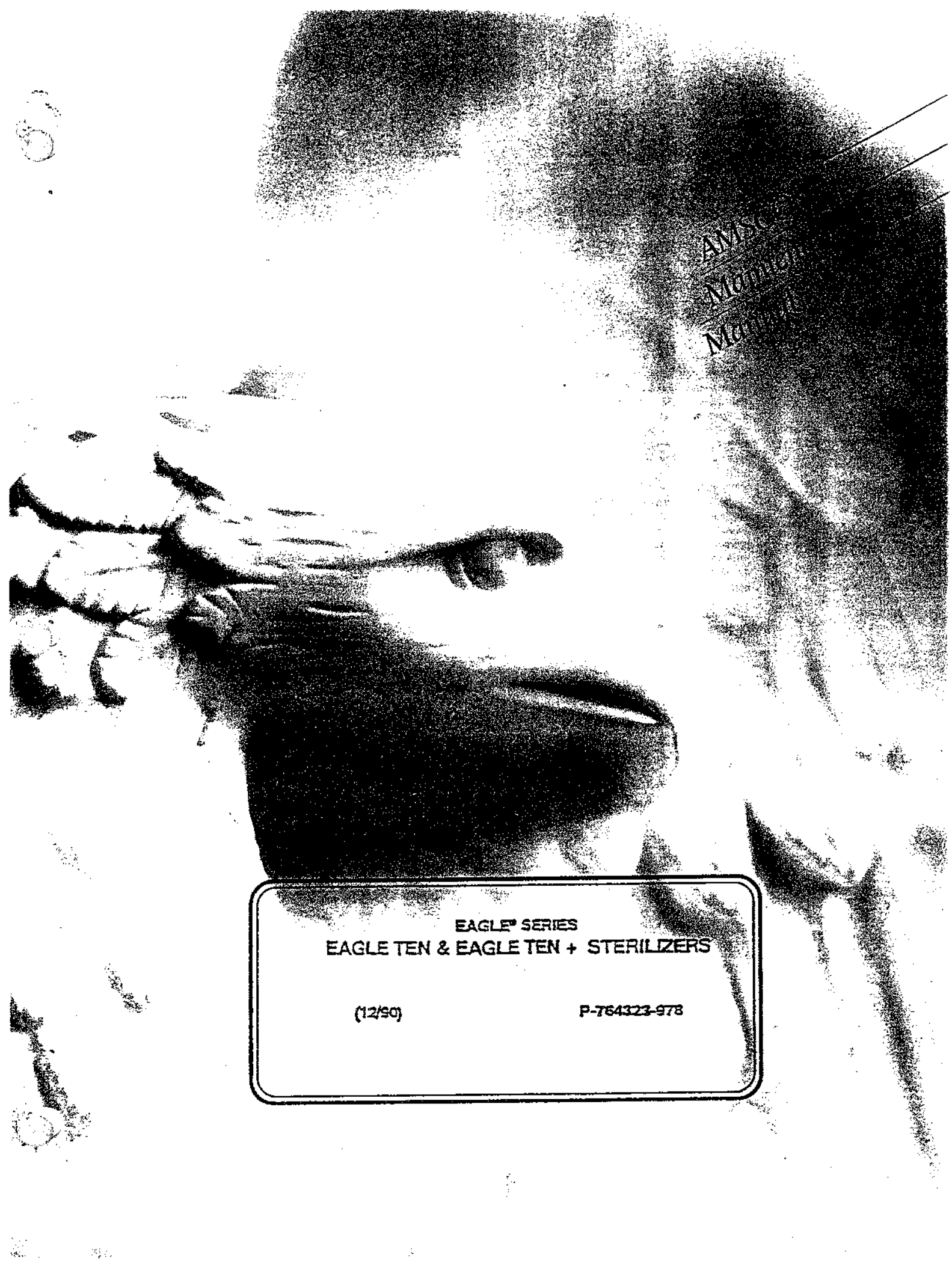


EAGLE® SERIES

EAGLE TEN & EAGLE TEN + STERILIZERS

(12/90) P-764323-978

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF ILLUSTRATIONS

SECTION 1: SUMMARY OF WARNINGS AND CAUTIONS

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

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

WARNINGS:

BURN HAZARD: To prevent possible personal injury, allow sterilizer to cool for ten minutes before unloading or performing maintenance.

BURN HAZARD: Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

BURN HAZARD: Beware of steam escaping from safety valve. To prevent burns, wear gloves or use an extension device if it becomes necessary to operate the pull ring.

INJURY HAZARD: Use only vented closures - do not use screw caps or rubber stoppers with crimped seals.

INJURY HAZARD: Use only Type I borosilicate glass bottles - do not use ordinary glass jugs or any container not designed for sterilization.

INJURY HAZARD: Open door slowly at the end of a liquid sterilization cycle. Do not allow hot bottles to be jolted. This can cause bottle explosions! Do not move bottles if any boiling or bubbling is present.

INJURY HAZARD: Allow bottles to cool to touch before attempting to move them from sterilizer shelf or tray(s) to the storage area.

INJURY HAZARD: Do not overfill reservoir. To avoid slippery conditions and possible load recontamination, immediately wipe up all spillage resulting from overfilling chamber or reservoir. (Reservoir overflow tube exits on back of unit.)

INJURY HAZARD: Repairs and adjustments, other than those described in these instructions, should be attempted only by experienced mechanics fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage.

INJURY HAZARD: When performing adjustments, use only an insulated screwdriver. Also, ensure metal of screwdriver does not come in contact with any grounded surface.

INJURY HAZARD: Always use two persons when lifting/moving unit to prevent personal injury or equipment damage.

FIRE HAZARD: When sterilizing wrapped goods, do not allow pouches or wraps to touch chamber wall.

CAUTIONS:

Never use a wire brush, steel wool, abrasive material, or chloride-containing products to clean door and chamber assembly.

If media is processed, bottles and tubes should contain no more than 1/2 the total volume of the container. When processing water bottles and test tubes, the bottles and tubes should contain no more than 3/4 the total volume of the container

To prevent collection of mineral deposits and corrosion of chamber components, use distilled or deionized water only. Clean chamber after each use if sterilizing saline solutions.

Do not remove or replace printed circuit boards unless facility power is off and electrostatic precautions are taken.

To avoid thermistor damage, when installing new thermistor, ensure that it does not touch outer cover.

AMSCO

EAGLE TEN SERIES STERILIZERS

• Tabletop Sterilizers

TECH
DATA

Tabletop Sterilizer

APPLICATION:

AMSCO Eagle Ten Series Tabletop Sterilizers efficiently sterilize unwrapped, wrapped, packed and liquid products in hospital, laboratory, scientific, and medical office environments.

DESCRIPTION:

AMSCO Eagle Ten Series Tabletop Sterilizers feature state-of-the-art microcomputer control systems providing the latest standards in cycle setup, selection, and monitoring. Once selections are made and a cycle initiated, microcomputers accurately monitor and control system operations. The control panel provides an easy-to-read LED display and an optional integral thermal printer prints relevant cycle data. Two trays are provided with each unit to enable maximum loading.

Eagle Ten Series Sterilizers can be used in various applications and offer a choice of two configurations:

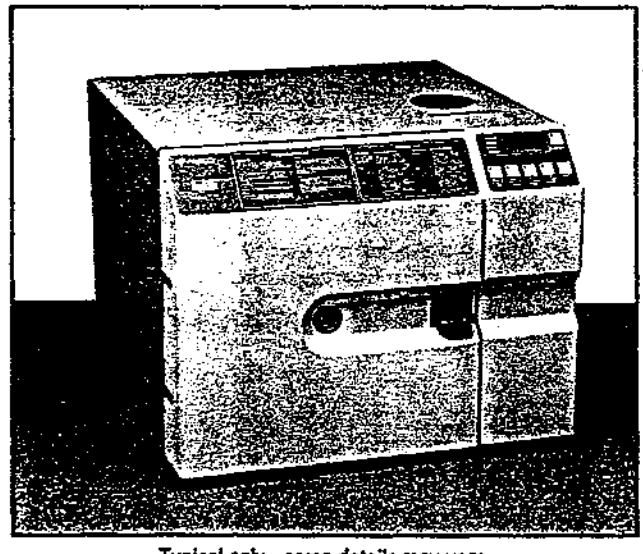
- Eagle Ten - for hospital, dental, veterinary applications, featuring four preprogrammed cycle selections:
  - unwrapped (270° F/132° C)
  - wrapped (270° F/132° C)
  - liquid (250° F/121° C)
  - packed (250° F/121° C).
- Eagle Ten+ - for laboratory/scientific applications, featuring programmable cycles for:
  - gravity (200 - 275° F/90 - 135 ° C, 1-99 min.)
  - liquid (200 - 255° F/90 - 124° C, 1-99 min.).

CHAMBER SIZE:

Both the Eagle Ten and Eagle Ten+ feature a 10 x 16" cylindrical chamber.

STANDARDS:

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



Typical only - some details may vary.

THE SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

MODEL	RECORDING DEVICE
☐ Eagle Ten	☐ Printer
☐ Eagle Ten +	
POWER SUPPLY	**MATERIAL HANDLING ACCESSORIES**
☐ 120 Volts, 50/60 Hz	☐ Accessory Tray Handle
☐ 240 Volts, 50/60 Hz	

ETL Testing Laboratories, Inc.

Canadian Standards Association (CSA).

ASME Pressure Vessel Code.

DESIGN FEATURES:

Microcomputer monitors and controls system operations and functions. Cycle progresses automatically through fill, condition, sterilize and exhaust phases. Indicator lights on the control panel indicate specific phase of cycle while display shows temperature and time. Control indicates cycle completion visually and audibly. At end of cycle, timer returns to precycle operating parameters, eliminating the need to reset values between repeated cycles. Timer also resets if sterilization temperature

Printed in U.S.A.

drops 2° F/1° C below set point during sterilization phase. If temperature does not reach 212° F/103° C within 20 minutes of cycle start-up or if sterilization temperature is not reached within 15 minutes of unit reaching 212° F/103° C, the unit will abort the cycle.

CONTROL PANEL (Figures 1 & 2)

Touch sensitive pads are conveniently located at the upper right side of the sterilizer...not exposed to heat, vapor and condensate resulting from the sterilization process.

Salient features include:

1. Optional printer provides easy-to-read permanent printed record of all pertinent cycle data, providing assurance to the operator that cycle parameters have been met. Alphanumeric printer documents power-on, control-on, starting time of cycle, temperature, key transition points in cycle, a cycle summary and any deviation which might jeopardize the sterilization process.
2. Indicator lights display the phase of the current cycle. Also, a light is provided to warn the operator of the presence of hot liquids.

Cycle selection (Eagle Ten) or Sterilize Times, Dry Times and Sterilize Temperature Settings (Eagle Ten +) are locked in and cannot be changed once a cycle is started. The control retains precycle operating parameters upon completion of a cycle, eliminating the need for reprogramming between repeated cycles. Sterilize timer automatically resets if chamber temperature drops 2° F (1° C) below setpoint during exposure time. Exposure timing resumes when chamber has returned to set temperature.

The timer displays in minutes and seconds. Temperature displays in either Fahrenheit or Celsius (user selectable).

A Chamber Pressure Gauge is mounted in the center of the door assembly.

TECHNICAL DATA

Automatic Control

Sterilize times, dry times, and temperatures are self-contained in an intelligent, controller based microcomputer consisting of two connected PC boards (Control and Printer, if unit equipped with printer).

Control Board monitors all sterilizer functions, has time of day clock, and an 8 bit A/D converter controlling temperature between 212° and 290° F (100°-134° C). A watchdog-timer protects AC outputs, and an audible piezoelectric alarm is provided.

Printer Board (if unit equipped with printer) operates a 24-column thermal digital alphanumeric printer, producing characters within a five-by-seven dot matrix on 2-1/4 inch single-ply, thermal paper (Figure 3). Print speed is approximately 48 lines per minute. Three tape rolls are furnished with each unit.

- Printer is controlled by its own microcomputer.
- Used tape is rerolled onto a take-up reel for a permanent record of cycle data. Data is automatically printed at various points during the sterilization cycle (see Figure 3).

Control panel includes a large, easy-to-read LED readout, visible legends and touch-sensitive pads. Display panel shows all messages, phase times, current clock value, and temperature, or timer set-up points. Pressing ▲ or ▼ (Eagle Ten +) or Liquids or Packs (Eagle Ten) touch pads at the appropriate time changes control parameters (i.e., time, date, etc.).

Power Supply - Sterilizer operates on 120 VAC, 50/60 Hz or 240 VAC, 50/60 Hz, single-phase electrical power service. Internal power supply provides regulated voltage levels for display, optional printer, take-up motor, analog circuits, and digital circuits. Solenoid valves operate on 120 VAC.

Chamber and Door Assembly

The cylindrical chamber is made of 304 stainles steel. Glass-fiber blanket insulation on chamber is 1-inch (25 mm) thick (nominal) and single faced with aluminum foil, held in place by pressure-sensitive tape.

ASME certified stainless-steel chamber and welded hinge assembly features a manually operated door with left-hand hinge. Replaceable door gasket is made of silicon rubber. Sound-deadened door cover features a manual locking/opening mechanism matching the appearance of the overall unit. Microswitch prevents inadvertent start of cycle before door is locked.

Chamber drain is located is located at bottom rear of shell to remove chamber condensate. Thermostatic steam trap controls flow.

Drying System

At conclusion of Exhaust phase, the door must be manually opened 1/4". The dry heaters will then turn on and the control panel will count upwards until the specified dry time (preprogrammed in Eagle Ten) is achieved.

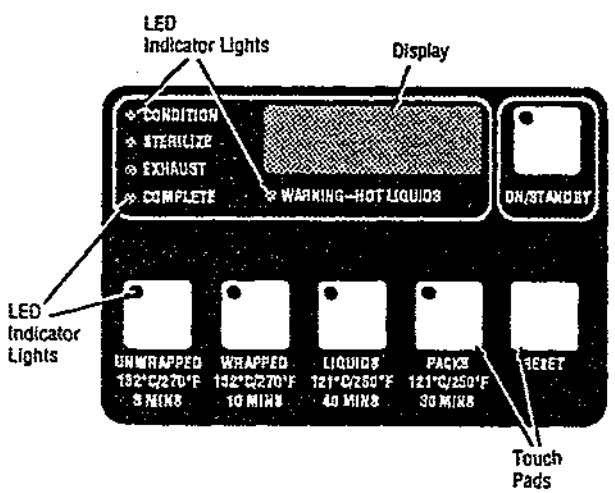


FIGURE 1: Control Panel, Eagle Ten

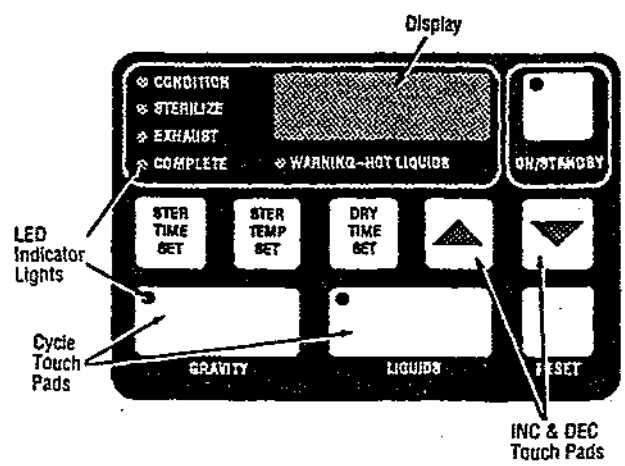


FIGURE 2: Control Panel, Eagle Ten +

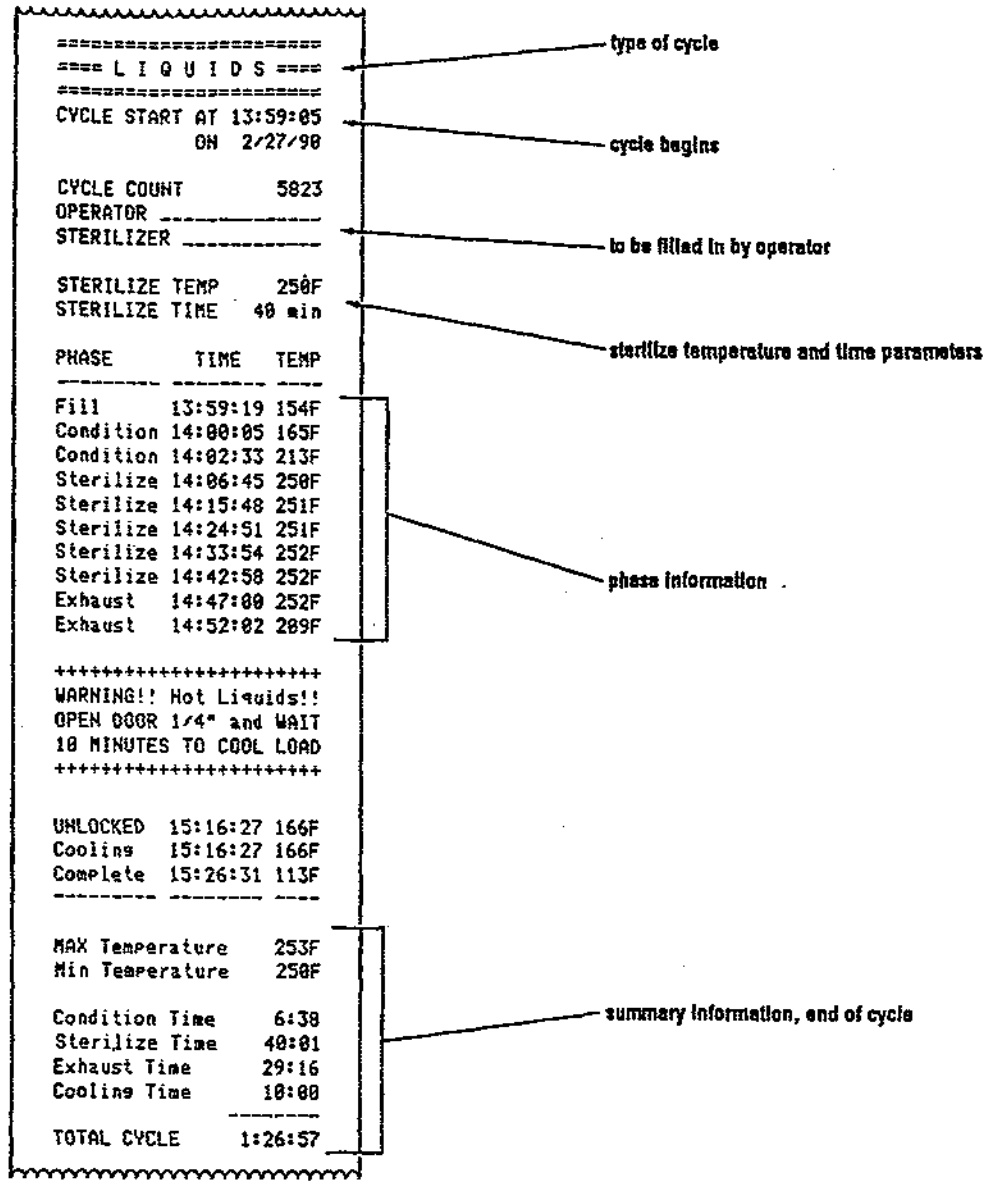


FIGURE 3: Typical Printout (Eagle Ten)

