SERVICE MANUAL

Harvey®

CHEMICLAVE EC SERIES STERILIZERS

MDT BIOLOGIC COMPANY
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Technology for Life

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Related Publications

Quick Reference Instr.	350485
Owner and Operator Manual	350482
Parts Catalog	350484

DESCRIPTION OF SYMBOLS AND NOTES IN MANUAL

The following symbols with related notes appear in this manual.

Hazard notes alert the user to the possibility of personal injury or damage to the equipment.

- *"Warning" notes alert the user to the possibility of personal injury.*
- *"Caution" notes alert the user to the possibility of damage to the equipment.*

"Notes" alert the user to pertinent facts and conditions.

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GENERAL DESCRIPTION

INTRODUCTION

The MDT HARVEY CHEMICLAVE sterilizer is a safe, fast, and effective sterilizer for use in medical and dental offices, hospitals, clinics, and other health care facilities.

To sterilize goods, CHEMICLAVE sterilizers use an unsaturated chemical vapor process. The active ingredient in VAPO-STERIL, the liquid sterilant, is formaldehyde.

Three models of the EC Series are available.

- EC5000 — 6" chamber diameter
- EC5500 — 8" chamber diameter
- EC6000 — 10" chamber diameter

A model with a larger chamber can process a larger load. Features of the three models are summarized in Figure 1–1 and in the following section, "Technical Data."

To save space, most figures in this manual show only one of the three models. This usually is the EC5500. All three models contain similar or identical components, and operate in a similar way.

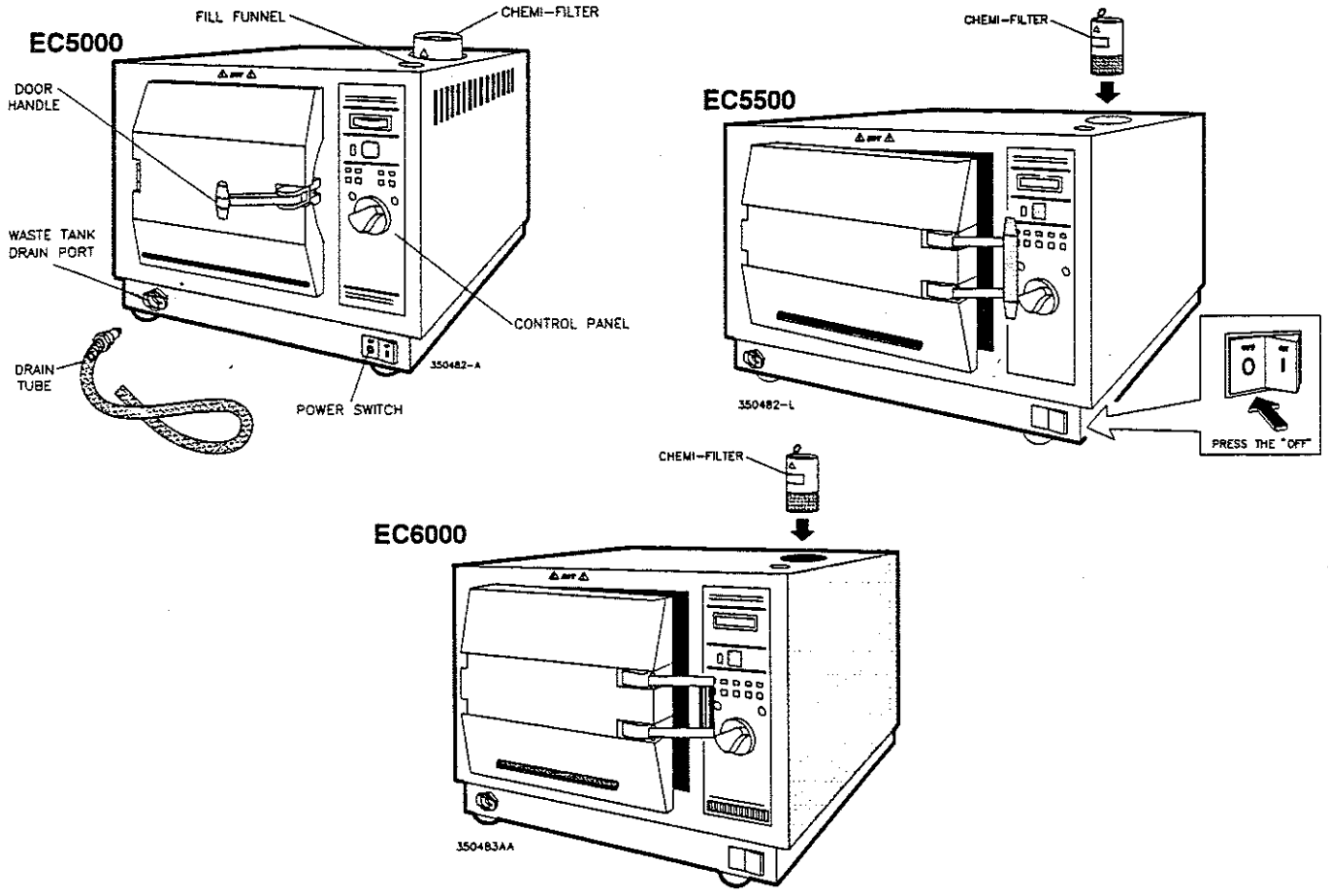


FIGURE 1–1. EC SERIES CHEMICLAVE STERILIZERS

TECHNICAL DATA

MODEL EC5000

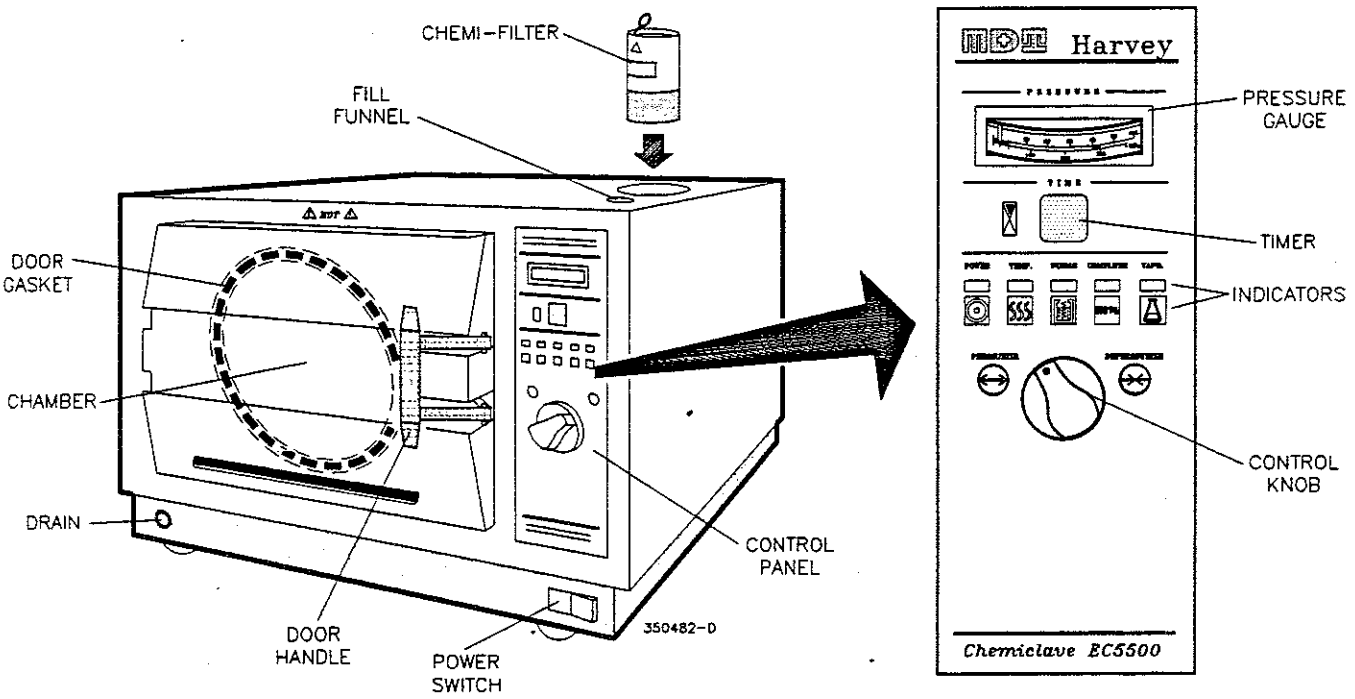
Cabinet Size	362 mm W x 330 mm H x 406 mm D (14.25 x 13 x 16 inches)
Chamber Size	152 mm diameter x 279 mm deep (6" x 11")
Weight	18.1 kg (40 lb.)
Heater Wattage	500 W
Electrical Rating	115 VAC, 60 Hz, 4 Amps 230 VAC, 50 Hz, 2 Amps
Operating Pressure	138–276 kPa (20–40 psig)
Operation Temperature	132°C (270°F)
Pressure Relief Valve	marked on valve
Fluid Capacities:	
Solution Reservoir	0.8 liters (27 fl. oz.)
Condensate tank	1.1 liters (37 fl. oz.)
Shot Chamber	15.7ml (0.53 fl.oz.)

MODEL EC5500

Cabinet Size	425 mm W x 330 mm H x 470 mm D (16.75 x 13 x 18.5 inches)
Chamber Size	203 mm diameter x 337 mm deep (8" x 13.25 ")
Weight	26.8 kg (59 lb)
Heater Wattage	800 W
Electrical Rating	115 VAC, 60 Hz, 8 Amps 230 VAC, 50 Hz, 4 Amps
Operating Pressure	138–276 kPa (20–40 psig)
Operation Temperature	132°C (270°F)
Pressure Relief Valve	marked on valve
Fluid Capacities	
Solution Reservoir	1.1 liters (37 fl. oz.)
Condensate tank	1.1 liters (37 fl. oz.)
Shot Chamber	30ml (1.01 fl.oz.)

MODEL EC6000

Cabinet Size	489 mm W x 419 mm H x 521 mm D (19.25 x 16.5 x 20.5 inches)
Chamber Size	254 mm diameter x 406 mm deep (10" x 16")
Weight	54.4 kg (120 lb.)
Heater Wattage	1200 W
Electrical Rating	115 VAC, 60 Hz, 12 Amps 230 VAC, 50 Hz, 6 Amps
Operating Pressure	138–276 kPa (20–40 psig)
Operation Temperature	132°C (270°F)
Pressure Relief Valve	marked on valve
Fluid Capacities	
Solution Reservoir	1.1 liters (37 fl. oz.)
Condensate tank	1.1 liters (37 fl. oz.)
Shot Chamber	60ml (2.03 fl.oz.)



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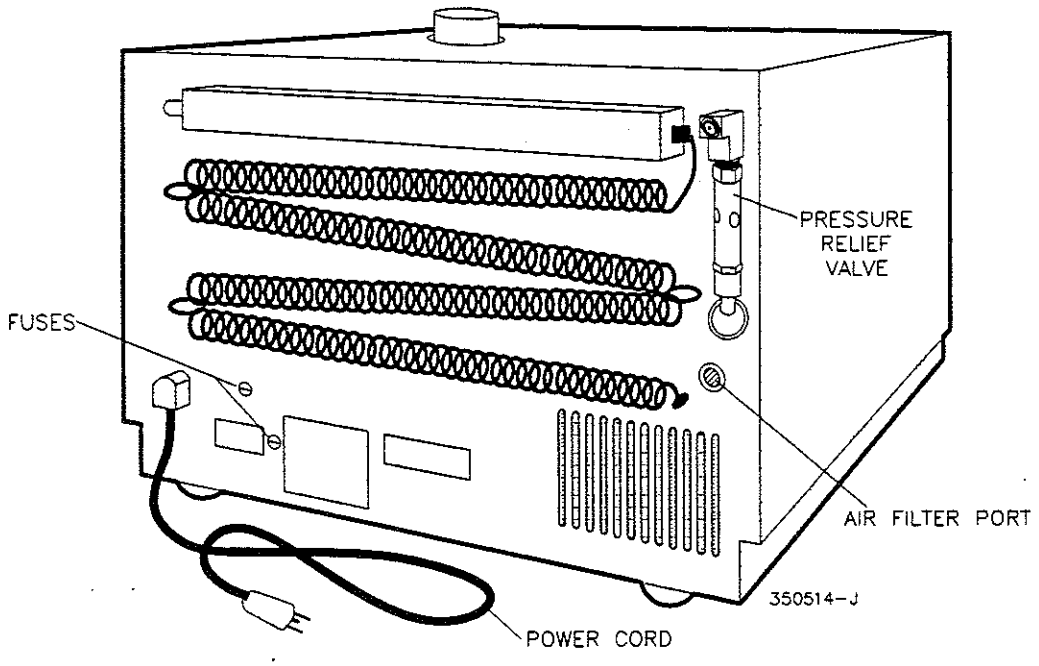

R E A R

FIGURE 1–2. CONTROLS AND FEATURES

CONTROLS AND FEATURES

POWER SWITCH

The power switch on the front of the sterilizer turns power to the sterilizer ON or OFF (see Figure 1–2).

CONTROL PANEL

Pressure Gauge

Displays the chamber pressure (see Figure 1–3).

Timer

Times the 20–minute exposure phase, and the purge phase for models EC5500 and EC6000.

after pressure reaches 20 psi starts counting

Indicators

POWER

Lights when power to the unit is ON.

TEMP.

Turns on and off as the chamber heaters cycle on and off.

COMPLETE

Lights when the exposure phase is complete.

PURGE (EC5500, EC6000)

Lights when the chamber is being emptied of vapors.

VAPO.

Signals when the reservoir must be filled with VAPO-STERIL. The indicator will remain lit until solution is added.

CONTROL KNOB

Attached to the valve shaft, this knob controls the metering valve.

Turning the contol knob to PRESSURIZE introduces VAPO-STERIL into the chamber and enables a cycle to begin.

Turning the knob to DEPRESSURIZE permits vapors to exhaust from the chamber.

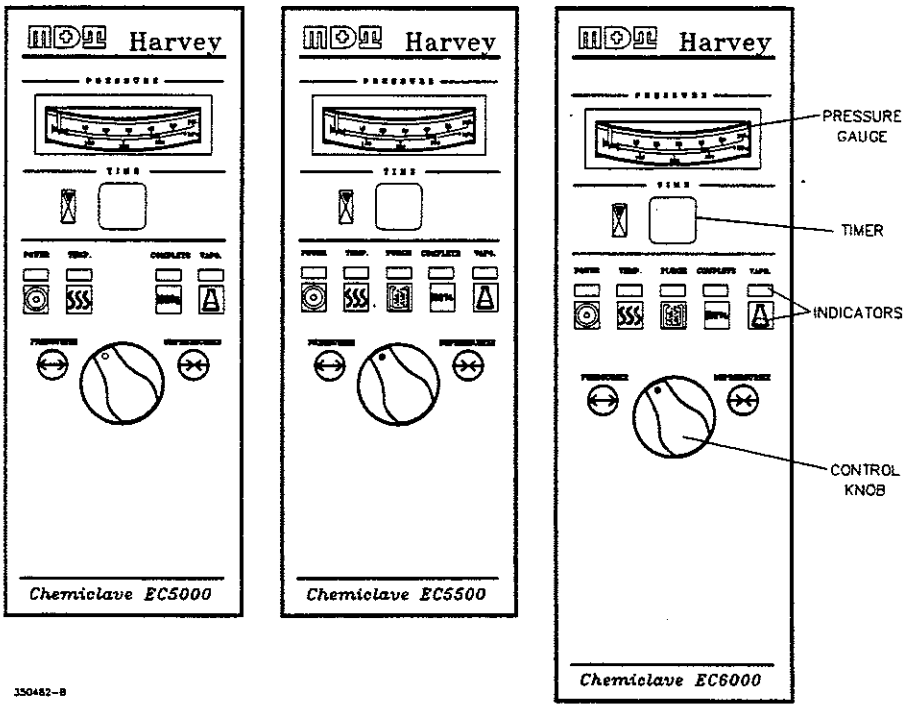

FIGURE 1–3. CONTROL PANELS—EC SERIES

* cold air test All to 30+ psi and test all fittings with soapy water and assure no leaks

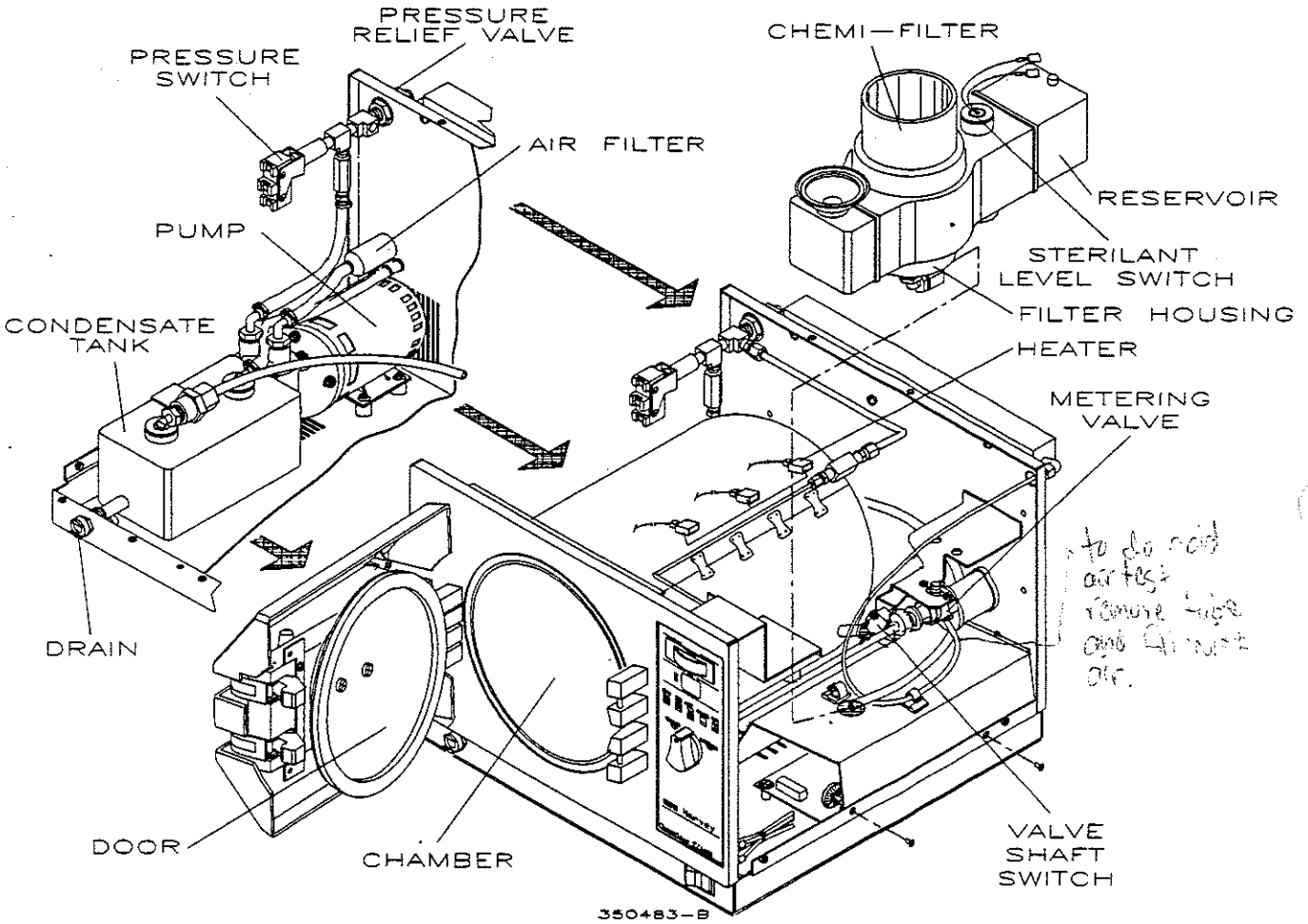

FIGURE 1–4. MAJOR COMPONENTS

CHEMI-FILTER

The CHEMI-FILTER is placed in the top of the sterilizer. It removes chemicals from the exhaust.

