AMSCO Maintenance Manual

Eagle Series

EAGLE® 3000 SERIES

Washer-Sterilizer

(2/86) P-764[illegible]-001

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Continued)

LIST OF ILLUSTRATIONS (Continued)

SAFETY PRECAUTIONS

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

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

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

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

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

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

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

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

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

CAUTION: The chamber door post (Fig. 8-25, 10) is welded to the lock clutch ring. If it is necessary to disassemble the door further, contact AMSCO for instructions for removing weld and rewelding.

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

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

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

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

SAFETY PRECAUTIONS

CONTINUED

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

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

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

CAUTION: Do not change lamps with control power on. Damage to the CPU PC board may result.

SECTION 1

GENERAL INFORMATION

1.1 APPLICATION AND DESIGN

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

THIS PAGE
INTENTIONALLY LEFT
BLANK

SD-256R5
(10/84)

AMSCO

Eagle® 2000 SERIES
Washer/Sterilizer/Decontaminator
• *single door* • *double door*

TECH DATA

Washer/Sterilizer/Decontaminator

DESCRIPTION

Microcomputer-controlled washer/sterilizer using heated, agitated water and spray rinses for washing cycle, steam under pressure for sterilizing cycle.

Applications

Wash-sterilize Cycle — for washing then sterilizing surgical instruments and utensils.

Sterilize Cycle — for sterilizing surgical instruments and utensils at 270° F (132° C).

Chamber Size

Interior dimensions are 16x16x26 inches (406x406x660 mm).

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-3 is furnished. Inner shell, including door, is constructed to withstand working pressure of **36 psig** (2.53 kg/cm²).

NFPA *Flammable Anesthetics Code* (for use in Group 1, Class C, hazardous areas).

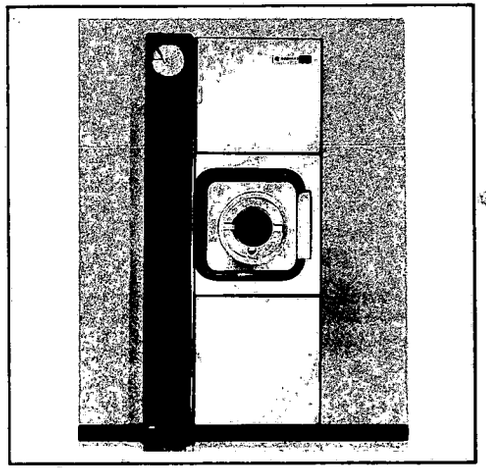
Federal Specification GG-S-1341A performance requirements.

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
- ☐ **2014:**16x16x26",Single Door
- ☐ **2014:**16x16x26",Double Door

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

Door Hinge, Single Door
- ☐ Right Side
- ☐ Left Side

Mounting
- ☐ Cabinet Enclosed
- ☐ Cabinet Enclosed for Recessing thru One Wall (Double-door Model)
- ☐ For Recessing

Materials Handling Accessories*
- ☐ Rack and Shelves
- ☐ Surgical Instrument Trays

**See separate product literature*

Item No. _____
Location(s) _____
_____
_____

Printed in U.S.A.

DESIGN FEATURES

Microcomputer Control

Microcomputer monitors and controls system operations and functions. Cycle progresses automatically through all phases. **Pre-rinse** and **post rinse** phases increase washing effectiveness. Controls **automatically** inject desired amount of **detergent**, maintain **water level** and **temperature** at optimum washing conditions. Completion of cycle indicated visually; also audibly for 90 seconds.

- **Quartz-crystal based timing.** Microcomputer uses inputs from thumbwheel switches to accurately set sterilize exposure time. Set time is displayed as **digital readout**. Selected time is not changeable once a cycle has started. Timing automatically resets upon completion or resetting of cycle. Automatic reset eliminates need to reprogram timer between repeated cycles. If chamber temperature drops 2° F (1.1° C) below 270° F (132° C) 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 and door is electromechanically **locked** until cycle is completed. Should chamber fail to reach sterilizing temperature, microcomputer **visually and audibly** alerts operator. During wash and subsequent phases of wash-sterilize cycle, panel light **WATER IN CHAMBER** is on to alert operator. Should chamber fail to fill with water during a wash-sterilize cycle, microcomputer visually and audibly alerts operator.

  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 a 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.

Eagle-Eye™ Vertical Control Column

Auto-Lume panels light up only when power is on. Upper panel gives **cycle status**; lower panel has sterilize time **digital readout** and lighted **cycle selectors.** Time readout is by large, easy-to-see LEDs that first indicate set time and then, as the cycle progresses, count down remaining time. Cycle selectors require positive force to actuate, eliminates unintentional cycle selections. Selected cycle (wash-sterilize or sterilize) is clearly indicated and the other is locked out. Control column is on side opposite door hinge.

Non-operating End Control (double-door model) includes cycle selectors by which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and water in chamber.

Indicator-Recorder-Controller provides **thermostatic temperature control** during sterilize phase. Continually indicates chamber temperature. Signals microcomputer when temperature reaches 270° F (132° C); also if chamber temperature drops below 270° F (132° C) 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.

Pressure Gauge. Chamber pressure gauge is beneath the primary control panel for easy viewing. Scales are graduated in both English and metric. A chamber pressure gauge is on the non-operating end of double-door model.

Secondary Control Panel

Secondary Controls are above the chamber, behind the service access door ... in compliance with the NFPA *Flammable Anesthetics Code* for hazardous location. Included on panel are **power switches,** one to isolate entire unit and a second to isolate only the controls; **circuit breaker;** thumbwheel switch for sterilize time; **cycle monitor (non-resettable)** to count number of sterilizing cycles for programming preventive maintenance; and cycle reset in case incorrect cycle is selected.

Chamber Drain System

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

Washing System

Automatic **spray rinse** at beginning and ending of wash cycle. **Adjustable detergent injector** automatically supplies correct amount of detergent to chamber during wash-agitate phase. Steam **jet compressors** force steam into chamber to heat and agitate water.

Manual Control

Sterilize cycle is manually operable (without electric power) by a single programming wheel. Control includes DOOR UNLOCK position to be used in the event of loss of power during automatic cycle.

Optional Material Handling Accessories

Includes racks with shelves and instrument trays ... **all constructed of Monel.** 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.

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 shell forms the sterilizer chamber. Interior of chamber, including backhead of single door model, is nickel clad, 0.025" (0.63 mm) thick. A chamber test opening (plugged) is provided.

Glass-fiber blanket insulation on outside of chamber 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 chamber is painted prior to being insulated.

Cast-bronze, manually operated door(s) has stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinges are adjustable for accurate gasket alignment. **Silicone-rubber sealing gasket** is pressed against door frames by handwheel-actuated radial holding arms. Gasket is replaceable without tools. Sound-deadened, stainless-steel cover conceals holding arms and door exterior. Electrical switch prevents inadvertent start of cycle before door is locked; **pressure lock** and **electro-mechanical lock** keep door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

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. Drain 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.

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 (free standing if a single-door model; recessed one wall if a double-door model) or for recessing (one wall if a single-door model), 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 (cabinet-enclosed units), or front panel to wall partition (recessed units). Stainless-steel front panel has upper and lower service access doors and height-adjustable kickplate. Inside of the lower 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.

WARRANTY

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

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

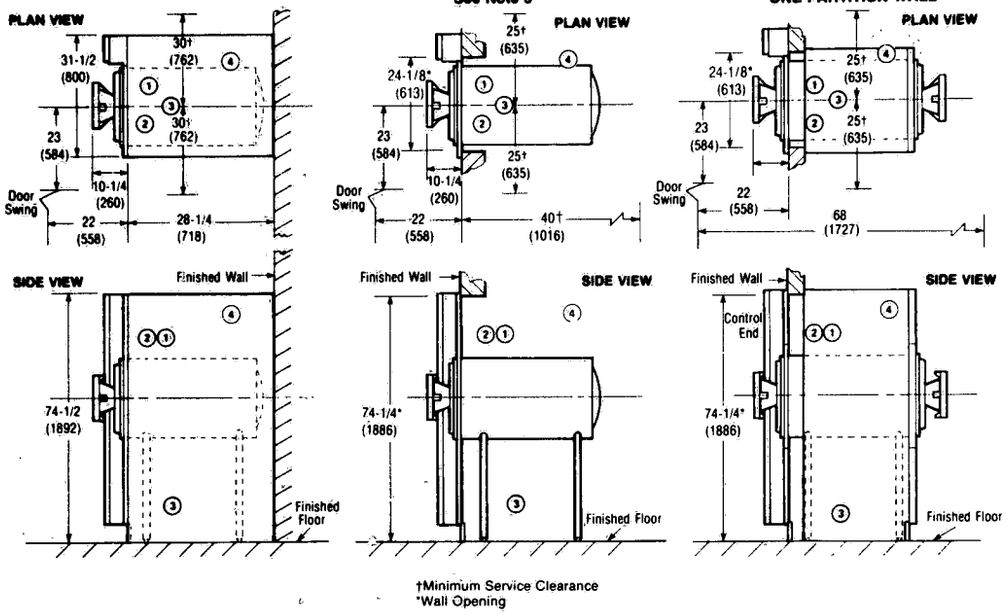
ENGINEERING DATA

STYLE	OPERATING WEIGHT** lbs (kg)	UTILITIES CONSUMPTION				HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam*				
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Cabinet Enclosed	Recessed	
							Front of Wall	Room Behind Wall
Single Door	1160 (526)	15 (57)	205 (776)	116 (53)	43 (20)	4300	1600	2700
Double Door	1360 (617)	15 (57)	205 (776)	116 (53)	43 (20)	N/A	1600	3500

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

SPECIFICATION WORKSHEET

Item _____ : Furnish an AMSCO Eagle Series sterilizer per Tech Data Sheet SD-256. Construct chamber 16x16x26". Supply ☐ single door model or ☐ double door model. Design control with microcomputer to monitor system operations and control system functions. Equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ to be free standing or ☐ for recessing (single door) or ☐ for recessing through one wall (double door).



†Minimum Service Clearance
*Wall Opening

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

OPERATING REQUIREMENTS

(1) COLD WATER — ½ NPT, 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness

(2) STEAM SUPPLY — ⅜ NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic

(3) DRAIN — 2 ODT

(4) TERMINAL BOX — 120-V, 60-Hz, Single-phase, 3 Amp Service

... CHECK LOCAL CODES ...

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. Clearance in front of each sterilizer door should be 38-inches (965 mm) for convenient withdrawal of shelves from chamber.
6. Right-hand door-swing clearances shown. Clearances for left-hand door swing are identical.
7. Floor drain should be provided within confines of sterilizer framework.

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

AMSCO

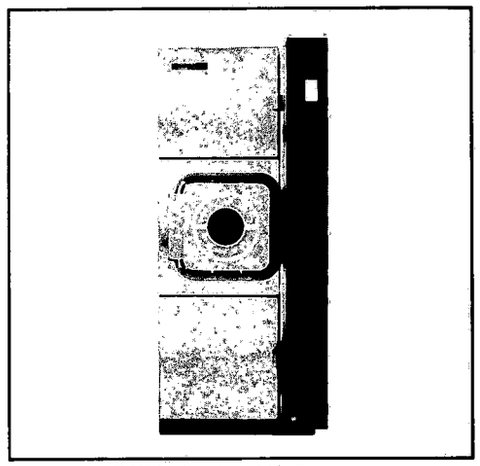
Eagle® 2000 SERIES with Printcon™
Washer/Sterilizer/Decontaminator
• *single door* • *double door*

TECH DATA

Washer/Sterilizer/Decontaminator

DESCRIPTION

Microcomputer-controlled washer/sterilizer with **digital-printer** and **state-of-the-art control system.** Uses heated, agitated water and spray rinses for washing cycle; steam under pressure for sterilizing cycle.



Typical only — some details may vary.

Applications

Wash-sterilize Cycle — for washing then sterilizing surgical instruments.

Sterilize Cycle — for sterilizing surgical instruments.

Chamber Sizes

Interior dimensions are 16x16x26 inches (406x406x660 mm).

Standards

Every washer/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-3 is furnished. Inner shell, including door, is constructed to withstand working pressure of 36 psig (2.53 kg/cm²).

Federal Specification GG-S-1341A 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
- ☐ 2014: 16x16x26", Single Door
- ☐ 2014: 16x16x26", Double Door

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

Door Hinge, Single Door
- ☐ Right Side
- ☐ Left Side

Mounting
- ☐ Cabinet Enclosed
- ☐ Cabinet Enclosed for Recessing Through One Wall (Double-door Model)
- ☐ For Recessing

Materials Handling Accessories*
- ☐ Rack and Shelves
- ☐ Surgical Instrument Trays

***See separate product literature*

Item No. _____
Location(s) _____

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

Printed in U.S.A.

THIS PAGE
INTENTIONALLY LEFT
BLANK

DESIGN FEATURES

Eagle® 2000 with Printcon™

Preprogrammed washer/sterilizer with digital readouts and computer-generated printed records, Eagle microcomputers monitor and control system operations and functions. Cycle progresses automatically through all phases. **Pre-rinse** and **post rinse** phases increase washing effectiveness. Controls **automatically** inject desired amount of **detergent**, maintain **water level** and **temperature** at optimum washing conditions. Completion of cycle indicated visually; also audibly for 90 seconds.

Eagle-Eye™ Vertical Control Column and Secondary Controls (Figure 1)

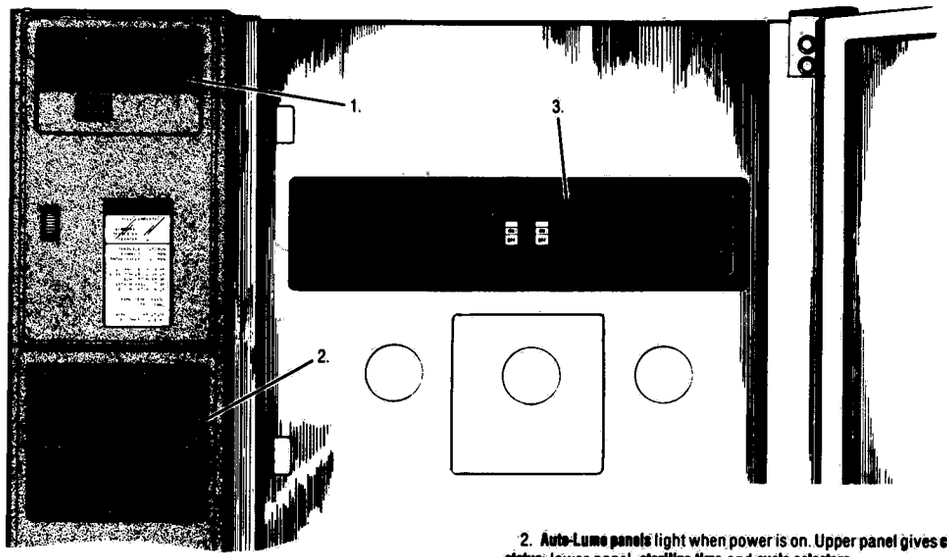


Figure 1. Eagle-Eye Control Column and Secondary Controls.

Salient features include:

1. **Printcon**, digital-printer-controller, controls, monitors, and records daily cycle number, chamber pressure, temperature, date, and time during washing and sterilization cycles, and provides **continuous LED display** of pressure and temperature. (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. Upper panel gives **cycle status**; lower panel, **sterilize time** and **cycle selectors.**

- **Status** lights show each phase of washer/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** is 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(s) must be locked pressure-tight to initiate a cycle.) Selected cycle (wash-sterilize or sterilize) is clearly indicated, other locked out. Should chamber fail to reach sterilizing temperature, microcomputer **visually and audibly** alerts operator. During wash and subsequent phases of wash-sterilize cycle, panel light **WATER IN CHAMBER** is on to alert operator. Should chamber fail to fill with water during a wash-sterilize cycle, microcomputer visually and audibly alerts operator.

3. **Secondary controls** are above the chamber, behind the service access door. Included are **power switches**, one to isolate entire unit and a second to isolate only the controls; **circuit breaker; thumbwheel switches** for Sterilize time; **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 Control (double-door model) includes **Wash-sterilize** and **Gravity** cycle selectors by which previous cycle can be repeated, **status lights** indicating the cycle phase and **warning lights** for door status and water in chamber.

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 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 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 can be in either English or metric. Temperature and pressure 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

Sterilizer function is manually operable (without electric power) by a single programming wheel. (Printcon function is not operational in this mode.) Control includes DOOR UNLOCK position to be used in the event of loss of power during automatic cycle.

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 shell, forms the sterilizer chamber. Interior of chamber, including backhead of single door model, 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.

Cast-bronze, manually operated door(s) has stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinges are adjustable for accurate gasket alignment. **Silicone-rubber sealing gasket** is pressed against door frame by handwheel-actuated radial holding arms. Gasket is replaceable without tools. Sound-deadened, stainless-steel cover conceals holding arms and door exterior. Electrical switch prevents inadvertent start of cycle before door is locked; **pressure lock** and **electromechanical lock** keep door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

Washing System

Automatic **spray rinse** at beginning and ending of wash cycle. **Adjustable detergent injector** automatically supplies correct amount of detergent to chamber during wash-agitate phase. Steam **jet compressors** force steam into chamber to heat and agitate water.

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.

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. Drain line includes a strainer, trap, and check valve. **Shutoff valve** is behind service access door. Chamber pressure **gauge** is 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.

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 and instrument trays . . . **all constructed of Monel.** See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model (freestanding if a single-door model; recessed through one wall if a double-door model), or for recessing (one wall if a single-door model), 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 upper and lower service access doors and height-adjustable kickplate. Inside of the lower 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.

WARRANTY

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

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

ENGINEERING DATA

STYLE	OPERATING WEIGHT** lbs (kg)	UTILITIES CONSUMPTION				HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam*			Recessed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)	Cabinet Enclosed	Front of Wall	Room Behind Wall
Single Door	1160 (526)	15 (57)	205 (776)	116 (53)	43 (20)	4300	1600	2700
Double Door	1360 (617)	15 (57)	205 (776)	116 (53)	43 (20)	N/A	1600	3500

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

SPECIFICATION WORKSHEET

Item ____: Furnish an AMSCO Eagle Series washer/sterilizer with Printcon per Tech Data Sheet SD-356. Construct chamber □ 16x16x26". Supply □ single door model **or** □ double door model. Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Equip washer/sterilizer to operate on steam from an independent source. Arrange washer/sterilizer □ to be freestanding **or** □ for recessing (single door) **or** □ for recessing through one wall (double door).

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

  LOAD(01) ---------
STERILIZER ---------
  OPERATOR ---------

      WASH   22 MIN
  STERILIZE   3 MIN
TOTAL CYCLE  29 MIN

Z 10:18A 224.3  0.9P
E 10:17A 273.5 29.6P
S 10:14A 270.0 31.4P
C 10:12A 221.2  9.4P
C 10:11A  83.1  0.0P
W 10:04A 138.5  0.0P
W  9:49A  72.3  0.0P

    TIME TEMP. PRES.
         °F   ENG.

WASH-STER   AT 273°F
CYCLE START  2-1-82
--------------------
```

to be filled in by operator

phase time selected

cycle complete
exhaust
sterilize phase
condition phase
wash phase

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 During Cycle

```
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 Set Point

```
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

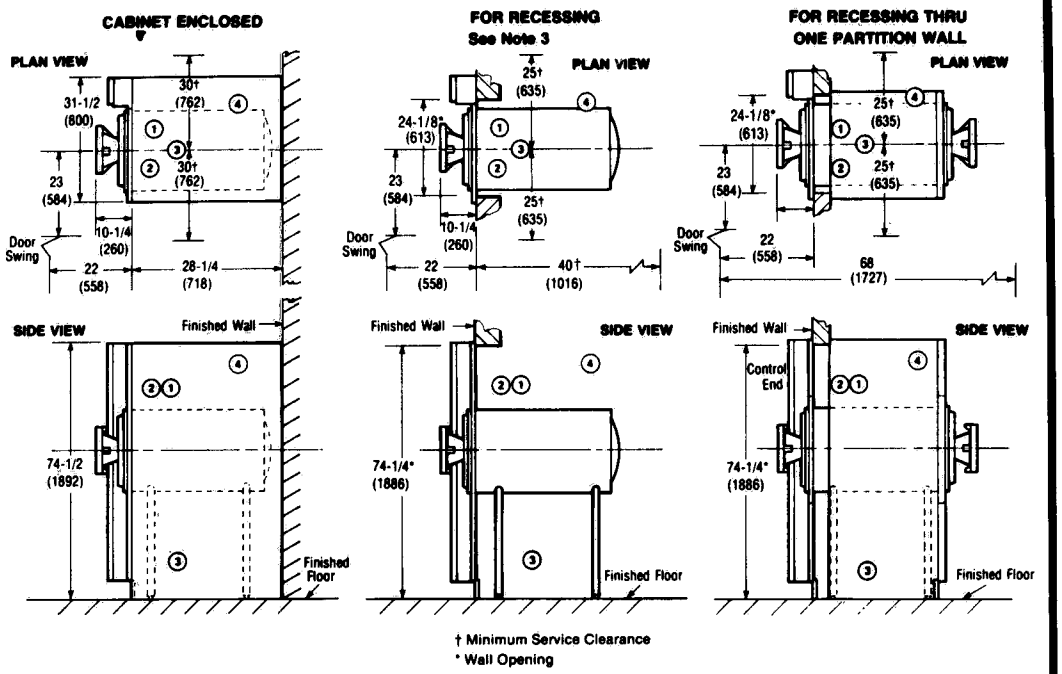
```
ABORT:    PRES SENSOR
* 11:55A 110.0 41.3P
```

Pressure Sensor Failure

```
ALARM:       NO WATER
*  5:25A 110.1  9.3P
```

Instrument Washer Aborts

Figure 3. Control Monitoring and Communication.



† Minimum Service Clearance
* Wall Opening

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

OPERATING REQUIREMENTS

(1) COLD WATER — 1/2 NPT, 20 to 50 psig (1.41 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness

(2) STEAM SUPPLY — 3/8 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic

(3) DRAIN — 2 ODT

(4) TERMINAL BOX — 120-V, 60-Hz, Single-phase, 0.6 Amp Service

. . . CHECK LOCAL CODES . . .

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.

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

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

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

5. Clearance in front of each sterilizer door should be 38-inches (965 mm) for convenient withdrawal of shelves from chamber.

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.

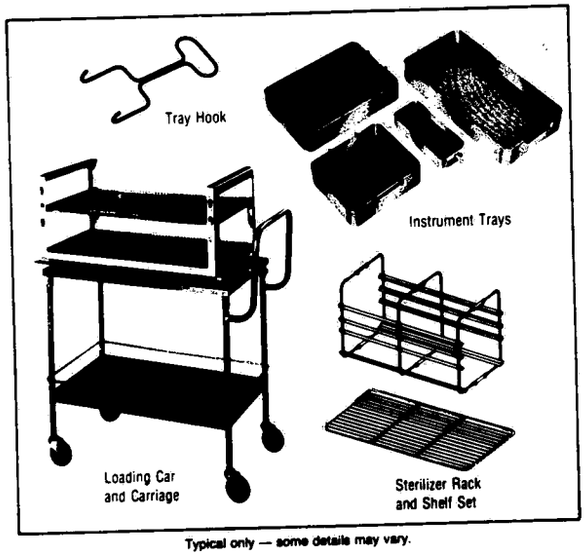
This print is for guidance when planning space and utility services. Actual installation prints may be obtained from any AMSCO office or representative.

THIS PAGE
INTENTIONALLY LEFT
BLANK

AMSCO

MATERIAL HANDLING ACCESSORIES
• *for small sterilizers and aerators*

TECH DATA



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THE EQUIPMENT BEING SPECIFIED.

Sterilizer Size
- ☐ 16x16x26" (406x406x660 mm)
- ☐ 20x20x38" (508x508x965 mm)

Accessories
- ☐ Bottom Shelf
- ☐ Rack and 2 Shelves
- ☐ Rack and 3 Shelves
- ☐ Loading Car 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 20x20x38" (508x508x965 mm) sterilizers or 24x28x38" (610x711x965 mm) aerators, and for transferring goods to and from processing areas.

- **Loading Car.** Welded-Monel framework with two removable shelves of welded-Monel sheet metal and wire. Upper shelf is adjustable to three heights. Car axles turn on Teflon® bearings impregnated with glass. Wheels are flanged brass. Chamber track assembly has welded-Monel tracks and crossbraces.
- **Carriage.** Welded stainless steel with four swivel casters and neoprene tires. Includes loading car tracks, height-adjustable to align with tracks in sterilizer or aerator chamber.

  Bottom of carriage has a stainless-steel shelf with guard rails. The rails and shelf reinforce the carriage legs.

over ▶

Carriage is held to the sterilizer or aerator door frame by a hand-operated latch. Loading car is secured to the carriage by a spring-loaded latch. Latches are operated from the handle-end of the carriage.

SHELF SETS (STERILIZERS ONLY)

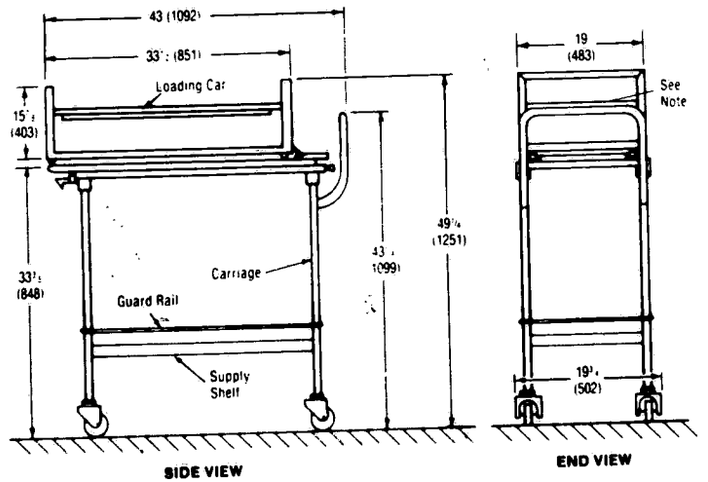
Provide loading efficiency for a variety of mixed or single item loads. Shelves are completely removable for processing bulk loads.

- **Rack With Two or Three Full-Length Shelves:** 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.
- **Bottom Shelf:** Includes a frame, supports and crossbraces of welded Monel wire rod. Supports keep the rack off the chamber floor.

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. 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

NOTE: Car has removable (non-adjustable) bottom shelf and upper shelf adjustable to 3 heights

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

SECTION 2

OPERATING INSTRUCTIONS (IRC)

2.1 GENERAL

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

Figure 2-2 shows the location of the various controls for units with Indicator-Recorder-Controllers. For units with Printcon, see paragraphs 2.8 through 2.12 and Figure 2-6.

2.2 BEFORE OPERATING THE EQUIPMENT

1. Open the upper access door.

a. Position the POWER and CONTROL switches to ON. Primary control panel lights up.

b. Make sure manual control is turned to OFF.

c. Turn STEAM and WATER valves to ON.

2. Open lower access door and check detergent level. Approximately 4 ounces of detergent are required for each wash cycle. Be sure strainer on end of injector hose is clean.

3. Be sure that instructions in paragraph 4.3 have been carried out.

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

5. Review paragraph 2.6, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle.

6. If a double-door unit, review paragraph 2.7 to become familiar with the controls on the non-operating end.

2.3 AUTOMATIC OPERATION: WASH-STERILIZE CYCLE

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

2. Open the upper access door.

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

b. Dial the correct exposure period on STERILIZE TIME thumbwheel switches as follows:

- ☐ 3 minutes for loads consisting of all-metal instruments.
- ☐ 10 minutes for unwrapped metal instruments combined with sutures, tubing or other porous materials.

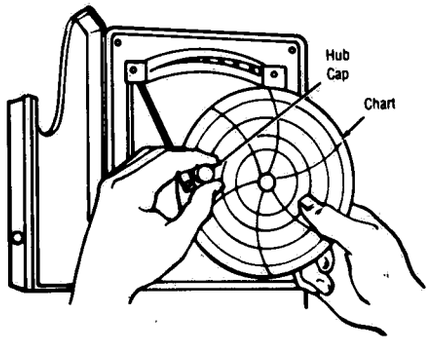


Figure 2-1. CHANGING THE CHART.

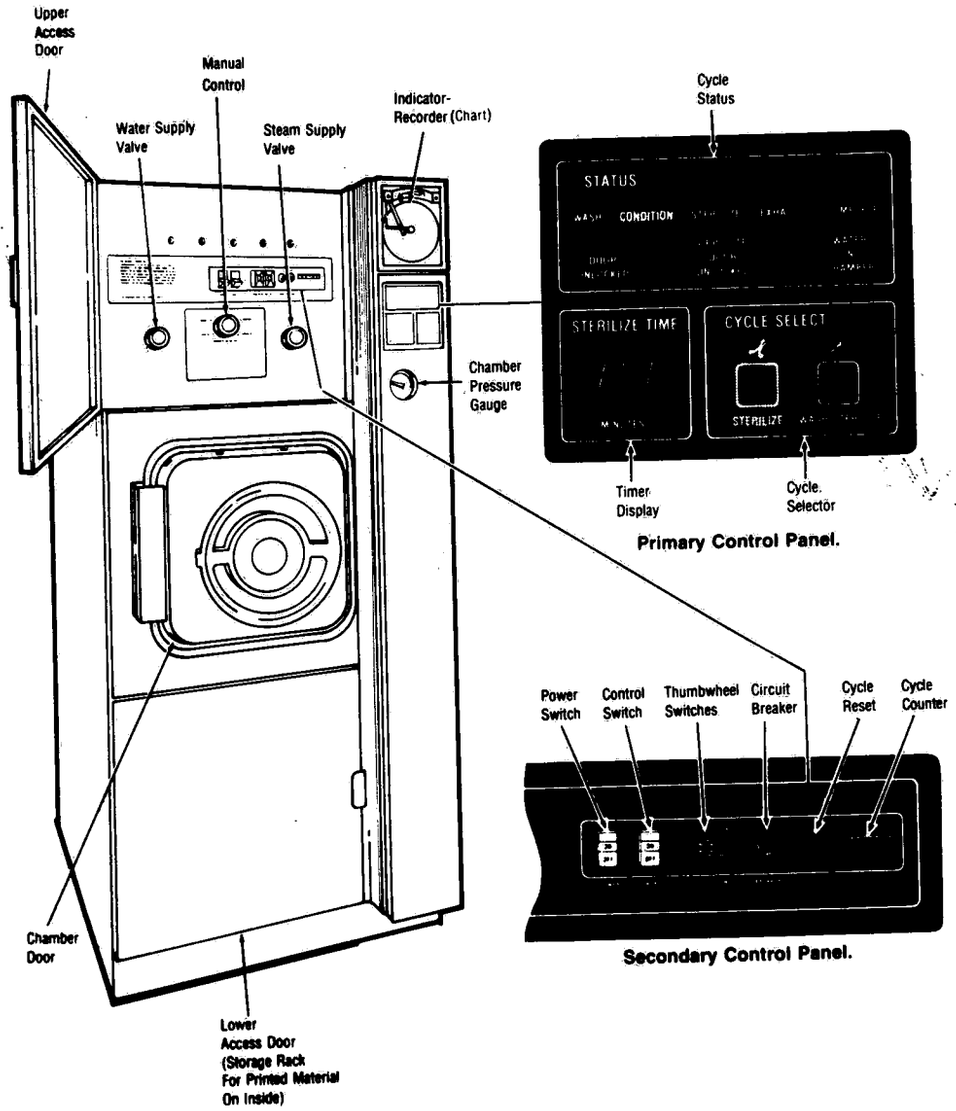


Figure 2-2. CONTROL LOCATIONS: Operating End.

3. Open chamber door and load washer/sterilizer. Should the door not at first unlock and panel light WATER IN CHAMBER is off, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. If panel light WATER IN CHAMBER is on, drain chamber by positioning manual control to DRAIN CHAMBER. Be sure Water Supply Valve is open. Wait 3 minutes or until water is no longer coming out of chamber drain line, then position selector to OFF and open the door. 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.

4. Close and lock the door. Turn handwheel to right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Door is mechanically locked by door unlocking solenoid once cycle is selected and by an integral pressure-actuated lock once chamber is pressurized.

5. Touch WASH-STERILIZE cycle selector. Light comes on to full brightness. Status light WASH comes on. WATER IN CHAMBER light will also come on when chamber begins to fill.

NOTE: If you push the wrong cycle selector, simply press, hold momentarily, 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 WASH will come on and new cycle will begin.

6. After wash phase is completed, WATER IN CHAMBER light goes out and CONDITION light comes on and remains on for the duration of the condition phase.

7. 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.

8. When sterilize timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure.

9. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Load may be removed from the washer/sterilizer.

NOTE: If WATER IN CHAMBER light is on, door will not open. Wait until water finishes draining (light goes out) or if necessary, follow instructions in step 3 for manually draining the chamber.

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

2.4 AUTOMATIC OPERATION: STERILIZE CYCLE

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

2. Open the upper access door.

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

b. Dial the correct exposure period on STERILIZE TIME thumbwheel switches as follows:

- ☐ 3 minutes for loads consisting of all-metal instruments.
- ☐ 10 minutes for unwrapped metal instruments combined with sutures, tubing, or other porous materials.

3. Open chamber door and load washer/sterilizer. Should the door not at first unlock and panel light WATER IN CHAMBER is off, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. If panel light WATER IN CHAMBER is on, drain chamber by positioning manual control to DRAIN CHAMBER. Be sure Water Supply Valve is open. Wait 3 minutes, or until water is no longer coming out of chamber drain line, then position selector to OFF and open the door. 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.

4. 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. Door is mechanically locked by door unlocking solenoid once cycle is selected and by an integral pressure-actuated lock once chamber is pressurized.

5. Push STERILIZE 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.

6. 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.

7. When sterilize timer times out. EXHAUST light comes on. Chamber exhausts to atmospheric pressure.

8. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Load may be removed from the washer/sterilizer.

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

2.5 MANUAL OPERATION: STERILIZE CYCLE

NOTE: Wash-Sterilize cycle cannot be operated manually.

1. Open the upper access door.

a. Position POWER switch to ON. Recorder will be energized. The CONTROL switch must be positioned at OFF when using manual operation.

b. Turn STEAM and WATER valves to ON.

2. Follow steps 3 and 4 in paragraph 2.2. "Before Operating The Equipment."

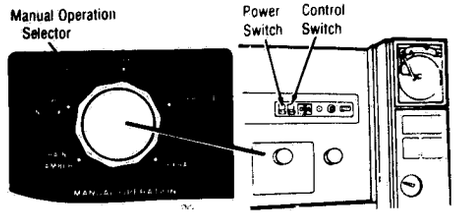


Figure 2-3. MANUAL CONTROL.

3. Open chamber door and load washer/sterilizer. 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. If door will not unlock:

a. Turn Manual Operation selector to DRAIN CHAMBER position (passing quickly through STERILIZE and EXHAUST). Be sure Water Supply Valve is open.

b. Wait 3 minutes or until water no longer comes out of chamber drain line, then position selector to DOOR UNLOCK.

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

4. 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. The door is also mechanically locked when Manual Control selector is in any position other than DOOR UNLOCKED and door unlock solenoid valve is not energized.

5. Push selector to STERILIZE. When chamber temperature reaches 270° F (132° C), begin timing. Sterilization period should be as follows:

☐ 3 minutes for loads consisting of all-metal instruments.

☐ 10 minutes for unwrapped metal instruments combined with sutures, tubing, or other porous materials.

6. After completion of sterilization period, turn selector to EXHAUST position. Keep in this position until chamber pressure is atmospheric (0 psig).

7. When chamber pressure is atmospheric, turn selector to DOOR UNLOCK position. Open door. Load may be removed from the washer/sterilizer.

8. Position Manual Operation selector to OFF.

2.6 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.

CONDITION NO. 1: Washer/Sterilizer at start of wash phase did not sense water entering chamber.

INDICATION: WASH light is on, WATER IN CHAMBER light flashes, buzzer sounds intermittently and chamber drain automatically opens.

OPERATOR SHOULD:

1. Be sure water supply valve is fully open (water pressure is necessary to operate diaphragm-type drain valve).

2. Wait for chamber to finish draining (open lower access door and check chamber drain line).

3. Press and hold cycle RESET button on secondary control panel, WATER IN CHAMBER light should go off.

a. If light goes off reinitiate cycle.

b. If light does not go off or condition repeats, have a qualified technician locate and correct problem . . . see Section 6, TROUBLESHOOTING. **Do not** attempt to open chamber door; chamber may contain water.

CONDITION NO. 2: During wash phase, Washer/Sterilizer did not fill within programmed time.

INDICATION: WASH and WATER IN CHAMBER lights are on and buzzer sounds intermittently.

OPERATOR SHOULD:

1. Press and hold cycle RESET button on secondary control panel.

2. Wait until chamber drains (WASH light goes out; chamber automatically drains and when complete, WATER IN CHAMBER light goes out and timer resets).

3. Be sure water supply to machine is at least 20 psig (1.14 kg/cm²) and that water supply valve is fully open.

4. Reinitiate cycle. If condition repeats, have a qualified technician locate and correct problem . . . see Section 6, TROUBLESHOOTING.

CONDITION NO. 3: Cycle cannot be selected because WATER IN CHAMBER light is on.

NOTE: Whenever water is sensed in chamber (e.g., chamber condensate), the light comes on and drain line automatically opens. Drain remains open for an additional 30 seconds after water drains out. When light goes out, cycle may be selected.

INDICATION: WATER IN CHAMBER light is on before wash cycle is selected.

OPERATOR SHOULD:

1. Wait for WATER IN CHAMBER light to go out; then select cycle.

2. If chamber door is closed and locked and light does not go out, have a qualified technician locate and correct problem . . . see Section 6, TROUBLESHOOTING. **Do not** attempt to open chamber door; chamber may contain water.

CONDITION NO. 4: Cycle cannot be selected because WATER IN CHAMBER light is flashing (indicates malfunction of water sensing system).

INDICATION: WATER IN CHAMBER light flashes, buzzer sounds intermittently, and drain line automatically opens. (WASH light is **not** on.)

OPERATOR SHOULD:

1. Press and hold cycle RESET button on control panel. If light goes out, cycle may then be selected.

2. If condition continues, turn off power to washer/sterilizer (to silence buzzer), then have a qualified technician locate and correct problem. **Do not** attempt to open chamber door, chamber may contain water.

CONDITION NO. 5: Washer/Sterilizer did not complete conditioning phase in programmed time.

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

OPERATOR SHOULD:

1. Push cycle selector to stop the buzzer (cycle will continue to operate, light will continue to flash).

2. 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 conditioning phase can be completed (i.e., chamber reaches sterilizing temperature) press cycle RESET button on secondary control panel to abort cycle. **Do not** proceed further until chamber is at atmospheric pressure.

4. Correct problem, reprocess load.

CONDITION NO. 6: Temperature drops 2° F below 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. Refer to Section 6, TROUBLESHOOTING if condition happens repeatedly.

CONDITION NO. 7: 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.

OPERATOR SHOULD:

1. Tighten door handwheel to see if light will go out and cycle can continue. If light will not go out, press cycle RESET button on secondary control panel to abort cycle. **Do not** proceed further until chamber is at atmospheric pressure and WATER IN CHAMBER light is out.

2. When chamber is at atmospheric pressure, check door and door switch operation.

3. Reprocess load.

CONDITION NO. 8: Loss of electricity.

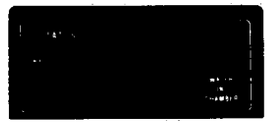
INDICATION: Primary control panel goes dark.

OPERATOR SHOULD:

1. Wait until power is restored to washer/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 at atmospheric pressure and WATER IN CHAMBER light is out.

3. Load may be reprocessed.



No. 1. Water Not Detected In Chamber.

No. 2. Chamber Did Not Fill.

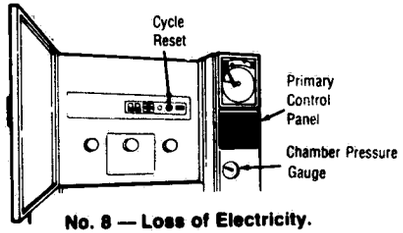
No. 3. Water Detected In Chamber.

No. 4. Water Detected In Chamber.

No. 5 — Condition Phase Too Long.

No. 6 — Sterilizing Temperature Drops.

No. 7 — Chamber Door Switch Not Made.



No. 8 — Loss of Electricity.

Figure 2-4. MONITORS AND ALARMS.

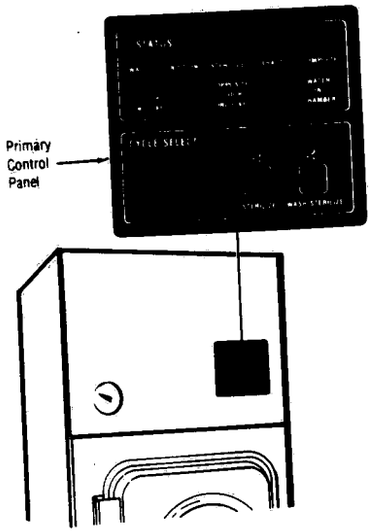


Figure 2-5. NON-OPERATING END PRIMARY CONTROL PANEL.

2.7 CONTROLS AND SIGNALS FOR DOUBLE-DOOR WASHER/STERILIZERS

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

1. Cycle selectors: STERILIZE and WASH-STERILIZE. If you wish to repeat the previous sterilize or wash-sterilize cycle, and all preparatory actions (para. 4.1) 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: WASH, CONDITION, STERILIZE, EXHAUST, COMPLETE.

3. Warning lights: DOOR UNLOCKED, OPPOSITE DOOR UNLOCKED, WATER IN CHAMBER.

OPERATING INSTRUCTIONS (PRINTCON)

2.8 BEFORE OPERATING THE EQUIPMENT

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

1. Open the upper access door.

a. Position the POWER and CONTROL switches 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.

b. Make sure manual control is turned to OFF.

c. Turn STEAM and WATER valves to ON.

2. Open lower access door and check detergent level. Approximately 4 ounces of detergent are required for each wash cycle. Be sure strainer on end of injector hose is clean.

3. Be sure that instructions in paragraph 5.1, "Daily Maintenance," have been carried out.

4. Check for correct time and date by pressing the "Time" or "Date" pushbutton. Set time (date) by **simultaneously** pressing TIME (DATE) and either FORWARD or REVERSE buttons. The longer both buttons are simultaneously held , the faster time (date) will change.

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

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

NOTE: The visual display 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 vacuum). LEDs on display indicate which units are being displayed. The display of temperature and (English) pressure can be either single precision (no decimal) or extended precision (one decimal). Metric pressure shows one or two decimal places. Metric vacuum shows no decimal places. See paragraph 7.17 "Changing Units of Display."

7. Review paragraphs 2.6 and 2.12, "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 2.7 "Controls and Signals for Double-Door Washer/Sterilizers," to become familiar with the controls on the non-operating end.

9. 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.

2.9 AUTOMATIC OPERATION: WASH-STERILIZE CYCLE

1. Follow instructions in paragraph 2.8, "Before Operating The Equipment."

2. Open the upper access door.

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

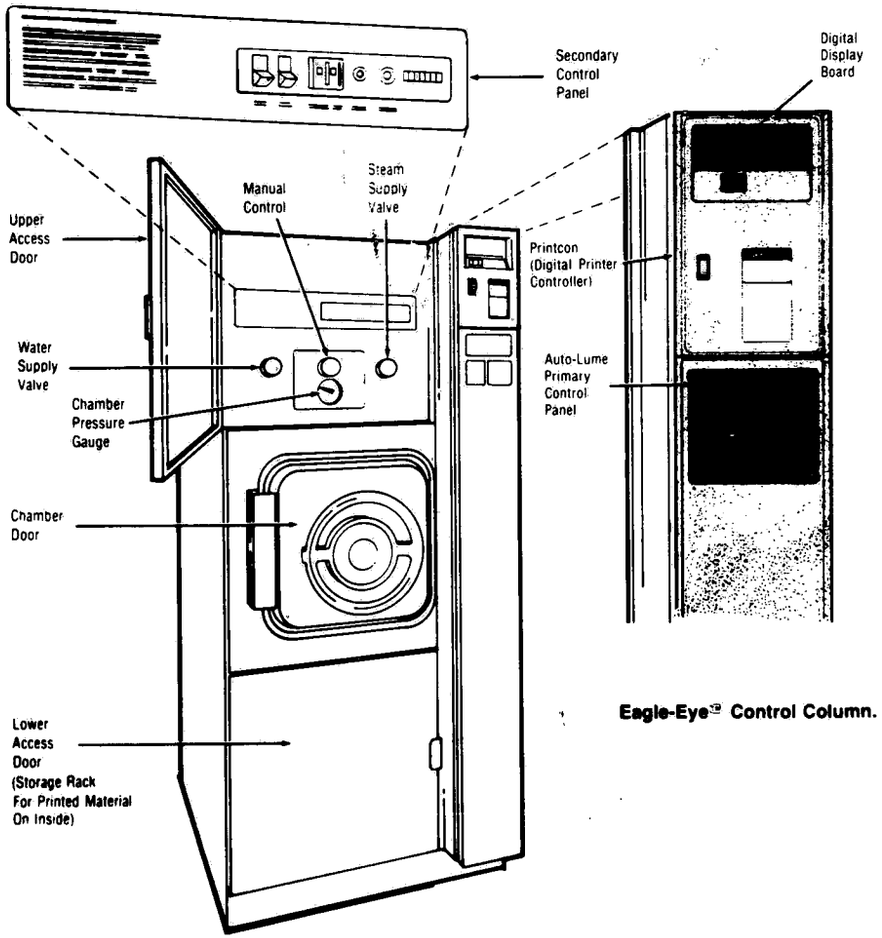
b. Dial the correct exposure period on STERILIZE TIME thumbwheel switches as follows:

☐ 3 minutes for loads consisting of all-metal instruments.

☐ 10 minutes for unwrapped metal instruments combined with sutures, tubing or other porous materials.

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

3. Using the thumbwheel switch on the Printcon board, set the sterilizer 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,



Eagle-Eye® Control Column.

Figure 2-6. CONTROL LOCATIONS: Operating End.

150-295 F (65-146 C), a buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

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

4. Open chamber door and load washer/sterilizer. The printer records the time the door is opened and prints "DOOR OPEN." Should the door not at first unlock and panel light WATER IN CHAMBER is off, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. If panel light WATER IN CHAMBER is on, drain chamber by positioning manual control to DRAIN CHAMBER. Be sure Water Supply Valve is open. Wait 3 minutes or until water is no longer coming out of chamber drain line then position selector to OFF and open the door. 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.

5. Close and lock the door. Turn handwheel to right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Door is mechanically locked by door unlocking solenoid once cycle is selected and by an integral pressure-actuated lock once chamber is pressurized.

6. Touch WASH-STERILIZE cycle selector. Light comes on to full brightness. Status light WASH comes on. WATER IN CHAMBER light will also come on when chamber begins to fill. The printed record will show the time the cycle begins, wash temperature, and pressure.

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

7. After wash phase is completed, WATER IN CHAMBER light goes out and CONDITION light comes on and remains on for the duration of the condition phase. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points.

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 sterilize timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure. 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. Load may be removed from the washer/sterilizer. the printed record will show the time the cycle finished, the wash time, sterilize time, and total cycle time.

NOTE: If WATER IN CHAMBER light is on, door will not open. Wait until water finishes draining (light goes out) or if necessary, follow instructions in step 4 for manually draining the chamber.

11. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on. Printer will print "DOOR OPEN", the time, and the date.

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

2.10 AUTOMATIC OPERATION: STERILIZE CYCLE

1. Follow instructions in paragraph 2.8, "Before Operating The Equipment".

2. Open the upper access door.

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

b. Dial the correct exposure period on STERILIZE TIME thumbwheel switches as follows:

☐ 3 minutes for loads consisting of all-metal instruments.

☐ 10 minutes for unwrapped metal instruments combined with sutures, tubing or other porous materials.

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

3. Using the thumbwheel switch on the Printcon board, set the sterilizer 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 feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to paragraph 7.17 "Adjusting the Sterilize Temperature Overdrive."

4. Open chamber door and load washer/sterilizer. The printer records the time the door is opened and prints "DOOR OPEN." Should the door not at first unlock and panel light WATER IN CHAMBER is off, turn door wheel slightly clockwise, press the center black button, then again turn door wheel counterclockwise and open. If panel light WATER IN CHAMBER is on, drain chamber by positioning manual control to DRAIN CHAMBER. Be sure Water Supply Valve is open. Wait 3 minutes or until water is no longer coming out of chamber drain line then position selector to OFF and open the door. 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.

5. Close and lock the door. Turn handwheel to right as far as it will go using normal hand pressure. Panel light DOOR UNLOCKED (also OPPOSITE DOOR UNLOCKED if applicable) must go off. Door is mechanically locked by door unlocking solenoid once cycle is selected and by an integral pressure-actuated lock once chamber is pressurized.

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

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

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

8. When sterilize timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure. The printed record will show the time the EXHAUST phase begins, the temperature and pressure.

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

10. When chamber door is opened, controls will automatically reset and DOOR UNLOCKED light will come on. Printer will print "DOOR OPEN", the time, and the date.

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

2.11 MANUAL OPERATION: STERILIZE CYCLE ONLY

1. Follow instructions in paragraph 2.5, "Manual Operation." POWER and CONTROL switches should be OFF. Begin STERILIZE phase timing when the desired chamber pressure as indicated by the chamber pressure gauge is reached.

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.

2.12 CONTROL MONITORING AND COMMUNICATION SYSTEMS

In addition to the cycle monitors outlined in paragraph 2.6 and Figure 2-4, Printcon prints the following messages:

```
ALARM      NO WATER
*  5:25P 110 1  9 3P
```

No. 1 — Water Not Detected In Chamber.

```
ALARM      TOO LONG
*  1 45P 265 9 20.4P
```

No. 2 — Chamber Did Not Fill.

```
ALARM      TOO LONG
C 1 45P 265 9 20.4P
```

No. 5 — Condition Phase Too Long.

```
S 11.05A 266 4 25 5P
ALARM      UNDER TEMP
S 11 04A 271 0 27 3P
```

No. 6 — Sterilizing Temperature Drops.

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

No. 7 — Chamber Door Switch Not Made.

```
POWER ON AT  8-18-82
  9:01A  68.4  0.0P
```

No. 8 — Power Restored After Loss of Electricity.

Figure 2-7. PRINTCON MESSAGES.

Additional printouts are provided whenever:

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

1. The RESET button is pressed.

```
POWER ON     8-18-82
  9:01A  68.4  0.0P
```

2. The power is turned on.

```
ALARM:  TEMP SENSOR
*  9:15P 306.8  0.0P
```

3. Temperature sensor failure is detected.

