AMSCO Maintenance Manual

Eagle Series

EAGLE® 2000 AND 2300 SERIES MEDIUM STERILIZERS
Vacamatic™

(8/87) P-700000-001

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Printed in U.S.A.

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SUMMARY OF SAFETY PRECAUTIONS

The following are personnel (WARNINGS) and equipment (CAUTIONS) safety precautions to be observed when operating or servicing this unit. This is a summary listing of safety precautions appearing in the text. Carefully read them before proceeding to use or service the unit. The precautions are repeated where applicable throughout the manual. 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.

WARNINGS:

TO PREVENT POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE RESULTING FROM BURSTING BOTTLES AND HOT FLUID, YOU MUST FOLLOW THE PROCEDURES COVERED IN THIS MANUAL.

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, FOLLOW THE PROCEDURES COVERED IN THIS MANUAL.

WHEN OPERATING A LIQUIDS CYCLE YOU MUST OBSERVE THE PRECAUTIONS LISTED IN PARAGRAPH 2.6. FAILURE TO FOLLOW THESE PRECAUTIONS COULD RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

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

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

CAUTIONS:

For those units with water booster pumps, operation of the sterilizer without water supply will destroy the pump.

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

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 plastic or painted surfaces. Follow directions on containers.

Do not open ball valve when there is positive pressure in sterilizer.

Because of excessive current draw, do not use an incandescent or neon type test light for setting the pressure and vacuum switches.

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.

SUMMARY OF SAFETY PRECAUTIONS (Continued)

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

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.

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.

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.

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.

Handle syiphon and bellows assembly gently, to avoid damage.

Use extreme care when opening a container of electronic parts. Avoid circumstances wherein a build-up of static electricity could discharge. Handle PC boards by card pulls or edges only.

When installing pipe connections to pump, use liquid Teflon only; do not use Teflon tape. Buildup of tape on threads could result in damage to pump housing.

Take necessary precautions to keep any of the washers or screws from dropping into control column.

120 Volts AC is present on microswitch terminals of units manufactured after 6/85 when sterilizer power is on. Turn power off.

PC Board contains static sensitive compounds. Handle accordingly.

SECTION 1

SECTION 1

GENERAL INFORMATION

1.1 APPLICATION AND DESIGN

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

The following information should be included in this section:

2000 Series:	SD-259
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SD-259R9
(5/86)

AMSCO

Eagle® 2000 SERIES MEDIUM STERILIZERS

Vacamatic

• *single door*

TECH DATA

DESCRIPTION

Microcomputer-controlled sterilizer using mechanical air-evacuation for high-speed, high-volume sterilization. Also functions by the gravity air-removal principle. Steam under pressure is the sterilizing agent.

Applications

Prevacuum Cycle — for efficient, high-volume processing of heat- and moisture-stabile materials such as fabrics or wrapped hard goods at 270° to 280° F (132° to 138° C).

Gravity Cycles — 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).

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 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).

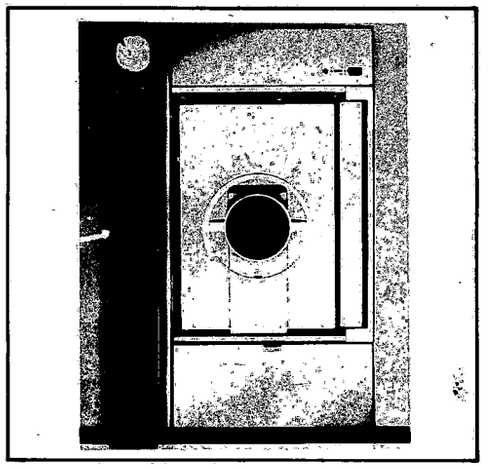
Federal Specification GG-S-1343A performance requirements.

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

- ☐ **2033:** 24x36x36"
- ☐ **2043:** 24x36x48"
- ☐ **2053:** 24x36x60"

Door Hinge

- ☐ Right Side ☐ Left Side

Door operation

- ☐ Manual ☐ Power

Mounting

- ☐ For Recessing
- ☐ Cabinet Enclosed

Materials Handling Accessories*

- ☐ Rack and Shelves (36 and 48" Sterilizers Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____

Location(s) _____

_____

_____

Medium Steam Sterilizer (SINGLE DOOR)

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 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.

  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.

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; **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.

Vacuum System

Prevacuum. Series of **microcomputer-controlled** and **monitored** vacuum/pressure pulses effectively condition various size and density loads ... reduces total sterilization time. Sequence consists of three pressure pulses and four evacuations. Evacuation system utilizes a **condenser** and **water ejector system.**

Post-vacuum. Following Sterilize phase, chamber is exhausted by the vacuum system. Vacuum system continues to evacuate chamber throughout the drying phase. At conclusion of drying phase, filtered air relieves the vacuum. **Air filter** is bacteria retentive.

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.

Manual Control (Gravity Cycles Only)

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 hinges 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 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 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 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

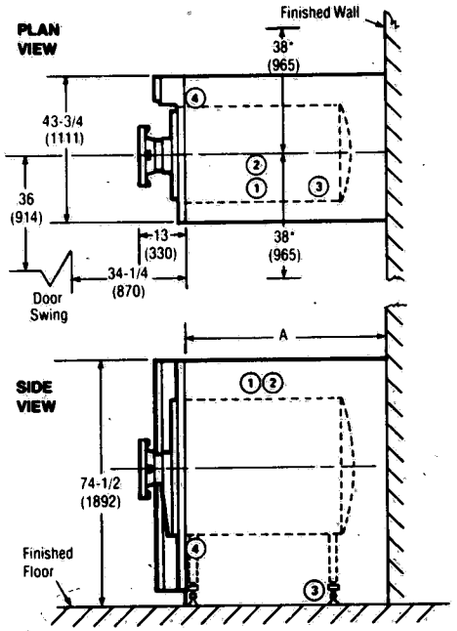
SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION				ELECTRICAL REQUIREMENTS		HEAT LOSS BTU/hr. at 70° F (21° C)		
		Water†		Steam††		Electricity — Amps 120 Volts, Single Phase		Cabinet Enclosed	Recessed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Controls	Power Door (Optional)	To Room	Front of Wall	Behind Wall
24x36x36 (610x914x914)	3850 (1748)	15 (57)	317 (1200)	190 (86)	112 (51)	0.9	14	12550	5000	7500
24x36x48 (610x914x1219)	4725 (2145)	15 (57)	320 (1216)	255 (116)	148 (67)	0.9	14	14650	5000	9800
24x36x60 (610x914x1524)	5400 (2452)	15 (57)	324 (1231)	335 (152)	185 (84)	0.9	14	16800	5000	11800

*†At 30-50 psig (2.11-3.52 kg/cm²) ††At 50-80 psig (3.52-5.62 kg/cm²) *Based upon chamber filled with water*

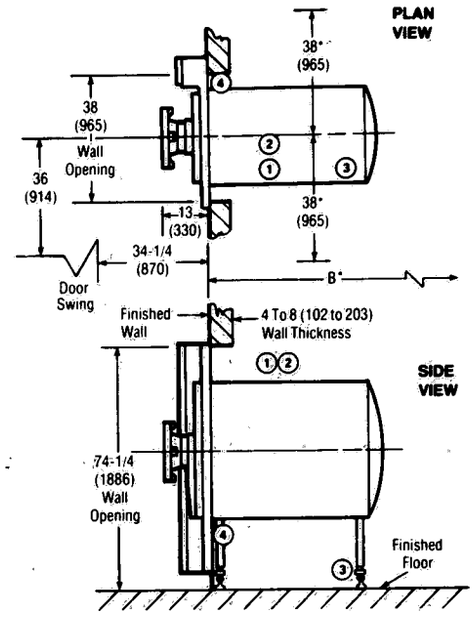
SPECIFICATION WORKSHEET

Item _____: Furnish an AMSCO Eagle Series sterilizer per Tech Data Sheet SD-259. Construct chamber ☐ 24x36x36" or ☐ 24x36x48" or ☐ 24x36x60". Design control with microcomputer to monitor system operations and control system functions. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ to be free standing or ☐ for recessing into a partition wall.

CABINET ENCLOSED



FOR RECESSING
See Note 3



* 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, 30 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 for controls and, if furnished, power doors

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

Medium Steam Sterilizer (DOUBLE DOOR)

Eagle® **2000 SERIES MEDIUM STERILIZERS**
Vacamatic™
• *double door*

TECH DATA

DESCRIPTION

Microcomputer-controlled sterilizer using mechanical air-evacuation for high-speed, high-volume sterilization. Also functions by the gravity air-removal principle. Steam under pressure is the sterilizing agent.

Applications

Prevacuum Cycle — for efficient, high-volume processing of heat- and moisture-stabile materials such as fabrics or wrapped hard goods at 270° to 280° F (132° to 138° C).

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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:

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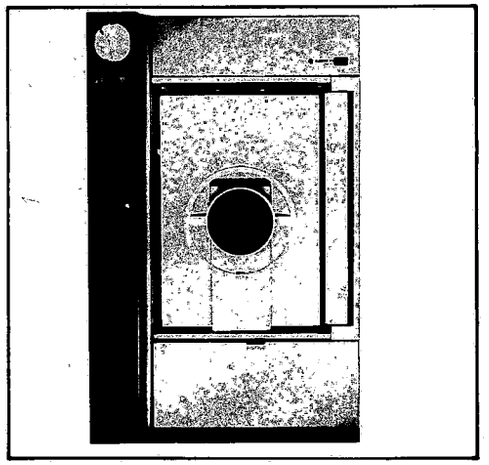
Seismic Stress Calculations — Title 24 (Division T-17 of Part 6) of the California Administrative Code.

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
☐ **2043:** 24x36x48"
☐ **2053:** 24x36x60"

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

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

Door Operation
☐ Manual ☐ Power

Option
☐ Seismic Tie-down Kit

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

**See separate product literature*

Item No. _____
Location(s) _____

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 to **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 cycle.

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; **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.

Vacuum System

Prevacuum. Series of **microcomputer-controlled** and **monitored** vacuum/pressure pulses effectively condition various size and density loads ... reduces total sterilization time. Sequence consists of three pressure pulses and four evacuations. Evacuation system utilizes a **condenser** and **water ejector system.**

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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 behind service access door.

Manual Control (Gravity Cycles Only)

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.

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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 smooth surfaces 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 door 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 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 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††		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)	Controls	Power Doors (Optional)	Front of Wall	Room Back of Wall	At Each End	Between Walls
24x36x48 (610x914x1219)	5025 (2281)	15 (57)	320 (1216)	255 (116)	148 (67)	0.9	14	5000	13800	5000	8800
24x36x60 (610x914x1524)	5700 (2588)	15 (57)	324 (1231)	335 (152)	185 (84)	0.9	14	5000	16500	5000	10500

*†At 30-50 psig (2.11-3.52 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-260. Construct chamber ☐ 24x36x48" or ☐ 24x36x60". Design control with microcomputer to monitor system operations and control system functions. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer for recessing through ☐ one wall or ☐ two walls.

AMSCO

Medium Steam Sterilizer (SINGLE DOOR)

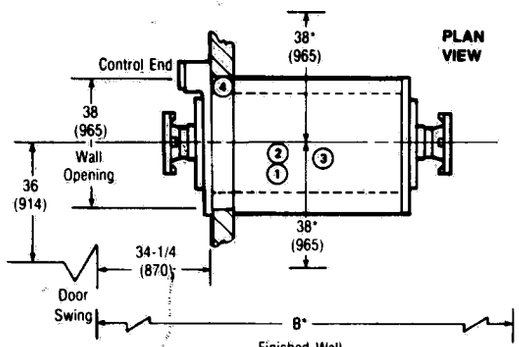
Eagle® 2000 SERIES MEDIUM STERILIZERS with Printcon™

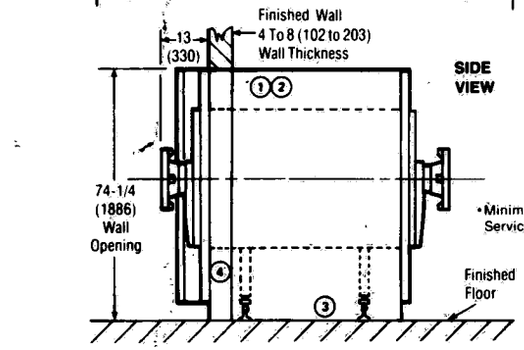
Vacamatic

• *single door*

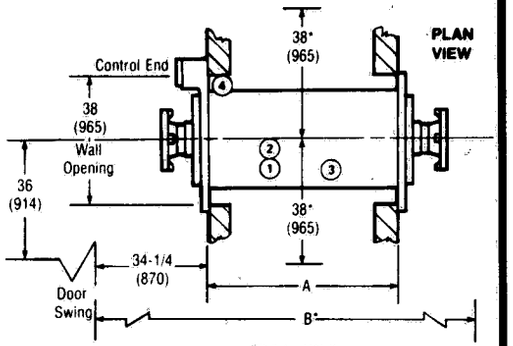
TECH DATA

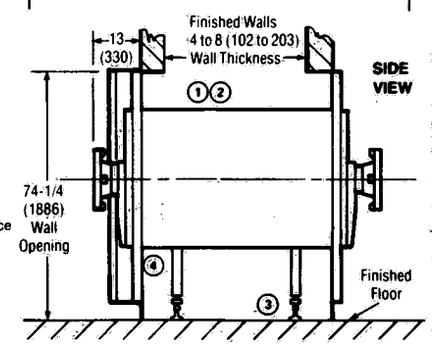
FOR RECESSING THRU ONE WALL





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, 30 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 for controls and, if furnished, power doors

... CHECK LOCAL CODES ...

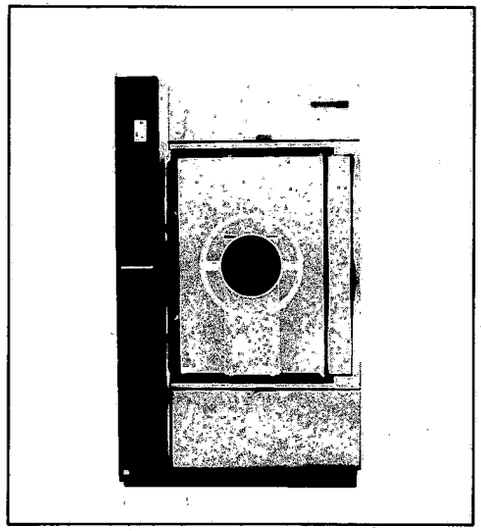
NOTES

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 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.
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.

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system.** Uses mechanical air-evacuation for high-speed, high-volume sterilization. Also functions by the gravity air-removal principle. Steam under pressure is the sterilizing agent.



Typical only — some details may vary.

Applications

Prevacuum Cycle — for efficient, high-volume processing of heat- and moisture-stabile materials such as fabrics or wrapped hard goods at 270 to 280 F (132 to 138 C).

Gravity Cycles — 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).

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-1343A performance requirements.

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.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Series
- ☐ **2033:** 24x36x36"
- ☐ **2043:** 24x36x48"
- ☐ **2053:** 24x36x60"

Door Hinge
- ☐ Right Side ☐ Left Side

Door Operation
- ☐ Manual ☐ Power

Mounting
- ☐ For Recessing
- ☐ Cabinet Enclosed

Option
- ☐ Seismic Tie-down Kit

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

**See separate product literature*

Item No. _____

Location(s) _____

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:

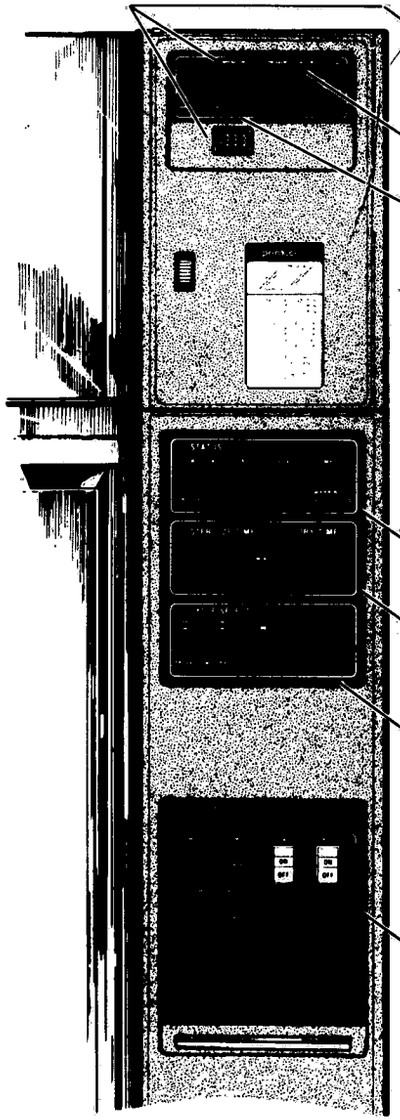


Figure 1. Eagle-Eye Vertical Control Column.

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; **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.

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 will store up to one entire roll. 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.

Vacuum System

Prevacuum. Series of **microcomputer-controlled** and **monitored** vacuum/-pressure pulses effectively condition various size and density loads . . . reduces total sterilization time. Sequence consists of three pressure pulses and four evacuations. Evacuation system utilizes a **condenser** and **water ejector system.**

Post-vacuum. Following Sterilize phase, chamber is exhausted by the vacuum system. Vacuum system continues to evacuate chamber throughout the drying phase. At conclusion of drying phase, filtered air relieves the vacuum. **Air filter** is bacteria retentive.

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.

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††		Electricity — Amps 120 Volts, Single Phase		Cabinet Enclosed	Recessed	
		Peak gpm (lmp)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Controls	Power Door (Optional)	To Room	Front of Wall	Behind Wall
24x36x36 (610x914x914)	3850 (1748)	15 (57)	317 (1200)	190 (86)	112 (51)	0.9	14	12550	5000	7500
24x36x48 (610x914x1219)	4725 (2145)	15 (57)	320 (1216)	255 (116)	148 (67)	0.9	14	14650	5000	9600
24x36x60 (610x914x1524)	5400 (2452)	15 (57)	324 (1231)	335 (152)	185 (84)	0.9	14	16800	5000	11800

**Based upon chamber filled with water*

†At 30-50 psig (2.11-3.52 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-359. Construct chamber □ 24x36x36" or □ 24x36x48" or □ 24x36x60". 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. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer □ to be freestanding or □ for recessing into a partition wall.

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```
CYCLE COMPLETE

  LOAD(04) _________
STERILIZER _________
  OPERATOR _________

  STERILIZE    4 MIN
        DRY    6 MIN
TOTAL CYCLE   19 MIN

Z  1:01P 213.7  0.9V
E 12:58P 209.2 26.6V
E 12:55P 273.5 29.6P
S 12:51P 270.0 31.2P
C 12:50P 222.7 25.6V
C 12:49P 225.1 26.0P
C 12:48P 214.0 25.0V
C 12:47P 217.1 26.0P
C 12:46P 202.8 24.8V
C 12:45P 206.5 26.1P
C 12:44P 179.4 23.8V
C 12:43P 183.7  9.1P
C 12:42P 107.2  0.2P

   TIME TEMP. PRES.
          °F   ENG.

PREVACUUM    AT 273°F
CYCLE START   2-1-82
```

to be filled in by operator

phase times run

cycle complete

exhaust: pressure and vacuum

sterilize phase

condition phase: 4 vacuum pulses and 3 pressure pulses

pressurized chamber purge

temperature in Fahrenheit, 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
```

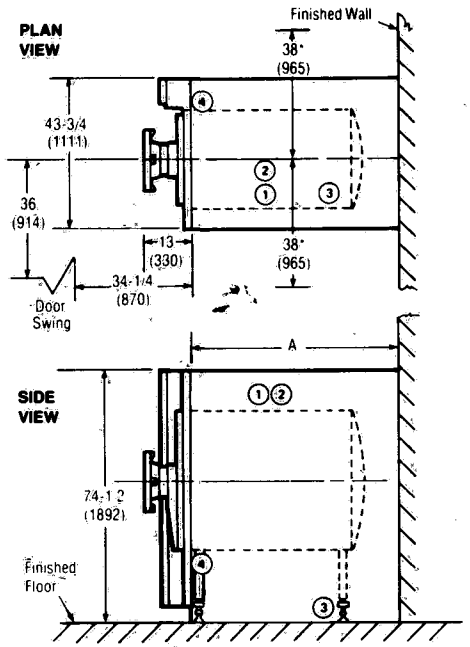
Temperature Sensor Failure

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

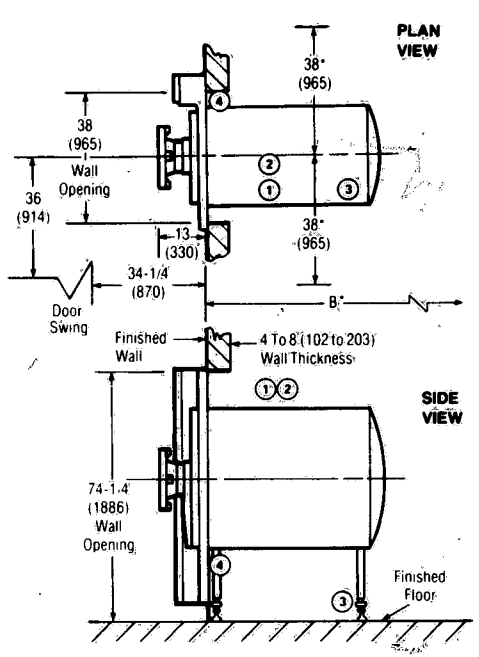
Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.

CABINET ENCLOSED



FOR RECESSING
See Note 3



*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, 30 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 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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SD-360R3
(8/86)

AMSCO

Eagle® 2000 SERIES MEDIUM STERILIZERS with Printcon™ Vacamatic
• *double door*

TECH DATA

DESCRIPTION

Microcomputer-controlled sterilizer with digital-printer and state-of-the-art control system. Uses mechanical air-evacuation for high-speed, high-volume sterilization. Also functions by the gravity air-removal principle. Steam under pressure is the sterilizing agent.

Applications

Prevacuum Cycle — for efficient, high-volume processing of heat- and moisture-stabile materials such as fabrics or wrapped hard goods at 270 to 280 F (132 to 138 C).

Gravity Cycles — 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).

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).

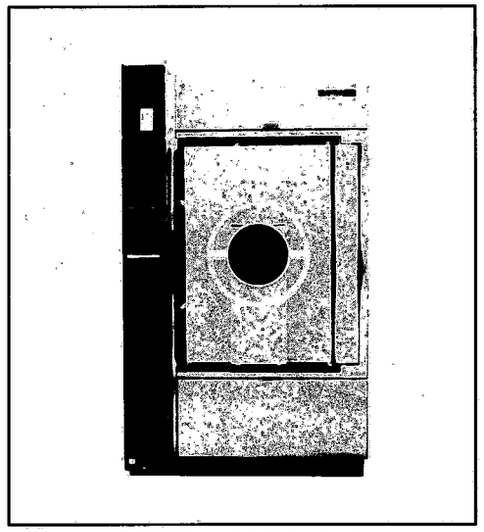
Federal Specification GG-S-1343A performance requirements.

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
- ☐ 2043: 24x36x48"
- ☐ 2063: 24x36x60"

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

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

Door Operation
- ☐ Manual ☐ Power

Option
- ☐ Seismic Tie-down Kit

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

**See separate product literature*

Item No. _____
Location(s) _____

Medium Steam Sterilizer (DOUBLE DOOR)

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 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; **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 Prevac and Liquid **cycle selectors** by which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and hot liquids.

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 . . . 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 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 cover conceals 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 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.

Vacuum System

Prevacuum. Series of **microcomputer-controlled** and **monitored** vacuum/pressure pulses effectively condition various size and density loads . . . reduces total sterilization time. Sequence consists of three pressure pulses and four evacuations. Evacuation system utilizes a **condenser** and **water ejector system.**

Post-vacuum. Following Sterilize phase, chamber is exhausted by the vacuum system. Vacuum system continues to evacuate chamber throughout the drying phase. At conclusion of drying phase, filtered air relieves the vacuum. **Air filter** is bacteria retentive.

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.

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, 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 and to wall partition(s) as required. Front and back stainless steel 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 stainless steel side panels and a louvered painted aluminum 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.

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						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)	Controls	Power Doors (Optional)	Front of Wall	Room Back of Wall	At Each End	Between Walls
24x36x48 (510x914x1219)	5025 (2281)	15 (57)	320 (1216)	255 (116)	148 (67)	3	20	5000	13600	5000	8800
24x36x60 (610x914x1524)	5700 (2588)	15 (57)	324 (1231)	335 (152)	185 (84)	3	20	5000	16500	5000	10500

**Based upon chamber filled with water ††At 50-80 psig (3.52-5.62 kg/cm²)*
†At 30-50 psig (2.11-3.52 kg/cm²)

SPECIFICATION WORKSHEET

Item _____: Furnish an AMSCO Eagle Series sterilizer with Printcon per Tech Data Sheet SD-360. Construct chamber □ 24x36x48" or □ 24x36x60". 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. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer □ for recessing through one wall or □ for recessing through two walls.

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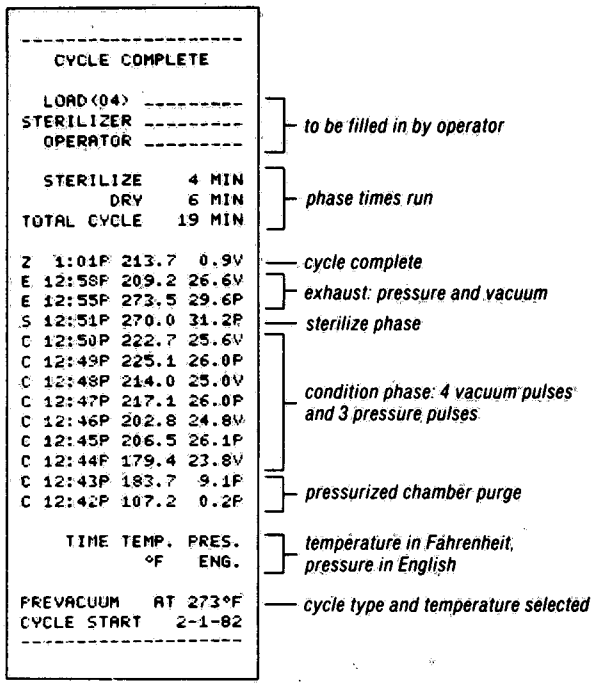


Figure 2. Typical Printout.

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

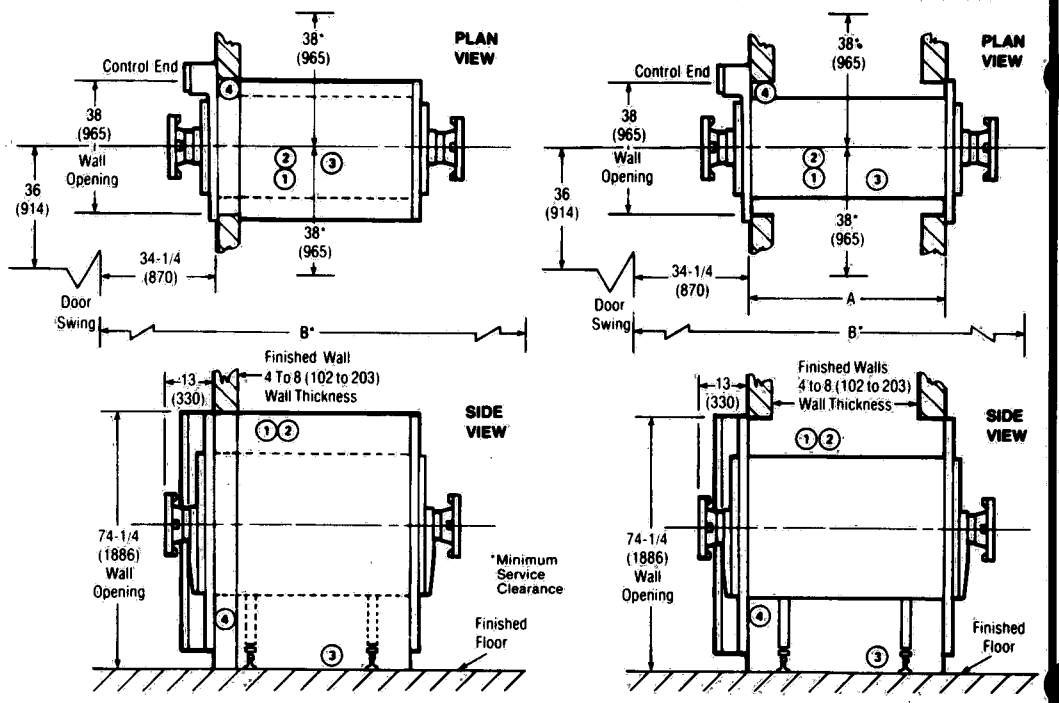
ABORT: TEMP SENSOR
* 3:45A 306.8 10.0P

Temperature Sensor Failure

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

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



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, 30 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 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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SD-363
(2/85)

AMSCO

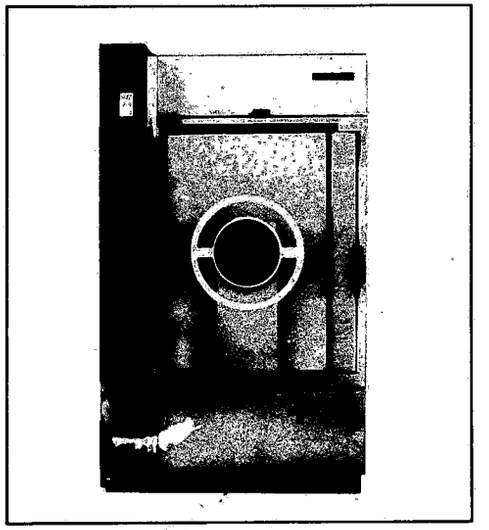
Eagle® 2300 SCIENTIFIC SERIES MEDIUM STERILIZERS with Printcon™
Vacamatic
• *single door*

TECH DATA

Medium Steam Sterilizer (SINGLE DOOR)

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system.** Uses mechanical air-evacuation for high-speed, high-volume sterilization. Also functions by the gravity air-removal principle. Steam under pressure is the sterilizing agent.



Typical only — some details may vary.

Applications

Eagle 2300 is designed for scientific, research laboratories.

Prevacuum Cycle - for efficient, high-volume processing of heat-and moisture-stabile materials such as fabrics, animal feed and bedding or wrapped hard goods at 270 to 280 F (132 to 138 C).

Gravity Cycles - 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.

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-1343A performance requirements.

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.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Chamber Size
- ☐ 24x36x36"
- ☐ 24x36x48"
- ☐ 24x36x60"

Door Hinge
- ☐ Right Side
- ☐ Left Side

Door Operation
- ☐ Manual
- ☐ Power

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" Sterilizers Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____

Location(s) _____

_____

_____

Printed in U.S.A.

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:

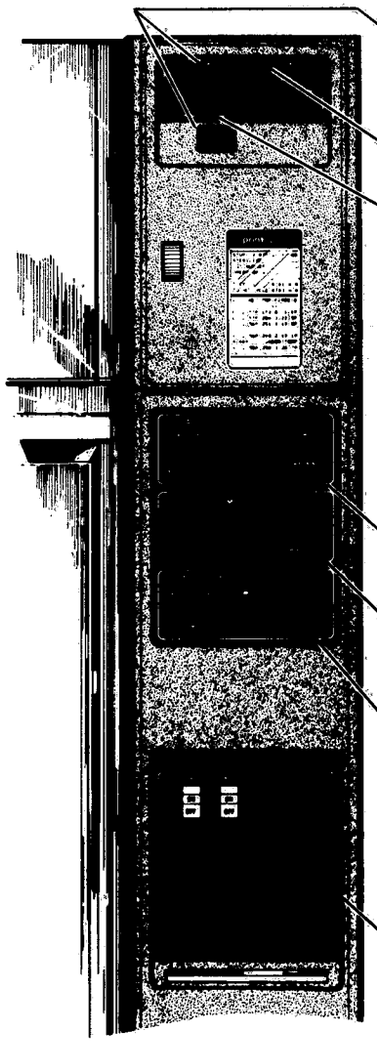


Figure 1. Eagle-Eye Vertical Control Column.

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.

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 are 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.

Vacuum System

Prevacuum. Series of **microcomputer-controlled** and **monitored** vacuum/pressure pulses effectively condition various size and density loads ...reduces total sterilization time. Factory-set sequence consists of three pressure pulses and four evacuations. Number of pulses is service adjustable from one to seven. Evacuation system utilizes a **condenser** and **water ejector system.**

Post-vacuum. Following Sterilize phase, chamber is exhausted by the vacuum system. Vacuum system continues to evacuate chamber throughout the drying phase. At conclusion of drying phase, filtered air relieves the vacuum. **Air filter** is bacteria retentive.

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.

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.

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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 (lmp)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Controls	Power Door (Optional)	To Room	Front of Wall	Behind Wall
24x36x36 (610x914x914)	3850 (1748)	15 (57)	317 (1200)	190 (86)	112 (51)	3	20	12550	5000	7500
24x36x48 (610x914x1219)	4725 (2145)	15 (57)	320 (1216)	255 (116)	148 (67)	3	20	14650	5000	9600
24x36x60 (610x914x1524)	5400 (2452)	15 (57)	324 (1231)	335 (152)	185 (84)	3	20	16800	5000	11800

*Based upon chamber filled with water

†At 30-50 psig (2.11-3.52 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-383. Construct chamber ☐ 24x36x36" **or** ☐ 24x36x48" **or** ☐ 24x36x60". 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. Include prevacuum cycle and 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 386.8 10.0P
--------------------
```

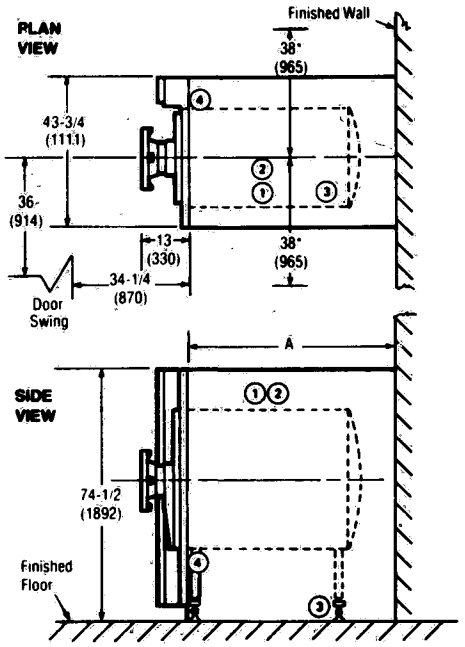
Temperature Sensor Failure

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

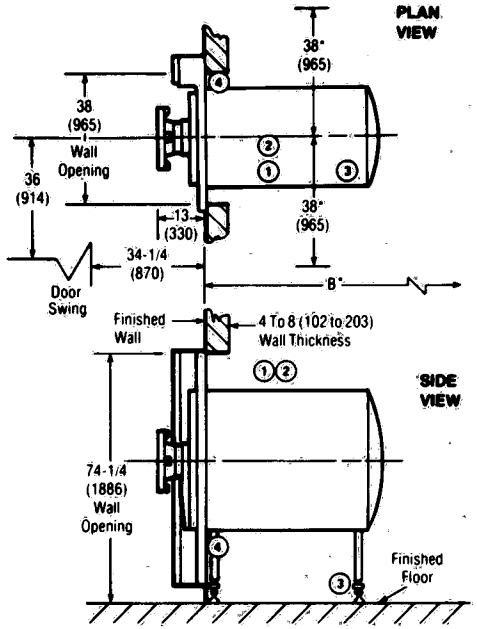
Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.

CABINET ENCLOSED



FOR RECESSING
See Note 3



*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, 30 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 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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AMSCO

Eagle® 2300 SCIENTIFIC SERIES MEDIUM STERILIZERS with Printcon™
Vacamatic
• *double door*

TECH DATA

Medium Steam Sterilizer (DOUBLE DOOR)

DESCRIPTION

Microcomputer-controlled sterilizer with **digital-printer** and **state-of-the-art control system.** Uses mechanical air-evacuation for high-speed, high-volume sterilization. Also functions by the gravity air-removal principle. Steam under pressure is the sterilizing agent.

Applications

Eagle 2300 is designed for scientific, research laboratories.

Prevacuum Cycle - for efficient, high-volume processing of heat-and moisture-stabile materials such as fabrics, animal feed and bedding or wrapped hard goods at 270 to 280 F (132 to 138 C).

Gravity Cycles - 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.

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:

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).

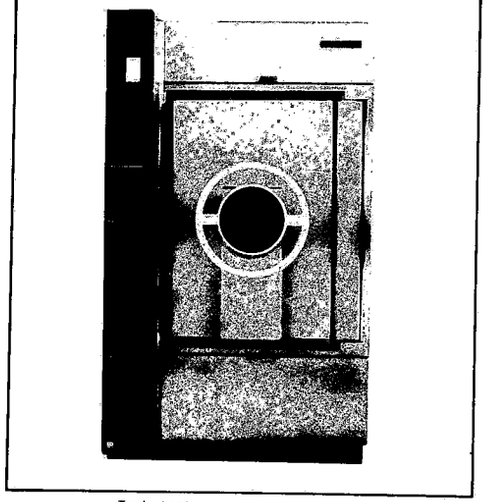
Federal Specification GG-S-1343A performance requirements.

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
- ☐ 24x36x48"
- ☐ 24x36x60"

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

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

Door Operation
- ☐ Manual ☐ Power

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" Sterilizer Only)
- ☐ Loading Car and Carriage
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____
Location(s) _____

Printed in U.S.A.

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:

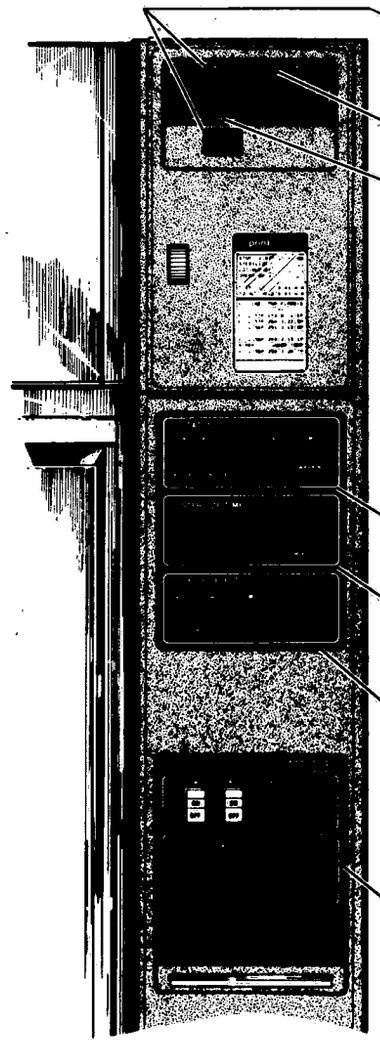


Figure 1. Eagle-Eye Vertical Control Column.

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 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 Prevac and Liquid **cycle selectors** by which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and hot liquids.

D-5

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 . . . 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 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 cover conceals 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 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.

Vacuum System

Prevacuum. Series of **microcomputer-controlled** and **monitored** vacuum/pressure pulses effectively condition various size and density loads ...reduces total sterilization time. Factory-set sequence consists of three pressure pulses and four evacuations. Number of pulses is service adjustable from one to seven. Evacuation system utilizes a **condenser** and **water ejector system.**

Post-vacuum. Following Sterilize phase, chamber is exhausted by the vacuum system. Vacuum system continues to evacuate chamber throughout the drying phase. At conclusion of drying phase, filtered air relieves the vacuum. **Air filter** is bacteria retentive.

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.

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 [illegible] Piping used to support other components is rigid brass.

D-6

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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, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Sub-frame 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 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)	OPERATING 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)	Controls	Power Doors (Optional)	Front of Wall	Room Back of Wall	At Each End	Between Walls
24x36x48 (610x914x1219)	5025 (2281)	15 (57)	320 (1216)	255 (116)	148 (67)	3	20	5000	13800	5000	8800
24x36x60 (610x914x1524)	5700 (2588)	15 (57)	324 (1231)	335 (152)	185 (84)	3	20	5000	16500	5000	10500

*Based upon chamber filled with water †At 30-50 psig (2.11-3.52 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-384. Construct chamber ☐ 24x36x48" **or** ☐ 24x36x60". 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. Include prevacuum cycle and 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(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

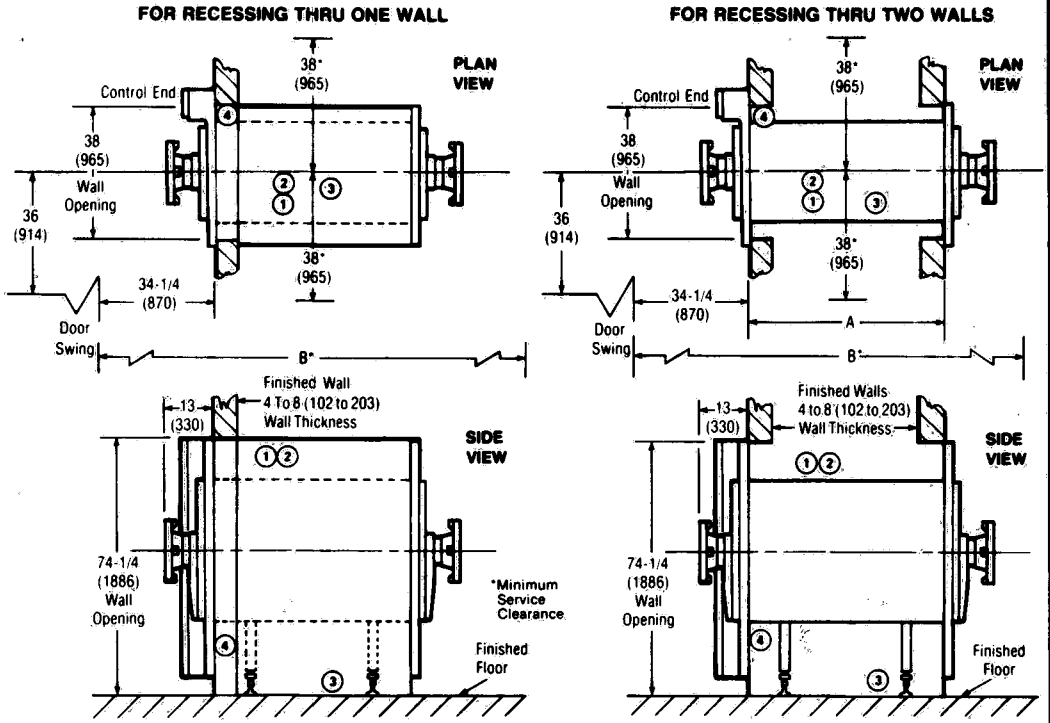
```
--------------------
ABORT:   TEMP SENSOR
*  3:45A 386.8 10.0P
--------------------
```

Temperature Sensor Failure