DOOR

The door latch secures the door with a cam-action locking mechanism. The door handle operates the door latch. It is designed to inhibit opening when the chamber pressure is greater than 2 psig.

DRAIN

A drain valve below the sterilizer door is provided to drain used VAPO-STERIL from the condensate tank.

PRESSURE RELIEF VALVE

A safety valve, on the rear of the sterilizer, relieves excess chamber pressure (see Figure 1–2).

PIPING COMPONENTS

See Figure 1–4 for major components, and Figure 3–1 for detailed component locations.

RESERVOIR

The reservoir holds about 1 liter of VAPO-STERIL solution (see "Technical Data" for exact amounts). The filling cup has a spring-loaded valve. When the reservoir is full, the valve stops the flow of solution from the filling bottle.

The reservoir contains Sterilant Level Switch 6S. This switch lights the VAPO. indicator on the control panel when the level of solution is low.

METERING VALVE MV1

Operated by the control knob, the valve has four ports and two settings, DEPRESSURIZE and PRESSURIZE.

With the control knob at DEPRESSURIZE, VAPO-STERIL can enter through the fill port and fill the shot chamber, while the chamber itself connects through the exhaust port to the exhaust line.

With the control knob at PRESSURIZE, the fill port and exhaust port are closed. The valve connects the shot chamber to the chamber. The measured amount of VAPO-STERIL from the shot chamber can enter the chamber. The chamber can build pressure to run a sterilizing cycle.

CHAMBER

Pressure vessel where loads of instruments are sterilized. The pressure for a typical sterilizing cycle is 138–276 kPa (20–40 psig).

PRESSURE GAUGE

Displays the chamber pressure.

PRESSURE RELIEF VALVE

The pressure relief valve will open to relieve the chamber pressure if it exceeds the pressure rating of the valve. This valve is on the rear of the sterilizer.

CONDENSER

The condensing coils, on the back of the sterilizer, liquify the vapors that exit from the chamber.

CONDENSATE TANK

The condensate tank collects the liquified vapors from the condenser. Any remaining vapors proceed through the exhaust line to the CHEMI-FILTER.

DRAIN

The drain includes a valve in the chassis, and a separate fitting with plastic tubing. The operator inserts the fitting into the valve to empty liquid waste from the condensate tank.

EXHAUST

Vapors from the chamber that do not liquify in the condenser proceed to the exhaust connection on the filter housing. They exit through the CHEMI-FILTER into the atmosphere.

CHEMI-FILTER

The CHEMI-FILTER traps the formaldehyde from the exhaust vapors before releasing them to the atmosphere. The CHEMI-FILTER should be installed before the sterilizer is operated. It must be replaced regularly.

CHEMIPURGE COMPONENTS (EC5500 & EC6000)

The Chemipurge components force vapors out of the chamber after a sterilizing cycle. Only the EC5500 and EC6000 have Chemipurge components. The EC5000 allows gravity and pressure to empty the vapors from the chamber.

Pump 1M

Propels air into the chamber during the purge phase.

Air Filter

Removes contaminants from intake air before the pump propels it into the chamber.

Check Valve

Prevents chamber backpressure from contacting pump 1M and the air filter.

ELECTRICAL COMPONENTS

PRINTED CIRCUIT BOARDS (PCBs)

EC Series controls use two printed circuit boards.

Power Supply Board 2A—Transforms line power into working voltages. Acts as "input/output" board for heater 1HTR and pump 1M.

Display/Control Board 3A—Contains logic circuits and display components, including the timer and the buzzer.

- **Timer**—On Display/Control Board 3A. Counts down to time the exposure and purge phases. For the exposure phase, the timer operates only if (1) valve shaft switch 4S is closed, and (2) pressure switch 5S is closed. For the purge phase, the timer is actuated when the control knob is turned to DEPRESSURIZE, and valve shaft switch 4S changes from closed to open. After a 1–minute delay, the timer begins to count down the preset purge value.
- Buzzer—On Display/Control Board 3A. Signals the end of the exposure and purge phases.

POWER CORD

The power cord connects the unit to the voltage supply.

POWER SWITCH 1S

The POWER switch turns ON and OFF the electrical power for the unit.

CONTROL PANEL

The control panel contains the indicators, pressure gauge, and the control knob.

HEATER 1HTR - very strong rarely go bad

The chamber is heated by a band-type heater that wraps completely around the outside of the chamber. Wattage for the heater is listed in "Technical Data."

THERMOSTAT 2S

Turns heater 1HTR on and off to maintain chamber temperature at 132°C (270°F). Rarely requires adjustment. CW lowers temp 10°F per ¼ turn

OVERTEMP SWITCH 3S

Opens to cut power to the heaters if chamber temperature reaches 163°C±4 (325°F). Closes and restores power to the heater circuit when temperature decreases to 148°C±6 (299°F).

VALVE SHAFT SWITCH 4S (Timer Cam Switch)

Engaged by the cam on the valve shaft, this switch is closed only when the control knob is set to PRESSURIZE. For the exposure phase, the timer will not operate if either this switch or pressure switch 5S is open. For the purge phase, this switch must change from the closed state to the open state. After a 1–minute delay, the timer begins to count down the preset purge value.

PRESSURE SWITCH 5S

Closes when chamber pressure reaches the minimum exposure pressure of 138 kPa (20 psi). Opens whenever chamber pressure is less than that value. For the exposure phase, the timer will not operate if either this switch or valve switch 4S is open.

STERILANT LEVEL SWITCH 6S

The sterilant level switch in the reservoir lights the VAPO. indicator when the sterilant level is low. This switch is preset to actuate when one liter of VAPOSTERIL can be poured into the reservoir. The float level is not adjustable.

NOTES

PRINCIPLES OF OPERATION

WARNING — Do not reuse VAPO-STERIL solution removed from the waste tank. This liquid may be contaminated or chemically altered. It may damage the sterilizer.

CAUTION — Use only Harvey VAPO-STERIL solution in the Chemiclave. Do not dilute, alter or otherwise change VAPO-STERIL in any way. Use of other solutions may cause mechanical damage to components of the sterilizer, and may result in nonsterile loads.

CHEMICLAVE CYCLE (EC5000)

FILLING THE RESERVOIR

This is a manual function. When the sterilant reservoir is filled, VAP0-STERIL can flow through metering valve MV1 to fill the shot chamber. The metering valve is open to the shot chamber when the control knob is set to DEPRESSURIZE (see Figure 2–1).

POWER ON

Control knob (1MV) is set to **DEPRESSURIZE** before turning the power ON. This vents any sterilant vapors into the condensate tank. Electrical power is applied to the unit when POWER switch S1 is turned ON. When the power is turned ON, the POWER indicator lights.

WARM UP

The heater (1HTR) that surrounds the chamber is turned on when the power is turned ON. It stays active until the temperature reaches 132° C (270° F). As long as the 1HTR is active, the TEMP. indicator lights (see Figure 2–2).

READY/LOAD

When the temperature reaches 132°C (270°F), 1HTR cycles off and the TEMP. indicator goes out. The chamber is ready to be loaded (see Figure 2–3). 1HTR is controlled to maintain chamber temperature. TEMP. cycles on and off with 1HTR.

PRESSURIZATION

When the operator sets control knob 1MV to **PRESSURIZE**, sterilant flows by gravity into the chamber from the shot chamber of the metering valve (see Figures 2–4 and 2–5, "PRESSURIZE mode"). Chamber pressure begins to increase. The timer displays "20" minutes.

EXPOSURE

This timed function begins when chamber pressure reaches 138 kPa (20 psig). Pressure switch 5S is then energized. The timer counts down the exposure time of 20 minutes. The decimal point flashes when the timer is active. Chamber pressure is displayed continually on the pressure gauge. If pressure goes below 138 kPa (20 psig), 5S is de-energized. This stops the timer countdown and the flashing decimal point until pressure returns to 138 kPa (20 psig) or above.

Exposure Complete

When the exposure is complete, the timer displays "00" and a tone sounds. The COMPLETE indicator flashes, then lights (see Figure 2–7).

NOTE

Exposure conditions are maintained until the control knob (1MV) is set to **DEPRESSURIZE**.

DEPRESSURIZATION

Begins when the operator sets the control knob 1MV to **DEPRESSURIZE** (see Figure 2–8). This vents the chamber through the metering valve to the condensate tank (see Figure 2–5, "DEPRESSURIZE mode"). Pressure switch 5S is de-energized. The COMPLETE indicator goes out. Much of the chemical vapor, under pressure in the chamber, escapes into the condensate tank and out through the CHEMI-FILTER. Chamber pressure drops to zero.

CYCLE COMPLETE

After Depressurization, the cycle is complete. Heater 1HTR remains controlled as long as the POWER switch remains ON. The POWER indicator is lit, and the TEMP. indicator cycles on and off with heater.

To unload, the operator opens the door once the pressure gauge reads less than 14 kPa (2 psig) (see Figure 2–10).

CHEMICLAVE CYCLE (EC5500 & 6000)

FILLING THE RESERVOIR

This is a manual function. When the sterilant reservoir is filled, VAPO-STERIL can flow through metering valve MV1 to fill the shot chamber. The metering valve is open to the shot chamber when the control knob is set to DEPRESSURIZE (see Figure 2–1).

POWER ON

Control knob (1MV) is set to **DEPRESSURIZE** before turning the power ON. This vents any sterilant vapors into the condensate tank. Electrical power is applied to the unit when POWER switch S1 is turned ON. When the power is turned ON, the POWER indicator lights.

WARM UP

The heater (1HTR) that surrounds the chamber is turned on when the power is turned ON. It stays active until the temperature reaches 132° C (270° F). As long as the 1HTR is active, the TEMP. indicator lights (see Figure 2–2).

READY/LOAD

When the temperature reaches 132°C (270°F), 1HTR cycles off and the TEMP. indicator goes out. The chamber is ready to be loaded (see Figure 2–3). 1HTR is controlled to maintain chamber temperature. TEMP. cycles on and off with 1HTR.

PRESSURIZATION

When the operator sets control knob 1MV to **PRESSURIZE**, sterilant flows by gravity into the chamber from the shot chamber of metering valve MV1 (see Figures 2–4 and 2–6, "PRESSURIZE mode"). Chamber pressure begins to increase. The timer displays "20" minutes.

EXPOSURE

This timed function begins when chamber pressure reaches 138 kPa (20 psig). Pressure switch 5S is then energized. The timer counts down the exposure time of 20 minutes. The decimal point flashes when the timer is active. Chamber pressure is displayed continually on the pressure gauge. If pressure goes below 138 kPa (20 psig), 5S is de-energized. This stops the timer countdown and the flashing decimal point until pressure returns to 138 kPa (20 psig) or above.

Exposure Complete

When the exposure is complete, the timer displays "00" and a tone sounds. The COMPLETE indicator lights. The PURGE indicator flashes briefly (see Figure 2–7).

NOTE ▶ *Exposure conditions are maintained until the control knob (1MV) is set to* **DEPRESSURIZE**.

DEPRESSURIZATION

Begins when the operator sets the control knob 1MV to **DEPRESSURIZE** (see Figure 2–8). This vents the chamber through the metering valve to the condensate tank (see Figure 2–6, "DEPRESSURIZE mode"). Pressure switch 5S is de-energized. The COMPLETE indicator stays on. The PURGE indicator continues to flash as the chamber depressurizes for one minute.

PURGE

Begins automatically after Depressurization (see Figure 2–9). Timer displays "07" (EC5500) or "09" (EC6000). The COMPLETE indicator goes out. The PURGE indicator lights. Purge pump 1M forces sterilant vapor from the chamber until the timer counts down to "00."

COMPLETE

After Purge, the pump stops and the PURGE indicator goes out. A tone sounds. The pressure gauge reads less than 14 kPa (2 psig). The cycle is complete. The COMPLETE indicator stays lit for one minute, then goes out. Heater 1HTR remains controlled as long as the POWER switch remains ON. The POWER indicator is lit, and the TEMP. indicator cycles on and off with the heater.

To unload, the operator opens the door (see Figure 2–10).