```
ALARM:  PRES SENSOR
*  1:12P 110.7 41.3P
```

4. Pressure sensor failure is detected.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 3

PRINCIPLES OF OPERATION

3.1 GENERAL

The Instrument Washer-Sterilizer is designed to efficiently process unwrapped hard goods, glass, and rubber items through either a wash and sterilize cycle or a sterilize cycle only. To accomplish sterilization, the machine uses steam, regulated at the most effective temperature and pressure for the particular load. For the wash cycle, the machine uses a spray rinse, followed by a wash/agitate phase, then followed again by a spray rinse. During the agitation phase, the chamber is filled with water, and the agitation is produced by forcing a mixture of steam and air, under pressure, into the filled chamber.

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

The washer/sterilizer is 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 DESCRIPTION OF COMPONENT FUNCTIONS TO ACHIEVE WASH AND STERILIZE CYCLE PHASES

NOTE: The material in paragraphs 3.2 through 3.5 applies to Printcon except that the temperature switch has been replaced with a resistance thermal detector (RTD), the pressure switch has been replaced with a pressure transducer, and the Indicator-Recorder-Controller (IRC) has been replaced with Printcon Digital-Printer-Controller (DPC) unit. See also Sections 3.6 and 3.7.

Washing Cycle

SPRAY/RINSE

- Solenoid valves S-21 and S-25 open to allow water to be sprayed into the chamber through the spray nozzle. Solenoid valves S-23 is open to allow water to flow through the ejector IJ-22. Water through the ejector draws a vacuum on drain valve CV-21 and causes it to open. All other valves are closed. The result is a continuous spray of water on the load in the chamber while the drain remains open.

DRAIN

- Solenoid valve S-23 opens to allow water to flow through the ejector IJ-22. Water through the ejector draws a vacuum on drain valve CV-21 and causes it to open and drain the chamber. All other valves are closed.

FILL

- Solenoid valves S-21 and S-25 open to allow water to be sprayed into the chamber. The chamber fills to the level where trap T-21 is connected. Water then overflows through trap T-21 where the liquid sensors shut off the water.

DETERGENT INJECT

- Water supply solenoid valve S-21 and detergent inject solenoid IJ-21 open. Water flowing through IJ-21 sucks detergent from the container, mixes it with water, and sprays it into the chamber.

WASH/AGITATE

- Solenoid valve S-26 opens. Steam passes through the jet compressors which simultaneously suck air from the chamber at the top. The steam/air mixture is charged into the chamber at the bottom through nozzles. The steam/air mixture bubbles through the water/detergent and thereby heats and agitates the contents of the chamber.

PURGE WATER FROM AIR/STEAM LINES

- Solenoid valves S-26 opens. Steam is charged into the piping. Solenoid valve S-23 opens to allow water to flow through the ejector IJ-22; hence drain valve CV-21 opens. Steam displaces the air and air is purged out through the drain valve.

Sterilizer Cycle

PURGE

• Solenoid valves S-2, S-3, and S-4 open. S-2 charges steam into the chamber. Exhaust valve S-3 continuously exhausts steam from the chamber. Cooling water valve S-4 dumps water to the drain to cool the exhaust steam. Steam continuously flows through the chamber and out valve S-3, thereby displacing the air in the chamber.

STERILIZE

• Solenoid valve S-2 remains open to charge the chamber with steam. S-2 is thermostatically controlled during this phase to maintain the chamber drain temperature. Cooling water valve S-4 remains open to dump water to the drain and maintain drain temperature below 140° F (trap exhaust).

EXHAUST

• Solenoid valve S-3 opens to exhaust the chamber. Cooling water valve S-4 remains open to cool the chamber exhaust.

COMPLETE

• Drain valve CV-21 is opened by opening solenoid valve S-23. Valves remain open until the door is opened.

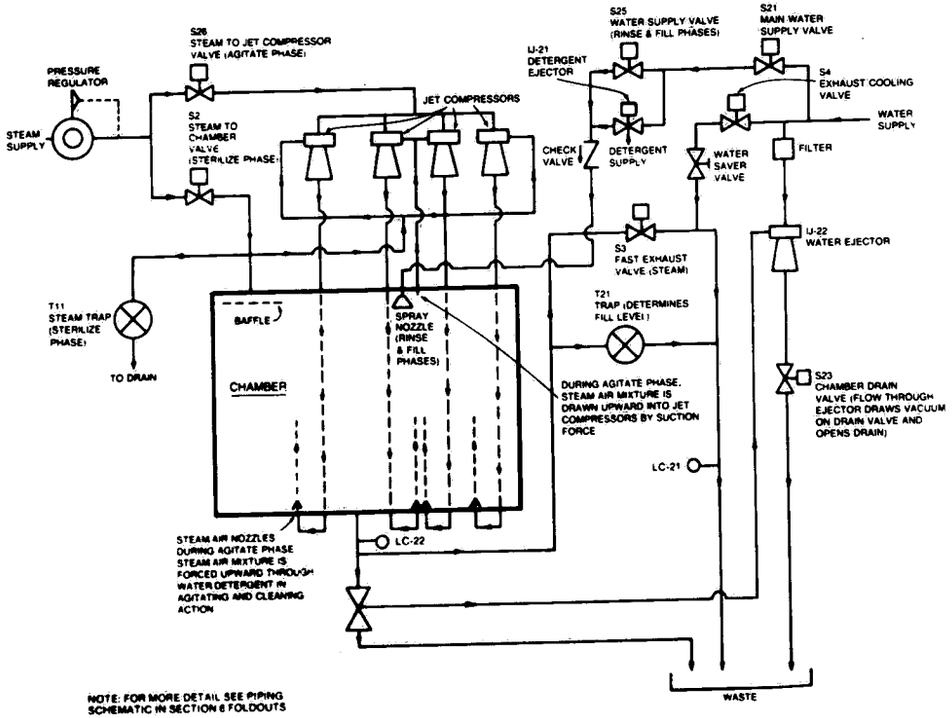


Figure 3-1. PIPING DIAGRAM.

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 and pressure 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 washer/sterilizer through the phases of each cycle. The printed circuit boards have LEDs to indicate the presence of an output to the associated solenoid valve.

The wash phase of the wash/sterilize cycle consists of the following stages: (1) spray rinse (about two minutes); (2) fill and detergent injection: (3) wash/agitate to 75° F water temperature followed by an 8.5 minute timed wash/agitate; (4) drain; (5) spray rinse (about 1 minute). A purge phase of approximately 1.5 minutes precedes the sterilize phase of either a wash/sterilize or a sterilize cycle. For the sterilize phase of either cycle, temperature switches in the IRC maintain chamber temperature within 270-274° F (132-134° C). During the sterilize phase, the controller automatically switches on and off the appropriate solenoid valves to maintain correct chamber pressure/temperature. At the end of the sterilize phase, the pressure switch provides an input to the controller which in turn de-energizes the exhaust system and provides the signals to the control panel to indicate the cycle is complete.

3.4 CYCLE DESCRIPTIONS

Preparatory actions: WATER and STEAM valves must be opened manually. Main power switch and control power switch, both on the secondary panel, must be in the on position. When power is on, the cycle selectors are dimly lit and door unlock solenoid (SA-1) is energized.

Wash/Sterilize Cycle

Operator selects STERILIZE timer, loads machine and locks door. Panel status light DOOR UNLOCKED goes off (limit switch LS-2 transfers). Operator touches WASH/STERILIZE cycle selector. The cycle light will come on to full brightness.

1. The first phase of the wash/sterilize cycle is the spray/rinse portion of the cycle. During this stage of the cycle, water is sprayed into the chamber through the nozzles while the chamber drain valve remains open. The following actions occur in the machine:

• Panel light WASH comes on. Solenoid SA-1 (door unlock) is de-energized and door is mechanically locked. The following solenoid valves are energized (opened): S-21 (main water supply), S-23 (chamber drain control), S-25 (chamber water supply). Spray continues for 2 minutes, ±6 seconds. All solenoid valves except S-23 (chamber drain control) then close. S-23 remains open for a 15-second drain period, then closes. A timed pause of 10 seconds then occurs before the next phase of the cycle begins.

2. The second phase of the cycle is the wash portion. During this stage of the cycle, detergent is added to the water which fills the chamber. The chamber water is heated and agitated by forcing an air/steam mixture from the jet compressors (JC-11 through JC-14) into the chamber from four nozzles located at the bottom of the chamber.

The following actions occur in the machine:

• S-25 (chamber water supply) and S-21 (main water supply) open for 30 seconds to begin filling chamber. Panel light WATER IN CHAMBER comes on. S-25 (chamber water supply) closes, IJ-21 opens for 15 seconds to inject detergent into water. IJ-21 closes, S-25 (chamber water supply) opens again to continue filling chamber. When the high water level is reached in the chamber, as sensed by high water probe (LC-22), solenoid valve S-25 (chamber water supply) and S-21 (main water supply) close. S-26 (steam-to-jet compressors) opens and begins agitating and heating water. When TS-4 senses 75° F (24° C), its contacts close and wash timer begins to time 8½-minute wash phase. When wash timer times out, S-23 (chamber drain control) is energized and chamber begins to drain. Chamber drain valve remains open for one minute, fifty seconds. The drain cycle repeats until the low water level probe (LC-21) senses there is no water in the chamber.

3. The third phase of the cycle is the second rinse. The following actions occur in the machine:

• S-25 (chamber water supply) and S-21 (main water supply) open for one minute. S-23 (chamber drain) remains open. Panel light WATER IN CHAMBER will come on. One minute after it opens, S-25 (chamber water supply) closes. When panel light WATER IN CHAMBER goes out, S-26 (steam-to-jet compressors) opens for 5 seconds. Ten seconds after S-26 (steam-to-jet compressors) closes, S-21 (main water supply) closes. Twenty seconds after S-26 (steam-to-jet compressors) closes, chamber drain solenoid, S-23, closes. A timed pause of 10 seconds occurs. WASH light goes out, CONDITION light comes on.

4. The fourth phase of the cycle is the purge portion of the sterilize part of the cycle. In addition to panel light CONDITION coming on, the following actions occur in the machine:

• The following solenoid valves open: S-4 (exhaust cooling), S-3 (fast exhaust), S-2 (steam-to-chamber). After 1½ minutes, fast exhaust valve, S-3, (fast exhaust) closes.

5. The washer/sterilizer begins to build steam pressure in the chamber until the proper temperature and pressure are reached. When adequate temperature and pressure are reached, the sterilizing phase of the cycle begins. The following sequence of actions occurs in the machine:

• Temperature-recorder reaches 274° F (134° C). TS-1 contacts close. CONDITION light goes out, STERILIZE light comes on. STERILIZE timer begins to count down from the pre-set time. When 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 (steam to-chamber). When the chamber temperature decreases to near set point, TS-2 contacts break, 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.

6. After the sterilize phase is complete, the machine 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. Solenoid valve S-3 (fast exhaust) opens for fast exhaust. When pressure switch PS-2 senses 1-2 psig in the chamber, valves S-4 (primary water cooling) and S-3 (fast exhaust) close, EXHAUST light goes out, COMPLETE light comes on, and buzzer begins to sound. The chamber drain valve, CV-21, opens and remains open until the door is unlocked. If low water level probe (LC-21) senses no water in the chamber, the door unlock solenoid valve (SA-1) is energized and door is unlocked.

7. Buzzer sounds for 90 seconds or until door is opened. When door is opened, buzzer stops, COMPLETE light goes out, WASH light goes out, and DOOR UNLOCKED light comes on. Control reset does not occur until 30 seconds after the DOOR UNLOCKED light comes on.

Sterilize Cycle

Operator selects STERILIZE TIME, loads machine and locks door. Panel status light DOOR UNLOCKED goes off (limit switch LS-2 transfers). Operator touches STERILIZE cycle selector. The cycle light will come on to full brightness.

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

• Panel light CONDITION comes on. Solenoid SA-1 (door unlock) is de-energized and door is mechanically locked. The following solenoid valves open: S-4 (primary water cooling), S-3 (fast exhaust), S-2 (steam-to-chamber). After 1½ minutes, fast exhaust valve, S-3, closes.

2. The washer/sterilizer begins to build pressure in the chamber until the proper temperature and pressure are reached. When adequate temperature and pressure are reached, the sterilizing phase of the cycle begins. The following sequence of actions occurs in the machine:

• Temperature-recorder reaches 270° F (132° C). TS-1 contacts close. CONDITION light goes out. STERILIZE light comes on. STERILIZE timer begins to count down from the pre-set time. When 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 (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, 274° F (134° C).

3. After the sterilize phase is complete, the machine 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. Solenoid valve S-3 (fast exhaust) opens for fast exhaust. When pressure switch PS-2 senses 1-2 psig in the chamber, valves S-3 (fast exhaust) and S-4 (primary water cooling) close, the chamber drain valve, CV-21, opens and remains open until the door is unlocked.

EXHAUST light goes out, COMPLETE light comes on, and buzzer begins to sound. If low water level probe (LC-21) senses no water in the chamber, the door unlock solenoid valve (SA-1) is energized and door is unlocked.

4. Buzzer sounds for 90 seconds or until door is opened. When door is opened, buzzer stops, COMPLETE light goes out, STERILIZE light goes out, and DOOR UNLOCKED light comes on. Control reset does not occur until 30 seconds after the DOOR UNLOCKED light comes on.

Cycle Monitoring and Communications

1. If the controls do not sense water entering the chamber at the start of the wash phase, the operator will be notified as follows:

• WASH light is on, WATER IN CHAMBER light flashes, buzzer sounds intermittently, and chamber drain automatically opens. Warning signals will continue until chamber is drained and RESET button is pressed.

2. If, during the wash phase, washer/sterilizer did not fill within the programmed time, the operator will be notified as follows:

• WASH and WATER IN CHAMBER lights are on, and buzzer sounds intermittently. RESET button must be pushed. WASH light goes out and chamber automatically drains. WATER IN CHAMBER light goes out when drain is complete, and timer resets.

3. WATER IN CHAMBER light is on before wash cycle is selected: cycle cannot be selected.

• Controls are so designed that drain remains open for 30 seconds after water drains out. If WATER IN CHAMBER light remains on after that period, an abnormal condition exists and must be remedied. See Section 6, TROUBLESHOOTING.

4. If, before WASH cycle is selected, there is a malfunction in the water sensing system, the operator will be notified as follows:

• WATER IN CHAMBER light flashes, buzzer sounds intermittently, and drain line automatically opens (WASH light is not on). Alarm will continue until RESET button is pushed. If alarm continues, power to the washer/sterilizer must be removed.

5. If the washer/sterilizer did not complete conditioning phase in programmed time, the operator will be notified as follows:

• CONDITION light flashes and buzzer sounds intermittently. The washer/sterilizer, however, will continue to attempt to reach temperature. The buzzer will continue to sound until (1) cycle selector is pressed (silences buzzer); or (2) temperature is finally reached (cycle continues normally); or (3) RESET button is pressed (cycle is aborted).

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

7. If, after a cycle has started, the door lock switch opens, the operator will be notified as follows:

• DOOR UNLOCKED light(s) on primary control panel comes on. If door cannot be tightened sufficiently to extinguish light, RESET must be pushed to abort cycle.

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

• When power is restored and CONTROL switch is reset to ON, the buzzer will sound intermittently. Pressing RESET button silences buzzer, but cycle cannot be reinitiated until chamber is at atmospheric pressure and WATER IN CHAMBER light is out.

3.5 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 PBC-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

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.

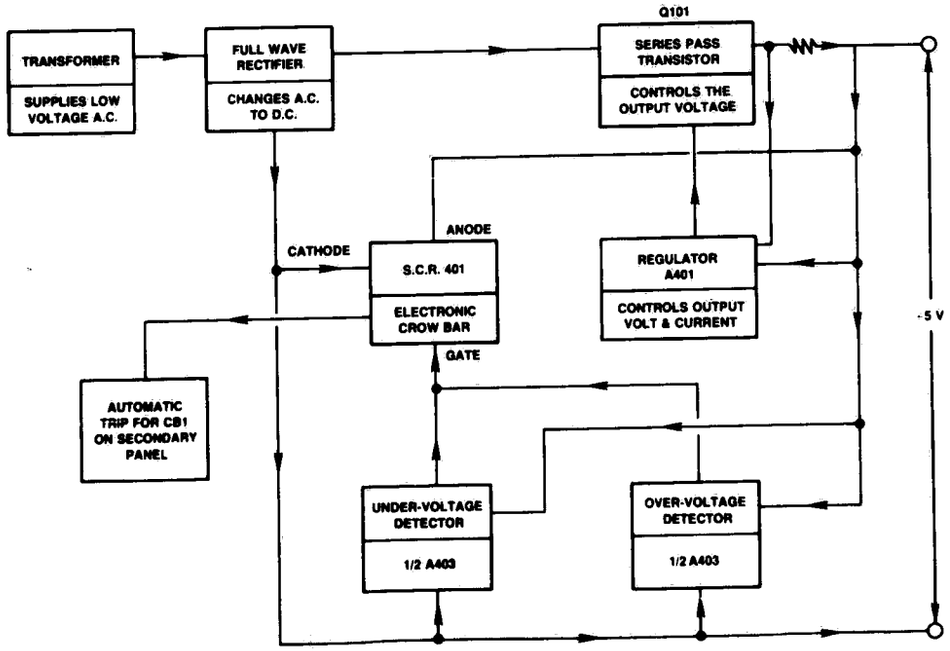


Figure 3-2. EAGLE 5-VOLT POWER SUPPLY.

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 regulating 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

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.

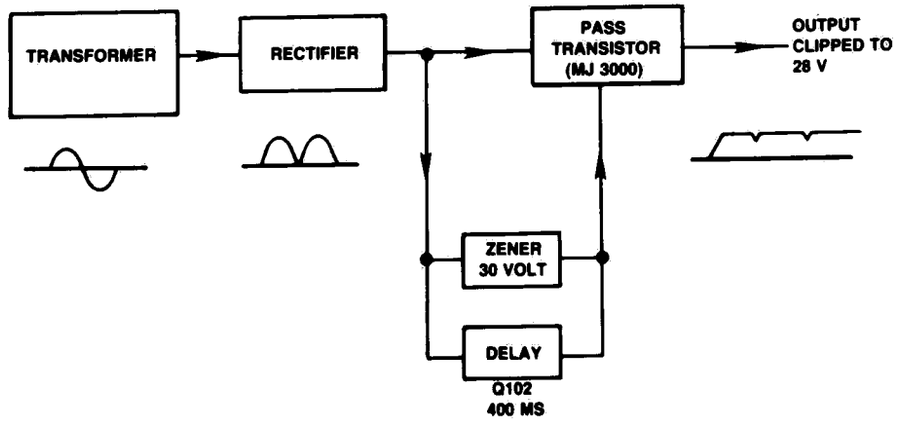


Figure 3-3. EAGLE 28-VOLT POWER SUPPLY.

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 3MHz). 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.

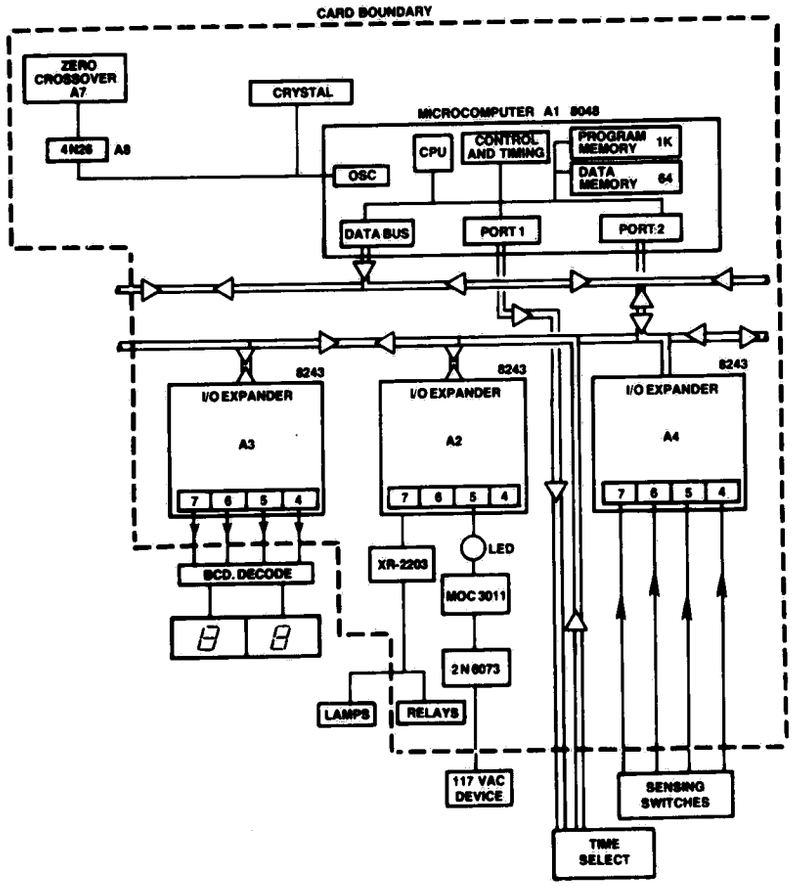


Figure 3-4. CPU PRINTED CIRCUIT BOARD 146586.

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 aded 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.

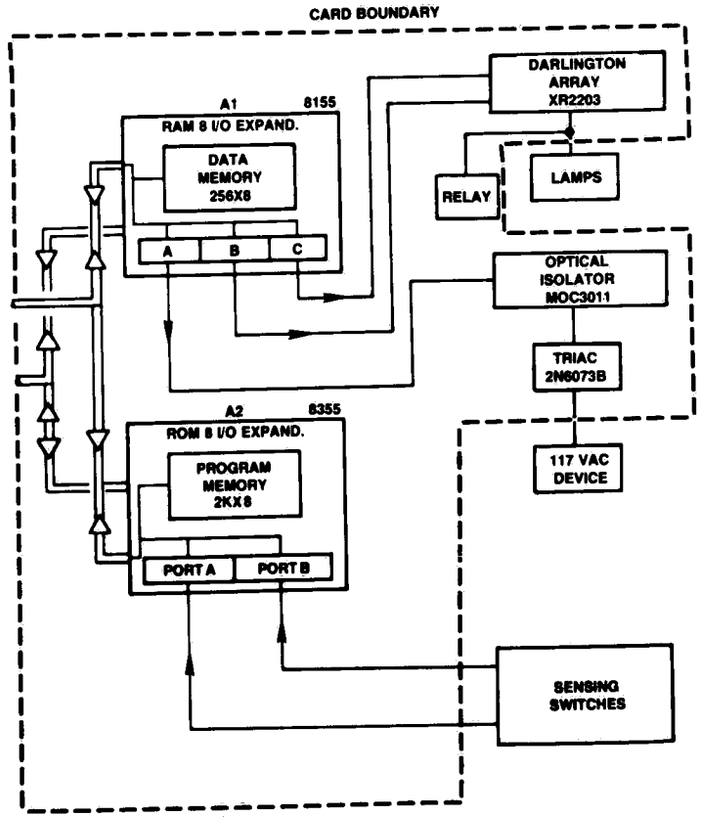


Figure 3-5. I/O #1 PRINTED CIRCUIT BOARD 146588.

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

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

The supporting circuits are an external crystal and a zero cross-over network. The crystal, C1 and C2, determines the frequency of the control's operation. This crystal is also the time base for the sterilizer timers. The zero cross-over network (ZCN) consists of A7, C4, R4, A8, C5, R5, and R6. The ZCN prevents the computer from actuating a 120-VAC device during peak voltage of the sine wave. The ZCN monitors the 120 VAC and when the voltage level is of the zero voltage points of the sine wave, it enables the computer output. The ZCN's function is to reduce live transients from being generated which might interfere with the computer operation. These transients might generate false signals should they occur. Another supporting circuit consists of Q9, C13, and R29. This circuit delays the activation of the triac outputs until the computer has gained control. It serves the same function as the delay circuit in the 28-volt power supply.

I/O #1 Printed Circuit Board — 146588 (Fig. 3-5)

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

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

PRINCIPLES OF OPERATION (PRINTCON)

3.6 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/ switches.** This is the key difference between **Printcon** and the older system. Maintenance is reduced, and both the reliability and 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 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 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

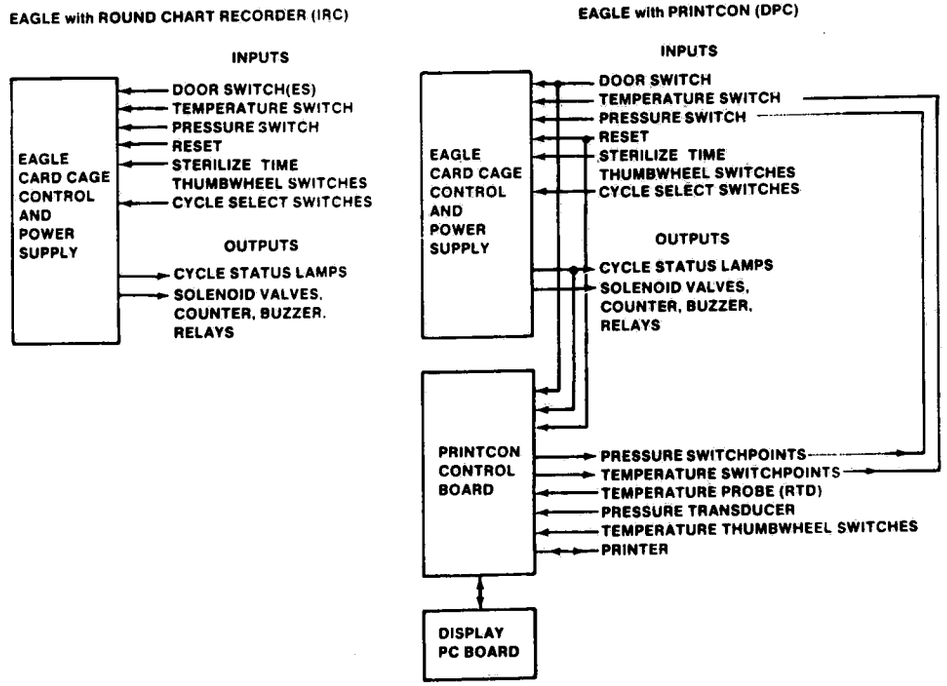


Figure 3-6. CONTROL COMPARISON.

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

On the Printcon system, the same switch input wires on the card-cage control are now wired to the main Printcon PC board. Instead of a mechanically activated switch opening and closing, however, a Printcon output transistor saturates (ϕ volts output) or cuts off (5 volts output) in response to a command from the microcomputer IC on the main Printcon PC board (Fig. 3-7). The microcomputer issues this command when it determines that the chamber pressure 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.

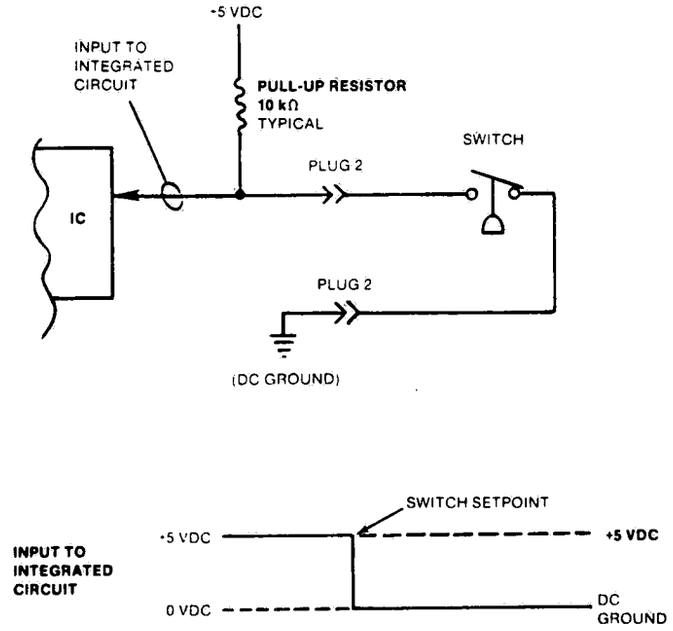


Figure 3-7. TYPICAL SWITCH INPUT.

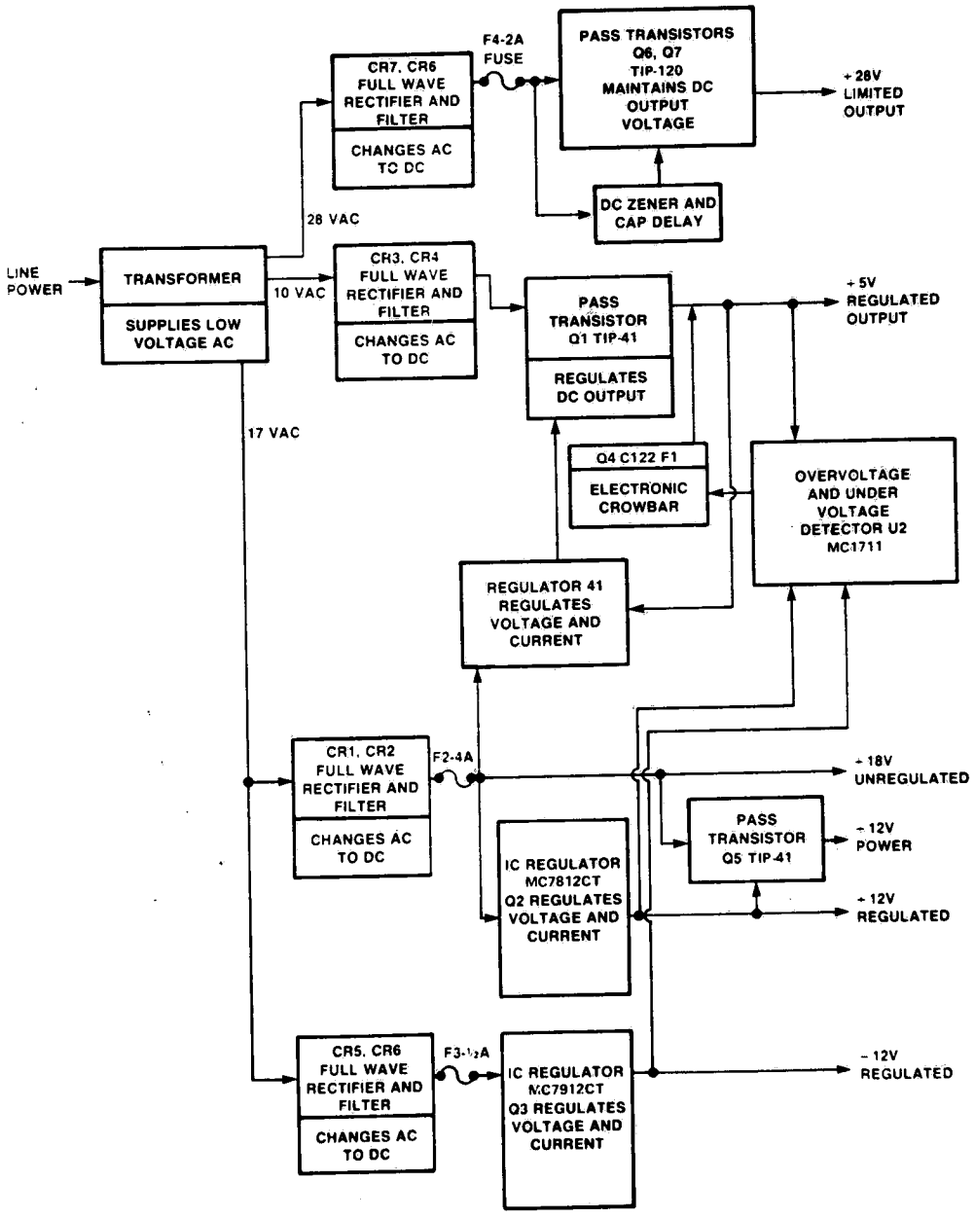


Figure 3-8. PRINTCON REGULATED POWER SUPPLY.

3.7 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 3-9).

+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).

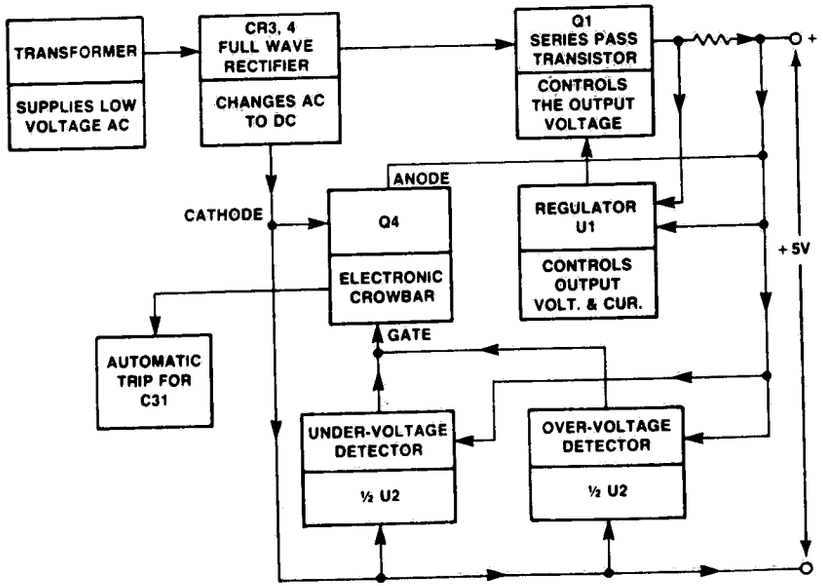


Figure 3-9. PRINTCON 5-VOLT POWER SUPPLY.

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).

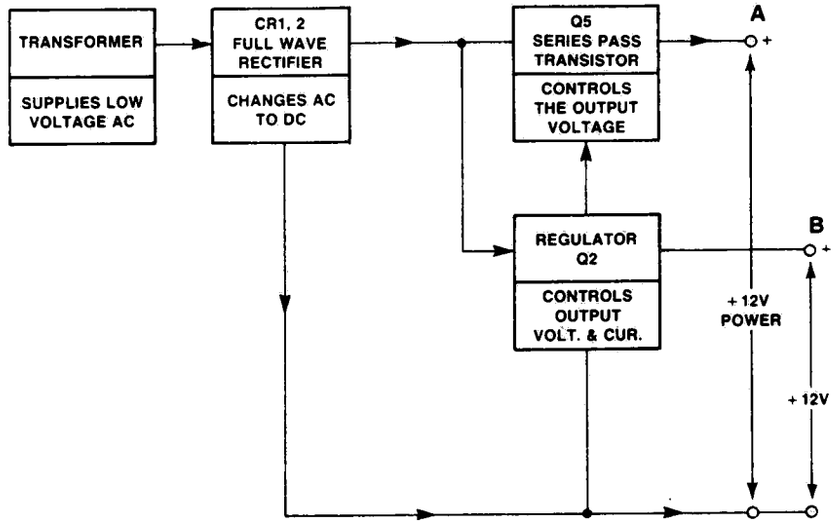


Figure 3-10. PRINTCON 12-VOLT POWER SUPPLY.

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.)

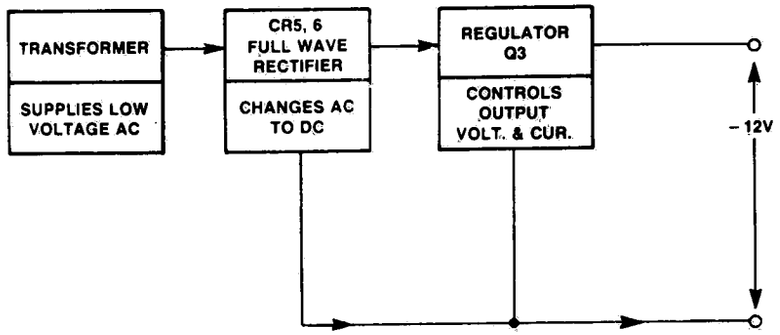


Figure 3-11. PRINTCON -12 VOLT POWER SUPPLY.

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.)

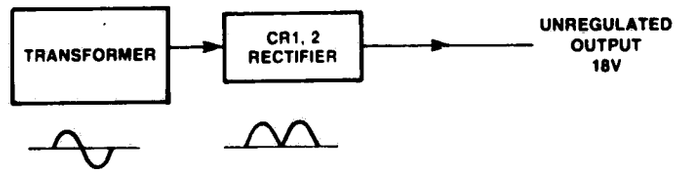


Figure 3-12. PRINTCON 18-VOLT POWER SUPPLY.

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.)

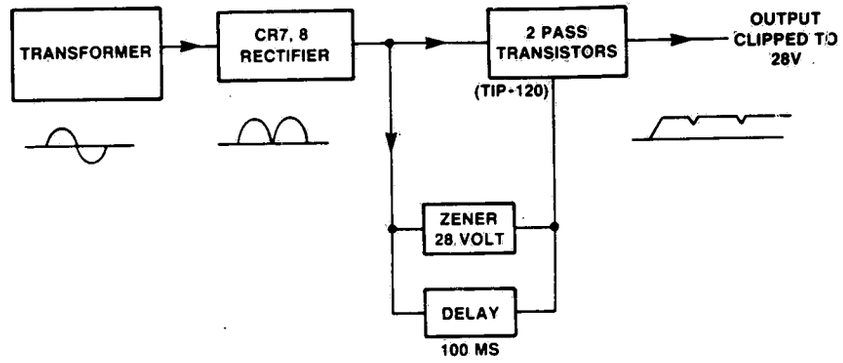


Figure 3-13. PRINTCON 28-VOLT POWER SUPPLY.

Motherboard/Card-Cage Assembly

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

CPU Printed Circuit Board — 146586

This assembly is identical to that used on Eagles with round-chart recorders. Refer to Section 3.5 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 3.5 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 pressure and temperature settings on the Digital Display PC board.

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

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

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

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

Display option and temperature control switch bank S1 on the main Printcon PC board allows selection of Fahrenheit or Celsius temperature display/printing; selection of English (psig) or metric (kg/cm²) 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. 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.

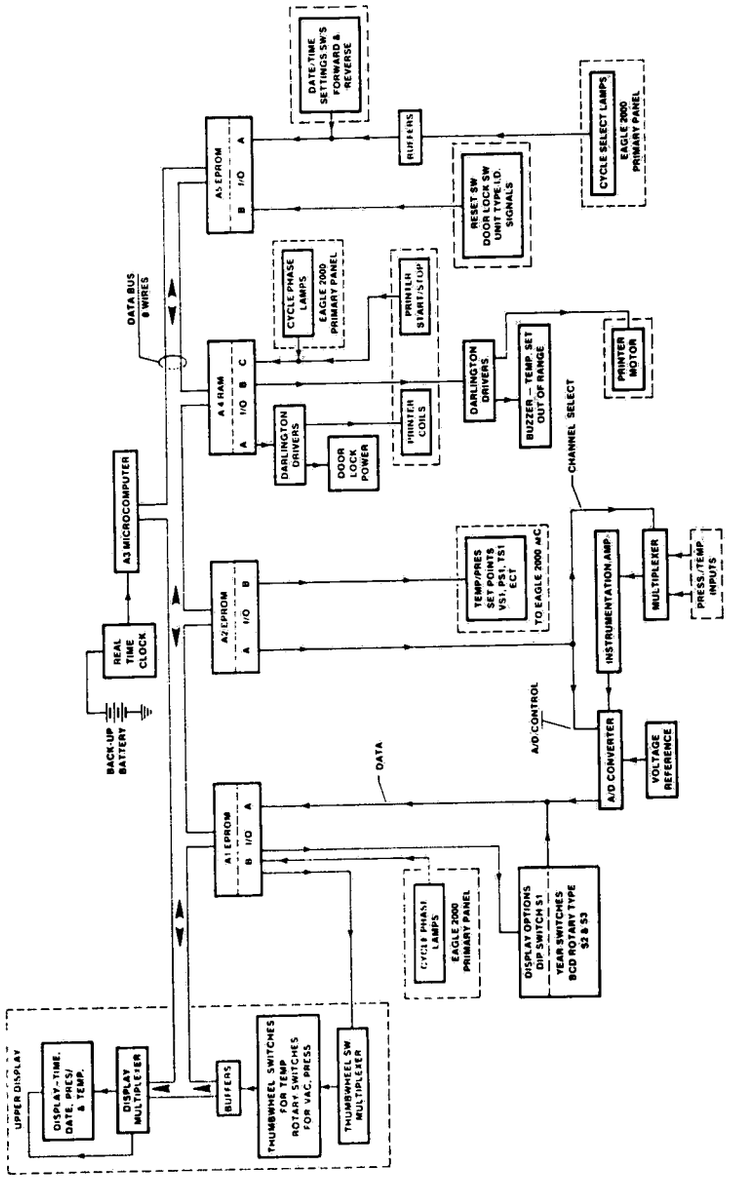


Figure 3-14. PRINTCON BLOCK DIAGRAM: Main Printcon P/C Board.

Via the input lines on IC's A1 and A5, this PC board will monitor for a cycle pushbutton (WASH/STERILIZE, STERILIZE) to be pressed. This PC board will always provide the 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.)

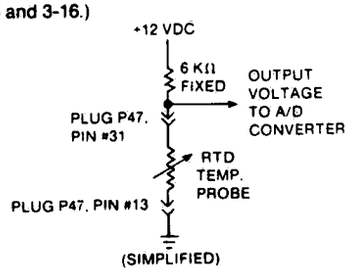


Figure 3-15. TEMPERATURE PROBE SCHEMATIC.

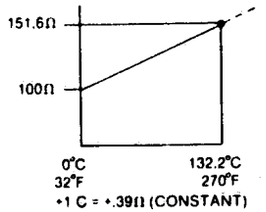


Figure 3-16. TEMPERATURE VS. RESISTANCE CHARACTERISTIC.

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.)

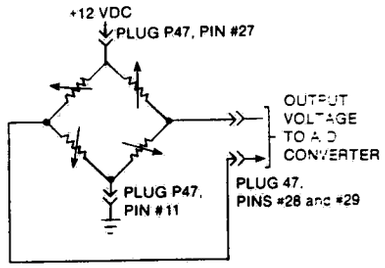


Figure 3-17. PRESSURE TRANSDUCER SCHEMATIC.

Figure 3-17 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 measurements in cycle. This same action will occur each time the power is turned ON **with the door(s) open.** If power is turned ON with the doors closed and locked, the control will assume an ambient pressure of 14.7 psia (29.92 in. Hg.)The same applies if the RESET button is pressed with the door(s) closed and locked.

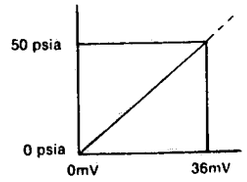


Figure 3-18. PRESSURE VS. TRANSDUCER OUTPUT CHARACTERISTICS.

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 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.

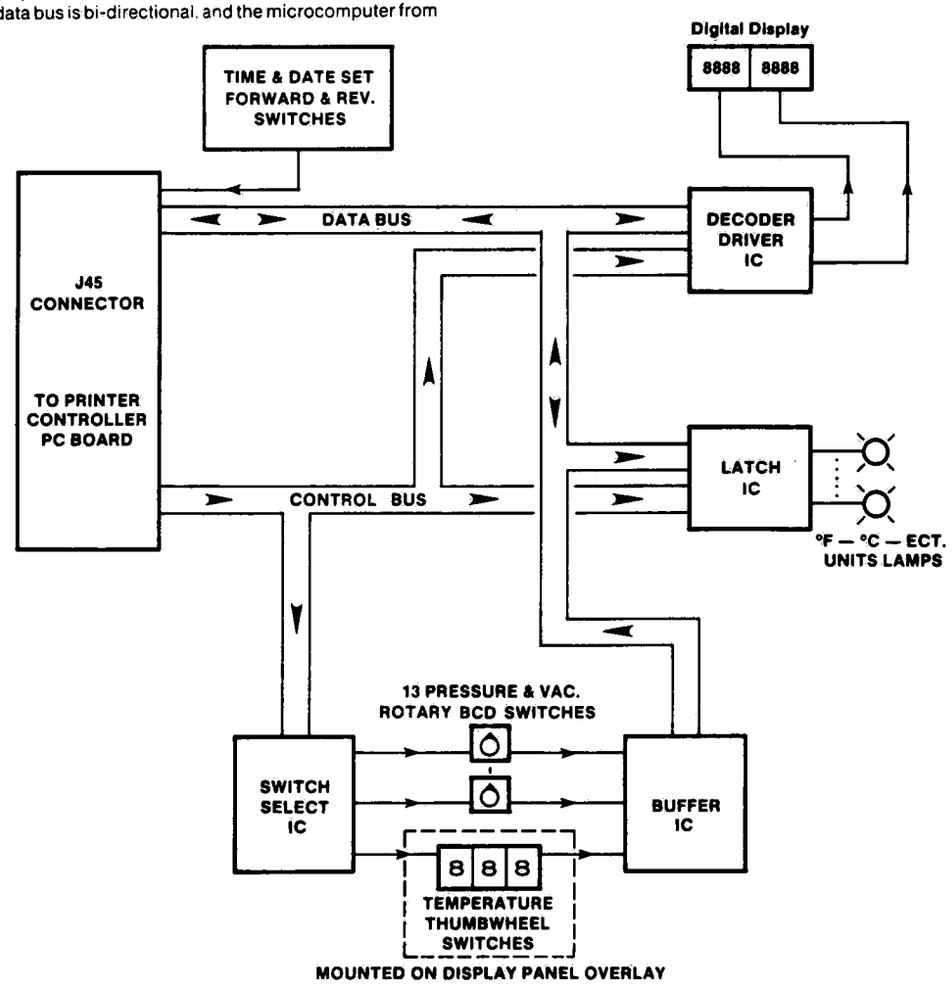


Figure 3-19. DIGITAL DISPLAY BLOCK DIAGRAM.

INTERPRETING THE PRINTED CYCLE RECORDS

A printed cycle record for a normal wash/sterilize cycle is presented in Figure 3-20. The letters in the left hand column represent the various phases of the cycle, as follows:

- W — Wash
- 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 occuring in the chamber.

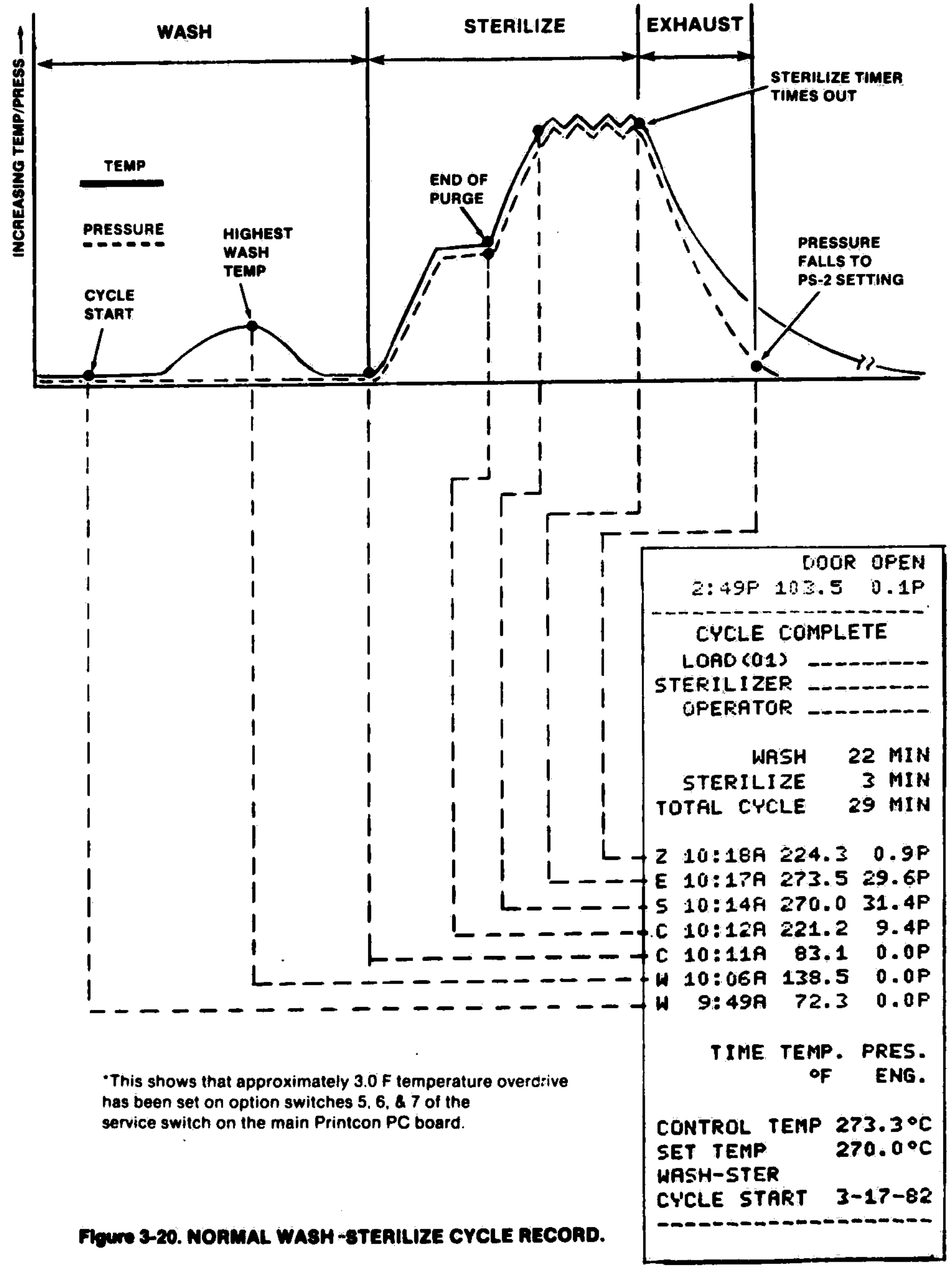
On a typical line; C 10:12A 221.2 9.4P

10:12A indicates the time at which this event occured — 10:12 a.m.

221.2 is the temperature at this time.

9.4P 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 3.0 F temperature overdrive has been set on option switches 5, 6, & 7 of the service switch on the main Printcon PC board.

Figure 3-20. NORMAL WASH-STERILIZE CYCLE RECORD.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 4

SECTION 4

INSPECTION AND MAINTENANCE

4.1 GENERAL

Maintenance procedures described in paragraphs 4.2 through 4.4 should be performed at regular intervals, as indicated. The frequency indicated is the minimum, and should be increased if usage of the sterilizer demands. Should a problem occur, refer to Section 6, TROUBLE-SHOOTING. Figure 4-2, is a sample maintenance record which we suggest the Maintenance Department keep. Such a record will prove helpful in assuring regular 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 control panel gauges and Printcon or recorder 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 is controlling pressure within acceptable ranges. If it appears to be malfunctioning, see paragraph 7.9.

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 7.6.

2. Flush chamber drain line as follows:

a. Remove chamber drain strainer (Fig. 8-27, 3).

b. Rinse drain with hot solution of trisodium phosphate (two tablespoons to one quart of water). If the use of trisodium phosphate is objectionable, use instead a solution of ½ cup of AMSCO Sonic Detergent (Part P-41591-091) and one quart of hot water.

c. Wait five minutes.

d. Then flush with one quart of hot water.

e. Place the strainer back in the chamber drain.

3. Check and clean spray system.

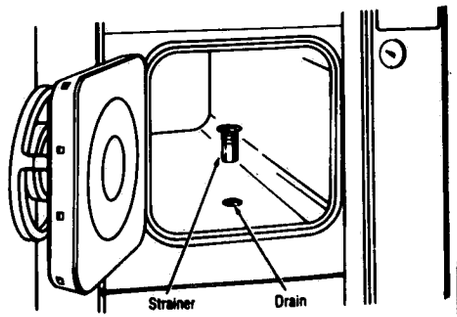


Figure 4-1. LOCATION OF CHAMBER DRAIN STRAINER.

Rev. 6/82

PREVENTIVE MAINTENANCE RECORD
Page 1 of 3

Department _____

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

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
1. Discuss operation with department personnel.	X	X	X	X	X	X
2. Operate unit through wash/sterilize cycle. Observe for correct times and temperature during different phases.	X	X	X	X	X	X
3. Door Assembly:						
A. Inspect for ease of operation. Lube bearings, door post and screw box.		X		X		X
B. Inspect door gasket for proper seal. Replace as required.	X	X	X	X	X	X
C. Check door alignment with end ring. Lightly oil hinge assembly.		X		X		X
D. Inspect door lock mechanism for proper operation and positive lock.	X	X	X	X	X	X
E. Disassemble, lube, replace worn parts in lock mechanism.			X			
4. Steam Supply and Piping:						
A. Inspect manual valves for proper operation. Tighten packing gland.	X	X	X	X	X	X
B. Rebuild manual valves.			X			
C. Inspect strainer for leaks. clean as required.		X		X		X
D. Check jacket and chamber trap. Clean as required. Rebuild as required.	X	X	X	X	X	X
E. Inspect pressure gauges.	X	X	X	X	X	X
F. Inspect check valves for seal and freedom of movement.	X		X		X	
G. Verify operation of solenoid valves S2. S26 and S3. Inspect for leaks.	X	X	X	X	X	X
H. Rebuild solenoid valves S2. S26 and S3.			X			
I. Check drain valve CV-21 for proper closing and mechanical malfunction.	X	X	X	X	X	X
J. Inspect operation of HI-LO valve.	X		X		X	

EQUIPMENT: Eagle 2000 16x16 Pressure Washer Serial No. _____

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

PREVENTIVE MAINTENANCE RECORD
Page 2 of 3

Department _____

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

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
5. Water Supply and Piping:						
A. Inspect vacuum breaker for leaks. Clean and or replace disc and float as required.		X		X		X
B. Inspect manual valves for proper operation and closing. Tighten packing as required.	X	X	X	X	X	X
C. Rebuild manual valves.			X			
D. Inspect strainer for leaks, clean as required.		X		X		X
E. Inspect swing check for proper operation.	X		X		X	
F. Verify operation of solenoid valves S23, S4. S21 and S25. Inspect for leaks.	X		X		X	
G. Rebuild solenoid valves S23, S4. S21, and S25.				X		
H. Inspect detergent dispenser valve/1J-21 for malfunction, clean as required.	X	X	X	X	X	X
6. Control System:						
A. Clean lint and dirt from components.	X	X	X	X	X	X
B. Inspect recorder linkage, chart drive, recalibrate as required.	X	X	X	X	X	X
C. Check inking system for proper indication.	X	X	X	X	X	X
D. Inspect operation of pressure and vacuum switches. Reset as required.	X	X	X	X	X	X
E. Inspect all wiring, terminals, socket connections for damage.	X		X		X	
F. Inspect LED's for correct operation of control signals to valves during each phase of operation.	X	X	X	X	X	X
G. Replace burned out lamps.	X	X	X	X	X	X
H. Clean glass on recorder.	X			X		
7. Miscellaneous:						
A. Inspect air filter for sufficient air flow.	X	X	X	X	X	X

EQUIPMENT: Eagle 2000 16x16 Pressure Washer Serial No. _____

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

PREVENTIVE MAINTENANCE RECORD
Page 3 of 3

Department _____

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

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

	1ST INSPECTION	2ND INSPECTION	3RD INSPECTION	4TH INSPECTION	5TH INSPECTION	6TH INSPECTION
B. Replace filter element.			X			
C. Lift safety valve lever, check freedom of lift assembly.	X	X	X	X	X	X
D. Inspect all swing checks on manual system for proper closing and proper function of the manual operator package.	X		X		X	
E. Verify that chamber strainer is clean of lint.	X	X	X	X	X	X
F. Inspect and clean spray system in chamber.	X	X	X	X	X	X
8. Final Check:						
A. Perform a chamber vacuum leak test utilizing absolute gauge.	X	X	X	X	X	X
B. Run complete cycle, checking all pressure and temperature settings in each phase of the cycle.	X	X	X	X	X	X
C. Verify recorded temperature with potentiometer.	X	X	X	X	X	X
D. Replace any covers removed.	X	X	X	X	X	X
E. Police work area to assure removal of all materials used during inspection.	X	X	X	X	X	X

EQUIPMENT: Eagle 2000 16x16 Pressure Washer Serial No. _____

INSPECTOR: Sign For Each Inspection and Fill In Date:

_____	Date	_____					
_____	Date	_____					
_____	Date	_____					
_____	Date	_____					
_____	Date	_____					
_____	Date	_____					

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

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.

2. Clean recorder slide wire and wiper arm with a lens tissue and AMSCO degreaser. Do not spray degreaser directly on slide wire or wiper arm.

Quarterly

1. Unscrew the button in center of chamber door wheel (Fig. 8-23, 10) to expose the door post grease fitting (Fig. 8-24, 27). Inject a high temperature grease such as Neptune 7* (Mfgr: Ore-Lube Corp., College Point. N.Y. 11356) or one of equivalent quality into the fitting. Replace button.

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

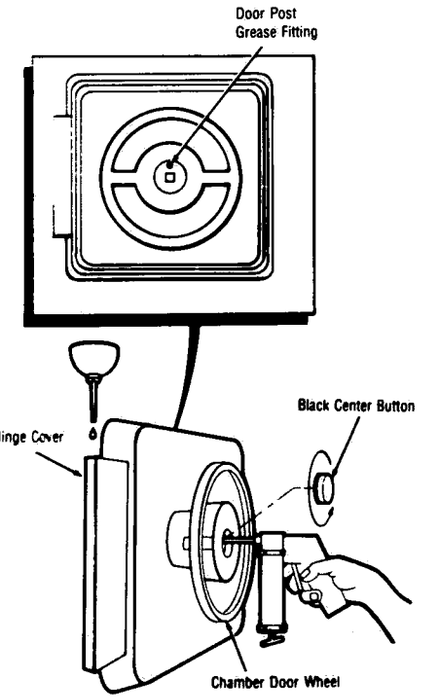


Figure 4-3. LUBRICATING CHAMBER DOOR.

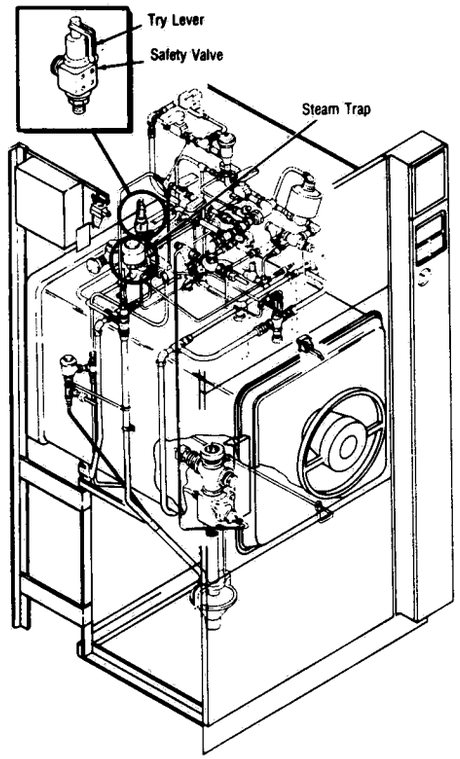


Figure 4-4. LOCATION OF STEAM TRAP AND SAFETY VALVE.

2. Check chamber safety valve (Fig. 4-4) as follows:

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

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.

d. Turn POWER and CONTROL switches to ON and open STEAM supply valve. 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.

Yearly

1. Open and inspect the thermostatic steam traps. See paragraph 7.5 for disassembly and cleaning instructions.

4.4 PRINTCON MAINTENANCE FREQUENCY CHART

1. Perform the following operations at the intervals specified.

a. Change ink cartridge — 300 cycles.
b. Evaluate paper take-up — 300 cycles.
c. Check calibration — 1200 cycles.
d. Change battery — yearly.
e. Set year switches — yearly.

4.5 CLEANING

Daily

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

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, AMSCO Part P-753377-091). Wipe off **Pry Cream** with damp cloth.

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

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

4. Open steam (Fig. 8-35,8) and water (Fig.8-33,2) supply line strainers and clean out sediment.

As Necessary

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.

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

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 ½ 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 after cleaning with trisodium phosphate or **AMSCO Sonic Detergent** and water solution.

SECTION 5

SECTION 5

FIELD TEST PROCEDURE

5.1 GENERAL

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

Upon completion of test, recorder chart or printout is to be attached to the service order form.

5.2 TEST INSTRUMENTATION REQUIRED

1. Potentiometer and thermocouple leads.

2. Calibrated compound test gauge (30" vacuum and 100 psig).

3. Voltmeter or LED test light.

4. 1000 ml graduated cylinder.

5. Spirit level.

5.3 CHECK FOR PROPER INSTALLATION

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

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

3. Check for proper hook-up to required services i.e., steam, water, and electrical. See table following.

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

TABLE 5-1. STERILIZER CONNECTIONS

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

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

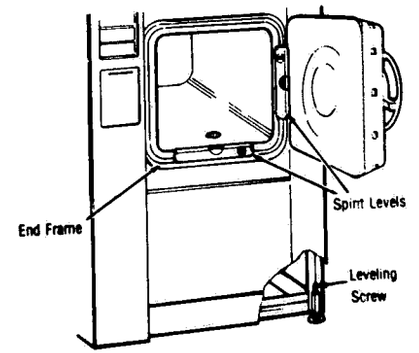


Figure 5-1. LEVELING THE STERILIZER.

5.4 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).

5.5 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 20 ft-lbs torque. The DOOR UNLOCKED light on primary panel should go out. See Figure 5-2.

2. If DOOR UNLOCKED light fails to go out, use the following procedure to adjust the door switch. See Figure 5-3.

a. Turn microswitch adjusting screw clockwise until switch actuates and DOOR UNLOCKED light on primary panel goes out. Continue to turn microswitch adjusting screw clockwise 1/4 turn.

b. Open door and reclose it to the same amount of torque used in step (1) to verify door switch actuates and DOOR UNLOCKED light goes out.

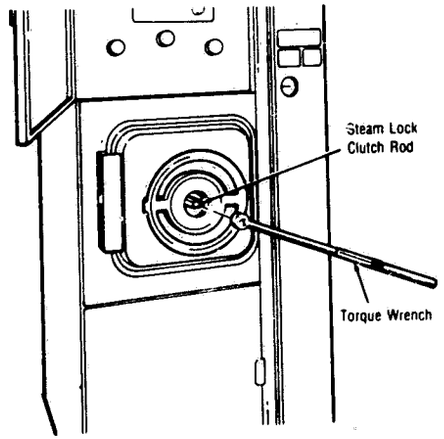


Figure 5-2. LOCKING DOOR TO CORRECT TORQUE.

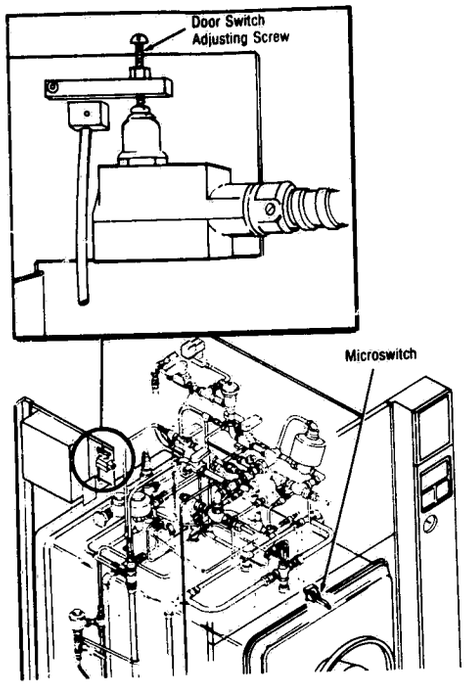


Figure 5-3. DOOR SWITCH ADJUSTMENT.

5.6 SAFETY VALVE TEST (no pressure in chamber)

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 checking for freedom of movement.

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

5.7 ADJUSTMENT OF PRESSURE AND TEMPERATURE FOR STERILIZE CYCLE (UNITS WITH IRC)

1. Set exposure time at 3 minutes.

2. Close and lock door (DOOR UNLOCKED light will go out).

3. Depress STERILIZE cycle button (light will come to full brightness).

4. Door lock solenoid SA-1 will de-energize and lock door.

5. CONDITION light will come on.

6. Exhaust cooling solenoid S-4 (LED-16) will open.

7. Steam-to-chamber solenoid S-2 (LED-14) will open.

8. Fast exhaust solenoid S-3 (LED-15) will open.

9. After 1 minute 30 seconds the fast exhaust solenoid S-3 (LED-15) will close.

10. Chamber pressure and temperature will rise. Adjust steam pressure regulator to bring chamber temperature to 270° F. TS-1 in the recorder starts the exposure timer. The CONDITION light will go out and the STERILIZE light will come on.

11. Adjust steam pressure regulator to raise chamber temperature to 274° F. TS-2 in the recorder will close the steam-to-chamber solenoid S-2 (LED-14).

12. When the chamber temperature drops to approximately 270° F, TS-2 will open the steam-to-chamber solenoid S-2 (LED-14).

13. During the remainder of the sterilize time TS-2 will cause the steam-to-chamber solenoid S-2 (LED-14) to cycle to maintain chamber at set point +4° F. −0° F.

14. At the end of the sterilize time, the EXHAUST light will come on, the exhaust cooling solenoid valve S-4 (LED-16) and the fast exhaust solenoid S-3 (LED-15) will open.

15. As the chamber is exhausted, adjust PS-2 to turn on the buzzer, cycle counter, and cycle COMPLETE light at 1-2 psig.

16. If the low water sensor (LC-21) senses no water in the chamber, the door lock solenoid (SA-1) will energize and unlock door.

17. Opening the chamber door will turn off the buzzer and cycle COMPLETE light. The DOOR UNLOCKED light will come on. Control reset does not occur until 30 seconds after the DOOR UNLOCKED light comes on.

18. If at the end of the cycle the door was not opened, the buzzer will sound for 90 seconds. The COMPLETE light will stay on until door is opened.

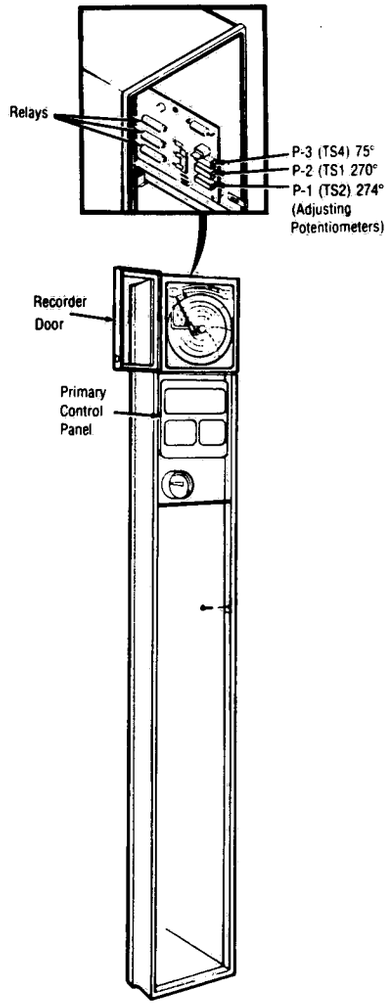


Figure 5-4. CONTROL COLUMN.

5.8 ADJUSTMENT OF PRESSURES AND TEMPERATURES FOR WASH/STERILIZE CYCLE

1. Close and lock door (DOOR UNLOCKED light will go out).

2. Depress WASH/STERILIZE cycle button (light will come to full brightness).

3. Door lock solenoid SA-1 will de-energize and lock the door.

First phase wash/sterilize cycle (SPRAY RINSE)

4. WASH light comes on.

5. Main water solenoid S-21 (LED-12) will open.

6. Chamber drain solenoid S-23 (LED-23) will open.

7. Chamber water supply solenoid S-25 (LED-21) will open.

8. After 2 minutes ±6 seconds of water spray into chamber, main water solenoid S-21 (LED-12) and chamber water supply solenoid S-25 (LED-21) close. Chamber drain solenoid S-23 (LED-23) remains open for 15 ±1.5 seconds, then closes.

9. A timed pause of 10 seconds will occur before next phase of operation.

Second Phase, Wash/Sterilize Cycle (WASH)

10. WASH light will remain on.

11. Chamber water supply solenoid S-25 (LED-21) and main water solenoid S-21 (LED-12) open for 30 seconds.

12. WATER IN CHAMBER light comes on.

13. IJ-21 (LED-22) opens for 15 seconds to inject detergent.

14. Chamber water supply solenoid S-25 (LED-21) again opens to fill chamber with water.

15. When the high water probe (LC-22) senses water in the chamber, water supply solenoid S-25 (LED-21) and main water supply solenoid S-21 (LED-12) will close.

16. Steam-to-jet compressors solenoid S-26 (LED-18) opens to agitate and heat water.

17. When TS-4 (in recorder) senses 75° F, wash timer starts for 8½ minutes.

NOTE: Water temperature must not exceed 140° F. during the 8½ minutes of timed wash.

18. Chamber drain control solenoid S-23 (LED-23) opens and chamber drains until the low water sensor senses there is no water in chamber. WATER IN CHAMBER light goes out.

Third Phase, Wash/Sterilize Cycle (SECOND RINSE)

19. Chamber water supply S-25 (LED-21) and main water supply S-21 (LED-12) open for one minute.

20. Chamber drain solenoid S-23 (LED-23) remains open.

21. WATER IN CHAMBER light will come on. After the one minute. chamber water supply S-25 (LED-21) closes.

22. When WATER IN CHAMBER light goes out, steam-to-jet compressors solenoid S-26 (LED-18) opens for 5 seconds.

23. Ten seconds after steam-to-jet compressors solenoid S-26 (LED-18) closes, the main water supply solenoid S-21 (LED-12) closes.

24. Twenty seconds after steam-to-jet compressors solenoid S-26 (LED-18) closes, the chamber drain solenoid S-23 (LED-23) closes. A timed pause of 10 seconds occurs.

25. The WASH light goes out and the CONDITION light comes on.

26. This indicates the end of the wash phase and the beginning of the sterilize phase.

27. The remainder of the wash/sterilize cycle will be the same as the sterilize cycle (paragraph 5.7 of this procedure).

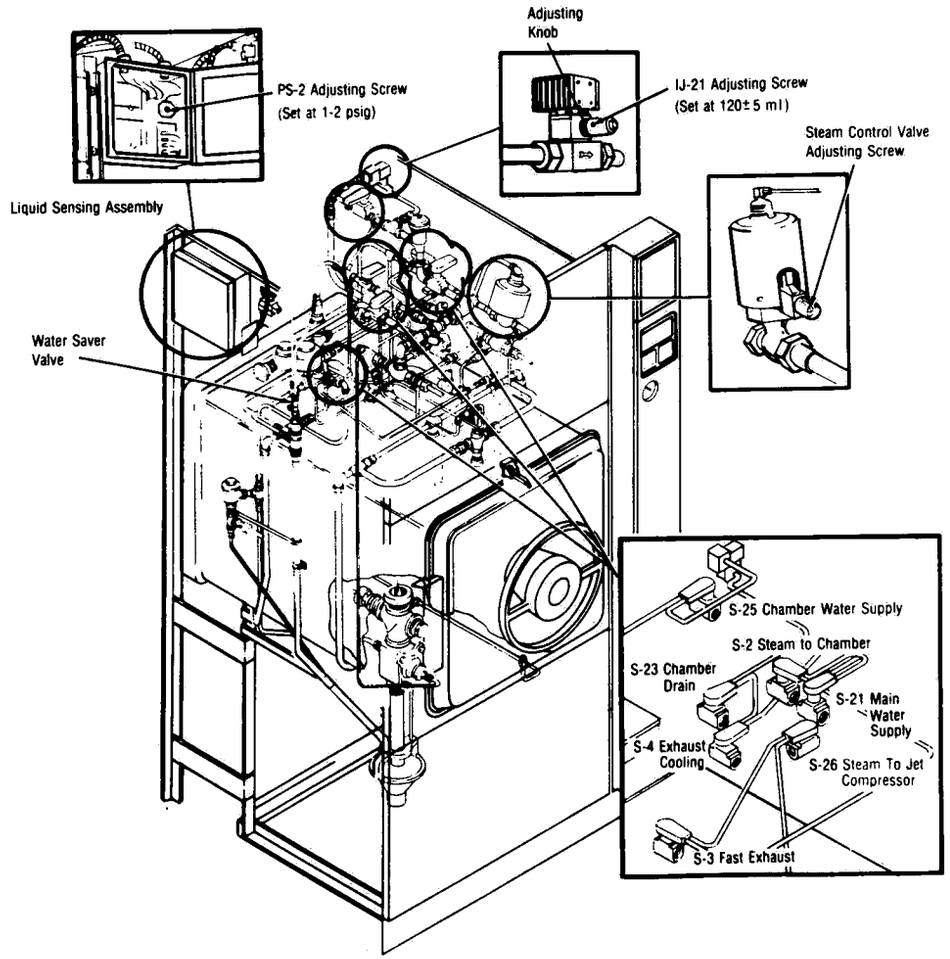


Figure 5-5. LOCATION OF STEAM CONTROL VALVE (PRESSURE REGULATOR), PRESSURE SWITCH PS-2, SOLENOID VALVES, AND DETERGENT INJECTOR IJ-21.

5.9 OPERATIONAL CHECKS

TABLE 5-2. STERILIZE CYCLE

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

Initial Setup:

1. Make certain WATER and STEAM supply valves are on.
2. Steam pressure regulator should be adjusted to control chamber temperature at 270° F.
3. Set STERILIZE TIME to 5 minutes.
4. 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.
5. Close and lock door(s). DOOR UNLOCKED light(s) must be extinguished when door is properly tightened.
6. Touch STERILIZE cycle selector. Only minimal pressure should be required to actuate the switch. Cycle status should illuminate CONDITION. Begin timing.

Phase	Washer/Sterilizer Condition	Time	Reference: TROUBLE-SHOOTING CHART, item no.:
Condition (Purge) Panel Light: CONDITION	a) Solenoid valves S-4 (D-16),* S-2 (D-14), S-3 (D-15) open. After 1½ minutes. S-3 (D-15) closes. b) Chamber pressure/temperature increases until 270° F is reached.	1½ mins.	3.A. 3.B., 3.C.
Sterilize Panel Light: STERILIZE	Chamber temperature at 270°-274° F. solenoid valve S-2 cycles to maintain pressure/temperature.	3 mins.	3.D., 3.1.
Fast Exhaust Panel Light: EXHAUST	Solenoid valves S-4 (D-16) and S-3 (D-15) open.		5.
Complete Panel Light: COMPLETE	Pressure switch PS-2 actuates at 1-2 psig. Solenoid valves S-3, S-4 close. Solenoid valves SA-1 and S-28 open. Buzzer sounds for 90 seconds or until door is opened.	90 secs.	5.A., 5.B., 5.C.

*LED NO. ON CONTROL BOARD

TABLE 5-3: WASH-STERILIZE CYCLE

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

1. Follow steps for "Initial Setup" of Sterilize Cycle.
2. Initiate a WASH-STERILIZE cycle.

Phase	Washer/Sterilizer Condition	Time	Reference: TROUBLE-SHOOTING CHART, item no.:
Spray/Rinse Panel Light: WASH	Solenoid valves S-21 (D-12),* S-23 (D-23), and S-25(D-21) open.	2 mins. ±6 secs.	4.A.
Pause Panel Light: WASH	Solenoid valves S-21 (D-12) and S-25 (D-21) close. S-23 (D-23) remains open for 15 ±1.5 seconds, then closes. There is a pause of 10 seconds in the cycle.	25 (±1.5) secs.	4.A.
Fill Panel Light: WASH	a) S-25 (D-21) and S-21 (D-12) open to begin filling the chamber. b) S-25 (D-21) closes. IJ 21 opens to inject detergent. c) IJ-21 closes, S-25 (D-21) opens to continue filling chamber.	a) 30 secs. b) 15 secs. c) 3 mins. 45 secs. max.	4.A. 4.E. 4.A., 4.B.
Wash Panel Light: WASH	a) High water level reached (LC-22). S-25 (D-21) and S-21 (D-12) close. S-26 (D-18) opens to begin heating and agitating water. b) When chamber water reaches 75° F. wash timer begins.	8½ mins.	4.F. 4.F.
Drain Panel Light: WASH	S-23 (D-23) opens, S-26 (D-18) closes.	1 min. 50 secs.	4.F.
Second Spray/Rinse Panel Light: WASH	a) Low water level reached (LC-21) S-21 (D-12) and S-25 (D-21) open for one minute. S-25 (D-21) closes and S-26 (D-18) opens for 5 seconds. After S-26 closes S-21 (D-12) remains open for 10 seconds, then closes. After S-21 closes, S-23 (D-23) remains open for 10 seconds, then closes.	1 min. +5 secs. +10 secs. +10 secs. +10 secs.	4.F.
Condition (Purge) Panel Light: CONDITION	a) Solenoid valves S-4 (D-16, S-2 (D-14, S-3 (D-15) open. b) Chamber pressure/temperature increases until 270° F is reached	1½ mins.	3.A. 3.A., 3.B.

Continued

*LED NO. ON CONTROL BOARD

TABLE 5-3: WASH-STERILIZE CYCLE

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

1. Follow steps for "Initial Setup" of Sterilize Cycle.
2. Initiate a WASH-STERILIZE cycle.

Phase	Washer/Sterilizer Condition	Time	Reference: TROUBLE-SHOOTING CHART, item no.:
Spray/Rinse Panel Light: WASH	Solenoid valves S-21 (D-12),* S-23 (D-23), and S-25(D-21) open.	2 mins. ±6 secs.	4.A.
Pause Panel Light: WASH	Solenoid valves S-21 (D-12) and S-25 (D-21) close. S-23 (D-23) remains open for 15 ±1.5 seconds, then closes. There is a pause of 10 seconds in the cycle.	25 (±1.5) secs.	4.A.
Fill Panel Light: WASH	a) S-25 (D-21) and S-21 (D-12) open to begin filling the chamber. b) S-25 (D-21) closes. IJ 21 opens to inject detergent. c) IJ-21 closes, S-25 (D-21) opens to continue filling chamber.	a) 30 secs. b) 15 secs. c) 3 mins. 45 secs. max.	4.A. 4.E. 4.A., 4.B.
Wash Panel Light: WASH	a) High water level reached (LC-22). S-25 (D-21) and S-21 (D-12) close. S-26 (D-18) opens to begin heating and agitating water. b) When chamber water reaches 75° F. wash timer begins.	 8½ mins.	4.F. 4.F.
Drain Panel Light: WASH	S-23 (D-23) opens, S-26 (D-18) closes.	1 min. 50 secs.	4.F.
Second Spray/Rinse Panel Light: WASH	a) Low water level reached (LC-21) S-21 (D-12) and S-25 (D-21) open for one minute. S-25 (D-21) closes and S-26 (D-18) opens for 5 seconds. After S-26 closes S-21 (D-12) remains open for 10 seconds, then closes. After S-21 closes, S-23 (D-23) remains open for 10 seconds, then closes.	1 min. +5 secs. +10 secs. +10 secs. +10 secs.	4.F.
Condition (Purge) Panel Light: CONDITION	a) Solenoid valves S-4 (D-16, S-2 (D-14, S-3 (D-15) open. b) Chamber pressure/temperature increases until 270° F is reached	1½ mins.	3.A. 3.A., 3.B.

Continued

*LED NO. ON CONTROL BOARD

FIELD TEST PROCEDURE (PRINTCON)

5.12 PROCEDURE

1. Check for proper installation as per paragraph 5.3.

2. 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).

3. Install a calibrated compound pressure gauge at the chamber gauge fitting after disconnecting the chamber gauge. This gauge should have 1/2 psig and 1/2 inch Hg. minimum resolution. Psig full scale should be 50 psig minimum.

4. Verify door switch adjustment as per paragraph 5.5.

5. Test the safety valve as per paragarph 5.6.

6. Open the display overlay door by unfastening the self-tapping screw at the top right of the door. Check the pressure and vacuum rotary BCD switches for the following settings:

PS-2: 02 (1 psig)
TS-4: 75 (75 F)

NOTE: Switch TS-4 is labeled VS-4 on the digital display PC board.

Close the display overlay door and replace the screw.

7. 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.

8. 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. Temperaure display should read room temperature with a cool chamber.

The following must be printed (with appropriate date, time, temperature, and pressure):

```
                DOOR OPEN
   2:37P  76.0  0.0P
--------------------
POWER ON AT  4-01-82
   2:37P  76.0  0.0P
--------------------
```

The following must be displayed:

a. Actual and F lamps ON.

b. Sterilize time display must match thumbwheel settings. The DOOR OPEN message will be printed as shown above.

Double door units — DOOR UNLOCKED lamp must be on at both ends. Open opposite door. OPPOSIDE DOOR UNLOCKED lamp must come on at both ends.

c. The following primary control panel lamps will be lit:

Status*
Cycle Select*
Sterilize at half illumination*
Wash/sterilize at half illumination*
Door unlocked (and OPPOSITE DOOR UNLOCKED if applicable)*
Sterilize time
Minutes

*Will also light at rear door if applicable.

Check for abnormalities if any other lamps remain on after pressing the RESET button. If any lamps listed fail to light, check for burned out lamps.

9. Close and lock door(s). Set the sterilize temperature to 270 F. Set sterilize time to 3 minutes. Start a "sterilize" cycle. Now adjust the steam pressure regulator to raise the chamber temperature to 274 F + 1, -0 F. Let the cycle continue to completion. Open the control end door.

10. Try to start both cycles. No cycle should start with the door(s) open.

11. Rotate all time setting thumbwheels. The time displayed must match the thumbwheel setting.

12. 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.

13. Press the RESET button. The following must be printed (with appropriate time and physical data):

```
          RESET BUTTON
*  2:37P  76.0  0.5V
```

14. 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.

15. Check paper feed switch. Forward position continuously feeds paper through printer. Center position is off. Rear position (away from the operator) runs take up motor until the paper platen is depressed (microswitch activates).

16. Check paper take-up mechanism. Feed paper through pinch rollers. Paper must not wander side-to-side. Platen microswitch must acivate and shut off take-up motor when the paper is drawn taut. Run at least 20 feet of paper into the take-up mechanism. Paper should feed smoothly and coil up in the coil.

17. 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).

18. 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
```

19. 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
--------------------
```

20. Set the sterilize temperature to 295 F. Initiate a STERILIZE cycle. Wait until the timed steam purge is completed and the pressure has risen to the regulator setting and stabilized. The temperature displayed should agree with the potentiometer to within ± 1°F. The pressure displayed should agree with the pressure gauge to within 0.5 psig. If not, adjust potentiometer P3 on the main Printcon PC board until these pressures agree. Then adjust P9 for temperature, if necessary.

Abort the cycle with the RESET button and exhaust the chamber through the manual control. When exhausted to less than 1 psig, open the door and let all vapors escape. **With the door open,** turn power OFF and then ON again. Restart a 295 F STERILIZE 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).

21. Abort the cycle with the RESET button and exhaust the chamber pressure using the manual control. Disconnect the measuring devices and reconnect the chamber gauge.

NOTE: If the above accuracy results are not obtainable, refer to the "Printcon Calibration Procedure" in Section 7 of this manual.

22. Use tables 5-2 and 5-3 to evaluate the "sterilize" and "wash-sterilize" cycles. Compare the printed records against the proper format presented in Section 3 of this manual.

23. Check the adjustment of the "Detergent Injector" (IJ-21) as per Section 5.10.

24. Evaluate the Manual control system as per Section 5.11.

25. Close and lock the door(s). Set STERILIZE time to 5 minutes. Set the temperature thumbwheels to 270 F. Initiate a STERILIZE cycle. After the STERILIZE lamp has come on, shut off the steam supply valve. When the temperature drops to 267.9 F, the following must occur:

a. STERILIZE lamp flashes.

b. The timer resets.

c. The following format is printed:

```
5  2:41P 270.0 21.9P
*  2:41P 264.1 21.9P
ALARM:    UNDER TEMP
*  2:41P 267.9 21.9P
```

Temperature falls 0.1 F under 268 F. These two lines are printed.

Reopen steam valve. As soon as 270 F is re-established, the lowest temperature reached during the alarm condition is printed.

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.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 6

TROUBLESHOOTING

This section contains detailed information for locating and correcting the cause of washer/sterilizer malfunction.

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 washer/sterilizer more than once in case reported problem is being caused by periodic component malfunction.

2. Use the cycle graph, Figure 6-1, in order to follow the cycles through the various phases. The cycle graph may also be used to check for correct operation of the solenoid valves which control the various phases.

3. Refer to paragraph 6.3 and the TROUBLESHOOTING CHARTS (Tables 6-1 and 6-2) after the symptom has been verified.

4. Use the operational descriptions (Section 3) and electrical schematics (Section 6) as aids in understanding system operation and how the malfunction of a specific component would affect it.

5. Refer to the following guides for example of what to look for and what to do when troubleshooting.

Steam & Water Supplies

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

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

c. Be sure the steam supply is of the proper quality and that the steam-supply line is well drained. This will ensure condensate-free steam of between 97 and 100 percent saturated vapor.

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

e. Clean the supply strainers.

f. Check the drain thermostatic traps; replace the elements if necessary.

g. Inspect the entire system; correct all leaks.

Electronic/Electrical System

a. In general, for any electrical malfunction, first measure or observe the input or output voltage signals as an indicator of the failure. This should isolate the malfunction to:

- Input drives: 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 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 GRAPH

The cycle graph (Figs. 6-1) is a representation of the operations of the cycles available with the sterilizer. It is 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 is a representation of chamber pressure variation during the separate phases of the cycle. The LEDs (light emitting diodes), located on the printed circuit boards behind the front panel, are identified with the corresponding output device. When a solenoid valve, for example, is actuated (energized), the LED will be on.

As an aid in troubleshooting, the graph should be used to, first, identify the point in the cycle where a malfunction occurs, and, second, to check the operation of the valves which should be opened (energized) or closed (deenergized) during the phase where the problem occurs. If the malfunction is not in the valves, the TROUBLESHOOTING CHART should be used to check for other possible causes of the problem.

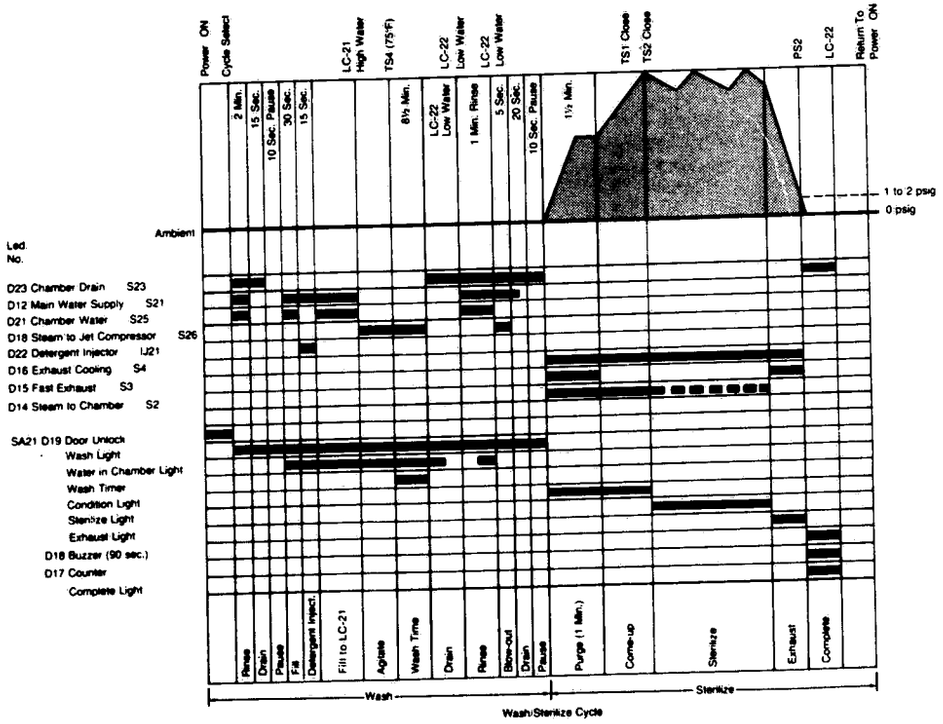
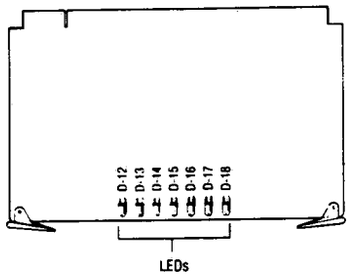
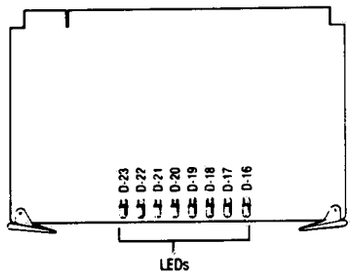


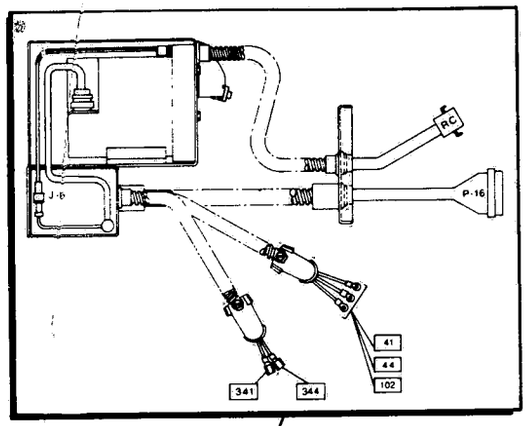
Figure 6-1. CYCLE GRAPH



P.C. Board #1



P.C. Board #2



End View

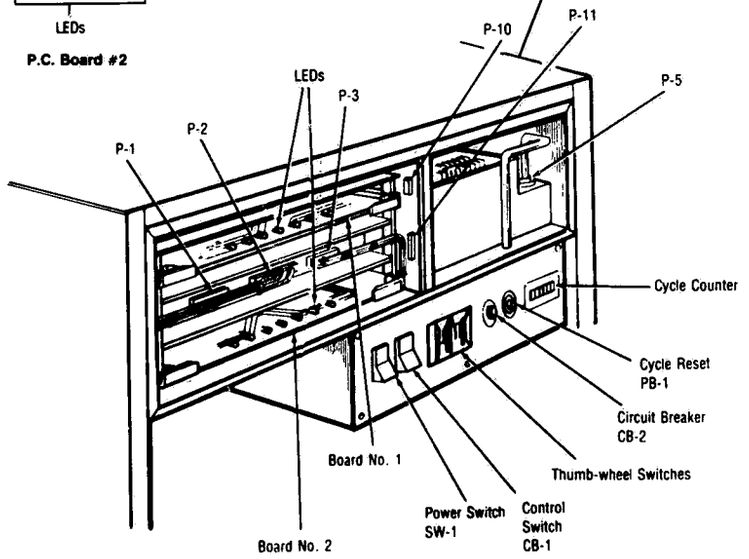


Figure 6-2. CONTROL DETAILS

6.3 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 TB1 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. 8-19, 30
		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. 6-2
		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. 6-2
		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. 6-2 Fig. 8-16, 7
		5) Defective line filter (PF-1) — check and replace if necessary.	Fig. 8-42, 16

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued	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. 8-16, 9
		2) With CB-1 off, disconnect J1 from controller. Turn CB-1 on and try to reset CB-2. If CB-2 resets, see step 1.B.5. If CB-2 does **not** reset, see next step, 1.B.3. Replace P1. Be sure to reconnect J1 to controller.	Fig. 6-2
		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. 6-2 Fig. 6-15, 8
		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. 6-2
		5) With CB-2 off, disconnect P1 from controller. Try to reset CB-2. If CB-2 resets, isolate and repair short between P1 and a solenoid valve, the counter, or the buzzer. If CB-2 does **not** reset, see next step 1.B.6.	Fig. 6-2
		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. 6-2 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. 6-2 Fig. 8-15, 9 Fig. 8-13, 3
	1.C. Control switch CB-1 will not set to ON or trips off 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. 6-2 Fig. 8-16, 6

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		2) Short circuit on 5 VDC buss, defective power supply, or power supply out of adjustment.	Fig. 8-13, 3
		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, replace or adjust power supply. If CB-1 can be positioned on, see next step, 1.C.2b.	Fig. 6-2 Fig. 8-13, 3
		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. 6-2 Fig. 8-15, 8
		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. 6-2 Fig. 8-15, 9
		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. 8-9, 8
		3) Ambient temperature in area of control housing too high. Increase ventilation.	
2. Before beginning cycle: POWER & CONTROL switches on	2.A. Primary Panel remains completely dark	1) Loss of all power — see TROUBLE item 1A for checks and remedies.	
		2) P5 on control power supply disconnected or pins loosely connected — check and reconnect.	Fig. 6-2
		3) P16 disconnected or loosely connected — reconnect	Fig. 8-9, 8
		4) Control power supply defective — check for 5 VDC and 28 VDC and replace power supply if necessary.	Fig. 8-13, 3
		5) Disconnect P16 from primary panel. Check 28 VDC between pins 27 and 7. Check 5 VDC between pins 16 and 7. If voltages check good, replace primary panel. If voltages are not present, repair P16 wire harness.	Fig. 8-9, 8

TABLE 6-1: 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 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, 11
		2) Open circuit. Disconnect P16 from primary panel and check 28 VDC between pins 27 and 7. If voltage check good, replace primary panel. If voltage is not present, repair A6 wire harness.	Fig. 8-9, 8
	2.C. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary.	Fig. 7-6 Fig. 8-9, 8
		2a) Logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see step below. 2.C.2b.	Fig. 8-9, 8
		2b) Reinstall lamp and check VDC from lamp socket to DC ground. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.C.2c.	Fig. 8-9, 8
		2c) Disconnect P3 from controller. Check VDC between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.C.3.	Fig. 6-2 Fig. 8-9, 8
		3) Disconnect P16 from primary panel and check continuity between P16 and P3, P4, P7 on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 8-9, 8
	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. 6-2
		2) Logic card defective. Disconnect P3 from controller. If light goes out, replace primary panel. If light remains on, see next step, 2.D.3.	Fig. 8-9, 8
		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. 8-9, 8

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.E. Incorrect timer display.	1) See Timer Display Checkout and Correction Charts, paragraph 6.4, following this Troubleshooting Chart.	
	2.F. Unable to reset system	1) Open circuit. Disconnect P4 from controller and make continuity check between pins 8 and 1 with RESET (CB-2) 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. 6-2 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. 6-2 Fig. 8-16, 9
	2.G. Unable to select cycle	1) No DOOR LOCKED signal. a) Adjust or replace door lock switch as required. Check that interlock relay CR-3 is energized.	Fig. 8-19, 18
		b) Disconnect P2 from controller and check continuity between Pins J and A. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.G.1c.	Fig. 6-2 Fig. 8-15, 8
		c) Check continuity across contacts of Relay CR-3. If continuity is present, isolate and repair open in P2 wire harness. If continuity is not present, replace relay.	Fig. 8-19, 18
		2) Controller PC board 1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and Pin A while pressing switch. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.G.3.	Fig. 6-2 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 7 while pressing switch. If continuity is present, isolate and repair open P3 wire harness. If continuity is not present, replace primary panel.	Fig. 8-9, 8
		4) Pressure Switch (PS-2) sensing greater than 1 PSIG pressure or out of adjustment. a) Adjust or replace Pressure Switch PS-2.	Fig. 8-20
		b) Check continuity of wire 113 to Plug 2 (P2) Pin B. If continuity is there, replace PC board 1.	

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.H. Door does not lock at start of cycle.	1) Tension spring is broken or loose — replace or adjust as necessary.	Fig. 8-19, 23
		2) Door lock mechanism is wedged unlocked — free door lock mechanism or replace as necessary.	Fig. 8-26
		3) Door lock solenoid SA-21 (D-19) is not deenergizing.	Fig. 8-22, 12
		a) Check LED D-19 on PC board 2 — should be off. Replace board if light is on.	Fig. 6-2 Fig. 8-15, 8
		b) Disconnect P-1 from control assembly. If door locks, replace PC board 2. If door remains unlocked, short in wiring must be cleared.	Fig. 6-2 Fig. 8-15, 9
	2.I. Steam enters a chamber while door is open	1) Manual operating valve improperly adjusted or malfunctioning — turn valve to OFF; adjust, repair, or replace manual control assembly.	Fig. 2-2
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — check valve for leak, replace if necessary; check D14 LED on PC board 1, replace board if LED on.	Fig. 8-28, 4 Fig. 6-2 Fig. 8-15, 8
	2.J. Pulsating buzzer and "Water in Chamber" light flashing	1) Upper Water level probe sensing	
		a) Clear obstruction in 5/8 OD tube from probe to drain, press "Reset."	Fig. 8-31
		b) Insure tip of probe is properly connected into tee.	Fig. 8-37
		c) Insure "O" ring within probe body not deteriorated.	P 8-75
		2) Control circuit malfunction	
		a) Disconnect Wire 24 from "H" terminal on P21 module in "Liquid Sensing" box, press "Reset." If problem clears, isolate and repair short to earth ground in conduit cable from probe. If problem does not clear, proceed to next step. (Reconnect wire.)	Fig. 8-20
		b) With **power off,** disconnect Wire 21 from NC1 terminal of P21 module and jumper to C1 terminal (Wire 117, DC common). Turn power on. If problem clears, replace P21 module. If problem does not clear, check continuity of Wire 21 to Plug 2 (P2), Pin D. If continuity is there, replace PC board 1.	Fig. 8-20

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. During sterilize phase of cycle	3.A. Steam does not enter chamber in sterilize phase	1) Steam-to-chamber valve (S-2) not operating correctly (should be open).	Fig. 7-9
		a) Repair or replace valve.	Fig. 8-28, 4
		b) Check wiring to valve — repair or replace.	
		c) Check LED D-14 on PC board 1 — should be on. Replace board if light not on.	Fig. 6-2 Fig. 8-15, 8
		d) If b and c OK, replace complete control assembly.	Fig. 8-15
	3.B. Chamber pressure does not rise during sterilize phase	1) Fast exhaust valve (S-3) not closed or leaking.	Fig. 7-9
		a) Repair or replace valve.	Fig. 8-29,13
		b) Check LED D15 on PC board 1. If light is on, replace board.	Fig. 6-2 Fig. 8-15, 8
		c) Disconnect P1 from control assembly. If valve closes, replace PC board 1. If valve remains open, recheck valve, or clear short in wiring to valve.	Fig. 6-2 Fig. 8-15, 8
		2) Steam-to-chamber valve (S-2) not open or sticking — See 3.A., above.	Fig. 7-9
		3) Steam pressure regulator valve incorrectly set or malfunctioning.	Fig. 7-9
		a) Reset to 30 ±1 psig.	Para. 7.9
		b) Replace valve.	Fig. 8-39
	3.C. Chamber temperature does not rise to recorder setting	1) Setting on steam pressure regulator valve incorrect — see 3.B.3., above.	Fig. 7-9
		2) Steam-to-chamber valve (S-2) not open or sticking — see 3.A., above.	Fig. 7-9
		3) Fast exhaust valve (S-3) not closed or leaking — see 3.B.1., above.	Fig. 7-9

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		4) Chamber drain line or strainer plugged — clean line or strainer.	Para. 4.3
		5) Chamber traps, T-11 or T-21, not operating correctly — replace trap element and seat.	Fig. 8-41 Para. 7.5
		6) Chamber drain valve (CV-21) not operating correctly.	Fig. 8-27
		a) Check that chamber drain solenoid valve S-23 is closed and not leaking — repair or replace valve.	Fig. 7-9 Para. 7.4
		b) Check LED D-23 on PC board 2. If light is on, replace board. If light is off, replace board or replace complete control assembly.	Fig. 6-2 Para. 7.12
		c) Disconnect P1 from control assembly. If valve closes, replace board. If valve remains open, short in wiring to valve must be cleared.	
		d) Check line filter upstream of IJ-22 — clean or replace.	Fig. 8-33, 2 Para. 7.6
		e) Check manual valve M-22 — repair or replace.	Fig. 8-40 Para. 7.10
		f) Check IJ-22 orifice — clean.	
		7) Check valve CK-11 is leaking through filter ST-12 — check CK-11 for leaking. replace if necessary.	Para. 7.7
	3.D. Chamber pressure and temperature drop during a cycle.	1) Steam supply pressure erratic — check voltage	
		2) Chamber traps, T-11 or T-21, not operating correctly — replace trap element and seat.	Fig. 8-41
		3) Fast exhaust valve (S-3) not closed or leaking — see 3.B.1., above.	Fig. 7-9

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3.E. Steam blows out around door during sterilize phase	1) Check door gasket — replace.	Fig. 8-25, 1 Para. 7.3
	3.F. Excessive steam in area during cycle.	1) Strainer in cold water line clogged — clean.	Fig. 8-33, 2
		2) Water saver valve in exhaust cooling line not set correctly — increase flow if necessary.	Fig. 7-9
		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, 1
		4) Leaking steam valve — check valves and piping for leaks. repair.	Fig. 8-35, 22
		5) Cooling water valve (S-4) not operating correctly (should be open during purge, sterilize and exhaust).	Fig. 7-9
		a) Repair or replace valve.	Fig. 8-29, 3
		b) Check wiring to valve — repair or replace.	Fig. 8-45
		c) Check LED D-16 on PC board 1 — should be on during exhaust and dry. Replace board if light not on.	Fig. 6-2 Fig. 8-15, 8
		d) 5b and 5c ok — replace PC board 1.	Fig. 8-15
	3.G. Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — replace diaphragm or gasket.	Fig. 8-24, 5 Para. 7.3
	3.H. Safety valve pops or bleeds excessively	1) Steam regulator valve improperly adjusted or malfunctioning — adjust, repair, or replace valve.	Fig. 8-39 Para. 7.9
		2) Safety valve defective — replace.	Fig. 8-35, 22

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.	Para. 4.3
4. During wash phase of cycle	4.A. Chamber fill time too long during wash phase	1) Water strainer plugged — clean or replace strainer.	Fig. 8-33, 2
		2) Water supply pressure low — correct pressure to 20-50 psig.	
		3) Defective main water supply valve (S-21) or water-to-chamber (S-25) valve — repair or replace.	Fig. 7-9 Fig. 8-33, 23 Fig. 8-34, 5
	4.B. Low-water level or high-water level probe is inoperative	1) P21 or P22 is inoperative — check for correct operation to liquid level and replace if defective. See step 2.J. above.	Fig. 8-37, 11 Fig. 8-38, 20
		2) Short in electrical line from probe to control P21 or P22 — correct.	
		3) Short at level probe — replace probe and probe housing.	
		4) Barrier resistors open — check resistors for 20KΩ and replace if necessary.	Fig. 8-20, 18
	4.C. Water leaking from water spray nozzles	1) Main-water supply solenoid valve (S-21) not operating correctly (should be closed).	Fig. 7-9
		a) Repair or replace valve.	Fig. 8-23, 23
		b) Check LED D-12 on PC board 1 — should be off. Replace board if light is on.	Fig. 6-2 Fig. 8-15, 8
		c) Disconnect P1 from control assembly. If valve closes, replace PC board 1, or replace complete control assembly. If valve remains open, short in wiring to valve must be cleared.	Fig. 6-2 Fig. 8-15, 8

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.D. Steam leaking from air/steam nozzles at bottom of chamber.	1) Steam-to-jet compressors solenoid valve (S-26) not operating correctly (should be closed).	Fig. 7-9
		a) Repair or replace valve.	Fig. 8-28, 12
		b) Check LED D-18 on PC board 2 — should be off. Replace board if light is on.	Fig. 6-2 Fig. 8-15, 9
		c) Disconnect P1 from control assembly. If valve closes, replace PC board 2, or replace complete control assembly. If valve remains open, short in wiring to valve must be cleared.	Fig. 6-2 Fig. 8-15, 9
	4.E. Insufficient detergent dispensed during wash cycle	1) Check detergent supply — replace or fill.	
		2) Check that injector is not plugged — unplug or replace.	Fig. 8-34, 13
		3) Check that detergent injector tubing is not pinched or kinked — free or replace.	
		4) Detergent injector solenoid (IJ-21) not operating correctly (should be open).	Fig. 7-9
		a) Repair or replace valve.	Fig. 8-34, 13
		b) Check wiring to valve — repair or replace.	
		c) Check LED D-22 on PC board 2 — should be on. Replace board if light not on.	Fig. 6-2 Fig. 8-15, 9
		d) If b and c OK, replace PC board 2.	Fig. 6-2 Fig. 8-15, 9
		5. Chamber water solenoid valve (S-25) not closing during detergent injection — repair or replace.	Fig. 7-9 Fig. 8-34, 5
	4.F. Wash phase of cycle too long	1) Temperature switch TS-4 incorrectly calibrated or faulty — reset or replace.	Para. 5.7
		2) Steam supply valve S-26 not heating water.	Fig. 7-9

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		a) Check steam line strainer.	Fig. 8-35, 8
		b) Check steam pressure regulator.	Fig. 8-39
		c) Check, repair, or replace S-26 solenoid valve.	Fig. 8-28, 12
	4.G. Temperature and pressure too high.	1) Premature chamber fill.	
		a) Steam trap T-11 defective (should be open).	
		b) Obstruction in T-11 trap discharge line.	
5. At end of cycle	5.A. Cycle fails to reach COMPLETE after exhaust completed, or signals COMPLETE too soon.	1) Pressure switch PS-2 or out of adjustment — reset to 1-2 psig or replace.	Para. 5.8
		2) Open or shorted wire — disconnect P2 from controller and check continuity of pressure switch circuits.	Fig. 6-2
		3) Printed circuit board defective — check for correct signal and replace if necessary.	Fig. 8-15, 8
	5.B. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective — check voltage across buzzer, replace if necessary.	Fig. 8-16, 10
		2) Open wire — disconnect P1 from control and check continuity between pin W and J6 3 or 4. Isolate and repair.	Fig. 6-2
		3) PC board 1 defective — check D18 LED on board; replace board 1 if LED does not come on at end of cycle.	Fig. 6-2 Fig. 8-15, 8
	5.C. Door does not unlock at end of cycle	1) Door unlock solenoid SA-21 (D-19) defective — repair or replace.	Fig. 8-22, 12
		2) Door unlock cable loose or broken — adjust or replace.	Fig. 8-26, 8
		3) Door unlock solenoid SA-21 not operating correctly (should be on).	Fig. 8-22, 12
		a) Check wiring to solenoid — repair or replace.	

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Continued		b) Check LED D-19 on PC board 2 — should be on. Replace board if light not on. If D-19 is on, replace board or complete control assembly	Fig. 6-2 Fig. 8-15, 9
		c) If a and b are OK, replace complete control assembly.	Fig. 8-15
	5.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. 5.8
	5.E. Water in chamber at end of cycle	1) Chamber drain valve CV-21 or S-23 not operating correctly (should be open).	Fig. 7-9 Fig. 8-38, 17
		a) Repair or replace valve.	Fig. 8-38, 4 Fig. 8-38, 17
		b) Check wiring to valves — repair or replace.	
		c) Check LED D-23 (solenoid valve S-23) on PC board 2 — should be on. Replace board if not on.	Fig. 6-2 Fig. 8-15, 9
		2) IJ-22 not operating correctly — clean IJ-22 orifice. or replace.	Fig. 8-38, 7
		3) Filter upstream of IJ-22 plugged — clean or replace.	Fig. 8-33, 2
		4) Water level probe not operating correctly — see 4.B. above.	
		5) Drains plugged or slow — remove chamber drain screen and clean thoroughly. Mix three tablespoons trisodium phosphate (tech. grade) in one pint water. Pour into chamber drain. Let sit and then rinse with cold water.	Para. 4.3

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Continued		6) Chamber steam trap does not open — replace trap element.	Fig. 8-41
		7) Steam supply not "dry" — correct.	
	5.G. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace, if necessary.	Fig. 8-16, 16
		2) Open wire — disconnect P1 from control and check continuity between pin P and J6, 3 or 4. Isolate and repair open.	Fig. 6-2
		3) PC board 1 defective — check D-17 LED on board: replace board if LED does not come on at end of cycle.	Fig. 6-2 Fig. 8-15, 8
6. Miscellaneous	6. A. Continuous sounding buzzer whenever machine is turned on	1) Excessive current leakage from triac — install buzzer resistor kit (P-764316-608) which includes a 3000 Ohm resistor (units before 1981).	Fig. 8-16, 10
		2) Defective PC board 1. Replace.	

AMSCO SERVICE

EAGLE® 2000 SERIES WASHER-STERILIZER P-764089-002

2/86

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 TB1 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. 8-19, 30
		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. 6-2
		3) 115 volt fuse in power supply (F402) blown — check.	Fig. 7-25
		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. 6-2 Fig. 8-16, 7
		5) Defective line filter (PF-1) — check and replace if necessary.	Fig. 8-58, 16
		5a) Check 120 VAC between filter contacts Load 1 and Line 2 with CB-2 tripped. Replace filter if necessary.	Fig. 8-58, 16
		5b) Check zero VAC between filter contacts Load 2 and Line 2 with CB-2 energized. Replace filter if necessary.	Fig. 8-58, 16
	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. 8-16, 9
		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. 6-2
		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. 6-2 Fig. 8-15, 8
		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. 6-2

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		5) With CB-2 off, disconnect P1 from controller. Try to reset CB-2. If CB-2 resets, isolate and repair short between P1 and a solenoid valve, the counter, or the buzzer. If CB-2 does **not** reset, see next step, 1.B.6.	Fig. 6-2
		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. 6-2 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. 6-2 Fig. 8-15, 9 Fig. 8-49, 3
	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. 6-2 Fig. 8-16, 6
		2) Short circuit on 5 VDC bus, or defective power supply.	Fig. 8-49, 3
		2a) With CB-1 off, disconnect PC boards 1 and 2 and disconnect connector P3 from controller. Disconnect Plugs P45 and P48 from the main Printcon PC board. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace power supply. If CB-1 can be positioned on, see next step, 1.C.2b.	Fig. 6-2 Fig. 8-15, 8
		2b) 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. 6-2 Fig. 8-15, 8
		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, 1.C.2d.	Fig. 6-2 Fig. 8-15, 9
		2d) With CB-1 off, reconnect P3 to controller. 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, or replace primary panel as required. If CB-1 can be positioned on, see next step.	Fig. 8-45, 8

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		5) With CB-2 off, disconnect P1 from controller. Try to reset CB-2. If CB-2 resets, isolate and repair short between P1 and a solenoid valve, the counter, or the buzzer. If CB-2 does **not** reset, see next step, 1.B.6.	Fig. 6-2
		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. 6-2 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. 6-2 Fig. 8-15, 9 Fig. 8-49, 3
	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. 6-2 Fig. 8-16, 6
		2) Short circuit on 5 VDC bus, or defective power supply.	Fig. 8-49, 3
		2a) With CB-1 off, disconnect PC boards 1 and 2 and disconnect connector P3 from controller. Disconnect Plugs P45 and P48 from the main Printcon PC board. Try to position CB-1 on. If CB-1 **cannot** be positioned on, replace power supply. If CB-1 can be positioned on, see next step, 1.C.2b.	Fig. 6-2 Fig. 8-15, 8
		2b) 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. 6-2 Fig. 8-15, 8
		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, 1.C.2d.	Fig. 6-2 Fig. 8-15, 9
		2d) With CB-1 off, reconnect P3 to controller. 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, or replace primary panel as required. If CB-1 can be positioned on, see next step.	Fig. 8-45, 8

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) Defective power supply. Replace.	Fig. 8-49, 3
	2.C. Printcon display is dark, and Printcon buzzer sounds	1) J45 connector on display PC board disconnected or loosely connected — reconnect.	Fig. 8-46, 3 & 11
	2.D. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary.	Fig. 7-6 Fig. 8-45, 8
		2a) Primary panel logic card defective. Check voltage across lamp socket. If it is 28 VDC, replace primary panel. If it is zero, see step below, 2.D.2b.	Fig. 8-45, 8
		2b) Reinstall lamp and check voltage from lamp socket to DC ground. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.D.2c.	Fig. 8-45, 8
		2c) Disconnect P3 from controller. Check for voltage between J3, pin 28 and pin applicable malfunctioning lamp. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.D.3.	Fig. 6-2 Fig. 8-45, 8
		3) Disconnect P16 from primary panel and check continuity between P16 and P3, P4, P7, on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 8-50
	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.M below.	Fig. 6-2
		2) Primary panel logic card defective. Disconnect P3 from controller. If light goes out, replace primary panel. If light remains on, see next step, 2.E.3.	Fig. 8-45, 8
		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. 8-45, 8 Fig. 8-50

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.F. Missing segment of digital LED on digital display panel on when power is turned on.	1) Burned out. Replace display PC board.	Fig. 8-46, 11
	2.G. Digital display is blank, printer is inoperative, and cycle will not run.	2) P48 unplugged from main Printcon PC board — reconnect.	Fig. 8-46, 3
	2.H. Incorrect timer display (sterilize)	2) See Timer Display Checkout and Correction Charts following this Troubleshooting Chart.	Para. 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. 6.5
		2) Component failure on display PC board.	Fig. 8-46, 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. 8-46, 11
	2.K. ALARM: TEMP SENSOR printed when power is turned on	1) Temperature probe or cable shorted — unplug P47 from jack on main Printcon PC board. Measure resistance between pins 13 and 31 on the plug. At 70-80 F, resistance should be 115-120 ohms. If okay, see 2.K.1a below.	Fig. 8-55, 2
		2) Temperature probe or cable open. See 2.K.1 above.	Fig. 8-55, 2 Note 2, Table 6-2
		3) Component failure on main Printcon PC board — replace.	Fig. 8-46, 3
		3a) Extreme misalignment of main Printcon PC board — check alignment.	Para. 7.21
	2.L. ALARM: PRES SENSOR printed when power is turned on	1) Pressure sensor or cable shorted.	Fig. 8-55, 5

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) Pressure sensor or cable open.	Fig. 8-55, 5
		3) P47 unplugged from main Printcon PC board — reconnect.	Fig. 8-46, 3
		4) Component failure on main Printcon PC board — replace.	Fig. 8-46, 3
		4a) Extreme misalignment of main Printcon PC board — check alignment.	Para. 7.21
	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, 2.M.2.	Fig. 6-2 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. 6-2 Fig. 8-16, 9
	2.N. Unable to select cycle	1) No DOOR LOCKED signal.	
		1a) Adjust or replace door lock switch as required. Check that interlock relay CR3 is energized.	Fig. 8-19, 18 Fig. 8-42
		1b) Disconnect P2 from controller and check continuity between pin J and DC ground. If continuity is present, replace controller PC board 1. If continuity is **not** present, see next step, 2.N.1c.	Fig. 6-2 Fig. 8-15, 8
		1c) Check continuity across contacts of relay CR3. If continuity is present, isolate and repair open in P2 wire harness. If continuity is **not** present, replace relay.	Fig. 8-42

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		2) Cycle select switch defective or open wire. Disconnect P16 from primary panel and check continuity between J16 pin applicable to specific switch and pin 7 while pressing switch. If continuity is present, isolate and repair open P3 wire harness or replace PC board 1 **as required**. If continuity is **not** present, replace primary panel.	Fig. 8-9, 8
		3) Pressure Switch (PS-2) sensing greater than 1 PSIG pressure or out of adjustment.	Fig. 8-20
		a) Adjust or replace Pressure Switch PS-2.	
		b) Check continuity of wire 113 to Plug 2 (P2) Pin B. If continuity is there, replace PC board 1.	
	2.O. Cycle will not run. "RESET" not printed out.	1) P40 unplugged from main Printcon PC board — reconnect.	Fig. 8-46, 3
	2.P. Door does not lock at start of cycle	1) Tension spring is broken or loose — replace or adjust as necessary.	Fig. 8-19, 23
		2) Door lock mechanism is wedged unlocked — free door lock mechanism or replace as necessary.	Fig. 8-26
		3) Door lock solenoid SA-21 (D-19) is not deenergizing.	Fig. 8-22, 12
		3a) Check LED D-19 on PC board 2 — should be off. Replace board if light is on.	Fig. 6-2 Fig. 8-15, 8
		3b) Disconnect J1 from control assembly. If door locks, replace PC board 2. If door remains unlocked, short in wiring must be cleared.	Fig. 6-2 Fig. 8-15, 9
	2.Q. Steam enters chamber while door is open	1) Manual operating valve improperly adjusted or malfunctioning — turn valve to OFF; adjust, repair, or replace manual control valve.	Fig. 2-2
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — check valve for leak, replace if necessary: check LED D-14 on PC board 1, replace board if LED on.	Fig. 8-28, 4 Fig. 6-2 Fig. 8-15, 8
	2.R. "ERROR 1" message is printed when power is turned on	1) A/D converter failure on main Printcon PC board.	Fig. 8-46, 3
		1a) F3, -12 VDC fuse is open in power supply — check fuse continuity and replace if necessary. If fuse is ok, see 2.R.1b.	Fig. 7-25
		1b) Component failure on main Printcon PC board — replace board.	Fig. 8-46, 3 Para. 7.17

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	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 2.S.1b.	Fig. 7-25
		1b) J42 printer connector unplugged or poor contact — check connector on both ends for proper contact and solid connections. If ok, see 2.S.1c.	Fig. 8-46, 3 Fig. 8-47, 23
		1c) Printer defective — replace.	Para. 7.15
		2) Printer motor speed too slow. Adjust potentiometer P10 on the main Printcon PC board for maximum speed.	Fig. 7-26
		3) Drag on paper roll or paper improperly loaded.	Para. 7.15