```
--------------------
ABORT:   PRES SENSOR
*11:59A 270.0 41.3P
--------------------
```

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



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, 30 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 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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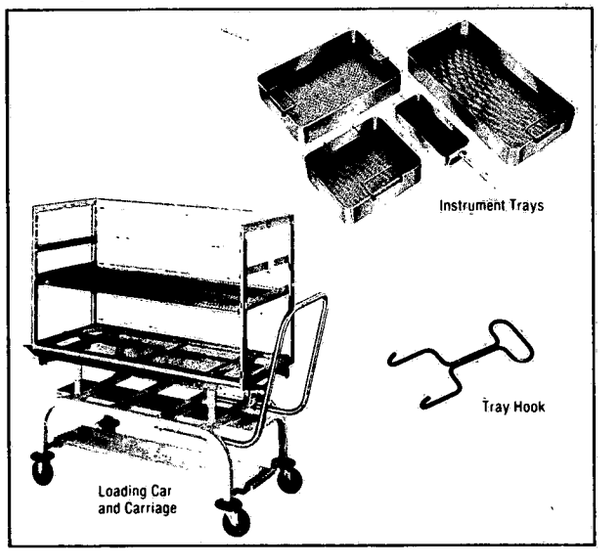
MATERIAL HANDLING ACCESSORIES

• 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*

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)

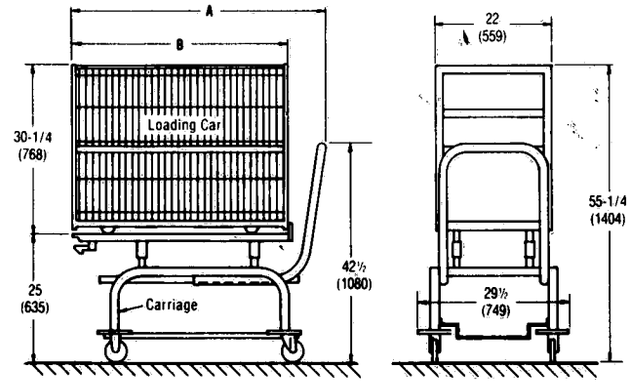
For 24x36x36" (610x914x914 mm) or 24x36x48" (610x914x1219 mm) sterilizers. Provides loading efficiency for a variety of mixed or single item loads. Shelves are completely removable for processing bulk loads. Rack has roller guides to accommodate either two or three equally spaced shelves. Two shelves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

NOTE: If there is a discrepancy between the operating instructions in this manual and those in the Equipment Manual, follow the Equipment Manual.

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

For Printcon units, refer to paragraphs 2.10 through 2.17.

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. 4.4).

2. Open the upper access door.

a. If sterilizer has a manual control, make sure it 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.

CAUTION: **For those units with water booster pumps, operation of the sterilizer without water supply will destroy the pump.**

3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel lights up. 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. Install a new paper chart on the indicator-recorder-controller at the beginning of each day (Para. 7.2).

5. Review paragraph 2.8, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle. Warning signals are an intermittent buzzer and the flashing on and off of the appropriate panel status light: CONDITION, DOOR UNLOCKED, STERILIZE.

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

7. Follow instructions in paragraph 4.3 for daily preventive maintenance procedure.

8. Wait until jacket pressure has stabilized, as indicated by jacket pressure gauge, before starting a cycle.

NOTE: In case of inadvertent, incorrect cycle selection, operator should press cycle RESET pushbutton on secondary panel. Overload circuit breaker, RECIRCUIT, 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."

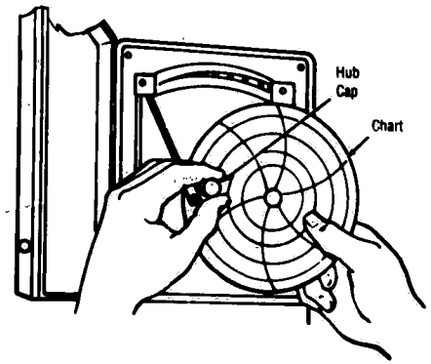


Figure 2-1. CHANGING THE CHART.

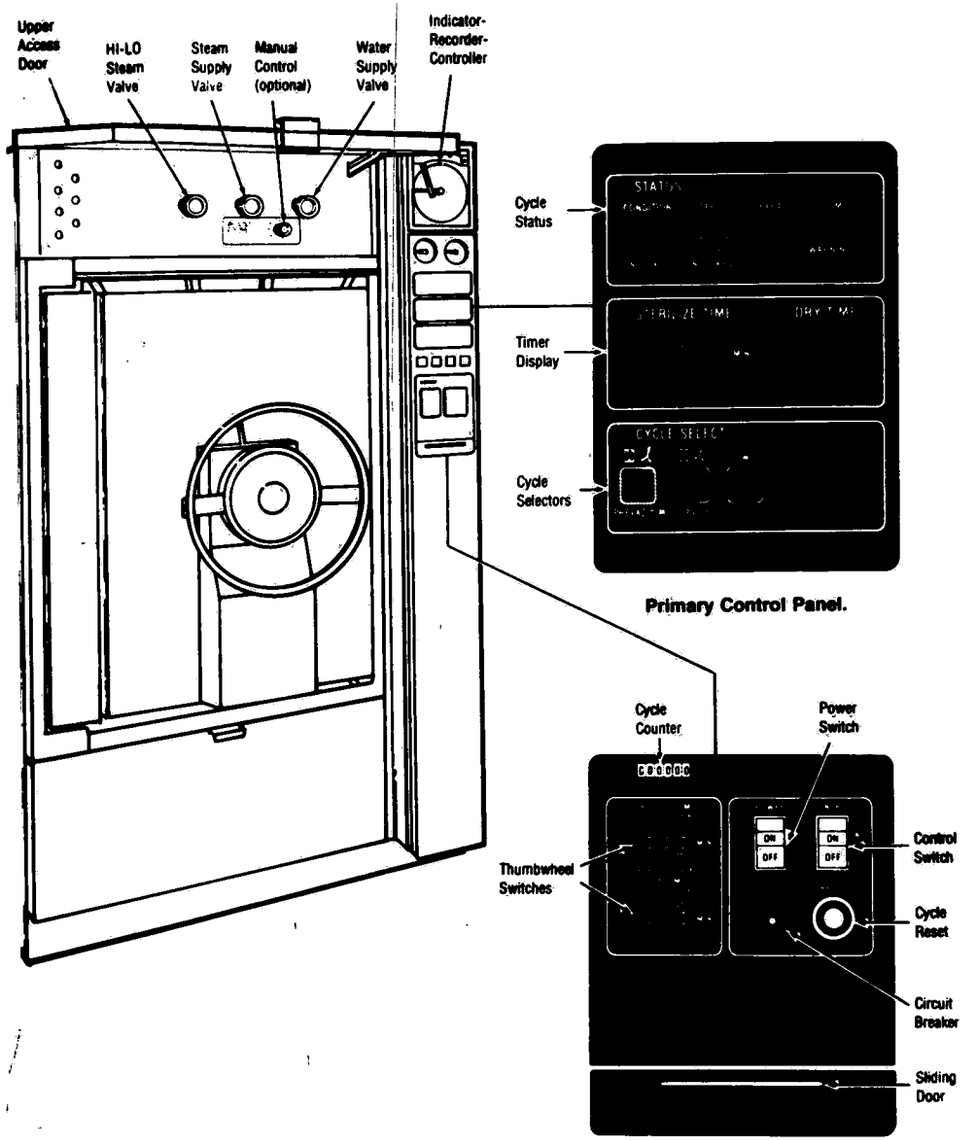


Figure 2-2. CONTROL LOCATIONS, OPERATING END.

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: PREVACUUM CYCLE (WRAPPED AND UNWRAPPED GOODS)

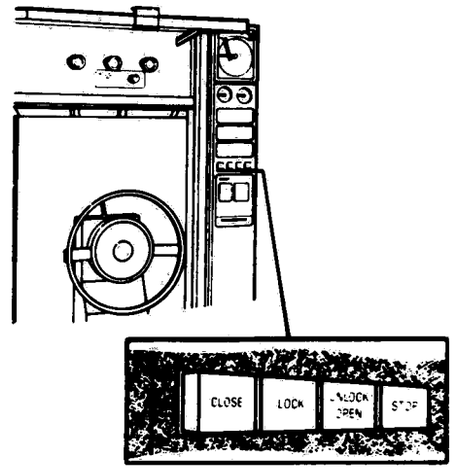
1. Follow instructions in paragraph 2.2, "Before Operating the Equipment."

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

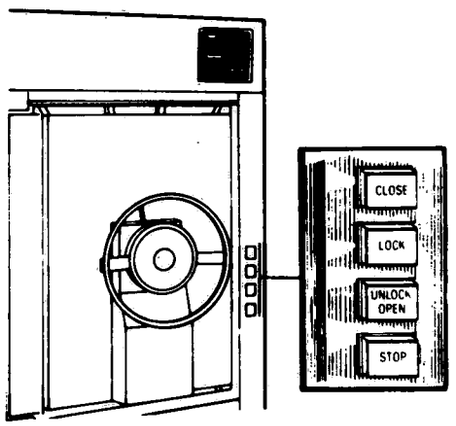
3. Open the door on the secondary panel.

a. Be sure the POWER and CONTROL 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.



Power Door Controls: Operating End.



Power Door Controls: Non-Operating End.

Figure 2-3. CONTROLS FOR POWER DOOR.

b. For routine loads, dial 04 minutes on STERILIZE TIME thumbwheels. Dry time will vary (usually between 5 and 20 minutes) depending on load processed and wrap material used. Set DRY TIME thumbwheel switches accordingly.

4. Set the yellow pointer on the indicator-recorder-controller to 270° F (132° 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.

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

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.

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.

9. When STERILIZE timer times out, EXHAUST light comes on. Steam 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.

10. When DRY timer times out, air is admitted to the chamber to relieve the vacuum. When vacuum is sufficiently relieved, approximately 2" Hg, COMPLETE light comes on, and buzzer sounds for 90 seconds or until door is opened — see step 5. Sterilized goods may be removed from the machine.

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

NOTE: If sterilization procedures routinely require fast processing of standard wrapped instrument trays, the number of prevacuum pulses may be increased for a shorter total sterilization period and greater productivity. See paragraph 7.12 for instructions on changing the number of pulses from the standard four.

2.5 AUTOMATIC OPERATION: GRAVITY CYCLE

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

NOTE: For cycle temperatures below 250° F (121° C), refer to paragraph 7.15.

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) sterilization cycle, or to LO for the 250° F (121° C) sterilizing cycle.

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.

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.

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, 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.

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

ITEMS	RECORDER SETTING 250° F (121° C) MINUTES	RECORDER SETTING 270° F (132° C) MINUTES
Dressings, wrapped in muslin or equivalent	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"x 12"x 20", 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

8. After condition phase is completed, 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. 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. 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.

2.6 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 7.15.

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: 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 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.

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.

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. Opening 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. Buzzer sounds for two minutes or until RESET button is pushed.

12. 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® FLASK(S) 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

2.7 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. A prevacuum cycle cannot be achieved manually.

1. Follow steps 1, 2, and 7 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.

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 7.15 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 2.6. 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 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 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. 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 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 atmospheric pressure:

a. **If a Liquids cycle** was in progress, crack door open 1/2'' 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.

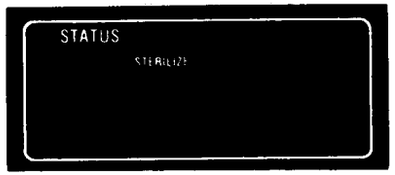
INDICATION: STERILIZE light on primary control panel flashes and STERILIZE timer display resets.

OPERATOR SHOULD:

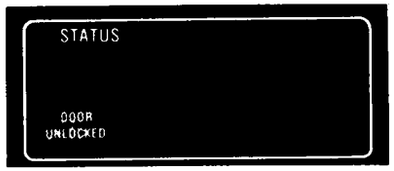
1. Let cycle continue to completion if sterilizing temperature is reestablished.

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

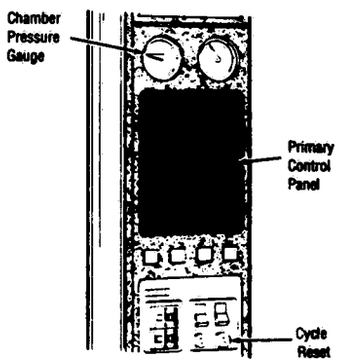
No. 1 — Condition Phase Too Long.



No. 2 — Sterilizing Temperature Drops.



No. 3 — Chamber Door Switch Not Made.



No. 4 — Power Failure.

Figure 2-4. MONITORS AND ALARMS.

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 1/2''** 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.

2.9 CONTROLS AND SIGNALS FOR DOUBLE-DOOR STERILIZERS (Fig. 2-5)

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

1. Cycle selectors: **PREVACUUM** and **LIQUIDS.** If you wish to repeat the previous prevacuum 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.

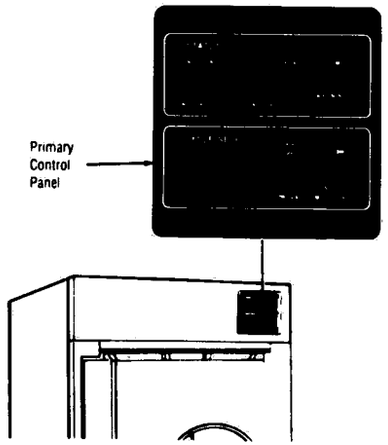


Figure 2-5. NON-OPERATING END PRIMARY CONTROL PANEL.

OPERATING INSTRUCTIONS (PRINTCON)

2.10 BEFORE OPERATING THE EQUIPMENT

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 (para. 4.4).

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.

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 while depressing either 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 7.16 "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 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 7.18, "Changing Units of Display" if changes are desired.

7. 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.

8. If a double-door model, refer to paragraph 2.9 to become familiar with 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.

2.11 AUTOMATIC OPERATION: (PRINTCON) PREVACUUM CYCLE (Wrapped and Unwrapped Goods)

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

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

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 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. 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). 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.

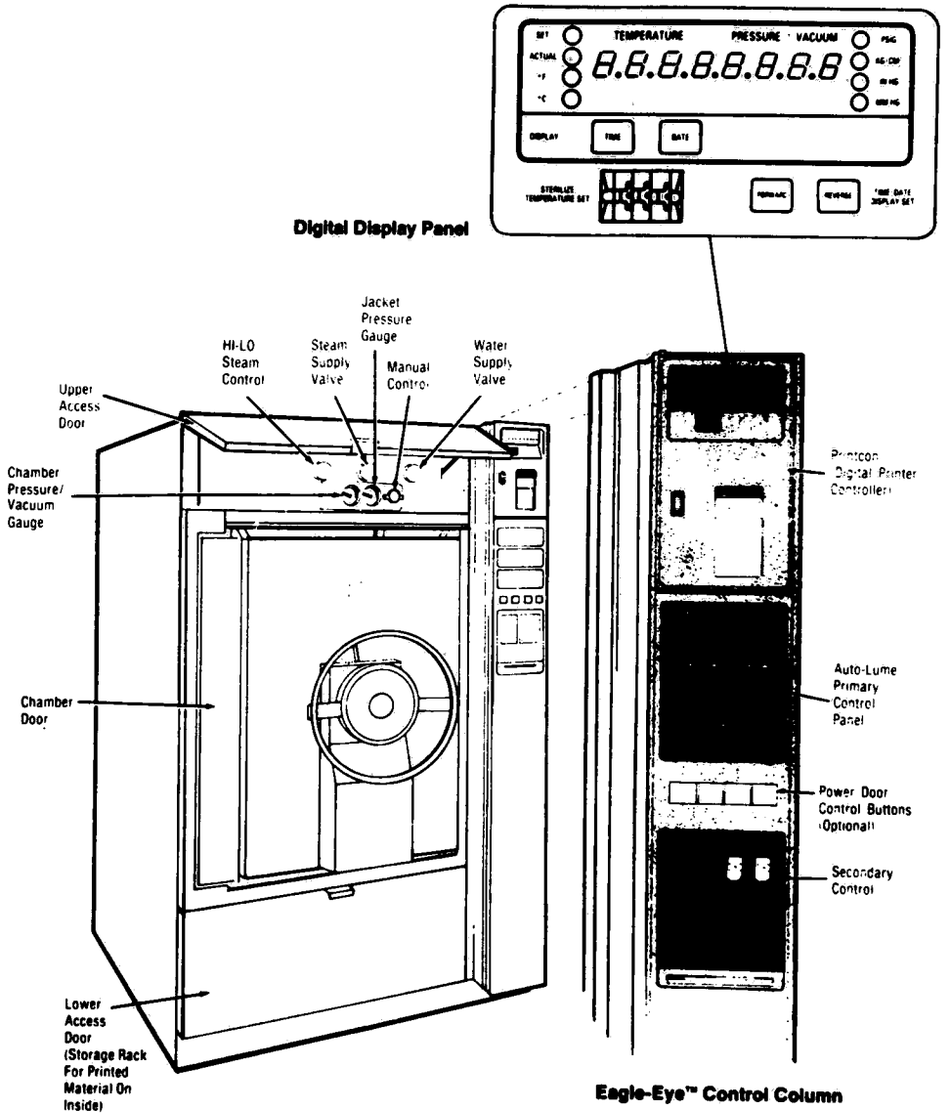


Figure 2-6. CONTROL LOCATIONS, Operating End.

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. 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.

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 2.17 if it becomes necessary to shift from power to manual operation.

7. Touch PREVACUUM 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 at the beginning of the cycle.

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.

9. When sterilizer timer times out, EXHAUST light comes on. Steam DRY TIME digital readout begins to count down. The printed record will show the time the EXHAUST phase begins and the temperature and pressure at the end of the STERILIZE phase.

10. When dry timer times out, air is admitted to the chamber to relieve the vacuum. When vacuum is sufficiently relieved, COMPLETE light comes on, and buzzer sounds. Open chamber door (see step 5). Sterilized goods may be removed from the machine. 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 the top copy of the printout and place with the completed load.

2.12 AUTOMATIC OPERATION: 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 7.15.

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.

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 250 F (121 C) or 270 F (132 C). This set point 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 range 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. 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.

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 2.17 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 at the beginning of the cycle.

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 panel light comes on and stays on for the duration of the STERILIZE phase. STERILIZE TIME digital readout begins to count down when chamber when sterilizing 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 at the end of the STERILIZE phase.

10. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Open chamber door (see 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 the top copy of the printout and place with the completed load.

2.13 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 2.6 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 7.15.

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. 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 7.18, "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 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 . . . 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 2.17 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 at the beginning of the cycle.

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.

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 and the temperature and pressure at the end of the STERILIZE phase.

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, the exhaust 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.

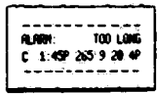
2.14 MANUAL OPERATION: GRAVITY (WRAPPED OR UNWRAPPED GOODS OR LIQUIDS CYCLE

During an electrical power failure, this sterilizer may be operated 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.

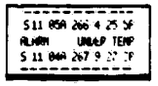
In cases where it is necessary to operate the sterilizer manually because it will not automatically advance to the next phase and electric power is available, the POWER and CONTROL switches may be left ON. The digital display of temperature and pressure can then be used for STERILIZE phase timing.

2.15 CONTROL MONITORING AND COMMUNICATIONS SYSTEMS (PRINTCON)

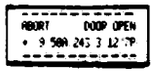
In addition to the monitors and messages outlined in paragraph 2.8 and Figure 2-4, Printcon units print the following messages:



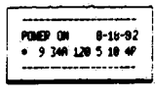
No. 1 — Condition Phase Too Long.



No. 2 — Sterilizing Temperature Drops.

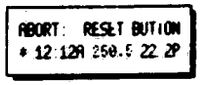


No. 3 — Chamber Door Switch Not Made.

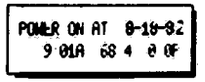


No. 4 — Power Restored After Power Failure.

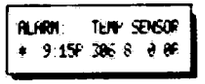
Additional printouts are provided whenever:



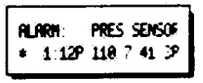
The RESET button is pressed.



The power is turned ON.



Temperature sensor failure is detected.



Pressure sensor failure is detected.

Figure 2-7. PRINTCON MESSAGES.

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

See paragraph 2.9 and Figure 2-5.

2.17 POWER DOOR MANUAL OPERATION

1. Pull shift handle to the left. If handwheel does not engage, turn it slowly while maintaining a slight pressure to the left on shift handle.

2. To return to power operation from manual, position shift handle to the right.

CAUTION: Be sure shift handle is in either the extreme right (POWER) or left (MANUAL) position at all times. Placing handle in an intermediate position could damage drive system.

SECTION 3

SECTION 3

PRINCIPLES OF OPERATION

3.1 GENERAL

The Vacamatic model sterilizer is designed to efficiently sterilize single and full loads of fabrics, wrapped and unwrapped hard goods, and solutions. To accomplish this, the sterilizer uses steam, regulated at the most effective temperature and pressure for the particular load. The control system offers three different sterilization cycles: Prevacuum, Gravity, and Liquids. The Liquids and Gravity cycles are conventional, gravity-displacement cycles, at the beginning of which air in the chamber is forced out by the introduction of steam. The Prevacuum cycle incorporates an initial conditioning phase which consists of a series of pressure/vacuum pulses. The purpose of the cycle is to quickly and thoroughly condition the load, thus permitting a relatively short sterilization cycle for suitable materials.

The control system and piping arrangement, 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 THEORETICAL PRINCIPLES OF OPERATION: MECHANICAL

NOTE: The material in Sections 3.2 through 3.6 applies to Printcon units except that the temperature switch has been replaced with a resistance thermal detector (RTD) probe, the pressure/vacuum switches have been replaced with a pressure transducer, and the recorder (IRC) is replaced with the Printcon (DPC) unit. For greater detail, see paragraphs 3.7 and 3.8 starting on page 3-15.

Prevacuum Cycle

The Vacamatic Model Sterilizer utilizes a special piping design to achieve high speed, efficient sterilization. Its features are as follows.

During the "purge" at the beginning of the cycle, the air in the chamber is quickly displaced by steam. This is accomplished by simultaneously opening the steam-to-chamber valve (S-2) and the fast exhaust valve (S-3).

At the same time, the water supply valve (S-7) and exhaust cooling valve (S-4) are open. Opening these valves accomplishes two purposes: (1) the cooling water is circulated through the heat exchanger (see diagram, Fig. 3-1), cooling the exhaust steam sufficiently to keep the drain temperature below 140° F; (2) simultaneously, the cooling water passing through the water ejector and heat exchanger flows at a rate sufficient to create a suction at the drain, thus increasing the rate of air and steam flow through the chamber. Flow control valve FC-6 is manually adjusted to permit water flow at the optimal 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 "conditioning" phase of the prevacuum cycle, a series of vacuum pressure pulses is created inside the chamber for efficient conditioning of the load. In the vacuum part of the phase, the filtered air valve (S-1) is closed, preventing air from entering the chamber. Steam-to-chamber valve (S-2) is also closed, preventing steam from entering the chamber. Fast exhaust valve (S-3), water supply valve (S-7), and exhaust cooling valve (S-4) remain open. The passage of cooling water through the heat exchanger condenses steam from the exhaust. The passage of cooling water through the ejector and the heat exchanger creates suction at the drain and produces a vacuum in the chamber.

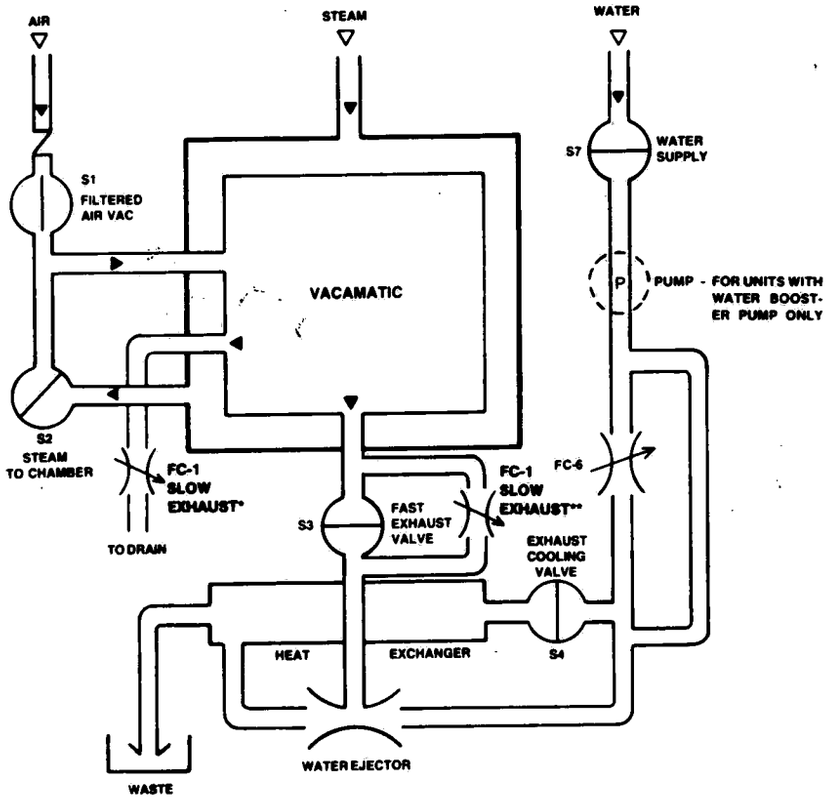
During the pressure part of the conditioning phase, the water supply (S-7), exhaust cooling (S-4), and fast exhaust (S-3) valves are closed. Since the filtered air valve (S-1) remains closed, the chamber is effectively sealed. The steam-to-chamber valve (S-2) opens, and steam is forced into the chamber to the desired pressure. The number of such vacuum/pressure pulses is determined by the microcomputer controls: see paragraph 3.6.

In the sterilize phase of the cycle, the chamber is again sealed, as described above in the pressure part of the conditioning phase. 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 (S-2) and filtered air (S-1) valves, and opening fast exhaust (S-3), vacuum water (S-7), and exhaust cooling (S-4) valves. The combined effect of cooling water through the ejector is a suction at the chamber drain, and thus a rapid evacuation of the chamber. The function of the exhaust cooling valve (S-4) is to provide cooling only for the period of peak discharge; therefore, the valve again turns off when chamber pressure is reduced to 2-3 psig.

The dry phase of the cycle again produces a vacuum in the chamber. The vacuum is produced by the combined action of steam condensing in the heat exchanger and the evacuating action of the water ejector.

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.



*FC-1 SLOW EXHAUST HOOK-UP FOR IRC UNITS

**FC-1 SLOW EXHAUST HOOK-UP FOR PRINTCON DPC UNITS

Figure 3-1. PIPING DIAGRAM: Vacamatic Sterilizer.

Gravity Cycle

In the Gravity cycle of the Prevacuum sterilizer, 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. This is accomplished by simultaneously opening the steam-to-chamber valve (S-2) and the fast exhaust valve (S-3) At the same time, the water supply valve (S-7) and exhaust cooling valve (S-4) are open. Opening these valves accomplishes two purposes: (1) the cooling water is circulated through the heat exchanger (see diagram, Fig. 3-1), cooling the exhaust steam sufficiently to keep the drain temperature below 140° F; (2) simultaneously, the cooling water passing through the water ejector and heat exchanger flows at a rate sufficient to create a suction at the drain, thus increasing the rate of air and steam flow through the chamber. Flow control valve FC-6 is manually adjusted to permit water flow at the optimal 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 (S-2) and filtered air (S-1) valves, and opening fast exhaust (S-3), vacuum water (S-7), and exhaust cooling (S-4) valves. The combined effect of cooling water through the ejector is a suction at the chamber drain, and thus a rapid evacuation of the chamber. The function of the exhaust cooling valve (S-4) is to provide cooling only for the period of peak discharge; therefore, the valve again turns off when chamber pressure is reduced to 2-3 psig.

The dry phase of the cycle is initiated by closing the exhaust cooling valve (S-4). All other valves remain as they were during the exhaust phase. The combined effect of the condensation of steam and the suction at the chamber drain is a vacuum in the chamber. 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.

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 electrical signal 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. Depending on which cycle is operating, the controller will automatically select a slow or fast exhaust at the completion of the sterilizing phase. If a drying time is selected for the Gravity or Prevacuum cycles, a vacuum will be pulled in the chamber during that phase. After the drying period, a vacuum switch senses when the chamber pressure is again near normal, and outputs from the controller actuate the COMPLETE signal and sound 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, cycle selectors are dimly lit.

Liquids Cycle

HI-LO valve must be set to LO. Operator selects sterilizing temperature, 250° F (121° C), on indicator-recorder-controller (IRC); then sets STERILIZE time. 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. Warning light WARNING HOT LIQUIDS will begin flashing and will continue until cycle is finished and RESET pushbutton is pushed.

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. The following solenoid valves are energized (opened): S-2 (steam-to-chamber), S-3 (fast exhaust), S-4 (exhaust cooling), S-7 (vacuum water). Vacuum water pump is turned on. The sixty-second purge timer begins to time. Purge timer times out.

2. After the sixty-second condition phase is completed, the fast exhaust, exhaust cooling, and vacuum water solenoid valves close, the water pump turns off, 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), S-4 (exhaust cooling), and S-7 (vacuum water) close, water pump turns off. When sterilizing temperature (250° F) is reached, temperature switch TS-1 (normally open) closes, CONDITION light goes off and 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 +2° F 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. Buzzer begins to sound and continues for 90 seconds or until door is opened. When door is opened (only cracked open for the first ten minutes following sterilization), buzzer is turned off. LIQUIDS cycle light and COMPLETE light go out. Solenoid valve S-3 (fast exhaust) closes, and DOOR UNLOCKED light turns on. WARNING HOT LIQUIDS light continues to blink until RESET button is pushed. Another cycle cannot begin until this is done.

Gravity Cycle

Operator selects sterilizing temperature (usually 250° F [121° C] or 270° F [132° C]) on indicator-recorder-controller, and sets STERILIZE and DRY timers. HI-LO valve must be set according to desired temperature. After loading 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 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), S-7 (vacuum water). Vacuum water pump is turned on. The sixty-second purge timer begins to time. Purge timer times out.

2. After the sixty-second condition phase is completed, the fast exhaust, exhaust cooling, and vacuum water valves are closed and the sterilizer chamber 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), S-4 (exhaust cooling), and S-7 (vacuum water) close, water pump turns off. When sterilizing temperature is reached, temperature switch TS-1 contacts close, and the STERILIZE timer begins to count down from the pre-set time. STERILIZE light comes on, CONDITION light goes out. 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 again opens. S-2 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 valves S-1 (filtered air), S-2 (steam-to-chamber) close. Solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water) open. Vacuum water pump is turned on. EXHAUST light comes on, STERILIZE light goes off. Chamber is quickly evacuated. When chamber pressure approaches atmospheric, solenoid valves S-4 (exhaust cooling), S-3 (fast exhaust), and S-7 (vacuum water) close, and water pump turns off. S-1 filtered air solenoid valve opens.

If a DRY time was set ...

- Solenoid valves S-1 (filtered air), S-2 (steam-to-chamber) close. Solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water) open. Vacuum water pump is turned on. EXHAUST light comes on, STERILIZE light goes off. When chamber pressure decreases to 3 psig, pressure switch PS-3 drops out. When this happens, the controller starts the DRY timer. Exhaust cooling valve S-4 closes. Chamber pressure during the drying period will be about 26''-28'' Hg. When DRY timer times out, solenoid valves S-3 (fast exhaust) and S-7 (vacuum water) close, and filtered air valve S-1 opens. When chamber pressure is at least 1-2'' Hg, as sensed by vacuum switch VS-2, COMPLETE light comes on, EXHAUST light goes out, and buzzer begins to sound. Solenoid valve S-3 (fast exhaust) opens.

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.

Prevacuum Cycle

HI-LO valve should be set to HI. Operator selects 270° F (132° C) sterilizing temperature on indicator-recorder-controller, and sets STERILIZE and DRY times. After loading machines, door must be locked. Panel status light DOOR UNLOCKED goes off. Operator touches PREVACUUM 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 valve (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:

- The following solenoid valves are energized (opened): S-2 (steam-to-chamber), S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water). Vacuum water pump is turned on. Panel light CONDITION comes on. The sixty-second purge timer begins to time. Purge timer times out.

2. The second phase of the prevacuum cycle consists of a series of four pressure-vacuum pulses. During this part of the conditioning phase, the chamber is alternately pressurized and then de-pressurized until a vacuum is drawn. This type of conditioning assures optimal utilization of the vacuum system for effective conditioning of loads which are appropriate for this method of sterilization. The following sequence of actions occurs in the machine:

• Solenoid valves S-1 (filtered air), S-2 (steam-to-chamber), and S-4 (exhaust cooling) close, and 1 minute vacuum timer begins timing. A vacuum is produced in the chamber. When vacuum switch VS-1 senses 10" Hg vacuum in the chamber, and vacuum timer (one minute) times out, steam-to-chamber valve (S-2) opens again to admit steam to the chamber to begin repressurizing. Simultaneously, solenoid valves S-3 (fast exhaust) and S-7 (vacuum water) close, and vacuum pump turns off. Chamber is pressurized to 26 psig, as sensed by pressure switch PS-1, and then S-2 (steam-to-chamber) again closes, and valves S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water) open and water pump begins evacuating the chamber until a vacuum is again produced. The entire sequence is repeated until three pressure pulses and four evacuations have occurred.

3. After the fourth evacuation, the chamber is again pressurized and the sterilize phase of the cycle begins.

• S-3 (fast exhaust) closes and S-2 (steam-to-chamber) opens in order to build pressure in the chamber. When sterilizing temperature is reached, as sensed by temperature switch TS-1, sterilizing timer begins to time. Simultaneously, filtered air valve S-1 opens, vacuum water valve S-7 closes and water pump turns off. STERILIZE light comes on, CONDITION light goes out. When the chamber temperature rises approximately 4° 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 (steam-to-chamber) and TS-2 cycle in this way for the duration of the sterilizing cycle. Recorded chamber temperature should not vary more than +2° from TS-2 set point.

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

• Solenoid valves S-1 (filtered air) and S-2 (steam-to-chamber) close. Solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water) open. Water pump is turned on, EXHAUST light comes on, STERILIZE light goes out. Chamber is quickly evacuated. When chamber pressure decreases to 3 psig, pressure switch PS-3 drops out. When this happens, the controller starts the DRY timer. Exhaust cooling valve, S-4, closes. During the drying period a vacuum will be drawn in the chamber. When DRY timer times out, solenoid valves S-3 (fast exhaust) and S-7 (vacuum water) close, filtered air valve S-1 opens, and water pump turns off. When pressure is at least 2" Hg, as sensed by vacuum switch VS-2, COMPLETE light comes on, EXHAUST light goes out, and buzzer begins to sound. Solenoid valve S-3 (fast exhaust) opens.

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

Control Monitoring and Communication Systems

1. If the sterilizer fails to reach sterilizing temperature within 35 minutes for vacamatic 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 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 1CR, 5TR, 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 LS5, 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 and vacuum switch VS2 must be in position completing circuit to energize 9CR. (**NOTE:** If a sterilizing cycle has ended and COMPLETE light is on, PS2 and VS2 are in position and 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 LS5 (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 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 LS5 (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 and vacuum switch VS2 must be in a position, completing circuit to energize 9CR. (**NOTE:** If a sterilizing cycle has ended and COMPLETE light is on, PS2 and VS2 are 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 released. 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.

Power Supply (Figure 6-15)

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 3-2), and five blocks for the 28-VDC supply (Figure 3-3).

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.

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. 6-13)

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 3-4 is a diagram of the CPU printed circuit board.

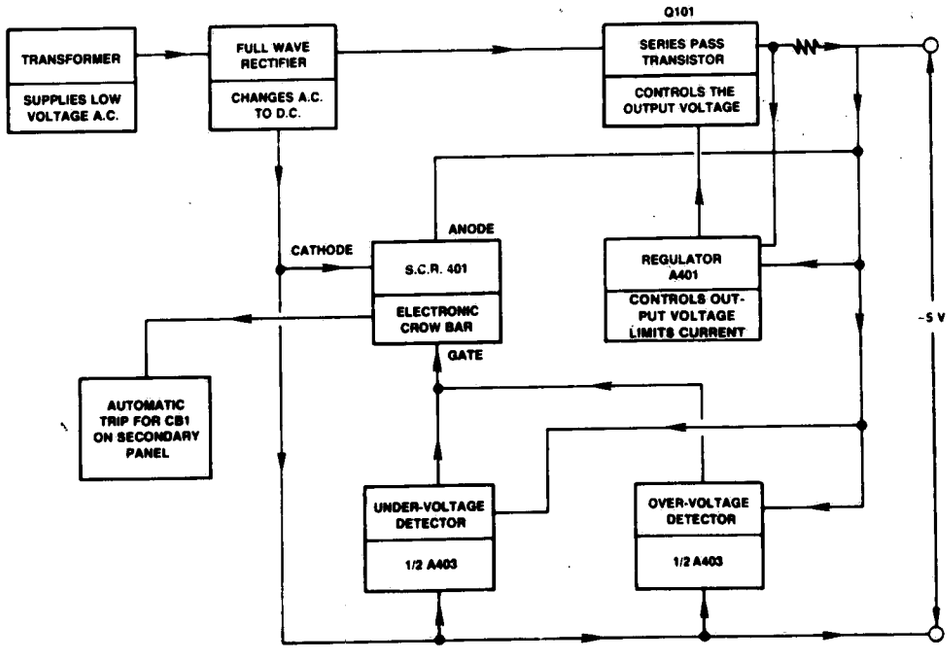


Figure 3-2. EAGLE 5-VOLT POWER SUPPLY.

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.

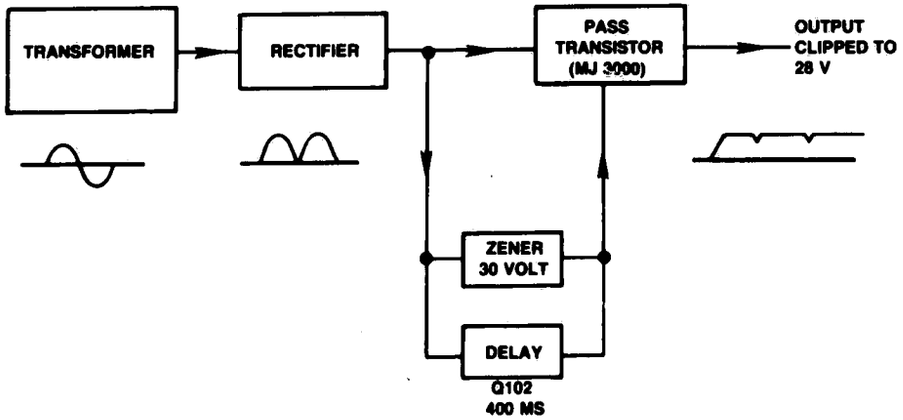


Figure 3-3. EAGLE 28-VOLT POWER SUPPLY.

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, 48, 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.

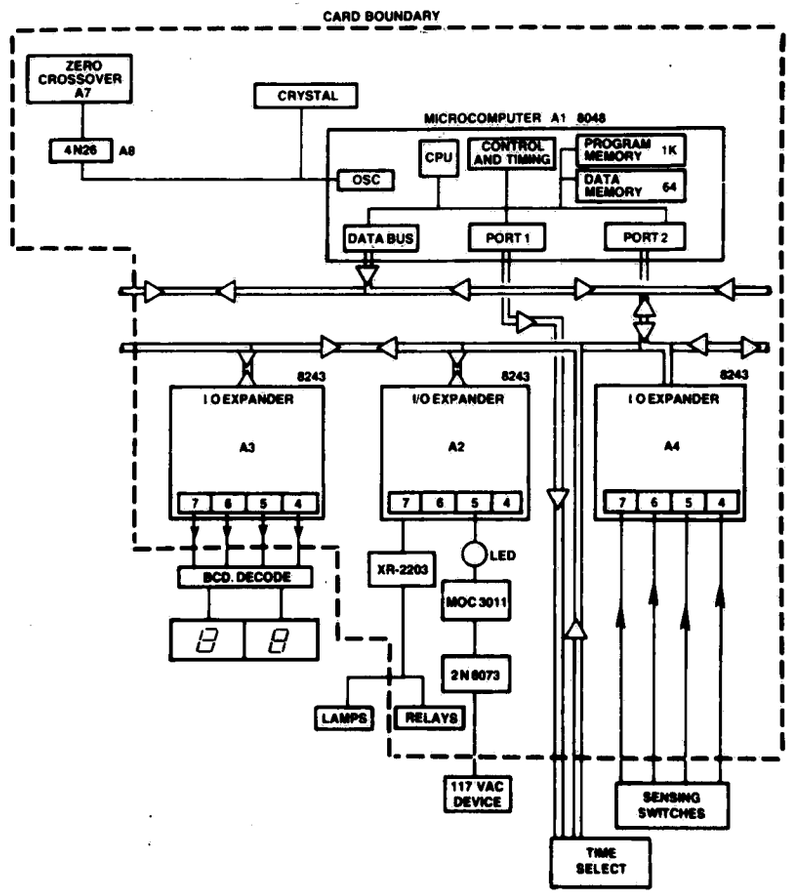


Figure 3-4. CPU PRINTED CIRCUIT BOARD 146586.

I/O #1 Printed Circuit Board — 146588 (Fig. 6-15)

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.

SW1 and SW2 provide a means of setting conditioning and exhausting pulses. Setting of these switches is covered in other sections of this manual.

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

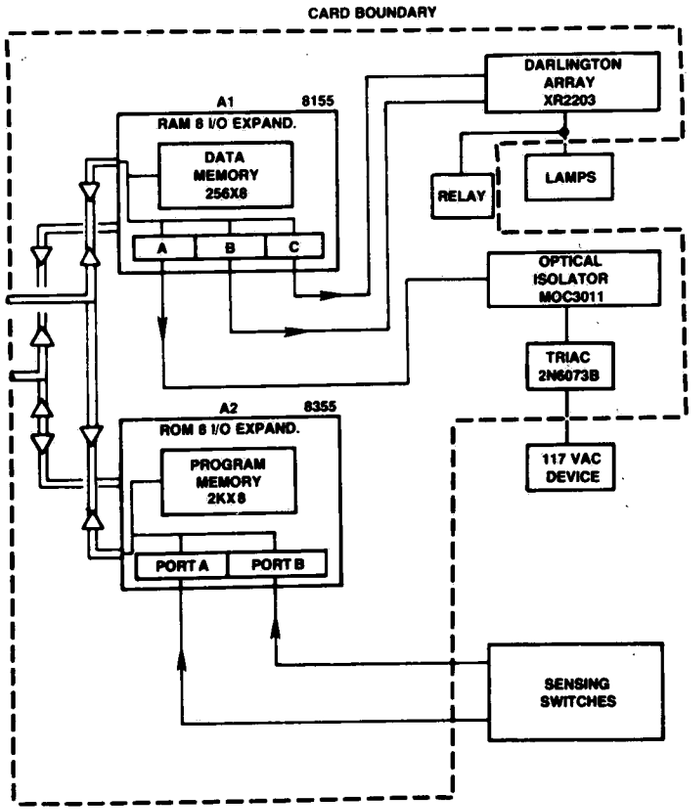


Figure 3-5. I/O #1 PRINTED CIRCUIT BOARD 146588.

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. 3-6, **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 (IRC) 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 (ϕ volts = OFF, 5 volts = ON), each switch

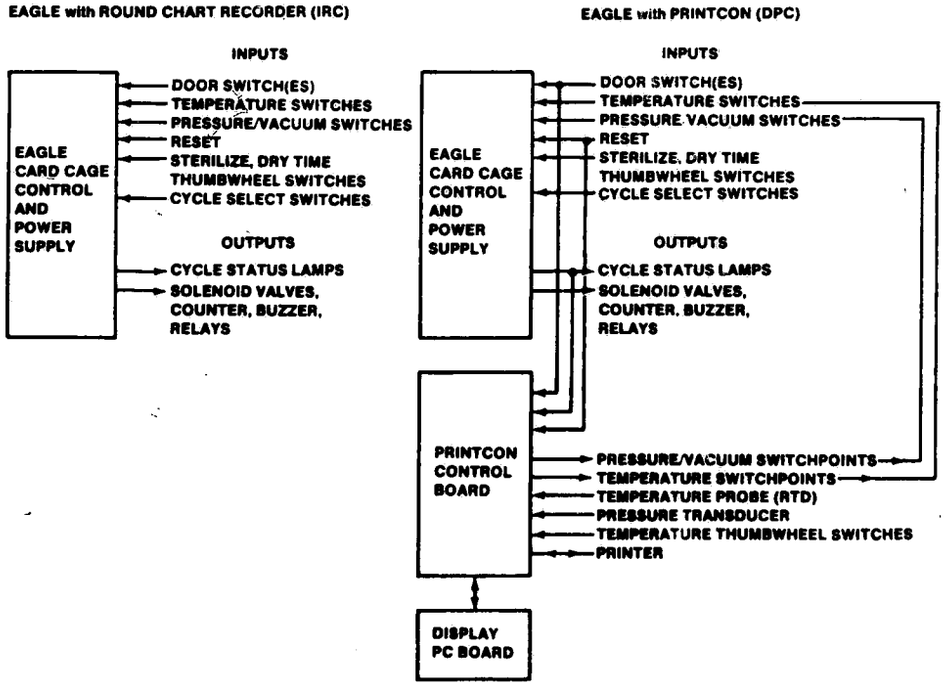


Figure 3-6. CONTROL COMPARISON.

was wired to the control as shown in Fig. 3-6. 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. 3-7). 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. 3-6.

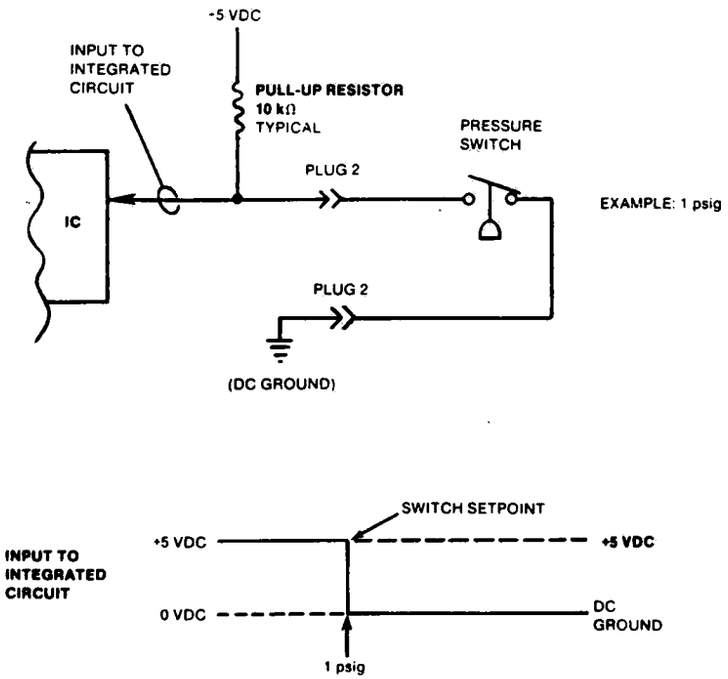


Figure 3-7. TYPICAL SWITCH INPUT.

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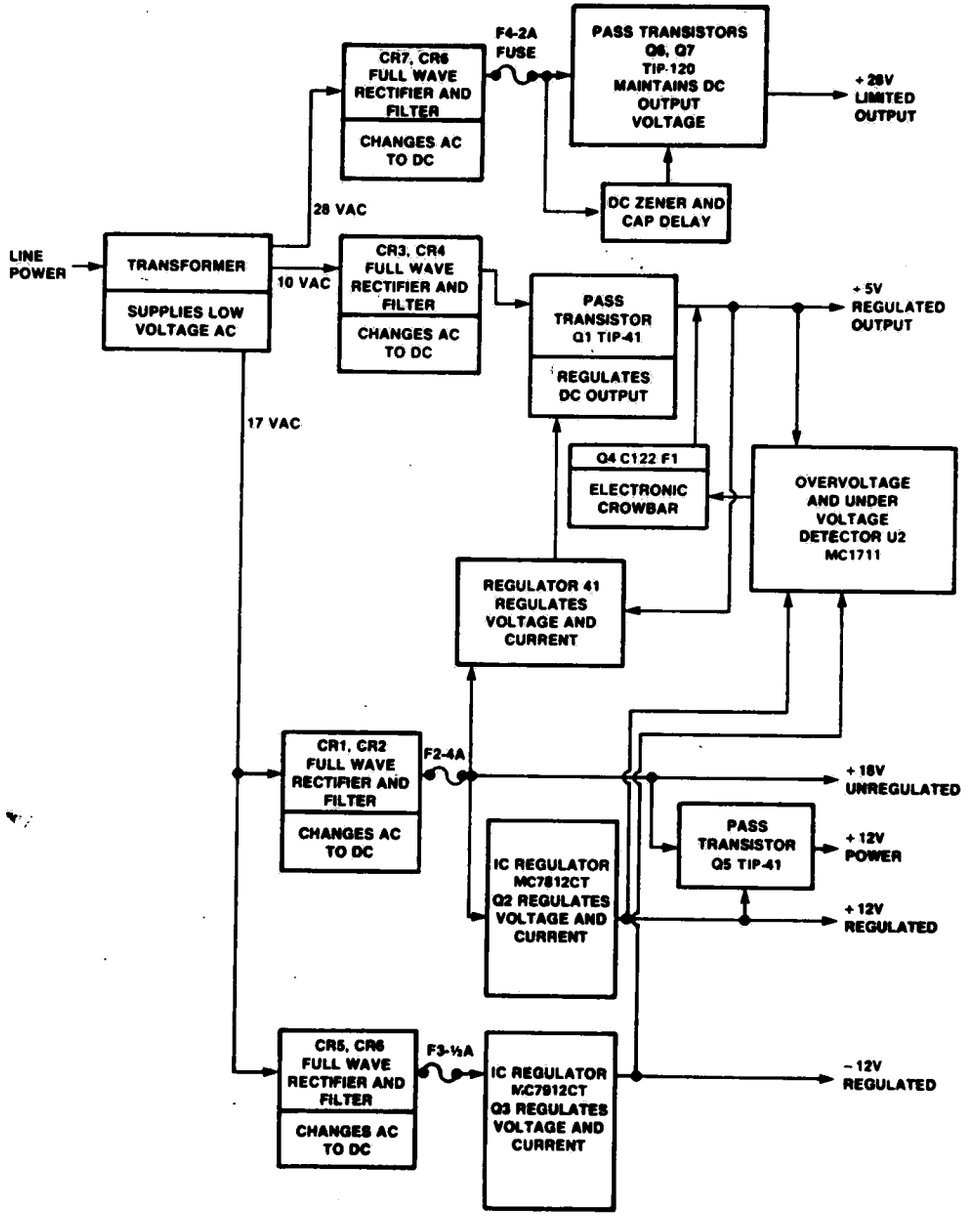

Figure 3-8. PRINTCON REGULATED POWER SUPPLY.

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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 3-8)

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 3-10).

+12 VDC at 1.5 amp, voltage regulated (Figure 3-10).

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

+18 VDC at 0.5 amp, unregulated (Figure 3-12).

+28 VDC at 1.5 amp, zener regulated (Figure 3-13).

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 3-9.)

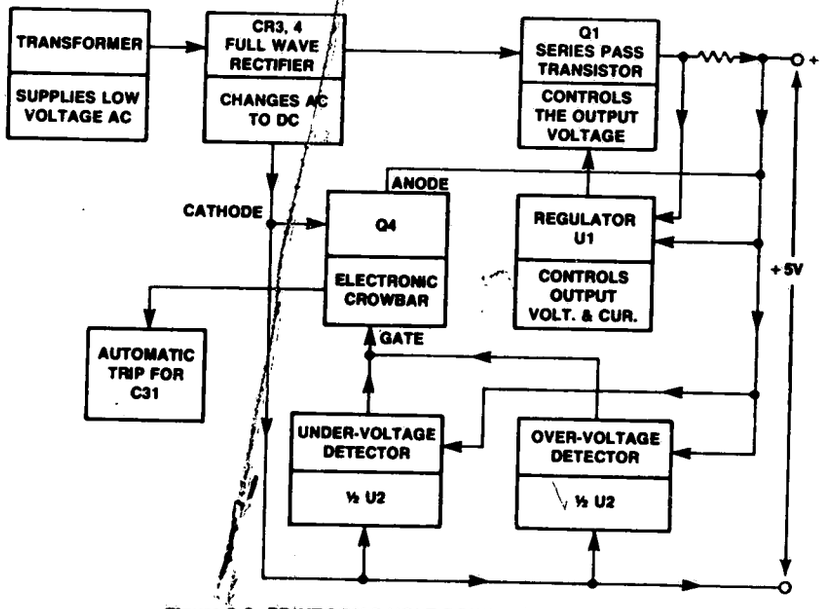


Figure 3-9. PRINTCON 5-VOLT POWER SUPPLY.

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 3-10, 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 3-10, Point A).

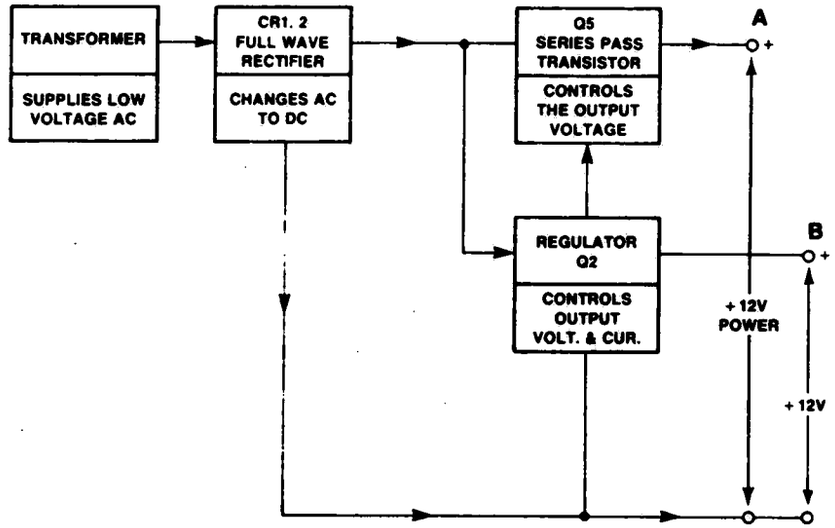


Figure 3-10. PRINTCON 12-VOLT POWER SUPPLY.

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 3-11.)

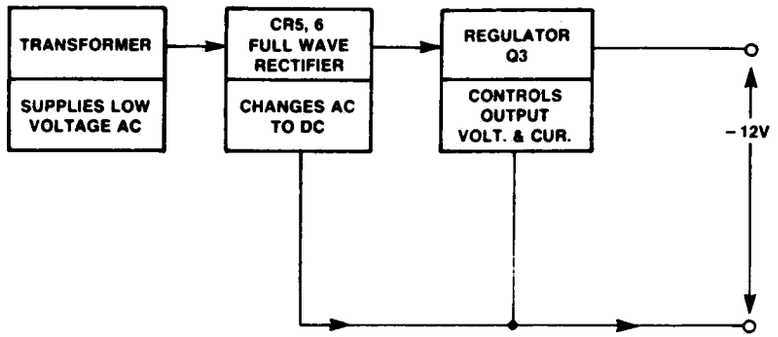


Figure 3-11. PRINTCON -12 VOLT POWER SUPPLY.

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 3-12.)

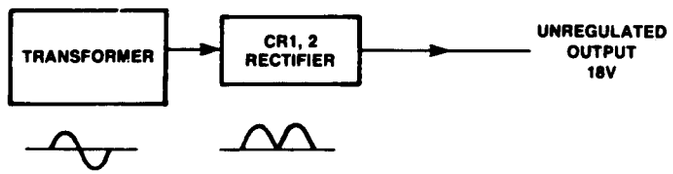


Figure 3-12. PRINTCON 18-VOLT POWER SUPPLY.

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 3-13.)

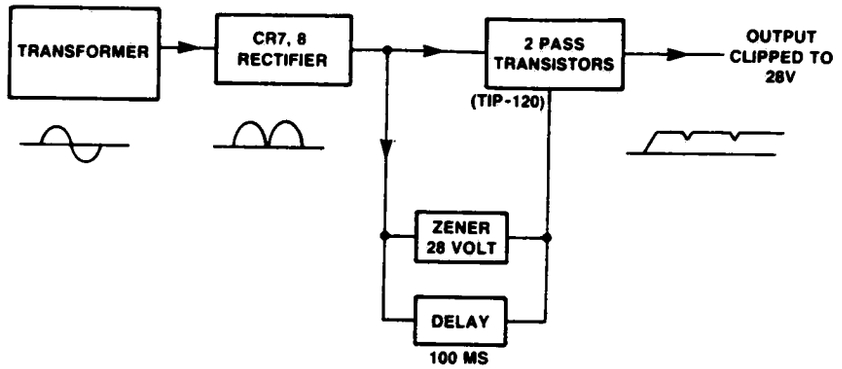


Figure 3-13. PRINTCON 28-VOLT POWER SUPPLY.

Motherboard/Card-Cage Assembly

This assembly is identical to that used on Eagles with round-chart recorders. Refer to Section 3.6 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. 3-4 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 3-14 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 linearly in response to changes in pressure and temperature respectively. These voltages are fed to a **Multiplexer IC** which is the electronic equivalent of a single-pole 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 linearly 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 PREVACUUM, 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. **BCD** (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.

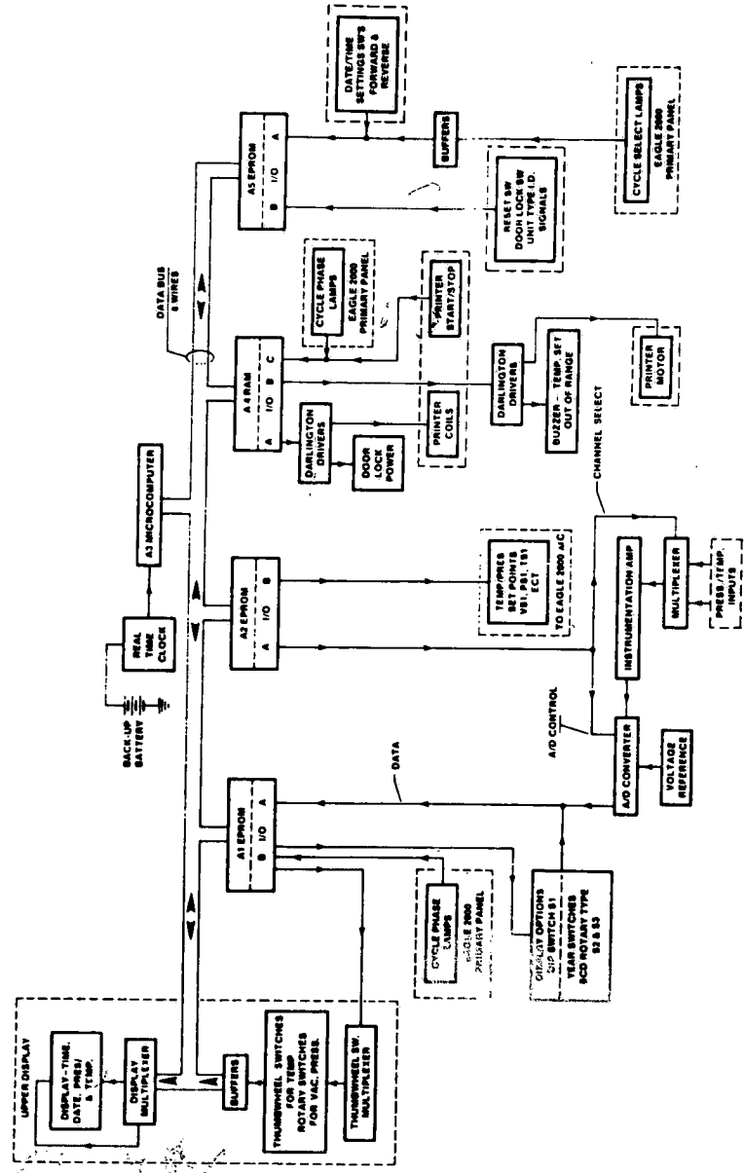


Figure 3-14. PRINTCON BLOCK DIAGRAM: Main Printcon P C Board.

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 3-15 and 3-16.)

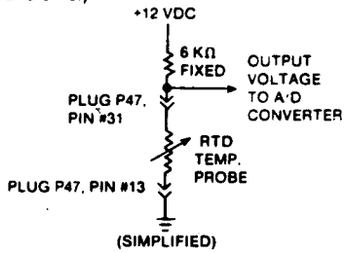


Figure 3-15 . TEMPERATURE PROBE SCHEMATIC.

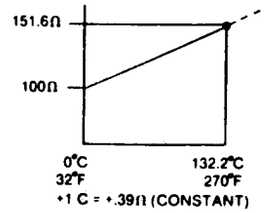


Figure 3-16. TEMPERATURE VS. RESISTANCE CHARACTERISTIC.

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 3-17 and 3-18.)

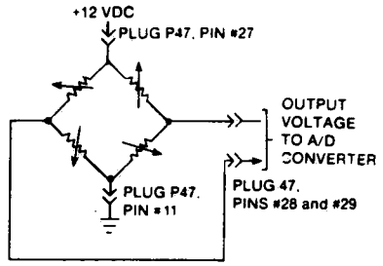


Figure 3-17. PRESSURE TRANSDUCER SCHEMATIC.

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.

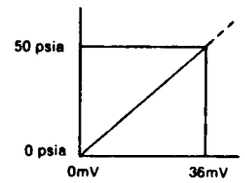


Figure 3-18. PRESSURE VS. TRANSDUCER OUTPUT CHARACTERISTICS.

DIGITAL DISPLAY PC BOARD 146633-081

A block diagram of this PC board is presented in Figure 3-19. 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.

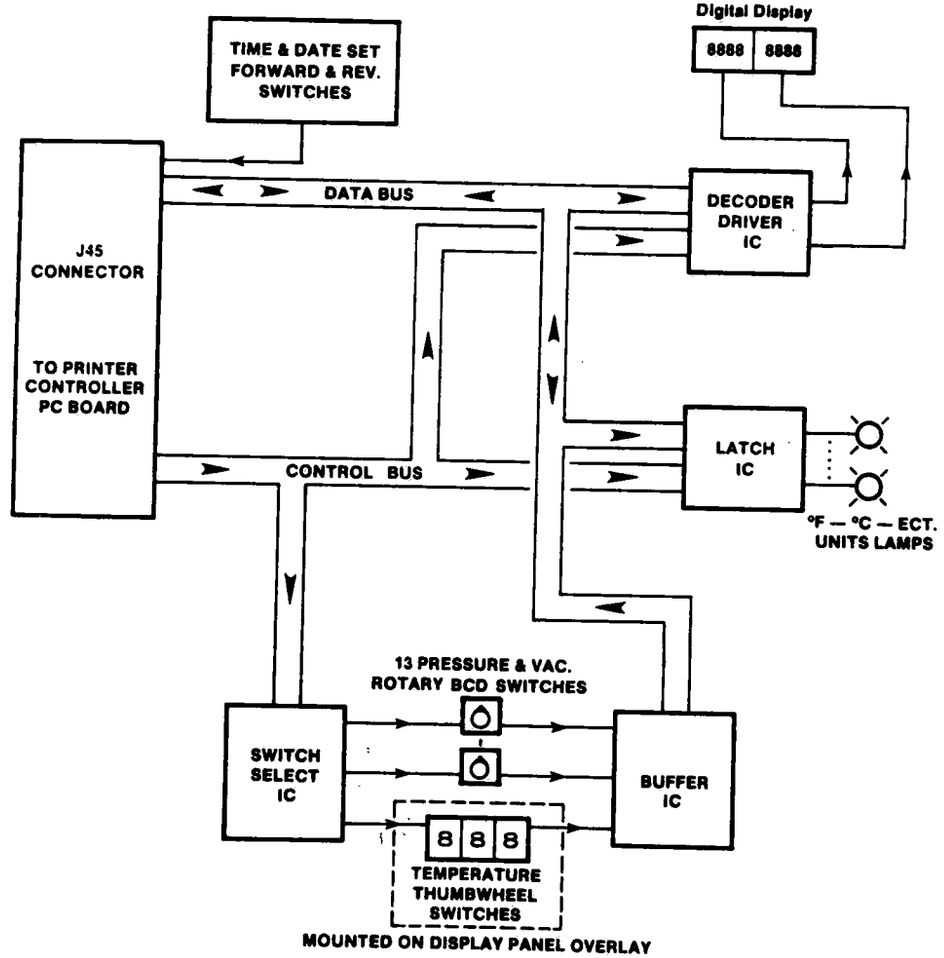


Figure 3-19. DIGITAL DISPLAY BLOCK DIAGRAM.

INTERPRETING THE PRINTED CYCLE RECORDS

Printed cycle records for normal steam sterilization cycles are presented in Figures 3-20, 3-21, and 3-22. The letters in the left hand 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.

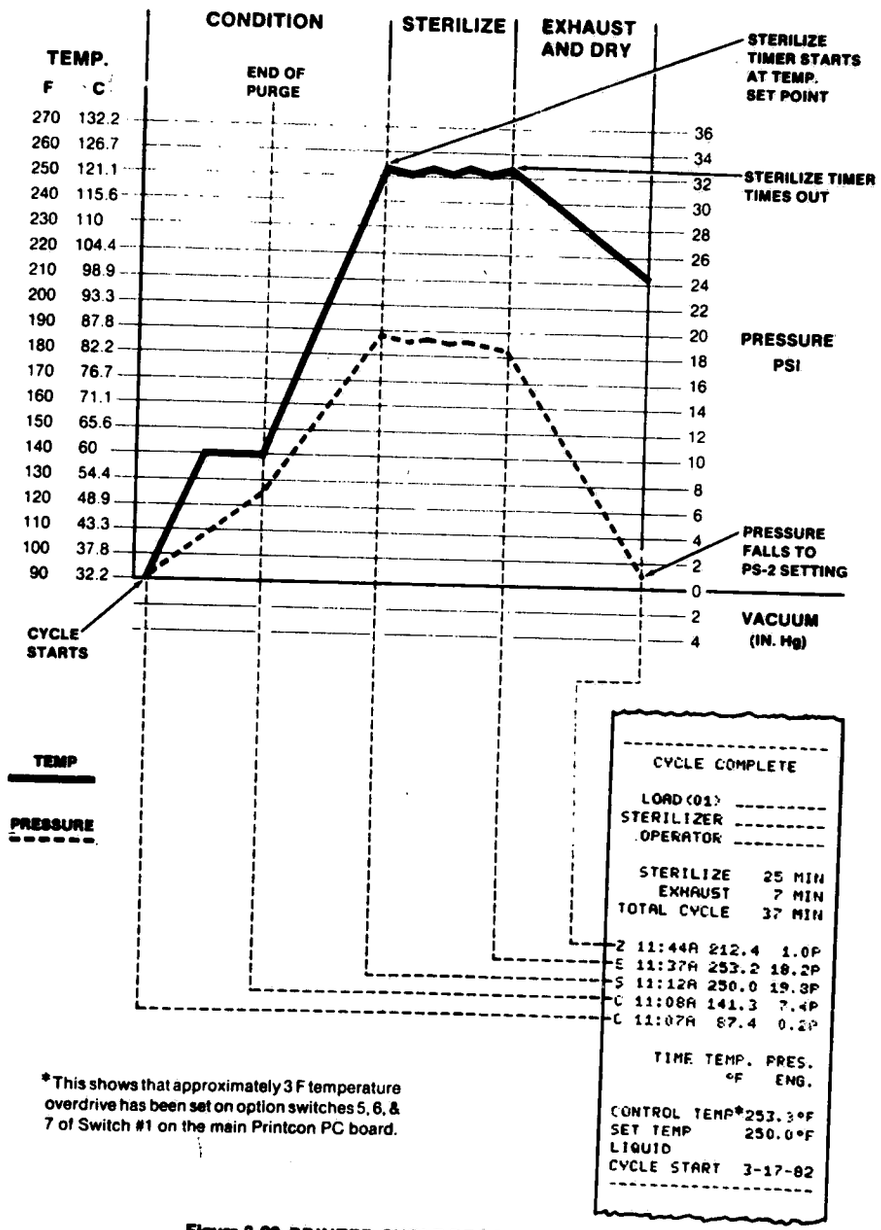
On a typical line; C 11:08A 141.3 7.4P

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 Printcon PC board.

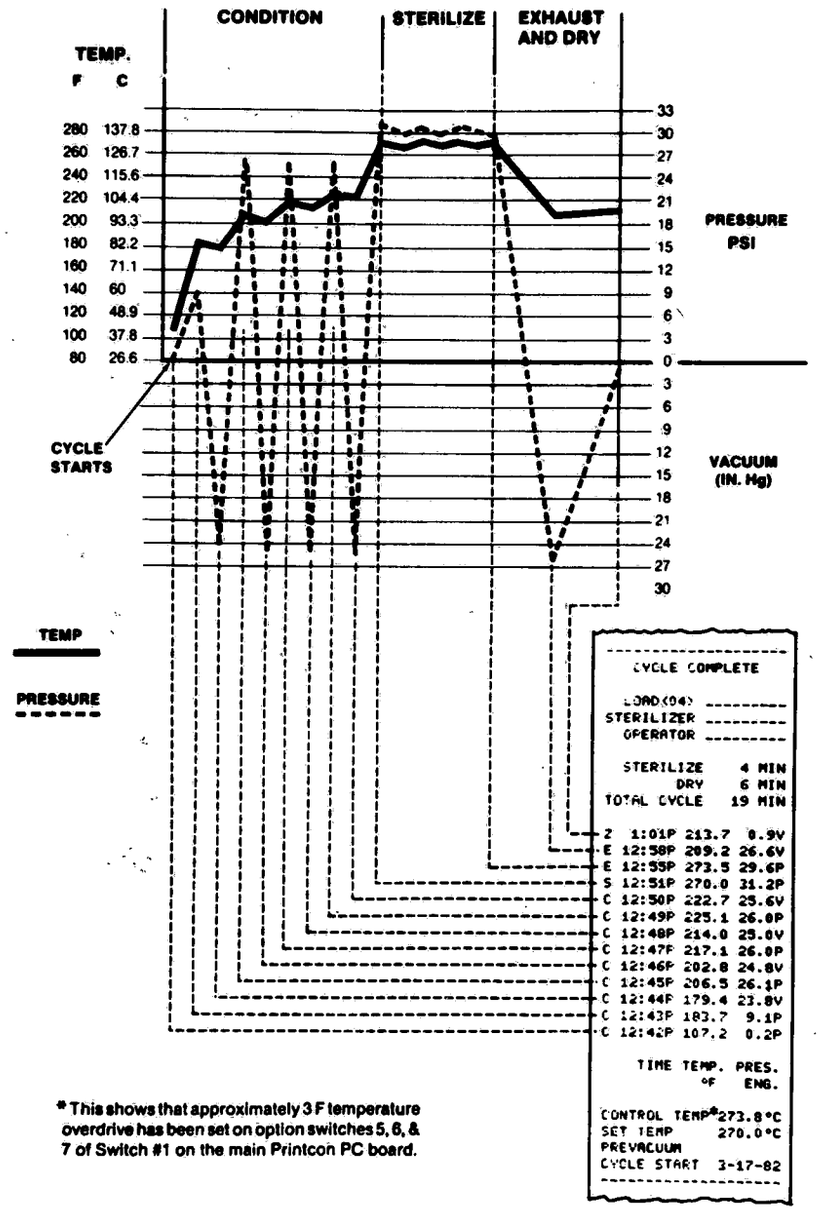
Figure 3-20. PRINTED CYCLE RECORD: Liquid Cycle (Units with Printcon)

AMSCO SERVICE

EAGLE 2000 SERIES MEDIUM STERILIZERS
VACAMATIC
P-764086-002

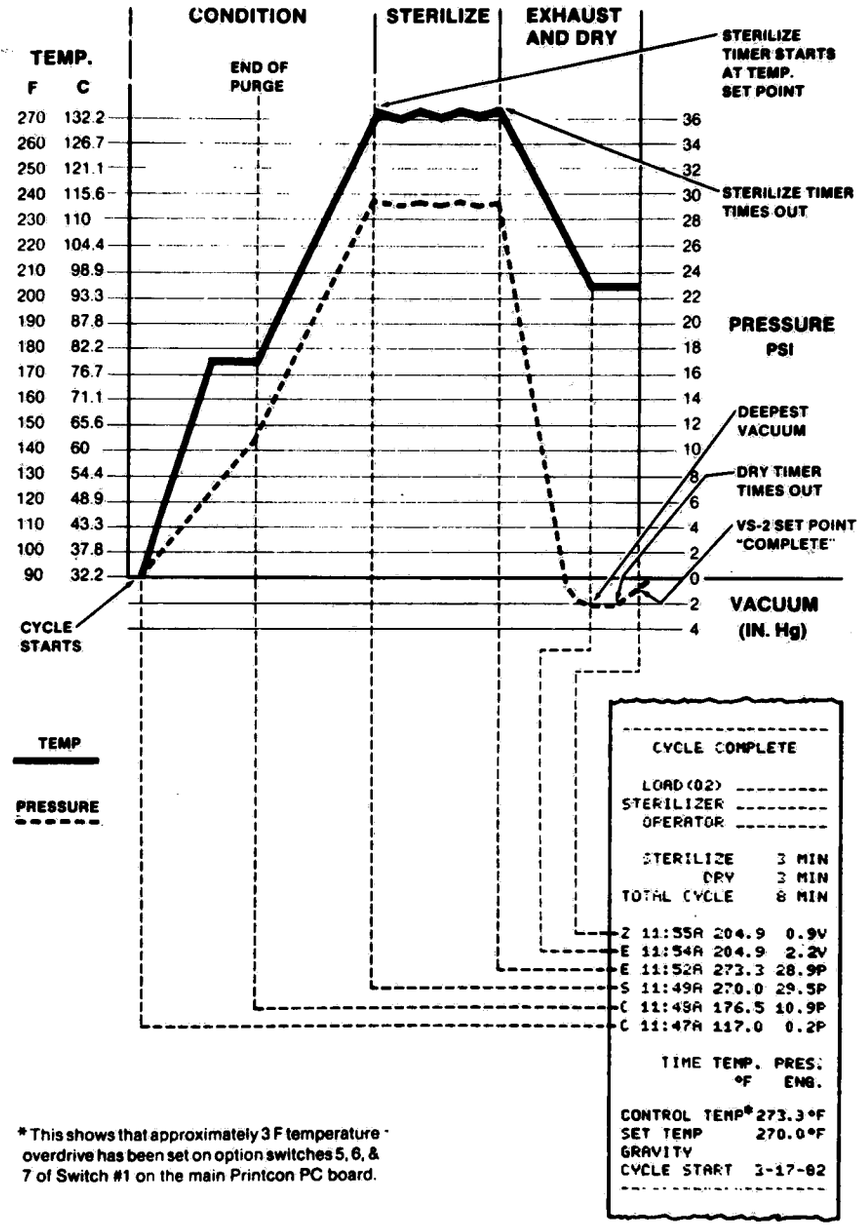
8/87

1 of 5



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

Figure 3-21. PRINTED CYCLE RECORD: Prevacuum Cycle (Units with Printcon)



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

Figure 3-22. PRINTED CYCLE RECORD: Gravity Cycle (Units with Printcon)

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SECTION 4

INSPECTION AND MAINTENANCE

4.1 GENERAL

Maintenance procedures described in paragraphs 4.2 through 4.5 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. Paragraph 4.6 is a sample maintenance record which we suggest the Maintenance Department keep. Such a record will prove helpful in ensuring 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 printout or recorder chart 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.

3. Check that pressure regulator (HI-LO valve) is controlling pressure within acceptable ranges. If it appears to be malfunctioning, see paragraph 7.10.

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 strainer (Fig. 8-30, 20).

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 a solution of 1/2 cup of AMSCO Sonic Detergent* (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.

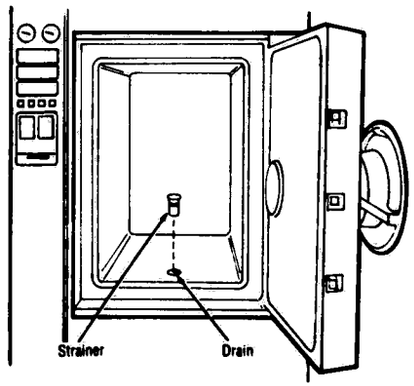


Figure 4-1. LOCATION OF CHAMBER DRAIN STRAINER.

**Available from your local AMSCO representative.*

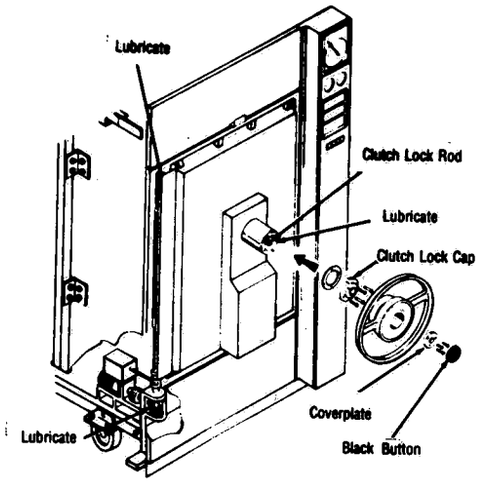


Figure 4-2. LUBRICATING CHAMBER DOOR.

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).

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. Lubricate the hinge-drive assembly pinion (power door) and drive gears with grease (P-75439-091) or equivalent.

3. Check chamber safety valve (Fig. 8-31, or 8-64. 11) as follows:

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

a. Be sure sterilizer is cool.

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

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

d. Turn POWER and CONTROL switches to ON, and open STEAM supply valve. With jacket pressurized, check safety valve for steam leakage. If valve is leaking, operate the try lever several times to see if the leakage stops.

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

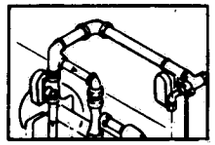
**Also available from your local AMSCO representative . . . ask for part P-385220-091.*

Semiannually

1. Remove cover from air filter (Fig. 8-32, 56 or 8-65, 53) 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.



UNIT WITHOUT WATER BOOSTER PUMP

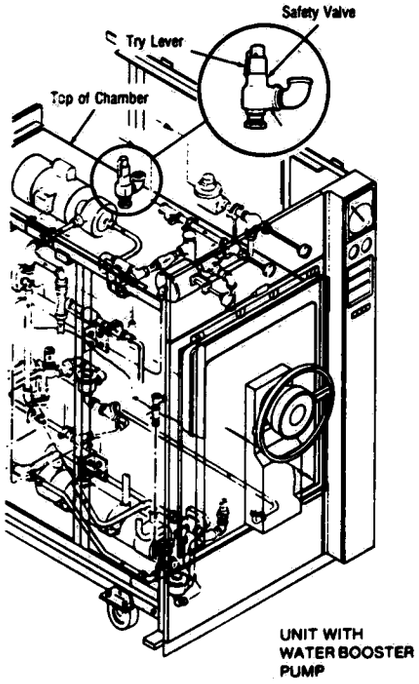


Figure 4-3. CHAMBER SAFETY VALVE.

4.4 CLEANING

Daily

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

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

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.

Monthly

1. Clean gasket sealing surface on chamber door frame(s) with **AMSCO Pry Cream** (included in Door Frame Cleaning Kit, 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 (Fig. 8-33, 14 and 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 plastic or 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.

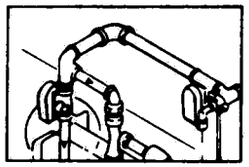
c. Wait five minutes, then flush drain with one quart of hot tap water.

d. Replace the strainer.

4.5 PRINTCON CONTROL MAINTENANCE FREQUENCY

Perform the following operations at the intervals specified. Also refer to Paragraph 4.6 for more information.

1. Change ink cartridge ..... 225 cycles (Paragraph 7.16)
2. Evaluate paper take-up ..... 225 cycles (Paragraph 7.16)
3. Check calibration ..... 1800 cycles (Paragraph 7.22)
4. Change battery ..... Yearly (Paragraph 7.18)
5. Set year date ..... Yearly (Paragraph 7.18)



UNIT WITHOUT WATER BOOSTER PUMP

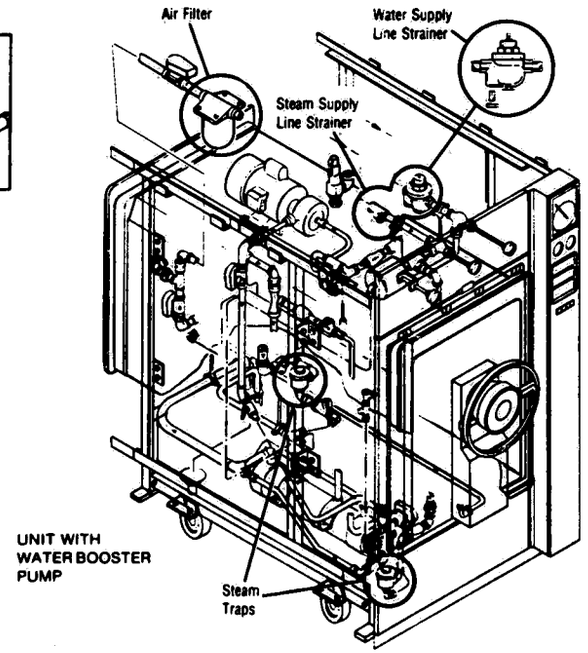


Figure 4-4. LOCATION OF AIR FILTER, STEAM TRAPS, AND STEAM AND WATER SUPPLY LINE STRAINERS.

4.6 PREVENTIVE MAINTENANCE GUIDE

EQUIPMENT: **Eagle® 2000 And 2300 Series Medium Vacamatic Sterilizers**
This form is to be used as a preventive maintenance record and, along with **Section 4** *instructions, as a guide to performing preventive maintenance.*

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

SERVICE PERFORMED:	1	2	3	4	5	6
1.0 PREPARATION FOR PREVENTIVE MAINTENANCE						
1.1 Discuss equipment operation with department personnel.	X	X	X	X	X	X
1.2 Inspect charts/printouts for signs of trouble.	X	X	X	X	X	X
1.3 Install new chart (IRC Units) for test purposes.	X	X	X	X	X	X
1.4 Install test equipment.	X	X	X	X	X	X
1.5 When necessary, shut off building services and drain all lines.	X	X	X	X	X	X
2.0 DOOR ASSEMBLY (EACH DOOR ON A DOUBLE DOOR UNIT)						
2.1 Inspect door for ease of operation.	X	X	X	X	X	X
2.2 Inspect condition of door gasket for wear and tear, replace as necessary.	X	X	X	X	X	X
