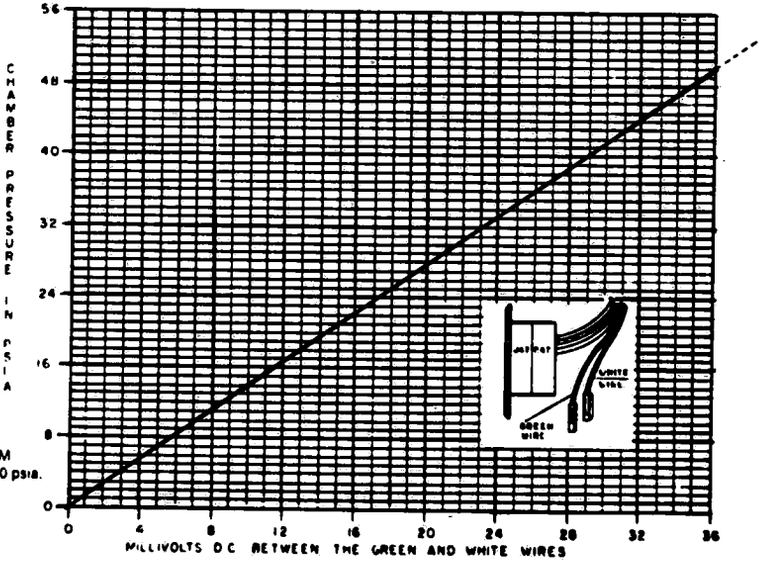
OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
7. Continued		3) Printcon control cannot monitor this internal EAGLE timer. Printcon adds any additional time required to achieve VS-2 set point (cycle COMPLETE) to total DRY time. This additional time can be as much as two minutes depending on chamber size. Note that printed DRY time includes vacuum break time, a normal part of DRY (EXHAUST) function.	
	7.W Printcon printed and thumbwheel settings differ more than two minutes	1) Abnormal restriction in air inlet piping (i.e., filter).	Fig. 7-11

NOTE 1: Use these formulas to calculate temperature probe (RTD) resistance at a given temperature.

a) For temperature in Celsius:
Probe resistance (ohms) = 100 + 0.385 x temperature.

b) For temperature in Fahrenheit:
Probe resistance (ohms) = 93.152 + 0.214 x temperature.

NOTE 2: The Table below shows the response of the strain gauge pressure transducer (in mVDC) to any given chamber pressure (in psia).



NOTE: NOMINAL MAXIMUM WORKING PRESSURE IS 50 psia.

TABLE 6-3. STRAIN GAUGE PRESSURE TRANSDUCER RESPONSE.

6.5 TIMER DISPLAY CHECKOUT AND CORRECTION CHARTS

1. Between cycles the primary panel timer displays can be checked by rotating the appropriate thumbwheel switches on the secondary panel. Before beginning the checkouts below, first push the RESET button to assure that the incorrect timer display is not caused by failure to reset the control system.

2. If **part of a number** fails to illuminate, rotate the appropriate thumbwheel switch and verify the segment failure. Correct by replacing the primary panel.

3. If an **entire number** fails to illuminate, disconnect P4 from controller and jump pin 38 of plug P4 to DC Common at TB-2 terminals 3, 4, or 5. Check for proper functioning of each display segment by following this procedure: Carefully jump, one at a time, the P4 connector pins (as listed in Table 6-4) to ground (TB2 terminals 3, 4, or 5, as applicable). Compare the segments actually illuminated with the pattern which should be indicated (pattern A, B, C, or D). If the pattern actually illuminated differs from the pattern illustrated, perform a continuity check of the wire. If the wire is good, then the primary panel must be replaced.

TABLE 6-4: TEST PATTERNS — STERILIZE AND DRY TIMER DISPLAY

P4 Connector Pin	"STERILIZE" DISPLAY, 10's digit, (IC1), should indicate pattern:	"STERILIZE" DISPLAY, unit's digit (IC2), should indicate pattern:	"DRY" DISPLAY, 10's digit (IC3), should indicate pattern:	"DRY" DISPLAY, unit's digit (IC4), should indicate pattern:
26 27 28 29	A B C D			
30 31 32 33		A B C D		
34 35 36 37			A B C D	
18 17 16 15				A B C D

TEST PATTERNS FOR CORRECTLY FUNCTIONING DIGITAL DISPLAYS



4. If an **entire number** fails to illuminate, check for correct functioning of the thumbwheel switches by following this procedure: Disconnect P3 and P4 from the controller. Make the following continuity check across the thumbwheel switches, according to the switch settings indicated in Table 6-4. Place the negative lead on P4-3 or P4-20. If the continuity is bad, replace the appropriate thumbwheel switch and/or repair the open circuit in the wire harness. If the continuity check is good, replace controller Board 1.

TABLE 6-5: CONTINUITY CHECK — STERILIZE AND DRY TIME THUMBWHEEL SWITCHES.

STERILIZE TIME THUMBWHEEL	
Switch Setting	Continuity Path to P4-3 From Pins
01	P3-1
02	P3-2
03	P3-1 and P3-2
04	P3-3
05	P3-1 and P3-3
06	P3-2 and P3-3
07	P3-1, P3-2 and P3-3
08	P3-4
09	P3-1 and P3-4
10	P4-9
20	P4-10
30	P4-9 and P4-10
40	P4-11
50	P4-9 and P4-11
60	P4-10 and P4-11
70	P4-9, P4-10 and P4-11
80	P4-12
90	P4-9 and P4-12
00	NONE

DRY TIME THUMBWHEEL	
Switch Setting	Continuity Path to P4-20 From Pins
01	P3-1
02	P3-2
03	P3-1 and P3-2
04	P3-3
05	P3-1 and P3-3
06	P3-2 and P3-3
07	P3-1, P3-2 and P3-3
08	P3-4
09	P3-1 and P3-4
10	P4-9
20	P4-10
30	P4-9 and P4-10
40	P4-11
50	P4-9 and P4-11
60	P4-10 and P4-11
70	P4-9, P4-10 and P4-11
80	P4-12
90	P4-9 and P4-12
00	NONE

6.6 TEMPERATURE THUMBWHEEL CHECKOUT

1. Turn power off. Open display panel overlay. Unplug temperature thumbwheel ribbon cable from display PC board at jack J52 (lower left, display board). Refer to Tables 6-6 and 6-7 during the checkout.

2. Check for open diodes and switch closures. Use the black lead of the digital multimeter on the appropriate switch "common". Rotate one switch at a time and check for proper continuity* through that switch and diode.

3. Check all four switch leads (8, 4, 2, 1) at each switch position (0, 1 . . . 9).

4. Check for diode shorts by placing red lead of meter on "common" terminal and repeating above. No continuity should be found curing this portion of test in any switch position.

**Proper continuity will be 1000 ohms or less using the 10 k ohm full scale setting.*

Figure 6-5. TEMPERATURE THUMBWHEEL SWITCHES: Wiring.

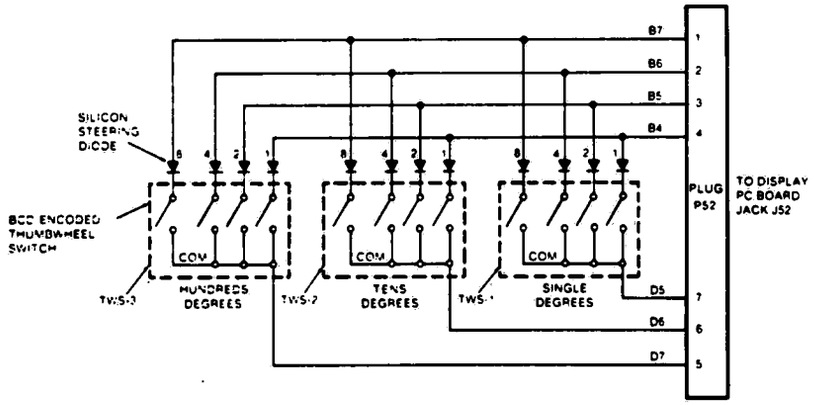


TABLE 6-6: SWITCH CHECKOUT CHART

Setting	Continuity To Appropriate Common From These Wires*
0	None
1	B4
2	B5
3	B4 and B5
4	B6
5	B6 and B4
6	B6 and B5
7	B6, B5 and B4
8	B7
9	B7 and B4

**Circuit to all other wires must be open*

TABLE 6-7: COMMONS

SWITCH	COMMON
TWS-3	D7
TWS-2	D6
TWS-1	D5

TABLE 6-7: POWER DOOR TROUBLESHOOTING CHART

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Door either open or closed	A. Motor does not run	1) Check main power switch — turn on.	
		2) 3-amp fuse burned out — replace.	Fig. 8-30, 23
		3) Overload relay A tripped — reset.	Fig. 8-30, 19
		4) Chamber pressure switch PS-2 or vacuum switch VS-2 actuated — readjust or replace.	Fig. 5-7 Para. 5.9 Fig. 8-7, 23
		5) Limit switches actuated — readjust or replace.	Fig. 7-10 Para. 7.3
		6) Electric clutch not energized — repair or replace.	Fig. 8-28, 6 Para. 7.3
		7) Hinge motor not energized — repair or replace.	Fig. 8-28, 2
	B. Motor runs, but does not operate door	1) Manual clutch not engaged — readjust, repair or replace.	Fig. 8-6 Para. 7.3
		2) Rectifier burned out — replace.	
		3) Coil burned out — replace.	Fig. 8-28, 6
		4) Relays not making contact — repair or replace.	Fig. 8-31
		5) Clutch slipping — repair or replace.	Fig. 7-8 Para. 7.3
		6) No lubricant on clutch faces — lubricate.	
		7) Low voltage — check and correct, if necessary.	
		8) Hinge not properly aligned — realign.	Fig. 7-3 Para. 7.3
		9) Gears not meshing properly — repair or replace.	Fig. 8-27
2. Door fully open	A. Door will not close when CLOSE or LOCK button is pushed	1) Motor not running — see item 1.A, above.	
		2) Relays 1CR, 3CR and 5TR not energized — check, repair or replace, as necessary.	Fig. 8-31, 6, 7, 9

TABLE 6-7: POWER DOOR TROUBLESHOOTING CHART.

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) No continuity through push button circuit — check, repair if necessary.	Fig. 8-20 & 21
		4) Push button not operating correctly — replace.	Fig. 8-20
		5) Time delay relays 5TR, 1TR not operating correctly — check, readjust or replace, as necessary.	Fig. 8-31,7,9
	B. Door closes but only partially	1) Door movement obstructed — correct.	
		2) Hinge assembly binding — correct.	Fig. 7-2 Para. 7.3
		3) Low clutch voltage — adjust R2.	
	C. Locks before completely closed	1) LS1 making too soon — readjust.	Para. 7.3
		2) Timers 3TR, 2TR not operating correctly — readjust, repair, or replace.	Fig. 8-31,6,11
	D. Door is closed, but motor is not deenergized (only CLOSE button pushed)	1) Limit switch LS1 not actuated — readjust, repair, or replace.	Para. 7.3
3. Door closed (but not locked); LOCK button pushed.	A. Door will not lock	1) Lock motor does not run — repair or replace.	Fig. 8-25, 29
		2) Overload relay A tripped — reset.	Fig. 8-30, 19
		3) Relay 8CR not energized — repair or replace.	Fig. 8-31, 8
		4) Limit switch LS1 not actuated — readjust, repair, or replace.	Para. 7.3
		5) Clutch not engaged — readjust, repair, or replace.	Para. 7.3
		6) Push button not operating correctly — replace.	Fig. 8-20 & 21
		7) No continuity through push button circuit — check, repair if necessary.	
		8) Relays 1CR, 8CR, 9CR, 1TR, 2TR, 3TR, 5TR not energized — repair or replace.	Fig. 8-31

TABLE 6-7: POWER DOOR TROUBLESHOOTING CHART.

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	B. Door is locked, but motor not deenergized	1) Limit switch LS-5 not actuated — readjust, repair or replace.	Fig. 7-8 Fig. 8-25, 46 Para. 7.3
4. Door closed and locked	A. Signal is not sent to controller	1) Limit switch LS-2 is not actuated — readjust, repair, or replace.	Fig. 7-8 Fig. 8-25, 46 Para. 7.3
	B. Door gasket seal is not maintained throughout cycle.	1) Door gasket is deformed, brittle, or cracked — replace.	Fig. 8-22, 1 Para. 7.3
	C. Door will not unlock when UNLOCK button is pushed	1) Relay 8CR is not energized — repair or replace.	Fig. 8-31, 8
		2) Overload relay A tripped — reset.	Fig. 8-30, 19
		3) Limit switches not actuated — readjust, repair, or replace.	Para. 7.3
		4) Pushbutton not operating correctly — replace.	Fig. 8-20 or 21
		5) Chamber pressure switch PS2 or vacuum switch VS2 actuated — check. Repair or replace, if necessary.	Fig. 5-7 Para. 5.9 Fig. 8-7, 23
		6) Motor not operating — see item 3.	
	D. Door is unlocked, but motor is not deenergized	1) Limit switch LS-3 not deactuated — readjust, repair, or replace.	Fig. 7-8 Fig. 8-25, 6 Para. 7.3
5. Door closed (but not locked); OPEN button is pushed	A. Door will not open	1) Motor does not run — see item 1.	
		2) Limit switch LS-3 not deactuated — readjust, repair, or replace.	Fig. 8-25, 6 Para. 7.3 Fig. 7-10
		3) Time delay relays 4TR, 3TR, 1TR not operating correctly — check, readjust or replace as necessary.	Fig. 8-31
	B. Door opens, but only partially	1) Door movement obstructed — correct.	Para. 7.3
		2) Hinge assembly binding — correct.	Fig. 7-2
		3) Low clutch voltage — adjust R2.	
	C. Door is fully opened, but is not deenergized	1) Limit switch LS-4 not deactuated — readjust, repair, or replace.	Para. 7.3

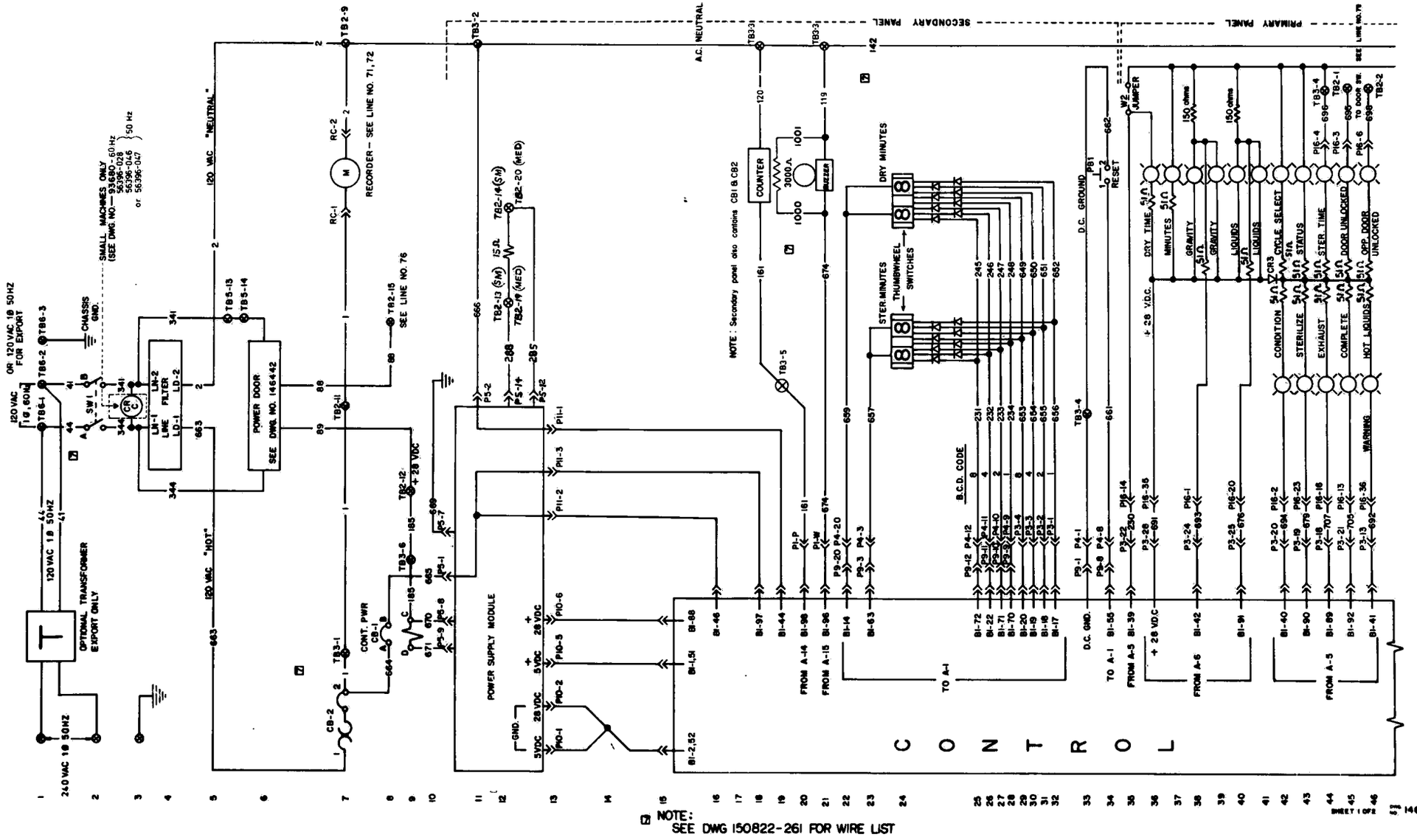
TABLE 6-8: SCHEMATIC REFERENCE LIST

The following drawings have been grouped together for convenience. They are:

Title	Sheet	Reference
ELECTRICAL SCHEMATIC: Gravity Sterilizer (IRC)	1 of 2 2 of 2	146620
ELECTRICAL SCHEMATIC: Laboratory/Isothermal Sterilizer (IRC)	1 of 2 2 of 2	146621
PIPING SCHEMATIC: Gravity Sterilizer (IRC)	1 of 1	—
PIPING SCHEMATIC: Laboratory/Isothermal Sterilizer (IRC)	1 of 1	—
ELECTRICAL SCHEMATIC: Gravity Sterilizer (Printcon)	1 of 2 2 of 2	146649-041
ELECTRICAL SCHEMATIC: Laboratory/Isothermal Sterilizer (Printcon)	1 of 2 2 of 2	146649-042
PIPING SCHEMATIC: Gravity Sterilizer (Printcon)	1 of 1	—
PIPING SCHEMATIC: Laboratory/Isothermal Sterilizer (Printcon)	1 of 1	—
MASTER WIRE LIST: Gravity/Isothermal/Vacamatic Sterilizers (IRC)	1 of 1	150822-261
ELECTRICAL SCHEMATIC: Optional Power Door (IRC)	1 of 2 2 of 2	146442
ELECTRICAL SCHEMATIC: Optional Power Door (Printcon)	1 of 2 2 of 2	141198-127
MASTER WIRE LIST: Optional Power Door (IRC)	1 of 1	150822-264
PRINTED CIRCUIT BOARD: Basic	1 of 2 2 of 2	146586
PRINTED CIRCUIT BOARD: Expander	1 of 2 2 of 2	146588
PC ASSEMBLY: Power Supply (IRC)	1 of 2 2 of 2	146599
PC ASSEMBLY: Power Supply (Printcon)	1 of 2 2 of 2	146633-051
MAIN PRINTCON PC BOARD	1 of 4 2 of 4 3 of 4 4 of 4	146651-001
PRINTCON DIGITAL DISPLAY PC BOARD	1 of 2 2 of 2	146633-081
PRIMARY PANEL SCHEMATIC (PC Board)	1 of 2 2 of 2	134468-444

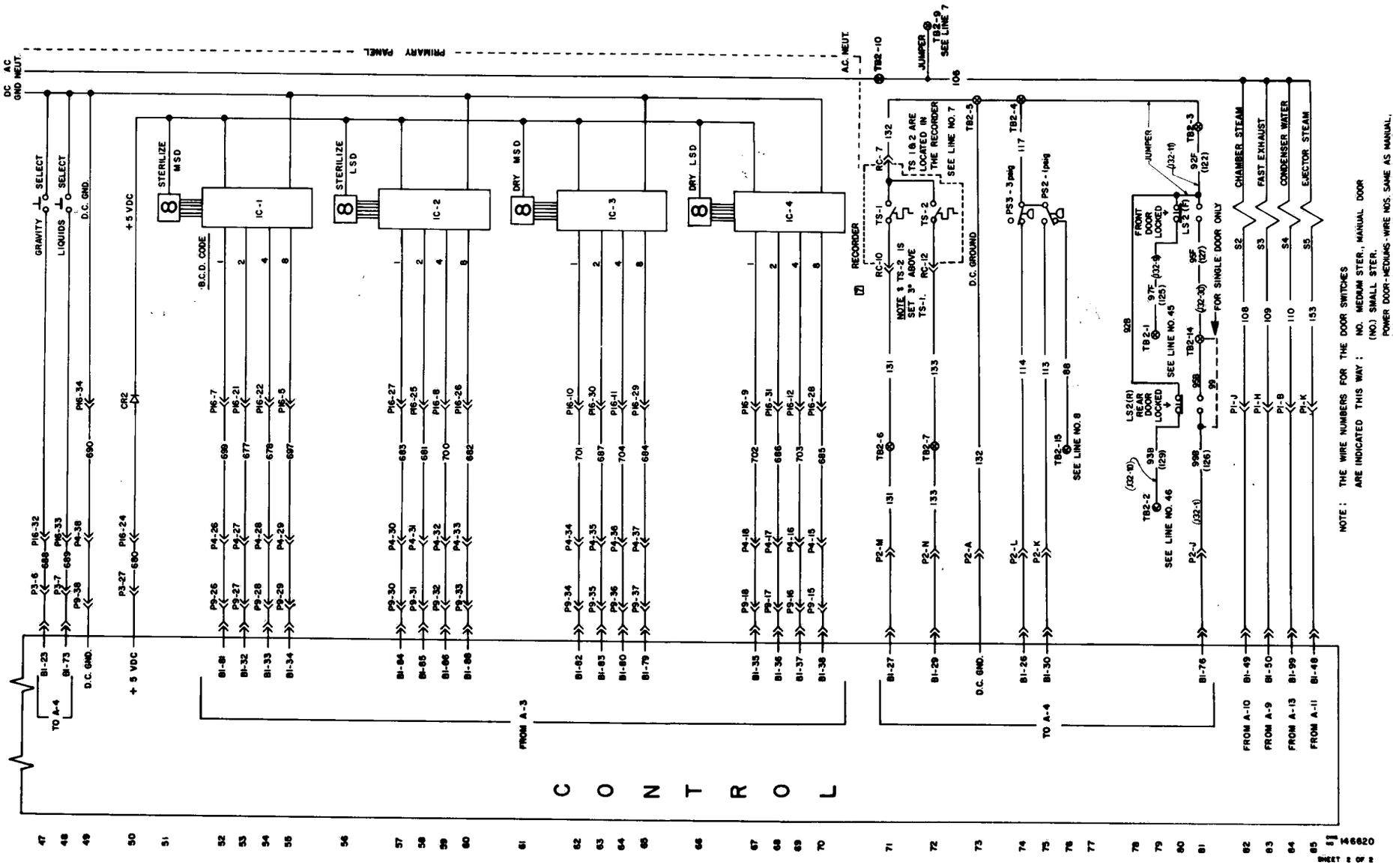
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DWG. NO. 146620
(9/26/85)



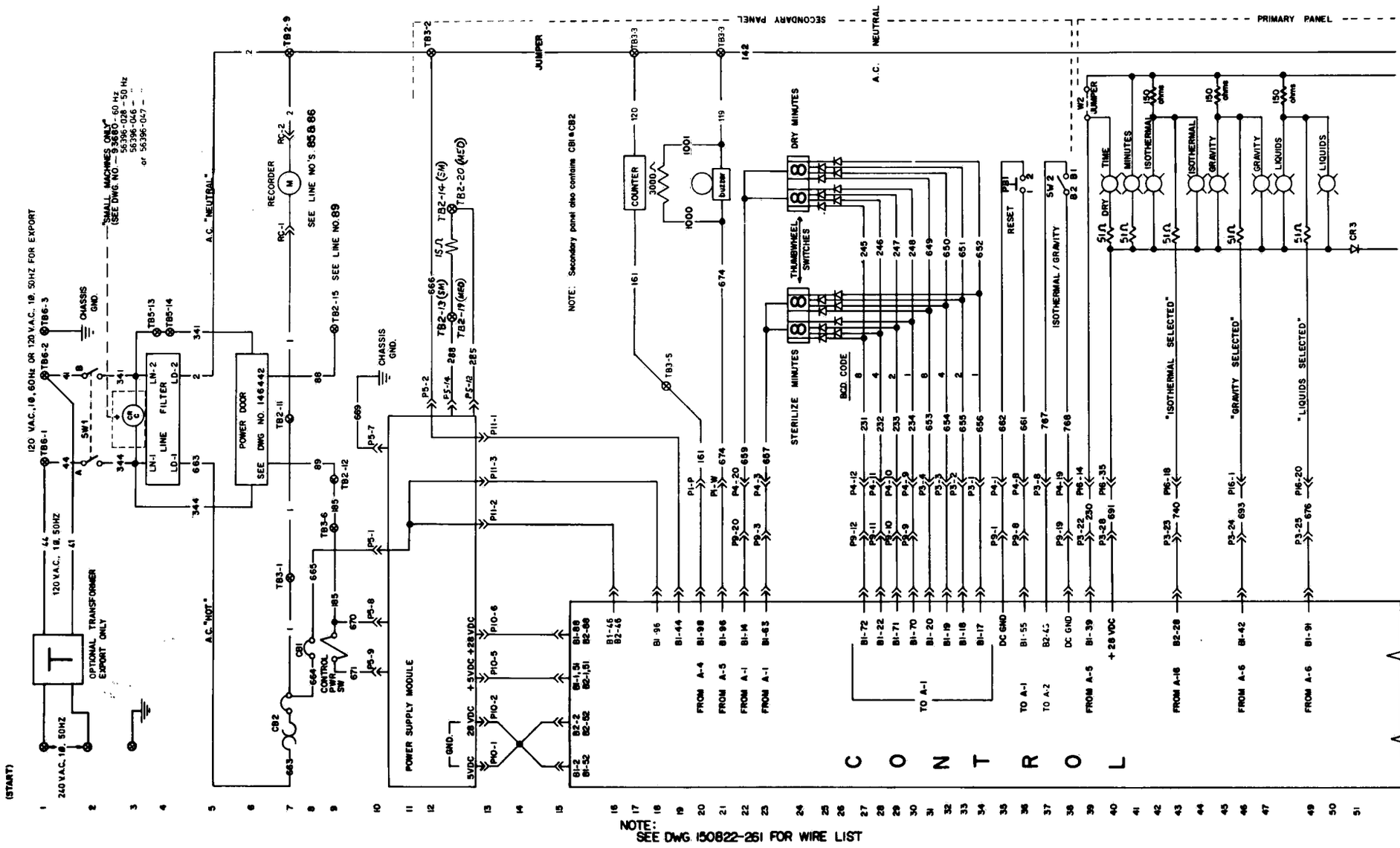
ELECTRICAL SCHEMATIC:
Gravity Sterilizer (1 of 2)
(Units with Indicator-Recorder)

DWG. NO. 146620
(9/26/85)



ELECTRICAL SCHEMATIC:
Gravity Sterilizer (2 of 2)
(Units with Indicator-Recorder)

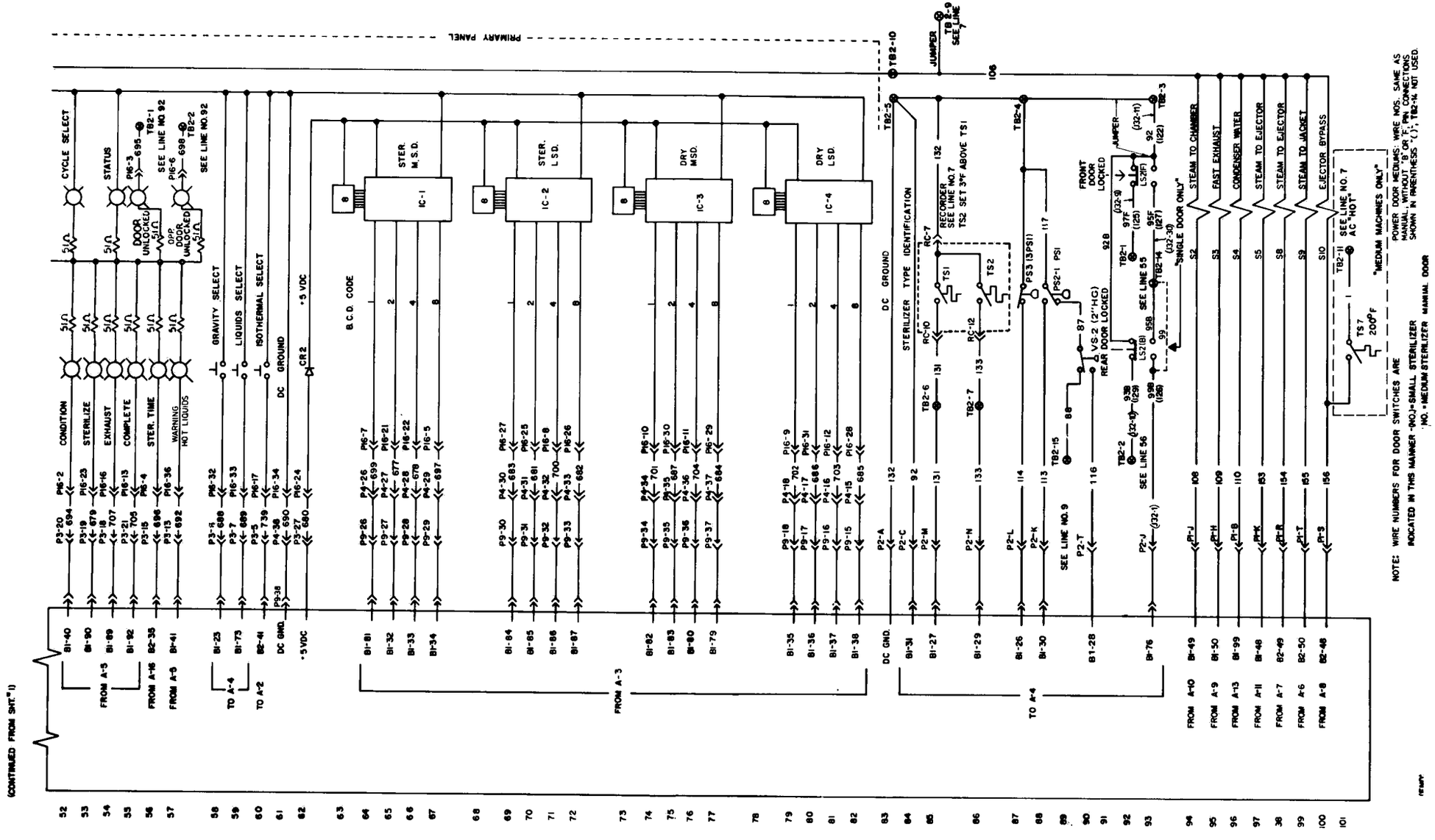
DWG. NO. 146621
(10/27/87)



NOTE:
SEE DWG 150822-261 FOR WIRE LIST

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(Units with Indicator-Recorder)

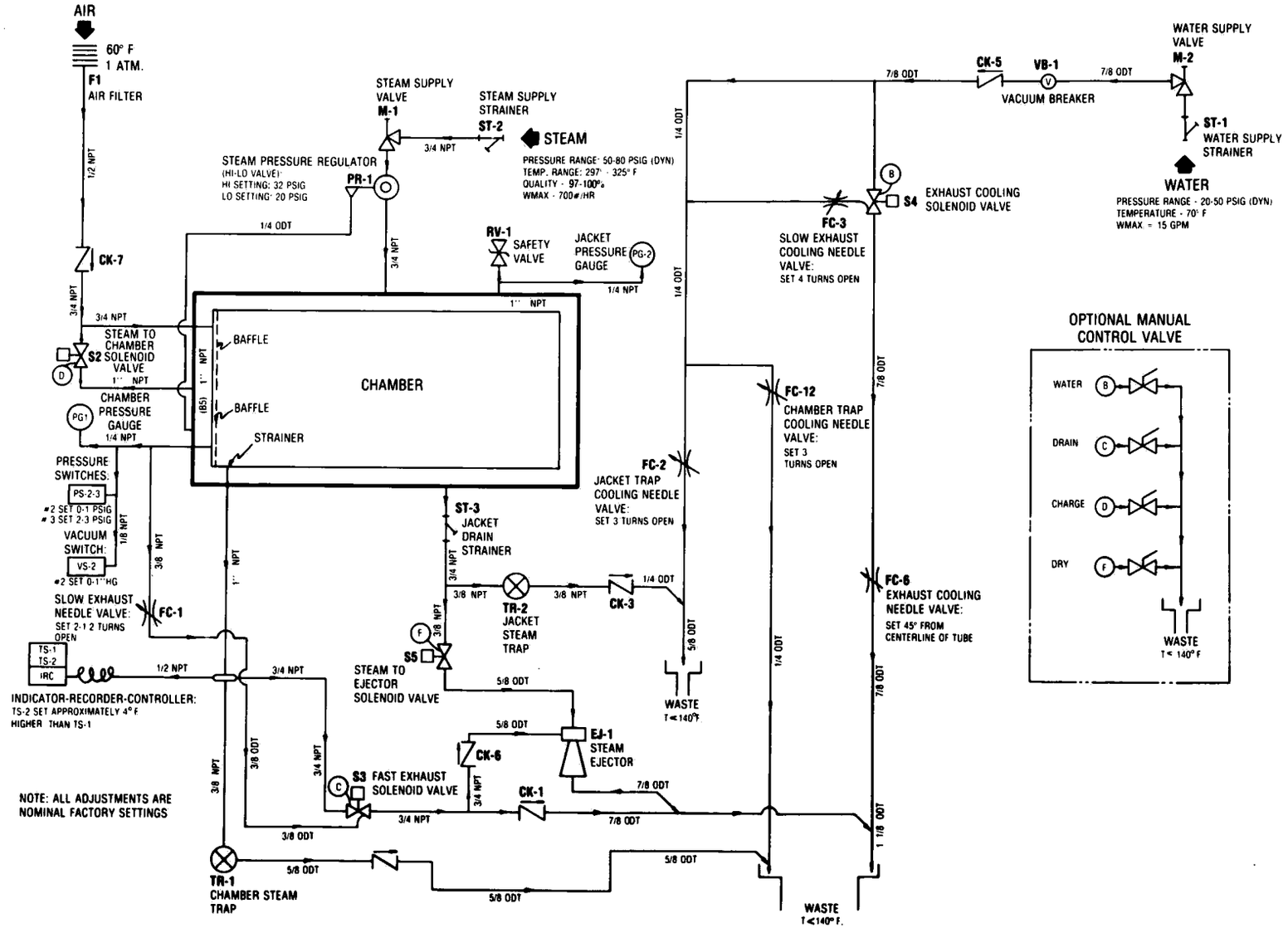
DWG. NO. 146621
(10/27/87)



NOTE: WIRE NUMBERS FOR DOOR SWITCHES ARE LOCATED IN THIS MANNER -(NO.)+SMALL STERILIZER NO. +MEDIUM STERILIZER MANUAL DOOR
POWER DOOR MEDIUMS: WIRE NOS. SAME AS MANUAL, WITHOUT "B" OR "F" PIN CONNECTIONS SHOWN IN PARENTHESIS "( )"; TB2-14 NOT USED.

ELECTRICAL SCHEMATIC:
Laboratory/Isothermal Sterilizer (2 of 2)
(Units with Indicator-Recorder)

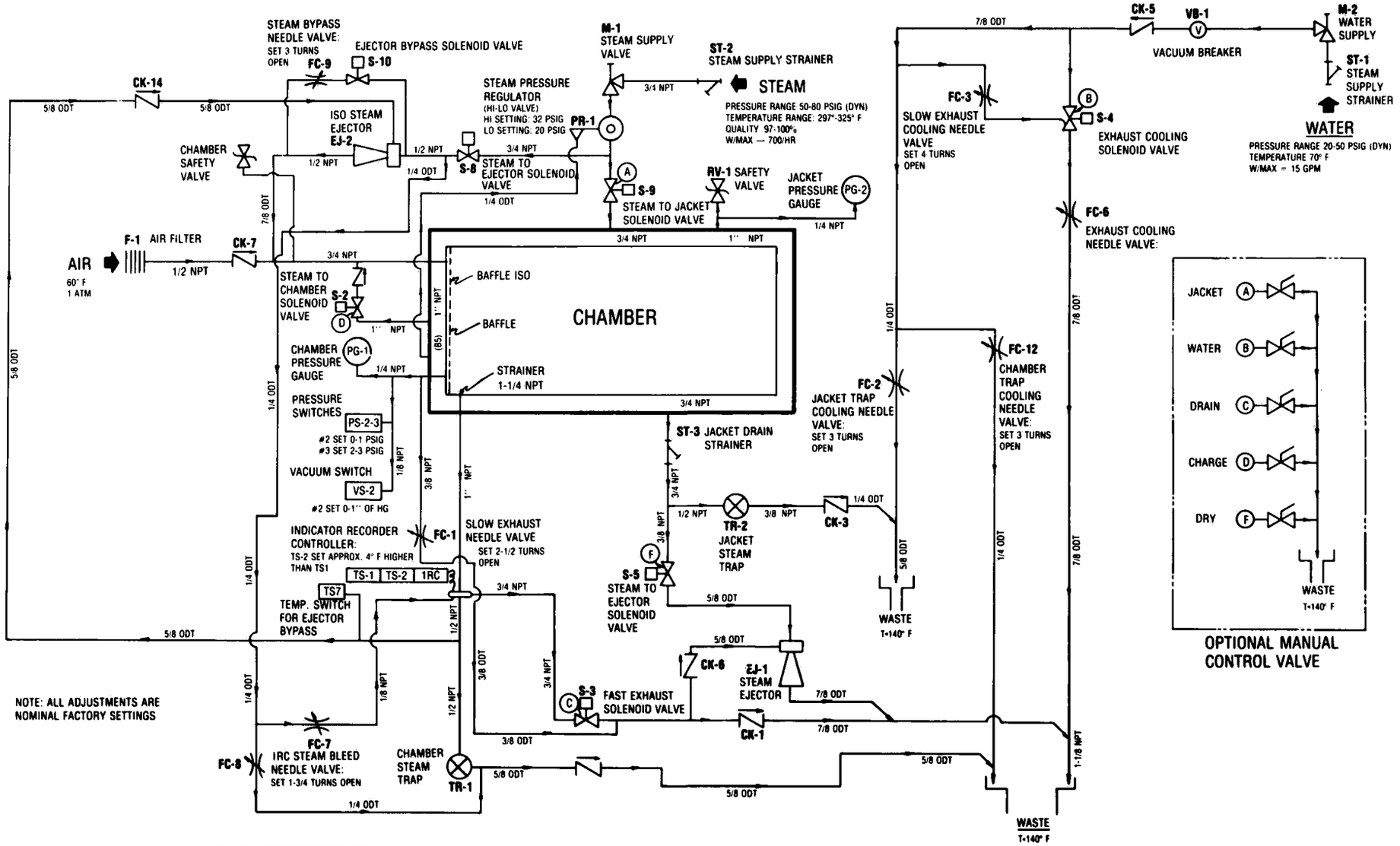
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(3-20-79)



SHELL SIZE	VOL FT³	AE	17 PSIG-250° F FULL CHARGE STEAM	17 PSIG-250° F EST. CHARGE TIME (SEC.)	30 PSIG-270° F FULL CHARGE # STEAM	30 PSIG-270° F EST. CHARGE TIME (SEC)	EST VAC BREAK TIME 60° F 1 ATM	EST. DISCHARGE TIME TO '0' PSIG 250° F	EST. DISCHARGE TIME TO '0' PSIG 270° F
24X36X36	18	.0371	1.35#	<9.91	1.85#	<10.8	<1.4 MIN	<13.93	<18.51
				<59.41 F.L.		<64.8 F.L.		<41.79F.L.	<55.53F.L.
24X36X48	24	.0371	1.80#	<13.22	2.50#	<14.4	<1.92 MIN	<18.57	<24.66
				<79.32 F.L.		<86.4 F.L.		<55.71F.L.	<74.04F.L.
24X36X60	30	.0371	2.25#	<16.53	3.09#	<18.011	<2.4 MIN	<23.22	<30.86SEC.
				<99.18 F.L.		<108 F.L.		<69.66F.L.	<92.58F.L.

PIPING SCHEMATIC: Gravity Sterilizer (Units with Indicator-Recorder)

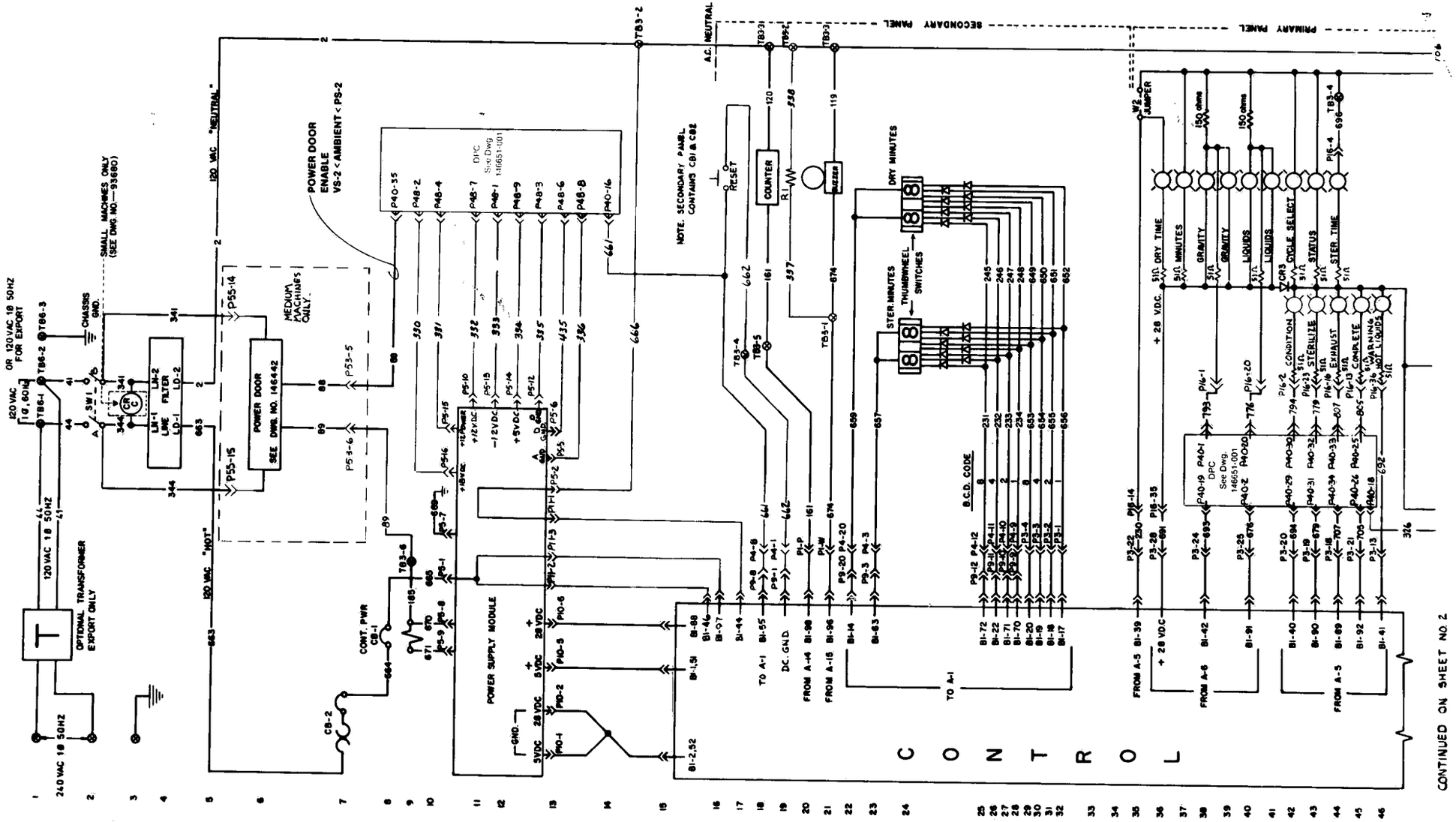
DWG. NO. SK-760290
(3-20-79)



			17 PSIG-250° F		30 PSIG-270° F			EST. DISCHARGE TIME TO 0 PSIG	
SHELL SIZE	VOL FT³	AE	FULL CHARGE STEAM	EST. CHARGE TIME (SEC.)	FULL CHARGE # STEAM	EST. CHARGE TIME (SEC)	EST VAC BREAK TIME 60° F 1 ATM	250° F	270° F
24X36X36	18	.0371	1.35#	<9.91 <59.41 F.L.	1.85#	<10.8 <64.8 F.L.	<1.4 MIN	<13.93 <41.79F.L.	<18.51 <55.53F.L.
24X36X48	24	.0371	1.80#	<13.22 <79.32 F.L.	2.50#	<14.4 <66.4 F.L.	<1.92 MIN	<18.57 <55.71F.L.	<24.68 <74.04F.L.
24X36X60	30	.0371	2.25#	<16.53 <99.18 F.L.	3.09#	<18.011 <108 F.L.	<2.4 MIN	<23.22 <69.66F.L.	<30.86SEC. <92.58F.L.

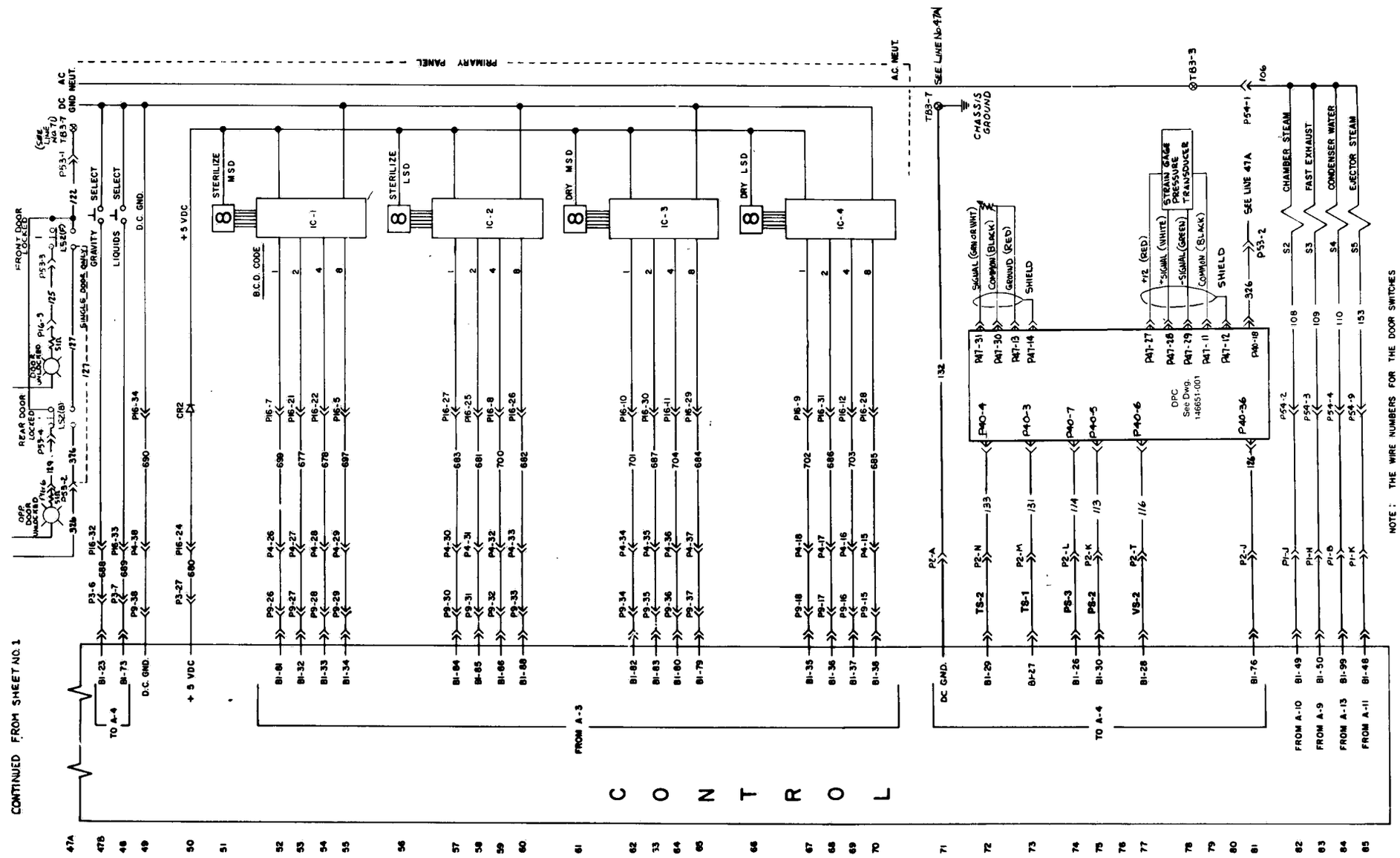
PIPING SCHEMATIC:
Laboratory/Isothermal Sterilizer
(Units with Indicator-Recorder)

REF. 146649-041
(91/27/86)



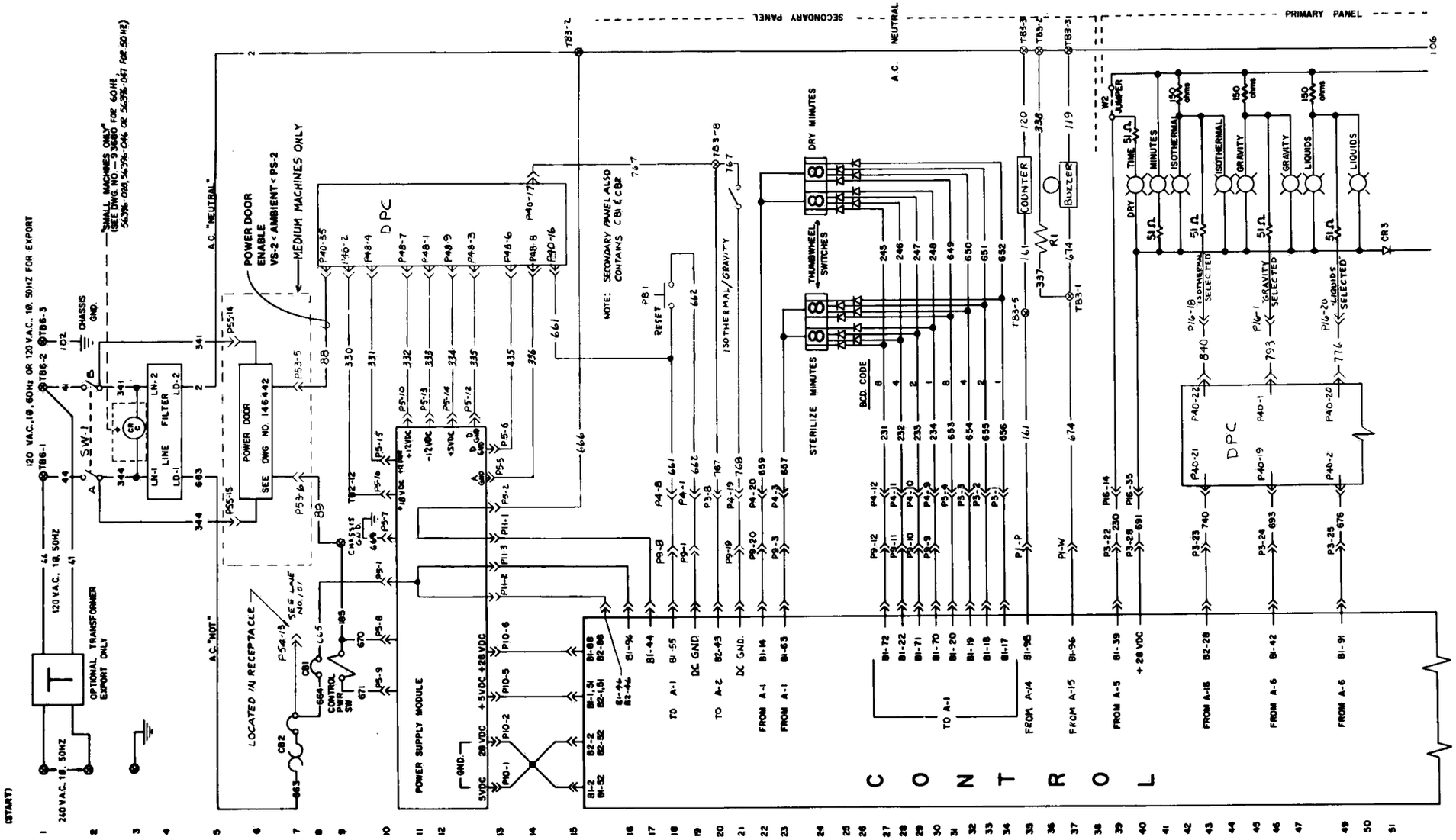
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Gravity Sterilizer (1 of 2)
(Units with Printcon)

REF. 146649-041
(91/27/86)



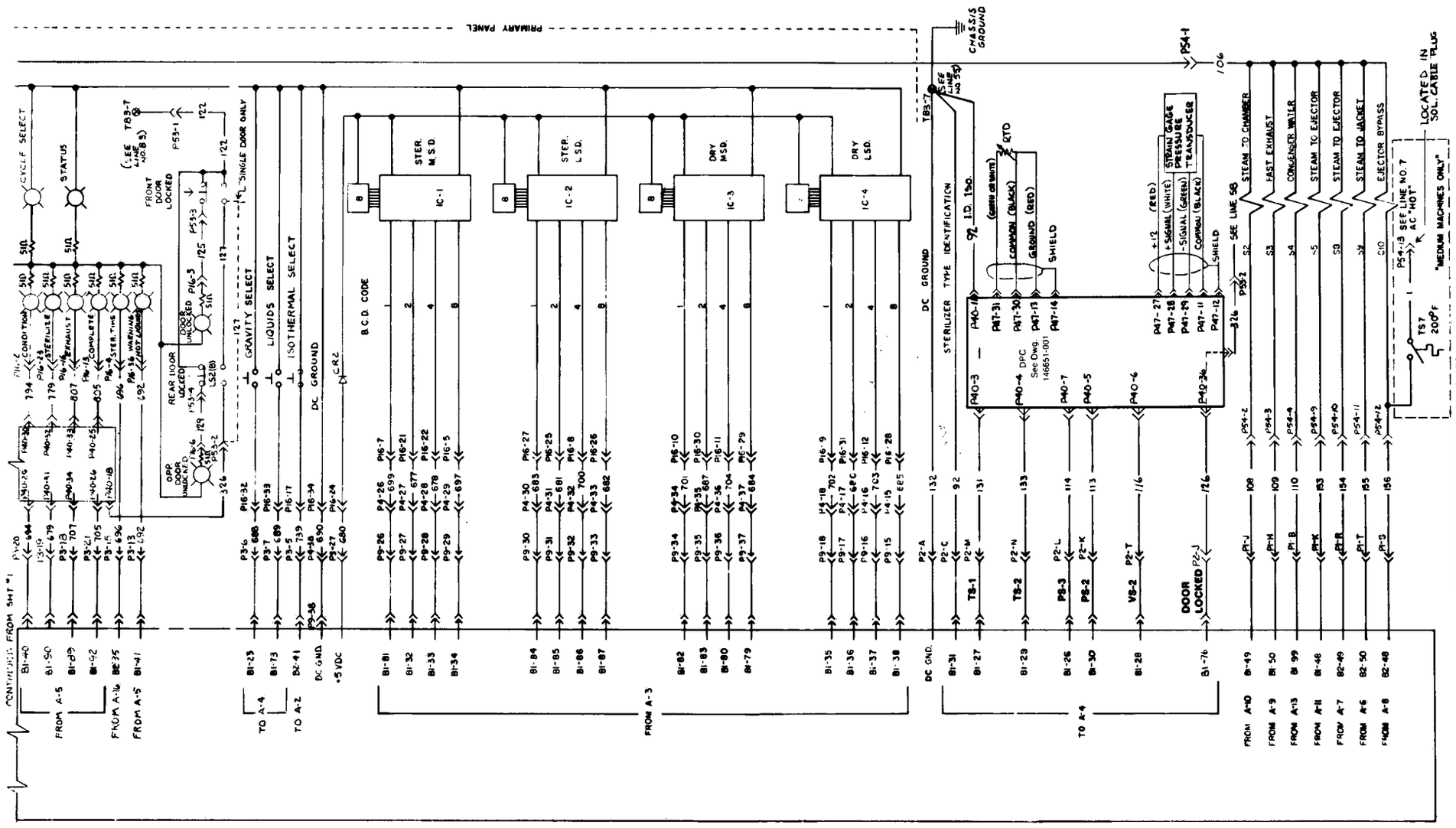
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Gravity Sterilizer (2 of 2)
(Units with Printcon)

REF. 146649-042
(9/27/86)

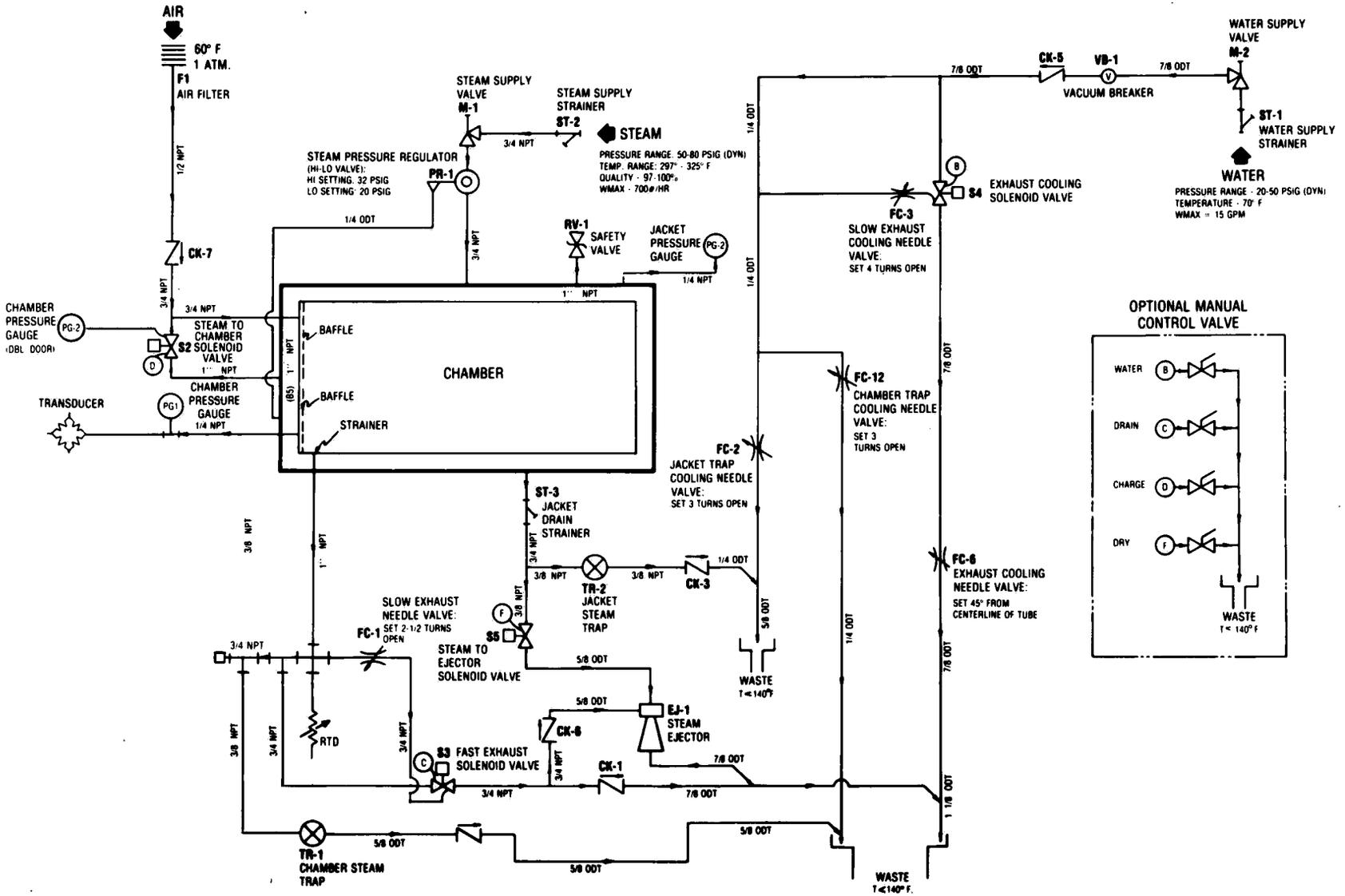


ELECTRICAL SCHEMATIC:
Laboratory/Isothermal Sterilizer (1 of 2)
(Units with Printcon)

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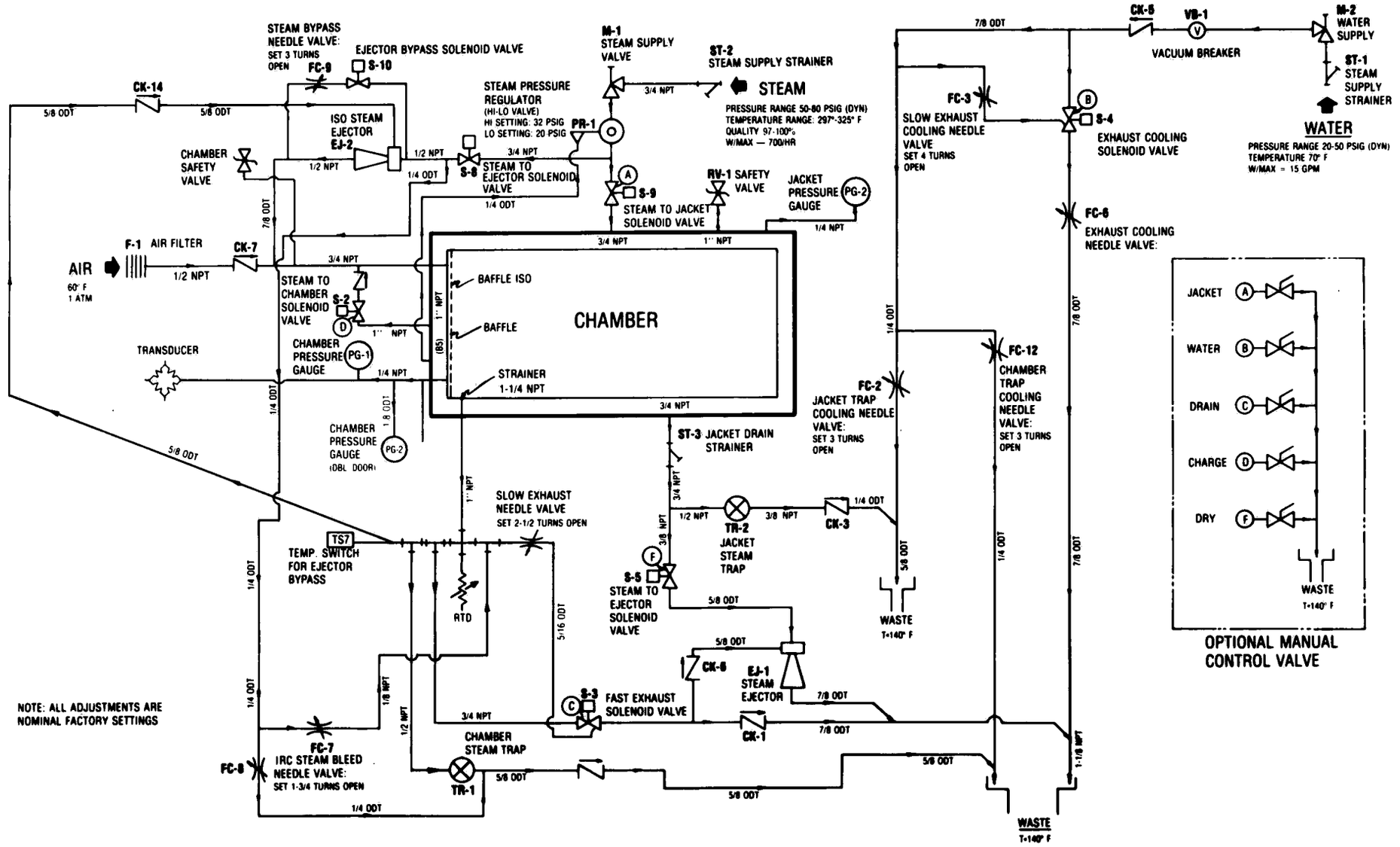


ELECTRICAL SCHEMATIC:
Laboratory/Isothermal Sterilizer (2 of 2)
(Units with Printcon)



SHELL SIZE	VOL FT³	AE	17 PSIG-250° F FULL CHARGE STEAM	17 PSIG-250° F EST. CHARGE TIME (SEC.)	30 PSIG-270° F FULL CHARGE # STEAM	30 PSIG-270° F EST. CHARGE TIME (SEC)	EST VAC BREAK TIME 60° F 1 ATM	EST. DISCHARGE TIME TO 0 PSIG 250° F	EST. DISCHARGE TIME TO 0 PSIG 270° F
24X36X36	18	.0371	1.35#	<9.91 <59.41 F.L.	1.85#	<10.8 <64.8 F.L.	< 1.4 MIN	<13.93 <41.79F.L.	<18.51 <55.53F.L.
24X36X48	24	.0371	1.80#	<13.22 <79.32 F.L.	2.50#	<14.4 <86.4 F.L.	<1.92 MIN	<18.57 <55.71F.L.	<24.68 <74.04F.L.
24X36X60	30	.0371	2.25#	<16.53 <99.18 F.L.	3.09#	<18.011 <108 F.L.	< 2.4 MIN	<23.22 <69.66F.L.	<30.86SEC. <92.58F.L.

PIPING SCHEMATIC: Gravity Sterilizer (Units with Printcon)



SHELL SIZE	VOL FT³	AE	17 PSIG-250° F FULL CHARGE STEAM	17 PSIG-250° F EST. CHARGE TIME (SEC.)	30 PSIG-270° F FULL CHARGE # STEAM	30 PSIG-270° F EST. CHARGE TIME (SEC)	EST VAC BREAK TIME 60° F 1 ATM	EST. DISCHARGE TIME TO '0' PSIG 250° F	EST. DISCHARGE TIME TO '0' PSIG 270° F
24X36X36	18	.0371	1.35#	<9.91 <58.41 F.L.	1.85#	<10.8 <64.0 F.L.	<1.4 MIN	<13.93 <41.79F.L.	<18.51 <55.53F.L.
24X36X48	24	.0371	1.80#	<13.22 <79.32 F.L.	2.50#	<14.4 <86.4 F.L.	<1.92 MIN	<18.57 <55.71F.L.	<24.68 <74.04F.L.
24X36X60	30	.0371	2.25#	<16.53 <99.18 F.L.	3.09#	<18.011 <108 F.L.	<2.4 MIN	<23.22 <69.66F.L.	<30.88SEC. <92.58F.L.

PIPING SCHEMATIC:
Laboratory/Isothermal Sterilizer
(Units with Printcon)

DWG. NO. 150822-261
(9-26-85)

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
1	BLK	CB2-2	QUICK-CONN	TB3-1	RING TERM	
1	"	TB3-1	RING TERM	TB2-11	"	
1	"	TB2-11	"	RC-1	PIN-FEMALE	
1	"	TB2-11	"	TS7-COM	RING TERM	ISO ONLY
2	WHITE	FILTER/LD2	QUICK-CONN	TB3-2	"	
2	JUMPER	TB3-2	RING TERM	TB3-3	"	
2	WHITE	TB2-9	"	RC1-2	PIN-FEMALE	
41	"	TB6-2	"	SW1-B	QUICK-CONN	
44	BLK	TB6-1	"	SW1-A	"	
87	BROWN	PS2-NC	QUICK-CONN	VS2-COM	"	VAC. ONLY
88	"	PS2-NC	"	TB2-15	RING TERM	ISO & GRAV/ISO ONLY
88	"	VS2-COM	"	TB2-15	"	VAC. ONLY
92	VIOLET	TB2-5	RING TERM	P2-C	PIN-FEMALE	ISO ONLY-STER. I.D.
92	"	TB2-5	"	P2-D	"	VAC. ONLY-STER. I.D.
92F/122	"	LSF-COM1A	"	TB2-3	RING TERM	
92B/122	"	LSB-NC1A	"	TB2-4	"	DBL. DOOR ONLY
93B/129	TAN	LSB-COM1A	"	TB2-2	"	" " "
95F/127	"	LSF-NO1B	"	TB2-14	"	
95B/127	GRAY	LSB-COM1B	"	TB2-14	"	DBL. DOOR ONLY
97F/125	VIOLET	LSF-NC1A	"	TB2-1	"	
99F/127	TAN	TB2-14	"	P2-J	PIN-FEMALE	SGL. DOOR ONLY
99B/126	TAN	LSB-NO1B	"	P2-J	"	DBL. DOOR ONLY
102	GREEN	TB6-3	"	CHASSIS GND	RING TERM	
106	WHITE	S9	SPLICE-CONN	S8	SPLICE-CONN	ISO ONLY
106	"	S8	"	S10	"	" "
106	"	S10	"	S4	"	ISO ONLY
106	"	S4	"	S2	"	
106	"	S7	"	S1	"	VAC. ONLY
106	"	S1	"	S2	"	" "
106	"	S2	"	S5	"	ISO, GRAV/ISO ONLY
106	"	S2	"	S3	"	
106	"	S3	"	TB2-15	RING TERM	
107	YELLOW	S1	"	P1-D	PIN-MALE	VAC. ONLY
108	YELLOW	S2	SPLICE-CONN	P1-J	PIN-MALE	VAC. ONLY
109	"	S3		P1-H	"	
110	"	S4		P1-B	"	
111	"	S7		P1-M	"	VAC. ONLY
112	BROWN	PS1-NC	QUICK-CONN	P2-J	PIN-FEMALE	VAC. ONLY
113	"	PS2-NO	"	P2-K	"	
114	"	PS3-COM	"	P2-L	"	
115	"	VS1-COM	"	P2-R	"	VAC. ONLY
116	"	VS2-NC	"	P2-T	"	" "
117	VIOLET	VS1-COM	"	PS-3	QUICK-CONN	" "
117	"	PS3-COM	"	PS-2	"	
117	"	PS2-COM	"	TB2-14	RING TERM	
117	"	PS2-COM	"	PS1-COM	QUICK-CONN	VAC. ONLY
117	"	PS1-COM	"	TB2-14	RING TERM	" "
119	WHITE	BUZZER	"	TB3-1	"	
120	WHITE	COUNTER	"	TB3-2	"	
131	ORANGE	P2-M	PIN-FEMALE	TB2-6	RING TERM	
131	ORANGE	TB2-6	RING TERM	RC1-10	PIN-FEMALE	
132	VIOLET	P2-A	PIN-FEMALE	TB2-5	RING TERM	
132	"	TB2-5	RING TERM	RC1-7	PIN-FEMALE	
133	ORANGE	P2-N	PIN-FEMALE	TB2-7	RING TERM	
133	"	TB2-7	RING TERM	RC1-12	PIN-FEMALE	
142	WHITE	TB3-2	"	TB2-10	RING TERM	
153	YELLOW	S5	SPLICE-CONN	P1-K	PIN-MALE	ISO ONLY

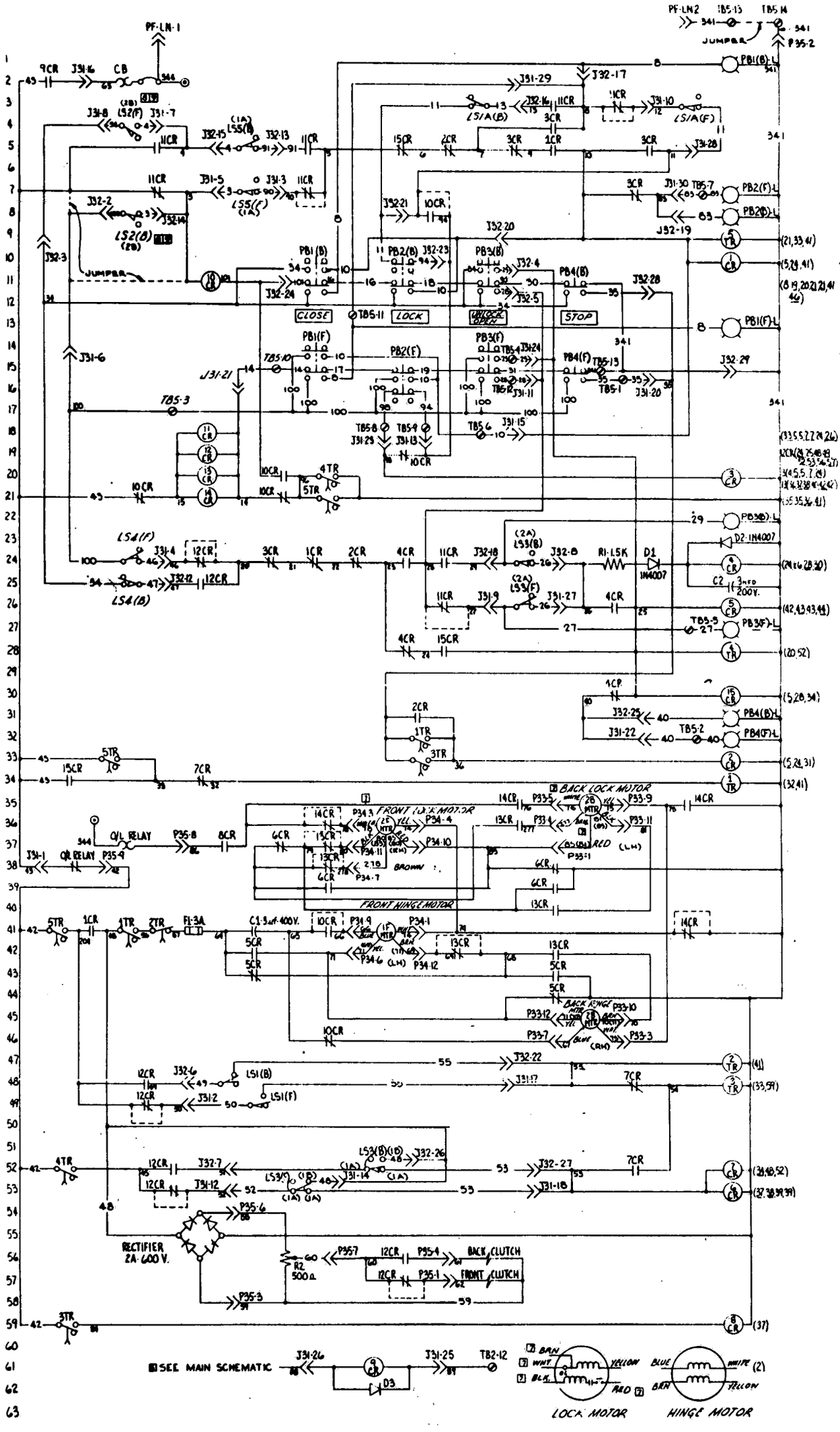
WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
154	"	S8	"	P1-R	"	" "
155	"	S9	"	P1-T	"	" "
156	"	S10	"	TS7-NO	RING TERM	" "
156	"	TS7-NO	RING TERM	P1-S	PIN-MALE	" "
161	BLK	COUNTER	SPLICE-CONN	TB3-5	RING TERM	
161	BLK	TB3-5	RING TERM	P1-P	PIN-MALE	
185	"	CB1-C	QUICK-DIS	TB3-6	RING TERM	
185	"	TB3-6	RING TERM	TB2-12	"	
206	GRAY	P25-1	PIN-FEMALE	P23-21	PIN-FEMALE	DBL. DOOR ONLY
207	"	" -2	"	" -10	"	DBL. DOOR ONLY
208	"	" -3	"	" -13	"	" " "
209	"	" -4	"	" - 7	"	" " "
210	GRAY	P25-5	PIN-FEMALE	P23-15	PIN-FEMALE	DBL. DOOR ONLY
211	"	" -6	"	" - 9	"	" " "
212	"	" -7	"	" - 5	"	" " "
213	"	" -8	"	" -24	"	" " "
214	"	" -9	"	" - 1	"	" " "
215	"	" -10	"	" -18	"	" " "
216	"	" -11	"	" - 3	"	" " "
217	"	" -12	"	" - 8	"	" " "
218	"	" -13	"	" -25	"	" " "
219	"	" -14	"	" -20	"	" " "
220	"	" -15	"	" -14	"	" " "
221	"	" -16	"	" -23	"	" " "
222	"	" -17	"	" - 6	"	" " "
223	"	" -18	"	" -19	"	" " "
225	"	" -20	"	" -17	"	" " "
226	"	" -21	"	" -12	"	" " "
229	"	" -24	"	" -28	"	" " "
230	BLK	P16-14	PIN-FEMALE	P3-22	PIN-MALE	
231	"	SWC-8	SOLDER	P4-12	"	
232	"	SWC-4	"	P4-11	"	
233	"	SWC-2	"	P4-10	"	
234	"	SWC-1	"	P4-9	"	
245	"	SWA-8	"	SWC-8	SOLDER	
246	"	SWA-4	"	SWC-4	"	
247	"	SWA-2	"	SWC-2	"	
248	"	SWA-1	"	SWC-1	"	
285	BLK	P5-12	PIN FEMALE	TB2-14	RING TERM	SMALLS ONLY
288	BLK	P5-14	PIN FEMALE	TB2-13	RING TERM	SMALLS ONLY
285	BLK	P5-12	PIN FEMALE	TB2-20	RING TERM	MEDIUMS
288	BLK	P5-14	PIN FEMALE	TB2-19	RING TERM	MEDIUMS
341	WHITE	SWB-NO	QUICK-DIS	FILTER/LN-2	QUICK-DIS	
341	"	FILTER/LN-2	"	TB5-13	RING TERM	PWR. DOOR ONLY
344	BLK	SWA-NO	"	FILTER/LN-1	QUICK-DIS	
649	"	SWD-8	SOLDER	SWB-8	SOLDER	
650	"	SWD-4	"	SWB-4	"	
651	"	SWD-2	"	SWB-2	"	
652	"	SWD-1	"	SWB-1	"	
653	"	SWD-8	"	P3-4	PIN-MALE	
654	"	SWD-4	"	P3-3	"	
655	"	SWD-2	"	P3-2	"	

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
656	BLK	SWD-1	SOLDER	P3-1	PIN-MALE	
657	"	SWA-C	"	P4-3	"	
659	"	SWC-C	"	P4-20	"	
661	"	PB1-1	SPLICE-CONN	P4-8	"	
662	"	PB-2	"	P4-1	"	SPLICE-CONN ON ISO ONLY
663	"	CB2-1	QUICK-DIS	FILTER/LD-1	QUICK-DIS	
664	"	CB2-2	"	CB1-A	"	
665	"	CB1-B	"	P5-1	PIN-FEMALE	
666	"	TB3-2	RING TERM	P5-2	"	
669	GREEN	CHASSIS GND	"	P5-7	"	
670	BLK	CB1-C	QUICK-DIS	P5-8	"	
671	"	CB1-D	"	P5-9	"	
674	"	BUZZER	"	P1-W	PIN-MALE	
675	"	P16-19	PIN-FEMALE	P3-23	"	VAC. ONLY
676	"	" -20	"	P3-25	"	
677	"	" -21	"	P4-27	"	
678	"	" -22	"	P4-28	"	
679	"	" -23	"	P3-19	"	
680	"	" -24	"	P3-27	"	
681	"	" -25	"	P4-31	"	
682	"	" -26	"	P4-33	"	
683	"	" -27	"	P4-30	"	
684	"	" -29	"	P4-37	"	
685	"	" -28	"	P4-15	"	
686	"	" -31	"	P4-17	"	
687	"	" -30	"	P4-35	"	
688	"	" -32	"	P3-6	"	
689	"	" -33	"	P3-7	"	
690	"	" -34	"	P3-38	"	
691	"	" -35	"	P3-28	"	
692	"	" -36	"	P3-13	"	
693	"	" - 1	"	P3-24	"	
694	"	" - 2	"	P3-20	"	
695	"	" - 3	"	TB2-1	RING TERM	
696	"	" - 4	"	P3-15	PIN-MALE	ISO
696	"	" - 4	"	TB3-4	RING TERM	GRAVITY
697	BLK	P16-5	PIN-FEMALE	P4-29	PIN-MALE	
698	"	" -6	"	TB2-2	RING TERM	
699	"	" -7	"	P4-26	PIN-MALE	
700	"	" -8	"	P4-32	"	
701	"	" -10	"	P4-34	"	
702	"	" -9	"	P4-18	"	
703	"	" -12	"	P4-16	"	
704	"	" -11	"	P4-36	"	
705	"	" -13	"	P3-21	"	
706	"	" -15	"	P3-5	"	VAC. ONLY
707	"	" -16	"	P3-18	"	
739	"	" -17	"	P3-5	"	ISO ONLY
740	"	" -18	"	P3-23	"	" "
767	"	SW2-B1	QUICK-DIS	P3-8	"	" "
768	"	SW2-B2	"	P4-19	"	" "
1000	"	BUZZER	SPLICE-CONN	3KΩ Res	SPLICE-CONN	
1001	"	BUZZER	"	3KΩ Res	"	

MASTER WIRE LIST:
Gravity/Isothermal/Vacamatic Sterilizers
(Units with Indicator-Recorder)

DWG. NO. 146442
(1/24/84)

Eagle Series

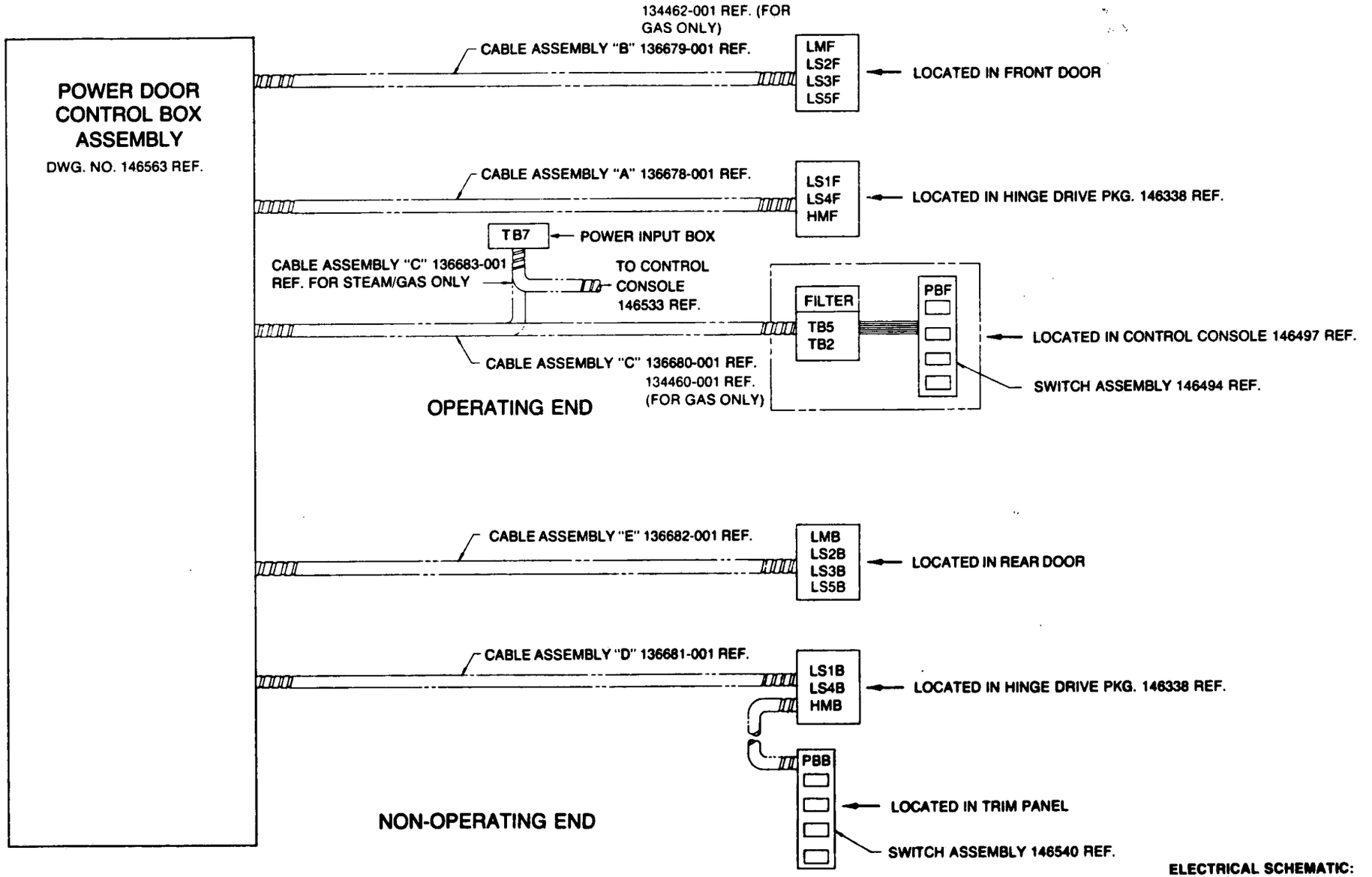


RELAYS SHOWN IN THEIR RELAX POSITION
BACK DOOR IS CLOSED & LOCKED
FRONT DOOR IS UNLOCKED & OPENED

NOTE:
1. FOR SINGLE DOOR (OD) REMOVE RELAYS 10CR, 11CR, 12CR, 13CR & 14CR. ADD JUMPERS & DUMMY RELAYS (TO 13CR & 14CR).
2. SEE DWG. 150822-264 FOR WIRE LIST.

ELECTRICAL SCHEMATIC:
Optional Power Door (1 OF 2).
(Units with Indicator-Recorder)

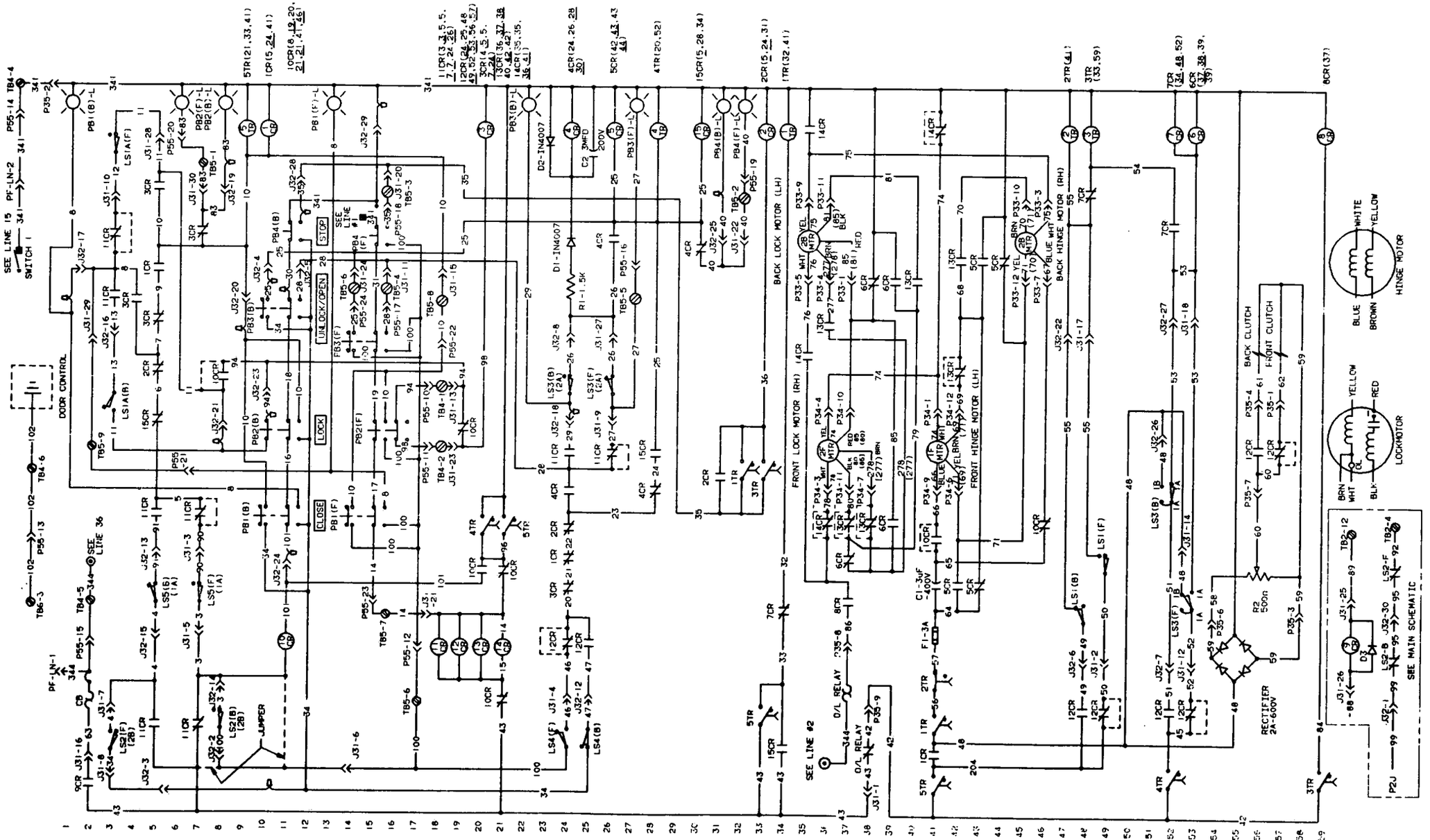
DWG. NO. 146442
(1/24/84)



ELECTRICAL SCHEMATIC:
Optional Power Door (2 OF 2).
(Units with Indicator-Recorder)

Rev. 5/84

DWG. NO. 141198-127
(4/11/85)



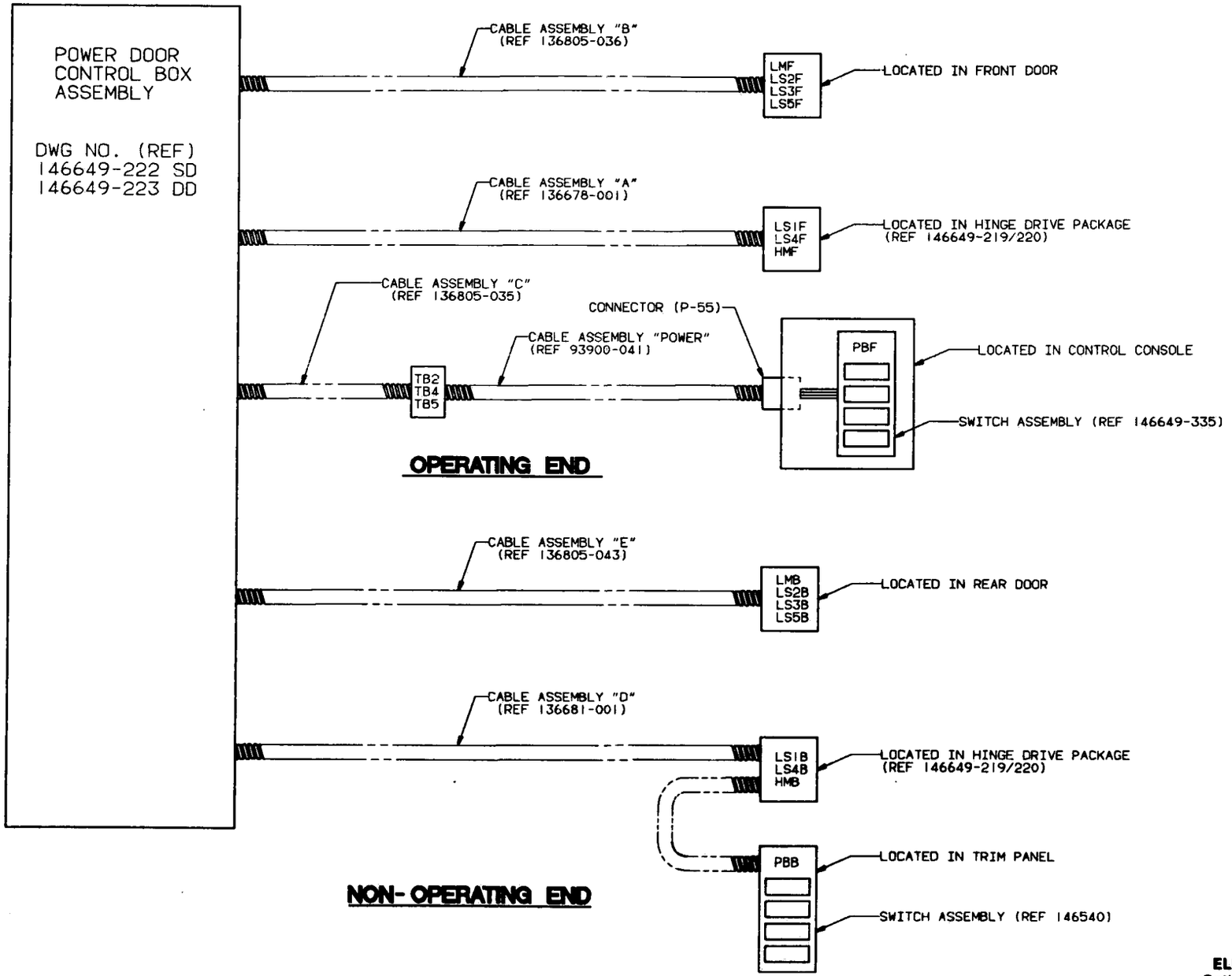
NOTES:
1. FOR SINGLE DOOR (001) REMOVE RELAYS 10CR, 11CR, 12CR, 13CR & 14CR -ADD JUMPERS AND DUMMY RELAYS TO 13CR & 14CR
2. ALL WIRES WITH THIS SYMBOL ⊗ ARE WIRE NUTTED IN N.O.E. HINGE MOTORCOVER. INCLUDING WIRES 341, 10, 11, 8, 28, 29, 34, 35, 40, 83, 94, 101 & 25

LEGEND
RELAYS SHOWN IN RELAX POSITION, BACK DOOR IS CLOSED & LOCKED. FRONT DOOR IS UNLOCKED & OPENED

ELECTRICAL SCHEMATIC:
Optional Power Door (1 OF 2).
(Units with Printcon)

Add. 9/86

DWG. NO. 141198-127
(4/11/85)



ELECTRICAL SCHEMATIC:
Optional Power Door (2 OF 2).
(Units with Printcon)

Add. 9/86

DWG. NO. 150822-264
(1-26-84)

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
3	RED	J31-5	SCREW CLAMP	LS5F-COM1A	RING TERM	THRU CABLE "B"
3	"	J32-14	"	LS2B-NO2B	"	" " "E"
4	"	J31-7	"	LS2F-NO2B	"	" " "B"
4	"	J32-15	"	LS5B-COM1A	"	" " "E"
8	"	J31-29	"	TB5-11	"	" " "C"
8	"	TB5-11	RING TERM	PB1F-NO	SOLDER	
8	"	PB1F-NO	SOLDER	PB1F-L	"	
8	"	J32-17	SCREW CLAMP	PB1B-NO	"	THRU CABLE "D"
8	"	PB1B-NO	SOLDER	PB1B-L	"	
10	"	J31-15	SCREW CLAMP	TB5-6	RING TERM	THRU CABLE "C"
10	"	TB5-6	RING TERM	PB2F-NO	SOLDER	
10	"	PB2F-NO	SOLDER	PB1F-NO	"	
10	"	J32-20	SCREW CLAMP	PB2B-NO	"	THRU CABLE "D"
10	"	PB2B-NO	SOLDER	PB1B-NO	"	
11	"	J32-21	SCREW CLAMP	LS1A-NC(B)	SPLICE-CONN	THRU CABLE "D"
11	"	LS1A-NC(B)	SPLICE-CONN	PB2B-NC	SOLDER	
11	"	J31-28	SCREW CLAMP	LS1A-NC(F)	QUICK-CONN	THRU CABLE "A"
12	"	J31-10	"	LS1A-COM(F)	"	" " "A"
13	"	J32-16	"	LS1A-COM(B)	"	" " "D"
14	"	J31-21	"	TB5-10	"	" " "C"
14	"	TB5-10	"	PB1F-NC	SOLDER	
16	"	PB1B-NC	SOLDER	PB12B-NC	"	
17	"	PB1F-NC	"	PB2F-NC	"	
18	"	PB2B-NC	"	PB3B-NC	"	
19	"	PB2F-NC	"	PB3F-NC	"	
25	"	J31-24	SCREW CLAMP	TB5-4	RING TERM	THRU CABLE "C"
25	"	TB5-4	RING TERM	PB3F-NO	SOLDER	
25	"	J32-4	SCREW CLAMP	PB3B-NO	"	THRU CABLE "D"
26	"	J31-27	"	LS3F-NC2A	SCREW TERM	" " "B"
26	"	J32-8	"	LS3B-NC2A	"	" " "E"
27	"	PB3F-L	SOLDER	TB5-5	"	
27	"	TB5-5	RING TERM	J31-9	SCREW CLAMP	THRU CABLE "C"
27	"	J31-9	SCREW CLAMP	LS3F-COM2A	RING TERM	" " "B"
28	RED	J31-11	SCREW CLAMP	TB5-12	RING TERM	THRU CABLE "C"
28	"	TB5-12	RING TERM	PB3F-NO	SOLDER	
28	"	J32-5	SCREW CLAMP	PB3B-NO	"	THRU CABLE "D"
29	"	PB3B-L	SOLDER	J32-18	SCREW CLAMP	" " "E"
29	"	J32-18	SCREW CLAMP	LS3B-COM2A	RING TERM	" " "D"
30	"	PB3B-NC	SOLDER	PB4B-NC	SOLDER	
31	"	PB3F-NC	"	PB4F-NC	"	
34	"	J31-8	SCREW CLAMP	LS2F-COM2B	RING TERM	THRU CABLE "B"
34	"	J32-3	"	LS4-A-NC(B)	SPLICE-CONN	" " "D"
34	"	LS4A-NC(B)	SPLICE-CONN	PB4B-NO	SOLDER	
34	"	PB4B-NO	SOLDER	PB3B-NO	"	
34	"	PB3B-NO	"	PB3B-NO	"	
34	"	PB3B-NO	"	PB2B-NO	"	
34	"	PB2B-NO	"	PB1B-NO	"	
34	"	PB1B-NO	"	PB1B-NO	"	
35	"	J31-20	SCREW CLAMP	TB5-1	RING TERM	THRU CAPLE "C"
35	"	TB5-1	RING TERM	PB4F-NO	SOLDER	
35	"	J32-28	SCREW CLAMP	PB4B-NO	"	THRU CABLE "D"
40	"	J31-22	"	TB5-2	RING TERM	
40	"	TB5-2	RING TERM	PB4F-L	SOLDER	THRU CABLE "C"
40	"	J32-25	SCREW CLAMP	PB4B-L	"	" " "D"
42	BLK	P35-9	PIN-FEMALE	O/L-Relay	RING TERM	

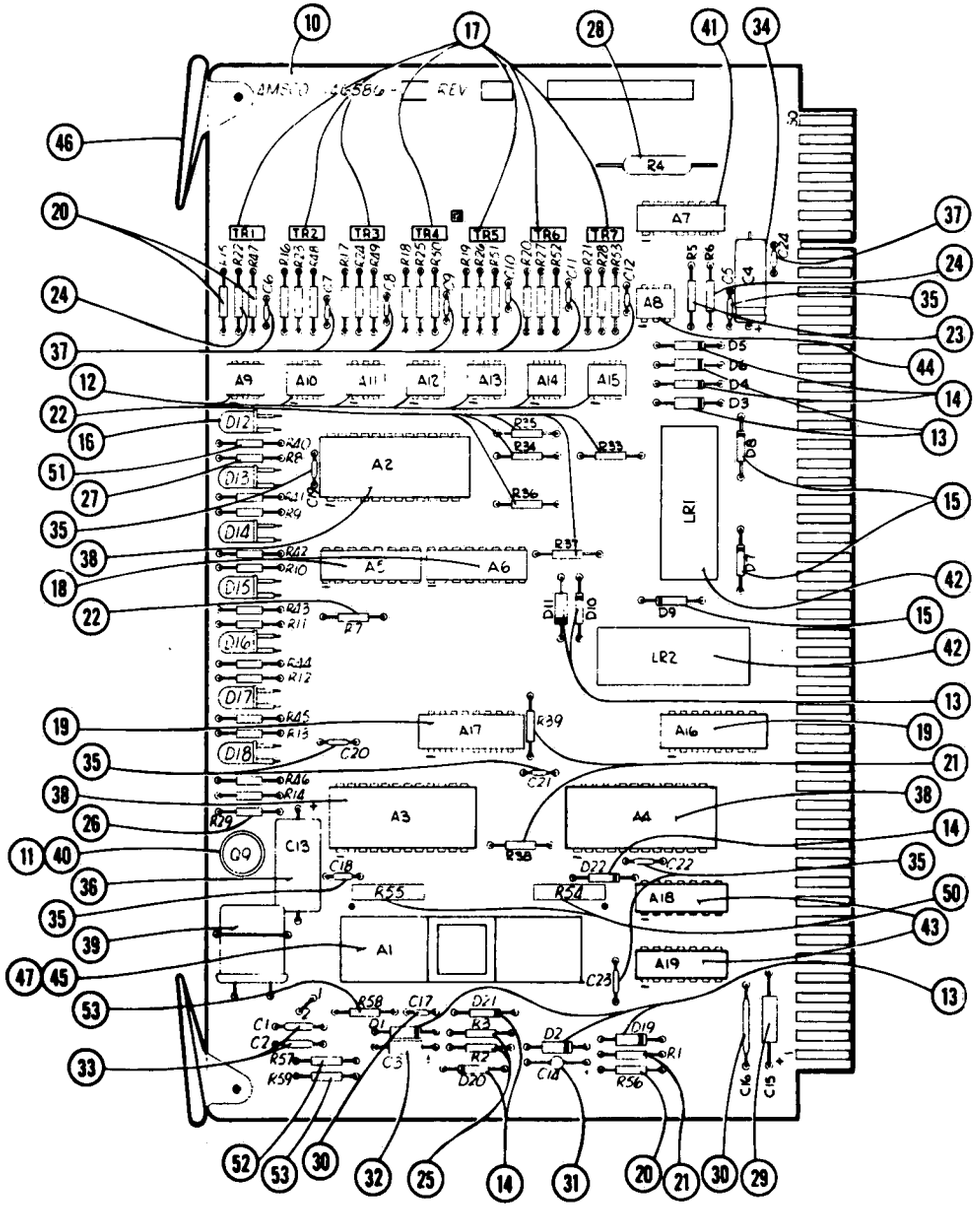
WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
43	"	J31-1	SCREW CLAMP	O/L-Relay	"	
46	RED	J31-4	"	LS4-NC(F)	QUICK-CONN	THRU CABLE "A"
47	"	J32-12	"	LS4-COM(B)	"	THRU CABLE "D"
48	YELLOW	J31-14	"	LS3F-NO1B	RING TERM	" " "B"
48	"	J32-26	"	LS3B-NO1B	"	" " "E"
49	"	J32-6	"	LS1-COM(B)	QUICK-CONN	" " "D"
50	"	J31-2	"	LS1-COM(F)	"	" " "A"
51	YELLOW	J32-7	"	LS3B-COM1A	RING TERM	" " "E"
52	"	J31-12	"	LS3F-COM1A	"	" " "B"
52	JUMPER	LS3F-COM1A	RING TERM	LS3F-COM1B	"	
53	YELLOW	J31-18	SCREW CLAMP	LS3F-NC1A	"	THRU CABLE "B"
53	"	J32-27	"	LS3B-NC1A	"	" " "E"
55	RED	J31-17	"	LS1-NO(F)	QUICK-CONN	" " "A"
55	"	J32-22	"	LS1-NO(B)	"	" " "D"
58	RED	P35-6	PIN-FEMALE	RHEOSTAT-1	SOLDER	
59	RED	P35-3	"	RHEOSTAT-2	"	
59	"	RHEOSTAT-2	SOLDER	HINGE MTR CLUTCH	SPLICE-CONN	THRU CABLE "A"
59	"	"	"	"	"	" " "D"
60	"	RHEOSTAT-3	"	P35-7	PIN-FEMALE	
61		P35-4	PIN-FEMALE	HINGE MTR CLUTCH	SPLICE-CONN	THRU CABLE "D"
62	"	P35-1	"	"	"	THRU CABLE "A"
63	BLK	J31-16	SCREW CLAMP	CB-2	QUICK-CONN	
66	RED	P34-9	PIN-MALE	HINGE MTR 1F	SPLICE-CONN-BLUE	THRU CABLE "A"
67	"	P33-7	"	HINGE MTR 2B	"	" " "D"
69	"	P34-12	"	HINGE MTR 1F	" -BRN	" " "A"
70	"	P33-10	"	HINGE MTR 2B	"	" " "D"
71	"	P34-6	"	HINGE MTR 1F	" -YEL	" " "A"
71	"	P33-12	"	HINGE MTR 2B	" -YEL	" " "D"
74	"	P34-1	"	HINGE MTR 1F	" -WHT	" " "A"
74	BLUE	P34-4	"	LOCK MTR 1F	" -YEL	" " "B"
75	RED	P33-1	"	HINGE MTR 2B	" -WHT	" " "D"
75	BLUE	P33-9	"	LOCK MTR 2B	" -YEL	" " "E"
76	"	P33-5	"	LOCK MTR 2B	" -BRN	" " "E"
78	"	P34-3	"	LOCK MTR 2F	" -BRN	" " "E"
80	"	P34-11	"	LOCK MTR 1F	" -BLK	" " "B"
81	"	P33-11	"	LOCK MTR 2B	" -BLK	" " "E"
83	RED	J31-10	SCREW CLAMP	TB5-7	RING TERM	" " "C"
83	"	TB5-10	RING TERM	PB2F-L	SOLDER	
83	"	J32-19	SCREW CLAMP	PB2B-L	"	THRU CABLE "D"
85	BLUE	P34-10	PIN-MALE	LOCK MTR 2F	SPLICE-CONN-RED	" " "B"
85	"	P33-1	"	LOCK MTR 2B	" -RED	" " "E"
86	BLK	P35-8	"	O/L HEATER	SCREW TERM	
88	RED	J31-26	SCREW CLAMP	TB2-15	RING TERM	THRU CABLE "C"
89	"	J31-25	"	TB2-12	"	" " "C"
90	"	J31-3	"	SSF-NC1A	"	" " "B"
91	"	J32-13	"	SSB-NC1A	"	" " "E"
92	"	LS2F-COM1A	RING TERM	J32-11	SCREW CLAMP	" " "B"
92	"	LS2B-COM1A	"	J32-11	"	" " "E"
92	VIOLET	J32-11	SCREW CLAMP	TB2-3	RING TERM	" " "C"
93	RED	LS2B-NC1A	RING TERM	J32-10	SCREW CLAMP	" " "E"

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
93	ORANGE	J32-10	SCREW CLAMP	TB2-2	RING TERM	THRU CABLE "C"
94	RED	J31-13	"	TB5-9	"	" " "C"
94	"	TB5-9	RING TERM	PB2F-NC	SOLDER	
94	"	J32-23	SCREW CLAMP	PB2B-NC	"	THRU CABLE "D"
95	"	LS2B-COM1B	RING TERM	J32-30	SCREW CLAMP	" " "E"
95	"	J32-30	SCREW CLAMP	LS2F-NO1B	RING TERM	" " "B"
97	"	LS2F-NC1A	RING TERM	J32-19	SCREW CLAMP	THRU CABLE "B"
97	VIOLET	J32-9	SCREW CLAMP	TB2-1	RING TERM	" " "C"
98	RED	J31-23	"	TB5-8	"	" " "C"
98	"	TB5-8	RING TERM	PB2F-NC	SOLDER	
99	"	LS2B-NO1B	"	J32-1	SCREW CLAMP	THRU CABLE "E"
99	ORANGE	J32-1	SCREW CLAMP	P2-J	PIN-FEMALE	" " "C"
99	RED	J32-1	"	J32-30	SCREW CLAMP	SGL. DOOR ONLY
100	"	J32-2	"	LS2B-COM2B	RING TERM	THRU CABLE "E"
100	"	LS4-COM(F)	QUICK-CONN	J31-6	SCREW CLAMP	" " "A"
100	"	J31-6	SCREW CLAMP	TB5-6	RING TERM	" " "C"
100	"	TB5-6	RING TERM	PB1F-NO	SOLDER	
100	"	PB1F-NO	SOLDER	PB1F-NO	"	
100	"	PB1F-NO	"	PB2F-NO	"	
100	"	PB2F-NO	"	PB3F-NO	"	
100	"	PB3F-NO	"	PB4F-NO	"	
100	"	PB1F-N	"	PB3F-NO	"	
100	"	PB4F-NO	"	TB5-3	RING TERM	
101	"	PB1B-NC	"	J32-24	SCREW CLAMP	THRU CABLE "D"
102	GREEN	CHASSIS GND	RING TERM	CONSOLE-GND	RING TERM	THRU CABLE "C"
277	BLUE	P34-4	PIN-MALE	HINGE MTR 1F	SPLICE-CONN	" " "E"
278	BLUE	P34-7	PIN-MALE	HINGE MTR 2B	SPLICE-CONN	THRU CABLE "B"
341	WHITE	PB1B-L	SOLDER	PB2B-L	SOLDER	
341	"	PB2B-L	"	PB3B-L	"	
341	"	PB3B-L	"	PB4B-L	"	
341	"	PB4B-L	"	PB4B-NC	"	
344	BLK	O/L HEATER	RING TERM	CB-1	QUICK-CONN	
344	"	CB-1	QUICK-CONN	FILTER/LN-1	"	THRU CABLE "C"

MASTER WIRE LIST:
Optional Power Door
(Units with Indicator-Recorder)

Rev. 9/86

DWG. NO. 146586
(8/30/87)