	2.T. Pulsating buzzer and "Water in Chamber" light flashing	1) Upper Water level probe sensing	Fig. 8-31
		a) Clear obstruction in 5/8 OD tube from probe to drain, press "Reset."	
		b) Insure tip of probe is properly connected into tee.	Fig. 8-37
		c) Insure "O" ring within probe body not deteriorated.	P 8-75
		2) Control circuit malfunction	
		a) Disconnect Wire 24 from "H" terminal on P21 module in "Liquid Sensing" box, press "Reset." If problem clears, isolate and repair short to earth ground in conduit cable from probe. If problem does not clear, proceed to next step. (Reconnect wire.)	Fig. 8-20
		b) With **power off,** disconnect Wire 21 from NC1 terminal of P21 module and jumper to C1 terminal (Wire 117, DC common). Turn power on. If problem clears, replace P21 module. If problem does not clear, check continuity of Wire 21 to Plug 2 (P2), Pin D. If continuity is there, replace PC board 1.	Fig. 8-20
3. During wash phase of cycle	3.A. Chamber fill time too long during wash phase	1) Water strainer plugged — clean or replace strainer.	Fig. 8-33, 2
		2) Water supply pressure low — correct pressure to 20-50 psig.	
		3) Defective main water supply valve (S-21) or water-to-chamber (S-25) valve — repair or replace.	Fig. 7-9 Fig. 8-33, 23 Fig. 8-34, 5
	3.B. Low-water level or high-water level probe is inoperative.	1) P21 or P22 is inoperative — check for correct operation to liquid level and replace if defective.	Fig. 8-37, 11 Fig. 8-38, 20
		2) Short or open in electrical line from probe to control P21 or P22 — correct.	Fig. 8-57

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		3) Short at level probe — replace probe and probe housing.	Schematics
		4) Barrier resistors open — check resistors for 20 kilohm and replace if necessary.	Fig. 8-20, 18
	3.C. Water leaking from water spray nozzles	1) Main water supply solenoid valve (S-21) not operating correctly (should be closed).	Fig. 7-9
		1a) Repair or replace valve.	Fig. 8-23, 23
		1b) Check LED D-12 on PC board 1 — should be off. Replace board if light is on.	Fig. 6-2 Fig. 8-15, 8
		1c) Disconnect J1 from control assembly. If valve closes, replace PC board 1. If valve remains open, short in wiring to valve must be cleared.	Fig. 6-2 Fig. 8-15, 8
	3.D. Steam leaking from air/steam nozzles at bottom of chamber.	1) Steam-to-jet compressors solenoid valve (S-26) not operating correctly (should be closed).	Fig. 7-9
		1a) Repair or replace valve.	Fig. 8-28, 12
		1b) Check LED D-18 on PC board 2 — should be off. Replace board if light is on.	Fig. 6-2 Fig. 8-15, 9
		1c) Disconnect J1 from control assembly. If valve closes, replace PC board 2. If valve remains open, short in wiring to valve must be cleared.	Fig. 6-2 Fig. 8-15, 9
	3.E. Insufficient detergent dispensed during wash cycle	1) Check detergent supply — replace or fill.	
		2) Check that injector is not plugged — unplug or replace.	Fig. 8-34, 13
		3) Check that detergent injector tubing is not pinched or kinked — free or replace.	
		4) Detergent injector solenoid (IJ-21) not operating correctly (should be open) or out of adjustment — adjust.	Fig. 7-9 Fig. 5-5
		4a) Repair or replace valve.	Fig. 8-34, 13
		4b) Check wiring to valve — repair or replace.	
		4c) Check LED D-22 on PC board 2 — should be on. Replace board if light not on.	Fig. 6-2 Fig. 8-15, 9
		4d) If b and c okay, replace PC board 2.	Fig. 6-2
		5. Chamber water solenoid valve (S-25) not closing during detergent injection — repair or replace.	Fig. 7-9 Fig. 8-34, 5

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3.F. Wash phase of cycle too long	1) Temperature switch TS-4 (VS-4) on display PC board incorrectly set — should be 75.	Fig. 8-46, 11 Fig. 7-20
		2) Steam supply valve S-26 not heating water.	Fig. 7-9
		2a) Check steam line strainer.	Fig. 8-35, 8
		2b) Check steam pressure regulator.	Fig. 8-39
		2c) Check, repair, or replace S-26 solenoid	Fig. 8-28, 12
		3) Loss of continuity in wire #27 or plugs — check continuity.	Schematics
		4) TS-4 (VS-4) output drive failure on main Printcon PC board — Turn power off. Extract pin 10 of plug 40. Reinstall plug 40. Reinitiate cycle. If cycle advances, replace main Printcon PC board. If **not** ok, replace control board 1.	Fig. 8-46, 3 Para. 7.17
	3.G. Cannot achieve sterilize phase	1) Loss of continuity in wire #28 or plugs — check continuity.	Schematics
		2) Sterilize temperature thumbwheel setting too high for pressure regulator — reset temperature thumbwheels or adjust regulator.	Sect. 2
	3.H. Temperature and pressure too high.	1) Premature chamber fill.	
		a) Steam trap T-11 defective (should be open).	
		b) Obstruction in T-11 trap discharge line.	
4. During sterilize phase of cycle	4.A. Steam does not enter chamber in sterilize phase	1) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open).	Fig. 7-9
		1a) Repair or replace valve.	Fig. 8-28, 4
		1b) Check wiring to valve — repair or replace.	
		1c) Check LED D-14 on PC board 1 — should be on. Replace board if light **not** on.	Fig. 6-2 Fig. 8-15, 8
		1d) 1b and 1c ok — replace PC board 1.	Fig. 8-15, 8

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.B. Chamber pressure does not rise during sterilize phase	1) Fast exhaust valve (S-3) not closed or leaking.	Fig. 7-9
		1a) Repair or replace valve.	Fig. 8-29, 13
		1b) Check LED D-15 on PC board 1. If light is on, replace board.	Fig. 6-2 Fig. 8-15, 8
		1c) Disconnect J1 from control assembly. If valve closes, replace PC board 1. If valve remains open, recheck valve, or clear short in wiring to valve.	Fig. 6-2 Fig. 8-15, 8
		2) Steam-to-chamber valve (S-2) not open or sticking — see 4.A., above.	Fig. 7-9
		3) Steam pressure regulator valve incorrectly set or malfunctioning.	Fig. 7-9
		3a) Reset to 30 ±1 psig.	Para. 7.9
		3b) Replace valve.	Fig. 8-39
	4.C. Chamber temperature does not rise to Printcon temperature thumbwheel setting, proper lead message printed.	1) Inadequate temperature in chamber — possible causes and corrections are as follows:	
		1a) Pressure regulator out of adjustment (set too low) — adjust pressure regulator for 33 ±1 psig in chamber during sterilize phase.	Para. 5.7 Fig. 8-39
		1b) Chamber drain line or strainer plugged — clean line or strainer.	Fig. 8-56
		1c) Chamber drain line trap not operating correctly — replace trap element and seat.	Fig. 8-27, 6
		1d) Fast exhaust valve (S3) not operating correctly. Repair or replace valve — check manual operation. Check LED D-15 — if on, replace control PC board 1.	Fig. 7-9
		1e) Loss of continuity in wire #28 (TS-1).	Schematics
		1f) 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. 3-7 Fig. 8-46, 3

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued		1g) TS-1 input failure on Eagle CPU PC board — see step 4.C.1e and 4.C.1f before replacing.	Fig. 8-15, 8
		1h) Temperature circuitry on main Printcon PC board out of calibration — check.	Para. 7.21
		1i) Faulty temperature probe — replace.	Fig. 8-55, 2
		2) Steam-to-chamber solenoid valve (S-2) not operating correctly.	Fig. 7-9
		2a) Repair or replace valve.	Fig. 8-28, 4
		2b) Check wiring to valve — repair or replace.	
		2c) Check LED D-14 on control PC board 1 — should be on. Replace board if light **not** on.	Fig. 6-2. Fig. 8-15, 8
		2d) 2b and 2c ok — replace control PC board 1.	Fig. 8-15, 8
	4.D. Chamber temperature does not rise to Printcon setting, no lead message is printed.	1) Component failure on main Printcon PC board — replace.	Fig. 8-46, 3 Para. 7.17
	4.E. Chamber pressure and temperature drop during cycle	1) Steam supply pressure erratic — check steam supply.	
		2) Chamber traps (T-11 or T-12) not operating correctly — replace trap element and seat.	Fig. 8-41
		3) Fast exhaust valve (S-3) not operating correctly (should be closed). Repair or replace valve — check manual operation. Check LED D-15 — if on, replace PC board 1.	Fig. 7-9 Fig. 8-15, 8
		4) Loss of continuity in wire #29 — check for continuity to DC common. If present, repair short in harness. If **not** present, see step 4.E.5 below.	Schematics
		5) TS-2 output drive shorted on main Printcon PC board — Turn power off. Extract pin 4 of plug 40. Reinstall plug 40 and restore power to sterilizer. Reinitiate cycle. If temperature control is ok, replace main Printcon PC board. If **not** ok, replace Eagle control board 1.	Fig. 8-46, 3 Fig. 8-15, 8

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.F Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-25, 1 Para. 7.3
	4.G. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean.	Fig. 8-33, 2
		2) Water saver valve in exhaust cooling line not set correctly — increase flow if necessary.	Fig. 7-9
		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, 1
		4) Leaking steam valve — check valves and piping for leaks, repair.	Fig. 8-35, 22
		5) Cooling water valve (S-4) not operating correctly (should be open during purge, sterilize and exhaust.	Fig. 7-9
		5a) Repair or replace valve.	Fig. 8-29, 3
		5b) Check wiring to valve — repair or replace.	
		5c) Check LED D-16 on PC board 1 — should be on during exhaust. Replace board if light **not** on.	Fig. 6-2 Fig. 8-15, 8
		5d) 5b and 5c ok — replace PC board 1.	Fig. 8-15
	4.H. Steam and or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — replace diaphragm or gasket.	Fig. 8-24, 5 Para. 7.9
	4.I. Safety valve pops or bleeds excessively	1) Pressure regulator valve improperly adjusted or malfunctioning — adjust, repair, or replace valve.	Fig. 8-39 Para. 7.9
		2) Safety valve defective — replace.	Fig. 8-35, 22

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
4. Continued	4.J. Pressure too high, temperature too low during sterilize phase	1) Air trapped in chamber because of clogged strainer or drains — clean strainer inside chamber, flush and clean drain line and traps.	Para. 4.3
		2) Chamber trap defective — replace element.	Fig. 8-41
		3) Improper loading technique or equipment.	
	4.K. Cycle stuck in exhaust phase	1) PS-2 on display panel set incorrectly — should be 2.	Fig. 8-46, 12 Para. 7.16
		2) PS-2 output drive failure on main Printcon PC board. Wire #113 should be at 5 VDC until pressure is below 1 psi, should drop to 0 VDC at 1 psi and below. Extract wire #113 from plug 2, pin 3 and check.	Fig. 3-7 Schematics
		3) PS-2 input failure on Eagle CPU PC board. Replace if 4.K.2. is ok.	Fig. 8-15, 8
5. At end of cycle	5.A. Cycle fails to reach COMPLETE after exhaust completed, or signals COMPLETE too soon	1) PS-2 on display panel set incorrectly — should be 2.	Fig. 7-20
		2) Open or shorted wire — see step 4.K.2.	
		3) Pressure circuitry on main Printcon PC board out of calibration — check.	Para. 7.21
	5.B. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective — check voltage across buzzer, replace if necessary.	Fig. 8-16, 10
		2) Open wire — disconnect P1 from control and check continuity between pin W and J6 3 or 4. Isolate and repair.	Fig. 6-2
		3) PC board defective — check LED D-18 on board; replace PC board if LED does **not** come on at end of cycle.	Fig. 6-2
	5.C. Door does not unlock at end of cycle	1) Door unlock solenoid SA-21 (D-19) defective — repair or replace.	Fig. 8-54, 12
		2) Door unlock cable loose or broken — adjust or replace.	Fig. 8-26, 8

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Continued		3) Door unlock solenoid SA-21 not operating correctly (should be on).	Fig. 8-54, 12
		3a) Check wiring to solenoid — repair or replace.	
		3b) Check LED D-19 on PC board 2 — should be on. Replace board if light **not** on. If D-19 is on, replace board.	Fig. 6-2 Fig. 8-15, 9
		3c) Internal thermal overload in door lock solenoid has opened. Replace solenoid. If problem persists, the ambient air temperature surrounding the machine is too hot. Correct by improving air flow in area.	
	5.D. Excessive steam when door is opened or excessive effort needed to unlock door when buzzer sounds	1) PS-2 setting incorrect (set too high) — should be 2.	Fig. 7-20
		2) Pressure circuitry on main Printcon PC board out of calibration — check.	Para. 7.21
		3) Excess water in chamber — see 5.E.	
	5.E. Water in chamber or door channel at end of cycle	1) Chamber drain valve (CV-21 or S-23) not operating correctly (should be open).	Fig. 7-9 Fig. 8-38, 17
		1a) Repair or replace valve.	
		1b) Check wiring to valve — repair or replace.	
		1c) Check LED D-23 on PC board 2 — should be on. Replace board if light **not** on.	Fig. 6-2 Fig. 8-15, 9
		1d) 1b and 1c ok — replace PC board 1.	Fig. 8-15
		2) IJ-22 not operating correctly — clean IJ-22 orifice or replace.	Fig. 8-38, 7
		3) Filter upstream of IJ-22 plugged — clean or replace.	Fig. 8-33, 2
		4) Chamber floor not pitched toward drain — see leveling procedure.	Para. 5.3

Eagle Series

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Continued		5) Drains plugged or slow — remove chamber drain screen and clean thoroughly. Mix three tablespoons trisodium phosphate (tech. grade) in one pint water. Pour into chamber drain. Let sit and then rinse with cold water.	Para. 4.3
		6) Chamber steam trap does not open — replace trap element.	Fig. 8-4
		7) Steam not "dry" — check steam quality.	
		8) Drain line check valve defective — replace.	Fig. 8-32. 4
		9) Water level probe not operating correctly — see step 3.B.	Fig. 8-56
	5.F. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace, if necessary.	Fig. 8-16, 17
		2) Open wire — disconnect P1 from control and check continuity between pin P and J6 3 or 4. Isolate and repair open.	Fig. 6-2
		3) PC board 1 defective — check LED D-17 on board; replace board if LED does not come on at end of cycle.	Fig. 6-2 Fig. 8-15, 8
6. Miscellaneous	6.A. Continuous sounding buzzer whenever machine is turned on	1) Excessive current leakage from triac — replace PC board 1.	Fig. 8-16, 10 Fig. 8-15, 8
	6.B. Pressure displayed is more than +2 PSI different than chamber gauge	1) Faulty chamber pressure gauge — replace.	Fig. 8-6, 27
		2) Pressure circuitry on main Printcon PC board out of alignment — check.	Para. 7.21
		3) Faulty sensor — replace.	
	6.C. Two or more adjacent columns on printed record are blank	1) Printer hammer coil(s) open or shorted — replace printer.	Fig. 7-19 Para. 7.15
	6.D. Illegible printed record	1) See 2.S.2 and 2.S.3.	
		2) Binding of mechanical linkage in printer — replace printer.	Para. 7.15 Fig. 8-47, 22

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued	6.E. Paper is advanced but is entirely blank	1) Printer coil connector is unplugged from P20/J20 connector — reconnect. 2) Loss of continuity in Wire 312 (to J42 Pin 7). 3) Failure on main Printcon PC board. Replace.	Fig. 8-47, 23
	6.F. Time or date not displayed	1) J51/P51 connector unplugged from display panel overlay — reconnect.	Fig. 8-46, 16
	6.G. Continuous display of time or date	1) Time or date display pushbutton on display panel shorted — replace.	Fig. 8-46, 16 Para. 7.16
	6.H. Automatic advance of display when time or date pressed.	1) Forward switch on display panel shorted — replace panel.	Fig. 8-46, 16 Para. 7.16
	6.I. Automatic reverse of display when time or date pressed.	1) Reverse switch on display panel shorted — replace panel.	Fig. 8-46, 16 Para. 7.16
	6.J. Cannot advance time or date.	1) Forward switch on display panel open — replace panel.	Fig. 8-46, 16 Para. 7.16
	6.K. Cannot reverse time or date.	1) Reverse switch on display panel open — replace panel.	Fig. 8-46, 16 Para. 7.16
	6.L. Paper will not be taken up	1) Paper advance toggle switch in wrong position — check. 2) Take-up motor fuse blown (1/32 amp). 3) Paper advance toggle switch failure — replace toggle switch. 4) Platen switch failure (closed) — replace platen switch. 5) Take-up motor open or shorted — replace motor.	 Fig. 7-19 Para. 7.15 Fig. 7-19 Fig. 8-48, 14 Fig. 8-47, 12 Para. 7.15
	6.M. Pinch rollers run continuously.	1) Platen switch failure (open) — replace platen switch. 2) Take up mechanism jammed.	Fig. 7-19 Fig. 8-48, 14
	6.N. Continuous paper feed	1) Paper advance toggle switch is in "paper advance" position — turn off paper advance. 2) Paper advance toggle switch failure — replace switch.	Fig. 7-19 Fig. 7-19 Fig. 8-47, 28

TABLE 6-2: CONTINUED

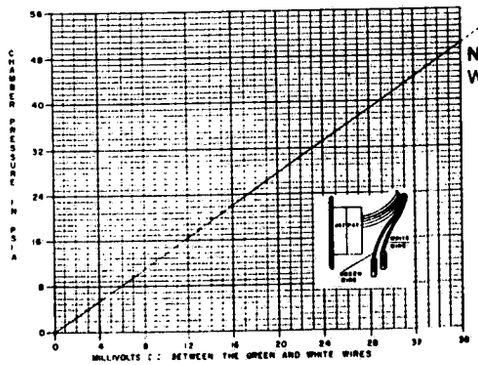
OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued	6.O. Display and printout show incorrect date	1) Year switch incorrectly set — check setting. 2) Year switch failure on main Printcon PC board — replace board.	Fig. 7-24 Fig. 8-46, 3 Para. 7.17
	6.P. Temperature indication is incorrect, pressure is correct	1) Calibration misalignment or component failure on main Printcon PC board — recalibrate or replace board. 2) Faulty temperature sensor — replace sensor. See Note 1 below.	Fig. 8-46, 3 Para. 7.21 Para. 7.17 Fig. 8-55, 2
	6.Q. "ALARM: PRES SENSOR" is printed and intermittent buzzer sounds	1) Switch #4 on the service switch (on the main Printcon PC board) is in the OFF position — set to ON.	Para. 7.19 Fig. 7-22 & 7-23
	6.R. Pressure and temperature readings are non-linear (i.e., accurate at some points but not at others.)	1) P2, gain adjustment setting is incorrect — adjust P2. 2) P1, converter reference setting is incorrect — adjust P1.	Fig. 7-26 Fig. 7-26

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

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

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

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



NOTE: NOMINAL MAXIMUM WORKING PRESSURE IS 50 psia.

TABLE 6-3. STRAIN GAUGE PRESSURE TRANSDUCER RESPONSE.

6.4 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.

NOTE: Jump pin 38 of P4 to DC common at common terminal of pressure switch PS-2 (Wire 117). PS-2 is located in the "Liquid Sensing" box.

3. If an **entire number** fails to illuminate, disconnect P4 from controller. Check for proper functioning of each display segment by following this procedure: Carefully jump, one at a time, the P4 connector pins (as listed in Table 6-4) to ground (TB2 terminals 3, 4, or 5, as applicable). Compare the segments actually illuminated with the pattern which should be indicated (pattern A, B, C, or D). If the pattern actually illuminated differs from the pattern illustrated, perform a continuity check of the wire. If the wire is good, then the primary panel must be replaced.

TABLE 6-4: TEST PATTERNS — STERILIZE TIME THUMBWHEEL SWITCHES.

P4 Connector Pin	"STERILIZE" DISPLAY, 10's digit. (IC2), should indicate pattern:	"STERILIZE" DISPLAY, unit's digit (IC2), should indicate pattern:
26	A	
27	B	
28	C	
29	D	
30		A
31		B
32		C
33		D

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 P4-2. If the continuity is bad, replace the appropriate thumbwheel switch and/or repair the open circuit in the wire harness. If the continuity check is good, replace controller Board 1.

TABLE 6-5: CONTINUITY CHECK — STERILIZE TIME THUMBWHEEL SWITCHES.

STERILIZE TIME THUMBWHEEL	
Switch Setting	Continuity Path to P4-2 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

6.5 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 6-3. TEMPERATURE THUMBWHEEL SWITCHES: Wiring.

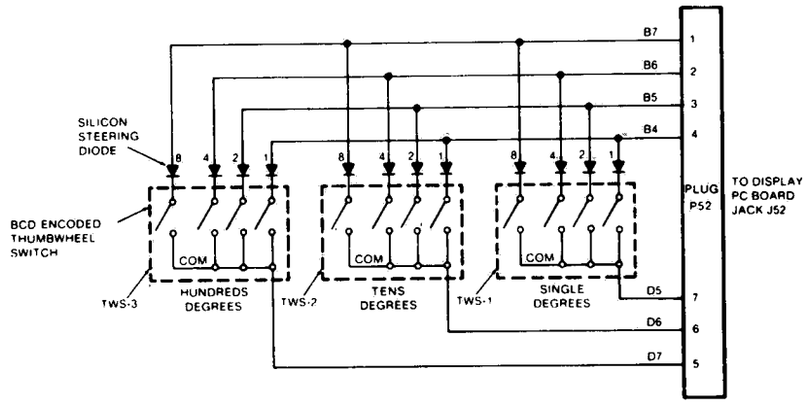


TABLE 6-6: SWITCH CHECKOUT CHART

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

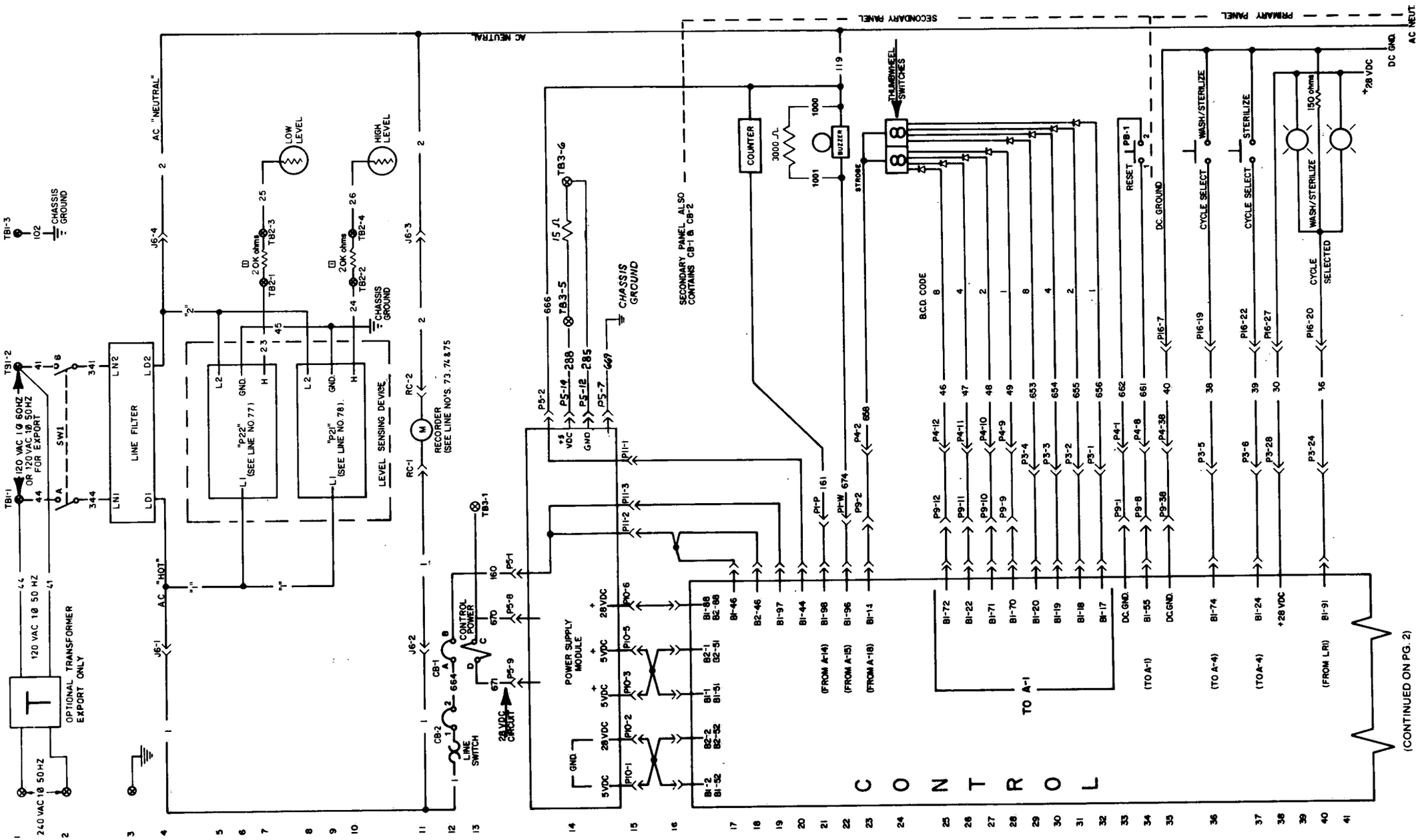
Eagle Series

TABLE 6-8: SCHEMATIC REFERENCE LIST

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

Title	Sheet	Reference
ELECTRICAL SCHEMATIC: Washer/Sterilizer (IRC)	1 of 2 2 of 2	146605
PIPING SCHEMATIC: Washer/Sterilizer (IRC)	1 of 1	—
ELECTRICAL SCHEMATIC: Washer/Sterilizer (Printcon)	1 of 2 2 of 2	146649-044
PIPING SCHEMATIC: Washer/Sterilizer (Printcon)	1 of 1	—
MASTER WIRE LIST: (IRC)	1 of 1	150822-260
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
TEMPERATURE CONTROL SCHEMATIC	1 of 1	764315-334
WARRICK LEVEL CONTROL	1 of 1	136729-001
PRIMARY P. .NEL SCHEMATIC	1 of 2 2 of 2	136640-001

DWG. NO. 146605
(9-26-85)

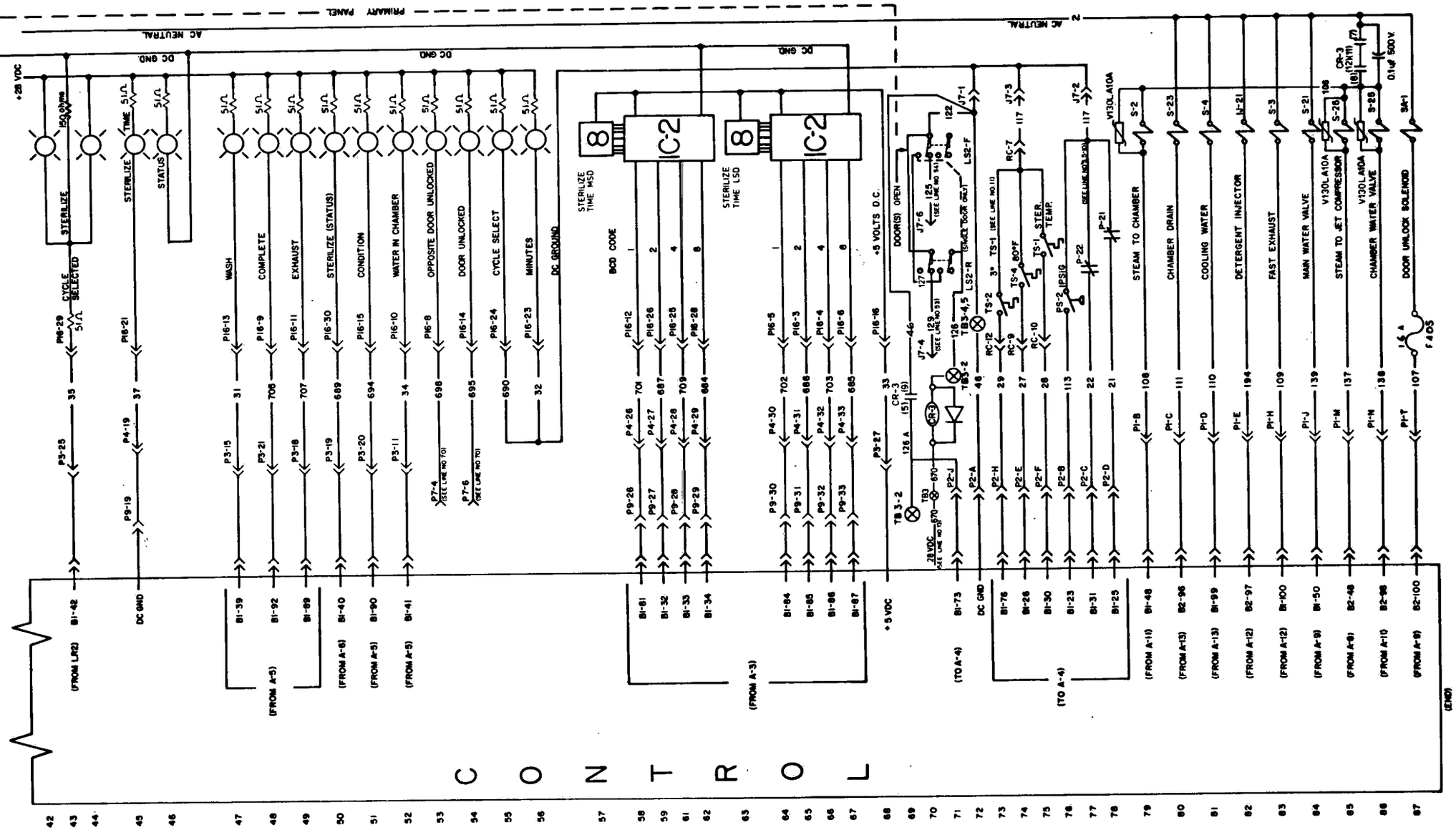


NOTE: See DWG. 150822-260 for Wire List

ELECTRICAL SCHEMATIC (1 OF 2).
(Units with Indicator-Recorder)

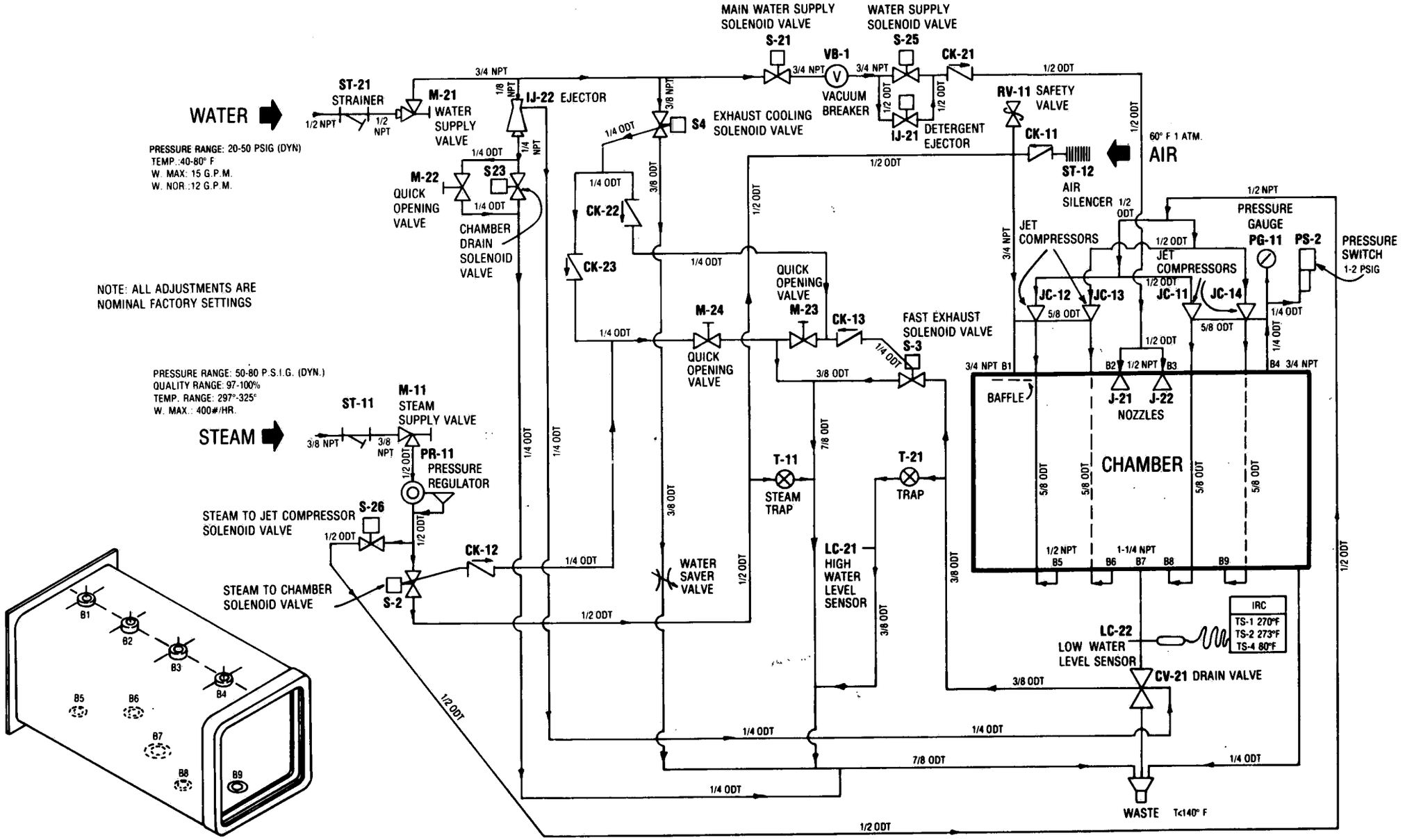
Rev. 2/86

DWG. NO. 146605
(9-26-85)



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

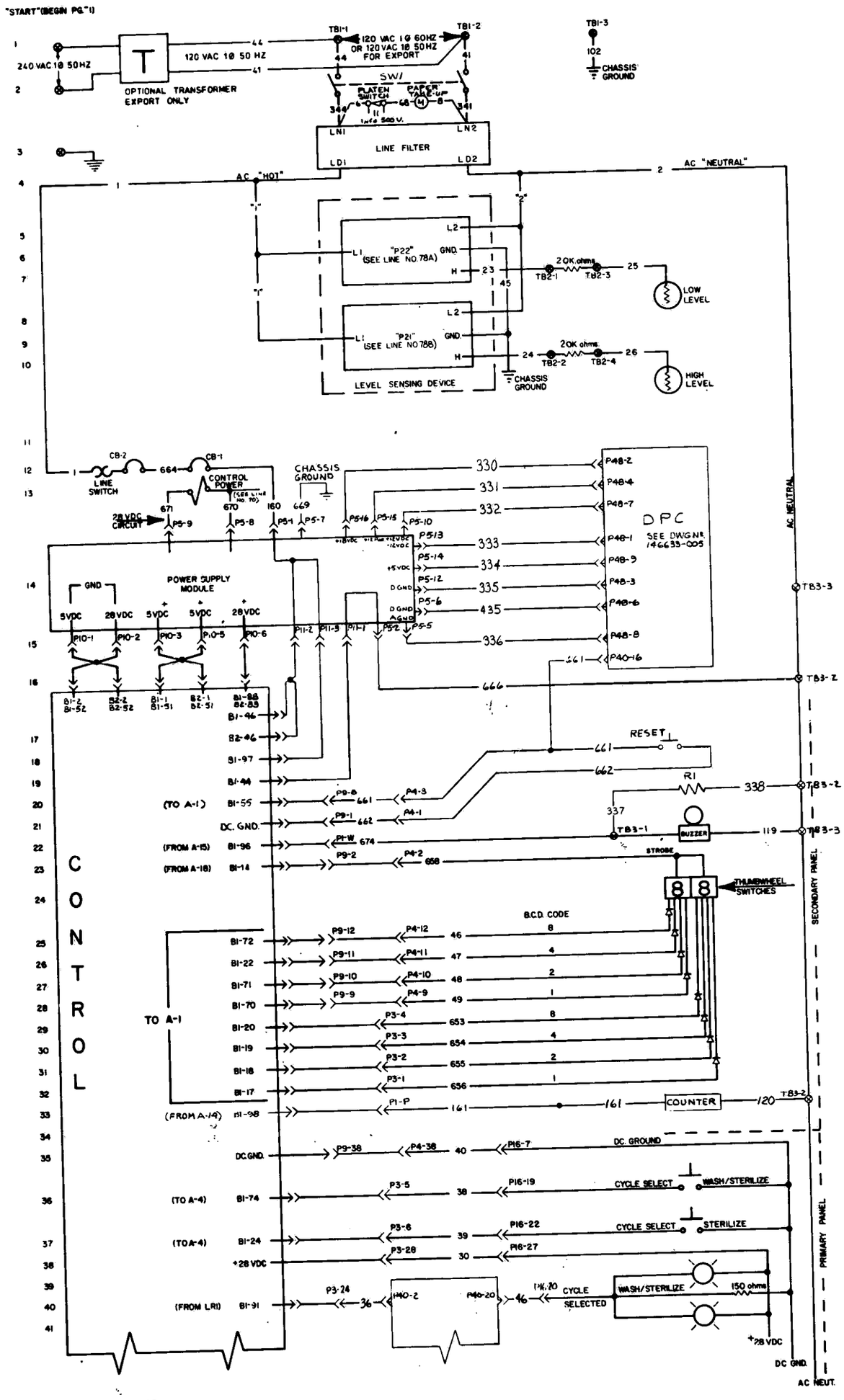
Rev. 2/86



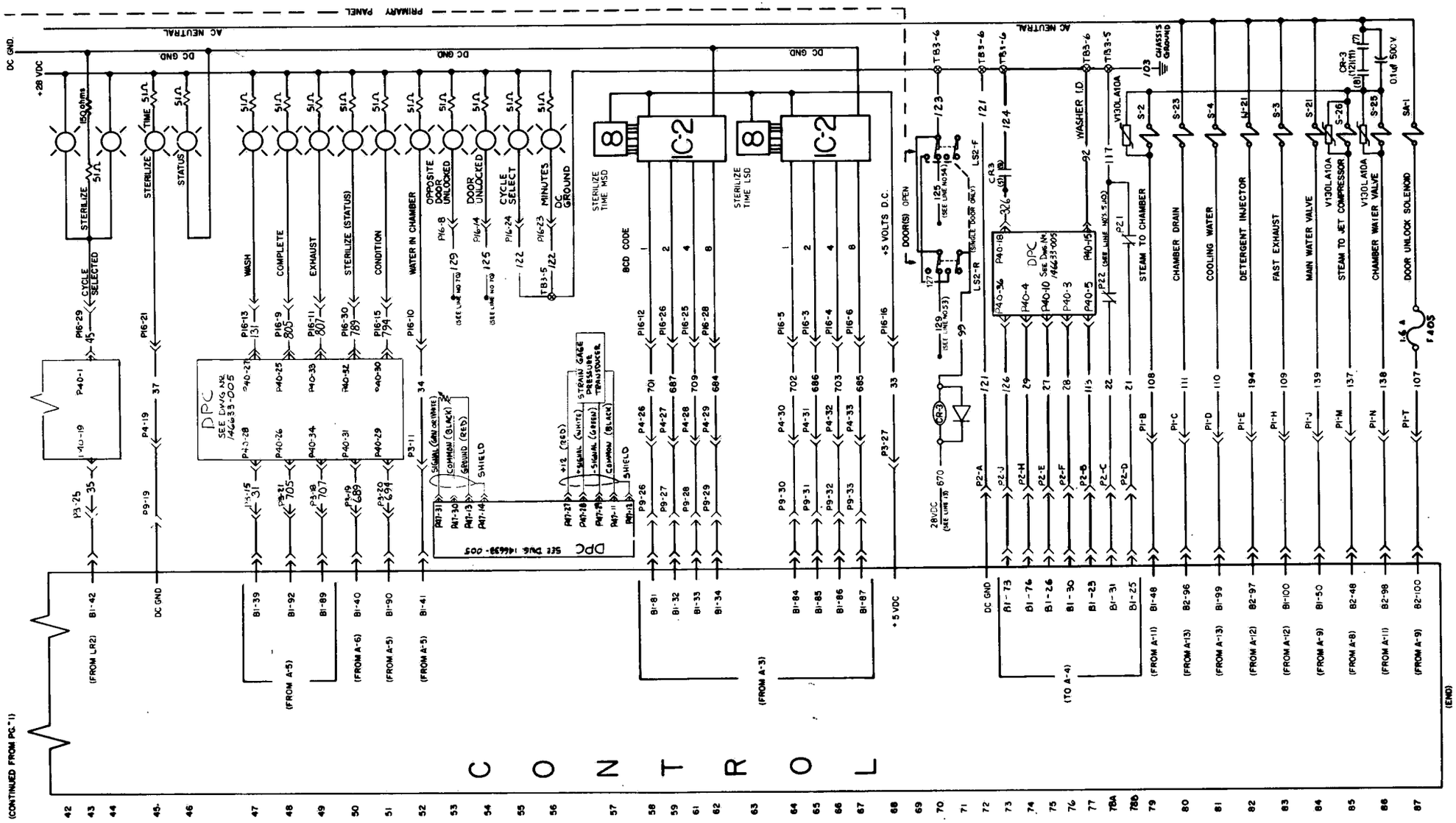
PIPING SCHEMATIC.
(Units with Indicator-Recorder)

764089

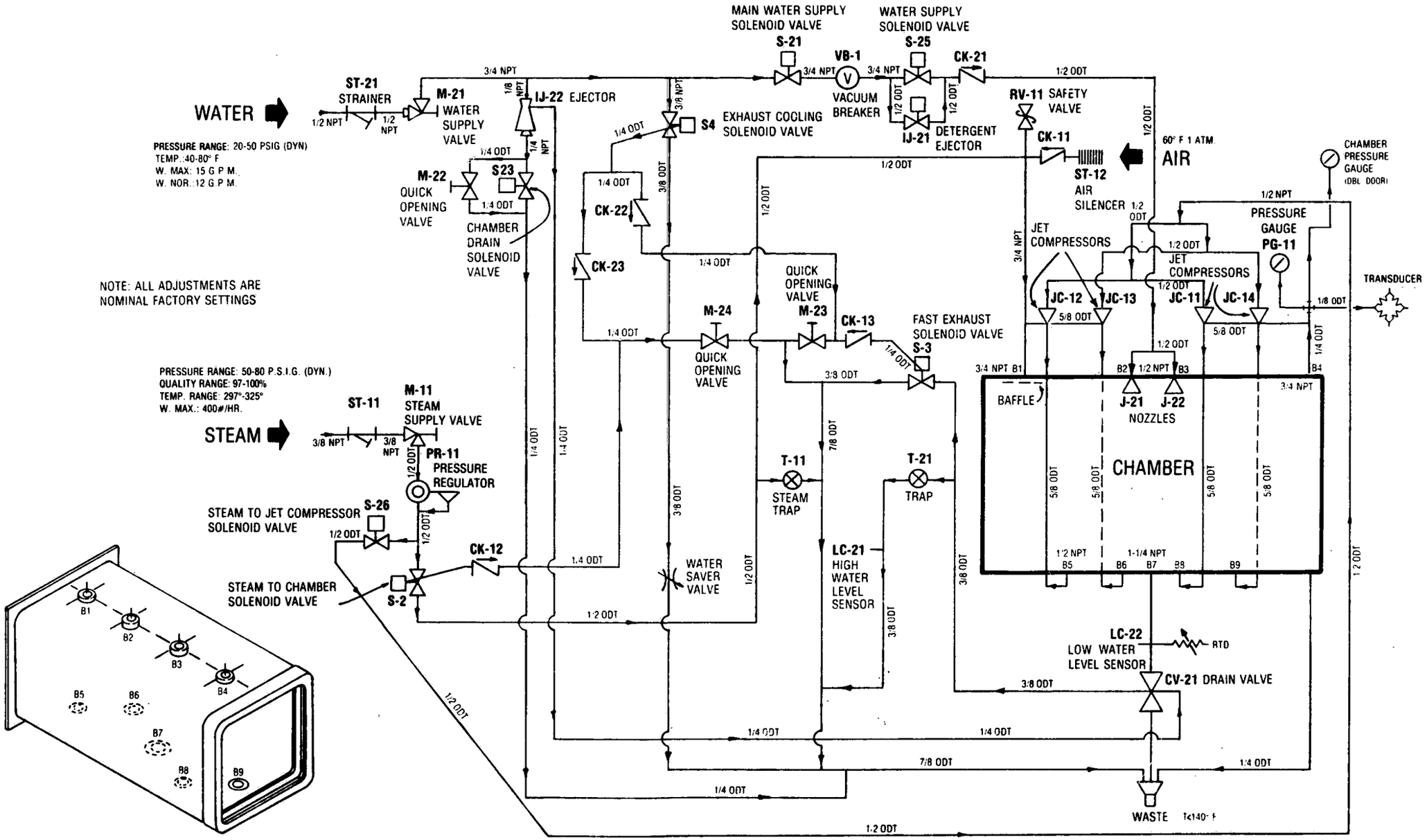
Rev. 2/86



ELECTRICAL SCHEMATIC (1 OF 2)
(Units with Printcon)



ELECTRICAL SCHEMATIC (2 OF 2)
(Units with Printcon)



PIPING SCHEMATIC.
(Units with Printcon)
764089

DWG. NO. 150822-260 (9-26-85)

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
1	BLK	LD-1/FILTER	QUICK-CONN	P21-L1/LSD	RING TERM	
1	"	P21-L1/LSD	RING TERM	P22-L1/LSD	"	
1	"	P22-L1/LSD	"	J6-1	PIN-MALE	
1	"	P6-1	PIN-FEMALE	CB2-1	QUICK-CONN	
1	"	CB2-1	QUICK-CONN	P6-2	PIN-FEMALE	
1	"	J6-2	PIN-MALE	RC-1	PIN-MALE	
2	WHITE	CR3-7/W WAY	RING TERM	SA-1	QUICK-CONN	
2	"	SA-1	QUICK-CONN	WIRE WAY	SPLICE-CONN	
2	"	WIRE WAY	SPLICE-CONN	S-3	"	
2	"	S-3	"	WIRE WAY	"	
2	"	WIRE WAY	"	S-21	"	
2	"	S-21	"	S-4	"	
2	"	S-4	"	S-23	"	
2	"	S-23	"	1J-21	"	
2	"	1J-21	"	WIRE WAY	"	
2	"	WIRE WAY	"	LSD/P21-L2	RING TERM	
2	"	LSD/P21-L2	"	LSD/P22-L2	"	
2	"	LD-2/FILTER	QUICK-CONN	LSD/P22-L2	"	
2	"	LSD/P21-L2	RING TERM	J6-4	PIN-MALE	
2	"	P6-4	PIN-FEMALE	BUZZER	SPLICE-CONN	
2	"	BUZZER	SPLICE-CONN	P6-3	PIN-FEMALE	
2	"	J6-3	PIN-MALE	RC-2	PIN-MALE	
21	BLUE	LSD/P21-NC-1	QUICK-CONN	P2-D	PIN-FEMALE	
22	"	LSD/P22-NC-1	"	P2-C	"	
23	BLK	LSD/P22-H	"	TB2-1	RING TERM	
24	"	LSD/P21-H	"	TB2-2	"	
25	RED	PROBE/LO	---	TB2-3	"	
26	"	PROBE/HI	---	TB2-4	"	
27	BLUE	RC-9	PIN-MALE	P2-E	PIN-FEMALE	
28	"	RC-10	"	P2-F	"	
29	"	RC-12	"	P2-H	"	
30	YELLOW	P16-27	PIN-FEMALE	P3-28	PIN-MALE	
31	"	P16-13	"	P3-15	"	
32	YELLOW	P16-23	PIN-FEMALE	P7-2	PIN-FEMALE	
32	"	P7-2	"	P7-3	"	
33	"	P16-16	"	P3-7	"	
34	"	P16-10	"	P3-11	PIN-MALE	
35	"	P16-29	"	P3-25	"	
36	"	P16-20	"	P3-24	"	
37	"	P16-21	"	P4-19	"	
38	"	P16-19	"	P3-5	"	
39	"	P16-22	"	P3-6	"	
40	"	P16-7	"	P4-38	"	
41	WHITE	TB1-L2	RING TERM	SW1-B	QUICK-CONN	
44	BLK	TB1-L1	"	SW1-A	"	
45	GREEN	LSD/P21-G	"	CHASSIS GND	"	
46	BROWN	J7-1	PIN-MALE	TB3-4	"	
46	"	TB3-4	RING TERM	P2-A	PIN-FEMALE	
46	"	TB3-4	"	CR3-9	RING TERM	
46	BLK	SWB-W5	SOLDER	P4-12	PIN-MALE	
47	"	SWB-W6	"	P4-11	"	
48	"	SWB-W7	"	P4-10	"	
49	"	SWB-W8	"	P4-9	"	
102	GREEN	GND SCREW	RING TERM	TB1-3	RING TERM	IN LSD JUNCTION
102	"	TB1-3	"	CHASSIS GND	"	BOX TO SECONDARY

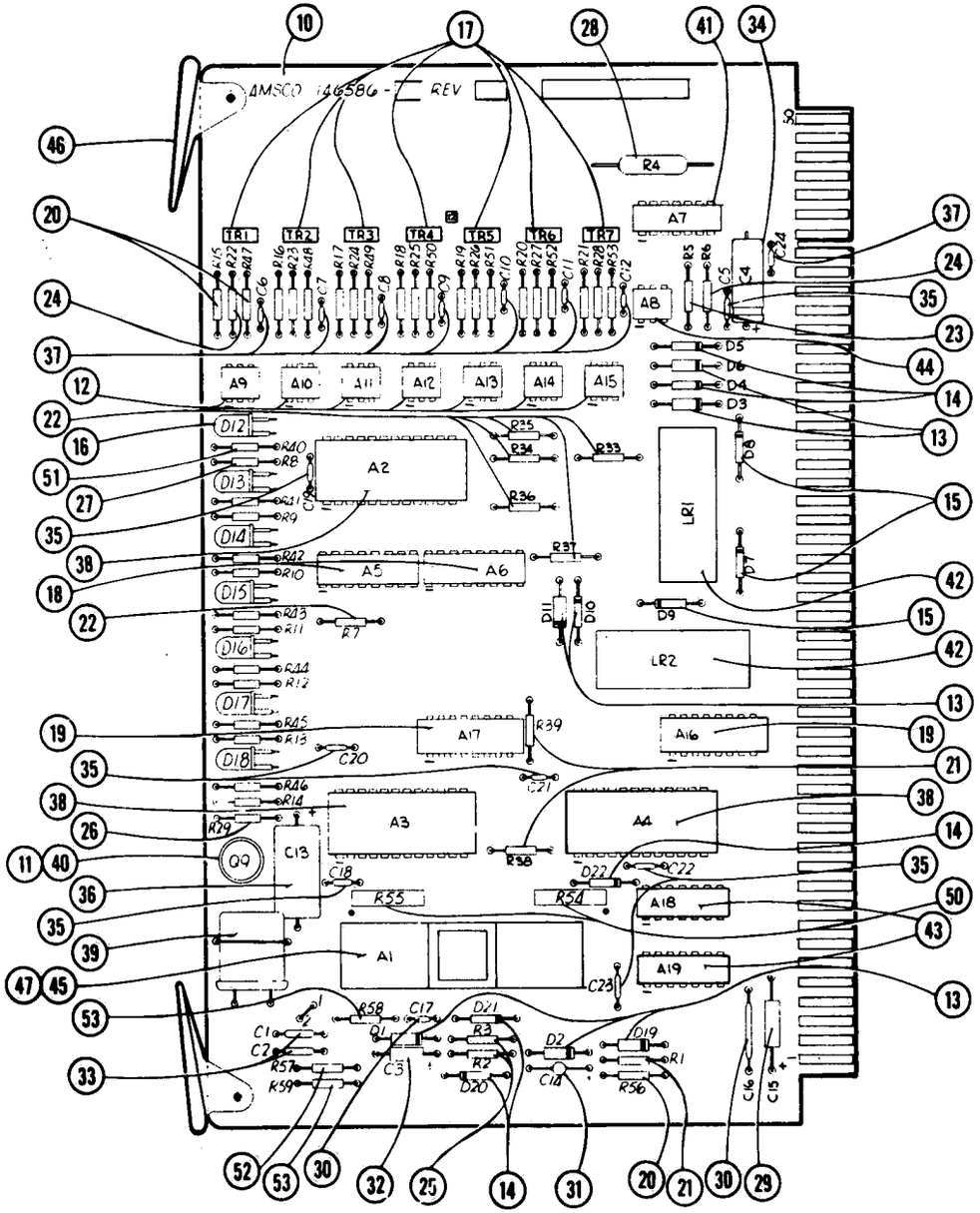
WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
106	WHITE	S2	SPLICE-CONN	S26	SPLICE-CONN	
106	"	S26	"	S25	"	
106	"	S25	"	CR3-8	RING TERM	
107	RED	SA-1	"	P1-T	PIN-MALE	
108	"	S2	"	WIRE WAY	SPLICE-CONN	
108	"	WIRE WAY	"	P1-B	PIN-MALE	
109	"	S3	"	P1-H	"	
110	"	S4	"	P1-D	"	
111	"	S23	"	P1-C	"	
113	BROWN	PS2-NO	QUICK-CONN	P2-B	PIN-FEMALE	
117	BLK	PS2-COM	"	LSD/P21-C1	QUICK-CONN	
117	"	LSD/P21-C1	"	LSD/P22-C1	"	
117	VIOLET	LSD/P22-C1	"	J7-2	PIN-MALE	
117	"	J7-3	PIN-MALE	RC-7	"	
119	WHITE	BUZZER	QUICK-CONN	WIRE #2	SPLICE-CONN	
122	VIOLET	J7-1	PIN-MALE	LS(F)-COM	RING TERM	
122	"	LS(F)-COM	RING TERM	LS(B)-COM	"	
125	RED	LS(F)-NC	"	J7-6	PIN-MALE	
126	"	LS(F)-NO	"	TB3-2	RING TERM	
126	"	TB3-2	"	CR3-B/W WAY	"	
126	"	LS(F)-NO	"	LS(B)-COM	"	DBL. DOOR ONLY
126A	"	CR3-5/W WAY	"	TB3-2	"	
126A	"	TB3-2	"	P2-J	PIN-FEMALE	
127	"	LS(F)-NO	"	LS(B)-NO	RING TERM	DBL. DOOR ONLY
129	"	LS(B)-NC	"	J7-4	PIN-MALE	" " "
137	"	S26	SPLICE-CONN	WIRE WAY	SPLICE-CONN	
137	"	WIRE WAY	"	P1-M	PIN-MALE	
138	"	S25	"	WIRE WAY	SPLICE-CONN	
138	"	WIRE WAY	"	P1-N	PIN-MALE	
139	"	S21	"	P1-J	"	
160	BLK	CB1-B	QUICK-CONN	P5-1	PIN-FEMALE	
161	"	COUNTER	SPLICE-CONN	P1-P	PIN-MALE	
194	RED	1J-21	SPLICE-CONN	P1-E	"	
341	WHITE	LN-2/FILTER	QUICK-CONN	SW1-B-NO	QUICK-CONN	
344	BLK	LN-1/FILTER	"	SW1-A-NO	"	
653	"	SWB-W1	SOLDER	P3-4	PIN-MALE	
654	"	SWB-W2	"	P3-3	"	
655	"	SWB-W3	"	P3-2	"	
656	"	SWB-W4	"	P3-1	"	
658	"	SWB-C	"	P4-2	"	
661	"	PB1-1	SPLICE-CONN	P4-8	"	
662	"	PB1-2	"	P4-1	"	
664	"	CB1-A	QUICK-CONN	CB2-2	QUICK-CONN	
666	"	P5-2	PIN-FEMALE	WIRE #2	SPLICE-CONN	
666	BLK	WIRE #2	SPLICE-CONN	COUNTER	WIRE LEAD	
669	GREEN	CHASSIS GND	RING TERM	P5-7	PIN-FEMALE	
670	BLK	P5-8	PIN-FEMALE	CB1-C	QUICK-CONN	
670	"	CB1-C	QUICK-CONN	TB3-1	RING TERM	
670	"	TB3-1	RING TERM	CR3-A/W WAY	"	
671	"	CB1-D	QUICK-CONN	P5-9	PIN-FEMALE	

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
674	BLK	BUZZER	QUICK-CONN	P1-W	PIN-MALE	
684	YELLOW	P16-28	PIN-FEMALE	P4-29	"	
685	"	P16-6	"	P4-33	"	
686	"	P16-3	PIN-FEMALE	P4-31	"	
687	"	P16-26	"	P4-27	"	
689	"	P16-30	"	P3-19	"	
690	"	P16-24	"	P7-1	PIN-FEMALE	
690	"	P7-1	"	P7-2	"	
694	"	P16-15	"	P3-20	PIN-MALE	
695	"	P16-14	"	P7-6	PIN-FEMALE	
698	"	P16-8	"	P7-4	"	
701	"	P16-12	"	P4-26	PIN-MALE	
702	"	P16-5	"	P4-30	"	
703	"	P16-4	"	P4-32	"	
705	"	P16-9	"	P3-21	"	
707	"	P16-11	"	P3-18	"	
709	"	P16-25	"	P4-28	"	
1000	BLK	BUZZER	SPLICE-CONN	3KΩRes	SPLICE-CONN	
1001	"	BUZZER	"	3KΩRes	"	
206	GRAY	P25-1	PIN-FEMALE	P25-1	PIN-FEMALE	DBL. DOOR ONLY
207	"	" -2	"	" -2	"	" " "
208	"	" -3	"	" -3	"	" " "
209	"	" -4	"	" -4	"	" " "
210	"	" -5	"	" -5	"	" " "
211	"	" -6	"	" -6	"	" " "
212	"	" -7	"	" -12	"	" " "
213	"	" -8	"	" -8	"	" " "
214	"	" -9	"	" -9	"	" " "
215	"	" -10	"	" -10	"	DBL. DOOR ONLY
216	"	" -11	"	" -12	"	" " "
217	"	" -12	"	" -7	"	" " "
218	"	" -13	"	" -13	"	" " "
219	"	" -14	"	" -14	"	" " "
220	"	" -15	"	" -15	"	" " "
221	"	" -16	"	" -16	"	" " "
222	"	" -17	"	" -17	"	" " "
223	GRAY	P25-18	PIN-FEMALE	P25-18	PIN-FEMALE	DBL. DOOR ONLY
224	"	" -19	"	" -19	"	" " "
225	"	" -20	"	" -20	"	" " "
226	"	" -21	"	" -21	"	" " "
229	"	" -24	"	" -24	"	" " "
285	BLK	P5-12	PIN-FEMALE	TB3-6	RING TERM	
288	BLK	P5-14	"	TB3-5	"	

MASTER WIRE LIST
Eagle Washer/Sterilizer (IRC)

Add. 2/86

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

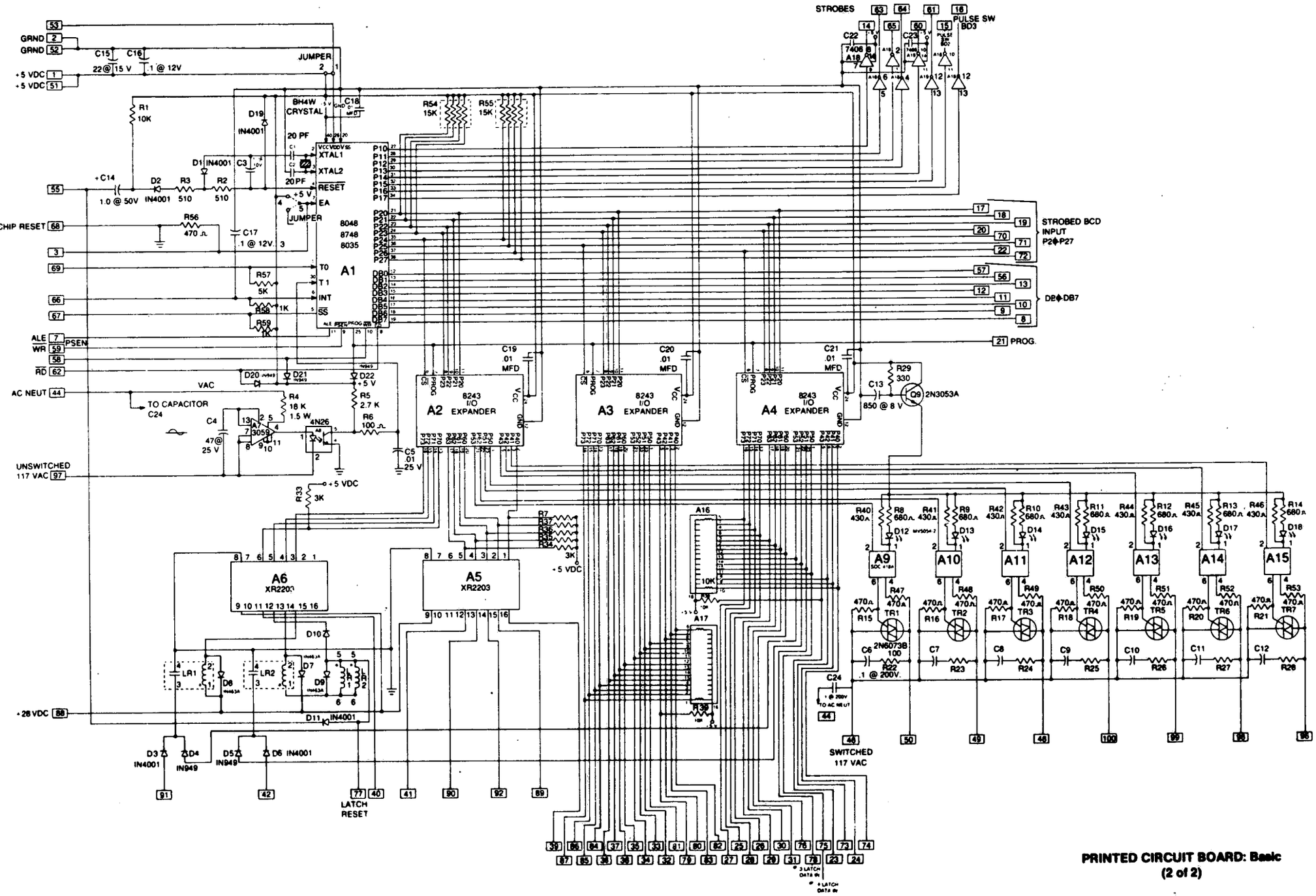


QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
1	10	P/C CARD & DRILL ASSY.	
1	11	PAD, TRANSISTOR	
7	12	IC SOC 418 A	TRIAC DRIVER A9-A15
7	13	RECTIFIER, IN4001	D1, D2, D3, D6, D10, D11, D19
5	14	DIODE, IN949	D4, D5, D20-D22
3	15	RECTIFIER, IN463A	D7, D8, D9
7	16	LAMP, SOLID STATE	MV 5054-2 L.E.D., DI2-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

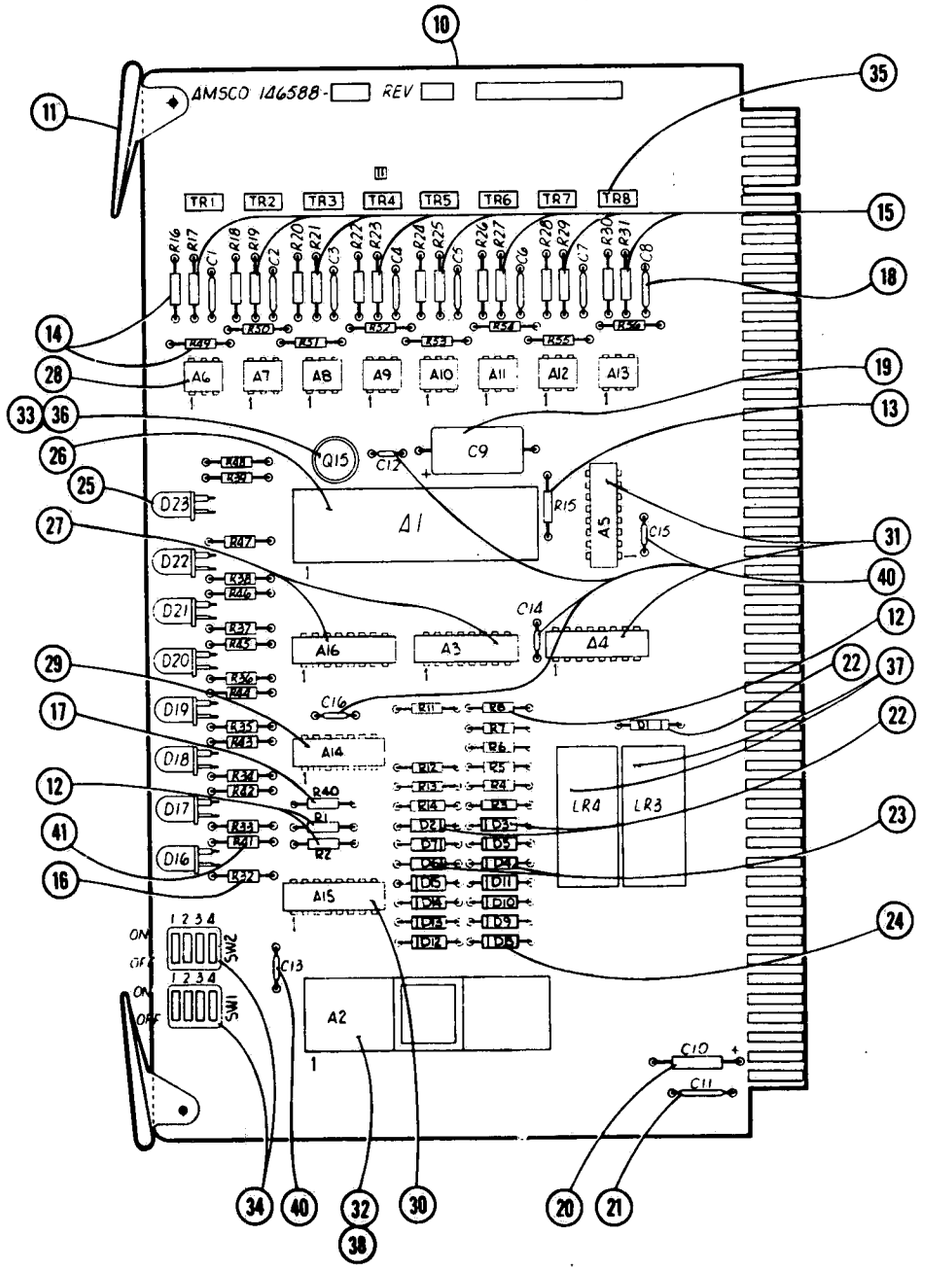
DWG. NO. 146586
(10/15/82)



PRINTED CIRCUIT BOARD: Basic
(2 of 2)

Rev. 11/83

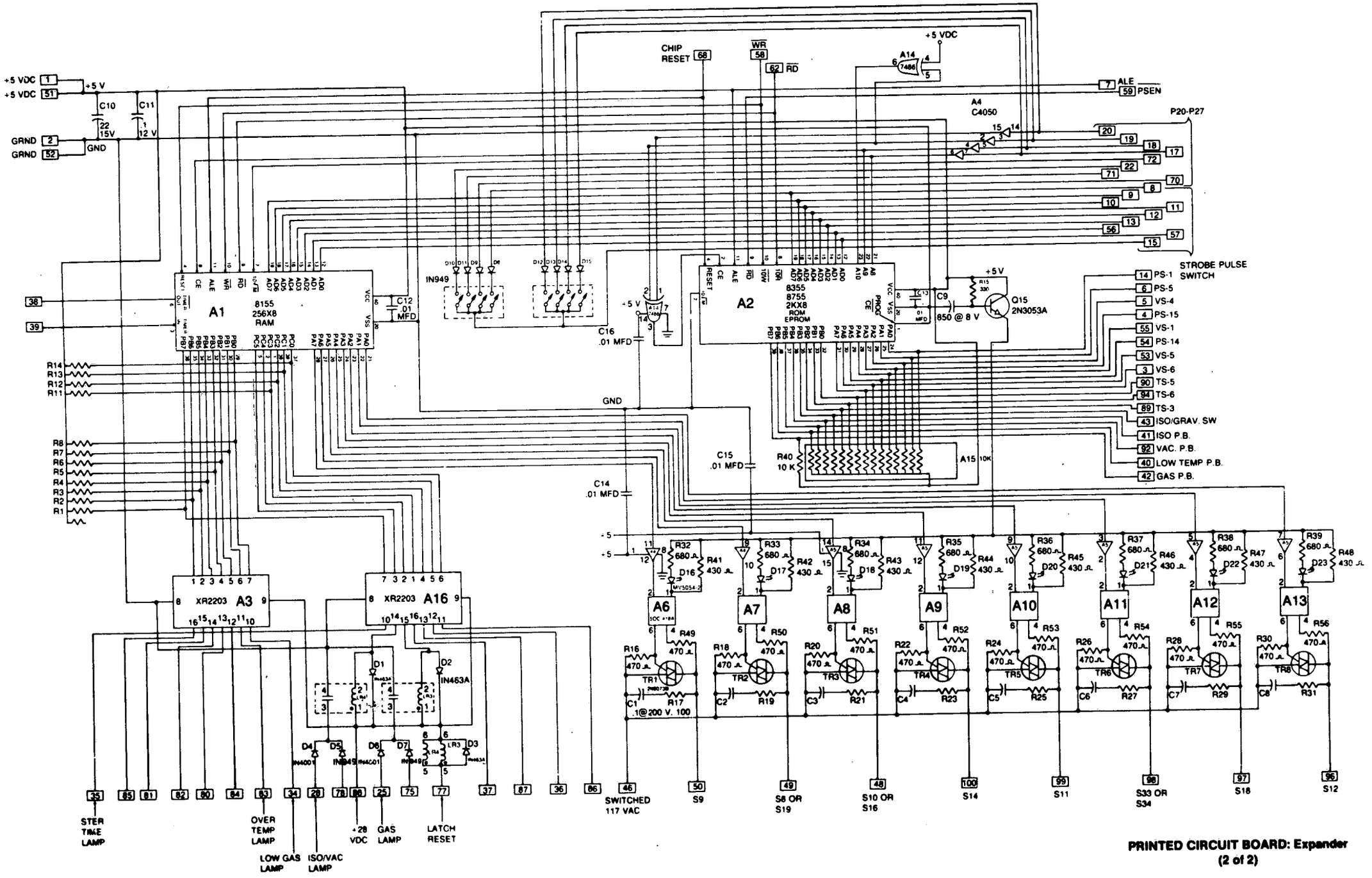
DWG. NO. 146588
(10/15/82)



QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
1	10	P/C CARD & DRILL SCHD.	
2	11	PULL, CARD	
12	12	RESISTOR, 3K OHMS	1/4W 5%, R1-R8, R11-R14
1	13	RESISTOR,330 OHMS	1/4W 5%, R15
16	14	RESISTOR, 470 OHMS	1/4W 5%, R16, R18, R20, R22, R24, R26, R28, R30, R49-R56
8	15	RESISTOR, 100 OHMS	1/4W 5%, R17, R19, R21, R23, R25, R27 R29, R31
8	16	RESISTOR, 680 OHMS	1/4W 5%, R32-R39
1	17	RESISTOR, 10K OHMS	1/4W 5%, R40
8	18	CAPACITOR, .1μf, 200V	C1-C8
1	19	CAPACITOR, 850μf, 8V	C9
1	20	CAPACITOR, 22μf, 15V	C10
1	21	CAPACITOR, .1μf, 12V	C11
3	22	DIODE	IN463A, D1, D2, D3
2	23	DIODE	IN4001, D4, D6
10	24	DIODE	IN949, D5, D7, D8-D15
8	25	L.E.D.	MV5054-2 D16-D23
1	26	MOS RAM, 8155	A1
2	27	DARLINGTON, XR2203	A3, A16
8	28	OPTOISO TRIAC	SOC 418A A6-A13
1	29	QUAD EX-OR, 7486	A14
1	30	RESISTOR, NETWORK	916C103X2PE A15
2	31	BUFFER, CMOS	CD4050BC A4, A5
1	32	DIP SOCKET, 40 PIN	A2
1	33	TRANSISTOR	2N3053A Q15
2	34	SWITCH, 16 POS HEX	SW1, SW2
8	35	TRIAC, 2N6073B	TRI-TR8
1	36	PAD, TRANSISTOR	Q15
2	37	RELAY, LATCH	LR3, LR4
1	38	BIT ROM	
	39	NOT USED	
5	40	CAPACITOR	0.01 MF @ 25V C12-C16
8	41	RESISTOR	430 OHMS 1/4W 5% R41-R48

PRINTED CIRCUIT BOARD: Expander
(1 of 2)

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



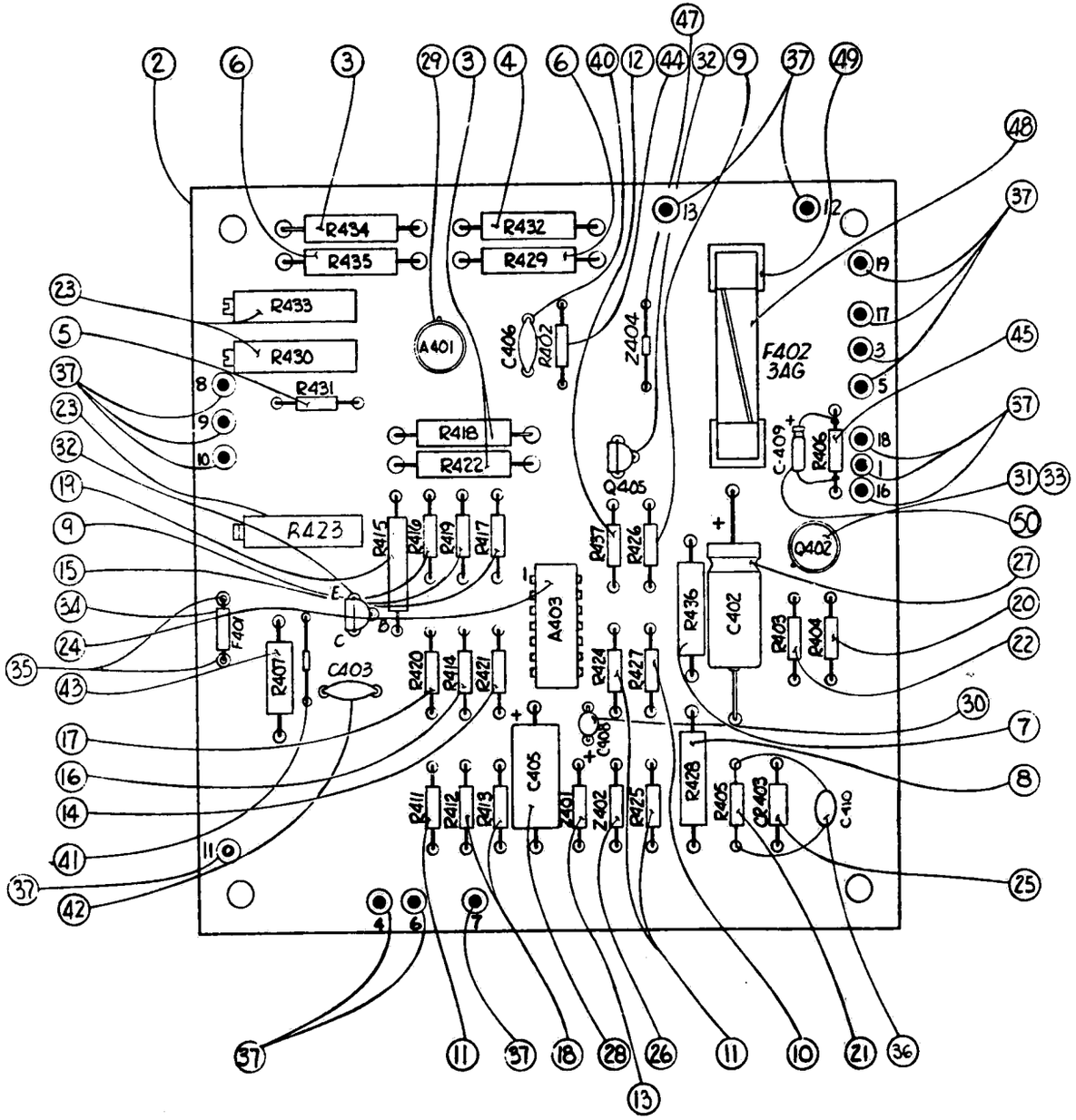
PRINTED CIRCUIT BOARD: Expander (2 of 2)

Rev. 11/83

D-1

D-2

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



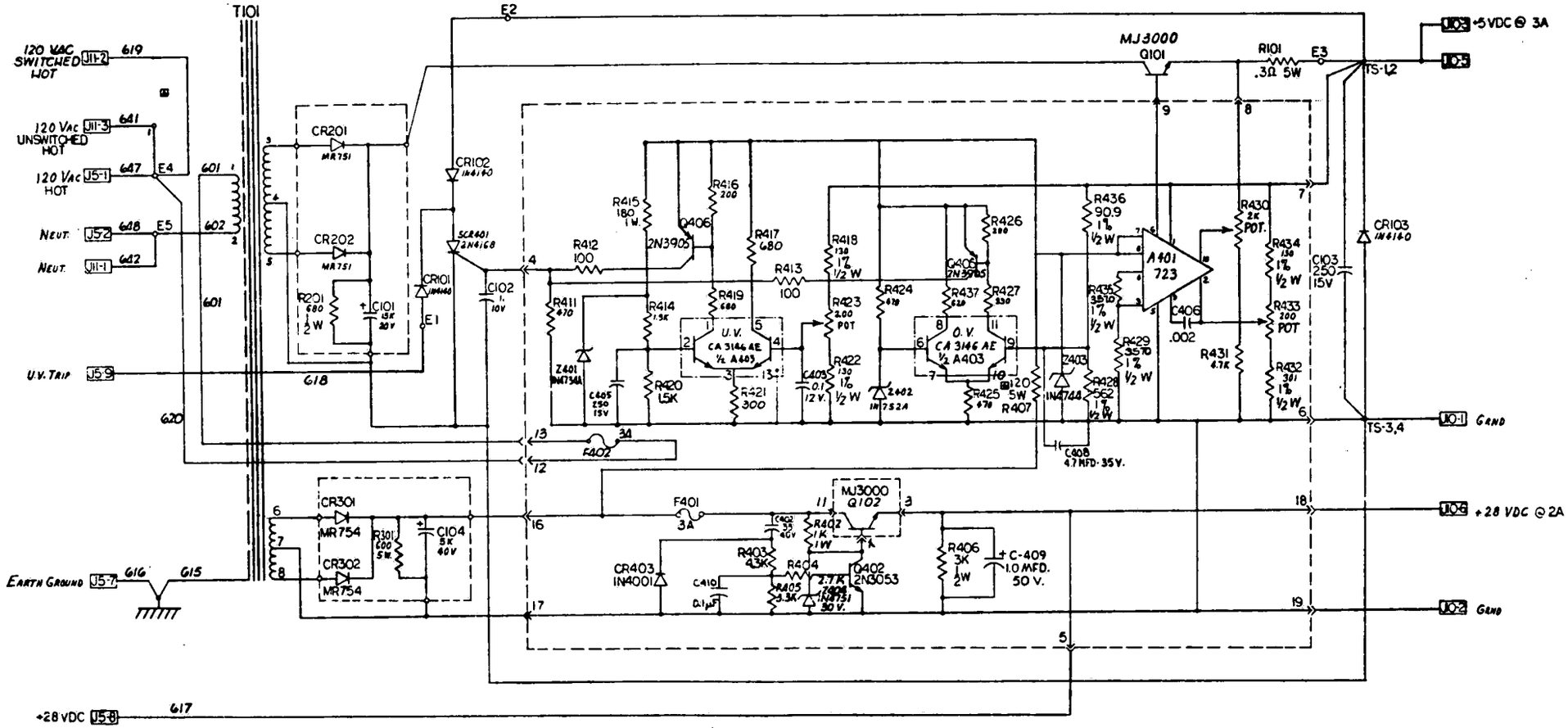
QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	2	P/C CARD	
1	3	RESISTOR, 130 OHMS	1% 1/2 W.M.F., R434
1	4	RESISTOR, 301 OHMS	1% 1/2 W.M.F., R432
1	5	RESISTOR, 47K OHMS	5% 1/4 W.C.C., R431
2	6	RESISTOR, 750 OHMS	1% 1/2 W.M.F., R429, R435
1	7	RESISTOR, 9.09 OHMS	1% 1/2 W.M.F., R436
1	8	RESISTOR, 562 OHMS	1% 1/2 W.M.F., R428
2	9	RESISTOR, 200 OHMS	5% 1/4 W.C.C., R416, R426
1	10	RESISTOR, 390 OHMS	5% 1/4 W.C.C., R427
3	11	RESISTOR, 470 OHMS	5% 1/4 W.C.C., R411, R424, R425
1	12	RESISTOR, 430 OHMS	5% 1/4 W.C.C., R437
1	13	DIODE, ZENER	IN4734A, Z401
1	14	RESISTOR, 300 OHMS	5% 1/4 W.C.C., R421
2	15	RESISTOR, 680 OHMS	5% 1/4 W.C.C., R419
1	16	RESISTOR, 1.3K OHMS	5% 1/4 W.C.C., R414
1	17	RESISTOR, 1.5K OHMS	5% 1/4 W.C.C., R420
2	18	RESISTOR, 100 OHMS	5% 1/4 W.C.C., R412, R413
1	19	RESISTOR, 180 OHMS	5% 1 W., C.C., R415
1	20	RESISTOR, 2.7K OHMS	5% 1/4 W.C.C., R404
1	21	RESISTOR, 3.3K OHMS	5% 1/4 W.C.C., R405
1	22	RESISTOR, 4.3K OHMS	5% 1/4 W.C.C., R403
2	23	POTENTIOMETER	200 OHMS, R423, R433
1	24	I.C.	CA3146AE. A403
1	25	DIODE	IN4001, CR403
1	26	DIODE, ZENER	IN752A, Z402
1	27	CAPACITOR, ELEC.	33 MFD 40V, C402
1	28	CAPACITOR, ELEC.	250 MFD 15 VDC, C405
1	29	I.C.	723 A401
1	30	CAPACITOR	4.7 MFD, 35V, C408
1	31	TRANSISTOR	2N3053 Q402
2	32	TRANSISTOR	2N3905, Q405, Q406
1	33	PAD, TRANSISTOR	
1	34	FUSE, 3 AMP	F401
2	35	TERMINAL, SOCKET	
1	36	CAPACITOR	C410
15	37	PIN, FORMED	
1	38	RESISTOR, 178 OHMS	1% 1/2 W.M.F., R422
1	39	RESISTOR, 82.5 OHMS	1% 1/2 W.M.F., R418
1	40	CAPACITOR, DISC.	.002 MFD 1KV, C406
1	41	DIODE, ZENER	IN4744, Z403
1	42	CAPACITOR	.1MFD 12VDC C403
1	43	RESISTOR	750 OHMS 3W R407
1	44	RESISTOR	1K 1W R402
1	45	RESISTOR	3K 1/2W R406
1	46	POTENTIOMETER	2K R 430
1	47	DIODE, ZENER	IN4751A 30V Z404
1	48	FUSE	3AG F402
2	49	CLIP, FUSE	
1	50	CAPACITOR	1.0 MFD, 50V, C409

P/C ASSEMBLY, Power Supply (Part 1 of 2)
(Units with Indicator-Recorder)

Rev. 2/86

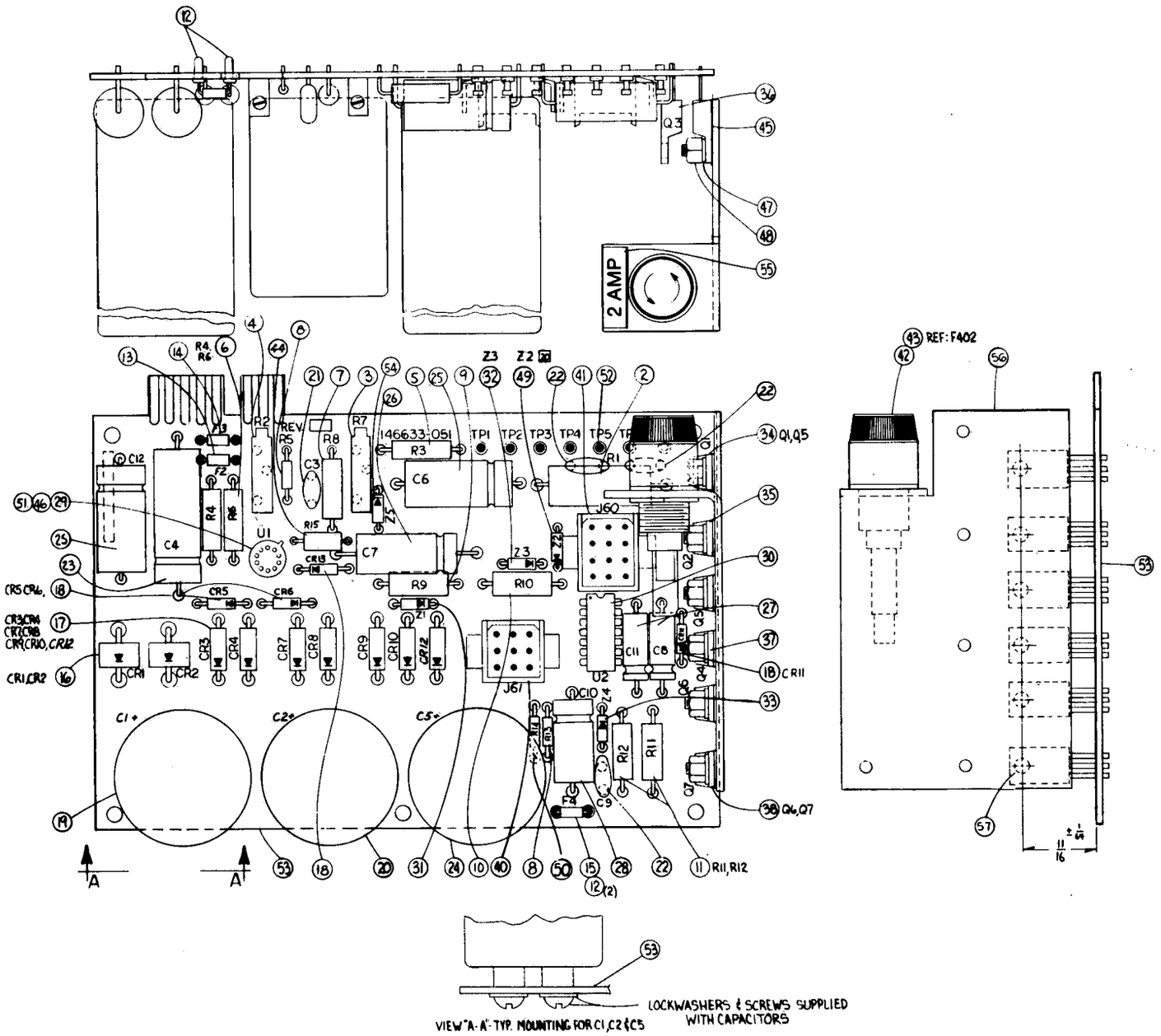
DWG. NO. 146599
(7-22-85)

NOTE:
1. ALL RESISTORS ¼ W UNLESS OTHERWISE NOTED



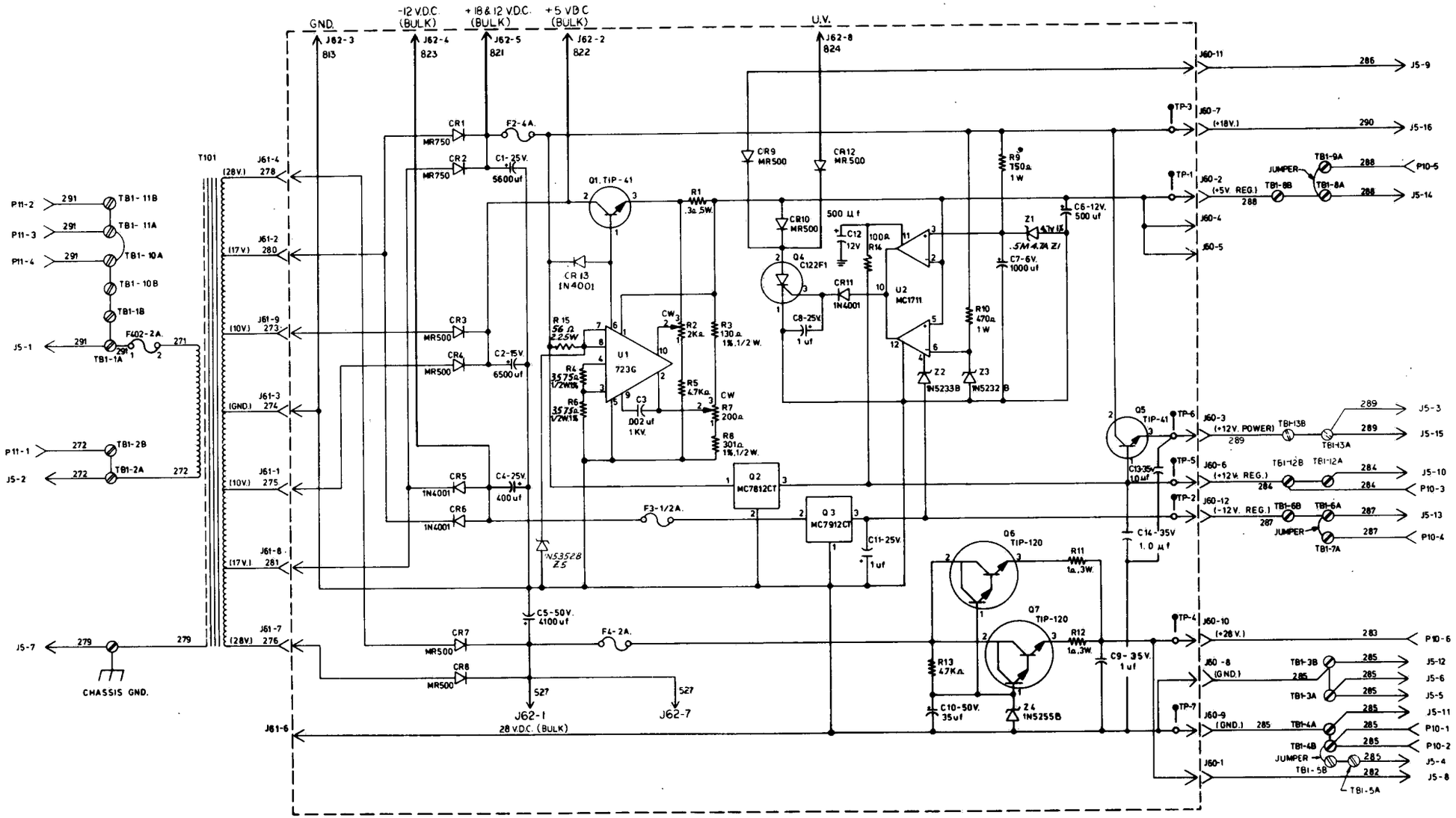
P/C ASSEMBLY, Power Supply (Part 2 of 2)
(Units with Indicator-Recorder)

REF. 146633-051
(9/7/84)



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
2	25	CAPACITOR, 470 μFD, 16V, C6, C12
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
	39	
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, 1/4 W.C.C. 100Ω 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)

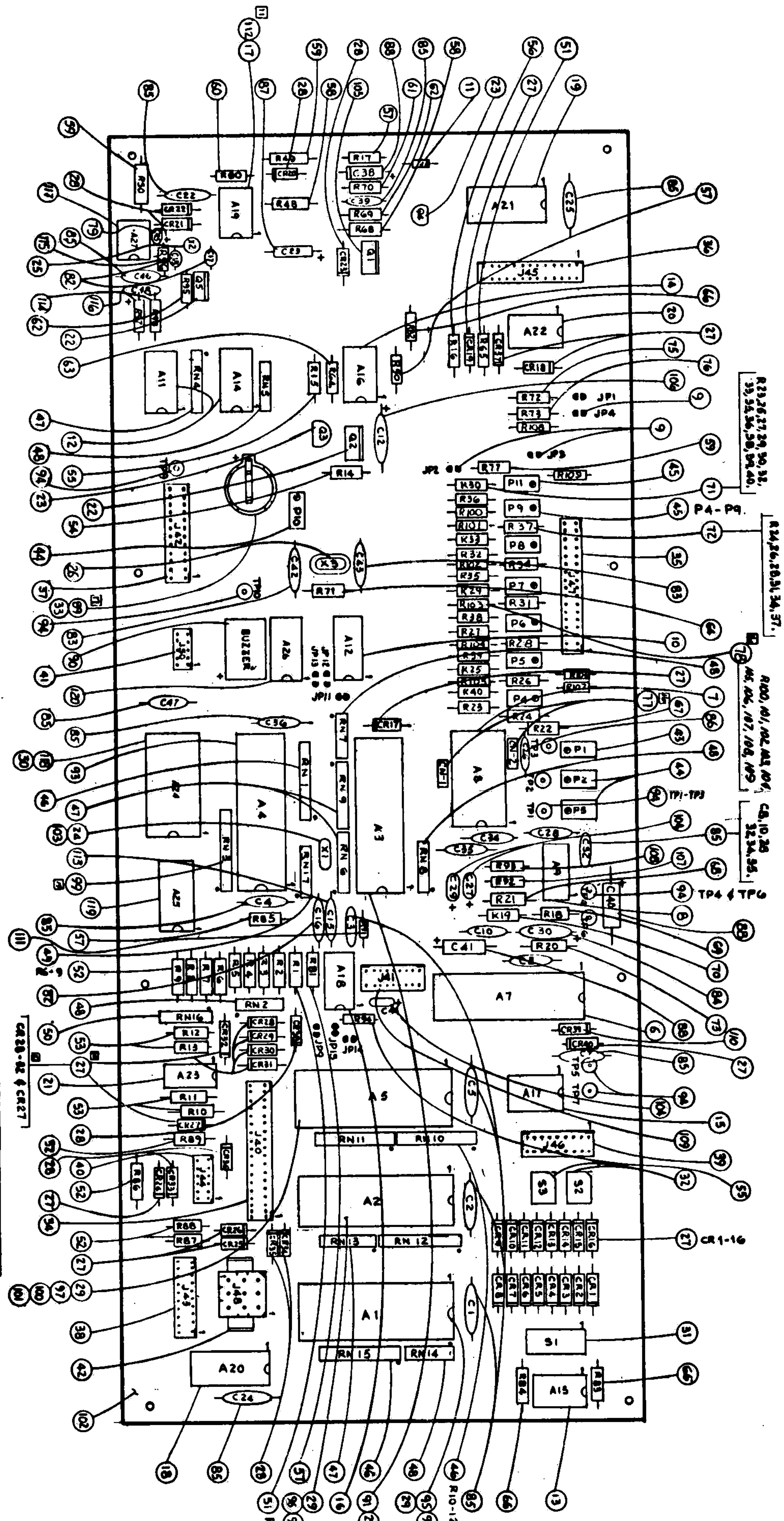


UNLESS OTHERWISE NOTED, ALL RESISTORS ARE 1/4 WATT.

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

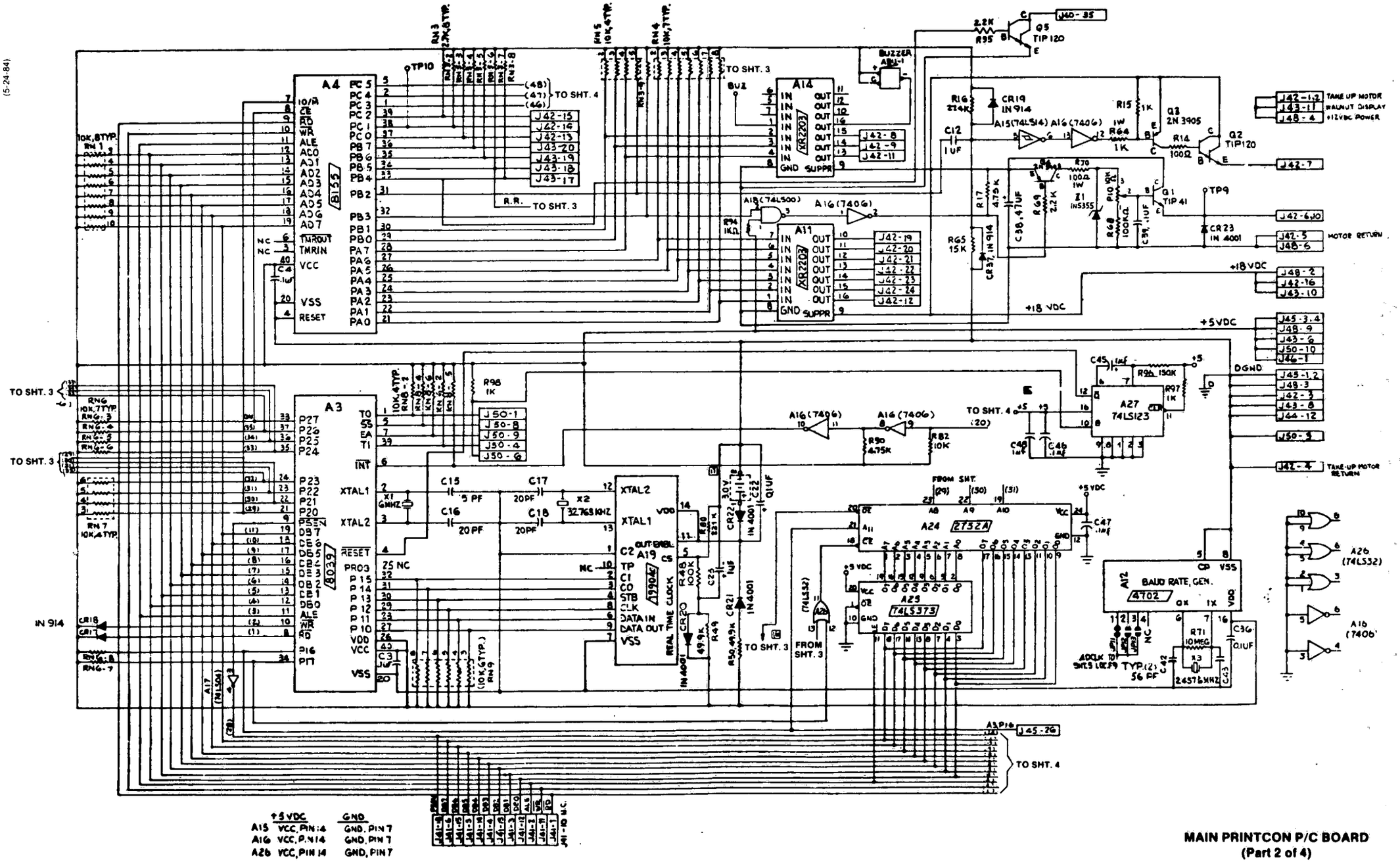
Rev. 11/84

REF. 146651-001
(5-24-84)



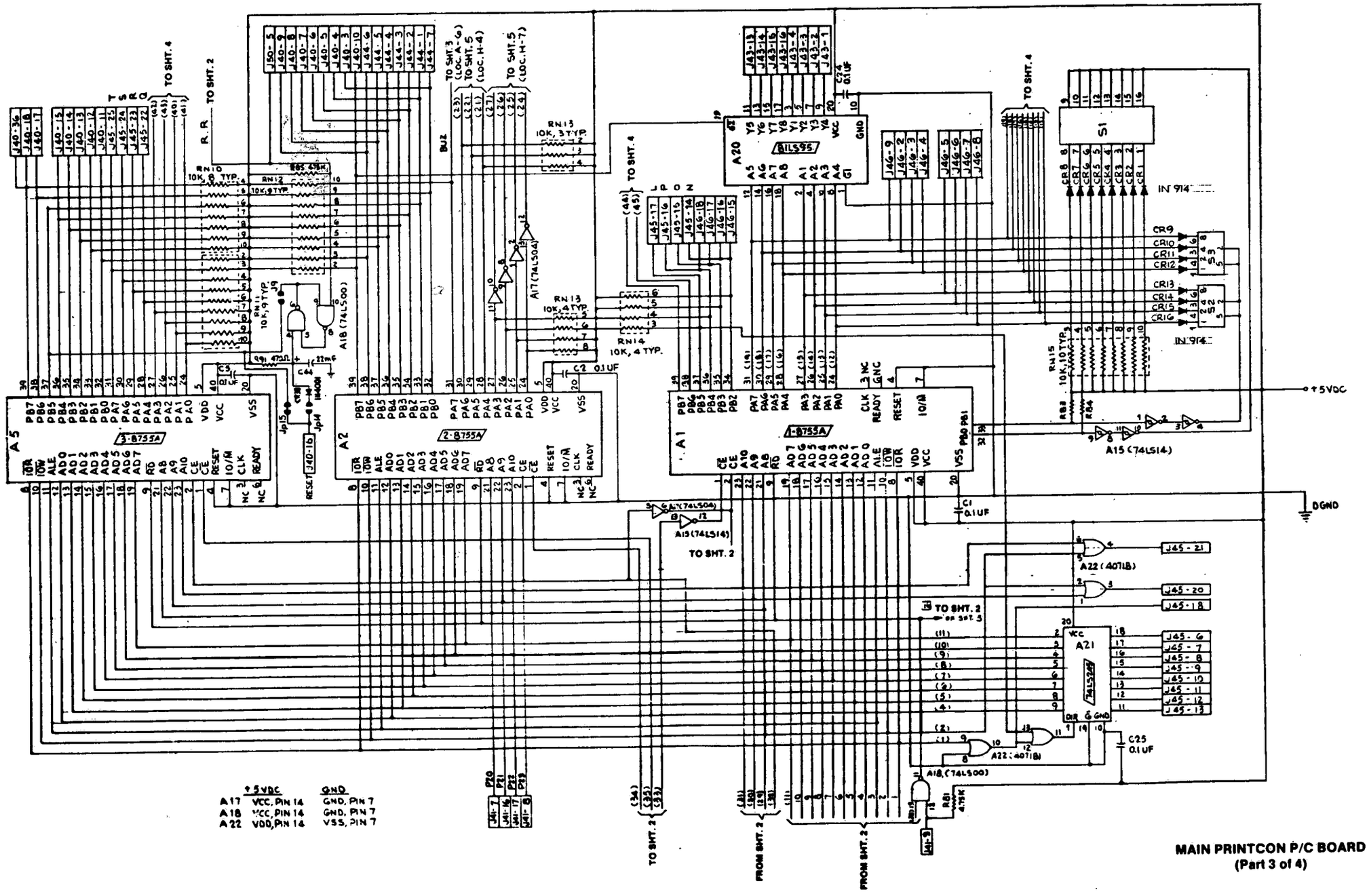
QTY	ITEM NO	PART NAME	DESCRIPTION, MATERIAL
x		DIGITAL PRINTER ASSY	PARTS LIST
	5	NOT USED	
1	6	40 PIN DIP IC	AD 7550 BD A/D CONVERTER (A7)
1	7	28 PIN DIP IC	AD 7507 JN ANALOG MUX (A8)
1	8	14 PIN DIP IC	AD 521 KD DIFFER AMP (A9)
3	9	WIRE, JUMPER	
1	10	16 PIN DIP IC	HD3-4702-9 BIT RATE GEN. (A12)
1	11	ZENER DIODE	IN5355 18V ZENER (Z1)
2	12	16 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 & R65)
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, 90, 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 (R80)