2.3 Inspect door alignment with end ring.	X	X	X	X	X	X
2.4 Lubricate hinge and hinge pins.	X	X	X	X	X	X
2.5 Inspect for loose screws and tighten.	X		X		X	
2.6 Lubricate bearings and door post.	X		X		X	
2.7 Remove handwheel and door cover.	X		X		X	
2.7.1 Inspect and clean internal parts, replace if necessary.	X		X		X	
2.7.2 Inspect door lock mechanism for wear.	X		X		X	
2.7.3 Lubricate and rebuild door lock mechanism.	X		X		X	
2.7.4 Reinstall cover and handwheel.	X		X		X	
3.0 EACH HAND VALVE (GATE/GLOBE/ANGLE/MULTIPORT*)						
3.1 Inspect valve for smooth operation and proper valve seating.	X	X	X	X	X	X
3.2 Inspect packing of valve for leaks.	X	X	X	X	X	X
3.3 Rebuild valve.	X					
3.4 Run manual cycle to test operation of Multiport valve. Rebuild as necessary.						X
4.0 EACH WATER, JACKET AND STEAM STRAINER						
4.1 Inspect strainers for debris, clean as necessary.		X			X	
5.0 EACH STEAM TRAP						
5.1 Inspect steam trap for proper operation.	X	X	X	X	X	X
5.2 Rebuild steam trap.		X				
6.0 EACH GAUGE						
6.1 Inspect each gauge for accuracy.	X	X	X	X	X	X
6.2 Calibrate or replace gauge if necessary.	X	X	X	X	X	X

4.6 PREVENTIVE MAINTENANCE GUIDE (Continued)

EQUIPMENT: **Eagle® 2000 And 2300 Series Medium Vacamatic Sterilizers**
This form is to be used as a preventive maintenance record and, along with **Section 4** *instructions, as a guide to performing preventive maintenance.*

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

SERVICE PERFORMED:	1	2	3	4	5	6
7.0 EACH VALVE						
7.1 Make internal inspection of each check valve.	X			X		
7.2 Replace or rebuild check valve if necessary.	X			X		
7.3 Inspect each solenoid valve for proper operation.	X	X	X	X	X	X
7.4 Rebuild solenoid valve.			X			
7.5 Inspect steam control valve for proper operation.	X	X	X	X	X	X
7.6 Rebuild the steam control valve.					X	
7.7 Flush out each flow control valve.	X	X	X	X	X	X
7.8 Reset flow control valve to original marked setting.	X	X	X	X	X	X
8.0 EACH VACUUM BREAKER						
8.1 Inspect each vacuum breaker for proper operation.	X	X	X	X	X	X
8.2 Rebuild vacuum breaker.					X	
9.0 AIR FILTER (CARTRIDGE TYPE)						
9.1 Replace cartridge as required.	X	X	X	X	X	X
10.0 CHAMBER DRAIN						
10.1 Inspect strainer for debris.	X	X	X	X	X	X
10.2 Flush chamber drain line.	X	X	X	X	X	X
11.0 IRC CONTROL						
11.1 Check chart drive and switches TS-1 and TS-2 in recorder for proper adjustment.		X		X		X
11.2 Inspect inking system for proper marking.	X	X	X	X	X	X
11.3 Check settings on pressure and vacuum switches. Readjust as required.	X	X	X	X	X	X
12.0 PRINTCON CONTROL						
12.1 Inspect proper settings of pressure and vacuum settings on BCD switches.	X	X	X	X	X	X
12.2 Verify proper settings of main PC Board.	X	X	X	X	X	X
12.3 Ensure proper operation of printer when unit is initially turned on.	X	X	X	X	X	X
12.4 Inspect for proper operation of all temperature thumbwheels.	X	X	X	X	X	X
12.5 Verify that proper reset message is printed when reset button is pressed.	X	X	X	X	X	
12.6 Verify that proper date and time are displayed, if not reset.	X	X	X	X	X	X
12.7 Ensure that paper feed switch is operating properly.	X	X	X	X	X	X
12.8 Inspect for proper operation of paper take-up.	X	X	X	X	X	X
12.9 Verify printed record quality.	X		X		X	
12.10 Verify temperature and pressure readouts with potentiometer and pressure gauge.	X			X		
12.11 Check for proper battery operation.	X	X	X	X	X	X
12.12 Change battery.	X			X		

4.6 PREVENTIVE MAINTENANCE GUIDE (Continued)

EQUIPMENT: **Eagle® 2000 And 2300 Series Medium Vacamatic Sterilizers**
This form is to be used as a preventive maintenance record and, along with **Section 4** *instructions, as a guide to performing preventive maintenance.*

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

SERVICE PERFORMED:	1	2	3	4	5	6
13.0 FINAL TEST						
13.1 Clean lint and dirt from components.	X	X	X	X	X	X
13.2 Inspect all wiring, terminals, and socket connections for damage or fraying.	X	X	X	X	X	X
13.3 Rotate thumbwheel switches 0 through 9 to ensure primary panel LEDs are operating properly.	X	X	X	X	X	X
13.4 Inspect door switch for proper operation.	X	X	X	X	X	X
13.5 Run machine through each cycle to verify proper operation. Check all LEDs.	X	X	X	X	X	X
13.6 Test manual gravity cycle (if applicable).	X	X	X	X	X	X
13.7 Inspect and clean chart recorder (IRC Units).	X	X	X	X	X	X
13.8 Remove test chart/tape and attach it to PMA. Install a new chart (IRC Units).	X	X	X	X	X	X
13.9 Remove all test equipment installed this inspection.	X	X	X	X	X	X
13.10 Install any panel or cover that was removed during the inspection.	X	X	X	X	X	X
13.11 Police area to ensure removal of all materials used during inspections.	X	X	X	X	X	X

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SECTION 5

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 the test, recorder chart or printout 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.

5.2 TEST INSTRUMENTATION REQUIRED

1. Potentiometer and thermocouple leads — Doric 400A or equivalent — ±1°F accuracy.

2. Calibrated compound test gauge (30" vacuum and 100 psig) — ±1/2% full scale accuracy. AMSCO part number P-764317-627.

3. Calibrated absolute pressure gauge (0-100 mm Hg) with ball valve — ±0.3% full scale accuracy.

4. Voltmeter or LED test light.

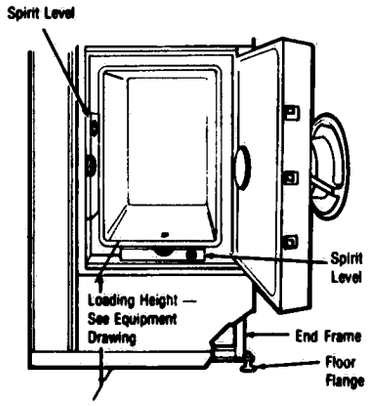


Figure 5-1. LEVELING STERILIZER.

5. Spirit level.

6. Chamber drain thermocouple test fixture.

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. With 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 to required services i.e., steam, water, and electrical. See following table.

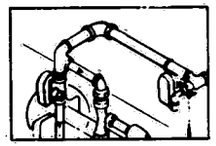
TABLE 5-1. STERILIZER CONNECTIONS.

Plumbing Connections	Nominal at Connection Point Pipe Size	Pressure (Dynamic) Range
Steam Supply	3/4 N.P.T.	50-80 psig
Cold Water	3/4 N.P.T.	30-50 psig
Waste	1-1/2 O.D. Funnel	flow capacity

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

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

	Adjustable Valves	Valve Setting
A	Jacket Trap Cooling FC-2	Two and one-half turns open.
B	Chamber Trap Cooling FC-3	Two and one-half turns open.
C	Exhaust Cooling FC-6	Approximately 45° from centerline of tube.
D	Slow Exhaust Valve FC-1	Two and one-half turns open.



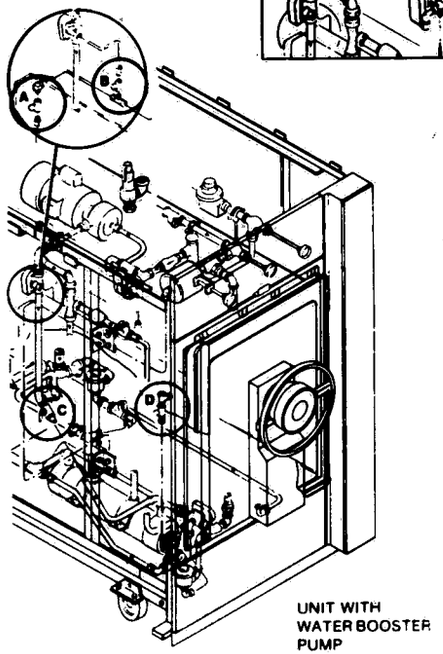


Figure 5-2. ADJUSTMENT OF COOLING WATER VALVES AND SLOW EXHAUST VALVE.

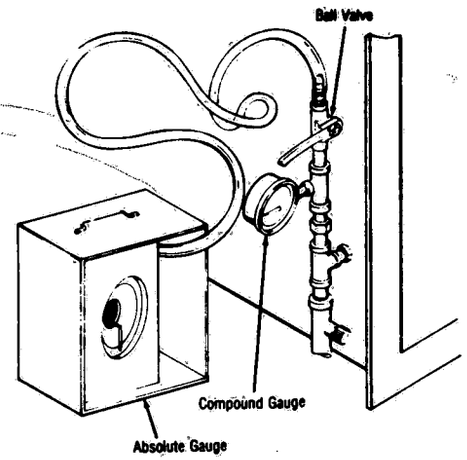


Figure 5-3. GAUGE INSTALLATION.

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 recorder bulb. Run leads through the door (between door gasket and sterilizer end ring).

5.6 INSTALLATION OF COMPOUND PRESSURE GAUGE

CAUTION: Do not open ball valve when there is positive pressure in sterilizer.

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

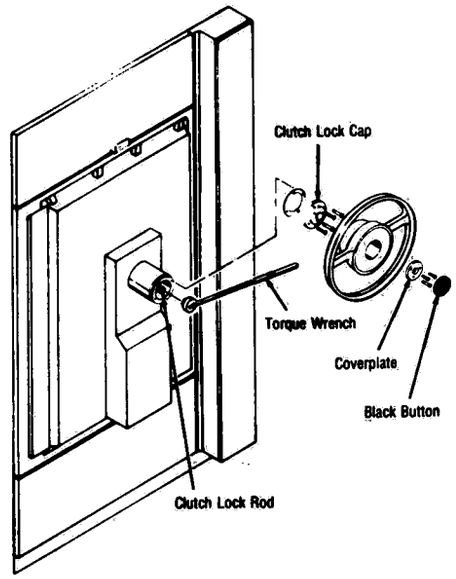


Figure 5-4. TORQUE LOCKING OF DOOR.

5.7 DOOR SWITCH ADJUSTMENT FOR DOOR WITH NEW GASKET

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.

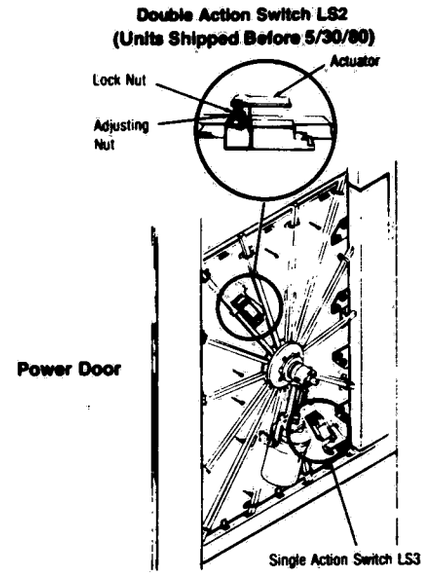
2. If DOOR UNLOCKED light fails to go out, use the following procedure to adjust the door switch. See Figure 5-5.

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

When the door is sufficiently tightened, the first section of switch LS-2 actuates (1st click) 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, RH door; upper left corner, LH door)*, stops the locking motor when the radial arms are fully retracted.

**Units shipped before 5/30/80.*



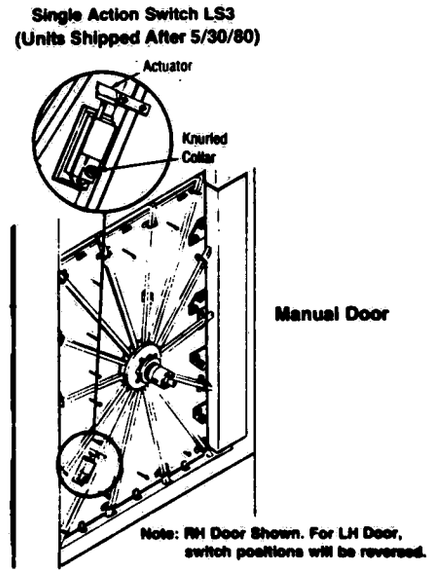


Figure 5-5. DOOR LOCKED LIMIT SWITCH.

Adjustment (Fig. 5-5)

Double Action Switch — LS2
(Units Shipped Before 5/30/80)

1. Close door and turn handwheel clockwise 10 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 — LS2, LS3, LS5
(Units Shipped After 5/30/80)

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-type actuator in the center of its travel. Tighten screws.

2. Turn handwheel counterclockwise until screw-box collar (Fig. 8-21, 37) contacts the Teflon® brake shoe. Move actuator until it actuates switch. Tighten screws. Move shaft lever to POWER position.

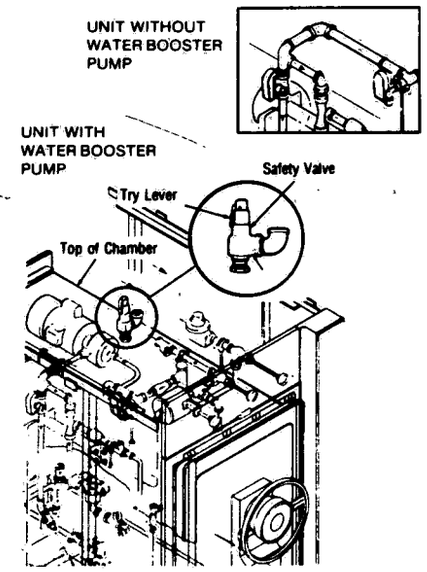


Figure 5-6. CHAMBER SAFETY VALVE.

3. Turn handwheel clockwise 10 turns and repeat step 2 for LS5.

4. Turn handwheel counterclockwise 2 turns and repeat step 2 for LS2.

5.8 SAFETY VALVE TEST (no pressure in jacket)

WARNING: BE CAREFUL OF STEAM ESCAPING FROM SAFETY VALVE. TO PREVENT BURNS, WEAR GLOVES OR USE AN EXTENSION DEVICE WHEN OPERATING THE TRY LEVER.

1. Operate try lever to check for freedom of movement.

2. Visually observe for indications of previous leakage (rust stains and/or scale formations).

5.9 ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES

1. Turn on power.

2. Turn on steam and water supply valves.

3. Adjust steam pressure regulator to control jacket pressure at 20 psig. After adjustment is made, lock low stop. See Figure 5-7.

4. Close slow exhaust valve and then open slow exhaust valve 2.5 turns. See Figure 5-2.

5. Close and lock door.

6. Set orange (top) pointer on recorder to 250° F (121° C).

7. Set STERILIZE time to 1 minute and DRY time to 0 minutes. **NOTE:** Refer to cycle graph for Liquids cycle.

8. Depress the LIQUIDS cycle button.

9. After the sterilize phase has been completed and control has advanced to slow exhaust, observe calibrated compound pressure gauge. When chamber pressure reaches 3 psig, adjust PS-3 (Figure 5-8) 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).

10. Press RESET button on control panel and initiate another LIQUIDS cycle as in step 6.

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

NOTE: MAKE SURE PS-3 AND PS-2 FUNCTION PROPERLY BEFORE PROCEEDING TO THE NEXT STEP.

12. Increase jacket steam pressure to approximately 24 psig.

13. Set orange (top) pointer on recorder to 270° F (132° C).

14. Set STERILIZE time to 1 minute and DRY time to 3 minutes.

CAUTION: Because of excessive current draw, do not use an incandescent or neon type test light for the following tests.

15. Hook a digital voltmeter set to 5 volts D.C. or an LED test light across VS-1. (Common to normally open.) With no vacuum in the chamber, meter should indicate 0 volts. After 10 vacuum is reached, meter should indicate 5 volts DC.

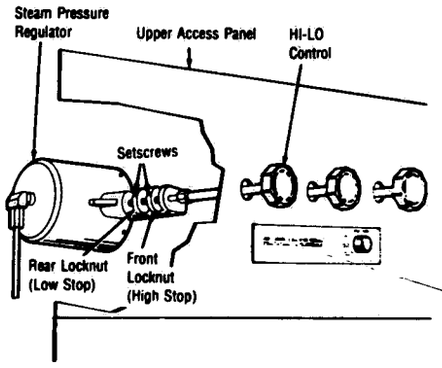


Figure 5-7. ADJUSTING PRESSURE REGULATOR.

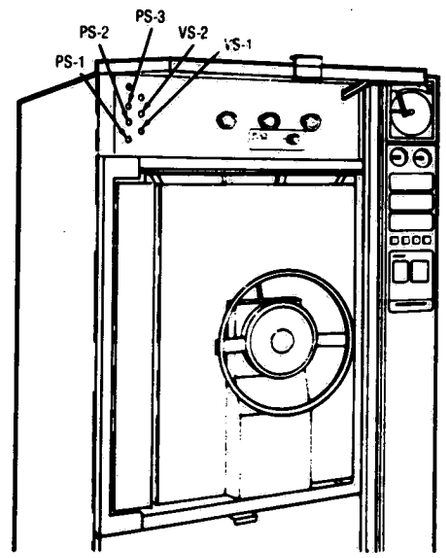


Figure 5-8. ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES.

16. Depress the PREVACUUM cycle button.

17. Following a steam purge (solenoids S-4 exhaust cooling [LED-16], S-7 vacuum water and water pump [LED-14], S-2 steam-to-chamber [LED-13], S-3 fast exhaust [LED-12] on, and CONDITION light on), a vacuum will be drawn in the chamber (solenoids S-1 filtered air [LED-15], S-7 vacuum water and water pump [LED-14], S-3 fast exhaust [LED-12] on, and CONDITION light on). Adjust VS-1 to actuate at 10'' of vacuum. (Voltmeter goes from 0 volts to 5 volts.)

18. The cycle will proceed to a steam pulse phase (solenoid S-1 filtered air [LED-15], S-2 steam-to-chamber [LED-13], on and CONDITION light on). Allow chamber pressure to rise to 26 psig by adjusting the steam pressure slowly upward.

19. When the chamber pressure has stabilized at 26 psig, adjust PS-1 to advance the control to the second vacuum phase.

20. Adjust the steam pressure regulator to 33 psig and set the high stop.

21. Observe the remaining vacuum/pressure pulses to assure settings of VS-1 at 10" vacuum and PS-1 at 26 psig.

22. Refer to the prevacuum cycle graph. After three steam pressure pulses and four vacuums, the control will advance to the sterilize phase.

23. During the sterilize phase (solenoid S-2 steam-to-chamber [LED-13] on and STERILIZE light on), observe the control to assure temperature is controlled between 272° F and 276° F. By TS-2 in the recorder, S-2 steam-to-chamber solenoid (LED-13) will cycle on and off.

24. After the timed sterilize phase, the control will advance to the fast exhaust phase (solenoid S-4 exhaust cooling [LED-16], S-1 filtered air [LED-15], S-7 vacuum water and water pump [LED-14], S-3 fast exhaust [LED-12] and EXHAUST light are on).

25. At 3 psig the control will start the timed dry phase: solenoid S-1 filtered air (LED-15), S-7 vacuum water and water pump (LED-14), S-3 fast exhaust (LED-12) are on and EXHAUST light is on.

26. At the end of the timed dry phase, the vacuum in the chamber will break. No solenoids will be powered. The exhaust light will be on.

27. When the vacuum breaks to 1" of vacuum, adjust VS-2 to bring on the COMPLETE light, the buzzer (LED-18) and the counter (LED-17).

28. Opening the door will reset the control and bring on the DOOR UNLOCKED light.

5.10 CHAMBER VACUUM LEAK TEST

1. Close and lock door.

2. Attach a manually operated valve to the air intake in place of the vacuum break filter. Set manual valve fully closed.

3. Set the DRY timer to maximum time setting. Set the STERILIZE timer to 1 minute.

4. Initiate a PREVACUUM cycle, allowing the cycle to progress to the vacuum drying phase.

5. Open the ball valve to the absolute pressure gauge and observe the gauge for the vacuum stall point. Vacuum should reach at least 40 mm absolute. If 40 mm absolute cannot be reached within 15 minutes, examine system for leaks.

6. After vacuum stall point is reached, turn power switch to OFF position.

7. Slowly bleed in air from the manual valve installed in place of air filter until 50 mm absolute pressure is reached. Tightly close valve.

8. Begin timing when chamber pressure reaches 50 mm Hg.

9. Using the absolute pressure gauge, determine the rate of air leakage into the chamber. The maximum acceptable leak rate is 1 mm per minute over a 5-minute period for a maximum increase of 5 mm pressure starting with 50 mm in the chamber. If these conditions cannot be met, there is a vacuum leak which must be located and remedied.

NOTE: When sterilizer does not pull proper vacuum, yet no leaks detected using chamber vacuum leak test, check piping between vacuum pump and chamber drain line check valve for leaks (see Fig. 5-9). During a chamber vacuum leak test, check valve closes isolating downstream piping from test. If leak is present in piping between check valve and pump, sterilizer will not pull proper vacuum; however, this leak is not detected using leak test. Failures in this section of piping are usually due to cracked fittings or leaking joints. Visually inspect for these problems.

10. Open manual valve on air filter to relieve chamber vacuum.

11. Remove manual valve and replace vacuum air filter and replace absolute pressure gauge with compound test gauge.

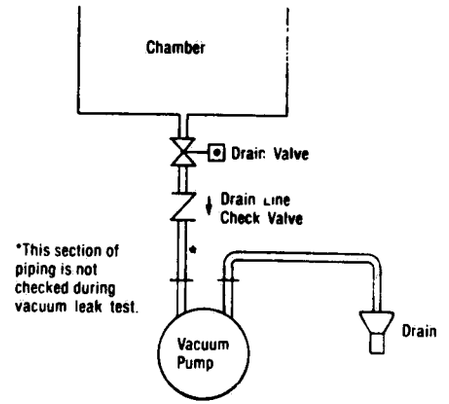


Figure 5-9. CHAMBER DRAIN LINE PIPING.

5.10A EJECTOR VACUUM TEST

1. Connect ball valve and absolute pressure gauge between ejector and check valve (CK-6). See Figure 5-10.

2. Close and lock door.

3. Proceed to static test as follows:

a. Close ball valve and initiate gravity cycle (empty chamber) with 0 STERILIZE time and 20-minute DRY time.

b. Allow sterilizer to exhaust to approximately 10-inches Hg and disconnect 5/8 ODT (see Fig. 5-11) copper inlet tubing from check valve.

c. Plug opening at CK-6 permitting ejector (EJ-1) to pull a vacuum only on gauge.

d. Ensure all piping connected to suction side of ejector is leak free.

e. Open ball valve and within seconds gauge will indicate ejector performance.

f. Ejector, under normal conditions, should pull 10-35 mm using this test.

g. If ejector fails test, check water temperature (ensure 85 F or less) and water pressure (ensure 30-50 psi). To check water pressure, install gauge at 1/8-inch plugged opening (see Fig. 5-11) on solenoid valve (S4).

h. If water temperature and pressure check out, replace ejector.

i. Remove plug and return copper tubing to check valve.

4. Proceed to dynamic test as follows:

a. Close ball valve and initiate gravity cycle (empty chamber) with 0 STERILIZE and 20-minute DRY time.

b. Allow sterilizer to exhaust to 10-inches Hg and open ball valve.

c. About three minutes into DRY phase vacuum level will stabilize. Gauge should read same as found in STATIC TEST.

d. If test fails, check for leak in vacuum system.

e. Return piping to original configuration.

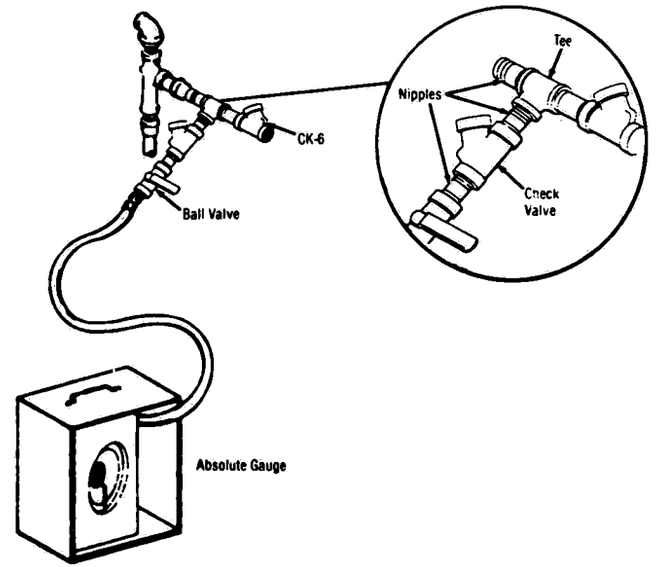


Figure 5-10. EJECTOR VACUUM TEST GAUGE INSTALLATION.

5.11 PRESSURE TESTING THE DOOR GASKET SEAL

1. Close and lock door.

2. Allow chamber to come up to operating pressure and temperature.

3. Inspect the door assembly for steam leaks by placing an inspection mirror between the door plate and the end ring.

4. If a leak is observed, take corrective action:

   a. Replace defective door gasket (Para. 7.3).

   b. Shim door (Para. 7.3).

   c. Make any other necessary repairs.

5.12 HEAT EXCHANGER MOUNTING ANGLE CHECK

1. Place a level on the body of the heat exchanger. It should be tilted slightly (1 degree or 1/4" drop) towards the operating end. This allows heat exchanger to drain properly.

2. If heat exchanger is not tilted sufficiently, loosen the clamps (Fig. 8-32. 11) holding the heat exchanger and place some shimming material between the clamp and the heat exchanger. The shimming material must be of sufficient thickness to provide the necessary tilt of heat exchanger.

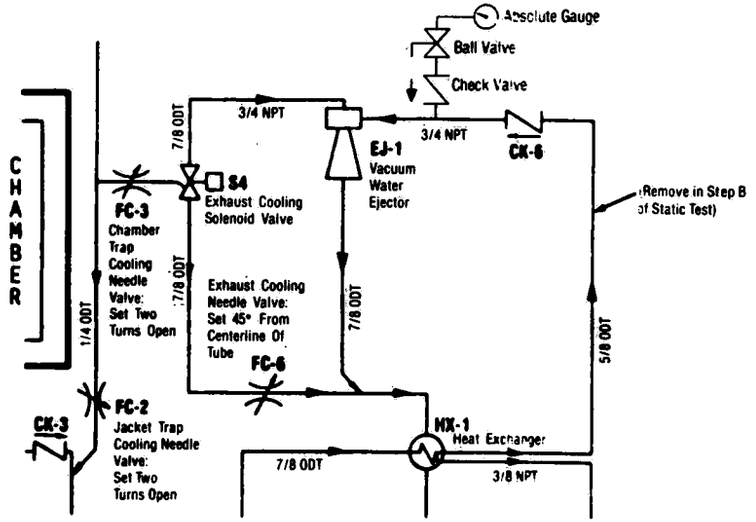


Figure 5-11. EJECTOR VACUUM TEST PIPING.

5.13 OPERATIONAL CHECKS (IRC Units)

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 that the 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. Set STERILIZE timer to 5 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. 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.

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

PHASE	STERILIZER CONDITION	TIME (Minutes)			REFERENCE: TROUBLE-SHOOTING CHART, Item no:
		24x36x36	24x36x48	24x36x60	
Charge Jacket	Jacket must charge to 20 +1, -0 psig.	N/A	N/A	N/A	2.H.
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to 5-15 psig. Solenoid valves S-2 (D-13)*, S-3 (D-12), S-4 (D-16), S-7 (D-14) open. Water pump is on.**	1	1	1	3.A.
Come-up time Panel Light: CONDITION	Solenoid valves S-3 (D-12), S-4 (D-16), S-7 (D-14) close. Pump turns off.** Chamber temperature rises to 250° F, pressure to 15-18 psig.	1	1-1/2	2	3.C., 3.D.
Sterilize Panel Light: STERILIZE	Chamber temperature at 252°-256° F, pressure at 15-20 psig. Solenoid valve S-2 (D-13) cycles to maintain pressure/temperature.	5	5	5	3.E., 3.F., 3.G.
Slow Exhaust Panel Light: EXHAUST	Solenoid valve S-2 (D-13) closes. Chamber exhausts slowly through slow exhaust needle valve. At chamber pressure 3 psig, S-3 (D-12) opens for fast exhaust of remaining steam.	4-6	4-1/2-7-1/2	5-9	5.A.
Complete Panel Light: COMPLETE	At 1 psig, buzzer (D-16) sounds for 90 seconds or until door is opened. When door is opened S-3 (D-12) closes.	1-1/2	1-1/2		6.A., 6.B.

*LED NO. ON CONTROL BOARD

**UNITS SUPPLIED WITH WATER BOOSTER PUMP ONLY

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, and 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)			REFERENCE: TROUBLE-SHOOTING CHART, item no.
		24x36x36	24x36x48	24x36x60	
Charge Jacket	Jacket must charge to 20 +1, -0 psig.	N/A	N/A	N/A	2.H.
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to 5-15 psig. Solenoid valves S-2 (D-13)*, S-3 (D-12), S-4 (D-16), S-7 (D-14) open. Water pump is on.**	1	1	1	3.A.
Come-up time Panel Light: CONDITION	Solenoid valve S-3 (D-12), S-4 (D-16), S-7 (D-14) close. Pump turns off.** Chamber temperature rises to 250° F, pressure to 20 +1, -0 psig.				3.C., 3.D.
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.	5	5	5	3.E., 3.F., 3.G.
Fast Exhaust Panel Light: EXHAUST	Solenoid valves S-1 (D-15) and S-2 (D-13) close. Solenoid valves S-3 (D-12), S-4 (D-16), and S-7 (D-14) open. Water pump is on.** Chamber pressure decreases to 3 psig, the DRY timer begins.	N/A	N/A	N/A	4.A., 4.B.
Dry Panel Light: EXHAUST	Solenoid valve S-4 (D-16) closes. Chamber continues exhausting until a vacuum is pulled on the chamber. Vacuum will be about 28" Hg.	5-1/4	5-1/4	5-1/4	4.A., 4.B.
Complete Panel Light: COMPLETE	Solenoid valves S-3 (D-12), S-7 (D-14) close, S-1 (D-15) opens. When chamber pressure reaches 2" Hg, buzzer sounds.	1-1/2	1-1/2	1-1/2	6.A., 6.B.

*LED NO. ON CONTROL BOARD

**UNITS SUPPLIED WITH WATER BOOSTER PUMP ONLY

TABLE 5-4. PREVACUUM CYCLE.

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

Initial Setup:

1. Turn HI-LO valve to the HI position. Jacket pressure should rise to 33 (+ 1) psig.
2. Set the temperature to 270 F (132 C).
3. Set STERILIZE timer to 4 minutes and DRY timer to 5 minutes.
4. Close and lock door.
5. Touch the **PREVACUUM** cycle selector button. Minimal pressure should be required to actuate the switch.

PHASE	STERILIZER CONDITION	TIME (Minutes)			REFERENCE: TROUBLE-SHOOTING CHART, item no.
		24x36x36	24x36x48	24x36x60	
Charge Jacket	Jacket must charge to 33 – 1 psig.	N/A	N/A	N A	2.H.
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to 5-15 psig. Solenoid valves S-2 (D-13)*, S-3 (D-12), S-4 (D-16), S-7 (D-14) open. Water pump is on.**	1	1	1	3.A.
Vacuum/Pressure Panel Light: CONDITION	Solenoid valves S-1 (D-15). S-2 (D-13) close chamber pressure is reduced. At 3 psig, S-4 (D-13) closes and a vacuum is drawn in the chamber. After one minute elapses and correct vacuum is reached (10" Hg), S-2 (D-13) opens, and S-3 (D-12) and S-7 (D-3) close: chamber is repressurized to 26 psig. Second vacuum is then drawn. Check IRC chart to verify a total of four chamber evacuations and three steam pulses, excluding initial pressure rise, for this phase. Phase ends with a vacuum.	Approximately one minute per each vacuum and pressure pulse, seven minutes total.			3.A., 3.B.
Come-up time Panel Light: CONDITION	S-3 (D-12) closes and S-2 (D-13) opens. Chamber pressure increases to 28 +2 psig, 270° F.	1	1	1	3.C., 3.D., 3.E.
Sterilize Panel Light: STERILIZE	Solenoid valve S-1 (D-15) opens, S-7 (D-14) closes. Water pump turns off.** Chamber at 272°-276° F, pressure at 28-32 psig. S-2 (D-13) cycles to maintain temperature/pressure.	4	4	4	3.F., 3.G.
Fast Exhaust Panel Light: EXHAUST	Solenoid valves S-1 (D-15), S-2 (D-13) close. S-3 (D-12), S-4 (D-16), S-7 (D-14) open. Pump is on.** Chamber pressure decreases to 3 psig.	N/A	N/A	N/A	4.A., 4.B.
Panel Dry Light: EXHAUST	Solenoid valve S-4 (D-15) closes. Chamber continues to be evacuated to 25-28" Hg. DRY timer begins counting down.	5-1/4	5-1/4	5-1/4	4.A., 4.B.
Complete Cycle Light: COMPLETE	Solenoid valves S-3 (D-12), S-7 (D-14) close, S-1 (D-15) opens. Water pump turns off.** When chamber pressure reaches 1" Hg, buzzer (D-18) sounds. Solenoid valve S-3 (D-12) opens until door is opened.	1-1/2	1-1/2	1-1/2	6.A., 6.B.

*LED NO. ON CONTROL BOARD

**UNITS SUPPLIED WITH WATER BOOSTER PUMP ONLY

TABLE 5-5. MANUAL OPERATION (OPTIONAL).

Initial Setup:

1. Set HI-LO valve on LO. Power switch must be off.
2. Manual operating valve must be in OFF position.
3. Open manual steam and water supply valves.
4. Close and lock door(s).
5. Operate manual valve as follows in sequence clockwise rotation:

POSITION	OBSERVATIONS	TIME
CHARGE JACKET	Jacket must charge to 20 +1 psig.	
CONDITION	Solenoid valves S-2, S-3, S-4 and S-7 must open. Purge must take place with approximately 10 psig steam pressure in chamber.	1 minute
STERILIZE	Solenoid valve S-2 open and chamber must be pressurized to approximately 20 psig.	5 minutes
SLOW EXHAUST	All valves must remain closed and slow exhaust must start. When pressure in the chamber is 4 psig turn manual valve to next position.	4-7 minutes
FAST EXHAUST	Solenoid valves S-3, S-4 and S-7 MUST OPEN AND FAST EXHAUST MUST COMMENCE. When pressure in the chamber is 1 psig turn manual valve to DRY POSITION.	1-2 minutes
DRY	Solenoid valves S-3, S-4 and S-7 must open and vacuum must be pulled on the chamber and air must be sucked in through the vacuum break line.	5 minutes
OFF	Cycle completed. Open the door.	1 minute

FIELD TEST PROCEDURE (PRINTCON)

5.14 PROCEDURE

Vacamatic 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, ball valve, and absolute 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. See paragraph 5.6 and figure 5-3.

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, steps 1 through 3.

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-1: 52 (26 psig)
PS-2: 02 (1 psig)
PS-3: 06 (3 psig)
VS-1: 20 (10 in. Hg)
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 when the sterilizer chamber is cool.

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.

c. Cycle selectors for Liquids, Prevacuum, 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.

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 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).

18. Check paper take-up mechanism. Feed paper through pinch rollers (units before 6/85) or onto paper take-up spool (units after 6/85). Paper must not wander side-to-side. Platen microswitch must activate and shut off take-up motor when paper is drawn taut. Run at least 20 feet of paper into take-up mechanism. Paper should feed smoothly and coil up in coil or on spool.

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 P2 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 Section 7 of this manual.)

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. Perform the chamber vacuum leak test as outlined in paragraph 5.10. Disconnect the measuring devices and reconnect the chamber gauge.

NOTE: If the above accuracy results are not obtainable, refer to Paragraph 7.22, **"Printcon Calibration Procedure".**

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. Check to make sure that the STERILIZE temperature is maintained between 252.5 F and 253.5 F.

25. 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 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 270 F PREVACUUM sterilization cycle except set a 4 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.

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.

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 cycle 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 6.4 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 examples of what to look for and what to do when troubleshooting.

Steam & Water Supplies

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

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

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

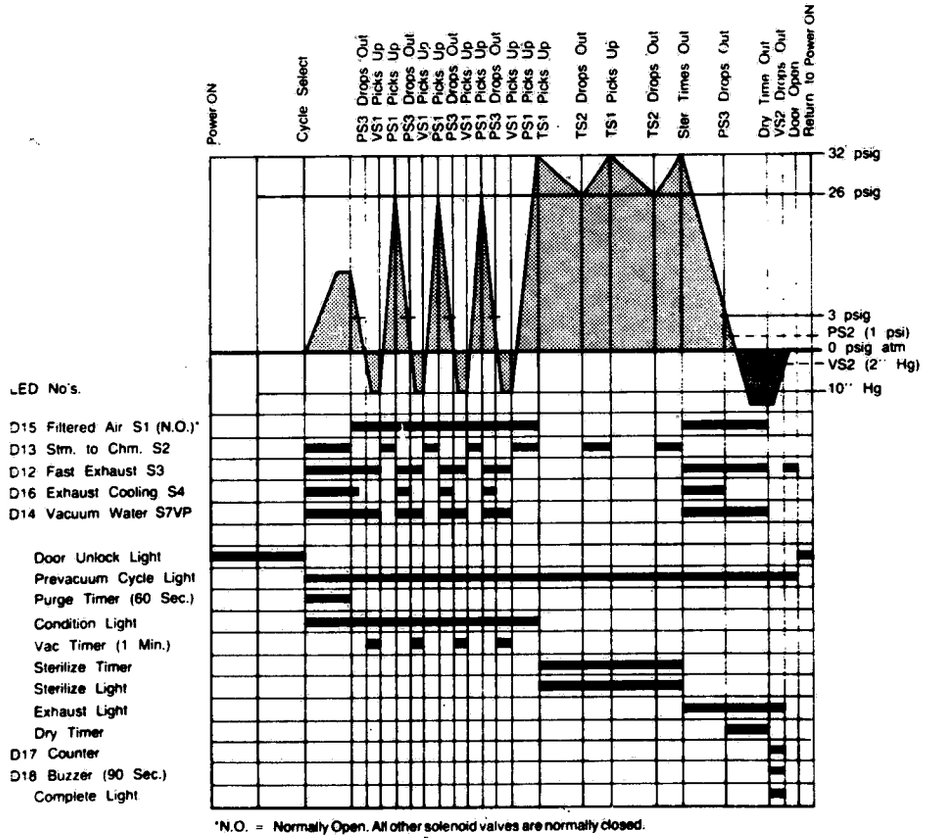
Pins in plugs P1, P2, P5, P10, P11, P48, P53, and P54 seldom need replacement. However, if replacement of pins is necessary, a special pin extraction tool is required. Contact AMSCO Service Co. for details.

6.2 HOW TO USE THE CYCLE GRAPHS

(Figs. 6-1, 6-2, and 6-3).

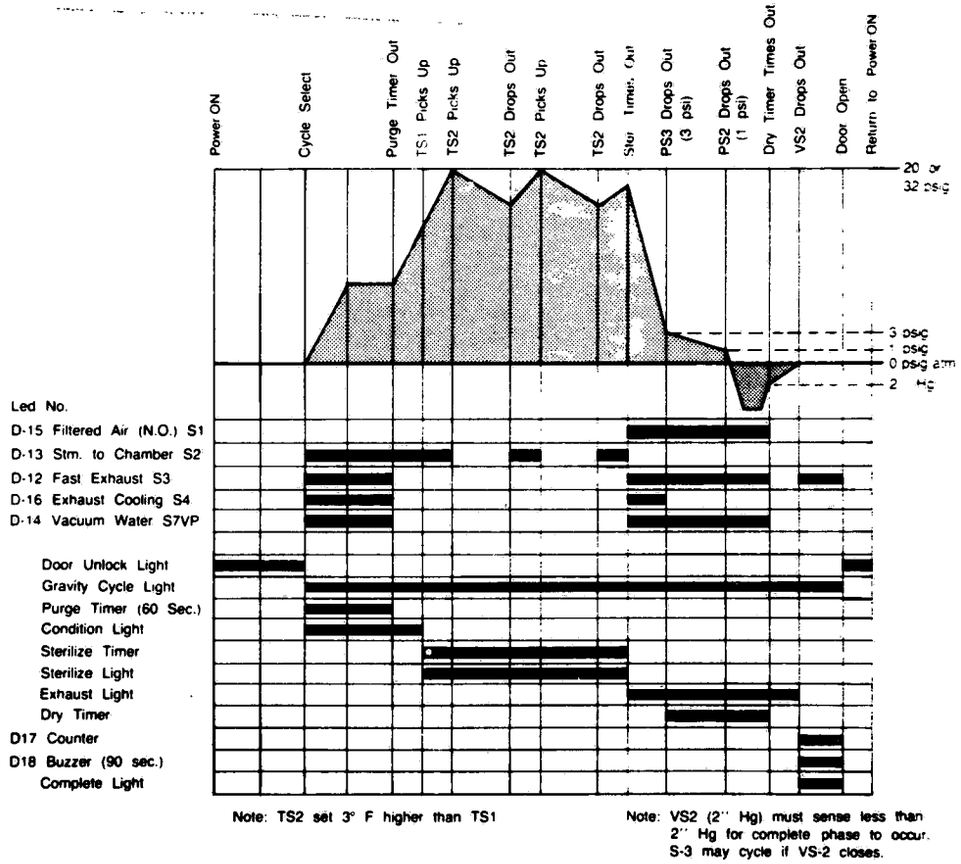
The cycle graphs (Figs. 6-1, 6-2, and 6-3) on pages 6-1 to 6-3 are representations of the operations of the cycles available with the sterilizer. They are intended to be used for two main purposes: (1) as an aid in understanding how the various cycles work; (2) as an aid in troubleshooting. The upper graph on each page is a representation of chamber pressure variation during the separate phases of the cycle. This graph should agree with the indicator on the chamber pressure gauge during the cycle. The bar graph in the middle of each page is a representation of which output devices (valves, lights, buzzer) are energized during the separate phases of the cycle. The LEDs (light emitting diodes), located on the printed circuit boards behind the front panel, are identified with the corresponding output device. When a solenoid valve, for example, is actuated (energized), the LED will be on.

As an aid in troubleshooting, the graph should be used to, first, identify the point in the cycle where a malfunction occurs, and, second, to check the operation of the valves which should be opened (energized) or closed (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.



*N.O. = Normally Open. All other solenoid valves are normally closed.

Figure 6-1. CYCLE GRAPH: PREVACUUM 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.

Figure 6-2. CYCLE GRAPH: GRAVITY CYCLE.

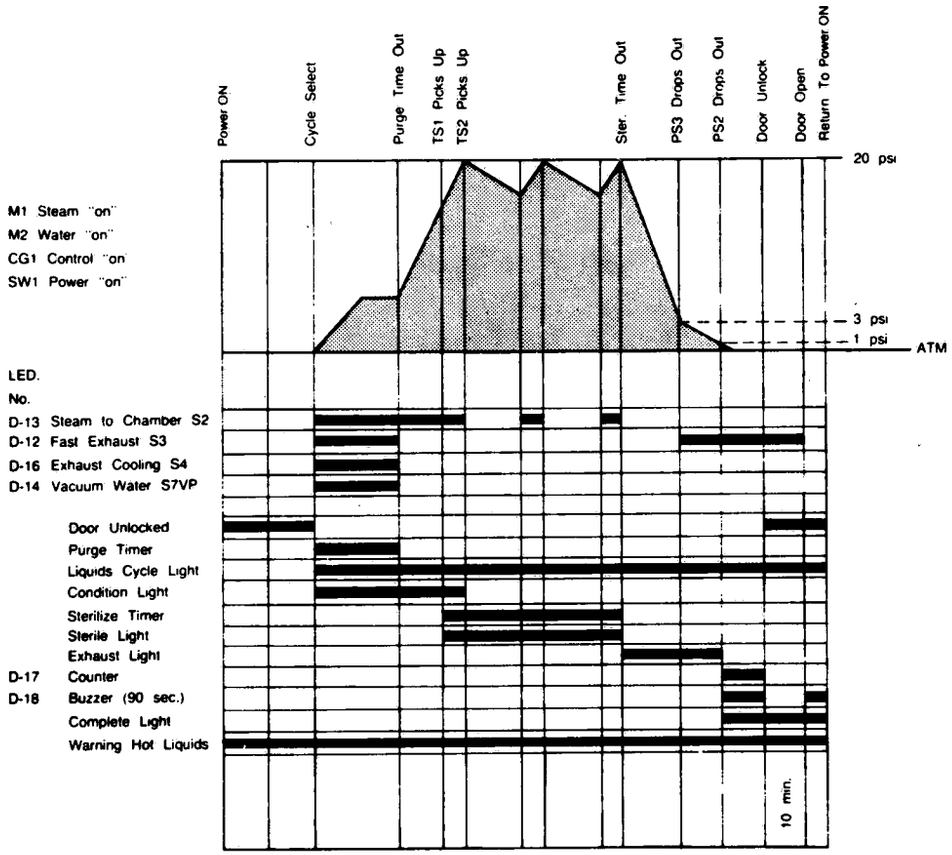


Figure 6-3. CYCLE GRAPH: LIQUIDS CYCLE.

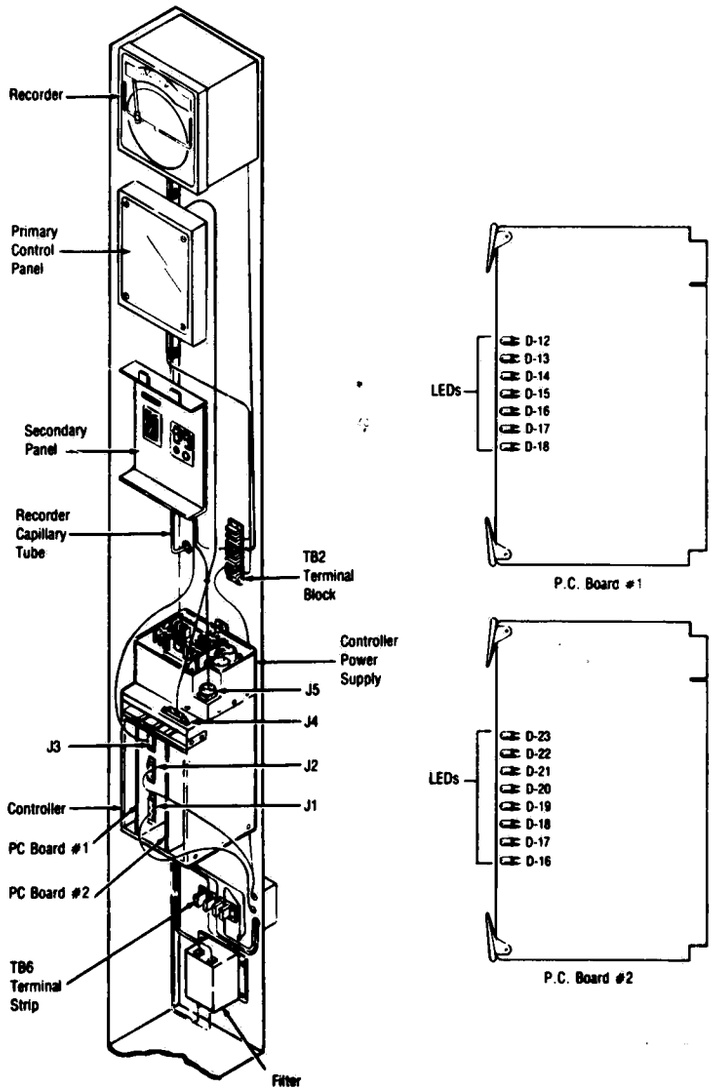


Figure 6-4. CIRCUIT BOARDS WITH LEDs.

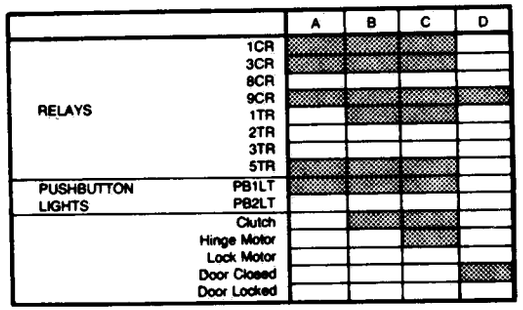
6.3 HOW TO USE THE POWER DOOR CYCLE GRAPHS

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.

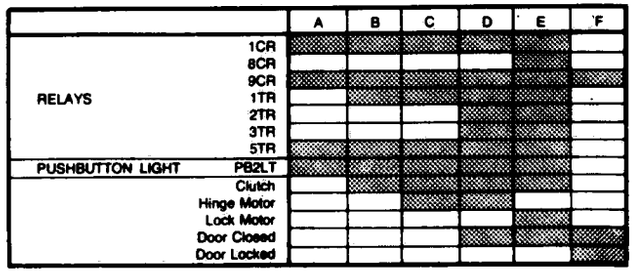
The positions of the switches shown on the electrical schematic for the power doors indicate the following state of the doors:

Switch	Door
LS1	Open
LS2	Open
LS3	Locked
LS4	Closed
LS5	Unlocked



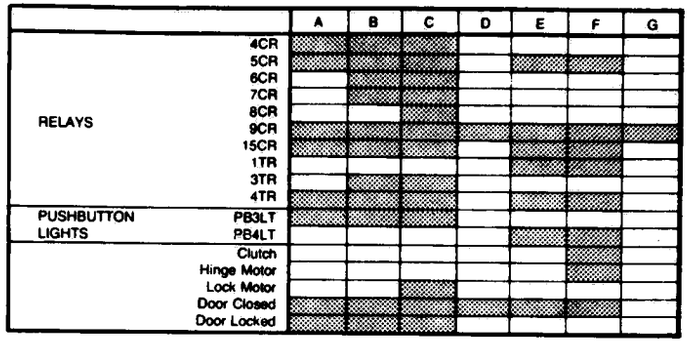
A. CLOSE pushbutton is pressed, starting closing part of cycle.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.

Figure 6-5. POWER DOOR, SINGLE: CLOSE.



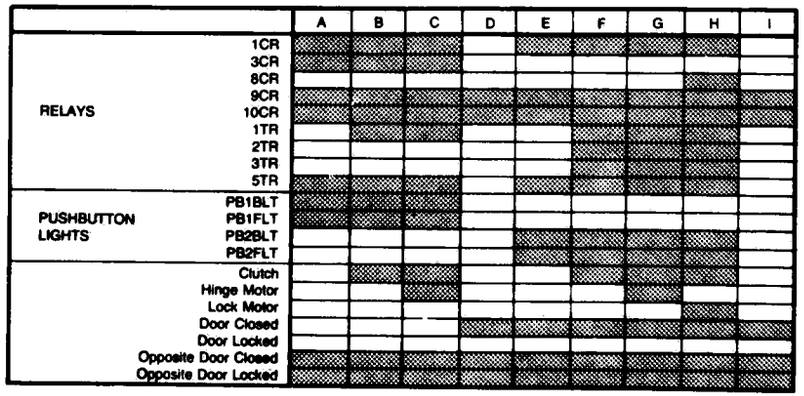
A. LOCK pushbutton is pressed, starting close and lock cycle.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.
E. After three seconds, lock motor locks door.
F. Door is locked.

Figure 6-6. POWER DOOR, SINGLE: LOCK.



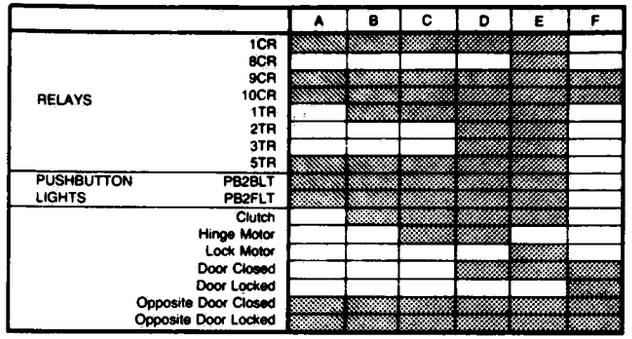
A. COMPLETE light is on. UNLOCK/OPEN pushbutton is pressed, starting unlocking part of cycle.
B. After one second, coils are energized, completing unlocking circuit.
C. After three seconds, lock motor unlocks door.
D. Door is unlocked.
E. UNLOCK/OPEN pushbutton is pressed, starting opening part of cycle.
F. After one second, clutch engages and hinge motor opens door.
G. Door is open.

Figure 6-7. POWER DOOR, SINGLE: UNLOCK/OPEN.



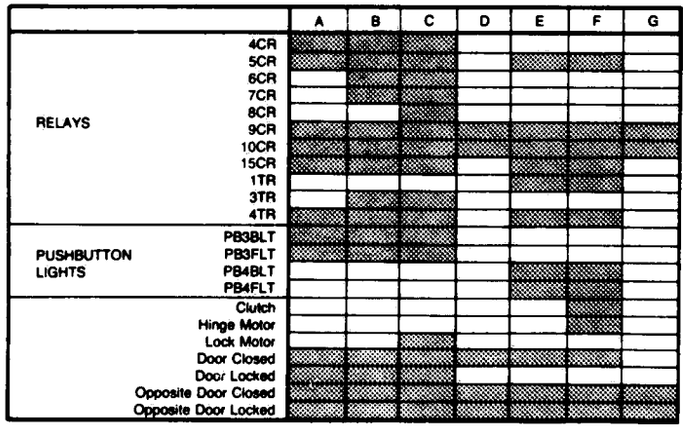
A. Opposite door is closed and locked. Door CLOSE pushbutton is pressed, starting closing part of cycle.
B. After one second, clutch engages.
C. After one second, hinge motor closes door.
D. Door is closed.
E. Door CLOSE pushbutton is pressed, starting locking part of cycle for door.
F. After one second, 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 or instructions are identified by figure number, paragraph, or 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. 8-48
		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. 8-48 Fig. 8-16, 7
		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. 8-48 Fig. 8-16, 13
		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. 8-48 Fig. 8-16, 14
		5) Check 120 VAC between filter contacts Load-1 and Line-2 with CB-2 tripped. Replace filter if necessary.	Fig. 8-48

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		6) Check zero VAC between filter contacts Load-2 and Line-2 with CB-2 engaged. Replace filter if necessary.	Fig. 8-48
		7) Defective power door circuit (if applicable) — check 120 VAC between line filter contacts Line-1 and Line-2 with CB-2 tripped. Isolate and repair short in power door circuit.	Fig. 8-48 Fig. 8-52
	1.B. Circuit breaker CB-2 (reset circuit breaker on 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. 8-48 Fig. 8-16, 7
		2) With CB-1 off, disconnect P1 from the controller. Turn CB-2 to on. 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. Be sure to reconnect P1 to the controller.	Fig. 8-48 Fig. 8-16, 7
		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. 8-48 Fig. 8-15, 8 Para. 7.12
		4) With CB-2 off, disconnect P-5 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 P-5 and CB-1.	Fig. 8-48 Fig. 8-16, 7 Fig. 8-16, 13
		5) With CB-2 off, disconnect P-1 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. 8-48 Fig. 8-16, 7, 15, 4
		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. 8-48 Fig. 8-15, 8
		7) With CB-2 off, remove PC board 2 from controller. Try to reset CB-2. If CB-2 resets, replace PC board 2. If CB-2 does not reset, replace controller power supply.	Fig. 8-48 Fig. 8-15, 15 Fig. 8-15, 1 Para. 7.12

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, 13
	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. 8-48 Fig. 8-16, 13
		2) Short circuit on 5 VDC buss, or defective power supply.	Fig. 8-48
		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. 8-48 Fig. 8-15, 8 & 15 Fig. 8-16, 13
		b) With CB-1 off, reconnect 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. 8-48 Fig. 8-15, 8 Para. 7.12
		c) 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. 8-48 Fig. 8-15, 15 Para. 7.12
		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 panel.	Fig. 8-48 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. 8-48

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) P16 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. 8-10, 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.	
		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 A6 wire harness.	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.	Fig. 7-15 Fig. 8-10, 24
		2. a) Primary panel logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see step below, 2.6.2b.	Fig. 8-10, 24
		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. 8-48 Fig. 8-10, 24 Para. 7.12
		c) Disconnect P3 from controller. Check VDC between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, replace primary control panel. If it is 28 VDC, see step below, 2.C.3.	Fig. 8-48 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. 8-10, 24 Fig. 8-48
	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. 2-2
		2) Primary panel logic card defective. Disconnect P3 from controller. If light goes out, replace primary control panel. If light remains on, see next step, 2.D.3.	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. 8-48 Fig. 8-10, 24 Para. 7.12
	2.E. Incorrect timer display	1) See Timer Display Checkout and Correction Charts, paragraph 6.5, following this Troubleshooting Chart.	Para. 6.5 Table 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. 8-48 Fig. 8-15, 8
		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.	
		a) Adjust or replace door lock switch as required.	Fig. 8-21, 22 Para. 7.3
		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. 8-48 Fig. 8-15, 8

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		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.	Fig. 8-21, 22 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. 8-48 Fig. 8-15, 8
		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. 8-48 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.	Fig. 8-37 Para. 7.10
		3) Manual STEAM supply valve malfunctioning — repair or replace, as necessary.	Fig. 8-30 Para. 7.11
		4) Jacket return steam trap malfunctioning — replace.	Fig. 8-38 Para. 7.6
		5) Steam supply strainer plugged — clean.	Fig. 8-33, 21 Para. 7.7
	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. 8-43
		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, replace board if LED on.	Fig. 7-19 Para. 7.5 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
3. During a cycle	3.A. First vacuum pulse won't reach 10" Hg and sterilizer alarms	1) S3 Fast exhaust valve failed closed.	Fig. 8-36
		2) S7 Pump water valve failed closed.	Fig. 8-33
		3) CK2 Heat exchange check valve failed open.	Fig. 8-32
		4) CK5 Water inlet check valve failed closed.	Fig. 8-33
		5) CK6 Ejector check valve failed closed.	Fig. 8-35
		6) Heat exchanger leaks.	Fig. 8-32
		7) Piping between heat exchanger and CK6 ejector check valve leaks.	Fig. 8-35
		8) Insufficient water pressure to ejector (must be 30 psi min.).	
		9) Ejector fins clogged.	Fig. 8-35
		10) Water supplied to ejector too high temperature (higher than 85 F).	
	3.B. Cycle does not advance during pre-vacuum phase	1) Leaks in chamber piping and/or door gasket — check for leaks, repair; replace gasket.	Fig. 8-20, 1 Para. 7.3
		2) Vacuum switch VS-1 defective or setting drifted.	Fig. 5-8 Fig. 8-7, 24
		a) Reset to 10" Hg or replace.	Para. 5.9
		b) Disconnect P2 from controller and check continuity between pin R and TB2 terminals 3, 4, or 5. Isolate and repair wiring or replace switch. If check ok, replace PC board 1.	Fig. 8-48 Fig. 8-15, 8 Para. 7.12
		3) Pressure switch PS-1 defective or setting drifted.	Fig. 5-8 Fig. 8-7, 23
		a) Reset to 26 psig or replace.	Para. 5.9

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		b) Disconnect P2 from controller and check continuity between pin S and TB2 terminals 3, 4 or 5. Isolate and repair wiring or replace switch. If check ok, replace PC board 2.	Fig. 8-48 Fig. 8-15, 15 Para. 7.12
		4) Pressure switch PS-3 defective or setting drifted.	Fig. 5-8 Fig. 8-7, 23
		a) Reset to 4 psig or replace.	Para. 5.9
		b) Disconnect P2 from controller and check continuity between pin L and TR-2 terminals 3, 4, or 5.	Fig. 8-48
		5) Water ejector valve (S-7) not operating correctly — should be open for drying time.	Fig. 7-19
		a) Repair or replace valve.	Para. 7.5
		b) Check wiring to valve — repair or replace.	
		c) Check LED D-14 on control PC board 1 — should be on during vacuum part of prevacuum phase. Replace board if light not on.	Para. 7.12
		d) 5b and 5c ok — replace PC board 1.	Fig. 8-15, 8
		6) Inadequate temperature in chamber — possible causes and corrections are as follows:	
		a) Settings on recorder and HI-LO valve do not correspond — set recorder and valve properly.	Sect. 2
		b) Chamber drain line or strainer plugged — clean line or strainer.	Fig. 8-30, 20 Para. 4.3
		c) Chamber drain line trap not operating correctly — replace trap element.	Para. 7.6

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		d) Chamber drain solenoid valve (S-3) not operating correctly (should be closed during pressurized part of prevacuum phase). Repair or replace valve — check manual operation. Check LED D-12 — if on, replace PC board 1.	Fig. 7-19 Para. 7.5 Fig. 8-15, 8 Para. 7.12
		7) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open during pressurized part of prevacuum phase).	Fig. 7-19
		a) Repair or replace valve.	Para. 7.5
		b) Check wiring to valve — repair or replace.	
		c) Check LED D-13 on PC board 1 — should be on during vacuum part of pre-vacuum phase. Replace board if light not on.	Fig. 8-15, 8 Para. 7.12
		d) 7b and 7c ok — replace PC board 1.	
		8) No pressure in jacket — see 2.H, above, "Jacket pressure does not rise. ..."	
	3.C. Number of pulses (pressure and vacuum) not correct during pre-vacuum conditioning phase	1) Pulse selection switch set incorrectly or defective. Adjust switch to correct setting.	Fig. 7-18 Para. 7.12
		2) Replace PC board 2. Replace PC board 1.	Fig. 8-15, 8 & 15
	3.D. Unit goes through conditioning but vacuum levels poor	1) S4 Exhaust cooling valve failed.	Fig. 8-35
		2) S7 Pump water valve failed partially closed.	Fig. 8-33
		3) CK2 Heat exchanger check valve leaks.	Fig. 8-32
		4) CK5 Water inlet check valve failed partially closed.	Fig. 8-33
		5) Heat exchanger leaks.	Fig. 8-32

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		6) Heat exchanger plugged.	Fig. 8-32
		7) Piping between heat exchanger and CK6 ejector check valve leaks.	Fig. 8-35
		8) CK6 Ejector check valve failed partially closed.	Fig. 8-35
		9) Insufficient water pressure to ejector (must be 30 psi min).	
		10) Ejector fins clogged	Fig. 8-35
		11) Water supplied to ejector too high temperature (higher than 85 F).	
	3.E. Chamber temperature does not rise to recorder setting	1) See 3.A.6), above.	
	3.F. Steam does not enter chamber in sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. See 3.A.6d), above.	Fig. 7-19
		2) Steam-to-chamber valve (S-2) not open or sticking. See 3.A.7), above.	Fig. 7-19
		3) No pressure in jacket. See 2.H, above.	
	3.G. Chamber pressure does not rise during sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. See 3.A.6d), above.	Fig. 7-19
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). See 3.A.7), above.	Fig. 7-19