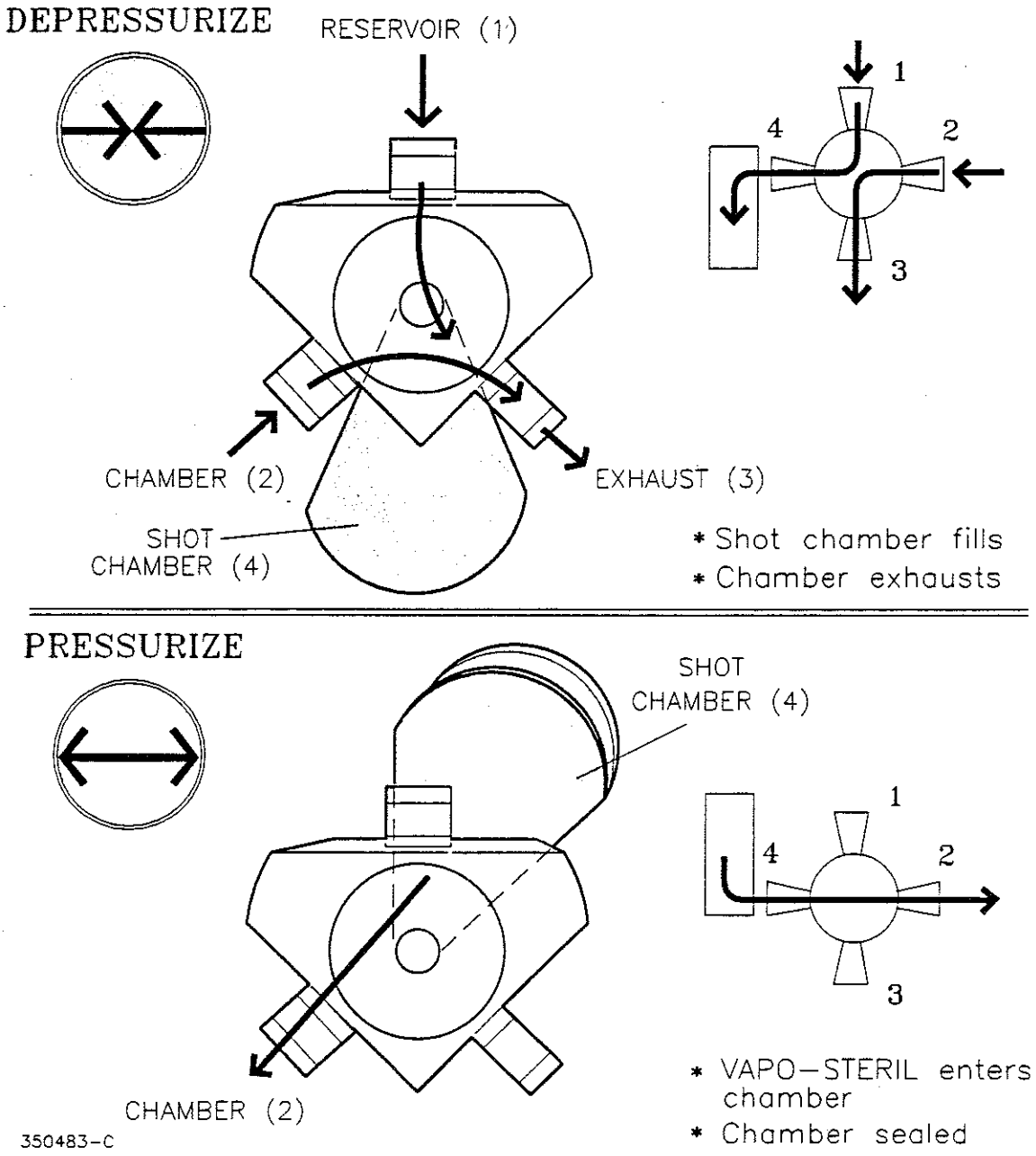

FIGURE 2–1. METERING VALVE FUNCTION

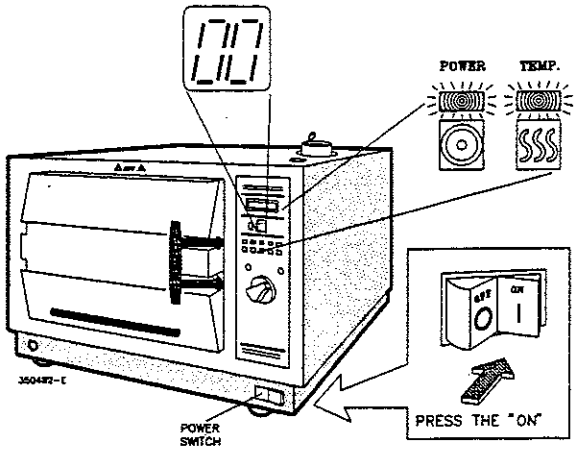

FIGURE 2–2. WARM UP

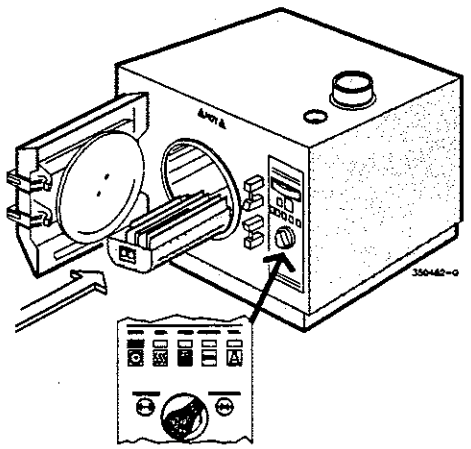

FIGURE 2–3. READY/LOAD

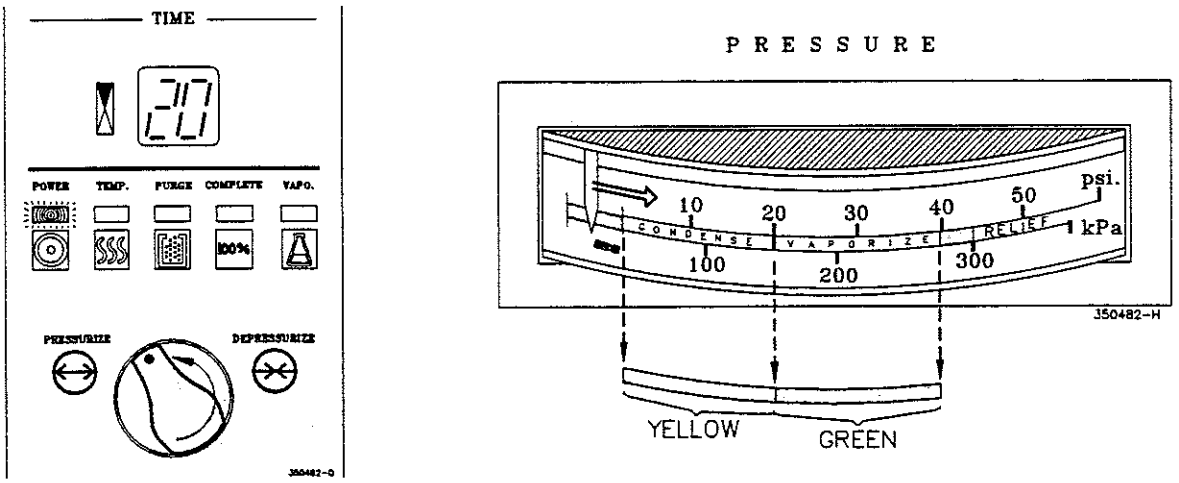

FIGURE 2–4. PRESSURIZATION

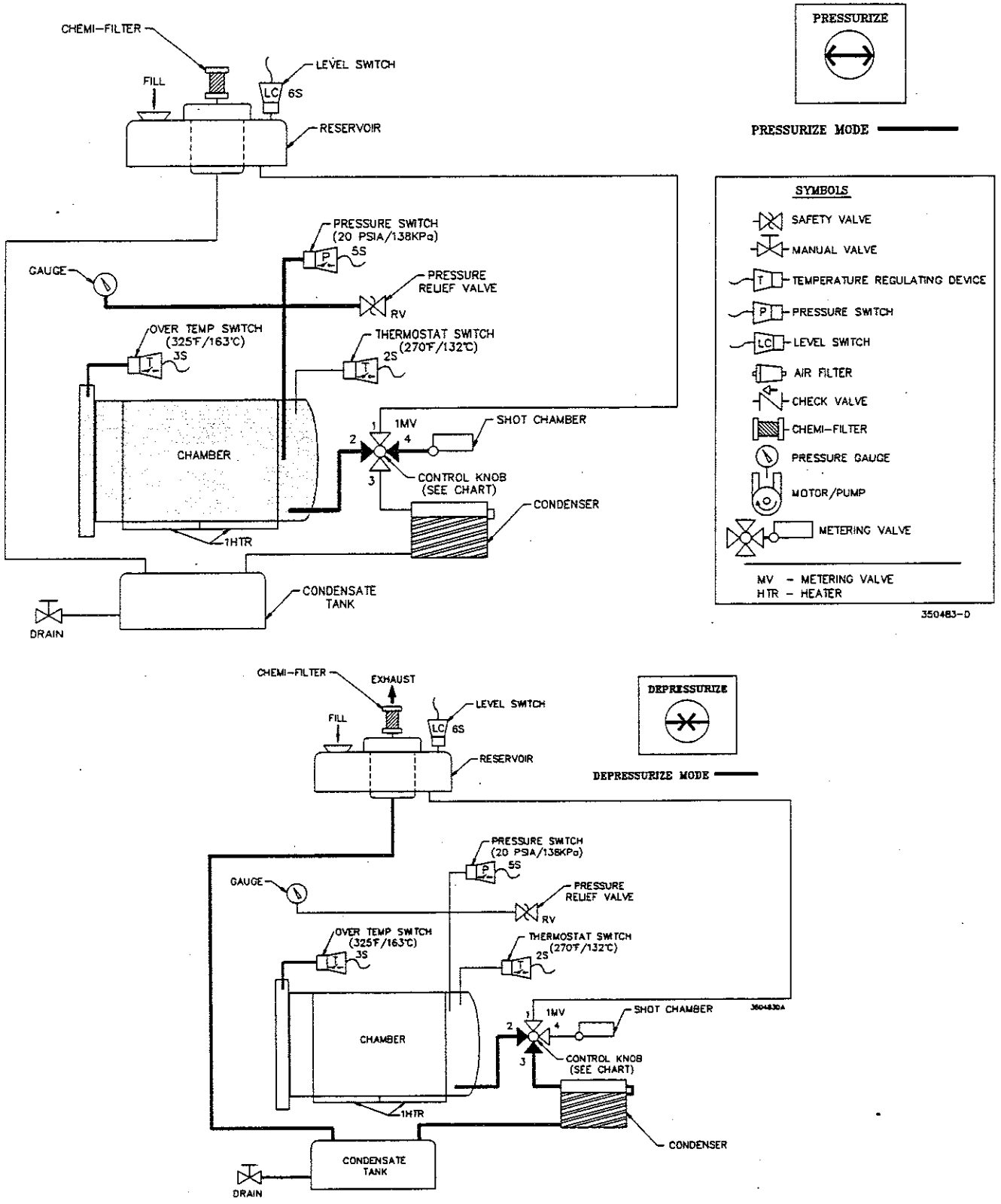

FIGURE 2–5. EC5000 OPERATION

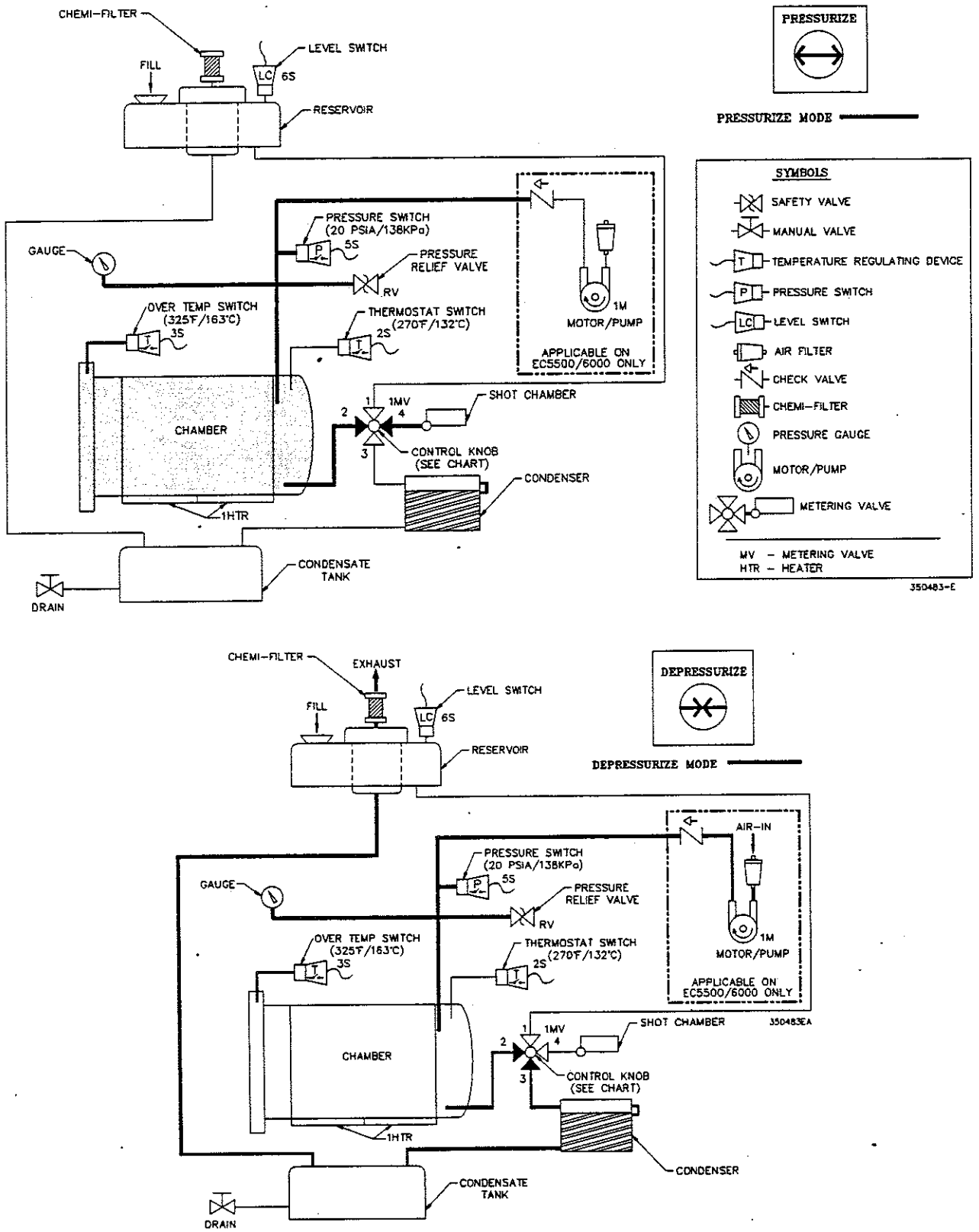

FIGURE 2–6. EC5500/EC6000 OPERATION

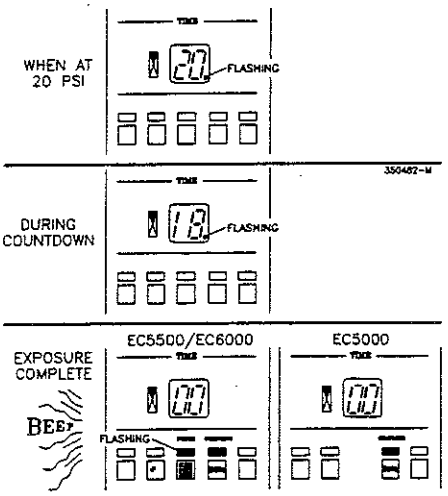

FIGURE 2–7. EXPOSURE

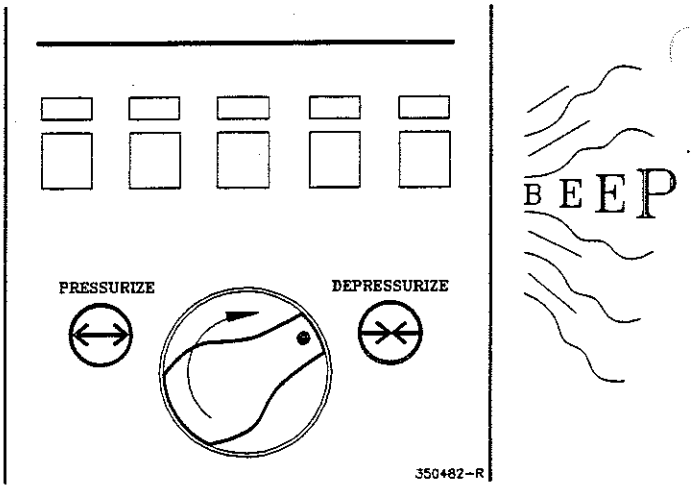

FIGURE 2–8. DEPRESSURIZATION

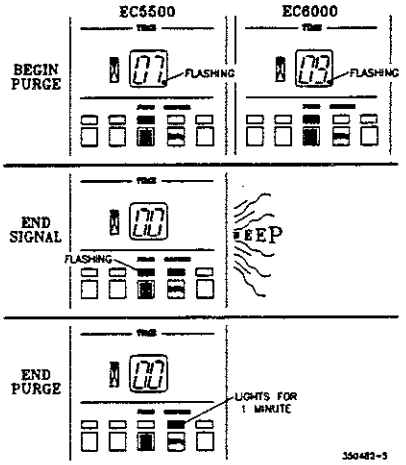

FIGURE 2–9. PURGE (EC5500/EC6000)

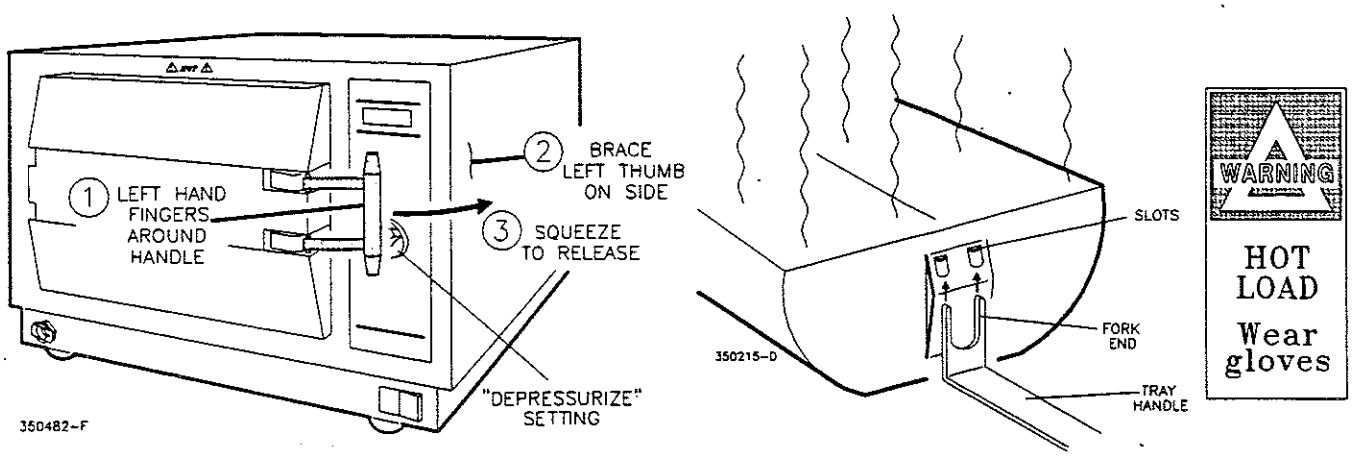

FIGURE 2–10. END/UNLOAD

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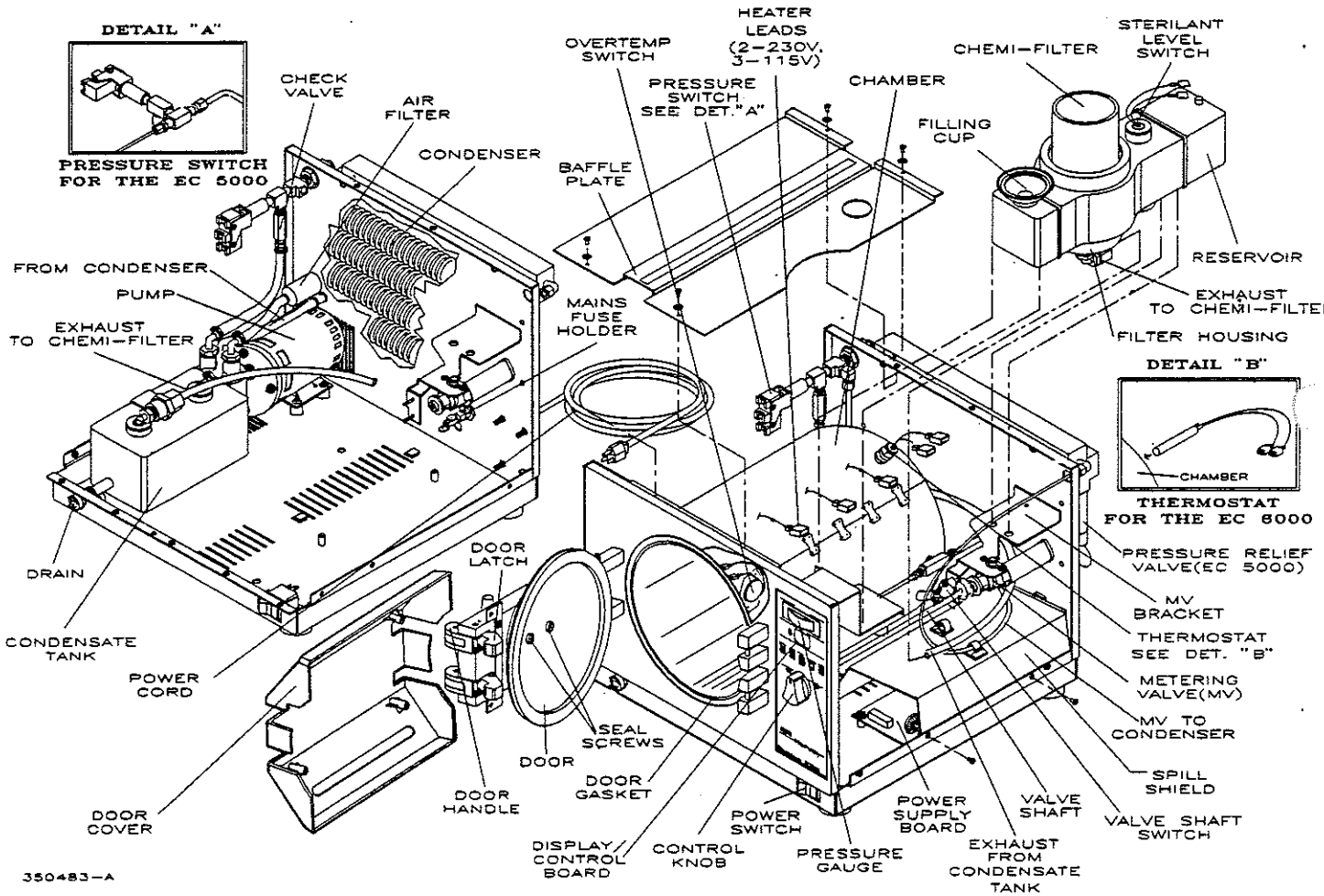