Other Components

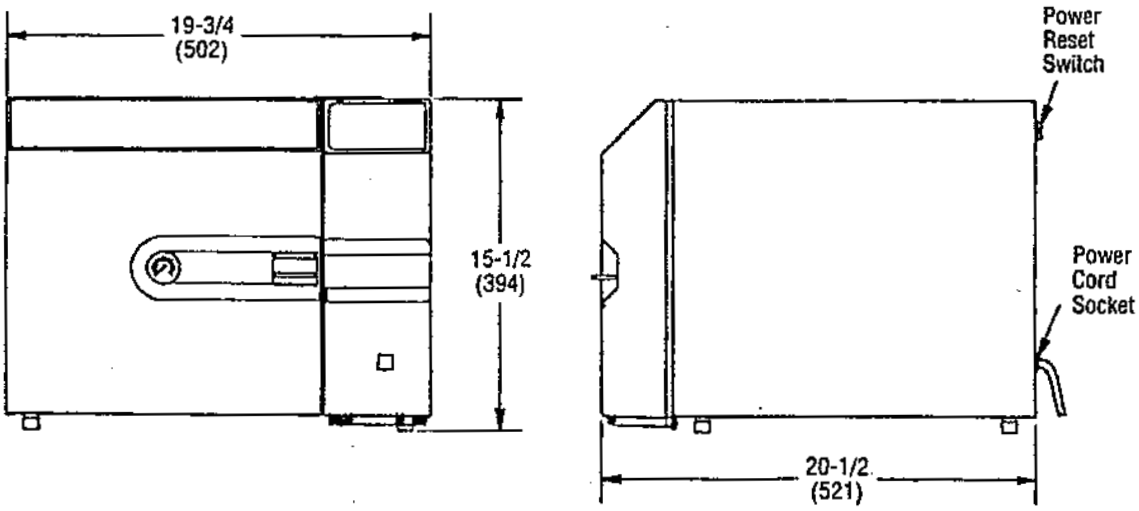
Two solenoid valves simplify sterilizer piping and are placed conveniently. They can be serviced individually.

Air vent is pressure and temperature compensated. Chamber trap allows for complete air removal during conditioning phases.

Piping and electrical connections terminate within confines of sterilizer.

INSTALLATION:

The Eagle Ten Series Sterilizers require at least 19-3/4" W x 15-1/2" H x 20-1/2" D of free counter space to be properly positioned.



FRONT VIEW

SIDE VIEW

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

OPERATING REQUIREMENTS

1. DISTILLED or DEIONIZED WATER - minimum resistivity of one megohm/cm.
2. Electrical Service: 120V, 240V 50/60 Hz., 15 Amp dedicated supply recommended.

NOTES

1. Clearances shown are minimal for installing and servicing the equipment.
2. Chamber Size: 10" inside dia. X 16-3/4" lg.
4. Electrical Rating: 120V, 240V 50/60 Hz, 12 Amps.
5. Reservoir Capacity: 1gal., deionized or distilled water only.
6. Power: 1500 watts max.

SECTION 2: GENERAL INFORMATION

2.0 GENERAL INFORMATION

The product information included in Table 2-1, along with Figure 2-1, provides a general concept of the equipment and its technical specifications.

TABLE 2-1: EAGLE TEN & EAGLE TEN + LEADING PARTICULARS	
• Unit Dimensions	19-3/4 x 15-1/2 x 20-1/2 inches (502 x 394 x 521 x mm)
• Chamber Dimensions	10 x 16-3/4 inches (254 x 425 mm)
• Weight	Approximately 80 lbs (36 kg)
• Power Requirements	120 VAC (102-126V), 50/60 Hz, single phase, (dedicated) 240 VAC (204-252V), 50/60 Hz, single phase, (dedicated)
• Mounting	Countertop
• Construction: Shell Door Insulation	 304SS Aluminum Glass Fiber
• Reservoir	1 Gallon capacity
• Water	Distilled or Deionized ONLY (with a minimum resistivity of 1 megohm/cm
• Temperature Control (Eagle Ten) Temperature Control (Eagle Ten +)	Preset Adjustable from 215-275 F
• Exposure Time (Eagle Ten) Exposure Time (Eagle Ten +)	Preset Adjustable from 0-99 Minutes
• Overtemperature Cutout	400 F
• Eagle Ten & Eagle Ten +	ASME Rated Units

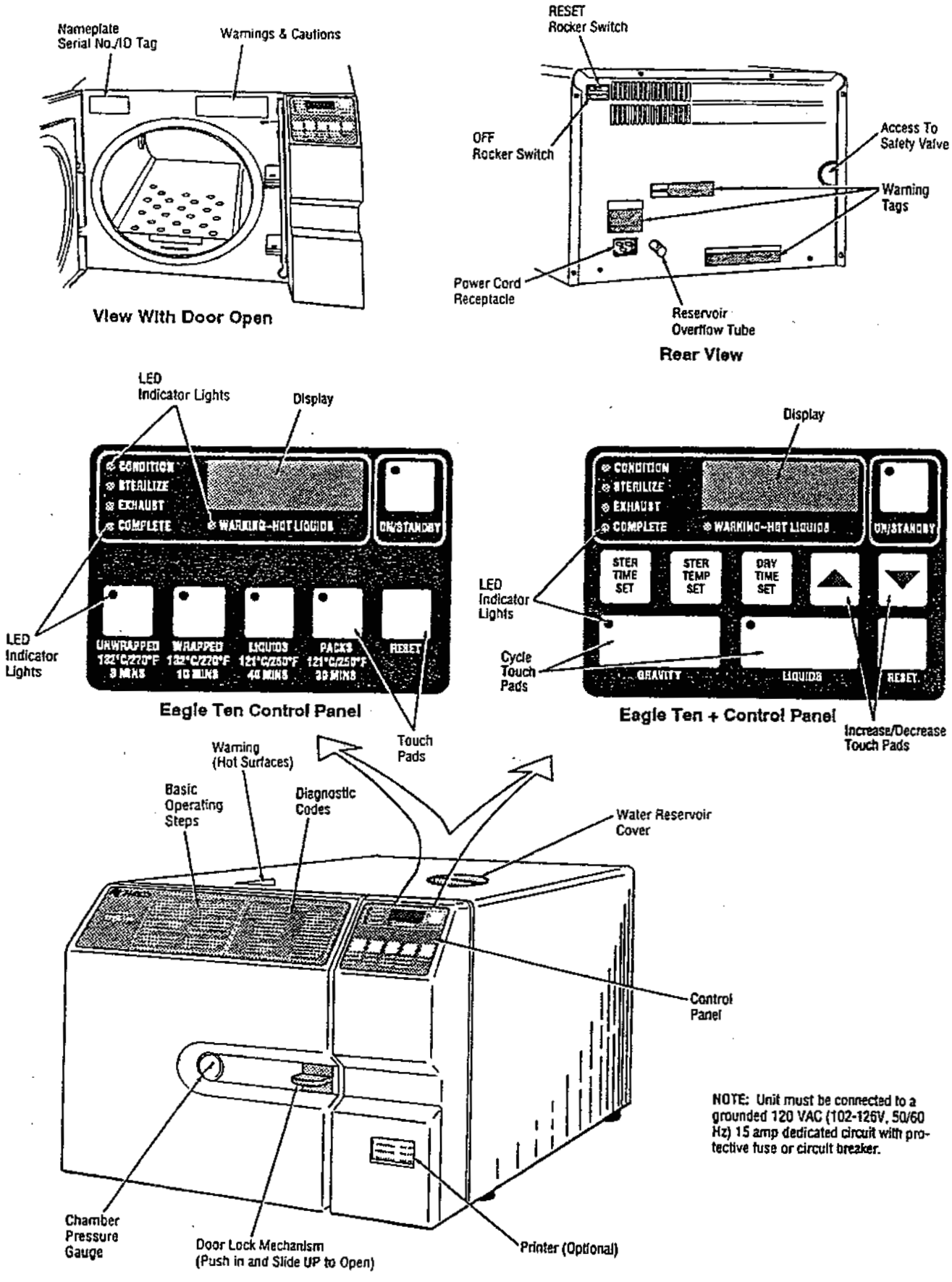


FIGURE 2-1. Eagle Ten, Ten + Series Sterilizer

SECTION 3: OPERATING INSTRUCTIONS

3.0 GENERAL

The following procedures 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. As a reminder for operators, a simplified version of the operating instructions can be found on a permanent plate mounted on the front panel of the unit. New operators should always use the supplied Equipment Manual.

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

See Troubleshooting Chart and Functional Description found in Section 4-4 if this unit is not operating properly. Refer to Section 2, **GENERAL INFORMATION,** for capabilities of the unit. Figure 3-1 shows the control panel for the Eagle Ten Sterilizer.

3.1 OPERATING INSTRUCTIONS (EAGLE TEN)

3.1.1 Preparing Unit for Initial Use (Figure 3-2)

The following procedure shall be followed closely to ensure proper setup and operation of the sterilizer.

1. Open the sterilizer door (push handle in and slide upward) and remove all chamber contents: trays, videotape, power cord, and Proof.
2. Remove and unwrap contents of chamber.
3. Carefully remove bottom shelf from inside the chamber and verify that the filter is connected to the fill port and is resting on bottom of chamber.
4. Verify that the water level tube is in an upright position and secure in its holders.

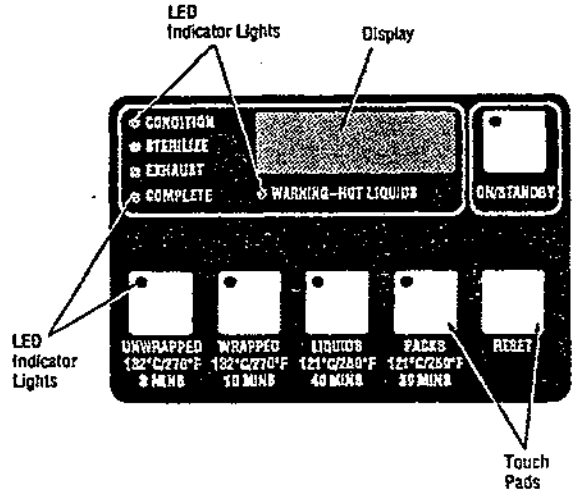


FIGURE 3-1. Eagle Ten Control Panel

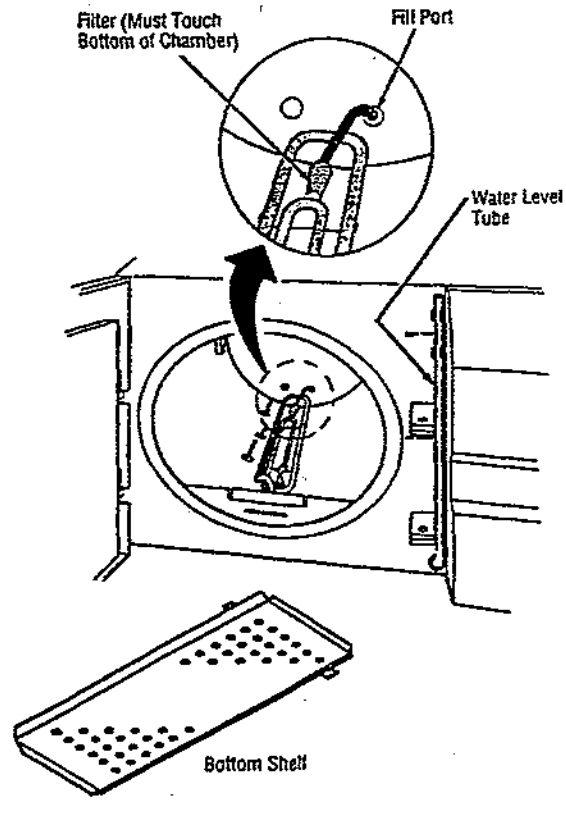


FIGURE 3-2. Sterilizer Set-Up

5. Replace bottom shelf, then close and lock the chamber door (push handle in and slide downward).

6. Attach the female end of the power cord to the rear of the sterilizer.

7. Plug the male end of the power cord into a dedicated, properly grounded electric outlet of the voltage and current specified on the serial no./ID nameplate located on inside front panel of sterilizer).

8. Press the RESET rocker switch on the rear of the sterilizer. The front panel display will alternate between OFF and time of day. The optional printer will print "POWER ON".

9. Press the ON/STANDBY touch pad and verify that the indicator light turns on and TIME is displayed. The heaters will begin to cycle to preheat the chamber. The optional printer will print "CONTROL ON".

10. Set the correct time and date (see Para. 4.1.6, "Setting Time of Day").

WARNING: INJURY HAZARD. Do not overfill reservoir. To avoid slippery conditions and possible load recontamination, immediately wipe up all spillage resulting from overfilling reservoir. (Reservoir overflow tube exits on back of unit.)

11. Remove the water reservoir cover and fill reservoir with distilled or deionized water (minimum resistivity of one megohm/cm) until water level in water level tube is between REFILL and MAX indicators. (Reservoir capacity is approximately one gallon. DO NOT OVERFILL. Replace the water reservoir cover.

12. Verify that there are no Error Messages on the front panel display. If there are, consult Section 3.3 for corrective measures.

13. Press the ON/STANDBY touch pad and verify the indicator light is extinguished. The sterilizer should remain in the STANDBY mode (indicator light off) when the unit is not in use.

NOTE: Initial odor (from insulation) will disappear after approximately 24 hours use.

3.1.2 Sterilizing Wrapped, Unwrapped, and Packed Goods

IMPORTANT: Should an abnormal cycle condition occur, it will be displayed as indicated in Table 3-3, Troubleshooting Error Codes.

PREUSE CHECKOUT PROCEDURE

1. Prior to the first cycle of the day (be sure the chamber is not hot), wipe out the cooled chamber using a clean cloth with deionized or distilled water. Dry the chamber with a lint-free cloth. If the chamber needs cleaning, refer to Para. 4.1.1, ("Daily").

WARNING: INJURY HAZARD. Do not overfill reservoir. To avoid slippery conditions and possible recontamination, immediately wipe up all spillage resulting from overfilling reservoir. (Reservoir overflow tube exits on back of unit.)

2. Verify that the water reservoir is full (water level should be between REFILL and MAX indications on the water level tube, Figure 3-3). If needed, add **distilled** or **deionized** water (minimum resistivity of one megohm/cm). **Do not overfill.** Replace the water reservoir cover.