		3) No pressure in jacket. See 2.H, above.	
	3.H. 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. 8-30, 4 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. 7-19 Para. 7.5 Fig. 8-15, 8

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3.I. 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. 8-30, 20 Para. 4.3
		2) Chamber trap defective — replace element.	Fig. 8-30, 4 Para. 7.6
	3.J. Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-20, 1 Para. 7.3
	3.K. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean.	Fig. 8-30, 1 Para. 7.7
		2) Insufficient flow through cooling water flow control valve — clean, adjust, repair or replace flow control valve.	Fig. 5-2
		CAUTION: If safety valve is found to be defective, do not attempt to repair. Replace with new valve.	
		3) Safety valve popping or bleeding — check for source of excessive pressure.	Fig. 8-31, 34
		4) Leaking steam valve — check valves and piping for leaks, repair.	
		5) Cooling water valve (S-4) not operating correctly (should be open above and closed below 3 psig).	Fig. 7-19
		a) Repair or replace valve.	Para. 7.5
		b) Check wiring to valve — repair or replace.	
		c) Check LED D-16 on PC board 1 — should be on during exhaust (above 3 psig) and dry. Replace board if light not functioning properly.	Para. 7.12
		d) 5b and 5c ok — replace PC board 1.	
	3.L. Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — replace diaphragm or gasket.	Fig. 8-21, 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.M. Safety valve pops or bleeds excessively	1) HI-LO steam control valve improperly adjusted or malfunctioning — adjust, repair, or replace valve.	Fig. 8-37 Para. 7.10
		2) Safety valve defective — replace.	Fig. 8-31, 34
	3.N. Solenoid Valve (S-2) chattering	1) Intermittent contact of reed switches in recorder — replace switch.	Fig. 8-14, 3
4. During "DRY" part of Exhaust Phase	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.	Fig. 5-8 Para. 5.9 Fig. 8-7, 23
		2) Disconnect P2 from controller and check continuity between pin L and TR2 terminals 3, 4, or 5 — If ok, replace control PC board 1. Otherwise, isolate and repair wiring or replace switch.	Fig. 8-48 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.	
	4.C. Vacuum level during dry phase fluctuates upward after reaching maximum vacuum level	1) Heat exchanger not tilted sufficiently to allow drainage — tilt exchanger.	Para. 5.12
	4.D. Unit goes through dry but vacuum levels are poor	1) S4 Exhaust cooling valve failed open.	Fig. 8-35
		2) S7 Pump water valve failed partially closed.	Fig. 8-33
		3) CK2 Heat exchanger check valve failed partially open.	Fig. 8-32
		4) CK5 Water inlet check valve failed partially closed.	Fig. 8-33
		5) Heat exchanger leaks.	Fig. 8-32
		6) Heat exchanger plugged.	Fig. 8-32
		7) Piping between heat exchanger and CK6 ejector check valve leaks.	Fig. 8-35
		8) CK6 Ejector check valve failed partially closed.	Fig. 8-35

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		9) Insufficient water pressure to ejector (must be 30 psi min).	
		10) Ejector fins clogged.	Fig. 8-35
		11) Water supplied to ejector too high temperature (higher than 85 F).	
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.	Fig. 8-32, 17 Para. 7.6
		2) Slow exhaust valve malfunctioning — clean, adjust, repair or replace valve.	Fig. 5-2 Para. 5.4
		3) Pressure switch PS-3 misadjusted or defective — reset to 4 psig or replace.	Para. 5.9 Fig. 8-7, 23
		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. 8-48 Fig. 8-15, 8
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.	Para. 5.9 Fig. 8-7, 23, 24
		2) Open or shorted wire — disconnect 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. 8-48
	6.B. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective — check voltage across buzzer, replace if necessary.	Fig. 8-16, 4
		a) Check buzzer resistor. Replace if necessary.	Fig. 8-17, 9
		2) Open wire — disconnect P1 from control and check continuity between pin W and TB3 terminal 2. Isolate and repair.	Fig. 8-48
		3) PC board defective — check D18 LED on board; replace PC board 1 if LED does not come on at end of cycle.	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 air break line — replace check valve.	Fig. 8-34
		2) Air break line plugged — clean or replace plugged components in line.	Fig. 8-34

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		3) Vacuum switch VS-2 out of adjustment or defective — reset VS-2 to 0-1" Hg or replace.	Para. 5.9 Fig. 8-7, 24
	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 Fig. 8-7, 23
	6.E. Goods are wet after completion of "wrapped" cycle, or excessive vapor in chamber when door is opened	1) Review **Technique Manual** (MK-2085) for Wet Pack problems.	
		2) Air break line plugged — clean or replace filter.	Fig. 8-32, 52
		3) Check valve in drain line defective — replace.	Fig. 8-32, 26
		4) Vacuum water valve (S-7) not operating correctly (should be open for drying time).	Fig. 7-19
		a) Repair or replace valve.	Para. 7.5
		b) Check wiring to valve — repair or replace.	
		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 Para. 7.12
		d) 4b) and 4c) ok — replace PC board 1.	
		5) Cooling water valve (S-4) not operating correctly (should be open above and closed below 3 psig).	Fig. 7-19
		a) Repair or replace valve.	Para. 7.5
		b) Check wiring to valve — repair or replace.	
		c) Check LED D-16 on PC board 1 — should be on during exhaust (above 3 psig) and dry. Replace board if light not functioning properly.	Fig. 8-15, 8 Para. 7.12
		d) 5b) and 5c) ok — replace board 1.	

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued	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. 7-19
		a) Repair or replace valve.	Para. 7.5
		b) Check wiring to valve — repair or replace.	
		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
		d) 1b and 1c ok — replace board 1.	
		2) Vacuum water valve (S-7) not operating correctly (should be open for drying time). See 6.E.4), above.	Fig. 7-19
		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. 8-35, 27 Para. 7.7 Para. 7.6
		4) Chamber floor not pitched toward drain — see leveling procedure, para. 5.3.	
		5) Drains plugged or clogged — see drain cleaning procedure, para. 4.4.	
		6) Chamber steam trap does not open — replace trap element.	Fig. 8-36, 11 Para. 7.6
		7) Steam not "dry" — check steam quality.	
		8) Drain line check valve defective — replace.	Fig. 8-32, 26
		For units with water booster pump.	
		9) Water pump defective.	Fig. 8-41 Para. 7.14
		a) Check motor. If not running, check motor starter, reset if necessary. Check heater, replace if necessary. Check motor starter, replace if necessary.	Fig. 8-46

TABLE 6-1. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
		b) Check secondary power source, turn on if necessary.	
		c) Replace motor, if necessary.	Fig. 8-41 Para. 7.14
		d) Check water pump. Replace if necessary.	Fig. 8-41 Para. 7.14
	6.G. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace if necessary.	Fig. 8-16, 15
		2) Open wire — disconnect P1 from control and check continuity between pin P and TB3 terminal 2. Isolate and repair open.	Fig. 8-48
		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
		4) High zener voltage at counter — install resistor per instructions in 7.A.	Fig 8-16. 15
7. Miscellaneous	7. A. Continuous sounding buzzer whenever machine is turned on	1) Install buzzer resistor kit, P-764316-608. For resistor installation, see Figure 8-17.	Fig. 8-16.4

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. 8-70
		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. 8-70 Fig. 8-16. 7
		3) 115 volt fuse in power supply (F402) blown — check.	Fig. 7-37 Fig. 8-15. 18
		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
		5) Defective line filter (PF-1).	Fig. 8-70
		5a) Check 120 VAC between filter contacts Load 1 and Line 2 with CB-2 tripped. Replace filter if necessary.	Fig. 8-70
		5b) Check zero VAC between filter contacts Load-2 and Line-2 with CB-2 energized. Replace filter if necessary.	Fig. 8-70
		6) Defective power door circuit (if applicable) — check 120 VAC between line filter contacts Line-1 and Line-2 with CB-2 tripped. Isolate and repair short in power door circuit.	Fig. 8-70 Fig. 8-73
	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. 8-70
		2) With CB-1 off, disconnect P1 from the controller. Turn CB-1 to on. Try to reset CB-2. If CB-2 resets, see step 1.B.5. If CB-2 does **not** reset, see step, 1.B.3. Be sure to reconnect P1 to the controller.	Fig. 8-70 Fig. 8-16, 7

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1 Continued		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. 8-70 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. 8-70 Fig. 8-16, 7 Fig. 8-16, 13
		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, proceed.	Fig. 8-70 Fig. 8-16, 7
		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 proceed.	Fig. 8-70 Fig. 8-15, 8
		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. 8-70 Fig. 8-15, 15 Fig. 8-15, 18
	1.C. Control switch CB-1 will not set to ON	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. 8-70 Fig. 8-16, 13
		2) Short circuit on 5 VDC bus, or defective power supply.	Fig. 8-70
		2a) With CB-1 off, disconnect PC boards 1 and 2 and disconnect connector P3 from controller. Also unplug P48 from main Printcon PC board. Try to position CB-1 on. If CB-1 **cannot** be positioned on, proceed to step 1.C.3). If CB-1 can be positioned on, see next step.	Fig. 8-70 Fig. 8-15, 18 Fig. 8-16, 13
		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.	Fig. 8-70 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
1. Continued		2c) 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.	Fig. 8-70 Fig. 8-15, 15 Para. 7.12
		2d) With CB-1 off, reconnect P3 to controller. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace primary panel. If CB-1 can be positioned on, see next step.	Fig. 8-70 Fig. 8-10, 24 Para. 7.12
		2e) Short circuit on 5 VDC bus within digital display PC board. Reconnect plug 48. 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.	Table 6-11 Fig. 8-58, 3 & 11
		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.	Table 6-11 Fig. 8-58, 3
		3) Fuse F3 (125 V, 1/2 A) in power supply blown — check. If OK, replace power supply.	
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. 8-70
		3) P16 disconnected or loosely connected — reconnect.	Fig. 8-55, 13
		4) Control power supply defective — check for 5 VDC and 28 VDC and replace power supply if necessary.	Table 6-11 Fig. 8-15, 18
		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. 8-55, 13 Para. 7.12 Fig. 8-72

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	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.	Table 6-11
		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, 18
		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. 8-55, 13 Para. 7.12
		3) Defective power supply. Replace.	Fig. 8-15. 18
	2.C. Printcon display is dark, and Printcon buzzer sounds	1) P45 connector on display PC board disconnected or loosely connected —reconnect.	Fig. 8-58. 11
		2) Power Supply F2 fuse blown — replace.	Fig. 7-37
	2.D. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary.	Fig. 7-15 Fig. 8-55, 13
		2a) Primary panel logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see next step.	Fig. 8-55, 13
		2b) Reinstall lamp and check voltage from lamp socket to TB7 in power supply. If it is zero, replace primary panel. If it is 28 VDC, see next step.	Fig. 8-70 Fig. 8-55, 13 Para. 7.12
		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 next step.	Fig. 8-70 Fig. 8-55, 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. 8-70 Fig. 8-55, 13

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	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. 2-6
		2) Primary panel logic card defective. Disconnect P3 from controller. If light goes out, replace primary panel. If light remains on, see next step.	Fig. 8-55, 13 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. 8-70 Fig. 8-55, 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. 8-58. 11
	2.G. Digital display is dark, printer is inoperative, and cycle will not run.	1) Fuse F2 in power supply blown — replace.	Fig. 7-37
		2) P48 unplugged from main Printcon PC board — reconnect.	Fig. 8-58, 3
	2.H. Incorrect timer display ("Sterilize" or "Dry")	2) See Timer Display Checkout and Correction Charts, paragraph 6.5, following this Troubleshooting Chart.	Table 6-4
	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.	Para. 6.6
		2) Component failure on display PC board.	Fig. 8-58, 11
	2.J. Buzzer sounds and set temperature is continuously displayed	1) J52/P52 connector on the display PC board disconnected or loosely connected — reconnect.	Fig. 8-58, 11 Table 6-11
	2.K. ALARM: TEMP SENSOR printed when power is turned on, buzzer sounds intermittently, and 306.8 F is displayed	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 next step.	Fig. 8-58, 3 Fig. 8-67

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) Extreme misalignment of main Printcon PC board — check alignment.	Para. 7.22
		3) Component failure on main Printcon PC board — replace.	Fig. 8-58, 3 Para. 7.18
		4) Temperature probe or cable open. See 2.K.1) above — replace and recalibrate.	Para. 7.20
		5) Position 4 of Service Switch is in OFF position.	Para. 7.18
	2.L. ALARM: PRES SENSOR printed when power is turned on and buzzer sounds intermittently	1) Pressure sensor or cable shorted — replace and recalibrate.	Fig. 8-67
		2) Extreme misalignment of main Printcon PC board — check alignment.	Para. 7.22
		3) Component failure on main Printcon PC board — replace.	Fig. 8-58, 3 Para. 7.18
		4) P47 unplugged from main Printcon PC board — reconnect.	Fig. 8-67 Fig. 8-58, 3 Table 6-11
		5) Position 4 of Service Switch is in OFF position.	Para. 7.18
	2.M. 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.	Fig. 8-70 Fig. 8-15, 8
		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.N. Unable to select cycle	1) No DOOR LOCKED signal.	
		1a) Adjust or replace door lock switch as required.	Fig. 8-21, 22 Para. 7.3
		1b) Disconnect P2 from controller and check continuity between pin J and TP7 in power supply. If continuity is present, replace controller PC Board. If continuity is **not** present, see next step.	Fig. 8-70 Fig. 8-15, 8

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		1c) 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. 8-21 Para. 7.3
		2) Controller PC Board 1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and TP7 in power supply. If continuity is present, replace controller PC Board. If continuity is **not** present, see next step.	Fig. 8-70 Fig. 8-15, 8
		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. 8-70 Fig. 8-55, 13 Para. 7.12
	2.O. Cycle will not run. Reset not printed out.	1) P40 unplugged from main Printcon PC board — reconnect.	Fig. 8-58, 3 Table 6-11
	2.P. 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. 8-37 Para. 7.10
		3) Manual STEAM supply valve malfunctioning — repair or replace, as necessary.	Fig. 8-64 Para. 7.11
		4) Jacket return steam trap malfunctioning — replace.	Fig. 8-35, 27 Fig. 8-38 Para. 7.6
		5) Steam supply strainer plugged — clean.	Para. 7.7
	2.Q. 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. 8-43

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — inspect check valve for leak, replace if necessary; check D13 LED on PC Board 1, replace board if LED on.	Fig. 7-19 Para. 7.5 Fig. 8-55, 13 Para. 7.12
	2.R. "ERROR 1" message is printed when power is turned on	1) A/D converter failure on main Printcon PC board.	Fig. 8-58, 3
		1a) F3, -12 VDC fuse is open in power supply — check fuse continuity and replace if necessary. If fuse is ok, see next step.	Fig. 8-15, 18 Table 6-9
		1b) Component failure on main Printcon PC board — replace board.	Fig. 8-58, 3 Para. 7.18
	2.S. "ERROR 2" message is displayed momentarily on each attempt to print.	1) Printer status signal lost.	
		1a) F2, +18 volt fuse open in power supply — check fuse for continuity and replace if necessary. If fuse is ok, see next step.	Fig. 8-15, 18 Table 6-9
		1b) J42 printer connector unplugged or poor contact — check connector on both ends for proper contact and solid connections. If ok, see next step.	Fig. 8-58, 3
		1c) Printer motor speed too slow — adjust P10 on main Printcon PC board for maximum speed.	Fig. 8-58, 3 Table 6-11
		1d) Printer defective — replace.	Fig. 8-59, 22
		1e) Printcon main PC board defective — replace.	Fig. 8-60A, 22
3. During a cycle	3.A. Cycle does not advance during pre-vacuum phase	1) Leaks in chamber piping and/or door gasket — check for leaks, repair; replace gasket.	Fig. 8-20, 1 Para. 7.3
		2) VS-1 setting incorrect on display PC board; should be 20 — reset if required.	Para. 7.17 Table 6-11
		3) VS-1 setting not recognized by lower controller — measure voltage at P2, pin R with P2 connected. If it is zero volts, see enxt step. If it is 5 VDC, replace control PC Board 2.	Fig. 8-15, 15 Para. 7.12 Table 6-10

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		4) Loss of VS-1 signal to lower controller — with all power off, extract pin 9 of plug 40. Replace plug 40 and reinitiate cycle. If cycle now advances, replace main Printcon PC board. If cycle does **not** advance, repair short between wire #115 and other wire(s) in harness.	Fig. 8-58, 3 Para. 7.18 Tables 6-10 and 6-11
		5) PS-1 setting incorrect on display PC board; should be 52 — reset if required.	Para. 7.17 Table 6-11
		6) PS-1 setting not recognized by lower controller — measures voltage at P2, pin S with P2 connected. If it is zero volts, see step 3.A.7. If it is 5 VDC, replace control PC board 2.	Fig. 8-15, 15 Para. 7.12 Table 6-10
		7) Loss of PS-1 signal to lower controller — with all power off, extract pin 8 of plug 40. Replace plug 40 and reinitiate cycle. If cycle now advances, replace main Printcon PC board. If cycle does **not** advance, repair short between wire #112 and other wire(s) in harness.	Fig. 8-58, 3 Para. 7.18 Tables 6-10 and 6-11
		8) PS-3 setting incorrect on display PC board; should be 6 — reset if required.	Para. 7.17 Table 6-11
		9) PS-3 setting not recognized by lower controller — measure voltage at P2, pin L with P2 connected. If it is zero volts, see next step. If it is 5 VDC, replace control PC Board 1.	Fig. 8-15, 8 Para. 7.12 Table 6-10
		10) Loss of PS-3 signal to lower controller — with all power off, extract pin 7 of plug 40. Replace plug 40 and reinitiate cycle. If cycle now advances, replace main Printcon PC board. If cycle does **not** advance, repair short between wire #114 and other wire(s) in harness.	Fig. 8-58, 3 Para. 7.18 Tables 6-10 and 6-11
		11) Water ejector valve (S-7) not operating correctly — should be open for vacuum part of pre-vacuum phase.	Fig. 7-19
		11a) Repair or replace valve.	Para. 7.5

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		11b) Check wiring to valve — repair or replace.	
		11c) Check LED D-14 on control PC board 1 — should be on during vacuum part of prevacuum phase. Replace board if light not on.	Fig. 8-15, 8 Para. 7.12
		11d) If steps 11b) and 11c) ok — replace PC Board 1.	Fig. 8-15, 8 Para. 7.12
		12) Inadequate temperature in chamber — possible causes and corrections are as follows:	
		12a) Settings on temperature thumbwheels and HI-LO valve do not correspond — set thumbwheels and valve properly.	Fig. 8-58, 13 Section 2
		12b) Chamber drain line or strainer plugged — clean line or strainer.	Fig. 8-66 Para. 4.3
		12c) Chamber drain line trap not operating correctly — replace trap element.	Para. 7.6
		12d) Chamber drain solenoid valve (S3) not operating correctly (should be closed during pressurized part of pre-vacuum phase). Repair or replace valve — check manual operation. Check LED D-12 — if on, replace control PC board 1.	Fig. 8-66, 9 Para. 7.5 Fig. 8-15, 8 Para. 7.12
		12e) Slow exhaust bleed valve too far open — check and reset if necessary.	Fig. 8-66, 14
		12f) Loss of continuity in wire #131 (TS-1).	Table 6-11
		12g) TS-1 output drive failure on main Printcon PC board. Should switch from 5 VDC to zero VDC when setting on thumbwheels is achieved.	Fig. 8-58, 3 Table 6-10
		12h) TS-1 input failure on Eagle CPU PC board — see step 3.A.12f) above before replacing.	Fig. 8-15, 8 Table 6-10
		12i) Temperature circuitry on main Printcon PC board out of calibration — check.	Fig. 8-58, 3 Para. 7.22

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		12j) Faulty temperature probe — replace and recalibrate.	Para. 7.20
		13) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open during pressurized part of pre-vacuum phase.)	Fig. 7-19 Fig. 8-34, 16
		13a) Repair or replace valve.	Para. 7.5
		13b) Check wiring to valve — repair or replace.	
		13c) Check LED D-13 on control PC board 1 — should be on during vacuum part of pre-vacuum phase. Replace board if light **not** on.	Fig. 8-15, 8 Para. 7.12
		13d) If steps 13b) and 13c) ok — replace control PC Board 1.	Fig. 8-15, 8 Para. 7.12
		14) No pressure in jacket — see step 2.P, "Jacket pressure does not rise . . ."	
	3.B. Number of pulses (pressure and vacuum) not correct during pre-vacuum conditioning phase	1) Pulse selection switch set incorrectly or defective. Adjust switch to correct setting.	Fig. 7-18 Para. 7.12
		2) Replace PC Boards 1 and 2.	Fig. 8-15, 8 and 15
	3.C. Chamber temperature does not rise to Printcon temperature thumbwheel setting, proper lead message printed.	1) See steps 3.A.12 through 3.A.12j: — "Inadequate temperature in chamber . . ."	
	3.D. Chamber temperature does not rise to Printcon setting, no lead message is printed.	1) Component failure on main Printcon PC board — replace.	Fig. 8-58, 3 Para. 7.18
	3.E. Steam does not enter chamber in sterilize phase	1) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open).	Fig. 7-19 Fig. 8-34, 16
		1a) Repair or replace valve.	Para. 7.5
		1b) Check wiring to valve — repair or replace.	

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		1c) Check LED D-13 on PC board 1 — should be on. Replace board if light not on.	Fig. 8-15. 8 Para. 7.12
		1d) If steps 1b) and 1c) ok — replace PC Board 1.	
		2) No pressure in chamber jacket (check pressure gauge) — see 2.P. above, "Jacket pressure does not rise . . ."	
	3.F. 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. 8-15. 8 Para. 7.12
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). See 3.A.13). above.	Fig. 8-34. 16
		3) No pressure in jacket. See 2.P, above.	
	3.G. 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. 8-36, 11 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. 7-19 Para. 7.5 Fig. 8-15. 8
	3.H. 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. 8-36 Para. 4.3
		2) Chamber trap defective — replace element.	Fig. 8-36, 11 Para. 7.6
		3) Improper loading technique or equipment.	
	3.I. Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-20, 1 Para. 7.3

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3.J. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean.	Fig. 8-33. 14 Para. 7.7
		2) Insufficient flow through cooling water flow control valve — clean, adjust, repair or replace flow control valve.	Fig. 8-64
		CAUTION: If safety valve is found to be defective, do not attempt to repair. Replace with new valve.	
		3) Safety valve popping or bleeding — check for source of excessive pressure.	Fig. 8-64. 11
		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. 7-19
		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) If steps 5b) and 5c) ok — replace PC Board 1.	
	3.K Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — or gasket.	Fig. 8-21. 5 and 6 Para. 7.3
	3.L. Safety valve pops or bleeds excessively	1) HI-LO steam control valve improperly adjusted or malfunctioning — adjust, repair, or replace valve.	Fig. 8-37 Para. 7.10
		2) Safety valve defective — replace.	Fig. 8-64. 11
4. During "DRY" part of Exhaust phase	4.A. Dry timer does not start and cooling water valve (S-4) does not close in exhaust phase	1) PS-3 setting on display PC board incorrect — should be 6.	Fig. 8-58, 11 Para. 7.17
		2) Loss of continuity in wire #114 (PS-3).	Table 6-11

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.B. Dry timer starts and cooling water valve closes immediately after sterilize phase	1) See step 4.A. 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. 4) Open or shorted wire — Disconnect P2 from controller, check continuity between pin L and TP 7 in power supply. If okay, replace PC Board 1. Otherwise isolate and repair wiring.	Fig. 8-66, 8 Para. 7.6 Para. 5.4 Fig. 8-66, 14 Fig. 8-70 Fig. 8-15, 8
	5.B. Slow exhaust too fast or too slow (Liquids Cycles only)	1) Slow exhaust valve malfunctioning — adjust, repair or replace valve. 2) PS-3 setting incorrect — should be 6. 3) Loss of continuity in wire #114 (PS-3). 4) 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. 5) PS-3 input failure on Eagle CPU PC board.	Fig. 8-66, 14 Para. 7.17 Table 6-11 Fig. 8-58, 3 Tables 6-10 and 6-11 Fig. 8-15, 8 Table 6-10
	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 3) PS-2 input failure on Eagle CPU PC board 4) Pressure display was not zero when cycle began. Always press reset first.	Para. 7.17 Fig. 8-58, 3 Tables 6-10 and 6-11 Fig. 8-15, 8

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
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)	1) PS-2 setting incorrect (set too low) — should be 2. 2) Same as steps 5.C.2) and 5.C.3). 3) Open or shorted wire — disconnect P2 from controller and check continuity of of P52 switch point circuits, i.e., between pin K and pin 5 of plug 40. See electrical schematic for test points. 4) Pressure circuitry on main Printcon PC board out of calibration — check.	Para. 7.17 Fig. 8-70 Table 6-11
	6.B. Buzzer and Cycle COMPLETE will not come on at end of dry time (Gravity and Pre-vacuum cycles only)	1) VS-2 setting incorrect — should be 4. 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. 3) VS-2 input failure on Eagle CPU PC board.	Para. 7.17 Fig. 8-58, 3 Tables 6-10 and 6-11 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. 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. 8-61, 1 Fig. 8-70 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 air break line — replace check valve. 2) Air break line plugged — clean or replace plugged components in line. 3) VS-2 setting incorrect — should be 4.	Fig. 8-34, 12 Fig. 8-34 Para. 7.17
	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. 2) Pressure circuitry on main Printcon PC board out of calibration — check.	Para. 7.17 Para. 7.22

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued	6.F. Goods are wet after completion of "Wrapped" cycle, or excessive vapor in chamber when door is opened	1) Air break line plugged — clean or replace filter.	Fig. 8-32, 56
		2) Check valve in drain line defective — replace.	Fig. 8-35, 31
		3) Wet steam — check quality.	
		4) Vacuum water valve (S-6) not operating correctly (should be open for drying time).	Fig. 7-19
		4a) Repair or replace valve.	Para. 7.5
		4b) Check wiring to valve — repair or replace.	
		4c) Check LED D-14 on PC board 1 — should be on for drying time. Replace board if light not on.	Fig. 8-15, 8 Para. 7.12
		4d) If steps 4b) and 4c) ok — replace PC Board 1.	
		5) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry).	Fig. 7-19
		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) If steps 5b) and 5c) ok — replace PC Board 1.	
	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. 7-19
		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) If steps 1b) and 1c) ok — replace PC Board 1.	

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		2) Vacuum water valve (S-7) not operating correctly (should be open for drying time). See step 6.F.4), above	Fig. 7-19
		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. 8-35, 27 Para. 7.6 Para. 7.7
		4) Chamber floor not pitched toward drain — see leveling procedure, paragraph 5.3.	
		5) Drains plugged or clogged — see drain cleaning procedure, paragraph 4.5.	
		6) Chamber steam trap does not open — replace trap element.	Fig. 8-35, 27 Para. 7.6
		7) Steam not "dry" — check steam quality.	
		8) Drain line check valve defective — replace.	Fig. 8-35, 31
	6.H. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace, if necessary.	Fig. 8-16, 15
		2) Open wire — disconnect P1 from control and check continuity between pin P and TB3 terminal 2. Isolate and repair open.	Fig. 8-70
		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 buzzer whenever machine is turned on	1) Excessive current leakage from triac — replace PC board 1.	Fig. 8-15, 8
		2) Resistor R1 open — replace.	Fig. 8-17, 9
	7.B. Pressure displayed is more than +2 PSI different than chamber gauge	1) Faulty chamber pressure gauge — replace.	Fig. 8-67
		2) Faulty sensor — replace and recalibrate.	Fig. 8-67
		3) Pressure circuitry on main Printcon PC board out of alignment — check.	Para. 7.22

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
7. Continued	7.C. Two or more adjacent columns on printed record are blank	1) Printer hammer coil(s) open or shorted — replace printer.	Fig. 8-59, 22 Fig. 8-60A, 22
	7.D. Illegible printed record	1) Drag on paper roll — check.	Para. 7.16
		2) Binding of mechanical linkage in printer — replace printer.	Fig. 8-59, 22 Fig. 8-60A, 22 Para. 7.16
	7.E. Paper is advanced but is entirely blank	1) Printer coil connector is unplugged from P20/J20 connector — reconnect.	Fig. 8-59, 36
	7.F. Time or date not displayed	1) J51/P51 connector unplugged from display panel overlay — reconnect.	Fig. 8-58, 16
	7.G. Continuous display of time or date	1) Time or date display pushbutton on display panel shorted — replace.	Fig. 8-58, 16 Para. 7.17
	7.H. Automatic advance of display when time or date pressed.	1) Forward switch on display panel shorted — replace panel.	Fig. 8-58, 16 Para. 7.17
	7.I. Automatic reverse of display when time or date pressed.	1) Reverse switch on display panel shorted — replace panel.	Fig. 8-58, 16 Para. 7.17
	7.J. Cannot advance time or date.	1) Forward switch on display panel open — replace panel.	Fig. 8-58, 16 Para. 7.17
	7.K. Cannot reverse time or date.	1) Reverse switch on display panel open — replace panel.	Fig. 8-58, 16 Para. 7.17
	7.L. Paper will not be taken up	1) Paper jammed in take-up mechanism — check alignment.	Para. 7.16
		2) Paper advance toggle switch in wrong position or failed — reset or replace toggle switch as required.	Fig. 8-59, 28 Fig. 8-60A, 30 Para. 7.16
		3) Platen switch failure (open) — replace platen switch.	Fig. 8-60, 14 Fig. 8-60B, 25 Para. 7.16
		4) Take-up motor fuse (1/32 amp) blown. Check.	

TABLE 6-2. CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
7. Continued		5) Take-up motor open or shorted — replace motor.	Para. 7.16
	7.M. Pinch rollers run continuously (units before 6/85)	1) Paper jammed in mechanism — check alignment.	Para. 7.16
		2) Platen switch failure (closed) — replace platen switch.	Fig. 8-60, 14 Para. 7.16
	7.N.Continuous paper feed	1) Paper advance toggle switch is in "paper advance" position — turn off paper advance.	Fig. 8-59, 28 Fig. 8-60A, 30
	7.O. Display and printout show incorrect date	1) Year switch incorrectly set — check setting.	Para. 7.18
	7.P. Temperature indication is incorrect, pressure is correct	1) Calibration misalignment or component failure on main Printcon PC board — recalibrate or replace board.	Para. 7.22 Para. 7.18 Fig. 8-58, 3
		2) Faulty temperature sensor — replace sensor, and recalibrate.	Para. 7.20 Para. 7.22
	7Q. Time and Date not retained when control power is turned off	1) Memory battery dead. Replace.	Fig. 8-58, 3
		2) Battery installed incorrectly.	
		3) Component failure on main Printcon PC board — replace board and check calibration.	Para. 7.18 Para. 7.22
	7.R. Erratic Temperature/ Pressure display	1) Units manufactured before 6/85, loss of DC ground or capacitor bypass.	Para. 7.17
		2) Units manufactured after 6/85, add jumper wire.	Para. 7.17

NOTE 1: Use these formulas to calculate temperature probe (RTD) resistance at a given temperature.

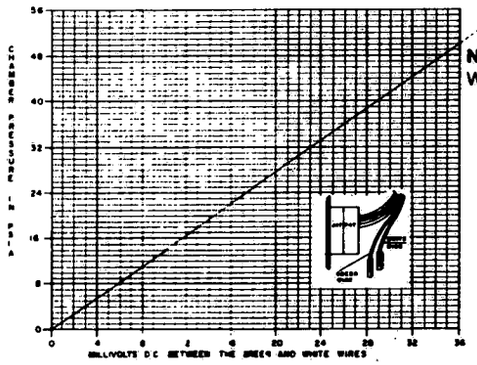
a) Celsius:
Probe resistance (ohms) = temperature x 0.385 + 100

b) Fahrenheit:
Probe resistance (ohms) = temperature-32 x 0.214 + 100

NOTE 2: The Table below shows the response of the strain gauge pressure transducer (in mVDC) to any given chamber pressure (in psia).

NOTE 3: PSIG = PSIA -14.7

TABLE 6-3. STRAIN GAUGE PRESSURE TRANSDUCER RESPONSE.



NOTE: NOMINAL MAXIMUM WORKING PRESSURE IS 50 psia.

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, jump pin 38 to DC ground. 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 6-5) 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.

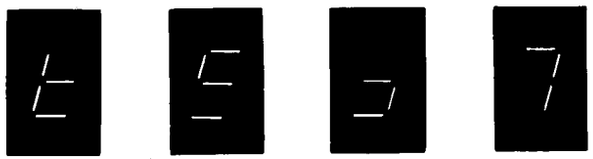
For PRINTCON units, use test point TP7 at power supply.

TABLE 6-4. TEST PATTERNS: STERILIZE AND DRY THUMBWHEEL SWITCHES.

P4 Connector Pin	"STERILIZE" or "HOURS"* DISPLAY, 10's digit, (IC1), should indicate pattern:	"STERILIZE" or "HOURS"* DISPLAY, unit's digit (IC2), should indicate pattern:	"DRY" or "MINUTES"* DISPLAY, 10's digit (IC3), should indicate pattern:	"DRY" or "MINUTES"* 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

Eagle 2300 Units.

TEST PATTERNS FOR CORRECTLY FUNCTIONING DIGITAL DISPLAYS



A B C D

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 6-5. 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 PC board 1.

TABLE 6-5. CONTINUITY CHECK — STERILIZE AND DRY TIME 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.*

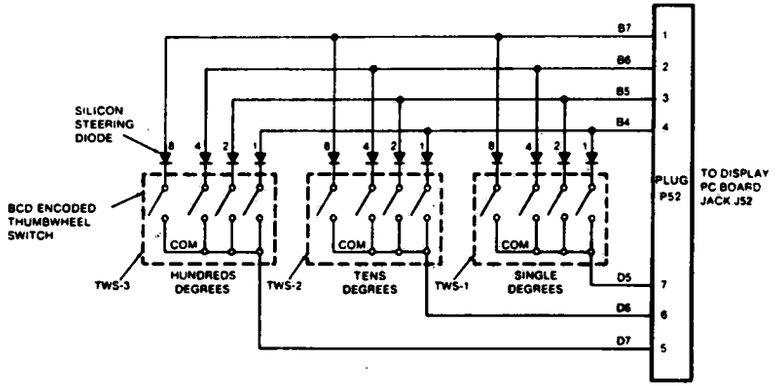


Figure 6-11. TEMPERATURE THUMBWHEEL SWITCHES: Wiring.

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 6-8. 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. 8-29, 2
		3) Overload relay A tripped — reset.	Fig. 8-28, 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 and 24
		5) Limit switches actuated — readjust or replace.	Fig. 7-10 Para. 7.3
		6) Electric clutch not energized — repair or replace.	Fig. 8-26, 6 Para. 7.3
		7) Hinge motor not energized — repair or replace.	Fig. 8-26, 2
	B. Motor runs, but does not operate door	1) Clutch not engaged — readjust, repair or replace.	Fig. 8-26, 6 Para. 7.3
		2) Rectifier burned out — replace.	
		3) Coil burned out — replace.	Fig. 8-26, 6
		4) Relays not making contact — repair or replace.	Fig. 8-29
		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. 8-25
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. 8-29, 7 and 10

TABLE 6-8. 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. 8-18 or 19
		4) Push button not operating correctly — replace.	Fig. 8-18
		5) Time delay relays 5TR, 1TR not operating correctly — check, readjust or replace, as necessary.	Fig. 8-29, 7
	B. Door closes but only partially	1) Door movement obstructed — correct.	
		2) Hinge assembly binding — correct.	Fig. 7-2 Para. 7.3
	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. 8-29, 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. 8-23, 29
		2) Overload relay A tripped — reset.	Fig. 8-28, 19
		3) Relay 8CR not energized — repair or replace.	Fig. 8-29, 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. 8-18 or 19
		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. 8-29

TABLE 6-8. 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. 7-10 Fig. 8-23, 46 Para. 7.3
4. Door closed and locked	A. Signal is not sent to controller	1) Limit switch LS-2 not actuated — readjust, repair or replace.	Fig. 7-10 Fig. 8-23, 46 Para. 7.3
	B. Door gasket seal is not maintained throughout cycle.	1) Door gasket is deformed, brittle, or cracked — replace.	Fig. 8-20, 1 Para. 7.3
	C. Door will not unlock when UNLOCK button is pushed	1) Relay 8CR is not energized — repair or replace.	Fig. 8-29. 8
		2) Overload relay A tripped — reset.	Fig. 8-28. 19
		3) Limit switches not actuated — readjust, repair, or replace.	Para. 7.3
		4) Pushbutton not operating correctly — replace.	Fig. 8-18 or 19
		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 1.A, above.	
	D. Door is unlocked, but motor is not deenergized	1) Limit switch LS-3 not deactuated — readjust, repair, or replace.	Fig. 7-8 Fig. 8-23, 6 or 46 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.A, above.	
		2) Limit switch LS-3 not deactuated — readjust, repair, or replace.	Fig. 8-23, 6 Para. 7.3 Fig. 7-8
		3) Time delay relays 4TR, 3TR, 1TR not operating correctly — check, readjust or replace as necessary.	Fig. 8-29
	B. Door opens, but only partially	1) Door movement obstructed — correct.	Para. 7.3
		2) Hinge assembly binding — correct.	Fig. 7.2
	C. Door is fully opened, but is not deenergized	1) Limit switch LS-4 not deactuated — readjust, repair, or replace.	Para. 7.3

TABLE 6-9. PRINTCON PERMISSIBLE POWER SUPPLY TOLERANCES.

NOMINAL DC VOLTAGE	TEST POINT	TOLERANCE (VOLTS DC)
+5	TP1	5.00 — 5.25 (adjustable)
-12	TP2	-11.50 — -12.50
+18	TP3	16 — 23
+28	TP4	24 — 30
+12	TP5	11.50 — 12.50
+12	TP6	11 — 13

NOTE: Use test point TP7 as DC common connection for all voltage measurements.

TABLE 6-10. PRINTCON PLUG P-40 OUTPUTS.

	Typical Values	5 volts output	0 volts output
TS1	250 F	Temp < TS1	Temp > TS1
TS2	270 F	Temp < TS2	Temp > TS2
VS1	10" Hg	Vacuum > 10" (eg. 15")	Vacuum < 10"
VS2	2" Hg	Vacuum < 2" (eg. 0 PSIG)	Vacuum > 2"
PS1	26 PSIG	Pressure > 26 PSIG (eg. 30 PSIG)	Pressure < 26 PSIG
PS2	1 PSIG	Pressure < 1 PSIG (eg. 0 PSIG)	Pressure > 1 PSIG
PS3	3 PSIG	Pressure < 3 PSIG (eg. 0 PSIG)	Pressure > 3 PSIG

TABLE 6-11. SCHEMATIC REFERENCE LIST.

The following drawings have been grouped together for convenience. They are:

Title	Sheet	Reference
ELECTRICAL SCHEMATIC: Vacamatic Sterilizer (IRC)	1 of 3 2 of 3 3 of 3	146622
PIPING SCHEMATIC (IRC)	1 of 1	
ELECTRICAL SCHEMATIC: Vacamatic Sterilizer (Printcon)	1 of 3 2 of 3 3 of 3	146649-043
PIPING SCHEMATIC: Printcon	1 of 1	—
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
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
MASTER WIRE LIST (IRC)	1 of 1	150822-261
MASTER WIRE LIST OPTIONAL POWER DOOR (IRC)	1 of 1	150822-264
PRINTED CIRCUIT BOARD: Primary Panel (OE)	1 of 2 2 of 2	134468-444
PRINTED CIRCUIT BOARD: Primary Panel (NOE)	1 of 2 2 of 2	136640-001

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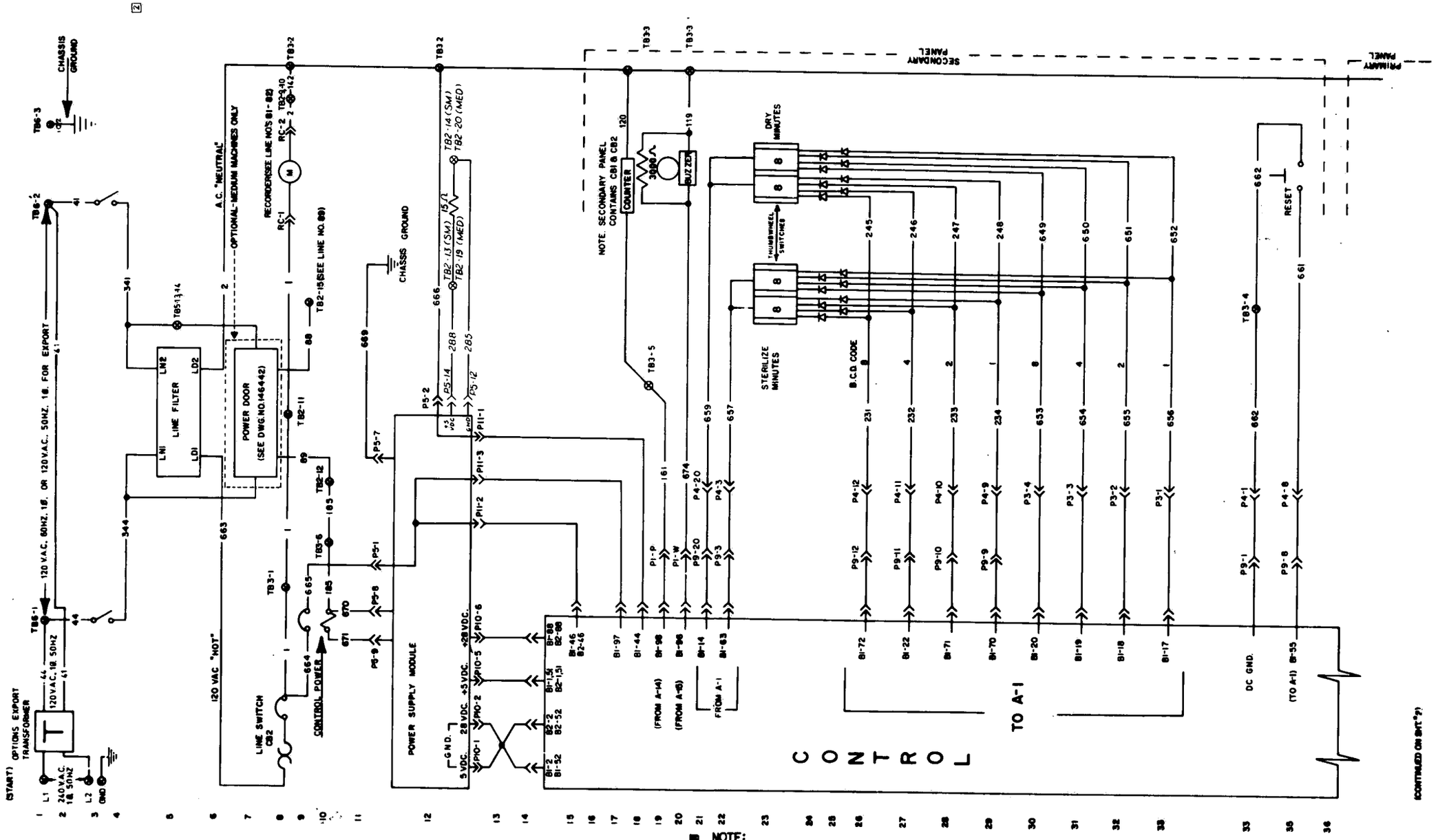
DWG. NO. 146822
(9-26-85)

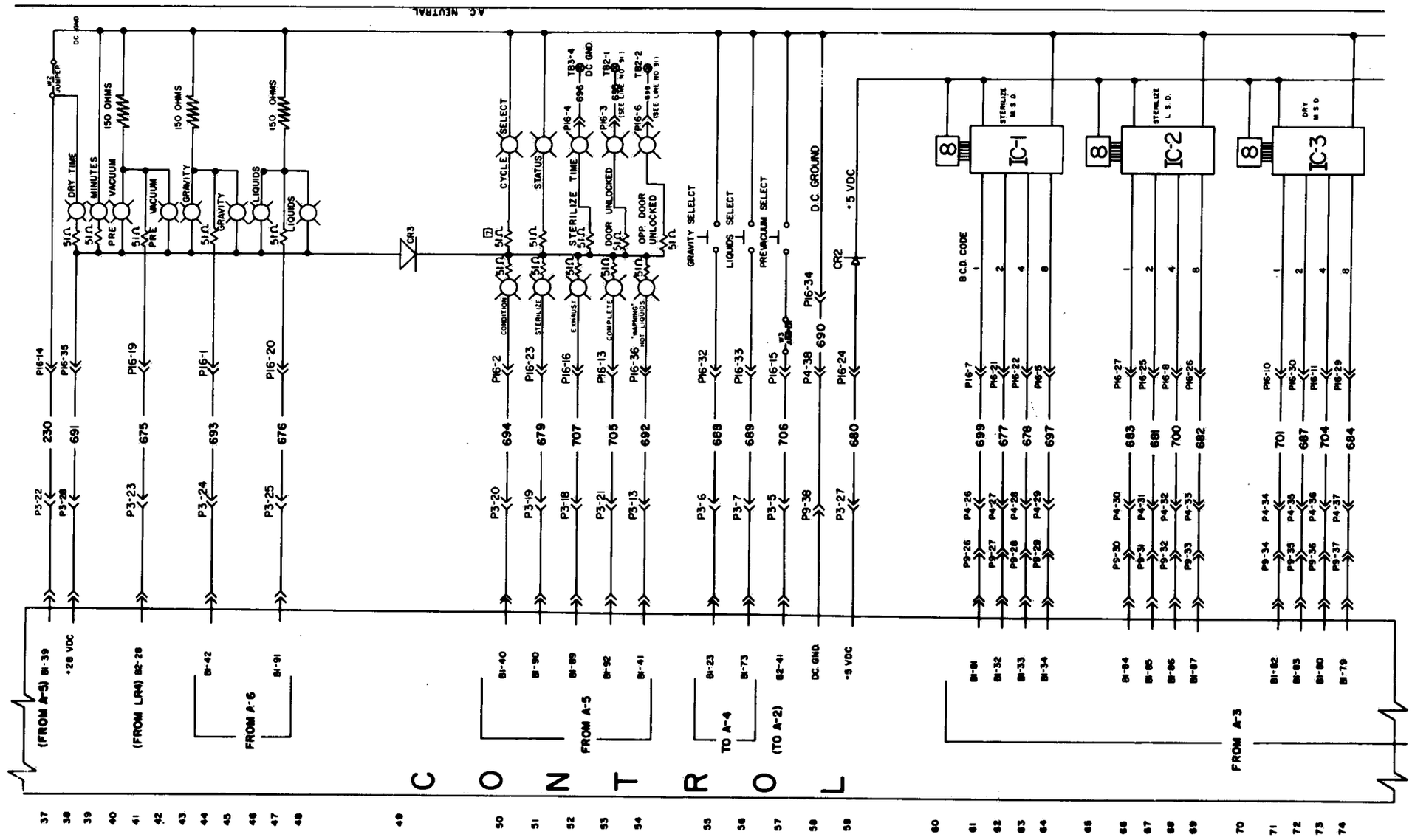


■ NOTE:
SEE DWG 150822-261 FOR WIRE LIST

ELECTRICAL SCHEMATIC: (1 OF 3).
(Units with Indicator-Recorder)

Rev. 2/86

DWG. NO. 146622
(9-26-85)



ELECTRICAL SCHEMATIC: (2 OF 3).
(Units with Indicator-Recorder)

Rev. 2/86

DWG. NO. 146622
(9-26-85)

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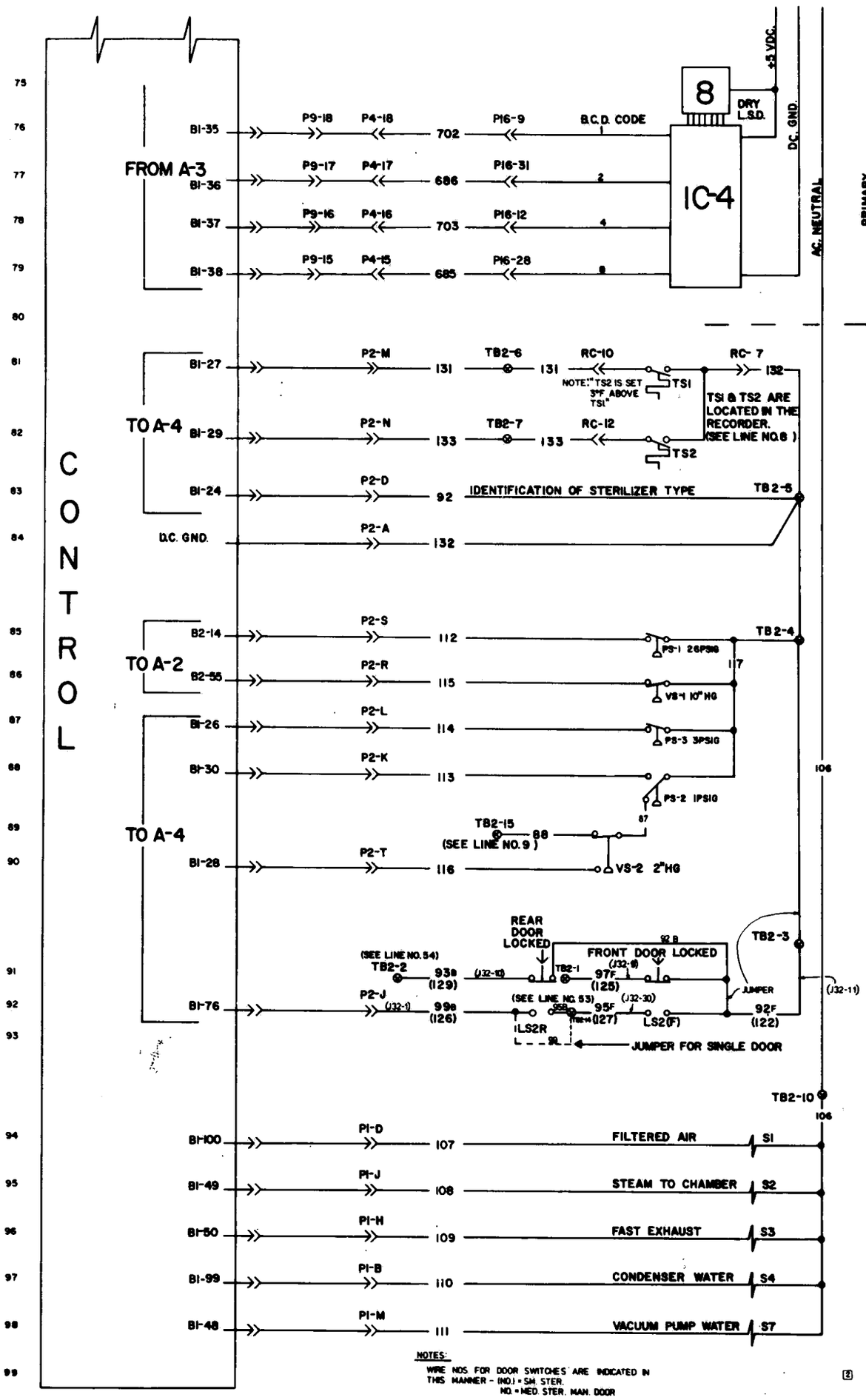


NOTES:

WIRE NOS. FOR DOOR SWITCHES ARE INDICATED IN THIS MANNER - (NO.) = SM. STER.
NO. = MED. STER. MAN. DOOR

POWER DOOR MEDIUMS: WIRES NOS. SAME AS MANUAL WITHOUT "B" OR "F" PIN CONNECTIONS SHOWN IN PARENTHESIS "( )". TB2-14 NOT USED.

[2]

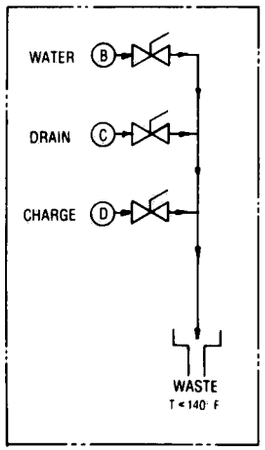
ELECTRICAL SCHEMATIC: (3 OF 3).
(Units with Indicator-Recorder)

(END)

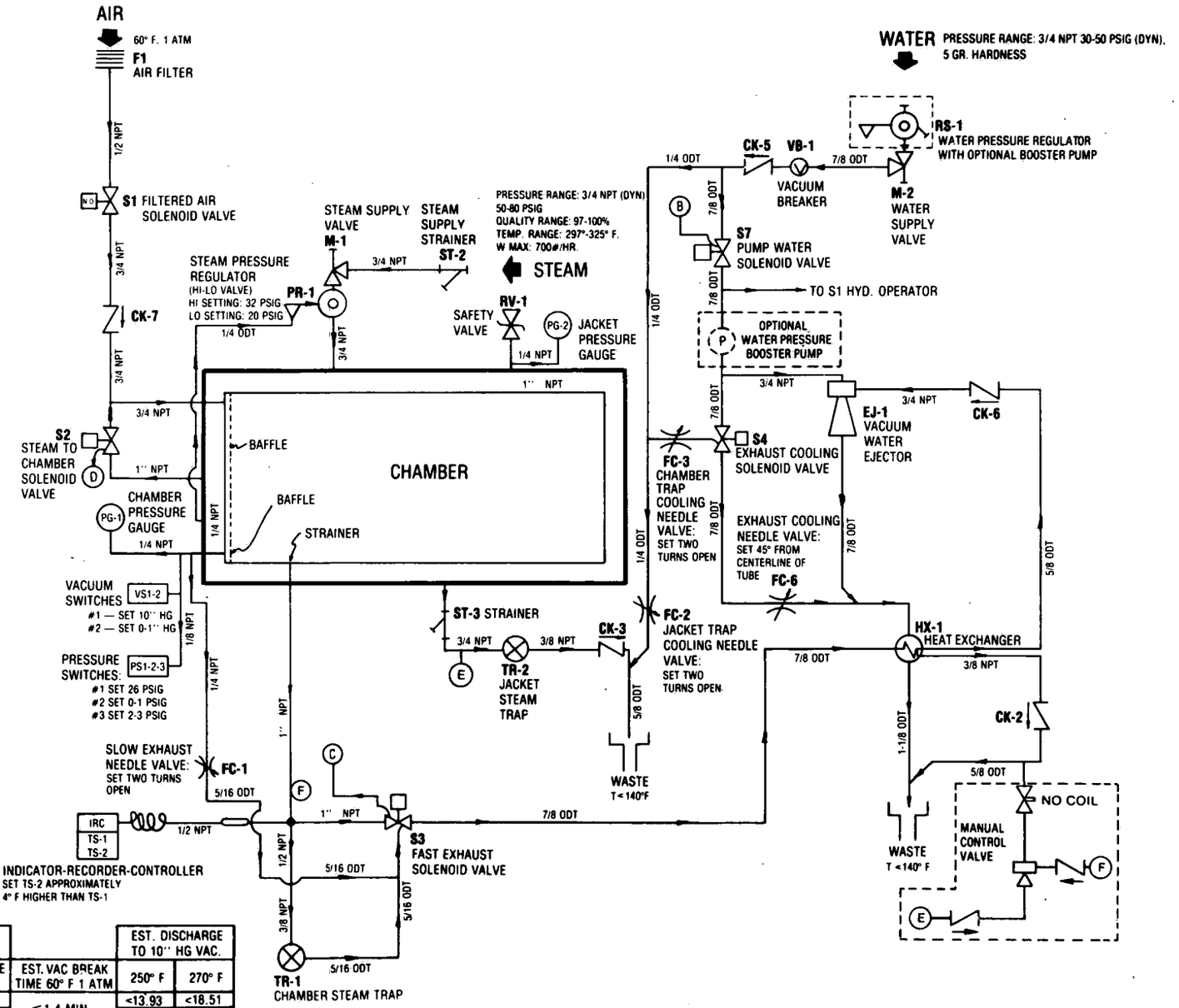
Eagle Series

G-1

G-2



MANUAL CONTROL VALVE

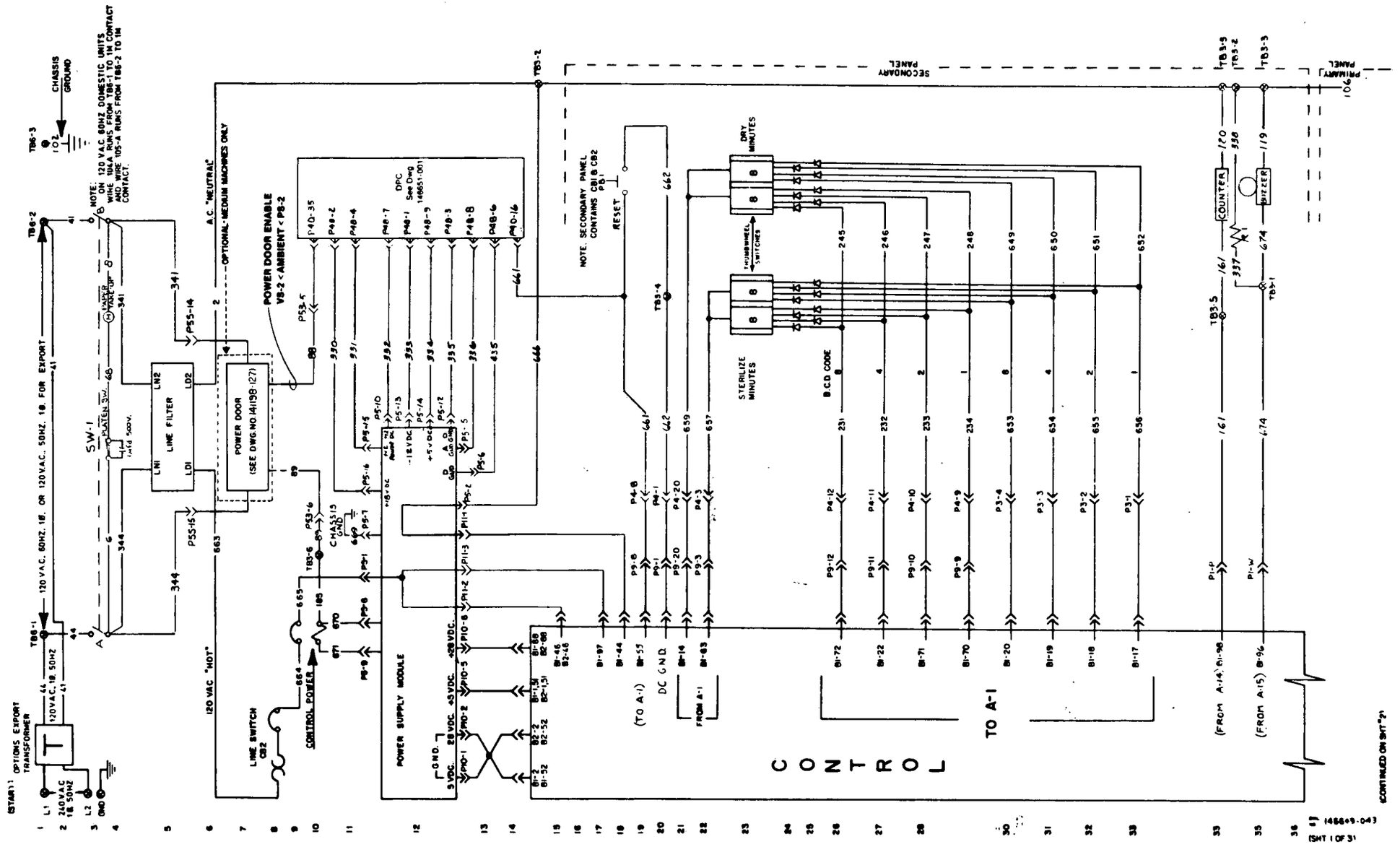


NOTE: ALL ADJUSTMENTS ARE NOMINAL FACTORY SETTINGS.

SHELL SIZE	VOL FT³	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 TO 10" HG VAC. 250° F	EST. DISCHARGE TO 10" HG VAC. 270° F
24X36X36	18	1.35#	<9.91 <59.46 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	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	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
(Units with Indicator-Recorder)

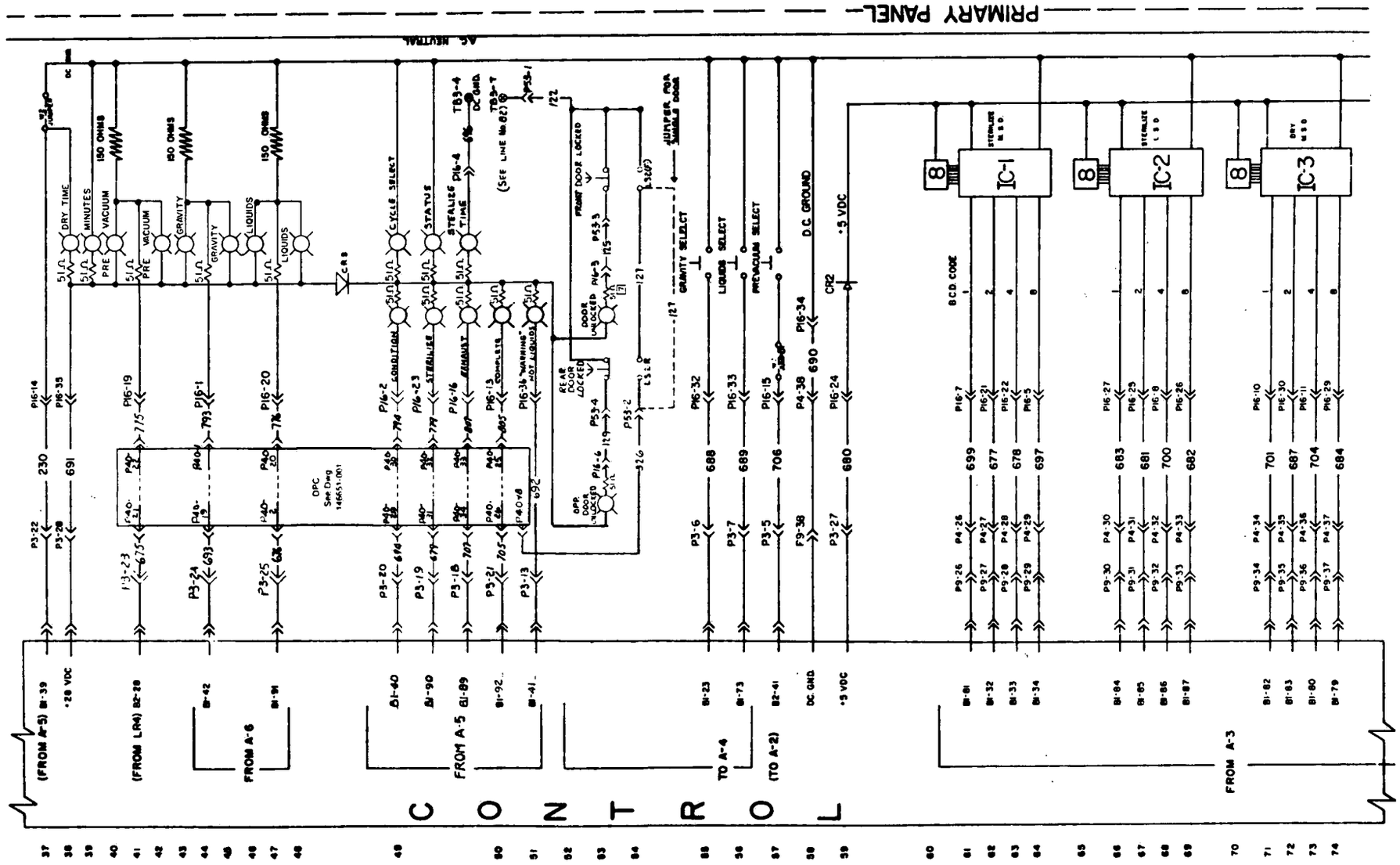
DWG. NO. 146649-043