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
1	86	CAPACITOR	.01µF .25V CERAMIC C26
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	P8155, RAM & I/O (A4)
9	94	TEST POINT	(TP1-TP7, TP9, 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. (R81) (RX3)
1	112	SOCKET	14 PIN DIP (A19)
1	113	CAPACITOR	5 pF, 500 V, MICA (C-15)
2	114	RESISTOR	1KΩ, 1/4 W, C.C. (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 IC	74LS123 (A27)
1	118	24 PIN DIP IC	2732A (A24)
1	119	20 PIN DIP IC	74LS373 (A25)
1	120	14 PIN DIP IC	74LS32 (A26)

MAIN PRINTCON P/C BOARD
(Part 1 of 4)



+5 VDC	GND
A15 VCC, PIN 14	GND, PIN 7
A16 VCC, PIN 14	GND, PIN 7
A26 VCC, PIN 14	GND, PIN 7

Rev. 7/84

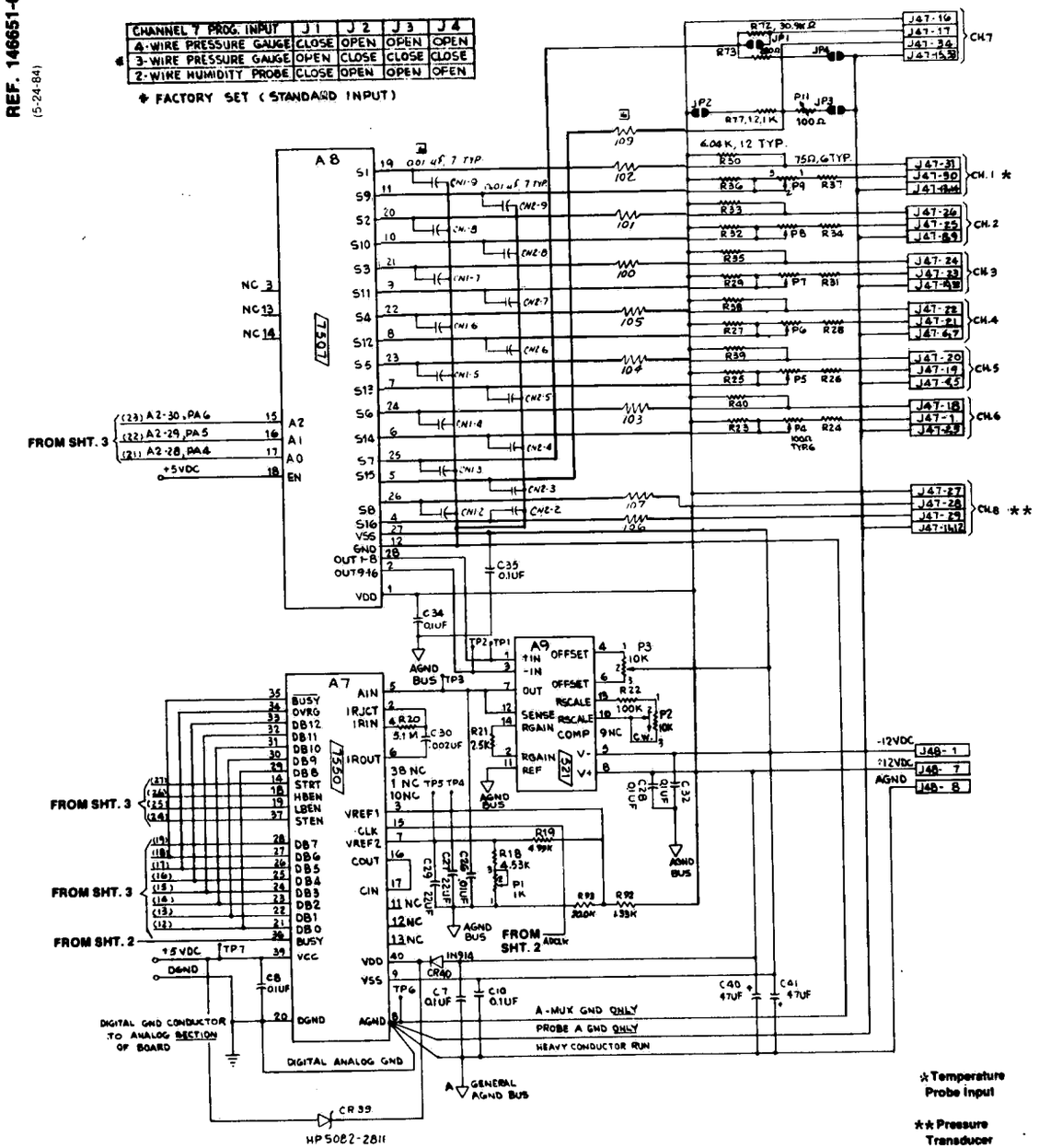


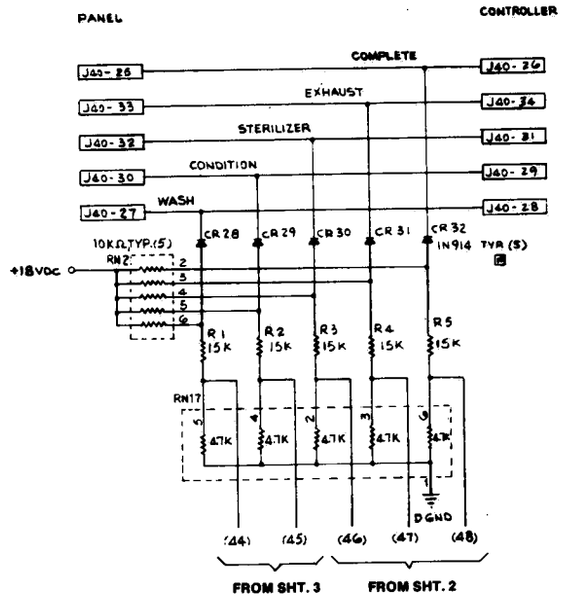
MAIN PRINTCON P/C BOARD
(Part 3 of 4)

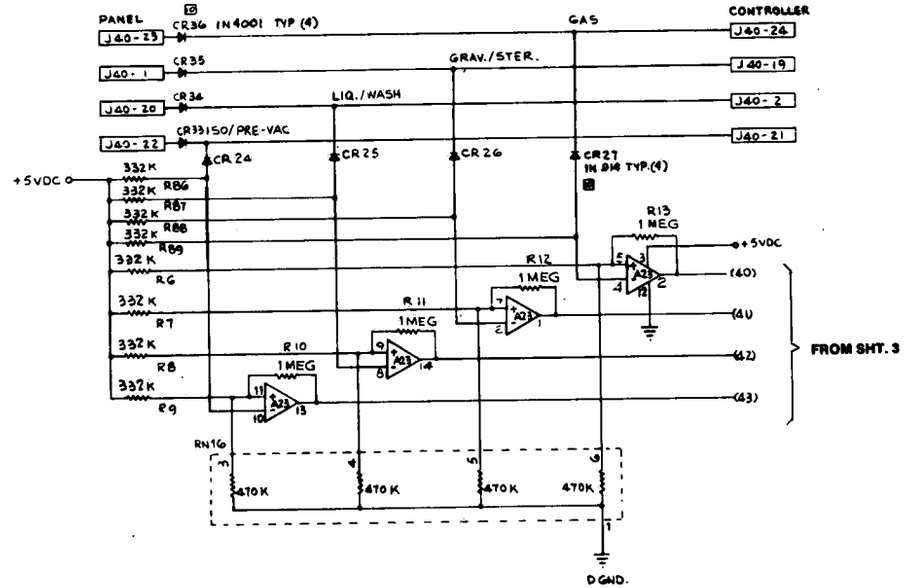
REF. 146651-001
(5-24-84)

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

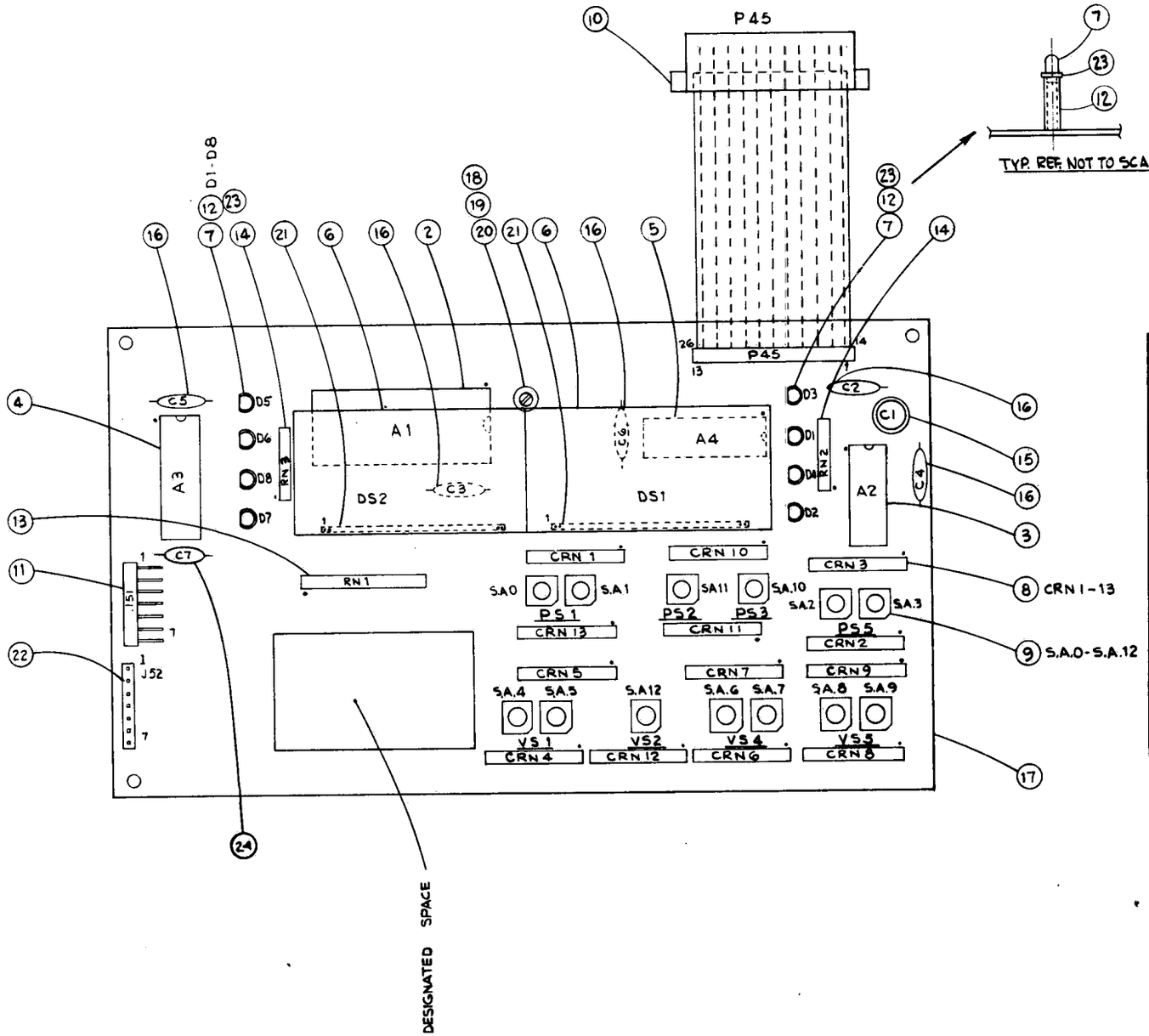
* FACTORY SET (STANDARD INPUT)





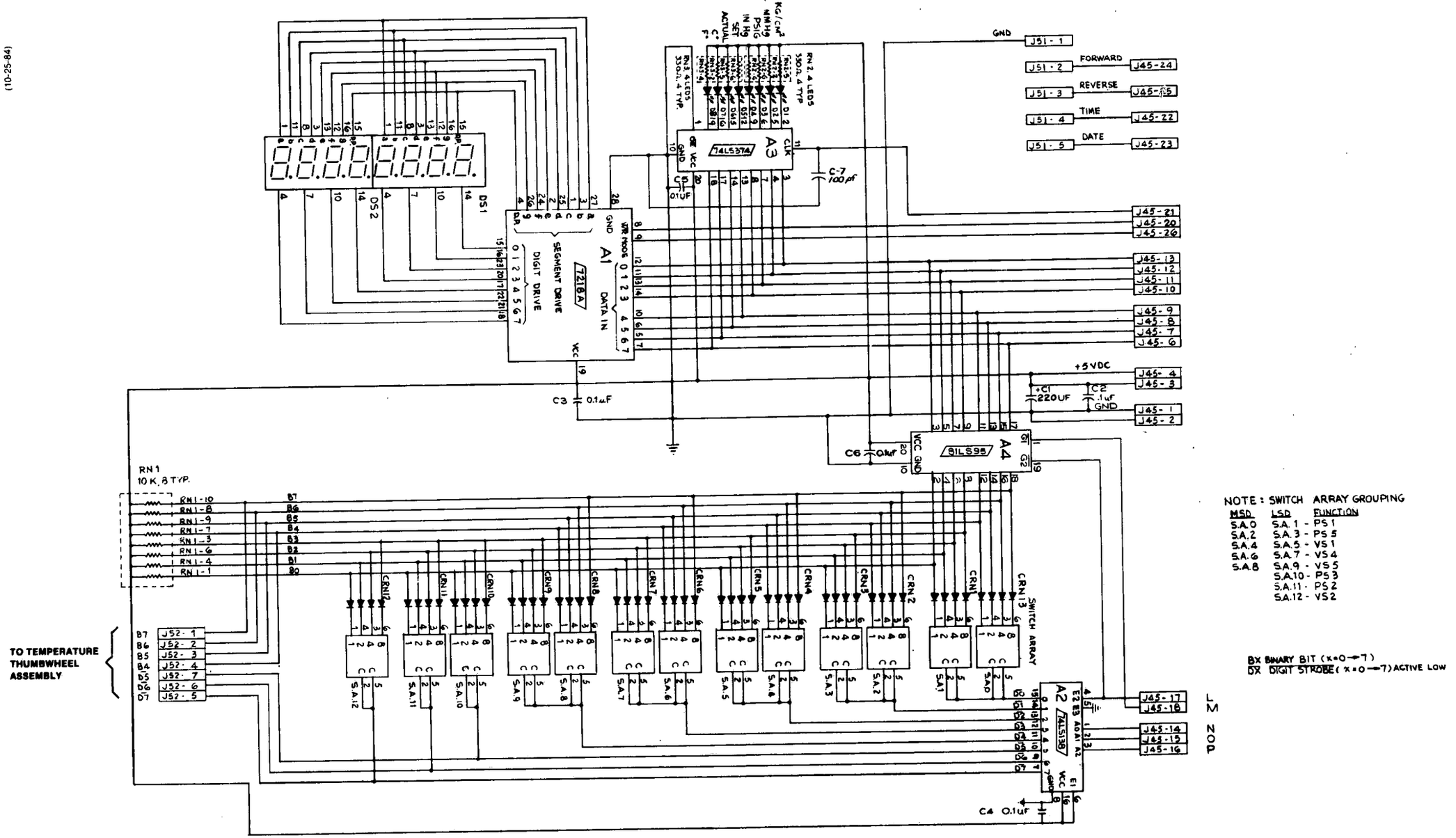


MAIN PRINTCON P/C BOARD
(Part 4 of 4)



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)



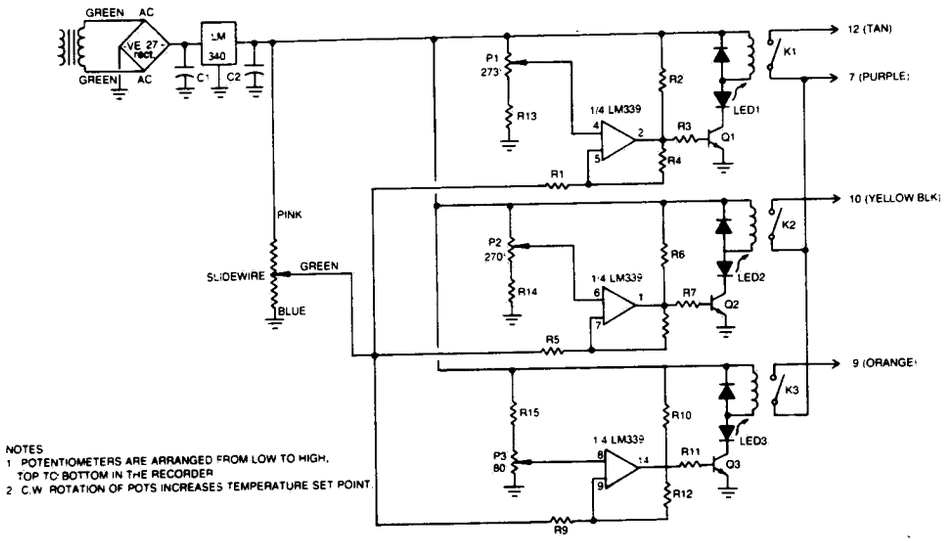
NOTE : SWITCH ARRAY GROUPING

MSD	LSD	FUNCTION
S.A.0	S.A. 1	- PS 1
S.A.2	S.A. 3	- PS 5
S.A.4	S.A. 5	- VS 1
S.A.6	S.A. 7	- VS 4
S.A.8	S.A. 9	- VS 5
	S.A.10	- PS 3
	S.A.11	- PS 2
	S.A.12	- VS 2

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

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

DWG. NO. 764315-334
(11-21-79)



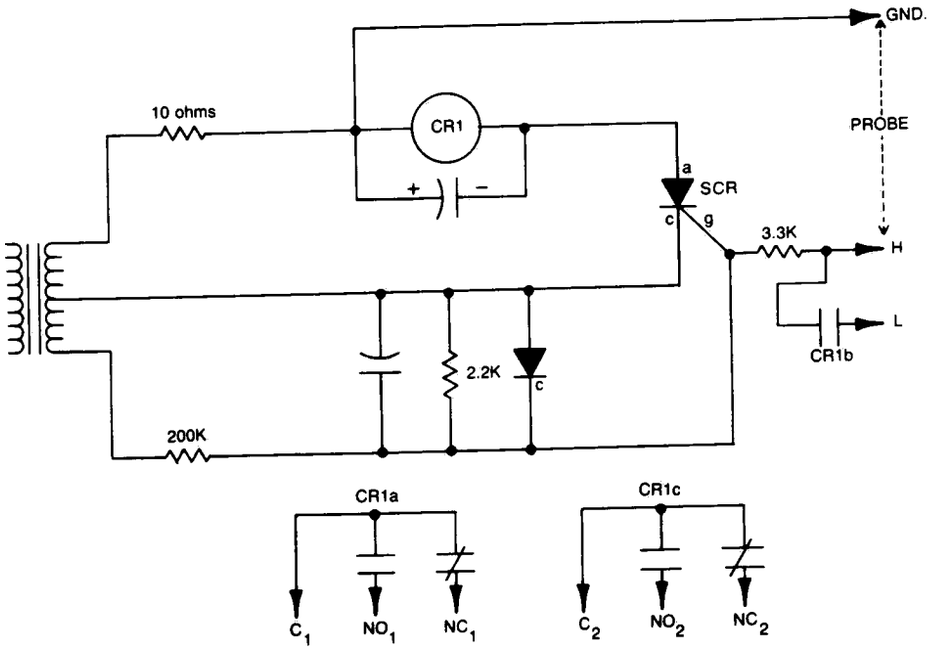
NOTES
1. POTENTIOMETERS ARE ARRANGED FROM LOW TO HIGH, TOP TO BOTTOM IN THE RECORDER
2. C.W. ROTATION OF POTS INCREASES TEMPERATURE SET POINT.

TEMPERATURE CONTROL SCHEMATIC.

Rev. 1/84

DWG. NO. 136729-001
(5-17-83)

WARRICK LEVEL CONTROL

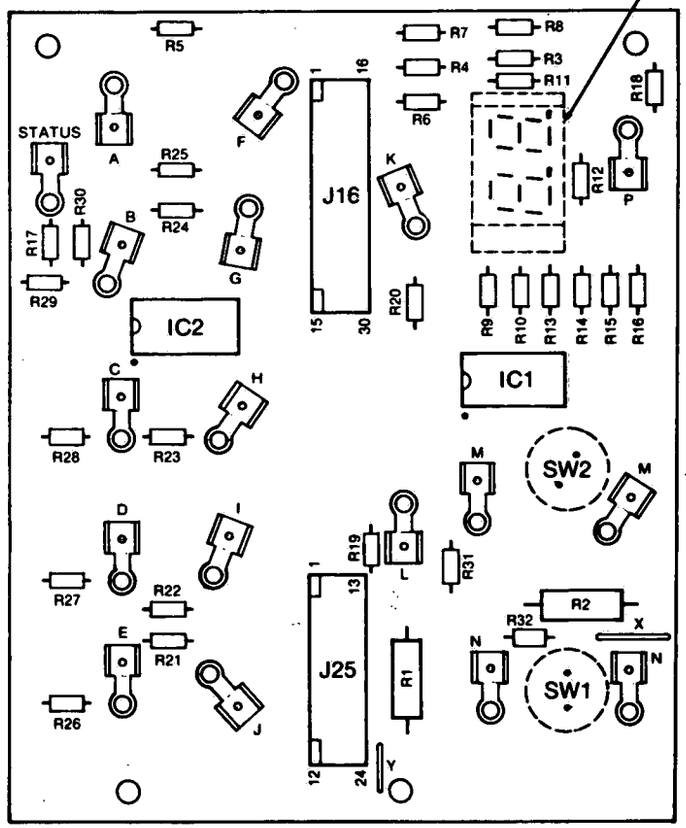


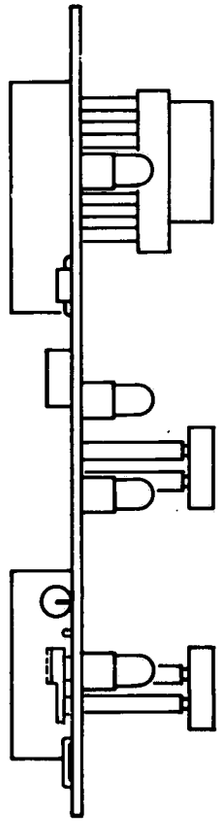
WARRICK LEVEL CONTROL.

Rev. 1/84

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

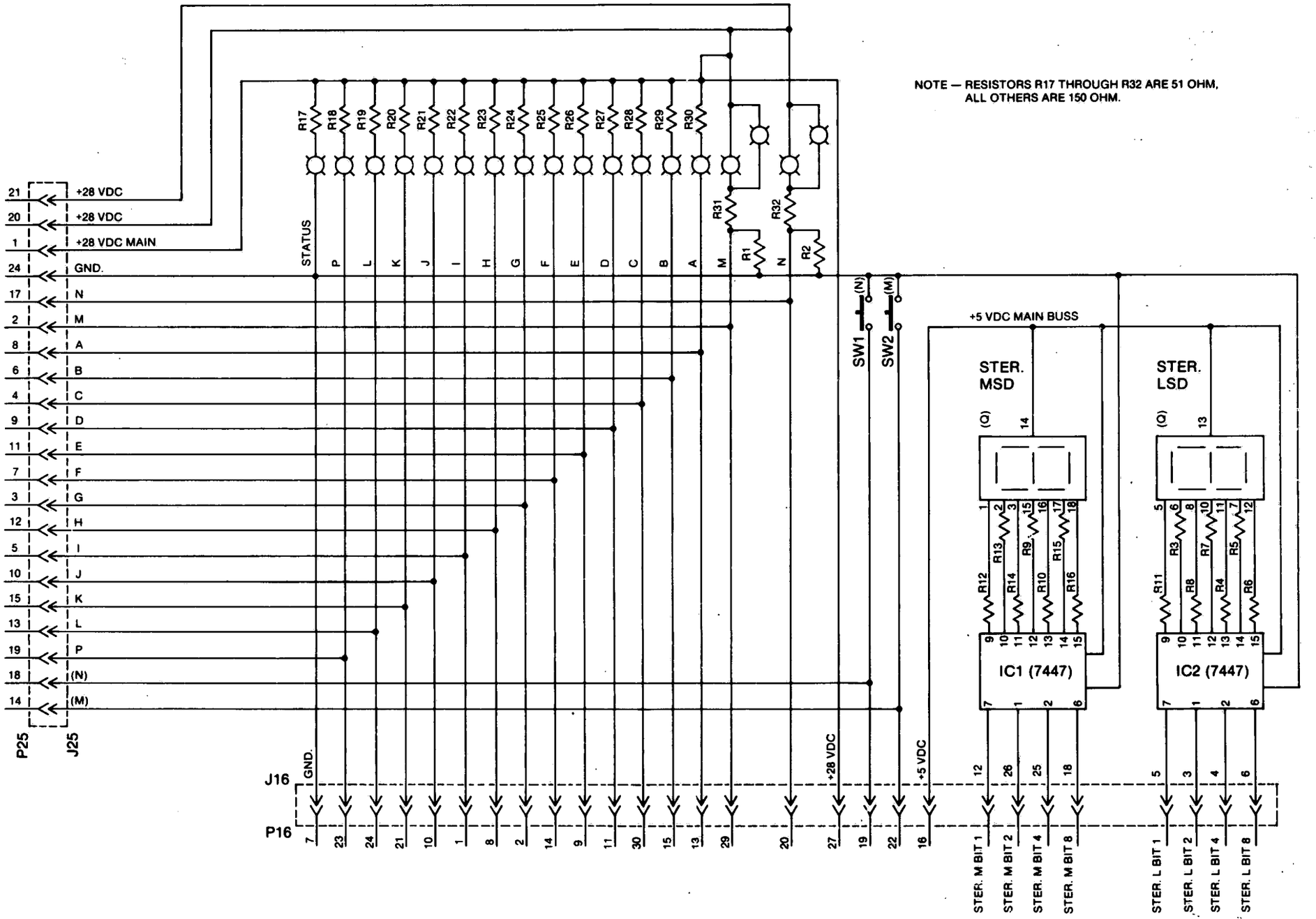
DISPLAY P.N. 93455-001





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

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



PRIMARY PANEL SCHEMATIC (PC Board)
(Part 2 of 2)

Add. 2/86

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 7

COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT

7.1 GENERAL

This section includes instructions for the disassembly, repair, and replacement of selected washer-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. 8-10 thru 8-12)

NOTE: The swing out panel is hinged to the case, for access to the internal components, such as the drive motor (Fig. 8-11,1) and adjustments. 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. 8-10)

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. 8-10)

1. Unscrew the hub cap (4). This cap retains a spring loaded wire bracket (2) which acts as a pen lifter. 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. 8-10)

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.

Calibrating Control Circuit Board (Fig. 8-12)

NOTE: The following calibration procedure must be followed whenever recorder control circuit board is replaced.

1. Turn all three adjustment pots at least 20 turns clockwise.

2. Tape a thermocouple lead of a potentiometer to the recorder bulb in the chamber drain. Do not run the thermocouple lead out across the door gasket; use a Conax adapter to run the wire out the tee at the top front of the chamber (Fig. 8-31, 32).

3. Leaving the steam supply valve closed for the moment, depress WASH-STERILIZE cycle button.

4. Wait until the cycle completes the DETERGENT INJECTION phase. When the high water level is reached, S-26 (LED-18) will open to begin heating and agitating water. Slowly open the steam supply valve to heat water to 75F as read on the potentiometer. Close the steam supply valve and adjust the top (75F) potentiometer in the recorder counterclockwise until the 75 degree LED indicator comes on. Press RESET to abort the cycle.

5. Start a STERILIZE cycle. The steam supply valve is still closed at this point. Wait for the 90 second purge to complete as indicated by closing of S-3 solenoid (LED-15). Open the steam supply valve to bring the chamber temperature up to 270F. Adjust the center (270) potentiometer counterclockwise in the recorder until the 270 degree LED indicator comes on.

6. Bleed in steam until the chamber temperature reaches 272F. Adjust the bottom potentiometer counterclockwise in the recorder until the 272 degree LED comes on. Press RESET to abort the cycle.

7. Run a WASH-STERILIZE cycle to confirm all three recorder adjustments.

Adjustment of Temperature Control (Fig. 7-1)

1. Turn adjusting screw on potentiometers, located on printed circuit board inside controller case. Clockwise rotation increases setpoint, counterclockwise rotation decreases set point.

2. Adjusting screw on pen arm is used to make minor corrections in pen setting.

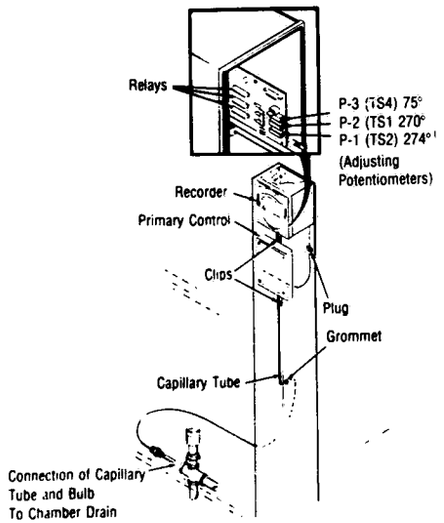


Figure 7-1. REPLACING THE RECORDER.

Removal and Replacement (Fig. 8-9)

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.

1. Remove primary panel . . . see Paragraph 7.11.

2. Open chart back-up plate.

3. Make sure power is off. Disconnect electrical leads by pulling the plug at the bottom of the recorder, behind the gauges.

4. Disconnect capillary tube from chamber drain cross behind control console. (USE CARE!)

5. Remove capillary from the three clips at (Fig. 7-1) rear of console.

6. Remove the two mounting screws at rear of case.

7. Remove recorder, gently feeding the capillary and its bulb through the grommet.

Replacing the Recorder

1. **Carefully** direct the capillary tube and bulb behind the primary and secondary panels, through the grommet above the controller, to the chamber drain cross.

2. Plug connector into socket on recorder. Position recorder and replace the two screws and washers which were removed.

3. Replace the capillary beneath the three clips.

4. Reconnect the bulb into chamber drain tee.

5. Secure any wires which were loosened.

6. Replace primary panel.

7.3 CHAMBER DOOR ASSEMBLY

Some repairs can be made without removing the door from the sterilizer. For major repairs the door should be removed and placed on a clean padded work bench or table.

Removing Door From Hinges (Fig. 8-24)

1. With door open and supported, remove the retaining rings (14) from each of the hinge pins.

2. Withdraw the pins (15) and slide the door and hinge assembly out of the hinge body, saving any washers assembled with the door.

3. Place the door on a clean padded bench with the chamber door handle facing upward.

4. If it is necessary to remove the hinge body, remove the four capscrews that fasten it to the door frame.

Disassembling Door

1. Turn the chamber door handle to retract the chamber door arms.

2. Turn the button assembly (8-23, 10) counterclockwise until it disengages and remove it.

3. Remove setscrews (9) handwheel, grease fitting (8-19,27), screws, washers, handle nut (28), thrust ring assembly (26), and spring.

4. Remove the self tapping screws (Fig. 8-23,15) and lift off the chamber door cover (8).

5. If necessary, replace door cover brackets (Fig. 8-24,16) by removing the self tapping screws.

6. Remove any worn speednuts (17) and slip new speednuts over the door cover brackets.

7. Remove hex head screws, plain washers, lockwashers, (11,12,13) and door hinge bracket (2) from the door.

8. Remove drive pin (25) from handle nut and bearing from recess in top socket plate (29).

9. Remove socket head screws (23) and washers (38).

10. Slide the top socket plate (29) forward and withdraw the roll pins and washers.

11. Remove the top socket plate and the door arms.

12. If necessary, loosen, but do not remove the arm clip links and studs. Arm clip studs retain shims under the fulcrums which align the arms to seal the door against the door frame. If the arm clip studs must be removed, be sure that arm clip studs and shims are replaced in the same location during reassembly.

13. Remove the bottom socket plate (30).

If necessary to remove pawl shaft (Fig. 8-26,4) and actuator (5), loosen set-screw (9), unhook cable (8) from actuator, and drive out roll pin (2). The pawl (1) and shaft (4) may then be removed from back side of the door (beneath diaphragm).

14. Turn the door over and remove the screws (8-25,3) holding door back cover in place.

15. Remove door back cover (2) and the gasket. Discard the gasket.

16. Using a socket wrench, remove the screws (8-24,3) holding the diaphragm cover in place.

17. Remove the diaphragm cover (4), diaphragm (5) and gasket (6).

18. Pull out the thrust plate (8), lock clutch (9) and lock clutch rod spring (10).

CAUTION: The door post (8-25,10) is welded to the lock clutch ring. If it is necessary to disassemble the door further, contact AMSCO for instruction for removing weld and reweiding.

Cleaning And Inspection

1. Clean all working parts with a solvent (such as Stoddard solution) and remove all gum or grease from bearing and wear surfaces.

2. Wipe all parts dry with a clean, lint-free cloth.

3. Inspect all parts for wear, cracks, chipping or other damage.

4. Examine door post key, keyway and threads.

5. Excessive wear may cause the closing mechanism to jam. If necessary, replace parts to make handwheel action smooth.

6. Examine diaphragm for breaks or distortion. Replace if necessary.

7. When steam lock diaphragm has been removed, always use a new diaphragm gasket when reassembling.

REASSEMBLING DOOR

Lubricate parts indicated with Neptune-7 grease (P/N 385220-091).

1. Replace back cover, align, and secure with twelve drive screws.

2. Insert assembled pawl (Fig. 8-26,1), shaft (4), and torsion spring (3) through the hole in door.

3. Turn door over, and replace any missing or damaged cover clips and speed nuts (Fig. 8-24,16,17).

4. Replace actuator (Fig. 8-26,5) on shaft and drive in roll pin (2). Replace cable (8) in actuator, and tighten set screw.

5. Replace any arm clip studs and fulcrum blocks which may have been removed. Be sure than shims are replaced in their proper positions. Drive fulcrum blocks down with a wood block and mallet. Replace arm clip links (Fig. 8-24, 31 thru 34).

6. Replace hinge assembly, if removed.

7. Lubricate door post threads, and place two wood blocks about 2 inches thick on the door, to hold the bottom socket plate up. Slide bottom socket plate in position (Fig. 8-24,30).

8. Set two key (Fig. 8-24,22) in door post, and drive two roll pins (8-24,21) into socket plate (Fig. 8-24, 29).

9. Place top socket plate over door post, and position four corner arms and eight side arms to door. Secure top socket plate to bottom plate with six socket-head screws. Check arm movement for freedom.

10. Pack thrust bearing (Fig. 8-24,24) and insert into socket plate. Replace drive pin (Fig. 8-24,25). Lubricate wheel nut (Fig. 8-24,28) inside and outside, and screw onto door post.

11. Assemble thrust ring and springs (Fig. 8-24,26) and position in nut. Screw nut all the way down, guiding the ball thrust bearing onto nut. Secure with two screws and washers (Fig. 8-24, 19, 20).

12. Remove the two wood blocks. Lower arms, and check assemblage for freedom of movement. Free up as necessary. Drive grease fitting in.

13. Raise arms, and stand door on end. Try clutch rod (Fig. 8-24,9) in post. Free movement if necessary. Lubricate rod, and insert it with spring into door. Engage thrust plate. (Fig. 8-24,8), and lubricate.

14. Assemble diaphragm, gasket, and cover. (Fig. 8-24,4,5,6) and secure in place with 9 screws. **NOTE:** Graphited face of gasket is next to door casting.

15. Clean gasket groove, and install new gasket. **NOTE:** Gaskets are cut to fit snugly and must be forced in. Push in a short section at a time. **Do not stretch.** If gasket seems too long, **do not cut it,** but remove it, and start over, compressing short sections as they are inserted in the groove, to take up the full length.

16. After installing gasket, spray seating surface of end ring with **AMSCO Fluorocarbon Lubricant,** to prevent sticking.

17. Wipe door carefully with a clean cloth, to remove excess grease.

REASSEMBLING DOOR AND HINGES TO STERILIZER

1. Set door into place with door hinge between ears of hinge body.

2. Position and secure hinge pins with washers and retaining rings.

NOTE: Proper centering of door in the field is best accomplished as follows:

1. Center door on sterilizer body.

2. Chalk surface of gasket and check position of gasket. Space between inner edge of gasket and edge of chamber opening should be uniform on all sides.

3. Check for full engagement of locking arms. Engagement in end ring should be uniform for all arms.

DOOR ALIGNMENT

After reassembling and centering the door, ensure that door arms are engaged in door frame at least 1/4 inch with door normally tightened (approximately 30 ft-lb locking torque). Reshim door arms, if necessary, to obtain proper arm contact when door arms are in end frame. Shimming procedure is as follows:

1. Tighten door to compress gasket in position.

2. Back off until door arms are loose. Then tighten door to approximately 8 ft-lb torque.

3. Ensure that all arms are tightened. If any arm is loose, determine thickness of shim required to bring loose arm to a height that will cause it to be as tight as the existing tight arms.

4. Disengage arms, open door, and install shims where required.

5. Close door, tighten door to approximately 8 ft-lb torque, and check all arms to ensure that they are of equal tightness. Repeat steps 3 and 4, if necessary, until this equal tightness requirement is met.

6. Disengage arms and place an additional .010 shim under each corner arm.

7. Slowly tighten door while checking to ensure that the corner arms engage and become tight before any other arm. If necessary, repeat prior steps until this requirement is met.

NOTE: Use the following shims:

39910 — .005
39911 — .010
39912 — .015

To meet the requirements of step 7, the maximum additional shim permitted under a corner arm is .005.

DIAPHRAGM OPERATION CHECK

After replacing and reassembling the diaphragm, ensure that the door properly locks and unlocks under operating pressure. Door should lock between 1/2 and 6 psig rising steam pressure and unlock between 1/2 and 5 psig falling steam pressure.

7.4 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.

Solenoid valves S-2, S-25, and S-26 each have a varistor (PN-150778-001) connected across the solenoid coil leads. If any of these valves are replaced, the varistor must be removed from the old valve and replaced on the new valve. The varistor should be visually inspected for any sign of damage.

Principle of Operation

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

Direct-acting Valve (Fig. 7-2): In direct-acting valves, the solenoid core is mechanically connected to the valve disc and directly opens or closes the orifice, depending on whether the solenoid is energized or de-energized.

Internal pilot-operated Valve (Fig. 7-3 or 7-3A): This valve has a pilot, a bleed orifice, and utilizes the line pressure for operation. When the solenoid is energized, it opens the pilot orifice and releases pressure from the top of the valve piston or diaphragm to the outlet side of the valve.

This results in an unbalanced pressure which causes the line pressure to lift the piston or diaphragm off the main orifice, thereby opening the valve. When solenoid is de-energized the pilot orifice is closed and full line pressure is applied to the top of the piston or diaphragm through the bleed orifice, thereby providing a seating force for tight closure.

Testing

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

a. Check voltage across the coil leads: it should be approximately 120 volts.

b. Check solenoid coil for open circuit or ground.

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

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

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.

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.

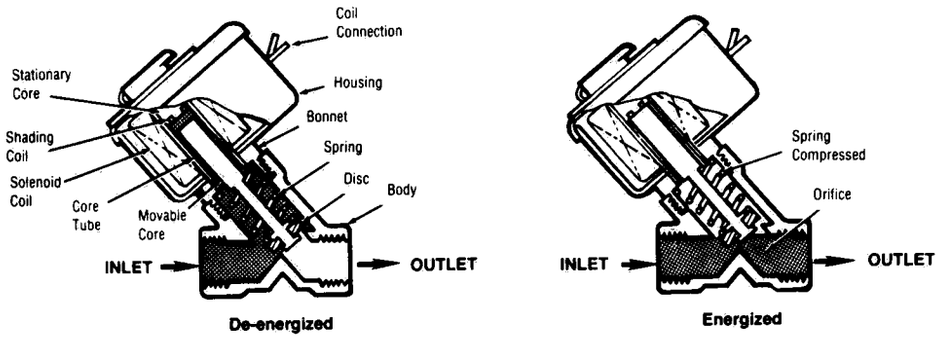


Figure 7-2. DIRECT ACTING SOLENOID VALVE.

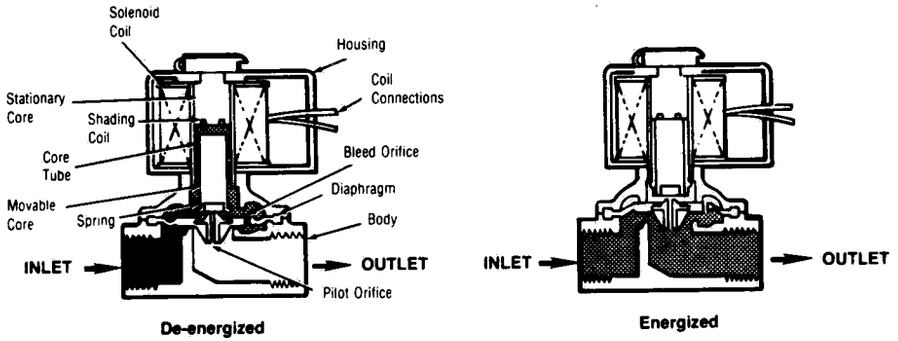


Figure 7-3. INTERNAL PILOT-OPERATED SOLENOID VALVE. (DIAPHRAGM TYPE)

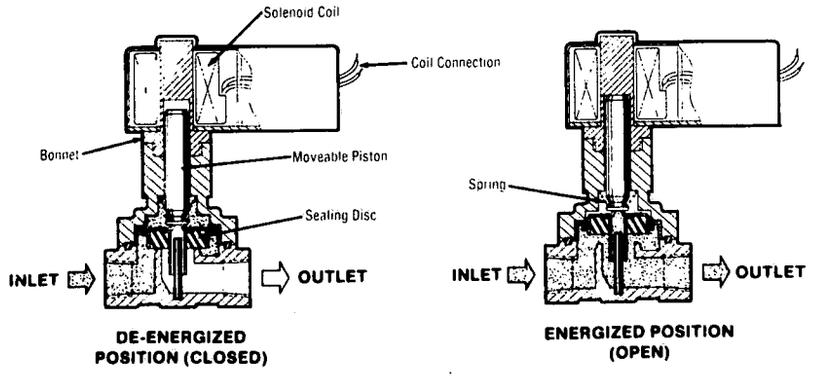


Figure 7-3A. PISTON TYPE SOLENOID VALVE.

7.5 STEAM TRAP (Fig. 8-41)

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

Disassembly

1. Unscrew and remove the cap (1) and diaphragm assembly (3). Use a hex socket wrench to unscrew and remove seat.

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

3. Wipe out the bowl (5) taking care that loose material does not enter the piping.

4. Test diaphragm for flexibility. 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 P764080-001.

1. Screw seat in firmly. (Use hex socket wrench.)

2. Insert diaphragm assembly.

3. Replace cap, using a new gasket.

7.6 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.

7.7 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.

7.8 VACUUM BREAKER

Disassembly

1. Unscrew and remove bonnet assembly.

2. Remove friction ring and air valve seat.

3. Remove assembled ballast and float.

4. Separate ballast and float.

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

Reassembly

1. Assemble ballast and float.

2. Slide float/ballast assembly into valve body, making sure that the assembly moves freely in valve body.

3. Insert air valve seat and friction ring.

4. Screw on bonnet assembly.

5. Test for leaks. No water leakage at bonnet is permissible.

7.9 STEAM CONTROL VALVE (Fig. 8-39)

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

DISASSEMBLY

1. Remove pilot line fitting at top of valve. Turn adjusting screw (13) counterclockwise until spring is completely free of compression. Remove screw (12) and turn entire top assembly to align lugs on bonnet and sylphon assembly (16) with notches on bottom plate. Lift top assembly off.

2. Remove four screws which secure cover to bottom plate, (15) 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 (16) from valve body; also unscrew and remove valve seat (18).

6. Pull stem and disc assembly (17) 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 (18) into body. (Hex side down.)

2. Replace stem and disc (17) in sylphon (16), and screw bonnet onto body.

3. Position fork (9) on bottom plate (15). Insert pivot pin (10) and cotter pins.

4. Screw reinforcement (4) onto bellows, and fasten to cover with two screws (2).

5. Set lower spring plate (8), spring (7), and upper spring seat (6) in place. See that the lugs on the spring seat are properly positioned in the fork bearings.

6. Replace cover (1) and bellows (5), and secure cover with the four screws (3).

7. Lower this entire assemblage into position over the sylphon, aligning the notches in the bottom plate with the lugs on the bonnet, to allow the bottom plate to seat on the bonnet. Replace screw (12).

8. Turn adjusting screw (13) 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. 7-4). If valve was not removed from sterilizer, open side connection to see disc and seat.

9. Adjust according to paragraph 7.14.

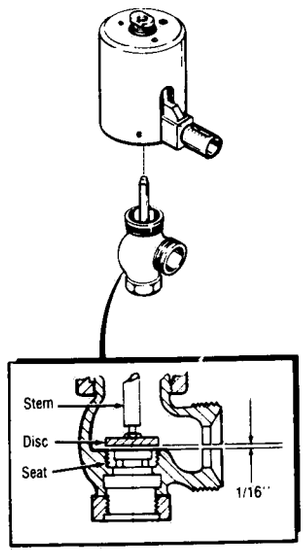


Figure 7-4. STEAM CONTROL VALVE ADJUSTMENT.

7.10 VALVE ASSEMBLY, ANGLE (Fig. 8-40)

Cleaning and Inspection

1. Open valve fully, and disconnect extension rod coupling by driving out roll pin.

2. Remove packing nut (3), gland (4), and bonnet nut (6). Remove bonnet assembly (2) from valve body and remove packing.

3. Unscrew stem (8) from bonnet. Remove disc holder (10) from stem and install new disc.

4. Examine valve seat (13) for scratches, nicks or wear. Remove and replace if necessary. Clean and inspect all components; replace as necessary.

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.

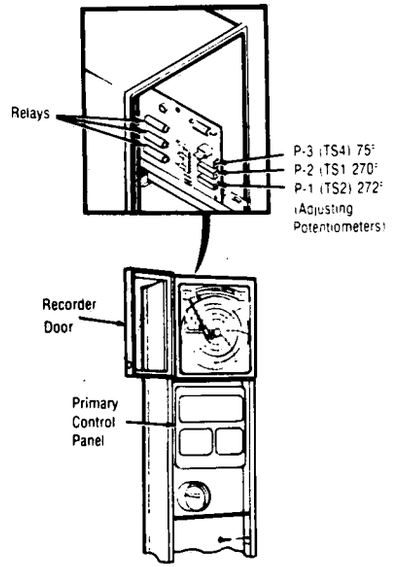


Figure 7-5. CONTROL COLUMN.

7.11 CONTROL COLUMN

The primary panel and indicator-recorder-controller in the control column are made accessible for servicing by removing the front panel.

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. The primary control panel is now accessible for maintenance and servicing.

4. The primary control panel is held in place by four screws. Take out these screws to remove the panel for control servicing.

5. The light bulbs are removed by moving the retainer aside and lifting out the bulb.

CAUTION: Do not change lamps with control power on. Damage to the CPU PC board may result.

7.12 CONTROL COMPARTMENT

The main control, secondary panel, water level sensing, and door lock assemblies are housed in a compartment located above the chamber, and are made accessible by removing the valve panel.

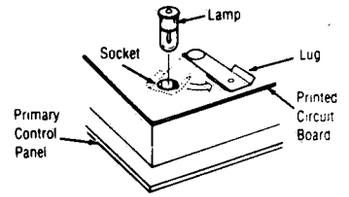


Figure 7-6. LAMP REPLACEMENT.

Control Assembly (See Figure 7-7)

1. Open upper access door (Fig. 8-5,1).

2. Remove three knobs (27). Remove strike (Fig. 8-6,3) and four screws (4) securing valve panel (2).

3. Remove panel and set aside. Main control assembly cover and secondary control panel are now accessible.

Secondary Control Panel

1. Remove the five screws (Fig. 8-13.7) which secure the panel (4).

2 Lift off panel. Be careful of attached wires.

3. Replace defective component and reinstall panel.

Main Control Assembly (Microcomputer Controller) (Fig. 8-15)

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

1. Remove the eight screws (Fig. 8-13.7) which secure panel to main control assembly.

2. Remove cover (5) and set aside. The main control assembly is now accessible.

3. To remove a printed circuit card, lift both card pulls simultaneously to disengage contacts from socket and pull card straight out, to avoid damage to socket and contacts.

4. Insert the replacement card, making sure that it goes in straight. The cards are keyed, to prevent improper installation.

5. Replace cover and top panel.

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

After replacing a printed circuit board, the following **must** be adhered to:

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

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

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

1) reason for return (failure mode of equipment)

2) general condition of board

3) quantity

4) individual item identification (part number, serial number, etc.)

5) serial number of machine from which board was removed plus cycle count of machine.

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

e. Return board (and all other microprocessor parts) to AMSCO Service Company, Erie, Pa. 16514, attention: Returned Materials Coordinator.

This procedure must be followed to avoid inadvertent damage by static electricity.

NOTE: Static electricity is a problem because of its ability to damage printed circuit boards. If a static discharge happens to go through an integrated circuit, and the transient current pulse is not effectively diverted by protective circuitry, the current from the discharge can flow through the board and raise the temperature of internal junctions to their melting points. Damage can range from complete destruction to latent degradation.

Adjustment of Power Supply Voltage (IRC)

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

ADJUSTMENT PROCEDURE

1. With control power (CB1) off, connect B & K Model 2800 DVM to ground post of capacitor C101 (-) and to terminal post E2 (+). See Figure 7-8.

2. Set DVM to 10 VDC scale and turn control power (CB1) on. Machine should be idling (no cycle in progress).

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

4. Turn pot R433 two turns in the opposite direction.

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

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

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

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

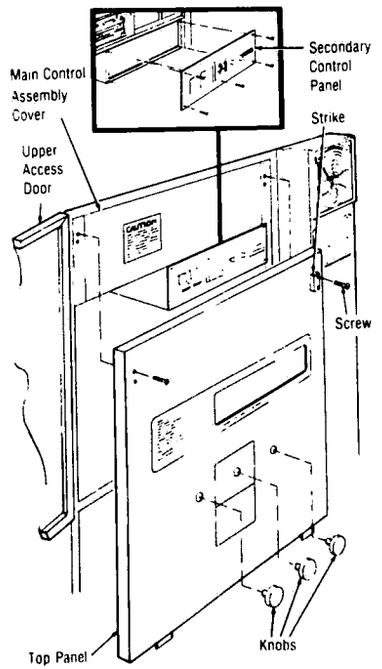


Figure 7-7. REMOVAL OF VALVE PANEL FOR ACCESS TO MAIN CONTROL AND SECONDARY CONTROL.

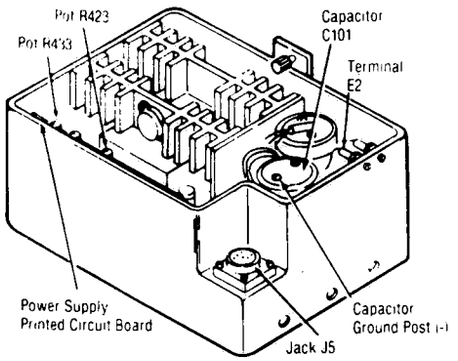


Figure 7-8. POWER SUPPLY (IRC).

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

b. Adjust pot R433 for an output of 5.15 volts.

7.13 DOOR SWITCH (Fig. 8-19)

NOTE: Chamber door must be closed and tightened to 20 ft-lbs of torque for door to withstand maximum chamber pressure. Door switch is on top of chamber and permits sterilizer operation only when door is locked. Adjustment should be made with a heated sterilizer shell. Run a complete three-minute sterilize cycle before proceeding with following instructions.

Adjustment

1. Using a torque wrench on the steam lock clutch rod (Fig. 8-24,9), close and tighten the chamber door by applying 20 ft-lbs of torque.

2. Turn adjusting screw (Fig. 8-19,4) clockwise until switch (7) is actuated. Then turn screw 1/4 turn clockwise.

3. Open door then close and tighten it by applying the specified torque.

4. Check that switch is actuated before torque applied reaches specified value.

5. With switch adjusting screw properly set and door closed and tightened with specified amount of torque, start a cycle.

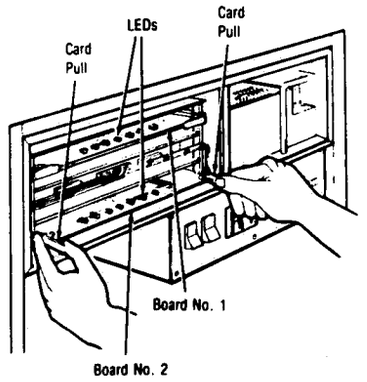
NOTE: Do not disturb handwheel until leak test in step 6 is completed.

6. Using a metal mirror, check around door gasket for steam leaks. If door does not seal,

a. determine if chamber door has to be adjusted and

b. determine if door gasket has to be replaced because it is cracked or worn.

7. To be sure that chamber has been exhausted, do not open the chamber door until after the "end-of-cycle" buzzer stops.



Removing A Printed Circuit Board.

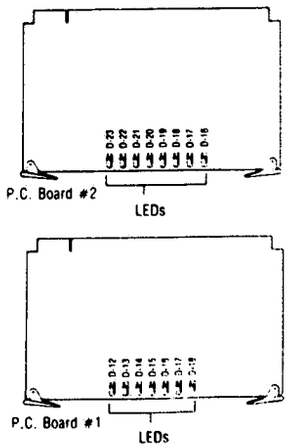


Figure 7-9. PRINTED CIRCUIT BOARDS AND LEDs.

7.14 ADJUSTMENT OF PRESSURE AND TEMPERATURE SETTINGS

Install potentiometer leads through chamber drain screen so that the termocouple junction is in contact with recorder bulb. Run leads out between door gasket and sterilizer end ring. The temperature switch adjusting potentiometers are mounted on a printed circuit board, located in the recorder case. To gain access to these adjustments, open the recorder door, loosen the captive screw at the lower right hand corner of the panel, and swing panel out. The printed circuit board and adjusting pots are on the right wall of the case. (See Fig. 7-1.)

Steam control valve is near top of machine on right side. (Fig. 7-10) Remove right side panel to gain access to this valve for adjustment. Pressure switch PS-2 (Fig. 7-10) is located in the liquid sensing and door switch assembly box, near the upper left corner on the left side of machine. Remove left side panel, and open the hinged door on the box. The switch is about two-thirds of the way up from the bottom of the box, on the extreme right end.

Sterilize Cycle

1. Set exposure time to three minutes.

2. Close and lock door. (DOOR UNLOCKED light goes out.)

3. Depress STERILIZE cycle button.

4. Door lock solenoid SA-1 de-energizes and locks door.

5. CONDITION light comes on.

6. Exhaust cooling solenoid S-4 (LED-16) opens.

7. Steam-to-chamber solenoid S-2 (LED-14) opens.

8. Fast exhaust solenoid S-3 (LED-15) opens.

9. After one minute and thirty seconds, fast exhaust solenoid S-3 (LED-15) closes.

10. Chamber pressure and temperature begin to rise. Adjust steam pressure regulator (See Fig. 7-10) to bring chamber temperature to 270°. Adjust TS-1 (P-2 in recorder) to start exposure timer. CONDITION light goes out and STERILIZE light comes on.

11. Adjust steam pressure regulator to raise chamber temperature to 274°. Adjust TS-2 (P-1 in recorder Fig. 7-1)to close steam-to-chamber solenoid S-2 (LED-14).

12. When chamber temperature drops to about 270° F, TS-2 reopens steam-to-chamber solenoid S-2 (LED-14).

13. During the remainder of the period, TS-2 will cycle steam-to-chamber solenoid S-2 (LED-14) to maintain chamber temperature at set point, +4°-0°F.

14. At the end of the STERILIZE time, EXHAUST light comes on, and exhaust cooling solenoid S-4 (LED-16) and fast exhaust solenoid S-3 (LED-15) open.

15. As chamber exhausts, adjust PS-2 (See Fig. 7-10) to turn on buzzer, cycle counter, and CYCLE COMPLETE light at 1-2 psig.

16. When low water sensor (LC-21) senses no water in chamber, door lock solenoid (SA-1) energizes and unlocks door.

17. Open door. Buzzer stops and CYCLE COMPLETE light goes out. DOOR UNLOCKED light comes on.

18. If door is not opened, buzzer sounds for 90 seconds. COMPLETE light stays on until door is opened.

Wash/Sterilize Cycle

1. Close and lock door. (DOOR UNLOCKED light goes out).

2. Depress WASH/STERILIZE cycle button (light comes to full brightness).

3. Door lock solenoid (SA-1) de-energizes and locks door.

First Phase Wash/Sterilize Cycle (Spray/Rinse)

1. WASH light comes on.

2. Main water solenoid S-21(LED-12) opens.

3. Chamber drain solenoid S-23 (LED-23) opens.

4. Chamber water supply solenoid S-25 (LED-21) opens.

5. After two minutes ± 6 seconds of water spray, main water solenoid S-21 (LED-12) and chamber water supply S-25 (LED-21) close. Chamber drain solenoid S-23 (LED-23) remains open for 15 ± 1.5 seconds, then closes.

6. Timed pause of 10 seconds occurs.

Second Phase, WASH/STERILIZE (WASH)

1. WASH light remains lit.

2. Chamber water supply solenoid S-25 (LED-21) and main water solenoid S-21 (LED-12) open for 30 seconds.

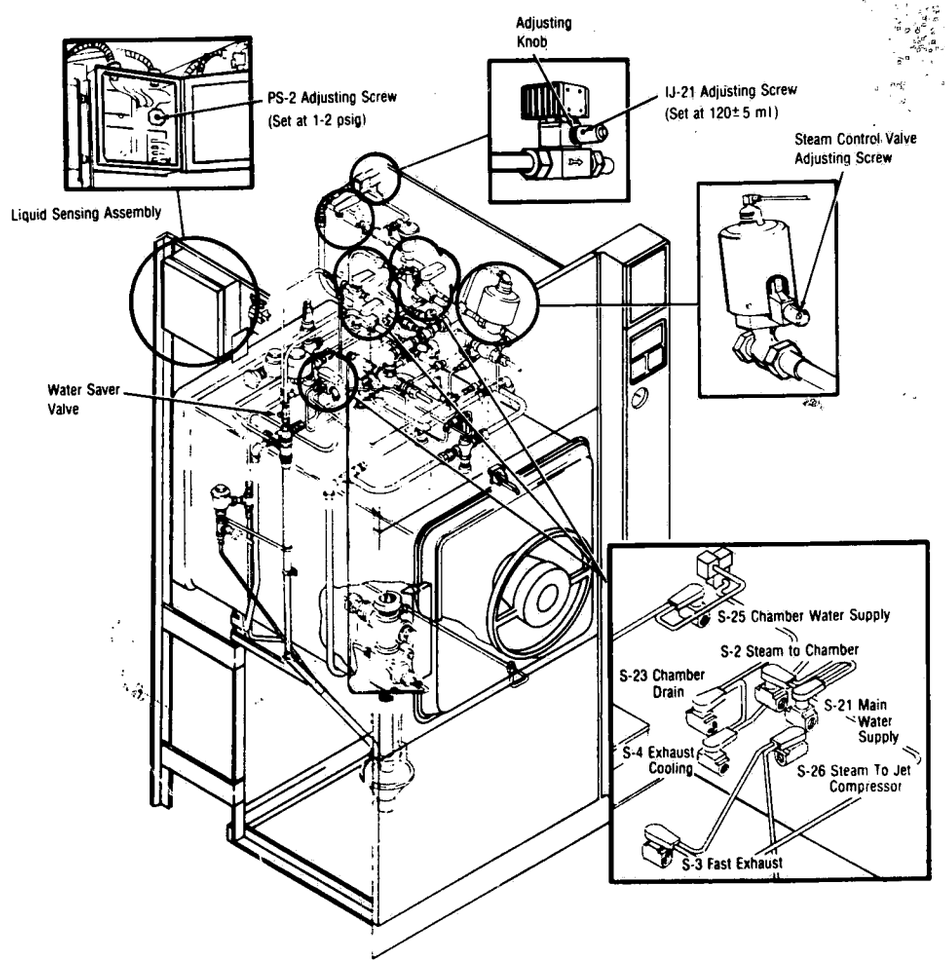


Figure 7-10. LOCATION OF STEAM CONTROL VALVE (PRESSURE REGULATOR) PRESSURE SWITCH PS-2, SOLENOID VALVES, AND DETERGENT INJECTOR IJ-21.

3. WATER IN CHAMBER light comes on.

4. IJ-21 (LED-22) opens for 15 seconds to inject detergent.

5. Chamber water supply solenoid S-25 (LED-21) opens to fill chamber.

6. When high water probe (LC-22) senses water in the chamber, water supply solenoid S-25 (LED-21) and main water supply solenoid S-21 (LED-12) close.

7. Steam-to-jet compressors solenoid S-26 (LED-18) opens to agitate and heat water.

8. When TS-4 (P-3 in recorder) senses 75°F, washer timer starts. Timer runs for eight and one-half minutes.

NOTE: During the timed wash period water temperature must not exceed 140°.

9. Chamber drain solenoid S-23 (LED-23) opens to drain chamber until low water sensor (LC-21) senses no water.

Third Phase, WASH/STERILIZE (SECOND RINSE)

1. Chamber water supply solenoid S-25 (LED-21) and main water supply S-21 (LED-12) open for one minute.

2. Chamber drain solenoid S-23 (LED-23) remains open.

3. WATER IN CHAMBER light comes on. After one minute, chamber water supply S-25 (LED-21) closes.

4. When WATER IN CHAMBER light goes out, steam-to-jet compressors solenoid S-26 (LED-18) opens for five seconds.

5. Ten seconds after S-26 (LED-18) closes, main water supply solenoid S-21 (LED-12) closes.

6. Twenty seconds after S-26 (LED-18) closes, chamber drain solenoid S-23 (LED-23) closes. A timed pause of 10 seconds occurs.

