

Amsco EAGLE® SERIES 3000

Gravity And Vacumatic Sterilizers

**(3/26/98)
Rev.10**

P-129359-452

**Volume 2, Sterilizer Operating Procedures,
Hospital Usage**

A WORD FROM STERIS CORPORATION

This manual contains important information on proper use and maintenance of this sterilizer. All operators and department heads are urged to carefully review and become familiar with the warnings, cautions and instructions contained herein. This sterilizer is specifically designed to process goods using only the cycles as specified in this manual. If there is any doubt about a specific material or product, contact the manufacturer of the product for the recommended sterilization technique.

A thorough preventive maintenance program is essential to safe and proper sterilizer operation. You are encouraged to contact STERIS concerning our Preventive Maintenance Agreement. Under terms of this agreement, preventive maintenance, adjustments, and replacement of worn parts are done on a scheduled basis to assure equipment performance at peak capability and to help avoid untimely or costly interruptions. STERIS maintains a nationwide staff of well-equipped, factory-trained technicians to provide this service, as well as expert repair services. Contact your STERIS representative for details.

STERIS carries a complete line of accessories for this unit to simplify, organize and assure sterility of the sterilization process. Instrument trays, Vantage and DEXTEX wraps and biological/chemical monitoring systems are all available to fulfill your facility's processing needs. A STERIS representative will gladly review these with you.

This sterilizer is not designed to process flammable liquids nor liquids in containers that are not designed for sterilization. Any alteration of the sterilizer which affects its operation will void the warranty and could violate state and local regulations and jeopardize insurance coverage.

IMPORTANT: A SUMMARY OF THE SAFETY PRECAUTIONS TO BE OBSERVED WHEN OPERATING THIS EQUIPMENT CAN BE FOUND ON PAGE 1 OF EACH VOLUME OF THIS MANUAL AND BEHIND THE UPPER ACCESS PANEL OF THE UNIT. DO NOT OPERATE THE STERILIZER UNTIL YOU HAVE BECOME FAMILIAR WITH THIS INFORMATION.

SERIES 3011
16x16x26" Gravity
(406x406x660 mm)

SERIES 3021
20x20x38" Gravity
(508x508x965 mm)

SERIES 3031
24x36x36" Gravity
(610x914x914 mm)

SERIES 3041
24x36x48" Gravity
(610x914x1219 mm)

SERIES 3051
24x36x60" Gravity
(610x914x1524 mm)

SERIES 3013
16x16x26" Vacamatic
(406x406x660 mm)

SERIES 3023
20x20x38" Vacamatic
(508x508x965 mm)

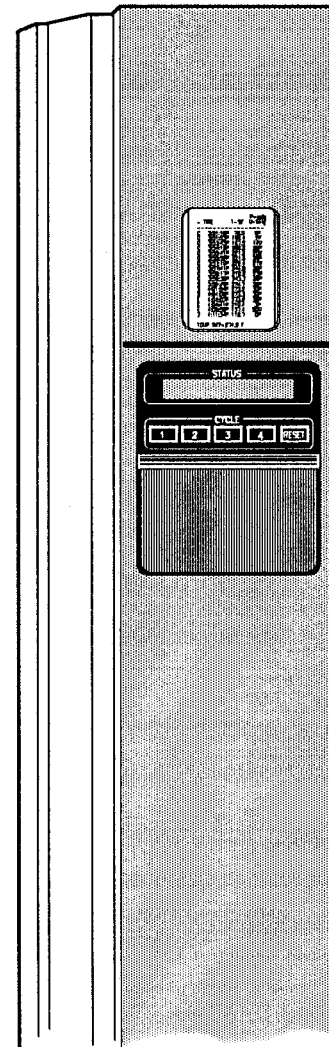
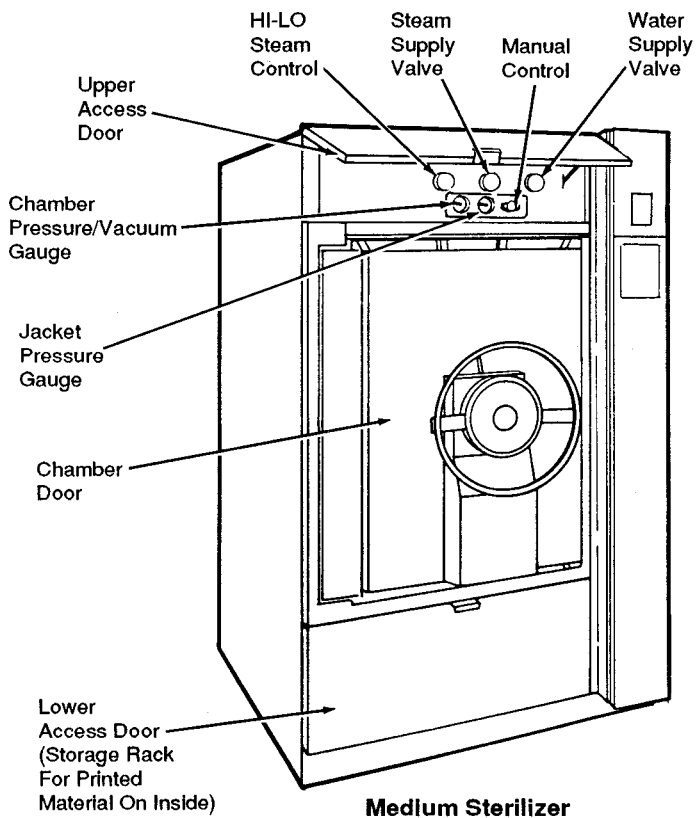
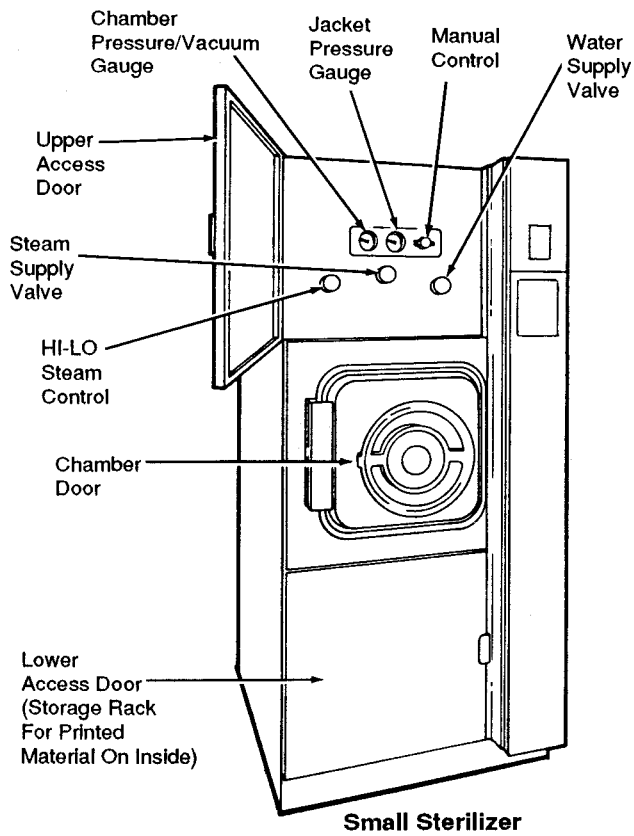
SERIES 3033
24x36x36" Vacamatic
(610x914x914 mm)