(4/30/87)



ELECTRICAL SCHEMATIC, GRAVITY STEAM CONTROL WITH PRE-VACUUM (1 OF 3). (Units with Printcon)

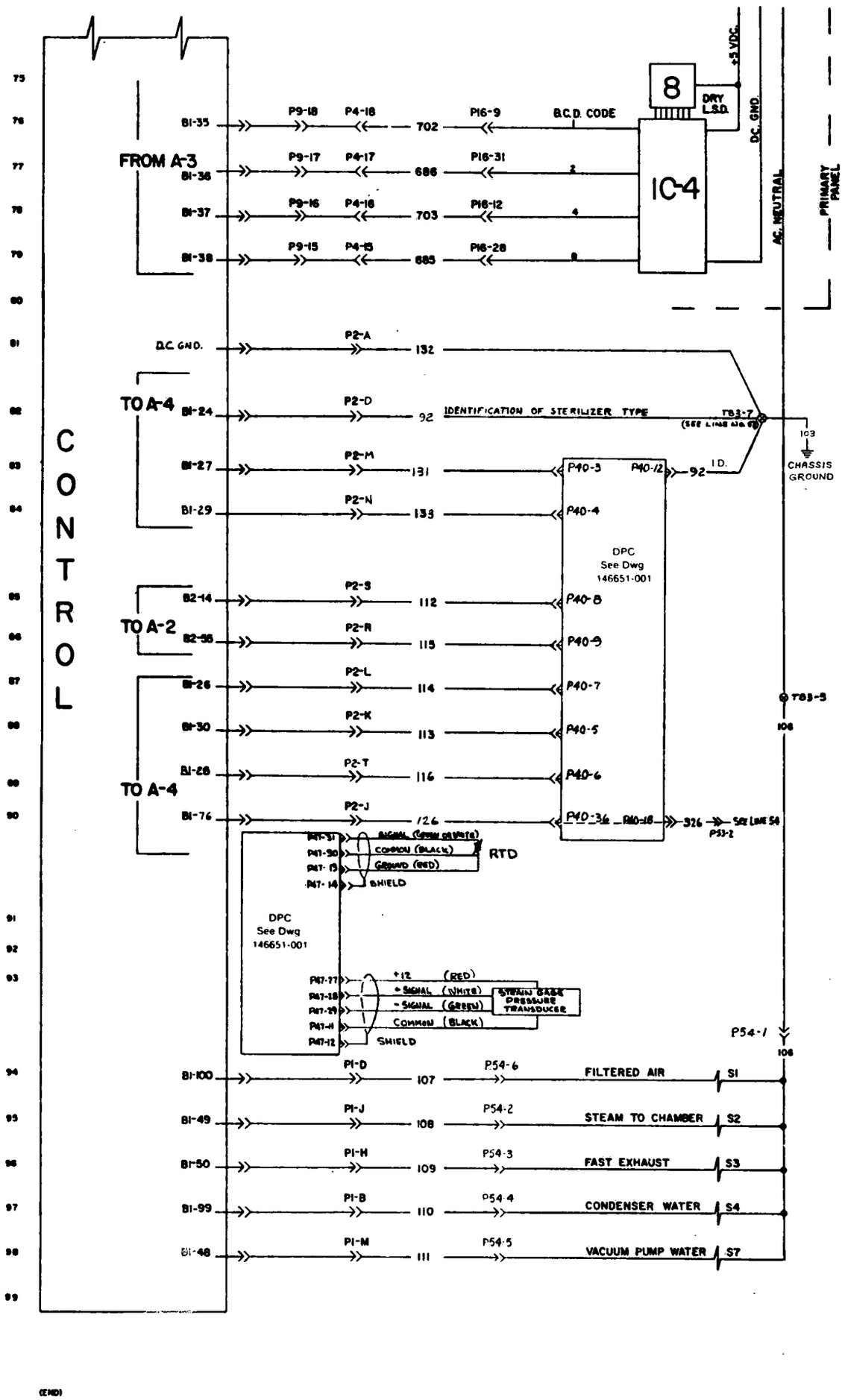
Rev. 8/87

DWG. NO. 146649-043
(4/30/87)



ELECTRICAL SCHEMATIC, GRAVITY STEAM CONTROL WITH PRE-VACUUM (2 OF 3). (Units with Printcon)

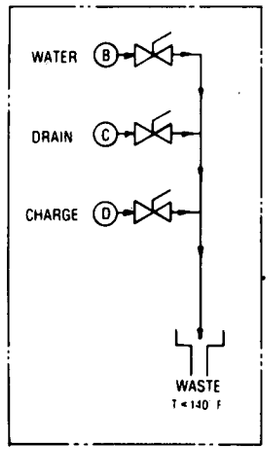
Rev. 8/87



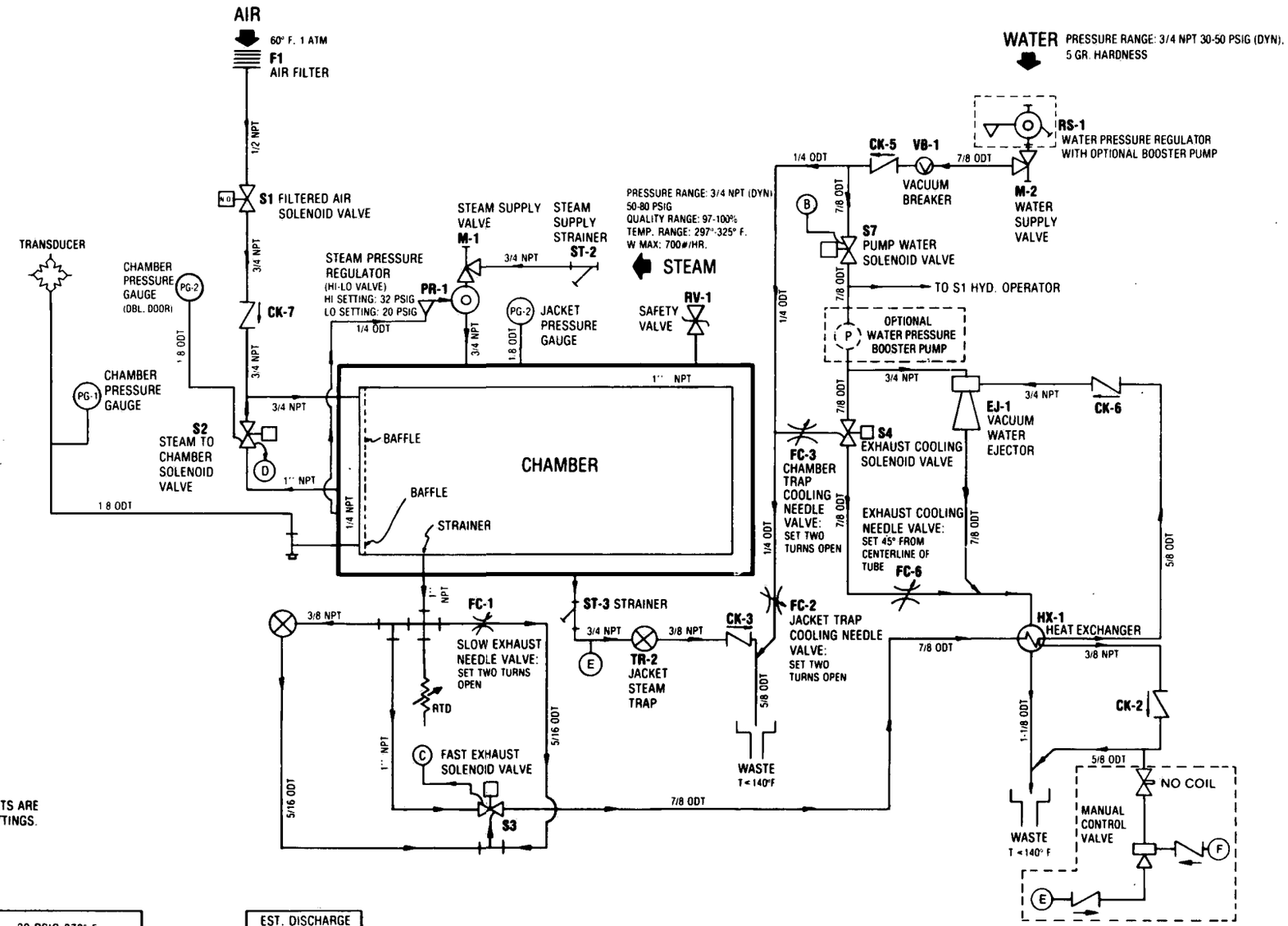
G-9

G-10

ELECTRICAL SCHEMATIC, GRAVITY STEAM CONTROL WITH PRE-VACUUM (3 OF 3).
(Units with Printcon)



MANUAL CONTROL VALVE



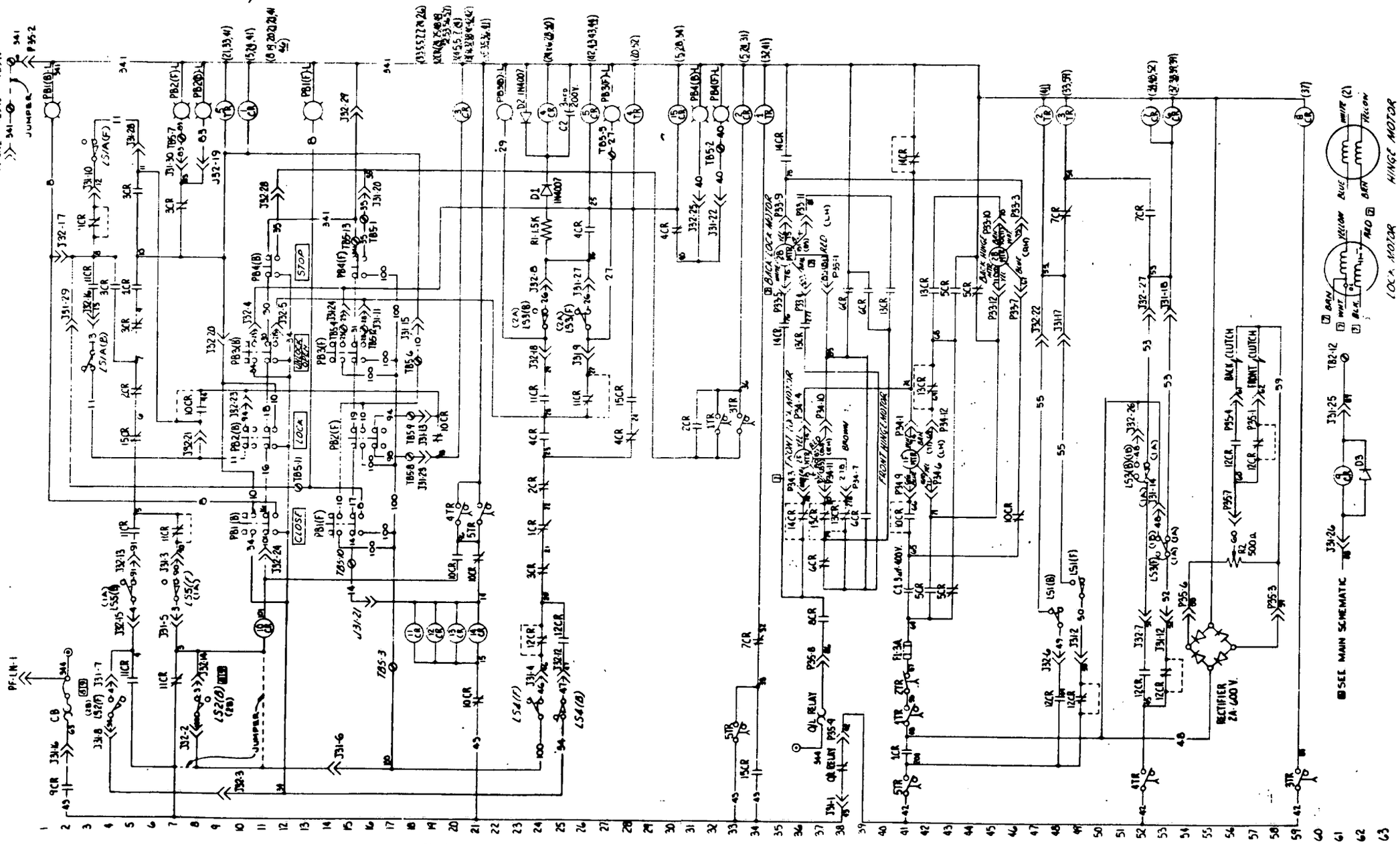
NOTE: ALL ADJUSTMENTS ARE NOMINAL FACTORY SETTINGS.

		17 PSIG-250° F		30 PSIG-270° F			EST. DISCHARGE TO 10" HG VAC.	
SHELL SIZE	VOL FT³	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	1.35#	<9.91	1.85#	<10.8	< 1.4 MIN	<13.93	<18.51
			<59.46 F.L.		<64.8 F.L.		<41.79F.L.	<55.53F.L.
24X36X48	24	1.80#	<13.22	2.50#	<14.4	< 1.92 MIN	<18.57	<24.68
			<79.32 F.L.		<86.4 F.L.		<55.71F.L.	<74.04F.L.
24X36X60	30	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
(Units with Printcon)

Rev. 2/86

DWG. NO. 146442



ELECTRICAL SCHEMATIC:
Optional Power Door (1 OF 2).
(Units with Indicator-Recorder)

Rev. 9/86

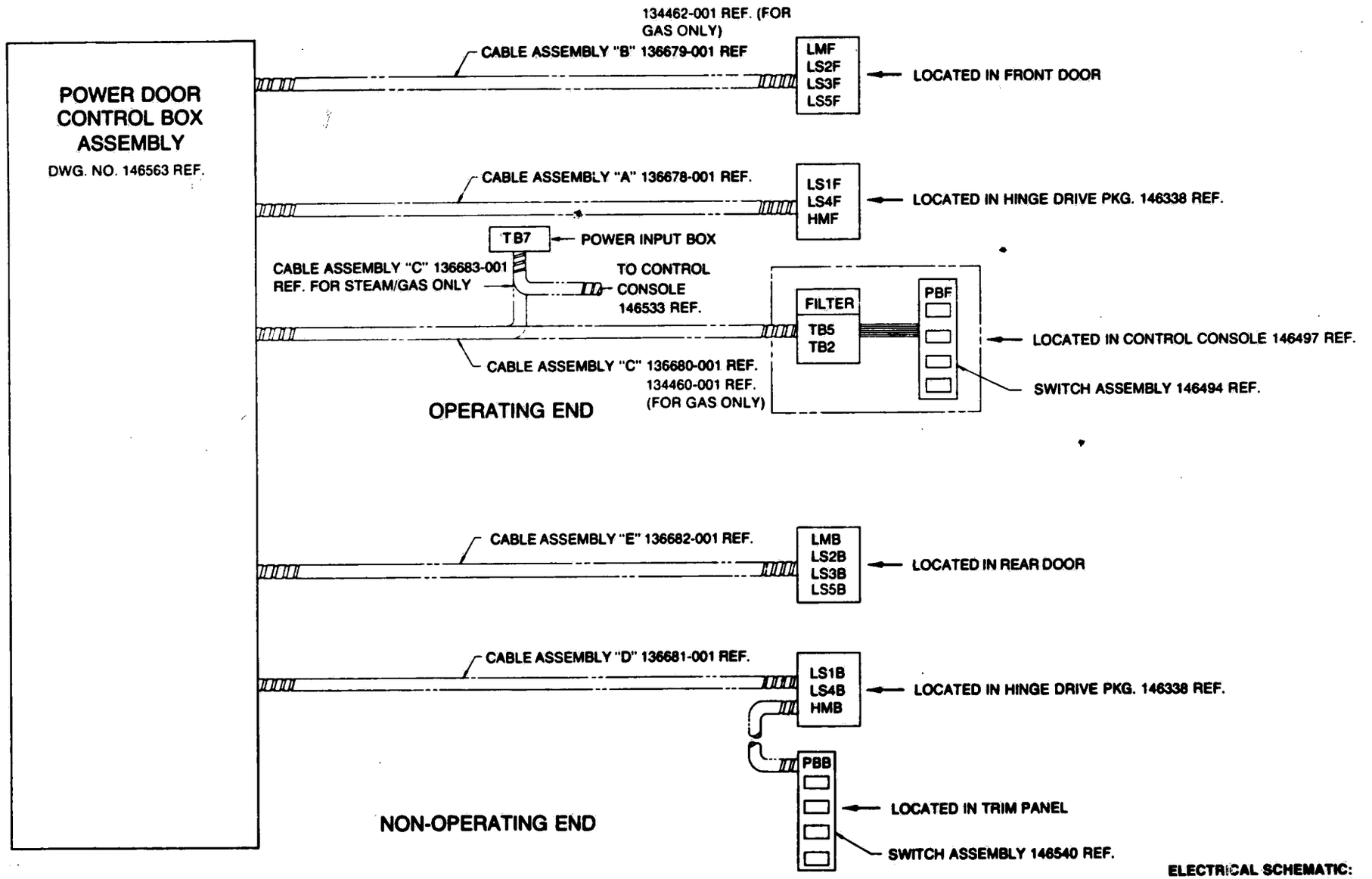
AMSCO SERVICE

EAGLE 2000 SERIES MEDIUM STERILIZERS
VACAMATIC
P-764086-002

8/87

2 of 5

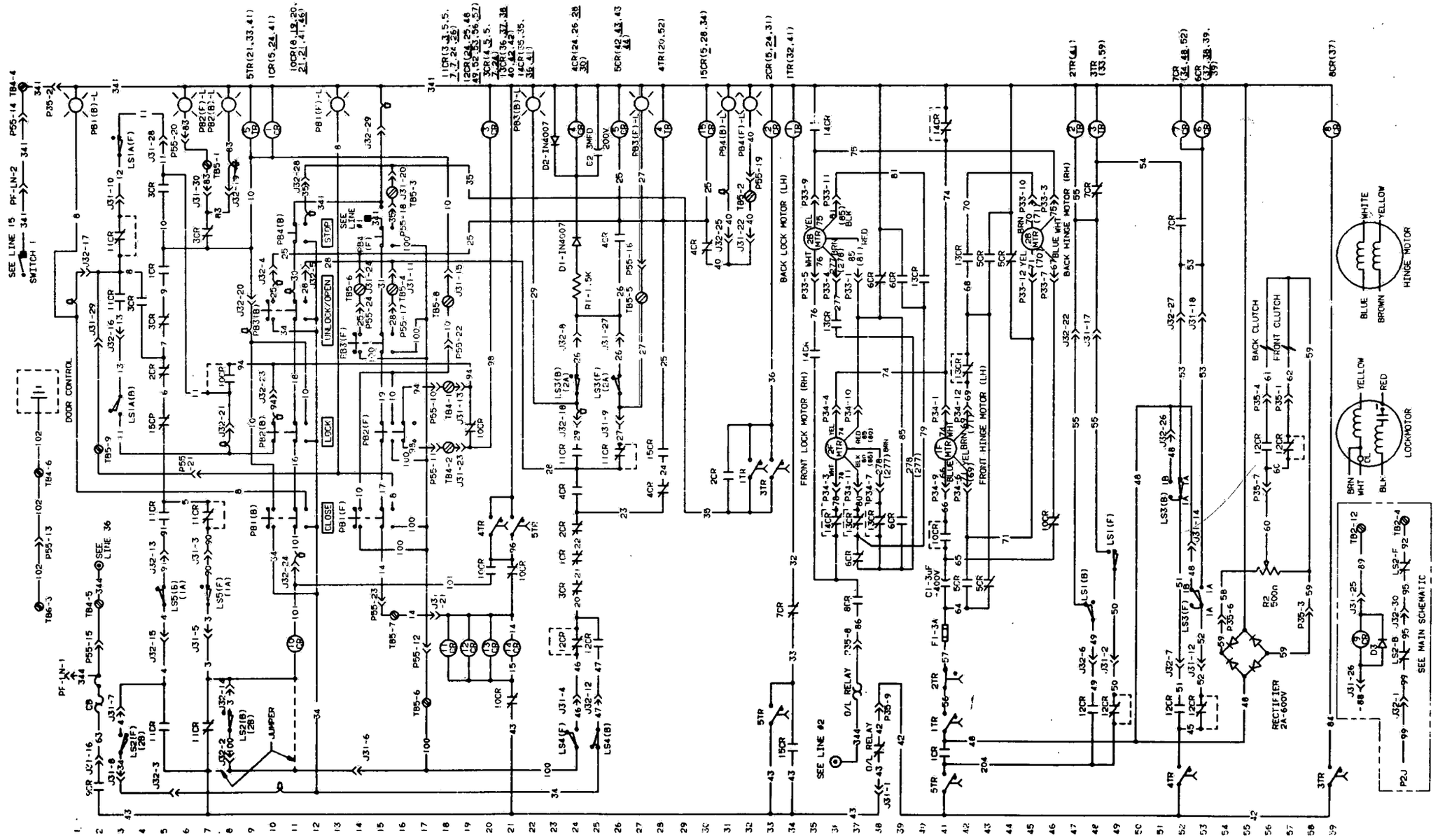
DWG. NO. 146442
(1/28/84)



ELECTRICAL SCHEMATIC:
Optional Power Door (2 OF 2).
(Units with Indicator-Recorder)

Rev. 5/84

DWG. NO. 141198-127
(4/11/85)



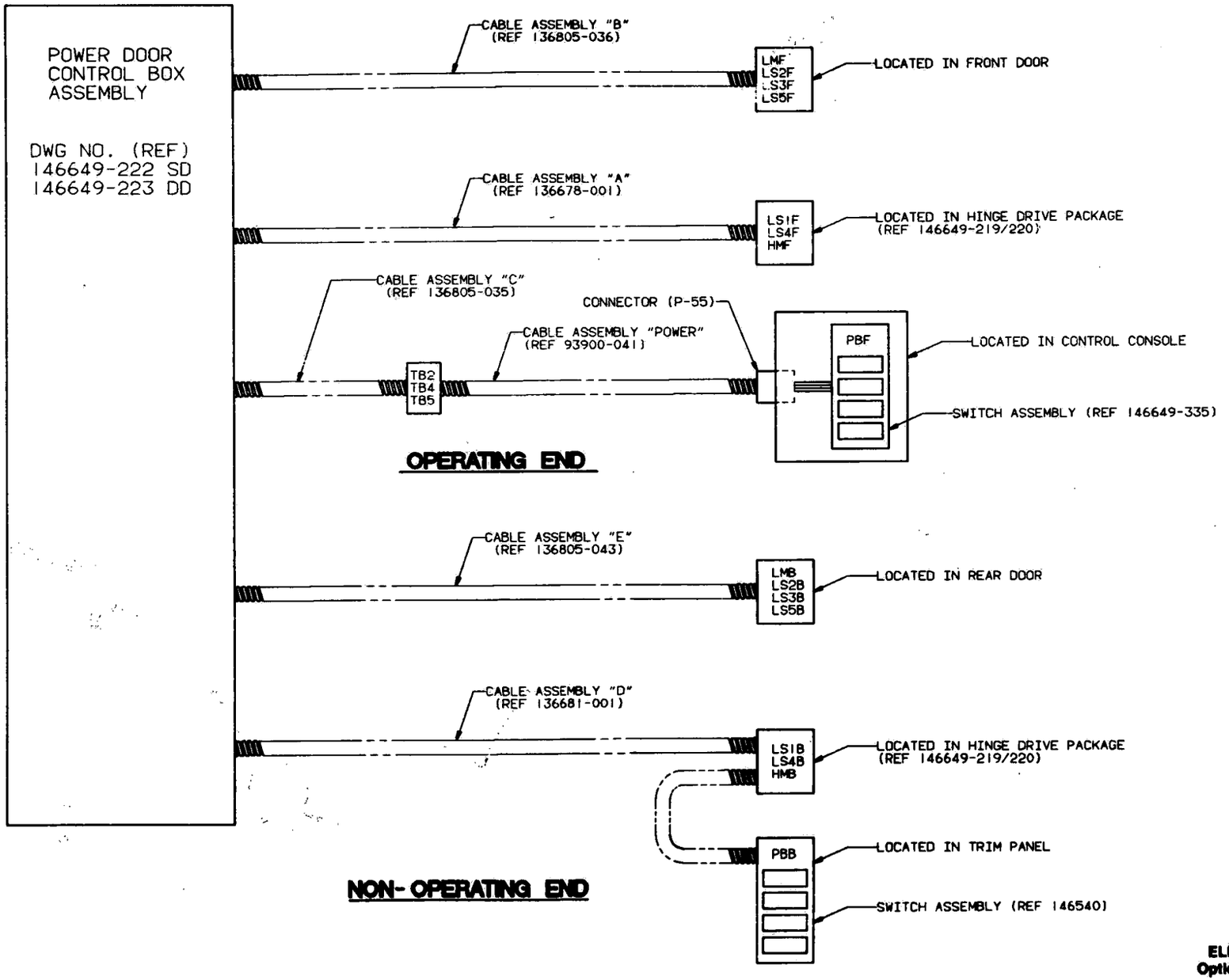
NOTES:
1. FOR SINGLE DOOR (001) REMOVE RELAYS 10CR, 11CR, 12CR, 13CR & 14CR -ADD JUMPERS AND DUMMY RELAYS TO 13CR & 14CR
2. ALL WIRES WITH THIS SYMBOL ⊗ ARE WIRE NUTTED IN N.O.E. HINGE MOTOR COVER. INCLUDING WIRES 341, 10, 11, 8, 28, 29, 34, 35, 40, 83, 94, 101 & 25

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

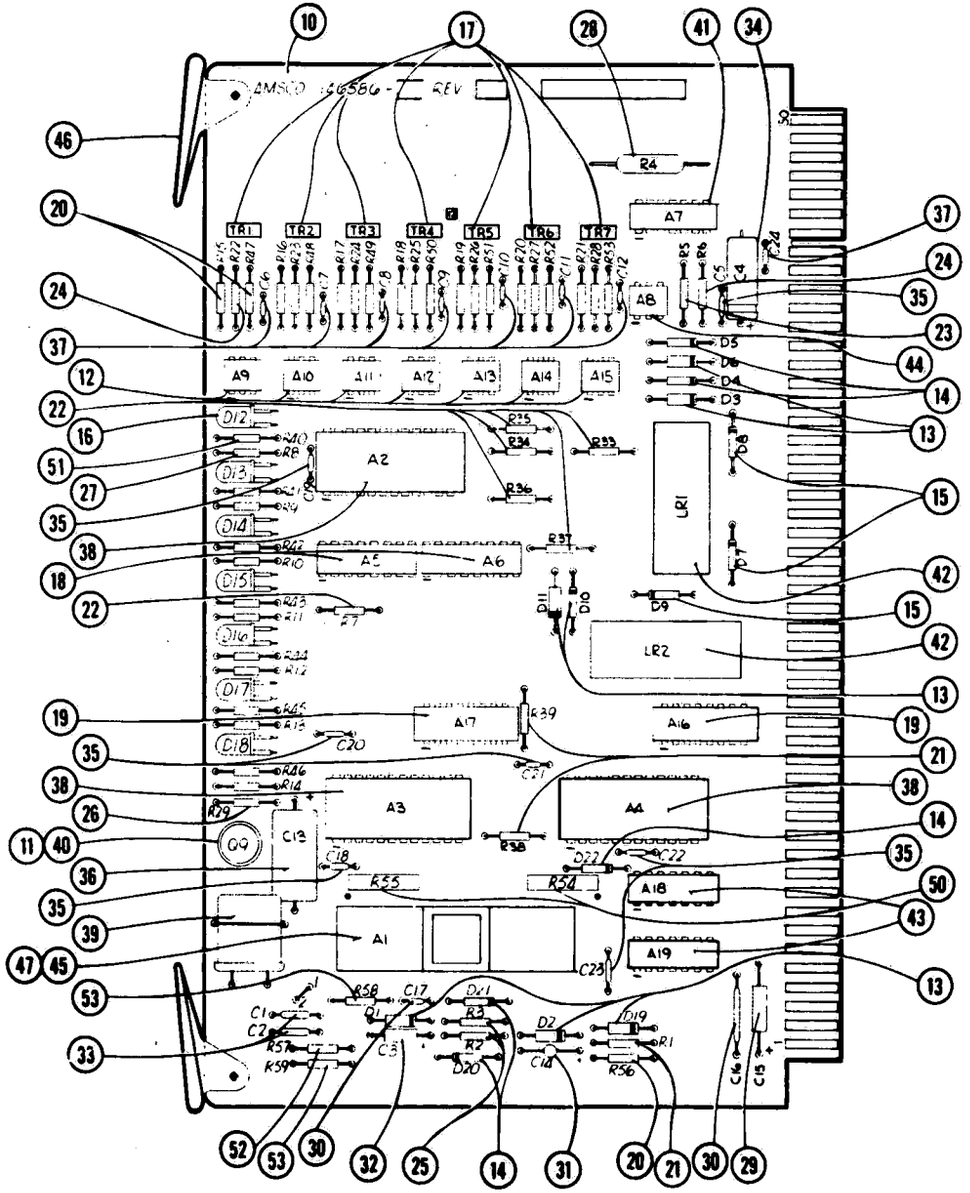
DWG. NO. 141198-127
(4/11/85)



ELECTRICAL SCHEMATIC:
Optional Power Door (2 OF 2).
(Units with Printcon)

Add. 9/86

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

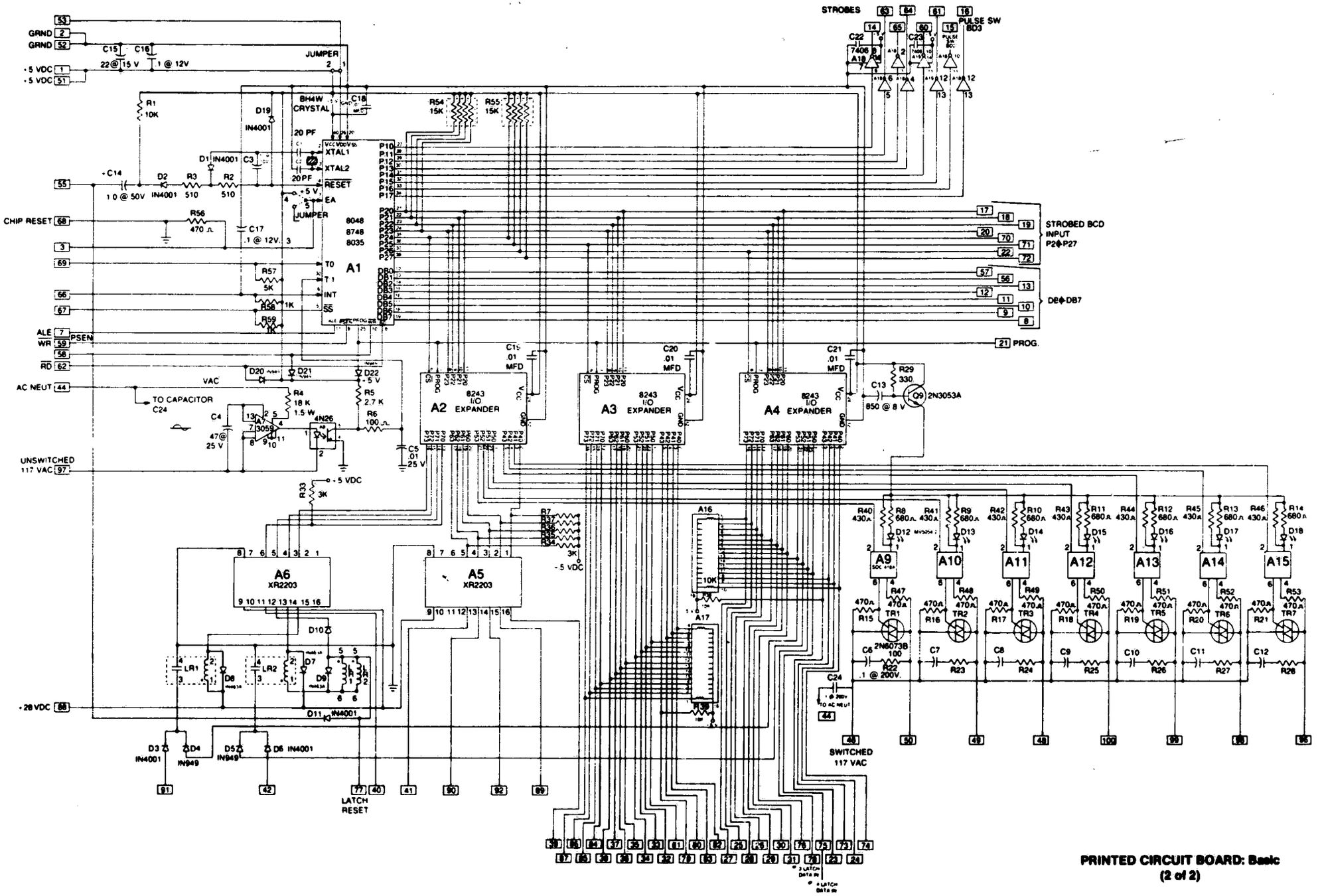


QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
1	10	P/C CARD & DRILL ASSY.	
1	11	PAD, TRANSISTOR	
7	12	IC SOC 418 A	TRIAC DRIVER A9-A15
7	13	RECTIFIER, IN4001	D1, D2, D3, D6, D10, D11, D19
5	14	DIODE, IN949	D4, D5, D20-D22
3	15	RECTIFIER, IN463A	D7, D8, D9
7	16	LAMP, SOLID STATE	MV 5054-2 L.E.D., D12-D18
7	17	TRIAC, 2N6073B	TR1-TR7
2	18	TRANSISTOR, XR2203	DARLINGTON - A5, A6
2	19	RESISTOR, NETWORK	916C103X2PE A16, A17
15	20	RESISTOR	470 OHMS 1/4W 5% CARBON, R15-R21, R47-R53, R56
3	21	RESISTOR	10K 1/4W 5% CARBON, R1, R38, R39
6	22	RESISTOR	3K 1/4W 5% CARBON, R7, R33-R37
1	23	RESISTOR	2.7K 1/4W 5% CARBON, R5
8	24	RESISTOR	100 OHMS 1/4W 5% CARBON, R6, R22-R28
2	25	RESISTOR	510 OHMS 1/4W 5% CARBON, R2, R3
1	26	RESISTOR	330 OHMS 1/4W 5% CARBON, R29
7	27	RESISTOR	680 OHMS 1/4W 5% CARBON, R8-R14
1	28	RESISTOR	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. 11/83

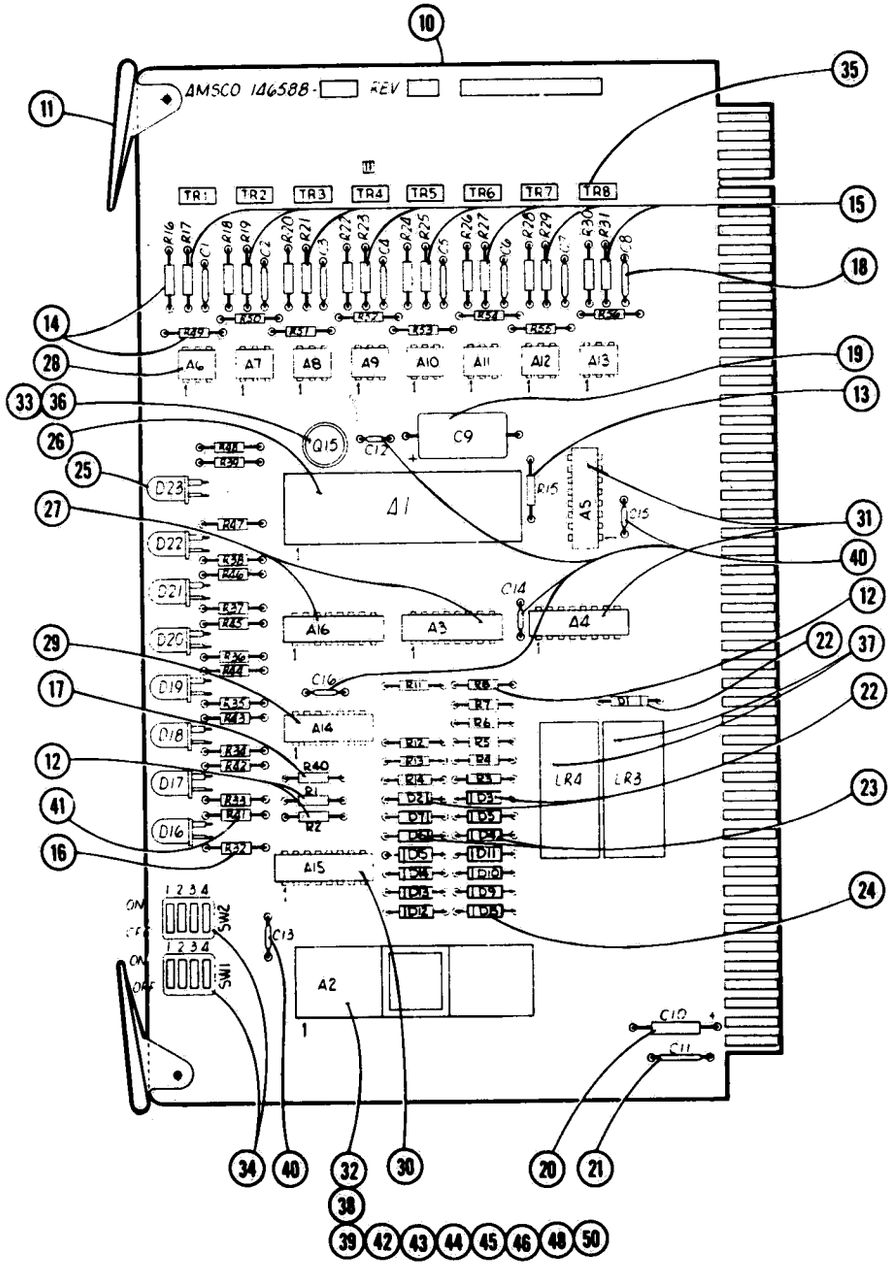
DWG. NO. 146586
(10/15/82)



PRINTED CIRCUIT BOARD: Basic (2 of 2)

Rev. 11/83

DWG. NO. 146588
(7/29/86)

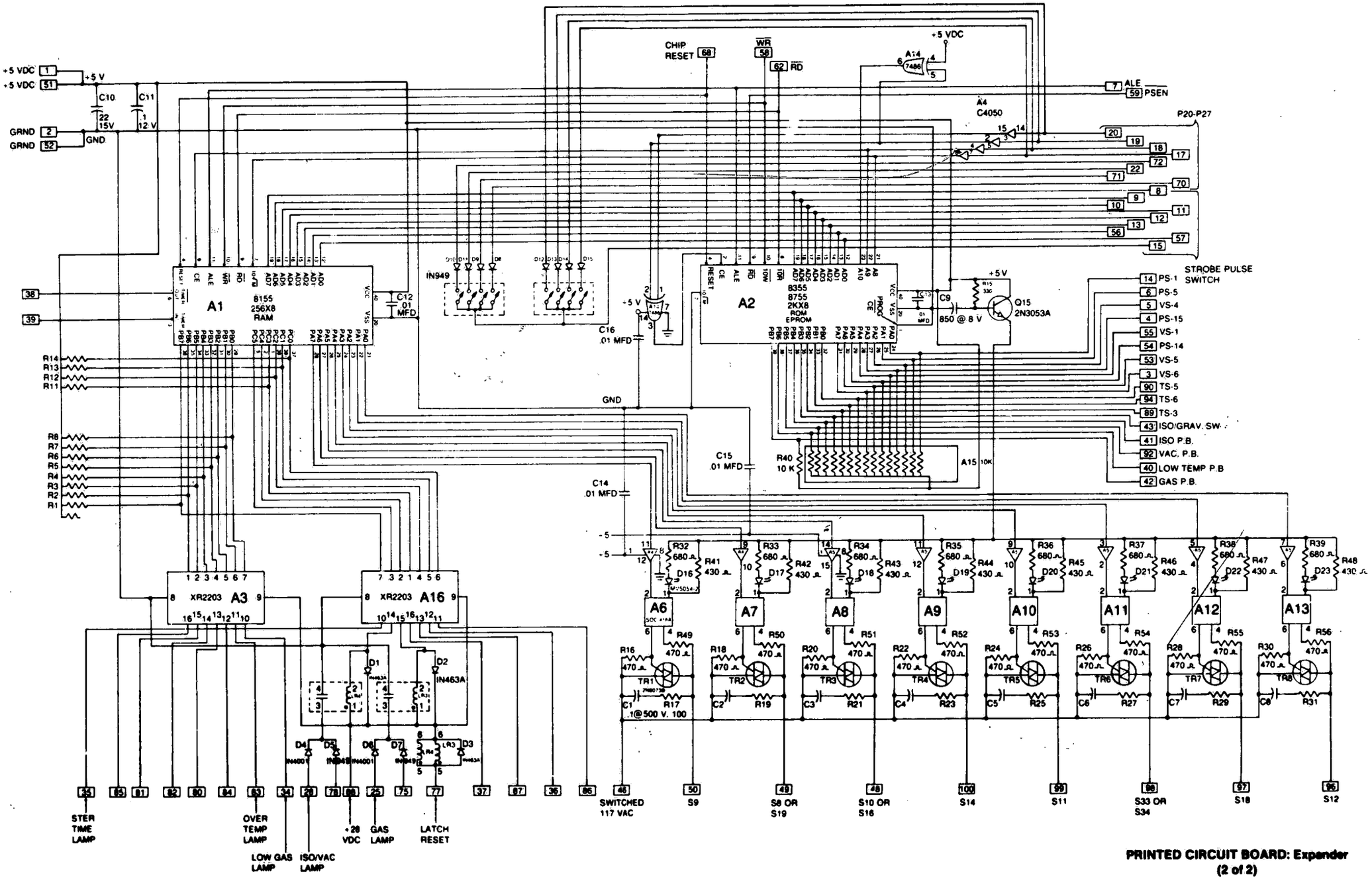


QTY.											ITEM NO.	NAME	DESCRIPTION, MATERIAL
										X	1	P/C CARD ASSY.	VAC & GAS
									X		2	P/C CARD ASSY.	PULSTAR 2000(CRW),PULSTAR 3000(HCW)
								X			3	P/C CARD ASSY.	EAGLE 2200
							X				4	P/C CARD ASSY.	PULSTAR 5000
						X					5	P/C CARD ASSY.	
					X						6	P/C CARD ASSY.	
				X							7	P/C CARD ASSY.	
			X								8	P/C CARD ASSY.	
1	1	X	1	1	1	1	1	1	1	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)

Rev. 5/87

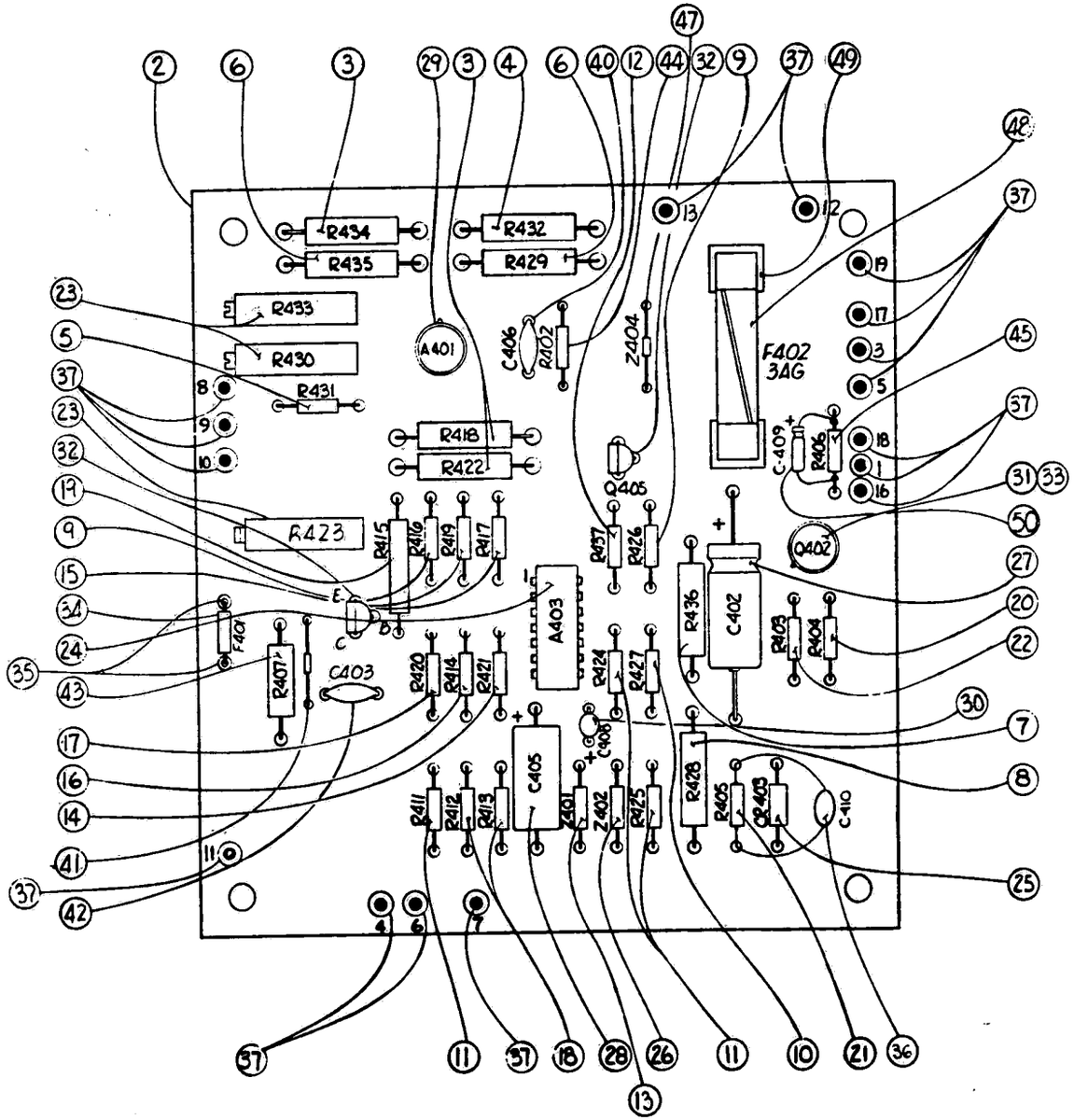
DWG. NO. 146588
(7/29/86)



PRINTED CIRCUIT BOARD: Expander (2 of 2)

Rev. 5/87

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



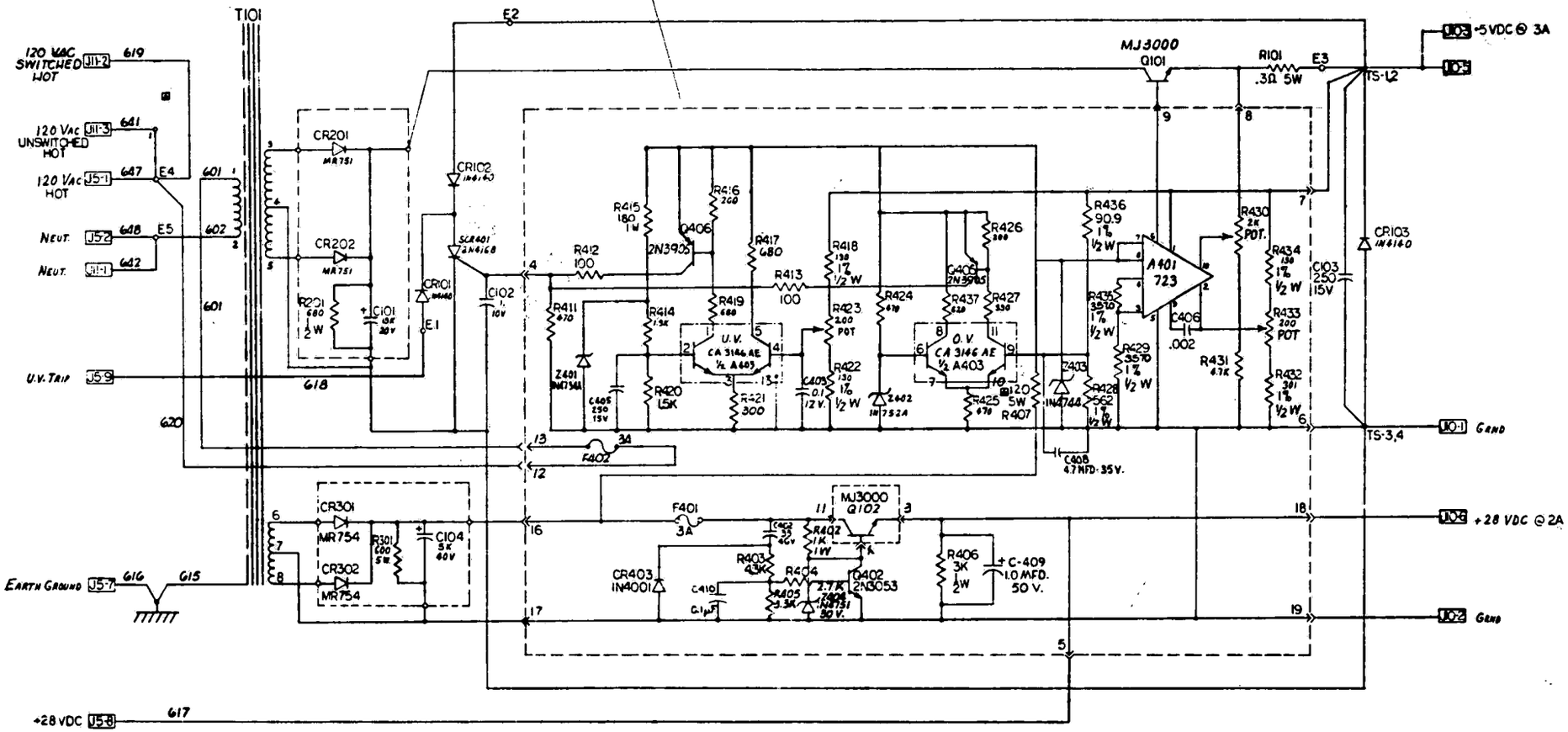
QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	2	P/C CARD	
1	3	RESISTOR, 130 OHMS	1% 1/2 W.M.F., R434
1	4	RESISTOR, 301 OHMS	1% 1/2 W.M.F., R432
1	5	RESISTOR, 47K OHMS	5% 1/4 W.C.C., R431
2	6	RESISTOR, 750 OHMS	1% 1/2 W.M.F., R429, R435
1	7	RESISTOR, 9.09 OHMS	1% 1/2 W.M.F., R436
1	8	RESISTOR, 562 OHMS	1% 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

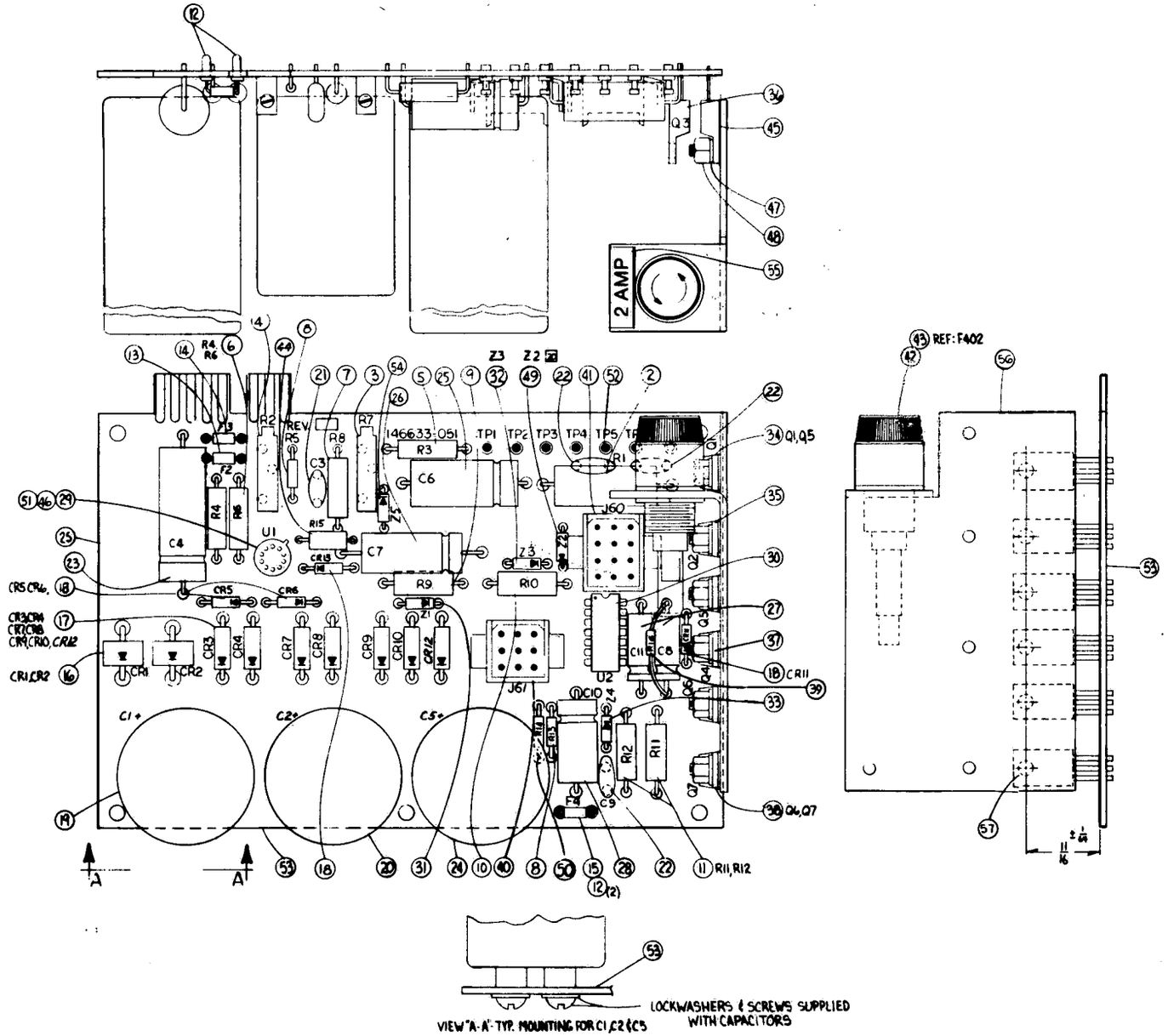
DWG. NO. 146599
(7-22-86)

NOTE:
1. ALL RESISTORS ¼ W UNLESS OTHERWISE NOTED



P/C ASSEMBLY, Power Supply (Part 2 of 2)
(Units with Indicator-Recorder)

DWG. NO. 146633-051
(91/32/71)



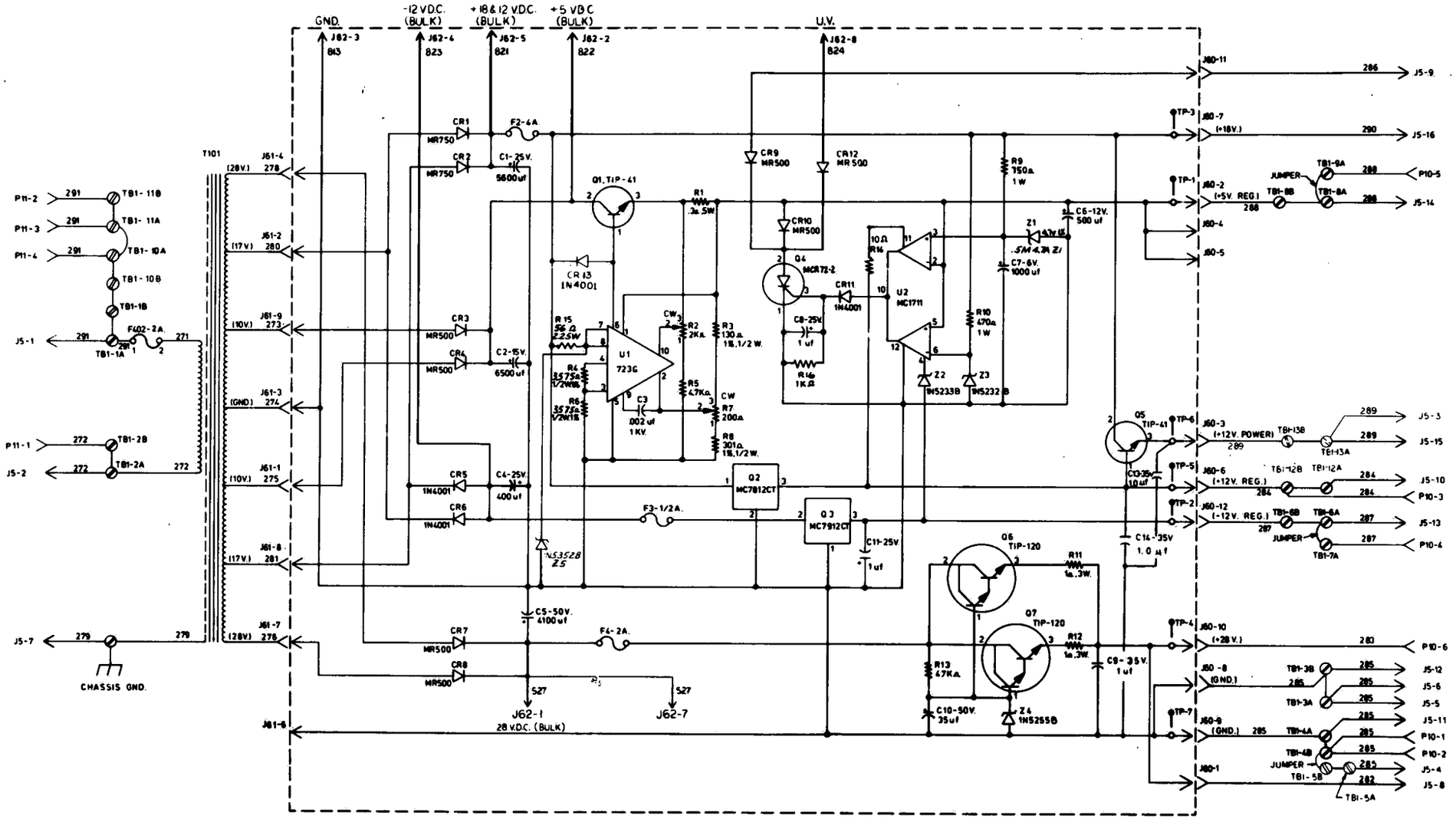
VIEW "A-A" TYP. MOUNTING FOR C1, C2 & C5

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

P/C ASSEMBLY, Power Supply
(Part 1 of 2)
(Units with Printcon)

Rev. 7/87

DWG. NO. 146633-051
(9/30/71)



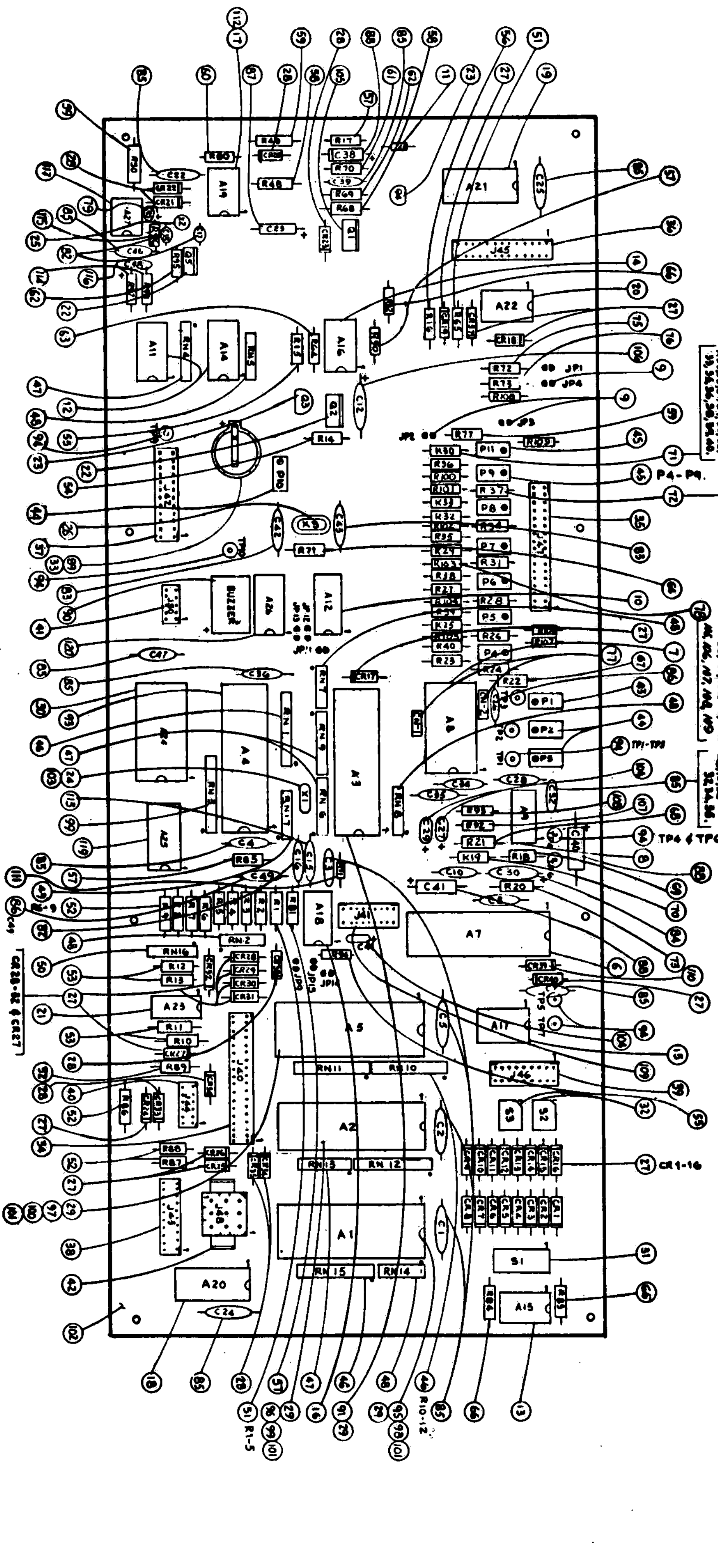
UNLESS OTHERWISE NOTED, ALL RESISTORS ARE 1/4 WATT.

P/C ASSEMBLY, Power Supply
(Part 2 of 2)
(Units with Printcon)

Rev. 7/87

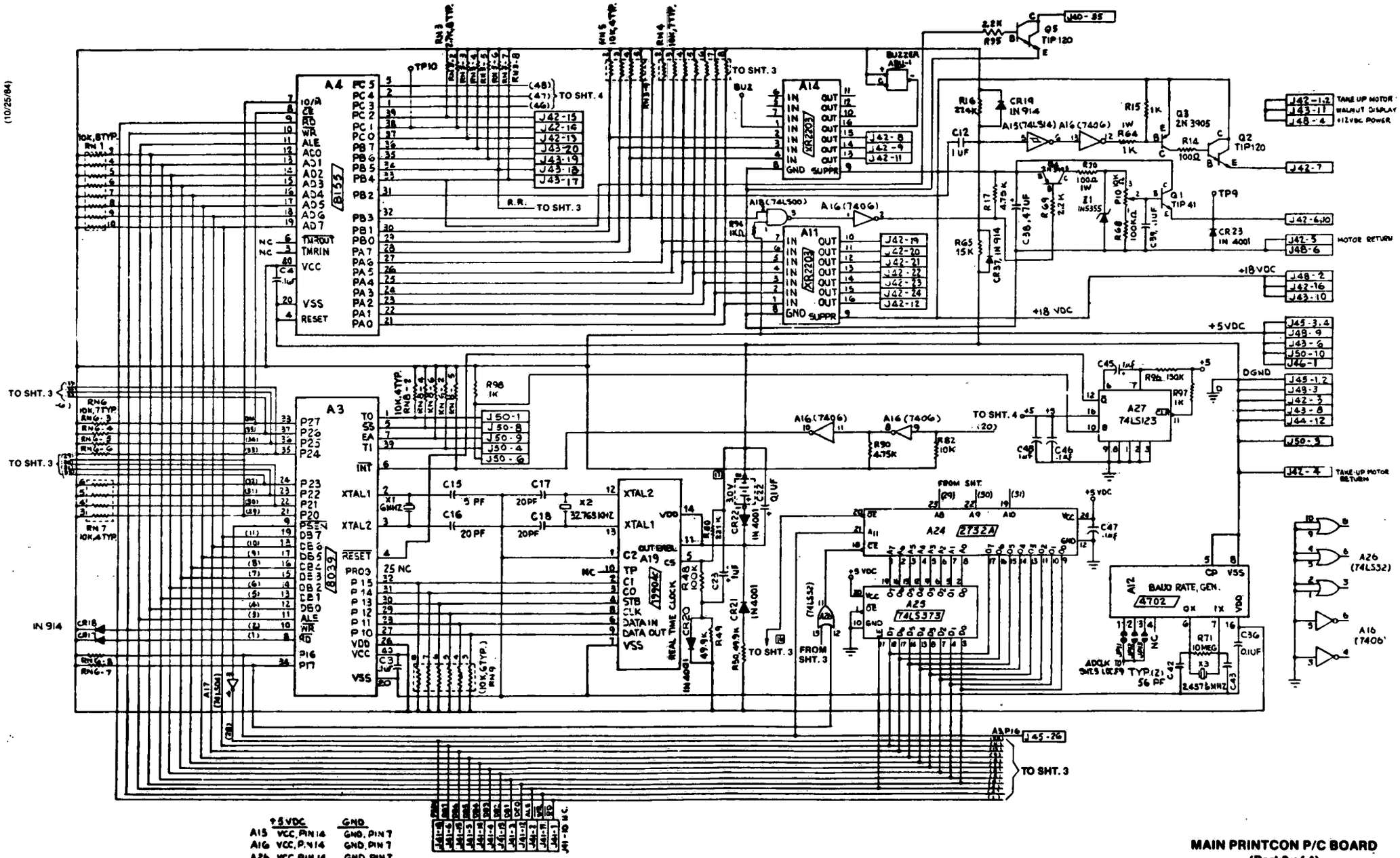
Rev. 7/87

QTY	ITEM NO	PART NAME	DESCRIPTION MATERIAL
4		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	HD3-4702-9 BIT RATE GEN (A12)
1	11	ZENER DIODE	IN5355 18V ZENER (Z1)
2	12	18 PIN DIP IC	XR2203 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	DM81LS95N 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 3905 (PNP), Q3 & Q4
1	24	CRYSTAL	6.0 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, 38
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 230002 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 (J46)
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 (J48)
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)
5	46	RESISTOR NETWORK	10KΩ, 9 RESISTOR SIP (RN 1, 10, 11, 12 & 15)
4	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 & R85)
8	52	RESISTOR	332KΩ, 1% MF 1/8 W (R6-R9 & R86-89)
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) (R94)
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 (R48 & R68)
3	59	RESISTOR	49.9KΩ, 1% MF 1/8 W (R 49 & R50 & R77)
1	60	RESISTOR	221KΩ, 1% MF 1/8 W (R90)
1	61	RESISTOR	100Ω 5% 1W (R70)
2	62	RESISTOR	2.2KΩ, 1% MF 1/4 W (R69, 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, 36, 38, 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 C1-5, C7, C8, C10, C22, C24, C25, C28, C32, C34-C36, C39, C46, C47
2	86	CAPACITOR	.01µF 25V CERAMIC C26, C49
1	87	CAPACITOR	1µF 50V ALUMINUM (C23)
3	88	CAPACITOR	47µF 35V ALUMINUM C38, C40 & C41
1	89	BATTERY	MEMORY BACKUP 150822-351
1	90	BUZZER	5VDC
1	91	40 PIN DIP IC	P8039-6 CPU (A3)
	92	NOT USED	
1	93	40 PIN DIP IC	P8156, RAM & I/O (A4)
9	94	TEST POINT	(TP1-TP7, TP8, TP10)
1	95	40 PIN DIP IC	8355/8755 ROM EAGLE 2000 A1
1	96	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 (IN5713) SCHOTTKY CR39
2	111	RESISTOR	470Ω, 1/4 W, 5% C.C. (R91) (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. (R97, R98)
1	115	RESISTOR	150KΩ, 1/4 W, C.C. (R96)
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)

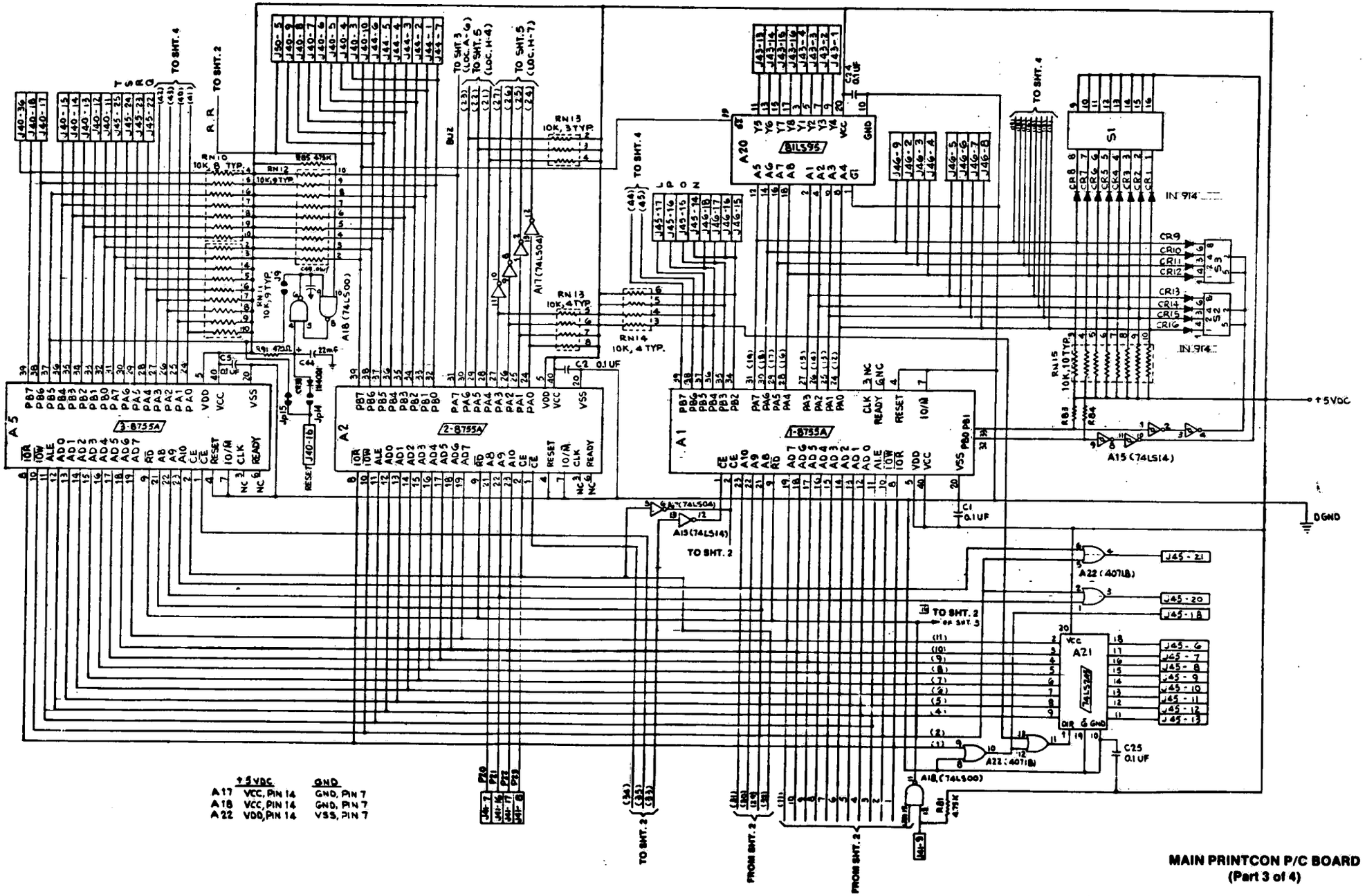
DWG NO. 146851-001
(10/25/84)



MAIN PRINTCON P/C BOARD
(Part 2 of 4)

Rev. 7/87

DWG NO. 146651-001
(10/25/84)



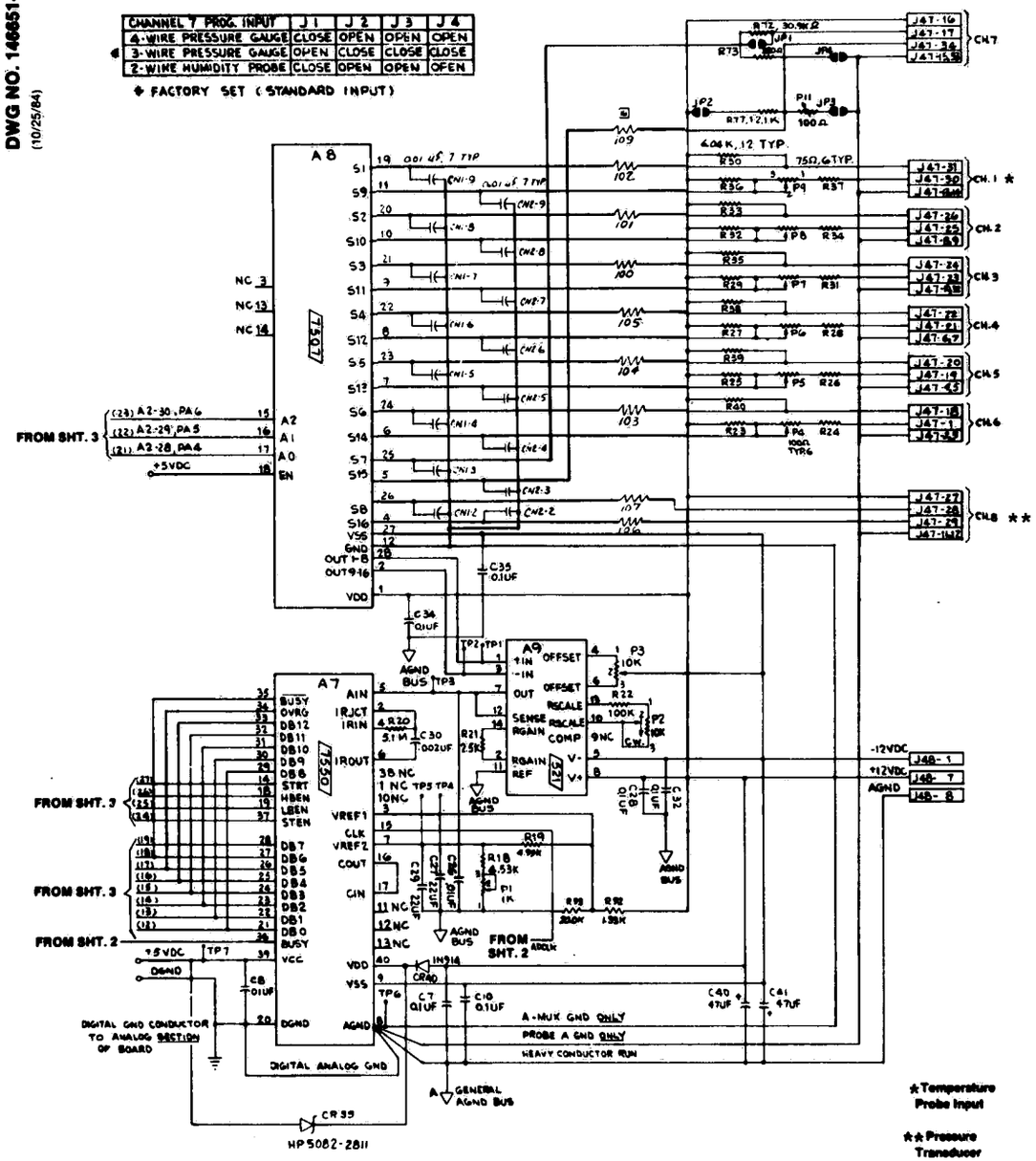
MAIN PRINTCON P/C BOARD
(Part 3 of 4)

Rev. 7/87

DWG NO. 146651-001
(10/25/84)

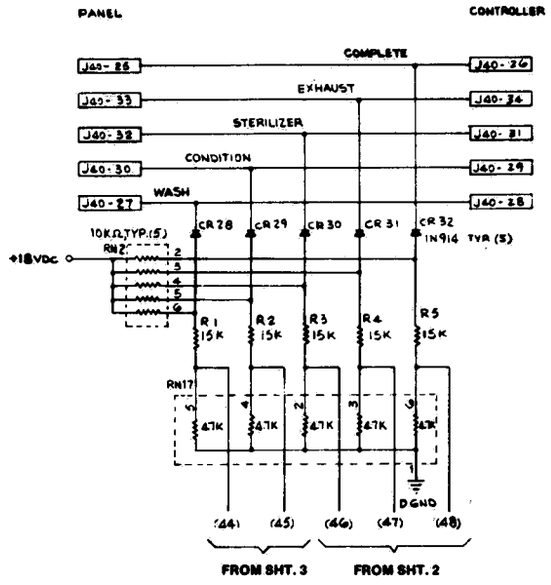
CHANNEL 7 PROG. INPUT	J1	J2	J3	J4
4-WIRE PRESSURE GAUGE	CLOSE	OPEN	OPEN	OPEN
3-WIRE PRESSURE GAUGE	OPEN	CLOSE	CLOSE	CLOSE
2-WIRE HUMIDITY PROBE	CLOSE	OPEN	OPEN	OPEN

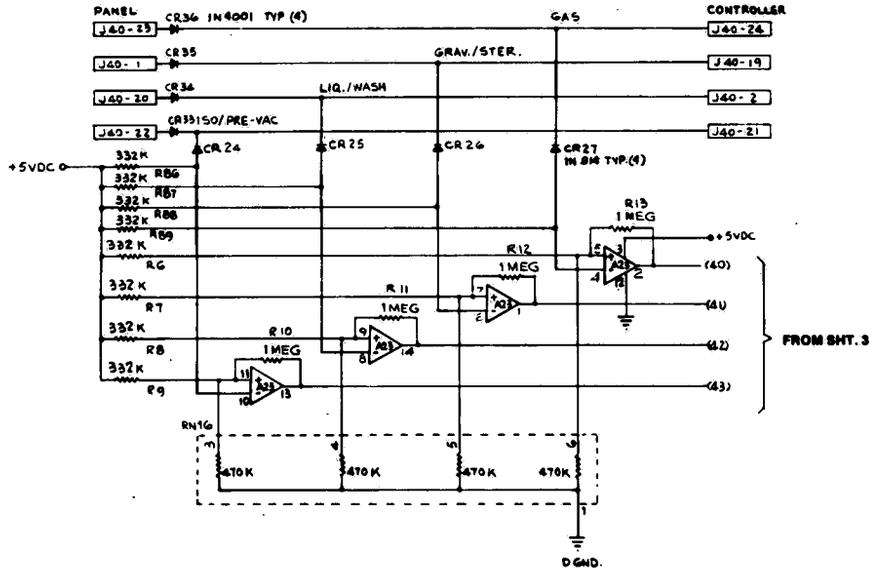
◆ FACTORY SET (STANDARD INPUT)



Rev. 7/87

C-1

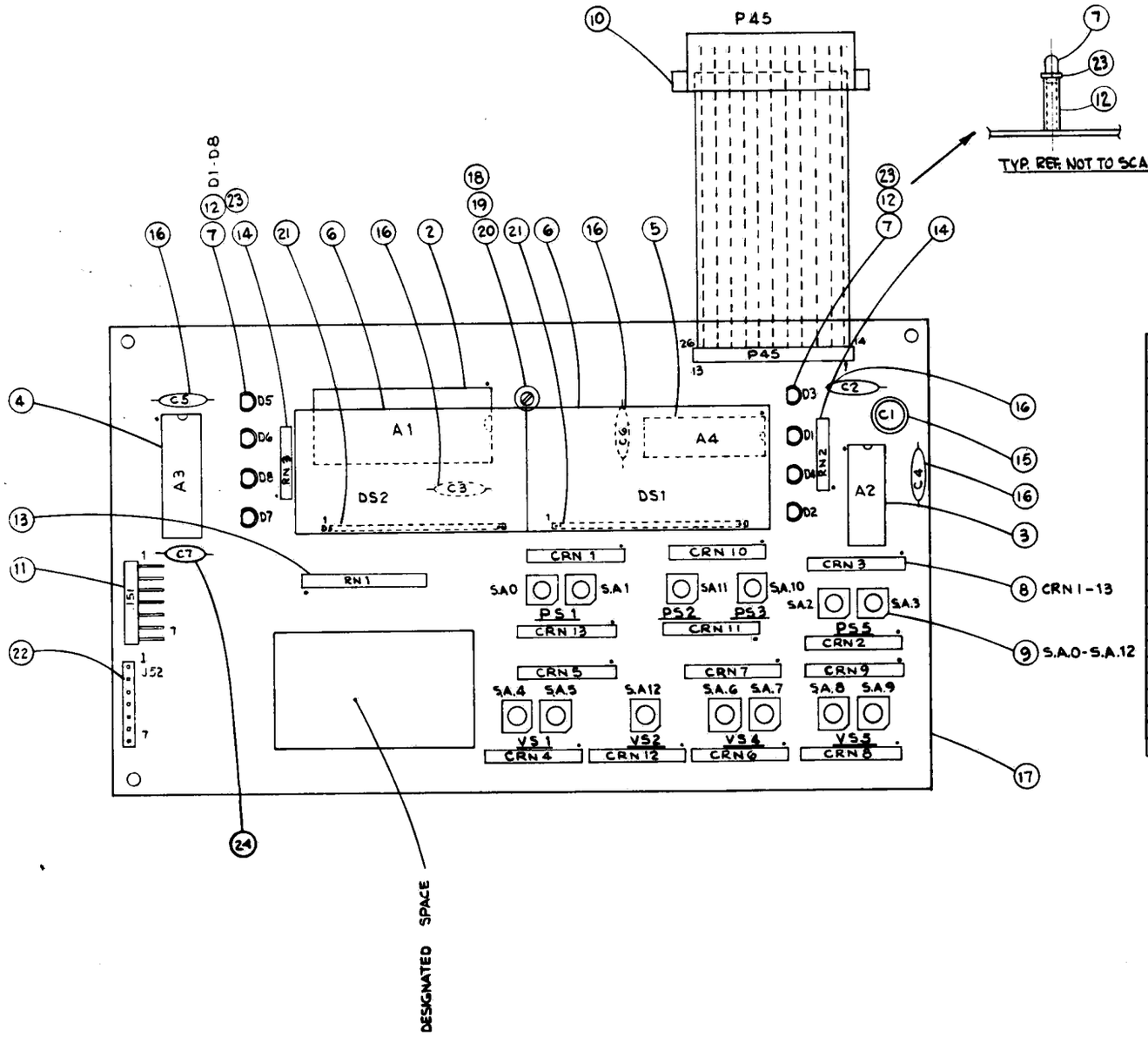




MAIN PRINTCON P/C BOARD
(Part 4 of 4)

C-2

DWG. NO. 146633-081
(10/25/84)

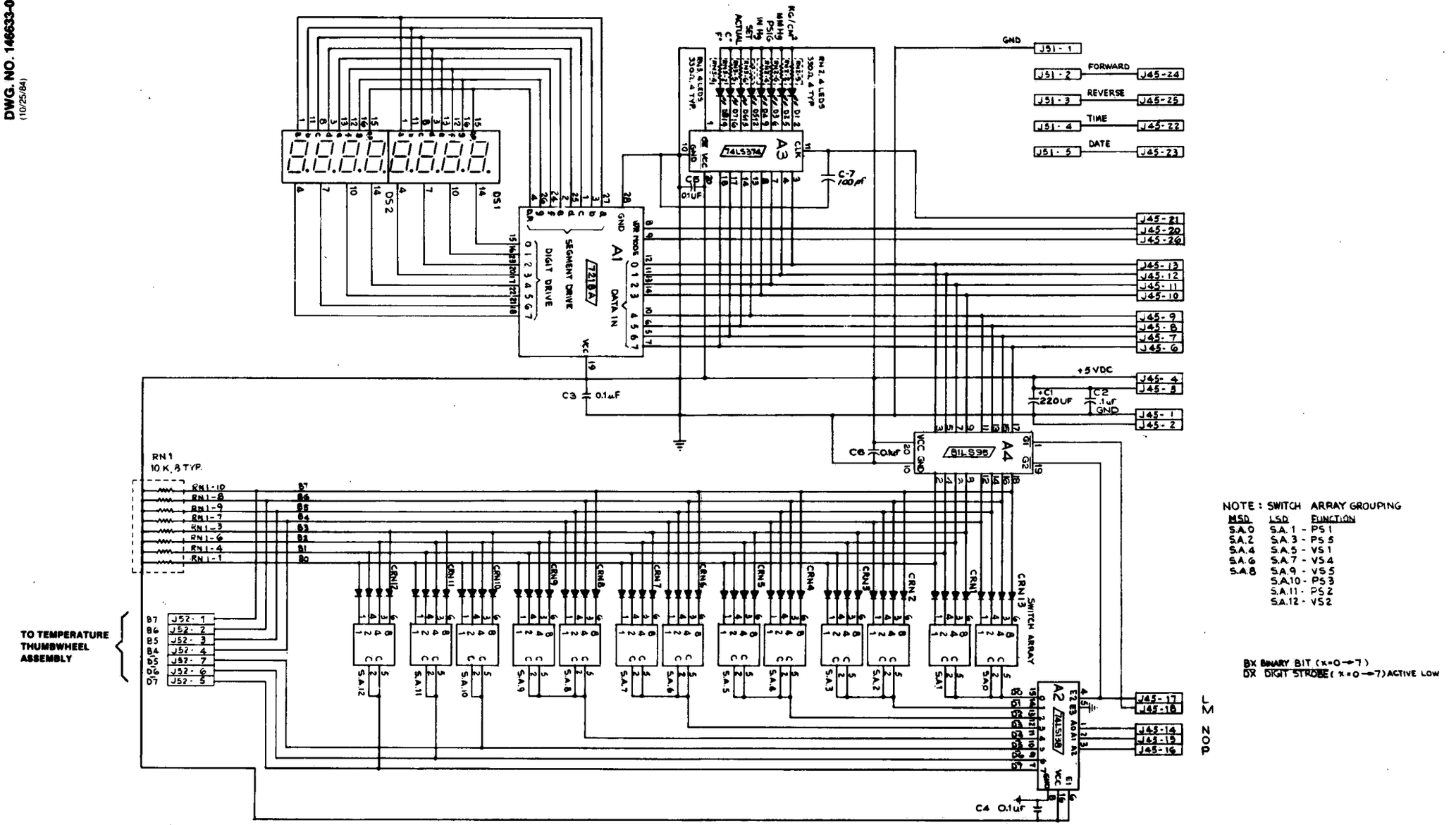


QTY.	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL
X	1	DIGITAL PRINTER	DISPLAY BOARD
1	2	28 PIN DIP IC	7218A, 8 DIGIT 7 SEG. DISPLAY DRIVER (A1)
1	3	16 PIN DIP IC	74 LS 138 DECODER/MULTIPLEXER (A2)
1	4	20 PIN DIP IC	74LS374 OCTAL D-TYPE LATCH (A3)
1	5	20 PIN DIP IC	8ILS 95 TRI-STATE OCTAL BUZZER (A4)
2	6	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	9" (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. 7/87

DWG. NO. 146633-001
(10/25/84)



NOTE : SWITCH ARRAY GROUPING

MSD	LSD	FUNCTION
S.A.0	S.A. 1 -	PS1
S.A.2	S.A. 3 -	PS 5
S.A.4	S.A.5 -	VS1
S.A.6	S.A.7 -	VS4
S.A.8	S.A.9 -	VS5
	S.A.10 -	PS3
	S.A.11 -	PS2
	S.A.12 -	VS2

BX BINARY BIT (x=0→7)
DX DIGIT STROBE (x=0→7) ACTIVE LOW

JM 202

PRINTCON DIGITAL DISPLAY PC/BOARD (Part 2 of 2)

Rev. 7/87

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	"	TB3-3	"	
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-	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)

Rev. 9/86

DWG. NO. 150822-264
(1-28-84)

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 CABLE "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	

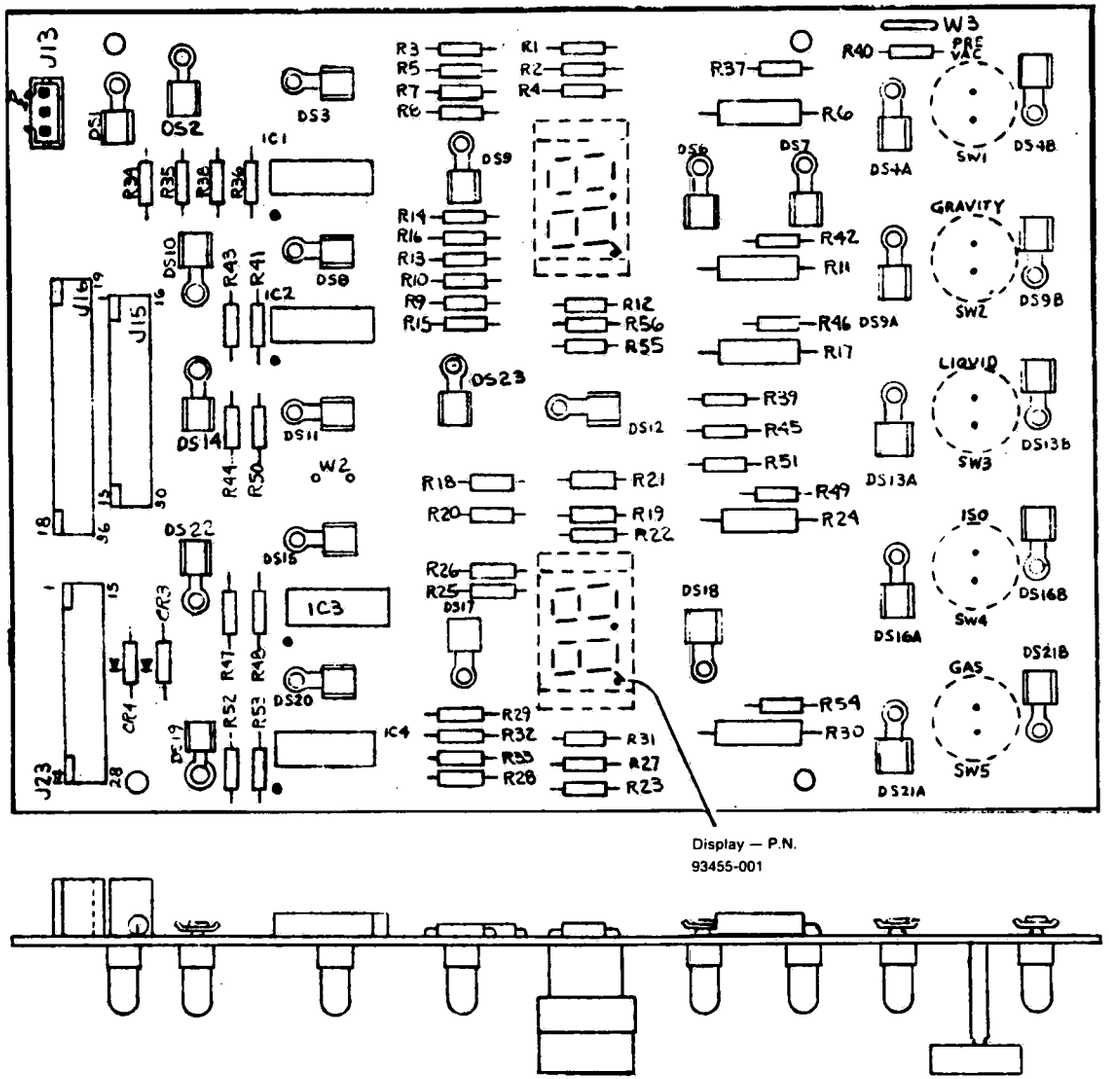
WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
43	"	J31-1	SCREW CLAMP	O/L-Relay	"	
46	RED	J31-4	"	LS4-NC(F)	QUICK-CONN	THRU CABLE "A"
47	"	J32-12	"	LS4-COM(B)	"	THRU CABLE "D"
48	YELLOW	J31-14	"	LS3F-NO1B	RING TERM	" " "B"
48	"	J32-26	"	LS3B-NO1B	"	" " "E"
49	"	J32-6	"	LS1-COM(B)	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. 2F	" -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 2F	" -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	"	LS5F-NC1A	"	" " "B"
91	"	J32-13	"	LS5B-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	P34-6	PIN-MALE	HINGE MTR 2F WHT.,GRN. OR BLUE	SPLICE-CONN	" " "E"
278	BLUE	P34-7	PIN-MALE	HINGE MTR 2B WHT., GRN OR BLUE	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

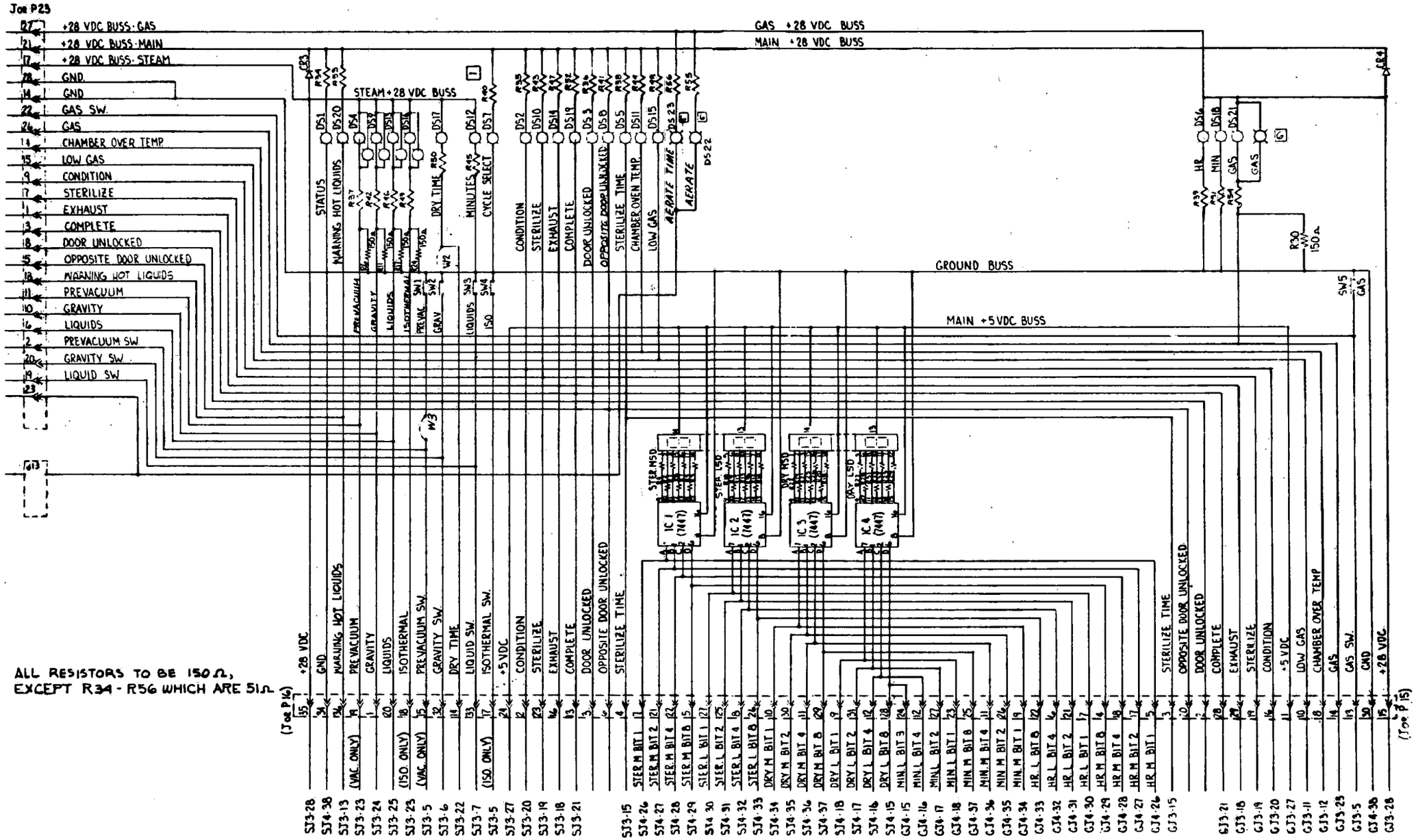
DWG. NO. 134468-444
(91/32/97)



PRIMARY PANEL SCHEMATIC (PC Board)
Operating End (Part 1 of 2)

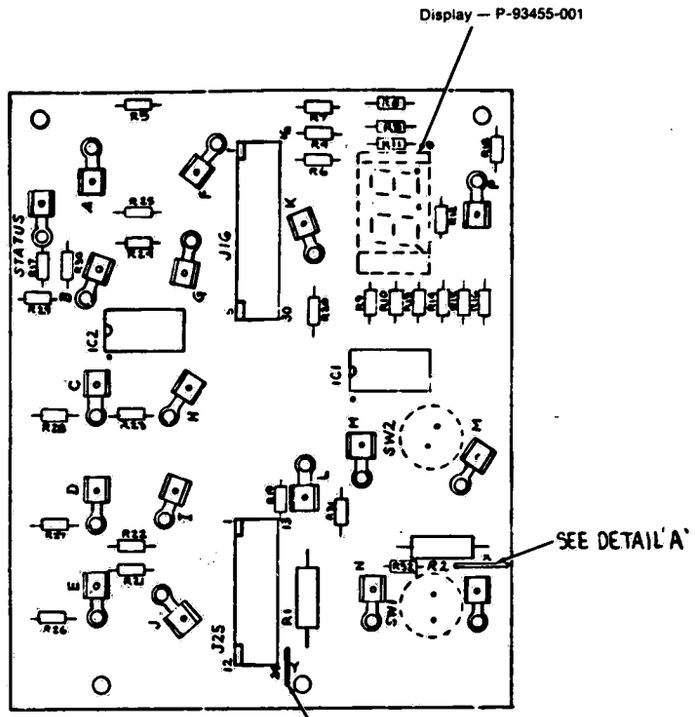
Rev. 7/87

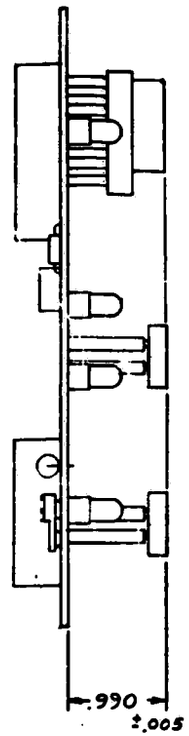
DWG. NO. 134468-444
(91/32/87)

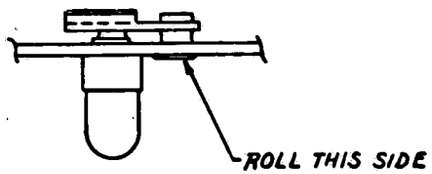


Rev. 7/87

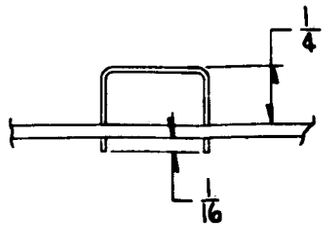
DWG. NO. 136640-001
(5/28/84)







ENLARGED VIEW
OF LAMP MOUNTING

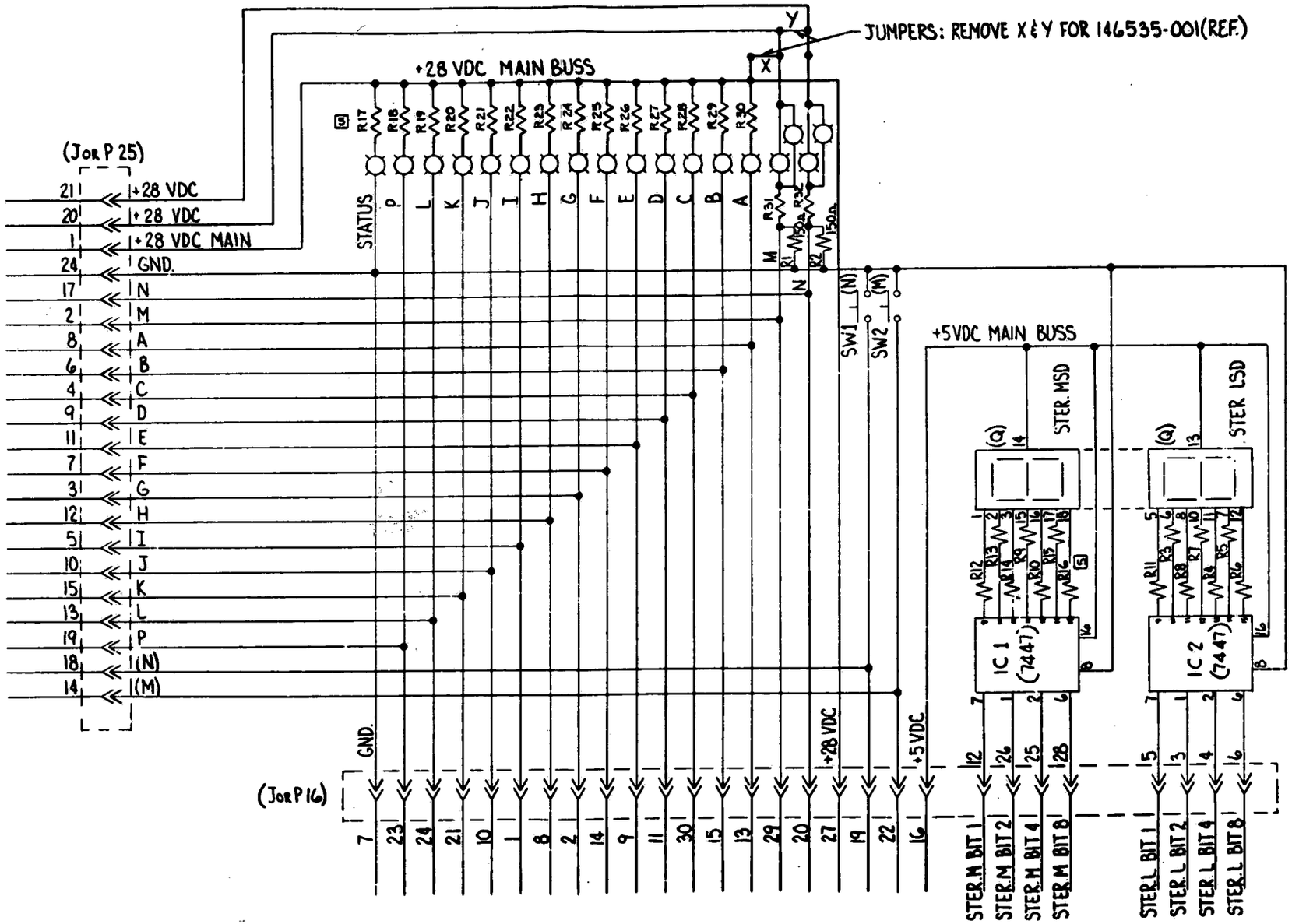


DETAIL "A" (TYP. 2 PLACES)
JUMPER FORMATION

PRIMARY PANEL SCHEMATIC (PC Board)
Non-Operating End (Part 1 of 2)

Add. 7/87

DWG. NO. 136640-001
(5/28/84)



PRIMARY PANEL SCHEMATIC
Non-Operating End (Part 2 of 2)

Add. 7/87

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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. 7-1)

1. Turn adjusting screw on reed switches (8-14, 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

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.

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. 8-20)

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.

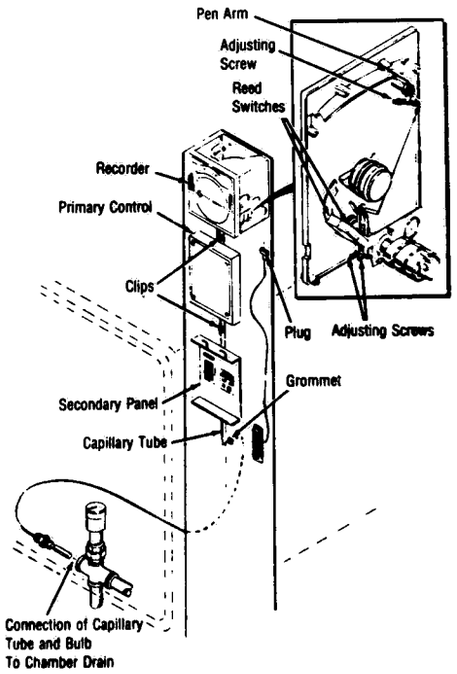


Figure 7-1. REPLACING THE RECORDER.

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. 8-21)

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. 8-20)

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 retainers (25); remove retainer and handwheel from door.

4. Remove the four 10-24 socket head screws (18) from the handwheel adapter (19) (manual door) or clutch ring (power door) to replace bushing (20).

5. Power doors only (Fig. 8-23):

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 slips and speed nuts.

2. Place cover on door and secure with ten #8 self-tapping screws on three sides.

3. Power doors only: (Fig. 8-23)

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. 8-21)

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 (Fig. 8-23)

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 (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 (31) to remove the bottom half of the gear housing (14) and the motor (29) as a unit; disassemble if necessary.

5. Remove the two keys (Fig. 8-21, 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. 8-21, 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.

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 pins (Fig. 8-22, 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. 8-22, 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.

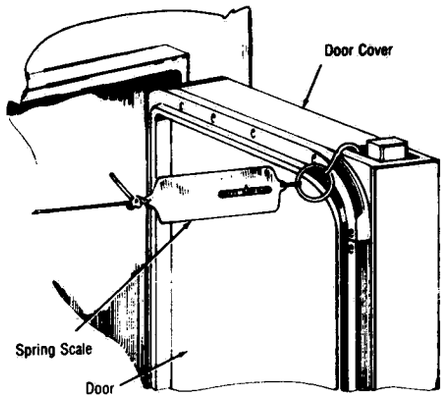


Figure 7-2. HINGE BINDING.

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.

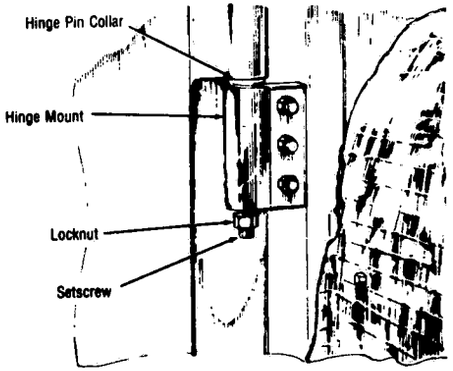


Figure 7-3. HINGE CLEARANCE.

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.

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.

Figure 7-4. DOOR SHIMS.

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.** See Figure 7-5. 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.

c. **Torque Check.** See Figure 7-6. 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. 8-21, 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.)

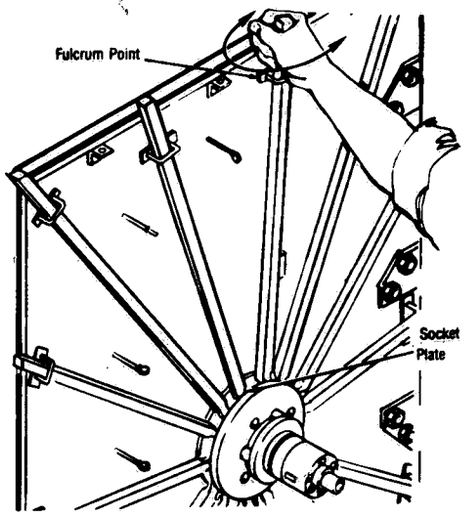


Figure 7-5. ARM TEST, RADIAL ARM.

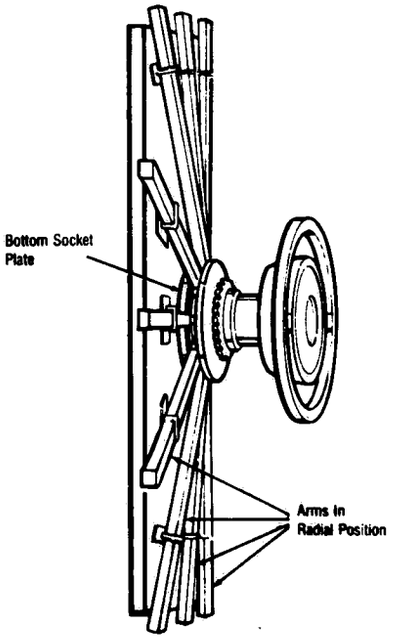


Figure 7-6. TORQUE CHECK, CHAMBER DOOR.

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. 8-21)

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.

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. 8-29, 2) from the contactor box. Turn rheostat knob (Fig. 8-28, 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.

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 6.**

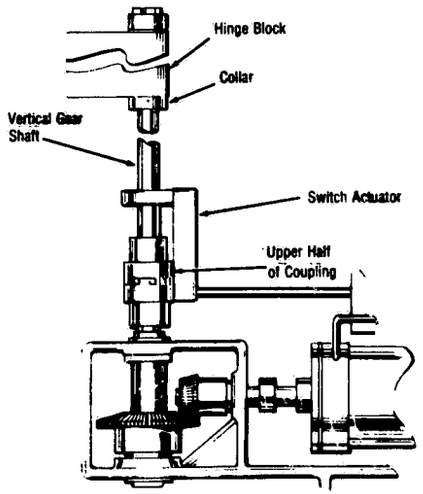


Figure 7-7. HINGE DRIVE ASSEMBLY.

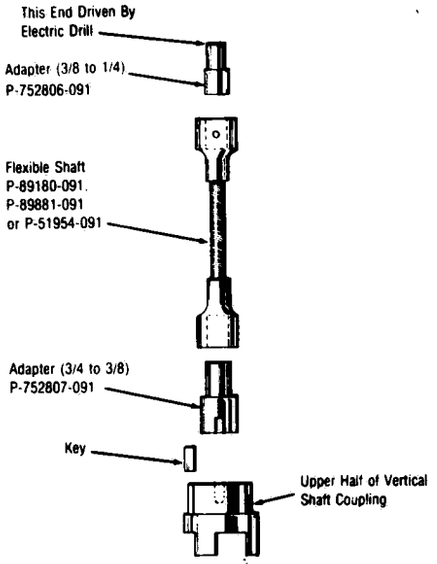


Figure 7-8. CLUTCH-DRIVE TOOL ASSEMBLY.

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 and repeat **step 6.** Perform this procedure for the three-quarter and full settings of the rheostat.

Rheostat Adjustment

The voltage to the electric clutch (Fig. 8-26, 6) is adjusted by use of the rheostat (Fig. 8-28, 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. 8-23, 46) above the clutch. Connect a D.C. voltmeter to the two wires from the electric clutch.

Hinge Drive Clutch Adjustment (Fig. 8-26)

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.

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.

Adjustment of Door Switches

A. Manual Door (Fig. 8-21)

1. Loosen screws which hold actuator (27) to radial arm and slide actuator from switch.

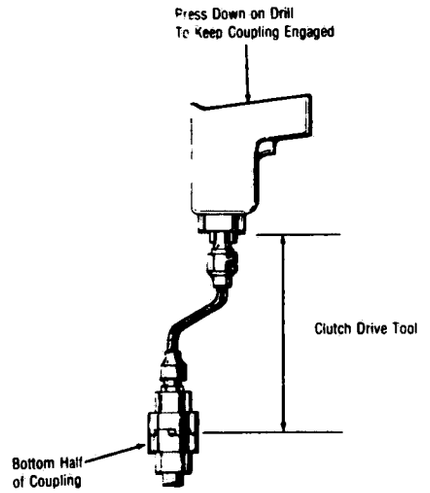


Figure 7-9. DRIVE TOOL POSITIONED TO DRIVE CLUTCH.

2. Loosen screw in center of knurled collar on arm switch and turn the collar to position the plunger type actuator in the center of its travel. Tighten screws.

3. Close door and lock to 40 ft-lbs torque, maximum.

4. Slide actuator down arm until it actuates switch. Tighten screws.

5. Make final adjustment with knurled collar. Switch should actuate approximately 1 to 2 turns before maximum door torque. DOOR UNLOCKED light(s) should extinguish when door is tightened and switches properly adjusted.

B. Power Door

Hinge Switch Adjustments (Fig. 8-26)

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. 8-27, 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. 8-26, 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 level 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.

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.

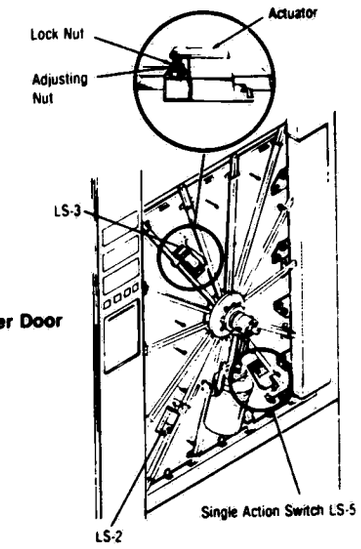
2. Move shift lever to Manual position, turn handwheel counterclockwise to release block, and remove block. Return shift lever to POWER position. Check that motor is cut out in unlock position also.

3. Press button on reset relay (Fig. 8-28, 19). 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.

Double Action Switch LS2



Single Action Switch LS3

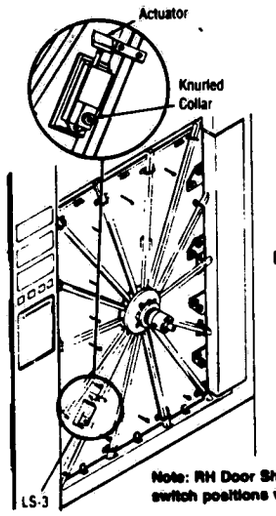


Figure 7-10. DOOR LOCKED LIMIT SWITCH.

Handwheel Faceplate Check

Black faceplate located in center of handwheel may fall off.

Check faceplate. If faceplate is loose or has fallen off, return faceplate to unit as follows (see Figure 8-20):

1. Rough surfaces of both faceplate and handwheel using Scotch-Brite® pad or light sandpaper. Remove any residue from surfaces with clean cloth.

2. Apply contact cement* by brushing it on in light, even coat on both surfaces.

3. Allow glue to dry for five to ten minutes.

4. Press faceplate onto handwheel with firm, even pressure.

NOTE: If faceplate needs replaced, order and install P-93647-002.

**3M Company Scotch Grip® Contact Cement #1357 (R-5300-840; comes in pint jar) has been approved by Engineering for this procedure.*

7.4 AIR FILTER ASSEMBLY (Fig. 8-40)

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 cartridge and its gasket, also a plastic gasket ring. 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 cartridge with small hole faces bottom of bowl.

4. Insert plastic gasket ring (4), followed by filter cartridge (1) and gasket (3) into cartridge retainer. Ensure gasket is seated against flange on filter.

5. Screw retainer onto head, and replace bowl, taking care to tighten bolts evenly.

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.

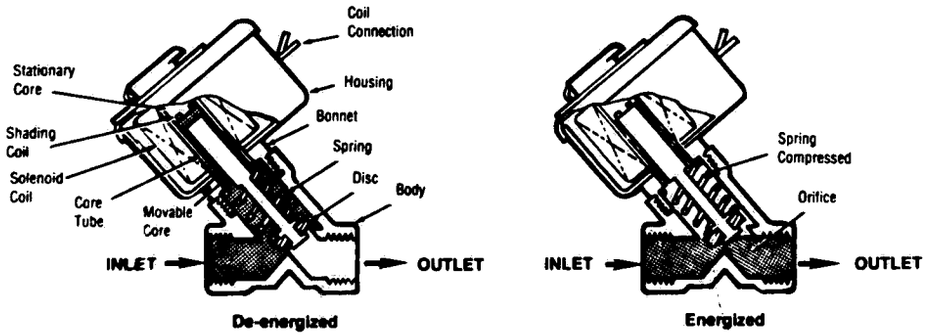


Figure 7-11. DIRECT-ACTING SOLENOID VALVE.

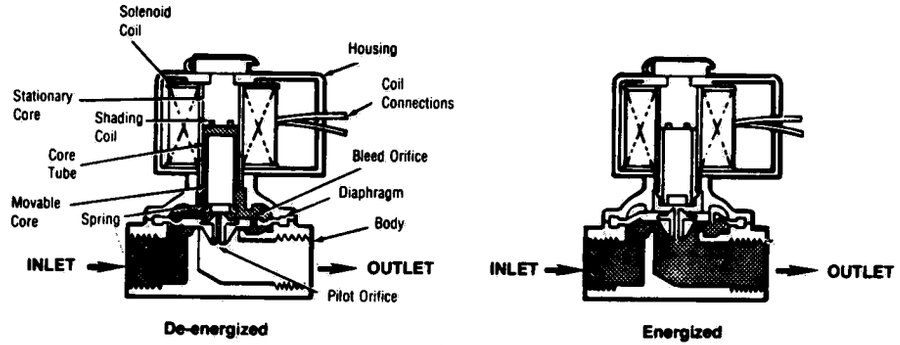


Figure 7-12. INTERNAL PILOT-OPERATED SOLENOID VALVE.

Testing

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

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

b. Check solenoid coil for open circuit or ground.

Direct-acting Valve (Fig. 7-11): 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. 7-12): 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.

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

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

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

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

NOTE: When installing/repairing Asco diaphragm or piston valves, it may be necessary to separate solenoid base from valve bonnet to facilitate removal, repair and/or installation. When valve is reassembled, ensure no teflon tape or pipe sealer is used between solenoid base and valve bonnet (see O-ring seal shown in Figure 7-12B). When teflon tape or pipe sealer is used it can find its way into core tube and inhibit proper traveling of core/disc. If core/disc does not seat correctly into copper ring at top inside of core tube, valve will emit an audible buzzing sound.

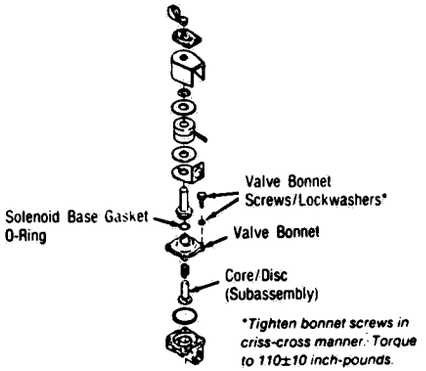


Figure 7-12B. ASCO SOLENOID VALVE.

7.6 STEAM TRAP (Fig. 8-38)

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 and attached diaphragm assembly. 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 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 (Fig. 8-33, 7)

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. 8-37)

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.

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 top spring plate (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. 7-13). If valve was not removed from sterilizer, open side connection to see disc and seat.

9. Adjust high and low settings according to paragraph 7.15.

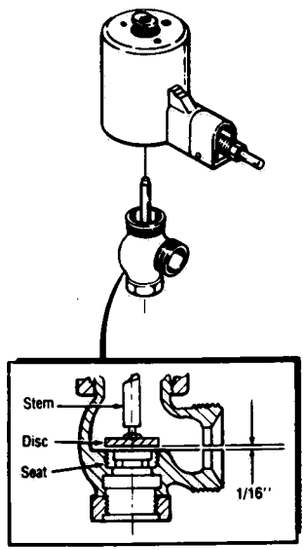


Figure 7-13. HI-LO VALVE ADJUSTMENT.

10. Loosen nut (27) and back out screw (26) to ensure that it does not contact adjusting fork (9). Turn adjusting screw (18) counterclockwise until minimum load with no rattle is obtained on spring.

11. Adjust screw (26) until it bottoms on fork (9). Lock in place with nut (27).

7.11 VALVE ASEMBLY, ANGLE (Fig. 8-39)

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 componnnts; replace as necessary.

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.

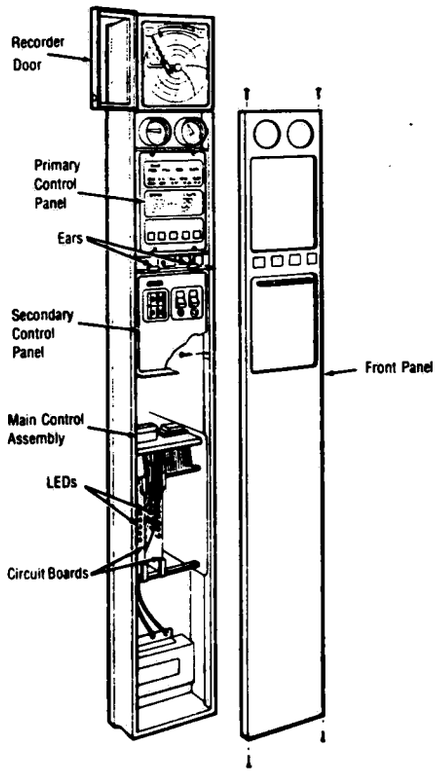


Figure 7-14. CONTROL CONSOLE.

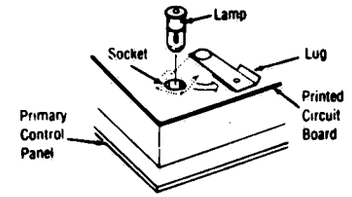


Figure 7-15. LAMP REPLACEMENT.

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 7-14.

1. Remove 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.

CAUTION: Turn power off before proceeding.

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 7-15.

b. If the entire primary control is to be replaced, replacement control (Fig. 8-10, 24) must be modified for use in Vacamatic sterilizer. Do this by clipping and removing R-24, as shown in Figure 7-16.

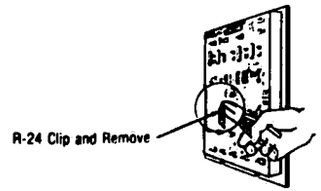


Figure 7-16. CLIP AND REMOVE R-24.

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. The controller and its printed circuit cards are now exposed.

CAUTION: Use extreme care when opening a container of electronic parts. Avoid circumstances wherein a build-up of static electricity could discharge. Handle PC boards by card pulls or edges only. The use of a grounding wrist strap is recommended.

6. Before handling or replacing Printed Circuit Boards, review Paragraph 7.23. 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 7-17. 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.

7. The number of pulses during the Condition phase of the prevacuum cycle has been factory-set at 4. This number may be changed, within the range of 0-15, by following these steps:

a. Locate the pulse-setting hexadecimal switch on the Vacamatic printed circuit expander board (Fig. 8-15, 15). Refer to Figure 7-18 for location of the switch.

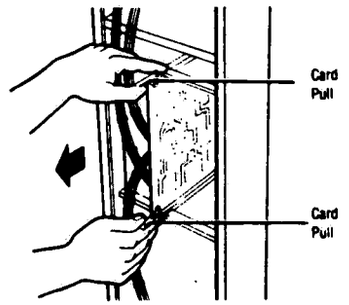
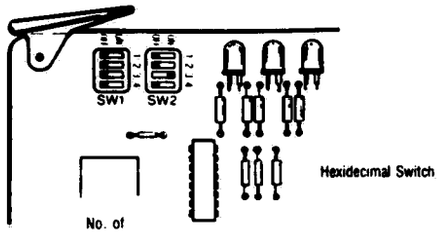


Figure 7-17. REMOVING A PRINTED CIRCUIT CARD.



No. of Pulses Desired

	1	2	3	4
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
Factory Setting → 4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

Switch No. and Position
1 = ON
0 = OFF

Pulse Setting Chart

Figure 7-18. SETTING PULSE SWITCH.

b. From the left-hand column of the pulse-setting chart, select the number of pressure/vacuum pulses you want during the conditioning phase. Then note the positions (1 = on, 0 = off) of the individual four switches for that number of pulses.

c. Use a pencil or similar object to position the switches accordingly.

Example: If you wish 5 pulses, locate "5" in the left hand column under "No. of pulses desired." Reading the chart from left to right, note that switch #1 is to be positioned "on" (1 = on), switch #2 is to be positioned off (0 = off), #3 is on, #4 is off.

7.13 ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES

1. Adjust steam pressure regulator to control jacket pressure at 20 psig. After adjustment is made, lock low stop.

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. **NOTE:** Refer to cycle graph for liquids cycle.

6. Depress the LIQUIDS cycle button.

7. After the sterilize phase has been completed and control has advanced to slow exhaust, observe calibrated compound pressure gauge. When chamber pressure reaches 3 psig, adjust PS-3 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 setting of PS-3 at 3 psig, and PS-2 at 1 psig.

NOTE: MAKE SURE PS-3 AND PS-2 FUNCTION PROPERLY BEFORE PROCEEDING TO THE NEXT STEP.

10. Increase jacket steam pressure to approximately 24 psig.

11. Set orange (top) pointer on recorder to 270° F (132° C).

12. Set STERILIZE time to 1 minute and DRY time to 3 minutes.

CAUTION: Because of excessive current draw, do not use an incandescent or neon type test light for the following tests.

13. Hook a digital voltmeter set to 5 volts DC or an LED test light across VS-1. (Common to normally open.) With no vacuum in the chamber, meter should read 0 volts. After 10'' vacuum is reached, meter should read 5 volts DC.

14. Depress the PREVACUUM cycle button.

15. Following a steam purge (solenoids S-4 exhaust cooling [LED-16], S-7 vacuum water [LED-14], S-2 steam-to-chamber [LED-13], S-3 fast exhaust [LED-12], on and CONDITION light on), a vacuum will be drawn in the chamber (solenoids S-1 filtered air [LED-15], S-7 vacuum water [LED-14], S-3 fast exhaust [LED-12], on and CONDITION light on.) Adjust VS-1 to actuate at 10'' of vacuum. (Voltmeter goes from 0 volts to 5 volts.)

16. The cycle will proceed to a steam pulse phase (solenoid S-1 filtered air [LED-15], S-2 steam-to-chamber [LED-13], on and CONDITION light on). Allow chamber pressure to rise to 26 psig by adjusting the steam pressure slowly upward.

17. When the chamber pressure has stabilized at 26 psig, adjust PS-1 to advance the control to the second vacuum phase.

18. Adjust the steam pressure regulator to 33 psig and set the high stop.

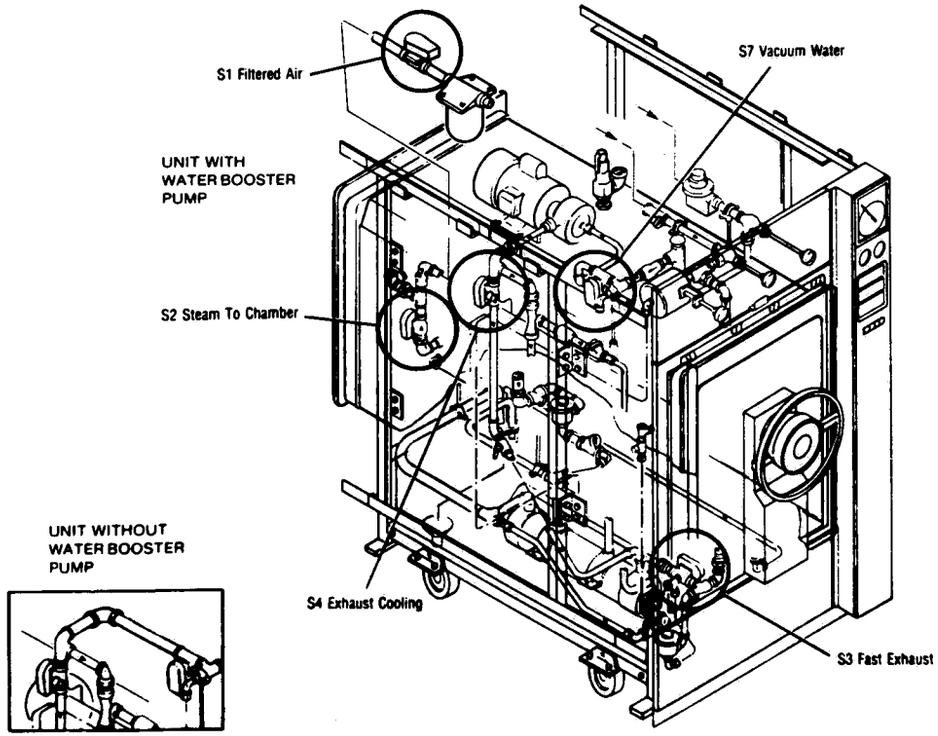


Figure 7-19. LOCATION OF SOLENOID VALVES.

19. Observe the remaining vacuum/pressure pulses to assure settings of VS-1 at 10'' vacuum and PS-1 at 26 psig.

20. Refer to the prevacuum cycle graph. After three steam pressure pulses and four vacuums, the control will advance to the sterilize phase.

21. During the sterilize phase (solenoid S-2 steam-to-chamber [LED-13] on and STERILIZE light on), observe the control to assure temperature is controlled between 272° F and 276° F. By TS-2 in the recorder, S-2 steam-to-chamber solenoid (LED-13) will cycle on and off.

22. After the timed sterilize phase, the control will advance to the fast exhaust phase (solenoid S-4 exhaust cooling [LED-16], S-1 filtered air [LED-15], S-7 vacuum water [LED-14], S-3 fast exhaust [LED-12] and EXHAUST light are on).

23. At 3 psig the control will start the timed dry phase: solenoid S-1 filtered air (LED-15), S-7 vacuum water (LED-14), S-3 fast exhaust (LED-12) are on and EXHAUST light is on.

24. At the end of the timed dry phase, the vacuum in the chamber will break. No solenoids will be powered. The EXHAUST light will be on.

25. When the vacuum breaks to 1'' of vacuum, adjust VS-2 to bring on the COMPLETE light, the buzzer (LED-18) and the counter (LED-17).

26. Opening the door will reset the control and bring on the DOOR UNLOCKED light.

7.14 PUMP AND MOTOR (Fig. 8-41, For units with water booster pump only)

CAUTION: When installing pipe connections to pump, use liquid Teflon only; do not use Teflon tape. Buildup of tape on threads could result in damage to pump housing.

1. To replace seal (4), first remove bolts (10), nuts (12), and washer (11) from end cover (7). Remove end cover and O-ring (6) from body (2).

2. Remove impeller screw (9) and washer (8).

3. Insert hex wrench through window in side of body (2) into one of the setscrews in the shaft assembly (3) to prevent shaft from turning. Unscrew impeller (5) by inserting handle end of pliers between vanes in eye of impeller (5) and rotating it in counterclockwise direction (it has a right hand thread). The impeller will come completely out.

4. Remove the four motor bolts (13) and washer (14) and remove the body assembly (2).

5. Slide the rotating seal element and seal spring off the pump shaft.

6. Remove the seal seat from the pump body by carefully pushing a screwdriver through the seal bore from the impeller side of the pump body.

7. Clean all parts.

8. Using water as a lubricant, hand press new seal seat into pump body (with polished face out). Seal must be evenly seated and not cocked. It may be necessary to use a wooden tool such as a hammer handle or screwdriver handle to press the seal seat into the body seal bore. The polished face should be clean and coated lightly with one drop of oil.

9. Slide seal spring and rotary element onto pump shaft, using water as a lubricant. Slide body assembly over pump shaft and bolt to motor, using four bolts (13) and washers (14). Using hex wrench to stop shaft rotation, as in **step 3** above, screw impeller onto pump shaft in clockwise direction until it stops. Install impeller washer (8) and screw (9).

10. Clean O-ring (6) or replace it with a new one and slide it and end cover (7) onto pump, lining up bolt holes properly. Reinstall the bolts (10), washers (11), and nuts (12).

11. Turn shaft by hand to make certain that it turns fully, except for small, even drag caused by the seal.

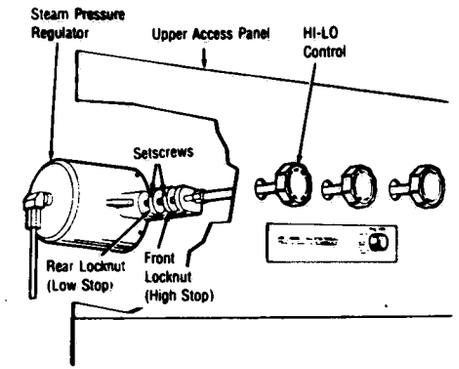
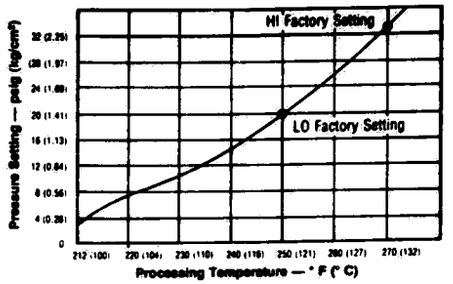


Figure 7-20. ADJUSTING PRESSURE REGULATOR.



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.

7.15 ADJUSTMENT 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. Follow 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.

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 2.5 if a Gravity cycle; paragraph 2.6 if a Liquids cycle, except set the yellow pointer on the indicator-recorder-controller for the desired processing temperature.

NOTE: At lower settings 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.

8. Replace the adjusting screw cover and, if applicable, the cabinet side panel.

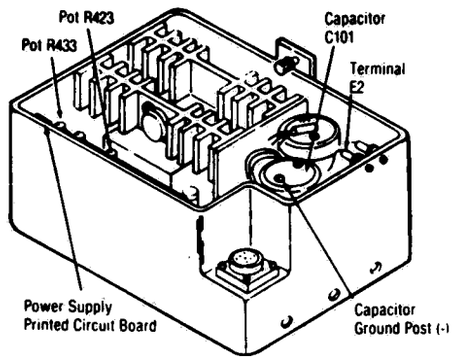


Figure 7-21A. POWER SUPPLY (IRC).

7-15A POWER SUPPLY ADJUSTMENT (IRC).

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

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

1. Turn control power (CB-1) off.

2. Connect the DVM to ground post of capacitor C101 (-) and to terminal post E2 (+). Refer to Figure 7-21A.

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. If lower, proceed to **step 6.**

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.

7.16 PRINTCON PRINTER

NOTE: Two styles of printer assemblies are in use. Units manufactured before 6/85 used a 12 VDC gear-motor to drive the carbon copy into a collection coil. Units manufactured after 6/85 used a 120 VAC gear-motor to pull the copy onto a spool.

Changing Paper (Figs. 7-22, 7-23, 7-24)

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. 7-25)

NOTE: Printcon is capable of storing twenty feet of single ply paper. 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 manufactured before 6/85.*

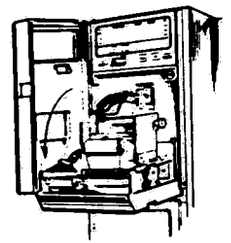


Figure 7-22. PRINTER IN LOWERED POSITION*.

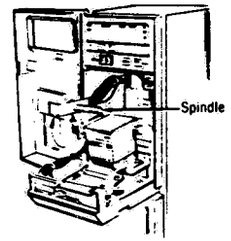


Figure 7-23. SPINDLE IN RAISED POSITION*.

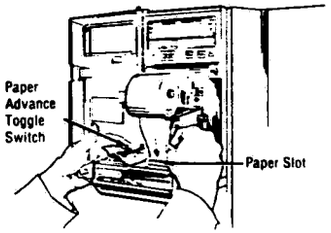


Figure 7-24. INSERTING PAPER*.

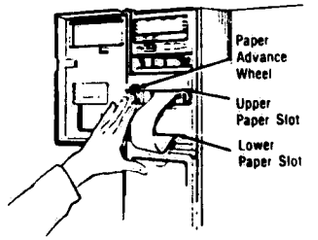


Figure 7-25. INSERTING PAPER INTO AUTOMATIC PAPER STORAGE AREA.

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 (Units After 6/85)

1. Open door on secondary control panel and position POWER switch to OFF.

2. Using 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 (Fig. 7-25).

3. Insert tape end into lower slot until entire 6 to 8 inches is inserted.

4. Swing printer assembly forward and downward and allow it to rest in service position.

5. Grasp end of tape, fold two corners to form a **V** and fully insert end into slot of paper take-up spool (Fig. 7-25A).

6. Position POWER switch to ON. Paper take-up spool will advance paper until taut.

7. Swing printer assembly upward and back into operating position.

Removing Stored Daily Record*
(Figs. 7-26, 7-27, 7-28)

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 manufactured before 6/85.

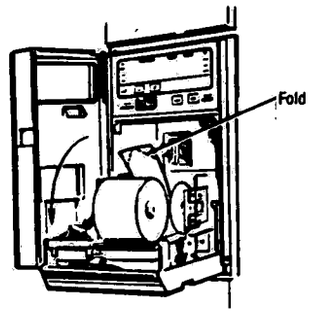


Figure 7-25A. FOLD PAPER TAPE (Units After 6/85).

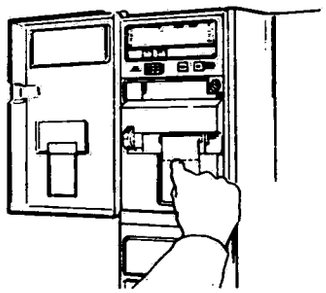


Figure 7-26. CREASING PAPER TAPE*.

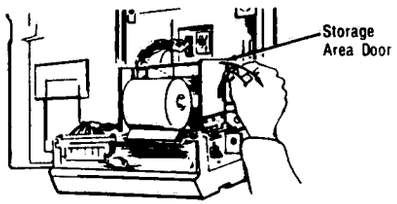


Figure 7-27. OPENING STORAGE AREA*.

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 (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 POWER switch to ON. Tape will advance onto take-up spool. Position power switch to OFF when tape is completely advanced.

6. To remove take-up spool, release tension on spring-loaded retaining clip and lift spool from unit (Fig. 7-28A).

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. 7-29)

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.

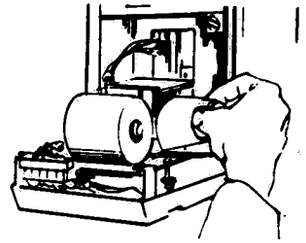


Figure 7-28. REMOVING STORED DAILY RECORD*.

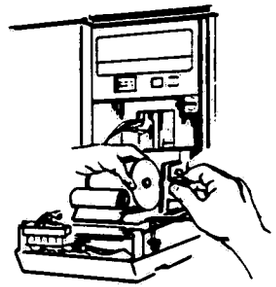


Figure 7-28A. REMOVING STORED RECORD (Units After 6/85).

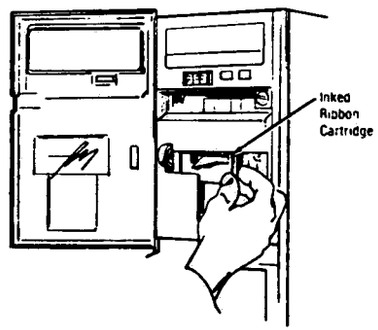


Figure 7-29. REMOVING INKED RIBBON CARTRIDGE.

*Units manufactured before 6/85.

Printer Replacement (Fig. 7-31 and 8-59 or 7-31A and 8-60A)

1. Open unit outer door.

2. Tilt printer assembly forward to service position. Remove two #6-32 screws and washers holding silver anodized cover in place.

3. Remove cover by disengaging it from pivot shoulder screws.

4. Unsolder wire #11 (units before 6/85) or wire #119 (units after 6/85) from printer.

5. Pivot assembly back to operating position and disconnect J1 and J2 connectors (plugged into J20 receptacle mounted on upper left edge of printer mounting plate).

6. Printer can now be disassembled by removing three 1/4-20 hex nuts — two on right and one on left end of printer.

7. Reconnect wire #11 (units before 6/85) or wire #119 (units after 6/85) when new printer is installed.

8. For units shipped before 6/85, adjust printer (see Paragraph **"Printer Assembly Inspection and Adjustment"**).

Paper Advance Toggle Switch Replacement (Fig. 7-31 and 8-59 or 7-31A and 8-60A)

1. Open unit outer door.

2. Tilt printer assembly forward to service position. Remove two #6-32 screws holding silver cover in position. Remove cover by disengaging from pivot shoulder screws.

3. Unsolder all wire connections to switch. Remove locking nut and washers from toggle side to remove.

4. See Figure 7-30 or 7-30A to rewire new switch.

5. For units shipped before 6/85, adjust switch (see Paragraph **"Printer Assembly Inspection and Adjustment"**).

Platen Microswitch Replacement (Fig. 7-31 and 8-60 or 7-31A and 8-60B)

CAUTION: 120 VAC is present on microswitch terminals of units manufactured after 6/85 when sterilizer POWER is ON. Turn POWER OFF.

1. Open unit outer door.

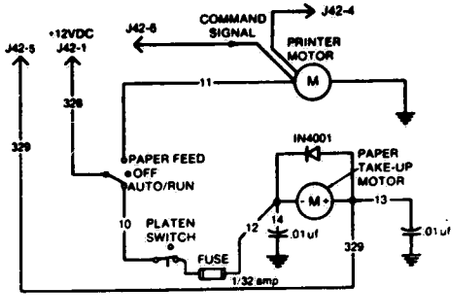


Figure 7-30. SWITCH AND MOTOR SCHEMATIC (Units Before 6/85).

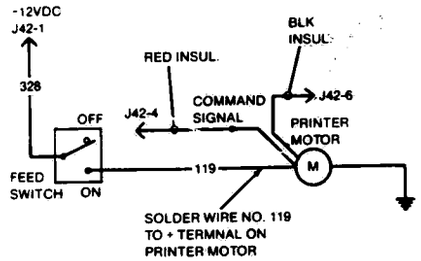


Figure 7-30A. SWITCH AND MOTOR SCHEMATIC (Units After 6/85).

2. Tilt printer assembly forward to service position. Remove two #6-32 screws and washers from printer mounting plate anchoring silver cover in place.

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 7-30 or 7-30A to rewire the new switch.

8. For units shipped before 6/85, adjust printer (see Paragraph **"Printer Assembly Inspection and Adjustment"**).

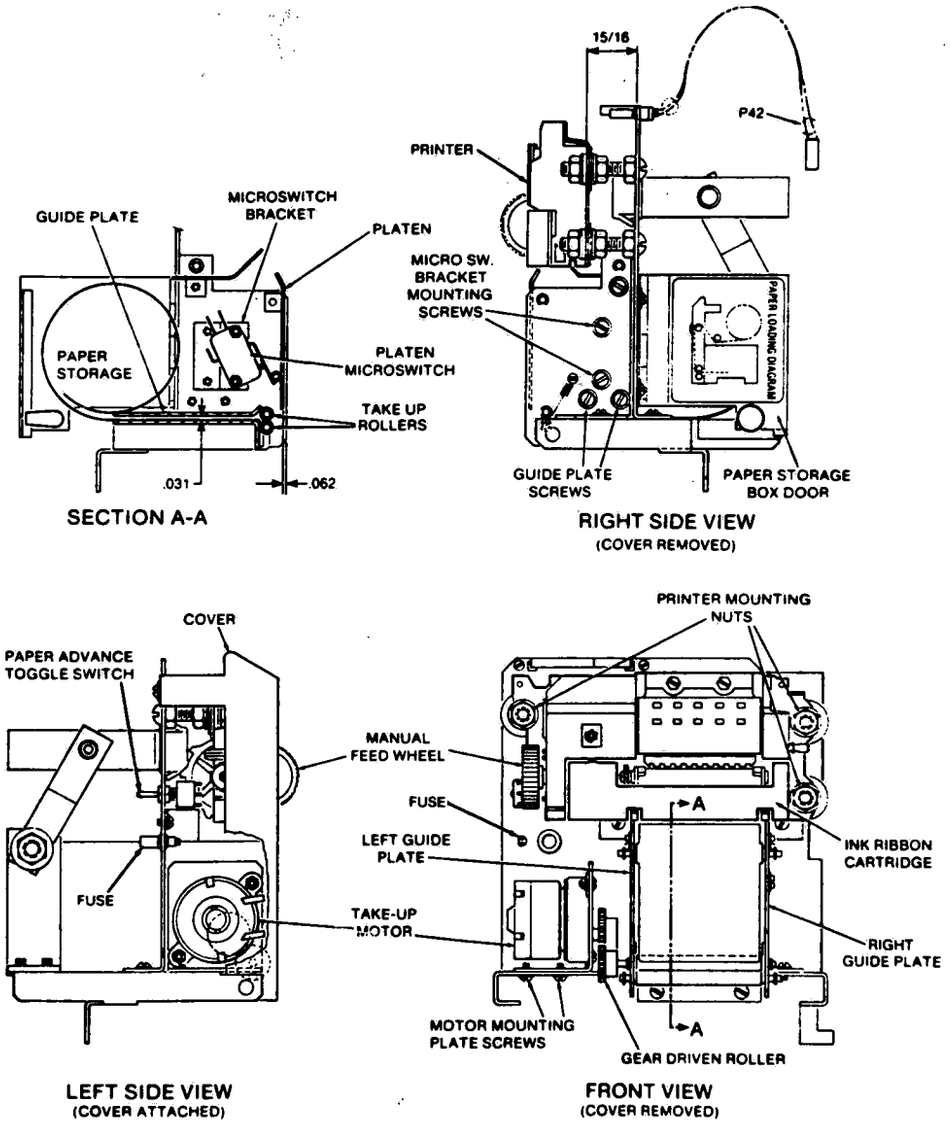


Figure 7-31. PRINTCON PRINTER ASSEMBLY (Units Before 6/85).

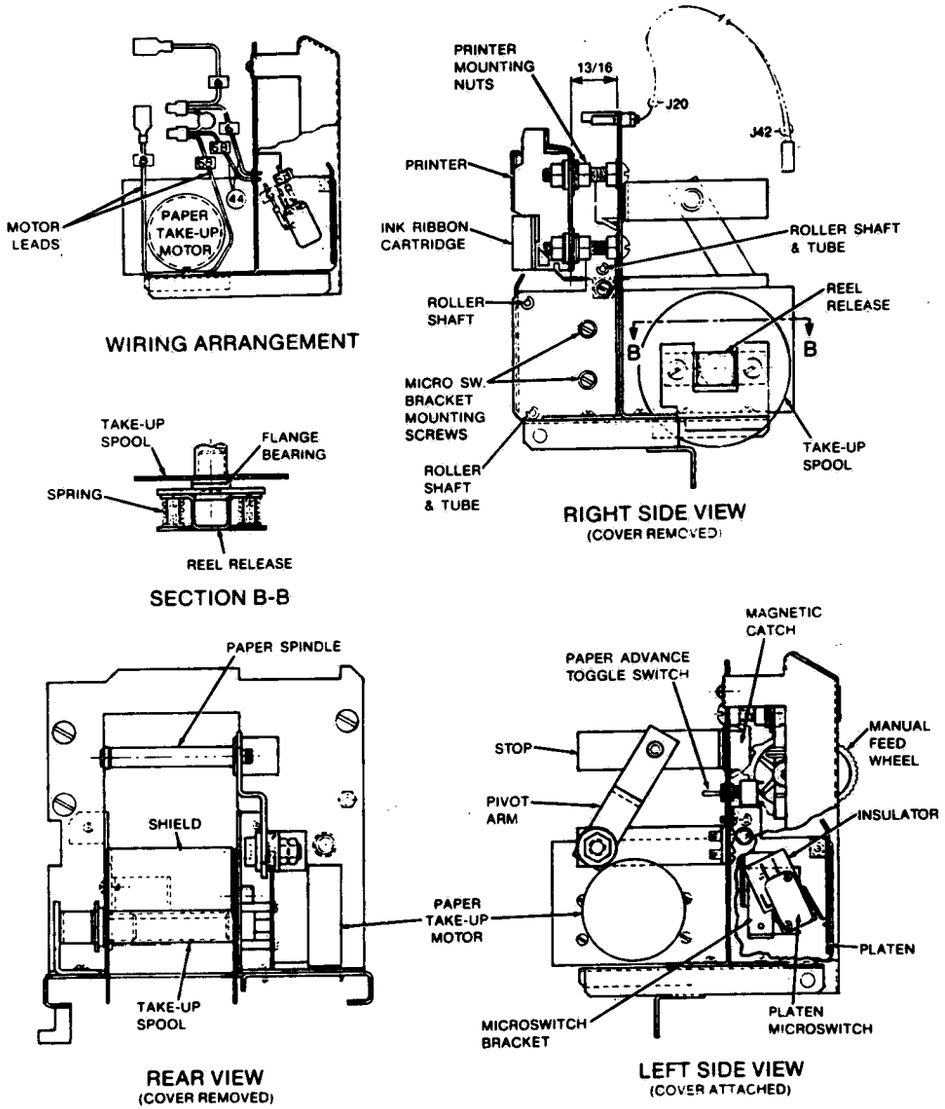


Figure 7-31A. PRINTCON PRINTER ASSEMBLY (Units After 6/85).

Take-Up Motor Replacement* (Figs. 7-31 and 8-59)

1. To replace take-up motor, complete printer take-up assembly must be removed. Tilt assembly forward and disconnect J42 plug from main Printcon PC Board. Also remove two #6-32 screws and washers that hold silver anodized cover in place.

2. Disengage slots from pivot shoulder screws and remove silver 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. Replace motor. Rewire motor as shown in Figure 7-30.

9. Adjust motor using following procedure.

Printer Assembly Inspection and Adjustment* (Figs. 7-31, 8-59 and 8-60)

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.

**Units manufactured before 6/85.*

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*

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*

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*

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. 8-58, 16)

1. Review Paragraph 7.23. 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. 8-58, 13)

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. 8-58, 11)

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, temperature, purge times and print intervals are located on the Printcon digital display board. Refer to Figure 7-32 for appropriate settings.

NOTE: VS4 (Purge Time) and VS5 (Print Intervals) are used on Eagle 2300 Series units. PS5 (Special) is used for special non-standard functions; for standard units it **must** be set to 0-0.

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

PS 1 PRESSURE
psig = setting + 2

Setting SA0	Setting SA1	psig	Setting SA0	Setting SA1	psig	Setting SA0	Setting SA1	psig	Setting SA0	Setting SA1	psig
0	0	0.0	1	7	8.5	3	4	17.0	5	1	25.5
0	1	0.5	1	8	9.0	3	5	17.5	5	2	26.0
0	2	1.0	1	9	9.5	3	6	18.0	5	3	26.5
0	3	1.5	2	0	10.0	3	7	18.5	5	4	27.0
0	4	2.0	2	1	10.5	3	8	19.0	5	5	27.5
0	5	2.5	2	2	11.0	3	9	19.5	5	6	28.0
0	6	3.0	2	3	11.5	4	0	20.0	5	7	28.5
0	7	3.5	2	4	12.0	4	1	20.5	5	8	29.0
0	8	4.0	2	5	12.5	4	2	21.0	5	9	29.5
0	9	4.5	2	6	13.0	4	3	21.5	6	0	30.0
1	0	5.0	2	7	13.5	4	4	22.0	6	1	30.5
1	1	5.5	2	8	14.0	4	5	22.5	6	2	31.0
1	2	6.0	2	9	14.5	4	6	23.0	6	3	31.5
1	3	6.5	3	0	15.0	4	7	23.5	6	4	32.0
1	4	7.0	3	1	15.5	4	8	24.0	6	5	32.5
1	5	7.5	3	2	16.0	4	9	24.5	6	6	33.0
1	6	8.0	3	3	16.5	5	C	25.0	6	7	33.5
									6	8	34.0

VS 1 VACUUM
in. Hg. = setting + 2

Setting SA4	Setting SA5	In.Hg.	Setting SA4	Setting SA5	In.Hg.	Setting SA4	Setting SA5	In.Hg.
0	0	0.0	2*	0*	10.0	4	0	20.0
0	1	0.5	2	1	10.5	4	1	20.5
0	2	1.0	2	2	11.0	4	2	21.0
0	3	1.5	2	3	11.5	4	3	21.5
0	4	2.0	2	4	12.0	4	4	22.0
0	5	2.5	2	5	12.5	4	5	22.5
0	6	3.0	2	6	13.0	4	6	23.0
0	7	3.5	2	7	13.5	4	7	23.5
0	8	4.0	2	8	14.0	4	8	24.0
0	9	4.5	2	9	14.5	4	9	24.5
1	0	5.0	3	0	15.0	5	0	25.0
1	1	5.5	3	1	15.5	5	1	25.5
1	2	6.0	3	2	16.0	5	2	26.0
1	3	6.5	3	3	16.5	5	3	26.5
1	4	7.0	3	4	17.0	5	4	27.0
1	5	7.5	3	5	17.5	5	5	27.5
1	6	8.0	3	6	18.0	5	6	28.0
1	7	8.5	3	7	18.5	5	7	28.5
1	8	9.0	3	8	19.0	5	8	29.0
1	9	9.5	3	9	19.5	6	9	29.5
						6	0	30.0

*=Recommended Initial Settings

VS4 - PURGE TIME
Minutes - Seconds

Setting SA6	Setting SA7	M-S	Setting SA6	Setting SA7	M-S	Setting SA6	Setting SA7	M-S
0	0	00	3	0	00	7	2	30
0	1	00	3	1	15	7	3	15
0	2	00	3	2	30	7	4	30
0	3	00	3	3	45	7	5	45
0	4	00	4	0	00	7	6	00
0	5	15	4	1	15	7	7	15
0	6	30	4	2	30	7	8	30
0	7	45	4	3	45	7	9	45
0	8	00	4	4	00	8	0	00
0	9	15	4	5	15	8	1	15
1	0	30	4	6	30	8	2	30
1	1	45	4	7	45	8	3	45
1	2	00	4	8	00	8	4	00
1	3	15	4	9	15	8	5	15
1	4	30	5	0	30	8	6	30
1	5	45	5	1	45	8	7	45
1	6	00	5	2	00	8	8	00
1	7	15	5	3	15	8	9	15
1	8	30	5	4	30	9	0	30
1	9	45	5	5	45	9	1	45
2	0	00	5	6	00	9	2	00
2	1	15	5	7	15	9	3	15
2	2	30	5	8	30	9	4	30
2	3	45	5	9	45	9	5	45
2	4	00	6	0	00	9	6	00
2	5	15	6	1	15	9	7	15
2	6	30	6	2	30	9	8	30
2	7	45	6	3	45	9	9	45
2	8	00	6	4	00			
2	9	15	6	5	15			
3	0	30	6	6	30			
3	1	45	6	7	45			
3	2	00	6	8	00			
3	3	15	6	9	15			
3	4	30	7	0	30			
3	5	45	7	1	45			

VS5 - PRINT INTERVALS
Minutes - Seconds

Setting SA1	Setting SA5	M-S	Setting SA1	Setting SA5	M-S	Setting SA1	Setting SA5	M-S
0	0	00	3	0	00	7	2	30
0	1	00	3	1	15	7	3	15
0	2	00	3	2	30	7	4	30
0	3	00	3	3	45	7	5	45
0	4	00	4	0	00	7	6	00
0	5	15	4	1	15	7	7	15
0	6	30	4	2	30	7	8	30
0	7	45	4	3	45	7	9	45
0	8	00	4	4	00	8	0	00
0	9	15	4	5	15	8	1	15
1	0	30	4	6	30	8	2	30
1	1	45	4	7	45	8	3	45
1	2	00	4	8	00	8	4	00
1	3	15	4	9	15	8	5	15
1	4	30	5	0	30	8	6	30
1	5	45	5	1	45	8	7	45
1	6	00	5	2	00	8	8	00
1	7	15	5	3	15	8	9	15
1	8	30	5	4	30	9	0	30
1	9	45	5	5	45	9	1	45
2	0	00	5	6	00	9	2	00
2	1	15	5	7	15	9	3	15
2	2	30	5	8	30	9	4	30
2	3	45	5	9	45	9	5	45
2	4	00	6	0	00	9	6	00
2	5	15	6	1	15	9	7	15
2	6	30	6	2	30	9	8	30
2	7	45	6	3	45	9	9	45
2	8	00	6	4	00			
2	9	15	6	5	15			
3	0	30	6	6	30			
3	1	45	6	7	45			
3	2	00	6	8	00			
3	3	15	6	9	15			
3	4	30	7	0	30			
3	5	45	7	1	45			

Figure 7-32. ROTARY BCD SWITCHES.

Erratic Temperature/Pressure Display

1. Units manufactured before 6/85:

Erratic display operation because of loss of DC ground or capacitor bypass. Proceed as follows:

a. Verify +12 and -12 ±0.5 VDC at power supply (see Table 6-9). If voltage is not steady, replace power supply (see Figure 8-15). If voltage is steady, proceed to next step.

b. Remove cover from Printer Assembly (refer to Paragraph 7.16). Ensure motor mounting screws (also serve as grounding screws) are intact and that both capacitors are secured. If screw or nut has backed off, secure using Loctite 242 (P-764320-823). Return cover. If screw and capacitors are connected and problem persists, proceed to next step.

c. Turn take-up motor switch to TAKE-UP. If situation stops, ensure switch remains in this position. If situation continues, proceed to next step.

d. Remove temperature probe (refer to Paragraph 7.20) from mounting clip or chamber drain. If situation stops, probe is bad and needs replaced. If situation continues, return probe to clip and proceed to next step.