3. Without closing the chamber door, press the ON/STANDBY touch pad; verify that the indicator light is ON.

WARNING: BURN HAZARD. Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

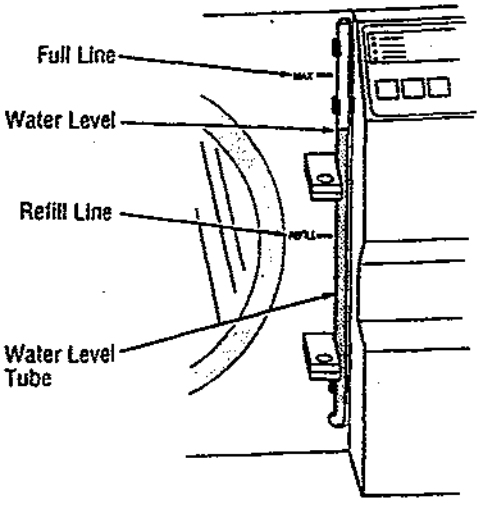


FIGURE 3-3. Water Level Tube

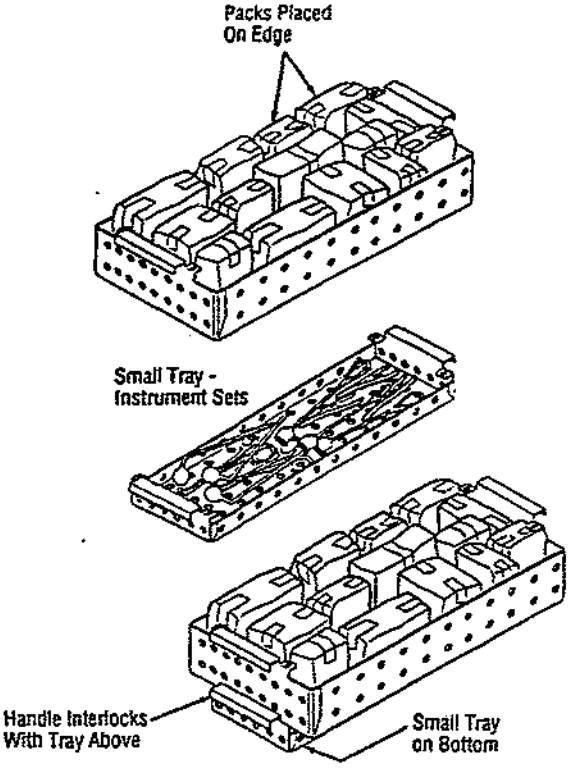


FIGURE 3-4. Loading Trays, Mixed Load

LOADING THE TRAYS AND CHAMBER

The following procedure must be followed closely when sterilizing wrapped, unwrapped, and packed goods.

NOTE: When positioning the loading trays, the small tray must always be used under the large tray even if the large tray is the only one containing items to be sterilized. For additional information on sterilization, please consult publications ED-1098 and ED-1099.

4. Place items to be sterilized into the trays loosely allowing space for proper air removal and steam penetration throughout the load, Figure 3-4. Pay special attention to the following:

   a. Place all fabric packs on edge and arrange packs for maximum steam exposure.

   b. Place items, such as bowls and pitchers, upside down or on edge so they will be sterilized and dried properly (i.e. they will not "catch" condensate during the drying process).

   c. Place instrument sets flat in the tray.

   d. Remove any caps from empty jars, canisters, and nonporous containers and place them upside down in the tray to facilitate sterilization and drying.e. Place hard goods (i.e. metallic instruments) on the bottom when processing mixed loads combining fabrics and hard goods. This prevents wetting of wrapped packs from condensed water dripping from the hard goods load.

5. Carefully insert trays into the sterilizing chamber.

WARNING: BURN HAZARD. Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

6. Close and lock the chamber door.

INITIATING A STERILIZATION CYCLE (non-liquids)

NOTE: Pressing the RESET touch pad while a cycle is in progress will always abort the cycle. If a cycle is aborted, the load must be reprocessed.

The following procedure is used to initiate a sterilization cycle for non-liquid goods. Consult Table 3-1 for minimum times and temperatures for various load types.

7. After the door is closed, press the appropriate cycle touch pad (UNWRAPPED, WRAPPED, or PACKS). The corresponding indicator light illuminates. Display will read "FILL" (it takes one to two minutes to fill).

8. Next, the optional printer will print relevant data in the format shown in Figure 3-5.

```
==========================
==== U R A P P E D ====
==========================
CYCLE START AT 13:12:50
            ON  3/02/90

CYCLE COUNT          5845
OPERATOR _______________
STERILIZER _____________

STERILIZE TEMP       132c
STERILIZE TIME     3 min
DRY TIME          60 min

PHASE        TIME    TEMP
---------- -------- ----
Fill       13:13:05  57c
```

FIGURE 3-5. Sample Printout

NOTE: If the cycle does not start when the appropriate touch pad is pressed, consult Section 4, "Troubleshooting".

After successfully starting the cycle, the Eagle Ten automatically begins the sterilization process (CONDITION, STERILIZE, EXHAUST, DRY, and COMPLETE phases).

Following is a brief description of each stage in this process.

3.1.2.1 Condition

During the CONDITION phase, the CONDITION indicator light illuminates and the chamber heater turns on. The temperature is then displayed on the front panel display and rises until the preset sterilization temperature is reached.

If the chamber is cold, allow up to 30 minutes for chamber to reach sterilization temperature.

If the chamber is hot, allow up to 20 minutes for chamber to reach sterilization temperature.

NOTE: If 212 F (100 C) is not reached within 20 minutes or if exposure temperature is not reached within an additional 15 minutes, the unit will abort the cycle. If this occurs, see Para. 4.3, "Troubleshooting".

NOTE: Once sterilization temperature is reached, verify that the chamber pressure gauge indicates at least the minimum pressure for the cycle selected as shown in Table 3-1. If the pressure is less than specified, press RESET to abort the cycle, then consult Section 4, "Troubleshooting".

3.1.2.2 Sterilize

The STERILIZE indicator light illuminates once the chamber attains the temperature specified through the program control (the timer then counts downward from the preset exposure time to zero). During the STERILIZE phase, temperature and time remaining in phase are displayed alternately on the front panel display once sterilization temperature is achieved.

Table 3-1: Recommended Exposure Time and Temperature Settings, Pressure Gauge Readings, and Drying Times For Non-Liquids

CYCLE TYPE	LOAD*	CONTROL SETTINGS			
		STERILIZE CYCLE SETTINGS		DRY TIME	MIN. PRES-SURE** (psig)
		STERILIZE TIME (min)	TEMPERATURE F (C)		
PACKED	Fabric Packs	30	250 (121)	30	15
WRAPPED	Wrapped Instrument Sets	10	270 (132)	45	27
UNWRAPPED	Unwrapped Metal Instruments (without lumens), Trays and Other Empty, Non-porous Containers	3	270 (132)	0	27

** If processing mixed loads, always use the longer exposure time setting.*
*** This pressure reading is the minimum necessary to achieve sterility. Actual readings may be higher.*

NOTE: Temperature may rise 3-5 F above the preset cycle temperature parameter.

3.1.2.3 Exhaust

The EXHAUST indicator light illuminates once the sterilize phase is complete. During the EXHAUST phase, the heater turns off, the chamber exhausts, and the chamber temperature is shown on the front panel display. The tone sounds for four (4) seconds when EXHAUST is complete; "door" is shown on the front panel display and the tone sounds every minute until the door is opened. Be sure chamber pressure is at zero prior to opening.

At the end of the EXHAUST phase, open the door (push in and lift the handle), then push the door in until it rests against the door latching mechanism (DO NOT CLOSE DOOR) as pictured in Figure 3-6. The dry heaters will automatically turn on and begin DRY phase.

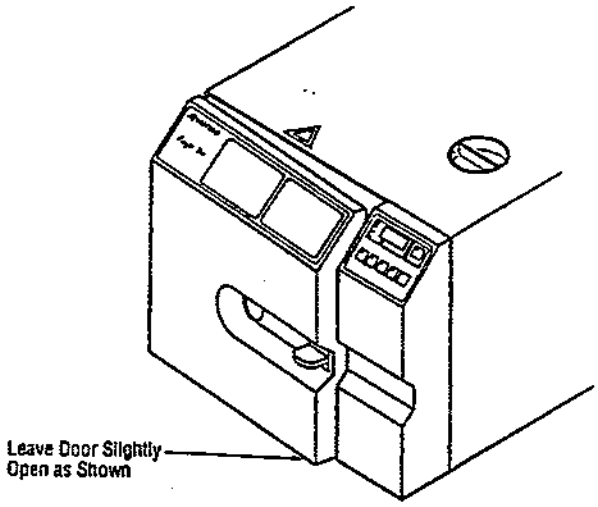


FIGURE 3-6. Door Cracked Following Sterilization

3.1.2.4 Dry

During the DRY phase, the phase time is shown on the front panel display and counts upward (min:sec) for 60 minutes. A tone will sound at 30, 45 and 60 minute intervals (depending on dry time specified). The

operator may terminate the DRY phase at anytime by pressing the ON/STANDBY touch pad. When the touch pad is pressed, or specified DRY time is attained, "donE" appears in the front panel display indicating the phase is complete.

3.1.2.5 Complete

Once the DRY phase is complete, a tone sounds the COMPLETE indicator light illuminates and "donE" appears in the front panel display. The optional printer also prints out pertinent cycle information as shown in Figure 3-7.

```
PHASE        TIME    TEMP
Fill       13:28:57   75F
Condition  13:29:22   75F
Condition  13:41:59  213F
Sterilize  13:50:29  270F
Sterilize  13:51:29  271F
Sterilize  13:52:30  271F
Sterilize  13:53:30  271F
Exhaust    13:53:31  271F

++++++++++++++++++++++
OPEN DOOR 1/4" and WAIT
 RECOMMENDED DRY TIME.
++++++++++++++++++++++


UNLOCKED   13:57:00  223F
Drying     13:57:00  223F
Complete   14:02:02  108F

MAX Temperature     272F
Min Temperature     270F

Condition Time     20:59
Sterilize Time      3:01
Exhaust Time        3:28
Dry Time            5:00

TOTAL CYCLE        0:33:11
Complete   14:02:15  107F
```

FIGURE 3-7. Sample Printout, End of Cycle

Pressing the RESET touch key completes the cycle and the time of day is shown in the front panel display.

WARNING: BURN HAZARD. Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

Finally, remove the tray containing the sterilized items from the chamber (remember, protective gloves are necessary when removing items from the sterilizer).

3.1.3 Sterilizing Liquids

WARNINGS:

BURN HAZARD: Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

BURN HAZARD: To prevent possible personal injury, allow sterilizer to cool for ten minutes before unloading or performing maintenance.

INJURY HAZARD: Use only vented closures - do not use screw caps or rubber stoppers with crimped seals.

INJURY HAZARD: Use only Type I borosilicate glass bottles - do not use ordinary glass jugs or any container not designed for sterilization.

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

INJURY HAZARD: Allow bottles to cool to touch before attempting to move them from sterilizer shelf or tray(s) to the storage area.

If media is processed, bottles and tubes should contain no more than 1/2 the total volume of the container. When processing water bottles and test tubes, the bottles and tubes should contain no more than 3/4 the total volume of the container.

PREUSE CHECKOUT PROCEDURE

1. Prior to the first cycle of the day (be sure the chamber is not hot), wipe out the cooled chamber using a clean cloth with deionized or distilled water. Dry the chamber with a lint-free cloth. If the

chamber needs cleaning, refer to Para. 4.1.1, ("Daily").

WARNING: INJURY HAZARD. Do not overfill reservoir. To avoid slippery conditions and possible load recontamination, immediately wipe up all spillage resulting from overfilling chamber or reservoir. (Reservoir overflow tube exits on back of unit.)

2. Verify that the water reservoir is full (water level should be between REFILL and MAX indications on the water level tube, Figure 3-3). If needed, add distilled or deionized water (minimum resistivity of one megohm/cm). Do not overfill. Replace the water reservoir cover.

3. Without closing the chamber door, press the ON/STANDBY touch pad; verify that the indicator light is ON.

LOADING THE TRAY AND CHAMBER

The following procedure must be followed precisely when sterilizing liquids.

NOTE: When positioning trays, the small tray must always be used under the large tray even if the large tray is the only containing items to be sterilized. For additional information on sterilization, please consult publications ED-1098 and ED-1099.

4. Place items to be sterilized into tray allowing space for proper steam penetration between items (Figure 3-8). Only use Type 1 borosilicate glass containers and do not overload the trays (Figure 3-9).

WARNING: BURN HAZARD. Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

5. Carefully insert trays into the sterilizing chamber.

6. Close and lock the chamber door.

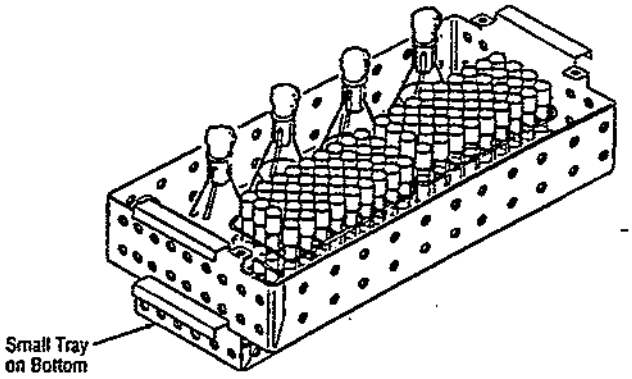


FIGURE 3-8. Loading Tray, Liquid Cycle

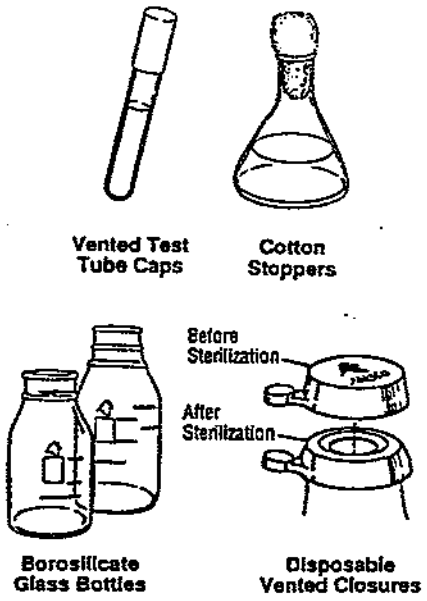


FIGURE 3-9. Proper Liquid Containers & Vented Closures

IMPORTANT: Sterilization of chloride-containing solutions can cause chamber corrosion and is not recommended by the manufacturer. However, if chloride-containing solutions must be processed, clean the chamber after use (see Para. 4.1.1, "Daily").

INITIATING A STERILIZATION CYCLE (liquid)

NOTE: Pressing the RESET touch pad while a cycle is in progress will always abort the cycle. If a cycle is aborted, the load must be reprocessed.

The following procedure is used to initiate a sterilization cycle for liquid goods. Consult Table 3-2 for minimum time and temperature for a full load of flasked solutions.

1. After the door is closed, press the appropriate cycle touch pad (LIQUID). The corresponding indicator light illuminates. Display will read "FILL" (it takes one to two minutes to fill).
2. Next, the optional printer will print relevant data in the format shown in Figure 3-10.

```
LOCKED     13:58:59 137F

====================
==== L I Q U I D S ====
====================
CYCLE START AT 13:59:05
            ON  2/27/98

CYCLE COUNT          5823
OPERATOR _____________
STERILIZER _____________

STERILIZE TEMP       250F
STERILIZE TIME     40 min

PHASE          TIME   TEMP
---------- -------- ----
Fill       13:59:19 154F
```

FIGURE 3-10. Sample Printout

NOTE: If the cycle does not start when the appropriate touch pad is pressed, consult Section 4, "Troubleshooting".

After successfully initiating the cycle, the Eagle Ten automatically begins the sterilization process (CONDITION, STERILIZE, EXHAUST, COOL, and COMPLETE phases).

Following is a brief description of each stage in this process.

3.1.3.1 Condition

During the CONDITION phase, the CONDITION and WARNING-HOT LIQUIDS indicator lights illuminate and the chamber heater turns on. The temperature is then displayed on the front panel display and rises until the preset sterilization temperature is reached.

If the chamber is cold, allow up to 30 minutes for chamber to reach sterilization temperature.

If the chamber is hot, allow up to 20 minutes for chamber to reach sterilization temperature.

NOTE: If 212 F (100 C) is not reached within 20 minutes or if sterilization temperature is not reached within an additional 15 minutes, the unit will abort the cycle. If this occurs, see Section 4, "Troubleshooting".

NOTE: Once sterilization temperature is reached (250 F, 121 C), verify that chamber pressure gauge indicates at least the minimum pressure for the cycle selected as shown in Table 3-2 If the pressure is less than specified, press RESET to abort the cycle, then consult Section 4, "Troubleshooting".

3.1.3.2 Sterilize

The STERILIZE indicator light illuminates once the chamber attains the temperature specified through the program control (the timer then counts downward from the preset exposure time to zero). During the STERILIZE phase, temperature and time remaining in phase are displayed alternately on the front panel display once sterilization temperature is achieved.

NOTE: Temperature may rise 3-5 F above preset cycle temperature parameter.