SERIES 3043
24x36x48" Vacamatic
(610x914x1219 mm)

SERIES 3053
24x36x60" Vacamatic
(610x914x1524 mm)

TABLE OF CONTENTS

Section	Description	Page
1	SUMMARY OF SAFETY PRECAUTIONS	1-1
2	COMPONENT IDENTIFICATION/FUNCTION	2-1
2.1	Printer	2-1
2.2	Operating End Control Panel	2-1
2.3	Non-Operating End Control Panel (Double-Door Sterilizers)	2-3
2.4	Reset Function	2-4
2.5	Manual Door Operation	2-4
2.6	Power Door Operation	2-5
3	STERILIZER CYCLES AND CYCLE VALUES	2-1
3.1	Permanent Default Cycles and Cycle Values	3-1
3.2	Gravity Sterilizer Factory Settings (Series 3011, 3021, 3031, 3041 and 3051)	3-2
3.3	Change Gravity Sterilizer Cycles, Cycle Values And Control Values	3-2
3.4	Prevacuum Sterilizer Factory Settings (Series 3013, 3023, 3033, 3043 and 3053)	3-5
3.5	Change Prevacuum Sterilizer Cycles, Cycle Values And Control Values	3-6
4	STERILIZER OPERATION	4-1
4.1	Automatic Operation: Flash Cycle	4-1
4.2	Automatic Operation: Gravity Cycle (Wrapped and Unwrapped Goods)	4-4
4.3	Automatic Operation: Liquids Cycle	4-6
4.4	Automatic Operation: Express Cycle (Wrapped Instruments)	4-10
4.5	Automatic Operation: Prevacuum Cycle (Wrapped and Unwrapped Goods)	4-13
4.6	Vacuum Leak Test Cycle	4-15
4.7	DART (Bowie-Dick) Test Cycle	4-18
4.8	Manual Operation: Gravity (Wrapped or Unwrapped Goods) or Liquids Cycle Only	4-20
4.9	Control Monitoring and Communication Systems	4-22
5	TECHNIQUES OF STERILIZATION	5-1
5.1	Fabrics and Hard Goods: Use Prevacuum or Gravity Cycle	5-1
5.1.1	Preparation	5-1
5.1.2	Loading The Sterilizer	5-1
5.2	Liquids: Use Liquids Cycle Only	5-2
5.3	Control Measures For Verifying Sterilization Process	5-3
5.3.1	Biological Monitors	5-3
5.3.2	Testing For Prevacuum Efficiency	5-3
5.3.3	Auxiliary Controls	5-4
5.3.3.1	Printed Records and Display Messages	5-4
5.3.3.2	Chemical Controls	5-4








Amsco Eagle® 3000 Series Sterilizers

SUMMARY OF SAFETY PRECAUTIONS


1

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

WARNING – BURN AND SHOCK HAZARD:

-  Repairs and adjustments should be attempted only by authorized persons 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.
-  Allow sterilizer, generator (if applicable) and accessories to cool to room temperature before performing any cleaning or maintenance procedures.
-  Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.
-  When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedure:
 - Use LIQUIDS cycle only. No other cycle is safe for processing liquids.
 - Use only vented closures — do not use screw caps or rubber stoppers with crimped seal.
 - Use only Type I borosilicate glass bottles — do not use ordinary glass bottles or any container not designed for sterilization.
 - Avoid sudden full opening of door at end of cycle. Open sterilizer door no more than one inch and wait at least 10 minutes before unloading sterilizer.
 - Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.
 - Allow bottles to cool to touch before attempting to move them from sterilizer shelf or tray(s) to the storage area.
-  A steam supply malfunction may cause the sterilizer-chamber to fill with scalding water. Do not open chamber door if the unit fails to complete an automatic cycle or if water leaks past the door gasket upon unlocking the door.


WARNING – SLIPPING HAZARD:

-  To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

WARNING – EXPLOSION HAZARD:

-  This sterilizer is not designed to process flammable liquids.

CAUTION – POSSIBLE EQUIPMENT DAMAGE:

-  On sterilizers equipped with power door option, be sure shift handle is in either the extreme right (POWER) or left (MANUAL) position at all times. Placing handle in an intermediate position could damage drive system of door.

Become familiar with all control locations and functions before operating the sterilizer. (See Figure 2-1)

- **Sterilizer Power Switch** — located behind the printer door. This switch controls power to the sterilizer, sterilizer control, and (if equipped) steam generator.

Located behind the upper access door are the following:

- **Water Supply Valve** — provides cold water supply to sterilizer; must be open for sterilizer operation.
- **Steam Supply Valve** — provides steam supply to sterilizer; must be open for sterilizer operation.
- **HI-LO Steam Control Valve** — regulates steam pressure; factory set at: HI — 30-32 psig for 270 F cycles. LO — 18-20 psig for 250 F cycles.
- **Chamber Pressure/Vacuum And Jacket Pressure Gauges** — show respective steam pressure and chamber vacuum levels.
- **Manual Control** — used for manual operation of sterilizer (see Paragraph 4.8 for procedure). Must be set to OFF for automatic operation.

2.1 Printer (See Figure 2-1)

Printer records all cycle data on 2-1/4 inch wide single ply thermal paper. See VOLUME I, SERVICE AND MAINTENANCE PROCEDURES for paper ordering information and for paper changing procedure.

- **Printer Switch** (located behind printer door) controls two printer functions, print and print values.
- **Print** — Press top of printer switch to obtain a complete duplicate printout of the last previous cycle (when unit is not in cycle) or to obtain a printout of current cycle phase and conditions (when unit is in cycle).
- **Print Values** — Press bottom of printer switch to obtain a printout of all currently set cycles and cycle values (when unit is not in cycle).

2.2 Operating End Control Panel (See Figure 2-2)

The operating end control panel is used to start cycles, set cycles and cycle values, and obtain status printouts.

- Cycles and cycle values can be **set** using the cursor control touch pads accessible when sliding door is in **raised** position.
- Cycles can be **started or reset** using the numbered touch pads accessible when sliding door is in **lowered** position.
- Cycle status and control messages are shown on a 2 line x 20 character display.

When **not** in cycle and sterilizer **not** in the READY mode, the display shows a brief status of the sterilizer:

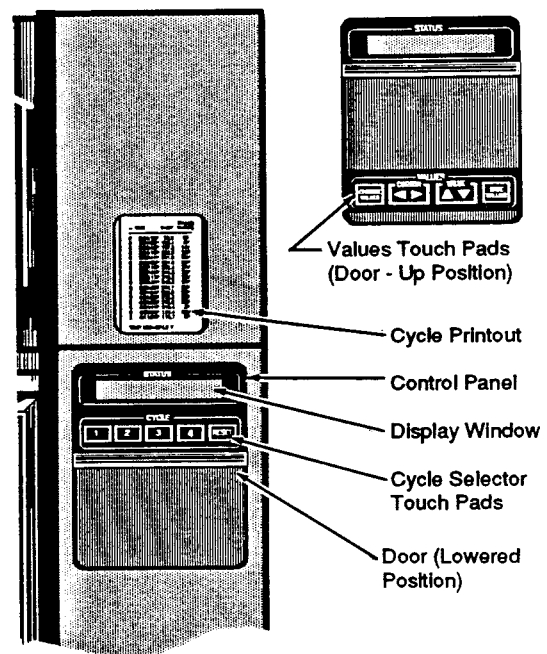
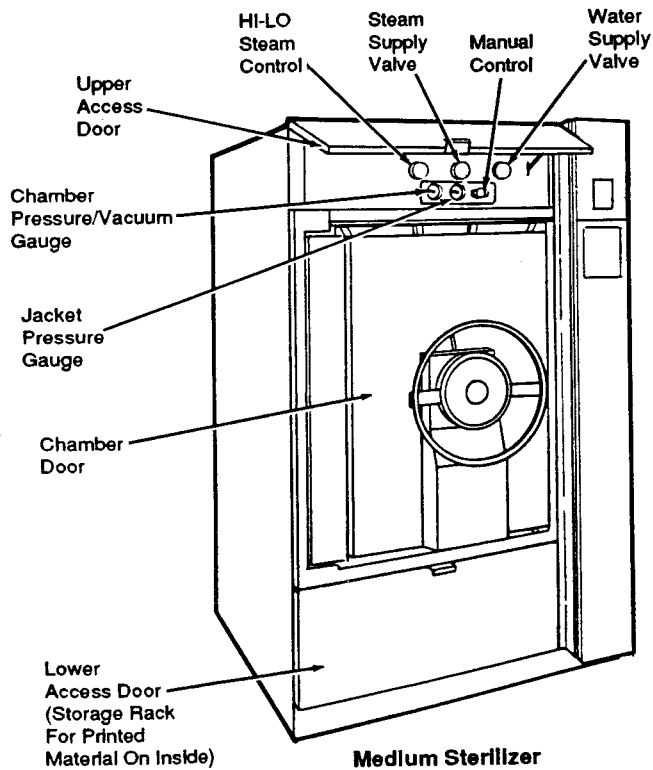
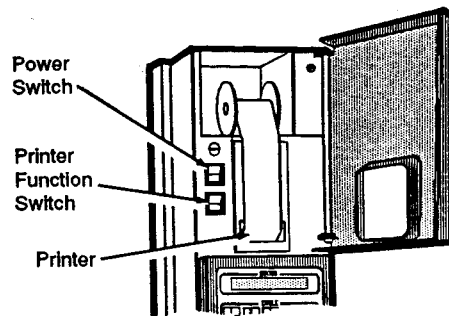
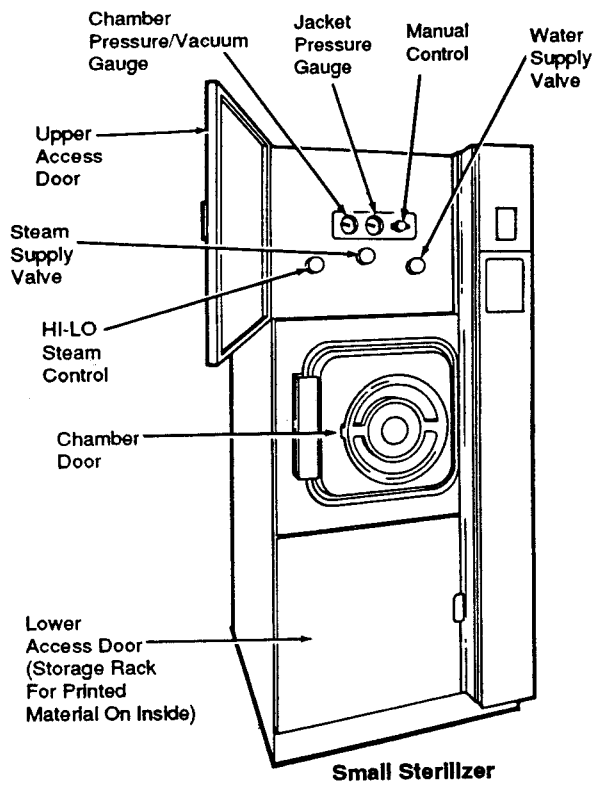


Figure 2-1. Sterilizer Controls

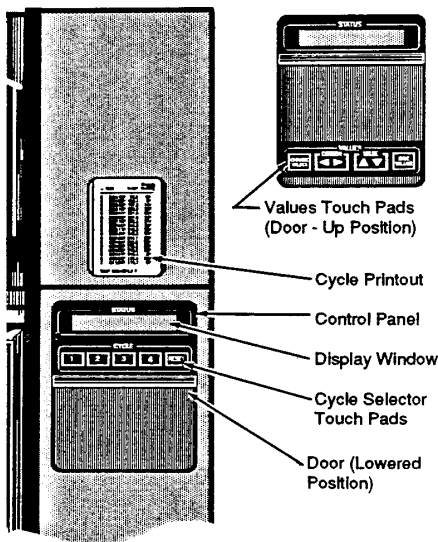


Figure 2-2. Control Panel

- ... DOOR UNLOCKED **or**
- ... NOE DOOR UNLOCKED, **or**
- ... BOTH DOORS UNLOCKED, **or**

Shows the door(s) is locked and some **abnormal out-of-cycle condition** exists such as:

- ... PRESSURE IN CHAMBER
- ... WARNING: HOT LIQUIDS

When **not** in cycle and sterilizer **in** the READY mode, the display alternately shows available cycle selections ... (example)

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

and ... READY ... time of day.

NOTE: To view cycle values, press and hold the corresponding cycle selector touch pad.