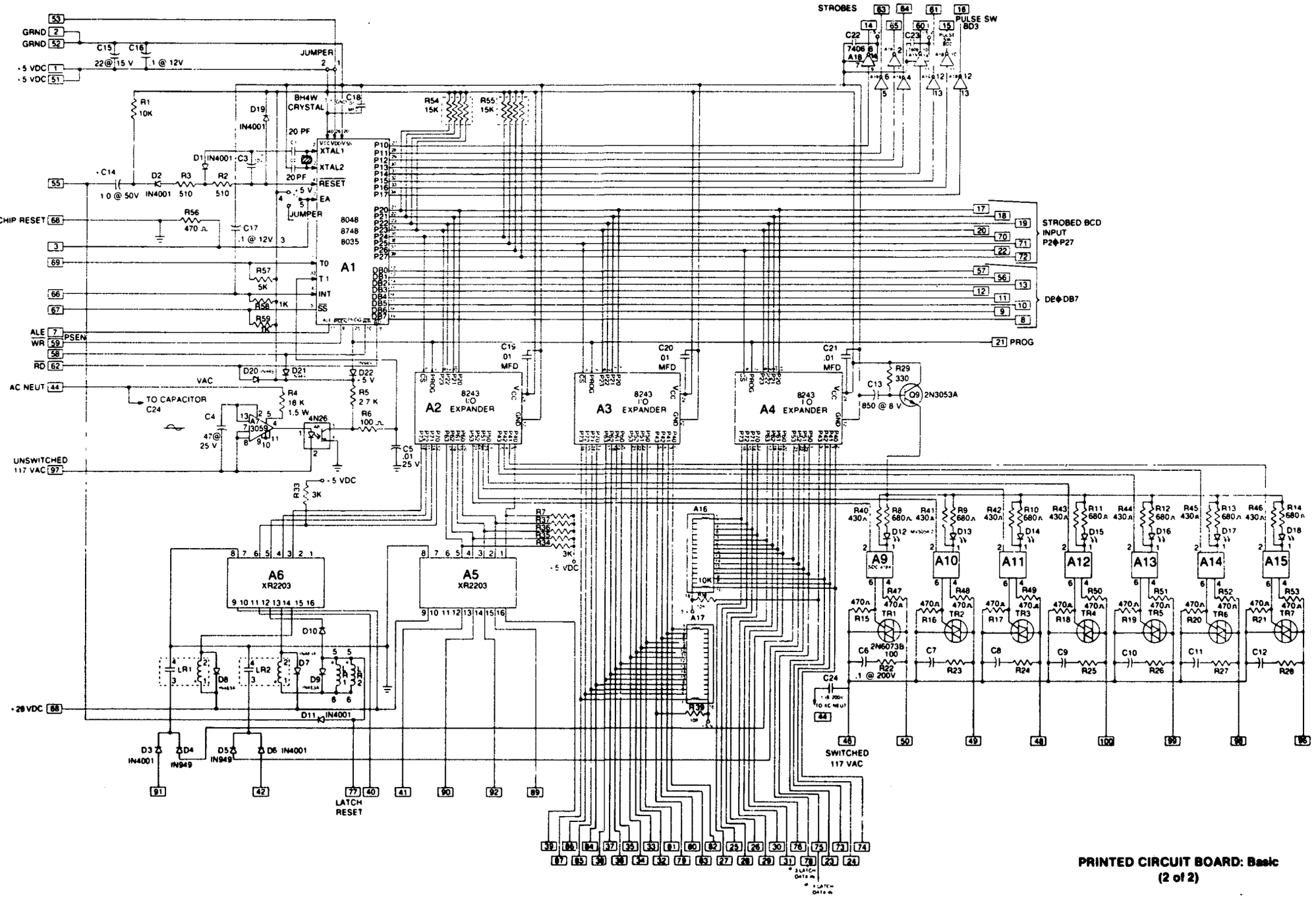


QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
1	10	P/C CARD & DRILL ASSY.	
1	11	PAD, TRANSISTOR	
7	12	IC SOC 418 A	TRIAC DRIVER A9-A15
7	13	RECTIFIER, IN4001	D1, D2, D3, D6, D10, D11, D19
5	14	DIODE, IN949	D4, D5, D20-D22
3	15	RECTIFIER, IN463A	D7, D8, D9
7	16	LAMP, SOLID STATE	MV 5054-2 L.E.D., D12-D18
7	17	TRIAC, 2N6073R	TR1-TR7
2	18	TRANSISTOR, XR2203	DARLINGTON - A5, A6
2	19	RESISTOR, NETWORK	916C103X2PE A16, A17
15	20	RESISTOR	470 OHMS 1/4W 5% CARBON, R15-R21, R47-R53, R56
3	21	RESISTOR	10K 1/4W 5% CARBON, R1, R38, R39
6	22	RESISTOR	3K 1/4W 5% CARBON, R7, R33-R37
1	23	RESISTOR	2.7K 1/4W 5% CARBON, R5
8	24	RESISTOR	100 OHMS 1/4W 5% CARBON, R6, R22-R28
2	25	RESISTOR	510 OHMS 1/4W 5% CARBON, R2, R3
1	26	RESISTOR	330 OHMS 1/4W 5% CARBON, R29
7	27	RESISTOR	680 OHMS 1/4W 5% CARBON, R8-R14
1	28	RESISTOR	18K 1.5W 10%, CARBON, R4
1	29	CAPACITOR	22µf @ 15V TANTALUM-C15
2	30	CAPACITOR	0.1µf @ 12V CERAMIC DISC-C16, C17
1	31	CAPACITOR	1.0µf @ 50V TANTALUM-C14
1	32	CAPACITOR	1.0µf @ 10V TANTALUM-C3
2	33	CAPACITOR	20pf @ 500V CERAMIC DISC-C1, C2
1	34	CAPACITOR	47µf @ 25V TANTALUM, C4
7	35	CAPACITOR	0.01µf @ 25V CERAMIC DISC-C5, C18, C23
1	36	CAPACITOR	850µf @ 8V TANTALUM-C13
8	37	CAPACITOR	0.1µf @ 200 WVDC CERAMIC DISC-C6-C12, C24
3	38	EXPANDER, I/O	8243 A2, A3, A4
1	39	CRYSTAL, 3MHZ	
1	40	TRANSISTOR,	2N3053A Q9
1	41	IC 3059	A7
2	42	RELAY, LATCH	LR1, LR2
2	43	IC-7406	INVERTER HEX BUFFER/DRIVER-A18, A19
1	44	IC, 4N26	OPTO ISO TRANS., A8
1	45	DIP SOCKET	40 PIN A1
2	46	PULL, CARD	
1	47	MICROCOMPUTER	
	48	NOT USED	
	49	NOT USED	
2	50	RESISTOR NETWORK	15K BY 5 R54, R55
7	51	RESISTOR	430 OHMS 1/4W 5% R40-R46
1	52	RESISTOR	5.1K OHMS 1/4W 5% R57
2	53	RESISTOR	1K OHMS 1/4W 5% R58, R59

PRINTED CIRCUIT BOARD: Basic
(1 of 2)

Rev. 5/88

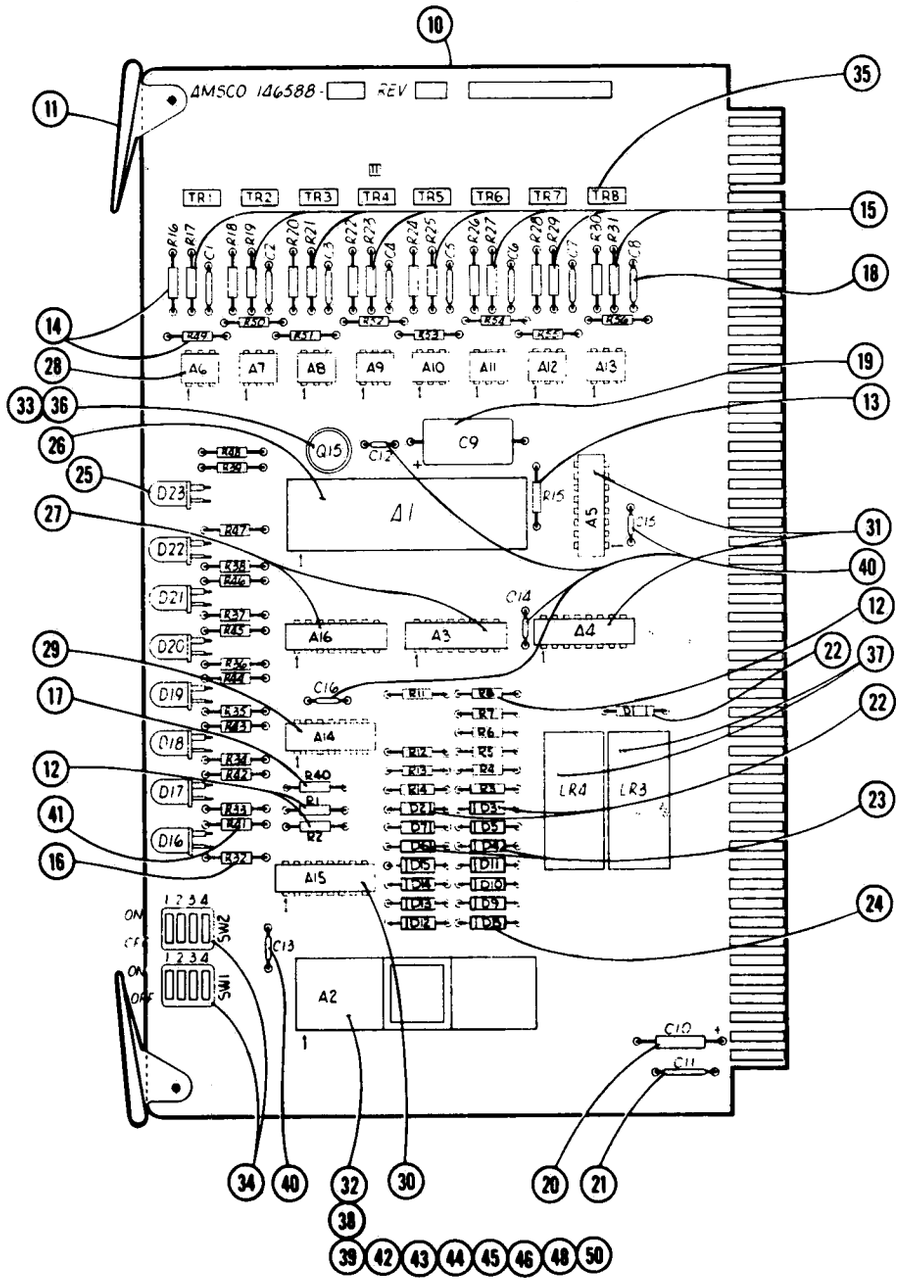
DWG. NO. 146586
(6/30/87)



PRINTED CIRCUIT BOARD: Basic
(2 of 2)

Rev. 5/88

DWG. NO. 146588
(6/30/87)



QTY.										ITEM NO.	NAME	DESCRIPTION, MATERIAL
									X	1	P/C CARD ASSY.	VAC & GAS
								X		2	P/C CARD ASSY.	PULSTAR 2000(CRW),PULSTAR 3000(HCW)
							X			3	P/C CARD ASSY.	EAGLE 2200
						X				4	P/C CARD ASSY.	PULSTAR 5000
					X					5	P/C CARD ASSY.	
				X						6	P/C CARD ASSY.	
			X							7	P/C CARD ASSY.	
		X								8	P/C CARD ASSY.	
1	1	X	1	1	1	1	1	1	1	9	COMMON PARTS LIST	
		1								10	P/C CARD & DRILL SCHD.	
		2								11	PULL, CARD	
		12								12	RESISTOR, 3K OHMS	1/4W 5%, R1-R8, R11-R14
		1								13	RESISTOR,330 OHMS	1/4W 5%, R15
		16								14	RESISTOR, 470 OHMS	1/4W 5%, R16, R18, R20, R22, R24, R26, R28, R30, R49-R56
		8								15	RESISTOR, 100 OHMS	1/4W 5%, R17, R19, R21, R23, R25, R27 R29, R31
		8								16	RESISTOR, 680 OHMS	1/4W 5%, R32-R39
		1								17	RESISTOR, 10K OHMS	1/4W 5%, R40
		8								18	CAPACITOR, .1μf, 500V	C1-C8
		1								19	CAPACITOR, 850μf, 8V	C9
		1								20	CAPACITOR, 22μf, 15V	C10
		1								21	CAPACITOR, .1μf, 12V	C11
		3								22	DIODE	IN463A, D1, D2, D3
		2								23	DIODE	IN4001, D4, D6
										24	DIODE	IN949, D5, D7, D8-D15
		8								25	L.E.D.	MV5054-2 D16-D23
		1								26	MOS RAM, 8155(H)	A1
		2								27	DARLINGTON, XR2203	A3, A16
		8								28	OPTOISO TRIAC	SOC 418A A6-A13
		1								29	QUAD EX-OR	A14
		1								30	RESISTOR, NETWORK	916C103X2PE A15
		2								31	BUFFER, CMOS	CD4050BC A4, A5
		1								32	DIP SOCKET, 40 PIN	A2
		1								33	TRANSISTOR	2N3053A Q15
		2								34	SWITCH, 16 POS HEX	SW1, SW2
		8								35	TRIAC, 2N6073B	TR1-TR8
		1								36	PAD, TRANSISTOR	Q15
		2								37	RELAY, LATCH	LR3, LR4
		1							1	38	BIT ROM	8355/8755-A2
								1		39	BIT-ROM	8355/8755-A2
		5								40	CAPACITOR	0.01 MF @ 25V C12-C16
		8								41	RESISTOR	430 OHMS 1/4W 5% R41-R48
							1			42	BIT-ROM	
						1				43	BIT-ROM	
							1			44	BIT-ROM	8355/8755-A2
				1						45	BIT-ROM	8755A-A2
			1							46	BIT-ROM	8755A
	X									47	P/C CARD ASSY.	
	1									48	BIT-ROM	8755A-A2
X										49	P/C CARD ASSY.	GAS MOD
1										50	BIT-ROM	8755A-A2

PRINTED CIRCUIT BOARD: Expander
(1 of 2)

AMSCO SERVICE

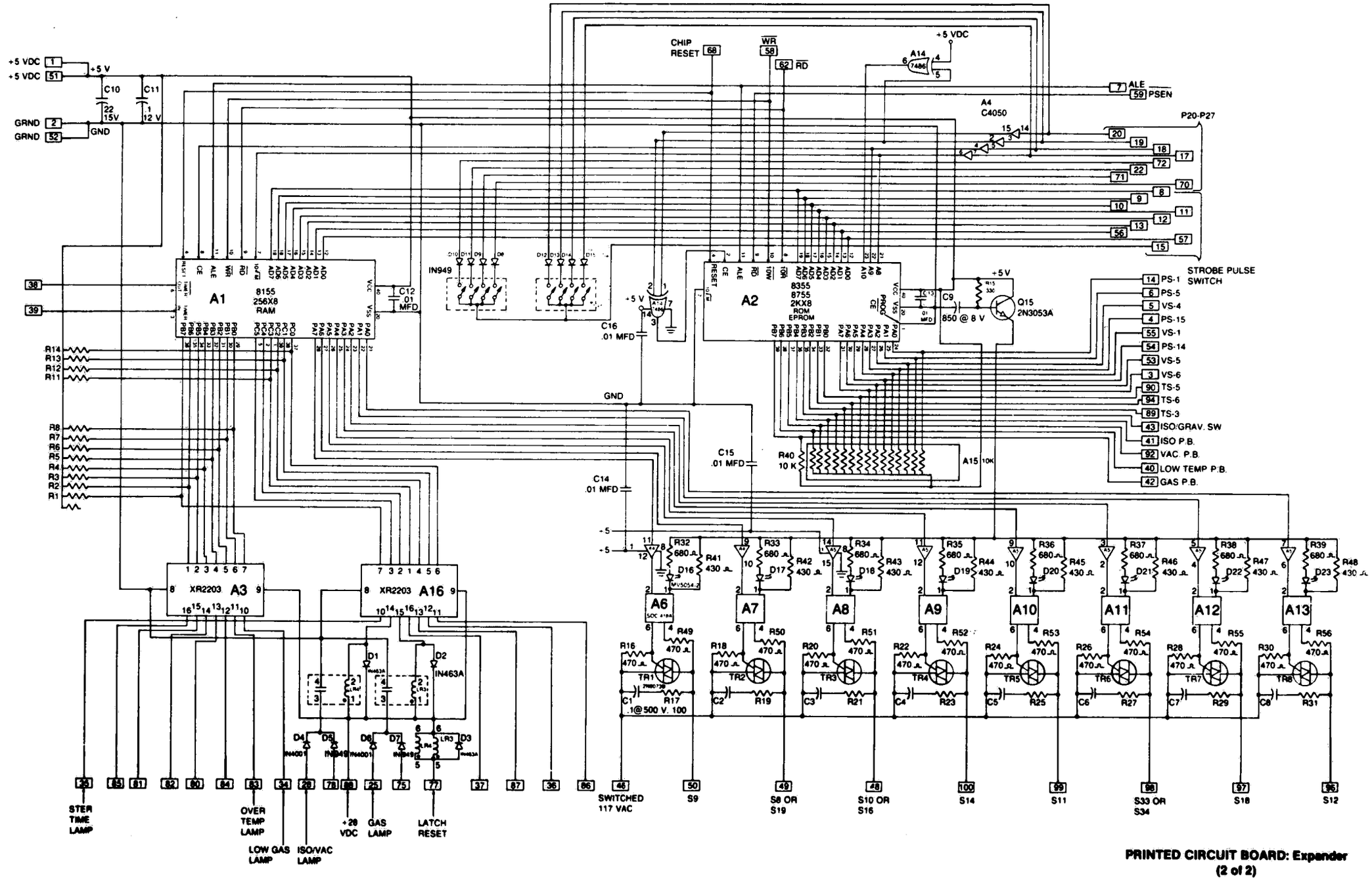
EAGLE® 2000 SERIES - UNIVERSAL GRAVITY/ISOTHERMAL MEDIUM RECTANGULAR STERILIZER P-764087-002

6/88

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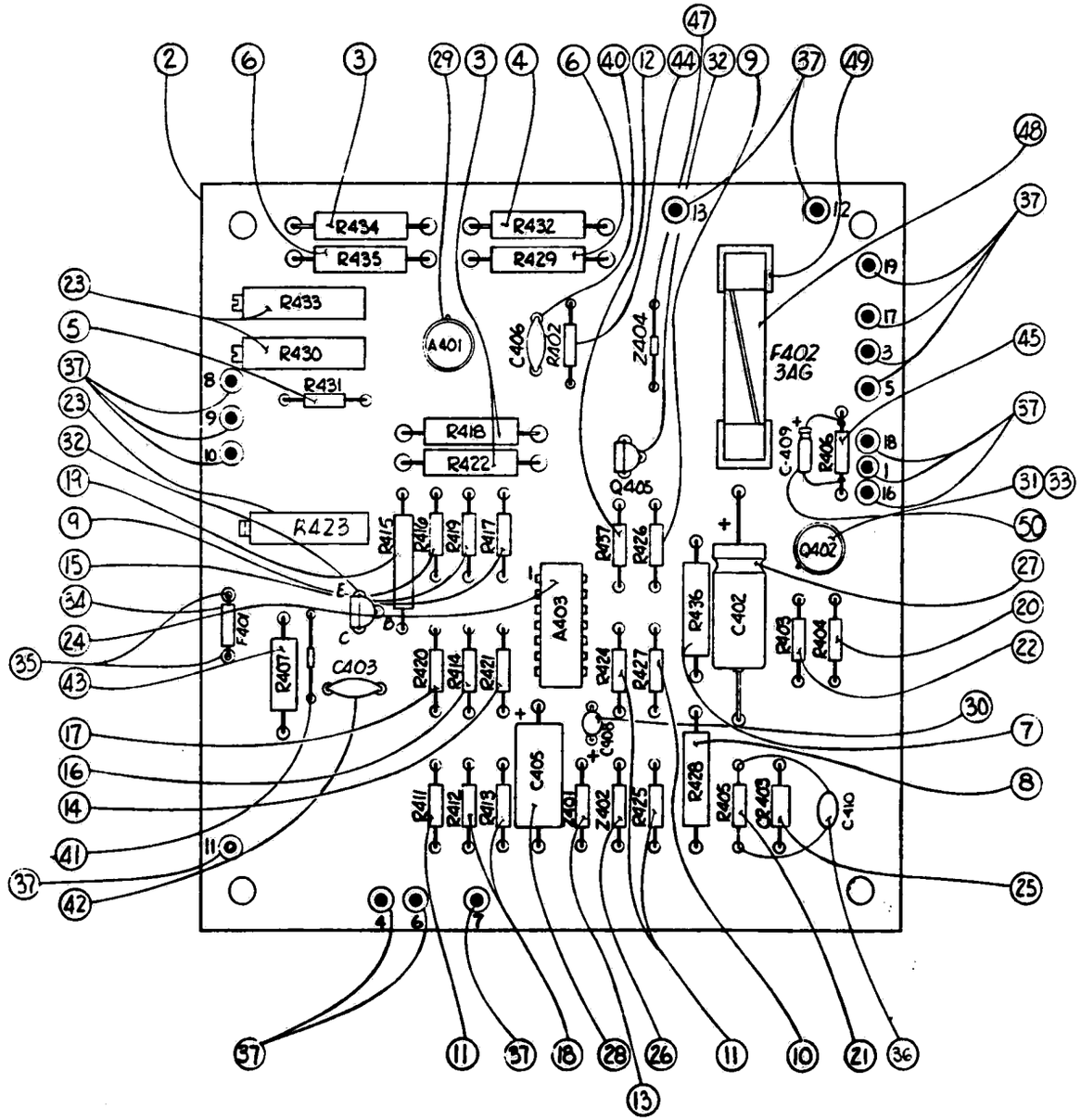
DWG. NO. 146588
(6/30/87)



PRINTED CIRCUIT BOARD: Expender (2 of 2)

Rev. 5/88

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



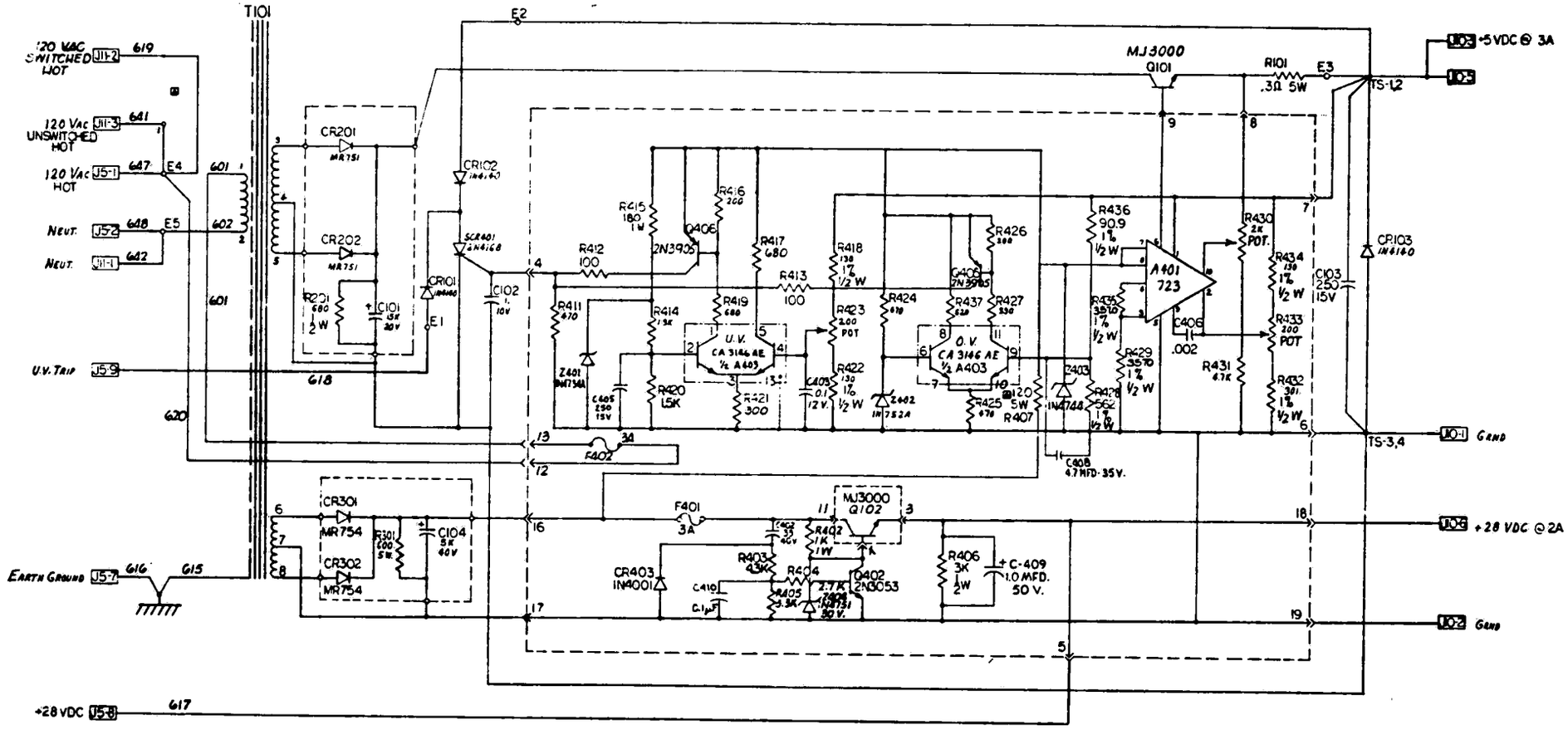
QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	2	P/C CARD	
1	3	RESISTOR, 130 OHMS	1% 1/2 W.M.F., R434
1	4	RESISTOR, 301 OHMS	1% 1/2 W.M.F., R432
1	5	RESISTOR, 47K OHMS	5% 1/4 W.C.C., R431
2	6	RESISTOR, 750 OHMS	1% 1/2 W.M.F., R429, R435
1	7	RESISTOR, 9.09 OHMS	1% 1/2 W.M.F., R436
1	8	RESISTOR, 562 OHMS	1% 1/2 W.M.F., R428
2	9	RESISTOR, 200 OHMS	5% 1/4 W.C.C., R416, R426
1	10	RESISTOR, 390 OHMS	5% 1/4 W.C.C., R427
3	11	RESISTOR, 470 OHMS	5% 1/4 W.C.C., R411, R424, R425
1	12	RESISTOR, 430 OHMS	5% 1/4 W.C.C., R437
1	13	DIODE, ZENER	IN4734A, Z401
1	14	RESISTOR, 300 OHMS	5% 1/4 W.C.C., R421
2	15	RESISTOR, 680 OHMS	5% 1/4 W.C.C., R419
1	16	RESISTOR, 1.3K OHMS	5% 1/4 W.C.C., R414
1	17	RESISTOR, 1.5K OHMS	5% 1/4 W.C.C., R420
2	18	RESISTOR, 100 OHMS	5% 1/4 W.C.C., R412, R413
1	19	RESISTOR, 180 OHMS	5% 1 W., C.C., R415
1	20	RESISTOR, 2.7K OHMS	5% 1/4 W.C.C., R404
1	21	RESISTOR, 3.3K OHMS	5% 1/4 W.C.C., R405
1	22	RESISTOR, 4.3K OHMS	5% 1/4 W.C.C., R403
2	23	POTENTIOMETER	200 OHMS, R423, R433
1	24	I.C.	CA3146AE. A403
1	25	DIODE	IN4001, CR403
1	26	DIODE, ZENER	IN752A, Z402
1	27	CAPACITOR, ELEC.	33 MFD 40V, C402
1	28	CAPACITOR, ELEC.	250 MFD 15 VDC, C405
1	29	I.C.	723 A401
1	30	CAPACITOR	4.7 MFD, 35V, C408
1	31	TRANSISTOR	2N3053 Q402
2	32	TRANSISTOR	2N3905, Q405, Q406
1	33	PAD, TRANSISTOR	
1	34	FUSE, 3 AMP	F401
2	35	TERMINAL, SOCKET	
1	36	CAPACITOR	C410
15	37	PIN, FORMED	
1	38	RESISTOR, 178 OHMS	1% 1/2 W.M.F., R422
1	39	RESISTOR, 82.5 OHMS	1% 1/2 W.M.F., R418
1	40	CAPACITOR, DISC.	.002 MFD 1KV, C406
1	41	DIODE, ZENER	IN4744, Z403
1	42	CAPACITOR	.1MFD 12VDC C403
1	43	RESISTOR	750 OHMS 3W R407
1	44	RESISTOR	1K 1W R402
1	45	RESISTOR	3K 1/2W R406
1	46	POTENTIOMETER	2K R 430
1	47	DIODE, ZENER	IN4751A 30V Z404
1	48	FUSE	3AG F402
2	49	CLIP, FUSE	
1	50	CAPACITOR	1.0 MFD, 50V, C409

P/C ASSEMBLY, Power Supply (Part 1 of 2)
(Units with Indicator-Recorder)

Rev. 2/86

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

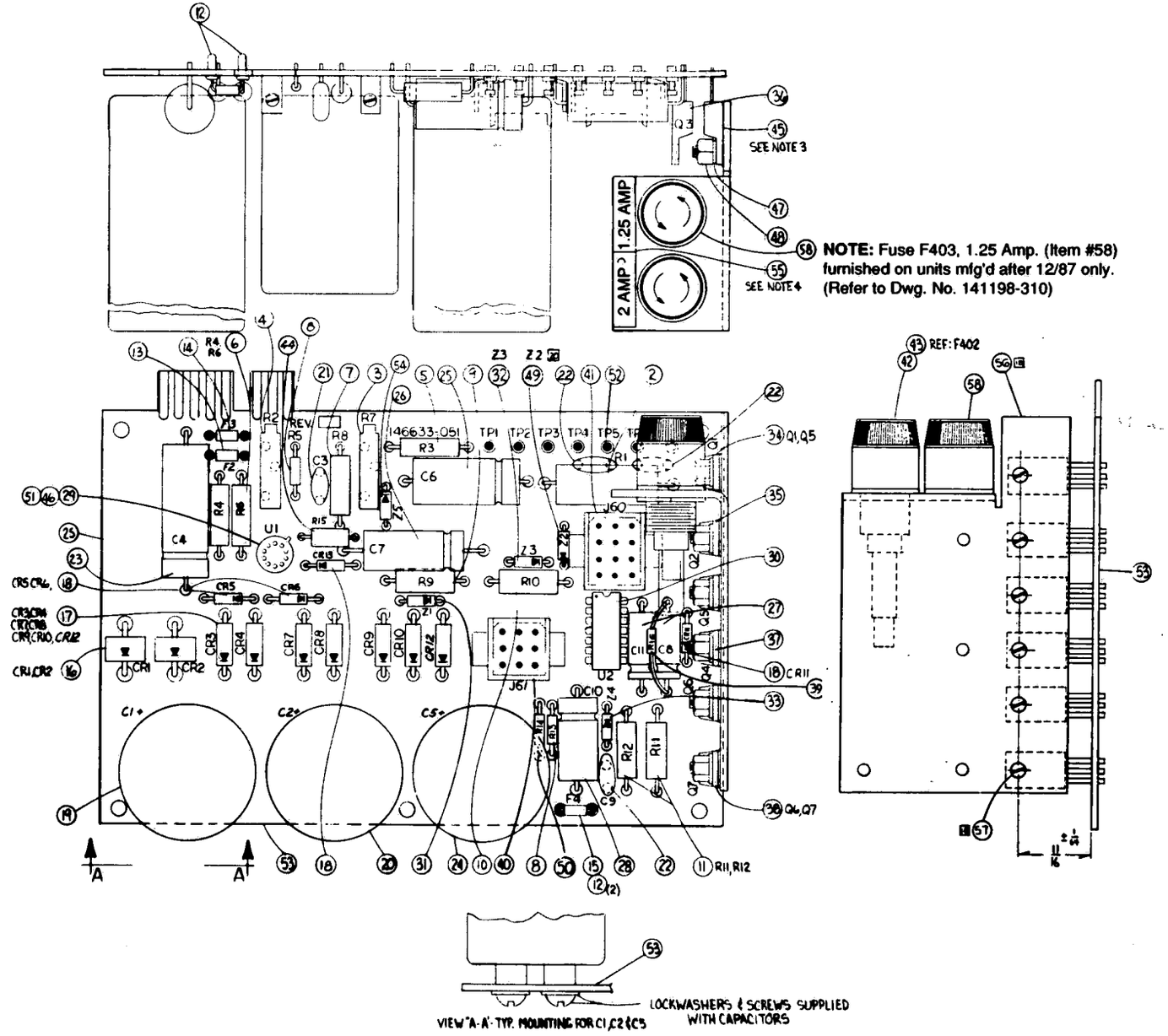
NOTE:
1. ALL RESISTORS ¼ W UNLESS OTHERWISE NOTED



P/C ASSEMBLY, Power Supply (Part 2 of 2)
(Units with Indicator-Recorder)

Rev. 2/86

DWG. NO. 146633-051



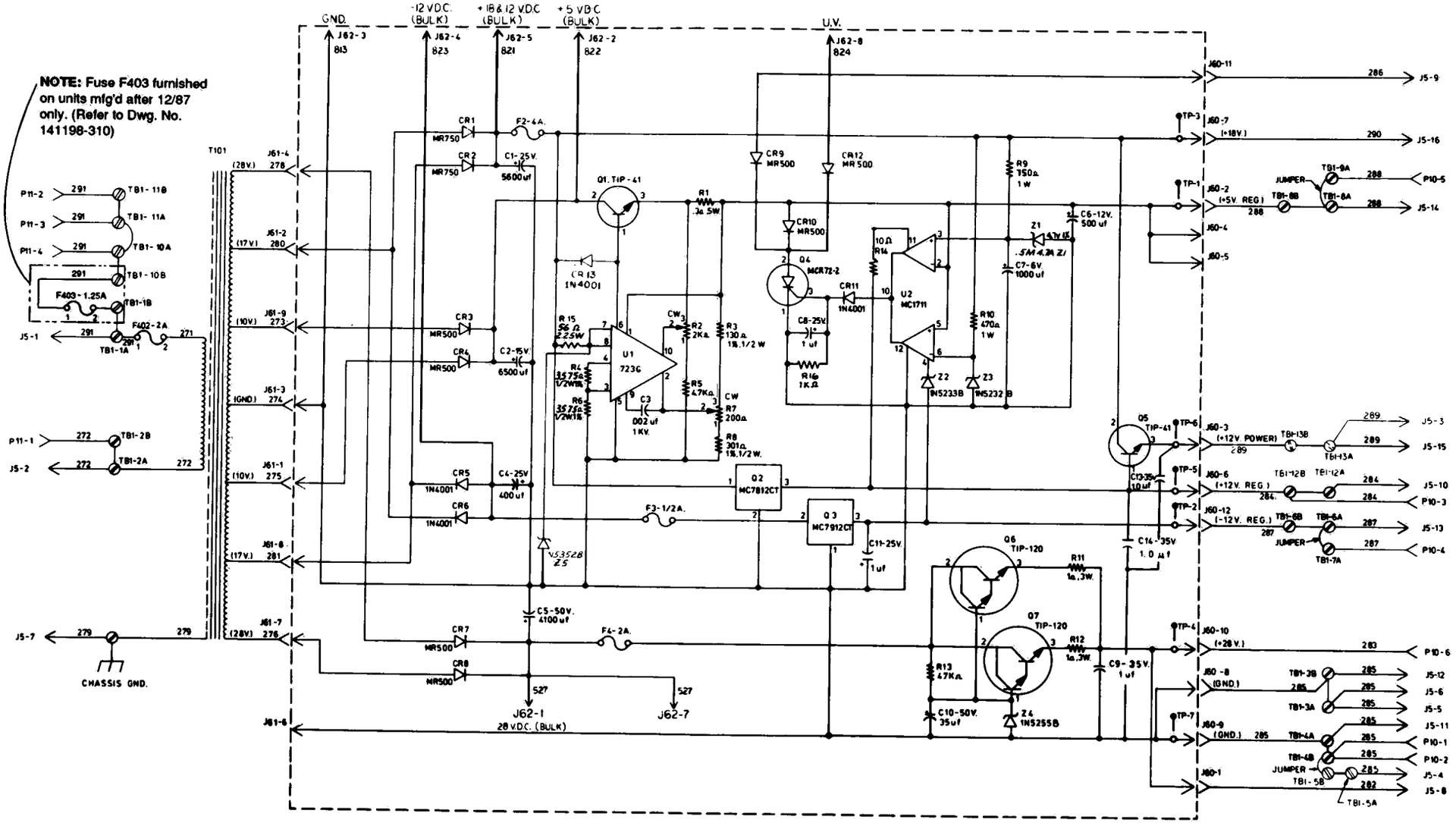
NOTE: Fuse F403, 1.25 Amp. (Item #58) furnished on units mfg'd after 12/87 only. (Refer to Dwg. No. 141198-310)

QTY.	ITEM NO.	DESCRIPTION
X	1	BOARD, POWER SUPPLY P.C. ASSEMBLY
1	2	RESISTOR 5 W.W.W., 3Ω R1
1	3	POT., 200Ω R7
1	4	POT, 2KΩ R2
1	5	RESISTOR, 1/2 W.M.F., 130Ω R3
2	6	RESISTOR, 1/2 W.M.F., 3570Ω R4, R6
1	7	RESISTOR, 1/2 W.M.F., 301Ω R8
2	8	RESISTOR, 1/4 W.C.C., 4.7KΩ R5, R13
1	9	RESISTOR, 1 W.C.C., 750Ω R9
1	10	RESISTOR, 1 W.C.C., 470Ω R10
2	11	RESISTOR, 3 W.W.W., 1Ω R11, R12
6	12	TERMINAL, SPRING SOCKET
1	13	PICOFUSE, 4A, F2
1	14	PICOFUSE, 1/2A, F3
1	15	PICOFUSE, 2A, F4
2	16	RECTIFIER, 6A POWER, CR1, CR2
7	17	RECTIFIER, 3A POWER, CR3, CR4, CR7, CR8, CR9, CR10, CR12
4	18	RECTIFIER, 1A, CR5, CR6, CR11, CR13
1	19	CAPACITOR, 5600 μFD, 25V, C1
1	20	CAPACITOR, 6500 μFD, 15V, C2
1	21	CAPACITOR, .002 μFD, 1KV, C3
3	22	CAPACITOR, 1 μFD, 35 VDC, C9, C13, C14
1	23	CAPACITOR, 470 μFD, 25V, C4
1	24	CAPACITOR, 4100 μFD, 50V, C5
1	25	CAPACITOR, 470 μFD, 16V, C6
1	26	CAPACITOR, 1000 μFD, 10V, C7
2	27	CAPACITOR, 1 μFD, 50V, C8, C11
1	28	CAPACITOR, 33 μFD, 50V, C10
1	29	REGULATOR, POS. VOLTAGE, U1
1	30	COMPARATOR, DUAL DIFFER., U2
1	31	DIODE, 4.7V, ZENER, 1%, Z1
1	32	DIODE, 5.6V, ZENER, 5%, Z3
1	33	DIODE, 28V, ZENER, 5%, Z4
2	34	TRANSISTOR POWER, Q1, Q5
1	35	REGULATOR, 12V POSITIVE, Q2
1	36	REGULATOR, 12V NEGATIVE, Q3
1	37	THYRISTOR REV. BLOCK TRIODE, Q4
2	38	TRANSISTOR, POWER, Q6, Q7
1	39	RESISTOR, 1/4 W, 1KΩ, R16
1	40	HEADER PIN, PC MOUNTING, J61
1	41	HEADER PIN, PC MOUNTING, J60
1	42	FUSEHOLDER
1	43	FUSE, 2A, F402
1	44	RESISTOR, 56 Ω 2-1/4 W, R15
6	45	INSULATOR
1	46	HEATSINK
6	47	BUSHING, NYLON INSULATING
6	48	NUT #4-40 HEX
1	49	DIODE 6.0V ZENER, Z2
1	50	RESISTOR, 1/2 W, C.C. 10Ω, R14
1	51	SOCKET (USED WITH U1 ITEM #29)
7	52	TERMINAL TEST POINT
1	53	BOARD BARE POWER SUPPLY P.C. — DRILL SCHEDULE
1	54	DIODE, 15V ZENER 5% Z5
1	55	DECAL — 2 AMP
1	56	HEAT SINK
6	57	SCREW, FLAT HD. #4-40 X 5/16
1	58	FUSE, 1.25 A, F403

P/C ASSEMBLY, Power Supply
(Part 1 of 2)
(Units with Printcon)

Rev. 1/88

DWG. NO. 146633-051



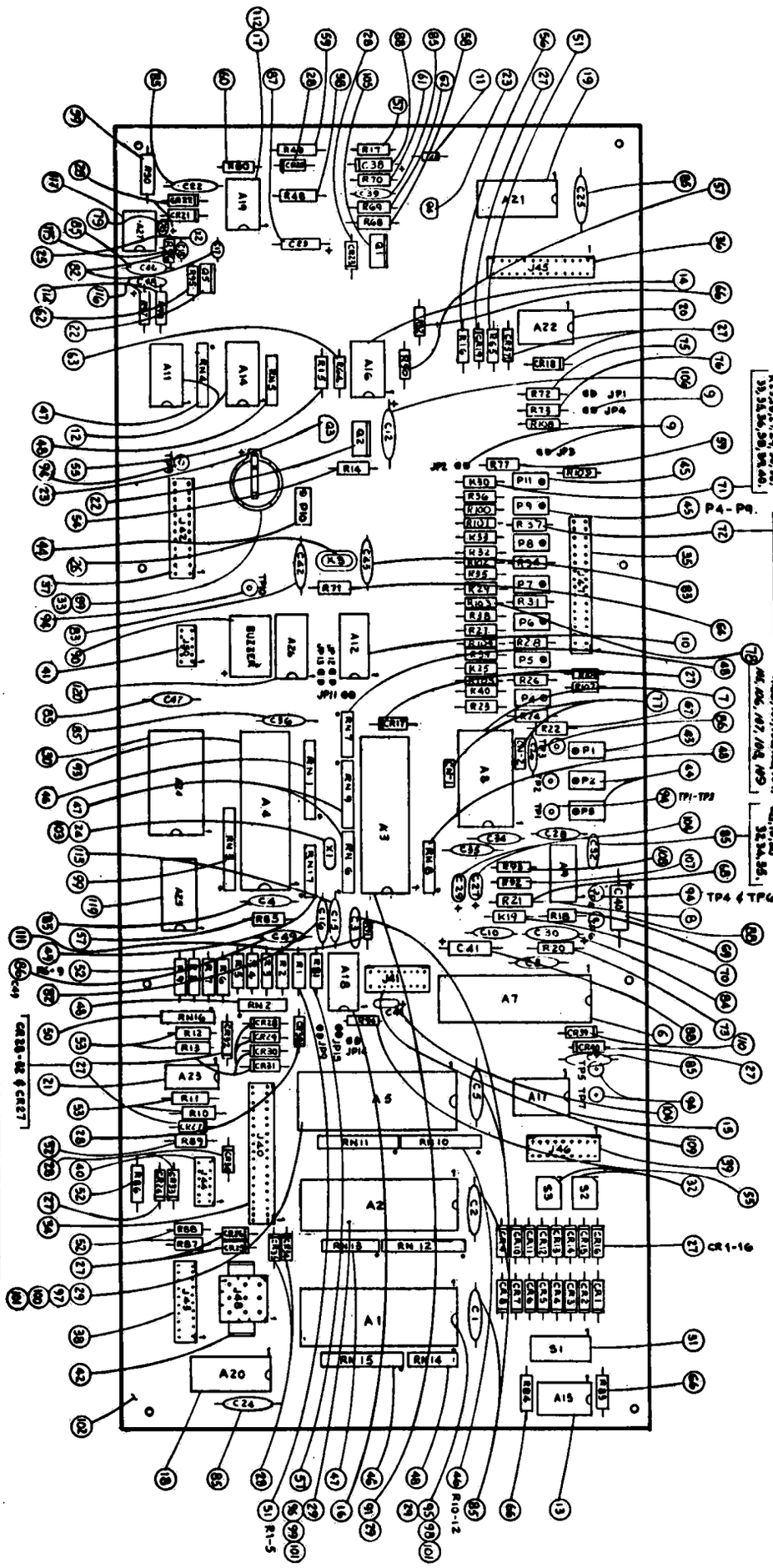
UNLESS OTHERWISE NOTED, ALL RESISTORS ARE 1/4 WATT.

P/C ASSEMBLY, Power Supply (Part 2 of 2) (Units with Printcon)

Rev. 1/88

DWG. NO. 146651-001
(9/23/87)

QTY X	ITEM NO	PART NAME	DESCRIPTION, MATERIAL
		DIGITAL PRINTER ASSY	PARTS LIST
	5	NOT USED	
1	6	40 PIN DIP IC	AD 7550 BD A/D CONVERTER (A7)
1	7	28 PIN DIP IC	AD 7507 JN ANALOG MUX (A8)
1	8	14 PIN DIP IC	AD 521 KD DIFFER AMP (A9)
3	9	WIRE JUMPER	
1	10	16 PIN DIP IC	HD3-4702-8 BIT RATE GEN (A12)
1	11	ZENER DIODE	IN5355 18V ZENER (Z1)
2	12	16 PIN DIP IC	KR2203 CR. DARLINGTON ARRAY (A11, 14)
1	13	14 PIN DIP IC	DM74LS14N HEX. SCHMIDT TRIGGER (A15)
1	14	14 PIN DIP IC	7406N HEX INVER H.V./O.C. (A16)
1	15	14 PIN DIP IC	DM74LS04N HEX. INVER LOW POWER SCHOTTY (A17)
1	16	14 PIN DIP IC	DM74LS00NQUAD 2 INPUT, NAND GATE, LOW POWER SCHOTTY (A18)
1	17	14 PIN DIP IC	MPD 1990 AC REAL TIME CLOCK (A19)
1	18	20 PIN DIP IC	DM81LS96N OCTAL DRIVER (A20)
1	19	20 PIN DIP IC	74LS245 OCTAL BUS TRANSCEIVER (A21)
1	20	14 PIN DIP IC	CD4071B QUAD 2-INPUT OR GATE (A22)
1	21	14 PIN DIP IC	LM339N QUAD COMPARATOR (A23)
2	22	TRANSISTOR	TIP 120 DARLINGTON (NPN) Q2, Q5
2	23	TRANSISTOR	2N 3906 (PNP), Q3 & Q4
1	24	CRYSTAL	8.0 MHZ (X1)
1	25	CRYSTAL	32.768 KHZ (X2)
1	26	CRYSTAL	2.4576 MHZ (X3)
30	27	DIODE	IN914 CR1-19 CR24 THRU 32, 37, 40
9	28	DIODE	IN4001 CR20-23, 33-36, 39
4	29	SOCKET	40 PIN DIP (A1, 2, 3 & 5)
1	30	SOCKET	24 PIN DIP (A24)
1	31	SWITCH	8 POS ROCKER DIP (S1) GRAYHILL 76SB08S
2	32	SWITCH	10 POS ROTARY BCD DIP (S2, S3) EECO 250002 G
1	33	HOLDER, BATTERY	2 PIN
1	34	CONNECTOR	36 PIN S P D R HEADER (J40)
1	35	CONNECTOR	34 PIN S P D R HEADER (J47)
1	36	CONNECTOR	26 PIN S P D R HEADER (J45)
1	37	CONNECTOR	24 PIN S P D R HEADER (J42)
1	38	CONNECTOR	20 PIN S P D R HEADER (J43)
1	39	CONNECTOR	18 PIN S P D R HEADER (J48)
1	40	CONNECTOR	12 PIN S P D R HEADER (J44)
1	41	CONNECTOR	10 PIN S P D R HEADER (J50)
1	42	CONNECTOR	9 PIN S P M & L HEADER (J46)
1	43	POTENTIOMETER	3299 W 1K CERMET (P1)
3	44	POTENTIOMETER	3299 W 10K CERMET (P2, P3, P10)
7	45	POTENTIOMETER	3299 W 100Ω CERMET (P4-P9, P11)
3	46	RESISTOR NETWORK	10KΩ, 9 RESISTOR SIP (RN 1, 10, 11, 12 & 15)
6	47	RESISTOR NETWORK	10KΩ, 7 RESISTOR SIP (RN 4, 6, 9, 13)
5	48	RESISTOR NETWORK	10KΩ, 5 RESISTOR SIP (RN 2, 5, 7 & 8 & 14)
1	49	RESISTOR NETWORK	4.7KΩ, 5 RESISTOR SIP (RN 17)
1	50	RESISTOR NETWORK	470KΩ, 5 RESISTOR SIP (RN 16)
6	51	RESISTOR	15KΩ, 1% MF 1/8 W (R1-R5 & R65)
8	52	RESISTOR	332KΩ, 1% MF 1/8 W (R6-R9 & R66-69)
4	53	RESISTOR	1 MEGΩ, 1% MF 1/8 W (R10-R13)
1	54	RESISTOR	100Ω, 1% MF 1/8 W (R14)
2	55	RESISTOR	1KΩ, 1% MF 1/8 W (R15), (R84)
1	56	RESISTOR	27.4KΩ, 1% MF 1/8 W (R16)
4	57	RESISTOR	4.75KΩ, 1% MF 1/8 W (R17, 80, 81, 85)
2	58	RESISTOR	100KΩ, 1% MF 1/8 W (R46 & R88)
3	59	RESISTOR	49.9KΩ, 1% MF 1/8 W (R 49 & R50 & R77)
1	60	RESISTOR	221KΩ, 1% MF 1/8 W (R60)
1	61	RESISTOR	100Ω, 5% 1W (R70)
2	62	RESISTOR	2.2KΩ, 1% MF 1/4 W (R89, R95)
1	63	RESISTOR	1Ω, 5% 1W (R64)
1	64	RESISTOR	10 MEGΩ, 5% CC 1/8 W (R71)
	65	NOT USED	
3	66	RESISTOR	10KΩ, 1% MF, 1/8 W (R82-84)
1	67	RESISTOR	100KΩ, 1% 25 PPM/°C TC MF 1/8 W (R22)
1	68	RESISTOR	2.5KΩ, 1% 25 PPM/°C TC MF 1/8 W (R21)
1	69	RESISTOR	4.53KΩ, 1% 25 PPM/°C TC MF 1/8 W (R18)
1	70	RESISTOR	4.99KΩ, 1% 25 PPM/°C TC MF 1/8 W (R19)
12	71	RESISTOR	6.04KΩ, 1% 25 PPM/°C TC MF 1/8 W (R23, 25, 27, 29, 30, 32, 33, 35, 38, 39, 39 & 40)
6	72	RESISTOR	75Ω, 1% 25 PPM/°C TCMF 1/4 W (R24, 26, 28, 31, 34 & 37)
1	73	RESISTOR	5.1 MEG, 5% MF, 1/8 W R20
	74	NOT USED	
1	75	RESISTOR	30.9KΩ, 0.1% 25 PPM/°C TCMF 1/8 W (R72)
1	76	RESISTOR	280Ω, 0.1% 25 PPM/°C TCMF 1/8 W (R73)
2	77	CAPACITOR NETWORK	01μF 50V CN-1 CN-2
10	78	RESISTOR	1K R100 THRU R109
1	79	CAPACITOR	1uF 35V (C45)
	80	NOT USED	
	81	NOT USED	
3	82	CAPACITOR	20PF 500V MICA C16-18
2	83	CAPACITOR	56PF 300V MICA C42 & C43
1	84	CAPACITOR	.0022μF 600V POLYPROPALENE C30
19	85	CAPACITOR	1μF 25V CERAMIC C1-3, C7, C8, C10, C22, C24, C25, C29, C32, C34-C36, C38, C46, C47
2	86	CAPACITOR	01μF 25V CERAMIC C26, C49
1	87	CAPACITOR	1μF 50V ALUMINUM (C23)
3	88	CAPACITOR	47μF 35V ALUMINUM C39, C40 & C41
1	89	BATTERY	MEMORY BACKUP 150827-351
1	90	BUZZER	5VDC
1	91	40 PIN DIP IC	P8039-8 CPU (A3)
	92	NOT USED	
1	93	40 PIN DIP IC	P8155, RAM & I/O (A4)
9	94	TEST POINT	(TP1-TP7, TP9, TP10)
1	96	40 PIN DIP IC	8355/8755 ROM EAGLE 2000 A1
1	98	40 PIN DIP IC	8355/8755 ROM EAGLE 2000 A2
1	97	40 PIN DIP IC	8355/8755 ROM EAGLE 2000 A5
	98	NOT USED	
	99	RESISTOR NETWORK	2.7KΩ, 9 RESISTOR SIP (RN-3)
	100	NOT USED	
	101	NOT USED	
1	102	DRILL SCHEDULE	PC BOARD
1	103	MOUNT	DISCRETE COMPONENT
3	104	CAPACITOR	22μF 35V TANTALUM C27, C29, C44
1	105	TRANSISTOR	TIP41 (NPN) POWER (Q1)
1	106	CAPACITOR	1μF, 50V BIPOLAR (C12)
1	107	RESISTOR	1.33K 1% 25 PPM/°C TC MF 1/8W (R92)
1	108	RESISTOR	20.0K 1% 25 PPM/°C TC MF 1/8W (R93)
1	109	CONNECTOR	18 PIN SPDR HEADER (UNSHROUDED) (J41)
1	110	DIODE	HP5082-2811 (1N5713) SCHOTTKY CR38
2	111	RESISTOR	470Ω, 1/4 W, 5% C.C. (R81) (RX3)
1	112	SOCKET	14 PIN DIP (A19)
1	113	CAPACITOR	5 pF, 500 V. MICA (C-15)
2	114	RESISTOR	1KΩ, 1/4 W, C.C (R87 R88)
1	115	RESISTOR	150KΩ, 1/4 W, C.C (R86)
1	116	CAPACITOR	1μF, 10 V, TANT (C48)
1	117	16 PIN DIP I.C	74LS123 (A27)
	118	NOT USED	
1	119	20 PIN DIP I.C	74LS373 (A25)
1	120	14 PIN DIP I.C	74LS32 (A26)

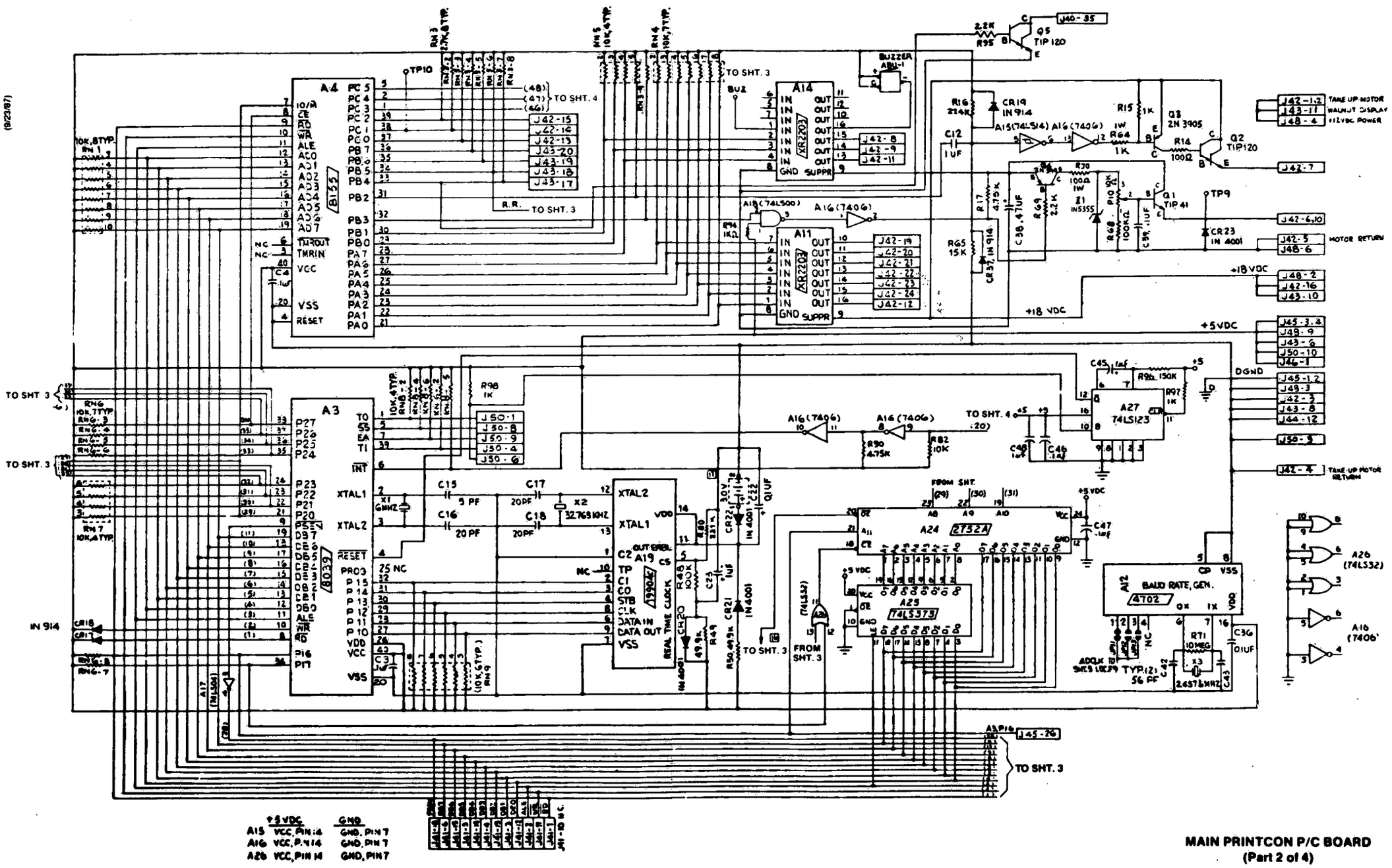


MAIN PRINTCON P/C BOARD
(Part 1 of 4)

A-11

A-12

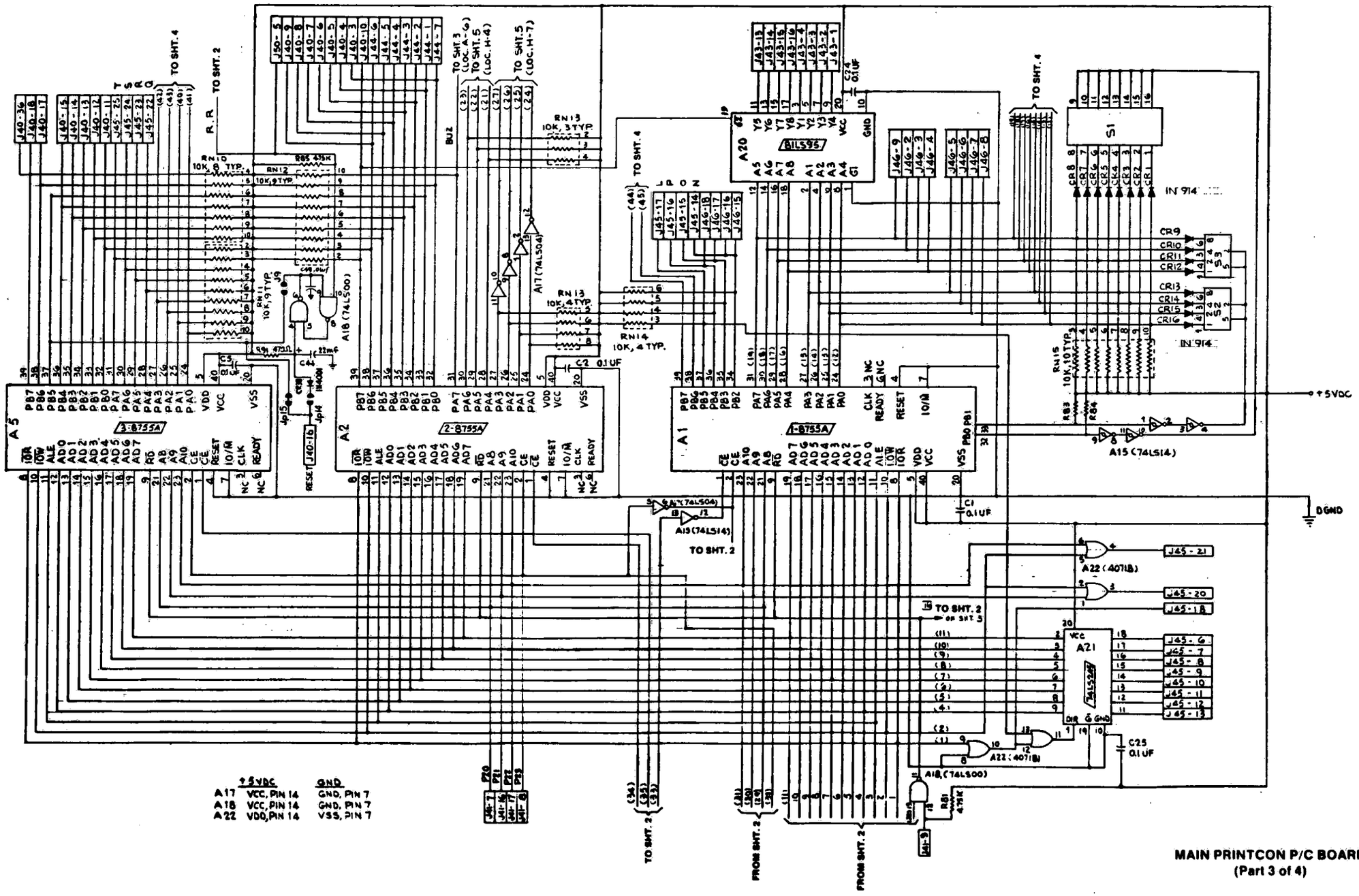
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(9/23/87)



MAIN PRINTCON P/C BOARD
(Part 2 of 4)

Rev. 1/88

DWG. NO. 146651-001
(9/23/87)



MAIN PRINTCON P/C BOARD
(Part 3 of 4)

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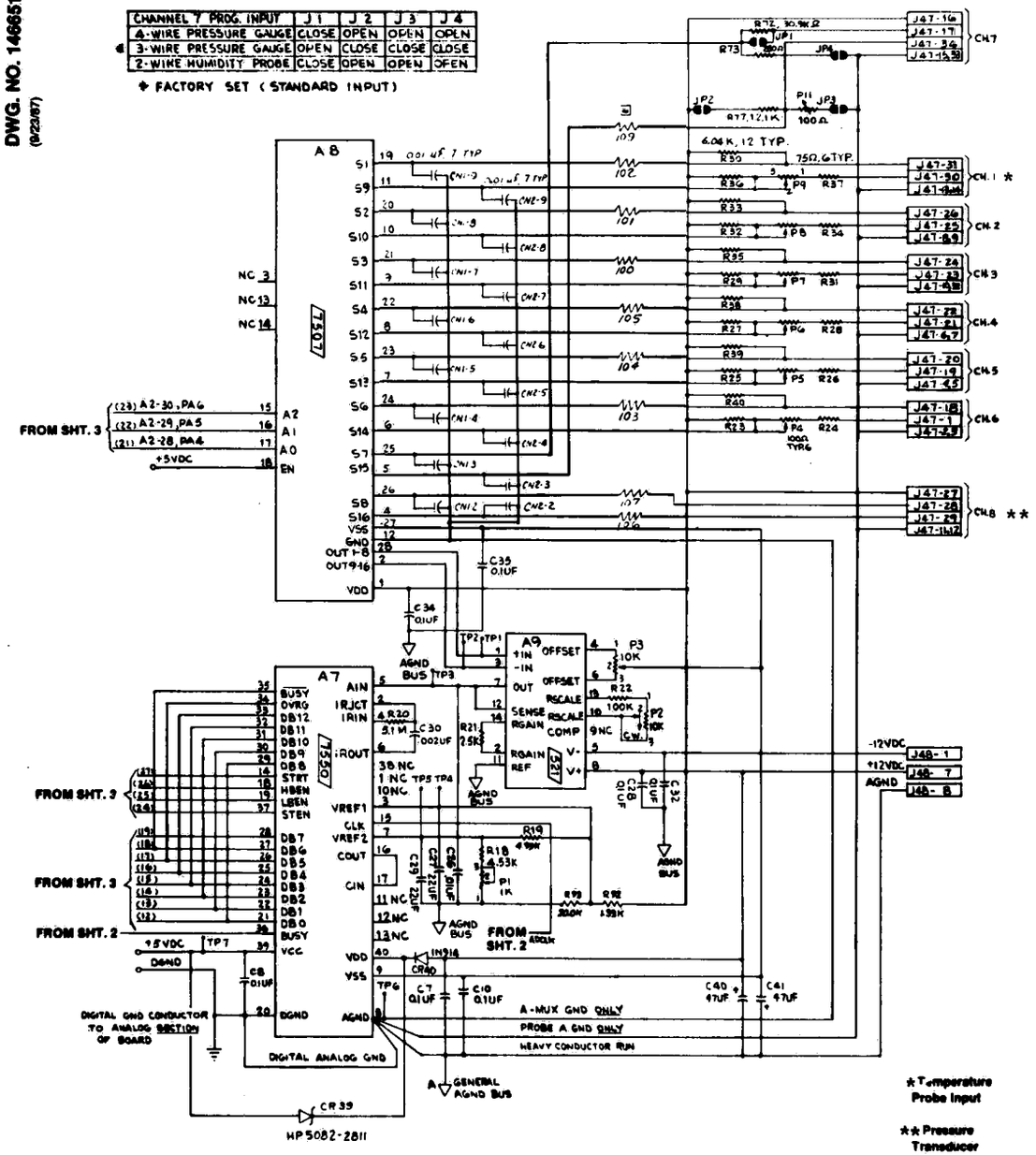
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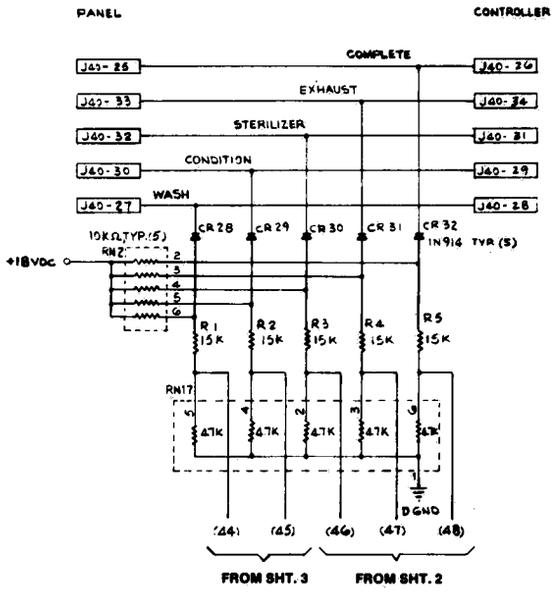
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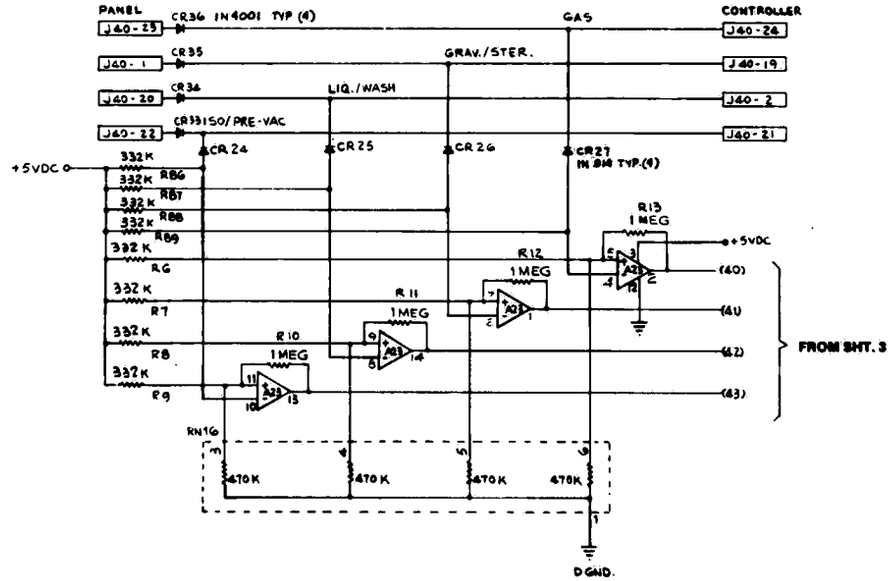
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CHANNEL 7 PROG. INPUT	J1	J2	J3	J4
4-WIRE PRESSURE GAUGE	CLOSE	OPEN	OPEN	OPEN
3-WIRE PRESSURE GAUGE	OPEN	CLOSE	CLOSE	CLOSE
2-WIRE HUMIDITY PROBE	CLOSE	OPEN	OPEN	OPEN

◆ FACTORY SET (STANDARD INPUT)



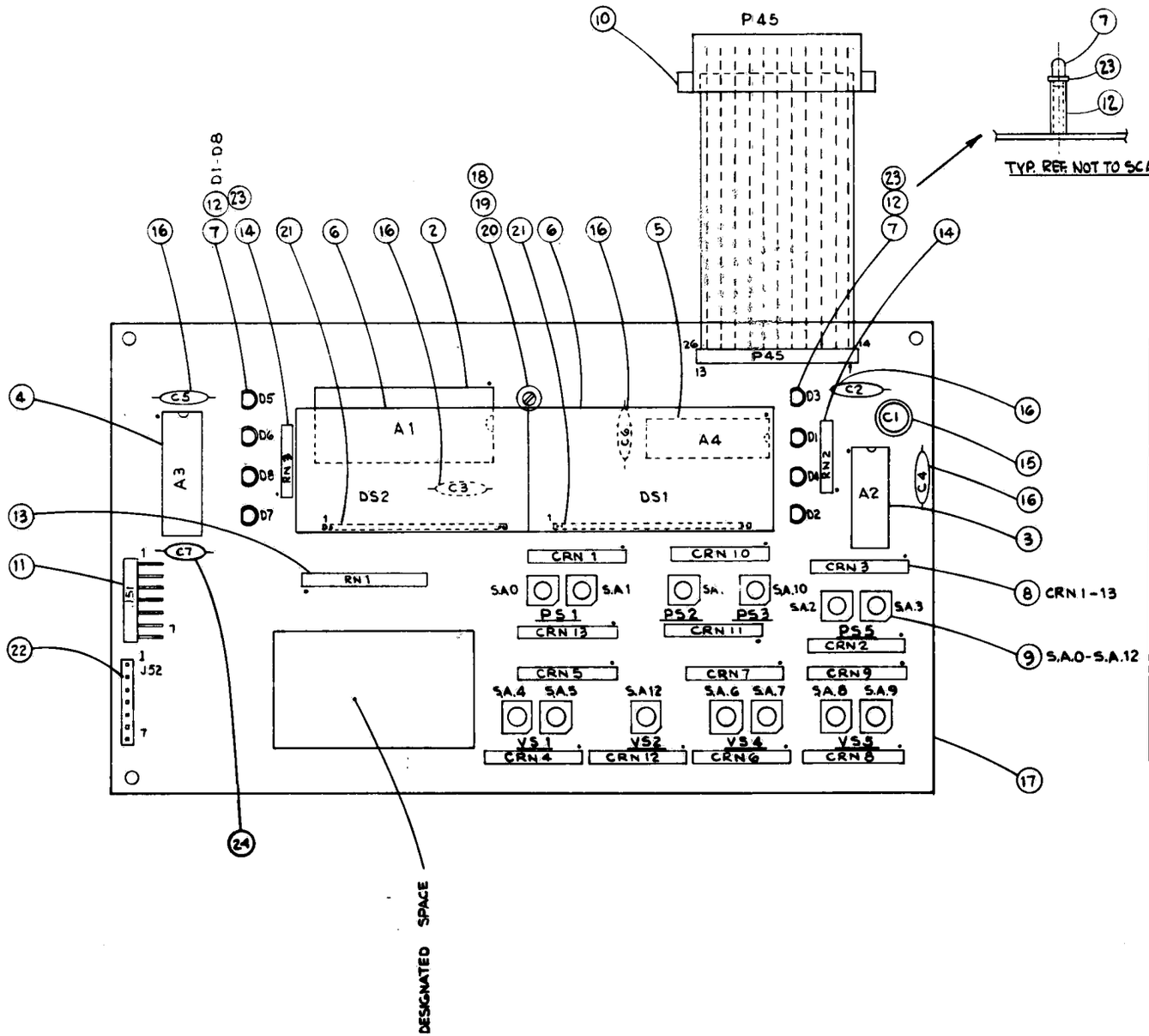




MAIN PRINTCON P/C BOARD
(Part 4 of 4)

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DWG. NO. 146633-081
(9/23/87)

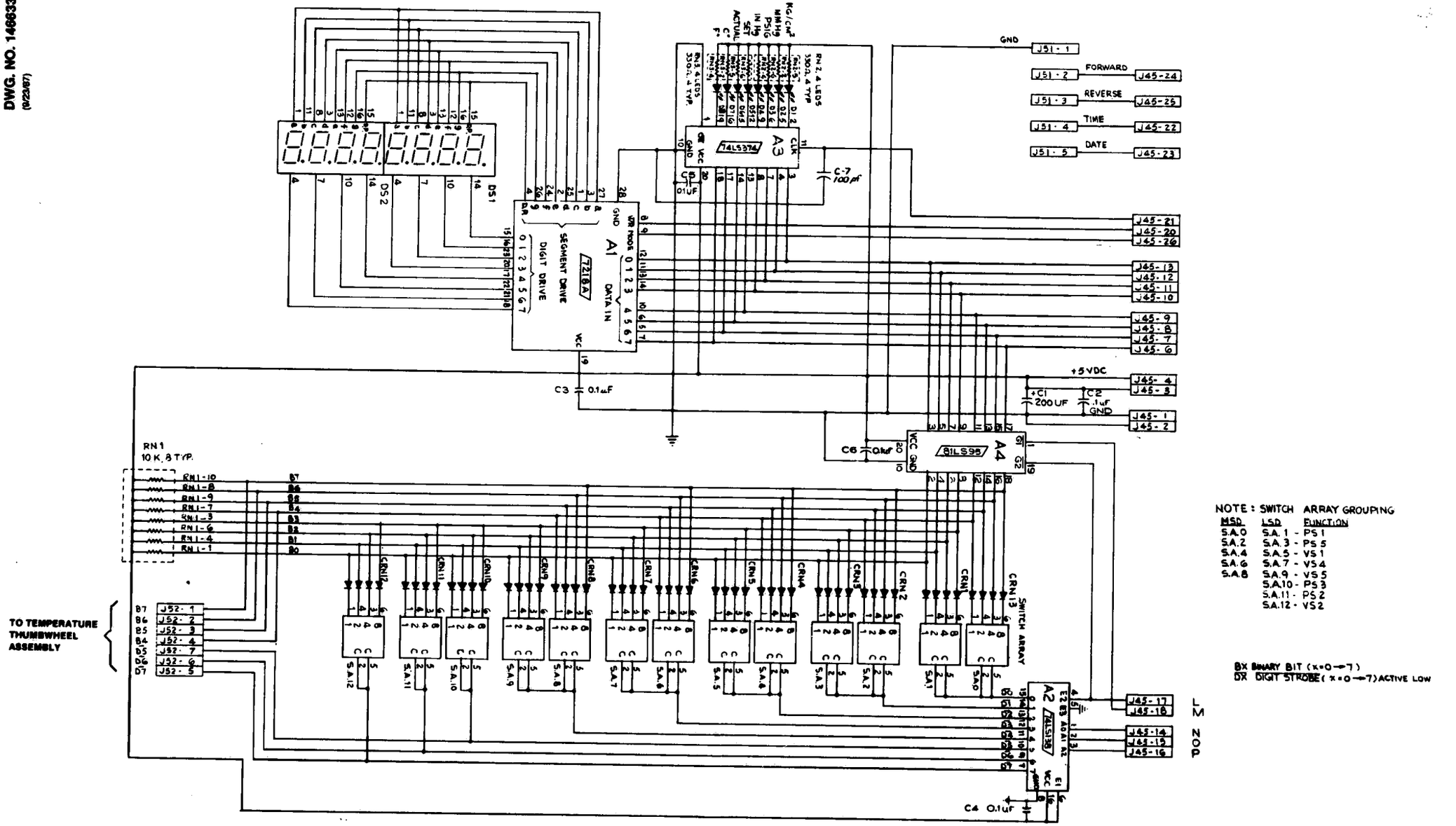


QTY.	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL
X	1	DIGITAL PRINTER	DISPLAY BOARD
1	2	28 PIN DIP IC	7218A, 8 DIGIT 7 SEG. DISPLAY DRIVER (A1)
1	3	16 PIN DIP IC	74 LS 138 DECODER/MULTIPLEXER (A2)
1	4	20 PIN DIP IC	74LS374 OCTAL D-TYPE LATCH (A3)
1	5	20 PIN DIP IC	8ILS 95 TRI-STATE OCTAL BUZZER (A4)
2	6	DISPLAY	QUAD — 7 SEG. DISPLAY (DS1 & DS2)
8	7	LED	SOLID STATE INDICATOR LED, RED (D1-D8)
13	8	DIODE NETWORK	CRN1-13 (SIMILAR TO IN4150)
13	9	SWITCH	10 POS. ROTARY BCD DIP (S.A.O.-S.A.12) EECO 24008G
1	10	CABLE ASSEMBLY	7.5" (J45)
1	11	CONNECTOR	7 POS. S.R. R.A. HEADER
8	12	L.E.D. MOUNT	NYLON, .675 HIGH
1	13	RESISTOR	10K, 9 NETWORK SIP RN1
2	14	RESISTOR	330Ω, 5 NETWORK SIP RN2.3
1	15	CAPACITOR	220μF, 10V ALUM. C1
5	16	CAPACITOR	.1μ, 25V CERAMIC C2-C6
1	17	PC BOARD	
1	18	SUPPORT	NYLON
2	19	WASHER	FLAT, NYLON
1	20	SCREW	#6-32 X 3/8 SELF TAPPING
2	21	CONNECTOR	16 POS. S.R. HEADER
1	22	HEADER	7 POS. S.R. HEADER
8	23	BUSHING	INSULATION
1	24	CAPACITOR	100μF, 1000V, CERAMIC C-7

PRINTCON DIGITAL DISPLAY
PC/BOARD (Part 1 of 2)

Rev. 1/88

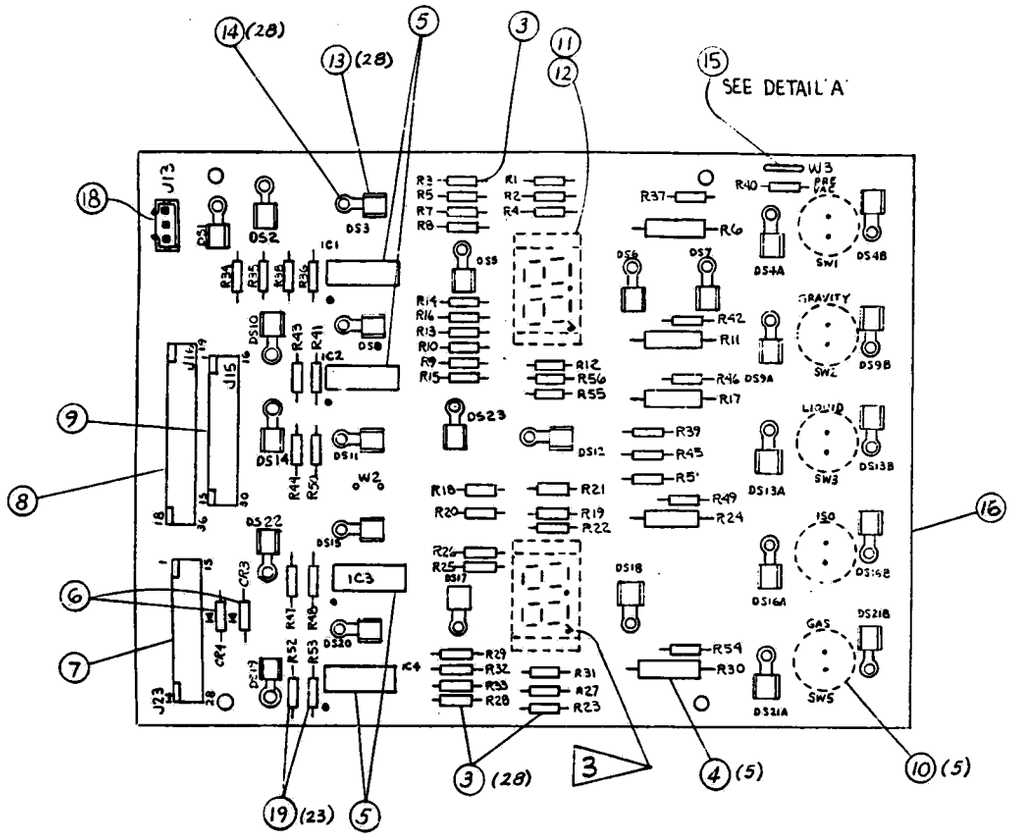
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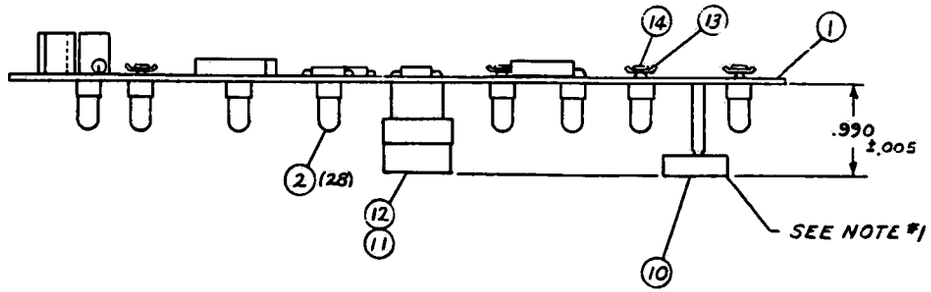


PRINTCON DIGITAL DISPLAY PC/BOARD (Part 2 of 2)

Rev. 1/88

DWG. NO. 134468-444
(10/30/87)

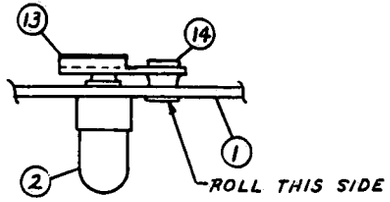




ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	P.C. BOARD ASS'Y	
2	LAMP	
3	RES. 150Ω, 1/4W, 5%	R1-5, 7-10, 12-16, 18-23, 25-29, 31, 32, 35
4	RES. 150Ω, 1W, 5%	R6, 11, 17, 24, 30
5	INTEGRATED CKT	IC1, 2, 3, 4
6	DIODE	IN4001 CR1, 2, 3, 4
7	HEADER, DBL ROW	28 POS. J23
8	HEADER, DBL ROW	36 POS. J16
9	HEADER, DBL ROW	30 POS. J15
10	SWITCH, TOUCH	SWI-5
11	DISPLAY	
12	SOCKET, I.C.	
13	LUG, BULB	
14	RIVET	
15	WIRE	SEE NOTE #2 2"LG
16	P.C. BOARD	
17		
18	HEADER ASS'Y	
19	RES. 51.1Ω, 1/4 W,	1% R34 - R56

NOTES:

1. TOUCH SWITCH TO BE PERPENDICULAR WITH P.C. BOARD WITHIN 3°.
2. WIRE SPEC. - #18 AWG, SOLID COPPER, UNINSULATED.
3. INSERT DISPLAY, ITEM #11 INTO PINS #2 THRU #10 AND #15 THRU #23 FOR BOTH 24 PIN SOCKETS, ITEM #12. (PIN #1 OF DISPLAY IN PIN #2 OF SOCKET)

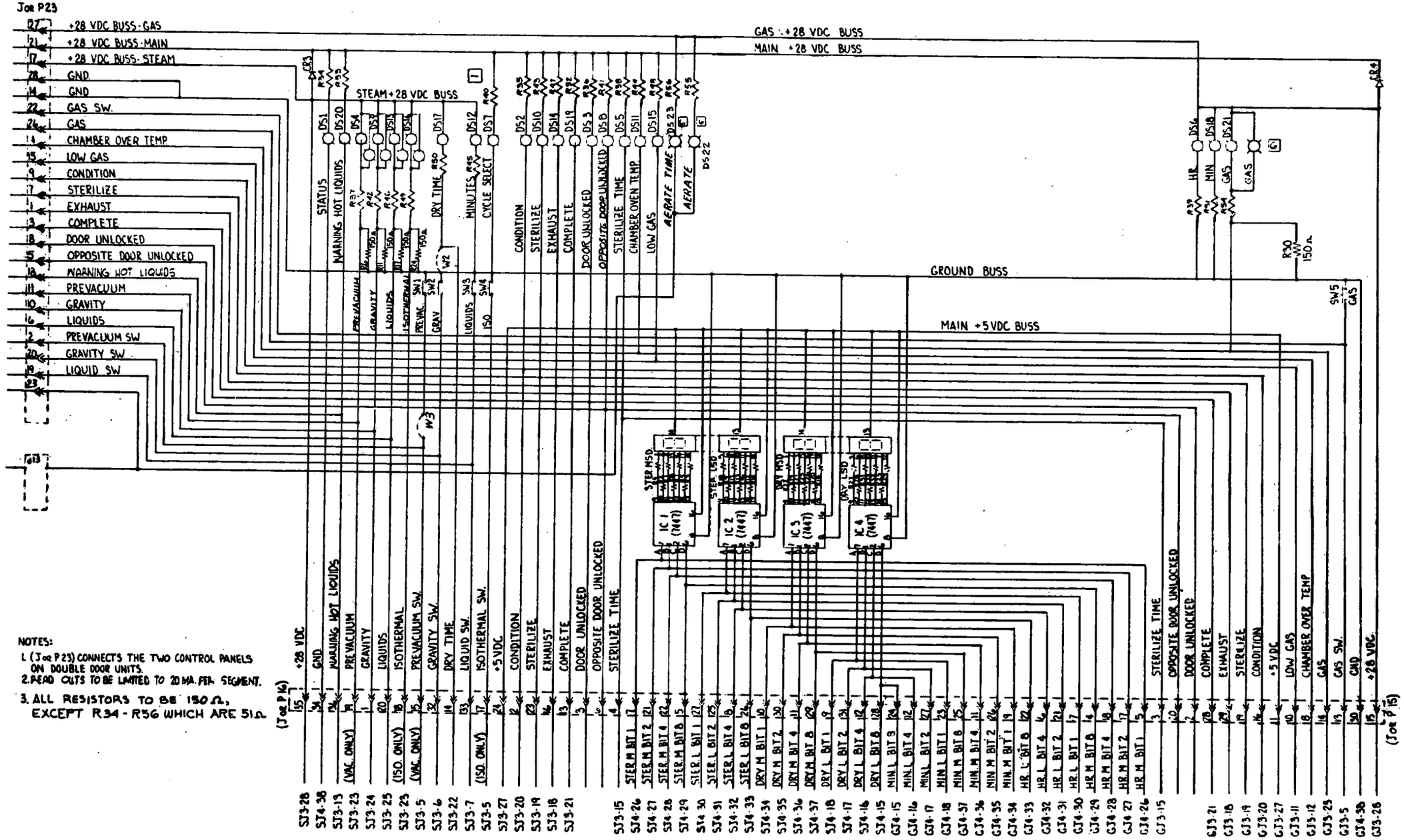


ENLARGED VIEW
OF LAMP MOUNTING

PRIMARY PANEL SCHEMATIC (PC Board)
Operating End (Part 1 of 2)

Rev. 5/88

DWG. NO. 134468-444
(10/30/87)



NOTES:

1. (J∞ P23) CONNECTS THE TWO CONTROL PANELS ON DOUBLE DOOR UNITS.
2. READ OUTS TO BE LIMITED TO 20 MA. PER SEGMENT.
3. ALL RESISTORS TO BE 150Ω, EXCEPT R34 - R56 WHICH ARE 51Ω.

PRIMARY PANEL SCHEMATIC
Operating End (Part 2 of 2)

Rev. 1/88

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SECTION 7

SECTION 7
COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT

7.1 GENERAL

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

7.2 INDICATOR-RECORDER-CONTROLLER (Figs. 8-13 and 8-14)

NOTE: The swing-out panel is hinged to the case, for access to the internal components, such as the drive motor (8-14, 1), reed switches (3), and adjusting screws. To gain access, open the door, loosen the captive screw located at the lower right hand corner of the backing plate, and swing the plate out.

Starting Ink Flow (Fig. 8-13)

1. Lift pen by loosening hub cap (4).

2. Remove cap from ink cartridge pen tip (6).

3. Insert a small piece of paper under the pen and move it slightly back and forth to initiate flow. If necessary, moisten pen tip.

Changing The Chart (Fig. 8-13)

1. Unscrew the hub cap (4). This cap retains a spring loaded wire bracket, which acts as a pen lifter (2). Hold this bracket while unscrewing cap.

2. With hub and pen away from the chart, lift chart (3) off hub, and remove.

3. Slip new chart under pen arm and locate on hub. Replace hub cap loosely.

4. Rotate chart until pen rests on proper time arc. Press chart flat against dial plate.

5. Tighten hub cap firmly, taking care that chart remains in proper position.

Replacing Ink Cartridge (Fig. 8-13)

1. Lift ink cartridge (6) from chart by loosening hub cap.

2. Grasp cartridge near tip end.

3. Pull straight off, with a steady pull. Be careful not to distort pen arm.

4. Support pen arm with one hand. Slide cartridge into engagement with clip.

5. Holding pen arm, slide cartridge onto the arm, until the tip boss is properly positioned against the end of the arm.

Adjustment of Temperature Control (Fig. 8-14)

1. Turn adjusting screw on reed switches (3) clockwise to increase temperature settings, counterclockwise to reduce settings. (TS-1 controls timer actuator, TS-2 controls steam to chamber.)

2. Adjusting screw on pen arm is used to make minor corrections in pen setting.

Removal and Replacement (Fig. 8-10)

CAUTION: Recorders should be handled with care, and caution should be exercised when making changes to ensure against kinking or compressing the capillary system. The bulb, tubing and pressure element are filled with a fluid approved by the Scientific Instrument Makers Association and form a sealed system. This system must never be broken. Even the most minute leak will render it inoperative. Excess capillary should be formed into an 8-inch diameter coil and properly supported by taping to any smooth unheated surface.

Removing Recorder

1. Disconnect power to sterilizer at main panel.

2. Remove primary panel ... see Paragraph 7-12.

3. Disconnect electrical leads by pulling the plug at bottom of recorder. Remove temperature bulb from chamber drain tee, release capillary tube from the three clips at rear of console, and carefully withdraw through the grommet in back of console. Roll capillary into an eight-inch coil and tape to recorder case. Use care and do not damage bulb or tube.

4. Open chart back-up plate, remove the two screws which hold recorder in place, and slide unit to the front, out of the panel.

Replacing Recorder

1. Slide recorder into position and secure with the two screws.

2. Carefully uncoil capillary tube, and straighten without twisting, kinking, or bending. Do not bend the tube to less than a 3-inch radius. The 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. Form excess tubing into an 8-inch coil and tape out of the way. Do not cut off any excess.

NOTE: Position bulb as shown in Fig. 7-1. "Bulb" portion must be above bottom of cross. Bulb should be as vertical as possible.

3. **Carefully** direct the capillary tube and bulb behind primary and secondary panels, through the grommet, and install bulb in chamber drain tee.

4. Secure capillary tube with the three clips; also any wires which were displaced. Replace connector plug at bottom of recorder.

5. Replace primary panel.

7.3 CHAMBER DOOR ASSEMBLY — Manually or Power Operable

Most repairs can be made without removing the door from the sterilizer. Disassemble the 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 wearing surfaces. Wipe all parts with a clean lint-free cloth. Inspect bearings for wear and damage. Wrap or otherwise protect polished and painted components when removed.

Lubricate parts when indicated with high temperature grease, Neptune 7, (Part Number P-385220-091) or equivalent.

Replacement of Door Gasket (Fig. 8-22)

1. Remove gasket (1) and gasket bars (2, 4, 5) from door.

NOTE: Carefully examine gasket over its entire length for variations in compression. If variations in gasket compression indicate an appreciable difference in different areas, the door is not properly shimmed and should be realigned and shimmed. (See Alignment and Shimming Procedure, located in this paragraph.)

2. Clean door surface and gasket surface with **AMSCO Pry Cleaner** (included in Door Frame Cleaning Kit, 753377). Make certain that surfaces are free of foreign matter.

3. Run a 1/4-28 tap through the gasket bar holes in door to clean threads.

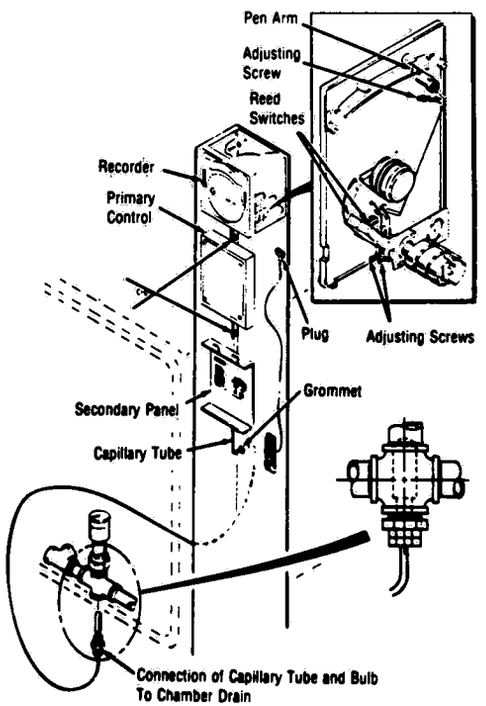


Figure 7-1. REPLACING THE RECORDER.

4. Replace gasket bars. Leave bars loose enough to allow gasket to be inserted.

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

6. Tighten gasket bars alternately to almost snug.

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

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

Replacement of Diaphragm or Diaphragm Gasket (Fig. 8-23)

1. Open the chamber door.

2. Remove the twelve 1/4-20 x 5/8 screws (8) which secure diaphragm cover to inside of door.

3. Remove diaphragm cover (7), diaphragm (6), and diaphragm gasket (5).

4. Remove thrust plate assembly (4), clutch rod assembly (9), front lock clutch (10), and lock clutch spring (12) from door. Then remove the four lock clutch pins (11).

5. Examine diaphragm for breaks or distortion; replace if necessary.

6. Install front lock clutch, using shims as required to maintain a gap of 0.080-0.100 inches between lock clutch and lock clutch rod. Drive in the four pins.

7. Assemble and lubricate clutch rod, clutch rod spring, and thrust plate; insert into door.

8. Position diaphragm gasket (graphited face next to door), diaphragm, and diaphragm cover on door; replace and tighten the twelve screws.

Removal of Handwheel and Door Cover (Fig. 8-22)

1. Open the chamber door and position the radial arms at their maximum extension.

2. Remove the clutch rod button (22) by unscrewing it in a counterclockwise direction.

3. Remove the three 10-24 x 5/8 capscrews (24) from the handwheel retainer (25); remove retainer and handwheel from door.

4. Remove the four 10-24 socket head screws (36) from the handwheel adapter (19) (manual door) or clutch ring (power door) to replace bushing (20).

5. Power doors only (Fig. 8-25):

a. Position clutch shift lever at POWER and remove ball detent (11) from top of clutch shift ring (12).

b. Shift lever to MANUAL and remove bottom ball detent (11).

c. Shift clutch shift ring forward and remove ring (12), clutch shift pins (13), shoes (16) and clutch driver (15) as an assembly.

d. Remove pins and shoes to disassemble ring and driver if necessary.

6. Remove the No. 8 self-tapping screws from around the three sides of the door cover; remove cover.

Replacement of Handwheel and Door Cover

1. Replace any damaged or missing cover clips and speed nuts.

2. Place cover on door and secure with ten #8 self-tapping screws on three sides.

3. Power doors only: (Fig. 8-25)

a. Lubricate and assemble clutch shift ring, shoes, driver, and pins. Slide this entire assembly down over door post.

b. Move shift lever to MANUAL and replace bottom ball detent.

c. Shift lever to POWER and replace top ball detent.

4. Set handwheel into position, making sure that keys are in alignment with keyways. Replace retainer and tighten three screws.

5. Screw in clutch rod button.

Removal of Radial Arms (Fig. 8-23)

1. Follow the above instructions for the removal of the handwheel and door cover.

2. Mark the position of the limit switch actuator (27) (or actuators — power door) on the radial arm; remove the actuator.

3. Mark radial arms so they can be returned to their correct positions at reassembly.

4. With the radial arms positioned at their maximum extension, remove the 1/4''-20 socket head screws (36) from the top socket plate (31).

5. Slowly rotate the top socket plate (31) to release the radial arms; remove the arms.

NOTE: Be careful to prevent the arms from falling. If necessary, loosen but **do not remove the nuts which retain the fulcrum assemblies.** Fulcrum assemblies are positioned by shims which align the radial arms to seal against the door frame. If the nuts which retain the fulcrum assemblies must be removed, be careful to replace the shims and the fulcrum assemblies in the same location during assembly.

6. Inspect the radial arms and fulcrum assemblies for wear; replace if necessary.

Reassembly of Radial Arms

1. Replace any fulcrum assemblies which have been removed, together with their shims. Drive fulcrums down with a wood block or mallet.

2. Slide the radial arms into position, and screw the top socket plate down onto the arm ball ends. Tighten the four 1/4-20 socket head screws.

3. Secure the limit switch actuator (or actuators) to the radial arms in the position marked at disassembly.

4. Replace cover and handwheel according to above instructions.

Removal of Power Door Drive Assembly

1. Follow the above instructions for the removal of the handwheel and door cover.

2. Remove the 1/4''-20 socket head capscrews from the top half of the worm gear housing (Fig. 8-25, 14); remove the top half.

3. Withdraw the worm drive shaft assembly (38) from the bottom half of the gear housing; disassemble if necessary.

4. Remove the 1/4-20 capscrews from the motor strap (26) to remove the bottom half of the gear housing and the motor (29) as a unit; disassemble if necessary.

5. Remove the two keys (Fig. 8-23, 44) from the end of the screw shaft assembly (37) to facilitate removal of the worm gear assembly and thrust washers.

Replacement of Power Door Drive Assembly

NOTE: Lubricate all moving parts as they are assembled.

1. Slide worm gear onto screw shaft and replace two keys in end of shaft.

2. Position motor and lower gear housing half. Fasten motor strap and connect ground strap.

3. Insert worm drive shaft into lower half of gear box housing. Adjust motor coupling for 0.020-0.022 inch clearance.

4. Replace top half of gear box and tighten the four screws.

Removal of Screw Shaft Assembly (Fig. 8-23, 37)

1. Follow the above instructions for the removal of the handwheel, door cover, radial arms, and if applicable, power door drive assembly.

2. Remove the 10-24 socket head screws (43) from the clutch lock cap (42) at the end of the screw shaft assembly; remove the cap.

3. Bend back tab on lockwasher (41); remove screw shaft locknuts (40) and discard lockwasher. Remove thrust washer (39).

4. Remove screw shaft assembly and top socket plate (31); disassemble if necessary. Press out ball bearing only if it is to be replaced. Remove Teflon caps and stops only if they are to be replaced.

5. Remove bottom socket plate (30) assembly from door post.

6. Wash the screw shaft, top socket plate and door post threads with solvent. Inspect all parts for breaks, chips or wear.

7. If they were removed, replace the stops in the top socket plate. Insert the Teflon caps and tap them into position.

Replacement of Screw Shaft Assembly

1. Lubricate door post and bottom socket plate, and slide socket plate down over door post.

2. Replace radial arms. (See previous instructions.) Grease top socket plate, position it, and secure with four cap screws.

3. Lubricate screw shaft assembly threads, and engage with top socket plate.

4. Grease roller bearing, place in position, and secure with two locknuts and washers. Use a new lock washer between the two nuts.

5. Replace clutch lock cap and tighten screws.

6. Replace power drive assembly, radial arms, door cover, and handwheel according to above instructions.

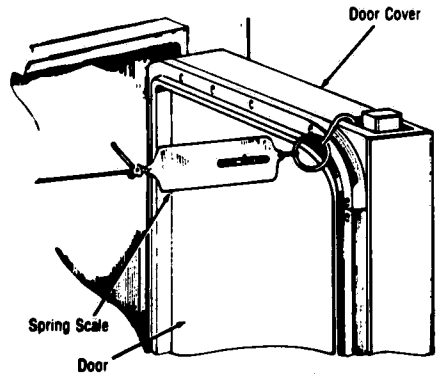


Figure 7-2. HINGE BINDING.

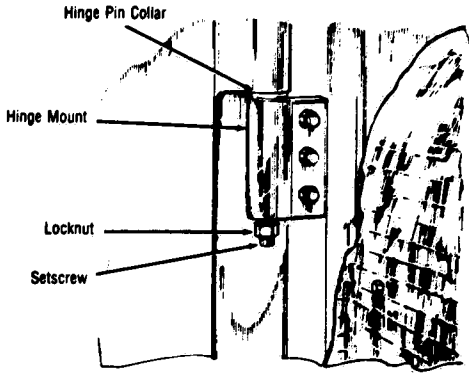


Figure 7-3. HINGE CLEARANCE.

Door Alignment and Shimming Procedure

1. Attach a spring scale to the edge of the door on the side opposite the hinge (Fig. 7-2). If a force of more than 4 lbs is required to open or close the door, check the hinge system as follows:

a. Slowly push the door open and closed with one finger at the upper edge of the door on the side opposite the hinge. Vibration indicates the hinge shoulder pins (Fig. 8-24, 17) are not lined up and require shimming.

b. Check the gears to be sure that they are meshing properly.

c. Check the upper hinge pin to be sure the door is riding on the ball (Fig. 8-24, 16). Measure the clearance between the hinge pin collar and the top of the upper hinge mount as shown in Fig. 7-3. If the clearance is not at least 1/16'', loosen the locknut and adjust the setscrew. Retighten the locknut.

2. Follow the above instructions for the removal of the handwheel and door cover. Replace the handwheel.

3. Close the door and fully engage the locking arms. Measure the distance from the edge of the door to the end frame on all four sides. If necessary center the door as follows:

a. Insert wedges between the bottom edge of the door and the end frame.

b. Loosen the nuts which mount the door to the hinge.

c. Center the door in the end frame so that edges of door are equidistant (approximately 7/8 inch) from end frame. Then tilt the door by raising the side opposite the hinge 1/16 to 1/8 inch. This compensates for deflection in hinge.

d. Resecure the hinge to the door and remove the wedges. The door should hang level. The side opposite the hinge can be 1/16'' higher than the other side if all arms protrude through the end frame at least 1/8 inch.

e. Check that sides of arms do not rub against the sides of the end frame slots. If interference exists, check location of fulcrum blocks and end frame slots.

CAUTION: **The hinge shims must not protrude beyond the end of the door. If hinge shims hang up on the stud threads, the shims could prevent sufficient tightening of nuts, allowing the door to drop.**

4. Open and close the door. Check that the gasket on the side opposite the hinge touches the top and bottom of the end frame at the same time the bottom touches slightly before the top. If they do not touch properly, add shims between the door and hinge. Use the following shims.

(See Figure 7-4)

Part No.	Type	Thickness
P-48932-045	B	0.0598
P-48933-045	A	0.0598
P-77097-049	B	0.0299
P-77100-045	A	0.0299
P-77098-061	B	0.0150
P-77099-061	A	0.0150
P-150034-061	B	0.0050

5. The side opposite the hinge should touch the end frame before the other sides. If it does not, shim the tabs of the hinge as follows:

a. Shim top and bottom tabs.

b. Check that door closes properly.

c. Shim center tabs 0.020 to 0.030 inch less than the top and bottom tabs.

d. Again check that door closes properly.

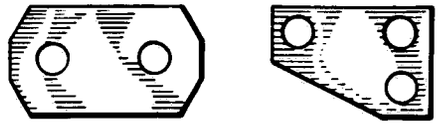


Figure 7-4. DOOR SHIMS.

6. Hinge adjusting cams are stamped on the high side with the letter "X." To adjust door movement in vertical or horizontal, position the cam so that the X moves in the direction opposite to the desired door movement. That is, if cam is positioned so that "X" moves to the right, the door moves to the left; if cam is positioned so that "X" moves down, the door moves up.

7. To adjust door arms, use the following shims:

Part No.	Thickness
P-78652-061	0.062
P-33379-061	0.025
P-33380-061	0.015
P-46078-061	0.010

Adjust door arms as follows:

a. Open and close chamber door.

b. Turn the handwheel clockwise until the arms are in the radial position. The distance between the bottom socket plate and the door should be 1-5/8 inches. This is the starting position for counting revolutions of the handwheel.

c. When shimming the arms, do not allow shims to protrude beyond the edge of the door. Shim the arms so that they tighten in the following sequence:

(1) At four turns, the corner arms should start to tighten.

(2) After six turns, the four corner arms must be tight.

(3) At seven turns, the two top and two bottom arms must be tight.

(4) At eight turns, the three arms on each side must be tight. All arms must be tight.

d. Repeat step c at least two times to make sure that the arms are tightening in the proper sequence.

NOTE: Chamber door may occasionally become distorted due to heating. If this condition prevents proper door closing, the hinge must be reshimmed. It may be necessary to chalk the end frame on the hinge side to check for binding due to gasket interference when closing the door.

8. Perform the following tests. Failure to pass any of the tests is cause for reshimming the chamber door.

a. **Arm Test.** Twist radial arm about its own axis. Arm should not be loose at intersection of end frame and radial arm or intersection of fulcrum point and radial arm. Side play at socket plate is acceptable if chamber is not pressurized.

b. **Blow-by Test.** Close chamber door and engage the door arms in the slots. Do not tighten the arms. Allow steam to enter the chamber with controls set to give maximum steam flow. The gasket must not prevent steam from escaping the chamber.

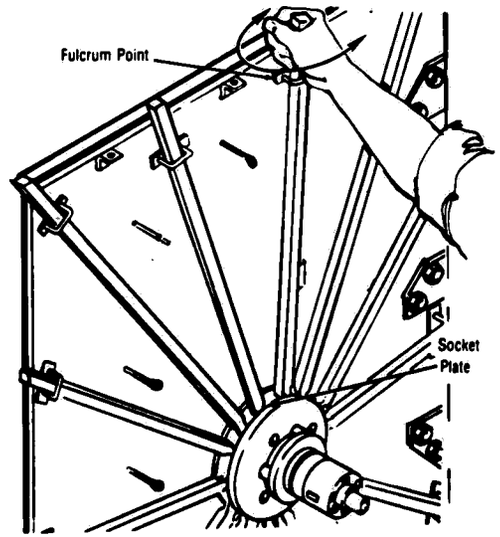


Figure 7-5. ARM TEST — RADIAL ARM.

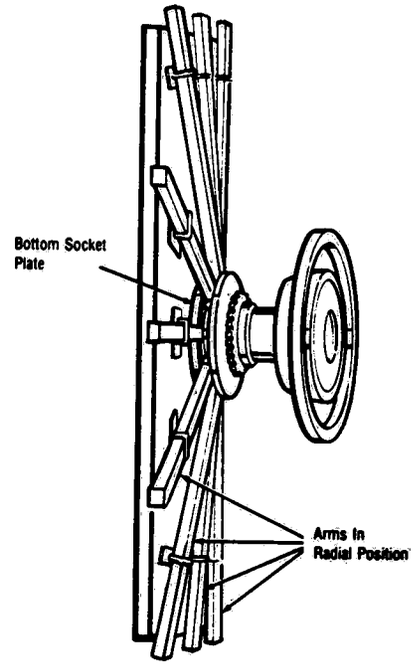


Figure 7-6. TORQUE CHECK CHAMBER DOOR.

c. **Torque Check.** Turn the handwheel clockwise until the arms are in the radial position. The distance between the bottom socket plate and the door should be 1-5/8 inches. Make eight turns of the handwheel. The distance between the bottom socket plate and door should be 19/32 inch. When the door is tightened with 30 to 40 foot-pounds of torque, the distance between the back surface of the bottom plate and the door should be between 3/8 and 5/8 inch.

d. **Leak Test.** Close chamber door. Allow steam to enter the chamber. Hold steam in chamber at operating pressure for approximately five minutes. Gasket should prevent steam from escaping from the chamber. Then exhaust the steam.

9. Replace the door cover.

Replacement of Teflon Stops (Fig. 8-23, 33)

1. Follow the above instructions for the removal of the handwheel and door cover. Replace the handwheel.

2. Place the door in the locked position.

3. Remove the Teflon caps (35) from the top socket plate. Remove the stops (33) only if they are to be replaced. Be sure the stops are securely fastened in the top socket plate.

4. Insert one of the new caps into a stop and unlock the door. (This movement will press the cap into the stop.)

5. Lock the door and repeat step 4 for each remaining cap.

6. Replace the door cover and handwheel.

Power Door Clutch (Lock) Adjustment (Fig. 8-23)

1. Place the shift lever at MANUAL.

2. Turn the handwheel clockwise until the door is fully locked. If handwheel slips while locking door (clutch teeth are not engaged), proceed as follows:

   a. Follow the above instructions for the removal of the handwheel.

   b. Remove shims from between the clutch lock cap (42) and the screw shaft (37).

   c. Replace the handwheel.

3. Repeat step 2 until the clutch teeth engage sufficiently.

4. Close the door and with the shift lever still at MANUAL, press the LOCK button.

5. Hold the handwheel with your right hand. Reach around the handwheel with your left hand and slowly shift from MANUAL to POWER. Add shims between clutch lock cap and screw shaft if handwheel is driven by locking motor.

6. Recheck both the manual and power operation.

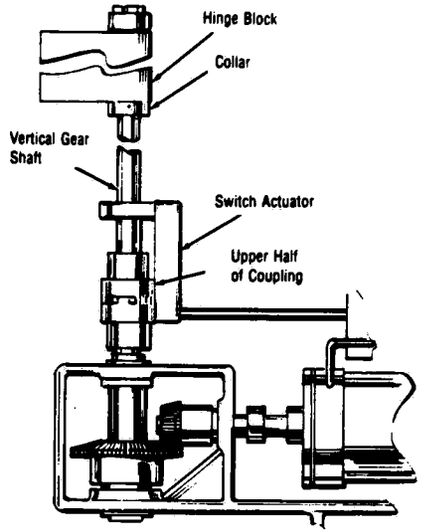


Figure 7-7. HINGE DRIVE ASSEMBLY.

Resetting Electric Clutch to Rated Torque

If the electric clutch in the power-door hinge-drive assembly slips due to lack of use, oxidation or atmospheric contamination; the clutch can be restored to its rated torque as follows:

NOTE: Generally, the procedure consists of energizing the clutch coil, stalling one-half of the clutch, and driving the other half at approximately 1500 rpm for a short interval. During this "run-in", the hinge gear and drive pinion serve as a speed multiplier for half of the clutch while the motor speed reducer acts as a brake to stall the other half.

1. Remove the fuse (Fig. 8-31, 2) from the contactor box. Turn rheostat knob (Fig. 8-30, 24) to maximum resistance position (lowest voltage to clutch coil) to give clutch its lowest holding power.