e. Install jumper from DC GND side of RESET button (see Figure 8-61) to ground stud behind secondary control (refer to unit schematic for wiring detail). If problem persists after installing jumper, contact Service Field Engineering.

2. Units manufactured after 6/85:

Erratic temperature reading is being displayed when unit is idle or at sterilizing temperature. Add a jumper wire (labeled #103) from secondary panel chassis ground (see Figure 8-61) to TB3-7 (control DC ground).

7.18 MAIN PRINTCON PC BOARD

Changing The Battery (Fig. 7-33)

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:

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. **Note:** To ensure correct connection, observe notched (see Fig. **A**) corner of battery. This 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.

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.

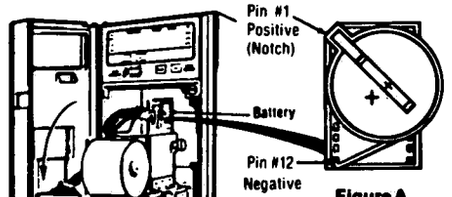


Figure A.

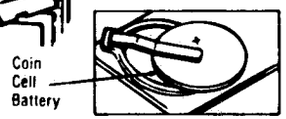


Figure B.

Figure 7-33. 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. 7-34, 7-35 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.

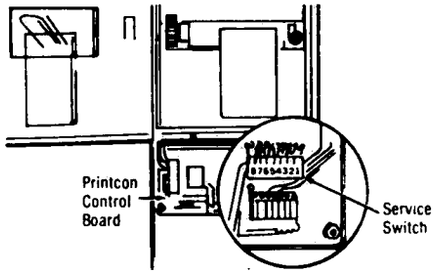


Figure 7-34. LOCATING SERVICE SWITCH.

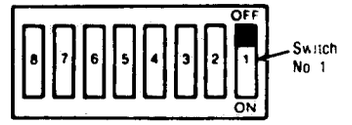


Figure 7-35. SERVICE SWITCH.

Adjusting The Sterilize Temperature Overdrive
(Figs. 7-34, 7-35 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 switch No. 1 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		
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

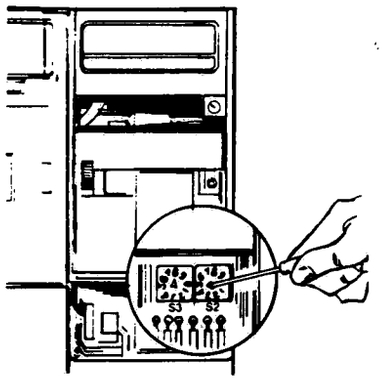


Figure 7-36. LOCATING ROTARY SWITCHES S2 AND S3.

Setting The Year Switches (Fig. 7-36)

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. 8-58, 3)

CAUTION: This PC Board contains static-sensitive components. Handle accordingly.

1. Review Paragraph 7.23. Turn power OFF. 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.

8. Check calibration (refer to Paragraph 7.22).

7.19 PRINTCON PRESSURE TRANSDUCER REPLACEMENT (Fig. 8-67)

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. Remove transducer from the tee in the piping.

5. Mount new transducer.

6. Run the transducer cable through the cable clamp. Crimp new pins on the transducer cable and install the new cable into plug P47. Reconnect P47. Refer to proper schematics (see Table 6-11) when rewiring.

7. Check calibration (refer to Paragraph 7.22).

7.20 PRINTCON TEMPERATURE PROBE (RTD) REPLACEMENT (Fig. 8-67)

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 pointing upward into chamber drain.

3. Reassemble in reverse order.

4. Check calibration (refer to Paragraph 7.22).

7.21 REPLACEMENT OF PRINTCON POWER SUPPLY FUSES

If fuse replacement is necessary, refer to Figure 7-37 for locations of these fuses.

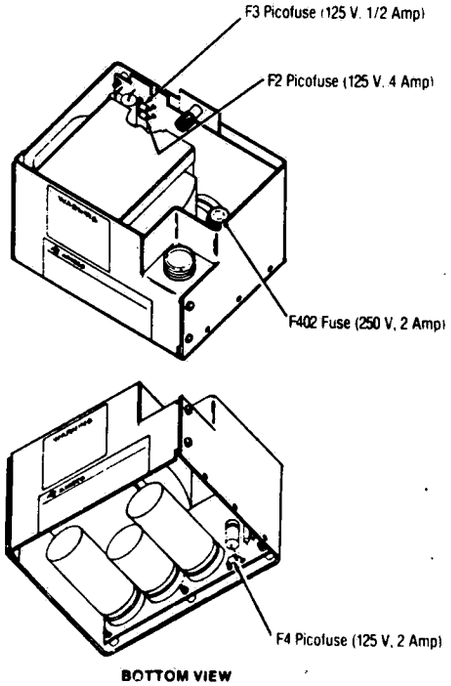


Figure 7-37. POWER SUPPLY FUSE LOCATIONS.

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 or greater. (AMSCO P-764317-627 or equivalent).

2. Calibrated potentiometer — resolution to 1 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: (Fig. 7-38)

1. With control power OFF, remove front panel of control column. Remove primary panel mounting screws and unplug primary panel.

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 Gage 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.

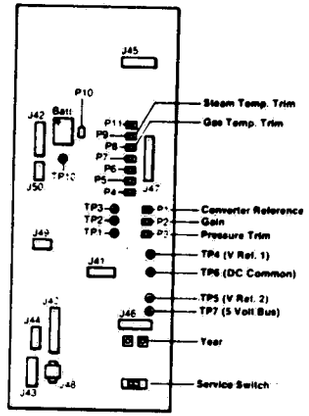


Figure 7-38. TEST POINT AND POTENTIOMETER LOCATIONS: Main Printcon PC Board.

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, turn the radial arms to the fully extended position and observe that the "door unlocked" lamp goes out. Exercise caution beause **the "cycle inhibit" feature is defeated** by this action. With the door open and 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 at sea level. For altitudes above sea level, adjust P3 according to the approximation of 1-inch Hg vacuum displayed for each 1000 feet altitude. For example, for an elevation of 2700 feet, set P3 to display 2.7 in. Hg vacuum. This is a "coarse" adjustment only because the control will "autozero" the pressure display when the RESET button is pressed with the door open.

7. Retract the radial arms to 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. 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.

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.

7.23 RECOMMENDED ELECTROSTATIC DAMAGE (ESD) PRECAUTIONS

NOTE: Following precautions should be taken whenever Printed Circuit Boards are being handled or replaced:

1. Always use an ESD safe container when transporting boards from one location to another.

2. No boards should be removed from their containers except at an approved static station or where personnel and machine are properly grounded.

3. At minimum, use a wrist strap grounded to the sterilizer when removing and/or replacing board.

NOTE: Failure to follow the above precautions may result in electrostatic damage to the Printed Circuit Board. 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.

Return Policy:

NOTE: After replacing any printed circuit board, especially those failing during the warranty period, the following **must** be adhered to:

1. Put defective board into static-proof plastic bag in which replacement board was shipped.

2. Place plastic bag (with defective board) into replacement part shipping carton.

3. Initiate service order and enclose a copy with defective board. Include the following information:

a. Reason for return (failure mode of equipment)

b. General condition of board

c. Quantity

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

e. Serial number of machine from which board was removed plus cycle count of machine.

4. Wrap shipping carton with protective wrapper or cover (envelope, paper, box, etc.).

5. Return board (and all other microprocessor parts) to AMSCO SERVICE in Erie. Mark the package to the attention of the RETURNED MATERIALS SPECIALIST.

7.24 PRINTCON POWER SUPPLY ADJUSTMENT (Fig. 8-15)

1. Refer to Functional Description, Paragraph 3.7.

2. Adjust pot R7 for 5.05-5.12 VDC at test point TP1.

3. With 5 volt output loaded to 3 amps (1.67Ω), adjust pot R2 until circuit breaker CB1 just trips.

4. Remaining voltages are not adjustable. They must be within following tolerances:

Output	Tolerance	Maximum Ripple (p-p)
-12	-11.40-12.60	0.02
+12	11.40-12.60	0.02
+12p	10.70-12.50	0.05
+18	16.30-24.50	—
+28	24.60-30.80	0.20

7.25 SERIES 2300 I/O #1 PC BOARD DIP SWITCH SETTING (Fig 7-39)

1. **Dip Switch #1 (SW1):**

This switch selects/deselects cycle pushbutton on primary panel. Switch is factory set but may have to be set if board is replaced. Cycle versus switch number is as follows:

Isothermal	Pos. #1	ON
Liquic	Pos. #2	ON
Gravity	Pos. #3	ON
Pre-vac	Pos. #4	OFF

NOTE: Setting particular switch ON deselects cycle.

2. **Dip Switch #2 (SW2):**

This switch (Positions 1, 2 and 3) selects number of VAC pulses during conditioning on a VACAMATIC machine. Number of pulses can vary from 0 to 7 (see Figure 7-39). Position 4 is used to determine TOO LONG IN STEP alarm setting. For small and medium units, position 4 is set to OFF; ensure switch setting when replacing board.

7.26 LABORATORY ACCOUNT LIQUID PROCESSING CYCLE CORRECTIONS

In liquid processing some laboratories are experiencing media boil-over stopper dislodgement and excessively long exhaust times. Eliminate these situations by completing following adjustments:

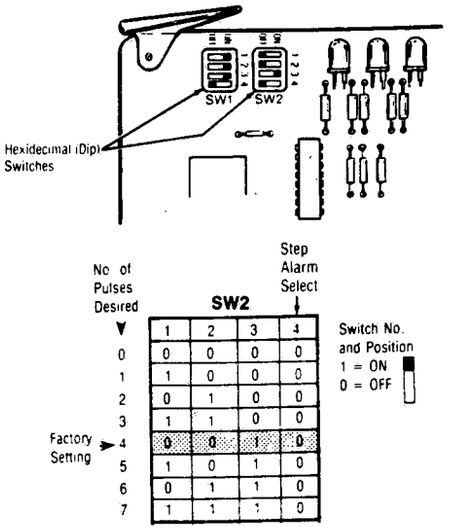


Figure 7-39. DIP SWITCH SETTINGS: Eagle 2300.

1. Reset pressure switch PS-3 (Figure 5-8) to actuate at 1 PSIG instead of 3 PSIG.

2. Verify proper jacket pressure setting (e.g., 20 +4,-1 PSIG).

3. Verify proper temperature control setting of 122-124 C (252-256 F).

4. Readjust slow exhaust rate (after setting PS-3 to 1 PSIG) on an empty chamber (using 20-minute exposure) to following:

   a. 16 x 20 inch Sterilizers = 4 to 7 minutes

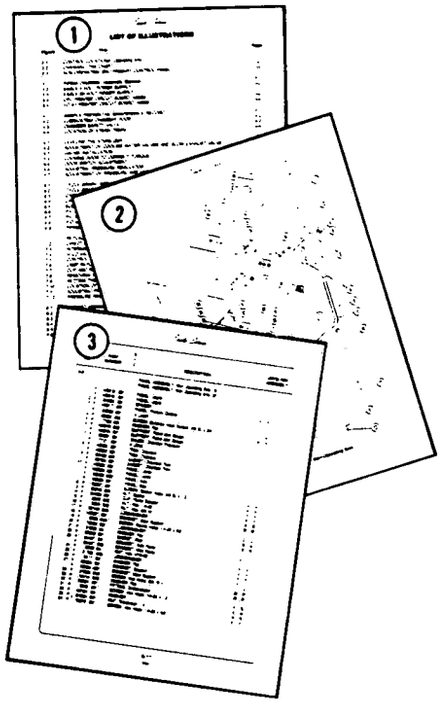
   b. 24 x 36 inch Sterilizers = 5 to 8 minutes

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 .....

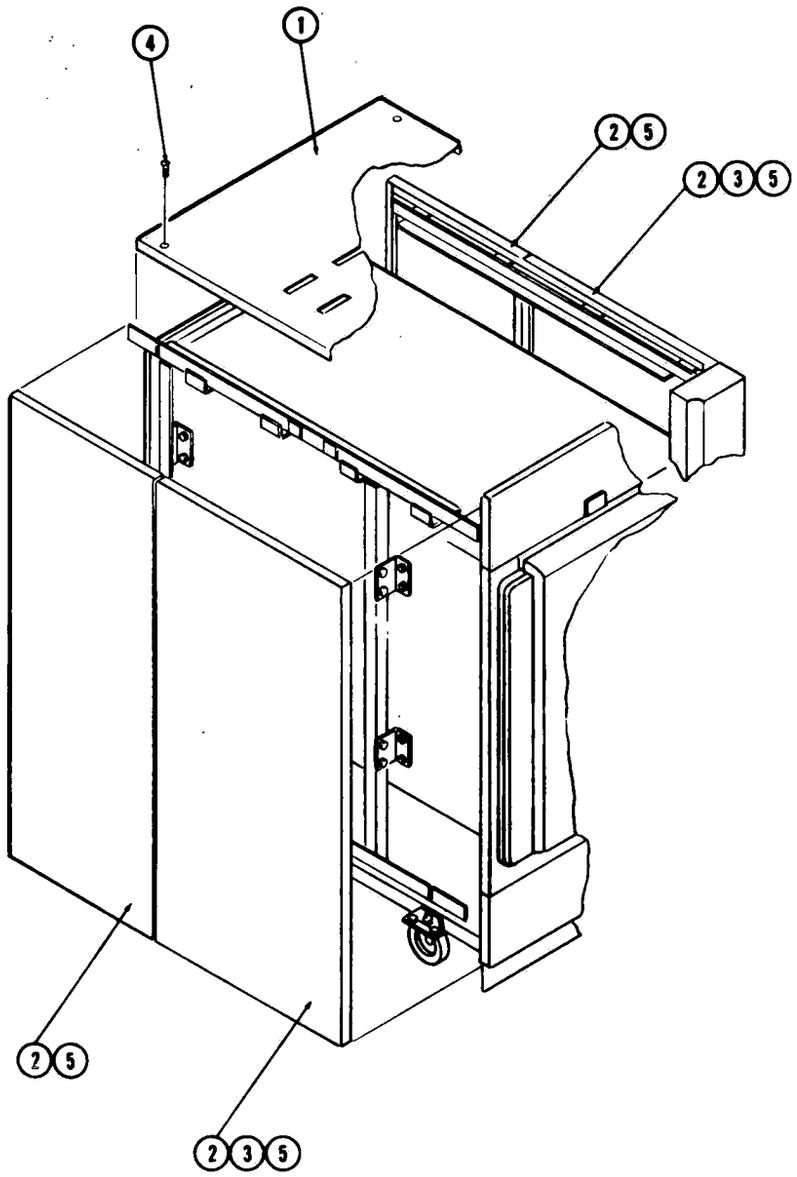


Figure 8-1. CABINET ASSEMBLY: Freestanding Sterilizer (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-1-	P	146503	001		CABINET ASSEMBLY: 36" SD. Freestanding, Part 1 of 2	X		
	P	146493	001		CABINET ASSEMBLY: 48" SD. Freestanding, Part 1 of 2		X	
	P	146509	001		CABINET ASSEMBLY: 60" SD. 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

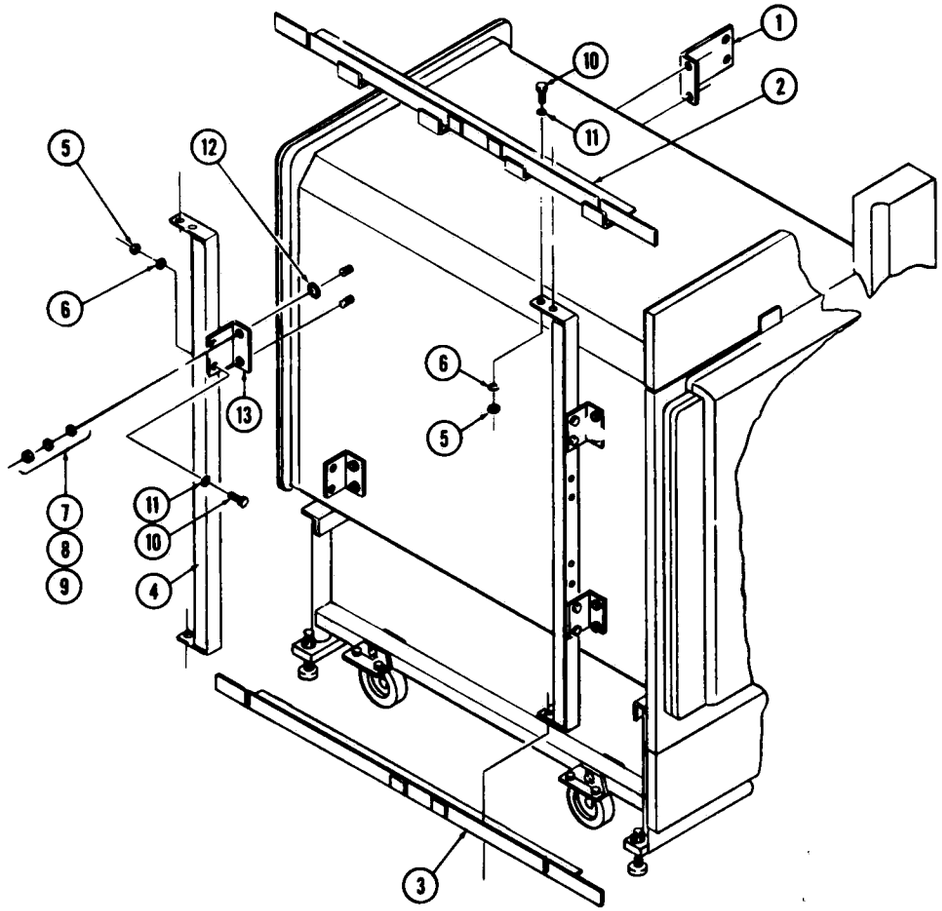


Figure 8-2. CABINET ASSEMBLY: Freestanding Sterilizer (Part 2 of 2).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-2-	P	146503	001		CABINET ASSEMBLY: 36" SD. Freestanding, Part 2 of 2	X			
	P	146493	001		CABINET ASSEMBLY: 48" SD. Freestanding, Part 2 of 2		X		
	P	146509	001		CABINET ASSEMBLY: 60" SD. 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	

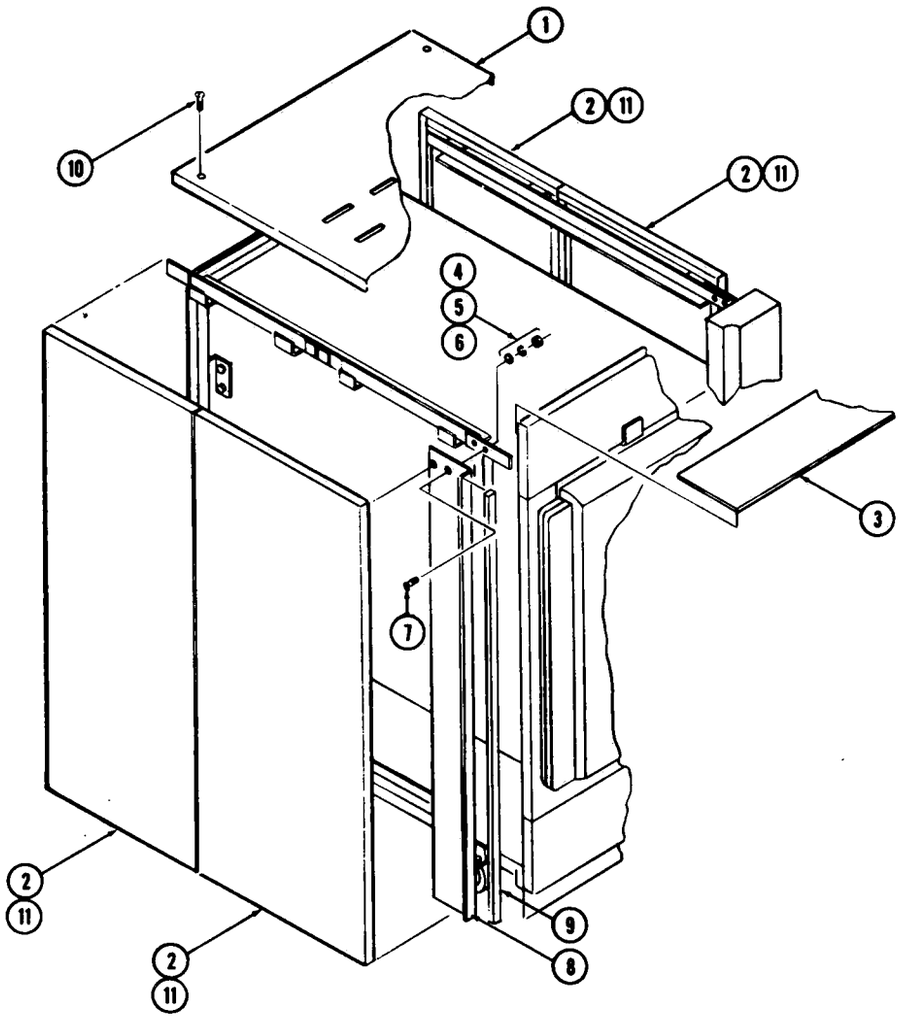


Figure 8-3. CABINET ASSEMBLY: Double Door, Recessed (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-3-	P	146471	001		CABINET ASSEMBLY: 48" DD. Recessed. Part 1 of 2	X				
	P	146480	002		CABINET ASSEMBLY: 60" DD. Recessed. Part 1 of 2		X			
1	P	146632	002		PANEL, Top	1				
	P	146632	005		PANEL, Top		1			
2	P	146339	012		PANEL, Side	4				
	P	146339	013		PANEL, Side		4			
3	P	93685	002		FILLER	1	1			
4	P	17589	045		WASHER, Flat	4	4			
5	P	31705	045		LOCKWASHER, Shakeproof, #10	4	4			
6	P	2960	042		NUT, Hex, #10-32	4	4			
7	P	33708	041		SCREW, Flat Head, #10-32 x 5/8	4	4			
8	P	93590	001		ANGLE, Extension	2	2			
9	P	84297	001		STRIP, Sponge	2	2			
10	P	43255	091		SCREW, Round Head, 1/4-20 x 1-1/4	6	6			
11	P	84298	001		CATCH, Magnetic (Not shown)	16	16			

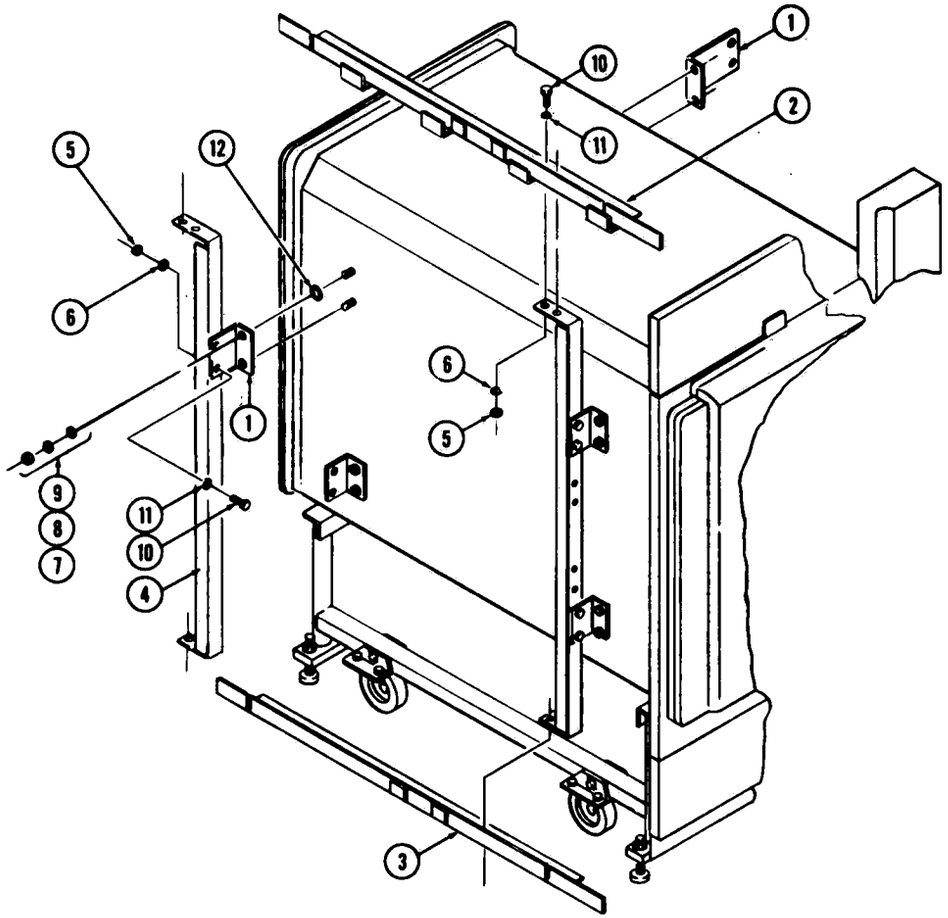


Figure 8-4. CABINET ASSEMBLY: Double Door, Recessed (Part 2 of 2).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-4-	P	146471	001		CABINET ASSEMBLY: 48" DD, Recessed, Part 2 of 2	X			
	P	146480	002		CABINET ASSEMBLY: 60" DD, Recessed, Part 2 of 2		1		
1	P	93583	002		SUPPORT, Angle	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	009		ANGLE WELDMENT, Upper Mounting, L.H.	1			
	P	136467	011		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	015		ANGLE WELDMENT, Lower Mounting, L.H.	1			
	P	136467	017		ANGLE WELDMENT, Lower Mounting, L.H.		1		
4	P	146631	001		ANGLE, Vertical	4	4		
5	P	3097	041		NUT, Hex, 1/4-20	32	32		
6	P	76230	091		LOCKWASHER, Shakeproof, 1/4	32	32		
7	P	3099	042		NUT, Hex, 3/8-16	16	16		
8	P	52149	045		LOCKWASHER, Shakeproof, 3/8	16	16		
9	P	5503	045		WASHER, Flat	16	16		
10	P	37321	051		SCREW, Hex Head, 1/4-20 x 1	32	32		
11	P	49134	061		WASHER, Flat, 1/4	32	32		
12	P	17349	041		WASHER, Flat	16	16		

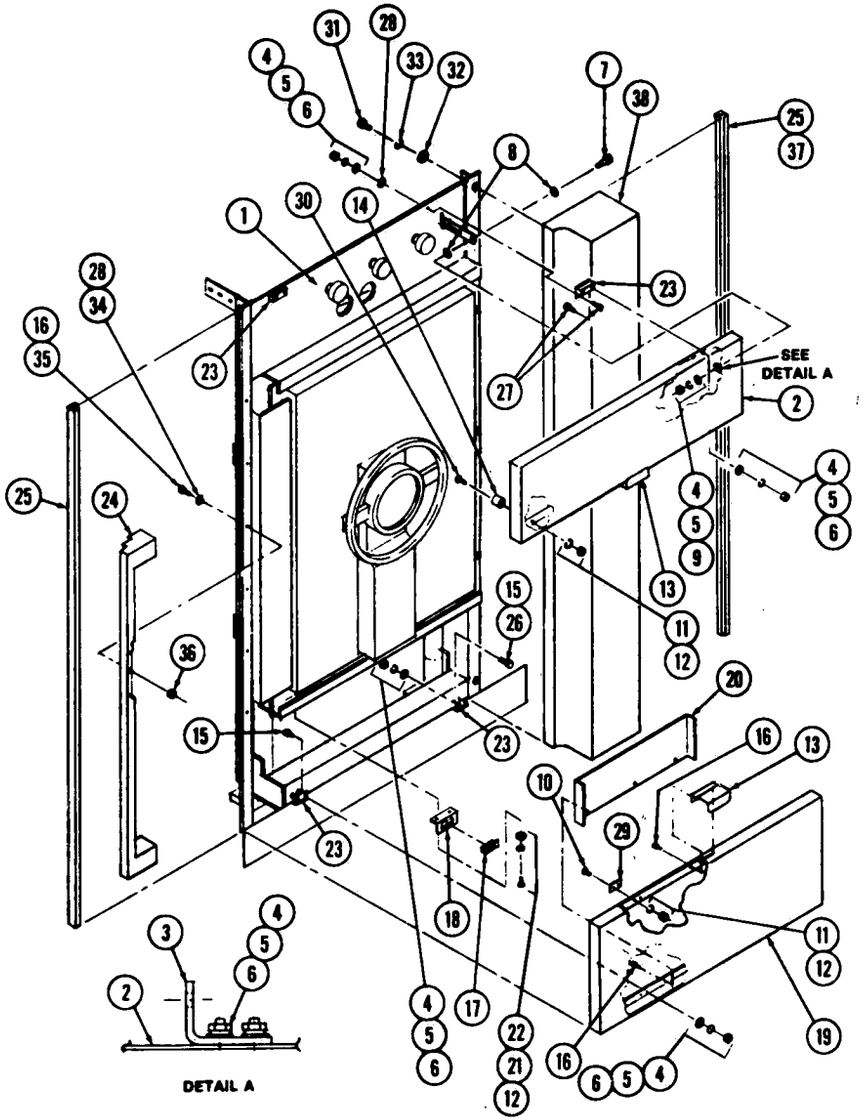


Figure 8-5. PANEL ASSEMBLY: Operating End.

FIG. & INDEX NO.	PART NUMBER	SVC	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				
			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				
			CONTROL COLUMN ASSEMBLY (See Fig. 8-55)		1			

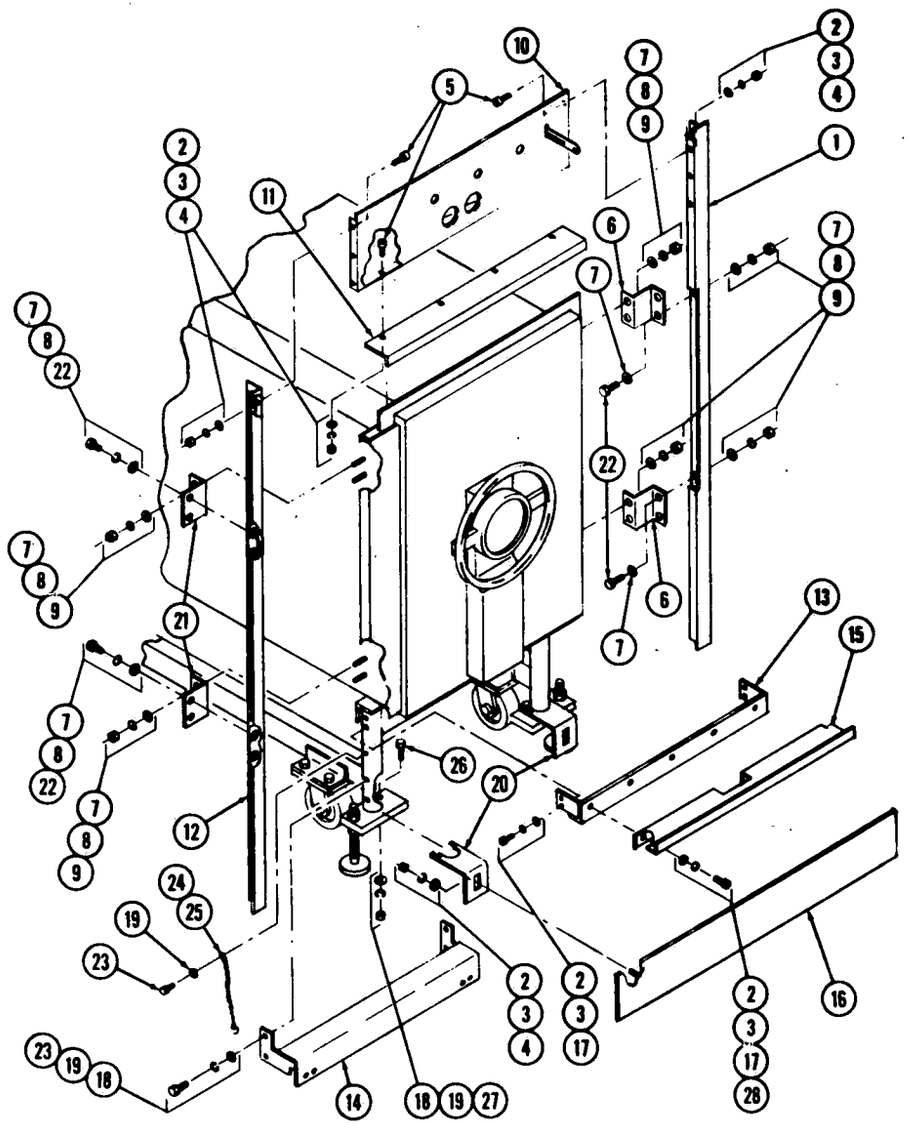


Figure 8-6. SUB PANELS: Operating End.

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, Weldment, Top (See Fig. 8-7) L.H.		1		
	P	146242	002		PANEL, Weldment, Top (See Fig. 8-7) R.H.	1		1	
	P	146649	192		PANEL, Weldment, Top (See Fig. 8-7) L.H.		1		1
	P	146649	193		PANEL, Weldment, Top (See Fig. 8-7) R.H.			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

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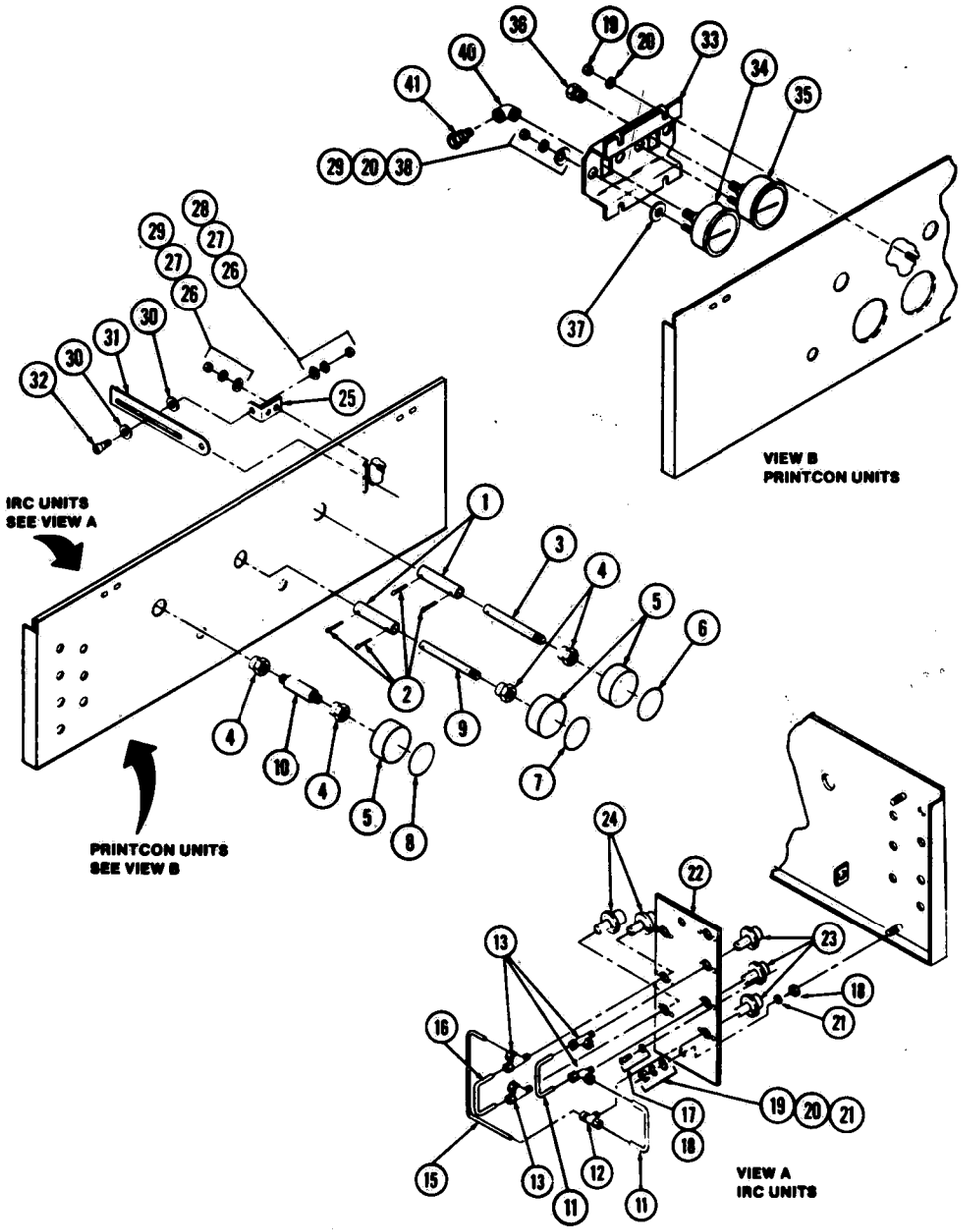


Figure 8-7. TOP CONTROL PANEL: Operating End.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-7-					TOP CONTROL PANEL: Operating End					
					Units with Indictor-Recorder	X				
					Units with Printcon		X			
1	P	45524	045		COUPLING	2	2			
2	P	46038	061		PIN, Cotter	4	4			
3	P	45493	043		ROD, Valve Extension	1	1			
4	P	8605	042		NUT, Valve	4	4			
5	P	54899	091		KNOB, Valve	3	3			
6	P	90323	091		DECAL, Water Supply	1	1			
7	P	90322	091		DECAL, Steam Supply	1	1			
8	P	90576	091		DECAL, Steam Pressure, Hi-Lo	1	1			
9	P	83868	001		ROD, Valve Extension	1	1			
10	P	83869	001		ROD, Extension	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.	4				
14					Not Used					
15	P	129059	001		TUBE	1				
16	P	82713	001		TUBE	1				
17	P	3984	041		SCREW, Round Head, #6-32 x 3/8	10				
18	P	5469	041		WASHER	10				
19	P	3097	041		NUT, Hex, 1/4-20	8	4			
20	P	19678	045		LOCKWASHER	10	8			
21	P	10445	091		WASHER, Flat	14				
22	P	93724	001		PLATE, Mounting	1				
23	P	83865	001		SWITCH, Pressure (PS1, PS2, PS3)	3				
24	P	83866	001		SWITCH, Vacuum (VS1, VS2)	2				
25	P	83543	001		BRACKET, Pivot	2	1			
26	P	5561	091		WASHER, Flat	3	3			
27	P	19677	041		LOCKWASHER	3	3			
28	P	43287	091		NUT, Hex, #10-24	2	1			
29	P	2960	042		NUT, Hex, #10-32	2	6			
30	P	48781	091		WASHER, Nylon	4	2			
31	P	93120	001		ARM, Pivot	1	1			
32	P	83547	001		SCREW, Shoulder, Socket Head, #10-24	2	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			

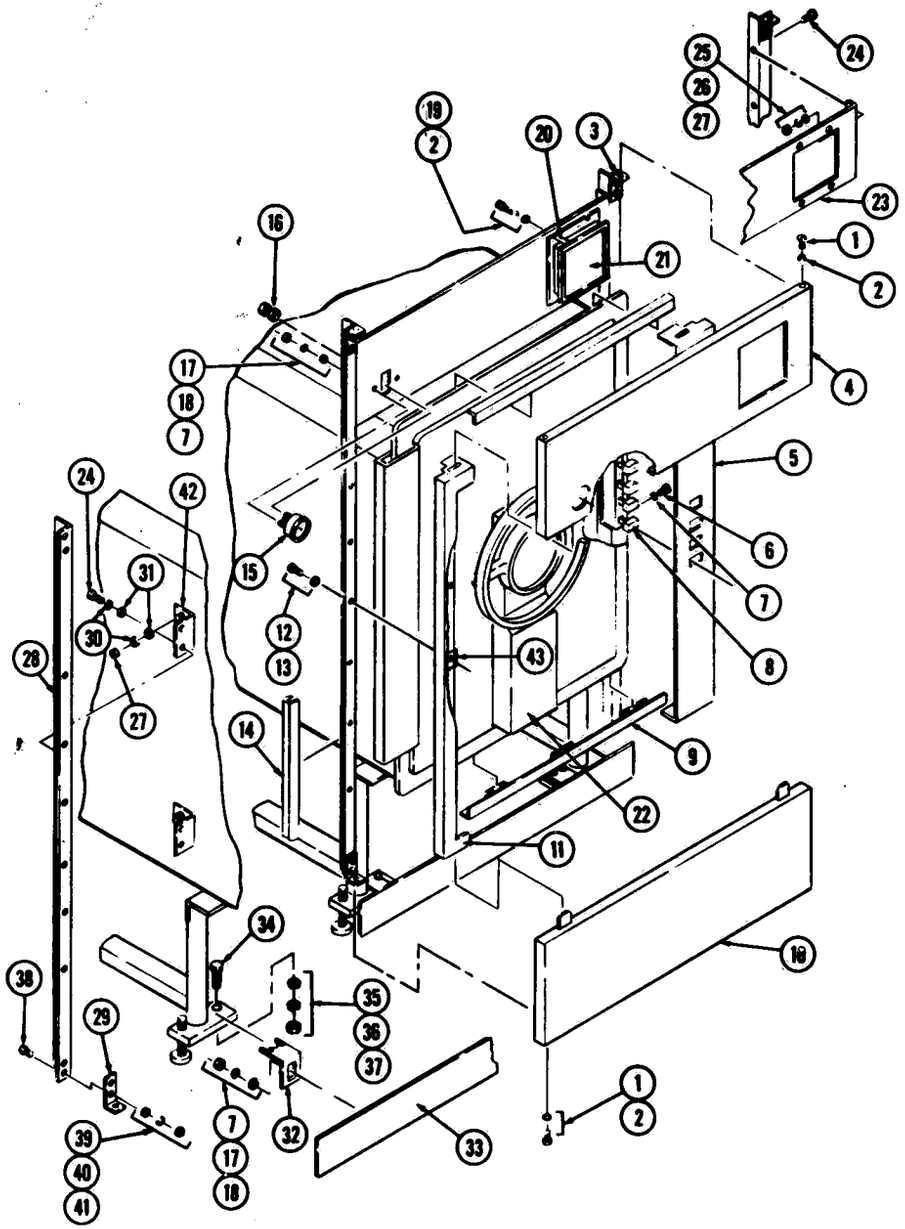


Figure 8-8. PANEL AND CONTROL ASSEMBLY: Non-operating End.

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 x 1 2	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. 8-19)		1		
	P	146540	002		SWITCH ASSEMBLY, R.H. (See Fig. 8-19)	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	146534	001		PANEL, Control	1	1	1	1
	P	764317	536		• LAMP (Box of 10)	A/R	A/R	A/R	A/R
22					COVER AND HANDWHEEL ASSEMBLY (See Fig. 8-20)	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

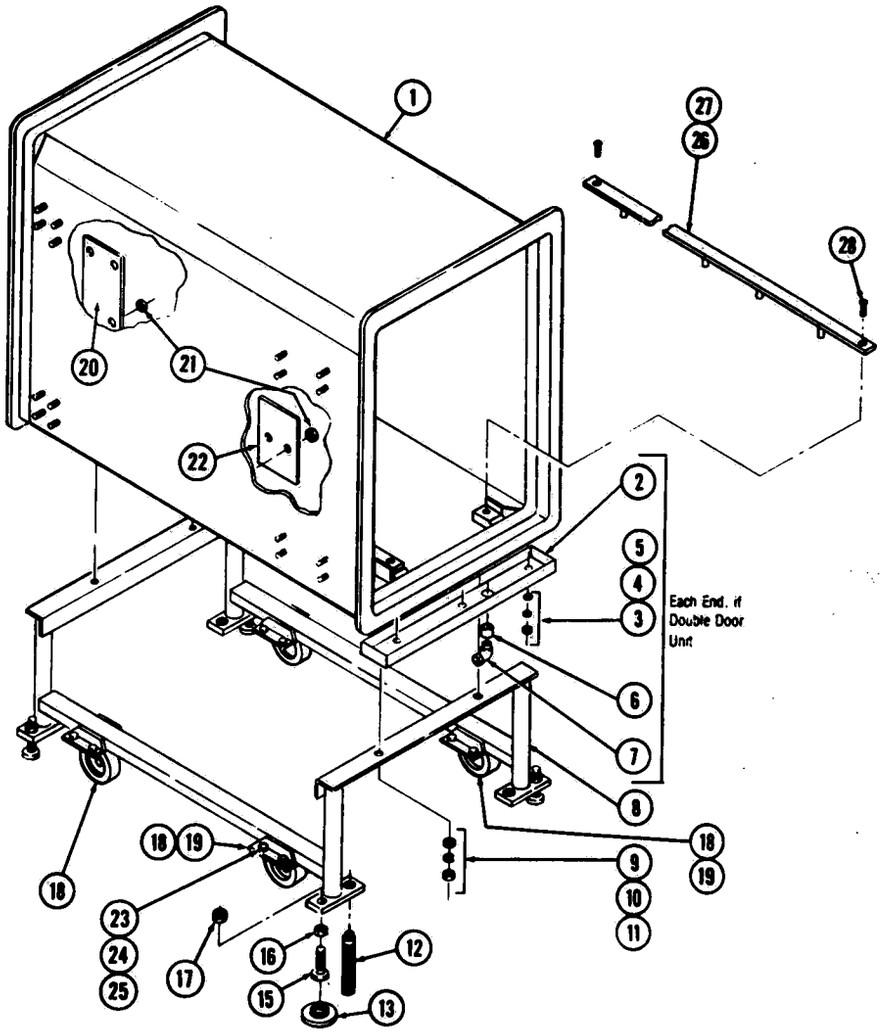


Figure 8-9. SHELL AND STAND ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
8-9-			SHELL & STAND ASSEMBLY: 24x36x36 SD	X					
			SHELL & STAND ASSEMBLY: 24x36x48 SD		X				
			SHELL & STAND ASSEMBLY: 24x36x60 SD			X			
			SHELL & STAND ASSEMBLY: 24x36x36 DD				X		
			SHELL & STAND ASSEMBLY: 24x36x48 DD					X	
			SHELL & STAND ASSEMBLY: 24x36x60 DD						X
1			SHELL ASSEMBLY, 36	1			1		
			SHELL ASSEMBLY, 48		1			1	
			SHELL ASSEMBLY, 60			1			1
2	P 93678 001		TROUGH ASSEMBLY, Drip	1	1	1	1	1	1
3	P 84426 001		GASKET	3	3	3	3	3	3
4	P 31599 041		WASHER	3	3	3	3	3	3
5	F 24987 041		NUT, Hex, 1/4-20	3	3	3	3	3	3
6	P 84373 001		ADAPTER	1	1	1	1	1	1
7	P 23972 091		FITTING, Ell	1	1	1	1	1	1
8	P 136463 001		STAND, End Weldment	2	2	2	2	2	2
9	P 81673 003		WASHER, Flat	4	4	4	4	4	4
10	P 19680 041		WASHER, Lock	4	4	4	4	4	4
11	P 150475 594		NUT, Hex, 3/8-16	4	4	4	4	4	4
12	P 129352 001		JACK	4	4	4	4	4	4
13	P 90423 091		PAD, Foot	4	4	4	4	4	4
14			(Not Used)						
15	P 91054 045		FOOT WELDMENT	4	4	4	4	4	4
16	P 3107 045		NUT, Hex, 1/8	4	4	4	4	4	4
17	P 3123 045		HALF NUT, Hex, 1/8	4	4	4	4	4	4
18	P 91058 091		CASTER, Swivel	2	4	4	2	4	4
19	P 129352 079		CASTER, Fixed	2			2		
20	P 56396 224		BAFFLE	1	1	1	1	1	1
21	P 8648 061		NUT, Hex, 1/4-20	6	6	6	6	6	6
22	P 56396 225		BAFFLE	1	1	1	1	1	1
23	P 3872 091		BOLT, Hex Head	16	16	16	16	16	16
24	P 3101 091		NUT, Hex	16	16	16	16	16	16
25	P 19681 045		WASHER, Lock	16	16	16	16	16	16
26	P 89669 061		TRACK, 36	2					
	P 89629 061		TRACK, 48		2				
	P 89630 061		TRACK, 60			2			
	P 89628 061		TRACK, 36				2		
	P 89627 061		TRACK, 48					2	
	P 89626 061		TRACK, 60						2
27	P 89666 061		PIN, Track	A/R	A/R	A/R	A/R	A/R	A/R
	P 89667 061		PIN, Track	A/R	A/R	A/R	A/R	A/R	A/R
	P 89668 061		PIN, Track	A/R	A/R	A/R	P		A/R
	P 35382 061		PIN, Track			A/R	A/R	A/R	A/R
28	P 39915 061		SCREW, Flat Head, 3/8-16 x 5/8	4	4	4	4	4	4

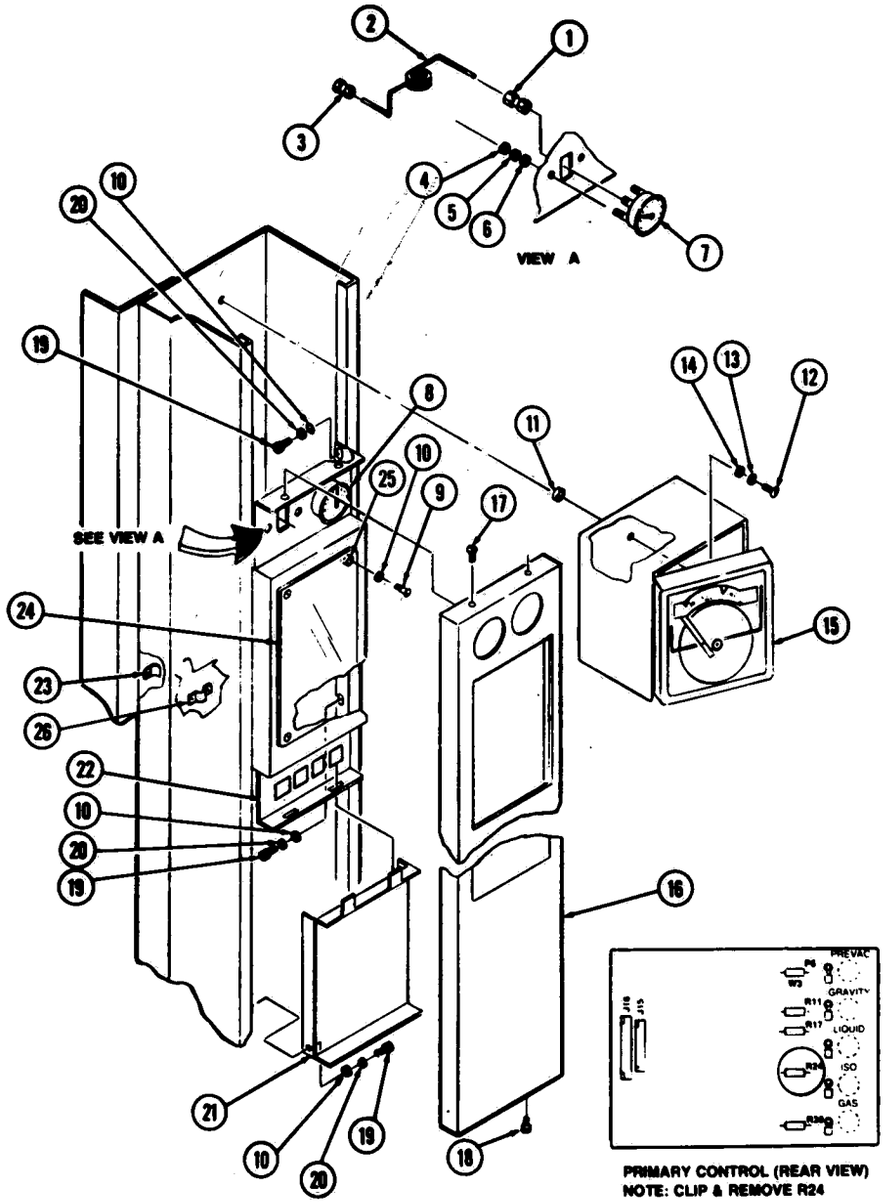


Figure 8-10. CONTROL COLUMN (Part 1 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY	
					UNITS WITH INDICATOR-RECORDER		
8-10-					CONTROL COLUMN: Manual Door (Part 1 of 3)	X	
					CONTROL COLUMN: Power Door (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	P	89053	091		TUBING, 1/8 O.D. x 40	1	1
3	P	129276	001		FITTING, Bulkhead, 1/8 O.D.T.	2	2
4	P	2959	041		NUT, Hex, #10-32	4	4
5	P	31705	045		LOCKWASHER	4	4
6	P	5511	091		WASHER, Flat	4	4
7	P	90525	091		GAUGE, Chamber Pressure	1	1
	P	77121	091		• LENS	1	1
8	P	90730	091		GAUGE, Jacket Pressure	1	1
	P	77121	091		• LENS	1	1
9	P	78025	042		SCREW, Button Head Socket, #8-32 x 7/8	4	4
10	P	17796	091		WASHER, Flat	10	10
11	P	84391	001		SPACER, Recorder	2	2
12	P	4005	041		SCREW, Round Head, 1/4-20 x 1-3/4	2	2
13	P	26962	061		LOCKWASHER	2	2
14	P	31599	041		WASHER, Flat	2	2
15	P	83518	001		RECORDER (See Fig. 8-13)	1	1
16	P	146483	002		FRONT PANEL ASSEMBLY, Manual Door	1	
	P	146483	001		FRONT PANEL ASSEMBLY, Power Door		1
17	P	45323	042		SCREW, Button Head Socket, #8-32 x 3/8	2	2
18	P	23431	041		SCREW, Socket Head Cap, #10-32 x 3/8	2	2
19	P	50527	061		SCREW, Socket Head Cap, #8-32 x 1/2	6	6
20	P	79588	001		LOCKWASHER	8	8
21	P	146490	001		PANEL, Secondary Assembly (See Fig. 8-16)	1	1
22	P	146484	001		PANEL, Mounting	1	
	P	146494	001		SWITCH ASSEMBLY, Door Operating (See Fig. 8-18)		1
23	P	451263	091		CLIP, Locking, Capillary	3	3
24	P	146163	001	*	CONTROL PANEL, Primary (Units Prior to 2/84) (Repaired P-764193-005)	1	1
	P	146645	226	*	CONTROL PANEL, Primary (Units After 2/84) (Repaired P-764193-033)	1	1
25	P	764317	536		• LAMP (Box of 10)	A/R	A/R
26	P	84390	001		SPACER, Primary Control	4	4
	P	431152	091		CLIP, Locking, Wire	8	8

* Although Primary Control Panels were changed 2/84, both panels are interchangeable with each other on Vacamatic sterilizers.

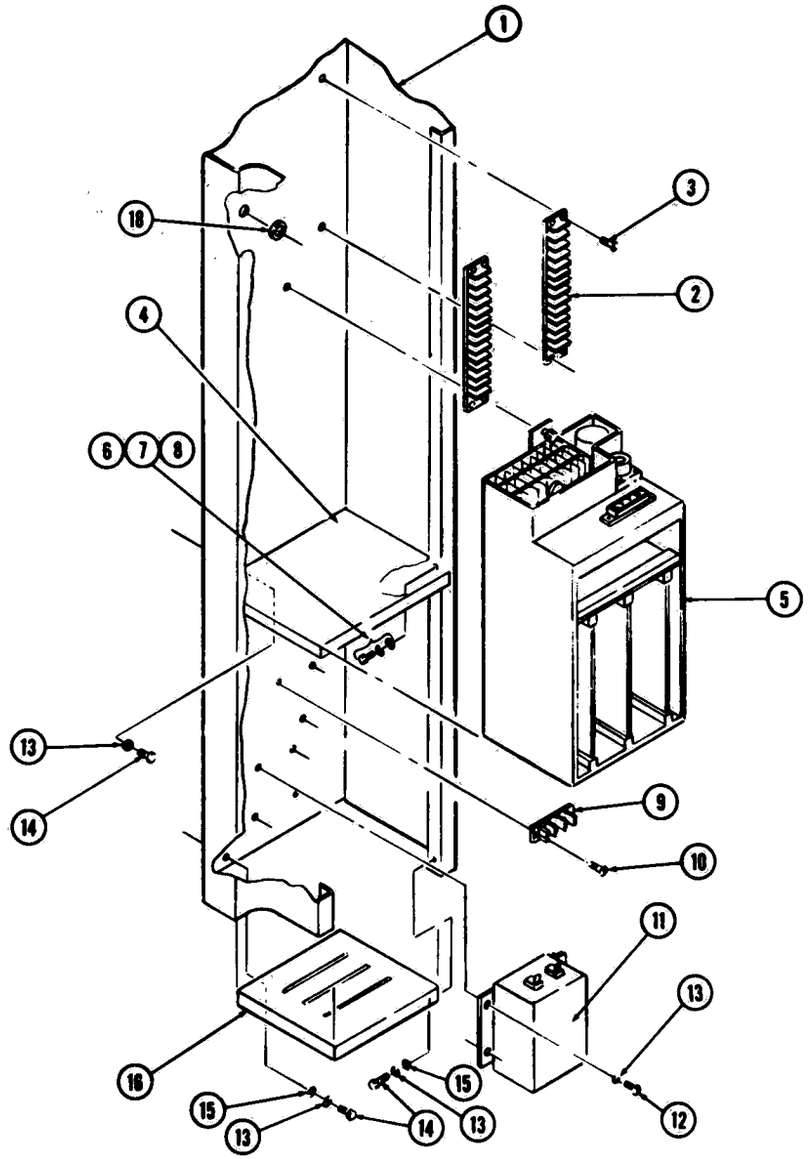


Figure 8-11. CONTROL COLUMN (Part 2 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-11-					CONTROL COLUMN (Part 2 of 3)	
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 (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	041		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

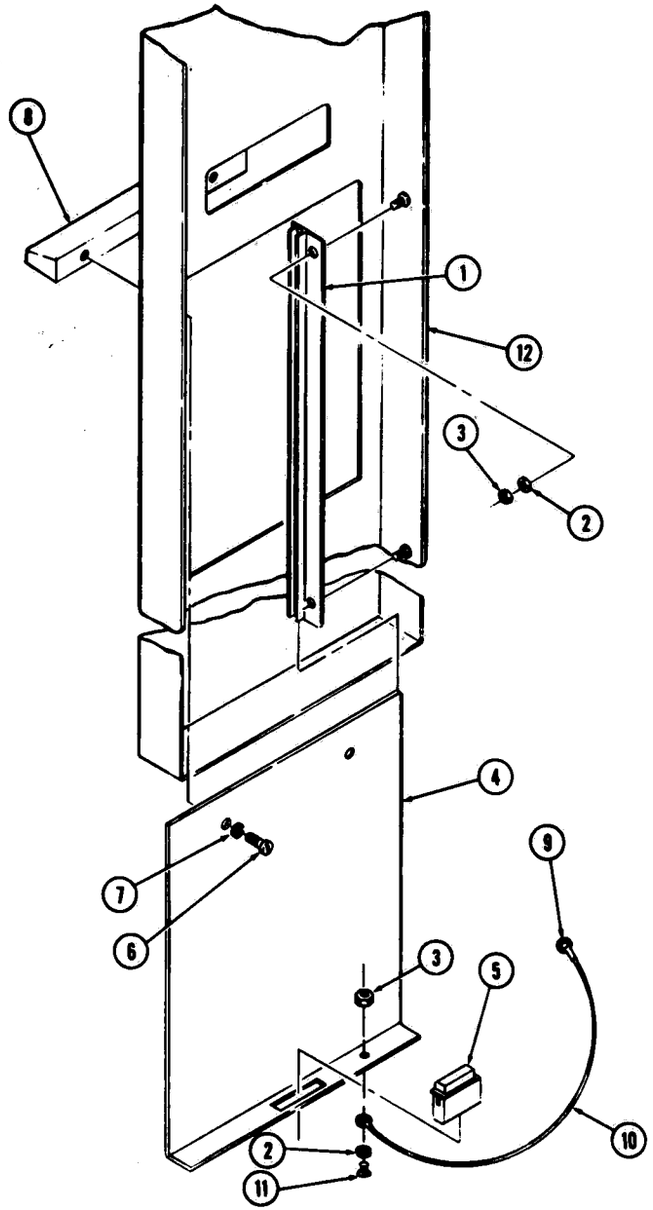


Figure 8-12. CONTROL COLUMN (Part 3 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			S V C	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
12					PANEL ASSEMBLY, Front, Manual Door (See Fig. 8-10)	
					PANEL ASSEMBLY, Front, Power Door (See Fig. 8-10)	

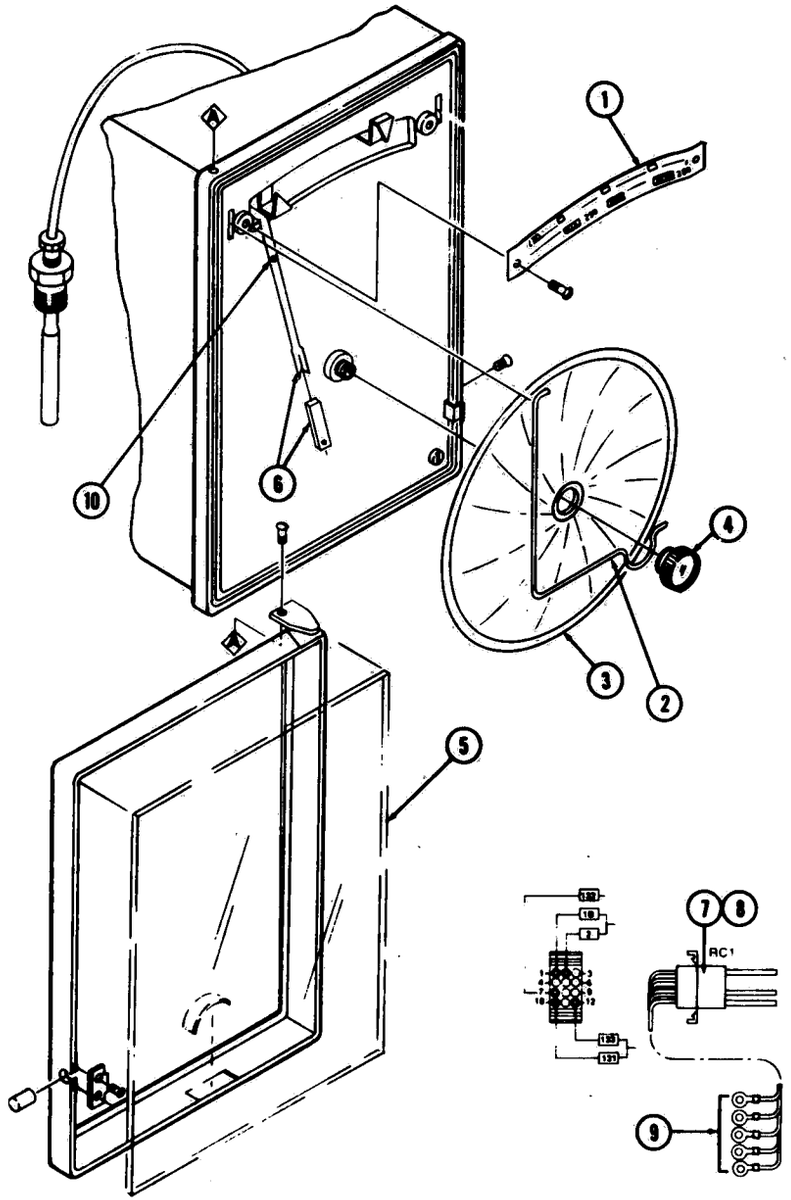


Figure 8-13. INDICATOR-RECORDER-CONTROLLER (Part 1 of 2).

FIG. & INDEX NO.		PART NUMBER		S V C	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	A/R
4	P	764315	319		HUB, Chart	1
5	P	76960	091		GLASS, Door	1
	P	751364	091		• TAPE, Mounting	1
6	P	764315	403		KIT, Red Pen (Contains 6 Pens and 1 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
10	P	750002	091		SCREW, Pen Arm	1

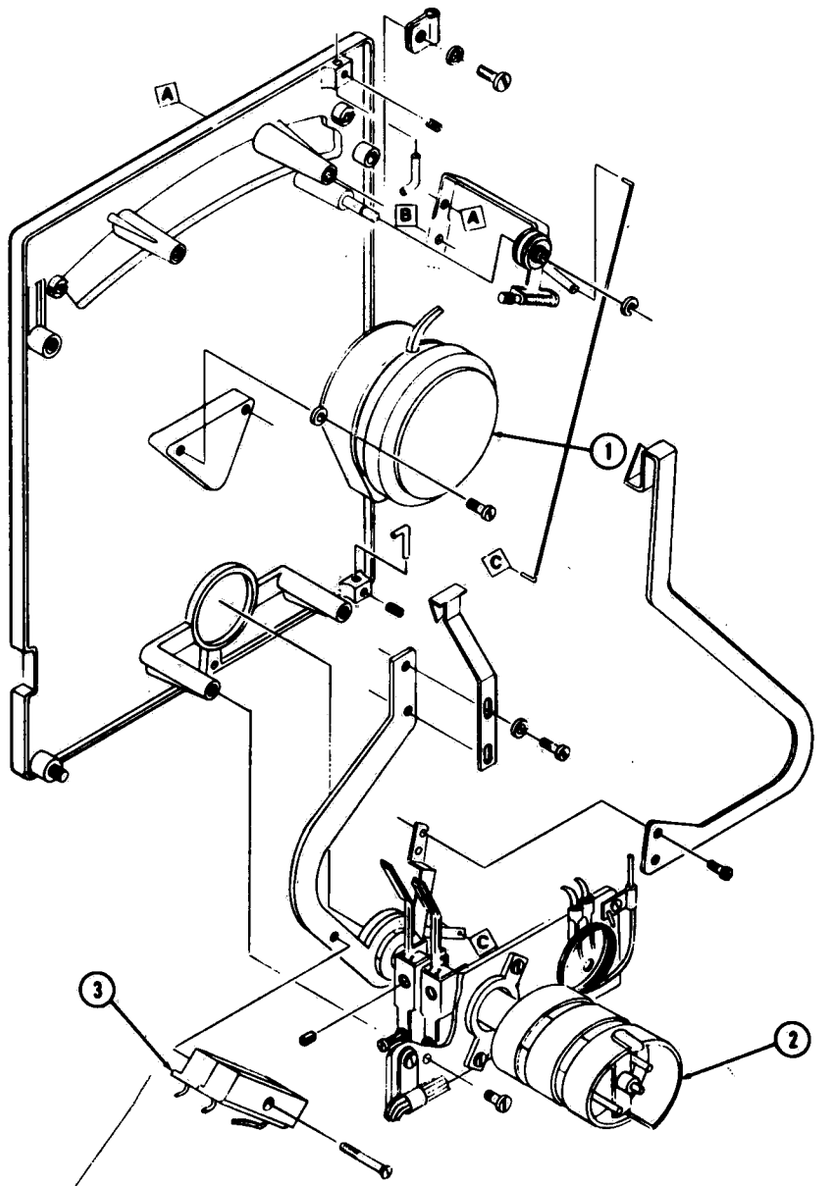
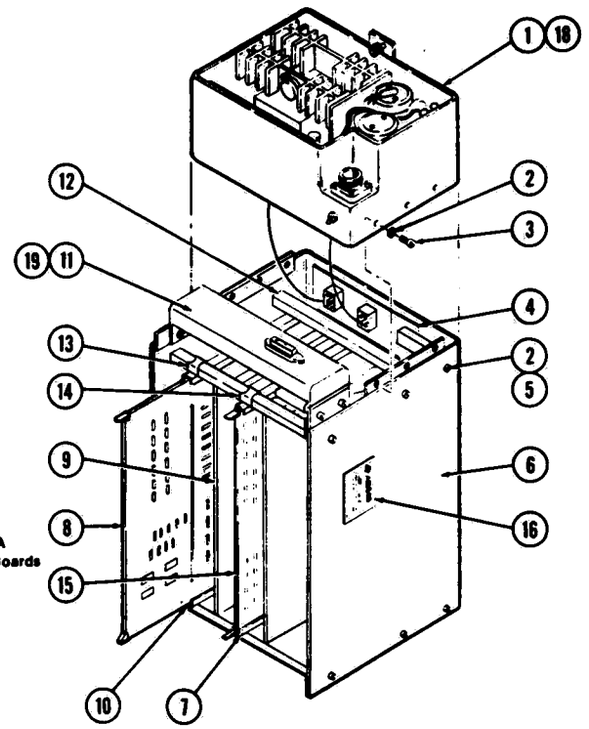


Figure 8-14. INDICATOR-RECORDER-CONTROLLER (Part 2 of 2).

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, Copper, 20 Foot	1
2	P	764315	326		THERMAL SYSTEM ASSEMBLY, Stainless, 20 Foot	1
3	P	78878	091		SWITCH, Reed (For units with 060 in model number)	2
3	P	752094	091		ARM AND MAGNET (For units with 060 in model number) ...	2
3	P	764316	560		SWITCH, Reed (For units with 062 in model number)	2
3	P	764316	561		ARM AND MAGNET (For units with 062 in model number)	2



See Figure 8-15A
To Identify PC Boards

Figure 8-15. MAIN CONTROL ASSEMBLY.

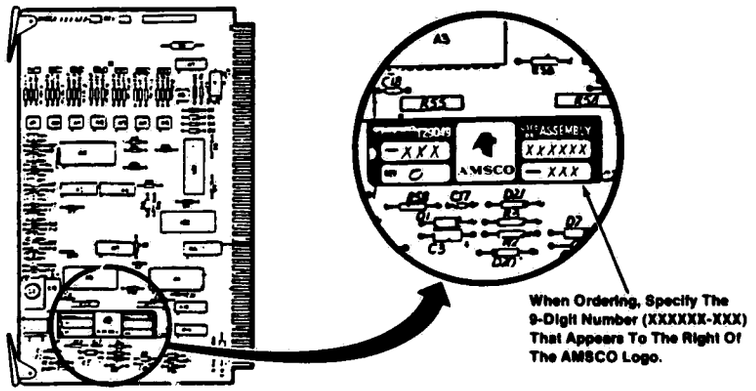
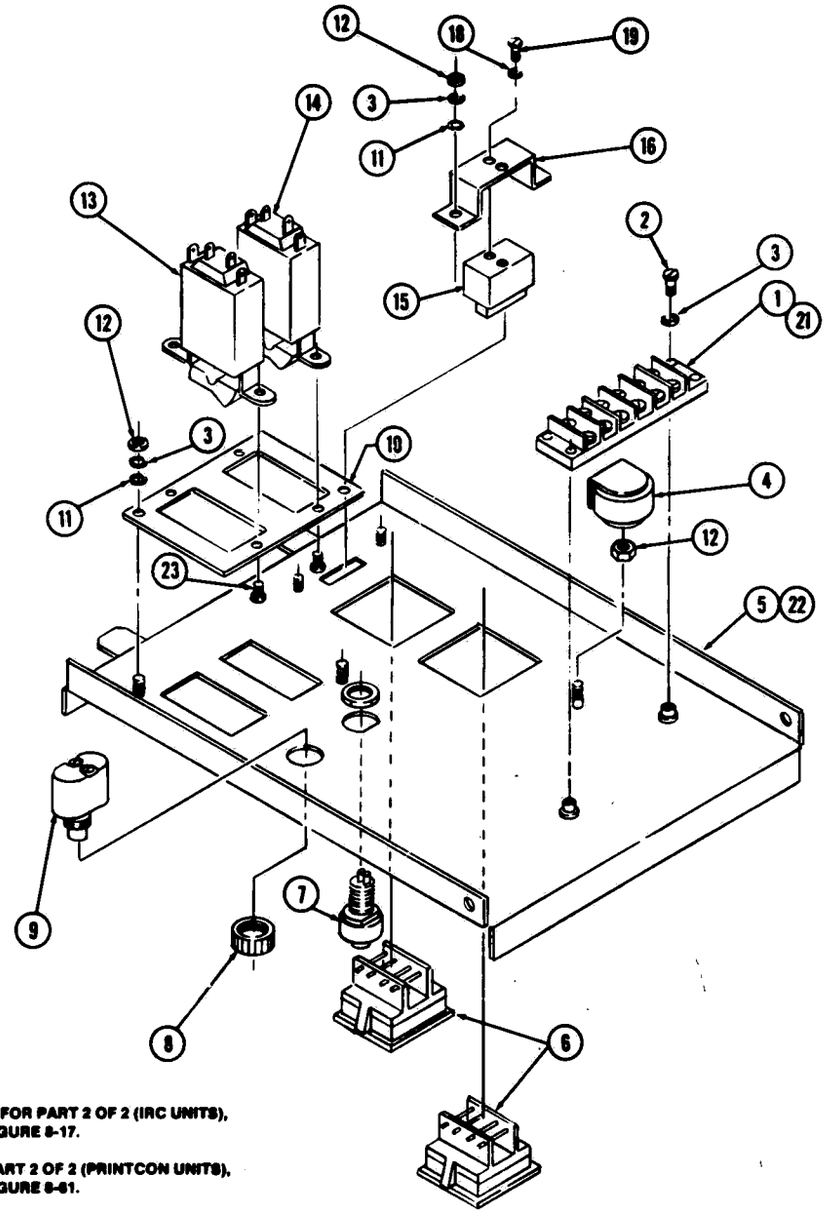


Figure 8-15A. IDENTIFYING PC BOARD PART NUMBERS.

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-15-					MAIN CONTROL ASSEMBLY				
					Units with Indicator-Recorder (Manufactured Before 9 26 85)	X			
					Units with Printcon		X		
					Units with Indicator-Recorder (Manufactured After 9 26 85)			X	
1	P	764320	963		POWER SUPPLY KIT	1			
	P	764317	835	•	FUSE, (F401) 3 Amp - 125 Volt	1			
	P	764317	778	•	FUSE, (F402) 3 Amp - 250 Volt	1			
	P	146645	042		POWER SUPPLY ASSEMBLY (Units Prior 12/87)		1	1	
	P	764317	833		• FUSE, 2 Amp, 125 V (F4)		1	1	
	P	764317	834	•	• FUSE, Pico, 4 Amp, 125 V (F2)		1	1	
	P	764317	836	•	• FUSE, Pico, 1/2 Amp, 125 V (F3)		1	1	
	P	764317	449	•	• FUSE, Cartridge, Slo-Blo, 2 Amp, 250 V (F402)		1	1	
2	P	84116	002		LOCKWASHER, #6	22	30	30	
3	P	40357	001		SCREW, Self Tapping, #6 x 1/4	10	18	18	
4	P	760244	002		MOTHER BOARD ASSEMBLY	1	1	1	
5	P	84117	002		SCREW, Pan Head, #6-32 x 5/16	12	12	12	
6	P	93762	001		CHASSIS	1	1	1	
7	P	84225	001		GUIDE, Card	6	4	4	
8					PC BOARD, CPU (See Fig. 8-15A)	1	1	1	
9	P	84667	001		PLATE, Side	1	2	2	
10	P	84226	001		TAB, Locking	9	6	6	
11	P	136714	001		RECEPTACLE BRACKET ASSEMBLY	1			
12	P	129030	001		BAR, PC Board, Guide	4	4	4	
13	P	83528	001		TAB, ID Locking, CPU	1	1	1	
14	P	83528	007		TAB, ID Locking, I/O 1	1	1	1	
15					PC BOARD, I/O (See Fig. 8-15A)	1	1	1	
16	P	129352	050		PLATE, Identification	1	1	1	
17	P	136800	561		HEAT SINK (Not Shown)		1	1	
18	P	141198	310		POWER SUPPLY ASSEMBLY (Units After 12/87)		1		
	P	764321	808	•	• FUSE, Cartridge, 1.25 Amp		1		
	P	764317	833		• FUSE, 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		
		764317	449	•	• FUSE, Cartridge, Slo-Blo, 2 Amp, 250 V (F402)		1		
19	P	93900	045		RECEPTACLE BRACKET ASSEMBLY		1	1	
				•	Box of Five.				
8-15A					IDENTIFYING P.C. BOARD PART NUMBERS To order replacement boards, note part number identified from Figure 8-15A.				



NOTE: FOR PART 2 OF 2 (IRC UNITS), SEE FIGURE 8-17.

FOR PART 2 OF 2 (PRINTCON UNITS), SEE FIGURE 8-61.

Figure 8-16. SECONDARY CONTROL PANEL (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-16-					SECONDARY CONTROL PANEL (Part 1 of 2)					
	P	146490	001		Units with Indicator-Recorder	X				
	P	146649	073		Units with Printcon		X			
1	P	89174	091		BLOCK, Terminal, 15 Amp, 6 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			
	P	764316	608		• KIT, Buzzer Resistor (See Fig. 8-17 or 8-61)	1	1			
5	P	146478	002		PANEL, Secondary	1				
6	P	136315	002		SWITCH, Thumbwheel, 2 Switch Assembly	2	2			
7	P	84400	001		BREAKER, Circuit, CB-2	1	1			
8	P	44155	091		GUARD, Button	1	1			
9	P	48070	091		SWITCH, Pushbutton, PB-1	1	1			
10	P	93757	001		SPACER, Breaker	1	1			
11	P	17589	045		WASHER	4	4			
12	P	3037	041		NUT, Hex, #6-32	5	5			
13	P	84386	001		BREAKER, Circuit, CB	1	1			
14	P	129022	001		SWITCH, Rocker, SW-	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					Not Used					
21	P	90627	091		BLOCK, Terminal		1			
22	P	146649	100		PANEL, Secondary		1			
23	P	27741	041		SCREW, Flat Head, #6-32 x 3/16	4	4			

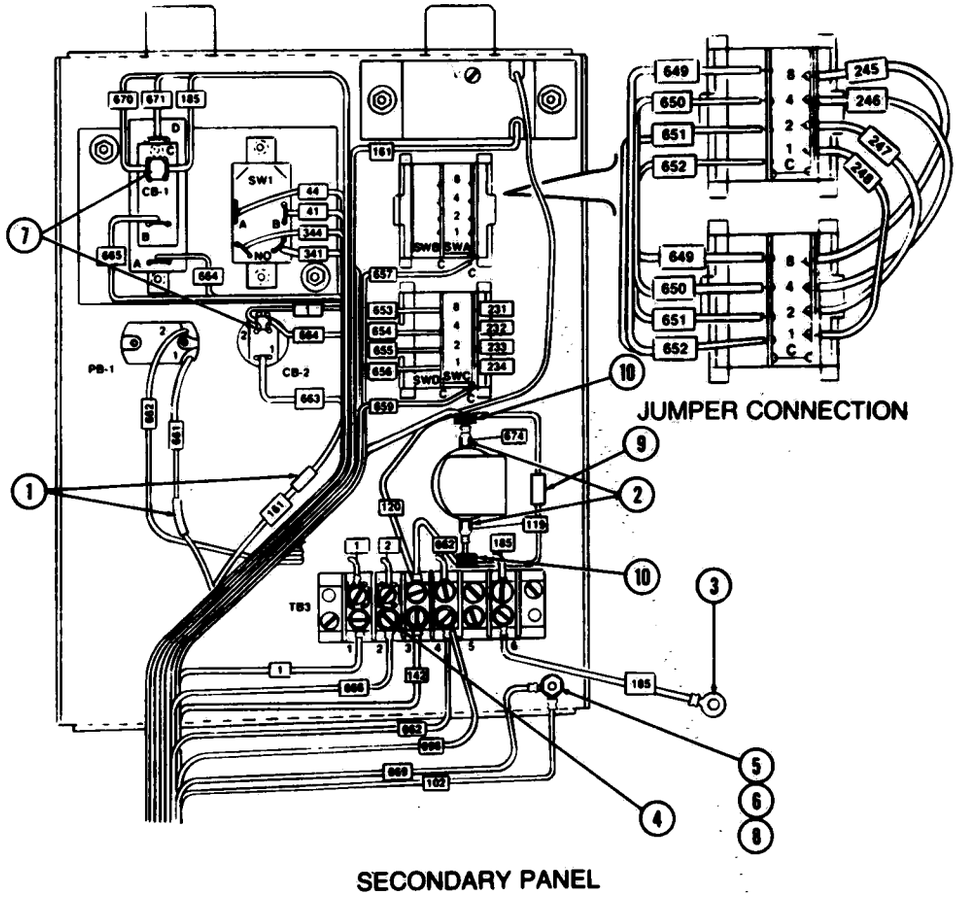
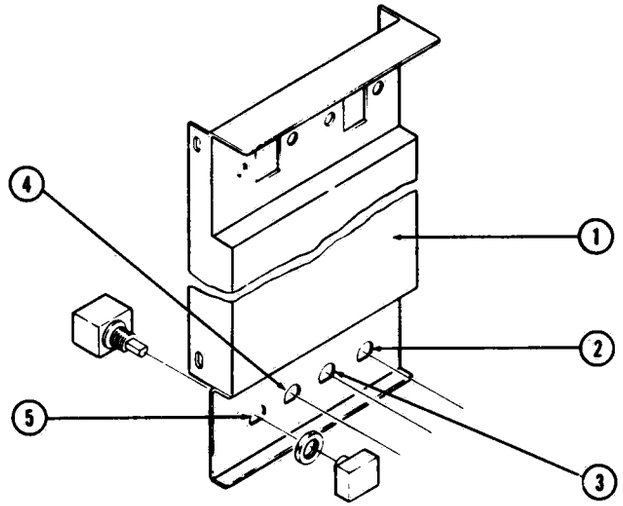


Figure 8-17. SECONDARY CONTROL PANEL (Part 2 of 2). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-17-	P	146490	001		SECONDARY CONTROL PANEL: (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	764316	608		BUZZER RESISTOR KIT	A/R
	P	129318	001		• RESISTOR, 3000 Ohm	1
10	P	150822	015		• SPLICE, Electrotap	2



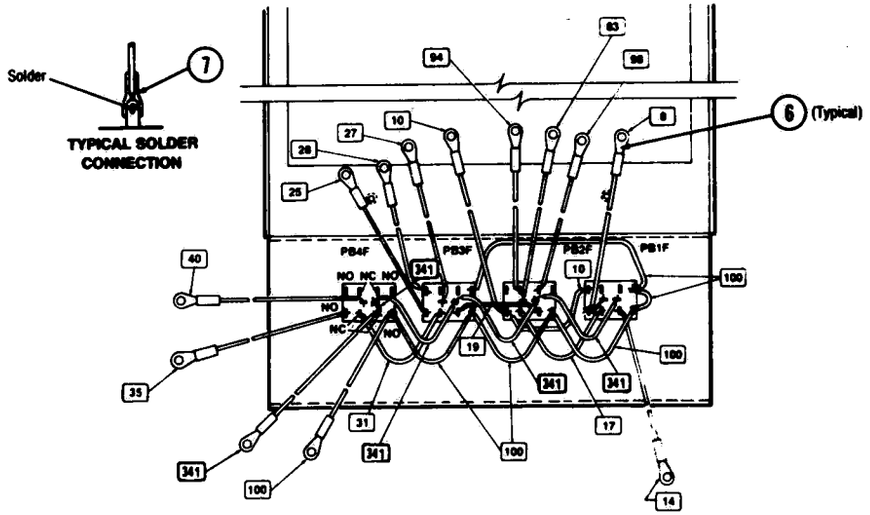


Figure 8-18. SWITCH ASSEMBLY: Operating End Power Door. (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-18-	P	146494	001		SWITCH ASSEMBLY: Operating End Power Door	X
1	P	146484	001		PANEL, Mounting	1
1	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

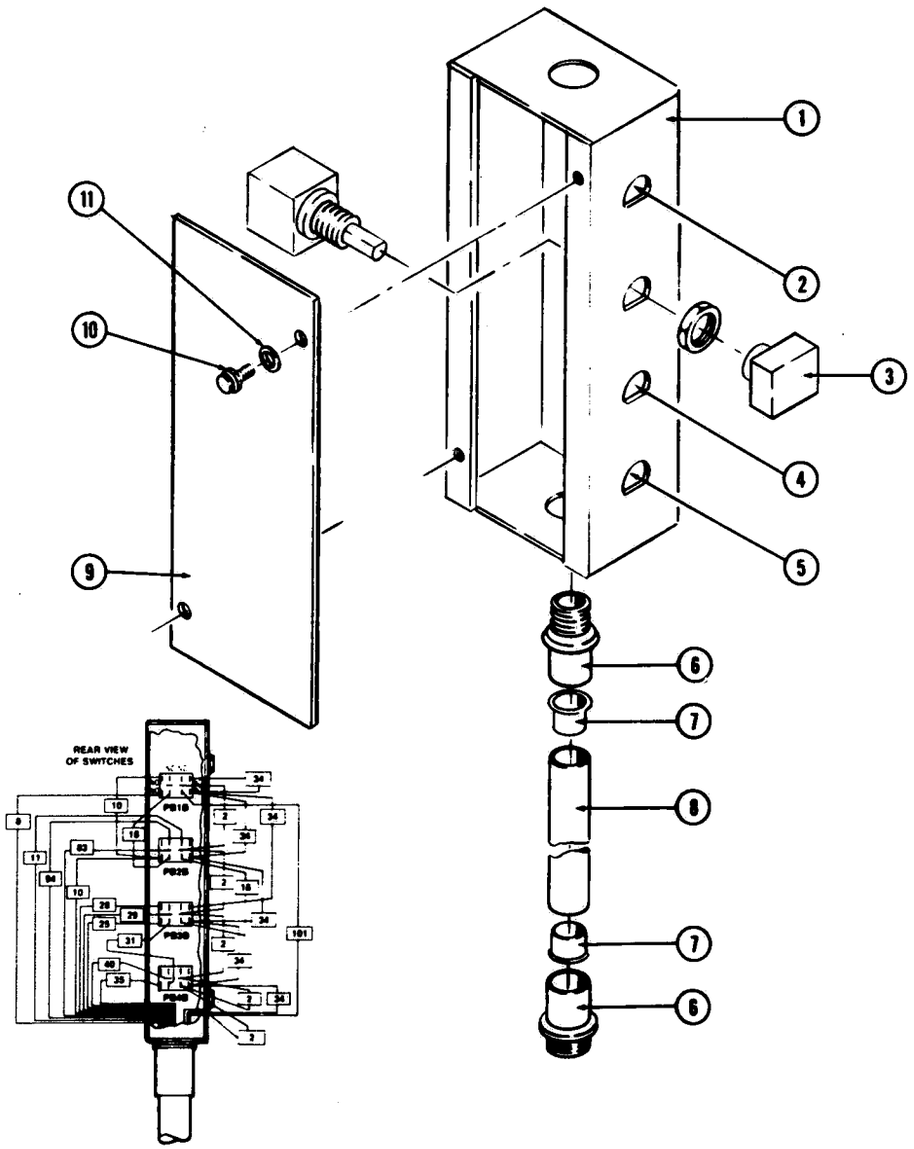


Figure 8-19. SWITCH ASSEMBLY: Non-operating End Power Door.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-19-	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		

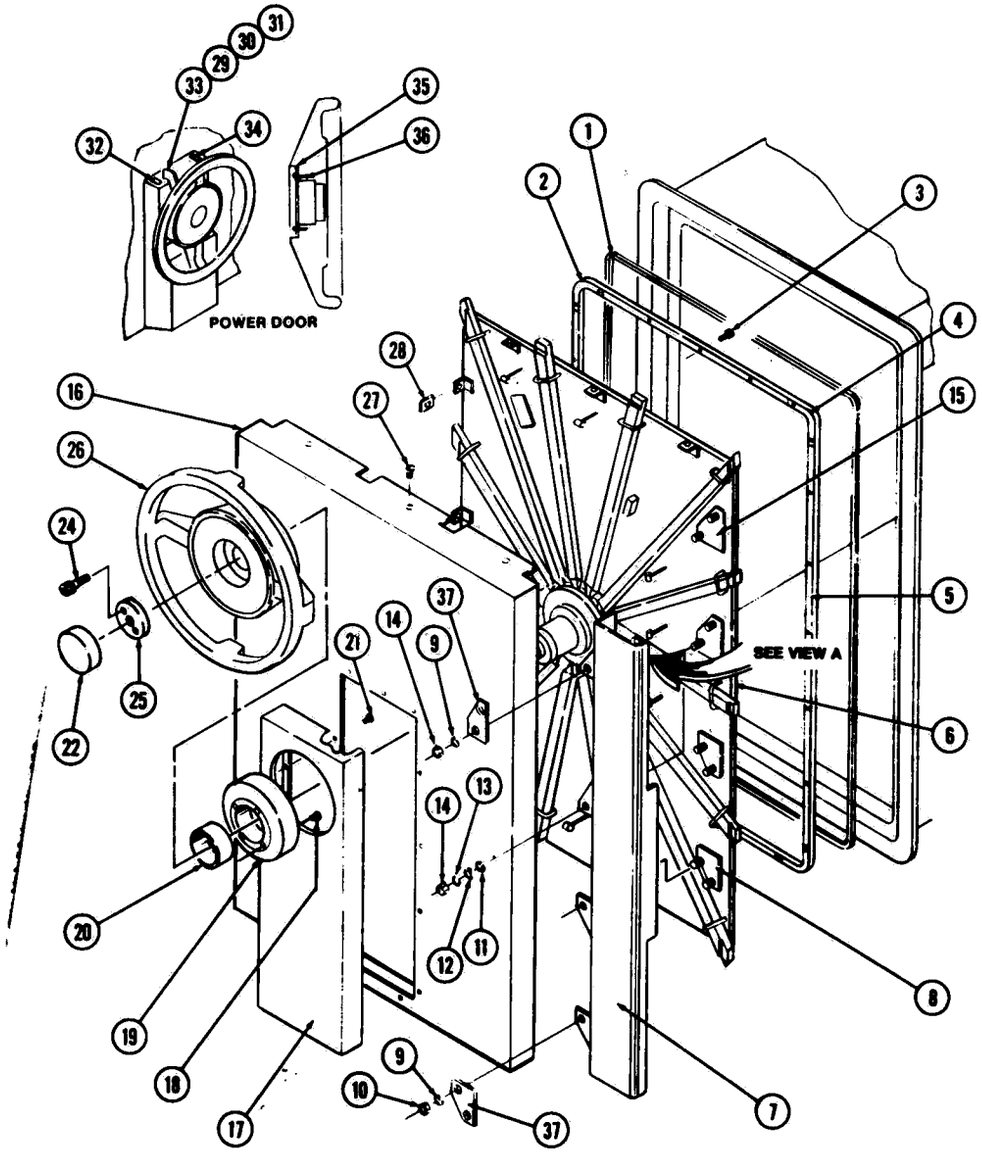


Figure 8-20. COVER AND HANDWHEEL ASSEMBLY: Chamber Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-20-					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. 8-21)	1	1	1	1
7	P	136566	001		HINGE ASSEMBLY, R.H. (See Fig. 8-22)	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, Clutch Rod	1	1	1	1
23					Not Used				
24	P	37891	091		SCREW, Socket Head, #10-24 x 5/8	3	3	3	3
25	P	90376	091		RETAINER, Hand Wheel	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

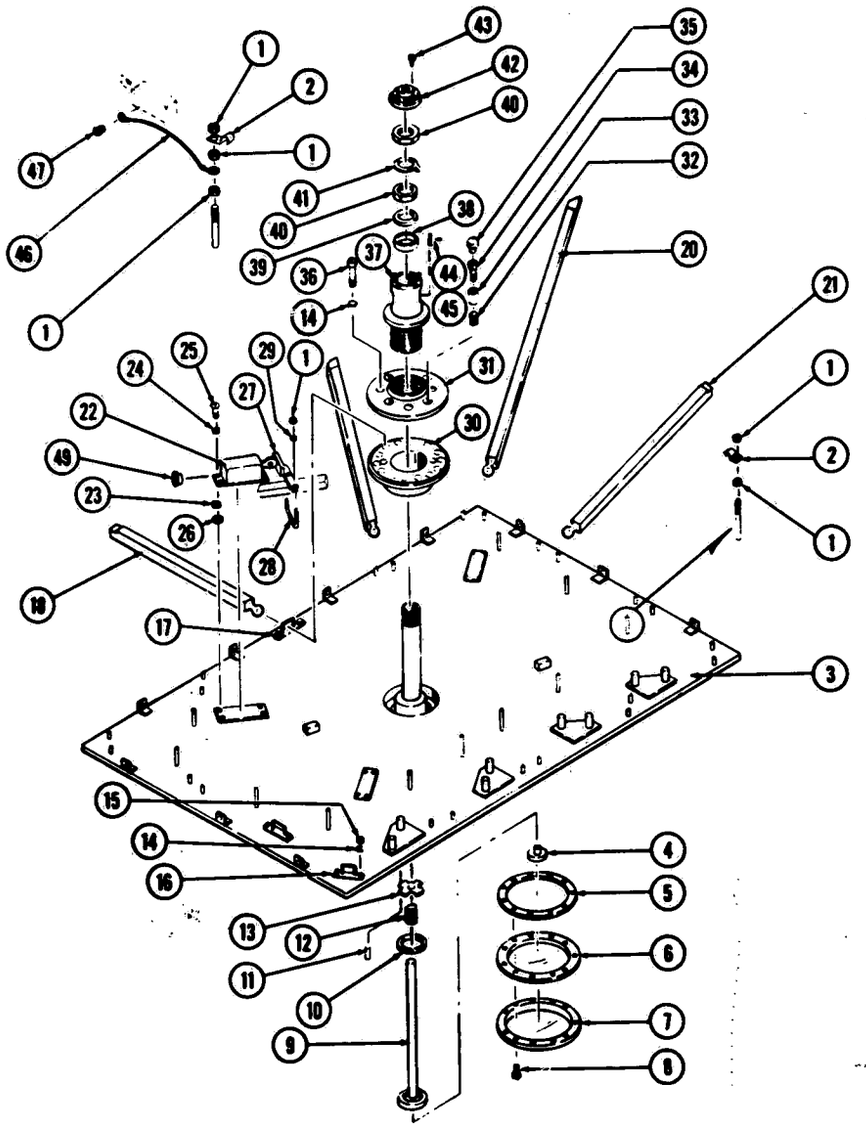


Figure 8-21. DOOR ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-21-	P 149582 091		DOOR ASSEMBLY: 24x36 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, .015" Thick	A/R
	P 150339 002		SHIM, .050" Thick	A/R
14	P 19686 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 92955 001		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 96354 091		SCREW SHAFT ASSEMBLY	1
38	P 90911 091		ROLLER BEARING	1
39	P 90913 091		WASHER, Thrust	1
40	P 90914 091		LOCK NUT	2
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 40625 041		SCREW, Flat Head, #8-32 x 1/2	2
46	P 92949 001		WIRE, Ground	1
47	P 3989 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

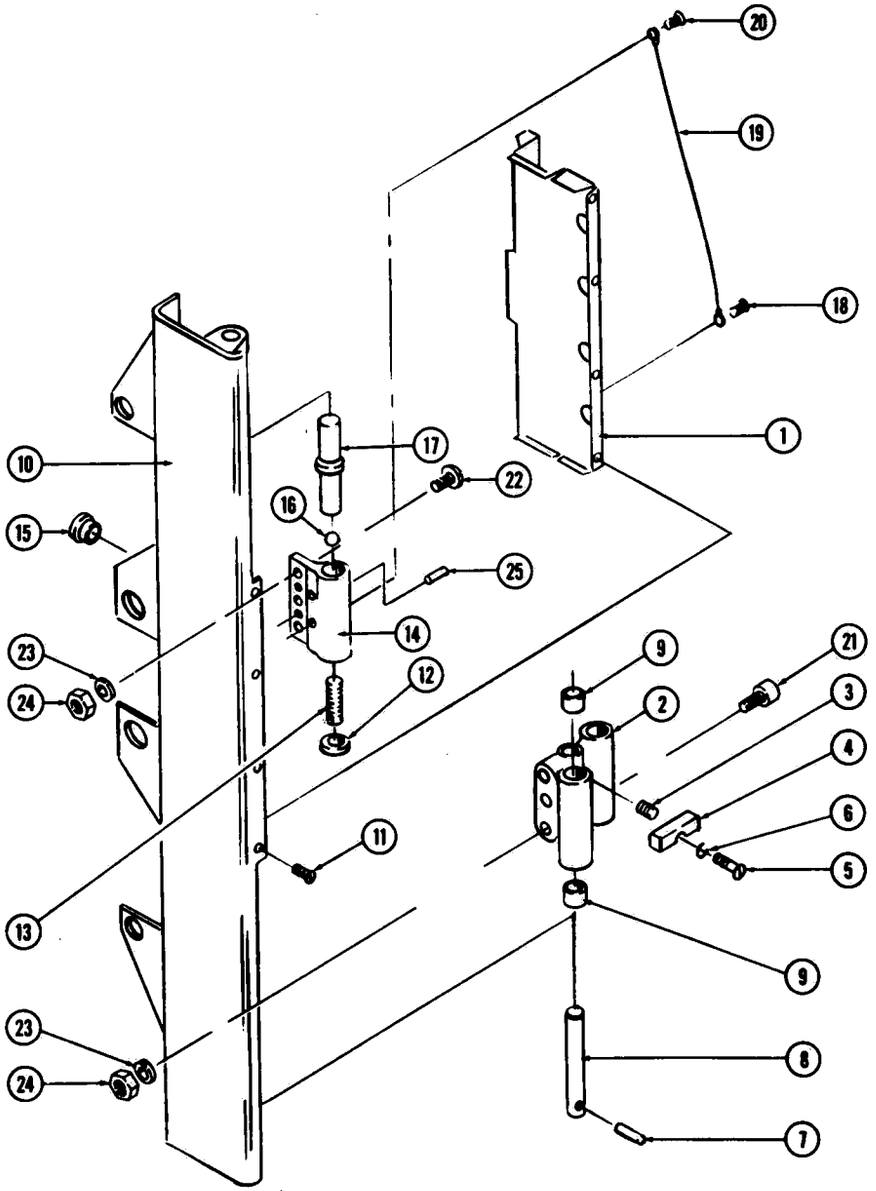
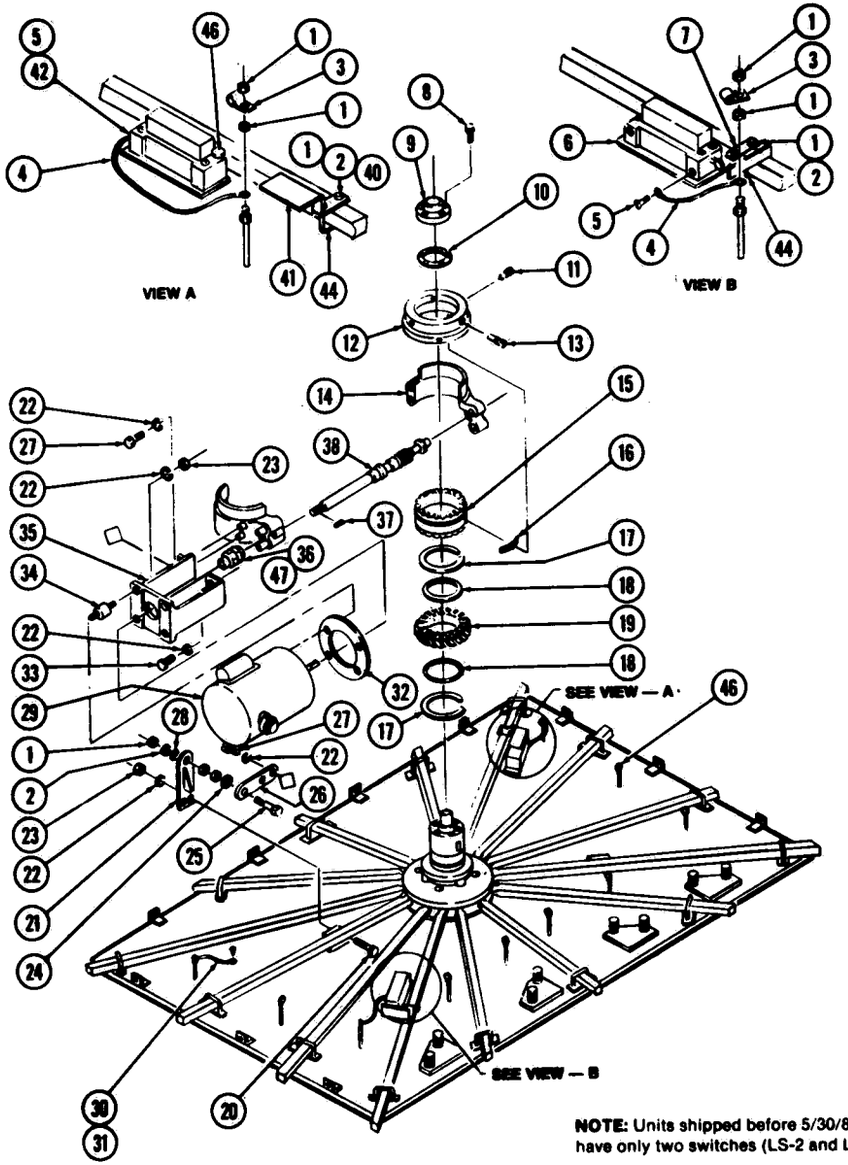


Figure 8-22. HINGE ASSEMBLY: Chamber Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-22-	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 shipped before 5/30/80 have only two switches (LS-2 and LS-3).

Figure 8-23. POWER DOOR PACKAGE.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-23-					POWER DOOR PACKAGE	X
1	P	3039	041		NUT, Hex, #10-24	18
2	P	19677	041		WASHER, Lock	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	92955	001		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 3/4	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	56396	197		MOTOR	1
30	P	9298	041		SCREW, Round Head, #10-32 x 1/2	1
31	P	119057	091		STRAP, Ground	1
32	P	90942	041		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. 8-24)	1
39					Not Used	
40	P	24488	091		WASHER	4
41	P	150822	276		ACTUATOR	1
42	P	19676	041		WASHER, Lock, #8	4
43	P	150455	001		SCREW, Round Head, #8-32 x 1-3/4 (Not Shown)	8
44	P	90935	061		BRACKET, Actuator	1
45	P	80250	091		CONNECTOR	2
46	P	93639	001		SWITCH, Limit, Two Step — Before 5/30/81 (LS-2)	1
	P	91328	091		SWITCH, Limit, One Step — After 5/30/81 (LS-3, LS-5)	2
47	P	150811	001		SLEEVE, Reducer	1

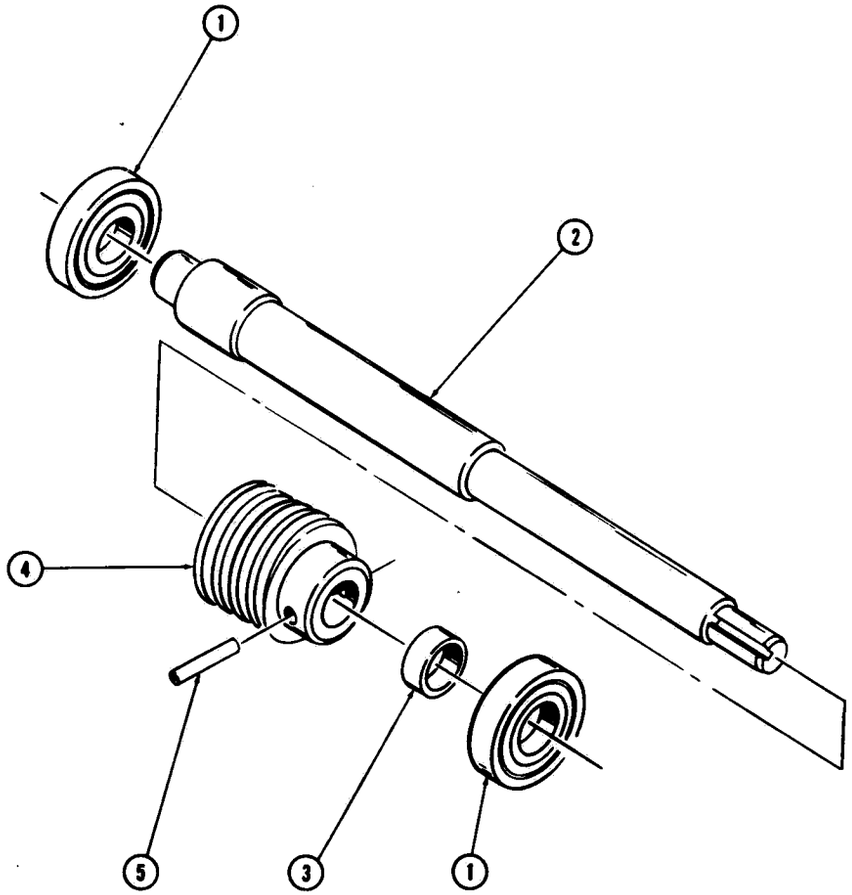


Figure 8-24. WORM SHAFT ASSEMBLY: Power Door.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-24-	P	90924 091		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

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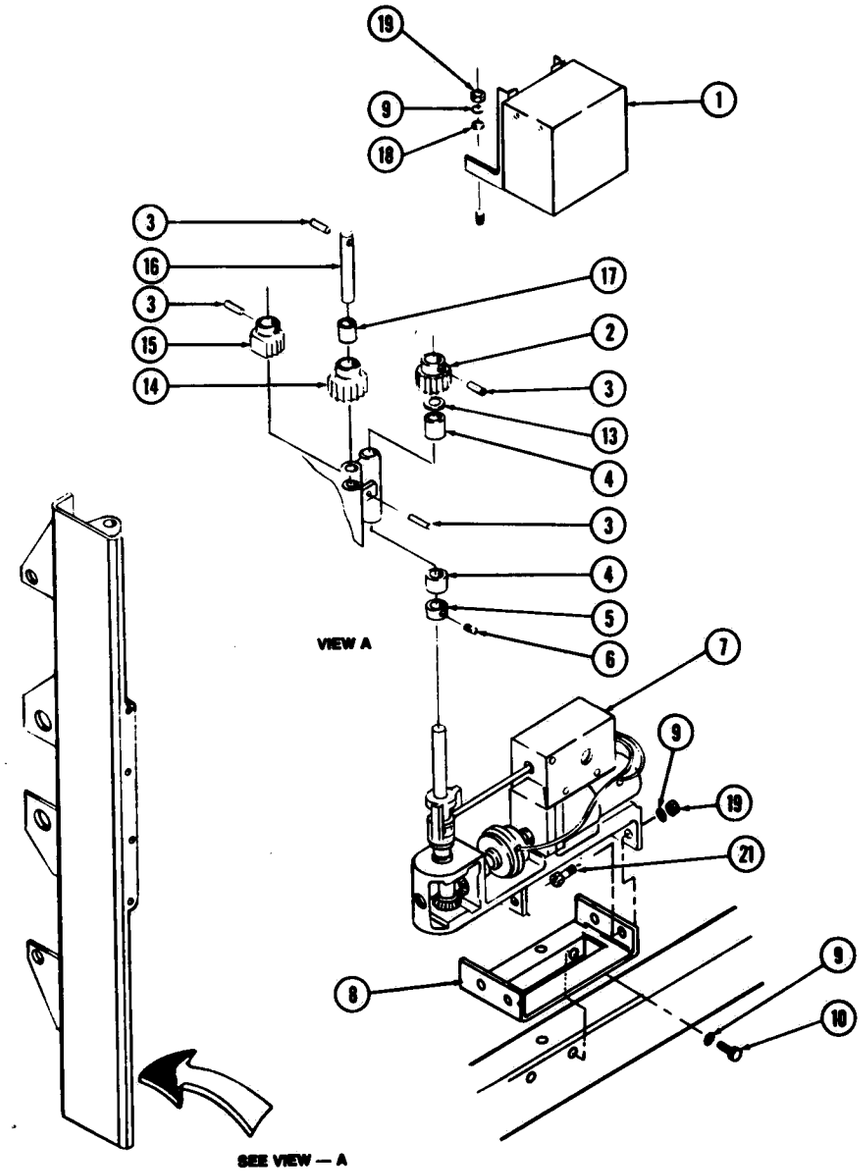


Figure 8-25. HINGE PACKAGE: Power Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-25-					HINGE PACKAGE: Power, Single Door Units	X				
					HINGE PACKAGE: Power, Double Door Units		X			
1	P	146563	001		RELAY BOX (See Fig. 8-28)	1				
	P	146563	002		RELAY BOX (See Fig. 8-28)		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. 8-26)	1	2			
8	P	136800	034		BRACKET	1	2			
9	P	19678	045		LOCKWASHER	4	8			
10	P	50677	045		SCREW, Cap, 1/4-28 x 5/8	4	8			
11	P	90992	091		LOCKWASHER, Tooth Type	4	8			
12	P	4782	061		SCREW, Cap, 3/8-16 x 7/8	3	6			
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	6	25			
21	P	81667	015		SCREW, Hex Head, 1/4-20 x 3/4	4	8			

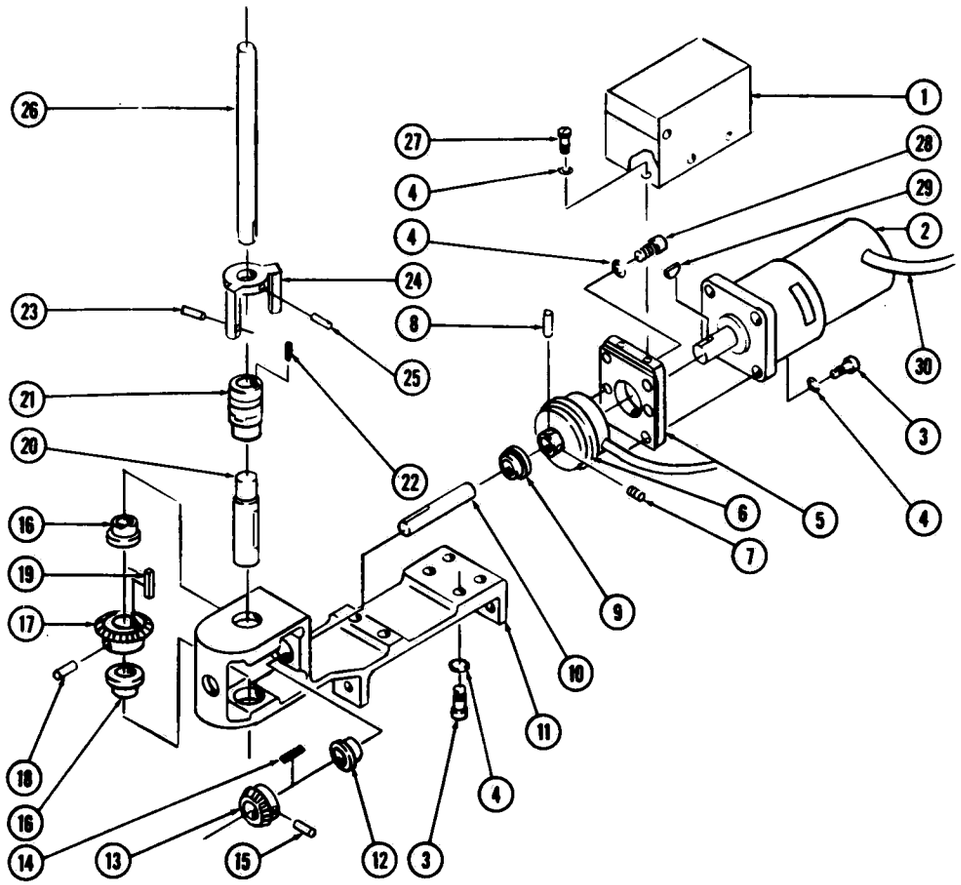


Figure 8-26. HINGE DRIVE ASSEMBLY: Power Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-26-					HINGE DRIVE ASSEMBLY, Power Door	X
1	P	133842	091		SWITCH ASSEMBLY (See Fig. 8-27)	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

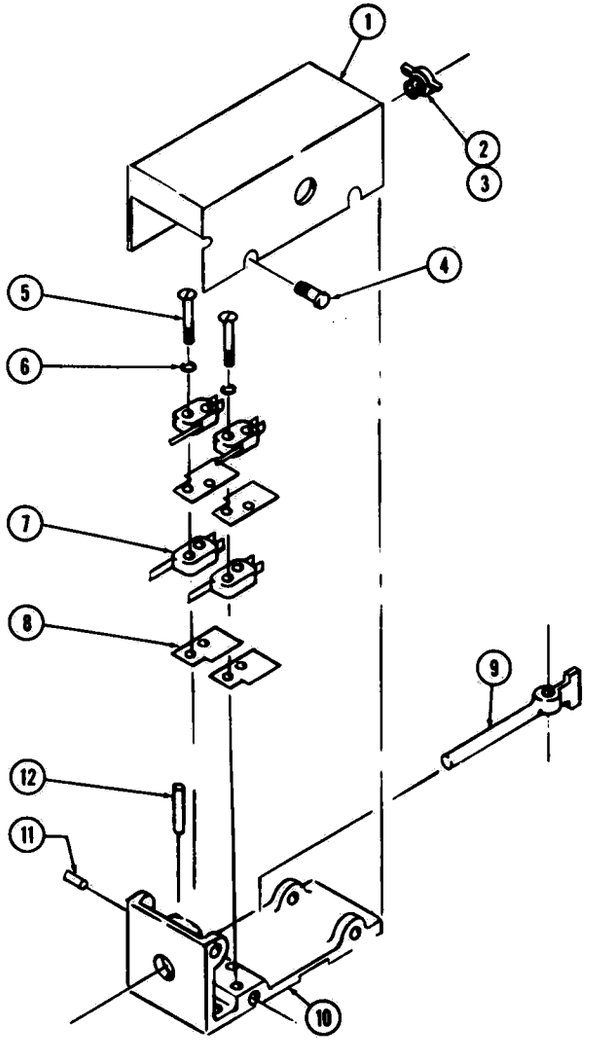


Figure 8-27. SWITCH ASSEMBLY: Power Door Hinge Drive.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-27-					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

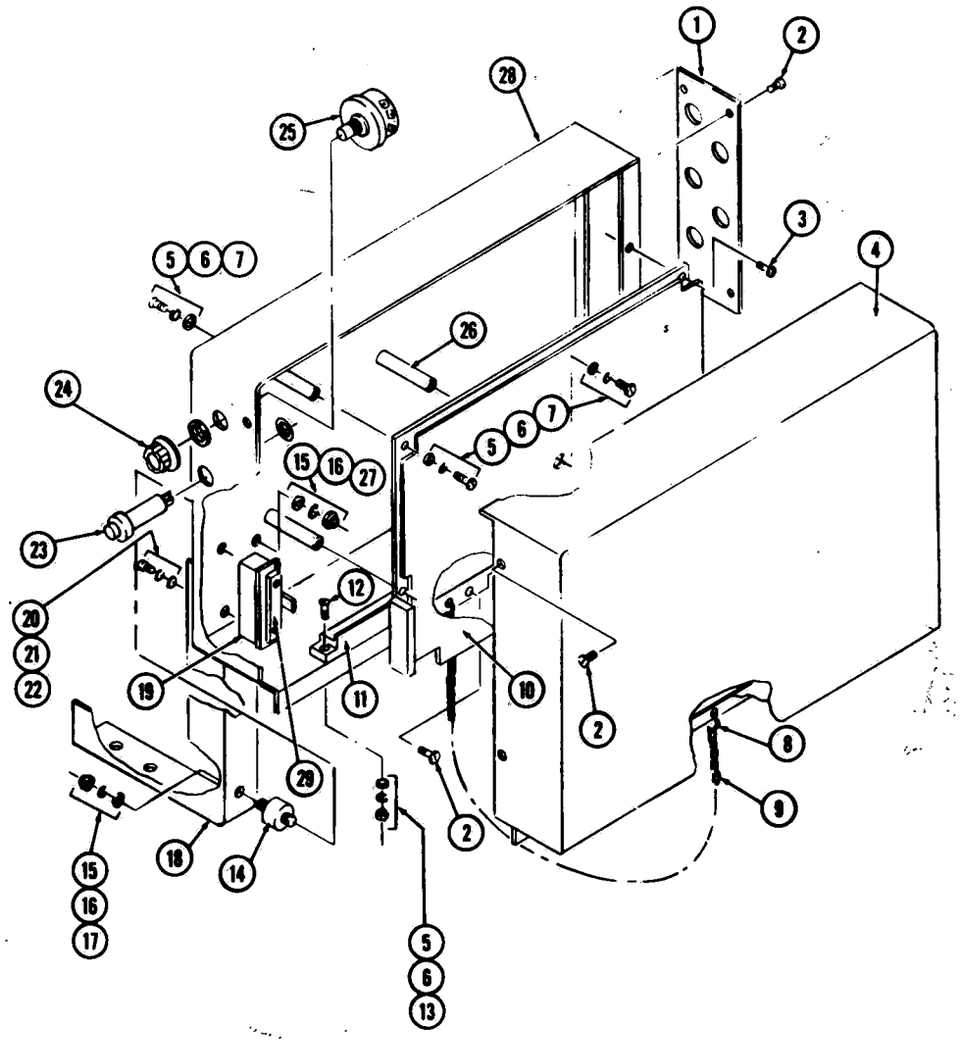
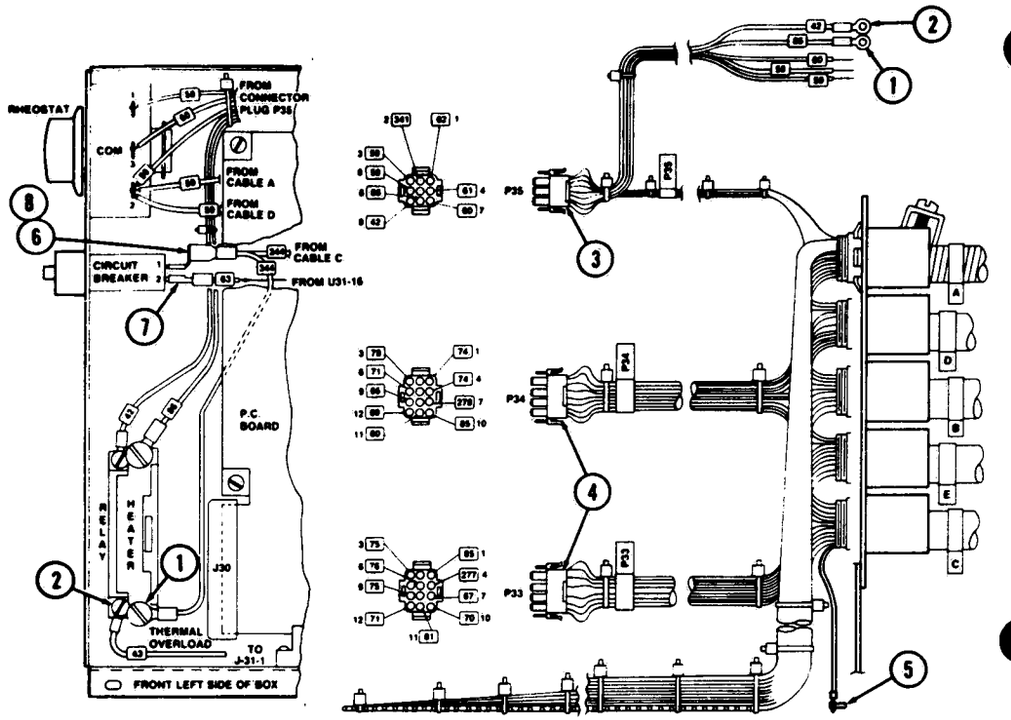


Figure 8-28. RELAY BOX ASSEMBLY: Power Door. (Part 1 of 2)

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-28-	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		LOCKWASHER	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	091		CHAIN, Sash, 17	1	1		
10	P	146593	001		PRINTED CIRCUIT BOARD, Single Door (See Fig. 8-29)	1			
	P	146593	002		PRINTED CIRCUIT BOARD, Double Door (See Fig. 8-29)		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		LOCKWASHER	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		LOCKWASHER	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 COIL	1	1		
	P	150822	383	•	HEATER COIL	1	1		
				•	Use Heater Coil P-89484-091 with Ohio Electric Lock Motor. Use Heater Coil P-150822-383 with Baldor Lock Motor.				



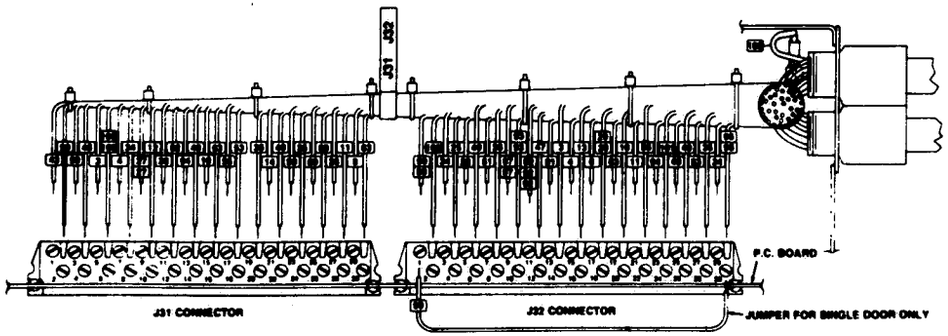


Figure 8-28A. RELAY BOX ASSEMBLY: Power Door. (Part 2 of 2)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-28A-					RELAY BOX ASSEMBLY: Single Power Door (Part 2 of 2)	X			
					RELAY BOX ASSEMBLY: Double Power Door (Part 2 of 2)		X		
1	P	14592	091		TERMINAL, #10 Ring x 14 AWG	2	2		
2	P	14865	091		TERMINAL, #8 Ring x 18 AWG	2	2		
3	P	129035	001		HOUSING, PLUG, 9 Circuit	1	1		
4	P	129034	001		HOUSING, Plug, 12 Circuit	1	2		
5	P	82675	001		SCREW, Ground, #10-32 x 3/8	1	1		
6	P	32118	091		ADAPTER, Terminal	1	1		
7	P	90695	091		TERMINAL, Quick Disconnect, 18-22 AWG	1	1		
8	P	32119	091		TERMINAL, Quick Disconnect, 14-16 AWG	1	1		

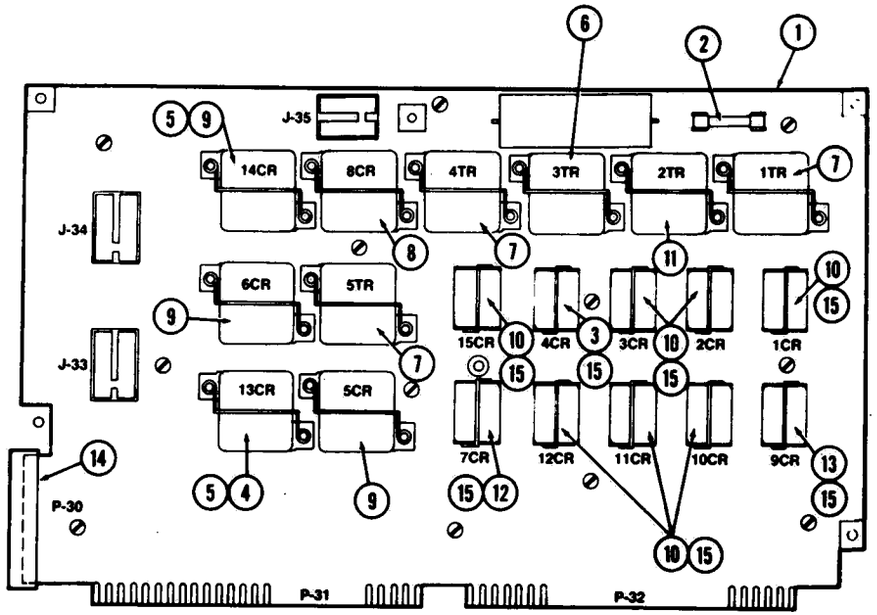


Figure 8-29. PRINTED CIRCUIT BOARD ASSEMBLY: Power Door.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-29-	P	146593	001		PRINTED CIRCUIT BOARD ASSEMBLY: Single Door Units	X				
	P	146593	002		PRINTED CIRCUIT BOARD ASSEMBLY: Double Door Units		X			
1	P	146593	003		BOARD, Printed Circuit	1	1			
2	P	129352	SUB		FUSE, 3 Amp, 250 Volts (SUB: P-764317-778. 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			

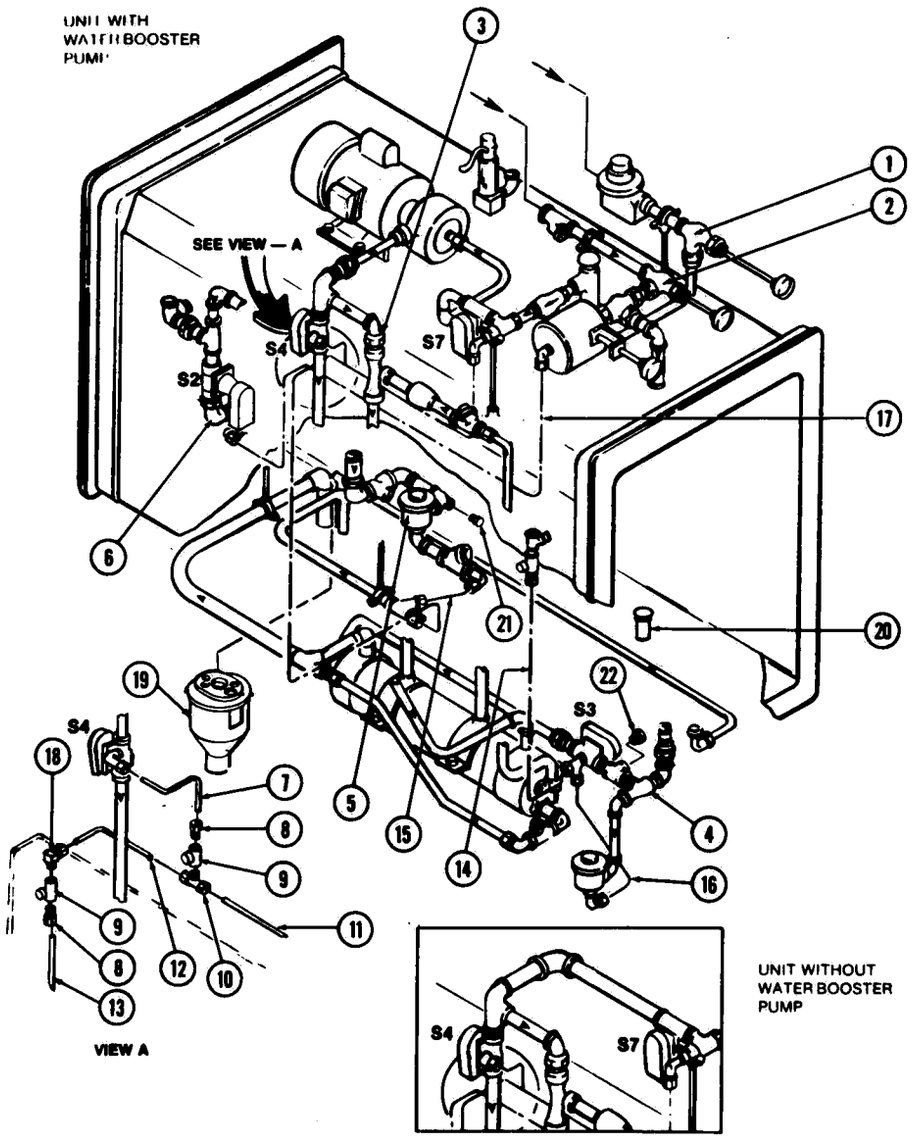


Figure 8-30. PIPING ASSEMBLY: Complete.
(Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER	
8-30-	P	146521	001		PIPING ASSEMBLY	X
1					WATER SUPPLY LINE (See Fig. 8-31)	1
2					STEAM SUPPLY LINE (See Fig. 8-31)	1
3					VACUUM LINE (See Fig. 8-31)	1
4					CHAMBER DRAIN LINE (See Fig. 8-36)	1
5					JACKET DRAIN LINE (See Fig. 8-35)	1
6					AIR BREAK LINE (See Fig. 8-32)	1
7					TUBE, 1/4 O.D. x 7-1/2	1
8	P	19514	091		FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
9	P	83630	001		VALVE, Needle, 1/8 N.P.T.	2
10	P	42581	091		TEE, Compression, 1/4 x 1/4 O.D.T. x 1/8 N.P.T.	1
11					TUBE, 1/4 O.D. x 17-13/32	1
12					TUBE, 1/4 O.D. x 4-21/32	1
13					TUBE, 1/4 O.D. x 64-25/32	1
14					TUBE, 5/16 O.D. x 31	1
15					TUBE, 1/4 O.D. x 6-1/4	1
16					TUBE, 5/16 O.D. x 10-23/32	1
17					TUBE, 1/4 O.D. x 55-21/32	1
18	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
19	P	764316	213		FUNNEL, Anti-Splash	1
	P	141198	004		• FUNNEL, 2" O.D.	1
	P	56396	012		• CAP, Funnel	1
	P	15272	091		• SCREW, Set, 1/4-20	2
	P	78881	045		• SCREW, Self Tap, 6-32 x 1/2	2
	P	56396	016		• PLUG, 7/8 Dia.	1
	P	56396	017		• PLUG, 1 Dia.	1
	P	56396	018		• PLUG, 1-3/8 Dia.	1
20	P	48733	042		STRAINER, Chamber Drain	1
21	P	3441	091		PLUG, Pipe, 3/8 N.P.T.	1
22	P	3442	091		PLUG, Pipe, 1/2 N.P.T.	1

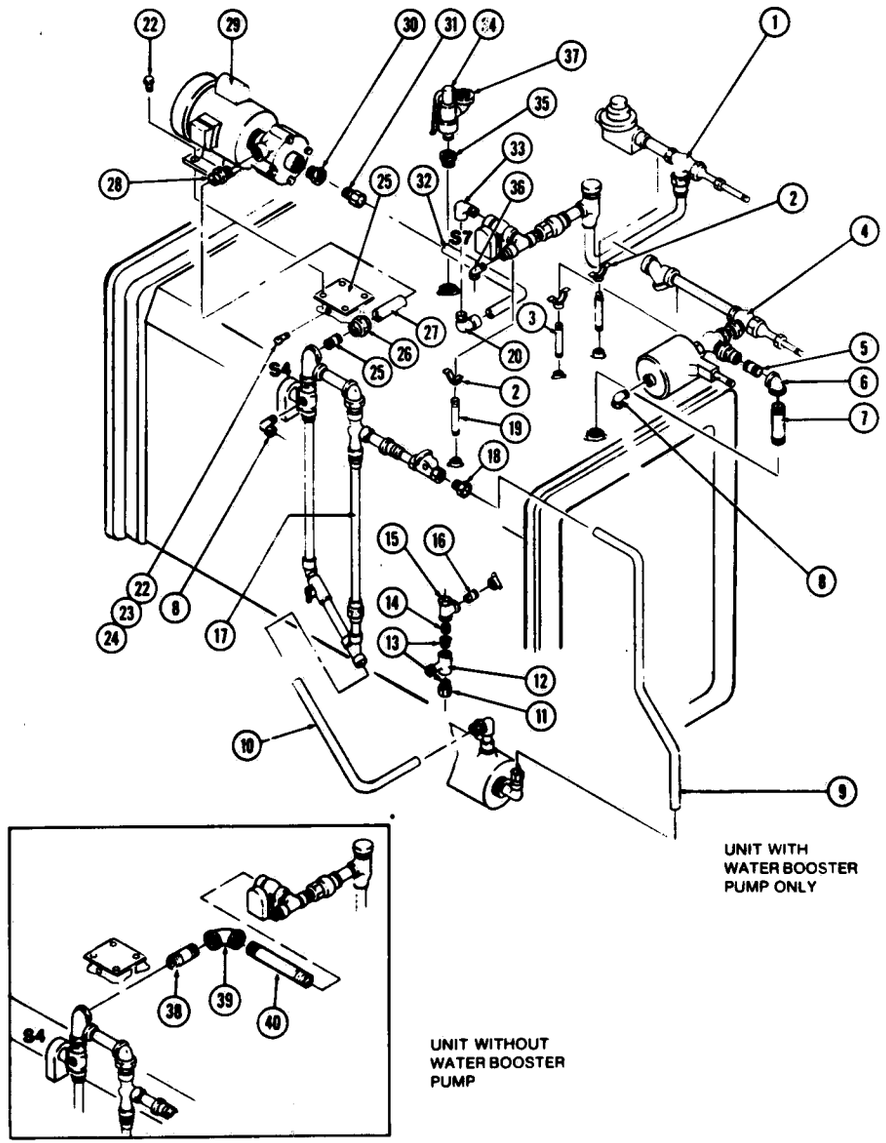


Figure 8-31. WATER AND STEAM SUPPLIES: Vacuum System. (Units with Indicator-Recorder).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-31-					WATER AND STEAM SUPPLIES — Vacuum System	
1	P	136604	001		WATER SUPPLY ASSEMBLY (See Fig. 8-33)	1
2	P	39590	010		CLAMP, Pipe	3
3	P	150822	289		NIPPLE, Steel, 1/4 N.P.T. x 6-9/16	2
4	P	136605	001		STEAM SUPPLY ASSEMBLY (See Fig. 8-33)	1
5	P	29291	091		NIPPLE, 3/4 N.P.T. x 1-1/4	1
6	P	1635	091		ELL, 3/4 N.P.T.	1
7	P	29312	091		NIPPLE, 3/4 N.P.T. x 6-1/2	1
8	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
9	P	93194	001		TUBE, 5/8 O.D.	1
10	P	83639	001		TUBE, 7/8 O.D.	1
11	P	22711	091		COUPLING, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1
12	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1
13	P	849	091		BUSHING, Reducing, 3/8 x 1/4 N.P.T.	2
14	P	28916	091		NIPPLE, 1/4 N.P.T. x 7/8	1
15	P	4906	091		TEE, 1/4 N.P.T.	1
16	P	27422	091		NIPPLE, 1/4 N.P.T. x 1-1/4	1
17	P	136603	001		EJECTOR ASSEMBLY (See Fig. 8-35)	1
18	P	39072	091		COUPLING, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1
19	P	150822	290		NIPPLE, Steel, 1/4 N.P.T. x 6-7/8	1
20	P	44507	091		*ELL, Street, 7/8 O.D.T.	1
21					NIPPLE, 3/4 N.P.T.	1
22	P	12553	061		*SCREW, Hex Head, 5/16-18 x 1-1/4	6
23	P	24282	091		LOCKWASHER	6
24	P	8650	061		NUT, Hex, 5/16-18	6
25	P	93202	001		*WELDMENT, Base	1
26	P	44846	091		*UNION, 7/8 O.D.T. x 3/4 N.P.T.	1
27	P	83277	007		*TUBE, 7/8 O.D. x 2-5/16	1
28	P	91221	091		*ADAPTER, 7/8 O.D.T. x 1 N.P.T.	1
29	P	92941	001		*PUMP AND MOTOR ASSEMBLY (See Fig. 8-41)	1
30	P	828	091		BUSHING, Reducing, 1-1/4 x 3/4 N.P.T.	1
31	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	1
32	P	83638	001		*TUBE, 7/8 O.D.	1
33	P	44500	091		*ELL, 7/8 O.D.T. x 3/4 N.P.T.	1
34	P	91960	091		VALVE, Safety, 3/4 N.P.T.	1
35	P	841	042		BUSHING, Reducing, 1 x 3/4 N.P.T.	1
36	P	43041	091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1
37	P	1639	091		ELL, Street, 1 N.P.T.	1
38	P	29295	091		†NIPPLE, 3/4 x 2-1/4	1
39	P	89986	091		†ELL, Union, 3/4	1
40	P	29312	091		†NIPPLE, 3/4 x 6-1/2	1
	P	764315	972		*KIT TO ADD WATER PUMP	1
	P	764315	711		†KIT TO REMOVE WATER PUMP	1

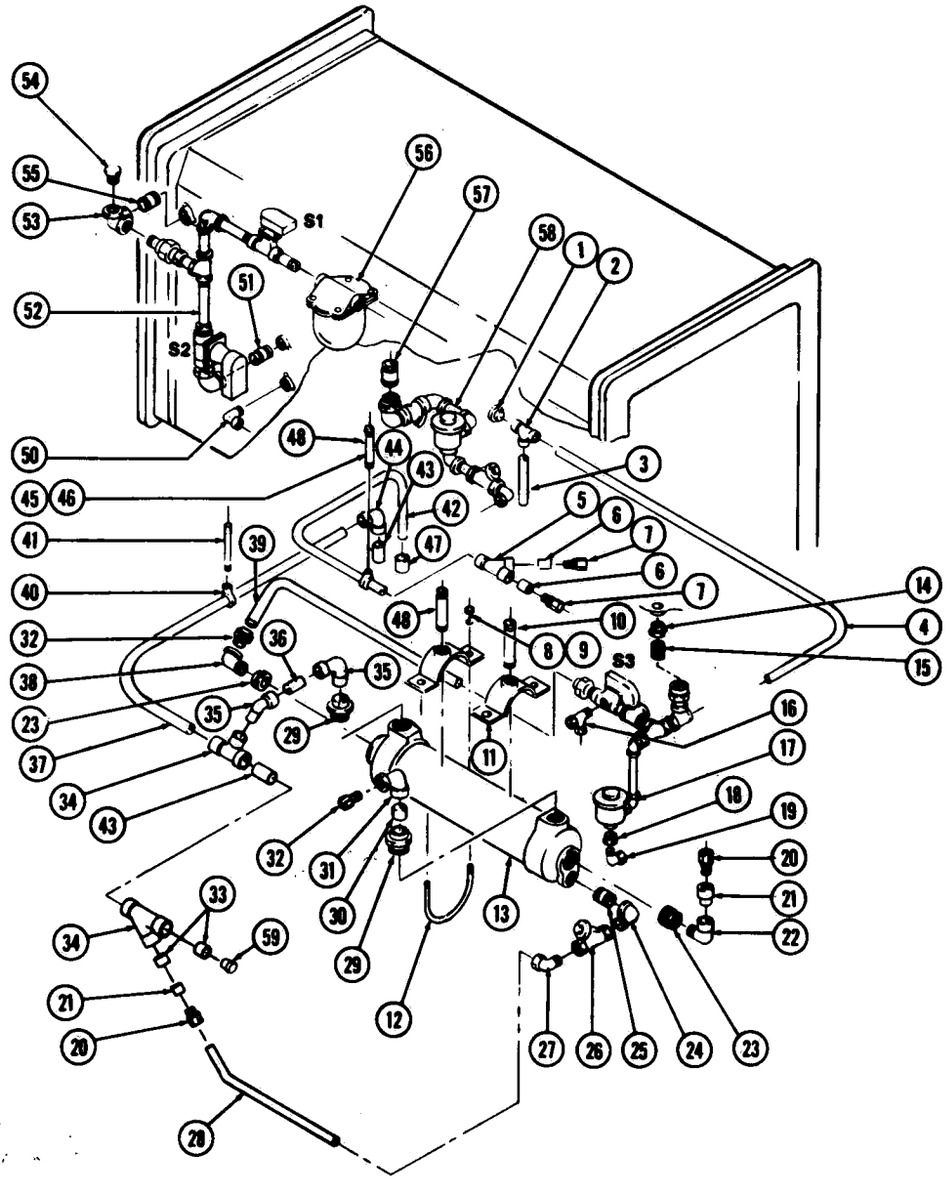
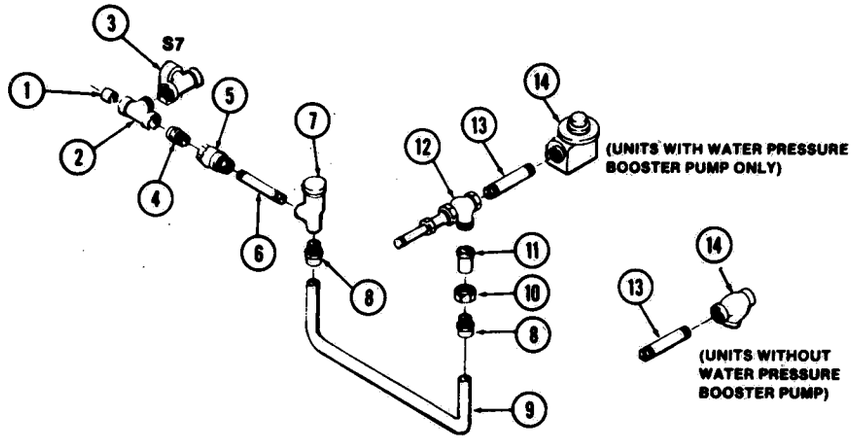


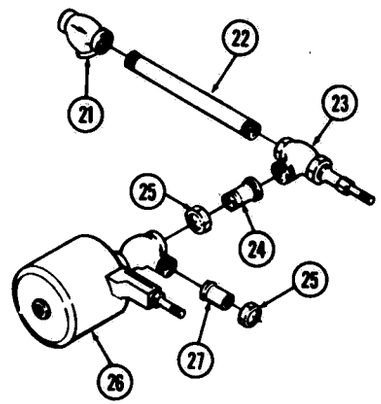
Figure 8-32. AIR BREAK AND HEAT EXCHANGER PIPING.
(Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-32-					AIR BREAK AND HEAT EXCHANGER PIPING	X
1	P	90547	091		PLUG, 5/8 O.D.T.	1
2	P	90221	091		TEE, 5/8 O.D.T.	1
3	P	89736	091		TUBE, 5/8 O.D. x 4-15/16	1
4	P	92935	008		TUBE, 5/8 O.D.	1
5	P	83377	001		"Y" BRANCH, 5/8 O.D.T.	1
6	P	89808	091		COUPLING, 5/8 O.D.T. x 1/8 N.P.T.	2
7	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
8	P	8650	061		NUT, Hex, 5/16-18	4
9	P	24282	091		LOCKWASHER	4
10	P	150822	300		NIPPLE, Steel, 3/4 N.P.T. x 6	1
11	P	93200	001		SUPPORT, Heat Exchanger	2
12	P	93201	001		"U" BOLT	2
13	P	89604	091		HEAT EXCHANGER	1
14	P	850	042		BUSHING, Reducing, 1-1/4 x 1 N.P.T.	1
15	P	29380	091		NIPPLE, 1 N.P.T. x 1-1/4	1
16	P	21549	091		TEE, Compression, 5/16 O.D.T. x 1/8 N.P.T.	1
17	P	136606	001		CHAMBER DRAIN ASSEMBLY (See Fig. 8-36)	1
18	P	76053	042		BUSHING, Reducing, 1/2 x 1/4 N.P.T.	1
19	P	7033	091		ELL, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1
20	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	2
21	P	89743	001		ADAPTER, 7/8 O.D.T. x 1/2 N.P.T.	2
22	P	44500	091		ELL, 7/8 O.D.T. x 3/4 N.P.T.	1
23	P	92865	002		BUSHING, Reducing, 2-1/2 x 3/4 N.P.T.	2
24	P	1631	091		ELL, Street, 3/8 N.P.T.	1
25	P	29016	091		NIPPLE, 3/8 N.P.T. x 1-3/4	1
26	P	5424	091		VALVE, Check, 3/8 N.P.T.	1
	P	74335	091		• DISC	1
27	P	40153	091		ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1
28	P	56396	005		TUBE, 5/8 O.D.	1
29	P	44721	091		ADAPTER, 1-1/8 O.D.T. x 1-1/2 N.P.T.	1
30	P	83376	003		TUBE, 1-1/8 O.D. x 2-1/4	1
31	P	44724	091		ELL, 1-1/8 O.D.T. x 3/4 N.P.T.	1
32	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	1
33	P	91317	091		COUPLING, 1-1/8 x 7/8 O.D.T.	2
34	P	83375	001		"Y" BRANCH, 1-1/8 O.D.T.	2
35	P	51764	091		ELL, Street, 1-1/8 O.D.T.	2
36	P	83376	004		TUBE, 1-1/8 O.D. x 2-1/2	1
37	P	93196	001		TUBE, 1-1/8 O.D.	1
38	P	1636	091		ELL, Street, 3/4 N.P.T.	1
39	P	93195	001		TUBE, 7/8 O.D.	1
40	P	39590	010		CLAMP, Pipe	1
41	P	150822	287		NIPPLE, Steel, 1/4 N.P.T. x 4-7/8	1
42	P	93198	001		TUBE, 5/8 O.D.	1
43	P	83376	002		TUBE, 1-1/8 O.D. x 3	2
44	P	44492	091		ELL, 1-1/8 O.D.T.	1
45	P	75376	010		CLAMP, Pipe	1
46	P	150822	288		NIPPLE, Steel, 1/4 N.P.T. x 6-5/16	1
47	P	83348	001		REDUCER, 1-1/8 x 5/8 O.D.T.	1
48	P	150822	299		SUPPORT, Pipe, 3/4 x 5-3/4	1
49					(Not Used)	
50	P	41306	091		ELL, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1
51	P	29354	091		NIPPLE, 1 N.P.T. x 1-1/2	1

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-32-			**UNITS WITH INDICATOR-RECORDER:**	
52	P 136602 001		AIR BREAK ASSEMBLY (See Fig. 8-34)	1
53	P 84435 001		ELL, Side Outlet, 3/4 N.P.T.	1
54	P 3443 091		PLUG, Pipe, 3/4 N.P.T.	1
55	P 29293 091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
56	P 82619 001		FILTER, Air, 1/2 N.P.T. (See Fig. 8-40)	1
57	P 29301 091		NIPPLE, 3/4 N.P.T. x 3-3/4	1
58	P 136607 001		JACKET DRAIN ASSEMBLY (See Fig. 8-35)	1
59	P 91227 091		PLUG, Pipe, 7/8	1



WATER SUPPLY ASSEMBLY



STEAM SUPPLY ASSEMBLY

Figure 8-33. PIPING SUBASSEMBLIES.

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FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-33-	P	136604	001		WATER SUPPLY ASSEMBLY	X
1	P	89385	091		COUPLING, 7/8 O.D.T. x 3/8 N.P.T.	1
2	P	89577	091		TEE, 7/8 x 7/8 O.D.T. x 3/4 N.P.T.	1
3	P	83261	002		VALVE, Solenoid, Water, 3/4 N.P.T.	1
	P	764072	001		• KIT, Repair	1
	P	764072	002		• COIL, 120 Volt, 60 Hz, 110 Volt, 50 Hz	1
4	P	91159	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1
5	P	83870	001		VALVE, Check, 3/4 N.P.T.	1
6	P	29303	091		NIPPLE, 3/4 N.P.T. x 4-1/2	1
7	P	77023	001		VACUUM BREAKER, 3/4 N.P.T.	1
	P	752735	091		• KIT, Repair	1
8	P	91158	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	2
9	P	93193	001		TUBE, 7/8 O.D.	1
10	P	2903	091		NUT, Union	1
11	P	4248	091		SPUD, Female, 3/4 N.P.T.	1
12	P	26907	091		VALVE, Angle, 3/4 N.P.T. (See Fig. 8-39)	1
13	P	29314	091		NIPPLE, 3/4 N.P.T. x 7 (Units without vacuum pump)	1
	P	29304	091		NIPPLE, 3/4 N.P.T. x 4-1/2 (Units with vacuum pump)	1
14	P	47708	091		*STRAINER	1
	P	83631	001		*REGULATOR (Used only on units with vacuum pump)	1
	P	136605	001		STEAM SUPPLY ASSEMBLY	X
21	P	41389	091		STRAINER, Steam, 3/4 N.P.T.	1
	P	751552	091		• SCREEN	1
	P	756207	091		• GASKET	1
22	P	29328	091		NIPPLE, 3/4 N.P.T. x 10-1/2	1
23	P	26907	091		VALVE, Angle, 3/4 N.P.T. (See Fig. 8-39)	1
24	P	4247	091		SPUD, Male, 3/4 N.P.T.	1
25	P	2903	091		NUT, Union	2
26	P	22429	091		VALVE, HI-LO, 3/4 N.P.T. (See Fig. 8-37)	1
27	P	4248	091		SPUD, Female, 3/4 N.P.T.	1

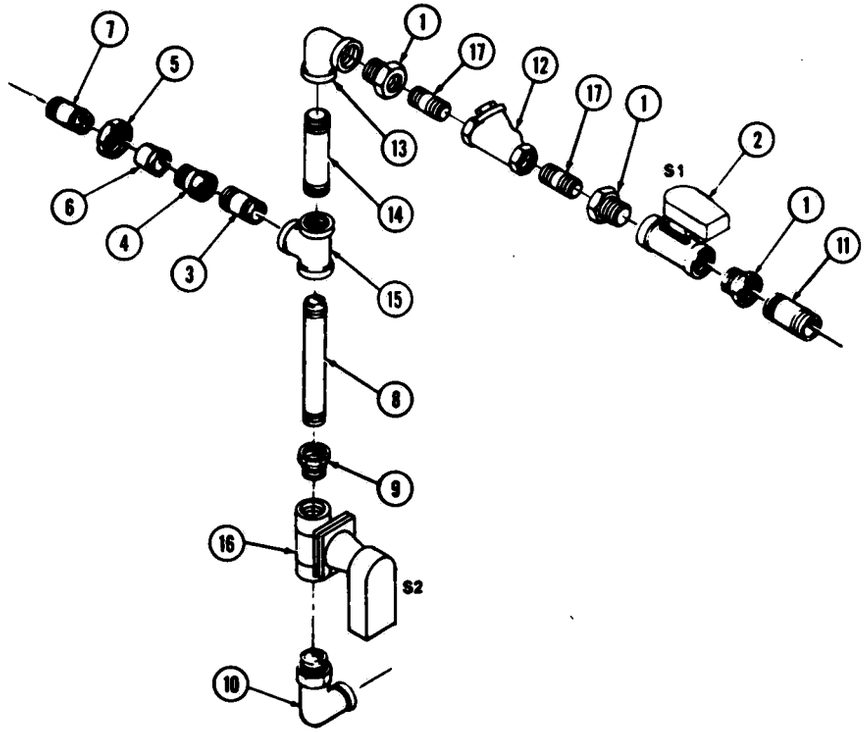
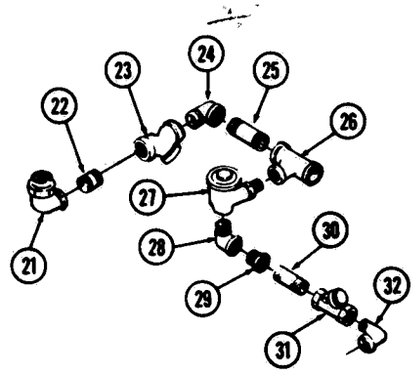
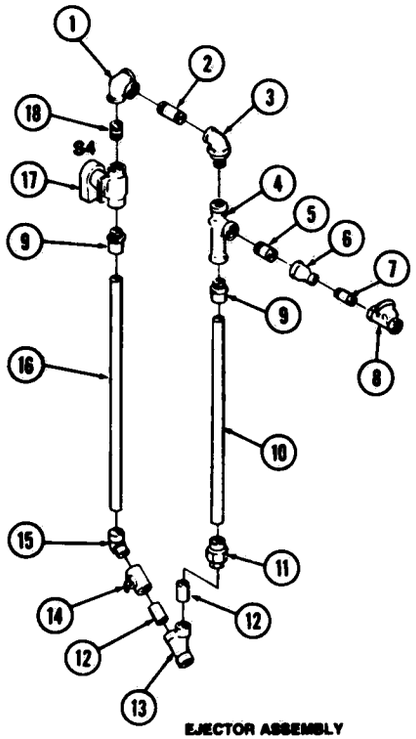


Figure 8-34. AIR BREAK ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-34-	P	136602	001		AIR BREAK ASSEMBLY	X
1	P	836	042		BUSHING, Reducing, 3/4 x 1/2 N.P.T.	3
2	P	84444	002		VALVE, Solenoid, Air, 3/4 N.P.T. (S-1)	1
	P	764078	001		• KIT, Repair	A/R
	P	764078	002		• COIL, 120 Volt, 60 Hz, 110 Volt, 50 Hz	A/R
3	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	1
4	P	1747	091		THREAD END, 3/4 N.P.T.	1
5	P	2903	091		NUT, Union	1
6	P	4248	091		SPUD, Female, 3/4 N.P.T.	1
7	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
8	P	29306	091		NIPPLE, 3/4 N.P.T. x 5	1
9	P	841	042		BUSHING, Reducing, 1 x 3/4 N.P.T.	1
10	P	89168	091		ELL, Union, 1 N.P.T.	1
11	P	29165	091		NIPPLE, 1/2 N.P.T. x 1-3/4	1
12	P	150822	354		VALVE, Swing Check	1
	P	764319	608		• DISC	1
13	P	1635	091		ELBOW, 3/4 N.P.T.	1
14	P	29300	091		NIPPLE, 3/4 N.P.T. x 3-1/2	1
15	P	4932	091		TEE, 3/4 N.P.T.	1
16	P	150822	311		VALVE, Solenoid, 1 NPT, S2, Piston Type	1
	P	764317	688		• KIT, Valve, Repair	A/R
	P	764070	002		• COIL	A/R
17	P	29163	091		NIPPLE, 1/2 N.P.T. x 1-1/4	2



JACKET DRAIN ASSEMBLY



EJECTOR ASSEMBLY

Figure 8-35. PIPING SUBASSEMBLIES.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-35-	P	136603	001		EJECTOR ASSEMBLY	X
1	P	84435	001		ELL, Side Outlet, 3/4 N.P.T.	1
2	P	29295	091		NIPPLE, 3/4 N.P.T. x 2-1/4	1
3	P	89986	091		ELL, Union, 3/4 N.P.T.	1
4	P	51616	091		EXHAUSTER, 3/4 N.P.T.	1
5	P	29291	091		NIPPLE, 3/4 N.P.T. x 1-1/4	1
6	P	84443	001		COUPLING, Reducing, 3/4 x 3/8 N.P.T.	1
7	P	29014	091		NIPPLE, 3/8 N.P.T. x 1-1/4	1
8	P	5424	091		VALVE, Check, 3/8 N.P.T.	1
	P	74335	091		• DISC	1
9	P	91158	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	2
10	P	83227	002		TUBE, 7/8 O.D. x 37-3/4	1
11	P	91226	091		UNION, 7/8 O.D.T.	1
12	P	83449	002		TUBE, 7/8 O.D. x 2-1/4	2
13	P	89384	091		"Y" BRANCH, 7/8 O.D.T.	1
14	P	83629	001		BALANCER, 7/8 O.D.T.	1
15	P	89721	091		ELL, Street, 45°, 7/8 O.D.T.	1
16	P	83227	001		TUBE, 7/8 O.D. x 36	1
17	P	83261	002		VALVE, Solenoid, Water, 3/4 N.P.T.	1
	P	764072	001		• KIT, Repair	1
	P	764072	002		• COIL, 120 V, 60 Hz, 110 V, 50 Hz	1
18	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	1
	P	136607	001		JACKET DRAIN ASSEMBLY	X
21	P	89986	091		ELL, Union, 3/4 N.P.T.	1
22	P	29291	091		NIPPLE, 3/4 N.P.T. x 1-1/4	1
23	P	41389	091		STRAINER, Steam, 3/4 N.P.T.	1
	P	751552	091		• SCREEN	1
	P	756207	091		• GASKET, Strainer	1
24	P	1636	091		ELL, Street, 3/4 N.P.T.	1
25	P	29295	091		NIPPLE, 3/4 N.P.T. x 2-1/4	1
26	P	4919	091		TEE, 3/4 x 1/2 x 3/8 N.P.T.	1
27	P	129222	001		TRAP, Steam, 1/2 N.P.T. (See Fig. 8-38)	1
28	P	1634	091		ELL, Street, 1/2 N.P.T.	1
