

AMSCO Maintenance Manual



Eagle Series

**EAGLE*2000 AND 2300 SERIES
SMALL STERILIZERS**

Vacumatic™

(5/88)

P-764084-001

Eagle Series

TABLE OF CONTENTS

Section	Paragraph	Title	Page	Grid
1		GENERAL INFORMATION	1-1	1-A-12
	1.1	APPLICATION AND DESIGN	1-1	1-A-12
2		OPERATING INSTRUCTIONS (IRC)	2-1	1-C-10
	2.1	GENERAL	2-1	1-C-10
	2.2	BEFORE OPERATING THE EQUIPMENT	2-1	1-C-10
	2.3	AUTOMATIC OPERATION: PREVACUUM CYCLE (WRAPPED AND UNWRAPPED GOODS)	2-3	1-C-12
	2.4	AUTOMATIC OPERATION: GRAVITY CYCLE	2-3	1-C-12
		TABLE 2-1. MINIMUM STERILIZATION EXPOSURE PERIOD — WRAPPED AND UNWRAPPED GOODS, GRAVITY CYCLE ONLY	2-4	1-C-13
	2.5	AUTOMATIC OPERATION: LIQUIDS CYCLE	2-5	1-C-14
		TABLE 2-2. MINIMUM RECOMMENDED EXPOSURE TIMES FOR FULL LOAD OF SQUARE-PAK® FLASKED SOLUTIONS		
		250 F (121 C) TEMPERATURE SETTING	2-5	1-C-14
	2.6	MANUAL OPERATION: GRAVITY (WRAPPED OR UNWRAPPED GOODS) OR LIQUIDS CYCLE	2-6	1-D-1
	2.7	CONTROL MONITORING AND COMMUNICATION SYSTEMS	2-7	1-D-2
	2.8	CONTROLS AND SIGNALS FOR DOUBLE-DOOR STERILIZERS	2-9	1-D-4
		OPERATING INSTRUCTIONS (PRINTCON)	2-10	1-D-5
	2.9	BEFORE OPERATING THE EQUIPMENT (PRINTCON)	2-10	1-D-5
	2.10	AUTOMATIC OPERATION: (PRINTCON) PREVACUUM CYCLE (WRAPPED AND UNWRAPPED GOODS)	2-10	1-D-5
	2.11	AUTOMATIC OPERATION: GRAVITY CYCLE (PRINTCON)	2-12	1-D-7
	2.12	AUTOMATIC OPERATION: LIQUIDS CYCLE (PRINTCON)	2-13	1-D-8
	2.13	MANUAL OPERATION: GRAVITY (WRAPPED OR UNWRAPPED GOODS) OR LIQUIDS CYCLE (PRINTCON)	2-15	1-D-10
	2.14	CONTROL MONITORING AND COMMUNICATION SYSTEMS (PRINTCON)	2-15	1-D-10
	2.15	CONTROL AND SIGNALS FOR DOUBLE DOOR STERILIZERS	2-15	1-D-10
3		PRINCIPLES OF OPERATION (IRC)	3-1	1-D-12
	3.1	GENERAL	3-1	1-D-12
	3.2	THEORETICAL PRINCIPLES OF OPERATION: MECHANICAL	3-1	1-D-12
	3.3	CONTROLS	3-3	1-D-14
	3.4	CYCLE DESCRIPTIONS	3-4	1-E-1
	3.5	FUNCTIONAL DESCRIPTIONS OF THE EAGLE MICROCOMPUTER CONTROLLER	3-7	1-E-4
		PRINCIPLES OF OPERATION (PRINTCON)	3-12	1-E-9
	3.6	GENERAL (PRINTCON)	3-12	1-E-9
	3.7	FUNCTIONAL DESCRIPTION OF THE PRINTCON MICROCOMPUTER CONTROLLER	3-15	1-E-12
4		INSPECTION AND MAINTENANCE	4-1	1-F-12
	4.1	GENERAL	4-1	1-F-12
	4.2	ROUTINE INSPECTION	4-1	1-F-12
	4.3	PREVENTIVE MAINTENANCE	4-1	1-F-12
	4.4	PRINTCON MAINTENANCE FREQUENCY CHART	4-2	1-F-13
	4.5	CLEANING	4-2	1-F-13
	4.6	PREVENTIVE MAINTENANCE GUIDE	4-4	1-G-1

TABLE OF CONTENTS (Continued)

Section	Paragraph	Title	Page	Grid
5		FIELD TEST PROCEDURE (IRC)	5-1	1-G-4
	5.1	GENERAL	5-1	1-G-4
	5.2	TEST INSTRUMENTATION REQUIRED	5-1	1-G-4
	5.3	CHECK FOR PROPER INSTALLATION	5-1	1-G-4
		TABLE 5-1. STERILIZER CONNECTIONS	5-1	1-G-4
	5.4	ADJUSTMENT OF COOLING WATER VALVES AND SLOW EXHAUST VALVE	5-2	1-G-5
	5.5	INSTALLATION OF POTENTIOMETER LEADS	5-2	1-G-5
	5.6	INSTALLATION OF PRESSURE GAUGES	5-2	1-G-5
	5.7	DOOR SWITCH ADJUSTMENT	5-3	1-G-6
	5.8	SAFETY VALVE TEST	5-3	1-G-6
	5.9	ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES	5-4	1-G-7
	5.10	CHAMBER VACUUM LEAK TEST	5-5	1-G-8
	5.10A	EJECTOR VACUUM TEST	5-6	1-G-9
	5.11	OPERATIONAL CHECKS	5-8	1-G-11
		TABLE 5-2. LIQUID CYCLE	5-8	1-G-11
		TABLE 5-3. GRAVITY CYCLE	5-9	1-G-12
		TABLE 5-4. PREVACUUM CYCLE	5-10	1-G-13
		TABLE 5-5. MANUAL OPERATION (OPTIONAL)	5-11	1-G-14
		FIELD TEST PROCEDURE (PRINTCON)	5-10	2-A-1
	5.12	PROCEDURE	5-10	2-A-1
6		TROUBLESHOOTING	6-1	2-A-4
	6.1	HELPFUL HINTS	6-1	2-A-4
	6.2	HOW TO USE THE CYCLE GRAPHS	6-2	2-A-5
	6.3	THE TROUBLESHOOTING CHART — EXPLANATION OF ITS CONTENTS	6-6	2-A-9
		TABLE 6-1. TROUBLESHOOTING CHART (IRC)	6-6	2-A-9
		TABLE 6-2. TROUBLESHOOTING CHART (PRINTCON)	6-20	2-B-13
		TABLE 6-3. STRAIN GAUGE PRESSURE TRANSDUCER RESPONSE	6-40	2-D-5
	6.4	TIMER DISPLAY CHECKOUT AND CORRECTION CHARTS	6-41	2-D-6
		TABLE 6-4. TEST PATTERNS — STERILIZE AND DRY TIMER DISPLAY	6-41	2-D-6
		TABLE 6-5. CONTINUITY CHECK — STERILIZE AND DRY TIME SWITCHES	6-42	2-D-7
	6.5	TEMPERATURE THUMBWHEEL CHECKOUT	6-43	2-D-8
		TABLE 6-6. SWITCH CHECKOUT CHART	6-43	2-D-8
		TABLE 6-7. COMMONS	6-43	2-D-8
		TABLE 6-8. SCHEMATIC REFERENCE LIST	6-44	2-D-9
7		COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT	7-1	3-A-10
	7.1	GENERAL	7-1	3-A-10
	7.2	INDICATOR-RECORDER-CONTROLLER	7-1	3-A-10
	7.3	CHAMBER DOOR ASSEMBLY	7-2	3-A-11
	7.4	AIR FILTER ASSEMBLY	7-5	3-A-14
	7.5	SOLENOID VALVES	7-5	3-A-14
	7.6	STEAM TRAP	7-6	3-B-1
	7.7	STRAINERS	7-7	3-B-2
	7.8	CHECK VALVES	7-7	3-B-2

TABLE OF CONTENTS (Continued)

Section	Paragraph	Title	Page	Grid
	7.9	VACUUM BREAKER	7-7	3-B-2
	7.10	STEAM CONTROL VALVE, HI-LO	7-7	3-B-2
	7.11	VALVE ASSEMBLY, ANGLE	7-8	3-B-3
	7.12	CONTROL COLUMN	7-9	3-B-4
	7.13	DOOR SWITCH	7-11	3-B-6
		TABLE 7-1: TORQUE REQUIREMENTS	7-11	3-B-6
	7.14	ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES	7-11	3-B-6
	7.15	ADJUSTMENT FOR STERILIZATION BELOW 250 F (121 C)	7-13	3-B-8
	7.16	ADJUSTMENT PROCEDURE FOR POWER SUPPLY (IRC)	7-14	3-B-9
	7.17	PRINTCON PRINTER	7-15	3-C-3
	7.18	PRINTCON DIGITAL DISPLAY	7-22	3-C-3
	7.19	MAIN PRINTCON PC BOARD	7-24	3-C-5
		TABLE 7-2: SERVICE SWITCH OPTION SETTINGS	7-25	3-C-6
	7.20	PRINTCON PRESSURE TRANSDUCER REPLACEMENT	7-26	3-C-7
	7.21	PRINTCON TEMPERATURE PROBE (RTD) REPLACEMENT	7-26	3-C-7
	7.22	REPLACEMENT OF PRINTCON POWER SUPPLY FUSES	7-26	3-C-7
	7.23	PRINTCON FIELD CALIBRATION	7-27	3-C-8
	7.24	PRINTCON POWER SUPPLY ADJUSTMENT	7-28	3-C-9
8		EXPLODED VIEWS AND PARTS LIST	8-1	3-C-10
9		EAGLE® 2300 SERIES SCIENTIFIC UNITS	9-1	4-E-1
	9.1	GENERAL	9-1	4-E-1
	9.2	GENERAL INFORMATION	9-1	4-E-1
	9.3	OPERATING INSTRUCTIONS	9-1	4-E-1
	9.4	PRINCIPLES OF OPERATION	9-10	4-E-11
	9.5	INSPECTION AND MAINTENANCE	9-10	4-E-11
	9.6	FIELD TEST PROCEDURE	9-10	4-E-11
	9.7	TROUBLESHOOTING	9-13	4-E-14
	9.8	COMPONENT REPAIR, REPLACEMENT AND ADJUSTMENT	9-14	4-F-1
	9.9	EXPLODED VIEWS AND PARTS LIST	9-15	4-F-2

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LIST OF ILLUSTRATIONS

Figure	Title	Page	Grid
2-1	CHANGING THE CHART	2-1	1-C-10
2-2	CONTROL LOCATIONS, OPERATING END	2-2	1-C-11
2-3	MONITORS AND ALARMS	2-8	1-D-3
2-4	NON-OPERATING END PRIMARY CONTROL PANEL	2-9	1-D-4
2-5	CONTROL LOCATIONS, OPERATING END (Printcon)	2-11	1-D-6
2-6	PRINTCON MESSAGES	2-15	1-D-10
3-1	PIPING DIAGRAM: Vacumatic Sterilizer	3-2	1-D-13
3-2	EAGLE 5-VOLT POWER SUPPLY	3-7	1-E-4
3-3	EAGLE 28-VOLT POWER SUPPLY	3-8	1-E-5
3-4	CPU PRINTED CIRCUIT BOARD 146586	3-9	1-E-6
3-5	I/O #1 PRINTED CIRCUIT BOARD 146588	3-11	1-E-8
3-6	CONTROL COMPARISON	3-12	1-E-9
3-7	TYPICAL SWITCH INPUT	3-13	1-E-10
3-8	PRINTCON REGULATED POWER SUPPLY	3-14	1-E-11
3-9	PRINTCON 5-VOLT POWER SUPPLY	3-15	1-E-12
3-10	PRINTCON 12-VOLT POWER SUPPLY	3-16	1-E-13
3-11	PRINTCON -12 VOLT POWER SUPPLY	3-17	1-E-14
3-12	PRINTCON 18-VOLT POWER SUPPLY	3-17	1-E-14
3-13	PRINTCON 28-VOLT POWER SUPPLY	3-18	1-F-1
3-14	PRINTCON BLOCK DIAGRAM: Main Printcon PC Board	3-20	1-F-3
3-15	TEMPERATURE PROBE SCHEMATIC	3-21	1-F-6
3-16	TEMPERATURE VS. RESISTANCE CHARACTERISTICS	3-21	1-F-6
3-17	PRESSURE TRANSDUCER SCHEMATIC	3-21	1-F-6
3-18	PRESSURE VS. TRANSDUCER OUTPUT CHARACTERISTICS	3-21	1-F-6
3-19	DIGITAL DISPLAY BLOCK DIAGRAM	3-22	1-F-7
3-20	PRINTED CYCLE RECORD: Liquid Cycle	3-24	1-F-9
3-21	PRINTED CYCLE RECORD: Prevacuum Cycle	3-25	1-F-10
3-22	PRINTED CYCLE RECORD: Gravity Cycle	3-26	1-F-11
4-1	LOCATION OF CHAMBER DRAIN STRAINER	4-2	1-F-13
4-2	LUBRICATING CHAMBER DOOR	4-2	1-F-13
4-3	LOCATION OF STEAM TRAPS AND SAFETY VALVES	4-3	1-F-14
5-1	LEVELING THE STERILIZER	5-1	1-G-4
5-2	ADJUSTMENT OF COOLING WATER VALVES AND SLOW EXHAUST VALVE	5-2	1-G-5
5-3	GAUGE INSTALLATION	5-2	1-G-5
5-4	LOCKING DOOR TO CORRECT TORQUE	5-3	1-G-6
5-5	DOOR SWITCH ADJUSTMENT	5-3	1-G-6
5-6	ADJUSTING PRESSURE REGULATOR	5-4	1-G-7
5-7	ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES	5-5	1-G-8
5-8	VACUUM LEAK TEST PIPING	5-6	1-G-9
5-9	EJECTOR VACUUM TEST GAUGE INSTALLATION	5-6	1-G-9
5-10	EJECTOR VACUUM TEST PIPING	5-7	1-G-10
6-1	CYCLE GRAPH: PREVACUUM CYCLE	6-2	2-A-5
6-2	CYCLE GRAPH: GRAVITY CYCLE	6-3	2-A-6
6-3	CYCLE GRAPH: LIQUIDS CYCLE	6-4	2-A-7
6-4	CIRCUIT BOARD WITH LEDs	6-5	2-A-8
6-5	TEMPERATURE THUMBWHEEL SWITCHES: Wiring	6-43	2-D-8

LIST OF ILLUSTRATIONS (Continued)

Figure	Title	Page	Grid
7-1	REPLACING THE RECORDER	7-2	3-A-11
7-2	DIRECT-ACTING SOLENOID VALVE	7-5	3-A-14
7-3	INTERNAL PILOT-OPERATED SOLENOID VALVE	7-6	3-B-1
7-3A	PISTON TYPE SOLENOID VALVE	7-6	3-B-1
7-4	HI-LO VALVE ADJUSTMENT	7-8	3-B-3
7-5	CONTROL CONSOLE	7-9	3-B-4
7-6	LAMP REPLACEMENT	7-9	3-B-4
7-7	CLIP AND REMOVE R-24	7-9	3-B-4
7-8	REMOVING A PRINTED CIRCUIT BOARD	7-10	3-B-5
7-9	SETTING THE SW2 PULSE SWITCH	7-10	3-B-5
7-10	LOCATION OF SOLENOID VALVES	7-12	3-B-7
7-11	ADJUSTING PRESSURE REGULATOR	7-13	3-B-8
7-12	PRESSURE REGULATOR SETTINGS	7-14	3-B-9
7-13	POWER SUPPLY (IRC)	7-14	3-B-9
7-14	PRINTER IN LOWERED POSITION (Units Before 6/85)	7-15	3-B-10
7-15	SPINDLE IN RAISED POSITION (Units Before 6/85)	7-15	3-B-10
7-16	INSERTING PAPER (Units Before 6/85)	7-15	3-B-10
7-17	INSERTING PAPER INTO AUTOMATIC PAPER STORAGE AREA	7-15	3-B-10
7-17A	FOLD PAPER TAPE (Units After 6/85)	7-16	3-B-11
7-18	CREASING PAPER TAPE (Units Before 6/85)	7-16	3-B-11
7-19	OPENING STORAGE AREA (Units Before 6/85)	7-16	3-B-11
7-20	REMOVING STORED DAILY RECORD (Units Before 6/85)	7-17	3-B-12
7-20A	REMOVING STORED RECORD (Units After 6/85)	7-17	3-B-12
7-21	REMOVING INKED RIBBON CARTRIDGE	7-17	3-B-12
7-22	SWITCH AND MOTOR SCHEMATIC (Units Before 6/85)	7-18	3-B-13
7-22A	SWITCH AND MOTOR SCHEMATIC (Units After 6/85)	7-18	3-B-13
7-23	PRINTCON PRINTER ASSEMBLY (Units Before 6/85)	7-19	3-B-14
7-23A	PRINTCON PRINTER ASSEMBLY (Units After 6/85)	7-20	3-C-1
7-24	ROTARY BCD SWITCHES	7-23	3-C-4
7-25	CHANGING THE BATTERY	7-24	3-C-5
7-26	LOCATING THE SERVICE SWITCH	7-24	3-C-5
7-27	SERVICE SWITCH	7-24	3-C-5
7-28	LOCATING ROTARY SWITCHES S2 AND S3	7-25	3-C-6
7-29	POWER SUPPLY FUSE LOCATIONS	7-26	3-C-7
7-30	TEST POINT AND POTENTIOMETER LOCATIONS: Main Printcon PC Board	7-27	3-C-8
8-1	CABINET ASSEMBLY: Freestanding Sterilizer (Part 1 of 2)	8-2	3-C-11
8-2	CABINET ASSEMBLY: Freestanding Sterilizer (Part 2 of 2)	8-4	3-C-13
8-3	CABINET ASSEMBLY: Double Door, Recessed (Part 1 of 2)	8-6	3-D-1
8-4	CABINET ASSEMBLY: Double Door, Recessed (Part 2 of 2)	8-8	3-D-3
8-5	PANEL ASSEMBLY: Operating End	8-10	3-D-5
8-6	SUB PANELS: Operating End	8-12	3-D-7
8-7	TOP CONTROL PANEL: Operating End	8-14	3-D-9
8-8	PANEL ASSEMBLY: Non-Operating End	8-16	3-D-11
8-9	SHELL AND STAND ASSEMBLY	8-18	3-D-13
8-10	CONTROL COLUMN (IRC) (Part 1 of 3)	8-20	3-E-1
8-11	CONTROL COLUMN (IRC) (Part 2 of 3)	8-22	3-E-3
8-12	CONTROL COLUMN (IRC) (Part 3 of 3)	8-24	3-E-5
8-13	INDICATOR-RECORDER-CONTROLLER (Part 1 of 2)	8-26	3-E-7
8-14	INDICATOR-RECORDER-CONTROLLER (Part 2 of 2)	8-28	3-E-9
8-15	MAIN CONTROL ASSEMBLY	8-30	3-E-11
8-15A	IDENTIFYING P.C. BOARD PART NUMBERS	8-30	3-E-11

LIST OF ILLUSTRATIONS (Continued)

Figure	Title	Page	Grid
8-16	SECONDARY CONTROL PANEL (Part 1 of 2)	8-32	3-E-13
8-17	SECONDARY CONTROL PANEL: (Part 2 of 2) (IRC)	8-34	3-F-1
8-18	COVER AND HANDWHEEL ASSEMBLY	8-36	3-F-34
8-19	DOOR LOCK AND HINGE ASSEMBLY	8-38	3-F-5
8-20	DOOR ASSEMBLY	8-40	3-F-7
8-21	DOOR SWITCH ASSEMBLY	8-42	3-F-9
8-22	PIPING ASSEMBLY: Complete (IRC)	8-44	3-F-11
8-23	PIPING SUBASSEMBLY, Top	8-46	3-F-13
8-24	PIPING SUBASSEMBLY, Side	8-48	3-G-1
8-25	PIPING SUBASSEMBLY, Bottom	8-50	3-G-3
8-26	STEAM SUPPLY ASSEMBLY	8-52	3-G-5
8-27	WATER SUPPLY ASSEMBLY	8-54	3-G-7
8-28	AIR BREAK ASSEMBLY	8-56	3-G-9
8-29	EJECTOR ASSEMBLY	8-58	3-G-11
8-30	DRAIN ASSEMBLIES	8-60	3-G-13
8-31	STEAM CONTROL VALVE	8-62	4-A-1
8-32	FILTER ASSEMBLY	8-64	4-A-3
8-33	UNION ANGLE VALVE	8-66	4-A-5
8-34	STEAM TRAP	8-68	4-A-7
8-35	OPTIONAL MANUAL VALVE PIPING	8-70	4-A-9
8-36	OPTIONAL MANUAL VALVE	8-72	4-A-11
8-37	WIRING ASSEMBLY	8-74	4-A-13
8-38	CONNECTION DETAILS: Control Column (IRC)	8-76	4-B-1
8-39	HARNESS ASSEMBLY (IRC)	8-78	4-B-3
8-40	WIRING HARNESS: Secondary Panel (IRC)	8-80	4-B-5
8-41	OPTIONAL RACK AND SHELVES	8-82	4-B-7
8-42	OPTIONAL LOADING CAR ASSEMBLY	8-83	4-B-8
8-43	OPTIONAL TRANSFER CARRIAGE ASSEMBLY	8-84	4-B-9
8-44	CONTROL COLUMN (Part 1 of 3) (Printcon)	8-86	4-B-11
8-45	CONTROL COLUMN (Part 2 of 3) (Printcon)	8-88	4-B-13
8-46	CONTROL COLUMN (Part 3 of 3) (Printcon)	8-90	4-C-1
8-47	PRINTCON HOUSING ASSEMBLY	8-92	4-C-3
8-48	PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 1 of 2)	8-94	4-C-5
8-49	PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 2 of 2)	8-96	4-C-7
8-49A	PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 1 of 2)	8-98	4-C-9
8-49B	PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 2 of 2)	8-100	4-C-11
8-50	SECONDARY CONTROL PANEL (Part 2 of 2)	8-102	4-C-13
8-51	PIPING ASSEMBLY: Complete (Printcon)	8-104	4-D-1
8-52	CHAMBER DRAIN ASSEMBLY (Printcon)	8-106	4-D-3
8-53	SENSING LINE PACKAGE (Printcon)	8-108	4-D-5
8-54	FINAL WIRING ASSEMBLY (Printcon)	8-110	4-D-7
8-55	CONNECTION DETAILS: Control Column with Printcon	8-112	4-D-9
8-56	HARNESS ASSEMBLY: Double Door (Printcon)	8-114	4-D-11
8-57	HARNESS ASSEMBLY: Secondary Panel (Printcon)	8-116	4-D-13
9-1	CONTROL LOCATIONS, Operating End	9-2	4-E-2
9-2	PRINTCON MESSAGES	9-4	4-E-5
9-3	PRINTED CYCLE RECORD: Liquid Cycle	9-11	4-E-12

LIST OF ILLUSTRATIONS (Continued)

Figure	Title	Page	Grid
9-4	CONTROL COLUMN, Eagle 2300 (Part 1 of 3)	9-16	4-F-3
9-5	CONTROL COLUMN, Eagle 2300 (Part 2 of 3)	9-18	4-F-5
9-6	CONTROL COLUMN, Eagle 2300 (Part 3 of 3)	9-20	4-F-7
9-7	MAIN CONTROL ASSEMBLY, Eagle 2300	9-22	4-F-9
9-8	SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2)	9-24	4-F-11
9-9	SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2)	9-26	4-F-13
9-10	PRINTCON HOUSING ASSEMBLY, Eagle 2300	9-28	4-G-1
9-11	HARNESS ASSEMBLY, Secondary Panel, Eagle 2300, Vacuum	9-30	4-G-3
9-12	CONNECTION DETAILS, Eagle 2300 Control Column	9-32	4-G-5

SUMMARY OF SAFETY PRECAUTIONS

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

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

WARNING: TO PREVENT POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE RESULTING FROM BURSTING BOTTLES AND HOT FLUID, YOU MUST FOLLOW THE PROCEDURE LISTED ON PAGE 2-5.

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

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

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

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

WARNING: BE CAREFUL IF STEAM IS ESCAPING FROM SAFETY VALVE. 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 plastic or painted surfaces. Follow directions on containers.

SUMMARY OF SAFETY PRECAUTIONS

CONTINUED

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

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

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

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

CAUTION: If primary panel 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.

CAUTION: If safety valve is found to be defective, do not attempt to repair. 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 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.

CAUTION: The door post (8-20, 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 rewelding.

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: 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.

SUMMARY OF SAFETY PRECAUTIONS

CONTINUED

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

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

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.



AMSCO

Eagle® 2000 SERIES SMALL STERILIZERS
Vacamatic®
• single door

TECH
DATA

Small Steam Sterilizer (SINGLE DOOR)

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DESCRIPTION

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

Applications

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

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

Chamber Sizes

Interior dimensions are 16x16x26 inches (406x406x660 mm) or 20x20x38 inches (508x508x965 mm), as specified.

Standards

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

Underwriters Laboratories, Incorporated, and Canadian Standards Association.

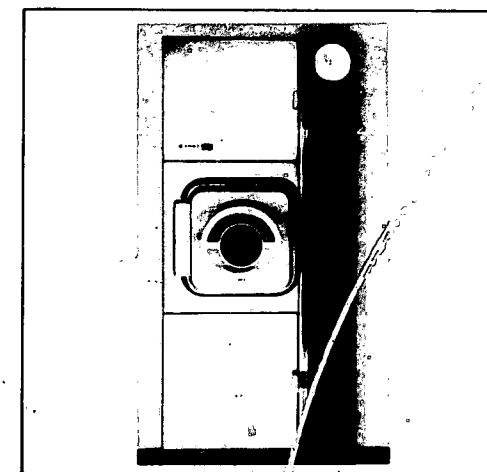
ASME Code, Section VIII, Division I for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Shell and door is constructed to withstand working pressure of 42 psig (2.95 kg/cm²) for 16x16x26" and 40 psig (2.81 kg/cm²) for 20x20x38" sterilizers.

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

- ☐ 2013: 16x16x26"
☐ 2023: 20x20x38"

Materials Handling Accessories*

- ☐ Rack and Shelves
☐ Loading Car and Carriage
(20x20x38" Sterilizer Only)
☐ Surgical Instrument Trays

*See separate product literature

Mounting

- ☐ For Recessing
☐ Cabinet Enclosed

Door Hinge

- ☐ Right Side ☐ Left Side

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 architects or designers. Reproduction in whole or in part by others is prohibited.

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Printed in U.S.A.

DESIGN FEATURES

Eagle-Eye® Vertical Control Column

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

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

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

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

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

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

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

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

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

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

Vacuum System

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

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

Chamber Drain System

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

Manual Control

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

Optional Material Handling Accessories

Includes racks with shelves, instrument trays and if 20x20x38" sterilizer, loading cars ... **all constructed of Monel**; and carriages of stainless steel. See separate product literature for details.

TECHNICAL DATA

Controls

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

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

Jacket and Chamber Assembly

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

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

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

Cast-bronze, manually operated door has stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinge is 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.

Microswitch prevents inadvertent start of cycle before door is locked; **pressure lock** keeps door from being opened during cycle. Door may be tightened but not opened while pressure is in chamber.

Steam Source

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

Other Components

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

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

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

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

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

Baffle shields steam supply opening inside the chamber.

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

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model, or for recessing, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other (free-standing units), or front panel to wall partition (recessed units). Stainless-steel front panel has 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 labor. AMSCO representatives can provide full details of the warranty program on request. The ASME pressure vessel is further warranted to the original owner against structural failure for a period of 15 years from the date of initial operation under normal use, operation and maintenance. This warranty does not extend to normal repairs, maintenance or adjustments required for the door closure mechanism.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

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

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION				ELECTRICAL REQUIREMENTS	HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam†		Amps 120 Volts, Single Phase	Cabinet Enclosed	Recessed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg. lbs/hr (kg/hr)		To Room	Front of Wall.	Behind Wall
16x16x26 (406x406x660)	1160 (527)	15 (57)	164 (611)	83 (38)	70 (32)	0.9	4300	1600	2700
20x20x38 (508x508x965)	1990 (903)	15 (57)	184 (611)	116 (53)	98 (44)	0.9	7000	2500	4500

¹At 30-50 psig (2.11-3.52 kg/cm²)

¹At 50-80 psig (3.52-5.62 kg/cm²)

¹Based upon chamber filled with water

SPECIFICATION WORKSHEET

Item _____: Furnish an AMSCO Eagle Series sterilizer per Tech Data Sheet SD-252. Construct chamber ☐ 16x16x26" or ☐ 20x20x38"
Design control with microcomputer to monitor system operations and control system functions. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ to be free standing or ☐ for recessing into a partition wall.



Small Steam Sterilizer (DOUBLE DOOR)

Eagle® 2000 SERIES SMALL STERILIZERS Vacamatic™ • double door

TECH DATA

DESCRIPTION

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

Applications

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

Gravity Cycles — for sterilizing liquids in flasks with vented closures at 212° to 250° F (100° to 121° C); also for heat- and moisture-stable goods at 270° to 280° F (132° to 138° C).

Chamber Sizes

Interior dimensions are 16x16x26 inches (406x406x660 mm) or 20x20x38 inches (508x508x965 mm), as specified.

Standards

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

Underwriters Laboratories, Incorporated, and Canadian Standards Association.

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped: ASME Form U-1 is furnished. Inner shell, including doors, is constructed to withstand working pressure of 42 psig (2.95 kg/cm²) for 16x16x26 and 40 psig (2.81 kg/cm²) for 20x20x38 sterilizers.

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

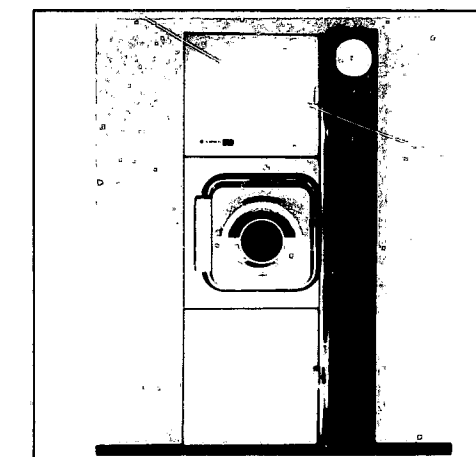
ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202 or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

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

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 architects or designers. Reproduction in whole or in part by others is prohibited.

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Typical only — some details may vary.

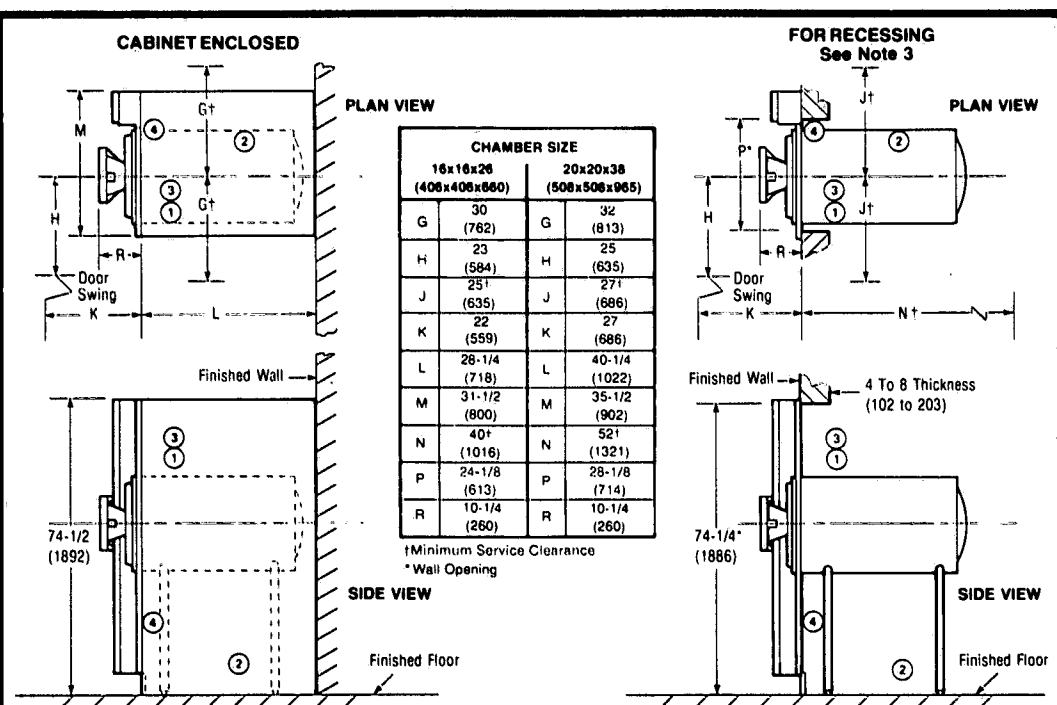
THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

- | | |
|---|---|
| Series
☐ 2013: 16x16x26"
☐ 2023: 20x20x38" | Materials Handling Accessories*
☐ Rack and Shelves
☐ Loading Car and Carriage
(20x20x38" Sterilizer Only)
☐ Surgical Instrument Trays |
| Door Hinge (Operating End First)
☐ Right Side/Left Side
☐ Right Side/Right Side
☐ Left Side/Right Side
☐ Left Side/Left Side | |
| Mounting
☐ For Recessing Through One Wall
☐ For Recessing Through Two Walls | |

*See separate product literature

Item No. _____
Location(s) _____

B- 4



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

OPERATING REQUIREMENTS

- ① COLD WATER — 3/4 NPT, 30 to 50 psig (2.11 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
- ② DRAIN — 1 1/2 ODT
- ③ STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
- ④ TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

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. If loading car and carriage are to be used with a 20x20x38" (508x508x965 mm) sterilizer, front clearance should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading car from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
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.

... CHECK LOCAL CODES ...

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

B- 3

DESIGN FEATURES

Eagle-Eye™ Vertical Control Column

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

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

- **Quartz-crystal based timing.** Microcomputer uses inputs from thumbwheel switches to accurately set exposure and drying times. Set times are displayed as **digital readouts**. Selected times are not changeable once a cycle has started. Timing automatically resets upon completion or resetting of cycle. Automatic reset eliminates need to reprogram timers between repeated cycles. If chamber temperature drops 2° F (1.1° C) below set value during exposure period, timing resets and STERILIZE phase indicator blinks for remainder of phase.

- **Cycle Monitoring.** Chamber doors must be locked pressure-tight to initiate a cycle. If unlocked, status lights alert operator. Once selected, cycle is **locked into microcomputer**. Should chamber fail to reach set sterilizing temperature, microcomputer **visually and audibly** alerts operator.

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

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

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

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

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

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

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

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

Vacuum System

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

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

Chamber Drain System

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

Manual Control (Gravity Cycles Only)

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

Optional Material Handling Accessories

Includes racks with shelves, instrument trays and if 20x20x38" sterilizer, loading cars ... **all constructed of Monel**; and carriages of stainless steel. See separate product literature for details.

TECHNICAL DATA

Controls

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

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

Jacket and Chamber Assembly

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

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

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

Cast-bronze, manually operated doors have stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinges are adjustable for accurate gasket alignment. **Silicone-rubber sealing gaskets** are pressed against door frames by handwheel-actuated radial holding arms. Gaskets are replaceable without tools. Sound-deadened, stainless-steel covers conceal holding arms and door exteriors. **Microswitches** prevent inadvertent start of cycle before doors are locked; **pressure locks** keep doors from being opened during cycle. **Doors may be tightened but not opened while pressure is in chamber.**

Steam Source

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

Other Components

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

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

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

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

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

Baffle shields steam supply opening inside the chamber.

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

INSTALLATION

Sterilizer arranged for mounting through one or two (20x20x38 inch [508x508x965 mm] only) partition walls. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other and to wall partition(s) as required. All panels are stainless steel. Front panel has upper and lower service access doors, back panel has lower service access door. Both panels have height-adjustable kickplates. Inside of each lower access door contains a rack for instructional materials. A model for recessing through one wall has side panels and louvered top panel to enclose the sterilizer body and piping.

WARRANTY

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

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION				ELECTRICAL REQUIREMENTS	HEAT LOSS BTU/hr at 70° F (21° C)			
		Water†		Steam‡		Amps 120 Volts, Single Phase	Thru One Wall		Thru Two Walls	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lbs/hr (kg/hr)	Avg lbs/hr (kg/hr)		Front of Wall	Room Back of Wall	At Each End	Between Walls
16x16x26 (406x406x660)	1360 (617)	15 (57)	164 (611)	83 (38)	70 (32)	0.9	1600	3500	NA	NA
20x20x38 (508x508x965)	2240 (912)	15 (57)	164 (611)	116 (53)	98 (44)	0.9	2500	5300	2500	2800

*At 30-50 psig (2.11-3.52 kg/cm²)

†At 50-80 psig (3.52-5.62 kg/cm²)

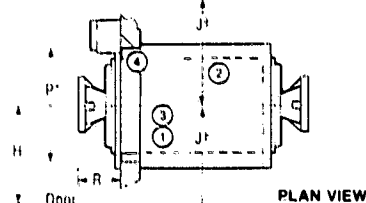
‡Based upon chamber filled with water

SPECIFICATION WORKSHEET

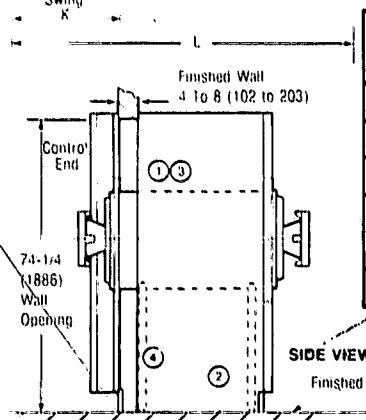
Item _____: Furnish an AMSCO Eagle Series sterilizer per Tech Data Sheet SD-253. Construct chamber ☐ 16x16x26" or ☐ 20x20x38". Design control with microcomputer to monitor system operations and control system functions. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer for recessing through ☐ one wall or ☐ two walls.

FOR RECESSING THRU ONE PARTITION WALL

FOR RECESSING THRU TWO PARTITION WALLS (20x20x38 inch [508x508x965 mm] Sterilizer Only)



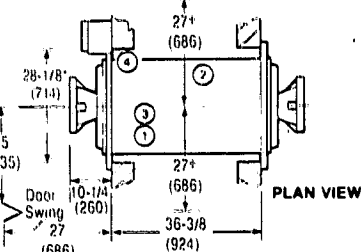
PLAN VIEW



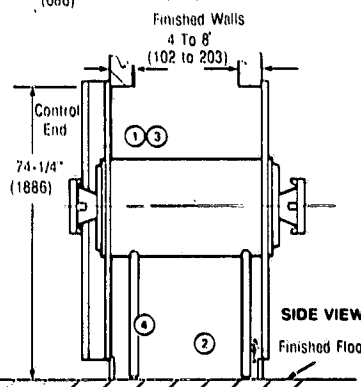
SIDE VIEW

CHAMBER SIZE	
16x16x26 (406x406x660)	20x20x38 (508x508x965)
H 23 (584)	H 25 (635)
J 25 (635)	J 27 (686)
K 22 (559)	K 27 (686)
P 21-1/8 (513)	P 20-1/8 (514)
R 10-1/4 (260)	R 10-1/4 (260)
L 80-0/8 (2040)	L 90-3/8 (2294)

† Minimum Service Clearance
* Wall Opening



PLAN VIEW



SIDE VIEW

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

OPERATING REQUIREMENTS

- 1 COLD WATER — 3/4 NPT, 30 to 50 psig (2.11 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
- 2 DRAIN — 1 1/2 ODT
- 3 STEAM SUPPLY — 3/4 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
- 4 TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

... CHECK LOCAL CODES ...

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. If loading car and carriage are to be used with a 20x20x38" (508x508x965 mm) sterilizer, front clearance should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading car from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
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 SMALL STERILIZERS with Printcon™ Vacumatic • single door

TECH DATA

DESCRIPTION

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

Applications

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

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

Chamber Sizes

Interior dimensions are 16x16x26 inches (406x406x660 mm) or 20x20x38 inches (508x508x965 mm), as specified.

Standards

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

Underwriters Laboratories Incorporated, and Canadian Standards Association Listing.

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Shell and door constructed to withstand working pressure of 42 psig (2.95 kg/cm²) for 16x16x26 and 40 psig (2.81 kg/cm²) for 20x20x38 sterilizers.

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

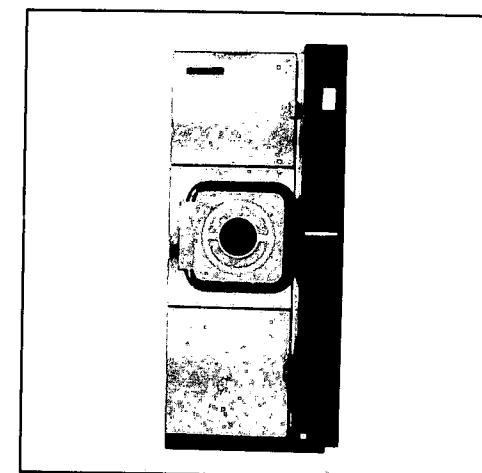
ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202 or 304 if not welded.

ASTM Specification B88 for seamless, copper tubing.

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

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 architects or designers. Reproduction in whole or in part by others is prohibited.

AMSCO — 1979, 1984, 1986, 1987



Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Series

- ☐ 2013: 16x16x26"
- ☐ 2023: 20x20x38"

Mounting

- ☐ For Recessing
- ☐ Cabinet Enclosed

Door Hinge

- ☐ Right Side
- ☐ Left Side

Materials Handling Accessories*

- ☐ Rack and Shelves
- ☐ Loading Car and Carriage (20x20x38" Sterilizer Only)
- ☐ Surgical Instrument Trays

*See separate product literature

Item No. _____
Location(s) _____

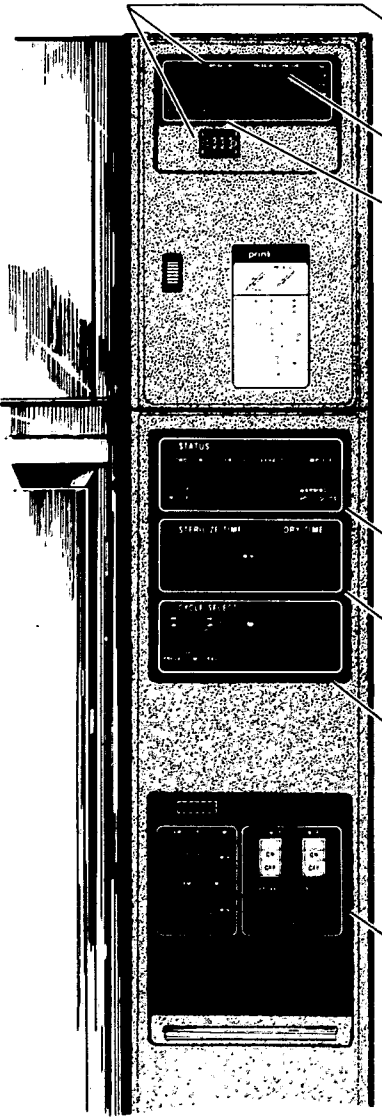
DESIGN FEATURES

Eagle 2000® with Printcon™

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

Eagle-Eye™ Vertical Control Column (Figure 1)

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



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

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

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

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

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

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

Figure 1. Eagle-Eye Vertical Control Column.

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TECHNICAL DATA

Automatic Control

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

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

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

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

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

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

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

Manual Control (Gravity Cycles Only)

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

Jacket and Chamber Assembly

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

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

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

Cast-bronze, manually operated door has stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinge is 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. Microswitch prevents inadvertent start of cycle before door is locked; **pressure lock** keeps door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

Vacuum System

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

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

Chamber Drain System

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

Steam Source

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

Other Components

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

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

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

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

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

Baffle shields steam supply opening inside the chamber.

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

Optional Material Handling Accessories

Include racks with shelves, instrument trays and if 20x20x38-inch sterilizer, loading cars. . . . **all constructed of Monel**; and carriages of stainless steel. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model, or for recessing, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other (freestanding units), or front panel to wall partition (recessed units). Stainless-steel front panel has 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 labor. AMSCO representatives can provide full details of the warranty program on request. The ASME pressure vessel is further warranted to the original owner against structural failure for a period of 15 years from the date of initial operation under normal use, operation and maintenance. This warranty does not extend to normal repairs, maintenance or adjustments required for the door closure mechanism.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

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

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	UTILITIES CONSUMPTION		ELECTRICAL REQUIREMENTS		HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam‡		Electricity — Amps 120 Volts, Single Phase	Cabinet Enclosed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lb/hr (kg/hr)	Avg. lb/hr (kg/hr)		To Room	Front of Wall Behind Wall
16x16x26 (406x406x660)	1150 (527)	15 (57)	164 (611)	83 (38)	70 (32)	0.9	4300	1600 2700
20x20x38 (508x508x965)	1990 (900)	15 (57)	164 (611)	116 (53)	98 (44)	0.9	7000	2500 4500

*Based upon chamber filled with water

†At 30-50 psig (2.11-3.52 kg/cm²)

‡At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item ____: Furnish an AMSCO Eagle Series sterilizer with Printcon per Tech Data Sheet SD-352. Construct chamber □ 16x16x26" or □ 20x20x38". Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer □ to be freestanding or □ for recessing into a partition wall.

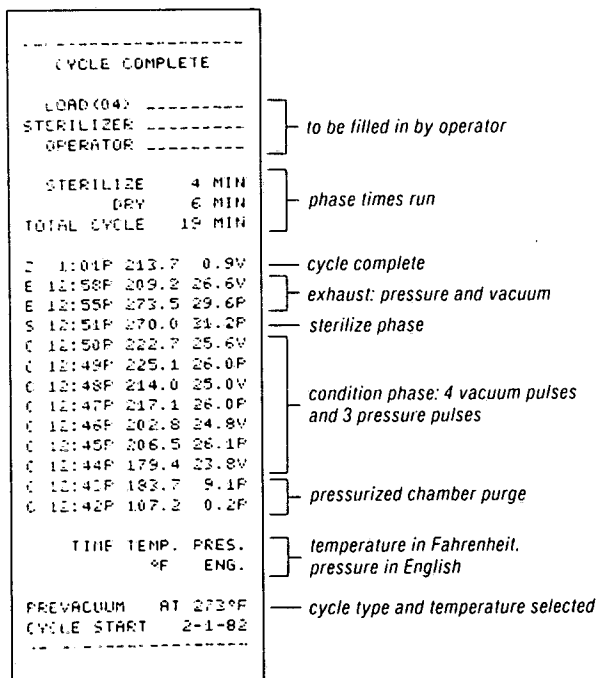


Figure 2. Typical Printout.

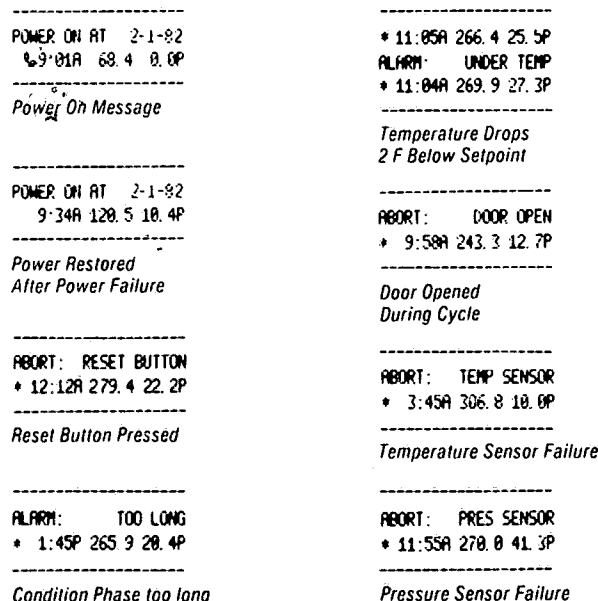
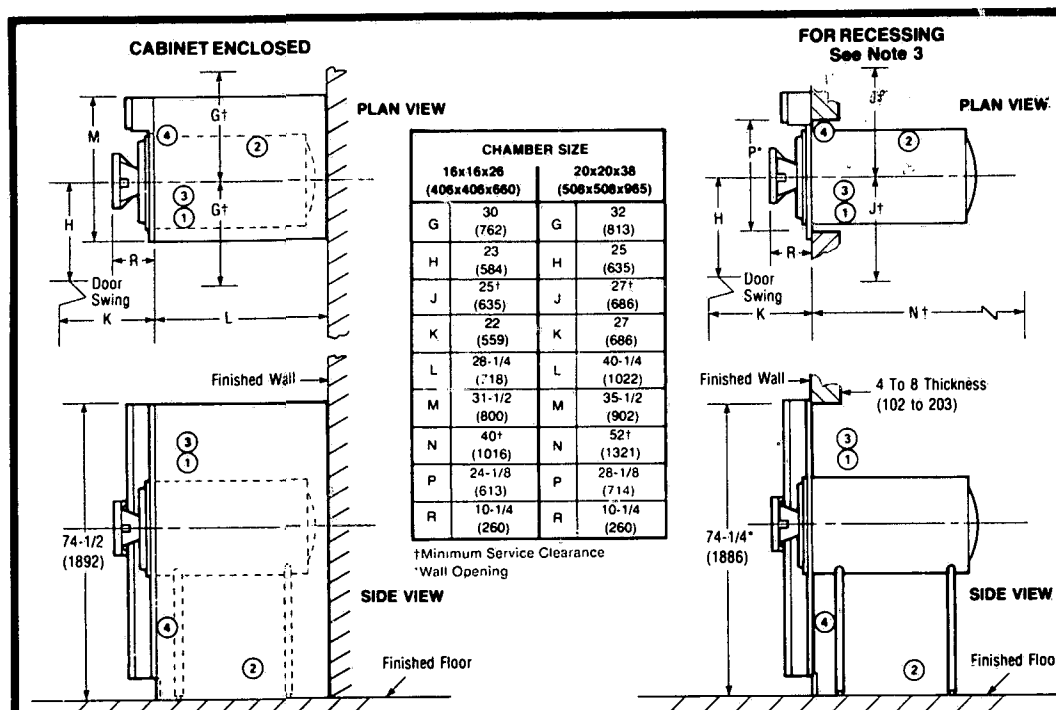


Figure 3. Control Monitoring and Communication.



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

OPERATING REQUIREMENTS

- ① COLD WATER — 3/4 NPT, 30 to 50 psig (2.11 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
- ② DRAIN — 1-1/2 ODT
- ③ STEAM SUPPLY — 3/8 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
- ④ TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

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. If loading car and carriage are to be used with a 20x20x38" (508x508x965 mm) sterilizer, front clearance should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading car from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.
7. Floor drain should be provided within confines of sterilizer framework.

... CHECK LOCAL CODES ...

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



Eagle® 2000 SERIES SMALL STERILIZERS with Printcon™

Vacumatic
• double door

TECH
DATA

DESCRIPTION

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

Applications

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

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

Chamber Sizes

Interior dimensions are 16x16x26 inches (406x406x660 mm) or 20x20x38 inches (508x508x965 mm), as specified.

Standards

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

Underwriters Laboratories Incorporated, and Canadian Standards Association listing.

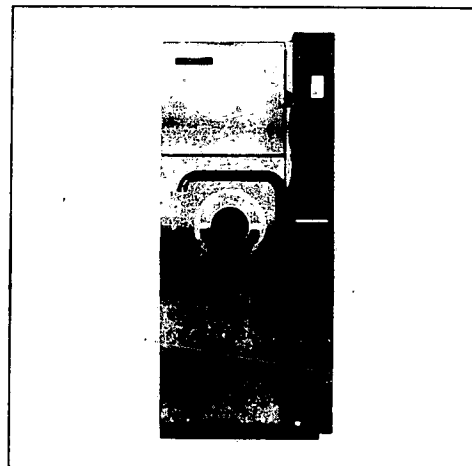
ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 is furnished. Shell and door is constructed to withstand working pressure of 42 psig (2.95 kg/cm²) for 16x16x26" and 40 psig (2.81 kg/cm²) for 20x20x38" sterilizers.

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

- ☐ 2013: 16x16x26"
- ☐ 2023: 20x20x38"

Door Hinge (Operating End First)

- ☐ Right Side/Left Side
- ☐ Right Side/Right Side
- ☐ Left Side/Right Side
- ☐ Left Side/Left Side

Mounting

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

- Materials Handling Accessories***
- ☐ Rack and Shelves
 - ☐ Loading Car and Carriage (20x20x38" Sterilizer Only)
 - ☐ Surgical Instrument Trays

*See separate product literature

Item No. _____
Location(s) _____

Small Steam Sterilizer (DOUBLE DOOR)

DESIGN FEATURES

Eagle™ 2000 with Printcon™

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

Eagle-Eye™ Vertical Control Column (Figure 1)

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



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

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

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

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

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

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

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

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

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

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

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

Figure 1. Eagle-Eye Vertical Control Column.

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 1 minute... eliminates necessity of reinitiating cycle following routine power switchovers. After 1 minute operator must reset control power. Visual and audible signals then indicate that cycle was interrupted. Printout records failure (see Figure 3).

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

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

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

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

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

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

Manual Control (Gravity Cycles Only)

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

Jacket and Chamber Assembly

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

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

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

Cast-bronze, manually operated doors have stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinges are adjustable for accurate gasket alignment. **Silicone-rubber sealing gaskets** are pressed against door frames by handwheel-actuated radial holding arms. Gaskets are replaceable without tools. Sound-deadened, stainless-steel covers conceal holding arms and door exteriors. Microswitches prevent inadvertent start of cycle before doors are locked; **pressure locks** keep doors from being opened during cycle. **Doors may be tightened but not opened while pressure is in chamber.**

Vacuum System

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

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

Chamber Drain System

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

Steam Source

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

Other Components

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

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

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

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

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

Baffle shields steam supply opening inside the chamber.

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

Optional Material Handling Accessories

Include racks with shelves, instrument trays and if 20x20x38-inch sterilizer, loading cars... **all constructed of Monel**; and carriages of stainless steel finish. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting through one or two (20x20x38 inch [508x508x965 mm] only) partition walls. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other and to wall partition(s) (as required). All panels are stainless-steel. Front panel has upper and lower service access doors, back panel has lower service access door. Both panels have height-adjustable kickplates. Inside of each lower access door contains a rack for instructional materials. A model for recessing through one wall has side panels and lowered top panel to enclose the sterilizer body and piping.

WARRANTY*

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

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

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	POWER CONSUMPTION				HEAT LOSS BTU/hr at 70 F (21 C)			
		Water†		Steam‡		Electricity — Amps 120 Volts, Single Phase	Thru One Wall		Thru Two Walls
		Peak gpm (lpm)	Avg. gph (lph)	Peak lb/hr (kg/hr)	Avg. lb/hr (kg/hr)		Front of Wall	Room Back of Wall	At Each End
16x16x26 (406x406x660)	1360 (617)	15 (57)	164 (611)	83 (38)	70 (32)	3	1600	3500	NA
20x20x38 (508x508x965)	2240 (912)	15 (57)	164 (611)	116 (53)	98 (44)	3	2500	5300	2500

*Based upon chamber filled with water

†At 30-50 psig (2.11-3.52 kg/cm²)

‡At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item _____: Furnish an AMSCO Eagle Series sterilizer with Printcon per Tech Data Sheet SD-353. Construct chamber □ 16x16x26" or □ 20x20x38". Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer □ for recessing through □ one wall or □ for recessing through two walls.

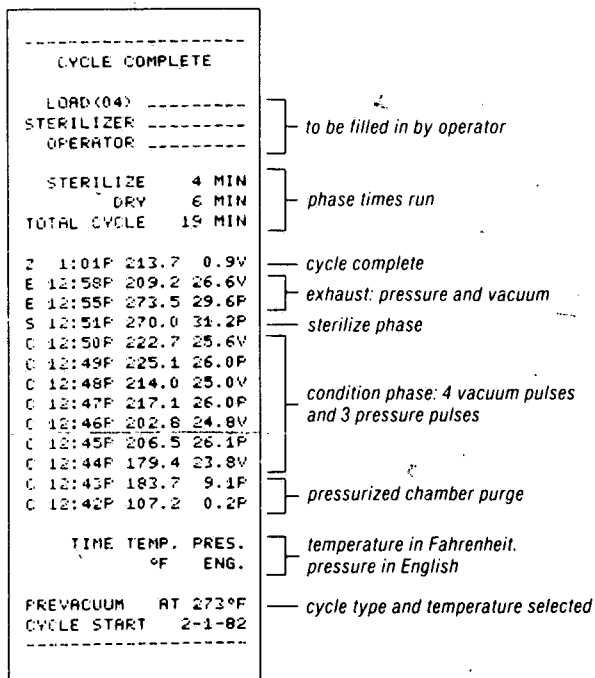


Figure 2. Typical Printout.

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

Power On Message

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

Power Restored
After Power Failure

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

Reset Button Pressed

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

Condition Phase too long

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

Temperature Drops
2 F Below Setpoint

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

Door Opened
During Cycle

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

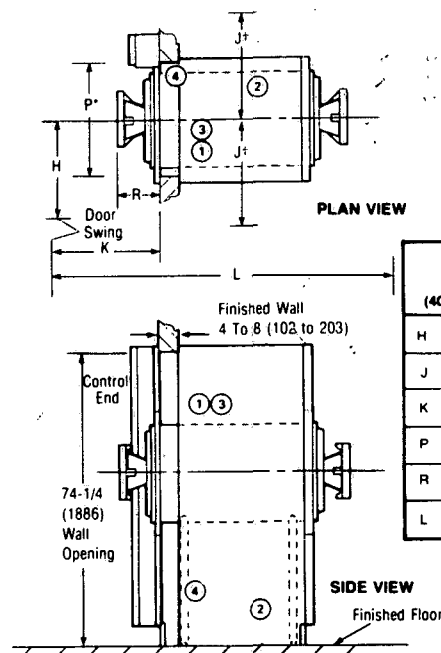
Temperature Sensor Failure

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

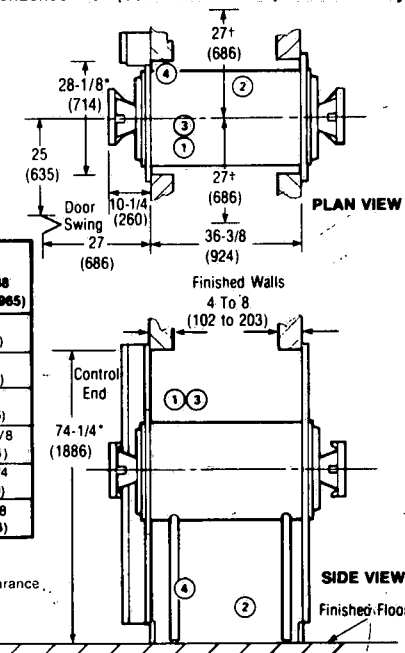
Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.

FOR RECESSING THRU ONE PARTITION WALL



FOR RECESSING THRU TWO PARTITION WALLS (20x20x38 inch [508x508x965 mm] Sterilizer Only)



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

OPERATING REQUIREMENTS

1. COLD WATER — 3/4 NPT, 30 to 50 psig (2.11 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
2. DRAIN — 1-1/2 ODT
3. STEAM SUPPLY — 3/8 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
4. TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

... CHECK LOCAL CODES ...

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. If loading car and carriage are to be used with a 20x20x38" (508x508x965 mm) sterilizer, front clearance should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading car from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.
7. Floor drain should be provided within confines of sterilizer framework.

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



AMSCO

Material Handling Accessories

MATERIAL HANDLING ACCESSORIES

• for small sterilizers and aerators

**TECH
DATA**THE SELECTIONS CHECKED BELOW
APPLY TO THE EQUIPMENT
BEING SPECIFIED.**Sterilizer Size**

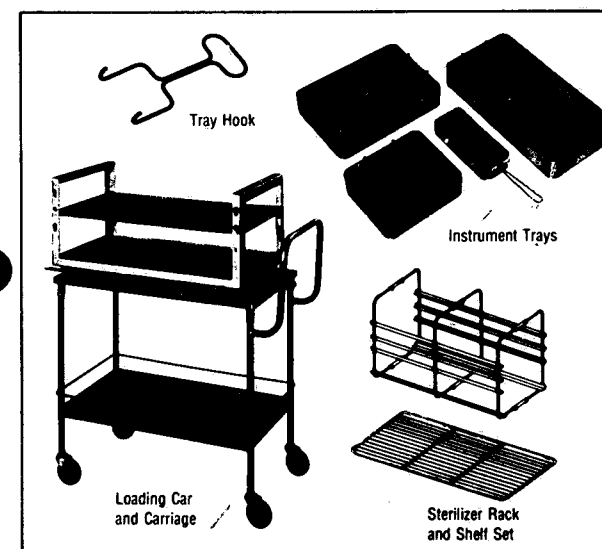
- ☐ 16x16x26" (406x406x660 mm)
☐ 20x20x38" (508x508x965 mm)

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



Typical only — some details may vary.

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.

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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).

Eagle Series

SECTION 2

OPERATING INSTRUCTIONS (IRC)

2.1 GENERAL

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

Figure 2-2 shows the location of the various controls. For Printcon units, refer to paragraphs 2.9 through 2.15.

2.2 BEFORE OPERATING THE EQUIPMENT

1. Be sure that chamber drain strainer is clean and in place and that chamber interior is clean (para. 4.5).
2. Open the upper access door.
 - a. If sterilizer has a manual control, make sure it is turned to OFF.
 - b. Turn STEAM and WATER valves to ON. Steam is admitted to jacket and will begin to warm chamber. If HI-LO valve is on HI, jacket pressure will stabilize at 32 psig; if on LO, it will stabilize at 20 psig.
3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel lights up. If door(s) is open, status light DOOR UNLOCKED (and OPPOSITE DOOR UNLOCKED, for double-door units) will be on. STERILIZE TIME and DRY TIME digital readouts will agree with settings on thumbwheel switches on secondary panel. Cycle selectors will be dimly lit.

4. Install a new paper chart on the indicator-recorder-controller at the beginning of each day.

5. Review paragraph 2.7, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle. Warning signals are an intermittent buzzer and the flashing on and off of the appropriate panel status light: CONDITION, DOOR UNLOCKED, STERILIZE.

6. If a double-door unit, review paragraph 2.8 to become familiar with the controls on the non-operating end.

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

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

NOTE: In case of inadvertent, incorrect cycle selection, operator should press cycle RESET pushbutton on secondary panel. Overload circuit breaker, RECIRCUIT, is also located on the secondary panel, beside cycle RESET. Other abnormal conditions which require cycle reset are described in paragraph 2.7, "Control Monitoring and Communications Systems."

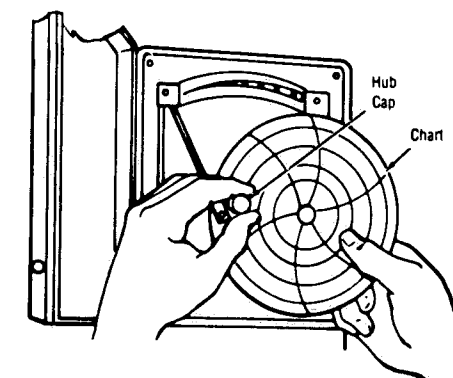
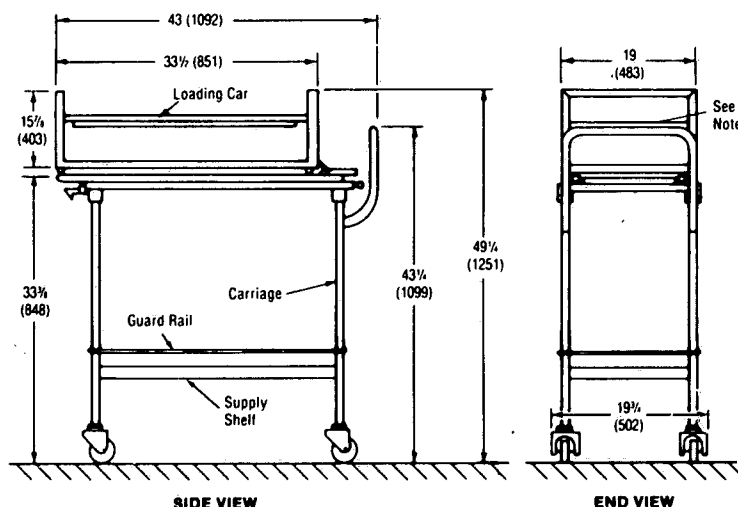


Figure 2-1. CHANGING THE CHART.



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.

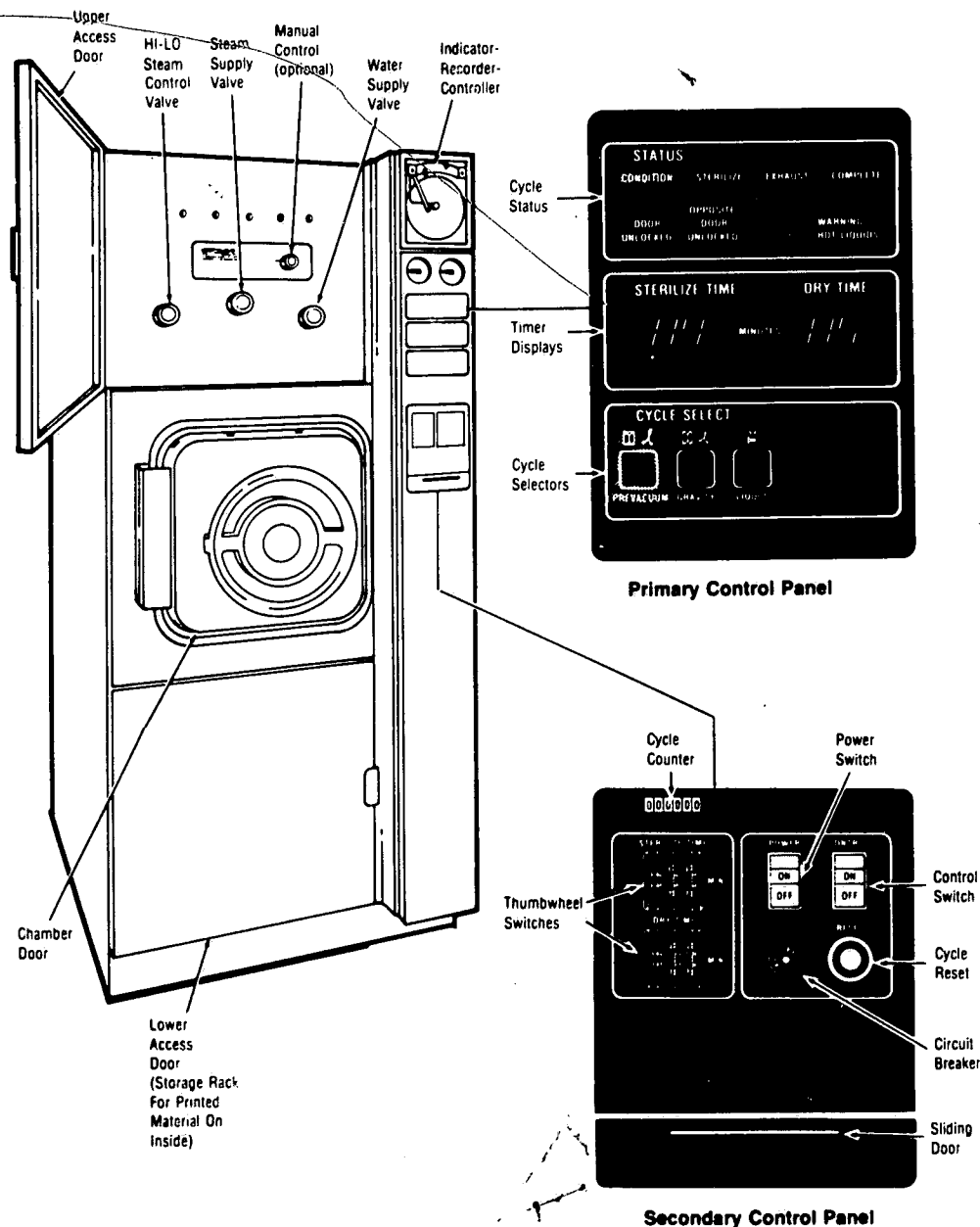


Figure 2-2. CONTROL LOCATIONS: Operating End.

2.3 AUTOMATIC OPERATION: PREVACUUM CYCLE (WRAPPED AND UNWRAPPED GOODS)

1. Follow instructions in paragraph 2.2, "Before Operating the Equipment."
2. Open the upper access door and turn HI-LO valve to HI. Verify that STEAM and WATER valves are ON.
3. Open the door on the secondary panel.
 - a. Be sure the POWER and CONTROL switches are ON. Primary control panel should be lit.
 - b. For routine loads, dial 04 minutes on the sterilize time thumbwheel switches.
 - c. Dial the desired drying time on the thumbwheel switches. For wrapped goods, dry time can vary (usually between 5 and 20 minutes) depending on pack density, instrument tray weight, pack preparation technique, including type of wrapping material used, and sterilizer loading procedures.

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

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

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

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

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

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. Steam DRY TIME digital readout begins to count down when chamber is exhausted to 3 psig. Chamber continues to be exhausted until a vacuum is drawn in the chamber.

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

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

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

2.4 AUTOMATIC OPERATION: GRAVITY CYCLE

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

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

2. Refer to Table 2.1 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to HI for the 270° F (132° C) sterilization cycle, or to LO for the 250° F (121° C) sterilizing cycle. Verify that STEAM and WATER valves are on.

3. Open the door on the secondary control panel.

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

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

b. Dial the correct exposure period (Table 2.1) on STERILIZE TIME thumbwheel switches.

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

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

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

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

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

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

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

9. When sterilize timer times out, EXHAUST light comes on. Chamber exhausts to atmospheric pressure. If a drying period was selected, DRY TIME digital readout begins to count down. If zero DRY TIME was selected, cycle proceeds to next step.

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

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

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

ITEMS	TEMPERATURE SETTING	
	250° F (121° C) MINUTES	270° F (132° C) MINUTES
Dressing, wrapped in paper or muslin	30	15
Glassware, empty, inverted	15	3
Instruments, metal only, any number (unwrapped)	15	3
Instruments, metal, combined with suture, tubing or other porous materials (unwrapped)	20	10
Instruments, wrapped in double thickness muslin or eoua	30	15
Linen packs (maximal size: 12"x12"x20"; maximal weight 12 pounds)	30	—
Treatment trays, wrapped in muslin or equal	30	15
Utensils, unwrapped	15	3
Utensils, wrapped in muslin or equal	30	15

2.5 AUTOMATIC OPERATION: LIQUIDS CYCLE

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

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

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

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

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

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

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

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

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

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

3. Open the door on the secondary control panel.

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

b. Set STERILIZE timer thumbwheels to appropriate time ... see Table 2.2.

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

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

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

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

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.

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

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

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

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

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

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

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

11. Crack the door open (see step 5) about 1/2" and leave it cracked for at least 10 minutes. Opening the door will stop buzzer and cause DOOR UNLOCKED light to come on. WARNING HOT LIQUIDS light will remain on, but will begin to flash ... continuing for 10 minutes. At the end of 10 minutes, buzzer will again sound and WARNING HOT LIQUIDS light will stay on. Buzzer sounds for two minutes or until RESET button is pushed.

12. Load may now be removed from sterilizer. Pressing RESET button on secondary control panel resets control and turns WARNING HOT LIQUIDS light off.

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

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

1. Follow steps 1, 2, and 7 in paragraph 2.2, "Before Operating The Equipment." If there is electricity to the sterilizer, positioning POWER switch on secondary control panel at ON will energize the Recorder. The CONTROL switch, however, must be positioned at OFF when using manual operation.

2. Open the upper access door.

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

4. Set HI-LO valve as follows:

a. For 250° F (121° C) operation — refer to paragraph 7.15 for instructions on loosening front stop on pressure regulator; then turn valve counterclockwise until jacket pressure gauge reads between 15 and 18 psig (1.056 and 1.267 kg/cm²).

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

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

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

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

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

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

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

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

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

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

10. Load may be removed from the sterilizer.

2.7 CONTROL MONITORING AND COMMUNICATION SYSTEMS

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

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

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

OPERATOR SHOULD:

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

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

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

4. When chamber is at atmospheric pressure:

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

b. Correct problem.

c. Reprocess load.

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

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

OPERATOR SHOULD:

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

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

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

4. When chamber is at atmospheric pressure:

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

b. Correct problem.

c. Reprocess load.

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

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

OPERATOR SHOULD:

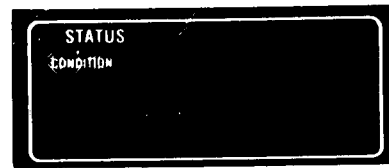
1. Press cycle RESET button on secondary control panel. **Do not** proceed further until chamber is at atmospheric pressure.
2. When chamber is at atmospheric pressure:
 - a. If a **Liquids** cycle was in progress, **crack door open about 1/2"** and wait for at least 10 minutes.
 - b. Check door and door switch operation.
 - c. Reprocess load.

CONDITION NO. 4: Loss of electricity.

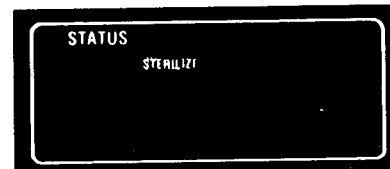
INDICATION: Primary control panel goes dark.

OPERATOR SHOULD:

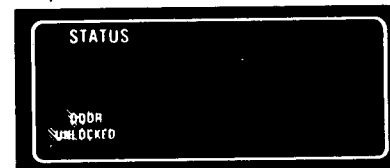
1. Wait until power is restored to sterilizer; then position CONTROL switch (on secondary control panel) to ON. Buzzer will sound intermittently.
2. Press cycle RESET button, but **do not** proceed until chamber is at atmospheric pressure.
3. When chamber is at atmospheric pressure:
 - a. If a **Liquids** cycle was in progress, **crack door open about 1/2"** and wait for at least 10 minutes, then reprocess load.
 - b. Other cycles, load may be reprocessed right away.



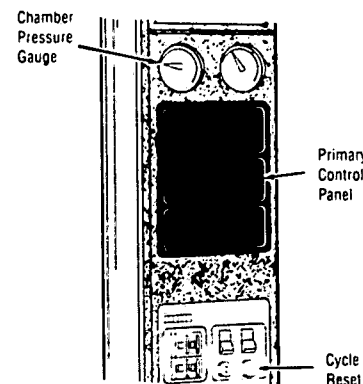
No. 1 — Condition Phase Too Long.



No. 2 — Sterilizing Temperature Drops.



No. 3 — Chamber Door Switch Not Made.



No. 4 — Loss of Electricity.

Figure 2-3. MONITORS AND ALARMS.

2.8 CONTROLS AND SIGNALS FOR DOUBLE-DOOR STERILIZERS (Fig. 2.4)

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

1. Cycle selectors: **PREVACUUM** and **LIQUIDS**. If you wish to repeat the previous prevacuum or liquids cycle, and all preparatory actions (para. 2.2) have been made, you may do this from the non-operating end by touching the appropriate selector.
2. Status lights: These indicate the cycle phase which is currently in progress: **CONDITION**, **STERILIZE**, **EXHAUST**, **COMPLETE**.
3. Warning lights: **DOOR UNLOCKED**, **OPPOSITE DOOR UNLOCKED**, **WARNING HOT LIQUIDS**.

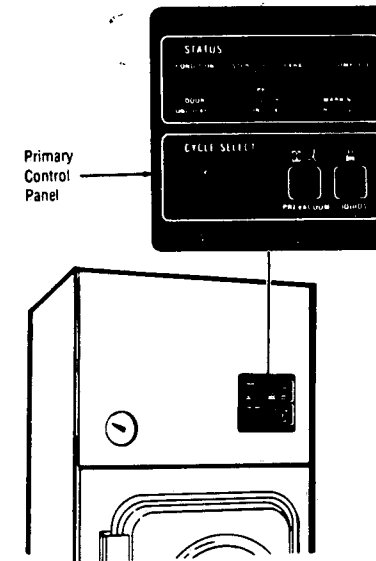


Figure 2-4. NON-OPERATING END PRIMARY CONTROL PANEL.

OPERATING INSTRUCTIONS (PRINTCON)

2.9 BEFORE OPERATING THE EQUIPMENT (PRINTCON)

Figure 2-5 shows the location of the various controls.

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

2. Open the upper access door.

a. Be sure manual control is turned to OFF.

b. Turn STEAM and WATER valves to ON. Steam is admitted to jacket and will begin to warm chamber.

3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel lights up and all LEDs on the Printcon display light momentarily for a lamp test to assure the operator that the system is functioning. The printer records the time and date that the power is turned ON.

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

5. Check paper roll. A colored warning stripe will appear on the paper when the roll is near its end. A single ply roll lasts approximately two months and double ply rolls one month. See paragraph 7.17 "Changing Paper," if replacement is necessary.

6. Check the printout to assure that the inked ribbon cartridge is providing adequate ink. A fresh cartridge should last approximately 3 to 4 months. See paragraph 7.17 "Changing The Inked Ribbon Cartridge," if replacement is necessary.

NOTE: The visual display of printer can optionally be set to indicate temperature in degrees Fahrenheit or Celsius and pressure can be either in English (PSI gauge and inches Hg) or metric (kg/cm² gauge and mm Hg). LEDs on display indicate which units are being displayed. The display of temperature and (English) pressure can be either single precision (no decimal) or extended precision (one decimal). Metric pressure shows one or two decimal places. Metric vacuum shows no decimal places. See paragraph 7.18, "Changing Units of Display" if changes are desired.

7. Review paragraphs 2.7 and 2.14, "Control Monitoring and Communication System," in order to identify the cause of any abnormal condition during a sterilization cycle.

8. If a double-door model, refer to paragraph 2.8 to become familiar with controls on the non-operating end.

9. Wait until jacket pressure has stabilized before starting a cycle.

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

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

1. Follow instructions in paragraph 2.9, "Before Operating the Equipment."

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

3. Open the door on the secondary control panel.

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

b. Dial the desired drying time on the thumbwheel switches. For wrapped goods, dry time can vary (usually between 5 and 20 minutes) depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures. Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

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

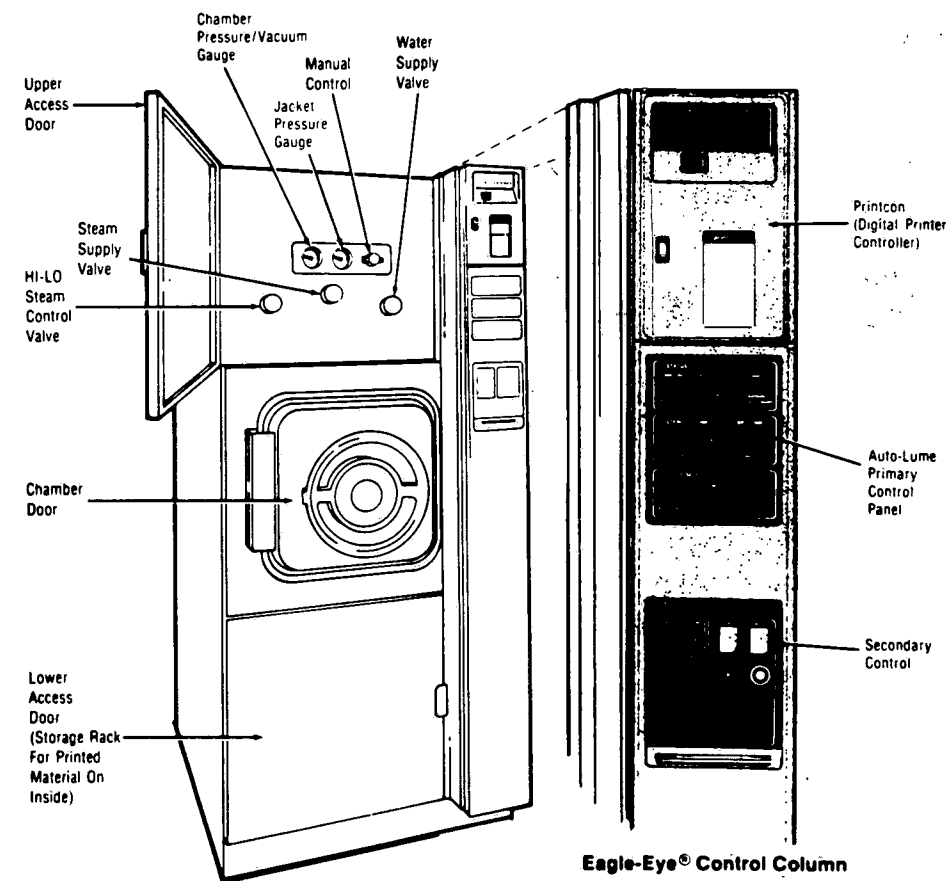


Figure 2-5. CONTROL LOCATIONS, Operating End.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to paragraph 7.18, "Adjusting the Sterilize Temperature Overdrive."

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

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

7. Touch PREVACUUM cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins, and the temperature and pressure at the beginning of the cycle.

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

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

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

10. When dry timer times out, air is admitted to the chamber to relieve the vacuum. When vacuum is sufficiently relieved, COMPLETE light comes on, and buzzer sounds. Open chamber door (see step 5). Sterilized goods may be removed from the machine. The printed record will show the time the cycle finished, the sterilize and dry time, and the total cycle time.

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

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

2.11 AUTOMATIC OPERATION: GRAVITY CYCLE

1. Follow instructions in paragraph 2.9, "Before Operating The Equipment."

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

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

3. Open the door on the secondary control panel.

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

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

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

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 250 F (121 C) or 270 F (132 C). This set point will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), the buzzer sounds until an allowable range is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to paragraph 7.18, "Adjusting the Sterilize Temperature Overdrive."

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

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

7. Touch GRAVITY cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure at the beginning of the cycle.

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

8. After condition phase is completed, STERILIZE panel light comes on and stays on for the duration of

the STERILIZE phase. STERILIZE TIME digital readout begins to count down when chamber when sterilizing temperature is reached. The printed record will show the time the sterilize phase begins and the temperature and pressure.

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

10. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Open chamber door (see step 5), load may be removed from the sterilizer. The printed record will show the time the cycle finished, the sterilize and dry time, and the total cycle time.

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

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

2.12 AUTOMATIC OPERATION: LIQUIDS CYCLE

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

• SEE PARAGRAPH 2.5 FOR FURTHER INFORMATION.

1. Follow instructions in paragraph 2.9, "Before Operating The Equipment."

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

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

3. Open the door on the secondary control panel.

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

b. Set STERILIZE timer thumbwheels to appropriate time... see Table 2-2. Set time will be displayed on the primary control panel; however, during a LIQUIDS cycle, controller automatically disregards any DRY time setting and blanks out that portion of the display. Once the cycle is started, the STERILIZE time will be locked in and cannot be changed.

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

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to paragraph 7.18, "Adjusting the Sterilize Temperature Overdrive."

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

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

7. Touch LIQUIDS cycle selector. Light comes on to full brightness. Status light CONDITION comes on; also WARNING HOT LIQUIDS light comes on. The printed record will show the time the CONDITION

phase begins and the temperature and pressure at the beginning of the cycle.

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

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

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

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

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

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

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

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

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

2.13 MANUAL OPERATION: GRAVITY (WRAPPED OR UNWRAPPED CYCLE) OR LIQUIDS CYCLE

During an electrical power failure, this sterilizer may be operated by following the instructions in paragraph 2.6, "Manual Operation." Begin STERILIZE phase timing when the desired chamber pressure as indicated by the chamber pressure gauge is reached. Refer to Figure 7-12 for pressure and temperature relationships.

ALARM: 100 LONG
C 1 45P 265.9 20 4P

No. 1 — Condition Phase Too Long.

S 11 05A 266 4 25 SP
ALARM: UNDER TEMP
S 11 04A 265.9 27 3P

No. 2 — Sterilizing Temperature Drops.

ALARM: DOOR OPEN
• 9 56A 243 3 12 7P

No. 3 — Chamber Door Switch Not Made.

POWER ON AT 8-18-92
• 9 34A 120 5 10 4P

No. 4 — Power Restored After Power Failure.

ABORT: RESET BUTTON
• 12 12A 379 4 22 2P

The RESET button is pressed.

POWER ON AT 8-18-92
9 01A 60 4 0 0P

The power is turned on.

ALARM: TEMP SENSOR
• 9 15P 306 8 0 0P

Temperature sensor failure is detected.

ALARM: PRES SENSOR
• 1 12P 110 7 41 3P

Pressure sensor failure is detected.

Figure 2-6. PRINTCON MESSAGES.

SECTION 3

PRINCIPLES OF OPERATION

3.1 GENERAL

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

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

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

3.2 THEORETICAL PRINCIPLES OF OPERATION:
MECHANICAL

PRINTCON: The material in paragraphs 3.2 through 3.5 applies to Printcon units except that the temperature switches have been replaced with a **resistance thermal detector (RTD)**, the pressure and vacuum switches have been replaced with a **pressure transducer**, and the recorder has been replaced with the **Printcon (DPC)** unit. See also paragraphs 3.6 and 3.7.

Prevacuum Cycle

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

During the "purge" at the beginning of the cycle, the air in the chamber is quickly displaced by steam. This is

accomplished by simultaneously opening the steam-to-chamber valve (S-2) and the fast exhaust valve (S-3). At the same time, the water supply valve (S-7) and exhaust cooling valve (S-4) are open. Opening these valves accomplishes two purposes: (1) the cooling water is circulated through the heat exchanger (see diagram, Fig. 3-1), cooling the exhaust steam sufficiently to keep the drain temperature below 140° F; (2) simultaneously, the cooling water passing through the water ejector and heat exchanger flows at a rate sufficient to create a suction at the drain, thus increasing the rate of air and steam flow through the chamber. Flow control valve FC-6 is manually adjusted to permit water flow at the optimal rate for the system. Because of flow resistance incorporated into the system design, the chamber pressure will rise to between 5 and 15 psig during this phase of the cycle.

During the "conditioning" phase of the prevacuum cycle, a series of vacuum pressure pulses is created inside the chamber for efficient conditioning of the load. In the vacuum part of the phase, the filtered air valve (S-1) is closed, preventing air from entering the chamber. Steam-to-chamber valve (S-2) is also closed, preventing steam from entering the chamber. Fast exhaust valve (S-3), water supply valve (S-7), and exhaust cooling valve (S-4) remain open. The passage of cooling water through the heat exchanger condenses steam from the exhaust. The passage of cooling water through the ejector and the heat exchanger creates suction at the drain and produces a vacuum in the chamber.

During the pressure part of the conditioning phase, the water supply (S-7), exhaust cooling (S-4), and fast exhaust (S-3) valves are closed. Since the filtered air valve (S-1) remains closed, the chamber is effectively sealed. The steam-to-chamber valve (S-2) opens, and steam is forced into the chamber to the desired pressure. The number of such vacuum/pressure pulses is determined by the microcomputer controls: see paragraph 3.5.

In the sterilize phase of the cycle, the chamber is again sealed, as described above in the pressure part of the conditioning phase. Steam-to-chamber valve S-2 is thermostatically controlled by temperature switch TS-2 to maintain correct temperature/pressure in the chamber.

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

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

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

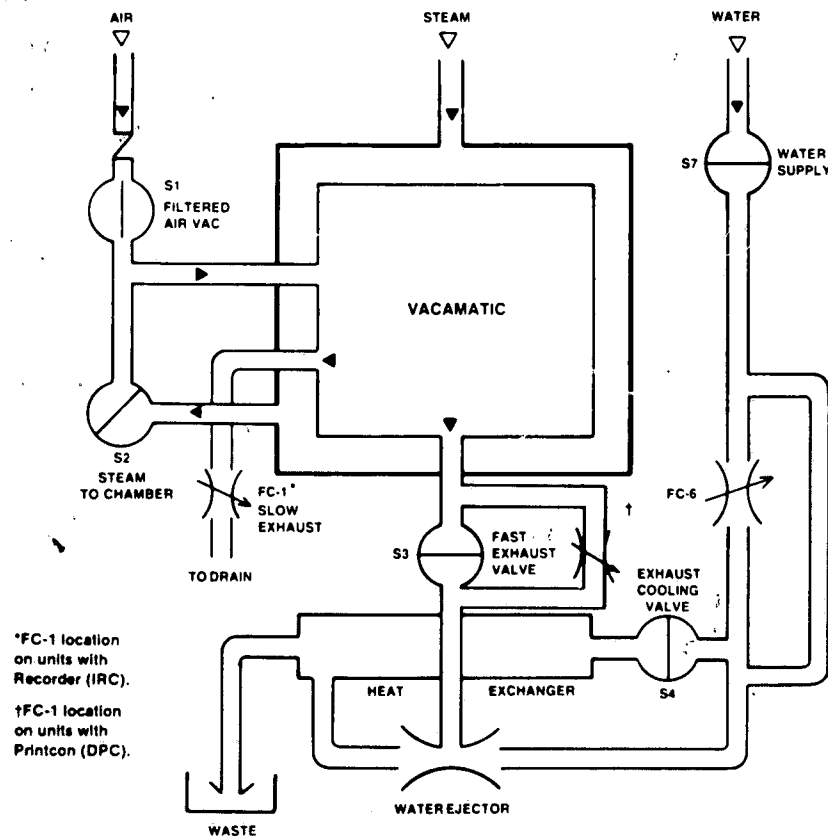


Figure 3-1. PIPING DIAGRAM: VACAMATIC STERILIZER.

3-2

Gravity Cycle

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

During the "purge" at the beginning of the cycle, the air in the chamber is quickly displaced by steam. This is accomplished by simultaneously opening the steam-to-chamber valve (S-2) and the fast exhaust valve (S-3). At the same time, the water supply valve (S-7) and exhaust cooling valve (S-4) are open. Opening these valves accomplishes two purposes: (1) the cooling water is circulated through the heat exchanger (see diagram, Fig. 3-1), cooling the exhaust steam sufficiently to keep the drain temperature below 140° F; (2) simultaneously, the cooling water passing through the water ejector and heat exchanger flows at a rate sufficient to create a suction at the drain, thus increasing the rate of air and steam flow through the chamber. Flow control valve FC-6 is manually adjusted to permit water flow at the optimal rate for the system. Because of flow resistance incorporated into the system design, the chamber pressure will rise to between 5 and 15 psig during this phase of the cycle.

During the "charge" and "sterilize" phases, fast exhaust (S-3), exhaust cooling (S-4), and vacuum water (S-7) valves are closed. The chamber is thus effectively sealed and steam is forced in until desired pressure is reached. Steam-to-chamber valve (S-2) is thermostatically controlled by temperature switches TS-1 and TS-2 to maintain correct temperature/pressure in the chamber.

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

The dry phase of the cycle is initiated by closing the exhaust cooling valve (S-4). All other valves remain as they were during the exhaust phase. The combined effect of the condensation of steam and the suction at the chamber drain is a vacuum in the chamber. A vacuum level of 1-2" Hg is maintained in the chamber.

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

Liquids Cycle

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

3.3 CONTROLS

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

Temperature set point is made manually on the indicator-recorder-controller (IRC). Temperature switches within the IRC maintain chamber temperature for the duration of the sterilizing phase. During the cycles, the controller automatically switches on and off the appropriate solenoid valves to maintain correct chamber pressure/temperature. By means of the slow exhaust needle valve, which is open throughout every cycle, there is a constant bleed of steam from the chamber. Depending on which cycle is operating, the controller will automatically select a slow or fast exhaust at the completion of the sterilizing phase. If a drying time is selected for the Gravity or Prevacuum cycles, a vacuum will be pulled in the chamber during that phase. After the drying period, a vacuum switch senses when the chamber pressure is again near normal, and outputs from the controller actuate the COMPLETE signal and sound the buzzer. During the parts of the cycle when steam is being disposed to waste, water to the condenser is automatically turned on to convert the steam to condensate.

3-3

3.4 CYCLE DESCRIPTIONS

Preparatory actions: WATER and STEAM valves must be opened manually. HI-LO valve (steam regulator) must be set to HI or LO position. Main power switch and control power switch, both on the secondary panel, must be in the ON position. When power is on, cycle selectors are dimly lit. (NOTE: For graphic representations of the cycles and operation of the solenoid valves, see the cycle graphs on pages 6-2, 6-3, and 6-4.)

Liquids Cycle

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

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

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

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

- Solenoid valves S-3 (fast exhaust) S-4 (exhaust cooling) and S-7 (vacuum water) close. When sterilizing temperature (250° F) is reached, temperature switch TS-1 (normally open) closes, CONDITION light goes off and STERILIZE light comes on. The STERILIZE timer begins to count down from the pre-set time. When the chamber temperature rises approximately 4 degrees above set point, temperature switch TS-2 (normally open) closes. The signal, processed by the controller, results in closing steam-to-chamber solenoid valve S-2.

When the chamber temperature decreases to near set point, TS-2 contacts open, and S-2 (steam-to-chamber) again opens. S-2 and TS-2 cycle in this way for the duration of the sterilizing cycle. Recorded chamber temperature should not vary more than +2° from TS-2 set point.

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

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

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

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

Gravity Cycle

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

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

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

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

- Solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling) and S-7 (vacuum water) close. When sterilizing temperature is reached, temperature switch TS-1 contacts close, and the STERILIZE timer begins to count down from the pre-set time. STERILIZE light comes on, CONDITION light goes out. When the chamber temperature rises approximately 4 degrees above set point, temperature switch TS-2 (normally open) closes. The signal, processed by the controller, results in closing steam-to-chamber solenoid valve S-2. When the chamber temperature decreases again to near set point, TS-2 contacts open, and S-2 again opens. S-2 and TS-2 cycle in this way for the duration of the sterilizing cycle.

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

If no DRY time was set ...

- Solenoid valves S-1 (filtered air), S-2 (steam-to-chamber) close. Solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water) open. EXHAUST light comes on, STERILIZE light goes off. Chamber is quickly evacuated. When chamber pressure approaches atmospheric, solenoid valves S-4 (exhaust cooling), S-3 (fast exhaust), S-7 (vacuum water) close. S-1 (filtered) air solenoid valve, opens. COMPLETE light comes on, EXHAUST light goes out, and buzzer begins to sound.

If a DRY time was set ...

- Solenoid valves S-1 (filtered air), S-2 (steam-to-chamber) close. Solenoid valves S-3 (fast exhaust), S-4 (exhaust cooling), and S-7 (vacuum water) open. EXHAUST light comes on, STERILIZE light goes off. Chamber is quickly evacuated. When chamber pressure decreases to 3 psig, pressure switch PS-3 drops out. When this happens, the controller starts the DRY timer. Exhaust cooling valve S-4 closes. Chamber pressure during the drying period will be about 26-28" Hg.

When DRY timer times out, solenoid valves S-3 (fast exhaust) and S-7 (vacuum water) close, and filtered air valve S-1 opens. When chamber pressure is at least 2 Hg, as sensed by vacuum switch VS-2, COMPLETE light comes on, EXHAUST light goes out, and buzzer begins to sound. Solenoid S-3 (fast exhaust) opens.

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

Prevacuum Cycle

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

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

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

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

- Solenoid valves S-1 (filtered air), S-2 (steam-to-chamber) and S-4 (exhaust cooling) close, and 1-minute vacuum timer begins timing. A vacuum is produced in the chamber. When vacuum switch VS-1 senses 10" Hg vacuum in the chamber, and vacuum timer times out, steam-to-chamber valve (S-2) opens

again to admit steam to the chamber to begin re-pressurizing. Simultaneously, solenoid valves S-3 (fast exhaust) and S-7 (vacuum water) close. Chamber is pressurized to 26 psig, as sensed by pressure switch PS-1, and then S-2 again closes, and valves S-3 (fast exhaust), S-4 (exhaust cooling) and S-7 (vacuum water) open to begin evacuating the chamber until a vacuum is again produced. The entire sequence is repeated until three pressure pulses and four evacuations have occurred.

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

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

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

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

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

Cycle Monitoring and Communications

1. If the sterilizer fails to reach sterilizing temperature within 35 minutes for vacuum cycle or within 60 minutes for gravity or liquids cycle, the operator will be notified as follows:

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

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

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

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

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

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

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

3.5 FUNCTIONAL DESCRIPTION OF THE EAGLE MICROCOMPUTER CONTROLLER

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

Power Supply

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.

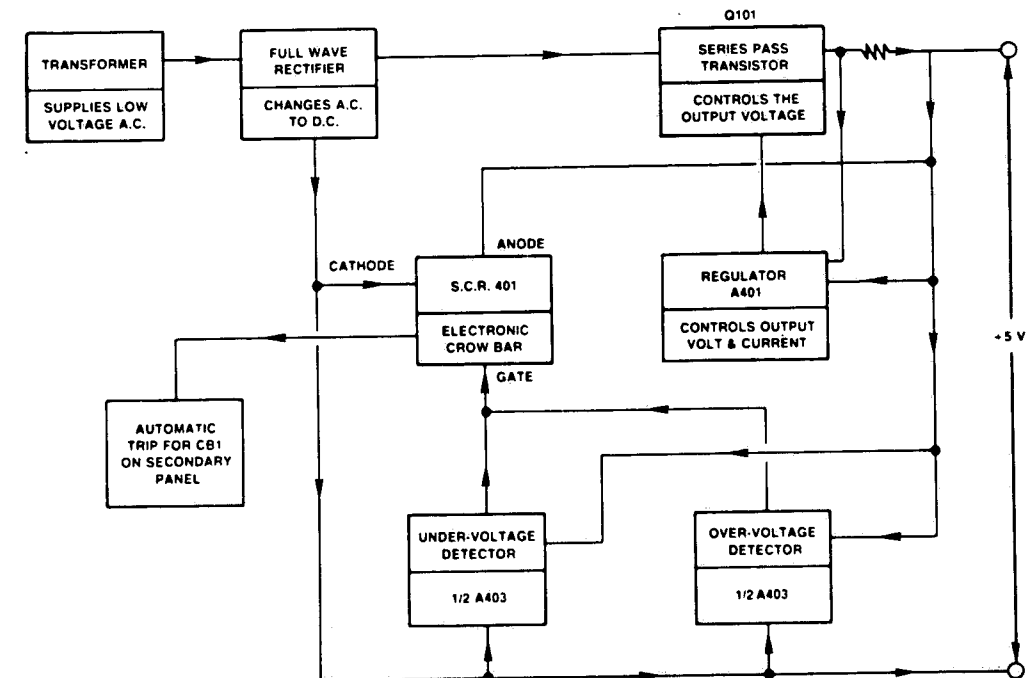


Figure 3-2. EAGLE 5-VOLT POWER SUPPLY.

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 pot R423) feeds back an output to switch Q406 to turn it on. This transistor provides the current through R412 to gate SCR401. SCR401 switches the control switch (CB-1), on the secondary control panel, to off.

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

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.

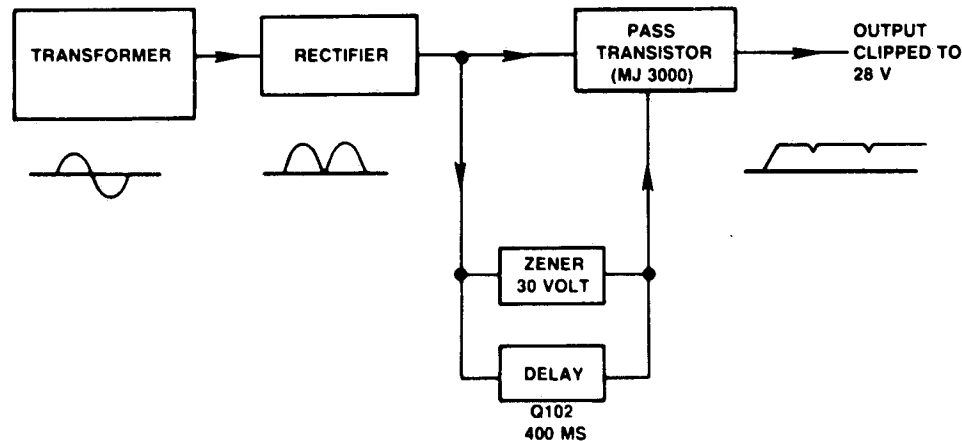


Figure 3-3. EAGLE 28-VOLT POWER SUPPLY.

CPU Printed Circuit Board — 146586 (Fig. 6-5)

The CPU printed circuit board (PCB) is required for all of the Eagle sterilizers. It contains the microcomputer,

A1, support circuits, input buffers and drivers, output buffers and drivers, and the data bus required to communicate with the other two boards. Figure 3-4 is a diagram of the CPU printed circuit board.

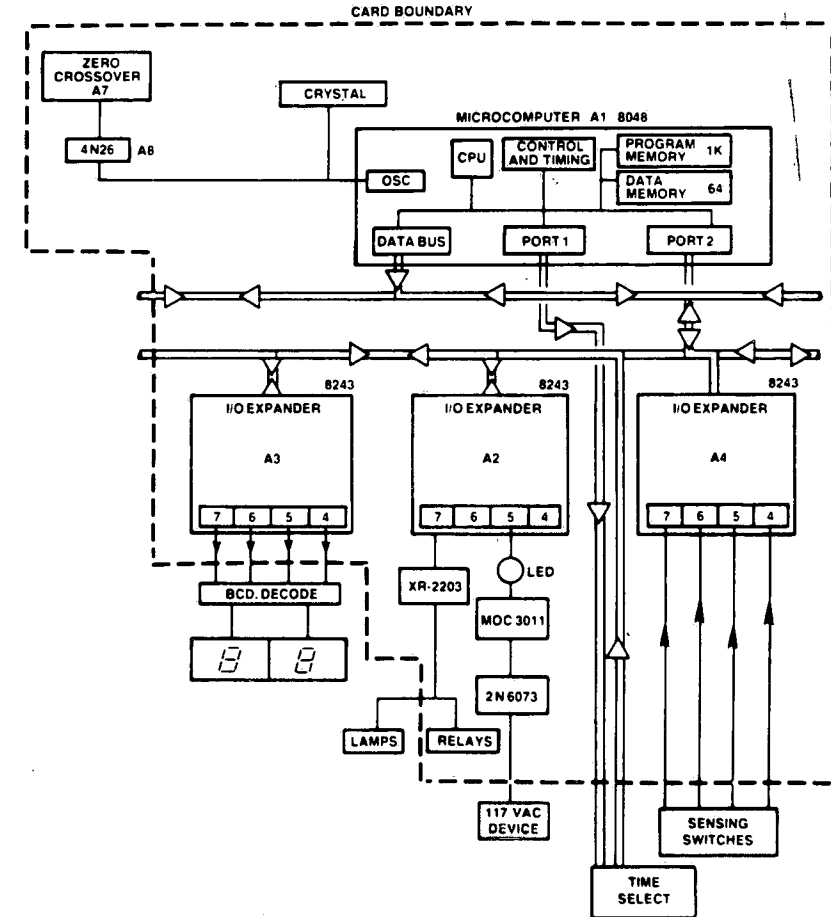


Figure 3-4. CPU PRINTED CIRCUIT BOARD 146586.

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

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

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

- (1) Program memory.
- (2) Data memory.
- (3) Input/output capacity of the 8048.