NOTE: Refer to Figure 7-7 for location of hinge-drive parts.

2. Loosen the setscrews holding collar, switch actuator and upper half of coupling. Remove these parts from vertical gear shaft, and lift shaft out of hinge block.

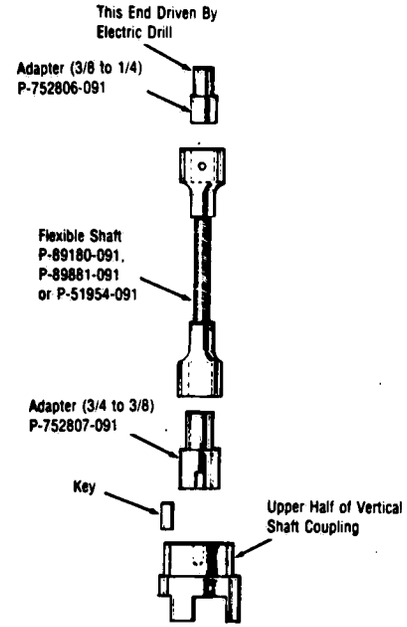


Figure 7-8. CLUTCH DRIVE TOOL ASSEMBLY.

3. Refer to Figure 7-8 for view of clutch-drive tool. Insert adapters into flexible shaft, and assemble the half coupling and key (remove from vertical shaft) onto the 3/4 to 3/8 adapter. Mount 3/8 to 1/4 adapter end of drive-tool assembly into chuck of an electric drill.

4. With the chamber door half open, engage CLOSE button. This will energize the clutch, but the hinge motor will not run because the fuse was removed. The hinge-motor gear box will act as a brake to stall one-half of the clutch.

5. Refer to Figure 7-9 for positioning the drive tool. Join the coupling halves as shown. Drill will drive clutch with gears acting as speed multiplier.

6. Run the drill for 15 seconds, then shut it off for a few seconds. Repeat this procedure two or three times.

7. Disengage CLOSE button and advance rheostat knob one-quarter of a turn. Engage CLOSE button and repeat step "7."

8. Advance rheostat knob another one-quarter of a turn to the one-half setting. Engage CLOSE button, and repeat step "7." Perform this procedure for the three-quarter and full settings of the rheostat.

9. Replace vertical gear shaft and assemble hinge-drive assembly (see Figure 7-7). Set limit switches for proper door swing and adjust rheostat to the lowest setting required to operate the door.

Rheostat Adjustment

The voltage to the electric clutch (Fig. 8-28, 6) is adjusted by use of the rheostat (Fig. 8-30, 25) in the contactor box. This voltage should not exceed 100 VDC. Above this voltage, the strength of the clutch begins to decrease. To measure the voltage, remove the limit-switch-box cover (Fig. 8-29, 1) above the clutch. Connect a D.C. voltmeter to the two wires from the electric clutch.

Hinge Drive Clutch Adjustment (Fig. 8-28)

NOTE: This procedure is to be used when replacing the electric clutch. However, it may also be used for existing clutches by removing the roll pin (see step 4) already installed.

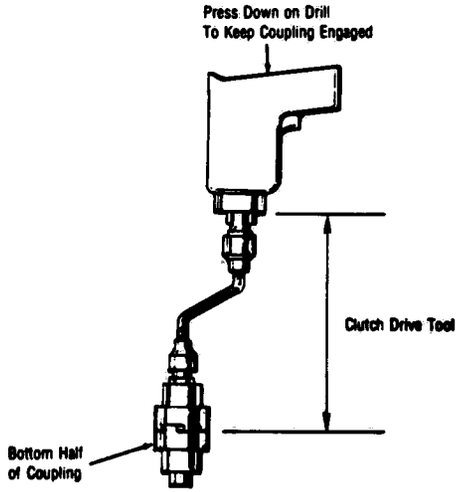


Figure 7-9. DRIVE TOOL POSITION TO DRIVE CLUTCH.

1. Be sure pinion (13) is tight against bushing.

2. Loosen the setscrew (7) on the clutch hub and separate the clutch faces to provide 0.010 to 0.030" clearance between them.

3. Tighten the setscrew and check to be sure the clutch faces are parallel and the outside diameters are concentric.

4. Drill a 3/32" hole through the hub and shaft and insert a 3/32" roll pin.

Hinge Switch Adjustments (Power Door Only) (Fig. 8-28)

1. Turn power switch OFF. Place shift lever in MANUAL position. Push door to fully closed position.

2. Loosen set screw (25) holding switch actuator cam (24) to drive shaft, and rotate until switches (Fig. 8-29, 7) actuate. Tighten set screw. Both switches in the bank must operate simultaneously. If necessary, bend the switch arms slightly to accomplish this.

3. Swing door open, then closed. The hinge switches should actuate when door gasket is 1/16 to 1/8 inch from end ring. Readjust if necessary. (A small fine adjustment may be made with the set screw [Fig. 8-28, 23].)

4. Swing door fully open. Adjust set screw on actuator to operate switches when door is open approximately 110°. Check adjustment by manually swinging door open and closed. (It may be necessary to reposition actuator to bring both adjustments within range of the set screws.)

Door Limit Switch Adjustments (for units shipped after 5/30/80) (Fig. 8-23)

Manual Door Units

1. Loosen screws which hold arm switch cam to locking arm and slide cam away from switch.

2. Loosen screw in center of knurled collar on arm switch LS2 and turn the knurled screw so that the plunger type actuator is at the center of travel. Tighten screws.

3. Close and lock door to 35-40 ft-lbs maximum torque.

4. To set switch, back off door one turn from maximum torque and slide the cam down arm far enough to activate switch. Tighten screws.

5. Final adjustment may be made with knurled collar. Switch should actuate approximately 1 to 2 turns before **maximum door** torque. DOOR UNLOCKED light(s) should go off when the door is tightened and switches are properly adjusted.

Power Door Units

1. Loosen the screws which fasten the actuators of the door switches to the locking arms. Slide actuators away from switches.

2. Loosen the screw in the center of the knurled collar on each switch. Turn collar so that the plunger-type actuator is at the center of travel. Tighten screw.

3. Manually close and lock door (10 to 10-1/2 turns). Slide actuator LS5 against the switch until the switch actuates. Tighten screws to hold the cap in place. Switch should actuate when all arms are tight.

4. Turn the handwheel 2 turns counterclockwise and adjust actuator on LS2 to actuate switch.

5. Turn handwheel counterclockwise until screw box collar contacts the Teflon® brake shoe. Move actuator LS3 until it actuates the switch. Tighten actuator in place. Move shift lever to AUTOMATIC position.

Door Limit Switch Adjustments (for units shipped before 5/30/80)

Manual Door Units

Follow procedure outlined for units shipped after 5/30/80.

Power Door Units

Units shipped before 5/30/80 have a two-step (double action) limit switch, LS2. This switch functions as follows:

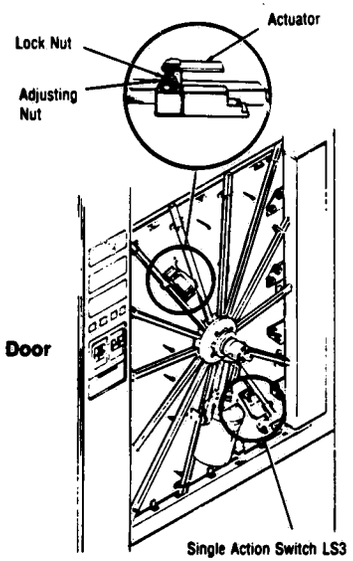
When the door is sufficiently tightened, the first section of switch LS2 actuates (1st click) to enable the controller to start the cycle. DOOR UNLOCKED light goes out. Door locking motor continues to run until the second section of switch LS2 actuates (2nd click). Motor stops.

Adjustment

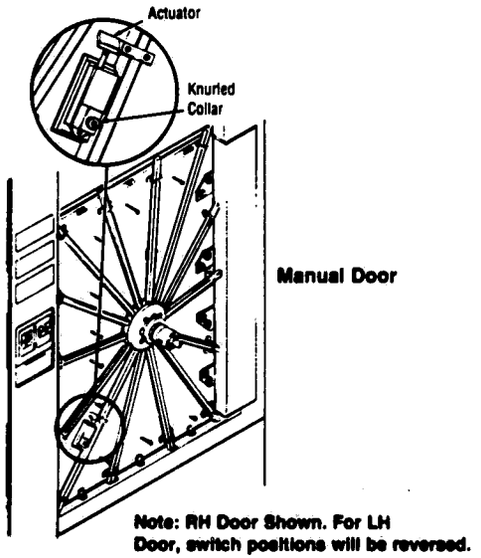
Double Action Switch

1. Close door and turn handwheel clockwise 10 turns.

Double Action Switch LS2



Single Action Switch LS3



Note: RH Door Shown. For LH Door, switch positions will be reversed.

Figure 7-10. DOOR LOCKED LIMIT SWITCH.

2. Loosen locknut and turn handwheel in all the way (clockwise).

3. Turn shaft counterclockwise until the second click is heard. Tighten locknut.

Single Action Switch

Limit switch LS3 is adjusted in the same way as double-action switch LS2.

Final Adjustment

1. Turn POWER and CONTROL switches ON. Press CLOSE button. Turn potentiometer knob clockwise until magnetic clutch slips, then counterclockwise until it engages again. Door should swing shut and hinge limit switch (Fig. 8-27, 7) should actuate to turn off hinge drive motor when door gasket is within 1/16" to 1/8" of end ring. Readjust hinge switch cam, if necessary. Open and close door several times to check clutch adjustment.

2. a. With door open, press the LOCK button. Door should swing shut and locking arm motor start. The hinge drive motor should run 3 seconds after door closes to assure that the door is held against the end ring until the door is sealed steam tight. Adjust screw of limit switch LS5 to shut off locking arm motor at right time.

b. Press the UNLOCK button. Locking arm motor should start and retract the locking arms. Motor should shut off just as screw box collar contacts the Teflon brake shoe. Adjust the knurled collar on limit switch LS3 if necessary.

Overload Relay Test

1. Insert a 1/2-inch thick wooden block between the bottom socket plate and door face, to prevent locking arms from traveling far enough to actuate the limit switches. This will cause the locking arm motor to stall. Overload relay "A" (see schematic) should trip within 60 seconds to de-energize motor.

2. Move shift lever to Manual position, turn handwheel counterclockwise to release block, and remove block. Return shift lever to POWER position. Check that motor is cut out in unlock position also.

3. Press button on circuit breaker (Fig. 8-30, 23). Operate door through LOCK and UNLOCK cycles, to ensure that relays have reset properly.

Diaphragm Operation Check

After replacing and reassembling the diaphragm, ensure that the door properly locks and unlocks under operating pressure. Door should lock between 1/2 and 6 psig rising steam pressure and unlock between 1/2 and 5 psig falling steam pressure.

7.4 AIR FILTER ASSEMBLY

Refer to Figure 8-45.

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

Removal and Replacement of Filter Cartridge

1. Take out the four bolts holding bowl to head, and remove bowl and "O" ring.

2. Unscrew cartridge retainer (5). It contains the filter and its gasket, also a plastic spacer. Separate these parts.

3. Clean all parts by wiping with a soft cloth, and inspect all parts for damage. Replace parts as necessary.

NOTE: Flanged end of filter element with small hole faces bottom of bowl.

4. Insert plastic ring (4), followed by filter cartrige (1) and gasket (3) into cartridge retainer. Be sure that gasket is seated against flange on filter.

5. Screw retainer onto head, and replace bowl, taking care to tighten bolts evenly.

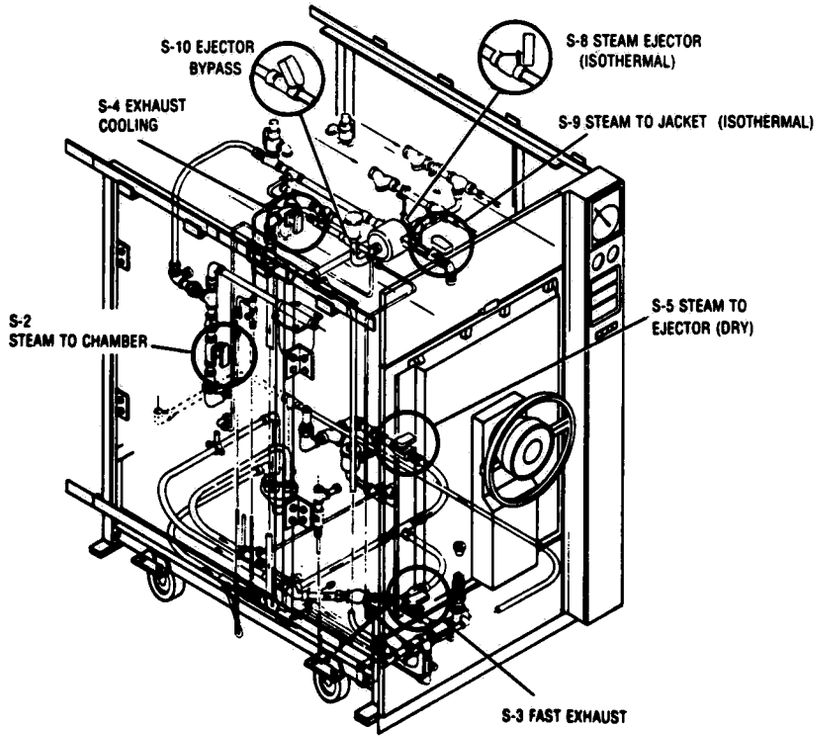


Figure 7-11. LOCATION OF SOLENOID VALVES.

7.5 SOLENOID VALVES

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

Principle of Operation

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

Direct-acting Valve (Fig. 7-12): In direct-acting valves, the solenoid core is mechanically connected to the valve disc and directly opens or closes the orifice, depending on whether the solenoid is energized or deenergized.

Internal pilot-operated Valve (Fig. 7-13): This valve has a pilot, a bleed orifice, and utilizes the line pressure for operation. When the solenoid is energized, it opens the pilot orifice and releases pressure from the top of the valve piston or diaphragm to the outlet side of the valve. This results in an unbalanced pressure which causes the line pressure to lift the piston or diaphragm off the main orifice, thereby opening the valve. When solenoid is de-energized the pilot orifice is closed and full line pressure is applied to the top of the piston or diaphragm through the bleed orifice, thereby providing a seating force for tight closure.

Testing

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

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

b. Check solenoid coil for open circuit or ground.

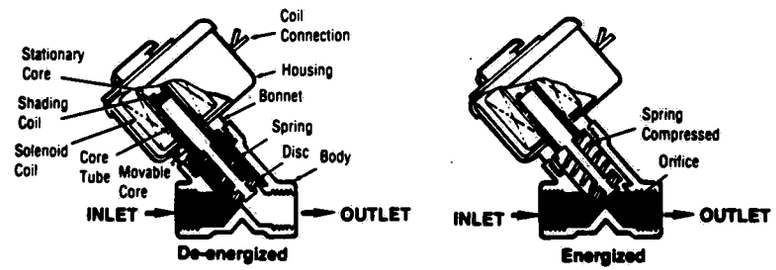


Figure 7-12. DIRECT-ACTING SOLENOID VALVE.

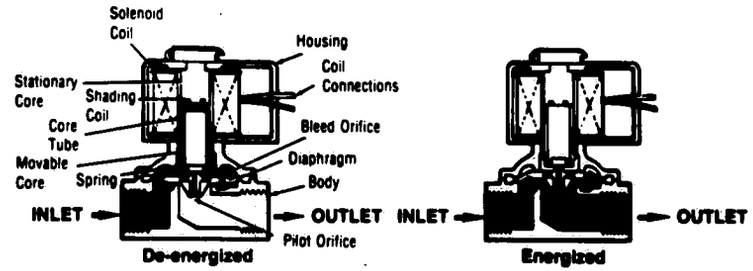


Figure 7-13. INTERNAL PILOT-OPERATED SOLENOID VALVE.

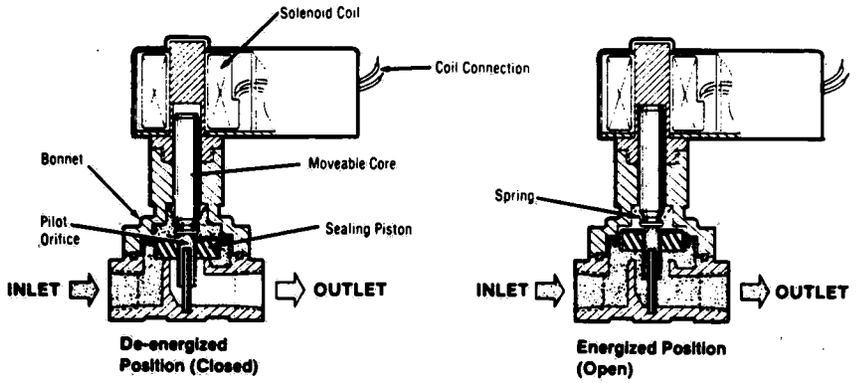


Figure 7-13A. PISTON TYPE SOLENOID VALVE.

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

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

NOTE: When replacing a diaphragm, the bonnet bolts should be torqued to 50 in/lbs. on reassembly.

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

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

7.6 STEAM TRAP (Fig. 8-43)

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

Disassembly

1. Unscrew and remove the cap (1) and attached diaphragm assembly (3). Use a hex socket wrench to unscrew and remove seat.

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

3. Wipe out the bowl (5) taking care that loose material does not enter the piping.

4. Test diaphragm for flexibility. (Unscrew from cap if necessary.) Examine solder joints for cracks or leaks; dip diaphragm in boiling water and look for a noticeable expansion. An element in good condition will be difficult to stretch by hand and will return to its original condition quickly when released. Examine the seat for wear.

Reassembly

NOTE: Use new parts as necessary. Repair kit part number is P-764080-001.

1. Screw seat in firmly. (Use hex socket wrench.)

2. Replace cap and attached diaphragm assembly, using a new gasket.

7.7 STRAINERS

These should be opened for cleaning at least twice a year. Accumulation of sediment and rust will reduce pressure and flow. In extreme conditions, complete blockage may occur.

Disassembly

1. Remove hex plug and gasket.

2. Pull out strainer screen from body.

3. Scrape and polish all rust and residue from strainer screen and body. Use a wire brush or steel wool. Be sure that all perforations are clear, by poking open with a wire. Replace screen if damaged, rusted or corroded.

Reassembly

1. Insert screen into strainer body. Take care that no dirt or other particles remain in strainer body.

2. Replace and tighten hex plug. Use a new gasket if necessary.

3. Make certain that all pipe connections are tight after assembly.

7.8 CHECK VALVES

Repair of check valves is limited to cleaning of valve seats when foreign matter causes improper operation. When a valve becomes defective, the entire valve must be replaced.

7.9 VACUUM BREAKER

Disassembly

1. Unscrew and remove bonnet assembly.

2. Remove friction ring and air valve seat.

3. Remove assembled ballast and float.

4. Separate ballast and float.

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

Reassembly

1. Assemble ballast and float.

2. Slide float/ballast assembly into valve body, making sure that the assembly moves freely in valve body.

3. Insert air valve seat and friction ring.

4. Screw on bonnet assembly.

5. Test for leaks. No water leakage at bonnet is permissible.

7.10 STEAM CONTROL VALVE, HI-LO (Fig. 8-42)

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

Disassembly

1. Remove pilot line fitting at top of valve. Turn adjusting screw (18) counterclockwise until spring is completely free of compression. Remove screw (12) and turn entire top assembly to align lugs on bonnet and sylphon assembly (19) with notches on bottom plate. Lift top assembly off.

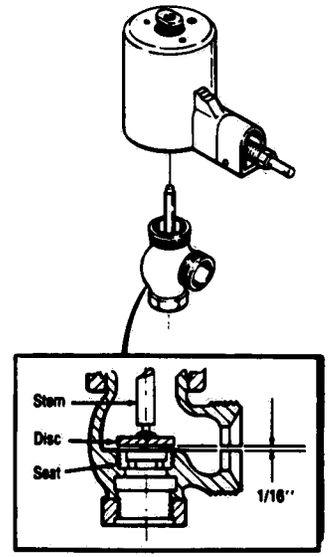


Figure 7-14. HI-LO VALVE ADJUSTMENT.

2. Remove four screws (3) which secure cover to bottom plate (13), lower spring plate (8), spring (7), and upper spring plate (6).

3. Remove two screws (2), reinforcement (4), and bellows assembly (5).

4. Remove cotter pin (11), pull out fork pivot pin (10), and remove fork (9).

5. Unscrew and remove sylphon and bonnet assembly (19) from valve body; also unscrew and remove valve seat (21).

6. Pull stem and disc assembly (20) from sylphon. Carefully clean valve components. Carefully examine the bellows assembly, and the sylphon and bonnet assembly for cracks. Check valve seat and valve stem assembly for etching, scratches, or other evidence of damage or leakage. Replace if worn or marred. Examine all parts for wear or damage. Replace as necessary.

Reassembly

1. Screw valve seat (21) into body (hex side down).

2. Replace stem and disc (20) in sylphon (19), and screw bonnet onto body.

3. Position fork (9) on bottom plate (13). Insert pivot pin (10) and cotter pins.

4. Screw reinforcement (4) onto bellows; and fasten to cover with two screws (2).

5. Set lower spring plate (8), spring (7), and upper spring seat (6) in place. See that the lugs on the spring seat are properly positioned in the fork bearings.

6. Replace cover (1) and bellows (5), and secure cover with the four screws (3).

7. Lower this entire assemblage into position over the sylphon, aligning the notches in the bottom plate with the lugs on the bonnet, to allow the bottom plate to seat on the bonnet. Replace screw (12).

8. Turn adjusting screw (18) fully counterclockwise, to remove all tension from the spring. Turn the stem protruding from the bellows to establish a clearance of 1/16 inch between the seat and the disc (Fig. 7-14). If valve was not removed from sterilizer, open side connection to see disc and seat.

9. Adjust high and low settings according to paragraph 7.14.

7.11 VALVE ASSEMBLY, ANGLE (Fig. 8-44)

Cleaning and Inspection

1. Open valve fully, and disconnect extension rod coupling by driving out roll pin.

2. Remove packing nut (3), gland (4), and bonnet nut (6). Remove bonnet assembly (2) from valve body and remove packing.

3. Unscrew stem (8) from bonnet. Remove disc holder (10) from stem and install new disc.

4. Examine valve seat (13) for scratches, nicks, or wear. Remove and replace if necessary. Clean and inspect all components; replace as necessary.

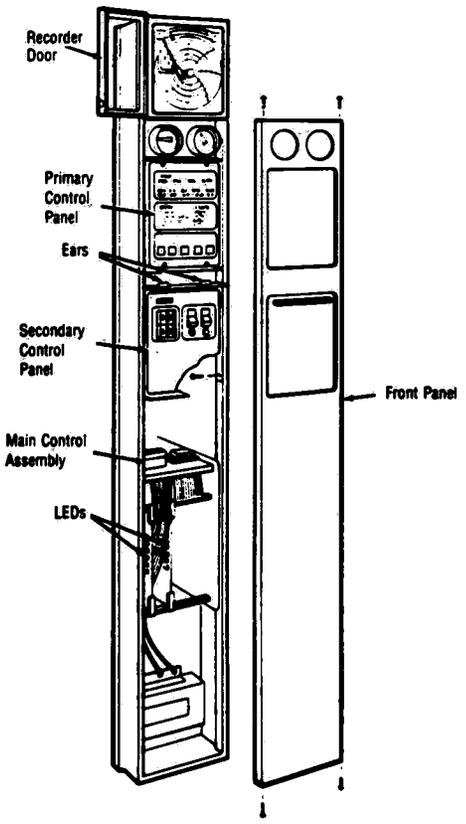


Figure 7-15. CONTROL CONSOLE.

Reassembly

1. Lubricate stem threads with Molykote Type "U", and replace disc holder assembly on stem.

2. Screw stem into bonnet, and install new packing, forcing it into place with packing nut and gland.

3. Replace bonnet assembly on valve body, and tighten bonnet and packing nuts. Tighten only enough to prevent leakage. Excessive tightening will make valve hard to operate.

7.12 CONTROL COLUMN

The primary and secondary control panels, controller, and other components in the control column are made accessible for servicing by removing the front panel. See Figure 7-15.

1. Remove the two #10-32 socket head screws from bottom of panel.

2. Open recorder door. Remove the two #8-32 button head screws thus exposed from top of panel.

3. Lift off panel and set aside. All internal components are now accessible for maintenance and servicing.

4. The primary control panel is held in place by four screws. Take out these screws to remove the panel for control servicing.

a. The light bulbs are removed by moving the retainer aside and lifting out the bulb. See Figure 7-16.

b. If the entire primary control is to be replaced, replacement control (PN 146163; Fig. 8-10, 24) must be modified as follows, according to whether the sterilizer is a Gravity or Laboratory/Isothermal type.

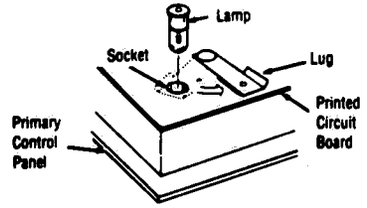


Figure 7-16. LAMP REPLACEMENT.

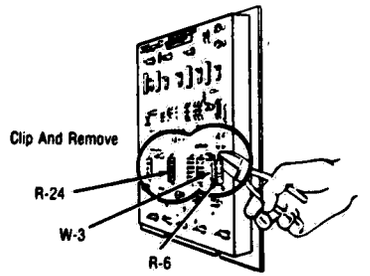


Figure 7-17. CLIP AND REMOVE R-24, R-6, W-3: Gravity Model Sterilizer.

For a **Gravity** sterilizer, clip and remove **R-6 and** R-24. See Fig. 7-17.

For a **Laboratory/Isothermal** sterilizer, clip and remove R-6. See Fig. 7-18.

NOTE: On units shipped after 11/15/81, it is possible to plug P1, P2, and P3 into the **wrong set of jacks** on the new mother board. If cycle cannot be selected, or if the heaters cannot be controlled, or if the Primary Panel lights are lit and cannot be cleared, check the jacks into which P1, P2, and P3 are connected. They must be as follows:

Plug	Jack
P1	J1-A
P2	J2-A
P3	J3-A

5. The secondary control panel is held in position by two screws, located behind the panel at the bottom. Remove these screws, swing bottom of panel forward and down to disengage ears at top. Lift panel away, being careful of the wires attached thereto.

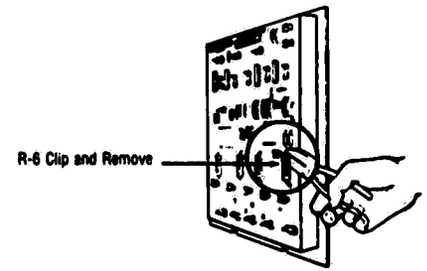


Figure 7-18. CLIP AND REMOVE R-6: Laboratory/Isothermal Sterilizer.

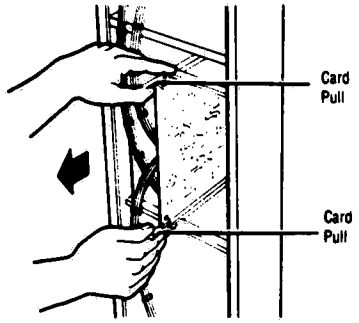


Figure 7-19. REMOVING A PRINTED CIRCUIT BOARD.

CAUTION: Use extreme care when opening a container of electronic parts. Avoid circumstances wherein a build-up of static electricity could discharge.

6. The printed circuit boards in the controller are removed by lifting the card pulls to disengage the contacts from the socket, and pulling the card straight out. See Figure 7-19. Use both card pulls simultaneously, to ensure starting the card straight. This prevents damage to the socket contacts. The controller itself is held in position by a single screw, located at the top. Unplug the two cables from controller, remove screw, and slide controller forward on its rails. For removal of Indicator-Recorder-Controller, refer to paragraph 7.2.

After replacing any printed circuit board, especially those failing during the warranty period, the following must be adhered to:

a. Put defective board into static-proof plastic bag in which replacement board was shipped.

b. Place plastic bag (with defective board) into replacement part shipping carton.

c. Initiate service order and **enclose a copy with defective board.** Include the following information:

1) reason for return (failure mode of equipment)

2) general condition of board

3) quantity

4) individual item identification (part number, serial number, etc.)

5) serial number of machine from which board was removed plus cycle count of machine.

d. Wrap shipping carton with protective wrapper or cover (envelope, paper, box, etc.)

e. Return board (and all other microprocessor parts) to AMSCO in Erie. Mark the package to the attention of the RETURNED MATERIALS SPECIALIST.

This procedure must be followed to avoid inadvertent damage by static electricity.

NOTE: Static electricity is a problem because of its ability to damage printed circuit boards. If a static discharge happens to go through an integrated circuit, and the transient current pulse is not effectively diverted by protective circuitry, the current from the discharge can flow through the board and raise the temperature of internal junctions to their melting points. Damage can range from complete destruction to latent degradation.

7.13 ADJUSTMENT OF PRESSURE SWITCHES

1. Adjust steam pressure regulator to control jacket pressure at 20 psig. After adjustment is made, lock low stop. See Figure 7-20.

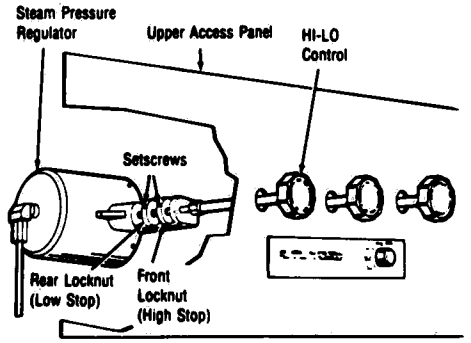


Figure 7-20. ADJUSTING PRESSURE REGULATOR.

2. Close slow exhaust valve and then open slow exhaust valve 2.5 turns.

3. Close and lock door.

4. Set orange (top) pointer on recorder to 250° F (121° C).

5. Set STERILIZE time to 1 minute and DRY time to 0 minutes. Set GRAVITY/ISO switch to GRAVITY.

NOTE: Refer to cycle graph for Liquids cycle.

6. Depress the LIQUIDS cycle button.

7. After the sterilize phase has completed and control has advanced to slow exhaust, observe calibrated compound pressure gauge. When chamber pressure reaches 3 psig adjust PS-3 (Figure 5-7) to open the fast exhaust valve (S-3) (LED-12). When chamber exhausts to 1 psig adjust PS-2 to turn on the COMPLETE light and the buzzer (LED-18).

8. Press RESET button on control panel and initiate another LIQUIDS cycle as in step 6.

9. When cycle advances to slow exhaust, observe the compound pressure gauge to assure proper setting of PS-3 at 3 psig and PS-2 and 1 psig.

7.14 ADJUSTMENTS FOR STERILIZATION BELOW 250° F (121° C)

The HI-LO valve (steam pressure regulator) on this sterilizer was factory set for 250° and 270° F (121° and 132° C) sterilization cycles. If sterilization procedures routinely require temperature control below 250° F (121° C) i.e. laboratory procedures, the LO setting may be changed. Following the procedure below.

1. If a freestanding sterilizer, remove a cabinet side panel for access to the HI-LO valve; If a recessed model proceed to the area behind the recessing wall.

2. Remove adjusting screw cover (Fig. 7.20).

3. Loosen setscrew on front locknut; turn locknut until it is against the rear locknut.

4. Follow instructions in paragraph 2.2, "Before Operating the Equipment".

5. Using the following chart (Fig. 7-21), adjust the HI-LO valve until jacket pressure as indicated on the jacket pressure gauge corresponds with the desired processing temperature.

6. Follow cycle instructions starting with step 3 of paragraph 2.3. if a Gravity cycle; paragraph 2.4 if a Liquids cycle, except set the yellow pointer on the indicator-recorder-controller for the desired processing temperature.

NOTE: At lower setting the indicator-recorder-controller will maintain chamber temperature at a slightly higher than set temperature ... if necessary, wait until cycle reaches the sterilize phase and readjust the yellow pointer until the recorder chart indicates the exact temperature.

7. Steps 4,5, and 6 will have to be repeated for each new temperature. If temperature is not to be changed, turn locknut on HI-LO valve until it is against the stop on the bottom plate, then tighten the setscrew.

NOTE: The jacket pressure/processing temperature relationships provided in this chart are guidelines for optimum performance of this Eagle Series sterilizer. They do not represent actual pressure/temperature ratios.

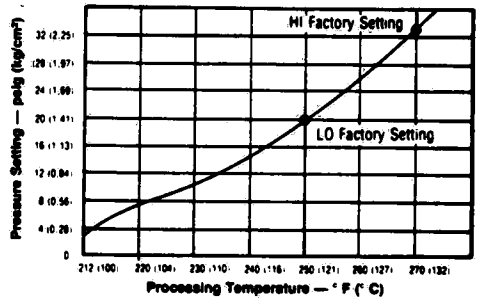


Figure 7-21. PRESSURE REGULATOR SETTINGS.

8. Replace the adjusting screw cover and , if applicable the cabinet side panel.

7.15 POWER SUPPLY ADJUSTMENT PROCEDURE (IRC) (Fig. 7-22)

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

1. With control power (CB1) off, connect B & K Model 2800 DVM to ground post of capacitor C101 (-) and to terminal post E2 (+). (See Figure 7-22.)

2. Set DVM to 10 VDC scale and turn control power (CB-1) on. Machine should be idling (no cycle in progress).

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

4. Turn pot R433 two turns in the opposite direction.

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

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

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

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

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

b. Adjust pot R433 for an output of 5.15 volts.

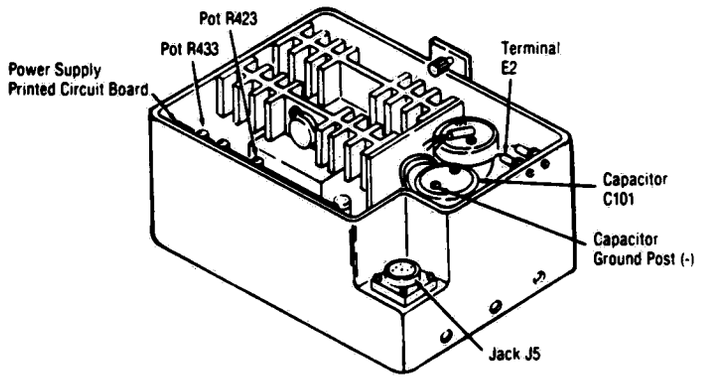


Figure 7-22. POWER SUPPLY (IRC).

7.16 PRINTCON PRINTER

NOTE: Two styles of printer assemblies are in use. Units manufactured before 6/85 used a 12V DC gearmotor to drive the carbon copy into a collection coil. Units manufactured after 6/85 used a 120V AC gearmotor to pull the copy onto a spool.

Changing Paper (Figs. 7-23, 7-24, 7-25)

(All Units)

NOTE: Printcon is designed to use 2-3/8 inch wide, one- or two-ply paper tape as supplied by AMSCO. Paper tape supplies must not be stored in areas of high humidity or temperature.

1. Open printer door. Swing printer assembly forward and downward and allow it to rest in the service position.

2. If one ply of paper has been inserted into the daily record storage area, it will be necessary to remove the stored daily record before continuing. Refer to paragraph, "Removing Stored Daily Record".

3. Using thumb and index finger, grasp paper spool and raise it upward.

4. Slide the empty paper spool toward the right and off the spindle.

5. Insert fresh paper roll onto spindle with loose end or ends of paper in back of roll going downward.

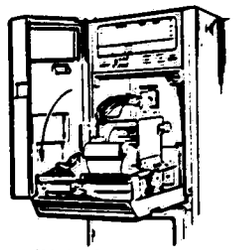
6. Insert loose end of one-ply roll or both ends of two-ply roll into paper slot. Using index finger of left hand, operate paper advance toggle switch to the forward position (toward the operator). Lower paper roll and spindle. If necessary, operate paper advance toggle switch again until the paper is drawn taut. Turn off paper advance.

7. Swing printer assembly upward and back into operating position.

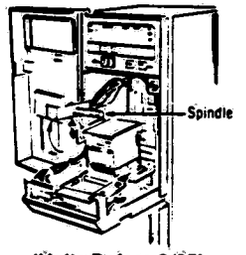
Automatic Paper Storage (Fig. 7-26)
(Units Before 6/85)

Printcon is capable of storing fifteen feet of single ply paper.

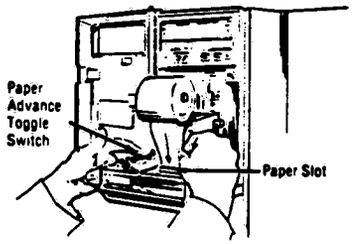
NOTE: AMSCO suggests that when using two-ply paper, the inner ply **only** should be inserted into the storage area for a permanent record. The outer ply can be torn off and placed with each sterilized load.



(Units Before 6/85)
Figure 7-23. PRINTER IN LOWERED POSITION.



(Units Before 6/85)
Figure 7-24. SPINDLE IN RAISED POSITION.



(Units Before 6/85)
Figure 7-25. INSERTING PAPER.

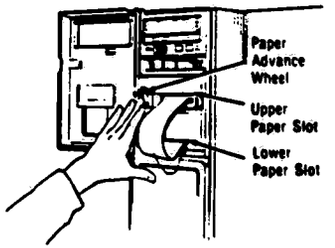


Figure 7-26. INSERTING PAPER INTO AUTOMATIC PAPER STORAGE AREA.

1. Using the paper advance wheel on the left side of the upper paper slot, advance paper until it extends 2 to 3 inches below lower paper slot.

2. Insert end of paper tape between motorized pinch rollers and allow to draw tight. The paper advance toggle switch must be in the rear position (away from the operator) to operate the motorized pinch rollers.

Automatic Paper Storage (Fig. 7-26)
(Units After 6/85)

1. Open door on secondary control panel and position POWER switch to OFF.

2. Using the paper advance thumbwheel on the left side of the upper paper slot, advance paper until it extends 6 to 8 inches below the lower paper slot.

NOTE: AMSCO suggests that when using two-ply paper, the inner ply **only** should be inserted into the storage area for a permanent record. The outer ply can be torn off and placed with each sterilized load.

3. Insert the end of the paper tape into the lower paper slot until full 6 to 8 inches is inserted.

4. Swing printer assembly forward and downward and allow it to rest in the service position.

5. Grasp end of the paper tape, fold the two corners to form a V and fully insert the end into the slot of paper take-up spool. (Fig. 7-26A)

6. Position the POWER switch to ON. Paper take-up spool will take up the paper until taut.

7. Swing printer assembly upward and back into operating position.

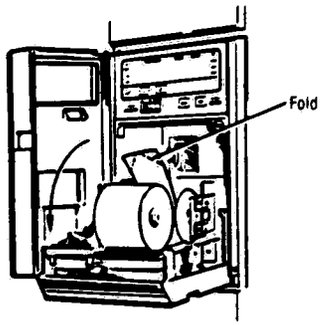
Removing Stored Daily Record (Figs. 7-27, 7-28, 7-29) **(Units Before 6/85)**

1. Open printer door. Crease the paper tape with a fingernail and tear tape as straight as possible. Allow trailing end of paper to enter rollers and storage area.

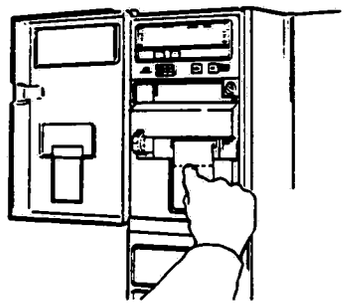
2. Swing the printer assembly forward and downward and allow it to rest in the service position.

3. Using thumb and index finger, grasp knob on storage area door and open door downward. Daily record is now easily removed from the right.

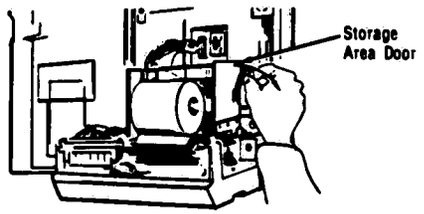
4. Close storage area door. Return printer assembly upward and back to the operating position.



(Units After 6/85)
Figure 7-26A. FOLD PAPER TAPE.



(Units Before 6/85)
Figure 7-27. CREASING PAPER TAPE.



(Units Before 6/85)
Figure 7-28. OPENING STORAGE AREA.

5. Using the paper advance wheel on the left side of the upper paper slot, advance paper until it extends 2 to 3 inches below lower paper slot.

6. Insert end of paper tape between motorized rollers and allow to draw tight. Close door.

Removing Stored Record (Fig. 7-29A)
(Units After 6/85)

Printcon is capable of storing an entire roll of paper, however stored record may be removed at any time.

1. Open door on secondary control panel and position the POWER switch to OFF.

2. Open printer door. Using the paper advance thumbwheel on the left side of the upper paper slot, advance paper until it extends 3 to 4 inches below the lower paper slot or until all information on the tape has been advanced.

3. Tear or cut the paper tape.

4. Swing printer assembly forward and downward and allow it to rest in the service position.

5. Position the POWER switch to ON. Paper will advance onto paper take-up spool. Position the power switch to OFF when paper is completely advanced.

6. To remove paper take-up spool, release tension on spring-loaded retaining clip and lift spool from unit.

7. Remove spool end plate and slide paper from spindle.

8. Replace spool end plate and return spool to spring-loaded clip.

9. Refer to paragraph "**Automatic Paper Storage (Units After 6/85)**" to reload spool.

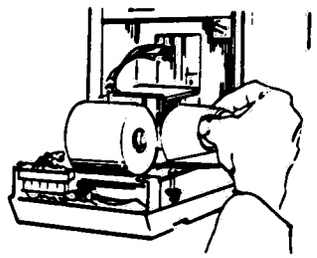
Changing The Inked Ribbon Cartridge (Fig. 7-30)
(All Units)

1. Tear off loose end of paper and open door to the left.

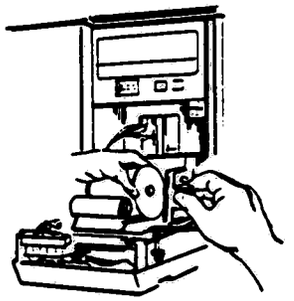
2. Remove old cartridge by placing index finger behind cartridge and pulling forward.

3. Install new cartridge, with ribbon above loose end of paper, by placing it into position and snapping it into place with thumbs of each hand.

4. Close door.



(Units Before 6/85)
Figure 7-29. REMOVING STORED DAILY RECORD.



(Units After 6/85)
Figure 7-29A. REMOVING STORED RECORD.

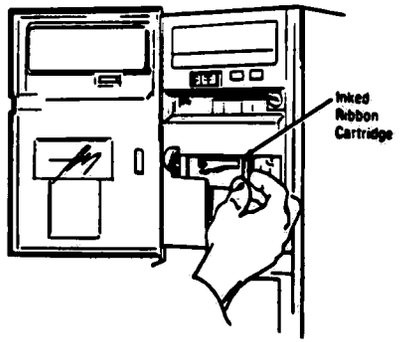


Figure 7-30. REMOVING INKED RIBBON CARTRIDGE.

Printer Replacement (Fig. 7-32 or 7-32A) **(All Units)**

1. Open the outer door of the unit.

2. Tilt the printer assembly forward to service position and remove the two #6-32 screws and washers from the back of the printer mounting plate that anchor the silver anodized cover.

3. Remove the cover by disengaging it from the pivot shoulder screws.

4. Unsolder wire #11 from the printer (units before 6/85) or wire #119 (units after 6/85).

5. Pivot the assembly back to the operating position and disconnect J1 and J2 connectors which are plugged into the J20 receptacle mounted on the upper left edge of the printer mounting plate.

6. Printer can now be disassembled by removing the three 1/4-20 hex nuts — two on the right end and one on the left end of the printer.

7. Reconnect wire #11 (units before 6/85) or wire #119 (units after 6/85) when new printer is installed.

Paper Advance Toggle Switch Replacement (Fig. 7-32 or 7-32A) **(All Units)**

1. Open the outer door of the unit.

2. Tilt printer assembly forward to the service position and remove the two #6-32 screws that hold the silver cover in position. Remove cover by disengaging from pivot shoulder screws.

3. Unsolder all wire connections to switch and then remove locking nut and washers from toggle side to remove.

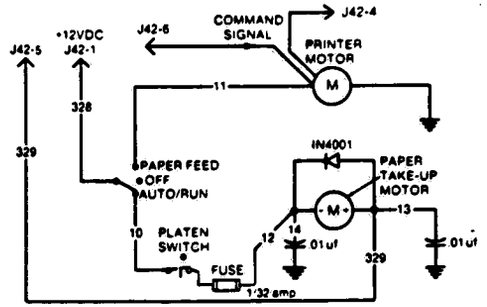
4. See Figure 7-31 or 7-31A to rewire the new switch.

Platen Microswitch Replacement (Fig. 7-32 or 7-32A)

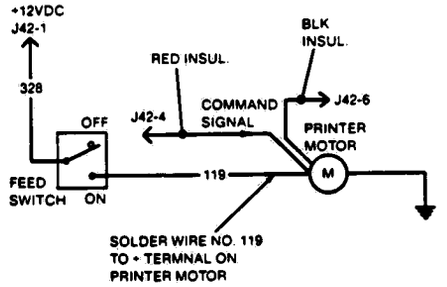
CAUTION: 120 Volts AC is present on microswitch terminals of units manufactured after 6/85 when sterilizer power is on. Turn power off.

1. Open the outer door of unit.

2. Tilt the printer assembly forward to the service position and disassemble the silver anodized cover by removing the two #6-32 screws and washers from the printer mounting plate anchoring the cover arms.



(Units Before 6/85)
Figure 7-31. SWITCH & MOTOR SCHEMATIC.



(Units After 6/85)
Figure 7-31A. SWITCH & MOTOR SCHEMATIC.

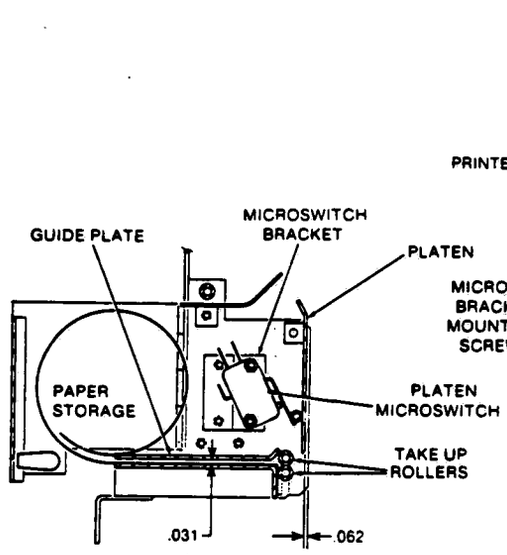
3. Remove the two #6 x 1/4 self-tapping screws on the right hand side of printer take-up unit located 5/8" forward of printer mounting plate on 31/32" centers.

4. Swing the platen open to expose the switch and mount.

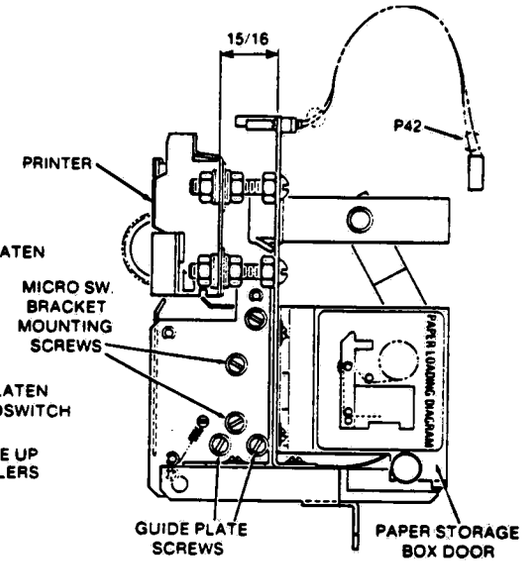
5. Reach in with fingers and pull the switch assembly out and disconnect the two wires with "fast-on" connectors from the switch tabs.

6. Switch and mount are now free. Disengage the switch from the mount by removing the two #4-40 hex nuts.

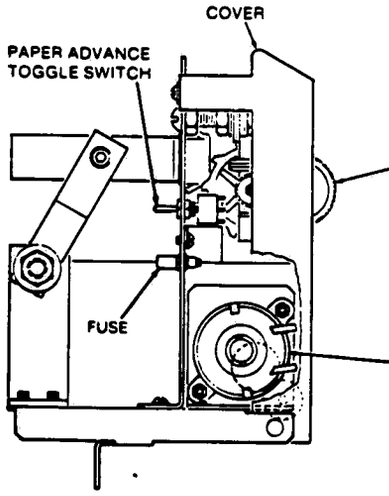
7. See Figure 7-31 or 7-31A to rewire the new switch.



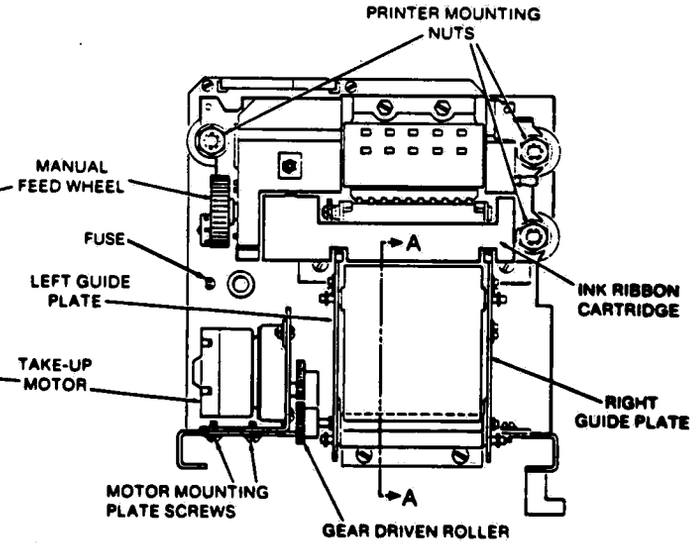
SECTION A-A



RIGHT SIDE VIEW
(COVER REMOVED)

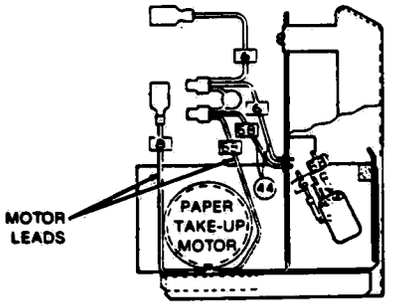


LEFT SIDE VIEW
(COVER ATTACHED)

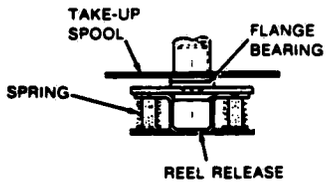


FRONT VIEW
(COVER REMOVED)

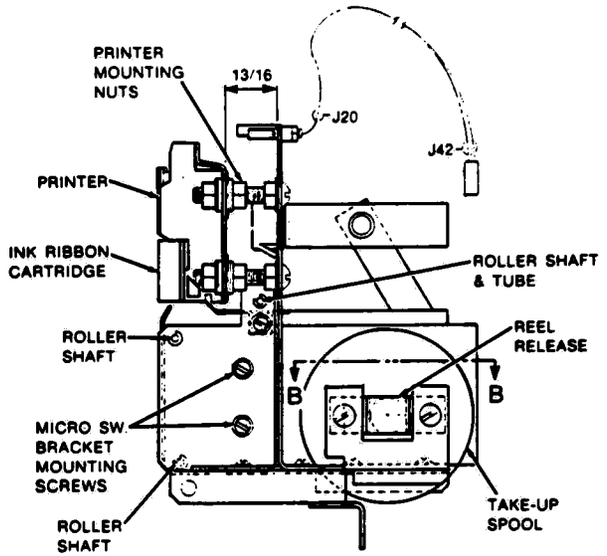
Figure 7-32. PRINTCON PRINTER ASSEMBLY (Units Before 6/85).



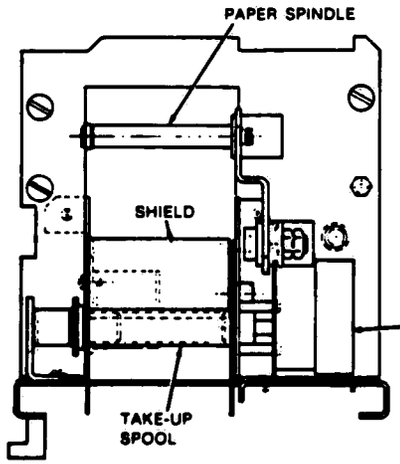
WIRING ARRANGEMENT



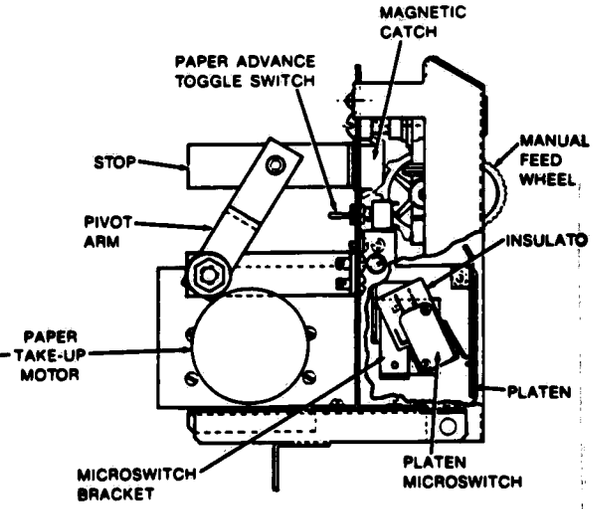
SECTION B-B



RIGHT SIDE VIEW
(COVER REMOVED)



REAR VIEW
(COVER REMOVED)



LEFT SIDE VIEW
(COVER ATTACHED)

Figure 7-32A. PRINTCON PRINTER ASSEMBLY (Units After 6/85).

Take-Up Motor Replacement (Fig. 7-32) **(Units Before 6/85)**

1. To replace take-up motor, the complete printer take-up assembly must be removed. Tilt the assembly forward and disconnect J42 plug from the main Printcon PC board. Also remove the two #6-32 screws and washers that hold the silver anodized cover in place.

2. Disengage the slots from the pivot shoulder screws and remove the cover.

3. Pivot the unit back to the upright position and remove the slot head shoulder screws and washers.

4. Disassemble the printer take-up assembly from Printcon housing.

CAUTION: Take necessary precautions to keep any of the washers or screws from dropping into control column.

5. To remove the take-up motor, unscrew the two #6-32 screws from the bottom of the unit.

6. Unsolder the wire connections and remove the motor and motor mount.

7. Disassemble the motor from the motor mount by unscrewing the two #4-40 nuts and screws holding them together.

8. See Figure 7-30 to rewire the new switch.

Printer Assembly Inspection and Adjustment (Fig. 7-32) **(Units Before 6/85)**

Whenever any of the following components are replaced, they must be aligned and/or adjusted to assure smooth paper advance and take-up.

- Printer.
- Paper Advance Toggle Switch.
- Platen Microswitch.
- Take-up Motor.

Dismount the unit from the control column and remove it to a bench.

1. Unplug P42 from the main Printcon PC Board. Unfasten the two 10-32 shoulder screws upon which the assembly pivots. Remove the printer assembly.

2. Remove the paper roll.

Paper Coil and Guideplate Clearance (Units Before 6/85).

1. Open the paper storage area door and inspect for 1/32" (.031) clearance between the paper coil and the guideplate. If this dimension is not correct, unfasten the take-up motor (with motor attached). The left-side adjustment screws are now accessible.

2. Loosen the four adjustment screws (two on each side) on the right and left side plates. Using a 1/32" (.031 or .032) feeler gauge for clearance between the paper coil and guideplates, adjust the guideplate position and then tighten down.

3. Remount the take-up motor mount and motor.

Microswitch Activation Adjustment (Units Before 6/85)

CAUTION: 120 Volts AC is present on microswitch terminals of units manufactured after 6/85 when sterilizer power is on. Turn power off.

1. Lift up the platen and observe the screws which mount the microswitch bracket to the right side plate. Loosen them slightly.

2. Adjust the microswitch position so that the trip point is audible when the platen is parallel to and about 1/16" below the ends of the side plates.

3. Tighten the screws securely.

Printer Alignment With Take-up Mechanism (Units Before 6/85)

If the printer has been replaced, it must be correctly aligned with the take-up mechanism.

1. Verify that the printer standoff is 15/16" between the printer mount plate and the printer itself. Correct if necessary.

2. Slightly loosen the three 1/4-20 nuts which secure the printer. Dismount the take-up motor plate (with motor attached) from the mounting base. Carefully allow the motor assembly to rest to one side. This will free the white nylon gear attached to the upper pinch roller.

3. Remove the ink ribbon cartridge. Cut approximately 6 ft. of paper from a roll. Only one ply is needed for the adjustment process.

4. Using the manual paper feed wheel on the printer, start the paper through the printer until about 8" of paper extends past the printer roller. Pull the 8" section tightly with even tension along the surface of the printer roller.

NOTE: Do not allow the paper to buckle at any point during the adjustment process.

5. Lay the end of the 8" section of paper across the pinch rollers of the take-up mechanism. Observe the paper alignment with the right and left side guide plates on the take-up assembly adjacent to the printer until the paper is centered in the take-up guide channel.

6. Using a 6" rule (or similar measuring device), measure the distance between the printer roller and the upper pinch roller of the take-up assembly. Adjust the printer assembly location until the rollers are equidistant at the right and left. Recheck the paper alignment in the guide channel.

7. When proper lateral and parallel alignment is achieved, hold the printer assembly in place and tighten the securing nuts. Start the end of the 8" section of paper into the pinch rollers by turning the nylon gear on the upper roller. Continue paper take-up in this fashion and observe the track of the paper. When proper printer/take-up alignment is achieved, the paper will remain seated in the guide channel without buckling and without riding up either the right or left side guide plate. If necessary, readjust and recheck.

8. Remove the remaining portion of paper from the printer and take-up assembly. Install the ink ribbon cartridge. Remount the take-up motor mount and motor to the motor mounting base. Reinstall the cover. Connect P42 to the main Printcon PC board and mount the printer assembly in the control column. Install a new roll of one- or two-ply paper and, under power take-up, insure that operation is correct.

7.17 PRINTCON DIGITAL DISPLAY

Display Panel Overlay Replacement (Fig. 8-62)

1. Open the outer door of the unit.

2. Remove #6 x 1/4 self tapping screw from top of upper right-hand corner of display panel door. This will allow opening door with left-hand swing.

3. Next, disconnect ribbon cable connections from panel PC board mounted directly behind panel door — one connector from PC board and one connector from thumbwheel switch.

4. Remove #4-40 nut from display panel door hinge stud at bottom left corner of display door. Remove hinge stud upward and out. Display panel door may now be removed.

5. Reverse the procedure to install a new Display Panel Overlay.

Temperature Thumbwheel Replacement (Fig. 8-62)

1. Follow steps 1 through 3 in the procedure outlined in "Display Panel Overlay Replacement."

2. Thumbwheel switch is extracted from assembly by removing the #4-40 nuts and washers from the two mounting studs assembled to display bracket assembly.

3. Reverse the procedure to install a new thumbwheel switch.

Display PC Board Replacement (Fig. 8-62)

1. Follow procedure outlined in "Display Panel Overlay Replacement."

2. The display PC board is removable by first disconnecting the ribbon cable connector P45 from the main Printcon PC board.

3. Tilt the printer assembly forward to the service position. This permits access to the opening in the upper rear of Printcon housing where P45 is plugged into the main Printcon PC board which is mounted on the back side of Printcon housing.

4. Display PC board can now be removed by disengaging the three circuit board supports.

5. Reverse the procedure to install a new Display PC Board.

Printcon Rotary BCD Switches: Digital Display Board

Rotary switches to control pressure and temperature are located on the Printcon digital display board. Refer to Figure 7-33 for appropriate settings.

PS2 PRESSURE psig = setting ÷ 2

Setting SA11	psig
0	0.0
1	0.5
*2	1.0
3	1.5
4	2.0
5	2.5
6	3.0
7	3.5
8	4.0
9	4.5

PS3 PRESSURE psig = setting ÷ 2

Setting SA10	psig
0	0.0
1	0.5
2	1.0
3	1.5
4	2.0
5	2.5
*6	3.0
7	3.5
8	4.0
9	4.5

VS2 VACUUM in.Hg. = setting ÷ 2

Setting SA12	in.Hg.
0	0.0
1	0.5
2	1.0
3	1.5
*4	2.0
5	2.5
6	3.0
7	3.5
8	4.0
9	4.5

*=Recommended Initial Settings

Figure 7-33. ROTARY BCD SWITCHES.

7.18 MAIN PRINTCON PC BOARD

Changing The Battery Fig. 7-34, 8-62

NOTE: Existing battery (RAY-O-VAC DP24-2-42; P-129356-038 is No Longer Available. When replacing RAY-O-VAC battery, order and install Battery Adapter Assembly (P-150822-349). Assemble plugs into Printcon Board in same fashion as RAY-O-VAC battery. Replace battery as follows:

NOTE: To ensure correct connection, observe notched (see Fig.A) corner of battery. This is positive terminal (Pin #1) and inserts into positive socket of receptacle (upper left-hand corner of socket). Although no danger exists if battery is incorrectly installed, clock and calendar will not function when machine is off.

1. Turn POWER switch OFF and open top door on Printcon column.

2. Swing printer assembly forward and downward. Allow it to rest in service position.

3. Remove and discard old battery from Printcon board (note polarity).

4. Install new battery (see NOTE).

5. Return printer assembly to operating position. Close door.

6. Turn POWER switch ON and reset time and date if necessary.

7. If necessary to replace new battery (Lithium coin cell), proceed as follows:

a. Turn POWER switch to OFF and open top door on Printcon column.

b. Swing printer assembly forward and downward. Allow it to rest in service position.

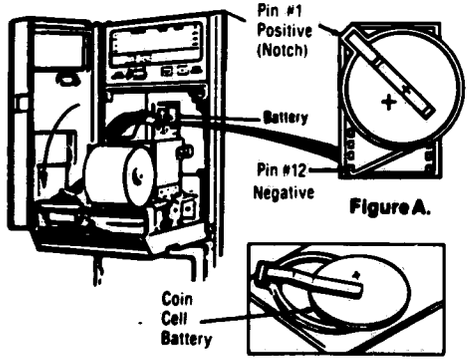


Figure 7-34. CHANGING THE BATTERY.

c. Carefully remove battery adapter assembly (P-150822-349) from Printcon board. Ensure no bent or broken pins by pulling assembly straight out (no twisting, rocking or prying).

d. Remove coin cell (see Fig.B) from holder and install replacement cell (P-150822-351).

e. Reinstall adapter assembly in Printcon board.

f. Return printer assembly and close door.

g. Turn POWER switch ON and reset time and date if necessary.

Changing Units of Display (Figs. 7-35, 7-36 and Table 7-1).

1. The visual display and printing of temperature can be either in degrees Fahrenheit or Celsius. To make this adjustment, locate service switch No. 1 on the Printcon control printed circuit board. Using a pencil or pen point, turn the switch to the alternate position. Return printer assembly upward and back to operating position. Close door.

2. The display and printing of pressure can be either in English (PSI gauge and inches Hg vacuum) or metric (kg/cm² gauge and millimeters Hg vacuum). To make this adjustment follow the procedure in step one and turn service switch No. 2 to alternate position.

3. The display of temperature and English pressure can be either single precision (no decimal places showing) or extended precision (one decimal place showing). Metric pressure shows one or two decimal places. Metric vacuum always shows no decimal place. To make this adjustment follow the procedure in step one and turn service switch No. 3 to alternate position.

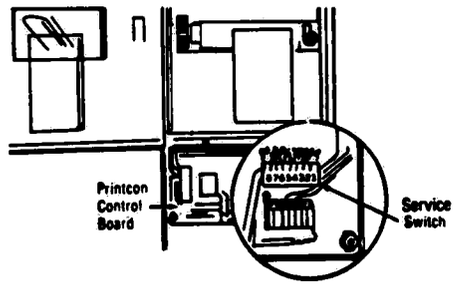


Figure 7-35. LOCATING THE SERVICE SWITCH.

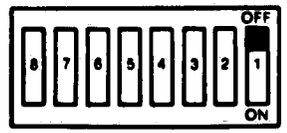


Figure 7-36. SERVICE SWITCH.

Adjusting The Sterilize Temperature Overdrive (Gravity Unit only) (Figs. 7-35, 7-36 and Table 7-1)

For special sterilizer applications, the temperature overdrive may be adjusted in increments of approximately 1/2 degree F. For example, if the temperature thumbwheel setpoint is at 270 F (132 C), the actual control temperature can be from 270 F to 273.8 F (132 C to 134.3 C) depending on how service switches, 5, 6 & 7 of the service switch are set. Refer to Table 7-1 for overdrive settings.

TABLE 7-1. SERVICE SWITCH OPTION SETTINGS

Feature	Switch No(s).	Setting
Temperature in Fahrenheit	1	OFF*
Temperature in Celsius	1	ON
Pressure (English) psig & in. Hg vacuum	2	OFF*
Pressure (Metric) Kg/cm² & mm Hg vacuum	2	ON
Single precision	3	OFF
Extended precision	3	ON*
Pressure Transducer	4	ON
Temperature Overdrive (Gravity Units Only)		
TS2 = TS1	5, 6, & 7	5 OFF, 6 OFF, 7 OFF
TS2 = TS1 + 0.5 F	5, 6, & 7	5 ON, 6 OFF, 7 OFF
TS2 = TS1 + 1.1 F	5, 6, & 7	5 OFF, 6 ON, 7 OFF
TS2 = TS1 + 1.6 F	5, 6, & 7	5 ON, 6 ON, 7 OFF
TS2 = TS1 + 2.2 F	5, 6, & 7	5 OFF, 6 OFF, 7 ON
TS2 = TS1 + 2.7 F	5, 6, & 7	5 ON, 6 OFF, 7 ON
TS2 = TS1 + 3.3 F*	5, 6, & 7	5 OFF, 6 ON, 7 ON
TS2 = TS1 + 3.8 F	5, 6, & 7	5 ON, 6 ON, 7 ON
Spare Switch	8	Unused

*Initial factory setting (for Gravity Sterilizers only)

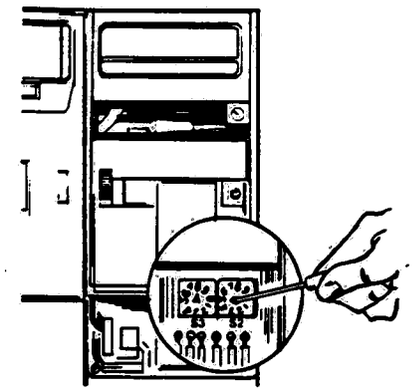


Figure 7-37. LOCATING ROTARY SWITCHES S2 AND S3.

Setting The Year Switches (Fig. 7-37)

1. The year as shown on the Printcon display does not automatically change on December 31st. It must be set annually. To make this adjustment locate rotary switches S2 and S3 on the Printcon control printed circuit board. Using a small screwdriver, turn the pointer to the desired digits (example: for 1982, set S3 at 8 and S2 at 2).

2. If no year display is needed, the switches may be set as follows: set S3 at 8 and S2 at 0. The month and date will still be displayed, but no year will be shown or printed.

Main Printcon PC Board Replacement (Fig. 8-62)

CAUTION: This PC Board contains static-sensitive components. Handle accordingly.

CAUTION: Plugs P16 and P40 of the control column wiring harness are identical in construction and can inadvertently be interchanged during replacement of the Printcon control PC Board. This results in damage to the PC Board. Positively identify and correctly install plugs P16 (to primary panel) and P40 (to Printcon PC Board) during reassembly. These plugs are labeled with tie wrap markers on the harness.

1. Open the outer door of the Printcon unit. The entire unit must be removed from the control column.

2. Remove the front cover panel from the column by taking two cap screws out of the top of the cover and two #10-32 screws out of the bottom.

3. Take off the primary panel by removing four #8-32 mounting screws and washers. It is not necessary to disconnect P16 from the primary panel if care is exercised.

4. Tilt the primary panel forward and reach through the primary panel mounting bracket to disconnect P40 and P48 connections.

5. Remove the four #8-32 Printcon unit mounting screws located two on each side of the unit. Access to the top two screws must be made by opening the display door at the top of the unit. The display PC board must be removed to expose the upper two mounting screws. See "Display Panel Overlay Replacement" and "Display PC Board Replacement." Printer unit must be tilted forward to remove the lower two screws.

6. Printcon unit can now be removed from the column. Main Printcon PC board is removed from the unit by extracting the eight #6-32 mounting screws and standoffs.

7. Reverse the procedure to install a new main Printcon PC board.

7.19 PRINTCON PRESSURE TRANSDUCER REPLACEMENT (Fig. 8-72)

1. Open the outer door of the Printcon unit.

2. Tilt the printer assembly forward to access the P47 connector plugged into the main Printcon PC board.

3. Disconnect P47 and note the cable that exits through the rear of control column to the pressure transducer on its mounting bracket. Extract the transducer cable pins from P47. Note the color coding of the wires. Pull the cable through the column. Read paragraph 6.1 before extracting pins.

4. Disassemble the compression coupling from the 1/4 NPT on the left-hand side of the chamber.

5. Mount new transducer.

6. Run the transducer cable through the cable clamp. If necessary, crimp new pins on the transducer cable and install the new cable into plug P47. Reconnect P47.

7.20 PRINTCON TEMPERATURE PROBE (RTD) REPLACEMENT (Fig. 8-72)

1. Follow procedure outlined in pressure transducer replacement in gaining access to P47 connector. Select temperature probe (RTD) cable and extract cable pins of P47 from this cable. Pull the cable through the column. Read paragraph 6.1 before extracting pins.

2. Free cable from any supports or ties to sterilizer. Then, disassemble probe from chamber drain by unscrewing 1/4 NPT probe fitting at chamber drain.

3. Reassemble in reverse order.

7.21 REPLACEMENT OF PRINTCON POWER SUPPLY FUSES

If fuse replacement is necessary, refer to the figure below for locations of these fuses.

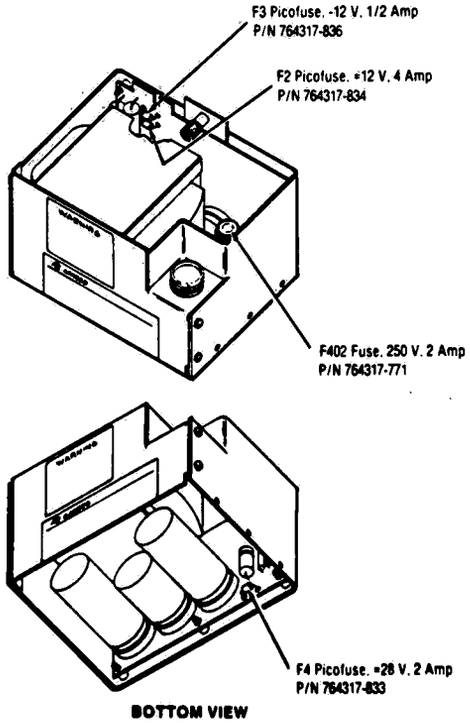


Figure 7-38. PRINTCON POWER SUPPLY FUSE LOCATIONS.

7.22 PRINTCON FIELD CALIBRATION

Special Tools and Documents Required:

NOTE: The measuring devices should be calibrated against NBS (National Bureau of Standards) traceable equipment and the inaccuracies of the measuring devices should be known (via a calibration report sheet).

1. Calibrated compound pressure gauge — resolution to 1/2 PSIG, 40 PSIG full scale minimum.

2. Calibrated potentiometer — resolution to one degree F (Doric 400 A with type T thermocouple or equal).

3. Digital voltmeter or multimeter with 1mv DC resolution (B&K 2800 or equal).

NOTE: All adjustments in this procedure should be verified whenever the main Printcon PC board is replaced. If the temperature probe (RTD) is replaced, check the temperature calibration. If the pressure transducer is replaced, first check the pressure calibration. Then, because temperature accuracy is affected by pressure adjustments, check the temperature **after** adjusting the pressure.

Procedure:

1. With control power OFF, remove the front panel of the control column. Remove the primary panel mounting screws.

If care is exercised, the primary panel need not be disconnected for the next step.

2. Check the service switch on the Printcon control PC board for the following settings:

#1 — OFF (Fahrenheit)
#2 — OFF (English pressure)
#3 — ON (Display tenths)
#4 — ON (Strain Gauge input)
#5 — OFF
#6 — ON
#7 — ON
#8 — not used

3. Remount the primary panel and secure by hand-tightening mounting screws.

4. Locate test points TP4, TP5 and TP6 on the Printcon control PC board.

Connect the negative lead of the voltmeter to TP6.

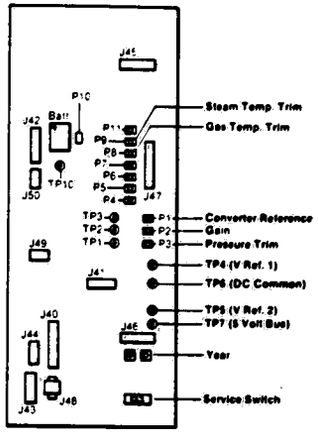


Figure 7-39. TEST POINT AND POTENTIOMETER LOCATIONS: Main Printcon PC Board.

With power on, measure the voltage at TP4. This will be around 10 VDC. Now measure the voltage at TP5 and adjust potentiometer **P1** until this voltage is **exactly** 1/2 of the voltage measured at TP4.

IMPORTANT: This setting was made at the factory and should not require readjustment. However, if adjustment is necessary, follow the instructions carefully as this setting greatly affects overall accuracy.

5. Install the pressure gauge to the chamber gauge connection at the side of the chamber. Leave the chamber gauge disconnected.

6. With the control end door open, manually actuate the door lock switch. Exercise caution because the **"cycle inhibit" feature is defeated** by this action. While holding the lock actuated, turn the control power ON. Adjust potentiometer **P3** on the main Printcon PC board until the pressure display reads 0.0 exactly.

7. Release the door lock switch. Turn power OFF then ON with the door open. Close and lock the chamber door(s). Set the HI-LO regulator valve to HI. Set sterilize temperature on the temperature thumbwheels to 295 F. Sterilize time is not applicable on this step. Start a GRAVITY cycle. After the 60 second purge has timed out, the pressure and temperature will rise to the regulator setting trying to achieve 295 F. When the regulator setting is achieved, the pressure will stabilize. Observe the Printcon pressure reading and adjust potentiometer **P2** on the main Printcon control PC board until this reading matches exactly the compound gauge. Press the RESET button to abort the cycle.

NOTE: This adjustment of **P2** affects the adjustment of **P3** made in step 6. Therefore, steps 6 and 7 must be repeated until **P2** adjustment is no longer required at high pressure (within 1/2 psig). At the end of step 7, exhaust the chamber through the EXHAUST position on the MANUAL control knob.

IMPORTANT: The following step must **always** be performed **after** steps 6 and 7.

8. Remove the chamber drain strainer. Install the potentiometer thermocouple lead in metal-to-metal contact with the temperature probe in the chamber drain (1/2" from the tip). Initiate the same type cycle as in step 7, and wait until the Printcon **temperature** display stabilizes at the regulator setting. Adjust potentiometer **P9** on the main Printcon PC board until the Printcon temperature display exactly agrees with the potentiometer reading. Press RESET to abort the cycle. Exhaust the chamber through the MANUAL control knob. Wait until 0 PSIG registers on the Printcon display.

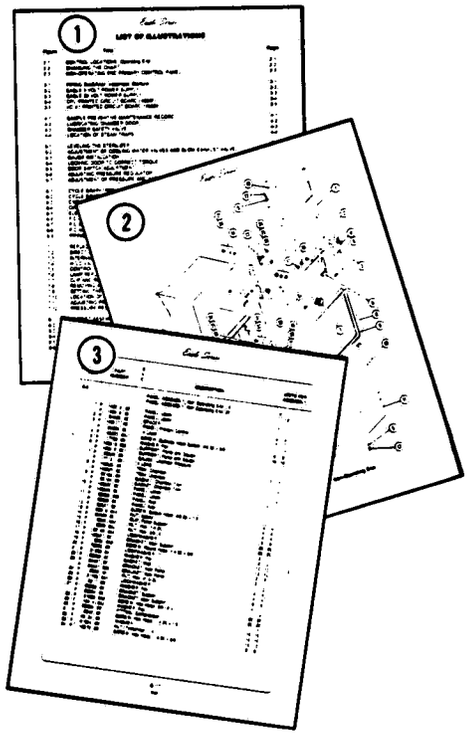
9. This concludes the calibration procedure. Remove the measuring devices and reconnect the chamber gauge. Restore the service switch No. 1 settings on the main Printcon PC board to the display options desired by the customer.

SECTION 8

SECTION 8

EXPLODED VIEWS AND PARTS LISTS

Assemblies and components of Eagle 2000 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. The UNITS PER ASSEMBLY column is specific for the given assembly or subassembly level.



HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN

(1) Determine the function and application of the part required. Turn to the List of Illustrations and select the most appropriate title. Note the illustration page number.

(2) Turn to the page indicated and locate the desired part on the illustration.

(3) From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.

TYPICAL INDENTATION EXAMPLE

No indentation — part of top assembly

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

PANEL ASSEMBLY: Non Operating End, 16" .....
PANEL ASSEMBLY: Non Operating End, 20" .....

PANEL, Upper .....
PANEL, Upper .....
SPACER .....
PANEL, Primary Control .....
• LAMP .....
SCREW, Buttress Head Socket, #8-32 x 3/8 .....
WASHER, Flat .....

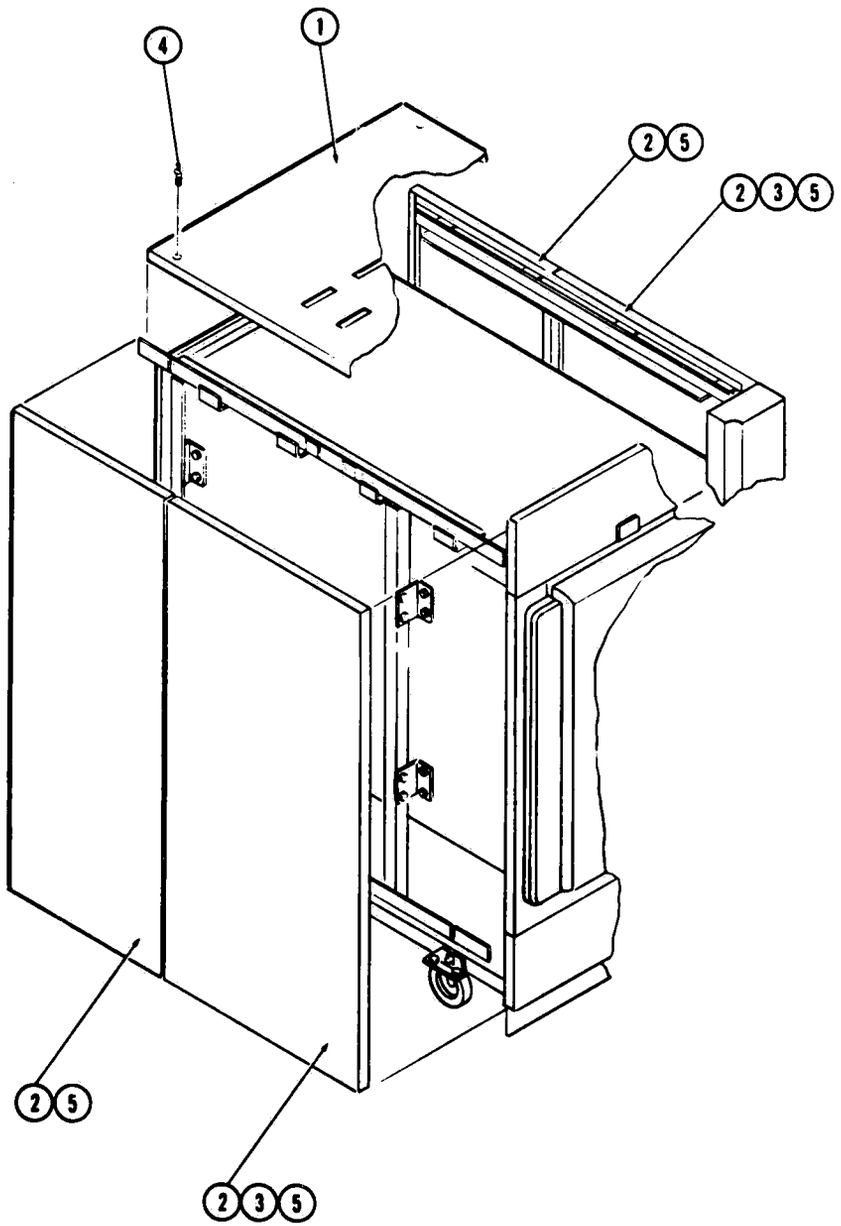


Figure 8-1. CABINET ASSEMBLY: Freestanding Sterilizer. (Part 1 of 2)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-1-	P	146503	001		CABINET ASSEMBLY: 36" Single Door, Freestanding (Part 1 of 2)	X			
	P	146493	001		CABINET ASSEMBLY: 48" Single Door, Freestanding (Part 1 of 2)		X		
	P	146509	001		CABINET ASSEMBLY: 60" Single Door, Freestanding (Part 1 of 2)			X	
1	P	146632	003		PANEL, Top	1			
	P	146632	004		PANEL, Top		1		
	P	146632	006		PANEL, Top			1	
2	P	146339	008		PANEL, Side	2			
	P	146339	007		PANEL, Side		2		
	P	146339	006		PANEL, Side			4	
3	P	146339	006		PANEL, Side	2	2		
4	P	43255	091		SCREW, Round Head, 1/4-20 x 1-1/4	4	4	6	
5	P	84298	001		CATCH, Magnetic (Not Shown)	16	16	16	

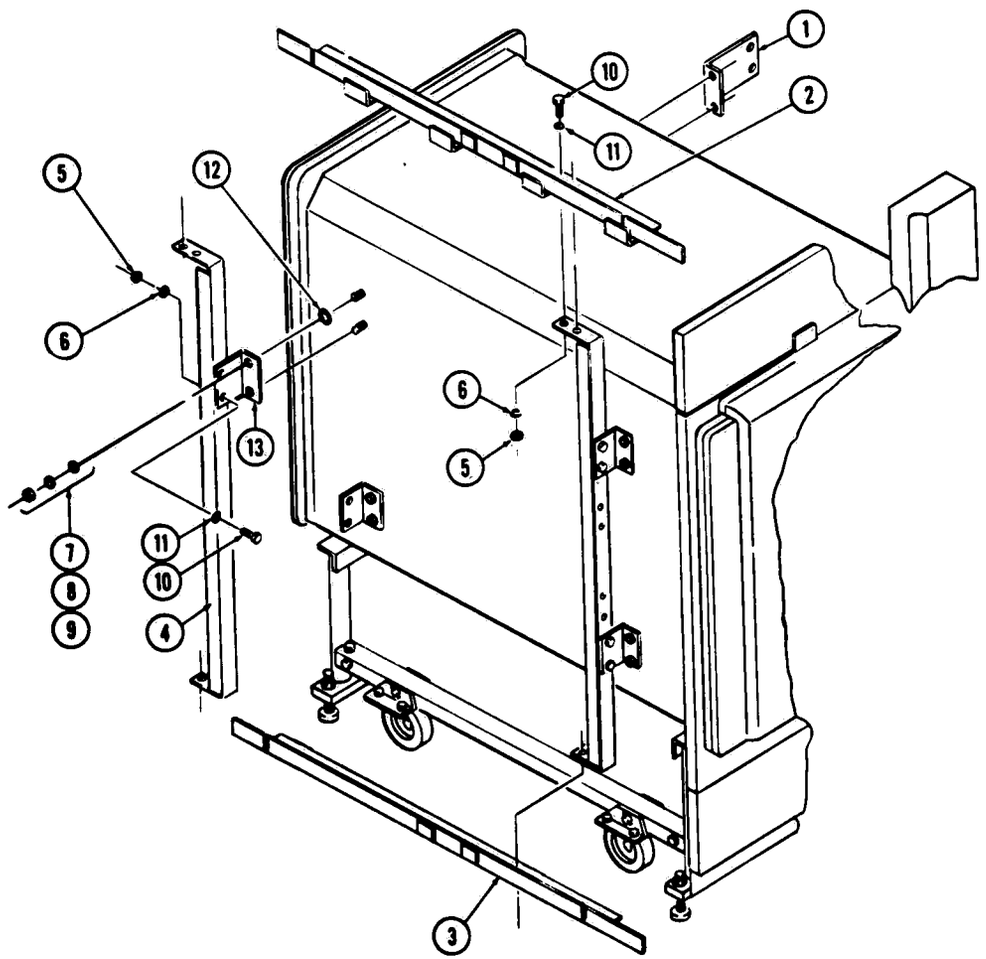


Figure 8-2. CABINET (SIDE FRAME) ASSEMBLY: Freestanding Sterilizer. (Part 2 of 2)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-2-					CABINET (SIDE FRAME) ASSEMBLY: 36" Single Door, Freestanding (Part 2 of 2)	X			
					CABINET (SIDE FRAME) ASSEMBLY: 48" Single Door, Freestanding (Part 2 of 2)		X		
					CABINET (SIDE FRAME) ASSEMBLY: 60" Single Door, Freestanding (Part 2 of 2)			X	
1	P	93583	002		SUPPORT, Angle	4	4	4	
2	P	136467	022		ANGLE WELDMENT, Upper Mounting	2			
	P	136467	003		ANGLE WELDMENT, Upper Mounting, R.H.		1		
	P	136467	002		ANGLE WELDMENT, Upper Mounting, L.H.		1		
	P	136467	006		ANGLE WELDMENT, Upper Mounting, R.H.			1	
	P	136467	004		ANGLE WELDMENT, Upper Mounting, L.H.			1	
3	P	136467	019		ANGLE WELDMENT, Lower Mounting	2			
	P	136467	020		ANGLE WELDMENT, Lower Mounting		2		
	P	136467	023		ANGLE WELDMENT, Lower Mounting, R.H.			1	
	P	136467	021		ANGLE WELDMENT, Lower Mounting, L.H.			1	
4	P	146631	001		ANGLE, Vertical	4	4	4	
5	P	3097	041		NUT, Hex, 1/4-20	32	32	32	
6	P	76230	091		LOCKWASHER, Shakeproof	32	32	32	
7	P	3099	042		NUT, Hex, 3/8-16	16	16	16	
8	P	52149	045		LOCKWASHER, Shakeproof	16	16	16	
9	P	5503	045		WASHER, Flat	16	16	16	
10	P	37321	051		SCREW, Hex Head, 1/4-20 x 1	32	32	32	
11	P	49134	061		WASHER, Flat	32	32	32	
12	P	17349	041		WASHER, Flat	16	16	16	
13	P	93589	002		SUPPORT, Angle	4	4	4	

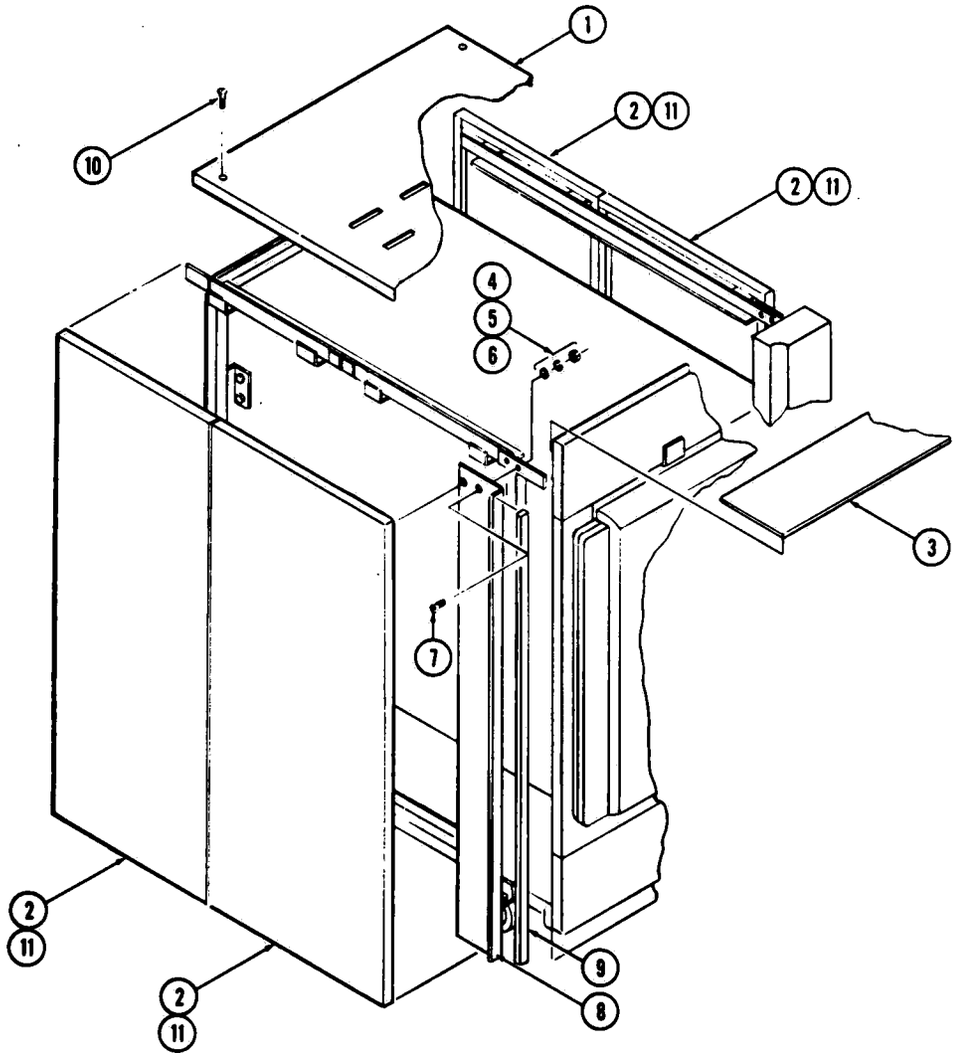


Figure 8-3. CABINET ASSEMBLY: Double Door, Recessed. (Part 1 of 2)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-3-	P	146471	001		CABINET ASSEMBLY: 48" Double Door, Recessed (Part 1 of 2)	X			
	P	146480	001		CABINET ASSEMBLY: 60" Double Door, Recessed (Part 1 of 2)		X		
	P	146498	001		CABINET ASSEMBLY: 36" Double Door, Recessed (Part 1 of 2)			X	
1	P	146632	002		PANEL, Top	1			
	P	146632	005		PANEL, Top		1		
	P	146632	001		PANEL, Top			1	
2	P	146339	012		PANEL, Side	4			
	P	146339	013		PANEL, Side		4		
	P	146339	006		PANEL, Side		2		
3	P	93585	002		FILLER	1	1	1	
4	P	17589	045		WASHER, Flat	4	4	4	
5	P	31705	045		LOCKWASHER, Shakeproof, #10	4	4	4	
6	P	2960	042		NUT, Hex, #10-32	4	4	4	
7	P	33708	041		SCREW, Flat Head, #10-32 x 5/8	4	4	4	
8	P	93590	001		ANGLE, Extension	2	2	2	
9	P	84297	001		STRIP, Sponge	2	2	2	
10	P	43255	091		SCREW, Socket Head, 1/4-20 x 1-1/4	6	6	4	
11	P	84298	001		CATCH, Magnetic (Not Shown)	16	16	8	

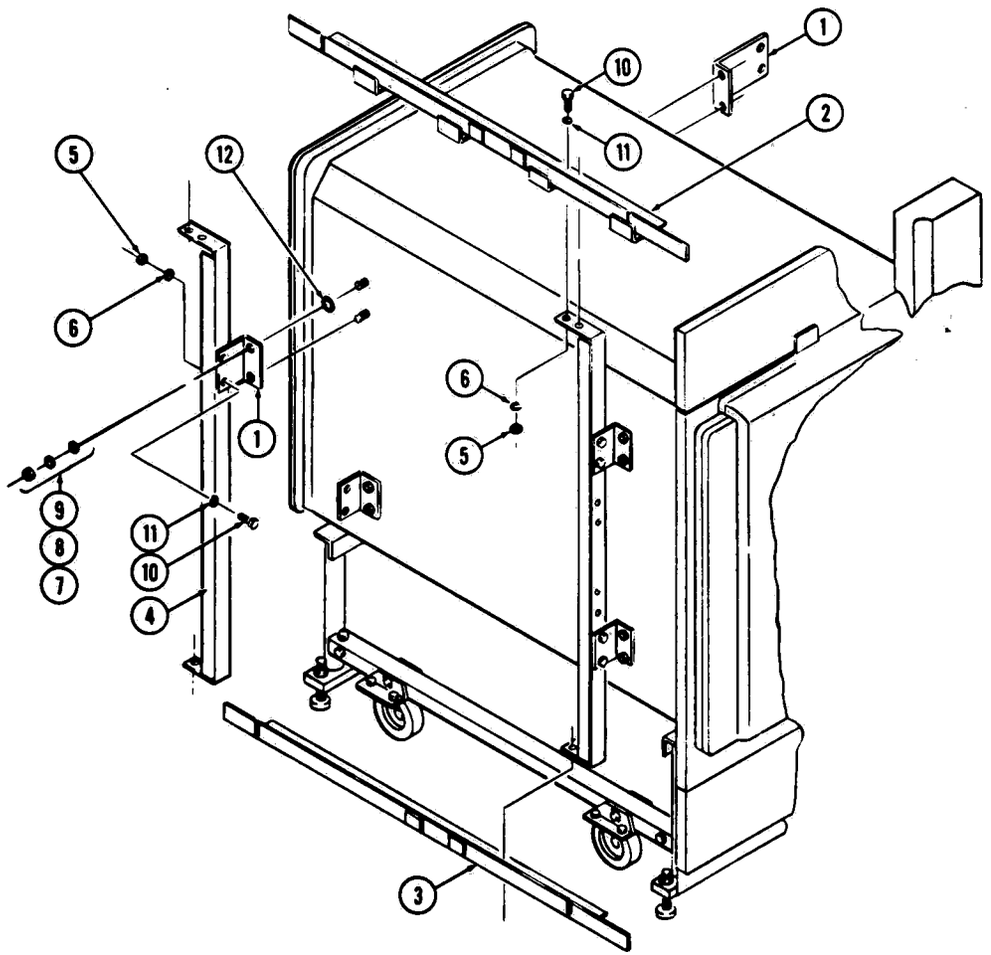


Figure 8-4. CABINET (SIDE FRAME) ASSEMBLY: Recessed Sterilizer. (Part 2 of 2)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-4-					CABINET (SIDE FRAME) ASSEMBLY: 48" Double Door, Recessed (Part 2 of 2)	X		
					CABINET (SIDE FRAME) ASSEMBLY: 60" Double Door, Recessed (Part 2 of 2)		X	
					CABINET (SIDE FRAME) ASSEMBLY: 36" Double Door, Recessed (Part 2 of 2)			X
1	P	93583	002		SUPPORT, Angle	8	8	8
2	P	136467	010		ANGLE WELDMENT, Upper Mounting, R.H.	1		
	P	136467	012		ANGLE WELDMENT, Upper Mounting, R.H.		1	
	P	136467	008		ANGLE WELDMENT, Upper Mounting, R.H.			1
	P	136467	009		ANGLE WELDMENT, Upper Mounting, L.H.	1		
	P	136467	011		ANGLE WELDMENT, Upper Mounting, L.H.		1	
	P	136467	007		ANGLE WELDMENT, Upper Mounting, L.H.			1
3	P	136467	016		ANGLE WELDMENT, Lower Mounting, R.H.	1		
	P	136467	018		ANGLE WELDMENT, Lower Mounting, R.H.		1	
	P	136467	014		ANGLE WELDMENT, Lower Mounting, R.H.			1
	P	136467	015		ANGLE WELDMENT, Lower Mounting, L.H.	1		
	P	136467	017		ANGLE WELDMENT, Lower Mounting, L.H.		1	
	P	136467	013		ANGLE WELDMENT, Lower Mounting, L.H.			1
4	P	146631	001		ANGLE, Vertical	4	4	4
5	P	3097	041		NUT, Hex, 1/4-20	32	32	32
6	P	76230	091		LOCKWASHER, Shakeproof, 1/4	32	32	32
7	P	3099	042		NUT, Hex, 3/8-16	16	16	16
8	P	52149	045		LOCKWASHER, Shakeproof, 3/8	16	16	16
9	P	5503	045		WASHER, Flat	16	16	16
10	P	37321	051		SCREW, Hex Head, 1/4-20 x 1	32	32	32
11	P	49134	061		WASHER, Flat, 1/4	32	32	32
12	P	17349	041		WASHER, Flat	16	16	16

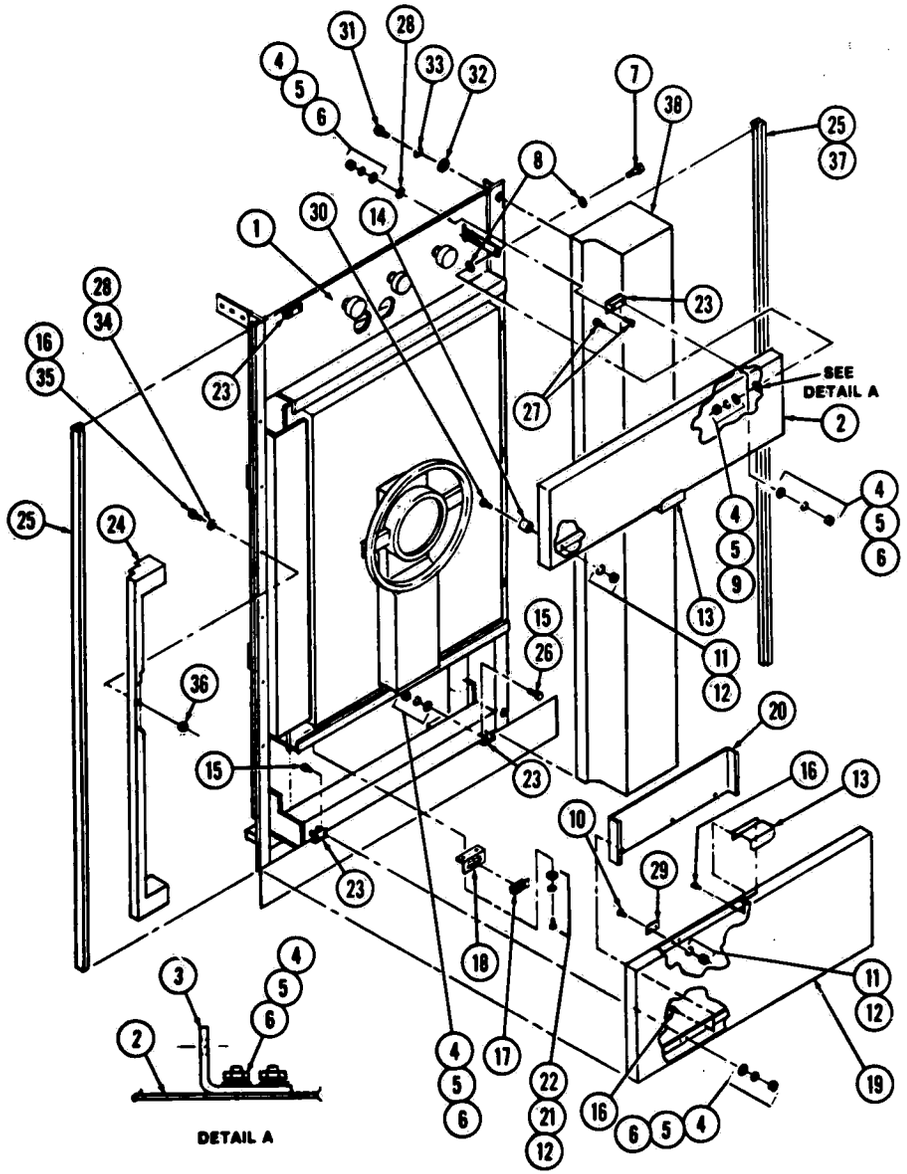


Figure 8-5. PANEL ASSEMBLY: Operating End.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-5-					**UNITS WITH INDICATOR-RECORDER**					
					PANEL ASSEMBLY: Operating End	X				
					UNITS WITH PRINTCON					
					PANEL ASSEMBLY: Operating End		X			
1					CONTROL PANEL, Top (See Fig. 8-6)	1				
1					CONTROL PANEL, Top (See Fig. 8-6)		1			
2	P	146232	001		PANEL, Upper Access	1	1			
3	P	83543	001		BRACKET, Pivot	1	1			
4	P	5561	091		WASHER, #10	8	19			
5	P	19677	041		LOCKWASHER	8	19			
6	P	2960	042		NUT, Hex, #10-32	8	18			
7	P	83547	001		SCREW, Shoulder, Socket Head #10-24	1	1			
8	P	48781	091		WASHER, Nylon	2	2			
9	P	43287	091		NUT, Hex, #10-24	1	1			
10	P	3961	041		SCREW, Flat Head, #6-32 x 5/8	4	4			
11	P	3037	041		NUT, Hex, #6-32	6	6			
12	P	19675	041		LOCKWASHER	8	10			
13	P	93095	001		HANDLE	2	2			
14	P	83510	001		BUMPER	2	2			
15	P	129062	001		SCREW, Hex Head, #10-32 x 3/8	4	4			
16	P	91620	061		SCREW, Self Tapping, Hex Head #10-32 x 3/8	10	7			
17	P	84298	001		CATCH, Magnetic	2	2			
18	P	129063	001		BRACKET, Magnetic Catch	2	2			
19	P	146161	001		PANEL, Lower Access	1	1			
20	P	93096	001		RACK, Manual	1	1			
21	P	5469	041		WASHER	4	4			
22	P	78881	045		SCREW, Self Tapping, #6-32 x 1/2	4	4			
23	P	129023	001		HINGE	4	4			
24	P	146160	001		TRIM, Chamber	1	1			
25	P	93089	001		GASKET, Wall	2	2			
26	P	41805	044		SCREW, Hex Head, #10-32 x 5/8	4	4			
27	P	41012	061		SCREW, Socket Head Cap, #10-32 x 1/2	8	8			
28	P	17589	045		WASHER	11	4			
29	P	83509	001		STRIKE	2	2			
30	P	3964	041		SCREW, Round Head, #6-32 x 5/8	2	2			
31	P	3857	045		SCREW, Hex Head, 3/8-16 x 1/2	5	5			
32	P	79511	045		WASHER, Flat	5	5			
33	P	25832	041		LOCKWASHER	5	5			
34	P	49134	061		WASHER	6	6			
35	P	3846	041		SCREW, Hex Head, 1/4-20 x 1/2	6	6			
36	P	3097	041		NUT, Hex, 1/4-20	6	6			
37					TAPE, 1/2" Wide		A/R			
38					CONTROL COLUMN ASSEMBLY (See Fig. 8-10)	1				
38					CONTROL COLUMN ASSEMBLY (See Fig. 8-59)		1			

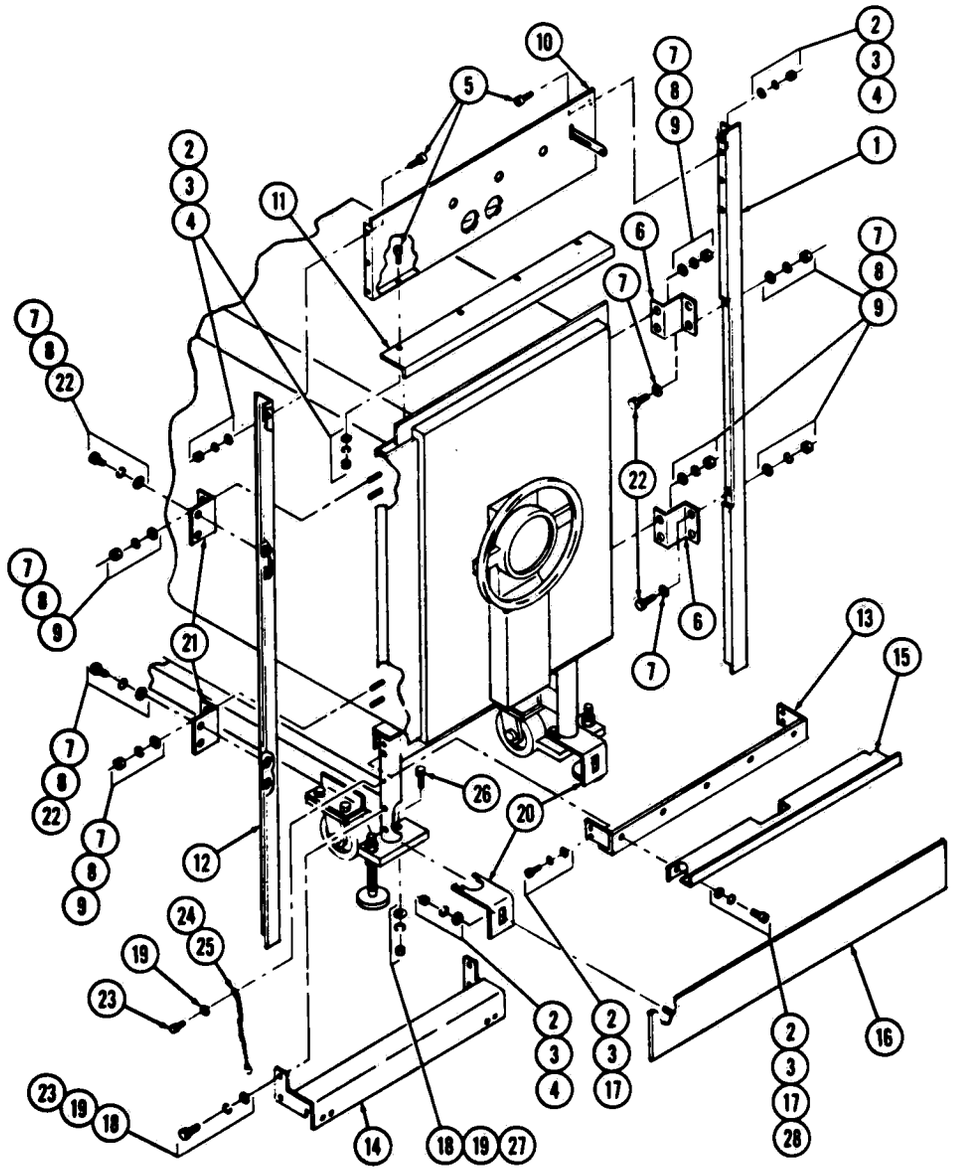


Figure 8-6. SUB PANELS: Operating End.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-6-					**UNITS WITH INDICATOR-RECORDER:**				
					SUB PANELS: Operating End, R.H.	X			
					SUB PANELS: Operating End, L.H.		X		
					UNITS WITH PRINTCON:				
					SUB PANELS: Operating End, R.H.			X	
					SUB PANELS: Operating End, L.H.				X
1	P	146154	001		BRACKET, Main Support	1	1		
	P	146649	194		BRACKET, Main Support			1	1
2	P	5561	091		WASHER, #10	22	22	16	16
3	P	19677	041		LOCKWASHER	22	22	20	20
4	P	2960	042		NUT, Hex, #10-32	22	22	12	12
5	P	41012	061		SCREW, Socket Head Cap, #10-32 x 1/2	22	22	10	10
6	P	83513	001		BRACKET, Main Support	2	2	2	2
7	P	79511	045		WASHER, 3/8	16	16	16	16
8	P	19680	041		LOCKWASHER	16	16	16	16
9	P	3099	042		NUT, Hex, 3/8-16	12	12	12	12
10	P	146242	001		PANEL ASSEMBLY, Top, L.H. (See Fig. 8-7)		1		
	P	146242	002		PANEL ASSEMBLY, Top, R.H. (See Fig. 8-7)	1			
	P	146649	192		PANEL ASSEMBLY, Top, L.H. (See Fig. 8-7)				1
	P	146649	193		PANEL ASSEMBLY, Top, R.H. (See Fig. 8-7)			1	
11	P	136327	001		TRIM, Upper	1	1	1	1
12	P	146222	001		BRACKET, Support	1	1	1	1
13	P	136307	001		SUPPORT, Panel	1	1	1	1
14	P	136308	001		SUPPORT, Lower Hinge	1	1	1	1
15	P	146164	001		TRIM, Lower	1	1	1	1
16	P	93084	008		PANEL, Kick	1	1	1	1
17	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	9	9	9	9
18	P	19678	045		LOCKWASHER	4	4	8	8
19	P	10445	091		WASHER	4	4	8	8
20	P	93697	001		BRACKET, Kick Panel	2	2	2	2
21	P	83516	001		BRACKET, Support	2	2	2	2
22	P	31838	042		SCREW, Hex Head, 3/8-16 x 1	8	8	8	8
23	P	3846	041		SCREW, Hex Head, 1/4-20 x 1/2	6	6	6	6
24	P	91043	091		HOOK, Chain	4	4	4	4
25	P	83549	001		CHAIN, Sash	2	2	2	2
26	P	4685	051		SCREW, Hex Head, 1/4-20 x 1-1/4	4	4	4	4
27	P	3097	041		NUT, Hex, 1/4-20	1	1	1	1
28	P	17589	045		WASHER, Flat			4	4