7. WASH light goes out and CONDITION light comes on.

8. This indicates end of WASH phase and beginning of STERILIZE phase. Remainder of cycle is same as STERILIZE cycle, steps 5 through 18.

Adjustment of Detergent Injector IJ-21 (LED-22)

1. Normal detergent usage is 120 ± 5 ml per cycle.

2. Fill a 1000 ml graduated cylinder to 900 ml with detergent.

3. Place tube from detergent injector IJ-21 in graduated cylinder.

4. When detergent injector solenoid IJ-21 (LED-22) opens, observe amount of detergent drawn in.

5. Adjust the screw on side of knurled knob on the detergent injector solenoid IJ-21 counterclockwise to increase amount of detergent used.

6. Adjust the knurled knob on the detergent injector solenoid IJ-21 clockwise to decrease amount of detergent used.

7.15 PRINTCON PRINTER

NOTE: Two styles of printer assemblies are in use. Units manufactured before 6/85 used a 12V DC gearmotor to drive the carbon copy into a collection coil. Units manufactured after 6/85 used a 120V AC gearmotor to pull the copy onto a spool.

Changing Paper (Figs. 7-11, 7-12, 7-13)

(All Units)

NOTE: Printcon is designed to use 2-3/8 inch wide, one- or two-ply paper tape as supplied by AMSCO. Paper tape supplies must not be stored in areas of high humidity or temperature.

1. Open printer door. Swing printer assembly forward and downward and allow it to rest in the service position.

2. If one ply of paper has been inserted into the daily record storage area, it will be necessary to remove the stored daily record before continuing. Refer to paragraph, "Removing Stored Daily Record".

3. Using thumb and index finger, grasp paper spool and raise it upward.

4. Slide the empty paper spool toward the right and off the spindle

5. Insert fresh paper roll onto spindle with loose end or ends of paper in back of roll going downward.

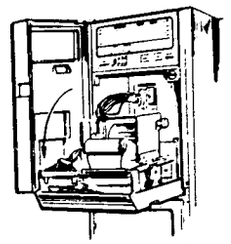
6. Insert loose end of one-ply roll or both ends of two-ply roll into paper slot. Using index finger of left hand, operate paper advance toggle switch to the forward position (toward the operator). Lower paper roll and spindle. If necessary, operate paper advance toggle switch again until the paper is drawn taut. Turn off paper advance.

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

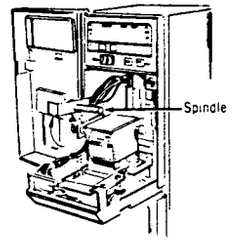
Automatic Paper Storage (Fig. 7-14)
(Units Before 6/85)

Printcon is capable of storing fifteen feet of single ply paper.

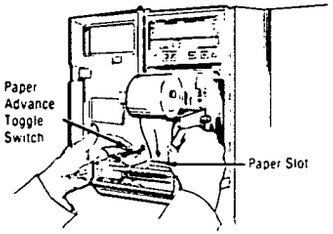
NOTE: AMSCO suggests that when using two-ply paper, the inner ply **only** should be inserted into the storage area for a permanent record. The outer ply can be torn off and placed with each sterilized load.



(Units Before 6/85)
Figure 7-11. PRINTER IN LOWERED POSITION.



(Units Before 6/85)
Figure 7-12. SPINDLE IN RAISED POSITION.



(Units Before 6/85)
Figure 7-13. INSERTING PAPER.

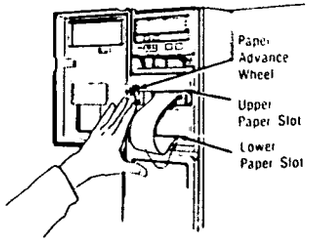


Figure 7-14. INSERTING PAPER INTO AUTOMATIC PAPER STORAGE AREA.

1. Using the paper advance wheel on the left side of the upper paper slot, advance paper until it extends 2 to 3 inches below lower paper slot.

2. Insert end of paper tape between motorized pinch rollers and allow to draw tight. The paper advance toggle switch must be in the rear position (away from the operator) to operate the motorized pinch rollers.

Automatic Paper Storage (Fig. 7-14)
(Units After 6/85)

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

2. Using the paper advance thumbwheel on the left side of the upper paper slot, advance paper until it extends 6 to 8 inches below the lower paper slot.

NOTE: AMSCO suggests that when using two-ply paper, the inner ply **only** should be inserted into the storage area for a permanent record. The outer ply can be torn off and placed with each sterilized load.

3. Insert the end of the paper tape into the lower paper slot until full 6 to 8 inches is inserted.

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

5. Grasp end of the paper tape, fold the two corners to form a **V** and fully insert the end into the slot of paper take-up spool. (Fig. 7-14A)

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

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

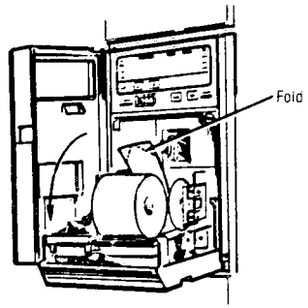
Removing Stored Daily Record (Figs. 7-15, 7-16, 7-17) **(Units Before 6/85)**

1. Open printer door. Crease the paper tape with a fingernail and tear tape as straight as possible. Allow trailing end of paper to enter rollers and storage area.

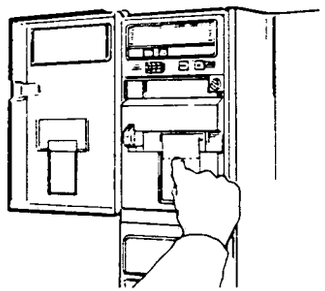
2. Swing the printer assembly forward and downward and allow it to rest in the service position.

3. Using thumb and index finger, grasp knob on storage area door and open door downward. Daily record is now easily removed from the right.

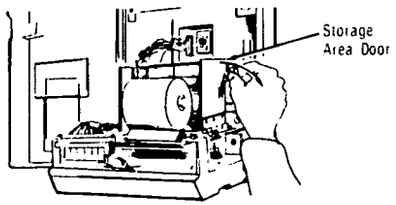
4. Close storage area door. Return printer assembly upward and back to the operating position.



(Units After 6/85)
Figure 7-14A. FOLD PAPER TAPE.



(Units Before 6/85)
Figure 7-15. CREASING PAPER TAPE.



(Units Before 6/85)
Figure 7-16. OPENING STORAGE AREA.

5. Using the paper advance wheel on the left side of the upper paper slot, advance paper until it extends 2 to 3 inches below lower paper slot.

6. Insert end of paper tape between motorized rollers and allow to draw tight. Close door.

Removing Stored Record (Fig. 7-17A)
(Units After 6/85)

Printcon is capable of storing an entire roll of paper, however stored record may be removed at any time.

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

2. Open printer door. Using the paper advance thumbwheel on the left side of the upper paper slot, advance paper until it extends 3 to 4 inches below the lower paper slot or until all information on the tape has been advanced.

3. Tear or cut the paper tape.

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

5. Position the POWER switch to ON. Paper will advance onto paper take-up spool. Position the power switch to OFF when paper is completely advanced.

6. To remove paper take-up spool, release tension on spring-loaded retaining clip and lift spool from unit.

7. Remove spool end plate and slide paper from spindle.

8. Replace spool end plate and return spool to spring-loaded clip.

9. Refer to paragraph "**Automatic Paper Storage (Units After 6/85)**" to reload spool.

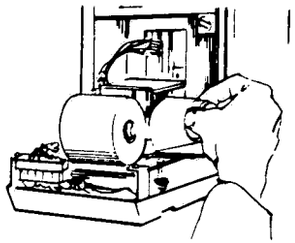
Changing The Inked Ribbon Cartridge (Fig. 7-18)
(All Units)

1. Tear off loose end of paper and open door to the left.

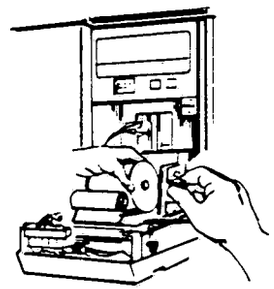
2. Remove old cartridge by placing index finger behind cartridge and pulling forward.

3. Install new cartridge, with ribbon above loose end of paper, by placing it into position and snapping it into place with thumbs of each hand.

4. Close door.



(Units Before 6/85)
Figure 7-17. REMOVING STORED DAILY RECORD.



(Units After 6/85)
Figure 7-17A. REMOVING STORED RECORD.

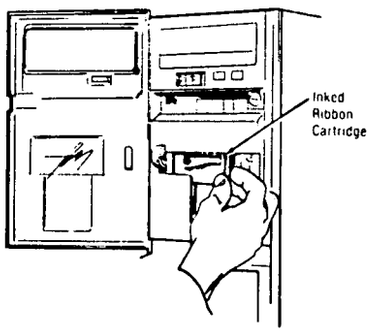


Figure 7-18. REMOVING INKED RIBBON CARTRIDGE.

Printer Replacement (Fig. 7-20 or 7-20A) **(All Units)**

1. Open the outer door of the unit.

2. Tilt the printer assembly forward to service position and remove the two #6-32 screws and washers from the back of the printer mounting plate that anchor the silver anodized cover.

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

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

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

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

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

Paper Advance Toggle Switch Replacement (Fig. 7-20 or 7-20A) **(All Units)**

1. Open the outer door of the unit.

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

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

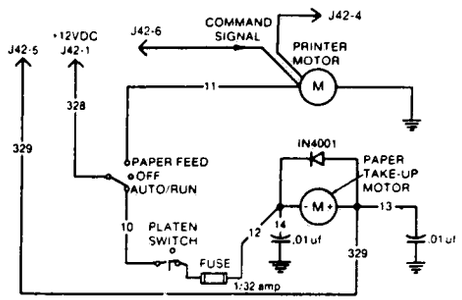
4. See Figure 7-19 or 7-19A to rewire the new switch.

Platen Microswitch Replacement (Fig. 7-20 or 7-20A)

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

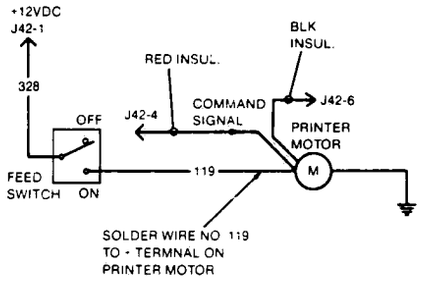
1. Open the outer door of unit.

2. Tilt the printer assembly forward to the service position and disassemble the silver anodized cover by removing the two #6-32 screws and washers from the printer mounting plate anchoring the cover arms.



(Units Before 6/85)

Figure 7-19. SWITCH & MOTOR SCHEMATIC.



(Units After 6/85).

Figure 7-19A. SWITCH & MOTOR SCHEMATIC.

3. Remove the two #6 x 1/4 self-tapping screws on the right hand side of printer take-up unit located 5/8" forward of printer mounting plate on 31/32" centers.

4. Swing the platen open to expose the switch and mount.

5. Reach in with fingers and pull the switch assembly out and disconnect the two wires with "fast-on" connectors from the switch tabs.

6. Switch and mount are now free. Disengage the switch from the mount by removing the two #4-40 hex nuts.

7. See Figure 7-19 or 7-19A to rewire the new switch.

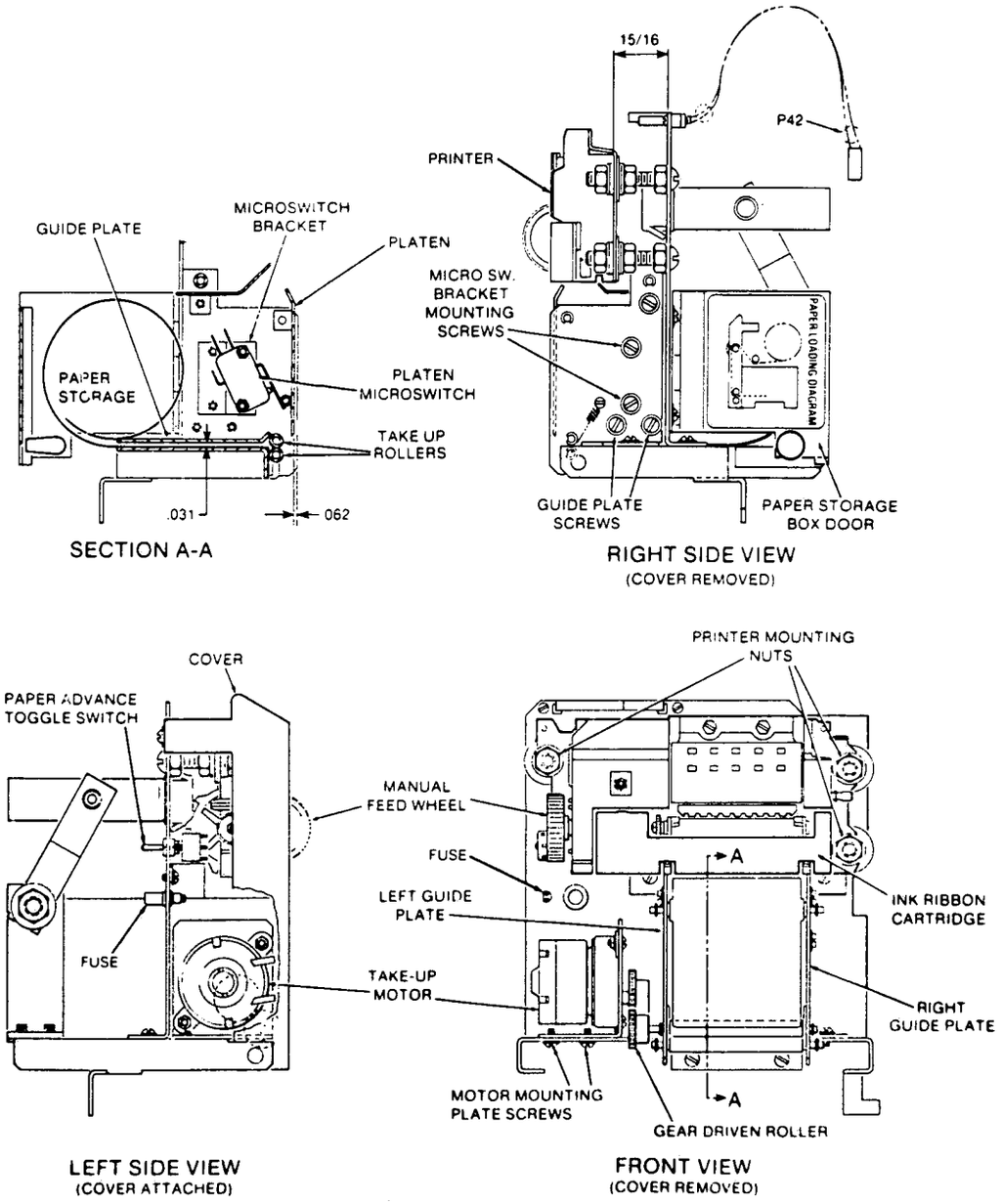
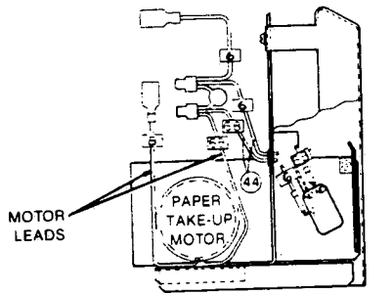
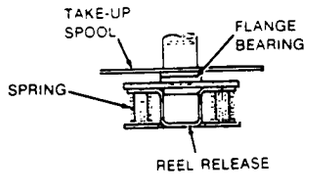


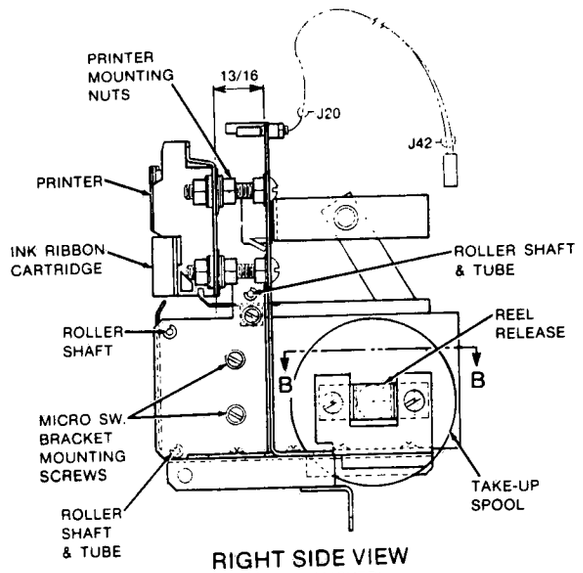
Figure 7-20. PRINTCON PRINTER ASSEMBLY.
(Units Before 6/85)



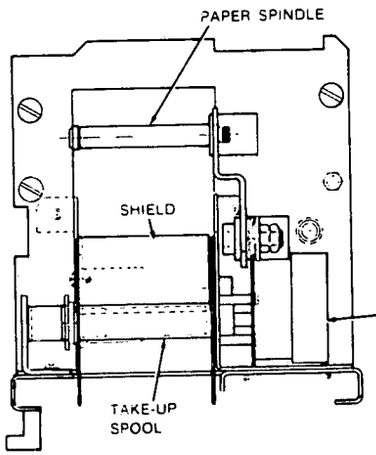
WIRING ARRANGEMENT



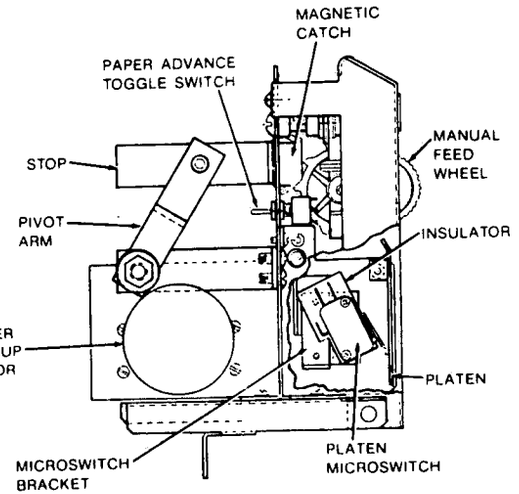
SECTION B-B



RIGHT SIDE VIEW
(COVER REMOVED)



REAR VIEW
(COVER REMOVED)



LEFT SIDE VIEW
(COVER ATTACHED)

Figure 7-20A. PRINTCON PRINTER ASSEMBLY. (Units After 6/85)

Take-Up Motor Replacement (Fig. 7-20) **(Units Before 6/85)**

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

2. Disengage the slots from the pivot shoulder screws and remove the cover.

3. Pivot the unit back to the upright position and remove the slot head shoulder screws and washers.

4. Disassemble the printer take-up assembly from Printcon housing.

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

5. To remove the take-up motor, unscrew the two #6-32 screws from the bottom of the unit.

6. Unsolder the wire connections and remove the motor and motor mount.

7. Disassemble the motor from the motor mount by unscrewing the two #4-40 nuts and screws holding them together.

8. See Figure 7-19 to rewire the new switch.

Printer Assembly Inspection and Adjustment (Fig. 7-20) **(Units Before 6/85)**

Whenever any of the following components are replaced, they must be aligned and/or adjusted to assure smooth paper advance and take-up.

- Printer.
- Paper Advance Toggle Switch.
- Platen Microswitch.
- Take-up Motor.

Dismount the unit from the control column and remove it to a bench.

1. Unplug P42 from the main Printcon PC Board. Unfasten the two 10-32 shoulder screws upon which the assembly pivots. Remove the printer assembly.

2. Remove the paper roll.

Paper Coil and Guideplate Clearance (Units Before 6/85).

1. Open the paper storage area door and inspect for 1/32" (.031) clearance between the paper coil and the guideplate. If this dimension is not correct, unfasten the take-up motor (with motor attached). The left-side adjustment screws are now accessible.

2. Loosen the four adjustment screws (two on each side) on the right and left side plates. Using a 1/32" (.031 or .032) feeler gauge for clearance between the paper coil and guideplates, adjust the guideplate position and then tighten down.

3. Remount the take-up motor mount and motor.

Microswitch Activation Adjustment (Units Before 6/85)

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

1. Lift up the platen and observe the screws which mount the microswitch bracket to the right side plate. Loosen them slightly.

2. Adjust the microswitch position so that the trip point is audible when the platen is parallel to and about 1/16" below the ends of the side plates.

3. Tighten the screws securely.

Printer Alignment With Take-up Mechanism (Units Before 6/85)

If the printer has been replaced, it must be correctly aligned with the take-up mechanism.

1. Verify that the printer standoff is 15/16" between the printer mount plate and the printer itself. Correct if necessary.

2. Slightly loosen the three 1/4-20 nuts which secure the printer. Dismount the take-up motor plate (with motor attached) from the mounting base. Carefully allow the motor assembly to rest to one side. This will free the white nylon gear attached to the upper pinch roller.

3. Remove the ink ribbon cartridge. Cut approximately 6 ft. of paper from a roll. Only one ply is needed for the adjustment process.

4. Using the manual paper feed wheel on the printer, start the paper through the printer until about 8" of paper extends past the printer roller. Pull the 8" section tightly with even tension along the surface of the printer roller.

NOTE: Do **not** allow the paper to buckle at any point during the adjustment process.

5. Lay the end of the 8" section of paper across the pinch rollers of the take-up mechanism. Observe the paper alignment with the right and left side guide plates on the take-up assembly adjacent to the printer until the paper is centered in the take-up guide channel.

6. Using a 6" rule (or similar measuring device), measure the distance between the printer roller and the upper pinch roller of the take-up assembly. Adjust the printer assembly location until the rollers are equidistant at the right and left. Recheck the paper alignment in the guide channel.

7. When proper lateral and parallel alignment is achieved, hold the printer assembly in place and tighten the securing nuts. Start the end of the 8" section of paper into the pinch rollers by turning the nylon gear on the upper roller. Continue paper take-up in this fashion and observe the track of the paper. When proper printer/take-up alignment is achieved, the paper will remain seated in the guide channel without buckling and without riding up either the right or left side guide plate. If necessary, readjust and recheck.

8. Remove the remaining portion of paper from the printer and take-up assembly. Install the ink ribbon cartridge. Remount the take-up motor mount and motor to the motor mounting base. Reinstall the cover. Connect P42 to the main Printcon PC board and mount the printer assembly in the control column. Install a new roll of one- or two-ply paper and, under power take-up, insure that operation is correct.

7.16 PRINTCON DIGITAL DISPLAY

Display Panel Overlay Replacement (Fig. 8-46, 16)

1. Open the outer door of the unit.

2. Remove #6 x 1/4 self tapping screw from top of upper right-hand corner of display panel door. This will allow opening door with left-hand swing.

3. Next, disconnect ribbon cable connections from panel PC board mounted directly behind panel door — one connector from PC board and one connector from thumbwheel switch.

4. Remove #4-40 nut from display panel door hinge stud at bottom left corner of display door. Remove hinge stud upward and out. Display panel door may now be removed.

5. Reverse the procedure to install a new Display Panel Overlay.

Temperature Thumbwheel Replacement
(Fig. 8-46, 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. 8-46, 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 and temperature are located on the Printon digital display board. Refer to Figure 7-21 for appropriate settings.

PS2
PRESSURE
psig =
setting +2

Setting SA11	psig
0	0.0
1	0.5
*2	1.0
3	1.5
4	2.0
5	2.5
6	3.0
7	3.5
8	4.0
9	4.5

TS4 TEMPERATURE
*F = setting
Note: This switch is labelled VS4

Setting		*F	Setting		*F	Setting		*F	Setting		*F
SA6	SA7		SA6	SA7		SA6	SA7		SA6	SA7	
3	3	32	4	9	49	6	6	66	8	3	83
3	4	33	5	0	50	6	7	67	8	4	84
3	5	34	5	1	51	6	8	68	8	5	85
3	6	35	5	2	52	6	9	69	8	6	86
3	7	36	5	3	53	7	0	70	8	7	87
3	8	37	5	4	54	7	1	71	8	8	88
3	9	38	5	5	55	7	2	72	8	9	89
4	0	39	5	6	56	7	3	73	9	0	90
4	1	40	5	7	57	7	4	74	9	1	91
4	2	41	5	8	58	7*	5*	75	9	2	92
4	3	42	5	9	59	7	6	76	9	3	93
4	4	43	6	0	60	7	7	77	9	4	94
4	5	44	6	1	61	7	8	78	9	5	95
4	6	45	6	2	62	7	9	79	9	6	96
4	7	46	6	3	63	8	0	80	9	7	97
4	8	47	6	4	64	8	1	81	9	8	98
4	9	48	6	5	65	8	2	82	9	9	99

*=Recommended Initial Settings

Figure 7-21. ROTARY BCD SWITCHES.

7.17 MAIN PRINTCON PC BOARD

Changing The Battery (Fig. 7-22, 8-62)

NOTE: Existing battery (RAY-O-VAC DP24-2-42; P-129356-038 is No Longer Available. When replacing RAY-O-VAC battery, order and install Battery Adapter Assembly (P-150822-349). Assemble plugs into Printcon Board in same fashion as RAY-O-VAC battery. Replace battery as follows:

NOTE: To ensure correct connection, observe notched (see Fig. A) corner of battery. This is positive terminal (Pin #1) and inserts into positive socket of receptacle (upper left-hand corner of socket). Although no danger exists if battery is incorrectly installed, clock and calendar will not function when machine is off.

1. Turn POWER switch OFF and open top door on Printcon column.

2. Swing printer assembly forward and downward. Allow it to rest in service position.

3. Remove and discard old battery from Printcon board (note polarity).

4. Install new battery (see NOTE).

5. Return printer assembly to operating position. Close door.

6. Turn POWER switch ON and reset time and date if necessary.

7. If necessary to replace new battery (Lithium coin cell), proceed as follows:

a. Turn POWER switch to OFF and open top door on Printcon column.

b. Swing printer assembly forward and downward. Allow it to rest in service position.

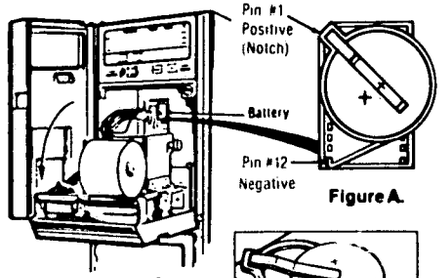


Figure 7-22. CHANGING THE BATTERY.

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. 7-23, 7-24 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.

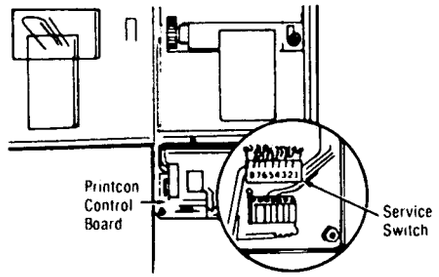


Figure 7-23. LOCATING SERVICE SWITCH.

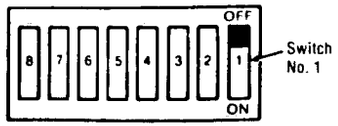


Figure 7-24. SERVICE SWITCH.

Adjusting The Sterilize Temperature Overdrive
(Figs. 7-23, 7-24 and Table 7-1)

For special sterilizer applications, the temperature overdrive may be adjusted in increments of approximately 1/2 degree F. For example, if the temperature thumbwheel setpoint is at 270 F (132 C), the actual control temperature can be from 270 F to 273.8 F (132 C to 134.3 C) depending on how service switches, 5, 6 & 7 of the service switch are set. Refer to Table 7-1 for overdrive settings.

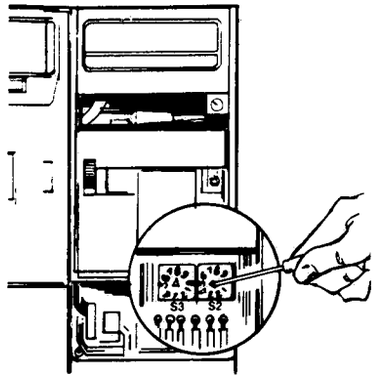


Figure 7-25. LOCATING ROTARY SWITCHES S2 AND S3.

TABLE 7-1. SERVICE SWITCH OPTION SETTINGS

Feature	Switch Position No(s).	Setting
Temperature in Fahrenheit	1	OFF
Temperature in Celsius	1	ON
Pressure (English) psig & in Hg vacuum	2	OFF
Pressure (Metric) Kg/cm² & mm Hg vacuum	2	ON
Single precision	3	OFF
Extended precision	3	ON
Pressure Transducer	4	ON
Temperature Overdrive (Gravity Units Only)		
TS2 = TS1	5, 6 & 7	5 OFF, 6 OFF, 7 OFF
TS2 = TS1 + 0.5 F	5, 6 & 7	5 ON, 6 OFF, 7 OFF
TS2 = TS1 + 1.1 F	5, 6 & 7	5 OFF, 6 ON, 7 OFF
TS2 = TS1 + 1.6 F	5, 6 & 7	5 ON, 6 ON, 7 OFF
TS2 = TS1 + 2.2 F	5, 6 & 7	5 OFF, 6 OFF, 7 ON
TS2 = TS1 + 2.7 F	5, 6 & 7	5 ON, 6 OFF, 7 ON
TS2 = TS1 + 3.3 F*	5, 6 & 7	5 OFF, 6 ON, 7 ON
TS2 = TS1 + 3.8 F	5, 6 & 7	5 ON, 6 ON, 7 ON
Spare Switch	8	Unused

*Initial factory setting (for Gravity Sterilizers only).

Setting The Year Switches (Fig. 7-25)

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. 8-46, 3)

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

1. Open the outer door of the Printcon unit. The entire unit must be removed from the control column.

2. Remove the front cover panel from the column by taking two cap screws out of the top of the cover and two #10-32 screws out of the bottom.

3. Take off the primary panel by removing four #8-32 mounting screws and washers. It is not necessary to disconnect P16 from the primary panel if care is exercised.

4. Tilt the primary panel forward and reach through the primary panel mounting bracket to disconnect P40 and P48 connections.

5. Remove the four #8-32 Printcon unit mounting screws located two on each side of the unit. Access to the top two screws must be made by opening the display door at the top of the unit. The display PC board must be removed to expose the upper two mounting screws. See "Display Panel Overlay Replacement" and "Display PC Board Replacement." Printer unit must be tilted forward to remove the lower two screws.

6. Printcon unit can now be removed from the column. Main Printcon PC board is removed from the unit by extracting the eight #6-32 mounting screws and standoffs.

7. Reverse the procedure to install a new main Printcon PC board.

7.18 PRINTCON PRESSURE TRANSDUCER REPLACEMENT (Fig. 8-55, 5)

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 and reinstall U-bolt and nuts.

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 Fig. 6-12 or Fig. 6-13 when rewiring.

7.19 PRINTCON TEMPERATURE PROBE (RTD) REPLACEMENT (Fig. 8-55, 2)

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.

7.20 REPLACEMENT OF PRINTCON POWER SUPPLY FUSES

If fuse replacement is necessary, refer to the figure below for locations of these fuses.

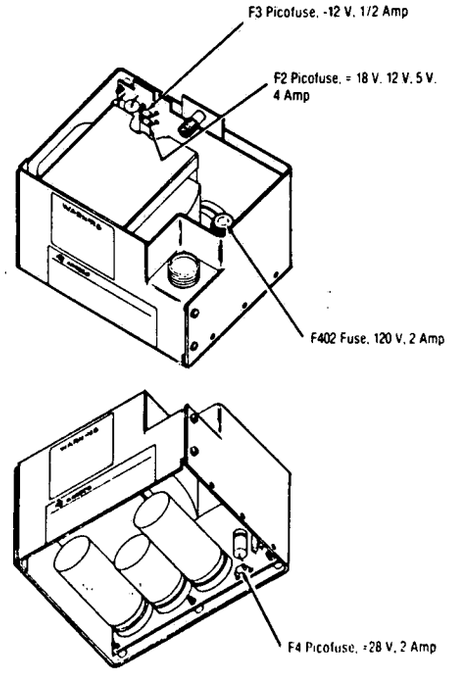


Figure 7-26. POWER SUPPLY FUSE LOCATIONS.

7.21 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, 100 psig, 30 in. Hg. (AMSCO P/N 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 the front panel of the control column. Remove the primary panel mounting screws.

If care is exercised, the primary panel need not be disconnected for the next step.

2. Check the service switch on the Printcon control PC board for the following settings:

#1 — OFF (Fahrenheit)
#2 — OFF (English pressure)
#3 — ON (Display tenths)
#4 — ON (Strain 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.

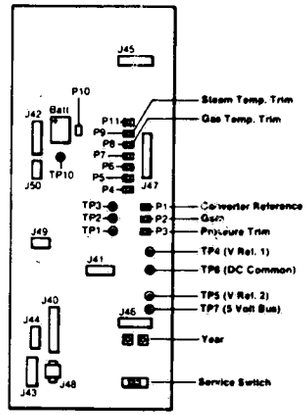


Figure 7-27. TEST POINT AND POTENTIOMETER LOCATIONS: Main Printcon PC Board.

With power on, measure the voltage at TP4. This wil 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 radia arms to the fully extended position and observe tha the "door unlocked" lamp goes out. Exercise caution because **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.

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-LC 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 adjus:

AMSCO SERVICE

EAGLE® 2000 SERIES WASHER-STERILIZER P-764089-002

2/86

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.

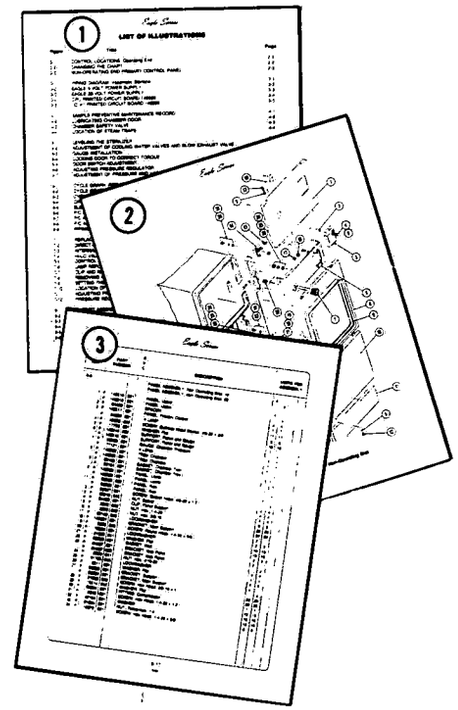
8. Remove the chamber drain strainer. Install the potentiometer thermocouple lead in metal-to-metal contact with the temperature probe in the chamber drain (1/2" from the tip). Initiate the same type cycle as in step 7, and wait until the Printcon **temperature** display stabilizes at the regulator setting. 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.

SECTION 8

EXPLODED VIEWS AND PARTS LISTS

Assemblies and components of Eagle 2000 Washer sterilizers are illustrated and identified on the following pages. The part number, the description and the quantity required for each usage is given. Each identification in the description represents the assembly level. The UNITS PER ASSEMBLY column is specific for the given assembly or 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 .....

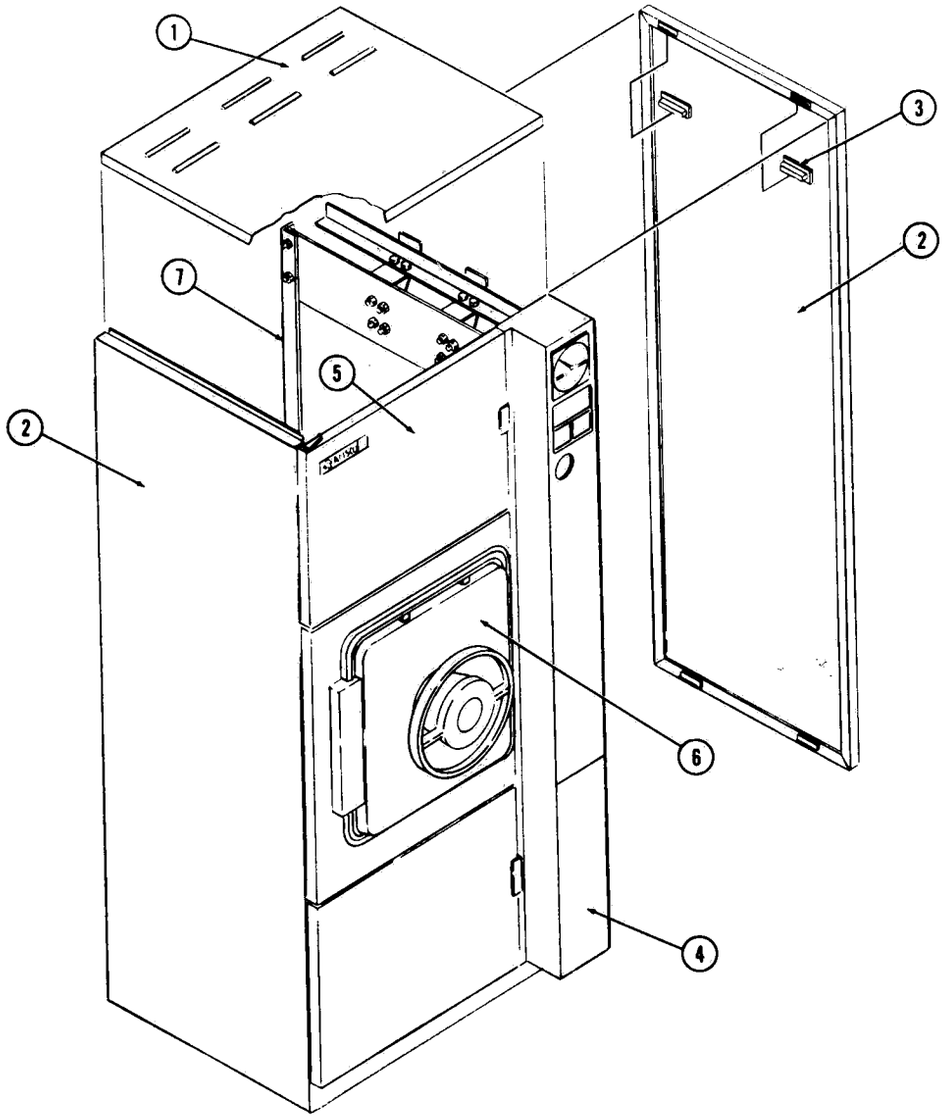


Figure 8-1. CABINET ASSEMBLY: Freestanding Sterilizer.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-1-					CABINET ASSEMBLY: Single Door, Freestanding					
					Units with Indicator-Recorder	X				
					Units with Printcon		X			
1	P	136422	002		PANEL, Top	1	1			
2	P	93404	003		PANEL, Side	2	2			
3	P	84298	001		CATCH, Magnetic	8	8			
4					CONTROL COLUMN ASSEMBLY (See Fig. 8-9)	1				
					CONTROL COLUMN ASSEMBLY (See Fig. 8-45)		1			
5					PANEL ASSEMBLY, Operating End (See Fig. 8-5)	1	1			
6					COVER AND HANDWHEEL ASSEMBLY (See Fig. 8-23)	1	1			
7					SIDE FRAME ASSEMBLY (See Fig. 8-2)	1	1			
	P	146441	011	*	KIT, Cabinet Assembly, 16 x 16 P.I.W.S.	A/R	A/R			

*Order reference drawing W-146441-001 as a separate item when ordering Cabinet Assembly Kit.

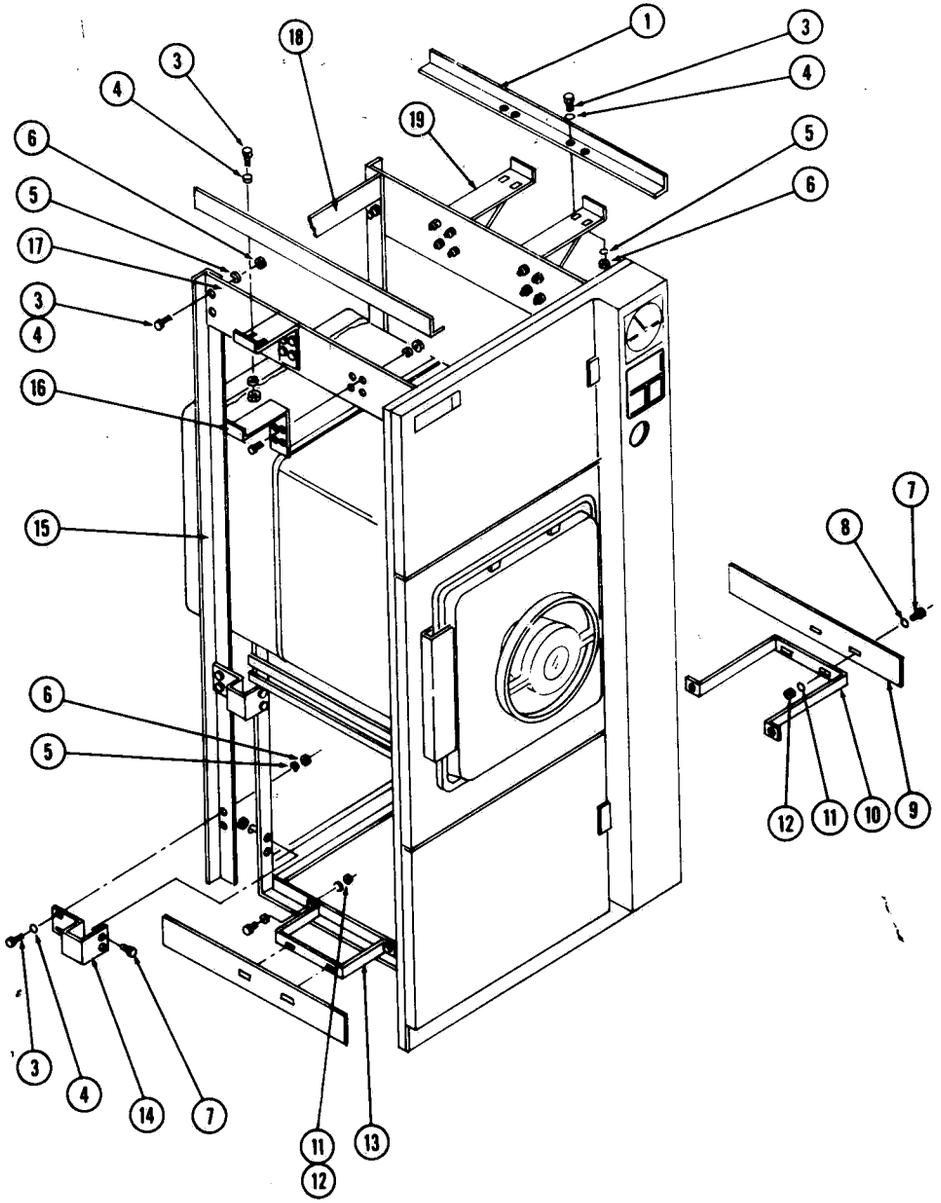


Figure 8-2. SIDE FRAME ASSEMBLY: Freestanding Sterilizer.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-2-					SIDE FRAME ASSEMBLY: Single Door, Freestanding	X
1	P	93896	083		SUPPORT, Top Panel	2
2					NOT USED	—
3	P	3848	051		SCREW, Hex Head, 1/4-20 x 3/4	20
4	P	3515	041		WASHER, Flat, 1/4	20
5	P	76230	091		LOCKWASHER, 1/4	20
6	P	3097	041		NUT, 1/4-20	14
7	P	31838	042		SCREW, Hex Head, 3/8-16 x 1	20
8	P	10414	042		WASHER, 3/8	20
9	P	93663	001		SUPPORT, Bottom	2
10	P	93665	002		BRACKET, Bottom, Long	1
11	P	89809	061		LOCKWASHER, Stainless Steel, Internal Tooth	20
12	P	3099	042		NUT, 3/8-16	20
13	P	93665	001		BRACKET, Bottom, Short	1
14	P	93688	001		BRACKET, Main Support	4
15	P	146628	001		SUPPORT, Rear Cabinet	2
16	P	93896	089		HANGER ASSEMBLY, Short	2
17	P	93896	088		SUPPORT, Top Attachment	2
18	P	93668	001		BRACKET, Top Attachment	1
19	P	93896	090		HANGER ASSEMBLY, Long	2

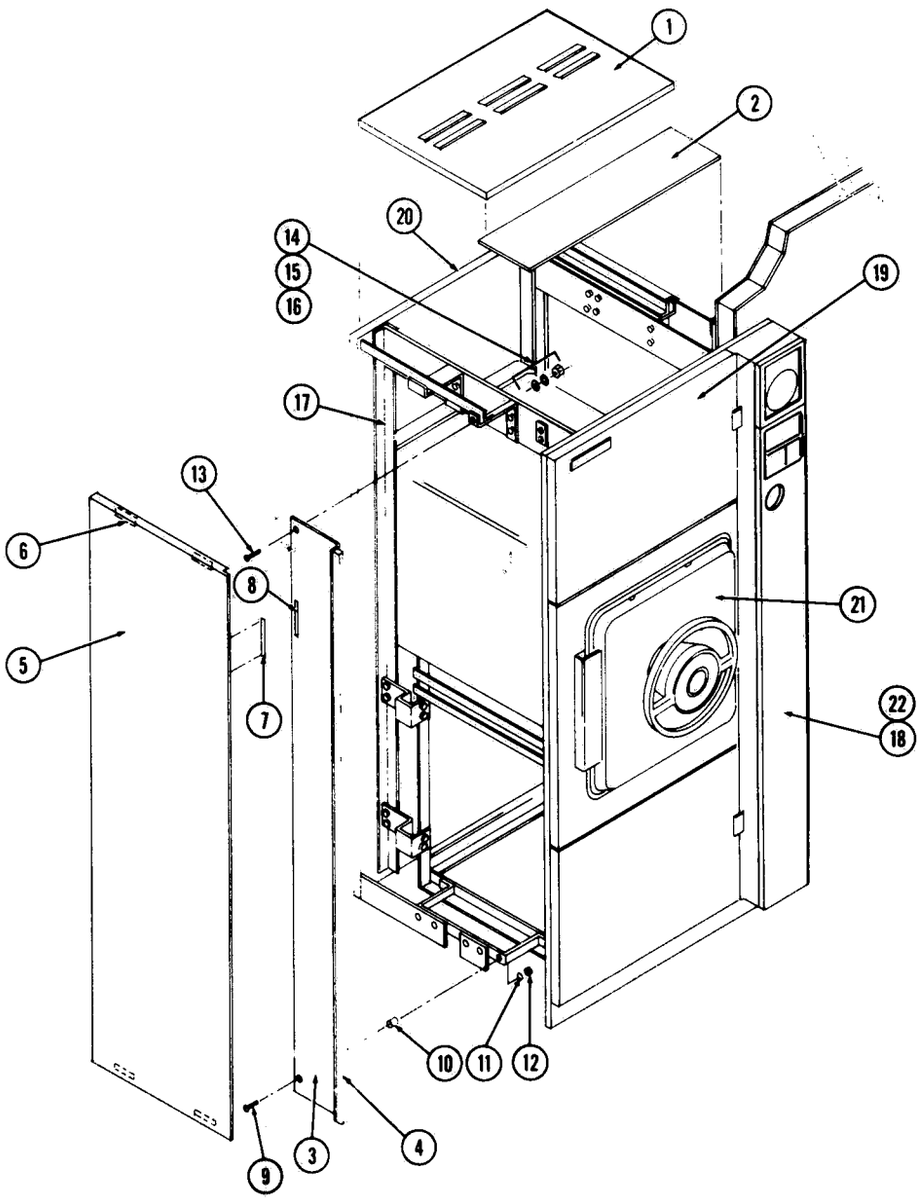


Figure 8-3. CABINET ASSEMBLY: Double Door, Recessed.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-3-					CABINET ASSEMBLY: Double Door, Recessed		
					Units with Indicator-Recorder	X	
					Units with Printcon		X
1	P	136422	001		PANEL, Top	1	1
2	P	93415	001		FILLER	1	1
3	P	93401	001		PANEL, Extension	2	2
4	P	84297	001		STRIP, Sponge	2	2
5	P	93404	001		PANEL, Side	2	2
6	P	84298	001		CATCH, Magnetic	8	8
7	P	129340	001		†TAPE, Velcro, Wool Type	2	2
8	P	129340	002		†TAPE, Velcro, Hook Type	2	2
9	P	38675	041		SCREW, Flat Head, 10-32 x 1-3/4	2	2
10	P	129341	001		SPACER	2	2
11	P	19677	041		LOCKWASHER, #10	2	2
12	P	2960	042		NUT, 10-32	2	2
13	P	42656	091		SCREW, Flat Head, 1/4-20 x 1	2	2
14	P	76230	091		LOCKWASHER, 1/4	2	2
15	P	3097	041		NUT, 1/4-20	2	2
16	P	3515	041		WASHER, Flat, 1/4	2	2
17					SIDE FRAME ASSEMBLY (See Fig. 8-4)	1	1
18					CONTROL COLUMN ASSEMBLY (See Fig. 8-9)	1	
19					PANEL ASSEMBLY, Operating End (See Fig. 8-5)	1	1
20					PANEL ASSEMBLY, Non-Operating End (See Fig. 8-7)	1	1
21					COVER AND HANDWHEEL ASSEMBLY (See Fig. 8-23)	2	
22					CONTROL COLUMN ASSEMBLY (See Fig. 8-45)		1
	P	146441	012		KIT, Cabinet Assembly, 16x16 P.I.W.S.	A/R	A/R

†Secure Velcro fasteners to panels with Loctite Super Bonder 495 or equivalent.

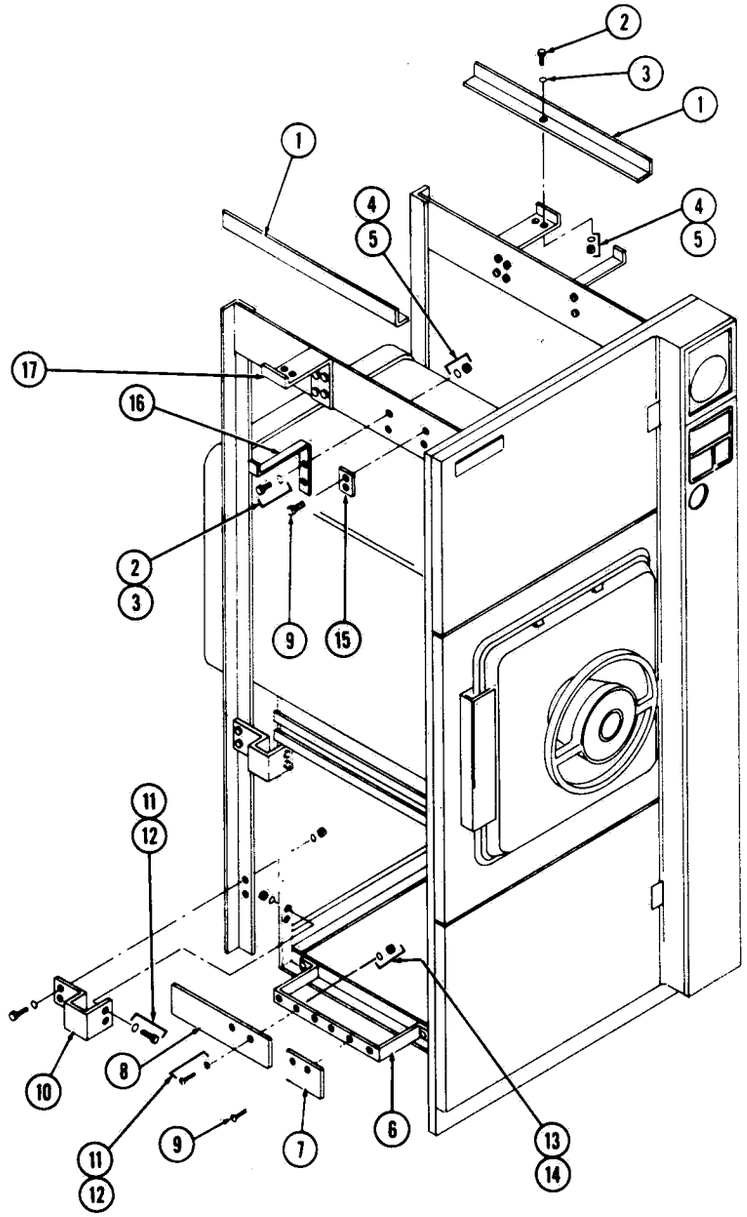


Figure 8-4. SIDE FRAME ASSEMBLY: Recessed Sterilizer.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-4-					SIDE FRAME ASSEMBLY: Double Door, Recessed	X
1	P	56396	214		SUPPORT, Top Panel (Right)	1
	P	56396	213		SUPPORT, Top Panel (Left)	1
2	P	3848	051		SCREW, Hex Head, 1/4-20 x 3/4	32
3	P	3515	041		WASHER, Flat, 1/4	32
4	P	76230	091		LOCKWASHER, 1/4	10
5	P	3097	041		NUT, Hex, 1/4-20	6
6	P	93666	001		BRACKET, Bottom	2
7	P	84470	001		PLATE, Strike	2
8	P	84471	001		PLATE, Strike	2
9	P	43341	091		SCREW, Flat Head, #8-32 x 1/2	16
10	P	93688	001		BRACKET, Main Support	4
11	P	31838	042		SCREW, Hex Head Cap, 3/8-16 x 1	4
12	P	10414	042		WASHER, Flat	4
13	P	89809	061		LOCKWASHER, Stainless, Internal Tooth Type	10
14	P	3099	042		NUT, Hex, 3/8-16	4
15	P	84469	001		PLATE, Strike	4
16	P	84075	001		BRACKET, Top	2
17	P	93896	089		HANGER, Top	2

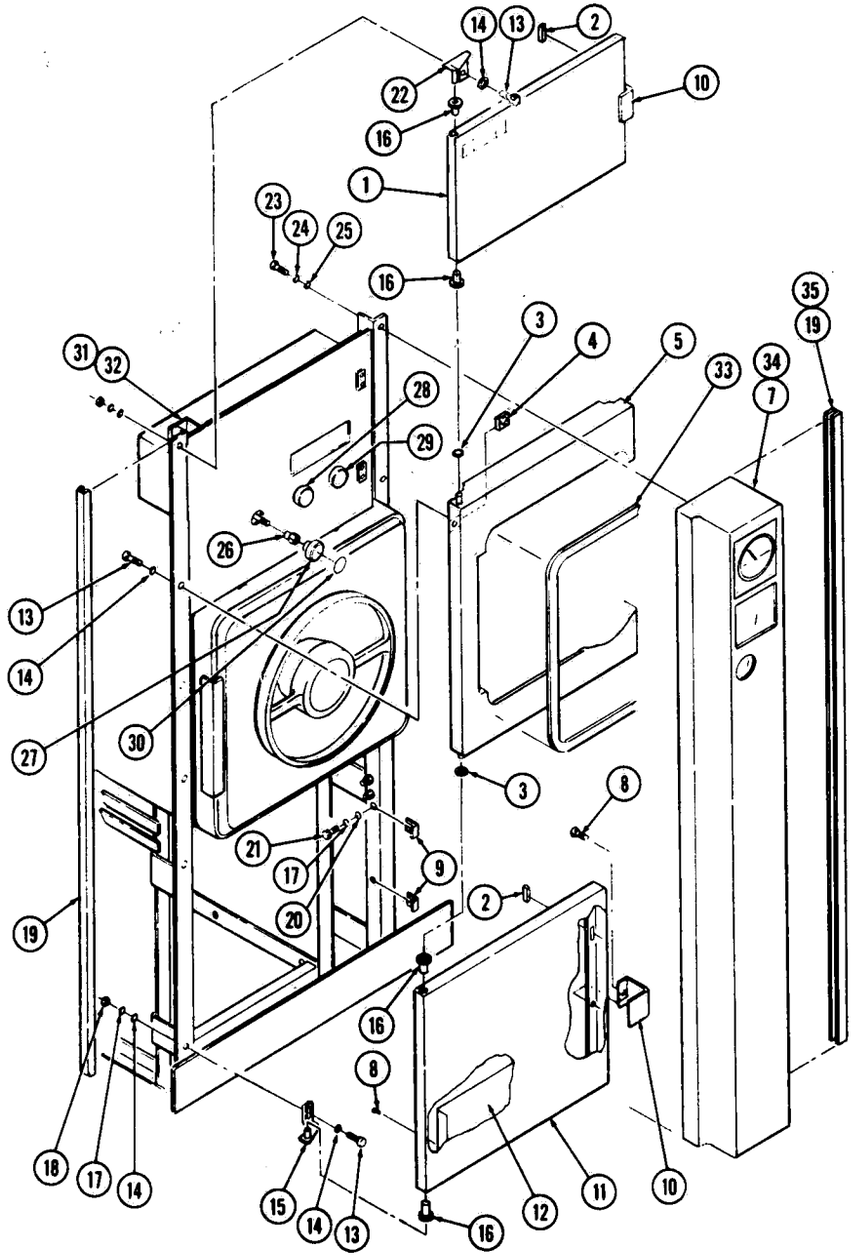


Figure 8-5. PANEL ASSEMBLY: Operating End.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-5-					PANEL ASSEMBLY: Operating End					
					Units with Indicator-Recorder	X				
					Units with Printcon		X			
1	P	143146	002		PANEL, Upper Access	1	1			
2	P	83920	001		CATCH, Magnetic	4	4			
3	P	84457	001		WASHER	2	2			
4	P	91924	091		NUT, Tinnerman	5	5			
5	P	143149	001		TRIM, Shell	1	1			
6	P				NOT USED					
7					CONTROL COLUMN ASSEMBLY (See Fig. 8-9)	1				
8	P	91620	061		SCREW, Self Tap, #10-32 x 3/8	2	7			
9	P	93702	001		STRIKE	2	2			
10	P	93095	001		HANDLE	2	2			
11	P	136302	002		PANEL, Lower	1	1			
12	P	93096	001		RACK, Manual	1	1			
13	P	3847	042		SCREW, Hex Head, 1/4-20 x 5/8	13	13			
14	P	10445	091		WASHER	13	15			
15	P	93701	001		HINGE	1	1			
16	P	84455	001		BEARING, Flange	4	4			
17	P	19678	045		LOCKWASHER	2	4			
18	P	3097	041		NUT, Hex, 1/4-20	8	10			
19	P	93089	001		GASKET, Wall	2	2			
20	P	49134	061		WASHER, Flat	4	4			
21	P	3846	041		SCREW, Hex Head, 1/4-20 x 1/2	2	2			
22	P	93701	002		HINGE	1	1			
23	P	3857	045		SCREW, Hex Head, 3/8-16 x 1/2	5	5			
24	P	25832	041		LOCKWASHER	5	5			
25	P	10456	091		WASHER, Shim	5	5			
26	P	8605	042		NUT, Valve	3	3			
27	P	54899	091		KNOB, Valve	3	3			
28	P	129317	001		DECAL, Indicator	1	1			
29	P	90322	091		DECAL, Steam Supply	1	1			
30	P	90323	091		DECAL, Water Supply	1	1			
31	P	150782	001		SHIM	2	2			
32	P	56373	001		BRACKET	2	2			
33	P	90184	091		GASKET, Chamber Trim	1	1			
34					CONTROL COLUMN ASSEMBLY (See Fig. 8-45)		1			
35					TAPE, 1/2 Wide x 70	1	1			

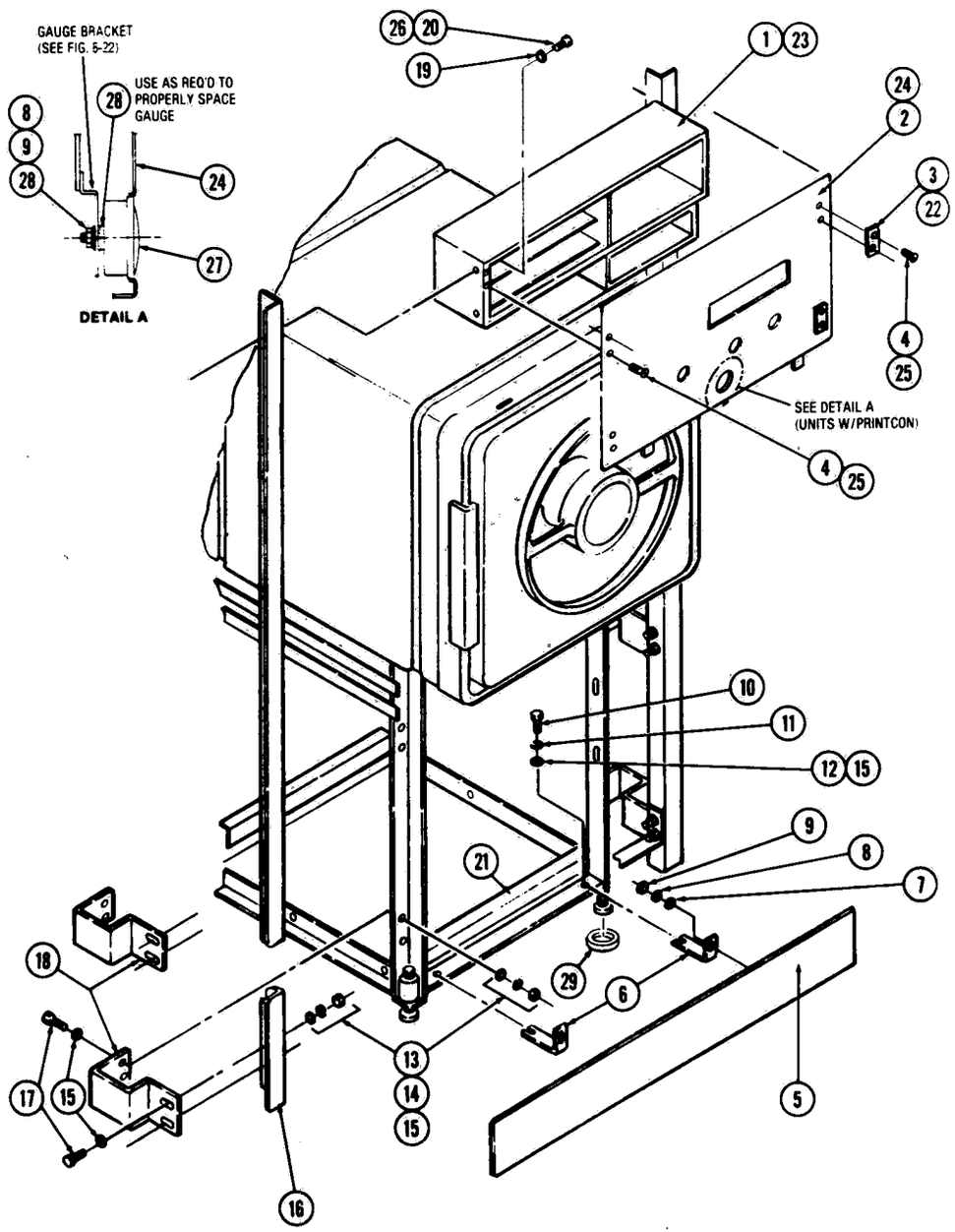


Figure 8-6. SUB PANELS: Operating End.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-6-			SUB-PANELS: Operating End					
			Units with Indicator-Recorder	X				
			Units with Printcon		X			
1			CONTROL ASSEMBLY (See Fig. 8-13)	1				
2	P 146644	001	PANEL, Valve and Control	1				
3	P 129329	001	STRIKE	2	2			
4	P 42618	045	SCREW, Buttress Head, #6-32 x 1/4	6				
5	P 93084	002	PANEL, Kick	1	1			
6	P 84437	002	BRACKET, Kick Panel	2	2			
7	P 5511	041	WASHER, Flat	10	10			
8	P 19677	041	LOCKWASHER	10	16			
9	P 2960	042	NUT, Hex, #10-32	10	12			
10	P 3846	041	SCREW, Hex Head, 1/4-20 x 1/2	2	4			
11	P 19678	045	LOCKWASHER	2	2			
12	P 10455	091	WASHER	2				
13	P 3099	042	NUT, Hex, 3/8-16	16				
14	P 19680	041	LOCKWASHER	16				
15	P 10456	091	WASHER, Shim	32	18			
16	P 143145	001	BRACKET, R.H.	1	1			
	P 143145	002	BRACKET, L.H.	1	1			
17	P 31838	042	SCREW, Hex Head, 3/8-16 x 1	16				
18	P 93688	002	BRACKET	4				
19	P 76230	091	WASHER, Shakeproof	8				
20	P 3848	051	SCREW, Hex Head, 1/4-20 x 3/4	4				
21	P 136769	001	STABILIZER (Not Shown)	1	1			
22	P 129328	001	SHIM	2				
23			MAIN CONTROL ASSEMBLY (See Fig. 8-49)		1			
24	P 146649	134	PANEL, Valve and Control		1			
25	P 83628	001	SCREW, Button Head, #6-32 x 3/8		6			
26	P 37321	051	SCREW, Hex Head, 1/4-20 x 1		4			
27	P 90525	091	GAUGE, Chamber Pressure		1			
28	P 10414	042	WASHER, Flat		6			
29	P 90423	091	PAD, Floor	4	4			

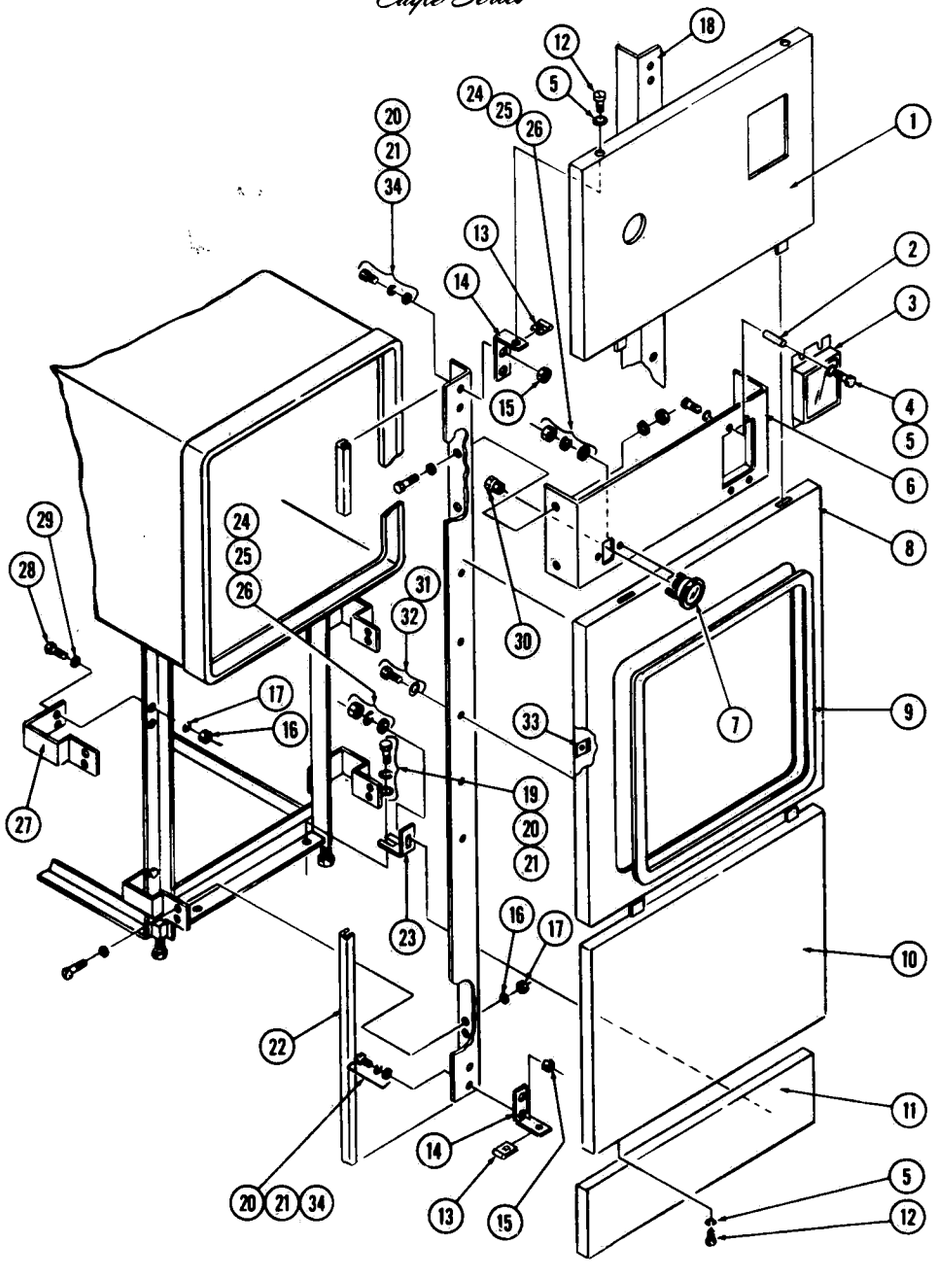


Figure 8-7: PANEL ASSEMBLY, Non-operating End.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-7-			PANEL ASSEMBLY: Non-operating End	X
1	P 146518 001		PANEL, Upper	1
2	P 84438 001		SPACER	4
3	P 146528 001		PANEL, Primary Control	1
	P 755715 570		• PANEL AND REFLECTOR ASSEMBLY (Without P.C. Board)	1
	P 764317 536		• LAMP (Box of 10)	A/R
	P 93455 001		• DISPLAY, L.E.D.	1
4	P 45323 042		SCREW, Buttress Head Socket, #8-32 x 3/8	8
5	P 17796 091		WASHER, Flat	16
6	P 146516 002		SUPPORT, Panel and Gauge	1
7	P 90525 091		GAUGE, Chamber Pressure	1
	P 77121 091		• LENS	1
8	P 146522 001		TRIM, Chamber	1
9	P 84374 003		GASKET, Chamber Trim	1
10	P 146520 001		PANEL, Lower	1
11	P 93689 002		PANEL, Kick	1
12	P 90562 061		SCREW, Self-tapping, #8-32	4
13	P 90918 045		NUT, Speed	4
14	P 84436 001		CLIP, Panel Support	4
15	P 3040 042		NUT, Hex, 1/4-20	8
16	P 3099 042		NUT, Hex, 3/8-16	20
17	P 52149 045		LOCKWASHER	20
18	P 146527 001		BRACKET, Main Support	2