When cycle is in progress, display shows cycle status and information. It will also show abnormal conditions such as:

- ... OVERTEMP
- ... UNDERTEMP

Printer will record above messages and also additional abnormal conditions such as:

- ... ALARM: TOO LONG IN FAST EXHAUST
- ... ALARM: TOO LONG IN VENT
- ... ALARM: TOO LONG IN SLOW EXHAUST
- ... ALARM: TOO LONG IN CHARGE

NOTE: See Paragraph 4.9 for recommended operator actions if abnormal conditions occur.

2.3 Non-Operating End Control Panel (Double-Door Sterilizers) (See Figure 2-2)

The non-operating end control panel features four cycle selector touch pads and RESET touch pad. Display window concurrently shows the same message as shown in display window on the operating end of the sterilizer. Cycle values **cannot** be changed from the non-operating end.

- Cycles can be **started or reset** using the four cycle selector and RESET touch pads.
- Cycle status and control messages are concurrently shown on a 2 line x 20 character display.

2.4 Reset Function (See Figure 2-2)

The RESET touch pad is used to abort a cycle and put the control into a known condition.

NOTE: *If you push the wrong cycle selector touch pad when starting a cycle, proceed as follows:*

1. Press RESET touch pad to abort cycle. Display will show. . . ABORT. . . and the printer will record time RESET was pressed and will print ABORT....(time of day).
2. Wait until display shows ...READY.
3. Press touch pad for correct cycle and printer will record cycle selected and proceed through correct cycle.

2.5 Manual Door Operation (See Figure 2-3)

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

A handwheel operates the manual door for locking or unlocking. Door can be swung open or closed from the unlocked position.

- **To open door from locked position** – rotate handwheel counterclockwise as far as it will go using normal hand pressure and swing door open by hand.
- **To close and lock door from open position** – swing door closed by hand and rotate handwheel clockwise as far as it will go using normal hand pressure.

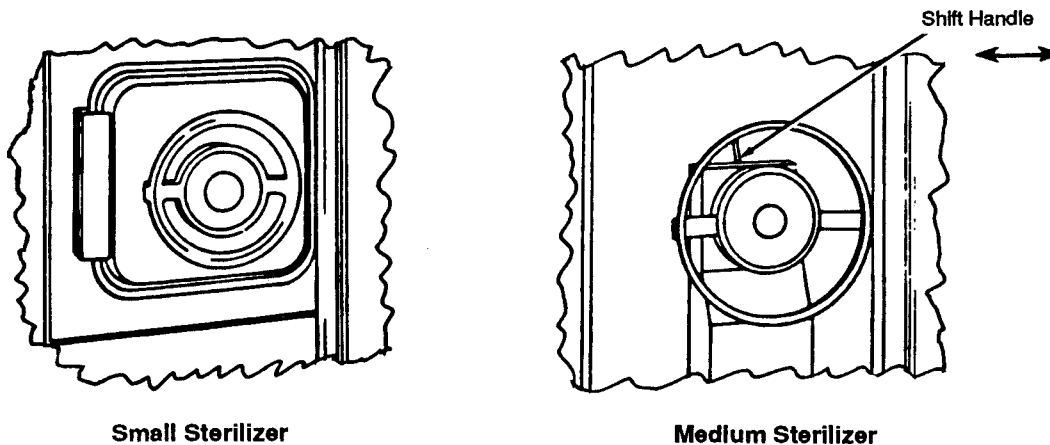


Figure 2-3. Door Handwheel



CAUTION: On sterilizers equipped with power door option, be sure shift handle is in either the extreme right (POWER) or left (MANUAL) position at all times. Placing handle in an intermediate position could damage drive system of door.

2.6 Power Door Operation (See Figure 2-3)

Door movement on sterilizers equipped with power door(s) is controlled by four touch pads located on the control panel (four touch pads are also located on the non-operating end control panel of double door units). Touch pads are labeled CLOSE, LOCK, UNLOCK/OPEN and STOP and perform the following:

- **CLOSE** - Press to swing the door closed.
- **LOCK** - Press to lock door (from closed position) or to close and lock door (from open position).
- **UNLOCK/OPEN** - To open door from the locked position, press once to unlock the door and press again to open the door.
- **STOP** - Press to stop movement of door at any time. Press the desired movement control to resume operation of the door.

NOTE: *Door motion stops whenever a resistance is encountered and motion resumes when resistance is removed.*

Manual Operation Of Power Door

Power doors may be manually operated as follows:

1. Pull shift handle to left to engage handwheel. (If handwheel does not engage, turn it slowly while maintaining a slight pressure to the left on the shift handle).
2. Operate door as described in Paragraph 2.5.

NOTE: *To return to power operation, push shift handle back to the right while pressing the LOCK or UNLOCK/OPEN touch pad to ease engagement of gears.*

⚠ WARNING – SLIPPING HAZARD: To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

Series 3000 Sterilizers have factory set cycles, cycle values and control values programmed into the control (see Paragraph 3.2 and 3.4). These are the cycles and values that the control will default to should a battery or battery powered memory failure ever occur. These preset values can be changed to tailor the sterilizer to the operating environment in which it has been placed (see Paragraph 3.3 or 3.5).