FIGURE 3–1. COMPONENT LOCATIONS

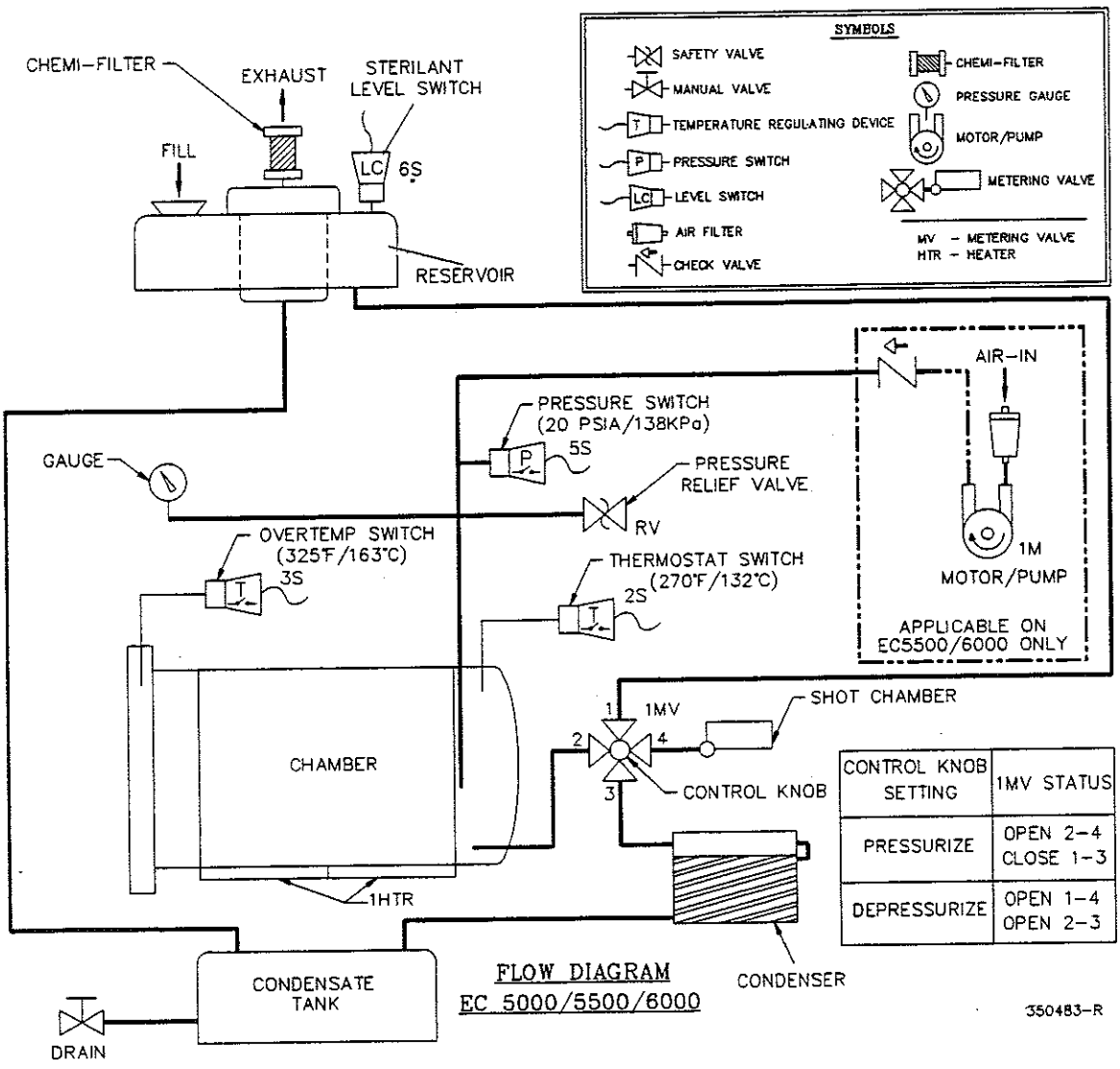


FIGURE 3–2. PIPING SCHEMATIC

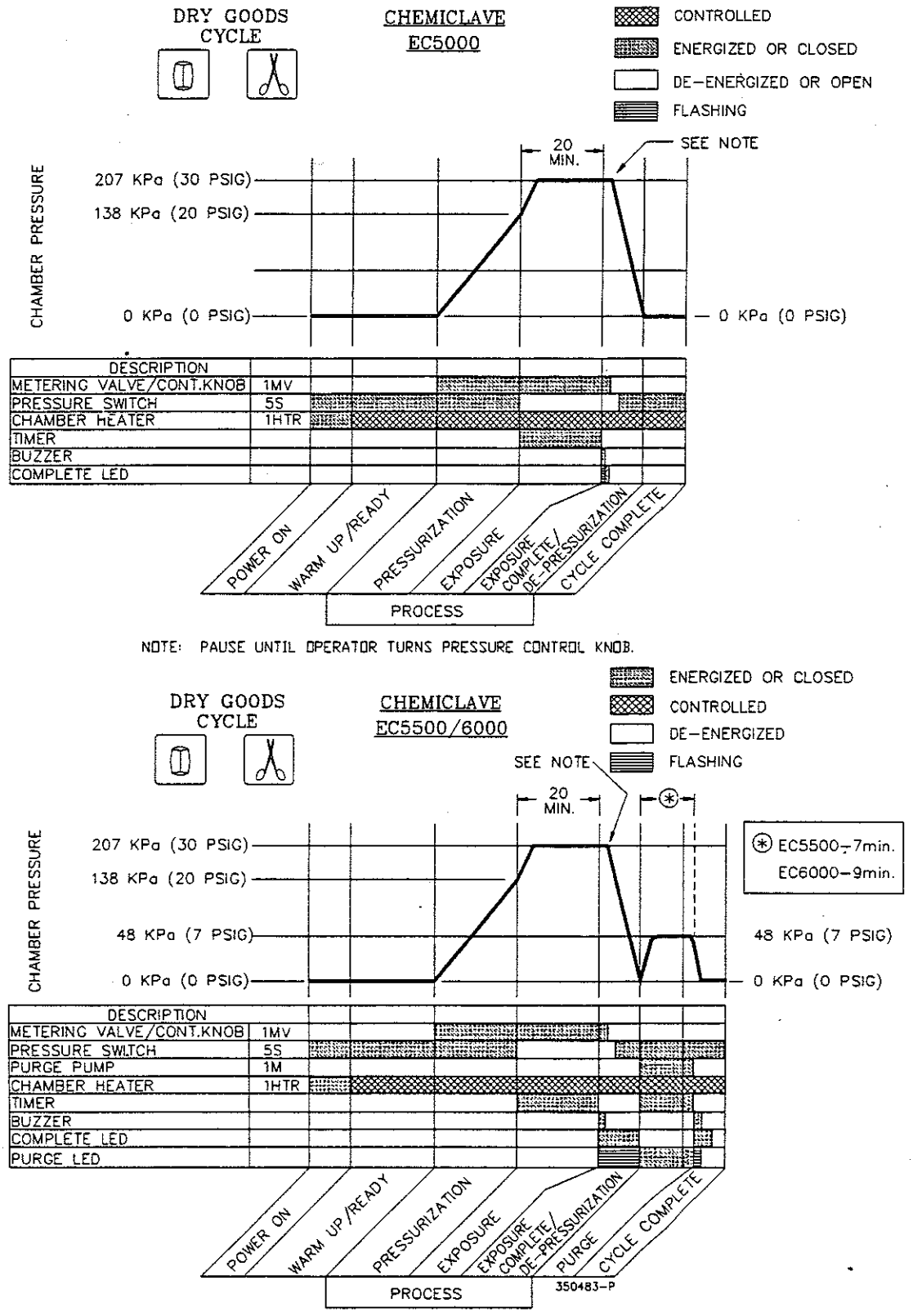
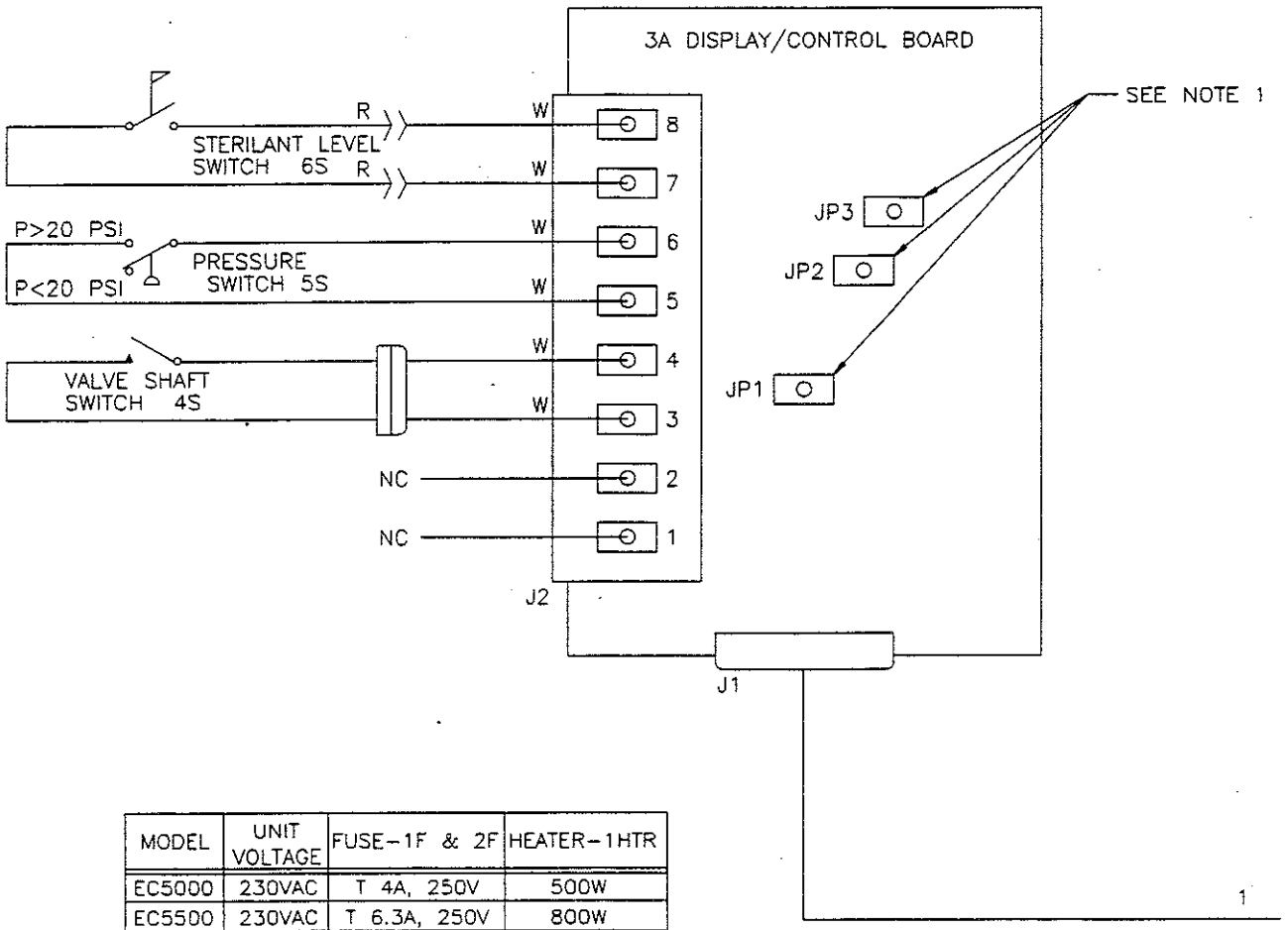


FIGURE 3–3. CYCLE PHASE DIAGRAM

NOTES



MODEL	UNIT VOLTAGE	FUSE–1F & 2F	HEATER–1HTR
EC5000	230VAC	T 4A, 250V	500W
EC5500	230VAC	T 6.3A, 250V	800W
EC6000	230VAC	T.D. 8A, 250V	1200W

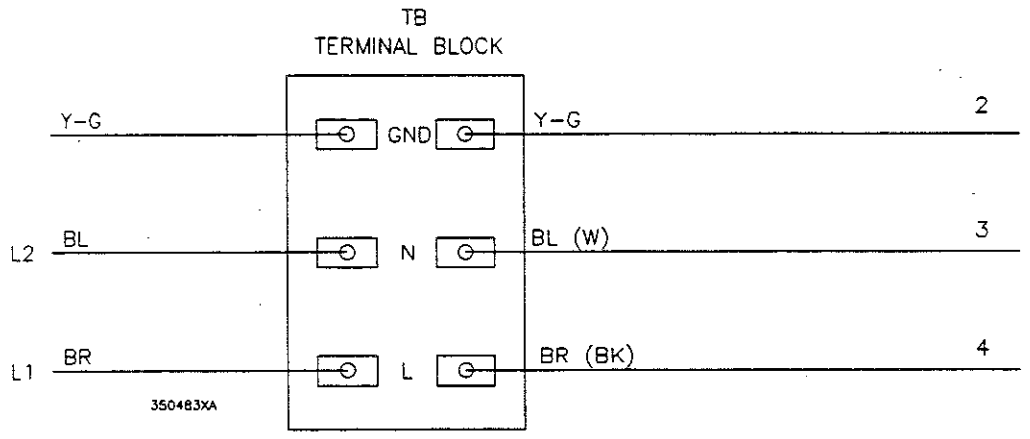


FIGURE 3–4. WIRING DIAGRAM, 230V
(Page 1 of 2)

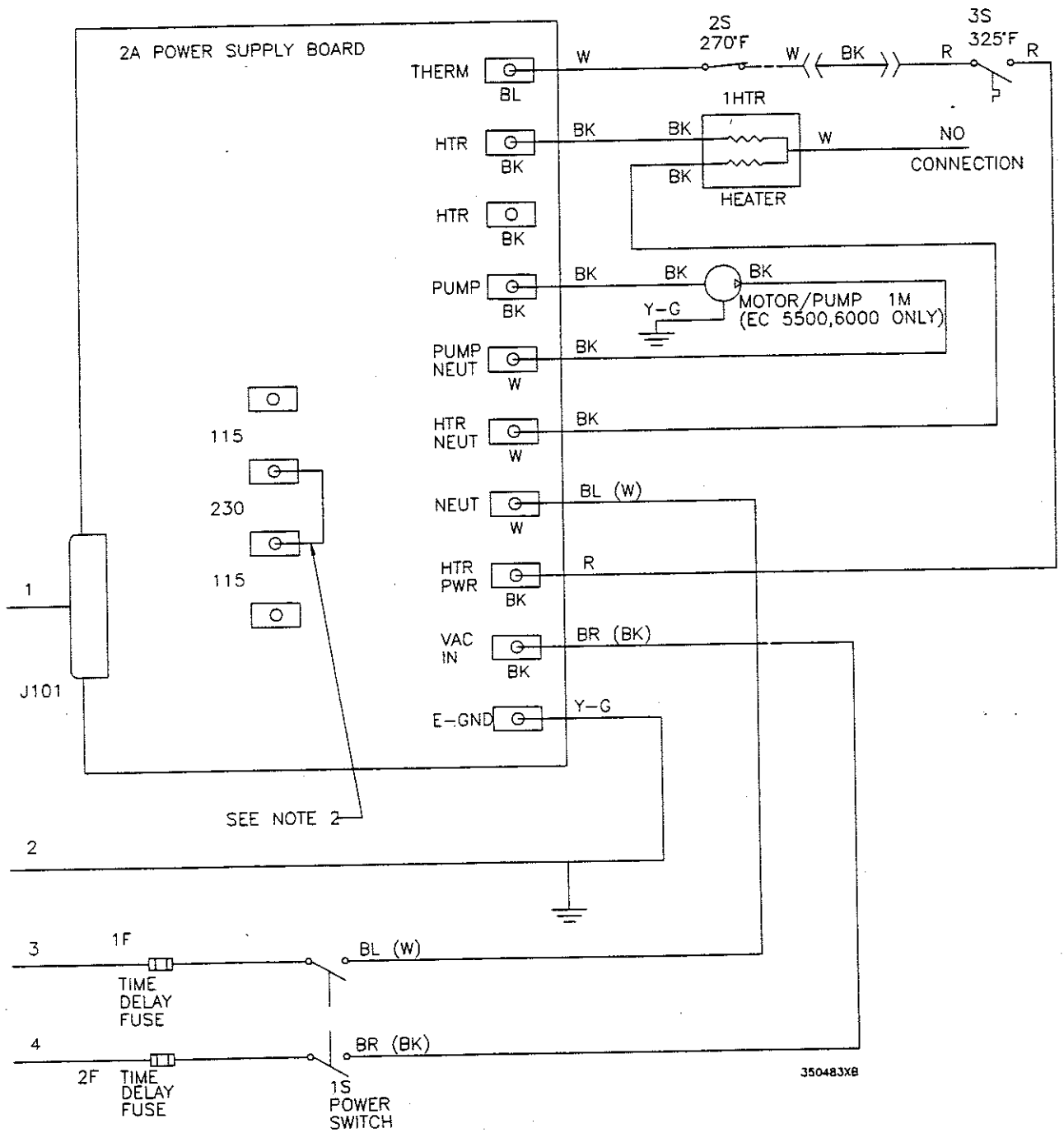
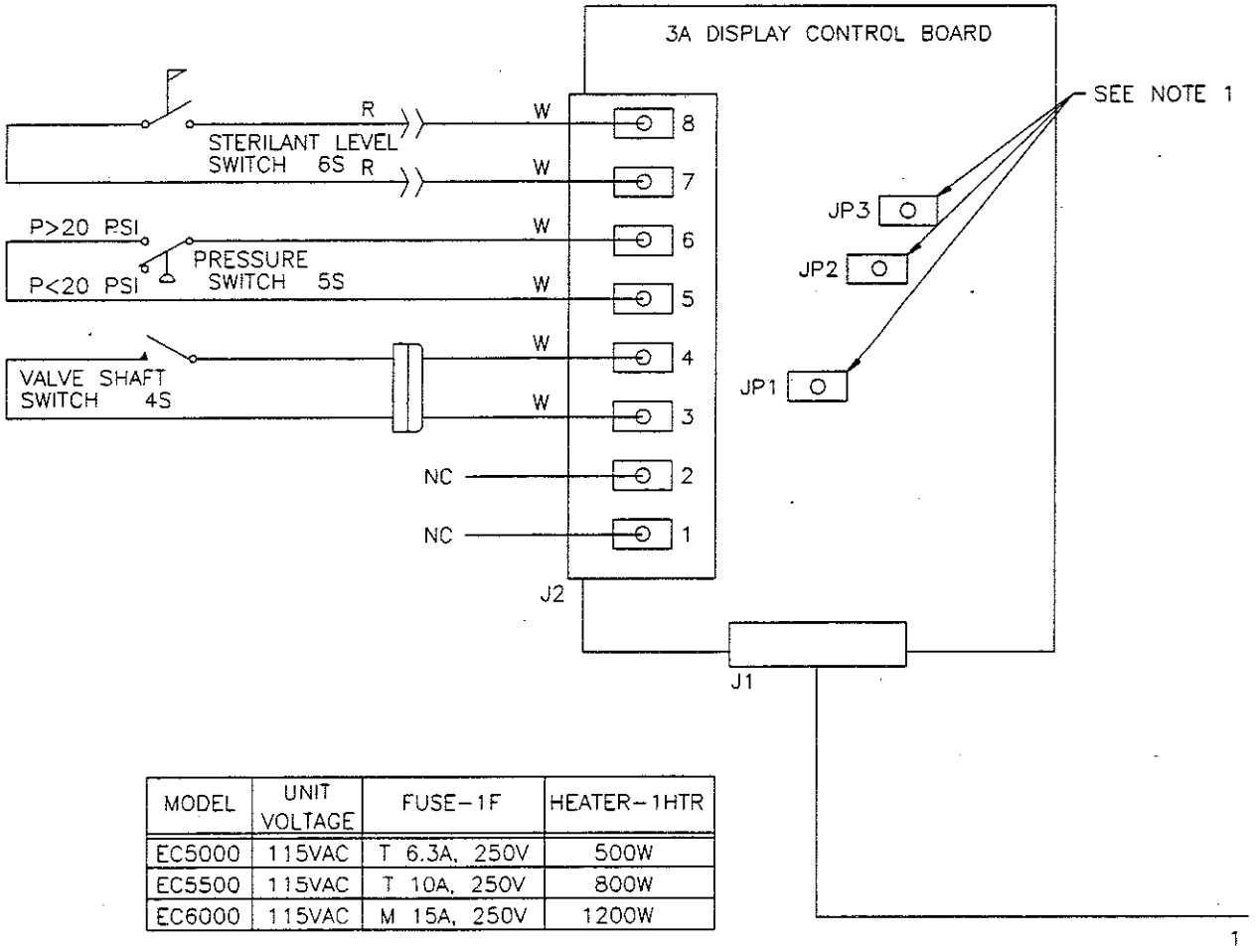


FIGURE 3–4. WIRING DIAGRAM, 230V
(Page 2 of 2)



MODEL	UNIT VOLTAGE	FUSE–1F	HEATER–1HTR
EC5000	115VAC	T 6.3A, 250V	500W
EC5500	115VAC	T 10A, 250V	800W
EC6000	115VAC	M 15A, 250V	1200W

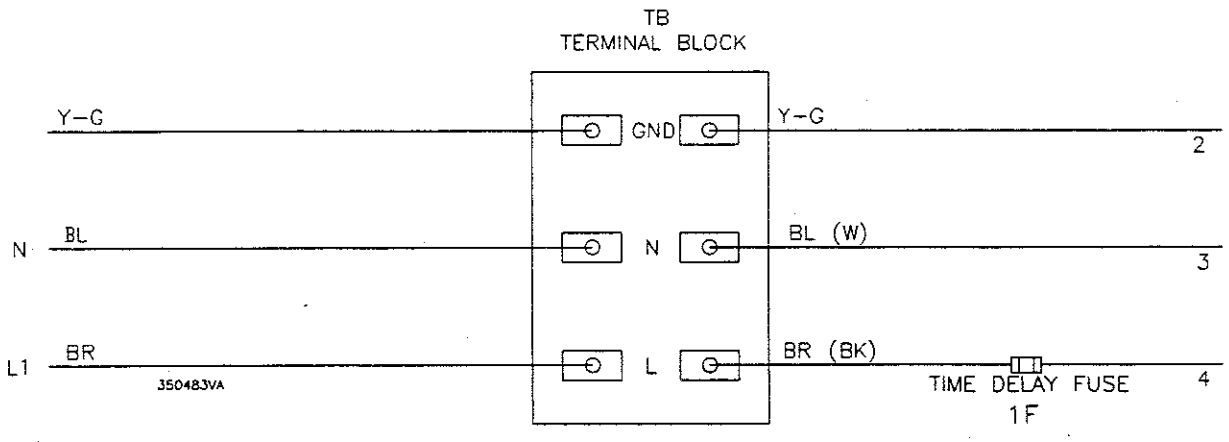


FIGURE 3–5. WIRING DIAGRAM, 115V
(Page 1 of 2)

NOTES: UNLESS OTHERWISE SPECIFIED.
1. JUMPER CONFIGURATION:
   JP3 9 MINUTE PURGE – INSTALL ON EC 6000
   JP2 7 MINUTE PURGE – INSTALL ON EC 5500
   JP1 60 HZ – INSTALL ON ALL 60 HZ UNITS
2. INSTALL TWO (2) VOLTAGE JUMPERS IN OUTBOARD POSITIONS FOR 115V UNITS.