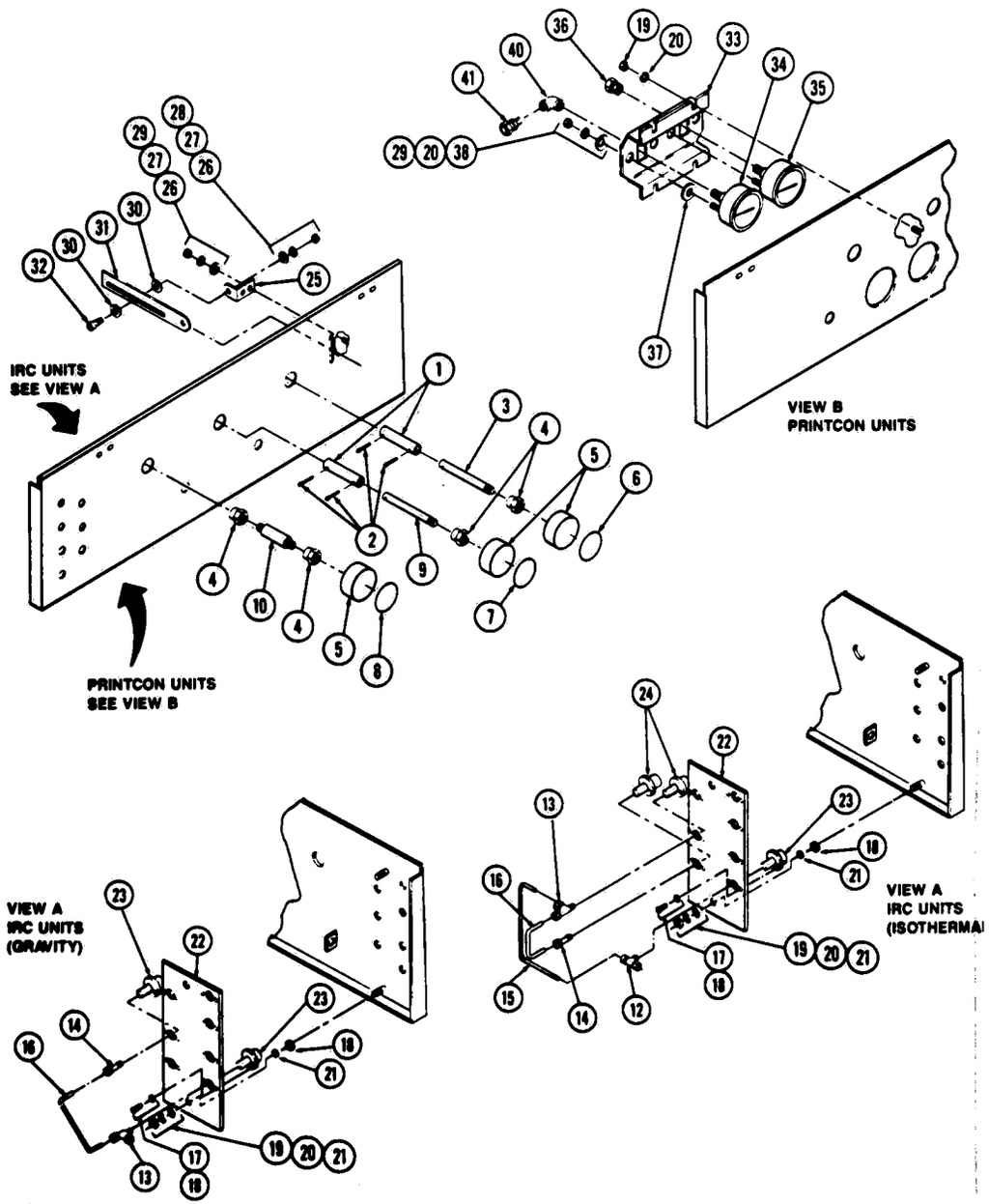


Figure 8-7. TOP CONTROL PANEL: Operating End.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-7-					TOP CONTROL PANEL: Operating End				
					Units with Indicator-Recorder ISO	X			
					Units with Printcon		X		
					Units with IRC Grav.			X	
1	P	45524	045		COUPLING	2	2	2	
2	P	46038	061		PIN, Cotter	4	4	4	
3	P	45493	043		ROD, Valve Extension	1	1	1	
4	P	8605	042		NUT, Valve	4	4	4	
5	P	54899	091		KNOB, Valve	3	3	3	
6	P	90323	091		DECAL, Water Supply	1	1	1	
7	P	90322	091		DECAL, Steam Supply	1	1	1	
8	P	90576	091		DECAL, Steam Pressure, Hi-Lo	1	1	1	
9	P	83868	001		ROD, Valve Extension	1	1	1	
10	P	51999	043		ROD, Extension	1	1	1	
11	P	82711	001		TUBE	2			
12	P	42581	091		TEE, Male Branch, 1/4 O.D.T. x 1/8 N.P.T.	1			
13	P	78285	091		TEE, Male Run, 1/4 O.D.T. x 1/8 N.P.T.	3		1	
14	P	43289	091		CONNECTOR, 1/4 O.D.T. x 1/8 N.P.T.	1		1	
15	P	129059	001		TUBE	1			
16	P	82713	001		TUBE	1		1	
17	P	3984	041		SCREW, Round Head, #6-32 x 3/8	6		4	
18	P	5469	041		WASHER	6		4	
19	P	3097	041		NUT, Hex, 1/4-20	4	4	4	
20	P	19678	045		LOCKWASHER	2	8	2	
21	P	10445	091		WASHER, Flat	4		4	
22	P	93724	001		PLATE, Mounting	1		1	
23	P	83865	001		SWITCH, Pressure	2		2	
24	P	83866	001		SWITCH, Vacuum	1			
25	P	83543	001		BRACKET, Pivot	1	1	1	
26	P	5561	091		WASHER, Flat	3	3	3	
27	P	19677	041		LOCKWASHER	3	3	3	
28	P	43287	091		NUT, Hex, #10-24	1	1	1	
29	P	2960	042		NUT, Hex, #10-32	2	6	2	
30	P	48781	091		WASHER, Nylon	2	2	2	
31	P	93120	001		ARM, Pivot	1	1	1	
32	P	83547	001		SCREW, Shoulder, Socket Head, #10-24	1	1	1	
33	P	93900	052		BRACKET, Gauge		1		
34	P	90525	091		GAUGE, Chamber Pressure		1		
35	P	90730	091		GAUGE, Jacket Pressure		1		
36	P	90594	091		FITTING, Compression, 1/8 O.D.T. x 1/8 I.P.S. (Female)		1		
37	P	5503	045		WASHER, Flat		4		
38	P	129356	132		WASHER, Belleville		4		
39					NOT USED				
40	P	1614	091		ELL, 3/8 N.P.T.		1		
41	P	20344	091		FITTING, Compression, 1/8 O.D.T. x 1/8 I.P.S. (Male)		1		

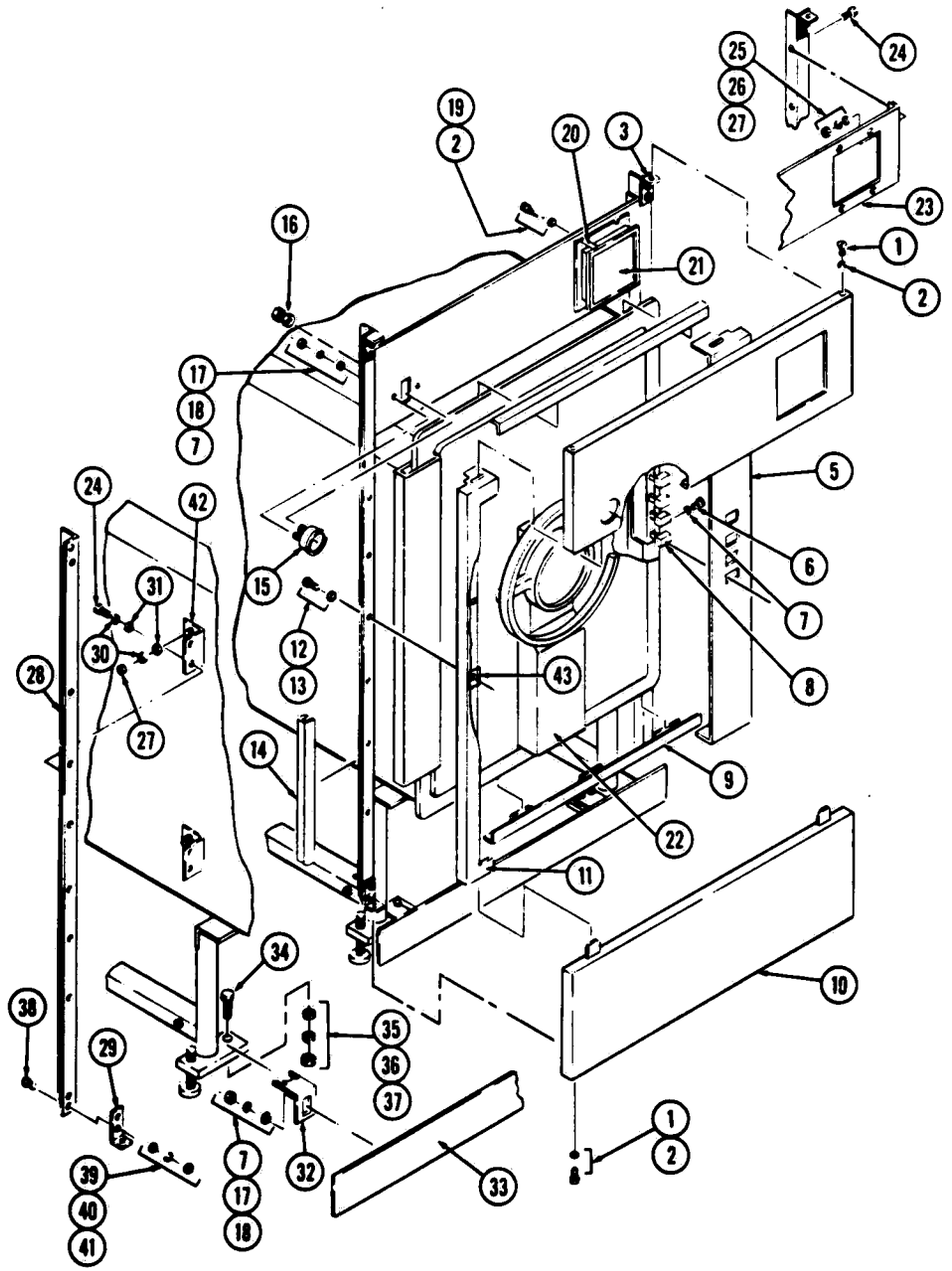


Figure 8-8. PANEL AND CONTROL ASSEMBLY: Non Operating End.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-8-					PANEL AND CONTROL ASSEMBLY, Non-Operating End: 24x36 R.H. Power Door	X			
					PANEL AND CONTROL ASSEMBLY, Non-Operating End: 24x36 L.H. Power Door		X		
					PANEL AND CONTROL ASSEMBLY, Non-Operating End: 24x36 R.H. Manual Door			X	
					PANEL AND CONTROL ASSEMBLY, Non-Operating End: 24x36 L.H. Manual Door				X
1	P	30236	061		SCREW, Round Head, Self Tapping, #8-1/4	4	4	4	4
2	P	17796	091		WASHER	12	12	12	12
3	P	90198	045		NUT, Speed, #8	4	4	4	4
4	P	136609	001		PANEL, Upper	1	1	1	1
5	P	146529	001		TRIM, Chamber, Manual Door			1	1
	P	146529	002		TRIM, Chamber, Power Door	1	1		
6	P	90168	045		SCREW, Self Tapping, #10 x 5/16	3	3	3	3
7	P	5511	091		WASHER	7	7	7	7
8	P	146540	001		SWITCH ASSEMBLY, L.H. (See Fig. 8-20)		1		
	P	146540	002		SWITCH ASSEMBLY, R.H. (See Fig. 8-20)	1			
9	P	93693	001		TRIM ASSEMBLY	2	2	2	2
10	P	136620	001		PANEL, Lower	1	1	1	1
11	P	146160	001		TRIM, Chamber	1	1	1	1
12	P	3847	042		SCREW, Hex Head, 1/4-20 x 5/8	12	12	12	12
13	P	17589	045		WASHER	12	12	12	12
14	P	93089	001		GASKET, Wall	2	2	2	2
15	P	90525	091		GAUGE, Chamber Pressure	1	1	1	1
	P	77121	091		• LENS	1	1	1	1
16	P	90594	091		FITTING, Compression	1	1	1	1
17	P	31705	045		LOCKWASHER	2	2	2	2
18	P	2959	041		NUT, Hex, #10-32	2	2	2	2
19	P	45323	042		SCREW, Socket Head, #8-32 x 3/8	8	8	8	8
20	P	84438	001		SPACER	4	4	4	4
21	P	146517	001		PANEL, Control	1	1	1	1
	P	764317	536		• LAMP (Box of 10)	18	18	18	18
22					COVER AND HANDWHEEL ASSEMBLY (See Fig. 8-22)	1	1	1	1
23	P	146516	003		SUPPORT, Panel and Gauge	1	1	1	1
24	P	31838	042		SCREW, Hex Head, 3/8-16 x 1	12	12	12	12
25	P	52149	045		LOCKWASHER	4	4	4	4
26	P	10414	042		WASHER	4	4	4	4
27	P	3099	042		NUT, Hex, 3/8-16	12	12	12	12
28	P	146222	001		BRACKET, Main Support	2	2	2	2
29	P	84436	001		CLIP, Panel Support	4	4	4	4
30	P	19680	041		LOCKWASHER	16	16	16	16
31	P	79511	045		WASHER	16	16	16	16
32	P	93697	001		BRACKET, Kick Panel	2	2	2	2
33	P	93689	006		PANEL, Kick	1	1	1	1
34	P	4685	051		SCREW, Hex Head, 1/4-20 x 1-1/4	4	4	4	4
35	P	19678	045		LOCKWASHER	4	4	4	4
36	P	10445	091		WASHER	4	4	4	4
37	P	3097	041		NUT, Hex, 1/4-20	4	4	4	4
38	P	3950	048		SCREW, Round Head, 1/4-20	8	8	8	8
39	P	76230	091		LOCKWASHER	8	8	8	8
40	P	31599	041		WASHER	8	8	8	8
41	P	3040	042		NUT, Hex, 1/4-20	8	8	8	8
42	P	83516	001		BRACKET, Support	4	4	4	4
43	P	91924	091		NUT, Tinnerman	12	12	12	12

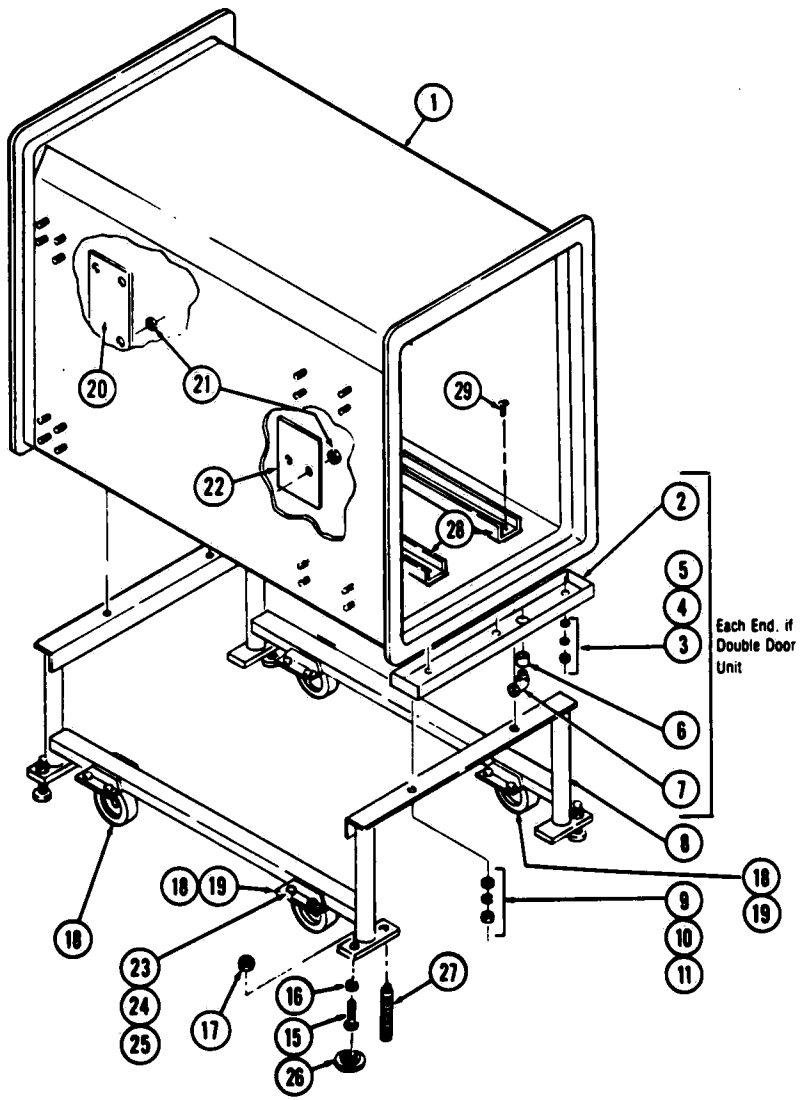


Figure 8-9. SHELL AND STAND ASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-9-					SHELL AND STAND ASSEMBLY: 24x36x36	X			
					SHELL AND STAND ASSEMBLY: 24x36x48		X		
					SHELL AND STAND ASSEMBLY: 24x36x60			X	
	1				SHELL ASSEMBLY, 36	1			
					SHELL ASSEMBLY, 48		1		
					SHELL ASSEMBLY, 60			1	
	2	P	93678	001	TROUGH ASSEMBLY, Drip	1	1	1	
	3	P	84426	001	GASKET	3	3	3	
	4	P	31599	041	WASHER	3	3	3	
	5	P	24987	041	NUT, Hex, 1/4-20	3	3	3	
	6	P	89743	091	ADAPTER, Tube 3/4 x 1/2	1	1	1	
	7	P	23972	091	FITTING, Ell	1	1	1	
	8	P	136463	001	STAND, End Weldment	2	2	2	
	9	P	81673	003	WASHER, Flat	4	4	4	
	10	P	19680	041	WASHER, Lock	4	4	4	
	11	P	150475	594	NUT, Hex, 3/8-16	4	4	4	
	12				(Not Used)				
	13				(Not Used)				
	14				(Not Used)				
	15	P	91054	045	FOOT WELDMENT	4	4	4	
	16	P	3107	045	NUT, Hex, 1/8	4	4	4	
	17	P	3123	045	HALF NUT, Hex, 1/8	4	4	4	
	18	P	91058	091	CASTER, Swivel	2	4	4	
	19	P	129352	079	CASTER, Fixed	2			
	20	P	93293	NLA	BAFFLE, Gravity (SUB: P-56396-224)	1	1	1	
		P	93686	001	BAFFLE, Isothermal, 36	1			
		P	93685	001	BAFFLE, Isothermal, 48		1		
		P	93684	001	BAFFLE, Isothermal, 60			1	
	21	P	150231	NLA	NUT, Hex, 1/4-20 (SUB: P-8648-061)	6	6	6	
	22	P	93832	NLA	BAFFLE (SUB: P-56396-225)	1	1	1	
	23	P	3872	091	BOLT, Hex Head	16	16	16	
	24	P	3101	091	NUT, Hex	16	16	16	
	25	P	19681	045	WASHER, Lock	16	16	16	
	26	P	90423	091	PAD, Foot	4	4	4	
	27	P	129352	001	JACK	4	4	4	
	28	P	89669	061	TRACK, 36 Single Door	2			
		P	89628	061	TRACK, 36 Double Door	2			
		P	89629	061	TRACK, 48 Single Door		2		
		P	89627	061	TRACK, 48 Double Door		2		
		P	89630	061	TRACK, 60 Single Door			2	
		P	89626	061	TRACK, 60 Double Door			2	
	29	P	39915	061	SCREW, Flat Head, 3/8-16 x 5/8	4	4	4	

*Double quantities for Double Door Sterilizers

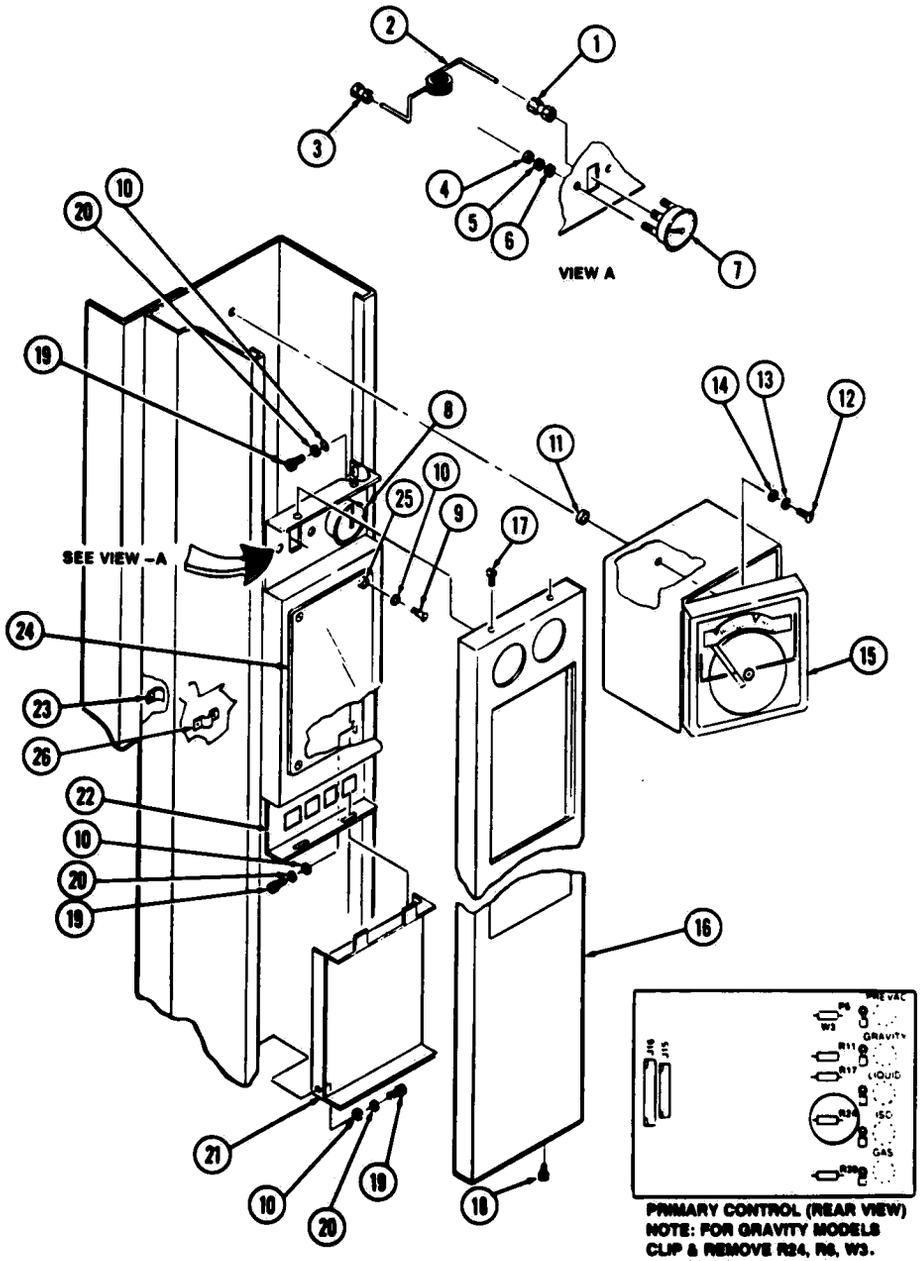


Figure 8-10. CONTROL COLUMN (Part 1 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-10-					CONTROL COLUMN: Manual Door, Gravity (Part 1 of 3)	X			
					CONTROL COLUMN: Manual Door, Isothermal (Part 1 of 3)		X		
					CONTROL COLUMN: Power Door, Gravity (Part 1 of 3)			X	
					CONTROL COLUMN: Power Door, Isothermal (Part 1 of 3)				X
1	P	90594	091		COUPLING, Compression, 1/8 O.D.T. x 1/8 N.P.T.	2	2	2	2
2	P	89053	091		TUBING, 1/8 O.D. x 40	1	1	1	1
3	P	129276	001		FITTING, Bulkhead, 1/8 O.D.T.	2	2	2	2
4	P	2959	041		NUT, Hex, #10-32	4	4	4	4
5	P	31705	045		LOCKWASHER	4	4	4	4
6	P	5511	091		WASHER, Flat	4	4	4	4
7	P	90525	091		GAUGE, Chamber Pressure	1	1	1	1
	P	77121	091		• LENS	1	1	1	1
8	P	90730	091		GAUGE, Jacket Pressure	1	1	1	1
	P	77121	091		• LENS	1	1	1	1
9	P	78025	042		SCREW, Button Head Socket, #8-32 x 7/8	4	4	4	4
10	P	17796	091		WASHER, Flat	10	10	10	10
11	P	84391	001		SPACER, Recorder	2	2	2	2
12	P	4005	041		SCREW, Round Head, 1/4-20 x 1-3/4	2	2	2	2
13	P	26962	061		LOCKWASHER	2			
14	P	31599	041		WASHER, Flat	2	2	2	2
15	P	83518	001		RECORDER (See Fig. 8-13)	1	1	1	1
16	P	146483	002		FRONT PANEL ASSEMBLY, Manual Door	1	1		
	P	146483	001		FRONT PANEL ASSEMBLY, Power Door			1	1
17	P	45323	042		SCREW, Button Head Socket, #8-32 x 3/8	2	2	2	2
18	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	2	2	2	2
19	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	6			
20	P	79588	001		LOCKWASHER	8	8	8	8
21	P	146490	001		PANEL, Secondary Assembly, Gravity (See Fig. 8-16)	1	1		
	P	146491	001		PANEL, Secondary Assembly, Isothermal (See Fig. 8-18)		1		1
22	P	146484	001		PANEL, Mounting	1	1		
	P	146494	001		SWITCH ASSEMBLY, Door Operating (See Fig. 8-20)			1	1
23	P	451283	091		CLIP, Locking, Capillary	3	3	3	3
24	P	146645	226		CONTROL, Primary	1	1	1	1
25	P	764317	536		• LAMP	26	26	26	26
26	P	84390	001		SPACER, Primary Control	4	4	4	4
	P	431152	091		CLIP, Locking, Wire	8	8	8	8

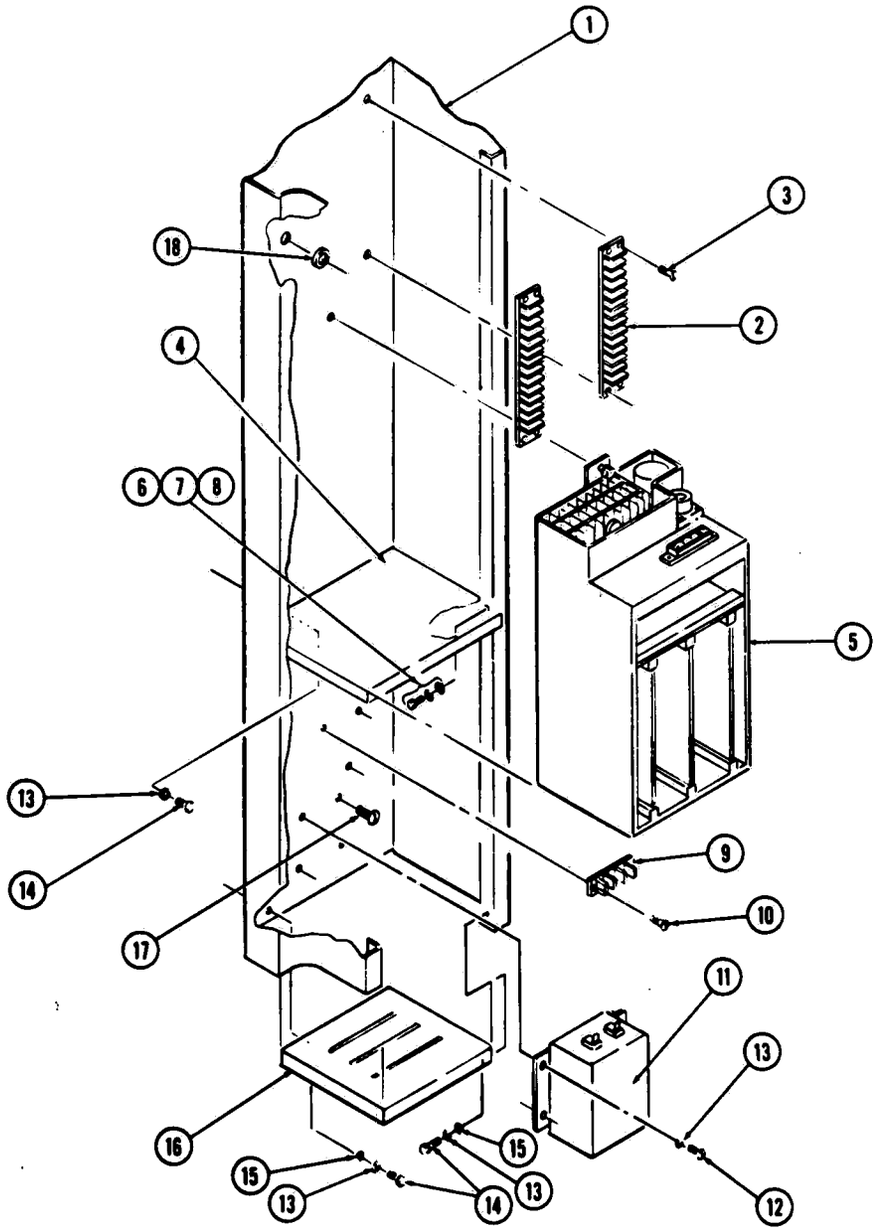


Figure 8-11. CONTROL COLUMN (Part 2 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-11-					CONTROL COLUMN (Part 2 of 3)	X
1	P	146485	003		HOUSING ASSEMBLY	1
2	P	41560	091		BLOCK, Terminal	1
3	P	3964	041		SCREW, Round Head, #6-32 x 5/8	2
4	P	136579	001		SUPPORT, Controller	1
5					MAIN CONTROL ASSEMBLY, Gravity (See Fig. 8-15)	1
					MAIN CONTROL ASSEMBLY, Isothermal (See Fig. 8-15)	1
6	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	2
7	P	79588	001		LOCKWASHER	2
8	P	17796	091		WASHER, Flat	2
9	P	90746	091		STRIP, Terminal	1
10	P	9661	051		SCREW, #10-32 x 5/8	2
11	P	93821	001		FILTER	1
12	P	4682	041		SCREW, Round Head, #10	4
13	P	31705	045		LOCKWASHER	10
14	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	6
15	P	5511	091		WASHER, Flat	4
16	P	136588	001		PLATE, Bottom	1
17	P	92675	001		SCREW, Green Ground, #10-32	1
18	P	24582	091		GROMMET	1

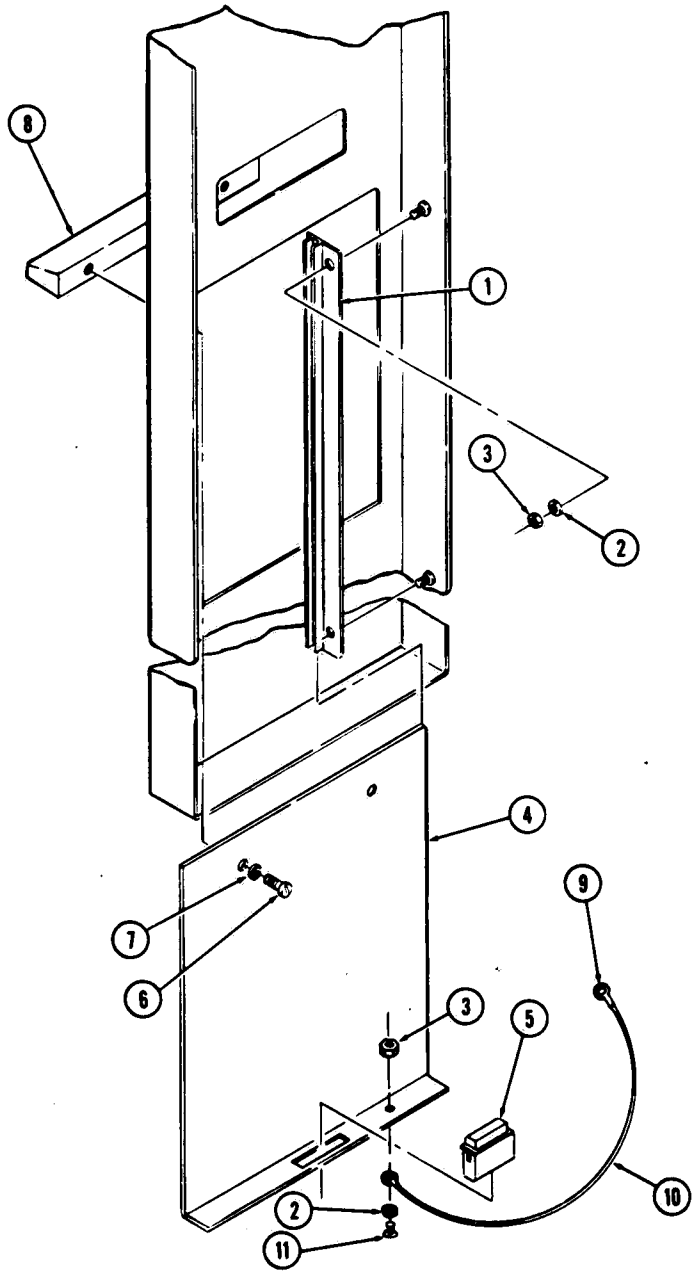


Figure 8-12. CONTROL COLUMN (Part 3 of 3). (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER	
8-12-					CONTROL COLUMN (Part 3 of 3)	X
1	P	84394	001		SLIDE, Door	2
2	P	5469	041		WASHER, Flat	5
3	P	3037	041		NUT, Hex, #6-32	5
4	P	93662	001		DOOR	1
5	P	83920	001		CATCH, Magnetic	1
6	P	4682	041		SCREW, Round Head	2
7	P	79588	001		LOCKWASHER	2
8	P	84393	001		HANDLE	1
9	P	19521	091		TERMINAL, #6 Ring x 16-22 AWG	2
10					WIRE, Green, #18 AWG	1
11	P	50705	041		SCREW, Flat Head, #6-32 x 5/16	1

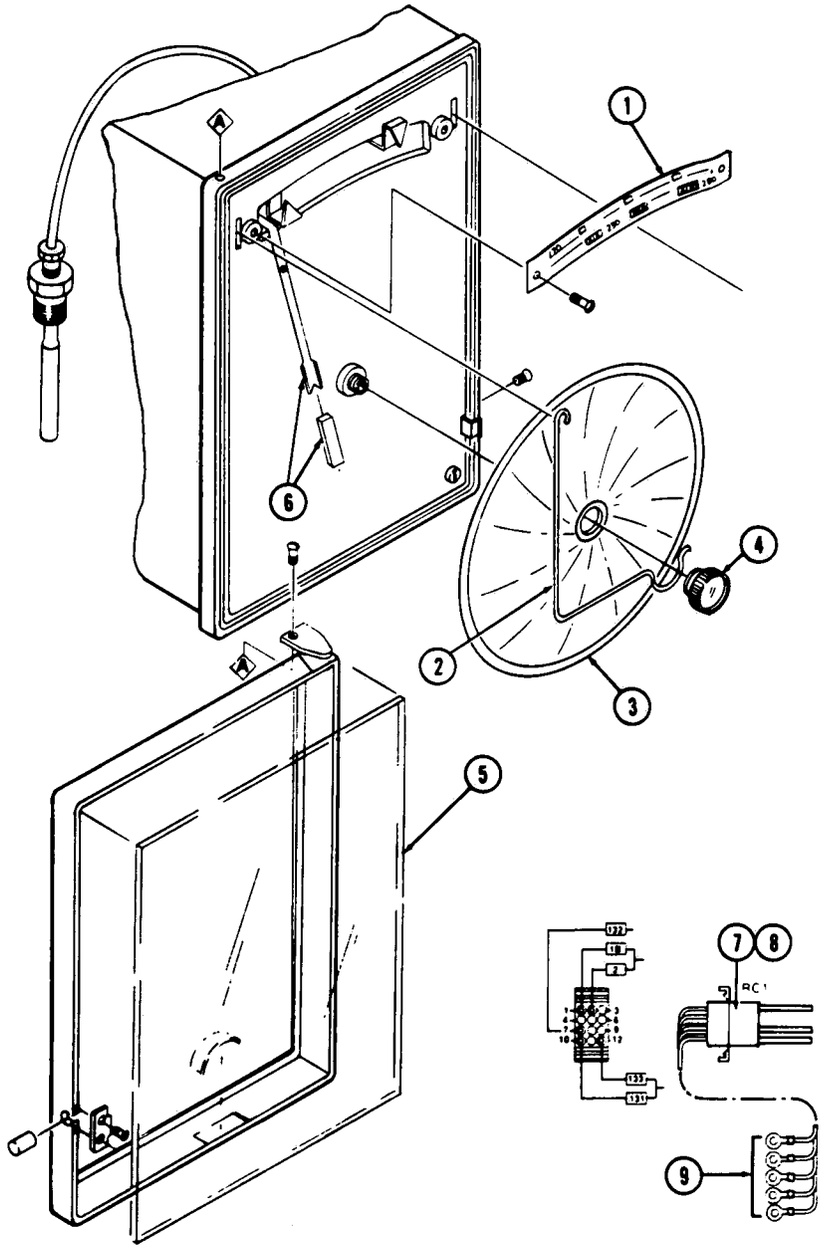


Figure 8-13. INDICATOR-RECORDER-CONTROLLER (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-13-	P	83518	001		INDICATOR-RECORDER-CONTROLLER (Part 1 of 2)	X
1	P	93711	001		SCALE, Temperature	1
2	P	764315	320		LIFTER, Pen	1
3	P	93707	001		CHART, Recording (Box of 100)	A/R
4	P	764315	319		HUB, Chart	1
5	P	76960	091		GLASS, Door	1
	P	751364	091		• TAPE, Door Glass	1
6	P	764315	403		CARTRIDGE, Ink (Card of Six, With One Arm)	A/R
7	P	84381	001		CONNECTOR	1
8	P	84382	001		TERMINAL, Pin	5
9	P	19521	091		TERMINAL, #6 Ring x 16-22 AWG	5

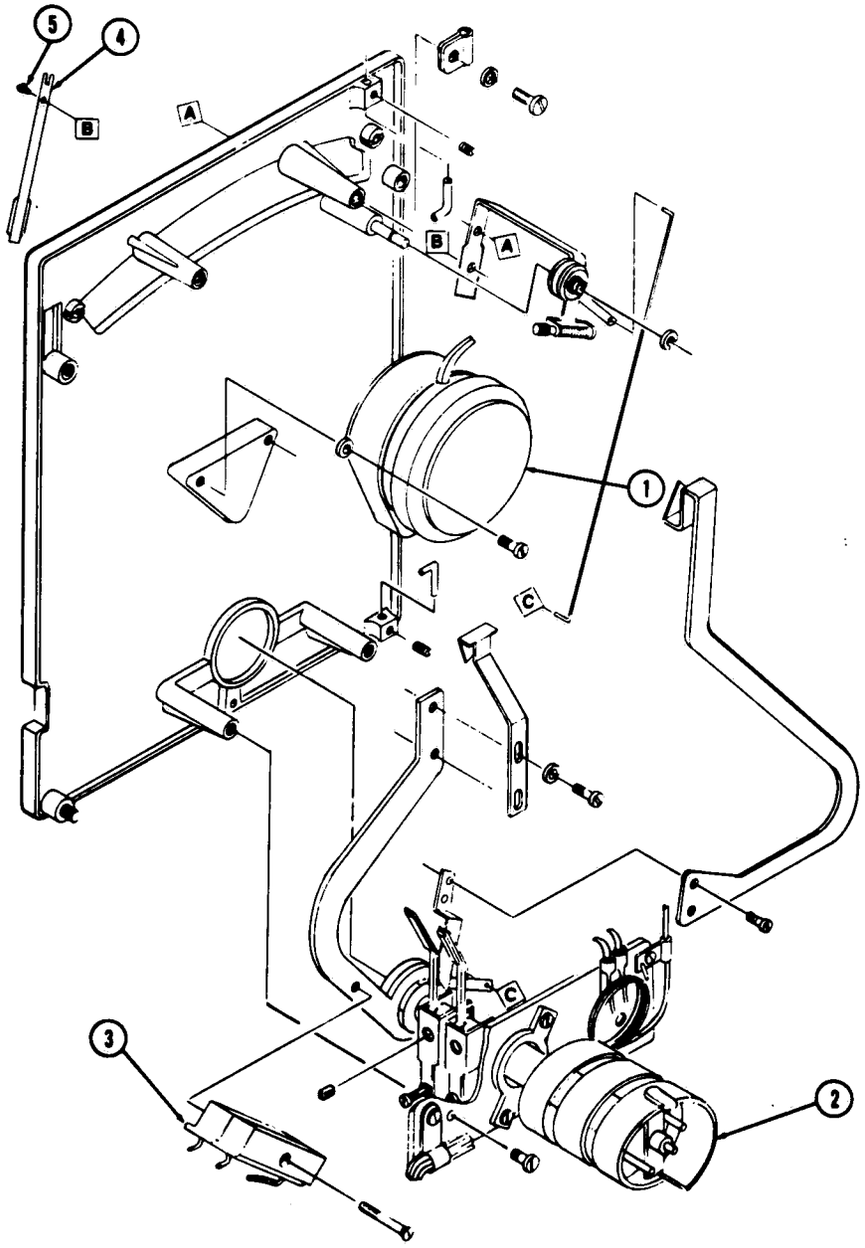


Figure 8-14. INDICATOR-RECORDER-CONTROLLER (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-14-	P	83518	001		INDICATOR-RECORDER-CONTROLLER (Part 2 of 2)	X
1	P	764315	336		MOTOR, Chart Drive	1
2	P	764315	325		THERMAL SYSTEM ASSEMBLY, (20 Foot Copper)	1
	P	764315	326		THERMAL SYSTEM ASSEMBLY, (20 Foot Stainless)	1
3	P	78878	091	*	SWITCH, Reed	2
	P	752094	091	*	• ARM AND MAGNET	2
	P	764316	560	**	SWITCH, Reed	2
	P	764316	561	**	• ARM AND MAGNET	2
4	P				ARM, Pen (See Figure 8-13)	1
5	P	750002	091		SCREW, Pen Arm	1

*Used on recorder Model No. 5632-40W-060-221-111-120

**Used on recorder Model No. 5632-40W-062-221-111-120

NOTE: The recorder Model No. is on the nameplate located under the chart paper.

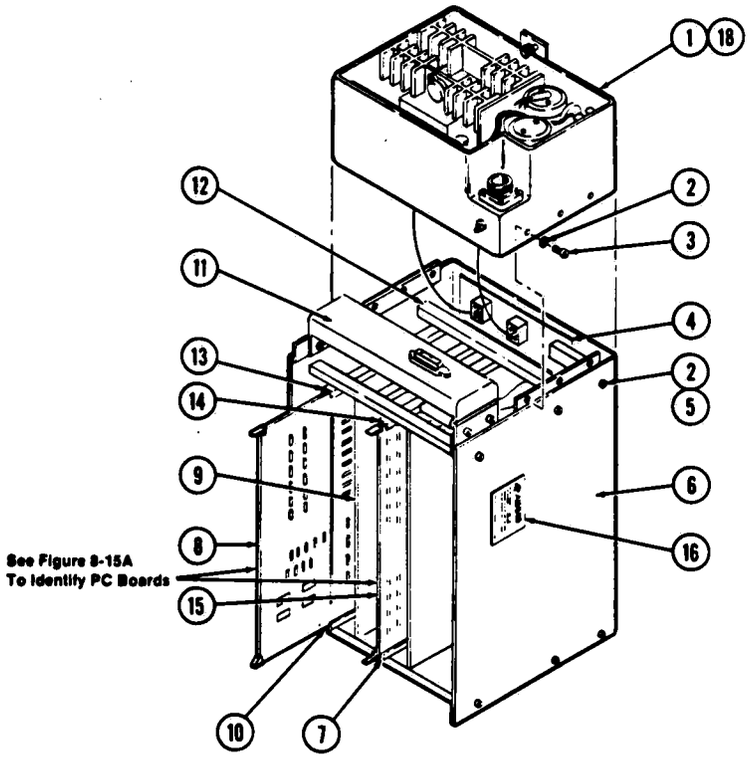


Figure 8-15. MAIN CONTROL ASSEMBLY.

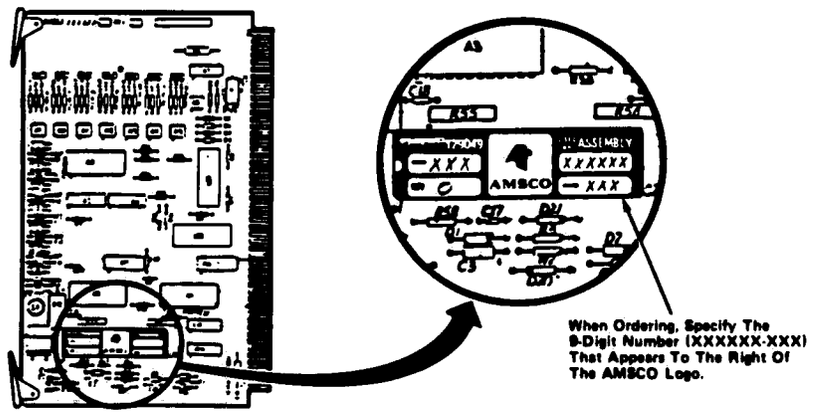
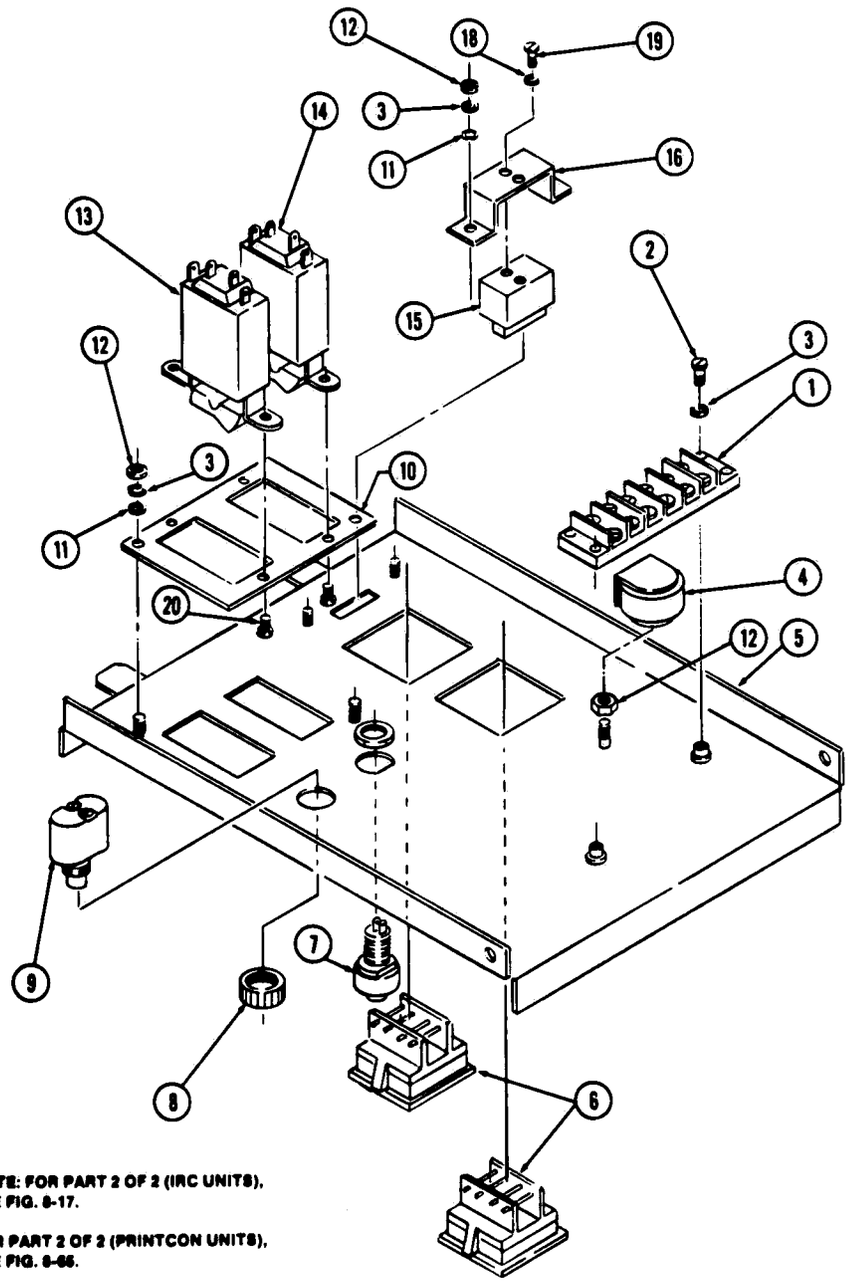


Figure 8-15.A. IDENTIFYING PC BOARD PART NUMBERS.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-15-					MAIN CONTROL ASSEMBLY, Gravity Sterilizer	X			
					MAIN CONTROL ASSEMBLY, Isothermal Sterilizer		X		
					UNITS WITH PRINTCON:				
					MAIN CONTROL ASSEMBLY, Gravity Sterilizer			X	
					MAIN CONTROL ASSEMBLY, Isothermal Sterilizer				X
1	P	146402	001		POWER SUPPLY ASSEMBLY	1	1		
	P	764317	835		• FUSE, Pico (F401) 3 Amp, 125 V (Box of 5)	1	1		
	P	764317	778		• FUSE, Cartridge (F402) 3 Amp, 250 V (Box of 5)	1	1		
	P	146645	042		POWER SUPPLY ASSEMBLY			1	1
	P	764317	833		• FUSE, Pico, 2 Amp, 125 V (Box of 5)			1	1
	P	764317	834		• FUSE, Pico, 4 Amp, 125 V (Box of 5)			1	1
	P	764317	836		• FUSE, Pico, 1/2 Amp, 125 V (Box of 5)			1	1
	P	764317	449		• FUSE, 2 Amp, 250 V (F402) (Box of 5) Slo-Blo			1	1
2	P	84116	002		LOCKWASHER, #6	22	22	25	30
3	P	40357	045		SCREW, Self Tapping, #6 x 1/4	10	10	10	10
4	P	760244	001		MOTHER BOARD ASSEMBLY, Gravity	1		1	
	P	760244	004		MOTHER BOARD ASSEMBLY, Isothermal		1		1
5	P	84117	002		SCREW, Pan Head, #6-32 x 5/16	12	12	12	12
6	P	93762	001		CHASSIS	1	1	1	1
7	P	84225	001		GUIDE, Card	2	4	2	4
8	P	146586	001	•	PC CARD, Basic	1	1	1	1
9					NOT USED				
10	P	84226	001		TAB, Locking	3	9	3	9
11	P	93900	045		RECEPTACLE BRACKET ASSEMBLY	1	1	1	1
12	P	129030	001		BAR, PC Board, Guide	4	4	4	4
13	P	83528	001		TAB, ID Locking, CPU	1	1	1	1
14	P	83528	007		TAB, ID Locking I/O 1		1		1
15	P	146588	001	•	PC CARD, Expander I/O 1		1		1
16	P	129352	050		PLATE, Identification	1	1	1	1
17	P	136800	561		HEAT SINK (Not Shown)			1	1
18	P	141198	310		POWER SUPPLY (For Units after 2/88)	1	1	1	1
	P	764317	833		• FUSE, Pico, 2 Amp, 125 V (F4) (Box of 5)	1	1	1	1
	P	764317	834		• FUSE, Pico, 4 Amp, 125 V (F2) (Box of 5)	1	1	1	1
	P	764317	836		• FUSE, Pico, 1/2 Amp, 125 V (F3) (Box of 5)	1	1	1	1
	P	764317	449		• FUSE, 2 Amp, 250 V (F402) (Box of 5) Slo-Blo	1	1	1	1
	P	129359	135		• FUSE, 1.25 Amp, 250 V (F403)	1	1	1	1



NOTE: FOR PART 2 OF 2 (IRC UNITS), SEE FIG. 8-17.

FOR PART 2 OF 2 (PRINTCON UNITS), SEE FIG. 8-66.

Figure 8-16. SECONDARY CONTROL PANEL: Gravity (Part 1 of 2).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
					UNITS WITH INDICATOR-RECORDER:					
8-16-					SECONDARY CONTROL PANEL, Gravity Model (Part 1 of 2)	X				
					UNITS WITH PRINTCON:					
					SECONDARY CONTROL PANEL, Gravity Model (Part 1 of 2)		X			
1	P	89174	091		BLOCK, Terminal, 6 point	1				
	P	90627	091		BLOCK, Terminal, 8 point		1			
2	P	3960	041		SCREW, Round Head, #6-32 x 1/2	2	2			
3	P	18131	091		LOCKWASHER, #6	6	6			
4	P	83933	002		BUZZER	1	1			
5	P	146478	002		PANEL, Secondary	1				
	P	146649	100		PANEL, Secondary		1			
6	P	136315	002		SWITCH, Thumbwheel, 2 Switch Assembly	2	2			
7	P	84400	001		BREAKER, Circuit, CB2	1	1			
8	P	44155	091		GUARD, Button	1	1			
9	P	48070	091		SWITCH, Pushbutton, PB1	1	1			
10	P	93757	001		SPACER, Breaker	1	1			
11	P	17589	045		WASHER, Flat	4	4			
12	P	3037	041		NUT, Hex, #6-32	7	7			
13	P	93105	001		BREAKER, Circuit, CB1	1	1			
14	P	129022	001		SWITCH, Rocker, SW1	1	1			
15	P	84362	002		COUNTER	1	1			
16	P	93737	001		BRACKET, Counter	1	1			
17					NOT USED					
18	P	30743	045		LOCKWASHER	2	2			
19	P	17658	041		SCREW, #4-40 x 3/16	2	2			
20	P	27741	041		SCREW, Flat Head, #6-32 x 3/16	4	4			

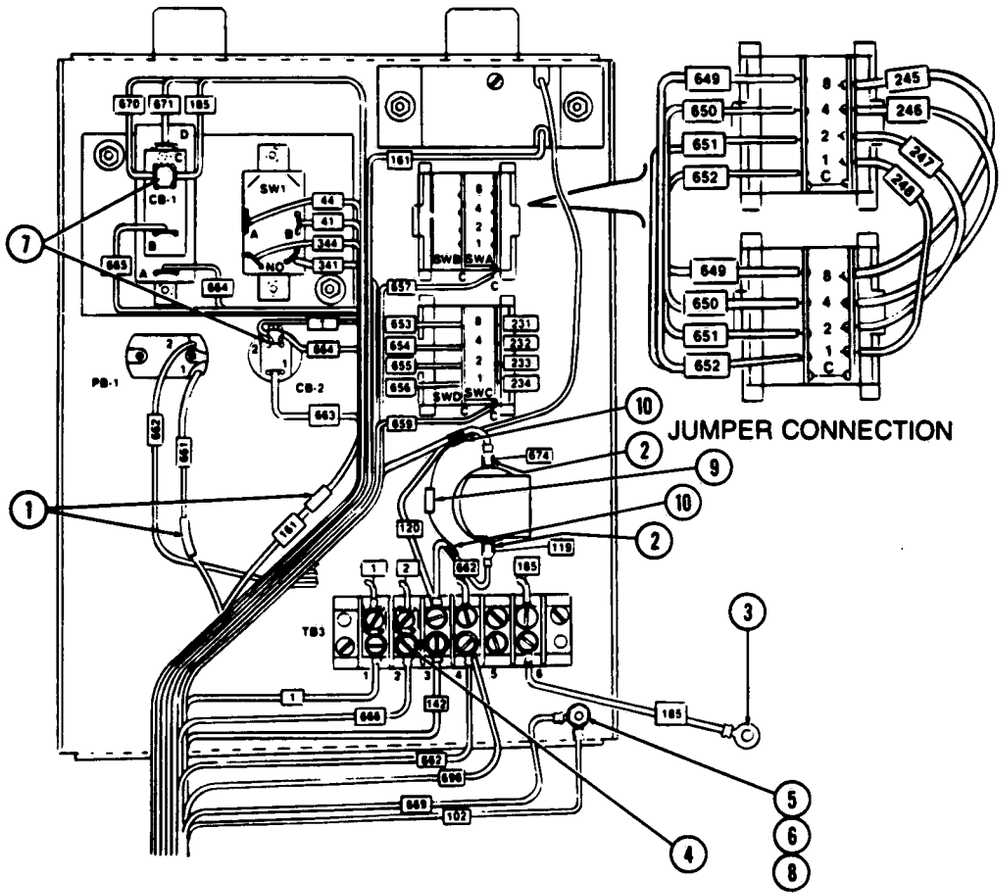
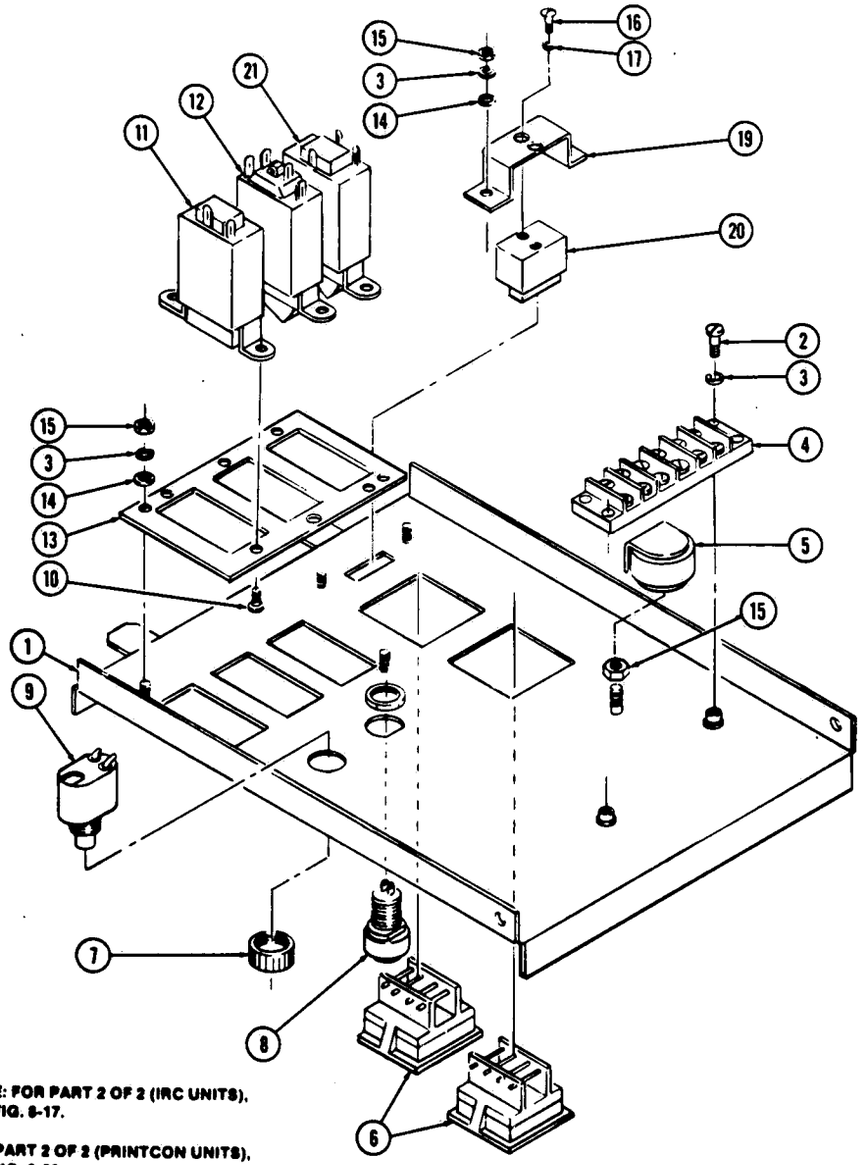


Figure 8-17. SECONDARY CONTROL PANEL: Gravity (Part 2 of 2). (Units With Indicator Recorder)

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-17-					SECONDARY CONTROL PANEL: Gravity (Part 2 of 2)	X
1	P	129352	049		CONNECTOR, Butt	2
2	P	91694	091		RECEPTACLE, 3/16 Lug x #18-22 Wire	2
3	P	90619	091		TERMINAL, Wire, 6 Ring x #16-22 Wire	12
4	P	84123	001		JUMPER, Terminal Block	1
5	P	3037	041		NUT, Hex, #6-32	1
6	P	18131	091		LOCKWASHER, #6	1
7	P	32118	091		ADAPTER, Terminal	2
8	P	17589	045		WASHER, Flat	1
9	P	129318	001		RESISTOR, 3000 Ohm	1
	P	764316	608		• KIT, Buzzer Resistor	AR
10	P	150822	015		SPLICE, Electrotap	2



NOTE: FOR PART 2 OF 2 (IRC UNITS), SEE FIG. 8-17.

FOR PART 2 OF 2 (PRINTCON UNITS), SEE FIG. 8-66.

Figure 8-18. SECONDARY CONTROL PANEL: Isothermal Model (Part 1 of 2).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-18-					**UNITS WITH INDICATOR-RECORDER:** SECONDARY CONTROL PANEL: Isothermal Model (Part 1 of 2)	X			
					UNITS WITH PRINTCON: SECONDARY CONTROL PANEL: Isothermal Model (Part 1 of 2)		X		
1	P	146481	001		PANEL, Secondary	1			
	P	146649	116		PANEL, Secondary		1		
2	P	3960	041		SCREW, Round Head, #6-32 x 1/2	2	2		
3	P	18131	091		LOCKWASHER	6	6		
4	P	89174	091		BLOCK, Terminal, 6 point	1			
	P	90627	091		BLOCK, Terminal, 8 point		1		
5	P	83933	002		BUZZER	1	1		
6	P	136315	002		SWITCH, Thumbwheel	2	2		
7	P	44155	091		GUARD, Button	1	1		
8	P	84400	001		BREAKER, Circuit, CB2	1	1		
9	P	48070	091		SWITCH, Pushbutton, PB1	1	1		
10	P	27741	041		SCREW, Flat Head, #6-32 x 3/16	6	6		
11	P	84148	001		SWITCH, Rocker, SW2	1	1		
12	P	83105	001		BREAKER, Circuit, CB1	1	1		
13	P	93758	001		SPACER, Breaker and Switch	1	1		
14	P	17589	045		WASHER, Flat	4	4		
15	P	3037	041		NUT, Hex, #6-32	7	7		
16	P	17658	041		SCREW, #4-40 x 3/16	2	2		
17	P	30743	045		LOCKWASHER	2	2		
18					NOT USED				
19	P	93737	001		BRACKET, Counter	1	1		
20	P	84362	002		COUNTER	1	1		
21	P	129022	001		SWITCH, Rocker (SW-1)	1	1		

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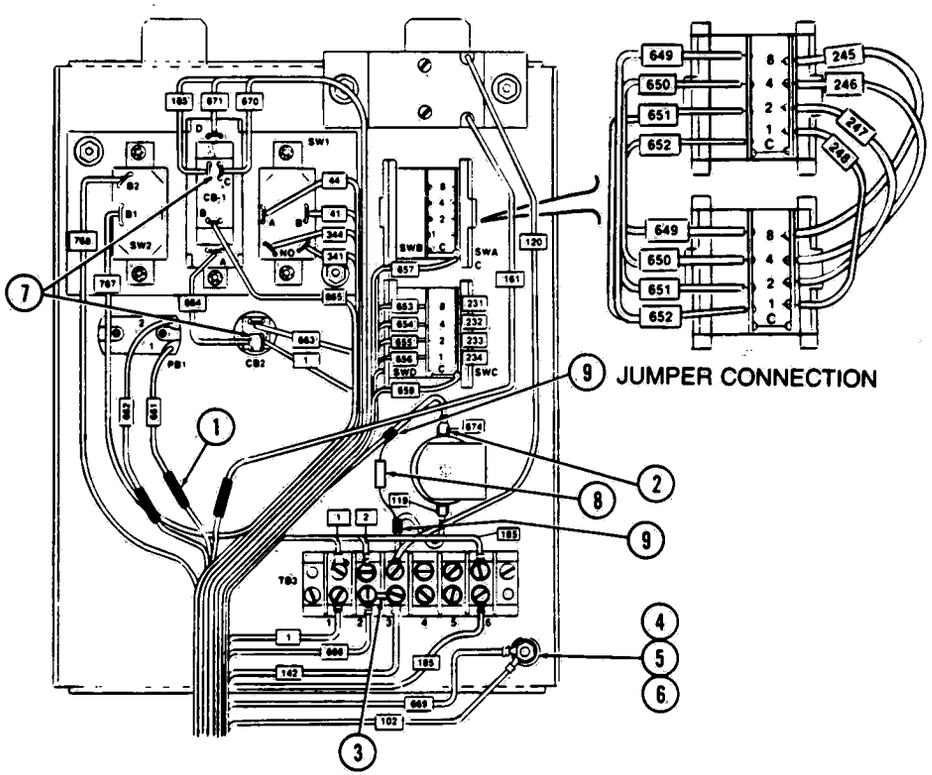


Figure 8-19. SECONDARY CONTROL PANEL: Isothermal Model (Part 2 of 2). (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-19-					SECONDARY CONTROL PANEL: Isothermal Model (Part 2 of 2) ..	X
1	P	129352	049		CONNECTOR, Butt	3
2	P	91694	091		RECEPTACLE, 1/4 Lug x 18-22 Wire	2
3	P	84123	001		JUMPER, Terminal Block	1
4	P	3037	041		NUT, Hex, #6-32	1
5	P	18131	091		LOCKWASHER, #6	1
6	P	17589	045		WASHER, Flat	1
7	P	32118	091		ADAPTER, Terminal	2
	P	14590	091		TERMINAL, Wire, #6 Ring x 14-16 Wire	3
	P	90619	091		TERMINAL, Wire, #6 Ring x 18-22	11
8	P	129318	001		RESISTOR, 3000 Ohm	1
	P	764316	608		• KIT, Buzzer Resistor	AR
9	P	150822	015		SPLICE, Electrotap	2

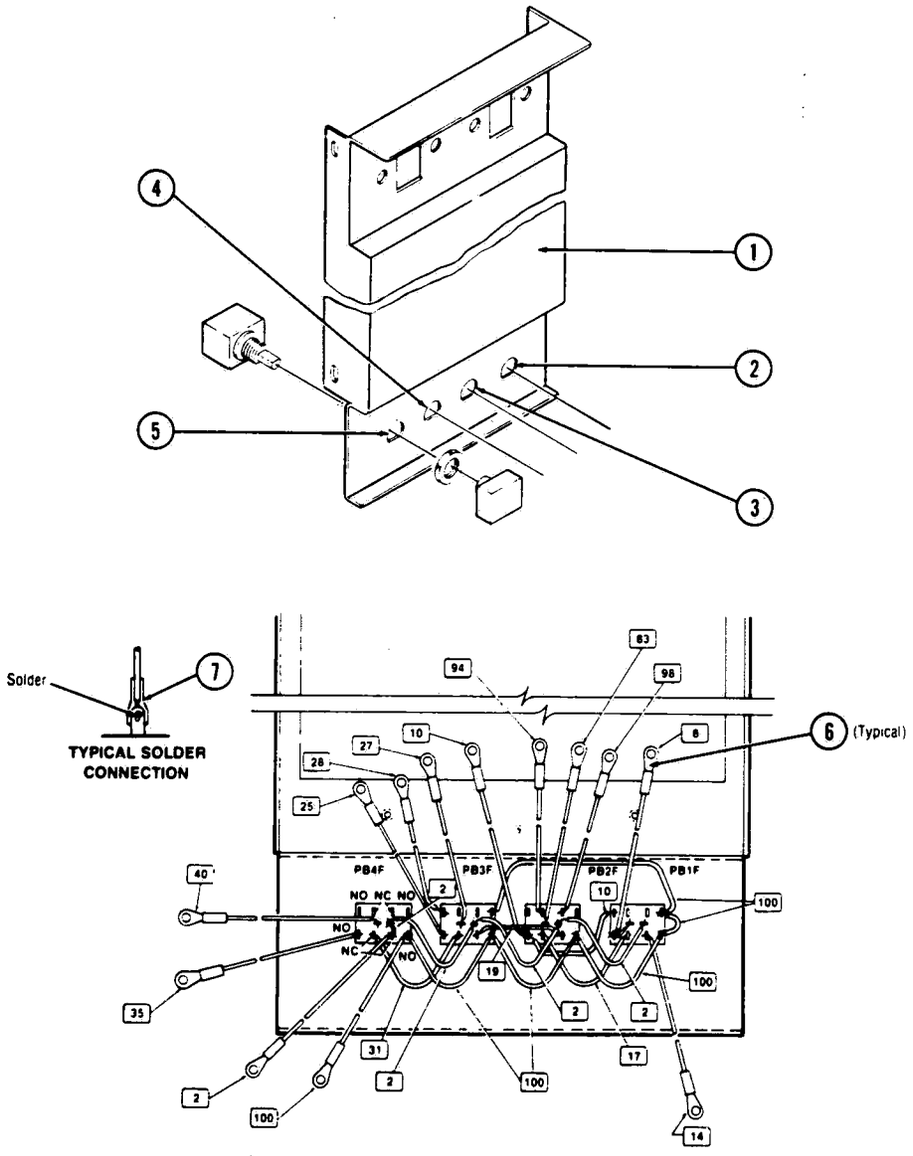


Figure 8-20. SWITCH ASSEMBLY: Operating End Power Door. (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH INDICATOR-RECORDER:	
8-20-	P	146494 001		SWITCH ASSEMBLY: Operating End Power Door	X
1	P	146484 001		PANEL, Mounting	1
2	P	93177 004		SWITCH, "Stop"	1
3	P	93177 003		SWITCH, "Unlock"/"Open"	1
4	P	93177 002		SWITCH, "Lock"	1
5	P	93177 001		SWITCH, "Close"	1
6	P	129278 001		TERMINAL, #6 Ring	13
7	P	78629 091		TUBE, Hy Shrink	26

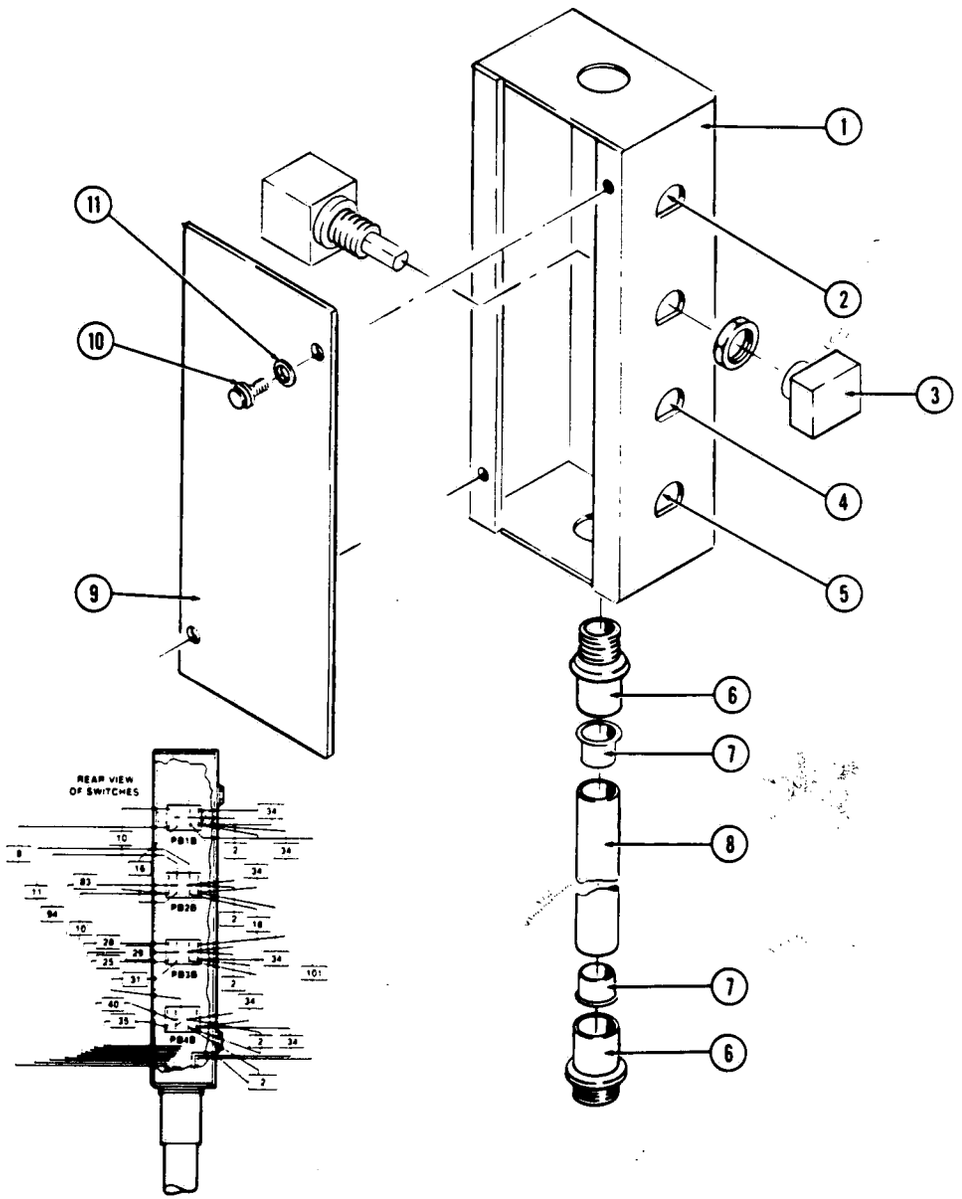


Figure 8-21. SWITCH ASSEMBLY: Non-Operating End Power Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-21-	P	146540	001		SWITCH ASSEMBLY: Non-Operating End Power Door (L.H.)	X			
	P	146540	002		SWITCH ASSEMBLY: Non-Operating End Power Door (R.H.)		X		
1	P	93695	001		BOX, Switch	1	1		
2	P	93177	001		SWITCH, Close	1	1		
3	P	93177	002		SWITCH, Lock	1	1		
4	P	93177	003		SWITCH, Unlock/Open	1	1		
5	P	93177	004		SWITCH, Stop	1	1		
6	P	150030	001		CONNECTOR, Straight, 1/2	2	2		
7	P	24748	091		BUSHING	2	2		
8	P	91758	091		CONDUIT, Flexible, 1/2 x 85	1	1		
9	P	93694	001		COVER, Switch Box	1	1		
10	P	90168	045		SCREW, Self Tapping, #10 x 5/16	2	2		
11	P	5511	041		WASHER, Flat	2	2		

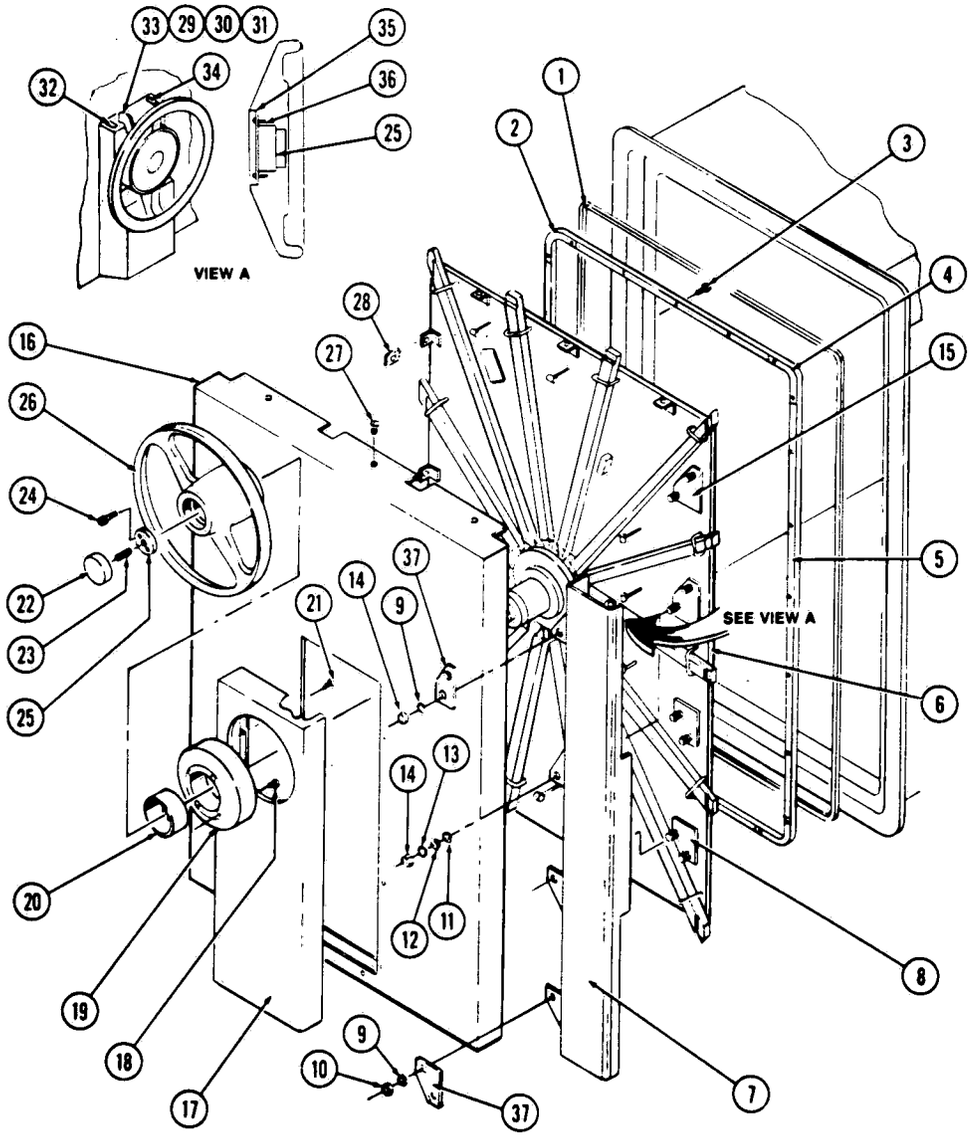


Figure 8-22. COVER AND HANDWHEEL ASSEMBLY: Chamber Door.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-22-					COVER AND HANDWHEEL ASSEMBLY: Manual, R.H.	X			
					COVER AND HANDWHEEL ASSEMBLY: Manual, L.H.		X		
					COVER AND HANDWHEEL ASSEMBLY: Power, R.H.			X	
					COVER AND HANDWHEEL ASSEMBLY: Power, L.H.				X
1	P	97487	091		GASKET, Door	1	1	1	1
2	P	38268	091		GASKET BAR, Top and Bottom	2	2	2	2
3	P	46705	061		SCREW, Socket Head	32	32	32	32
4	P	48255	001		GASKET BAR, Corner	4	4	4	4
5	P	48254	091		GASKET BAR, Side	2	2	2	2
6	P	149582	091		DOOR ASSEMBLY (See Fig. 8-23)	1	1	1	1
7	P	136566	001		HINGE ASSEMBLY, R.H. (See Fig. 8-24)	1		1	
	P	136567	001		HINGE ASSEMBLY, L.H.		1		1
8	P	150034	001		SHIM, .005" Thick	A/R	A/R	A/R	A/R
	P	48932	045		SHIM, .060" Thick	A/R	A/R	A/R	A/R
	P	77098	061		SHIM, .015" Thick	A/R	A/R	A/R	A/R
	P	77097	045		SHIM, .029" Thick	A/R	A/R	A/R	A/R
9	P	19681	045		WASHER, Lock	4	4	4	4
10	P	3101	041		NUT, Hex, 1/2-13	4	4	4	4
11	P	38265	045		CAM	4	4	4	4
12	P	17285	045		WASHER, Flat	4	4	4	4
13	P	19692	061		WASHER, Lock	4	4	4	4
14	P	3104	045		NUT, Hex, 5/8-11	4	4	4	4
15	P	150034	001		SHIM, .005" Thick	A/R	A/R	A/R	A/R
	P	48933	045		SHIM, .060" Thick	A/R	A/R	A/R	A/R
	P	77099	061		SHIM, .015" Thick	A/R	A/R	A/R	A/R
	P	77100	045		SHIM, .029" Thick	A/R	A/R	A/R	A/R
16	P	149584	063		COVER, Door, R.H.	1		1	
	P	149585	063		COVER, Door, L.H.		1		1
17	P	139749	063		COVER, Manual Door	1	1		
	P	139750	063		COVER, Power Door			1	1
18	P	34144	091		SCREW, Socket Head, #10-24 x 3/4	4	4		
19	P	90961	056		ADAPTER	1	1		
20	P	90405	091		BUSHING	1	1	1	1
21	P	90170	045		SCREW, Self Tapping	15	15	15	15
22	P	93174	002		BUTTON ASSEMBLY, Clutch Rod	1	1	1	1
23	P	24911	091		SCREW, Set	1	1	1	1
24	P	37891	091		SCREW, Socket Head, #10-24 x 5/8	3	3	3	3
25	P	90376	091		RETAINER, Handwheel	1	1	1	1
26	P	136445	002		HANDWHEEL ASSEMBLY	1	1	1	1
	P	93647	002		• FACEPLATE	1	1	1	1
27	P	90562	061		SCREW, Self Tapping, #8 x 5/8	10	10	10	10
28	P	90198	045		SPEEDNUT, #8-A	10	10	10	10
29	P	91919	045		LOCKWASHER			1	1
30	P	5590	042		WASHER, Flat			1	1
31	P	45685	061		PIN, Roll			2	2
32	P	89172	091		NAMEPLATE, Manual			1	1
33	P	90377	056		LEVER			1	1
34	P	89173	091		NAMEPLATE, Power			1	1
35	P	90372	091		RING, Clutch			1	1
36	P	37344	048		SCREW, Socket Head, #10-24 x 3/8			4	4
37	P	44358	010		PLATE, Hinge	2	2	2	2

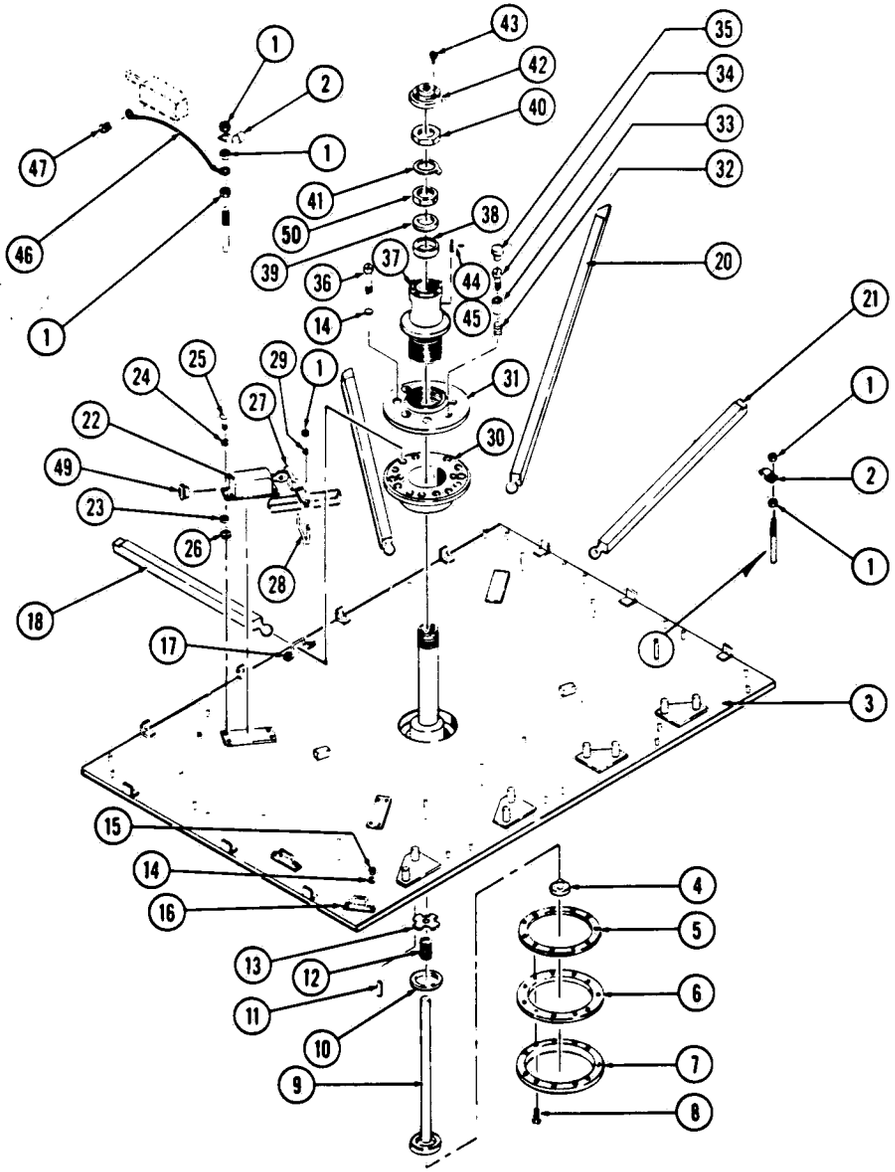


Figure 8-23. DOOR ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-23-	P	149582	091		DOOR ASSEMBLY: 24 x 36 Sterilizer	X
1	P	3039	091		NUT, Hex, #10-32	17
2	P	91315	091		CLAMP, Harness	7
3	P	149570	091		DOOR WELDMENT	1
4	P	8778	091		THRUST PLATE ASSEMBLY	1
5	P	7753	091		GASKET, Diaphragm	1
6	P	7230	061		DIAPHRAGM	1
7	P	6624	042		COVER, Diaphragm	1
8	P	4782	061		SCREW, Hex Head, 1/4-20 x 5/8	12
9	P	90357	091		ROD ASSEMBLY, Clutch	1
10	P	11707	091		LOCK CLUTCH, Front	1
11	P	11829	091		PIN, Lock Clutch	4
12	P	11709	091		SPRING, Lock Clutch	1
13	P	150339	001		SHIM	A/R
	P	150339	002		SHIM	A/R
14	P	19666	061		WASHER, Lock	32
15	P	3097	041		NUT, Hex, 1/4-20	28
16	P	50472	042		FULCRUM ASSEMBLY	10
17	P	43848	042		FULCRUM ASSEMBLY	4
18	P	50478	052		ARM, Radial	2
19	P	50473	052		ARM, Radial	4
20	P	50474	052		ARM, Radial	4
21	P	50480	052		ARM, Radial	4
22	P	56396	482		SWITCH, Limit	1
23	P	82459	001		SPACER	4
24	P	19676	041		WASHER, Lock	4
25	P	150455	001		SCREW, Round Head, #8-32 x 2	4
26	P	3515	041		WASHER, Flat	4
27	P	90936	091		ACTUATOR, Limit Switch	1
28	P	90935	061		BRACKET, Actuator	1
29	P	19677	041		WASHER, Lock, #10	2
30	P	89635	045		SOCKET PLATE, Bottom	1
31	P	139576	045		SOCKET PLATE, Top	1
32	P	89183	091		SPRING	4
33	P	89642	045		STOP	4
34	P	89184	091		SCREW	4
35	P	76189	091		CAP	4
36	P	45613	091		SCREW, Socket Head, 1/4-20 x 1-1/2	4
37	P	86354	091		SCREW SHAFT ASSEMBLY	1
38	P	90911	091		ROLLER BEARING	1
	P	90910	091		• BEARING	1
	P	90912	091		• RACE	1
39	P	90913	091		WASHER, Thrust	1
40	P	90914	091		LOCK NUT	1
41	P	90915	091		LOCKWASHER	1
42	P	90373	091		CAP, Clutch Lock	1
43	P	34144	091		SCREW, Socket Head, #10-24 x 3/4	6
44	P	90926	091		KEY, Clutch	2
45	P	40825	041		SCREW, Flat Head, #8-32 x 1/2	2
46	P	92949	001		WIRE, Ground	1
47	P	3969	041		SCREW, Round Head, 1/4-20 x 1/4	1
48	P	33379	061		SHIM, .025" Thick	A/R
	P	33380	061		SHIM, .015" Thick	A/R
	P	78652	061		SHIM, .065" Thick	A/R
	P	46078	061		SHIM, .010" Thick	A/R
49	P	80250	091		CONNECTOR	1
50	P	56396	735		NUT	1

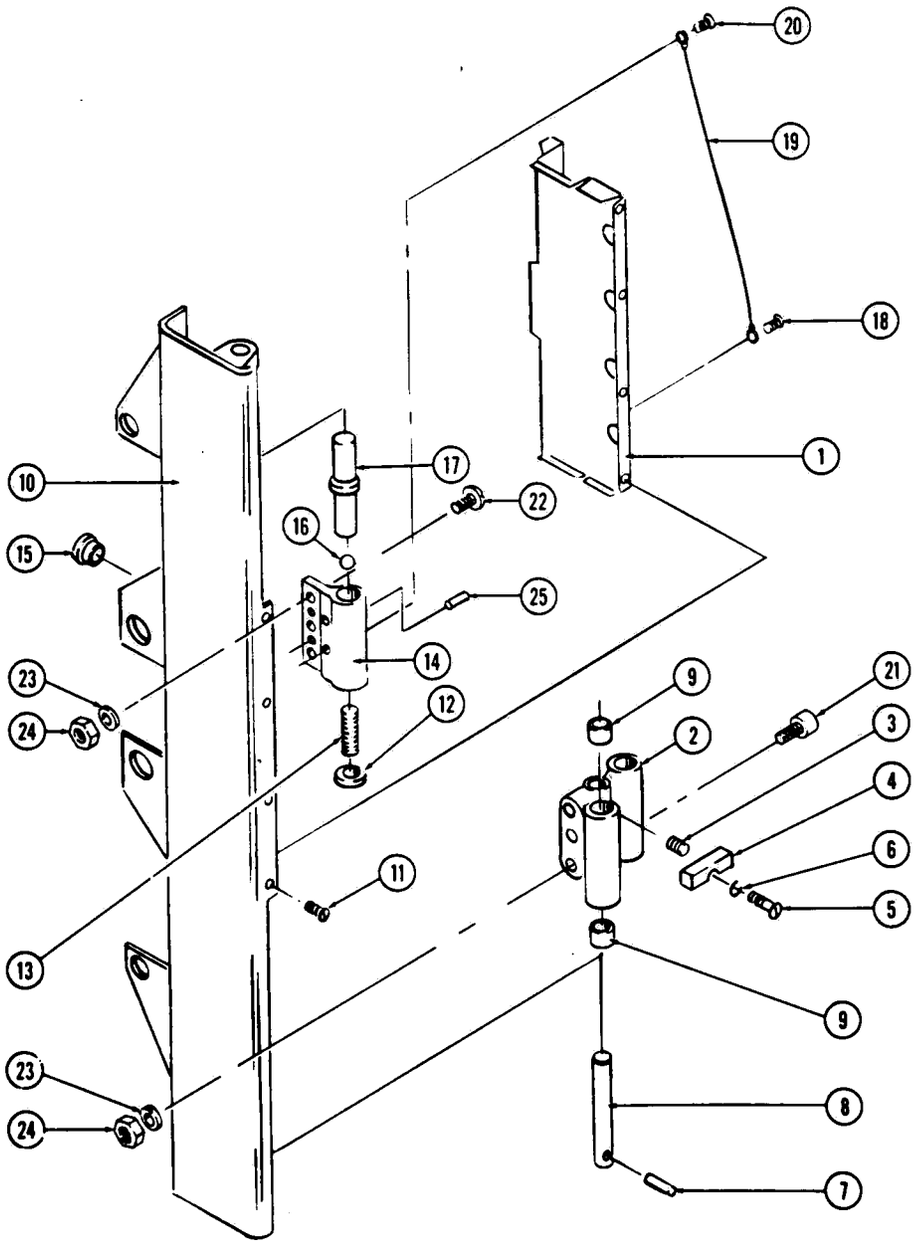
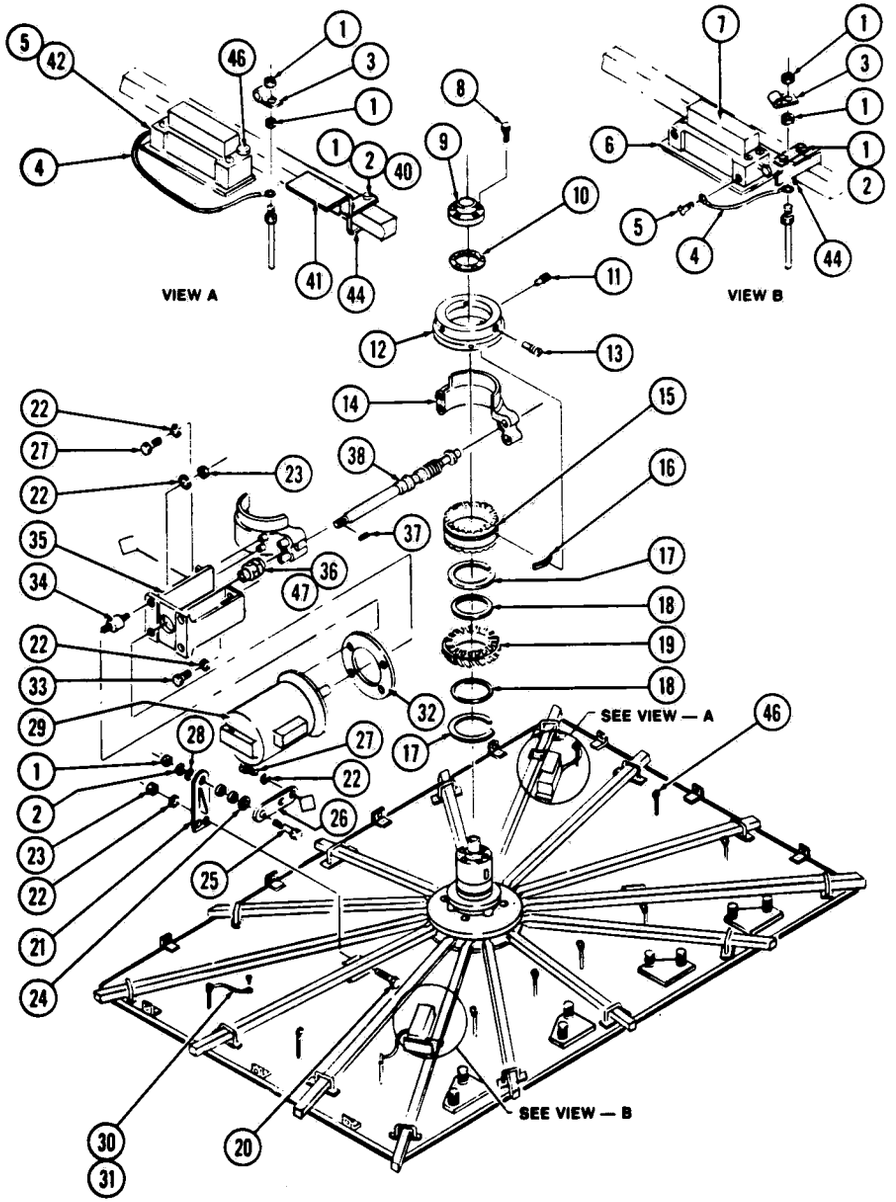


Figure 8-24. HINGE ASSEMBLY: Chamber Door.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-24-	P	136567	001		HINGE ASSEMBLY: Chamber Door (L.H.)	X			
	P	136566	001		HINGE ASSEMBLY: Chamber Door (R.H.)		X		
1	P	96142	031		BOX, Hinge	1	1		
2	P	139716	091		BLOCK, Gear	1	1		
3	P	15450	091		SCREW, Set	2	2		
4	P	89202	045		STOP, Door	1	1		
5	P	3850	045		SCREW	1	1		
6	P	19679	041		LOCKWASHER	1	1		
7	P	47979	061		PIN, Roll	1	1		
8	P	91130	061		SHAFT, Gear Block	1	1		
9	P	91109	091		BUSHING, Plain	2	2		
10	P	96403	063		HINGE WELDMENT, Door	1	1		
11	P	90170	045		SCREW	8	8		
12	P	33961	045		NUT, Jamb	1	1		
13	P	90358	061		SCREW, Set	1	1		
14	P	91134	043		MOUNT, Hinge, L.H.	1			
	P	90353	043		MOUNT, Hinge, R.H.		1		
15	P	76262	091		BUSHING, Snap	2	2		
16	P	91142	091		BALL BEARING	1	1		
17	P	90354	061		PIN, Shoulder	1	1		
18	P	24840	061		SCREW, Self Tapping, #10-32 x 1/2	1	1		
19	P	92950	001		STRAP ASSEMBLY, Ground	1	1		
20	P	3990	042		SCREW, Round Head, #10-24 x 3/8	1	1		
21	P	43237	091		SCREW, Socket Head Cap, 3/8-16 x 3/4	3	3		
22	P	28397	052		BOLT, Carriage, 3/8-16	3	3		
23	P	19687	061		LOCKWASHER	6	6		
24	P	3099	042		NUT, Plain 3/8-16	6	6		
25	P	26696	061		PIN, Groove, 1/4	4	4		



NOTE: Units before 5/30/80 have only two switches (LS-2 and LS-3).

Figure 8-25. POWER DOOR PACKAGE.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-25-					POWER DOOR PACKAGE	X
1	P	3039	041		NUT, Hex, #10-24	18
2	P	19677	041		WASHER, Lock, #10	6
3	P	91316	091		CLAMP, Harness	3
4	P	92949	001		WIRE, Ground	2
5	P	3969	041		SCREW, Round Head, 1/4-20 x 1/4	2
6	P	56396	482		SWITCH, Limit (LS-2 after 5/30/80)	1
7	P	90936	091		ACTUATOR, Limit Switch	1
8	P	34144	091		SCREW, Socket Head, #10-24 x 34	6
9	P	90373	091		CAP, Locking Clutch	1
10	P	51085	061		SHIM	4
11	P	90380	091		BALL DETENT	2
12	P	96154	091		RING, Clutch Shift	1
13	P	90378	091		PIN, Clutch Shift	3
14	P	149569	091		HOUSING ASSEMBLY	1
15	P	96156	091		DRIVER, Clutch	1
16	P	89641	091		SHOE	3
17	P	90916	091		RING, Retaining	2
18	P	90379	091		WASHER, Thrust	2
19	P	90921	091		GEAR ASSEMBLY, Worm	1
20	P	4729	091		BOLT, 1/4-20 x 1-1/2	2
21	P	90940	010		SUPPORT, Motor	1
22	P	19686	061		WASHER, Lock	12
23	P	3097	041		NUT, Hex, 1/4-20	6
24	P	27279	091		SPACER	4
25	P	89185	091		SCREW, Shoulder, #10-24	1
26	P	90941	010		STRAP, Motor	1
27	P	3847	042		SCREW, Hex Head, 1/4-20 x 5/8	4
28	P	3515	041		WASHER	1
29	P	56213	NLA		MOTOR (SUB: P-56396-197)	1
30	P	9298	041		SCREW, Round Head, #10-32 x 1-1/2	1
31	P	119057	091		STRAP, Ground	1
32	P	90942	091		SPACER, Motor	1
33	P	81667	015		SCREW, Hex Head, 1/4-20 x 3/4	2
34	P	48459	091		MOUNTING, Motor	4
35	P	139591	010		BRACKET, Motor	1
36	P	150810	001		COUPLING, Motor	1
37	P	150809	001		KEY	2
38	P	90924	091		SHAFT ASSEMBLY, Worm (See Fig. 8-26)	1
39					Not Used	
40	P	24488	091		WASHER	4
41	P	150822	276		ACTUATOR	1
42	P	19676	041		WASHER, Lock, #8	8
43	P	150455	001		SCREW, Round Head, #8-32 x 1-3/4 (Not Shown)	8
44	P	90935	061		BRACKET, Actuator	2
45	P	80250	091		CONNECTOR (Not Shown)	3
46	P	93839	001		SWITCH, Limit, Two Step (LS-2 before 5/30/80)	1
	P	91328	091		SWITCH, Limit, Single Action (LS-3, LS-5 after 5/30/80)	2
47		150811	001		SLEEVE, Reducer	1

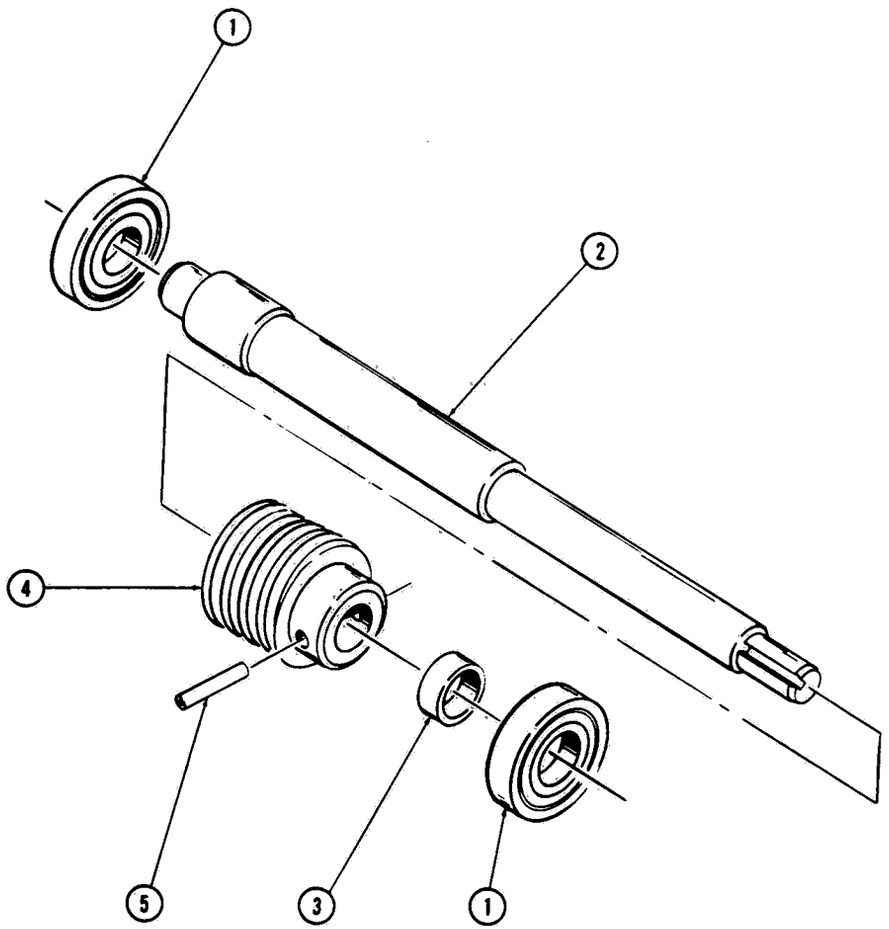


Figure 8-26. WORM SHAFT ASSEMBLY: Power Door.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-26-				WORM SHAFT ASSEMBLY: Power Door	X
1	P	90923 091		BEARING, Ball	2
2	P	90393 091		SHAFT, Worm Drive	1
3	P	90394 091		SPACER, Bearing	1
4	P	90389 091		WORM	1
5	P	22997 061		PIN	1

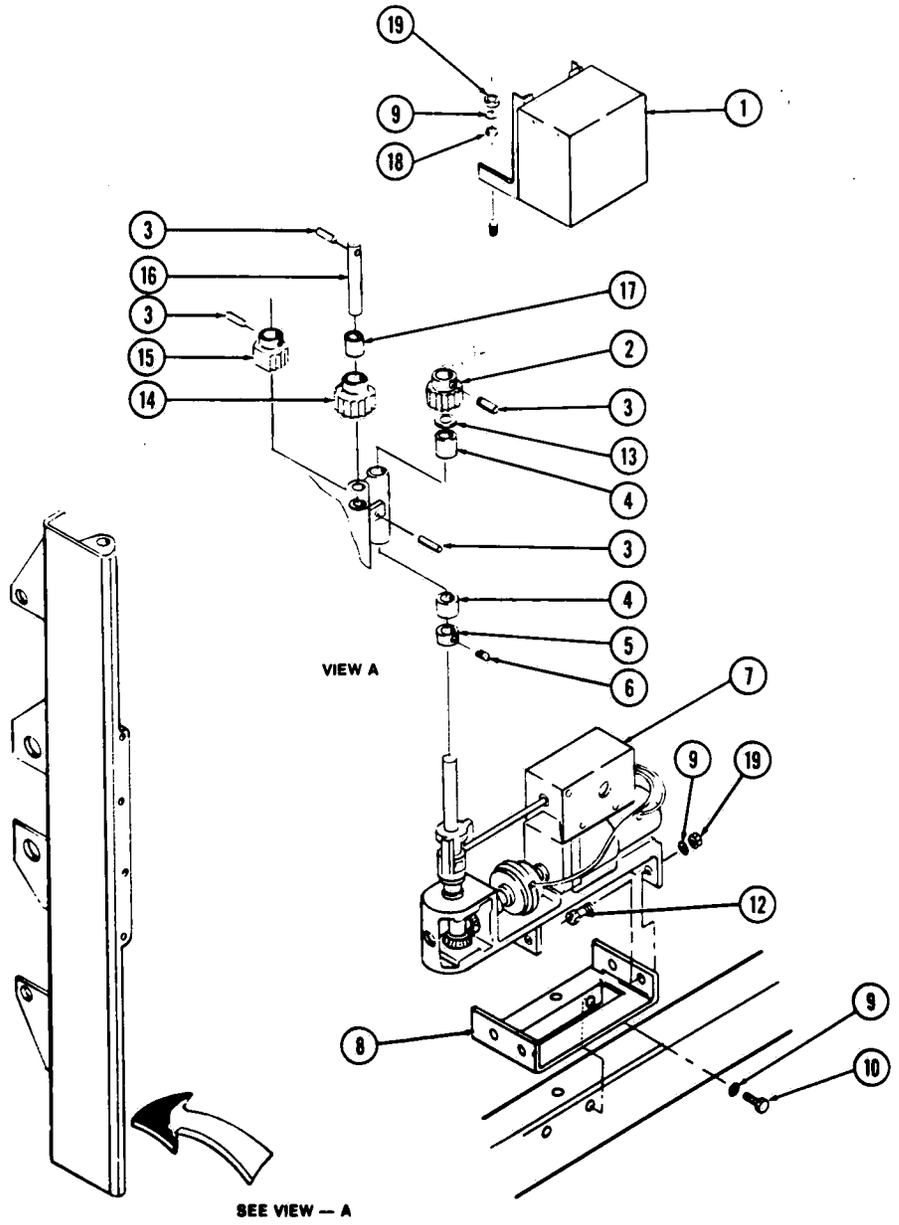


Figure 8-27. HINGE PACKAGE: Power Door.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-27-				HINGE PACKAGE: Power, Single Door Units	X				
				HINGE PACKAGE: Power, Double Door Units		X			
1	P	146563 001		RELAY BOX (See Fig. 8-30)	1				
	P	146563 002		RELAY BOX (See Fig. 8-30)		1			
2	P	91123 091		GEAR, Spur	1	2			
3	P	47979 061		PIN, Roll	4	8			
4	P	91109 091		BUSHING, Plain	2	4			
5	P	89352 091		COLLAR	1	2			
6	P	10585 041		SETSCREW, Socket Head, #10-32 x 1/4	1	2			
7	P	146438 001		HINGE DRIVE ASSEMBLY (See Fig. 8-28)	1	2			
8	P	136800 034		BRACKET	1	2			
9	P	19678 045		LOCKWASHER, 1/4	8	16			
10	P	50677 045		SCREW, Cap, 1/4-28 x 7/8	4	8			
11				NOT USED					
12	P	81667 015		SCREW, Hex Hd., 1/4-20 x 3/4	4	8			
13	P	43633 091		WASHER, Flat	1	2			
14	P	91111 091		GEAR, Spur	1	2			
15	P	91124 091		GEAR, Spur	1	2			
16	P	91129 061		SHAFT, Idler Gear	1	2			
17	P	91112 091		BUSHING, Plain	1	2			
18	P	10453 042		WASHER, Flat	4	8			
19	P	3097 041		NUT, Hex, 1/4-20	4	8			
20	P	18538 091		NUT, Wire (Not Shown)	6	25			

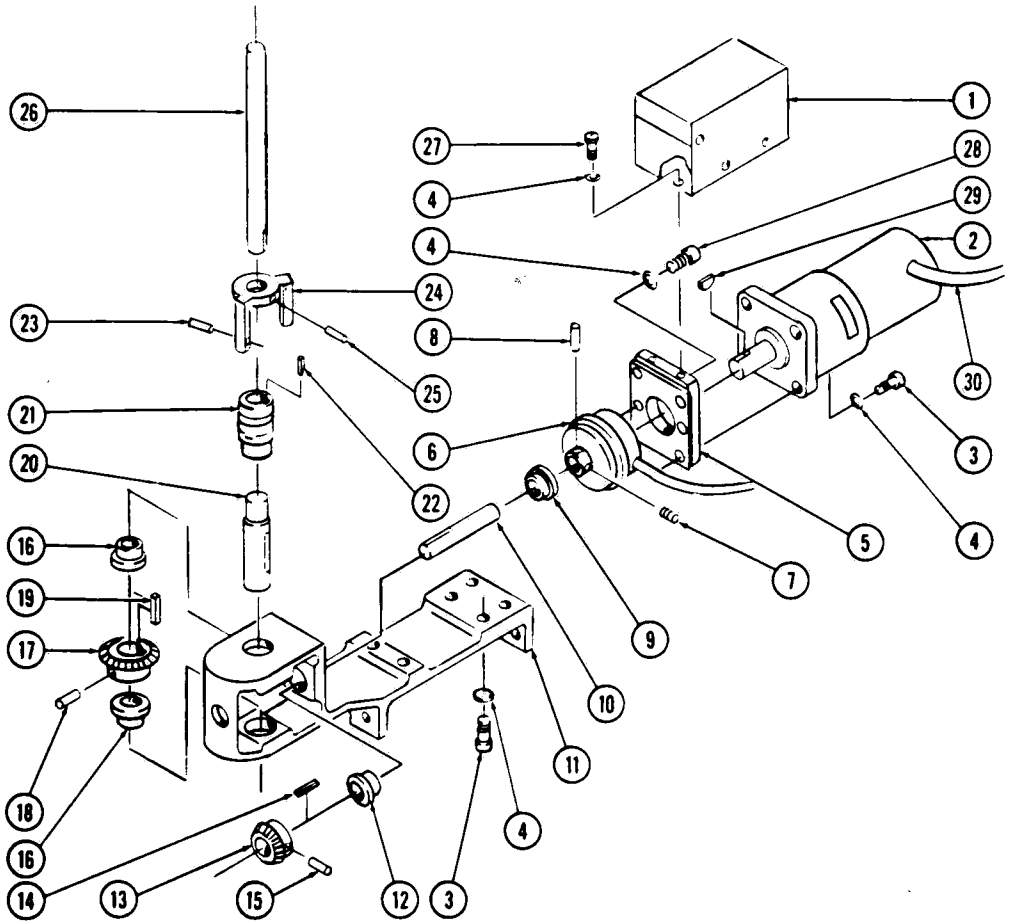


Figure 8-28. HINGE DRIVE ASSEMBLY: Power Door.