Table 3-2: Recommended Exposure Time and Temperature Settings, Pressure Gauge Readings, and Drying Times For Liquids

FLASK SIZE	STERILIZE CYCLE SETTINGS		MINIMUM* PRESSURE (psig)
	EXPOSURE TIME (minutes)	TEMPERATURE F (C)	
500 ml or Smaller	40	250 (121)	15

** This pressure reading is the minimum necessary to achieve sterility. Actual readings may be higher.*

3.1.3.3 Exhaust

The EXHAUST indicator light illuminates once the sterilizer phase is completed. During the EXHAUST phase, the heater turns off, the chamber exhausts, and the chamber temperature is shown on the front panel display.

The tone sounds for four (4) seconds when EXHAUST is complete; "door" is shown on the front panel display and the tone sounds every minute until the door is opened. Be sure chamber pressure is at zero prior to opening.

Open the door (push in and lift the handle), then push the door in until it rests against the door latching mechanism (DO NOT CLOSE DOOR) as shown in Figure 3-6.

3.1.3.4 Cool

During the COOL phase, the phase time is shown on the front panel display and counts upward (10 min.) until the COOL time automatically specified by program control is achieved.

3.1.3.5 Complete

Once the COOL phase is complete, the COMPLETE indicator light illuminates, a tone sounds, and "donE" appears in the front panel display. The optional printer also prints out pertinent cycle information as shown in Figure 3-11.

Pressing the RESET touch key completes the cycle and the time of day is shown in the front panel display.

```
PHASE        TIME    TEMP
---------- -------- ----
Fill       13:59:19 154F
Condition  14:00:05 165F
Condition  14:02:33 213F
Sterilize  14:06:45 250F
Sterilize  14:15:48 251F
Sterilize  14:24:51 251F
Sterilize  14:33:54 252F
Sterilize  14:42:58 252F
Exhaust    14:47:00 252F
Exhaust    14:52:02 209F

++++++++++++++++++++++
WARNING!! Hot Liquids!!
OPEN DOOR 1/4" and WAIT
10 MINUTES TO COOL LOAD
++++++++++++++++++++++



UNLOCKED   15:16:27 166F
Cooling    15:16:27 166F
Complete   15:26:31 113F
---------- -------- ----

MAX Temperature     253F
Min Temperature     250F

Condition Time      6:38
Sterilize Time     40:01
Exhaust Time       29:16
Cooling Time       10:00
                   -----
TOTAL CYCLE         1:26:57
```

FIGURE 3-11. Sample Printout, End of Cycle

WARNINGS:

BURN HAZARD: Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

Do not move bottles if any boiling or bubbling is present.

INJURY HAZARD: Allow bottles to cool to touch before attempting to move them from sterilizer shelf or tray(s) to the storage area.

Finally, remove the trays containing sterilized items from the chamber (remember, protective gloves and a face mask are necessary when removing items from the sterilizer).

3.2 OPERATING INSTRUCTIONS (Eagle Ten +)

3.2.1 Preparing Unit for Initial Use (see Figure 3-2)

Follow the procedure outlined below closely to ensure proper setup and operation of the sterilizer.

1. Open the sterilizer door (push handle in and slide upward) and remove all chamber contents: trays, videotape, power cord, and Proof.
2. Unwrap the loading trays and power cord.
3. Carefully remove bottom shelf from inside the chamber and verify that the filter is connected to the fill port and is resting on bottom of chamber.
4. Verify that the water level tube is in an upright position and secure in its holders.
5. Replace bottom shelf, then close and lock the chamber door (push handle in and slide downward).
6. Attach the female end of the power cord to the rear of the sterilizer.
7. Plug the male end of the power cord into a dedicated, properly grounded electric outlet of the voltage and current specified on the serial no./ID nameplate (located on inside front panel of sterilizer).
8. Press the RESET rocker switch on the rear of the sterilizer. The front panel display will alternate between OFF and time of day. The optional printer will print "POWER ON".
9. Press the ON/STANDBY touch pad and verify that the indicator light turns on and TIME is displayed. The heaters will begin to cycle to preheat the chamber. The optional printer will print "CONTROL ON".
10. Set the correct time and date (see Para. 4.1.6, "Setting Time of Day").

WARNING: INJURY HAZARD. Do not overfill reservoir. To avoid slippery conditions and possible load recontamination, immediately wipe up all spillage resulting from overfilling reservoir. (Reservoir overflow tube exits on back of unit.)

11. Remove the water reservoir cover and fill reservoir with distilled or deionized water (minimum resistivity of one megohm/cm) until water level in the water level tube is between REFILL and MAX indicators. (Reservoir capacity is approximately one gallon. DO NOT OVERFILL. Replace the water reservoir cover.
12. Verify that there are no Error Messages on the front panel display. If there are, consult Section 4 for corrective measures.
13. Press the ON/STANDBY touch pad and verify the indicator light is extinguished. The sterilizer should remain in the STANDBY mode (indicator light off) when the unit is not in use. The RESET rocker switch does not have to be pressed at the end of each day or between cycles.

NOTE: Initial odor (from insulation) will disappear after approximately 24 hours use.

3.2.2 Gravity Sterilization

IMPORTANT: Should an abnormal cycle condition occur, it will be displayed as indicated in the "Error Code Troubleshooting Chart" at the end of this section.

PREUSE CHECKOUT PROCEDURE

1. Prior to the first cycle of the day (be sure the chamber is not hot), wipe out the cooled chamber using a clean cloth with deionized or distilled water. Dry the chamber with a lint-free cloth. If the chamber needs cleaning, refer to Para. 4.1.1, ("Daily").

WARNING: INJURY HAZARD. Do not overfill reservoir. To avoid slippery conditions and possible recontamination, immediately wipe up all spillage resulting from overfilling reservoir. (Reservoir overflow tube exits on back of unit.)

2. Verify that the water reservoir is full (water level between REFILL and MAX indications on the water level tube. If needed, add distilled or deionized water (minimum resistivity of one megohm/cm). Do not overfill. Replace the water reservoir cover.

3. Without closing the chamber door, press the ON/STANDBY touch pad; verify that the indicator light is ON.

WARNING: BURN HAZARD. Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

LOADING THE TRAYS AND CHAMBER

The following procedure must be followed closely when sterilizing wrapped, unwrapped, and packed goods.

NOTE: When positioning trays, the small tray must always be used under the large tray even if the large tray is the only one containing items to be sterilized. For additional information on sterilization, please consult publications ED-1098 and ED-1099.

4. Place items to be sterilized into tray allowing space for proper air removal and steam penetration throughout the load, see Figure 3-4. Pay special attention to the following:

   a. Place all fabric packs on edge and arrange packs for maximum steam exposure.

   b. Place items, such as bowls and pitchers, upside down or on edge so they will be sterilized and dried properly (i.e. they will not "catch" condensate during the drying process).

   c. Place instrument sets flat in the tray.

   d. Remove any caps from empty jars, canisters, and nonporous containers and place them upside down in the tray to facilitate sterilization and drying.e. Place hard goods (i.e. metallic instruments) on the bottom when processing mixed loads combining fabrics and hard goods. This prevents wetting of wrapped packs from condensed water dripping from the hard goods load.

WARNING: BURN HAZARD. Sterilizer chamber walls and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

5. Carefully insert trays into the sterilizing chamber.

6. Close and lock the chamber door.

PROGRAMMING THE CONTROLLER: GRAVITY CYCLE

The following procedure is used to alter preset cycle parameters for a given load (see Figure 3-12 for touch key locations). Consult Table 3-1 for minimum times and temperatures for various load types. Read through the entire procedure prior to programming the controller as there is a five second time limit between steps.

1. After the door is closed, press the STER TIME SET touch pad. The GRAVITY and LIQUID indicator lights will both turn on.

2. Press the GRAVITY touch pad. The LIQUID indicator light will extinguish.

3. Use the increase or decrease keys to set the proper sterilization time for the load (consult Table 3-1 for proper sterilization times).

4. Press the STER TEMP SET touch pad. The GRAVITY and LIQUID indicator lights will both turn on.

5. Press the GRAVITY touch pad. The LIQUID indicator light will extinguish.

6. Use the increase or decrease keys to set the proper sterilization temperature for the load (consult Table 3-1 for proper sterilization temperatures).

7. Press the DRY TIME SET touch pad. The GRAVITY indicator light will turn on.

8. Press the GRAVITY touch pad.

9. Use the increase or decrease keys to set the proper sterilization dry time for the load (consult Table 3-1 for proper sterilization dry times).

INITIATING A GRAVITY CYCLE

NOTE: Pressing the RESET touch pad while a cycle is in progress will always abort the cycle. If a cycle is aborted, the load must be reprocessed, (see Figure 3-12, Eagle Ten + Control Panel).

1. Press the GRAVITY touch pad once to verify settings, set values will be displayed in succession (if incorrect, follow the previous procedure to alter parameters), then again within five seconds to initiate the cycle. The panel will display "FILL" (it takes one to two minutes to fill).

2. Next, the optional printer will print out relevant data, Figure 3-13.

NOTE: If the cycle does not start when the GRAVITY touch pad is pressed, consult Section 4, "Troubleshooting".

After successfully programming the cycle controller, the Eagle Ten Plus automatically

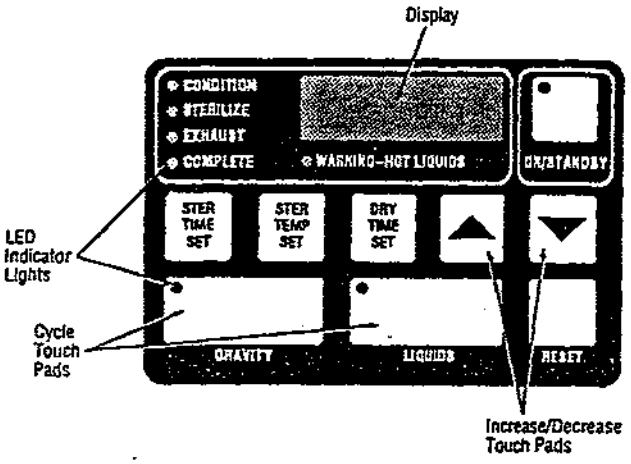


FIGURE 3-12. Eagle Ten + Control Panel

```
LOCKED     13:28:32  74F
=======================
==== G R A V I T Y ====
=======================
CYCLE START AT 13:28:42
            ON  3/05/90

CYCLE COUNT         5846
OPERATOR  ____________
STERILIZER ___________

STERILIZE TEMP      270F
STERILIZE TIME     3 min
DRY TIME           5 min

PHASE        TIME    TEMP
-----------  ------  ----
Fill         13:28:57  75F
```

FIGURE 3-13. Sample Printout

begins the sterilization process (CONDITION, STERILIZE, EXHAUST, DRY, and COMPLETE phases).

Following is a brief description of each stage in this process.

3.2.2.1 Condition

During the CONDITION phase, the CONDITION indicator light illuminates and

the chamber heater turns on. The temperature is then displayed on the front panel display and rises until the preset sterilization temperature is reached.

If the chamber is cold, allow up to 30 minutes for chamber to reach sterilization temperature.

If the chamber is hot, allow up to 20 minutes for chamber to reach sterilization temperature.

NOTE: If 212 F (100 C) is not reached within 20 minutes or if sterilization temperature is not reached within an additional 15 minutes, the unit will abort the cycle. If this occurs, see Section 4, "Troubleshooting".

NOTE: Once sterilization temperature is reached, verify that the chamber pressure gauge indicates at least the minimum pressure for the cycle selected as shown in Table 3-1. If the pressure is less than specified, press RESET to abort the cycle, then consult Section 4, "Troubleshooting".

3.2.2.2 Sterilize

The STERILIZE indicator light illuminates once the chamber attains the temperature specified through the program control (the timer then counts downward from the preset exposure time to zero). During the STERILIZE phase, temperature and time remaining in phase are displayed alternately on the front panel display once sterilization temperature is achieved.

NOTE: Temperature may rise 3-5 F above the preset cycle temperature parameter.

3.2.2.3 Exhaust

The EXHAUST indicator light illuminates once the STERILIZE phase is complete. During the EXHAUST phase, the heater turns off, the chamber exhausts, and the chamber temperature is shown on the front panel display. The tone sounds for four (4) seconds when EXHAUST is complete; "door" is shown on the front panel display and the tone sounds every minute until the door is opened. Be sure chamber pressure is at zero prior to opening.

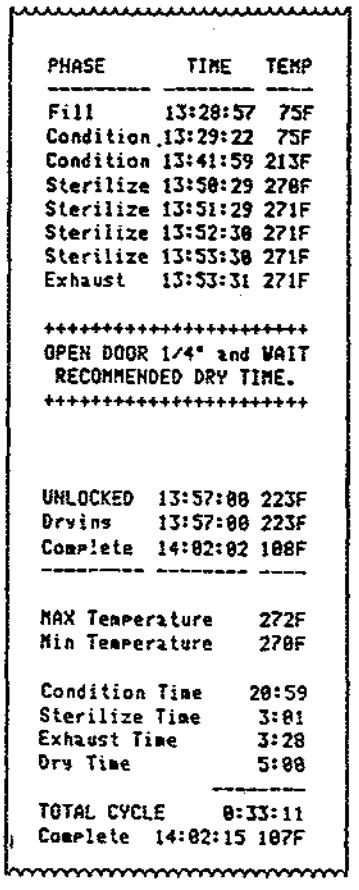
At the end of the EXHAUST phase, open the door (push in and lift the handle), then push the door in until it rests against the door latching mechanism (DO NOT CLOSE DOOR) as pictured in Figure 3-6. The dry heaters will automatically turn on and begin DRY phase.

3.2.2.4 Dry

During the DRY phase, the phase time is shown on the front panel display and counts upward (min:sec) until the DRY time specified through the program control is achieved. (The operator may terminate the DRY phase at anytime by pressing the ON/STANDBY touch pad.) When the touch pad is pressed, or the programmed DRY time is achieved, "donE" appears in the front panel display to indicate that the cycle is complete.

3.2.2.5 Complete

Once the DRY phase is complete, a tone sounds, the COMPLETE indicator light illuminates and "donE" appears in the front panel display. The optional printer also prints out pertinent cycle information as shown in Figure 3-14.



```
PHASE        TIME    TEMP
---------  --------  ----
Fill       13:28:57   75F
Condition  13:29:22   75F
Condition  13:41:59  213F
Sterilize  13:50:29  270F
Sterilize  13:51:29  271F
Sterilize  13:52:30  271F
Sterilize  13:53:30  271F
Exhaust    13:53:31  271F

++++++++++++++++++++++++
OPEN DOOR 1/4" and WAIT
 RECOMMENDED DRY TIME.
++++++++++++++++++++++++


UNLOCKED   13:57:00  223F
Drying     13:57:00  223F
Complete   14:02:02  108F
---------  --------  ----

MAX Temperature      272F
Min Temperature      270F

Condition Time     20:59
Sterilize Time      3:01
Exhaust Time        3:28
Dry Time            5:00
                   -------
TOTAL CYCLE        0:33:11
Complete   14:02:15  107F
```

FIGURE 3-14. Sample Printout, End of Cycle

Pressing the RESET touch key completes the cycle and the time of day is shown in the front panel display.

WARNING: BURN HAZARD. Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

Finally, remove the tray containing the sterilized items from the chamber (remember, protective gloves are necessary when removing items from the sterilizer).

3.2.3 Liquid Sterilization

WARNINGS:

BURN HAZARD: Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

BURN HAZARD: To prevent possible personal injury, allow sterilizer to cool for ten minutes before unloading or performing maintenance.

INJURY HAZARD: Use only vented closures - do not use screw caps or rubber stoppers with crimped seals.

INJURY HAZARD: Use only Type I borosilicate glass bottles - do not use ordinary glass jugs or any container not designed for sterilization.

INJURY HAZARD: Open door slowly at the end of a liquid sterilization cycle. Do not allow hot bottles to be jolted. This can cause bottle explosions! Do not move bottles if any boiling or bubbling is present.

INJURY HAZARD: Allow bottles to cool to touch before attempting to move them from sterilizer shelf or tray(s) to the storage area.

If media is processed, bottles and tubes should contain no more than 1/2 the total volume of the container. When processing water bottles and test tubes, the bottles and tubes should contain no more than 3/4 the total volume of the container.

PREUSE CHECKOUT PROCEDURE

1. Prior to the first cycle of the day (be sure the chamber is not hot), wipe out the cooled chamber using a clean cloth with deionized or distilled water. Dry the chamber with a lint-free cloth. If the chamber needs cleaning, refer to Para 4.1.1, ("Daily").

WARNING: INJURY HAZARD. Do not overfill reservoir. To avoid slippery conditions and possible load recontamination, immediately wipe up all

spillage resulting from overfilling chamber or reservoir. (Reservoir overflow tube exits on back of unit.)

2. Verify that the water reservoir is full (water level should be between REFILL and MAX indications on the water level tube. If needed, add distilled or deionized water (minimum resistivity of one megohm/cm). Do not overfill. Replace the water reservoir cover.

3. Without closing the chamber door, press the ON/STANDBY touch pad; verify that the indicator light is ON.

BURN HAZARD: Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

LOADING THE TRAY AND CHAMBER

The following procedure must be followed precisely when sterilizing liquids.