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

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

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

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

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

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

I/O #1 Printed Circuit Board — 146588 (Fig. 6-7)

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

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

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

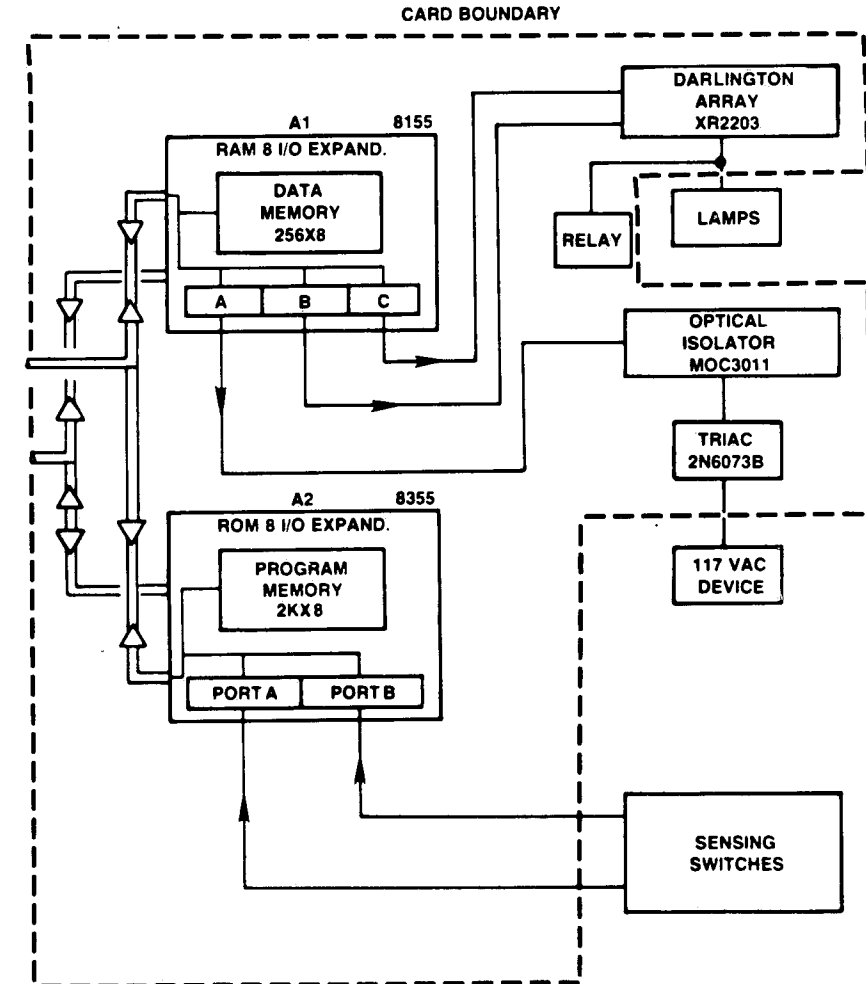


Figure 3-5. I/O #1 PRINTED CIRCUIT BOARD 146588.

PRINCIPLES OF OPERATION (PRINTCON)

3.6 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/vacuum switches**. This is the key difference between **Printcon** and the older system. Maintenance is reduced, and the accuracy of the control system is increased. Other than changes to accommodate these new measuring elements, the piping arrangement of the sterilizer remains the same.

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

Overview of the Printcon Control System

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

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

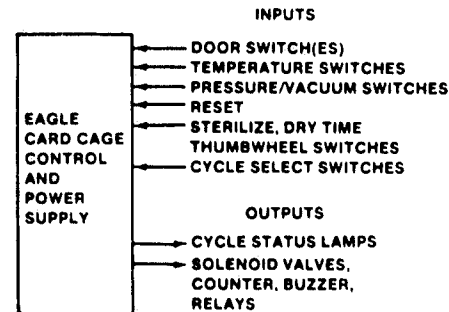
was wired to the control as shown in Fig. 3-7. The control typically opens one or more solenoid valves and monitors a specific switch input line until that line changed from 5 volts to ϕ volts (or from ϕ volts to 5 volts). As an example, during the EXHAUST phase of a gravity steam cycle, the fast exhaust solenoid valve is energized to allow steam to evacuate the chamber. During the time when the chamber pressure is dropping, the control monitors the input line from PS-2 pressure switch to activate (open) at 1 psig. When the switch opens (and the input voltage rises to 5 volts), the control activates the buzzer to end the cycle.

On the Printcon system, the same switch input wires on the card-cage control are now wired to the main Printcon PC board. Instead of a mechanically activated switch opening and closing, however, a Printcon output

transistor saturates (ϕ volts output) or cuts off (5 volts output) in response to a command from the microcomputer IC on the main Printcon PC board (Fig. 3-7). The microcomputer issues this command when it determines that the chamber pressure, vacuum or temperature is equal to the value selected for the set-point (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.

EAGLE with ROUND CHART RECORDER (IRC)



EAGLE with PRINTCON (DPC)

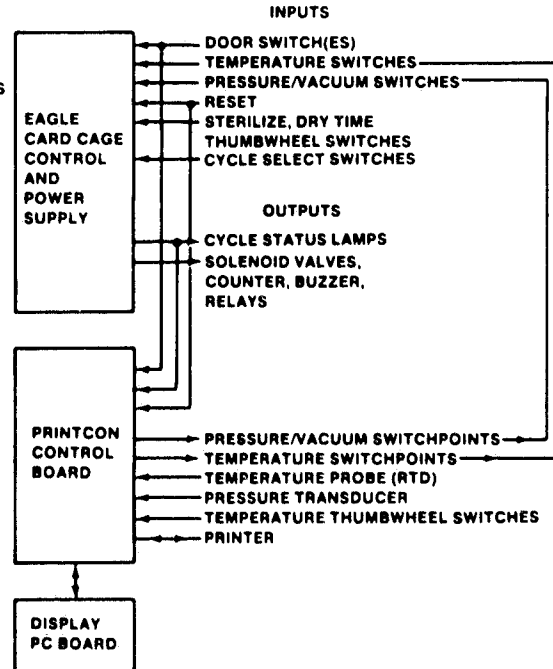


Figure 3-6. CONTROL COMPARISON.

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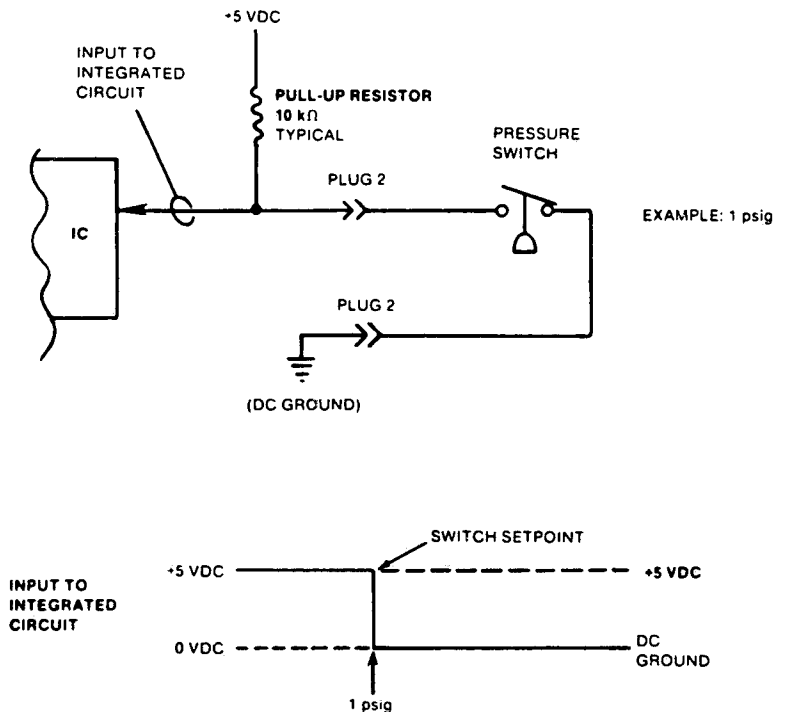


Figure 3-7. TYPICAL SWITCH INPUT.

3-13

E- 10

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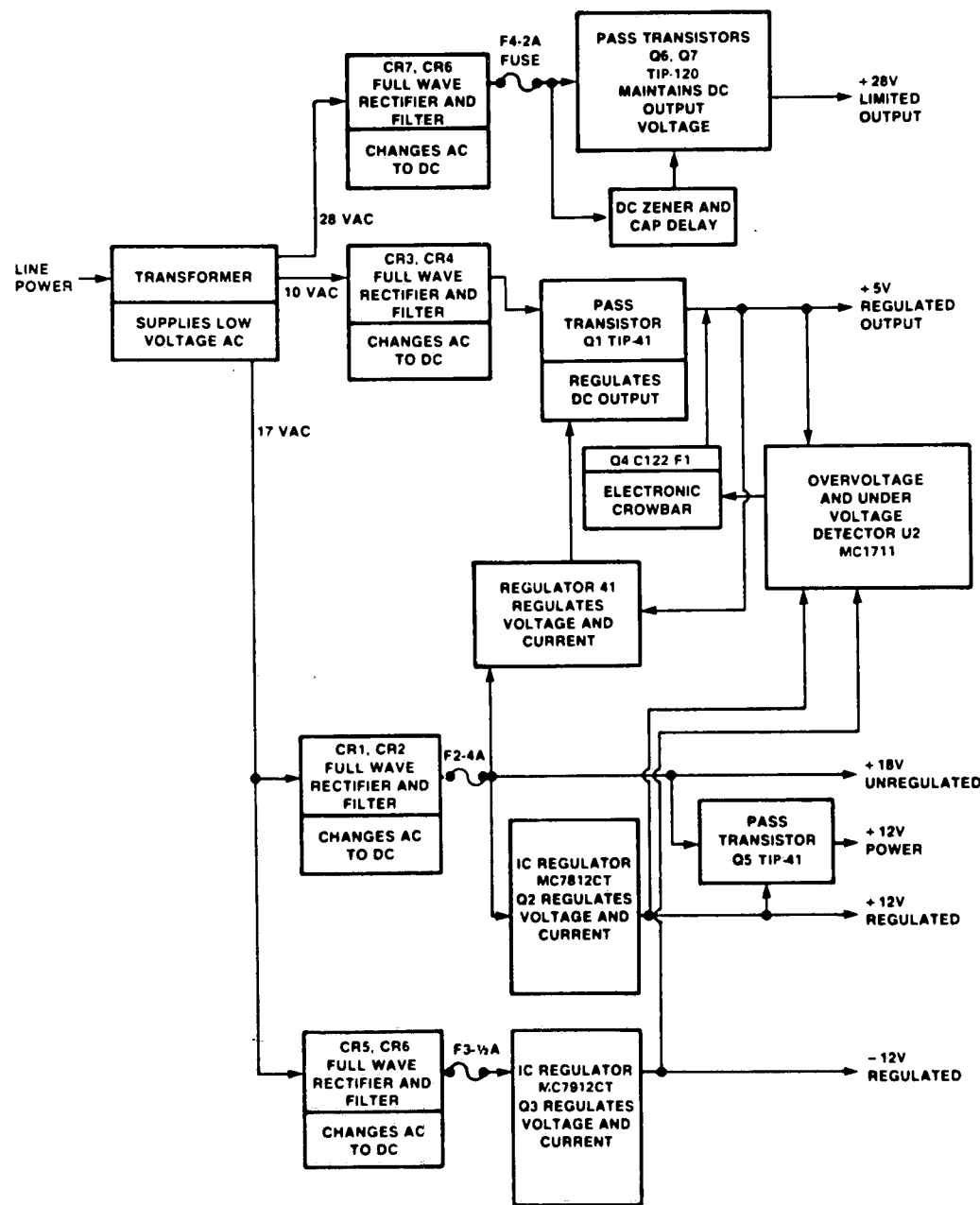


Figure 3-8. PRINTCON REGULATED POWER SUPPLY.

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.)

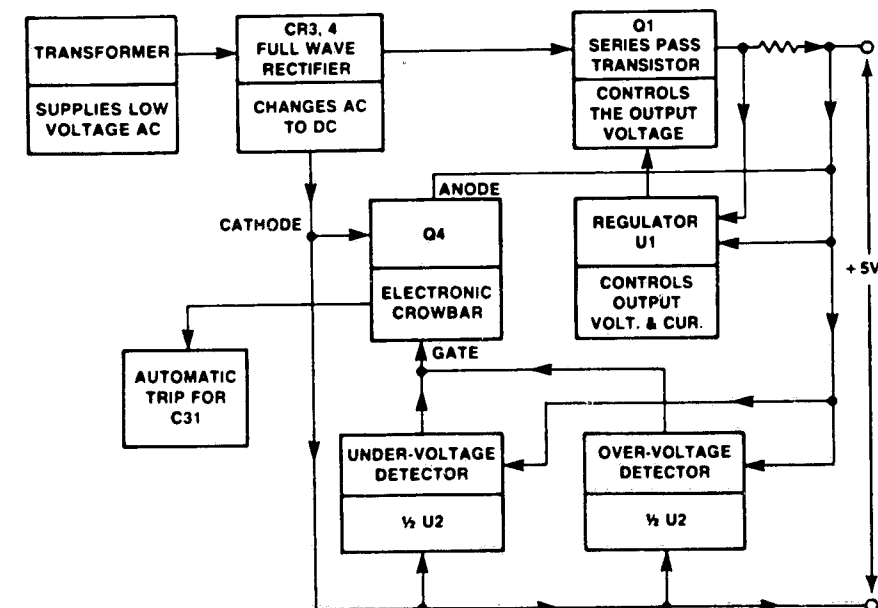


Figure 3-9. PRINTCON 5-VOLT POWER SUPPLY.

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).

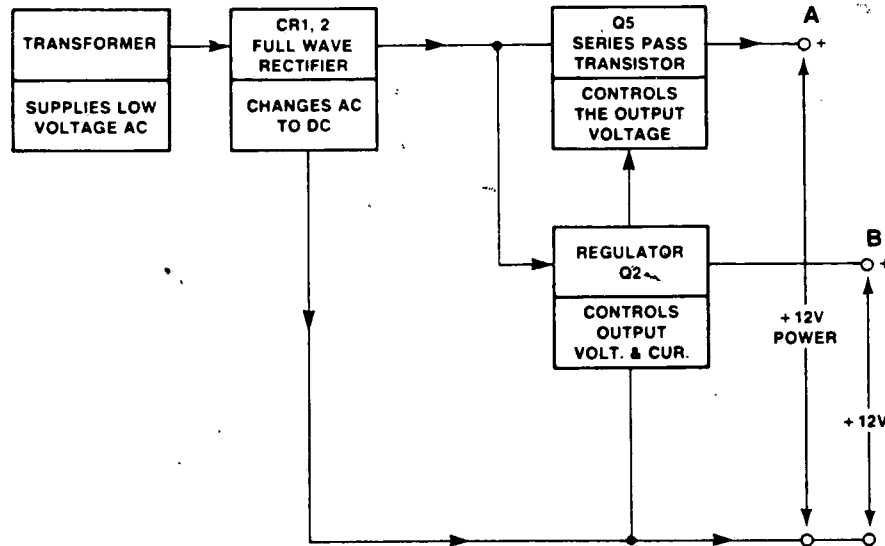


Figure 3-10. PRINTCON 12-VOLT POWER SUPPLY.

3-16

E- 13

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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.)

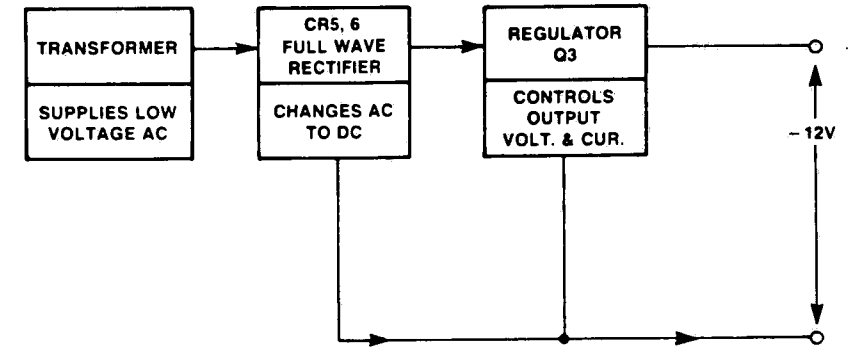


Figure 3-11. PRINTCON -12 VOLT POWER SUPPLY.

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.)

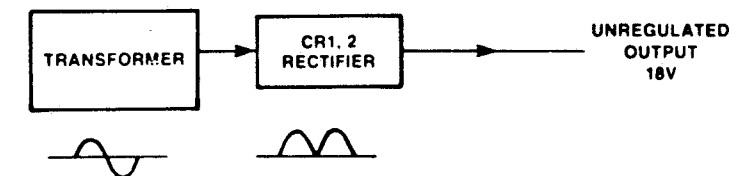


Figure 3-12. PRINTCON 18-VOLT POWER SUPPLY.

3-17

E- 14

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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.)

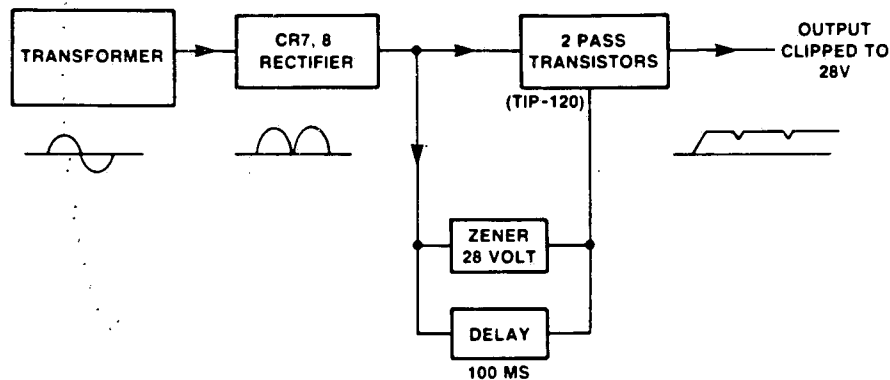


Figure 3-13. PRINTCON 28-VOLT POWER SUPPLY.

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 vacuum, pressure and temperature settings on the Digital Display PC board.
6. Send the temperature, vacuum, and pressure transition point commands to the Eagle controller.

Figure 3-14 is a block diagram of the Digital Printer Control board. As on CPU printed circuit board 146586, a **microcomputer IC** is used to control the sequence of operation of this board. It pulls program instructions from IC's A1, A2 and A5. These last IC's also contain input and output lines for control and monitoring of various devices such as the temperature thumbwheels and digital display.

A **Realtime Clock IC** keeps track of the time and date and sends this information to the microcomputer for display or printing. A small on-board Lithium battery

provides power to the **REAL TIME CLOCK IC** (only) when the sterilizer power is shut off. The battery is not rechargeable and lasts about one year.

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

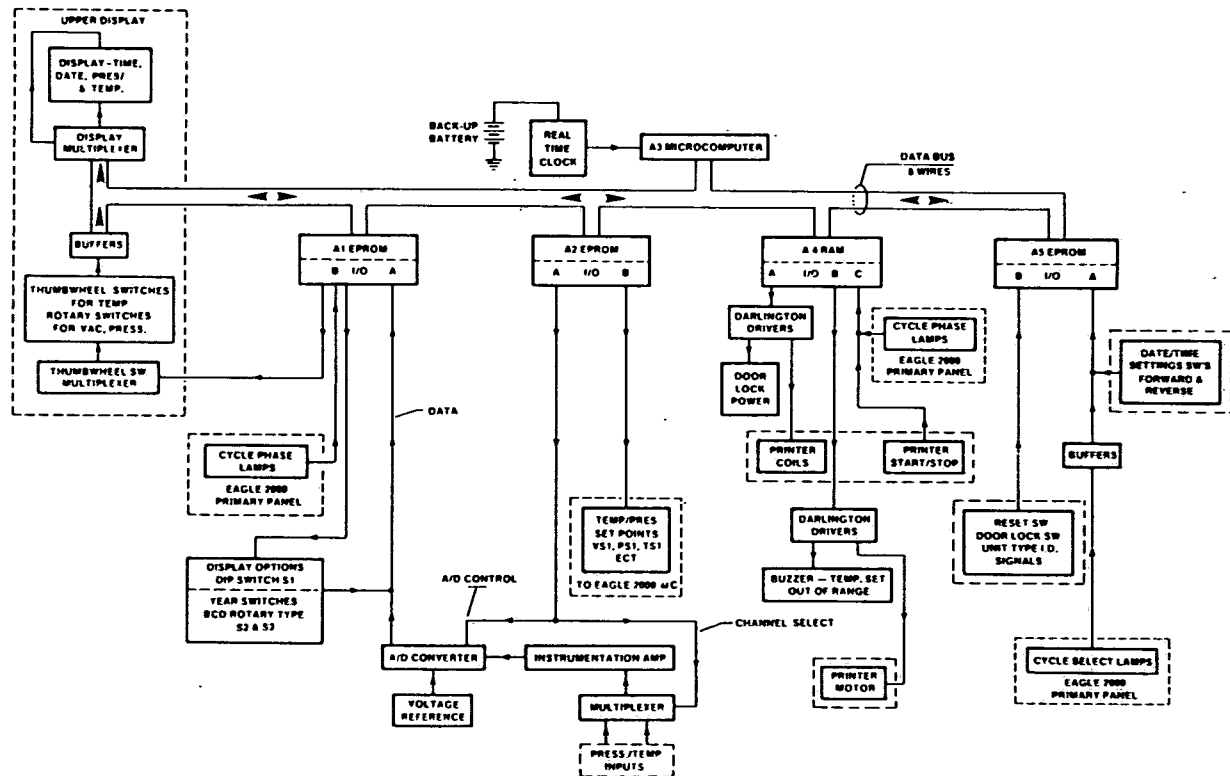
The instrumentation amplifier is a precision IC which boosts the pressure or temperature voltages to levels convenient for the next IC, the **Analog/Digital (A/D) Converter**. This IC converts the linearly varying pressure and temperature voltages (analog voltages) to a 12-level digital code (12 bit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

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

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

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

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



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

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

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

Temperature and pressure input circuits: Temperature is sensed by a **resistive temperature probe**. The probe degree has a resistance of 100 ohms at 0 C, and increases about 0.39 ohms for every degree C that the temperature increases. By connecting the probe as part of a voltage divider circuit, an output voltage exactly related to temperature is obtained. (Figures 3-15 and 3-16.)

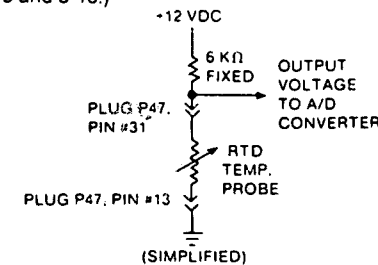


Figure 3-15. TEMPERATURE PROBE SCHEMATIC.

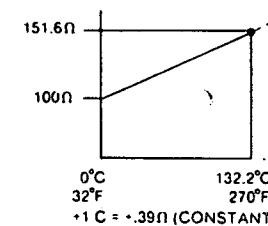


Figure 3-16. TEMPERATURE VS. RESISTANCE CHARACTERISTIC.

The pressure transducer also exhibits a resistance change in response to a pressure change, and is termed a **strain gauge** type. The illustration below shows the internal configuration and output voltage. (Figures 3-17 and 3-18.)

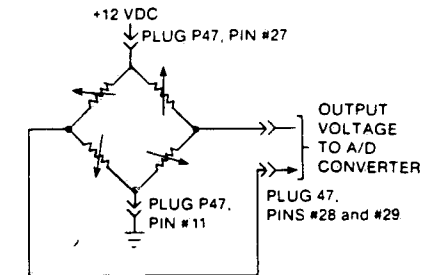


Figure 3-17. PRESSURE TRANSDUCER SCHEMATIC.

Figure 3-17 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 and vacuum measurements in cycle. This same action will occur each time the power is turned ON **with the doors open**. If power is turned ON with the door(s) closed and locked, the control will assume an ambient pressure of 14.7 psia (29.92 Hg. absolute or 0 in. Hg.). The same applies if RESET is pressed with the door(s) closed and locked.

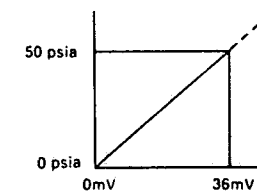


Figure 3-18. PRESSURE VS. TRANSDUCER OUTPUT CHARACTERISTICS.

DIGITAL DISPLAY PC BOARD 146633-081

A block diagram of this PC board is presented in Figure 3-19. The microcomputer presents changeable temperature, pressure, and other information for display to this PC board on the data bus. Note that the data bus is bi-directional, and the microcomputer from

time to time will read the data bus for pressure, vacuum and temperature set-points. The control bus will activate the decoder/driver, latch, or switch select control IC when fresh data is at hand or needed. J45 connector also interfaces the time, date, forward and reverse touch switches on the display panel overlay.

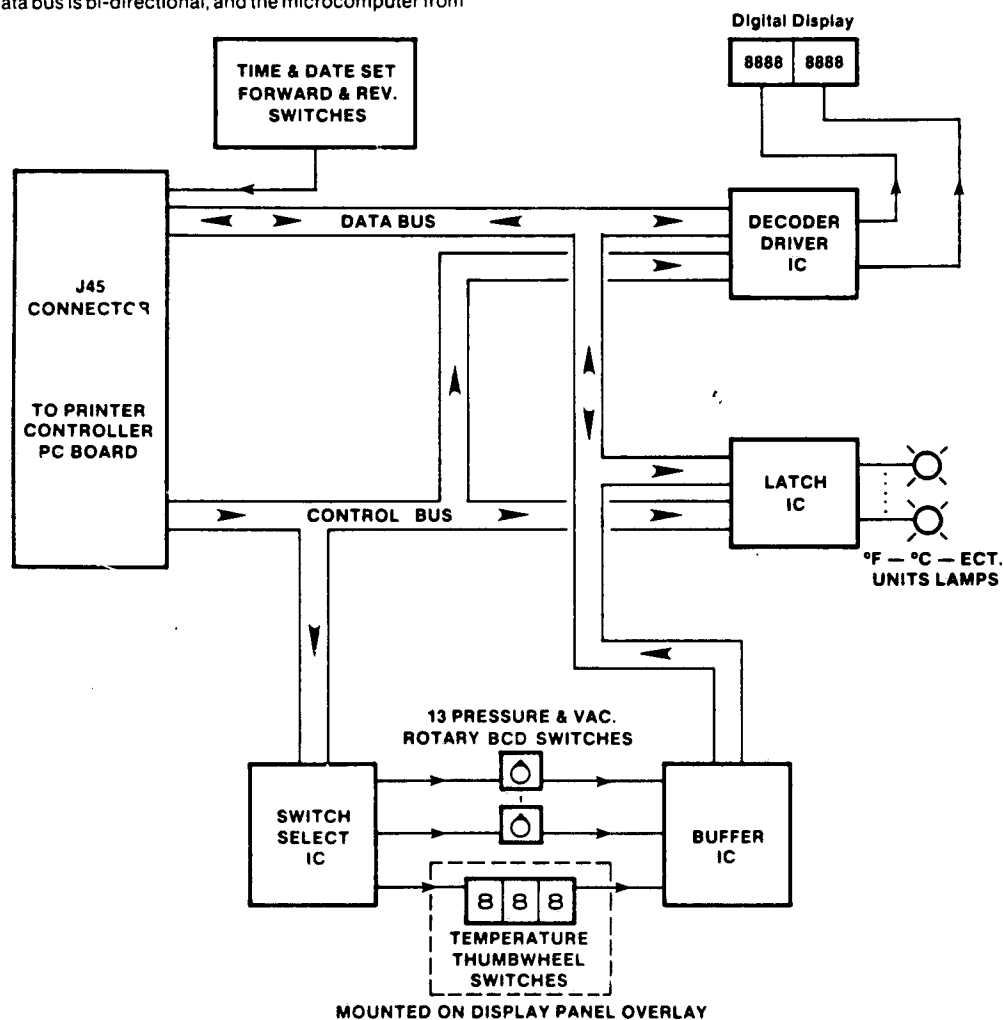


Figure 3-19. DIGITAL DISPLAY BLOCK DIAGRAM.

INTERPRETING THE PRINTED CYCLE RECORDS

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

Printed cycle records for normal steam sterilization cycles are presented in Figures 3-20, 3-21, and 3-22. The letters in the left hand column represent the various phases of the cycle, as follows:

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

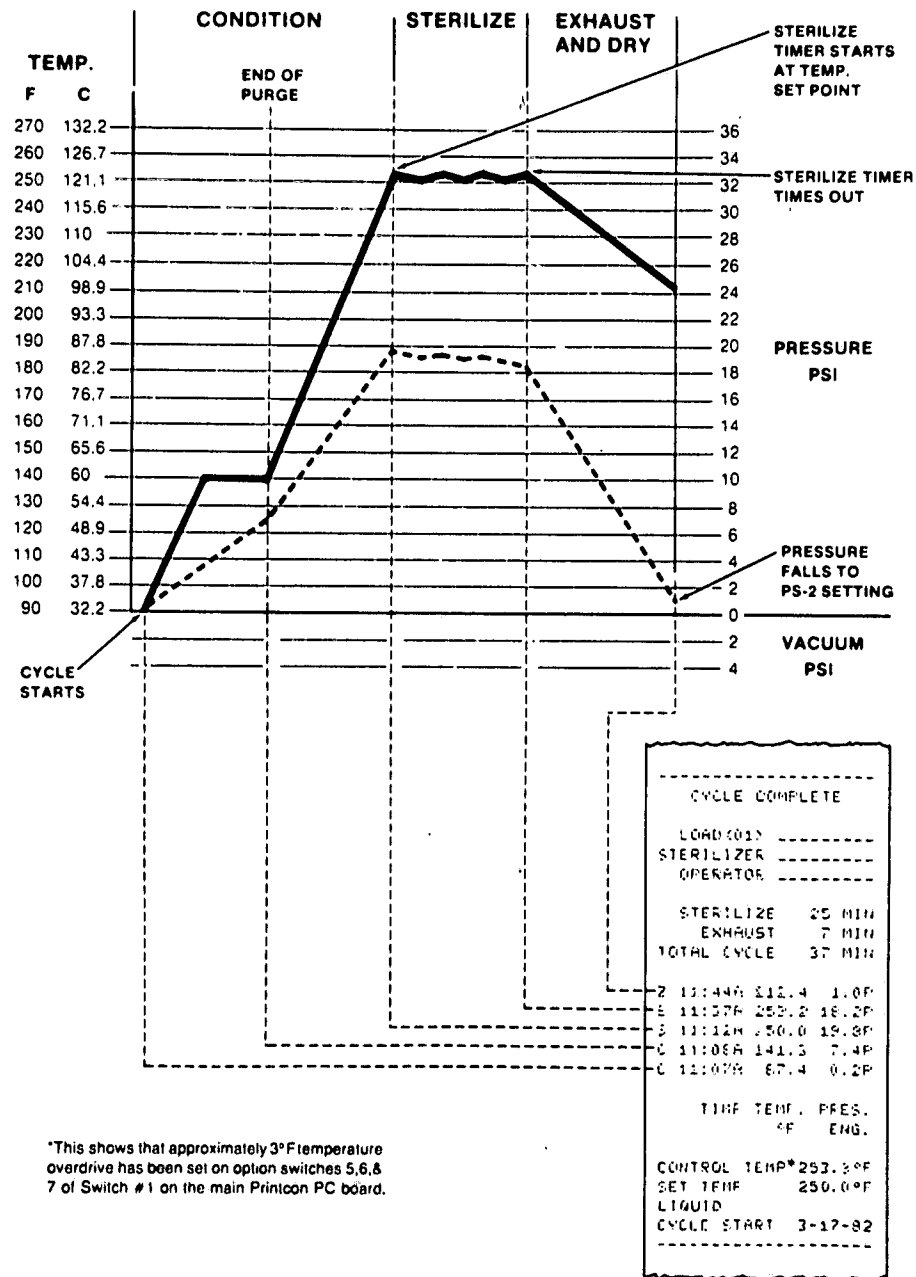
Note how these printed lines correspond to changes in the cycle graph. This graph represents the pressure changes occurring in the chamber.

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

141.3 is the temperature at this time.

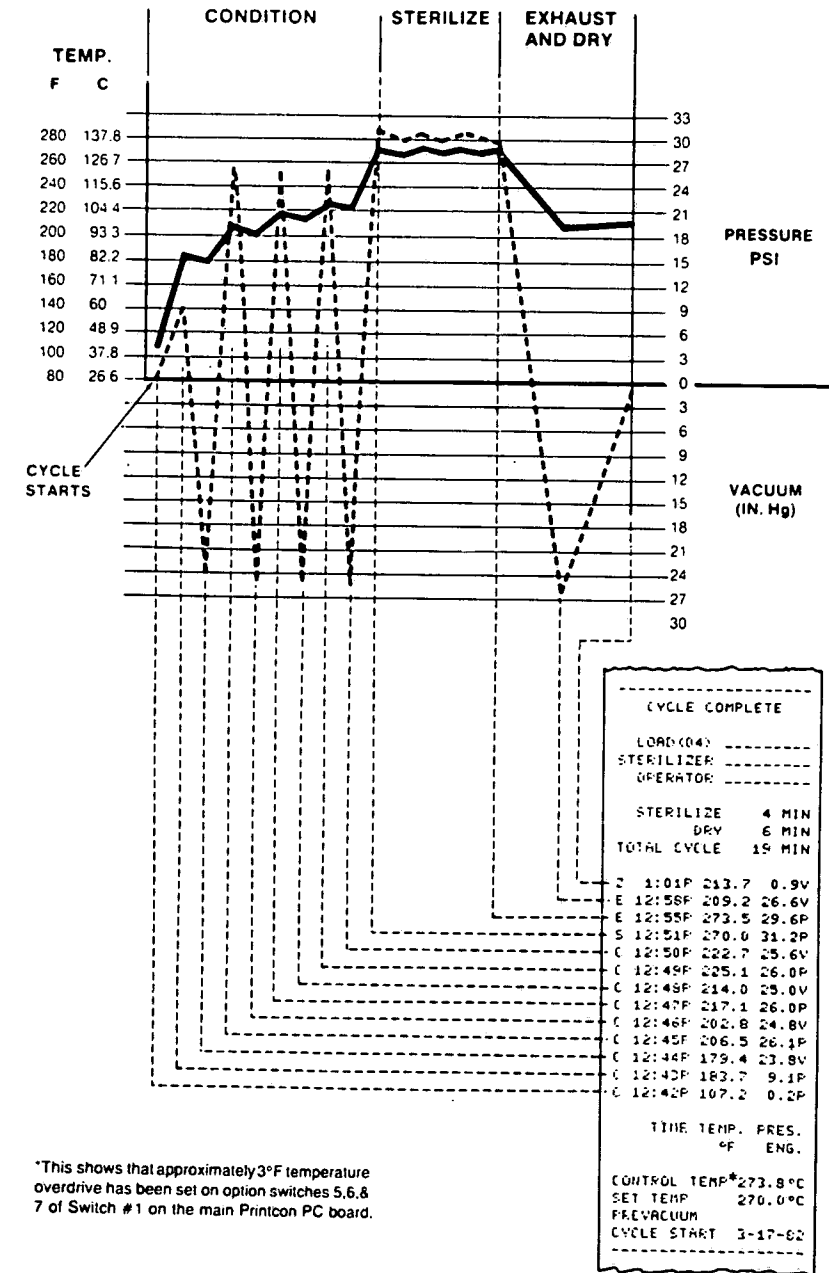
7.4P is the pressure achieved at this time.

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



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

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



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

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

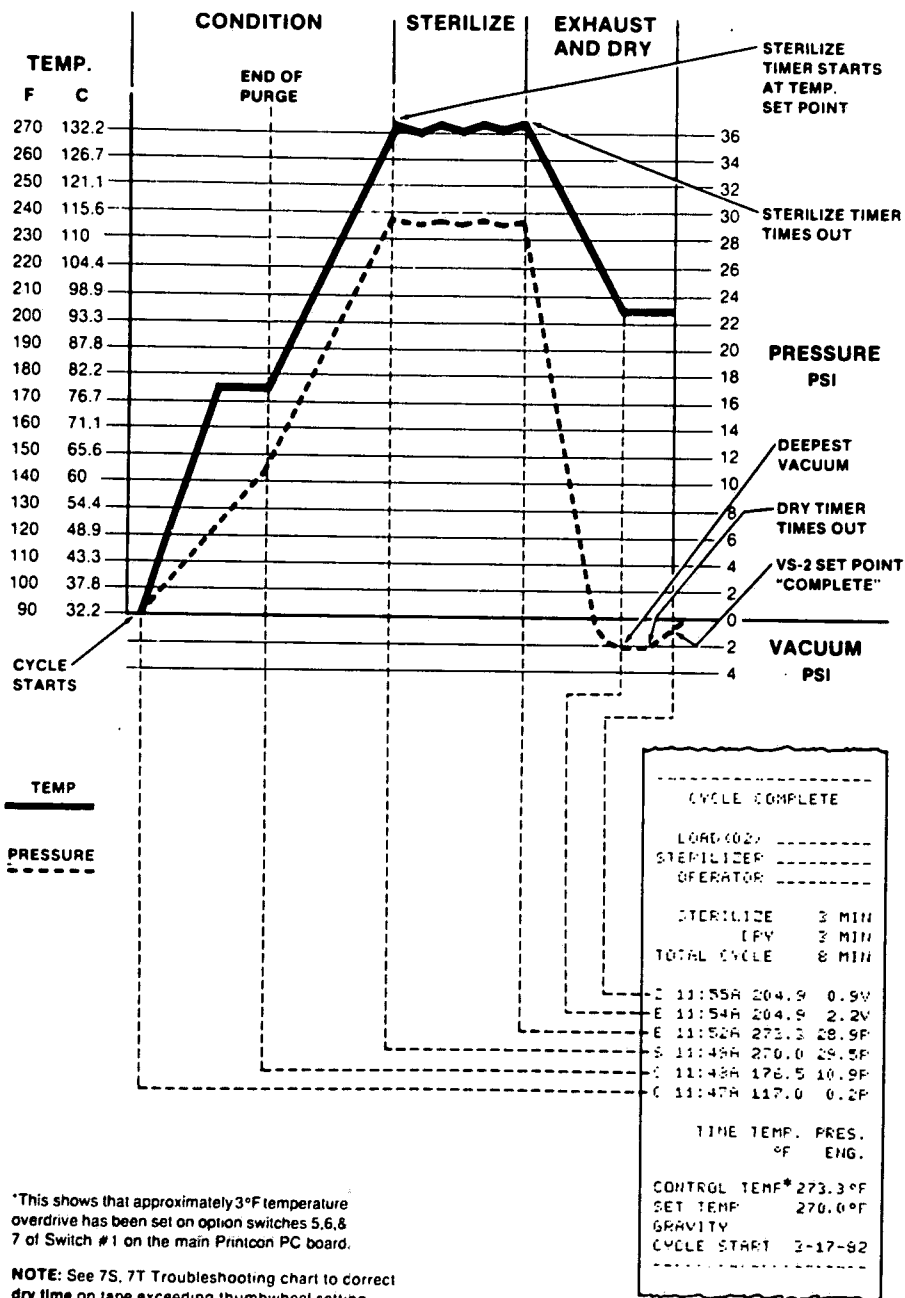


Figure 3-22. PRINTED CYCLE RECORD: Gravity Cycle
(Units with Printcon)

3-26

F- 11

Rev. 6/84

SECTION 4

INSPECTION AND MAINTENANCE

4.1 GENERAL

Maintenance procedures described in Sections 4.2 through 4.5 should be performed at regular intervals, as indicated. The frequency indicated is the minimum, and should be increased if usage of the sterilizer demands. Should a problem occur, refer to Section 6, TROUBLESHOOTING. Figure 4-1, p. 4-2 to 4-4, 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 gauges and recorder or Printcon for cracked or broken glass, or other obvious damage.
3. Open lower access door and check chamber piping for loose fittings or other obvious defects.
4. With manual steam and water valves open, check lines and valves for leaks.
5. Clean lint and dirt from control system components.

4.3 PREVENTIVE MAINTENANCE

Daily

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

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

3. Check that pressure regulator (HI-LO valve) is controlling pressure within acceptable ranges. If it appears to be malfunctioning, see paragraph 7.15.

Weekly

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

2. Flush chamber drain line as follows:

- a. Remove chamber drain screen (Fig. 4-2).
- b. Rinse drain with hot solution of trisodium phosphate (two tablespoons to one quart of water). If the use of trisodium phosphate is objectionable, use instead a solution of 1/2 cup of AMSCO Sonic Detergent (Part P-41591-091) and one quart of hot water.
- c. Wait five minutes.
- d. Then flush with one quart of hot water.
- e. Place the strainer back in the chamber drain.

Monthly

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

Quarterly

1. See Figure 4-3. Unscrew the button in center of chamber door wheel to expose the door post grease fitting. Inject a high-temperature grease such as Neph-tune 7* (Mlgr: 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.

4-1

F- 12

Rev. 6/82

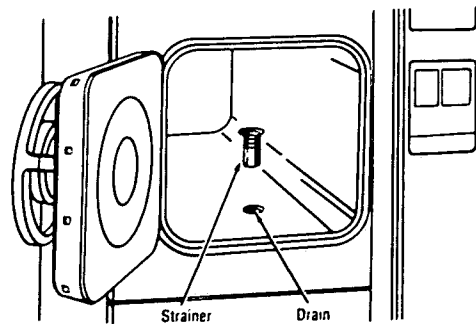


Figure 4-2. LOCATION OF CHAMBER DRAIN STRAINER.

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.

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

- Be sure sterilizer is cool.
- 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.
- Operate the try lever several times. The lever should move freely and return to its closed position after each operation.
- Check safety valve for steam leakage. If valve is leaking, operate the try lever several times to see if the leakage stops.
- If leakage continues, discontinue operation of sterilizer until a qualified technician replaces the leaky safety valve.

Semiannually

- Remove cover from air filter (Fig. 8-31, 2) and inspect. Replace if necessary. Replacement may be required more often if sterilizer is in an area with high dust level.

Yearly

- Open and inspect the thermostatic steam traps.

See paragraph 7.6 for disassembly and cleaning instructions.

4.4 PRINTCON PREVENTIVE MAINTENANCE FREQUENCY

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

- Flush chamber drain _____ 100 cycles
- Change ink cartridge _____ 225 cycles
- Inspect paper take-up _____ 225 cycles
- Check calibration _____ 1800 cycles
- Change battery _____ Yearly
- Set year switches _____ Yearly

4.5 CLEANING

Daily

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

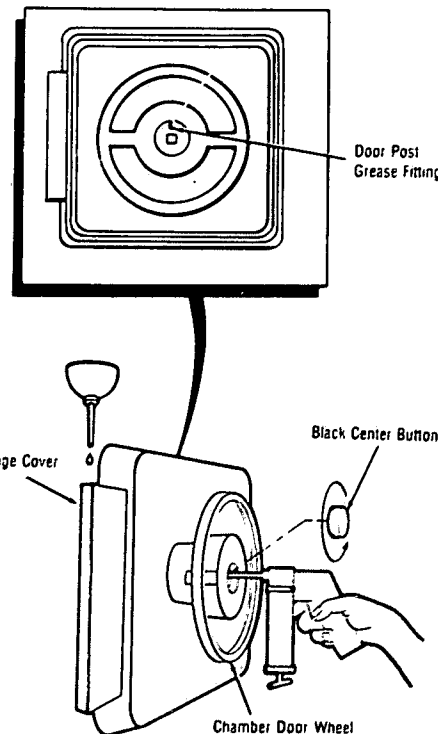


Figure 4-3. LUBRICATING CHAMBER DOOR.

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 and water supply line strainers (Figs. 8-26, 1 and 8-27, 13 respectively) and clean out sediment.

As Necessary

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

1. Use **AMSCO Stainless Steel Cleaner and Polish** on all stainless steel exterior surfaces of both the sterilizer and the loading equipment. Apply the cleaner with a damp cloth or sponge, thoroughly wipe off and then polish with a clean, dry cloth. Use **AMSCO Pry Cleaner** to remove stubborn stains.

2. Use a mild detergent such as **AMSCO Sonic Detergent** (P-41591-091) to wash non-stainless-steel surfaces. Rinse with tap water, using a sponge or damp cloth. Wipe dry with a lint-free cloth.

3. Flush chamber drain if drain line becomes clogged or if spillage occurs during 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 trisodium phosphate is objectionable, use a solution of 1/2 cup of **AMSCO Sonic Detergent** (P-41591-091) and one quart of hot tap water.

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

d. Replace chamber drain strainer.

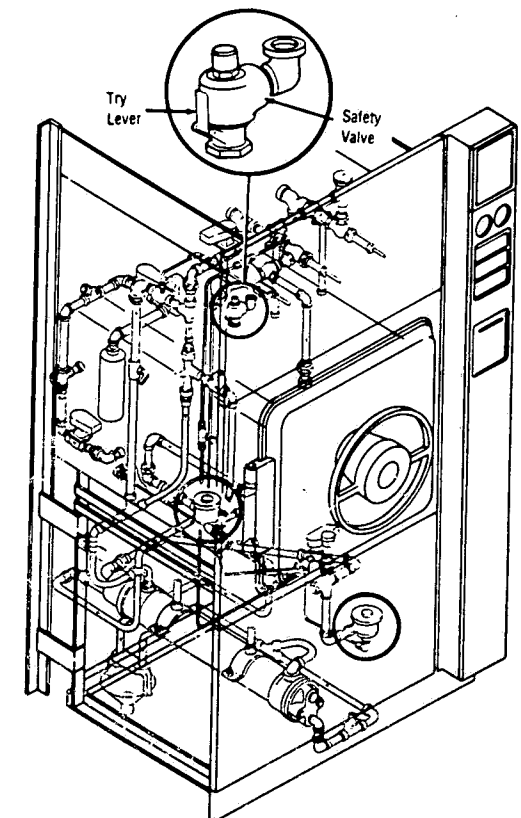


Figure 4-4. LOCATION OF STEAM TRAPS AND SAFETY VALVES.

4.6 PREVENTIVE MAINTENANCE GUIDE

EQUIPMENT: Eagle® 2000 And 2300 Series Small Vacumatic Sterilizers

This form is to be used as a preventive maintenance record and, along with Section 4 instructions, as a guide to performing preventive maintenance.

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

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

4.6 PREVENTIVE MAINTENANCE GUIDE (Continued)

EQUIPMENT: Eagle® 2000 And 2300 Series Small Vacumatic Sterilizers

This form is to be used as a preventive maintenance record and, along with Section 4 instructions, as a guide to performing preventive maintenance.

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

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

4.6 PREVENTIVE MAINTENANCE GUIDE (Continued)

EQUIPMENT: Eagle® 2000 And 2300 Series Small Vacumatic Sterilizers

This form is to be used as a preventive maintenance record and, along with Section 4 instructions, as a guide to performing preventive maintenance.

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

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

SECTION 5

FIELD TEST PROCEDURE (IRC)

5.1 GENERAL

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

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

For Printcon units, see also paragraph 5.12.

NOTE: Voltmeter indications referred to in this procedure are approximations. A variance of 0.5 volts is acceptable.

5.2 TEST INSTRUMENTATION REQUIRED

1. Potentiometer and thermocouple leads.
2. Calibrated compound test gauge (30" vacuum and 100 psig).
3. Calibrated absolute pressure gauge (0-100 mm Hg) with ball valve.
4. Voltmeter or LED test light.
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.

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

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

TABLE 5-1. STERILIZER CONNECTIONS

Plumbing Connections	Nominal at Connection Point Pipe Size	Pressure (Dynamic) Range
Steam Supply	3/8 N.P.T.	50-80 psig
Cold Water	3/4 N.P.T.	30-50 psig
Waste	1-1/2 O.D. Funnel	flow capacity

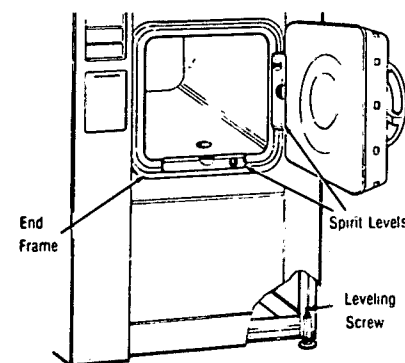


Figure 5-1. LEVELING THE STERILIZER.

Electrical Connections

Volts	Phase	Frequency	Amps
115	1	60 Hz	5

5.4 ADJUSTMENT OF COOLING WATER VALVES AND SLOW EXHAUST VALVE (FIG. 5-2)

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

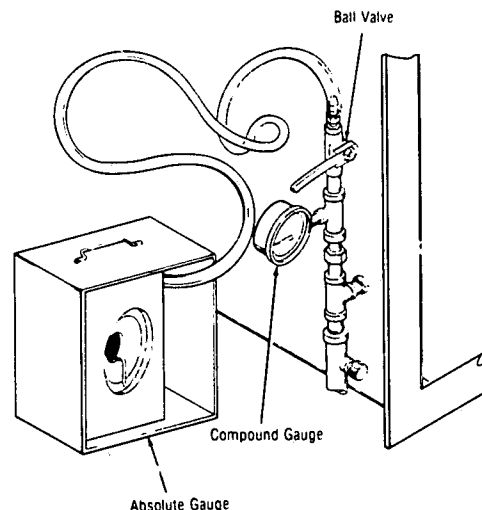


Figure 5-3. GAUGE INSTALLATION.

5.5 INSTALLATION OF POTENTIOMETER LEADS

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

5.6 INSTALLATION OF PRESSURE GAUGES

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

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

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

5-2

G- 5

Rev. 6/84

5.7 DOOR SWITCH ADJUSTMENT

1. Connect ohmmeter between common and normally-open contacts on door switch.

2. Remove center disc. Then, using a torque wrench on the steam lock clutch rod, close and lock door to approximately 20 ft lbs torque for 16x16 door and 24 ft lbs torque for a 20x20 door. The DOOR UNLOCKED light on primary panel should go out. See Figure 5-4.

3. Turn door switch adjusting screw (Figure 5-5) clockwise until switch is actuated (indicated by continuity on meter or meter reading of zero).

NOTE: Clockwise rotation should be sufficient to consistently actuate switch when normal operator pressure is used.

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

5. Check that switch actuates before torque reaches maximum.

6. If switch does not actuate before reaching maximum torque, repeat step 3.

7. Open door — replace center button.

NOTE: If door switch adjustment procedure is being made on a cold sterilizer, the adjustment must be rechecked after the sterilizer is hot to verify the proper actuation of the door switch.

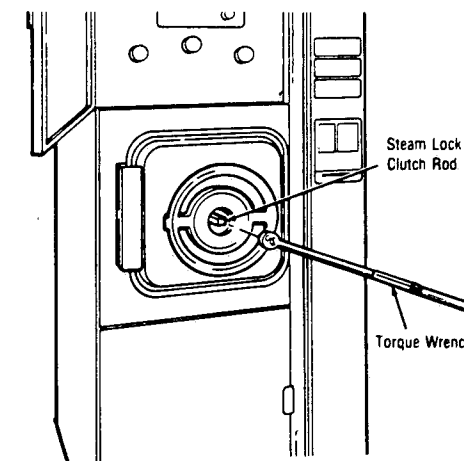


Figure 5-4. LOCKING DOOR TO CORRECT TORQUE.

5.8 SAFETY VALVE TEST

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. Jacket must be at operating pressure (33 psig).

2. Operate try lever for 3 seconds. Allow to snap shut.

3. Visually observe for leakage. If leakage occurs, repeat step 2 above. If leakage continues, replace valve.

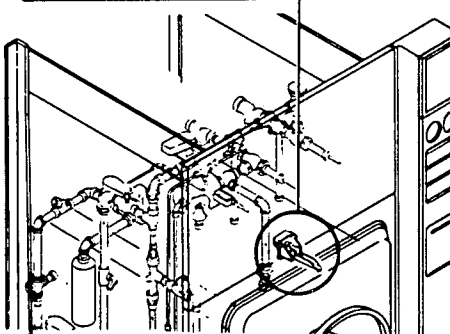
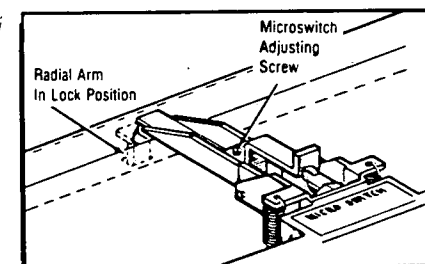


Figure 5-5. DOOR SWITCH ADJUSTMENT.

5-3

764084

G- 6

Rev. 5/88

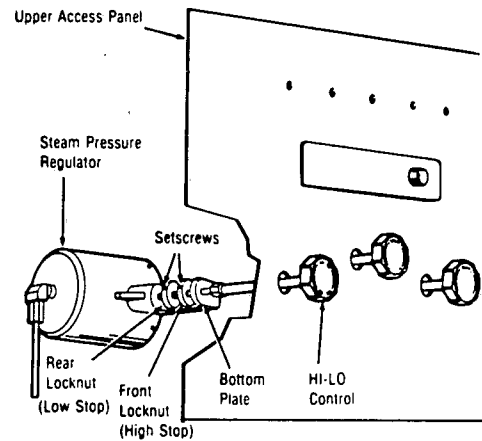


Figure 5-6. ADJUSTING PRESSURE REGULATOR.

5.9 ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES

1. Adjust steam pressure regulator to control jacket pressure at 20 psig. After adjustment is made, lock low stop. See Figure 5-6.
2. Close slow exhaust valve and then open slow exhaust valve 2.5 turns. See Figure 5-2.
3. Close and lock door.
4. Set orange (top) pointer on recorder to 250° F (121° C).
5. Set sterilize time to 1 minute and dry time to 0 minutes. **NOTE:** Refer to cycle graph for liquids cycle.
6. Depress the LIQUIDS cycle button.
7. After the sterilize phase has been completed and control has advanced to slow exhaust, observe calibrated compound pressure gauge. When chamber pressure reaches 3 psig, adjust PS-3 (Figure 5-7) to open the fast exhaust valve (S-3) (LED-12). When chamber exhausts to 1 psig, adjust PS-2 to turn on the COMPLETE light and the buzzer (LED-18).
8. Press reset button on control panel and initiate another LIQUIDS cycle as in step 6.
9. When cycle advances to slow exhaust, observe the compound pressure gauge to assure proper setting of PS-3 at 3 psig, and PS-2 at 1 psig.

NOTE: Make sure PS-3 and PS-2 function properly before proceeding to the next step.

10. Increase jacket steam pressure to approximately 24 psig.

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

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

12. Set sterilize time to 1 minute and dry time to 3 minutes.

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

14. Depress the PREVACUUM cycle button.

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

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

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

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

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

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

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

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

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

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

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

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

5.10 CHAMBER VACUUM LEAK TEST

1. Close and lock door.
2. Attach a manually operated valve to the air intake in place of the vacuum break filter. Set manual valve fully closed.
3. Set the DRY timer to maximum time setting. Set the STERILIZE timer to 1 minute.
4. Initiate a PREVACUUM cycle, allowing the cycle to progress to the vacuum drying phase.
5. Open the ball valve to the absolute pressure gauge and observe the gauge for the vacuum stall point. Vacuum should reach at least 40 mm absolute. If 40 mm absolute cannot be reached within 15 minutes, examine system for leaks.
6. After vacuum stall point is reached, turn power switch to OFF position.
7. Slowly bleed in air from the manual valve installed in place of air filter until 50 mm absolute pressure is reached. Tightly close valve.

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

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

NOTE: When sterilizer does not pull proper vacuum, yet no leaks detected using chamber vacuum leak test, check piping between vacuum pump and chamber drain line check valve for leaks (see Fig. 5-8). During a chamber vacuum leak test, check valve closes isolating downstream piping from test. If leak is present in piping between check valve and pump, sterilizer will not pull proper vacuum; however, this leak is not detected using leak test. Failures in this section of piping are usually due to cracked fittings or leaking joints. Visually inspect for these problems.

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

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

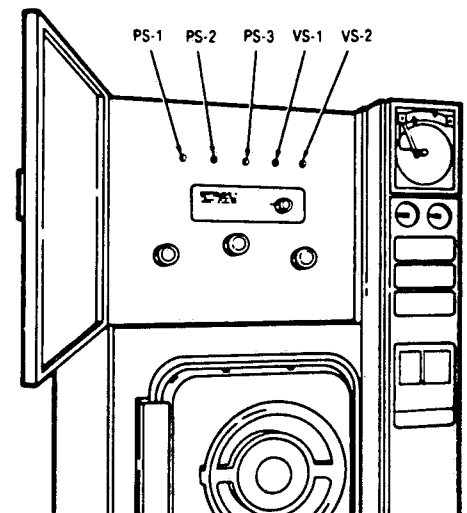


Figure 5-7. ADJUSTMENT OF PRESSURE AND VACUUM SWITCHES.

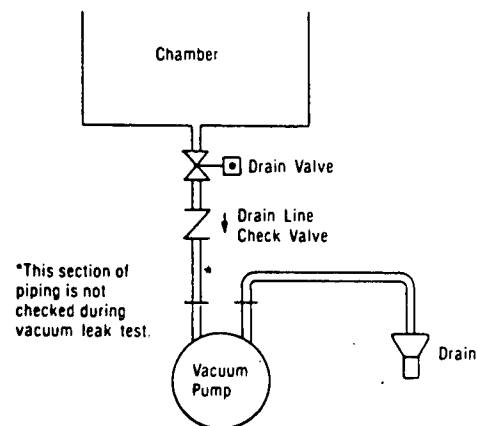


Figure 5-8. VACUUM LEAK TEST PIPING.

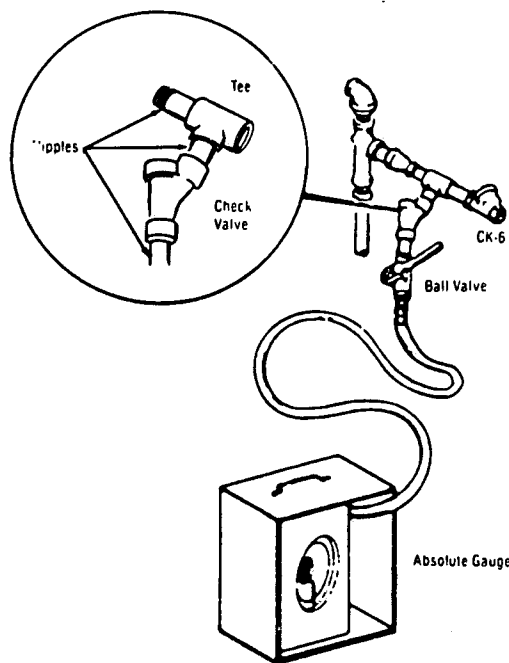


Figure 5-9. EJECTOR VACUUM TEST GAUGE INSTALLATION.

5.10A EJECTOR VACUUM TEST

1. Connect ball valve and absolute pressure gauge between ejector and check valve (CK-6). See Figure 5-9.

NOTE: If absolute gauge is not available, a good compound gauge can be substituted.

2. Close and lock door.

3. Proceed to static test as follows:

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

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

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

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

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

f. Ejector, under normal conditions, should pull 10-35mm (27" Hg) using this test.

g. If ejector fails test, check water temperature (ensure 85 F or less) and water pressure (ensure 30-50 psi). To check water pressure, install gauge at 1/8-inch plugged opening (see Fig. 5-10) on solenoid valve (S4).

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

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

4. Proceed to dynamic test as follows:

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

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

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

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

e. Return piping to original configuration.

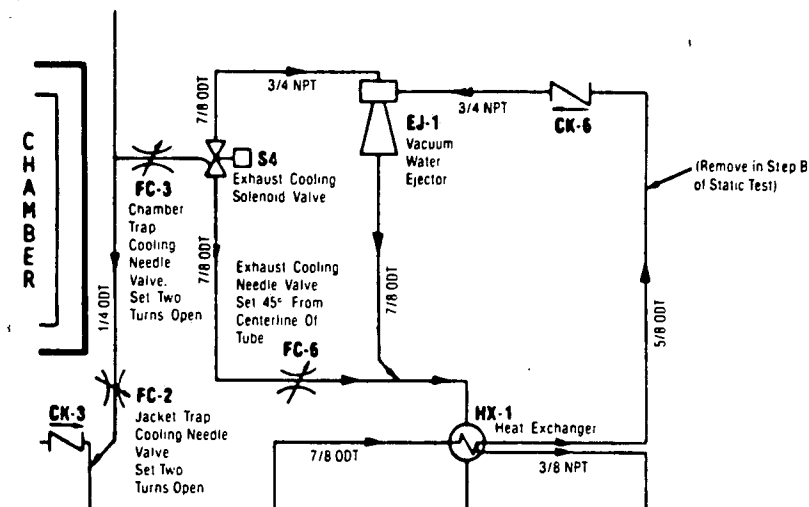


Figure 5-10. EJECTOR VACUUM TEST PIPING.

5.11 OPERATIONAL CHECKS

TABLE 5-2: LIQUIDS CYCLE

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

Initial Setup:

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

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

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

Phase	Sterilizer Condition	Time		Reference: TROUBLE- SHOOTING CHART, Item no:
		16x16	20x20	
Charge Jacket	Jacket must charge to 20 + 1, -0 psig			2.H
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to 5-15 psig Solenoid valves S-2 (D-13), S-3 (D-12), S-4 (D-16), S-7 (D-14) open.	1 min.	1 min.	3.A., 3.B., 3.C.
Come-up time Panel Light: CONDITION	Solenoid valve S-3 (D-12), S-4 (D-16), S-7 (D-14) close. Chamber temperature rises to 250° F, pressure to 15-18 psig	4 + 2 min.	5 + 2 min.	3.A., 3.C.
Sterilize Panel Light: STERILIZE	Chamber temperature at 252-256° F, pressure at about 20 psig. Solenoid valves S-2 (D-13) cycles to maintain pressure/temperature	20:00 — 20:15 min.	20:00 — 20:15 min.	3.D., 3.E., 3.F., 3.G.
Slow Exhaust Panel Light: EXHAUST	Solenoid valve S-2 (D-13) closes. Chamber exhausts slowly through slow exhaust valve. At chamber pressure 2-3 psig, S-3 (D-12) opens for fast exhaust for remaining steam	4-6 min.	4-6 min.	5.A.
Complete Panel Light: COMPLETE	At 1 psig, buzzer (D-18) sounds for 90 seconds or until door is opened. When door is opened, S-3 closes. WARNING HOT LIQUIDS light comes on and blinks for ten minutes	1 min	1 min	6.A., 6.B.

*LED NO. ON CONTROL BOARD

5-8

G- 11

Rev. 4/86

TABLE 5-3: GRAVITY CYCLE

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

Initial Setup:

1. Follow steps for "Initial Setup" of Liquids Cycle, except set both STERILIZE time to 4 minutes and DRY time to 5 minutes. Temperature should be set to 270 F (132 C).
2. Initiate a GRAVITY cycle.
3. This cycle should be identical to the LIQUIDS cycle until the EXHAUST phase of the cycle is reached.

Phase	Sterilizer Condition	Time		Reference: TROUBLE- SHOOTING CHART, Item no:
		16x16	20x20	
Charge Jacket	Jacket must charge to 20 + 1, -0 psig.			2.H
Condition (Purge) Panel Light: CONDITION	Chamber pressurizes to 5-20 psig Solenoid valves S-2 (D-13), S-3 (D-12), S-4 (D-16), S-7 (D-14) open.	1 min. ±5 sec.	1 min. ±5 sec.	3.A., 3.B., 3.C.
Come-up time Panel Light: CONDITION	Solenoid valve S-3 (D-12), S-4 (D-16), S-7 (D-14) close. Chamber temperature rises to 270 F, pressure to 30 ±3 psig.	4 - 1 min.	5 - 1 min.	3.A., 3.C.
Sterilize Panel Light: STERILIZE	Chamber temperature at 272-276 F, pressure at 30 psig Solenoid valve S-2 (D-13) cycles to maintain pressure/temperature	4 min. +10 sec.	4 min. +10 sec.	3.D., 3.E., 3.F., 3.G.
Fast Exhaust Panel Light: EXHAUST	Solenoid valves S-1 (D-15) and S-2 (D-13) close Solenoid valves S-3 (D-12), S-4 (D-16) and S-7 (D-14) open Chamber pressure decreases to 3 psig, the DRY timer begins			4.A., 4.B.
Dry Panel Light: EXHAUST	Solenoid valve S-4 (D-16) closes. Chamber continues exhausting until a vacuum is pulled on the chamber. Vacuum will be about 24" Hg.	5 + 1 min.	5 + 1 min.	4.A., 4.B.
Complete Panel Light: COMPLETE	Solenoid valves S-3 (D-12), S-7 (D-14) close. S-1 (D-15) opens. When Chamber pressure reaches 1-2" Hg, buzzer (D-18) sounds for 90 seconds or until door is opened.	1 min.	1 min	6.A., 6.B.

5-9

G- 12

Rev. 4/86

TABLE 5-4: PREVACUUM CYCLE

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

Initial Setup:

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

Phase	Sterilizer Condition	Time		Reference: TROUBLE- SHOOTING CHART, Item no:
		16x16	20x20	
Charge Jacket	Jacket must charge to 33 + 1 psig			2.H.
Condition (Purge) Panel Light CONDITION	Chamber pressurizes to 5-20 psig. Solenoid valves S-2 (D-13), S-3 (D-12), S-4 (D-16), S-7 (D-14) open	1 min. ±5 sec	1 min. ±5 sec.	3.A., 3.B., 3.C.
Vacuum/Pressure Pulses Panel Light: CONDITION	After one minute elapses and correct vacuum is reached (25" Hg. for 16x16 units, 20" Hg. for 20x20 units) S-2 (D-13) opens, and S-3 (D-12) and S-7 (D-14) close, chamber is repressurized to 26 psig. Second vacuum is then drawn. Check IRC chart to verify a total of four chamber evacuations and three steam pulses, excluding initial pressure rise, for this phase. Phase ends with a vacuum.	1-2 min. for vacuum, 1 min. for pressure	1-2 min. for vacuum, 1 min. for pressure	3.A., 3.B., 3.C.
Come-up time Panel Light: CONDITION	S-3 (D-12) closes and S-2 (D-13) opens. Chamber pressure increases 26 + 2 psig, 270° F.	1 min. maximum	1 min. + 10 sec maximum	3.A., 3.C.
Sterilize Panel Light STERILIZE	Solenoid Valve S-1 (D-15) opens. Chamber at 272°-276° F., pressure at 27-32 psig. S-2 (D-13) cycles to maintain temperature/pressure.	4 min. + 10 sec	4 min. + 10 sec.	3.D., 3.E., 3.F., 3.G.,
Fast Exhaust Panel Light EXHAUST	Solenoid valves S-1 (D-15), S-2 (D-13) close. S-3 (D-12), S-4 (D-16), S-7 (D-14) open. Chamber pressure decreases to 3 psig.	1 min.	1 min.	4.A., 4.B.
Dry Panel Light: EXHAUST	Solenoid valve S-4 (D-16) closes. Chamber continues to be evacuated to 25" Hg. DRY timer begins counting down.	6 min maximum	6 min maximum	4.A., 4.B.
Complete Cycle Light COMPLETE	Solenoid valves S-3 (D-12), S-7 (D-14) close, S-1 (D-15) opens. When chamber pressure reaches 0-1" Hg, buzzer (D-18) sounds for 90 seconds or until door is opened. Solenoid valve S-3 (D-12) opens until door is opened.	1 min maximum	1 min maximum	6.A., 6.B.

TABLE 5-5: MANUAL OPERATION

Initial Setup:

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

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



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SMALL STERILIZERS VACAMATIC
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5/88

1 of 5



FIELD TEST PROCEDURE (PRINTCON)

5.12 PROCEDURE

Vacumatic Models

1. Check for proper installation as per paragraph 5.3.

2. Adjust cooling water valves and slow exhaust valve as per paragraph 5.4 and Fig. 5-2. NOTE: The slow exhaust setting is preliminary.

3. Install potentiometer thermocouple lead in metal-to-metal contact with the temperature probe (from 1/2" to 1-1/2" of the tip). Run the lead through the door (between the door gasket and end ring).

4. Install a calibrated absolute pressure gauge and manual shut-off valve to the chamber gauge fitting after removing the compression fitting and reducing bushing (Fig. 8-53, 15 and 17). This gauge should have 1 mm. Hg. resolution and a 0-100 mm. Hg. range.

5. Verify door switch adjustment as per paragraph 5.7.

6. Test the safety valve as per paragraph 5.8.

7. Adjust the steam pressure regulator as per paragraph 5.9, steps 1 through 3.

8. Set the HI-LO valve to HI. Adjust the rear stop ring so that the jacket maintains 33 ± 1 psig pressure.

9. Open the display overlay door by unfastening the self-tapping screw at the top right of the door.

Check the pressure and vacuum rotary BCD switches for the following settings:

PS-1: 52 (26 psig) VS-1: 20 (10 in. Hg)
PS-2: 02 (1 psig) VS-2: 04 (2 in. Hg)
PS-3: 06 (3 psig)

Close the display overlay door and replace the screw.

10. Check the service switch on the main Printcon PC board for the following settings. (See Section 7, if necessary, for access instructions):

Temperature — °F (#1 OFF)
Pressure — English (#2 OFF)
Display precision — Extended (#3 ON)
Transducer — Strain gauge — (#4 ON)
Temperature overdrive — Normal (#5 OFF, #6 and #7 ON)

Check the alternate positions on #1, #2 and #3 for proper digital display. Set sterilize temperature to 270 F.

11. Open control end door. Turn POWER and CONTROL switches ON. All lamps and digits on the Printcon display panel will come on for a 3 second lamp test. DOOR UNLOCKED lamp must come on. Pressure display should read 0.0.

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

```

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

```

The following must be displayed:

a. Actual and F lamps ON.
b. Sterilize/dry time displays must match thumbwheel settings. The DOOR OPEN message will be printed as shown above.

c. Cycle selectors for Liquids, Prevacuum, and Gravity cycles (at half illumination.)

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

12. Try to start all cycles. No cycle should start with the door(s) open.

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

14. Change the temperature setting by 1 F. The new set point must be displayed for 2 seconds and the SET lamp must be on. Check all temperature thumbwheel digits to insure that the display matches the setting.

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

```

RESET BUTTON
2:37P 76.0 0.5V

```

16. Set the time and date if not correct. Turn CONTROL switch OFF and then ON again. If battery is functioning correctly, time and date will be retained.

17. Check paper advance toggle switch. Forward position continuously feeds paper through printer. Center position is off. Rear position runs take up motor until the paper platen is depressed (micro-switch activates).

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

19. Check printed record quality. Quality of print-out (or top copy) should conform to the examples in this procedure. Check for compressed digits (indicates printer motor speed too slow, or a drag on the paper roll).

20. Close and lock door(s). Start any cycle. Immediately abort it with the RESET button. This message must be printed.

```

ABORT: RESET BUTTON
* 2:37P 76.1 0.0P
C 2:37P 76.0 0.0P

```

21. Start any cycle. Immediately turn the CONTROL power OFF and then ON again. The POWER ON message must be printed. An intermittent buzzer will sound.

```

-----
POWER ON AT 4-01-82
2:38P 75.1 0.2V
-----

```

22. Set the sterilize temperature to 295 F. Initiate a GRAVITY cycle. Wait until the timed steam purge is completed and the pressure has risen to the regulator setting and stabilized. The temperature displayed should agree with the potentiometer to within ± 1 F. The pressure displayed should agree with the pressure gauge to within 0.5 psig. If not, adjust potentiometer P2 on the main Printcon PC board until these pressures agree. Then, adjust P9 for temperature, if necessary.

Abort the cycle with the RESET button and exhaust the chamber through the manual control. When exhausted to less than 1 psig, open the door and let all vapors escape. With the door open, turn power OFF and then ON again. Restart a 295 F GRAVITY cycle. With the pressure and temperature stabilized as before, the pressure should agree with the gauge to within 0.5 psig. If not, a realignment of the main Printcon PC board is indicated.

NOTE: A properly calibrated Printcon control is likely to be more accurate than the measuring devices. Therefore, the measuring devices should be calibrated against NBS (National Bureau of Standards) traceable equipment and the inaccuracies of the measuring devices should be known (via a calibration report sheet).

23. Perform the chamber vacuum leak test as outlined in paragraph 5.10. Then, disconnect the measuring devices and reconnect the chamber gauge.

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

24. Close and lock the door(s). Set STERILIZE and DRY times to 5 minutes each. Set the temperature thumbwheels to 250 F. Initiate a GRAVITY cycle. Reference Table 5.3 for proper valve actuation and correct phase times. The printer must print cycle information at the following times:

- Start of cycle.
- End of 1 minute purge.
- Start of STERILIZE phase.
- Start of EXHAUST phase.
- End of EXHAUST phase.
- Door open.

Refer to Section 3 for the correct format. Check to make sure that the STERILIZE temperature is maintained between 252.5 F and 253.5 F.

25. Repeat for a 250 F LIQUIDS cycle. Refer to Table 5.2. Check printout for correct format as shown in Section 3.

Adjust the slow exhaust valve as necessary to obtain 5-7 minutes exhaust time from start of EXHAUST phase to PS-3 set-point (3 psig factory set). (S3 solenoid will open.)

26. Repeat for a 270 F PREVACUUM sterilization cycle except set a 4 minute sterilize time. Refer to Table 5-4. Check printout for correct format as shown in Section 3.

NOTE: Component degradation which may not cause an actual control alarm is evidenced by:

- a. Slow charge time to temperature set-point.
- b. Excessive temperature make-ups in the STERILIZE phase.
- c. Excessively rapid or slow EXHAUST time.
- d. Calibration inaccuracies in the Printcon control.
- e. Chamber vacuum leaks.

27. Start a 250 F GRAVITY cycle, with 5 minute sterilize time set. After the STERILIZE phase is achieved, turn off the steam supply (use knob on valve panel). At 247.9 F, the following must occur:

- a. STERILIZE lamp flashes.
- b. The timer resets.
- c. The following format is printed:

```

5  2:41P 250.0 21.9P
*  2:41P 244.1 21.9P
ALARM: UNDER TEMP
*  2:41P 247.9 21.9P
  
```

Temperature falls 0.1 F under 248 F. These two lines are printed.

Reopen steam valve. As soon as 250 F is re-established, the lowest temperature reached during the alarm condition is printed.

28. Check all positions of the Manual control knob for proper operation — door(s) closed and locked.

SECTION 6

TROUBLESHOOTING

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

6.1 HELPFUL HINTS

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

2. Use the cycle graphs, Figures 6-1 through 6-3, in order to follow the sterilization cycles through the various phases. The cycle graphs may also be used to check for correct operation of the solenoid valves which control the various phases.

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

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

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

Steam & Water Supplies

- a. Be sure the building-supply valves are fully open.
- b. Be sure the supply pressure is the proper value and that it does not fluctuate. Be sure that gauge readings are accurate.
- c. Be sure the steam supply is of the proper quality and that the steam-supply line is well drained. This will ensure condensate-free steam of between 97 and 100 percent saturated vapor.
- d. Check all valves and adjust, repair or replace as necessary.
- e. Clean the supply strainers.
- f. Check the drain thermostatic traps; replace the elements if necessary.

g. Inspect the entire system; correct all leaks.

Electronic/Electrical System

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

- Input drives: vacuum, pressure, temperature, time settings, reset, cycle select.
- Output devices: solenoids, ball valves, relays, panel lamps, etc.
- System logic circuit boards of the controller.

b. In case of malfunctioning AC outputs, check the status of the light emitting diodes (LEDs), on the edge of the printed circuit board. All AC outputs are controlled by an AC ON/OFF switch (SW101) located on the power supply chassis. If the LED is on and the associated valve is off, the system logic is correct and the malfunction is in the wiring or output device.

c. If the LED is off, then check the input circuitry, i.e., pressure and vacuum switches.

d. All voltages are with respect to AC return and all DC voltages are with respect to DC ground.

e. Check circuit breakers first when supply voltage does not appear.

f. Should it become necessary to extract a pin from plugs P16, P23, P25, P40, P42, or P47, proceed as follows.

On the outside surface of the pin, there is a thin piece of metal sprung outward which locks the pin into the housing. Using a sharp-pointed object such as a pin or needle, push the metal spring inward while gently pulling on the appropriate wire. The pin will slide out of the socket. When installing a new pin, first give the metal spring a slight bend outward to assure its locking capacity.

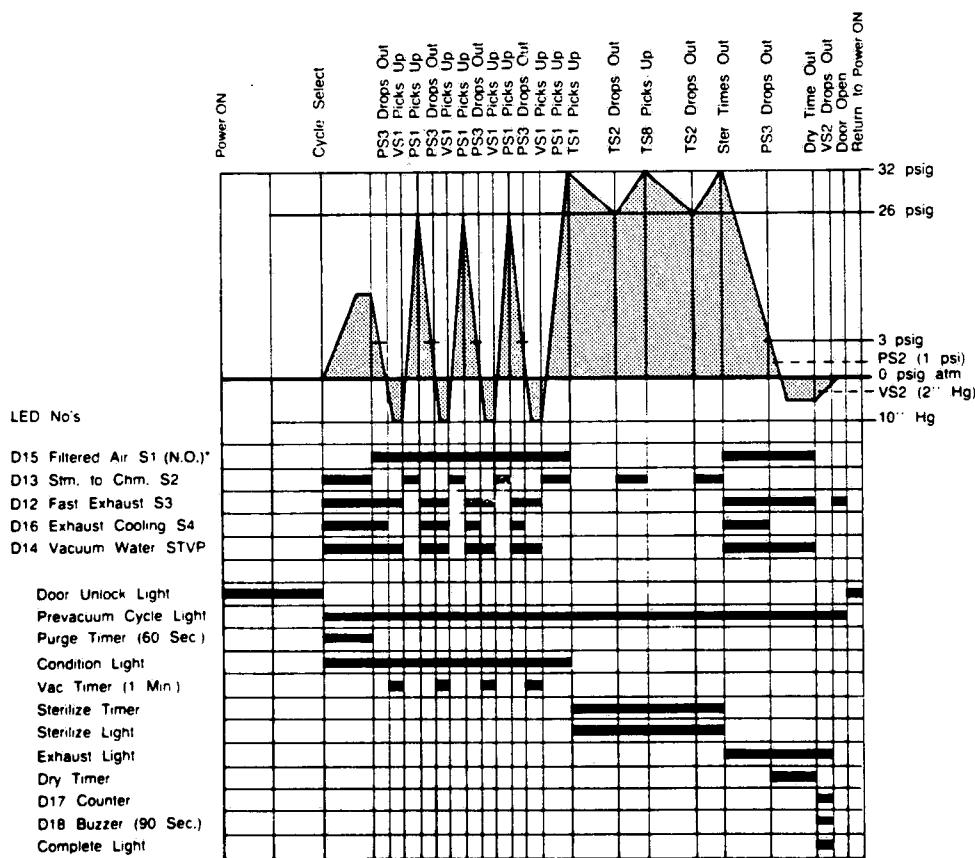
Pins in plugs P1, P2, P5, P10, P11, P48, P53, and P54 seldom need replacement. However, if replacement of pins is necessary, a special pin extraction tool is required. Contact AMSCO Service Co. for details.

6.2 HOW TO USE THE CYCLE GRAPHS

The cycle graphs (Figs. 6-1, 6-2 and 6-3) are representations of the operations of the cycles available with the sterilizer. They are intended to be used for two main purposes: (1) as an aid in understanding how the various cycles work; (2) as an aid in troubleshooting. The upper graph on each page is a representation of chamber pressure variation during the separate phases of the cycle. The LEDs (light emitting diodes), located on the printed circuit boards behind the front panel, are

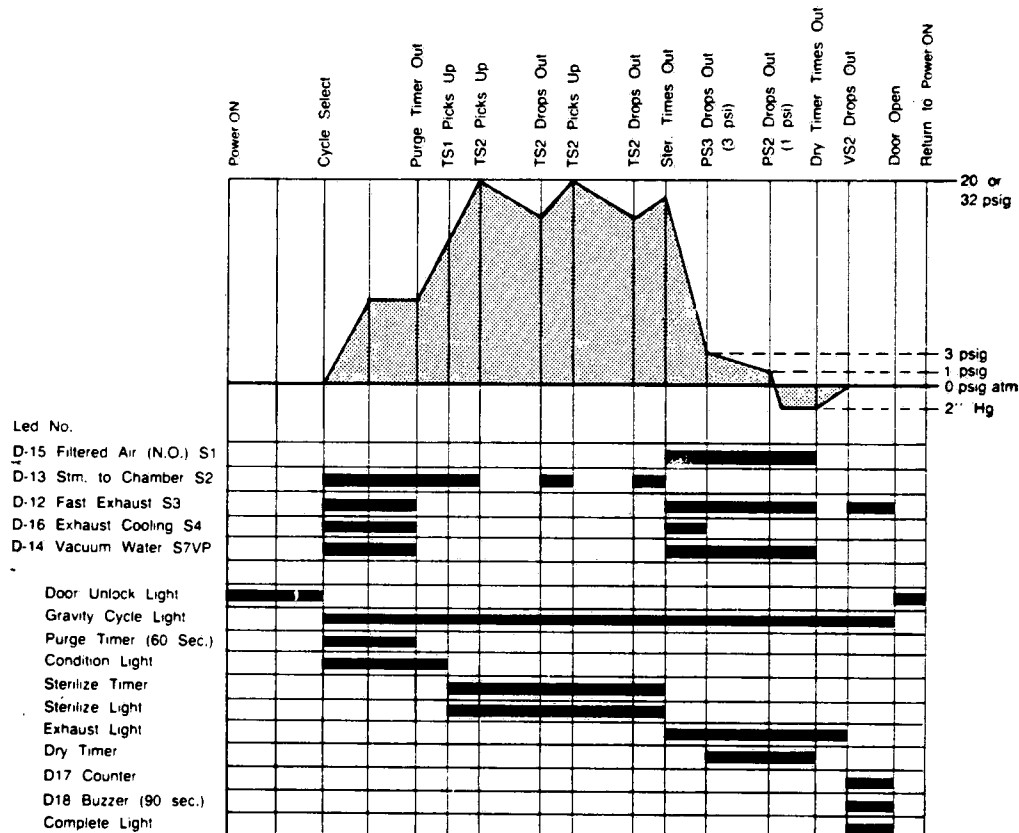
identified with the corresponding output device. When a solenoid valve, for example, is actuated (energized), the LED will be on.

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



*N.O. = Normally Open. All Other Solenoid Valves are Normally Closed.

Figure 6-1. CYCLE GRAPH: PREVACUUM CYCLE.



Note. TS2 set 3° F higher than TS1

Note: VS2 (2" Hg) must sense less than 2" Hg for complete phase to occur. S-3 may cycle if VS-2 closes.

Figure 6-2. CYCLE GRAPH: GRAVITY CYCLE.

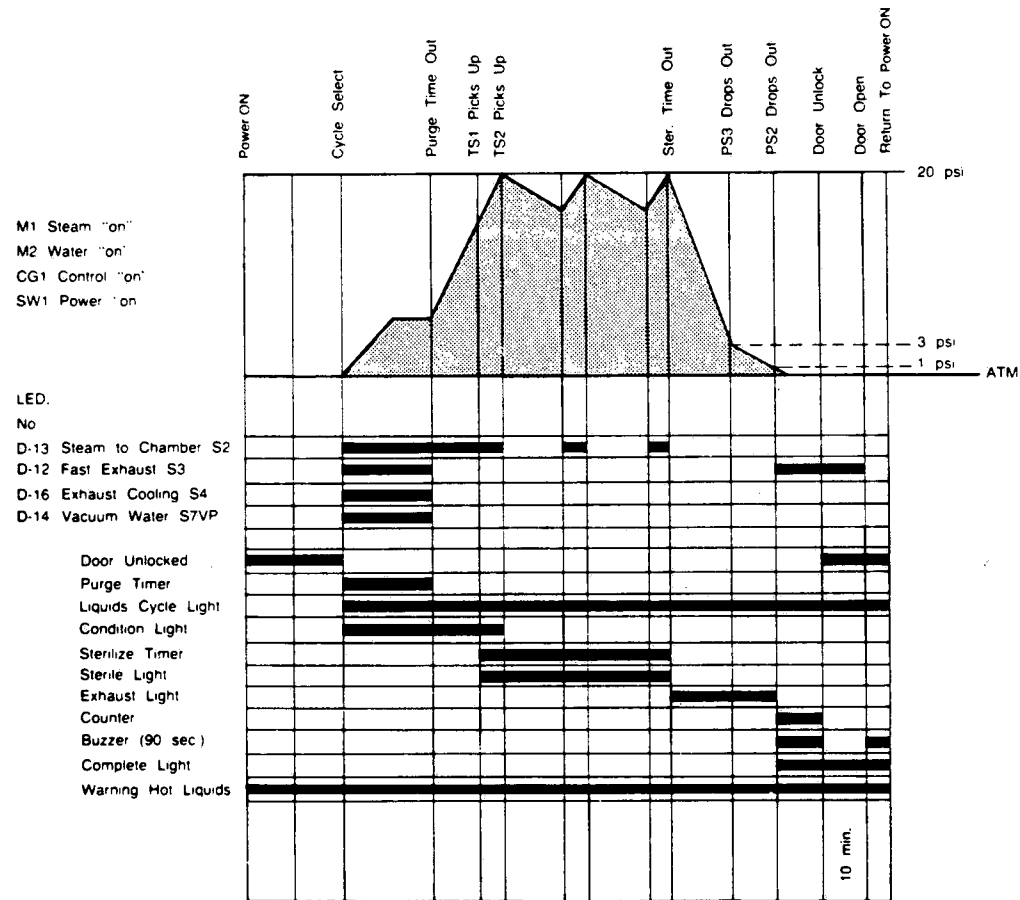


Figure 6-3. CYCLE GRAPH: LIQUIDS CYCLE.

6-4

A- 7

Rev. 6/82

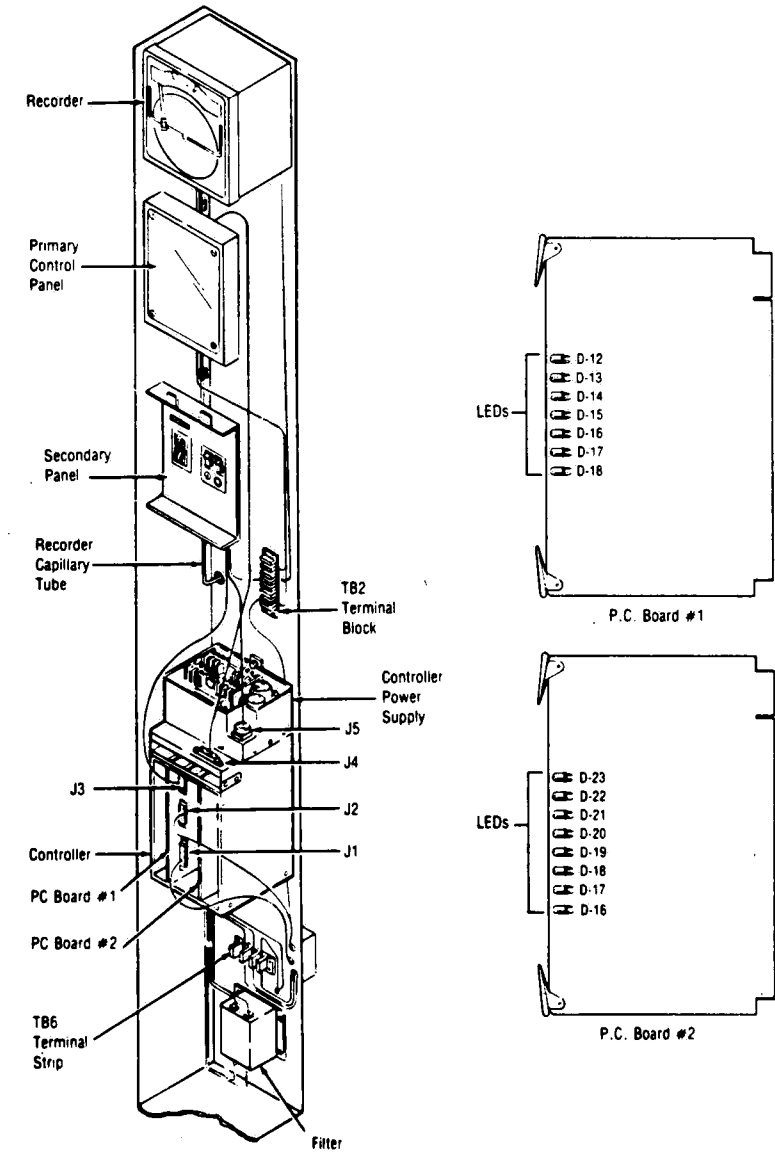


Figure 6-4. CIRCUIT BOARDS WITH LEDs.

6-5

A- 8

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 TB6 terminals 1 and 2 — connect or turn on. NOTE: If facility power will not reset, isolate and repair short between facility power source and sterilizer.	Fig. 8-38
		2) Circuit breaker CB-2 (RESET circuit breaker on secondary panel) tripped — push to reset. NOTE: If breaker will not reset, see item 1. B. under TROUBLE in this table.	Fig 8-38
		3) Control switch CB-1 (CONTROL switch on secondary panel) tripped — reset to ON. NOTE: If switch will not remain on, see item 1. C. in this table.	Fig 8-38
		4) Power switch SW-1 (POWER switch on secondary panel) off or defective — turn on; with facility power removed, check switch with ohmmeter and replace if necessary.	Fig. 8-38 Fig. 8-16, 14
		5) Defective line filter (PF-1) — check and replace if necessary.	Fig. 8-38 Fig. 8-11, 11

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, see step 1.B.8.	Fig. 8-38
		2) With CB-1 on, remove P1 and try to reset CB-2. If CB-2 resets, see step 1.B.5. If CB-2 does not reset, see next step, 1.B.3. Replace P1.	Fig. 8-38
		3) With CB-2 off, remove PC board 1 from controller. Try to reset CB-2. If CB-2 resets, replace PC board 1. If CB-2 does not reset, see next step, 1.B.4.	Fig. 8-38 Fig. 8-15, 8 Para. 7-12
		4) With CB-2 off, disconnect P5 from power supply. Try to reset CB-2. If CB-2 resets, replace power supply. If CB-2 does not reset, isolate and repair short between P5 and CB-1.	Fig. 8-38 Fig. 8-15, 1
		5) With CB-2 off, disconnect P1 from controller. Try to reset CB-2. If CB-2 resets, isolate and repair short between P1 and a solenoid valve, the counter, or the buzzer. If CB-2 does not reset, see next step, 1.B.6.	Fig. 8-38
		6) With CB-2 off, remove PC board 1 from the controller. Try to reset CB-2. If CB-2 resets, replace PC board 1. If CB-2 does not reset, reinstall PC board 1, and see next step, 1.B.7.	Fig. 8-38 Fig. 8-15, 8
		7) With CB-2 off, remove PC board 2 from controller. Try to reset CB-2. If CB-2 resets, replace board 2. If CB-2 does not reset, replace controller power supply.	Fig. 8-38 Fig. 8-15, 15 & 1
		8) Disconnect wire #1 connecting CB-2 and TB3 terminal 1. Try to reset CB-2 with CB-1 off. If CB-2 resets, isolate and repair short in recorder circuits. If CB-2 does not reset, replace CB-2.	Fig. 8-17 Fig. 8-16, 7

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued	1.C. Control switch CB-1 will not set to ON or trips infrequently.	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. 2) Short circuit on 5 VDC bus, or defective power supply. 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 adjuster. Replace power supply if it will not adjust to information in paragraph 7-16. If CB-1 can be positioned on, see next step, 1.C.2b. 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. 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. 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. 8-38 Fig. 8-16, 13 Fig. 8-38 Fig. 8-38 Fig. 8-15, 1 Para. 7-16 Fig. 8-15, 8 Para. 7.12 Fig. 8-15, 15 Fig. 8-38 Fig. 8-10, 24
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. 3) P16 disconnected or loosely connected — reconnect.	Fig. 8-38 Fig. 8-10, 24

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TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		4) Control power supply defective — check for 5 VDC and 28 VDC and replace power supply if necessary. 5) Disconnect P16 from primary panel. Check 28 VDC between pins 35 and 14. Check 5 VDC between pins 24 and 14. If voltages check good, replace primary panel. If voltages are not present, repair P16 wire harness.	Fig. 8-15, 1 Fig. 8-10, 24
	2.B. Primary panel remains dark except for timer numbers	1) Loss of 28 VDC. a) Check fuse in power supply. b) 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. 2) Open circuit. Disconnect P16 from primary panel and check 28 VDC between pins 35 and 14. If voltage check good, replace primary panel. If voltage is not present, repair A6 wire harness.	Fig. 8-15, 1 Fig. 8-10, 24
	2.C. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary. 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. 2b) Reinstall lamp and check VDC from lamp socket to TB2, terminals 3, 4, or 5. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.C.2c. 2c) Disconnect P3 from controller. Check VDC between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, replace logic card. If it is 28 VDC, see step below, 2.C.3.	Fig. 8-10, 24 Para. 7.12 Fig. 8-10, 24 Para. 7.12 Fig. 8-38 Fig. 8-10, 24 Para. 7.12 Fig. 8-38 Fig. 8-10, 24 Para. 7.12

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TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		3) Disconnect P16 from primary panel and check continuity between P16 and P3 on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 8-38 Fig. 8-10, 24 Para. 7.12
	2.D. One or more legends on primary panel lit when should be off	1) Control system did not reset — push cycle reset pushbutton. NOTE: If system does not reset see TROUBLE symptom 2.F below. 2) Logic card defective. Disconnect P3 from controller. If light goes out, replace logic card. If light remains on, see next step, 2.D.3. 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. 8-38 Fig. 8-38 Fig. 8-10, 24 Para. 7.12 Fig. 8-38 Fig. 8-10, 24 Para. 7.12
	2.E. Incorrect timer display	1) See Timer Display Checkout and Correction Charts, paragraph 6.4, following this Troubleshooting Chart.	Table 6-4
	2.F. Unable to reset system	1) Open circuit. Disconnect P4 from controller and make continuity check between pins 8 and 1 with RESET (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. 2) Make continuity check across contacts of RESET (CB-2) switch. If continuity is present, isolate and repair open in P4 wire harness. If continuity is not present, replace switch.	Fig. 8-38 Fig. 8-15, 8 Fig. 8-38 Fig. 8-16, 7
	2.G. Unable to select cycle	1) No DOOR LOCKED signal. a) Adjust or replace door lock switch as required.	Fig. 8-21 Para. 7.13

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		b) Disconnect P2 from controller and check continuity between Pin J and TB2 terminals 3, 4, or 5. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.G.1c. c) Check continuity across contacts of door lock switch(es). If continuity is present, isolate and repair open in P2 wire harness. If continuity is not present, adjust or replace door lock switch as required. 2) Controller PC board 1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and TB2 terminal 3, 4, or 5. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.G.3. 3) Cycle select switch defective or open wire. Disconnect P16 from primary panel and check continuity between J16 pin applicable to specific switch and pin 34. If continuity is present, isolate and repair open P3 wire harness. If continuity is not present, replace primary panel.	Fig. 8-38 Fig. 8-15, 8 Para. 7.12 Fig. 8-21 Fig. 8-38 Fig. 8-38 Fig. 8-15, 8 Fig. 8-10, 24
	2.H. Jacket pressure does not rise to required level	1) Steam supply less than 50 psig minimum — check supply pressure and increase if necessary. 2) HI-LO steam control valve malfunctioning — adjust, repair, or replace as necessary. 3) Manual STEAM supply valve malfunctioning — repair or replace, as necessary. 4) Jacket return steam trap malfunctioning — replace. 5) Steam supply strainer plugged — clean.	Fig. 8-23, 4 Fig. 8-26, 6 Para. 7.10 Fig. 8-26, 3 Para. 7.11 Fig. 8-25, 27 Para. 7.6 Fig. 8-26, 1 Para. 7.7

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.I. Steam enters chamber while door is open	1) Manual operating valve (if supplied) improperly adjusted or malfunctioning — turn valve to OFF; adjust, repair, or replace multiport valve. 2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — check valve for leak, replace if necessary; check D13 LED on PC board 1, replace board if LED on.	Fig. 8-35, 1 Fig. 8-24, 30 Fig. 8-15, 8 Para. 7.5 Para. 7.12
3. During a cycle	3.A. Cycle does not advance during pre-vacuum phase	1) Leaks in chamber piping and/or door gasket — check for leaks, repair; replace gasket. 2) Vacuum switch VS-1 defective or setting drifted. a) Reset to 10" Hg or replace. b) Disconnect P2 from controller and check continuity between pin R and TB2 terminals 3, 4, or 5. Isolate and repair wiring or replace switch. If check ok, replace PC board 1. 3) Pressure switch PS-1 defective or setting drifted. a) Reset to 26 psig or replace. b) Disconnect P2 from controller and check continuity between pin S and TB2 terminals 3, 4 or 5. Isolate and repair wiring or replace switch. If check ok, replace PC board 2. 4) Pressure switch PS-3 defective or setting drifted. a) Reset to 4 psig or replace. b) Disconnect P2 from controller and check continuity between pin L and TR-2 terminals 3, 4, or 5.	Fig. 8-20, 1 Para. 7.3 Fig. 8-7, 2 Para. 7.14 Fig. 8-38 Fig. 8-15, 8 Para. 7.12 Fig. 8-7, 1 Para. 7.14 Fig. 8-38 Fig. 8-15, 15 Para. 7.12 Fig. 8-7, 1 Para. 7.14 Fig. 8-38

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		5) Water ejector valve (S-7) not operating correctly — should be open for drying time. a) Repair or replace valve. b) Check wiring to valve — repair or replace. c) Check LED D-14 on PC board 1 — should be on during vacuum part of pre-vacuum phase. Replace board if light not on. d) 5b and 5c ok — replace board 1. 6) Inadequate temperature in chamber — possible causes and corrections are as follows: a) Operator settings on recorder and HI-LO valve do not correspond — set recorder and valve properly. b) Chamber drain line or strainer plugged — clean line or strainer. c) Chamber drain line trap not operating correctly — replace trap element. d) Chamber drain solenoid valve (S-3) not operating correctly (should be closed during pressurized part of prevacuum phase). Repair or replace valve. Check LED D-12 — if on, replace PC board 1. 7) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open during pressurized part of prevacuum phase). a) Repair or replace valve. b) Check wiring to valve — repair or replace.	Fig. 8-27, 4 Para. 7.5 Fig. 8-37, 10 Fig. 8-15, 8 Para. 7.12 Sect. 2 Para. 4.5 Fig. 8-25, 27 Para. 7.6 Fig. 8-25, 1 Fig. 8-15, 8 Para. 7.5 Para. 7.12 Fig. 8-24, 35 Para. 7.5 Fig. 8-37, 10

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		c) Check LED D-13 on PC board 1 — should be on during vacuum part of prevacuum phase. Replace board if light not on. d) 7b and 7c ok — replace board 1. 8) No pressure in jacket — see 2.H, above, "Jacket pressure does not rise. . . ."	Fig. 8-15, 8 Para. 7.12 Fig. 8-15, 8 Para. 7.12
	3.B. Number of pulses (pressure and vacuum) not correct during prevacuum conditioning phase	1) Pulse selection switch set incorrectly or defective. Adjust switch to correct setting. 2) Replace PC board 2. Replace PC board 1.	Para. 7.12 Fig. 8-15, 8 Fig. 8-15, 15
	3.C. Chamber temperature does not rise to recorder setting	1) See 3.A.6, above.	
	3.D. Steam does not enter chamber in sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. See 3.A.6d, above. 2) Steam-to-chamber valve (S-2) not open or sticking. See 3.A.7, above. 3) No pressure in jacket. See 2.H, above.	Fig. 8-25, 5 Fig. 8-24, 35
	3.E. Chamber pressure does not rise during sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. See 3.A.6d, above. 2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). See 3.A.7, above. 3) No pressure in jacket. See 2.H, above.	Fig. 8-25, 5 Fig. 8-24, 35
	3.F. Chamber pressure and temperature drop during cycle	1) Steam supply pressure erratic — check steam supply.	