FIG. & INDEX NO.	PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-28-				HINGE DRIVE ASSEMBLY, Power Door	X
1	P 133842	091		SWITCH ASSEMBLY (See Fig. 8-29)	1
2	P 78098	091		GEAR MOTOR	1
3	P 30511	041		SCREW, #10-32 x 1-1/8	10
4	P 46115	091		LOCKWASHER	16
5	P 78099	091		PLATE, Clutch Mounting	1
6	P 78109	091		CLUTCH, Electric	1
7	P 43282	091		SCREW, Set, #10-32 x 5/16	1
8	P 45577	061		ROLL-PIN, 3/32 Dia. x 1	1
9	P 78100	091		BUSHING	1
10	P 78101	091		SHAFT, Horizontal	1
11	P 99372	091		MOUNT, Motor	1
12	P 79199	091		BUSHING	1
13	P 78102	091		PINION	1
14	P 15346	091		KEY	1
15	P 30263	045		SCREW, Set, 5/16-18 x 3/8	1
16	P 79200	091		BUSHING	2
17	P 78104	091		GEAR	1
18	P 9655	091		SCREW, Set, 3/8-16 x 5/8	1
19	P 36674	091		KEY, 1/4 x 1/4 x 1-1/2	1
20	P 78105	091		SHAFT, Vertical	1
21	P 89408	091		COUPLING	1
22	P 12704	091		KEY	2
23	P 78106	091		SCREW, Set	2
24	P 55196	010		ACTUATOR, Switch	1
25	P 15272	091		SCREW, Set, 1/4-20 x 1/2	1
26	P 78788	061		SHAFT	1
27	P 15287	041		SCREW, Round Head, #10-32 x 1/2	2
28	P 3929	091		SCREW, #10-24 x 1/2	4
29	P 2396	091		KEY, Woodruff	1
30				SLEEVING, Glass Fiber	1

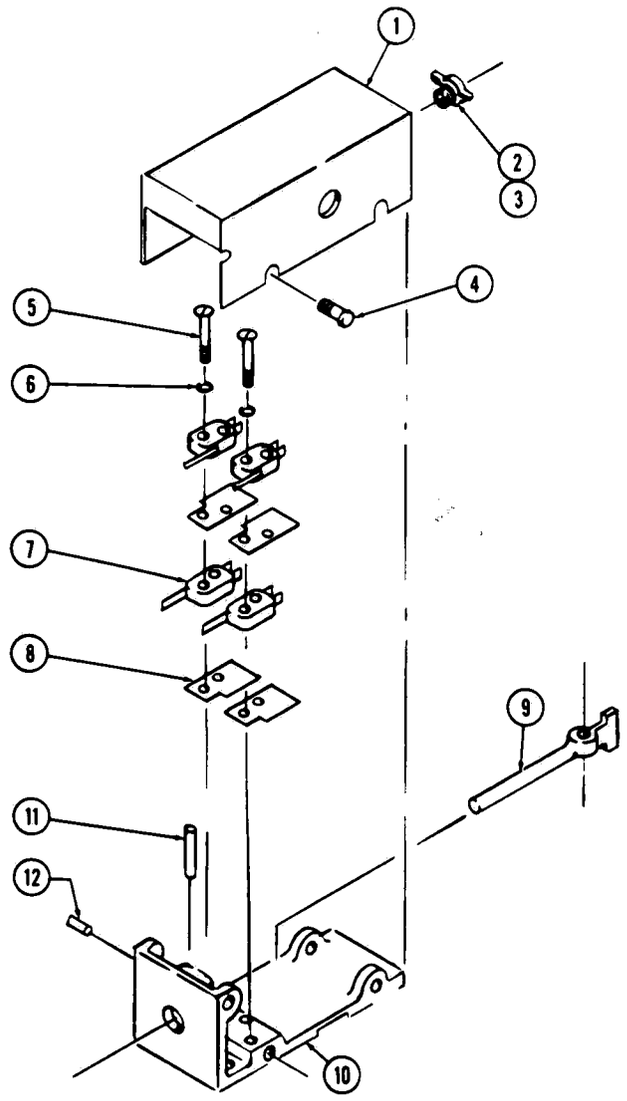


Figure 8-29. SWITCH ASSEMBLY: Power Door Hinge Drive.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-29-					SWITCH ASSEMBLY: Power Door Hinge Drive	X
1	P	136767	001		COVER	1
2	P	91354	045		CONNECTOR	1
3	P	91524	091		SLEEVE	1
4	P	33742	041		SCREW, #10-24 x 1/4	6
5	P	29811	091		SCREW, #4-40	4
6	P	30743	045		LOCKWASHER	4
7	P	76507	091		SWITCH	4
8	P	90124	091		INSULATOR, Switch	4
9	P	78113	091		ACTUATOR, Switch	1
10	P	98560	091		PLATE, Base	1
11	P	45591	061		PIN, Roll	1
12	P	89356	045		PIN, Hinge	1

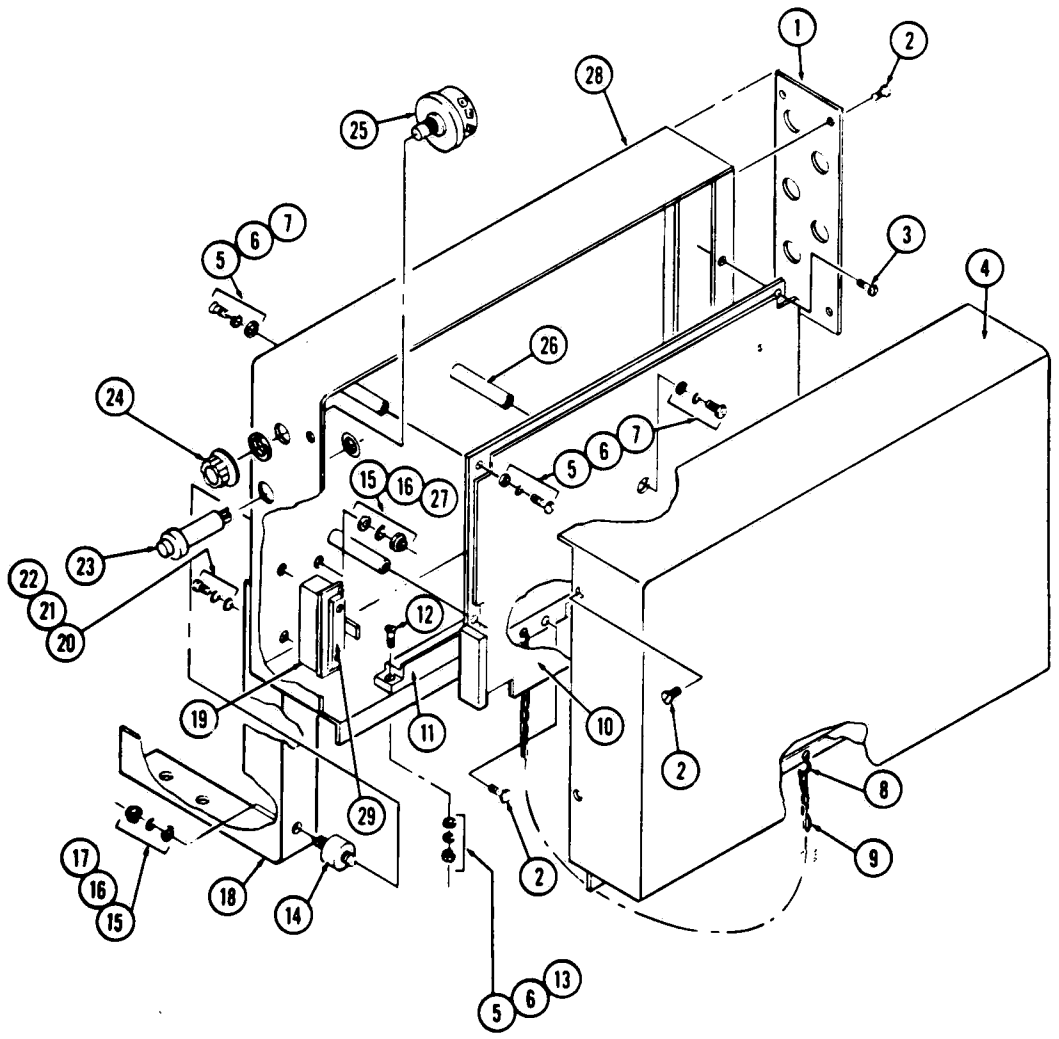
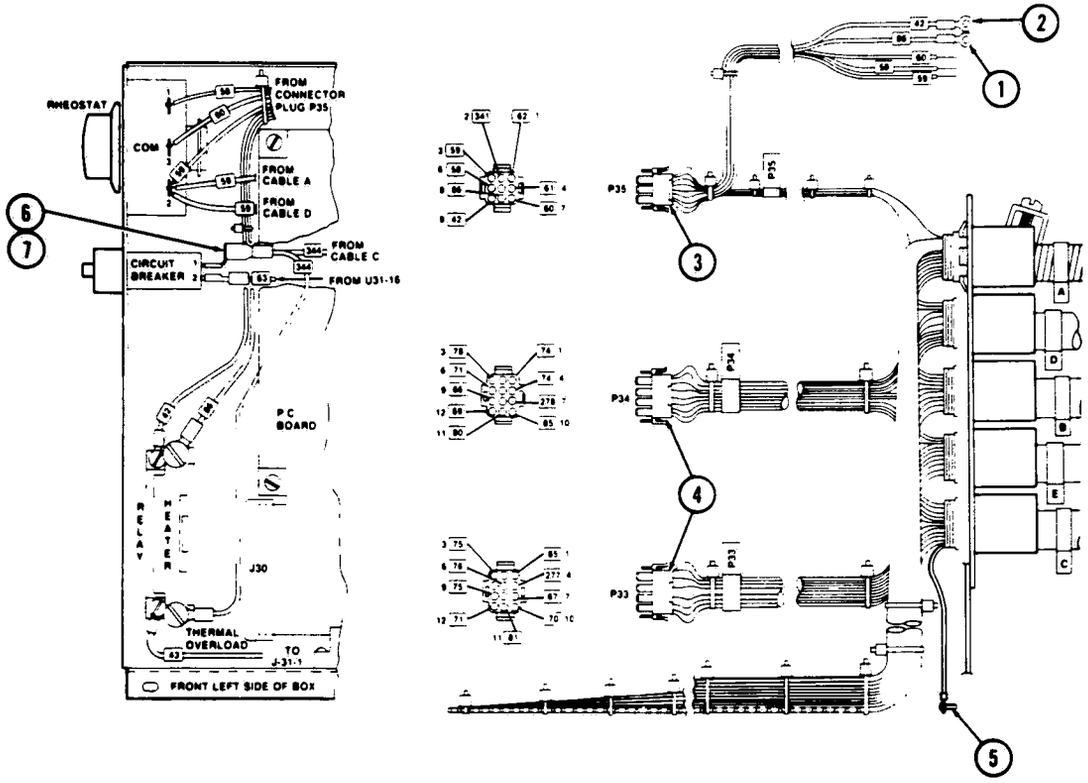


Figure 8-30. RELAY BOX ASSEMBLY: Power Door. (Part 1 of 2)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-30-	P	146563	001		RELAY BOX ASSEMBLY: Single Power Door (Part 1 of 2)	X	
	P	146563	002		RELAY BOX ASSEMBLY: Double Power Door (Part 1 of 2)		X
1	P	93720	001		PLATE, Cable	1	1
2	P	91022	045		SCREW, Pan Head, Self Tapping, #8-32 x 5/16	12	12
3	P	40357	045		SCREW, Pan Head, Self Tapping, #6-32 x 1/4	2	2
4	P	136676	001		COVER, Power Door	1	1
5	P	5469	041		WASHER, Flat	10	10
6	P	19675	041		WASHER, Lock	10	10
7	P	3960	041		SCREW, Machine, Round Head, #6-32 x 1/2	6	6
8	P	91043	091		HOOK, Chain	2	2
9	P	91023	040		CHAIN, Sash, 17	1	1
10	P	146593	001		PRINTED CIRCUIT BOARD, Single Door (See Fig. 8-31)	1	
	P	146593	002		PRINTED CIRCUIT BOARD, Double Door (See Fig. 8-31)		1
11	P	129038	001		CONNECTOR, Printed Circuit Board	2	2
12	P	3964	041		SCREW, Machine Round Head, #6-32 x 5/8	4	4
13	P	3037	041		NUT, Hex, #6-32	4	4
14	P	48459	091		MOUNT, Motor, 1/4-20 Stud	4	4
15	P	10453	042		WASHER, Flat	8	8
16	P	19678	045		WASHER, Lock	8	8
17	P	3097	041		NUT, Hex, 1/4-20	4	4
18	P	93651	001		BRACKET, Mounting	2	2
19	P	50408	091		RELAY, Thermal Overload	1	1
20	P	17796	091		WASHER, Flat	2	2
21	P	19676	041		WASHER, Lock	2	2
22	P	9288	041		SCREW, Machine, Round Head, #8-32 x 1/2	2	2
23	P	84400	001		BREAKER, Circuit, 3 Ampere	1	1
24	P	91708	091		KNOB, Rheostat	1	1
25	P	91709	091		RHEOSTAT	1	1
26	P	84466	001		STANDOFF, Support	3	3
27	P	118443	045		NUT, Locking, 1/4-20	4	4
28	P	146552	001		BOX, Power Door	1	1
29	P	89484	091		HEATER, For Use With Ohio Electric Power Door Motor	1	1
	P	150822	383		HEATER, For Use With Baldor Electric Power Door Motor	1	1



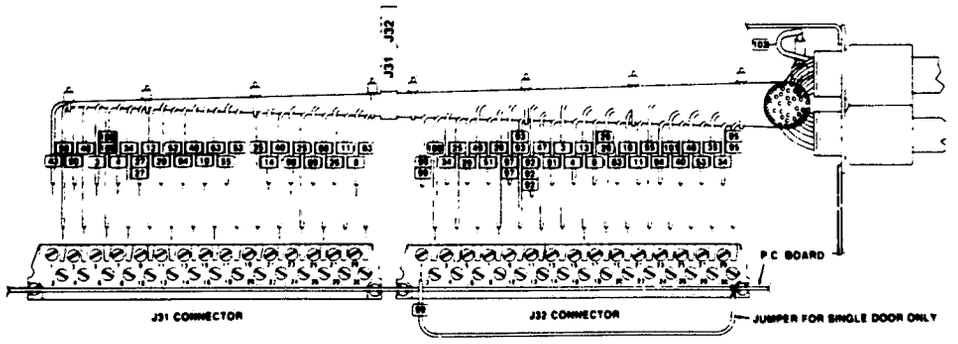


Figure 8-30. RELAY BOX ASSEMBLY: Power Door. (Part 2 of 2)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-30-					RELAY BOX ASSEMBLY: Power Door (Part 2 of 2)	X
1	P	14592	091		TERMINAL, #10 Ring x 14 AWG	2
2	P	14865	091		TERMINAL, #8 Ring x 18 AWG	1
3	P	129035	001		HOUSING PLUG, 9 Circuit	1
4	P	129034	001		HOUSING, Plug, 12 Circuit	2
5	P	82675	001		SCREW, Ground, #10-32 x 3/8	1
6	P	32118	091		ADAPTER, Terminal	1
7	P	90695	091		TERMINAL, Quick Disconnect, 18-22 AWG	3

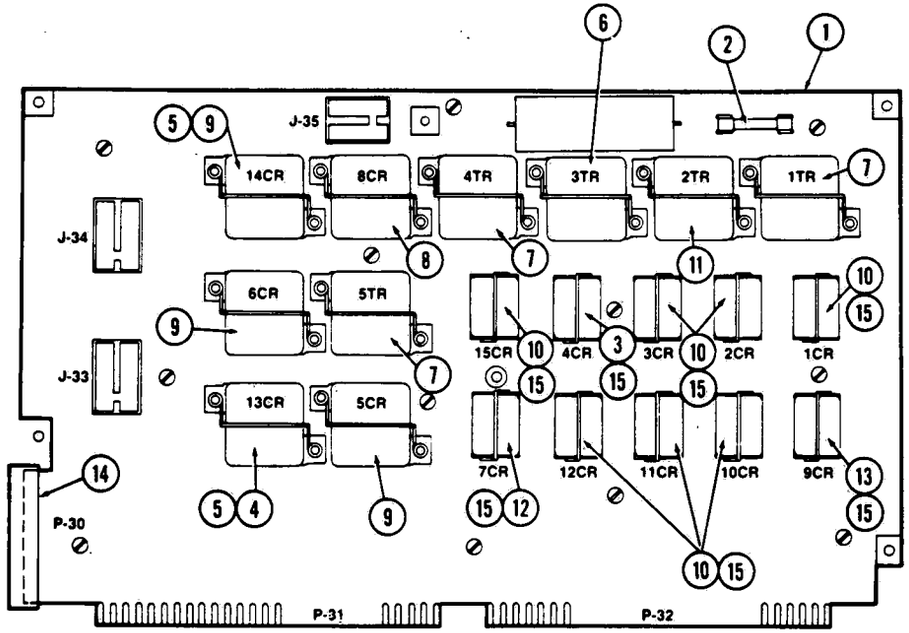


Figure 8-31. PRINTED CIRCUIT BOARD ASSEMBLY: Power Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-31-					PRINTED CIRCUIT BOARD ASSEMBLY: Single Door Units	X			
					PRINTED CIRCUIT BOARD ASSEMBLY: Double Door Units		X		
1	P	146593	003		BOARD, Printed Circuit	1	1		
2	P	764317	778		FUSE, 3 Amp, 250 Volts (Box of 5)	1	1		
3	P	129352	003		RELAY, 4PDT, 90 Volts	1	1		
4	P	129352	007		RELAY, 3PDT, 120 Volts		1		
5	P	129352	018		RELAY, Dummy	2			
6	P	129352	010		RELAY, DPDT, 120 Volts (3 Second)	1	1		
7	P	129352	011		RELAY, DPDT, 120 Volts (1 Second)	3	3		
8	P	129352	012		RELAY, SPDT, 120 Volts	1	1		
9	P	129352	008		RELAY, DPDT, 120 Volts	2	3		
10	P	129352	004		RELAY, 4PDT, 120 Volts	4	7		
11	P	129352	009		RELAY, DPDT, 120 Volts (5 Second)	1	1		
12	P	129352	005		RELAY, DPDT, 120 Volts	1	1		
13	P	129352	006		RELAY, DPDT, 24 Volts	1	1		
14	P	129352	024		HOUSING, Contact	1			
15	P	129352	013		SPRING, Socket Hold Down	10	10		

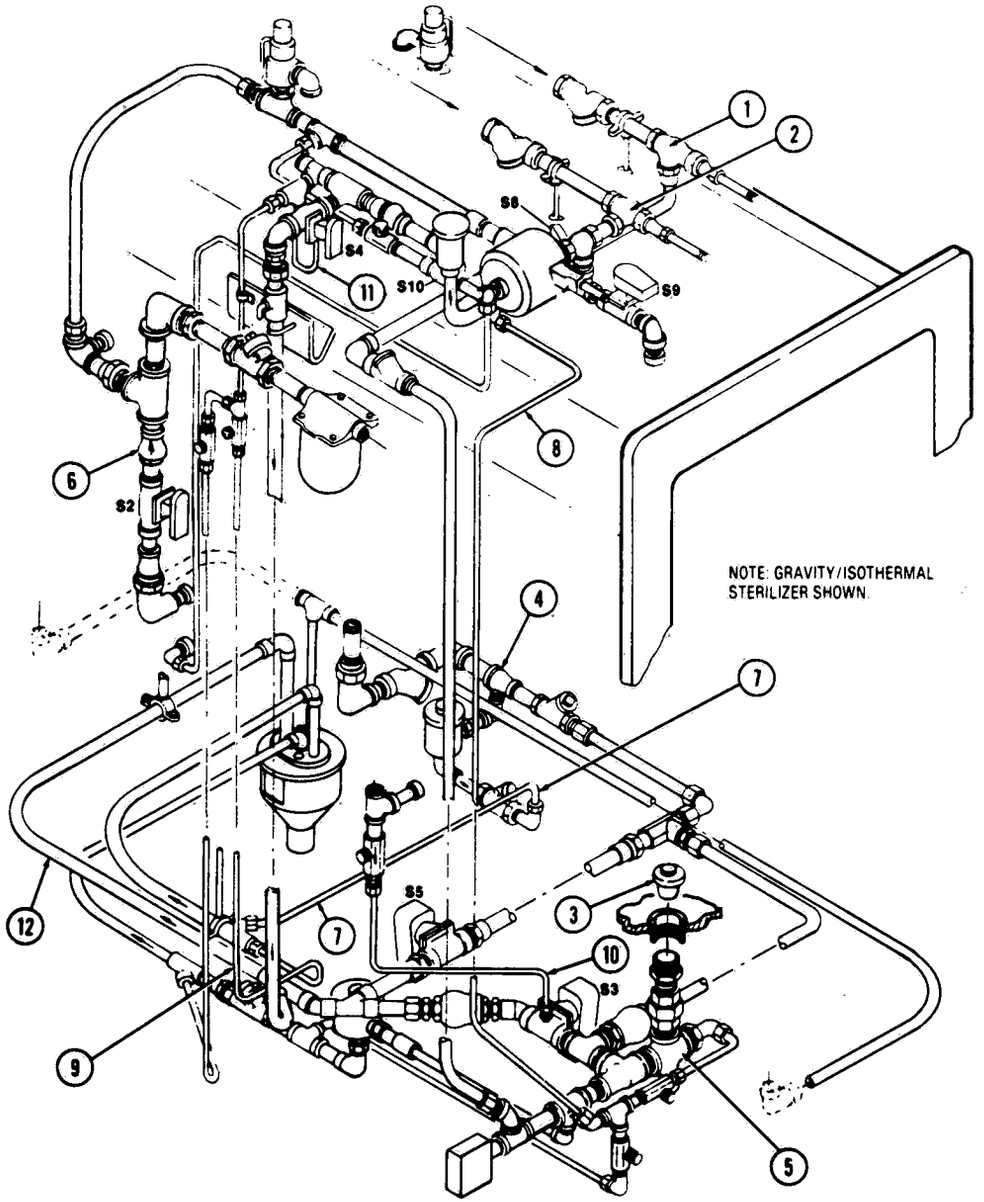


Figure 8-32. PIPING ASSEMBLY: Complete. (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-32-					PIPING ASSEMBLY: Complete	X
1	P	136613	001		WATER SUPPLY LINE (See Fig. 8-33)	1
2	P	136612	001		STEAM SUPPLY LINE (See Fig. 8-33)	1
3	P	48733	042		STRAINER, Chamber Drain	1
4	P	136615	001		JACKET DRAIN LINE (See Fig. 8-41)	1
5	P	134464	001		CHAMBER DRAIN LINE (See Fig. 8-40)	1
6	P	136610	001		AIR BREAK LINE (See Fig. 8-34)	1
7					TUBE, 1/4 O.D. x 14-1/2	1
8					TUBE, 1/4 O.D. x 80-7/8	1
9					TUBE, 1/4 O.D. x 50-3/4	1
10					TUBE, 3/8 O.D. x 30-25/32	1
11					TUBE, 1/4 O.D. x 5-3/8	1
12					DRAIN PIPING (See Fig. 8-35)	1

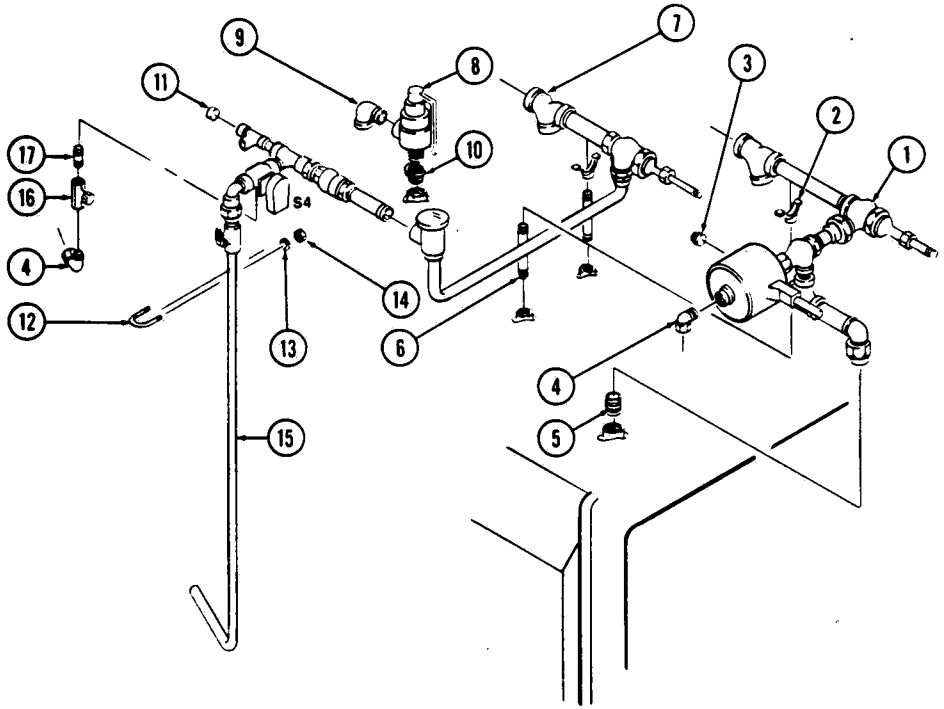


Figure 8-33. STEAM AND WATER SUPPLIES.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-33-					STEAM AND WATER SUPPLIES	X
1	P	136612	001		STEAM SUPPLY ASSEMBLY (See Fig. 8-38)	1
2	P	39590	010		CLAMP	2
3	P	3443	091		PLUG, 3/4 N.P.T.	1
4	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
5	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	1
6	P	84375	003		NIPPLE, Steel 1/4 N.P.T. x 6-9/16	2
7	P	136613	001		WATER SUPPLY ASSEMBLY (See Fig. 8-38)	1
8	P	91960	091		VALVE, Safety, 3/4 N.P.T.	1
9	P	1639	091		ELL, Street, 1 N.P.T.	1
10	P	841	042		BUSHING, Reducing, 1 x 3/4 N.P.T.	1
11	P	90547	091		PLUG, 5/8 O.D.T.	1
12	P	75297	061		"U" BOLT	2
13	P	76230	091		LOCKWASHER	4
14	P	3040	042		NUT, Hex, 1/4-20	4
15	P	136611	001		COOLING WATER ASSEMBLY (See Fig. 8-39)	1
16	P	83630	001		VALVE, Needle, 1/8 N.P.T.	1
17	P	28900	091		NIPPLE, 1/8 N.P.T. x 1-1/2	1

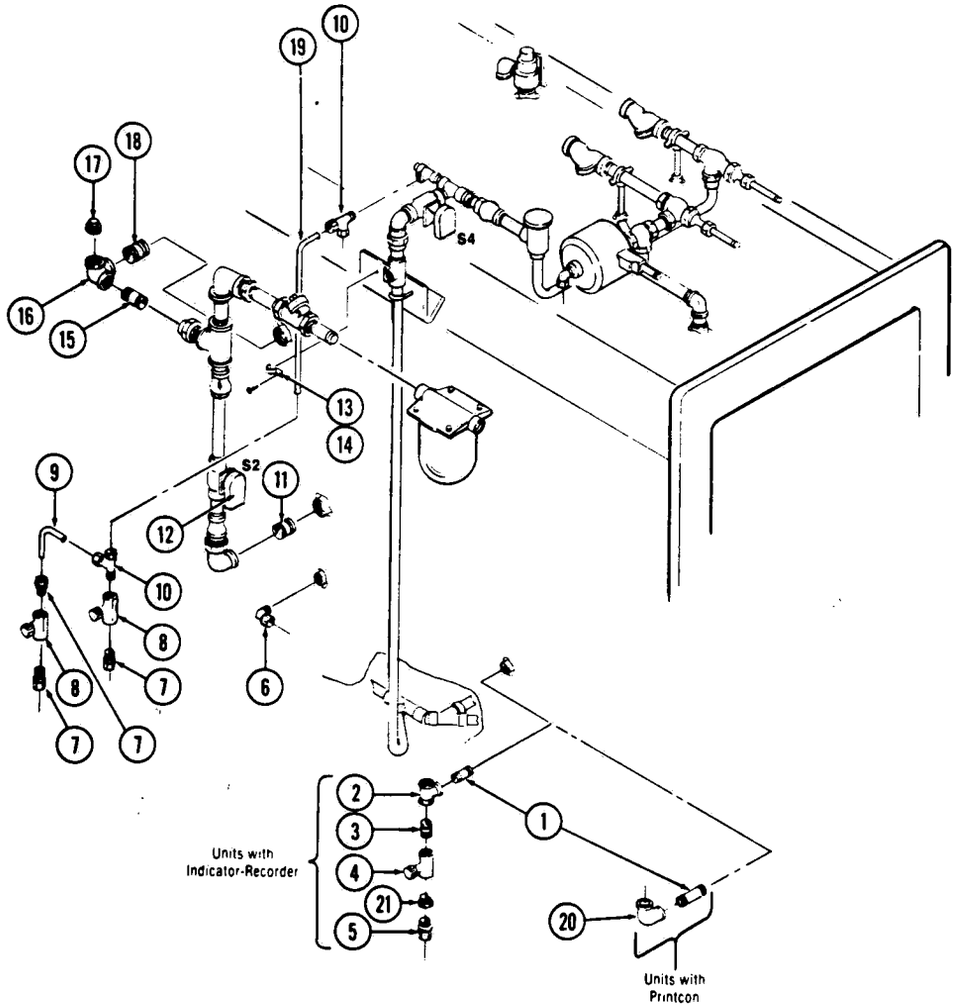


Figure 8-34. COOLING WATER AND AIR SUPPLIES.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-34-					**UNITS WITH INDICATOR-RECORDER:** COOLING WATER AND AIR SUPPLIES	X				
					UNITS WITH PRINTCON: COOLING WATER AND AIR SUPPLIES		X			
1	P	28919	091		NIPPLE, 1/4 N.P.T. x 1-1/2	1	1			
2	P	4910	091		TEE, 3/8 x 3/8 x 1/4 N.P.T.	1	-			
3	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1	-			
4	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1	-			
5	P	22711	091		COUPLING, Compression, 1/4 N.P.T. x 5/16 O.D.T.	1	-			
6	P	41306	091		ELL, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1	1			
7	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	3	3			
8	P	83630	001		VALVE, Needle, 1/8 N.P.T.	2	2			
9					TUBE, 1/4 O.D. x 2-1/2	1	1			
10	P	89429	091		TEE, Compression, 1/8 N.P.T. x 1/4 x 1/4 O.D.T.	2	2			
11	P	29354	091		NIPPLE, 1 N.P.T. x 1-1/2	1	1			
12	P	136610	001		AIR BREAK ASSEMBLY (See Fig. 8-39)	1	1			
13	P	26720	091		CLAMP	1	1			
14	P	91022	045		SCREW, Self Tapping, #8-32 x 5/16	1	1			
15	P	29294	001		NIPPLE, 3/4 N.P.T. x 3	1	1			
16	P	84435	001		ELL, Side Outlet, 3/4 N.P.T.	1	1			
17	P	3443	091		PLUG, 3/4 N.P.T.	1	1			
18	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1	1			
19					TUBE, 1/4 O.D. x 16-1/4	1	1			
20	P	1620	091		ELL, Reducing, 3/8 NPT x 1/4 NPT		1			
21	P	849	091		BUSHING, Reducing, 3/4 N.P.T. x 1/4 N.P.T.	1	-			

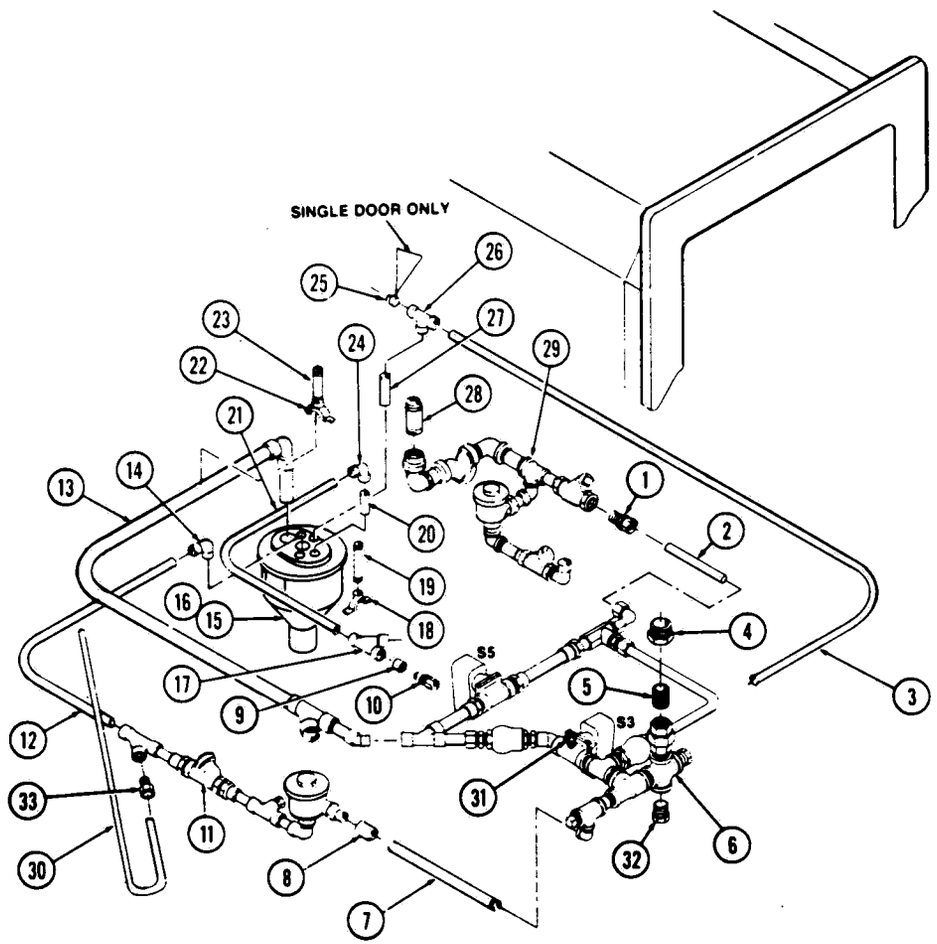


Figure 8-35. DRAIN PIPING.
(Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR RECORDER:	
8-35-					DRAIN PIPING	X
1	P	39072	091		COUPLING, Compression, 5/8 O.D.T. x 3/8 N.P.T.	2
2	P	89736	091		TUBE, 5/8 O.D.	1
3	P	92935	008		TUBE, 5/8 O.D.	1
4	P	850	042		BUSHING, Reducing, 1-1/4 x 1 N.P.T.	1
5	P	29354	091		NIPPLE, 1 N.P.T. x 1-1/4	1
6	P	134464	001		CHAMBER DRAIN ASSEMBLY (See Fig. 8-71)	1
7	P	29053	091		NIPPLE, 3/8 N.P.T. x 11	1
8	P	3530	091		COUPLING, 1/2 x 3/8 N.P.T.	1
9	P	89808	091		COUPLING, 5/8 O.D.T. x 1/8 N.P.T.	1
10	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
11	P	136614	001		DRAIN TRAP ASSEMBLY (See Fig. 8-40)	1
12	P	89705	091		TUBE, 5/8 O.D.	1
13	P	136615	001		DRAIN LINE ASSEMBLY (See Fig. 8-41)	1
14	P	90214	091		ELL, 5/8 O.D.T.	1
15	P	141198	004		FUNNEL ASSEMBLY	1
	P	764316	213		• KIT, Antisplash Funnel	1
	P	141198	002		• • FUNNEL, Drain, 2 O.D.	1
	P	56396	012		• • CAP, Funnel	1
	P	15272	091		• • SCREW, Hex Set, 1/4-20	2
	P	78881	045		• • SCREW, 6-32 x 1/2	2
	P	56396	016		• • PLUG, 7/8	1
	P	56396	017		• • PLUG, 1	1
	P	56396	018		• • PLUG, 1-3/8	1
16	P	56396	018		PLUG	1
17	P	83377	001		"Y" BRANCH, 45°, 5/8 O.D.T.	1
18	P	75376	010		CLAMP	1
19	P	84375	007		NIPPLE, Steel, 1/4 N.P.T. x 5-9/16	1
20	P	83376	001		TUBE, 1-1/8 O.D. x 3-1/2	1
21	P	93018	001		TUBE, 5/8 O.D.	1
22	P	39590	010		CLAMP	1
23	P	84375	006		NIPPLE, Steel, 1/4 N.P.T. x 4-1/16	1
24	P	129233	001		ELL, Reducing, 1-1/8 O.D.T. x 5/8 O.D.T.	1
25	P	90547	091		PLUG, 5/8 O.D.T.	1
26	P	90221	091		TEE, 5/8 O.D.T.	1
27	P	90517	091		TUBE, 5/8 O.D. x 6-1/8	1
28	P	29299	091		NIPPLE, 3/4 N.P.T. x 3-1/4	1
29	P	134465	001		JACKET TRAP ASSEMBLY (See Fig. 8-41)	1
30					TUBE, 1/4 O.D. x 50-1/2	1
31	P	80917	091		CONNECTOR, Male, 5/16 O.D.T. x 1/8 N.P.T.	1
32	P	6263	091		BUSHING, Reducing, 1 x 1/2 N.P.T.	1
33	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1

For Future Use

For Future Use

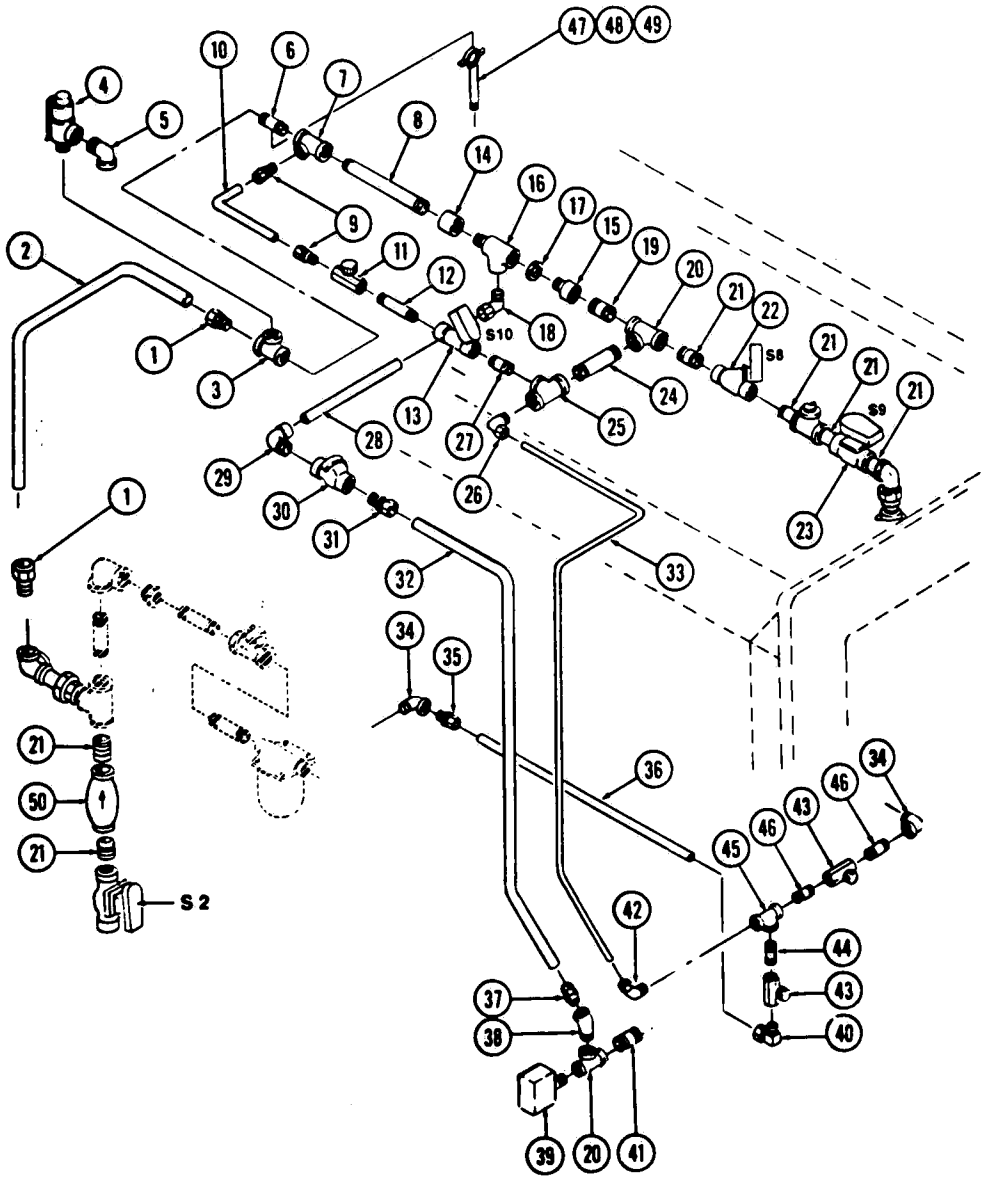


Figure 8-37. ISOTHERMAL PIPING PACKAGE (Part 2 of 2).
(Units With Indicator Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-37-					**UNITS WITH INDICATOR-RECORDER:**				
					ISOTHERMAL PIPING PACKAGE 24x36x36	X			
					ISOTHERMAL PIPING PACKAGE 24x36x48		X		
					ISOTHERMAL PIPING PACKAGE 24x36x60			X	
1	P	33949	091		COUPLING, Compression, 3/4 O.D.T. x 3/4 N.P.T.	2	2	2	
2	P	93014	001		TUBE, 3/4 O.D.	1			
	P	93014	002		TUBE, 3/4 O.D.		1		
	P	93014	003		TUBE, 3/4 O.D.			1	
3	P	4925	091		TEE, 3/4 x 1/2 x 3/4 N.P.T.	1	1	1	
4	P	91960	091		VALVE, Safety, 3/4 N.P.T.	1	1	1	
5	P	1639	091		ELL, Street, 1 N.P.T.	1	1	1	
6	P	29166	091		NIPPLE, 1/2 N.P.T. x 2	1	1	1	
7	P	4929	091		TEE, 1/2 x 1/2 x 3/8 N.P.T.	1	1	1	
8	P	29184	091		NIPPLE, 1/2 N.P.T. x 6-1/2	1	1	1	
9	P	30947	091		FITTING, Compression, 3/8 O.D.T. x 3/8 N.P.T.	2	2	2	
10					TUBE, 3/8 O.D. x 7-13/32	1	1	1	
11	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1	1	1	
12	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1	1	1	
13	P	84430	002		VALVE, Solenoid, Steam, 3/8 N.P.T.	1	1	1	
	P	764077	001		• REPAIR KIT	1	1	1	
	P	764077	002		• COIL. 120 Volt, 60 Hz. 110 Volt, 50 Hz	1	1	1	
14	P	1313	091		COUPLING, 1/2 N.P.T.	1	1	1	
15	P	84322	001		NOZZLE	1	1	1	
16	P	84321	001		EJECTOR, 1/2 N.P.T.	1	1	1	
17	P	7841	091		GASKET	1	1	1	
18	P	23972	091		ELL, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1	1	1	
19	P	29163	091		NIPPLE, 1/2 N.P.T. x 1-1/4	1	1	1	
20	P	4922	091		TEE, 3/4 x 1/2 x 1/2 N.P.T.	2	2	2	
21	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	5	5	5	
22	P	93650	002		VALVE, Solenoid, Steam, 3/4 N.P.T.	1	1	1	
	P	764137	001		• REPAIR KIT	1	1	1	
	P	764137	002		• COIL. 120 Volt, 60 Hz	1	1	1	
23	P	83228	002		VALVE, Solenoid, Steam, 3/4 N.P.T.	1	1	1	
	P	764070	001		• REPAIR KIT	1	1	1	
	P	764070	002		• COIL. 120 Volt, 60 Hz	1	1	1	
24	P	29170	091		NIPPLE, 1/2 N.P.T. x 3	1	1	1	
25	P	4915	091		TEE, 1/2 x 3/8 x 3/8 N.P.T.	1	1	1	
26	P	43041	091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1	1	1	
27	P	29017	091		NIPPLE, 3/8 N.P.T. x 2	1	1	1	
28	P	83464	006		TUBE, 5/8 O.D. x 11-3/8	1	1	1	
29	P	90217	091		ELL, 5/8 O.D.T. x 3/8 N.P.T.	1	1	1	
30	P	5424	091		VALVE, Check, 3/8 N.P.T.	1	1	1	
	P	74335	091		• DISC	1	1	1	
31	P	90208	091		ADAPTER, 5/8 O.D.T. x 3/8 N.P.T.	1	1	1	
32	P	93015	001		TUBE, 5/8 O.D.	1	1	1	
33					TUBE, 1/4 O.D. x 68-5/8	1	1	1	
34	P	1615	091		ELL, Street, 1/8 N.P.T.	2	2	2	
35	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1	1	
36					TUBE, 1/4 O.D. x 17-7/16	1	1	1	
37	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1	1	1	
38	P	90219	091		ELL, Street, 45°, 1/2 N.P.T.	1	1	1	
39	P	37615	091		CONTROL, Temperature	1	1	1	
40	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1	1	
41	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1	1	1	
42	P	52697	091		ELL, Compression, 45°, 1/4 O.D.T. x 1/8 N.P.T.	1	1	1	
43	P	83630	001		VALVE, Needle, 1/8 N.P.T.	2	2	2	
44	P	28899	091		NIPPLE, 1/8 N.P.T. x 1	1	1	1	
45	P	4898	091		TEE, 1/8 N.P.T.	1	1	1	
46	P	28900	091		NIPPLE, 1/8 N.P.T. x 1-1/2	2	2	2	
47	P	39589	010		CLAMP	1	1	1	
48	P	42396	091		NIPPLE, Steel, 1/4 N.P.T. x 2-3/4	1	1	1	
49	P	78787	091		BUSHING, 1/4 N.P.T.	1	1	1	
50	P	83870	001		VALVE, Check, 3/4 N.P.T.	1	1	1	

*Torque bonnet bolts to 50 inch/lbs. when installing repair kit.

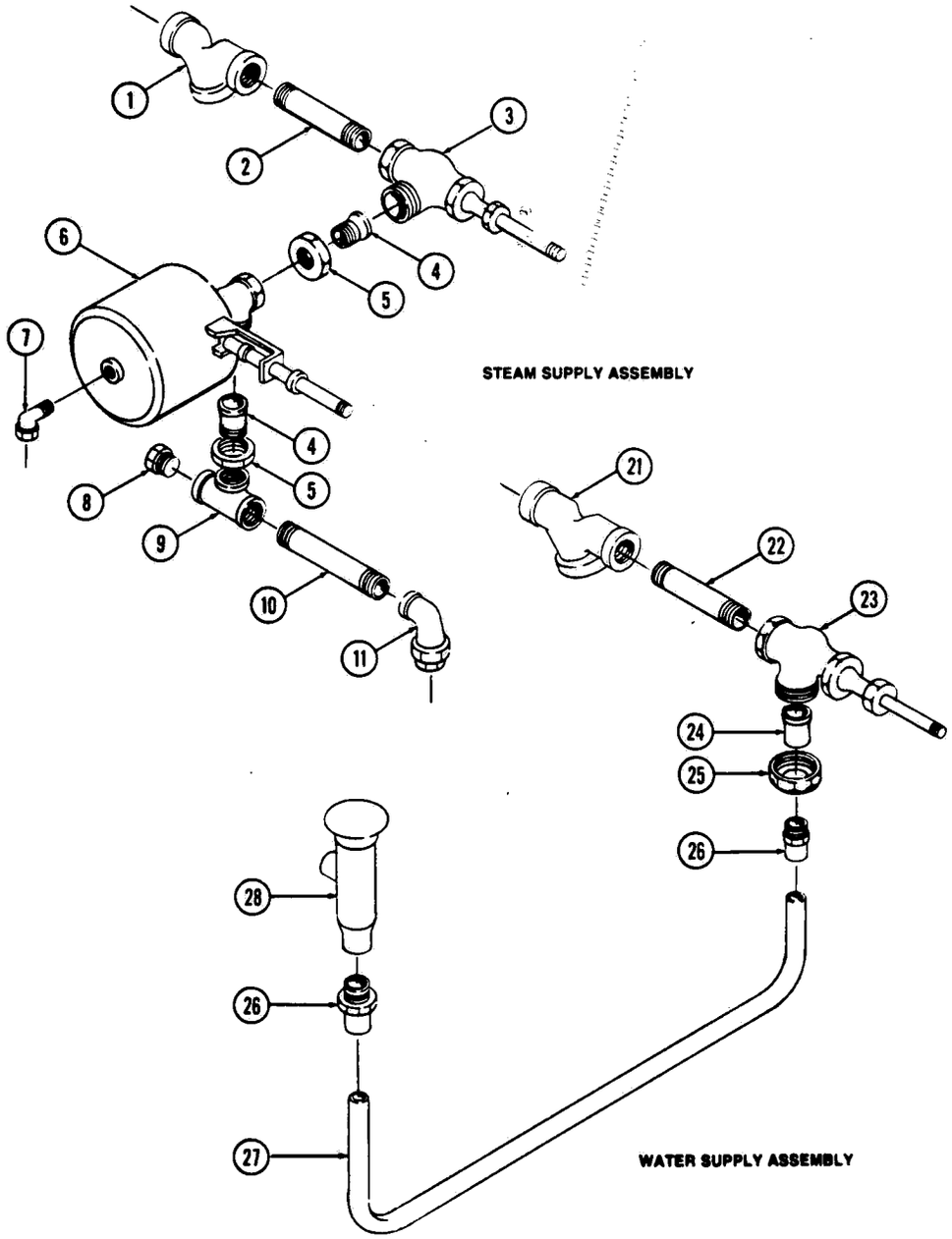


Figure 8-38. PIPING SUBASSEMBLIES.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-38-					PIPING SUBASSEMBLIES	
	P	136612	001		STEAM SUPPLY ASSEMBLY	X
1	P	41389	091		STRAINER, Steam, 3/4 N.P.T.	1
	P	751552	091		• SCREEN	1
	P	756207	091		• GASKET	1
	P	3442	091		• PLUG, Pipe	1
2	P	29323	091		NIPPLE, 3/4 N.P.T. x 9-1/4	1
3	P	34029	091		VALVE, Angle, 3/4 N.P.T. (See Fig. 8-44)	1
4	P	4247	091		SPUD, Male, 3/4 N.P.T.	2
5	P	2903	091		NUT, Union	2
6	P	22429	091		VALVE, Hi-Lo, Steam, 3/4 N.P.T. (See Fig. 8-42)	1
7	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
8	P	3443	091		PLUG, Pipe, 3/4 N.P.T.	1
9	P	4932	091		TEE, 3/4 N.P.T.	1
10	P	29304	091		NIPPLE, 3/4 N.P.T. x 4-1/2	1
11	P	89986	091		ELL, Union, 3/4 N.P.T.	1
	P	136613	001		WATER SUPPLY ASSEMBLY	X
21	P	47708	091		STRAINER, Water, 3/4 N.P.T.	1
	P	754616	091		• SCREEN	1
22	P	29309	091		NIPPLE, 3/4 N.P.T. x 5-3/4	1
23	P	26907	091		VALVE, Angle, 3/4 N.P.T. (See Fig. 8-44)	1
24	P	4248	091		SPUD, Female, 3/4 N.P.T.	1
25	P	2903	091		NUT, Union	1
26	P	91158	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	2
27	P	93017	001		TUBE, 7/8 O.D.	1
28	P	77023	001		VACUUM BREAKER, 3/4 N.P.T.	1
	P	752735	091		• REPAIR KIT	1

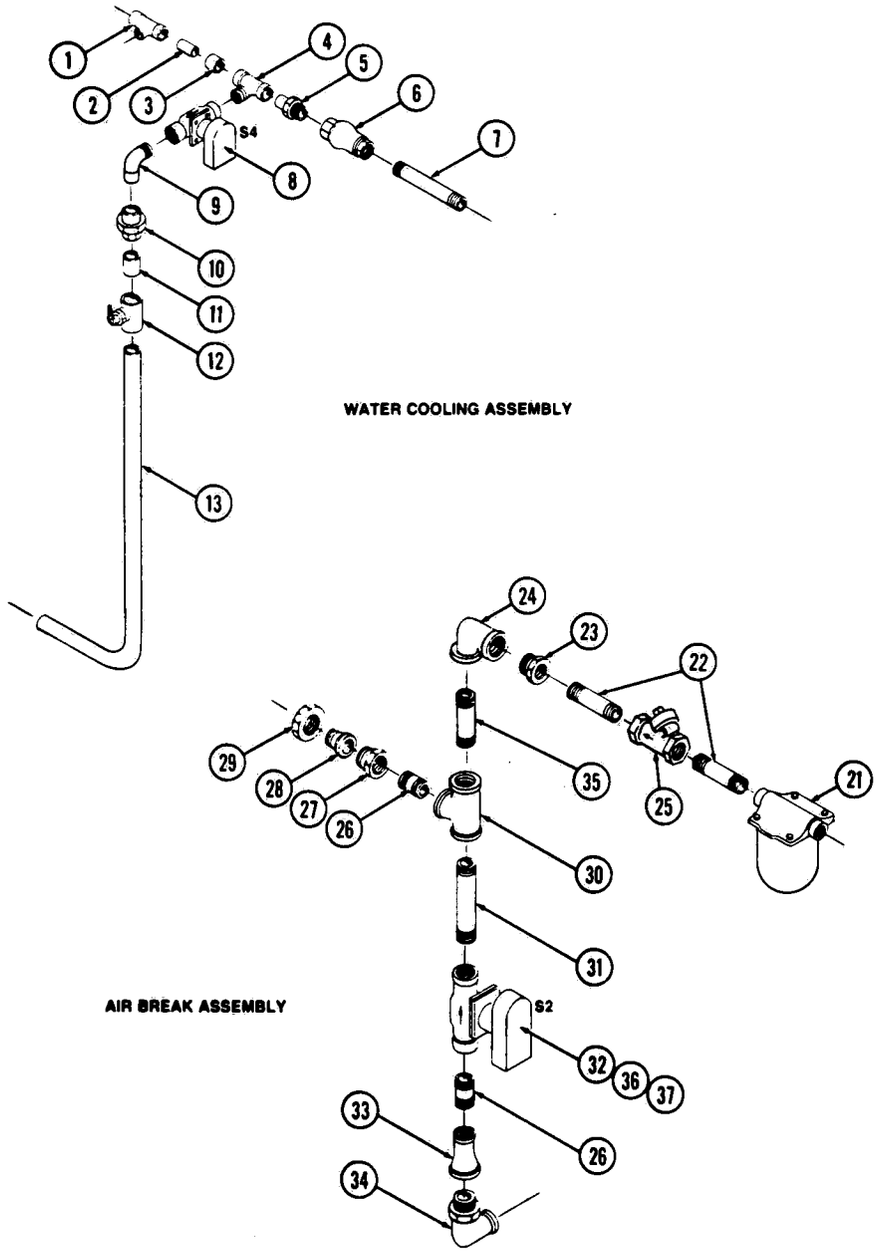
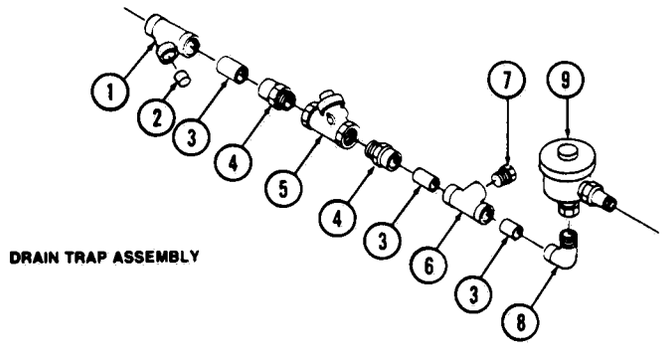
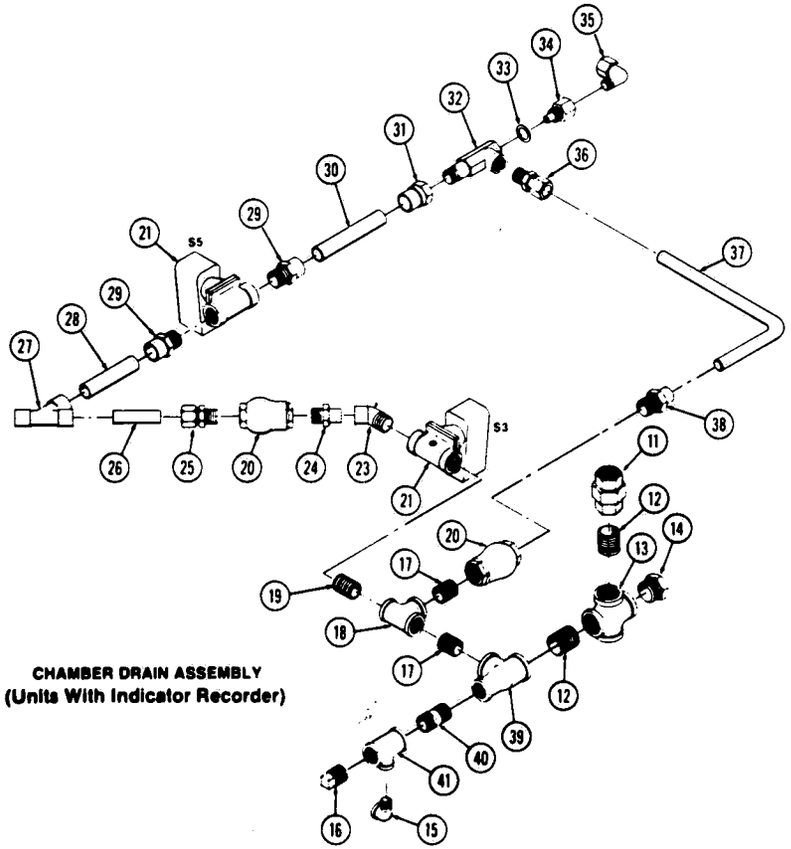


Figure 8-39. PIPING SUBASSEMBLIES.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-39-					PIPING SUBASSEMBLIES	
	P	136611	001		WATER COOLING ASSEMBLY	X
1	P	89864	091		TEE, 5/8 x 5/8 O.D.T. x 1/8 N.P.T.	1
2	P	90272	091		TUBE, 5/8 O.D. x 1-5/8	1
3	P	91223	091		COUPLING, 7/8 x 5/8 O.D.T.	1
4	P	89577	091		TEE, 7/8 x 7/8 O.D.T. x 3/4 N.P.T.	1
5	P	91159	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1
6	P	83870	001		VALVE, Check, 3/4 N.P.T.	1
7	P	29304	091		NIPPLE, 3/4 N.P.T. x 4-1/2	1
8	P	83261	002		VALVE, Solenoid, Water, 3/4 N.P.T.	1
	P	764072	001		• REPAIR KIT	1
	P	764072	002		• COIL, 120 Volt, 60 Hz, 110 Volt, 50 Hz	1
9	P	91228	091		ELL, Street, 7/8 O.D.T. x 3/4 N.P.T.	1
10	P	91226	091		UNION, 7/8 O.D.T.	1
11	P	91248	091		TUBE, 7/8 O.D. x 2	1
12	P	83629	001		BALANCER, 7/8 O.D.T.	1
13	P	93016	001		TUBE, 7/8 O.D.	1
	P	136610	001		AIR BREAK ASSEMBLY	X
21	P	82619	001		FILTER, Air, 1/2 N.P.T. (See Fig. 8-45)	1
22	P	29173	091		NIPPLE, 1/2 x 3-3/4	2
23	P	836	042		BUSHING, Reducing, 3/4 x 1/2 N.P.T.	1
24	P	1635	091		ELL, 3/4 N.P.T.	1
25	P	150822	354		VALVE, Swing Check (See Below)	1
	P	764319	608		• DISC, Teflon Renewal	A/R
26	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	1
27	P	1747	091		END, Thread, 3/4 N.P.T.	1
28	P	2903	091		NUT, Union	1
29	P	4248	091		SPUD, Female, 3/4 N.P.T.	1
30	P	4932	091		TEE, 3/4 N.P.T.	1
31	P	29303	091		NIPPLE, 3/4 N.P.T. x 4-1/4	1
32	P	150822	310		VALVE, Solenoid, Steam, 3/4 N.P.T. (Piston Type)	1
	P	764317	687		• REPAIR KIT	1
	P	764070	002		• COIL, 120 Volt, 60 Hz, 110 Volt, 50 Hz	1
33	P	84450	001		COUPLING, Reducing 1 x 3/4 N.P.T.	1
34	P	89168	091		ELL, Union, 1 N.P.T.	1
35	P	29300	091		NIPPLE, 3/4 N.P.T. x 3-1/2 Lg.	1
	P	764319	574		KIT, to replace poppet check 44317-091 with swing check 150822-354 on existing units manufactured prior to 2-84	
36	P	83228	002		VALVE, Solenoid, 3/4 N.P.T. Diaphragm Type (Before 12/83)	1
	P	764070	001		• KIT, Repair	A/R
	P	764070	002		• COIL	A/R
37	P	**83229**	**002**		VALVE, Solenoid, 1 N.P.T. Piston Type (After 2/85) (ISO Only)	1
	P	764317	688		• KIT, Repair	A/R
	P	764070	002		• COIL	A/R



DRAIN TRAP ASSEMBLY



CHAMBER DRAIN ASSEMBLY
(Units With Indicator Recorder)

Figure 8-40. PIPING SUBASSEMBLIES.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-40-					PIPING SUBASSEMBLIES	
	P	136614	001		DRAIN TRAP ASSEMBLY	X
1	P	83377	001		"Y" BRANCH, 45°, 5/8 O.D.T.	1
2	P	89808	091		COUPLING, 5/8 O.D.T. x 1/8 N.P.T.	1
3	P	90263	091		TUBE, 5/8 O.D. x 1-1/2	3
4	P	90208	091		ADAPTER, 5/8 O.D.T. x 3/8 N.P.T.	2
5	P	5424	091		VALVE, Check, 3/8 N.P.T.	1
	P	74335	091		• DISC	1
6	P	89864	091		TEE, 5/8 x 5/8 O.D.T. x 1/8 N.P.T.	1
7	P	3439	091		PLUG, Pipe, 1/8 N.P.T.	1
8	P	44499	091		ELL, 5/8 O.D.T. x 1/2 N.P.T.	1
9	P	129222	001		TRAP, Steam, 1/2 N.P.T. (See Fig. 8-43)	1
					UNITS WITH INDICATOR-RECORDER:	
	P	134464	001		CHAMBER DRAIN ASSEMBLY	X
11	P	5283	091		UNION, 1 N.P.T.	1
12	P	29380	091		NIPPLE, 1 N.P.T. x 1-1/4	2
13	P	1351	091		CROSS, 1 x 1 x 1 x 1 N.P.T.	1
14	P	3444	091		PLUG, Pipe 1 N.P.T.	1
15	P	1631	091		ELL, Street, 3/8 N.P.T.	1
16	P	3443	091		PLUG, Pipe, 3/4 N.P.T.	1
17	P	29290	091		NIPPLE, 3/4 N.P.T. x 1	2
18	P	4932	091		TEE, 3/4 x 3/4 x 3/4 N.P.T.	1
19	P	29291	091		NIPPLE, 3/4 N.P.T. x 1-1/4	1
20	P	83870	001		VALVE, Check, 3/4 N.P.T	2
21	P	83228	002		VALVE, Solenoid, Steam, 3/4 N.P.T.	2
	P	764070	001		• REPAIR KIT	1
	P	764070	002		• COIL, 120 Volt, 60 Hz, 110 Volt, 50 Hz	1
22	P	80917	091		COUPLING, Compression, 5/16 O.D.T. x 1/8 N.P.T.	1
23	P	89271	091		ELL, Street 45°, 7/8 O.D.T. x 3/4 N.P.T.	1
24	P	91159	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1
25	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	1
26	P	83373	001		TUBE, 7/8 O.D.T. x 2-5/8	1
27	P	89384	091		Y-BRANCH, 45°, 7/8 O.D.T.	1
28	P	89728	091		TUBE, 7/8 O.D.T. x 3-7/8	1
29	P	91158	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T. (Male)	2
30	P	91188	091		TUBE, 7/8 O.D.T. x 5	1
31	P	83374	001		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T. (Female)	1
32	P	25900	042		EJECTOR, 1/2 N.P.T. x 3/4-18 x 1/2 N.P.T.	1
33	P	7841	091		GASKET	1
34	P	25546	042		NOZZLE, 3/4-18 x 3/8 N.P.T.	1
35	P	40153	091		ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1
36	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1
37	P	150821	001		TUBE, 5/8 O.D.T.	1
38	P	91155	091		ADAPTER, 5/8 O.D.T. x 3/4 N.P.T.	1
39	P	4938	091		TEE, 1 x 3/4 x 3/4 N.P.T.	1
40	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
41	P	4924	091		TEE, 3/4 x 3/4 x 3/8 N.P.T.	1

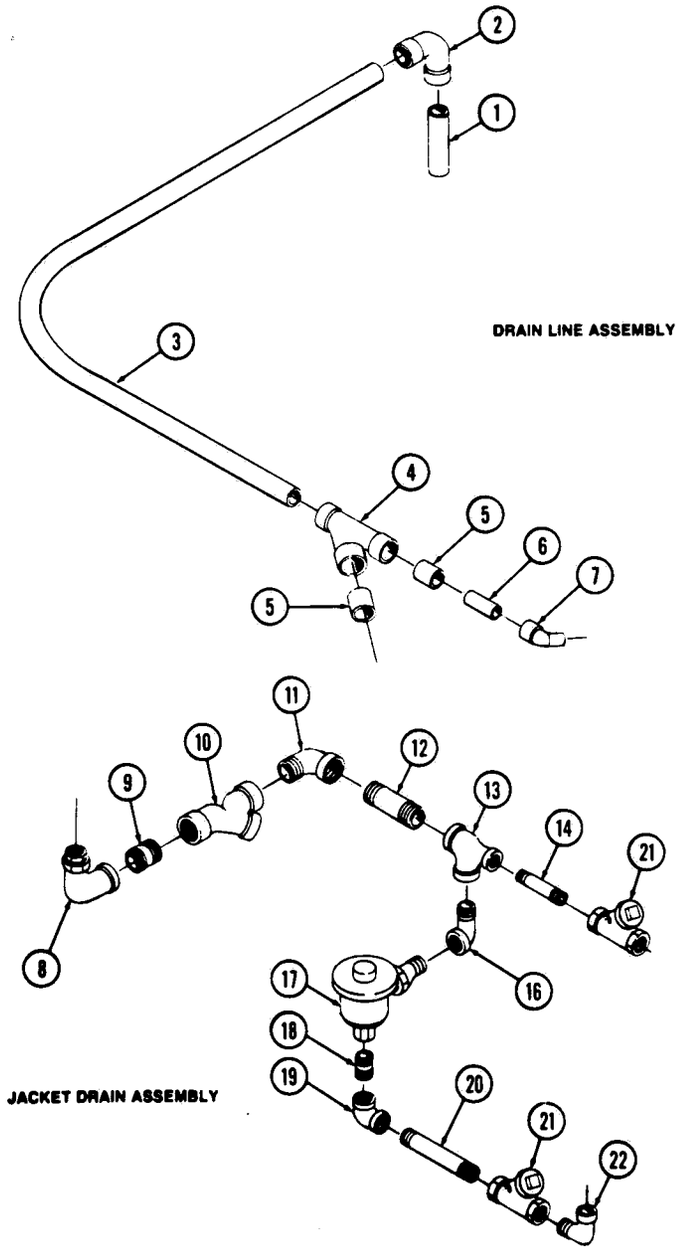


Figure 8-41. PIPING SUBASSEMBLIES.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-41-					PIPING SUBASSEMBLIES	
	P	136615	001		DRAIN LINE ASSEMBLY	X
1	P	83376	001		TUBE, 1-1/8 O.D. x 3-1/2	1
2	P	44492	001		ELL, 1-1/8 O.D T.	1
3	P	93019	001		TUBE, 1-1/8 O.D.	1
4	P	83375	001		"Y" BRANCH, 45°, 1-1/8 O.D.T.	1
5	P	91317	091		COUPLING; 1-1/8 O.D.T. x 7/8 O.D.T.	2
6	P	83373	007		TUBE, 7/8 O.D. x 3/16	1
7	P	89721	091		ELL, Street, 45°, 7/8 O.D.T.	1
		134465	001		JACKET DRAIN ASSEMBLY	
8	P	89986	091		ELL, Union, 3/4 N.P.T.	1
9	P	29290	091		NIPPLE, 3/4 N.P.T. x 1	1
10	P	41389	091		STRAINER, Steam, 3/4 N.P.T.	1
	P	751552	091		• SCREEN	1
	P	756207	091		• GASKET	1
	P	3442	091		• PIPE PLUG	1
11	P	1636	091		ELL, Street, 3/4 N.P.T.	1
12	P	29295	091		NIPPLE, 3/4 N.P.T. x 2-1/4	1
13	P	4919	091		TEE, 3/4 x 3/8 x 1/2 N.P.T.	1
14	P	29017	091		NIPPLE, 3/8 N.P.T. x 2	1
15					Not Used	
16	P	1634	091		ELL, Street, 1/2 N.P.T.	1
17	P	129222	001		TRAP, Steam, 1/2 N.P.T. (See Fig. 8-43)	1
18	P	29162	091		NIPPLE, 1/2 N.P.T. x 1	1
19	P	1622	091		ELL, Reducing, 1/2 x 3/8 N.P.T.	1
20	P	29025	091		NIPPLE, 3/8 N.P.T. x 4	1
21	P	5424	091		VALVE, Check, 3/8 N.P.T.	2
	P	74335	091		• DISC	2
22	P	43041	091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1

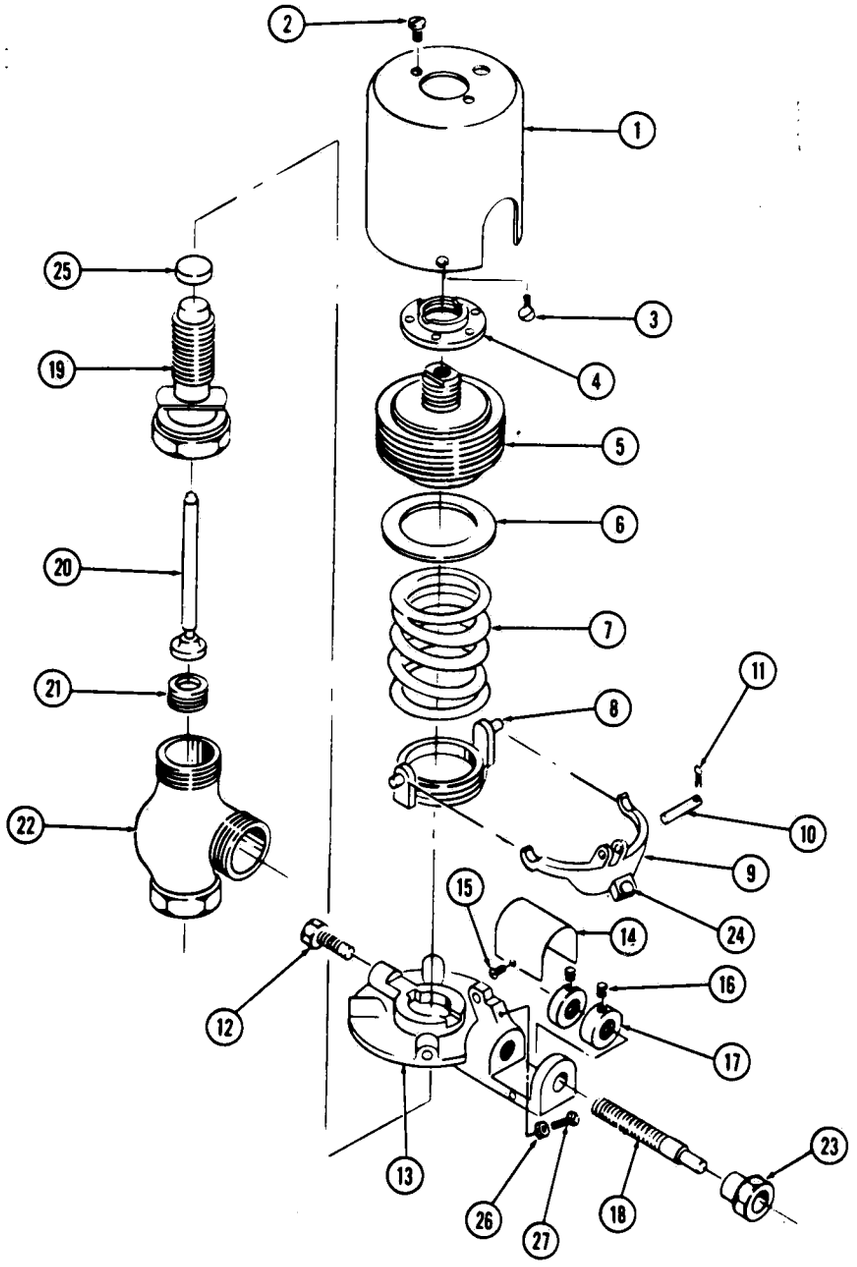


Figure 8-42. STEAM CONTROL VALVE.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-42-	P	22429	091		STEAM CONTROL VALVE, HI-LO	X
1	P	22349	045		COVER	1
2	P	9276	041		SCREW, #8-32 x 3/16	2
3	P	3969	041		SCREW, 1/4-20 x 1/4	4
4	P	9172	091		REINFORCEMENT	1
5	P	35880	091		BELLOWS ASSEMBLY	1
6	P	35911	061		PLATE, Top Spring	1
7	P	19947	045		SPRING	1
8	P	12474	042		PLATE, Lower Spring	1
9	P	14976	091		FORK, Adjusting	1
10	P	11890	061		PIN, Fork Pivot	1
11	P	8897	091		COTTER PIN	2
12	P	12471	041		SCREW, 1/4-20 x 1-1/2	1
13	P	20658	042		BOTTOM PLATE	1
14	P	20662	061		COVER, Adjusting Screw	1
15	P	12534	061		SCREW, #8-32 x 1/4	2
16	P	10585	041		SETSCREW, Allen Head, #10-32 x 1/4	2
17	P	20659	091		LOCK NUT, Split	2
18	P	20657	061		SCREW, Adjusting	1
19	P	26837	091		SYLPHON AND BONNET ASSEMBLY	1
20	P	28267	091		VALVE STEM ASSEMBLY	1
21	P	22425	061		SEAT, Valve	1
22	P	22427	091		BODY, Valve	1
23	P	8605	043		NUT, Wheel	1
24	P	2299	045		INSERT	1
25	P	37367	045		SPACER	1
26	P	2959	041		NUT	1
27	P	9315	041		SCREW	1
28	P	754359	003		KIT. Replacement Parts Package (includes items 2, 3, 5, 19, 20 & 21)	AR

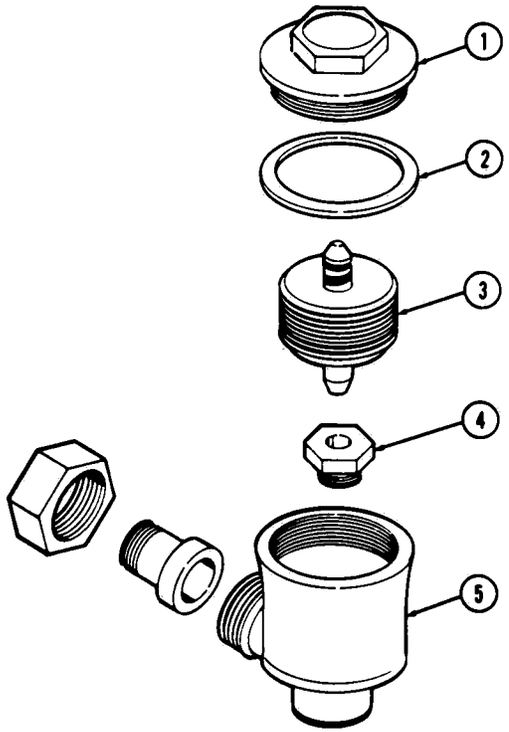


Figure 8-43. STEAM TRAP.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-43-	P	129222	001		STEAM TRAP	1
	P	764080	001		KIT, Repair, 1/2 N.P.T. (incl. items 2, 3, 4)	1
1	P	764315	209		CAP	1
2					GASKET	1
3					DIAPHRAGM ASSEMBLY	1
4					SEAT	1
5					BODY	1

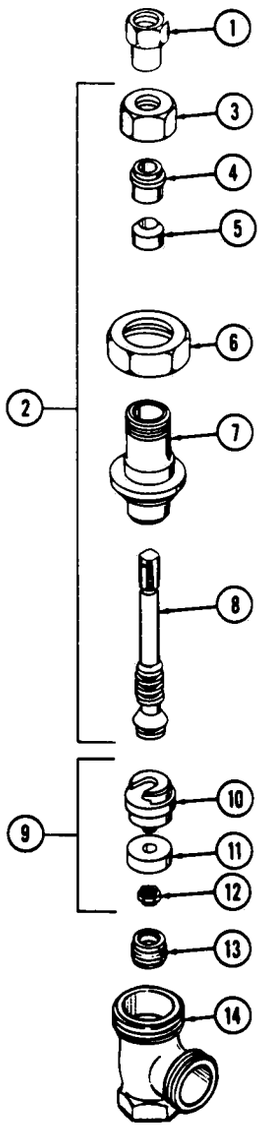


Figure 8-44. UNION ANGLE VALVE.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-44-	P	26907	091		UNION ANGLE VALVE: (3/4), Water	X	
	P	34029	091		UNION ANGLE VALVE: (3/4), Steam		X
	P	754361	003		RENEWAL PARTS PACKAGE (Includes Item 5, Qty. of 4; Item 8, Qty. of 1; Item 9, Qty. of 2, Item 13, Qty. of 2)	A/R	
1	P	8605	051		NUT, Wheel	1	1
2	P	53917	091		VALVE STEM AND BONNET ASSEMBLY	1	
	P	54363	091		VALVE STEM AND BONNET ASSEMBLY	1	1
3	P	48431	091		• NUT, Packing	1	1
4	P	48432	091		• GLAND, Packing	1	1
5	P	8784	091		• PACKING	1	1
6	P	25566	091		• NUT, Bonnet	1	1
7	P	53913	091		• BONNET, Valve	1	1
8	P	53911	091		• STEM, Valve	1	
	P	54296	051		• STEM, Valve		1
9	P	25567	091		DISC HOLDER ASSEMBLY	1	1
10	P	25568	091		• DISC HOLDER	1	1
11	P	25569	091		• DISC, Teflon	1	1
12	P	2927	091		• NUT, Disc	1	1
13	P	22425	061		SEAT, Valve	1	1
14	P	22427	091		BODY, Valve	1	1

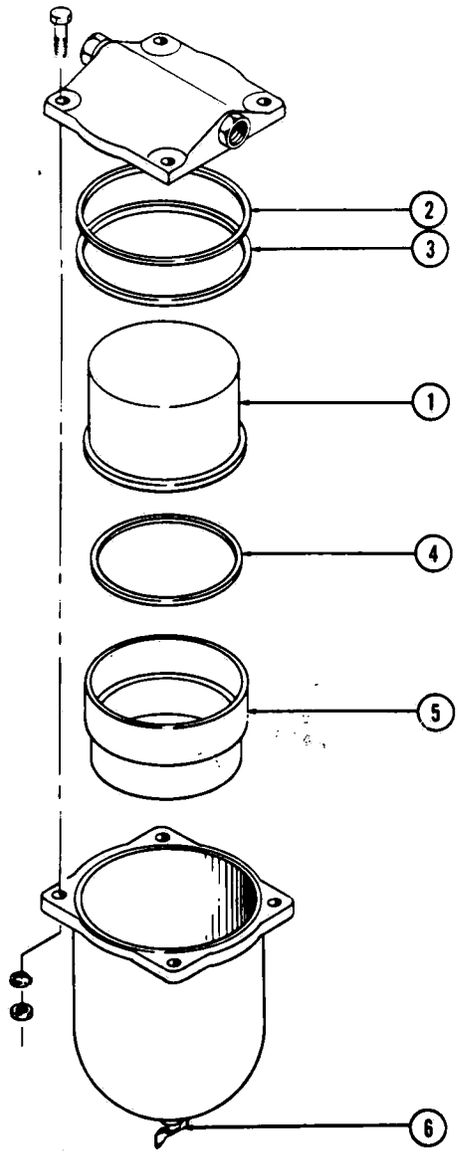


Figure 8-45. AIR FILTER.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-45-	P	56396	812		AIR FILTER	X
1	P	150822	941		CARTRIDGE	1
2	P	754325	091		GASKET, O Ring, Head	1
3	P	758175	091		GASKET, Cartridge	1
4	P	763972	091		RING, Plastic Gasket	1
5	P	764316	787		RETAINER, Cartridge	1
6	P	764316	055		VALVE, Drain	1

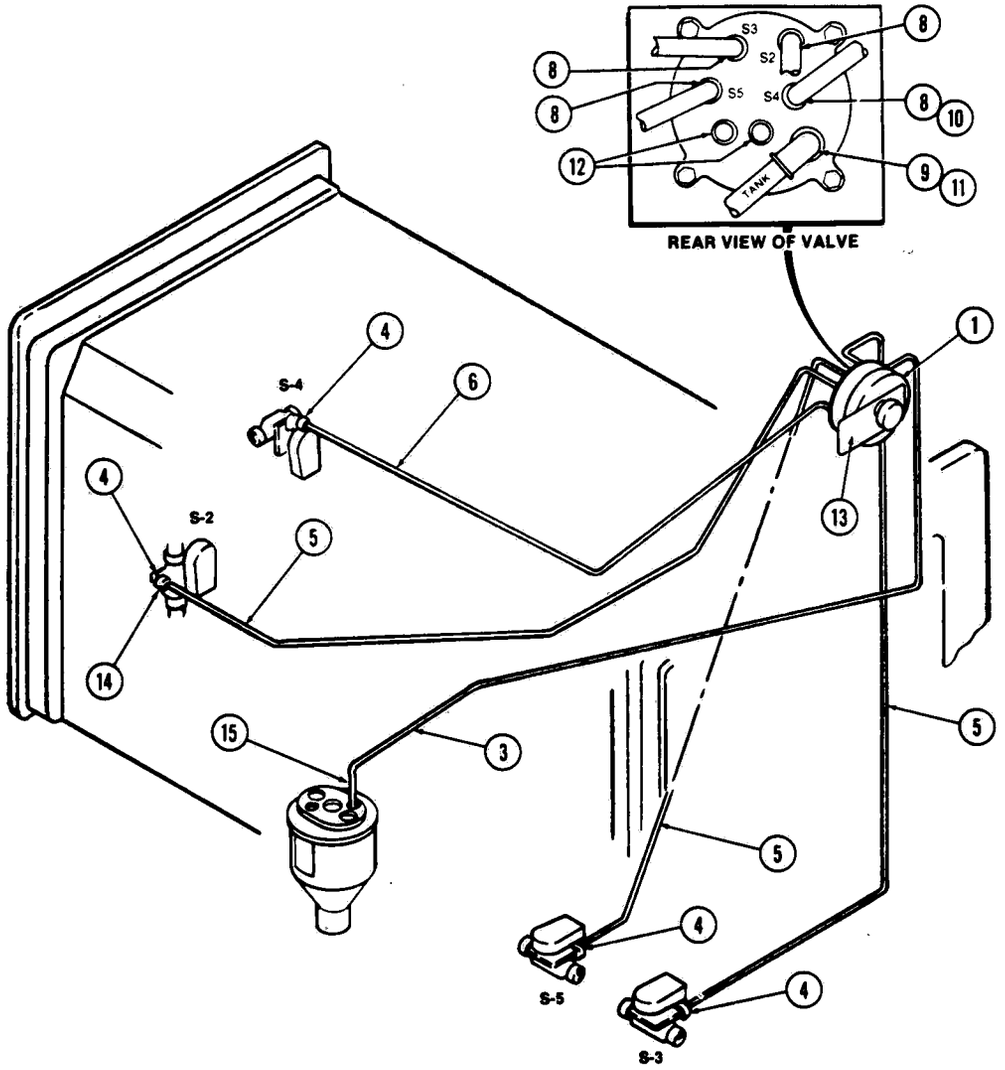


Figure 8-46. OPTIONAL MANUAL VALVE PIPING: Gravity Model.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR RECORDER:				
8-46-				†	OPTIONAL MANUAL VALVE PIPING: Gravity Model	X			
					UNITS WITH PRINTCON:				
				†	OPTIONAL MANUAL VALVE PIPING: Gravity Model		X		
1	P	136726	001		VALVE, Manual Multiport (See Fig. 8-48)	1	1		
2					Not Used				
3	R	3500	736	*	TUBE, Drain 3/8 O.D.	AR	AR		
4	P	42510	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	4	4		
5	R	915	103	*	TUBE, S-2, S-3 & S-5, 1/4 O.D.	AR	AR		
6	R	3500	735	*	TUBE, S-4, 1/4 O.D.	AR	AR		
7					Not Used				
8	P	43289	091		FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	4	4		
9	P	45530	091		ELL, Compression, 3/8 O.D.T. x 3/8 N.P.T.	1	1		
10	P	84371	001		INSERT, Tube, 1/4	2	2		
11	P	84371	002		INSERT, Tube, 3/8	1	1		
12	P	3439	091		PLUG, Pipe (Not Shown)	5	5		
13	P	136727	001		DECAL, Manual	1	1		
	P	93900	048		DECAL, Manual		1		
14	P	40891	091		COUPLING, 5/16 O.D.T. x 1/8 N.P.T.	1	1		
15	P	77299	091		WIRE TIES, Short	6	6		

*Order tubing using the raw material numbers shown. Correct unit of measure is by the foot — do **not** specify number of inches.

†This feature may be added to an existing sterilizer by installing conversion kit P/N P-764315-601. Kit also includes reference drawing 146594-000.

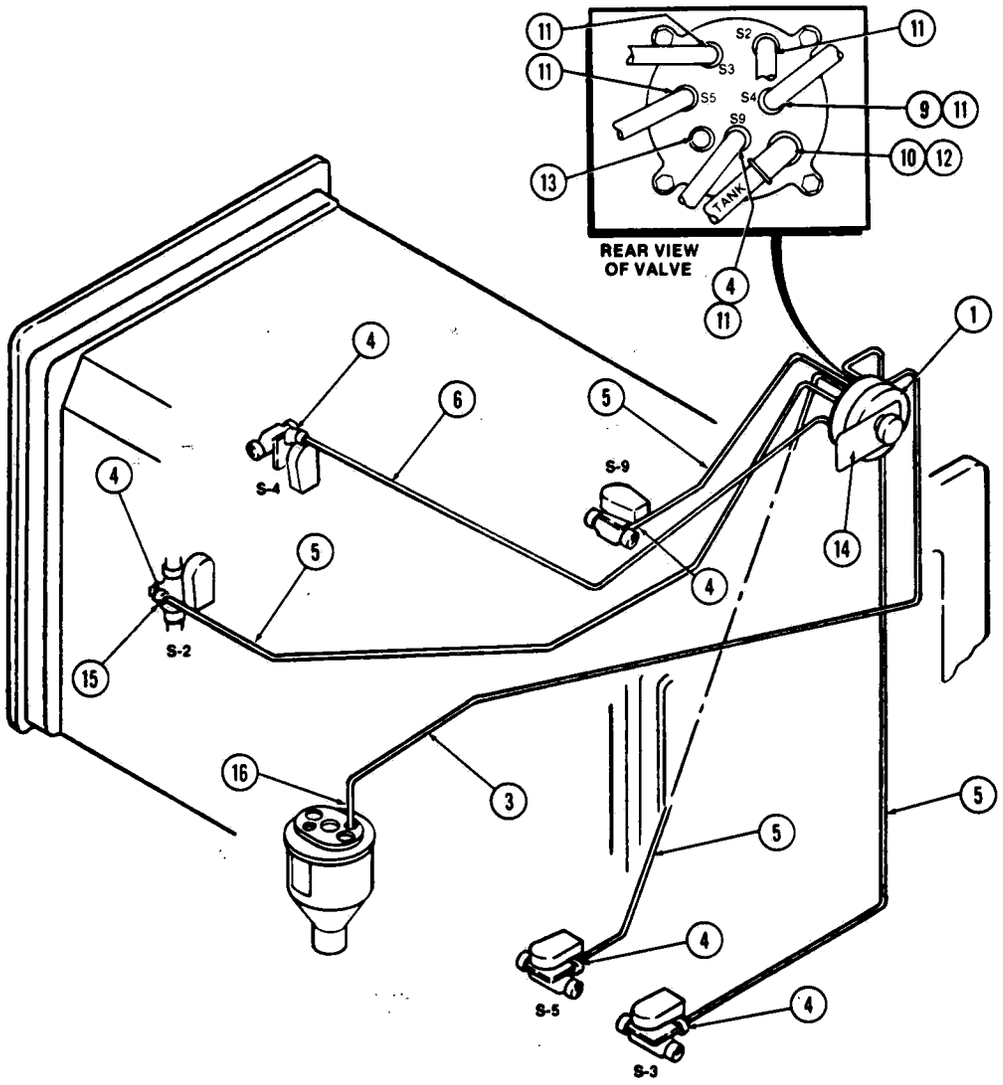


Figure 8-47. OPTIONAL MANUAL VALVE PIPING: Isothermal Model.

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR RECORDER:				
8-47-				†	OPTIONAL MANUAL VALVE PIPING: Isothermal Model	X			
					UNITS WITH PRINTCON:				
				†	OPTIONAL MANUAL VALVE PIPING: Isothermal Model		X		
1	P	136726	001		VALVE, Manual Multiport (See Fig. 8-48)	1	1		
2					Not Used				
3	R	3500	736	*	TUBE, Drain 3/8 O.D.	AR	AR		
4	P	42510	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	5	5		
5	R	915	103	*	TUBE, S-2, S-3 & S-5, S-9, 1/4 O.D.	AR	AR		
6	R	3500	735	*	TUBE, S-4, 1/4 O.D.	AR	AR		
7					Not Used				
8					Not Used				
9	P	84371	001		INSERT, Tube, 1/4	2	2		
10	P	84371	002		INSERT, Tube, 3/8	1	1		
11	P	43289	091		FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	5	5		
12	P	45530	091		ELL, Compression, 3/8 O.D.T. x 3/8 N.P.T.	1	1		
13	P	3439	091		PLUG, Pipe (Not Shown)	5	5		
14	P	136727	002		DECAL, Manual	1			
	P	93900	048		DECAL, Manual		1		
15	P	40891	091		COUPLING, 5/16 O.D.T. x 1/8 N.P.T.	1	1		
16	P	77299	091		WIRE TIES, Short	6	6		

*Order tubing using the raw material numbers shown. Correct unit of measure is by the foot — do **not** specify number of inches.

†This feature may be added to an existing sterilizer by installing conversion kit P/N P-764315-601. Kit also includes reference drawing 146594-000.

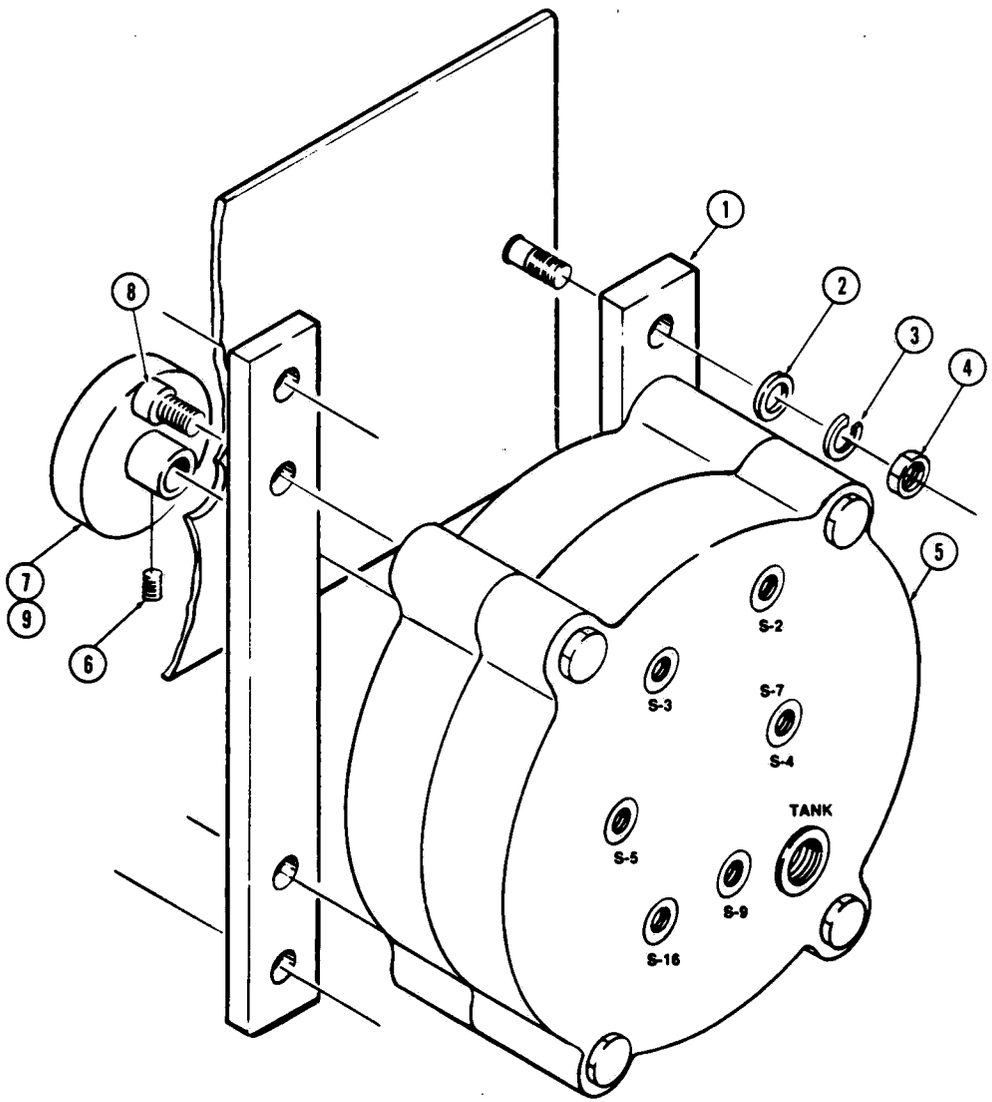


Figure 8-48. OPTIONAL MANUAL VALVE.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-48-					OPTIONAL MANUAL VALVE	X
1	P	129061	001		PLATE, Mounting	2
2	P	10445	091		WASHER, Flat	4
3	P	19678	045		LOCKWASHER	4
4	P	3097	041		NUT, Hex, 1/4-20	4
5	P	136726	001		VALVE, Manual Multi-Port	1
6	P	43282	091		SCREW, Set	1
7	P	136760	001		KNOB, Selector	1
8	P	79253	045		SCREW, Socket Head, 1/4-20 x 1/2	4
9	P	129060	001		INSERT, Knob	1

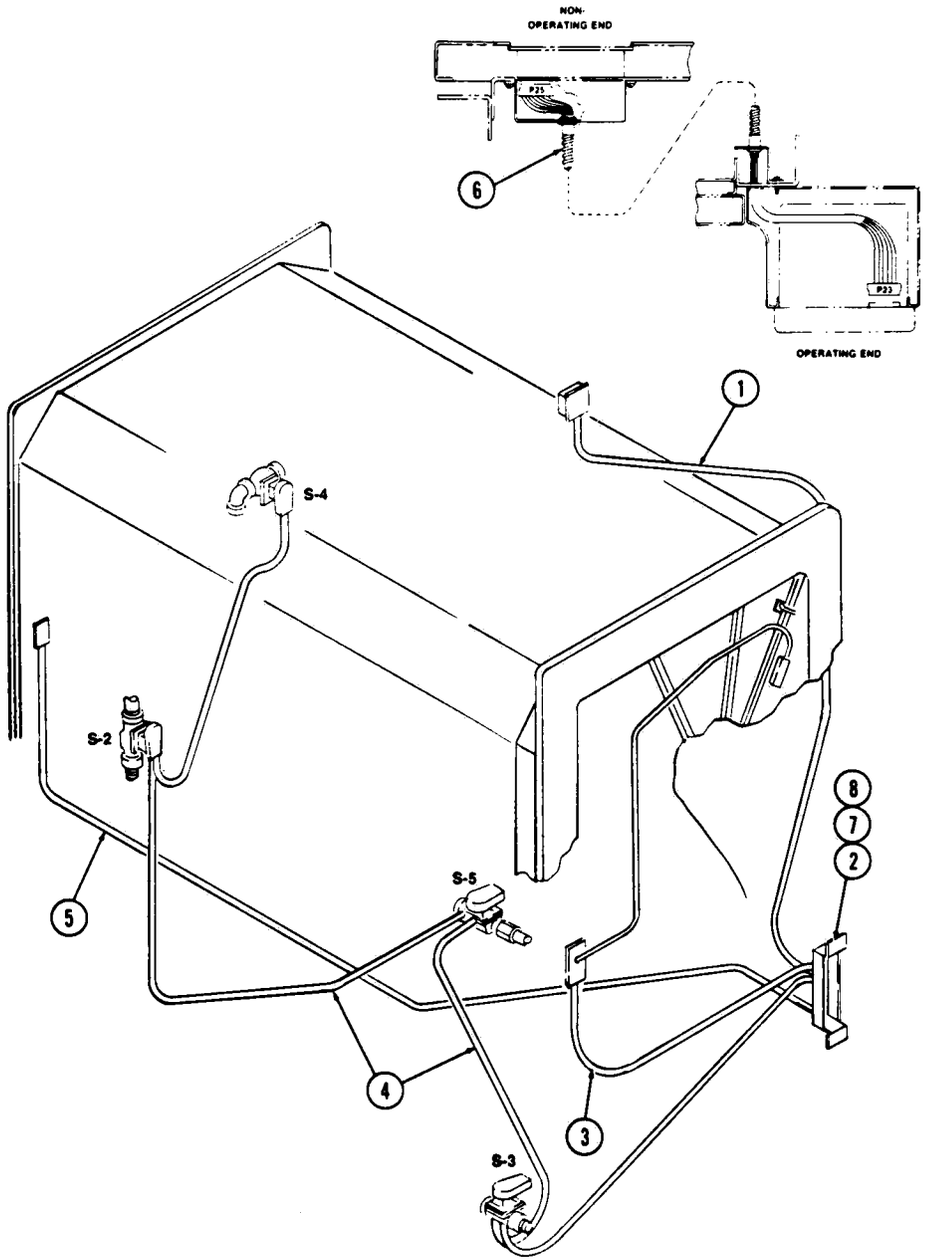


Figure 8-49. WIRING ASSEMBLY: Gravity Model. (Units With Indicator Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-49-					FINAL WIRING ASSEMBLY: 24x36x36 Gravity Models	X			
					FINAL WIRING ASSEMBLY: 24x36x48 Gravity Models		X		
					FINAL WIRING ASSEMBLY: 24x36x60 Gravity Models			X	
1	P	93657	002		CABLE, Pressure and Vacuum Switch	1	1	1	
2	P	93617	001		BOX, Junction (See Fig. 8-51)	1	1	1	
3	P	93652	001		CABLE ASSEMBLY, Door, Operating End	1	1	1	
4	P	136574	001		CABLE, Solenoid, Valves	1			
	P	136575	001		CABLE, Solenoid, Valves		1		
	P	136576	001		CABLE, Solenoid, Valves			1	
5	P	93652	018		CABLE ASSEMBLY, Non-operating End	1			
	P	93652	013		CABLE ASSEMBLY, Non-operating End		1		
	P	93652	008		CABLE ASSEMBLY, Non-operating End			1	
6	P	136751	001		HARNESS, Double Door Primary Panels (See Fig. 8-53)	1	1	1	
7	P	15361	042		SCREW, Round Head, #10-32 x 1/4	6	6	6	
8	P	31705	045		LOCKWASHER, #10	6	6	6	

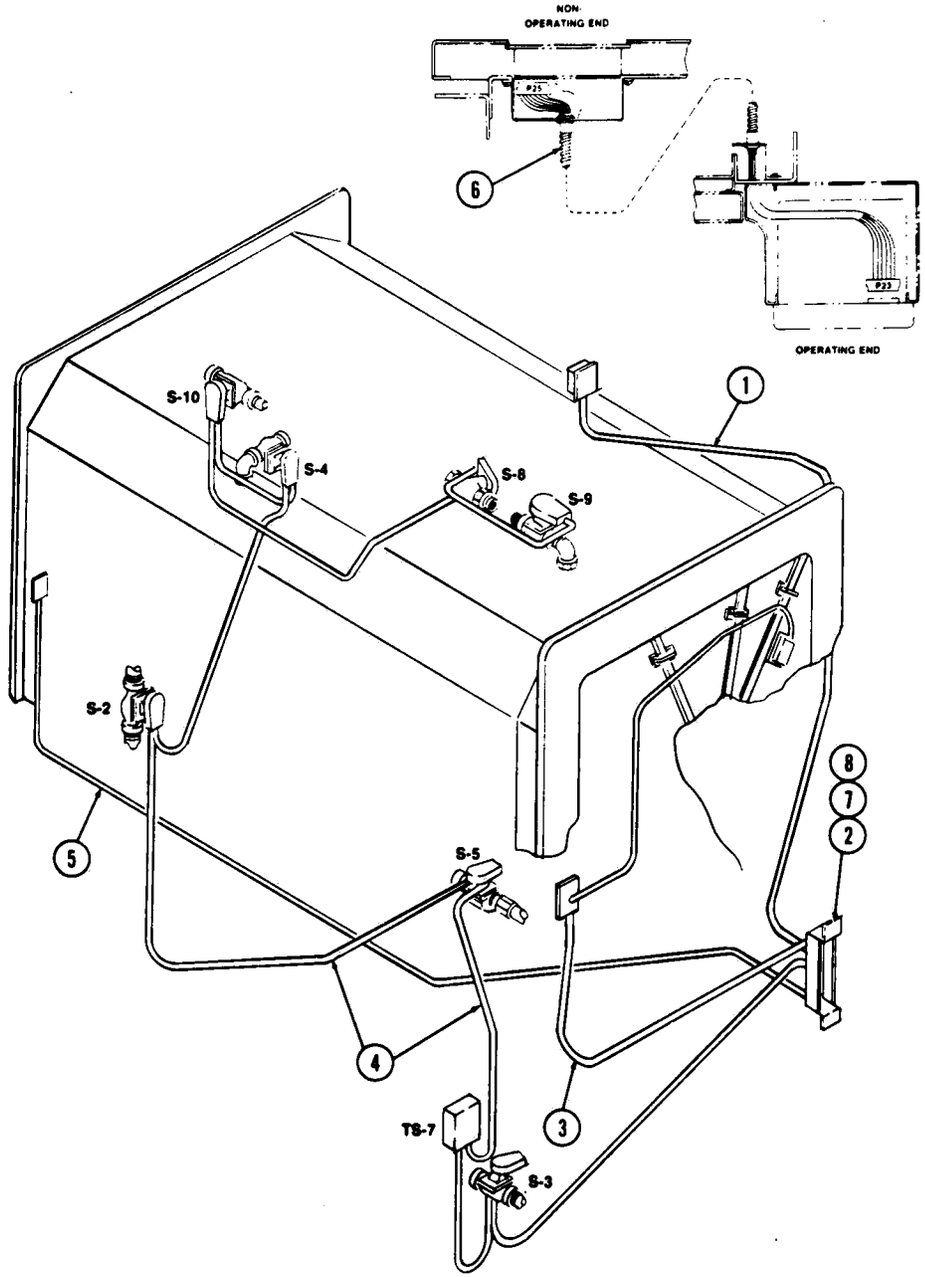


Figure 8-50. WIRING ASSEMBLY: Isothermal Model. (Units With Indicator Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-50-					FINAL WIRING ASSEMBLY: 24x36x36 Isothermal Models	X			
					FINAL WIRING ASSEMBLY: 24x36x48 Isothermal Models		X		
					FINAL WIRING ASSEMBLY: 24x36x60 Isothermal Models			X	
1	P	93657	001		CABLE, Pressure and Vacuum Switch	1	1	1	
2	P	93617	001		BOX, Junction (See Fig. 8-51)	1	1	1	
3		93652	001		CABLE ASSEMBLY, Door, Operating End	1	1	1	
4	P	136577	001		CABLE, Solenoid, Valves	1			
	P	136578	001		CABLE, Solenoid, Valves		1		
	P	136579	001		CABLE, Solenoid, Valves			1	
5	P	93652	018		CABLE ASSEMBLY, Non-operating End	1			
	P	93652	013		CABLE ASSEMBLY, Non-operating End		1		
	P	93652	008		CABLE ASSEMBLY, Non-operating End			1	
6	P	136751	001		HARNESS, Double Door Primary Panels (See Fig. 8-53)	1	1	1	
7	P	15361	042		SCREW, Round Head, #10-32 x 1/4	6	6	6	
8	P	31705	045		LOCKWASHER, #10	6	6	6	

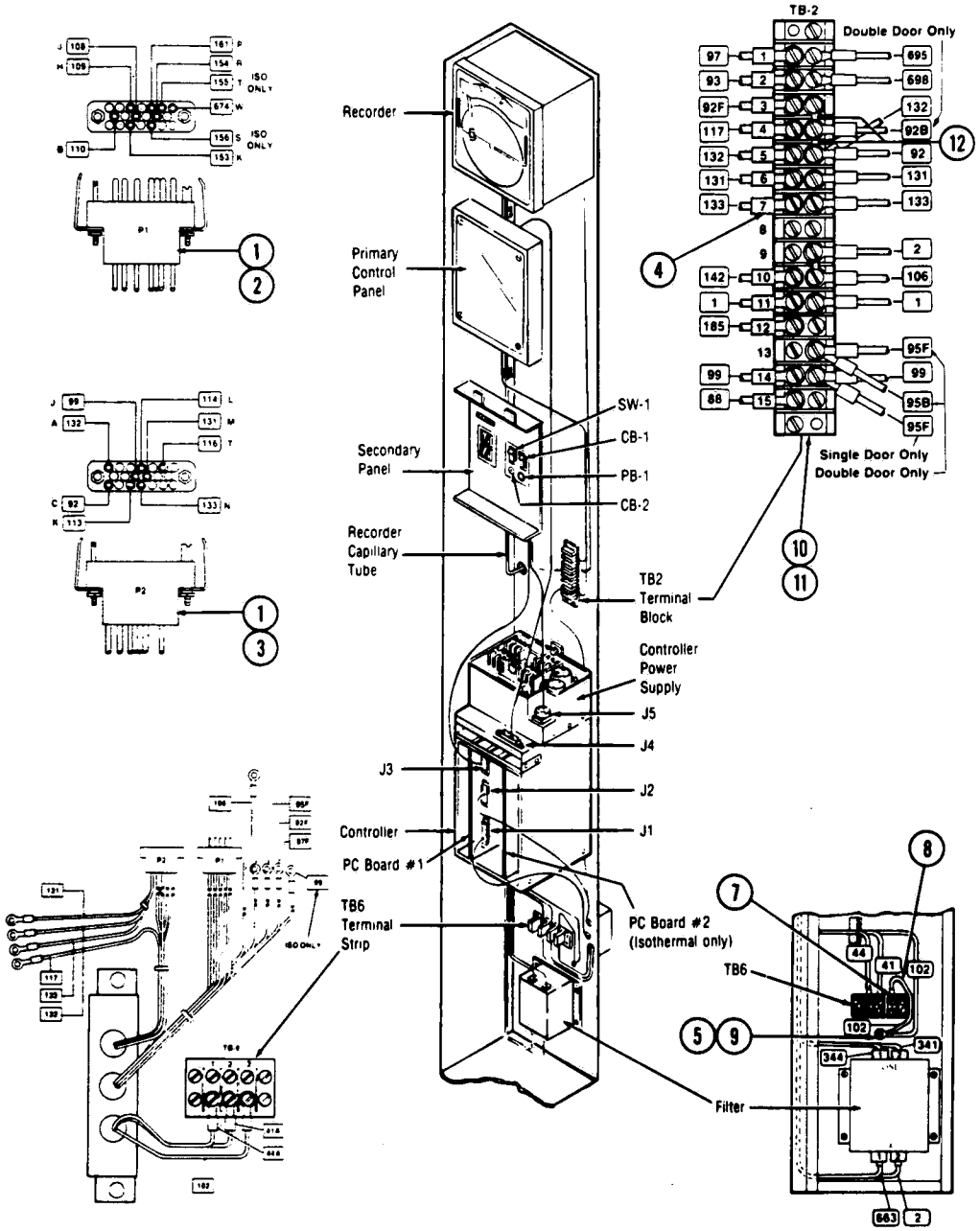


Figure 8-51. CONNECTION DETAILS: Control Column, Manual Door. (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
					UNITS WITH INDICATOR-RECORDER:					
8-51-					CONNECTION DETAILS, Control Column, Manual Door Gravity Models	X				
					CONNECTION DETAILS, Control Column, Manual Door Isothermal Models		X			
1	P	93829	001		BLOCK, P-1 and P-2	2	2			
2	P	150822	042		PIN, Contact, P-1	6	9			
3	P	84198	002		SOCKET, Contact, P-2	7	8			
4	P	90619	091		TERMINAL, Wire, #6 Ring	5	5			
5	P	92675	001		SCREW, Green, Ground, #10-32 x 3/8	1	1			
6	P	78629	091		TUBING, Hy-Shrink (Not Shown)	12	12			
7	P	14592	091		TERMINAL, Wire, #8 Ring x 14-16 AWG	1	1			
8					WIRE, Green, 14 AWG	1	1			
9	P	14591	091		TERMINAL, Wire, #10 Ring x 14-16 AWG	1	1			
10	P	41560	091		BLOCK, Terminal	1	1			
11	P	3964	041		SCREW, Round Head, #6-32 x 5/8	2	2			
12	P	91945	091		JUMPER	1	1			