NOTE: When positioning trays, the small tray must always be used under the large tray even if the large tray is the only one containing items to be sterilized. For additional information on sterilization, please consult publications ED-1098 and ED-1099.

4. Place items to be sterilized into tray allowing space for proper air removal and steam circulation between items, see Figure 3-8. Only use Type 1 borosilicate glass containers and do not overload the trays, see Figure 3-9.

5. Carefully insert trays into the sterilizing chamber.

6. Close and lock the chamber door.

IMPORTANT: Sterilization of chloride-containing solutions can cause chamber corrosion and is not recommended by the manufacturer. However, if chloride-containing solutions must be processed, clean the chamber after each use (see Para. 4.1.1, "Daily").

PROGRAMMING THE CYCLE CONTROLLER

The following procedure is used to alter preset cycle parameters for a given load (see Figure 3-12 for touch key locations). Consult Table 3-2 for minimum time and temperature for a full load of flasked solutions. Read through the entire procedure prior to programming the controller as there is a five second time limit between steps.

1. After the door is closed, press the STER TIME SET touch pad. The GRAVITY and LIQUID indicator lights will both turn on.

2. Press the LIQUID touch pad. The GRAVITY indicator light will extinguish.

3. Use the increase or decrease keys to set the proper sterilization time for the load (consult Table 3-2 for proper sterilization time).

4. Press the STER TEMP SET touch pad. The GRAVITY and LIQUID indicator lights will both turn on.

5. Press the LIQUID touch pad. The GRAVITY indicator light will extinguish.

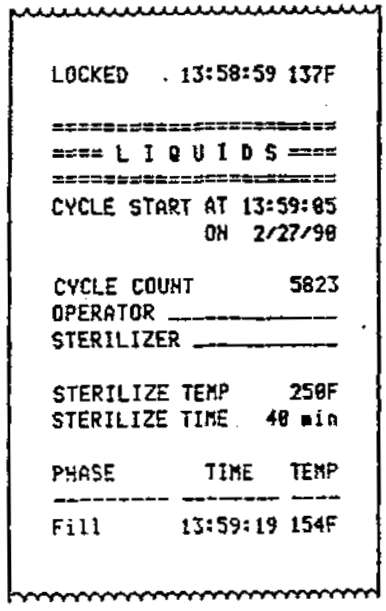
6. Use the increase or decrease keys to set the proper sterilization temperature for the load (consult Table 3-2 for proper sterilization temperature).

INITIATING A LIQUID CYCLE

NOTE: Pressing the RESET touch pad while a cycle is in progress will always abort the cycle. If a cycle is aborted, the load must be reprocessed.

1. Press the LIQUID touch pad once, to verify settings, set values will be displayed in succession (if incorrect, follow the previous procedure to alter parameters), then again within five seconds to initiate the cycle. The panel will display "FILL" (it takes one to two minutes to fill).

2. Following the previous step, the optional printer will print relevant data in the format shown in Figure 3-15.



```
LOCKED    13:58:59 137F

======================
==== L I Q U I D S ====
======================
CYCLE START AT 13:59:05
            ON  2/27/98

CYCLE COUNT          5823
OPERATOR _____________
STERILIZER ___________

STERILIZE TEMP       250F
STERILIZE TIME    40 min

PHASE        TIME    TEMP
---------  --------  ----
Fill       13:59:19  154F
```

FIGURE 3-15. Sample Printout

NOTE: If the cycle does not start when the LIQUID touch pad is pressed, consult Section 4, "Troubleshooting".

After successfully programming the cycle controller, the Eagle Ten Plus automatically begins the sterilization process (CONDITION, STERILIZE, EXHAUST, COOL, and COMPLETE phases).

Following is a brief description of each stage in this process.

3.2.3.1 Condition

During the CONDITION phase, the CONDITION and WARNING-HOT LIQUIDS indicator lights illuminate and the chamber heater turns on. The temperature is then displayed on the front panel display and rises until the preset sterilization temperature is reached.

If the chamber is cold, allow up to 30 minutes for chamber to reach sterilization temperature.

If the chamber is hot, allow up to 20 minutes for chamber to reach sterilization temperature.

NOTE: If 212 F (100 C) is not reached within 20 minutes or if sterilization temperature is not reached within an additional 15 minutes, the unit will abort the cycle. If this occurs, see Section 4, "Troubleshooting".

NOTE: Once sterilization temperature is reached (250 F, 121 C), verify that chamber pressure gauge indicates at least the minimum pressure for the cycle selected as shown in Table 3-2 If the pressure is less than specified, press RESET to abort the cycle, then consult Section 4, "Troubleshooting".

3.2.3.2 Sterilize

The STERILIZE indicator light illuminates once the chamber attains the temperature specified through the program control (the timer then counts downward from the preset exposure time to zero). During the STERILIZE phase, temperature and time remaining in phase are displayed alternately on the front panel display once sterilization temperature is achieved.

NOTE: Temperature may rise 3-5 F above preset cycle temperature parameter.

3.2.3.3 Exhaust

The EXHAUST indicator light illuminates once the sterilizer phase is completed. During the EXHAUST phase, the heater turns off, the chamber exhausts, and the chamber temperature is shown on the front panel display.

The tone sounds for four (4) seconds when EXHAUST is complete; "door" is shown on the front panel display and the tone sounds every minute until the door is opened. Be sure chamber pressure is at zero prior to opening.

Open the door (push in and lift the handle), then push the door in until it rests against the door latching mechanism (DO NOT CLOSE DOOR) as pictured in Figure 3-6.

3.2.3.4 Cool

During the COOL phase, the phase time is shown on the front panel display and counts upward (10 min.) until the COOL time automatically specified by program control is achieved.

3.2.3.5 Complete

Once the COOL phase is complete, a tone sounds, the COMPLETE indicator light illuminates and "donE" appears in the front panel display. The optional printer also prints out pertinent cycle information as shown in Figure 3-16.

```
PHASE         TIME     TEMP
---------- -------- ----
Fill       13:59:19 154F
Condition  14:00:05 165F
Condition  14:02:33 213F
Sterilize  14:06:45 250F
Sterilize  14:15:48 251F
Sterilize  14:24:51 251F
Sterilize  14:33:54 252F
Sterilize  14:42:58 252F
Exhaust    14:47:00 252F
Exhaust    14:52:02 209F

++++++++++++++++++++++++
WARNING!! Hot Liquids!!
OPEN DOOR 1/4" and WAIT
10 MINUTES TO COOL LOAD
++++++++++++++++++++++++


UNLOCKED   15:16:27 166F
Cooling    15:16:27 166F
Complete   15:26:31 113F
---------- -------- ----

MAX Temperature     253F
Min Temperature     250F

Condition Time      6:38
Sterilize Time     40:01
Exhaust Time       29:16
Cooling Time       10:00
                 -------
TOTAL CYCLE      1:26:57
```

FIGURE 3-16. Sample Printout, End of Cycle

Pressing the RESET touch key completes the cycle and the time of day is shown in the front panel display.

WARNINGS:

BURN HAZARD: Sterilizer and trays will be hot after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

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

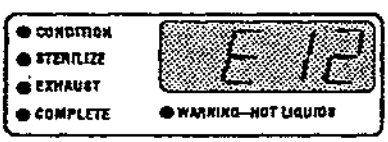
INJURY HAZARD: Allow bottles to cool to touch before attempting to move them from sterilizer shelf or tray(s) to the storage area.

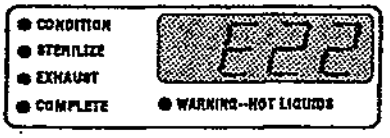
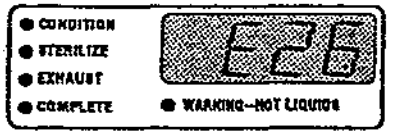
Finally, remove the trays containing sterilized items from the chamber (remember, protective gloves and a face mask are necessary when removing items from the sterilizer).

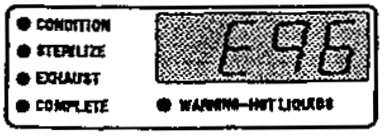
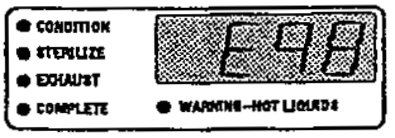
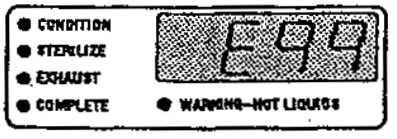
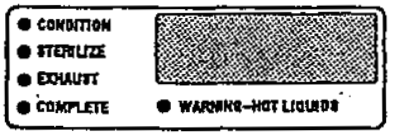
3.3 ERROR CODES

If any error codes appear on the display panel during sterilizer operation, users should consult the Error Code Troubleshooting Chart on the following pages for corrective actions.

ERROR CODE TROUBLESHOOTING CHART

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION
	Shorted temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Open temperature sensor.	• Open the door and allow unit to stabilize at room temperature. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Level sensor detects water. Possible water sensor failure.	• Check water level in chamber. If O.K., start cycle. • Clean water probe (see Section 5). • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Shorted temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Open temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Water level sensor failure or insufficient water in chamber.	• Carefully open chamber door. • Check for water in the chamber. • If no water is in the chamber, then check reservoir for adequate supply. Refill if necessary. If not, clean the filter. • If there is water in the chamber, then clean the water level sensor. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Heating problem	• Wait for tone to sound. • Press RESET touch pad, then retry. • Check door gasket for damage or dirt build-up. • If error code is displayed again, contact dealer service department.

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION
	Unit fails to reach sterilization temperature in allotted time.	• Wait for tone to sound. • Press RESET touch pad, then retry. • Check door gasket for damage or dirt build-up. • If error code is displayed again, contact dealer service department.
	Door unlocked during condition phase.	• Wait for tone to sound. • Press RESET touch pad, close and lock door, then retry. • If error code is displayed again, contact dealer service department.
	Shorted temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Open temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Door unlocked during sterilize phase.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Failed to maintain temperature set point.	• Wait for tone to sound. • Press RESET touch pad, then retry. • Check door gasket for damage/dirt. • If error code is displayed again, contact dealer service department.
	Temperature has dropped below set point (blinking sterilizer indicator light). The timer resets and cycle will resume when preset temperature is achieved.	• Monitor cycle.
	Over temperature (cycle will abort).	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Door unlocked at cycle start. Door locked during exhaust or dry phase.	• Close and lock door. • Unlock and open door 1/4 inch.

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION
	Power failure during cycle.	• Check for DRY (Gravity) or COOL (Liquid) load. If load still wet, let load DRY or COOL.
	Power failure during cycle.	• Load must be reprocessed.
	Power failure during cycle.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	Abnormal rapid rise in temperature (>10° in 10 seconds).	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.
	RESET touch pad was pressed during a cycle.	• Wait for tone to sound. • Press RESET touch pad to clear.
	Chamber temperature exceeded 395 degrees.	• Press main reset switch on rear of unit. • Allow unit to cool. • Reprocess the load. • Retry cycle. • If display is blank again, contact dealer service department.

SECTION 4: INSPECTION AND MAINTENANCE

WARNING: INJURY HAZARD. Repairs and adjustments, other than those described in these instructions, should be attempted only by experienced mechanics fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage.

4.0 GENERAL

The following periodic maintenance procedures must be performed at the suggested intervals indicated. This frequency is the minimum and should be increased with increased usage of the sterilizer.

A Preventative Maintenance Agreement is available whereby maintenance, adjustments, and replacement of worn parts are performed by a qualified technician on a scheduled basis to assure peak equipment performance and to avoid unscheduled downtime. Contact your AMSCO or dealer representative for more information.

Paragraph 4.2 is a Preventive Maintenance Guide which we suggest the facility keep. Such a guide will prove helpful in ensuring regular maintenance.

NOTE: Quarterly and semi-annual maintenance procedures require reference to the Maintenance Manual and should only be performed by a qualified technician.

WARNING: BURN HAZARD. To prevent possible personal injury, allow sterilizer to cool for ten minutes before unloading or performing maintenance.

4.1 ROUTINE MAINTENANCE

4.1.1 Daily (see Figure 4-1)

1. Inspect cabinetry for signs of damage or misaligned parts.
2. Remove bottom shelf and trays from chamber. Wash the inside of sterilizer, bottom shelf, and trays with a damp cloth, and, if necessary, a mild detergent solution such as AMSCO's Ligui-Jet or Sonic detergents (products are available from your local AMSCO or dealer representative). When cleaning, be careful not to damage the three sensors located to the left of the heating element.

Never use a wire brush, steel wool, abrasive material, or chloride-containing products to clean door and chamber assembly.

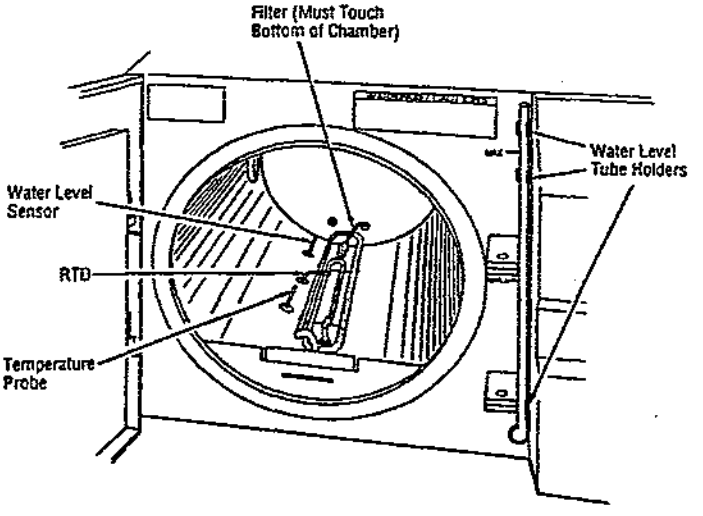


FIGURE 4-1. Cleaning Chamber

3. Rinse chamber thoroughly with tap water to remove all detergent residue.
4. Rinse chamber thoroughly with distilled or deionized water to remove all tap water residue.
5. Dry chamber with a lint-free cloth.
6. Verify that the filter is securely in place and is resting on the bottom of the chamber.

7. Check door gasket and wipe clean with a damp cloth. Replace it if it has become deformed, brittle, cracked, or leaks under pressure (see "Replacing Door Gasket").

NOTE: Clean chamber after each use if sterilizing chloride-containing solutions.

4.1.2 Weekly (see Figure 4-2)

NOTE: When draining reservoir, drain water into at least a one-gallon container. Wipe up any spilled water.

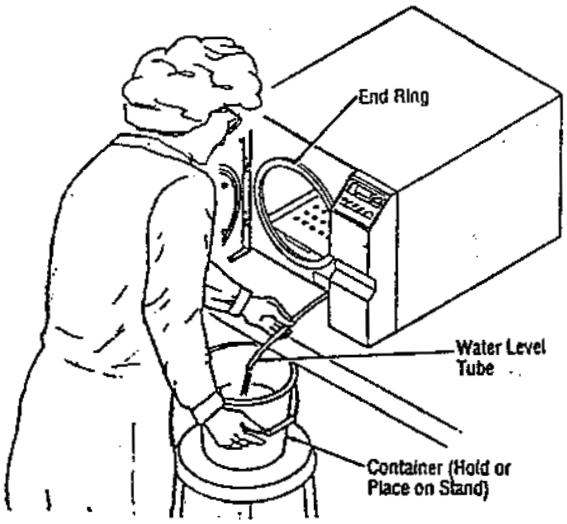


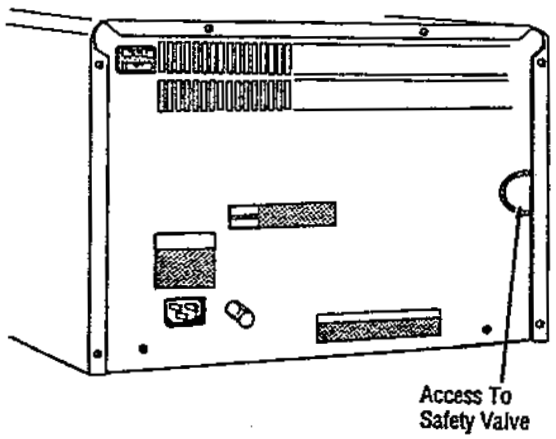
FIGURE 4-2. Draining Chamber

1. Place or hold a container directly if front of the sterilizer below countertop level. The sterilizer should be positioned about six inches from the edge of the countertop.
2. Drain the reservoir by opening chamber door and removing water level tube from its holders. With forefinger covering the end of tube, lower tube into the container to drain the reservoir.
3. Reinstall the water level tube into its holders.
4. Check that the door gasket is not sticking to the end ring. Clean the end ring with a damp cloth or, if necessary, with a mild detergent solution such as AMSCO's Liqui-jet or Sonic detergents (products are available from your local AMSCO or dealer representative). Spray end ring with fluorocarbon lubricant (available from AMSCO Service Company, P-753377-091).
5. Clean the chamber filter by reverse flushing with water. Refer to Cleaning/Replacing the Chamber Filter.