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		2) Chamber drain line trap not operating correctly — replace trap element. 3) Chamber drain solenoid valve (S-3) not operating correctly (should be closed). Repair or replace valve. Check Check LED-12 — if on, replace PC board 1.	Fig. 8-25, 5 Para. 7.6 Fig. 8-25, 5 Fig. 8-15, 8 Para. 7.5 Para. 7.12
	3.G. Pressure too high, temperature too low during sterilize phase	1) Air trapped in chamber because of clogged strainer or drains — clean strainer inside chamber, flush and clean drain line and traps. 2) Chamber trap defective — replace element.	Para. 4.5 Fig. 8-25, 5 Para. 7.6
	3.H. Buzzer sounds intermittently, temperature drops during sterilize phase	1) Door switch defective — replace.	Fig. 8-21, 7 Para. 7.13
	3.I. Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-20, 1 Para. 7.3
	3.J. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean. 2) Insufficient flow through cooling water flow control valve — clean, adjust, repair or replace flow control valve. 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. 4) Leaking steam valve — check valves and piping for leaks, repair. 5) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry). a) Repair or replace valve. b) Check wiring to valve — repair or replace.	Fig. 8-27, 13 Para. 7.7 Fig. 8-29, 14 Para. 5.4 Fig. 8-23, 16 Fig. 8-23, 4 Fig. 8-24, 30 Fig. 8-29, 17 Para. 7.5 Fig. 8-37, 10

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		c) Check LED D-16 on PC board 1 — should be on during exhaust and dry. Replace board if light not on. d) 5b and 5c ok — replace PC board 1.	Fig. 8-15, 8 Fig. 8-15, 8
	3.K. Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — replace diaphragm or gasket.	Fig. 8-19, 5 & 6 Para. 7.3
	3.L. Safety valve pops or bleeds excessively	1) HI-LO steam control valve improperly adjusted or malfunctioning — adjust, repair, or replace valve. 2) Safety valve defective — replace.	Fig. 8-26, 6 Para. 7.14 Fig. 8-23, 16
4. During "DRY" part of Exhaust phase — Gravity cycle only	4.A. Dry timer does not start and cooling water valve (S-4) does not close in exhaust phase	1) Pressure switch PS-3 defective or malfunctioning — reset to 4 psig or replace. 2) Disconnect P2 from controller and check continuity between pin L and TB2 terminals 3, 4, and 5 — If ok, replace PC board 1. Otherwise, isolate and repair wiring or replace switch.	Fig. 8-7, 1 Para. 7.14 Fig. 8-38 Fig. 8-15, 8 Para. 7.12
	4.B. Dry timer starts and cooling water valve closes immediately after sterilize phase	Same as 4.A, immediately above.	
5. During Exhaust phase of Liquids cycle	5.A. Slow exhaust too rapid — solutions spill or pop caps	1) Chamber drain line trap not operating correctly — replace trap element.	Fig. 8-25, 27 Para. 7.6
		2) Slow exhaust needle valve malfunctioning — clean, adjust, repair or replace valve.	Fig. 8-23, 11 Para. 5.4
		3) Pressure switch PS-3 misadjusted or defective — reset to 4 psig or replace.	Fig. 8-7, 1 Para. 7.14
		4) Open or shorted wire — disconnect P2 from controller, check continuity between pin L and TB2 terminals 3, 4, or 5. If okay, replace PC board 1. Otherwise isolate and repair wiring or replace switch.	Fig. 8-38 Fig. 8-15, 8 Para. 7.12

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. At end of cycle	6.A. Cycle fails to reach COMPLETE after exhaust completed, or signals COMPLETE too soon	1) Pressure switch PS-2 or vacuum switch VS-2 defective — reset, respectively, to 2 psig or 2" Hg or replace. 2) Open or shorted wire — disconnect P2 from controller and check continuity of pressure and vacuum switch circuits, i.e., between pins T and K and applicable TB-2 terminals. See electrical schematic for test points.	Fig. 8-7, 1 & 2 Para. 7.14 Fig. 8-38
	6.B. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective — check voltage across buzzer, replace if necessary. 2) Open wire — disconnect P1 from control and check continuity between pin W and TB3 terminal 2. Isolate and repair. 3) PC board 1 defective — check D18 LED on board; replace board 1 if LED does not come on at end of cycle.	Fig. 8-16, 4 Fig. 8-38 Fig. 8-17 Fig. 8-15, 8
	6.C. Doors can be unlocked but cannot be opened when the buzzer sounds	1) Vacuum in chamber caused by faulty check valve in vacuum break line — replace check valve. 2) Vacuum break line plugged — clean or replace plugged components in line. 3) Vacuum switch VS-2 out of adjustment or defective — reset VS-2 to 0-1" Hg or replace.	Fig. 8-28, 3 Fig. 8-28 Fig. 8-7, 2 Para. 7.14
	6.D. Excessive steam when door is opened or excessive effort needed to unlock door when buzzer sounds	1) Pressure switch PS-2 out of adjustment or defective — reset PS-2 to 1-2 psig or replace.	Fig. 8-7, 1 Para. 7.14
	6.E. Goods are wet after completion of "wrapped" cycle, or excessive vapor in chamber when door is opened	1) Vacuum break line plugged — clean or replace filter. 2) Check valve in drain line defective — replace.	Fig. 8-28 Fig. 8-25, 11

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		3) Vacuum water valve (S-7) not operating correctly (should be open for drying time). a) Repair or replace valve. b) Check wiring to valve — repair or replace. c) Check LED D-14 on PC board 1 — should be on for drying time. Replace board if light not on. d) 3b and 3c ok — replace PC board 1. 4) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry). a) Repair or replace valve. b) Check wiring to valve — repair or replace. c) Check LED D-16 on PC board 1 — should be off below 3 psig during exhaust and dry. Replace board if light not off. d) 4b and 4c ok — replace board 1.	Fig. 8-27, 4 Para. 7.5 Fig. 8-37, 10 Fig. 8-15, 8 Para. 7.12 Fig. 8-15, 8 Para. 7.12 Fig. 8-29, 17 Para. 7.5 Fig. 8-37, 10 Fig. 8-15, 8 Para. 7.12 Fig. 8-15, 8 Para. 7.12
	6.F. Water in chamber or door channel at end of cycle	1) Chamber drain valve (S-3) not operating correctly (should be open during exhaust and dry). a) Repair or replace valve. b) Check wiring to valve — repair or replace. c) Check LED D-12 on PC board 1 — should be on during exhaust and dry. Replace board if light not on. d) 1b and 1c ok — replace PC board 1.	Fig. 8-30, 21 Para. 7.5 Fig. 8-37, 10 Fig. 8-15, 8 Para. 7.12 Para. 7.12

TABLE 6-1: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		2) Vacuum water valve (S-7) not operating correctly (should be open for drying time). See 6.E.3, above. 3) Cold chamber floor caused by condensate accumulating in lower jacket — check return line strainer and clean if necessary; check operation of jacket return trap and replace trap if necessary; check for back pressure on return steam line, locate source and eliminate. 4) Chamber floor not pitched toward drain — see leveling procedure. 5) Drains plugged or clogged — see drain cleaning procedure. 6) Chamber steam trap does not open — replace trap element. 7) Steam not "dry" — check steam quality. 8) Drain line check valve defective — replace.	Fig. 8-27, 4 Fig. 8-30, 4 Fig. 8-30, 6 Para. 7.6 Para. 7.7 Para. 5.3 Para. 4.5 Fig. 8-30, 27 Para. 7.6 Fig. 8-25, 11
	6.G. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace, if necessary. 2) Open wire — disconnect P1 from control and check continuity between pin P and TB3 terminal 2. Isolate and repair open. 3) PC board 1 defective — check D-17 LED on board: replace board if LED does not come on at end of cycle.	Fig. 8-16, 4 Fig. 8-38 Fig. 8-17 Fig. 8-15, 8
7. Miscellaneous	7. A. Continuous sounding buzzer whenever machine is turned on	1) Excessive current leakage from triac — bend buzzer clapper away from coil until buzzing stops.	Fig. 8-16, 4

TABLE 6-2: TROUBLESHOOTING CHART (PRINTCON)

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Before beginning cycle	1. A. No 120 facility power — primary panel and digital display completely blank	1) Check main power source or check 120 VAC between TB6 terminals 1 and 2 — connect or turn on. NOTE: If facility power will not reset, isolate and repair short between facility power source and sterilizer. 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. 3) 115 volt fuse in power supply (F402) blown — check. 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. 5) Defective line filter (PF-1). 5a) Check 120 VAC between filter contacts Load 1 and Line 2 with CB-2 tripped. Replace filter if necessary. 5b) Check zero VAC between filter contacts Load-2 and Line-2 with CB-2 energized. Replace filter if necessary.	Fig. 8-55 Fig. 8-55 Fig. 8-16, 7 Fig. 7-28 Fig. 8-15, 18 Fig. 8-16, 14 Fig. 8-55 Fig. 8-55 Fig. 8-55
	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. 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. 3) With CB-2 off, remove PC board 1 from controller. Try to reset C. If CB-2 resets, replace PC board 1. If CB-2 does not reset, see next step, 1.B.4. 4) With CB-2 off, disconnect P5 from power supply. Try to reset CB-2. If CB-2 resets, replace power supply. If CB-2 does not reset, isolate and repair short between P5 and CB-1.	Fig. 8-55 Fig. 8-55 Fig. 8-16, 7 Fig. 8-55 Fig. 8-15, 21 Para. 7.12 Fig. 8-55 Fig. 8-16, 7 Fig. 8-16, 13

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. 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. 7) With CB-2 off, remove PC board 2 from controller. Try to reset CB-2. If CB-2 resets, replace board 2. If CB-2 does not reset, replace controller power supply.	Fig. 8-55 Fig. 8-16, 7 Fig. 8-55 Fig. 8-15, 21 Fig. 8-55 Fig. 8-15, 22 Fig. 8-15, 18
	1.C. Control switch CB-1 will not set to ON	1) Control switch CB-1 defective. With CB-1 off, disconnect connector P5 from power supply. Try to position CB-1 on. If CB-1 cannot be positioned on, replace CB-1. If CB-1 can be positioned on, see 1.C.2 below, and reconnect P5 with CB-1 off. 2) Short circuit on 5 VDC bus, or defective power supply. 2a) With CB-1 off, disconnect PC boards 1 and 2 and disconnect connector P3 from controller. Also unplug P48 from main Printcon PC board. Try to position CB-1 on. If CB-1 cannot be positioned on, replace power supply. If CB-1 can be positioned on, see next step, 1.C.2b. 2b) With CB-1 off, replace PC board 1. Try to position CB-1 on. If CB-1 cannot be positioned on, replace PC board 1. If CB-1 can be positioned on, see next step, 1.C.2c. 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. 8-55 Fig. 8-16, 13 Fig. 8-55 Fig. 8-15, 18 Fig. 8-55 Fig. 8-15, 21 and 22 Fig. 8-16, 13 Fig. 8-55 Fig. 8-15, 21 Para. 7.12 Fig. 8-55 Fig. 8-15, 22 Para. 7.12

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
1. Continued		2d) With CB-1 off, reconnect P3 to controller. Disconnect P16 from primary panel. Try to position CB-1 on. If CB-1 cannot be positioned on, isolate and repair short between P3 pin 27 and other wire in the same harness. If CB-1 can be positioned on, replace primary panel. 2e) Short circuit on 5 VDC bus within digital display PC board. Disconnect plug P45 at main Printcon PC board. If CB-1 will set to on, replace the display PC board; if CB-1 will not be positioned to on, see next step, 1.C.2f. 2f) Short circuit on 5 VDC bus within main Printcon PC board. Unplug plug P48 from main Printcon board. If CB-1 will set to on, replace this board. 3) Fuse F3 in power supply blown.	Fig. 8-55 Fig. 8-44, 13 Para. 7.12 Schematics Fig. 8-47, 3 & 11 Schematics Fig. 8-47, 3
2. Before beginning cycle: POWER & CONTROL switches on	2.A. Primary panel remains completely dark	1) Loss of all power — see TROUBLE item 1.A. for checks and remedies. 2) P5 on control power supply disconnected or pins loosely connected — check and reconnect. 3) P16 disconnected or loosely connected — reconnect. 4) Control power supply defective — check for 5 VDC and 28 VDC and replace power supply if necessary. Check fuses F2 and F4. 5) Disconnect P16 from primary panel. Check 28 VDC between pins 35 and 14. Check 5 VDC between pins 24 and 14. If voltages check good, replace primary panel. If voltages are not present, repair P16 wire harness.	Fig. 8-55 Fig. 8-44, 13 Fig. 8-15, 18 Fig. 7-28 Fig. 8-44, 13 Para. 7.12
	2.B. Primary panel remains dark except for timer	1) Loss of 28 VDC. Check 28 VDC power supply output at test-point 4 (TP-4) in power supply. Check fuse F4 in power supply and replace if necessary.	Fig. 8-15, 18

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		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. 2) Open circuit. Disconnect P16 from panel and check 28 VDC between pins 35 and 14. If voltage check good, replace primary panel. If voltage is not present, repair P16 wire harness. 3) Defective power supply. Replace.	Fig. 8-44, 13 Para. 7.12
	2.C. Printcon display is dark, and Printcon buzzer sounds	1) J45 connector on display PC board disconnected or loosely connected — reconnect. 2) F2 fuse blown in power supply — replace fuse.	Fig. 8-47, 11 Fig. 7-28
	2.D. One or more legends on primary panel fail to light	1) Lamp burned out. Check with ohmmeter, and replace if necessary. 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. 2b) Reinstall lamp and check voltage from lamp socket to TB7 in power supply. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.D.2c. 2c) Disconnect P3 from controller. Check voltage between J3, pin 28 and pin applicable for malfunctioning lamp. If it is zero, replace primary panel. If it is 28 VDC, see step below, 2.D.3. 3) Disconnect P16 from primary panel and check continuity between P16 and P3 on pins applicable for malfunctioning lamp. If okay, replace primary panel. Otherwise isolate and repair open in cable.	Fig. 7-6 Para. 7.12 Fig. 8-44, 13 Fig. 8-55 Fig. 8-44, 13 Para. 7.12 Fig. 8-55 Fig. 8-44, 13 Para. 7.12 Fig. 8-55 Fig. 8-44, 13
	2.E. One or more legends on primary panel lit when should be off	1) Control system did not reset — push cycle RESET pushbutton. NOTE: If system does not reset, see TROUBLE symptom 2.F below.	Fig. 2-8

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		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. 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. 8-44, 13 Para. 7.12 Fig. 8-55 Fig. 8-44, 13 Para. 7.12
	2.F. Missing segment of digital LED on digital display panel on "power up" lamp test.	1) Burned out. Replace display PC board.	Fig. 8-47, 11
	2.G. Digital display is blank, printer is inoperative, and cycle will not run.	1) P48 unplugged from main Printcon PC board — reconnect. 2) See 2.C.2 above.	Fig. 8-47, 3
	2.H. Incorrect timer display ("Sterilize" or "Dry")	1) See Timer Display Checkout and Correction Charts, paragraph 6.4, 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. 2) Component failure on display PC board.	Para. 6.5 Fig. 8-47, 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. 2) Invalid temperature selected.	Fig. 8-47, 11 Schematics
	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. 1a) Extreme misalignment of main Printcon PC board — check alignment.	Fig. 8-47, 3 Para. 7.22

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued		1b) Component failure on main Printcon PC board — replace. 2) Temperature probe or cable open. See 2.K.1 above.	Fig. 8-47, 3 Para. 7.18 Para. 7.20
	2.L. ALARM: PRES SENSOR printed when power is turned on	1) Pressure sensor or cable shorted. 1a) Extreme misalignment of main Printcon PC board — check alignment. 1b) Component failure on main Printcon PC board — replace. 2) Pressure sensor or cable open. 3) P47 unplugged from main Printcon PC board — reconnect. 4) Position "4" of service switch is in "off" position.	Fig. 8-53 Para. 7.22 Fig. 8-47, 3 Para. 7.18 Fig. 8-53 Fig. 8-47, 3 Schematics Para. 7-9
	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.N.2. 2) Make continuity check across contacts of RESET switch. If continuity is present, isolate and repair open in P4 wire harness. If continuity is not present, replace switch.	Fig. 8-55 Fig. 8-15, 21 Fig. 8-16, 9
	2.N. Unable to select cycle	1) No DOOR LOCKED signal. 1a) Adjust or replace door lock switch as required. 1b) Disconnect P2 from controller and check continuity between pin J and TB2 terminals 3, 4, or 5. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.N.1c. 1c) Check continuity across contacts of door lock switch(es). If continuity is present, isolate and repair open in P2 wire harness. If continuity is not present, adjust or replace door lock switch as required.	Fig. 8-21 Para. 7.3 Fig. 8-55 Fig. 8-15, 21 Para. 7.3

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
		2) Controller PC board 1 defective. Disconnect P3 from controller and check continuity between pin applicable to specific switch and TB7 in power supply. If continuity is present, replace controller PC board 1. If continuity is not present, see next step, 2.N.3. 3) Cycle select switch defective or open wire. Disconnect P16 from primary panel and check continuity between J16 pin applicable to specific switch and pin 34. If continuity is present, isolate and repair open in P3 wire harness. If continuity is not present, replace primary panel.	Fig. 8-55 Fig. 8-15, 21 Fig. 8-55 Fig. 8-44, 13 Para. 7.12
	2.O. Cycle will not run. Reset not printed out.	1) P40 unplugged from main Printcon PC board — reconnect.	Fig. 8-47, 3 Schematics
	2.P. Jacket pressure does not rise to required level	1) Steam supply less than 50 psig minimum — check supply pressure and increase if necessary. 2) HI-LO steam control valve malfunctioning — adjust, repair, or replace as necessary. 3) Manual STEAM supply valve malfunctioning — repair or replace, as necessary. 4) Jacket return steam trap malfunctioning — replace. 5) Steam supply strainer plugged — clean.	Fig. 8-31 Para. 7.10 Fig. 8-36 Fig. 8-34 Para. 7.6 Para. 7.7
	2.Q. Steam enters chamber while door is open	1) Manual operating valve (if supplied) improperly adjusted or malfunctioning — turn valve to OFF; adjust, repair, or replace multiport valve. 2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be closed) — check valve for leak, replace if necessary; check D13 LED on PC board 1, replace board if LED on.	Fig. 8-36 Fig. 8-24, 30 Para. 7.5 Fig. 8-44, 13 Para. 7.12

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
2. Continued	2.R. "ERROR 1" message is printed when power is turned on	1) A/D converter failure on main Printcon PC board. 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. 1b) Component failure on main Printcon PC board — replace board.	Fig. 8-47, 3 Fig. 8-15, 18 Fig. 8-47, 3 Para. 7.18
	2.S. "ERROR 2" message is displayed momentarily on each attempt to print.	1) Printer status signal lost. 1a) F2, +18 volt fuse open in power supply — check fuse for continuity and replace if necessary. If fuse is ok, see 2.S.1b. 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. 1c) Printer motor speed too slow — adjust P10 on main Printcon PC board for maximum speed. 1d) Printer defective — replace. 1e) Drag on paper roll — check.	Fig. 8-15, 18 Fig. 8-47, 3 Fig. 8-47, 3 Schematics Fig. 8-48, 22
3. During a cycle	3.A. Cycle does not advance during pre-vacuum phase	1) Leaks in chamber piping and/or door gasket — check for leaks, repair, replace gasket. 2) VS-1 setting incorrect on display PC board; should be 20 — reset if required. 3) VS-1 setting not recognized by lower controller — measure voltage at P2, pin R with P2 connected. If it is zero volts, see step 3.A.4. If it is 5 VDC, replace control PC board 2. 4) Loss of VS-1 signal to lower controller — with all power off, extract pin 9 of plug 40. Replace plug 40 and reinitiate cycle. If cycle now advances, replace main Printcon PC board. If cycle does not advance, repair short between wire #115 and other wire(s) in harness.	Fig. 8-20, 1 Fig. 8-19, 6 Para. 7.3 Para. 7.17 Schematics Fig. 8-15, 22 Para. 7.12 Fig. 8-47, 3 Para. 7.18 Schematics

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		5) PS-1 setting incorrect on display PC board; should be 52 — reset if required. 6) PS-1 setting not recognized by lower controller — measures voltage at P2, pin S with P2 connected. If it is zero volts, see step 3.A.7. If it is 5 VDC, replace control PC board 2. 7) Loss of PS-1 signal to lower controller — with all power off, extract pin 8 of plug 40. Replace plug 40 and reinitiate cycle. If cycle now advances, replace main Printcon PC board. If cycle does not advance, repair short between wire #112 and other wire(s) in harness. 8) PS-3 setting incorrect on display PC board; should be 6 — reset if required. 9) PS-3 setting not recognized by lower controller — measure voltage at P2, pin L with P2 connected. If it is zero volts, see step 3.A.10. If it is 5 VDC, replace control PC board. 1. 10) Loss of PS-3 signal to lower controller — with all power off, extract pin 7 of plug 40. Replace plug 40 and reinitiate cycle. If cycle now advances, replace main Printcon PC board. If cycle does not advance, repair short between wire #114 and other wire(s) in harness. 11) Water ejector valve (S-7) not operating correctly — should be open for vacuum part of pre-vacuum phase. 11a) Repair or replace valve. 11b) Check wiring to valve — repair or replace. 11c) Check LED D-14 on control PC board 1 — should be on during vacuum part of prevacuum phase. Replace board if light not on.	Para. 7.17 Schematics Fig. 8-15, 22 Para. 7.12 Fig. 8-47, 3 Para. 7.18 Schematics Para. 7.17 Schematics Fig. 8-15, 21 Para. 7.12 Fig. 8-47, 3 Para. 7.18 Schematics Fig. 7-10 Para. 7.5 Fig. 8-15, 21 Para. 7.12

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		11d) 5b and 5c ok — replace PC board 1. 12) Inadequate temperature in chamber — possible causes and corrections are as follows: 12a) Settings on temperature thumbwheels and HI-LO valve do not correspond — set thumbwheels and valve properly. 12b) Chamber drain line or strainer plugged — clean line or strainer. 12c) Chamber drain line trap not operating correctly — replace trap element. 12d) Chamber drain solenoid valve (S3) not operating correctly (should be closed during pressurized part of pre-vacuum phase). Repair or replace valve — check manual operation. Check LED D-12 — if on, replace control PC board 1. 12e) Slow exhaust bleed valve too far open — check and reset if necessary. 12f) Loss of continuity in wire #131 (TS-1). 12g) TS-1 output drive failure on main Printcon PC board. Should switch from 5 VDC to zero VDC when setting on thumbwheels is achieved. 12h) TS-1 input failure on Eagle CPU PC board — see step 3.A.12f above before replacing. 12i) Temperature circuitry on main Printcon PC board out of calibration — check. 12j) Faulty temperature probe — replace. 13) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open during pressurized part of pre-vacuum phase.) 13a) Repair or replace valve.	Fig. 8-15, 21 Para. 7.12 Fig. 8-44, 13 Section 2 Fig. 8-25, 2 Para. 4.3 Para. 7.6 Fig. 8-52, 12 Fig. 8-51 Para. 7.5 Fig. 8-15, 21 Para. 7.12 Fig. 8-51 Schematics Fig. 8-47, 3 Fig. 8-15, 21 Fig. 8-47, 3 Para. 7.22 Para. 7.20 Fig. 7-10 Fig. 8-34, 15 Para. 7.5

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued		13b) Check wiring to valve — repair or replace. 13c) Check LED D-13 on control PC board 1 — should be on during vacuum part of pre-vacuum phase. Replace board if light not on. 13d) 13b and 13c ok — replace control PC board 1. 14) No pressure in jacket — see step 2.P, "Jacket pressure does not rise . . ."	Fig. 8-15, 21 Para. 7.12 Fig. 8-15, 21 Para. 7.12
	3.B. Number of pulses (pressure and vacuum) not correct during pre-vacuum conditioning phase	1) Pulse selection switch set incorrectly or defective. Adjust switch to correct setting. 2) Replace PC board 2. Replace PC board 1.	Fig. 7-9 Para. 7.12 Fig. 8-7 Fig. 8-15, 21 & 22
	3.C. Chamber temperature does not rise to Printcon temperature thumbwheel setting, proper lead message printed.	1) See steps 3.A.12 through 3.A.12j: — "Inadequate temperature in chamber . . ."	
	3.D. Chamber temperature does not rise to Printcon setting, no lead message is printed.	1) Component failure on main Printcon PC board — replace.	Fig. 8-47, 3 Para. 7.18
	3.E. Steam does not enter chamber in sterilize phase	1) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). 1a) Repair or replace valve. 1b) Check wiring to valve — repair or replace. 1c) Check LED D-13 on PC board 1 — should be on. Replace board if light not on. 1d) 1b and 1c ok — replace PC board 1.	Fig. 7-10 Fig. 8-24, 30 Para. 7.5 Fig. 8-15, 21 Para. 7.12 Fig. 8-15, 21
		2) No pressure in chamber jacket (check pressure gauge) — see 2.P. above, "Jacket pressure does not rise . . ."	

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
3. Continued	3.F. Chamber pressure does not rise during sterilize phase	1) Chamber drain valve (S-3) not closed or leaking. Repair or replace valve — check manual operation. Check LED-12 — if on, replace PC board 1. 2) Steam-to-chamber solenoid valve (S-2) not operating correctly (should be open). See 3.A.13. above. 3) No pressure in jacket. See 2.P. above.	Fig. 8-15, 21 Para. 7.12 Fig. 8-24, 30
	3.G. Chamber pressure and temperature drop during cycle	1) Steam supply pressure erratic — check steam supply. 2) Chamber drain line trap not operating correctly — replace trap element. 3) Chamber drain solenoid valve (S-3) not operating correctly (should be closed). Repair or replace valve — check manual operation. Check LED-12 — if on, replace PC board 1.	Fig. 8-52, 12 Para. 7.6 Fig. 7-10 Fig. 8-15, 21 Para. 7.5 Fig. 6-4
	3.H. Pressure too high, temperature too low during sterilize phase	1) Air trapped in chamber because of clogged strainer or drains — clean strainer inside chamber, flush and clean drain line and traps. 2) Chamber trap defective — replace element. 3) Improper loading technique or equipment.	Fig. 8-25, 2 Para. 4.3 Fig. 8-52, 12 Para. 7.6
	3.I. Steam blows out around door during sterilize phase	1) Door gasket worn or defective — replace.	Fig. 8-20, 1 Para. 7.3
	3.J. Excessive steam in area during cycle	1) Strainer in cold water line clogged — clean. 2) Insufficient flow through cooling water flow control valve — clean, adjust, repair or replace flow control valve. CAUTION: If safety valve is found to be defective, do not attempt to repair. Replace with new valve.	Fig. 8-27, 13 Fig. 8-51

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
		3) Safety valve popping or bleeding — check for source of excessive pressure.	Fig. 8-64, 11
		4) Leaking steam valve — check valves and piping for leaks. repair.	Fig. 8-51
		5) Cooling water valve (S-4) not operating correctly (should be open during exhaust and dry).	Fig. 8-51
		5a) Repair or replace valve.	Para. 7.5
		5b) Check wiring to valve — repair or replace.	
		5c) Check LED D-16 on PC board 1 — should be on during exhaust and dry. Replace board if light not on.	Fig. 8-15, 21 Para. 7.12
		5d) 5b and 5c ok — replace PC board 1.	
	3.K Steam and/or condensate leaking around door lock clutch rod	1) Steam lock diaphragm cracked or diaphragm gasket faulty — or gasket.	Fig. 8-19, 5 & 6 Para. 7.3
	3.L. Safety valve pops or bleeds excessively	1) HI-LO steam control valve improperly adjusted or malfunctioning — adjust, repair, or replace valve. 2) Safety valve defective — replace.	Fig. 8-31 Para. 7.10 Fig. 8-23, 16
4. During "DRY" part of Exhaust phase	4.A. Dry timer does not start and cooling water valve (S-4) does not close in exhaust phase 4.B. Dry timer starts and cooling water valve closes immediately after sterilize phase	1) PS-3 setting on display PC board incorrect — should be 6. 2) Loss of continuity in wire #114 (PS-3). Same as 4.A, immediately above.	Fig. 8-47, 11 Para. 7.17 Schematics
5. During Exhaust phase of Liquids cycle	5.A. Slow exhaust too rapid — solutions spill or pop caps	1) Chamber drain line trap not operating correctly — replace trap element.	Fig. 8-52, 12 Para. 7.6

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
5. Continued		2) Slow exhaust valve malfunctioning — clean, adjust, repair or replace valve. 3) PS-3 setting incorrect — should be 6. 4) Open or shorted wire — Disconnect P2 from controller, check continuity between pin L and TB2 terminals 3, 4, or 5. If okay, replace PC board 1. Otherwise isolate and repair wiring.	Fig. 8-51, 15 Fig. 8-55 Fig. 8-15, 21
	5.B. Slow exhaust too fast or too slow (Liquids Cycles only)	1) Slow exhaust valve malfunctioning — adjust, repair or replace valve. 2) PS-3 setting incorrect — should be 6. 3) Loss of continuity in wire #114 (PS-3). 4) PS-3 output drive failure on main Printcon PC board. Wire #114 should be at 5 VDC until pressure is below 3 psi, should drop to 0 VDC at 3 psi and below. 5) PS-3 input failure on Eagle CPU PC board.	Fig. 8-51, 15 Para. 7.17 Schematics Fig. 8-47, 3 Schematics Fig. 8-15, 21
	5.C. Cycle stuck in exhaust phase	1) PS-2 setting incorrect — should be 2. 2) PS-2 output drive failure on main Printcon PC board. Wire #113 should be at 5 VDC until pressure is below 1 psi, should drop to 0 VDC at 1 psi and below 3) PS-2 input failure on Eagle CPU PC board.	Para. 7.17 Fig. 8-47, 3 Schematics Fig. 8-15, 21
6. At end of cycle	6.A. Cycle fails to reach COMPLETE after exhaust completed, or signals COMPLETE too soon (liquids cycle or gravity with no dry time)	1) PS-2 setting incorrect (set too low) — should be 2. 2) Same as 5.C.2 and 5.C.3. 2) Open or shorted wire — disconnect P2 from controller and check continuity of of P52 switch point circuits, i.e., between pin K and pin 5 of plug 40. See electrical schematic for test points. 3) Same as 6.E.2.	Para. 7.17 Fig. 8-55 Schematics

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued	6.B. Buzzer and Cycle COMPLETE will not come on at end of dry time (Gravity and Pre-vacuum cycles only)	1) VS-2 setting incorrect — should be 4. 2) VS-2 output drive failure on main Printcon PC board. Wire #116 should be at 0 VDC until 2 inches or less vacuum attained — switches to 5 VDC. 3) VS-2 input failure on Eagle CPU PC board.	Para. 7.17 Fig. 8-47, 3 Schematics Fig. 8-15, 21
	6.C. Buzzer does not sound when COMPLETE light is on	1) Buzzer defective — check voltage across buzzer, replace if necessary. 2) Open wire — disconnect P1 from control and check continuity between pin W and TB3 terminal 2. Isolate and repair. 3) PC board defective — check D-18 LED on board, replace PC board 1 if LED does not come on at end of cycle.	Fig. 8-50, 1 Fig. 8-55 Fig. 8-15, 21 Para. 7.12
	6.D. Doors can be unlocked but cannot be opened when the buzzer sounds	1) Vacuum in chamber caused by faulty check valve in vacuum break line — replace check valve. 2) Vacuum break line plugged — clean or replace plugged components in line. 3) VS-2 setting incorrect — should be 4.	Fig. 8-28, 3 Fig. 8-28 Para. 7.17
	6.E. Excessive steam when door is opened or excessive effort needed to unlock door when buzzer sounds	1) PS-2 setting incorrect (set too high) — should be 2. 2) Pressure circuitry on main Printcon PC board out of calibration — check.	Para. 7.17 Para. 7.22
	6.F. Goods are wet after completion of "Wrapped" cycle, or excessive vapor in chamber when door is opened	1) Vacuum break line plugged — clean or replace filter. 2) Check valve in drain line defective — replace. 3) Wet steam — check quality. 4) Vacuum water valve (S-6) not operating correctly (should be open for drying time).	Fig. 8-28, 9 Fig. 8-52 Fig. 7-10

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		4a) Repair or replace valve. 4b) Check wiring to valve — repair or replace. 4c) Check LED D-14 on PC board 1 — should be on for drying time. Replace board if light not on. 4d) 4b and 4c ok — replace PC board 1. 5) Cooling water valve (S-4) not operating correctly (should be closed below 3 psig during exhaust and dry). 5a) Repair or replace valve. 5b) Check wiring to valve — repair or replace. 5c) Check LED D-16 on PC board 1 — should be OFF below 3 psig during exhaust and dry. Replace board if light not OFF. 5d) 5b and 5c ok — replace PC board 1.	Para. 7.5 Fig. 8-15, 21 Para. 7.12 Fig. 7-10 Para. 7.5 Fig. 8-15, 21 Para. 7.12
	6.G. Water in chamber or door channel at end of cycle	1) Chamber drain valve (S-3) not operating correctly (should be open during exhaust and dry). 1a) Repair or replace valve. 1b) Check wiring to valve — repair or replace. 1c) Check LED D-12 on PC board 1 — should be on during exhaust and dry. Replace board if light not on. 1d) 1b and 1c ok — replace PC board 1. 2) Vacuum water valve (S-7) not operating correctly (should be open for drying time). See 6.F.4, above. 3) Cold chamber floor caused by condensate accumulating in lower jacket — check return line strainer and clean if necessary; check operation of jacket return trap and replace trap if necessary; check for back pressure on return steam line, locate source and eliminate.	Fig. 7-10 Para. 7.5 Fig. 8-15, 21 Para. 7.12 Fig. 8-51 Fig. 8-30, 4 Para. 7.6 Para. 7.7

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
6. Continued		4) Chamber floor not pitched toward drain — see leveling procedure, paragraph 5.3. 5) Drains plugged or clogged — see drain cleaning procedure, paragraph 4.5. 6) Chamber steam trap does not open — replace trap element. 7) Steam not "dry" — check steam quality. 8) Drain line check valve defective — replace.	Fig. 8-52, 12 Para. 7.6 Fig. 8-25, 11
	6.H. Cycle counter fails to update on cycle complete	1) Counter defective — check voltage across counter and replace, if necessary. 2) Open wire — disconnect P1 from control and check continuity between pin P and TB3 terminal 2. Isolate and repair open. 3) PC board 1 defective — check D-17 LED on board; replace board if LED does not come on at end of cycle.	Fig. 8-16, 15 Fig. 8-55 Fig. 8-15, 21 Para. 7.12
7. Miscellaneous	7.A. Continuous sounding "cycle complete" buzzer whenever machine is turned on.	1) Excessive current leakage from triac — replace PC board 1.	Fig. 8-16, 4
	7.B. Pressure displayed is more than +2 PSI different than chamber gauge	1) Faulty chamber pressure gauge — replace. 2) Faulty sensor — replace. 3) Pressure circuitry on main Printcon PC board out of alignment — check.	Fig. 8-53 Fig. 8-53 Para. 7.22
	7.C. Two or more adjacent columns on printed record are blank	1) Printer hammer coil(s) open or shorted — replace printer.	Fig. 8-48, 22
	7.D. Illegible printed record	1) Drag on paper roll — check. 2) Binding of mechanical linkage in printer — replace printer.	Para. 7.16 Fig. 8-48, 22 Para. 7.16

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	7.E. Paper is advanced but is entirely blank	1) Printer coil connector is unplugged from P20/J20 connector — reconnect.	Fig. 8-48, 23
	7.F. Time or date not displayed	1) J51/P51 connector unplugged from display panel overlay — reconnect.	Fig. 8-47, 16
	7.G. Continuous display of time or date	1) Time or date display pushbutton on display panel shorted — replace.	Fig. 8-47, 16 Para. 7.17
	7.H. Automatic advance of display when time or date pressed.	1) Forward switch on display panel shorted — replace panel.	Fig. 8-47, 16 Para. 7.17
	7.I. Automatic reverse of display when time or date pressed.	1) Reverse switch on display panel shorted — replace panel.	Fig. 8-47, 16 Para. 7.17
	7.J. Cannot advance time or date.	1) Forward switch on display panel open — replace panel.	Fig. 8-47, 16 Para. 7.17
	7.K. Cannot reverse time or date.	1) Reverse switch on display panel open — replace panel.	Fig. 8-47, 16 Para. 7.17
	7.L. Paper will not be taken up. (Units Before 6/85)	1) Paper jammed in take-up mechanism — check alignment. 2) Paper advance toggle switch in wrong position or failed — reset or replace toggle switch as required. 3) Platen switch failure (open) — replace platen switch. 4) Take-up motor open or shorted — replace motor. 5) Take-up motor fuse blown.	Para. 7.16 Fig. 8-48, 28 Para. 7.16 Fig. 8-49, 14 Para. 7.16 Fig. 8-48, 12 Para. 7.16 Fig. 8-48
	7.M. Pinch rollers run continuously. (Units Before 6/85)	1) Platen switch failure (closed) — replace platen switch. 2) Paper jammed in take-up — check paper feed.	Fig. 8-49, 14 Para. 7.16

TABLE 6-2: CONTINUED

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
	7.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. 8-48, 28 Para. 7.16
	7.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.	Para. 7.18 Fig. 8-47, 3 Para. 7.18
	7.P. Temperature indication is incorrect, pressure is correct	1) Calibration misalignment or component failure on main Printcon PC board — recalibrate or replace board. 2) Faulty temperature sensor — replace sensor.	Para. 7.22 Para. 7.18 Fig. 8-47, 3 Para. 7.20
	7.Q. "ALARM PRESS SENSOR" is printed and intermittent buzzer sounds	1) Switch #4 on service switch (main Printcon PC Board) is in the OFF position. Set to ON. 2) Faulty pressure sensor wiring at plug P47 — check. 3) Defective pressure transducer — replace. 4) Component failure on main Printcon PC board — replace.	Para. 7.19 Table 7-2.
	7.R. Time and date settings not retained when power turned off.	1) Faulty battery on main Printcon PC board. install new battery.	Para. 7-19
	7.S. Drytime on printer tape exceeds thumbwheel setting	1) EAGLE (lower controller) and Printcon controls start DRY timing at PS-3 set point (3 psig). 2) EAGLE control operates solenoid valves drawing a vacuum for thumbwheel switch (DRY) set time.	Fig. 3-22

OPERATIONAL STATUS	TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION	WHERE TO FIND ITEMS IN MANUAL
7. Continued		3) Printcon control cannot monitor this internal EAGLE timer. Printcon adds any additional time required to achieve VS-2 set point (cycle COMPLETE) to total DRY time. This additional time can be as much as two minutes depending on chamber size. Note that printed DRY time includes vacuum brake time, a normal part of DRY (EX-HAUST) function.	
	7.T. Printcon printer and dry time thumbwheel settings differ more than two minutes.	1) Abnormal restriction in air inlet piping (i.e., filter).	Fig. 7-11
8. During Printout	8.A. The sterilize time on the cycle summary is shorter than the time dialed in on the thumbwheel switches.	1) Manually time the sterilize countdown time with a stop watch for a gravity cycle and a prevac cycle. If timing error occurs for both prevac and gravity cycles, proceed to step 2. If timing error occurs for only the prevac cycle, proceed to step 3. 2) If countdown time displayed is less than what is dialed in, refer to 2.H. and 2.I. to verify thumbwheel switch is operating properly. 3) Verify that greater than 29 PSI is displayed on Printcon prior to achieving 270°F setpoint. If not, calibration or probe replacement is required. Printcon will accumulate countdown time only while in a prevac cycle and only if both temperature (270°F) and pressure (greater than 29 lbs) are sensed. If 270°F is reached, but pressure displayed is less than 29 lb, the sterilize time will count down on display, but Printcon will not accept it unless pressure is also greater than 29 PSI. Refer to Field Test Procedure 5.12 to verify calibration.	

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

a) For temperature in Celsius:

$$\text{Probe resistance (ohms)} = 100 + 0.385 \times \text{temperature.}$$

b) For temperature in Fahrenheit:

$$\text{Probe resistance (ohms)} = 100 + 0.214 \times (\text{temperature} - 32).$$

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

NOTE 3: PSIG = PSIA - 14.7

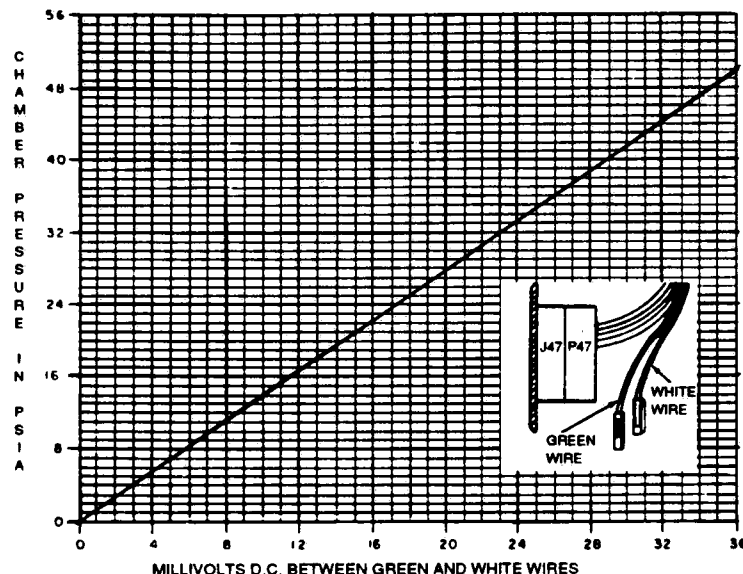


TABLE 6-3. STRAIN GAUGE PRESSURE TRANSDUCER RESPONSE.

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.

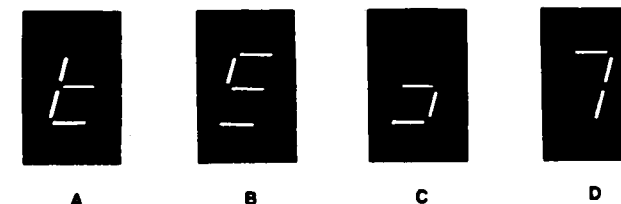
3. If an **entire number** fails to illuminate, disconnect P4 from controller and jump pin 38 of plug P4 to DC Common at terminal block TB2, terminals 3, 4, or 5*. Check for proper functioning of each display segment by following this procedure: Carefully jump, one at a time, the P4 connector pins (as listed in Table 6-5) to ground (TB2 terminals 3, 4, or 5, as applicable)*. Compare the segments actually illuminated with the pattern which should be indicated (pattern A, B, C, or D). If the pattern actually illuminated differs from the pattern illustrated, perform a continuity check of the wire. If the wire is good, then the primary panel must be replaced.

*On Printcon units, use TB7 in power supply.

TABLE 6-4: TEST PATTERNS — STERILIZE AND DRY TIMER DISPLAY

P4 Connector Pin	"STERILIZE" DISPLAY, 10's digit, (IC1), should indicate pattern:	"STERILIZE" DISPLAY, unit's digit (IC2), should indicate pattern:	"DRY" DISPLAY, 10's digit (IC3), should indicate pattern:	"DRY" DISPLAY, unit's digit (IC4), should indicate pattern:
26 27 28 29	A B C D			
30 31 32 33		A B C D		
34 35 36 37			A B C D	
18 17 16 15				A B C D

TEST PATTERNS FOR CORRECTLY FUNCTIONING DIGITAL DISPLAYS



4. If an **entire number** fails to illuminate, check for correct functioning of the thumbwheel switches by following this procedure: Disconnect P3 and P4 from the controller. Make the following continuity check across the thumbwheel switches, according to the switch

settings indicated in Table 6-5. Place the negative lead on P4-3 or P4-20. If the continuity is bad, replace the appropriate thumbwheel switch and/or repair the open circuit in the wire harness. If the continuity check is good, replace controller Board 1.

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

STERILIZE TIME THUMBWHEEL		DRY TIME THUMBWHEEL	
Switch Setting	Continuity Path to P4-3 From Pins	Switch Setting	Continuity Path to P4-20 From Pins
01	P3-1	01	P3-1
02	P3-2	02	P3-2
03	P3-1 and P3-2	03	P3-1 and P3-2
04	P3-3	04	P3-3
05	P3-1 and P3-3	05	P3-1 and P3-3
06	P3-2 and P3-3	06	P3-2 and P3-3
07	P3-1, P3-2 and P3-3	07	P3-1, P3-2 and P3-3
08	P3-4	08	P3-4
09	P3-1 and P3-4	09	P3-1 and P3-4
10	P4-9	10	P4-9
20	P4-10	20	P4-10
30	P4-9 and P4-10	30	P4-9 and P4-10
40	P4-11	40	P4-11
50	P4-9 and P4-11	50	P4-9 and P4-11
60	P4-10 and P4-11	60	P4-10 and P4-11
70	P4-9, P4-10 and P4-11	70	P4-9, P4-10 and P4-11
80	P4-12	80	P4-12
90	P4-9 and P4-12	90	P4-9 and P4-12
00	NONE	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 during this portion of test in any switch position.

*Proper continuity will be 1000 ohms or less using the 10 k ohm full scale setting.

Figure 6-5. TEMPERATURE THUMBWHEEL SWITCHES: Wiring.

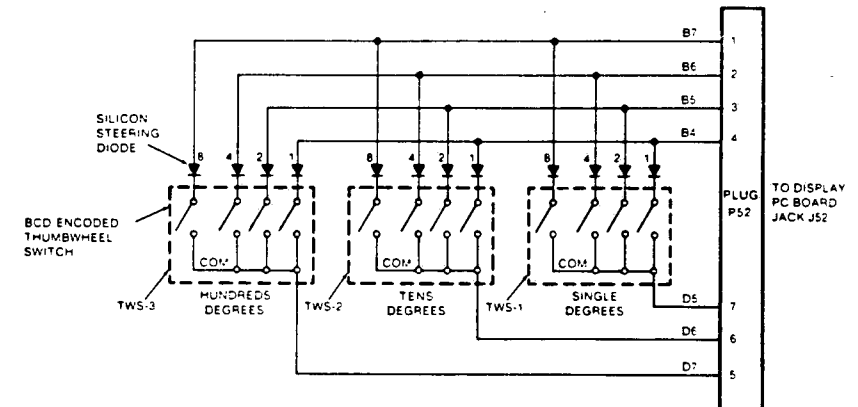


TABLE 6-6: SWITCH CHECKOUT CHART

Setting	Continuity To Appropriate Common From These Wires*
0	None
1	B4
2	B5
3	B4 and B5
4	B6
5	B6 and B4
6	B6 and B5
7	B6, B5 and B4
8	B7
9	B7 and B4

*Circuit to all other wires must be open.

TABLE 6-7: COMMONS

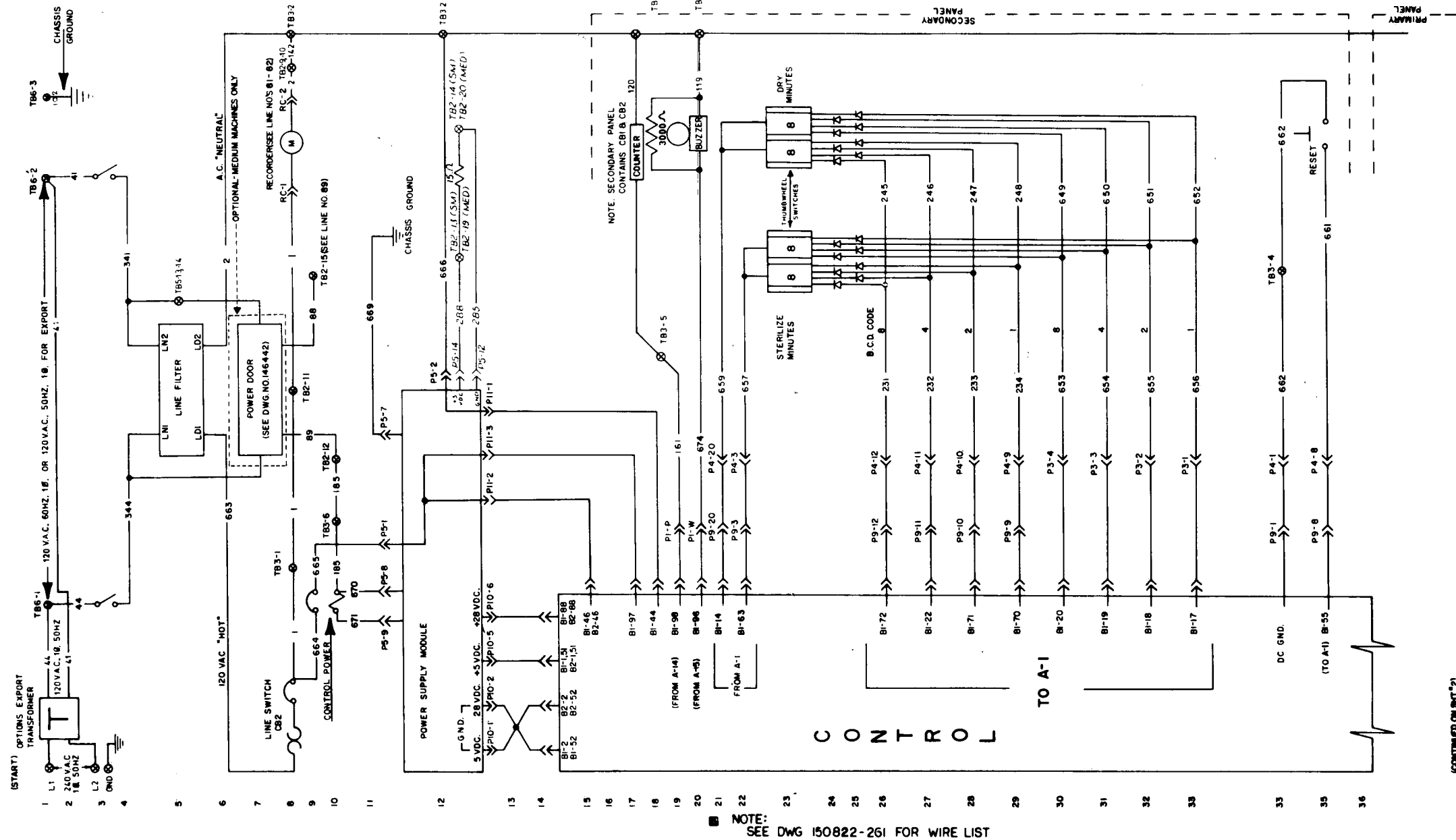
SWITCH	COMMON
TWS-3	D7
TWS-2	D6
TWS-1	D5

TABLE 6-8: SCHEMATIC REFERENCE LIST

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

Title	Sheet	Reference
ELECTRIC SCHEMATIC: Vacamatic Sterilizer (IRC)	1 of 3	146622
	2 of 3	
	3 of 3	
PIPING SCHEMATIC (IRC)	1 of 1	—
ELECTRIC SCHEMATIC: Vacamatic Sterilizer (Printcon)	1 of 3	146649-043
	2 of 3	
	3 of 3	
PIPING SCHEMATIC: Printcon	1 of 1	—
MASTER WIRE LIST (IRC)	1 of 1	150822-261
PRINTED CIRCUIT BOARD: Basic	1 of 2	146586
	2 of 2	
PRINTED CIRCUIT BOARD: Expander	1 of 2	146588
	2 of 2	
PC ASSEMBLY: Power Supply (IRC)	1 of 2	146599
	2 of 2	
PC ASSEMBLY: Power Supply (Printcon)	1 of 2	146633-051
	2 of 2	
MAIN PRINTCON PC BOARD	1 of 4	146651-001
	2 of 4	
	3 of 4	
	4 of 4	
PRINTCON DIGITAL DISPLAY PC BOARD	1 of 2	146633-081
	2 of 2	
PRINTED CIRCUIT BOARD: Primary Panel (OE)	1 of 2	134468-444
	2 of 2	
PRINTED CIRCUIT BOARD: Primary Panel (NOE)	1 of 2	136640-001
	2 of 2	

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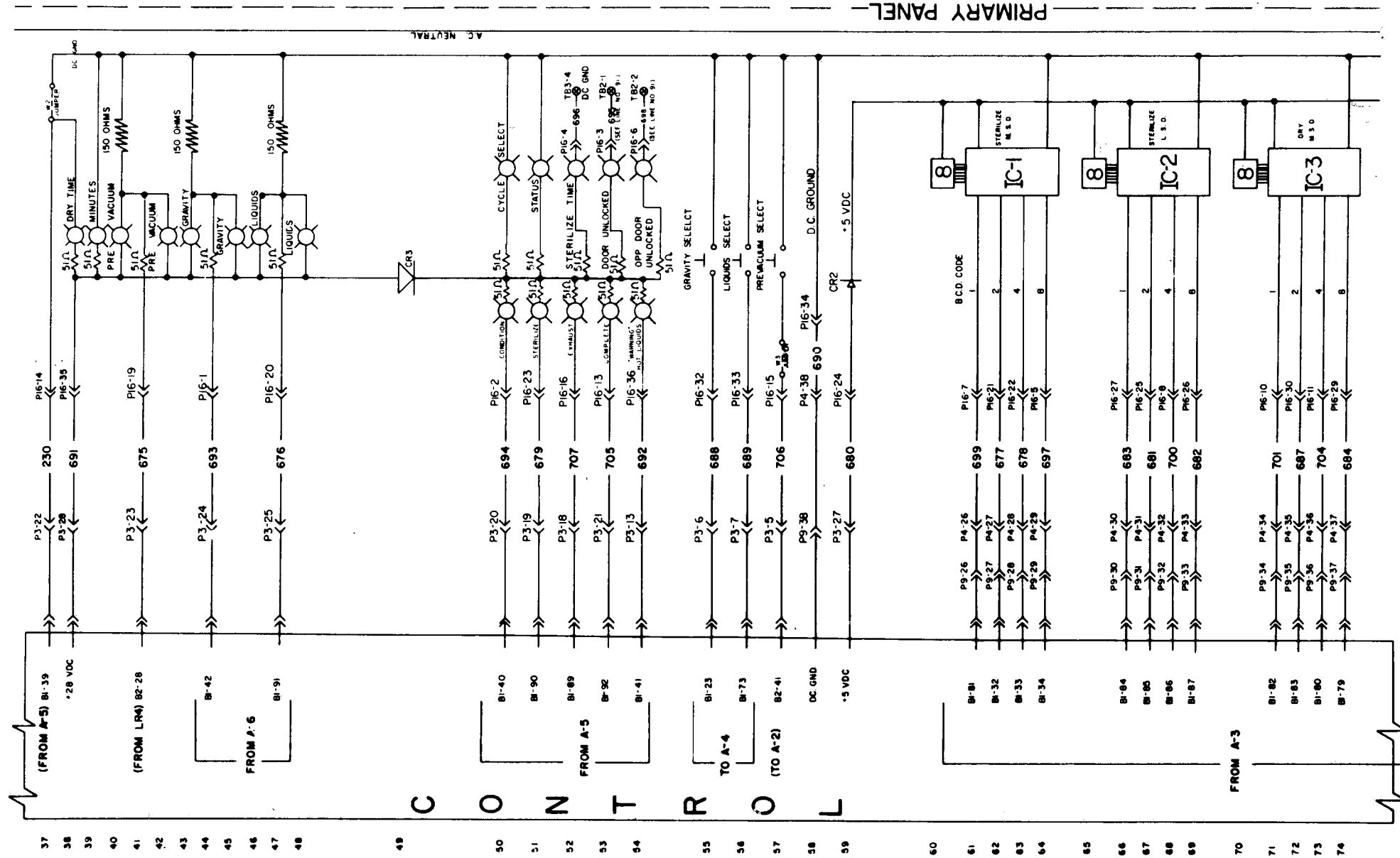


NOTE:
SEE DWG 150822-261 FOR WIRE LIST

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

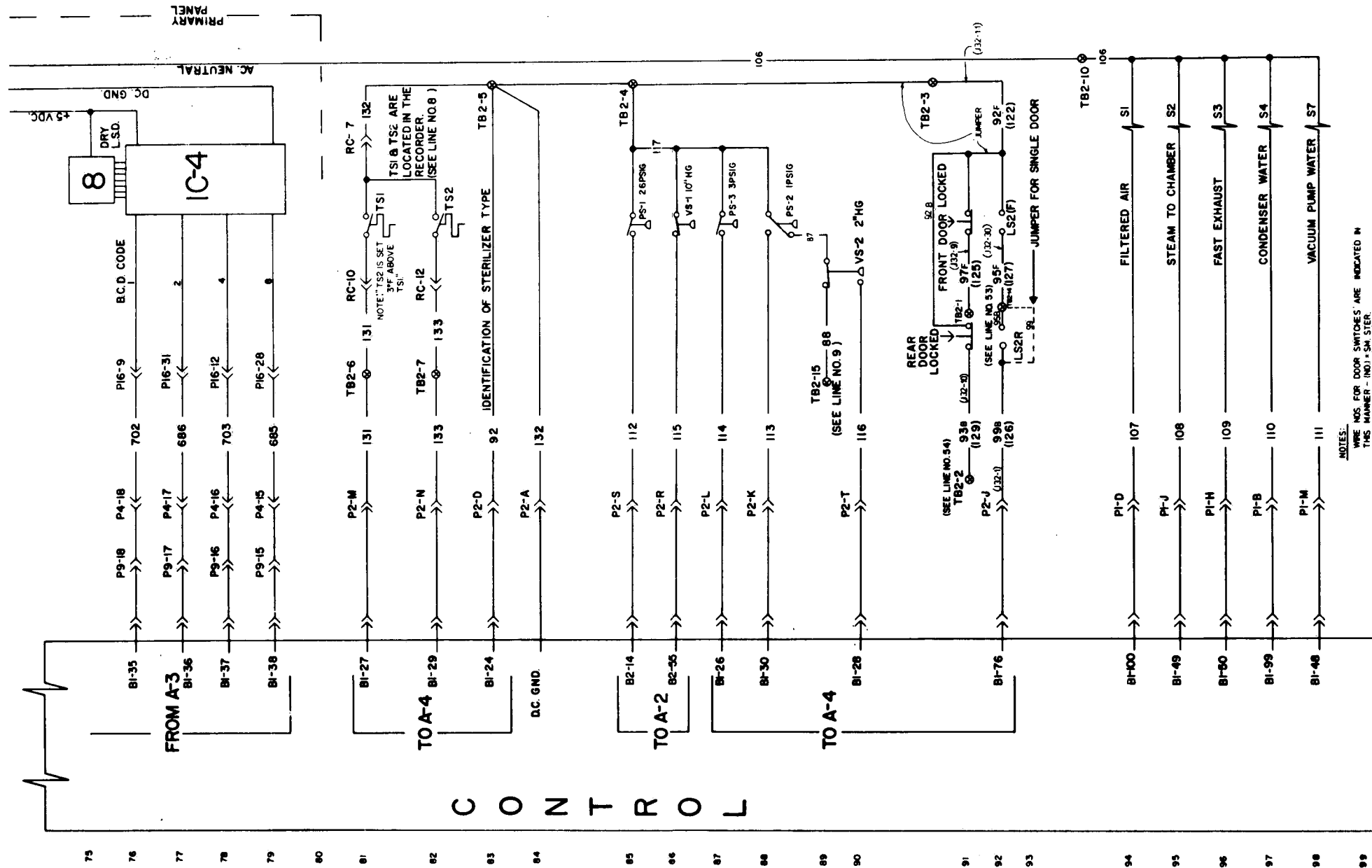
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(CONTINUED ON SHEET 3)

(CONTINUED FROM SWT. 2)



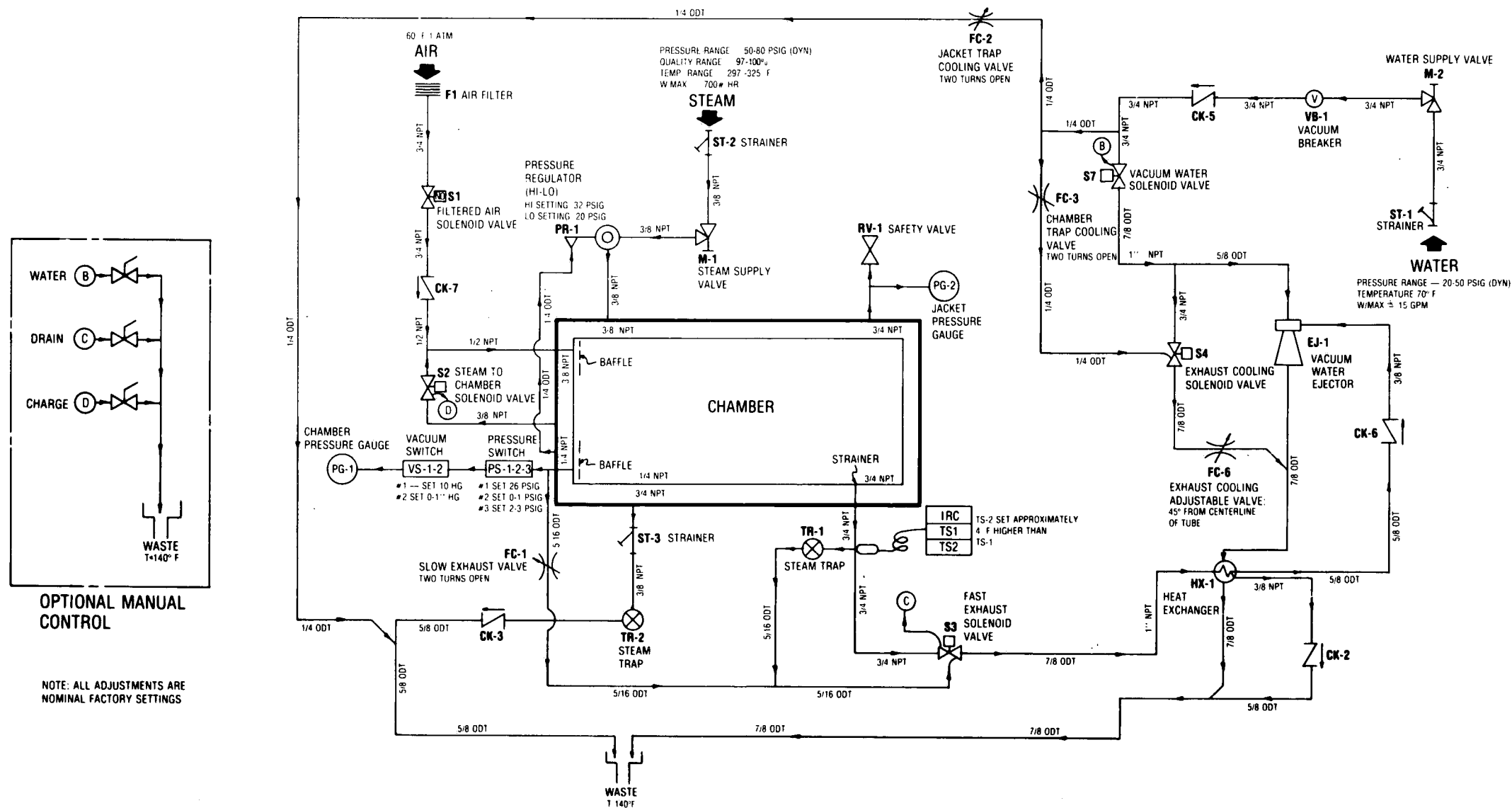
ELECTRICAL SCHEMATIC: (3 OF 3).
(Units with Indicator-Recorder)

NOTES:

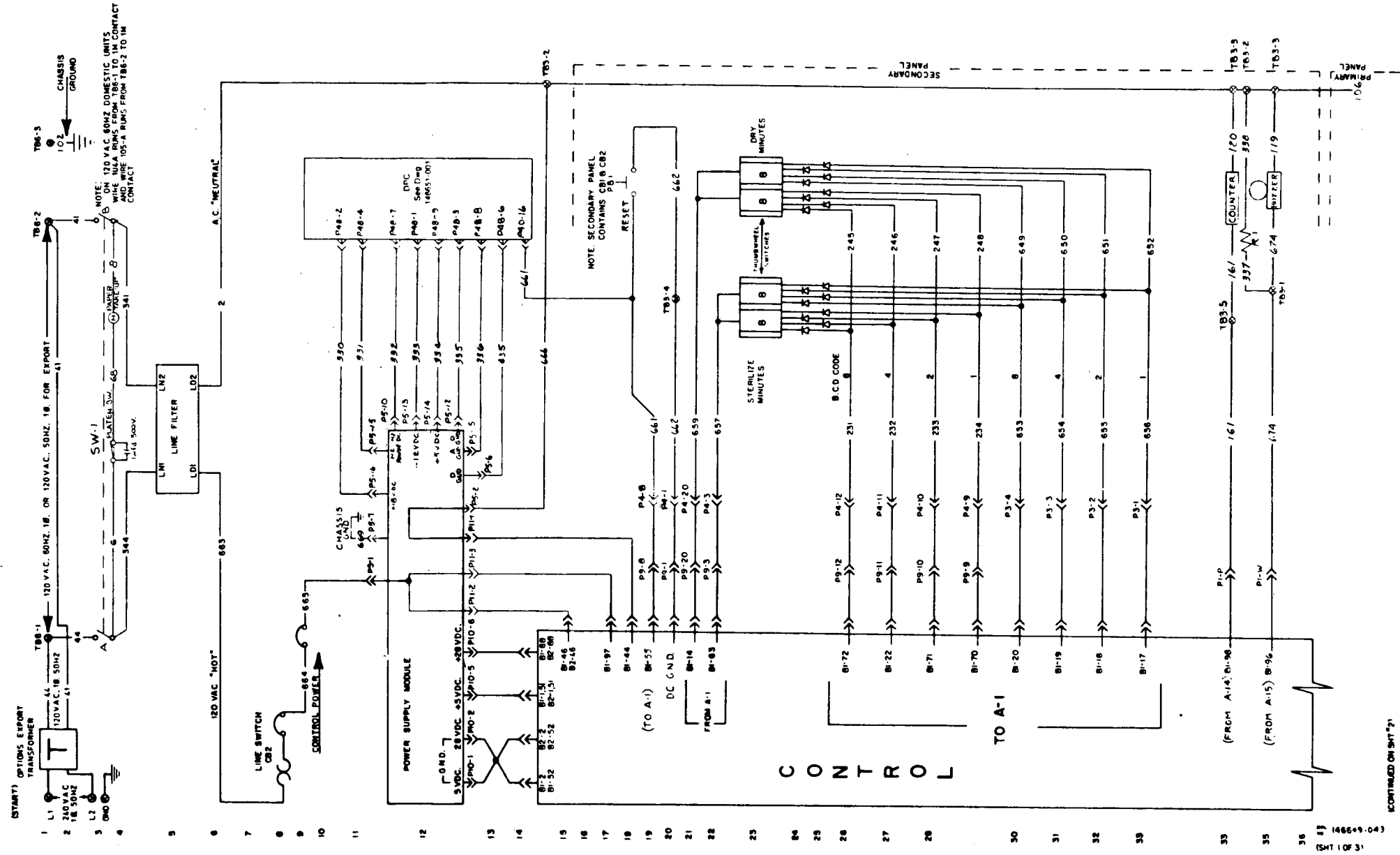
WIRE NOS. FOR DOOR SWITCHES ARE INDICATED IN THIS MANNER - (NO.) = SW. STER. NO. = MED STER. MAN. DOOR

POWER DOOR MEDUINS: WIRE NOS. SAME AS MANUAL WITHOUT "B" OR "F" PIN CONNECTIONS SHOWN IN PARENTHESES ("") T82-14 NOT USED.

1999

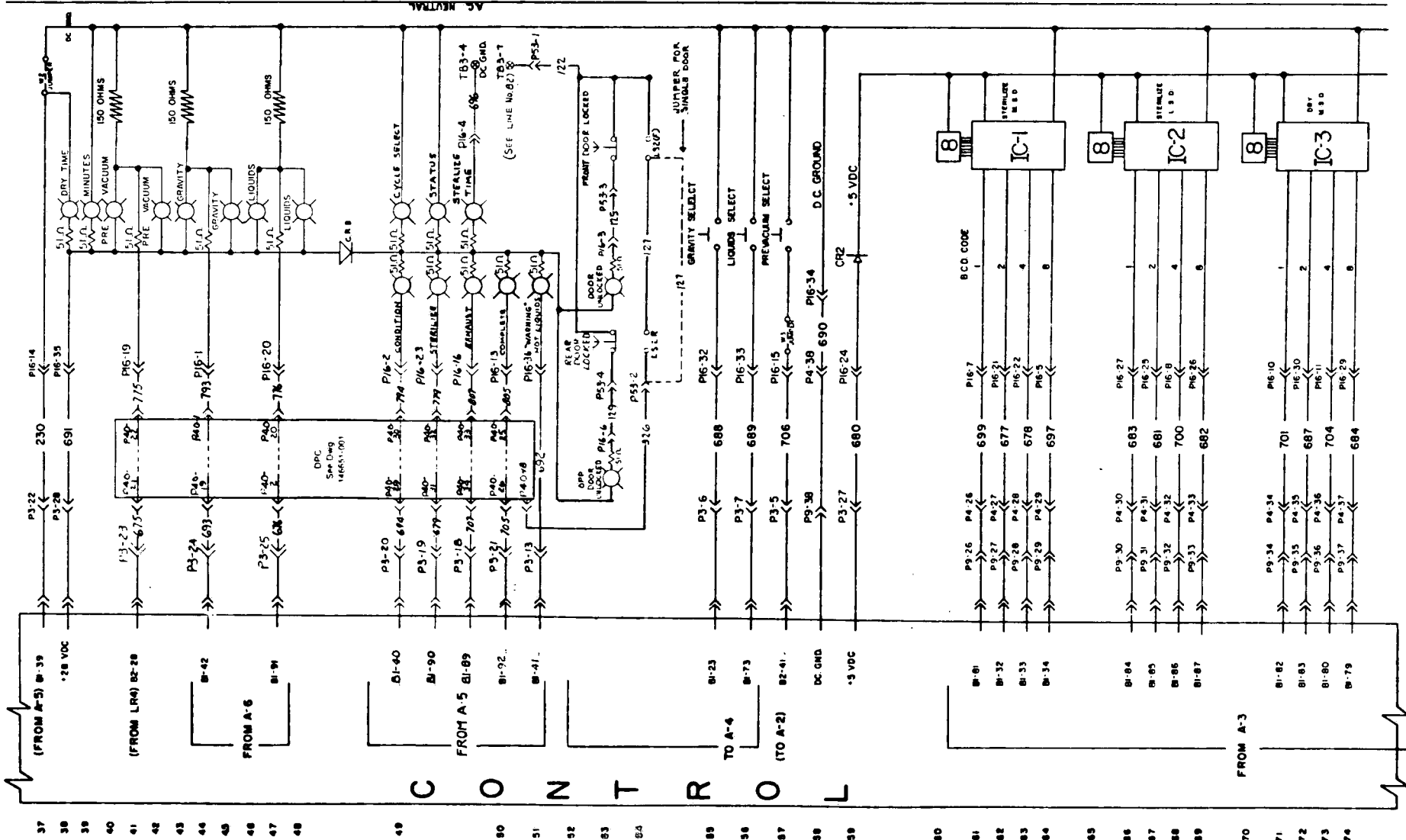


PIPING SCHEMATIC.
(Units with Indicator-Recorder)



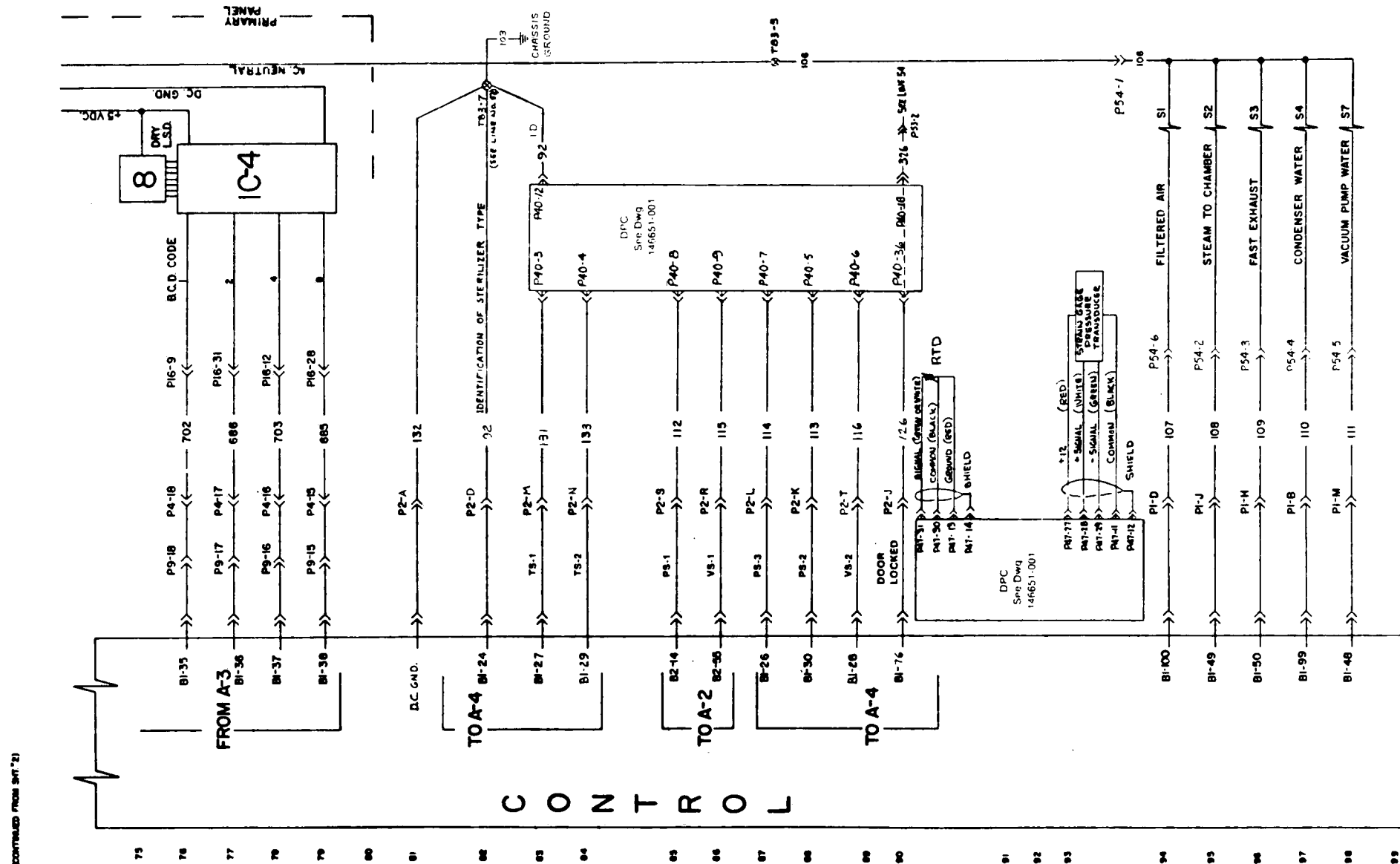
ELECTRICAL SCHEMATIC:
Vacumatic Sterilizer (1 of 3)
(Units with Printcon)

(CONTINUED FROM SHEET 1)

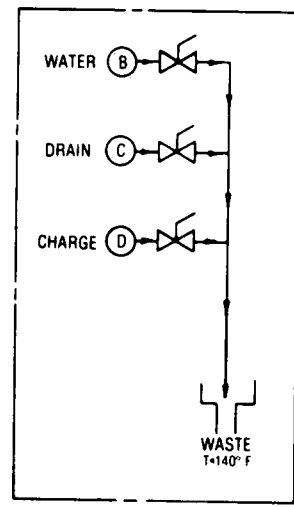
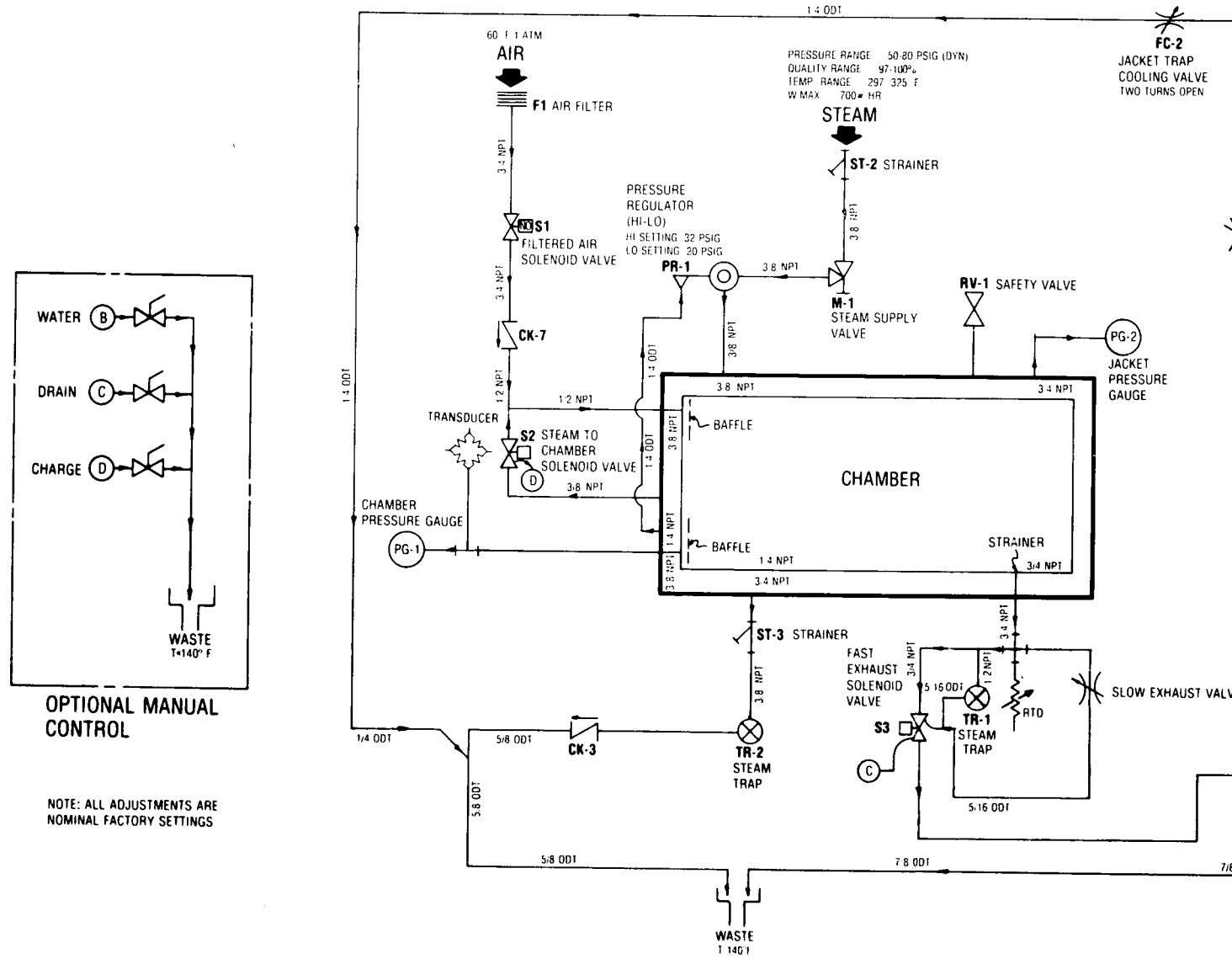


(CONTINUED ON SHEET 3)

ELECTRICAL SCHEMATIC:
Vacumatic Sterilizer (2 of 3)
(Units with Printcon)

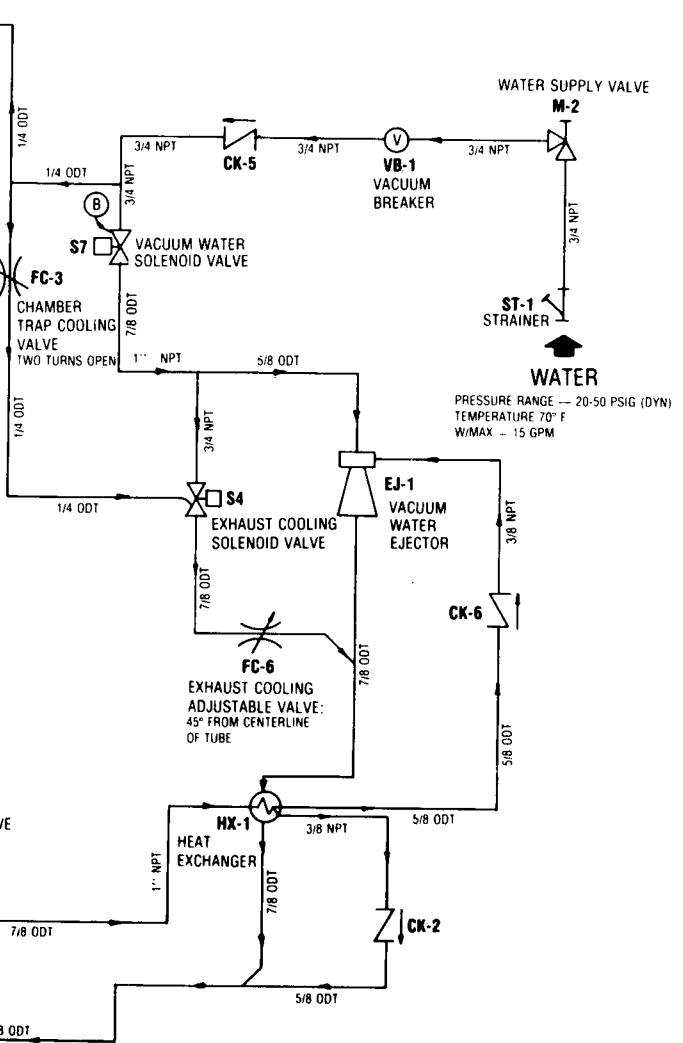


ELECTRICAL SCHEMATIC:
Vacumatic Sterilizer (3 of 3)
(Units with Printcon)



OPTIONAL MANUAL CONTROL

NOTE: ALL ADJUSTMENTS ARE NOMINAL FACTORY SETTINGS



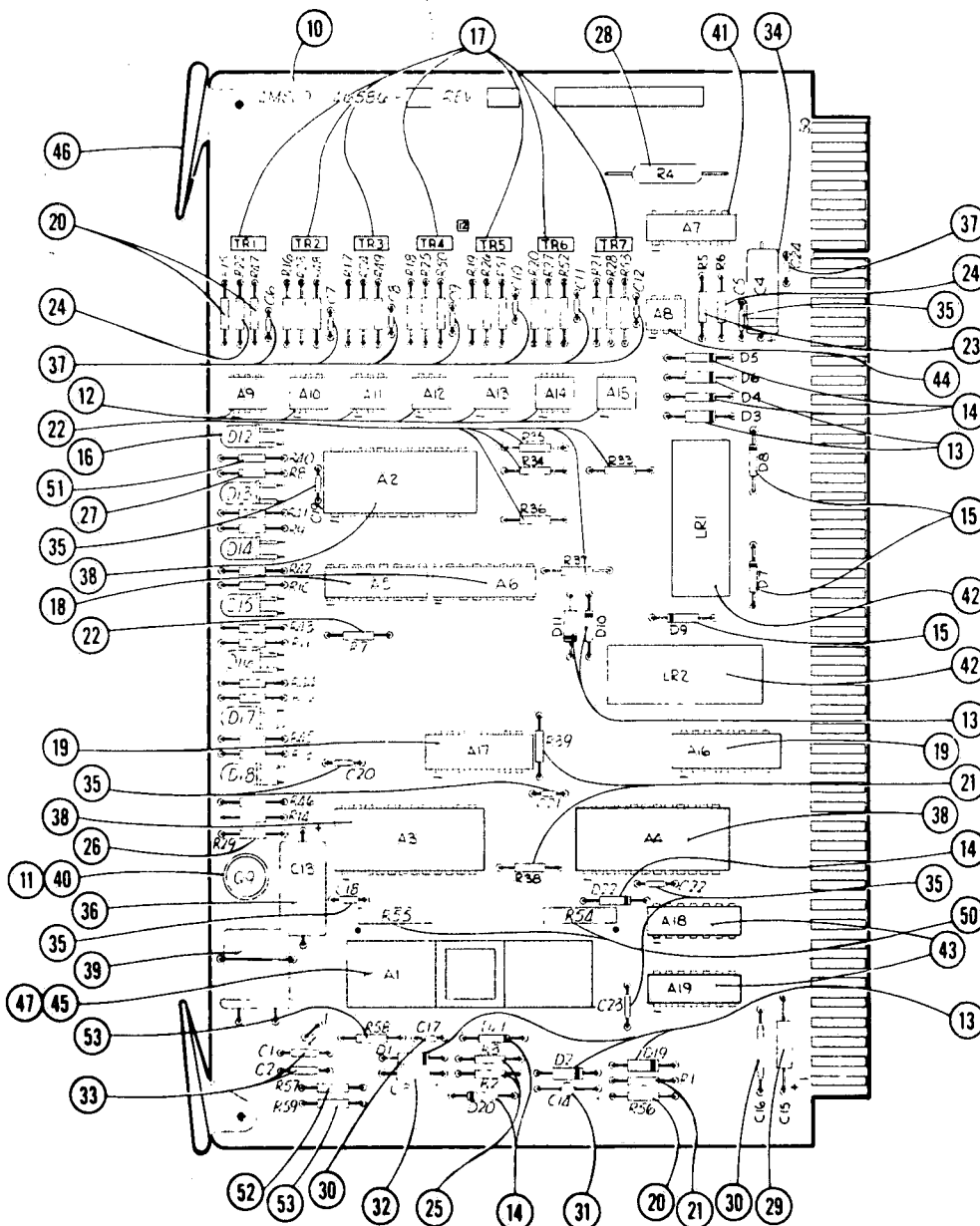
PIPING SCHEMATIC.
(Units with Printcon)

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
1	BLK	CB2-2	QUICK-CONN	TB3-1	RING TERM	
1	"	TB3-1	RING TERM	"	"	
1	"	TB2-11	"	RC-1	PIN-FEMALE	
1	"	TB2-11	"	TS7-COM	RING TERM	ISO ONLY
2	WHITE	FILTER/LD2	QUICK-CONN	TB3-2	"	
2	JUMPER	TB3-2	RING TERM	TB3-3	"	
2	WHITE	TB2-9	"	RC1-2	PIN-FEMALE	
41	"	TB6-2	"	SW1-B	QUICK-CONN	
44	BLK	TB6-1	"	SW1-A	"	
87	BROWN	PS2-NC	QUICK-CONN	VS2-COM	"	VAC. ONLY
88	"	PS2-NC	"	TB2-15	RING TERM	ISO & GRAV/ISO ONLY
88	"	VS2-COM	"	TB2-15	"	VAC. ONLY
92	VIOLET	TB2-5	RING TERM	P2-C	PIN-FEMALE	ISO ONLY-STER. I.D.
92	"	TB2-5	"	P2-D	"	VAC. ONLY-STER. I.D.
92F/122	"	LSF-COM1A	"	TB2-3	RING TERM	
92B/122	"	LSB-NC1A	"	TB2-4	"	DBL. DOOR ONLY
93B/129	TAN	LSB-COM1A	"	TB2-2	"	"
95F/127	"	LSF-NO1B	"	TB2-14	"	"
95B/127	GRAY	LSB-COM1B	"	TB2-14	"	DBL. DOOR ONLY
97F/125	VIOLET	LSF-NC1A	"	TB2-1	"	"
99F/127	TAN	TB2-14	"	P2-J	PIN-FEMALE	SGL. DOOR ONLY
99B/126	TAN	LSB-NO1B	"	P2-J	"	DBL. DOOR ONLY
102	GREEN	TB6-3	"	CHASSIS GND	RING TERM	
106	WHITE	S9	SPLICE-CONN	S9	SPLICE-CONN	ISO ONLY
106	"	S8	"	S10	"	"
106	"	S10	"	S4	"	ISO ONLY
106	"	S4	"	S2	"	"
106	"	S7	"	S1	"	VAC. ONLY
106	"	S1	"	S2	"	"
106	"	S2	"	S5	"	ISO, GRAV/ISO ONLY
106	"	S2	"	S3	"	"
106	"	S3	"	TB2-15	RING TERM	
107	YELLOW	S1	"	P1-D	PIN-MALE	VAC. ONLY
108	YELLOW	S2	SPLICE-CONN	P1-J	PIN-MALE	VAC. ONLY
109	"	S3	"	P1-H	"	"
110	"	S4	"	P1-B	"	"
111	"	S7	"	P1-M	"	VAC. ONLY
112	BROWN	PS1-NC	QUICK-CONN	P2-J	PIN-FEMALE	VAC. ONLY
113	"	PS2-NO	"	P2-K	"	"
114	"	PS3-COM	"	P2-L	"	"
115	"	VS1-COM	"	P2-R	"	VAC. ONLY
116	"	VS2-NC	"	P2-T	"	"
117	VIOLET	VS1-COM	"	PS-3	QUICK-CONN	"
117	"	PS3-COM	"	PS-2	"	"
117	"	PS2-COM	"	TB2-14	RING TERM	
117	"	PS2-COM	"	PS1-COM	QUICK-CONN	VAC. ONLY
117	"	PS1-COM	"	TB2-14	RING TERM	"
119	WHITE	BUZZER	"	TB3-3	"	
120	WHITE	COUNTER	"	TB3-2	"	
131	ORANGE	P2-M	PIN-FEMALE	TB2-6	RING TERM	
131	ORANGE	TB2-6	RING TERM	RC1-10	PIN-FEMALE	
132	VIOLET	P2-A	PIN-FEMALE	TB2-5	RING TERM	
132	"	TB2-5	RING TERM	RC1-7	PIN-FEMALE	
133	ORANGE	P2-N	PIN-FEMALE	TB2-7	RING TERM	
133	"	TB2-7	RING TERM	RC1-12	PIN-FEMALE	
142	WHITE	TB3-2	"	TB2-10	RING TERM	
153	YELLOW	S5	SPLICE-CONN	P1-K	PIN-MALE	ISO ONLY

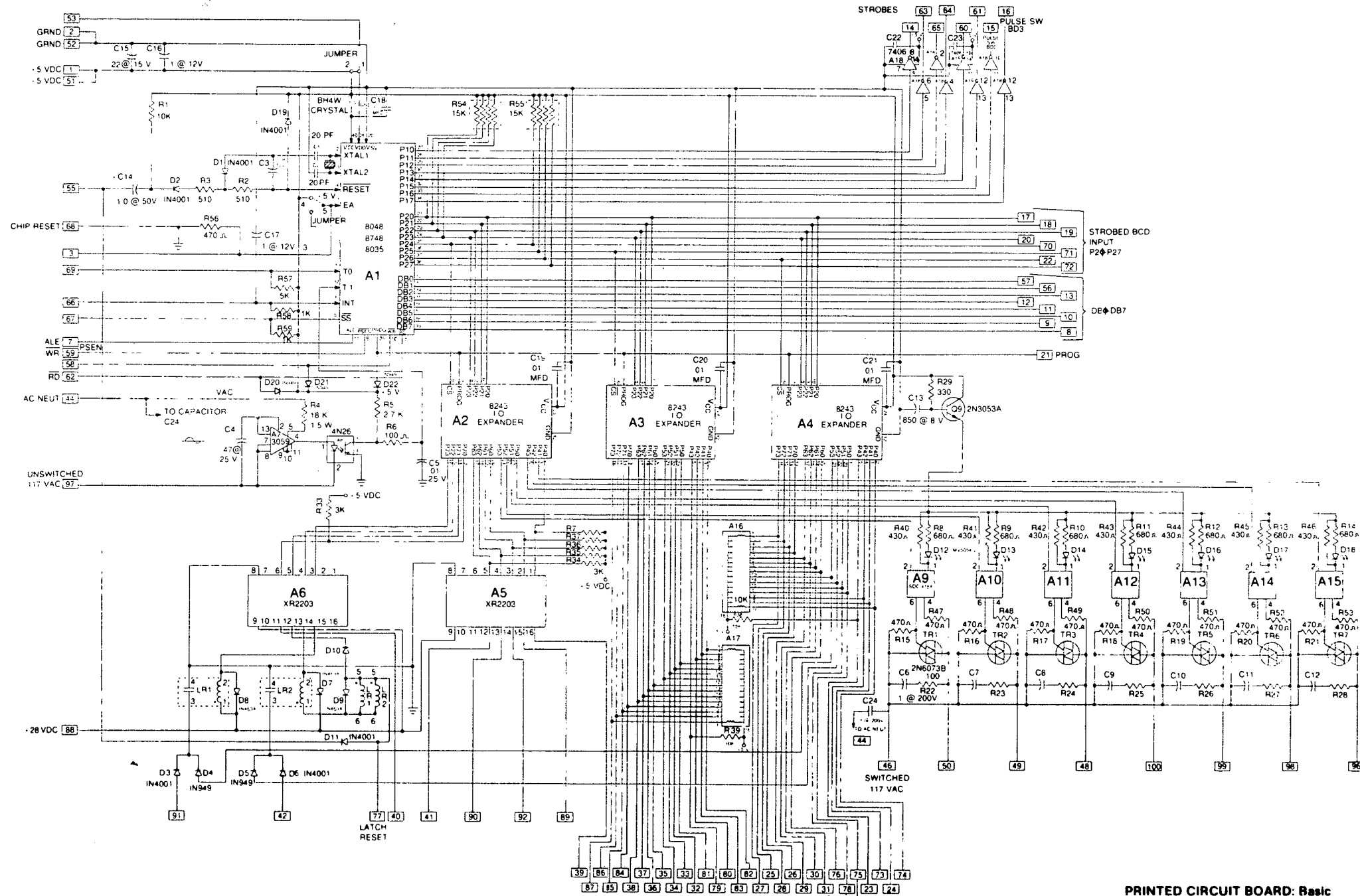
WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
154	"	S8	"	P1-R	"	"
155	"	S9	"	P1-T	"	"
156	"	S10	"	TS7-NO	RING TERM	"
156	"	TS7-NO	RING TERM	P1-S	PIN-MALE	"
161	BLK	COUNTER	SPLICE-CONN	TB3-5	RING TERM	
161	BLK	TB3-5	RING TERM	P1-P	PIN-MALE	
185	"	CB1-C	QUICK-DIS	TB3-6	RING TERM	
185	"	TB3-6	RING TERM	TB2-12	"	
206	GRAY	P25-1	PIN-FEMALE	P23-10	PIN-FEMALE	DBL. DOOR ONLY
207	"	" -2	"	" -10	"	DBL. DOOR ONLY
208	"	" -3	"	" -13	"	"
209	"	" -4	"	" -7	"	"
210	GRAY	P25-5	PIN-FEMALE	P23-15	PIN-FEMALE	DBL. DOOR ONLY
211	"	" -6	"	" -9	"	"
212	"	" -7	"	" -5	"	"
213	"	" -8	"	" -24	"	"
214	"	" -9	"	" -1	"	"
215	"	" -10	"	" -18	"	"
216	"	" -11	"	" -3	"	"
217	"	" -12	"	" -8	"	"
218	"	" -13	"	" -25	"	"
219	"	" -14	"	" -20	"	"
220	"	" -15	"	" -14	"	"
221	"	" -16	"	" -23	"	"
222	"	" -17	"	" -6	"	"
223	"	" -18	"	" -19	"	"
225	"	" -20	"	" -17	"	"
226	"	" -21	"	" -12	"	"
229	"	" -24	"	" -28	"	"
230	BLK	P16-14	PIN-FEMALE	P3-22	PIN-MALE	
231	"	SWC-8	SOLDER	P4-12	"	
232	"	SWC-4	"	P4-11	"	
233	"	SWC-2	"	P4-10	"	
234	"	SWC-1	"	P4-9	"	
245	"	SWA-8	"	SWC-8	SOLDER	
246	"	SWA-4	"	SWC-4	"	
247	"	SWA-2	"	SWC-2	"	
248	"	SWA-1	"	SWC-1	"	
285	BLK	P5-12	PIN FEMALE	TB2-14	RING TERM	SMALLS ONLY
288	BLK	P5-14	PIN FEMALE	TB2-13	RING TERM	SMALLS ONLY
285	BLK	P5-12	PIN FEMALE	TB2-20	RING TERM	MEDIUMS
288	BLK	P5-14	PIN FEMALE	TB2-19	RING TERM	MEDIUMS
341	WHITE	SWB-NO	QUICK-DIS	FILTER/LN-2	QUICK-DIS	
341	"	FILTER/LN-2	"	TB5-13	RING TERM	PWR. DOOR ONLY
344	BLK	SWA-NO	"	FILTER/LN-1	QUICK-DIS	
649	"	SWD-8	SOLDER	SWB-8	SOLDER	
650	"	SWD-4	"	SWB-4	"	
651	"	SWD-2	"	SWB-2	"	
652	"	SWD-1	"	SWB-1	"	
653	"	SWD-8	"	P3-4	PIN-MALE	
654	"	SWD-4	"	P3-3	"	
655	"	SWD-2	"	P3-2	"	

WIRE NO.	COLOR	FROM	CONNECTION METHOD	TO	CONNECTION METHOD	REMARKS
656	BLK	SWD-1	SOLDER	P3-1	PIN-MALE	
657	"	SWA-C	"	P4-3	"	
659	"	SWC-C	"	P4-20	"	
661	"	PB1-1	SPLICE-CONN	P4-8	"	
662	"	PB-2	"	P4-1	"	SPLICE-CONN ON ISO ONLY
663	"	CB2-1	QUICK-DIS	FILTER/LD-	QUICK-DIS	
664	"	CB2-2	"	CB1-A	"	
665	"	CB1-B	"	P5-1	PIN-FEMALE	
666	"	TB3-2	RING TERM	P5-2	"	
669	GREEN	CHASSIS GND	"	P5-7	"	
670	BLK	CB1-C	QUICK-DIS	P5-8	"	
671	"	CB1-D	"	P5-9	"	
674	"	BUZZER	"	P1-W	PIN-MALE	
675	"	P16-19	PIN-FEMALE	P3-23	"	VAC. ONLY
676	"	" -20	"	P3-25	"	
677	"	" -21	"	P4-27	"	
678	"	" -22	"	P4-28	"	
679	"	" -23	"	P3-19	"	
680	"	" -24	"	P3-27	"	
681	"	" -25	"	P4-31	"	
682	"	" -26	"	P4-33	"	
683	"	" -27	"	P4-30	"	
684	"	" -29	"	P4-37	"	
685	"	" -28	"	P4-15	"	
686	"	" -31	"	P4-17	"	
687	"	" -30	"	P4-35	"	
688	"	" -32	"	P3-6	"	
689	"	" -33	"	P3-7	"	
690	"	" -34	"	P3-38	"	
691	"	" -35	"	P3-28	"	
692	"	" -36	"	P3-13	"	
693	"	" -1	"	P3-24	"	
694	"	" -2	"	P3-20	"	
695	"	" -3	"	TB2-1	RING TERM	
696	"	" -4	"	P3-15	PIN-MALE	ISO
696	"	" -4	"	TB3-4	RING TERM	GRAVITY
697	BLK	P16-5	PIN-FEMALE	P4-29	PIN-MALE	
698	"	" -6	"	TB2-2	RING TERM	
699	"	" -7	"	P4-26	PIN-MALE	
700	"	" -8	"	P4-32	"	
701	"	" -10	"	P4-34	"	
702	"	" -9	"	P4-18	"	
703	"	" -12	"	P4-16	"	
704	"	" -11	"	P4-36	"	
705	"	" -13	"	P3-21	"	
706	"	" -15	"	P3-5	"	VAC. ONLY
707	"	" -16	"	P3-18	"	
739	"	" -17	"	P3-5	"	ISO ONLY
740	"	" -18	"	P3-23	"	"
767	"	SW2-B1	QUICK-DIS	P3-8	"	"
768	"	SW2-B2	"	P4-19	"	"
1000	"	BUZZER	SPLICE-CONN	3KΩPes	SPLICE-CONN	
1001	"	BUZZER	"	3KΩRes	"	

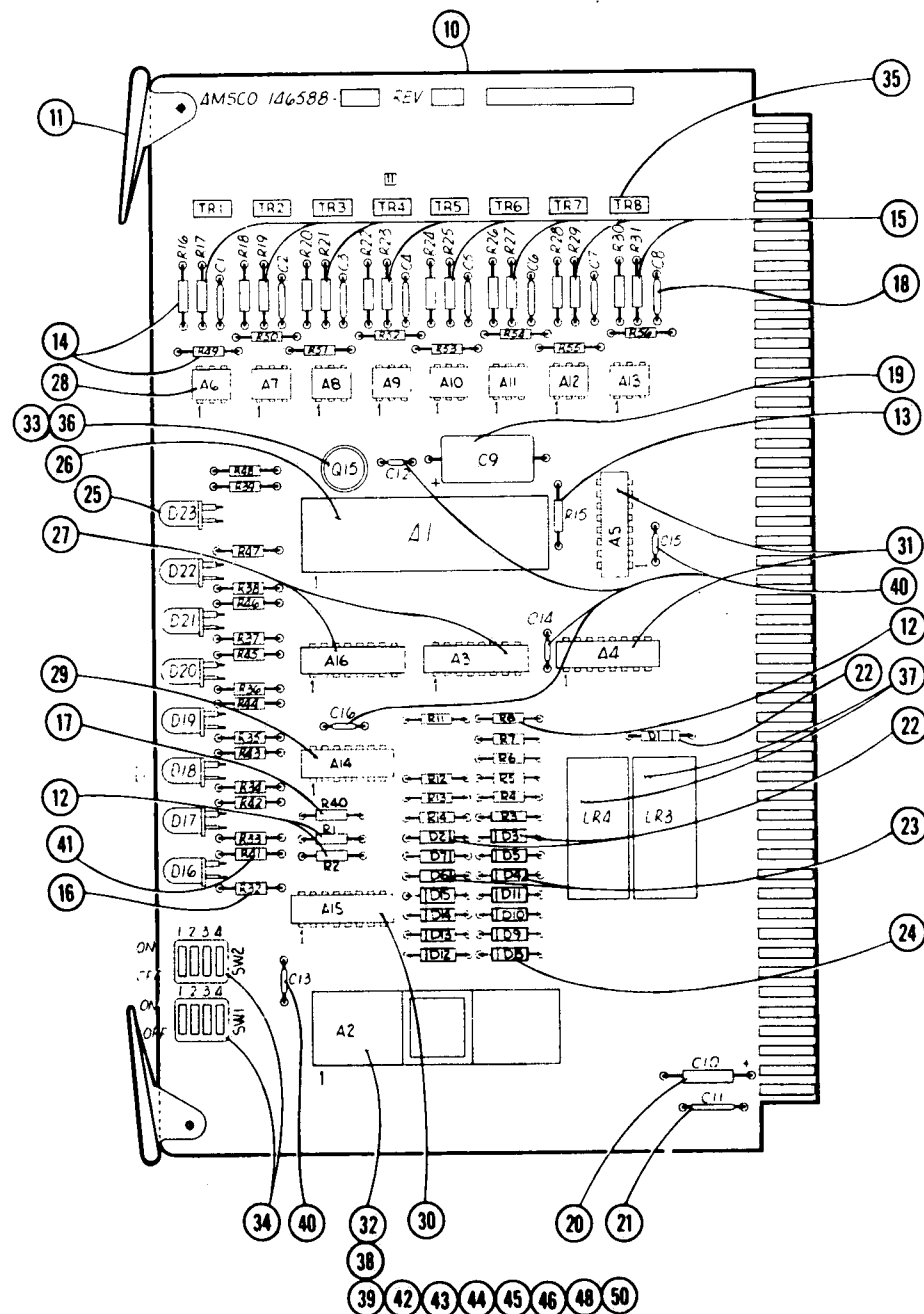
MASTER WIRE LIST:
Gravity/Isothermal/Vacumatic Sterilizers
(Units with Indicator-Recorder)



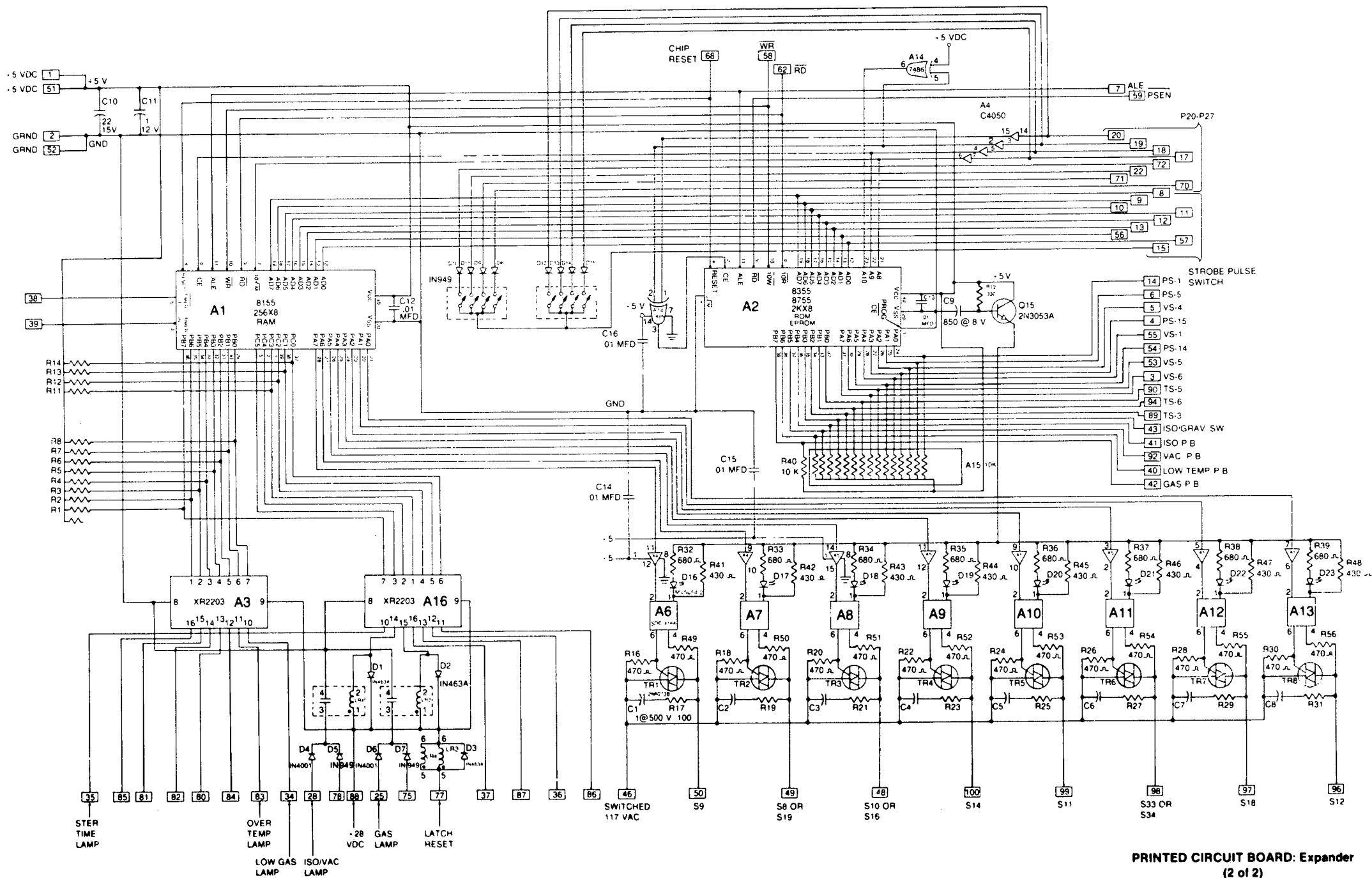
QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	NOT USED	
	2	NOT USED	
	3	NOT USED	
	4	NOT USED	
	5	NOT USED	
	6	NOT USED	
	7	NOT USED	
	8	NOT USED	
1	10	P/C CARD & DRILL ASSY.	
1	11	PAD, TRANSISTOR	
7	12	IC SOC 418 A	TRIAC DRIVER A9-A15
7	13	RECTIFIER, IN4001	D1, D2, D3, D6, D10, D11, D19
5	14	DIODE, IN949	D4, D5, D20-D22
3	15	RECTIFIER, IN463A	D7, D8, D9
7	16	LAMP, SOLID STATE	MV 5054-2 L.E.D., D12-D18
7	17	TRIAC, 2N6073R	TR1-TR7
2	18	TRANSISTOR, XR2203	DARLINGTON - A5, A6
2	19	RESISTOR, NETWORK	916C103X2PE A16, A17
15	20	RESISTOR	470 OHMS 1/4W 5% CARBON, R15-R21, R47-R53, R56
3	21	RESISTOR	10K 1/4W 5% CARBON, R1, R38, R39
6	22	RESISTOR	3K 1/4W 5% CARBON, R7, R33-R37
1	23	RESISTOR	2.7K 1/4W 5% CARBON, R5
8	24	RESISTOR	100 OHMS 1/4W 5% CARBON, R6, R22-R28
2	25	RESISTOR	510 OHMS 1/4W 5% CARBON, R2, R3
1	26	RESISTOR	330 OHMS 1/4W 5% CARBON, R29
7	27	RESISTOR	680 OHMS 1/4W 5% CARBON, R8-R14
1	28	RESISTOR	18K 1.5W 10%, CARBON, R4
1	29	CAPACITOR	22µf @ 15V TANTALUM-C15
2	30	CAPACITOR	0.1µf @ 12V CERAMIC DISC-C16, C17
1	31	CAPACITOR	1.0µf @ 50V TANTALUM-C14
1	32	CAPACITOR	1.0µf @ 10V TANTALUM-C3
2	33	CAPACITOR	20pf @ 500V CERAMIC DISC-C1, C2
1	34	CAPACITOR	47µf @ 25V TANTALUM, C4
7	35	CAPACITOR	0.01µf @ 25V CERAMIC DISC-C5, C18, C23
1	36	CAPACITOR	850µf @ 8V TANTALUM-C13
8	37	CAPACITOR	0.1µf @ 200 WDC 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