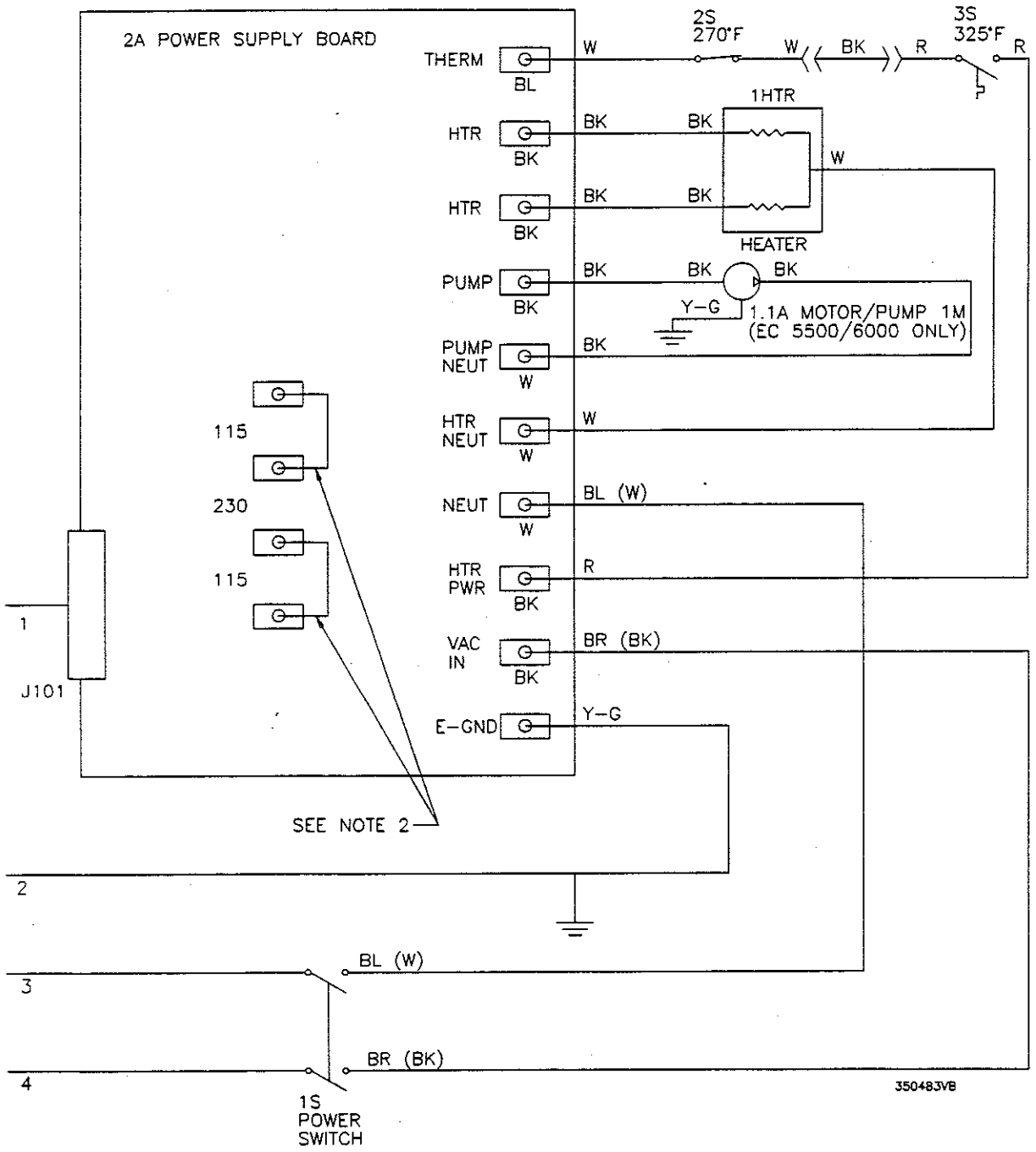


FIGURE 3–5. WIRING DIAGRAM, 115V
(Page 2 of 2)

NOTES

TROUBLESHOOTING

NOTE

Many complaints result from the operator not following the procedures outlined in the Owner and Operator Manual. Review the Owner and Operator Manual with the operator before proceeding.

The following chart covers common complaints. For troubleshooting the printed circuit boards, see "Printed Circuit Boards" in Chapter 5.

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**REMEDY**
Unit will not turn on.	1. Faulty power cord.	1. Check and replace.
	2. Mains fuse blown.	2. Check mains fuses. Replace if necessary.
	3. POWER switch faulty.	3. Test and replace.
Low chamber pressure		
(18–24 psi)	1. Low VAPO-STERIL level.	1. Fill VAPO-STERIL reservoir.
	2. Dirty gasket.	2. Wipe gasket and door face.
	3. Door loose.	3. Adjust door tension (see Chapter 6).
	4. Load too heavy.	4. Reduce load size.
	5. Using cloth wraps or gauze.	5. Not recommended in Chemiclave. Use wraps as specified in Owner & Operator Manual.
	6. Loose seal screws.	6. Tighten or replace.
(<18 psi)	1. Leaky check valve (EC5500/6000).	1. Soap the air filter on rear of unit. If it bubbles under pressure, replace the check valve.
	2. Metering valve.	2. Check for leaks. Replace if necessary.
	3. Low temp.	3. Calibrate to 270°F ± 5.
	4. Leaks.	4. Check for leaks at fittings, gasket and door, and pressure relief valve.

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**REMEDY**
High pressure (occasional)	1. Wet instruments.	1. Rinse instruments in isopropyl alcohol to remove water. Let instruments sit in unit with door cracked for 1 minute before running cycle.
	2. PRESSURIZE cycle started before previous DEPRESSURIZE cycle is complete.	2. Tell the user to wait at least 15 seconds before turning the control knob.
(constant)	High temperature.	Calibrate to 270°F ± 5.
Pressure rises but drops.	1. Door seal leaks.	1. Check for leaks. Repair.
	2. (EC5500 and EC6000) Leak at check valve.	2. Check for leaks. Replace.
	3. Leaks at fittings.	3. Check for leaks. Repair.
	4. Leak at pressure relief valve.	4. Check for leaks. Repair.
	5. Leak at metering valve.	5. Check for leaks. Replace.
Chamber full of VAPO-STERIL in the morning.	Unit was shut off the night before with the door closed.	Always crack the door before turning off the unit.
Timer won't start.	Pressure <138 kPa (20 psi).	See "Low chamber pressure" (p. 4–1).
(Pressure OK). NOTE ▶ *The timer is activated by the pressure switch when pressure builds up to approximately 138 kPa (20 psi).*	1. Valve shaft switch 4S not engaged.	1. Check that cam is engaging switch. If not, adjust cam position on valve shaft.
	2. Pressure switch 5S not closing at 138 kPa (20 psi).	2. Check pressure switch. Adjust.
	3. Check for power.	3. Restore power.
	4. Faulty Display/Control Board 3A.	4. Test PCB. Replace if necessary.
Purge time will not display (EC5500, EC6000).	Wrong jumpers on Control Board 3A.	Check jumpers. Reinstall as needed.
No buzzer.	Faulty buzzer.	Replace Display/Control Board 3A.

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**REMEDY**
Unit failed spore test.	Low pressure in chamber.	See "Low chamber pressure" (p. 4–1).
(Pressure OK)	1. Overloaded.	1. Reduce load.
	2. User is using Nyclave (plastic) bags.	2. Not recommended for Chemiclave.
	3. User is using see-thru bags improperly.	3. Do not stack or layer bags. One layer, paper side down, or align in a row placed on edge.
	4. Faulty test.	4. Retest.
Hard to open the door.		
NOTE ▶ *Tension on the door is preset at the factory. After the unit has been in use, door adjustment may be needed. Release the tension in small amounts. Pressure must not bypass the gasket at less than 276 kPa (40 psi).*		
	Door tension too tight.	Adjust door to relieve excess tension (see Chapter 6).
VAPO. indicator won't light.	1. Level switch 6S in reservoir is faulty.	1. Check and replace.
	2. Indicator is burned out.	2. Check. Replace Display/ Control Board if required.

NOTE ▶ *For troubleshooting the PCBs, see page 5–10.*

NOTES

Adjustment and Repair

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ADJUSTMENT & REPAIR

WARNING — When troubleshooting the system, be sure that VAPO-STERIL does not drip onto Power Supply Board 2A. If VAPO-STERIL drips or is spilled on the Power Supply Board, turn off the POWER switch and allow time for the VAPO-STERIL to evaporate completely. Otherwise the vapors could ignite, causing burns and damage.

NOTE

If following these procedures fails to repair the sterilizer, contact MDT Product Support.

PIPING COMPONENTS

LEAKS

If the sterilizer cannot reach or maintain chamber pressure, first inspect the door gasket and replace it if worn or damaged. Then check for leaks in components (see following procedures). As each leak is identified and corrected, be sure the process does not disturb nearby connections.

Leaks at fittings

NOTE

The unit must be at room temperature for these procedures. Chamber fittings in a heated unit will prevent soap from bubbling.

1. Allow the unit to cool to room temperature.
2. Use compressed air, soapy water, and a brush.
3. Remove the outside cover.
4. Pressurize the piping system with compressed air.
   a. Remove the reservoir. To do this, remove the mounting bands. (Bands are removable. Do not cut.) Then disconnect the tubing from the exhaust inlet and from the outlet to the metering valve MV1. Lift the reservoir straight up. Quickly cover the outlet under the reservoir to prevent spillage. Set the reservoir aside.
   b. Open the chamber door. Turn the control knob to PRESSURIZE. This will drain any VAPO-STERIL from the metering valve. Wipe any VAPO-STERIL from the bottom of the chamber.
   c. Turn the control knob to DEPRESSURIZE. Close and latch the door.
   d. Remove the tubing from the exhaust port of the metering valve (see Figure 5–1).
   e. Hold the compressed air nozzle tightly against the exhaust port stub on the metering valve. Blow air into the unit until the pressure gauge needle moves into the VAPORIZATION range (green). Then turn the control knob to PRESSURIZE.
5. Check for leaks around tube fittings and pipe threads at the pressure gauge, metering valve, and chamber. Do this by brushing the areas with soapy water. Leaks will appear as bubbles or foam that form and grow larger.

NOTE

Slight foaming around the taper of the metering valve (see Figure 5–1) is acceptable. Otherwise, no foaming should occur.

6. If there is a leak, tighten the leaking part. Repeat the pressure test. If there is still a leak, check for damage to fittings or threads. Replace as necessary.
7. If there is extensive damage contact MDT Product Support.

Leaks at gasket and door

1. IF UNIT IS AT ROOM TEMPERATURE
   a. Pressurize the unit. To do this, perform steps 2–4 of "Leaks at fittings" (p. 5–2).
   b. Brush around the edge of the door with soapy water. Leaks will appear as bubbles or foam that form and grow larger.
   c. Brush with soapy water around the seal screws at the center of the door. Watch for bubbles or foam that forms and grows larger.
2. IF UNIT IS HEATED TO READY TEMPERATURE
   a. Place a few drops of lightweight oil at the top edge of the door.
   b. Allow the oil to flow completely around the door.
   c. Place a few drops of oil at the top of the seal screws (see Figure 5–4). Let the oil flow around the screws.
   d. Foaming or bubbling indicate leakage.
3. If the door leaks around the edge, increase the door tension (see "Door Adjustment" in Chapter 6).
4. If the door tension is tight and there are still leaks, inspect the gasket. Replace if necessary (see "Gasket Replacement" in Chapter 6).
5. If there are leaks around the seal screws, check the door collar. Replace the seal screws, and the door collar if required.

Leaks at pressure relief valve

See "Pressure Relief Valve."

Leaks at metering valve

See "Metering Valve."

METERING VALVE MV1

The metering valve dispenses VAPO-STERIL into the chamber for each sterilizing cycle. With extended use, the metering valve may leak.

NOTE ▶

Buildup of residue in a dirty chamber can damage the inner coating of the metering valve, causing it to leak. The resulting low pressure condition is the most common failure of Chemiclave sterilizers.

Checking for leaks

UNIT AT ROOM TEMPERATURE

1. Remove the tubing to the exhaust port. Pressurize the unit. To do this, perform steps 2–4 of "Leaks at fittings" (p. 5–2).
2. Brush the stub of the exhaust port with soapy water. Leaks will appear as bubbles or foam that grow larger.
3. If the valve leaks, replace it.

UNIT HEATED TO OPERATING TEMPERATURE

1. Turn the control knob to PRESSURIZE. Remove the cover. Watch for movement of VAPO-STERIL solution in the tubing.
2. If liquid in the exhaust line moves toward the condenser, the metering valve is leaking.
3. If the valve leaks, replace it.

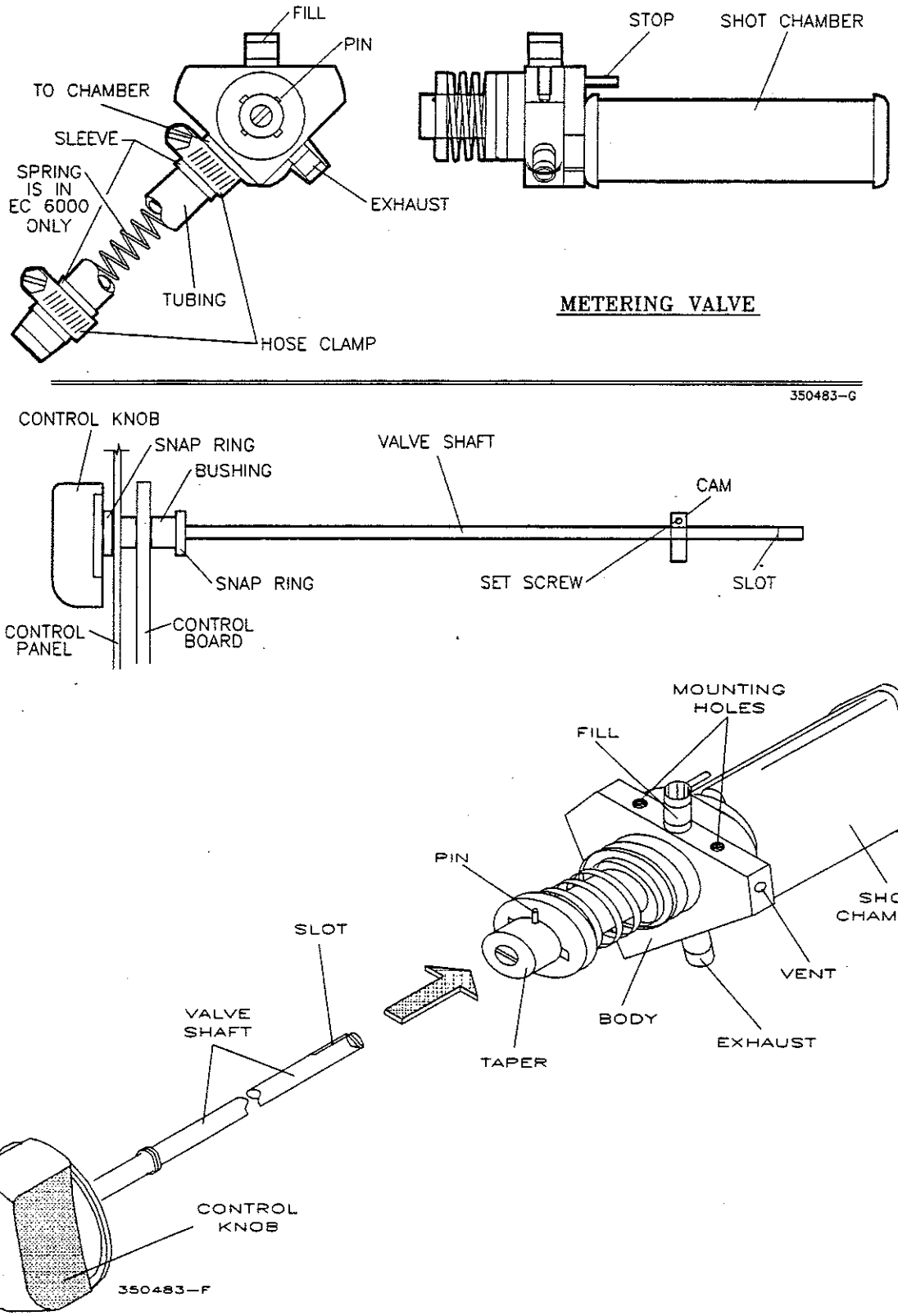


FIGURE 5–1. METERING VALVE MV1 (EC 5500 Shown)

Metering valve replacement

1. Turn OFF power switch 1S. Set the control knob to DEPRESSURIZE. Be sure the pressure gauge reads "0". Allow the unit to cool to room temperature.
2. Remove the cover (see Figure 3–1).

NOTE ▶ *Mounting bands on the reservoir are removable. Do not cut.*

3. Remove the reservoir.
4. Remove the tubing attached to metering valve MV1.
5. Remove the snap rings from the valve shaft (see Figure 5–1).
6. Remove the mounting screws of the metering valve.
7. Remove the metering valve from the unit.
8. Align the mounting holes in the new metering valve with the holes in the bracket.
9. Install the new valve, but do not tighten the mounting screws.
10. Move the sleeve down along the tubing from the chamber until about 1/16" of the stub on the chamber projects.
11. Slide the hose clamp to the center of the sleeve and tighten it.
12. Install the metering valve shaft. The shaft should slide freely in the end of the metering valve.

NOTE ▶ *The pin in the metering valve and the slot in the valve shaft are off-center. This assures assembly in one way only.*

13. Rotate the metering valve back and forth until it moves freely.
14. Tighten the mounting screws on the bracket.
15. Install the remaining tubing, and the reservoir.
16. Check the unit for proper function.

PRESSURE GAUGE

The pressure gauge only indicates pressure. It has no effect on temperature. Failure of the gauge is highly unusual. Before replacing the gauge, check other causes for pressure changes.

PRESSURE RELIEF VALVE

The pressure relief valve releases pressure at the rating marked on the valve. After prolonged use, the pressure relief valve may leak at lower pressures. If it leaks, first try to reseat the valve. If unsuccessful, replace the valve.