29	P	837	091		BUSHING, Reducing, 1/2 x 3/8 N.P.T.	1
30	P	29015	091		NIPPLE, 3/8 N.P.T. x 1-1/2	1
31	P	5424	091		VALVE, Check, 3/8 N.P.T.	1
	P	74335	091		• DISC	1
32	P	43041	091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1

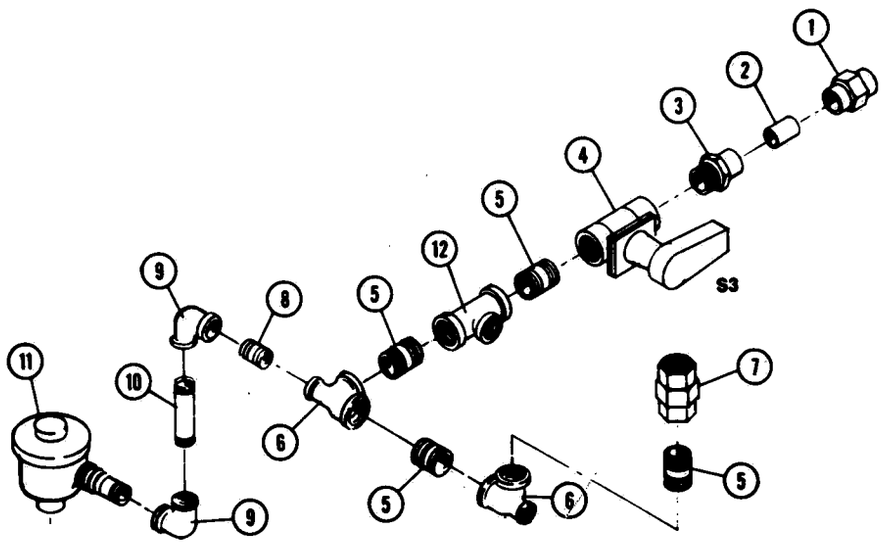


Figure 8-36. CHAMBER DRAIN ASSEMBLY. (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-36-	P	136606	001		CHAMBER DRAIN ASSEMBLY	X
1	P	91226	091		UNION, 7 8 O.D.T.	1
2	P	83449	002		TUBE, 7 8 O.D. x 2-1/4	1
3	P	91221	091		ADAPTER, 7/8 O.D.T. x 1 N.P.T.	1
4	P	83229	002		VALVE, Solenoid, Steam, 1 N.P.T. (S-3)	1
	P	764071	001		• KIT, Repair	1
	P	764071	002		• COIL, 120 V, 60 Hz, 110 V, 50 Hz	1
5	P	29380	091		NIPPLE, 1 N.P.T. x 1-1/4	4
6	P	4940	091		TEE, 1 x 1/2 x 1 N.P.T.	2
7	P	5283	091		UNION, 1 N.P.T.	1
8	P	83225	001		NIPPLE, 1/2 N.P.T. x 1-1/8	1
9	P	1622	091		ELL, Reducing, 1/2 x 3/8 N.P.T.	2
10	P	29019	091		NIPPLE, 3/8 N.P.T. x 2-1/2	1
11	P	129222	001		TRAP, Steam, 1/2 N.P.T. (See Fig. 8-38)	1
12	P	4935	091		TEE, 1 x 1 x 1/2 N.P.T.	1

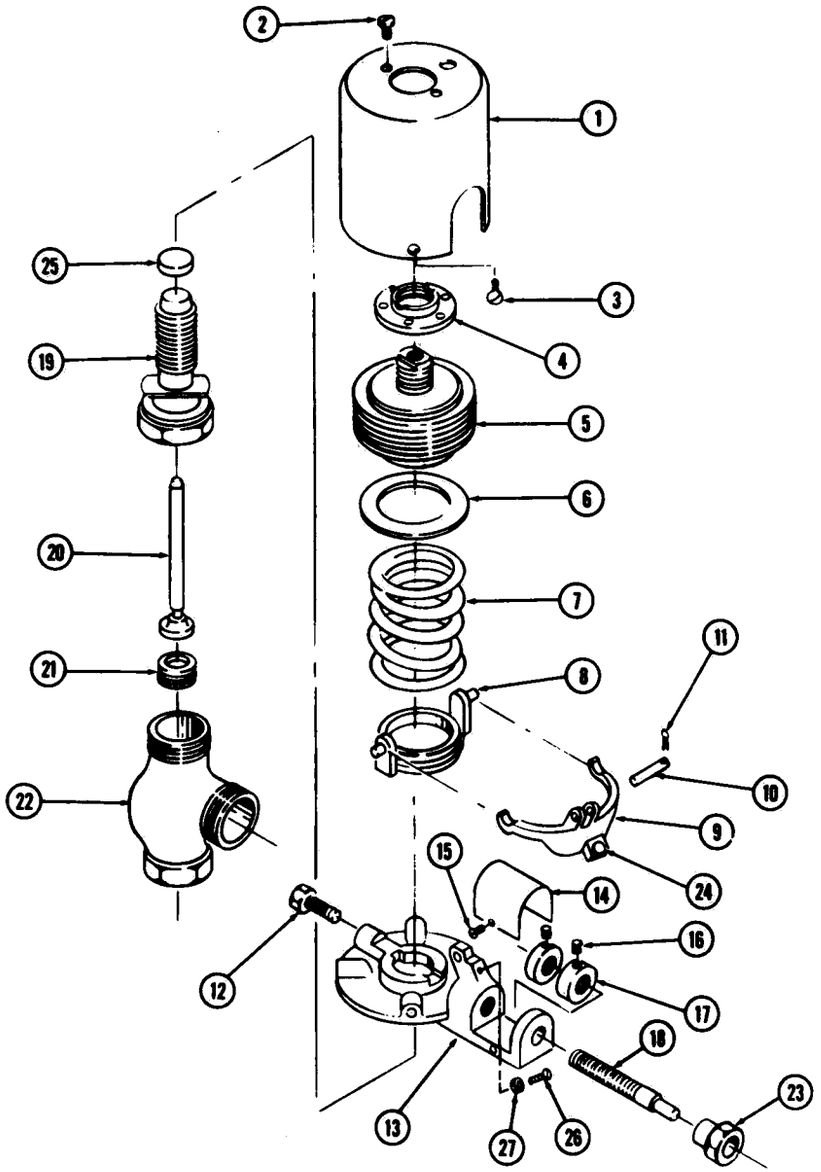


Figure 8-37. STEAM CONTROL VALVE.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-37-	P	22429 091		STEAM CONTROL VALVE, HI-LO (3/4 N.P.T.)	X
	P	754359 003		•KIT, Valve Repair	A/R
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	9315 041		SCREW	1
27	P	2959 041		NUT	1

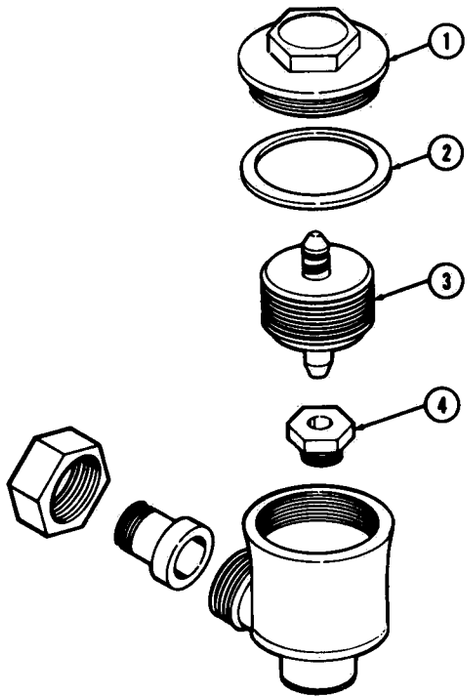


Figure 8-38. STEAM TRAP.

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FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-38-	P 129222 001		STEAM TRAP, 1/2 N.P.T.	1
	P 764080 001		KIT, Repair, 1/2 N.P.T. (incl. gasket, bellows assembly, seat)	A/R
1	P 764315 209		CAP	1
2			GASKET } NLA Order Repair Kit	1
3			BELLOWS } "Not available separately"	1
4			SEAT	1

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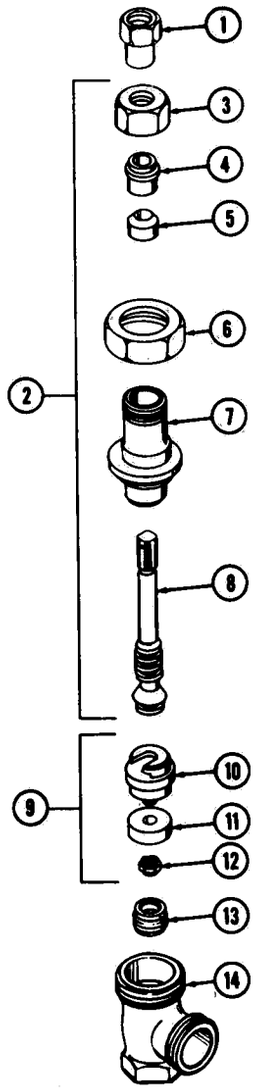

Figure 8-39. UNION ANGLE VALVE.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-39-	P 26907 091		UNION ANGLE VALVE: (3/4)	X
	P 754361 003		KIT, Repair	A/R
1	P 8605 051		NUT, Wheel	1
2	P 53917 091		VALVE STEM AND BONNET ASSEMBLY	1
3	P 48431 091		• NUT, Packing	1
4	P 48432 091		• GLAND, Packing	1
5	P 8784 091		• PACKING	1
6	P 25566 091		• NUT, Bonnet	1
7	P 53913 091		• BONNET, Valve	1
8	P 53911 091		• STEM, Valve	1
9	P 25567 091		DISC HOLDER ASSEMBLY	1
10	P 25568 091		• DISC HOLDER	1
11	P 25569 091		• DISC, Teflon	1
12	P 2927 091		• NUT, Disc	1
13	P 22425 061		SEAT, Valve	1
14	P 22427 091		BODY, Valve	1

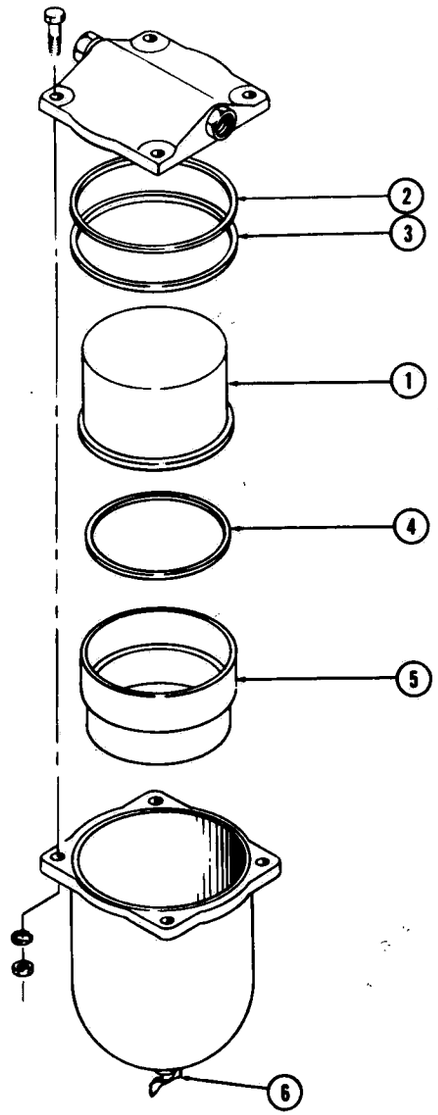

Figure 8-40. AIR FILTER.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-40-	P	82619	001		AIR FILTER	X
1	P	321198	091		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

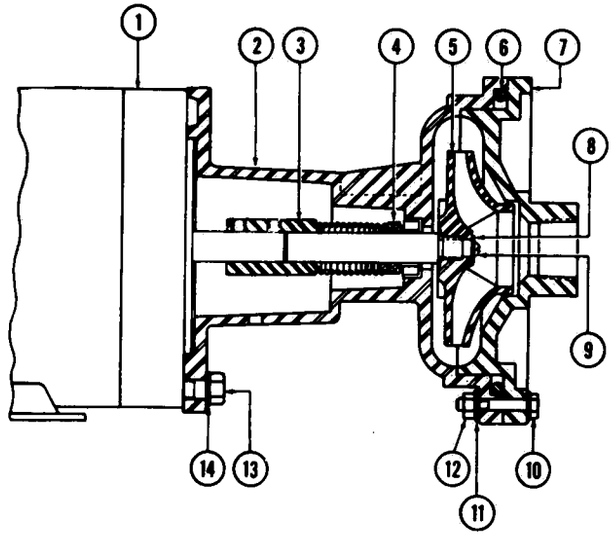

Figure 8-41. PUMP AND MOTOR.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-41-	P	92941	001		PUMP AND MOTOR, Water Booster	X
1	P	764315	248		MOTOR	1
2	P	764319	835		PUMP BODY	1
3	P	764319	635		ASSEMBLY, Shaft	1
4	P	764315	299		SEAL	1
5	P	764315	296		IMPELLER	1
6	P	764315	295		O-RING	1
7	P	764319	336		END COVER	1
8	P	764315	297		WASHER, Impeller	1
9	P	764315	298		SCREW, Impeller	1
10					BOLT	8
11	P	17250	042		WASHER	8
12	P	3097	041		NUT	8
13	P	31838	042		BOLT	4
14	P	81673	002		WASHER	4
	P	764315	249		PUMP ASSEMBLY	

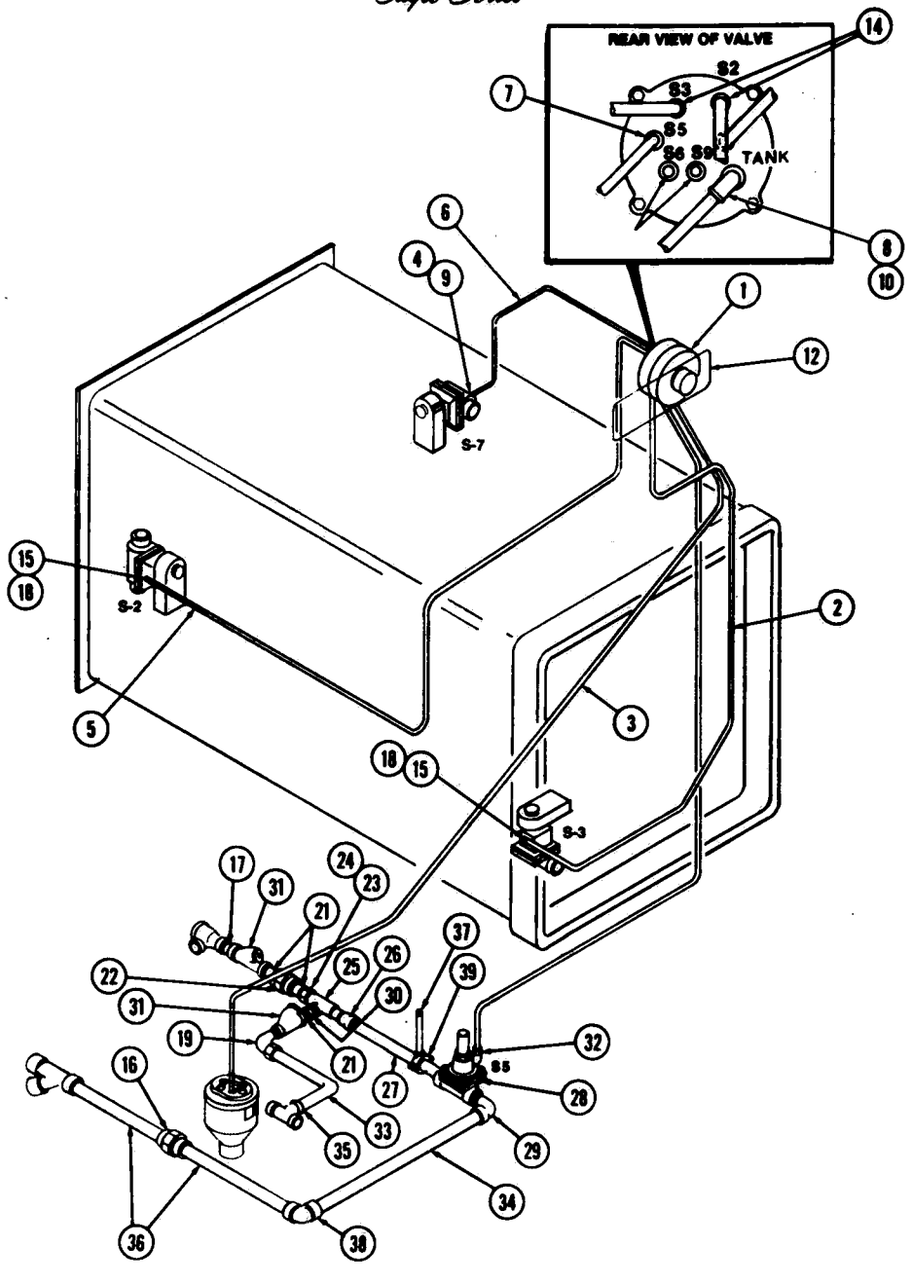

Figure 8-42. MANUAL VALVE PIPING.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
					UNITS WITH INDICATOR RECORDER:		
8-42-					MANUAL VALVE PACKAGE	X	
					UNITS WITH PRINTCON:		
					MANUAL VALVE PACKAGE		X
1	P	136726	001		VALVE, Manual Multiport (See Fig. 8-43)	1	1
2				**	TUBE, S3, 96	AR	AR
3				*	TUBE, Drain	AR	AR
4	P	42510	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2	
5				**	TUBE, S2, 102-1/64	AR	AR
6				†	TUBE, S7, 26	AR	AR
7	P	43289	091		FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1
8	P	45530	091		ELL, Compression, 3/8 O.D.T. x 3/8 N.P.T.	1	1
9	P	84371	001		INSERT, Tube, 1/4 (Not Shown)	2	2
10	P	84371	002		INSERT, Tube, 3/8 (Not Shown)	1	1
11	P	3439	091		PLUG, Pipe (Not Shown)	6	6
12	P	136727	001		DECAL, Manual	1	
	P	93900	047		DECAL, Manual		1
13				††	TUBE, S5, 84	AR	AR
14	P	80917	091		FITTING, Compression, 5/16 O.D.T. x 1/8 N.P.T.	2	2
15	P	40891	091		COUPLING, 5/16 O.D.T. x 1/8 N.P.T.	2	2
16	P	91226	091		UNION, 7/8 O.D.T.	1	1
17	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1	1
18	P	28899	091		NIPPLE, 1/8 N.P.T. x 1	2	2
19	P	40153	091		ELL, Compression, 3/8 N.P.T. x 5/8 O.D.T.	1	1
20	P	141208	001		ASSEMBLY, Steam Ejector	1	1
21	P	29013	091		• NIPPLE, 3/8 N.P.T. x 1" Lg.	3	3
22	P	5266	091		• UNION, 3/8 N.P.T.	1	1
23	P	25546	042		• NOZZLE	1	1
24	P	7841	091		• GASKET	1	1
25	P	25900	042		• EJECTOR	1	1
26	P	3531	091		• COUPLING, Reducing	1	1
27	P	29333	091		• NIPPLE, 3/8 x 11-3/4	1	1
28	P	83228	002		• VALVE, Solenoid, 3/4 N.P.T. S5	1	1
	P	764070	001		• • KIT, Repair	1	1
					• • COIL (Discard)	1	1
29	P	44500	091		• ELBOW, 3/4 N.P.T. x 7/8 O.D.T.	1	1
30	P	837	091		• BUSHING, Reducing, 1/2 N.P.T. x 3/8	1	1
31	P	5424	091		• VALVE, Check, 3/8 N.P.T.	2	2
32	P	42510	091		• FITTING, 1/8 N.P.T. x 1/4 O.D.T.	1	1
33	P	93018	001		TUBE, 5/8 O.D.T. x 21-13/16	1	1
34					TUBE, 7/8 O.D.T. x 21-5/8	1	1
35	P	29931	091		FITTING, 1/2 N.P.T. x 5/8 O.D.T.	1	1
36					TUBE, 7/8 O.D.T. x 10-5/16	2	2
37	P	43386	091		NIPPLE, 1/4 N.P.T. x 6	1	1
38	P	44495	091		ELL, 7/8 O.D.T.	1	1
39	P	39590	010		CLAMP, Pipe	1	1
	P	764315	602		KIT (To add manual valve package)	A/R	A/R
	R	3500	736	*	TUBE, Synflex, 3/8 O.D. x .275 I.D.		
	R	915	163	**	TUBE, Copper, 5/16 O.D. x .032 Wall	Order by	
	R	3500	735	†	TUBE, Synflex, 1/4 O.D. x .180 I.D.	feet	
	R	915	103	††	TUBE, Copper, 1/4 O.D. x .030 Wall		

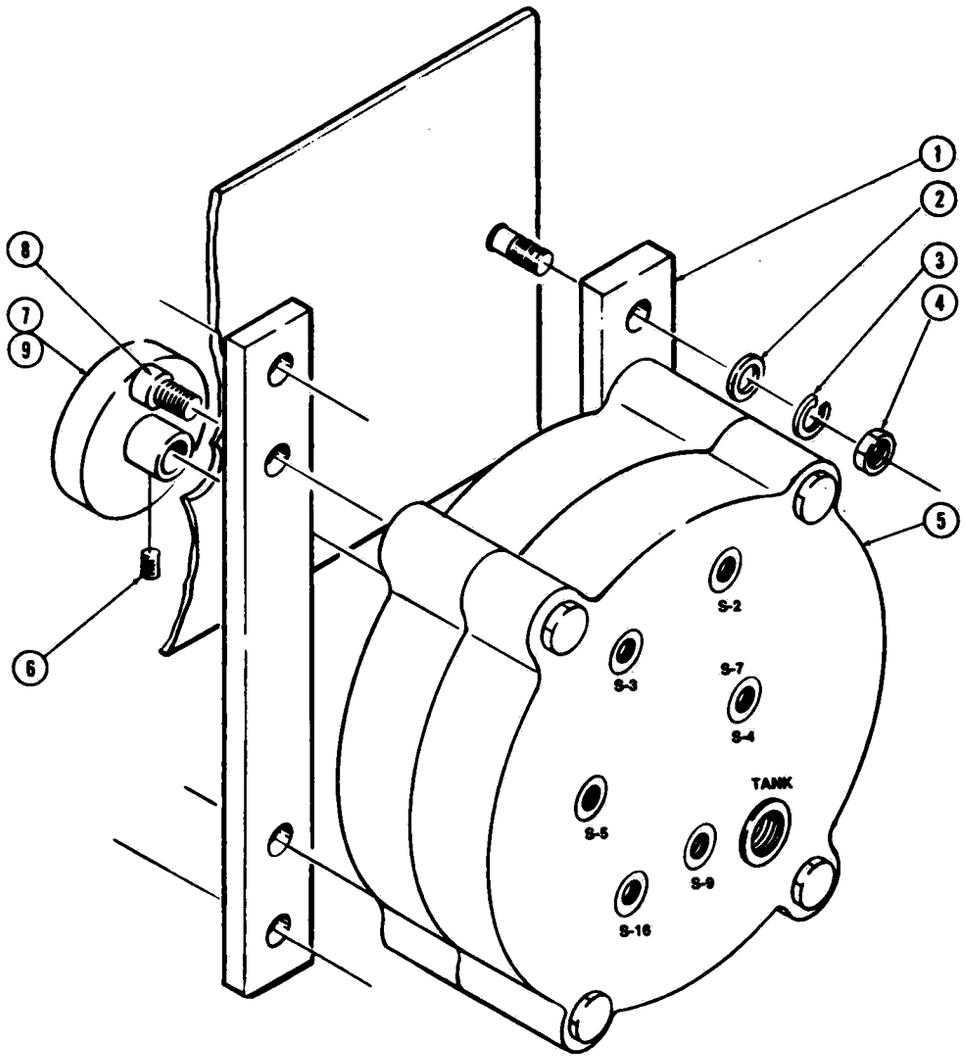

Figure 8-43. MANUAL VALVE.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-43-					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	4
5	P	136726	001		VALVE, Manual Multi-Port	1
6	P	43282	091		SCREW, Set, 10-32	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

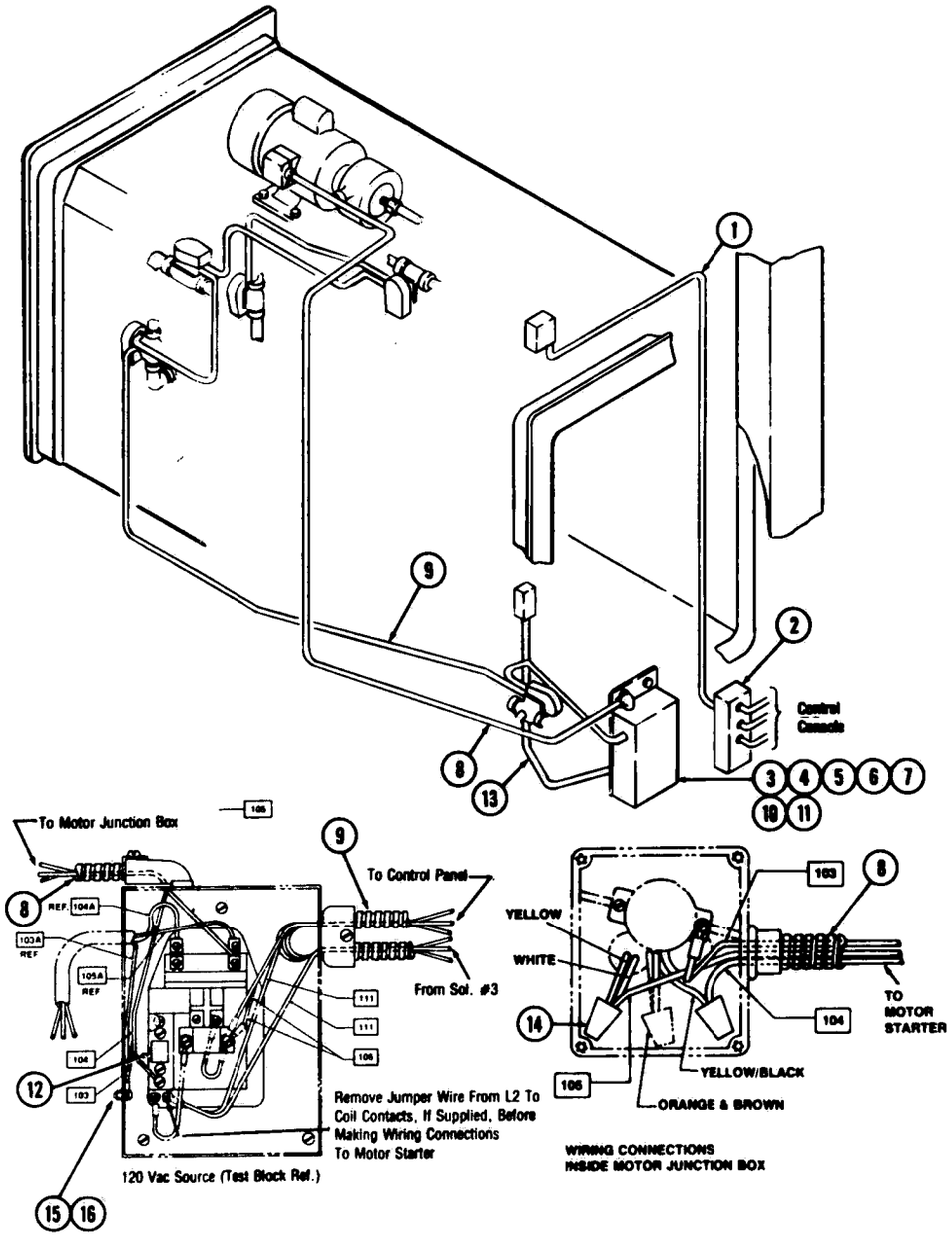

Figure 8-44. WIRING ASSEMBLY: Single Door Sterilizer with Water Booster Pump.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-44-			FINAL WIRING ASSEMBLY: 24x36x36 Single Door	X		
			FINAL WIRING ASSEMBLY: 24x36x48 Single Door		X	
			FINAL WIRING ASSEMBLY: 24x36x60 Single Door			X
1	P 93645 002		CABLE ASSEMBLY, Pressure and Vacuum Switches	1	1	1
2	P 93617 001		BOX, Junction (See Fig. 8-48)	1	1	1
3	P 136543 001		STARTER, Motor	1	1	1
4	P 84389 001		BRACKET, Mounting	1	1	1
5	P 3850 045		SCREW, Hex Head, 5/16-18 x 1-1/4	2	2	2
6	P 24282 091		LOCKWASHER, Shakeproof	2	2	2
7	P 3098 045		NUT, Hex, 5/16-18	2	2	2
8	P 93644 001		CABLE ASSEMBLY, Motor Starter	1	1	1
9	P 760265 209		CABLE ASSEMBLY, Solenoid Valve	1	1	1
10	P 3987 041		SCREW, Round Head, #8-32 x 3/4	3	3	3
11	P 3038 041		NUT, Hex, #8-32	3	3	3
12	P 84446 001		HEATER	1	1	1
13	P 93652 001		CABLE ASSEMBLY, Door	1	1	1
14	P 18538 091		NUT, Wire	3	3	3
15	P 4682 041		SCREW, Machine, #8-32 x 3/8	1	1	1
16	P 3153 041		NUT, Hex, #8-32	1	1	1

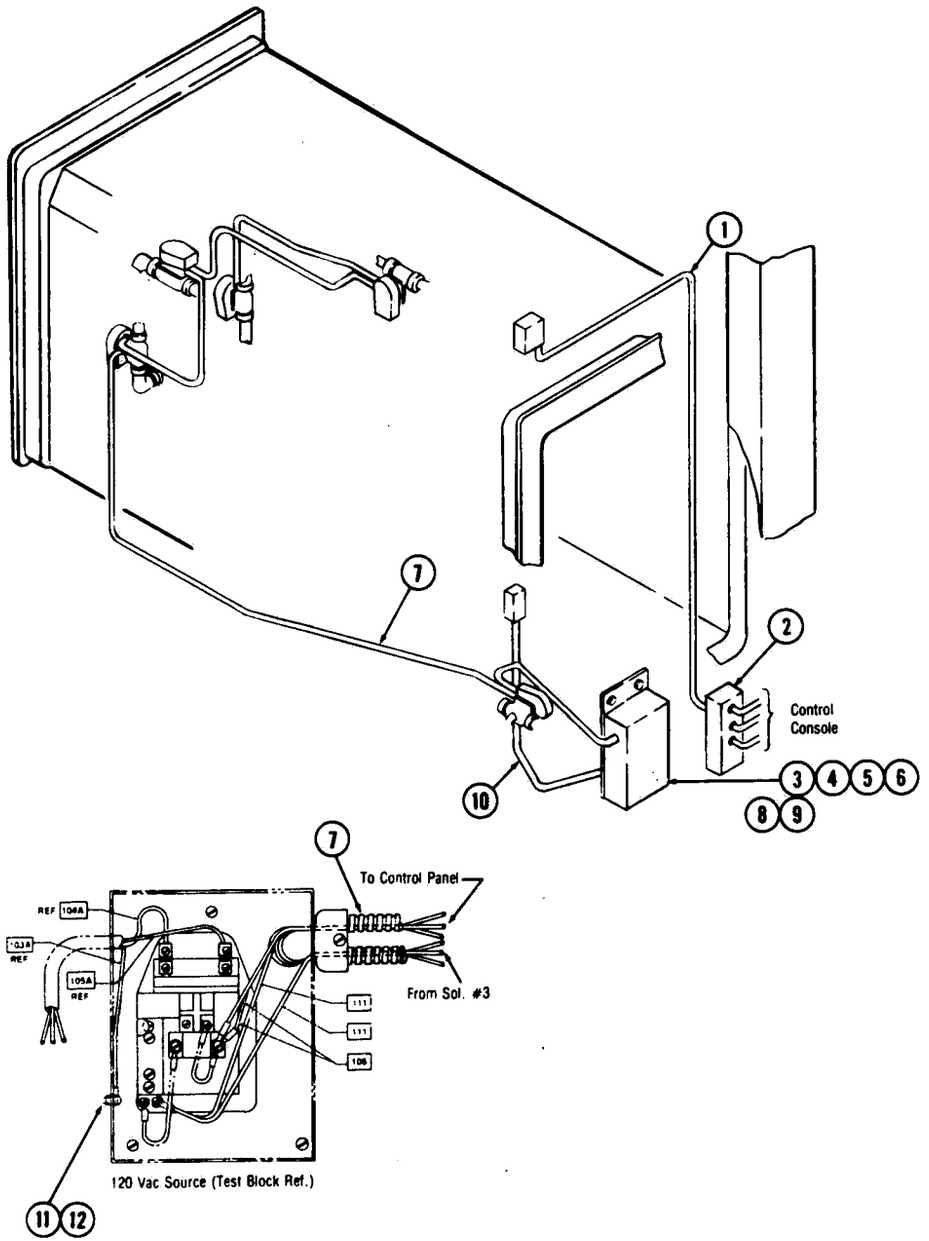

Figure 8-45. WIRING ASSEMBLY: Single Door Sterilizer without Water Booster Pump.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-45-			FINAL WIRING ASSEMBLY: 24x36x36 Single Door	X		
			FINAL WIRING ASSEMBLY: 24x36x48 Single Door		X	
			FINAL WIRING ASSEMBLY: 24x36x60 Single Door			X
1	P 93645 002		CABLE ASSEMBLY. Pressure and Vacuum Switches	1	1	1
2	P 93617 001		BOX. Junction (See Fig. 8-48)	1	1	1
3	P 84389 001		BRACKET. Mounting	1	1	1
4	P 3850 045		SCREW. Hex Head. 5/16-18 x 1-1/4	2	2	2
5	P 24282 091		LOCKWASHER. Shakeproof	2	2	2
6	P 3098 045		NUT. Hex. 5/16-18	2	2	2
7	P 136573 001		CABLE ASSEMBLY. Solenoid Valve	1		
	P 136580 001		CABLE ASSEMBLY. Solenoid Valve		1	
	P 136581 001		CABLE ASSEMBLY. Solenoid Valve			1
8	P 3987 041		SCREW. Round Head. #8-32 x 3/4	3	3	3
9	P 3038 041		NUT. Hex. #8-32	3	3	3
10	P 93652 001		CABLE ASSEMBLY. Door	1	1	1
11	P 4682 041		SCREW. Machine. #8-32 x 3/8	1	1	1
12	P 3153 041		NUT. Hex. #8-32	1	1	1

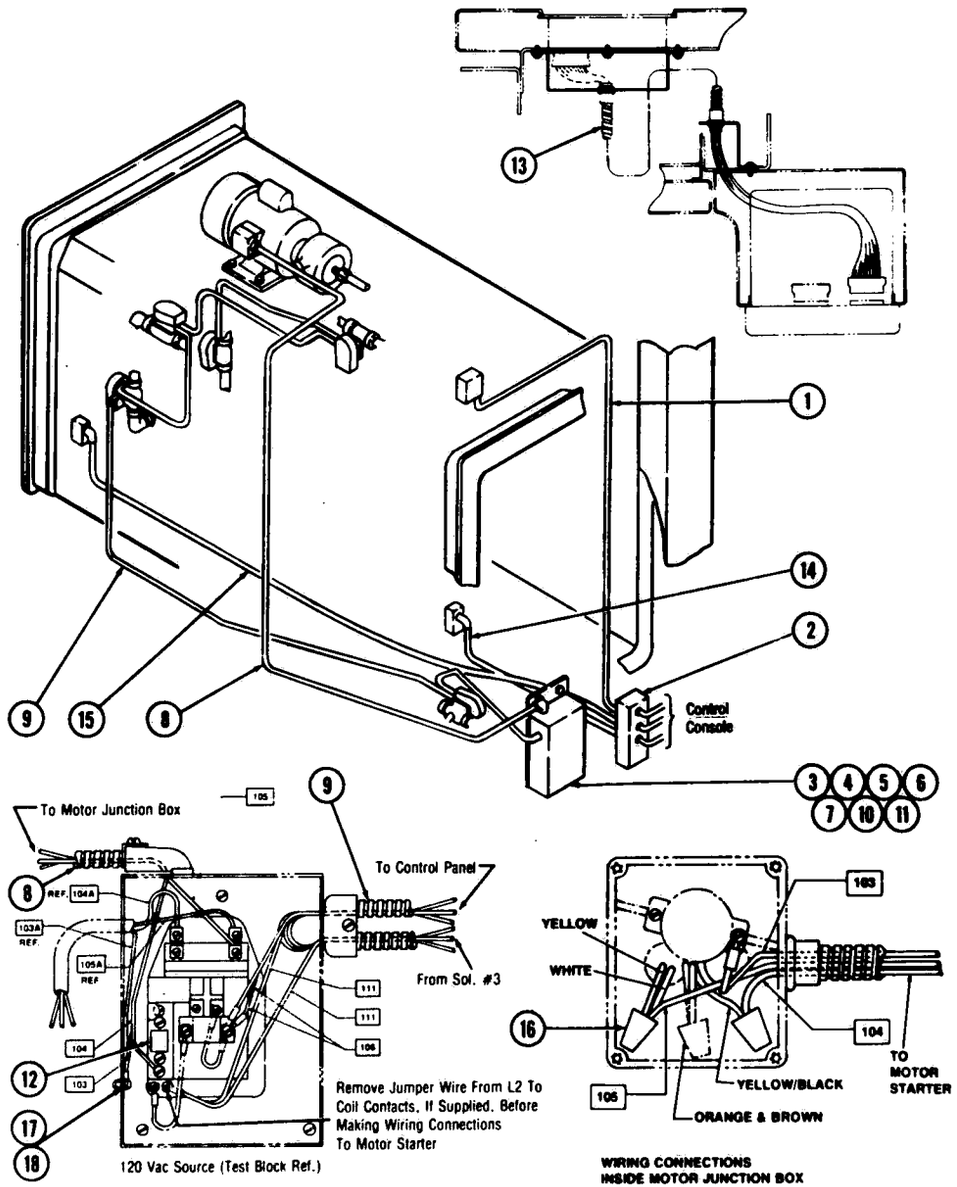

Figure 8-46. WIRING ASSEMBLY: Double Door Sterilizer with Water Booster Pump.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-46-					FINAL WIRING ASSEMBLY: 24x36x36 Double Door	X		
					FINAL WIRING ASSEMBLY: 24x36x48 Double Door		X	
					FINAL WIRING ASSEMBLY: 24x36x60 Double Door			X
1	P	93645	002		CABLE ASSEMBLY, Pressure and Vacuum Switches	1	1	1
2	P	93617	001		BOX, Junction (See Fig. 8-48)	1	1	1
3	P	136543	001		STARTER, Motor	1	1	1
4	P	84389	001		BRACKET, Mounting	1	1	1
5	P	3850	045		SCREW, Hex Head, 5/16-18 x 1-1/4	2	2	2
6	P	24282	091		LOCKWASHER, Shakeproof	2	2	2
7	P	3098	045		NUT, Hex, 5/16-18	2	2	2
8	P	93644	001		CABLE ASSEMBLY, Motor Starter	1	1	1
9	P	760265	209		CABLE ASSEMBLY, Solenoid Valve	1	1	1
10	P	3987	041		SCREW, Round Head, #8-32 x 3/4	3	3	3
11	P	3038	041		NUT, Hex, #8-32	3	3	3
12	P	84446	001		HEATER	1	1	1
13	P	136751	001		HARNESS ASSEMBLY, Primary Panels (See Fig. 8-50)	1	1	1
14	P	93652	001		CABLE ASSEMBLY, Door Operating End	1	1	1
15	P	93652	018		CABLE ASSEMBLY, Double Door (36)	1		
	P	93652	013		CABLE ASSEMBLY, Double Door (48)		1	
	P	93652	008		CABLE ASSEMBLY, Double Door (60)			1
16	P	18538	091		NUT, Wire	4	4	4
17	P	4682	041		SCREW, Machine, #8-32 x 3/8	1	1	1
18	P	3153	041		NUT, Hex, #8-32	1	1	1

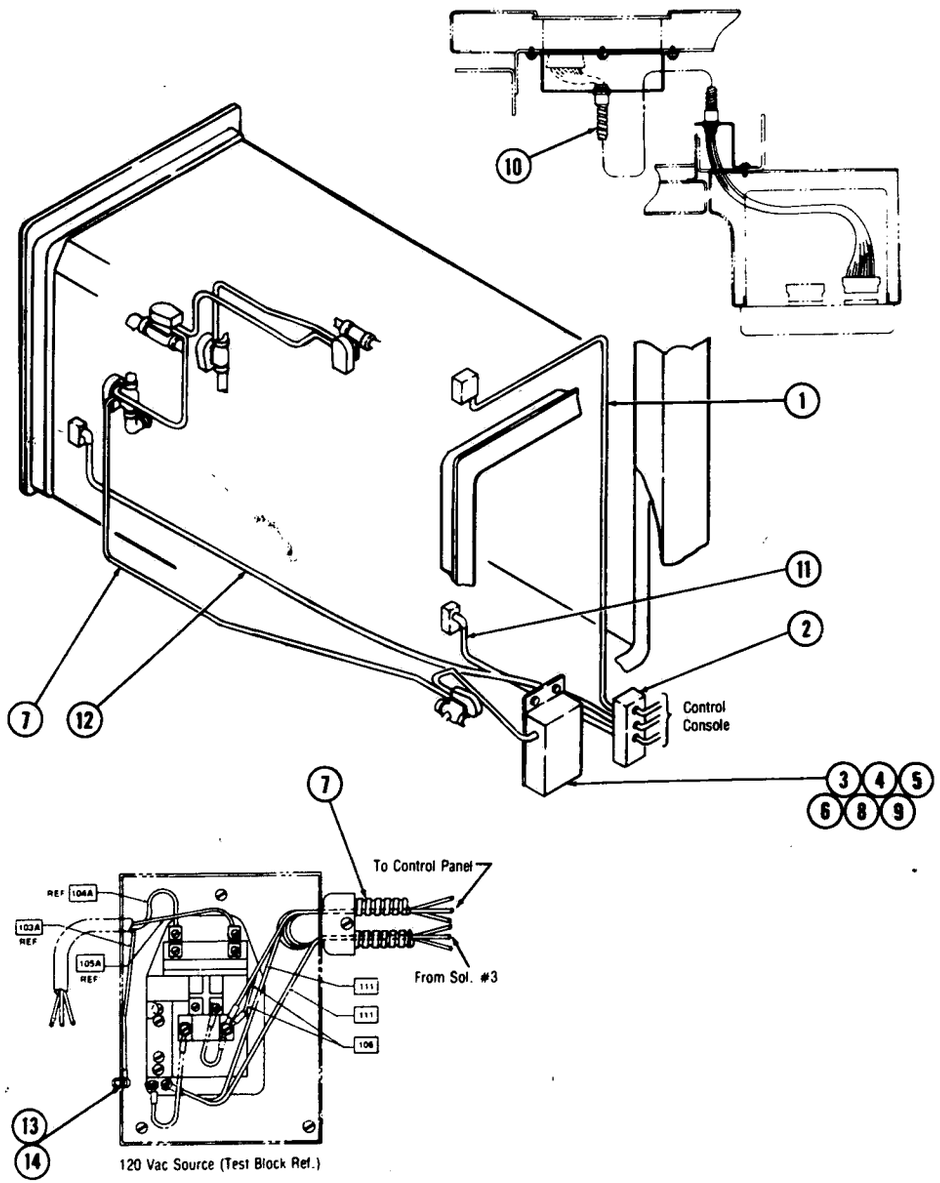

Figure 8-47. WIRING ASSEMBLY: Double Door Sterilizer without Water Booster Pump.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-47-			FINAL WIRING ASSEMBLY: 24x36x36 Double Door	X		
			FINAL WIRING ASSEMBLY: 24x36x48 Double Door		X	
			FINAL WIRING ASSEMBLY: 24x36x60 Double Door			X
1	P 93645 002		CABLE ASSEMBLY, Pressure and Vacuum Switches	1	1	1
2	P 93617 001		BOX, Junction (See Fig. 8-48)	1	1	1
3	P 84389 001		BRACKET, Mounting	1	1	1
4	P 3850 045		SCREW, Hex Head, 5/16-18 x 1-1/4	2	2	2
5	P 24282 091		LOCKWASHER, Shakeproof	2	2	2
6	P 3098 045		NUT, Hex, 5/16-18	2	2	2
7	P 136573 001		CABLE ASSEMBLY, Solenoid Valve	1		
	P 136580 001		CABLE ASSEMBLY, Solenoid Valve		1	
	P 136581 001		CABLE ASSEMBLY, Solenoid Valve			1
8	P 3987 041		SCREW, Round Head, #8-32 x 3/4	3	3	3
9	P 3038 041		NUT, Hex, #8-32	3	3	3
10	P 136751 001		HARNESS ASSEMBLY, Primary Panels (See Fig. 8-50)	1	1	1
11			CABLE ASSEMBLY, Door Operating End	1	1	1
12			CABLE ASSEMBLY, Door Non-Operating End	1	1	1
13	P 4682 041		SCREW, Machine, #8-32 x 3/8	1	1	1
14	P 3153 041		NUT, Hex, #8-32	1	1	1

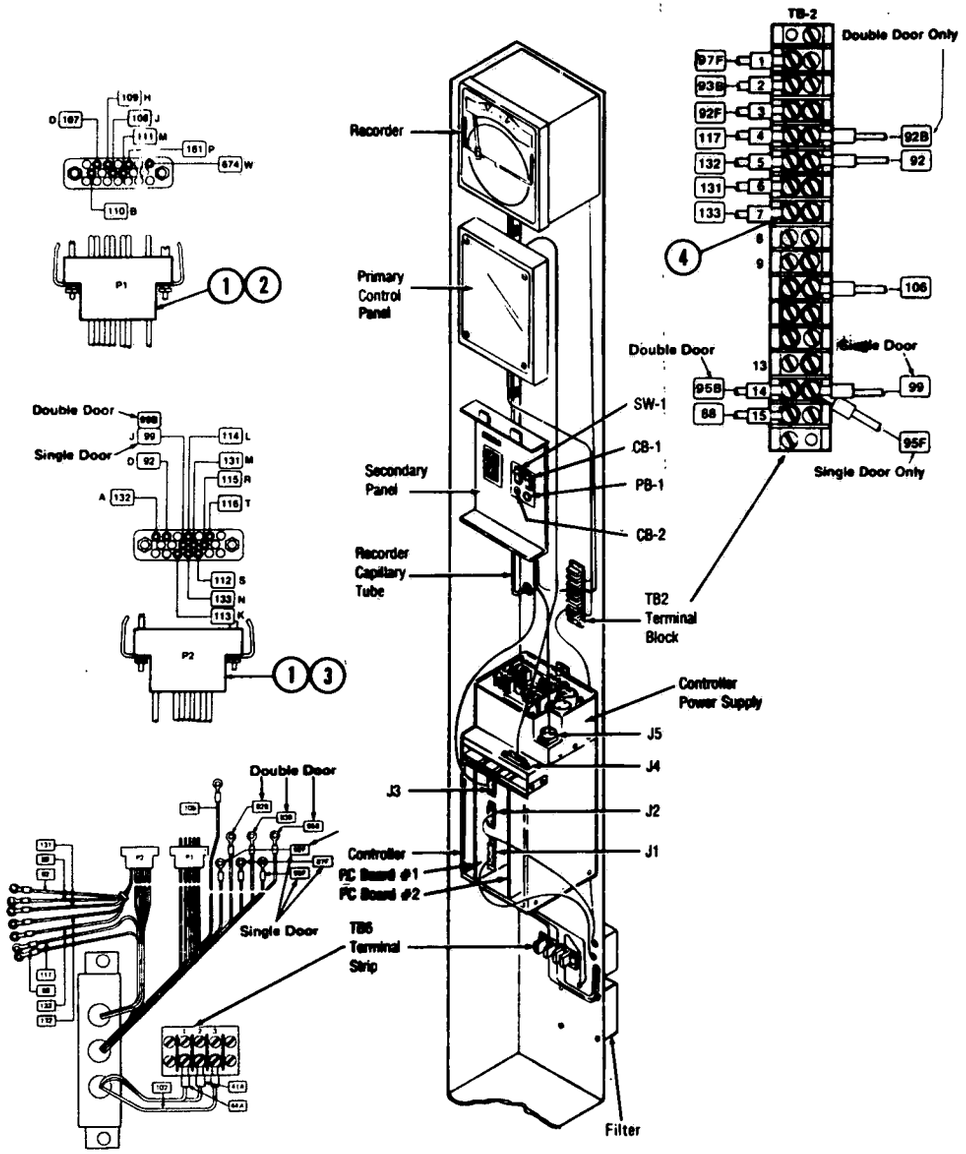

Figure 8-48. CONNECTION DETAILS: Control Column, Manual Door. (Units with Indicator-Recorder).

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY	
					UNITS WITH INDICATOR-RECORDER		
8-48-					CONNECTION DETAILS: Control Column, Manual Door		
					Single Door Models	X	
					Double Door Models		X
1	P	93829	001		BLOCK, P-1 and P-2	2	2
2	P	150822	042		PIN, Contact, P-1	5	5
3	P	84198	002		SOCKET, Contact, P-2	10	10
4	P	90619	091		TERMINAL, Wire, #6 Ring	5	4

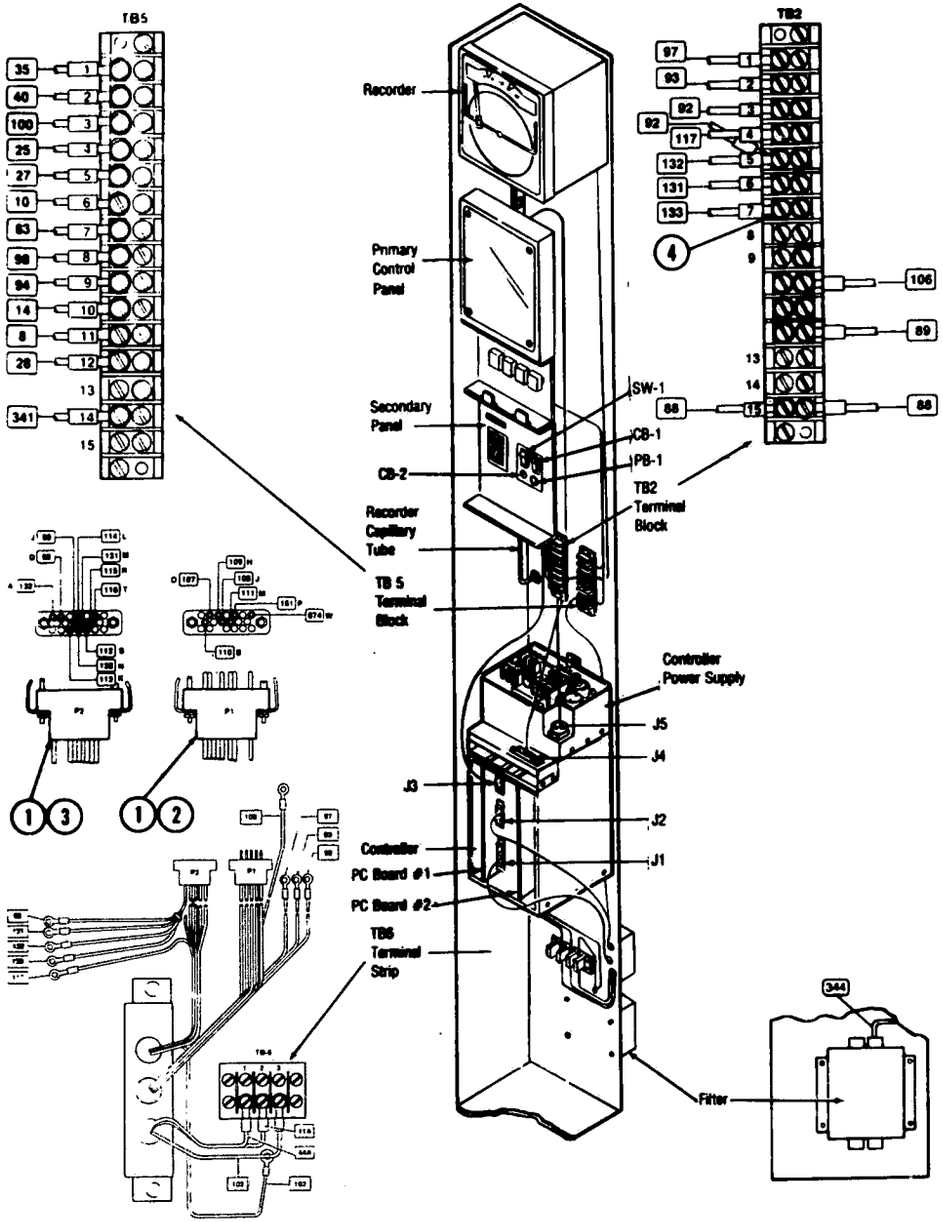

Figure 8-49. CONNECTION DETAILS: Control Column, Power Door. (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
			UNITS WITH INDICATOR-RECORDER		
8-49-			CONNECTION DETAILS: Control Column, Power Door		
			Single Door Models	X	
			Double Door Models		X
1	P 93829 001		BLOCK, P-1 and P-2	2	2
2	P 150822 042		PIN, Contact, P-1	5	5
3	P 84198 002		SOCKET, Contact, P-2	10	10
4	P 90619 091		TERMINAL, Wire, #6 Ring	4	4

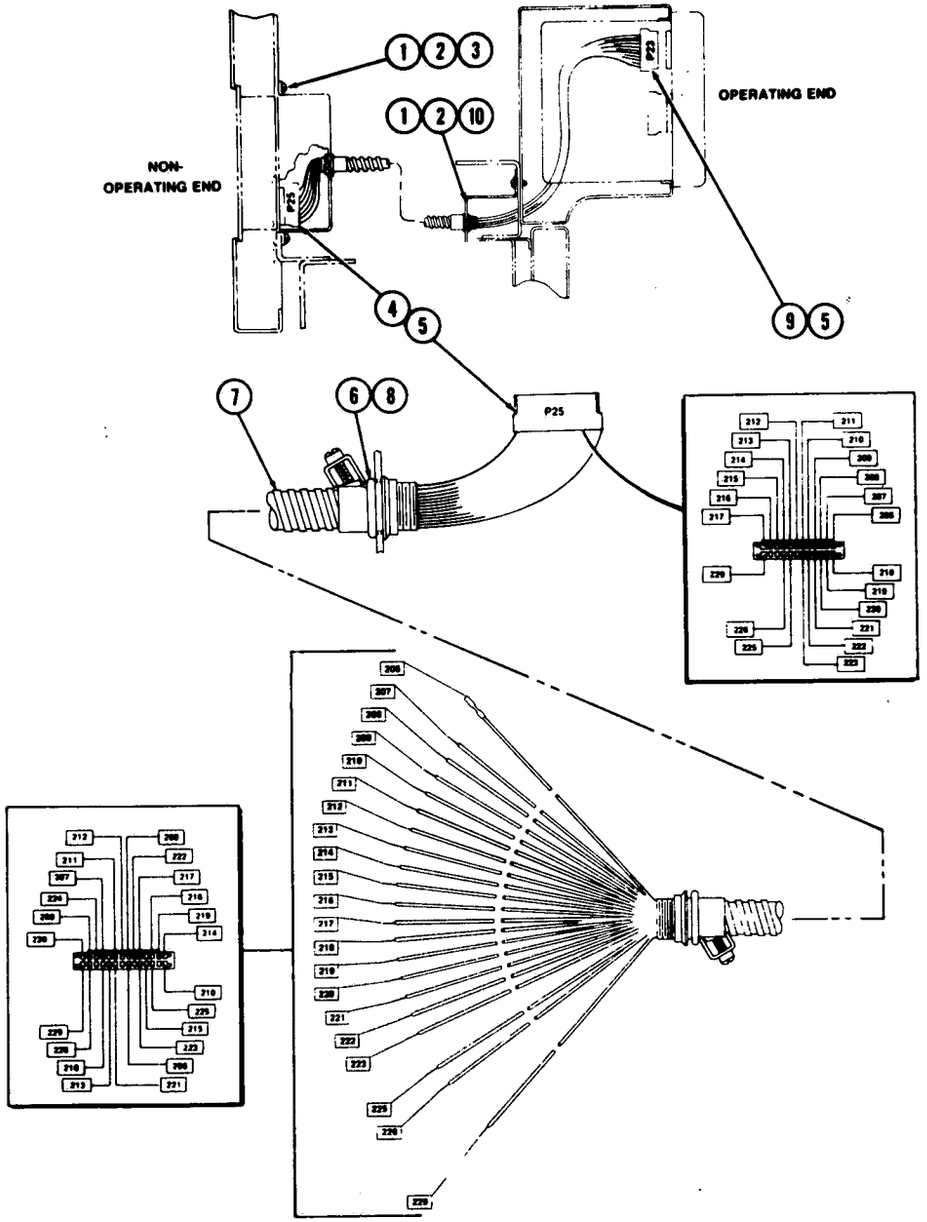

Figure 8-50. HARNESS ASSEMBLY.
(Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-50-	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	89186	091		CONDUIT, Flexible, 1/2 x 102" Lg.	1
8	P	150122	001		BUSHING	2
9	P	84229	006		HOUSING, Receptacle, P-23	1
10	P	129130	001		BRACKET, Mounting	1

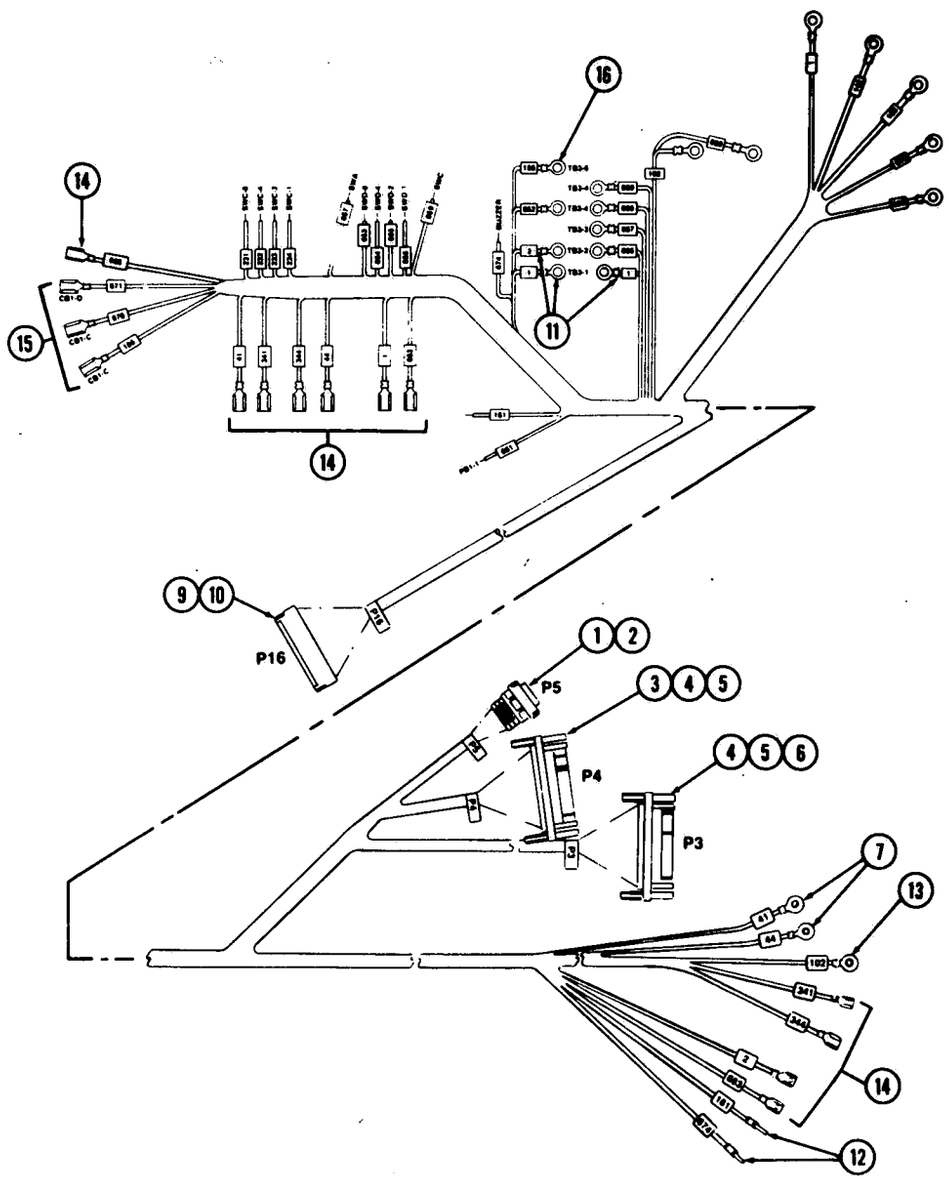

Figure 8-51. WIRING HARNESS: Secondary Panel.
(Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
			UNITS WITH INDICATOR-RECORDER:	
8-51-			WIRING HARNESS: 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		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			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 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
16	P 90619 091		TERMINAL, #6 Stud x 22-18 AWG	12

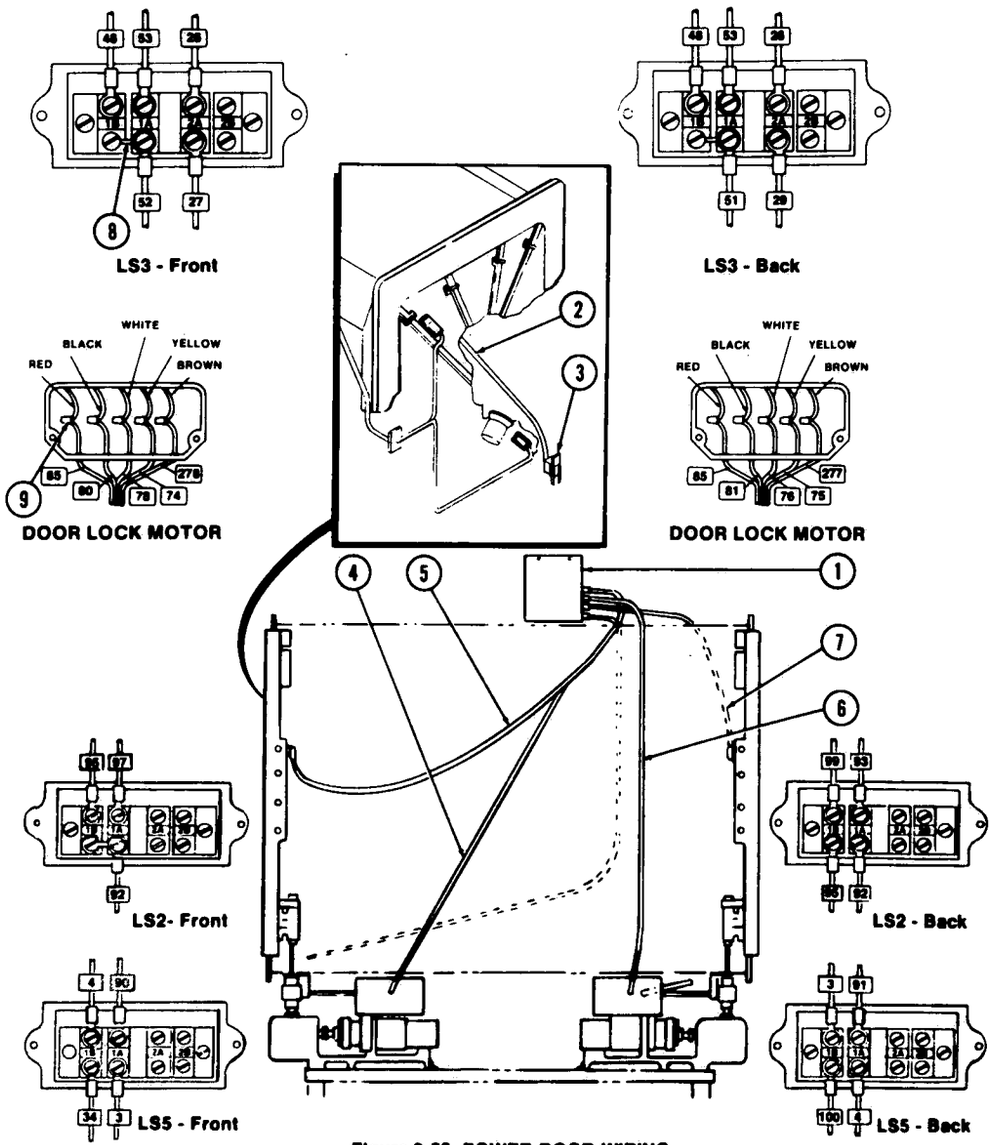

Figure 8-52. POWER DOOR WIRING.
(Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
			UNITS WITH INDICATOR-RECORDER:		
8-52			POWER DOOR WIRING: Single Door Model	X	
			POWER DOOR WIRING: Double Door Model		X
1			RELAY BOX (See Fig. 8-28)	Ref.	
2	P 136680	001	CABLE ASSEMBLY "C", Console to Relays	1	1
3			BOX, Junction (See Fig. 8-48)	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	2	3
9	P 18538	091	NUT, Wire	15	20

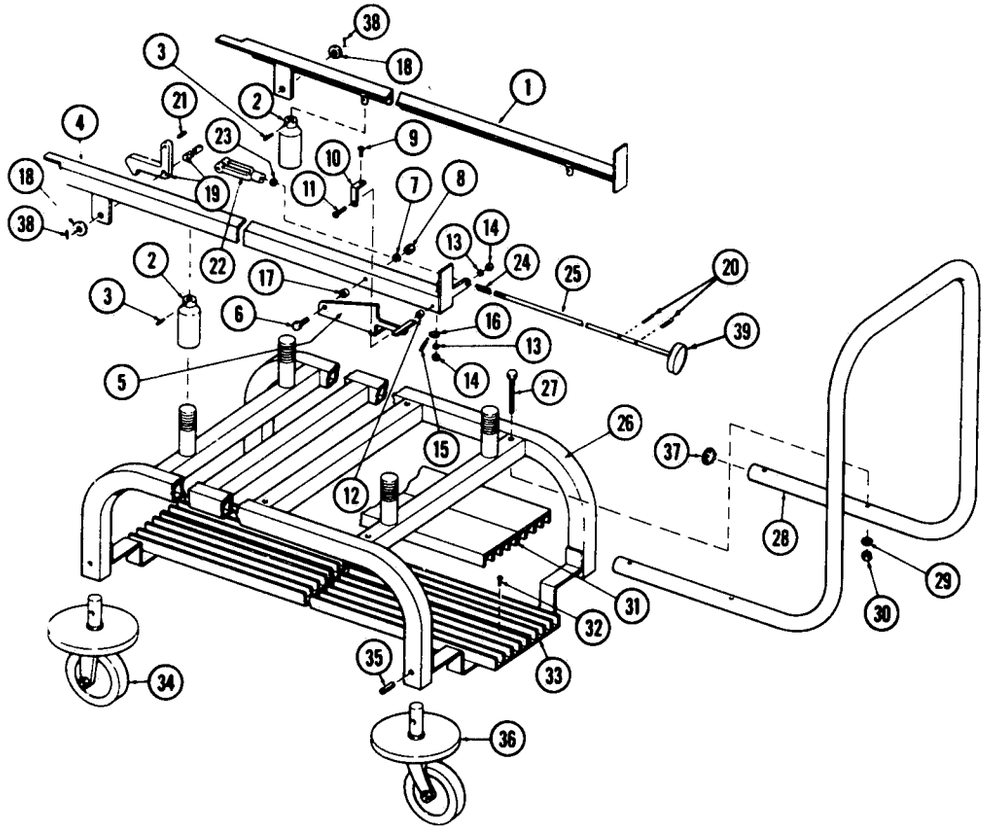

Figure 8-53. OPTIONAL TRANSFER CAR ASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-53-					OPTIONAL TRANSFER CAR ASSEMBLY (36)	X			
					OPTIONAL TRANSFER CAR ASSEMBLY (48)		X		
					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	003		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	
	P	764320	273		• REPLACEMENT WHEEL	A/R	A/R	A/R	
35	P	38968	061		ROLL PIN, 1/4 x 1-1/2	4	4	4	
36	P	91544	091		CASTER, Swivel	2	2	2	
	P	764320	273		• REPLACEMENT WHEEL	A/R	A/R	A/R	
37	P	25890	052		PLUG, Button	2	2	2	
38	P	23597	061		COTTER PIN	2	2	2	
39	P	452740	001		KNOB	1	1	1	

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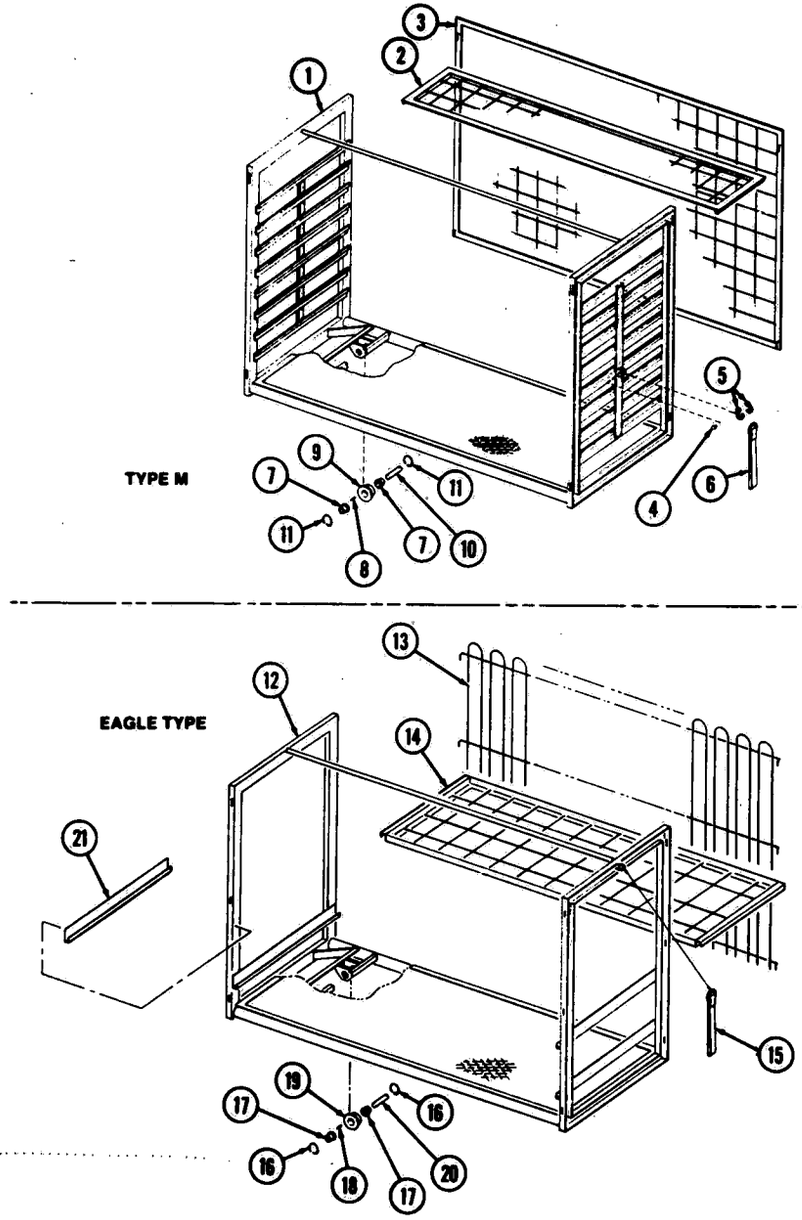


Figure 8-54. OPTIONAL LOADING CAR ASSEMBLY.

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	P	89595	061		PIN, Catch	1	1	1
5	P	89596	063		CATCH	2	2	2
6	P	89591	091		HANDLE	2	2	2
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	P	89591	091		HANDLE	2	2	2
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
21	P	93896	984		SUPPORT, Shelf	4	4	4

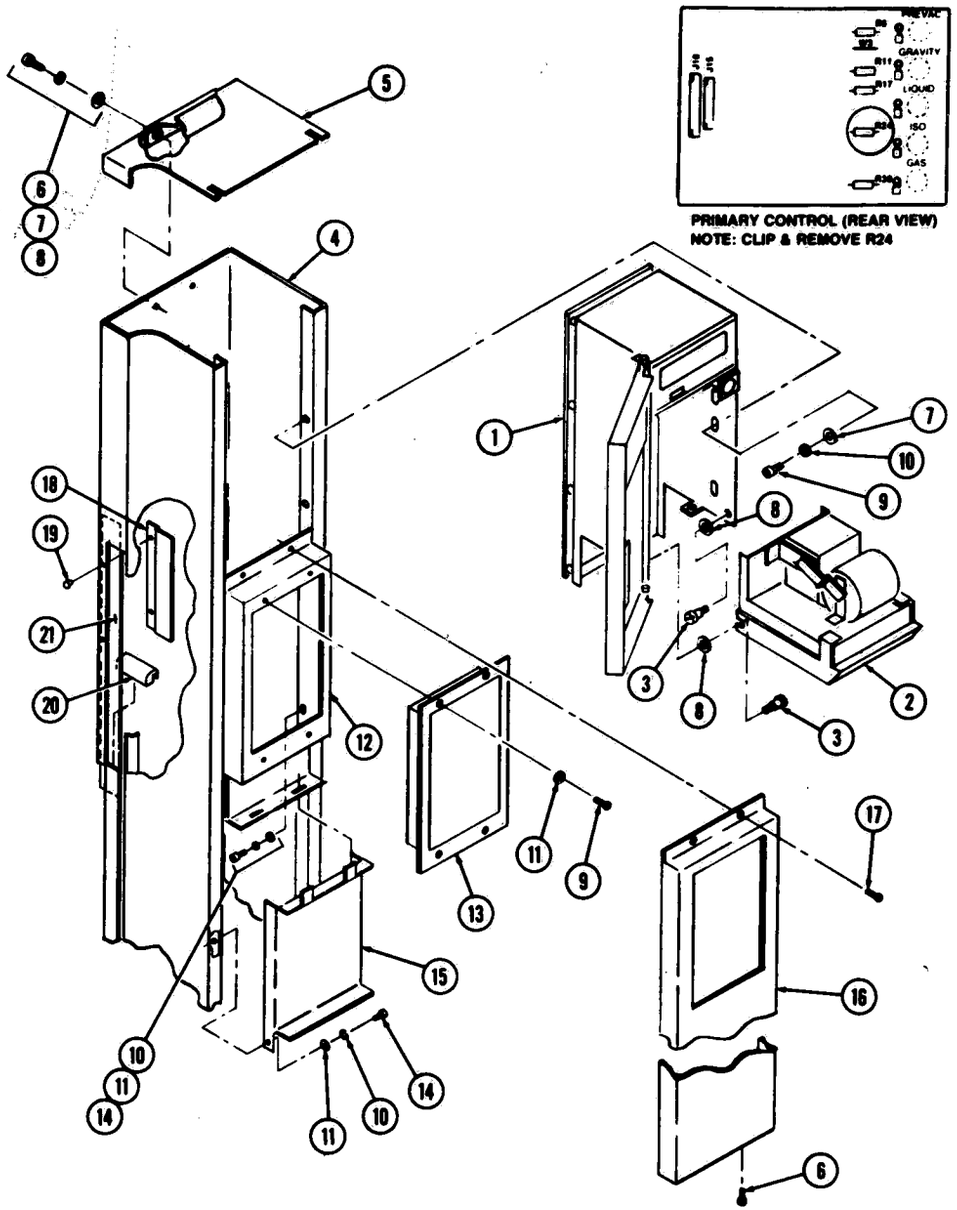


Figure 8-55. CONTROL COLUMN (Part 1 of 3) (Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-55-					CONTROL COLUMN: Manual Door, Right Hand (Part 1 of 3)	X			
					CONTROL COLUMN: Manual Door, Left Hand (Part 1 of 3)		X		
					CONTROL COLUMN: Power Door, Right Hand (Part 1 of 3)			X	
					CONTROL COLUMN: Power Door, Left Hand (Part 1 of 3)				X
1					PRINTCON HOUSING ASSEMBLY (See Fig. 8-58)	1	1	1	1
2					PRINTCON PRINTER ASSEMBLY (See Fig. 8-59)	1	1	1	1
3	P	129356	032		SCREW, Shoulder, #10-32 (For P-150822-336 Soc. Hd.)	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 (Shown)		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. 8-18)			1	1
13	P	146163	001	•	CONTROL, Primary (Units Prior to 2/84) (Repaired P-764193-005)	1	1	1	1
	P	146645	226		CONTROL, Primary (Units After 2/84) (Repaired P-764193-037)	1	1	1	1
	P	764317	536		• LAMP (Box of 10)	A/R	A/R	A/R	A/R
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)	1	1	1	1
16	P	146649	011		PANEL ASSEMBLY, Front, Manual Door	1	1		
17	P	146649	010		PANEL ASSEMBLY, Front, Power Door			1	1
	P	129356	135		SCREW, Button Head Socket, #8-32 x 3/8 (Black)	2	2	2	2
18	P	93900	013		PLATE, Cover	1	1	1	1
19	P	451422	091		RIVET, Pop, 1/8 Dia.	2	2	2	2
20	P	129356	013		PLUG, Gasket	1	1	1	1
21	P	150822	337		SPONGE, Strip	1	1	1	1

• Although Primary Control Panels were changed 2/84, both panels are interchangeable with each other on Vacamatic sterilizers.

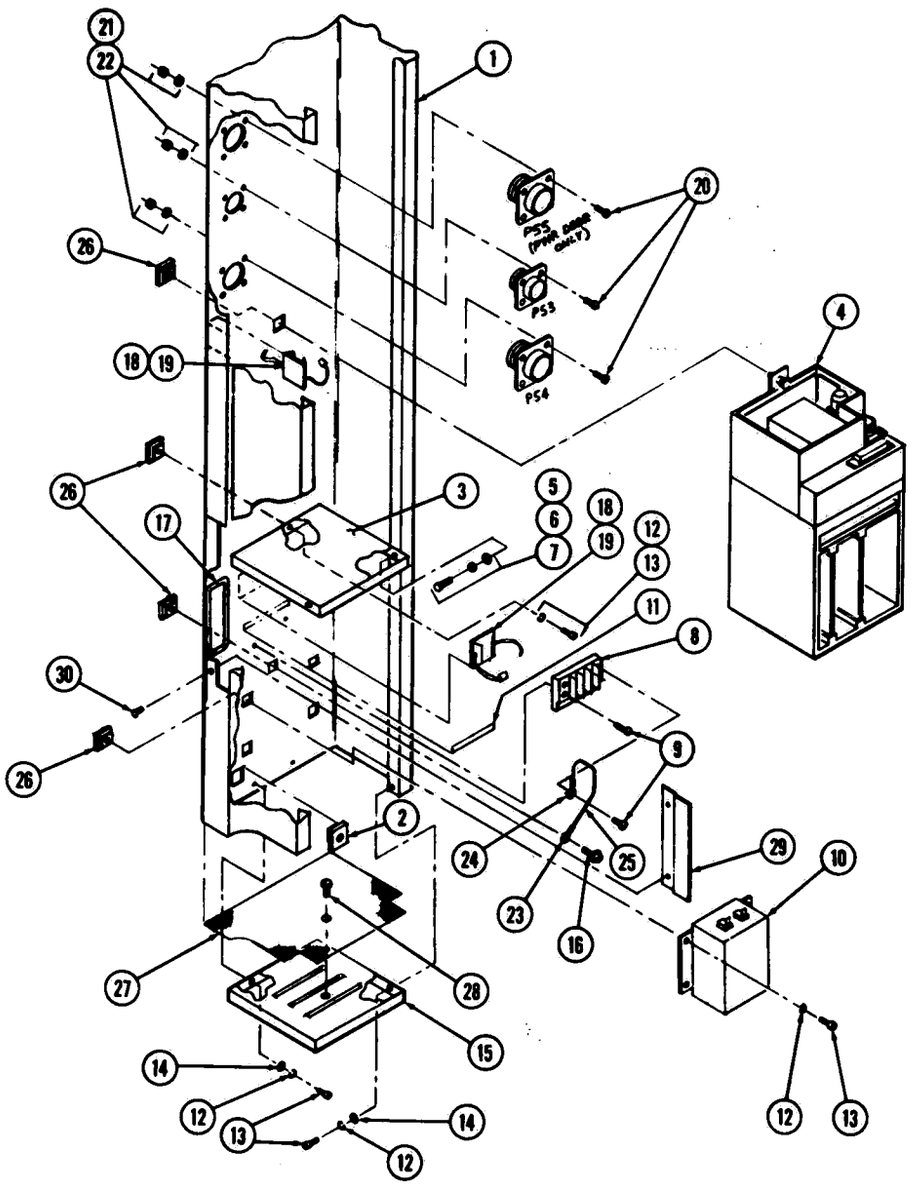


Figure 8-56. CONTROL COLUMN (Part 2 Of 3). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
			UNITS WITH PRINTCON:		
8-56-			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 17, 24, 25, 26 — see Fig. 8-76		

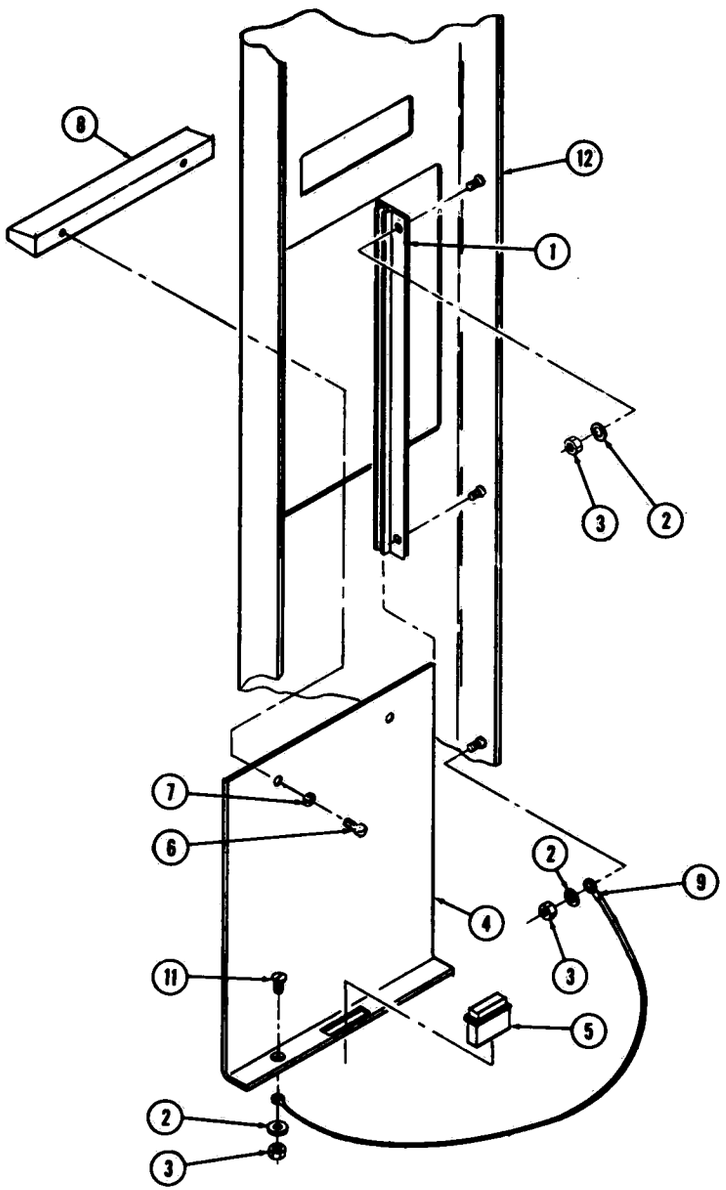


Figure 8-57. CONTROL COLUMN (Part 3 of 3). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON	
8-57-				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)	

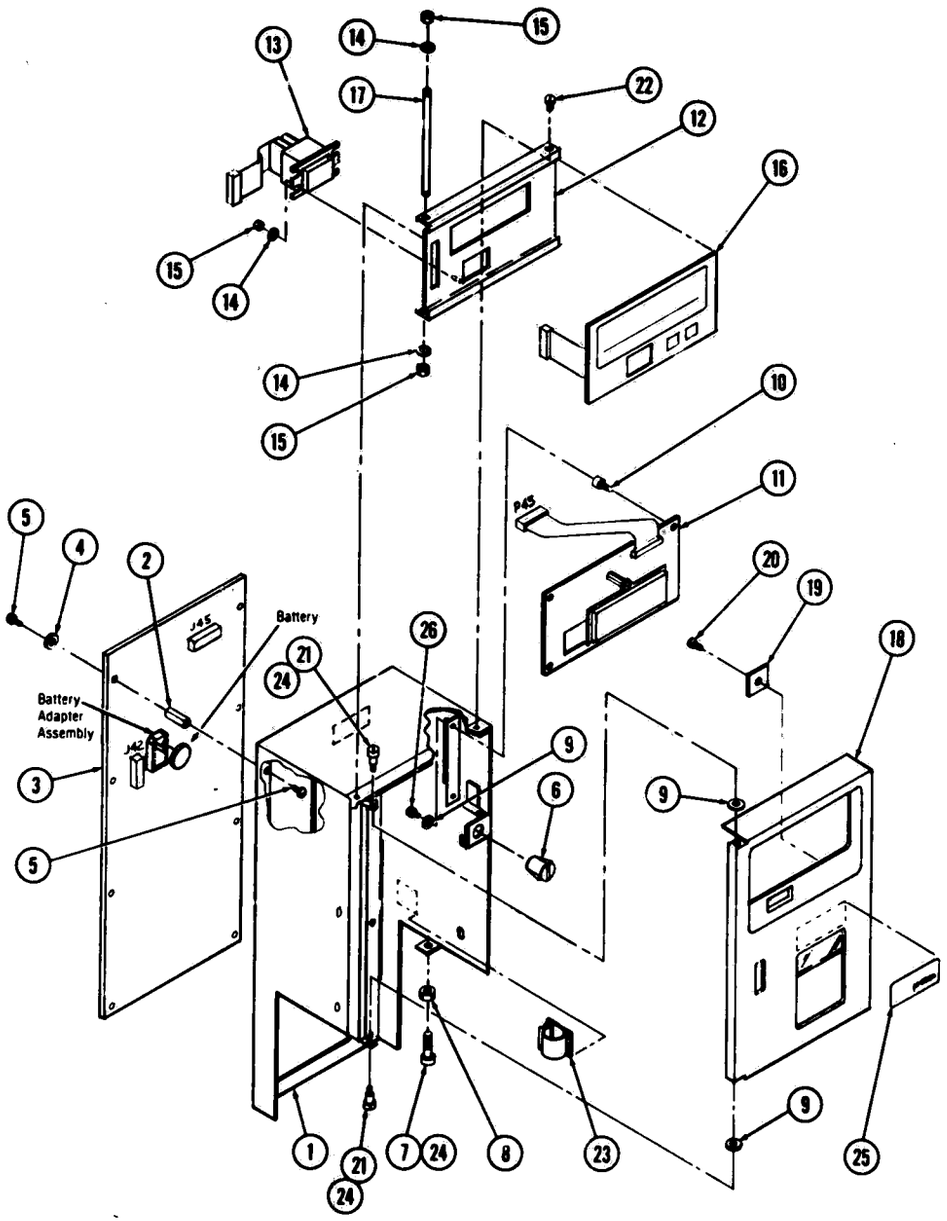


Figure 8-58. PRINTCON HOUSING ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-58-			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 150822 351		• BATTERY, Calendar/Clock, Coincell	1
	P 150822 349	**	• BATTERY, Coincell, w/Adapter Assembly	A/R
4	P 129352 094		WASHER, Flat, #6 Nylon	8
5	P 3984 091		SCREW, Rd. Hd., #6-32 x 1/4	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	5
10	P 84147 001		SUPPORT, Circuit Board	3
11	P 146633 081		DISPLAY BOARD ASSEMBLY, Digital Printer	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	R 5300 640		VIBRA-TITE	AR
25	P 129356 142		LABEL, Printcon	1
26	P 12451 041		SCREW, 6-32 x 1/4	3

**Use battery adapter assembly (P-150822-349) when replacing Ray-O-Vac DP-24 (see Paragraph 7.18).

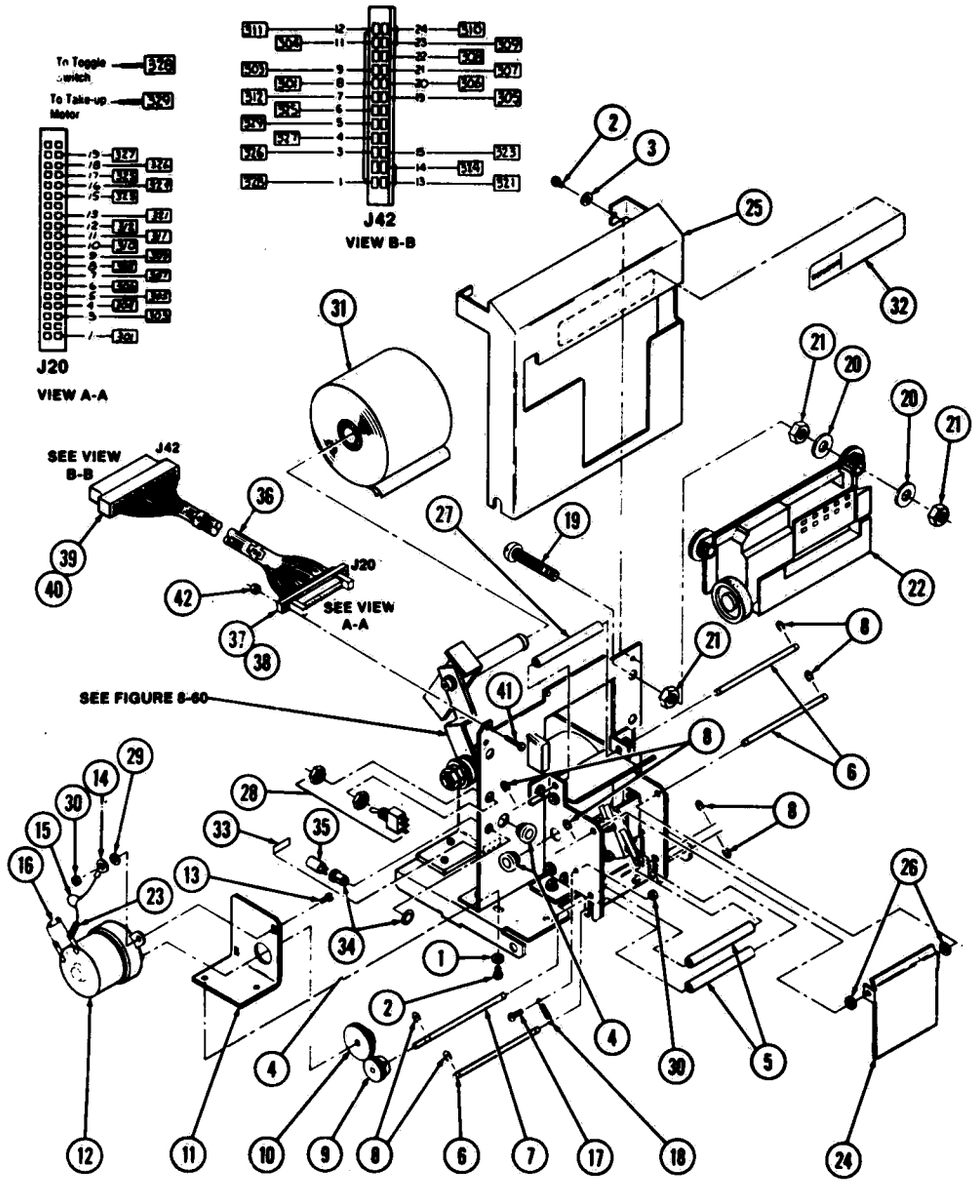


Figure 8-59. PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-59-					PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 1 of 2)	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	1
	P	129356	118		• CARTRIDGE, Inked Ribbon (Box of 2)	AR
23					INSULATION, .064 I.D. x 1-1/4	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	2
42	P	10370	045		NUT, Hex, 2-56	2

**AMSCO recommends using 2-ply paper.

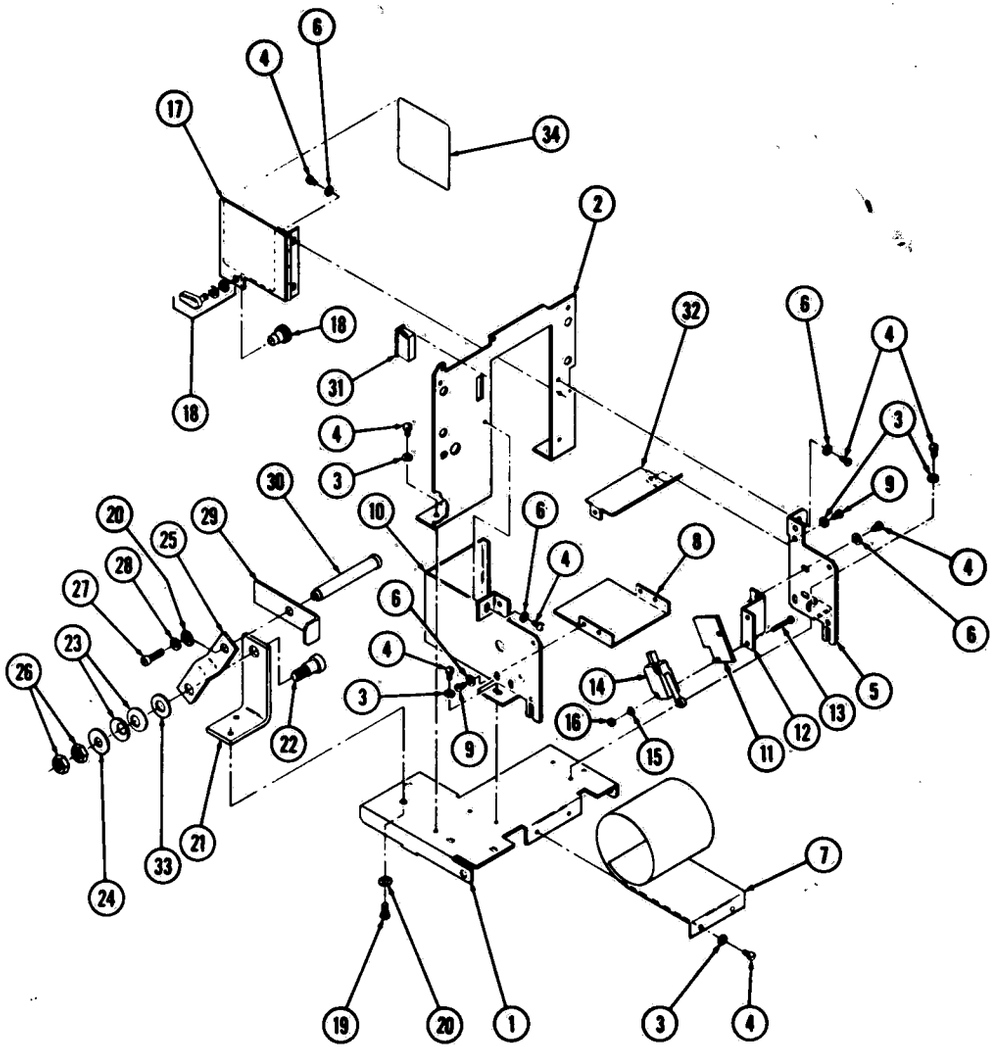


Figure 8-60. PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-60-					PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 2 of 2)	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

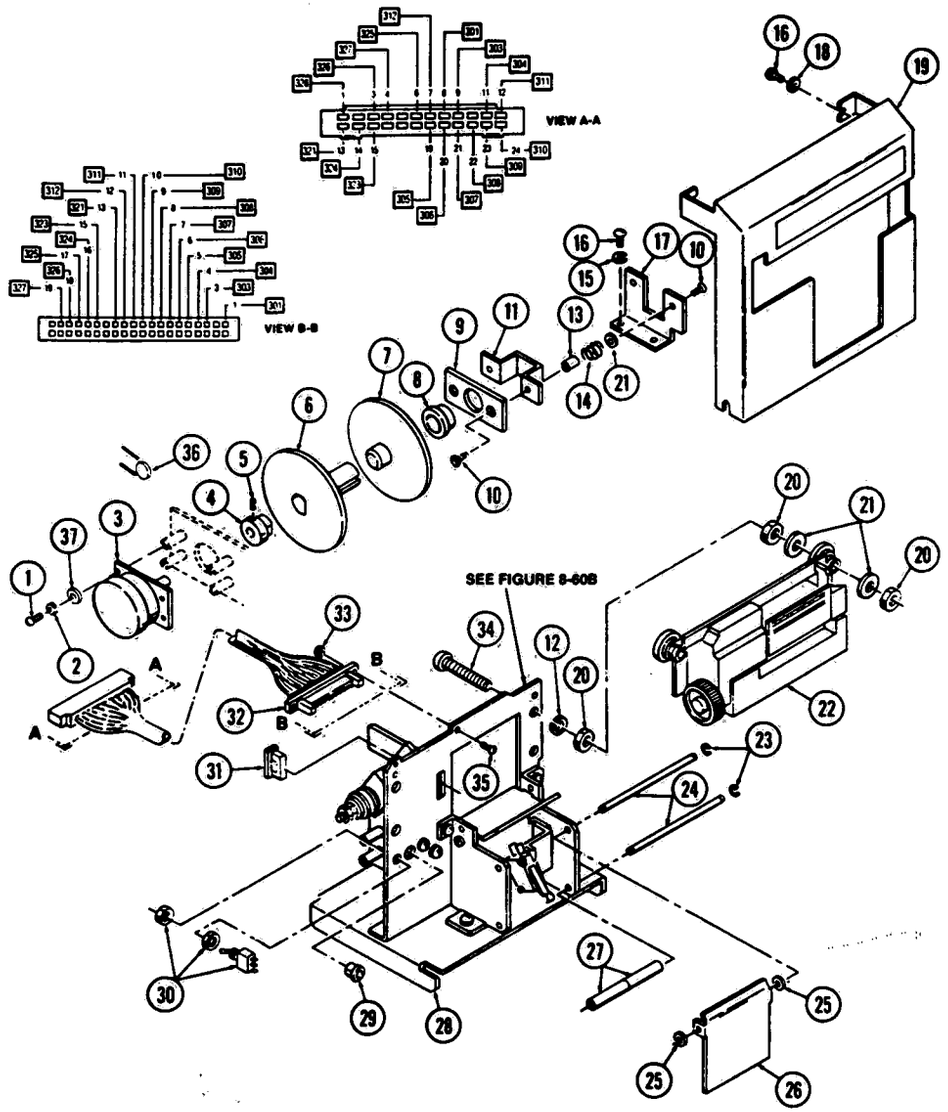


Figure 8-60A. PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-60A-	P	141198	171		PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 1 of 2)	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		SETSCREW, #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	1
12	P	26962	061		LOCKWASHER	3
13	P	150822	541		SPACER	2
14	P	129352	659		SPRING	2
15	P	18131	091		LOCKWASHER, #6	2
16	P	12451	041		SCREW, Round Head, #6-32 x 1/4	4
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	8
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, Flat Nylon, #6	2
26	P	129356	020		PLATEN	1
27	P	129352	115		TUBE, Roller	4
28					FRAME ASSEMBLY, Printer (See Fig. 8-60B)	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 µfd	1
37	P	84114	001		WASHER, Flat, #4	4

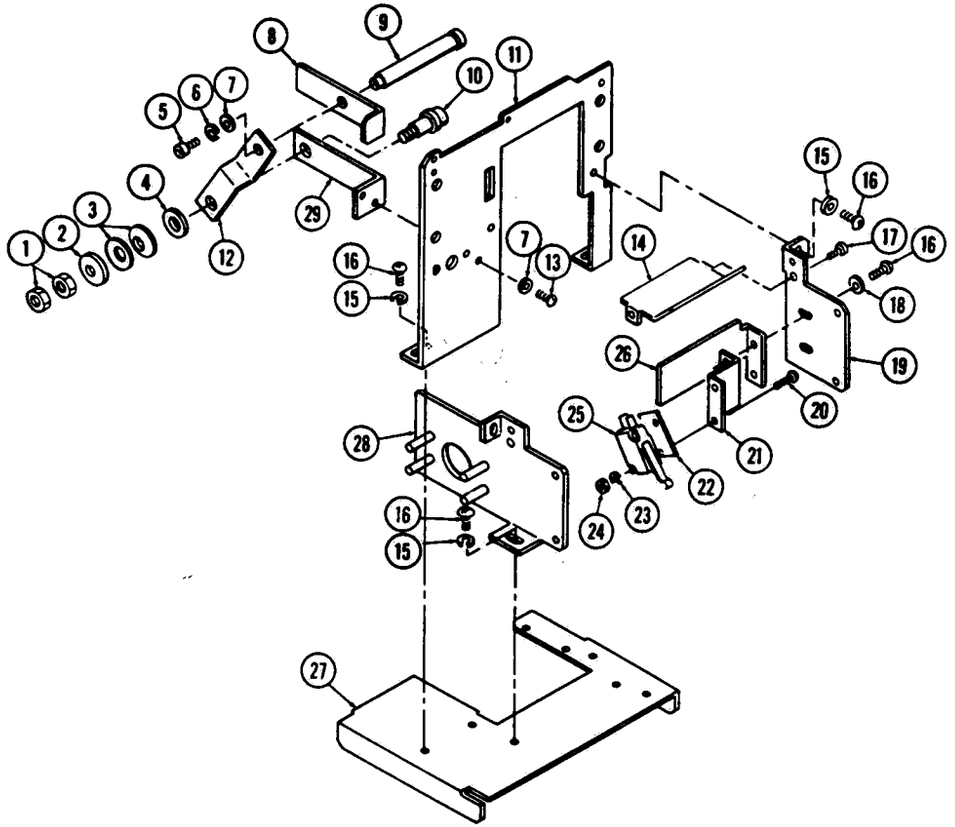
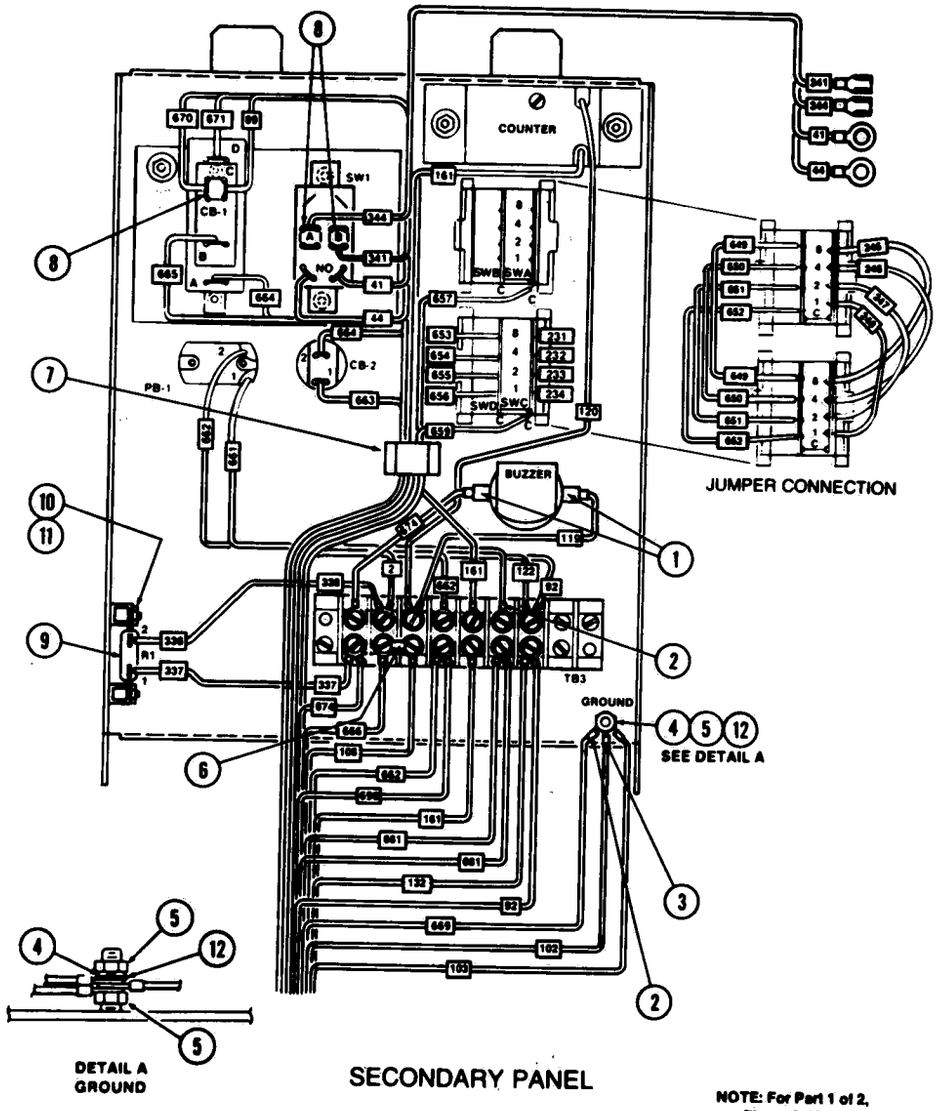


Figure 8-60B. PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-60B-				PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 2 of 2)	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, 3/8	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	3
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



NOTE: For Part 1 of 2, see Figure 8-16.

Figure 8-61. SECONDARY CONTROL PANEL (Part 2 of 2). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON:	
8-61-				SECONDARY CONTROL PANEL (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	2
11	P	26032 091		WASHER, Flat	2
12	P	17589 045		WASHER, Flat	1

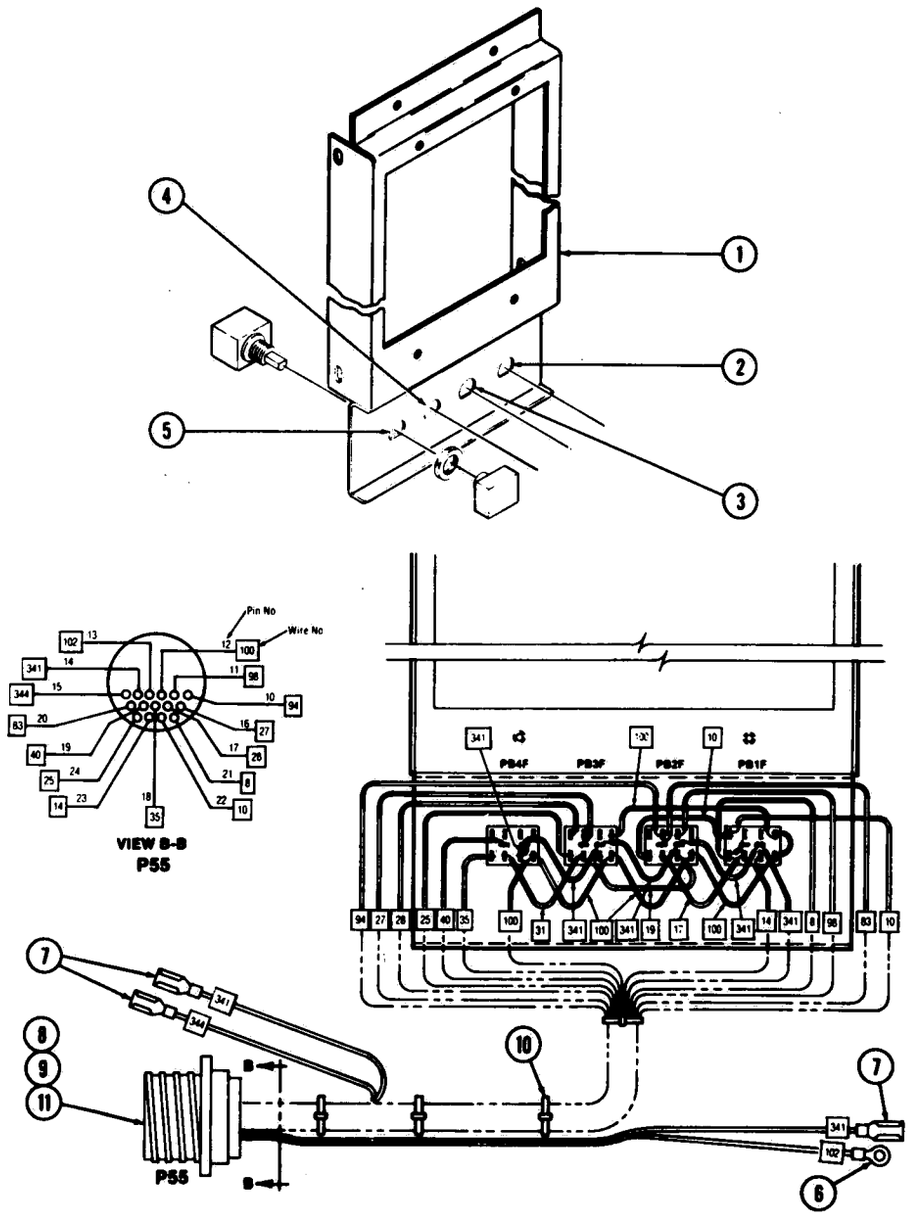


Figure 8-62. SWITCH ASSEMBLY: Operating End Power Door. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-62-	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	003		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	004		HOUSING, Receptacle, 24 Position	1

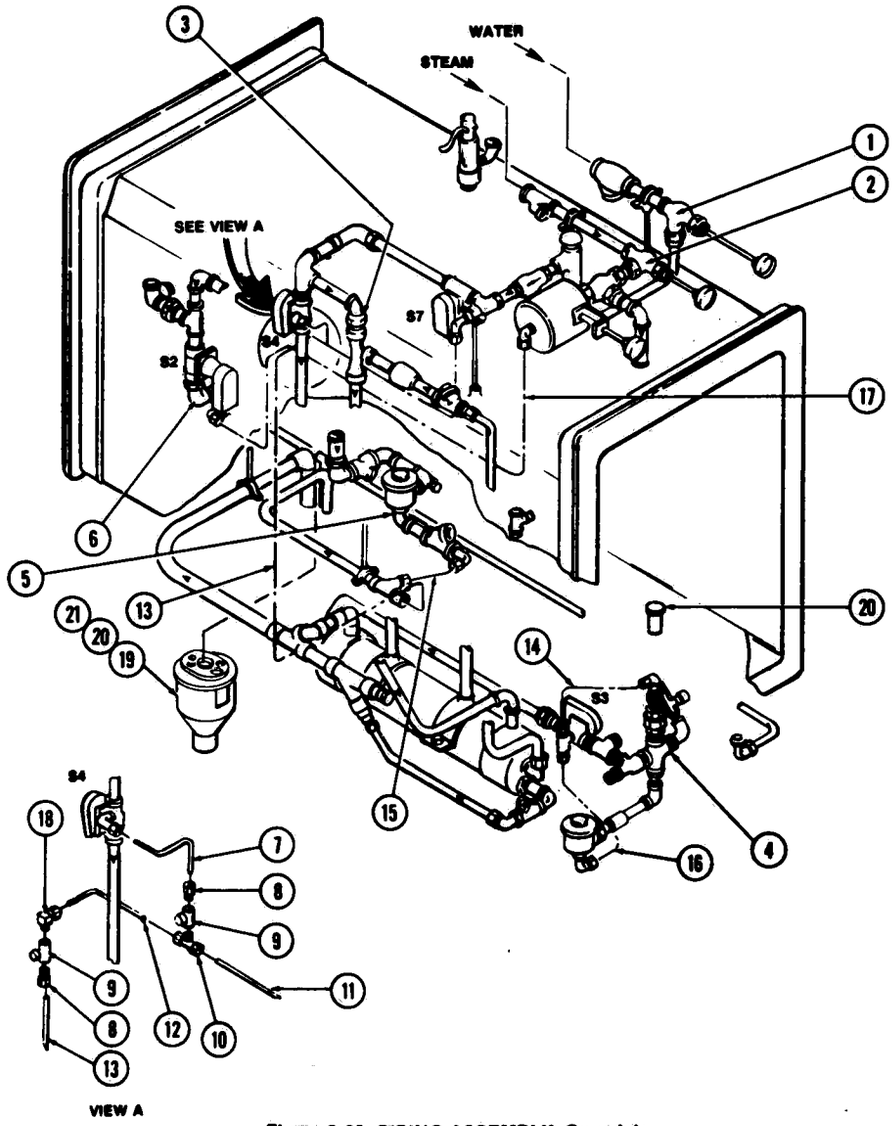


Figure 8-63. PIPING ASSEMBLY: Complete. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON	
8-63-				PIPING ASSEMBLY	X
1				WATER SUPPLY LINE (See Fig. 8-64)	1
2				STEAM SUPPLY LINE (See Fig. 8-64)	1
3				VACUUM LINE (See Fig. 8-64)	1
4				CHAMBER DRAIN LINE (See Fig. 8-65)	1
5				JACKET DRAIN LINE (See Fig. 8-35)	1
6				AIR BREAK LINE (See Fig. 8-65)	1
7				TUBE, 1/4 O.D. x 7-1/2	1
8	P	19514	091	FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
9	P	83630	001	VALVE, Needle, 1/8 N.P.T.	2
10	P	42581	091	TEE, Compression, 1/4 x 1/4 O.D.T. x 1/8 N.P.T.	1
11				TUBE, 1/4 O.D. x 17-13/32	1
12				TUBE, 1/4 O.D. x 4-21/32	1
13				TUBE, 1/4 O.D. x 64-25/32	1
14				TUBE, 5/16 O.D. x 15	1
15				TUBE, 1/4 O.D. x 6-1/4	1
16				TUBE, 5/16 O.D. x 14	1
17				TUBE, 1/4 O.D. x 55-21/32	1
18	P	21990	091	ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
19	P	141198	004	FUNNEL & CAP ASSEMBLY, 2" O.D.	1
20	P	48733	042	STRAINER, Chamber Drain	1
21	P	56396	018	PLUG	1

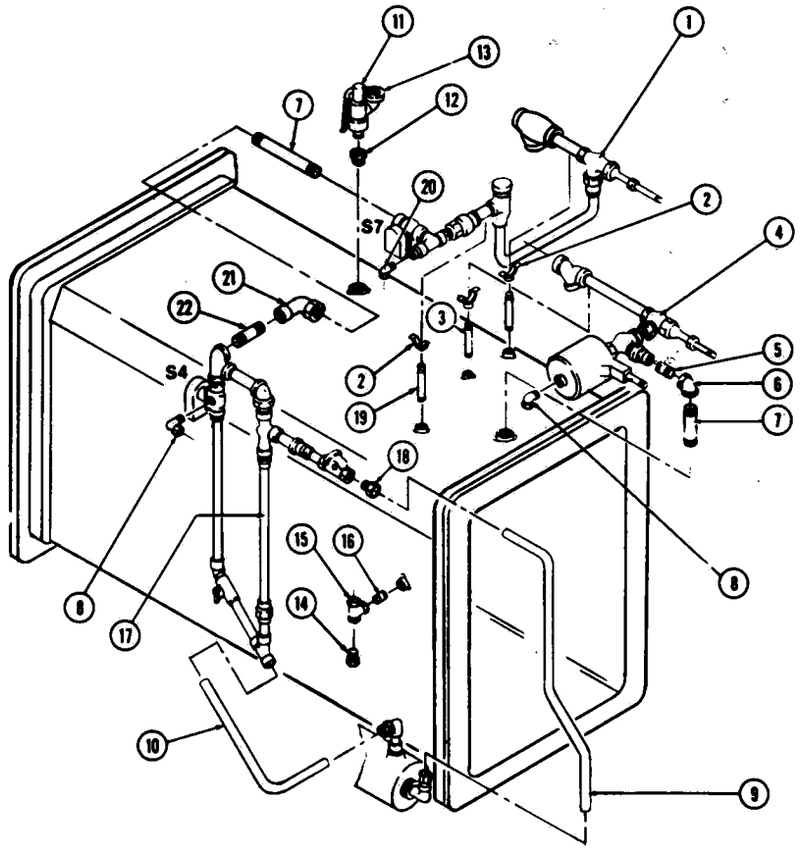


Figure 8-64. WATER AND STEAM SUPPLIES: Vacuum System. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON:	
8-64-				WATER AND STEAM SUPPLIES — Vacuum System	X
1	P	136604 001		WATER SUPPLY ASSEMBLY (See Fig. 8-33)	1
2	P	39590 010		CLAMP, Pipe	3
3	P	150822 289		NIPPLE, Steel, 1/4 N.P.T. x 6-9/16	2
4	P	136605 001		STEAM SUPPLY ASSEMBLY (See Fig. 8-33)	1
5	P	29291 091		NIPPLE, 3/4 N.P.T. x 1-1/4	1
6	P	1635 091		ELL, 3/4 N.P.T.	1
7	P	29312 091		NIPPLE, 3/4 N.P.T. x 6-1/2	1
8	P	21990 091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
9	P	93194 001		TUBE, 5/8 O.D.	1
10	P	83639 001		TUBE, 7/8 O.D.	1
11	P	91960 091		VALVE, Safety, 3/4 N.P.T.	1
12	P	841 042		BUSHING, Reducing, 1 x 3/4 N.P.T.	1
13	P	1639 091		ELL, Street, 1 N.P.T.	1
14	P	3440 091		PLUG, Pipe, 1/4 N.P.T.	1
15	P	4906 091		TEE, 1/4 N.P.T.	1
16	P	27422 091		NIPPLE, 1/4 N.P.T. x 1-1/4	1
17	P	136603 001		EJECTOR ASSEMBLY (See Fig. 8-35)	1
18	P	39072 091		COUPLING, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1
19	P	150822 290		NIPPLE, Steel, 1/4 N.P.T. x 6-7/8	1
20	P	43041 091		ELL, Compression, 1/4 O.D.T. x 3/8 N.P.T.	1
21	P	89986 091		ELL, Union, 3/4 N.P.T.	1
22	P	29295 091		NIPPLE, 3/4 N.P.T. x 2-1/4	1

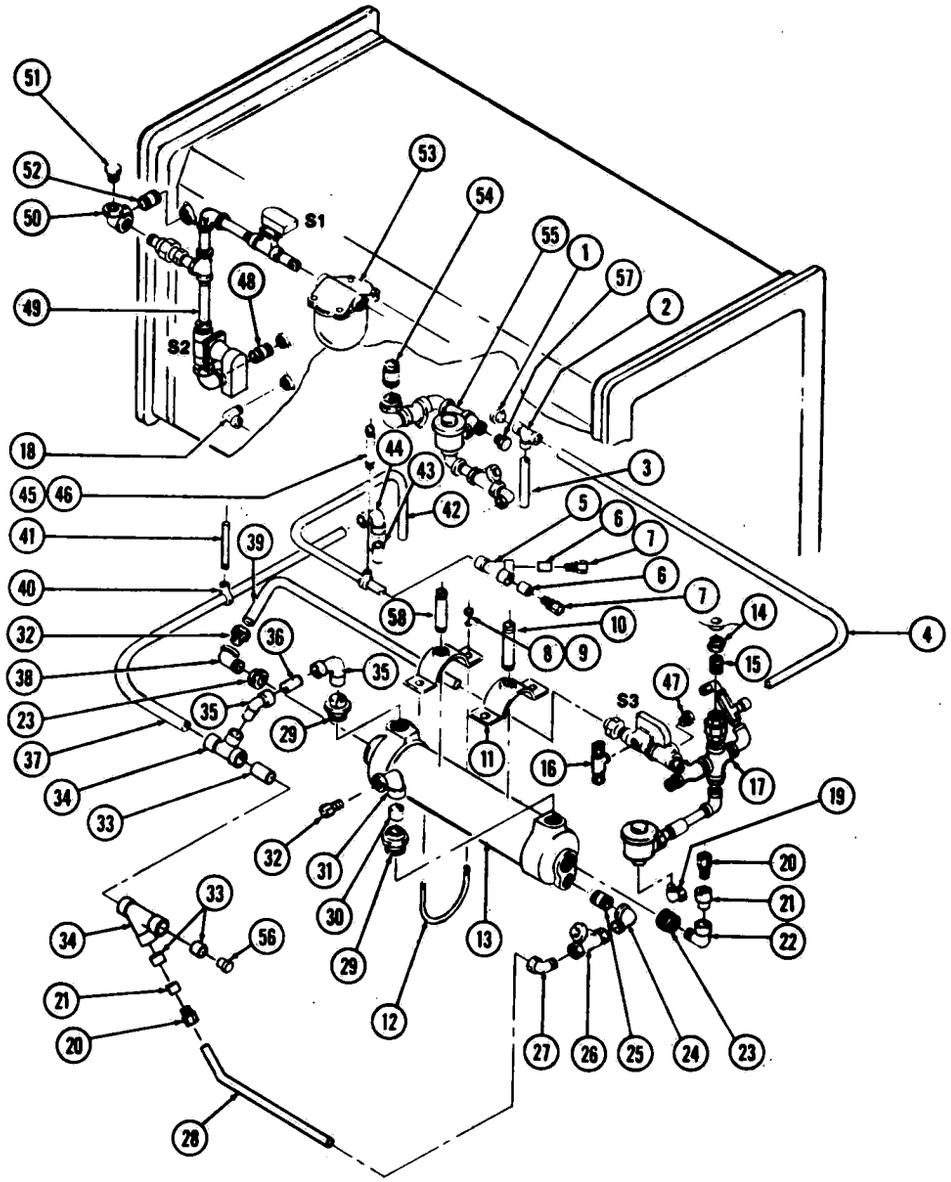


Figure 8-65. AIR BREAK AND HEAT EXCHANGER PIPING.
(Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-65-					AIR BREAK AND HEAT EXCHANGER PIPING	X
1	P	90547	091		PLUG, 5/8 O.D.T.	1
2	P	90221	091		TEE, 5/8 O.D.T.	1
3	P	89736	091		TUBE, 5/8 O.D. x 4-15/16	1
4	P	92935	008		TUBE, 5/8 O.D.	1
5	P	83377	001		"Y" BRANCH, 5/8 O.D.T.	1
6	P	89808	091		COUPLING, 5/8 O.D.T. x 1/8 N.P.T.	2
7	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2
8	P	8650	001		NUT, Hex, 5/16-18	4
9	P	24282	091		LOCKWASHER	4
10	P	150822	300		NIPPLE, Steel, 3/4 N.P.T. x 6	1
11	P	93200	001		SUPPORT, Heat Exchanger	2
12	P	93201	001		"U" BOLT	2
13	P	89604	091		HEAT EXCHANGER	1
14	P	850	042		BUSHING, Reducing, 1-1/4 x 1 N.P.T.	1
15	P	29380	091		NIPPLE, 1 N.P.T. x 1-1/4	1
16	P	21549	091		TEE, Compression, 5/16 O.D.T. x 1/8 N.P.T.	1
17	P	136805	044		CHAMBER DRAIN ASSEMBLY (See Fig. 8-66)	1
18	P	41306	091		ELL, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1
19	P	7033	091		ELL, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1
20	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	2
21	P	89743	091		ADAPTER, 7/8 O.D.T. x 1/2 N.P.T.	2
22	P	44500	091		ELL, 7/8 O.D.T. x 3/4 N.P.T.	1
23	P	92865	002		BUSHING, Reducing, 2-1/2 x 3/4 N.P.T.	2
24	P	1631	091		ELL, Street, 3/8 N.P.T.	1
25	P	29016	091		NIPPLE, 3/8 N.P.T. x 1-3/4	1
26	P	5424	091		VALVE, Check, 3/8 N.P.T.	1
	P	74335	091		• DISC	1
27	P	40153	091		ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1
28	P	56396	091		TUBE, 5/8 O.D.	1
29	P	44721	091		ADAPTER, 1-1/8 O.D.T. x 1-1/2 N.P.T.	1
30	P	83376	001		TUBE, 1-1/8 O.D. x 3-1/2	1
31	P	44724	091		ELL, 1-1/8 O.D.T. x 3/4 N.P.T.	1
32	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	2
33	P	91317	091		COUPLING, 1-1/8 x 7/8 O.D.T.	1
34	P	83375	001		"Y" BRANCH, 1-1/8 O.D.T.	2
35	P	51764	091		ELL, Street, 1-1/8 O.D.T.	2
36	P	83376	004		TUBE, 1-1/8 O.D. x 2-1/2	1
37	P	93196	001		TUBE, 1-1/8 O.D.	1
38	P	1636	091		ELL, Street, 3/4 N.P.T.	1
39	P	56396	006		TUBE, 7/8 O.D.	1
40	P	39590	010		CLAMP, Pipe	1
41	P	150822	287		NIPPLE, Steel, 1/4 N.P.T. x 4-7/8	1
42	P	93198	001		TUBE, 5/8 O.D.	1
43	P	83376	002		TUBE, 1-1/8 O.D. x 3	2
44	P	44492	091		ELL, 1-1/8 O.D.T.	1
45	P	75376	010		CLAMP, Pipe	1
46	P	150822	288		NIPPLE, Steel, 1/4 N.P.T. x 6-5/16	1
47	P	3442	091		PLUG, Pipe, 1/2 N.P.T.	1
48	P	29354	091		NIPPLE, 1 N.P.T. x 1-1/2	

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-65-						
49	P	136602	001		AIR BREAK ASSEMBLY (See Fig. 8-34)	1
50	P	84435	001		ELL, Side Outlet, 3/4 N.P.T.	1
51	P	3443	091		PLUG, Pipe, 3/4 N.P.T.	1
52	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
53	P	82619	001		FILTER, Air, 1/2 N.P.T. (See Fig. 8-40)	1
54	P	29301	091		NIPPLE, 3/4 N.P.T. x 3-3/4	1
55	P	136607	001		JACKET DRAIN ASSEMBLY (See Fig. 8-35)	1
56	P	91227	091		PLUG, Pipe, 7/8 O.D.T.	1
57	P	3441	091		PLUG, Pipe, 3/8 N.P.T.	1
58	P	150822	299		SUPPORT, Pipe, 3/4 x 5-3/4 Lg.	1

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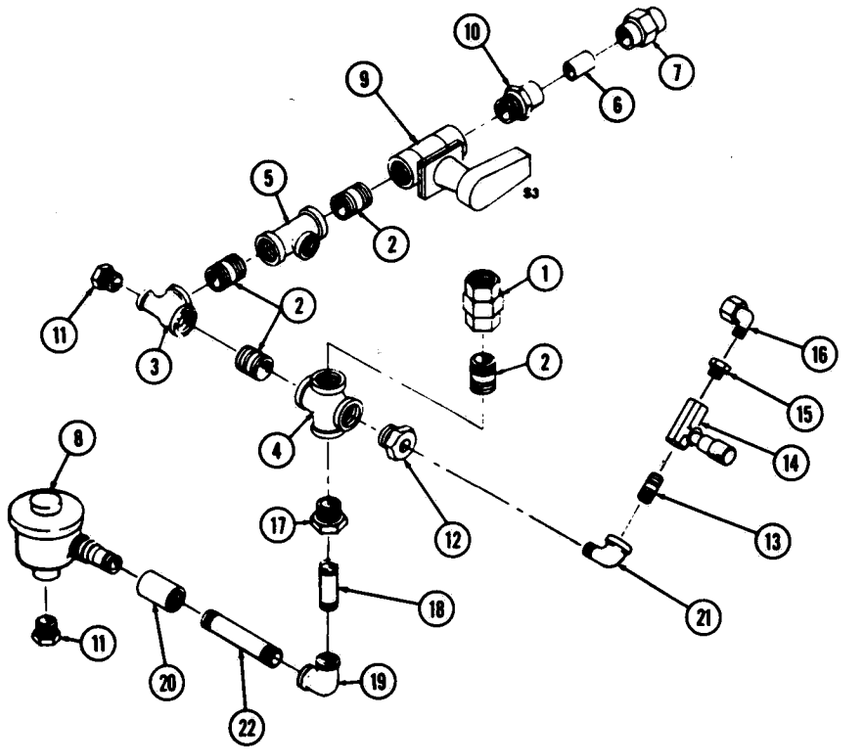

Figure 8-66. CHAMBER DRAIN ASSEMBLY. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-66-	P	136805	044		CHAMBER DRAIN ASSEMBLY	X
1	P	5283	091		UNION, 1 N.P.T.	1
2	P	29380	091		NIPPLE, 1 N.P.T.	4
3	P	4940	091		TEE, 1 x 1/2 x 1 N.P.T.	1
4	P	1351	091		CROSS, 1 N.P.T.	1
5	P	4935	091		TEE, 2 x 1 x 1/2 N.P.T.	1
6	P	83449	002		TUBE, 7/8 O.D.T. x 2-1/4	1
7	P	91226	091		UNION, 7/8 O.D.T.	1
8	P	129222	001		TRAP, Steam, 1/2 N.P.T. (See Fig. 8-38)	1
9	P	83229	002		VALVE, Solenoid, 1 N.P.T. Steam (S-3)	1
	P	764071	001		• KIT, Repair	A/R
	P	764071	002		• COIL	A/R
10	P	91221	091		ADAPTER, 1 N.P.T. x 7/8 O.D.T.	1
11	P	76053	042		BUSHING, Reducing, 1/2 x 1/4 N.P.T.	2
12	P	6208	091		BUSHING, Reducing, 1 x 3/8 N.P.T.	1
13	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1
14	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1
15	P	849	091		BUSHING, Reducing, 3/8 x 1/4 N.P.T.	1
16	P	7033	091		ELL, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1
17	P	6263	091		BUSHING, Reducing, 1 x 1/2 N.P.T.	1
18	P	29163	091		NIPPLE, 1/2 N.P.T. x 1-1/4	1
19	P	1633	091		ELBOW, 1/2 N.P.T.	1
20	P	118372	091		COUPLING, 1/2 N.P.T.	1
21	P	1631	091		ELL, Street, 3/8 N.P.T.	1
22	P	29172	091		NIPPLE, 1/2 N.P.T. x 3-1/2	1

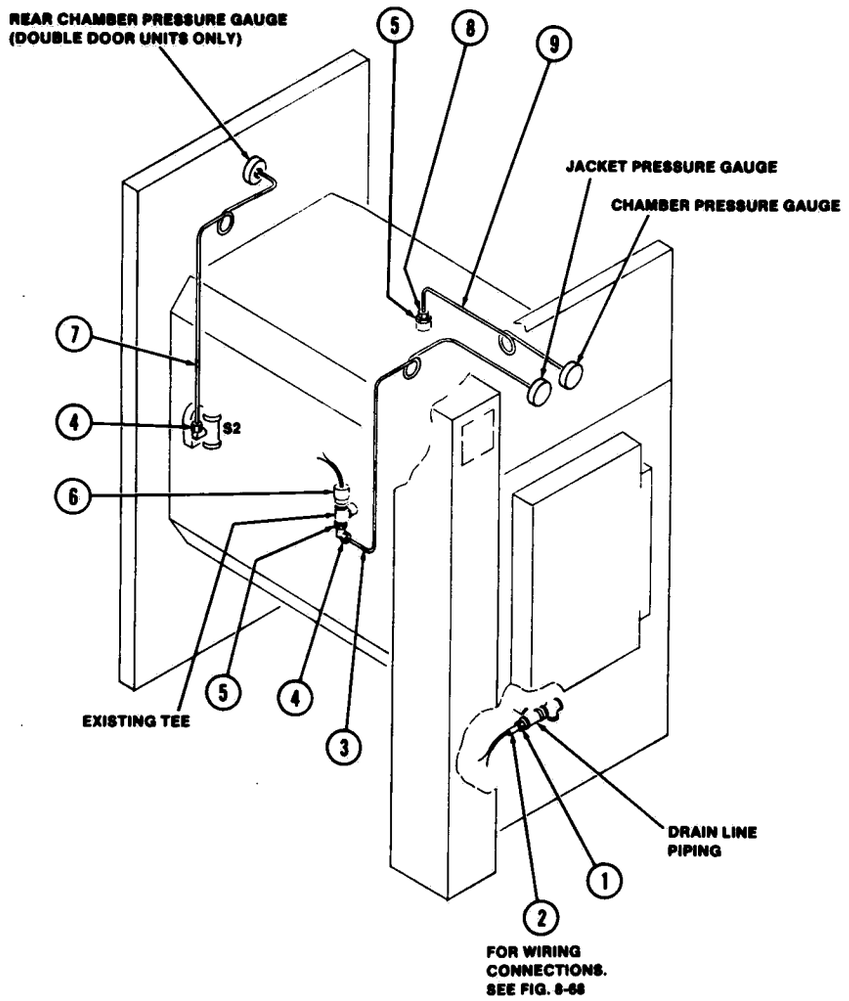

Figure 8-67. SENSING LINE PACKAGE (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
				UNITS WITH PRINTCON:				
8-67-				SENSING LINE PACKAGE, Single Door	X			
				SENSING LINE PACKAGE, Double Door		X		
1	P	150822	452	FITTING. Straight, 1/4 NPT x 1/8 ODT	1	1		
2	P	56396	211	TEMP. RTD	1	1		
3				TUBE. 1/8 ODT x 72 Copper (ASTM Spec. B280)	1	1		
4	P	26181	091	ELL. Compression, 1/8 NPT x 1/8 ODT	1	2		
5	P	939	042	BUSHING. Reducing, 1/4 NPT x 1/8 NPT	2	2		
6	P	56396	215	TRANSDUCER	1	1		
7				TUBE. 1 8 ODT x 60 Copper (ASTM Spec. B280)		1		
8	P	20344	091	FITTING. Straight, Comp., 1/8 NPT x 1/8 ODT	1	1		
9				TUBE. 1 8 ODT x 28 Copper (ASTM Spec. B280)	1	1		

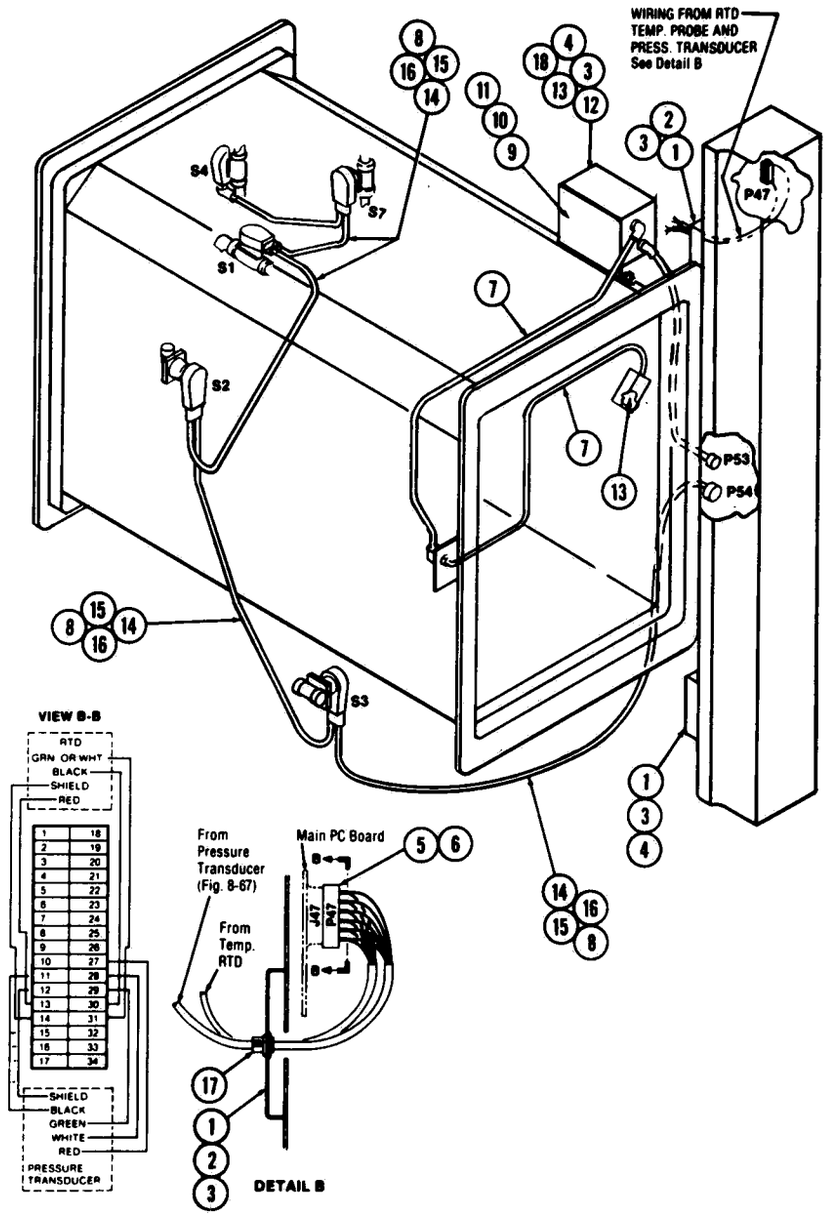

Figure 8-68. WIRING ASSEMBLY: Single Door Sterilizer with Printcon.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
					UNITS WITH PRINTCON			
8-68-	P	146649	337		FINAL WIRING ASSEMBLY: 24x36x36 Single Door	X		
	P	146649	338		FINAL WIRING ASSEMBLY: 24x36x48 Single Door		X	
	P	146649	339		FINAL WIRING ASSEMBLY: 24x36x60 Single Door			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	10	10	10
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	046		CABLE, Solenoid, 36"	1		
15	P	136805	047		CABLE, Solenoid, 48"		1	
16	P	136805	048		CABLE, Solenoid, 60"			1
17	P	91354	045		CLAMP, Cable	1	1	1
18	P	2959	041		NUT, #10-32	4	4	4

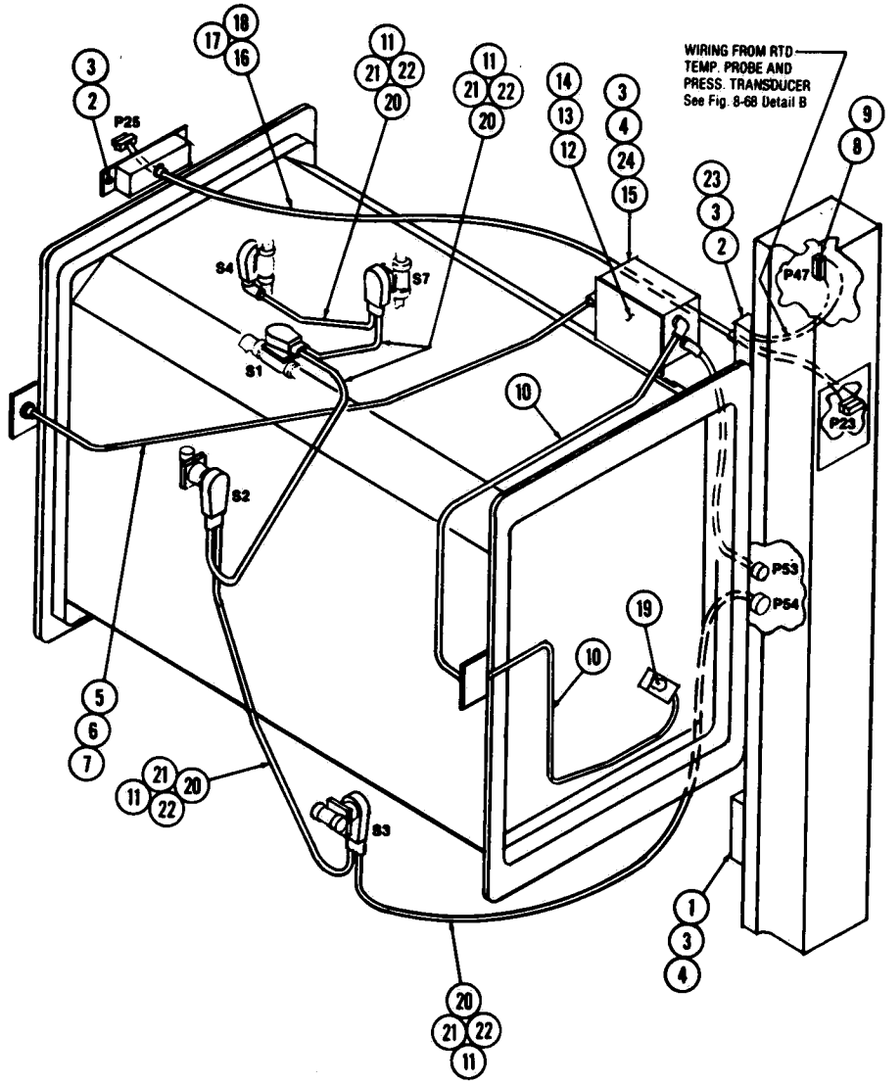

Figure 8-69. WIRING ASSEMBLY: Double Door Sterilizers with Printcon.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
					UNITS WITH PRINTCON			
8-69-	P	146649	340		FINAL WIRING ASSEMBLY: 24x36x36 Double Door	X		
	P	146649	341		FINAL WIRING ASSEMBLY: 24x36x48 Double Door		X	
	P	146649	342		FINAL WIRING ASSEMBLY: 24x36x60 Double Door			X
1	P	93617	001		BOX, Junction	1	1	1
2	P	15361	042		SCREW, Round Head, #10-32 x 1/4	4	4	4
3	P	31705	045		LOCKWASHER, #10	10	10	10
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	9	9	9
9	P	93900	026		HOUSING, Receptacle	1	1	1
10	P	93900	020		CABLE ASSEMBLY, Door, Operating End	1	1	1
11	P	129352	049		CONNECTOR, Splice	10	10	10
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	162		HARNESS ASSEMBLY (See Fig. 8-71)	1		
17	P	146649	163		HARNESS ASSEMBLY (See Fig. 8-71)		1	
18	P	146649	164		HARNESS ASSEMBLY (See Fig. 8-71)			1
19	P	91945	041		JUMPER	1	1	1
20	P	136805	046		CABLE, Solenoid, 36"	1		
21	P	136805	047		CABLE, Solenoid, 48"		1	
22	P	136805	048		CABLE, Solenoid, 60"			1
23	P	91354	045		CLAMP, Cable	1	1	1
24	P	2959	041		NUT, #10-32	4	4	4

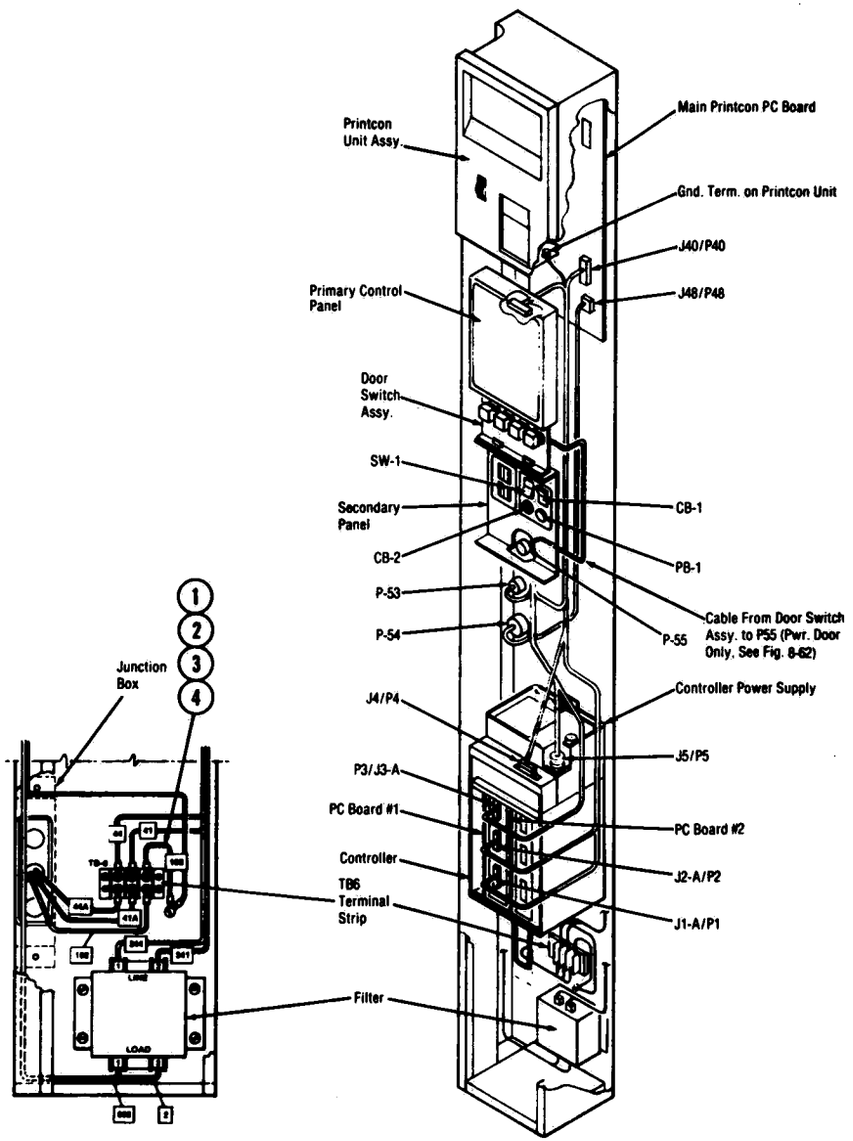

Figure 8-70. CONNECTION DETAILS: Control Column with Printcon. (Manual or Power Doors)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY	
				UNITS WITH PRINTCON:		
8-70-				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

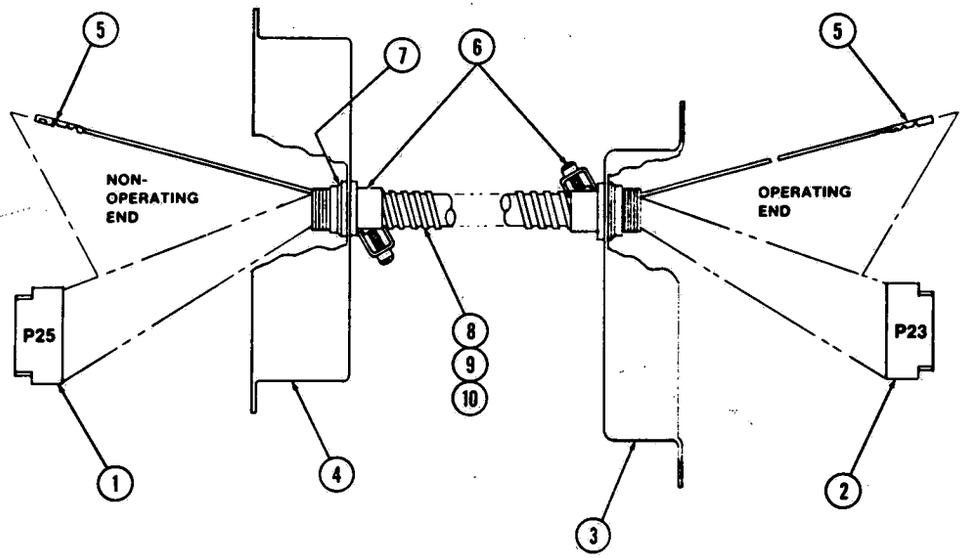

Figure 8-71. HARNESS ASSEMBLY: Double Door (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-71-	P	146649	162		HARNESS ASSEMBLY: Primary Panels, Double Door. 36" Long	X			
	P	146649	163		HARNESS ASSEMBLY: Primary Panels, Double Door. 48" Long		X		
	P	146649	164		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	

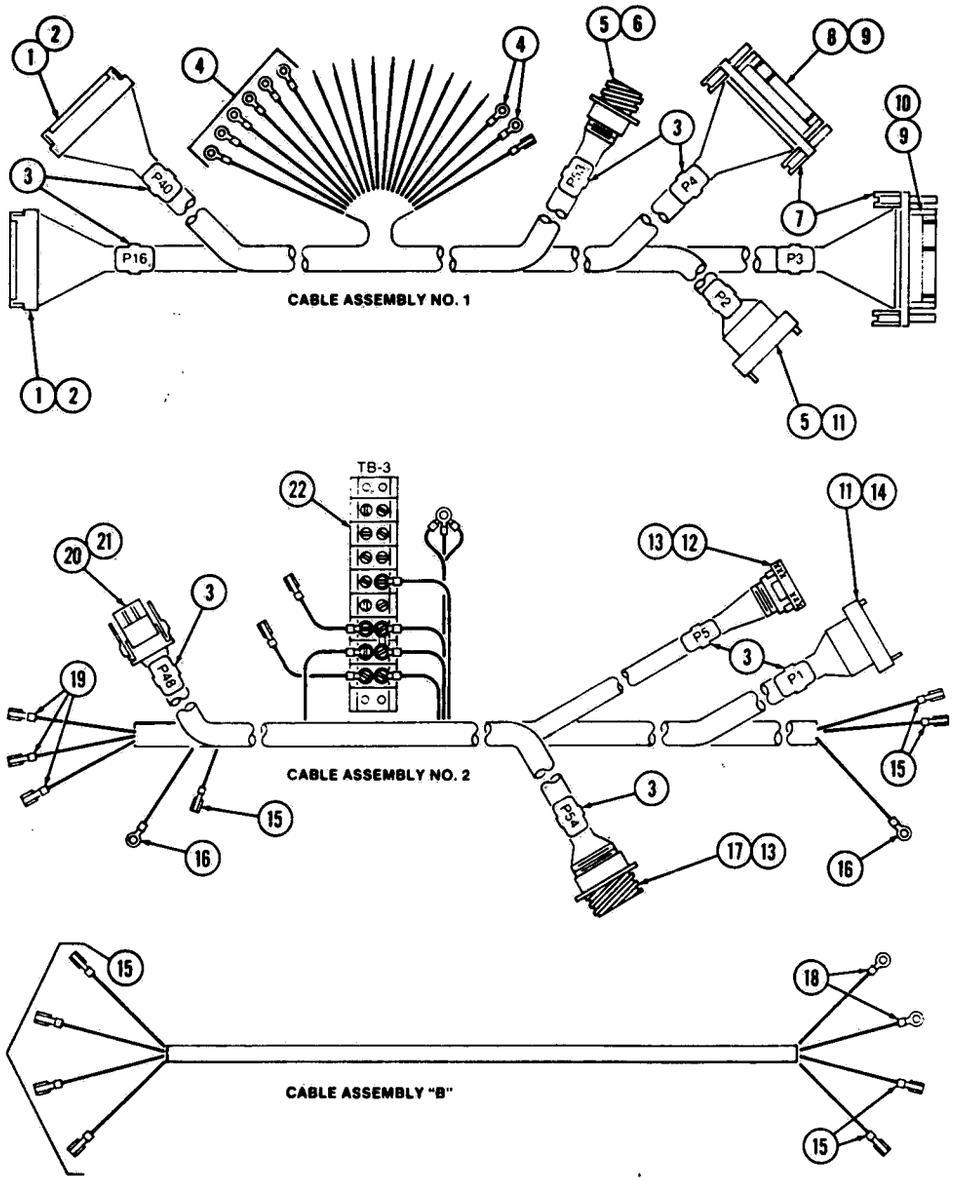

Figure 8-72. HARNESS ASSEMBLY: Secondary Panel. (Units With Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-72-					HARNESS ASSEMBLY: Secondary Panel	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	030		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	20
14	P	150822	043		PIN, Contact, P1	8
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	SUB		CONTACT, Socket, P48 (SUB: P-84220-002)	8
22	P	90627	091		BLOCK, Terminal, 8 Position, 15 A	1

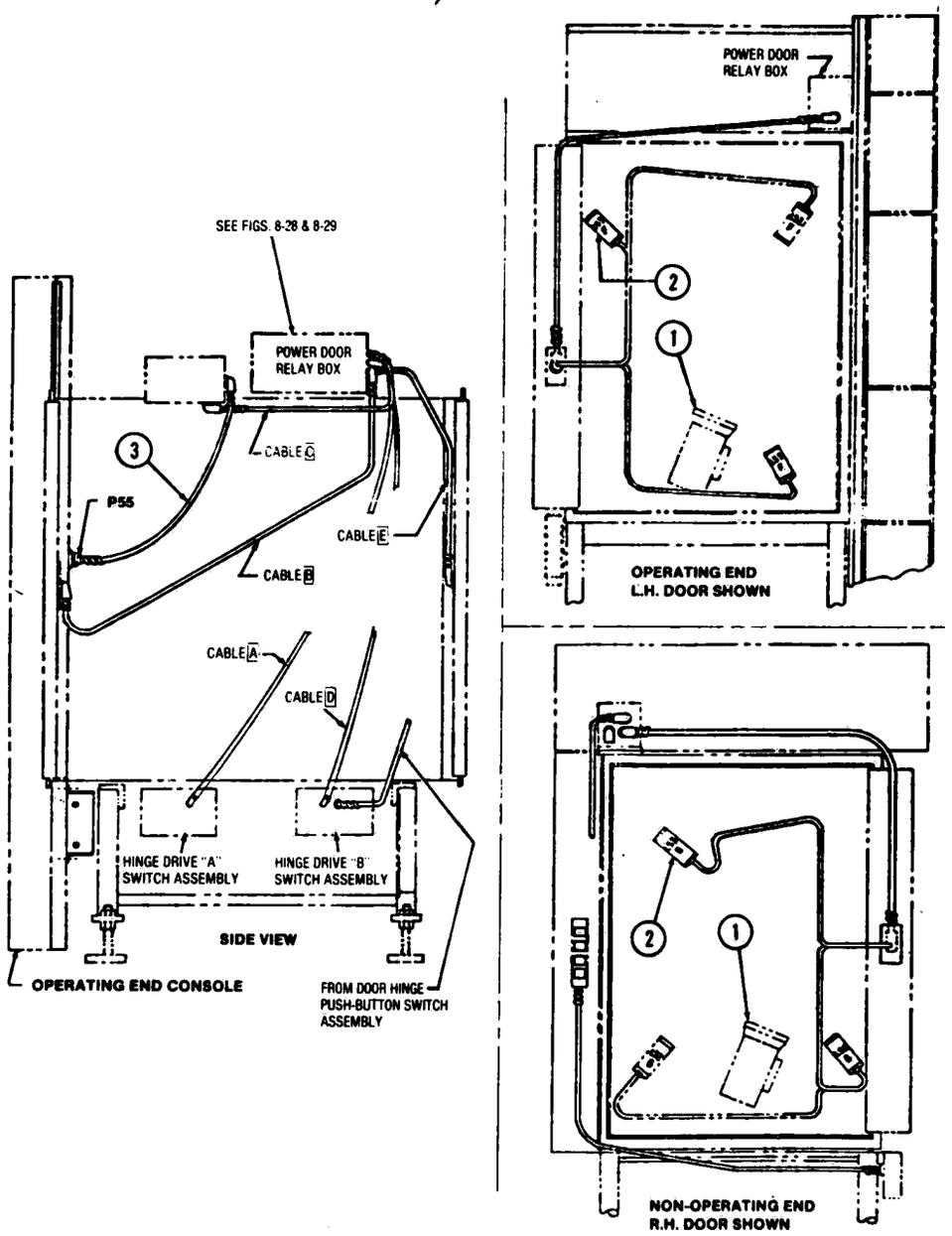

Figure 8-73. POWER DOOR WIRING (Units with Printcon)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
					UNITS WITH PRINTCON:		
8-73-					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 SERIES 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 for 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

Use Tech Data SD-383 and SD-384 found in **Section 1** of this manual.

9.3 OPERATING INSTRUCTIONS

NOTE: This Paragraph replaces **Section 2** located in the front of this manual. If there is a discrepancy between the operating instructions in this manual and those in the Equipment Manual, follow the Equipment Manual.

Figure 9-1 shows the location of the various controls.

9.3.1 Before Operating The Equipment

1. Ensure that chamber drain strainer is clean and in place and that chamber interior is clean *(Paragraph 4.4)*.

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 7.17, 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 7.17. 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/cm^2 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.

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.

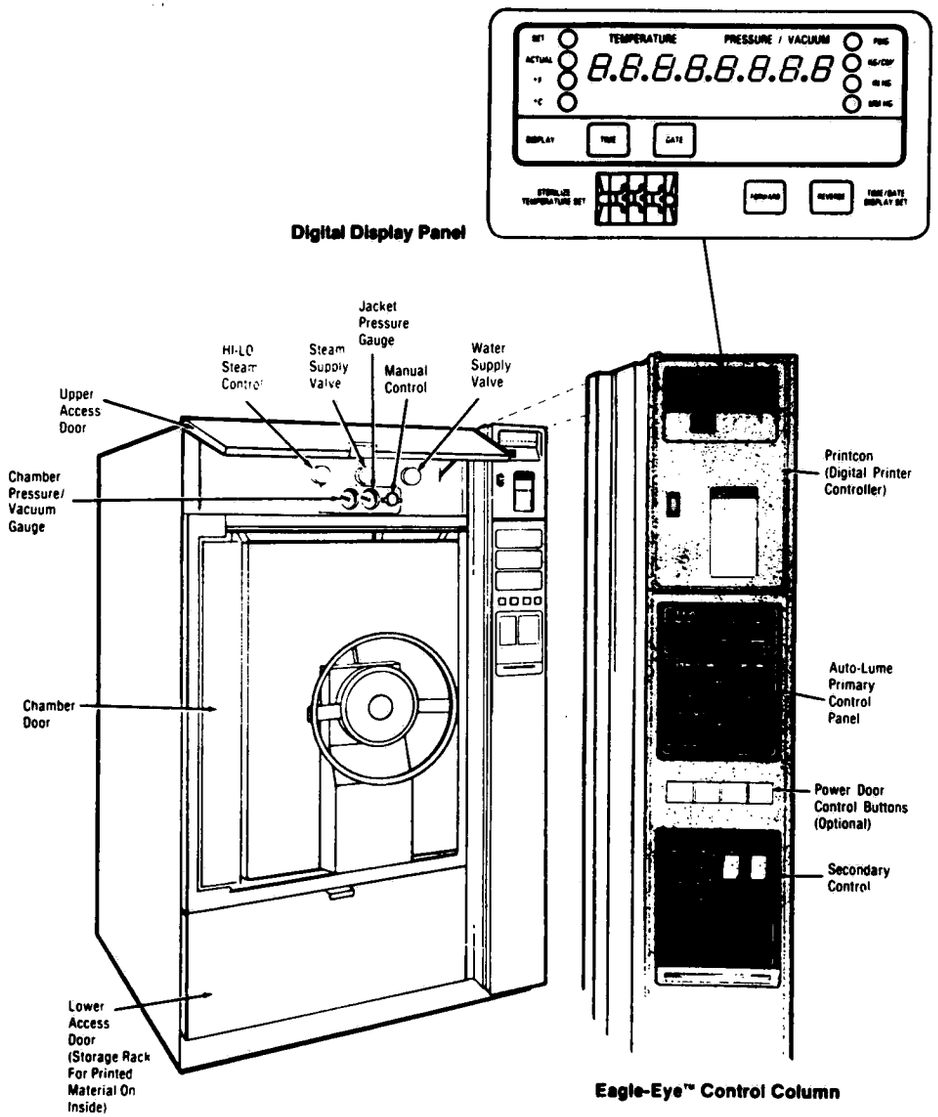


Figure 9-1. CONTROL LOCATIONS, OPERATING END.

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: Prevacuum Cycle (Wrapped and Unwrapped Goods)

1. Follow instructions in *Paragraph 9.3.1, Before Operating the Equipment.*

2. Open the upper access door and turn HI-LO valve to HI. 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 and Printcon display should be lit.

b. 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.

NOTE: 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). 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.*

5. Open chamber door and load sterilizer. Printer records the time 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 door, a second time to open it.

b. Manual Door — turn handwheel counterclockwise. Should door not at first unlock, turn door wheel slightly clockwise, press 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 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.

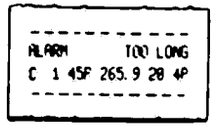
b. Manual Door — turn handwheel to right as far as it will go using normal hand pressure.

NOTE: Pressing STOP button **during** power door operation will immediately stop door. Refer to paragraph 9.3.8 if it becomes necessary to shift from power to manual operation.

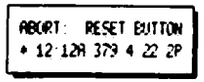
7. Press PREVACUUM cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points.

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.

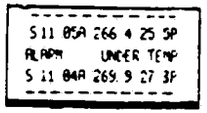
8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature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



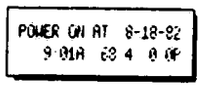
No. 1 — Condition Phase Too Long.



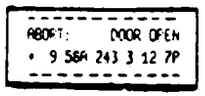
The RESET button is pressed.



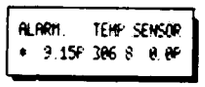
No. 2 — Sterilizing Temperature Drops.



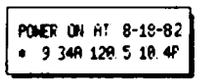
The power is turned on.



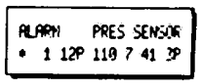
No. 3 — Chamber Door Switch Not Made.



Temperature sensor failure is detected.



No. 4 — Power Restored After Power Failure.



Pressure sensor failure is detected.

Figure 9-2. PRINTCON MESSAGES.

9. When sterilize timer times out, EXHAUST light comes on. Steam DRY TIME digital readout begins to count down. The printed record will show the time the EXHAUST phase begins and the temperature and pressure transition points.

10. When dry timer times out, air is admitted to the chamber to relieve the vacuum. When vacuum is sufficiently relieved, COMPLETE light comes on, and buzzer sounds. Open chamber door (**step 5**). Sterilized goods may be removed from the machine. 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 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 7.15.

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. Printer records the time 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 door, a second time to open it.

b. Manual Door — turn handwheel counterclockwise. Should door not at first unlock, turn door wheel slightly clockwise, press 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 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 right as far as it will go using normal hand pressure.

NOTE: Pressing STOP button **during** power door operation will immediately stop door. Refer to paragraph 9.3.8 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.

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:

- *Use only vented closures — do not use screw caps or rubber stoppers with crimped seal.*
- *Use only Type I borosilicate (Pyrex) glass bottles — do not use ordinary glass jugs or any container not designed for sterilization.*
- *Use sterilizer LIQUIDS cycle. No other cycle is safe for liquid sterilization.*
- *At end of cycle, open sterilizer door, no more than 1/2 inch. Wait 10 minutes before unloading sterilizer.*
- *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.*
- *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. Refer to Table 9-2 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to LO.

NOTE: For cycle temperatures below 250 F (121 C), refer to *Paragraph 7.15.*

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 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.

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

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. Printer records the time 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 door, a second time to open it.

b. Manual Door — turn handwheel counterclockwise. Should door not at first unlock, turn door wheel slightly clockwise, press 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 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 right as far as it will go using normal hand pressure.

NOTE: Pressing STOP button **during** power door operation will immediately stop door. Refer to paragraph 9.3.8 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.

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. (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 duplicate record and place with the completed load.

9.3.5 Manual Operation: Gravity (Wrapped or Unwrapped Goods) or Liquids Cycle

NOTE: Manual control is a feature on this sterilizer. However, a prevacuum cycle cannot be achieved manually.

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 7.15 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. Printer records the time 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 door, a second time to open it.

b. Manual Door — turn handwheel counterclockwise. Should door not at first unlock, turn door wheel slightly clockwise, press 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 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 right as far as it will go using normal hand pressure.

NOTE: Pressing STOP button **during** power door operation will immediately stop door. Refer to paragraph 9.3.8 if it becomes necessary to shift from power to manual operation.

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 (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."

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"** (see **step 5** previous paragraph) and wait 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."

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"** (see **step 5** previous paragraph) and wait 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."

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"** (see **step 5** previous paragraph) and wait 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."

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"** (see **step 5** previous paragraph) and wait 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."

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: **PREVACUUM** and **LIQUIDS.** If you wish to repeat the previous prevacuum or liquids 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.

9.3.8 Power Door Manual Operation

CAUTION: Ensure shift handle is in either extreme right (POWER) or left (MANUAL) position at all times. Placing handle in an intermediate position could damage drive system.

1. Pull shift handle to left. If handwheel does not engage, turn it slowly while maintaining a slight pressure to left on shift handle.

2. To return to power operation from manual, position shift handle to right.

9.4 PRINCIPLES OF OPERATION

1. Use the instructions found in **Section 3** located previous to this section, noting Printcon paragraphs.

2. Replace Figure 3-20 with Figure 9-3.

9.5 INSPECTION AND MAINTENANCE

1. Use the instructions found in **Section 4** of this manual.

9.6 FIELD TEST PROCEDURE

NOTE: This Paragraph replaces **Section 5** of this manual.

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.

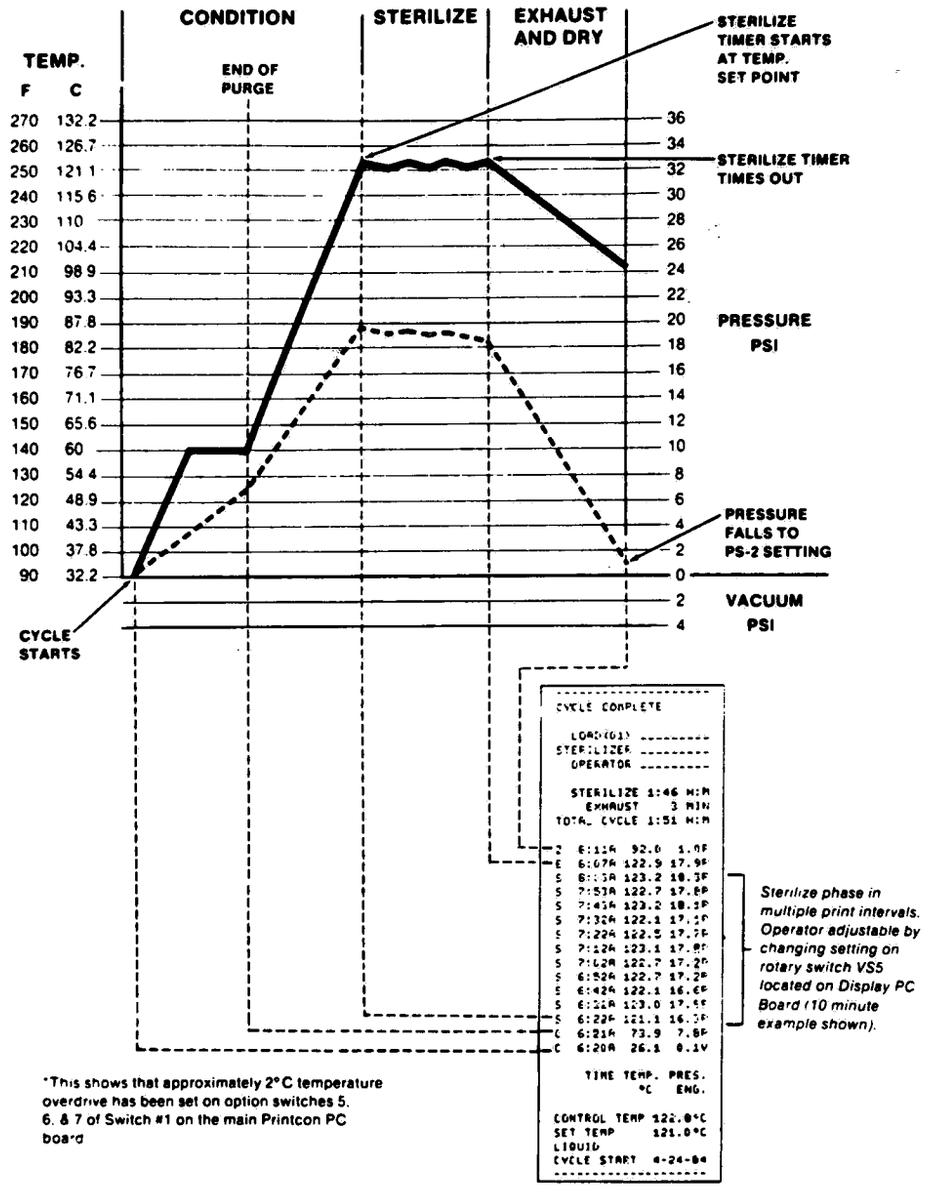
4. Install potentiometer thermocouple lead in metal-to-metal contact with the temperature probe (from 1/2" to 1-1/2" of the tip). Run the lead through the door (between the door gasket and end ring).

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. 8-67, 5). 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.**



*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.

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.

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, Prevacuum, 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.

See Paragraph 9.8.

13. Try to start all cycles. No cycle should start with the door(s) open.

14. Rotate sterilize time thumbwheels. Time displayed must match thumbwheel setting and STERILIZE must light on panel. Rotate dry time thumbwheel settings. Time displayed must match thumbwheel setting and DRY must light on panel for 3 seconds. Display will return to sterilize time.

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 ensure 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 (units before 6/85) or onto take-up spool (units after 6/85). Paper must not wander side-to-side. Platen microswitch must activate and shut off take-up motor when paper is drawn taut. Run at least 20 feet of paper into the take-up mechanism. Paper should feed smoothly and coil up in coil or on spool.

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
C  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
--------------------
```