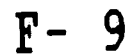
PRINTED CIRCUIT BOARD: Basic
(2 of 2)



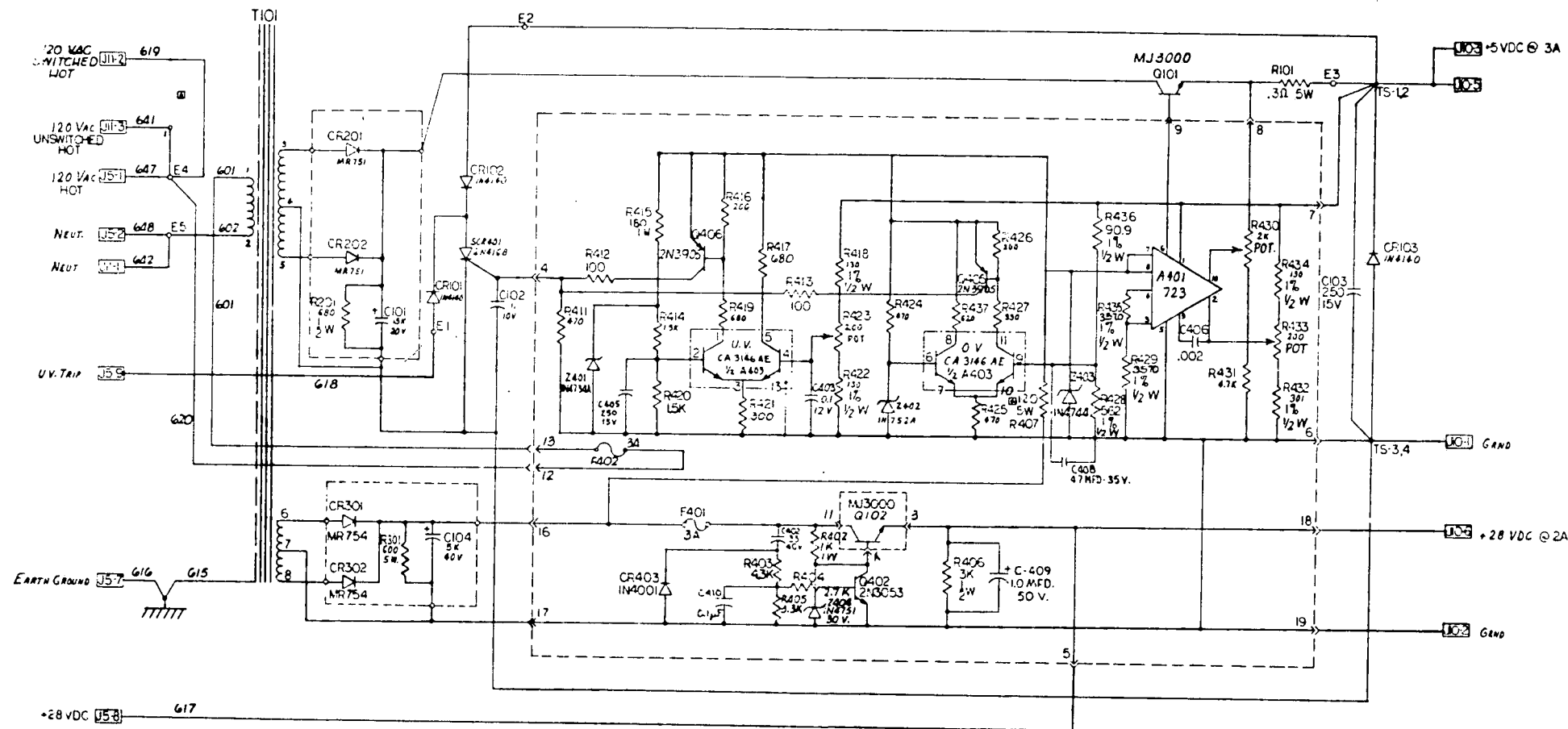
QTY.	ITEM NO.	NAME	DESCRIPTION, MATERIAL
	1	P/C CARD ASSY.	VAC & GAS
	2	P/C CARD ASSY.	PULSTAR 2000(CRW),PULSTAR 3000(HCW)
	3	P/C CARD ASSY.	EAGLE 2200
	4	P/C CARD ASSY.	PULSTAR 5000
	5	P/C CARD ASSY.	
	6	P/C CARD ASSY.	
	7	P/C CARD ASSY.	
	8	P/C CARD ASSY.	
1	9	COMMON PARTS LIST	
1	10	P/C CARD & DRILL SCHD.	
1	11	PULL, CARD	
12	12	RESISTOR, 3K OHMS	1/4W 5%, R1-R8, R11-R14
1	13	RESISTOR, 330 OHMS	1/4W 5%, R15
16	14	RESISTOR, 470 OHMS	1/4W 5%, R16, R18, R20, R22, R24, R26, R28, R30, R49-R56
8	15	RESISTOR, 100 OHMS	1/4W 5%, R17, R19, R21, R23, R25, R27 R29, R31
8	16	RESISTOR, 680 OHMS	1/4W 5%, R32-R39
1	17	RESISTOR, 10K OHMS	1/4W 5%, R40
8	18	CAPACITOR, .1µf, 500V	C1-C8
1	19	CAPACITOR, 850µf, 8V	C9
1	20	CAPACITOR, 22µf, 15V	C10
1	21	CAPACITOR, .1µf, 12V	C11
3	22	DIODE	IN463A, D1, D2, D3
2	23	DIODE	IN4001, D4, D6
2	24	DIODE	IN949, D5, D7, D8-D15
8	25	L.E.D.	MV5054-2 D16-D23
1	26	MOS RAM, 8155(H)	A1
2	27	DARLINGTON, XR2203	A3, A16
8	28	OPTOISO TRIAC	SOC 418A A6-A13
1	29	QUAD EX-OR	A14
1	30	RESISTOR, NETWORK	916C103X2PE A15
2	31	BUFFER, CMOS	CD4050BC A4, A5
1	32	DIP SOCKET, 40 PIN	A2
1	33	TRANSISTOR	2N3053A Q15
2	34	SWITCH, 16 POS HEX	SW1, SW2
8	35	TRIAC, 2N6073B	TR1-TR8
1	36	PAD, TRANSISTOR	Q15
2	37	RELAY, LATCH	LR3, LR4
1	38	BIT ROM	8355/8755-A2
5	39	BIT-ROM	8355/8755-A2
8	40	CAPACITOR	0.01 MF @ 25V C12-C16
	41	RESISTOR	430 OHMS 1/4W 5% R41-R48
	42	BIT-ROM	
	43	BIT-ROM	
	44	BIT-ROM	8355/8755-A2
	45	BIT-ROM	8755A-A2
	46	BIT-ROM	8755A
X	47	P/C CARD ASSY.	
1	48	BIT-ROM	8755A-A2
X	49	P/C CARD ASSY.	GAS MOD
1	50	BIT-ROM	8755A-A2



PRINTED CIRCUIT BOARD: Expander
(2 of 2)

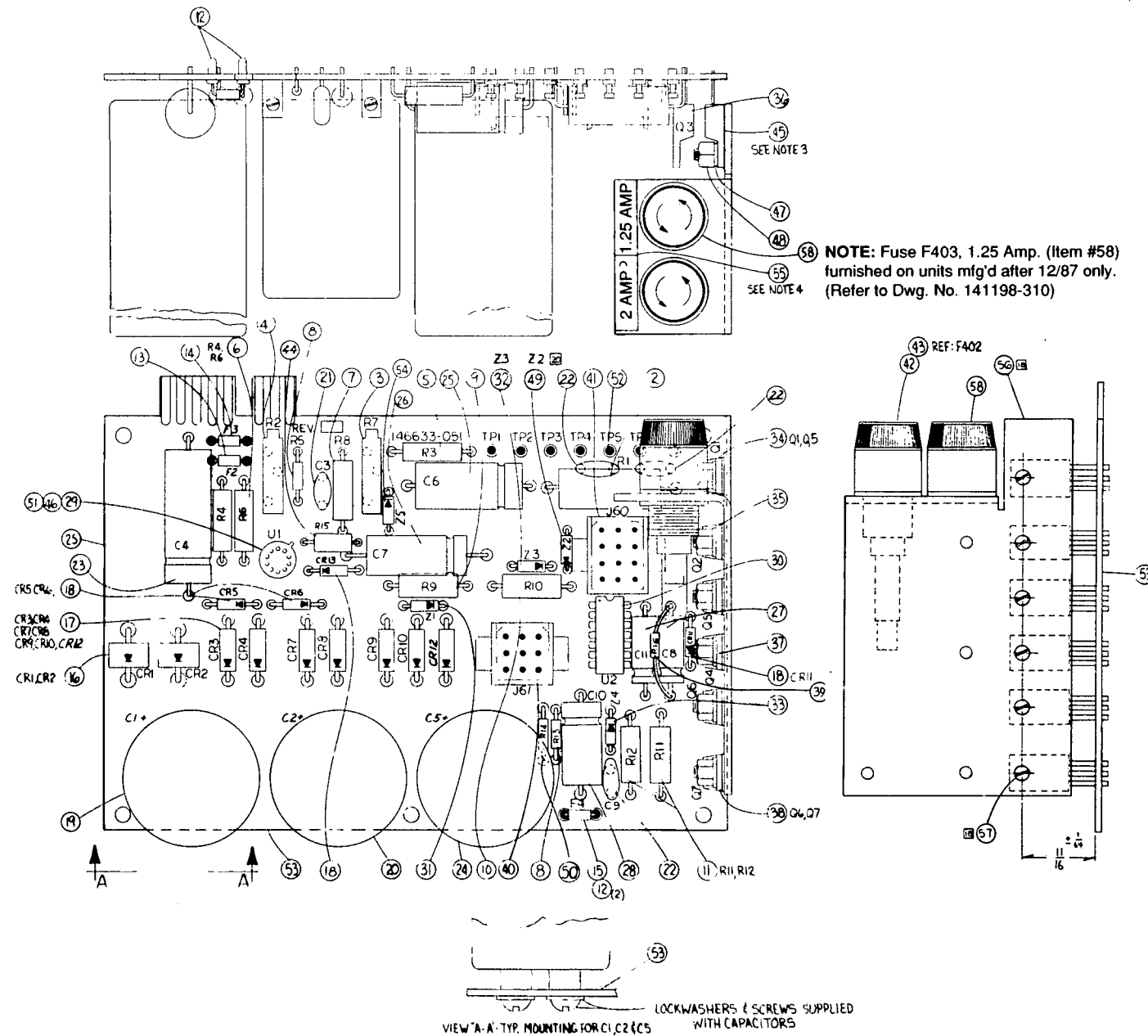


F- 10



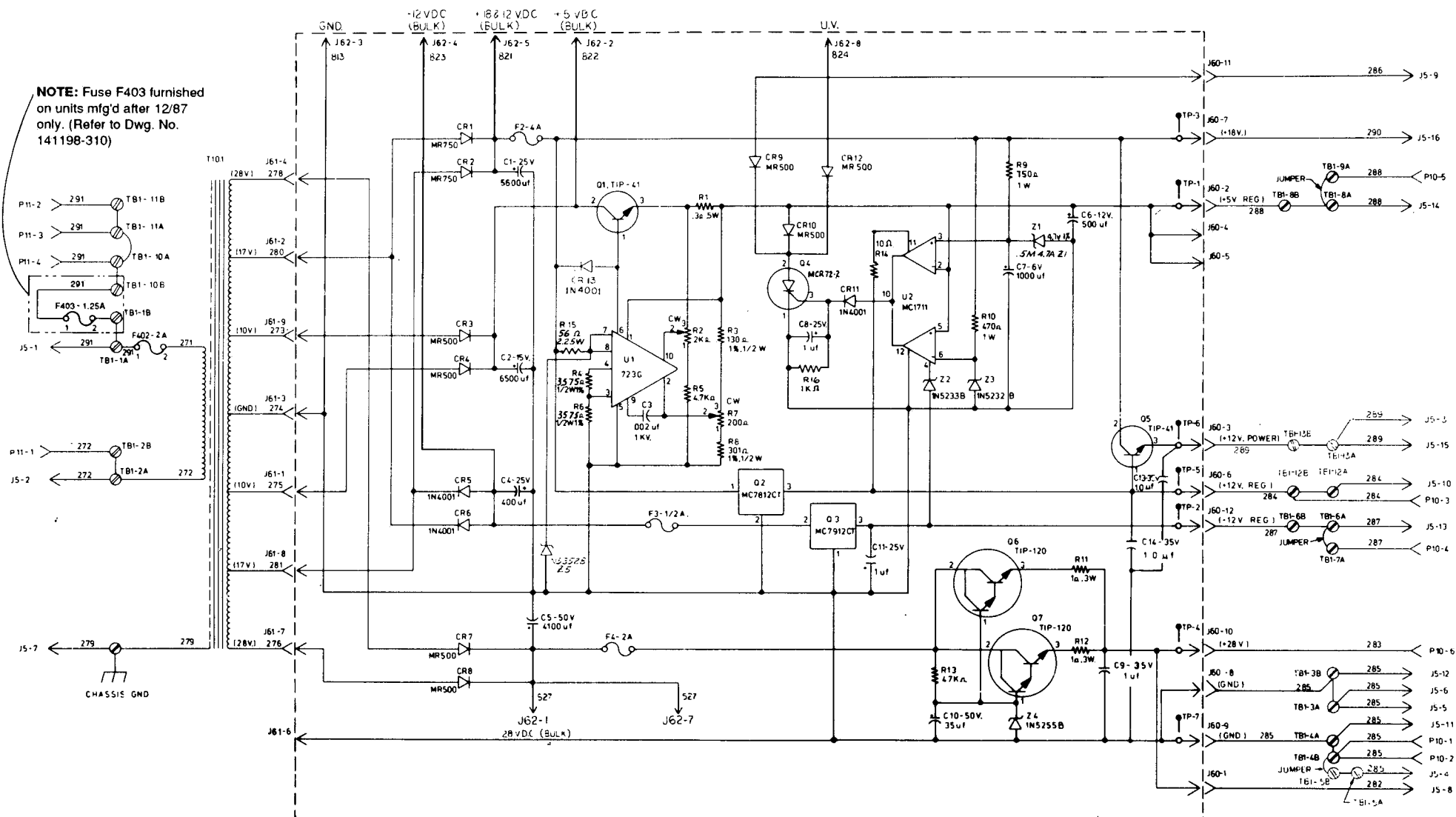
NOTE:
1. ALL RESISTORS 1/4 W UNLESS OTHERWISE NOTED

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



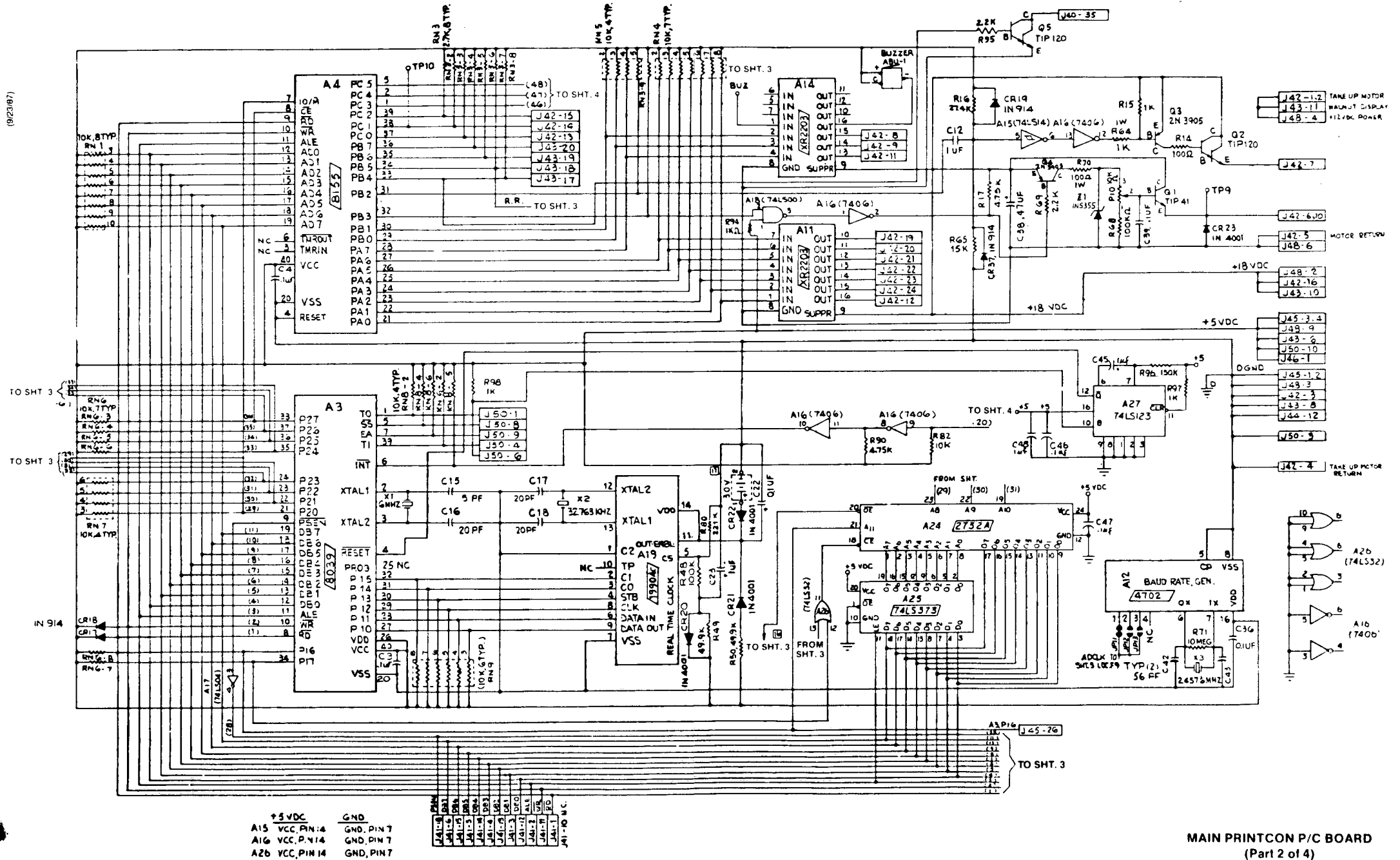
QTY.	ITEM NO.	DESCRIPTION
X	1	BOARD, POWER SUPPLY P.C. ASSEMBLY
1	2	RESISTOR 5 W.W.W., 311 R1
1	3	POT., 20011 R7
1	4	POT., 2K11 R2
1	5	RESISTOR, 1/2 W.M.F., 13011 R3
2	6	RESISTOR, 1/2 W.M.F., 357011 R4, R6
1	7	RESISTOR, 1/2 W.M.F., 3011 R8
2	8	RESISTOR, 1/4 W.C.C., 47K11 R5, R13
1	9	RESISTOR, 1 W.C.C., 75011 R9
1	10	RESISTOR, 1 W.C.C., 47011 R10
2	11	RESISTOR, 3 W.W.W., 111 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, 560011FD, 25V, C1
1	20	CAPACITOR, 650011FD, 15V, C2
1	21	CAPACITOR, .00211FD, 1KV, C3
3	22	CAPACITOR, 111FD, 35 VDC, C9, C13, C14
1	23	CAPACITOR, 47011FD, 25V, C4
1	24	CAPACITOR, 410011FD, 50V, C5
1	25	CAPACITOR, 47011FD, 16V, C6
1	26	CAPACITOR, 100011FD, 10V, C7
2	27	CAPACITOR, 111FD, 50V, C8, C11
1	28	CAPACITOR, 3311FD, 50V, C10
1	29	REGULATOR, POS. VOLTAGE, U1
1	30	COMPARATOR, DUAL DIFFER., U2
1	31	DIODE, 4.7V, ZENER, 1%, Z1
1	32	DIODE, 5.6V, ZENER, 5%, Z3
1	33	DIODE, 28V, ZENER, 5%, Z4
2	34	TRANSISTOR POWER, Q1, Q5
1	35	REGULATOR, 12V POSITIVE, Q2
1	36	REGULATOR, 12V NEGATIVE, Q3
1	37	THYRISTOR REV. BLOCK TRIODE, Q4
2	38	TRANSISTOR, POWER, Q6, Q7
1	39	RESISTOR, 1/4 W. 1K11, R16
1	40	HEADER PIN, PC MOUNTING, J61
1	41	HEADER PIN, PC MOUNTING, J60
1	42	FUSEHOLDER
1	43	FUSE, 2A, F402
1	44	RESISTOR, 56112-1/4 W, R15
6	45	INSULATOR
1	46	HEATSINK
6	47	BUSHING, NYLON INSULATING
6	48	NUT #4-40 HEX
1	49	DIODE 6.0V ZENER, Z2
1	50	RESISTOR, 1/2 W. C.C. 1011, R14
1	51	SOCKET (USED WITH U1 ITEM #29)
7	52	TERMINAL TEST POINT
1	53	BOARD BARE POWER SUPPLY P.C. - DRILL SCHEDULE
1	54	DIODE, 15V ZENER 5% Z5
1	55	DECAL - 2 AMP
1	56	HEAT SINK
6	57	SCREW, FLAT HD #4-40 X 5/16
1	58	FUSE, 1.25 A, F403

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

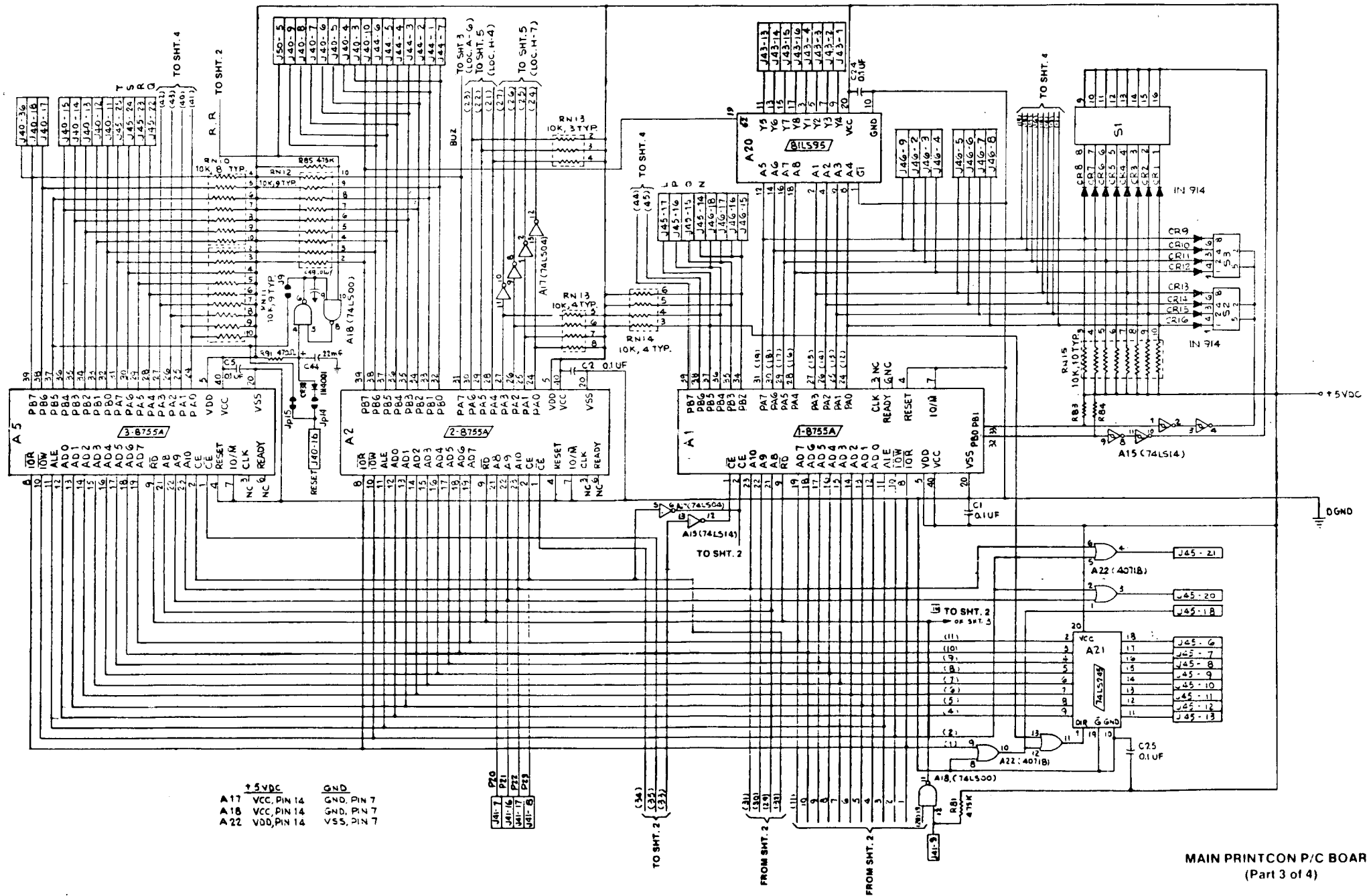


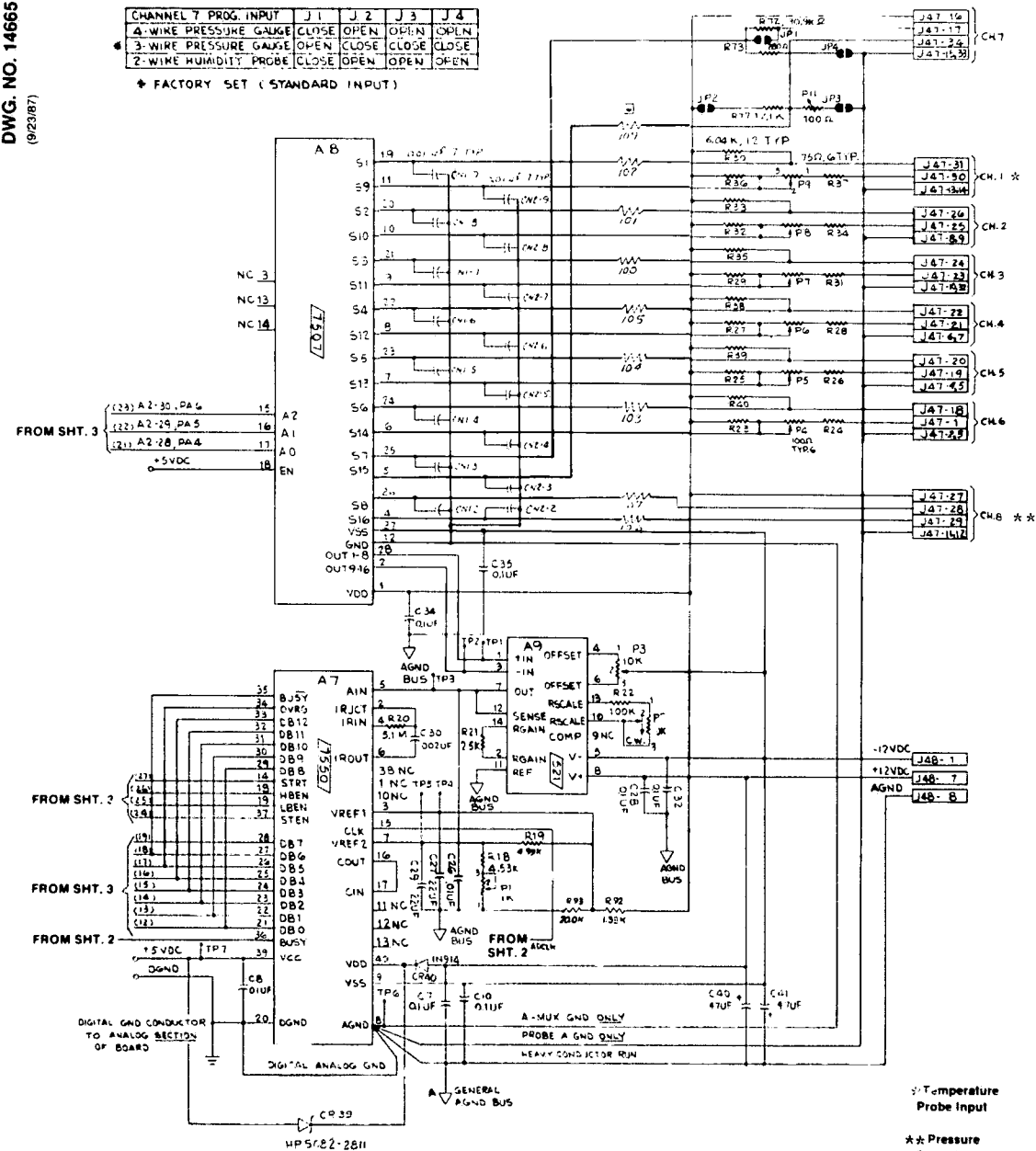
P/C ASSEMBLY, Power Supply
(Part 2 of 2)
(Units with Printcon)

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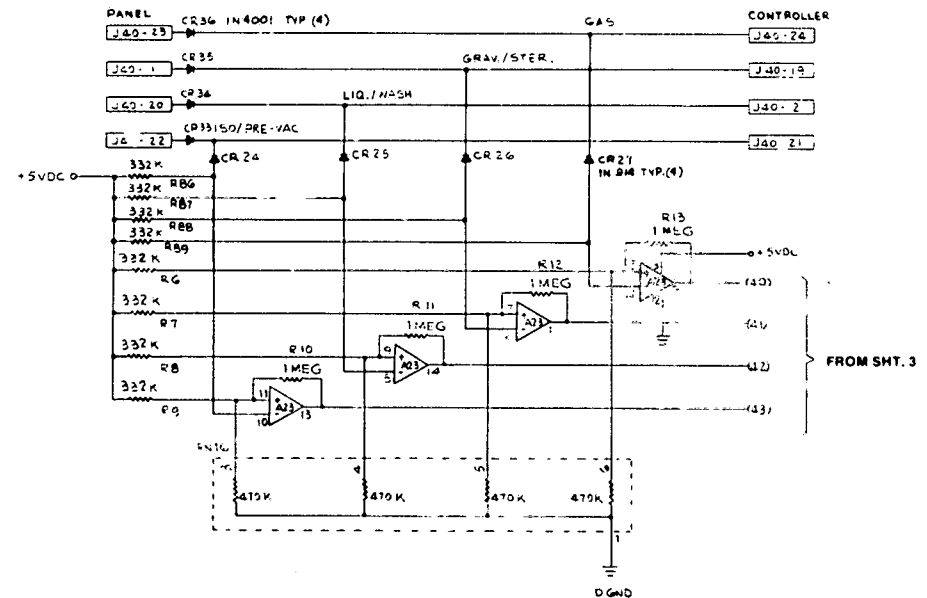
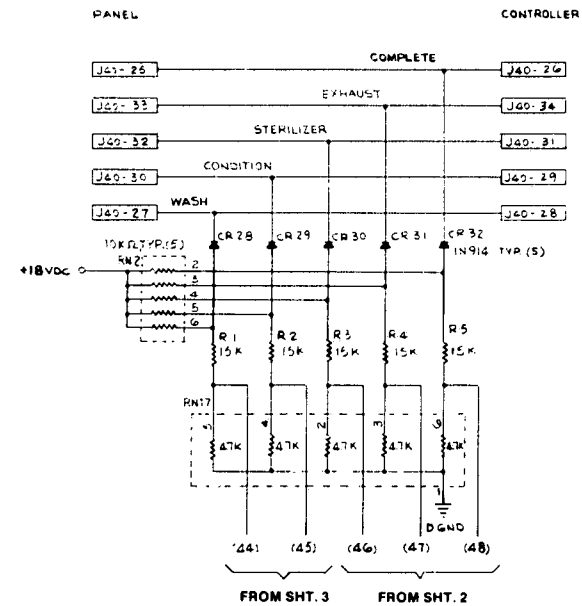
MAIN PRINTCON P/C BOARD
(Part 2 of 4)



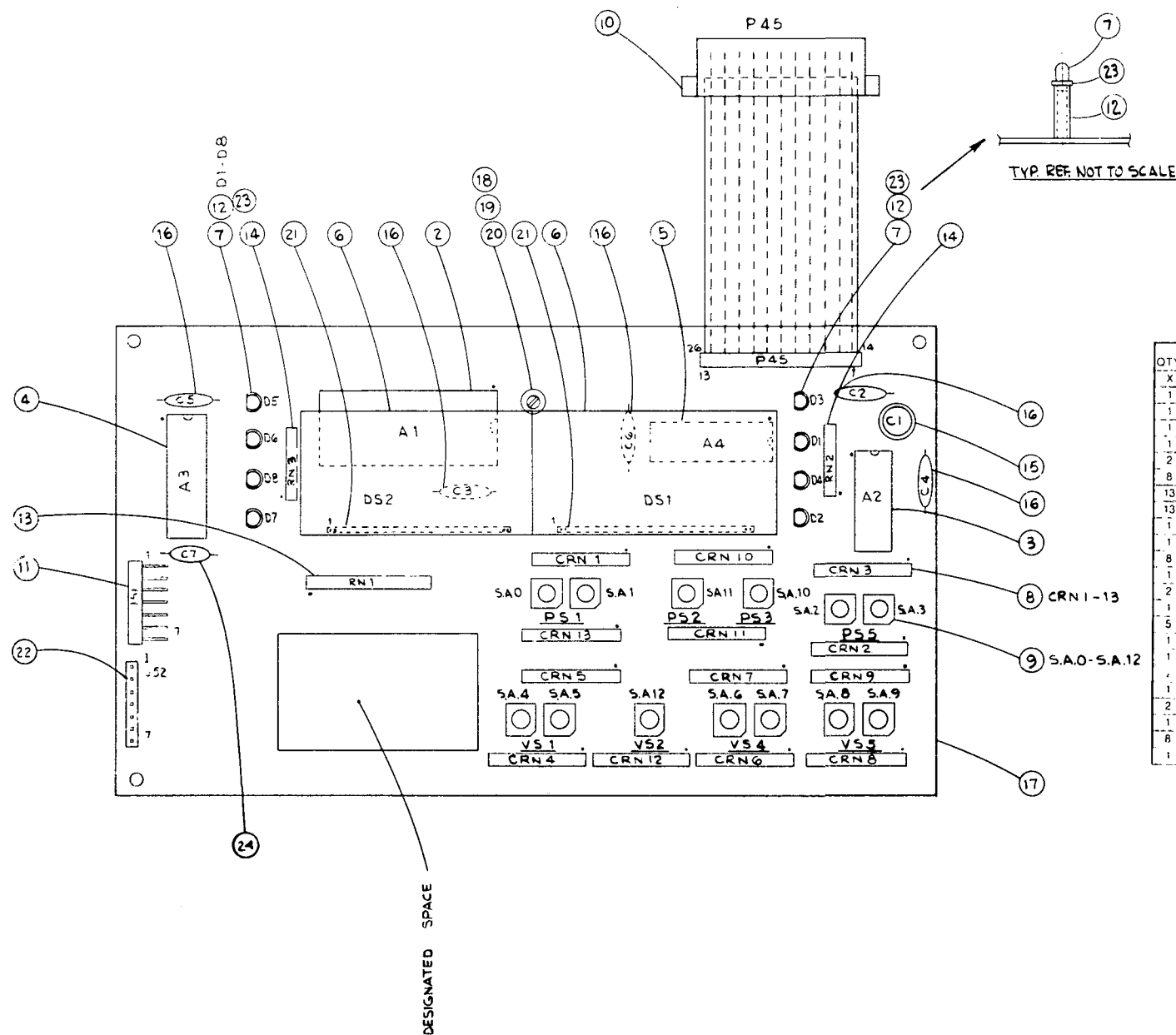


Temperature
Probe Input

Pressure
Transducer
Input

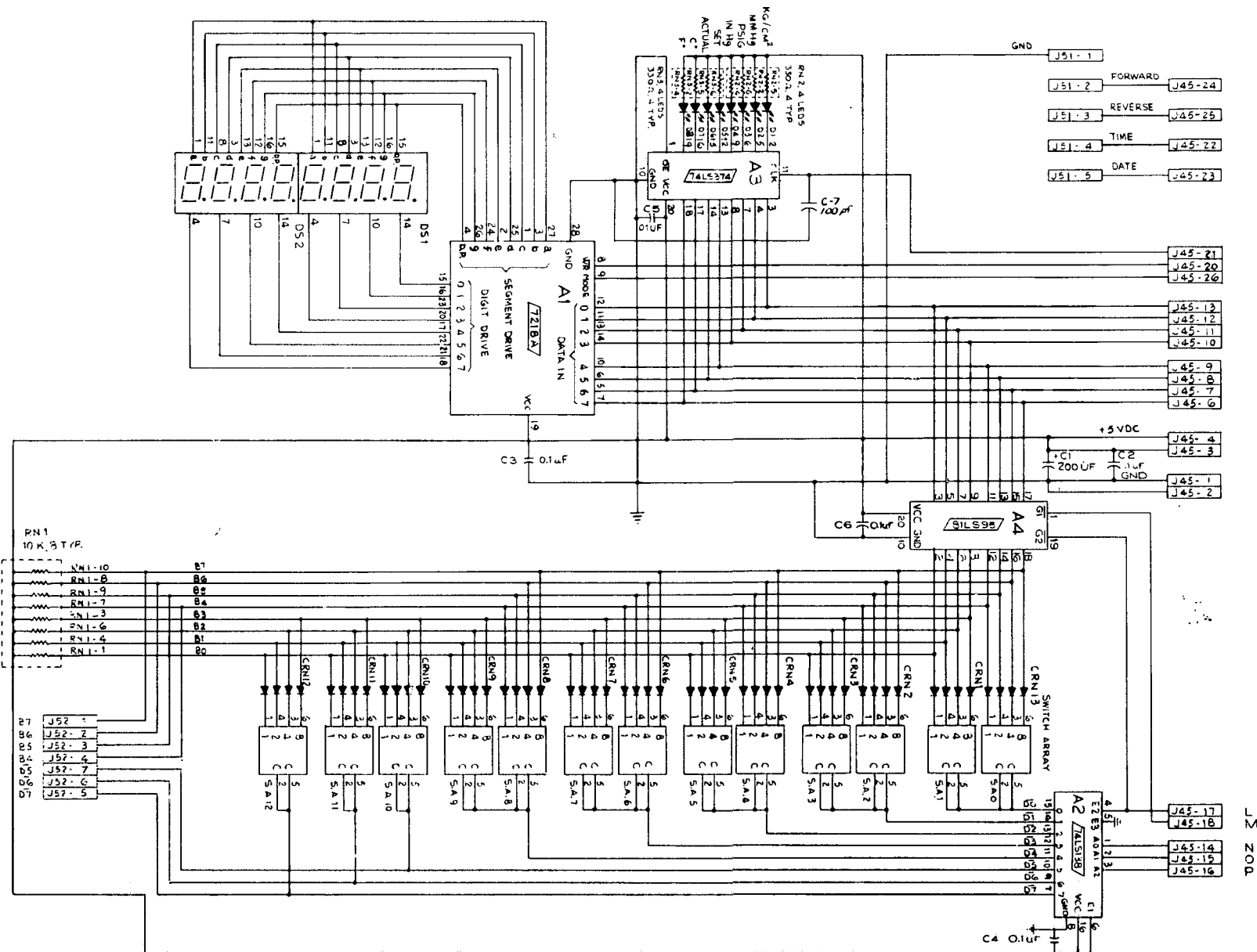


MAIN PRINTCON P/C BOARD
(Part 4 of 4)



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	81LS 95 TRI-STATE OCTAL BUZZER (A4)
2	6	DISPLAY	QUAD — 7 SEG. DISPLAY (DS1 & DS2)
8	7	LED	SOLID STATE INDICATOR LED, RED (D1-D8)
13	8	DIODE NETWORK	CRN1-13 (SIMILAR TO IN4150)
13	9	SWITCH	10 POS. ROTARY BCD DIP (S.A.O -S.A 12) EECO 24008G
1	10	CABLE ASSEMBLY	7.5" (J45)
1	11	CONNECTOR	7 POS. S.R. R.A. HEADER
8	12	L.E.D MOUNT	NYLON, .675 HIGH
1	13	RESISTOR	10K, 9 NETWORK SIP RN1
2	14	RESISTOR	3301. 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
1	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

TO TEMPERATURE
THUMBWHEEL
ASSEMBLY



NOTE: SWITCH ARRAY GROUPING

MSD	LSB	FUNCTION
SA.0	SA.1	PS.1
SA.2	SA.3	PS.5
SA.4	SA.5	VS.1
SA.6	SA.7	VS.4
SA.8	SA.9	VS.5
	SA.10	PS.3
	SA.11	PS.2
	SA.12	VS.2

BX BINARY BIT (x=0→1)
DX DIGIT STROBE (x=0→1) ACTIVE LOW

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



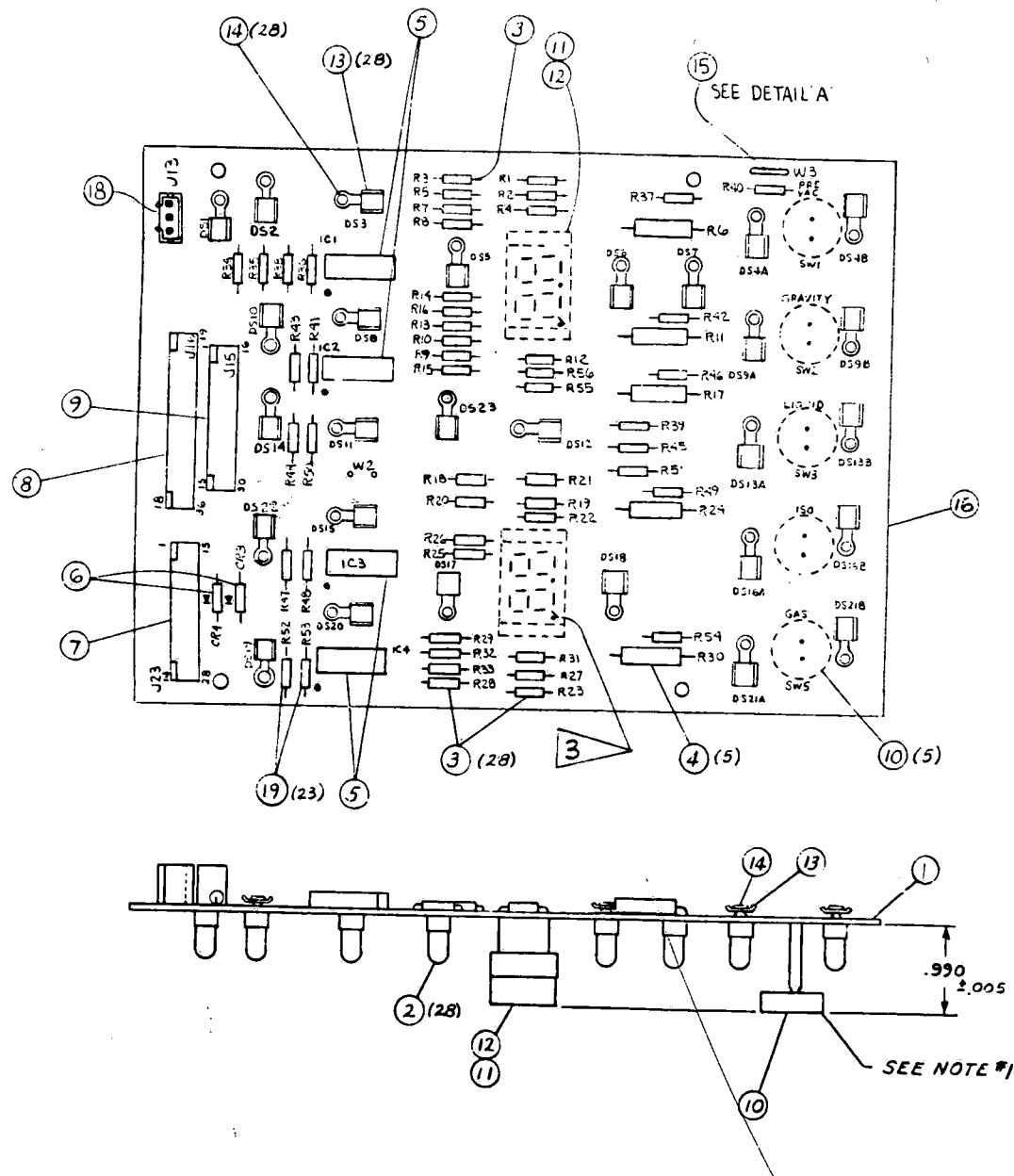
**AMSCO
SERVICE**

**EAGLE 2000 AND 2300 SERIES
SMALL STERILIZERS VACAMATIC
P-764084-002**

5/88

2 of 5

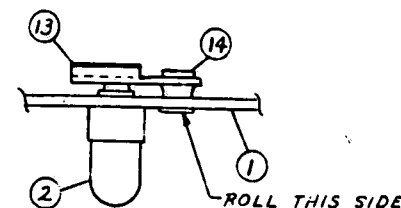




ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	P.C. BOARD ASS'Y	
2	LAMP	
3	RES. 150Ω 1/4W, 5%	R1-5, 7-10, 12-16, 18-23, 25-29, 31, 33, 34
4	RES. 150Ω 1W, 5%	R6, 11, 17, 24, 30
5	INTEGRATED CKT	IC1, 2, 3, 4
6	DIODE	IN4001 CR1, 2, 3, 4
7	HEADER, DBL ROW	28 POS. J23
8	HEADER, DBL ROW	36 POS. J16
9	HEADER, DBL ROW	30 POS. J15
10	SWITCH, TOUCH	SW1-5
11	DISPLAY	
12	SOCKET, I.C.	
13	LUG, BULB	
14	RIVET	
15	WIRE	SEE NOTE #2 2" LG
16	P.C. BOARD	
17		
18	HEADER ASS'Y	
19	RES. 51.1Ω, 1/4W, 1%	R34-R56

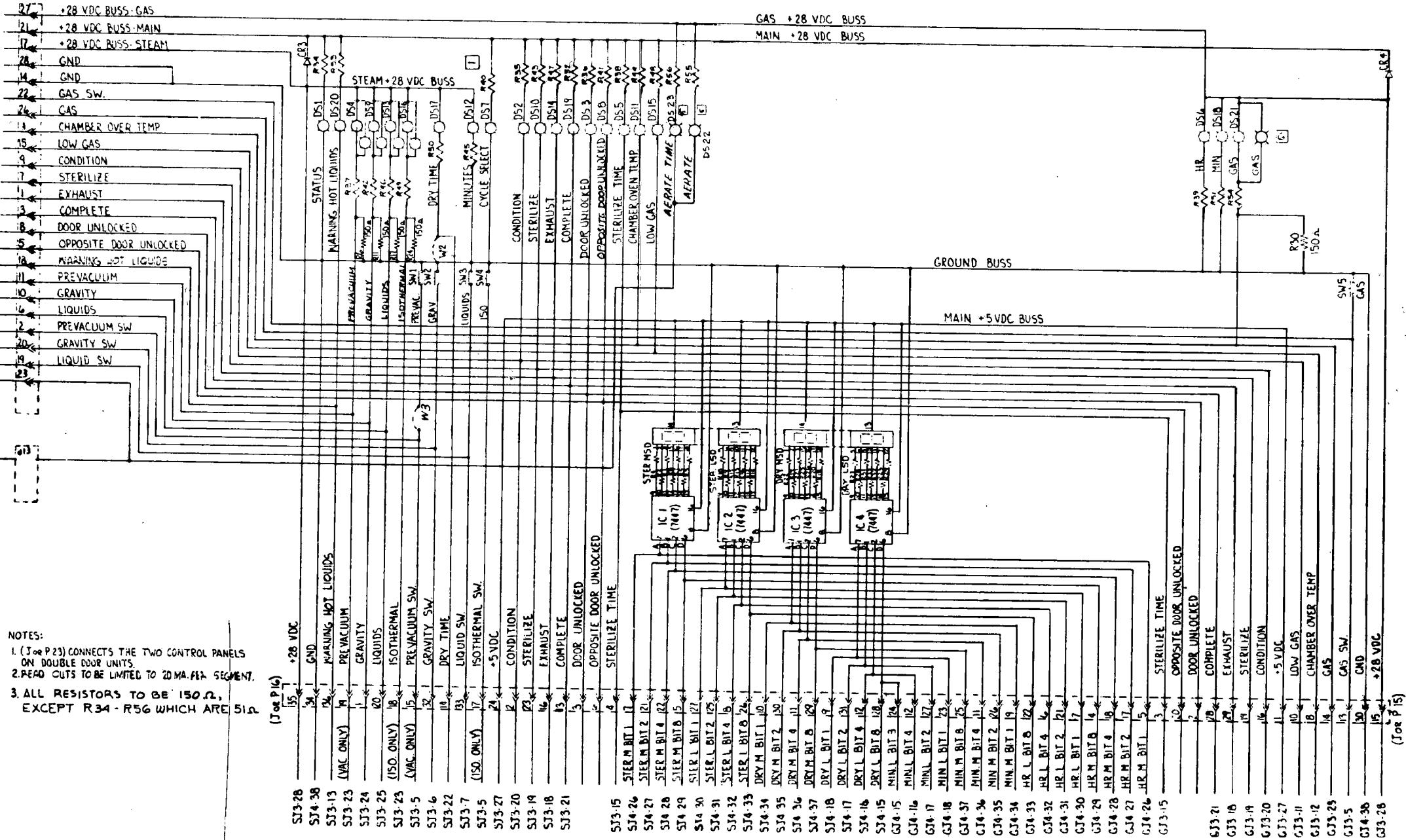
NOTES:

- TOUCH SWITCH TO BE PERPENDICULAR WITH P.C. BOARD WITHIN 3°.
- WIRE SPEC. - #18 AWG, SOLID COPPER, UNINSULATED.
- INSERT DISPLAY, ITEM #11 INTO PINS #2 THRU #10 AND #15 THRU #23 FOR BOTH 24 PIN SOCKETS, ITEM #12. (PIN #1 OF DISPLAY IN PIN #2 OF SOCKET)



ENLARGED VIEW
OF LAMP MOUNTING

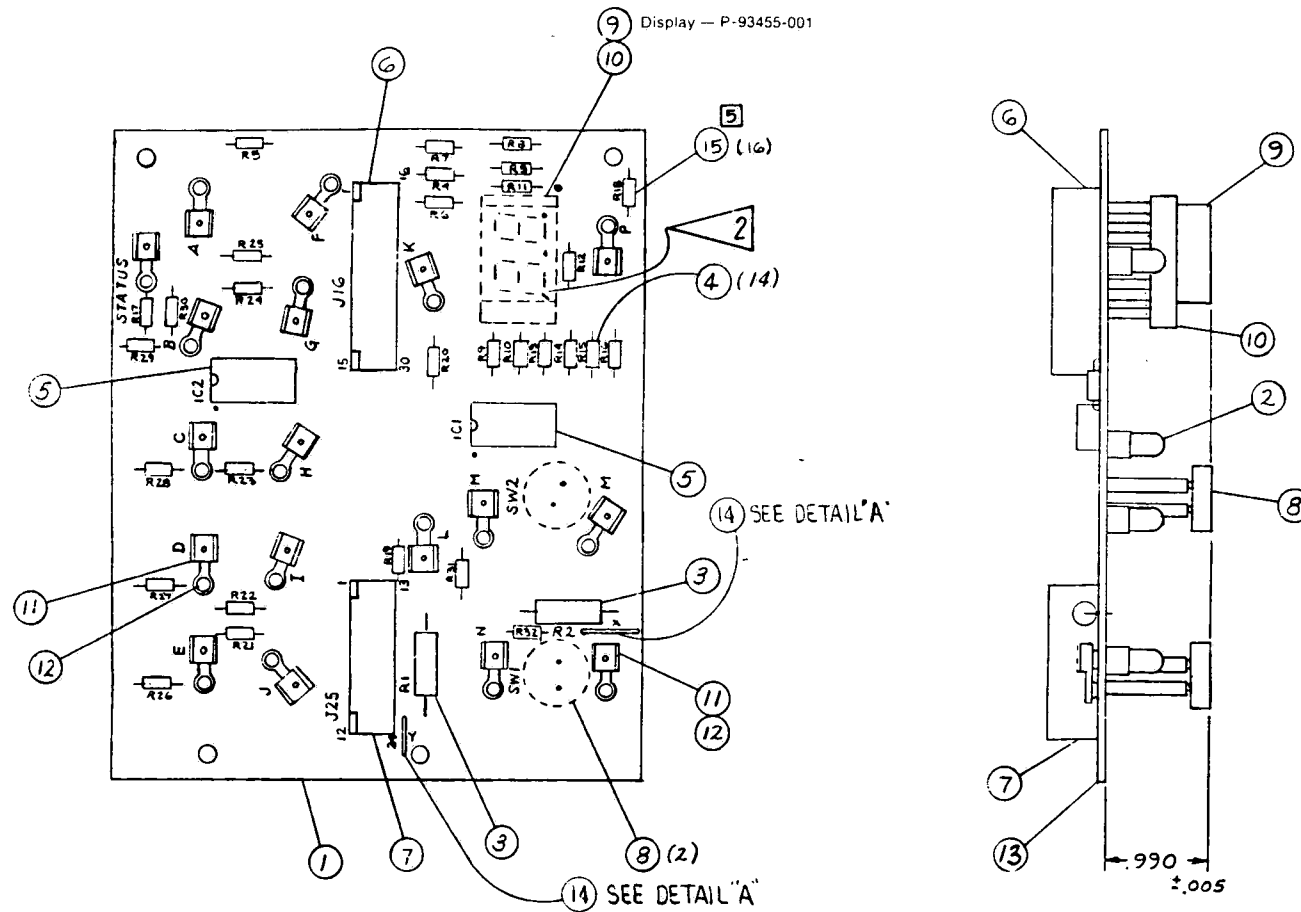
For P23



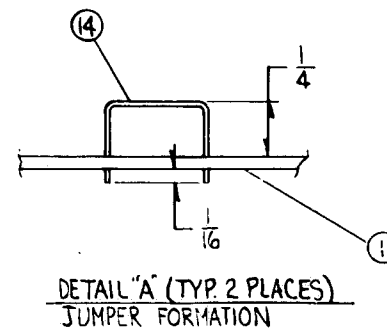
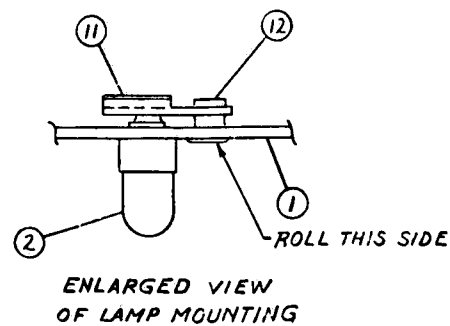
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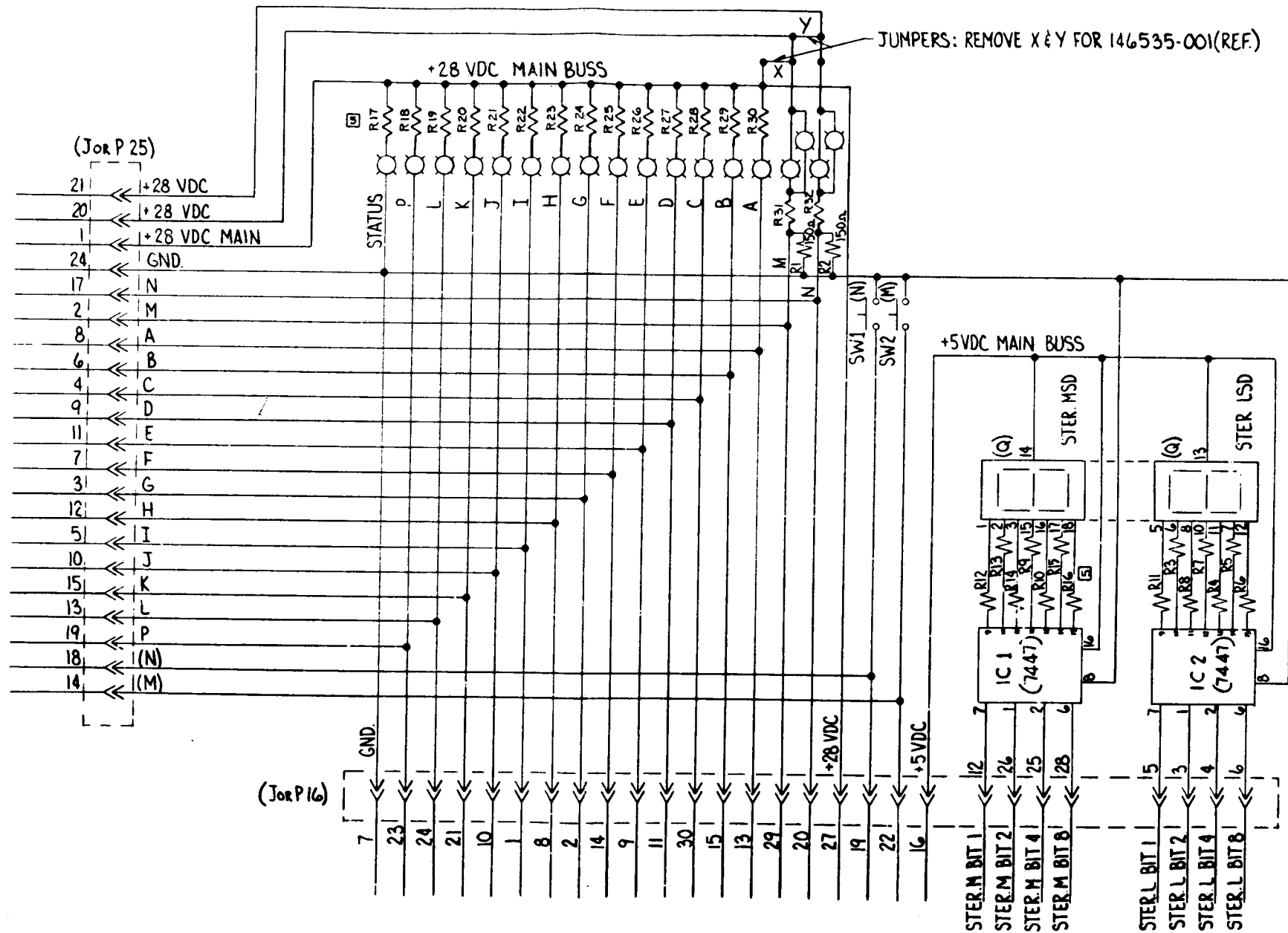
- (For P23) CONNECTS THE TWO CONTROL PANELS ON DOUBLE DOOR UNITS.
- READ CUTS TO BE LIMITED TO 20 MA. FEA SEGMENT.
- ALL RESISTORS TO BE 150Ω, EXCEPT R34 - R56 WHICH ARE 51Ω.

PRIMARY PANEL SCHEMATIC
Operating End (Part 2 of 2)



ITEM NO.	NAME	DESCRIPTION, MATERIAL
1	P.C. BOARD ASS'Y	
2	LAMP	
3	RES., 150Ω, 1W, 5%	R1, 2
4	RES., 150Ω, 1/4W, 5%	R3-16
5	INTEGRATED CKT	IC1, 2
6	HEADER, DBL ROW	30 POS. J16
7	HEADER, DBL ROW	24 POS J25
8	SWITCH, TOUCH	N/EXTENDER SW1, 2
9	DISPLAY	
10	SOCKET, I.C.	24 POS.
11	LUG, BULB	
12	RIVET	
13	P.C. BOARD	
14	WIRE	SEE NOTE 3 2 #4 LG
15	RES. 51Ω, 1/4W, 5%	R17-R32





SECTION 7

COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT

7.1 GENERAL

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

7.2 INDICATOR-RECORDER-CONTROLLER

NOTE: The swing out panel is hinged to the case, for access to the internal components, such as the drive motor (Fig. 8-14, 1), reed switches (3), and adjusting screws. To gain access, open the door, loosen the captive screw located at the lower right hand corner of the backing plate, and swing the plate out.

Starting Ink Flow (Fig. 8-13)

1. Lift pen by loosening chart hub cap (4).
2. Remove cap from ink cartridge pen tip (6).
3. Insert a small piece of paper under the pen and move it slightly back and forth to initiate flow. If necessary, moisten pen tip.

Changing The Chart (Fig. 8-13)

1. Unscrew the hub cap (4). This cap retains a spring loaded wire bracket, which acts as a pen lifter (2). Hold this bracket while unscrewing cap.
2. With hub and pen away from the chart, lift chart (3) off hub, and remove.
3. Slip new chart under pen arm and locate on hub. Replace hub cap loosely.
4. Rotate chart until pen rests on proper time arc. Press chart flat against dial plate.
5. Tighten hub cap firmly, taking care that chart remains in proper position.

Replacing Ink Cartridge (Fig. 8-13)

1. Lift ink cartridge (6) from chart by loosening hub cap.
2. Grasp cartridge near tip end.
3. Pull straight off, with a steady pull. Be careful not to distort pen arm.
4. Support pen arm with one hand. Slide cartridge into engagement with clip.
5. Holding pen arm, slide cartridge onto the arm, until the tip boss is properly positioned against the end of the arm.

Adjustment of Temperature Control (Fig. 7-1)

1. Turn adjusting screw on reed switches clockwise to increase temperature settings, counterclockwise to reduce settings. (TS-1 controls timer actuator, TS-2 controls steam to chamber.)
2. Adjusting screw on pen arm is used to make minor corrections in pen setting.

Removal and Replacement

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

Removing Recorder

1. Remove primary panel ... see Paragraph 7.12.
2. Open chart back-up plate (see note above.)

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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 tee behind control console. (USE CARE!)

5. Remove capillary from three clips at (Fig. 8-10,23) 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 tee.

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. 8-19)

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 (8-18, 10) counter-clockwise 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 springs (40).

4. Remove the self-tapping screws (Fig. 8-18, 15) and lift off the chamber door cover (8).

5. If door cover brackets (Fig. 8-19, 16) are damaged, remove them by removing the self-tapping screws (18) which held them in place. Replace brackets.

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

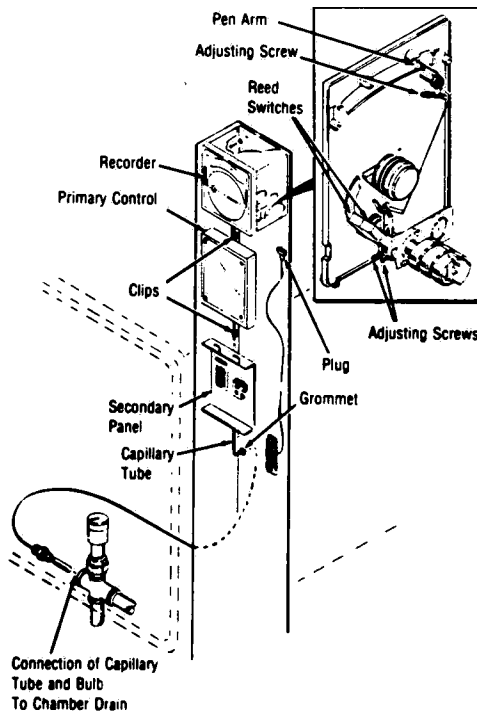


Figure 7-1. REPLACING THE RECORDER.

7-2

7. Remove hex head screws, plain washers, lock-washers (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 (39).

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).

14. Turn the door over and remove the screws (8-18, 7) holding door back cover in place.

15. Remove door back cover and the gasket (6). Discard the gasket.

16. Using a socket wrench, remove the screws (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 (8-20, 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 rewelding.

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 (Figure 8-19)

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

1. Replace back cover, align, and secure with 12 drive screws.

2. Turn door over, and replace any missing or damaged cover clips and speed nuts (16, 17)

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

4. Replace hinge assembly, if removed.

5. 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 (30).

6. Set two keys (22) in door post, and drive two roll pins (21) into socket plate (29).

7. 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.

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

7-3

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

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

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

NOTE: Graphited face of gasket is next to door casting.

12. Assemble diaphragm, gasket, and cover (4, 5, 6) and secure in place with nine screws.

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.

13. Clean gasket groove, and install new gasket.

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

15. 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:

Shims required in this procedure are as follows:

16x16 Door	Thickness	20x20 Door
P/N 150822-317	.005	P/N 150822-320
P/N 150822-318	.010	P/N 150822-321
P/N 150822-319	.015	P/N 150822-322

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

8. After shimming is complete, adjust arm clip links on the four bottom door arms and two arms opposite hinge using the following procedure:

- a. Disengage door arms, turn open completely.
- b. Loosen clip screws. While pressing door arm against fulcrum block, slide clip toward door post (UP) until it makes contact with door arm or reaches end of screw slot travel. Tighten clip screws.

c. Check to insure there is no interference between end of door arms and edge of end frame as door arms are being engaged.

Diaphragm Operation Check

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

7.4 AIR FILTER ASSEMBLY

Refer to Figure 8-32.

The bacterial air filter contains a replaceable filter cartridge (3) that is made up of 16 filter discs separated by screens. The filter discs are superfine glass wool that removes bacteria from entering air.

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

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

Remove the head assembly (5) by unscrewing the screws (1). Remove and inspect the filter cartridge (3). Clean the filter cover and body assembly by wiping with a soft cloth. Replace the filter cartridge, if necessary. Reassemble the air filter.

7.5 SOLENOID VALVES

NOTE: When installing new valves in any line, note the arrow stamped on the valve body or the words IN and OUT stamped at the inlet and outlet ports. A reversed valve cannot operate properly. To rebuild a defective

valve, order the appropriate valve repair kit. The repair kit part number is found on the same parts list as the solenoid valve.

Principle of Operation

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

Direct-acting Valve (Fig. 7-2): 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): 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.

NOTE: See 7.U. page 6-39 and Fig. 8-14 to correct chattering solenoid valves.

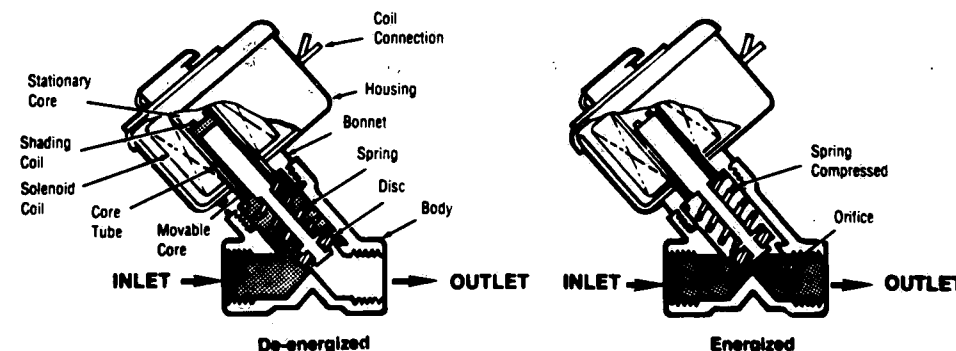


Figure 7-2. DIRECT-ACTING SOLENOID VALVE.

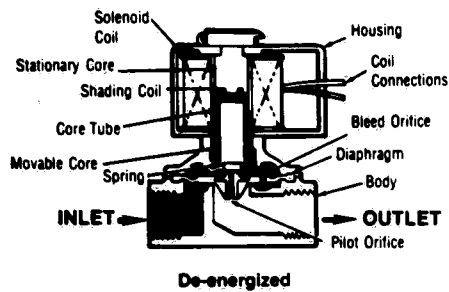


Figure 7-3. INTERNAL PILOT-OPERATED SOLENOID VALVE.

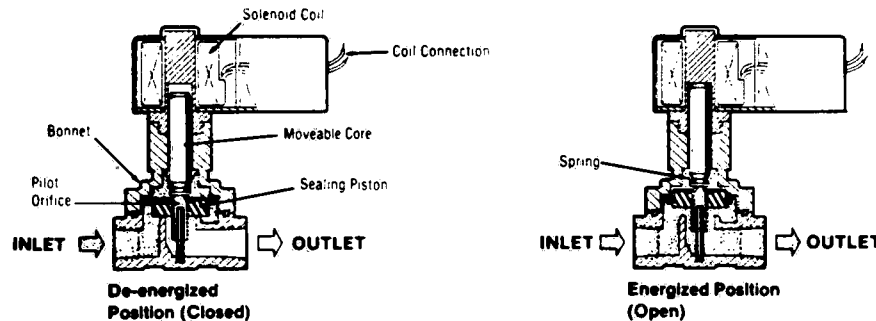
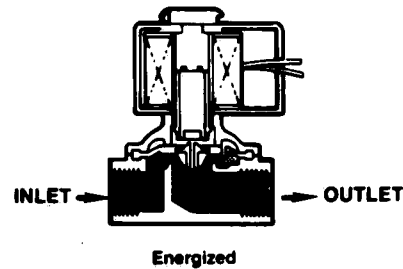


Figure 7-3A. PISTON TYPE SOLENOID VALVE.

Testing

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

a. Check voltage across the coil leads; when energized by the controller, it should be approximately 120 volts. When deenergized, it will be approximately 1 volt.

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.

NOTE: When replacing a diaphragm, the bonnet bolts should be torqued to 50 in/lbs. on reassembly.

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

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

7.6 STEAM TRAP (Fig. 8-34)

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

Disassembly

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

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

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

4. Test diaphragm for flexibility. (Unscrew from cap if necessary.) Examine solder joints for cracks or leaks; dip diaphragm in boiling water and look for a noticeable expansion. An element in good condition will be difficult to stretch by hand and will return to its original condition quickly when released. Examine the seat for wear.

Reassembly

NOTE: Use new parts as necessary. Repair kit part number is P764080-001.

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

2. Replace cap and diaphragm assembly, using a new gasket.

7.7 STRAINERS

These should be opened for cleaning at least twice a year. Accumulation of sediment and rust will reduce pressure and flow. In extreme conditions, complete blockage may occur.

Disassembly

1. Remove hex plug and gasket.

2. Pull out strainer screen from body.

3. Scrape and polish all rust and residue from strainer screen and body. Use a wire brush or steel wool. Be sure that all perforations are clear, by poking open with a wire. Replace screen if damaged, rusted or corroded.

Reassembly

1. Insert screen into strainer body. Take care that no dirt or other particles remain in strainer body.

2. Replace and tighten hex plug. Use a new gasket if necessary.

3. Make certain that all pipe connections are tight after assembly.

7.8 CHECK VALVES

Repair of check valves is limited to cleaning of valve seats when foreign matter causes improper operation. When a valve becomes defective, the entire valve must be replaced.

7.9 VACUUM BREAKER (Fig. 8-27, 8)**Disassembly**

1. Unscrew and remove bonnet assembly.
2. Remove friction ring and air valve seat.
3. Remove assembled ballast and float.
4. Separate ballast and float.

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

Reassembly

1. Assemble ballast and float.
2. Slide float/ballast assembly into valve body, making sure that the assembly moves freely in valve body.
3. Insert air valve seat and friction ring.
4. Screw on bonnet assembly.
5. Test for leaks. No water leakage at bonnet is permissible.

7.10 STEAM CONTROL VALVE, HI-LO (Fig. 8-31)

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

Disassembly

1. Remove pilot line fitting at top of valve. Turn adjusting screw (18) counterclockwise until spring is completely free of compression. Remove screw (12) and turn entire top assembly to align lugs on bonnet and syphon assembly (19) with notches on bottom plate. Lift top assembly off.

2. Remove 4 screws (3) which secure cover to bottom plate (13), lower spring plate (8), spring (7), and upper spring plate (6).

3. Remove 2 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 syphon and bonnet assembly (19) from valve body; also unscrew and remove valve seat (21).

6. Pull stem and disc assembly (20) from syphon. Carefully clean valve components. Carefully examine the bellows assembly, and the syphon and bonnet assembly for cracks. Check valve seat and valve stem assembly for etching, scratches, or other evidence of damage or leakage. Replace if worn or marred. Examine all parts for wear or damage. Replace as necessary.

Reassembly

1. Screw valve seat (21) into body. (Hex side down.)
2. Replace stem and disc (20) in syphon (19), and screw bonnet onto body.
3. Position fork (9) on bottom plate (13). Insert pivot pin (10) and cotter pins (11).
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 syphon, aligning the notches in the bottom plate with the lugs on the bonnet, to allow the bottom plate to seat on the bonnet. Replace screw (12).
8. Turn adjusting screw (18) fully counterclockwise, to remove all tension from the spring. Turn the stem protruding from the bellows to establish a clearance of 1/16 inch between the seat and the disc (Fig. 7-4). If valve was not removed from sterilizer, open side connection to see disc and seat.
9. Adjust high and low settings according to paragraph 7.15.
10. Loosen nut (25) and back out screw (26) to ensure that it does not contact adjusting fork (9). Turn adjusting screw (18) counterclockwise until minimum load with no rattle is obtained on spring.
11. Adjust screw (26) until it bottoms on fork (9). Lock in place with nut (25).

7.11 VALVE ASSEMBLY, ANGLE (Fig. 8-33)

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.

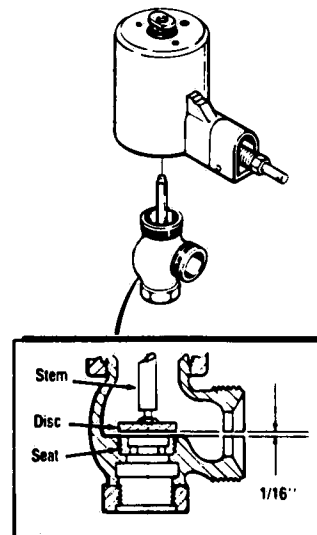


Figure 7-4. HI-LO VALVE ADJUSTMENT.

7.12 CONTROL COLUMN

The primary and secondary control panels, controller, and other components in the control column are made accessible for servicing by removing the front panel. See Figure 7-5.

1. Remove two #10-32 socket head screws from bottom of panel.
2. Open recorder door. Remove the two #8-32 button head screws thus exposed from top of panel.
3. Lift off panel and set aside. All internal components are now accessible for maintenance and servicing.

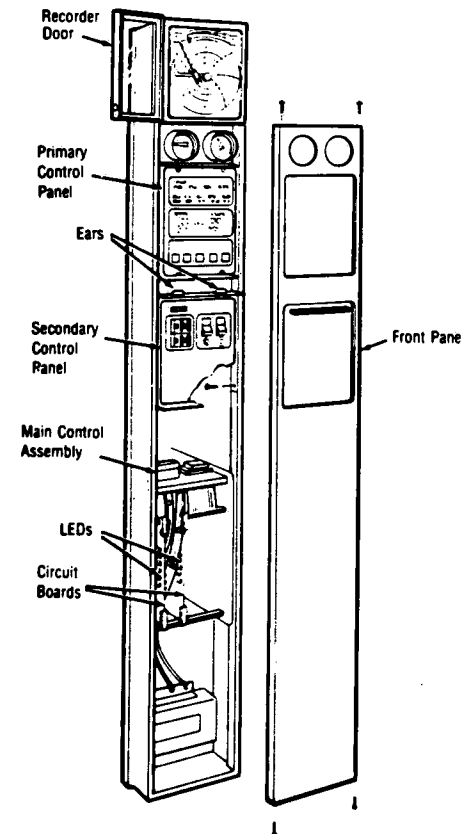


Figure 7-5. CONTROL CONSOLE.

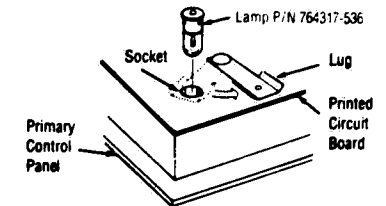


Figure 7-6. LAMP REPLACEMENT.

4. The primary control panel is held in place by four screws. Take out these screws to remove the panel for control servicing.
 - a. The light bulbs are removed by moving the retainer aside and lifting out the bulb. See Figure 7-6.
 - b. If the entire primary control is to be replaced, replacement control (Fig. 8-10, 24) must be modified for use in Vacumatic sterilizer. Do this by clipping and removing R-24, as shown in Figure 7-7.
5. The secondary control panel is held in position by two screws, located behind the panel at the bottom. Remove these screws, swing bottom of panel forward and down to disengage ears at top. Lift panel away, being careful of the wires attached thereto. The controller and its printed circuit cards are now exposed.

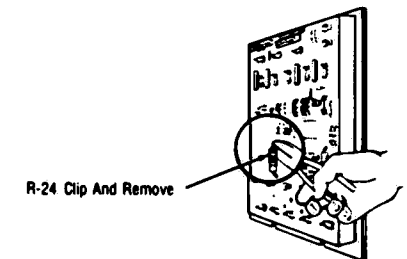


Figure 7-7. CLIP AND REMOVE R-24.

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

6. The printed circuit boards in the controller are removed by lifting the card pulls to disengage the contacts from the socket, and pulling the card straight out. See Figure 7-8. Use both card pulls simultaneously, to ensure starting the card straight. This prevents damage to the socket contacts. The controller itself is held in position by a single screw, located at the top. Unplug the two cables from controller, remove screw, and slide controller forward on its rails. For removal of Indicator-Recorder-Controller, refer to paragraph 7.2.

NOTE: Units shipped after 11/15/81 have a new mother board assembly. It is possible to plug P1, P2 and P3 into the **wrong set** of jacks on the new board. If a cycle cannot be selected, or if heaters cannot be controlled, or if the primary panel lights are lit and cannot be cleared, check the jacks into which P1, P2, and P3 are connected. They **must** be as follows:

Plug	Jack
P1	J1-A
P2	J2-A
P3	J3-A

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

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

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

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

- 1) reason for return (failure mode of equipment)
- 2) general condition of board
- 3) quantity
- 4) individual item identification (part number, serial number, etc.)

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

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

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

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

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

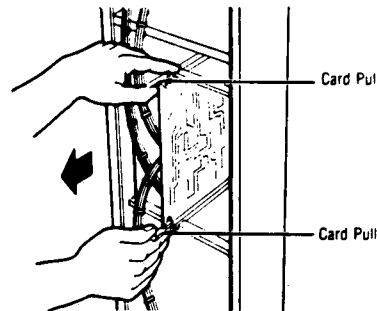


Figure 7-8. REMOVING A PRINTED CIRCUIT CARD.

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

a. Locate the pulse-setting hexadecimal switch, SW2, on the Vacamatic printed circuit expander board (Fig. 8-15, 15). Refer to Figure 7-9 for location of the switch.

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

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

Example: If you wish 5 pulses, locate "5" in the left hand column under "No. of pulses desired." Reading the chart from left to right, note that switch #4 is to be

No. of Pulses Desired	1	2	3	4	Switch No. and Position 1 = ON 0 = OFF
0	0	0	0	0	
1	1	0	0	0	
2	0	1	0	0	
3	1	1	0	0	
4	0	0	1	0	
5	1	0	1	0	
6	0	1	1	0	
7	1	1	1	0	
8	0	0	0	1	
9	1	0	0	1	
10	0	1	0	1	
11	1	1	0	1	
12	0	0	1	1	
13	1	0	1	1	
14	0	1	1	1	
15	1	1	1	1	

Figure 7-9. SETTING THE SW2 PULSE SWITCH.

positioned "off" (0 = off), switch #3 is to be positioned on (1 = on), #2 is off, #1 is on.

7.13 DOOR SWITCH (Fig. 8-21)

NOTE: Chamber door must be closed and tightened to specified torque (Table 7-1) for door to withstand maximum pressure in chamber. Door switch is on top of chamber and permits sterilizer operation only when door is locked.

Adjustment

1. Using a torque wrench on the steam lock clutch rod (Fig. 8-19, 9), close and tighten the chamber door by applying the appropriate torque specified in Table 7-1.

TABLE 7-1: TORQUE REQUIREMENTS

Sterilizer Size	Torque
16 x 10	20 foot-pounds
20 x 20	30 foot-pounds

2. Turn adjusting screw (Fig. 8-21, 1) 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 reached specified value.

5. With switch adjusting screw properly set and door closed and tightened with specified amount of torque, start a 270° F (132° C) steam 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.

7.14 ADJUSTMENT OF PRESSURE AND VACUUM SETTINGS

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

2. Close slow exhaust valve and then open slow exhaust valve 2.5 turns.

3. Close and lock door.

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

5. Set sterilize time to 1 minute and dry time to 0 minutes. **NOTE:** Refer to cycle graph for liquids cycle.

6. Depress the LIQUIDS cycle button.

7. After the sterilize phase has been completed and control has advanced to slow exhaust, observe calibrated compound pressure gauge. When chamber pressure reaches 3 psig, adjust PS-3 to open the fast exhaust valve (S-3) (LED-12). When chamber exhausts to 1 psig, adjust PS-2 to turn on the COMPLETE light and the buzzer (LED-18).

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

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

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

10. Increase jacket steam pressure to approximately 24 psig.

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

12. Set sterilize time to 1 minute and dry time to 3 minutes.

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

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

14. Depress the PREVACUUM cycle button.

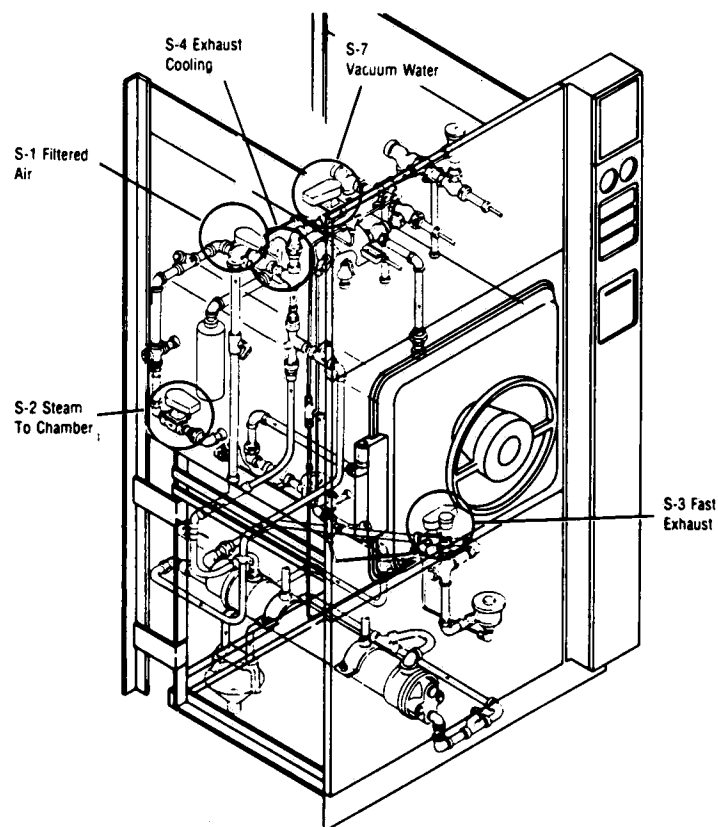


Figure 7-10. LOCATION OF SOLENOID VALVES.

7-12

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B- 7

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

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

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

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

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

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

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

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

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

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

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

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

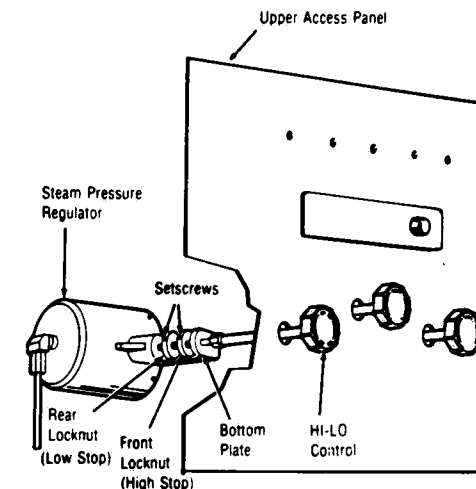


Figure 7-11. ADJUSTING PRESSURE REGULATOR

7.15 ADJUSTMENT FOR STERILIZATION BELOW 250° F (121° C)

The HI-LO valve (steam pressure regulator) on this sterilizer was factory set for 250° and 270° F (121° and 132° C) sterilization cycles. If sterilization procedures routinely require temperature control below 250° F (121° C), i.e., laboratory procedures, the LO setting may be changed. Follow the procedure below.

1. If a freestanding sterilizer, remove a cabinet side panel for access to the HI-LO valve; if a recessed model, proceed to the area behind the recessing wall.

2. Remove adjusting screw cover (Fig. 7-11).

3. Loosen setscrew on front locknut; turn locknut until it is against the rear locknut.

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

7-13

764084

B- 8

5. Using the following chart (Fig. 7-12), adjust the HI-LO valve until jacket pressure as indicated on the jacket pressure gauge corresponds with the desired processing temperature.

6. Follow cycle instructions starting with step 3 of paragraph 2.3 if a Gravity cycle; paragraph 2.4 if a Liquids cycle, except set the yellow pointer on the indicator-recorder-controller for the desired processing temperature.

NOTE: At lower settings the indicator-recorder-controller will maintain chamber temperature at a slightly higher than set temperature ... if necessary, wait until cycle reaches the sterilize phase and readjust the yellow pointer until the recorder chart indicates the exact temperature.

7. Steps 4, 5, and 6 will have to be repeated for each new temperature. If temperature is not to be changed, turn locknut on HI-LO valve until it is against the stop on the bottom plate, then tighten the setscrew.

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

NOTE: The jacket pressure/processing temperature relationships provided in this chart are guidelines for optimum performance of this Eagle Series sterilizer. They do not represent actual pressure/temperature ratios.

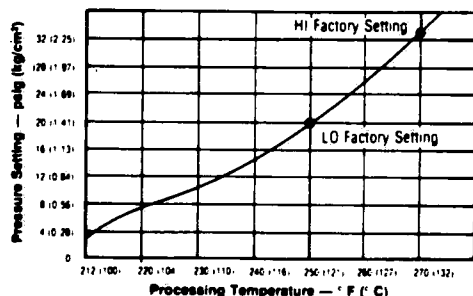


Figure 7-12. PRESSURE REGULATOR SETTINGS.

7.16 ADJUSTMENT PROCEDURE FOR POWER SUPPLY (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 DVM to ground post of capacitor C101 (-) and to terminal post E2 (+). See Figure 7-13.

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.

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

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

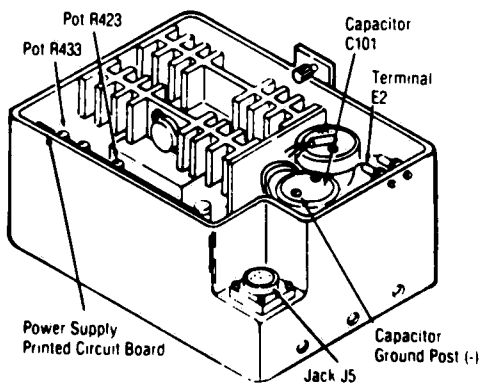


Figure 7-13. POWER SUPPLY (IRC).

7.17 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. 7-14, 7-15, 7-16)

(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.

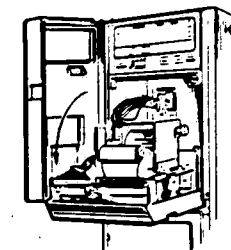
6. Insert loose end of one-ply roll or both ends of two-ply roll into paper slot. Using index finger of left hand, operate paper advance toggle switch to the forward position (toward the operator). Lower paper roll and spindle. If necessary, operate paper advance toggle switch again until the paper is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

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

Automatic Paper Storage (Fig. 7-17)
(Units Before 6/85)

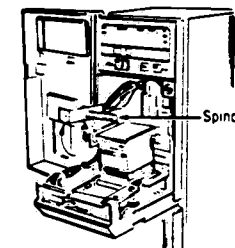
Printcon is capable of storing fifteen feet of single ply paper.

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.



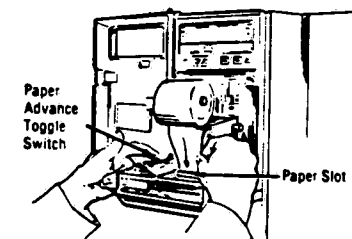
(Units Before 6/85)

Figure 7-14. PRINTER IN LOWERED POSITION.



(Units Before 6/85)

Figure 7-15. SPINDLE IN RAISED POSITION.



(Units Before 6/85)

Figure 7-16. INSERTING PAPER.

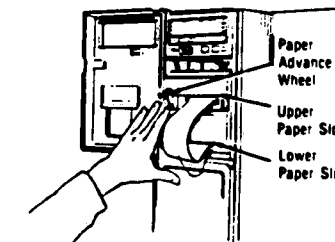


Figure 7-17. INSERTING PAPER INTO AUTOMATIC PAPER STORAGE AREA.

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. 7-17) (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. 7-17A)

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.

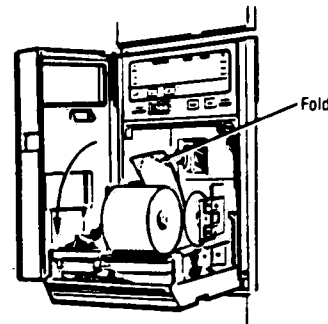
Removing Stored Daily Record (Figs. 7-18, 7-19, 7-20) (Units Before 6/85)

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.

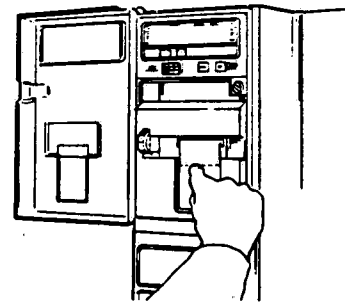
2. Swing the printer assembly forward and downward and allow it to rest in the service position.

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.

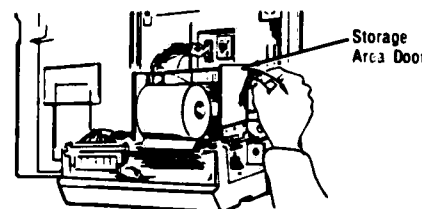
4. Close storage area door. Return printer assembly upward and back to the operating position.



(Units After 6/85)
Figure 7-17A. FOLD PAPER TAPE.



(Units Before 6/85)
Figure 7-18. CREASING PAPER TAPE.



(Units Before 6/85)
Figure 7-19. 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. 7-20A) (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.

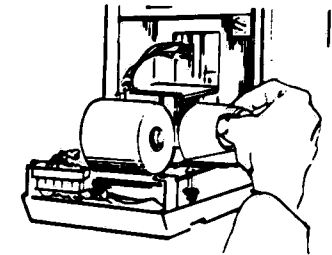
Changing The Inked Ribbon Cartridge (Fig. 7-21) (All Units)

1. Tear off loose end of paper and open door to the left.

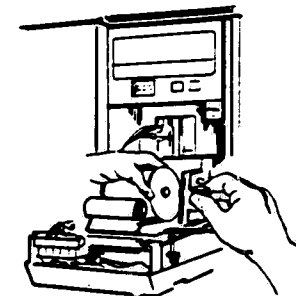
2. Remove old cartridge by placing index finger behind cartridge and pulling forward.

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 7-20. REMOVING STORED DAILY RECORD.



(Units After 6/85)
Figure 7-20A. REMOVING STORED RECORD.

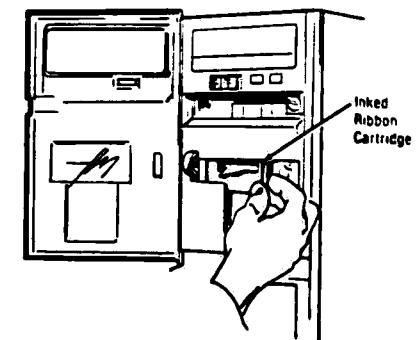


Figure 7-21. REMOVING INKED RIBBON CARTRIDGE.

Printer Replacement (Fig. 7-23 or 7-23A) (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. 7-23 or 7-23A) (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 7-22 or 7-22A to rewire the new switch.

Platen Microswitch Replacement (Fig. 7-23 or 7-23A)

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.

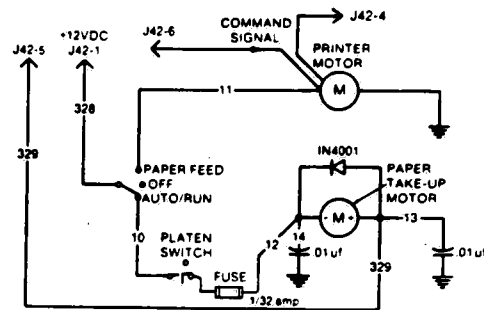


Figure 7-22. SWITCH & MOTOR SCHEMATIC
(Units Before 6/85).

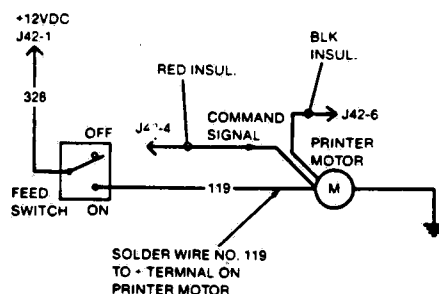


Figure 7-22A. SWITCH & MOTOR SCHEMATIC
(Units After 6/85).

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 7-22 or 7-22A to rewire the new switch.

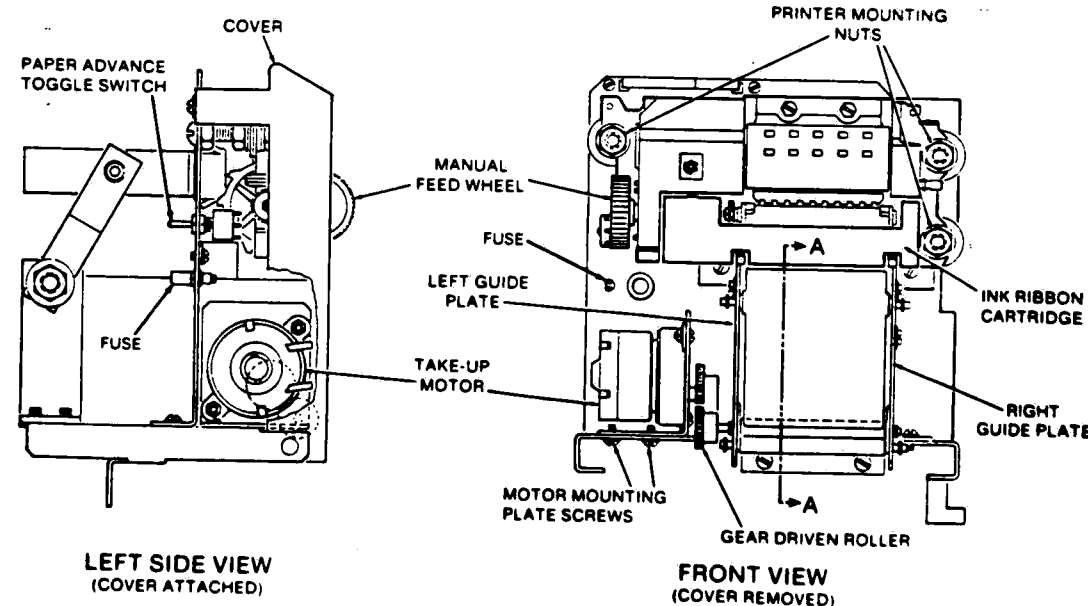
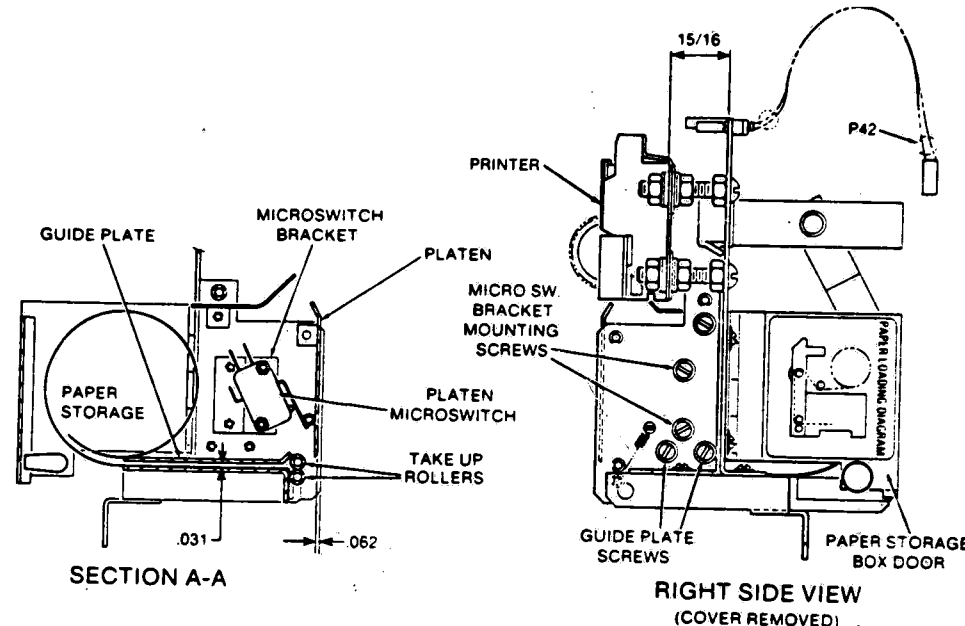


Figure 7-23. PRINTCON PRINTER ASSEMBLY
(Units Before 6/85).

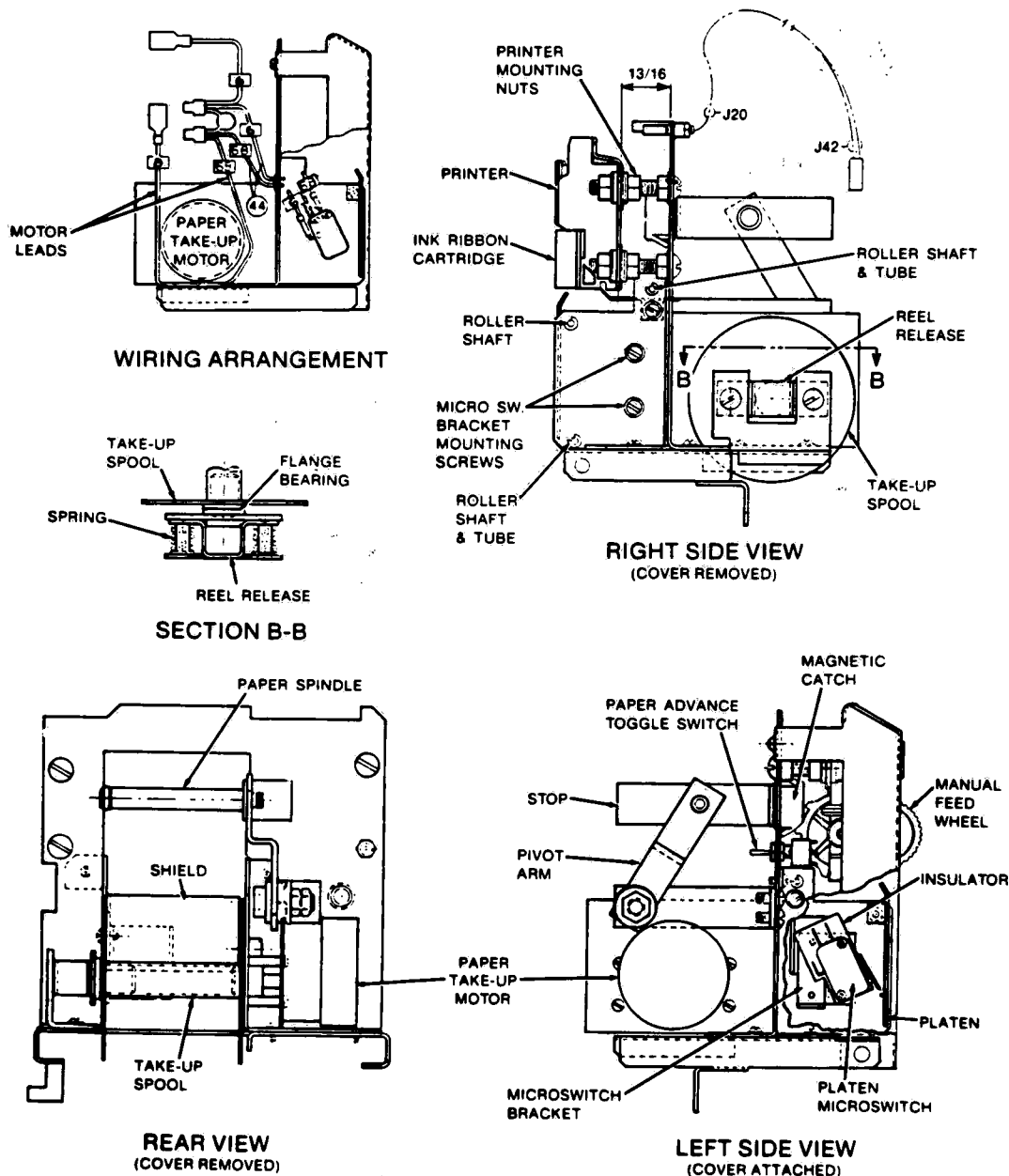


Figure 7-23A. PRINTCON PRINTER ASSEMBLY
(Units After 6/85).

Take-Up Motor Replacement (Fig. 7-23) (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 7-22 to rewire the new switch.

Printer Assembly Inspection and Adjustment (Fig. 7-23) (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 Coll 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.

7.18 PRINTCON DIGITAL DISPLAY

Display Panel Overlay Replacement (Fig. 8-47, 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. 8-47, 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. 8-47, 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 Printcon digital display board. Refer to Figure 7-32 for appropriate settings.

Eagle Series

PS2 PRESSURE psig = setting + 2		PS3 PRESSURE psig = setting + 2		VS2 VACUUM in. Hg. = setting + 2	
Setting	psig	Setting	psig	Setting	in. Hg.
SA11		SA10		SA12	
0	0.0	0	0.0	0	0.0
1	0.5	1	0.5	1	0.5
*2	1.0	2	1.0	2	1.0
3	1.5	3	1.5	3	1.5
4	2.0	4	2.0	*4	2.0
5	2.5	5	2.5	5	2.5
6	3.0	*6	3.0	6	3.0
7	3.5	7	3.5	7	3.5
8	4.0	8	4.0	8	4.0
9	4.5	9	4.5	9	4.5

PS 1 PRESSURE psig = setting + 2		PS 2 PRESSURE psig = setting + 2		VS 1 VACUUM in. Hg. = setting + 2	
Setting	psig	Setting	psig	Setting	in. Hg.
SA0	SA1	SA0	SA1	SA4	SA5
0	0	0	0	0	0
0	1	0	1	0	1
0	2	0	2	0	2
0	3	0	3	0	3
0	4	0	4	0	4
0	5	0	5	0	5
0	6	0	6	0	6
0	7	0	7	0	7
0	8	0	8	0	8
0	9	0	9	0	9
1	0	1	0	1	0
1	1	1	1	1	1
1	2	1	2	1	2
1	3	1	3	1	3
1	4	1	4	1	4
1	5	1	5	1	5
1	6	1	6	1	6

VS 1 VACUUM in. Hg. = setting + 2		VS 2 VACUUM in. Hg. = setting + 2		VS 3 VACUUM in. Hg. = setting + 2	
Setting	In. Hg.	Setting	In. Hg.	Setting	In. Hg.
SA4	SA5	SA4	SA5	SA4	SA5
0	0	0	0	0	0
0	1	0	1	0	1
0	2	0	2	0	2
0	3	0	3	0	3
0	4	0	4	0	4
0	5	0	5	0	5
0	6	0	6	0	6
0	7	0	7	0	7
0	8	0	8	0	8
0	9	0	9	0	9
1	0	1	0	1	0
1	1	1	1	1	1
1	2	1	2	1	2
1	3	1	3	1	3
1	4	1	4	1	4
1	5	1	5	1	5
1	6	1	6	1	6
1	7	1	7	1	7
1	8	1	8	1	8
1	9	1	9	1	9

*Recommended Initial Setting

Figure 7-24. ROTARY BCD SWITCHES.

7.19 MAIN PRINTCON PC BOARD

Changing The Battery Fig. 7-25, 8-47

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 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.