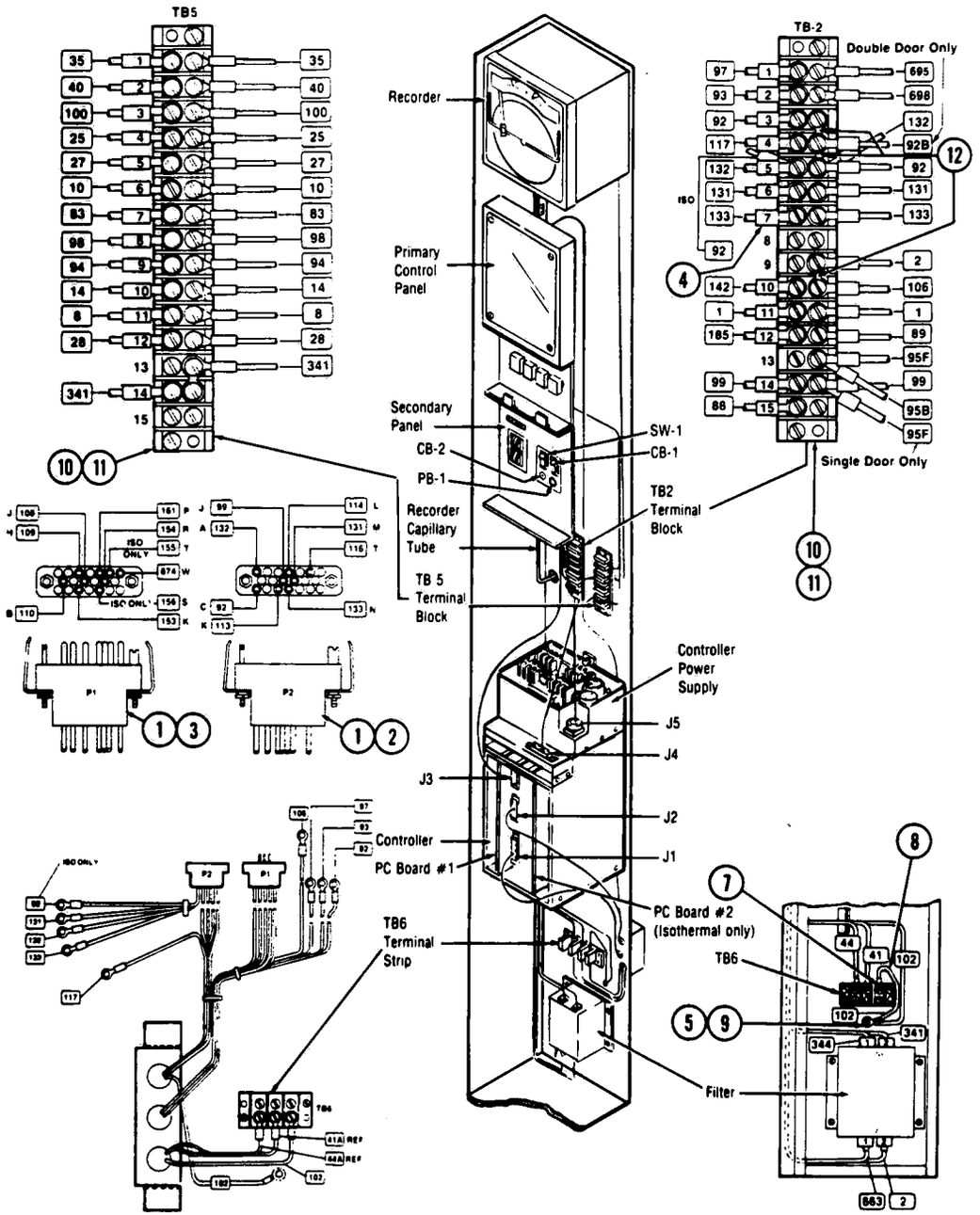


Figure 8-52. CONNECTION DETAILS: Control Column, Power Door. (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
				UNITS WITH INDICATOR-RECORDER:				
8-52-				CONNECTION DETAILS, Control Column, Power Door Gravity Models	X			
				CONNECTION DETAILS, Control Column, Power Door Isothermal Models		X		
1	P	93829	001	BLOCK, P-1 and P-2	2	2		
2	P	150822	042	PIN, Contact, P-1	6	9		
3	P	84198	002	SOCKET, Contact, P-2	7	8		
4	P	90619	091	TERMINAL, Wire, #6 Ring	5	5		
5	P	92675	001	SCREW, Green, Ground, #10-32 x 3/8	1	1		
6	P	78629	091	TUBING, Hy-Shrink (Not Shown)	12	12		
7	P	14592	091	TERMINAL, Wire, #8 Ring x 14-16 AWG	1	1		
8				WIRE, Green, 14 AWG	1	1		
9	P	14591	091	TERMINAL, Wire, #10 Ring x 14-16 AWG	1	1		
10	P	41560	091	BLOCK, Terminal	2	2		
11	P	3964	041	SCREW, Round Head, #6-32 x 5/8	4	4		
12	P	91945	041	JUMPER	3	3		

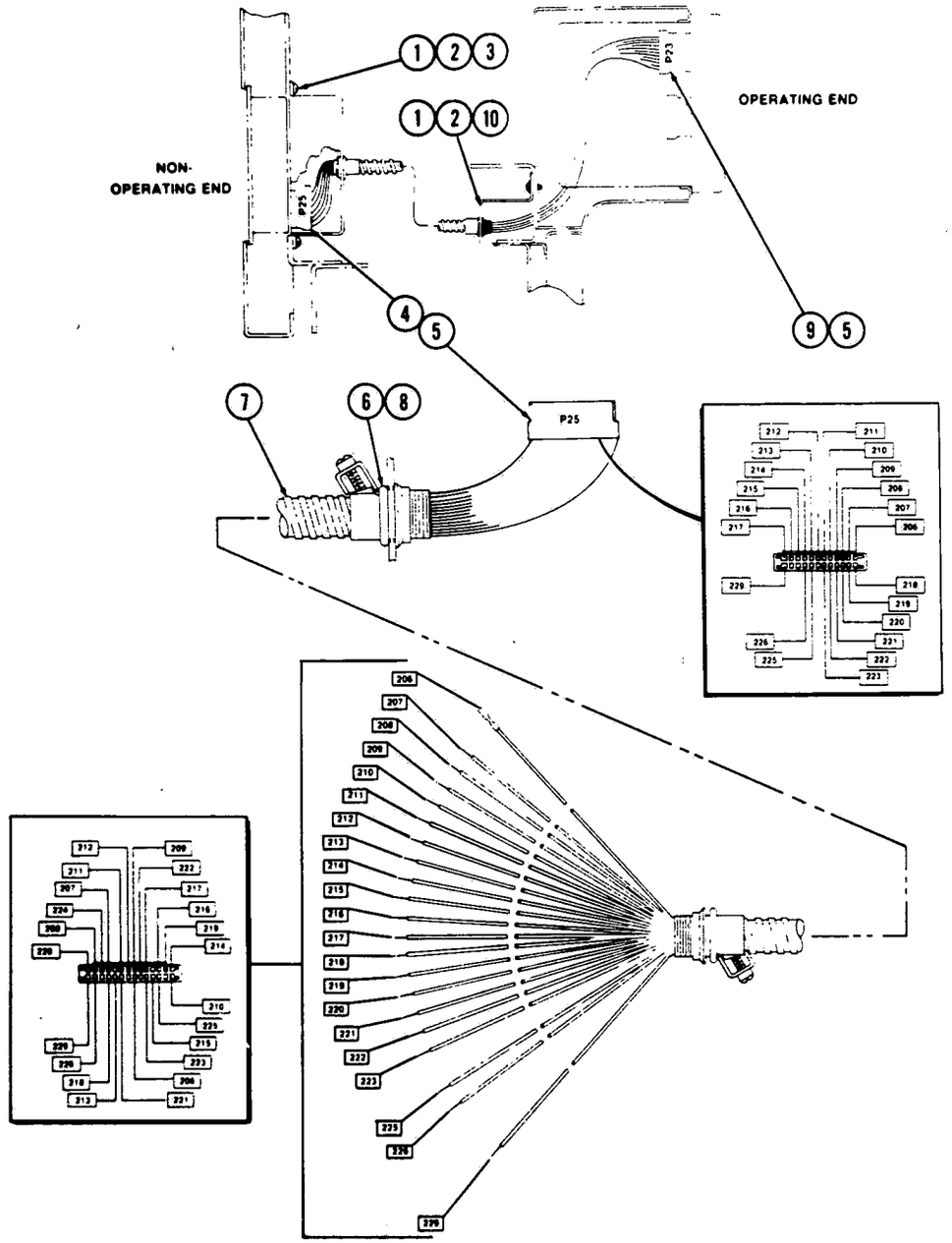


Figure 8-53. HARNESS ASSEMBLY.
(Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-53-	P	136751	001		HARNESS ASSEMBLY: Primary Panels, 36, 48 and 60 Long, Double Door	X
1	P	15361	042		SCREW, Round Head, #10-32 x 1/4	4
2	P	31705	045		LOCKWASHER, #10	4
3	P	136798	001		ENCLOSURE	1
4	P	84229	005		HOUSING, Receptacle, P-25	1
5	P	84187	002		CONTACT	42
6	P	150030	001		CONNECTOR, Straight, 1/2 Conduit	2
7	P	91758	091		CONDUIT, Flexible, 1/2 x 85	1
8	P	150122	001		BUSHING	2
9	P	84229	006		HOUSING, Receptacle, P-23	1
10	P	129130	001		BRACKET, Mounting	1

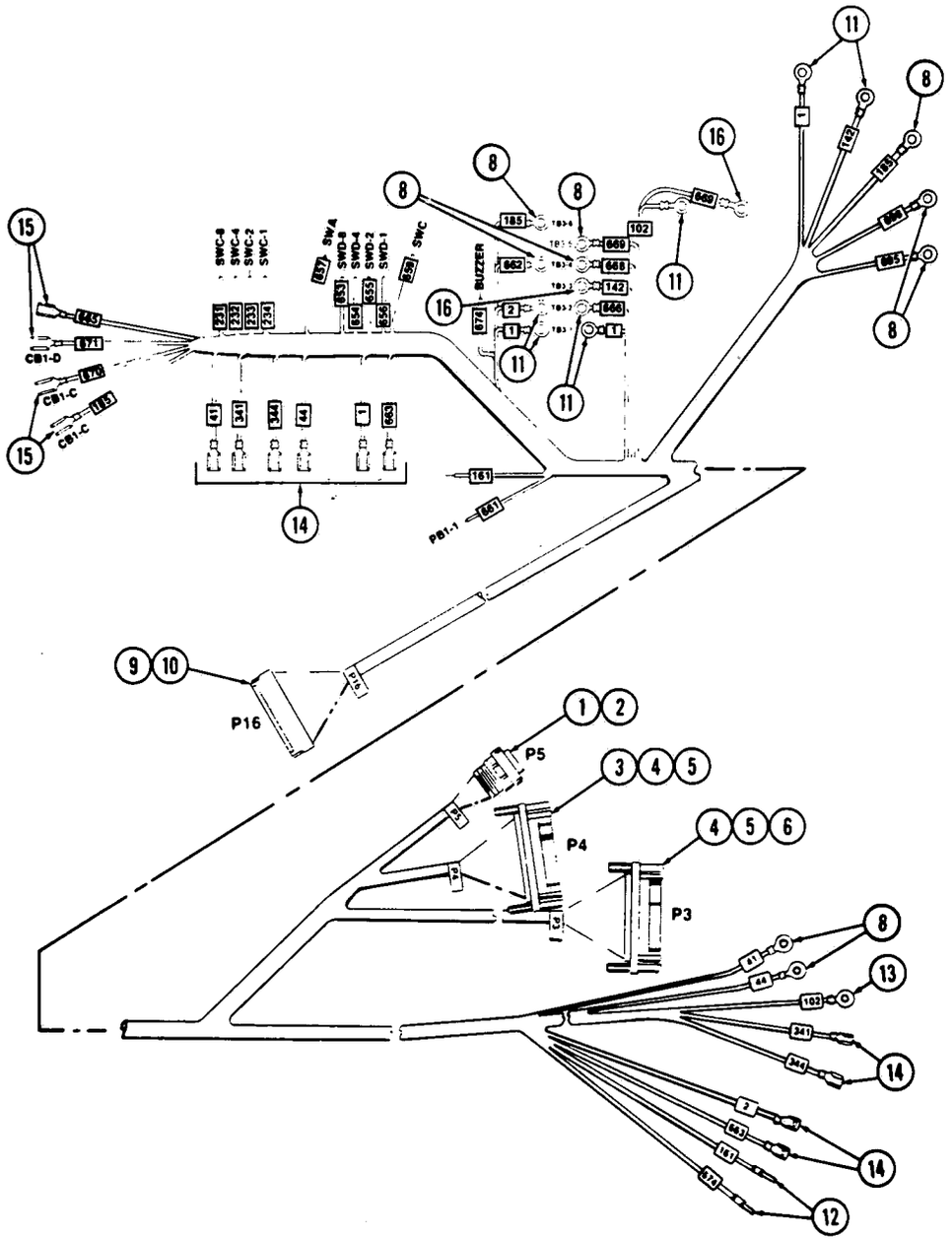


Figure 8-54. WIRING HARNESS: Secondary Panel, Gravity Models. (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH INDICATOR-RECORDER:	
8-54-				WIRING HARNESS: Secondary Panel, Gravity	X
1	P 93838	001		PLUG, 9-Position, P-5	1
2	P 84198	004		CONTACT, Socket, P-5	5
3	P 84205	002		HOUSING, Pin 38-Position, P-4	1
4	P 84207	002		PIN, Contact, P-3 and P-4	43
5	P 84192	001		JACK SCREW, Female, P-3 and P-4	4
6	P 84205	001		HOUSING, Pin, 28-Position, P-3	1
7	P 14591	091		TERMINAL, Wire, #8 Ring x 14-16 Wire	2
8	P 90619	091		TERMINAL, Wire, #6 Ring x 22-18 Wire	12
9	P 84229	002		HOUSING, Connector, 36-Position, P-16	1
10	P 84187	002		CONTACT, P-16	34
11	P 14590	091		TERMINAL, Wire, #6 Ring x 14-16 Wire	5
12	P 150822	043		PIN, Contact	2
13	P 14592	091		TERMINAL, #10 Ring x 14-16 AWG	1
14	P 32119	091		RECEPTACLE, 1/4 Lug x 14-16 AWG	12
15	P 90695	091		RECEPTACLE, 1/4 Lug x 18-22 AWG	4

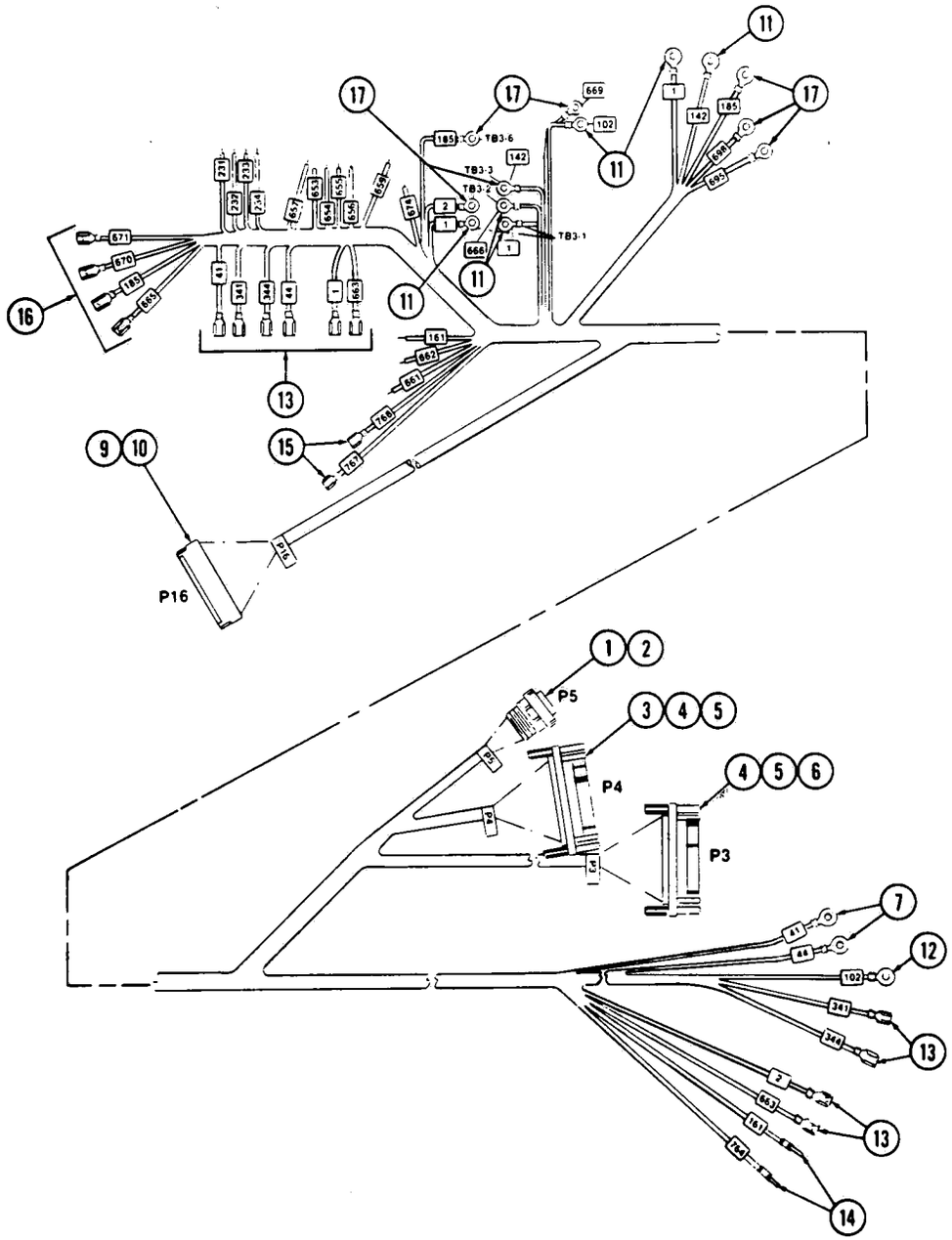


Figure 8-55. WIRING HARNESS: Secondary Panel, Isothermal Model. (Units With Indicator Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-55-					WIRING HARNESS: Isothermal Model Secondary Panel	X
1	P	93838	001		PLUG, 9-Position, P-5	1
2	P	84198	004		CONTACT, Socket, P-5	5
3	P	84205	002		HOUSING, Pin, 38-Position, P-4	1
4	P	84207	002		CONTACT, P-3 and P-4	46
5	P	84192	001		JACK SCREW, Female, P-3 and P-4	4
6	P	84205	001		HOUSING, Pin, 28-Position, P-3	1
7	P	14591	091		TERMINAL, Wire, #8 Ring x 14-16 AWG	2
8					NOT USED	
9	P	84229	002		HOUSING, Connector, 36-Position, P-16	1
10	P	84187	003		CONTACT, P-16	34
11	P	14590	091		TERMINAL, Wire, #6 Ring x 14-16 AWG	5
12	P	14592	091		TERMINAL, Wire, #10 Ring x 14-16 AWG	1
13	P	32119	091		RECEPTACLE, 1/4 Lug x 14-16 AWG	12
14	P	150822	043		CONTACT, Pin	2
15	P	84402	001		RECEPTACLE, 1/4 Lug x 24 AWG	2
16	P	90695	091		RECEPTACLE, 1/4 Lug x 18-22 AWG	4
17	P	90619	091		TERMINAL, #6 Ring x 18-22 AWG	11

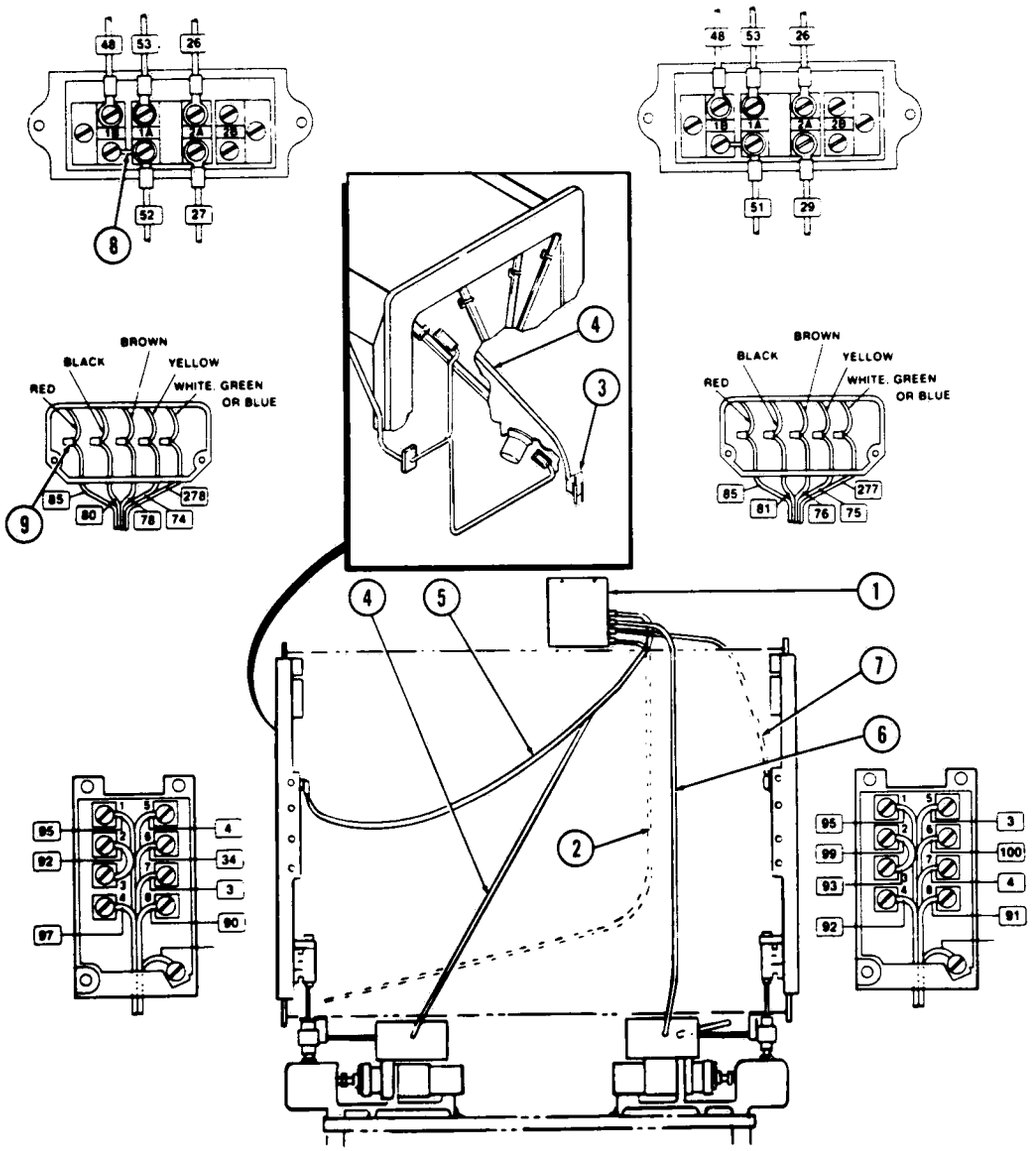


Figure 8-56. POWER DOOR WIRING. (Units With Indicator Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-56-					POWER DOOR WIRING: Single Door Model	X			
					POWER DOOR WIRING: Double Door Model		X		
	1				RELAY BOX (See Fig. 8-30)	Ref.			
	2	P	136680	001	CABLE ASSEMBLY "C", Console to Relays	1	1		
	3				BOX, Junction (See Fig. 8-52)	Ref.			
	4	P	136678	001	CABLE ASSEMBLY "A", Hinge Drive, Front	1	1		
	5	P	136679	001	CABLE ASSEMBLY "B", Limit Switch, Front	1	1		
	6	P	136681	001	CABLE ASSEMBLY "D", Hinge, Drive, Rear		1		
	7	P	136682	001	CABLE ASSEMBLY "E", Limit Switch, Rear		1		
	8	P	91945	041	JUMPER, Terminal Block	1	2		
	9	P	18538	091	NUT, Wire	5	10		

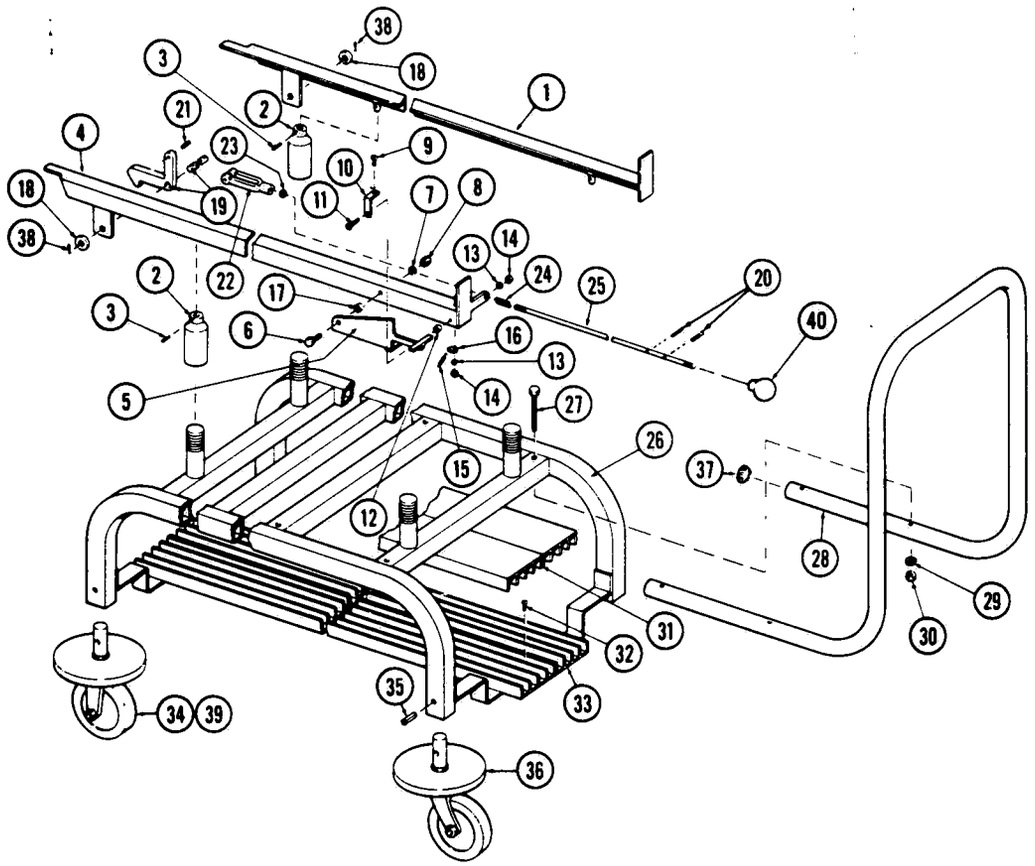
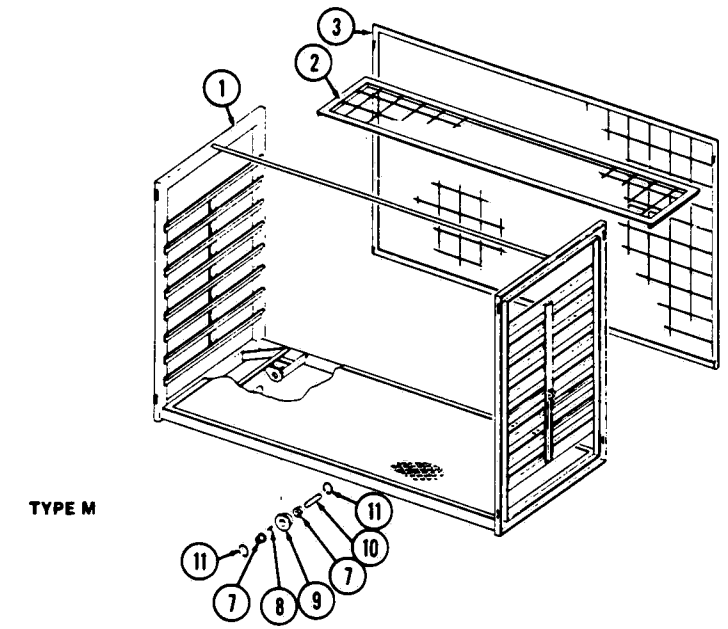


Figure 8-57. OPTIONAL TRANSFER CAR ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-57-	P	139814	091		OPTIONAL TRANSFER CAR ASSEMBLY (36)	X			
	P	139815	091		OPTIONAL TRANSFER CAR ASSEMBLY (48)		X		
	P	139816	091		OPTIONAL TRANSFER CAR ASSEMBLY (60)			X	
1	P	91603	063		TRACK, Right Side (36)	1			
	P	91604	063		TRACK, Right Side (48)		1		
	P	91605	063		TRACK, Right Side (60)			1	
2	P	7128	091		CAP, Adjusting	4	4	4	
3	P	30219	091		SETSCREW, #10-24 x 1/4	8	8	8	
4	P	91600	010		TRACK (36)	1			
	P	91601	010		TRACK (48)		1		
	P	91602	010		TRACK (60)			1	
5	P	91543	010		LATCH	1	1	1	
6	P	31838	042		SCREW, Hex Head, 3/8-16 x 1	1	1	1	
7	P	19680	041		LOCKWASHER (3/8)	1	1	1	
8	P	3099	051		NUT, Hex, 3/8-16	1	1	1	
9	P	3992	041		SCREW, Round Head, #10-24 x 3/8	1	1	1	
10	P	91538	061		SUPPORT, Latch	1	1	1	
11	P	39644	048		SCREW, Round Head, #10-24 x 3/4	1	1	1	
12	P	91540	041		SPACER, Latch	1	1	1	
13	P	19677	041		LOCKWASHER (10)	1	1	1	
14	P	3039	041		NUT, Hex, #10-24	2	2	2	
15	P	91535	061		SPRING, Tension	1	1	1	
16	P	91537	061		BRACKET, Spring	1	1	1	
17	P	91533	091		BUSHING, Latch	1	1	1	
18	P	31931	061		WASHER, Flat	2	2	2	
19	P	91562	010		SHAFT ASSEMBLY	1	1	1	
20	P	43262	061		ROLL PIN	2	2	2	
21	P	91558	045		CLEVIS PIN	1	1	1	
22	P	91557	010		YOKE	1	1	1	
23	P	3099	042		NUT, Hex, 3/8-16	1	1	1	
24	P	91536	061		SPRING, Compression	1	1	1	
25	P	91576	001		ROD, HANDLE (36)	1			
	P	91634	001		ROD, HANDLE (48)		1		
	P	91635	001		ROD, HANDLE (60)			1	
26	P	139808	010		FRAME (36)	1			
	P	139809	010		FRAME (48)		1		
	P	139810	010		FRAME (60)			1	
27	P	36921	045		SCREW, Hex Head, 5/16-24 x 3-1/4	4	4	4	
28	P	91546	056		HANDLE	1	1	1	
29	P	19679	041		LOCKWASHER (5/16)	4	4	4	
30	P	2946			NUT, Hex, 5/16-24	4	4	4	
31	P	91584	033		SUPPORT (36)	2			
	P	91585	033		SUPPORT (48)		2		
	P	91586	033		SUPPORT (60)			2	
32	P	4617	041		SCREW, Flat Head, 8-32 x 3/8	16	16	16	
33	P	91580	033		SUPPORT, Shelf (36)	2			
	P	31581	033		SUPPORT, Shelf (48)		2		
	P	91582	033		SUPPORT, Shelf (60)			2	
34	P	91545	091		CASTER, Rigid	4	4	4	
35	P	38968	061		ROLL PIN, 1/4 x 1-1/2	4	4	4	
36	P	91544	091		CASTER, Swivel	2	2	2	
37	P	25890	052		PLUG, Button	2	2	2	
38	P	23597	061		COTTER PIN	2	2	2	
39	P	764320	273		WHEEL, Replacement	A/R	A/R	A/R	
40	P	452740	001		KNOB	1	1	1	



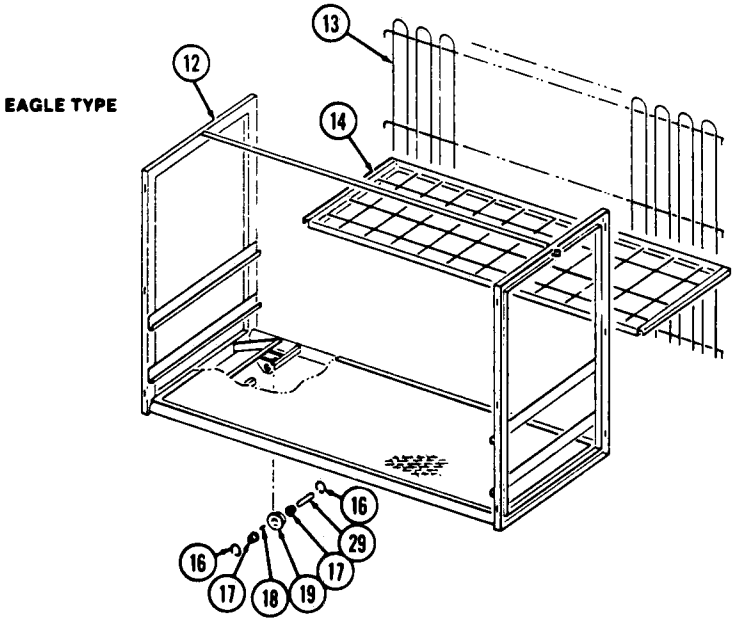


Figure 8-58. OPTIONAL LOADING CAR ASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-54-					LOADING CAR ASSEMBLY: 24x36x36 Sterilizer, Type M	X			
					LOADING CAR ASSEMBLY: 24x36x48 Sterilizer, Type M		X		
					LOADING CAR ASSEMBLY: 24x36x60 Sterilizer, Type M			X	
1	P	149602	063		CAR	1			
	P	149603	063		CAR		1		
	P	149605	063		CAR			1	
2	P	96546	063		SHELF	8			
	P	96547	063		SHELF		8		
	P	96548	063		SHELF			8	
3	P	96543	063		GATE	2			
	P	96544	063		GATE		2		
	P	96545	063		GATE			2	
4					Not Used				
5					Not Used				
6					Not Used				
7	P	47633	091		BUSHING	8	8	8	
8	P	47636	061		BEARING, Roller	48	48	48	
9	P	91633	042		WHEEL	4	4	4	
10	P	47632	061		AXLE	4	4	4	
11	P	42639	091		RING, Retaining	8	8	8	
	P	136800	315		LOADING CAR ASSEMBLY, 36, Eagle Type	X			
	P	136800	316		LOADING CAR ASSEMBLY, 48, Eagle Type		X		
	P	136800	317		LOADING CAR ASSEMBLY, 60, Eagle Type			X	
12	P	146645	192		CAR, Loading, Weldment, 36	1			
	P	146645	193		CAR, Loading, Weldment, 48		1		
	P	146645	194		CAR, Loading, Weldment, 60			1	
13	P	146645	189		GATE, Side, Weldment, 36	1			
	P	146645	190		GATE, Side, Weldment, 48		1		
	P	146645	191		GATE, Side, Weldment, 60			1	
14	P	146645	178		SHELF ASSEMBLY	2			
	P	146645	179		SHELF ASSEMBLY		2		
	P	146645	177		SHELF ASSEMBLY			4	
15					Not Used				
16	P	42639	091		RING, Retaining	8	8	8	
17	P	47633	091		BUSHING	8	8	8	
18	P	47636	061		BEARING, Roller	48	48	48	
19	P	91633	042		WHEEL	4	4	4	
20	P	47632	061		AXLE	4	4	4	

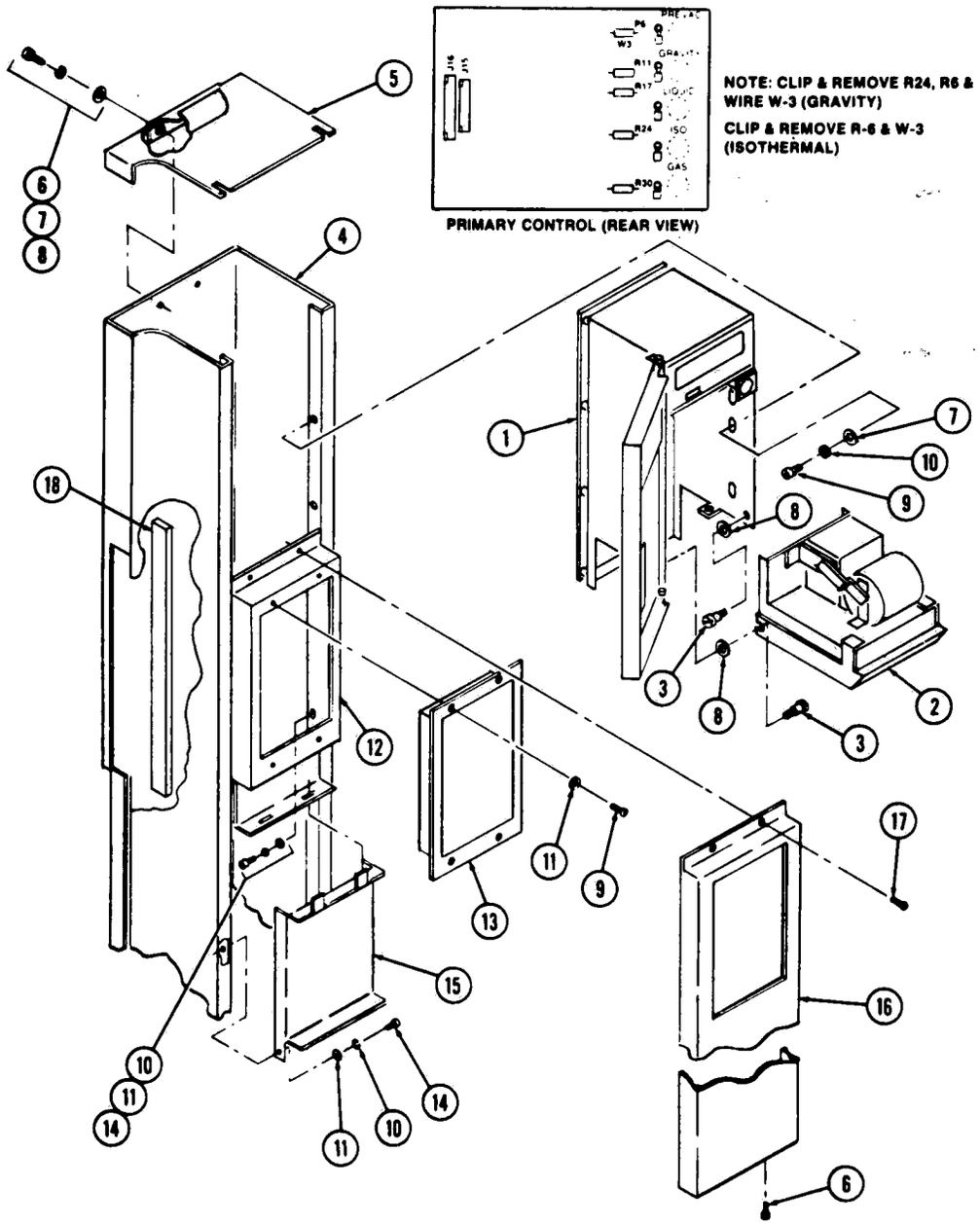


Figure 8-59. CONTROL COLUMN (Part 1 of 3) (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-59-					CONTROL COLUMN: Manual Door, Gravity Model (Part 1 of 3)	X			
					CONTROL COLUMN: Manual Door, Isothermal Model (Part 1 of 3)		X		
					CONTROL COLUMN: Power Door, Gravity Model (Part 1 of 3)			X	
					CONTROL COLUMN: Power Door, Isothermal Model (Part 1 of 3)				X
1					PRINTCON HOUSING ASSEMBLY (See Fig. 8-62)	1	1	1	1
2					PRINTCON PRINTER ASSEMBLY (See Fig. 8-63)	1	1	1	1
3	P	150822	336		SCREW, Shoulder, #10-32	2	2	2	2
4	P	146649	195		HOUSING, Control	1	1	1	1
5	P	134450	001		COVER, Top, Right Hand	1		1	
	P	134450	002		COVER, Top, Left Hand		1		1
6	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	4	4	4	4
7	P	31705	045		LOCKWASHER, #10	2	2	2	2
8	P	5511	091		WASHER, Flat, #10	2	2	2	2
9	P	45323	042		SCREW, Button Socket Head, #8-32 x 3/8	8	8	8	8
10	P	79588	001		LOCKWASHER, #8	10	10	10	10
11	P	17796	091		WASHER, Flat, #8	14	14	14	14
12	P	146649	006		PANEL, Mounting	1	1		
	P	146649	335		DOOR SWITCH ASSEMBLY (See Fig. 8-20)			1	1
13	P	146163	NLA		CONTROL, Primary (SUB: P-146645-226)	1	1	1	1
	P	764317	536		• LAMP	26	26	26	26
	P	764193	033		• REPAIRED	1	1	1	1
14	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	6	6	6	6
15	P	146649	073		PANEL, Secondary Assembly (See Fig. 8-16 or 8-18)	1	1	1	1
16	P	146649	011		PANEL ASSEMBLY, Front, Manual Door	1	1		
	P	146649	010		PANEL ASSEMBLY, Front, Power Door			1	1
17	P	129356	135		SCREW, Button Head Socket, #8-32 x 3/8 (Black)	2	2	2	2
18	P	150822	337		STRIP, Sponge	1	1	1	1

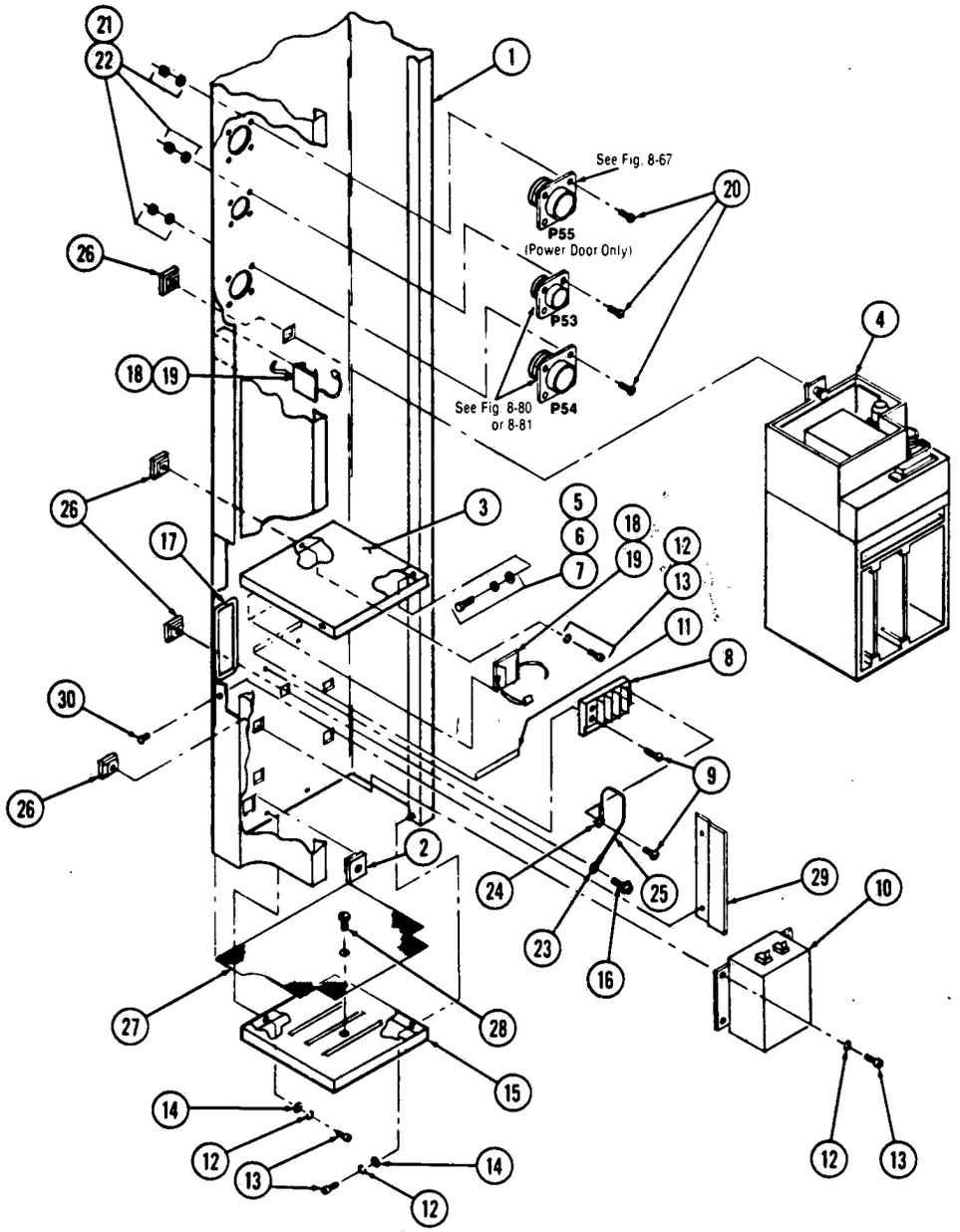


Figure 8-60. CONTROL COLUMN (Part 2 Of 3). (Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-60-					CONTROL COLUMN: Manual Door (Part 2 of 3)	X			
					CONTROL COLUMN: Power Door (Part 2 of 3)		X		
1					HOUSING, Control (Ref. Only)				
2	P	129352	070		NUT, Tinnerman, 3/8-16	4	4		
3	P	136759	001		SUPPORT, Controller	1	1		
4					MAIN CONTROL ASSEMBLY: (See Fig. 8-15)	1	1		
5	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	2	2		
6	P	79588	001		LOCKWASHER, #8	2	2		
7	P	17796	091		WASHER, Flat, #8	2	2		
8	P	90746	091		STRIP, Terminal	1	1		
9	P	9661	041		SCREW, #10-32 x 5/8	2	2		
10	P	93821	001		FILTER	1	1		
11	P	82647	001		STRIP, Marker	1	1		
12	P	31705	045		LOCKWASHER, #10	10	10		
13	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	10	10		
14	P	5511	091		WASHER, Flat, #10	4	4		
15	P	136588	001		PLATE, Bottom	1	1		
16					SCREW, Green Ground, #10-32	1	1		
17	P	150783	001		GROMMET	1	1		
18	P	129326	001		HOLDER, Wire	11	11		
19	P	75954	091		TIE, Wire	28	28		
20	P	3984	041		SCREW, Round Head, #6-32 x 3/8	8	12		
21	P	5469	041		WASHER, Flat, #6	8	12		
22	P	3037	041		NUT, Hex, #6-32	8	12		
23					TERMINAL, Wire, #10 Ring x 16-22 AWG	1	1		
24					TERMINAL, Wire, #8 Ring x 22-18 AWG	1	1		
25					WIRE, Green				
26	P	129352	069		NUT, Tinnerman, #10-32	8	8		
27	P	56374	002		SCREEN	1	1		
28	P	4682	041		SCREW, Round Head, #8-32 x 3/8	1	1		
29	P	93896	049		PLATE, Cover	1	1		
30	P	451422	091		RIVET, Pop, 1/8 Dia.	2	2		
					NOTE: Items 16, 23, 24, 25 — see Fig. 8-78.				

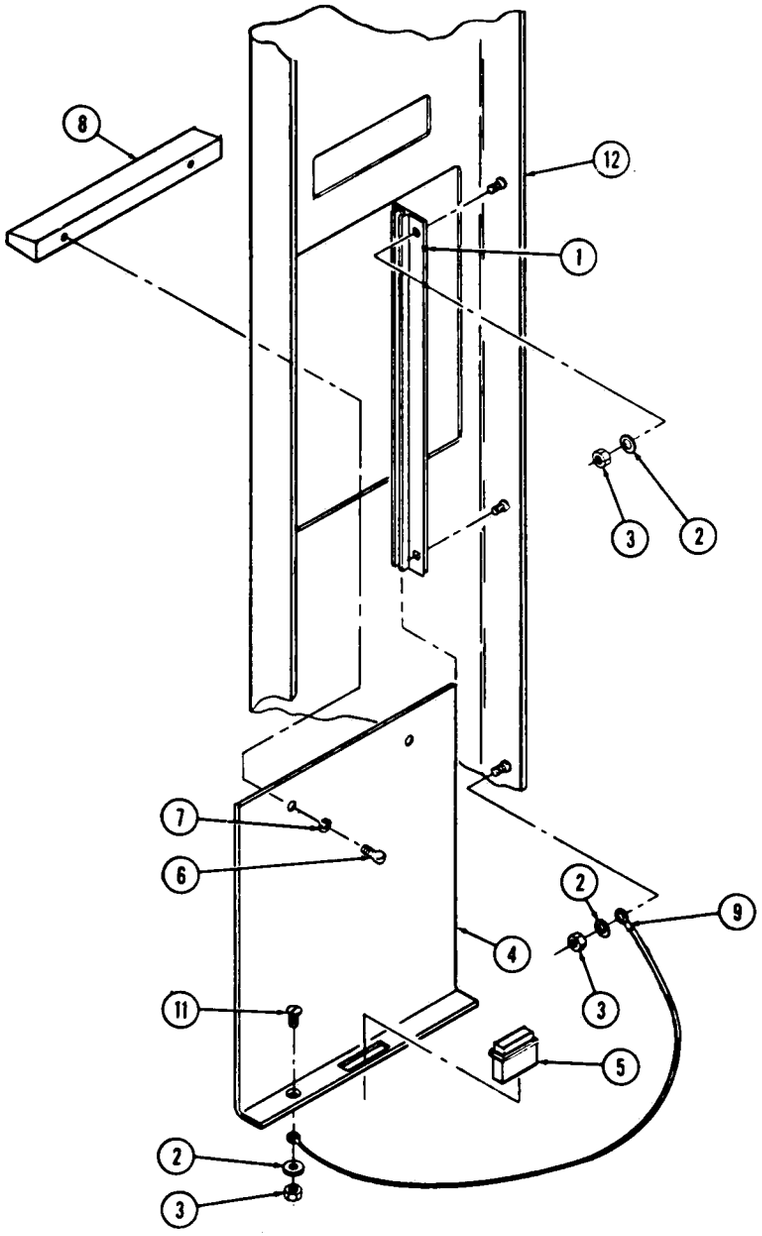


Figure 8-61. CONTROL COLUMN (Part 3 of 3). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON	
8-61-				CONTROL COLUMN (Part 3 of 3)	X
1	P	84394 001		SLIDE, Door	2
2	P	5469 041		WASHER, Flat, #6	6
3	P	3037 041		NUT, Hex, #6-32	6
4	P	93662 001		DOOR	1
5	P	83920 001		CATCH, Magnetic	1
6	P	4682 041		SCREW, Round Head, #8-32 x 3/8	2
7	P	79588 001		LOCKWASHER, #8	2
8	P	84393 001		HANDLE	1
9	P	90619 091		TERMINAL, #6 Ring x 18-22 AWG	2
10				WIRE, Green, 15" Lg.	1
11	P	50705 041		SCREW, Flat Head, #6-32 x 5/16	1
12				PANEL ASSEMBLY, Front, Manual Door (Ref. Only)	
				PANEL ASSEMBLY, Front, Power Door (Ref. Only)	

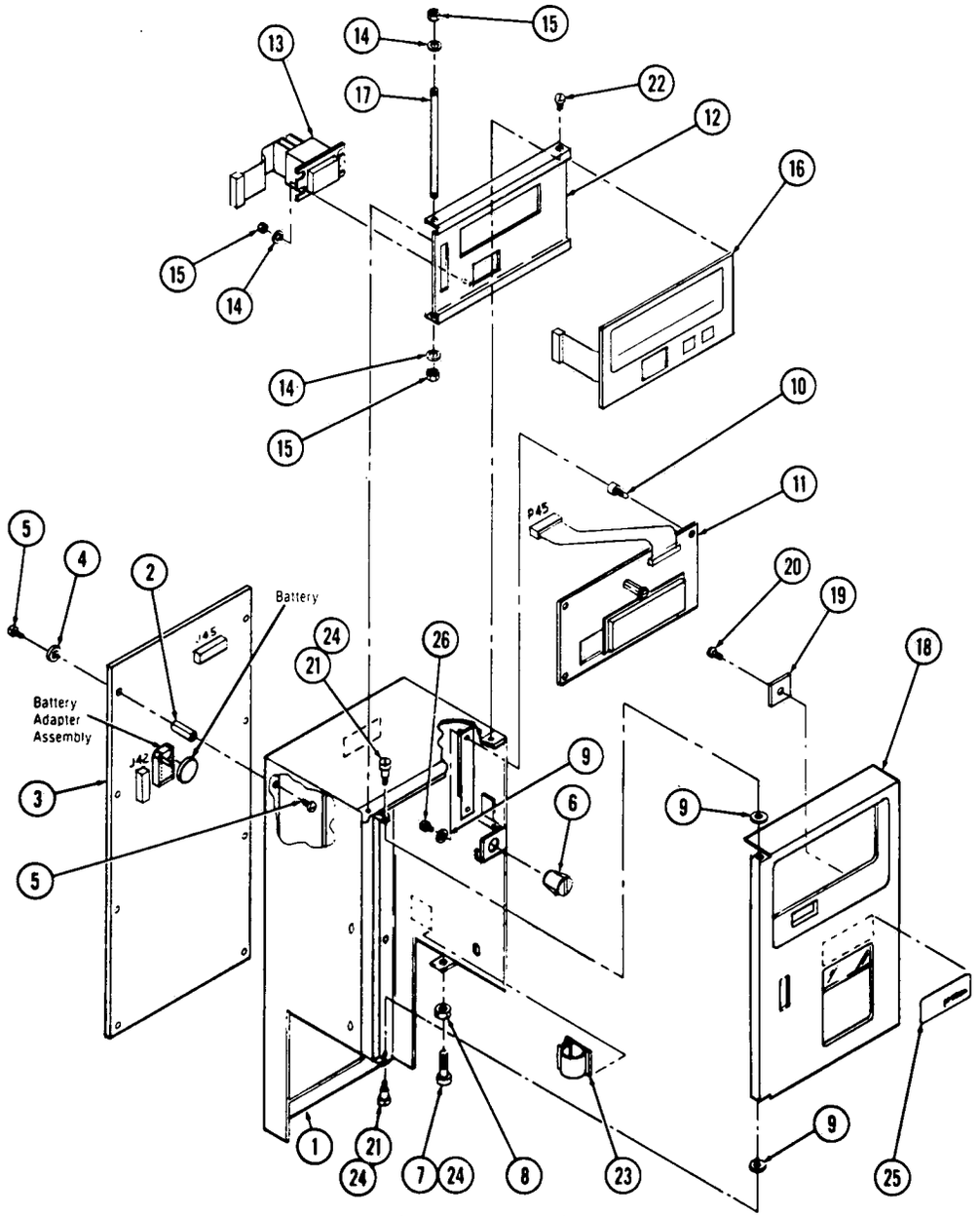


Figure 8-62. PRINTCON HOUSING ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-62-					PRINTCON HOUSING ASSEMBLY	X
1	P	146649	111		HOUSING, Weldment	1
2	P	129356	033		STAND-OFF	8
3	P	146651	001		P/C BOARD ASSEMBLY, Printcon Control	1
	P	764193	028		• Repaired	1
	P	150822	351		• BATTERY, Coincell	1
	P	150822	349		• BATTERY W/ADAPTER ASSEMBLY For units prior to 11/83	A/R
4	P	129352	094		WASHER, Flat, #6 Nylon	8
5	P	12451	NLA		SCREW, Rd. Hd., #6-32 x 1/4 (SUB: P-3984-091)	16
6	P	129356	001		CATCH, Magnetic	1
7	P	41012	061		SCREW, Socket Head, #10-32 x 1/2	2
8	P	2959	041		NUT, Hex, #10-32	2
9	P	5469	041		WASHER, Flat, #6	2
10	P	84147	001		SUPPORT, Circuit Board	3
11	P	146633	081		DISPLAY BOARD ASSEMBLY, Digital Printer	1
	P	764193	029		• Repaired	1
12	P	93900	001		DISPLAY BRACKET ASSEMBLY	1
13	P	93900	022		SWITCH, Thumbwheel	1
14	P	84114	001		WASHER, Flat, #4	4
15	P	13794	041		NUT, Hex, #4-40	4
16	P	136805	004		PANEL, Overlay Display	1
17	P	129356	023		STUD	1
18	P	146649	009		DOOR, Printer Display	1
19	P	129356	002		STRIKE	1
20	P	82340	001		SCREW, Flat Head, Self Tapping, #6 x 5/16	1
21	R	129356	006		SCREW, Shoulder, #4-40 x 1/8	2
22	P	40357	045		SCREW, Self Tapping, #6 x 1/4	1
23	P	150539	001		CLIP, Cable	1
24	P	5300	640		VIBRA-TITE	AR
25	P	129356	142		LABEL, Printcon	1
26	P	12451	041		SCREW, 6-32 x 1/4	3

*The RAY-O-VAC battery DP24-2-42 has been replaced by the Coincell battery. To facilitate conversion, order battery with adapter assembly P/N P-150822-349. Thereafter, replacement will only require the Coincell battery P/N P-150822-351.

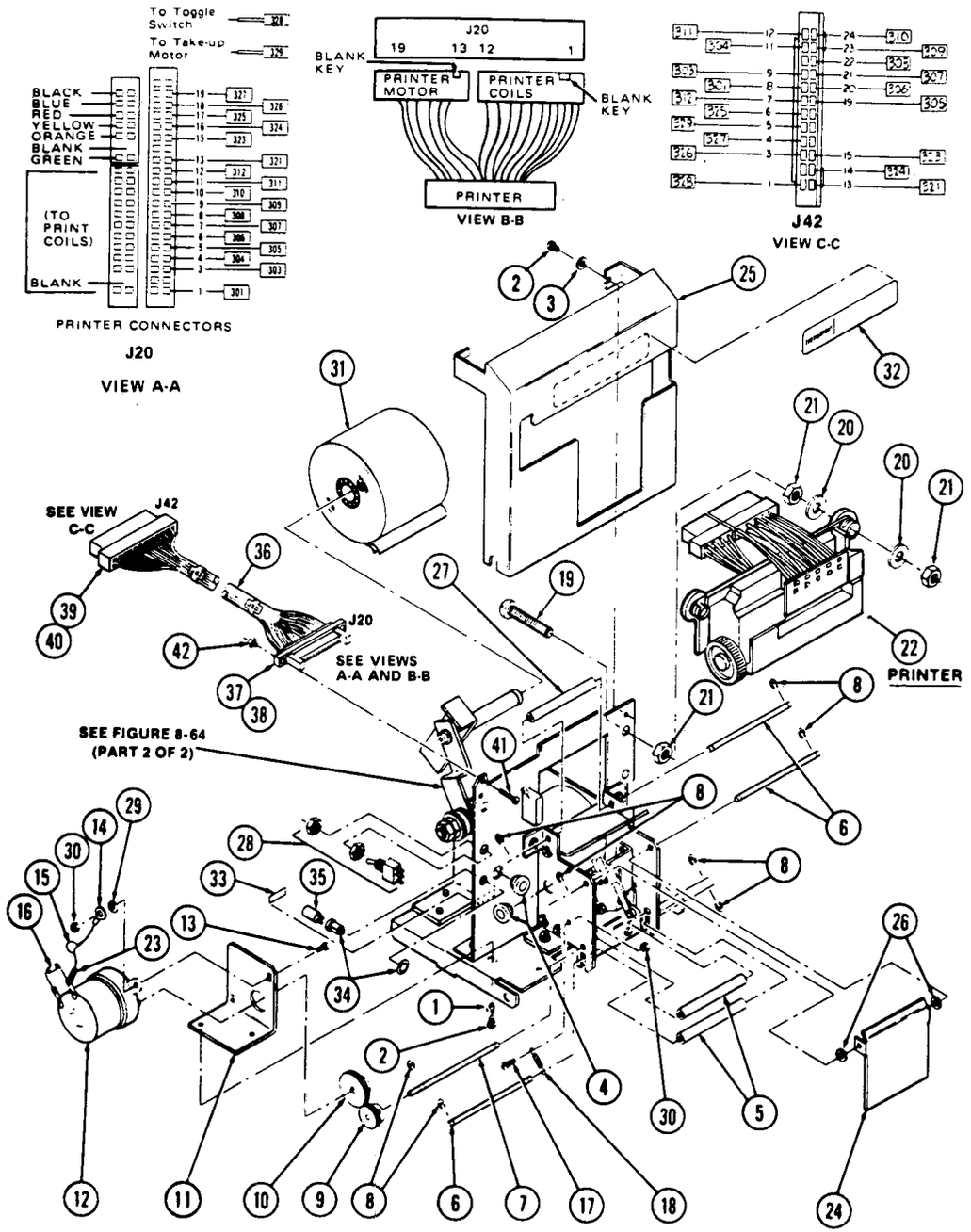


Figure 8-63. PRINTCON PRINTER ASSEMBLY (Part 1 of 2) Units Before 6/85.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-63-					PRINTCON PRINTER ASSEMBLY (Part 1 of 2)	
					Units Before 6/85	X
1	P	18131	091		LOCKWASHER, #6	2
2	P	12451	041		SCREW, Rd. Hd., #6-32 x 1/4	8
3	P	5469	091		WASHER, Flat, #6	2
4	P	77797	091		BUSHING, Snap	2
5	P	129356	015		ROLLER	2
6	P	129356	016		SHAFT, Roller	3
7	P	129356	024		SHAFT, Drive Roller	1
8	P	45301	091		E-RING	6
9	P	129356	028		GEAR, Drive Roller	1
10	P	129356	027		GEAR, Motor Shaft	1
11	P	129356	017		MOUNT, Motor	1
12	P	129356	029		MOTOR, Take-up	1
13	P	17659	041		SCREW, Round Head, #4-40 x 1/4	2
14	P	90619	091		TERMINAL, Ring, #5 Stud, 22-16 Wire	1
15	P	93437	001		CAPACITOR, .01 microfarad	2
16	P	84157	001		DIODE, IN 4001	1
17	P	13334	091		SCREW, Round Head, #4-40 x 3/8	2
18	P	129356	008		SPRING, Extension	2
19	P	4004	041		SCREW, Round Head, #1/4-20 x 1-1/2	3
20	P	31599	041		WASHER, Flat, 1/4	6
21	P	3040	042		NUT, Hex	9
22	P	136800	081		PRINTER (Includes 6-pin and 11-pin connectors)	1
	P	129356	118		• CARTRIDGE, Inked Ribbon (Box of 2)	AR
23					INSULATION, .064 I.D. x 1-1/4 Lg	2
24	P	129356	020		PLATEN	1
25	P	136805	009		COVER	1
26	P	129352	094		WASHER, Flat, #6 Nylon	2
27	P	129352	115		TUBE, Roller	1
28	P	129356	131		SWITCH, Toggle, SPDT	1
29	P	84114	001		WASHER, Flat, #4	2
30	P	13794	041	**	NUT, Hex, #4-40	4
31	P	129356	116	**	PAPER, 1-Ply (Box of 3)	AR
	P	129356	117		PAPER, 2-Ply (Box of 3)	AR
32	P	150822	345		DECAL, Information	1
33	P	92615	015		DECAL, 1/32 Amp	1
34	P	150822	382		HOLDER, Micro-fuse	1
35	P	150822	381		MICROFUSE, 1/32 Amp	1
36	P	136805	058		CABLE ASSEMBLY, Printer, J20 to J42	1
37	P	150822	364		• PIN, Contact	17
38	P	150822	335		• PLUG, Housing, 40 Pos Double Row	1
39	P	84229	005		• HOUSING, Receptacle, 24 Pos, Double Row	1
40	P	84187	003		• CONTACT, Receptacle	19
41	P	150824	124		SCREW, Rd. Hd. 2-56 x 3/4" Lg.	2
42	P	10370	045		NUT, Hex, 2-56	2

**AMSCO recommenJs using 2-ply paper.

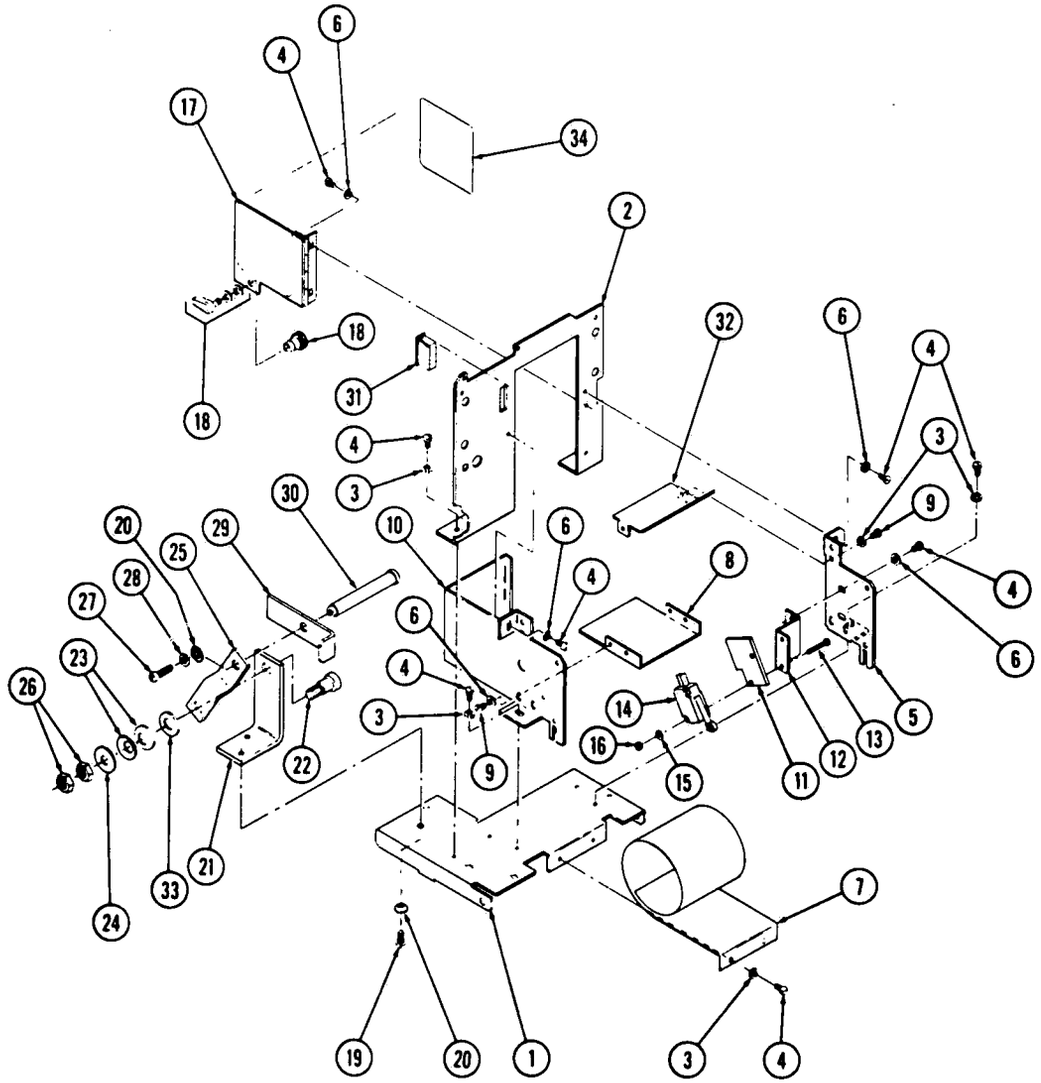


Figure 8-64. PRINTCON PRINTER ASSEMBLY (Part 2 of 2) Units Before 6/85.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-64-					PRINTCON PRINTER ASSEMBLY (Part 2 of 2)	
					Units Before 6/85	X
1	P	136805	012		BASE, Mounting	1
2	P	136805	011		PLATE, Printer Mount	1
3	P	18131	091		LOCKWASHER, #6	9
4	P	12451	041		SCREW, Rd. Hd., #6-32 x 1/4	11
5	P	93900	039		SIDE PLATE, Right Hand	1
6	P	5469	091		WASHER, Flat, #6	8
7	P	93900	009		COIL	1
8	P	93900	018		PLATE, Guide	1
9	P	77074	045		SCREW, Self Tapping, #8-18 x 3/8	2
10	P	136805	014		SIDE PLATE, Left Hand	1
11	P	90124	091		INSULATOR	1
12	P	129356	014		MOUNT, Switch	1
13	P	90993	091		SCREW, Round Head, #4-40 x 3/4	2
14	P	150822	343		SWITCH, Roller (Platen Microswitch)	1
15	P	84114	001		WASHER, Flat, #4	2
16	P	13794	041		NUT, Hex, #4-40	2
17	P	93900	005		DOOR ASSEMBLY	1
18	P	129356	009		ARROWHEAD LATCH	1
19	P	12539	061		SCREW, Round Head, #10-32 x 3/8	2
20	P	5511	091		WASHER, Flat, #10	3
21	P	93900	040		ANGLE, Pivot	1
22	P	150044	001		SCREW, Shoulder, 3/8 Dia. x 3/8 Lg. x 5/16-18	1
23	P	129356	132		WASHER, Belleville Spring, .38 I.D. x .75 O.D.	2
24	P	36690	051		WASHER, Flat, .328 I.D. x .812 O.D. x .062 Thick	1
25	P	129356	112		ARM, Pivot	1
26	P	19172	061		NUT, Hex Jam, 5/16-18	2
27	P	33061	061		SCREW, Socket Head, #10-32 x 3/8	1
28	P	19685	061		LOCKWASHER, #10	1
29	P	129356	110		STOP	1
30	P	129356	111		SPINDLE	1
31	P	150475	014		CATCH, Magnetic	1
32	P	93900	010		PLATE, Paper-Feed	1
33	P	10412	042		WASHER, Flat, 3/8	1
34	P	93900	002		LABEL, Paper Loading Diagram	1

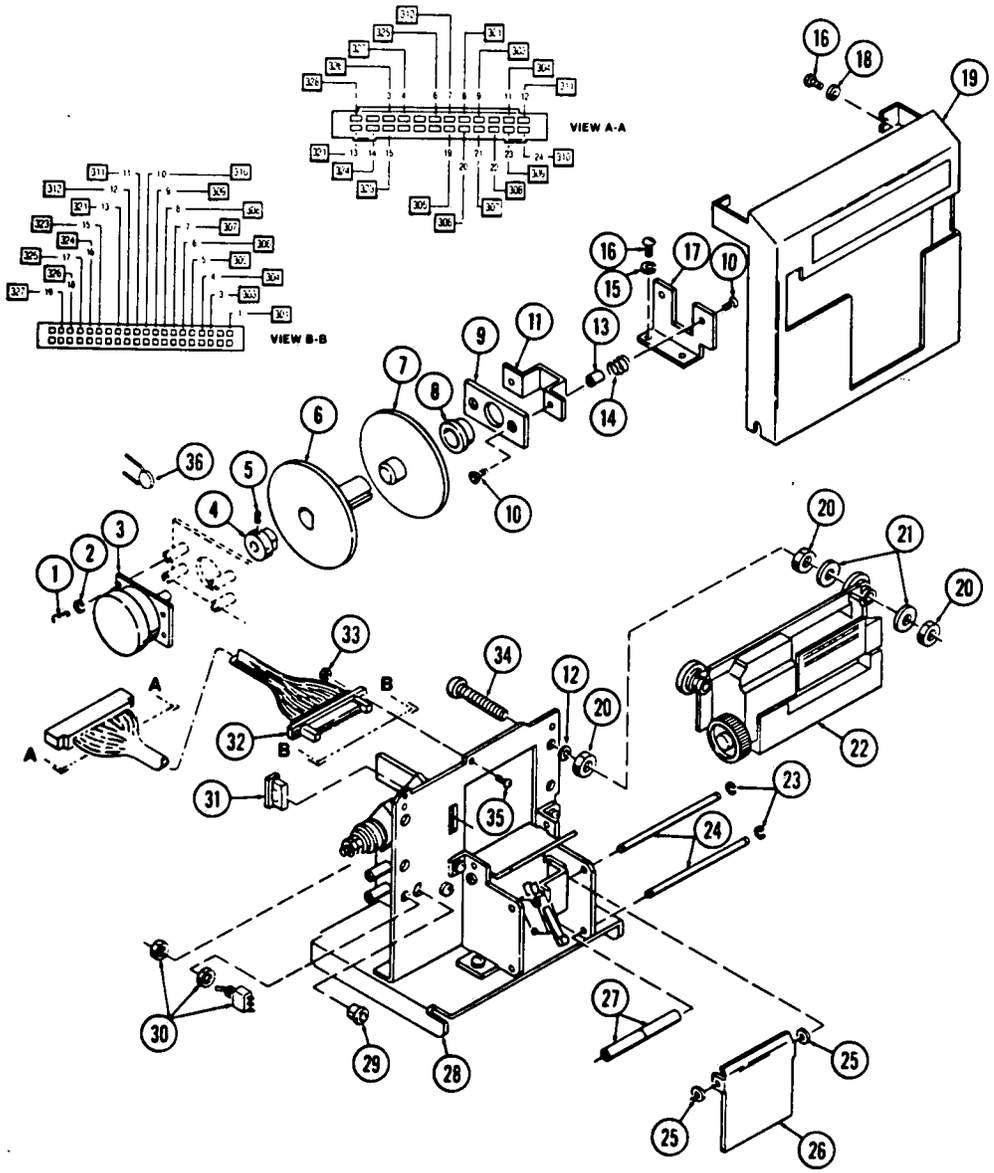


Figure 8-64A. PRINTCON PRINTER ASSEMBLY (Part 1 of 2) Units After 6/85.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-64A	P	141198	171		PRINTCON PRINTER ASSEMBLY (Part 1 of 2, Units After 6/85)	X
1	P	90993	091		SCREW, Round Head (#4-40 x 3/4)	4
2	P	81682	003		LOCKWASHER (#4)	4
3	P	41269	091		MOTOR	1
4	P	150822	480		STUD, Drive	1
5	P	129352	117		SCREW, Set (#5-40)	1
6	P	93896	077		SPOOL, Drive End	1
7	P	56396	300		SPOOL, Idler End	1
8	P	129352	662		BEARING, Flange	1
9	P	150822	543		RETAINER	1
10	P	38698	041		SCREW, Flat Head (#8-32 x 1/4)	4
11	P	150822	546		RELEASE, Reel	3
12	P	26962	061		LOCKWASHER	3
13	P	150822	541		SPACER	2
14	P	129352	659		SPRING	2
15	P	18131	091		LOCKWASHER	2
16	P	12451	041		SCREW, Round Head (#6-32 x 1/4)	6
17	P	150822	542		SUPPORT	1
18	P	5469	041		WASHER, Flat (#6)	4
19	P	134468	531		COVER	1
20	P	3040	042		NUT, Hex (1/4-20)	9
21	P	31599	041		WASHER, Flat (1/4)	6
22	P	136800	081		PRINTER	1
23	P	45301	091		E-RING	6
24	P	129356	016		SHAFT, Roller	3
25	P	129352	094		WASHER, Nylon (#6)	2
26	P	129356	020		PLATEN	1
27	P	129352	115		TUBE, Roller	4
28					FRAME ASSEMBLY, Printer (See Fig. 8-54B)	1
29	P	77797	091		BUSHING, Snap	2
30	P	129356	131		SWITCH, Toggle (SPDT)	1
31	P	150475	014		CATCH, Magnetic	1
32	P	134468	530		CABLE ASSEMBLY	1
33	P	10370	045		NUT, Hex (#2-56)	2
34	P	4004	041		SCREW, Round Head (1/4-20 x 1-1/2)	3
35	P	150824	124		SCREW, Round Head (#2-56 x 3/4)	2
36	P	150777	001		CAPACITOR, .01 ufd	1
	P	611962	769		KIT, To Add This Printer Assembly (Units Prior to 6/85)	

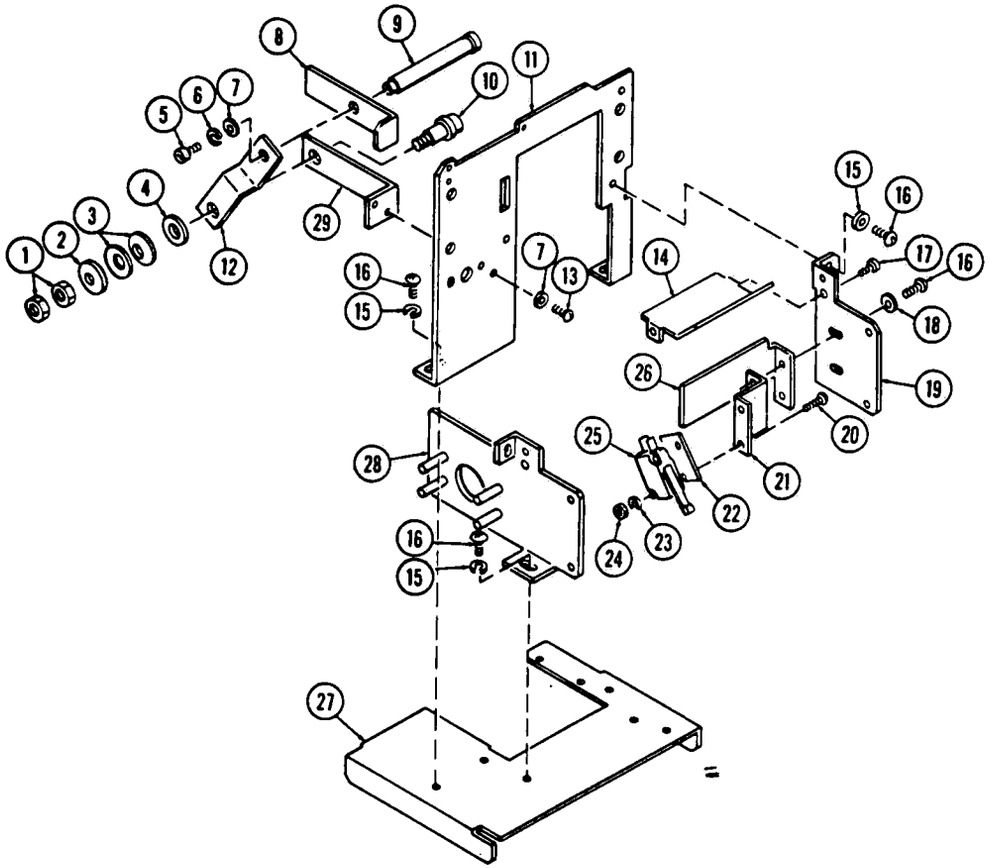


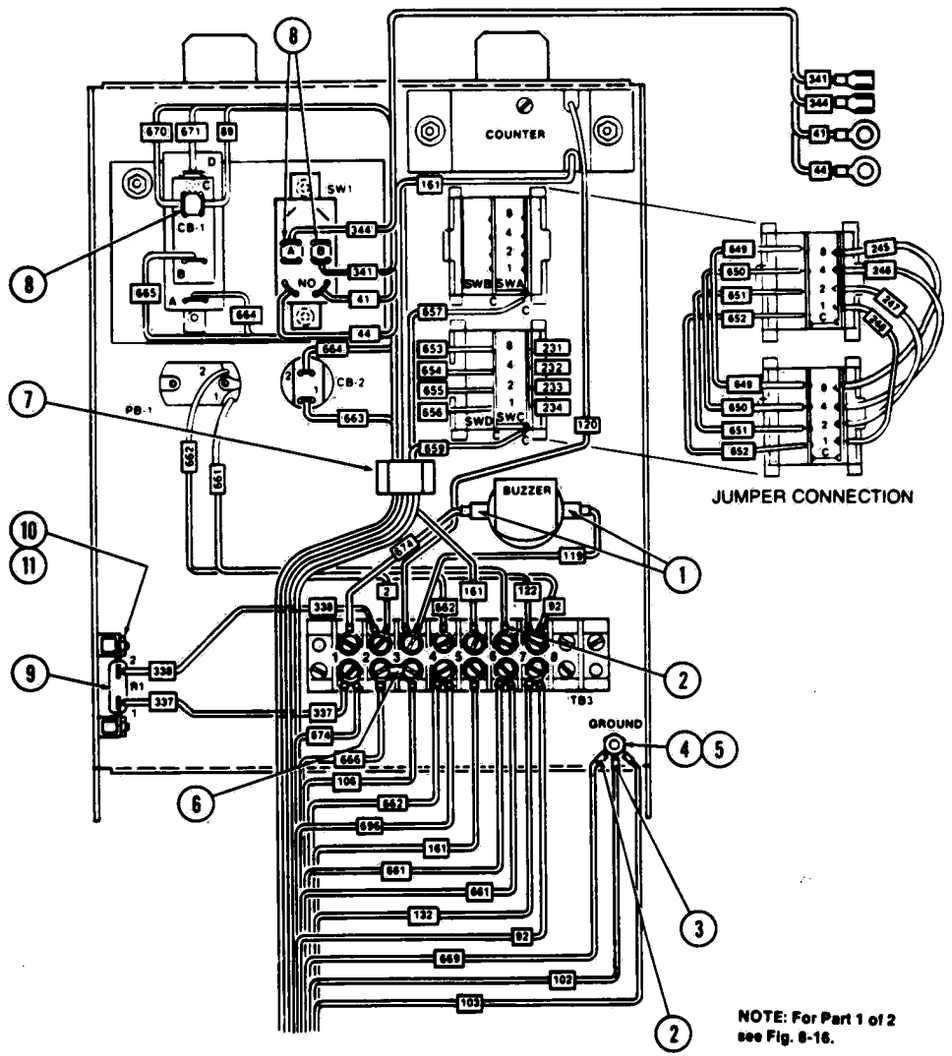
Figure 8-64B. PRINTCON PRINTER ASSEMBLY (Part 2 of 2) Units After 6/85

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-64B					PRINTCON PRINTER ASSEMBLY (Part 2 of 2, Units After 6/85)	X
1	P	19172	061		NUT, Jam (5/16-18)	2
2	P	36690	051		WASHER, Flat	1
3	P	129356	132		WASHER, Belleville	2
4	P	10412	042		WASHER, Flat	1
5	P	33061	061		SCREW, Socket Head (#10-32 x 5/8)	1
6	P	19685	061		LOCKWASHER (#10)	1
7	P	5511	091		WASHER, Flat (#10)	1
8	P	129356	110		STOP	1
9	P	150822	540		SPINDLE	1
10	P	150044	001		SCREW, Shoulder (5/16-18)	1
11	P	134468	528		PLATE, Mounting	1
12	P	129356	112		ARM, Pivot	1
13	P	12539	061		SCREW, Round Head (#10-32 x 3/8)	2
14	P	93900	010		PLATE, Paper Feed	1
15	P	18131	091		LOCKWASHER (#6)	7
16	P	12451	041		SCREW, Round Head (#6-32 x 1/4)	7
17	P	77074	045		SCREW, Self-tapping (#8-18 x 3/8)	2
18	P	5469	041		WASHER, Flat (#6)	2
19	P	56396	298		SIDE, RH	1
20	P	90993	091		SCREW, Round Head (#4-40 x 3/4)	2
21	P	129356	014		MOUNT, Switch	1
22	P	90124	091		INSULATOR	1
23	P	81682	003		LOCKWASHER (#4)	2
24	P	13794	041		NUT, Hex (#4-40)	2
25	P	150822	343		SWITCH, Roller Arm	1
26	P	150822	544		SHIELD	1
27	P	134468	527		BASE, Printer	1
28	P	56396	297		SIDE, LH	1
29	P	56396	299		ANGLE, Pivot	1

AMSCO SERVICE

EAGLE® 2000 SERIES - UNIVERSAL GRAVITY/ISOTHERMAL MEDIUM RECTANGULAR STERILIZER P-764087-002

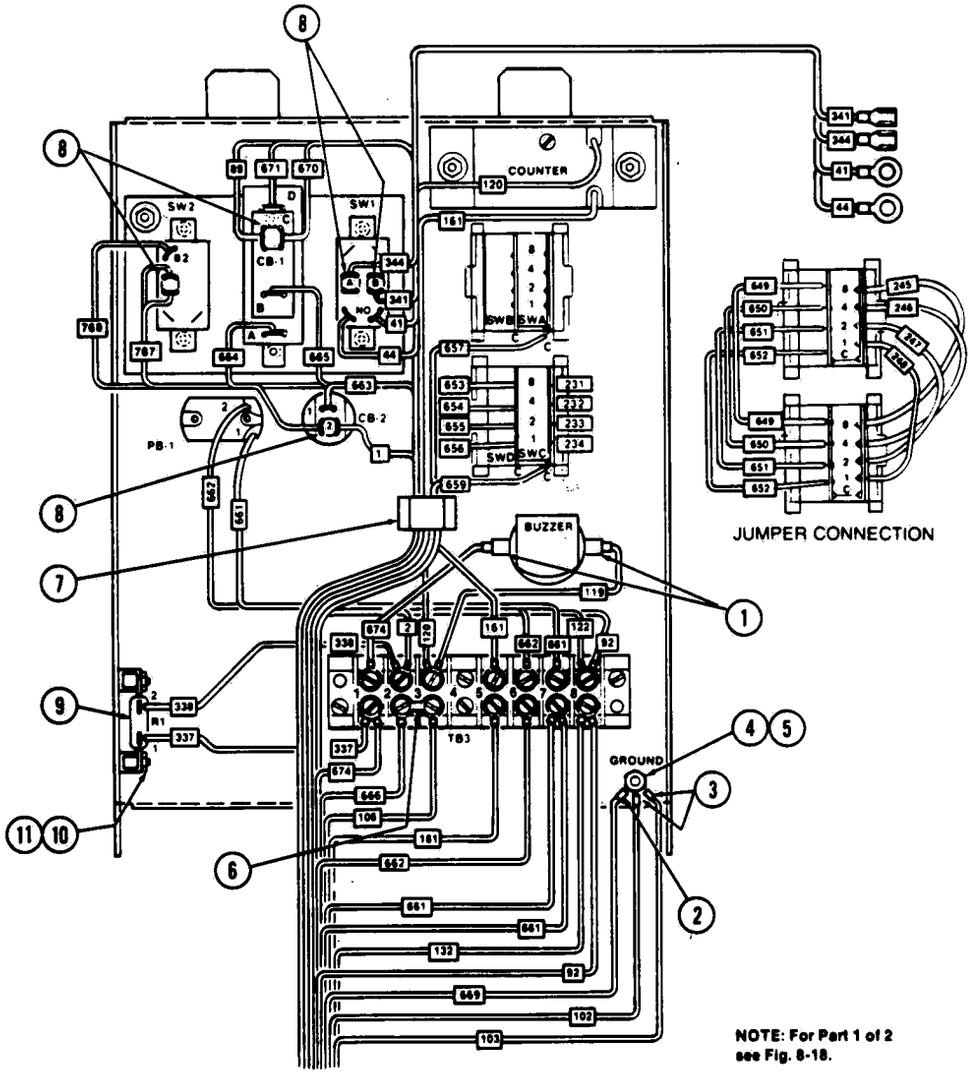




SECONDARY PANEL

Figure 8-65. SECONDARY CONTROL PANEL: Gravity (Part 2 of 2). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-65-	P	146649	073		SECONDARY CONTROL PANEL: Gravity Model (Part 2 of 2)	X
1	P	91694	091		RECEPTACLE, 3/16 Lug x #18-22 Wire	2
2	P	90619	091		TERMINAL, Wire, #6 Ring x #18-22 Wire	13
3	P	14590	091		TERMINAL, Wire, #8 Stud x #16-14 Wire	2
4	P	18131	091		LOCKWASHER, #6	1
5	P	3037	041		NUT, Hex, #6-32	1
6	P	84123	001		JUMPER, Terminal Block	1
7	P	431152	091		CLIP	1
8	P	32118	091		ADAPTER, Terminal	3
9	P	129318	001		RESISTOR, 3 kΩ, R1	1
10	P	13794	041		NUT, Hex	4
11	P	26032	091		WASHER, Flat	4



SECONDARY PANEL

Figure 8-66. SECONDARY CONTROL PANEL: Isothermal Model (Part 2 of 2). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-66-	P	146649	074		SECONDARY CONTROL PANEL: Isothermal Model (Part 2 of 2)	X
1	P	91694	091		RECEPTACLE, 3/16 Lug x #18-22 Wire	2
2	P	90619	091		TERMINAL, Wire, #6 Ring x #18-22 Wire	13
3	P	14590	091		TERMINAL, Wire, #8 Stud x #16-14 Wire	3
4	P	18131	091		LOCKWASHER, #6	1
5	P	3037	041		NUT, Hex, #6-32	1
6	P	84123	001		JUMPER, Terminal Block	1
7	P	431152	091		CLIP	1
8	P	32118	091		ADAPTER, Terminal	5
9	P	129318	001		RESISTOR, 3 kΩ, R1	1
10	P	13794	041		NUT, Hex	4
11	P	26032	091		WASHER, Flat	4

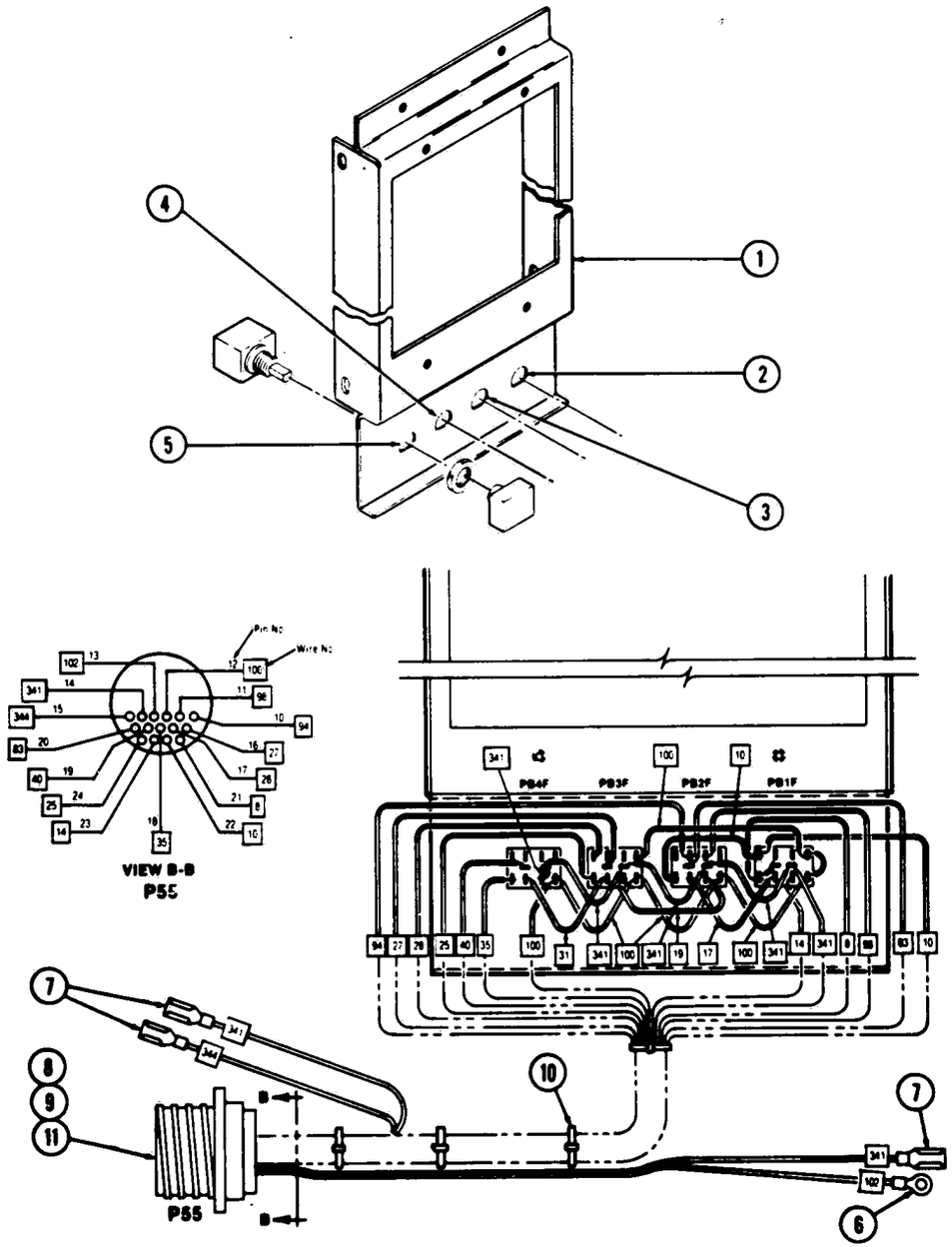


Figure 8-67. SWITCH ASSEMBLY: Operating End Power Door. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-67-	P	146649	335		SWITCH ASSEMBLY: Operating End Power Door	X
1	P	146649	006		PANEL, Mounting	1
2	P	93177	004		SWITCH, "Stop" (PB4F)	1
3	P	93177	003		SWITCH, "Unlock"/"Open" (PB3F)	1
4	P	93177	002		SWITCH, "Lock" (PB2F)	1
5	P	93177	001		SWITCH, "Close" (PB1F)	1
6	P	14865	091		TERMINAL, #8 Ring	1
7	P	32119	091		TERMINAL, 1/4 x .032	3
8	P	84461	001		CONTACT, Pin, Wire #20-24	12
9	P	150734	001		CONTACT, Pin, Wire #16-18	3
10	P	77299	091		TIE WRAP	8
11	P	93443	044		HOUSING, Receptacle, 24 Position	1

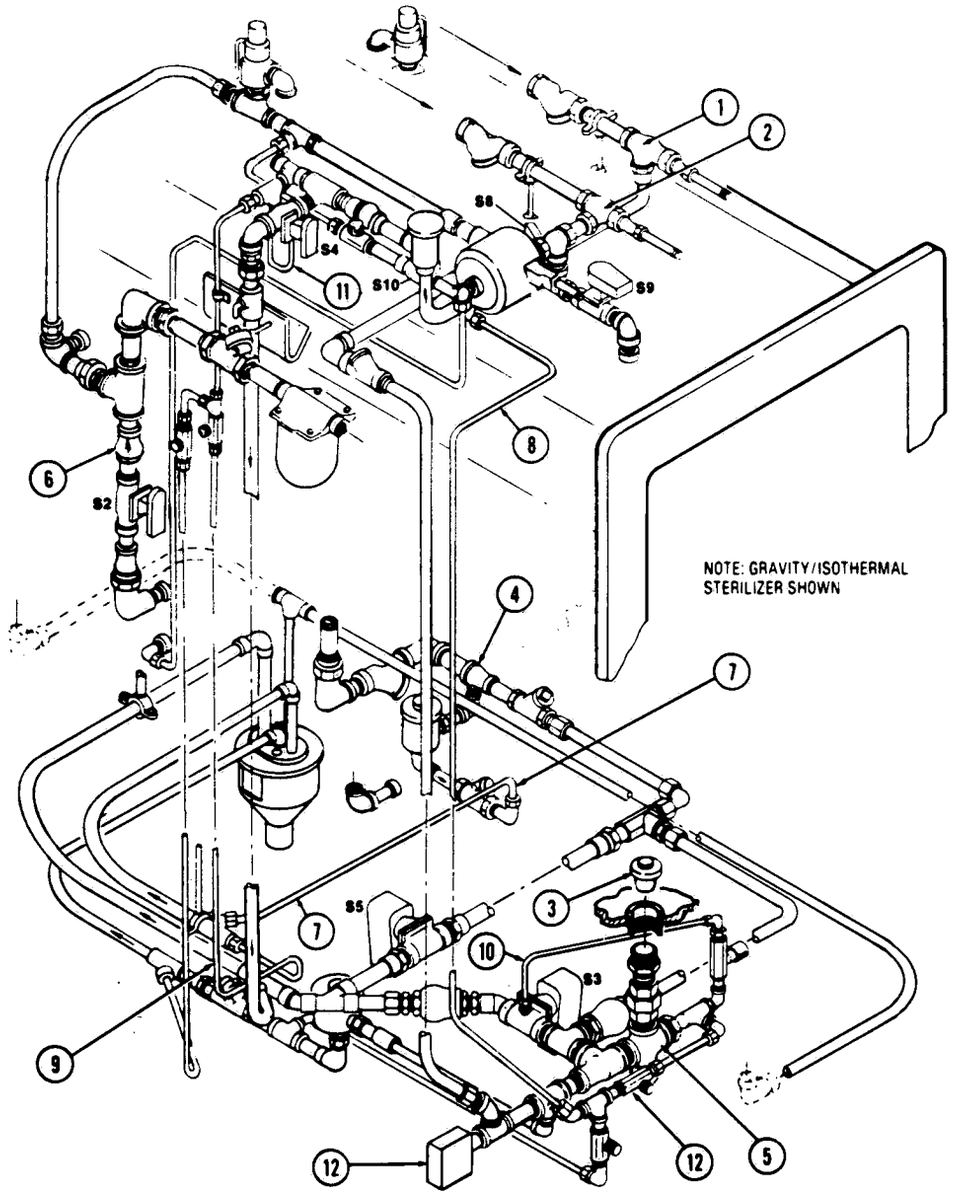


Figure 8-68. PIPING ASSEMBLY: Complete. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
				UNITS WITH PRINTCON:				
8-68-				PIPING ASSEMBLY: Complete, Gravity Sterilizer	X			
				PIPING ASSEMBLY: Complete, Gravity/Isothermal Sterilizer		X		
1				WATER SUPPLY LINE (See Fig. 8-33)	1	1		
2				STEAM SUPPLY LINE (See Fig. 8-33)	1	1		
3	P	48733	042	STRAINER, Chamber Drain	1	1		
4				JACKET DRAIN LINE (See Fig. 8-69)	1	1		
5				CHAMBER DRAIN LINE (See Fig. 8-69)	1	1		
6				AIR BREAK LINE (See Fig. 8-34)	1	1		
7				TUBE, 1/4 O.D. x 14-1/2	1	1		
8				TUBE, 1/4 O.D. x 80-7/8	1	1		
9				TUBE, 1/4 O.D. x 50-3/4	1	1		
10				TUBE, 5/16 O.D. x 16-1/16	1	1		
11				TUBE, 1/4 O.D. x 5-3/8	1	1		
12				ISOTHERMAL PIPING PACKAGE (See Fig. 8-36 & 8-70)		1		

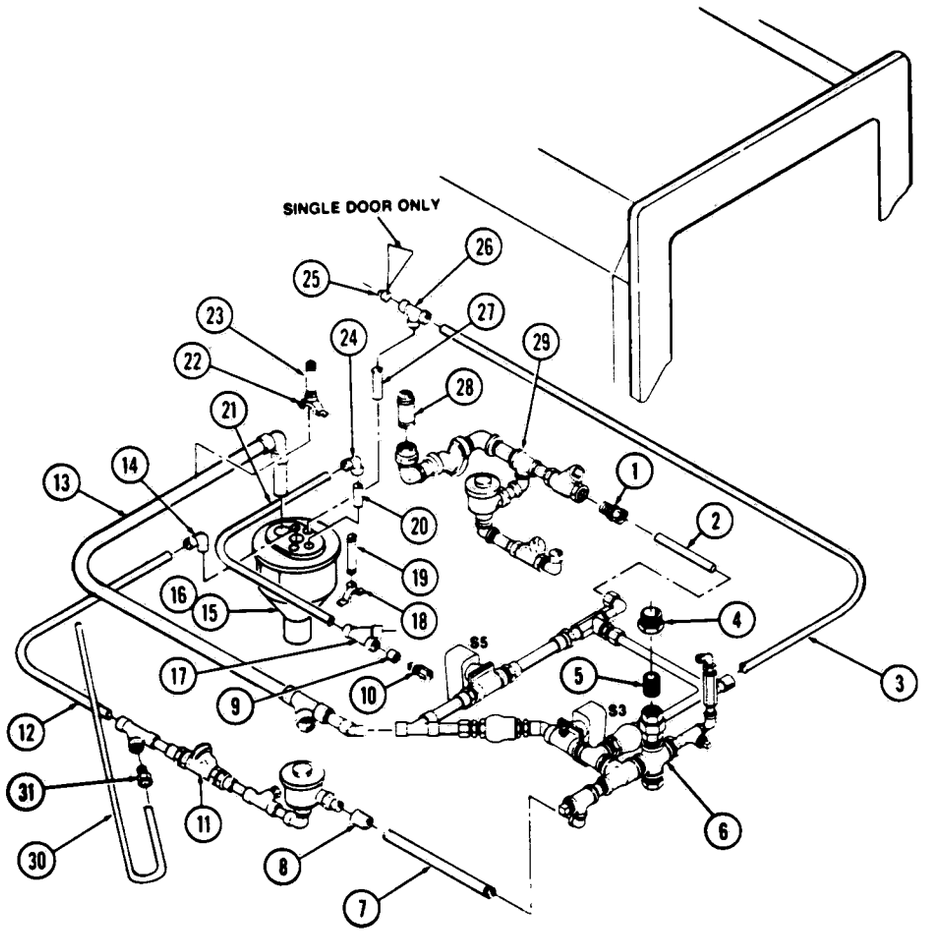


Figure 8-69. DRAIN PIPING.
(Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-69-					DRAIN PIPING	X
1	P	39072	091		COUPLING, Compression, 5/8 O.D.T. x 3/8 N.P.T.	2
2	P	89736	091		TUBE, 5/8 O.D.	1
3	P	92935	008		TUBE, 5/8 O.D.	1
4	P	850	042		BUSHING, Reducing, 1-1/4 x 1 N.P.T.	1
5	P	29354	091		NIPPLE, 1 N.P.T. x 1-1/4	1
6	P	136805	013		CHAMBER DRAIN ASSEMBLY (See Fig. 8-71)	1
7	P	29053	091		NIPPLE, 3/8 N.P.T. x 11	1
8	P	3530	091		COUPLING, 1/2 x 3/8 N.P.T.	1
9	P	89808	091		COUPLING, 5/8 O.D.T. x 1/8 N.P.T.	1
10	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
11	P	136614	001		DRAIN TRAP ASSEMBLY (See Fig. 8-40)	1
12	P	89705	091		TUBE, 5/8 O.D.	1
13	P	136615	001		DRAIN LINE ASSEMBLY (See Fig. 8-41)	1
14	P	90214	091		ELL, 5/8 O.D.T.	1
15	P	141198	004		FUNNEL ASSEMBLY	1
16	P	56396	018		PLUG	1
17	P	83377	001		"Y" BRANCH, 45°, 5/8 O.D.T.	1
18	P	75376	010		CLAMP	1
19	P	84375	007		NIPPLE, Steel, 1/4 N.P.T. x 5-9/16	1
20	P	83376	001		TUBE, 1-1/8 O.D. x 3-1/2	1
21	P	93018	001		TUBE, 5/8 O.D.	1
22	P	39590	010		CLAMP	1
23	P	84375	006		NIPPLE, Steel, 1/4 N.P.T. x 4-1/16	1
24	P	129233	001		ELL, Reducing, 1-1/8 O.D.T. x 5/8 O.D.T.	1
25	P	90547	091		PLUG, 5/8 O.D.T.	1
26	P	90221	091		TEE, 5/8 O.D.T.	1
27	P	90517	091		TUBE, 5/8 O.D. x 6-1/8	1
28	P	29299	091		NIPPLE, 3/4 N.P.T. x 3-1/4	1
29	P	134465	001		JACKET TRAP ASSEMBLY (See Fig. 8-41)	1
30					TUBE, 1/4 O.D. x 50-1/2	1

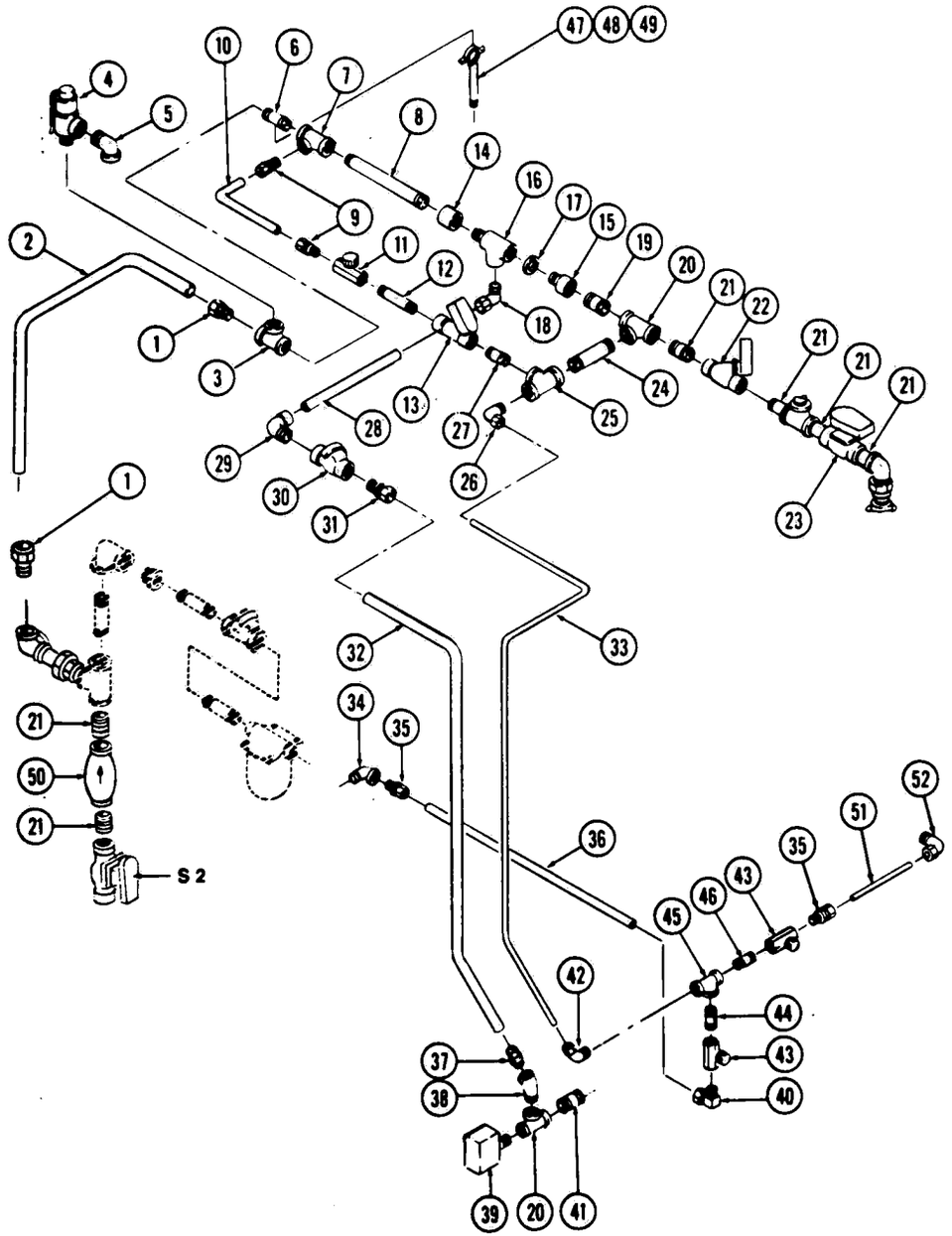


Figure 8-70. ISOTHERMAL PIPING PACKAGE (Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-70-					ISOTHERMAL PIPING PACKAGE 24x36x36	X			
					ISOTHERMAL PIPING PACKAGE 24x36x48		X		
					ISOTHERMAL PIPING PACKAGE 24x36x60			X	
1	P	33949	091		COUPLING, Compression, 3/4 O.D.T. x 3/4 N.P.T.	2	2	2	
2	P	93014	001		TUBE, 3/4 O.D.	1			
	P	93014	002		TUBE, 3/4 O.D.		1		
	P	93014	003		TUBE, 3/4 O.D.			1	
3	P	4925	091		TEE, 3/4 x 1/2 x 3/4 N.P.T.	1	1	1	
4	P	91960	091		VALVE, Safety, 3/4 N.P.T.	1	1	1	
5	P	1639	091		ELL, Street, 1 N.P.T.	1	1	1	
6	P	29166	091		NIPPLE, 1/2 N.P.T. x 2	1	1	1	
7	P	4929	091		TEE, 1/2 x 1/2 x 3/8 N.P.T.	1	1	1	
8	P	29184	091		NIPPLE, 1/2 N.P.T. x 6-1/2	1	1	1	
9	P	30947	091		FITTING, Compression, 3/8 O.D.T. x 3/8 N.P.T.	2	2	2	
10					TUBE, 3/8 O.D. x 7-13/32	1	1	1	
11	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1	1	1	
12	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1	1	1	
13	P	84430	002		VALVE, Solenoid, Steam, 3/8 N.P.T.	1	1	1	
	P	764077	001		• REPAIR KIT	1	1	1	
	P	764077	002		• COIL, 120 Volt, 60 Hz, 110 Volt, 50 Hz	1	1	1	
14	P	1313	091		COUPLING, 1/2 N.P.T.	1	1	1	
15	P	84322	001		NOZZLE	1	1	1	
16	P	84321	001		EJECTOR, 1/2 N.P.T.	1	1	1	
17	P	7841	091		GASKET	1	1	1	
18	P	23972	091		ELL, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1	1	1	
19	P	29163	091		NIPPLE, 1/2 N.P.T. x 1-1/4	1	1	1	
20	P	4922	091		TEE, 3/4 x 1/2 x 1/2 N.P.T.	2	2	2	
21	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	5	5	5	
22	P	93650	002		VALVE, Solenoid, Steam, 3/4 N.P.T.	1	1	1	
	P	764137	001		• REPAIR KIT	1	1	1	
	P	764137	002		• COIL, 120 Volt, 60 Hz	1	1	1	
23	P	83228	002		VALVE, Solenoid, Steam, 3/4 N.P.T.	1	1	1	
	P	764070	001		• REPAIR KIT	1	1	1	
	P	764070	002		• COIL, 120 Volt, 60 Hz	1	1	1	
24	P	29170	091		NIPPLE, 1/2 N.P.T. x 3	1	1	1	
25	P	4915	091		TEE, 1/2 x 3/8 x 3/8 N.P.T.	1	1	1	
26	P	43041	091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1	1	1	
27	P	29017	091		NIPPLE, 3/8 N.P.T. x 2	1	1	1	
28	P	83464	006		TUBE, 5/8 O.D. x 11-3/8	1	1	1	
29	P	40153	091		ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1	1	1	
30	P	5424	091		VALVE, Check, 3/8 N.P.T.	1	1	1	
	P	74335	091		• DISC	1	1	1	
31	P	39072	091		COUPLING, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1	1	1	
32	P	93015	001		TUBE, 5/8 O.D.	1	1	1	
33					TUBE, 1/4 O.D. x 68-5/8	1	1	1	
34	P	1615	091		ELL, Street, 1/8 N.P.T.	2	2	2	
35	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2	2	2	
36					TUBE, 1/4 O.D. x 17-7/16	1	1	1	
37	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1	1	1	
38	P	90219	091		ELL, Street, 45°, 1/2 N.P.T.	1	1	1	
39	P	37615	091		CONTROL, Temperature	1	1	1	
40	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1	1	
41	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1	1	1	
42	P	52697	091		ELL, Compression, 45°, 1/4 O.D.T. x 1/8 N.P.T.	1	1	1	
43	P	83630	001		VALVE, Needle, 1/8 N.P.T.	2	2	2	
44	P	28899	091		NIPPLE, 1/8 N.P.T. x 1	1	1	1	
45	P	4898	091		TEE, 1/8 N.P.T.	1	1	1	
46	P	28900	091		NIPPLE, 1/8 N.P.T. x 1-1/2	2	2	2	
47	P	39589	010		CLAMP	1	1	1	
48	P	42396	091		NIPPLE, Steel, 1/4 N.P.T. x 2-3/4	1	1	1	
49	P	78787	091		BUSHING, 1/4 N.P.T.	1	1	1	
50	P	83870	001		VALVE, Check, 3/4 N.P.T.	1	1	1	
51					TUBE, 1/4 O.D. x 5	1	1	1	
52	P	43041	091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1	1	1	

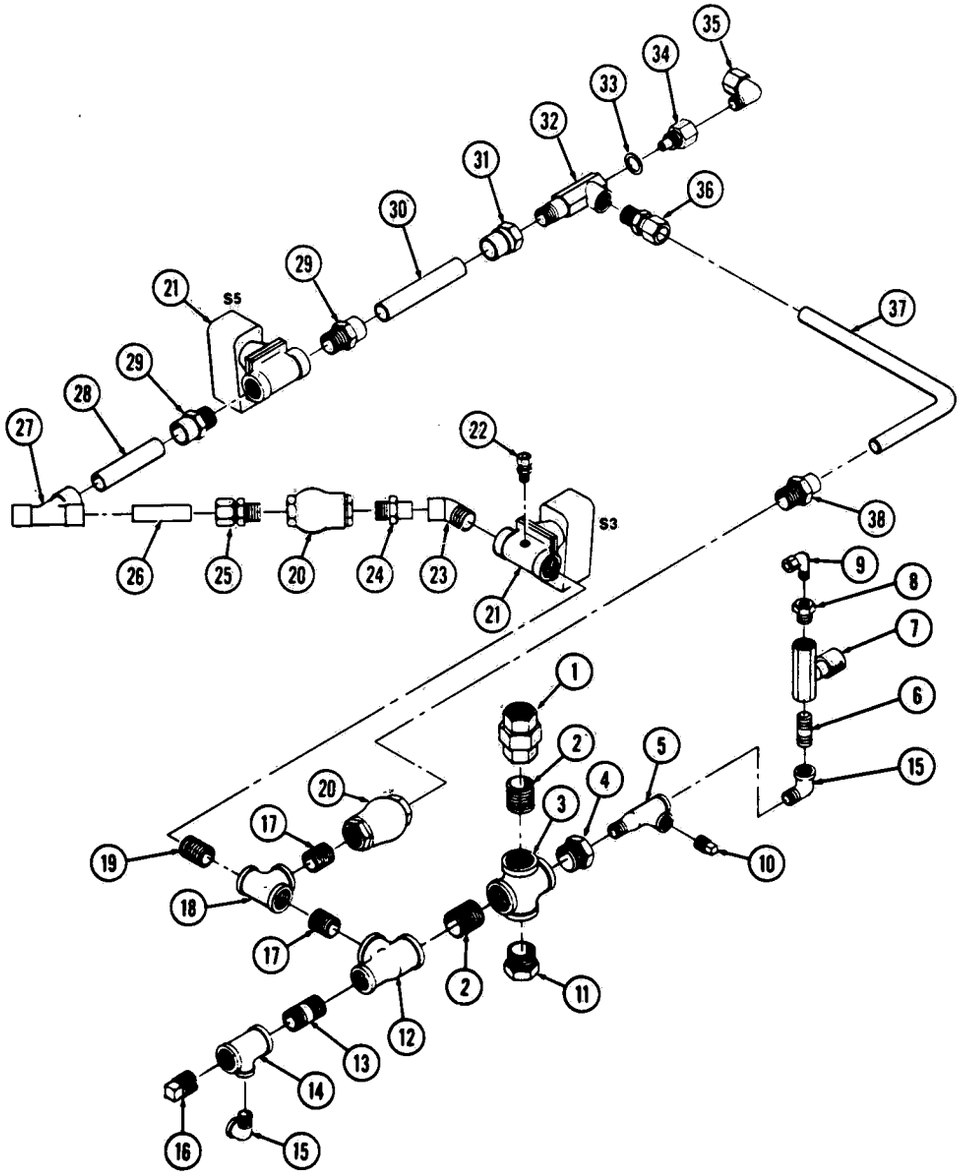


Figure 8-71. CHAMBER DRAIN ASSEMBLY. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-71-	P	136805	013		CHAMBER DRAIN ASSEMBLY	X
1	P	5283	091		UNION, 1 N.P.T.	1
2	P	29380	091		NIPPLE, 1 N.P.T. x 1-1/4	2
3	P	1351	091		CROSS, 1 x 1 x 1 x 1 N.P.T.	1
4	P	6208	091		BUSHING, Reducing, 1 x 3/8 N.P.T.	1
5	P	78387	091		TEE, Street, 3/8 N.P.T.	1
6	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1
7	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1
8	P	6223	091		BUSHING, Reducing, 3/8 x 1/8 N.P.T.	1
9	P	6750	091		ELL, Compression, 5/16 O.D.T. x 1/8 N.P.T.	1
10	P	3441	091		PLUG, Pipe, 3/8 N.P.T.	1
11	P	150822	052		BUSHING, Reducing, 1 x 1/4 N.P.T.	1
12	P	4938	091		TEE, 1 x 3/4 x 3/4 N.P.T.	1
13	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
14	P	4924	091		TEE, 3/4 x 3/4 x 3/8 N.P.T.	1
15	P	1631	091		ELL, Street, 3/8 N.P.T.	2
16	P	3443	091		PLUG, Pipe, 3/4 N.P.T.	1
17	P	29290	091		NIPPLE, 3/4 N.P.T. x 1	2
18	P	4932	091		TEE, 3/4 x 3/4 x 3/4 N.P.T.	1
19	P	29291	091		NIPPLE, 3/4 N.P.T. x 1-1/4	1
20	P	83870	001		VALVE, Check, 3/4 N.P.T.	2
	P	764070	002		• COIL	1
21	P	83228	002		VALVE, Solenoid, Steam, 3/4 N.P.T.	2
	P	764070	001		• KIT, Repair	1
22	P	80917	091		COUPLING, Compression, 5/16 O.D.T. x 1/8 N.P.T.	1
23	P	89271	091		ELL, Street 45°, 7/8 O.D.T. x 3/4 N.P.T.	1
24	P	91159	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1
25	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	1
26	P	83373	001		TUBE, 7/8 O.D.T. x 2-5/8	1
27	P	89384	091		Y-BRANCH, 45°, 7/8 O.D.T.	1
28	P	89728	091		TUBE, 7/8 O.D.T. x 3-7/8	1
29	P	91158	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T. (Male)	2
30	P	91188	091		TUBE, 7/8 O.D.T. x 5	1
31	P	83374	001		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T. (Female)	1
32	P	25900	042		EJECTOR, 1/2 N.P.T. x 3/4-18 x 1/2 N.P.T.	1
33	P	7841	091		GASKET	1
34	P	25546	042		NOZZLE, 3/4-18 x 3/8 N.P.T.	1
35	P	40153	091		ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1
36	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1
37	P	150821	001		TUBE, 5/8 O.D.T.	1
38	P	91155	091		ADAPTER, 5/8 O.D.T. x 3/4 N.P.T.	1

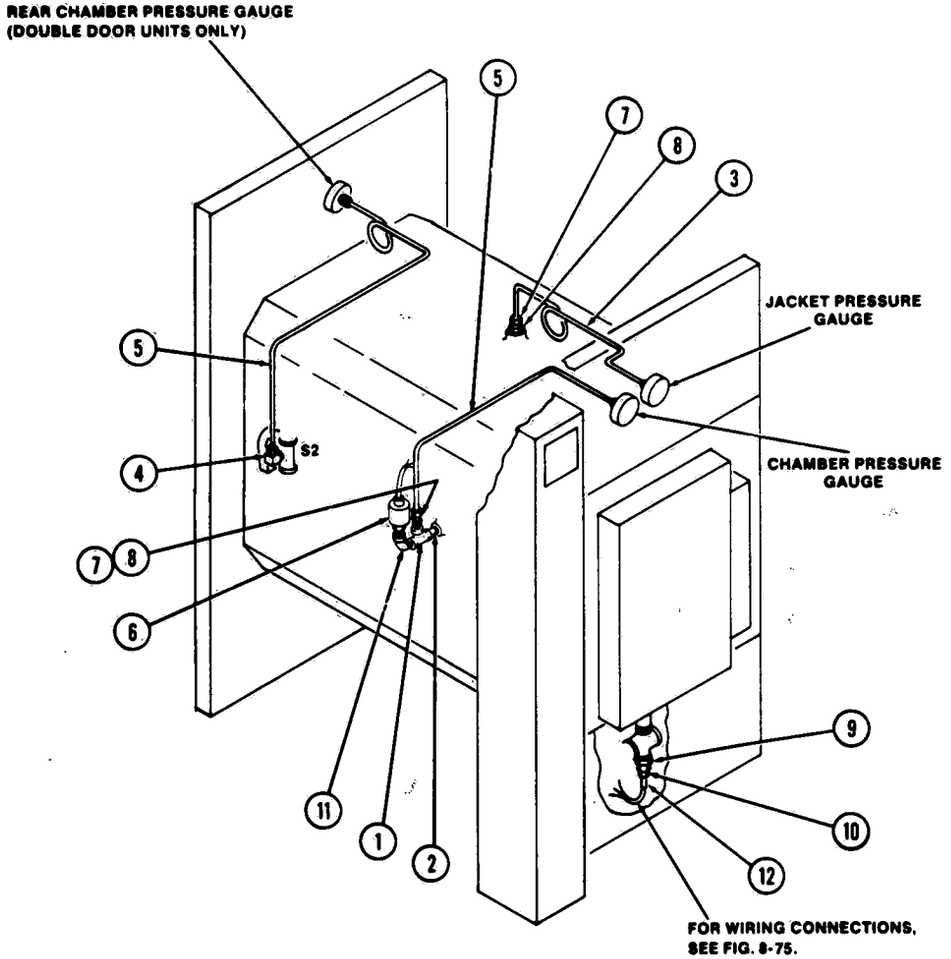


Figure 8-72. SENSING LINE PACKAGE. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-72-					SENSING LINE PACKAGE, Single Door	X			
					SENSING LINE PACKAGE, Double Door		X		
1	P	43649	091		TEE, 1/4 N.P.T.	1	1		
2	P	28916	091		NIPPLE, 1/4 N.P.T. x 7/8	1	2		
3					TUBE, 1/8 O.D.T. x 28	1	1		
4	P	26181	091		ELL, Compression, 1/8 O.D.T. x 1/8 N.P.T.	1	1		
5					TUBE, 1/8 O.D.T. x 29	1	2		
6	P	56396	215	*	TRANSDUCER, Pressure	1	1		
7	P	20344	091		FITTING, 1/8 O.D.T. x 1/8 N.P.T.	2	2		
8	P	939	042		BUSHING, Reducing, 1/4 N.P.T. x 1/8 N.P.T.	2	2		
9	P	76053	042		BUSHING, Reducing, 1/2 N.P.T. x 1/4 N.P.T.	1	1		
10	P	56306	NLA		FITTING, Compression (SUB: P-150822-452)	1	1		
11	P	1619	091		ELL, Street, 1/4 N.P.T.	1	1		
12	P	56396	211	*	PROBE, RTD, Temperature	1	1		

*These items are supplied with contact pins P/N P-150822-809 crimped on the electrical cable ready to install to plug P47.