19	P 3950 048		SCREW, Round Head, 1/4-20 x 5/8	2
20	P 76230 091		LOCKWASHER	10
21	P 31599 041		WASHER, Flat	10
22	P 93089 001		GASKET, Wall	2
23	P 84437 001		BRACKET, Kick Panel	2
24	P 2959 041		NUT, Hex, #10-32	4
25	P 31705 045		LOCKWASHER	4
26	P 5511 091		WASHER, Flat	6
27	P 93688 001		BRACKET, Support	4
28	P 31838 042		SCREW, Hex Head, 3/8-16 x 1	20
29	P 10414 042		WASHER, Flat	20
30	P 90594 091		FITTING, Compression	1
31	P 3846 041		SCREW, Hex Head, 1/4-20 x 1/2	10
32	P 49134 061		WASHER	10
33	P 91924 091		NUT, Tinnerman, 1/4	10
34	P 10572 061		SCREW, Hex Head, 1/4-20 x 5/8	8

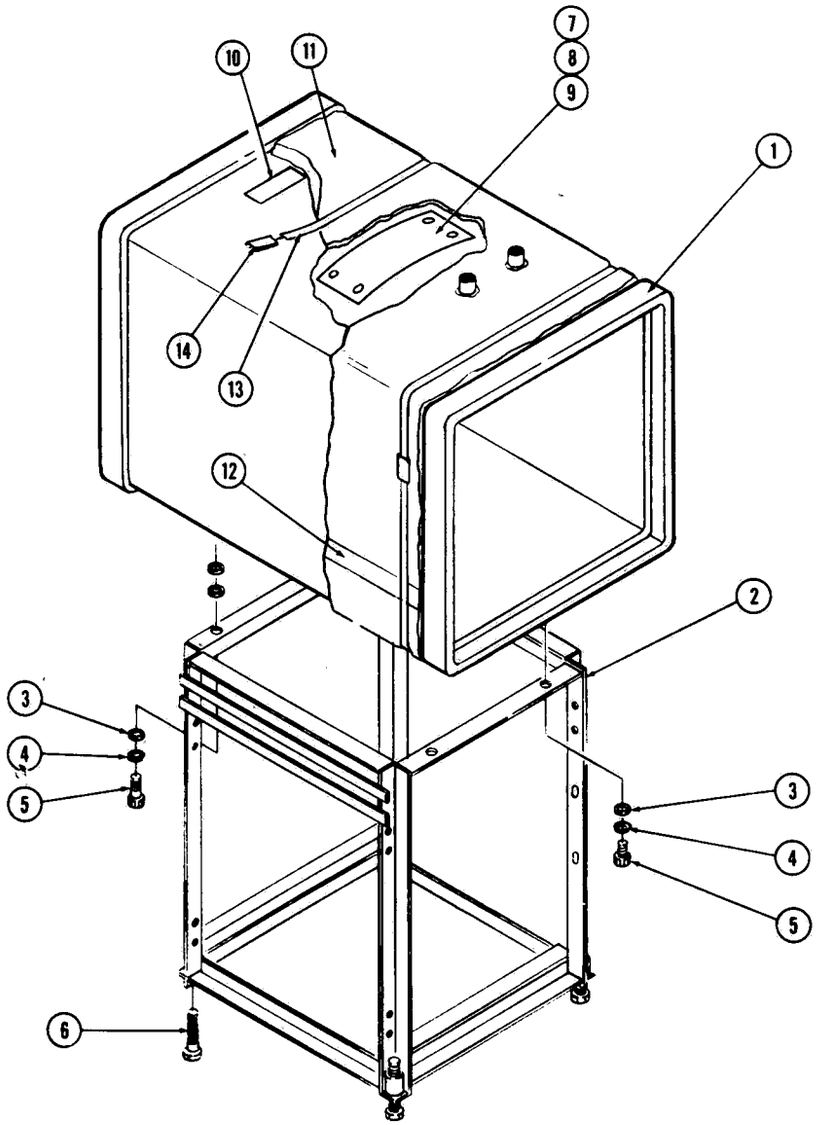


Figure 8-8. SHELL AND STAND ASSEMBLY.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-8-					SHELL AND STAND ASSEMBLY: Single Door Model	X			
					SHELL AND STAND ASSEMBLY: Double Door Model		X		
	1	P	146271	001	SHELL, Weldment, Single Door	1			
		P	146264	001	SHELL, Weldment, Double Door		1		
	2	P	136435	001	STAND, Weldment	1	1		
	3	P	5503	045	WASHER, Flat, 1 O.D. x 13/32 I.D. x 3/32 Thk.	4	4		
	4	P	19687	061	WASHER, Lock, 3/8	4	4		
	5	P	12439	045	SCREW, Socket Head, 3/8-16 x 3/4	4	4		
	6	P	90407	045	SCREW, Square Head, 5/8-11 x 4-1/2	4	4		
	7	P	93152	001	BAFFLE, Steam	1	1		
	8	P	8648	061	NUT, Hex, 1/4-20	8	8		
	9	P	76230	091	LOCKWASHER	4	4		
	10	P	90572	091	NAMEPLATE	1	1		
	11				INSULATION	1	1		
	12				TAPE	1	1		
	13				STRAP	2	2		
	14	P	32268	091	SEAL, Strap	2	2		

Rev. 4/83

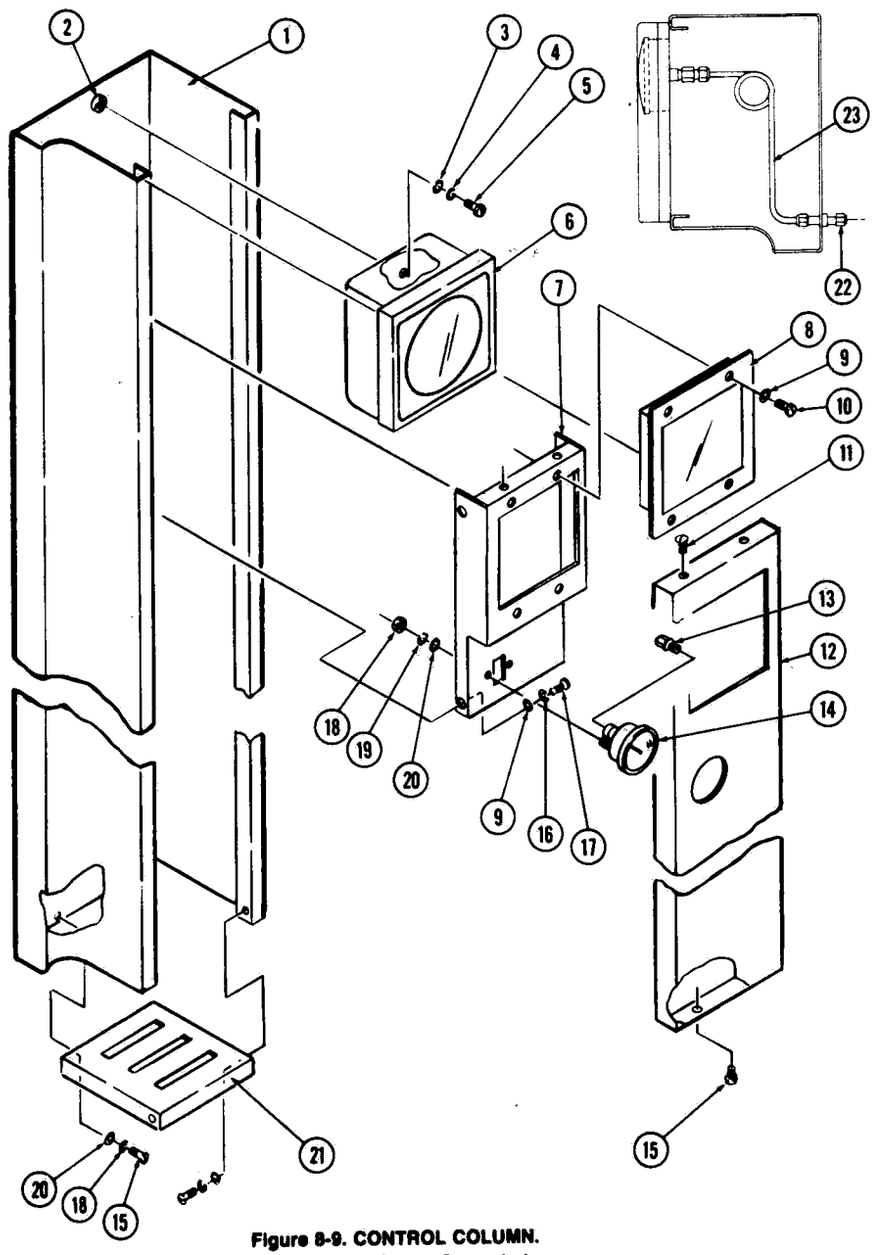


Figure 8-9. CONTROL COLUMN.
(Units with Indicator-Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER	
8-9-					CONTROL COLUMN	X
1	P	146508	001		HOUSING, Control	1
2	P	84391	001		SPACER, Recorder	2
3	P	31599	041		WASHER, Flat	2
4	P	26962	061		LOCKWASHER	2
5	P	4001	041		SCREW, Round Head. 1 4-20 x 7/8	2
6	P	83919	001		RECORDER (See Fig. 8-10)	1
7	P	136801	001		ENCLOSURE	1
8	P	146302	001		CONTROL, Primary (Repaired Unit P-764193-016)	1
	P	755715	572		• PANEL AND REFLECTOR ASSEMBLY	1
	P	764317	536		• LAMP (Box of 10)	A/R
	P	93455	001		• DISPLAY, L.E.D.	1
9	P	17796	091		WASHER, Flat	8
10	P	78025	042		SCREW, Button Head. #8-32 x 7/8	4
11	P	45323	042		SCREW, Button Head. #8-32 x 3/8	2
12	P	146510	001		PANEL, Front	1
13	P	90594	091		COUPLING, Compression	1
14	P	90525	091		GAUGE, Chamber Pressure	1
	P	77121	091		• LENS	1
15	P	23431	041		SCREW, Socket Head Cap. #10-32 x 3/8	6
16	P	79588	001		LOCKWASHER. #8	4
17	P	50527	061		SCREW, Socket Head Cap. #8-32 x 1/2	4
18	P	2959	041		NUT, Hex, #10-32	2
19	P	31705	045		LOCKWASHER. #10	6
20	P	5511	091		WASHER, Flat. #10	6
21	P	136588	001		PLATE, Bottom	1
22	P	129276	001		FITTING, Bulkhead. 1 8 O.D.T.	1
23					TUBE, 1/8 O.D. x 30	1

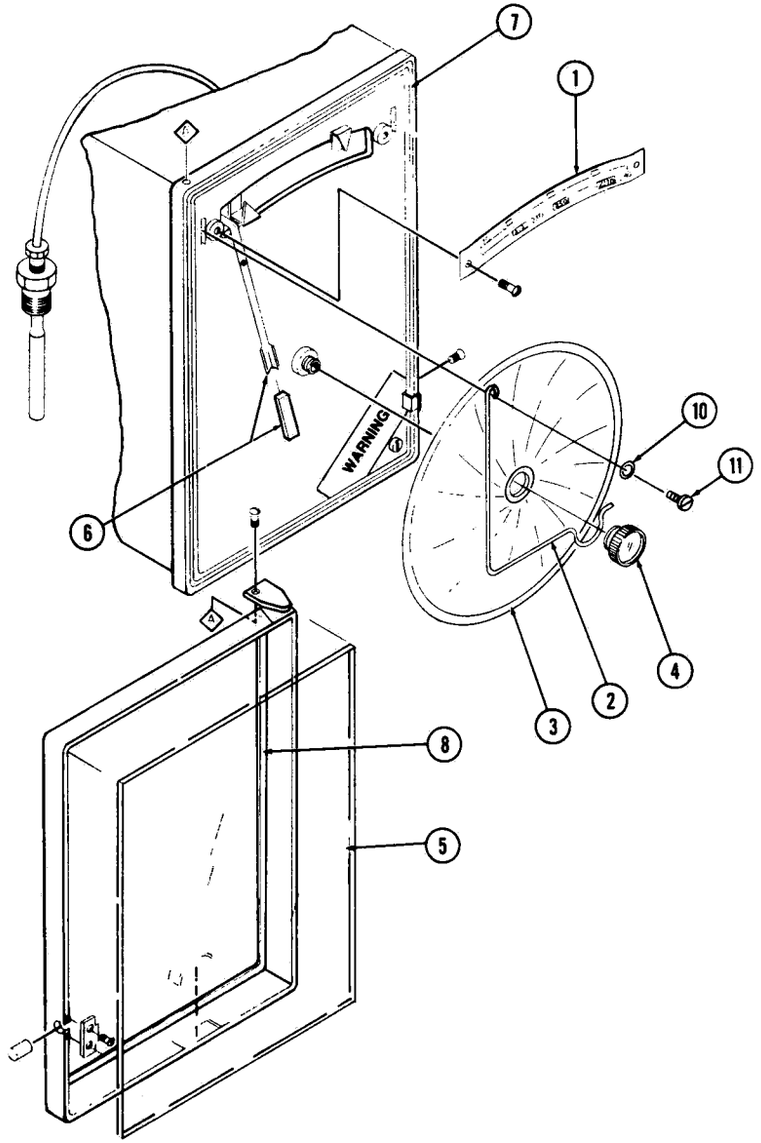


Figure 8-10. INDICATOR-RECORDER-CONTROLLER (Part 1 of 3).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-10-	P	83919	001		INDICATOR-RECORDER-CONTROLLER (Part 1 of 3)	X
1	P	93713	001		SCALE, Temperature	1
2	P	764315	320		LIFTER, Pen	1
3	P	93714	001		CHART, Recording (Box of 100)	A/R
4	P	764315	319		HUB, Chart	1
5	P	76960	091		GLASS, Door	1
6	P	764315	403		CARTRIDGE, Ink, Red (Card of Six w/One Arm)	A/R
7	P	34857	091		GASKET, Door	1
8	P	751364	091		TAPE, Door Glass	1
9					Not Used	
10	P	79588	001		WASHER, For Pen Lifter	1
11	P	3967	041		SCREW, For Pen Lifter	1

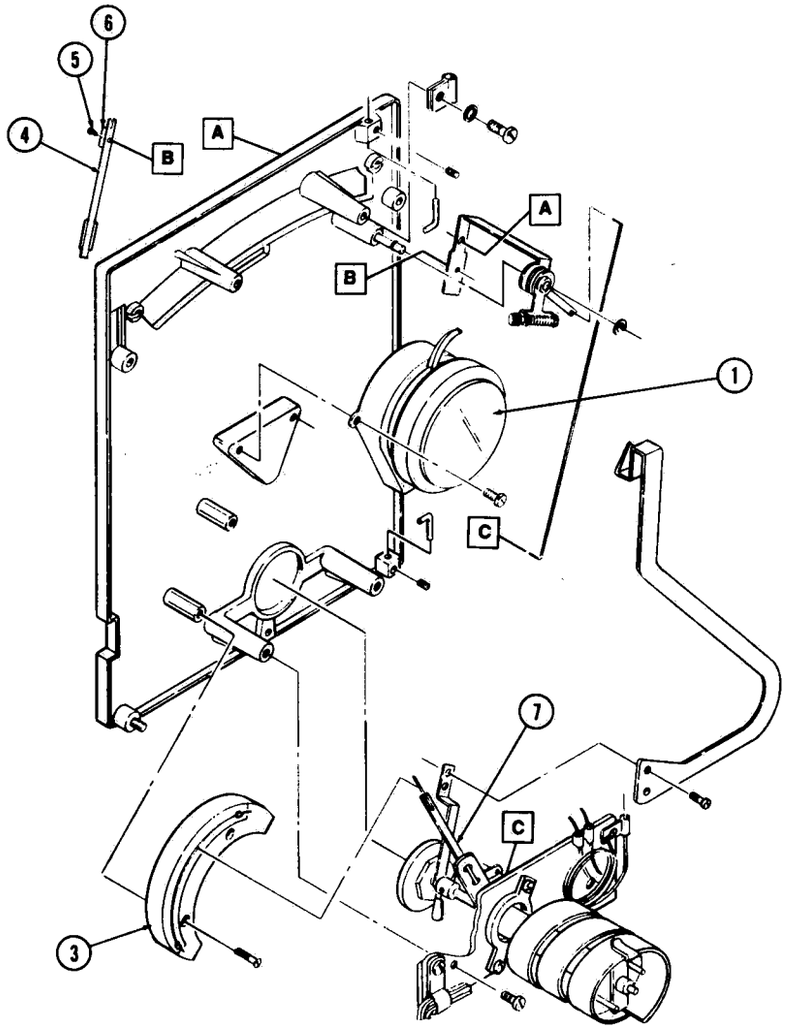


Figure 8-11. INDICATOR-RECORDER-CONTROLLER (Part 2 of 3).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-11-	P 83919 001		INDICATOR-RECORDER-CONTROLLER (Part 2 of 3)	X
1	P 764315 337		MOTOR, Chart Drive (120 V. 60 Hz)	1
2			Not Used	
3	P 764315 332		BLOCK, Slidewire (Assembly)	1
4	P 764315 403		CARTRIDGE, Ink, Red (Card of Six w/One Arm)	A/R
5	P 750002 091		SCREW, Pen Holder Arm	1
6	P 753402 091		LINK, Pen Arm Holddown	1
7	P 764315 333		CONTACT, Slidewire (Assembly)	1

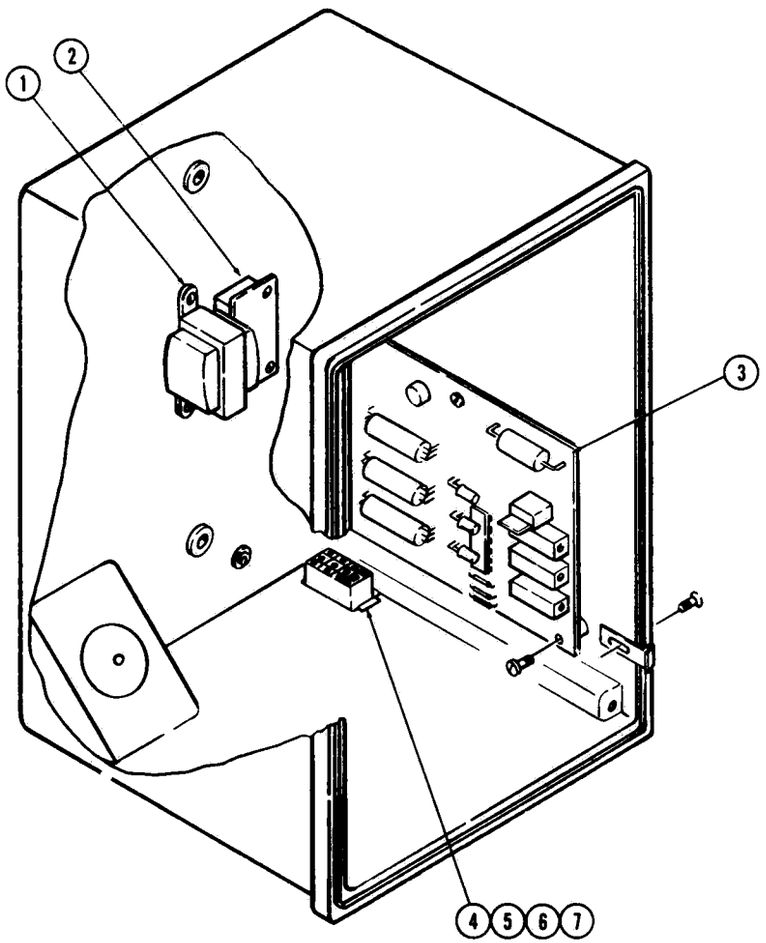


Figure 8-12. INDICATOR-RECORDER-CONTROLLER (Part 3 of 3).

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-12-	P	83919 001		INDICATOR-RECORDER-CONTROLLER (Part 3 of 3)	X
1	P	764315 335		TRANSFORMER	1
2				POWER SUPPLY TERMINAL BLOCK	1
3	P	764315 334		CONTROL CIRCUIT BOARD	1
4	P	764315 323		CONNECTOR, Molex Located In Recorder Case	1
5	P	764315 324		TERMINAL, Female For 764315-323 Connector	A/R
6	P	84381 001		CONNECTOR, Molex Located On Wire Harness, Not Shown ..	1
7	P	84382 001		TERMINAL, Male Pin For 84381-001 Connector, Not Shown ...	A/R

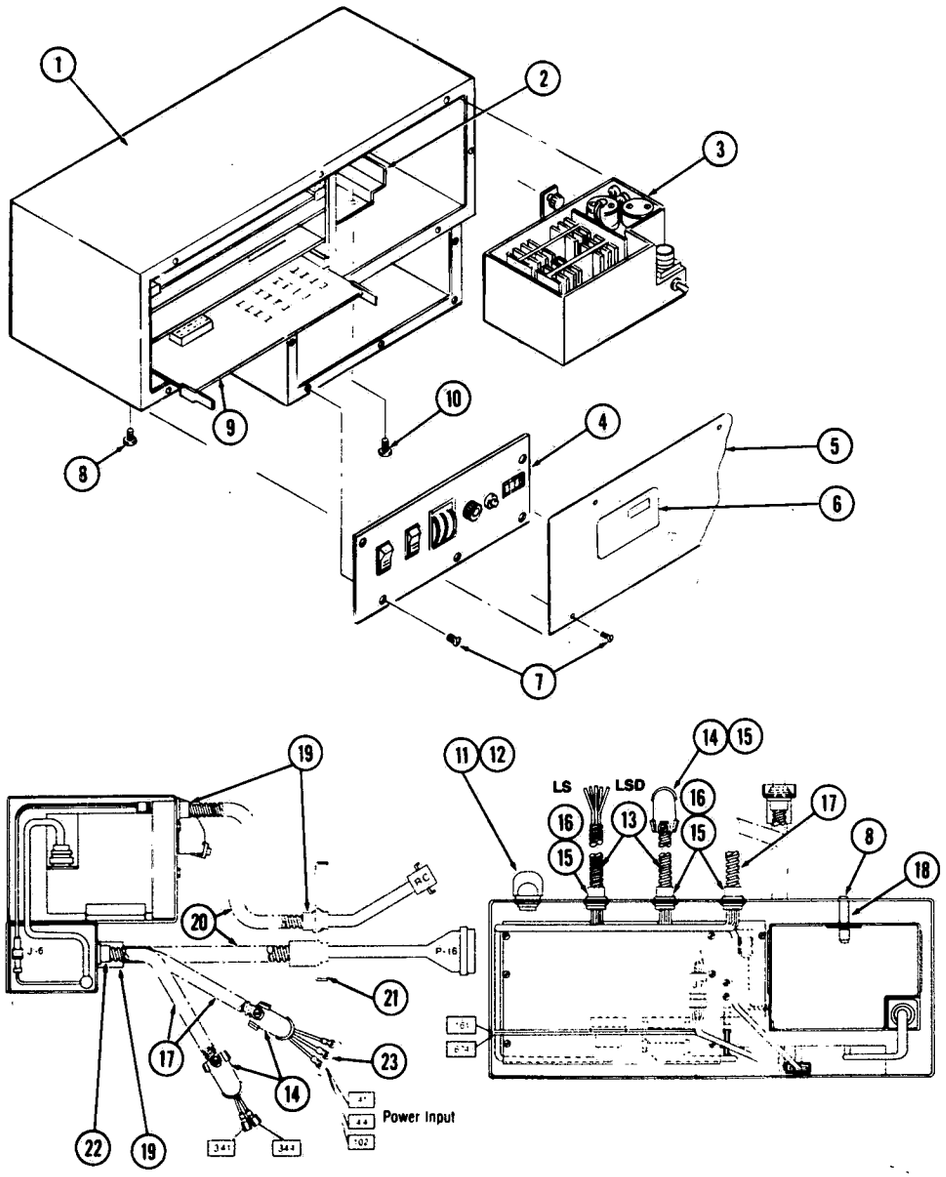


Figure 8-13. CONTROL ASSEMBLY (Part 1 of 2).
(Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER	
8-13-					CONTROL ASSEMBLY (Part 1 of 2)	X
1	P	146614	001		HOUSING ASSEMBLY, Control	1
2	P	93800	001		BRACKET, Support	1
3	P	146402	001		POWER SUPPLY (Repaired Unit P-764193-004)	1
	P	764317	835		• FUSE, Pico (F401) 3 Amp, 125 Volt, box of 5	
	P	764317	778		• FUSE, Cartridge (F402) 3 Amp, 250 Volt, box of 5	
4	P	146611	001		PANEL, Secondary Assembly (See Fig. 8-16)	1
5	P	146613	001		COVER, Control	1
6	P	150369	001		DECAL, Caution	1
7	P	50705	041		SCREW, Flat Head, #6-32 x 5/16	13
8	P	129062	001		SCREW, Hex Head, #10-32 x 1/2	6
9					MICROPROCESSOR ASSEMBLY (See Fig. 8-15)	1
10	P	40357	045		SCREW, Self Tapping, #6-32 x 1/4	2
11	P	91060	091		CONNECTOR, Conduit, 1/2	1
12	P	150122	001		BUSHING	2
13	P	91857	091		CONDUIT, Flexible, 3/8 x 20	2
14	P	90625	091		CONNECTOR, Conduit, 3/8	3
15	P	24748	091		BUSHING	8
16	P	90331	091		CONNECTOR, Conduit, 3/8	3
17	P	89867	091		CONDUIT, Flexible, 3/8 x 24	2
18	P	129106	001		BAR, Support	1
19	P	150030	001		CONNECTOR, Conduit, 1/2	4
20	P	90903	091		CONDUIT, Flexible, 1/2 x 24	2
21	P	129084	001		BOX, Adapter	1
22	P	18000	091		CONNECTOR, Conduit, Double, 3/8	1
23	P	14591	091		TERMINAL, Ring, #8 x 20-24 AWG	3

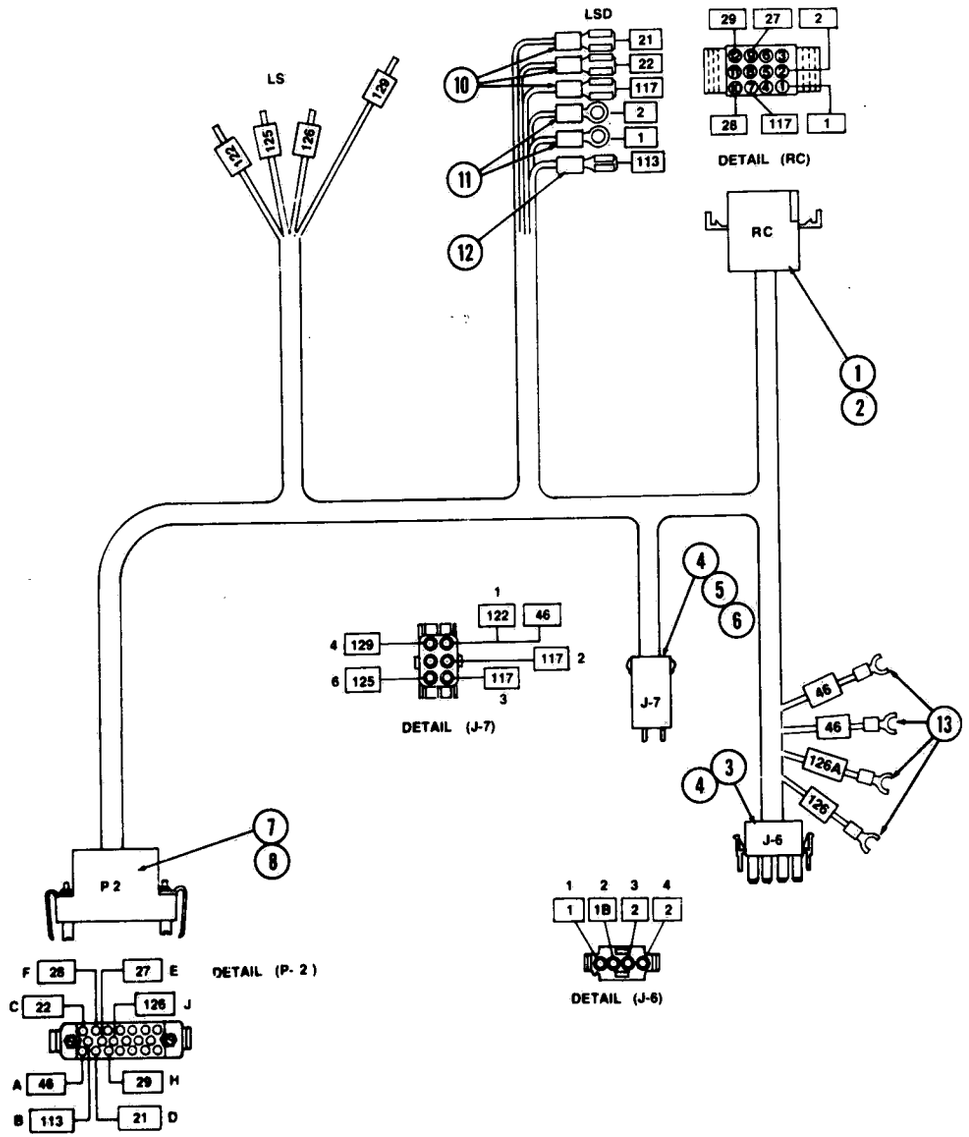


Figure 8-14. CONTROL ASSEMBLY (Part 2 of 2). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-14-					CONTROL ASSEMBLY (Part 2 of 2)	X
1	P	84381	001		CONNECTOR, RC	1
2	P	81192	001		TERMINAL, Pin, #18-24 AWG	6
3	P	129115	001		HOUSING, Plug, 4 Pin, J-6	1
4	P	129113	001		CONTACT, Pin, #14-20 AWG	6
5	P	129116	001		HOUSING, Cap, 6 Pin, J-7	1
6	P	129113	002		CONTACT, Pin, #14-16 AWG	3
7	P	93829	001		BLOCK ASSEMBLY, P-2	1
8	P	84198	004		SOCKET, #16-18 AWG	8
9	P	90619	091		TERMINAL, Ring, #6 x #18-22 AWG	4
10	P	90695	091		TERMINAL, Quick Detachable, 1/4 Lug x #18-22 AWG	3
11	P	14591	091		TERMINAL, Ring, #8 x #16-14 AWG	2
12	P	150475	978		TERMINAL, Quick Detachable, 3/16 Lug x #14-18 AWG	1
13	P	118177	091		TERMINAL, Spade	4

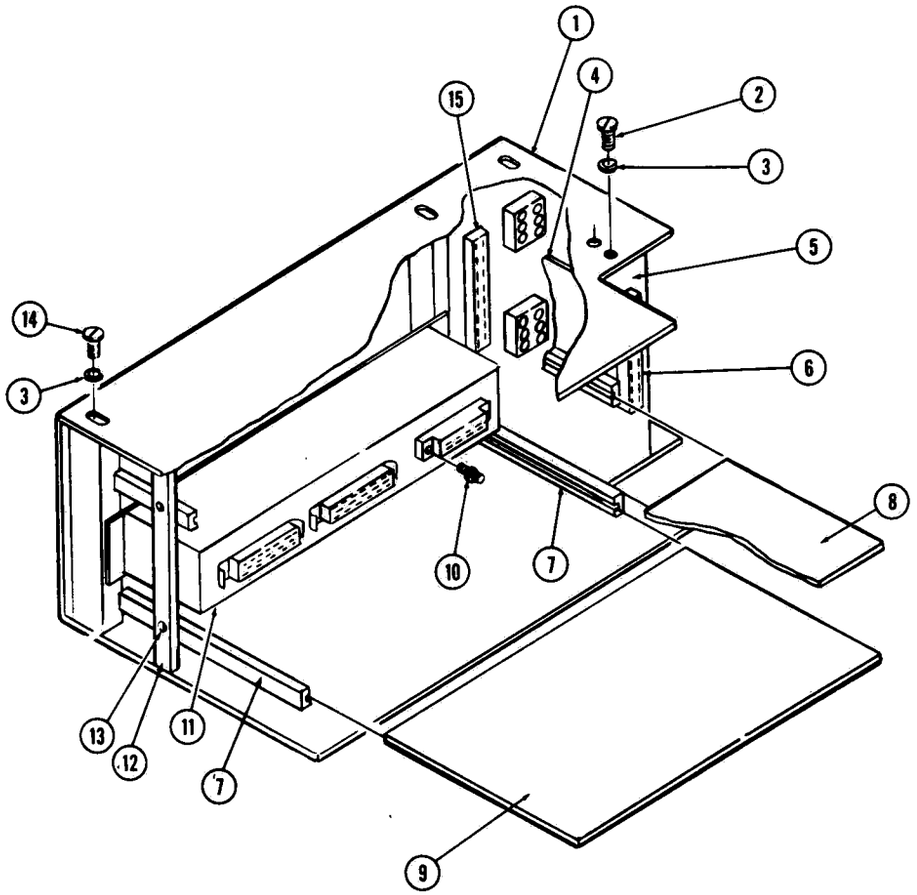


Figure 8-15. MICROPROCESSOR ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-15-					MICROPROCESSOR ASSEMBLY	X
1	P	136746	001		CHASSIS	1
2	P	40357	045		SCREW, Pan Head, #6-32 x 1/4	4
3	P	84116	002		LOCKWASHER, #6	18
4	P	129074	001		CABLE, Flat, 19 Pin	2
5	P	93778	001		BRACKET, Receptacle	1
6	P	84217	002		HOUSING, Receptacle, 38 Pin, J-4	1
7	P	84225	001		GUIDE, Card	4
8	P	146586	003		P/C CARD, Basic (CPU) (Repaired P-764193-015)	1
9	P	146588	001		P/C CARD, Washer/Sterilizer Expander (Repaired P-764193-002)	1
	P	146588	005		P/C CARD, #2, Units after 11/15/81 (Repaired P-764193-026)	1
	P	146588	007		P/C CARD, #2, Units after 2/84 (Repaired P-764193-031)	1
10	P	84193	001		JACKSCREW, Male	2
11	P	760265	132		MOTHERBOARD ASSEMBLY (Repaired P-764193-017)	1
12	P	129073	001		BAR, P/C Card Guide Support	4
13	P	84226	001		TAB, Locking	8
14	P	84117	001		SCREW, Pan Head, #6-32 x 5/16	14
15	P	84218	001		HOUSING, Receptacle, 38 Position	1
16	P	129352	050		PLATE, Identification (Not Shown)	1

NOTE: When replacing a printed circuit board, refer to paragraph 7-12, step 6.

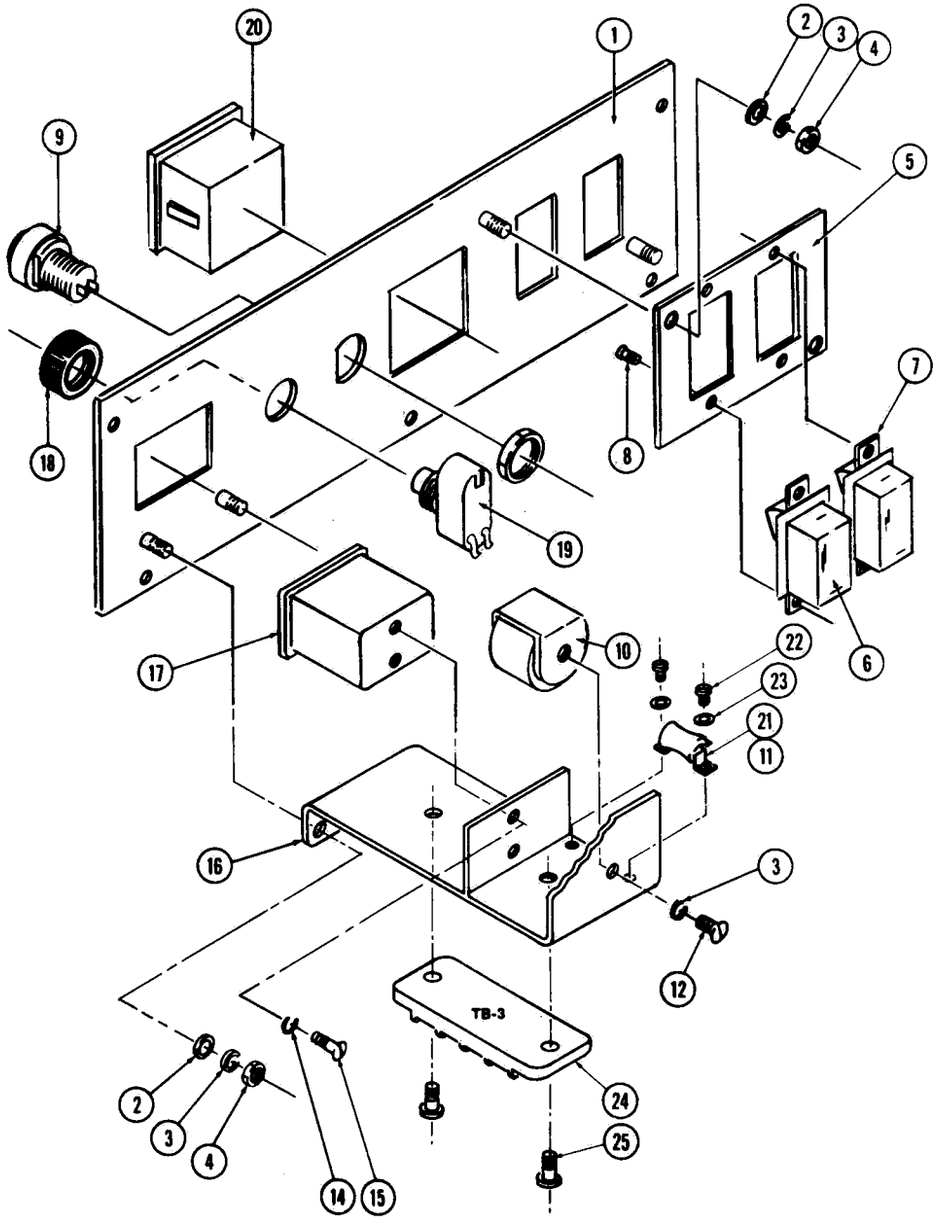


Figure 8-16. SECONDARY PANEL ASSEMBLY (Part 1 of 3).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-16-					**UNITS WITH INDICATOR-RECORDER:**				
	P	146611	001		PANEL ASSEMBLY, Secondary (Part 1 of 3)	X			
					UNITS WITH PRINTCON:				
	P	146649	156		PANEL ASSEMBLY, Secondary (Part 1 of 3)		X		
1	P	136742	001		PANEL WELDMENT	1	1		
2	P	5511	041		WASHER	5	5		
3	P	18131	091		LOCKWASHER, #6	6	6		
4	P	3037	041		NUT, Hex, #6-32	5	5		
5	P	93757	001		SPACER, Switch	1	1		
6	P	84386	001		BREAKER, Circuit, CB-1	1	1		
7	P	129022	001		SWITCH, SW-1	1	1		
8	P	27741	041		SCREW, Flat Head, #6-32 x 3/16	4	4		
9	P	84400	001		BREAKER, Circuit, CB-2	1	1		
10	P	83933	002		BUZZER	1	1		
	P	764316	608		KIT, Buzzer Resistor	A/R			
11	P	129318	001		RESISTOR, 3000 Ohm	1	1		
12	P	3984	041		SCREW, Round Head	1	1		
13					NOT USED				
14	P	30743	045		LOCKWASHER, #4	2	2		
15	P	17658	041		SCREW, Round Head, #4-40 x 3/16	2	2		
16	P	93795	001		BRACKET, Counter	1	1		
17	P	84362	002		COUNTER	1	1		
18	P	44155	091		GUARD, Button	1	1		
19	P	48070	091		SWITCH, Pushbutton, PB-1	1	1		
20	P	136315	002		SWITCH, Thumbwheel, 2 Switch Assembly	1	1		
21	P	129266	001		TUBING, Shrink	2	2		
22	P	150822	017		SCREW, Self Tapping	2	2		
23	P	19712	091		WASHER	2	2		
24	P	89174	091		BLOCK, Terminal, TB3	1	1		
25	P	12531	061		SCREW, Round Head	2	2		

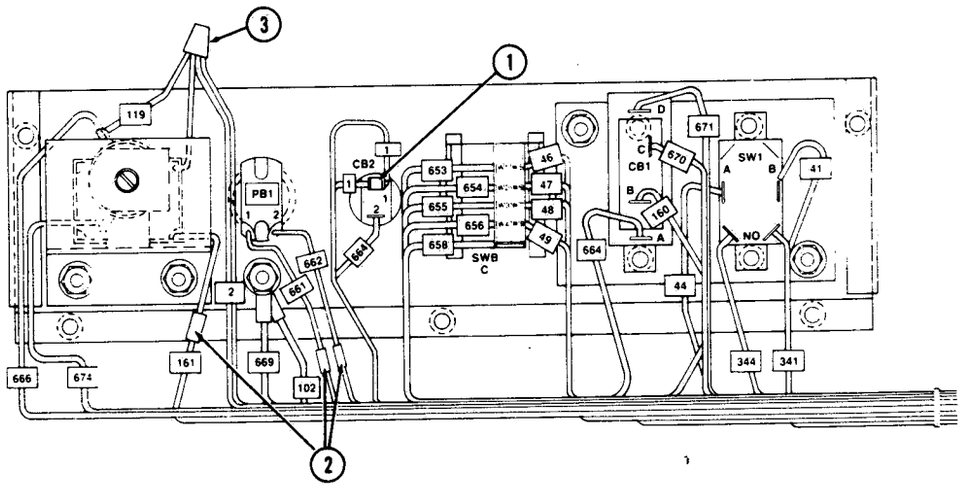


Figure 8-17. SECONDARY CONTROL PANEL (Part 2 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER	
8-17-	P	146611	001		PANEL ASSEMBLY, Secondary, Wiring (Part 2 of 3)	X
1	P	32118	091		ADAPTER, Terminal	2
2	P	129352	049		CONNECTOR, Butt	3
3	P	150808	001		NUT, Wire	1

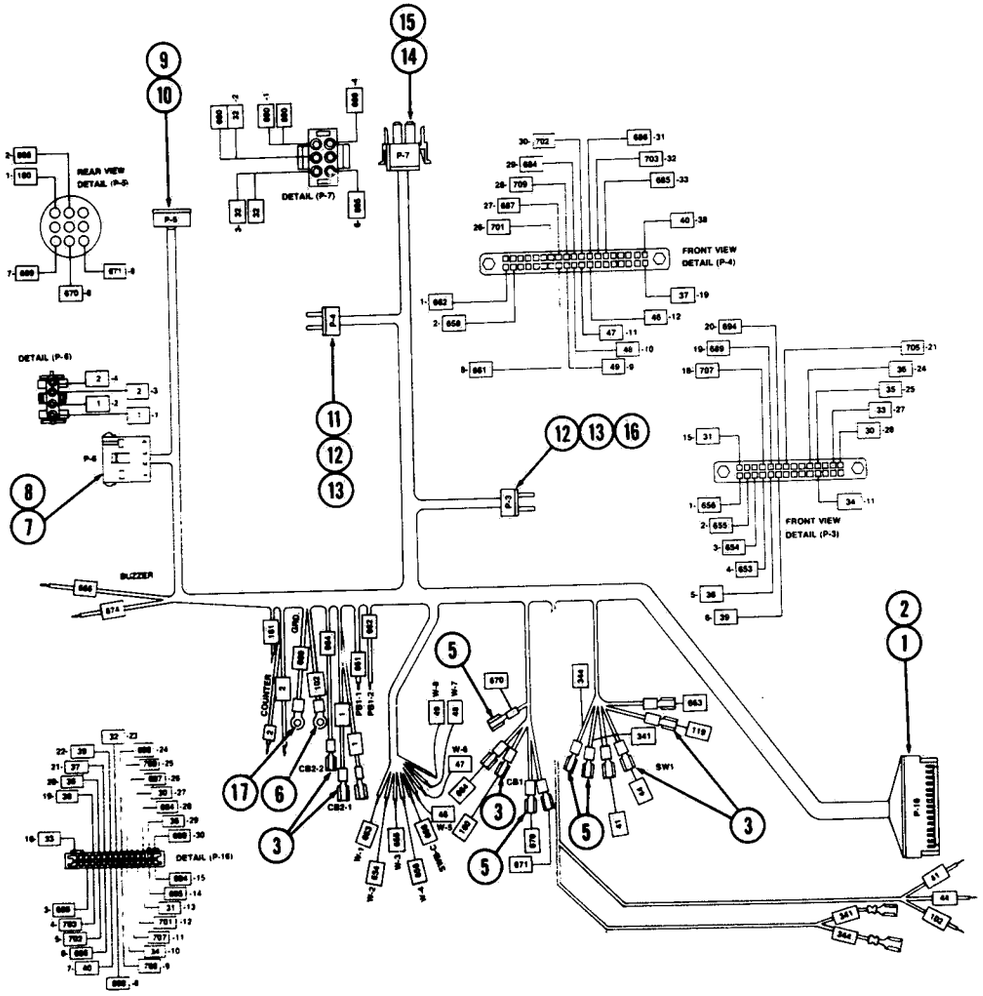


Figure 8-18. SECONDARY CONTROL PANEL (Part 3 of 3). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER	
8-18-	P	146611	001		SECONDARY CONTROL PANEL, Cable (Part 3 of 3)	X
1	P	84229	001		HOUSING, Receptacle, P-16	1
2	P	84187	002		CONTACT, #20-24 AWG	26
3	P	32119	091		RECEPTACLE, 1/4 Lug x #14-16 AWG	9
4					NOT USED	
5	P	90695	091		RECEPTACLE, 1/4 Lug x #18-22 AWG	5
6	P	14590	091		TERMINAL, Wire, #6 Stud #14-16 AWG	1
7	P	129118	001		HOUSING, Cap, 4 Position, P-6	1
8	P	129039	002		SOCKET, Contact P-6, #14-20 AWG	2
9	P	93838	001		PLUG, 9 Position, P-5	1
10	P	84198	004		SOCKET, Contact, P-5	5
11	P	84205	002		HOUSING, Pin, 38 Position, P-4	1
12	P	84207	002		PIN, Contact, P-3 and P-4	33
13	P	84192	001		JACKSCREW, Female P-3 and P-4	4
14	P	129119	001		HOUSING, Plug, 6 Position, P-7	1
15	P	129039	003		SOCKET, Contact, P-7, #18-24 AWG	5
16	P	84205	001		HOUSING, Pin, 28 Position, P-3	1
17	P	90619	091		TERMINAL, Wire, #6 18-22 AWG	2

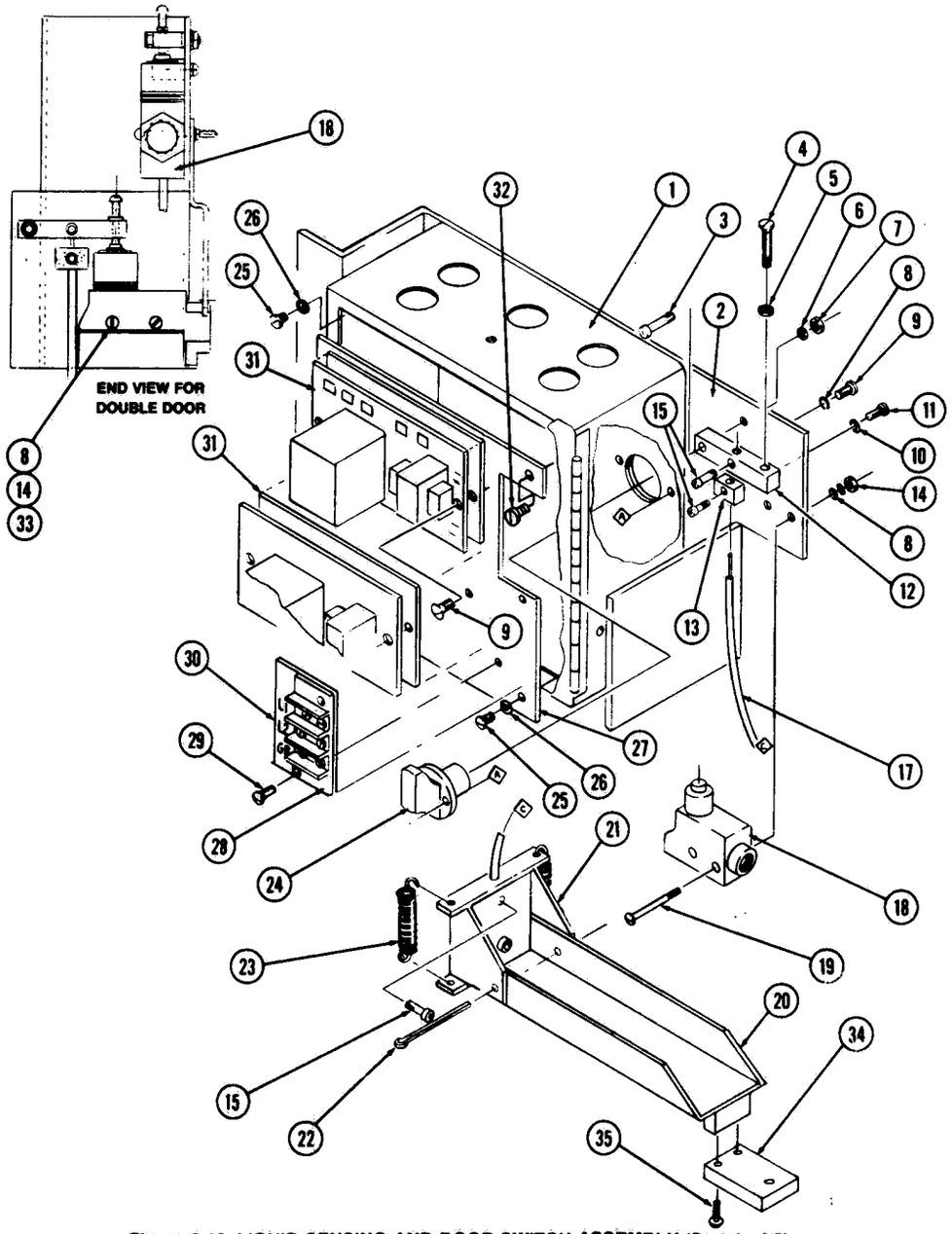


Figure 8-19. LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 1 of 2).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER				
8-19-	P	146607	001		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 1 of 2) Single Door	X			
	P	146607	002		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 1 of 2) Double Door		X		
					UNITS WITH PRINTCON				
	P	146649	150		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 1 of 2) Single Door			X	
	P	146649	151		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 1 of 2) Double Door				X
1	P	146601	001		BOX, Instrument	1	1	1	1
2	P	136743	001		PLATE, Mounting	1	1	1	1
3	P	45739	091		SCREW, Shoulder, #10-24 x 3/4	1	2	1	2
4	P	38569	041		SCREW, Round Head, #8-32 x 1	1	2	1	2
5	P	3038	041		NUT, Hex, #8-32	1	2	1	2
6	P	76801	045		LOCKWASHER, #10	1	2	1	2
7	P	3039	041		NUT, Hex, #10-24	1	2	1	2
8	P	18131	091		LOCKWASHER, #6	4	6	4	6
9	P	8129	042		SCREW, Bind Head, #6-32 x 3/8	6	6	4	4
10	P	19676	041		LOCKWASHER, #8	2	4	2	4
11	P	4682	041		SCREW, Round Head, #8-32 x 3/8	2	4	2	4
12	P	91830	045		ACTUATOR, Switch	1	2	1	2
13	P	91623	045		BLOCK, Cable	1	2	1	2
14	P	3037	041		NUT, Hex, #6-32	2	4	2	4
15	P	34518	061		SCREW, Socket Head, #8-32 x 1/4	4	6	4	8
16					NOT USED				
17	P	91619	091		CABLE	1	2	1	2
18	P	91622	091		SWITCH	1	2	1	2
19	P	22419	041		SCREW, Round Head, #6-32 x 1-3/4	2	2	2	2
20	P	91629	045		ARM WELDMENT	1	2	1	2
21	P	96577	045		BRACKET, Door Switch	1	2	1	2
22	P	90593	061		PIN, Cotter	1	2	1	2
23	P	90751	061		SPRING	2	4	2	4
24	P	83865	001		SWITCH, Pressure, PS-2	1	1		
25	P	9374	041		SCREW, Round Head, #10-32 x 3/8	5	5	5	5
26	P	5511	041		WASHER, Flat	4	4	4	4
27	P	93803	001		PLATE, Mounting	1	1	1	1
28	P	90746	091		STRIP, Terminal 3 Position TB-1	1	1	1	1
29	P	75242	045		SCREW, Bind Head, #10-32 x 5/8	2	2	2	2
30	P	82647	001		STRIP, Marker	1	1	1	1
31	P	136729	001		CONTROL, Liquid Level	2	2	2	2
	P	764316	621		• RELAY, SPDT	2	2	2	2
32	P	9282	041		SCREW, Flat Head, #10-32 x 3/8	4	4	4	4
33	P	3966	041		SCREW, Round Head, #6-32 x 1-1/4		2		2
34	P	90891	045		EXTENSION, Switch	1	2	1	2
35	P	4682	041		SCREW, Round Head, #8-32 x 3/8	2	4	2	4

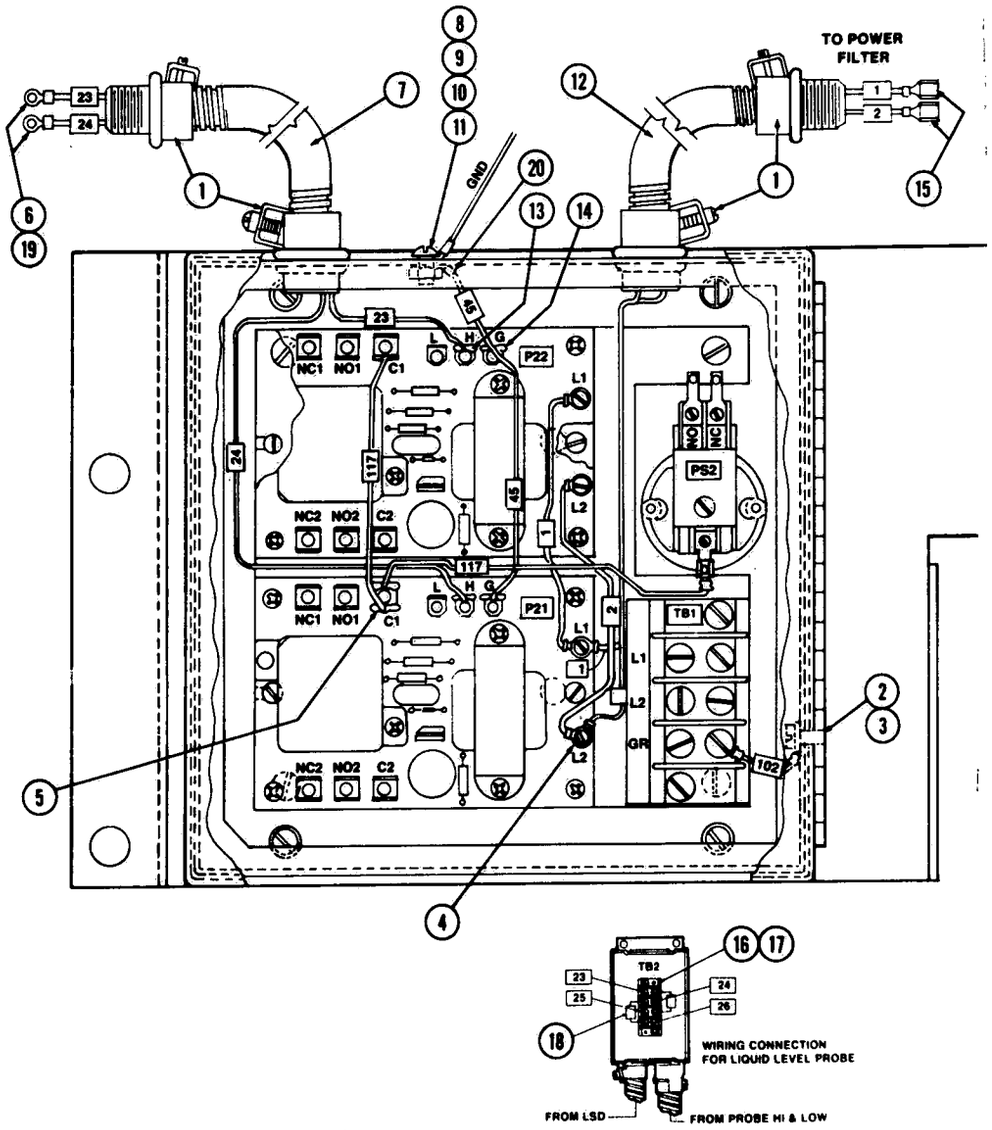


Figure 8-20. LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-20-				LIQUID SENSING AND DOOR SWITCH ASSEMBLY (Part 2 of 2)				
				Units with Indicator-Recorder	X			
				Units with Printcon		X		
1	P	90331	091	CONNECTOR, Conduit, 3/8	2	2		
2	P	82675	001	SCREW, Green Ground, #10-32 x 3/8	1	1		
3	P	14591	091	TERMINAL, Ring, #8 x 14-16 AWG	3	3		
4	P	14865	091	TERMINAL, Ring, #8 x 18-22 AWG	4	4		
5	P	90695	091	TERMINAL, Lug, 1/4 x 18-22 AWG	3	2		
6	P	90619	091	TERMINAL, Ring, #6 x 16-22 AWG	2	2		
7	P	79360	091	CONDUIT, Flexible, 3/8 x 15	1	1		
8	P	9374	041	SCREW, Round Head, #10-32 x 3/8	1	1		
9	P	2959	041	NUT, Hex, #10-32	1	1		
10	P	14592	091	TERMINAL, Ring, #10 x 14-16 AWG	1	1		
11	P	90943	091	TERMINAL, Ring, #8	1	1		
12	P	89867	091	CONDUIT, Flexible, 3/8 x 24	1	1		
13	P	91694	091	TERMINAL, Lug, 3/16 x 14-18 AWG	3	4		
14	P	82112	001	TERMINAL, Lug, 3/16 x 12-14 AWG	1			
15	P	32119	091	TERMINAL, Lug, 1/4 x 14-16 AWG	2	2		
16	P	90756	091	BLOCK, Terminal	1	1		
17	P	3984	041	SCREW, #6-32 x 3/8	2	2		
18	P	150415	001	RESISTOR	2	2		
19	P	90619	091	TERMINAL, Ring, #6 x 16-22 AWG	2	2		
20	P	19525	091	TERMINAL, Ring, #10 x 10-12 AWG		1		

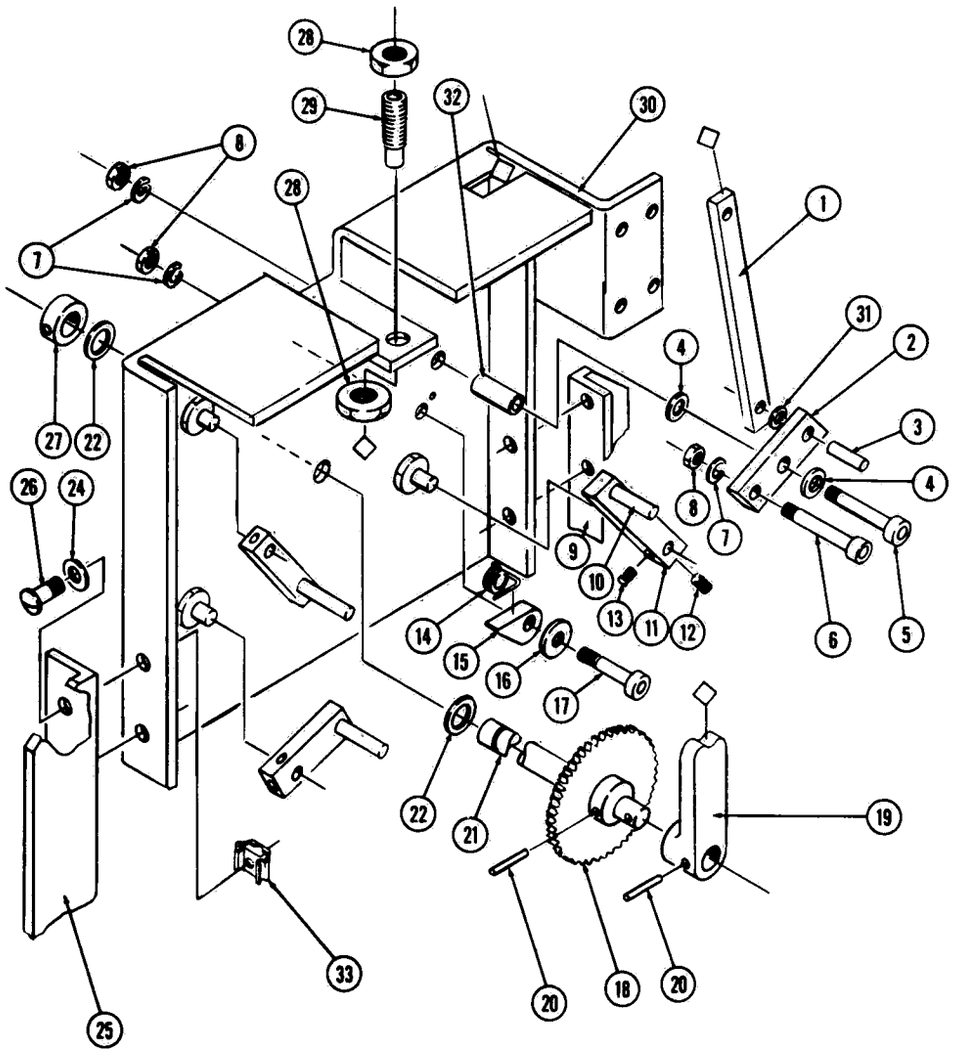


Figure 8-21. MANUAL CONTROL ASSEMBLY: Door Lock (Part 1 of 2). (Units with Indicator-Recorder)

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-21-	P	146337	001		MANUAL CONTROL ASSEMBLY, Door Lock (Part 1 of 2)	X
1	P	129104	001		ARM, Linkage	1
2	P	129105	001		LEVER, Door Unlock	1
3	P	43227	061		ROLLPIN, 1/8 x 5/8	1
4	P	31599	041		WASHER, Flat, 260 x 9/16 .040	2
5	P	129109	001		SCREW, Shoulder, #10-24 x 1/3	1
6	P	45739	091		SCREW, Shoulder, #10-24 x 3/4	1
7	P	31705	045		LOCKWASHER, #10	5
8	P	3039	041		NUT, Hex, #10-24	3
9	P	136745	001		LEG, Mounting, LH	1
10	P	38968	061		ROLLPIN, 1/4 x 1-1/2	3
11	P	129095	001		ARM, Solenoid	3
12	P	150822	095		SCREW, Set, #8-32 x 1/4	3
13	P	150822	094		SCREW, Set, #8-32 x 3/16	3
14	P	84288	001		SPRING	1
15	P	129096	001		PAWL	1
16	P	10445	091		WASHER, Brass	1
17	P	83547	001		SCREW, Shoulder, #10-24 x 3/8	1
18	P	93577	001		RATCHET	1
19	P	93802	001		ARM, Actuator	1
20	P	36565	061		ROLLPIN, 1/8 x 1	2
21	P	84285	001		SHAFT	1
22	P	34508	091		WASHER, Nylon	2
23	P	2960	042		NUT, Hex, #10-32	4
24	P	17589	045		WASHER, Flat, #10	4
25	P	136744	001		LEG, Mounting, RH	1
26	P	10347	042		SCREW, Round Head, #10-32 x 7/8	4
27	P	129125	001		RETAINER	1
28	P	33971	091		NUT, Hex, 1/2 x 13	2
29	P	129087	001		PIN,1/2-13 x 1	1
30	P	136748	001		PLATE. Hub	1
31	P	5469	041		WASHER, Flat	2
32	P	129108	001		SPACER	1
33	P	150822	093		NUT. Retained	4

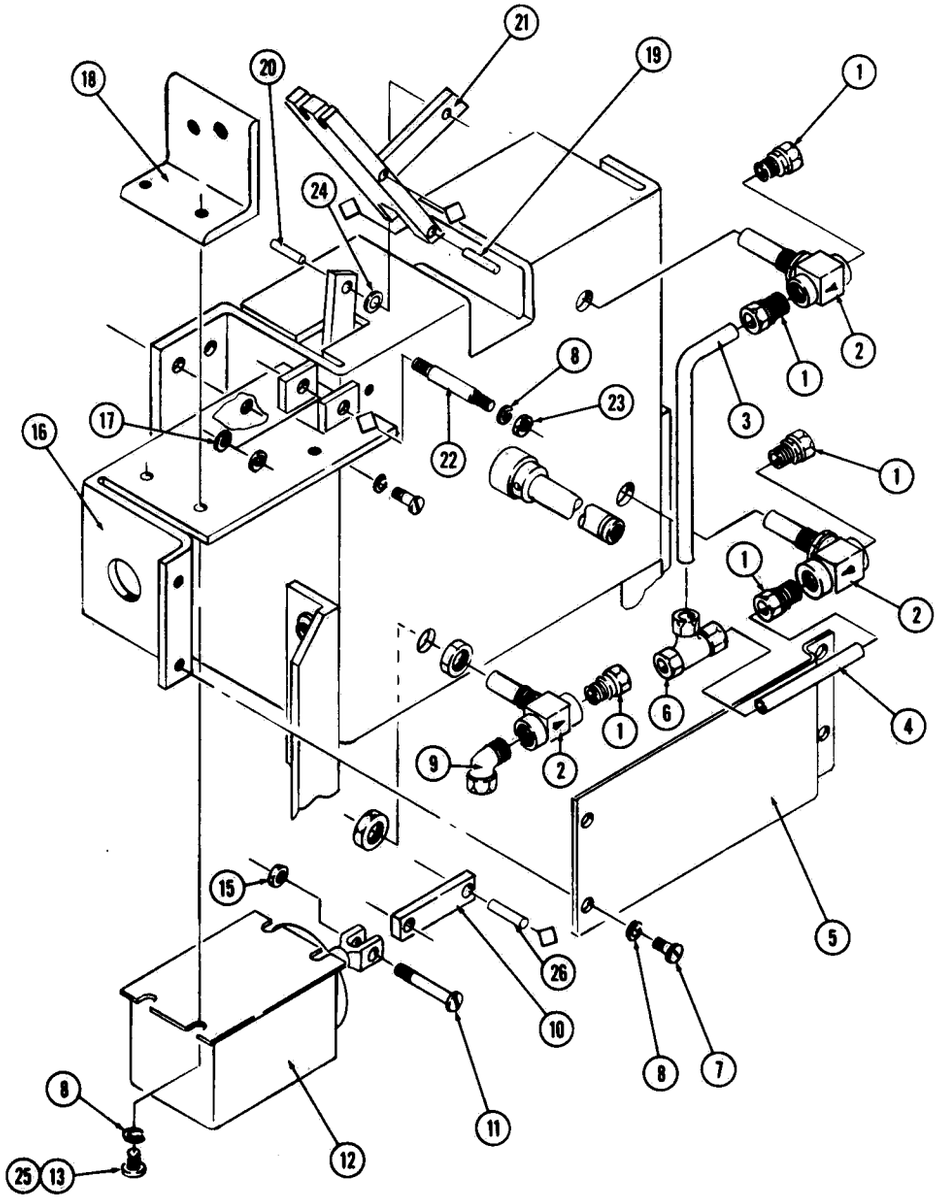


Figure 8-22. MANUAL CONTROL ASSEMBLY: Door Lock (Part 2 of 2). (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH INDICATOR-RECORDER:	
8-22-	P	146337	001		MANUAL CONTROL ASSEMBLY, Door Lock (Part 2 of 2)	X
1	P	34218	091		FITTING, Compression, 1/4 O.D. Tubing x 1/4 NPT	5
2	P	93799	001		VALVE, Quick Opening, 1/4 NPT	3
3	P	129081	001		TUBE, 1 4 O.D.	1
4	P	83877	001		TUBE, 1 4 O.D. x 2-13/16	1
5	P	93896	068		COVER, Solenoid	1
6	P	46097	091		TEE, Compression, 1/4 O.D. Tubing	4
7	P	12283	041		SCREW, Round Head, #10-32 x 1/4	10
8	P	31705	045		LOCKWASHER, #10	1
9	P	41306	091		ELL, Compression, 1/4 O.D. Tubing x 1/4 NPT	1
10	P	129101	001		ARM, Linkage	1
11	P	150822	047		SCREW, Round Head, (8-32 x 1-1/4)	1
12	P	56396	014		SOLENOID, 60 Hz	
	P	764316	274		KIT, Solenoid Replacement, 60 Hz (Units Prior to 11/80)	
	P	764320	463		KIT, Door Lock Solenoid, 60 Hz (Units Prior to 9/84)	1
	P	56396	015		SOLENOID, 50 Hz	
	P	764316	275		KIT, Solenoid Replacement, 50 Hz (Units Prior to 11/80)	
	P	764320	728		KIT, Door Lock Solenoid, 50 Hz (Units Prior to 9/84)	
13	P	9374	041		SCREW, Round Head, #10-32 x 3/8	4
14	P				(Not Used)	
15	P	150277	001		NUT, Hex, #8-32	1
16	P	136739	001		BRACKET, Solenoid	1
17	P	5511	091		WASHER, Flat	2
18	P	129112	001		BRACKET, Cable	1
19	P	43227	061		ROLLPIN, 1/8 x 5/8	1
20	P	36683	061		ROLL PIN, 1/8 x 1/2	1
21	P	93798	001		BELLCRANK	1
22	P	129210	001		STUD, #10-32 x 1-3/4	1
23	P	2960	042		NUT, Hex, #10-32	2
24	P	129325	001		RETAINER	1
25	P	9661	041		SCREW, Sol. Mtg	2
26	P	43308	061		PIN, Roll 1 8 x 3/4 Lg.	1

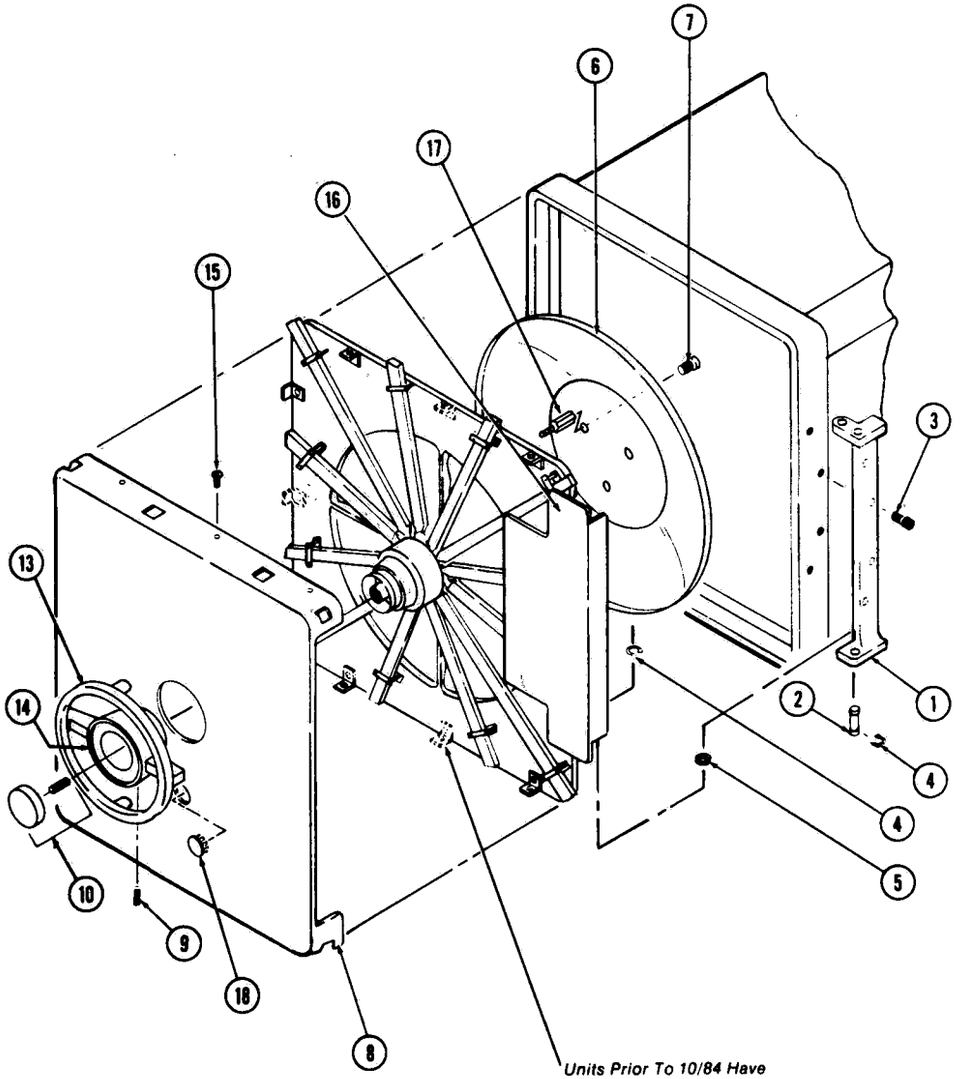


Figure 8-23. COVER AND HANDWHEEL ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-23-					COVER AND HANDWHEEL ASSEMBLY	X
1	P	91599	063		WELDMENT, Hinge	1
2	P	90041	063		PIN, Hinge	2
3	P	43845	045		CAP SCREW, Socket Head	4
4	P	12706	045		RING, Retaining	2
5	P	79806	001		WASHER, Hinge	A/R
6	P	54474	063		COVER, Door Back	1
7	P	12283	041		SCREW, Round Head	3
8	P	92111	001	•	COVER, Chamber Door, Stainless Steel	1
9	P	51963	045		SET SCREW	3
10	P	93174	001		BUTTON, Assembly	1
11					Not Used	
12					Not Used	
13	P	146327	001		HANDLE, Chamber Door	1
14	P	93647	001		FACE PLATE	1
15	P	90562	061		SCREW, Self Tapping	5
16					DOOR LOCK AND HINGE ASSEMBLY (Refer to Fig. 8-24)	1
17	P	74710	061		SCREW, Special	3
18	P	25890	050		PLUG, Button	1

• Current door cover requires only five fasteners. When this cover is installed on units prior to 10/84, the unused mounting brackets may be removed from the door.

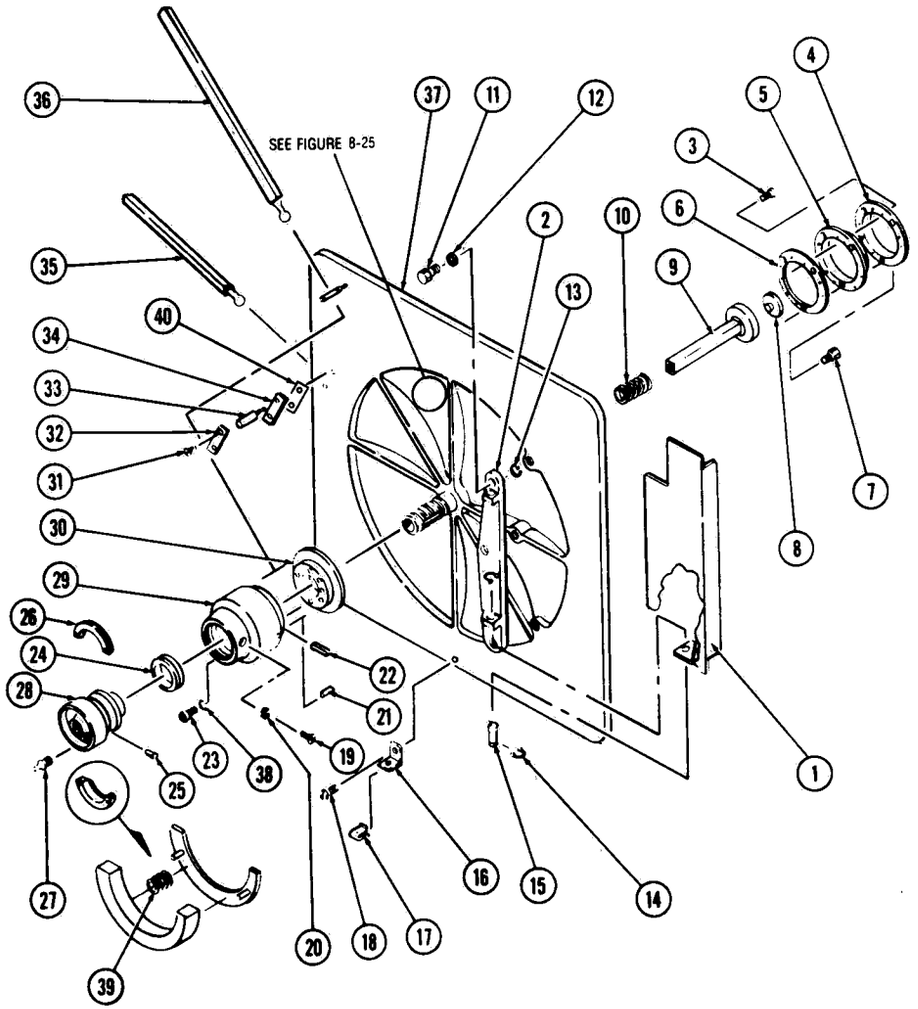


Figure 8-24. DOOR LOCK AND HINGE ASSEMBLY (Part 1 of 3).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-24-	P	760265	268		DOOR LOCK AND HINGE ASSEMBLY (Part 1 of 3)	X
1	P	93302	001		HINGE WELDMENT, Door	1
2	P	93300	001		DOOR HINGE BRACKET	1
3	P	4782	061		BOLT, Machine, Finished	9
4	P	6624	091		COVER, Diaphragm	1
5	P	7230	061		DIAPHRAGM	1
6	P	7753	091		GASKET, Diaphragm	1
7	P	74710	061		SCREW, Special	3
8	P	8778	091		THRUST PLATE ASSEMBLY	1
9	P	91574	091		ROD WELDMENT, Lock Clutch	1
10	P	12267	061		SPRING, Lock Clutch Rod	1
11	P	3858	041		SCREW, Hex Head	2
12	P	3516	041		WASHER, Spring	3
13	P	52149	045		LOCKWASHER	3
14	P	12706	045		RING, Retaining	4
15	P	24520	001		PIN, Hinge	2
16	P	90440	061		BRACKET, Door Cover	5
17	P	90198	045		SPEED NUT	5
18	P	90169	045		SCREW, Self Tapping	5
19	P	10570	061		SCREW, Truss Head	2
20	P	19678	045		LOCKWASHER	2
21	P	22996	061		ROLL PIN	2
22	P	8303	091		KEY, Door	2
23	P	12264	042		SCREW, Socket Head	6
24	P	6416	091		BEARING, Ball Thrust	1
25	P	47598	061		DRIVE SCREW	1
26	P	13194	091		THRUST RING ASSEMBLY	1
27	P	90475	091		LUBE FITTING	1
28	P	96102	091		NUT, Handle	1
29	P	96181	056		PLATE, Top Socket	1
30	P	11817	056		PLATE, Bottom Socket	1
31	P	39863	091		SCREW, Round Head	24
32	P	150365	001		LINK, Arm Clip	12
33	P	33429	001		STUD, Arm Clip	24
34	P	33435	045		BLOCK, Fulcrum Arm Clip	12
35	P	92634	001		ARM, Door	8
36	P	55972	004		ARM, Door	4
37		760265	413		DOOR ASSEMBLY (Refer to Fig. 8-25)	1
38	P	5596	041		LOCKWASHER	6
39	P	12260	091		SPRING, Thrust Ring	4
40	P	150822	317		SHIM, .005 Thick	A/R
	P	150822	318		SHIM, .010 Thick	A/R
	P	150822	319		SHIM, .015 Thick	A/R

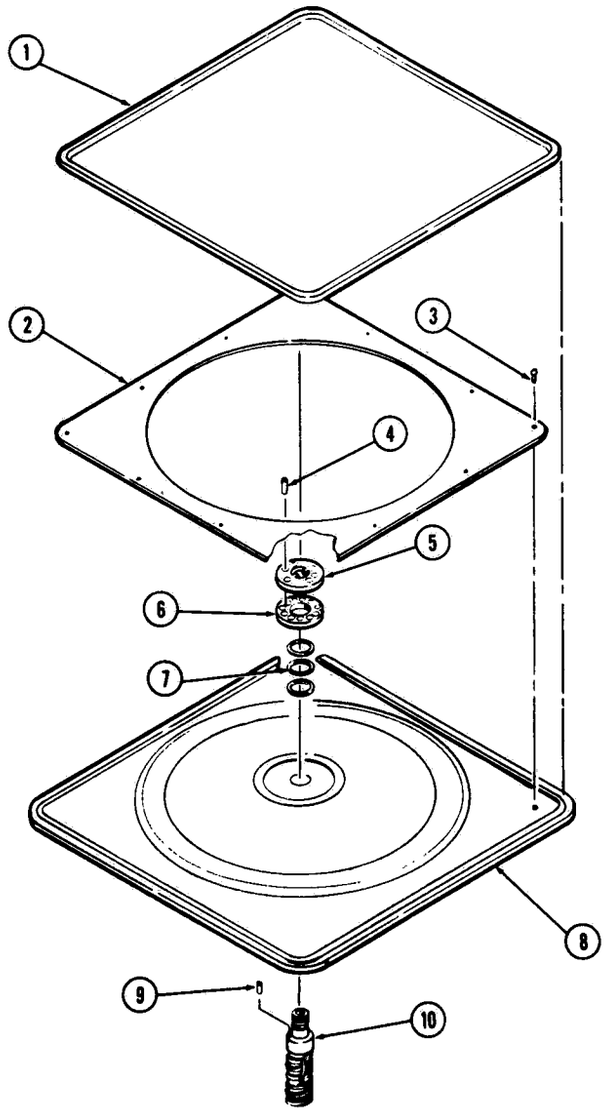


Figure 8-25. DOOR LOCK AND HINGE ASSEMBLY (Part 2 of 3).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-25-					DOOR LOCK AND HINGE ASSEMBLY (Part 2 of 3)	X
1	P	74367	091		GASKET	1
2	P	54475	061		COVER, Door Back	1
3	P	47598	061		DRIVE SCREW	12
4	P	44604	061		ROLL PIN	2
5	P	9083	091		RING, Lock Clutch	1
6	P	22057	091		NUT, Door Post	1
7	P	150330	001		SHIM, Door (.015)	A/R
	P				SHIM, Door (.050)	A/R
8	P				DOOR	1
9	P	2893	061		PIN	1
10	P	22058	091		POST, Door	1

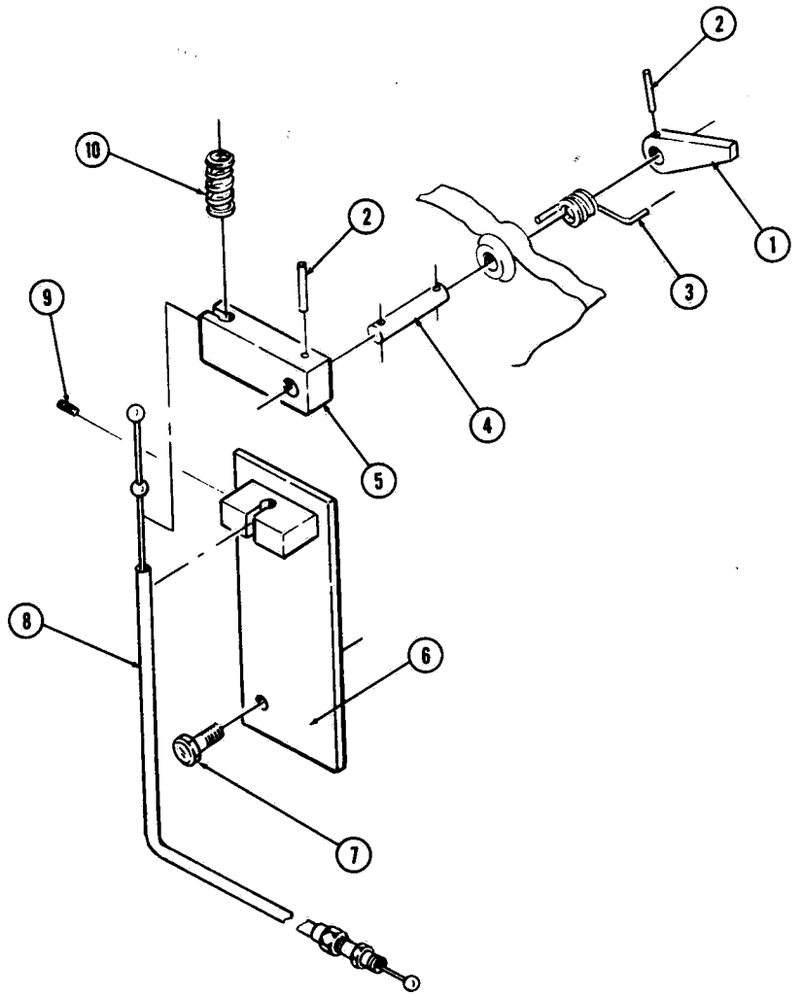


Figure 8-26. DOOR LOCK AND HINGE ASSEMBLY (Part 3 of 3).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-26-					DOOR LOCK AND HINGE ASSEMBLY (Part 3 of 3)	X
1	P	91578	061		PAWL	1
2	P	43227	061		ROLL PIN	2
3	P	129121	001		SPRING, Torsion	1
4	P	129120	001		SHAFT, Pawl	1
5	P	129122	001		ACTUATOR, Door Cable	1
6	P	93891	001		BRACKET, Mounting	1
7	P	31838	042		SCREW, Hex Head, 3/8 x 1	1
8	P	93805	001		CABLE ASSEMBLY	1
9	P	34518	061		SET SCREW	1
10	P	83878	001		SPRING, Compression	1

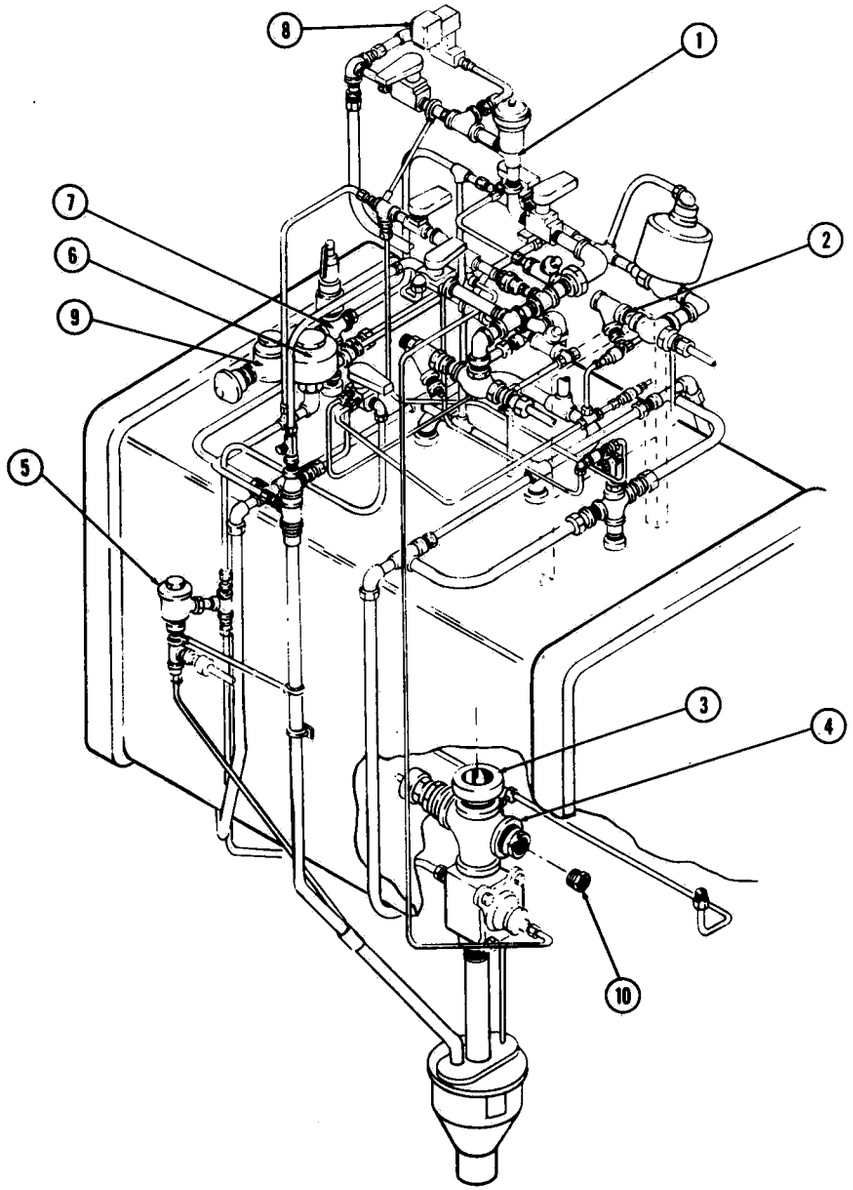


Figure 8-27. PIPING ASSEMBLY: Complete.

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY				
8-27-				PIPING ASSEMBLY: Complete					
				Units with Indicator-Recorder	X				
				Units with Printcon		X			
1				WATER PIPING (See Fig. 8-28)	1	1			
2				STEAM PIPING (See Fig. 8-28)	1	1			
3				CHAMBER STRAINER (See Fig. 8-30)	1	1			
4				CHAMBER DRAIN PIPING (See Fig. 8-38)	1	1			
5				WATER LEVEL SENSING (See Fig. 8-31)	1	1			
6				DRAIN TRAP (See Fig. 8-29)	1	1			
7				AIR INLET PIPING (See Fig. 8-31)	1	1			
8				DETERGENT INJECTOR (See Fig. 8-34)	1	1			
9				SAFETY VALVE AND AIR INLET ASSEMBLY (See Fig. 8-31)		1			
10	P	76053	042	BUSHING, Reducing, 1/2 N.P.T. x 1/4 N.P.T.					

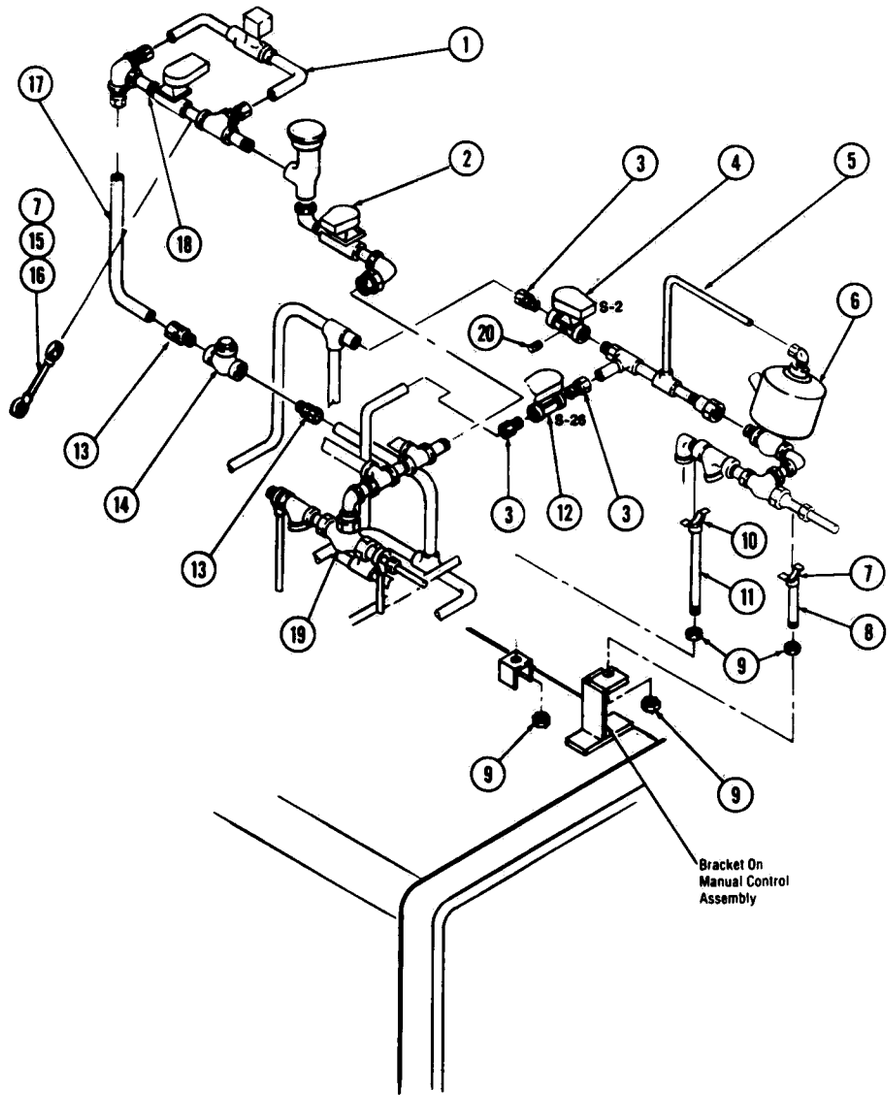


Figure 8-28. STEAM AND WATER SUPPLY PIPING.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-28-					STEAM AND WATER SUPPLY PIPING:		
					Units with Indicator-Recorder	X	
					Units with Printcon		X
1	P	93781	001		DETERGENT INJECTOR ASSEMBLY (See Fig. 8-34)	1	1
2	P	93783	001		VACUUM BREAKER ASSEMBLY (See Fig. 8-33)	1	1
3	P	13658	091		COUPLING, Compression, 1/2 O.D.T. x 3/8 N.P.T.	3	3
4	P	150822	309		VALVE, Solenoid, 3/8 N.P.T. (S-2)(Piston Type)	1	1
	P	764317	687	*	• REPAIR KIT	1	1
	P	764070	002		• COIL	1	1
5	P	93782	001		STEAM REGULATOR SENSING ASSEMBLY (See Fig. 8-35)	1	1
6	P	136731	001		STEAM REGULATOR ASSEMBLY (See Fig. 8-35)	1	1
7	P	39589	010		CLAMP, Pipe, 1/2	2	2
8	P	150803	001		NIPPLE, 1/4 N.P.T. x 5-9/16		1
9	P	129091	001		NUT, Lock, 1/4 N.P.T.	4	4
10	P	39591	010		CLAMP, Pipe, 1	1	1
11	P	150803	002		NIPPLE, 1/4 N.P.T. x 9		1
12	P	83874	002		VALVE, Solenoid, 3/8 N.P.T. (S-26)(Diaphragm Type)	1	1
	P	764187	001		• REPAIR KIT	1	1
	P	764070	002		• COIL	1	
	P	150822	309		VALVE, Solenoid, 3/8 NPT, (S-26) (Piston Type)	A/R	
	P	764317	687		• KIT, Valve Repair	A/R	
	P	764070	002		• COIL	2	2
13	P	35298	091		COUPLING, Compression, 3/4 O.D.T. x 1/2 N.P.T.	1	1
14	P	41998	091		VALVE, Check, 1/2 N.P.T.	1	1
15	P	28928	051		NIPPLE, 1/4 N.P.T. x 3-3/4	1	1
16	P	39590	010		CLAMP, Pipe, 3/4	1	1
17	P	84317	001		TUBE, 3/4 O.D.	1	1
18	P	136733	001		WATER INLET ASSEMBLY (See Fig. 8-34)		
19					WATER SUPPLY ASSEMBLY (Ref. Only) (See Fig. 8-29)	1	1
20	P	3439	091		PLUG, 1/8 N.P.T.		

* Torque bonnet bolts to 50 in./lbs.

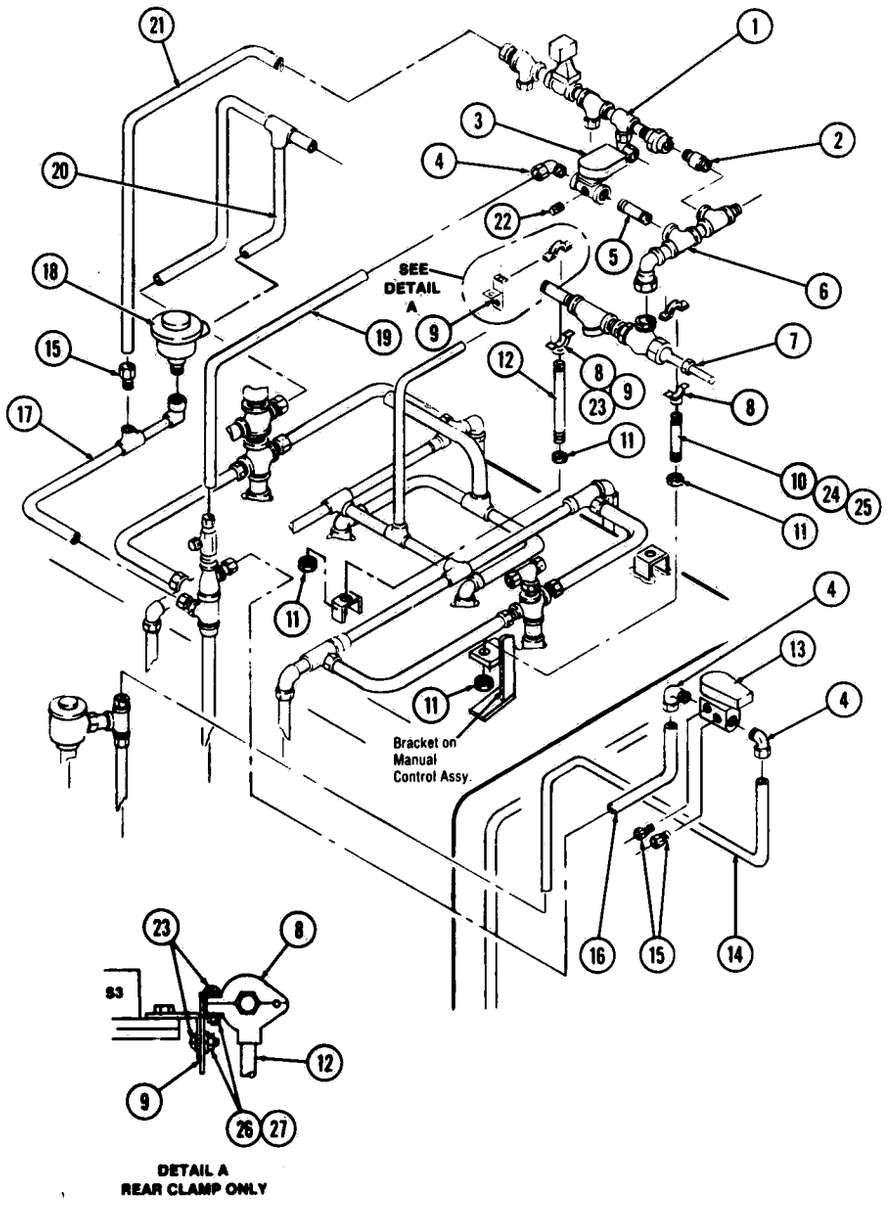


Figure 8-29. WATER AND STEAM TO CHAMBER PIPING.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY				
8-29-					WATER AND STEAM TO CHAMBER PIPING					
					Units with Indicator-Recorder	X				
					Units with Printcon		X			
1	P	136735	001		DRAIN VALVE OPERATOR ASSEMBLY (See Fig. 8-38)	1	1			
2	P	77774	091		STRAINER, Pipe, 1/4 N.P.T.	1	1			
3	P	83263	002		VALVE, Solenoid, 3/8 N.P.T. (S-4)	1	1			
	P	764073	001		• REPAIR KIT	1	1			
	P	764072	002		• COIL	1	1			
4	P	45530	091		ELL, Compression, 3/8 O.D.T. x 3/8 N.P.T.	3	3			
5	P	29023	091		NIPPLE, 3/8 N.P.T. x 3-1/2	1	1			
6	P	93784	001		WATER INLET ASSEMBLY (See Fig. 8-33)	1	1			
7	P	93785	001		WATER SUPPLY ASSEMBLY (See Fig. 8-33)	1	1			
8	P	39589	010		CLAMP, Pipe, 1/2	2	2			
9	P	129092	001		CLIP, Angle	1	1			
10	P	150803	001		NIPPLE, 1/4 N.P.T. x 5-9/16 Lg.	1	1			
11	P	129091	001		NUT, Lock, 1/4-18 N.P.T.	4	4			
12	P	150803	002		NIPPLE, 1/4 N.P.T. x 9	1	1			
13	P	83264	003		VALVE, Solenoid, 3/8 N.P.T. (S-3)	1	1			
	P	764070	001	•	• REPAIR KIT	1	1			
	P	764070	002		• COIL	1	1			
14	P	93789	001		TUBE, 3/8 O.D.	1	1			
15	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	3	3			
16	P	129078	001		TUBE, 3/8 O.D.	1	1			
17	P	93788	001		TRAP DRAIN ASSEMBLY (See Fig. 8-38)	1	1			
18	P	129222	001		TRAP, 1/2 N.P.T. (See Fig. 8-41)	1	1			
19	P	129079	001		TUBE, 3/8 O.D.	1	1			
20	P	93786	001		STEAM TO CHAMBER ASSEMBLY (See Fig. 8-36)	1	1			
21	P	129083	001		TUBE, 1/4 O.D.	1	1			
22	P	3439	091		PLUG, Pipe, 1/8 N.P.T.	1	1			
23	P	3998	091		SCREW, Round Head, 1/4-20 x 1/2	1	2			
24	P	37891	091		SCREW, Cap	6	6			
25	P	150822	009		SHIM (Not Shown)	4	4			
26	P	76230	091		LOCKWASHER, 1/4	2	2			
27	P	3097	041		NUT, 1/4-20	2	2			
				•	Torque bonnet bolts to 50 in./lbs.					

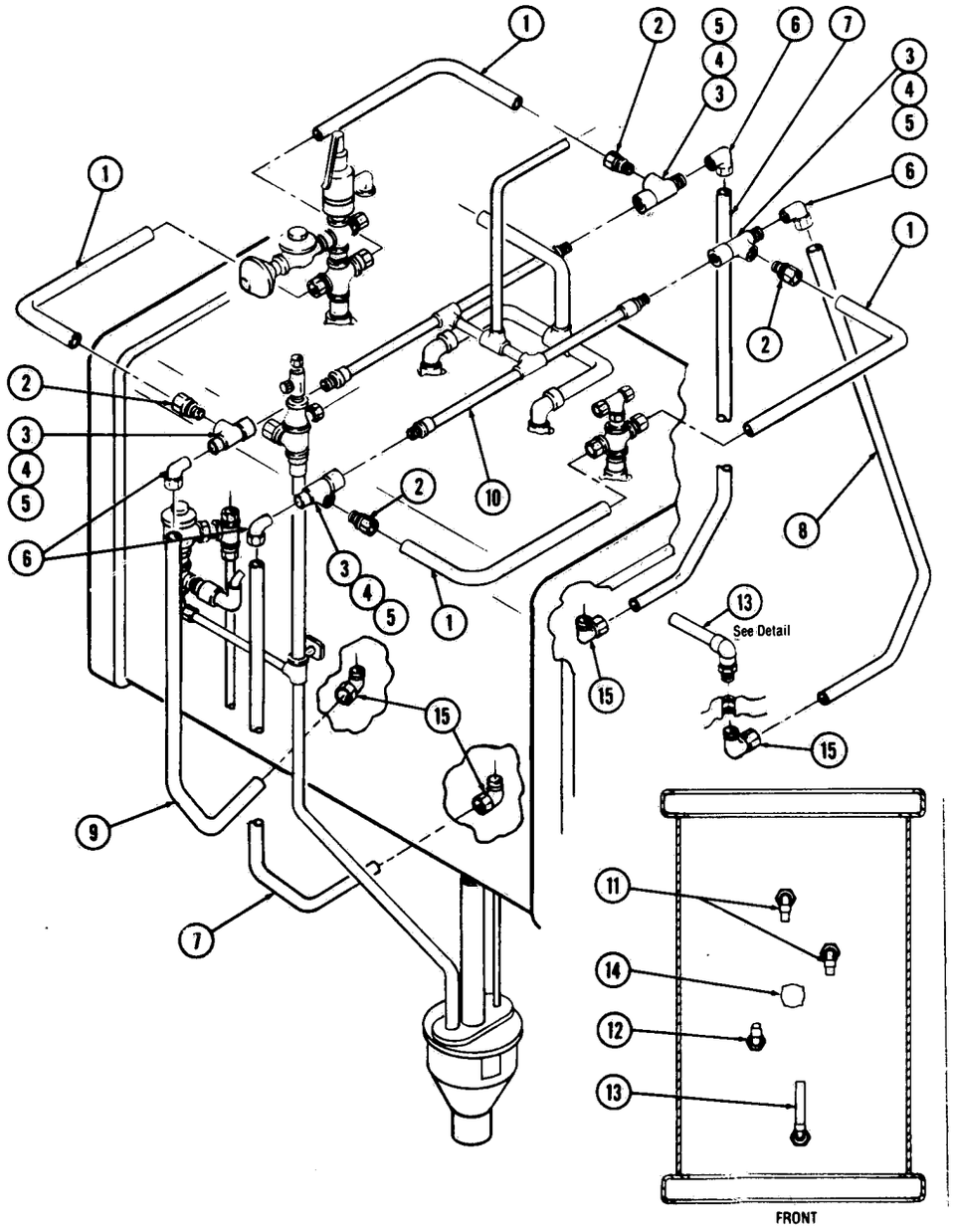


Figure 8-30. EJECTOR PIPING.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-30-					EJECTOR PIPING	X
1	P	84327	001		TUBE, 5/8 O.D.	4
2	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	4
3	P	84321	001		TUBE, Ejector	4
4	P	84322	001		NOZZLE, Steam	4
5	P	7841	091		GASKET	4
6	P	76707	091		ELL, Compression, 5/8 O.D.T. x 1/2 N.P.T. (Female)	4
7	P	93607	001		TUBE, 5/8 O.D.	2
8	P	93597	001		TUBE, 5/8 O.D.	1
9	P	93606	001		TUBE, 5/8 O.D.	1
10	P	136732	001		EJECTOR SUPPLY ASSEMBLY (See Fig. 8-37)	1
11	P	93773	002		WATER SPRAY ASSEMBLY (See Fig. 8-37)	2
12	P	93773	001		WATER SPRAY ASSEMBLY (See Fig. 8-37)	1
13	P	93773	003		WATER SPRAY ASSEMBLY (See Fig. 8-37)	1
14	P	29903	042		STRAINER, Chamber Drain	1
15	P	81064	001		ELL, Compression, 5/8 O.D.T. x 1/2 N.P.T. (Male)	4

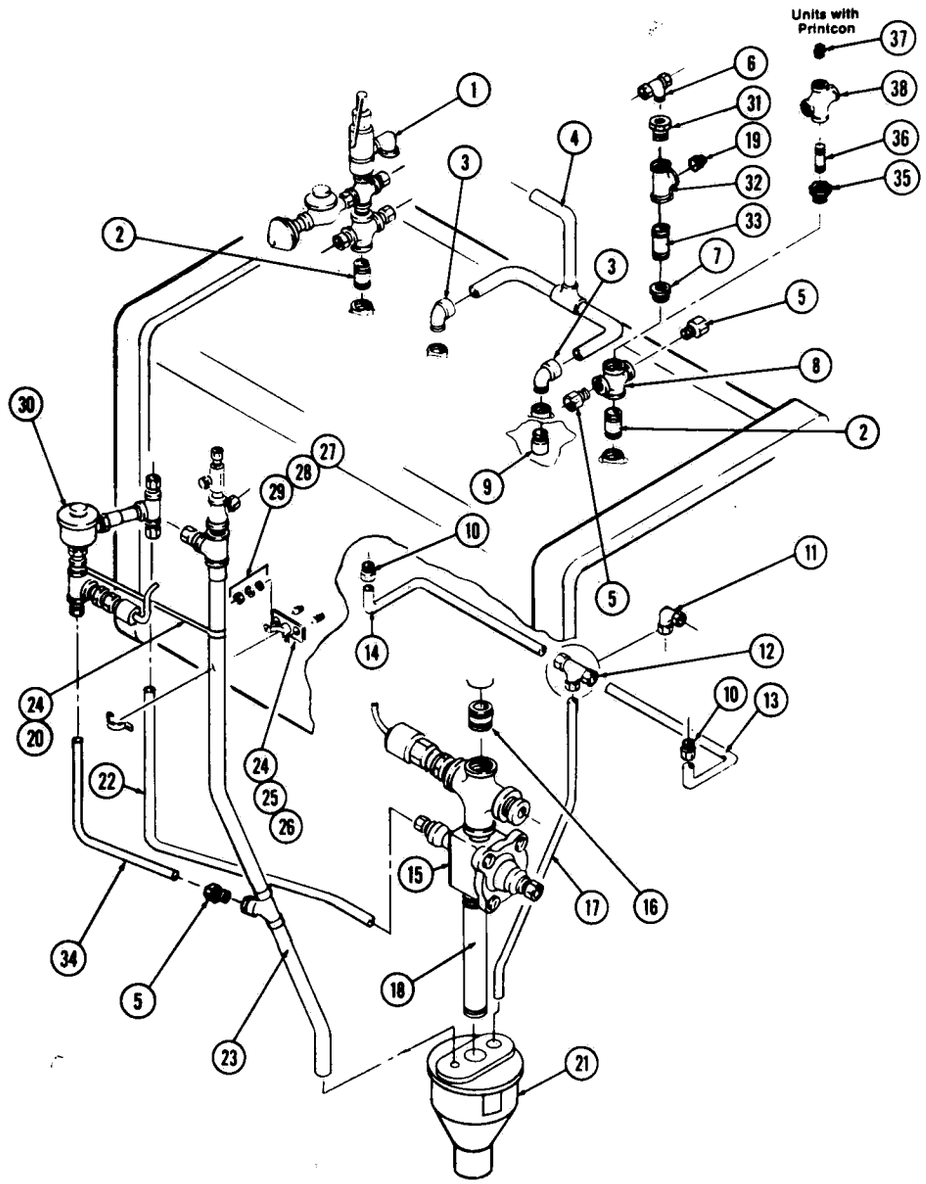


Figure 8-31. AIR AND STEAM INLET PIPING.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-31-					AIR AND STEAM INLET PIPING: Single Door	X			
					AIR AND STEAM INLET PIPING: Double Door		X		
					UNITS WITH PRINTCON:				
					AIR AND STEAM INLET PIPING: Single Door			X	
					AIR AND STEAM INLET PIPING: Double Door				X
1	P	136734	001		SAFETY VALVE AND AIR INLET ASSEMBLY (See Fig. 8-35)	1	1	1	1
2	P	29298	091		NIPPLE, 3/4 N.P.T. x 3	2	2	2	2
3	P	40223	091		ELL, 3/4 O.D.T. x 1/2 N.P.T.	2	2	2	2
4	P	93787	001		INLET STEAM ASSEMBLY (See Fig. 8-34)	1	1	1	1
5	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	3	3	3	3
6	P	42581	091		TEE, 1/4 x 1/4 O.D.T. x 1/8 N.P.T.	1	1		
7	P	22472	091		BUSHING, Reducing, 3/4 x 1/4 N.P.T.	1	1		
8	P	129070	001		CROSS, 3/4 x 3/4 x 1/2 x 1/2 N.P.T.	1	1	1	1
9	P	83876	001		NOZZLE, Water	2	2	2	2
10	P	34218	091		COUPLING, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1	2	1	2
11	P	46682	091		ELL, Compression, 1/4 O.D.T.	1		1	
12	P	46097	091		TEE, Compression, 1/4 O.D.T.		1		1
13	P	93612	001		TUBE, 1/4 O.D.	1	1	1	1
14	P	93594	001		TUBE, 1/4 O.D.		1		1
15	P	83885	001		VALVE, Drain	1	1	1	1
	P	764189	001		• KIT, Repair	1	1	1	1
16	P	39597	091		NIPPLE, 1-1/4 N.P.T. x 1-3/4	1	1	1	1
17	P	93611	001		TUBE, 1/4 O.D.	1	1	1	1
18	P	93780	001		DRAIN ASSEMBLY (See Fig. 8-38)	1	1	1	1
19	P	3440	091		PLUG, Pipe, 1/4 N.P.T.	1	1		
20	P	28937	091		NIPPLE, 1/4 N.P.T. x 6	1	1	1	1
21	P	141198	005		FUNNEL & CAP ASSEMBLY	1	1	1	1
	P	141198	002		• FUNNEL, Drain, 2" O.D.	1	1	1	1
	P	56396	011		• CAP, Funnel	1	1	1	1
	P	15272	091		• SCREW, Hex Set, 1/4-20	2	2	2	2
	P	78881	045		• SCREW, Self Tap, 6-32 x 1/2	2	2	2	2
22	P	93604	001		TUBE, 3/8 O.D.	1	1	1	1
23	P	136730	001		STEAM RETURN ASSEMBLY (See Fig. 8-36)	1	1	1	1
24	P	39589	010		CLAMP, Pipe, 1/2	3	3	3	3
25	P	27422	091		NIPPLE, 1/4 N.P.T. x 1-1/4	1	1	1	1
26	P	9613	091		SUPPORT	1	1	1	1
27	P	3097	041		NUT, 1/4-20	2	2	2	2
28	P	76230	091		LOCKWASHER	2	2	2	2
29	P	49134	061		WASHER	1	1	1	1
30	P	93790	001		WATER LEVEL SENSOR ASSEMBLY (See Fig. 8-37)	1	1	1	1
31	P	939	042		BUSHING, Reducing, 1/4 x 1/8 N.P.T.	1	1		
32	P	4906	091		TEE, 1/4 N.P.T.	1	1		
33	P	28917	091		NIPPLE, 1/4 N.P.T. x 1	1	1		
34	P	129352	098		TUBE, 5/8 O.D.T.	1	1	1	1
35	P	11506	091		BUSHING, Red, 3/4 N.P.T. x 1/8 N.P.T.			1	1
36	P	28899	091		NIPPLE, 1/8 N.P.T. x 1			1	1
	P	3439	091		PLUG, Pipe, 1/8 N.P.T.			1	1
	P	89880	091		CROSS, 1/8 N.P.T.			1	1

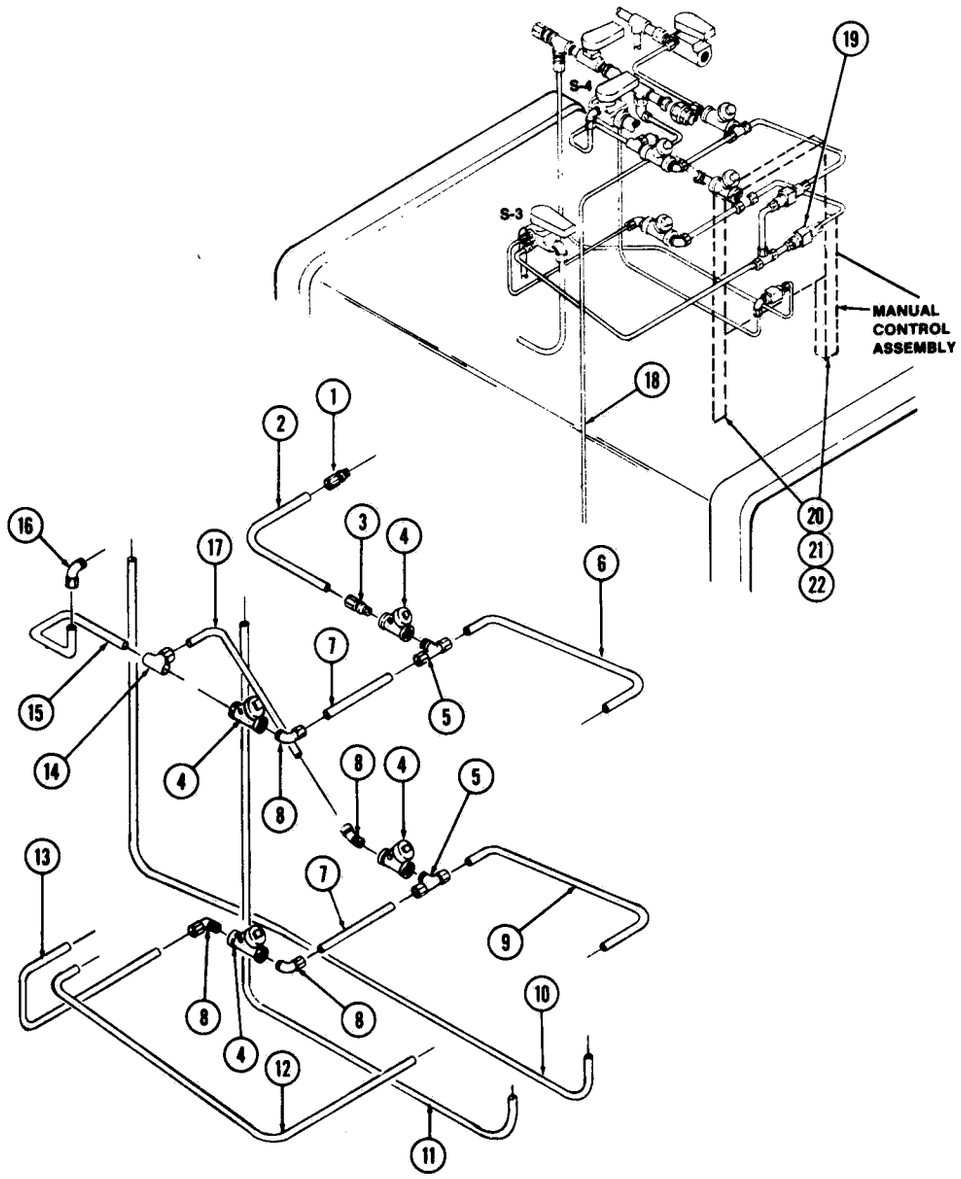
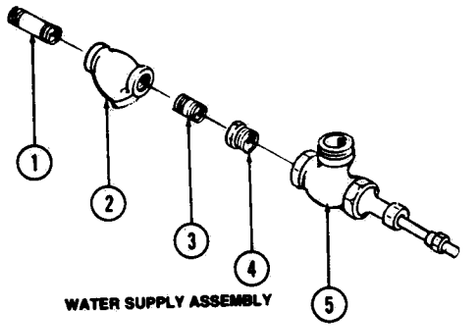
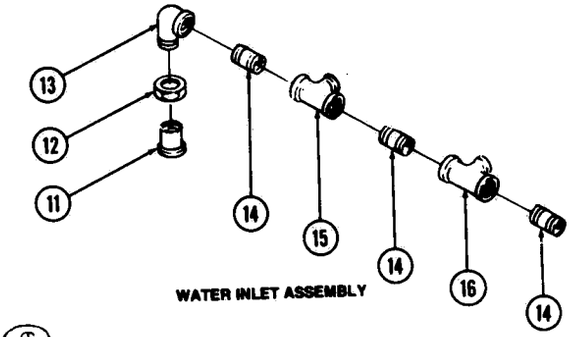


Figure 8-32. TUBING.

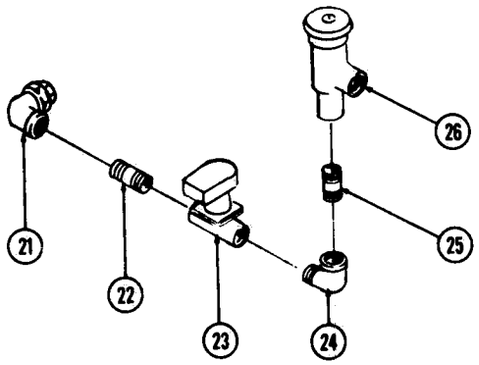
FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-32-					TUBING		
					Units with Indicator-Recorder	X	
					Units with Printcon		X
1	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1
2	P	129085	001		TUBE, 1/4 O.D.	1	1
3	P	34218	091		COUPLING, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1	
	P	34218	042		COUPLING, Compression, 1/4 O.D.T. x 1/4 N.P.T.		1
4	P	10278	091		VALVE, Check, 1/4 N.P.T.	4	4
5	P	129088	001		TEE, Male Branch, 1/4 x 1/4 O.D.T. x 1/4 N.P.T.	2	2
6	P	93791	002		TUBE, 1/4 O.D.	1	1
7	P	83877	002		TUBE, 1/4 O.D. x 2-19/32	2	2
8	P	41306	091		ELL, Compression, 1/4 O.D.T. x 1/4 N.P.T.	4	4
9	P	93791	001		TUBE, 1/4 O.D.	1	1
10	P	93793	001		TUBE, 1/4 O.D.	1	1
11	P	93792	001		TUBE, 1/4 O.D.	1	1
12	P	129295	001		TUBE, 1/4 O.D.	1	1
13	P	93791	004		TUBE, 1/4 O.D.	1	1
14	P	129089	001		TEE, Male Run, 1/4 O.D.T. x 1/4 N.P.T. x 1/4 O.D.T.	1	1
15	P	129086	001		TUBE, 1/4 O.D.	1	1
16	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1
17	P	129082	001		TUBE, 1/4 O.D.	1	1
18	P	136736	001		TUBE, 1/4 O.D.	1	1
19	P	146337	001		MANUAL CONTROL ASSEMBLY (See Fig. 8-22)	1	
	P	146649	160		MANUAL CONTROL ASSEMBLY (See Fig. 8-53)		1
20	P	3097	041		NUT, 1/4-20	4	4
21	P	76230	091		LOCKWASHER	4	4
22	P	10453	042		WASHER	4	4



WATER SUPPLY ASSEMBLY



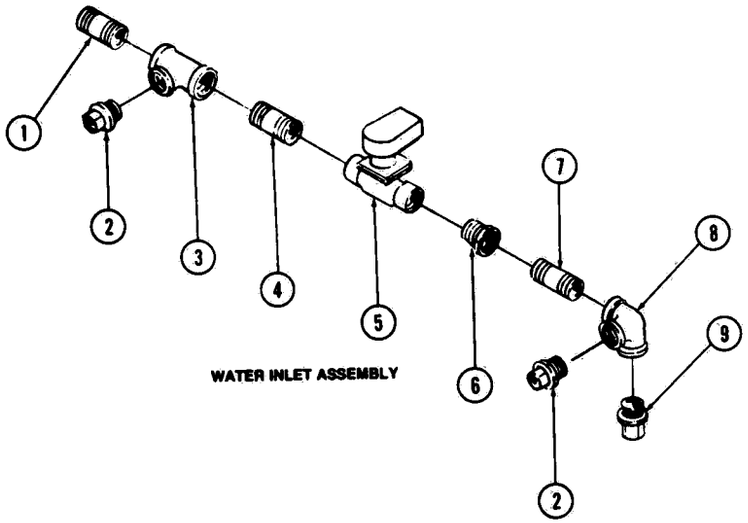
WATER INLET ASSEMBLY



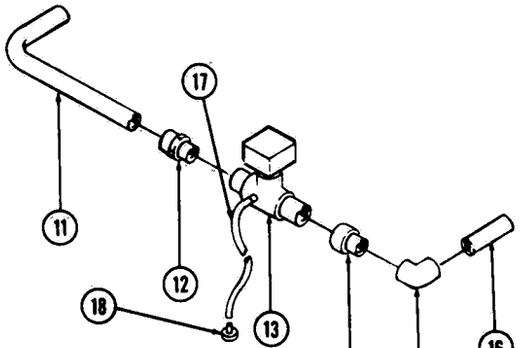
VACUUM BREAKER ASSEMBLY

Figure 8-33. PIPING SUB-ASSEMBLIES: Water Supply.

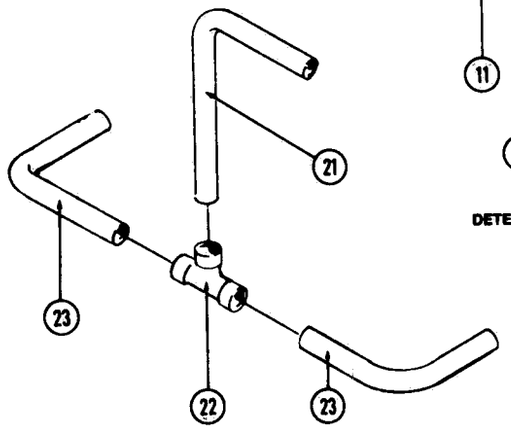
FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-33-					PIPING SUB-ASSEMBLIES: Water Supply	
	P	93785	001		WATER SUPPLY ASSEMBLY	X
1	P	29167	051		NIPPLE, 1/2 N.P.T. x 2-1/4	1
2	P	47709	091		STRAINER, 1/2 N.P.T.	1
	P	750890	091		• SCREEN	1
3	P	29162	091		NIPPLE, 1/2 N.P.T. x 1	1
4	P	836	042		REDUCER, 3/4 x 1/2 N.P.T.	1
5	P	34029	091		VALVE, Union Angle, 3/4 N.P.T. (See Fig. 8-40)	1
	P	93784	001		WATER INLET ASSEMBLY	X
11	P	4248	091		SPUD, Union, 3/4 N.P.T.	1
12	P	2903	091		NUT, Union	1
13	P	1636	091		ELL, Street, 3/4 N.P.T.	1
14	P	29291	091		NIPPLE, 3/4 N.P.T. x 1-1/4	3
15	P	4924	091		TEE, 3/4 x 3/4 x 3/8 N.P.T.	1
16	P	84323	001		TEE, 3/4 x 3/4 x 1/4 N.P.T.	1
	P	93783	001		VACUUM BREAKER ASSEMBLY	X
21	P	89986	091		ELL, Union, 3/4 N.P.T.	1
22	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
23	P	83875	002		VALVE, Solenoid, 3/4 N.P.T. (S-21)	1
	P	764188	001		• REPAIR KIT	1
	P	764072	002		• COIL	1
24	P	1636	091		ELL, Street, 3/4 N.P.T.	1
25	P	29292	051		NIPPLE, 3/4 N.P.T. x 1-1/2	1
26	P	77023	001		VACUUM BREAKER, 3/4 N.P.T.	1
	P	752735	091		• REPAIR KIT	1



WATER INLET ASSEMBLY



DETERGENT INJECTOR ASSEMBLY



INLET STEAM ASSEMBLY

Figure 8-34. PIPING SUB-ASSEMBLIES: Water and Detergent.

FIG. & INDEX NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-34-					PIPING SUB-ASSEMBLIES: Water and Detergent	
	P	136733	001		WATER INLET ASSEMBLY	X
1	P	29292	091		NIPPLE, 3/4 N.P.T. x 1-1/2	1
2	P	20173	091		COUPLING, 1/2 O.D.T. x 1/2 N.P.T.	2
3	P	4923	091		TEE, 3/4 x 3/4 x 1/2 N.P.T.	1
4	P	29294	091		NIPPLE, 3/4 N.P.T. x 2	1
5	P	83875	002		VALVE, Solenoid, 3/4 N.P.T. (S-25)	1