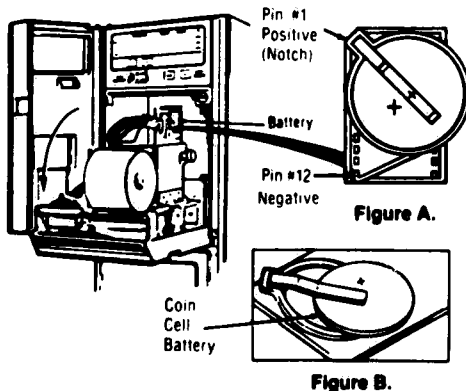


Figure 7-25. CHANGING THE BATTERY.

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.

Changing Units of Display (Figs. 7-26, 7-27 and Table 7-2).

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.

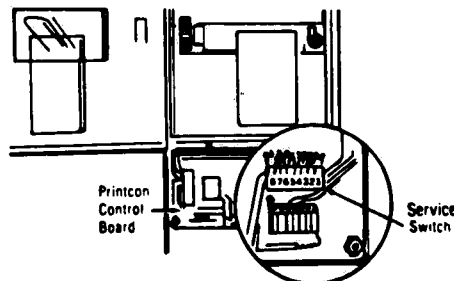


Figure 7-26. LOCATING THE SERVICE SWITCH.

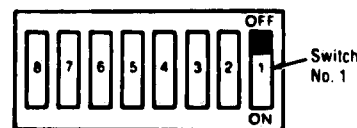


Figure 7-27. SERVICE SWITCH

Adjusting The Sterilize Temperature Overdrive (Gravity Unit only) (Figs. 7-35, 7-36 and Table 7-2)

For special sterilizer applications, the temperature overdrive may be adjusted in increments of approximately 1/2 degree F. For example, if the temperature thumbwheel setpoint is at 270 F (132 C), the actual control temperature can be from 270 F to 273.8 F (132 C to 134.3 C) depending on how service switches, 5, 6 & 7 of the service switch are set. Refer to Table 7-1 for overdrive settings.

TABLE 7-2 SERVICE SWITCH OPTION SETTINGS

Feature	Switch No(s).	Setting
Temperature in Fahrenheit	1	OFF*
Temperature in Celsius	1	ON
Pressure (English) psig & in Hg vacuum	2	OFF*
Pressure (Metric) Kg/cm ² & mm Hg vacuum	2	ON
Single precision	3	OFF
Extended precision	3	ON*
Pressure Transducer	4	ON
Temperature Overdrive (Gravity Units Only)		
TS2 = TS1	5, 6, 7	5 OFF, 6 OFF, 7 OFF
TS2 = TS1 + 0.5 F	5, 6, 7	5 ON, 6 OFF, 7 OFF
TS2 = TS1 + 1.1 F	5, 6, 7	5 OFF, 6 ON, 7 OFF
TS2 = TS1 + 1.6 F	5, 6, 7	5 ON, 6 ON, 7 OFF
TS2 = TS1 + 2.2 F	5, 6, 7	5 OFF, 6 OFF, 7 ON
TS2 = TS1 + 2.7 F	5, 6, 7	5 ON, 6 OFF, 7 ON
TS2 = TS1 + 3.3 F*	5, 6, 7	5 OFF, 6 ON, 7 ON
TS2 = TS1 + 3.8 F	5, 6, 7	5 ON, 6 ON, 7 ON
Spare Switch	8	Unused

*Initial factory setting (for Gravity Sterilizers only).

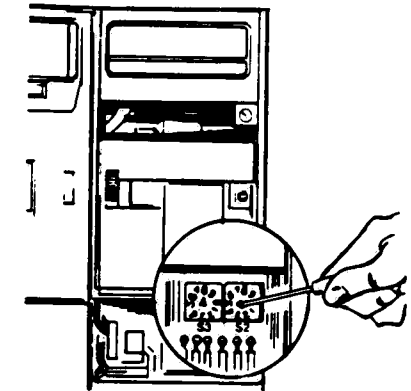


Figure 7-28. LOCATING ROTARY SWITCHES S2 AND S3.

Setting The Year Switches (Fig. 7-28)

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, remove front cover from control column. Remove primary display panel. 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. 8-47)

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

CAUTION: Plugs P16 and P40 of the control column wiring harness are identical in construction and can inadvertently be interchanged during replacement of the Printcon control PC Board. This results in damage to the PC Board. Positively identify and correctly install plugs P16 (to primary panel) and P40 (to Printcon PC Board) during reassembly. These plugs are labeled with tie wrap markers on the harness.

1. Open the outer door of the Printcon unit. The entire unit must be removed from the control column.

2. Remove the front cover panel from the column by taking two cap screws out of the top of the cover and two #10-32 screws out of the bottom.

3. Take off the primary panel by removing four #8-32 mounting screws and washers. It is not necessary to disconnect P16 from the primary panel if care is exercised.

4. Tilt the primary panel forward and reach through the primary panel mounting bracket to disconnect P40 and P48 connections.

5. Remove the four #8-32 Printcon unit mounting screws located two on each side of the unit. Access to the top two screws must be made by opening the display door at the top of the unit. The display PC board must be removed to expose the upper two mounting screws. See "Display Panel Overlay Replacement" and "Display PC Board Replacement." Printer unit must be tilted forward to remove the lower two screws. Disconnect the green grounding wire from the bottom of the printer assembly. Also disconnect the two "fasten" terminals from the printer assembly on units manufactured after 6/85.

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.

7.20 PRINTCON PRESSURE TRANSDUCER REPLACEMENT (Figs. 8-53 and 8-54)

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 1/4 NPT tee at the side of the chamber.
5. Mount new transducer.
6. Run the transducer cable through the cable clamp. Install the new cable into plug P47 as per the electrical schematic - section 6. Reconnect P47.

7.21 PRINTCON TEMPERATURE PROBE (RTD) REPLACEMENT (Figs. 8-53 and 8-54)

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. (Wire per electrical schematic - section 6)

7.22 REPLACEMENT OF PRINTCON POWER SUPPLY FUSES

If fuse replacement is necessary, refer to the figure 7-29 for location of these fuses.

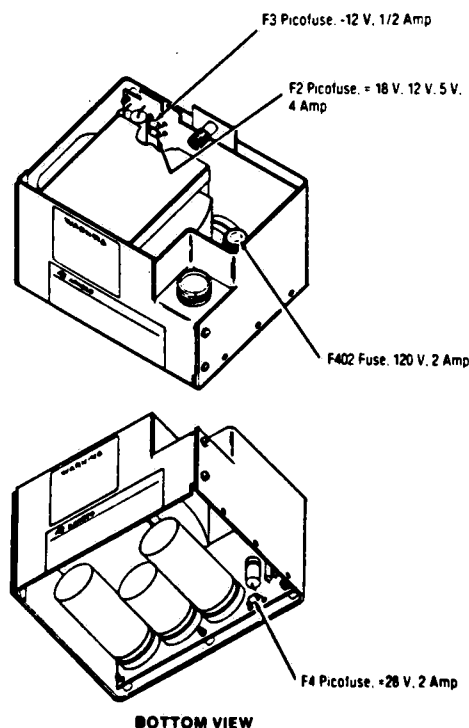


Figure 7-29. POWER SUPPLY FUSE LOCATIONS.

7-26
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C- 7

Rev. 4/86

7.23 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. 7-30)

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.

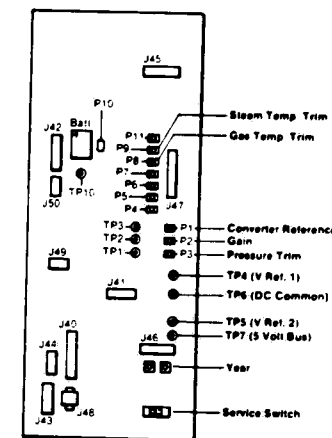
2. Check the service switch on the Printcon control PC board for the following settings:

- #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.



NOTE: This adjustment of **P2** affects the adjustment of **P3** made in step 6. Therefore, steps 6 and 7 must be repeated until **P2** adjustment is no longer required at high pressure. At the end of step 7, exhaust the chamber through the EXHAUST position on the MANUAL control knob.

IMPORTANT: The following step must **always** be performed **after** steps 6 and 7.

8. Remove the chamber drain strainer. Install the potentiometer thermocouple lead in metal-to-metal contact with the temperature probe in the chamber drain (1/2" from the tip). Initiate the same type cycle as in step 7, and wait until the Printcon **temperature** display stabilizes at the regulator setting. Adjust potentiometer **P9** on the main Printcon PC board until the

Printcon temperature display exactly agrees with the potentiometer reading. Press RESET to abort the cycle. Exhaust the chamber through the MANUAL control knob.

9. This concludes the calibration procedure. Remove the measuring devices and reconnect the chamber gauge. Restore the service switch No. 1 settings on the main Printcon PC board to the display options desired by the customer.

7.24 PRINTCON POWER SUPPLY ADJUSTMENT

1. Refer to Functional Description, paragraph 3.7.
2. Adjust R7 pot to achieve an output of 5.15 volts.

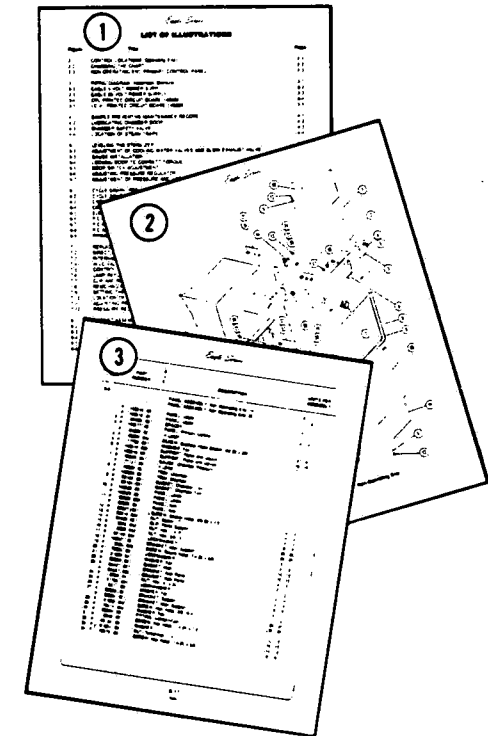
SECTION 8

EXPLODED VIEWS AND PARTS LISTS

Assemblies and components of Eagle 2000 sterilizers are illustrated and identified on the following pages. The part number, the description and the quantity required for each usage is given. Each indentation in the description represents the assembly level. The **UNITS PER ASSEMBLY** column is specific for the given assembly or subassembly level.

HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN

- ① Determine the function and application of the part required. Turn to the List of Illustrations and select the most appropriate title. Note the illustration page number.
- ② Turn to the page indicated and locate the desired part on the illustration.
- ③ From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.



TYPICAL INDENTATION EXAMPLE

No indentation —
part of top
assembly

One indentation —
(1st subassembly)
Part of above item
with no indentation

PANEL ASSEMBLY: Non Operating End, 16"	
PANEL ASSEMBLY: Non Operating End, 20"	
PANEL, Upper	
PANEL, Upper	
SPACER	
PANEL, Primary Control	
LAMP	
SCREW, Buttress Head Socket, #8-32 x 3/8	
WASHER, Flat	

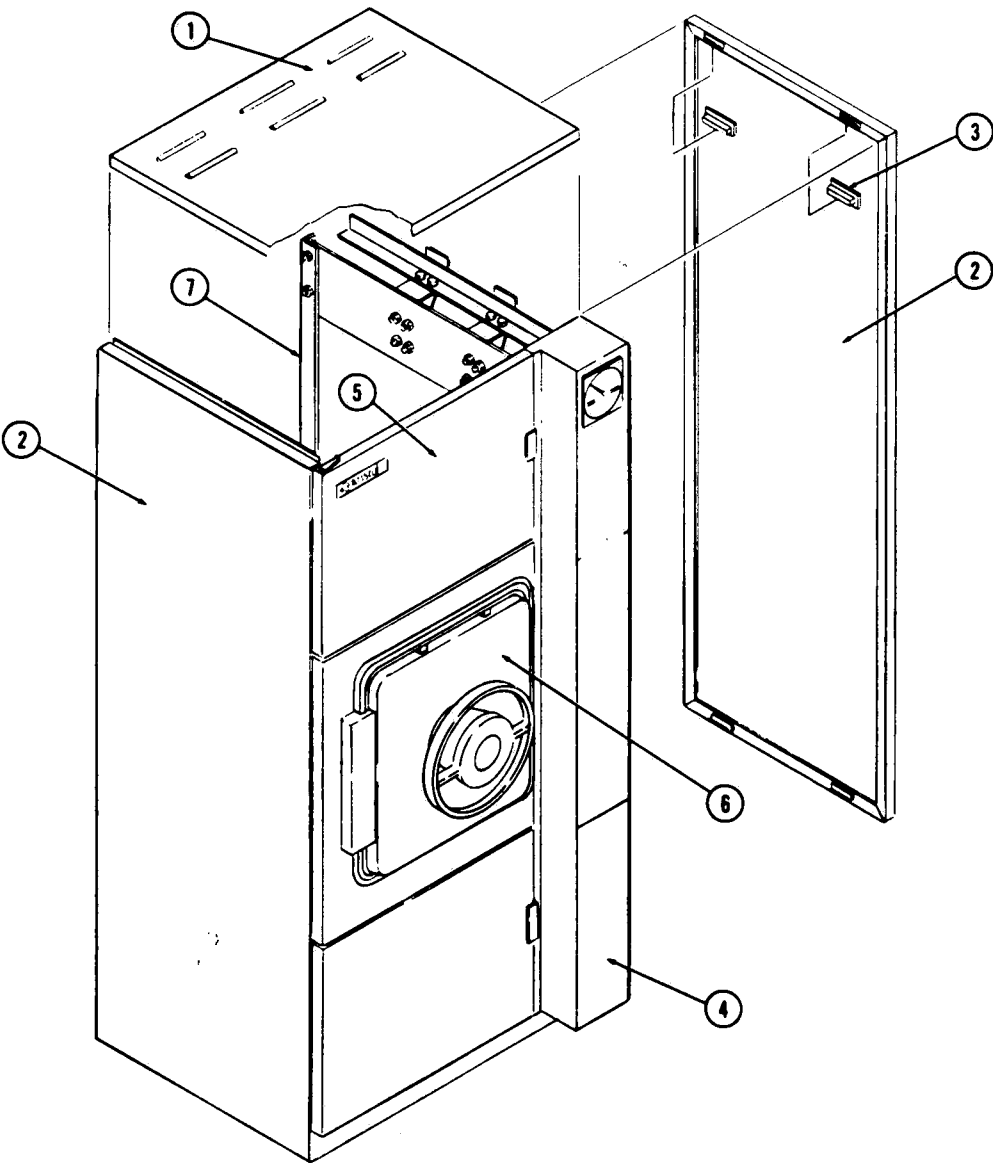


Figure 8-1. CABINET ASSEMBLY: Freestanding Sterilizer (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-1-	P	146441	002	CABINET ASSEMBLY: 16" Single Door, Freestanding (Part 1 of 2)	X		
	P	146441	006	CABINET ASSEMBLY: 20" Single Door, Freestanding (Part 1 of 2)		X	
1	P	136422	002	PANEL, Top	1		
	P	136423	002	PANEL, Top		1	
2	P	93404	003	PANEL, Side	2		
	P	93404	004	PANEL, Side		2	
3	P	84298	001	CATCH, Magnetic	8		
4				CONTROL ASSEMBLY (See Fig. 8-10 or Fig. 8-44)	1		
5				PANEL ASSEMBLY, Operating End (See Fig. 8-6)	1		
6				COVER AND HANDWHEEL ASSEMBLY (See Fig. 8-18)	1		
7				SIDE FRAME ASSEMBLY (See Fig. 8-2)	1		

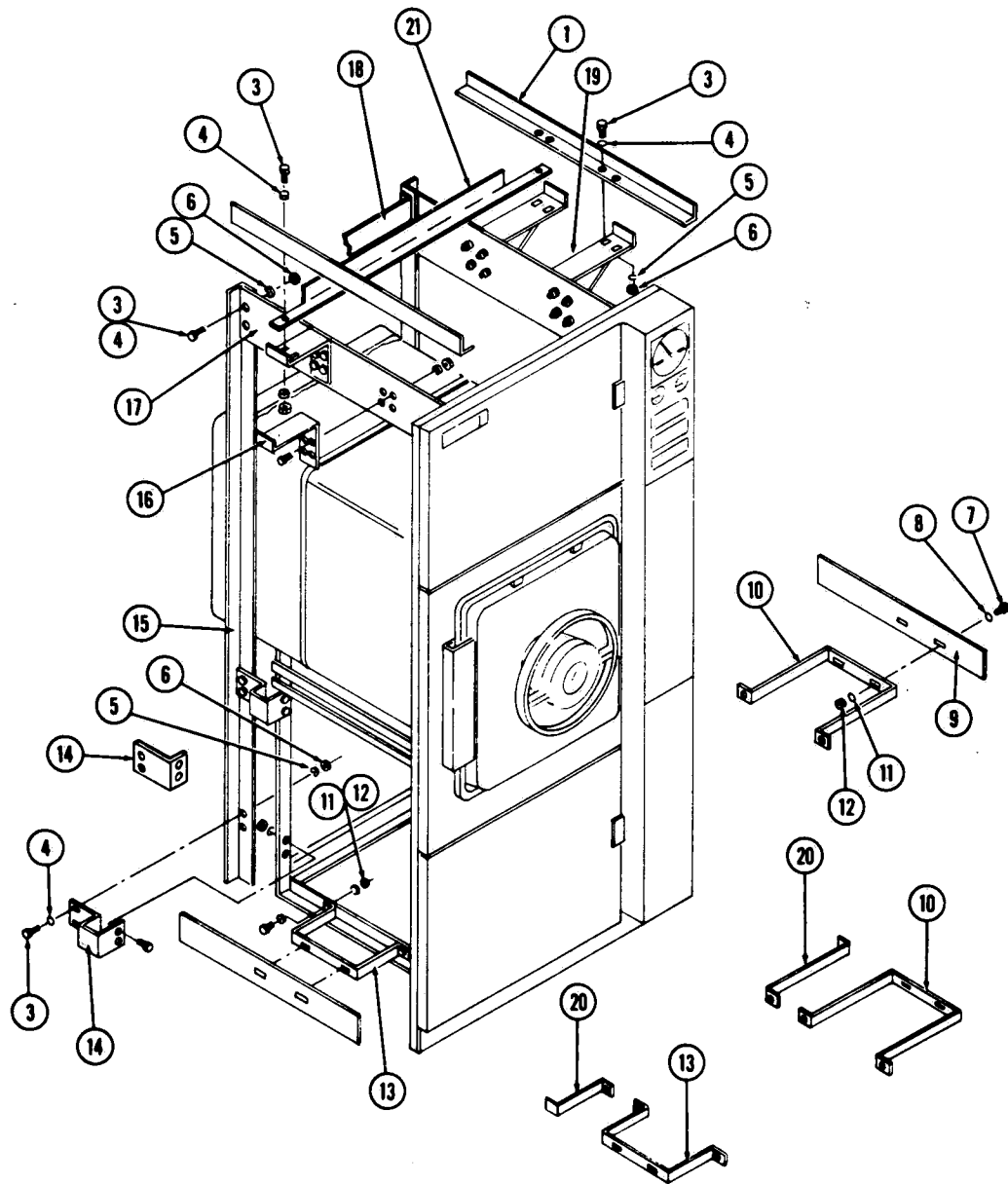


Figure 8-2. CABINET ASSEMBLY: Freestanding Sterilizer (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-2-	P 146441 002		CABINET ASSEMBLY: 16" Single Door, Freestanding (Part 2 of 2)	X		
	P 146441 006		CABINET ASSEMBLY: 20" Single Door, Freestanding (Part 2 of 2)		X	
1	P 93896 083		SUPPORT, Top Panel	2		
2	P 93896 084		SUPPORT, Top Panel			
3	P 3848 051		NOT USED			
4	P 3515 041		SCREW, Hex Head, 1/4-20 x 3/4	28	28	
5	P 76230 091		WASHER, Flat, 1/4	28	28	
6	P 3097 041		LOCKWASHER, 1/4	28	28	
7	P 31838 042		NUT, 1/4-20	18	18	
8	P 10414 042		SCREW, Hex Head, 3/8-16 x 1	20	22	
9	P 93663 001		WASHER, 3/8	20	22	
10	P 93663 002		SUPPORT, Bottom	2		
11	P 93665 002		SUPPORT, Bottom		2	
12	P 93398 002		BRACKET, Bottom, Long	1		
13	P 93398 001		BRACKET, Bottom, Long		1	
14	P 89809 061		LOCKWASHER, Stainless Steel, Internal Tooth	20	22	
15	P 3099 042		NUT, 3/8-16	20	22	
16	P 93665 001		BRACKET, Bottom, Short	1		
17	P 93398 001		BRACKET, Bottom, Short		1	
18	P 93688 001		BRACKET, Main Support	4		
19	P 93664 001		BRACKET, Main Support		4	
20	P 146628 001		SUPPORT, Rear Cabinet	2	2	
21	P 93896 089		HANGER ASSEMBLY, Short	2	2	
	P 93896 088		SUPPORT, Top Attachment	2		
	P 93896 085		SUPPORT, Top Attachment		2	
	P 93668 001		BRACKET, Top Attachment	1		
	P 93669 001		BRACKET, Top Attachment		1	
	P 93896 090		HANGER ASSEMBLY, Long	2	2	
	P 93399 001		BRACE, Bottom, Short		1	
	P 93399 002		BRACE, Bottom, Long		1	
	P 93896 093		BRACE, Cross	2		
	P 93896 094		BRACE, Cross		2	

Eagle Series

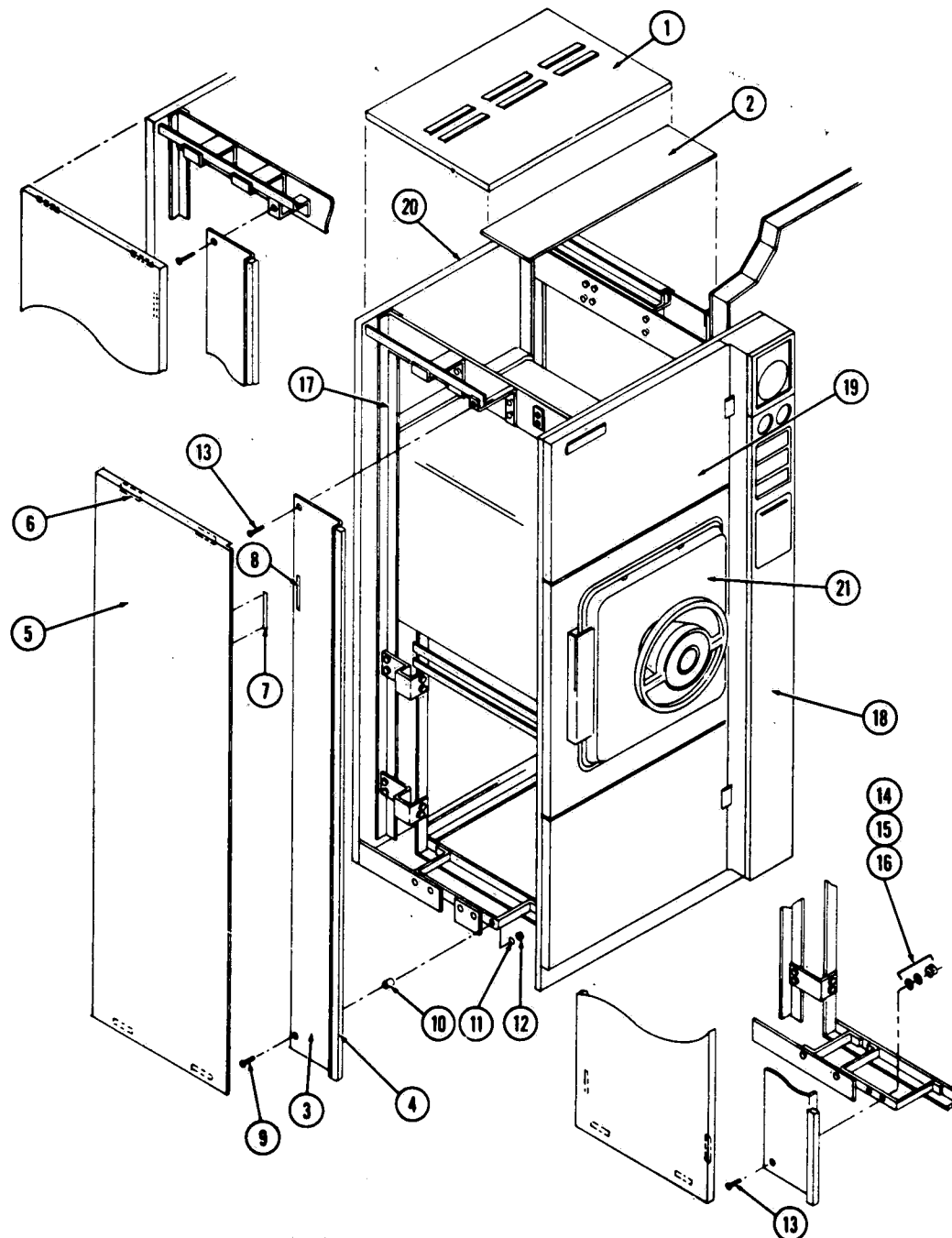


Figure 8-3. CABINET ASSEMBLY: Double Door, Recessed (Part 1 of 2).

8-6
D- 1

Rev. 4/86

Eagle Series

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-3-	P 146441 004		CABINET ASSEMBLY: 16" Double Door, Recessed (Part 1 of 2)	X	
	P 146441 008		CABINET ASSEMBLY: 20" Double Door, Recessed (Part 1 of 2)		X
1	P 136422 001		PANEL, Top	1	
	P 136423 001		PANEL, Top		1
2	P 93415 001		FILLER	1	
	P 93415 002		FILLER		1
3	P 93401 001		PANEL, Extension	2	
	P 93401 002		PANEL, Extension		2
4	P 84297 001		STRIP, Sponge	2	
5	P 93404 001		PANEL, Side	2	
	P 146339 014		PANEL, Side		2
6	P 84298 001		CATCH, Magnetic	8	
7	P 129340 001		*TAPE, Velcro, Wool Type	2	
8	P 129340 002		*TAPE, Velcro, Hook Type	2	
9	P 38675 041		SCREW, Flat Head, 10-32 x 1-3/4	2	
10	P 129341 001		SPACER	2	
11	P 19677 041		LOCKWASHER, #10	2	
12	P 2960 042		NUT, 10-32	2	
13	P 42656 091		SCREW, Flat Head, 1/4-20 x 1	2	4
14	P 76230 091		LOCKWASHER, 1/4	2	4
15	P 3097 041		NUT, 1/4-20	2	4
16	P 3515 041		WASHER, Flat, 1/4	2	4
17			SIDE FRAME ASSEMBLY (See Fig. 8-4)	1	1
18			CONTROL ASSEMBLY (See Fig. 8-10 or Fig. 8-44)	1	1
19			PANEL ASSEMBLY, Operating End (See Fig. 8-5)	1	1
20			PANEL ASSEMBLY, Non-Operating End (See Fig. 8-8)	1	1
21			COVER AND HANDWHEEL ASSEMBLY (See Fig. 8-18)	2	2
*Secure Velcro fasteners to panels with Loctite Super Bonder 495 or equivalent.					

8-7
D- 2

Rev. 4/86

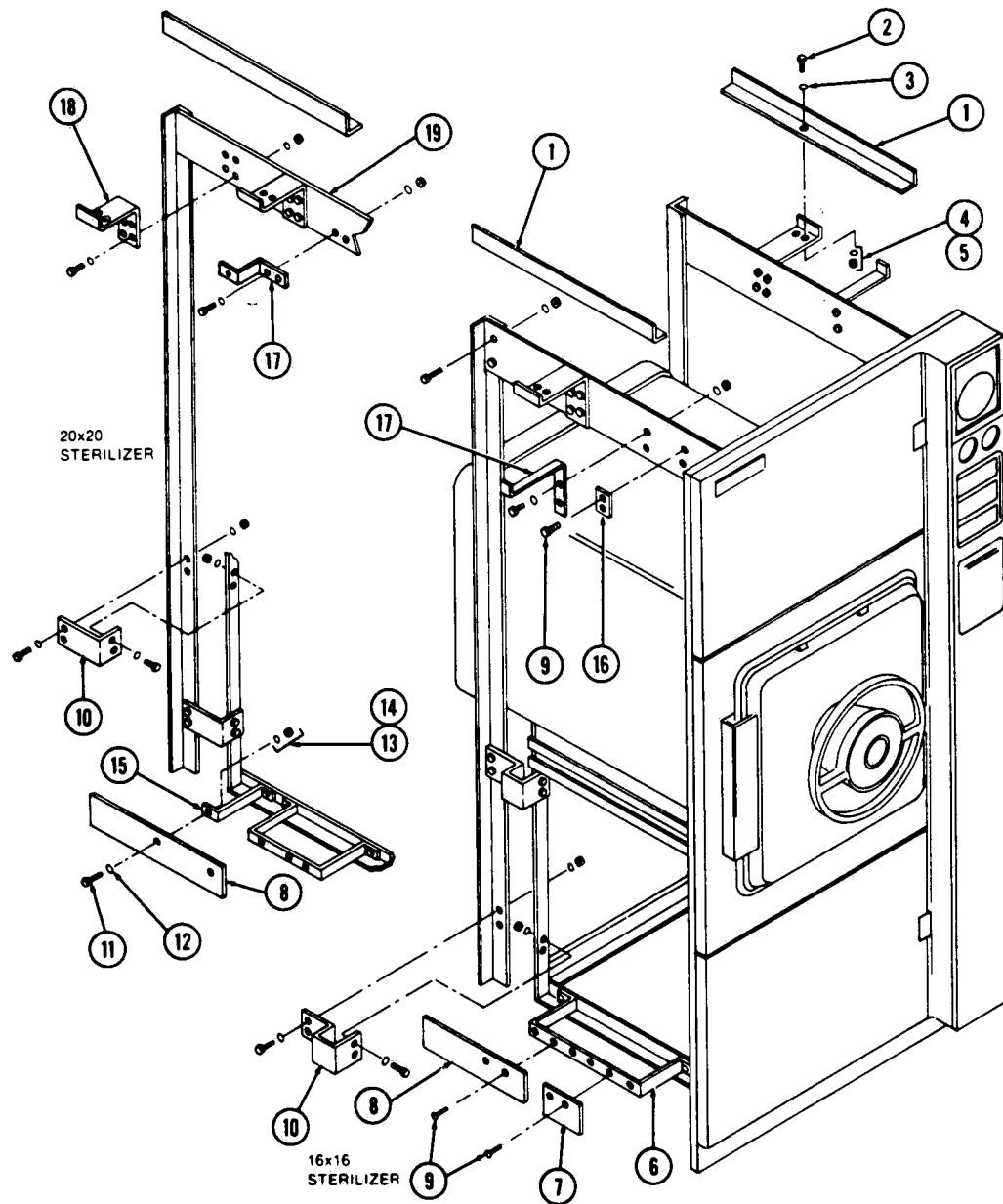


Figure 8-4. CABINET ASSEMBLY: Recessed Sterilizer (Part 2 of 2).

8-8

7/8/194

D- 3

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-4-	P 146441	004	CABINET ASSEMBLY: 16" Double Door, Recessed (Part 2 of 2)	X		
	P 146441	008	CABINET ASSEMBLY: 20" Double Door, Recessed (Part 2 of 2)		X	
1	P 93896	087	SUPPORT, Top Panel	2		
	P 93896	086	SUPPORT, Top Panel		2	
2	P 3848	051	SCREW, Hex Head, 1/4-20 x 3/4	8	28	
3	P 3515	041	WASHER, Flat, 1/4	8	28	
4	P 76230	091	LOCKWASHER, 1/4	10	28	
5	P 3097	041	NUT, Hex, 1/4-20	18	20	
6	P 93666	001	BRACKET, Bottom	2	32	
	P 93398	001	BRACKET, Bottom		2	
7	P 84470	001	PLATE, Strike	2		
8	P 84471	001	PLATE, Strike	2		
	P 93663	003	SUPPORT, Bottom		2	
9	P 43341	091	SCREW, Flat Head, #8-32 x 1/2	16	8	
10	P 93688	001	BRACKET, Main Support	4		
	P 93664	001	BRACKET, Main Support		4	
11	P 31838	042	SCREW, Hex Head Cap, 3/8-16 x 1	4	6	
12	P 10414	042	WASHER, Flat	4	6	
13	P 89809	061	LOCKWASHER, Stainless, Internal Tooth Type	4	6	
14	P 3099	042	NUT, Hex, 3/8-16	4	6	
15	P 93399	001	BRACE, Bottom		2	
16	P 84469	001	PLATE, Strike	4	4	
17	P 84075	001	BRACKET, Top	2		
	P 84075	003	BRACKET, Top		2	
18	P 93896	089	HANGER, Top	2	4	
19	P 93896	088	SUPPORT, Top Plate	2		
	P 93896	085	SUPPORT, Top Plate		2	

8-9

D- 4

Rev. 4/86

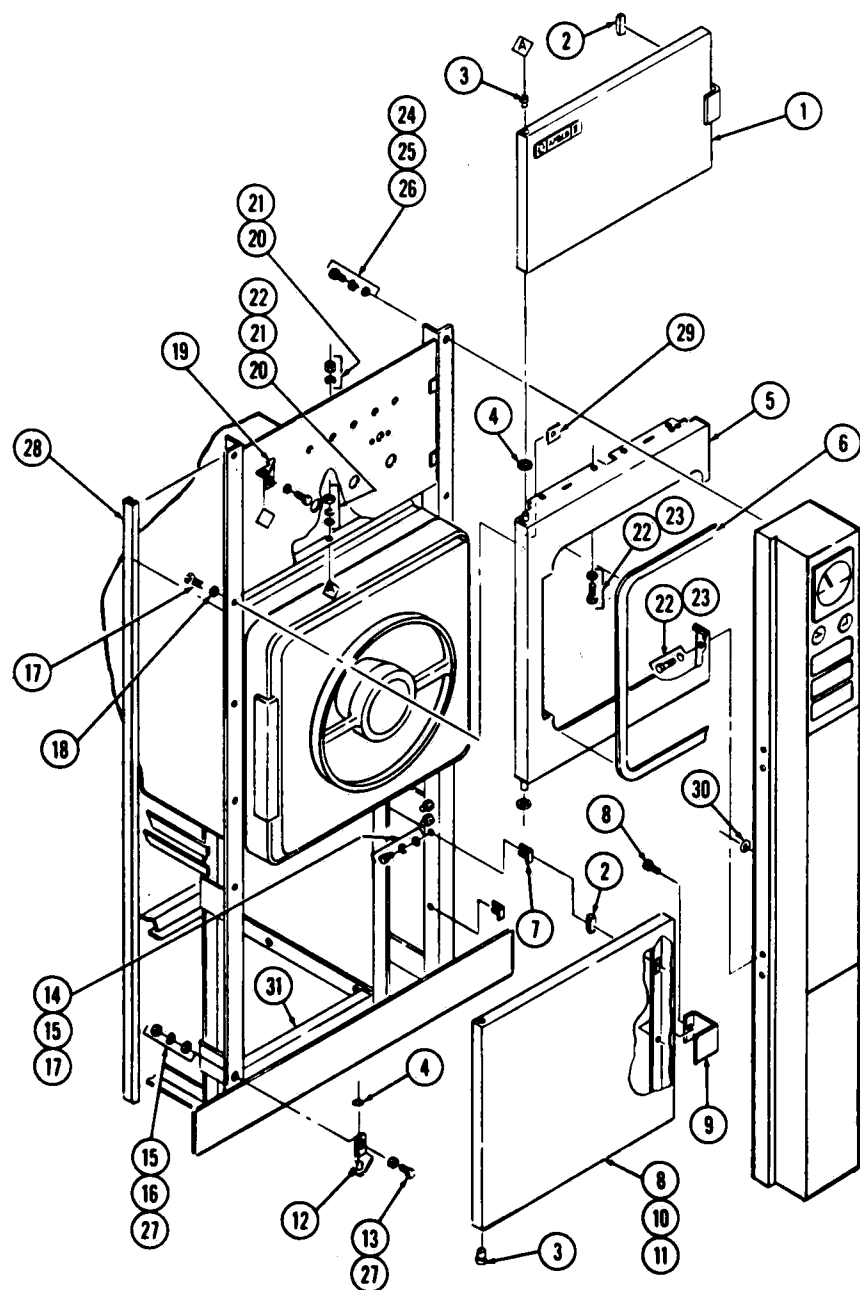


Figure 8-5. PANEL ASSEMBLY: Operating End.

8-10

D- 5

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-5-			PANEL ASSEMBLY: Operating End, 16"	X		
			PANEL ASSEMBLY: Operating End, 20"		X	
1 P	143146 002		PANEL ASSEMBLY, Upper Access	1		
2 P	143146 001		PANEL ASSEMBLY, Upper Access		1	
3 P	83920 001		CATCH, Magnetic	4	4	
4 P	84455 001		BEARING, Flange	4	4	
5 P	84457 001		WASHER	2	2	
6 P	143149 001		TRIM, Shell	1		
7 P	143148 001		TRIM, Shell		1	
8 P	90183 091		GASKET, Chamber Trim	1		
9 P	90184 091		GASKET, Chamber Trim		1	
10 P	93702 001		STRIKE	4	4	
11 P	91620 061		SCREW, Self Tap, #10-32 x 3/8	8	8	
12 P	93095 001		HANDLE	2	2	
13 P	136302 002		PANEL, Lower Access	1		
14 P	136302 001		PANEL, Lower Access		1	
15 P	93096 001		RACK, Manual (Not Shown)	1	1	
16 P	93701 001		HINGE ASSEMBLY	1	1	
17 P	10572 061		SCREW, Hex Head, 1/4-20 x 5/8	4	4	
18 P	49134 061		WASHER, Flat	17	17	
19 P	19678 045		LOCKWASHER	18	18	
20 P	3097 041		NUT, Hex, 1/4-20	8	8	
21 P	3846 041		SCREW, Hex Head, 1/4-20 x 1/2	11	11	
22 P	17589 045		WASHER, Flat	9	9	
23 P	93701 002		HINGE ASSEMBLY	1	1	
24 P	2960 042		NUT, Hex, #10-32	14	14	
25 P	19677 041		LOCKWASHER	14	14	
26 P	5511 041		WASHER, Flat	14	14	
27 P	41012 061		SCREW, Socket Head Cap, #10-32 x 1/2	12	12	
28 P	3857 045		SCREW, Hex Head Cap, 3/8-16 x 1/2	5	5	
29 P	25832 041		LOCKWASHER	5	5	
30 P	10456 091		WASHER, Shim, 11/16 x 25/32 x 1/32	5	5	
31 P	10445 091		WASHER, Flat	4	4	
	93089 001		GASKET, Wall	2	2	
	91924 091		NUT, Tinnerman	5	5	
	43754 045		WASHER	1	1	
	136769 001		STABILIZER (Not Shown)	1		
	136769 002		STABILIZER (Not Shown)		1	

8-11

D- 6

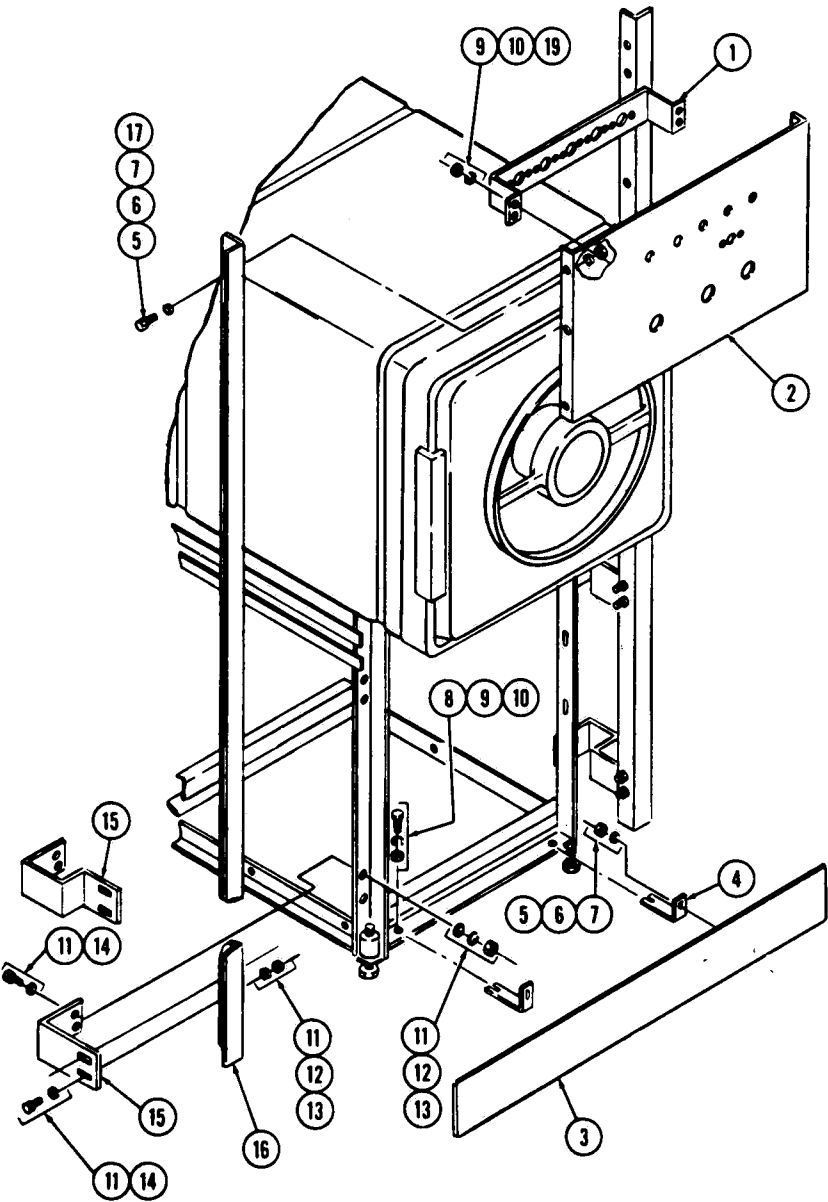


Figure 8-6. SUB PANELS: Operating End.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-6-			UNITS WITH INDICATOR-RECORDER				
			SUB PANELS: Operating End, 16"	X			
			SUB PANELS: Operating End, 20"		X		
			UNITS WITH PRINTCON				
			SUB PANELS: Operating End, 16"			X	
			SUB PANELS: Operating End, 20"				X
1	P 93092	001	SUPPORT, Switch	1	1	1	1
2	P 146153	002	PANEL ASSEMBLY, Valve (See Fig. 8-7)	1			
	P 146153	001	PANEL ASSEMBLY, Valve		1		
	P 146649	004	PANEL ASSEMBLY, Valve (See Fig. 8-7)			1	
	P 146649	005	PANEL ASSEMBLY, Valve				1
3	P 93084	002	PANEL, Kick	1		1	
	P 93084	001	PANEL, Kick		1		1
4	P 84437	002	BRACKET, Kick Panel	2	2	2	2
5	P 2960	042	NUT, Hex, #10-32	2	2	2	2
6	P 19677	041	LOCKWASHER	2	2	2	2
7	P 5511	041	WASHER, Flat	2	2	2	2
8	P 3846	041	SCREW, Hex Head Cap, 1/4-20 x 1/2	2	2	2	2
9	P 19678	045	LOCKWASHER	2	2	2	2
10	P 10445	091	WASHER, Flat	2	2	2	2
11	P 10456	091	WASHER, Shim 11/16 x 25/64 x 1/32	16	16	16	16
12	P 19680	041	LOCKWASHER	16	16	16	16
13	P 3099	042	NUT, Hex, 3/8-16	16	16	16	16
14	P 31838	042	SCREW, Hex Head Machine, 3/8-16 x 1	16	16	16	16
15	P 93688	002	BRACKET, Support	4		4	
	P 93664	001	BRACKET		4		4
16	P 146649	101	BRACKET, R.H.			1	1
	P 146649	102	BRACKET, L.H.			1	1
	P 143145	001	BRACKET, R.H.	1	1		
	P 143145	002	BRACKET, L.H.	1	1		
17	P 41012	061	SCREW, Socket Head Cap, #10-32 x 1/2	6	6		
18	P 17589	045	WASHER, Flat	6	6		
19	P 3097	041	NUT, Hex, 1/4-20	8	8		

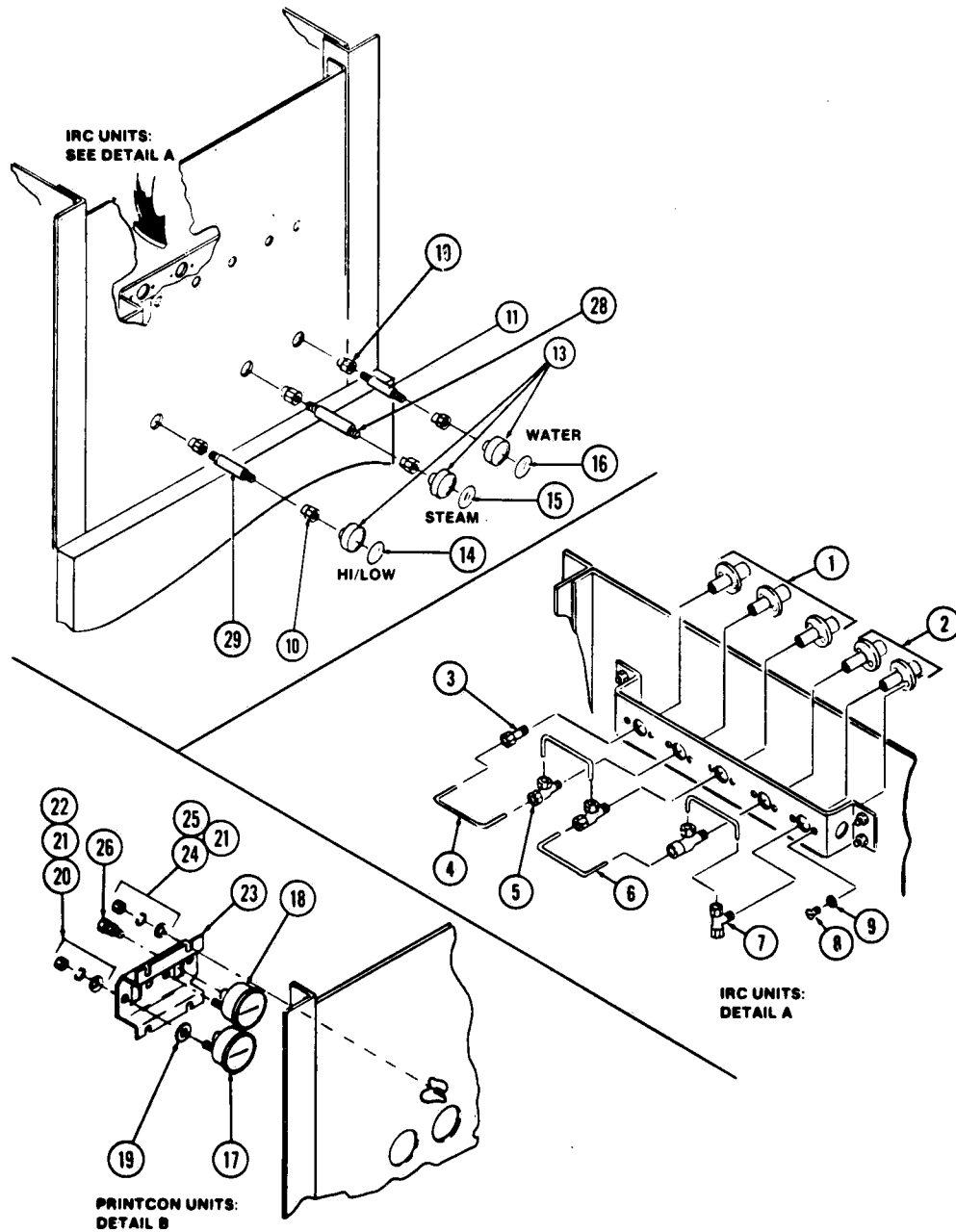


Figure 8-7. TOP CONTROL PANEL: Operating End.

8-14

D- 9

Rev. 12/83

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-7-			TOP CONTROL PANEL: Operating End			
			Units with Indicator-Recorder	X		
			Units with Printcon		X	
	1 P	83865 001	SWITCH, Pressure	3		
	2 P	83866 001	SWITCH, Vacuum	2		
	3 P	43289 091	FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1		
	4 P	83888 001	TUBE	1		
	5 P	78285 091	TEE, Male Run	3		
	6 P	83887 001	TUBE	3		
	7 P	42581 091	FITTING, Tube	1		
	8 P	3984 041	SCREW, #6-32 x 3/8	10		
	9 P	5469 041	WASHER, Flat	10		
	10 P	8605 042	NUT, Valve	6	6	
	11 P	51999 043	ROD, Extension (4-1/2" Lg.)	1	1	
	12		NOT USED			
	13 P	54899 091	KNOB, Valve	3	3	
	14 P	90576 091	DECAL, Steam Pressure, HI LO	1	1	
	15 P	90322 091	DECAL, Steam Supply	1	1	
	16 P	90323 091	DECAL, Water Supply	1	1	
	17 P	90525 091	GAUGE, Chamber Pressure	1		
	18 P	90730 091	GAUGE, Jacket Pressure	1		
	19 P	5503 045	WASHER, Flat	4		
	20 P	129356 132	WASHER, Belleville	4		
	21 P	19678 045	WASHER, Lock	4		
	22 P	2960 042	NUT, Hex #10-32	4		
	23 P	93900 052	BRACKET, Gauge	1		
	24 P	10445 091	WASHER, Flat	2		
	25 P	3097 041	NUT, Hex 1/4-20	2		
	26 P	90594 091	FITTING, Compression, 1/8 O.D.T. x 1/8 N.P.T.	2		
	27		NOT USED			
	28 P	51998 043	ROD, Extension (5" Lg.)	1	1	
	29 P	83869 002	ROD, Extension (2-9/16" Lg.)	1	1	

8-15

D- 10

Rev. 12/83

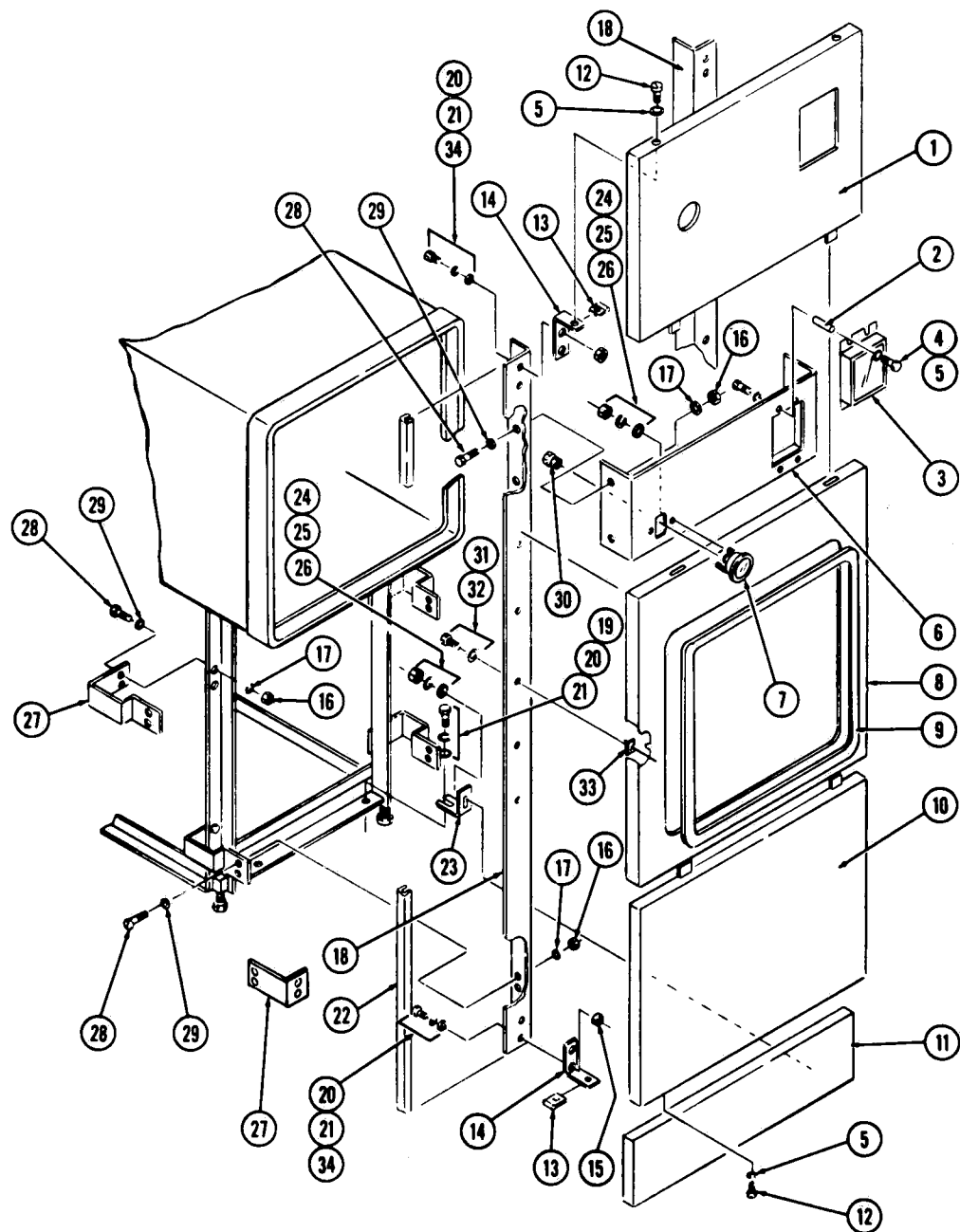


Figure 8-8: PANEL ASSEMBLY : Non-Operating End.

8-16

764084

D- 11

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-8-			PANEL ASSEMBLY: Non Operating End, 16"	X	
			PANEL ASSEMBLY: Non Operating End, 20"		X
1	P 146518	001	PANEL, Upper	1	
	P 146519	001	PANEL, Upper	1	
2	P 84438	001	SPACER	4	4
3	P 136534	001	PANEL, Primary Control	1	1
	P 764317	536	• LAMP (Box of 10)	18	18
4	P 45323	042	SCREW, Buttress Head Socket, #8-32 x 3/8	8	8
5	P 17796	091	WASHER, Flat	16	16
6	P 146516	002	SUPPORT, Panel and Gauge	1	
	P 146516	001	SUPPORT, Panel and Gauge	1	1
7	P 90525	091	GAUGE, Chamber Pressure	1	1
	P 77121	091	• LENS	1	1
8	P 146522	001	TRIM, Chamber	1	
	P 146525	001	TRIM, Chamber	1	1
9	P 90183	091	GASKET, Chamber Trim	1	
	P 90184	091	GASKET, Chamber Trim	1	1
10	P 146520	001	PANEL, Lower	1	
	P 146523	001	PANEL, Lower	1	1
11	P 93689	002	PANEL, Kick	1	
	P 93689	001	PANEL, Kick	1	1
12	P 50527	061	SCREW, Socket Head, #8-32 x 1/2	4	4
13	P 90918	045	NUT, Speed	4	4
14	P 84436	001	CLIP, Panel Support	4	4
15	P 3040	042	NUT, Hex, 1/4-20	8	8
16	P 3099	042	NUT, Hex, 3/8-16	20	20
17	P 52149	045	LOCKWASHER	20	20
18	P 146527	001	BRACKET, Main Support	2	
19	P 3950	048	SCREW, Round Head, 1/4-20 x 5/8	2	2
20	P 76230	091	LOCKWASHER	10	10
21	P 31599	041	WASHER, Flat	10	10
22	P 93089	001	GASKET, Wall	2	2
23	P 84437	001	BRACKET, Kick Panel	2	
	P 84437	002	BRACKET, Kick Panel	2	2
24	P 2959	041	NUT, Hex, #10-32	4	4
25	P 31705	045	LOCKWASHER	4	4
26	P 5511	091	WASHER, Flat	6	6
27	P 93688	001	BRACKET, Support	4	
	P 93664	001	BRACKET, Main Support	4	4
28	P 31838	042	SCREW, Hex Head, 3/8-16 x 1	20	20
29	P 10414	042	WASHER, Flat	20	20
30	P 90594	091	FITTING, Compression	1	1
31	P 3846	061	SCREW, Hex Head, 1/4-20 x 1/2	10	10
32	P 49134	061	WASHER	10	10
33	P 91924	091	NUT, Tinnerman, 1/4	10	10
34	P 10572	061	SCREW, Hex Head, 1/4-20 x 5/8	8	8

8-17

Rev. 12/82

D- 12

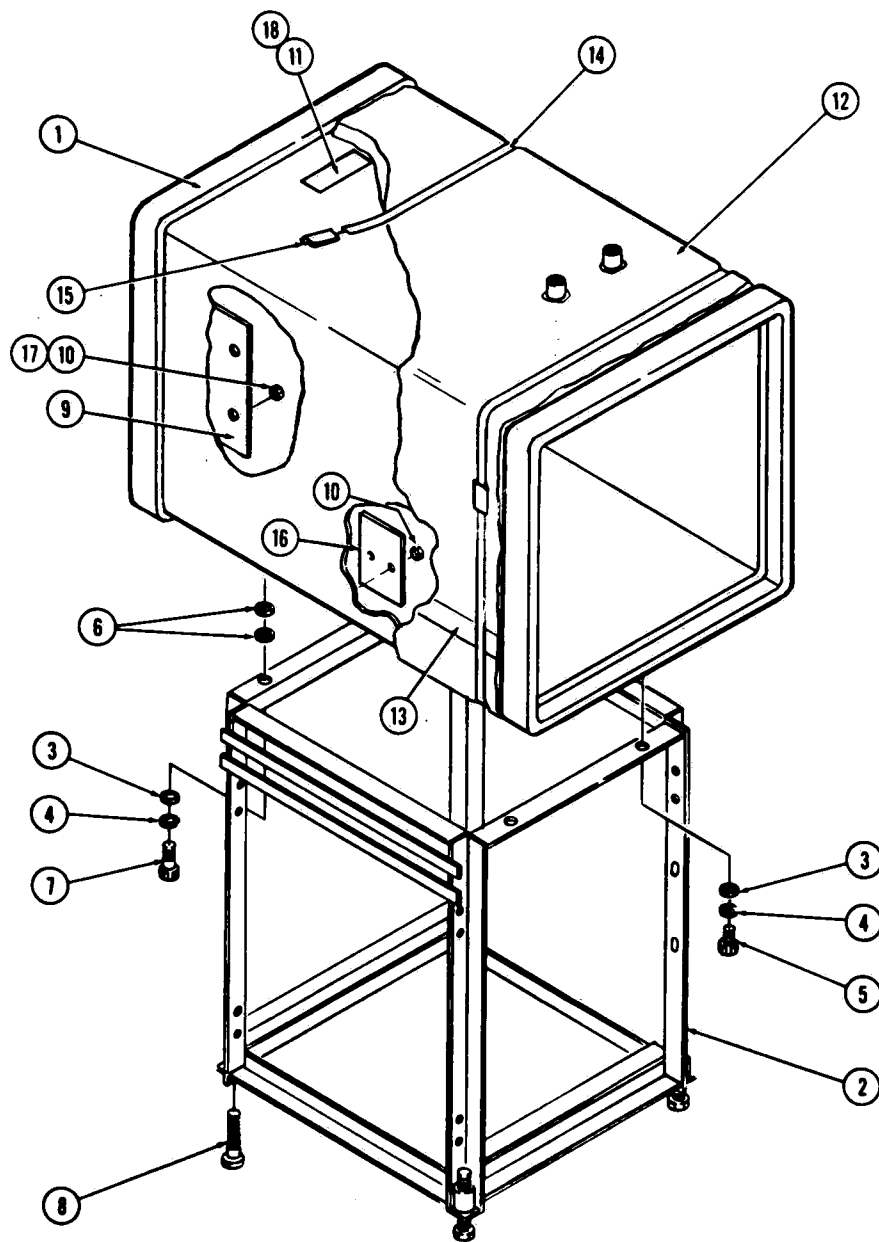


Figure 8-9. SHELL AND STAND ASSEMBLY.

8-18

D- 13

Rev. 12/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-9-			SHELL AND STAND ASSEMBLY: 16 x 16 Sterilizer	X			
			SHELL AND STAND ASSEMBLY: 20x20 Sterilizer		X		
1 P	136587 007		SHELL, Weldment, Single Door	1			
P	136587 001		SHELL, Weldment, Single Door		1		
P	136587 008		SHELL, Weldment, Double Door	1			
P	136587 002		SHELL, Weldment, Double Door		1		
2 P	136435 001		STAND, Weldment	1			
P	136435 002		STAND, Weldment		1		
3 P	5503 045		WASHER, Flat, 1 O.D. x 13/32 I.D. x 3/32 THK	4		8	
4 P	19687 061		WASHER, Lock (3/8)	4		4	
5 P	12439 045		SCREW, Socket Head 3/8-16 UNC x 3/4	2		2	
6 P	90441 045		WASHER, Flat, 1 O.D. x 13/32 I.D. x 1/8 THK	2			
7 P	16383 045		SCREW, Socket Head, 3/8-16 UNC x 1	2		2	
8 P	90407 045		SCREW, Square Head, 5/8-11 UNC x 4-1/2	4		4	
9 P	93293 NLA		BAFFLE, Steam (SUB: P-56396-223)	1		1	
10 P	150231 NLA		NUT, Hex, 1/4-20 UNC (SUB: P-8648-061)	6		6	
11 P	90542 091		NAMEPLATE	1		1	
12			INSULATION	1		1	
13			TAPE	1		1	
14			STRAP	2		2	
15 P	32268 091		SEAL, Strap	2		2	
16 P	93832 NLA		BAFFLE (SUB: P-56396-225)	1		1	
17 P	76666 061		WASHER, Flat (Not Shown)	4		4	
18 P	9448 045		SCREW, Drive, #4 x 1/4 (Not Shown)	2		2	

8-19

D- 14

Rev. 6/84

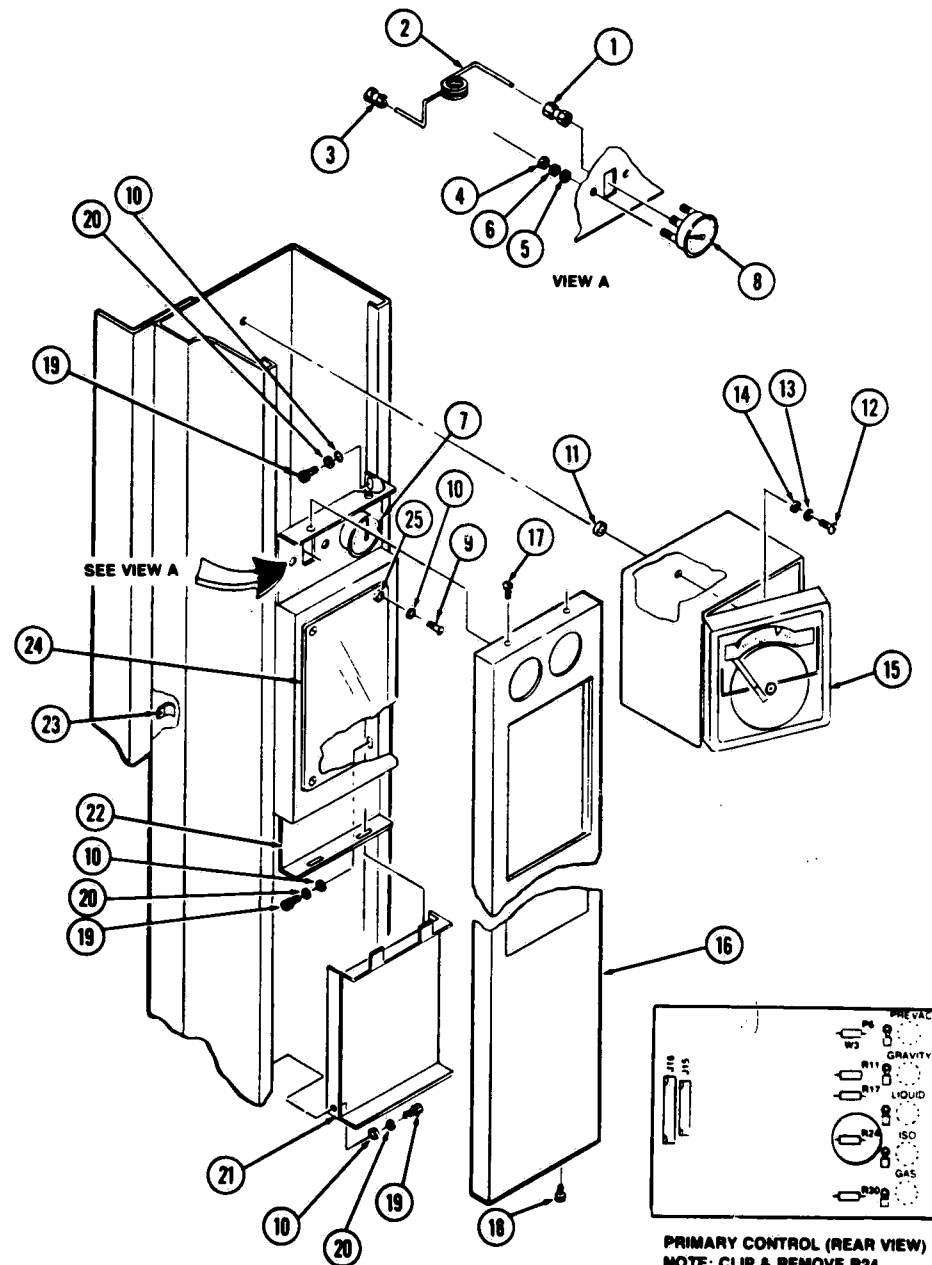


Figure 8-10. CONTROL COLUMN (Part 1 of 3).
(Units With Indicator Recorder)

8-20

E- 1

Rev. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-10-			UNITS WITH INDICATOR-RECORDER: CONTROL COLUMN (Part 1 of 3)	
1 P	90594 091		COUPLING, Compression, 1/8 O.D.T. x 1/8 N.P.T.	2
2 P	89053 091		TUBING, 1/8 O.D. x 40	1
3 P	129276 001		FITTING, Bulkhead, 1/8 O.D.T.	2
4 P	2959 041		NUT, Hex. #10-32 1/8 O.D.T.	4
5 P	31705 045		LOCKWASHER	4
6 P	5511 091		WASHER, Flat	4
7 P	90525 091		GAUGE, Chamber Pressure	1
	77121 091		• LENS	1
8 P	90730 091		GAUGE, Jacket Pressure	1
	77121 091		• LENS	1
9 P	78025 042		SCREW, Button Head Socket, #8-32 x 7/8	4
10 P	17796 091		WASHER, Flat	10
11 P	84391 001		SPACER, Recorder	2
12 P	4001 041		SCREW, Round Head, 1/4-20 x 7/8	2
13 P	26962 061		LOCKWASHER	2
14 P	31599 041		WASHER, Flat	2
15 P	83518 001		RECORDER (See Fig. 8-13)	1
16 P	146483 002		FRONT PANEL ASSEMBLY	1
17 P	45323 042		SCREW, Button Head Socket, #8-32 x 3/8	2
18 P	23431 041		SCREW, Socket Head Cap, #10-32 x 3/8	2
19 P	50527 061		SCREW, Socket Head Cap, #8-32 x 1/2	6
20 P	79588 001		LOCKWASHER	6
21 P	146490 001		PANEL, Secondary Assembly (See Fig. 8-16)	1
22 P	146484 001		PANEL, Mounting	1
23 P	451283 001		CLIP, Locking, Capillary	3
24 P	146645 226		CONTROL, Primary	1
	764317 536		• LAMP (Box of 10)	26
25 P	84390 001		SPACER, Primary Control	4

8-21

E- 2

Rev. 5/88

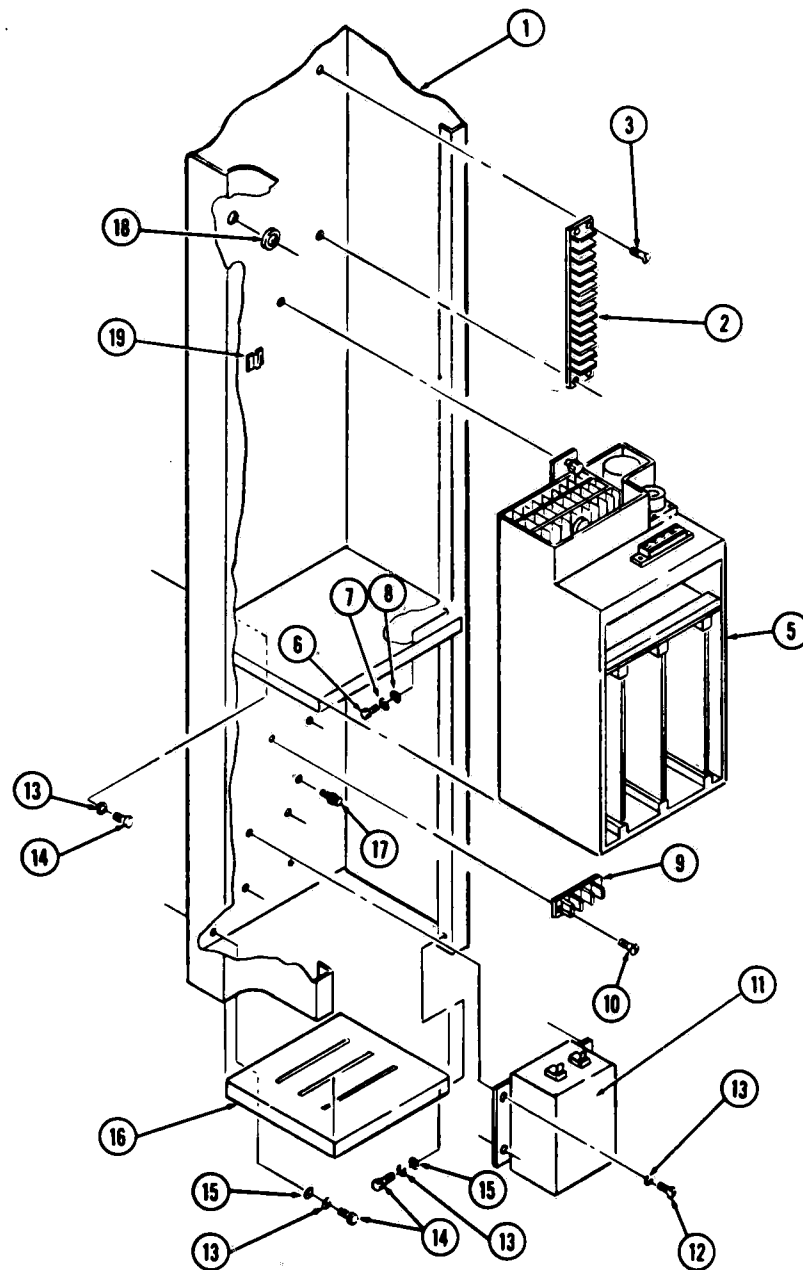


Figure 8-11. CONTROL COLUMN (Part 2 of 3).
(Units With Indicator Recorder)

8-22

THRU

E- 3

Rev. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-11-			UNITS WITH INDICATOR-RECORDER: CONTROL COLUMN (Part 2 of 3)	
1 P	146485	001	HOUSING ASSEMBLY	1
2 P	41560	091	BLOCK, Terminal	1
3 P	3964	041	SCREW, Round Head, #6-32 x 5/8	2
4 P	136759	001	SUPPORT, Controller	1
5			MAIN CONTROL ASSEMBLY (See Fig. 8-15)	1
6 P	50527	061	SCREW, Socket Head Cap, #8-32 x 1/2	2
7 P	79588	001	LOCKWASHER	2
8 P	17796	091	WASHER, Flat	2
9 P	90746	091	STRIP, Terminal	1
10 P	9661	041	SCREW, #10-32 x 5/8	2
11 P	93821	001	FILTER	1
12 P	4682	041	SCREW, Round Head, #8-32 x 3/8	6
13 P	31705	045	LOCKWASHER	10
14 P	23431	041	SCREW, Socket Head Cap, #10-32 x 3/8	6
15 P	5511	091	WASHER, Flat	4
16 P	136588	002	PLATE, Bottom	1
17 P	82675	001	SCREW, Green Ground, #10-32	1
18 P	24582	091	GROMMET	1
19 P	431152	091	HOLDER, Wire	8

8-23

E- 4

Rev. 12/83

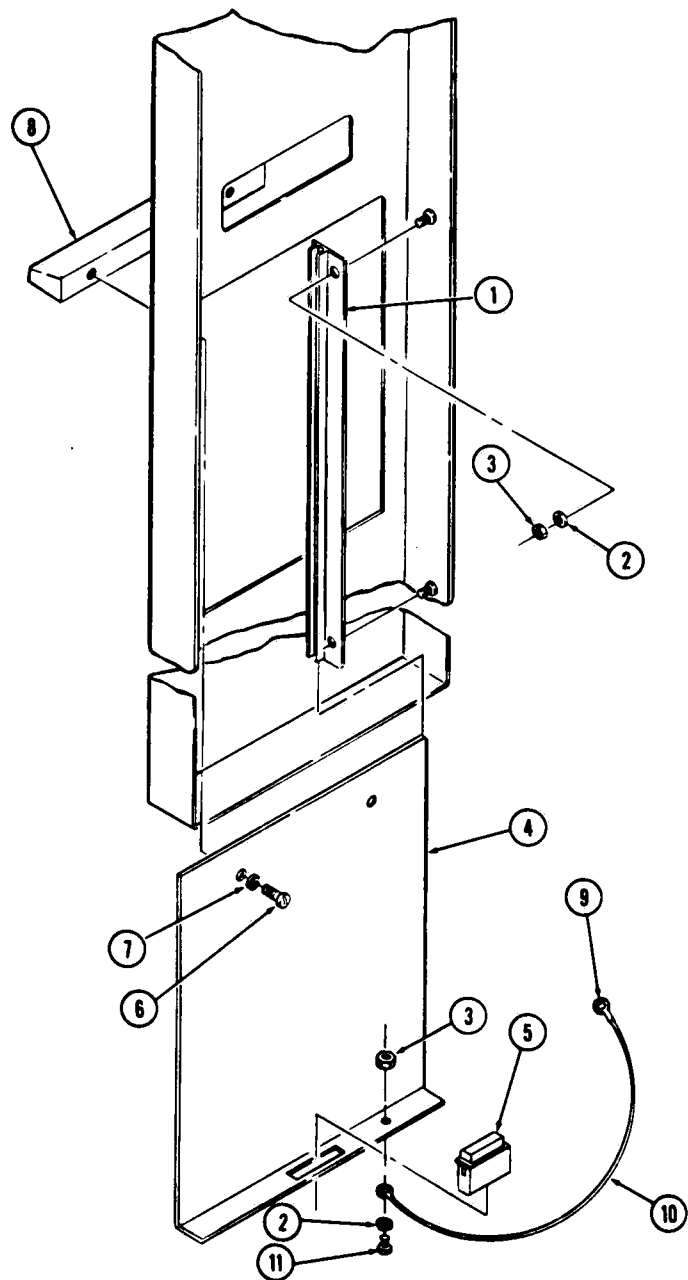


Figure 8-12. CONTROL COLUMN (Part 3 of 3).
(Units With Indicator Recorder)

8-24

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-12-					UNITS WITH INDICATOR-RECORDER:			
					CONTROL COLUMN (Part 3 of 3)			
	1	P	84394	001	SLIDE, Door	2		
	2	P	5469	041	WASHER, Flat	5		
	3	P	3037	041	NUT, Hex, #6-32	5		
	4	P	93662	001	DOOR	1		
	5	P	83920	001	CATCH, Magnetic	1		
	6	P	4682	041	SCREW, Round Head, #8-32 x 3/8	2		
	7	P	79588	001	LOCKWASHER	2		
	8	P	84393	001	HANDLE	1		
	9	P	19521	091	TERMINAL, #6 Ring x 16-22 AWG	2		
10					WIRE, Green	1		
11	P	50705	041		SCREW, Flat Head, #6-32 x 5/16	1		

8-25

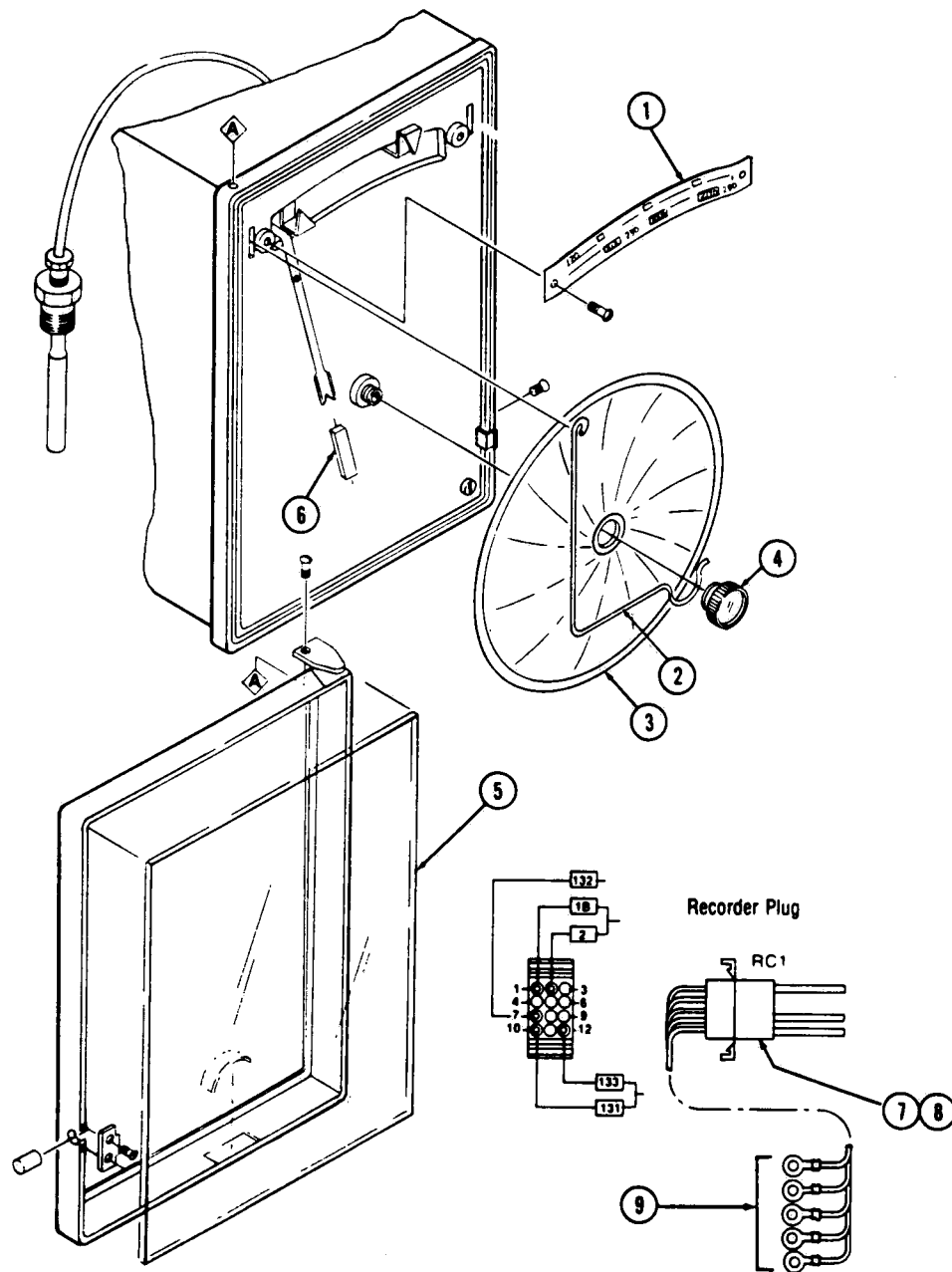


Figure 8-13. INDICATOR-RECORDER-CONTROLLER (Part 1 of 2).

8-26

E- 7

Rev. 5/88

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-13-	P 83518	001	INDICATOR-RECORDER-CONTROLLER (Part 1 of 2)	X
1	P 93711	001	SCALE, Temperature	1
2	P 764315	320	LIFTER, Pen	1
3	P 93707	091	CHART, Recording	A/R
4	P 764315	319	HUB, Chart	1
5	P 76960	091	GLASS, Door	1
	P 751364	091	• TAPE, Door Glass	A/R
6	P 764315	403	CARTRIDGE, Ink, Red (Card of 6, with Arm)	A/R
7	P 84381	001	CONNECTOR	1
8	P 84382	001	TERMINAL, Pin	5
9	P 19521	091	TERMINAL, #6 Ring x 16-22 AWG	5

8-27

764315

E- 8

Rev. 4/86

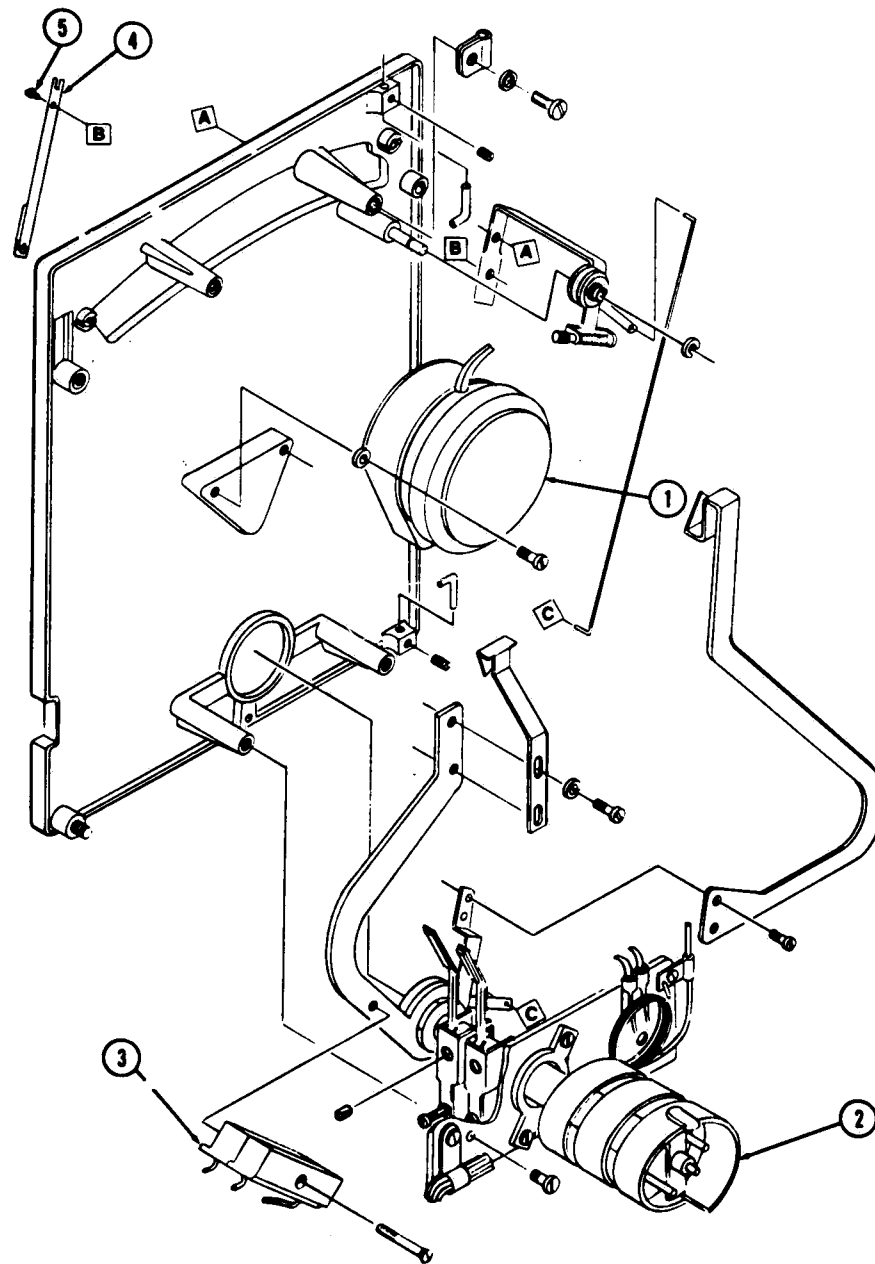


Figure 8-14. INDICATOR-RECORDER-CONTROLLER (Part 2 of 2).

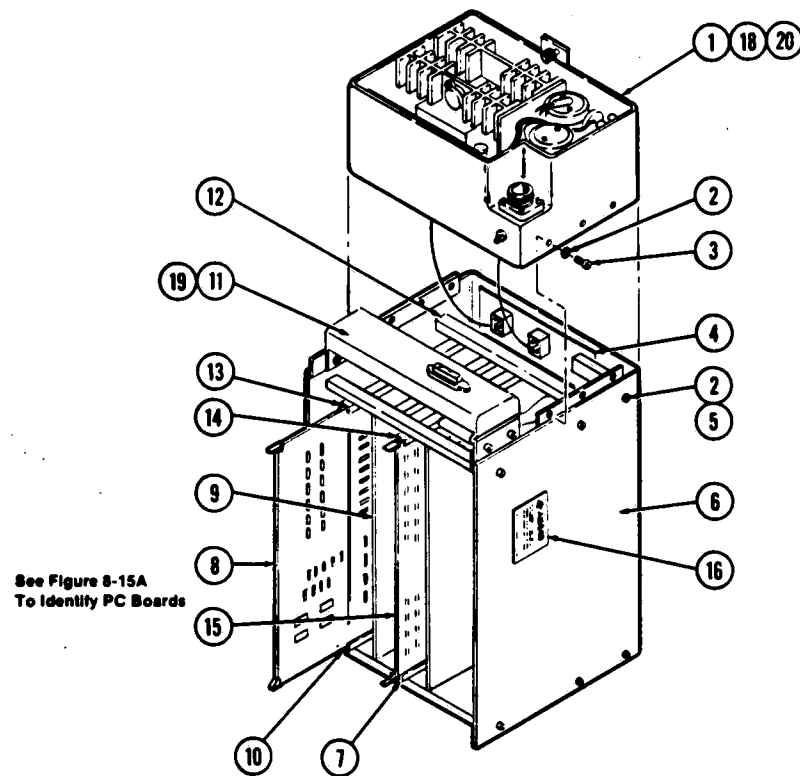
8-28

E- 9

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-14-	P 83518 001		INDICATOR-RECORDER-CONTROLLER (Part 2 of 2)	X
1	P 764315 336		MOTOR, Chart Drive	1
2	P 764315 325		THERMAL SYSTEM ASSEMBLY (20 Foot Copper)	1
	P 764315 326		THERMAL SYSTEM ASSEMBLY (20 Foot Stainless)	1
3	P 78878 091		SWITCH, Reed*	2
	P 752094 091		• ARM AND MAGNET*	2
4			ARM, Pen (See Figure 8-13)	1
5	P 750002 091		SCREW, Pen Arm	1
*Used on recorder with Model Number 563240W-060-221-111-120. If recorder is Model Number 563240W-062-221-111-120 use the following: P-764316-560 SWITCH, Reed P-764316-561 ARM AND MAGNET				

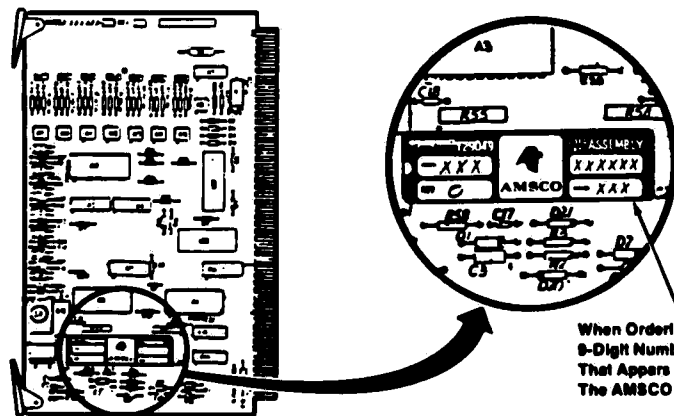
8-29

E- 10



See Figure 8-15A
To Identify PC Boards

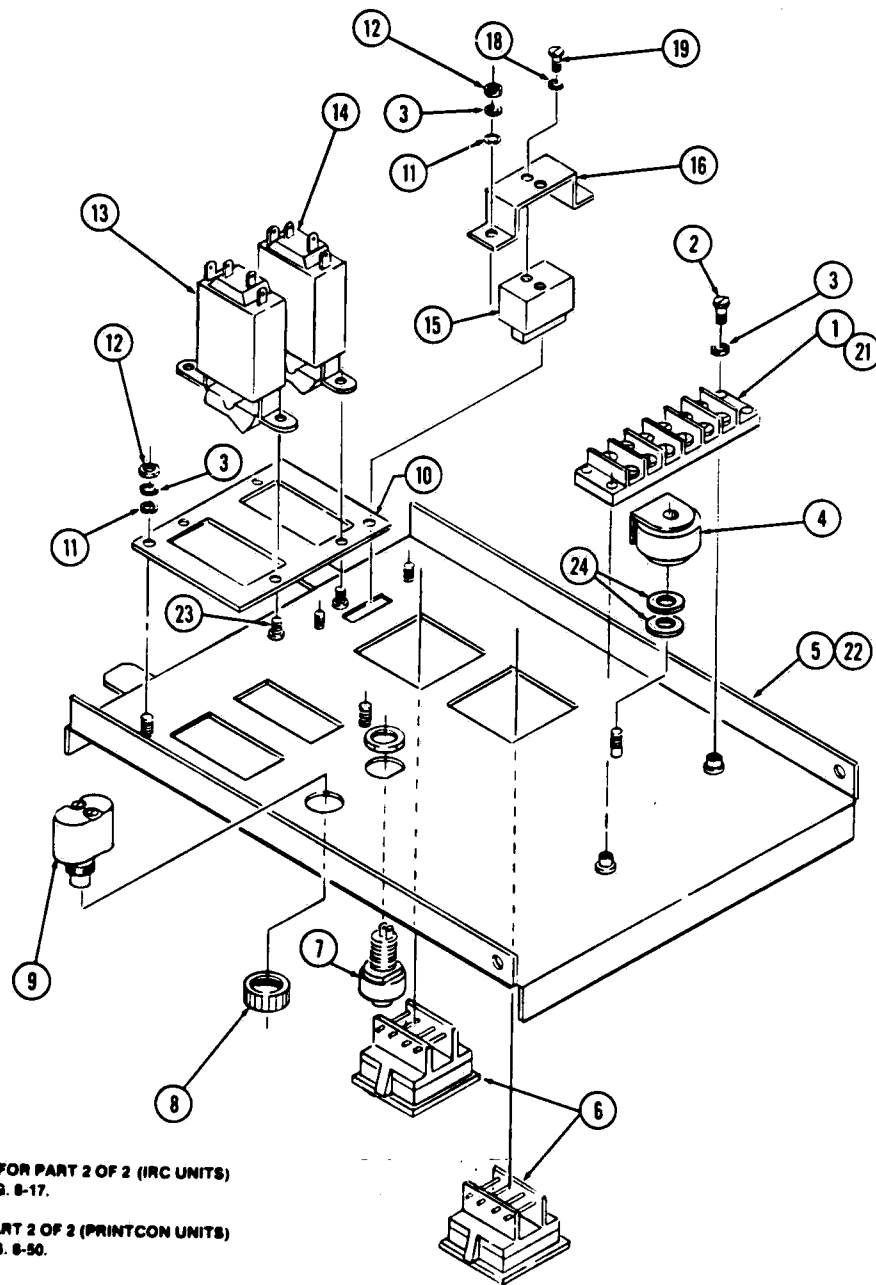
Figure 8-15. MAIN CONTROL ASSEMBLY.



When Ordering, Specify The
9-Digit Number (XXXXXX-XXX)
That Appears To The Right Of
The AMSCO Logo.

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

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-15-			MAIN CONTROL ASSEMBLY			
			Units with Indicator-Recorder (Manufactured Before 9/26/85)	X		
			Units with Printcon		X	
			Units with Indicator-Recorder (Manufactured After 9/26/85)			X
1	P 764320 963		POWER SUPPLY ASSEMBLY	1		
	P 764317 835		• FUSE, (F401) 3 Amp - 125 Volt (Box of 5)	1		
	P 764317 778		• FUSE, (F402) 3 Amp - 250 Volt (Box of 5)	1		
2	P 84116 002		LOCKWASHER, #6	22	30	30
3	P 40357 001		SCREW, Self Tapping, #6 x 1/4	10	18	18
4	P 760244 004		MOTHER BOARD ASSEMBLY	1	1	1
5	P 84117 002		SCREW, Pan Head, #6-32 x 5/16	12	12	12
6	P 93762 001		CHASSIS	1	1	1
7	P 84225 001		GUIDE, Card	6	4	4
8			P.C. BOARD, BASIC CPU	1	1	1
9	P 84667 001		PLATE, Side	1	2	2
10	P 84226 001		TAB, Locking	9	6	6
11	P 136714 001		RECEPTACLE BRACKET ASSEMBLY	1		
12	P 129030 001		BAR, PC Board, Guide	4	4	4
13	P 83528 001		TAB, ID Locking, CPU	1	1	1
14	P 83528 007		TAB, ID Locking, I/O 1	1	1	1
15			P.C. BOARD, Expander I/O 1	1	1	1
16	P 129352 050		PLATE, Identification	1	1	1
17	P 136800 561		HEAT SINK (Not Shown)	1	1	1
18	P 146645 042		POWER SUPPLY ASSEMBLY	1	1	1
	P 764317 833		• FUSE, Pico, 2 Amp, 125 V (F4)	1	1	1
	P 764317 834		• FUSE, Pico, 4 Amp, 125 V (F2) (Box of 5)	1	1	1
	P 764317 836		• FUSE, Pico, 1/2 Amp, 125 V (F3) (Box of 5)	1	1	1
	P 764317 771		• FUSE, Cartridge, 2 Amp, 250 V (F402) (Box of 5)	1	1	1
19	P 93900 045		RECEPTACLE BRACKET ASSEMBLY	1	1	1
20	P 141198 310		POWER SUPPLY (Units After 2/88)	1	1	1



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

FOR PART 2 OF 2 (PRINTCON UNITS)
SEE FIG. 8-50.

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

8-32

E- 13

Rev. 12/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-16-			SECONDARY CONTROL PANEL (Part 1 of 2)		
	P 146490 001		Units with Indicator-Recorder	X	
	P 146649 073		Units with Printcon		X
1	P 89174 091		BLOCK, Terminal, 15 Amp, 6 Point	1	
2	P 3960 041		SCREW, Round Head, #6-32 x 1/2	2	2
3	P 18131 091		LOCKWASHER, #6	6	6
4	P 83933 002		BUZZER	1	1
	P 764316 608		• KIT, Buzzer Resistor (See Fig. 8-17 or 8-50)	1	1
5	P 146478 002		PANEL, Secondary	1	
6	P 136315 002		SWITCH, Thumbwheel, 2 Switch Assembly	2	2
7	P 84400 001		BREAKER, Circuit, CB-2	1	1
8	P 44155 091		GUARD, Button	1	1
9	P 48070 091		SWITCH, Pushbutton, PB-1	1	1
10	P 93757 001		SPACER, Breaker	1	1
11	P 17589 045		WASHER	4	4
12	P 3037 041		NUT, Hex, #6-32	4	4
13	P 93105 001		BREAKER, Circuit, CB-1	1	1
14	P 129022 001		SWITCH, Rocker, SW-1	1	1
15	P 84362 002		COUNTER	1	1
16	P 93737 001		BRACKET, Counter	1	1
17			NOT USED		
18	P 30743 045		LOCKWASHER	2	2
19	P 17658 041		SCREW, #4-40 x 3/16	2	2
20			NOT USED		
21	P 90627 091		BLOCK, Terminal, 15 Amp, 8 Point	1	
22	P 146649 100		PANEL, Secondary	1	
23	P 27741 041		SCREW, Flat Head, #6-32 x 3/16	4	4
24	P 5469 041		WASHER, Flat, #6	3	3

8-33

E- 14

Rev. 5/88

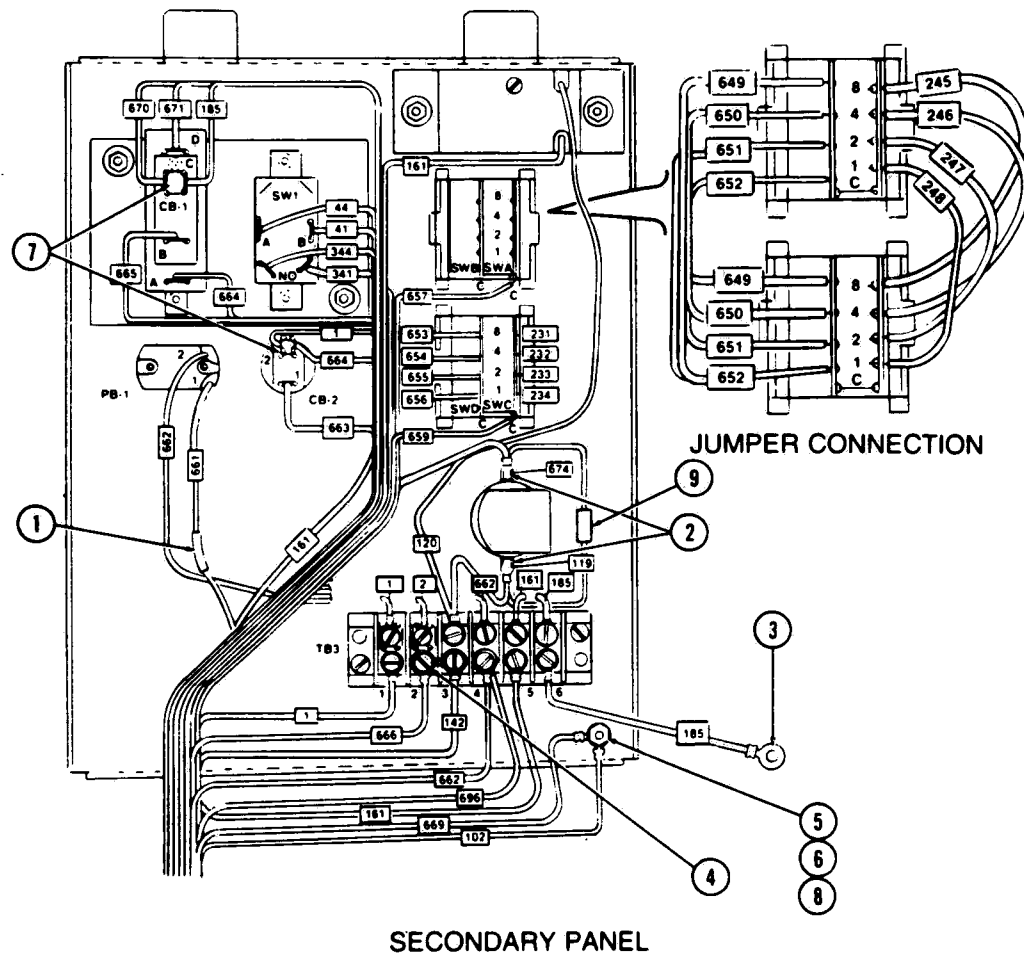


Figure 8-17. SECONDARY CONTROL PANEL (Part 2 of 2).
(Units with Indicator-Recorder)

8-34

764084

F- 1

Rev. 12/82

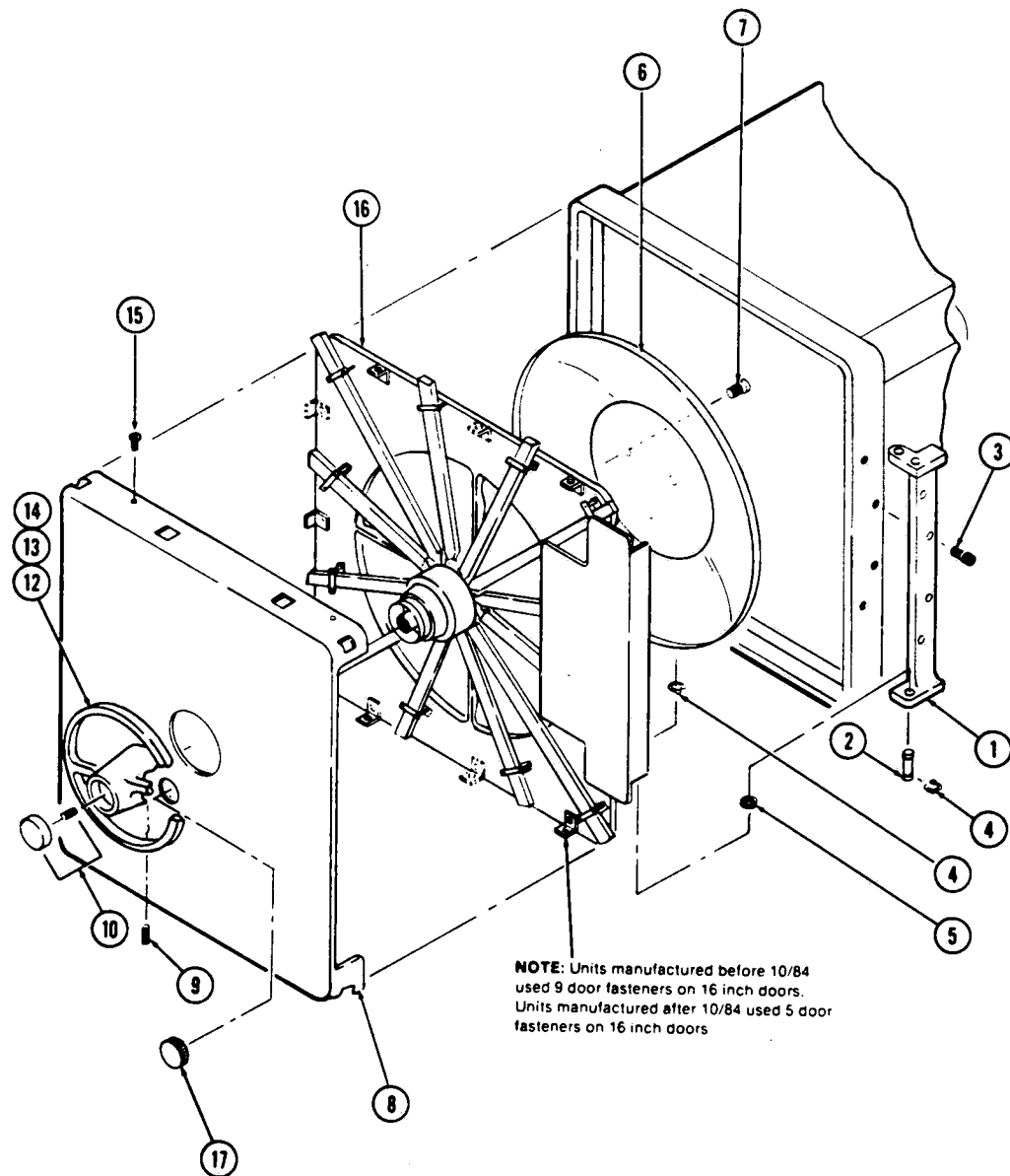
FIG. & INDEX NO.	PART NUMBER		S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-17-	P	146490	001	UNITS WITH INDICATOR-RECORDER: SECONDARY CONTROL PANEL: (Part 2 of 2)	X	
	1	P	129352	049	CONNECTOR, Splice	1
	2	P	91694	091	RECEPTACLE, 3/16 Lug x #18-22 Wire	2
	3	P	19521	091	TERMINAL, Wire, 6 Ring x #16-22 Wire	1
	4	P	84123	001	JUMPER, Terminal Block	1
	5	P	3037	041	NUT, Hex, #6-32	1
	6	P	18131	091	LOCKWASHER, #6	1
	7	P	32118	091	ADAPTER, Terminal	2
	8	P	17589	045	WASHER, Flat	1
	9	P	129318	001	RESISTOR, 3000 Ohm	1
		P	764316	608	• KIT, Buzzer Resistor	1

8-35

764084

F- 2

Rev. 12/82



NOTE: Units manufactured before 10/84
used 9 door fasteners on 16 inch doors.
Units manufactured after 10/84 used 5 door
fasteners on 16 inch doors

Figure 8-18. COVER AND HANDWHEEL ASSEMBLY.