Add. 8/87

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 (see **Section 7** of this Manual).

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).

24. Perform the chamber vacuum leak test as outlined in *Paragraph 5.10.* Then, disconnect the measuring devices and reconnect the chamber gauge.

NOTE: If the above accuracy results are not obtainable, refer to Paragraph 7.22, *"Printcon Calibration Procedure."*

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.

Add. 8/87

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 270 F PREVACUUM sterilization cycle except set a 4 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
```

Temperature falls 0.1 F under 240 F. These two lines are printed.

Reopen steam valve. As soon as 250 F is reestablished, 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** of this manual, 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, 8-55, 8-56, 8-57, 8-61, 8-70 and 8-72) refer instead to appropriate IPB found following *Paragraph 9.9.*

3. The schematics listed in Table 6-11 refer both to IRC and Printcon 2000 units. Refer only to 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 and can be found following the IPB Figures of this Section.

- ELECTRICAL SCHEMATIC, Eagle 2300 Vacamatic and Gravity 146645-607
- MAIN PRINTCON PC BOARD, Eagle 2300 146654-002

9.8 COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT

1. Use the instructions found in **Section 7** of this manual, especially noting Printcon paragraphs while disregarding IRC Paragraphs.

NOTE: Conditioning Pulses for Eagle 2300 Units may vary from 0-7,while Eagle 2000 Units may vary from 0-15 *(Paragraph 7.12).*

2. *Paragraph 7.17, Printcon Digital 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 are 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 Breakdown (IPB) (Figures 8-15, 8-16, 8-55, 8-56, 8-57, 8-61, 8-70 or 8-72), refer instead 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 Series are supplied only 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, 8-30, 8-31, 8-32, 8-36 and 8-48 through 8-52.

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, 8-55, 8-56, 8-57, 8-58, 8-59, 8-60*, 8-61, 8-70 and 8-72.

**Figures 8-60A and 8-60B 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 9-7A. IDENTIFYING PC BOARD PART NUMBERS.
- 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 Vacamatic.
- Figure 9-12. CONNECTION DETAILS, Eagle 2300 Control Column.

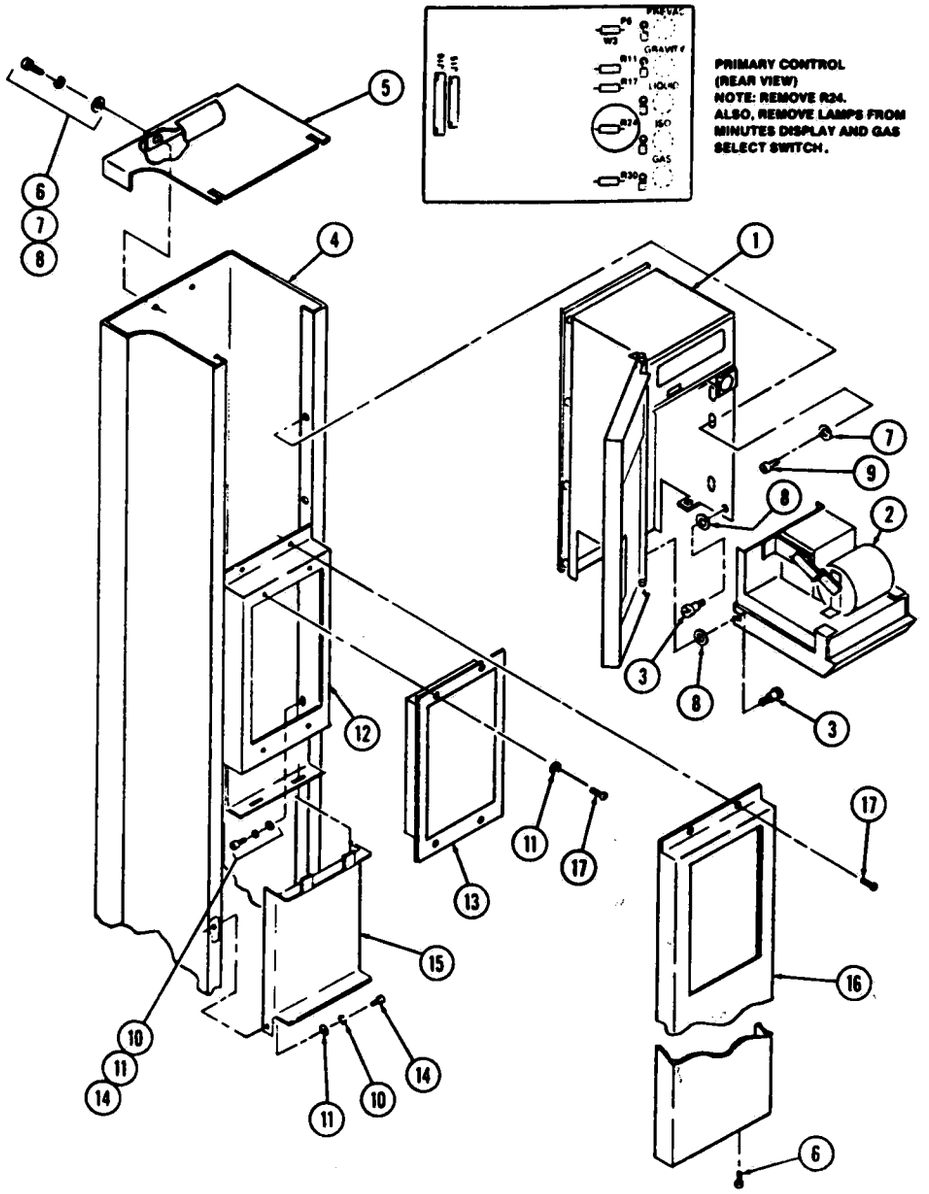


Figure 9-4. CONTROL COLUMN, Eagle 2300 (Part 1 of 3).

FIG. & INDEX NO.		PART NUMBER		S V C	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 Figs. 8-60A and 8-60B)	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

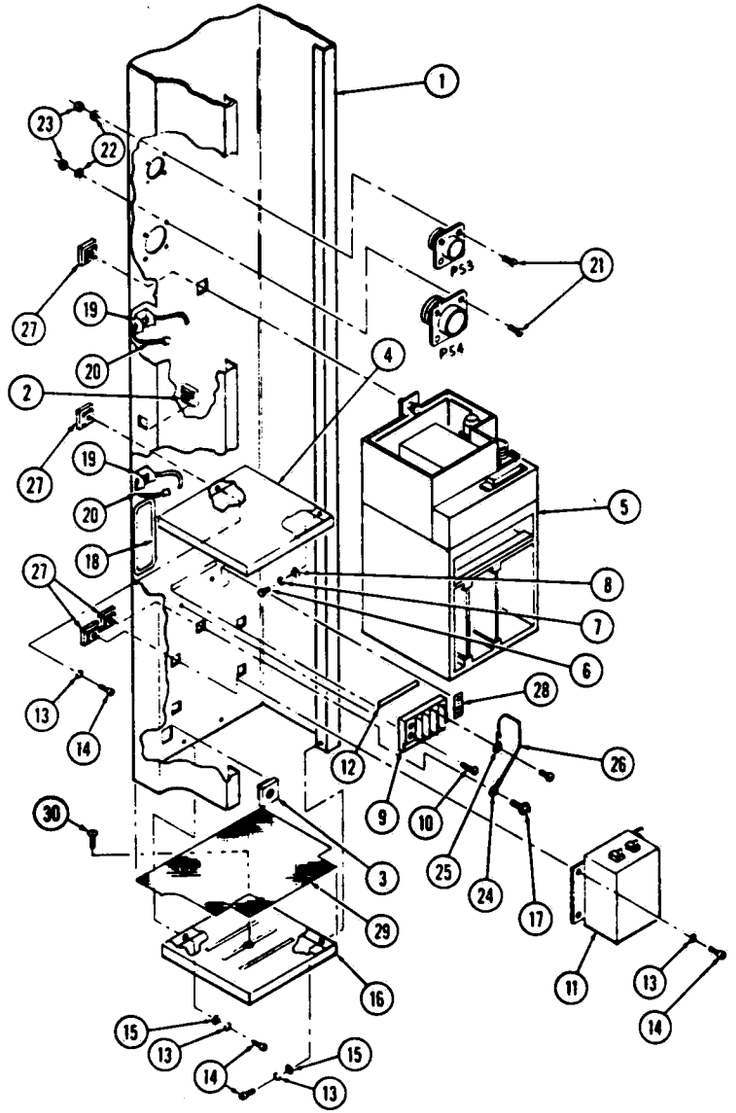


Figure 9-5. CONTROL COLUMN, Eagle 2300 (Part 2 of 3).

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				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	6
22	P	5469	041		WASHER, Flat, #6	6
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

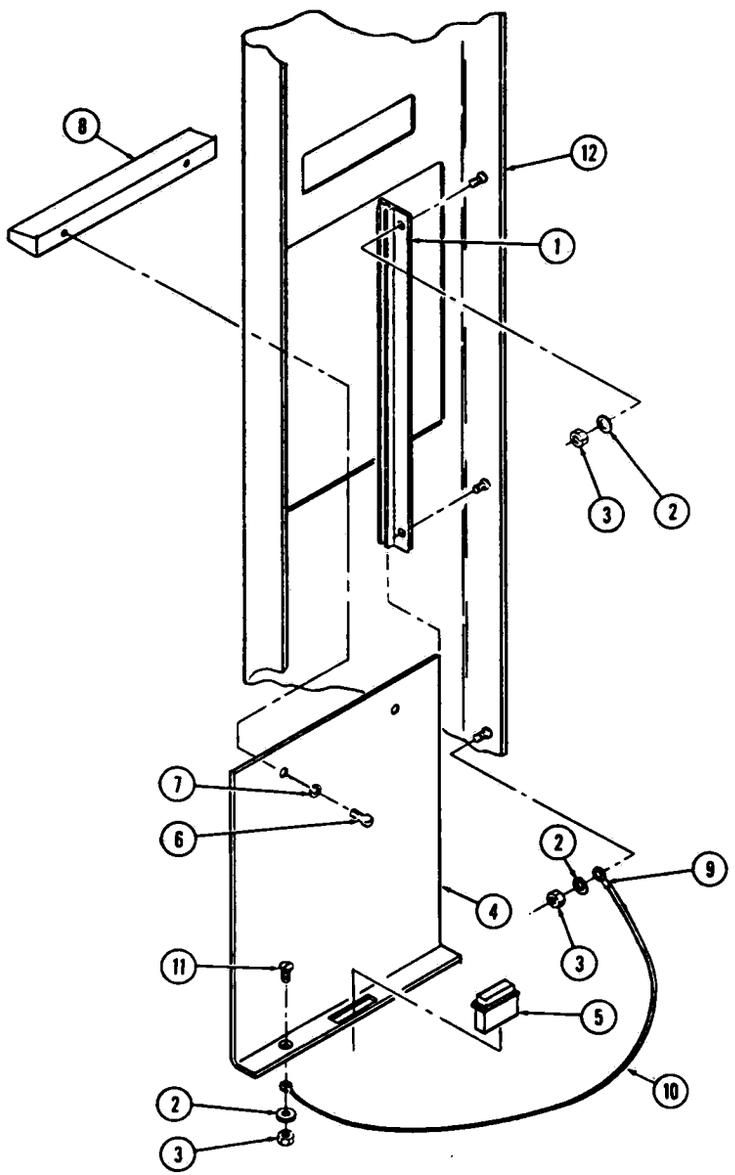
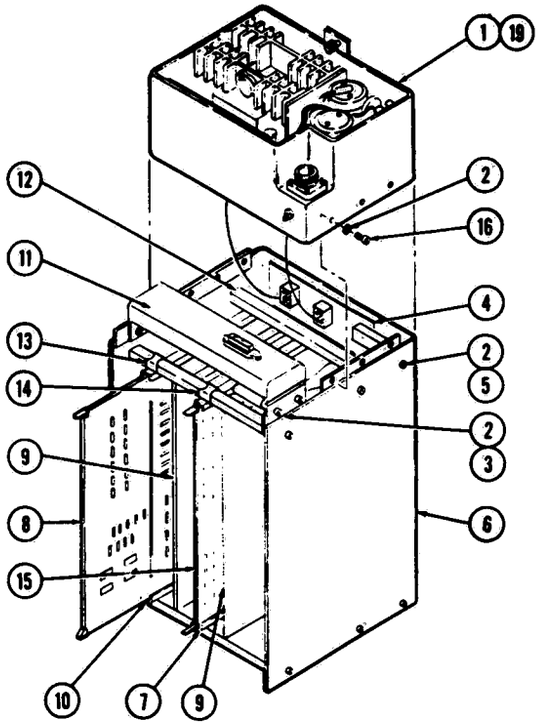


Figure 9-6. CONTROL COLUMN, Eagle 2300 (Part 3 of 3).

FIG. & INDEX NO.		PART NUMBER		S V C	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 inches	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



See Figure 9-7A To Identify PC Boards

Figure 9-7. MAIN CONTROL ASSEMBLY, Eagle 2300.

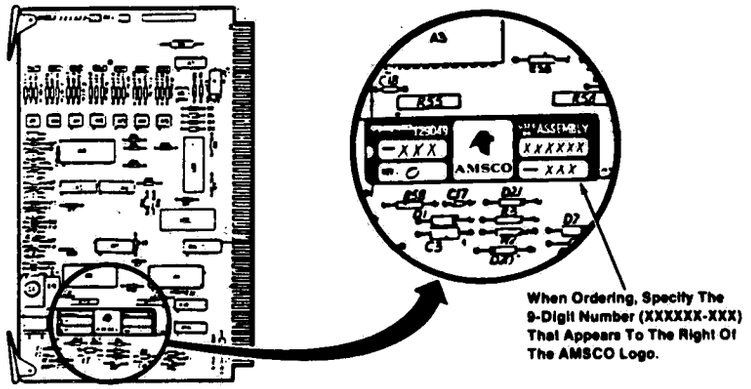


Figure 9-7A. IDENTIFYING PC BOARD PART NUMBERS.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-7-	P	146645	895		MAIN CONTROL ASSEMBLY, Eagle 2300	X
1	P	146645	042		POWER SUPPLY ASSEMBLY (Units Prior 12/87)	1
	P	764193	027		• REPAIRED, Power Supply Assembly	1
	P	764317	833		• FUSE, 2 Amp, 125 V (F4)	1
	P	764317	834	•	• FUSE, Pico, 2 Amp, 125 V (F2)	1
	P	764317	836	•	• FUSE, Pico, 1/2 Amp, 125 V (F3)	1
	P	764317	449	•	• FUSE, Cartridge, Slo-Blo, 2 Amp, 250 V (F402)	1
2	P	84116	002		LOCKWASHER, #6	20
3	P	150822	727		SCREW, Self Tapping, #6 x 1/4	5
4	P	760244	004		MOTHERBOARD ASSEMBLY, Isothermal	1
	P	764193	009		• REPAIRED, Isothermal Motherboard Assembly	1
	P	760244	001		MOTHERBOARD ASSEMBLY, Gravity	1
	P	764193	006		• REPAIRED, Gravity Motherboard 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, PC Board	6
8					PC BOARD, CPU (See Figure 9-7A)	1
9	P	84467	001		PLATE, Side	2
10	P	84226	001		TAB, Locking	9
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					PC BOARD, I/O 1 (See Figure 9-7A)	1
16	P	150822	728		SCREW, Hex Head, #6 x 3/8 (Cad. or Zinc Plated)	3
17	P	136800	561		HEAT SINK (Not Shown)	1
18	P	83528	008		TAB, ID Locking (I/O 2; Not Shown)	1
19	P	141198	310		POWER SUPPLY ASSEMBLY (Units After 12/87)	1
	P	764321	808	•	• FUSE, Cartridge, 1.25 Amp	1
	P	764317	833		• FUSE, 2 Amp, 125 V (F4)	1
	P	764317	834	•	• FUSE, Pico, 2 Amp, 125 V (F2)	1
	P	764317	836	•	• FUSE, Pico, 1/2 Amp, 125 V (F3)	1
	P	764317	449	•	• FUSE, Cartridge, Slo-Blo, 2 Amp, 250 V (F402)	1
				•	Box of Five.	
9-7A					IDENTIFYING PC BOARD PART NUMBERS To order replacement boards, note part number identified in Figure 9-7A.	

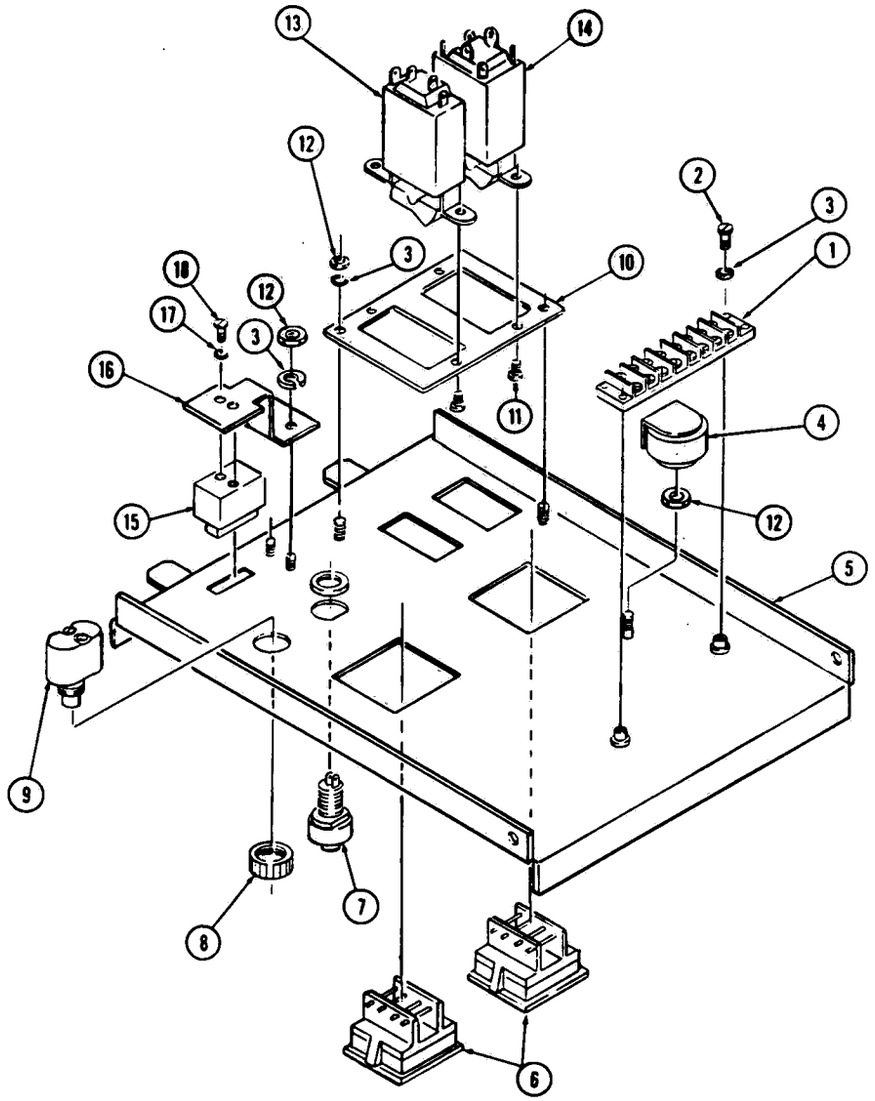


Figure 9-8. SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-8-	P	146645	569		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 (CB-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	84386	001		BREAKER, Circuit (PB-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

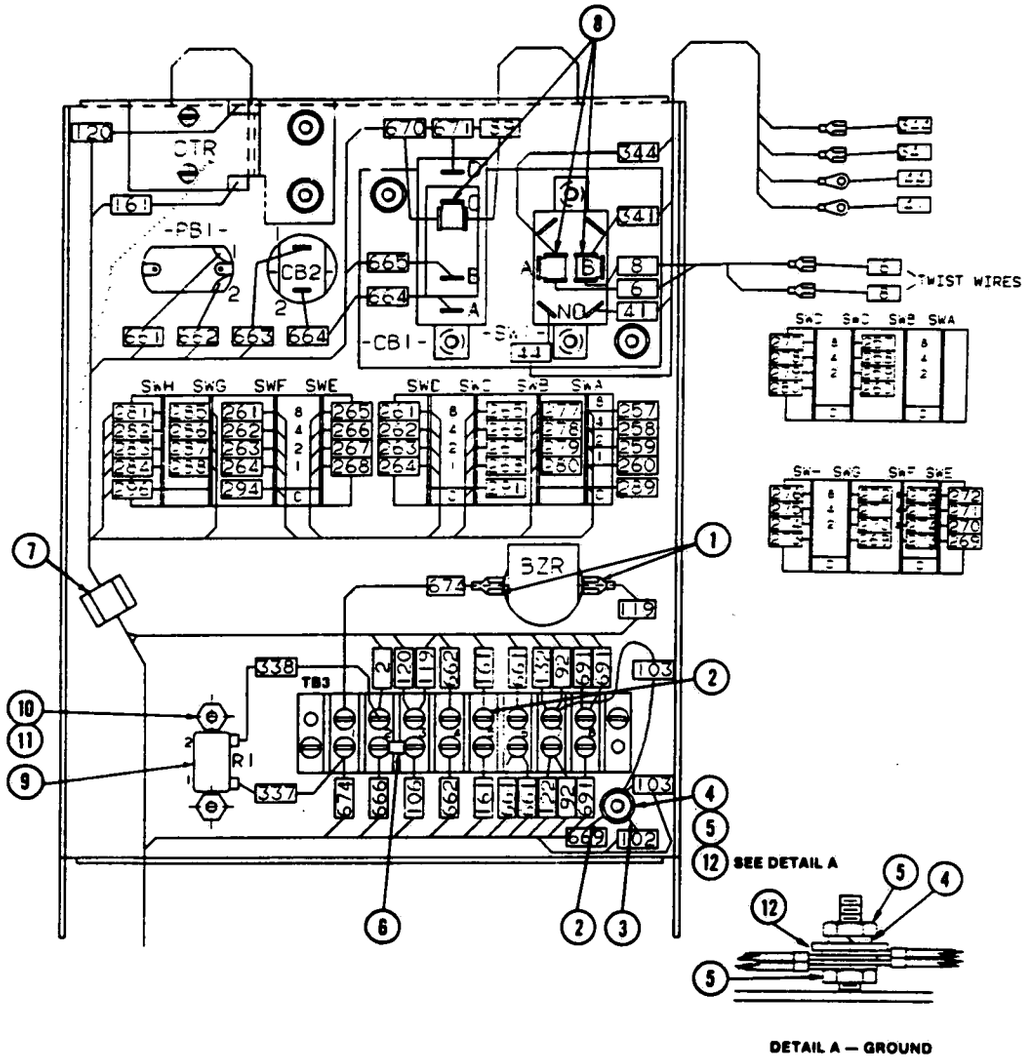


Figure 9-9. SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2).

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

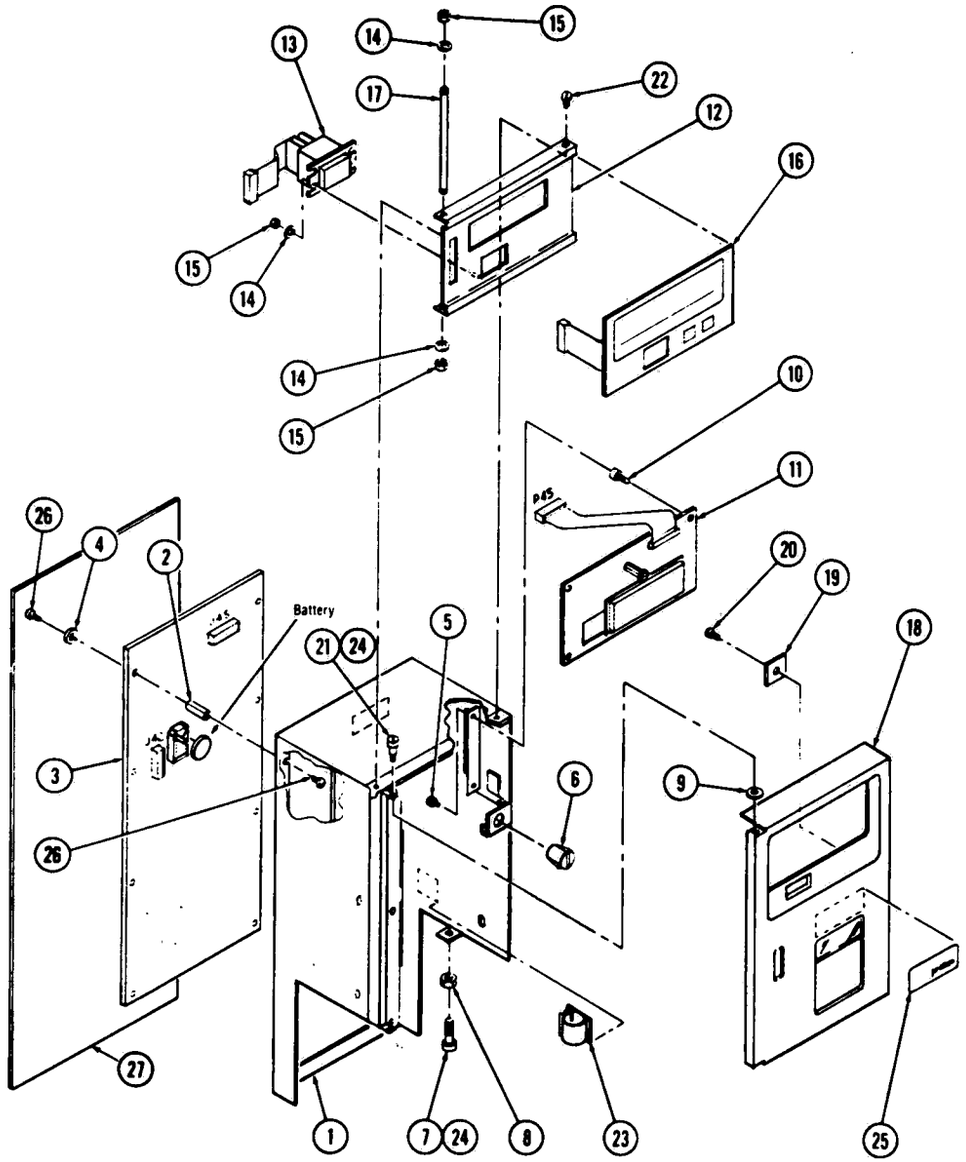


Figure 9-10. PRINTCON HOUSING ASSEMBLY, Eagle 2300.

FIG. & INDEX NO.	PART NUMBER		SVC	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 002		P/C BOARD ASSEMBLY, Printcon Control	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
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

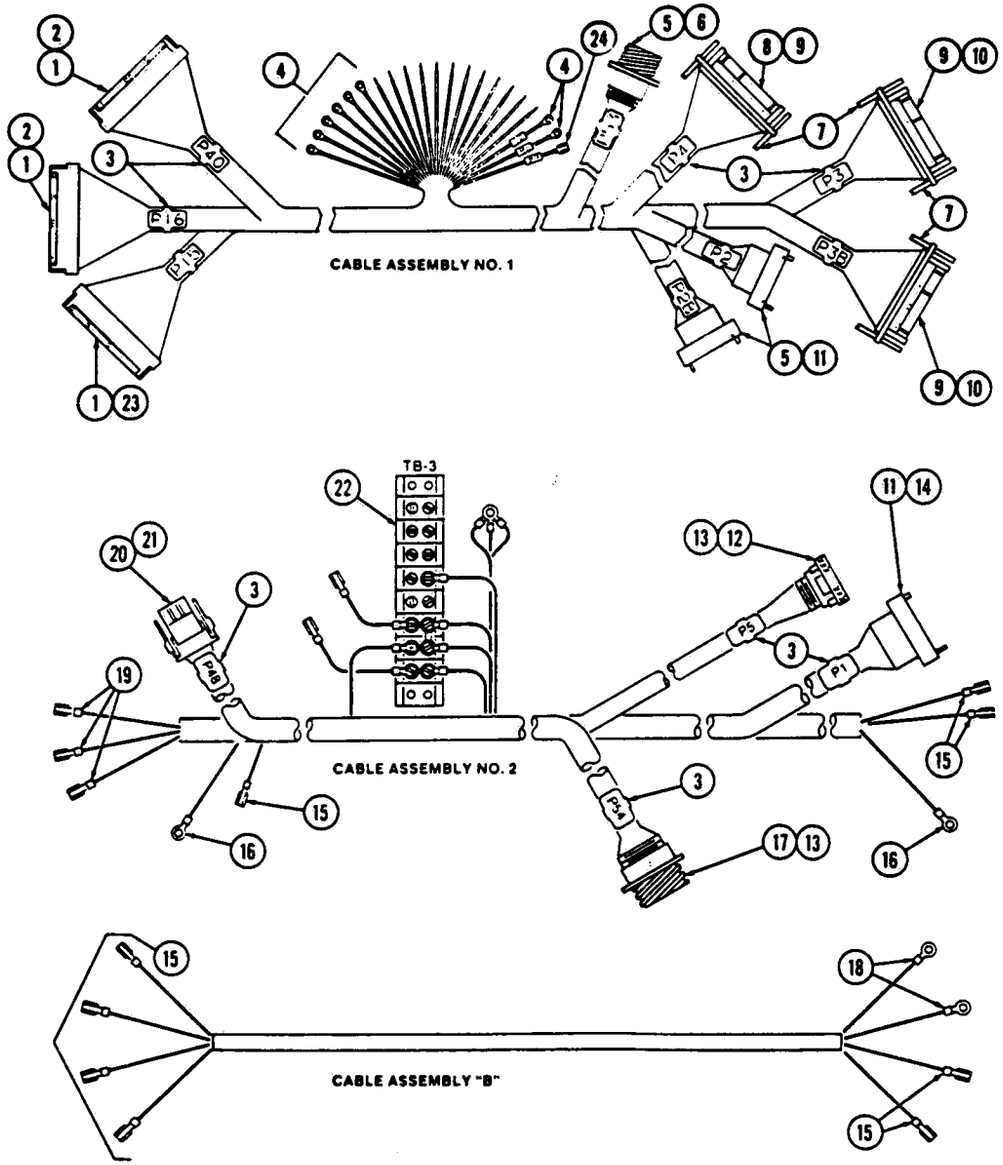


Figure 9-11. HARNESS ASSEMBLY, Secondary Panel, Eagle 2300 Vacamatic.

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

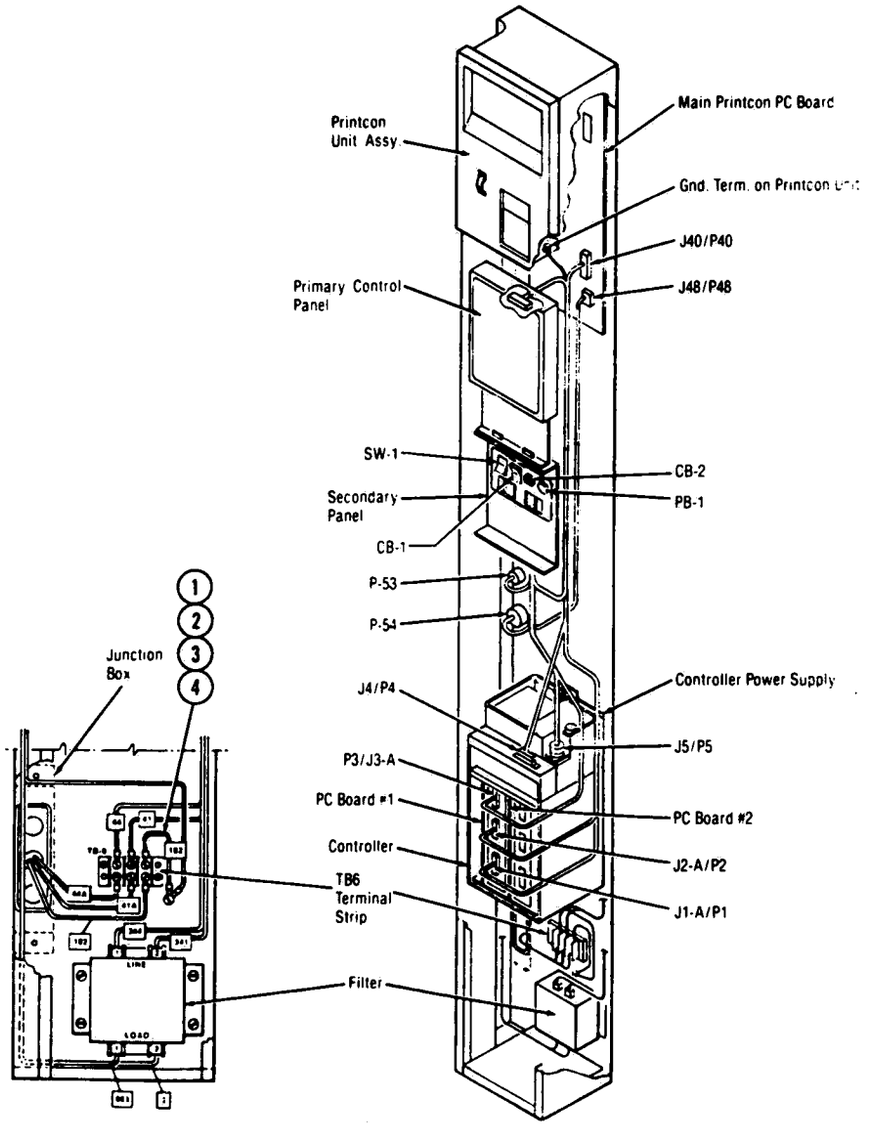
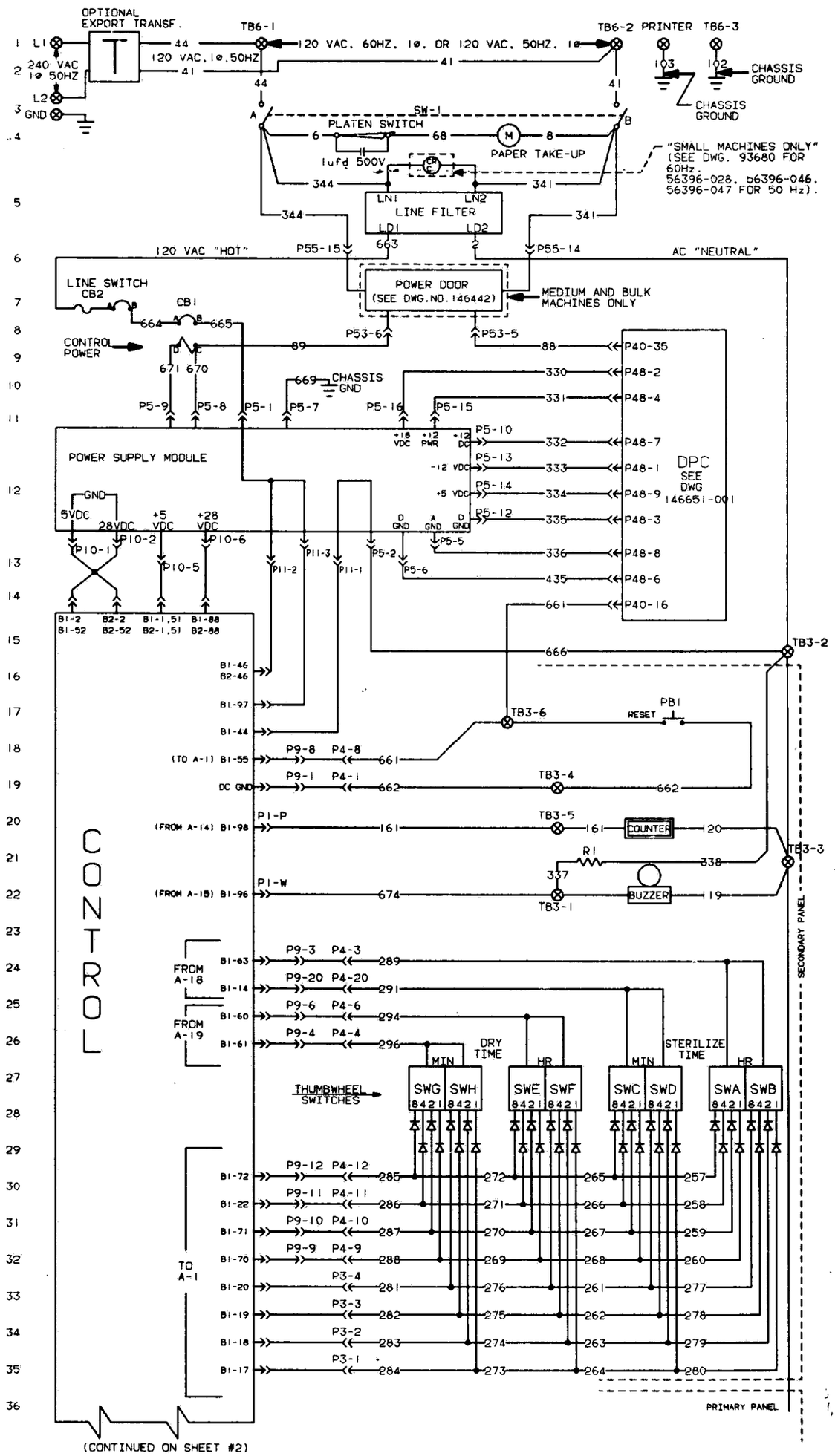


Figure 9-12. CONNECTION DETAILS, Eagle 2300 Control Column.

FIG. & INDEX NO.		PART NUMBER		S V C	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		

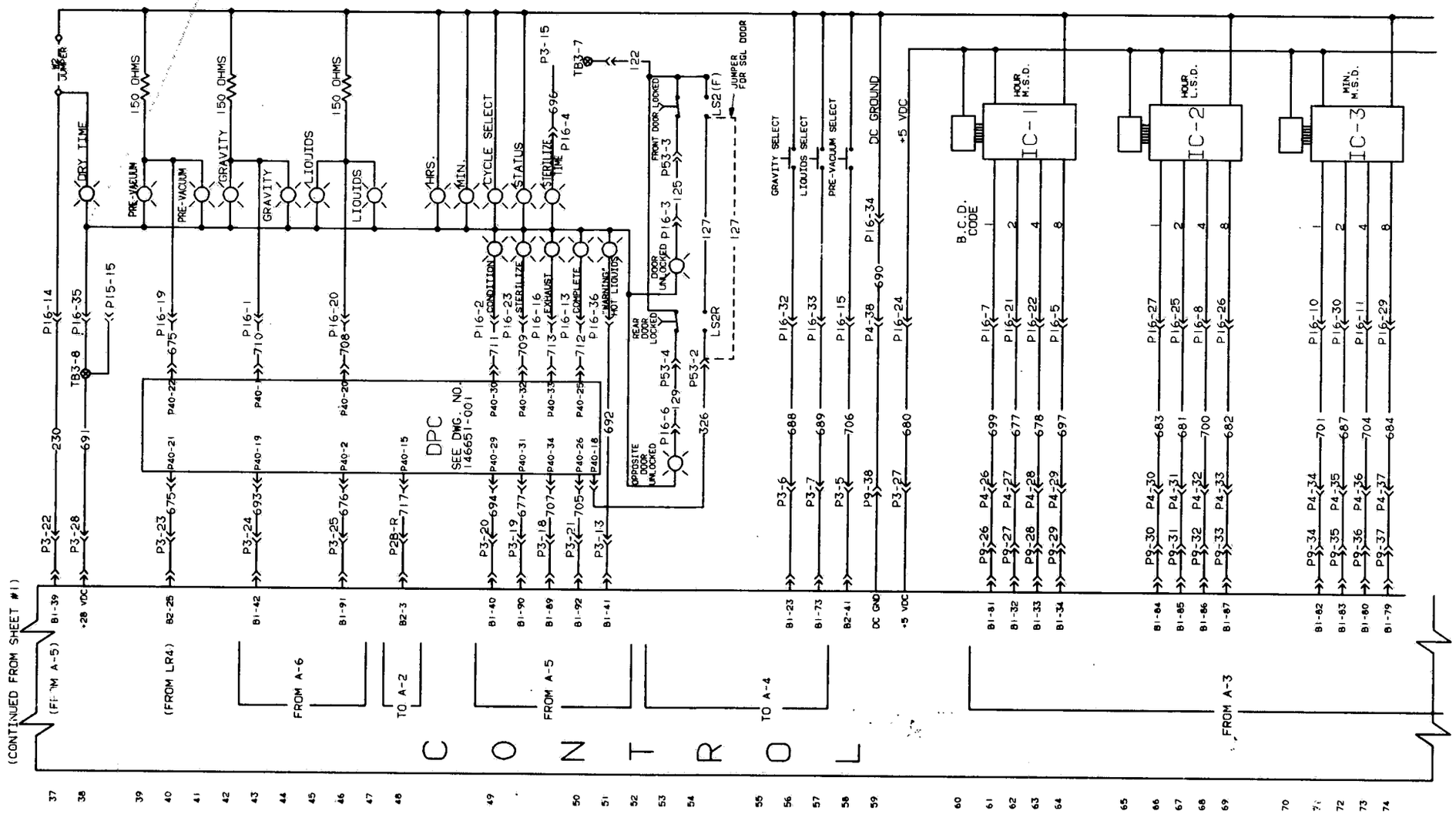


F-11

F-12

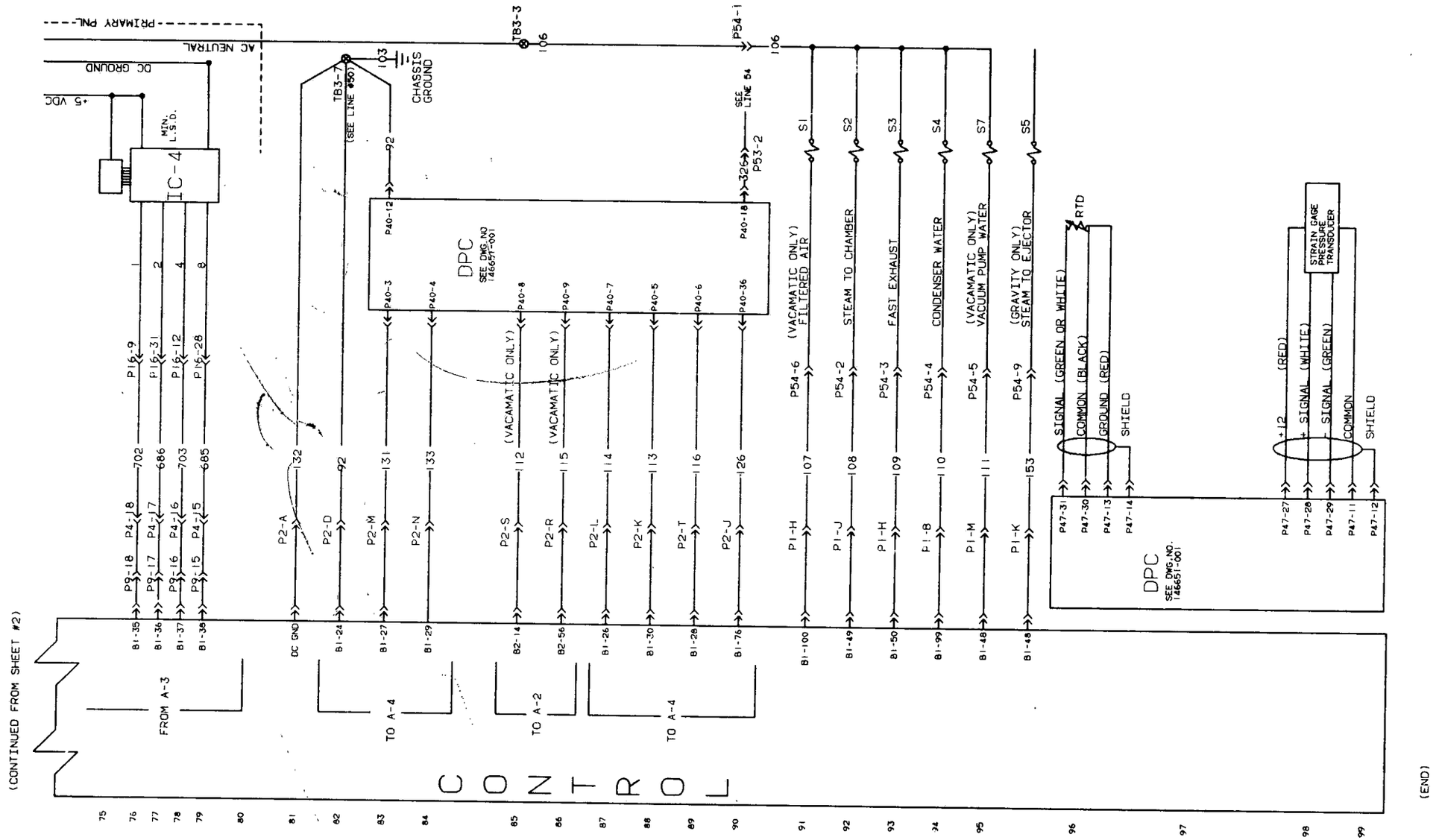
ELECTRICAL SCHEMATIC, Eagle 2300
Vacumatic and Gravity (Part 1 of 3)

DWG. NO. 146645-607
(12/19/85)



ELECTRICAL SCHEMATIC, Eagle 2300
Vacamatic and Gravity (Part 2 of 3)

Add. 7/87



ELECTRICAL SCHEMATIC, Eagle 2300
Vacamatic and Gravity (Part 3 of 3)

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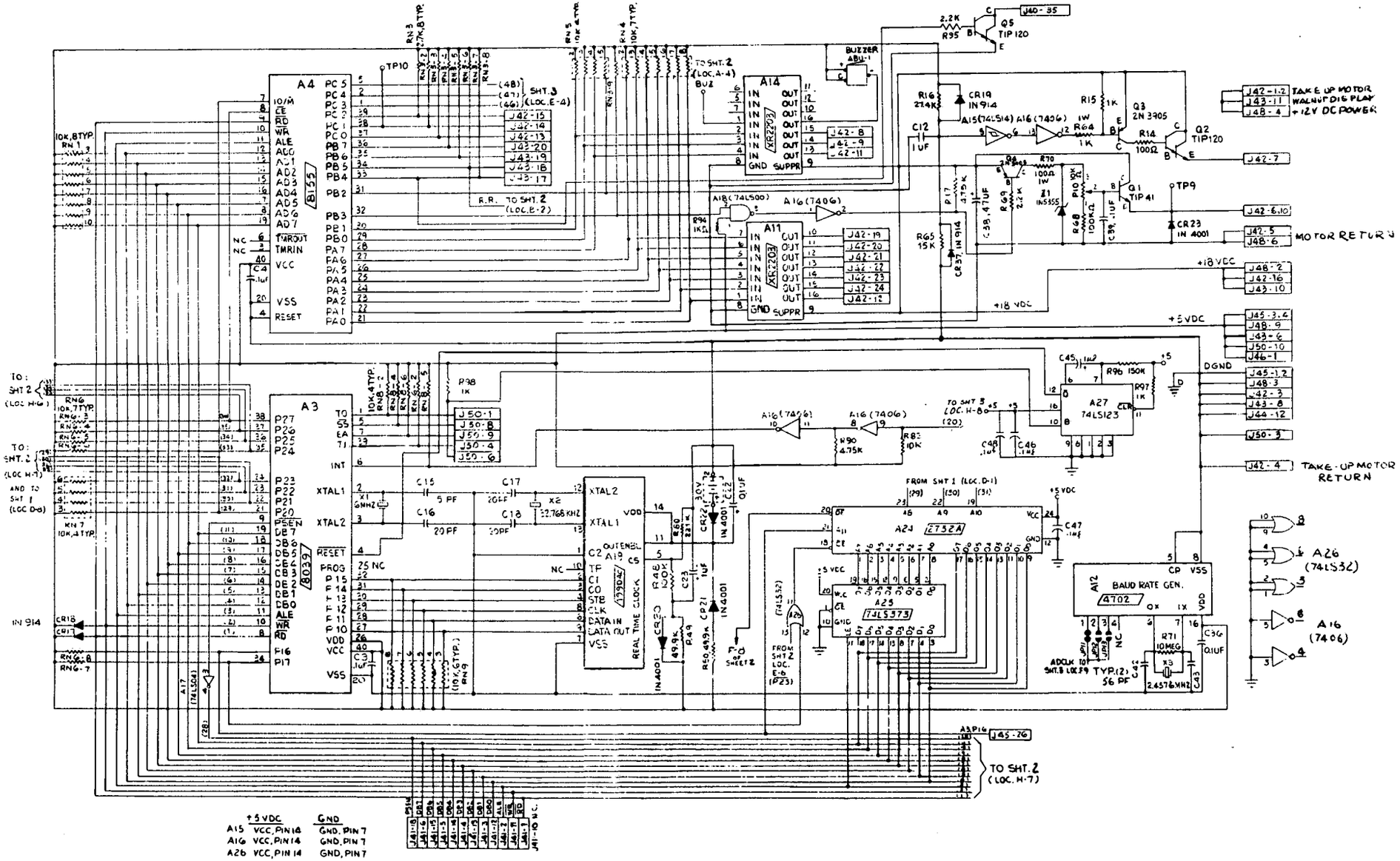
DWG. NO. 146654-002
(7/29/86)



MAIN PRINTCON PC BOARD, Eagle 2300
(Part 1 of 4)

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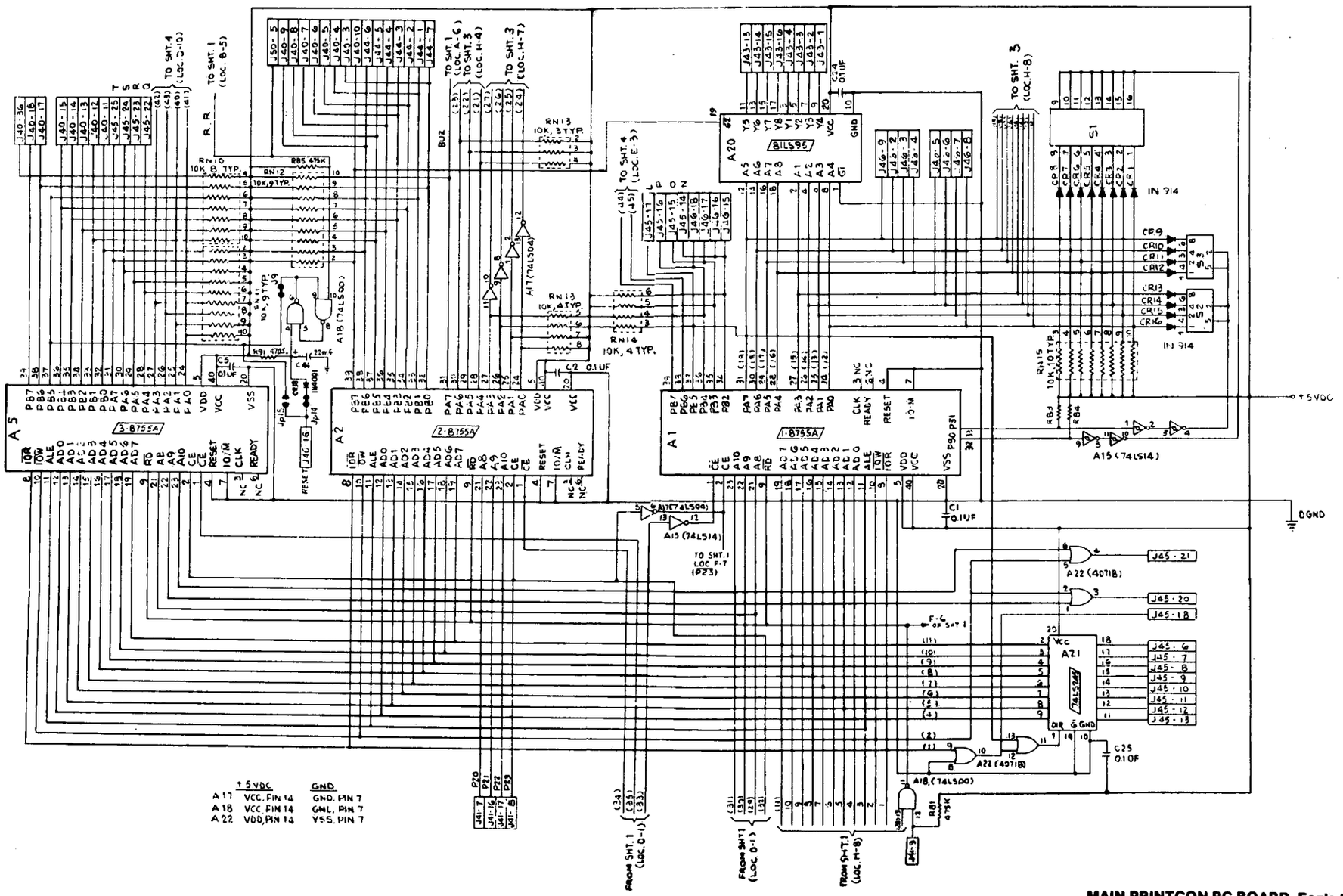
(7/29/86)



MAIN PRINTCON PC BOARD, Eagle 2300
(Part 2 of 4)

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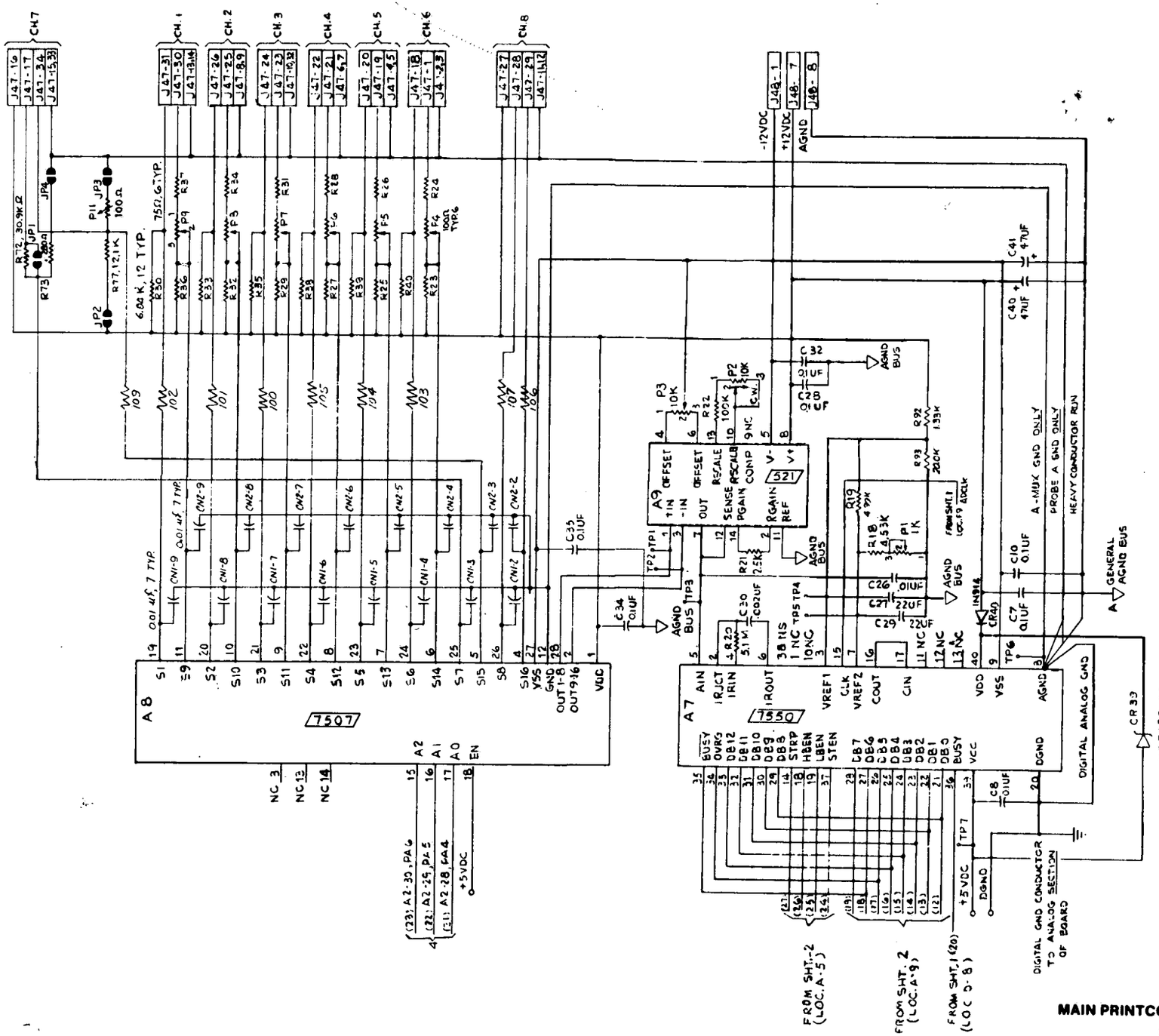
(7/29/86)



MAIN PRINTCON PC BOARD, Eagle 2300
(Part 3 of 4)

Add. 7/87

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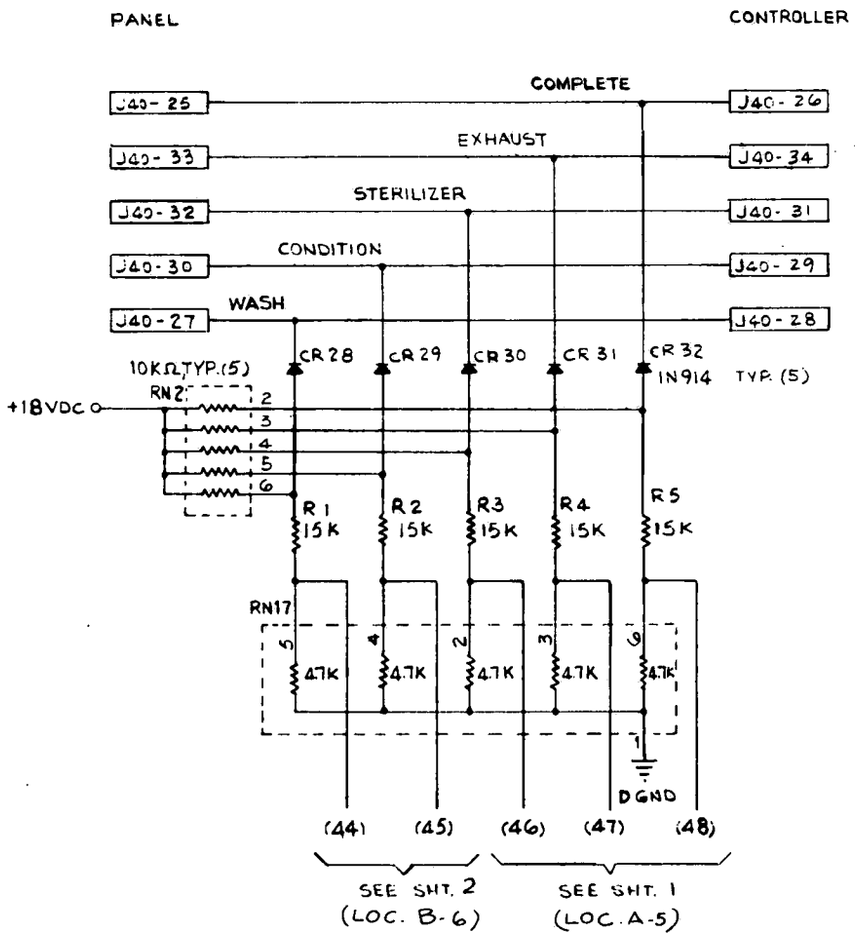

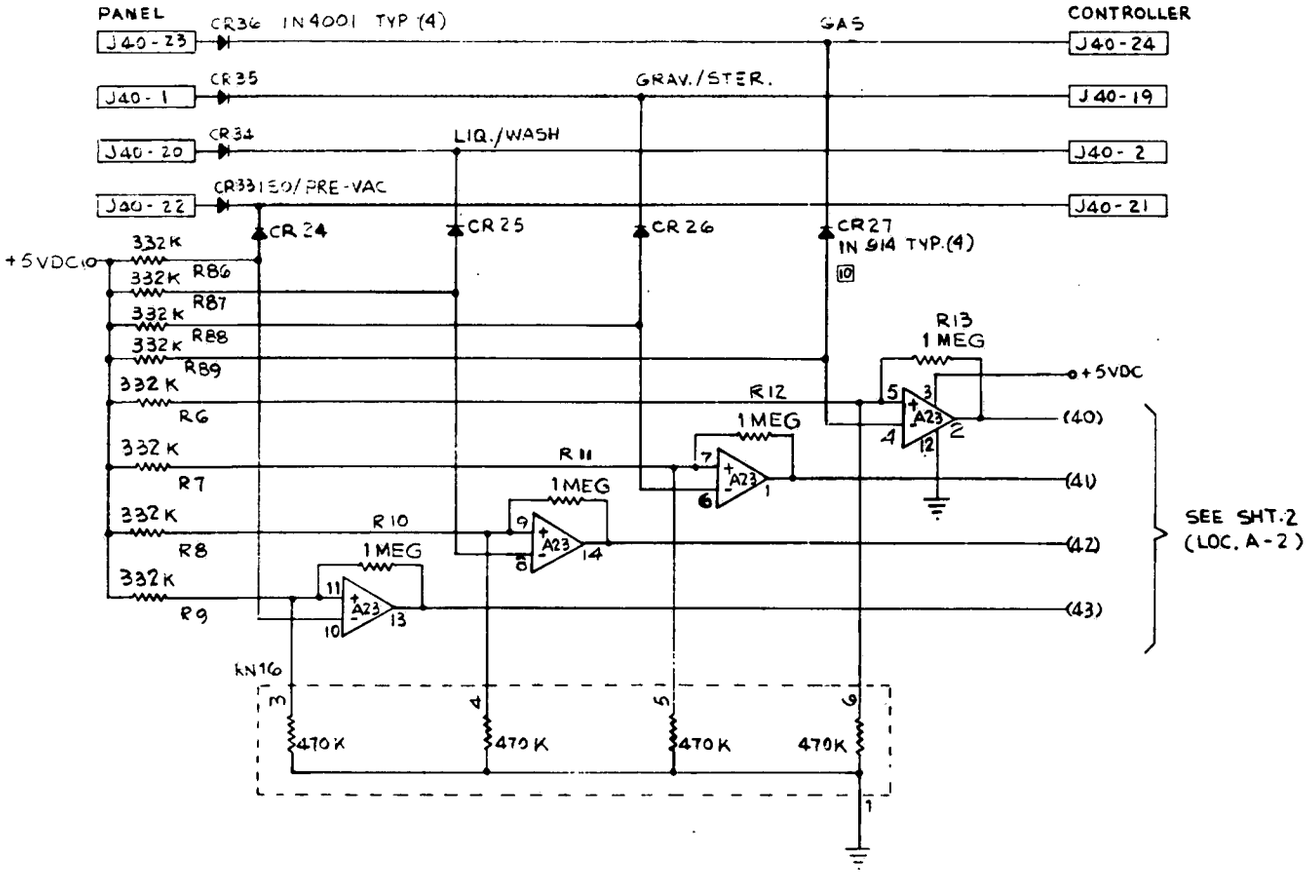

MAIN PRINTCON PC BOARD, Eagle 2300
(Part 4 of 4)

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