Checking for leaks

1. UNIT AT ROOM TEMPERATURE

a. Pressurize the unit. To do this, perform steps 2–4 of "Leaks at fittings" (p. 5–2).

b. Brush the opening ports with soapy water. Leaks will appear as bubbles or foam that grow larger.

2. UNIT HEATED TO OPERATING TEMPERATURE

   Turn control knob to PRESSURIZE. If liquid collects around the opening ports of the pressure relief valve, the pressure relief valve is leaking.

3. Pull the ring to clear debris and reseat the valve. Check again for leaks.
4. If the valve still leaks, replace it.

Pressure relief valve replacement

1. Depressurize the unit.
2. Remove the cover.
3. Remove the pressure relief valve (see Figure 5–2).
4. Install the new pressure relief valve.

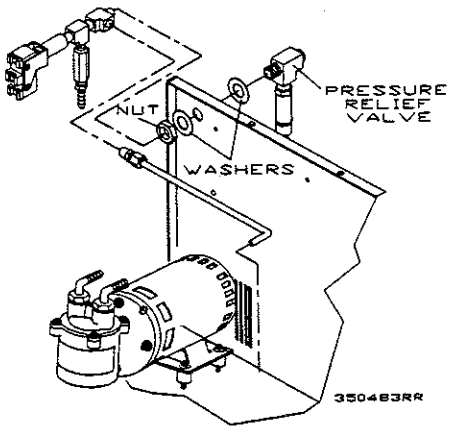


FIGURE 5–2. PRESSURE RELIEF VALVE REPLACEMENT

CONDENSER

In models EC5500 and EC6000 the condenser has a heatsink and a coil. In model EC5000, the condenser has only a coil.

Removing the coil

WARNING — BURN HAZARD. Allow the unit to cool to room temperature before performing this repair. Otherwise burns could result.

1. Remove the cover from the unit.
2. **Models EC5500, EC6000:** Disconnect the fitting at the heatsink (see Figure 5–3). Disconnect the tubing from the other end of the coil.

   Model EC5000: Disconnect the tubing from both ends of the coil.
3. Remove the hardware that secures the coil to the rear of the cabinet.

CONDENSATE TANK

If the condensate tank leaks, replace it.

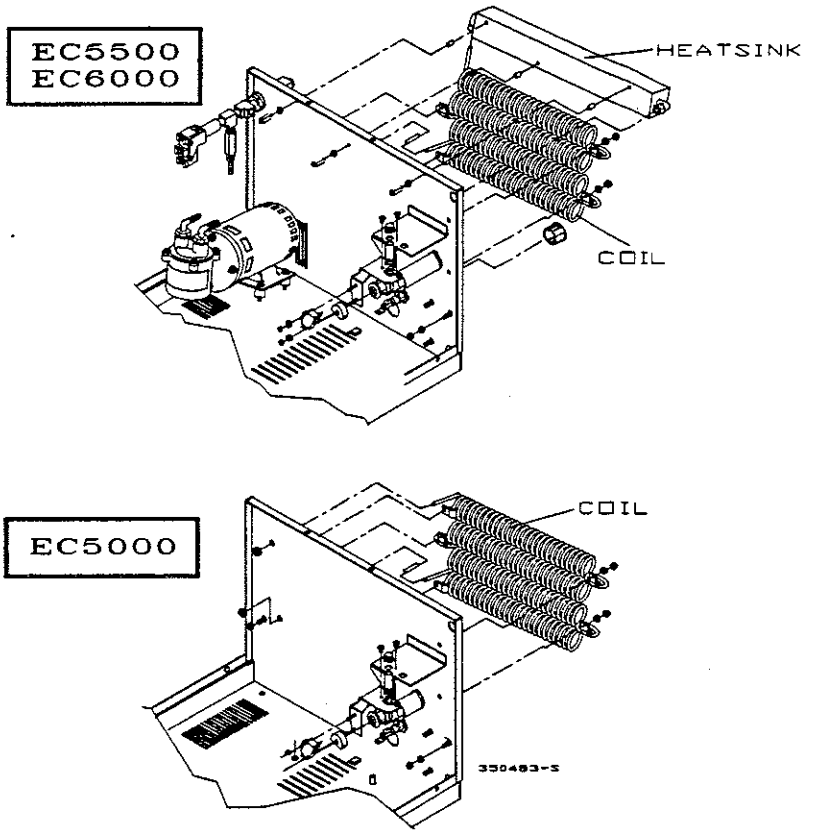


FIGURE 5–3. REMOVING THE CONDENSER COIL

DOOR

Door adjustment

See "Door Adjustment" in Chapter 6.

Gasket replacement

The door gasket seals the chamber at sterilization pressure to a minimum of 276 kPa (40 psi).

To replace the door gasket, see "Gasket replacement" in Chapter 6.

Door replacement

If replacement is necessary, see Figure 5–4.

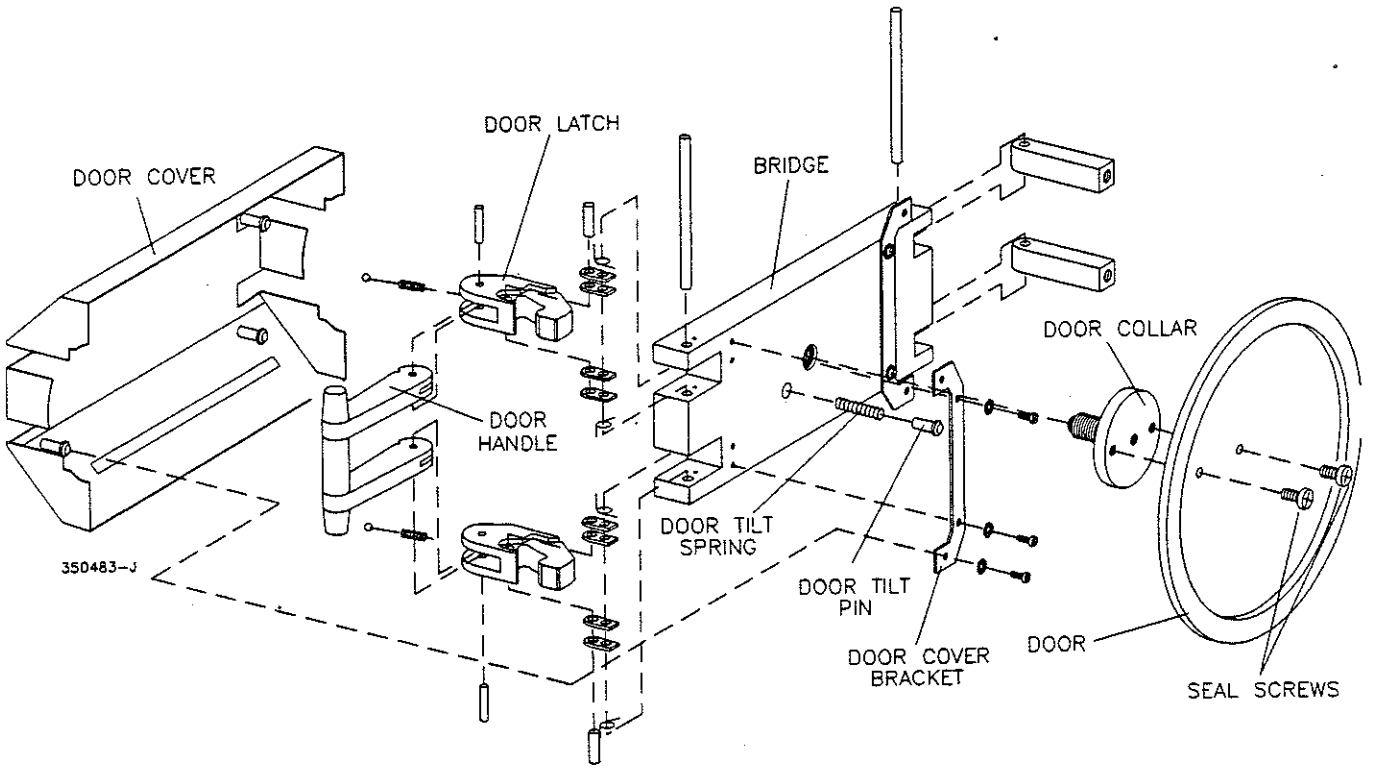
Door collar

If you can change the door adjustment by spinning the door, the door collar must be replaced. Replace the seal screws also (see Figure 5–4).

Seal screws

Replace if the unit leaks from the door collar, or if the door collar is replaced (see Figure 5–4).

CAUTION — Do not reuse seal screws. This could cause leaks.



NOTE

Torque all screws to 12 in.-lb.

FIGURE 5–4. DOOR ASSEMBLY (EC5500 Shown)

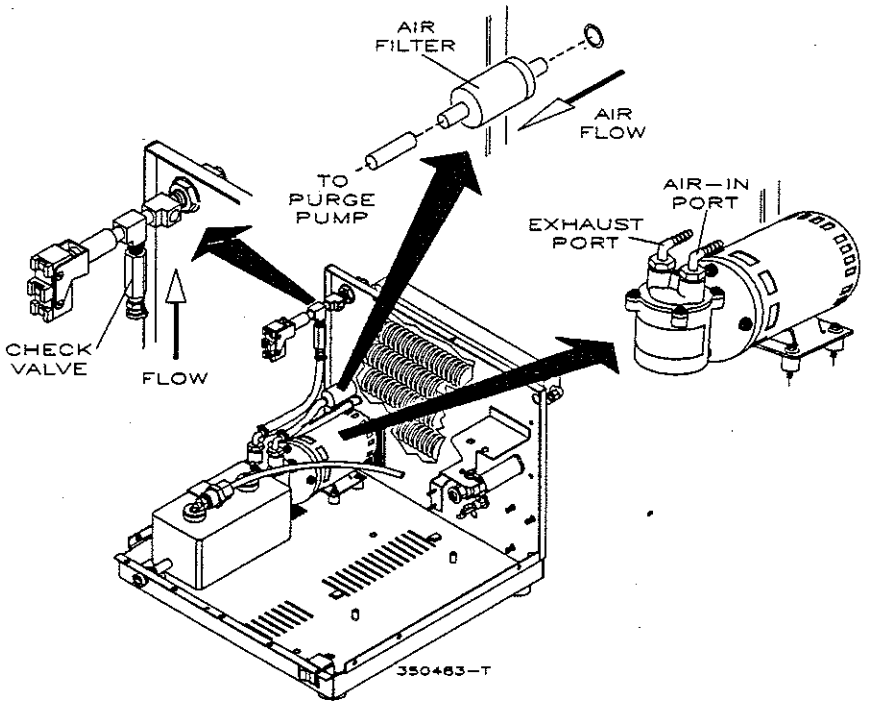


FIGURE 5–5. CHEMIPURGE COMPONENTS

PURGE PUMP 1M (EC5500/6000)

WARNING — SHOCK HAZARD. Disconnect power cord before repairing or replacing the pump.

Functional check

Observe the pressure display during the PURGE phase.

- If the pump is running, but is not producing enough pressure: Check piping for leaks before replacing the pump.
- If the pump makes a constant loud knocking sound:
  a. Check that the pump mountings are snug (see Figure 5–5). Tighten if needed.
  b. If the sound continues inside the pump, replace the pump.

Replacement

1. Turn OFF POWER switch 1S.
2. Unplug electrical connections to the pump (see Figure 5–5).
3. Disconnect hoses from air-in and exhaust ports.
4. Remove the hardware that secures the pump to the base of the cabinet.
5. Remove the pump.
6. Install replacement pump in reverse order. Make sure tubing lines are connected to the correct ports.

AIR FILTER (EC5500/6000)

Replace the air filter once a year. Mark the replacement date on the air filter for reference.

To replace the air filter, disconnect tubing (from Purge Pump 1M), install replacement air filter, and reconnect tubing (see Figure 5–5).

CHECK VALVE (EC5500/6000)

If the unit does not maintain pressure during operation, the check valve may not be seated properly. To reseat the check valve:

a. Run the unit in PURGE for one minute to loosen the check valve ball.
b. Run a test cycle. It should reseat the check valve ball.
c. If the check valve continues to leak under pressure, replace it (see Figure 5–5).

ELECTRICAL COMPONENTS

FUSES

If the control panel does not activate when Power Switch 1S is ON, check the fuse cartridges. If a fuse is blown, replace it with another of the same rating. (See wiring diagrams, Figures 3–4 and 3–5).

Model	Fuse			Code	Part No.
EC5000	115V	6.3 A	Time Lag	T	266057
	230V	4 A	Time Lag	T	266056
EC5500	115V	10 A	Time Lag	T	261575
	230V	6.3 A	Time Lag	T	266057
EC6000	115V	15 A	Medium Time Lag	M	266058
	230V	8 A	Time Delay	T.D.	264306

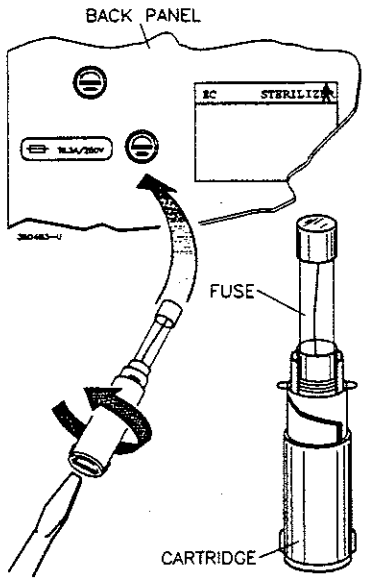


FIGURE 5–6. FUSE REPLACEMENT

Fuse replacement

WARNING — SHOCK HAZARD. Disconnect power cord before replacing a fuse.

1. Remove the fuse cartridge (see Figure 5–6).
2. Check the fuse with an ohmmeter. Replace fuse if necessary.
3. Reinstall fuse cartridge.

PRINTED CIRCUIT BOARDS (PCBs)

There are two printed circuit boards:

- Power Supply Board 2A
- Display/Control Board 3A

Power Supply Board 2A

(see Figure 5–7)

- Can be configured for 115V or 230V
- Hard-wired fuse F102:
  - –100 mA, 5 x 20 mm, with leads, UL 198G, UL listed, CSA certified
  - –SANO part no. SD5–100mA, 250V
    or
    Wickmann part no. 19198–027–LO

Display/Control Board 3A

(see Figure 5–8)

JUMPERS

Jumper	Frequency Rating	
	60 Hz	50 Hz
JP1	IN	OUT

Jumper	Model		
	EC5000 (no purge)	EC5500 7–min purge	EC6000 9–min purge
JP2	OUT	IN	OUT
JP3	OUT	OUT	IN

Testing The Printed Circuit Boards (PCBs)

1. Check for voltage to Power Supply Board 2A.
   a. Set the probes of a DC voltmeter across test points TP1 and TP2 (see Figure 5–7).
   b. Check for 5 VDC ± 0.25V.
   c. If voltage does not check out, check for F102 fuse blown. Also check that the jumpers are properly configured.
   d. If voltage still does not check out, replace the board.
2. Check for power to the Display/Control Board 3A.
   a. Set the probes of a DC voltmeter across test points TP1 and TP2 (see Figure 5–8).
   b. Check for 5 VDC ± 0.25V.
   c. If voltage does not check out, replace the cable.
   d. If voltage does checkout, but board does not function, replace the board.

Troubleshooting the Printed Circuit Boards (PCBs)

Problem	Cause	Solution
F102 fuse blown on Power Supply Board.	Power Supply Board configured for 115V, connected to 230V line.	Check power configuration on Power Supply Board. Change if required.
Unit will not power up or shows erratic display.	Power Supply Board configured for 230V, connected to 115V line.	Check power configuration on Power Supply Board. Change if required.
Display/Control Board does not show 5 VDC across test points.	1. Power Supply Board not configured. 2. Fuse F102 blown on Power Supply Board (see p. 5–9). 3. If Power Supply board shows 5 VDC but Display/Control Board does not: bad connecting cable. 4. If both boards show 5 VDC but Display/Control board does not function, bad Display/ Control board.	1. Check power configuration on Power Supply Board. Change if required. 2. Replace Power Supply Board 2A. 3. Replace cable. 4. Replace Display/Control Board.
Problems with heatup or cycle phase timing.	Display/Control Board jumpers incorrect.	Check and correct jumper configuration.