8-36

F- 3

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-18-			COVER AND HANDWHEEL ASSEMBLY: 16x16 Sterilizer	X	
			COVER AND HANDWHEEL ASSEMBLY: 20x20 Sterilizer		X
1	P 90034 063		WELDMENT, Hinge	1	
	P 90119 063		WELDMENT, Hinge		1
2	P 90041 063		PIN, Hinge	2	2
3	P 43845 045		CAP SCREW, Socket Head	4	4
4	P 12706 045		RING, Retaining	2	2
5	P 79806 001		WASHER, Hinge	A/R	A/R
6	P 54474 063		COVER, Door Back	1	
	P 54476 063		COVER, Door Back		1
7	P 12283 041		SCREW, Round Head	3	3
8	P 139540 063	*	COVER, Chamber Door, Stainless Steel	1	
	P 149502 063		COVER, Chamber Door, Stainless Steel		1
9	P 51963 045		SET SCREW	3	3
10	P 93174 001		BUTTON, Assembly	1	1
11			NOT USED		
12	P 136445 001		HANDWHEEL ASSEMBLY	1	1
13	P 146327 001		• HANDLE, Chamber Door	1	1
14	P 93647 001		• FACE PLATE	1	1
15	P 90562 061		SCREW, Self Tapping	5	9
16			DOOR LOCK AND HINGE ASSEMBLY (Refer to Fig. 8-19)	1	1
17	P 25890 050		PLUG, Button	1	1

*New style door cover requires only 5 mounting fasteners.
When installing this cover on units manufactured before
10/84, the unused mounting brackets on the door may be
removed.

8-37

F- 4

Rev. 4/86

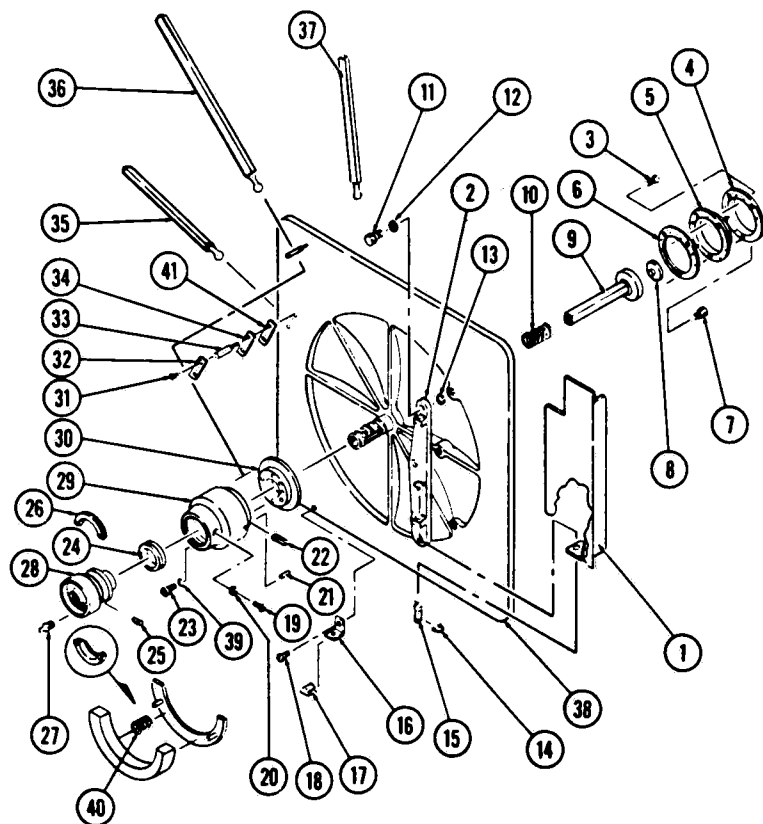


Figure 8-19. DOOR LOCK AND HINGE ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-19-	P 99172 091		DOOR LOCK AND HINGE ASSEMBLY: 16x16 Sterilizer	X			
	P 99201 091		DOOR LOCK AND HINGE ASSEMBLY: 20x20 Sterilizer		X		
1	P 93303 001		HINGE WELDMENT, Door	1			
	P 96096 063		HINGE WELDMENT, Door		1		
2	P 93300 001		DOOR HINGE BRACKET	1			
	P 134194 001		DOOR HINGE BRACKET		1		
3	P 4782 061		BOLT, Machine, Finished	9	9		
4	P 6624 091		COVER, Diaphragm	1	1		
5	P 7230 061		DIAPHRAGM	1	1		
6	P 7753 091		GASKET, Diaphragm	1	1		

8-38

F- 5

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
7	P 74710 061		SCREW, Special	3	3		
8	P 8778 091		THRUST PLATE ASSEMBLY	1	1		
9	P 90363 091		ROD WELDMENT, Lock Clutch	1	1		
10	P 12267 061		SPRING, Lock Clutch Rod	1	1		
11	P 3858 041		SCREW, Hex Head	3			
	P 89257 041		SCREW, Hex Head		3		
12	P 3516 041		WASHER, Plain	3			
	P 17264 042		WASHER, Plain		3		
13	P 52149 045		WASHER, Shake Proof	3			
	P 52148 045		WASHER, Shake Proof		3		
14	P 12706 045		RING, Retaining	4	4		
15	P 24520 001		PIN, Hinge	2			
	P 89265 062		PIN, Hinge		2		
16	P 90440 061		BRACKET, Door Cover	5			
	P 150136 001		BRACKET, Door Cover		9		
17	P 90198 045		SPEED NUT	5	9		
18	P 90169 045		SCREW, Self Tapping	5	9		
19	P 10570 061		SCREW, Truss Head	2	2		
20	P 19678 045		LOCKWASHER	2	2		
21	P 22996 061		ROLL PIN	2	2		
22	P 8303 091		KEY, Door	2	2		
23	P 12264 042		SCREW, Socket Head	6	6		
24	P 6416 091		BEARING, Ball Thrust	1	1		
25	P 47598 061		DRIVE SCREW	13	13		
26	P 13194 091		THRUST RING ASSEMBLY	1	1		
27	P 90475 091		LUBE FITTING	1	1		
28	P 96102 091		NUT, Handle	1	1		
29	P 96181 056		PLATE, Top Socket	1	1		
30	P 11817 056		PLATE, Bottom Socket	1	1		
31	P 39863 091		SCREW, Round Head	24	24		
32	P 150365 001		LINK, Arm Clip	12	12		
33	P 33429 001		STUD, Arm Clip	24			
	P 150135 001		STUD, Arm Clip		24		
34	P 33435 045		BLOCK, Fulcrum Arm Clip	12			
	P 150134 001		BLOCK, Fulcrum Arm Clip		12		
35	P 92634 001		ARM, Door	8			
	P 92633 001		ARM, Door		4		
36	P 55972 004		ARM, Door	4			
	P 55973 002		ARM, Door		4		
37	P 92633 002		ARM, Door		4		
38			DOOR ASSEMBLY (Refer to Fig. 8-20)	1	1		
39	P 5596 041		LOCKWASHER	6	6		
40	P 12260 091		SPRING, Thrust Ring	4	4		
41	P 150822 317		SHIM, Door, .005 Thickness	A/R			
	P 150822 318		SHIM, Door, .010 Thickness	A/R			
	P 150822 319		SHIM, Door, .015 Thickness	A/R			
	P 150822 320		SHIM, Door, .005 Thickness		A/R		
	P 150822 321		SHIM, Door, .010 Thickness		A/R		
	P 150822 322		SHIM, Door, .015 Thickness		A/R		

8-39

F- 6

Rev. 4/86

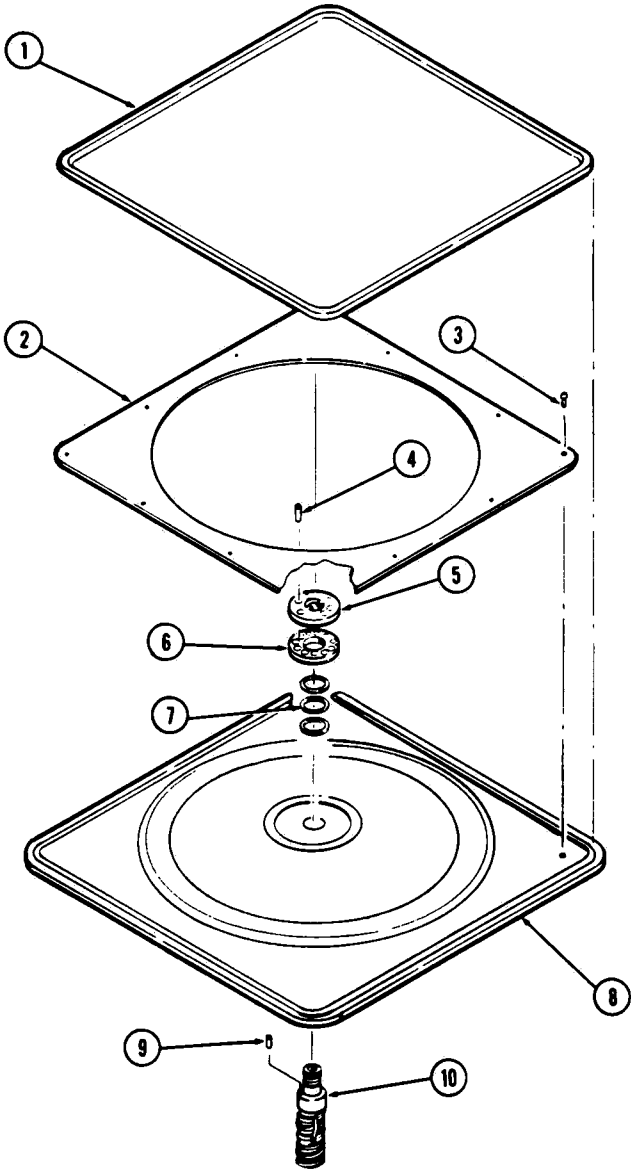


Figure 8-20. DOOR ASSEMBLY.

8-40

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-20-			DOOR ASSEMBLY: 16x16	X
			DOOR ASSEMBLY: 20x20	X
1 P	74367 091		GASKET	1
P	78767 091		GASKET	1
2 P	54475 061		COVER, Door Back	1
P	97889 061		COVER, Door Back	1
3 P	47598 061		DRIVE SCREW	13
4 P	44004 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	A/R A/R
8 P	149505 091		DOOR	1
P	141105 001		DOOR	1
9 P	2893 061		PIN	1
10 P	22058 091		POST, Door	1

8-41

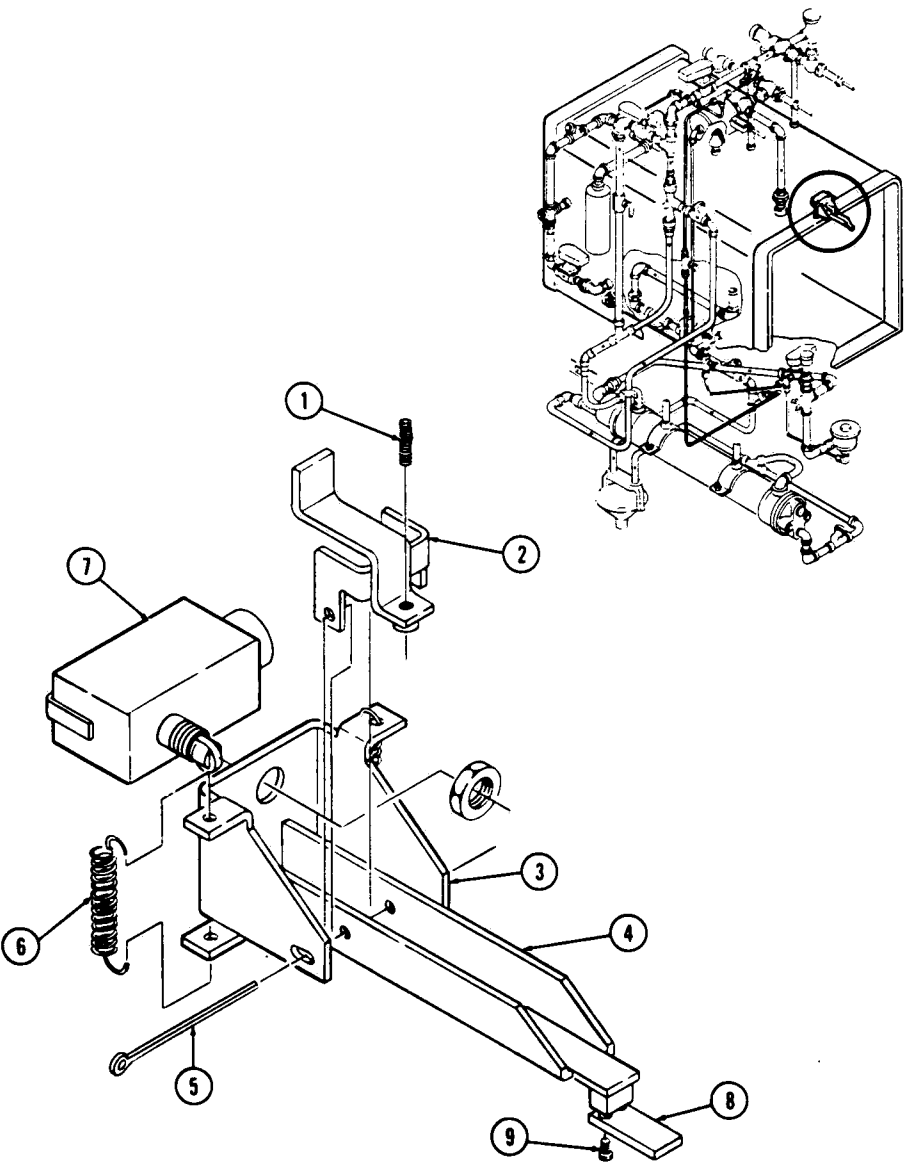


Figure 8-21. DOOR SWITCH ASSEMBLY.

8-42

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-21-	P	136475	001		DOOR SWITCH ASSEMBLY	X		
1	P	25542	091		SCREW, Socket Set	2		
2	P	90706	045		LEVER, Weldment	1		
3	P	56396	166		BRACKET	1		
4	P	90748	045		ARM, Weldment	1		
5	P	90593	061		PIN, Cotter	1		
6	P	90751	061		SPRING	2		
7	P	90752	091		SWITCH	1		
*8	P	90891	045		EXTENSION, Switch (Operating End Only)	1		
9	P	4682	041		SCREW, Round Head #8-32 x 3/8	2		
*Special door switch extension for double door sterilizer is P-90888-045. (Non-operating End Only)								

8-43

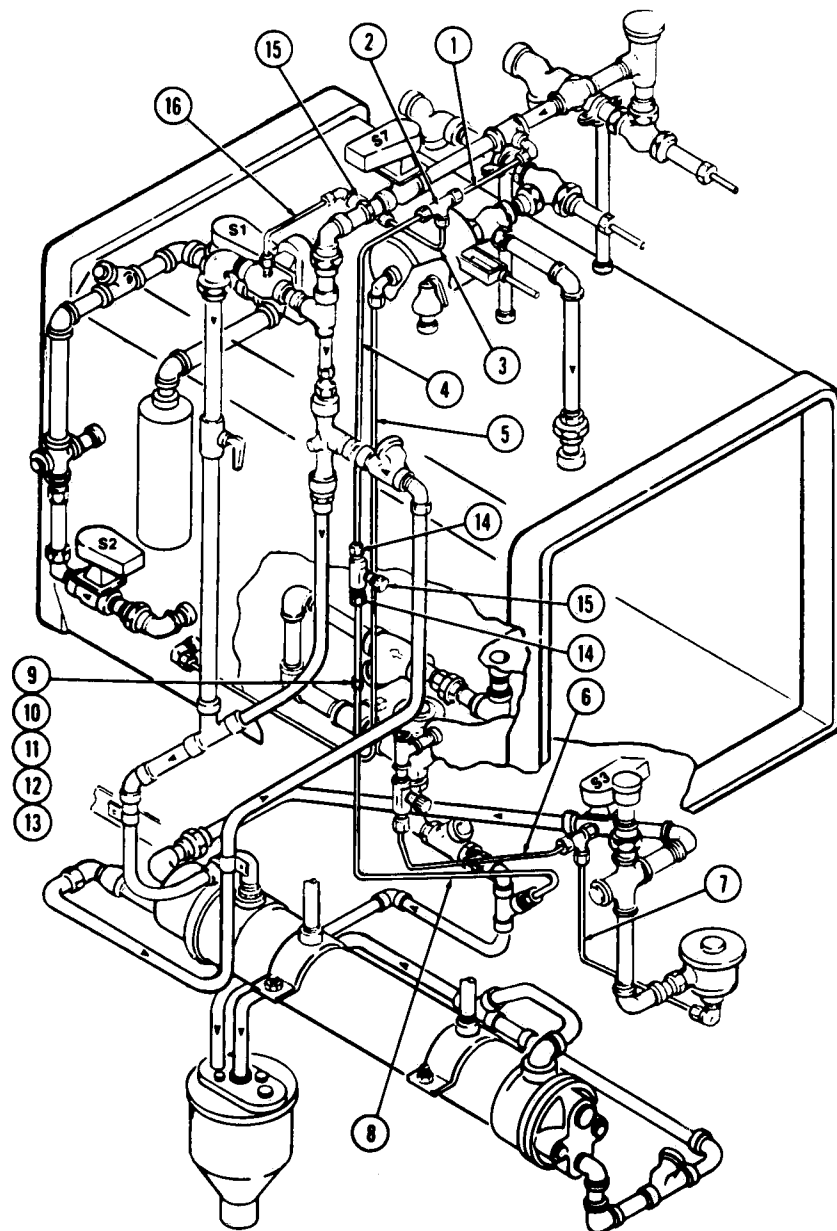


Figure 8-22. PIPING ASSEMBLY, Complete.
(Units with Indicator-Recorder)

8-44

F- 11

Rev. 6/84

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-22-	P 146551	001	UNITS WITH INDICATOR-RECORDER: PIPING ASSEMBLY, Complete	X
1			TUBE, 1/4 O.D. x 4-9/32	1
2	P 46097	091	TEE, Compression, 1/4 O.D.T.	1
3			TUBE, 1/4 O.D. x 4-5/8	1
4			TUBE, 1/4 O.D. x 20-1/16	1
5			TUBE, 1/4 O.D. x 33-1/16	1
6			TUBE, 5/16 O.D. x 20	1
7			TUBE, 5/16 O.D. x 8-3/8	1
8			TUBE, 1/4 O.D. x 41-1/64	1
9	P 26720	091	CLAMP, 1/4 O.D.T.	1
10	P 3986	041	SCREW, #8-32 x 1/2	1
11	P 5561	091	WASHER, Flat	1
12	P 9099	091	LOCKWASHER	1
13	P 3038	041	NUT, Hex, #8-32	1
14	P 19514	091	FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	3
15	P 83630	001	VALVE, Needle, 1/8 N.P.T.	2
16			TUBE, 1/4 O.D. x 6-5/8	1
17			PIPING SUBASSEMBLY, Top (See Fig. 8-23)	1
18			PIPING SUBASSEMBLY, Side (See Fig. 8-24)	1
19			PIPING SUBASSEMBLY, Bottom (See Fig. 8-25)	1

8-45

F- 12

Rev. 12/82

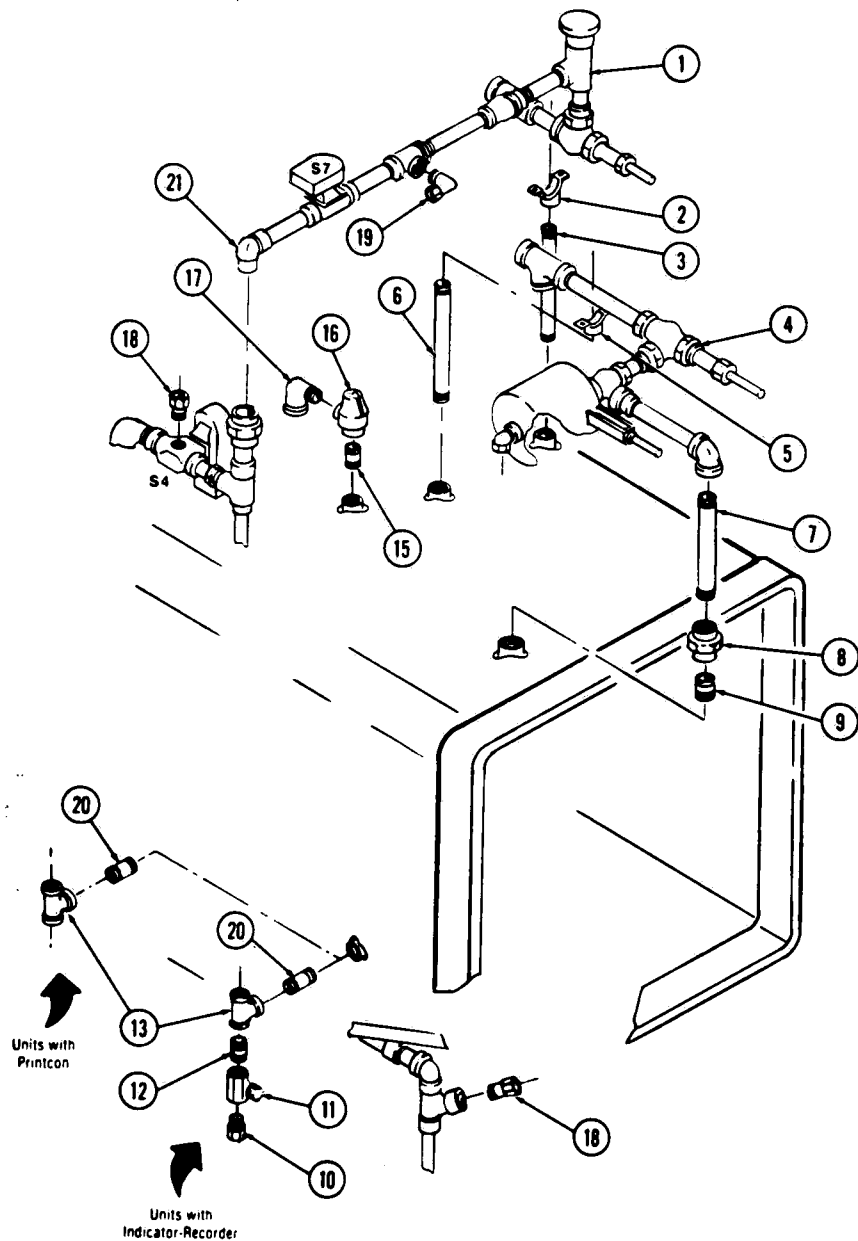


Figure 8-23. PIPING SUBASSEMBLY, Top.

8-46

F- 13

Rev. 12/83

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-23-			UNITS WITH INDICATOR RECORDER		
			PIPING SUBASSEMBLY, Top	X	
			UNITS WITH PRINTCON		
			PIPING SUBASSEMBLY, Top		X
1	P 136648 001		WATER SUPPLY ASSEMBLY (See Fig. 8-27)	1	1
2	P 39590 010		CLAMP, Pipe, 3/4	1	1
3	P 150822 292		NIPPLE, Steel, 1/4 N.P.T. x 8-1/2	1	1
4	P 93708 001		STEAM SUPPLY ASSEMBLY (See Fig. 8-26)	1	1
5	P 75376 010		CLAMP, Pipe, 3/8	1	1
6	P 150822 293		NIPPLE, Steel, 1/4 N.P.T. x 8-11/16	1	1
7	P 29036 091		NIPPLE, 3/8 N.P.T. x 6-3/4	1	1
8	P 5266 091		UNION, 3/8 N.P.T.	1	1
9	P 29013 091		NIPPLE, 3/8 N.P.T. x 1	1	1
10	P 22711 091		FITTING, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1	
11	P 83523 001		VALVE, Needle, 1/4 N.P.T.	1	
12	P 28917 091		NIPPLE, 1/4 N.P.T. x 1	1	
13	P 4906 091		TEE, 1/4 N.P.T.	1	1
14			NOT USED		
15	P 836 042		BUSHING, Reducing, 3/4 x 1/2 N.P.T.	1	1
16	P 150527 001		VALVE, Safety, 1/2 N.P.T.	1	1
17	P 1636 091		ELL, Street, 3/4 N.P.T.	1	1
18	P 19514 091		FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1	1
19	P 45407 091		ELL, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1	1
20	P 27422 091		NIPPLE, 1/4 N.P.T. x 1-1/4	1	1
21	P 44507 091		ELL, Street, 7/8 O.D.T.	1	1

8-47

F- 14

Rev. 12/83

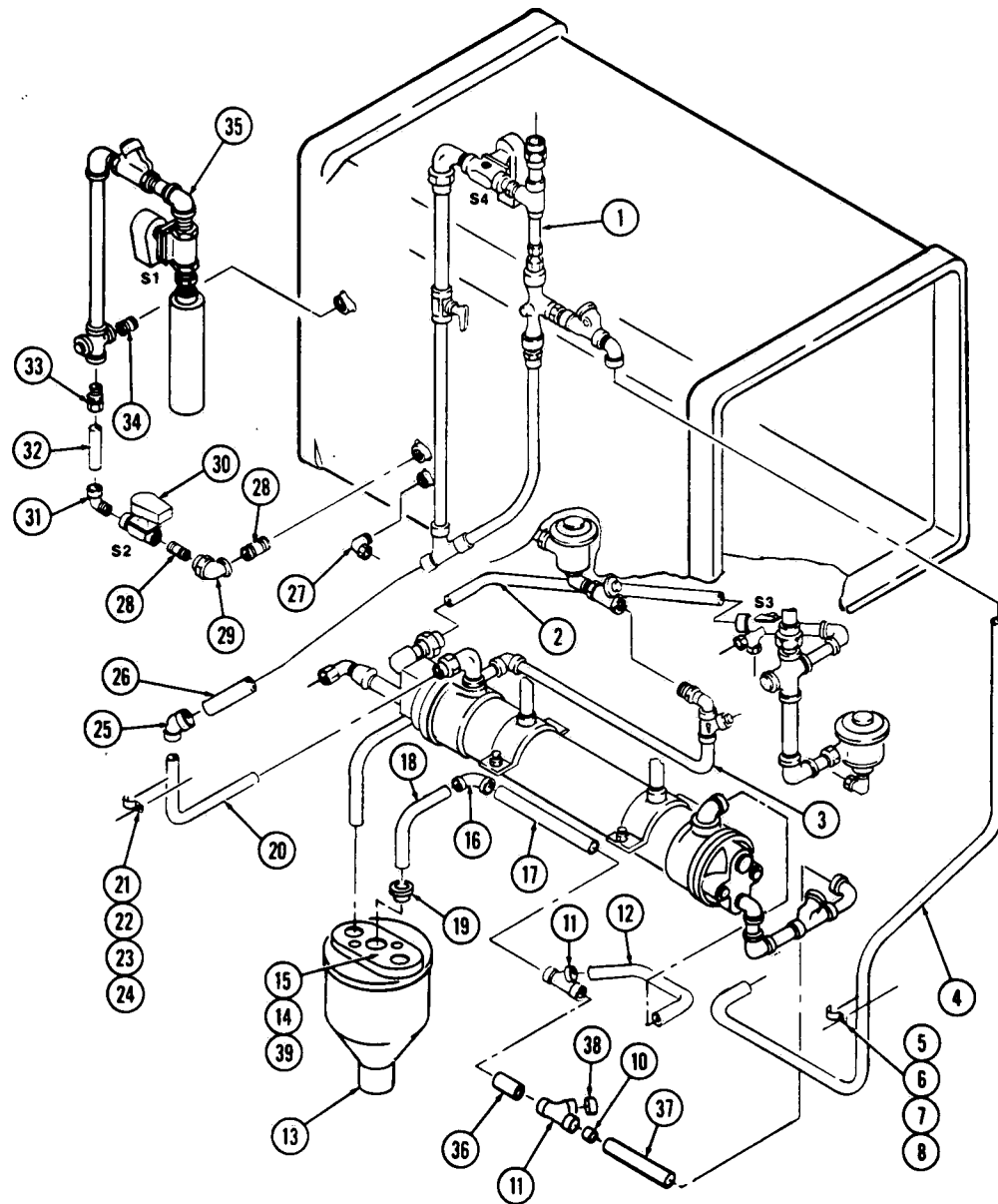


Figure 8-24. PIPING SUBASSEMBLY, Side.

8-48

G- 1

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY	
8-24-			PIPING SUBASSEMBLY, Side		
			Units with Indicator-Recorder	X	
			Units with Printcon		X
1	P 136655 001		EJECTOR ASSEMBLY (See Fig. 8-29)	1	1
2	P 93709 001		TUBE, Exhaust, 7/8 O.D.	1	1
3	P 136667 001		DRAIN ASSEMBLY (See Fig. 8-30)	1	1
4	P 136656 001		TUBE, 5/8 O.D.	1	1
5	P 90513 091		CLAMP, 5/8 O.D.T.	1	1
6	P 41805 044		SCREW, #10-32 x 5/8	1	1
7	P 76801 045		LOCKWASHER	1	1
8	P 2959 041		NUT, Hex, #10-32	1	1
9			NOT USED		
10	P 91223 091		REDUCER, 7/8 x 5/8 O.D.T.	1	1
11	P 89384 091		"Y" BRANCH, 7/8 O.D.T.	2	2
12	P 93090 001		TUBE, 7/8 O.D.	1	1
13	P 141198 006		ASSEMBLY, Funnel (Kit P-764316-212)	1	1
14	P 56396 017		PLUG, 1	1	1
15	P 56396 016		PLUG, 7/8	1	1
16	P 44495 091		ELBOW, 7/8 O.D.T.	1	1
17	P 79060 NLA		TUBE, 7/8 O.D. x 7-7/8 (SUB: P-89272-091)	1	1
18	P 93090 005		TUBE, 7/8 O.D.	1	1
19	P 91317 091		REDUCER, 1-1/8 x 7/8 O.D.T.	1	1
20	P 84453 003		TUBE, Water, 7/8 O.D.	1	1
21	P 91215 010		CLAMP, 7/8 O.D.T.	1	1
22	P 3950 048		SCREW, 1/4-20 x 5/8	1	1
23	P 76230 091		LOCKWASHER, Shake-Proof	1	1
24	P 3040 042		NUT, Hex, 1/4-20	1	1
25	P 84456 001		ELL, 45°, 7/8 O.D.T.	1	1
26	P 91238 091		TUBE, 7/8 O.D. x 4-3/8	1	1
27	P 41306 091		ELL, Compression, 1/4 O.D.T. x 1/4 N.P.T.	1	1
28	P 29013 091		NIPPLE, 3/8 N.P.T. x 1	2	2
29	P 89153 091		ELL, Union, 3/8 N.P.T.	1	1
30	P 150822 309		VALVE, Solenoid, 3/8 NPT (S2) Piston Type	1	1
	P 764317 687		• KIT, Valve Repair	1	1
	P 764070 002		• COIL, 120 V., 60 Hz, 110 V., 50 Hz	1	1
31	P 40153 091		ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1	1
32	P 90273 091		TUBE, 5/8 O.D. x 3-1/2	1	1
33	P 29931 091		FITTING, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1	1
34	P 29163 091		NIPPLE, 1/2 N.P.T. x 1-1/4	1	1
35	P 136654 001		AIR BREAK ASSEMBLY (See Fig. 8-28)	1	1
36	P 91248 NLA		TUBE, 7/8 O.D.T. x 2-15/16 (SUB: P-91391-091)	1	1
37	P 89789 091		TUBE, 5/8 O.D.T. x 4	1	1
38	P 91227 091		PLUG, 7/8 O.D.T. (Units without Manual Control)	1	1
39	P 56396 018		PLUG, 1-3/8	1	1

*Units manufactured prior to 9/83 utilized a diaphragm type S2 valve (P-83264-002). Repair kit for this valve is P-764070-001.

8-49

764064

G- 2

Rev. 5/88

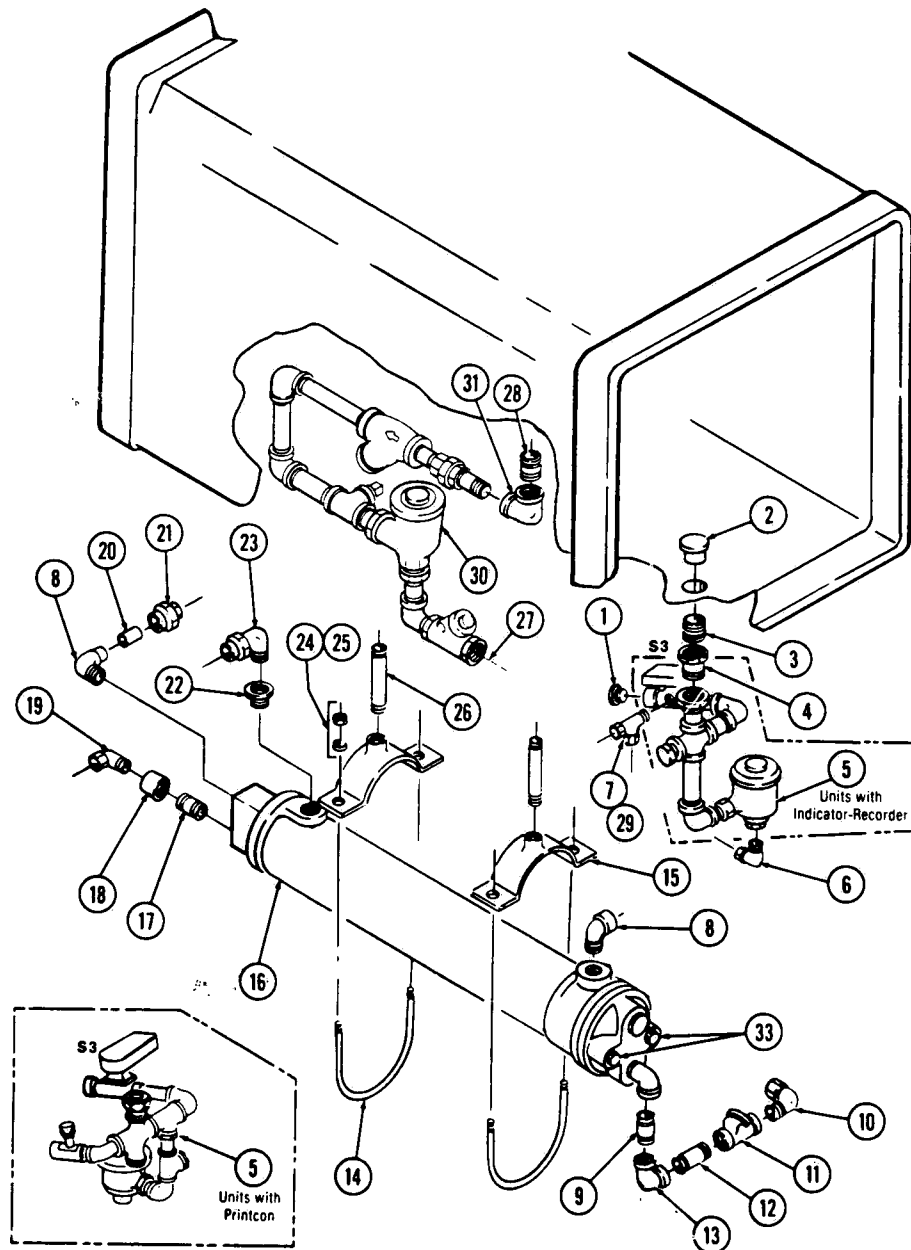


Figure 8-25. PIPING SUBASSEMBLY, Bottom.

8-50

G- 3

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-25-			PIPING SUBASSEMBLY, Bottom				
			Units with Indicator-Recorder	X			
			Units with Printcon		X		
1 P	91158	091	ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1	1		
2 P	93294	001	SCREEN, Chamber Drain	1	1		
3 P	29294	091	NIPPLE, 3/4 N.P.T. x 2	1	1		
4 P	1747	091	THREAD END, 3/4 N.P.T.	1	1		
5 P	136668	001	CHAMBER DRAIN ASSEMBLY (See Fig. 8-30)	1			
	136805	001	CHAMBER DRAIN ASSY. (See Fig. 8-52)		1		
6 P	7033	091	ELL, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1	1		
7 P	6774	091	TEE, Compression, 5/16 O.D.T. x 1/8 N.P.T. x 5/16 O.D.T.	1	1		
8 P	89996	091	ELL, 7/8 O.D.T. x 1 N.P.T.	2	2		
9 P	29015	091	NIPPLE, 3/8 N.P.T. x 1-1/2	1	1		
10 P	40153	091	ELL, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1	1		
11 P	5424	091	VALVE, Check, 3/8 N.P.T.	1	1		
	74335	091	• DISC	1	1		
12 P	29014	091	NIPPLE, 3/8 N.P.T. x 1-1/4	1	1		
13 P	1630	091	ELL, BRASS, 3/8 N.P.T.	1	1		
14 P	93163	001	"U" BOLT	2	2		
15 P	93161	001	STRAP	2	2		
16 P	56396	231	HEAT EXCHANGER	1	1		
17 P	29357	091	NIPPLE, 1 N.P.T. x 2-1/4	1	1		
18 P	118384	091	COUPLING, 1 x 1/2 N.P.T.	1	1		
19 P	23972	091	FITTING, 5/8 O.D.T. x 1/2 N.P.T.	1	1		
20 P	89400	091	TUBE, 7/8 O.D.T. x 1-5/8	1	1		
21 P	91226	091	UNION, 7/8 O.D.T.	1	1		
22 P	841	042	BUSHING, Reducing, 1 x 3/4 N.P.T.	1	1		
23 P	91230	091	ELL, Union, 7/8 O.D.T. x 3/4 N.P.T.	1	1		
24 P	3098	045	NUT, Hex, 5/16-18	4	4		
25 P	19679	041	LOCKWASHER, 5/16	4	4		
26 P	150822	301	NIPPLE, Steel, 3/4 N.P.T. x 7-3/4	2	2		
27 P	136666	001	DRAIN TRAP ASSEMBLY (See Fig. 8-30)	1	1		
28 P	29292	091	NIPPLE, 3/4 N.P.T. x 1-1/2	1	1		
29 P	1615	091	ELL, Street, 1/8 N.P.T.	1			
30 P	136666	001	JACKET DRAIN TRAP ASSEMBLY (See Fig. 8-30)	1	1		
31 P	7461	091	ELL, Reducing, 3/4 x 3/8 N.P.T.	1	1		
32 P	1631	091	ELL, 3/8 N.P.T.	1	1		
33 P	764321	006	ZINC ANODE, 3/8 NPT	2	2		
**For units manufactured prior to 1/84, order Kit, Part Number P-764319-932.							

8-51

764084

G- 4

Rev. 5/88

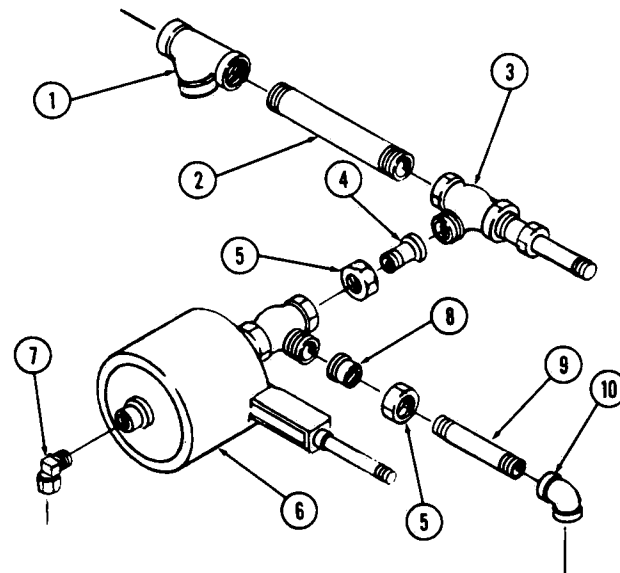


Figure 8-26. STEAM SUPPLY ASSEMBLY.

8-52

782/782

G- 5

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-26-	P 93708 001		STEAM SUPPLY ASSEMBLY	X
1	P 47671 091		STRAINER, Steam, 3/8 N.P.T.	1
	P 50341 091		• SCREEN	1
	P 28447 091		• "O" RING	1
2	P 29028 091		NIPPLE, 3/8 N.P.T. x 4-3/4	1
3	P 5654 051		VALVE, Angle, 3/8 N.P.T. (See Fig. 8-33)	1
4	P 4076 091		SPUD, Male, 3/8 N.P.T.	1
5	P 2901 091		NUT, Union	2
6	P 20661 091		VALVE, Steam Control, 3/8 N.P.T. (See Fig. 8-31)	1
7	P 21990 091		ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	1
8	P 4201 091		SPUD, Female, 3/8 N.P.T.	1
9	P 29024 091		NIPPLE, 3/8 N.P.T. x 3-3/4	1
10	P 1630 091		ELL, 3/8 N.P.T.	1

Rev. 11/79

8-53

G- 6

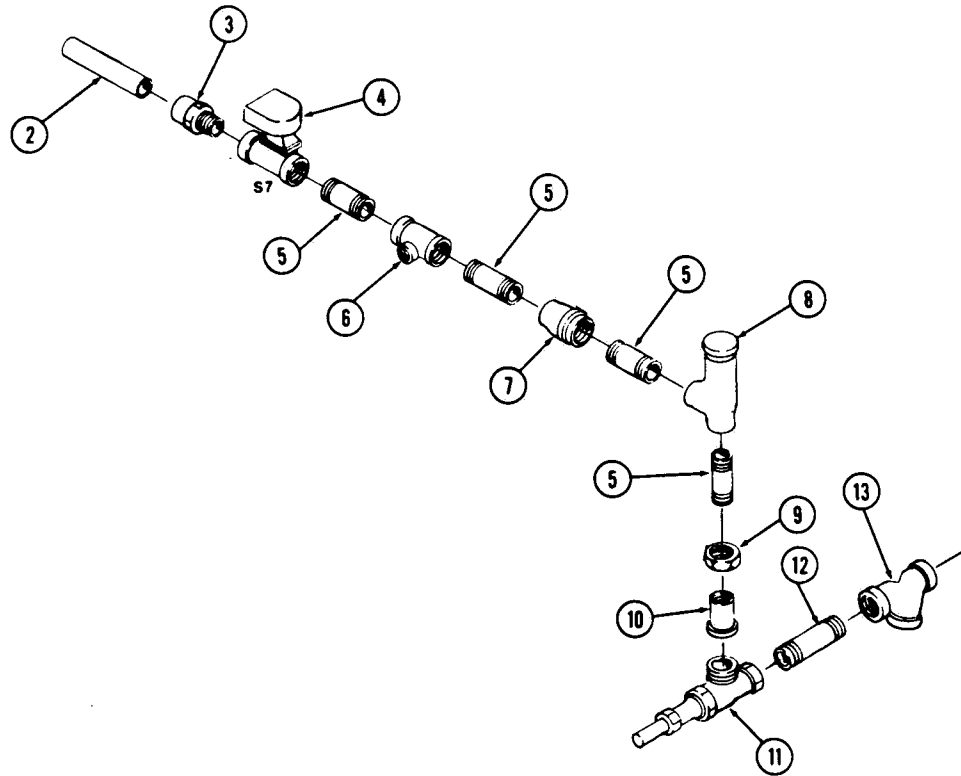


Figure 8-27. WATER SUPPLY ASSEMBLY.

8-54

G- 7

Rev. 12/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-27	P 136648	001	WATER SUPPLY ASSEMBLY	X
1			NOT USED	
2	P 91238	091	TUBE, 7/8 O.D. x 4-3/8	1
3	P 91158	091	ADAPTER, 7/8 O.D.T. x 3/4 N.P.T.	1
4	P 83261	002	VALVE, Solenoid, 3/4 N.P.T. (S-7)	1
	P 764072	001	• KIT, Valve Repair	1
	P 764072	002	• COIL, 120 V. 60 Hz, 110 V. 50 Hz	1
5	P 29295	091	NIPPLE, 3/4 N.P.T. x 2-1/4	4
6	P 75040	091	TEE, 3/4 x 3/4 x 1/4 N.P.T.	1
7	P 83870	001	VALVE, Check, 3/4 N.P.T.	1
8	P 77023	001	VACUUM BREAKER, 3/4 N.P.T.	1
	P 752735	091	• KIT, Repair	1
9	P 2903	091	NUT, Union	1
10	P 4248	091	SPUD, Female, 3/4 N.P.T.	1
11	P 26907	091	VALVE, Angle, 3/4 N.P.T. (See Fig. 8-33)	1
12	P 29299	091	NIPPLE, 3/4 N.P.T. x 3-1/4	1
13	P 47708	091	STRAINER, 3/4 N.P.T.	1
	P 754616	091	• SCREEN, Stainless Steel	1

8-55

G- 8

Rev. 12/82

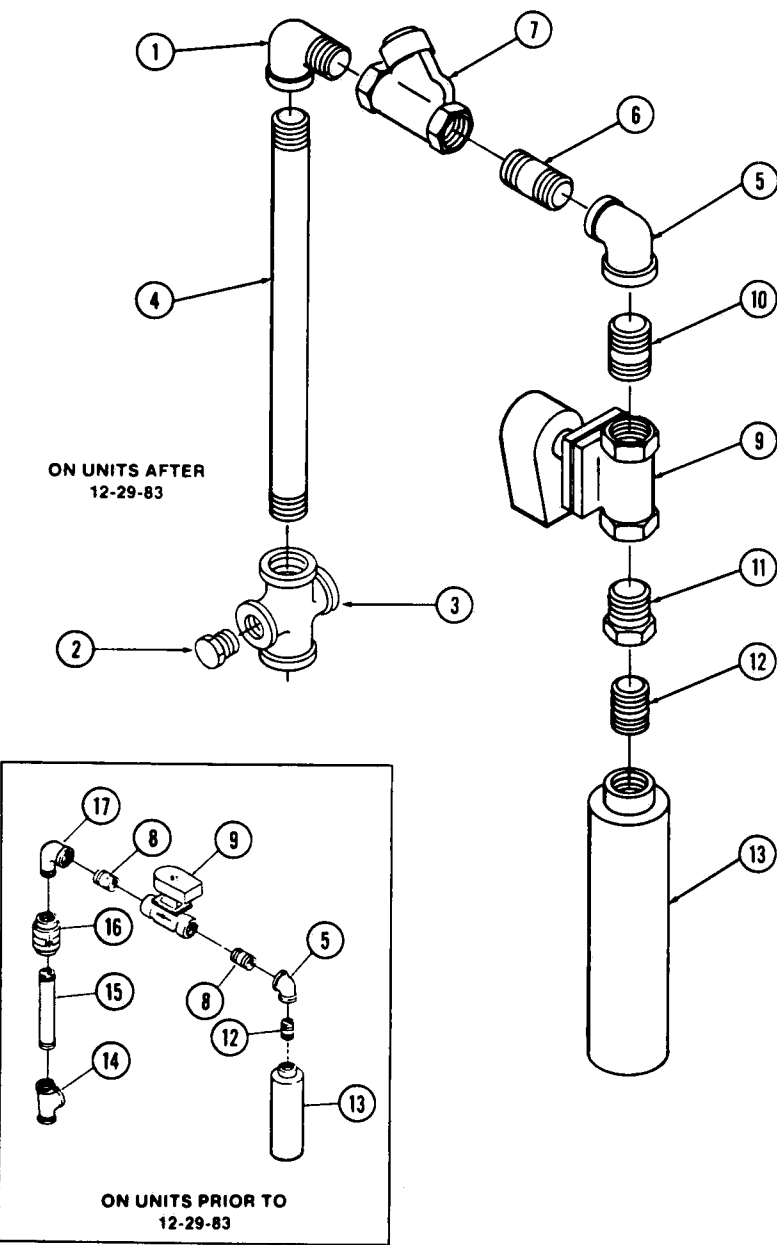


Figure 8-28. AIR BREAK ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-28-	P 136654 001		AIR BREAK ASSEMBLY (After 12/29/83)	X		
			AIR BREAK ASSEMBLY (Before 12/29/83)		X	
1	P 1634 091		ELL. Street, 1/2 NPT	1		
2	P 38404 091		PLUG, Pipe, 1/2 NPT	1		
3	P 150822 333		CROSS, 1/2 NPT	1		
4	P 29203 091		NIPPLE, 1/2 NPT x 11-1/4 Lg.	1		
5	P 1625 091		ELL, 3/4 NPT x 1/2 NPT	1	1	
6	P 29166 091		NIPPLE, 1/2 N.P.T. x 2" Lg.	1		
7	P 150822 354		VALVE, swing, Check 1/2 N.P.T.	1		
	P 764319 608		• DISC, Teflon, Renewal	A/R		
8	P 29291 091		NIPPLE, 3/4 N.P.T. x 1-1/4 Lg.	2		
9	P 84444 002		VALVE, Solenoid, 3/4 N.P.T. (S-1)	1	1	
	P 764078 001		• KIT, Valve Repair	1		
	P 764078 002		• COIL, 120 Volt, 60 Hz, 110 V, 60 Hz	1		
10	P 29292 091		NIPPLE, 3/4 NPT x 1-1/2 Lg.	1		
11	P 836 042		BUSHING, Reducer, 3/4 NPT x 1/2 NPT	1		
12	P 29162 091		NIPPLE, 1/2 N.P.T. x 1" Lg.	1	1	
13	P 56396 812		FILTER, Air (See Fig. 8-32)	1	1	
	P 764319 570		• KIT, to Replace 44317-091 Poppet Check Valve (Not Shown)			
14	P 4922 091		TEE, 3/4 x 1/2 x 1/2 N.P.T.	1		
15	P 29303 091		NIPPLE, 3/4 N.P.T. x 4-1/4	1		
16	P 44317 091		VALVE, Check, 3/4 N.P.T. (No Longer Available)	1		
	P 751769 091		• POPPET ASSEMBLY (No Longer Available)	1		
17	P 1636 091		ELL. Street, 3/4 N.P.T.	1		
				*Use kit P-764319-570 for replacement of obsolete P-44317-091 check valve.		

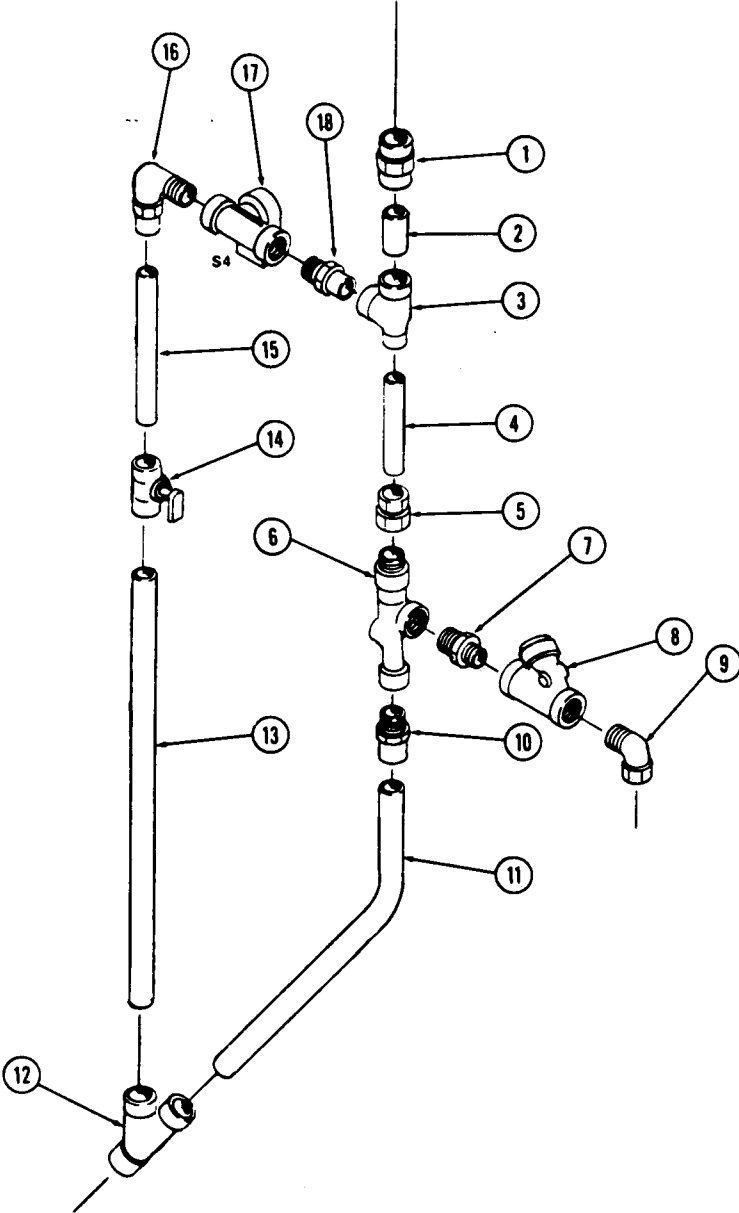


Figure 8-29. EJECTOR ASSEMBLY.

8-58

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-29-	P	136655	001		EJECTOR ASSEMBLY	X		
1	P	91226	091		UNION, 7/8 O.D.T.	1		
2	P	91248	091		TUBE, 7/8 O.D. x 2	1		
3	P	44847	091		TEE, 7/8 x 5/8 x 7/8 O.D.T.	1		
4	P	90276	091		TUBE, 5/8 O.D. x 4-3/8	1		
5	P	30948	091		FITTING, 5/8 O.D.T. x 1/2 N.P.T.	1		
6	P	83924	001		EJECTOR, 1/2 N.P.T.	1		
7	P	84459	001		REDUCER, 1/2 x 3/8 N.P.T.	1		
8	P	5424	091		VALVE, Check, 3/8 N.P.T.	1		
	P	74335	091		• DISC	1		
9	P	40153	091		ELL, 5/8 O.D.T. x 3/8 N.P.T.	1		
10	P	91156	091		FITTING, 7/8 O.D.T. x 1/2 N.P.T.	1		
11	P	84462	001		TUBE, 7/8 O.D.	1		
12	P	89384	091		FITTING, "Y", 7/8 O.D.T.	1		
13	P	84460	002		TUBE, 7/8 O.D. x 13	1		
14	P	83629	001		BALANCER, 7/8 O.D.T.	1		
15	P	84460	001		TUBE, 7/8 O.D. x 8-5/8	1		
16	P	91230	091		ELL, Union, 7/8 O.D.T. x 3/4 N.P.T.	1		
17	P	83261	002		VALVE, Solenoid, 3/4 N.P.T. (S-4)	1		
	P	764072	001		• KIT, Valve Repair	1		
	P	764072	002		• COIL, 120 V. 60 Hz., 110 V. 50 Hz.	1		
18	P	91159	091		FITTING, 7/8 O.D.T. x 3/4 N.P.T.	1		

8-59

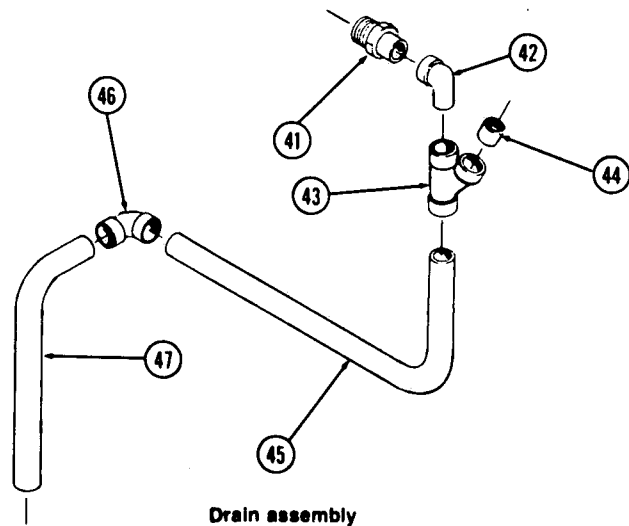
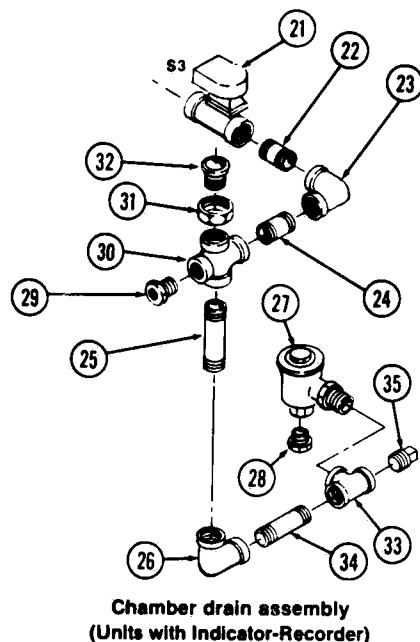
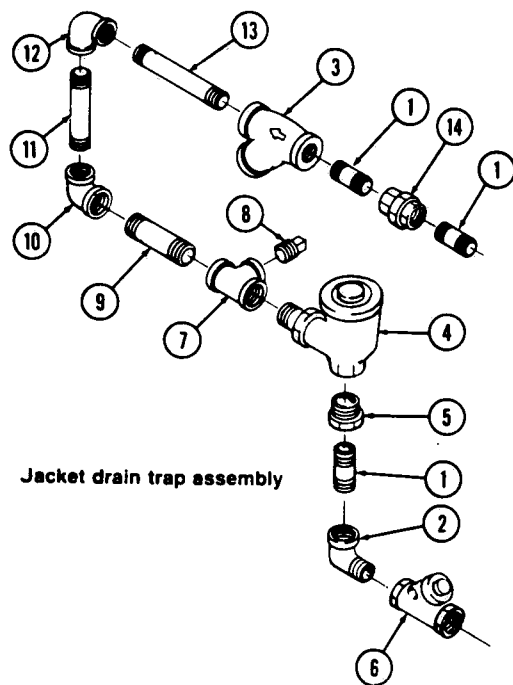


Figure 8-30. DRAIN ASSEMBLIES.

8-60

G- 13

Rev. 12/82

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-30-	P 136666	001	JACKET DRAIN TRAP ASSEMBLY	X
1	P 29013	091	NIPPLE, 3/8 N.P.T. x 1	3
2	P 1631	091	ELL, Street, 3/8 N.P.T.	1
3	P 47671	091	STRAINER, 3/8 N.P.T.	1
	P 50341	091	• SCREEN	1
	P 28447	091	• "O" RING	1
4	P 129222	001	TRAP, Steam, 1/2 N.P.T. (See Fig. 8-34)	1
5	P 837	091	BUSHING, Reducing, 1/2 x 3/8 N.P.T.	1
6	P 5424	091	VALVE, Check, 3/8 N.P.T.	1
	P 74335	091	• DISC	1
7	P 4929	091	TEE, 1/2 N.P.T. x 1/2 N.P.T. x 3/8 N.P.T.	1
8	P 3441	091	PLUG, Pipe, 3/8 N.P.T.	1
9	P 29167	091	NIPPLE, 1/2 N.P.T. x 2-1/4	1
10	P 1622	091	ELL, 1/2 N.P.T. x 3/8 N.P.T.	1
11	P 29023	091	NIPPLE, 3/8 N.P.T. x 3-1/2	1
12	P 1630	091	ELL, 3/8 N.P.T.	1
13	P 29028	091	NIPPLE, 3/8 N.P.T. x 4-3/4	1
14	P 5266	091	UNION, 3/8 N.P.T.	1
	P 136668	001	UNITS WITH INDICATOR-RECORDER: CHAMBER DRAIN ASSEMBLY	X
21	P 83228	002	VALVE, Solenoid, 3/4 N.P.T. (S-3)	1
	P 764070	001	• KIT, Valve Repair	1
	P 764070	002	• COIL, 120 V. 60 Hz, 110 V. 50 Hz	1
22	P 29291	091	NIPPLE, 3/4 N.P.T. x 1-1/4	1
23	P 1637	091	ELL, Reducing, 1 x 3/4 N.P.T.	1
24	P 29356	091	NIPPLE, 1 N.P.T. x 2	1
25	P 29298	091	NIPPLE, 3/4 N.P.T. x 3	1
26	P 1625	091	ELL, Reducing, 3/4 x 1/2 N.P.T.	1
27	P 129222	001	TRAP, Steam, 1/2 N.P.T. (See Fig. 8-34)	1
28	P 76053	042	BUSHING, Reducing, 1/2 x 1/4 N.P.T.	1
29	P 6263	091	BUSHING, Reducing, 1 x 1/2 N.P.T.	1
30	P 1350	091	CROSS, 1 x 1 x 3/4 x 3/4 N.P.T.	1
31	P 2903	091	NUT, Union	1
32	P 4247	091	SPUD, Male, 3/4 N.P.T.	1
33	P 29356	091	TEE, 1/2 N.P.T. x 1/2 N.P.T. x 1/2 N.P.T.	1
34	P 29167	091	NIPPLE, 1/2 N.P.T. x 2-1/4	1
35	P 3442	091	PLUG, Pipe, 1/2 N.P.T.	1
	P 136667	001	When replacing the diaphragm, the bonnet bolts should be torqued to 50 in./lbs. DRAIN ASSEMBLY	X
41	P 90209	091	ADAPTER, 5/8 O.D.T. x 3/8 N.P.T.	1
42	P 90214	091	ELL, Street, 5/8 O.D.T.	1
43	P 83377	001	"Y" BRANCH, 5/8 O.D.T.	1
44	P 89808	091	COUPLING, 5/8 O.D.T. x 1/8 N.P.T.	1
45	P 92935	009	TUBE, Drain, 5/8 O.D.	1
46	P 90212	091	ELL, 5/8 O.D.T.	1
47	P 92935	010	TUBE, Drain, 5/8 O.D.	1

8-61

G- 14

Rev 12/83



**AMSCO
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**EAGLE 2000 AND 2300 SERIES
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5/88

3 of 5



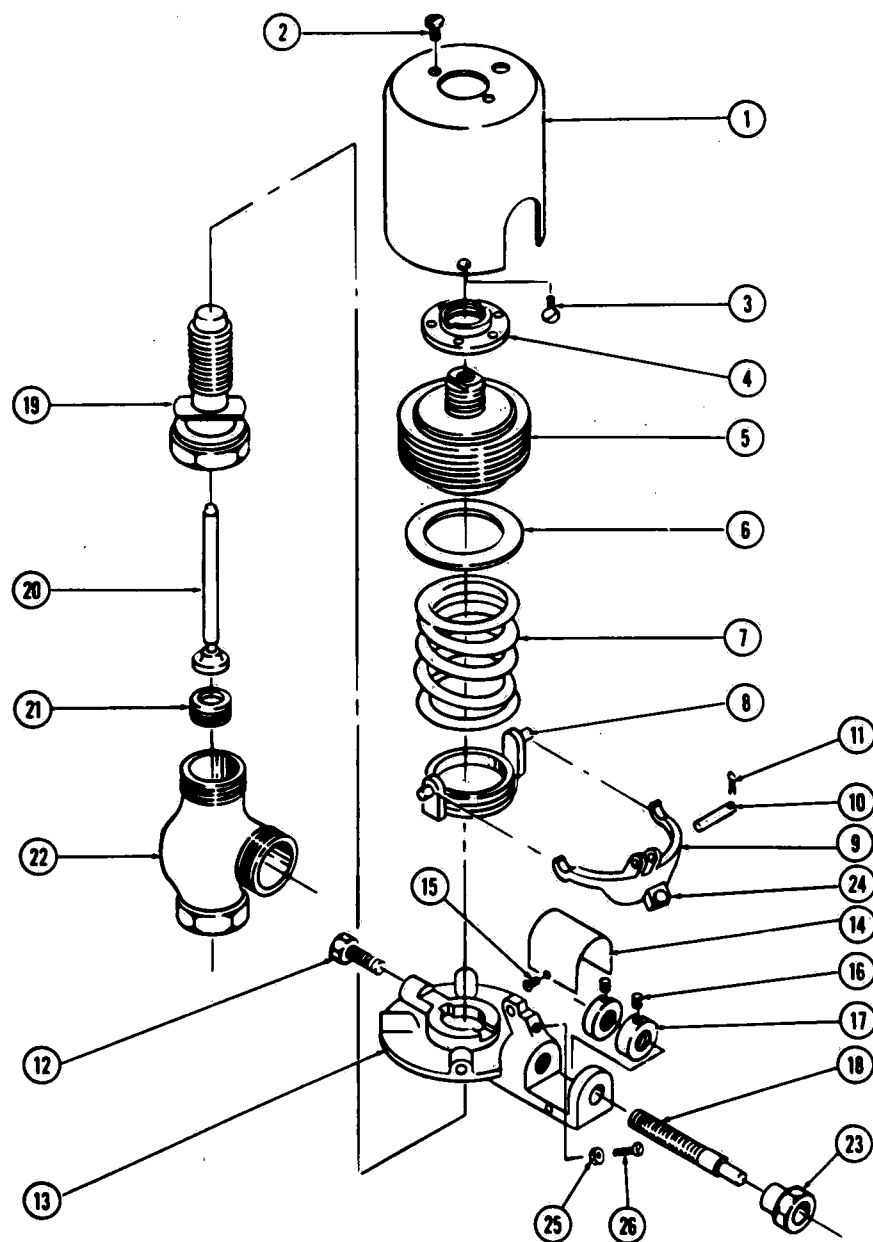


Figure 8-31. STEAM CONTROL VALVE.

8-62

A- 1

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-31-	P 20661	091	STEAM CONTROL VALVE, HI-LO	X
	P 754359	001	KIT, Valve Repair	1
1	P 22349	045	COVER	1
2	P 9276	041	SCREW, #8-32 x 3/16	2
3	P 3969	041	SCREW, 1/4-20 x 1/4	4
4	P 9172	091	REINFORCEMENT	1
5	P 35880	091	BELLOWS ASSEMBLY	1
6	P 35911	061	PLATE, Top Spring	1
7	P 19947	045	SPRING	1
8	P 12474	042	PLATE, Lower Spring	1
9	P 14976	091	FORK, Adjusting	1
10	P 11890	061	PIN, Fork Pivot	2
11	P 8897	091	COTTER PIN	1
12	P 12471	041	SCREW, 1/4-20 x 1-1/2	1
13	P 20658	042	BOTTOM PLATE	1
14	P 20662	061	COVER, Adjusting Screw	1
15	P 12534	061	SCREW, #8-32 x 1/4	2
16	P 10585	041	SETSCREW, Allen Head, #10-32 x 1/4	2
17	P 20659	091	LOCK NUT, ...	2
18	P 20657	061	SCREW, Adjusting	1
19	P 26836	091	SYLPHON AND BONNET ASSEMBLY	1
20	P 28265	091	VALVE STEM ASSEMBLY	1
21	P 5685	061	SEAT, Valve	1
22	P 5669	091	BODY, Valve	1
23	P 8605	043	NUT, Wheel	1
24	P 2299	045	INSERT	1
25	P 2959	041	NUT	1
26	P 9315	041	SCREW	1

Rev. 11/79

8-63

A- 2

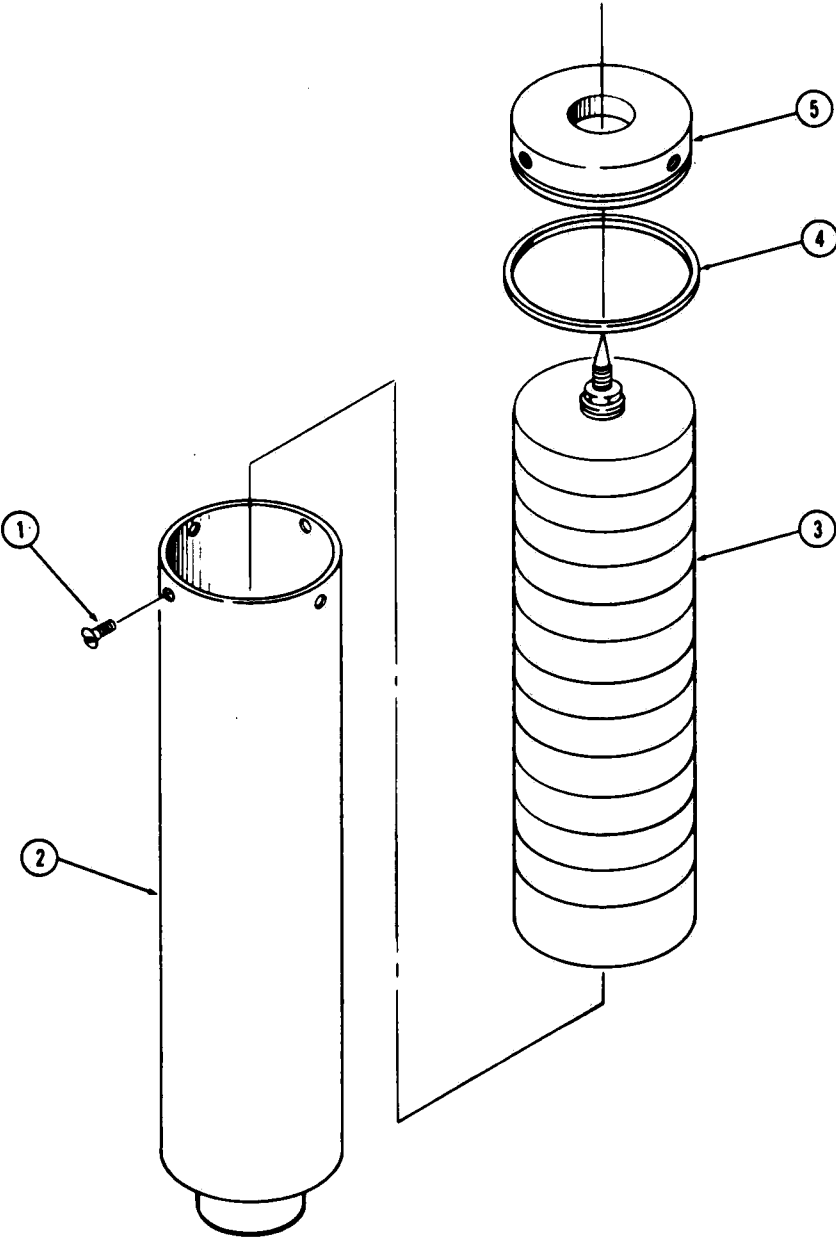


Figure 8-32. FILTER ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-32-	P	56396	812		FILTER ASSEMBLY	X			
	1 P	12283	041		SCREW, Round Head, #10-32 x 1/4	4			
	2 P	93159	001		TUBE ASSEMBLY	1			
	3 P	150822	941		CARTRIDGE, Filter	1			
	4 P	41301	091		"O" RING	1			
	5 P	83900	001		HEAD	1			

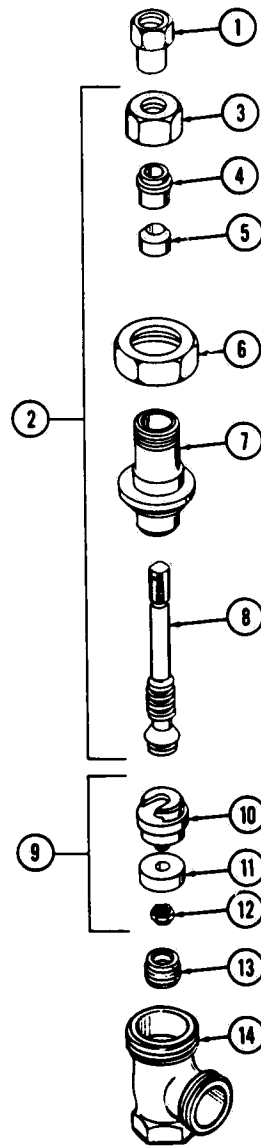


Figure 8-33. UNION ANGLE VALVE.

8-66

A- 5

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-33-	P 5654 091		UNION ANGLE VALVE: Steam Supply, 3/8	X			
	P 26907 091		UNION ANGLE VALVE: Water Supply, 3/4		X		
	P 754361 001		KIT, Repair, 3/8 N.P.T.	1			
	P 754361 003		KIT, Repair, 3/4 N.P.T.		1		
	1 P 8605 051		NUT, Wheel	1	1		
	2 P 53915 091		VALVE STEM AND BONNET ASSEMBLY	1			
	P 53917 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 091		• STEM, Valve	1	1		
	9 P 25347 091		DISC HOLDER ASSEMBLY	1			
	P 25567 091		DISC HOLDER ASSEMBLY		1		
	10 P 150576 001		• DISC HOLDER	1			
	P 25568 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		

8-67

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A- 6

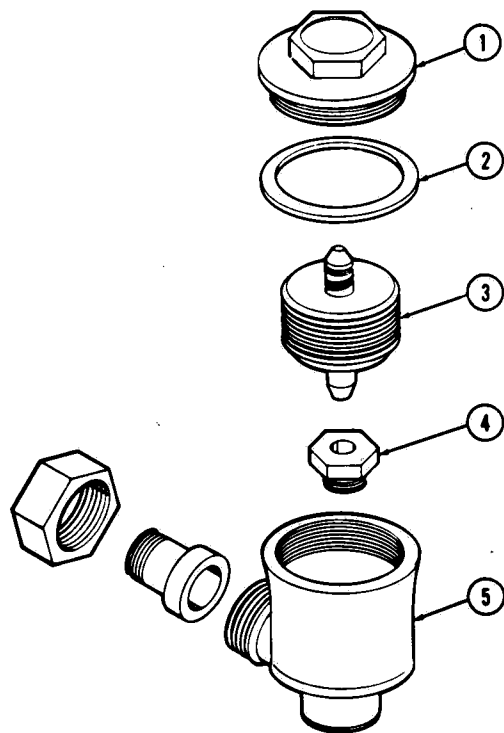


Figure 8-34. STEAM TRAP.

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY		
8-34-	P	129222	001		STEAM TRAP	1		
	P	764080	001		KIT, Repair, 1/2 N.P.T. (incl. items 2, 3, 4)	1		
	1	764315	209		CAP	1		
	* 2	764315	208		GASKET	1		
	* 3	764315	207		DIAPHRAGM ASSEMBLY	1		
	* 4	764315	206		SEAT	1		
	5				BODY	1		
*Not available as separate items. Order Repair Kit P-764080-001 above.								

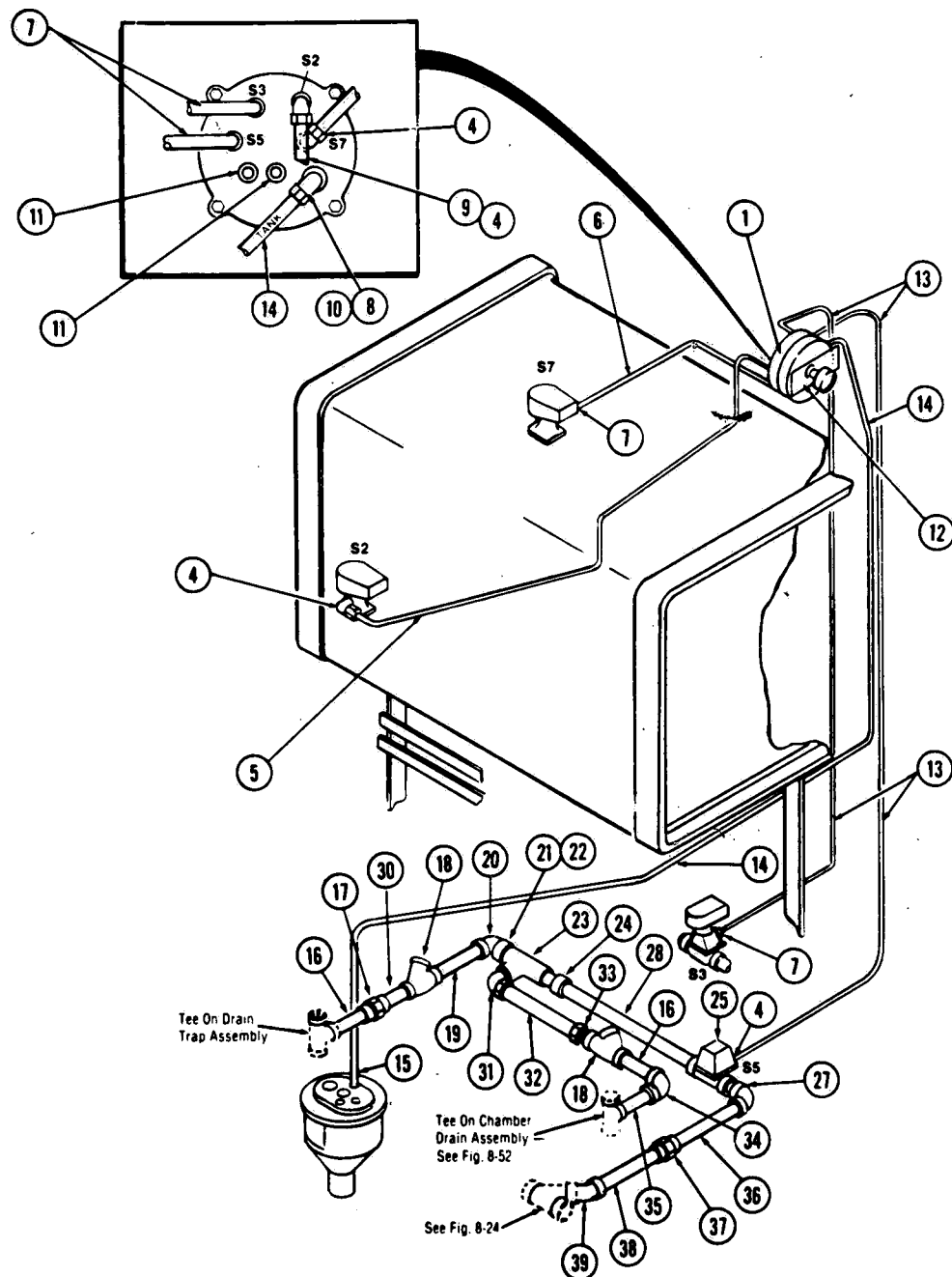


Figure 8-35. OPTIONAL MANUAL VALVE PIPING.

8-70

754/001

Rev. 6/84

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY			
8-35-			UNITS WITH INDICATOR-RECORDER:				
			OPTIONAL MANUAL VALVE PIPING: 16x16 Vacumatic	X			
			OPTIONAL MANUAL VALVE PIPING: 20x20 Vacumatic		X		
			UNITS WITH PRINTCON:				
			OPTIONAL MANUAL VALVE PIPING: 16x16 Vacumatic			X	
			OPTIONAL MANUAL VALVE PIPING: 20x20 Vacumatic				X
1	P 136726	001	VALVE, Manual Multiport (See Fig. 8-36)	1	1	1	1
2			NOT USED				
3			NOT USED				
4	P 42510	091	ELL, Compression, 1/4 O.D.T. x 1/8 N.P.T.	2	2	2	2
5	R 915	103	TUBE, S-2, 1/4 O.D. x 50-17/64"	1		1	
6	R 915	103	TUBE, S-2, 1/4 O.D. x 66-17/64"		1		1
7	P 3500	735	TUBE, S-7, 1/4 O.D. x 12"	1	1	1	1
8	P 43289	091	FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	4	4	4	4
9	P 45530	091	ELL, Compression, 3/8 O.D.T. x 3/8 N.P.T.	1	1	1	1
10	P 84371	001	INSERT, Tube, 1/4 (Not Shown)	6	6	2	2
11	P 84371	002	INSERT, Tube, 3/8 (Not Shown)	2	2	6	6
12	P 3439	091	PLUG, Pipe	1	1	1	1
13	P 136727	001	DECAL, Manual	1	1	1	1
14	P 93900	047	DECAL, Manual			1	1
15	R 915	103	TUBE, S-3 & S-5, 1/4 O.D. x 142"	1		1	
16	R 915	103	TUBE, S-3 & S-5, 1/4 O.D. x 148"		1		1
17	R 3500	736	TUBE, Drain, 3/8 O.D. x 80"	1	1	1	1
18	P 77299	091	TIES, Wire	6	6	6	6
19	P 141209	001	EJECTOR ASSEMBLY	1	1	1	1
20	P 29013	091	• NIPPLE, 3/8 N.P.T. x 1	1	1	1	1
21	P 5266	091	• UNION, 3/8 N.P.T.	1	1	1	1
22	P 5424	091	• VALVE, Check, 3/8 N.P.T.	1	1	1	1
23	P 29017	091	• NIPPLE, 3/8 N.P.T. x 2	1	1	1	1
24	P 1631	091	• ELL, Street, 3/8 N.P.T.	1	1	1	1
25	P 25546	042	• NOZZLE	1	1	1	1
26	P 7841	091	• GASKET	1	1	1	1
27	P 25900	042	• EJECTOR	1	1	1	1
28	P 3531	091	• COUPLING, Reducer	1	1	1	1
29	P 83228	002	• VALVE, 3/4 N.P.T.	1	1	1	1
30	P 764070	001	• REPAIR KIT (Not Shown)	1	1	1	1
31	P 44500	091	• ELBOW, 3/4 N.P.T. x 7/8 O.D.T.	1	1	1	1
32	P 29307	091	• NIPPLE, 3/4 N.P.T. x 5-1/4	1	1	1	1
33	P 42510	091	• FITTING, 1/8 N.P.T. x 1/4 O.D.T.	1	1	1	1
34	P 29016	091	• NIPPLE, 3/8 N.P.T. x 1-3/4 Lg.	1	1	1	1
35	P 23972	091	ELL, Compression, 5/8 O.D.T. x 1/2 N.P.T.	1	1	1	1
36	P 39072	091	TUBE, 5/8 O.D.T. x 8-1/2	1	1	1	1
37	P 1622	091	FITTING, Compression, 5/8 O.D.T. x 3/8 N.P.T.	1	1	1	1
38	P 29167	091	ELL, Reducing, 1/2 x 3/8 N.P.T.	1	1	1	1
39	R 915	460	NIPPLE, 1/2 N.P.T. x 2-1/4	1	1	1	1
40	P 91226	091	TUBE, 7/8 O.D.T. x 4-7/8	1	1	1	1
41	P 91248	091	UNION, 7/8 O.D.T.	1	1	1	1
42	P 89721	091	TUBE, 7/8 O.D.T. x 2	1	1	1	1
43			ELBOW, Street, 45°	1	1	1	1

8-71

Rev. 6/84

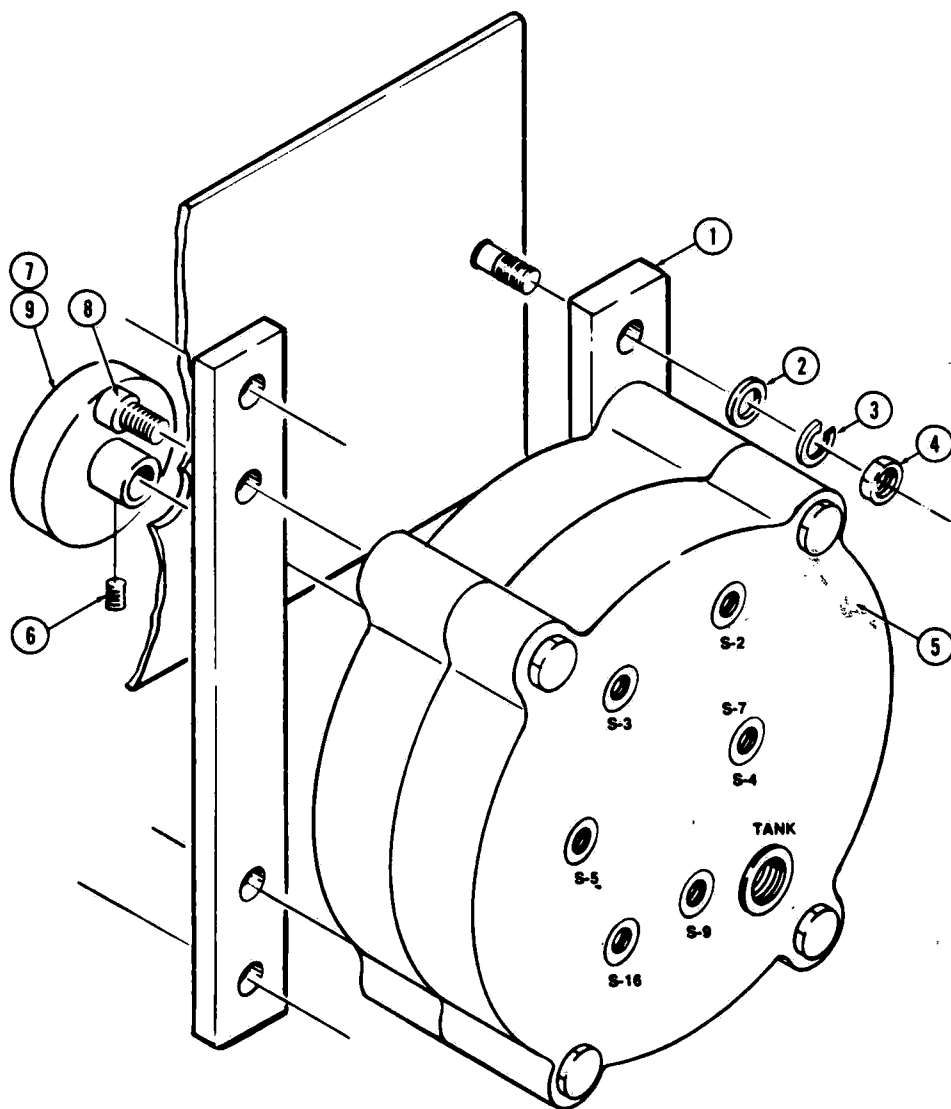


Figure 8-36. OPTIONAL MANUAL VALVE.

8-72

A- 11

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-36-			OPTIONAL MANUAL VALVE	X
1 P	129061 001		PLATE, Mounting	2
2 P	10445 091		WASHER, Flat	4
3 P	19678 045		LOCKWASHER	4
4 P	3097 041		NUT, Hex	4
5 P	136726 001		VALVE, Manual Multi-Port	1
6 P	43282 091		SCREW, Set	1
7 P	136760 001		KNOB, Selector	1
8 P	79253 045		SCREW, Socket Head, 1/4-20 x 1/2	4
9 P	129060 001		INSERT, Knob	1
			This feature may be added to existing equipment by ordering conversion kit P-764315-600. Kit includes installation drawing 146594-000.	

8-73

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A- 12

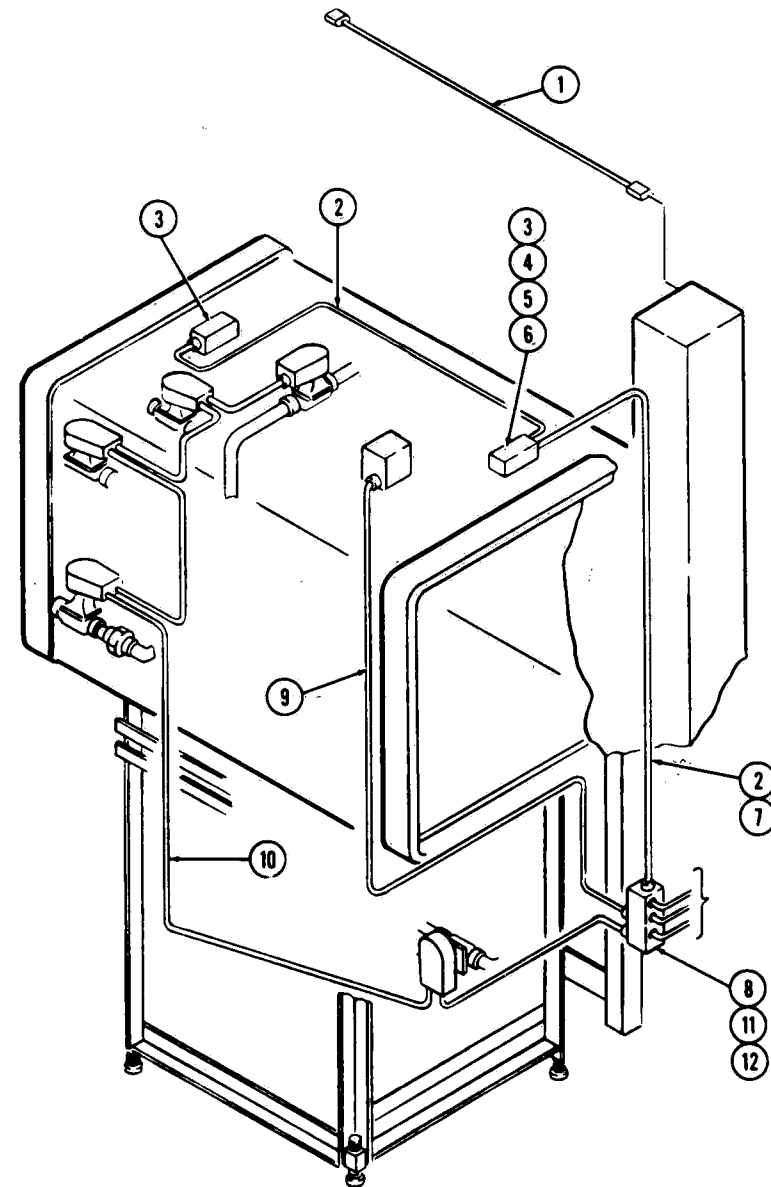


Figure 8-37. WIRING ASSEMBLY.
(Units with Indicator-Recorder)

8-74

A- 13

Rev. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-37-			UNITS WITH INDICATOR-RECORDER:			
			WIRING ASSEMBLY: Single Door Models	X		
			WIRING ASSEMBLY: Double Door Models		X	
	1 P	136752 001	HARNESS ASSEMBLY (See Fig. 8-39)		1	
	2 P	136548 001	CABLE, Door Switch, Double Door		1	
	3 P	136475 001	ASSEMBLY, Door Switch (See Fig. 8-21)	1	2	
	4 P	90168 045	SCREW, Hex Head, Self Tapping, #10 x 5/16	2	4	
	5 P	90891 045	EXTENSION, Switch	1	2	
	6 P	4682 041	SCREW, Round Head, #8-32 x 3/8	2	4	
	7 P	93643 001	CABLE, Door Switch, Single Door	1		
	8 P	93617 001	BOX, Junction (See Fig. 8-38)	1	1	
	9 P	93645 001	CABLE, Pressure and Vacuum Switch	1	1	
	10 P	136549 001	CABLE, Solenoid	1	1	
	11 P	15361 042	SCREW, Round Head, #10-32 x 1/4	2	6	
	12 P	31705 045	LOCKWASHER, #10	2	6	

8-75

A- 14

Rev. 12/82

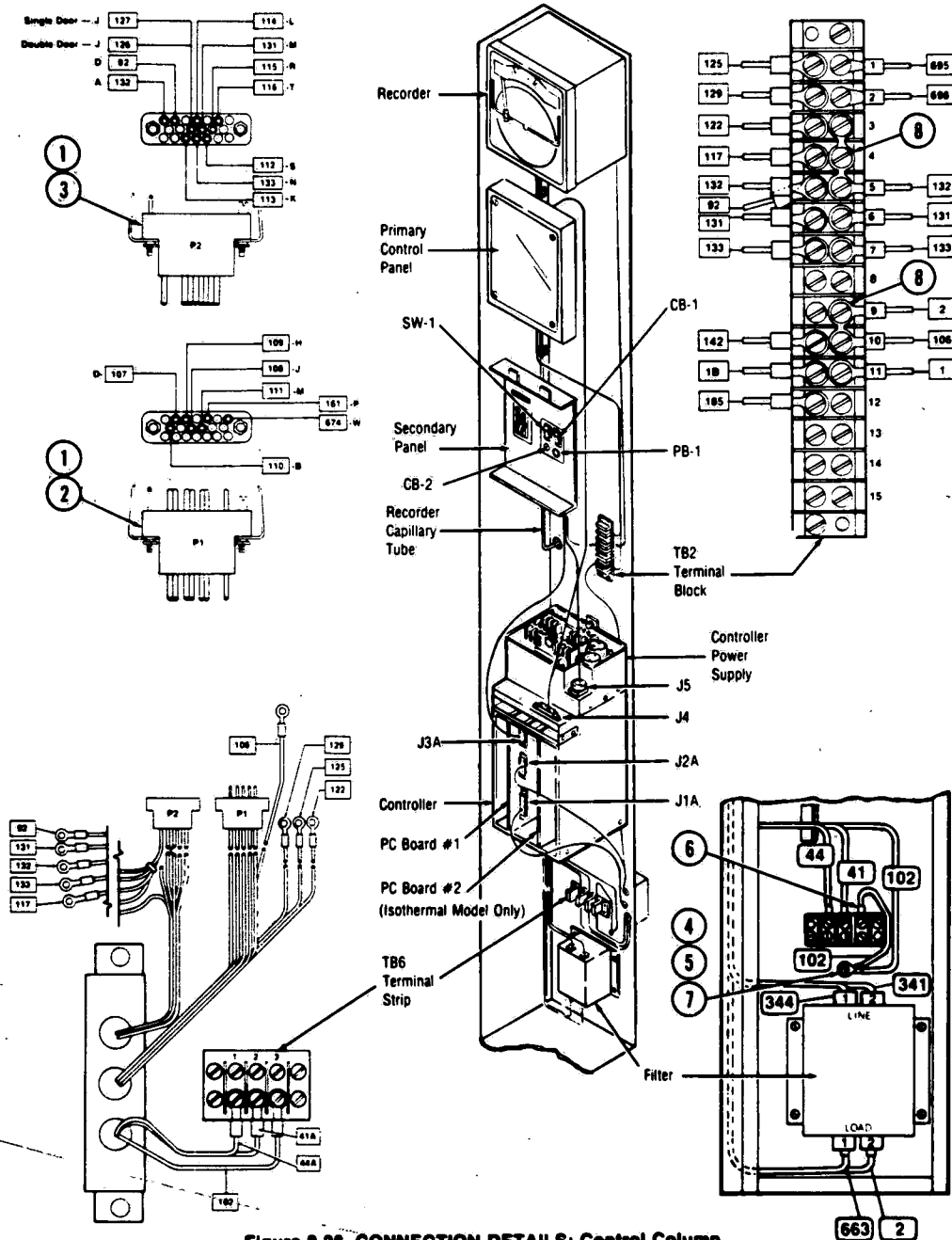


Figure 8-38. CONNECTION DETAILS: Control Column.
(Units with Indicator-Recorder)

8-76

B- 1

Rev. 12/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
UNITS WITH INDICATOR-RECORDER:				
8-38-	P 146341	001	CONNECTION DETAILS: Control Column	X
1	P 93829	001	BLOCK, P1 and P2	2
2	P 150822	042	PIN, Contact, J-1	5
3	P 84198	002	SOCKET, Contact, J-2	11
4	P 19522	091	TERMINAL, Wire, #10 Ring x 16-22 AWG	1
5	P 82675	001	SCREW, Green, Ground, #10-32 x 3/8	1
6	P 14865	091	TERMINAL, Wire, #8 Ring x 18-22 AWG	1
7			WIRE, Green	1
8	P 91945	041	JUMPER	3

8-77

B- 2

Rev. 12/82

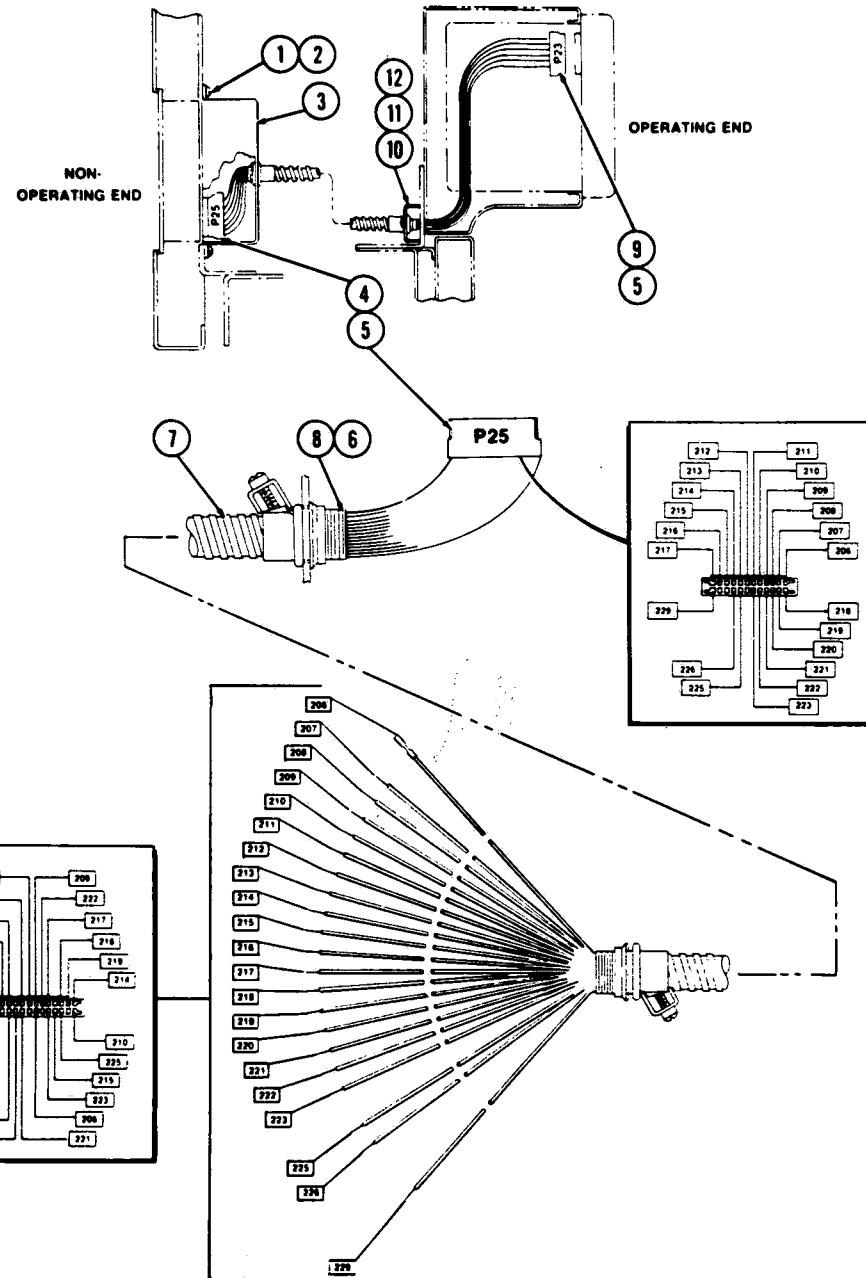


Figure 8-39. HARNESS ASSEMBLY.
(Units with Indicator-Recorder)

8-78

764084

B- 3

Rev. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-39-	P 136752 001		UNITS WITH INDICATOR-RECORDER: HARNESS ASSEMBLY: Primary Panel, Double Door	X
1 P	15361 042		SCREW, Round Head, #10-32 x 1/4	2
2 P	31705 045		LOCKWASHER	2
3 P	136798 001		ENCLOSURE	1
4 P	84229 005		HOUSING, Receptacle, P-25	1
5 P	84187 002		CONTACT	42
6 P	150030 001		CONNECTOR, Straight, 1/2	2
7 P	91666 091		CONDUIT, Flexible, 1/2 x 50	1
8 P	150122 001		BUSHING, Anti-Short	2
9 P	84229 006		HOUSING, Receptacle, P-23	1
10 P	129084 001		BOX, Adapter	1
11 P	3985 041		SCREW, Round Head, #6-32 x 3/4	2
12 P	18131 091		LOCKWASHER, #6	2

8-79

B- 4

Rev. 12/82

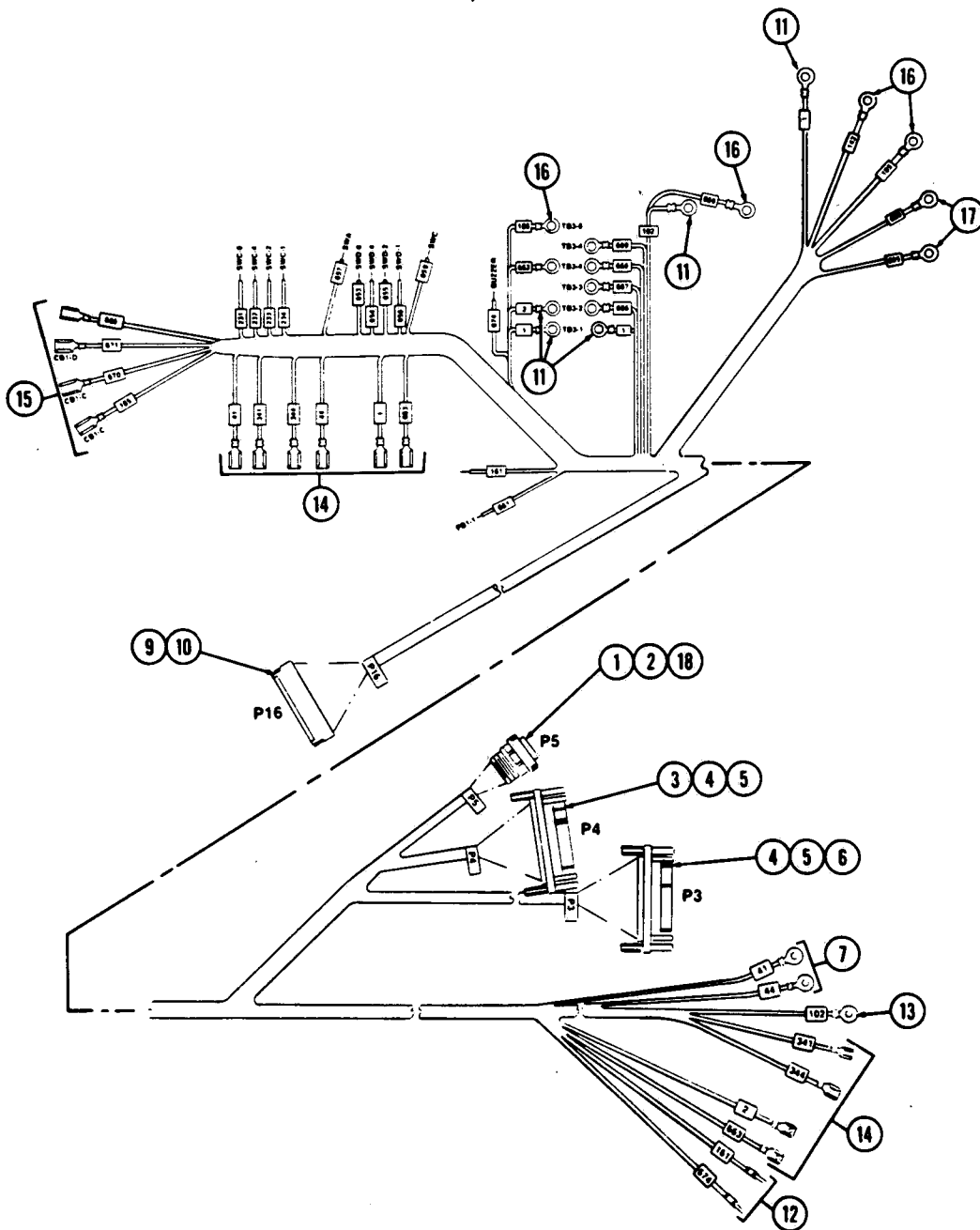


Figure 8-40. WIRING HARNESS. Secondary Panel.
(Units with Indicator-Recorder)

8-80

B- 5

Rev. 5/88

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-40-			UNITS WITH INDICATOR-RECORDER:	
			WIRING HARNESS: Secondary Panel	X
1	P 93838	001	PLUG, 9-Position, P5 (Units Before 12/85)	1
2	P 84198	004	CONTACT, Socket, P5	5
3	P 84205	002	HOUSING, Pin 38-Position, P4	1
4	P 84207	002	PIN, Contact, P3 and P4	43
5	P 84192	001	JACK SCREW, Female, P3 and P4	4
6	P 84205	001	HOUSING, Pin, 28-Position, P3	1
7	P 14591	091	TERMINAL, Wire, #8 Ring x #14-16 Wire	2
8			NOT USED	
9	P 84229	002	HOUSING, Connector, 36-Position, P16	1
10	P 84187	002	CONTACT, P-16	34
11	P 14590	091	TERMINAL, Wire, #6 Ring x #14-16 Wire	5
12	P 150822	043	PIN, Contact	2
13	P 14592	091	TERMINAL, #10 Ring x 14-16 AWG	1
14	P 32119	091	RECEPTACLE, 1/4 Lug x 14-16 AWG	12
15	P 90695	091	RECEPTACLE, 1/4 Lug x 18-22 AWG	4
16	P 90619	091	TERMINAL, #6 Stud x 18-22 AWG	12
17	P 129278	001	TERMINAL, Ring, 22-26 AWG	4
18	P 93808	002	PLUG, 16 Position, P5 (Units After 12/85)	1

8-81

B- 6

Rev. 5/88

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-41-			OPTIONAL RACK AND SHELVES, 16x16 Sterilizer	X			
			OPTIONAL RACK AND SHELVES, 20x20 Sterilizer		X		
	P	136800 011	RACK ASSEMBLY	X			
	P	136800 010	RACK ASSEMBLY		X		
	1 P	136800 035	• RACK WELDMENT, R.H.	1			
	P	136800 036	• RACK WELDMENT, L.H.	1			
	1 P	136800 032	• RACK WELDMENT, R.H.		1		
	P	136800 033	• RACK WELDMENT, L.H.		1		
	2 P	91291 062	• RACK RETAINING TUBE	4	6		
	3 P	8649 061	• NUT, Hex, 1/4-28	8	12		
	4 P	139537 068	SHELF, Chamber, 15 x 22"	2			
				or 3			
	P	139573 068	SHELF, Chamber, 19 x 34"		2		
					or 3		

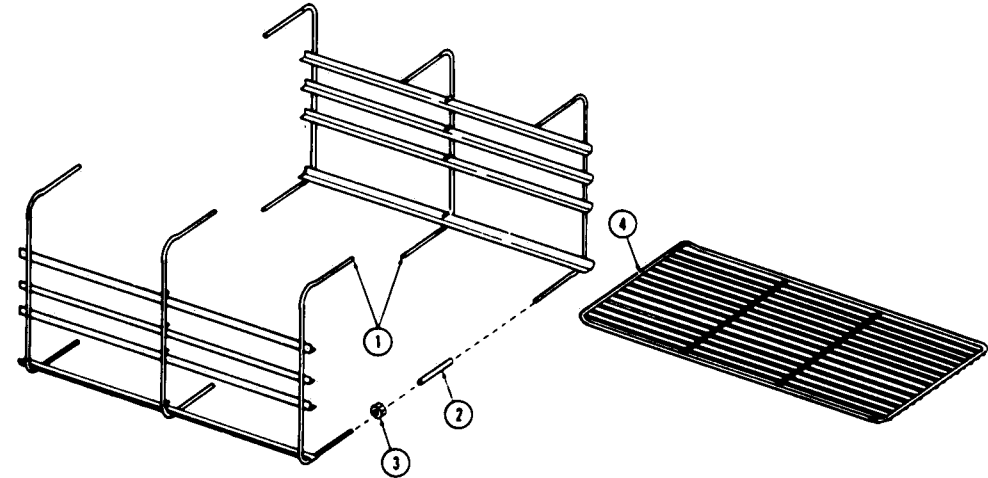


Figure 8-41. OPTIONAL RACK AND SHELVES.