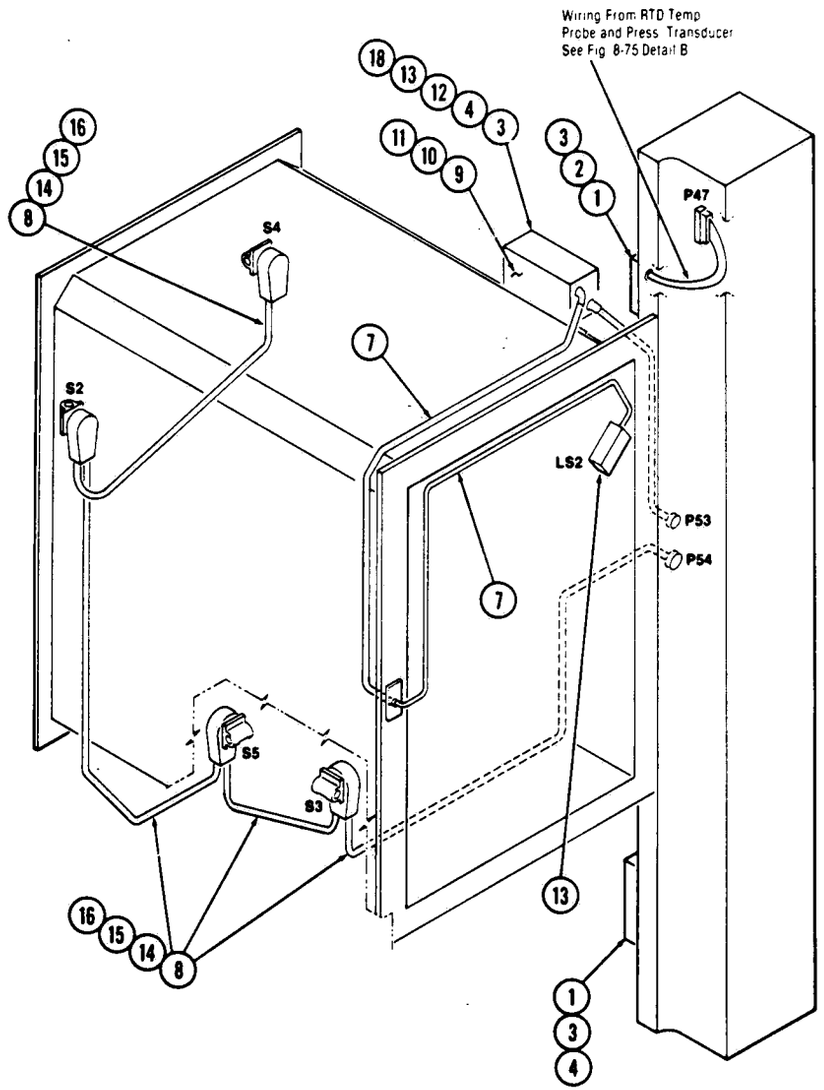


Figure 8-73. WIRING ASSEMBLY: Gravity Sterilizer Single Door with Printcon.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY		
				UNITS WITH PRINTCON			
8-73-	P	146649 172		WIRING ASSEMBLY: Gravity, Single Door, 24x36x36	X		
	P	146649 173		WIRING ASSEMBLY: Gravity, Single Door, 24x36x48		X	
	P	146649 174		WIRING ASSEMBLY: Gravity, Single Door, 24x36x60			X
1	P	93617 001		BOX, Junction	2	2	2
2	P	15361 042		SCREW, Round Head, #10-32 x 1/4	2	2	2
3	P	31705 045		LOCKWASHER, #10	6	6	6
4	P	9374 041		SCREW, Round Head, #10-32 x 3/8	6	6	6
5	P	93900 026		HOUSING, Receptacle	1	1	1
6	P	84187 002		CONTACT, Socket	9	9	9
7	P	93900 020		CABLE ASSEMBLY, Door, Operating End	1	1	1
8	P	129352 049		CONNECTOR, Splice	8	8	8
9	P	93900 042		BRACKET, Support	1	1	1
10	P	3040 042		NUT	2	2	2
11	P	76230 091		LOCKWASHER	2	2	2
12	P	136805 033		BOX, Junction, Door Switch	1	1	1
13	P	91945 041		JUMPER	2	2	2
14	P	136805 030		CABLE, Solenoid, 36"	1		
15	P	136805 031		CABLE, Solenoid, 48"		1	
16	P	136805 032		CABLE, Solenoid, 60"			1
17	P	91354 045		CLAMP, Cable	1	1	1
18	P	2959 041		NUT, #10-32	4	4	4

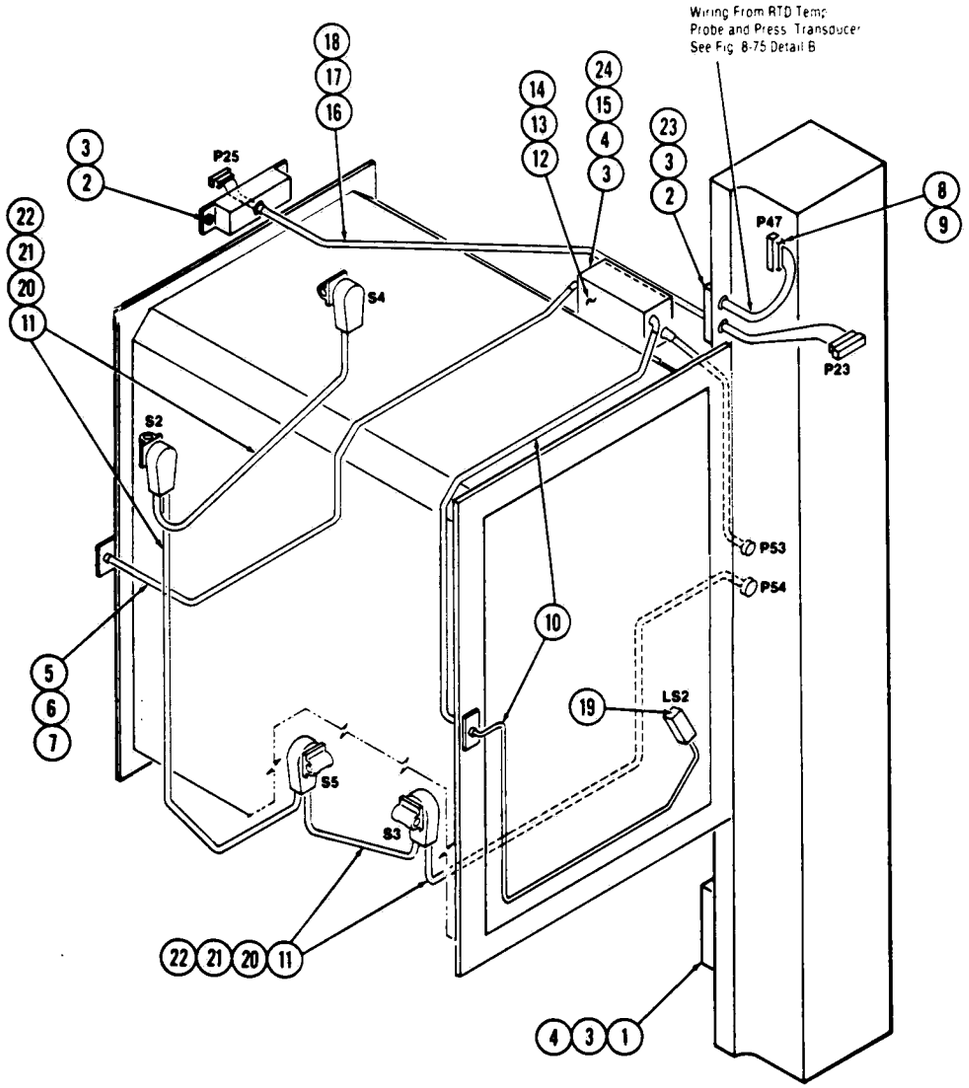


Figure 8-74. WIRING ASSEMBLY: Gravity Sterilizer Double Door with Printcon.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON				
8-74-	P	146649	175		WIRING ASSEMBLY: Gravity, Double Door, 24x36x36	X			
	P	146649	176		WIRING ASSEMBLY: Gravity, Double Door, 24x36x48		X		
	P	146649	177		WIRING ASSEMBLY: Gravity, Double Door, 24x36x60			X	
1	P	93617	001		BOX, Junction	1	1	1	
2	P	15361	042		SCREW, Round Head, #10-32 x 1/4	8	8	8	
3	P	31705	045		LOCKWASHER, #10	12	12	12	
4	P	9374	041		SCREW, Round Head, #10-32 x 3/8	6	6	6	
5	P	93900	025		CABLE ASSEMBLY, Door 36" Sterilizer, Non-Operating End	1			
6	P	93900	024		CABLE ASSEMBLY, Door 48" Sterilizer, Non-Operating End		1		
7	P	93900	023		CABLE ASSEMBLY, Door 60" Sterilizer, Non-Operating End			1	
8	P	84187	002		CONTACT, Socket (Before 12-87)	9	9	9	
	P	150822	809		CONTACT, Socket (After 12-87)	34	34	34	
9	P	93900	026		HOUSING, Receptacle (Before 12-87)	1	1	1	
	P	56396	486		HOUSING, Receptacle (After 12-87)	1	1	1	
10	P	93900	020		CABLE ASSEMBLY, Door, Operating End	1	1	1	
11	P	129352	049		CONNECTOR, Splice	8	8	8	
12	P	93900	042		BRACKET, Support	1	1	1	
13	P	3040	042		NUT	2	2	2	
14	P	76230	091		LOCKWASHER	2	2	2	
15	P	136805	033		BOX, Junction, Door Switch	1	1	1	
16	P	146649	165		HARNESS ASSEMBLY	1			
17	P	146649	166		HARNESS ASSEMBLY		1		
18	P	146649	167		HARNESS ASSEMBLY			1	
19	P	91945	041		JUMPER	1	1	1	
20	P	136805	030		CABLE, Solenoid, 36"	1			
21	P	136805	031		CABLE, Solenoid, 48"		1		
22	P	136805	032		CABLE, Solenoid, 60"			1	
23	P	91354	045		CLAMP, Cable	1	1	1	
24	P	2959	041		NUT, #10-32	4	4	4	

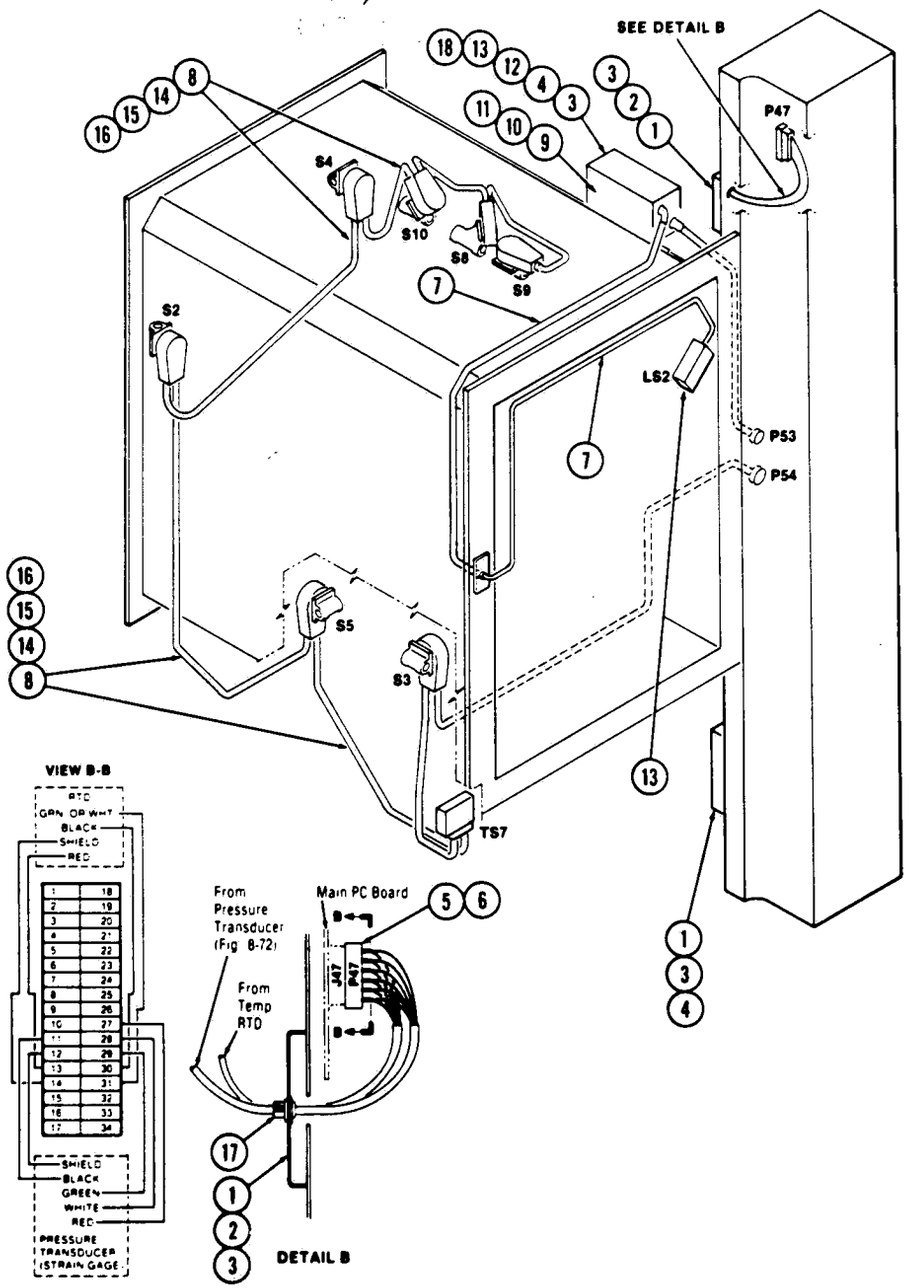


Figure 8-75. WIRING ASSEMBLY: Isothermal Sterilizer Single Door with Printcon.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
					UNITS WITH PRINTCON			
8-75-	P	146649	344		WIRING ASSEMBLY: Isothermal, Single Door, 24x36x36	X		
	P	146649	345		WIRING ASSEMBLY: Isothermal, Single Door, 24x36x48		X	
	P	146649	346		WIRING ASSEMBLY: Isothermal, Single Door, 24x36x60			X
1	P	93617	001		BOX, Junction	2	2	2
2	P	15361	042		SCREW, Round Head, #10-32 x 1/4	2	2	2
3	P	31705	045		LOCKWASHER, #10	6	6	6
4	P	9374	041		SCREW, Round Head, #10-32 x 3/8	6	6	6
5	P	93900	026		HOUSING, Receptacle (Before 12-87)	1	1	1
	P	56396	486		HOUSING, Receptacle (After 12-87)	1	1	1
6	P	84187	002		CONTACT, Socket (Before 12-87)	9	9	9
	P	150822	809		CONTACT, Socket (After 12-87)	34	34	34
7	P	93900	020		CABLE ASSEMBLY, Door, Operating End	1	1	1
8	P	129352	049		CONNECTOR, Splice	8	8	8
9	P	93900	042		BRACKET, Support	1	1	1
10	P	3040	042		NUT	2	2	2
11	P	76230	091		LOCKWASHER	2	2	2
12	P	136805	033		BOX, Junction, Door Switch	1	1	1
13	P	91945	041		JUMPER	2	2	2
14	P	136805	050		CABLE, Solenoid, 36"	1		
15	P	136805	051		CABLE, Solenoid, 48"		1	
16	P	136805	052		CABLE, Solenoid, 60"			1
17	P	91354	045		CLAMP, Cable	1	1	1
18	P	2959	041		NUT, #10-32	4	4	4

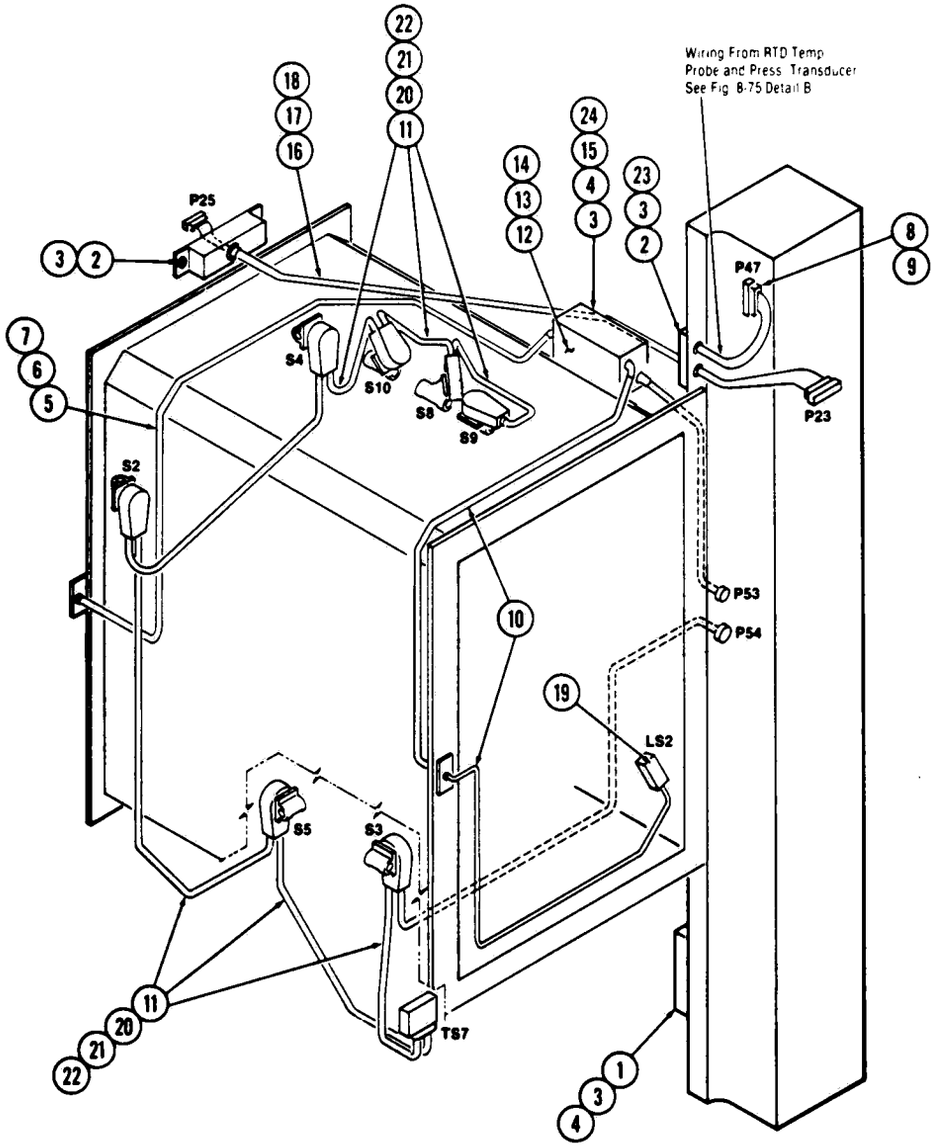


Figure 8-76. WIRING ASSEMBLY: Isothermal Sterilizer Double Door with Printcon.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-77-					CONNECTION DETAILS: Control Column, Manual Door	X			
					CONNECTION DETAILS: Control Column, Power Door		X		
1	P	19522	091		TERMINAL, Wire, #10 Ring x 16-22 AWG	1	1		
2	P	82675	001		SCREW, Green, Ground, #10-32 x 3/8	2	2		
3	P	14865	091		TERMINAL, Wire, #8 Ring x 18-22 AWG	1	1		
4					WIRE, Green	1	1		

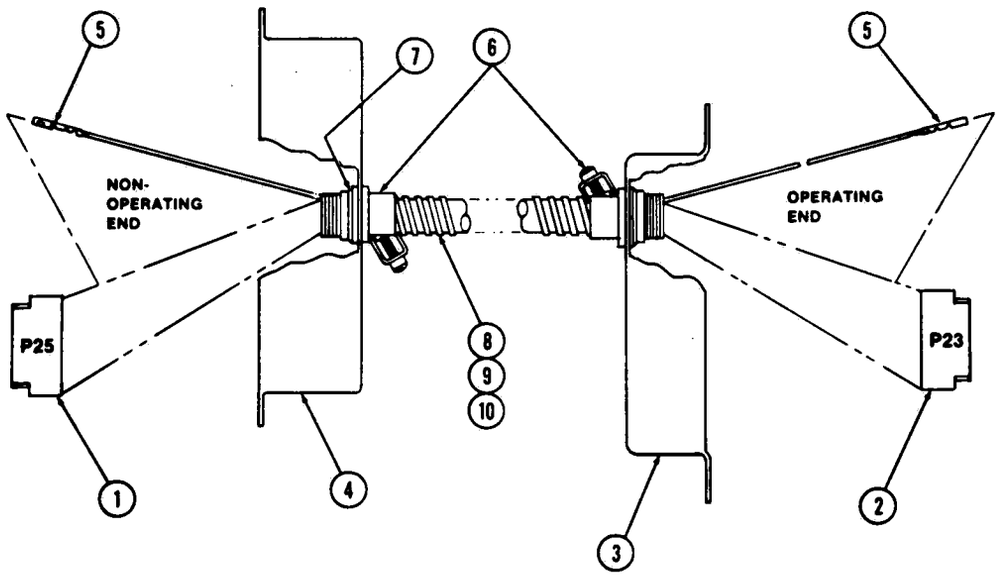


Figure 8-78. HARNESS ASSEMBLY: Double Door (Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON				
8-76-		P 146649	347		WIRING ASSEMBLY: Isothermal, Double Door, 24x36x36	X			
		P 146649	348		WIRING ASSEMBLY: Isothermal, Double Door, 24x36x48		X		
		P 146649	349		WIRING ASSEMBLY: Isothermal, Double Door, 24x36x60			X	
	1	P 93617	001		BOX, Junction	1	1	1	
	2	P 15361	042		SCREW, Round Head, #10-32 x 1/4	8	8	8	
	3	P 31705	045		LOCKWASHER, #10	12	12	12	
	4	P 9374	041		SCREW, Round Head, #10-32 x 3/8	6	6	6	
	5	P 93900	025		CABLE ASSEMBLY, Door 36" Sterilizer, Non-Operating End	1			
	6	P 93900	024		CABLE ASSEMBLY, Door 48" Sterilizer, Non-Operating End		1		
	7	P 93900	023		CABLE ASSEMBLY, Door 60" Sterilizer, Non-Operating End			1	
	8	P 84187	002		CONTACT, Socket (Before 12-87)	9	9	9	
		P 150822	809		CONTACT, Socket (After 12-87)	34	34	34	
	9	P 93900	026		HOUSING, Receptacle (Before 12-87)	1	1	1	
		P 56396	486		HOUSING, Receptacle (After 12-87)	1	1	1	
	10	P 93900	020		CABLE ASSEMBLY, Door, Operating End	1	1	1	
	11	P 129352	049		CONNECTOR, Splice	8	8	8	
	12	P 93900	042		BRACKET, Support	1	1	1	
	13	P 3040	042		NUT	2	2	2	
	14	P 76230	091		LOCKWASHER	2	2	2	
	15	P 136805	033		BOX, Junction, Door Switch	1	1	1	
	16	P 146649	165		HARNESS ASSEMBLY	1			
	17	P 146649	166		HARNESS ASSEMBLY		1		
	18	P 146649	167		HARNESS ASSEMBLY			1	
	19	P 91945	041		JUMPER	1	1	1	
	20	P 136805	050		CABLE, Solenoid, 36"	1			
	21	P 136805	051		CABLE, Solenoid, 48"		1		
	22	P 136805	052		CABLE, Solenoid, 60"			1	
	23	P 91354	045		CLAMP, Cable	1	1	1	
	24	P 2959	041		NUT, #10-32	4	4	4	

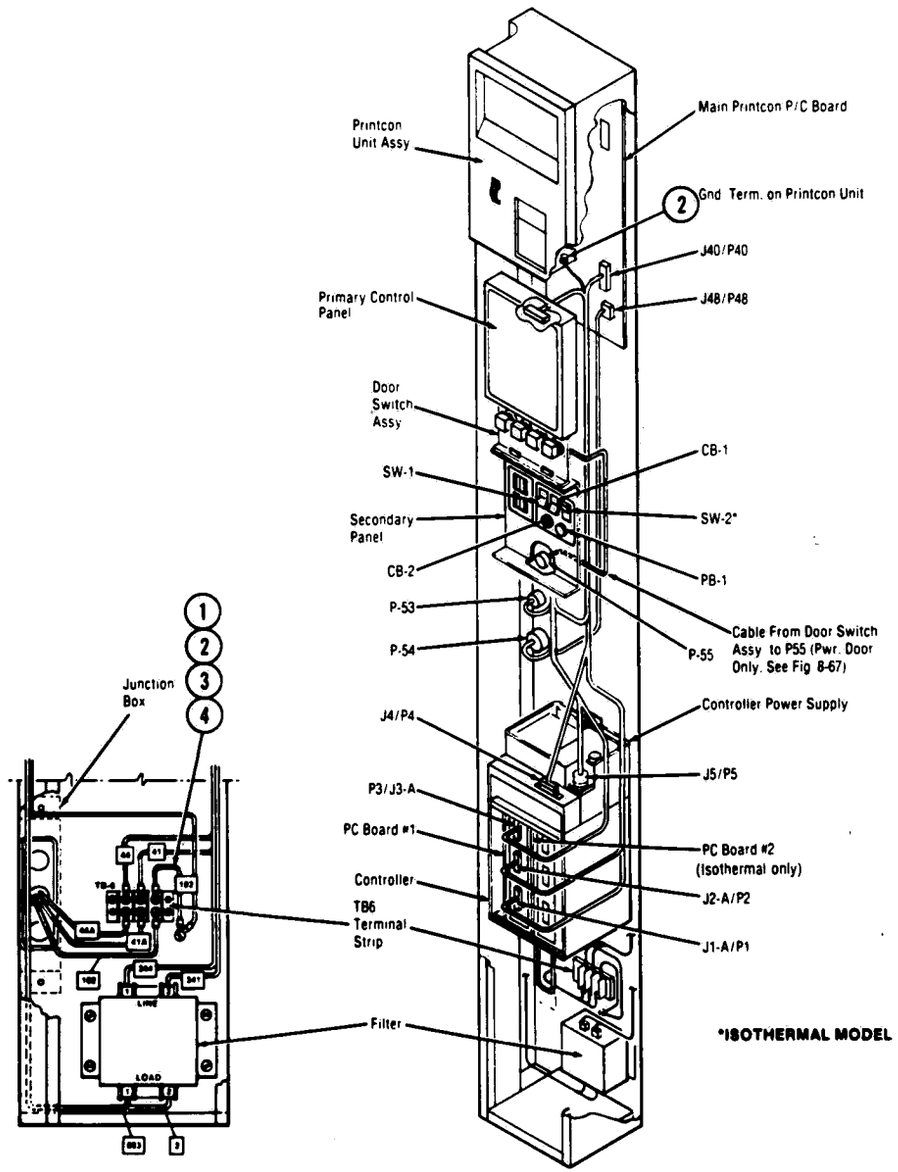


Figure 8-77. CONNECTION DETAILS: Control Column with Printcon. (Manual or Power Doors)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-78-	P	146649	165		HARNESS ASSEMBLY: Primary Panels, Double Door, 36" Long	X			
	P	146649	166		HARNESS ASSEMBLY: Primary Panels, Double Door, 48" Long		X		
	P	146649	167		HARNESS ASSEMBLY: Primary Panels, Double Door, 60" Long			X	
1	P	84229	005		HOUSING, Receptacle, P25	1	1	1	
2	P	84229	006		HOUSING, Receptacle, P23	1	1	1	
3	P	93617	001		BOX, Junction	1	1	1	
4	P	136798	001		ENCLOSURE	1	1	1	
5	P	84187	003		CONTACT	42	42	42	
6	P	150030	001		CONNECTOR, Conduit, Straight	2	2	2	
7	P	150122	001		BUSHING	2	2	2	
8	P	91666	091		CONDUIT, Flexible, 1/2 x 50	1			
9	P	79201	091		CONDUIT, Flexible, 1/2 x 60		1		
10	P	89878	091		CONDUIT, Flexible, 1/2 x 75			1	

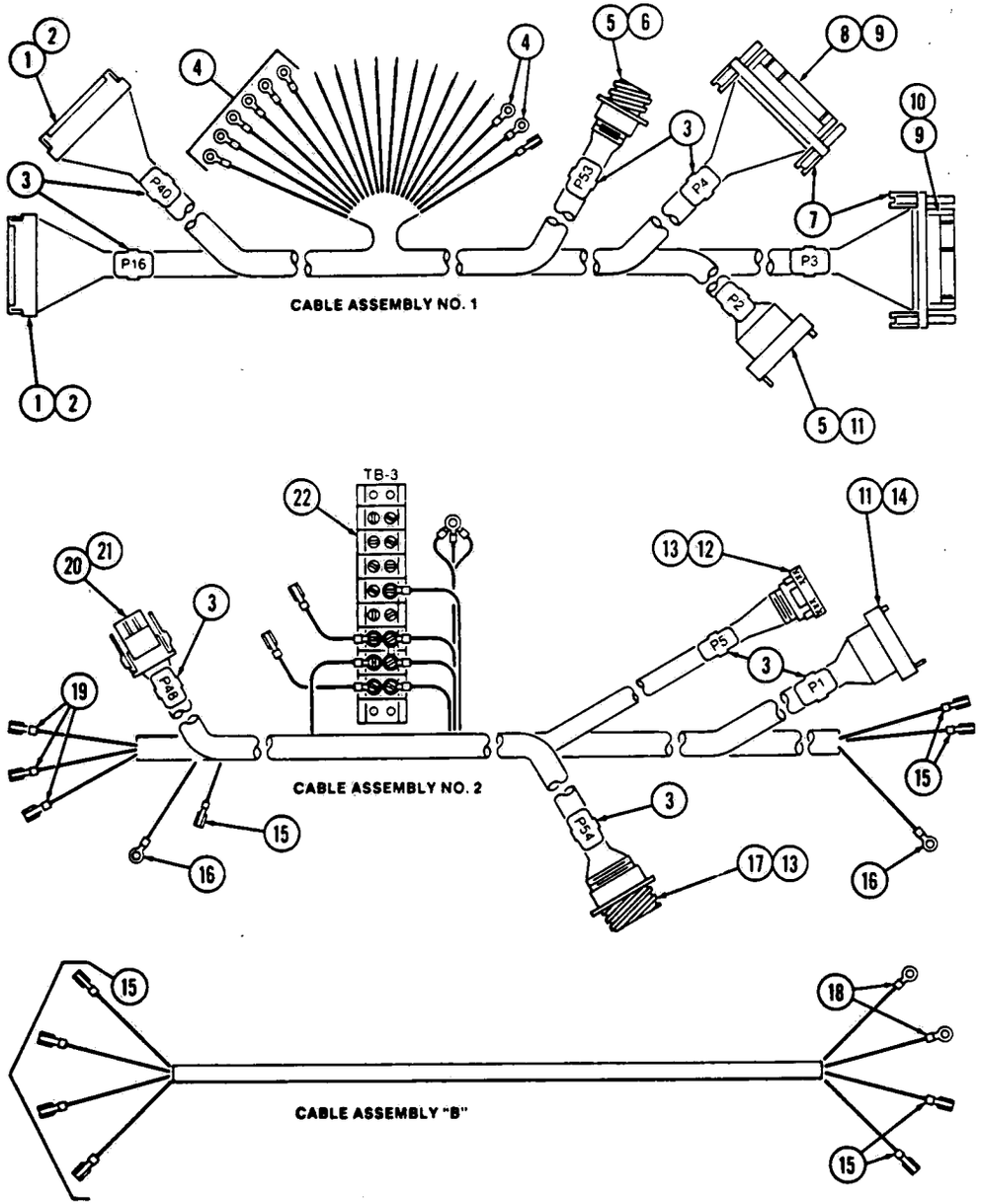


Figure 8-79. HARNESS ASSEMBLY: Secondary Panel, Gravity. (Units With Printcon)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-79-					HARNESS ASSEMBLY: Secondary Panel, Gravity	X
1	P	84187	003		CONTACT, Socket, P16 and P40	60
2	P	84229	002		HOUSING, Connector, 36 Position, P16 & P40	2
3	P	150822	003		MARKER, Tie	10
4	P	129278	001		TERMINAL, Wire, #6 Ring x 22-26 AWG	8
5	P	150822	032		CONTACT, Socket, P2 and P53	16
6	P	93443	005		RECEPTACLE, 14 Position, P53	1
7	P	84192	001		JACKSCREW, Female	4
8	P	84205	002		HOUSING, Pin, 38 Position, P4	1
9	P	84207	002		PIN, Contact, P3 and P4	43
10	P	84205	001		HOUSING, Pin, 28 Position, P3	1
11	P	93829	001		BLOCK, P1 and P2	2
12	P	93838	002		PLUG, 16 Position, P5	1
13	P	84198	004		SOCKET, Contact, P5 and P54	19
14	P	150822	042		PIN, Contact, P1	7
15	P	32119	091		RECEPTACLE, 1/4 Lug x 14-16 AWG	9
16	P	14592	091		TERMINAL, #10 Ring x 14-16 AWG	2
17	P	93443	006		RECEPTACLE, 37 Position, P54	1
18	P	14591	091		TERMINAL, Wire, Ring x 14-16 AWG	2
19	P	90695	091		RECEPTACLE, 1/4 Lug x 18-22 AWG	5
20	P	129352	121		HOUSING, Socket, 9 Position, P48	1
21	P	84220	002		CONTACT, Socket, P48	8
22	P	90627	091		BLOCK, Terminal, 8 Position, 15 A	1

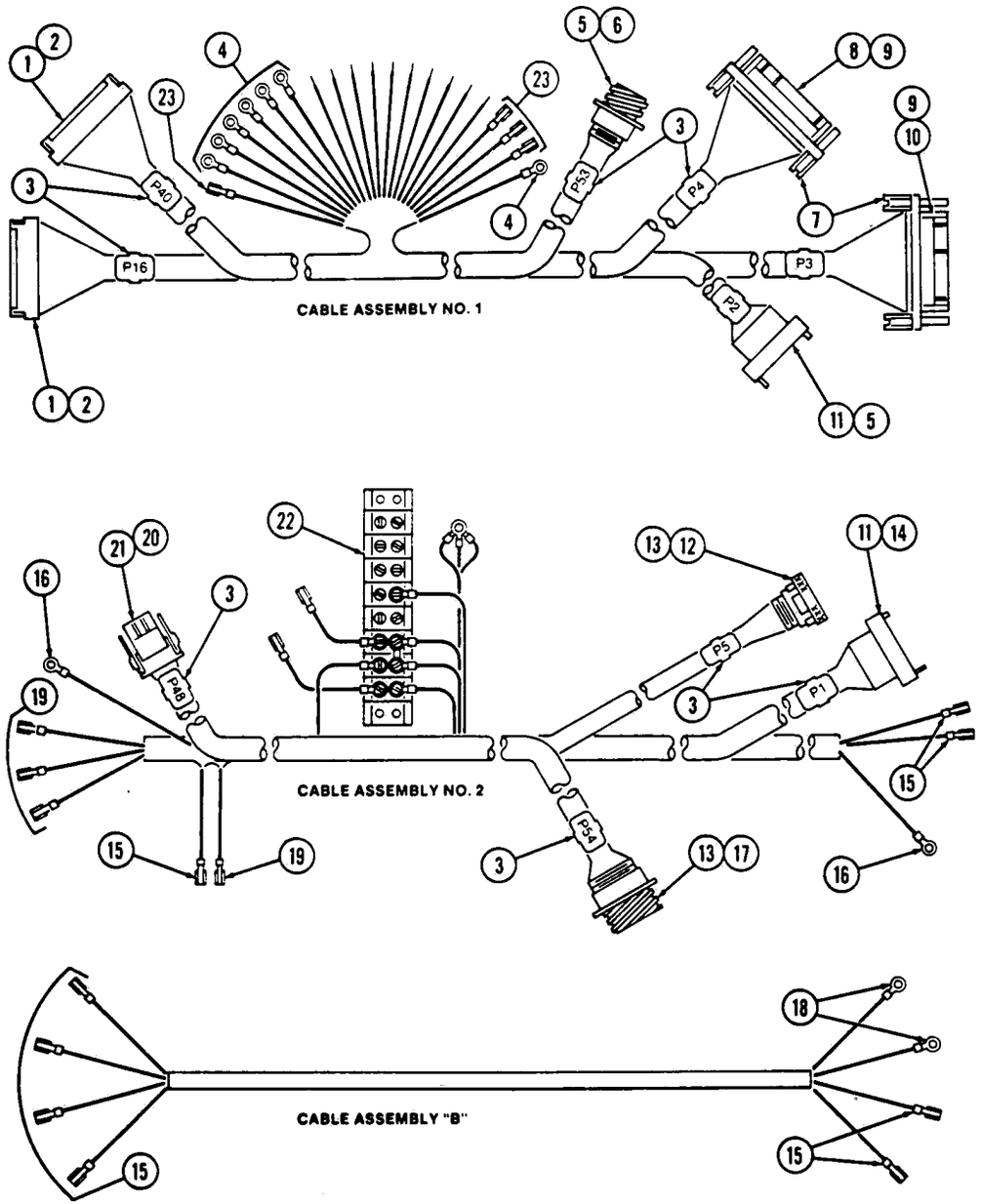


Figure 8-80. HARNESS ASSEMBLY: Secondary Panel, Isothermal. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-80-					HARNESS ASSEMBLY: Secondary Panel, Isothermal	X
1	P	84187	003		CONTACT, Socket, P16 and P40	59
2	P	84229	002		HOUSING, Connector, 36 Position, P16 & P40	2
3	P	150822	003		MARKER, Tie	10
4	P	129278	001		TERMINAL, Wire, #6 Ring x 22-26 AWG	7
5	P	150822	032		CONTACT, Socket, P2 and P53	14
6	P	93443	005		HOUSING, Receptacle, 14 Position, P53	1
7	P	84192	001		JACKSCREW, Female	4
8	P	84205	002		HOUSING, Pin, 38 Position, P4	1
9	P	84207	002		PIN, Contact, P3 and P4	46
10	P	84205	001		HOUSING, Pin, 28 Position, P3	1
11	P	93829	001		BLOCK, P1 and P2	2
12	P	93838	002		PLUG, 16 Position, P5	1
13	P	84198	004		SOCKET, Contact, P5 and P54	22
14	P	150822	042		PIN, Contact, P1	9
15	P	32119	091		RECEPTACLE, 1/4 Lug x 14-16 AWG	9
16	P	14592	091		TERMINAL, #10 Ring x 14-16 AWG	3
17	P	93443	006		HOUSING, Receptacle, 37 Position, P54	1
18	P	14591	091		TERMINAL, Wire, Ring x 14-16 AWG	2
19	P	90695	091		RECEPTACLE, 1/4 Lug x 18-22 AWG	6
20	P	129352	121		HOUSING, Socket, 9 Position, P48	1
21	P	84220	002		CONTACT, Socket, P48	8
22	P	90627	091		BLOCK, Terminal, 8 Position, 15 A	1
23	P	84402	001		RECEPTACLE, 1/4 Lug x #24-26 AWG	4

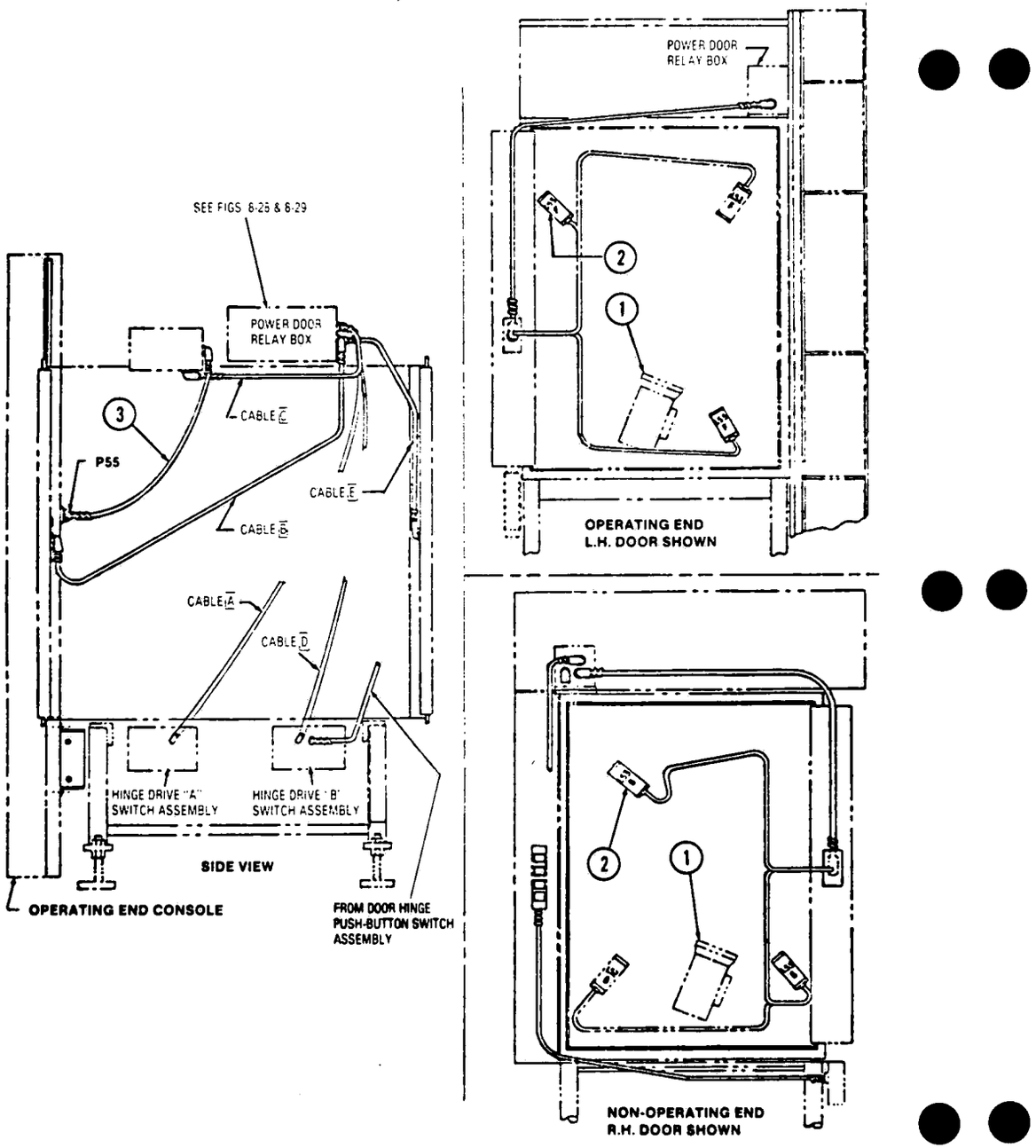


Figure 8-81. POWER DOOR WIRING (Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
					UNITS WITH PRINTCON:					
8-81-					POWER DOOR WIRING, Single Door	X				
					POWER DOOR WIRING, Double Door		X			
1	P	129352	049		CONNECTOR, Splice	5	10			
2	P	91945	041		JUMPER	1	2			
3	P	93900	041		CABLE ASSEMBLY, P55	1	1			

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SECTION 9



EAGLE® 2300 SCIENTIFIC UNITS

9.1 GENERAL

The 2300 series is similar to the 2000 series with Printcon™ except for some hardware and program changes. This section will provide these differences and refer the user to pertinent sections (noting any changes) of this manual. The 2300 series is **only** available with Printcon™ control; therefore, any paragraphs or figures in the Indicator-Recorder-Controller (IRC) should be disregarded. Before beginning any procedures, review **SUMMARY OF SAFETY PRECAUTIONS** at beginning of this manual.

9.2 GENERAL INFORMATION

NOTE: This Paragraph replaces **Section 1** located in the front of this manual.

The product literature following this paragraph contains factual data relating to the principal descriptive and identifying characteristics of particulars for EAGLE 2300 sterilizers. The literature is informational rather than instructional. It provides and conveys, textually and illustratively, a general concept of the equipment, its purpose, capabilities, limitations, and technical specifications.

NOTE: For Material Handling Accessories, refer to Tech Data SD-326 included in **Section 1** of this manual.

9.3 OPERATING INSTRUCTIONS

NOTE: This Paragraph replaces **Section 2** located in the front of this manual.

Figure 9-1 shows the location of the various controls.

9.3.1 Before Operating The Equipment

1. Be sure that chamber drain strainer is clean and in place and that chamber interior is clean *(Paragraph 4.5)*.

2. Open the upper access door.

   a. Be sure manual control is turned to OFF.

   b. Turn STEAM and WATER valves to ON. Steam is admitted to jacket and will begin to warm chamber. If HI-LO valve is on HI, jacket pressure will stabilize at 32 psig; if on LO, it will stabilize at 20 psig.

3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel lights up and all LEDs on the Printcon display light momentarily for a lamp test to assure the operator that the system is functioning. The printer records the time and date that the power is turned ON.

4. Check for correct time and date by pressing the TIME or DATE pushbutton. To change either, press the FORWARD or REVERSE pushbutton until the correct time/date is displayed.

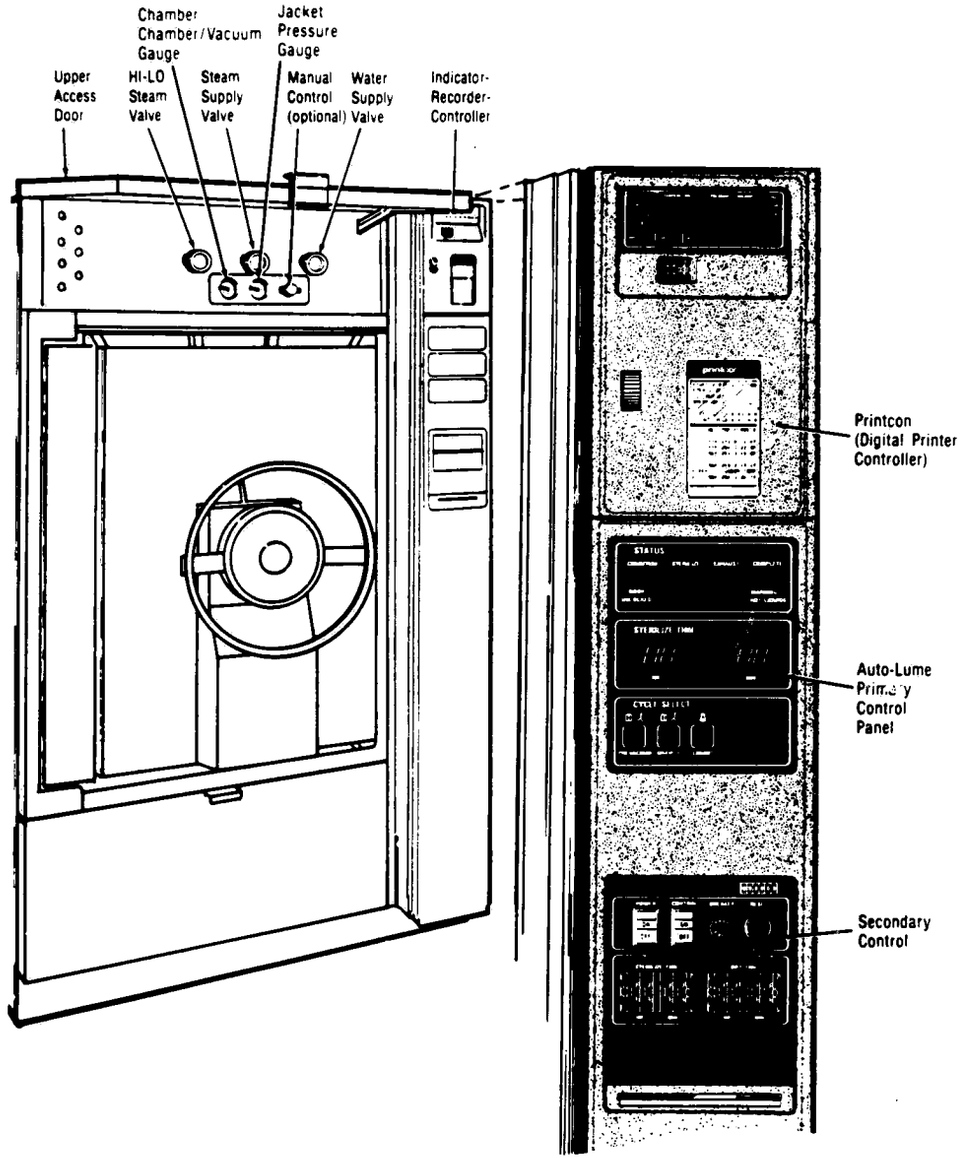
5. Check paper roll. A colored warning stripe will appear on the paper when the roll is near its end. A single ply roll lasts approximately two months and double ply rolls one month. See *Paragraph 7.16, Changing Paper*, if replacement is necessary.

6. Check the printout to assure that the inked ribbon cartridge is providing adequate ink. A fresh cartridge should last approximately 3 to 4 months. See *Paragraph 7.16, Changing The Inked Ribbon Cartridge*, if replacement is necessary.

NOTE: The visual display and printout of printer can optionally be set to indicate temperature in degrees Fahrenheit or Celsius and pressure can be either in English (PSI gauge and inches Hg vacuum) or metric (kg/cm² gauge and mm Hg). LEDs on display indicate which units are being displayed. The display of temperature and (English) pressure can be either single precision (no decimal) or extended precision (one decimal). Metric pressure shows one or two decimal places. Metric vacuum shows no decimal places. See *Paragraph 7.18, Changing Units of Display*.

Unit is factory set so that the printout during STERILIZE phase only includes beginning time, temperature and pressure points. This can be changed, however, so that the printing of time, temperature and pressure can be done at continuous intervals throughout STERILIZE phase. The time of interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See *Paragraph 9.8, Changing Sterilize Printout Intervals*.

7. Review *Paragraph 9.3.6, Control Monitoring and Communication Systems*, in order to identify the cause of any abnormal condition during a sterilization cycle.



Eagle Eye® Control Column

Figure 9-1. CONTROL LOCATIONS: Operating End.

8. If a double-door unit, review *Paragraph 9.3.7* to become familiar with the controls on the non-operating end.

9. Wait until jacket pressure has stabilized before starting a cycle.

10. Pressure display should read zero when the sterilizer door is open. If it does not, simply press the RESET button on the secondary control panel.

9.3.2 Automatic Operation: Laboratory/Isothermal Cycle (Models 2032, 2042, and 2052 only)

1. Follow instructions in *Paragraph 9.3.1, Before Operating the Equipment.*

2. Open the door on the secondary control panel.

a. Be sure the POWER and CONTROL switches are ON. Primary control panel and Printcon display should be lit. If the jacket is pressurized from an earlier Gravity or Liquids cycle, wait until the jacket pressure reduces to approximately 0 psig before proceeding.

b. Dial the desired exposure period on the STERILIZE TIME thumbwheel switches. Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

3. Using the thumbwheel switch on the Printcon unit, set the desired temperature. This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), a buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive features assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to *Paragraph 7.18, Adjusting the Sterilize Temperature Overdrive.*

4. Open chamber door and load sterilizer. The printer records the time the door is opened and prints "DOOR OPEN."

a. Power Door (if double-door unit, opposite door must be locked) — press UNLOCK/OPEN button . . . once to unlock the door, a second time to open it.

b. Manual Door — turn handwheel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

5. Close and lock the door . . . panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

a. Power Door — press LOCK button.

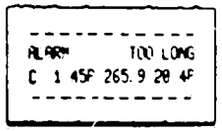
b. Manual Door — turn handwheel to the right as far as it will go using normal hand pressure.

NOTE: Pressing the STOP button **during** power door operation will immediately stop the door. Refer to paragraph 2.3 if it becomes necessary to shift from power to manual door operation.

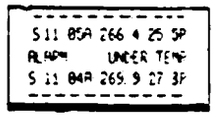
6. Touch ISOTHERMAL cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

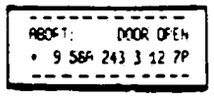
7. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the EXPOSURE phase begins, the temperature and pressure. Unit is factory set so that time, temperature and pressure are printed out at one-minute intervals. However, this setting can be changed. The printout time interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See *Paragraph 9.8, Changing Sterilize Printout Intervals.*



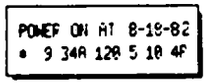
No. 1 — Condition Phase Too Long.



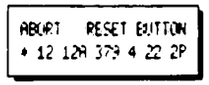
No. 2 — Sterilizing Temperature Drops.



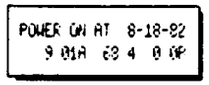
No. 3 — Chamber Door Switch Not Made.



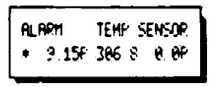
No. 4 — Power Restored After Power Failure.



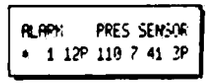
The RESET button is pressed.



The power is turned on.



Temperature sensor failure is detected.



Pressure sensor failure is detected.

Figure 9-2. PRINTCON MESSAGES.

8. When sterilize timer times out, EXHAUST light comes on and chamber exhausts slowly. The printed record will show the time the EXHAUST phase begins and the temperature and pressure transition points.

9. When exhaust phase is completed, panel light COMPLETE comes on, and buzzer sounds. Open chamber door. Load may be removed from the sterilizer. The printed record will show the time the cycle finished, the exposure time, and the total cycle time.

10. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on. The printer records the time the door is opened and prints "DOOR OPEN."

11. If two ply paper is used in the printer, tear off the duplicate record and place with the completed load.

9.3.3 Automatic Operation: Gravity Cycle

1. Follow instructions in *Paragraph 9.3.1, Before Operating The Equipment.*

2. Refer to Table 9-1 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to HI for the 270 F (132 C) sterilizing cycle, or to LO for the 250 F (121 C) sterilizing cycle.

NOTE: For cycle temperatures below 250 F (121 C), refer to paragraph 7.14.

3. Open the door on the secondary control panel.

a. Be sure the POWER and CONTROL switches are ON. Primary control panel and Printcon display should be lit.

b. Dial the correct exposure period (Table 9-1) on STERILIZE TIME thumbwheel switches.

c. Dial the desired drying time on the thumbwheel switches. This time will be displayed for 5 seconds on primary control panel. Following this 5 seconds, panel will return to sterilize time unless dry time is changed again. For wrapped goods, dry time can vary (usually between 5 and 20 minutes) depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures (refer to Section 3). For unwrapped goods, drying time is not required, however, a minimum of 02 minutes will eliminate excess steam vapors prior to opening chamber door. Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 250 F (121 C) or 270 F (132 C). This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), the buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to *Paragraph 7.18, Adjusting the Sterilize Temperature Overdrive.*

5. Open chamber door and load sterilizer. Turn handwheel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

6. Close and lock the door. Turn handwheel to the right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

7. Touch GRAVITY cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure. Unit is factory set so that time, temperature and pressure are printed out at one-minute intervals. However, this setting can be changed. The printout time interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See *Paragraph 9.8, Changing Sterilize Printout Intervals.*

9. When sterilize timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure. If a drying period was selected, DRY TIME digital readout begins to count down. If zero DRY TIME was selected, cycle proceeds to next step. The printed record will show the time the EXHAUST phase begins and the temperature and pressure transition points.

10. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Open chamber door **(step 5)**, load may be removed from the sterilizer. The printed record will show the time the cycle finished, the sterilize and dry time, and the total cycle time.

11. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on. The printer records the time the door is opened and prints "DOOR OPEN."

12. If two ply paper is used in the printer, tear off duplicate record and place with the completed load.

9.3.4 Automatic Operation: Liquids Cycle

WARNING: TO PREVENT THE POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE RESULTING FROM BURSTING BOTTLES AND HOT FLUID, YOU MUST FOLLOW THE PROCEDURE LISTED BELOW:

1. Use only vented closures — do not use screw caps or rubber stoppers with crimped seal.

2. Use only Type I borosilicate (Pyrex) glass bottles — do not use ordinary glass jugs or any container not designed for sterilization.

3. Use sterilizer LIQUIDS cycle. No other cycle is safe for liquid sterilization.

4. At end of cycle, open sterilizer door, no more than 1/2 inch. Wait 10 minutes before unloading sterilizer.

5. Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.

6. Bottles should be cool to touch before attempting to move them from sterilizer loading car or shelves to the storage area.

1. Follow instructions in *Paragraph 9.3.1, Before Operating The Equipment.*

2. Open the upper access door and turn HI-LO valve to LO.

NOTE: For cycle temperatures below 250 F (121 C), refer to *Paragraph 7.14.*

3. Open the door on the secondary control panel.

TABLE 9-1. MINIMUM STERILIZATION EXPOSURE PERIOD — WRAPPED AND UNWRAPPED GOODS GRAVITY CYCLE ONLY.

ASPF SIZE	TIME (MINUTES)
75 ML	25
250 ML	30
500 ML	40
1000 ML	45
1500 ML	50
2000 ML	55

TABLE 9-2. MINIMUM RECOMMENDED EXPOSURE TIMES FOR FULL LOAD OF SQUARE-PAK® FLASKED SOLUTIONS 250° F (121° C) TEMPERATURE SETTING.

ITEMS	TEMPERATURE SETTING	
	250° F (121° C) MINUTES	270° F (132° C) MINUTES
Dressing, wrapped in paper or muslin	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, wrapped in double thickness muslin or equal	30	15
Linen packs (maximal size: 12"x12"x20"; maximal weight 12 pounds)	30	—
Treatment trays, wrapped in muslin or equal	30	15
Utensils, unwrapped	15	3
Utensils, wrapped in muslin or equal	30	15

a. Be sure the POWER and CONTROL switches are ON. Primary control panel and Printcon display should be lit.

b. Set STERILIZE timer thumbwheels to appropriate time . . . see Table 9-2. Set time will be displayed on the primary control panel; however, during a LIQUIDS cycle, controller automatically disregards any DRY time setting. Once the cycle is started, the STERILIZE time will be locked in and cannot be changed.

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 250 F (121 C). This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), a buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to *Paragraph 7.18, Adjusting the Sterilize Temperature Overdrive.*

5. Open chamber door and load sterilizer. Turn handwheel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

6. Close and lock the door. Turn handwheel to the right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

7. Touch LIQUIDS cycle selector. Light comes on to full brightness. Status light CONDITION comes on; also WARNING HOT LIQUIDS light comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure. Unit is factory set so that time, temperature and pressure are printed out at one-minute intervals. However, this setting can be changed. The printout time interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See *Paragraph 9.8, Changing Sterilize Printout Intervals.*

9. When sterilize timer times out, EXHAUST light comes on and chamber exhausts slowly. The printed record will show the time the EXHAUST phase begins and the temperature and pressure.

10. When exhaust phase is completed, COMPLETE light comes on and buzzer begins to sound. The printed record will show the time the cycle finished, the sterilize time, and the total cycle time.

WARNING: SUDDEN FULL OPENING OF THE DOOR FOLLOWING A STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST. TO PREVENT POSSIBLE PERSONAL INJURY, PROCEED AS FOLLOWS.

11. Crack the door open (see step 5) **about 1/2"** and leave it cracked for at least 10 minutes.

12. Unlocking the door will stop buzzer and cause DOOR UNLOCKED light to come on. WARNING HOT LIQUIDS light will remain on, but will begin to flash . . . continuing for 10 minutes. At the end of 10 minutes, buzzer will again sound and WARNING HOT LIQUIDS light will stay on, but will stop flashing.

13. Open chamber door, load may now be removed from sterilizer. Press RESET button on secondary control panel to reset control and turn WARNING HOT LIQUIDS light off. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

14. If two ply paper is used in the printer, tear off duplicate record and place with the completed load.

9.3.5 Manual Operation: Gravity (Wrapped or Unwrapped Goods) or Liquids Cycle

1. Follow **steps 1, 2 and 9** in *Paragraph 9.3.1, Before Operating The Equipment.* The CONTROL switch must be positioned at OFF when using manual operation.

2. Open the upper access door.

3. Determine desired processing temperature (270 F [132 C)] or 250 F [121 C] for Gravity cycle; 250 F [121 C] for Liquids cycle). See Table 9-1 or 9-2.

4. Set HI-LO valve as follows:

a. **For 250 F (121 C) operation —** refer to paragraph 7.13 for instructions on loosening front stop on pressure regulator; then turn valve counterclockwise until jacket pressure gauge reads between 15 and 18 psig (1.056 and 1.267 kg/cm²).

NOTE: If normal LO setting is used for manual operation, chamber temperature will be approximately 250 F (126 C).

b. **For 270 F (132 C) operation —** set HI-LO valve so that jacket pressure gauge reads between 28 and 30 psig (1.971 and 2.112 kg/cm²).

NOTE: See Figure 7-21 for pressure and temperature relationships.

WARNING WHEN OPERATING A LIQUIDS CYCLE YOU MUST OBSERVE THE PRECAUTIONS LISTED IN PARAGRAPH 9.3.4. FAILURE TO FOLLOW THESE PRECAUTIONS COULD RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

5. Open chamber door and load sterilizer. Turn handwheel counterclockwise. Should the door not at first unlock, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. Turn handwheel to extreme left to bring ends of holding arms inward so that they will not strike door frame when door is opened or closed.

6. Close and lock the door. Turn handwheel to the right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

7. Turn the Manual Operation selector to Condition and wait for sixty seconds. Proceed to **step 8.**

8. After Condition phase, turn selector to STERILIZE. When chamber reaches desired pressure, begin timing. After correct sterilization period, proceed to next step.

WARNING SUDDEN FULL OPENING OF THE DOOR FOLLOWING A STERILIZATION CYCLE COULD CAUSE LIQUIDS TO BOIL OVER OR BOTTLES TO BURST. TO PREVENT POSSIBLE PERSONAL INJURY, PROCEED AS FOLLOWS.

9. **If a Liquids cycle, turn selector to SLOW EXHAUST and keep it in this position until chamber pressure is atmospheric (0 psig).** Then turn selector to OFF position, **omitting** the DRY phase. Crack the door open **about 1/2"** and wait for at least 10 minutes.

If a Gravity cycle, turn the selector to the FAST EXHAUST position until chamber pressure is between 4 and 6 psig (0.28 and 0.42 kg/cm²). If the load consists of wrapped goods, turn the selector to the DRY position. Begin timing. After drying period, turn selector to OFF position. If the load is unwrapped goods, turn selector directly to OFF position.

10. Load may be removed from the sterilizer.

9.3.6 Control Monitoring and Communication Systems

To ensure the validity of the sterilizing process, the automatic control continually monitors the cycle. Should one of the following conditions occur, you will be notified as indicated (Figure 9-2).

CONDITION NO. 1: Sterilizer did not complete conditioning phase in preset time.

INDICATION: CONDITION light on primary control panel flashes, buzzer sounds intermittently and a **permanent record is printed.**

OPERATOR SHOULD:

1. Touch cycle selector to stop buzzer (sterilizer will continue to operate).

2. Refer to **Section 6, TROUBLESHOOTING** to see if problem can be determined and corrected without interrupting cycle (e.g., HI-LO valve is incorrectly set).

3. If problem cannot be corrected so that conditioning phase can be completed (i.e., chamber reaches set sterilizing temperature), press cycle RESET button on secondary control panel to abort cycle. **Do not** proceed further until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

4. When chamber is at atmospheric pressure:

a. **If a Liquids cycle** was in progress, **crack door open 1/2"** and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Correct problem.

c. Reprocess load.

CONDITION NO. 2: Temperature drops 2 F below set point.

INDICATION: STERILIZE light on primary control panel flashes, STERILIZE timer display resets and a **permanent record is printed.**

OPERATOR SHOULD:

1. Let cycle continue to completion if sterilizing temperature is reestablished.

2. If condition happens repeatedly, refer to **Section 6, TROUBLESHOOTING** to see if problem can be determined and corrected without interrupting cycle.

3. If problem cannot be corrected so that sterilizing phase can be completed, press cycle RESET button on secondary control panel to abort cycle. **Do not** proceed further until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

4. When chamber is at atmospheric pressure:

a. **If a Liquids cycle** was in progress, **crack door open 1/2"** and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Correct problem.

c. Reprocess load.

CONDITION NO. 3: Cycle started, but chamber door not sufficiently tightened to keep door lock switch actuated.

INDICATION: DOOR UNLOCKED light(s) on primary control panel comes on, buzzer sounds intermittently and a **permanent record is printed.**

OPERATOR SHOULD:

1. Press cycle RESET button on secondary control panel. **Do not** proceed further until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

2. When chamber is at atmospheric pressure:

a. **If a Liquids cycle** was in progress, **crack door open 1/2"** and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Correct problem.

c. Reprocess load.

CONDITION NO. 4: Loss of electricity.

INDICATION: Primary control panel goes dark.

OPERATOR SHOULD:

1. Wait until power is restored to sterilizer; then position CONTROL switch (on secondary control panel) to ON. Buzzer will sound intermittently and a **permanent record is printed.**

2. Press cycle RESET button, but **do not** proceed until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

3. When chamber is at atmospheric pressure:

a. **If a Liquids cycle** was in progress, **crack door open 1/2"** and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Other cycles, load may be reprocessed right away.

Additional printouts are provided whenever:

1. The RESET button is pressed.

2. The power is turned ON.

3. Temperature sensor failure is detected.

4. Pressure sensor failure is detected.

9.3.7 Controls and Signals for Double-Door Sterilizers

The following controls will be found on the non-operating end of the sterilizer:

1. Cycle selectors: **ISOTHERMAL** and **GRAVITY.** If you wish to repeat the previous isothermal or gravity cycle, and all preparatory actions *(Paragraph 9.3.1)* have been made, you may do this from the non-operating end by touching the appropriate selector.

2. Status lights: These indicate the cycle phase which is currently in progress: CONDITION, STERILIZE, EXHAUST, COMPLETE.

3. Warning lights: DOOR UNLOCKED, OPPOSITE DOOR UNLOCKED, WARNING HOT LIQUIDS.

9.4 PRINCIPLES OF OPERATION

1. Use the instructions found in **Section 3** located previous to this section, noting Printcon paragraphs.

2. Replace Figure 3-21 with Figure 9-3.

9.5 INSPECTION AND MAINTENANCE

1. Use the instructions found in **Section 4** located previous to this section.

9.6 FIELD TEST PROCEDURE

NOTE: This Paragraph replaces **Section 5** located previous to this section.

Every sterilizer must be tested and inspected according to this procedure on initial start-up or whenever an adjustment or repair has been made. Keep a record of the test on the recorder chart or printout. Each test must meet the standards of material, workmanship and performance set forth in this procedure. Potentiometer must be used on each test. Refer to **Section 7,** should mechanical problems arise or adjustments be required.

Upon completion of test, the record is to be attached to the service order form.

NOTE: Voltmeter indications referred to in this procedure are approximations. A variance of 0.5 volts is acceptable.

1. Test Instrumentation Required:

   a. Potentiometer and thermocouple leads.

   b. Calibrated compound test gauge (30" vacuum and 100 psig).

   c. Calibrated absolute pressure gauge (0-100 mm Hg) with ball valve.

   d. Voltmeter or LED test light.

   e. Spirit level.

2. Check for proper installation as per *Paragraph 5.3.*

3. Adjust cooling water valves and slow exhaust valve as per *Paragraph 5.4* and Fig. 5-2. **Note:** The slow exhaust setting is preliminary.

4. Install potentiometer thermocouple lead in metal-to-metal contact with the temperature probe (from 1/2" to 1-1/2" of the tip). Run the lead through the door (between the door gasket and end ring).

5. Install a calibrated absolute pressure gauge and manual shut-off valve to the chamber gauge fitting after removing the compression fitting and reducing bushing (Fig. 8-72). This gauge should have 1 mm. Hg. resolution and a 0-100 mm. Hg. range.

6. Verify door switch adjustment as per *Paragraph 5.7.*

7. Test the safety valve as per *Paragraph 5.8.*

8. Adjust the steam pressure regulator as per *Paragraph 5.9,* **steps 1 through 3.**

9. Set the HI-LO valve to HI. Adjust the rear stop ring so that the jacket maintains 33 ±1 psig pressure.

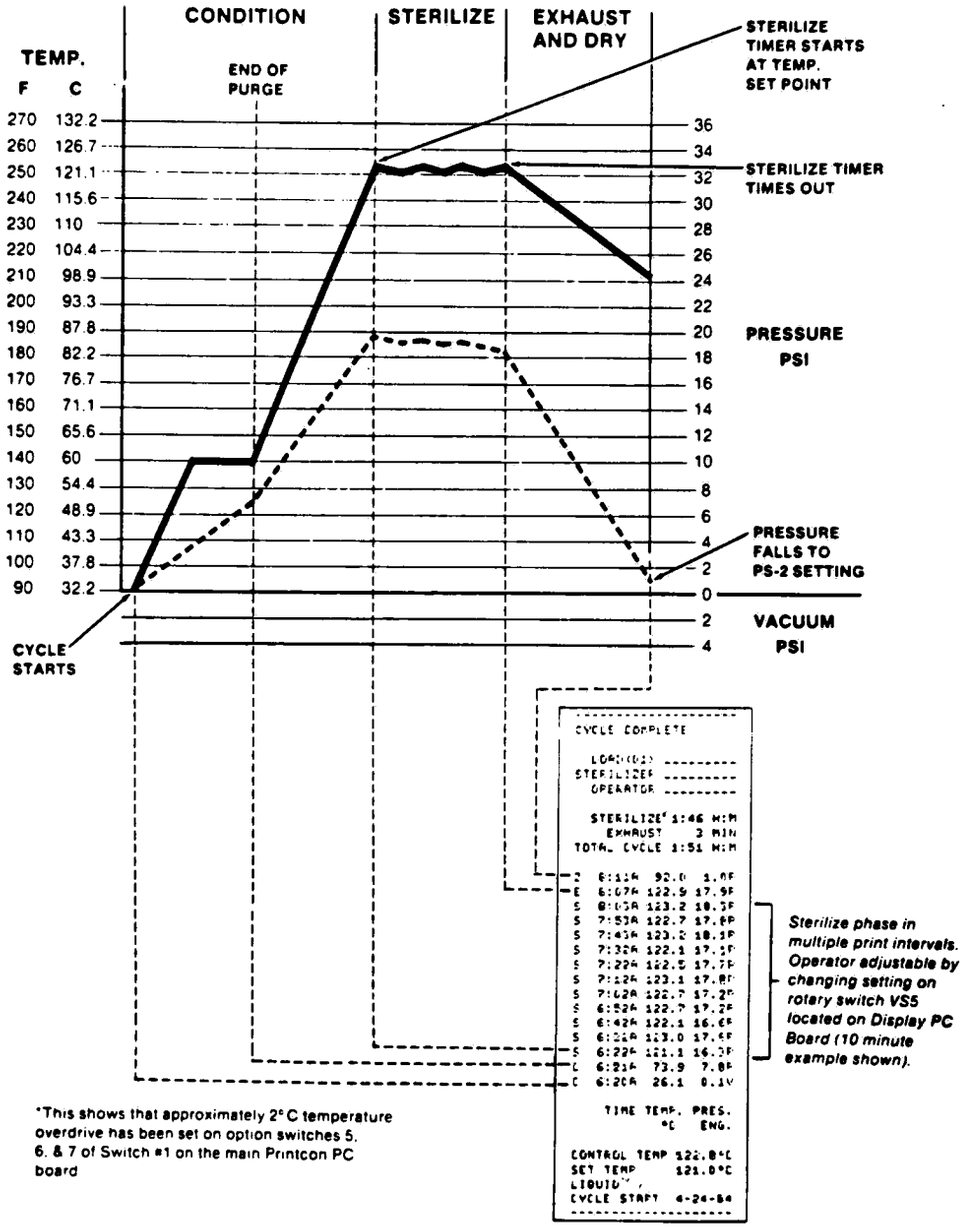
10. Open the display overlay door by unfastening the self-tapping screw at the top right of the door.

Check the pressure and vacuum rotary BCD switches for the following settings:

PS-1: 52 (26 psig)	VS-1: 20 (10 in. Hg)
PS-2: 02 (1 psig)	VS-2: 04 (2 in. Hg)
PS-3: 06 (3 psig)	VS-4: 04 (Purge time: 1 minute)*
PS-5: 00 (Machine type; standard)	VS-5: 02 (Print interval 1 minute)*

Close the display overlay door and replace the screw.

**See Paragraph 9.8.*



*This shows that approximately 2°C temperature overdrive has been set on option switches 5, 6, & 7 of Switch #1 on the main Printcon PC board

Figure 9-3. PRINTED CYCLE RECORD: Liquid Cycle.

11. Check the service switch on the main Printcon PC board for the following settings. (See **Section 7**, if necessary, for access instructions):

Temperature — °F (#1 OFF)
Pressure — English (#2 OFF)
Display precision — Extended (#3 ON)
Transducer — Strain gauge — (#4 ON)
Temperature overdrive — Normal (#5 OFF, #6 and #7 ON)

Check the alternate positions on #1, #2 and #3 for proper digital display. Set sterilize temperature to 270 F.

12. Open control end door. Turn POWER and CONTROL switches ON. All lamps and digits on the Printcon display panel will come on for a 3 second lamp test. DOOR UNLOCKED lamp must come on. **Pressure display should read 0.0.**

The following must be printed (with appropriate date, time, temperature, and pressure):

```
                DOOR OPEN
  2:37P    76.0  0.0P
```

```
POWER ON AT     4-01-82
  2:37P    76.0  0.0P
```

The following must be displayed:

a. Actual and F lamps ON.

b. Sterilize time displays must match thumbwheel settings. The DOOR OPEN message will be printed as shown above.

c. Cycle selectors for Liquids, Isothermal, and Gravity cycles (at half illumination.)

Double door units — DOOR UNLOCKED lamp must be on at both ends. Open opposite door. OPPOSITE DOOR UNLOCKED lamp must come on at both ends.

13. Try to start all cycles. No cycle should start with the door(s) open.

14. Rotate all time setting thumbwheels. The time displayed must match the thumbwheel setting.

15. Change the temperature setting by 1 F. The new set point must be displayed for 2 seconds and the SET lamp must be on. Check all temperature thumbwheel digits to insure that the display matches the setting.

16. Press the RESET button. The following must be printed (with appropriate time and physical data):

```
                RESET BUTTON
*  2:37P    76.0  0.5V
```

17. Set the time and date if not correct. Turn CONTROL switch OFF and then ON again. If battery is functioning correctly, time and date will be retained.

18. Check paper advance toggle switch. Forward position continuously feeds paper through printer. Center position is off. Rear position runs take up motor until the paper platen is depressed (microswitch activates).

19. Check paper take-up mechanism. Feed paper through pinch rollers. Paper must not wander side-to-side. Platen microswitch must activate and shut off take-up motor when the paper is drawn taut. Run at least 20 feet of paper into the take-up mechanism. Paper should bleed smoothly and coil up in the coil.

20. Check printed record quality. Quality of printout (or top copy) should conform to the examples in this procedure. Check for compressed digits (indicates printer motor speed too slow, or a drag on the paper roll).

21. Close and lock door(s). Start any cycle. Immediately abort it with the RESET button. This message must be printed.

```
ABORT:    RESET BUTTON
*  2:37P    76.1  0.0P
y  2:37P    76.0  0.0P
```

22. Start any cycle. Immediately turn the CONTROL power OFF and then ON again. The POWER ON message must be printed. An intermittent buzzer will sound.

```
POWER ON AT     4-01-82
  2:38P    76.1  0.2V
```

23. Set the sterilize temperature to 295 F. Initiate a GRAVITY cycle. Wait until the timed steam purge is completed and the pressure has risen to the regulator setting and stabilized. The temperature displayed should agree with the potentiometer to within ±1 F. The pressure displayed should agree with the pressure gauge to within 0.5 psig. If not, adjust potentiometer P2 on the main Printcon CP board until these pressures agree. Then, adjust P9 for temperature, if necessary.

Abort the cycle with the RESET button and exhaust the chamber through the manual control. When exhausted to less than 1 psig, open the door and let all vapors escape. **With the door open,** turn power OFF and then ON again. Restart a 295 F GRAVITY cycle. With the pressure and temperature stabilized as before, the pressure should agree with the gauge to within 0.5 psig. If not, a realignment of the main Printcon PC board is indicated.

NOTE: A properly calibrated Printcon control is likely to be more accurate than the measuring devices. Therefore, the measuring devices should be calibrated against NBS (National Bureau of Standards) traceable equipment and the inaccuracies of the measuring devices should be known (via a calibration report sheet). If the above accuracy results are not obtainable, refer to the *Printcon Calibration Procedure* in **Section 7** of this manual.

24. Disconnect the measuring devices and reconnect the chamber gauge.

25. Close and lock the door(s). Set STERILIZE and DRY times to 5 minutes each. Set the temperature thumbwheels to 250 F. Initiate a GRAVITY cycle. Reference Table 5-3 for proper valve actuation and correct phase times. The printer must print cycle information at the following times:

a. Start of cycle.

b. End of 1 minute purge.

c. Start of STERILIZE phase. Data, depending on setting of VS-5, will be printed at set time intervals throughout STERILIZE phase.

d. Start of EXHAUST phase.

e. End of EXHAUST phase.

f. Door open.

Refer to **Section 3** for the correct format. Check to make sure that the STERILIZE temperature is maintained between 252.5 F and 253.5 F.

26. Repeat for a 250 F LIQUIDS cycle. Refer to Table 5-2. Check printout for correct format as shown in **Section 3.**

Adjust the slow exhaust valve as necessary to obtain 5-7 minutes exhaust time from start of EXHAUST phase to PS-3 set-point (3 psig factory set). (S3 solenoid will open.)

27. Repeat for a 172 F ISOTHERMAL sterilization cycle except set a 10 minute sterilize time. Refer to Table 5-4. Check printout for correct format as shown in **Section 3.**

NOTE: Component degradation which may not cause an actual control alarm is evidenced by:

a. Slow charge time to temperature set-point.

b. Excessive temperature make-ups in the STERILIZE phase.

c. Excessively rapid or slow EXHAUST time.

d. Calibration inaccuracies in the Printcon control.

e. Chamber vacuum leaks.

28. Start a 250 F GRAVITY cycle, with 5 minute sterilize time set. After the STERILIZE phase is achieved, turn off the steam supply (use knob on valve panel). At 247.9 F, the following must occur:

a. STERILIZE lamp flashes.

b. The timer resets.

c. The following format is printed:

```
5     2:41P  250.0  21.9P
*     2:41P  244.1  21.9P
ALARM:          UNDER TEMP
*     2:41P  247.9  21.9P
```

Reopen steam valve. As soon as 250 F is re-established, the lowest temperature reached during the alarm condition is printed.

29. Check all positions of the Manual control knob for proper operation — door(s) closed and locked.

9.7 TROUBLESHOOTING

1. Use the instructions found in **Section 6** located previous to this section, noting Printcon paragraphs.

2. Use Table 6-2 for Troubleshooting Chart. **Note:** For references to Printcon control column and components Illustrated Parts Breakdown (IPB) (Figures 8-15, 8-16, 8-18, 8-59, 8-60, 8-61, 8-65, 8-66, 8-77, 8-79, 8-80) refer to appropriate IPB found following *Paragraph 9.9.*

3. The schematics following Table 6-8 refer both to IRC and Printcon 2000 units. Use the schematics listed below and disregard the remainder.

- PIPING SCHEMATIC: Printcon
- PRINTED CIRCUIT BOARD: Basic 146586
- PRINTED CIRCUIT BOARD: Expander 146588
- PC ASSEMBLY: Power Supply (Printcon) 146633-051

4. The following schematics are pertinent to the 2300 units only.

- ELECTRICAL SCHEMATIC, Eagle 2300 Isothermal and Gravity 146645-575
- MAIN PRINTCON PC BOARD, Eagle 2300 146654-002

9.8 COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT

1. Use the instructions found in **Section 7** located previous to this Section, especially noting Printcon paragraphs while disregarding IRC Paragraphs.

2. *Paragraph 7.18, Changing Units of Display,* describes procedures for the Secondary Panel and Display Printed Circuit Board. Two additional adjustments capable on Eagle 2300 Units are: Changing Sterilize Printout Intervals and Changing Unit Purge Times. The respective procedures for the above adjustments as follows:

a. **Changing Sterilize Printout Intervals**

1) Open the unit outer door.

2) Remove the #6 x 1/4 self tapping screw from the upper right-hand corner of the display panel door. This permits door opening with a left-hand swing.

3) Locate VS 5. VS 5 is used to set the print interval in 30 second increments during EXPOSURE phase. **Example:** VS 5 set to 10 will produce a 5 minute print interval; while VS 5 set to 29 will produce 14 minute-30 second print intervals, etc.

4) Close display panel door and refasten with screw.

5) Close the outer door.

b. **Changing Unit Purge Times**

1) Open the unit outer door.

2) Remove the #6 x 1/4 self tapping screw from the upper right-hand corner of the display panel door. This permits door opening with a left-hand swing.

3) Locate VS 4. VS 4 is used to set the purge time in 15 second increments during conditioning. **Example:** VS 4 set to 4 will produce one second purge; while VS 4 set to 99 will produce a 24 minute, 45 second purge.

4) Close display panel door and refasten with screw.

5) Close the outer door.

NOTE: In any of the procedures presented in **Section 7** reference Printcon Control Column or associated components Illustrated Parts Breakdowns (IPB) (Figures 8-15, 8-16, 8-17, 8-59, 8-60, 8-61, 8-65, 8-66, 8-77, 8-79, or 8-80), refer to appropriate IPB found following *Paragraph 9.9.*

9.9 EXPLODED VIEWS AND PARTS LISTS

1. Use the Illustrated Parts Breakdowns (IPBs) found in **Section 8** located previous to this Section, noting the following exceptions:

a. Since Eagle 2300 are supplied with Printcon controls, disregard IRC IPBs:

- Figures 8-10, 8-11, 8-12, 8-13, 8-14, 8-15, 8-16, 8-17, 8-18, 8-19, 8-32, 8-49, 8-50, 8-51, 8-52, 8-53, 8-54, and 8-55.

b. Since the Eagle 2300 Printcon Control is designed to handle more versatile scientific cycles, the control hardware has changed somewhat, disregard the following Printcon IPBs (note appropriate IPBs following this paragraph):

- Figures 8-15, 8-16, 8-59, 8-60, 8-61, 8-62, 8-63, 8-64*, 8-65, 8-66, 8-77, 8-79 and 8-80.

**Figures 8-64A and 8-64B are applicable to Eagle 2300 Series*

2. Use the following Eagle 2300 Control IPBs as aids in troubleshooting and repair.

- Figure 9-4. CONTROL COLUMN, Eagle 2300 (Part 1 of 3).
- Figure 9-5. CONTROL COLUMN, Eagle 2300 (Part 2 of 3).
- Figure 9-6. CONTROL COLUMN, Eagle 2300 (Part 3 of 3).
- Figure 9-7. MAIN CONTROL ASSEMBLY, Eagle 2300.
- Figure 9-8. SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2).
- Figure 9-9. SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2).
- Figure 9-10. PRINTCON HOUSING ASSEMBLY, Eagle 2300.
- Figure 9-11. HARNESS ASSEMBLY, Secondary Panel, Eagle 2300.
- Figure 9-12. CONNECTION DETAILS, Eagle 2300 Control Column.

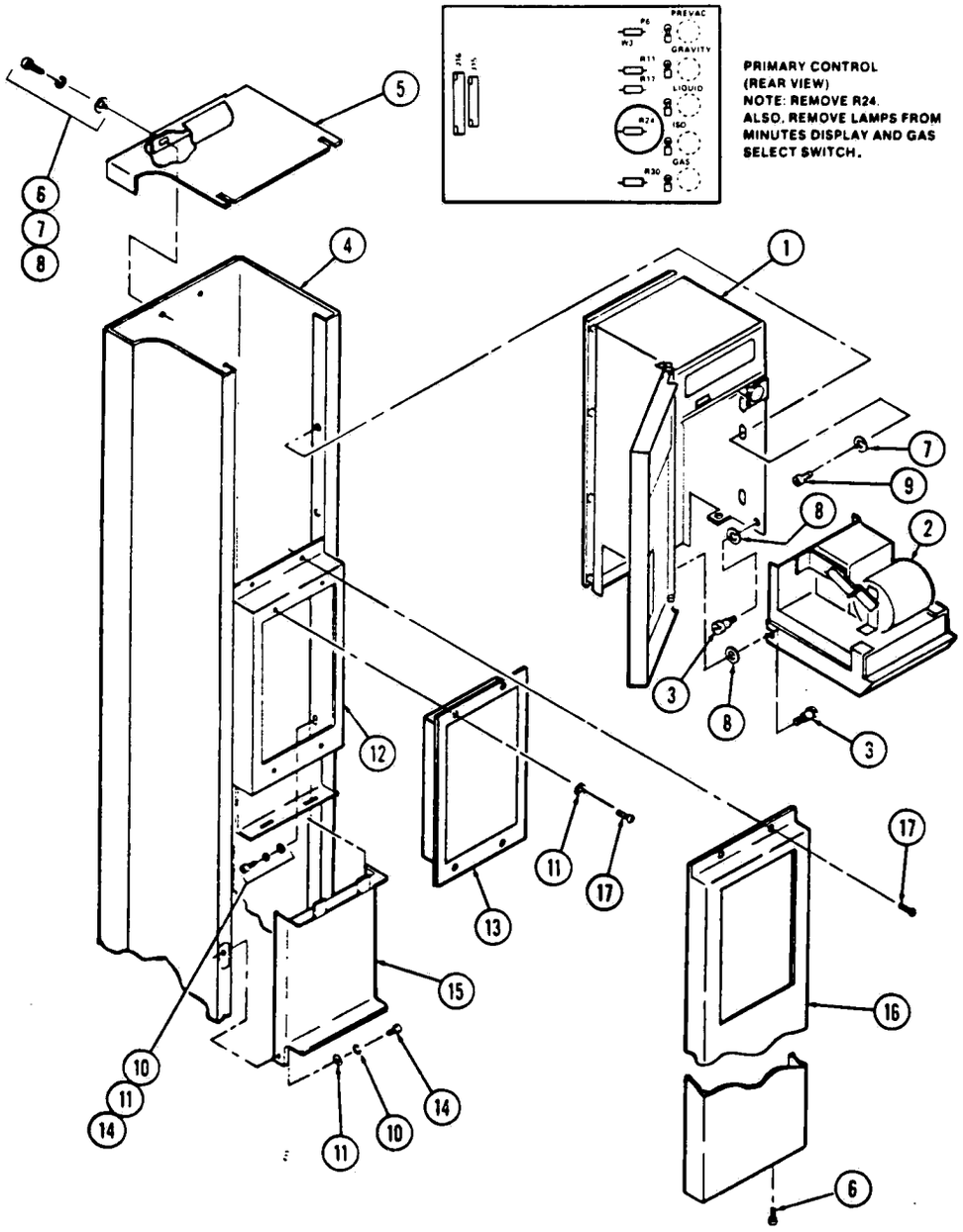


Figure 9-4. CONTROL COLUMN, Eagle 2300 (Part 1 of 3).

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FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-4-					CONTROL COLUMN, Eagle 2300 (Part 1 of 3)	X
1					PRINTCON HOUSING ASSEMBLY (See Fig. 9-10)	1
2	P	141198	171		PRINTCON PRINTER ASSEMBLY (See Fig. 9-11)	1
3	P	150822	336		SCREW, Shoulder, #10-32	2
4	P	146649	040		HOUSING, Control	1
5	P	134449	001		COVER, RH Top	1
	P	134449	002		COVER, LH Top	1
6	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	4
7	P	31705	045		LOCKWASHER, #10	6
8	P	5511	091		WASHER, Flat, #10	4
9	P	45323	042		SCREW, Button Socket Head, #8-32 x 3/8	4
10	P	79588	001		LOCKWASHER, #8	6
11	P	17796	091		WASHER, Flat, #8	10
12	P	146649	006		PANEL, Mounting	1
13	P	146645	226		CONTROL, Primary	1
	P	764317	536		• LAMP (Box of 10)	26
14	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	6
15	P	146645	569		PANEL, Secondary Assembly	1
16	P	146649	011		PANEL ASSEMBLY, Front	1
17	P	129356	135		SCREW, Button Head Socket, #8-32 x 3/8 (Black)	2

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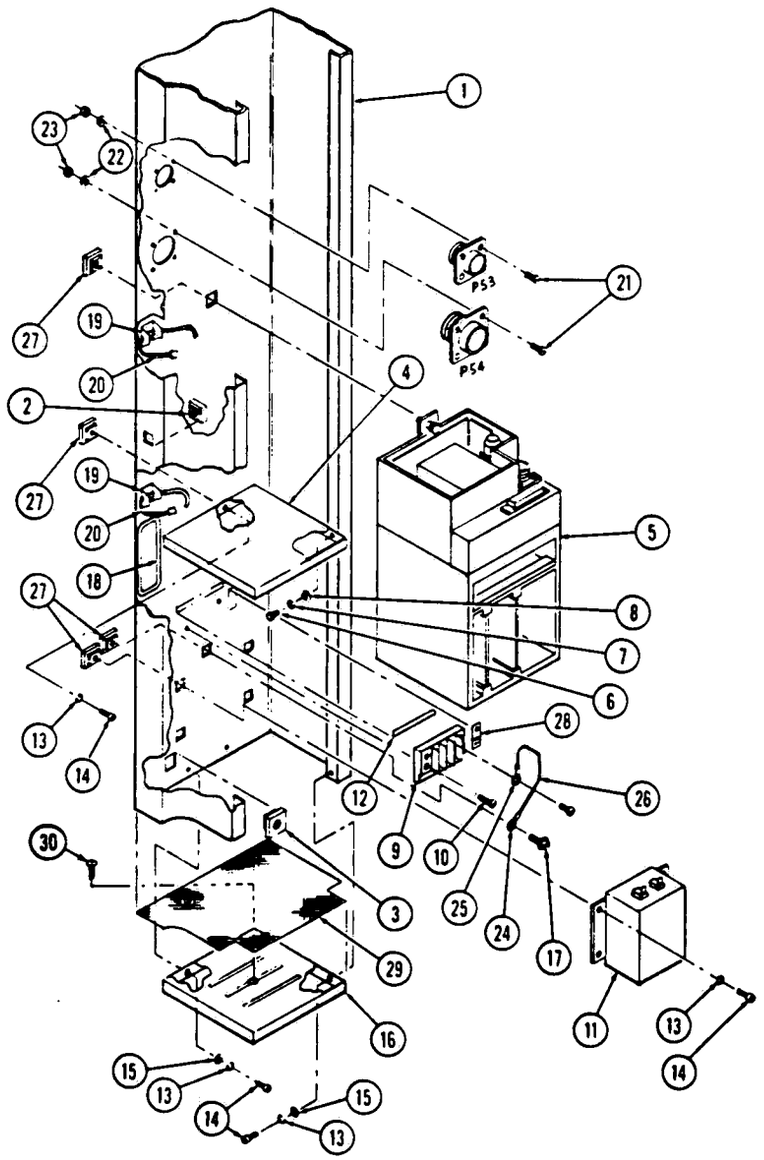


Figure 9-5. CONTROL COLUMN, Eagle 2300 (Part 2 of 3).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-5-					CONTROL COLUMN, Eagle 2300 (Part 2 of 3)	X
1					HOUSING, Control	REF
2	P	91924	091		NUT, Tinnerman, 1/4-20	6
3	P	129352	070		NUT, Tinnerman, 3/8-16	4
4	P	136759	001		SUPPORT, Controller	1
5	P	146645	895		MAIN CONTROL ASSEMBLY: (See Fig. 9-7)	1
6	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	2
7	P	79588	001		LOCKWASHER, #8	2
8	P	17796	091		WASHER, Flat, #8	2
9	P	90746	091		STRIP, Terminal	1
10	P	9661	041		SCREW, Round Head, #10-32 x 5/8	2
11	P	93821	001		FILTER	1
12	P	82647	001		STRIP, Marker	1
13	P	31705	045		LOCKWASHER, #10	10
14	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	10
15	P	5511	091		WASHER, Flat, #10	4
16	P	136588	002		PLATE, Bottom	1
17	P	82675	001		SCREW, Green Ground, #10-32	1
18	P	150783	001		GROMMET	1
19	P	129326	001		HOLDER, Wire	11
20	P	75954	091		TIE, Wire	28
21	P	3984	041		SCREW, Round Head, #6-32 x 3/8	8
22	P	5469	041		WASHER, Flat, #6	8
23	P	3037	041		NUT, Hex, #6-32	8
24	P	19522	091		TERMINAL, Wire, #10 Ring x 16-22 AWG	1
25	P	14865	091		TERMINAL, Wire, #8 Ring x 22-18 AWG	1
26					WIRE, Green	1
27	P	129352	069		NUT, Tinnerman, #10-32	8
28					TAPE, Label (Dymo or equiv.)	AR
29	P	56374	001		SCREW	1
30	P	4682	041		SCREW, Round Head, #8-32 x 3/8	1

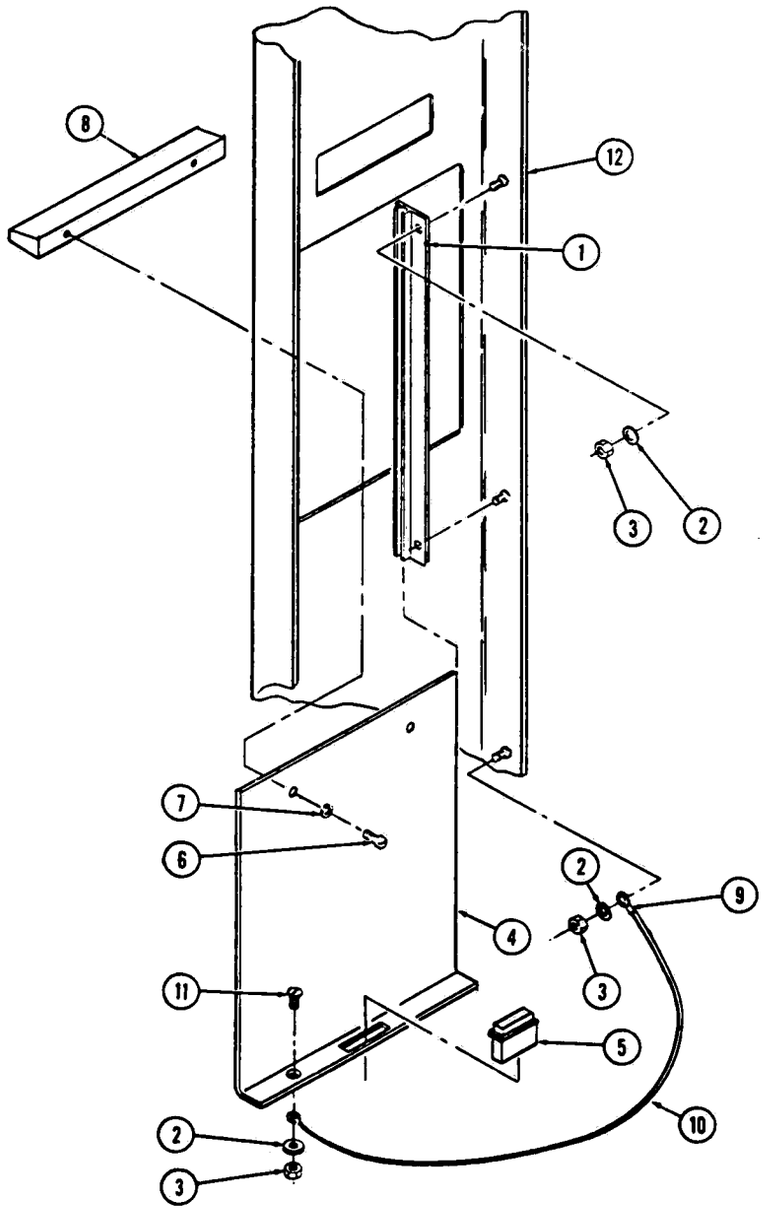


Figure 9-6. CONTROL COLUMN, Eagle 2300 (Part 3 of 3).

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-6-				CONTROL COLUMN, Eagle 2300 (Part 3 of 3)	X
1	P	84394 001		SLIDE, Door	2
2	P	5469 041		WASHER, Flat, #6	6
3	P	3037 041		NUT, Hex, #6-32	6
4	P	93662 001		DOOR	1
5	P	83920 001		CATCH, Magnetic	1
6	P	4682 041		SCREW, Round Head, #8-32 x 3/8	2
7	P	79588 001		LOCKWASHER, #8	2
8	P	84393 001		HANDLE	1
9	P	90619 091		TERMINAL, #6 Ring x 18-22 AWG	2
10				WIRE, Green, 15" Lg.	1
11	P	50705 041		SCREW, Flat Head, #6-32 x 5/16	1
12				PANEL ASSEMBLY, Front, Manual Door	REF
				PANEL ASSEMBLY, Front, Power Door	REF

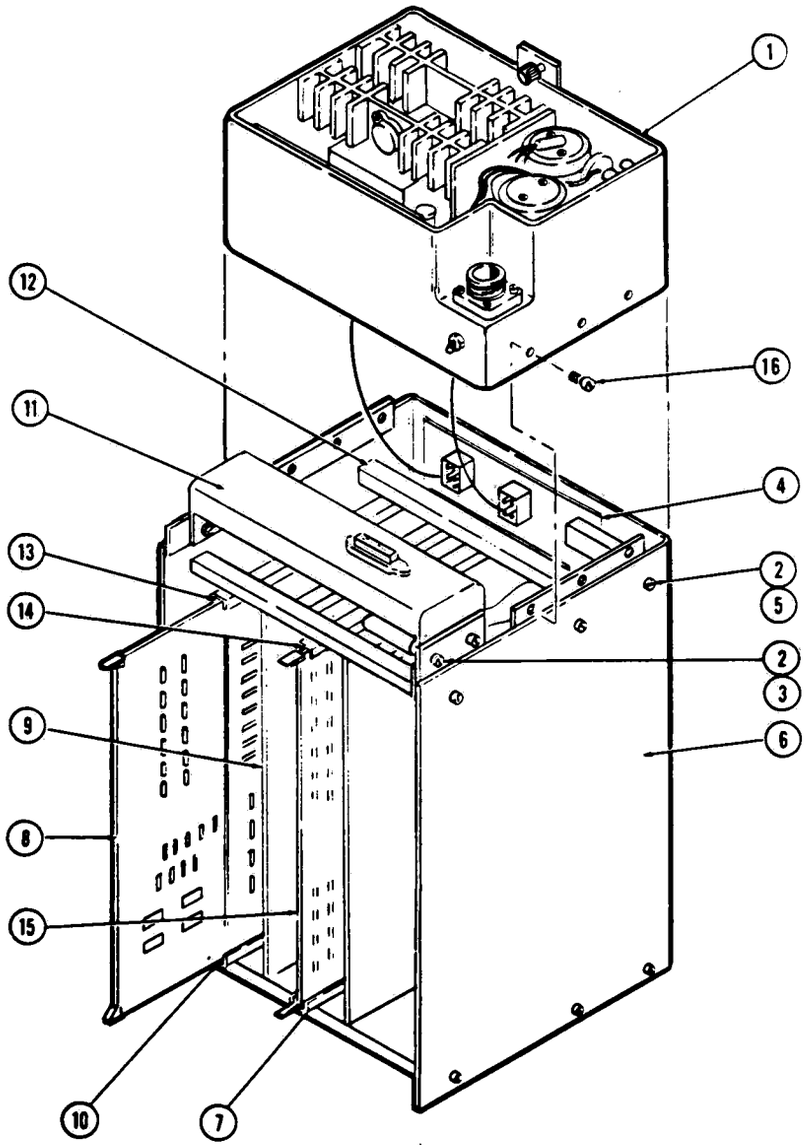


Figure 9-7. MAIN CONTROL ASSEMBLY, Eagle 2300.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-7-	P	146645	895		MAIN CONTROL ASSEMBLY, Eagle 2300	X
1	P	146645	042		POWER SUPPLY ASSEMBLY (Repaired P-764193-027)	1
	P	764317	833		• FUSE, Pico, 2 Amp, 125 V (F4)	1
	P	764317	834	*	• FUSE, Pico, 4 Amp, 125 V (F2)	1
	P	764317	836	*	• FUSE, Pico, 1/2 Amp, 125 V (F3)	1
	P	764317	771	*	• FUSE, Cartridge, 2 Amp, 250 V (F402)	1
2	P	84116	002		LOCKWASHER, #6	20
3	P	40357	045		SCREW, Self Tapping, #6 x 1/4	8
4	P	146581	004		MOTHER BOARD ASSEMBLY	1
5	P	84117	002		SCREW, Pan Head, #6-32 x 5/16	10
6	P	93762	001		CHASSIS	1
7	P	84225	001		GUIDE, Card	6
8	P	146586	051		PC CARD, CPU	1
9	P	84467	001		PLATE, Side	2
10	P	84226	001		TAB, Locking	6
11	P	93900	045		RECEPTACLE BRACKET ASSEMBLY	1
12	P	129030	001		BAR, PC Board Guide	4
13	P	83528	001		TAB, ID Locking, CPU	1
14	P	83528	007		TAB, ID Locking, I/O 1	1
15	P	146588	051		PC CARD, I/O 1	1
16	P	34461	001		SCREW, Round Head, #6 x 3/8	3
17	P	136800	561		HEAT SINK (Not Shown)	1
18	P	83528	008		TAB, ID Locking, I/O 2 (Not Shown)	1

*Box of Five.