4.1.3 Quarterly

Check chamber safety valve (Figure 4-3) as follows:

1. Verify sterilizer is cool.
2. Inspect safety valve for accumulations of rust, scale or other foreign substances which would prevent free operation of the valve. The opening of discharge pipe must be clear and free from restrictions.



Rear View

FIGURE 4-3. Checking Chamber Safety Valve

3. Operate safety valve several times. The pull ring should move freely and return to the closed position after each operation.

4. Follow operating instructions found in Section 3 and allow chamber to reach operating pressure.

WARNING: BURN HAZARD. Beware of steam escaping from safety valve. To prevent burns, wear gloves or use an extension device if it becomes necessary to operate the pull ring.

5. Check safety valve for steam leakage. If valve is leaking, operate the pull ring several time to see if the leakage will stop. **Avoid letting moisture get under insulation on chamber.**

6. If leakage continues, discontinue operation of sterilizer and replace the safety valve.

4.1.4 As Necessary

4.1.4.1 Cleaning Chamber Filter

1. Remove bottom shelf from chamber to gain access to the filter.

2. Pull filter out of fill port on the back wall of the chamber.

3. Clean by reverse flushing with water (Figure 4-4). If filter cannot be effectively cleaned, (i.e. it remains clogged) replace the filter, P-129357-645.

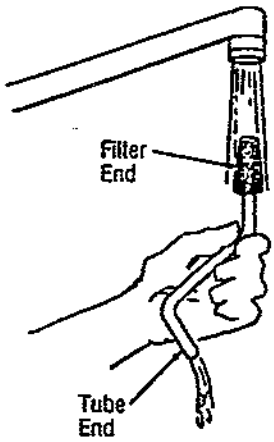


FIGURE 4-4. Reverse-Flushing Filter

4. After changing/replacing filter, insert tube end of filter into the fill port (located on the bottom right portion of the chamber rear wall). After inserting, turn filter so the tip rests on the bottom of the chamber near the center line. (See Figures 4-5 & 4-6).

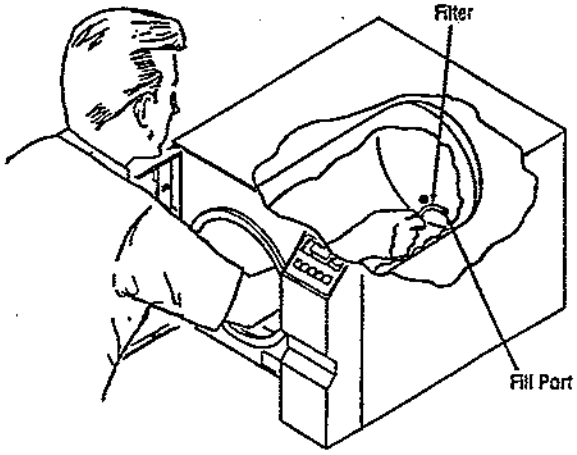


FIGURE 4-5. Re-Inserting Filter

5. Place bottom shelf back into chamber and make sure the front edge of the shelf inserted into tab for shelf support (Figure 4-6). Be careful not to dislodge filter when reinserting the bottom shelf.

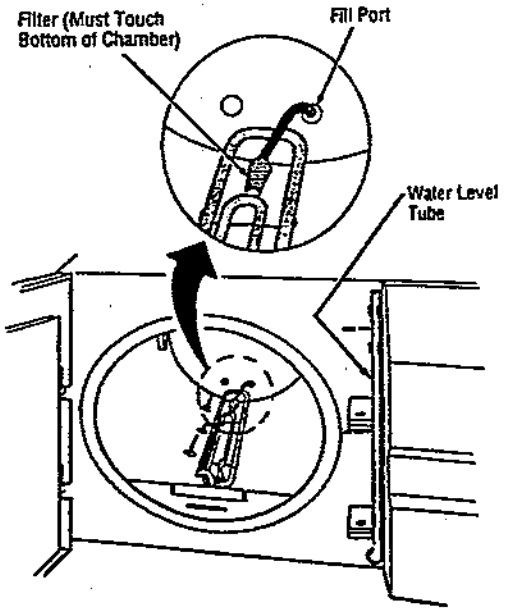


FIGURE 4-6: Proper Filter Placement

4.1.5 Replacing Printer Paper (if unit equipped with printer)

For quick reference, see Threading Diagram, Figure 4-7.

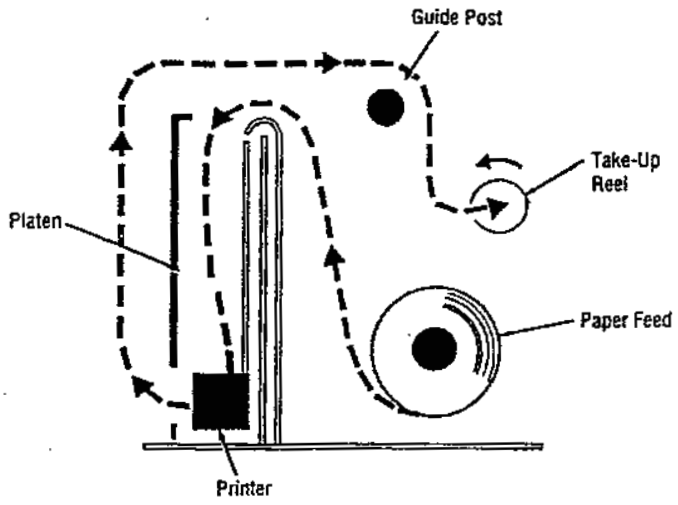


FIGURE 4-7. Threading Diagram

1. Pull out printer assembly (Figure 4-8).
   a. Open printer door by gently grasping both sides and pulling down.
   b. Slide printer assembly out of unit.
   c. Hold printer by the motor and remove take-up reel with used printer paper.
   d. Remove used printer paper from take-up reel and file.
2. Install new paper spool onto paper feed post (Figure 4-9).

NOTE: Check that the paper roll is positioned correctly. Thermal paper will not print if paper roll is inserted backwards.

3. Swing platen down (Figure 4-10).
   a. Pull approximately eight inches of paper out from roll and feed under guide post.
   b. Fold and crease paper end into a point.
4. Slide pointed end of paper into slot at top of printer until it exits from the front side of printer (Figure 4-11).
   a. Paper should extend out from printer approx. 1 inch.

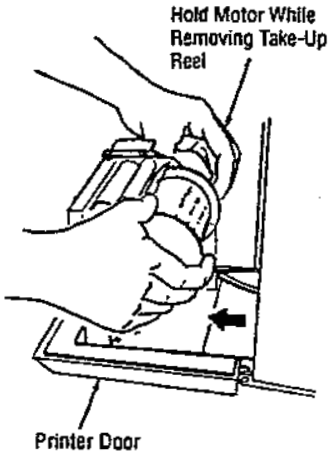


FIGURE 4-8.

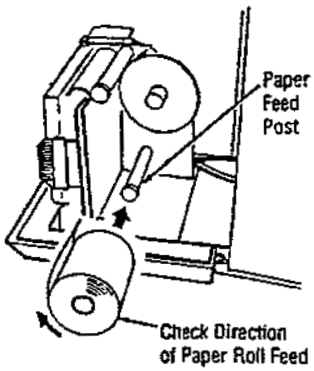


FIGURE 4-9.

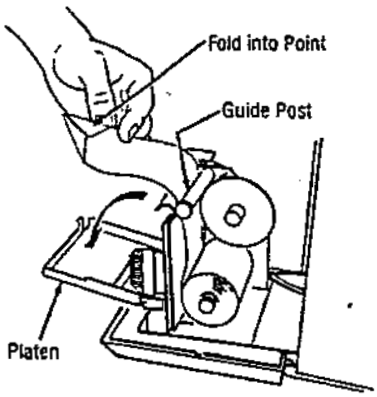


FIGURE 4-10.

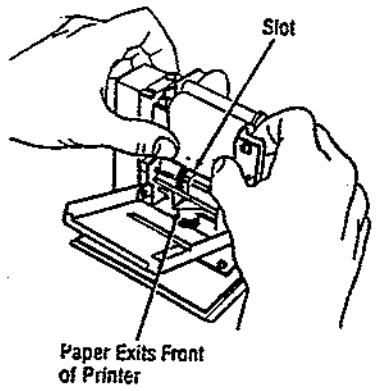


FIGURE 4-11.

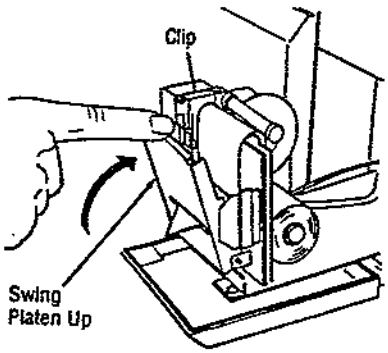


FIGURE 4-12.

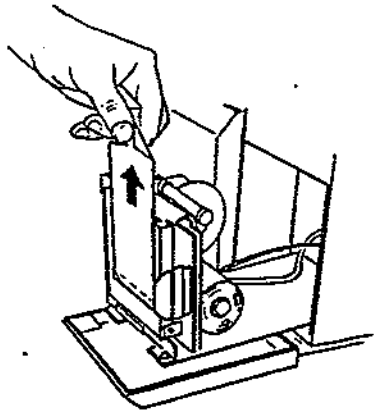


FIGURE 4-13.

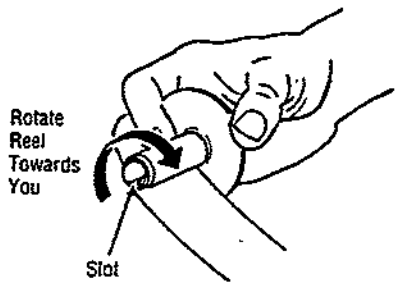


FIGURE 4-14.

5. Raise platen to operating position (Figure 4-12).

   a. Pointed end of paper should thread itself through slot in platen.

   b. Platen will snap in place under clip.

6. Grasp pointed end of paper, and in an upward motion to protect print head, pull out 10 to 12 inches of paper (Figure 4-13).

7. Insert pointed end of paper into slot of take-up reel and rotate in the direction shown to secure paper in slot (Figure 4-14).

8. Reinstall take-up reel onto the upper spindle (Figure 15).

   a. Slide printer assembly into unit and close printer door.

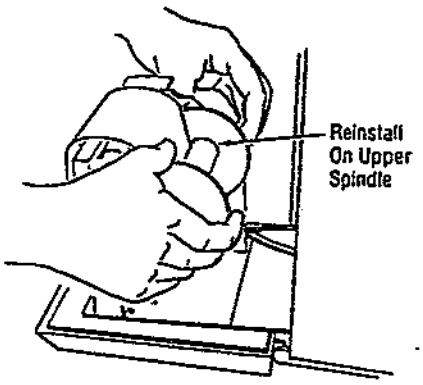


FIGURE 4-15.

4.1.6 Verifying and Setting Control Parameters, Eagle Ten (Figure 4-16)

NOTE: To set any of the following parameters without going through the each procedure, simply press and hold the RESET touch pad until "F1" is displayed, then press RESET repeatedly until the appropriate "F" character is displayed. Then use the LIQUIDS or PACKS touch pads to change the parameter.

SELECTING TEMPERATURE ALTERNATIVES

1. Open sterilizer door.
2. Press and hold RESET touch pad (Figure 4-16) until -F1- appears on the front panel display and the tone sounds.
3. Press any cycle select touch pad to change from degrees C to F or degrees F to C.
4. Set the temperature alternative to the user's personal preference.
5. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as tone sounds. Control returns to ON ready mode.

SETTING CALENDAR YEAR

1. Press RESET touch pad repeatedly (Figure 4-16) until -F2- appears on the front panel display. Hold until the tone sounds.
2. Advance year by pressing the LIQUIDS touch pad. Decrease year by pressing the PACKS touch pad. Range is 00-99.
3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR MONTH

1. Press RESET touch pad repeatedly (Figure 4-16) until -F3- appears on the front panel display. Hold until the tone sounds.

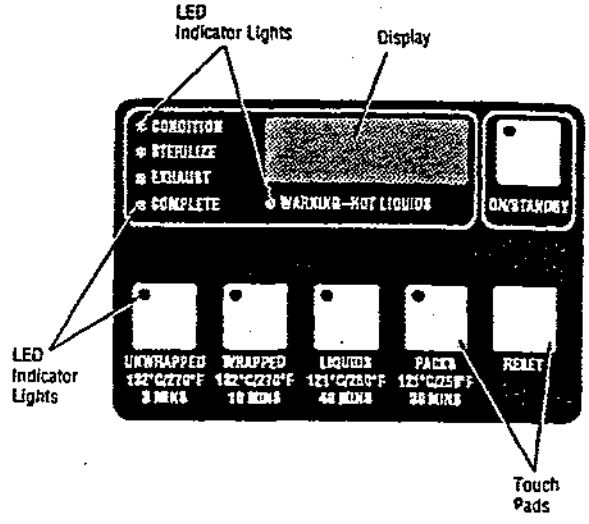


FIGURE 4-16. Eagle Ten Control Panel

2. Advance month by pressing the LIQUIDS touch pad. Decrease month by pressing the PACKS touch pad. Range is 01-12.
3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR DAY

1. Press RESET touch pad repeatedly (Figure 4-16) until -F4- appears on the front panel display. Hold until the tone sounds.
2. Advance day by pressing the LIQUIDS touch pad. Decrease day by pressing the PACKS touch pad. Range is 01-31.
3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR HOUR

1. Press RESET touch pad repeatedly (Figure 4-16) until -F5- appears on the front panel display. Hold until the tone sounds.

2. Advance hour by pressing the LIQUIDS touch pad. Decrease hour by pressing the PACKS touch pad. Range is 00-24.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR MINUTE

1. Press RESET touch pad repeatedly (Figure 4-16) until -F6- appears on the front panel display. Hold until the tone sounds.

2. Advance minute by pressing the LIQUIDS touch pad. Decrease minute by pressing the PACKS touch pad. Range is 00-59.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

4.1.7. Verifying and Setting Control Parameters, Eagle Ten + (Figure 4-17)

SELECTING TEMPERATURE ALTERNATIVES

1. Open sterilizer door.

2. Press and hold the RESET touch pad (Figure 4-17) until -F1- appears on the front panel display and the tone sounds.

3. Press either the increase or decrease touch pad to change from degrees C to F or degrees F to C.

4. Set the temperature alternative to the user's personal preference.

5. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as tone sounds. Control returns to ON ready mode.

SETTING CALENDAR YEAR

1. Press RESET touch pad repeatedly (Figure 4-17) until -F2- appears on the front panel display. Hold until the tone

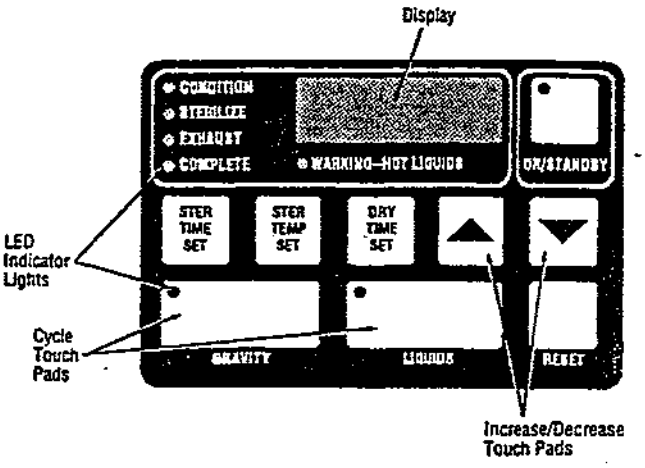


FIGURE 4-17. Eagle Ten + Control Panel

sounds.

2. Advance year by pressing the increase touch pad. Decrease year by pressing the decrease touch pad. Range is 00-99.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR MONTH

1. Press RESET touch pad repeatedly (Figure 4-17) until -F3- appears on the front panel display. Hold until the tone sounds.

2. Advance month by pressing the increase touch pad. Decrease month by pressing the decrease touch pad. Range is 01-12.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR DAY

1. Press RESET touch pad repeatedly (Figure 4-17) until -F4- appears on the

front panel display. Hold until the tone sounds.

2. Advance day by pressing the increase touch pad. Decrease day by pressing the decrement touch pad. Range is 01-31.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR HOUR

1. Press RESET touch pad repeatedly (Figure 4-17) until -F5- appears on the front panel display. Hold until the tone sounds.

2. Advance hour by pressing the increase touch pad. Decrease hour by pressing the decrease touch pad. Range is 00-24.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

SETTING CALENDAR MINUTE

1. Press RESET touch pad repeatedly (Figure 4-17) until -F6- appears on the front panel display. Hold until the tone sounds.

2. Advance minute by pressing the increase touch pad. Decrease minute by pressing the decrease touch pad. Range is 00-59.

3. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

4.2 SERVICE DIAGNOSTIC TESTS (Eagle Ten and Eagle Ten +)

4.2.1 Verifying Touch Panel LED's

1. Press RESET touch pad repeatedly (Figure 4-16 or 4-17) until -F7- appears on the front panel display. Hold until the tone sounds.

2. ON/STANDBY and all cycle select LED's will illuminate.

3. Press and hold any cycle select touch pad; all remaining panel lights will illuminate and the ON/STANDBY and cycle select LED's will extinguish.

4.2.2 Verifying Door Switch and Water Level Probe

1. Press RESET touch pad repeatedly (Figure 4-16 or 4-17) until -F7- appears on the front panel display. Hold until the tone sounds.

2. Simultaneously press and hold the RESET and ON/STANDBY touch pads until -F8- appears on the display; release when tone sounds.

3. After the tone sounds, the display shows the status of the Door Limit Switch and Water Level Sensor as "1 1"; 1 signifying an open switch and 0 signifying a closed switch.

4. Activate the door limit switch; first digit must read "0". Deactivate the door limit switch; first digit must read "1".

5. Simultaneously touch the end of the water level sensor and inside chamber wall; second digit must read "0". Release and the second digit must read "1".

6. Press and hold RESET touch pad until -F8- appears on display. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

4.2.3 Verifying Heater, Relay, and Valve Functions

1. Press RESET touch pad repeatedly (Figure 4-16 or 4-17) until -F7- appears on the front panel display. Hold until the tone sounds.

2. Simultaneously press and hold the RESET and ON/STANDBY touch pads until -F8- appears on the display; press

and hold RESET touch pad until -F9- appears, release when tone sounds.

3. Press and release WRAPPED touch pad (STER TEMP SET on Eagle Ten +); audible click verifies that relay is activated. Second digit on the display must be "1".

4. Press and release UNWRAPPED touch pad (STER TIME SET on Eagle Ten +); first digit on display must read "1" indicating that the heater is activated. Immediately press and release the WRAPPED and UNWRAPPED touch pads to turn off the relay and heater; first two digits will be "0 0".

5. Press and release LIQUIDS touch pad (DRY TIME SET on Eagle Ten +); third digit on display must read "1". To activate the fill valve (indicated by an audible click), touch top of solenoid core with a screwdriver. Touch again to deactivate the fill valve; third digit must read "0".

6. Press and release PACK touch pad (UP arrow on Eagle Ten +); fourth digit on display must read "1". To activate the vent valve (indicated by an audible click), touch top of solenoid core with a screwdriver. Touch again to deactivate the vent valve; third digit must read "0".

7. Press and hold RESET touch pad until -F8- appears on display. Press and hold the ON/STANDBY touch pad until the front panel display indicates -F0-; release as soon as the tone sounds. Control returns to ON ready mode.

4.3 PREVENTIVE MAINTENANCE GUIDE

EQUIPMENT: **Eagle Ten and Ten + Sterilizers**

This form is to be used as a preventive maintenance record and as a guide to performing preventive maintenance.

(Circle "X" in Bi-Monthly 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.	X	X	X	X	X	X
1.2 Install test equipment (Paragraph 4.5).	X	X	X	X	X	X
1.3 Disconnect electrical plug.	X	X	X	X	X	X
2.0 DOOR ASSEMBLY						
2.1 Inspect door for ease of operation.	X	X	X	X	X	X
2.2 Inspect condition of door gasket for wear.	X	X	X	X	X	X
2.3 Inspect door alignment and shim with end ring.	X	X	X	X	X	X
2.4 Lubricate hinge and hinge pins. Do not lubricate locking mechanism.	X	X	X	X	X	X
2.5 Inspect alignment of lock pins and door latch catches.	X	X	X	X	X	X
2.6 Inspect wear of lock pins and door latch catches.	X	X	X	X	X	X
3.0 SOLENOID VALVES						
3.1 Verify operation of electric solenoid valves.	X	X	X	X	X	X
3.2 Rebuild valves.						X
4.0 OVERTEMPERATURE CONTROLLER						
4.1 Inspect for proper operation of controller; replace if not functioning properly.	X	X	X	X	X	X
5.0 AIR VENT (Steam Trap)						
5.1 Inspect air vent for proper operation.	X	X	X	X	X	X
5.2 Replace air vent.						X
6.0 GAUGE						
6.1 Inspect chamber gauge for accuracy; replace if necessary.	X	X	X	X	X	X
7.0 CHAMBER & WATER RESERVOIR						
7.1 Check piping for leaks.	X	X	X	X	X	X
7.2 Check condition of water reservoir.	X		X		X	
7.3 Check condition of chamber filter.	X	X	X	X	X	X
7.4 Replace filter. **NOTE:** Filter must rest on chamber bottom near centerline.						X
8.0 CONTROL COMPONENTS						
8.1 Ensure all electrical connections are tight.	X	X	X	X	X	X
8.2 Inspect heater for proper operation.	X	X	X	X	X	X
8.3 Verify proper operation of control panel touch pads and display.	X	X	X	X	X	X
8.4 Verify proper operation of safety valve.				X		

SERVICE PERFORMED	1	2	3	4	5	6
9.0 FINAL TEST						
9.1 Clean lint and dirt from components.	X	X	X	X	X	X
9.2 Run test cycle, verifying temperature (use potentiometer).	X	X	X	X	X	X
9.3 Inspect all wiring, terminals, and socket connections for damage or fraying.	X	X	X	X	X	X
9.4 Check electrical cord for fraying, broken wires, etc.	X	X	X	X	X	X
9.5 Remove all test equipment installed in this inspection.	X	X	X	X	X	X
9.6 Install any panel or cover that was removed during the inspection.	X	X	X	X	X	X

4.4 TROUBLESHOOTING AND ERROR CODE CHARTS (Eagle Ten & Ten +)

WARNING: INJURY HAZARD. Repairs and adjustments, other than those described in these instructions, should be attempted only by experienced mechanics fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage.

This section describes the types of sterilizer malfunctions likely to occur, and indicates probable causes.

1. Use following Troubleshooting Chart and Error Code Chart to identify problem and probable cause.
2. Locate parts in Section 6, ILLUSTRATED PARTS BREAKDOWN.
3. If you are unable to correct problem with use of this Troubleshooting Chart, or if a problem occurs that is not described on the chart, please call a factory-trained technician. Never permit unqualified persons to work on the sterilizer.

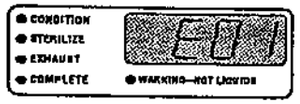
Do not remove or replace printed circuit boards unless facility power is off and electrostatic precautions are taken.

TROUBLESHOOTING CHART

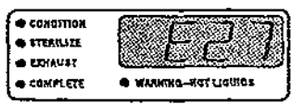
PROBLEM	POSSIBLE CAUSE AND/OR CORRECTION
1. No power/control panel remains dark.	1) Unit is not plugged into outlet -> plug unit into a properly grounded outlet. 2) POWER ON/RESET switch is not turned ON -> turn ON. 3) Check facility power source -> turn ON. 4) Check overtemperature control -> replace if needed. 5) Check RTD sensor -> replace if needed. 6) Check fuse FU1 -> replace if needed. 7) Check 120 VAC input to power supply assembly. 8) Check 5 VDC output from power supply -> replace if needed. 9) Check rocker switch -> replace if needed 7) Replace PC Board (Para. 5.2).
2. One or more legends on control panel fail to light.	1) Confirm by testing (Service Routine, -F7-). If legend fails to light -> replace time/temp display.
3. Unable to start cycle (unit displays "DOOR")	1) Chamber door open -> close and lock door. 2) Check continuity of touch pad when pressed (see P2-5-10 to P2-1) -> replace touch pad if needed. 3) Check continuity of door switch -> replace switch if necessary (see P7-1 to P7-2). 4) Replace PC Board (Para. 5.2).

PROBLEM	POSSIBLE CAUSE AND/OR CORRECTION
4. Water continues entering chamber after FILL phase is complete.	1) Fill valve has failed in open position -> repair or replace valve.
5. E13 displayed. No water enters chamber during FILL phase	1) Check for water in chamber. a. If no water in chamber, check reservoir for adequate supply. b. Clean or replace chamber filter. 2) If water in chamber. a. Clean water level probe. b. Replace water level probe. 3) Check fill valve -> replace if needed. 4) Replace PC Board (Para. 5.2).
6. Loss of pressure during cycle.	1) Steam trap failed open -> replace trap (Figure 6-4). 2) Vent solenoid valve has failed open -> repair or replace valve (Figure 6-4). 3) Heater failed -> replace heater (Para. 5.4) 4) Safety valve has failed open -> repair or replace valve (Figure 6-4). 5) Faulty pressure gauge -> check connections or replace gauge (Figure 6-4). 6) Loose connection or fitting -> isolate and correct pressure leak. 7) Check TRIAC control assembly -> replace if needed. 8) Replace PC Board (Para. 5.2).
7. Unable to open chamber door.	1) Cycle not complete -> wait for completion of exhaust phase. 2) Firmly push in on door handle while sliding handle up. 3) Door locking assembly stuck -> correct. 4) Faulty pressure gauge reading atmospheric pressure; however, slight pressure remains in chamber -> wait five minutes, then try again.
8. Water in chamber at end of cycle.	1) Filter assembly not properly installed or missing -> install filter assembly properly. NOTE: Filter must rest on chamber bottom near centerline.
9. Loads are not drying.	1) Door not opened to start dry phase -> open door. 2) Door switch failed -> replace switch (Figure 6-2 or 6-3). 3) Drain filter plugged -> clean filter.
10. Loads are not sterilized.	1) Improper pack preparation or sterilizer loading -> verify proper loading techniques. 2) Incorrect cycle parameters selected -> select correct parameters for load. 3) Bad steam trap element -> replace steam trap (Figure 6-4). 4) PC Board out of calibration -> recalibrate.
11. Erratic unit behavior.	1) Loose wire or cable -> firmly tighten wire or cable to connections. 2) Input voltage outside allowable limits (126 VAC max., 102 VAC min.) -> check power supply. 3) Unstable power supply (5VDC) -> verify and replace. 4) PC Board defective -> replace PC Board (Para. 5.2).

PROBLEM	POSSIBLE CAUSE AND/OR CORRECTION
12. Unit will not exhaust.	1) Plugged chamber filter -> unplug unit and let stand for one hour. Clean or replace filter (Figure 6-3). NOTE: Filter must rest on chamber bottom near centerline. If filter is plugged with media, refer to chamber filter cleaning instructions. 2) Check for 120 VAC across P1-5 and P1-10 during Exhaust phase -> if no voltage present, replace PC Board, if voltage present, replace or repair vent solenoid valve.
13. Unit does not reach set temperature.	1) Check steam trap for excessive or no leak -> repair or replace trap (Figure 6-4). 2) Verify door gasket is not leaking -> clean end frame and seal, and if necessary replace gasket. 3) Check safety valve for leaks -> replace valve. 4) Check fill and vent solenoid valves for leaks -> repair or replace valve(s). 5) Check resistance of the heater -> if resistance is not approximately 10 m/ohm, replace heater. 6) With unit in cycle, measure 120 VAC across P9-9 and WIRE 101 on the AC receptacle. Voltage should be present -> if no voltage, replace triac control assembly.
14. Customer complaint of media loss.	1) Refer to Paragraph 5.13.

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION	WHERE IN CYCLE	CORRECTIVE ACTION
	Shorted temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Control "ON", not in cycle	1. Use Ohmmeter to test thermistor resistance. Refer to Thermistor Temperatures vs. Resistance, Para. 5.3. 2. If unit defective, replace. 3. If unit operational, replace PC Board.
	Open temperature sensor.	• Open the door and allow unit to stabilize at room temperature. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Control "ON", not in cycle	Same as "E01".
	Level sensor detects water. Possible water sensor failure.	• Check water level in chamber. If O.K., start cycle. • Clean water probe (see Section 5). • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Control "ON", not in cycle	NOTE: This does not always indicate a component failure, the control will display "E03" if cycle was aborted after filling. 1. Clean water level probe. 2. If no water in chamber: a) Disconnect water level probe signal wire. b) If "E03" goes away after pressing reset, replace probe. c) If "E03" continues, replace PC Board Assembly.
	Shorted temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Condition Phase	Same as "E01".
	Open temperature sensor.	Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Condition Phase	Same as "E01".
	Water level sensor failure or insufficient water in chamber.	• Carefully open chamber door. • Check for water in the chamber. • If no water is in the chamber, then check reservoir for adequate supply. Refill if necessary. If not, clean the filter. • If there is water in the chamber, then clean the water level sensor. (Cont'd Next Page)	Condition Phase	1. Inspect water level probe for corrosion or damage. 2. Inspect water level probe signal wire for corrosion or damage. 3. Test probe circuit as follows: a) Remove probe from chamber and isolate from chassis ground. b) Close and lock chamber door, then start a cycle. c) Display will indicate "FILL". (Cont'd Next Page)

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION	WHERE IN CYCLE	CORRECTIVE ACTION
	Water level sensor failure or insufficient water in chamber. (Cont'd)	• Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Condition Phase	d) Touch probe tip to the chassis ground. e) Unit should now display chamber temperature. f) If temperature not displayed, remove signal wire from probe and touch signal wire to chassis ground. g) Unit should now display chamber temperature. h) If temperature was displayed in f and not in d, replace the probe. i) If temperature was displayed in d and not in f, replace the PC Board.
	Heating problem	• Wait for tone to sound. • Press RESET touch pad, then retry. • Check door gasket for damage or dirt build-up. • If error code is displayed again, contact dealer service department.	Condition Phase	1. Check door gasket for dirt build-up or damage: clean or replace as needed. 2. Assure air vent closes properly during condition phase, if not, replace air vent. 3. Check heating element resistance: should be 9-11 ohms. 4. Check voltage to heating element during cycle. If not present: a) Test TRIAC module: 120 volts between P9-7 and wire 101 on AC receptacle. b) Test Triac R1, P9-1 to P9-3 should be 0 volts.
	Unit fails to reach sterilization temperature in allotted time.	• Wait for tone to sound. • Press RESET touch pad, then retry. • Check door gasket for damage or dirt build-up. • If error code is displayed again, contact dealer service department.	Condition Phase	Same as "E14".
	Door unlocked during condition phase.	• Wait for tone to sound. • Press RESET touch pad, close and lock door, then retry. • If error code is displayed again, contact dealer service department.	Condition Phase	1. Check door status; close or open as appropriate. 2. Inspect door switch for proper operation: adjust or replace as needed.
	Shorted temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Sterilize Phase	Same as "E01".
	Open temperature sensor.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Sterilize Phase	Same as "E01".

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION	WHERE IN CYCLE	CORRECTIVE ACTION
	Door unlocked during sterilize phase.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Sterilize Phase	Same as "E16".
	Failed to maintain temperature set point.	• Wait for tone to sound. • Press RESET touch pad, then retry. • Check door gasket for damage/dirt. • If error code is displayed again, contact dealer service department.	Sterilize Phase	Same as "E14".
	Temperature has dropped below set point (blinking sterilizer indicator light). The timer resets and cycle will resume when preset temperature is achieved.	• Monitor cycle.	Sterilize Phase	After cycle completion: 1. Inspect Door gasket for dirt build-up or damage; clean or replace as needed. 2. Inspect plumbing for leaks; repair or replace asneeded.
	Over temperature (cycle will abort).	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Sterilize Phase	Test heating circuit as outlined in "E14", step #3. 1. Verify that the control signals Triac to OFF when unit reaches set temperature + 3 degrees. If not, replace the control board or Triac module as needed.
	Door unlocked at cycle start. Door locked during exhaust or dry phase.	• Close and lock door. • Unlock and open dor 1/4 inch.	Prior to cycle starting, or at end of Exhaust Phase	Same as "E16".
	Power failure during cycle.	• Check for DRY (Gravity) or COOL (Liquid) load. If load still wet, let load DRY or COOL.	Exhaust Phase (Drying)	1. Check for DRY (Gravity) or COOL (Liquid) load. If load still wet, let load DRY or COOL.
	Power failure during cycle.	• Load must be reprocessed.	Condition Phase (after temperature reaching 212 degrees)	1. Load must be reprocessed.
	Power failure during cycle.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Condition Phase (prior to temperature reaching 212 degrees)	1. Wait for tone to sound. 2. Press RESET touch pad, then retry.

ERROR MESSAGE	EXPLANATION	OPERATOR ACTION	WHERE IN CYCLE	CORRECTIVE ACTION
	Abnormal rapid rise in temperature.	• Wait for tone to sound. • Press RESET touch pad, then retry. • If error code is displayed again, contact dealer service department.	Any time control is ON	If in cycle: 1. Confirm water level in chamber and level probe is functioning. If not in cycle: 1. Test Heating circuit as outlined in "E14", step #3. 2. Confirm Air Vent is functioning.
	RESET touch pad was pressed during a cycle.	• Wait for tone to sound. • Press RESET touch pad to clear.	Any time control is ON	1. Wait for tone to sound. 2. Press RESET touch pad to clear.
	Chamber temperature exceeded 395 degrees.	• Press main reset switch on rear of unit. • Allow unit to cool. • Reprocess the load. • Retry cycle. • If display is blank again, contact dealer service department.	Any time control is ON	1. Test overtemperature control for proper operation as outlined in Paragraph 5.10; replace as outlined in Paragraph 5.7.