NOTE: If a battery or memory failure should occur, operator set cycles and values would be lost. The factory set cycles, cycle values and control values would then appear on the display when the sterilizer power is switched ON (see Paragraph 3.2 and 3.4). Cycles and values may be changed (see Paragraph 3.3 or 3.5) so that desired cycles can be run until battery or memory failure is corrected. Access Code (If activated) will be set back to zero. **Time of Day** should be reset. (Any cycle or value changes made during this time will only be retained as long as the sterilizer power remains ON.)

NOTE: If access code option has been set to ON, a four digit access code must be correctly entered before cycles or values can be changed. See VOLUME I, SERVICE AND MAINTENANCE PROCEDURES.

3.1 Permanent Default Cycles and Cycle Values

Series 3000 sterilizers also have permanent default cycles and cycle values programmed into the control. These default values will appear on display when changing cycles (see Paragraph 3.3 and 3.5).

PROGRAMMED PERMANENT DEFAULT VALUES

Cycle	Sterilize Temp.	Sterilize Time	Dry Time
(1)PREVACUUM	270 F	4 min.	5 min.
GRAVITY	270 F	15 min.	30 min.
LIQUID	250 F	45 min.	0 min.
FLASH	270 F	10 min.	1 min.
(1)EXPRESS*	270 F	4 min.	3 min.

(1) *PREVACUUM* and *EXPRESS* cycles are available only on Vacamatic Sterilizers (Series 3013, 3023, 3033, 3043 and 3053).

* The *EXPRESS* Cycle has been designed primarily for use in small operating room type (16x16x26" and 20x20x38" chamber sizes) prevacuum sterilizers only. It is an abbreviated cycle that has only two pressure pulses at the beginning of the cycle and is designed for sterilizing instrument trays with a single wrapper. It is useful in providing quick turnaround of instruments using the wrapped technique for transport from the sterilizer to the point of use. Up to three trays in the above sized units in single wrappers may be processed at one time. At the immediate conclusion of cycle, the wrapper will be dry. The instruments will be hot and, therefore, caution is advised in handling to avoid injury, or contamination of the set contents because of condensation striking through the wrapper. Instrument trays processed using the *EXPRESS* Cycle are intended for immediate use. **NOTE:** While medium sized sterilizers have the express option in the cycle menu, the cycle is not ordinarily used with 24x36" sized sterilizers because they are more appropriately used for volume production of sterile goods in the Central Supply and are double wrapped for longer storage.

3.2 Gravity Sterilizer Factory Settings (Series 3011, 3021, 3031, 3041 and 3051)

Series 3011 and 3021 Sterilizers are shipped with the following cycles and cycle values:

Cycle	Sterilize Temp.	Sterilize Time	Dry Time
1. FLASH	270 F	3 min.	1 min.
2. FLASH	270 F	10 min.	1 min.
3. GRAVITY	270 F	15 min.	30 min.
4. GRAVITY	250 F	30 min.	15 min.

Series 3031, 3041 and 3051 Sterilizers are shipped with the following cycles and cycle values:

Cycle	Sterilize Temp.	Sterilize Time	Dry Time
1. GRAVITY	270 F	15 min.	30 min.
2. GRAVITY	250 F	30 min.	15 min.
3. GRAVITY	250 F	30 min.	30 min.
4. LIQUIDS	250 F	45 min.	0 min.

Any combination of up to four FLASH, GRAVITY, or LIQUIDS cycles can be set for the cycle selector touch pads (numbered 1, 2, 3 and 4). For example:

- One FLASH, One GRAVITY, and Two LIQUIDS Cycles **or**
- Two GRAVITY and Two LIQUIDS Cycles **or**
- Four GRAVITY Cycles **or**
- Three GRAVITY and One FLASH Cycle, **etc.**

Cycle values can be changed within the following parameters:

- **Maximum Sterilize Temperature** setting is 285 F for all cycles with a **minimum** setting of 270 F for FLASH cycles and a **maximum** setting of 250 F for LIQUIDS cycles. Cycles outside of these temperature ranges cannot be programmed.
- **Sterilize Temperature** can be set to the nearest degree; however, control and printout is to the nearest 1/10 degree.
- **Sterilize Time** and **Dry Time** can be set in one minute increments.

3.3 Change Gravity Sterilizer Cycles, Cycle Values And Control Values (See Figure 3-1)

1. Open the printer door and position the power switch to ON.
 - Display panel lights up.
 - The printer records the time and date that the power is turned ON.
2. Close the printer door and raise the sliding door over the touch pad panel to access the VALUES touch pads. Pressing the CHANGE VALUES touch pad will access the following sequence of display window messages where values can be changed:
 - **First*** - Cycle 1 and its sterilize temperature and sterilize and dry times.
 - **Second*** - Cycle 2 and its sterilize temperature and sterilize and dry times.
 - **Third*** - Cycle 3 and its sterilize temperature and sterilize and dry times.