	P	764188	001		• REPAIR KIT	1
	P	764072	002		• COIL	1
6	P	836	042		BUSHING, Reducing, 3/4 x 1/2 N.P.T.	1
7	P	29165	091		NIPPLE, 1/2 N.P.T. x 1-3/4	1
8	P	1627	091		ELL, Side Outlet, 1/2 N.P.T.	1
9	P	35298	091		COUPLING, 3/4 O.D.T. x 1/2 N.P.T.	1
	P	93781	001		DETERGENT INJECTOR ASSEMBLY	X
11	P	84330	001		TUBE, 1/2 O.D.	1
12	P	90210	091		ADAPTER, Male, 1/2 O.D.T. x 1/2 N.P.T.	1
13	P	84331	002		INJECTOR (IJ-21)	1
14	P	90436	091		ADAPTER, Female, 1/2 O.D.T. x 1/2 N.P.T.	1
15	P	90213	091		ELL, 1/2 O.D.T.	1
16	P	92942	009		TUBE, 1/2 O.D.	1
17	P	761695	001		TUBE, Detergent Pick-up	1
18	P	761696	001		STRAINER, Foot	1
	P	93787	001		INLET STEAM ASSEMBLY	X
21	P	150822	184		TUBE, 3/4 O.D.	1
22	P	129069	001		TEE, 3/4 O.D.T.	1
23	P	93774	001		TUBE, 3/4 O.D.	2

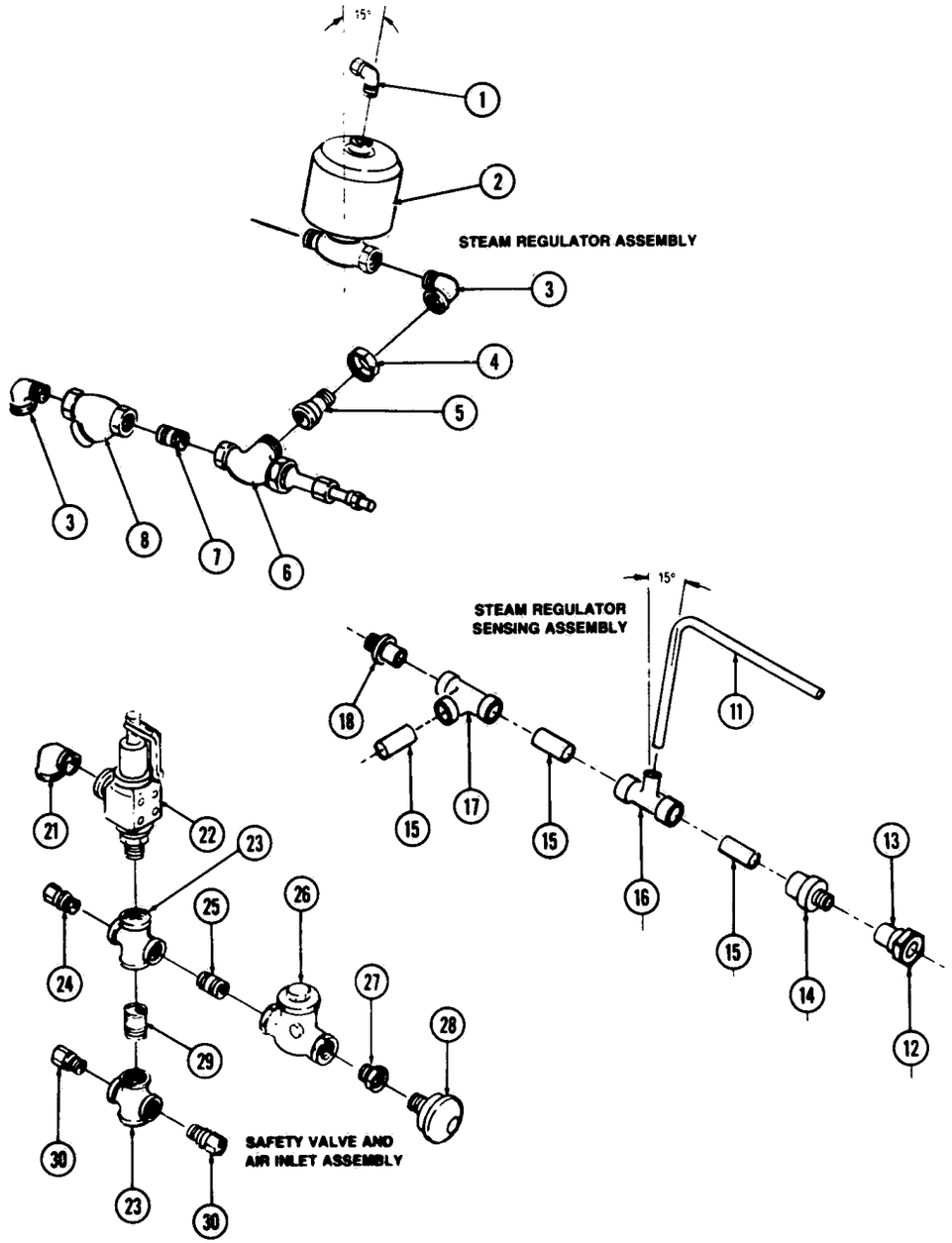
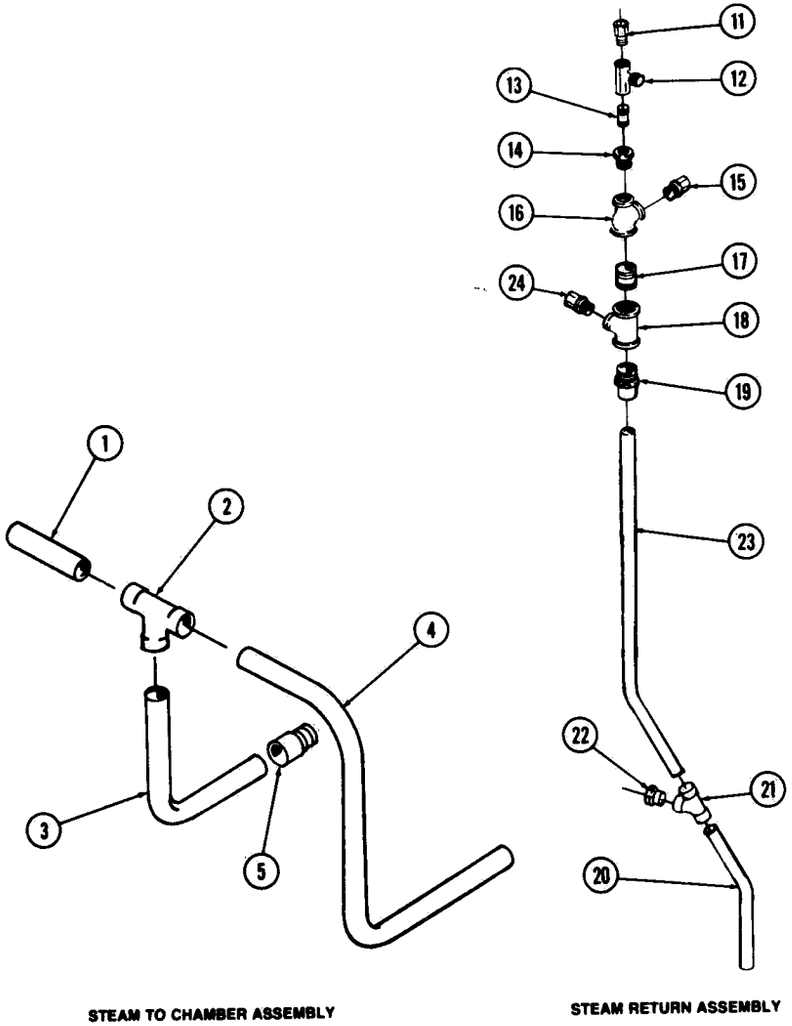


Figure 8-35. PIPING SUB-ASSEMBLIES: Steam and Air.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-35-					PIPING SUB-ASSEMBLIES: Steam and Air	
	P	136731	001		STEAM REGULATOR ASSEMBLY	X
1	P	21990	091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
2	P	32003	091		VALVE, Steam Control, 3/8 N.P.T. (See Fig. 8-39)	1
3	P	1631	091		ELL, Street, 3/8 N.P.T.	2
4	P	2901	051		NUT, Union	1
5	P	4076	091		SPUD, 3/8 N.P.T.	1
6	P	5654	051		VALVE, Angle, 3/8 N.P.T.	1
7	P	29013	091		NIPPLE, 3/8 N.P.T. x 1	1
8	P	47671	091		STRAINER, 3/8 N.P.T.	1
	P	50341	091		• SCREEN	1
	P	28447	091		• GASKET (O Ring)	1
	P	93782	001		STEAM REGULATOR SENSING ASSEMBLY	X
11	P	84324	001		TUBE, 1/4 O.D.	1
12	P	2901	051		NUT, Union	1
13	P	4201	091		SPUD, 3/8 N.P.T.	1
14	P	90242	091		ADAPTER, 1/2 O.D.T. x 3/8 N.P.T.	1
15	P	92942	006		TUBE, 1/2 O.D. x 1-7/16	3
16	P	84325	001		TEE, 1/2 x 1/2 x 1/4 O.D.T.	1
17	P	90223	091		TEE, 1/2 O.D.T.	1
18	P	90587	091		ADAPTER, 1/2 O.D.T. x 3/8 N.P.T.	1
	P	136734	001		SAFETY VALVE AND AIR INLET ASSEMBLY	X
21	P	1639	091		ELL, Street, 1 N.P.T.	1
22	P	84342	001		VALVE, Safety, 3/4 N.P.T.	1
23	P	129070	001		CROSS, 3/4 x 3/4 x 1/2 x 1/2 N.P.T.	2
24	P	20173	091		COUPLING, Compression, 1/2 O.D.T. x 1/2 N.P.T.	1
25	P	29163	044		NIPPLE, 1/2 N.P.T. x 1-3/4	1
26	P	41998	091		VALVE, Check, 1/2 N.P.T.	1
27	P	76053	042		BUSHING, Reducing, 1/2 x 1/4 N.P.T.	1
28	P	41285	091		SILENCER, Air	1
29	P	29293	091		NIPPLE, 3/4 N.P.T. x 1-3/4	1
30	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	2



STEAM TO CHAMBER ASSEMBLY

STEAM RETURN ASSEMBLY

Figure 8-36. PIPING SUB-ASSEMBLIES: Chamber Steam.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-36-					PIPING SUB-ASSEMBLIES: Chamber Steam	
	P	93786	001		STEAM TO CHAMBER ASSEMBLY	X
1	P	92942	010		TUBE, 1/2 O.D. x 1-3/4	1
2	P	84344	001		TEE, 1/2 x 1/2 x 5/8 O.D.T.	1
3	P	93779	001		TUBE, 5/8 O.D.	1
4	P	93610	001		TUBE, 1/2 O.D.	1
5	P	91410	091		ADAPTER, 5/8 O.D.T. x 1/2 N.P.T.	1
	P	136730	001		STEAM RETURN ASSEMBLY	X
11	P	30947	091		COUPLING, Compression, 3/8 O.D.T. x 3/8 N.P.T.	1
12	P	83256	001		VALVE, Needle, 3/8 N.P.T.	1
13	P	29014	051		NIPPLE, 3/8 N.P.T. x 1-1/4	1
14	P	837	091		BUSHING, Reducing, 1/2 x 3/8 N.P.T.	1
15	P	89947	091		COUPLING, Compression, 3/8 O.D.T. x 1/2 N.P.T.	1
16	P	4922	091		TEE, 3/4 x 1/2 x 1/2 N.P.T.	1
17	P	29290	091		NIPPLE, 3/4 N.P.T. x 1	1
18	P	4923	091		TEE, 3/4 x 3/4 x 1/2 N.P.T.	1
19	P	91158	091		ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1
20	P	93609	001		TUBE, 7/8 O.D.	1
21	P	89384	091		"Y" BRANCH, 7/8 O.D.T.	1
22	P	89743	091		ADAPTER, 7/8 O.D.T. x 1/2 N.P.T.	1
23	P	84313	001		TUBE, 7/8 O.D.	1
24	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1

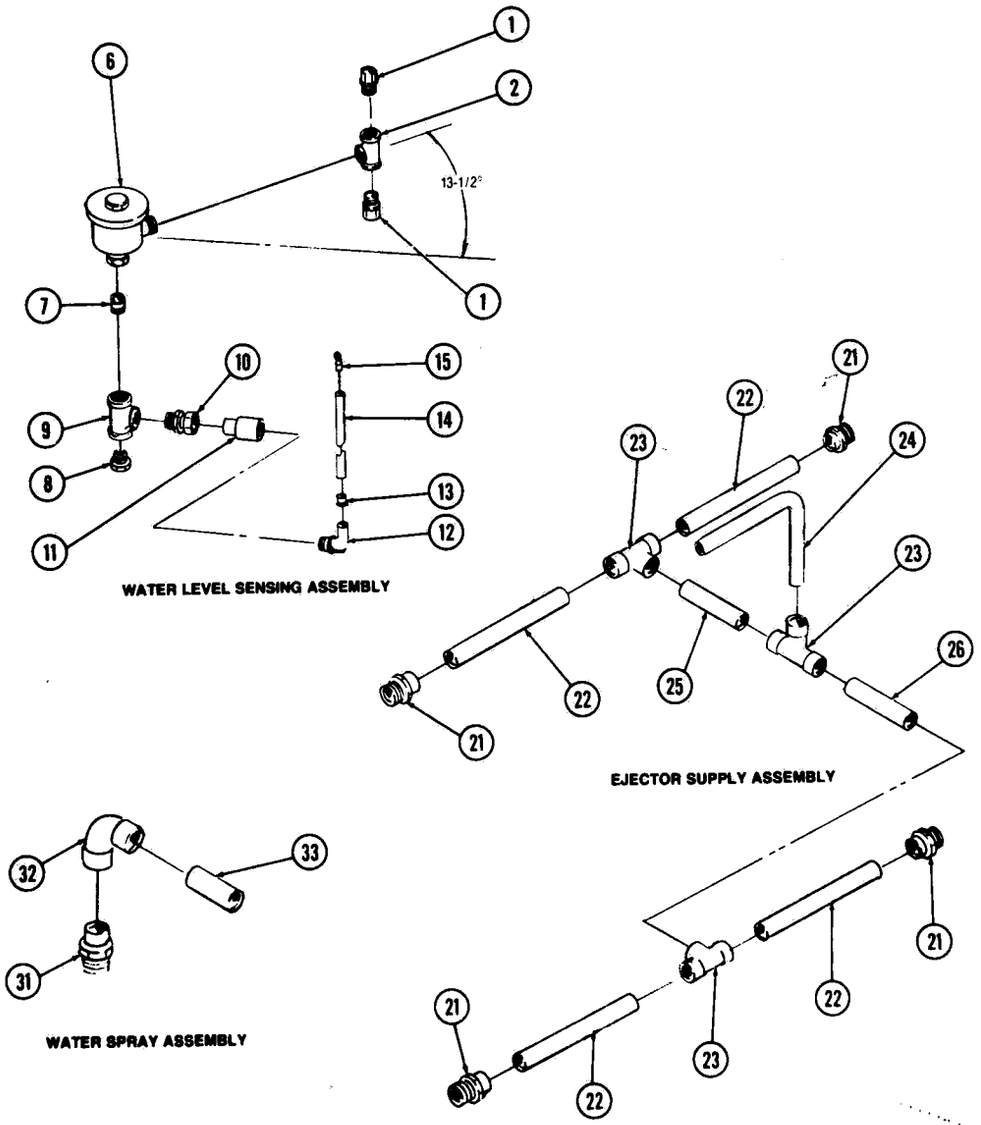


Figure 8-37. PIPING SUB-ASSEMBLIES: Water Level and Ejector.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-37-					PIPING SUB-ASSEMBLIES: Water Level and Ejector				
	P	93790	001		WATER LEVEL SENSING ASSEMBLY	X			
1	P	30947	091		COUPLING, Compression, 3/8 O.D.T. x 3/8 N.P.T.	2			
2	P	4914	091		TEE, 3/8 x 3/8 x 1/2	1			
3					(Not Used)				
4					(Not Used)				
5					(Not Used)				
6	P	129222	001		TRAP, Steam, 1/2 N.P.T. (See Fig. 8-41)	1			
	P	764080	001		• PARTS RENEWAL PACKAGE	1			
7	P	29170	051		NIPPLE, 1/2 x 3	1			
8	P	29931	091		COUPLING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1			
9	P	4930	091		TEE, 1/2 x 1/2 x 3/4 N.P.T.	1			
10	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	1			
11	P	93595	001	*	SENSOR	1			
	P	150822	307		• O-RING	1			
12	P	90625	091		ELL, Conduit, 3/8	1			
13	P	24748	091		BUSHING	1			
14	P	76576	091		CONDUIT (3/8 x 48)	1			
15	P	90619	091		TERMINAL	1			
	P	136732	001		EJECTOR SUPPLY ASSEMBLY	X			
21	P	90210	091		ADAPTER, Male, 1/2 O.D.T. x 1 2 N.P.T.	4			
22	P	92942	011		TUBE, 1/2 O.D. x 5	4			
23	P	90223	091		TUBE, 1/2 O.D.T.	3			
24	P	84326	001		TUBE, 1/2 O.D.	1			
25	P	92942	007		TUBE, 1/2 O.D. x 2-7/16	1			
26	P	92942	008		TUBE, 1/2 O.D. x 2-3/4	1			
	P	93773	001		WATER SPRAY ASSEMBLY	X			
	P	93773	002		WATER SPRAY ASSEMBLY		X		
	P	93773	003		WATER SPRAY ASSEMBLY			X	
31	P	90762	091		ADAPTER, Male, 5/8 O.D.T. x 1 2 N.P.T.	1	1	1	
32	P	90212	091		ELBOW, 5/8 O.D.T.	1	1	1	
33	P	84350	001		TUBE, 5/8 O.D. x 5/8	1			
	P	84350	002		TUBE, 5/8 O.D. x 7/8		1		
	P	84350	003		TUBE, 5/8 O.D. x 3-3/4			1	

* When replacing sensor, Pt. 11, it may be necessary to install a new compression coupling Pt. 10. In most cases it will not be removed from the old sensor.

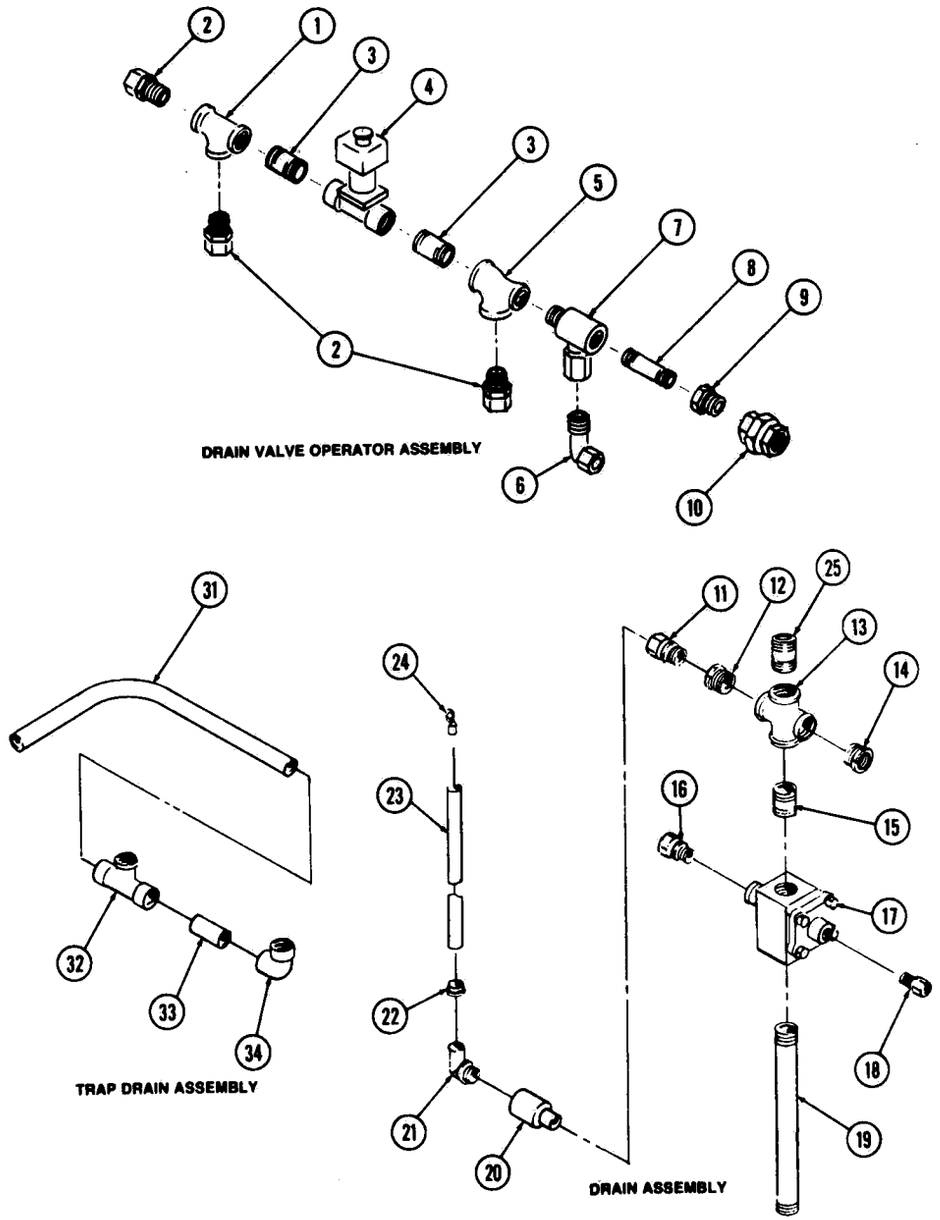


Figure 8-38. PIPING SUB-ASSEMBLIES: Drain.

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-38-					PIPING SUB-ASSEMBLIES: Drain	
	P	136735	001		DRAIN VALVE OPERATOR ASSEMBLY	X
1	P	43649	091		TEE, 1/4 N.P.T.	1
2	P	34218	091		COUPLING, Compression, 1/4 O.D.T. x 1/4 N.P.T.	3
3	P	28919	091		NIPPLE (1/4 x 1-1/2)	2
4	P	83475	002		VALVE, Solenoid, 1/4 N.P.T. (S-23)	1
	P	764075	001		• REPAIR KIT	1
	P	764075	002		• COIL	1
5	P	4900	091		TEE, 1/4 x 1/8 x 1/4 N.P.T.	1
6	P	41306	091		ELL, 1/4 O.D.T. x 1/4 N.P.T.	1
7	P	84318	001		INJECTOR	1
8	P	33816	043		NIPPLE, 1/8 N.P.T. x 3/4	1
9	P	939	091		BUSHING, Reducing, 1/4 x 1/8 N.P.T.	1
10	P	129071	001		UNION, 1/4 N.P.T.	1
	P	93780	001		DRAIN ASSEMBLY	X
11	P	30005	091		COUPLING, Compression, 7/8 O.D.T. x 3/4 N.P.T.	1
12	P	828	091		BUSHING, Reducing, 1-1/4 x 3/4 N.P.T.	1
13	P	129075	001		CROSS, 1-1/4 N.P.T.	1
14	P	81402	001		BUSHING, Reducing, 1-1/4 x 1/2 N.P.T.	1
15	P	39597	091		NIPPLE, 1-1/4 N.P.T. x 1-3/4	1
16	P	89947	091		COUPLING, Compression, 3/8 O.D.T. x 1/2 N.P.T.	1
17	P	83885	001		VALVE, Drain	1
	P	764189	001		• REPAIR KIT	1
18	P	19514	091		COUPLING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
19	P	129076	001		NIPPLE, 1-1/4 N.P.T. x 8-1/2	1
20	P	93595	001		SENSOR	1
	P	150822	307		• O-RING	1
21	P	90625	091		ELL, Conduit, 3/8	1
22	P	24748	091		BUSHING	1
23	P	91343	091		CONDUIT, Flexible, 3/8 x 60	1
24	P	90619	091		TERMINAL	1
25	P	39597	091		NIPPLE, 1-1/4 NPT x 1-3/4	1
	P	93788	001		TRAP DRAIN ASSEMBLY	X
31	P	93599	091		TUBE, 5/8 O.D.	1
32	P	89864	091		TEE, 5/8 x 5/8 O.D.T. x 1/8 N.P.T.	1
33	P	90267	091		TUBE, 5/8 O.D. x 2-1/4	1
34	P	44499	091		ELL, 5/8 O.D.T. x 1/2 N.P.T.	1

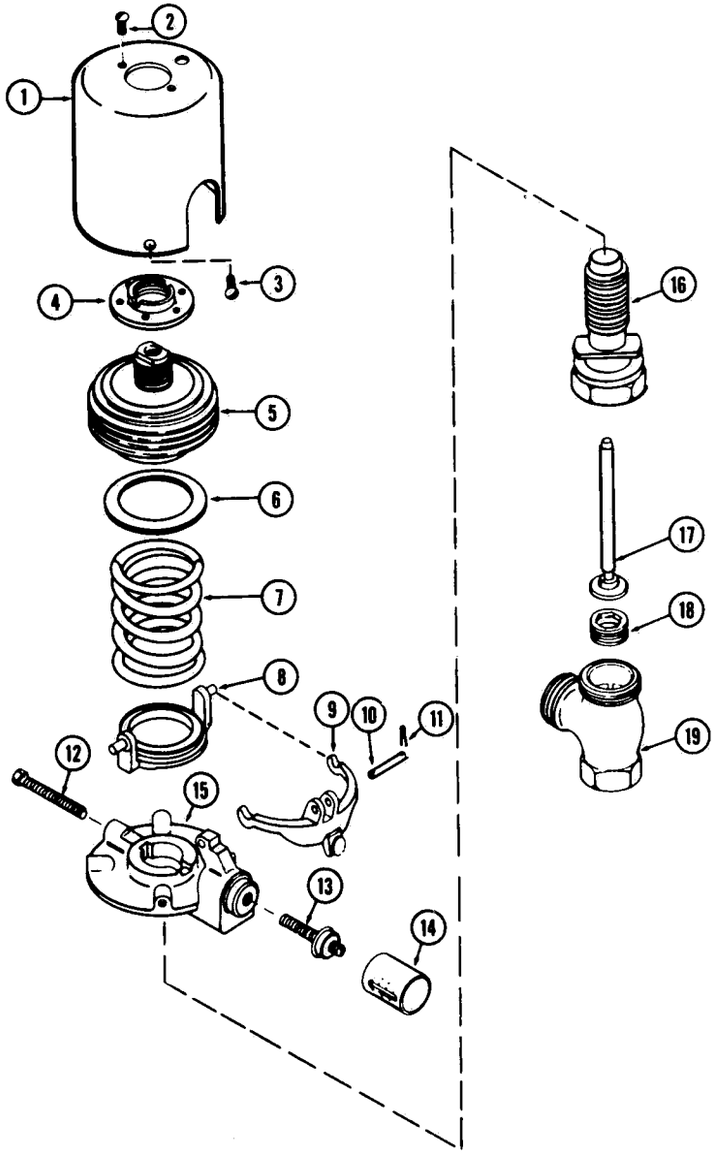


Figure 8-39. STEAM CONTROL VALVE.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-39-	P	32003	091		STEAM CONTROL VALVE	X
1	P	22349	045		COVER	1
2	P	9276	041		SCREW (8-32 x 3/16)	2
3	P	3969	041		SCREW (1/4-20 x 1/4)	4
4	P	9172	091		REINFORCEMENT	1
5	P	35880	091		BELLOWS	1
6	P	35911	061		SEAT, Top Spring	1
7	P	19947	045		SPRING	1
8	P	12474	042		SEAT, Lower Spring	1
9	P	14976	091		FORK, Adjusting	1
10	P	11890	061		PIN, Pivot	1
11	P	8897	091		COTTER PIN	2
12	P	12471	041		SCREW (1/4-20 x 1-1/2)	1
13	P	11417	045		SCREW, Pressure Adjust	1
14	P	31273	044		SLEEVE, Indicator	1
15	P	11887	042		PLATE, Bottom	1
16	P	26836	051		SYLPHON AND BONNET ASSEMBLY	1
17	P	28265	091		STEM ASSEMBLY	1
18	P	5685	061		SEAT, Valve	1
19	P	5672	091		BODY, Valve	1
20	P	2299	045		INSERT	1
	P	754359	001		• REPAIR KIT (Includes Items 2,3,5,16,17,and 18)	A/R

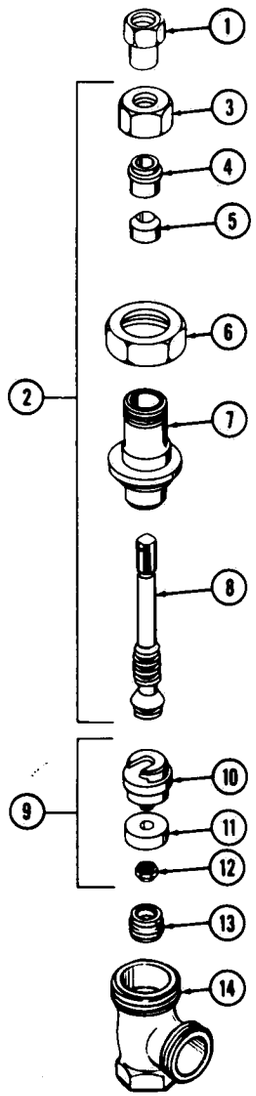


Figure 8-40. UNION ANGLE VALVE.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-40-	P	5654	051		UNION ANGLE VALVE, Steam Supply (3/8)	X			
	P	34029	091		UNION ANGLE VALVE, Water Supply (3/4)		X		
1	P	8605	043		NUT, Wheel	1	1		
2	P	53915	091		VALVE STEM AND BONNET ASSEMBLY	1			
	P	54363	091		VALVE STEM AND BONNET ASSEMBLY		1		
3	P	48431	091		• NUT, Packing	1	1		
4	P	48432	091		• GLAND, Packing	1	1		
5	P	8784	091		• PACKING	1	1		
6	P	5683	091		• NUT, Bonnet	1			
	P	25566	091		NUT, Bonnet		1		
7	P	53912	091		• BONNET, Valve	1			
	P	53913	091		BONNET, Valve		1		
8	P	53911	051		• STEM, Valve	1			
	P	54296	091		STEM, Valve		1		
9	P	25347	091		DISC HOLDER ASSEMBLY	1			
	P	25567	091		DISC HOLDER ASSEMBLY		1		
10	P	150576	001		• DISC HOLDER	1			
	P	25567	091		• DISC HOLDER		1		
11	P	25345	091		• DISC, Teflon	1			
	P	25569	091		• DISC, Teflon		1		
12	P	5680	091		• NUT, Disc	1			
	P	2927	091		• NUT, Disc		1		
13	P	5685	061		SEAT, Valve	1			
	P	22425	061		SEAT, Valve		1		
14	P	5669	091		BODY, Valve	1			
	P	22427	091		BODY, Valve		1		
	P	754361	001		• REPAIR KIT (Includes Items 4,8,9, and 13)	A/R			
	P	754361	003		• REPAIR KIT (Includes Items 4,9, and 13)		A/R		

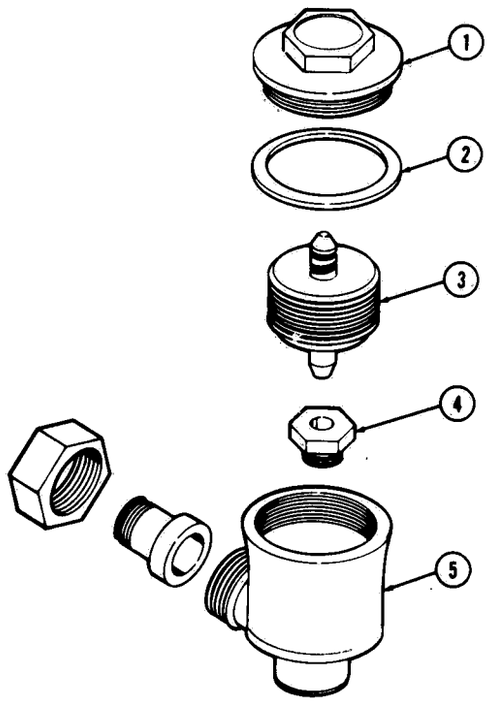


Figure 8-41. STEAM TRAP.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-41-	P	129222	001		STEAM TRAP 1/2	X
	P	764080	001		KIT. Repair (Includes items 2, 3, and 4)	A/R
1	P	764315	209		CAP	1
2					GASKET. NLA See Kit P-764080-001	1
3					DIAPHRAGM. NLA See Kit P-764080-001	1
4					SEAT. NLA See Kit P-764080-001	1
5					BODY	1

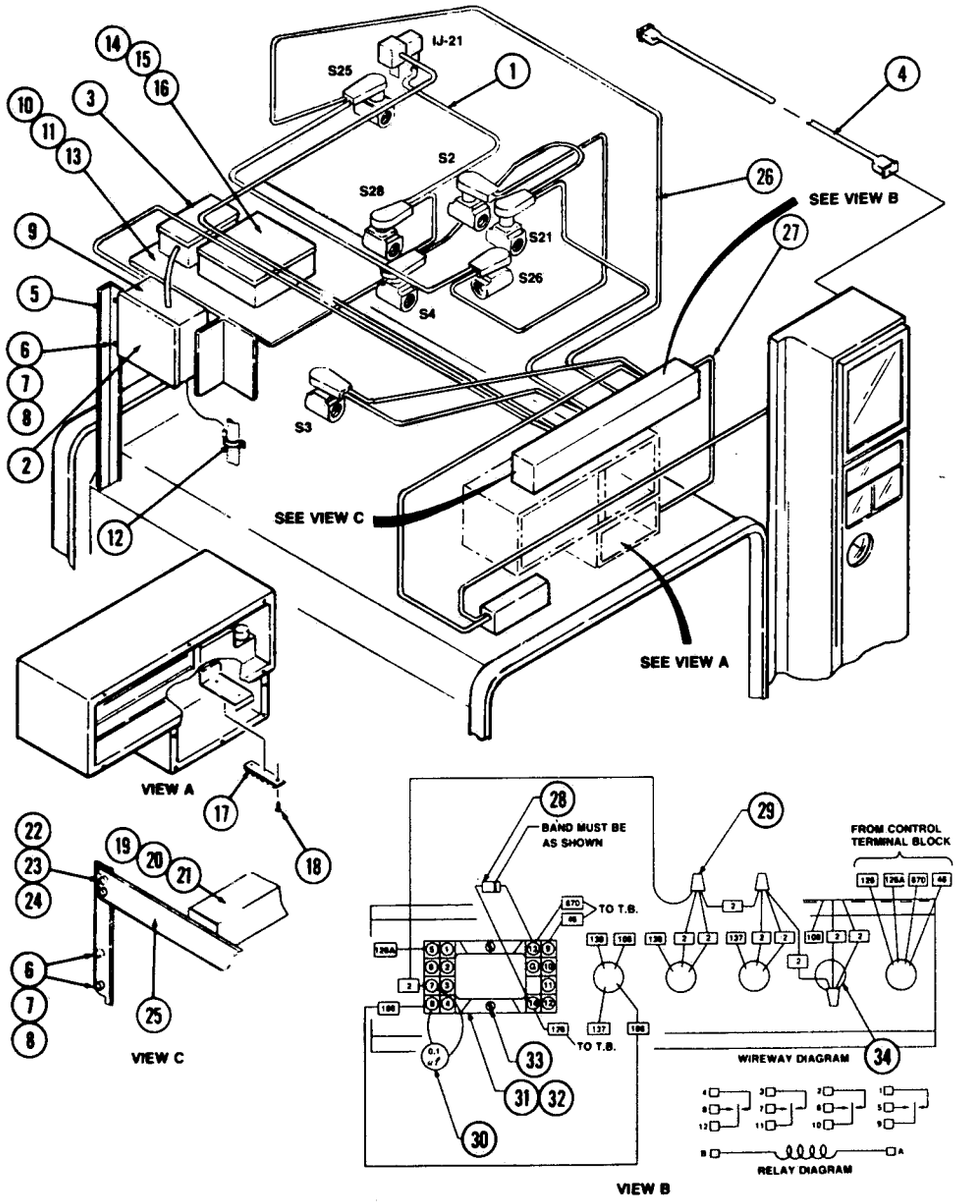


Figure 8-42. FINAL WIRING ASSEMBLY. (Units with Indicator-Recorder)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH INDICATOR-RECORDER:				
8-42-					FINAL WIRING, Single Door	X			
					FINAL WIRING, Double Door		X		
1	P	136747	001		CABLE, Solenoid (See Fig. 8-57)	1	1		
2	P	146607	001		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (See Fig. 8-19)	1			
	P	146607	002		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (See Fig. 8-19)		1		
3	P	93794	001		BOX, Terminal	1	1		
4	P	136805	026		HARNESS ASSEMBLY, Double Door Primary Panels (See Fig. 8-43)		1		
5	P	93801	001		ANGLE, Support, R.H.	1			
	P	93801	002		ANGLE, Support, L.H.	1			
6	P	3858	041		SCREW, Hex Head, 3/8-16 x 7/8	8	4		
7	P	25832	041		LOCKWASHER	8	4		
8	P	3099	042		NUT, Hex, 3/8-16	8	4		
9	P	146609	001		SUPPORT, Angle	1	1		
10	P	12574	061		SCREW, Round Head, #10-32 x 1/4 5/16	17	21		
11	P	31705	045		LOCKWASHER, #10	17	21		
12	P	454129	001		CLAMP, Ground	1	1		
13	P	136773	001		PLATE, Mounting	1	1		
14	P	93823	001		PANEL, Filter Mounting	1	1		
15	P	136758	001		ENCLOSURE, Filter	1	1		
16	P	93821	001		FILTER, Line	1	1		
17	P	89174	091		BLOCK Terminal	1	1		
18	P	12531	061		SCREW, Round Head, #6-32 x 3/8	2	2		
19	P	150822	033		PLATE, Closing	2	2		
20	P	150822	014		ANGLE, Mounting	2	2		
21	P	56396	009		WIREWAY	1	1		
22	P	3848	051		CAPSCREW,1/4-20 x 3/4	10	10		
23	P	3515	041		WASHER, Flat	10	10		
24	P	3097	041		NUT, 1/4-20	10	10		
25	P	93896	088		PLATE, Top Attachment	2	2		
26	P	56396	008		CABLE, Secondary Solenoid	1	1		
27	P	56396	007		CABLE ASSEMBLY	1	1		
28	P	84157	001		RECTIFIER	1	1		
29	P	17691	091		WIRE NUT	3	3		
30	P	150777	001		CAPACITOR	1	1		
31	P	80928	091		RELAY	1	1		
32	P	150768	001		SOCKET, Relay	1	1		
33	P	78881	045		SCREW, Round Head, #6-32 x 3/8	2	2		
34	P	24563	056		PLUG, Button	1	1		

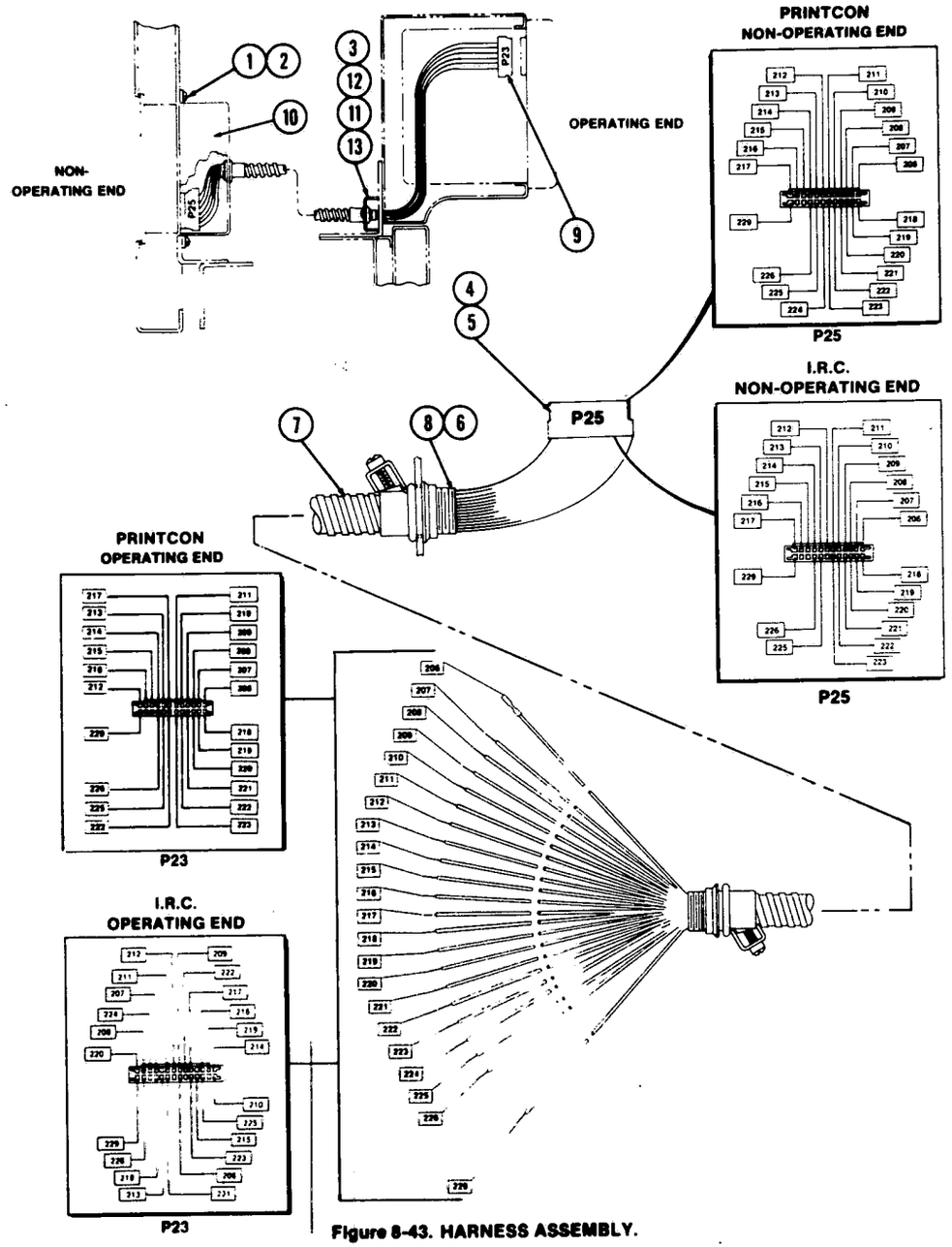


Figure 8-43. HARNESS ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-43- P	136805 026		HARNESS ASSEMBLY: Primary Panel, Double Door	X
1 P	12574 061		SCREW, Round Head, #10-32 x 5/16	4
2 P	31705 045		LOCKWASHER	4
3 P	129084 001		BOX, Adapter	1
4 P	84229 005		HOUSING, Receptacle, P-25	1
5 P	84187 003		CONTACT	44
6 P	150030 001		CONNECTOR, Straight, 1/2	2
7 P	51163 091		CONDUIT, Flexible, 1/2 x 41	1
8 P	150122 001		BUSHING, Anti-Short	2
9 P	84229 006		HOUSING, Receptacle, P-23	1
10 P	136798 001		ENCLOSURE	1
11 P	3985 041		SCREW, Round Head, #6-32 x 3/4	2
12 P	18131 091		LOCKWASHER, #6	2
13 P	24582 091		GROMMET	2

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-44-					OPTIONAL RACK AND TWO SHELVES. 16 x 16 Sterilizer	X			
					OPTIONAL RACK AND THREE SHELVES. 16 x 16 Sterilizer ...		X		
1	P	91291	062		TUBE. Rack Retaining	4	4		
2	P	8649	061		NUT. Hex Monel. 1/4-28	8	8		
3	P	139537	068		WELDMENT. Chamber Shelf	2	3		
4	P	136800	035		WELDMENT. Rack. R.H.	1	1		
5	P				Not Used				
6	P	136800	036		WELDMENT. Rack. L.H.	1	1		

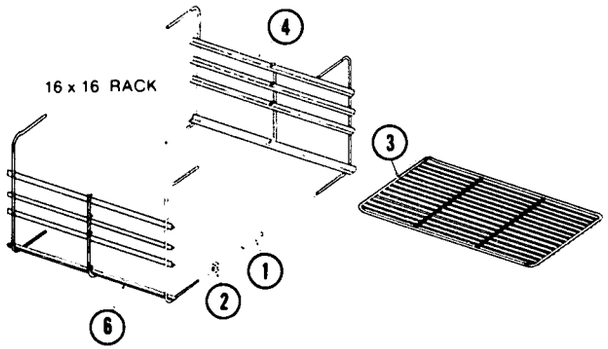


Figure 8-44.OPTIONAL RACK AND SHELVES.

(NOT USED)

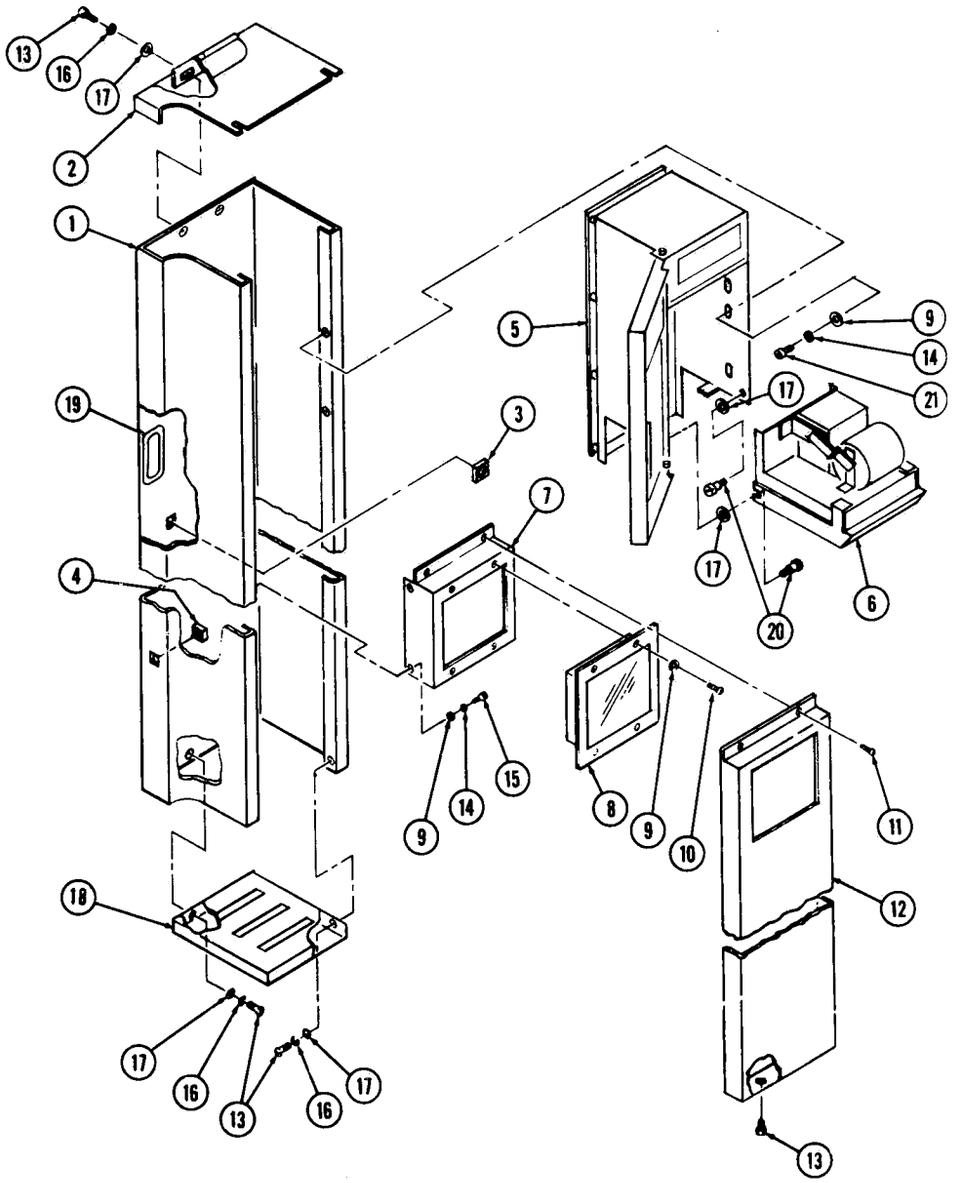


Figure 8-45. CONTROL COLUMN. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY	
			UNITS WITH PRINTCON:		
8-45-			CONTROL COLUMN, R.H.	X	
			CONTROL COLUMN, L.H.		X
1	P 146649 145		HOUSING, Control	1	
2	P 134449 001		COVER, Top, R.H.	1	
	P 134449 002		COVER, Top, L.H.		1
3	P 129352 070		NUT, Tinnerman, 3/8-16	4	4
4	P 91924 091		NUT, Tinnerman, 1/4-20	4	4
5			HOUSING ASSEMBLY, Printcon (See Fig. 8-46)	1	1
6			PRINTER ASSEMBLY, Printcon (See Fig. 8-47)	1	1
7	P 146649 132		PANEL, Mounting	1	1
8	P 146302 001		CONTROL, Primary (Repaired P-764193-016)	1	1
	P 755715 572		• PANEL AND REFLECTOR ASSEMBLY (Without P/C Board)	1	1
	P 764317 536		• LAMP (Box of 10)	A/R	
	P 93455 001		• DISPLAY, L.E.D.	1	1
9	P 17796 091		WASHER, Flat	14	14
10	P 78025 042		SCREW, Button Head, #8-32 x 7/8	4	4
11	P 129356 135		SCREW, Button Head, #8-32 x 3/8	2	2
12	P 146649 133		PANEL, Front	1	1
13	P 23431 041		SCREW, Socket Head Cap, #10-32 x 3/8	8	8
14	P 79588 001		LOCKWASHER, #8	10	10
15	P 50527 061		SCREW, Socket Head Cap, #8-32 x 1/2	4	4
16	P 31705 045		LOCKWASHER, #10	6	6
17	P 5511 091		WASHER, Flat, #10	8	8
18	P 136588 002		PLATE, Bottom	1	1
19	P 150783 001		GROMMET	1	1
20	P 129356 032		SCREW, Shoulder, #10-32	2	2
21	P 45323 042		SCREW, Button Head, #8-32 x 3/8	4	4

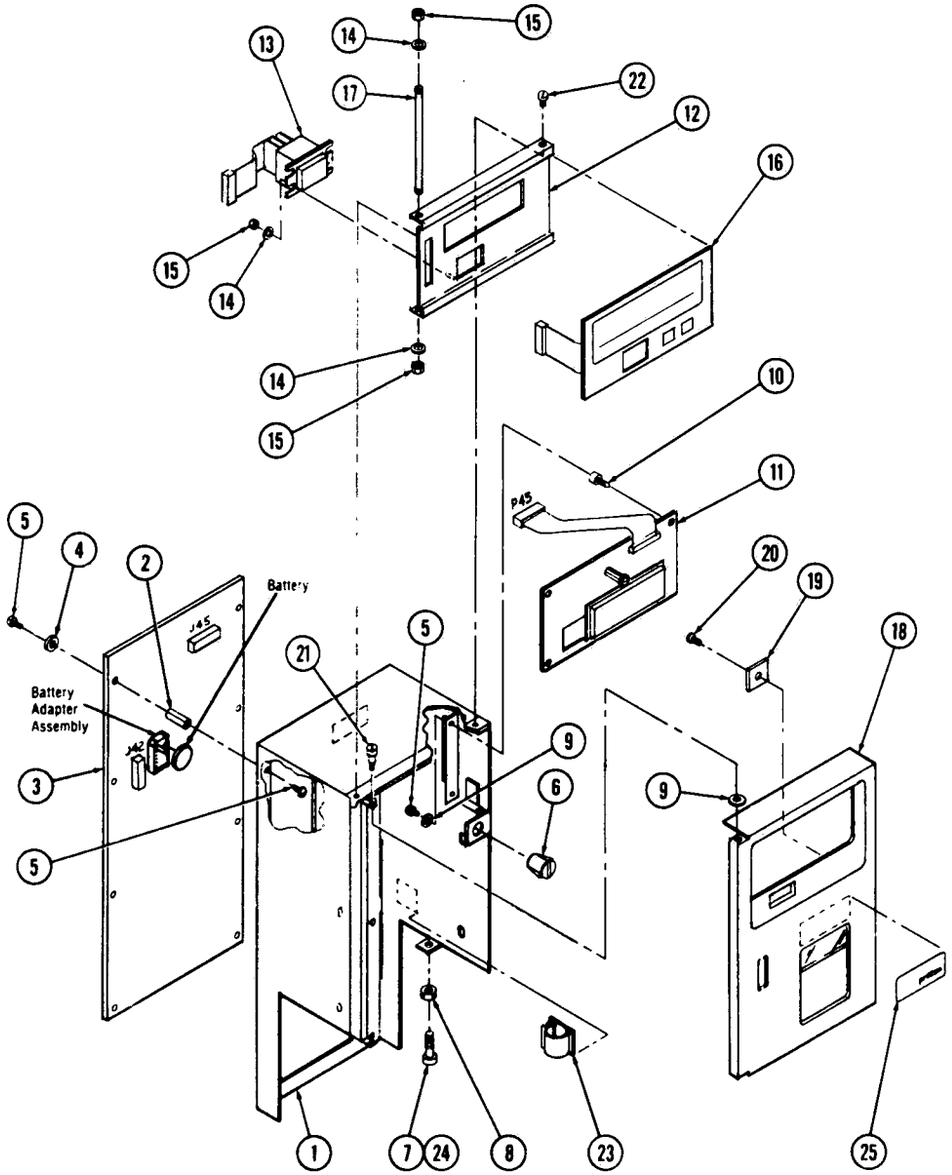


Figure 8-46. PRINTCON HOUSING ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-46-	P	146649	099		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 (Repaired P-764193-028)	1
	P	150822	351		• BATTERY, Coincell	1
	P	150822	349	•	BATTERY W/ADAPTER ASSEMBLY	AR
4	P	129352	094		WASHER, Flat, #6 Nylon	8
5	P	12451	041		SCREW, Rd. Hd., #6-32 x 1/4	19
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 (Repaired P-764193-029)	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	R	40357	045		SCREW, Self Tapping, #6 x 1/4	1
23	P	150539	001		CLIP, Cable	1
24	P	5300	640		NYLOC	AR
25	P	129356	142		LABEL, Printcon	1

• Units manufactured prior to 12/7/83 will require Battery with Adaptor Assembly P-150822-349 to replace old style Ray-O-Vac® DP-24.

Rev. 8/85

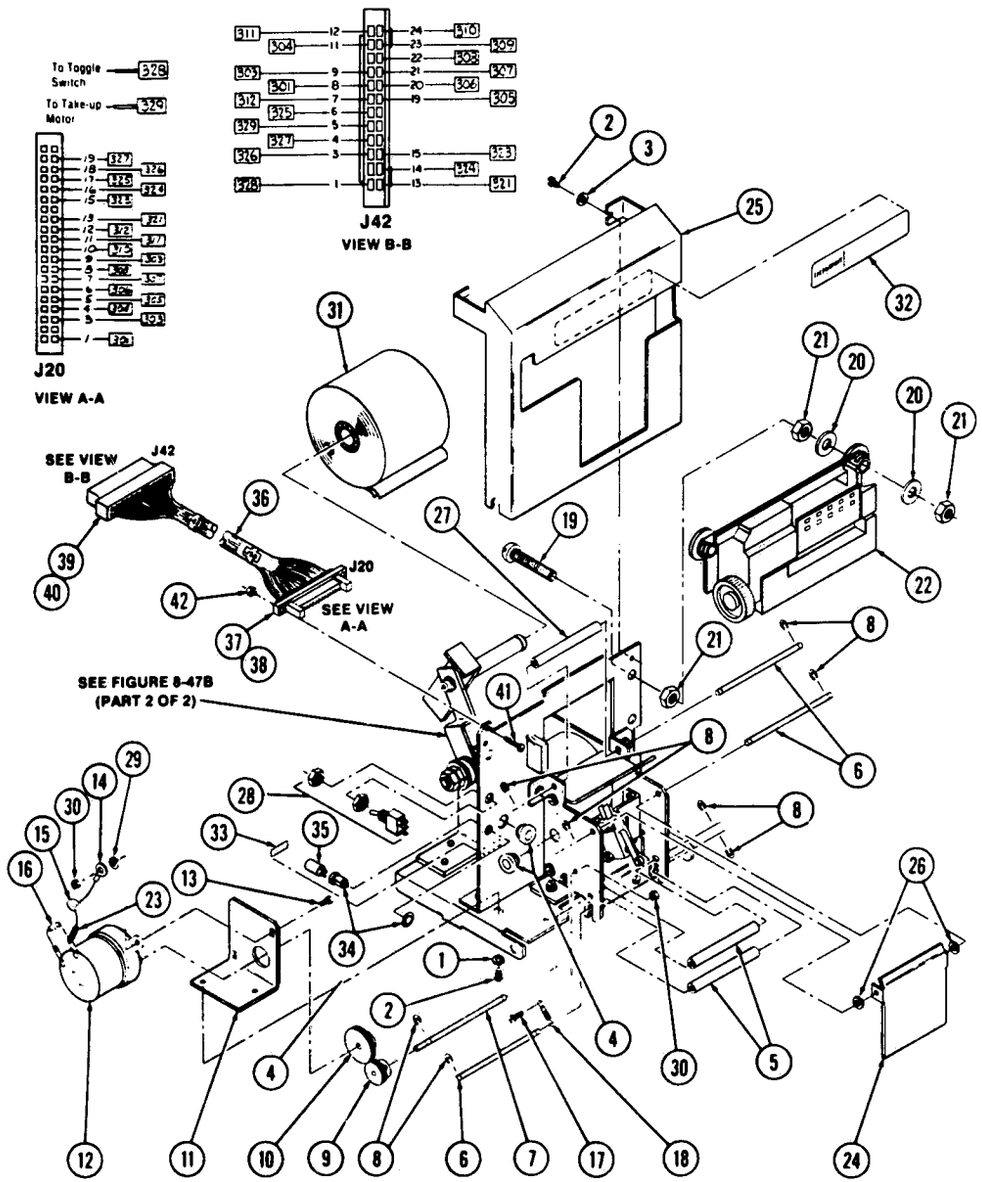


Figure 8-47. PRINTCON PRINTER ASSEMBLY (Part 1 of 2, Units Before 6/85).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-47-					PRINTCON PRINTER ASSEMBLY (Part 1 of 2, Units Before 6/85)	X
1	P	18131	091		LOCKWASHER, #6	2
2	P	12451	041		SCREW, Rd. Hd., #6-32 x 1/4	8
3	P	5469	091		WASHER, Flat, #6	2
4	P	77797	091		BUSHING, Snap	2
5	P	129356	015		ROLLER	2
6	P	129356	016		SHAFT, Roller	3
7	P	129356	024		SHAFT, Drive Roller	1
8	P	45301	091		E-RING	6
9	P	129356	028		GEAR, Drive Roller	1
10	P	129356	027		GEAR, Motor Shaft	1
11	P	129356	017		MOUNT, Motor	1
12	P	129356	029		MOTOR, Take-up	1
13	P	17659	041		SCREW, Round Head, #4-40 x 1/4	2
14	P	90619	091		TERMINAL, Ring, #5 Stud, 22-16 Wire	1
15	P	93437	001		CAPACITOR, .01 microfarad	2
16	P	84157	001		DIODE, IN 4001	1
17	P	13334	091		SCREW, Round Head, #4-40 x 3/8	2
18	P	129356	008		SPRING, Extension	2
19	P	4004	041		SCREW, Round Head, #1/4-20 x 1-1/2	3
20	P	31599	041		WASHER, Flat, 1/4	6
21	P	3040	042		NUT, Hex	9
22	P	136800	081		PRINTER	1
	P	129356	118		• CARTRIDGE, Inked Ribbon (Box of 2)	AR
23					INSULATION, .064 I.D. x 1-1/4 Lg.	2
24	P	129356	020		PLATEN	1
25	P	136805	009		COVER	1
26	P	129352	094		WASHER, Flat, #6 Nylon	2
27	P	129352	115		TUBE, Roller	1
28	P	129356	131		SWITCH, Toggle, SPDT	1
29	P	84114	001		WASHER, Flat, #4	2
30	P	13794	041		NUT, Hex, #4-40	4
31	P	129356	116	**	PAPER, 1-Ply (Box of 3)	AR
	P	129356	117	**	PAPER, 2-Ply (Box of 3)	AR
32	P	150822	345		DECAL, Information	1
33	P	92615	015		DECAL, 1/32 Amp	1
34	P	150822	382		HOLDER, Micro-fuse	1
35	P	150822	381		MICROFUSE, 1/32 Amp	1
36	P	136805	058		CABLE ASSEMBLY, Printer, J20 to J42	1
37	P	150822	364		• PIN, Contact	17
38	P	150822	335		• PLUG, Housing, 40 Pos. Double Row	1
39	P	84229	005		• HOUSING, Receptacle, 24 Pos. Double Row	1
40	P	84187	003		• CONTACT, Receptacle	19
41	P	150824	124		SCREW, Rd. Hd. 2-56 x 3/4" Lg.	2
42	P	10370	045		NUT, Hex. 2-56	2

**AMSCO recommends using 2-ply paper.

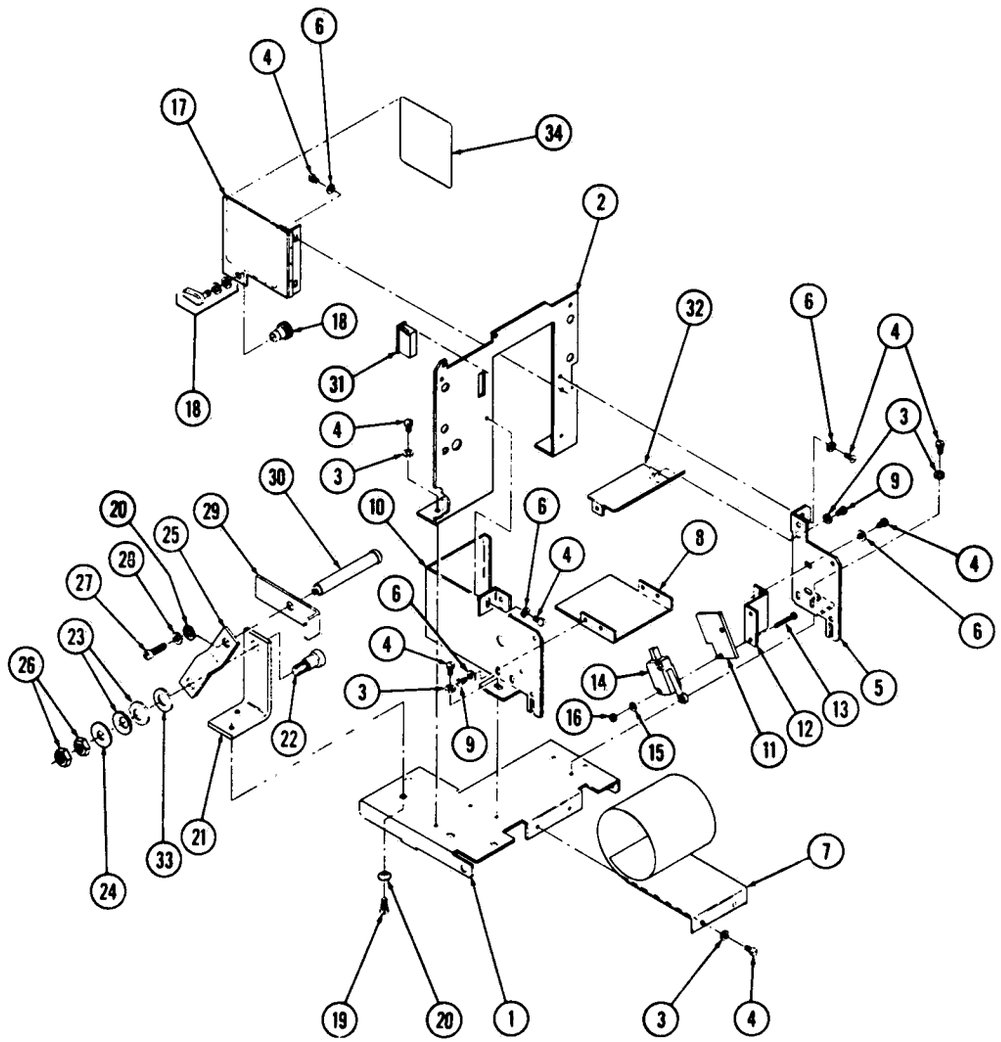


Figure 8-48. PRINTCON PRINTER ASSEMBLY (Part 2 of 2, Units Before 6/85).

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-48-				PRINTCON PRINTER ASSEMBLY (Part 2 of 2, Units Before 6/85)	X
1	P	136805 012		BASE, Mounting	1
2	P	136805 011		PLATE, Printer Mount	1
3	P	18131 09		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

AMSCO SERVICE

EAGLE® 2000 SERIES WASHER-STERILIZER P-764089-002

2/86

3 of 4

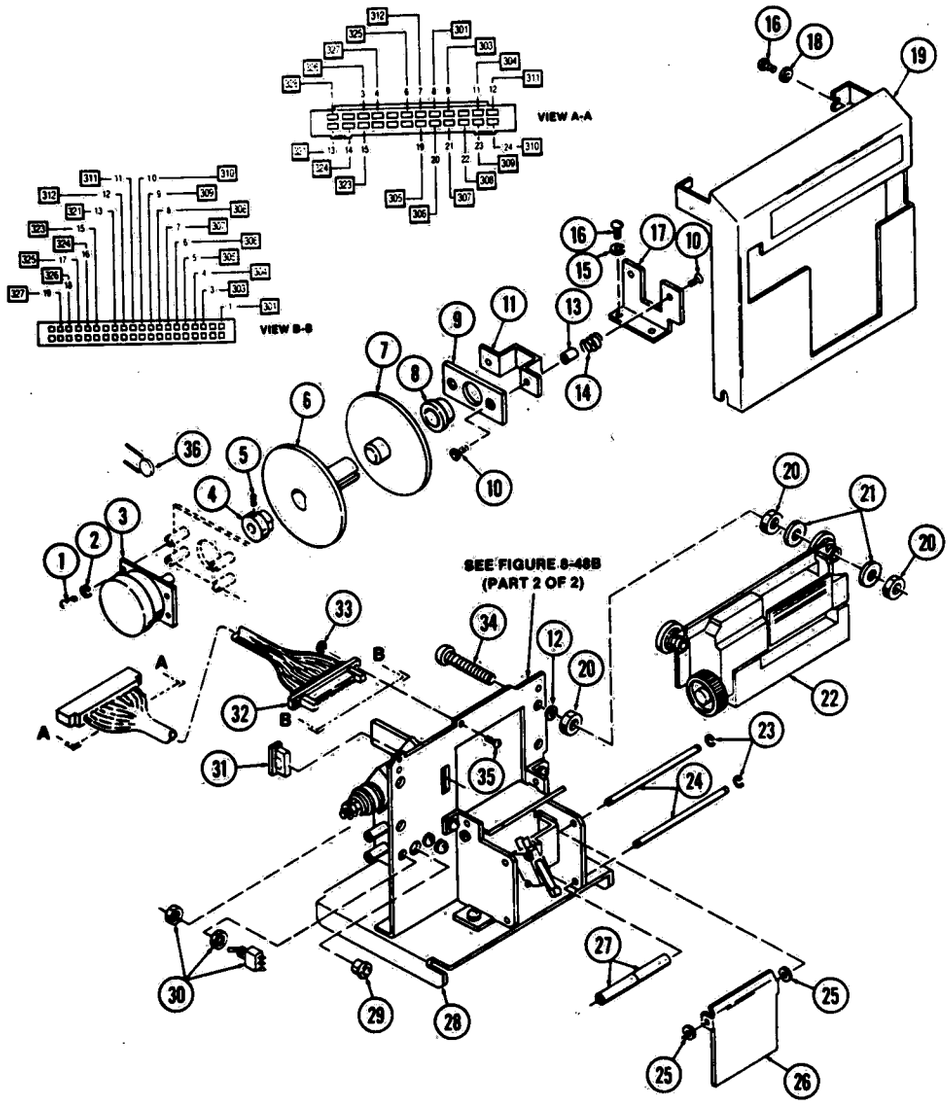


Figure 8-48A. PRINTCON PRINTER ASSEMBLY (Part 1 of 2, Units After 6/85).

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-48A-	P	141198	171		PRINTCON PRINTER ASSEMBLY (Part 1 of 2, Units After 6/85)	X
1	P	90993	091		SCREW, Round Head (#4-40 x 3/4)	4
2	P	81682	003		LOCKWASHER (#4)	4
3	P	41269	091		MOTOR	1
4	P	150822	480		STUD, Drive	1
5	P	129352	117		SCREW, Set (#5-40)	1
6	P	93896	077		SPOOL, Drive End	1
7	P	56396	300		SPOOL, Idler End	1
8	P	129352	662		BEARING, Flange	1
9	P	150822	543		RETAINER	1
10	P	38698	041		SCREW, Flat Head (#8-32 x 1/4)	4
11	P	150822	546		RELEASE, Reel	1
12	P	26962	061		LOCKWASHER	3
13	P	150822	541		SPACER	2
14	P	129352	659		SPRING	2
15	P	18131	091		LOCKWASHER	2
16	P	12451	041		SCREW, Round Head (#6-32 x 1/4)	6
17	P	150822	542		SUPPORT	1
18	P	5469	041		WASHER, Flat (#6)	4
19	P	134468	531		COVER	1
20	P	3040	042		NUT, Hex (1 4-20)	9
21	P	31599	041		WASHER, Flat (1/4)	6
22	P	136800	081		PRINTER	1
23	P	45301	091		E-RING	6
24	P	129356	016		SHAFT, Roller	3
25	P	129352	094		WASHER, Nylon (#6)	2
26	P	129356	020		PLATEN	1
27	P	129352	115		TUBE, Roller	4
28					FRAME ASSEMBLY, Printer (See Fig. 8-48B)	1
29	P	77797	091		BUSHING, Snap	2
30	P	129356	131		SWITCH, Toggle (SPDT)	1
31	P	150475	014		CATCH, Magnetic	1
32	P	134468	530		CABLE ASSEMBLY	1
33	P	10370	045		NUT, Hex (#2-56)	2
34	P	4004	041		SCREW, Round Head (1/4-20 x 1-1/2)	3
35	P	150824	124		SCREW, Round Head (#2-56 x 3/4)	2
36	P	150777	001		CAPACITOR, .01 ufd	1
	P	611962	769		KIT, To Add This Printer Assembly (Units Prior to 6/85)	

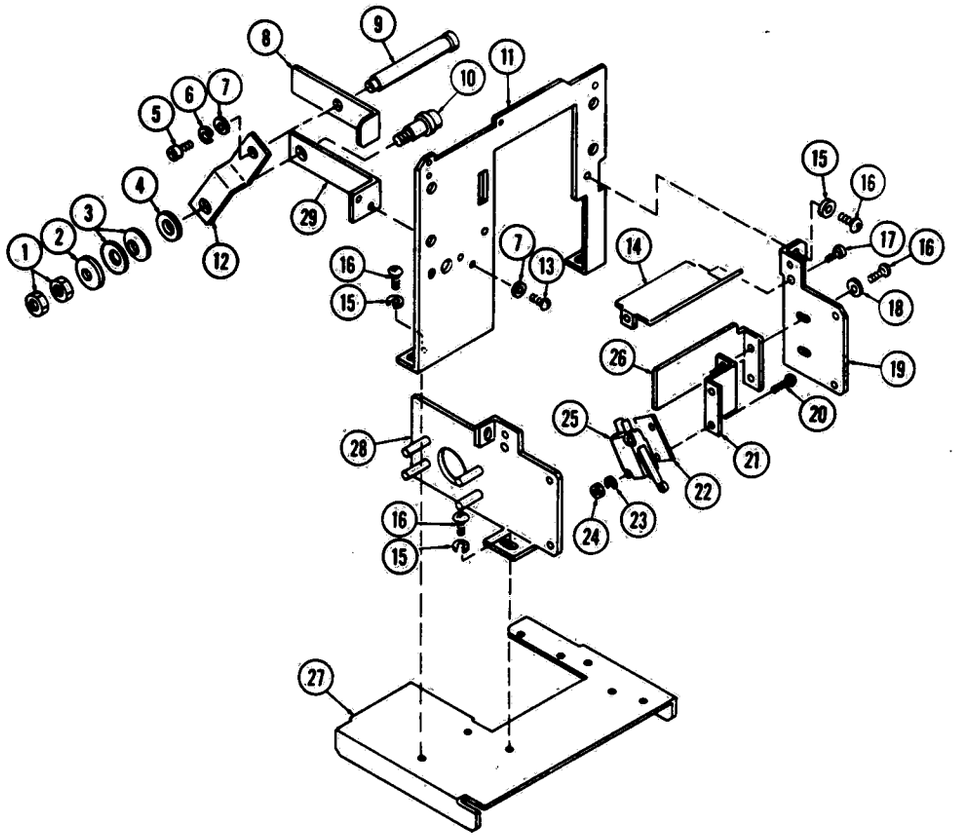


Figure 8-48B. PRINTCON PRINTER ASSEMBLY (Part 2 of 2, Units After 6/85).

FIG. & INDEX NO.		PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-48B-					PRINTCON PRINTER ASSEMBLY (Part 2 of 2, Units After 6/85)	X
1	P	19172	061		NUT, Jam (5/16-18)	2
2	P	36690	051		WASHER, Flat	1
3	P	129356	132		WASHER, Belleville	2
4	P	10412	042		WASHER, Flat	1
5	P	33061	061		SCREW, Socket Head (#10-32 x 5/8)	1
6	P	19685	061		LOCKWASHER (#10)	1
7	P	5511	091		WASHER, Flat (#10)	1
8	P	129356	110		STOP	1
9	P	611962	719		SPINDLE	1
10	P	150044	001		SCREW, Shoulder (5/16-18)	1
11	P	626973	997		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	617100	432		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	611962	722		SHIELD	1
27	P	626973	996		BASE, Printer	1
28	P	617100	433		SIDE, LH	1
29	P	617100	430		ANGLE, Pivot	1

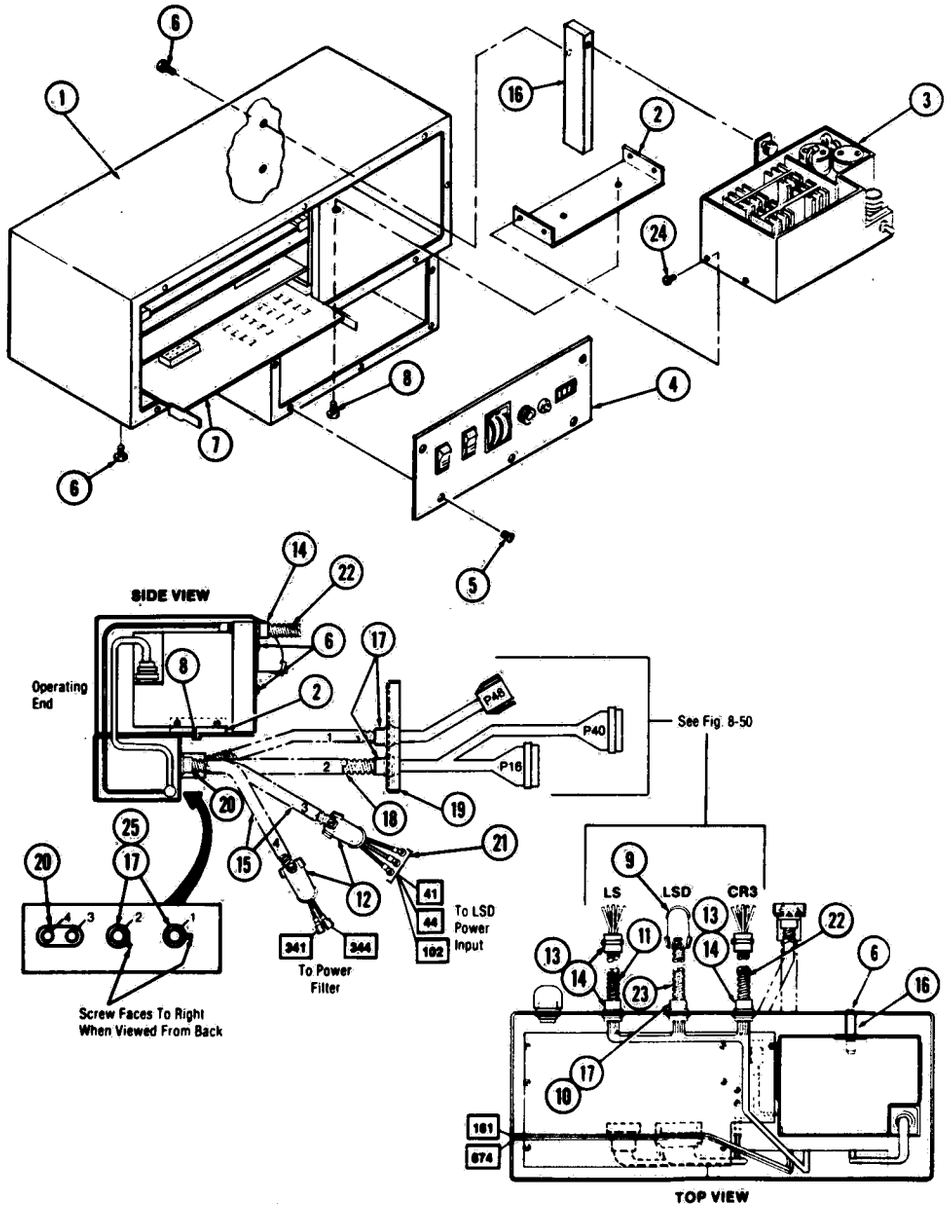


Figure 8-49. CONTROL ASSEMBLY (Part 1 of 2). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
			UNITS WITH PRINTCON:	
8-49-			CONTROL ASSEMBLY (Part 1 of 2)	X
1			HOUSING ASSEMBLY, Control	1
2	P 93900 050		BRACKET, Support	1
3	P 146645 042		POWER SUPPLY (Repaired P-764193-027)	1
	P 764317 833		• FUSE, 2 amp (F4) box of 5	1
	P 764317 834		• FUSE, 4 amp (F2) box of 5	1
	P 764317 836		• FUSE, 1/2 amp (F3) box of 5	1
	P 764317 449		• FUSE, 2 amp, Slo-Blo, (F402) box of 5	1
4	P 146649 156		PANEL, Secondary	1
5	P 50705 041		SCREW, Flat Head, #6-32 x 5/16	5
6	P 129062 001		SCREW, Hex Head, #10-32 x 1/2	6
7			MICRO PROCESSOR ASSEMBLY (See Fig. 8-15)	1
8	P 40357 045		SCREW, Self Tapping, #6-32 x 1/4	4
9	P 91060 091		CONNECTOR, Conduit, 1/2	2
10	P 150122 001		BUSHING, 1/2	6
11	P 91857 091		CONDUIT, Flexible, 3/8 x 20	1
12	P 90625 091		CONNECTOR, Conduit, 3/8	3
13	P 24748 091		BUSHING, 3/8	8
14	P 90331 091		CONNECTOR, Conduit, 3/8	3
15	P 89867 091		CONDUIT, Flexible, 3/8 x 24	2
16	P 129106 001		BAR, Support	1
17	P 150030 001		CONNECTOR, Conduit, 1/2	4
18	P 90903 091		CONDUIT, Flexible, 1/2 x 24	2
19	P 129084 001		BOX, Adapter	1
20	P 18000 091		CONNECTOR, Conduit, Double, 3/8	1
21	P 14591 091		TERMINAL, Ring, #8 x 20-24 AWG	3
22	P 89804 091		CONDUIT, Flexible, 3/8 x 10	1
23	P 80272 091		CONDUIT, Flexible, 1/2 x 20	1
24	P 78881 045		SCREW, Pan Hd., #6-32 x 1/2	2
25	P 8681 091		LOCKNUT	2

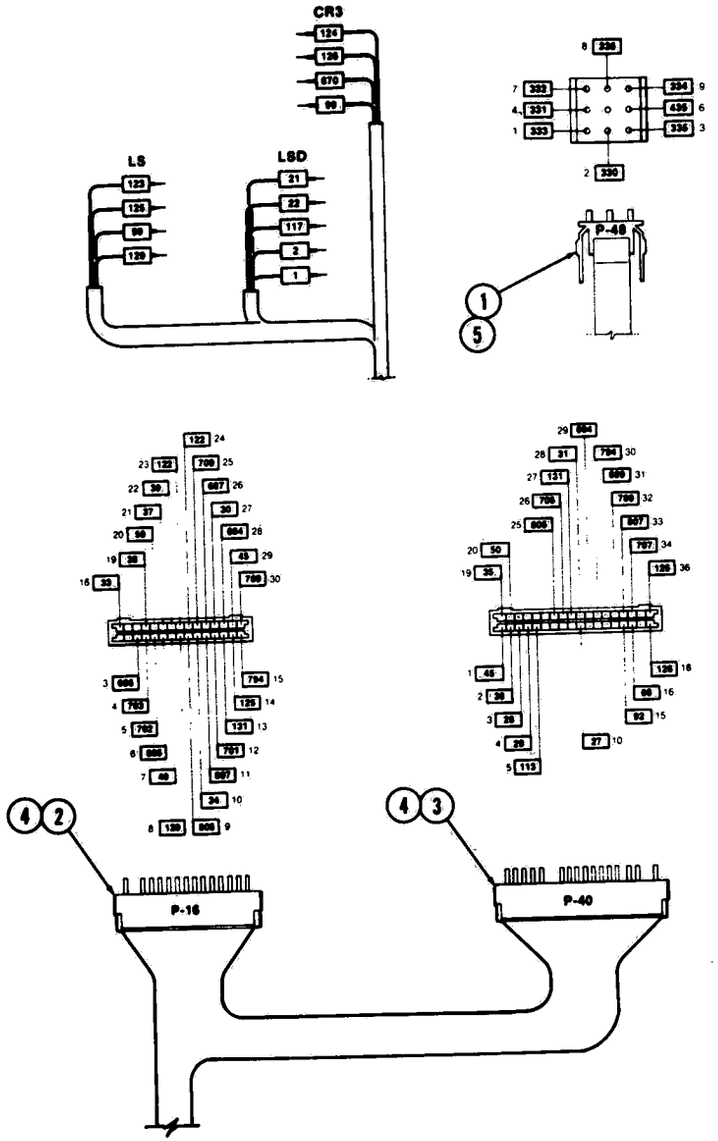
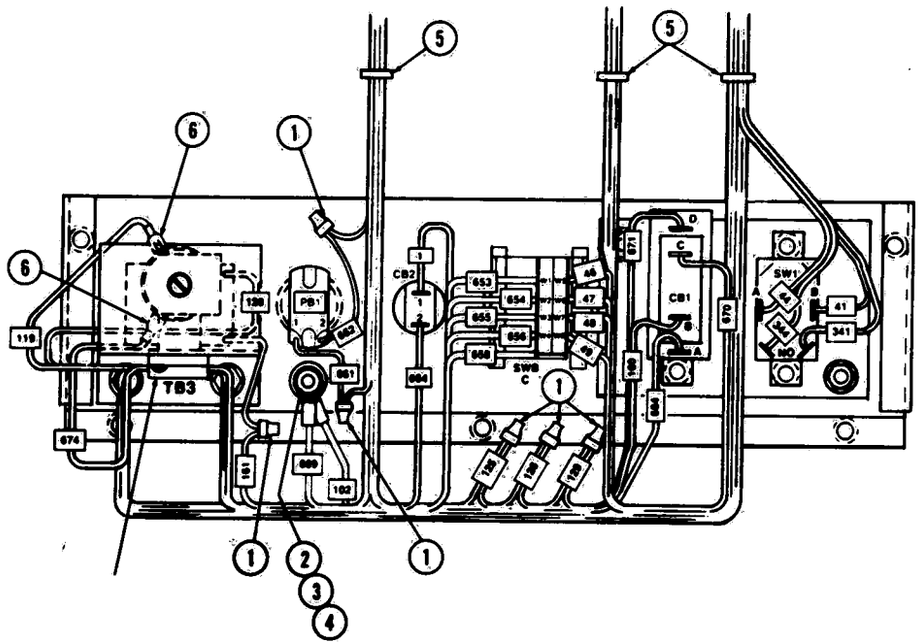


Figure 8-50. CONTROL ASSEMBLY (Part 2 of 2). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-50-					CONTROL ASSEMBLY (Part 2 of 2)	X
1	P	129352	121		HOUSING, Socket, P48	1
2	P	84229	001		HOUSING, Receptacle, P16	1
3	P	84229	002		HOUSING, Receptacle, P40	1
4	P	84187	002		CONTACT, #22-26 AWG, P16 & P40	48
5	P	84220	002		CONTACT, Socket	8



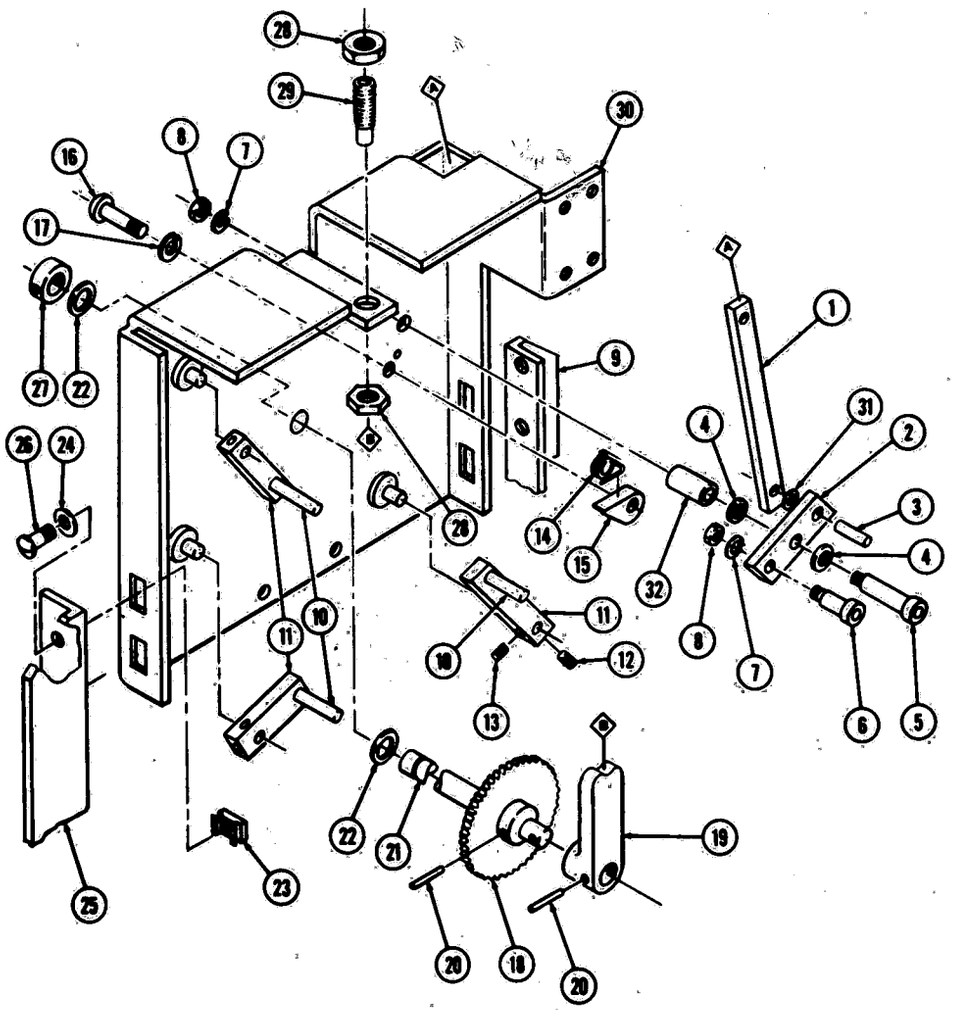
For Part 1 of 3, See Fig. 8-16

Figure 8-51. SECONDARY CONTROL PANEL (Part 2 of 3). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON:	
8-51-				PANEL ASSEMBLY, Secondary, Wiring (Part 2 of 3)	X
1	P 129352	049		CONNECTOR, Splice	6
2	P 5511	041		WASHER	1
3	P 18131	091		LOCKWASHER	1
4	P 3037	041		NUT, Hex, #6-32	1
5	P 84104	001		TIE, Cable (Use to Suit)	30
6	P 91694	091		TERMINAL, Quick Disconnect, 3/16 x .025 Lug, #18-22 AWG	2

FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON:	
8-51-				PANEL ASSEMBLY, Secondary, Wiring (Part 2 of 3)	X
1	P	129352 049		CONNECTOR, Splice	6
2	P	5511 041		WASHER	1
3	P	18131 091		LOCKWASHER	1
4	P	3037 041		NUT, Hex, #6-32	1
5	P	84104 001		TIE, Cable (Use to Suit)	30
6	P	91694 091		TERMINAL, Quick Disconnect, 3/16 x .025 Lug, #18-22 AWG	2

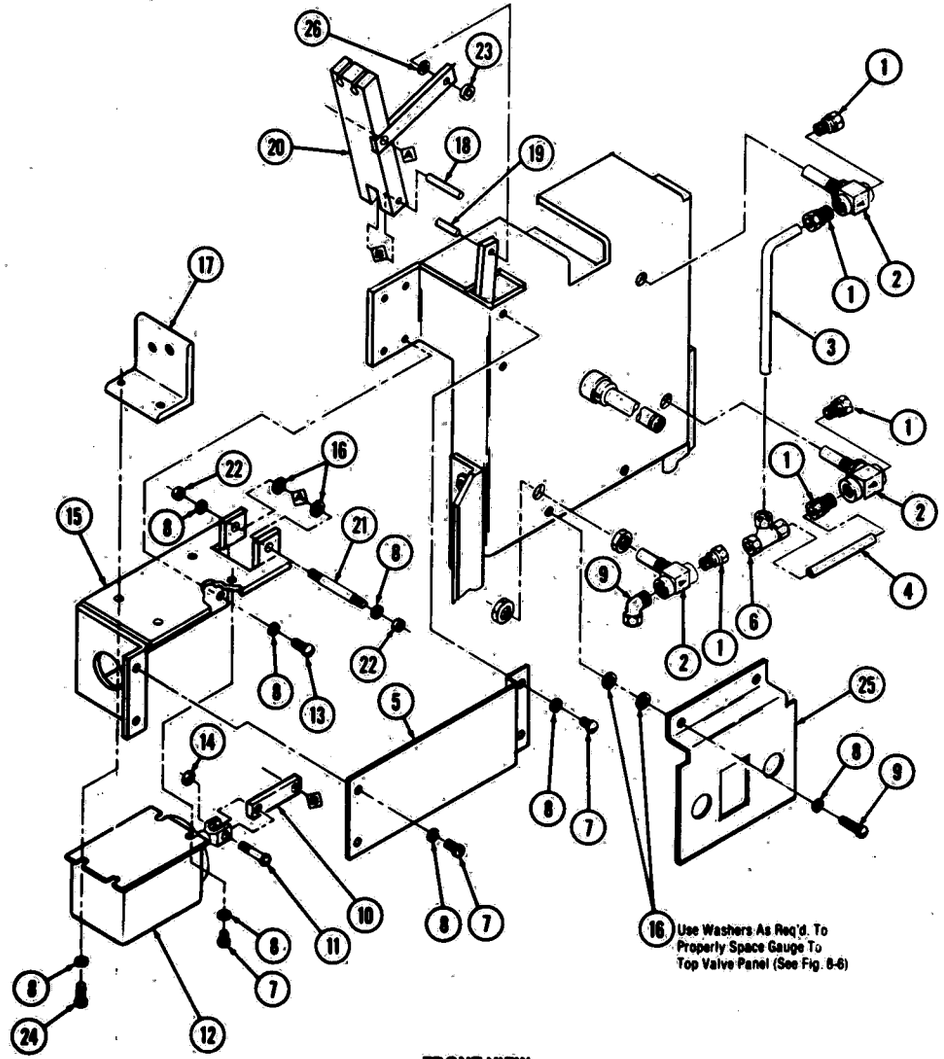
FIG. & INDEX NO.	PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY
				UNITS WITH PRINTCON:	
8-52-				SECONDARY CONTROL PANEL, Cable (Part 3 of 3)	X
1	P	14590 091		TERMINAL, Wire, #6 Ring, #14-16 AWG	1
2	P	90619 091		TERMINAL, Wire, #6 Ring, #18-22 AWG	16
3	P	84205 001		HOUSING, Pin, 28 Position, P3	1
4	P	84205 002		HOUSING, Pin, 38 Position, P4	1
5	P	93838 002		PLUG, 16 Position, P5	1
6	P	90695 091		RECEPTACLE, 1/4 Lug x #18-22 AWG	10
7	P	32119 091		RECEPTACLE, 1/4 Lug x #14-16 AWG	6
8	P	84192 001		JACKSCREW, Female	4
9	P	84207 002		CONTACT, Pin, P3 and P4	33
10	P	84198 004		SOCKET, Contact, #16-18 AWG, P2 and P5	16
11	P	84461 002		SOCKET, Contact, #20-24 AWG, P2	5
12	P	93829 001		BLOCK ASSEMBLY, P2	1
13	P	150822 003		MARKER, Tie	4
14	P	84220 002		CONTACT, Socket, P48	8
15	P	150822 043		PIN, Contact	2
16	P	431152 091		JUMPER	2
17	P	14591 091		TERMINAL, #8 Ring, #14-16 AWG (Not Shown)	2



REAR VIEW

Figure 8-53. MANUAL CONTROL ASSEMBLY: Door Lock (Part 1 of 2). (Units with Printcon)

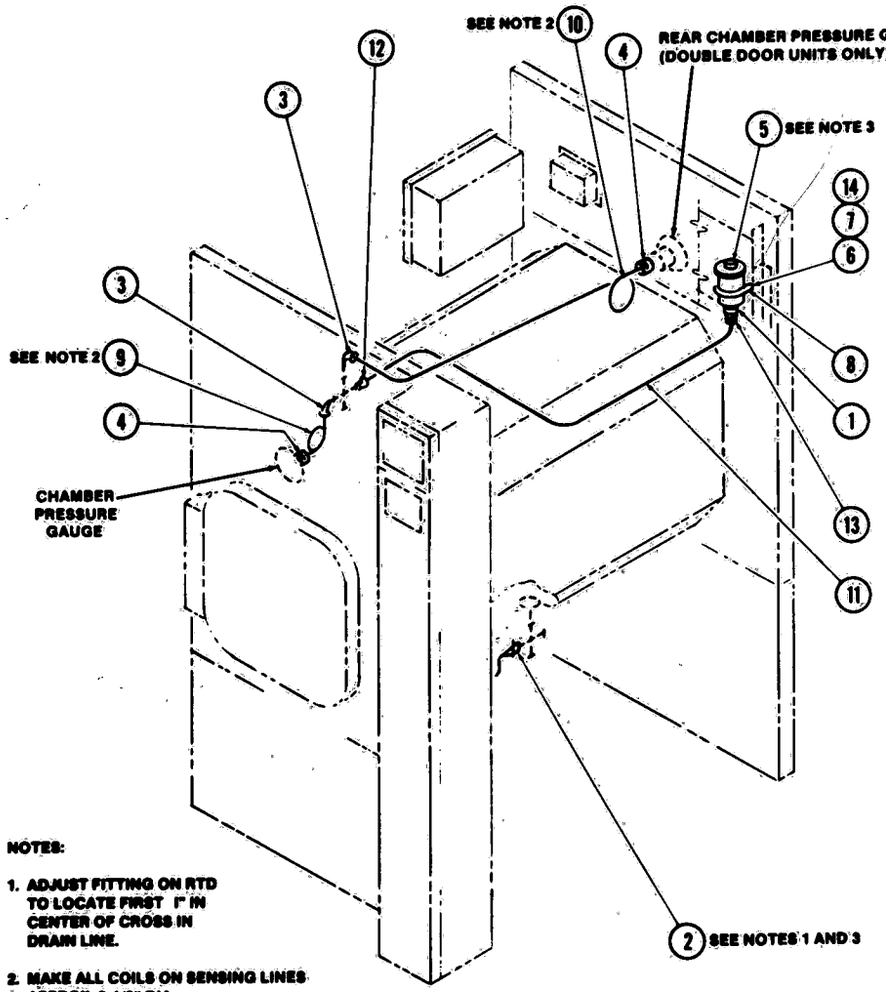
FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-53-	P	146649	160		MANUAL CONTROL ASSEMBLY, Door Lock (Part 1 of 2)	X
1	P	129104	001		ARM, Linkage	1
2	P	129105	001		LEVER, Door Unlock	1
3	P	43227	061		ROLLPIN, 1/8 x 5/8	1
4	P	31599	041		WASHER, Flat, 260 x 9/16 .040	2
5	P	129109	001		SCREW, Shoulder, #10-24 x 1-3/8	1
6	P	45739	091		SCREW, Shoulder, #10-24 x 3/4	1
7	P	31705	045		LOCKWASHER, #10	2
8	P	3039	041		NUT, Hex, #10-24	3
9	P	136745	001		LEG, Mounting, LH	1
10	P	38968	061		ROLLPIN, 1/4 x 1-1/2	3
11	P	129095	001		ARM, Solenoid	3
12	P	150822	095		SCREW, Set, #8-32 x 1/4	3
13	P	150822	094		SCREW, Set, #8-32 x 3/16	3
14	P	84288	001		SPRING	1
15	P	29892	045		PAWL	1
16	P	24315	061		BOLT, Shoulder, 1/4 x 3/8	1
17	P	76230	091		LOCKWASHER	1
18	P	93577	001		RATCHET	1
19	P	93802	001		ARM, Actuator	1
20	P	36565	061		ROLLPIN, 1/8 x 1	2
21	P	84285	001		SHAFT	1
22	P	34508	091		WASHER, Nylon	2
23	P	150822	093		NUT, Retained, #10-32	4
24	P	17589	045		WASHER, Flat, #10	4
25	P	136744	001		LEG, Mounting, RH	1
26	P	10347	042		SCREW, Round Head, #10-32 x 7/8	4
27	P	129125	001		RETAINER	1
28	P	33971	091		NUT, Hex, 1/2-13	2
29	P	129087	001		PIN, 1/2-13 x 1	1
30	P	136805	034		PLATE, Hub	1
31	P	5469	041		WASHER, Flat	1
32	P	129108	001		SPACER	1



FRONT VIEW

Figure 8-54. MANUAL CONTROL ASSEMBLY: Door Lock (Part 2 of 2). (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
					UNITS WITH PRINTCON:	
8-54-	P	146649	160		MANUAL CONTROL ASSEMBLY, Door Lock (Part 2 of 2)	X
1	P	34218	091		FITTING, Compression, 1/4 O.D. Tubing x 1/4 NPT	5
2	P	93799	001		VALVE, Quick Opening, 1/4 NPT	3
3	P	129081	001		TUBE, 1/4 O.D.	1
4	P	83877	001		TUBE, 1/4 O.D. x 2-13/16	1
5	P	93896	068		COVER, Solenoid	1
6	P	46097	091		TEE, Compression, 1/4 O.D. Tubing	1
7	P	12283	041		SCREW, Round Head, #10-32 x 1/4	6
8	P	31705	045		LOCKWASHER, #10	16
9	P	41306	091		ELL, Compression, 1/4 O.D. Tubing x 1/4 NPT	1
10	P	129101	001		ARM, Linkage	1
11	P	150822	047		SCREW, Round Head, 8-32 x 1-1/2	1
12	P	56396	014		SOLENOID, 60 Hz	1
	P	764320	463		KIT, Solenoid Replacement, 60 Hz (Units Prior to 9/84)	A/R
	P	56396	015		SOLENOID, 50 Hz	1
	P	764320	728		KIT, Solenoid Replacement, 50 Hz (Units Prior to 9/84)	A/R
13	P	9374	041		SCREW, Round Head, #10-32 x 3/8	4
14	P	150277	001		NUT, Hex, #8-32, Self Lock	1
15	P	136739	001		BRACKET, Solenoid	1
16	P	5511	091		WASHER, Flat	6
17	P	129112	001		BRACKET, Cable	1
18	P	43308	061		PIN, Roll, 1/8 x 3/4 Lg.	1
19	P	36683	061		PIN, Roll, 1/8 x 1/2	1
20	P	93798	001		BELLCRANK	1
21	P	129210	001		STUD, #10-32 x 1-3/4	1
22	P	2960	042		NUT, Hex, #10-32	2
23	P	129325	001		RETAINER	1
24	P	9661	041		SCREW, Round Head, #10-32 x 5/8	4
25	P	93900	043		BRACKET, Gauge	1
26	P	5469	041		WASHER, Flat	1



NOTES:

1. ADJUST FITTING ON RTD TO LOCATE FIRST 1" IN CENTER OF CROSS IN DRAIN LINE.
2. MAKE ALL COILS ON SENSING LINES APPROX. 2-1/2" DIA.
3. FOR WIRING CONNECTIONS SEE FIG. 8-57.

Figure 8-55. SENSING LINE PACKAGE. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-55-					**UNITS WITH PRINTCON:**				
	P	93900	016		SENSING LINE PACKAGE, Single Door Units	X			
	P	93900	017		SENSING LINE PACKAGE, Double Door Units		X		
1	P	45589	091		COUPLING, 1/4 NPT	1	1		
2	P	56396	211		TEMP. RTD	1	1		
3	P	26181	091		FITTING, Ell, 1/8 N.P.T. x 1/8 O.D.T.	1	2		
4	P	90594	091		COUPLING, COMP., 1/8 N.P.T. x 1/8 O.D.T.	1	2		
5	P	56396	215		TRANSDUCER, Pressure	1	1		
6	P	31399	041		WASHER, 1/4 I.D.	2	2		
7	P	3097	041		NUT, Hex, 1/4-20	2	2		
8	P	129356	145		U-BOLT, 1/4-20	1	1		
9					TUBE, 1/8 O.D.T. x 12"	1			
10					TUBE, 1/8 O.D.T. x 48"		1		
11					TUBE, 3/16 O.D.T. x 54"	1	1		
12	P	42564	091		CONNECTOR, 3/16 O.D.T. x 1/8 N.P.T.	1	1		
13	P	41291	091		CONNECTOR, 3/16 O.D.T. x 1/4 N.P.T.	1	1		

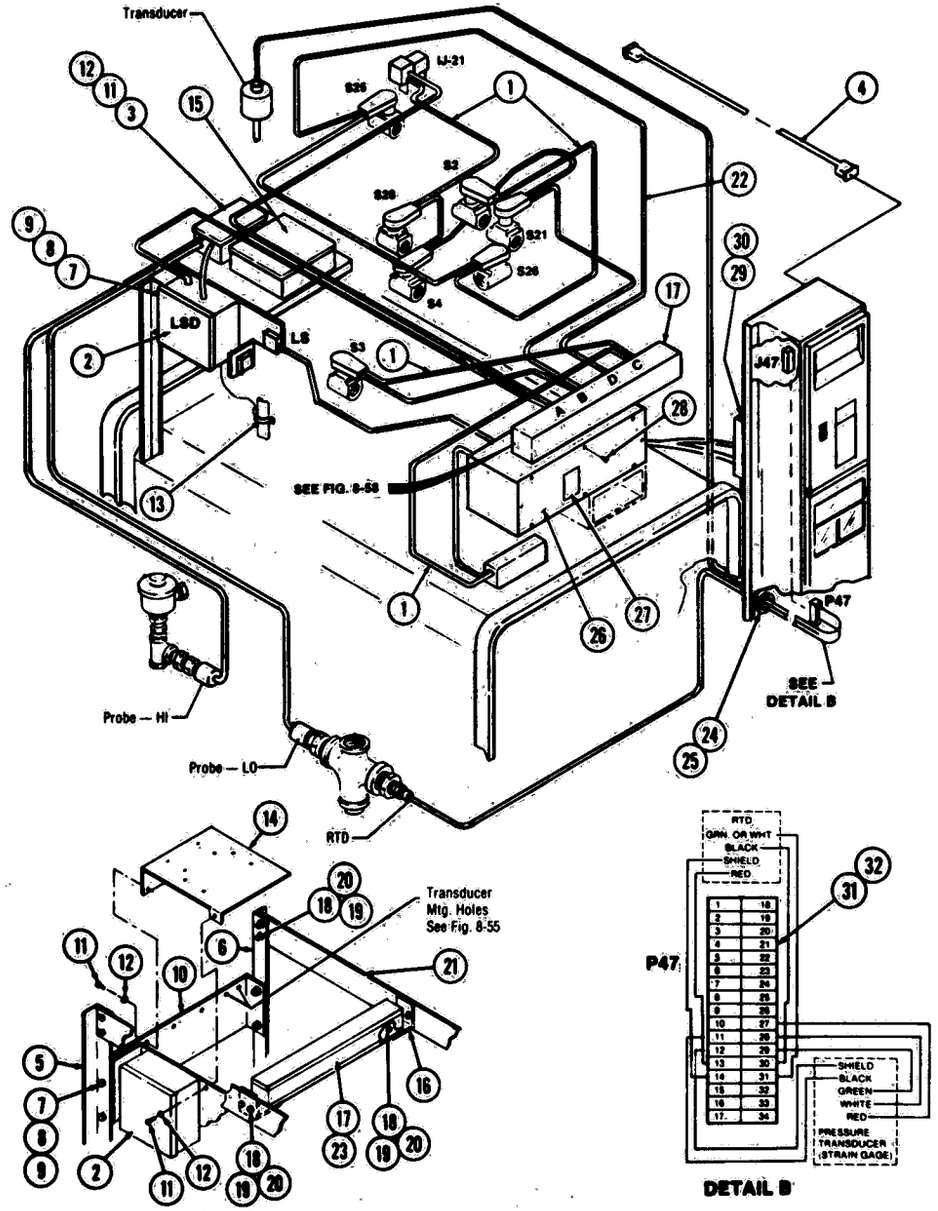


Figure 8-56. FINAL WIRING ASSEMBLY. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY			
					UNITS WITH PRINTCON:				
8-56-					FINAL WIRING, Single Door	X			
					FINAL WIRING, Double Door		X		
1	P	136747	001		CABLE, Solenoid (See Fig. 8-57)	1	1		
2	P	146649	150		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (See Fig. 8-19)	1			
	P	146649	151		LIQUID SENSING AND DOOR SWITCH ASSEMBLY (See Fig. 8-19)		1		
3	P	93794	001		BOX, Terminal (See Fig. 8-20)	1	1		
4	P	136805	026		HARNESS ASSEMBLY, Dbl. Door Primary Panels (See Fig. 8-59)		1		
5	P	93801	001		ANGLE, Support, R.H.	1			
6	P	93801	002		ANGLE, Support, L.H.	1			
7	P	3858	041		SCREW, Hex Head, 3/8-16 x 7/8	8	4		
8	P	25832	041		LOCKWASHER	8	4		
9	P	3099	042		NUT, Hex, 3/8-16	8	4		
10	P	136805	053		SUPPORT, Angle	1	1		
11	P	12574	061		SCREW, Round Head, #10-32 x 1/4 x 5/16	17	21		
12	P	31705	045		LOCKWASHER, #10	17	21		
13	P	454129	001		CLAMP, Ground	1	1		
14	P	136773	001		PLATE, Mounting	1	1		
15	P	136758	001		ENCLOSURE, Filter (See Fig. 8-58)	1	1		
16	P	150822	014		ANGLE, Mounting	2	2		
17	P	56396	009		WIREWAY (See Fig. 8-57 & 8-58)	1	1		
18	P	81667	015		CAPSCREW, 1/4-20 x 3/4	14	14		
19	P	3515	041		WASHER, Flat	10	10		
20	P	3097	041		NUT, 1/4-20	10	10		
21	P	93896	088		PLATE, Top Attachment	2	2		
22	P	56396	008		CABLE, Secondary Solenoid (See Fig. 8-58)	1	1		
23	P	150822	033		PLATE, Closing	2	2		
24	P	23358	091		WASHER, Conduit Reducer, 3/4 x 1/2	2	2		
25	P	80523	091		CONNECTOR, Cord Grip, 3/8	1	1		
26	P	146613	001		COVER, Control	1	1		
27	P	150369	001		DECAL, Caution	1	1		
28	P	50705	041		SCREW, Flat Head, #6-32 x 5/16	8	8		
29	P	3985	041		SCREW, Round Head, #6-32 x 3/4	2	2		
30	P	18131	091		LOCKWASHER, #6	2	2		
31	P	93900	026		HOUSING, Receptacle	1	1		
32	P	84187	002		CONTACT, Receptacle	9	9		

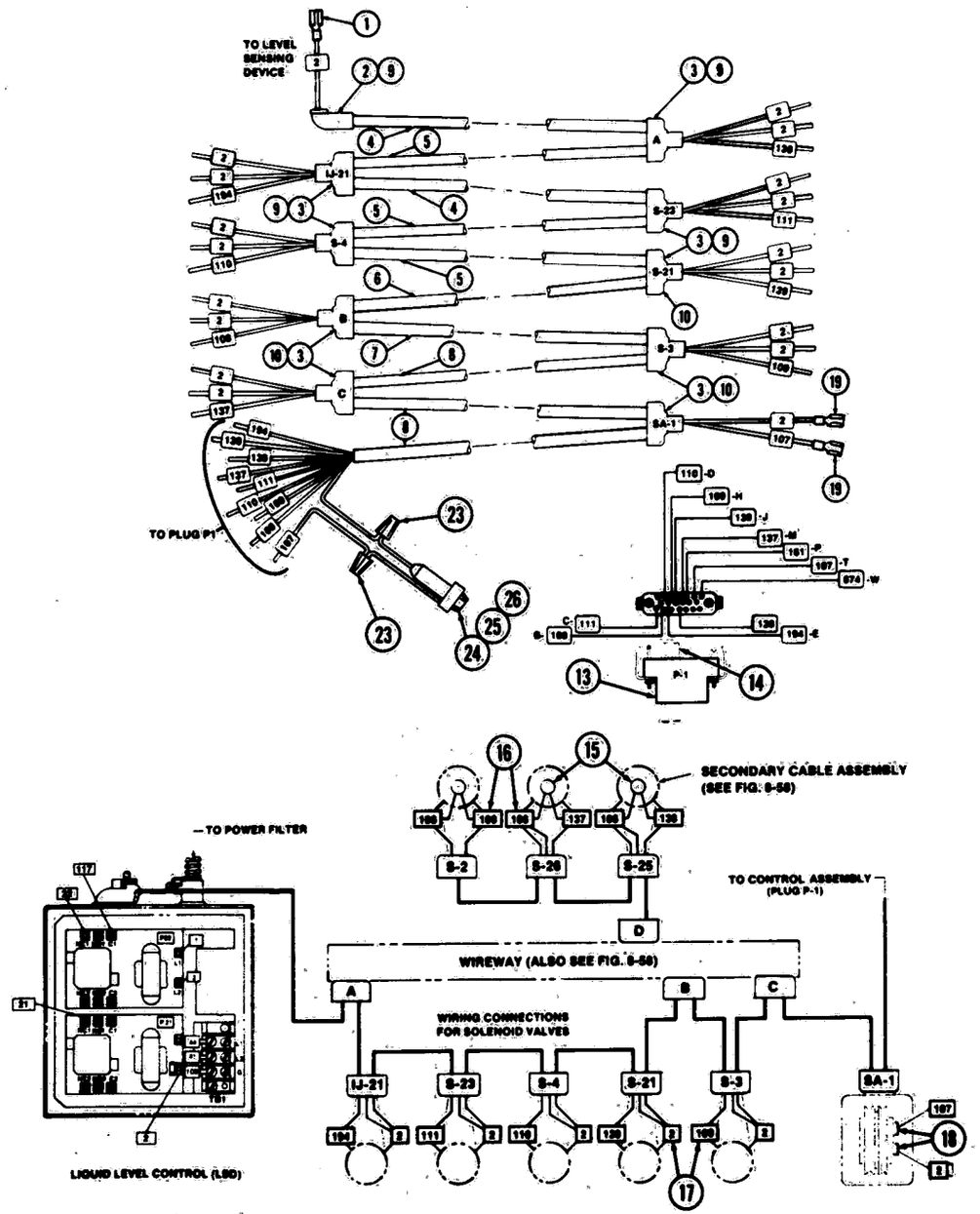


Figure 8-57. CABLE ASSEMBLY: Solenoid Valves.

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-57-	P	136747	001		CABLE ASSEMBLY: Solenoid Valves	X
1	P	90695	091		TERMINAL, Lug, 1/4 Lug x #18-22 Wire	1
2	P	90625	091		CONNECTOR, Ell, 3/8	1
3	P	18000	091		CONNECTOR, Double, 3/8	9
4	P	79360	091		CONDUIT, Flexible, 3/8 x 15	2
5	P	91857	091		CONDUIT, Flexible, 3/8 x 20	3
6	P	78067	091		CONDUIT, Flexible, 1/2 x 16	1
7	P	90761	091		CONDUIT, Flexible, 1/2 x 26	1
8	P	90903	091		CONDUIT, Flexible, 1/2 x 24	3
9	P	24748	091		BUSHING	10
10	P	150122	001		BUSHING	9
11	P	129131	001		TERMINAL, Lug, .205 Lug x #18-22 Wire	2
12	P	18538	091		WIRENUT	16
13	P	93829	001		BLOCK, P-1	1
14	P	84352	001		PIN, Contact	11
15	P	150778	001		VARISTOR	3
16	P	17691	091		SPLICE, Connector	6
17	P	18538	091		SPLICE, Connector	16
18					TUBING, Hy Shrink, 1/4 O.D. x 3/4 L., No. 9100	2
19	P	91694	091		TERMINAL, Lug	2
20	P	3984	041		SCREW, #6-32 x 3/8	2
21	P	90756	091		BLOCK, Terminal (TB2)	1
22	P	150415	001		RESISTOR	2
23	P	18538	091		NUT, Wire	2
24	P	150822	386		HOLDER, In-line Fuse	1
25	P	150822	385		FUSE, 1.6 Amp	1
26	P	150822	387		DECAL, 1.6 Amp Fuse	1

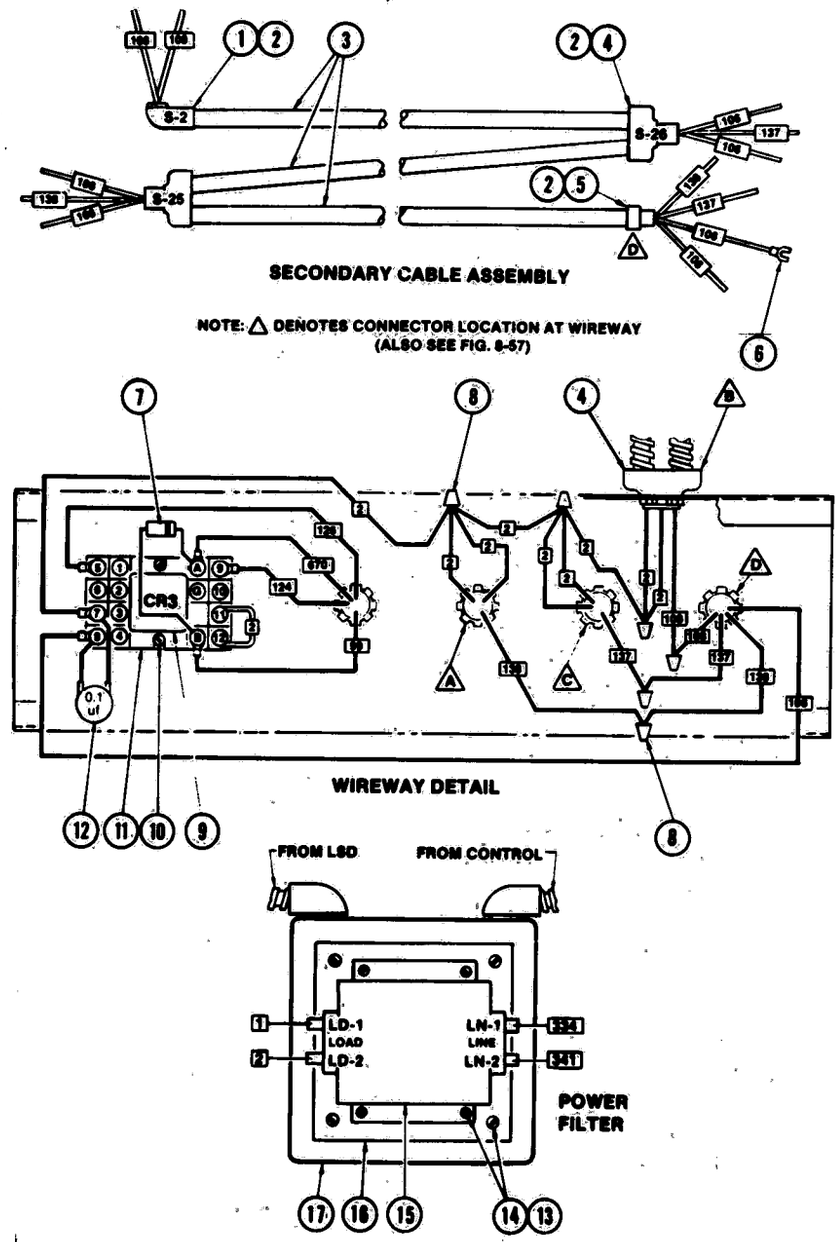


Figure 8-58. SECONDARY CABLE ASSEMBLY AND DETAILS. (Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-58-					**UNITS WITH PRINTCON:**	
					SECONDARY SOLENOID CABLE ASSEMBLY	X
1	P	90625	091		CONNECTOR, Ell	1
2	P	24748	091		BUSHING	6
3	P	79360	091		CONDUIT, Flex. 3/8 x 15 Lg.	3
4	P	18000	091		CONNECTOR, Double, 3/8	3
5	P	90331	091		CONNECTOR, Str.	1
6	P	118177	091		TERMINAL	1
					WIREWAY DETAIL	X
7	P	84157	001		RECTIFIER	1
8	P	150808	001		SPLICE, Connector	2
9	P	80928	091		RELAY	1
10	P	7881	045		SCREW, 6-32 x 1/2	2
11	P	150768	001		SOCKET, Relay	1
12	P	150777	001		CAPACITOR, 0.1 mfd	1
					POWER FILTER	X
13	P	12574	061		SCREW, Rd. Hd., 10-32 x 5/16	8
14	P	31705	045		LOCKWASHER	8
15	P	93821	001		FILTER, Line	1
16	P	93823	001		PANEL, Filter Mtg.	1
17	P	136758	001		ENCLOSURE, Filter	1

AMSCO SERVICE

EAGLE® 2000 SERIES WASHER-STERILIZER P-764089-002