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
8-42-	P	54448 091	OPTIONAL LOADING CAR ASSEMBLY, 20x20 Sterilizer, Units Before 6/83	X			
	P	136800 308	OPTIONAL LOADING CAR ASSEMBLY, 20x20 Sterilizer, Units After 6/83		X		
	1 P	30420 063	ANGLE	2			
	2 P	30422 063	SHELF	2			
	3 P	30414 063	FRAME	1	1		
	4 P	24956 061	ROLL PIN	4	4		
	5 P	30418 061	WHEEL	4	4		
	6 P	30417 091	BUSHING	4	4		
	7 P	30416 061	AXLE	2	2		
	8 P	93896 963	SUPPORT, Shelf Weldment		2		
9	P	146645 176	SHELF ASSEMBLY		2		
	10 P	37995 063	TRACK, Chamber (Not Shown)	2	2		

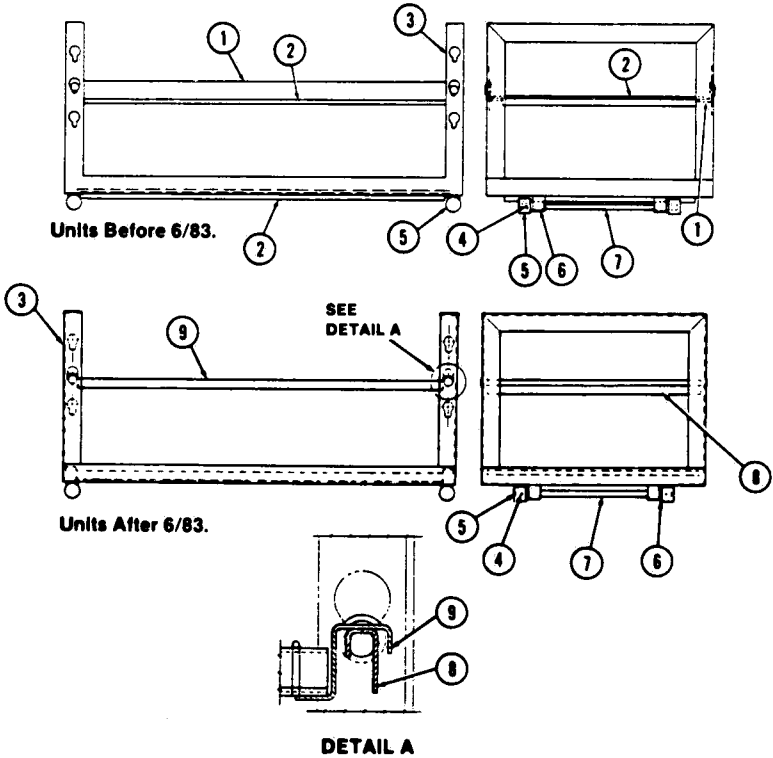


Figure 8-42. OPTIONAL LOADING CAR ASSEMBLY

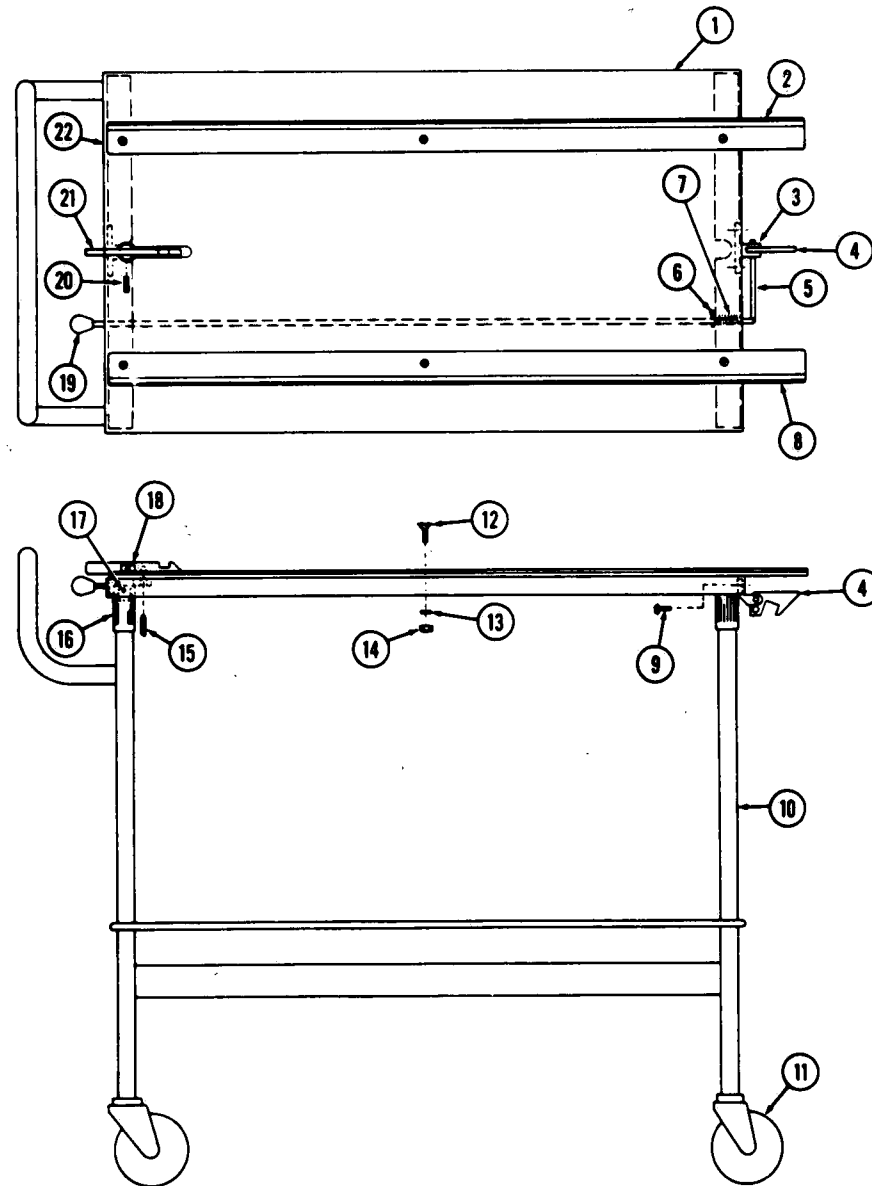


Figure 8-43. OPTIONAL TRANSFER CARRIAGE ASSEMBLY.

8-84

784084

B- 9

Rev. 6/82

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-43-	P 139693	001	OPTIONAL TRANSFER CARRIAGE ASSEMBLY, 20x20 Sterilizer	X
1	P 30459	063	TOP	1
2	P 30444	063	TRACK, Right Hand	1
3	P 30440	051	CATCH BLOCK	1
4	P 30447	063	CATCH, Door Frame	1
5	P 30449	061	CATCH ROD	1
6	P 23597	061	COTTER PIN	1
7	P 30458	061	SPRING	1
8	P 30455	063	TRACK, Left Hand	1
9	P 3999	041	SCREW, 1/4-20 x 5/8	4
10	P 139692	063	STAND ASSEMBLY	1
11	P 20542	091	CASTER	4
12	P 12549	062	SCREW, 1/4-20 x 5/8	6
13	P 19686	061	LOCKWASHER	6
14	P 8648	061	HEX NUT	6
15	P 30457	061	SPRING, Lock Lever	1
16	P 30446	052	ADJUSTING COLLAR	4
17	P 4772	045	SCREW, Set, 1/4-20 x 1/4	4
18	P 30448	051	BLOCK, Lock Lever	1
19	P 14918	091	KNOB	1
20	P 24268	061	ROLL PIN	2
21	P 30415	063	LOCK LEVER	1
22	P 30441	061	ANGLE ASSEMBLY	2

8-85

784084

B- 10

Rev. 6/82

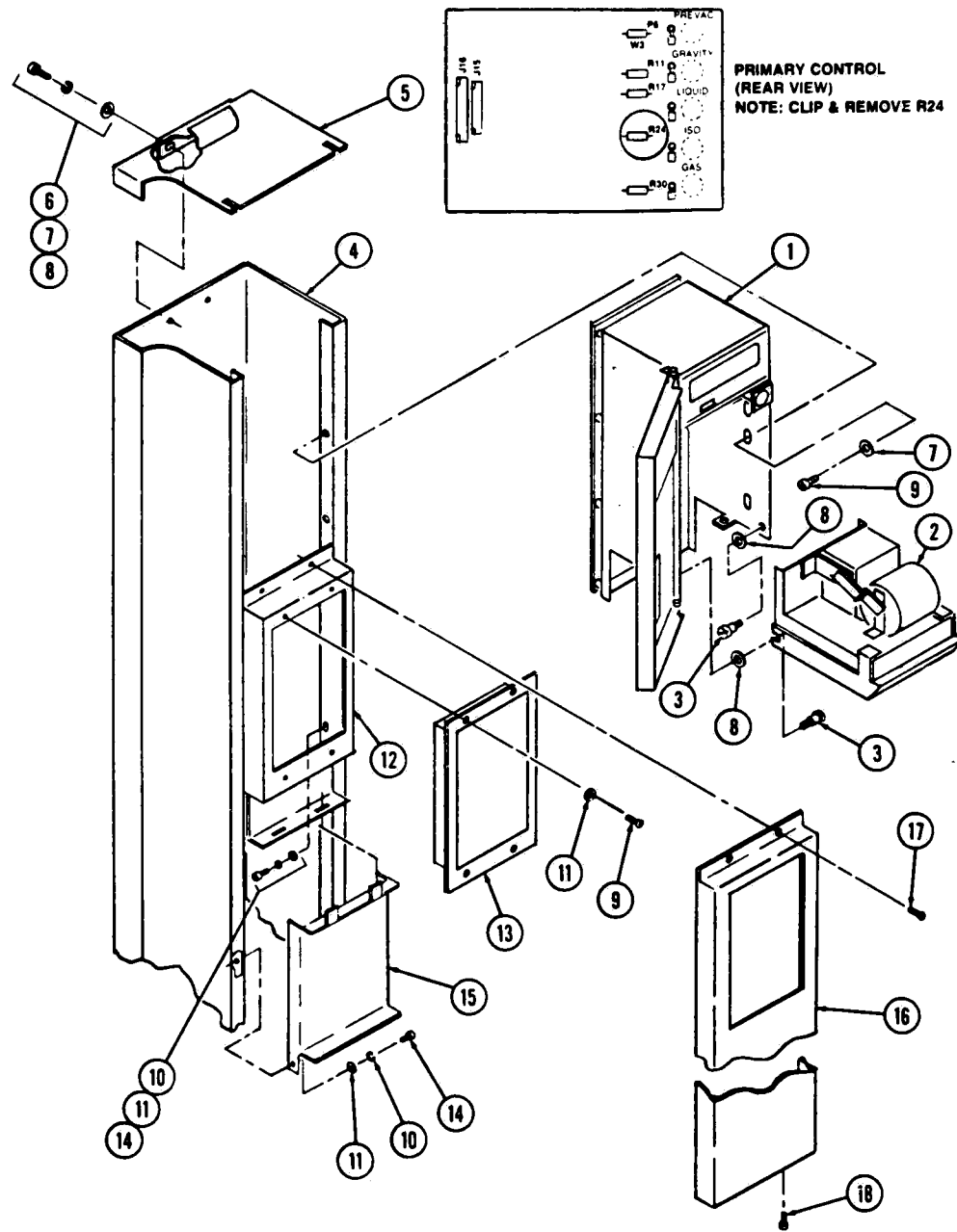


Figure 8-44. CONTROL COLUMN (Part 1 of 3)
(Units with Printcon)

8-86

TAL/MS

B- 11

Add. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-44-			UNITS WITH PRINTCON:	
			CONTROL COLUMN: (Part 1 of 3)	X
1			PRINTCON HOUSING ASSEMBLY (See Fig. 8-47)	1
2			PRINTCON PRINTER ASSEMBLY (See Fig. 8-48)	1
3	P 129356	032	SCREW, Shoulder, #10-32	2
4	P 146649	040	HOUSING, Control	1
5	P 134449	001	COVER, Top, Right Hand Column	1
	P 134449	002	COVER, Top, Left Hand Column	1
6	P 81672	002	SCREW, Socket Head Cap, #10-32 x 1/4	2
7	P 31705	045	LOCKWASHER, #10	2
8	P 5511	091	WASHER, Flat, #10	2
9	P 45323	042	SCREW, Button Socket Head, #8-32 x 3/8	8
10	P 79588	001	LOCKWASHER, #8	6
11	P 17796	091	WASHER, Flat, #8	14
12	P 146649	006	PANEL, Mounting	1
13	P 146645	226	CONTROL, Primary	1
	P 764317	536	* LAMP, Box of 10	A/R
14	P 50527	061	SCREW, Socket Head Cap, #8-32 x 1/2	6
15	P 146649	073	PANEL, Secondary Assembly, ...	1
16	P 146649	011	PANEL ASSEMBLY, Front	1
17	P 129356	135	SCREW, Button Head Socket, #8-32 x 3/8 (Black)	2
18	P 23431	041	SCREW, Socket Head Cap, #10-32 x 3/8	2

8-87

TAL/MS

B- 12

Rev. 5/88

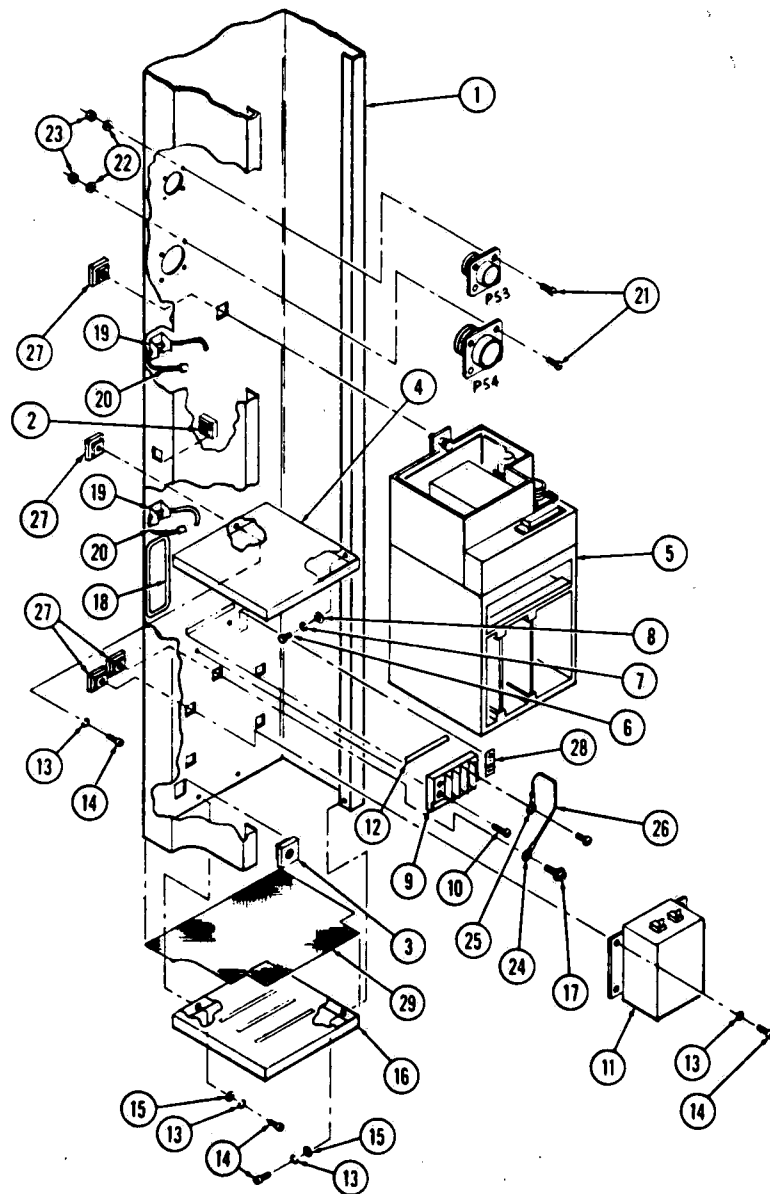


Figure 8-45. CONTROL COLUMN (Part 2 of 3).
(Units with Printcon)

8-88

B- 13

Add. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
UNITS WITH PRINTCON:				
8-45-			CONTROL COLUMN: (Part 2 of 3)	X
1			HOUSING, Control (Ref. Only)	
2 P	91924 091		NUT, Tinnerman, 1/4-20	6
3 P	129352 090		NUT, Tinnerman, 3/8-16	4
4 P	136759 001		SUPPORT, Controller	1
5 P	146649 107		MAIN CONTROL ASSEMBLY: (See Fig. 8-15)	1
6 P	50527 061		SCREW, Socket Head Cap, #8-32 x 1/2	2
7 P	79588 001		LOCKWASHER, #8	2
8 P	17796 091		WASHER, Flat, #8	2
9 P	90746 091		STRIP, Terminal	1
10 P	9661 041		SCREW, #10-32 x 5/8	2
11 P	93821 001		FILTER	1
12 P	82647 001		STRIP, Marker	1
13 P	31705 045		LOCKWASHER, #10	10
14 P	23431 041		SCREW, Socket Head Cap, #10-32 x 3/8	10
15 P	5511 091		WASHER, Flat, #10	4
16 P	136588 002		PLATE, Bottom	1
17 P	82675 001		SCREW, Green Ground, #10-32	1
18 P	150783 001		GROMMET	1
19 P	129326 001		HOLDER, Wire	11
20 P	75954 091		TIE, Wire	28
21 P	3984 041		SCREW, Round Head, #6-32 x 3/8	8
22 P	5469 041		WASHER, Flat, #6	8
23 P	3037 041		NUT, Hex, #6-32	8
24 P	19522 091		TERMINAL, Wire #10 Ring x 16-22 AWG	1
25 P	14865 091		TERMINAL, Wire #8 Ring x 22-18 AWG	1
26			WIRE, Green	1
27 P	129352 069		NUT, Tinnerman, #10-32	8
28			TAPE, Label (Dymo or equiv.)	AR
29 P	56374 001		SCREEN	1

8-89

B- 14

Rev. 5/88

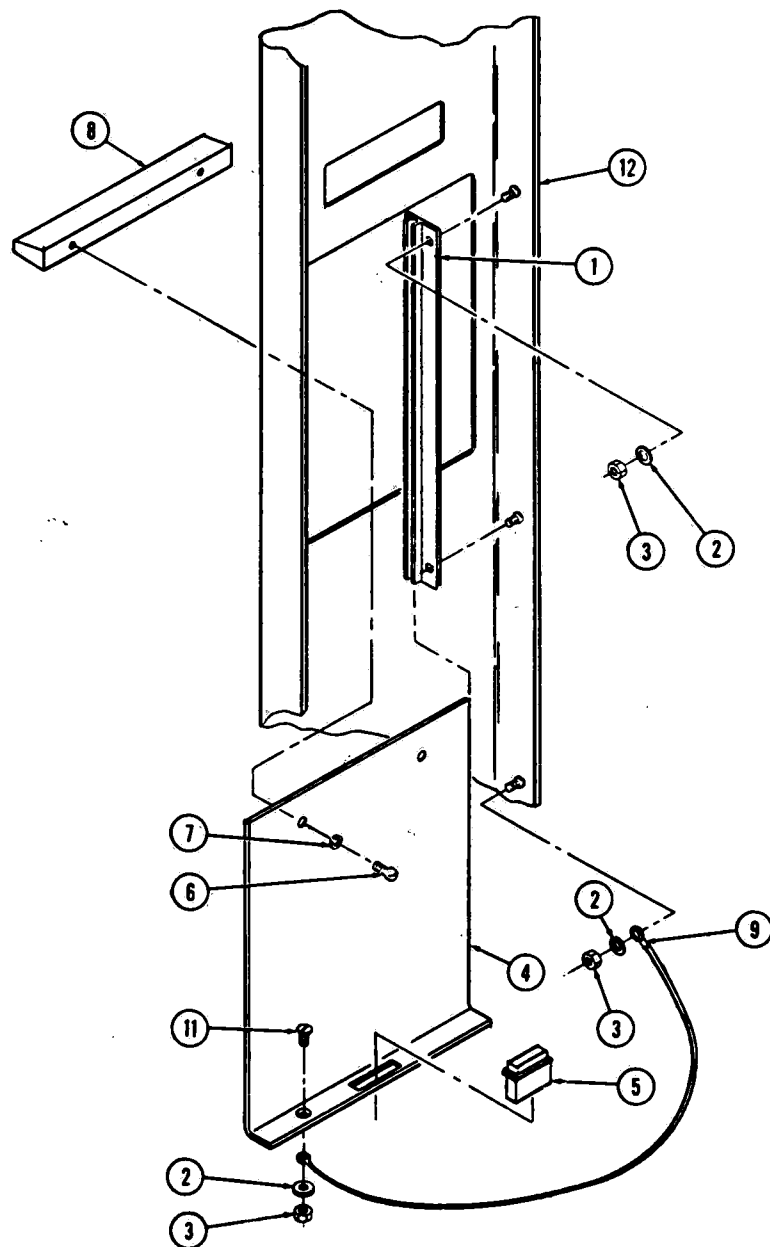


Figure 8-46. CONTROL COLUMN (Part 3 of 3).
(Units with Printcon)

8-90

C- 1

Add. 6/82

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
UNITS WITH PRINTCON				
8-46-			CONTROL COLUMN (Part 3 of 3)	X
1	P 84394	001	SLIDE, Door	2
2	P 5469	041	WASHER, Flat, #6	6
3	P 3037	041	NUT, Hex, #6-32	6
4	P 93662	001	DOOR	1
5	P 83920	001	CATCH, Magnetic	1
6	P 4682	041	SCREW, Round Head, #8-32 x 3/8	2
7	P 79588	001	LOCKWASHER, #8	2
8	P 84393	001	HANDLE	1
9	P 90619	091	TERMINAL, #6 Ring x 18-22 AWG	2
10			WIRE, Green, 15" Lg.	1
11	P 50705	041	SCREW, Flat Head, #6-32 x 5/16	1
12			PANEL ASSEMBLY, Front, Manual Door (Ref. Only)	
			PANEL ASSEMBLY, Front, Power Door (Ref. Only)	

8-91

C- 2

Add. 6/82

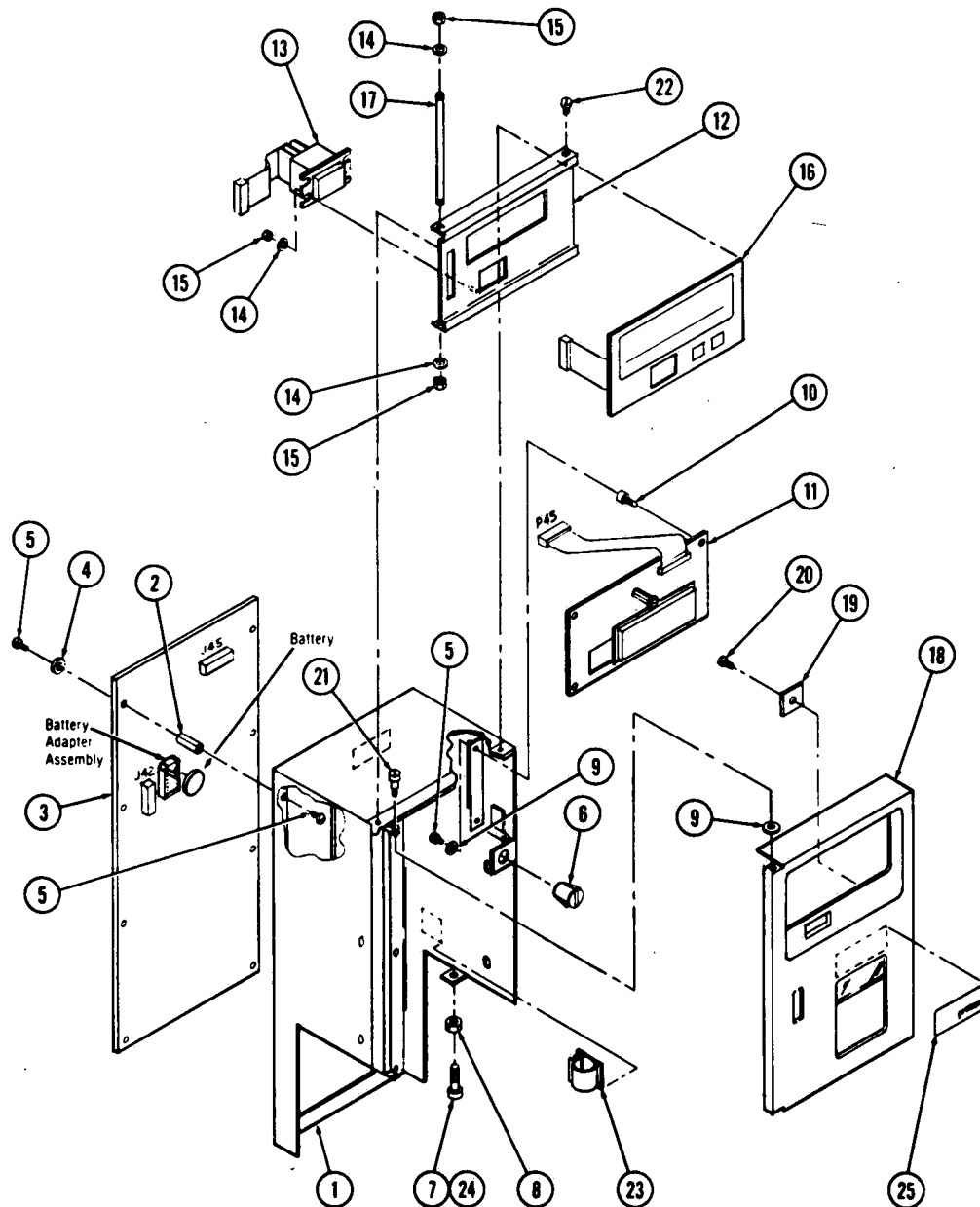


Figure 8-47. PRINTCON HOUSING ASSEMBLY.

8-92

764064

C- 3

Rev. 12/83

FIG. & INDEX NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-47-					PRINTCON HOUSING ASSEMBLY	X
1	P	146649	111		HOUSING, Weldment	1
2	P	129356	033		STAND-OFF	8
3	P	146651	001		P/C BOARD ASSEMBLY, Printcon Control	1
	P	150822	351		• BATTERY, Coincell	1
	P	150822	349		• BATTERY w/Adapter Assembly**	A/R
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	1
12	P	93900	001		DISPLAY BRACKET ASSEMBLY	1
13	P	93900	022		SWITCH, Thumbwheel	1
14	P	84114	001		WASHER, Flat, #4	4
15	P	13794	041		NUT, Hex, #4-40	4
16	P	136805	004		PANEL, Overlay Display	1
17	P	129356	023		STUD	1
18	P	146649	009		DOOR, Printer Display	1
19	P	129356	002		STRIKE	1
20	P	82340	001		SCREW, Flat Head, Self Tapping, #6 x 5/16	1
21	P	129356	006		SCREW, Shoulder, #4-40 x 1/8	2
22	P	40357	045		SCREW, Self Tapping, #6 x 1/4	1
23	P	150539	001		CLIP, Cable	1
24	R	5300	640		NYLOC	AR
25	P	129356	142		LABEL, Printcon	1
The Ray-O-Vac battery DP24-2-42 has been replaced by the Coincell battery. To facilitate conversion, order battery with adapter assembly P/N P-150822-349. Thereafter, replacement will only require the Coincell battery P/N P-150822-351. **Not required on units manufactured after 12/7/83.						

8-93

764064

C- 4

Rev. 5/88

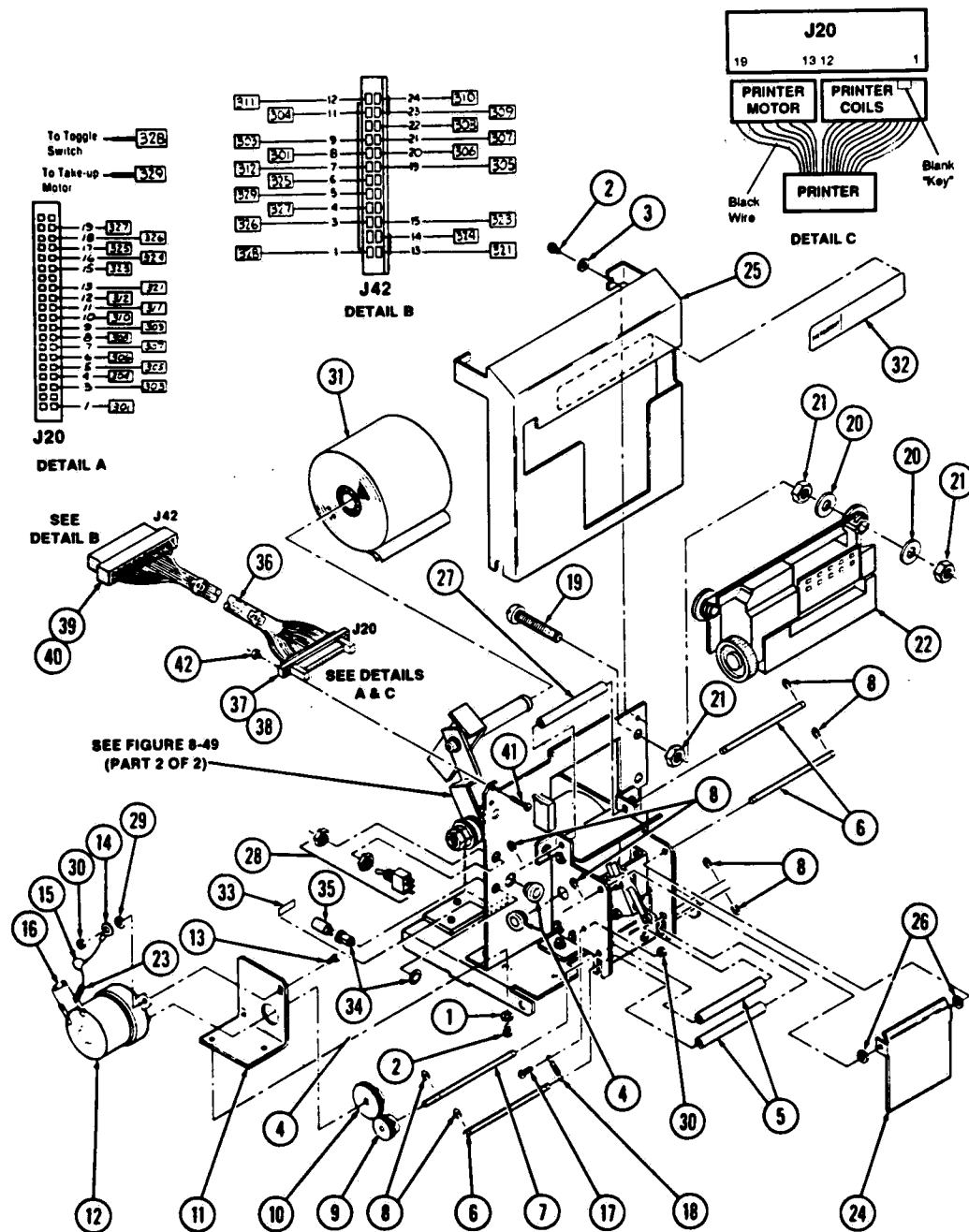


Figure 8-48. PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-48-			PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 1 of 2).....	X
1	P 18131	091	LOCKWASHER, #6	2
2	P 12451	041	SCREW, Rd. Hd., #6-32 x 1/4	8
3	P 5469	091	WASHER, Flat, #6	2
4	P 77797	091	BUSHING, Snap	2
5	P 129356	015	ROLLER	2
6	P 129356	016	SHAFT, Roller	3
7	P 129356	024	SHAFT, Drive Roller	1
8	P 45301	091	E-RING	6
9	P 129356	028	GEAR, Drive Roller	1
10	P 129356	027	GEAR, Motor Shaft	1
11	P 129356	017	MOUNT, Motor	1
12	P 129356	029	MOTOR, Take-up	1
13	P 17659	041	SCREW, Round Head, #4-40 x 1/4	2
14	P 90619	091	TERMINAL, Ring, #5 Stud, 22-16 Wire	1
15	P 93437	001	CAPACITOR, .01 microfarad	2
16	P 84157	001	DIODE, IN 4001	1
17	P 13334	091	SCREW, Round Head, #4-40 x 3/8	2
18	P 129356	008	SPRING, Extension	2
19	P 4004	041	SCREW, Round Head, #1/4-20 x 1-1/2	3
20	P 31599	041	WASHER, Flat, 1/4	6
21	P 3040	042	NUT, Hex	9
22	P 136800	081	PRINTER	1
	P 129356	118	• CARTRIDGE, Inked Ribbon (Box of 2)	AR
23			INSULATION, .064 I.D. x 1-1/4 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.

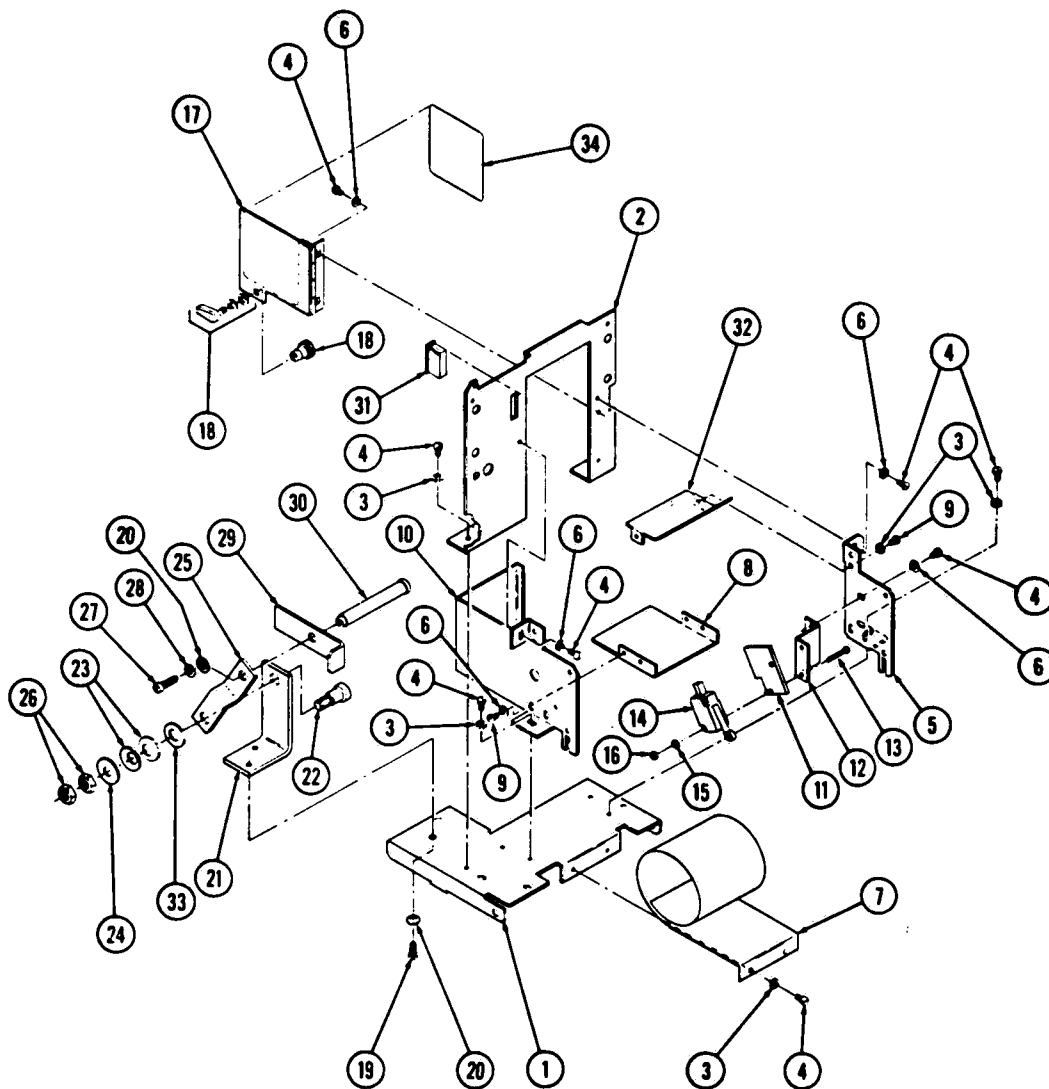


Figure 8-49. PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 2 of 2).

8-96

794084

C- 7

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-49-			PRINTCON PRINTER ASSEMBLY, Units Before 6/85 (Part 2 of 2)	X
1	P 136805 012		BASE, Mounting	1
2	P 136805 011		PLATE, Printer Mount	1
3	P 18131 091		LOCKWASHER, #6	9
4	P 12451 041		SCREW, Rd. Hd., #6-32 x 1/4	11
5	P 93900 039		SIDE PLATE, Right Hand	1
6	P 5469 091		WASHER, Flat, #6	8
7	P 93900 009		COIL	1
8	P 93900 018		PLATE, Guide	1
9	P 77074 045		SCREW, Self Tapping, #8-18 x 3/8	2
10	P 136805 014		SIDE PLATE, Left Hand	1
11	P 90124 091		INSULATOR	1
12	P 129356 014		MOUNT, Switch	1
13	P 90993 091		SCREW, Round Head, #4-40 x 3/4	2
14	P 150822 343		SWITCH, Roller (Platen Microswitch)	1
15	P 84114 001		WASHER, Flat, #4	2
16	P 13794 041		NUT, Hex, #4-40	2
17	P 93900 005		DOOR ASSEMBLY	1
18	P 129356 009		ARROWHEAD LATCH	1
19	P 12539 061		SCREW, Round Head, #10-32 x 3/8	2
20	P 5511 091		WASHER, Flat, #10	3
21	P 93900 040		ANGLE, Pivot	1
22	P 150044 001		SCREW, Shoulder, 3/8 Dia. x 3/8 Lg. x 5/16-18	1
23	P 129356 132		WASHER, Belleville Spring, .38 I.D. x .75 O.D.	2
24	P 36690 051		WASHER, Flat, .328 I.D. x .812 O.D. x .062 Thick	1
25	P 129356 112		ARM, Pivot	1
26	P 19172 061		NUT, Hex Jam, 5/16-18	2
27	P 33061 061		SCREW, Socket Head, #10-32 x 3/8	1
28	P 19685 061		LOCKWASHER, #10	1
29	P 129356 110		STOP	1
30	P 129356 111		SPINDLE	1
31	P 150475 014		CATCH, Magnetic	1
32	P 93900 010		PLATE, Paper-Feed	1
33	P 10412 042		WASHER, Flat, 3/8	1
34	P 93900 002		LABEL, Paper Loading Diagram	1

8-97

794084

C- 8

Rev. 4/86

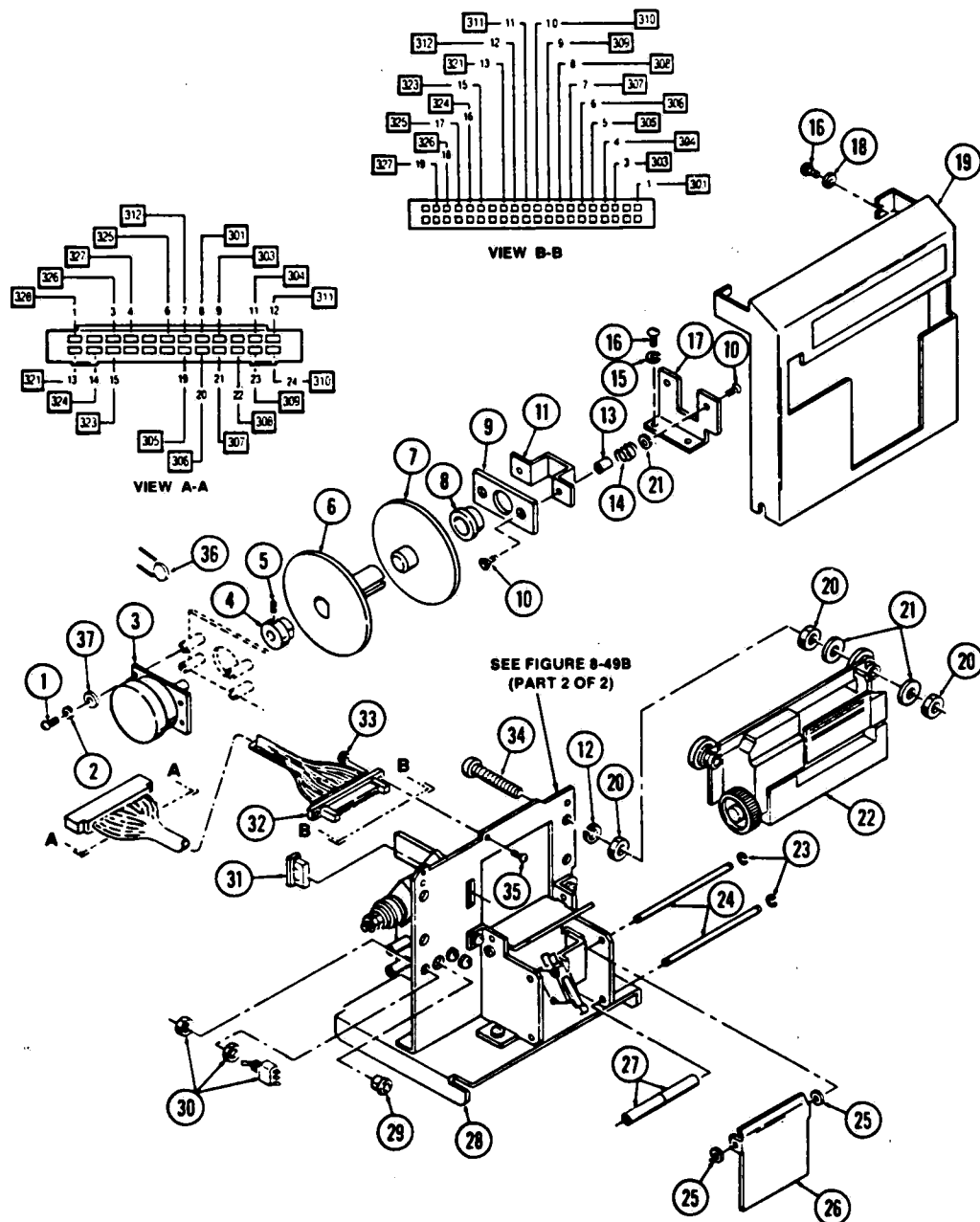


Figure 8-49A. PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 1 of 2).

8-98

764084

C-9

Rev. 5/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-49A-	P 141198 171		PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 1 of 2)	X
1	P 90993 091		SCREW, Round Head (#4-40 x 3/4)	4
2	P 81682 003		LOCKWASHER (#4)	4
3	P 41269 091		MOTOR	1
4	P 150822 480		STUD, Drive	1
5	P 129352 117		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)	4
17	P 150822 542		SUPPORT	1
18	P 5469 041		WASHER, Flat (#6)	4
19	P 134468 531		COVER	1
20	P 3040 042		NUT, Hex (1/4-20)	9
21	P 31599 041		WASHER, Flat (1/4)	8
22	P 136800 081		PRINTER	1
23	P 45301 091		E-RING	6
24	P 129356 016		SHAFT, Roller	3
25	P 129352 094		WASHER, Nylon (#6)	2
26	P 129356 020		PLATEN	1
27	P 129352 115		TUBE, Roller	4
28			FRAME ASSEMBLY, Printer (See Fig. 8-49B)	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
37	P 84114 001		WASHER, Flat (#4)	4
	P 611962 769		KIT, To Add This Printer Assembly (Units Before 6/85)	A/R

8-99

C-10

Add. 4/86

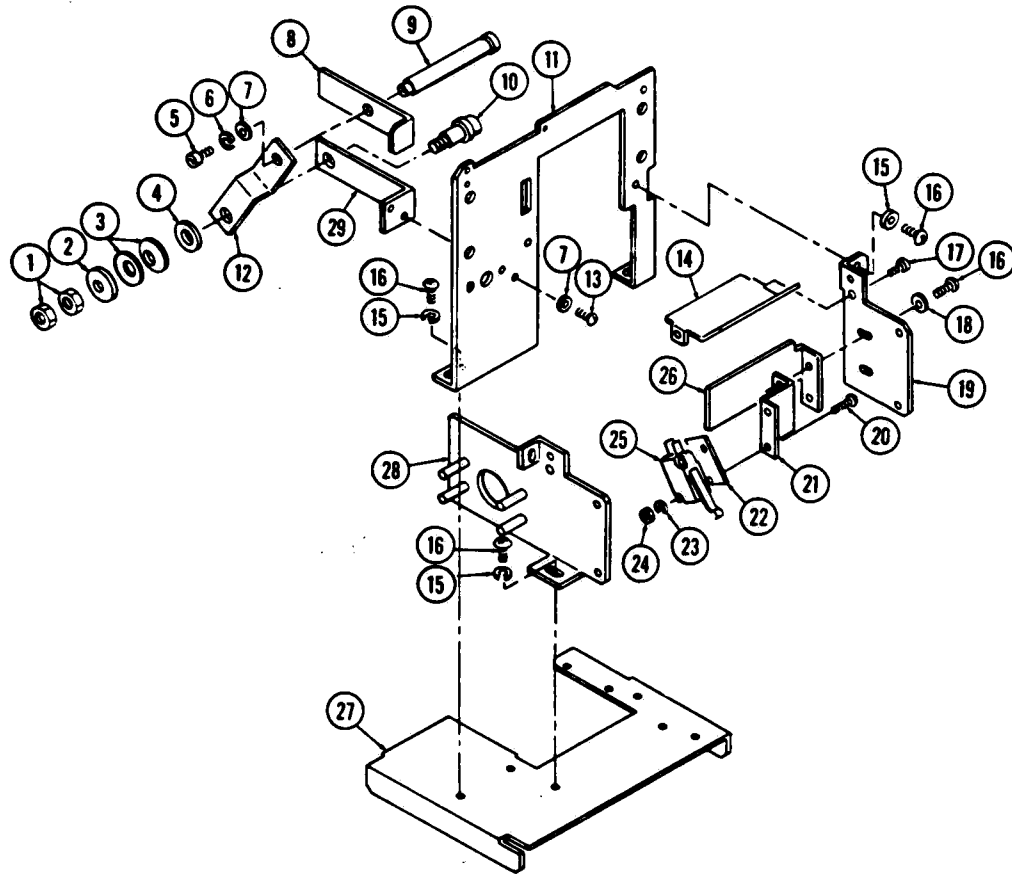


Figure 8-49B. PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 2 of 2).

8-100

764084

C- 11

Add. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-49B-			PRINTCON PRINTER ASSEMBLY, Units After 6/85 (Part 2 of 2)	X
1	P 19172 061		NUT, Jam (5/16-18)	2
2	P 36690 051		WASHER, Flat	1
3	P 129356 132		WASHER, Belleville	2
4	P 10412 042		WASHER, Flat	1
5	P 33061 061		SCREW, Socket Head (#10-32 x 5/8)	1
6	P 19685 061		LOCKWASHER (#10)	1
7	P 5511 091		WASHER, Flat (#10)	3
8	P 129356 110		STOP	1
9	P 150822 540		SPINDLE	1
10	P 150044 001		SCREW, Shoulder (5/16-18)	1
11	P 134468 528		PLATE, Mounting	1
12	P 129356 112		ARM, Pivot	1
13	P 12539 061		SCREW, Round Head (#10-32 x 3/8)	2
14	P 93900 010		PLATE, Paper Feed	1
15	P 18131 091		LOCKWASHER (#6)	7
16	P 12451 041		SCREW, Round Head (#6-32 x 1/4)	7
17	P 77074 045		SCREW, Self-tapping (#8-18 x 3/8)	2
18	P 5469 041		WASHER, Flat (#6)	2
19	P 56396 298		SIDE, RH	1
20	P 90993 091		SCREW, Round Head (#4-40 x 3/4)	2
21	P 129356 014		MOUNT, Switch	1
22	P 90124 091		INSULATOR	1
23	P 81682 003		LOCKWASHER (#4)	2
24	P 13794 041		NUT, Hex (#4-40)	2
25	P 150822 343		SWITCH, Roller Arm	1
26	P 150822 544		SHIELD	1
27	P 134468 527		BASE, Printer	1
28	P 56396 297		SIDE, LH	1
29	P 56396 299		ANGLE, Pivot	1

8-101

764084

C- 12

Add. 4/86

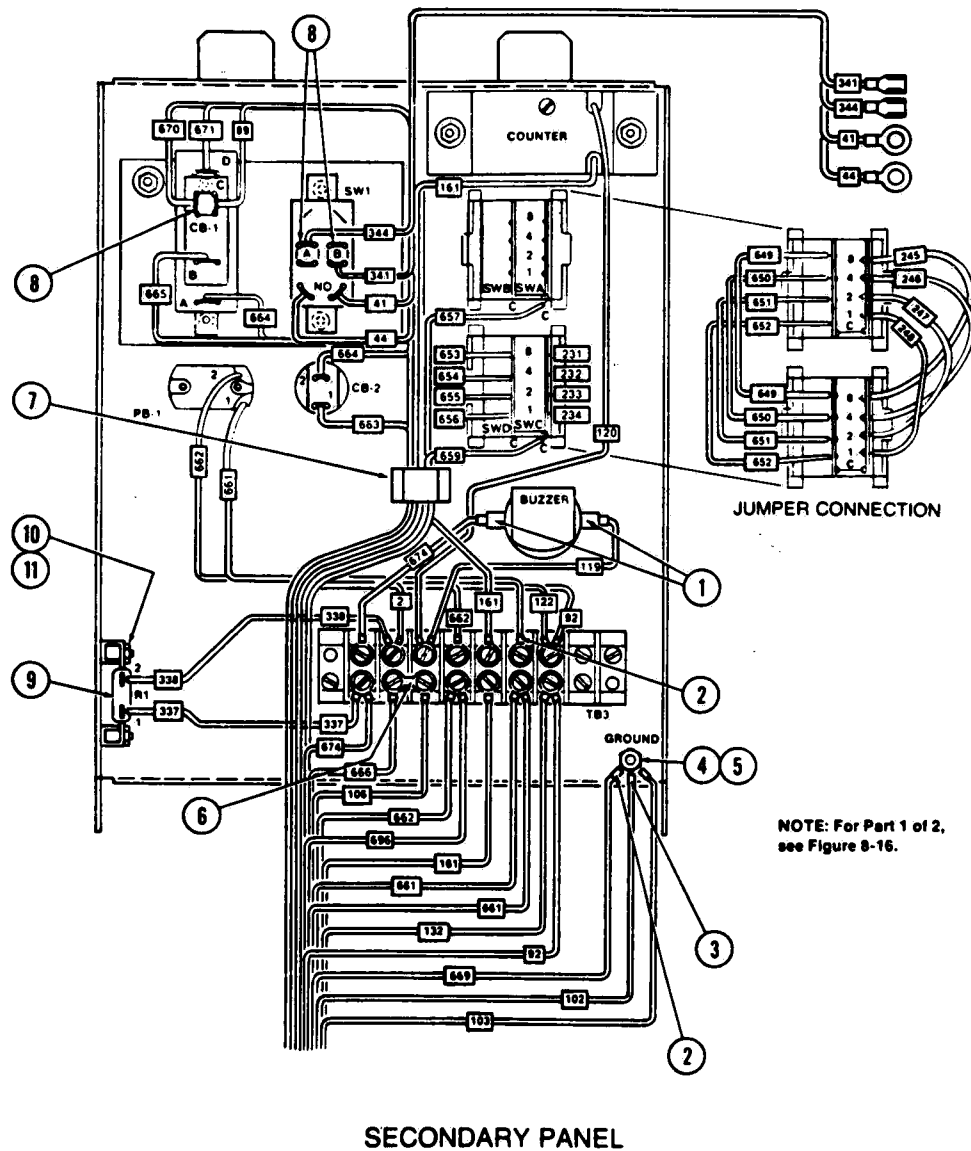


**Figure 8-50. SECONDARY CONTROL PANEL (Part 2 of 2).
(Units with Printcon)**

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-50-	P 146649	073	UNITS WITH PRINTCON: SECONDARY CONTROL PANEL (Part 2 of 2)	X
1	P 91694	091	RECEPTACLE, 3/16 Lug x #18-22 Wire	2
2	P 90619	091	TERMINAL, Wire, #6 Ring x #18-22 Wire	13
3	P 14590	091	TERMINAL, Wire, #8 Stud x #16-14 Wire	2
4	P 18131	091	LOCKWASHER, #6	1
5	P 3037	041	NUT, Hex, #6-32	1
6	P 84123	001	JUMPER, Terminal Block	1
7	P 431152	091	CLIP	1
8	P 32118	091	ADAPTER, Terminal	3
9	P 129318	001	RESISTOR, 3 k Ω , R1	1
10	P 13794	041	NUT, Hex	2
11	P 26032	091	WASHER, Flat	2

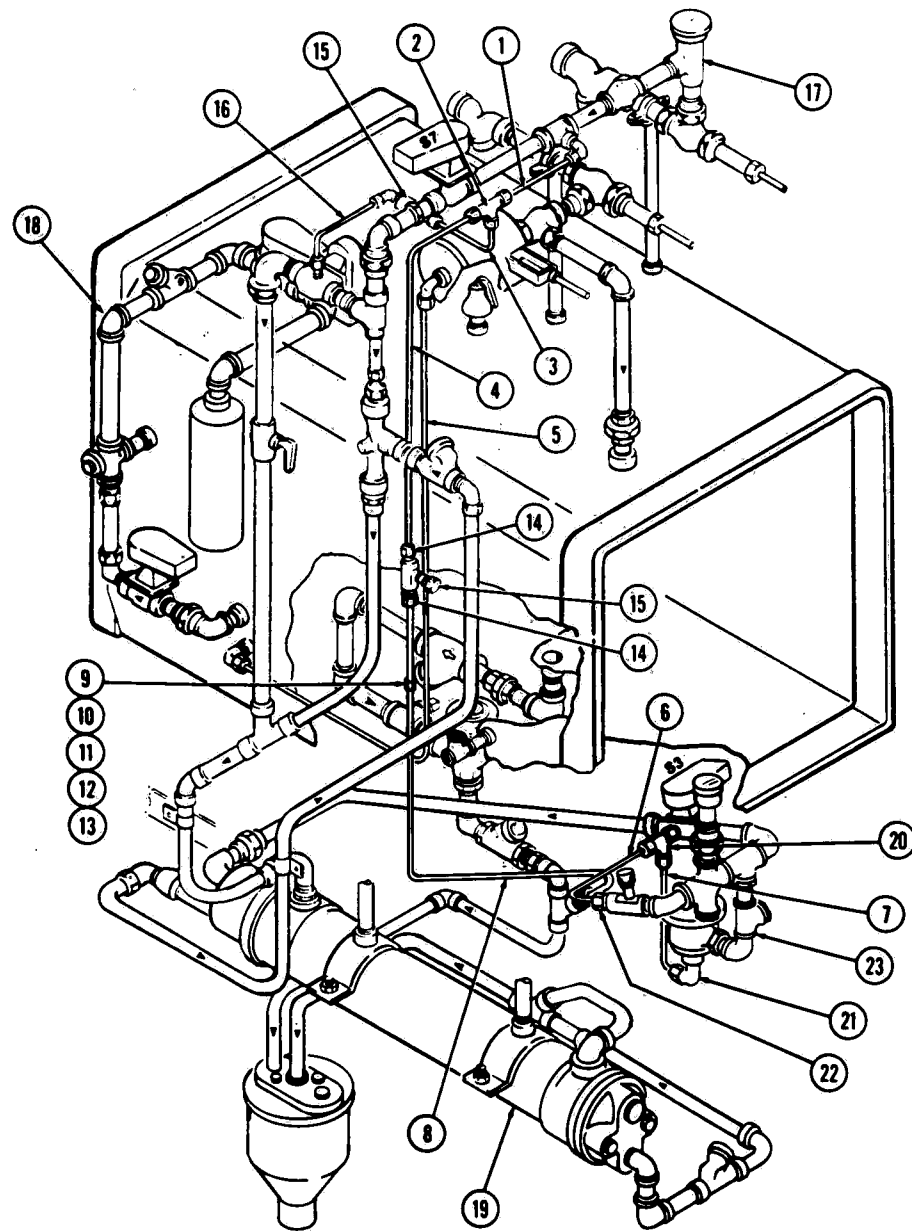


Figure 8-51. PIPING ASSEMBLY, Complete.
(Units with Printcon)

8-104
764084

D- 1

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-51-	P 146649	001	UNITS WITH PRINTCON: PIPING ASSEMBLY, Complete	X
1			TUBE, 1/4 O.D. x 4-9/32	1
2	P 46097	091	TEE, Compression, 1/4 O.D.T.	1
3			TUBE, 1/4 O.D. x 4-5/8	1
4			TUBE, 1/4 O.D. x 20-1/16	1
5			TUBE, 1/4 O.D. x 33-1/16	1
6			TUBE, 5/16 O.D. x 8-11/16	1
7			TUBE, 5/16 O.D. x 8-1/4	1
8			TUBE, 1/4 O.D. x 41-1/64	1
9	P 26720	091	CLAMP, 1/4 O.D.T.	1
10	P 3986	041	SCREW, #8-32 x 1/2	1
11	P 5561	091	WASHER, Flat	1
12	P 90991	091	LOCKWASHER	1
13	P 3038	041	NUT, Hex, #8-32	1
14	P 19514	091	FITTING, Compression, 1/4 O.D.T. x 1/8 N.P.T.	3
15	P 83630	001	VALVE, Needle, 1/8 N.P.T.	2
16			TUBE, 1/4 O.D. x 6-5/8	1
17			PIPING SUBASSEMBLY, Top (See Fig. 8-23)	1
18			PIPING SUBASSEMBLY, Side (See Fig. 8-24)	1
19			PIPING SUBASSEMBLY, Bottom (See Fig. 8-25)	1
20	P 6774	091	TEE, Compression, 5-16 O.D.T. x 1/8 N.P.T. x 5/16 O.D.T.	1
21	P 7033	091	ELL, Compression, 5/16 O.D.T. x 1/4 N.P.T.	1
22	P 22711	091	FITTING, Compression, 1/4 N.P.T. x 5/16 O.D.T.	1
23	P 136805	001	PIPING ASSEMBLY, Chamber Drain (See Fig. 8-52)	1

8-105
764084

D- 2

Rev. 4/86

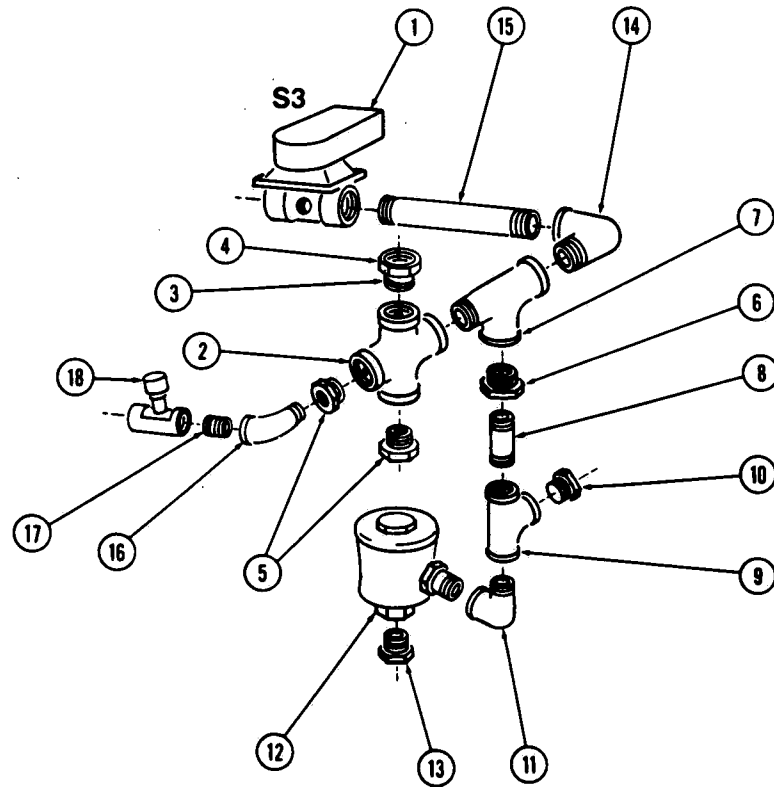


Figure 8-52. PIPING ASSEMBLY, Chamber Drain.
(Units with Printcon)

8-106
764084

D- 3

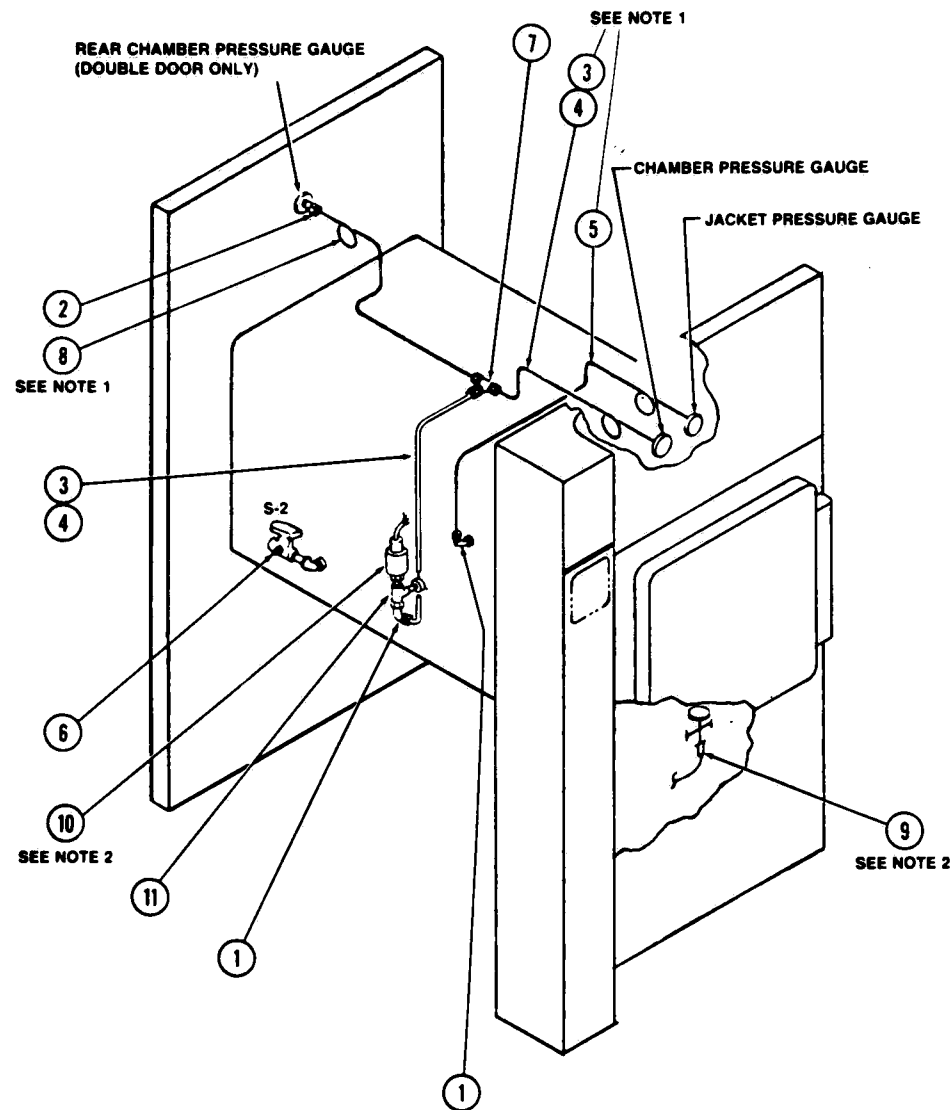
Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
8-52-	P 136805 001		UNITS WITH PRINTCON: PIPING ASSEMBLY, Chamber Drain	X
1	P 83228 002		VALVE, Solenoid, 3/4 N.P.T. Steam, S3	1
	P 764070 001		• KIT, Repair	AR
	P 764070 002		• COIL, 110 V	AR
2	P 1345 091		CROSS, 3/4 N.P.T.	1
3	P 4247 091		SPUD, Male, 3/4 N.P.T.	1
4	P 2903 091		NUT, Union, 3/4 N.P.T.	1
5	P 22472 091		REDUCER, Bush., 3/4 N.P.T. x 1/4 N.P.T.	2
6	P 836 042		REDUCER, Bush., 3/4 N.P.T. x 1/2 N.P.T.	1
7	P 91918 091		TEE, Street, 3/4 N.P.T.	1
8	P 29162 091		NIPPLE, 1/2 N.P.T. x 1" Lg.	1
9	P 4931 091		TEE, 1/2 N.P.T.	1
10	P 3442 091		PLUG, Pipe, 1/2 N.P.T.	1
11	P 1634 091		ELL, Street, 1/2 N.P.T.	1
12	P 129222 001		TRAP, Steam, 1/2 N.P.T. "Nicholson"	1
13	P 76053 042		REDUCER BUSH., 1/2 N.P.T. x 1/4 N.P.T.	1
14	P 1636 091		ELL, Street, 3/4 N.P.T.	1
15	P 29308 091		NIPPLE, 3/4 N.P.T. x 5-1/2"	1
16	P 1619 091		ELL, Street, 1/4 N.P.T.	1
17	P 28917 091		NIPPLE, 1/4 N.P.T. x 1"	1
18	P 83523 001		VALVE, Needle, 1/4 N.P.T.	1
When replacing the diaphragm, the bonnet bolts should be torqued to 50 in./lbs.				

8-107
764084

D- 4

Rev. 4/86



NOTE:

- 1 — MAKE ALL COILS ON SENSING LINES APPROX. 2-1/2" DIA.
2 — FOR WIRING TERMINATIONS OF PART 9 & PART 10 SEE FIG. 8-54

Figure 8-53. SENSING LINE PACKAGE.
(Units with Printcon)

8-108

D- 5

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-53-			UNITS WITH PRINTCON:			
			SENSING LINE PACKAGE			
			• 16x16 & 20x20 Vacumatic, Single Door	X		
			• 16x16 & 20x20 Vacumatic, Double Door		X	
	1 P	26181 091	ELL, 1/8 O.D.T. x 1/8 N.P.T.	2	2	
	2 P	90594 091	COUPLING, 1/8 O.D.T. x 1/8 N.P.T. (Female)		1	
	3		TUBE, 1/8 O.D.T. x 26		2	
	4		TUBE, 1/8 O.D.T. x 52	1		
	5		TUBE, 1/8 O.D.T. x 44	1		
	6 P	3439 091	PLUG, Pipe, 1/8 N.P.T.	1	1	
	7 P	129356 113	TEE, 1/8 O.D.T.		1	
	8		TUBE, 1/8 O.D.T. x 40		1	
	9 P	56396 211	RTD, Temp.	1	1	
	10 P	56396 215	TRANSDUCER, Press.	1	1	
	11 P	939 091	BUSHING, Reducer, 1/4 NPT x 1/8 NPT	1	1	

8-109

784084

Rev. 4/86

D- 6

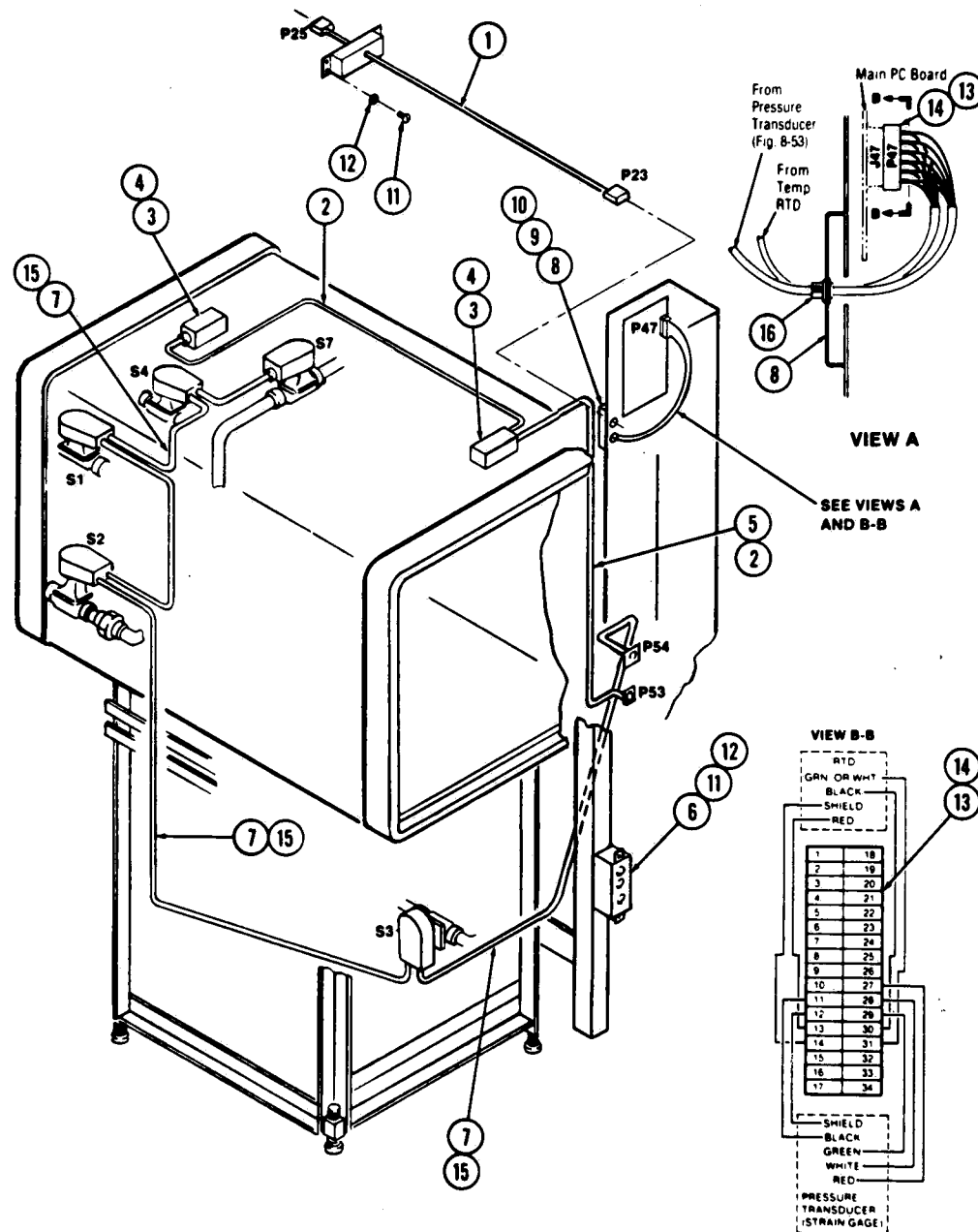


Figure 8-54. WIRING ASSEMBLY.
(Units with Printcon)

8-110

764084

D- 7

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
UNITS WITH PRINTCON:					
8-54-			WIRING ASSEMBLY: Vacumatic, Single Door Models	X	
			WIRING ASSEMBLY: Vacumatic, Double Door Models		X
1	P 146649	103	HARNESS ASSEMBLY, Double Door (See Fig. 8-56)		1
2	P 136805	016	CABLE, Door Switch, Double Door		1
3	P 136475	001	ASSEMBLY, Door Switch (See Fig. 8-23)	1	2
4	P 90168	045	SCREW, Hex Head, Self Tapping, #10 x 5/16	2	4
5	P 93900	011	CABLE, Door Switch, Single Door	1	
6	P 93617	001	BOX, Junction (See Fig. 8-55)	1	1
7	P 136805	017	CABLE, Solenoid	1	1
8	P 129084	001	BOX, Adapter	1	
9	P 3985	041	SCREW, Round Head, #6-32 x 3/4	2	2
10	P 18131	091	LOCKWASHER	2	2
11	P 15361	042	SCREW, Round Head, #10-32 x 1/4	2	6
12	P 31705	045	LOCKWASHER, #10	2	6
13	P 93900	026	HOUSING, Receptacle P47 (Units Before 12/87)	1	1
	P 56396	486	HOUSING, Receptacle P47 (Units After 12/87)	1	1
14	P 84187	003	CONTACT, Socket (Units Before 12/87)	9	9
	P 150822	809	CONTACT, Socket (Units After 12/87)	9	9
15	P 150808	001	SPLICE CONNECTOR	10	10
16	P 91354	045	CLAMP, Cable	1	1

8-111

764084

D- 8

Rev. 5/88

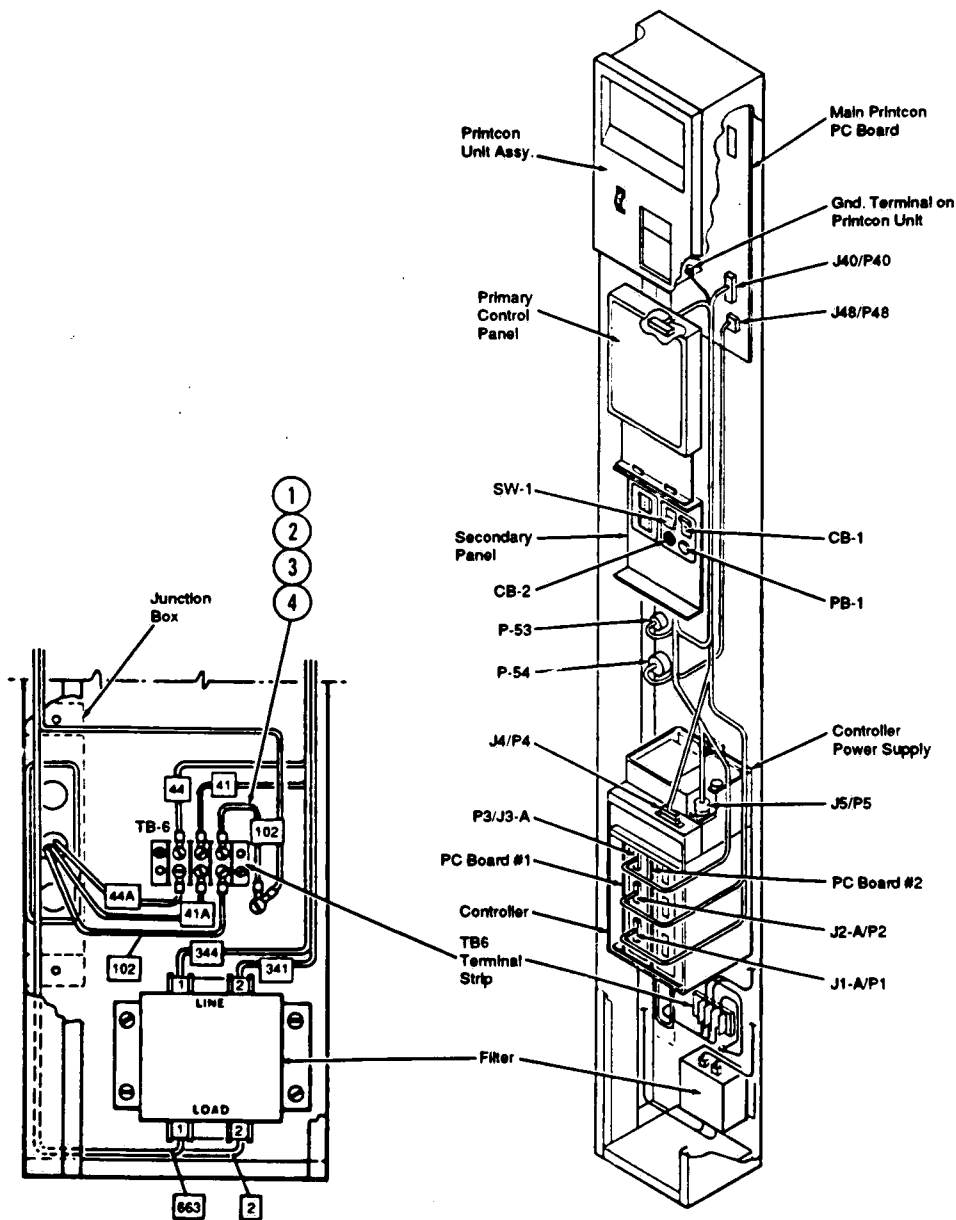


Figure 8-55. CONNECTION DETAILS: Control Column with Printcon.
(Units with Printcon)

8-112

764084

D- 9

Rev. 5/88

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY	
8-55-			UNITS WITH PRINTCON:		
			CONNECTION DETAILS: Control Column, Manual Door.....	X	
			CONNECTION DETAILS: Control Column, Power Door.....		X
	1 P	19522 091	TERMINAL, Wire, #10 Ring x 16-22 AWG	1	1
	2 P	82675 001	SCREW, Green, Ground, #10-32 x 3/8	1	1
	3 P	14865 091	TERMINAL, Wire, #8 Ring x 18-22 AWG	1	1
	4		WIRE, Green	1	1

8-113

764084

D- 10

Rev. 4/86

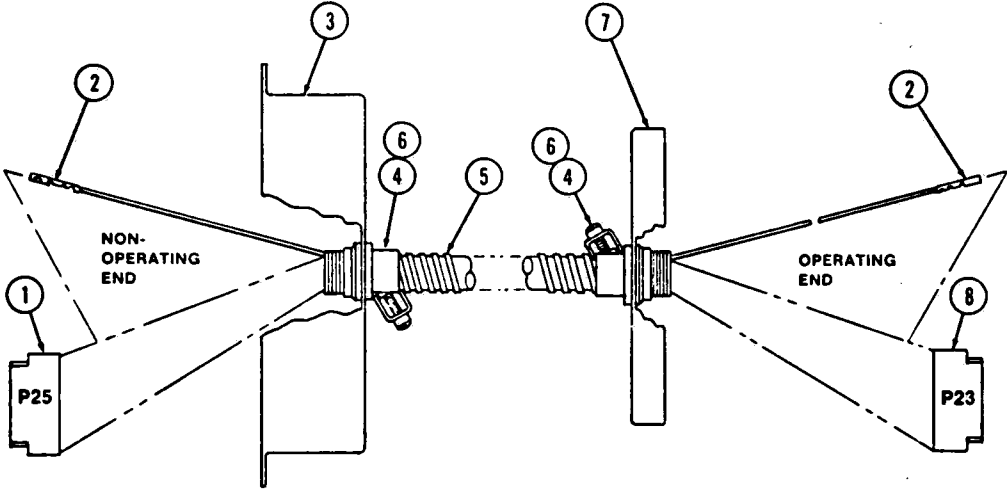


Figure 8-56. HARNESS ASSEMBLY
(Units with Printcon)

FIG. & INDEX NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY		
8-56-					UNITS WITH PRINTCON:			
					HARNESS ASSEMBLY, Double Door Primary Panel.....	X		
	1	P	84229	005	HOUSING, Receptacle, P25	1		
	2	P	84187	003	CONTACT	42		
	3	P	136798	001	ENCLOSURE	1		
	4	P	150030	001	CONNECTOR, Straight, 1/2 Conduit	2		
	5	P	91666	091	CONDUIT, Flex, 1/2 x 50	1		
	6	P	150122	001	BUSHING, Anti-Short	2		
	7	P	129084	001	BOX, Adapter	1		
	8	P	84229	006	HOUSING, Receptacle, P23	1		

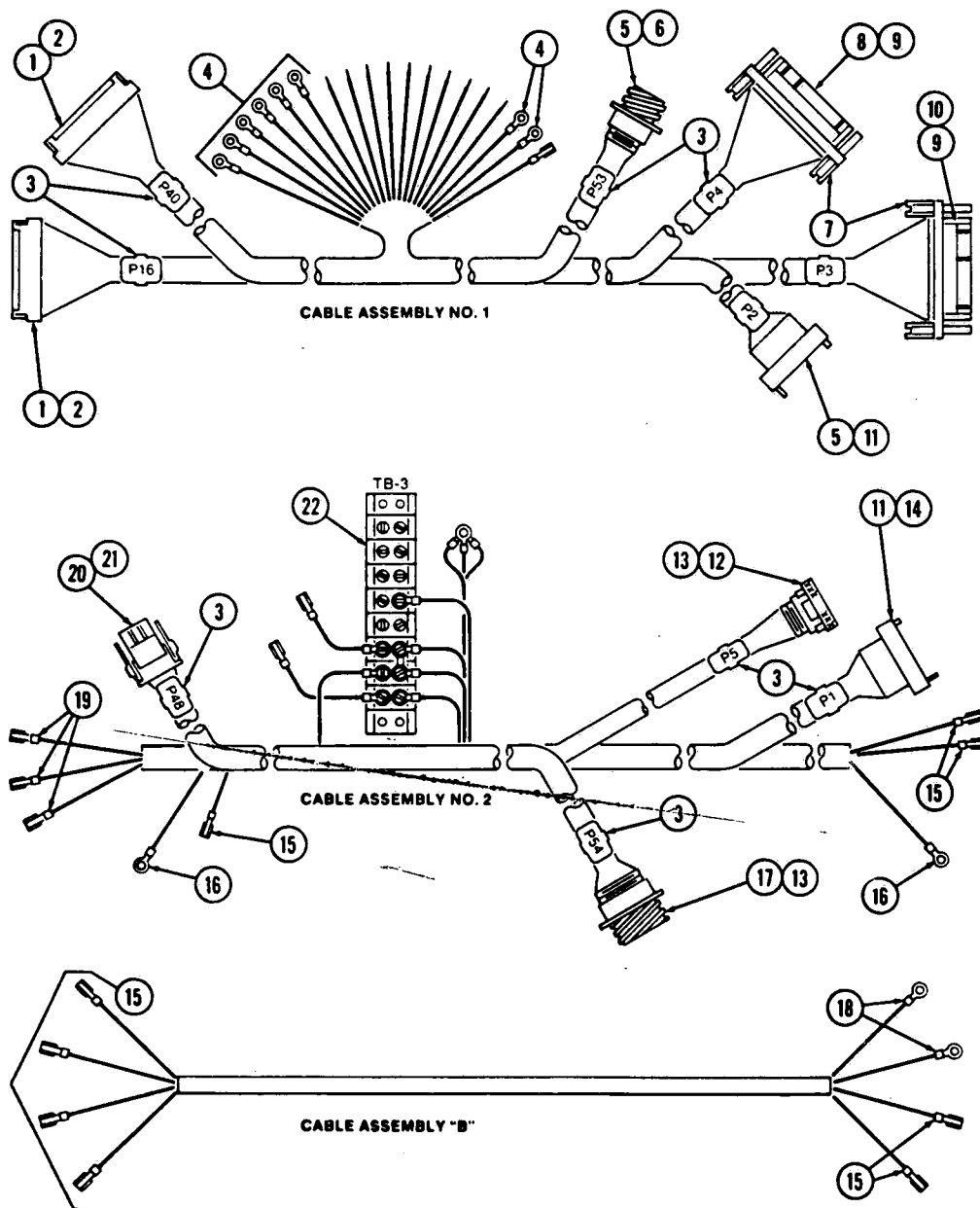


Figure 8-57. HARNESS ASSEMBLY: Secondary Panel, Vacuum
(Units With Printcon)

8-116

D- 13

Rev. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
8-57-			UNITS WITH PRINTCON:	
			HARNESS ASSEMBLY: Secondary Panel, ...	X
1	P 84187 003		CONTACT, Socket, P16 and P40	60
2	P 84229 002		HOUSING, Connector, 36 Position, P16 & P40	2
3	P 150822 003		MARKER, Tie	10
4	P 129278 001		TERMINAL, Wire, #6 Ring x 22-26 AWG	8
5	P 150822 032		CONTACT, Socket, P2 and P53	16
6	P 93443 005		RECEPTACLE, 14 Position, P53	1
7	P 84192 001		JACKSCREW, Female	4
8	P 84205 002		HOUSING, Pin, 38 Position, P4	1
9	P 84207 002		PIN, Contact, P3 and P4	43
10	P 84205 001		HOUSING, Pin, 28 Position, P3	1
11	P 93829 001		BLOCK, P1 and P2	2
12	P 93838 002		PLUG, 16 Position, P5	1
13	P 84198 004		SOCKET, Contact, P5 and P54	19
14	P 150822 042		PIN, Contact, P1	7
15	P 32119 091		RECEPTACLE, 1/4 Lug x 14-16 AWG	9
16	P 14592 091		TERMINAL, #10 Ring x 14-16 AWG	2
17	P 93443 006		RECEPTACLE, 37 Position, P54	1
18	P 14591 091		TERMINAL, Wire, Ring x 14-16 AWG	2
19	P 90695 091		RECEPTACLE, 1/4 Lug x 18-22 AWG	5
20	P 129352 121		HOUSING, Socket, 9 Position, P48	1
21	P 84220 003		CONTACT, Socket, P48	8
22	P 90627 091		BLOCK, Terminal, 8 Position, 15 A	1

8-117

D- 14

Rev. 4/86

SECTION 9

EAGLE® 2300 SERIES SCIENTIFIC UNITS



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9.1 GENERAL

The 2300 series is similar to the 2000 series with Printcon™ except for some hardware and program changes. This section will provide these differences and refer the user to pertinent sections (noting any changes) of this manual. The 2300 series is **only** available with Printcon™ control; therefore, any paragraphs or figures for the Indicator-Recorder-Controller (IRC) should be disregarded. Before beginning any procedures, review **SUMMARY OF SAFETY PRECAUTIONS** at beginning of this manual.

9.2 GENERAL INFORMATION

NOTE: This Paragraph replaces **Section 1** located in the front of this manual.

The product literature following this paragraph contains factual data relating to the principal descriptive and identifying characteristics of particulars for EAGLE 2300 sterilizers. The literature is informational rather than instructional. It provides and conveys, textually and illustratively, a general concept of the equipment, its purpose, capabilities, limitations, and technical specifications.

NOTE: For Material Handling Accessories, refer to Tech Data SD-325 included in **Section 1** of this manual.

9.3 OPERATING INSTRUCTIONS

NOTE: This Paragraph replaces **Section 2** located in the front of this manual.

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

9.3.1 Before Operating The Equipment

1. Be sure that chamber drain strainer is clean and in place and that chamber interior is clean (*Paragraph 4.5*).
2. Open the upper access door.
 - a. Be sure manual control is turned to OFF.

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

3. Open the door on the secondary control panel and position the POWER and CONTROL switches to ON. Primary control panel lights up and all LEDs on the Printcon display light momentarily for a lamp test to assure the operator that the system is functioning. The printer records the time and date that the power is turned ON.

4. Check for correct time and date by pressing the TIME or DATE pushbutton. To change either, press the FORWARD or REVERSE pushbutton until the correct time/date is displayed.

5. Check paper roll. A colored warning stripe will appear on the paper when the roll is near its end. A single ply roll lasts approximately two months and double ply rolls one month. See *Paragraph 7.17, Changing Paper*, if replacement is necessary.

6. Check the printout to assure that the inked ribbon cartridge is providing adequate ink. A fresh cartridge should last approximately 3 to 4 months. See *Paragraph 7.17, Changing The Inked Ribbon Cartridge*, if replacement is necessary.

NOTE: The visual display and printout of printer can optionally be set to indicate temperature in degrees Fahrenheit or Celsius and pressure can be either in English (PSI gauge and inches Hg vacuum) or metric (kg/cm² gauge and mm Hg). LEDs on display indicate which units are being displayed. The display of temperature and (English) pressure can be either single precision (no decimal) or extended precision (one decimal). Metric pressure shows one or two decimal places. Metric vacuum shows no decimal places. See *Paragraph 7.18, Changing Units of Display*.

Unit is factory set so that the printout during STERILIZE phase only includes beginning time, temperature and pressure points. This can be changed, however, so that the printing of time, temperature and pressure can be done at continuous

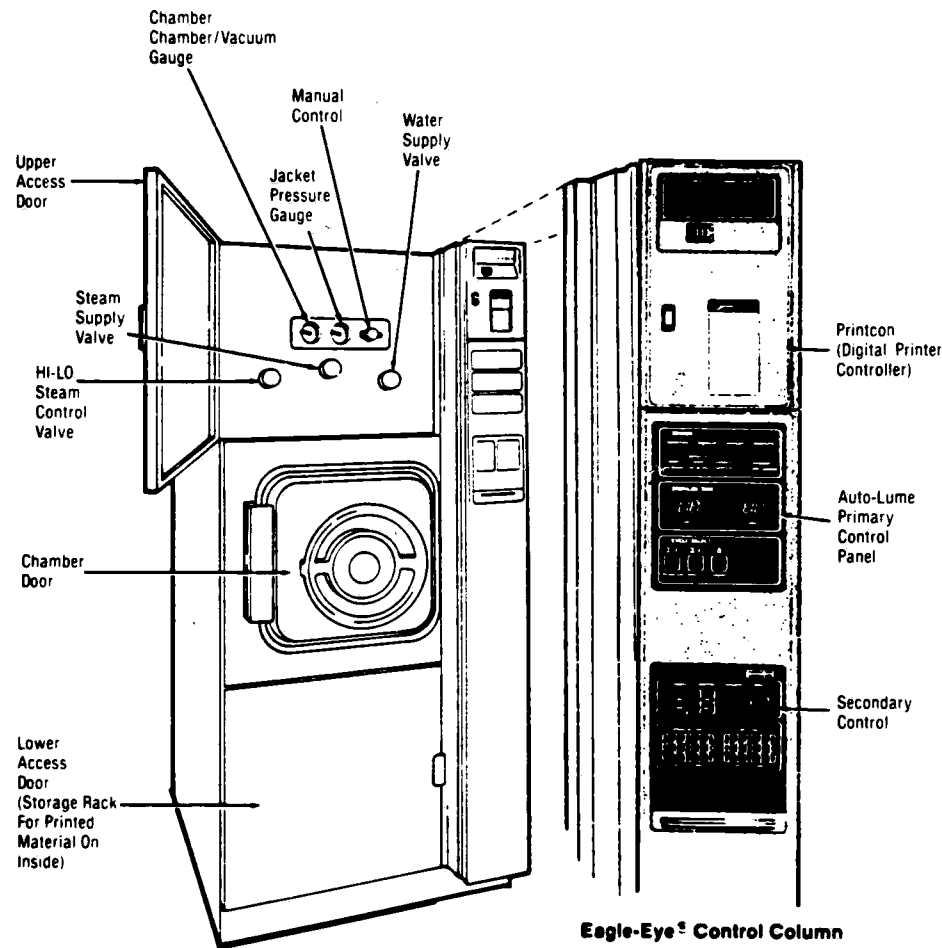


Figure 9-1. CONTROL LOCATIONS, OPERATING END.

intervals throughout STERILIZE phase. The time of interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See Paragraph 9.8, *Changing Sterilize Printout Intervals*.

7. Review Paragraph 9.3.6, *Control Monitoring and Communication Systems*, in order to identify the cause of any abnormal condition during a sterilization cycle.

8. If a double-door unit, review Paragraph 9.3.7 to become familiar with the controls on the non-operating end.

9. Wait until jacket pressure has stabilized before starting a cycle.

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

9.3.2 Automatic Operation: Prevacuum Cycle (Wrapped and Unwrapped Goods)

1. Follow instructions in Paragraph 9.3.1, *Before Operating the Equipment*.

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

3. Open the door on the secondary control panel.

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

b. For routine loads, dial 04 minutes on the sterilize time thumbwheel switches.

c. Dial the desired drying time on the thumbwheel switches. This time will be displayed for 5 seconds on primary control panel. Following this 5 seconds, panel will return to sterilize time unless dry time is changed again. For wrapped goods, dry time can vary (usually between 5 and 20 minutes) depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures.

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

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 270 F (132 C). This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range,

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

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive features assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to Paragraph 7.18, *Adjusting the Sterilize Temperature Overdrive*.

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

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

7. Turn PREVACUUM cycle selector. Light comes on to full brightness. Status light CONDITION comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points.

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

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure. Unit is factory set so that time, temperature and pressure are printed out at one-minute intervals. However, this setting can be changed. The printout time interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See Paragraph 9.8, *Changing Sterilize Printout Intervals*.

```

  ALARM:    TOO LONG
  C 1 45F 265.9 20 4P
  
```

No. 1 — Condition Phase Too Long.

```

  S 11 05A 266.4 25 5P
  ALARM:    UNDER TEMP
  S 11 04A 269.9 27 3P
  
```

No. 2 — Sterilizing Temperature Drops.

```

  ABORT:    DOOR OPEN
  • 9 58A 243.3 12 7P
  
```

No. 3 — Chamber Door Switch Not Made.

```

  POWER ON AT 8-18-82
  • 9 34A 120.5 10 4P
  
```

No. 4 — Power Restored After Power Failure.

```

  ABORT:    RESET BUTTON
  • 12 12A 379.4 22 2P
  
```

The RESET button is pressed.

```

  POWER ON AT 8-18-82
  9 01A 63.4 0 0P
  
```

The power is turned on.

```

  ALARM:    TEMP SENSOR
  • 9 15F 306.8 0 0P
  
```

Temperature sensor failure is detected.

```

  ALARM:    PRES SENSOR
  • 1 12P 110.7 41 3P
  
```

Pressure sensor failure is detected.

Figure 9-2. PRINTCON MESSAGES.

9. When sterilize timer times out, EXHAUST light comes on. Steam DRY TIME digital readout begins to count down. The printed record will show the time the EXHAUST phase begins and the temperature and pressure transition points.

10. When dry timer times out, air is admitted to the chamber to relieve the vacuum. When vacuum is sufficiently relieved, COMPLETE light comes on, and buzzer sounds. Open chamber door (step 5). Sterilized

goods may be removed from the machine. The printed record will show the time the cycle finished, the sterilize and dry time, and the total cycle time.

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

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

9.3.3 Automatic Operation: Gravity Cycle

1. Follow instructions in Paragraph 9.3.1, *Before Operating The Equipment*.

2. Refer to Table 9-1 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to HI for the 270 F (132 C) sterilizing cycle, or to LO for the 250 F (121 C) sterilizing cycle.

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

3. Open the door on the secondary control panel.

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

b. Dial the correct exposure period (Table 9-1) on STERILIZE TIME thumbwheel switches.

c. Dial the desired drying time on the thumbwheel switches. This time will be displayed for 5 seconds on primary control panel. Following this 5 seconds, panel will return to sterilize time unless dry time is changed again. For wrapped goods, dry time can vary (usually between 5 and 20 minutes) depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures (refer to Section 3). For unwrapped goods, drying time is not required, however, a minimum of 02 minutes will eliminate excess steam vapors prior to opening chamber door. Set times are displayed on the primary control panel. Once the cycle is started, these times are locked in and cannot be changed.

4. Using the thumbwheel switch on the Printcon unit, set the sterilize temperature to 250 F (121 C) or 270 F (132 C). This setpoint will be displayed for about 3 seconds before the chamber drain temperature is redisplayed. If selected temperature is outside the allowable range, 150-295 F (65-146 C), the buzzer sounds until an allowable temperature is selected. This temperature is locked in and cannot be changed once the cycle is started.

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to Paragraph 7.18, *Adjusting the Sterilize Temperature Overdrive*.

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

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

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

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

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure. Unit is factory set so that time, temperature and pressure are printed out at one-minute intervals. However, this setting can be changed. The printout time interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See Paragraph 9.8, *Changing Sterilize Printout Intervals*.

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

10. When exhaust phase is completed, panel light COMPLETE comes on and buzzer sounds. Open chamber door (step 5), load may be removed from the sterilizer. The printed record will show the time the cycle finished, the sterilize and dry time, and the total cycle time.

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

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

9.3.4 Automatic Operation: Liquids Cycle

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

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

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

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

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

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

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

1. Follow instructions in Paragraph 9.3.1, Before Operating The Equipment.

2. Refer to Table 9-2 and select the desired sterilizing temperature. Open the upper access door and turn HI-LO valve to LO.

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

3. Open the door on the secondary control panel.

TABLE 9-1. MINIMUM STERILIZATION EXPOSURE PERIOD — WRAPPED AND UNWRAPPED GOODS GRAVITY CYCLE ONLY.

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

TABLE 9-2. MINIMUM RECOMMENDED EXPOSURE TIMES FOR FULL LOAD OF SQUARE-PAK® FLASKED SOLUTIONS 250° F (121° C) TEMPERATURE SETTING.

ITEMS	TEMPERATURE SETTING	
	250° F (121° C) MINUTES	270° F (132° C) MINUTES
Dressing, wrapped in paper or muslin	30	15
Glassware, empty, inverted	15	3
Instruments, metal only, any number (unwrapped)	15	3
Instruments, metal, combined with suture, tubing or other porous materials (unwrapped)	20	10
Instruments, wrapped in double thickness muslin or equal	30	15
Linen packs (maximal size: 12"x12"x20"; maximal weight 12 pounds)	30	—
Treatment trays, wrapped in muslin or equal	30	15
Utensils, unwrapped	15	3
Utensils, wrapped in muslin or equal	30	15

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

b. Set STERILIZE timer thumbwheels to appropriate time... see Table 9-2. Set time will be displayed on the primary control panel; however, during a LIQUIDS cycle, controller automatically disregards any DRY time setting. Once the cycle is started, the STERILIZE time will be locked in and cannot be changed.

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

NOTE: Printcon is calibrated to control the temperature at approximately 3 F (1.7 C) above the thumbwheel setpoint. This overdrive feature assures effective load temperature control and provides for the shortest possible cycle time. However, for special applications, this overdrive feature is adjustable. Refer to Paragraph 7.18, Adjusting the Sterilize Temperature Overdrive.

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

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

7. Touch LIQUIDS cycle selector. Light comes on to full brightness. Status light CONDITION comes on; also WARNING HOT LIQUIDS light comes on. The printed record will show the time the CONDITION phase begins and the temperature and pressure transition points.

NOTE: If you push the wrong cycle selector, simply press and release the RESET pushbutton on the secondary panel. Earlier selected cycle light will go

out. Touch selector for correct cycle. Cycle light will come on; status light CONDITION will come on and new cycle will begin. The printer will record the time the RESET button was depressed and will print "ABORT: RESET BUTTON" on the tape. It will then record the new cycle data.

8. After condition phase is completed, STERILIZE light comes on and remains on for the duration of the sterilize phase. Steam STERILIZE TIME digital readout begins to count down when sterilizing temperature is reached. The printed record will show the time the STERILIZE phase begins and the temperature and pressure. Unit is factory set so that time, temperature and pressure are printed out at one-minute intervals. However, this setting can be changed. The printout time interval is adjustable in 30-second increments with a total range from 30-seconds to 49 minutes, 30 seconds. See Paragraph 9.8, Changing Sterilize Printout Intervals.

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

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

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

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

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

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

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

9.3.5 Manual Operation: Gravity (Wrapped or Unwrapped Goods) or Liquids Cycle

NOTE: Manual control is a feature on this sterilizer. However, a prevacuum cycle cannot be achieved manually.

1. Follow steps 1, 2 and 9 in Paragraph 9.3.1, Before Operating The Equipment. The CONTROL switch must be positioned at OFF when using manual operation.

2. Open the upper access door.

3. Determine desired processing temperature (270 F [132 C]) or 250 F [121 C] for Gravity cycle; 250 F [121 C] for Liquids cycle). See Table 9-1 or 9-2.

4. Set HI-LO valve as follows:

a. **For 250 F (121 C) operation** — refer to paragraph 7.15 for instructions on loosening front stop on pressure regulator; then turn valve counterclockwise until jacket pressure gauge reads between 15 and 18 psig (1.056 and 1.267 kg/cm²).

NOTE: If normal LO setting is used for manual operation, chamber temperature will be approximately 250 F (126 C).

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

NOTE: See Figure 7-12 for pressure and temperature relationships.

WARNING: WHEN OPERATING A LIQUIDS CYCLE YOU MUST OBSERVE THE PRECAUTIONS LISTED IN PARAGRAPH 9.3.4. FAILURE TO FOLLOW THESE PRECAUTIONS COULD RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

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

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

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

8. After Condition phase, turn selector to STERILIZE. When chamber reaches desired pressure, begin timing. After correct sterilization period, proceed to next step.

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

9. If a Liquids cycle, turn selector to SLOW EXHAUST and keep it in this position until chamber pressure is atmospheric (0 psig). Then turn selector to OFF position, omitting the DRY phase. Crack the door open about 1/2" and wait for at least 10 minutes.

If a Gravity cycle, turn the selector to the FAST EXHAUST position until chamber pressure is between 4 and 6 psig (0.28 and 0.42 kg/cm²). If the load consists of wrapped goods, turn the selector to the DRY position. Begin timing. After drying period, turn selector to OFF position. If the load is unwrapped goods, turn selector directly to OFF position.

10. Load may be removed from the sterilizer.

9.3.6 Control Monitoring and Communication Systems

To ensure the validity of the sterilizing process, the automatic control continually monitors the cycle. Should one of the following conditions occur, you will be notified as indicated (Figure 9-2).

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

INDICATION: CONDITION light on primary control panel flashes, buzzer sounds intermittently and a permanent record is printed.

OPERATOR SHOULD:

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

2. Refer to Section 8, TROUBLESHOOTING to see if problem can be determined and corrected without interrupting cycle (e.g., HI-LO valve is incorrectly set).

3. If problem cannot be corrected so that conditioning phase can be completed (i.e., chamber reaches set sterilizing temperature), press cycle RESET button on secondary control panel to abort cycle. Do not proceed further until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

4. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open 1/2" and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Correct problem.

c. Reprocess load.

CONDITION NO. 2: Temperature drops 2 F below set point.

INDICATION: STERILIZE light on primary control panel flashes, STERILIZE timer display resets and a permanent record is printed.