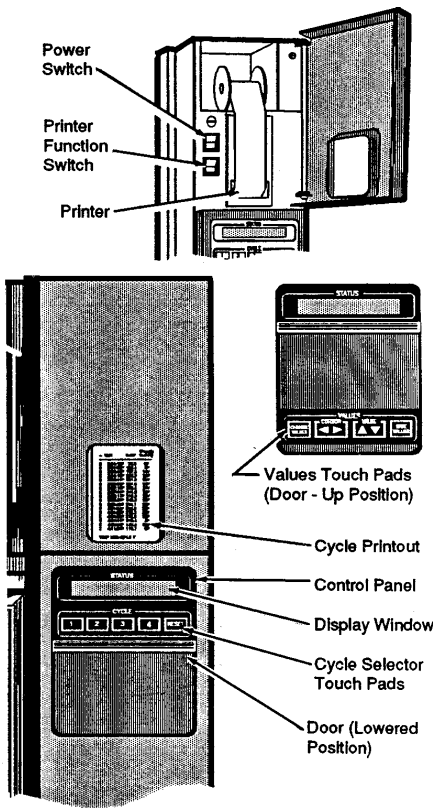


Figure 3-1. Turn Power On

- **Fourth*** - Cycle 4 and its sterilize temperature and sterilize and dry times.
- **Fifth** - Clock/calender time and date.

NOTE: The following two displays will appear only if the Automatic Utilities Control Feature is set to ON (see VOLUME I, SERVICE AND MAINTENANCE PROCEDURES).

- **Sixth** - Automatic Utilities Control, day **of** week and days **in** week.
- **Seventh** - Automatic Utilities Control, shutdown and restart hours/minutes.

3. Change cycles or cycle values as follows:

- Press and release the CHANGE VALUES touch pad the same number of times as the cycle number to be changed (i.e. press and release once to change cycle 1, twice to change cycle 2, etc.*). Cycle name will blink.
- Press the VALUE touch pad up or down to view the available cycles (FLASH, GRAVITY or LIQUIDS) and release VALUE touch pad when cycle desired is displayed. Cycle displayed (and the default values for that type cycle) are now set for that cycle number.
- Move cursor (the blinking display position) to the digit (sterilize temperature, sterilize time or dry time) you wish to change by pressing CURSOR direction pad (left or right).
- Increase or decrease the value (of blinking digit) by pressing the VALUE direction pad (up or down). See TABLE 3-1, TABLE 3-2 or TABLE 3-3 for recommended sterilize temperature, sterilize time and dry time settings.
- Repeat steps a, b, c and d until all desired cycle, sterilize temperature, sterilize time and dry time changes have been made.
- Press and release the CHANGE VALUES touch pad to continue sequence of displays to change any of the control values.
- Move cursor (the blinking display position) to the digit (of control value) you wish to change by pressing CURSOR direction pad (left or right).
- Increase or decrease the value (of blinking digit) by pressing the VALUE direction pad (up or down).
- Repeat steps f, g and h until all desired control value changes have been made.
- Press SAVE VALUES touch pad to record the new values and to advance control to the ready mode. Printout of **all** new values will also be furnished.

4. Proceed to the appropriate paragraph of Section 4 for running of cycles now set.

* *These message displays will not appear if cycle is locked out by access code feature. Press CHANGE VALUES touch pad when NO is blinking to advance to first cycle that is **not** locked out.*

TABLE 3-1. MINIMUM STERILIZATION EXPOSURE PERIOD — WRAPPED AND UNWRAPPED GOODS: GRAVITY CYCLE ONLY

Items	Sterilize Time 250 F (121 C)	Sterilize Time 270 F (132 C)	Dry Time Minutes
Dressings, wrapped in muslin or equivalent	30	15	30*
Glassware, empty, inverted	15	3	0**
Instruments, metal combined with suture, tubing or other porous materials (unwrapped)	20	10	0**
Instruments, wrapped in double thickness muslin or equivalent	30	15	30*
Linen packs (maximal size: 12x12x20", maximum weight 12 pounds)	30	—	30*
Treatment trays wrapped in muslin or equivalent	30	15	30*
Utensils, unwrapped	15	3	0**
Utensils, wrapped in muslin or equivalent	30	15	30*

* Dry time can vary for wrapped goods depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures (refer to Section 5).

** Dry time is not required for unwrapped goods, however, a dry time of one or two minutes will help reduce excess steam vapor when opening chamber door at end of cycle.

TABLE 3-2. MINIMUM STERILIZATION EXPOSURE PERIOD — UNWRAPPED GOODS: FLASH CYCLE ONLY

Items	Sterilize Time 270 F (132 C)	Dry Time Minutes
Instruments, metal, combined with suture, tubing or other porous materials (unwrapped)	10	0*
Utensils, (unwrapped)	3	0*

* Dry time is not required for unwrapped goods, however, a dry time of one or two minutes will help reduce excess steam vapor when opening chamber door at end of cycle.

TABLE 3-3. MINIMUM RECOMMENDED EXPOSURE TIMES FOR FULL LOAD OF SQUARE-PAK FLASKED SOLUTIONS

ASPF Size	Time (Minutes)	Temperature
75 ML	25	250 F (121 C)
250 ML	30	250 F (121 C)
500 ML	40	250 F (121 C)
1000 ML	45	250 F (121 C)
1500 ML	50	250 F (121 C)
2000 ML	55	250 F (121 C)

3.4 Prevacuum Sterilizer Factory Settings (Series 3013, 3023, 3033, 3043 and 3053)

Series 3013 and 3023 Sterilizers are shipped with the following cycles and cycle values:

Cycle	Sterilize Temp.	Sterilize Time	Dry Time
1. EXPRESS*	270 F	4 min.	3 min.
2. PREVAC	270 F	4 min.	20 min.
3. FLASH	270 F	3 min.	1 min.
4. FLASH	270 F	10 min.	1 min.