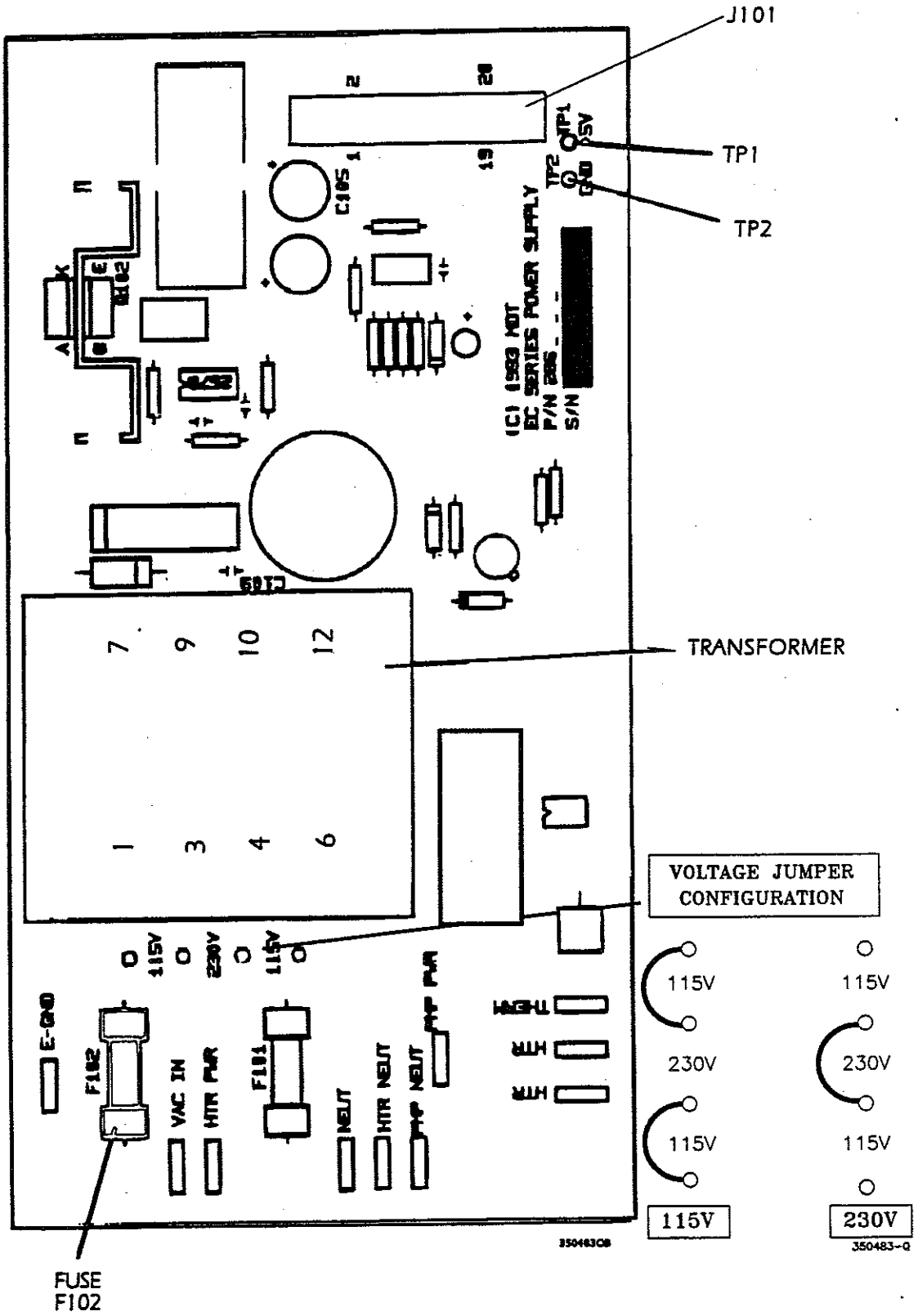
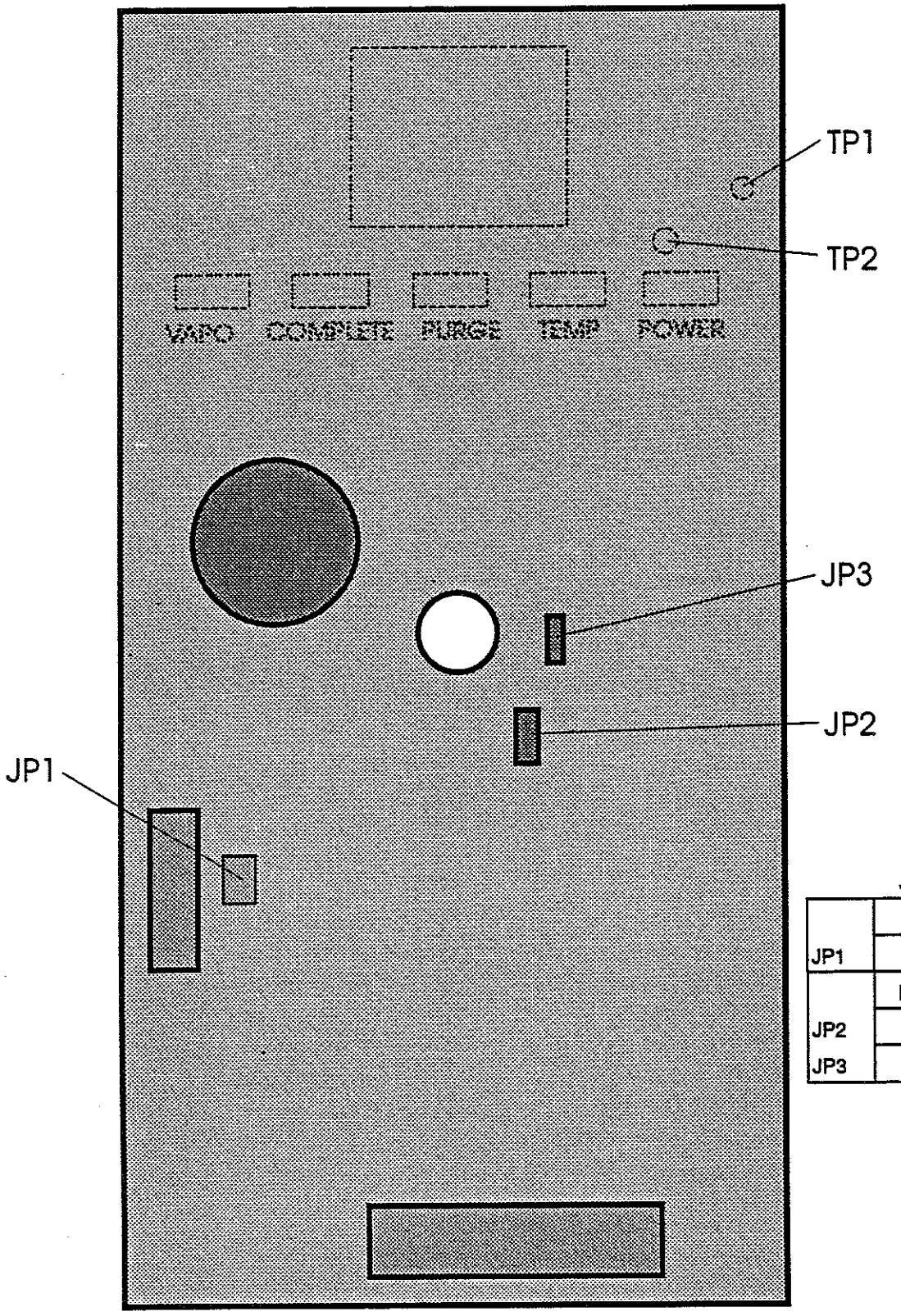


FIGURE 5–7. POWER SUPPLY BOARD 2A (PCB)



Jumper Conditions

	60 Hz	50 Hz	
JP1	IN	OUT	
	EC5000	EC5500	EC6000
JP2	OUT	IN	OUT
JP3	OUT	OUT	IN

FIGURE 5–8. DISPLAY/CONTROL BOARD 3A (PCB)
[REAR VIEW]

TIMER

The timer is part of Display/Control Board 3A. It indicates the time only. It cannot interfere with the sterilization cycle.

When chamber pressure increases to about 138 kPa (20 psi), Pressure Switch 5S closes. This enables the timer to count down. Valve Shaft Switch 4S must also be closed by setting the control knob to PRESSURIZE.

Timer Check

If the timer does not function correctly, test Display/Control Board 3A.

Be sure the jumpers on the board are correct.

Replace Display/Control Board 3A if required.

POWER SWITCH 1S

WARNING — SHOCK HAZARD. Unplug power cord before removing main power switch.

1. Disconnect the power cord from the unit.
2. Remove the top cover.
3. Unplug connectors from switch terminals.

Be sure to compress the prongs of the spring clips, not the body. Bending the body of the spring clips could disassemble the switch instead of removing it in one piece.

4. Compress and hold spring clips at both sides of switch (see Figure 5–9).
5. Remove the switch from outside the cabinet.
6. Install replacement switch in reverse order. See the wiring diagrams (Figures 3–4 and 3–5).
7. If resistance values differ, the heater must be replaced.

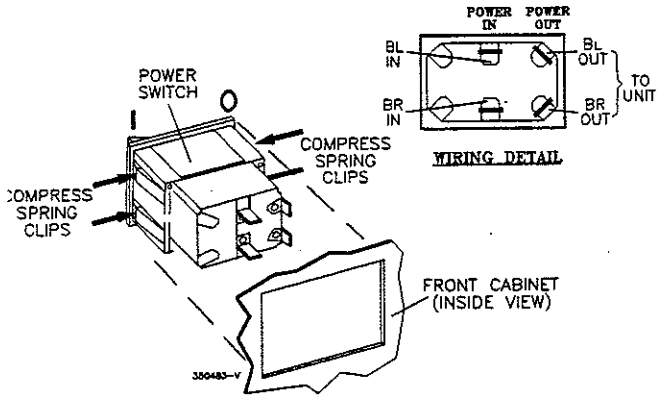


FIGURE 5–9. POWER SWITCH 1S REMOVAL

HEATER 1HTR

WARNING — SHOCK HAZARD. Unplug the power cord before testing or replacing the heater.

Functional Check

Test the continuity (resistance) of heater 1HTR.

230V Units

1. Remove the baffle plate over Power Supply Board 2A.
2. Disconnect the two black heater leads (see Figure 3–1).
3. Measure the heater leads for continuity.
4. If there is no continuity, the connectors on the heater leads may be bad. Perform step 5 at the heater terminals. Replace the connectors if required.

   If there is continuity, perform step 5 at the heater leads.
5. Measure the resistance between the heater leads or between the corresponding heater terminals (see chart below for correct range):

230V Units—Heater Resistance

MODEL	EC5000	EC5500	EC6000
Resistance (ohms)	104–122 Ω	60–70 Ω	38–44 Ω

6. If resistance values differ from the range in the chart, the heater may need to be replaced.

115V Units

1. Remove the baffle plate over Power Supply Board 2A.
2. Disconnect the two black heater leads (see Figure 3–1).
3. Disconnect the white heater lead.
4. Measure the wires for continuity.
5. If there is no continuity, the connectors on the heater leads may be bad. Perform step 6 at the heater terminals. Replace the connectors if required.

   If there is no continuity, perform step 6 at the heater leads.
6. Measure the resistance separately from each black heater lead to the white heater lead or between the corresponding heater terminals (see chart below for correct range):

   115V Units—Heater Resistance Replacement

MODEL	EC5000	EC5500	EC6000
Resistance (ohms)	52–61 Ω	30–35 Ω	19–22 Ω

7. If resistance values differ from the range in the chart, the heater may need to be replaced.

Replacement

Contact MDT Biologic Company for return authorization before shipping the sterilizer to the factory for repair.

Heater 1HTR is not field replaceable. Return the unit to the factory for repair.

CHAMBER TEMPERATURE

CAUTION – Thermostat 2S can operate for years without adjustment. Never adjust it unless the test shows that adjustment is necessary.

Temperature test

1. Obtain an accurate etched-glass thermometer with a reading of at least 150°C (302°F). A lag or max reading thermometer is recommended.
2. Set the thermometer in an instrument tray. Use blocks or a rack to hold the bulb of the thermometer about 1 inch above the bottom of the instrument tray.
3. Place the tray with the thermometer inside the chamber.
4. Be sure the reservoir contains VAPO-STERIL, and the power cord is connected.
5. Turn ON the unit.
6. Close the door. Be sure the control knob is set to DEPRESSURIZE.
7. When the TEMP. light goes out, turn the control knob to PRESSURIZE. Pressure should reach 138 kPa (20 psi—green zone on the pressure gauge) within 3 minutes, and remain stable for 20 minutes.

Leave the thermometer in the unit with the control knob set to PRESSURIZE for at least 15 minutes before making the reading.

8. After the buzzer sounds, turn the control knob to DEPRESSURIZE. The pressure gauge should read "0" in about 1 minute.
9. Open the door. Using the tray handle, slide the tray out and QUICKLY read the thermometer.
10. Temperature should read between 129°C–135°C (265°F–275°F). If it does not, adjust the thermostat.

THERMOSTAT 2S

See "Chamber temperature" at left.

Functional check

A continuity check of thermostat 2S with the chamber at room temperature should indicate full continuity (0 ohms).

Thermostat 2S Adjustment

NOTE

- *Never adjust the thermostat only because the pressure in the chamber is low. Troubleshoot more likely causes first (see Section 4, "Troubleshooting").*
- *Adjust the chamber temperature to 132°C ± 3° (270°F ± 5°).*
- *DO NOT adjust per pressure reading.*
- *Check the temperature with a lag thermometer.*

1. Perform the temperature test (at left) before adjusting the temperature.
2. Remove the cover.
3. Find Thermostat 2S (see Figure 3–1).
4. CAREFULLY turn the adjusting screw on the thermostat to adjust the temperature.
   - 1/4 turn CLOCKWISE —lowers the temperature about 11°C (20°F).
   - 1/4 turn COUNTERCLOCKWISE —raises the temperature about 11°C (20°F).
5. Repeat the temperature test.
6. If the temperature reading is not in the specified range, repeat steps 4–5.
7. If after REPEATED adjustments the thermostat will not maintain the proper temperature, replace the thermostat.

Thermostat replacement

NOTE

Open door to be sure pressure in the chamber is 0 psig.

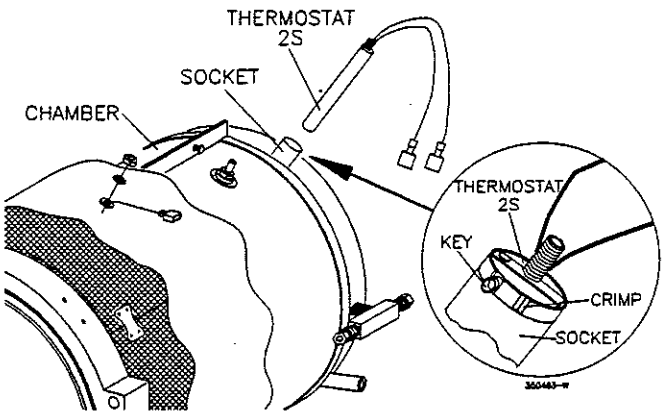


FIGURE 5–10. THERMOSTAT 2S

1. Disconnect the wire leads (see Figure 5–10).
2. Remove the thermostat from its socket. To do this, use a flat-bladed screwdriver to open the crimp in the socket.
3. Install the replacement thermostat. Align the key in the slot of the socket. Use pliers to crimp the socket and retain the thermostat.
4. Reconnect the wires.

OVERTEMP SWITCH 3S

WARNING — SHOCK HAZARD. Unplug power cord before performing these procedures.

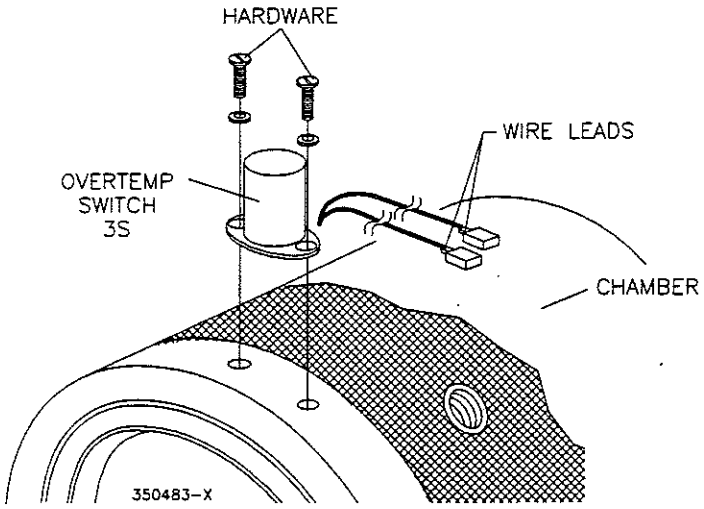


FIGURE 5–11. OVERTEMP SWITCH 3S

Functional check

Test continuity of the overtemp switch at the ends of its wire leads. If the switch is open when the chamber is at room temperature, replace the switch.

Overtemp switch replacement

1. Disconnect the wire leads (see Figure 5–11).
2. Remove the hardware that secures the switch to the chamber.
3. Install the replacement switch. Reconnect the wire leads.

PRESSURE SWITCH 5S

The pressure switch is set to close at 138 kPa (20 psi). If it does not, adjust it.

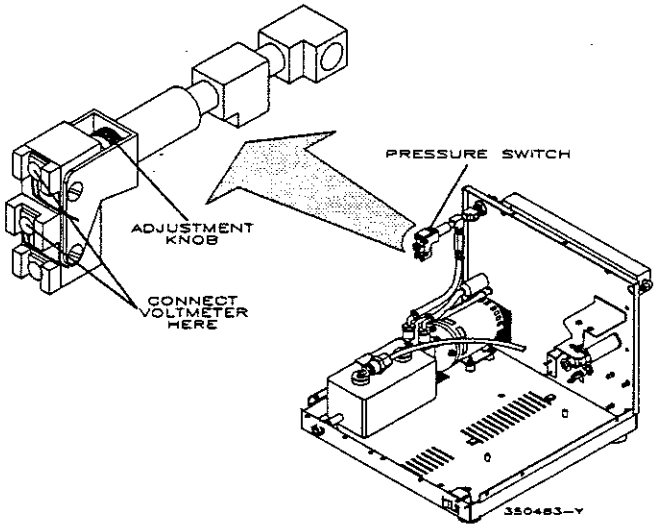


FIGURE 5–12. PRESSURE SWITCH 5S

Pressure switch 5S adjustment

1. Pressurize the chamber to 138 kPa (20 psi).
2. Connect a voltmeter to the pressure switch terminals (see Figure 5–12).
3. Turn the adjusting knob of the pressure switch until its microswitch closes. (The voltmeter will read "0.")
4. Depressurize the chamber.

STERILANT LEVEL SWITCH 6S

The float on the sterilant level switch can stick, interfering with the function of the VAPO. indicator.

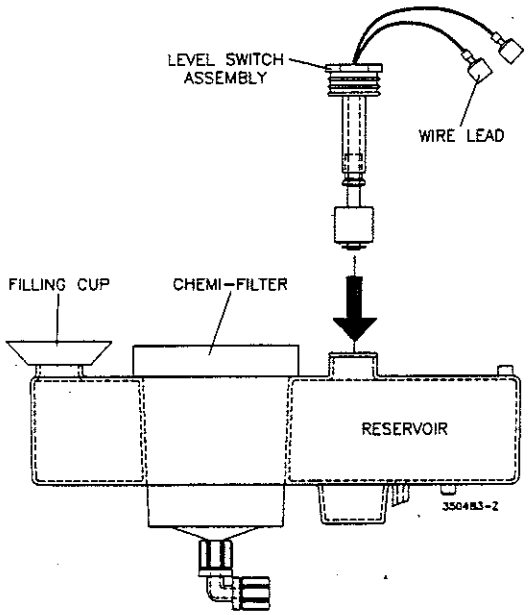


FIGURE 5–13. STERILANT LEVEL SWITCH 6S

Testing Sterilant Level Switch 6S

1. Remove the outside cover.
2. Remove the level switch from the reservoir.
3. Check the float for free movement and correct function. Replace the level switch if faulty.

Sterilant Level Switch Replacement

WARNING — FIRE HAZARD. Do not spill VAPO-STERIL onto electrical components. If VAPO-STERIL is spilled, unplug the unit and wait until the VAPO-STERIL is completely evaporated.

1. Remove the top cover.
2. Disconnect the wire leads (see Figure 5–13).
3. Remove the sterilant level switch from the reservoir.
4. Install the replacement sterilant level switch in reverse order.

RECOMMENDED SPARE PARTS

Maintain these parts in service inventory to assure immediate repair capability.

QTY.	PART NO.	DESCRIPTION
GENERAL COMPONENTS		
2	261569	Chemi-Filter
2	260560	Filter, Air (EC5500 & EC6000)
2	260145	Gasket, Door (EC5000)
2	260146	Gasket, Door (EC5500)
2	260147	Gasket, Door (EC6000)
2	266043	Handle, Tray Removal (EC5000)
2	231550301	Handle, Tray Removal (EC5500)
2	231600301	Handle, Tray Removal (EC6000)
1	266212	Knob, Control, Pressurize/Depressurize Valve
ELECTRICAL COMPONENTS		
1	266216	Board, Power Supply Printed Circuit
1	266206	Board, Display/Control Printed Circuit
4	266056	Fuse, 4A Time Delay (EC5000 – 230V Units)
4	266057	Fuse, 6.3A Time Delay (EC5000 – 115V Units & EC5
4	264306	Fuse, 8A Time Delay (EC6000 – 230V Units)
4	261575	Fuse, 10A Time Delay (EC5500 – 115V Units)
4	266058	Fuse, 15A Time Delay (EC6000 – 115V Units)
2	266089	Switch, On/Off Rocker (with Wires & Terminals)
2	266087	Switch, Reservoir Level Switch Assembly
1	266812	Switch, Limit (Microswitch)
1	260766	Switch, Overtemp Cut-Out
2	266838	Thermostat Assembly
PLUMBING COMPONENTS		
1	261824	Cup Assembly, Reservoir Filling
2	266820	Gauge, Pressure
2	267002	Pump, Purge Pump Assembly (115V Units)
2	266229	Pump, Purge Pump Assembly (230V Units)
1	267019	Switch, Pressure (EC5000)
1	260061101	Switch, Pressure (EC5500 & EC6000)
1	260797	Valve, Check (EC5500 & EC6000)
1	260670	Valve, Metering (EC5000)
1	260671	Valve, Metering (EC5500)
1	266447	Valve, Metering (EC6000)
1	250052411	Valve, Pressure Relief [310 KPa (45 psi)]

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OPERATOR MAINTENANCE

Proper maintenance can prevent both down-time and repair bills. Operators should maintain their units carefully.