OPERATOR SHOULD:

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

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

3. If problem cannot be corrected so that sterilizing phase can be completed, press cycle RESET button on secondary control panel to abort cycle. Do not proceed further until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

4. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open 1/2" and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Correct problem.

c. Reprocess load.

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

INDICATION: DOOR UNLOCKED light(s) on primary control panel comes on, buzzer sounds intermittently and a permanent record is printed.

OPERATOR SHOULD:

1. Press cycle RESET button on secondary control panel. Do not proceed further until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

2. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open 1/2" and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

b. Correct problem.

c. Reprocess load.

CONDITION NO. 4: Loss of electricity.

INDICATION: Primary control panel goes dark.

OPERATOR SHOULD:

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

2. Press cycle RESET button, but do not proceed until chamber is at atmospheric pressure. The printer records the time the RESET button is depressed and prints "ABORT: RESET BUTTON."

3. When chamber is at atmospheric pressure:

a. If a Liquids cycle was in progress, crack door open 1/2" and wait for at least 10 minutes. The printer records the time the door is opened and prints "DOOR OPEN."

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

Additional printouts are provided whenever:

1. The RESET button is pressed.

2. The power is turned ON.

3. Temperature sensor failure is detected.

4. Pressure sensor failure is detected.

9.3.7 Controls and Signals for Double-Door Sterilizers

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

1. Cycle selectors: **PREVACUUM** and **LIQUIDS**. If you wish to repeat the previous prevacuum or liquids cycle, and all preparatory actions (Paragraph 9.3.1) have been made, you may do this from the non-operating end by touching the appropriate selector.

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

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

9.4 PRINCIPLES OF OPERATION

1. Use the instructions found in **Section 3** located previous to this section, noting Printcon paragraphs.

2. Replace Figure 3-20 with Figure 9-3.

9.5 INSPECTION AND MAINTENANCE

1. Use the instructions found in **Section 4** of this manual.

9.6 FIELD TEST PROCEDURE

NOTE: This Paragraph replaces **Section 5** of this manual.

Every sterilizer must be tested and inspected according to this procedure on initial start-up or whenever an adjustment or repair has been made. Keep a record of the test on the recorder chart or printout. Each test must meet the standards of material, workmanship and performance set forth in this procedure. Potentiometer must be used on each test. Refer to **Section 7**, should mechanical problems arise or adjustments be required.

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

NOTE: Voltmeter indications referred to in this procedure are approximations. A variance of 0.5 volts is acceptable.

1. Test Instrumentation Required:

- Potentiometer and thermocouple leads.
- Calibrated compound test gauge (30" vacuum and 100 psig).
- Calibrated absolute pressure gauge (0-100 mm Hg) with ball valve.
- Voltmeter or LED test light.
- Spirit level.

2. Check for proper installation as per *Paragraph 5.3*.

3. Adjust cooling water valves and slow exhaust valve as per *Paragraph 5.4* and Fig. 5-2. **Note:** The slow exhaust setting is preliminary.

4. Install potentiometer thermocouple lead in metal-to-metal contact with the temperature probe (from 1/2" to 1-1/2" of the tip). Run the lead through the door (between the door gasket and end ring).

5. Install a calibrated absolute pressure gauge and manual shut-off valve to the chamber gauge fitting after removing the compression fitting and reducing bushing (Fig. 8-53, 15 and 17). This gauge should have 1 mm. Hg. resolution and a 0-100 mm. Hg. range.

6. Verify door switch adjustment as per *Paragraph 5.7*.

7. Test the safety valve as per *Paragraph 5.8*.

8. Adjust the steam pressure regulator as per *Paragraph 5.9, steps 1 through 3*.

9. Set the HI-LO valve to HI. Adjust the rear stop ring so that the jacket maintains 33 ± 1 psig pressure.

10. Open the display overlay door by unfastening the self-tapping screw at the top right of the door.

Check the pressure and vacuum rotary BCD switches for the following settings:

- | | |
|-----------------------------------|-------------------------------------|
| PS-1: 52 (26 psig) | VS-1: 20 (10 in. Hg) |
| PS-2: 02 (1 psig) | VS-2: 04 (2 in. Hg) |
| PS-3: 06 (3 psig) | VS-4: 04 (Purge time: 1 minute)* |
| PS-5: 00 (Machine type: standard) | VS-5: 02 (Print interval 1 minute)* |

*See *Paragraph 9.8*.

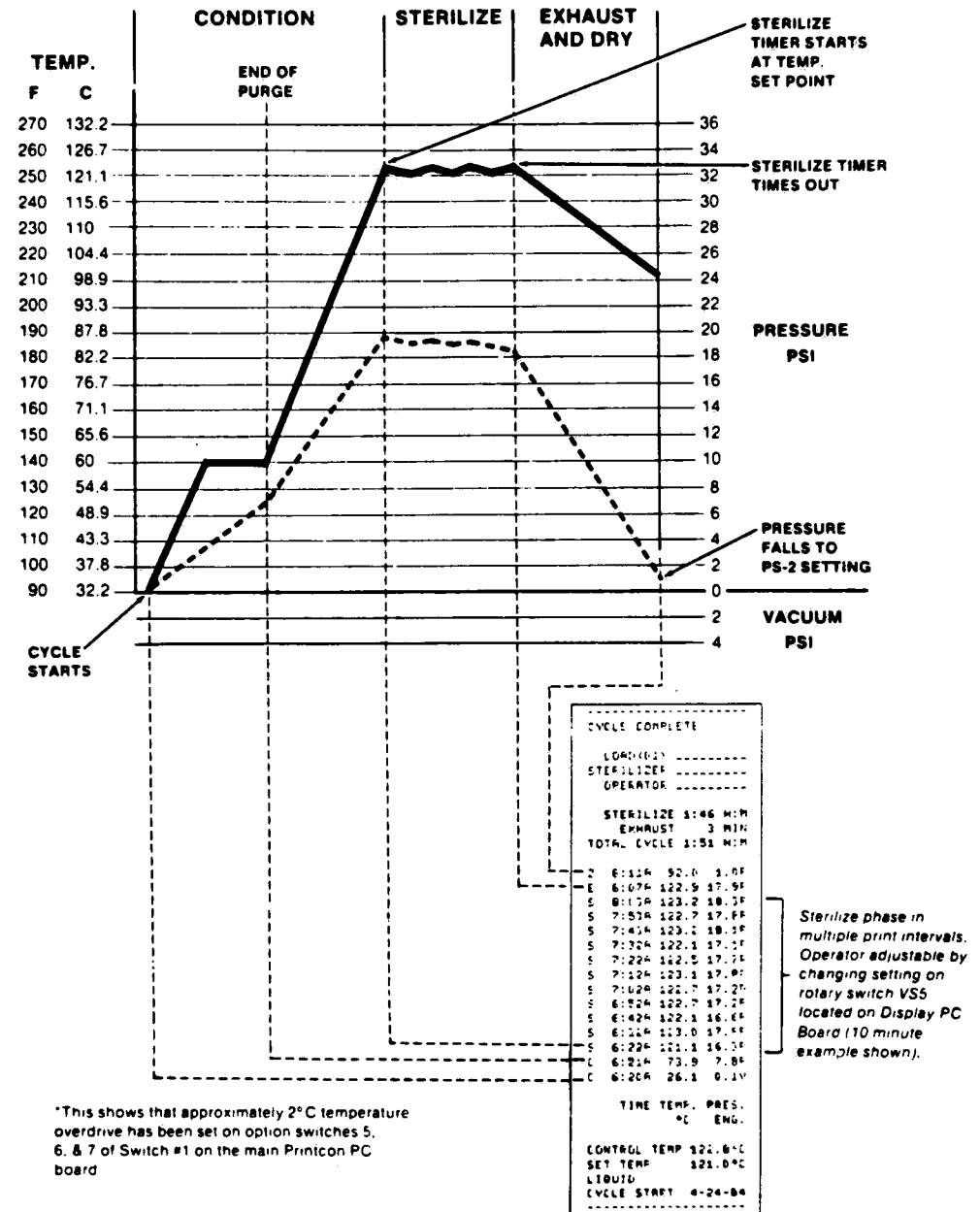


Figure 9-3. PRINTED CYCLE RECORD: Liquid Cycle.

Close the display overlay door and replace the screw.

11. Check the service switch on the main Printcon PC board for the following settings. (See **Section 7**, if necessary, for access instructions):

Temperature — °F (#1 OFF)
Pressure — English (#2 OFF)
Display precision — Extended (#3 ON)
Transducer — Strain gauge — (#4 ON)
Temperature overdrive — Normal (#5 OFF, #6 and #7 ON)

Check the alternate positions on #1, #2 and #3 for proper digital display. Set sterilize temperature to 270 F.

12. Open control end door. Turn POWER and CONTROL switches ON. All lamps and digits on the Printcon display panel will come on for a 3 second lamp test. DOOR UNLOCKED lamp must come on. **Pressure display should read 0.0.**

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

```

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

```

The following must be displayed:

- Actual and F lamps ON.
- Sterilize time displays must match thumbwheel settings. The DOOR OPEN message will be printed as shown above.
- Cycle selectors for Liquids, Prevacuum, and Gravity cycles (at half illumination.)

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

13. Try to start all cycles. No cycle should start with the door(s) open.

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

15. Change the temperature setting by 1 F. The new set point must be displayed for 2 seconds and the SET lamp must be on. Check all temperature thumbwheel digits to insure that the display matches the setting.

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

```

RESET BUTTON
* 2:37P 76.0 0.5V

```

17. Set the time and date if not correct. Turn CONTROL switch OFF and then ON again. If battery is functioning correctly, time and date will be retained.

18. Check paper advance toggle switch. Forward position continuously feeds paper through printer. Center position is off. Rear position runs take-up motor until the paper platen is depressed (microswitch activates).

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

20. Check printed record quality. Quality of print-out (or top copy) should conform to the examples in this procedure. Check for compressed digits (indicates printer motor speed too slow, or a drag on the paper roll).

21. Close and lock door(s). Start any cycle. Immediately abort it with the RESET button. This message must be printed.

```

ABORT: RESET BUTTON
* 2:37P 76.1 0.0P
C 2:37P 76.0 0.0P

```

22. Start any cycle. Immediately turn the CONTROL power OFF and then ON again. The POWER ON message must be printed. An intermittent buzzer will sound.

```

-----
POWER ON AT 4-01-82
2:38P 76.1 0.2V
-----

```

23. Set the sterilize temperature to 295 F. Initiate a GRAVITY cycle. Wait until the timed steam purge is completed and the pressure has risen to the regulator setting and stabilized. The temperature displayed should agree with the potentiometer to within ± 1 F. The pressure displayed should agree with the pressure gauge to within 0.5 psig. If not, adjust potentiometer P2 on the main Printcon CP board until these pressures agree. Then, adjust P9 for temperature, if necessary.

Abort the cycle with the RESET button and exhaust the chamber through the manual control. When exhausted to less than 1 psig, open the door and let all vapors escape. **With the door open**, turn power OFF and then ON again. Restart a 295 F GRAVITY cycle. With the pressure and temperature stabilized as before, the pressure should agree with the gauge to within 0.5 psig. If not, a realignment of the main Printcon PC board is indicated.

NOTE: A properly calibrated Printcon control is likely to be more accurate than the measuring devices. Therefore, the measuring devices should be calibrated against NBS (National Bureau of Standards) traceable equipment and the inaccuracies of the measuring devices should be known (via a calibration report sheet).

24. Perform the chamber vacuum leak test as outlined in *Paragraph 5.10*. Then, disconnect the measuring devices and reconnect the chamber gauge.

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

25. Close and lock the door(s). Set STERILIZE and DRY times to 5 minutes each. Set the temperature thumbwheels to 250 F. Initiate a GRAVITY cycle. Reference Table 5-3 for proper valve actuation and correct phase times. The printer must print cycle information at the following times:

- Start of cycle.
- End of 1 minute purge.
- Start of STERILIZE phase. Data, depending on setting of VS-5, will be printed at set time intervals throughout STERILIZE phase.
- Start of EXHAUST phase.
- End of EXHAUST phase.
- Door open.

Refer to **Section 3** for the correct format. Check to make sure that the STERILIZE temperature is maintained between 252.5 F and 253.5 F.

26. Repeat for a 250 F LIQUIDS cycle. Refer to Table 5-2. Check printout for correct format as shown in **Section 3**.

Adjust the slow exhaust valve as necessary to obtain 5-7 minutes exhaust time from start of EXHAUST phase to PS-3 set-point (3 psig factory set). (S3 solenoid will open.)

27. Repeat for a 270 F PREVACUUM sterilization cycle except set a 4 minute sterilize time. Refer to Table 5-4. Check printout for correct format as shown in **Section 3**.

NOTE: Component degradation which may not cause an actual control alarm is evidenced by:

- Slow charge time to temperature set-point.
- Excessive temperature make-ups in the STERILIZE phase.
- Excessively rapid or slow EXHAUST time.
- Calibration inaccuracies in the Printcon control.
- Chamber vacuum leaks.

28. Start a 250 F GRAVITY cycle, with 5 minute sterilize time set. After the STERILIZE phase is achieved, turn off the steam supply (use knob on valve panel). At 247.9 F, the following must occur:

- STERILIZE lamp flashes.
- The timer resets.
- The following format is printed:

```

S 2:41P 250.0 21.9P
* 2:41P 244.1 21.9P
ALARM: UNDER TEMP
* 2:41P 247.9 21.9P

```

Temperature falls 0.1 F under 240 F. These two lines are printed.

Reopen steam valve. As soon as 250 F is reestablished, the lowest temperature reached during the alarm condition is printed.

29. Check all positions of the Manual control knob for proper operation — door(s) closed and locked.

9.7 TROUBLESHOOTING

1. Use the instructions found in **Section 6** of this manual, noting Printcon paragraphs.

2. Use Table 6-2 for Troubleshooting Chart. **Note:** For references to Printcon control column and components Illustrated Parts Breakdown (IPB) (Figures 8-15, 8-16, 8-44, 8-45, 8-46, 8-50, 8-55 and 8-57) refer instead to appropriate IPB found following *Paragraph 9.9*.

3. The schematics listed in Table 6-8 refer both to IRC and Printcon 2000 units. Refer only to the schematics listed below and disregard the remainder.

- PIPING SCHEMATIC: Printcon
- PRINTED CIRCUIT BOARD: Basic 146586
- PRINTED CIRCUIT BOARD: Expander 146588
- PC ASSEMBLY: Power Supply (Printcon) 146633-051

4. The following schematics are pertinent to the 2300 units only and can be found following the IPB Figures of this Section.

- ELECTRICAL SCHEMATIC, Eagle 2300 Vacumatic and Gravity 146645-607
- MAIN PRINTCON PC BOARD, Eagle 2300 146654-002

9.8 COMPONENT REPAIR, REPLACEMENT, AND ADJUSTMENT

1. Use the instructions found in **Section 7** of this manual, especially noting Printcon paragraphs while disregarding IRC Paragraphs.

NOTE: Conditioning Pulses for Eagle 2300 Units may vary from 0-7, while Eagle 2000 Units may vary from 0-15 (Paragraph 7.12).

2. Paragraph 7.18, *Printcon Digital Display*, describes procedures for the Secondary Panel and Display Printed Circuit Board. Two additional adjustments capable on Eagle 2300 Units are: Changing Sterilize Printout Intervals and Changing Unit Purge Times. The respective procedures for the above adjustments are as follows:

a. Changing Sterilize Printout Intervals

- 1) Open the unit outer door.
- 2) Remove the #6 x 1/4 self tapping screw from the upper right-hand corner of the display panel door. This permits door opening with a left-hand swing.
- 3) Locate VS 5. VS 5 is used to set the print interval in 30 second increments during EXPOSURE phase. **Example:** VS 5 set to 10 will produce a 5 minute print interval; while VS 5 set to 29 will produce 14 minute-30 second print intervals, etc.

4) Close display panel door and refasten with screw.

5) Close the outer door.

b. Changing Unit Purge Times

- 1) Open the unit outer door.
- 2) Remove the #6 x 1/4 self tapping screw from the upper right-hand corner of the display panel door. This permits door opening with a left-hand swing.
- 3) Locate VS 4. VS 4 is used to set the purge time in 15 second increments during conditioning. **Example:** VS 4 set to 4 will produce one second purge; while VS 4 set to 99 will produce a 24 minute, 45 second purge.

4) Close display panel door and refasten with screw.

5) Close the outer door.

NOTE: In any of the procedures presented in **Section 7** reference Printcon Control Column or associated components Illustrated Parts Breakdown (IPB) (Figures 8-15, 8-16, 8-44, 8-45, 8-46, 8-50, 8-55 or 8-57), refer instead to appropriate IPB found following Paragraph 9.9.

9.9 EXPLODED VIEWS AND PARTS LISTS

1. Use the Illustrated Parts Breakdowns (IPBs) found in **Section 8** located previous to this Section, noting the following exceptions:

a. Since Eagle 2300 Series are supplied only with Printcon controls, disregard IRC IPBs:

- Figures 8-10, 8-11, 8-12, 8-13, 8-14, 8-15, 8-16, 8-17, 8-22, 8-37, 8-38, 8-39, and 8-40.

b. Since the Eagle 2300 Printcon Control is designed to handle more versatile scientific cycles, the control hardware has changed somewhat. Disregard the following Printcon IPBs (note appropriate IPBs following this paragraph):

- Figures 8-15, 8-16, 8-44, 8-45, 8-46, 8-47, 8-48, 8-49*, 8-50, 8-55 and 8-57.

*Figures 8-49A and 8-49B are applicable to Eagle 2300 Series.

2. Use the following Eagle 2300 Control IPBs as aids in troubleshooting and repair.

- Figure 9-4. CONTROL COLUMN, Eagle 2300 (Part 1 of 3).
- Figure 9-5. CONTROL COLUMN, Eagle 2300 (Part 2 of 3).
- Figure 9-6. CONTROL COLUMN, Eagle 2300 (Part 3 of 3).
- Figure 9-7. MAIN CONTROL ASSEMBLY, Eagle 2300.
- Figure 9-8. SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2).
- Figure 9-9. SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2).
- Figure 9-10. PRINTCON HOUSING ASSEMBLY, Eagle 2300.
- Figure 9-11. HARNESS ASSEMBLY, Secondary Panel, Eagle 2300 Vacumatic.
- Figure 9-12. CONNECTION DETAILS, Eagle 2300 Control Column.

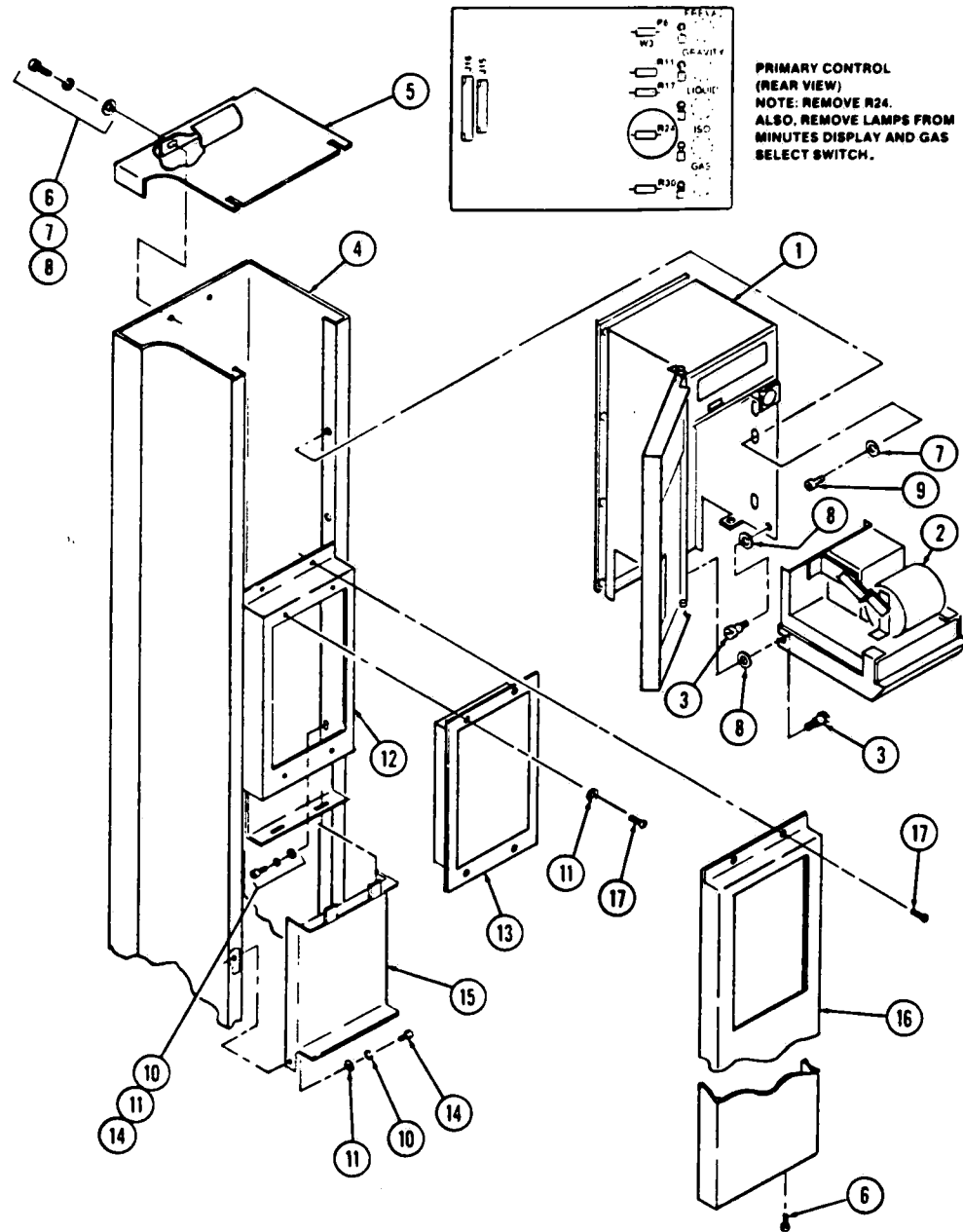


Figure 9-4. CONTROL COLUMN, Eagle 2300 (Part 1 of 3).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-4-			CONTROL COLUMN, Eagle 2300 (Part 1 of 3)	X
1			PRINTCON HOUSING ASSEMBLY (See Fig. 9-10)	1
2	P 141198	171	PRINTCON PRINTER ASSEMBLY (See Fig. 9-11)	1
3	P 150822	336	SCREW, Shoulder, #10-32	2
4	P 146649	040	HOUSING, Control	1
5	P 134449	001	COVER, RH Top	1
	P 134449	002	COVER, LH Top	1
6	P 23431	041	SCREW, Socket Head Cap, #10-32 x 3/8	4
7	P 31705	045	LOCKWASHER, #10	6
8	P 5511	091	WASHER, Flat, #10	4
9	P 45323	042	SCREW, Button Socket Head, #8-32 x 3/8	4
10	P 79588	001	LOCKWASHER, #8	6
11	P 17796	091	WASHER, Flat, #8	10
12	P 146649	006	PANEL, Mounting	1
13	P 146645	226	CONTROL, Primary	1
	P 764317	536	* LAMP (Box of 10)	26
14	P 50527	061	SCREW, Socket Head Cap, #8-32 x 1/2	6
15	P 146645	569	PANEL, Secondary Assembly	1
16	P 146649	011	PANEL ASSEMBLY, Front	1
17	P 129356	135	SCREW, Button Head Socket, #8-32 x 3/8 (Black)	2

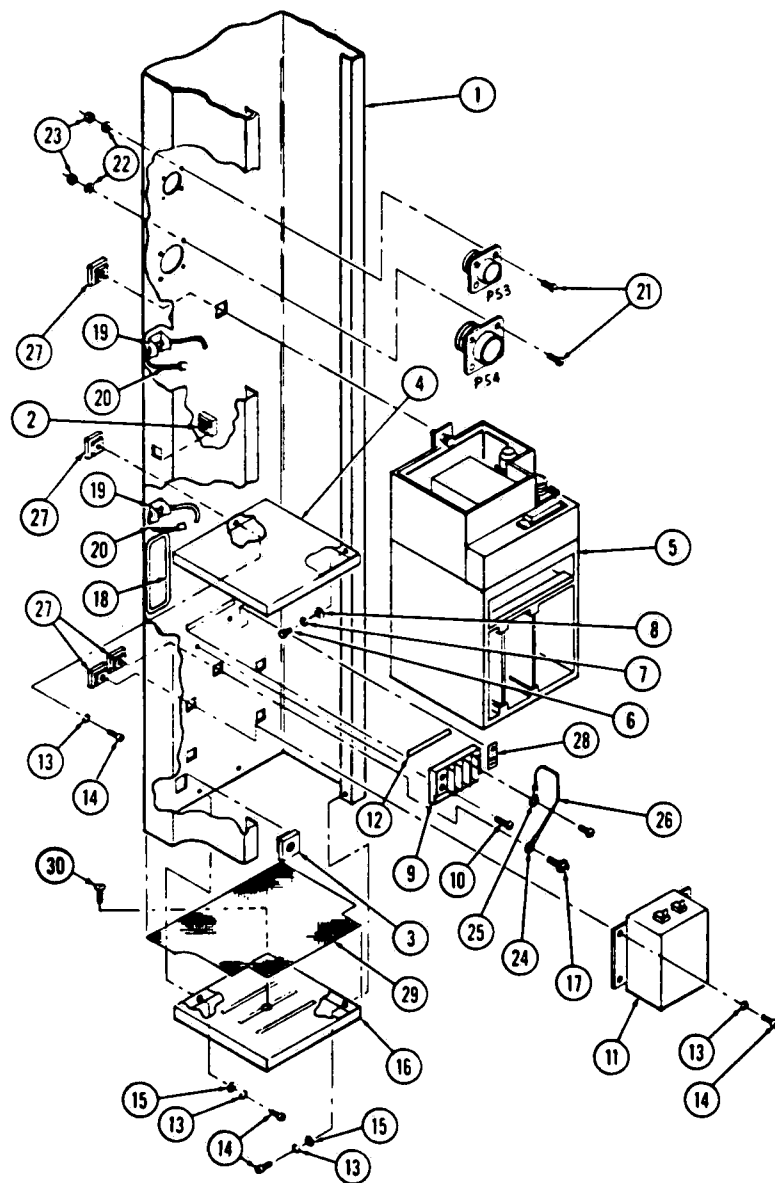


Figure 9-5. CONTROL COLUMN, Eagle 2300 (Part 2 of 3).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-5-			CONTROL COLUMN, Eagle 2300 (Part 2 of 3)	X
1			HOUSING, Control	REF
2	P 91924 091		NUT, Tinnerman, 1/4-20	6
3	P 129352 070		NUT, Tinnerman, 3/8-16	4
4	P 136759 001		SUPPORT, Controller	1
5	P 146645 895		MAIN CONTROL ASSEMBLY: (See Fig. 9-7)	1
6	P 50527 061		SCREW, Socket Head Cap, #8-32 x 1/2	2
7	P 79588 001		LOCKWASHER, #8	2
8	P 17796 091		WASHER, Flat, #8	2
9	P 90746 091		STRIP, Terminal	1
10	P 9661 041		SCREW, Round Head, #10-32 x 5/8	2
11	P 93821 001		FILTER	1
12	P 82647 001		STRIP, Marker	1
13	P 31705 045		LOCKWASHER, #10	10
14	P 23431 041		SCREW, Socket Head Cap, #10-32 x 3/8	10
15	P 5511 091		WASHER, Flat, #10	4
16	P 136588 002		PLATE, Bottom	1
17	P 82675 001		SCREW, Green Ground, #10-32	1
18	P 150783 001		GROMMET	1
19	P 129326 001		HOLDER, Wire	11
20	P 75954 091		TIE, Wire	28
21	P 3984 041		SCREW, Round Head, #6-32 x 3/8	8
22	P 5469 041		WASHER, Flat, #6	8
23	P 3037 041		NUT, Hex, #6-32	8
24	P 19522 091		TERMINAL, Wire, #10 Ring x 16-22 AWG	1
25	P 14865 091		TERMINAL, Wire, #8 Ring x 22-18 AWG	1
26			WIRE, Green	1
27	P 129352 069		NUT, Tinnerman, #10-32	8
28			TAPE, Label (Dymo or equiv.)	AR
29	P 56374 001		SCREW	1
30	P 4682 041		SCREW, Round Head, #8-32 x 3/8	1

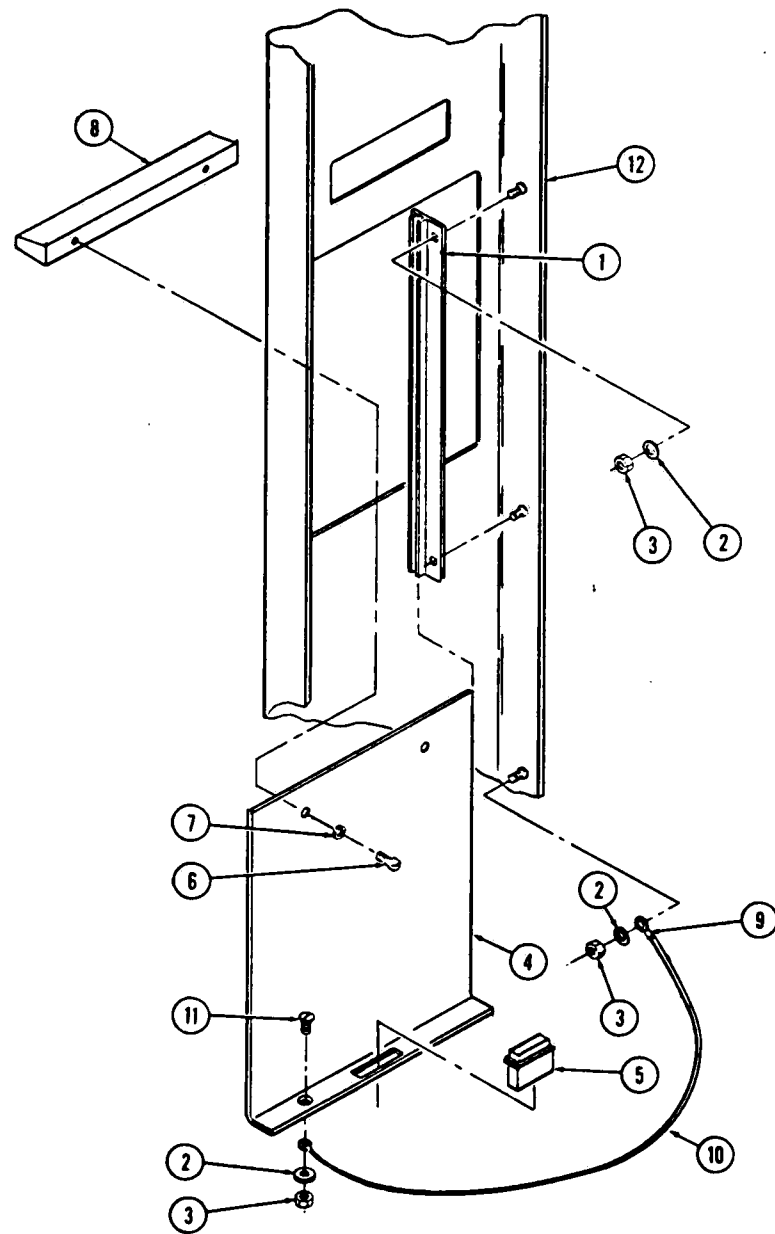


Figure 9-6. CONTROL COLUMN, Eagle 2300 (Part 3 of 3).

9-20

764084

F- 7

Add. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-6-			CONTROL COLUMN, Eagle 2300 (Part 3 of 3)	X
1	P 84394	001	SLIDE, Door	2
2	P 5469	041	WASHER, Flat, #6	6
3	P 3037	041	NUT, Hex, #6-32	6
4	P 93662	001	DOOR	1
5	P 83920	001	CATCH, Magnetic	1
6	P 4682	041	SCREW, Round Head, #8-32 x 3/8	2
7	P 79588	001	LOCKWASHER, #8	2
8	P 84393	001	HANDLE	1
9	P 90619	091	TERMINAL, #6 Ring x 18-22 AWG	2
10			WIRE, Green, 15" Lg.	1
11	P 50705	041	SCREW, Flat Head, #6-32 x 5/16	1
12			PANEL ASSEMBLY, Front, Manual Door	REF
			PANEL ASSEMBLY, Front, Power Door	REF

9-21

764084

F- 8

Add. 4/86

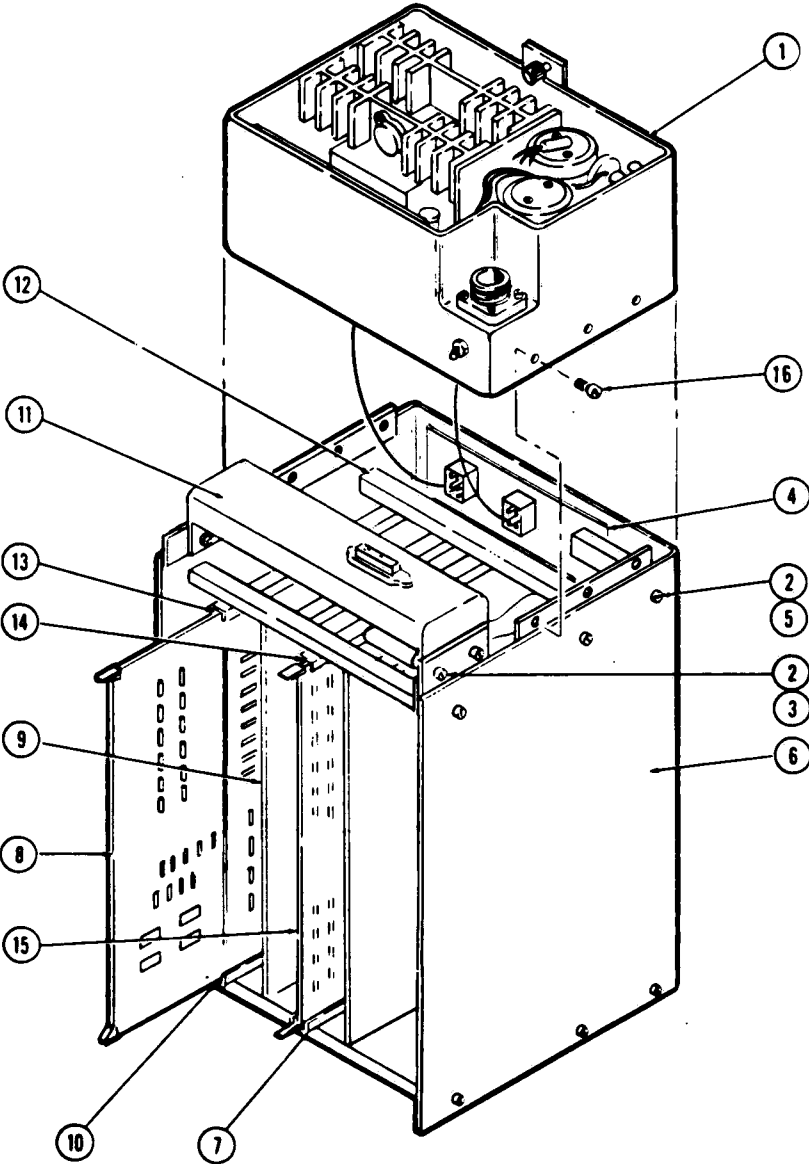


Figure 9-7. MAIN CONTROL ASSEMBLY, Eagle 2300.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-7-	P 146645 895		MAIN CONTROL ASSEMBLY, Eagle 2300	X
1	P 146645 042		POWER SUPPLY ASSEMBLY (Repaired P-764193-027)	1
	P 764317 833		• FUSE, Pico, 2 Amp, 125 V (F4)	1
	P 764317 834	*	• FUSE, Pico, 4 Amp, 125 V (F2)	1
	P 764317 836	*	• FUSE, Pico, 1/2 Amp, 125 V (F3)	1
	P 764317 771	*	• FUSE, Cartridge, 2 Amp, 250 V (F402)	1
2	P 84116 002		LOCKWASHER, #6	20
3	P 40357 045		SCREW, Self Tapping, #6 x 1/4	8
4	P 146581 004		MOTHER BOARD ASSEMBLY	1
5	P 84117 002		SCREW, Pan Head, #6-32 x 5/16	10
6	P 93762 001		CHASSIS	1
7	P 84225 001		GUIDE, Card	6
8	P 146586 051		PC CARD, CPU	1
9	P 84467 001		PLATE, Side	2
10	P 84226 001		TAB, Locking	6
11	P 93900 045		RECEPTACLE BRACKET ASSEMBLY	1
12	P 129030 001		BAR, PC Board Guide	4
13	P 83528 001		TAB, ID Locking, CPU	1
14	P 83528 007		TAB, ID Locking, I/O 1	1
15	P 146588 051		PC CARD, I/O 1	1
16	P 34461 001		SCREW, Round Head, #6 x 3/8	3
17	P 136800 561		HEAT SINK (Not Shown)	1
18	P 83528 008		TAB, ID Locking, I/O 2 (Not Shown)	1
*Box of Five.				

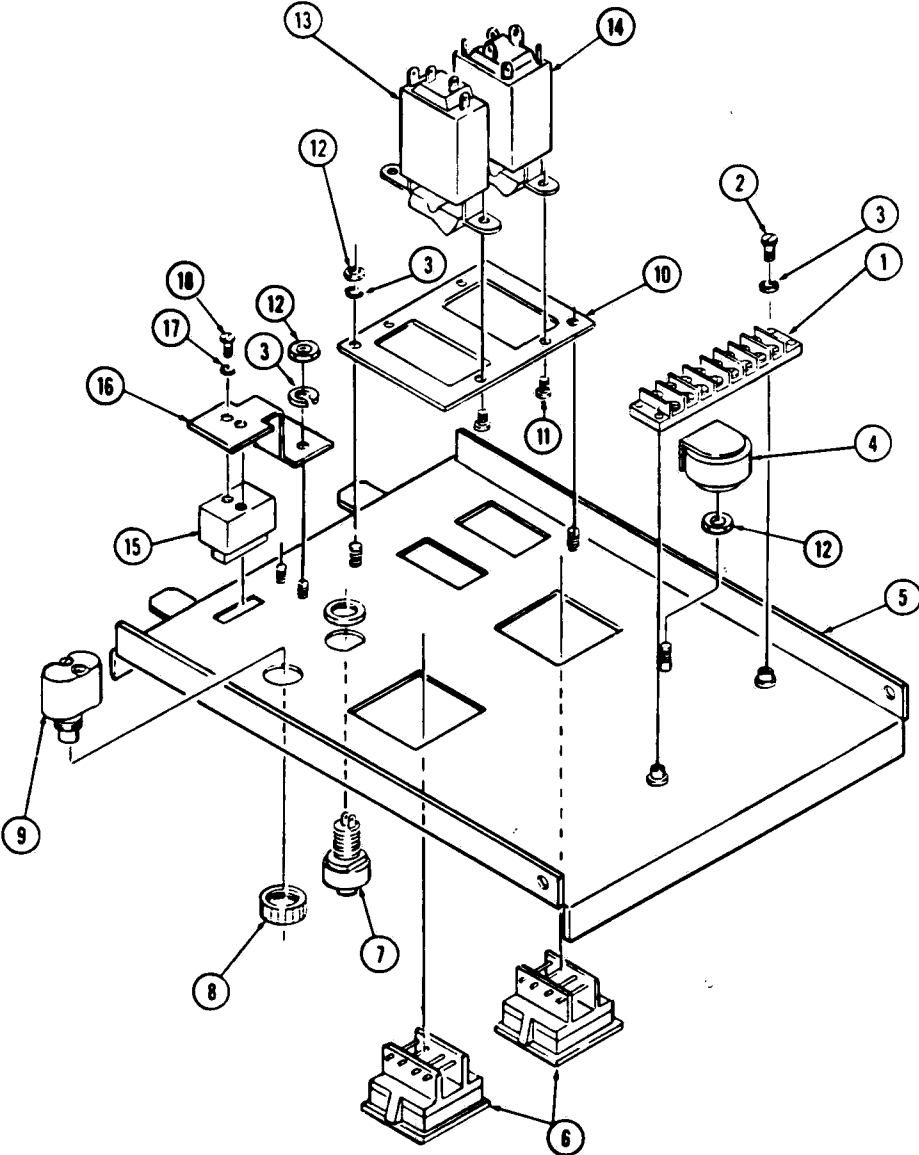


Figure 9-8. SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-8-			SECONDARY CONTROL PANEL, Eagle 2300 (Part 1 of 2)	X
1	P 90627 091		BLOCK, Terminal, 15 Amp, 8 Point	1
2	P 3960 041		SCREW, Round Head, #6-32 x 1/2	2
3	P 18131 091		LOCKWASHER, #6	6
4	P 83933 002		BUZZER	1
	P 764316 608		• KIT, Buzzer Resistor (See Fig. 9-9)	1
5	P 146645 568		PANEL, Secondary	1
6	P 136315 001		SWITCH, Thumbwheel, 4 Switch Assembly	2
7	P 84400 001		BREAKER, Circuit, CB-2	1
8	P 44155 091		GUARD, Button	1
9	P 48070 091		SWITCH, Pushbutton, PB-1	1
10	P 93757 001		SPACER, Breaker	1
11	P 27741 041		SCREW, Flat Head, #6-32 x 3/16	4
12	P 3037 041		NUT, Hex, #6-32	5
13	P 93105 001		BREAKER, Circuit, CB-1	1
14	P 129022 001		SWITCH, Rocker, SW-1	1
15	P 84362 002		COUNTER	1
16	P 93749 001		BRACKET, Counter	1
17	P 30743 045		LOCKWASHER, #4	2
18	P 17658 041		SCREW, Round Head, #4-40 x 3/16	2

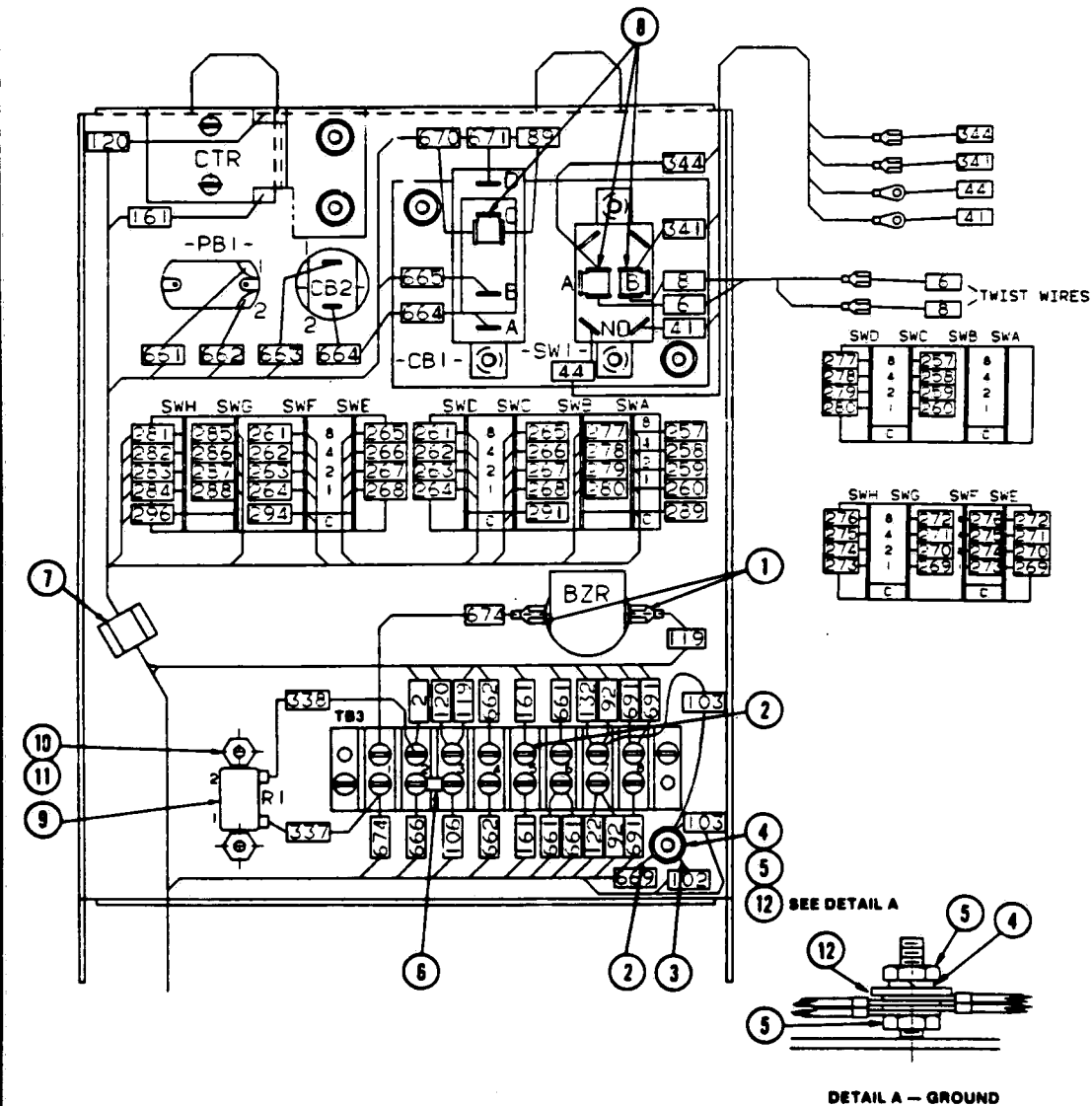


Figure 9-9. SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2).

9-26

F- 13

Add. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-9-	P 146645	569	SECONDARY CONTROL PANEL, Eagle 2300 (Part 2 of 2)	X
1	P 91694	091	RECEPTACLE, 3/16 Lug x #18-22 Wire	2
2	P 90619	091	TERMINAL, Wire, #6 Ring x #18-22 Wire	11
3	P 14592	091	TERMINAL, Wire, #10 Stud x #16-14 Wire	2
4	P 18131	091	LOCKWASHER, #6	1
5	P 3037	041	NUT, Hex, #6-32	2
6	P 84123	001	JUMPER, Terminal Block	1
7	P 431152	091	CLIP	1
8	P 32118	091	ADAPTER, Terminal	3
9	P 129318	001	RESISTOR, 3 kΩ, R1	1
10	P 13794	041	NUT, Hex, #4-40	2
11	P 26032	091	WASHER, Flat	2
12	P 17589	045	WASHER, Flat	1

9-27

F- 14

Add. 4/86

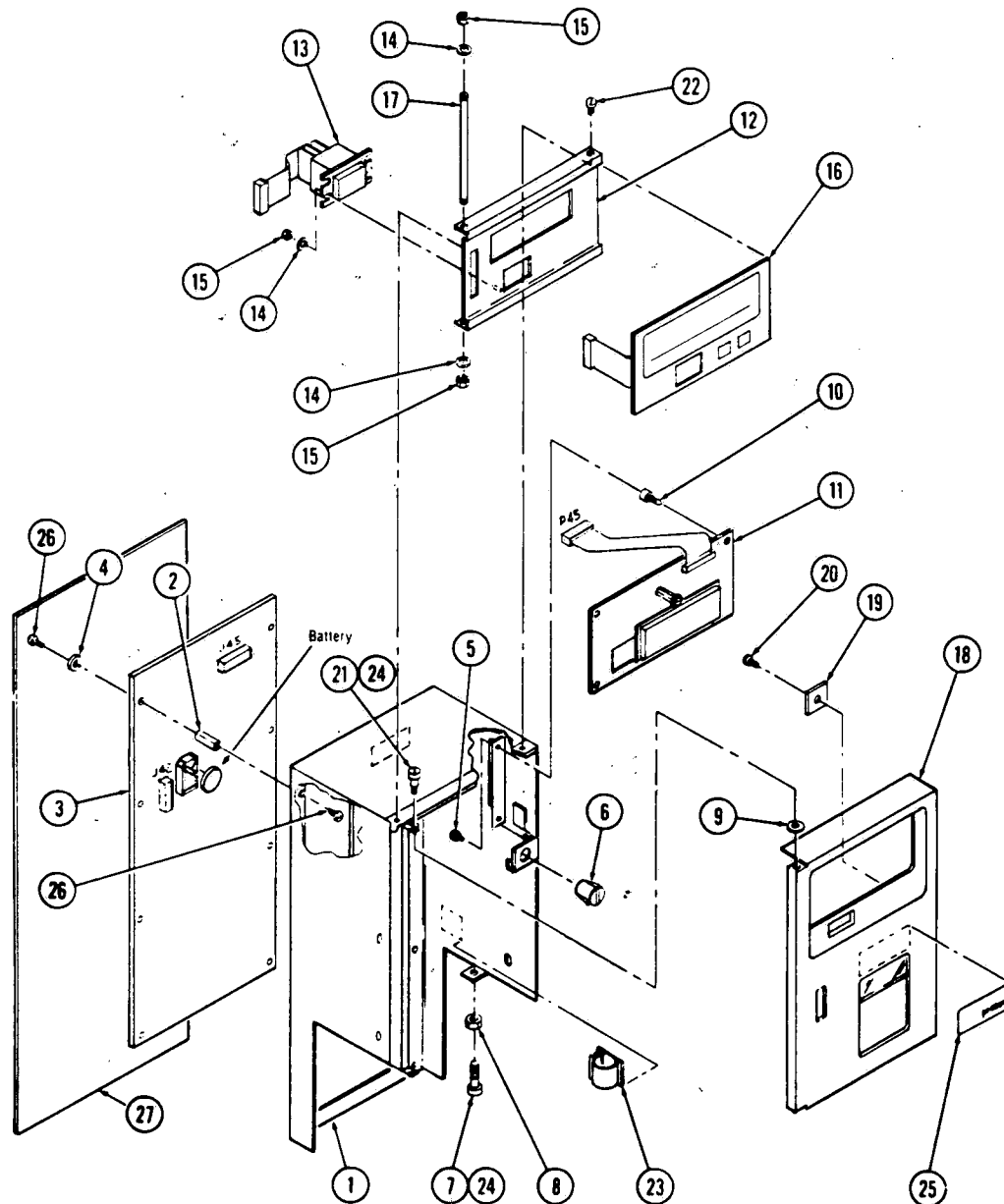


Figure 9-10. PRINTCON HOUSING ASSEMBLY, Eagle 2300.

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-10-	P 146645 624		PRINTCON HOUSING ASSEMBLY, Eagle 2300	X
1	P 146649 111		HOUSING, Weldment	1
2	P 129356 033		STAND-OFF	8
3	P 146654 001		P/C BOARD ASSEMBLY, Printcon Control	1
			• P/C BOARD ASSEMBLY, Repaired	1
	P 150822 351		• BATTERY, Coincell	1
4	P 129352 094		WASHER, Flat, #6 Nylon	8
5	P 12451 041		SCREW, Round Head, #6-32 x 1/4	8
6	P 129356 001		CATCH, Magnetic	1
7	P 41012 061		SCREW, Socket Head, #10-32 x 1/2	2
8	P 2959 041		NUT, Hex, #10-32	2
9	P 5469 041		WASHER, Flat, #6	2
10	P 84147 001		SUPPORT, Circuit Board	3
11	P 146633 081		DISPLAY BOARD ASSEMBLY, Digital Printer	1
	P 764193 029		• DISPLAY BOARD ASSEMBLY, Repaired	1
12	P 93900 001		DISPLAY BRACKET ASSEMBLY	1
13	P 93900 022		SWITCH, Thumbwheel	1
14	P 84114 001		WASHER, Flat, #4	4
15	P 13794 041		NUT, Hex, #4-40	4
16	P 136805 004		PANEL, Overlay Display	1
17	P 129356 023		STUD	1
18	P 146649 009		DOOR, Printer Display	1
19	P 129356 002		STRIKE	1
20	P 82340 001		SCREW, Flat Head Self Tapping, #6 x 5/16	1
21	P 129356 006		SCREW, Shoulder, #4-40 x 1/8	2
22	P 40357 045		SCREW, Self Tapping, #6 x 1/4	1
23	P 150539 001		CLIP, Cable	1
24	P 5300 640		VIBRATITE	AR
25	P 129356 142		LABEL, Printcon	1
26	P 3984 041		SCREW, Round Head, #6-32 x 3/8	16
27	P 150822 611		PAD, Anti-Static	1

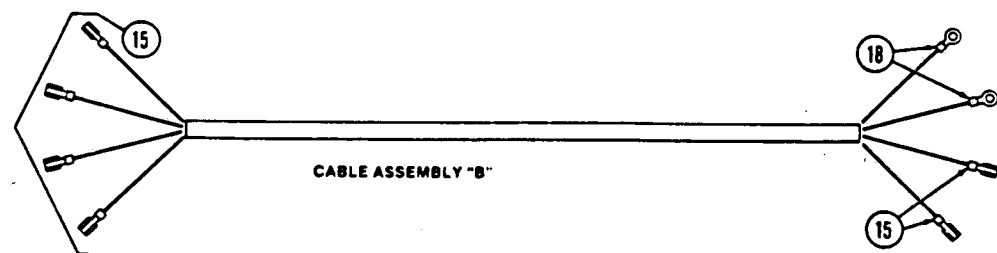
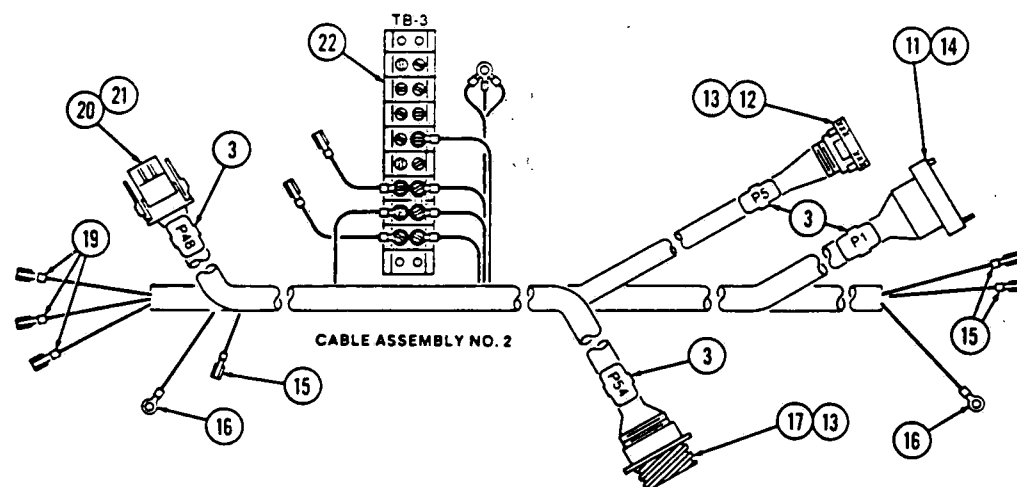
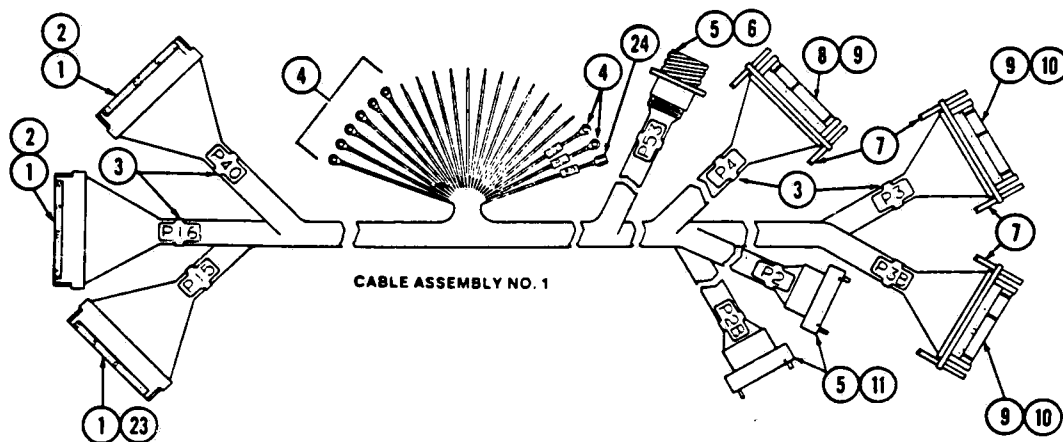


Figure 9-11. HARNESS ASSEMBLY, Secondary Panel, Eagle 2300 Vacuum.

9-30

764084

G- 3

Add. 4/86

FIG. & INDEX NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY
9-11-			HARNESS ASSEMBLY, Eagle 2300 Secondary Panel	X
1 P	84187 003		CONTACT, Socket, P15, P16 and P40	67
2 P	84229 002		HOUSING, Connector, 36 Position, P16 and P40	2
3 P	150822 003		MARKER, Tie	10
4 P	129278 001		TERMINAL, Wire, #6 Ring x 22-26 AWG	11
5 P	150822 030		CONTACT, Socket, P2, P2B and P53	17
6 P	93443 005		RECEPTACLE, 14 Position, P53	1
7 P	84192 001		JACKSCREW, Female	6
8 P	84205 002		HOUSING, Pin, 38 Position, P4	1
9 P	84207 002		PIN, Contact, P3, P3B and P4	48
10 P	84205 001		HOUSING, Pin, 28 Position, P3 and P3B	2
11 P	93829 001		BLOCK, P1, P2 and P2B	3
12 P	92838 002		PLUG, 16 Position, P5	1
13 P	84198 004		SOCKET, Contact, P5 and P54	22
14 P	150822 043		PIN, Contact, P1	8
15 P	32119 091		RECEPTACLE, 1/4 Lug x 14-16 AWG	9
16 P	14590 091		TERMINAL, #6 Ring x 14-16 AWG	3
17 P	93443 006		RECEPTACLE, 37 Position, P54	1
18 P	14591 091		TERMINAL, Wire, Ring x 14-16 AWG	2
19 P	90695 091		RECEPTACLE, 1/4 Lug x 18-22 AWG	7
20 P	129352 121		HOUSING, Socket, 9 Position, P48	1
21 P	84220 002		CONTACT, Socket, P48	8
22 P	90627 091		BLOCK, Terminal, 8 Position, 15 A	1
23 P	84229 001		RECEPTACLE, 30 Position, P15	1
24 P	84402 001		RECEPTACLE, 1/4 Lug x 18-22 AWG	1

9-31

764084

G- 4

Add. 4/86

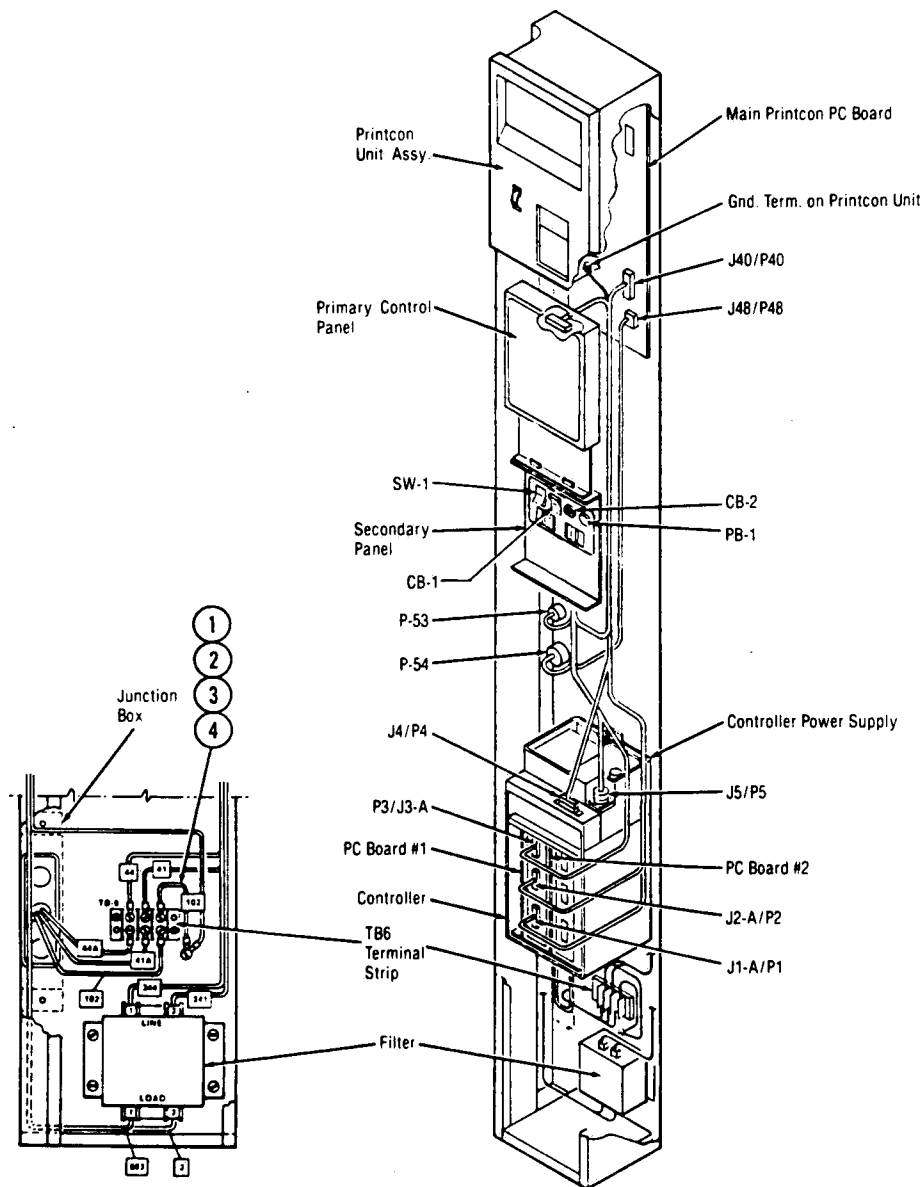


Figure 9-12. CONNECTION DETAILS, Eagle 2300 Control Column.

9-32

764084

G- 5

Add. 4/86

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY			
9-12-			CONNECTION DETAILS, Control Column, Manual Door	X			
			CONNECTION DETAILS, Control Column, Power Door		X		
1	P 19522	091	TERMINAL, Wire, #10 Ring x 16-22 AWG	1	1		
2	P 82675	001	SCREW, Green Ground, #10-32 x 3/8	1	1		
3	P 14865	091	TERMINAL, Wire, #8 Ring x 18-22 AWG	1	1		
4			WIRE, Green	1	1		

9-33

764084

G- 6

Add. 4/86

TECHNICAL DATA

Automatic Control

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

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

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

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

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

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

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

Manual Control (Gravity Cycles Only)

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

Jacket and Chamber Assembly

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

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

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

Cast-bronze, manually operated door has stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinge is 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. Microswitch prevents inadvertent start of cycles before door is locked; **pressure lock** keeps door from being opened during cycle. **Door may be tightened but not opened while pressure is in chamber.**

Vacuum System

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

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

Chamber Drain System

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

Steam Source

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

Other Components

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

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

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

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

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

Baffle shields steam supply opening inside the chamber.

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

OPTIONAL CONTROLS AND CYCLES

Compressed-Air Solution Cooling*

Cycle facilitates processing of media-filled, screw-capped borosilicate glass containers. The load is cooled via filtered, compressed air circulating off the rapidly cooled chamber walls and exiting through the drain plumbing.

Automatic Shutdown Device*

Automatic shutoff enables added productivity.

Pure Steam Piping*

All pipes, fittings, and valves leading to and from both the steam source and the sterilizer chamber are constructed from 300- series stainless steel.

Chamber Penetrations*

Capped openings to chamber to facilitate insertion of test equipment and instrumentation leads.

Optional Material Handling Accessories

Include racks with shelves, instrument trays and if 20x20x38-inch sterilizer, loading cars . . . **all constructed of Monel**; and carriages of stainless steel. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting as a cabinet-enclosed model, or for recessing, as specified. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other (freestanding units), or front panel to wall partition (recessed units). Stainless-steel front panel has 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 lowered. 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.

*See separate product literature for further details.

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	POWER CONSUMPTION				HEAT LOSS BTU/hr at 70° F (21° C)		
		Water†		Steam:		Electricity — Amperes 120 Volts, Single Phase	Cabinet Enclosed	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lb/hr (kg/hr)	Avg. lb/hr (kg/hr)		To Room	Front of Wall
16x16x26 (406x406x660)	1160 (527)	15 (57)	164 (611)	83 (38)	70 (32)	3	4300	1600 2700
20x20x38 (508x508x965)	1990 (903)	15 (57)	164 (611)	116 (53)	98 (44)	3	7000	2500 4500

*Based upon chamber filled with water

†At 30-50 psig (2.11-3.52 kg/cm²)

†At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item _____; Furnish an AMSCO Eagle 2300 Series sterilizer with Printcon per Tech Data Sheet SD-379. Construct chamber ☐ 16x16x26" or ☐ 20x20x38". Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ to be freestanding or ☐ for recessing into a partition wall.

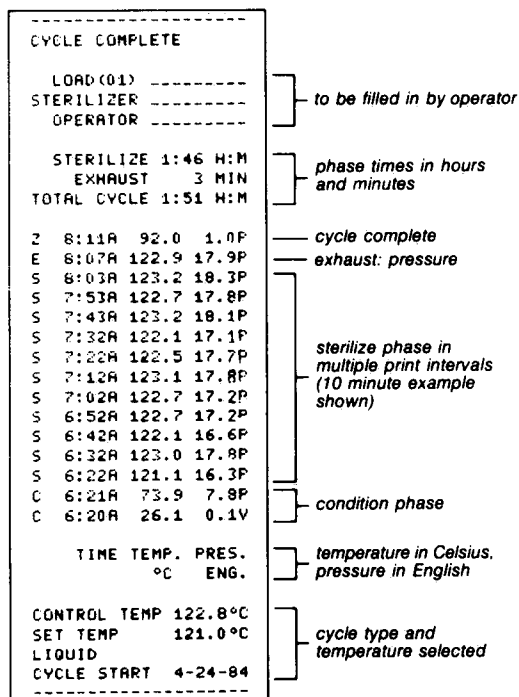


Figure 2. Typical Printout.

POWER ON AT 4-24-84
 9:01A 68.4 0.0P

Power On Message

POWER ON AT 4-24-84
 9:34A 120.5 10.4P

Power Restored
 After Power Failure

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

Reset Button Pressed

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

Condition Phase too long

* 11:05A 266.4 25.5P
 ALARM: UNDER TEMP

* 11:04A 269.9 27.3P

Temperature Drops
 2 F Below Setpoint

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

Door Opened
 During Cycle

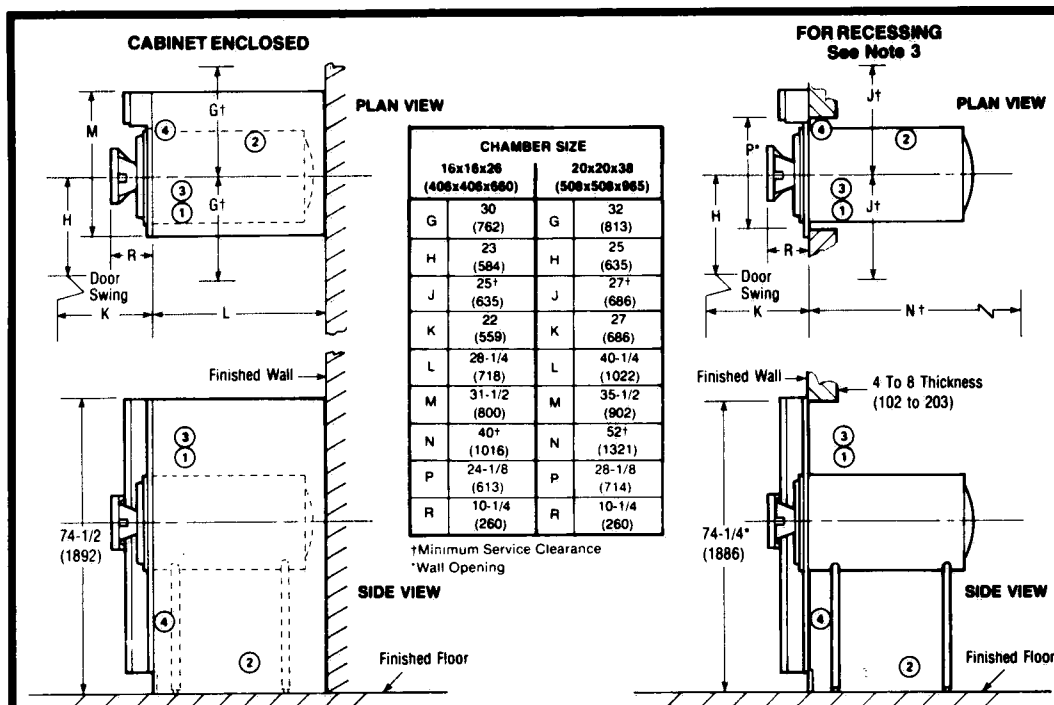
ABORT: TEMP SENSOR
 * 3:45A 306.8 10.0P

Temperature Sensor Failure

ABORT: PRES SENSOR
 * 11:55A 278.0 41.3P

Pressure Sensor Failure

Figure 3. Control Monitoring and Communication.



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

OPERATING REQUIREMENTS

- 1 COLD WATER — 3/4 NPT, 30 to 50 psig (2.11 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
- 2 DRAIN — 1-1/2 ODT
- 3 STEAM SUPPLY — 3/8 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
- 4 TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

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. If loading car and carriage are to be used with a 20x20x38" (508x508x965 mm) sterilizer, front clearance should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading car from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
6. Right-side door-swing clearances are shown. Clearances for left-side door swing are identical.
7. Floor drain should be provided within confines of sterilizer framework.

... CHECK LOCAL CODES ...

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



Small Steam Sterilizer (DOUBLE DOOR)

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

TECH DATA

DESCRIPTION

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

Applications

Eagle 2300 is designed for scientific, research laboratories.

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

Gravity Cycles - for sterilizing liquids in flasks with vented closures at 212 to 254 F (100 to 122 C); also heat- and moisture-stable goods at 212 to 280 F (100 to 138 C), and for decontaminating supplies after laboratory procedures

Chamber Sizes

Interior dimensions are 16x16x26 inches (406x406x660 mm) or 20x20x38 inches (508x508x965 mm), as specified.

Standards

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

ASME Code, Section VIII, Division 1 for unfired pressure vessels. The pressure vessel is so stamped; ASME Form U-1 or U-3, as applicable, is furnished. Inner shell, including doors, is constructed to withstand working pressure of 36 psig (2.53 kg/cm²).

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

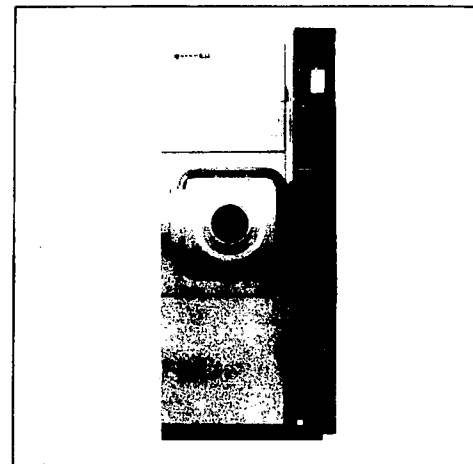
ASTM Specification A240 for stainless steel, alloy 304 if welded, alloy 201, 202 or 304 if not welded

ASTM Specification B88 for seamless, copper tubing.

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

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 architects or designers. Reproduction in whole or in part by others is prohibited.

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Typical only — some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Chamber Size

- ☐ 16x16x26"
- ☐ 20x20x38"

Door Hinge (Operating End First)

- ☐ Right Side/Left Side
- ☐ Right Side/Right Side
- ☐ Left Side/Right Side
- ☐ Left Side/Left Side

Mounting

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

Option

- Compressed - Air Solution Cooling*
- Automatic Shutdown Device*
- Cross Contamination Seal*
- Door Interlock and Light*
- Extra Chamber Penetrations*
- Pure Steam Piping*

Materials Handling Accessories*

- ☐ Rack and Shelves
- ☐ Loading Car and Carriage (20x20x38" Sterilizer Only)
- ☐ Surgical Instrument Trays

*See separate product literature

Item No. _____
Location(s) _____

G- 13

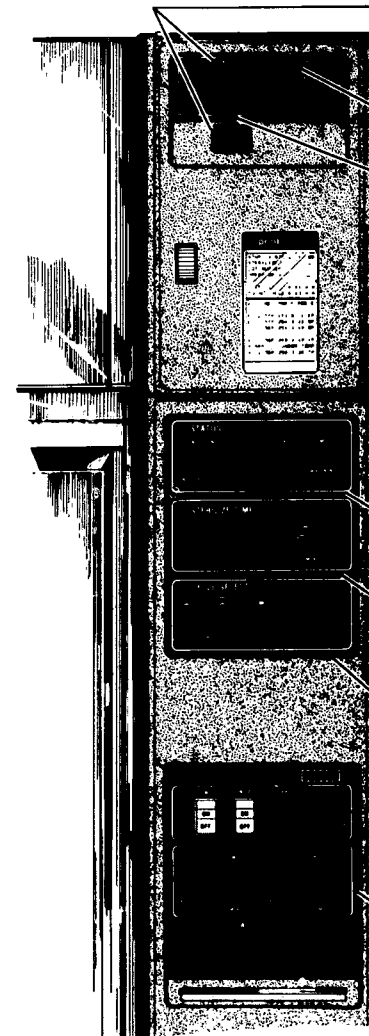
DESIGN FEATURES

Eagle® 2300 with Printcon™

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

Eagle-Eye™ Vertical Control Column (Figure 1)

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



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

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

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

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

Printcon provides easy-to-read **permanent printed record** of all pertinent cycle data, providing assurance to operator that cycle parameters have been met. **Alphanumeric printer** documents date, daily cycle number, starting time of each cycle, temperature selected, key transition points in cycle, and deviations which might jeopardize sterilization process. **The Eagle 2300 printout** may, with a service adjustment, provide the printing of time, temperature, and pressure at **scheduled intervals** throughout the exposure phase. Print interval is adjustable in 30-second increments from 30 seconds to 49 minutes, 30 seconds. One- or two-ply paper is available for the printer. With two-ply paper, an average day's record can be automatically stored, which can then be saved for future documentation; the second copy torn off and placed with each sterilizer load. (A sample printout is shown in **Figure 2**.)

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

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

• **Sterilize Time and Dry Time** are locked in and cannot be changed once cycle is started. **Sterilize time** displays when in cycle. **Dry time** displays (momentarily) when operator makes selection, or (continuously) when in Dry phase of cycle. Timers automatically reset upon completion of cycle, eliminating need for resetting between repeated cycles. Timers also reset if sterilize temperature drops 2 F (1.1 C) below set point during exposure period.

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

3. **Secondary Controls** are behind a sliding door beneath the Auto-Lume panels. Included are **cycle monitor** (non-resettable) to count number of sterilizing cycles for programming preventive maintenance; **power switches**, one to isolate the entire unit and a second one to isolate only the controls; **circuit breaker**; **cycle reset** button (in case incorrect cycle is selected); two sets of **thumbwheel switches** for setting Sterilize and Dry times (up to 99 hours and 99 minutes); and operating instructions.

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

Figure 1. Eagle-Eye Vertical Control Column.

G- 14



**AMSCO
SERVICE**

**EAGLE 2000 AND 2300 SERIES
SMALL STERILIZERS VACAMATIC
P-764084-002**

5/88

4 of 5



TECHNICAL DATA

Automatic Control

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

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

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

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

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

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

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

Manual Control (Gravity Cycles Only)

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

Jacket and Chamber Assembly

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

Not-rolled carbon-steel shells, welded one within the other, form the sterilizer steam jacket. Inside of inner shell is **nickel clad**, 0.025-inch (0.63 mm) thick (nominal). A chamber test opening (plugged) is provided.

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

Cast-bronze, manually operated doors have stainless-steel, bearing-mounted hinges on either side of chamber, as specified. Hinges are adjustable for accurate gasket alignment. **Silicone-rubber sealing gaskets** are pressed against door frames by handwheel-actuated radial holding arms. Gaskets are replaceable without tools. Sound-deadened, stainless-steel covers conceal holding arms and door exteriors. Microswitches prevent inadvertent start of cycle before doors are locked; **pressure locks** keep doors from being opened during cycle. **Doors may be tightened but not opened while pressure is in chamber.**

Vacuum System

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

Chamber Drain System

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

Steam Source

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

Other Components

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

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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.

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Baffle shields steam supply opening inside the chamber.

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

OPTIONAL CONTROLS AND CYCLES

Compressed-Air Solution Cooling*

Cycle facilitates processing of media-filled, screw-capped borosilicate glass containers. The load is cooled via filtered, compressed air circulating off the rapidly cooled chamber walls and exiting through the drain plumbing.

Automatic Shutdown Device*

Automatic shutoff enables added productivity.

Pure Steam Piping*

All pipes, fittings, and valves leading to and from both the steam source and the sterilizer chamber are constructed from 300- series stainless steel.

Door Interlocks and Lights*

Mechanism prevents both sterilizer doors (double door units only) from opening simultaneously, under routine operating conditions. Door interlocks may be specified as a single option or included as part of the Cross Contamination Seal Package.

Cross Contamination Seal*

Arrangement (double door units only) prevents passage of airborne micro-organisms through room wall-opening on non-operating end of sterilizer. Provides positive, safe separation of "clean" and "contaminated" goods-processing areas. Includes door interlocks, and light.

Chamber Penetrations*

Capped openings to chamber to facilitate insertion of test equipment and instrumentation leads.

Optional Material Handling Accessories

Include racks with shelves, instrument trays and if 20x20x38-inch sterilizer, loading cars... **all constructed of Monel**, and carriages of stainless steel finish. See separate product literature for details.

INSTALLATION

Sterilizer arranged for mounting through one or two (20x20x38 inch [508x508x965 mm] only) partition walls. Includes height-adjustable, steel floor stand with cadmium-plated pads and leveling screws. Subframe with synthetic-rubber gasket ensures tight fit of cabinet panels to each other and to wall partition(s) (as required). All panels are stainless-steel. Front panel has upper and lower service access doors, back panel has lower service access door. Both panels have height-adjustable kickplates. Inside of each lower access door contains a rack for instructional materials. A model for recessing through one wall has side panels and louvered top panel to enclose the sterilizer body and piping.

WARRANTY

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

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

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

*See separate product literature for further details.

ENGINEERING DATA

SIZE in. (mm)	OPERATING WEIGHT* lbs (kg)	POWER CONSUMPTION						HEAT LOSS BTU/hr at 70 F (21 C)			
		Water†		Steam‡		Electricity — Amps 120 Volts, Single Phase		Thru One Wall		Thru Two Walls	
		Peak gpm (lpm)	Avg. gph (lph)	Peak lb/hr (kg/hr)	Avg. lb/hr (kg/hr)			Front of Wall	Room Back of Wall	At Each End	Between Walls
16x16x26 (406x406x660)	1360 (617)	15 (57)	164 (611)	83 (38)	70 (32)	3		1600	3500	NA	NA
20x20x38 (508x508x965)	2240 (912)	15 (57)	164 (611)	116 (53)	98 (44)	3		2500	5300	2500	2800

*Based upon chamber filled with water

†At 30-50 psig (2.11-3.52 kg/cm²)

‡At 50-80 psig (3.52-5.62 kg/cm²)

SPECIFICATION WORKSHEET

Item _____; Furnish an AMSCO Eagle 2300 Series sterilizer with Printcon per Tech Data Sheet SD-380. Construct chamber ☐ 16x16x26" or ☐ 20x20x38". Design control with microcomputer to control system functions; monitor system operations; and visually indicate and print chamber temperature, pressure, time, date, and daily cycle number. Include prevacuum cycle and equip sterilizer to operate on steam from an independent source. Arrange sterilizer ☐ for recessing through ☐ one wall or ☐ for recessing through two walls.

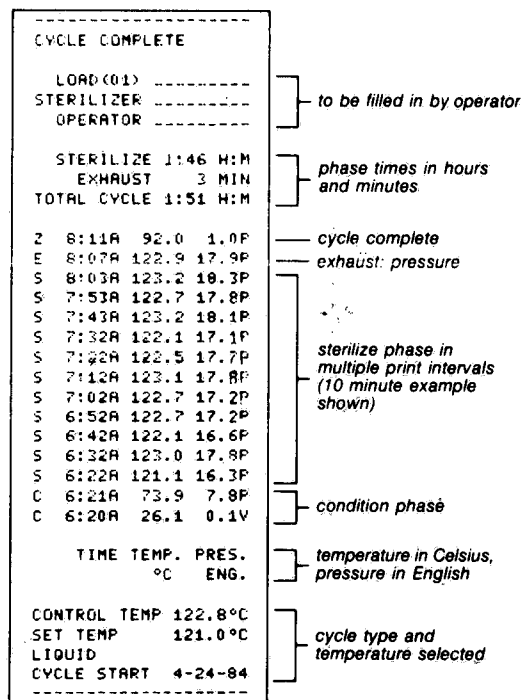


Figure 2. Typical Printout.

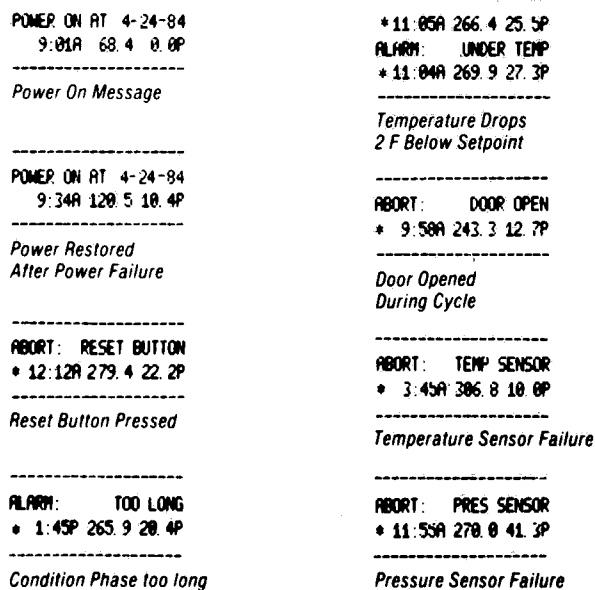
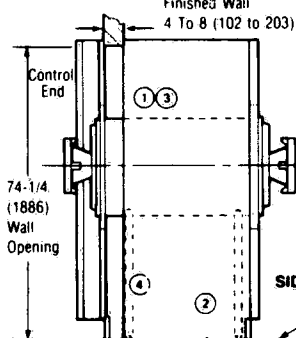
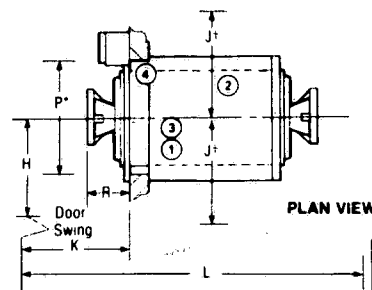


Figure 3. Control Monitoring and Communication.

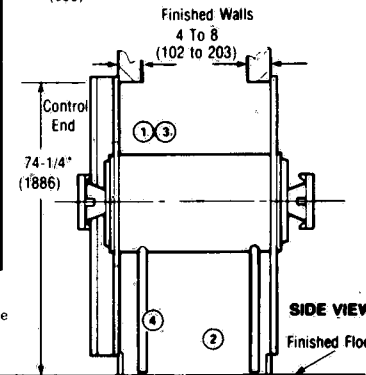
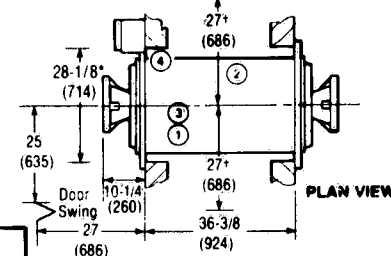
FOR RECESSING THRU ONE PARTITION WALL



CHAMBER SIZE			
16x16x26 (406x406x660)		20x20x38 (508x508x965)	
H	23 (584)	H	25 (635)
J	25 (635)	J	27 (686)
K	22 (559)	K	27 (686)
P	24-1/8 (613)	P	28-1/8 (714)
R	10-1/4 (260)	R	10-1/4 (260)
L	80-3/8 (2040)	L	90-3/8 (2294)

†Minimum Service Clearance
 *Wall Opening

FOR RECESSING THRU TWO PARTITION WALLS
 (20x20x38 inch [508x508x965 mm] Sterilizer Only)



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

OPERATING REQUIREMENTS

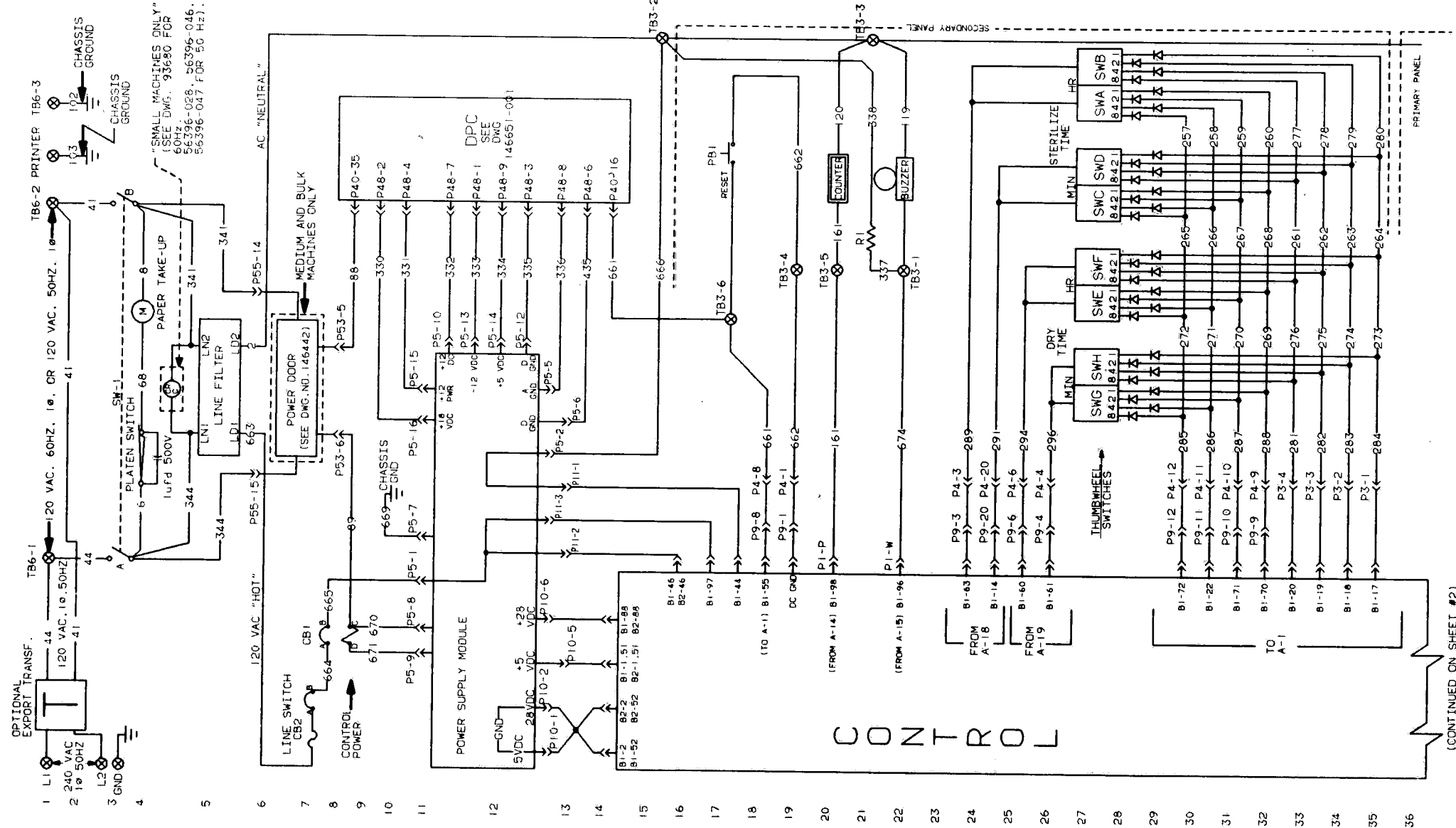
1. COLD WATER — 3/4 NPT, 30 to 50 psig (2.11 to 3.52 kg/cm²) dynamic, approximately 5 gr. hardness
2. DRAIN — 1-1/2 ODT
3. STEAM SUPPLY — 3/8 NPT, 50 to 80 psig (3.52 to 5.62 kg/cm²) dynamic, condensate free, between 97 and 100% saturated vapor
4. TERMINAL BOX — 120-V, 60-Hz, Single-phase Service

... CHECK LOCAL CODES ...

NOTES

1. Pipe sizes shown indicate terminal outlets. Building service lines to and from the equipment should be increased one pipe size to ensure optimum equipment performance.
2. Disconnect switches (by others) should be installed in electric supply lines near the equipment.
3. Access to the recessing area from the control end of the sterilizer is recommended.
4. Clearances shown are minimal for installing and servicing the equipment.
5. If loading car and carriage are to be used with a 20x20x38" (508x508x965 mm) sterilizer, front clearance should equal twice the length of the sterilizer. This will permit complete withdrawal of the loading car from the chamber and allow convenient maneuverability of the transfer assembly to and from the sterilizer.
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.

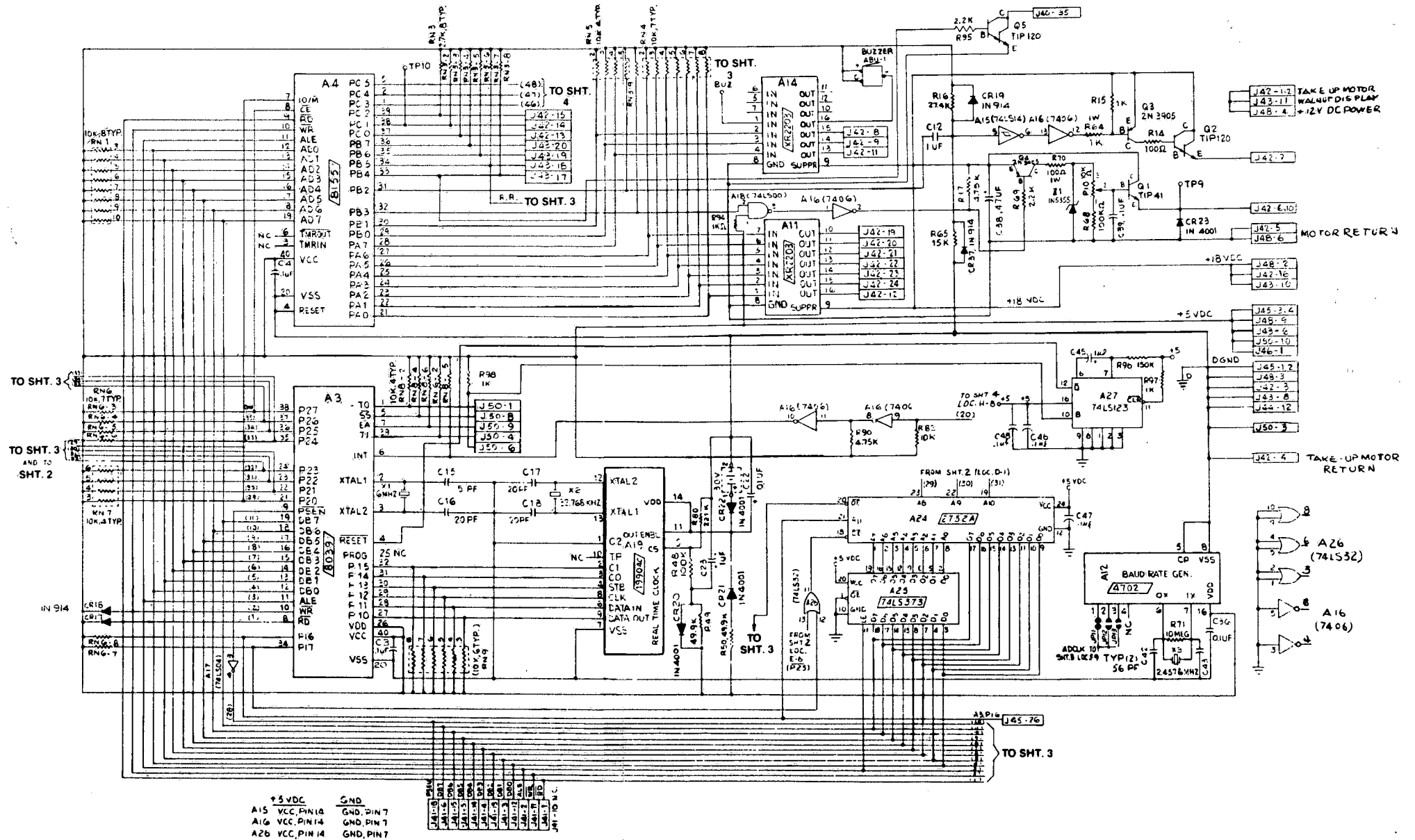


(CONTINUED ON SHEET #2)

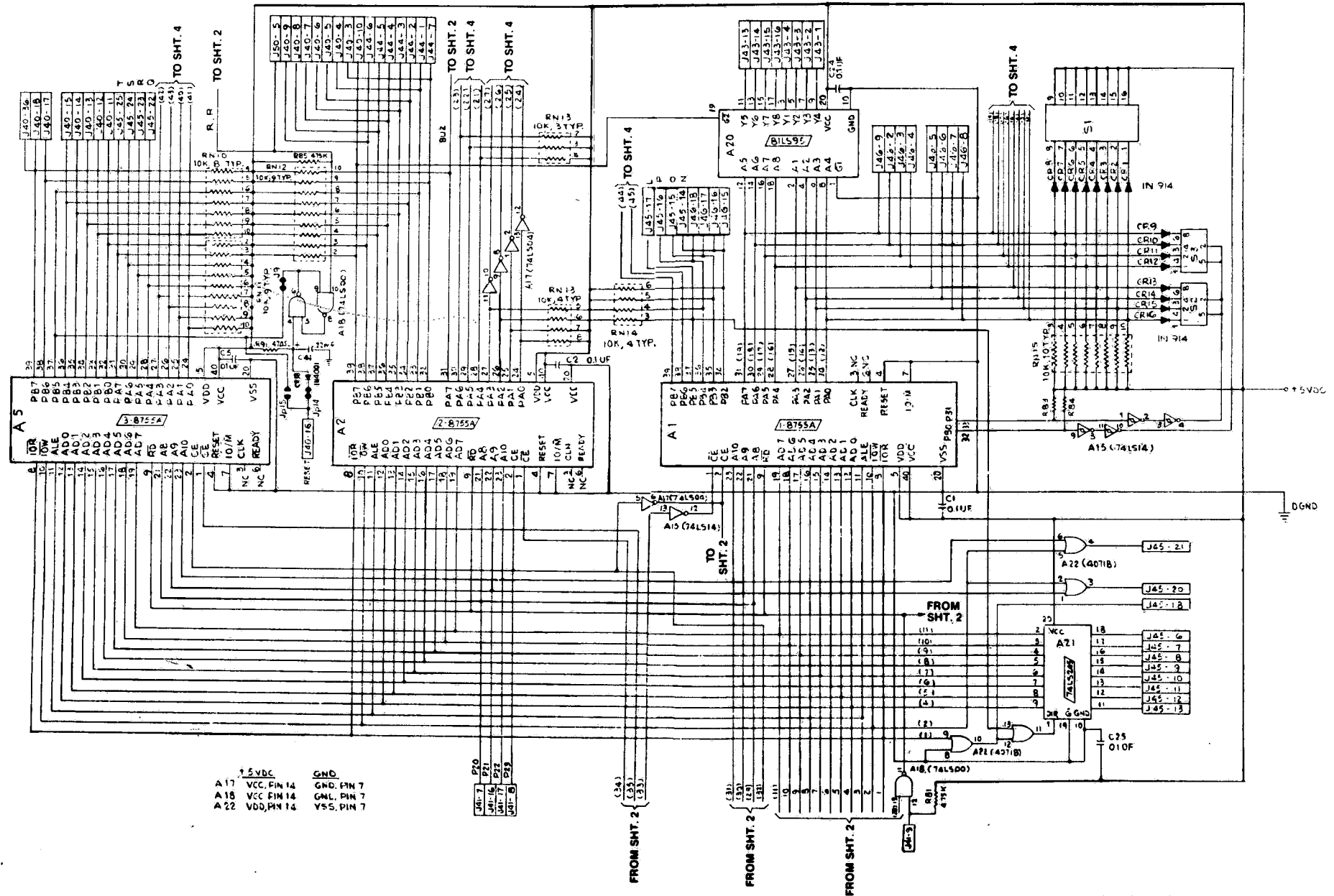




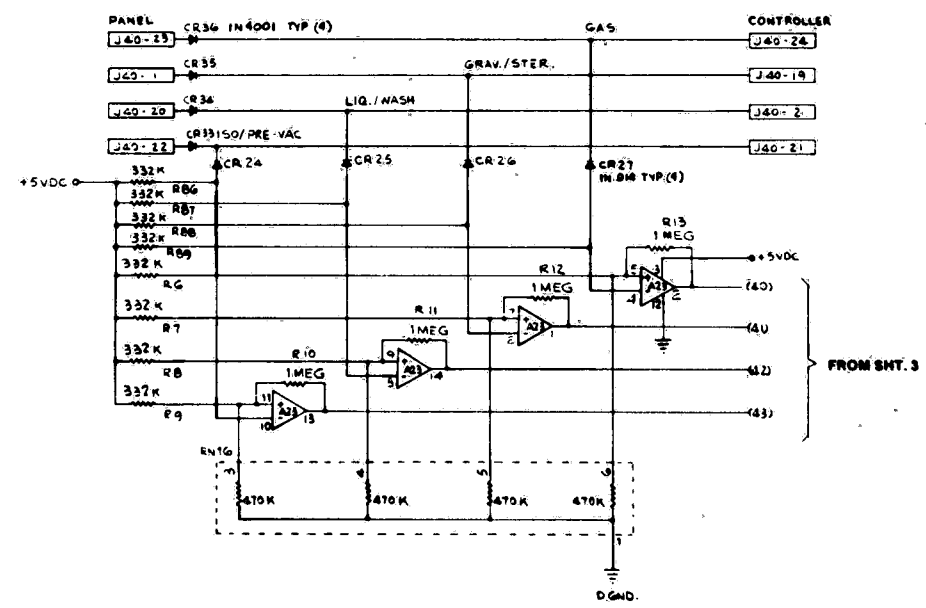
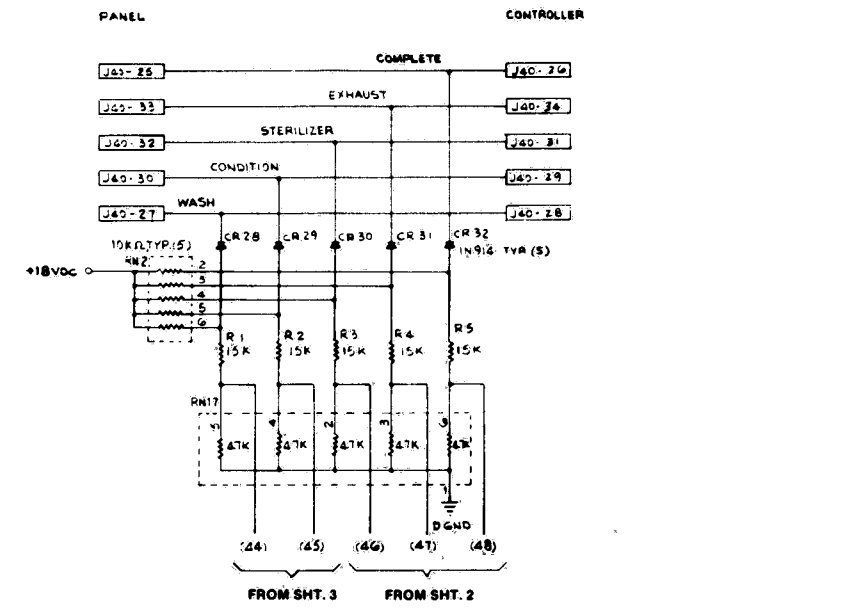
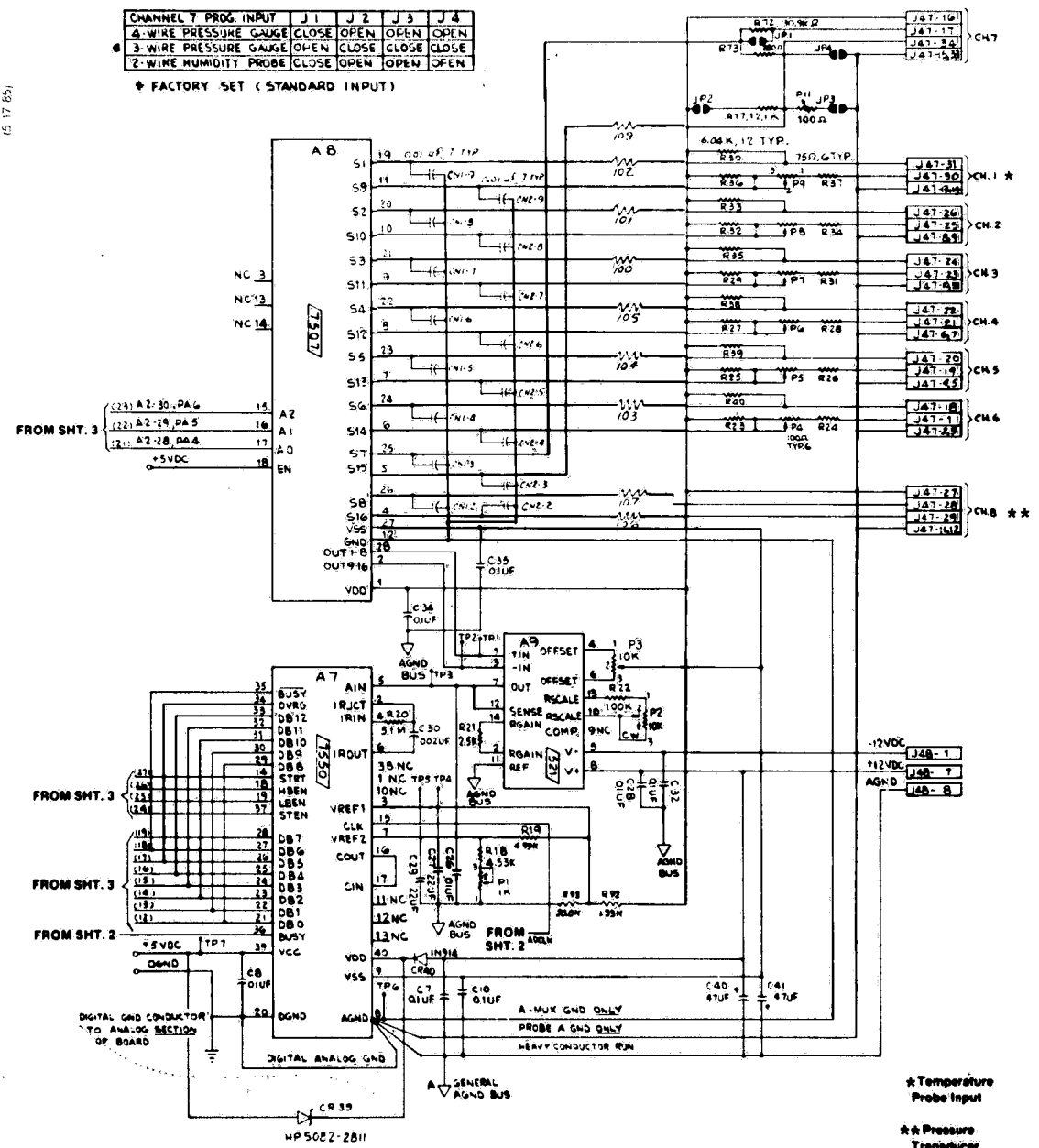




MAIN PRINTCON PC BOARD, Eagle 2300
(Part 2 of 4)



MAIN PRINTCON PC BOARD, Eagle 2300
(Part 3 of 4)



MAIN PRINTCON PC BOARD, Eagle 2300
(Part 4 of 4)



**AMSCO
SERVICE**

**EAGLE 2000 AND 2300 SERIES
SMALL STERILIZERS VACAMATIC
P-764084-002**

5/88

5 of 5