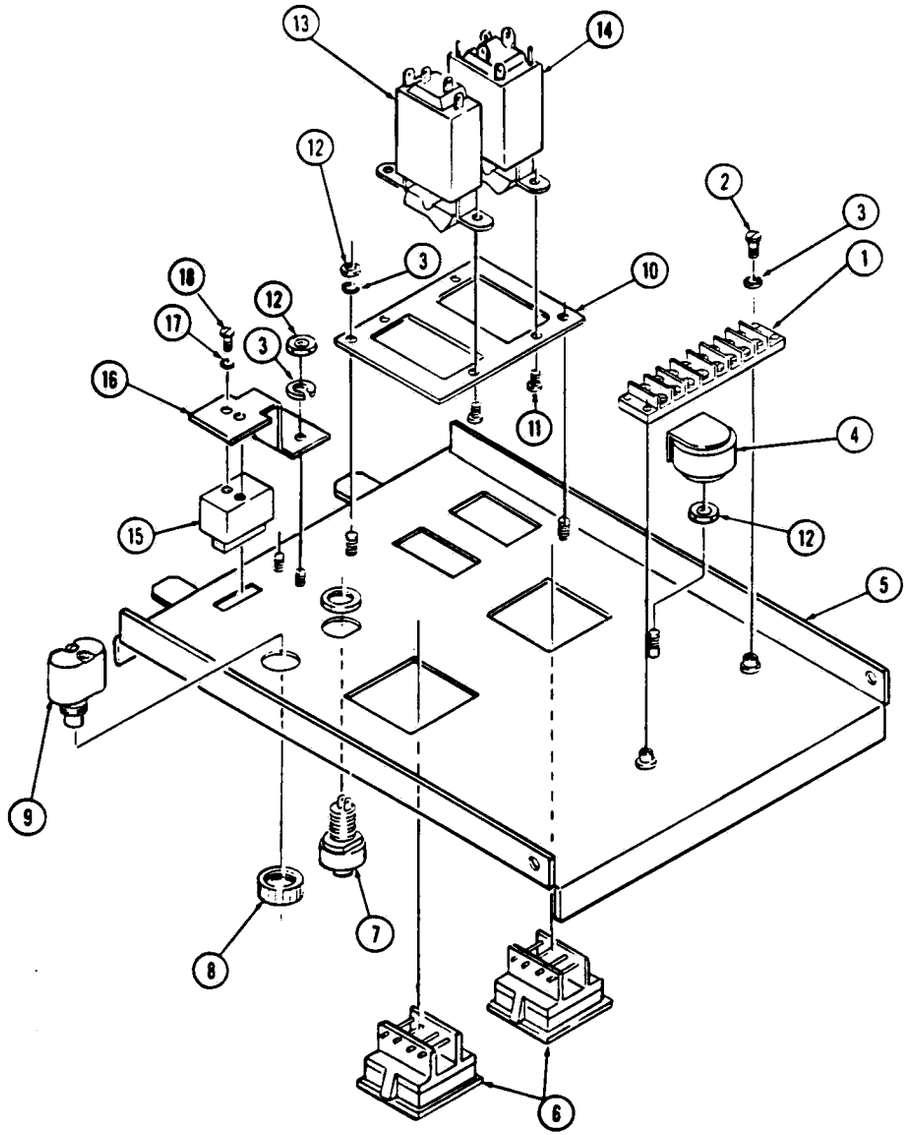


Figure 9-8. SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-8-					SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2)	X
1	P	90627	091		BLOCK, Terminal, 15 Amp, 8 Point	1
2	P	3960	041		SCREW, Round Head, #6-32 x 1/2	2
3	P	18131	091		LOCKWASHER, #6	6
4	P	83933	002		BUZZER	1
	P	764316	608		• KIT, Buzzer Resistor (See Fig. 9-9)	1
5	P	146645	568		PANEL, Secondary	1
6	P	136315	001		SWITCH, Thumbwheel, 4 Switch Assembly	2
7	P	84400	001		BREAKER, Circuit, CB-2	1
8	P	44155	091		GUARD, Button	1
9	P	48070	091		SWITCH, Pushbutton, PB-1	1
10	P	93757	001		SPACER, Breaker	1
11	P	27741	041		SCREW, Flat Head, #6-32 x 3/16	4
12	P	3037	041		NUT, Hex, #6-32	5
13	P	93105	001		BREAKER, Circuit, CB-1	1
14	P	129022	001		SWITCH, Rocker, SW-1	1
15	P	84362	002		COUNTER	1
16	P	93749	001		BRACKET, Counter	1
17	P	30743	045		LOCKWASHER, #4	2
18	P	17658	041		SCREW, Round Head, #4-40 x 3/16	2

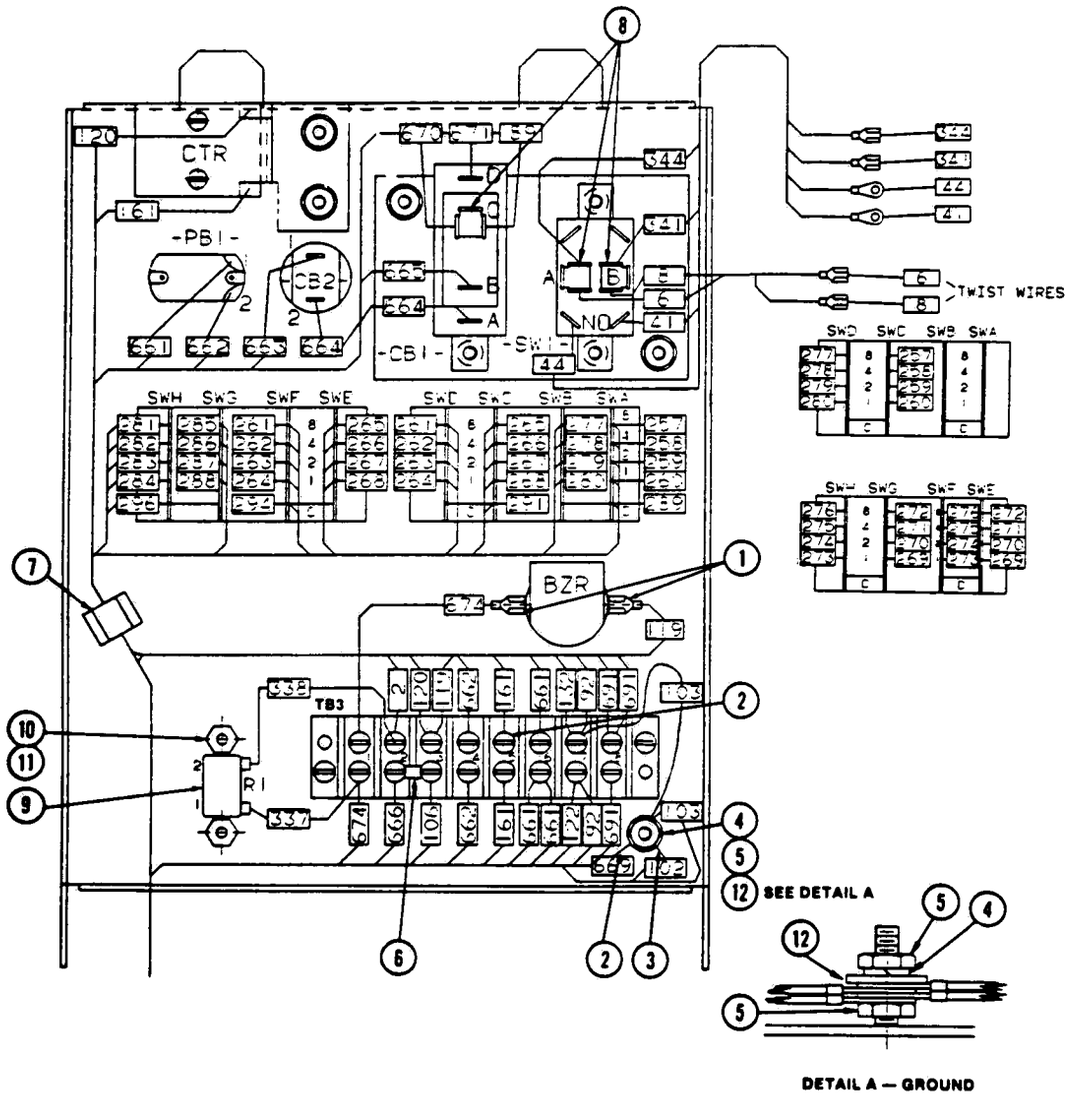


Figure 9-9. SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-9-	P	146645	569		SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2)	X
1	P	91694	091		RECEPTACLE, 3/16 Lug x #18-22 Wire	2
2	P	90619	091		TERMINAL, Wire, #6 Ring x #18-22 Wire	11
3	P	14592	091		TERMINAL, Wire, #10 Stud x #16-14 Wire	2
4	P	18131	091		LOCKWASHER, #6	1
5	P	3037	041		NUT, Hex, #6-32	2
6	P	84123	001		JUMPER, Terminal Block	1
7	P	431152	091		CLIP	1
8	P	32118	091		ADAPTER, Terminal	3
9	P	129318	001		RESISTOR, 3 kΩ, R1	1
10	P	13794	041		NUT, Hex, #4-40	2
11	P	26032	091		WASHER, Flat	2
12	P	17589	045		WASHER, Flat	1

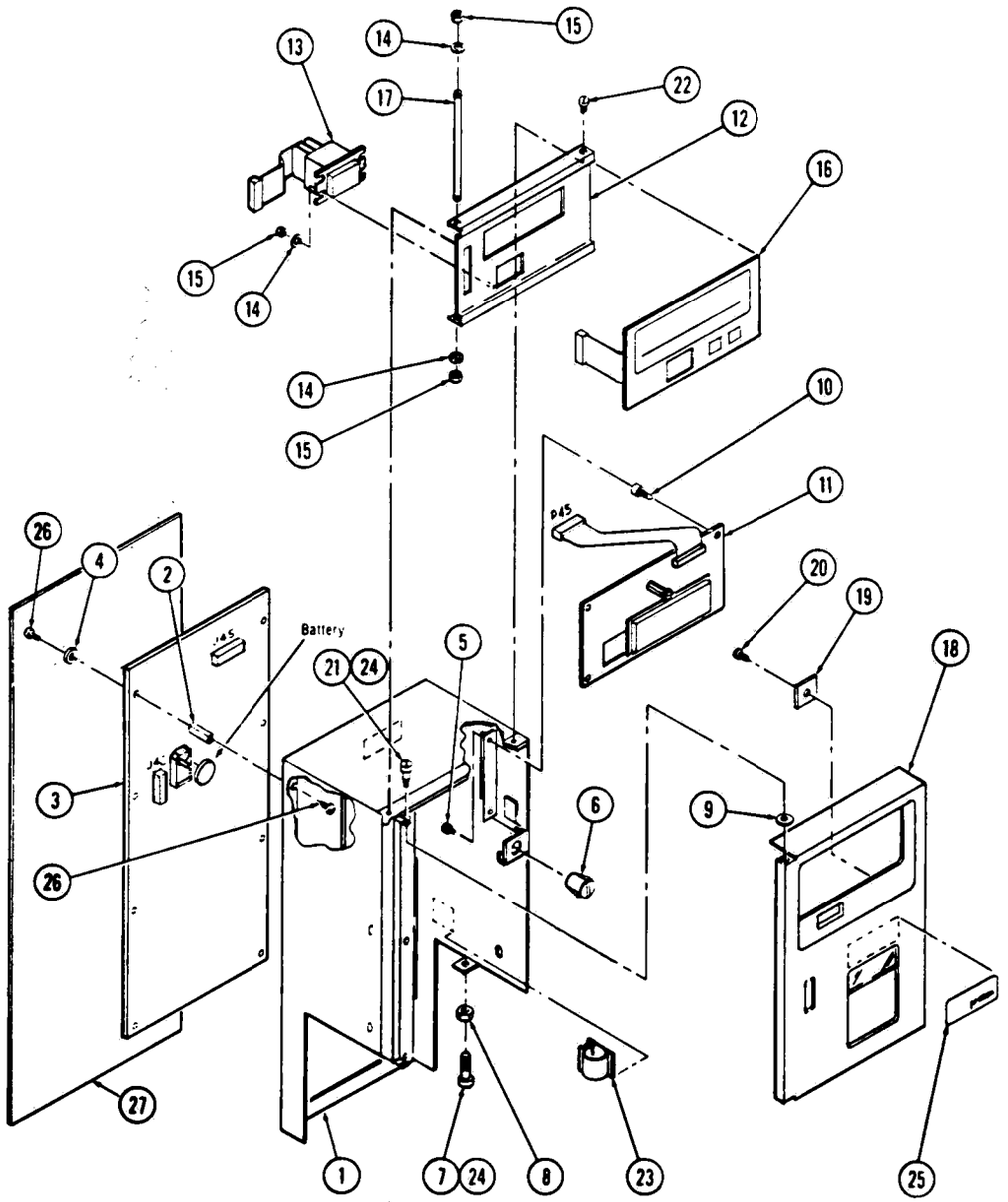


Figure 9-10. PRINTCON HOUSING ASSEMBLY, Eagle 2300.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-10-	P	146645	624		PRINTCON HOUSING ASSEMBLY, Eagle 2300	X
1	P	146649	111		HOUSING, Weldment	1
2	P	129356	033		STAND-OFF	8
3	P	146654	001		P/C BOARD ASSEMBLY, Printcon Control	1
					• P/C BOARD ASSEMBLY, Repaired	1
	P	150822	351		• BATTERY, Coincell	1
4	P	129352	094		WASHER, Flat, #6 Nylon	8
5	P	12451	041		SCREW, Round Head, #6-32 x 1/4	8
6	P	129356	001		CATCH, Magnetic	1
7	P	41012	061		SCREW, Socket Head, #10-32 x 1/2	2
8	P	2959	041		NUT, Hex, #10-32	2
9	P	5469	041		WASHER, Flat, #6	2
10	P	84147	001		SUPPORT, Circuit Board	3
11	P	146633	081		DISPLAY BOARD ASSEMBLY, Digital Printer	1
	P	764193	029		• DISPLAY BOARD ASSEMBLY, Repaired	1
12	P	93900	001		DISPLAY BRACKET ASSEMBLY	1
13	P	93900	022		SWITCH, Thumbwheel	1
14	P	84114	001		WASHER, Flat, #4	4
15	P	13794	041		NUT, Hex, #4-40	4
16	P	136805	004		PANEL, Overlay Display	1
17	P	129356	023		STUD	1
18	P	146649	009		DOOR, Printer Display	1
19	P	129356	002		STRIKE	1
20	P	82340	001		SCREW, Flat Head Self Tapping, #6 x 5/16	1
21	P	129356	006		SCREW, Shoulder, #4-40 x 1/8	2
22	P	40357	045		SCREW, Self Tapping, #6 x 1/4	1
23	P	150539	001		CLIP, Cable	1
24	P	5300	640		VIBRATITE	AR
25	P	129356	142		LABEL, Printcon	1
26	P	3984	041		SCREW, Round Head, #6-32 x 3/8	16
27	P	150822	611		PAD, Anti-Static	1

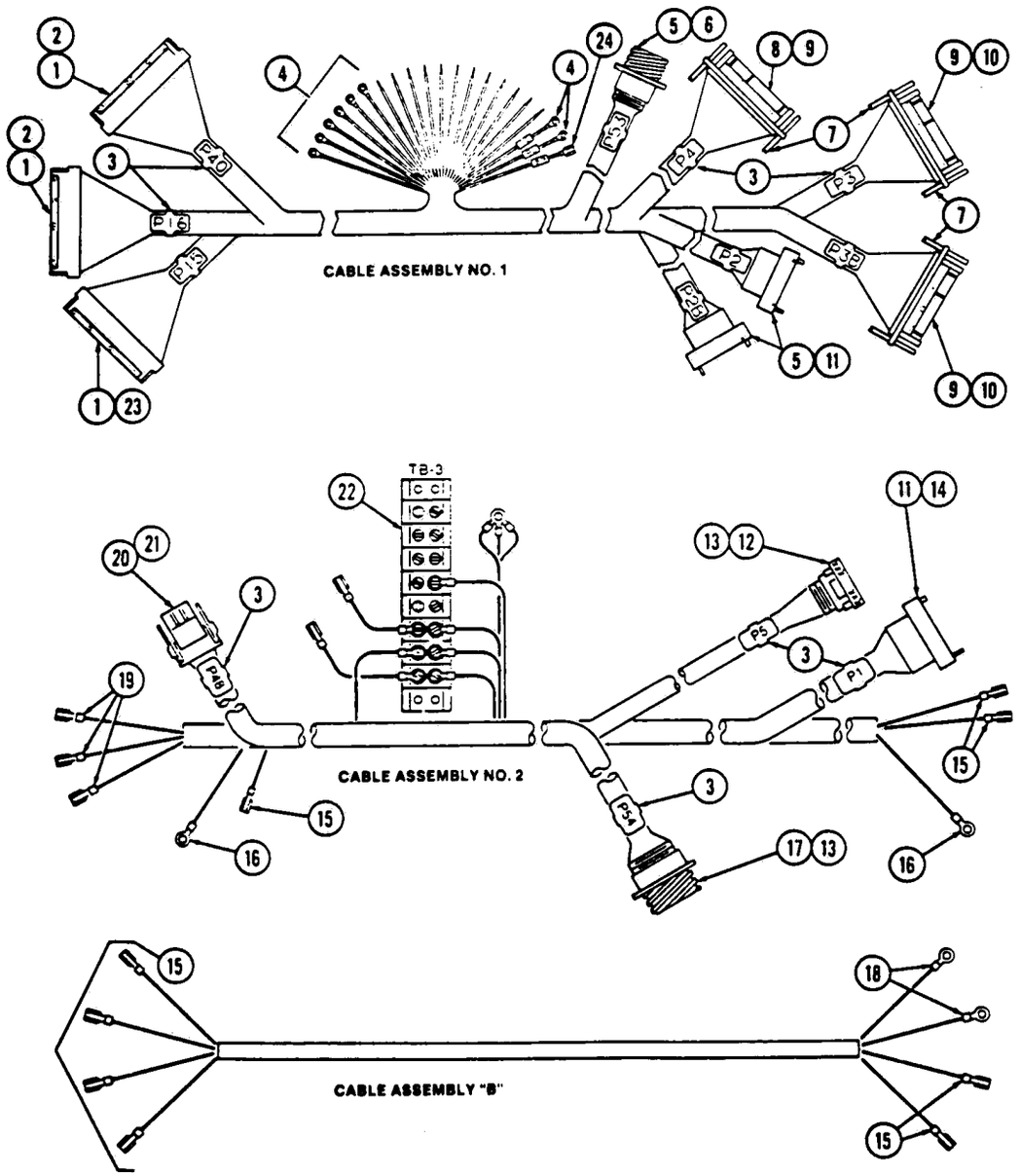


Figure 9-11. HARNESS ASSEMBLY, Secondary Panel, Eagle 2300.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-11-					HARNESS ASSEMBLY, Eagle 2300 Secondary Panel	X
1	P	84187	003		CONTACT, Socket, P15, P16 and P40	67
2	P	84229	002		HOUSING, Connector, 36 Position, P16 and P40	2
3	P	150822	003		MARKER, Tie	10
4	P	129278	001		TERMINAL, Wire, #6 Ring x 22-26 AWG	11
5	P	150822	030		CONTACT, Socket, P2, P2B and P53	17
6	P	93443	005		RECEPTACLE, 14 Position, P53	1
7	P	84192	001		JACKSCREW, Female	6
8	P	84205	002		HOUSING, Pin, 38 Position, P4	1
9	P	84207	002		PIN, Contact, P3, P3B and P4	48
10	P	84205	001		HOUSING, Pin, 28 Position, P3 and P3B	2
11	P	93829	001		BLOCK, P1, P2 and P2B	3
12	P	92838	002		PLUG, 16 Position, P5	1
13	P	84198	004		SOCKET, Contact, P5 and P54	22
14	P	150822	043		PIN, Contact, P1	8
15	P	32119	091		RECEPTACLE, 1/4 Lug x 14-16 AWG	9
16	P	14590	091		TERMINAL, #6 Ring x 14-16 AWG	3
17	P	93443	006		RECEPTACLE, 37 Position, P54	1
18	P	14591	091		TERMINAL, Wire, Ring x 14-16 AWG	2
19	P	90695	091		RECEPTACLE, 1/4 Lug x 18-22 AWG	7
20	P	129352	121		HOUSING, Socket, 9 Position, P48	1
21	P	84220	002		CONTACT, Socket, P48	8
22	P	90627	091		BLOCK, Terminal, 8 Position, 15 A	1
23	P	84229	001		RECEPTACLE, 30 Position, P15	1
24	P	84402	001		RECEPTACLE, 1/4 Lug x 18-22 AWG	1

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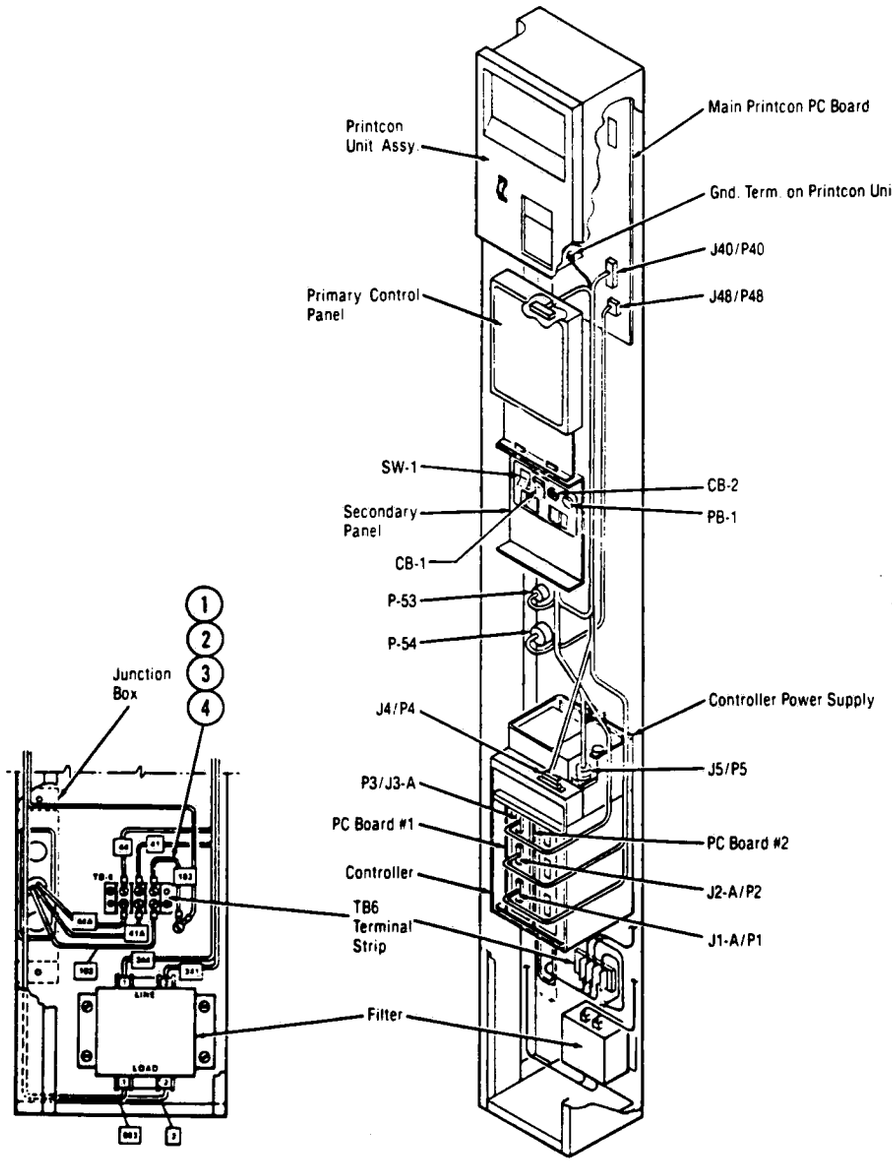


Figure 9-12. CONNECTION DETAILS, Eagle 2300 Control Column.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
9-12-				CONNECTION DETAILS, Control Column, Manual Door	X			
				CONNECTION DETAILS, Control Column, Power Door		X		
1	P	19522 091		TERMINAL, Wire, #10 Ring x 16-22 AWG	1	1		
2	P	82675 001		SCREW, Green Ground, #10-32 x 3/8	1	1		
3	P	14865 091		TERMINAL, Wire, #8 Ring x 18-22 AWG	1	1		
4				WIRE, Green	1	1		

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AMSCO

Eagle® 2300 SCIENTIFIC SERIES MEDIUM STERILIZERS with Printcon™

Gravity **Laboratory/Isothermal**

• *single door*

TECH DATA

Medium Steam Sterilizer (SINGLE DOOR)

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system**; two types, both use steam under pressure as the sterilizing agent and operate by the gravity air-removal principle.

Types and Uses

Eagle 2300 is designed for scientific, research laboratories.

Gravity - for sterilizing liquids in flasks with vented closures at 212 to 254 F (100 to 122 C); also heat- and moisture-stabile goods at 212 to 280 F (100 to 138 C); and for decontaminating supplies after laboratory procedures.

Laboratory/Isothermal - in addition to the above gravity cycles, offers processing heat-coagulable and heat-sensitive solutions and media at the lower temperatures of 170 to 212 F (78 to 100 C); fractional sterilization; pasteurization; and inspissation.

Chamber Sizes

Interior dimensions are 24x36x36 inches (610x914x914 mm), 24x36x48 inches (610x914x1219 mm) or 24x36x60 inches (610x914x1524 mm), as specified.

Standards

Every sterilizer meets applicable requirements of the following listings and standards and carries the appropriate symbols:

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Inner shell, including door, is constructed to withstand working pressure of 40 psig (2.81 kg/cm²).

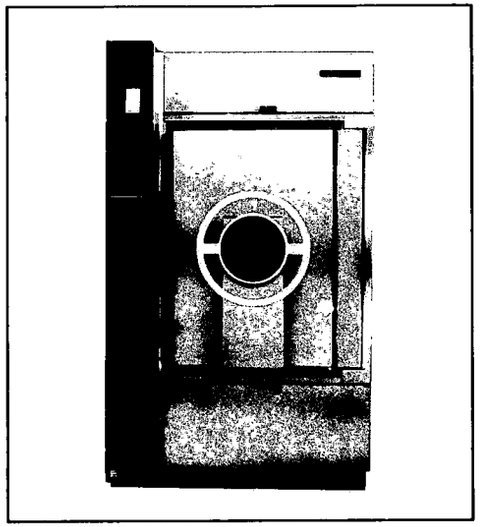
Federal Specification GG-S-1340A performance requirements for both high and low temperature processing.

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

ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202 or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

ASTM Specification B43 or B135, alloy 1 for seamless, red brass tubing.



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Chamber Size
- ☐ Gravity, 24 x 36 x 36"
- ☐ Laboratory/Isothermal, 24 x 36 x 36"
- ☐ Gravity, 24 x 36 x 48"
- ☐ Laboratory/Isothermal, 24 x 36 x 48"
- ☐ Gravity, 24 x 36 x 60"
- ☐ Laboratory/Isothermal, 24 x 36 x 60"

Door Operation
- ☐ Manual ☐ Power

Door Hinge
- ☐ Right Side
- ☐ Left Side

Mounting
- ☐ For Recessing
- ☐ Cabinet Enclosed

Option
- ☐ Seismic Tie-down Kit
- ☐ Compressed - Air Solution Cooling*
- ☐ Automatic Shutdown Device*
- ☐ Extra Chamber Penetrations*
- ☐ Pure Steam Piping*

Materials Handling Accessories*
- ☐ Rack and Shelves (36 and 48" Long Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____

Location(s) _____

_____

_____

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DESIGN FEATURES

Eagle® 2300 with Printcon™

Preprogrammed sterilizer with digital readouts and computer-generated printed records. Eagle microcomputers monitor and control system operations and functions. Cycle progresses automatically through conditioning, sterilizing, exhaust (fast or if liquids, adjustable slow with accelerator) and drying phases. Completion of cycle indicated visually; also audibly for 90 seconds.

Eagle-Eye™ Vertical Control Column (Figure 1)

Controls are neatly arranged in a vertical column conveniently located at the side of the sterilizer . . . not exposed to the continuous heat, vapor, and condensate resulting from the sterilization process. For easy access, column is on side opposite door hinge. Salient features include:

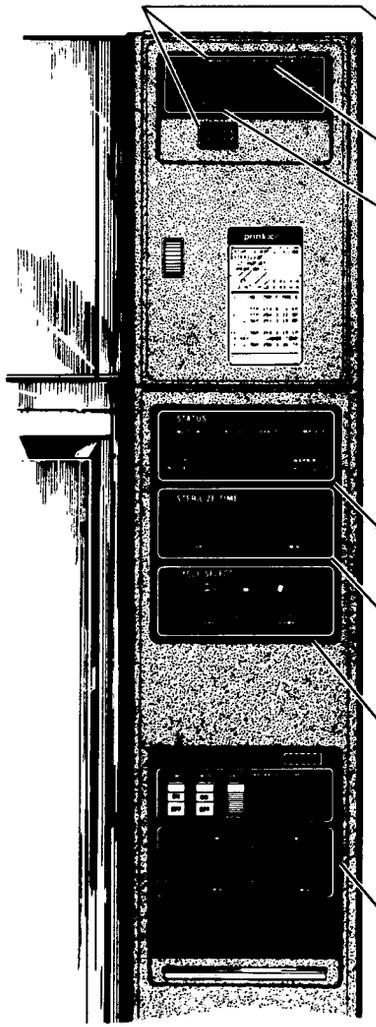


Figure 1. Eagle-Eye Vertical Control Column.

1. **Printcon,** digital-printer-controller, controls, monitors, and records daily cycle number, chamber pressure, temperature, date, and time during sterilization, and provides **continous LED display** of pressure and temperatures. (When control is turned on, all LEDs on the display board light momentarily for a **lamp test.**).

• **Temperature** is set on three-digit thumbwheel switch. During cycle actual temperature is displayed and printed. If selected temperature is outside allowable range, 150-295 F (65-146 C), buzzer sounds until an allowable temperature is selected. Temperature is locked in and cannot be changed once cycle is started.

• **Pressure** is continuously displayed and printed at programmed cycle transition points.

• **Time** (in hours and minutes, am/pm) and **Date** (month, day, year) are displayed by touching Time or Date switches.

Printcon provides easy-to-read **permanent printed record** of all pertinent cycle data, providing assurance to operator that cycle parameters have been met. **Alphanumeric printer** documents date, daily cycle number, starting time of each cycle, temperature selected, key transition points in cycle, and deviations which might jeopardize sterilization process. **The Eagle 2300 printout** may, with a service adjustment, provide the printing of time, temperature, and pressure at **scheduled intervals** throughout the exposure phase. Print interval is adjustable in 30-second increments from 30 seconds to 49 minutes, 30 seconds. One- or two-ply paper is available for the printer. With two-ply paper, an average day's record can be automatically stored, which can then be saved for future documentation; the second copy torn off and placed with each sterilizer load. (A sample printout is shown in **Figure 2.**)

2. **Auto-Lume panels** light when power is on. Top panel gives **cycle status**; center panel, **sterilize** and **dry times**; bottom panel, **cycle selectors**.

• **Status** lights show each phase of sterilizer operation. Light visually alerts operator if door is unlocked. Operator is visually and audibly alerted if temperature setpoint is not reached or if temperature drops below setpoint during Sterilize phase.

• **Sterilize Time** and **Dry Time** are locked in and cannot be changed once cycle is started. **Sterilize time** displays when in cycle. **Dry time** displays (momentarily) when operator makes selection, or (continuously) when in Dry phase of cycle. Timers automatically reset upon completion of cycle, eliminating need for resetting between repeated cycles. Timers also reset if sterilize temperature drops 2 F (1.1 C) below set point during exposure period.

• **Cycle Select** buttons require positive force to actuate, eliminating unintentional cycle selections. (Chamber door must be locked pressure-tight to initiate a cycle.) Selected cycle is clearly indicated, others locked out. Throughout entire liquids cycle, **WARNING** light alerts operator to **HOT LIQUIDS** in chamber. Following cycle, light **begins flashing** when chamber door is cracked open for cooling period. **Buzzer** again sounds to indicate end of required **10-minute** cooling period. Pressing RESET button eliminates warning signal.

3. **Secondary Controls** are behind a sliding door beneath the Auto-Lume panels. Included are **cycle monitor** (non-resettable) to count number of sterilizing cycles for programming preventive maintenance; **power switches**, one to isolate the entire unit and a second one to isolate only the controls; **circuit breaker**; **cycle reset** button (in case incorrect cycle is selected); two sets of **thumbwheel switches** for setting Sterilize and Dry times (up to 99 hours and 99 minutes); and operating instructions.

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F- 2

TECHNICAL DATA

Automatic Control

Programmed instructions (cycle and printer) are contained in 8-bit parallel **microcomputers,** each fabricated on a single silicon chip using N-channel silicon gate metal-oxide semiconductor (MOS) process. This fabrication represents today's "state-of-the-art" technology in large-scale integrated (LSI) circuits. **Cycle memory** is maintained during power outages of up to 20 milliseconds . . . eliminates necessity of reinitiating cycle following routine power switchovers. After 20 milliseconds operator must reset control power. Visual and audible signals then indicate that cycle was interrupted. Printout records failure (see **Figure 3**).

Inputs. Precision time (exposure and drying) and temperature settings are made on **thumbwheel switches.** Timing precision is maintained with the use of quartz crystals. Temperature is sensed by a **resistance thermal detector** (RTD) and pressure by a strain-gauge-type **pressure transducer.** These signals are then converted into electrical impulses to provide accurate control inputs and readings during entire cycle.

Pressure and vacuum set points are service adjustable. Pressure and temperature sensor failure will sound an alarm and a message will be printed. (See **Figure 3.**)

Display panels include large, easy-to-see **LED digital readouts,** visible legends and touch-sensitive switches. Time readouts first indicate set times and then, as cycle progresses, count down remaining time. Temperature readout can be in either Fahrenheit or Celsius. Display of pressure/vacuum can be in either English or metric. Temperature and pressure/vacuum can be shown with or without decimal places.

Alphanumeric Impact Printer produces characters within a **five-by-seven dot matrix.** Maximum 20 characters per line are printed on **2-3/8-inch-wide paper tape.** Tape exits from an opening flush with the surface of the control panel. Motorized take-up simplifies tape replacement and provides **automatic tape storage.** Maximum length of stored record is 15 feet. Black ink ribbon is contained in a compact, **easy-to-change cartridge.** Proper inking of ribbon is assured by a re-inking roll within the cartridge. Printer rated speed is 108 lines per minute. **Data is automatically printed** at the beginning and end of each cycle and at all transition points. Three tape rolls and two ink cartridges are furnished.

Printed Circuit Boards. Program boards are keyed, plug-in type. Service is accomplished from front of sterilizer. For diagnostic purposes, light emitting diodes (LEDs) indicate presence of signal to associated valves or other electrically operated devices. All PC boards are **coated** for increased dielectric strength and humidity protection.

Power Supply. Sterilizer requires 120 VAC, 50/60 Hz, single phase. Integral power supply provides regulated voltage levels for lamps, printer, take-up motor, analog circuits, and digital circuits. Solenoid valves operate on 120 VAC. The Printcon system includes a three-volt **silver oxide battery** to continuously maintain correct time and date without external power. Battery life is approximately one year.

Manual Control (Gravity Cycles Only)

Sterilizer is manually operable (without electric power) by a single programming wheel. (Printcon function is not operational in this mode.)

Jacket and Chamber Assembly

Monel door frame supports and conceals ends of door-holding arms when door is locked . . . presents a smooth surface for door gasket contact.

Hot-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell and chamber backhead are **nickel clad,** 0.025-inch (0.63 mm) thick (nominal). A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber assembly is 1-inch (25 mm) thick (nominal), and double faced with aluminum foil. It is held in place by pressure-sensitive tape, aluminum straps and clips. Sterilizer jacket (including backhead) is painted prior to being insulated.

Door. Nickel-clad (0.025-inch (0.63 mm) thick, nominal), hot-rolled carbon steel. Manually operable or power driven, as specified. Stainless-steel, sound-deadened cover conceals holding arms and exterior parts. Stainless-steel, bearing-mounted hinge on either side of chamber, as specified. Door adjustable for accurate gasket alignment. Radial arms exert even pressure on silicone-rubber sealing gasket. Microswitch prevents inadvertent start of cycle before door is locked; **pressure lock** keeps door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

- **Manual Door.** Radial arms actuated by rotating a low-heat-conducting handwheel.
- **Power Door.** Opened and closed by a fused, motorized mechanism with magnetic slip clutch (for overload protection). Radial arms positioned by socket plate assembly run by motorized mechanism with gear reducer and overload protection. Door stops automatically if obstruction is encountered while operating, in addition a separate stop button is provided. Power-driven door is also manually operable.

Isothermal Processing (Laboratory/Isothermal Model Only)

If isothermal mode is selected, chamber jacket is not heated. Chamber temperature is maintained by circulation of steam/air mix. Automatic cycle control and monitoring is same as for gravity cycles.

Chamber Drain System

Designed to prevent pollutants from entering into the water-supply system and sterilizer. **Steam-condensate system with water saver** converts steam to condensate and disposes condensate to waste. Regulates waterflow consistent with amount of steam discharged. Water supply **shutoff valve** is behind service access door. A constant steam bleed across the temperature sensing element (RTD) in the chamber line provides improved air elimination and more accurate temperature sensing.

Drying System

System ejector reduces chamber pressure during drying phase, draws air into chamber through a **bacteria-retentive filter.** This filtered air entrains and conducts odors and vapors from chamber to drain. Steam to ejector is microcomputer-controlled.

Steam Source

Sterilizer is piped, valved and trapped to receive steam delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). Service lines terminate at fittings for connection to building service lines. Sterilizer steam supply line includes a strainer, shutoff and internal pressure regulator. Jacket condensate line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door. Jacket pressure and chamber pressure/vacuum **gauges** are mounted in the valve panel, behind the upper access door. Scales are graduated in both English and metric.

Other Components

The following are furnished to obtain a complete working unit, ready for (but not including) connection to the building utility service lines.

Solenoid Valves to simplify sterilizer piping. Valves are placed where they are needed and can be serviced individually.

Manual Valves. Bronze, angle type with renewable Monel seats and synthetic discs or equivalent high-quality parts. Hydrostatically tested at 350 psig (24.61 kg/cm²) or proven leakproof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Low-heat-conducting, easily replaceable handles.

Steam Pressure Regulator operates on supply pressure of 50 to 80 psig (3.52 to 5.62 kg/cm²). Secondary pressure is adjustable and controlled by a phosphor-bronze, spring-loaded bellows. Adjustable stops are factory set for sterilizer operation at either 253 or 273 F (122 or 134 C).

Thermostatic Steam Traps pressure and temperature compensated. Renewable **Monel bellows** with matched stainless-steel plunger and seat.

Baffle shields steam supply opening inside the chamber.

Pipe and Electrical Connections terminate within the confines of the sterilizer. Piping used to support other components is rigid brass.

OPTIONAL CONTROLS AND CYCLES

Compressed-Air Solution Cooling*

Cycle facilitates processing of media-filled, screw-capped borosilicate glass containers. The load is cooled via filtered, compressed air circulating off the rapidly cooled chamber walls and exiting through the drain plumbing.

Automatic Shutdown Device*

Automatic shutoff enables added productivity.

Pure Steam Piping*

All pipes, fittings, and valves leading to and from both the steam source and the sterilizer chamber are constructed from 300- series stainless steel.

Chamber Penetrations*

Capped openings to chamber to facilitate insertion of test equipment and instrumentation leads.

Optional Material Handling Accessories

Include racks with shelves, instrument trays and loading cars . . . **all constructed of Monel;** and carriages with a painted-steel finish. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model, or for recessing, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other (freestanding units), or front panel to wall partition (recessed units). Stainless-steel front panel has service access door and height-adjustable kickplate. Inside of the access door contains a rack for instructional materials. Top and side panels (only freestanding units) enclose the sterilizer body and piping. Top panel is louvered. All panels are stainless steel. **Casters and lifting lugs** facilitate transporting and positioning sterilizer. A **Seismic Tie-down Kit** is available for seismic installation of all medium Eagle sterilizers, if required.

WARRANTY

The American Sterilizer Company warrants that each sterilizer is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and 90 days on labor. AMSCO representatives can provide full details of the warranty program upon request.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.

*See separate product literature for further details.

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION						HEAT LOSS BTU/hr at 70 F (21 C)		
		Water†		Steam††		Electricity — Amps (120 Volts, Single Phase)		Cabinet Enclosed	Recessed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Manual Door Model	Power Door Model		Front of Wall	Behind Wall
24x36x36 (610x914x914)	3700 (1680)	15 (57)	280 (1060)	112 (51)	112 (51)	3	20	12550	5000	7500
24x36x48 (610x914x1219)	4575 (2077)	15 (57)	284 (1075)	148 (67)	148 (67)	3	20	14650	5000	9600
24x36x60 (610x914x1524)	5250 (2384)	15 (57)	288 (1090)	185 (84)	185 (84)	3	20	16800	5000	11800

Based upon chamber filled with water
†At 20-50 psig (1.41-3.52 kg/cm²)
††At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item_____: Furnish an AMSCO Eagle 2300 Series sterilizer with Printcon per Tech Data Sheet SD-381. Construct chamber ☐ 24x36x36" **or** ☐ 24x36x48" **or** 24x36x60". Supply ☐ gravity model **or** ☐ laboratory/isothermal model. Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ to be freestanding **or** ☐ for recessing into a partition wall.

```
----------------------
CYCLE COMPLETE

  LOAD(01) __________
STERILIZER __________
  OPERATOR __________

  STERILIZE 1:46 H:M
    EXHAUST    3 MIN
TOTAL CYCLE 1:51 H:M

Z  8:11A  92.0  1.0P
E  8:07A 122.9 17.9P
S  8:03A 123.2 18.3P
S  7:53A 122.7 17.8P
S  7:43A 123.2 18.1P
S  7:32A 122.1 17.1P
S  7:22A 122.5 17.7P
S  7:12A 123.1 17.8P
S  7:02A 122.7 17.2P
S  6:52A 122.7 17.2P
S  6:42A 122.1 16.6P
S  6:32A 123.0 17.8P
S  6:22A 121.1 16.3P
C  6:21A  73.9  7.8P
C  6:20A  26.1  0.1V

    TIME TEMP. PRES.
         °C   ENG.

CONTROL TEMP 122.8°C
SET TEMP     121.0°C
LIQUID
CYCLE START  4-24-84
----------------------
```

- to be filled in by operator
- phase times in hours and minutes
- cycle complete
- exhaust: pressure
- sterilize phase in multiple print intervals (10 minute example shown)
- condition phase
- temperature in Celsius, pressure in English
- cycle type and temperature selected

Figure 2. Typical Printout.

```
----------------------
POWER ON AT 4-24-84
   9:01A  68.4  0.0P
----------------------
```

Power On Message

```
----------------------
POWER ON AT 4-24-84
   9:34A 120.5 10.4P
----------------------
```

Power Restored After Power Failure

```
----------------------
ABORT:  RESET BUTTON
* 12:12A 279.4 22.2P
----------------------
```

Reset Button Pressed

```
----------------------
ALARM:      TOO LONG
*  1:45P 265.9 20.4P
----------------------
```

Condition Phase too long

```
----------------------
*11:05A 266.4 25.5P
ALARM:    UNDER TEMP
*11:04A 269.9 27.3P
----------------------
```

Temperature Drops 2 F Below Setpoint

```
----------------------
ABORT:     DOOR OPEN
*  9:58A 243.3 12.7P
----------------------
```

Door Opened During Cycle

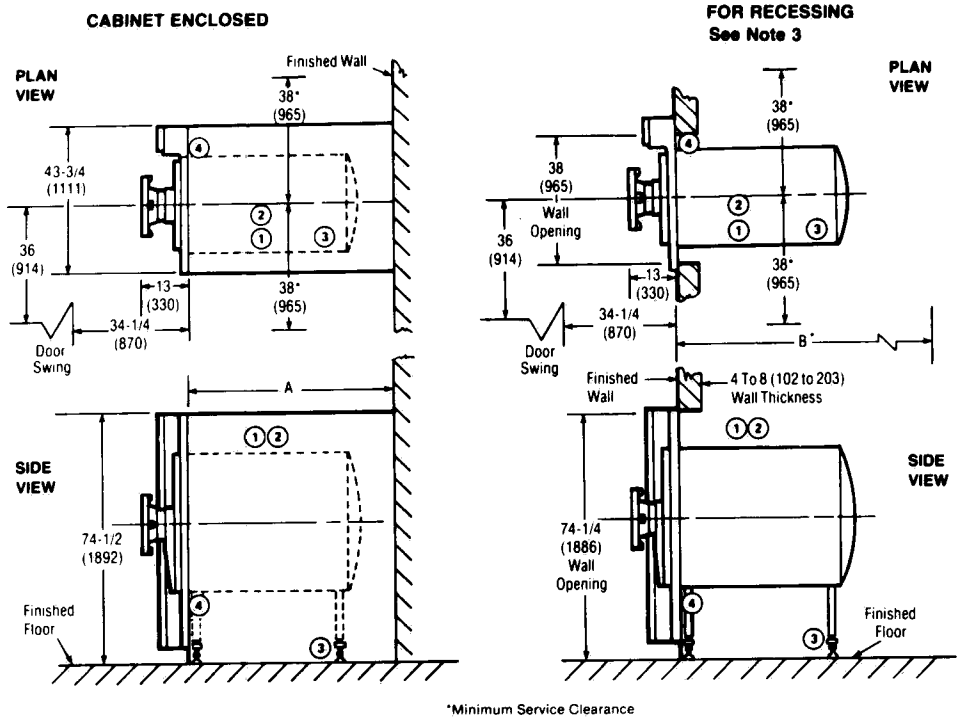
```
----------------------
ABORT:   TEMP SENSOR
*  3:45A 306.8 10.0P
----------------------
```

Temperature Sensor Failure

```
----------------------
ABORT:   PRES SENSOR
* 11:55A 270.0 41.3P
----------------------
```

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



*Minimum Service Clearance

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

CHAMBER SIZE	A	B*
24x36x36 (610x914x914)	49-1/4 (1251)	62-1/8 (1578)
24x36x48 (610x914x1219)	62-1/2 (1587)	74 (1880)
24x36x60 (610x914x1524)	73-1/2 (1867)	89 (2261)

OPERATING REQUIREMENTS

1. COLD WATER — 3/4 NPT, 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
2. STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
3. DRAIN — 2 ODT
4. TERMINAL BOX — 120-V, 60-Hz, Single-phase Service for controls and, if furnished, power door

. . . 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. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. Clearance in front of sterilizer, for loading purposes, should equal
   - length of sterilizer plus 12 inches (305 mm), if shelves will be used.
   - twice the length of sterilizer, if loading car and carriage will be used.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.
7. Floor drain should be provided within confines of sterilizer framework.

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

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Eagle® 2300 SCIENTIFIC SERIES MEDIUM STERILIZERS with Printcon™

Gravity **Laboratory/Isothermal**

• *double door*

TECH DATA

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system**; two types, both use steam under pressure as the sterilizing agent and operate by the gravity air-removal principle.

Types and Uses

Eagle 2300 is designed for scientific, research laboratories.

Gravity - for sterilizing liquids in flasks with vented closures at 212 to 254 F (100 to 122 C); also heat- and moisture-stabile goods at 212 to 280 F (100 to 138 C); and for decontaminating supplies after laboratory procedures.

Laboratory/Isothermal - in addition to the above gravity cycles, offers processing heat-coagulable and heat-sensitive solutions and media at the lower temperatures of 170 to 212 F (78 to 100 C); fractional sterilization; pasteurization; and inspissation.

Chamber Sizes

Interior dimensions are 24x36x48 inches (610x914x1219 mm) or 24x36x60 inches (610x914x1524 mm), as specified.

Standards

Every sterilizer meets applicable requirements of the following listings and standards and carries the appropriate symbols:

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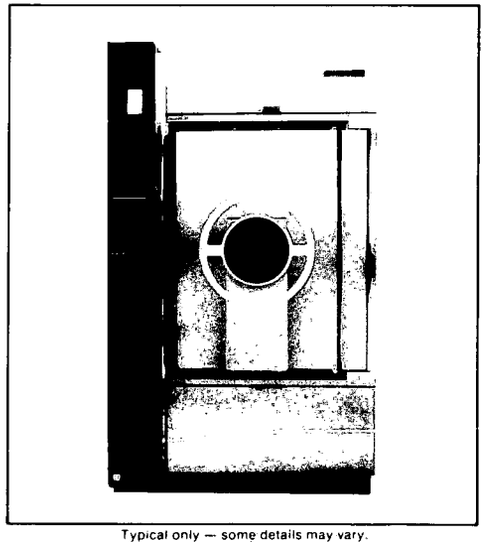
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Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Chamber Size
- ☐ Gravity, 24x36x48"
- ☐ Laboratory/Isothermal, 24x36x48"
- ☐ Gravity, 24x36x60"
- ☐ Laboratory/Isothermal, 24x36x60"

Door Operation
- ☐ Manual ☐ Power

Door Hinge (Operating End First)
- ☐ Right Side/Left Side
- ☐ Right Side/Right Side
- ☐ Left Side/Right Side
- ☐ Left Side/Left Side

Mounting
- ☐ For Recessing Through One Wall
- For Recessing Through Two Walls

Option
- Seismic Tie-down Kit
- Compressed - Air Solution Cooling*
- Automatic Shutdown Device*
- Cross Contamination Seal*
- Door Interlock and Light*
- Extra Chamber Penetrations*
- Pure Steam Piping*

Materials Handling Accessories*
- Rack and Shelves (48" Long Only)
- Loading Car and Carriage
- Surgical Instrument Trays

**See separate product literature*

Item No. _____

Location[s] _____

_____

_____

Medium Steam Sterilizer (DOUBLE DOOR)

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DESIGN FEATURES

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Eagle-Eye™ Vertical Control Column (Figure 1)

Controls are neatly arranged in a vertical column conveniently located at the side of the sterilizer . . . not exposed to the continuous heat, vapor, and condensate resulting from the sterilization process. For easy access, column is on side opposite door hinge. Salient features include:

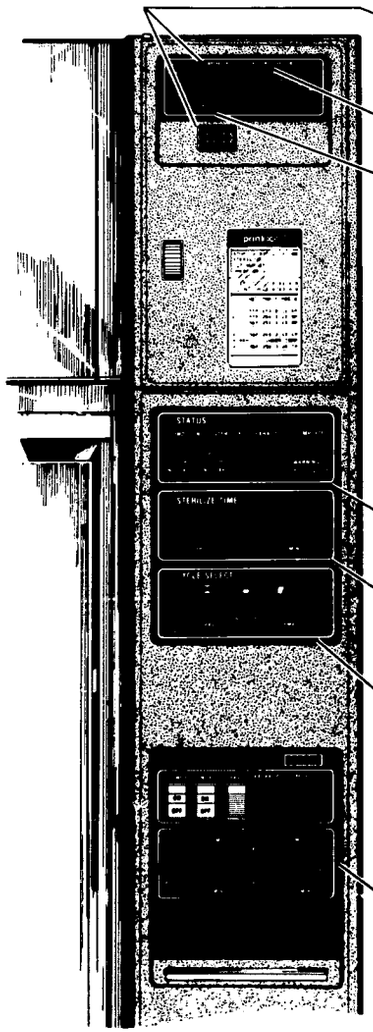


Figure 1. Eagle-Eye Vertical Control Column.

1. **Printcon,** digital-printer-controller, controls, monitors, and records daily cycle number, chamber pressure, temperature, date, and time during sterilization, and provides **continous LED display** of pressure and temperatures. (When control is turned on, all LEDs on the display board light momentarily for a **lamp test.**).

• **Temperature** is set on three-digit thumbwheel switch. During cycle actual temperature is displayed and printed. If selected temperature is outside allowable range, 150-295 F (65-146 C), buzzer sounds until an allowable temperature is selected. Temperature is locked in and cannot be changed once cycle is started.

• **Pressure** is continuously displayed and printed at programmed cycle transition points.

• **Time** (in hours and minutes, am/pm) and **Date** (month, day, year) are displayed by touching Time or Date switches.

Printcon provides easy-to-read **permanent printed record** of all pertinent cycle data, providing assurance to operator that cycle parameters have been met. **Alphanumeric printer** documents date, daily cycle number, starting time of each cycle, temperature selected, key transition points in cycle, and deviations which might jeopardize sterilization process. **The Eagle 2300 printout** may, with a service adjustment, provide the printing of time, temperature, and pressure at **scheduled intervals** throughout the exposure phase. Print interval is adjustable in 30-second increments from 30 seconds to 49 minutes, 30 seconds. One- or two-ply paper is available for the printer. With two-ply paper, an average day's record can be automatically stored, which can then be saved for future documentation; the second copy torn off and placed with each sterilizer load. (A sample printout is shown in **Figure 2.**)

2. **Auto-Lume panels** light when power is on. Top panel gives **cycle status**; center panel, **sterilize** and **dry times**; bottom panel, **cycle selectors**.

• **Status** lights show each phase of sterilizer operation. Light visually alerts operator if door is unlocked. Operator is visually and audibly alerted if temperature setpoint is not reached or if temperature drops below setpoint during Sterilize phase.

• **Sterilize Time** and **Dry Time** are locked in and cannot be changed once cycle is started. **Sterilize time** displays when in cycle. **Dry time** displays (momentarily) when operator makes selection, or (continuously) when in Dry phase of cycle. Timers automatically reset upon completion of cycle, eliminating need for resetting between repeated cycles. Timers also reset if sterilize temperature drops 2 F (1.1 C) below set point during exposure period.

• **Cycle Select** buttons require positive force to actuate, eliminating unintentional cycle selections. (Chamber doors must be locked pressure-tight to initiate a cycle.) Selected cycle is clearly indicated, others locked out. Throughout entire liquids cycle, **WARNING** light alerts operator to **HOT LIQUIDS** in chamber. Following cycle, light **begins flashing** when chamber door is cracked open for cooling period. **Buzzer** again sounds to indicate end of required **10-minute** cooling period. Pressing RESET button eliminates warning signal.

3. **Secondary Controls** are behind a sliding door beneath the Auto-Lume panels. Included are **cycle monitor** (non-resettable) to count number of sterilizing cycles for programming preventive maintenance; **power switches**, one to isolate the entire unit and a second one to isolate only the controls; **circuit breaker**; **cycle reset** button (in case incorrect cycle is selected); two sets of **thumbwheel switches** for setting Sterilize and Dry times (up to 99 hours and 99 minutes); and operating instructions.

Non-operating End Controls include Gravity and Liquids **cycle selectors** by which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and hot liquids.

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TECHNICAL DATA

Automatic Control

Programmed instructions (cycle and printer) are contained in 8-bit parallel **microcomputers**, each fabricated on a single silicon chip using N-channel silicon gate metal-oxide semiconductor (MOS) process. This fabrication represents today's "state-of-the-art" technology in large-scale integrated (LSI) circuits. **Cycle memory** is maintained during power outages of up to 20 milliseconds . . . eliminates necessity of reinitiating cycle following routine power switchovers. After 20 milliseconds operator must reset control power. Visual and audible signals then indicate that cycle was interrupted. Printout records failure (see **Figure 3**).

Inputs. Precision time (exposure and drying) and temperature settings are made on **thumbwheel switches.** Timing precision is maintained with the use of quartz crystals. Temperature is sensed by a **resistance thermal detector** (RTD) and pressure by a strain-gauge-type **pressure transducer.** These signals are then converted into electrical impulses to provide accurate control inputs and readings during entire cycle.

Pressure and vacuum set points are service adjustable. Pressure and temperature sensor failure will sound an alarm and a message will be printed. (See **Figure 3.**)

Display panels include large, easy-to-see **LED digital readouts,** visible legends and touch-sensitive switches. Time readouts first indicate set times and then, as cycle progresses, count down remaining time. Temperature readout can be in either Fahrenheit or Celsius. Display of pressure/vacuum can be in either English or metric. Temperature and pressure/vacuum can be shown with or without decimal places.

Alphanumeric Impact Printer produces characters within a **five-by-seven dot matrix.** Maximum 20 characters per line are printed on **2-3/8-inch-wide paper tape.** Tape exits from an opening flush with the surface of the control panel. Motorized take-up simplifies tape replacement and provides **automatic tape storage.** Maximum length of stored record is 15 feet. Black ink ribbon is contained in a compact, **easy-to-change cartridge.** Proper inking of ribbon is assured by a re-inking roll within the cartridge. Printer rated speed is 108 lines per minute. **Data is automatically printed** at the beginning and end of each cycle and at all transition points. Three tape rolls and two ink cartridges are furnished.

Printed Circuit Boards. Program boards are keyed, plug-in type. Service is accomplished from front of sterilizer. For diagnostic purposes, light emitting diodes (LEDs) indicate presence of signal to associated valves or other electrically operated devices. All PC boards are **coated** for increased dielectric strength and humidity protection.

Power Supply. Sterilizer requires 120 VAC, 50/60 Hz, single phase. Integral power supply provides regulated voltage levels for lamps, printer, take-up motor, analog circuits, and digital circuits. Solenoid valves operate on 120 VAC. The Printcon system includes a three-volt **silver oxide battery** to continuously maintain correct time and date without external power. Battery life is approximately one year.

Manual Control (Gravity Cycles Only)

Sterilizer is manually operable (without electric power) by a single programming wheel. (Printcon function is not operational in this mode.)

Jacket and Chamber Assembly

Monel door frames support and conceal ends of door-holding arms when doors are locked . . . present a smooth surface for door gasket contact.

Hot-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell is **nickel clad,** 0.025-inch (0.63 mm) thick (nominal). A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber assembly is 1-inch (25 mm) thick (nominal), and double faced with aluminum foil. It is held in place by pressure-sensitive tape, aluminum straps and clips. Sterilizer jacket is painted prior to being insulated.

Doors. Nickel-clad (0.025-inch [0.63 mm] thick, nominal), hot-rolled carbon steel. Manually operable or power driven, as specified. Stainless-steel, sound-deadened covers conceal holding arms and exterior parts. Stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Doors adjustable for accurate gasket alignment. Radial arms exert even pressure on silicone-rubber sealing gasket. Microswitches prevent inadvertent start of cycle before doors are completely closed; **pressure locks** keeps doors from being opened during cycle. **Doors may be tightened but not opened while pressure is in chamber.**

- **Manual Doors.** Radial arms actuated by rotating a low-heat-conducting handwheel.
- **Power Doors.** Each door opened and closed by a fused, motorized mechanism with magnetic slip clutch (for overload protection). Radial arms positioned by socket plate assembly run by motorized mechanism with gear reducer and overload protection. Doors stop automatically if obstruction is encountered while operating, in addition a separate stop button is provided. Power-driven doors are also manually operable.

Isothermal Processing (Laboratory/Isothermal Model Only)

If isothermal mode is selected, chamber jacket is not heated. Chamber temperature is maintained by circulation of steam/air mix. Automatic cycle control and monitoring is same as for gravity cycles.

Chamber Drain System

Designed to prevent pollutants from entering into the water-supply system and sterilizer. **Steam-condensate system with water saver** converts steam to condensate and disposes condensate to waste. Regulates waterflow consistent with amount of steam discharged. Water supply **shutoff valve** is behind service access door. A constant steam bleed across the temperature sensing element (RTD) in the chamber line provides improved air elimination and more accurate temperature sensing.

Drying System

System ejector reduces chamber pressure during drying phase, draws air into chamber through a **bacteria-retentive filter.** This filtered air entrains and conducts odors and vapors from chamber to drain. Steam to ejector is microcomputer-controlled.

Steam Source

Sterilizer is piped, valved and trapped to receive steam delivered at 50 to 80 psig (3.52 to 5.62 kg/cm²). Service lines terminate at fittings for connection to building service lines. Sterilizer steam supply line includes a strainer, shutoff and internal pressure regulator. Jacket condensate line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door. Jacket pressure and chamber pressure/vacuum **gauges** are mounted in the valve panel, behind the upper access door. Scales are graduated in both English and metric.

Other Components

The following are furnished to obtain a complete working unit, ready for (but not including) connection to the building utility service lines.

Solenoid Valves to simplify sterilizer piping. Valves are placed where they are needed and can be serviced individually.

Manual Valves. Bronze, angle type with renewable Monel seats and synthetic discs or equivalent high-quality parts. Hydrostatically tested at 350 psig (24.61 kg/cm²) or proven leakproof when tested at 100-psig (7.03 kg/cm²) air pressure with valve body submerged in water. Low-heat-conducting, easily replaceable handles.

Steam Pressure Regulator operates on supply pressure of 50 to 80 psig (3.52 to 5.62 kg/cm²). Secondary pressure is adjustable and controlled by a phosphor-bronze, spring-loaded bellows. Adjustable stops are factory set for sterilizer operation at either 253 or 273 F (122 or 134 C).

Thermostatic Steam Traps pressure and temperature compensated. Renewable **Monel bellows** with matched stainless-steel plunger and seat.

Baffle shields steam supply opening inside the chamber.

Pipe and Electrical Connections terminate within the confines of the sterilizer. Piping used to support other components is rigid brass.

OPTIONAL CONTROLS AND CYCLES

Compressed-Air Solution Cooling*

Cycle facilitates processing of media-filled, screw-capped borosilicate glass containers. The load is cooled via filtered, compressed air circulating off the rapidly cooled chamber walls and exiting through the drain plumbing.

Automatic Shutdown Device*

Automatic shutoff enables added productivity.

Pure Steam Piping*

All pipes, fittings, and valves leading to and from both the steam source and the sterilizer chamber are constructed from 300- series stainless steel.

Door Interlocks and Lights*

Mechanism prevents both sterilizer doors (double door units only) from opening simultaneously, under routine operating conditions. Door interlocks may be specified as a single option or included as part of the Cross Contamination Seal Package.

Cross Contamination Seal*

Arrangement (double door units only) prevents passage of airborne micro-organisms through room wall opening on non-operating end of sterilizer. Provides positive, safe separation of "clean" and "contaminated" goods-processing areas. Includes door interlocks and light.

Chamber Penetrations*

Capped openings to chamber to facilitate insertion of test equipment and instrumentation leads.

Optional Material Handling Accessories

Include racks with shelves, instrument trays and loading cars . . . **all constructed of Monel;** and carriages with a painted-steel finish. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting through one or two partition walls. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other and to wall partition(s) as required. All panels are stainless-steel. Front and back panels have service access doors and height-adjustable kickplates. Inside of each access door contains a rack for instructional materials. A model for recessing through one wall has side panels and a louvered top panel. **Casters and lifting lugs** facilitate transporting and positioning sterilizer. A **Seismic Tie-down Kit** is available for seismic installation of all medium Eagle sterilizers, if required.

WARRANTY

The American Sterilizer Company warrants that each sterilizer is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and 90 days on labor. AMSCO representatives can provide full details of the warranty program upon request.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.

*See separate product literature for further details.

ENGINEERING DATA

SIZE in. (mm)	WEIGHT* lbs (kg)	UTILITIES CONSUMPTION						HEAT LOSS BTU/hr at 70° F (21° C)			
		Water†		Steam††		Electricity — Amps (120 Volts, Single Phase)		Thru One Wall		Thru Two Walls	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Manual Door Model	Power Door Model	Front of Wall	Room Back of Wall	At Each End	Between Walls
24x36x48 (610x914x1219)	4875 (2213)	15 (57)	284 (1075)	148 (67)	148 (67)	3	20	5000	13800	5000	8800
24x36x60 (610x914x1524)	5550 (2520)	15 (57)	288 (1090)	185 (84)	185 (84)	3	20	5000	16500	5000	10500

*Based upon chamber filled with water. †At 20-50 psig (1.41-3.52 kg/cm²) ††At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item_____: Furnish an AMSCO Eagle 2300 Series sterilizer with Printcon per Tech Data Sheet SD-382. Construct chamber ☐ 24x36x48" **or** ☐ 24x36x60". Supply ☐ gravity model **or** ☐ laboratory/isothermal model. Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Equip sterilizer to operate on ☐ steam from an independent source **or** ☐ steam supplied from an integral electric steam generator. Arrange sterilizer ☐ for recessing through one wall **or** ☐ for recessing through two walls.

```
----------------------
CYCLE COMPLETE

  LOAD(01) ----------
STERILIZER ----------
  OPERATOR ----------

  STERILIZE 1:46 H:M
    EXHAUST    3 MIN
TOTAL CYCLE 1:51 H:M

Z  8:11A  92.0   1.0P
E  8:07A 122.9  17.9P
S  8:03A 123.2  18.3P
S  7:53A 122.7  17.8P
S  7:43A 123.2  18.1P
S  7:32A 122.1  17.1P
S  7:22A 122.5  17.7P
S  7:12A 123.1  17.8P
S  7:02A 122.7  17.2P
S  6:52A 122.7  17.2P
S  6:42A 122.1  16.6P
S  6:32A 123.0  17.8P
S  6:22A 121.1  16.3P
C  6:21A  73.9   7.8P
C  6:20A  26.1   0.1V

    TIME TEMP. PRES.
         °C    ENG.

CONTROL TEMP 122.8°C
SET TEMP     121.0°C
LIQUID
CYCLE START  4-24-84
----------------------
```

to be filled in by operator

phase times in hours and minutes

cycle complete

exhaust: pressure

sterilize phase in multiple print intervals (10 minute example shown)

condition phase

temperature in Celsius, pressure in English

cycle type and temperature selected

Figure 2. Typical Printout.

```
----------------------
POWER ON AT 4-24-84
   9:01A  68.4   0.0P
----------------------
```

Power On Message

```
----------------------
POWER ON AT 4-24-84
   9:34A 120.5  10.4P
----------------------
```

Power Restored After Power Failure

```
----------------------
ABORT:  RESET BUTTON
* 12:12A 279.4  22.2P
----------------------
```

Reset Button Pressed

```
----------------------
ALARM:      TOO LONG
*  1:45P 265.9  20.4P
----------------------
```

Condition Phase too long

```
----------------------
* 11:05A 266.4  25.5P
ALARM:    UNDER TEMP
* 11:04A 269.9  27.3P
----------------------
```

Temperature Drops 2 F Below Setpoint

```
----------------------
ABORT:     DOOR OPEN
*  9:58A 243.3  12.7P
----------------------
```

Door Opened During Cycle

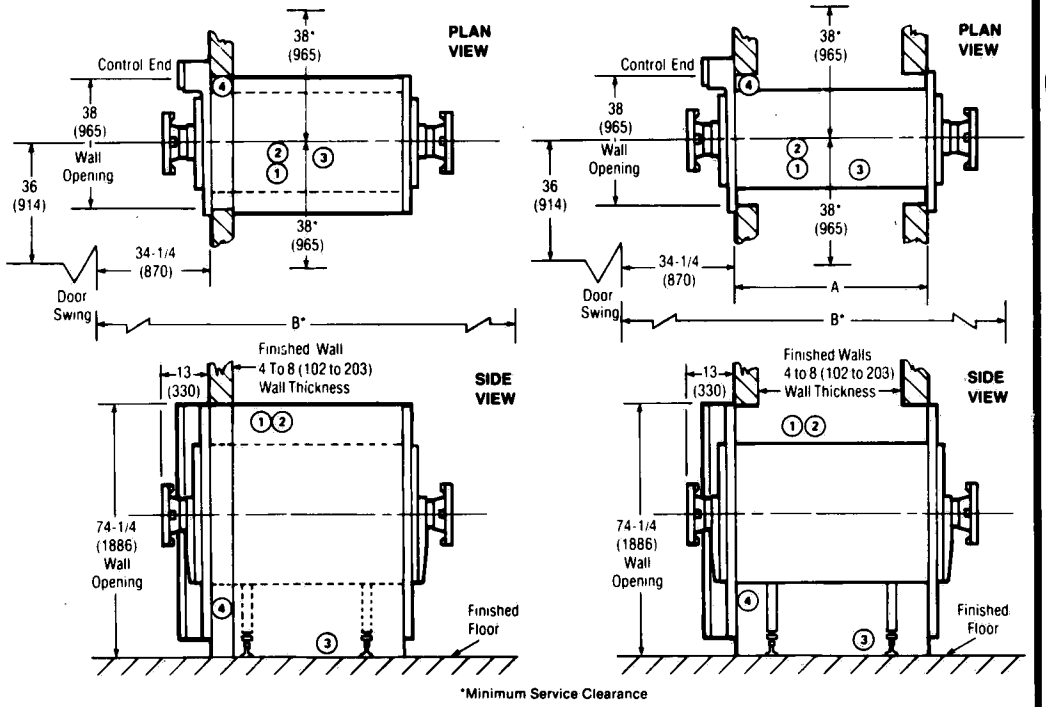
```
----------------------
ABORT:   TEMP SENSOR
*  3:45A 306.8  10.0P
----------------------
```

Temperature Sensor Failure

```
----------------------
ABORT:   PRES SENSOR
*  11:55A 270.0  41.3P
----------------------
```

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



*Minimum Service Clearance

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

CHAMBER SIZE	A	B*
24x36x48 (610x914x1219)	61-3/4 (1568)	130-1/4 (3308)
24x36x60 (610x914x1524)	76 (1930)	144-1/2 (3670)

OPERATING REQUIREMENTS

(1) COLD WATER — 3/4 NPT 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness

(2) STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor

(3) DRAIN — 2 ODT

(4) TERMINAL BOX — 120-V, 60-Hz, Single-phase Service for controls and, if furnished, power doors

. . . 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. Disconnect switches (by others) should be installed in electric supply lines near the equipment.

3. Access to the recessing area from the control end of the sterilizer is recommended.

4. Clearances shown are minimal for installing and servicing the equipment.

5. Clearance at each end of sterilizer, for loading purposes, should equal

   • length of sterilizer plus 12 inches (305 mm), if shelves will be used.

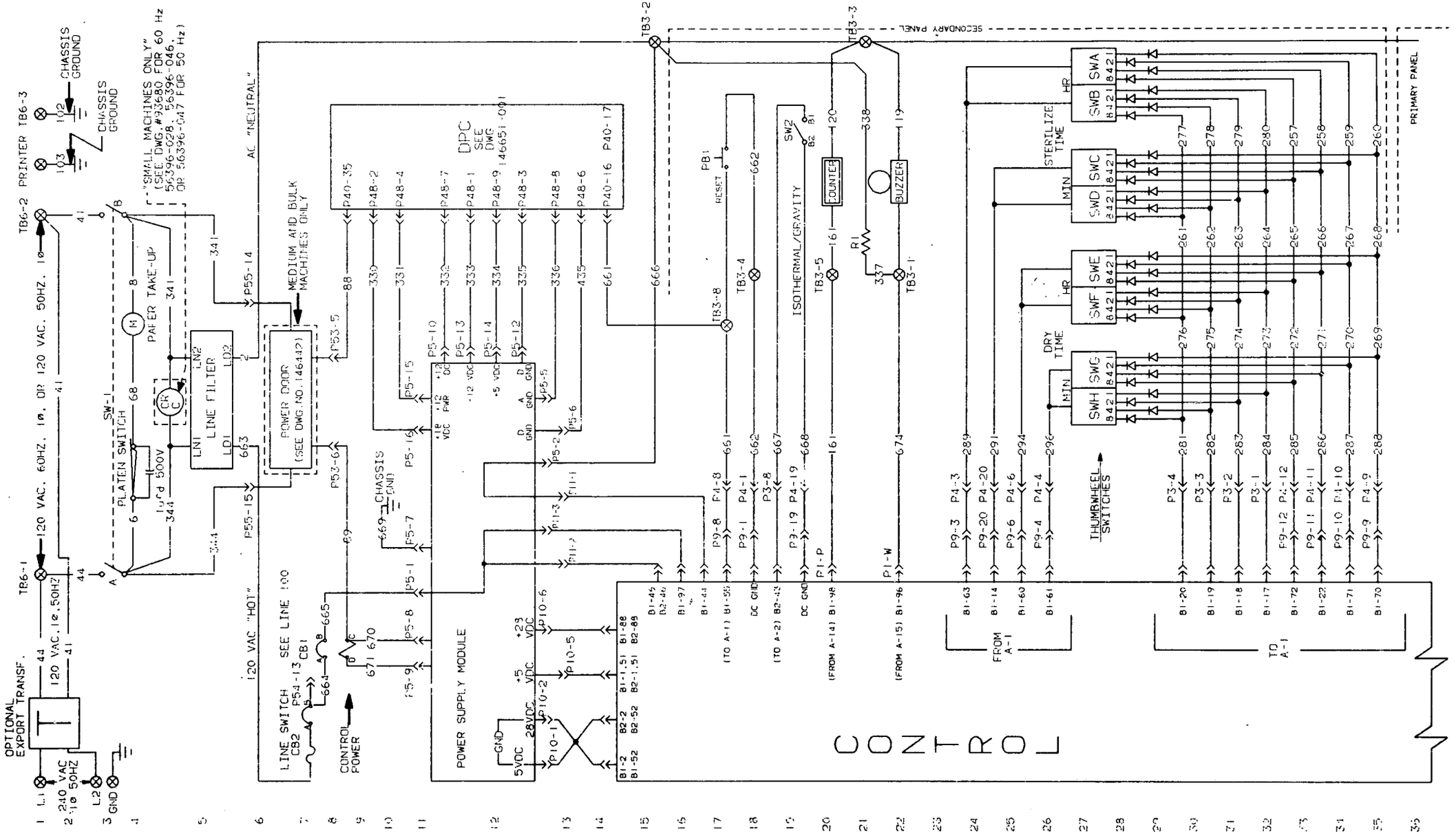
   • twice the length of sterilizer, if loading car and carriage will be used.

6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.

7. Wall opening dimensions for non-operating end are identical to those for control end.

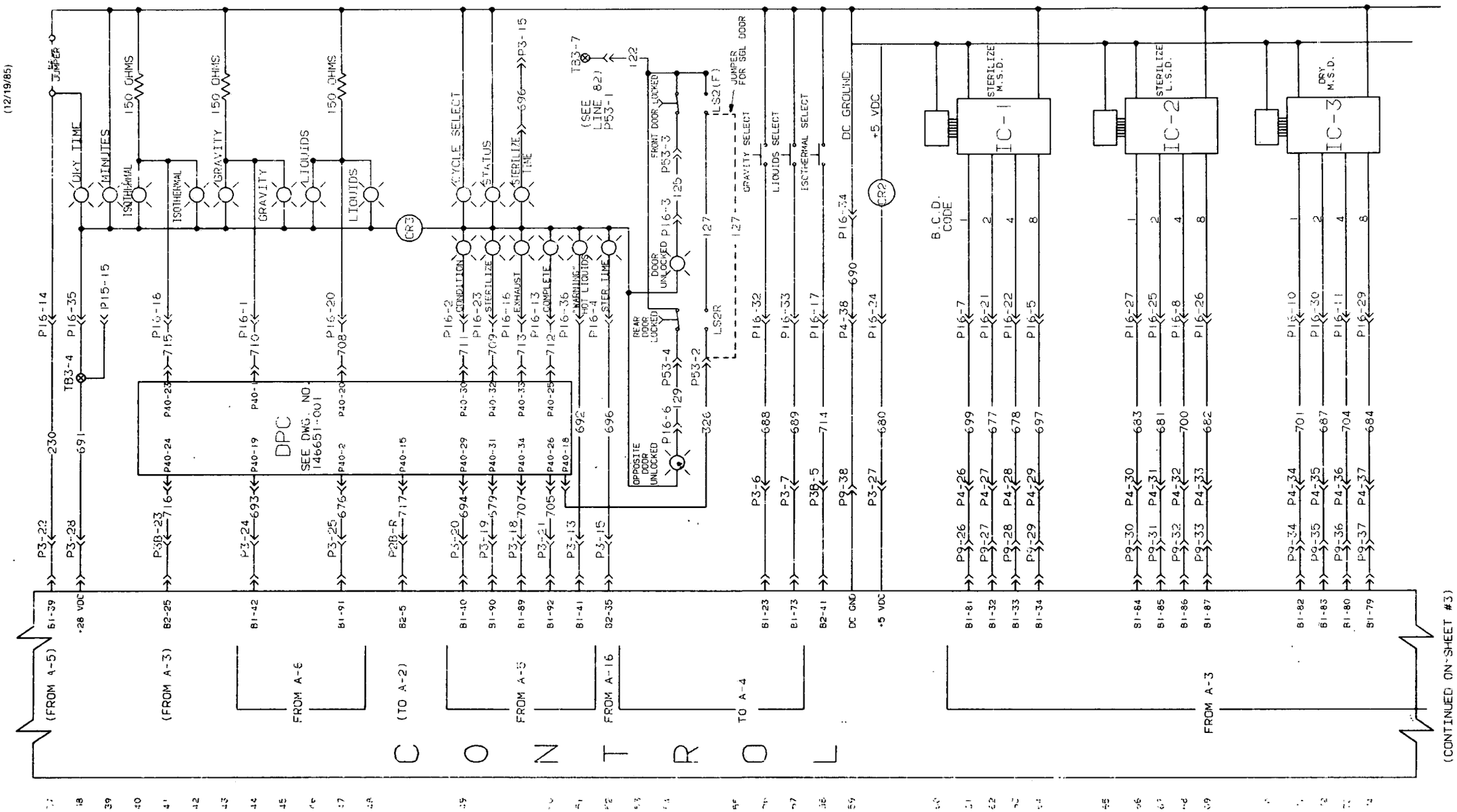
8. Floor drain should be provided within confines of sterilizer framework.

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



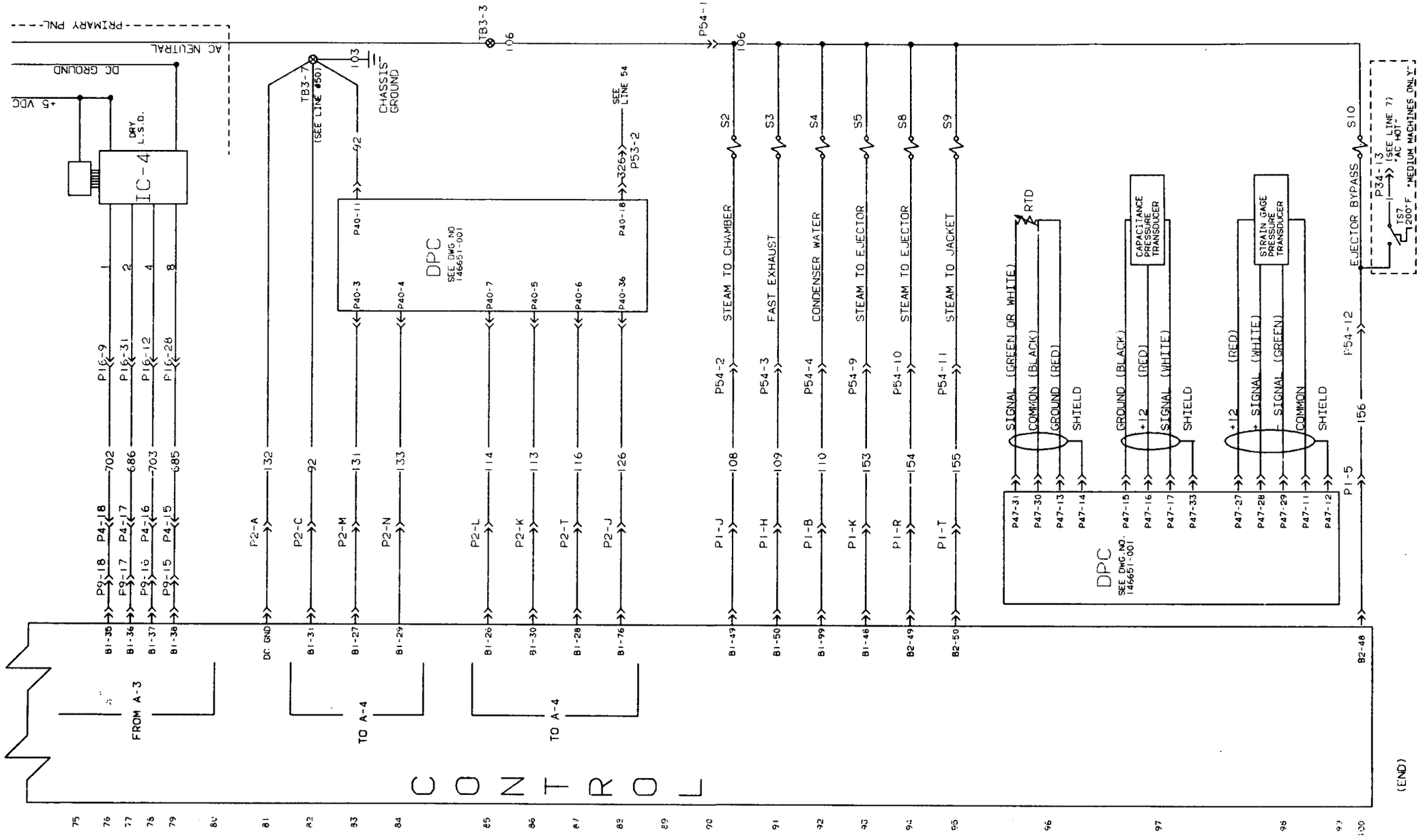
ELECTRICAL SCHEMATIC. Eagle 2300.
Isothermal and Gravity
(Part 1 of 3)

Add. 9/86



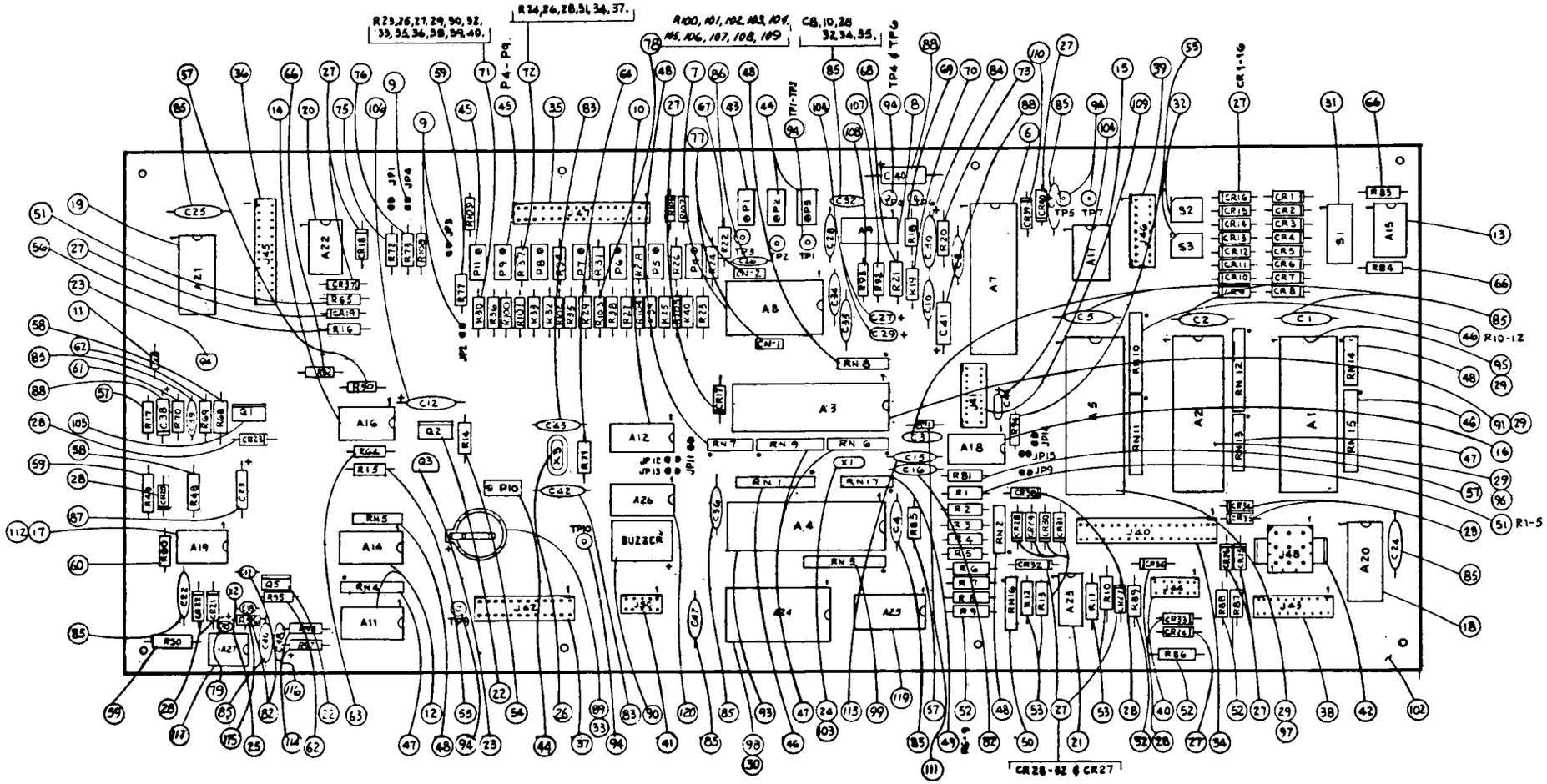
ELECTRICAL SCHEMATIC. Eagle 2300.
Isothermal and Gravity
(Part 2 of 3)

DWG. No. 146645-575
(12/19/85)



ELECTRICAL SCHEMATIC. Eagle 2300.
Isothermal and Gravity
(Part 3 of 3)

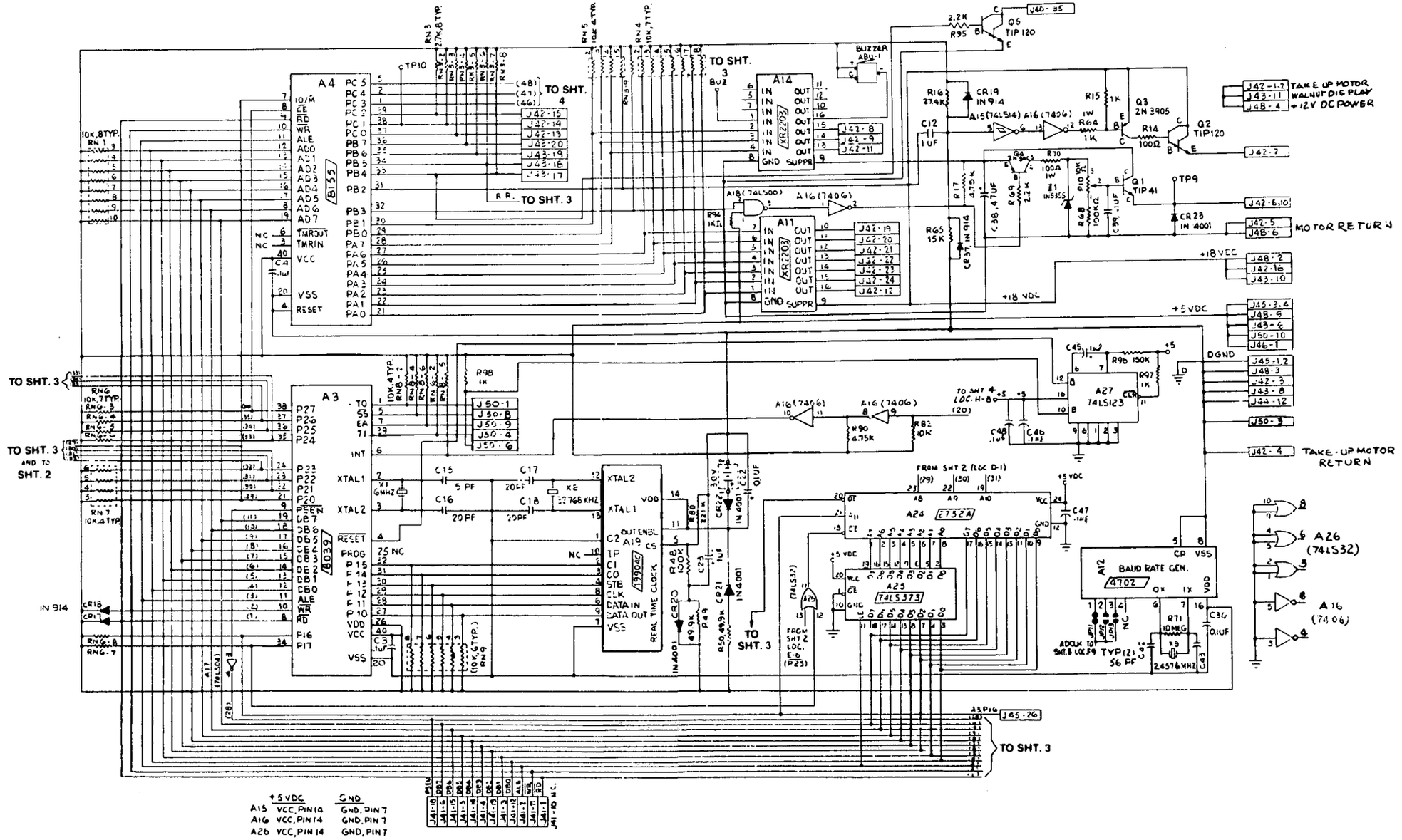
Add. 9/86



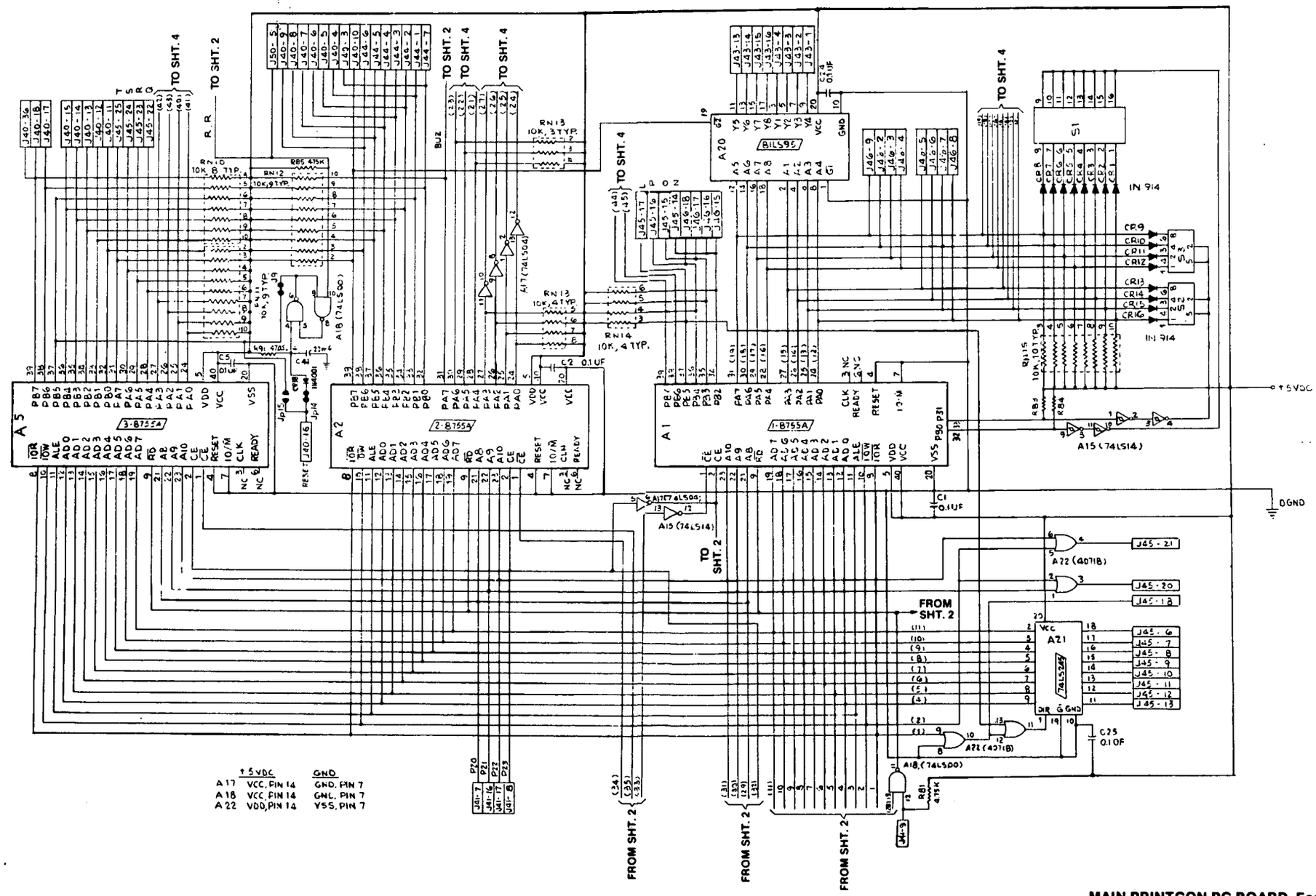
QTY	REQ	PART NAME	DESCRIPTION MATERIAL
*	*	DIGITAL PRINTER ASSY	PARTS LIST
1	A	NOT USED	
1	8	40 PIN DIP IC	AD 7550 BD A/D CONVERTER (A2)
1	7	28 PIN DIP IC	AD 7507 JN ANALOG MUX (A8)
1	6	14 PIN DIP IC	AD 521 KD DIFFER AMP (A9)
3	9	WIRE JUMPER	
1	10	16 PIN DIP IC	HD3-6702-9 BIT RATE GEN (C2)
1	11	ZENER DIODE	IN4735 6.8V ZENER (C2)
1	12	16 PIN DIP IC	HA7203 CR DARLINGTON ARRAY (A11, 14)
1	13	16 PIN DIP IC	DM74LS14N HEX SCHMITT TRIGGER (A15)
1	14	16 PIN DIP IC	DM74LS04N HEX INVERTER LOW POWER SCHOTTKY (A17)
1	15	14 PIN DIP IC	DM74LS00N QUAD 2 INPUT NAND GATE LOW POWER SCHOTTKY (A18)
1	16	14 PIN DIP IC	DM74LS00N QUAD 2 INPUT NAND GATE LOW POWER SCHOTTKY (A19)
1	17	14 PIN DIP IC	MPD 1990 AC REAL TIME CLOCK (A19)
1	18	20 PIN DIP IC	DM81LS95N OCTAL DRIVER (A20)
1	19	20 PIN DIP IC	74LS245 OCTAL BUS TRANSCEIVER (A21)
1	20	14 PIN DIP IC	CD4011B QUAD 2-INPUT NOR GATE (A22)
1	21	16 PIN DIP IC	LM339N QUAD COMPARATOR (A23)
2	22	TRANSISTOR	2N3906 PNP GP SW (Q4, Q5)
1	23	TRANSISTOR	2N3904 NPN GP SW (Q3)
1	25	CRYSTAL	32.768 KHZ (X2)
1	26	CRYSTAL	7.6416 MHZ (X1)
30	27	DIODE	IN914 OR 1-19 CRZN (INPU 32 37 40
1	28	DIODE	IN4001 OR 1-20 33 36 38
1	29	SOCKET	40 PIN DIP (A1 2 3 4 5)
1	30	SOCKET	24 PIN DIP (A24)
1	31	SWITCH	8 POS ROCKER DIP (S1) GRAYHILL 76SB08
2	32	SWITCH	10 POS ROTARY BCD DIP (S2, S3) ECO 2300D 6
1	33	HOLDER BATTERY	2 PIN
1	34	CONNECTOR	36 PIN SPDR HEADER (J40)
1	35	CONNECTOR	26 PIN SPDR HEADER (J42)
1	36	CONNECTOR	26 PIN SPDR HEADER (J45)
1	37	CONNECTOR	24 PIN SPDR HEADER (J43)
1	38	CONNECTOR	20 PIN SPDR HEADER (J41)
1	39	CONNECTOR	18 PIN SPDR HEADER (J46)
1	40	CONNECTOR	17 PIN SPDR HEADER (J44)
1	41	CONNECTOR	10 PIN SPDR HEADER (J50)
1	42	CONNECTOR	9 PIN SPW & LL HEADER (J48)
1	43	POTENTIOMETER	2299 W 10K CERMET (P1, P2, P10)
3	44	POTENTIOMETER	2299 W 100K CERMET (P4, P6, P11)
1	45	POTENTIOMETER	2299 W 100H CERMET (P3, P5, P7, P8, P9)
5	48	RESISTOR NETWORK	10K1% SIP (RN 1, 10, 9, 13, 17 & 15)
1	49	RESISTOR NETWORK	10K1% SIP (RN 2, 5, 7, 8 & 16)
1	50	RESISTOR NETWORK	470K1% SIP (RN 16)
6	51	RESISTOR	15K1% 1/8 W (R1-R5 & R85)
8	52	RESISTOR	332K1% 1/8 W (R6-R9 & R86-R89)
4	53	RESISTOR	1 MEG1% 1/8 W (R10-R13)
1	54	RESISTOR	100K1% 1/8 W (R14)
2	55	RESISTOR	1K1% 1/8 W (R15, R84)
1	56	RESISTOR	27.4K1% 1/8 W (R16)
4	57	RESISTOR	4.75K1% 1/8 W (R17, 90, 91, 95)
3	58	RESISTOR	100K1% 1/8 W (R48 & R68)
3	59	RESISTOR	49.9K1% 1/8 W (R18 & R50 & R77)
1	60	RESISTOR	10K1% 1/8 W (R60)
2	62	RESISTOR	2.74K1% 1/8 W (R96, R97)
1	63	RESISTOR	1K1% 1/8 W (R66)
1	64	RESISTOR	10 MEG1% CC 1/8 W (R71)
1	65	NOT USED	
3	66	RESISTOR	10K1% 1/8 W (R92-94)
1	67	RESISTOR	100K1% 1% 25 PPM/°C TC MF 1/8 W (R72)
1	68	RESISTOR	2.55K1% 1% 25 PPM/°C TC MF 1/8 W (R73)
1	69	RESISTOR	4.53K1% 1% 25 PPM/°C TC MF 1/8 W (R18)
1	70	RESISTOR	4.99K1% 1% 25 PPM/°C TC MF 1/8 W (R19)
12	71	RESISTOR	8.06K1% 1% 25 PPM/°C TC MF 1/8 W (R23 25 27 29 30 32 33 35 36 38 39 40)
6	72	RESISTOR	75K1% 1% 25 PPM/°C TCMF 1/4 W (R24 26 28 31 34 37)
1	73	RESISTOR	5.11 MEG 5% MF 1/8 W R20
1	74	NOT USED	
1	75	RESISTOR	30.9K1% 0.1% 25 PPM/°C TCMF 1/8 W (R72)
1	76	RESISTOR	28K1% 0.1% 25 PPM/°C TCMF 1/8 W (R73)
2	77	CAPACITOR NETWORK	01µF 50V CN-1 CN-2
1	78	RESISTOR	1K1% 8100 THRU 8109
1	79	NOT USED	1µF 35V IC41
1	80	NOT USED	
3	82	CAPACITOR	20PF 500V MICA C16-18
1	83	CAPACITOR	56PF 300V MICA C42 & C43
19	84	CAPACITOR	.0022µF 500V POLYPROPALENE E30
19	85	CAPACITOR	1µF 25V CERAMIC C1-5 C7 C8 C10 C17 C24 C25 C28 C33 C34-C36 C38 C46 C47
1		CAPACITOR	01µF 25V CERAMIC C26
1	87	CAPACITOR	1µF 50V ALUMINUM C27
3	88	CAPACITOR	10µF 25V TANTALUM C29 C40 C41
1	89	BATTERY	MEMORY BACKUP 3.6V (B1)
1	90	BUZZER	3VDC
1	91	40 PIN DIP IC	P8155 RAM & I/O (A4)
1	92	NOT USED	
1	93	40 PIN DIP IC	P8085A CPU (A3)
1	94	TEST POINT	(TP1-TP7, TP9, TP10)
1	95	40 PIN DIP IC	8355/8755 ROM EAGLE 2300 A1
1	96	40 PIN DIP IC	8355/8755 ROM EAGLE 2300 A2
1	97	40 PIN DIP IC	8355/8755 ROM EAGLE 2300 A5
1	98	NOT USED	
1	99	RESISTOR NETWORK	2.7K1% 9 RESISTOR SIP (RN 3)
1	100	NOT USED	
1	101	NOT USED	
1	102	DRILL SCHEDULE	PC BOARD
1	103	MOUNT	DISCRETE COMPONENT
3	104	CAPACITOR	22µF 35V TANTALUM C27 C29 C44
1	105	TRANSISTOR	TIP41 (NPN) POWER (Q1)
1	106	CAPACITOR	1µF 50V BIPOLAR (C21)
1	107	RESISTOR	1.3K 1% 25 PPM/°C TC MF 1/8W (R92)
1	108	RESISTOR	20.0K 1% 25 PPM/°C TC MF 1/8W (R93)
1	109	CONNECTOR	18 PIN SPDR HEADER (UNSHROUDED) (J41)
1	110	DIODE	HP5082-2811 (1N5711) SCHOTTKY CR39
1	111	RESISTOR	470Ω 1/4 W 5% E.C. (R91)
2		SOCKET	16 PIN DIP (A19)
1	113	CAPACITOR	33pF 500 V MICA (C15)
1	114	RESISTOR	150Ω 1/4 W 5% C.C. (R96)
1	115	RESISTOR	150K 1/4 W 5% C.C. (R95)
1	116	CAPACITOR	10 V TANT. (C48)
1	117	16 PIN DIP IC	74LS03 (A24)
1	118	NOT USED	
1	119	20 PIN DIP IC	74LS03 (A26)
1	120	14 PIN DIP IC	74LS30 (A25)

MAIN PRINTCON PC BOARD, Eagle 2300
(Part 1 of 4)

Add. 9/86



MAIN PRINTCON PC BOARD, Eagle 2300
(Part 2 of 4)

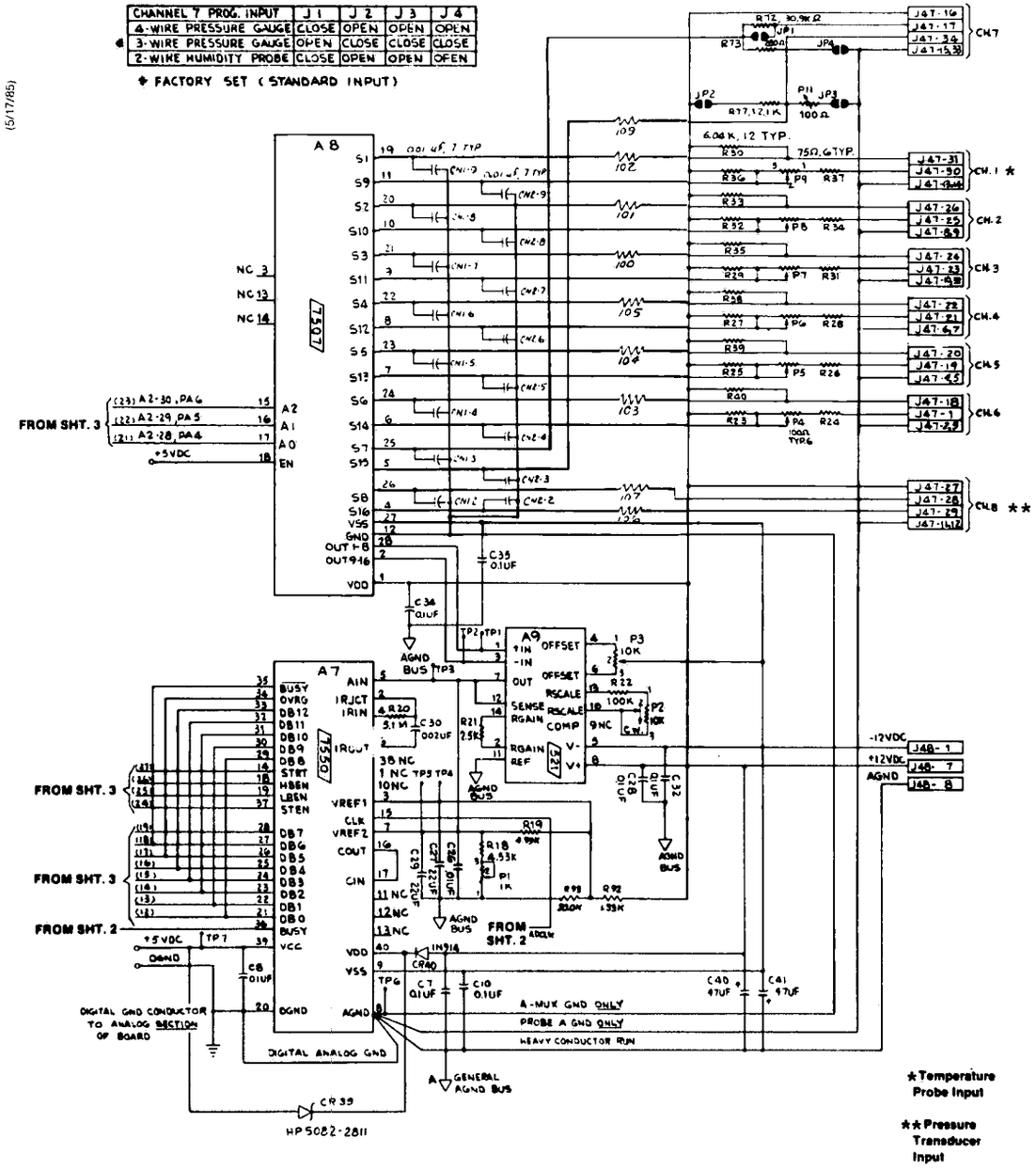


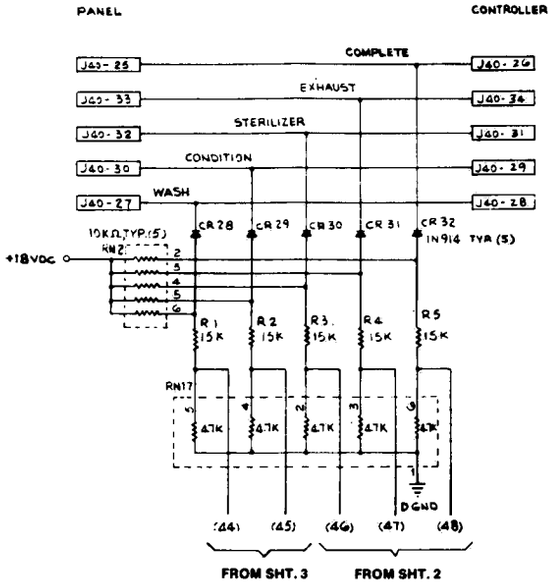
MAIN PRINTCON PC BOARD, Eagle 2300
(Part 3 of 4)

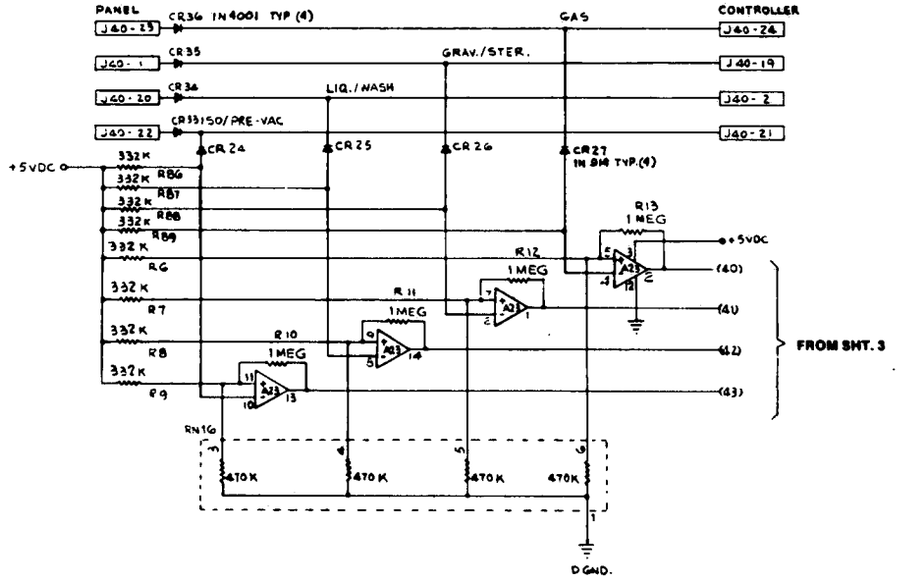
DWG. NO. 146654-002
(5/17/85)

CHANNEL 7 PROG. INPUT	J1	J2	J3	J4
4-WIRE PRESSURE GAUGE	CLOSE	OPEN	OPEN	OPEN
3-WIRE PRESSURE GAUGE	OPEN	CLOSE	CLOSE	CLOSE
2-WIRE HUMIDITY PROBE	CLOSE	OPEN	OPEN	OPEN

* FACTORY SET (STANDARD INPUT)







MAIN PRINTCON PC BOARD, Eagle 2300
(Part 4 of 4)

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