Suggest these to the owner/operator to help them avoid needless service calls/repairs:

- Use only VAPO-STERIL solution.
  Store VAPO-STERIL solution separately from other liquids to prevent mistakenly filling the reservoir with a different liquid. USE OF ANY OTHER LIQUID COULD PREVENT STERILIZATION AND MAY SEVERELY DAMAGE THE UNIT.

Film fixer bottles resemble gallon bottles of VAPO-STERIL.

- Do not reuse VAPO-STERIL solution. This liquid may be contaminated or chemically altered. It may damage the sterilizer.
- Always line the instrument tray with chemically pure Harvey Tray Liners. Certain papers (such as paper towels) contain paper-processing impurities. If used as liners, they may stain or cause deposits in the tray and chamber.
- Check the door gasket periodically for cuts or wear. This will anticipate leaks and loss of VAPO-STERIL solution.
- Leave the door unlatched when not in use. Otherwise, the pressure of the latched door will shorten the life of the door gasket.
- Never turn OFF the power switch with the door latched. As the unit cools, it could create a slight vacuum and pull waste VAPO-STERIL Solution back into the chamber from the waste tank.

The rest of this section includes the "Maintenance" chapter from the *Owner & Operator Manual* (350482). Notes have been added for service personnel.

WARNING–Avoid burns! Be sure the sterilizer is cool when maintaining areas around the chamber and door.

DAILY

CLEAN THE DOOR GASKET

Wipe the door gasket and mating surface each day with a clean damp cloth (see Figure 6–1). Do not use abrasive cleaners.

Examine the door gasket for cracks or damage, which could result in a poor pressure seal. If replacement is required, refer to "Replace the Door Gasket" on page 6–3.

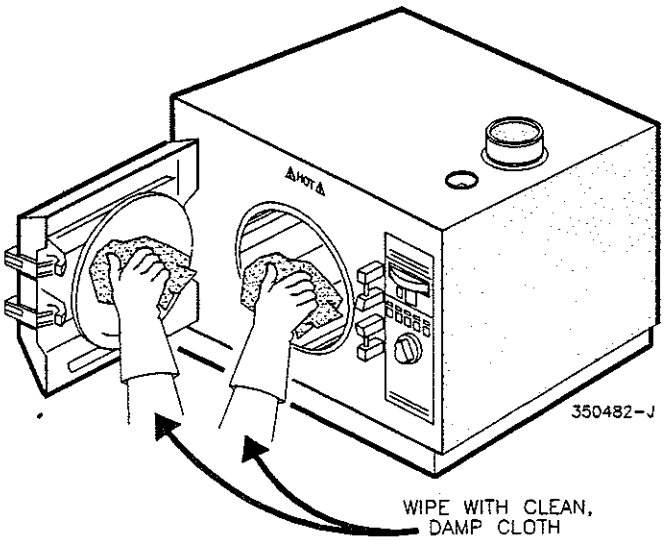

FIGURE 6–1. CLEANING THE DOOR GASKET

DRAINING THE WASTE TANK

WARNING–VAPO-STERIL solution causes eye damage and may cause skin irritation. Do not get in eyes, or on skin or on clothing. Wear goggles or face shield when handling. Harmful or fatal if swallowed. Avoid contamination of food.

WARNING–Do not drain the waste tank while a cycle is in progress. This could depressurize the chamber and interfere with sterilization.

WARNING–Do not reuse VAPO-STERIL solution removed from the waste tank. This liquid may be contaminated or chemically altered. It may damage the sterilizer.

WARNING–Flammable liquid. Treat VAPO-STERIL solution as a hazardous waste. Dispose of it properly.

WARNING–Dispose of used VAPO-STERIL solution in accordance with all prevailing local jurisdictional requirements.

CAUTION–ALWAYS DRAIN THE WASTE TANK BEFORE FILLING THE RESERVOIR. If this is not done, excess waste could overflow, damage the Chemi-Filter, and require substantial clean-up.

Drain the waste tank when the VAPO. indicator lights on the control panel (see Figure 6–2).

If preferred, drain the waste tank daily—but also whenever the VAPO. indicator lights.

Store the tubing with the drain fitting attached.

In some areas, MDT offers the MDT Enviro-Safe Program for proper and affordable disposal of VAPO-STERIL solution. For more information, contact your MDT representative.

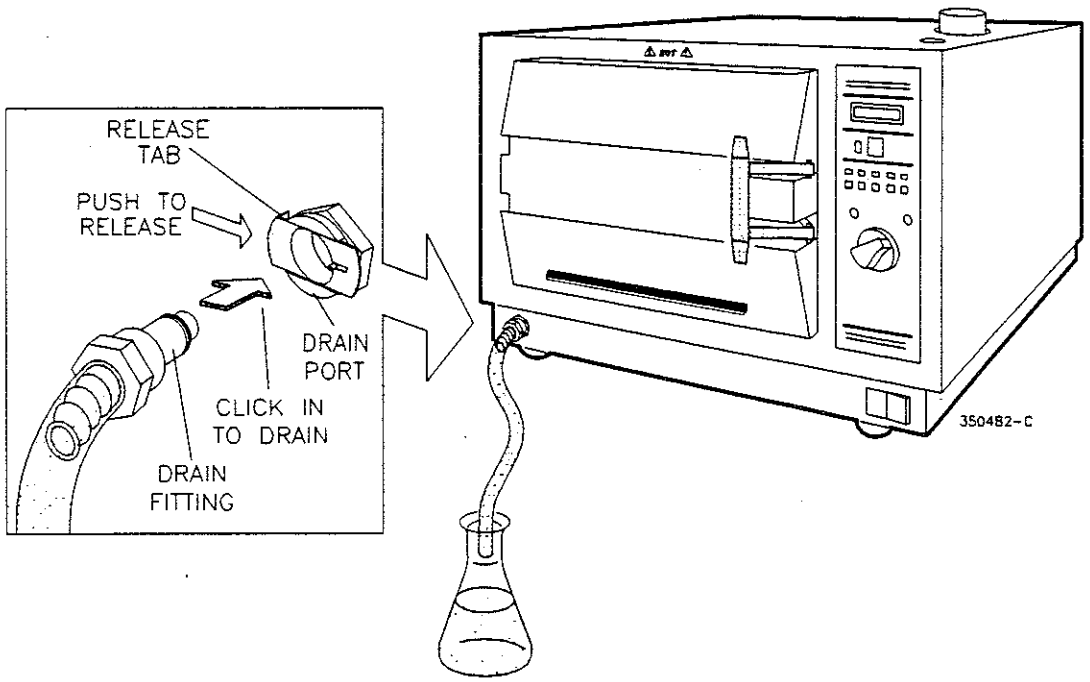

FIGURE 6–2. DRAINING THE WASTE TANK

WEEKLY

CLEAN CHAMBER AND TRAYS

NOTE

Buildup of residue in a dirty chamber can damage the inner coating of the metering valve, causing it to leak. This is the most common failure of Chemiclaves.

At least once a week, clean the chamber and trays with HARVEY Chamber Cleaner. Clean whenever slight staining appears.

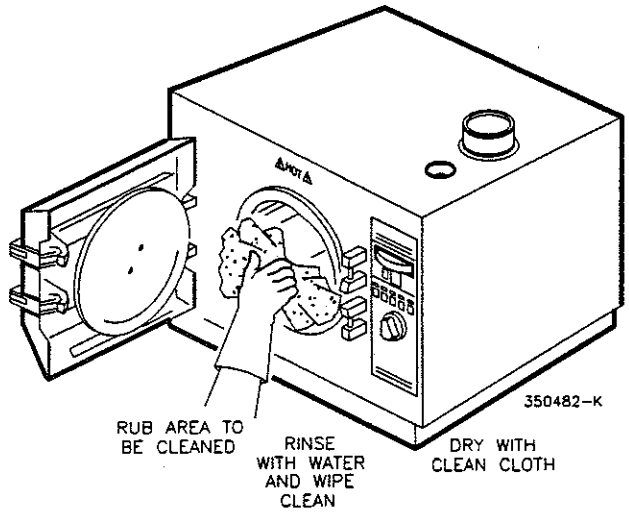

FIGURE 6–3. CLEANING THE STERILIZER CHAMBER AND TRAYS

NOTE

HARVEY Chamber Cleaner works best in a warm, dry chamber.

1. Close the door.
2. Turn ON the POWER switch. Wait 2 minutes.
3. Turn OFF the POWER switch.
4. Open the door. The chamber should be warm, not hot.

WARNING–HOT SURFACES. Wear protective gloves and safety glasses. Chamber and trays may cause burns if touched.

5. Clean the chamber and trays with HARVEY Chamber Cleaner. Follow the instructions on the container.

MONTHLY

CHECK PRESSURE RELIEF VALVE

WARNING—Exposure hazard. Do not operate the valve plunger while the sterilizer is in a cycle or under pressure. Exposure to chemical vapor could result.

Manually operate the valve plunger of the pressure relief valve on the back of the sterilizer (see Figure 6–4). This is to be sure the plunger will move should the chamber become overpressurized.

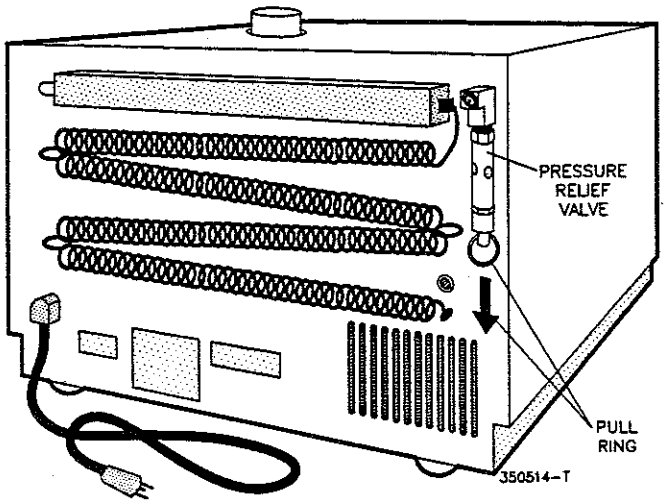

FIGURE 6–4. CHECKING THE PRESSURE RELIEF VALVE

To check the plunger:

1. Pull on the ring several times to ensure free movement.
2. If the plunger does not move freely, contact service personnel to replace the pressure relief valve.

WHEN REQUIRED

REPLACE THE CHEMI-FILTER

WARNING—If the Chemi-Filter cartridge is broken, avoid contact with skin and eyes and avoid breathing dust. For additional information, see the Material Safety Data Sheet.

WARNING—Do not attempt to remove the cartridge while the sterilizer is processing.

WARNING—Replace only with an MDT HARVEY Chemi-Filter.

WARNING—To dispose of the used cartridge, consult the Material Safety Data Sheet.

NOTE

Frequently check the Chemi-Filter for expiration. Replace per filter chart as required.

1. Be sure the power switch is OFF. (see Figure 6–5).
2. Grasp the pull strap at the top of the used Chemi-Filter. Remove the filter from the filter opening. Dispose of it properly.
3. Remove the new Chemi-Filter from its package.

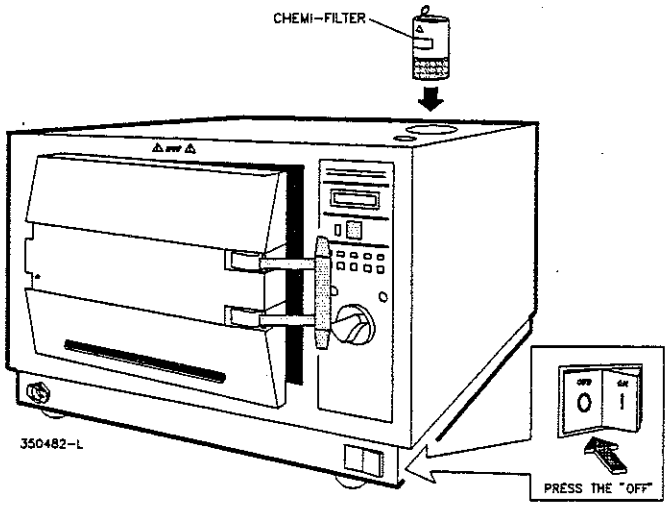

FIGURE 6–5. REPLACING THE CHEMI-FILTER

4. Mark the replacement date in the "Replace By" box on the Chemi-Filter label. To calculate this date, read the Chemi-Filter label or refer to "Finding the Replacement Date" (following).
5. Grasp the pull strap at the top of the Chemi-Filter. Insert the filter into the filter opening. Push the filter down as far as possible.

FINDING THE REPLACEMENT DATE

Calculate the replacement date by adding the number of months until replacement to the current month.

Use the chart on the Chemi-Filter label to find the number of months until replacement.

The chart on the Chemi-Filter label is based on a 5-day work week and an average number of cycles/workday of 2, 4, 6, 8, 10, or 12.

If your usage differs from these values, calculate the months until replacement as shown below.

Months Until Replacement Calculation

VALUES NEEDED

1. Assign proper values to c, D, and T.

   c = no. of cycles per workday (operator-defined)

   D = no. of workdays per week (operator-defined)

   T = Total no. of cycles before filter needs replacement (refer to chart below)

TOTAL CYCLES BEFORE FILTER REPLACEMENT (T)			
Model	**EC5000**	**EC5500**	**EC6000**
Total Cycles (T)	1000	500	250

CALCULATION

2. Insert the values for c, D, and T into the formula:

   no. months until replacement = 0.231 x (T/[c x D])

EXAMPLE

A. An operator has an EC5500 sterilizer. She intends to run it 7 cycles each day, 4 days/week.

   How soon must she replace the Chemi-Filter?

   Solution
   c = 7, D = 4, and T = 500. Substituting into the formula, we get

   $$0.231 \times (500/[7 \times 4]) = 4.125$$

   Replace the Chemi-Filter after 4 months.

B. If this operator begins running the sterilizer in April, 1994, when must she replace the ChemiFilter?

   Solution
   April is the fourth month. Since the operator must replace the Chemi-Filter after four months, she adds four to four to get the eighth month, August.

   The operator must replace the Chemi-Filter in August. On the filter label, she should mark "8/94" in the "Replace By" box.

REPLACE THE DOOR GASKET

- *CAUTION–Check the door gasket periodically for cuts or wear. This will anticipate leaks and loss of Vapo-Steril solution.*
- *CAUTION–Leave the door unlatched when not in use. Otherwise, the pressure of the latched door will shorten the life of the door gasket.*

Replace the door gasket at least once a year.

WARNING–Burn hazard. Door could be hot. Be sure the unit has cooled before performing this procedure.

1. Open the door. Use a blunt instrument to lift it from the gasket groove

CAUTION–Do not cut or scratch the gasket groove. This could prevent the new gasket from sealing properly.

2. Remove the gasket from the gasket groove in the rim of the chamber (see Figure 6–6).

3. Clean the gasket groove and sealing surface so that it is free of dirt or deposits.

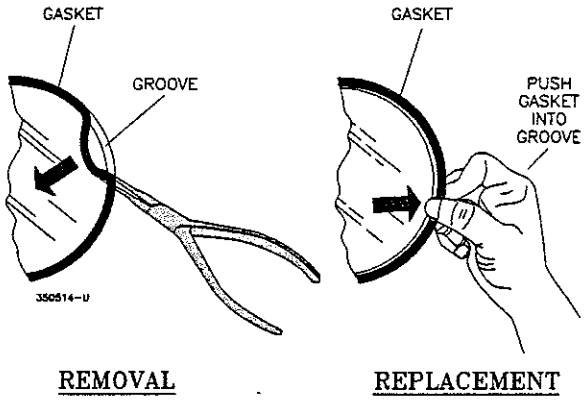

FIGURE 6–6. DOOR GASKET REPLACEMENT

4. Wipe the replacement gasket with a clean damp cloth. Then insert the gasket into the gasket groove.

CAUTION–Be careful not to cut or damage the gasket when seating it in the groove. Otherwise it may not seal properly.

a. Seat the gasket in the groove at 12 o'clock, 6 o'clock, 3 o'clock, and 9 o'clock.

b. Work the gasket into the groove in each of the four quadrants. Use finger pressure only.

c. To seat the gasket completely, slowly close and latch the door.

DOOR ADJUSTMENT

If chamber pressure is not retained during a cycle, a door adjustment may be necessary.

1. Clean or replace the door gasket if necessary.
2. Turn ON the sterilizer. Run a "no load" cycle to heat it to operating temperature. When the cycle is complete and chamber pressure is below 2 psi, open the door.
   - If chamber pressure is retained during the cycle, do not adjust the door.
   - If chamber pressure is not retained, go on to Step 3.
3. Hold the tray handle at the fork end so that the fork points towards you. Insert the hex end of the tray handle through the slot in the bottom of the door cover (see Figure 6–7).

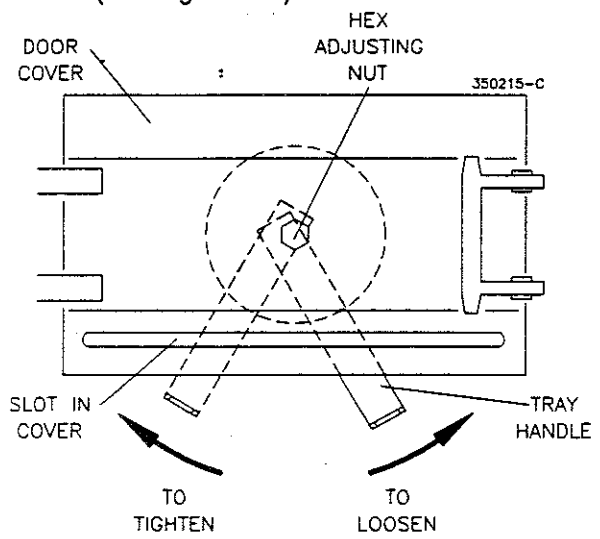

FIGURE 6–7. DOOR ADJUSTMENT

4. TO TIGHTEN: Move the fork end of the tray handle toward the right of the slot. Fit the hex end onto the adjusting nut. Move the tray handle to the left side of the slot, turning the adjusting nut clockwise.
5. Moving the tray handle from one side of the slot to the other should be enough to achieve a seal. If the door is difficult to close, loosen the door slightly.
6. TO LOOSEN: Position the fork end of the tray handle to the left of the slot. Then fit the hex end onto the adjusting nut. Move the tray handle toward the right side of the slot, turning the adjusting nut counterclockwise.

NOTE

Adjust until the latch can just be opened without the safety handle breaking at the hinge.

OWNER'S SPARE PARTS LIST

The following spare parts should be kept on hand by the owner for prompt replacement when needed.

Qty.	Part No.	Description
1	260560	Air filter (EC5500,6000)
1	261569	CHEMI-FILTER
1	260145	Door gasket, 6" (EC5000)
1	260146	Door gasket, 8" (EC5500)
1	260147	Door gasket, 10" (EC6000)
2–4	260056	Fuse, 4A (EC5000 — 230V)
2–4	266057	Fuse, 6.3A (EC5000 — 115V & EC5500 — 230V)
2–4	264306	Fuse, 8A (EC6000 — 230V)
1	261575	Fuse, 10A (EC5500 — 115V)
1	226058	Fuse,15A (EC6000 — 115V)
1	32-0103-01	MDT/Harvey Cleaning Kit

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