4.5 FIELD TEST PROCEDURE

4.5.1 General

Every unit must be tested and inspected according to this procedure. Whenever a part is adjusted, repaired or replaced, retest using appropriated section of Field Test. Items of noncompliance must be corrected and retested. Each test must meet the standards of material, workmanship, and performance set forth in this procedure. Calibrated potentiometer must be used on each test. Refer to Section 5 should mechanical problems arise or adjustments be required.

4.5.2 Test Equipment Required

1. Calibrated potentiometer (Doric 400 or equivalent) with Conax adapter.
2. Calibrated compound test gauge.
3. Stopwatch.
4. Cross, 1/2 (P-150822-333.
5. Nipple, 4" (P-029174-091) 1/2NPT x 4".
6. Amprobe.

4.4.3 Ensure Proper Installation

1. Verify unit is installed on a flat, level surface.
2. Ensure proper dedicated electrical service: 120 VAC (+5%, -15%), grounded, single phase, 15 Amps, 50/60 Hz or 240 VAC (+5%, -15%), grounded, single phase, at least 15 Amps, 50/60 Hz.

4.5.4 Install Test Equipment

WARNING: INJURY HAZARD. To prevent personal injury and equipment damage, unplug unit before removing outer cover.

1. Remove fastening screws and lift cover from unit.
2. Remove safety valve. Install 4" nipple than 1/2" cross. Attach safety valve to cross.
3. Attach compound gauge to cross and run thermocouple into chamber through remaining port in cross until it is in contact with thermistor.

4.5.5 Cycle Tests

Prior to tests, the following steps should be followed:

1. Fill reservoir with deionized or distilled water.
2. Plug unit into a 120 VAC, 15 Amp receptacle. Verify that at least 102 VAC and no more than 126 VAC exists during operation.
3. Press POWER RESET rocker switch on back panel. Verify that the display alternates between time (5 sec.) and OFF (1 sec.).
4. Press ON/STANDBY touch pad to ON. ON/STANDBY LED should illuminate and display should show time of day.

4.5.5.1 Eagle Ten Cycle Test

1. Close and lock door.
2. Press WRAPPED touch pad. Cycle should start and the following should occur:
   a. CONDITION indicator lights illuminates.
   b. FILL appears on display.
   c. S1 and S2 solenoid valves energize. Check for water leaks.
   d. Within 1-1/2 minutes, the water fill should be complete; the display will indicate chamber temperature. S1 and S2 will de-energize.
   e. Heater turns ON and chamber temperature will start rising. Upon reaching 212 F/100 C, the gauge will display chamber pressure.
3. Visually check all gasket seal areas and piping connections for leaks. A mirror or highly polished piece of metal is needed. Check and correct gasket especially during 0 - 5 psig pressure range.

4. When the temperature reaches 270 F (132 C), STERILIZE indicator light illuminates. CONDITION indicator light turns off. Display will start counting down from 10 minutes and display temperature and time alternately. Check all piping and gasket areas for leaks.

5. Check pressure gauge on the sterilizer and verify that it reads within ± 1.5 psig of the chamber test gauge.

6. After five minutes, verify that the chamber temperature is 272 F ± 2 F (133 C ± 1 C) corresponding with the digital thermometer. If not, refer to Thermistor Calibration Procedure in Para. 5.3.

7. After 10 minutes, EXHAUST indicator illuminates and STERILIZE indicator shuts off. Verify that the time for sterilizer phase is 10 minutes.

8. Sterilizer will exhaust and at the end of exhaust, display indicates "DOOR".

9. Unlock and open chamber door 1/4".

10. Dry phase begins. Verify that the display progressively counts up dry time.

11. During dry phase, note the displayed DRY TIME, then close and lock chamber door. Verify the display shows "DOOR" and the tone sounds every minute.

12. Unlock and open the door 1/4". Verify the display shows the noted time (see above) and resumes counting up.

13. Time continues to count:

    a. At 30 minutes, a tone sounds for four seconds and the exhaust LED goes out and the COMPLETE LED illuminates.

    b. At 45 minutes, a tone sounds for four seconds.

    c. At 60 minutes, the display shows "DONE" and the tone sounds four time per minute.

14. At this point, drying is complete and the heater shuts off. Press RESET touch pad. Verify sterilizer cycles back to STAND BY condition (display alternates between time and OFF).

4.5.5.2 Eagle Ten + Cycle Test

1. Press and release STER TIME SET touch pad. Verify both cycle select touch pad indicator lights illuminate.

2. Press and release GRAVITY touch pad. Verify LIQUIDS indicator light goes out and time is displayed.

3. Press and hold INC touch pad. Verify time goes up to 99 and then to 0.

4. Release INC touch pad. Then press and hold DEC touch pad. Verify time decreases to 0, then to 99.

5. Press and release STER TEMP SET touch pad. Verify both cycle select touch pad indicator lights illuminate.

6. Press and release GRAVITY touch pad. Verify LIQUID indicator light goes out and temperature is displayed.

7. Press and hold INC touch pad. Verify temperature goes up to 275 and then to 200. Release INC touch pad.

8. Press and hold DEC touch pad. Verify temperature down to 200 and then to 275. Release DEC touch pad.

9. Press and release DRY TIME SET touch pad. Verify **only** the GRAVITY indicator light illuminates.

10. Repeat Steps 2-4 above.

11. Set STER TIME SET to 10 minutes, STER TEMP SET to 270 F (132 C), DRY TIME SET to 10 minutes. Initiate a cycle by pressing GRAVITY button twice; first press displays "SET VALUES", second press initiates the cycle.

12. Repeat procedure 4.4.5.1 using the GRAVITY cycle.

4.5.5.3 Cycle Aborts

1. Initiate a 270 F (132 C) cycle. Allow chamber pressure to reach 20 psig. Press RESET touch pad. Verify the unit hoes into exhaust and ensure pressure drops to atmospheric pressure before end of exhaust phase.

2. Initiate a 270 F (132 C) cycle. Press RESET touch pad during sterilization phase. Verify unit goes into exhaust and depressurizes.

4.5.5.4 Final Test

1. Ensure door swings easily without rubbing or binding.

2. Verify door gasket is properly installed.

3. Check unit for any water leaks at shell and reservoir.

4. Ensure all electrical connections are tight.

5. Remove all test equipment.

6. Police work area to ensure removal of all materials used during test.

4.6 FUNCTIONAL DESCRIPTION

When unit is plugged into a properly grounded 120 VAC outlet and the reset rocker switch, located on the back of the unit is pressed, AC power will be enabled to the unit. The display will alternate between OFF and time of day. The optional printer will print "POWER ON". Pressing the ON/STANDBY touch pad will turn on the "ON" indicator light and the time will be displayed. The Optional printer will print, "CONTROL ON". The heater, HTR1. will be pulsed on by the control using Triac #1 and the CR1 heater disconnect relay.

After the door is closed and locked and a non-liquids cycle has been selected, the unit will automatically fill the chamber through fill valve V1 to the proper level detected by the water level probe FS1. The display will indicate "FILL". The optional printer will now print relevant cycle data through the remainder of the cycle (ref. fig. ....). Typical fill time is one to two minutes. The condition light will now be lit, indicating advancement into this phase. After the fill is complete the heater, HTR1, is energized using triac #1 and the heater disconnect relay CR1. The display will indicate chamber temperature until selected sterilize temperature is reached. The heater will remain energized until sterilize temperature plus 2 degrees has been reached. Temperature is controlled by the use of thermistor QTM1.

Upon reaching the selected sterilizing temperature the "STERILIZE" phase indicator light will come on and the "CONDITION" light will go off. The display will now alternate the chamber temperature and the exposure time remaining until the exposure timer has counted down to zero.

Once the sterilize phase has been completed the "EXHAUST" indicator light illuminates signaling the beginning of the exhaust phase. The display will indicate chamber temperature. The heater will be deenergized and the vent valve, V2, will be energized by the control for a preset time of 4 minutes. Steam in the chamber is diverted through the vent piping into the condensing coil and back into the reservoir in the form of condensate. After the exhaust time has elapsed the display will indicate "DOOR" and a tone will sound for 4 seconds. Opening the door will initiate the "DRY" phase. If the door is not opened a tone will sound every three minutes to indicate cycle status.

When the door is unlocked the "DRY" phase begins. The display indicates "00" and starts counting up. Locking the door at this time will cause a tone to sound, the dry time to stop counting, and the display to indicate "DOOR". The heater, HTR1, will be energized during dry through Triac #1 and the heater disconnect relay. A tone will sound for 4 seconds at 30, 45, and 60 minutes. At the end of the 60 minute dry phase "DONE" will appear on the display and the heater will be deenergized. The dry phase may be terminated by pressing the ON/STANDBY touch key any time during the dry phase. When "DONE" appears on the display the complete phase indicator will light. Pressing

the reset touch key returns the time of day to the front panel display.

The liquids cycle varies from the gravity cycle as follows:

During the "EXHAUST" phase the vent solenoid is pulsed to maintain a slow exhaust rate. This is accomplished by the control pulsing the vent valve over a 10 minute period.

There is no "DRY" phase in a liquid cycle.

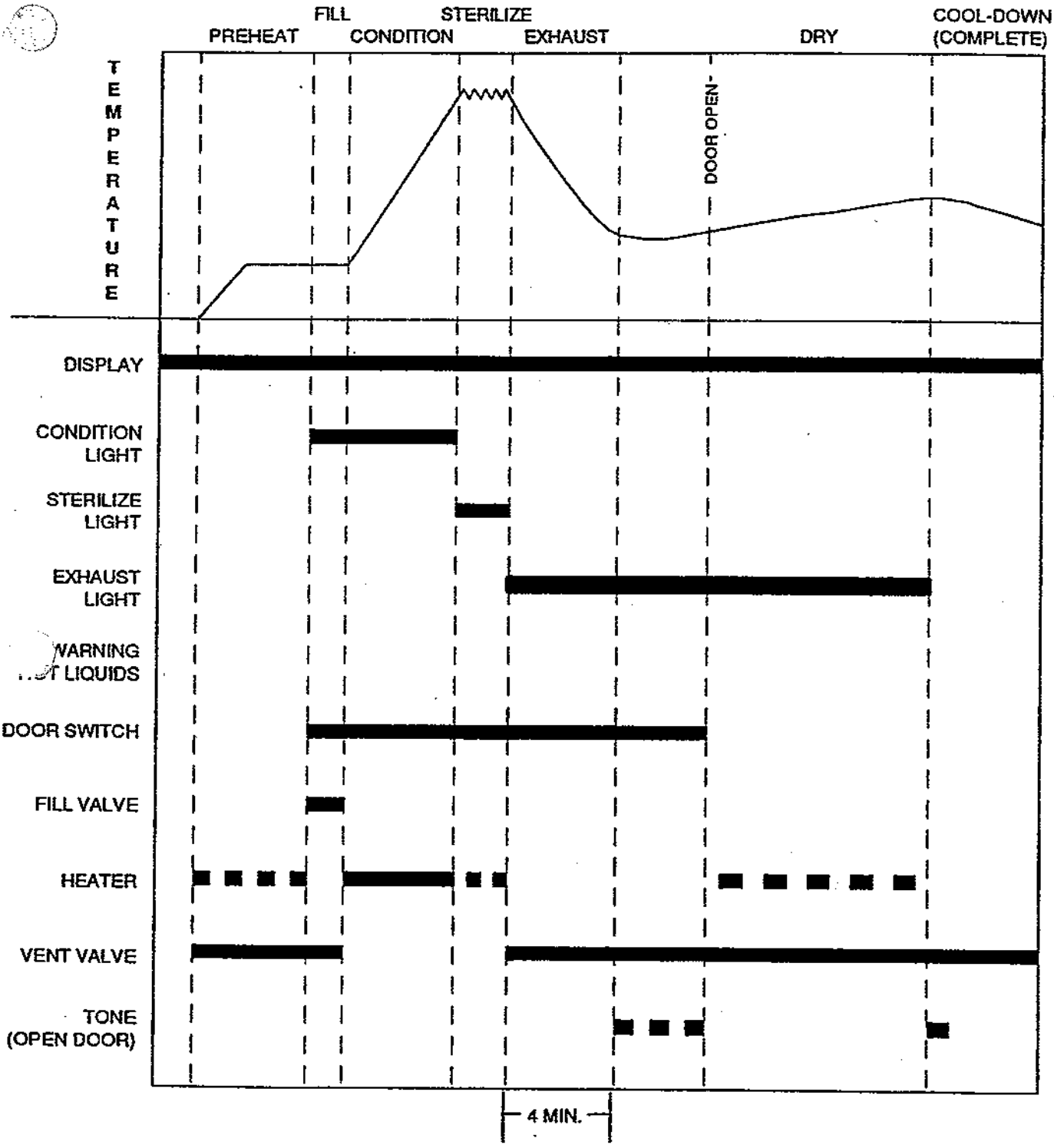


FIGURE 4-18. Cycle Graph - Gravity Cycle

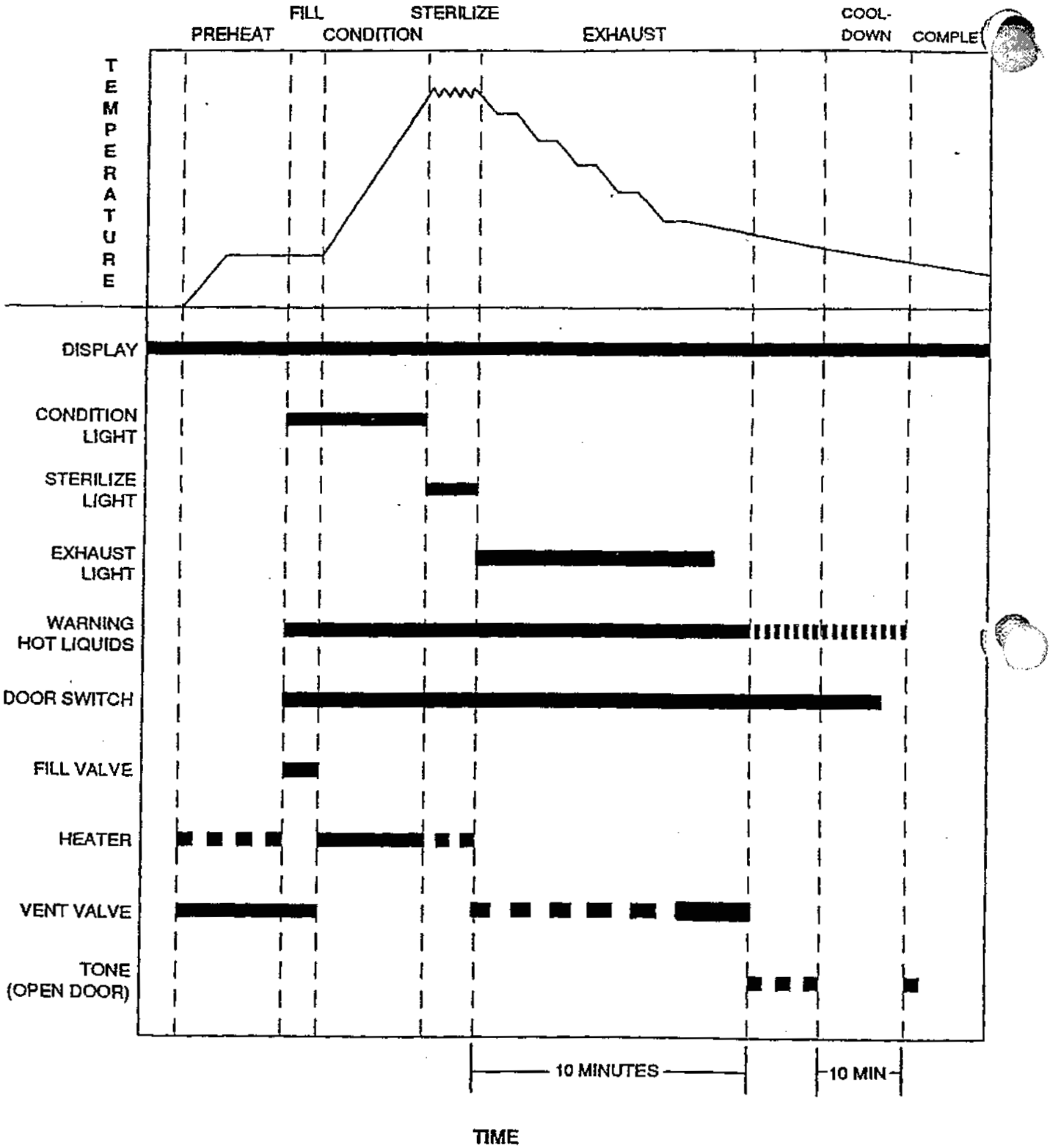


FIGURE 4-19. Cycle Graph - Liquid Cycle