Series 3033, 3043 and 3053 Sterilizers are shipped with the following cycles and cycle values:

Cycle	Sterilize Temp.	Sterilize Time	Dry Time
1. PREVAC	270 F	4 min.	5 min.
2. PREVAC	270 F	4 min.	20 min.
3. GRAVITY	250 F	30 min.	15 min.
4. LIQUIDS	250 F	45 min.	0 min.

* *The EXPRESS Cycle has been designed primarily for use in small operating room type (16x16x26" and 20x20x38" chamber sizes) prevacuum sterilizers only. It is an abbreviated cycle that has only two pressure pulses at the beginning of the cycle and is designed for sterilizing instrument trays with a single wrapper. It is useful in providing quick turnaround of instruments using the wrapped technique for transport from the sterilizer to the point of use. Up to three trays in the above sized units in single wrappers may be processed at one time. At the immediate conclusion of cycle, the wrapper will be dry. The instruments will be hot and, therefore, caution is advised in handling to avoid injury, or contamination of the set contents because of condensation striking through the wrapper. Instrument trays processed using the EXPRESS Cycle are intended for immediate use. NOTE: While medium sized sterilizers have the express option in the cycle menu, the cycle is not ordinarily used with 24x36" sized sterilizers because they are more appropriately used for volume production of sterile goods in the Central Supply and are double wrapped for longer storage.*

Any combination of up to four EXPRESS*, PREVAC, FLASH, GRAVITY or LIQUIDS cycles can be set for the cycle selector touch pads (numbered 1, 2, 3 and 4). For example:

One FLASH, One GRAVITY, and Two PREVAC Cycles **or**

Two GRAVITY and Two EXPRESS Cycles **or**

Four GRAVITY Cycles **or**

Three PREVAC and One FLASH Cycle **or**

One EXPRESS, One PREVAC, One FLASH and One GRAVITY Cycle, **etc.**

Cycle values can be changed within the following parameters:

- **Maximum Sterilize Temperature** setting is 285 F for all cycles with a **minimum** setting of 270 F for FLASH, EXPRESS and PREVAC cycles and a **maximum** setting of 250 F for LIQUIDS cycles. Cycles outside of these temperature ranges cannot be programmed.
- **Sterilize Temperature** can be set to the nearest degree; however, control and printout is to the nearest 1/10 degree.
- **Sterilize Time** and **Dry Time** can be set in one minute increments.

* *The EXPRESS Cycle has been designed primarily for use in small operating room type (16x16x26" and 20x20x38" chamber sizes) prevacuum sterilizers only. It is an abbreviated cycle that has only two pressure pulses at the beginning of the cycle and is designed for sterilizing instrument trays with a single wrapper. It is useful in providing quick turnaround of instruments using the wrapped technique for transport from the sterilizer to the point of use. Up to three trays in the above sized units in single wrappers may be processed at one time. At the immediate conclusion of cycle, the wrapper will be dry. The instruments will be hot and, therefore, caution is advised in handling to avoid injury, or contamination of the set contents because of condensation striking through the wrapper. Instrument trays processed using the EXPRESS Cycle are intended for immediate use. NOTE: While medium sized sterilizers have the express option in the cycle menu, the cycle is not ordinarily used with 24x36" sized sterilizers because they are more appropriately used for volume production of sterile goods in the Central Supply and are double wrapped for longer storage.*

3.5 Change Prevacuum Sterilizer Cycles, Cycle Values And Control Values (See Figure 3-2)

1. Open the printer door and position the power switch to ON.

- Display panel lights up.
- The printer records the time and date that the power is turned ON.

NOTE: When power to sterilizer is switched ON, display will show the following series of messages:

- **First Message:** PERFORM LEAK TEST? Press cycle selector touch pad 2 for NO.
- **Second Message:** PERFORM DART TEST? (BOWIE-DICK) Press cycle selector touch pad 2 for NO.

2. Close the printer door and raise the sliding door over the touch pad panel to access the VALUES touch pads. Pressing the CHANGE VALUES touch pad will access the following sequence of display window messages where values can be changed**:

- **First*** - Cycle 1 and its sterilize temperature and sterilize and dry times.
- **Second*** - Cycle 2 and its sterilize temperature and sterilize and dry times.
- **Third* Time** - Cycle 3 and its sterilize temperature and sterilize and dry times.
- **Fourth* Time** - Cycle 4 and its sterilize temperature and sterilize and dry times.
- **Fifth Time** - Clock/calender time and date

NOTE: The following two displays will appear only if the Automatic Utilities Control Feature is set to ON (see VOLUME I, SERVICE AND MAINTENANCE PROCEDURES).

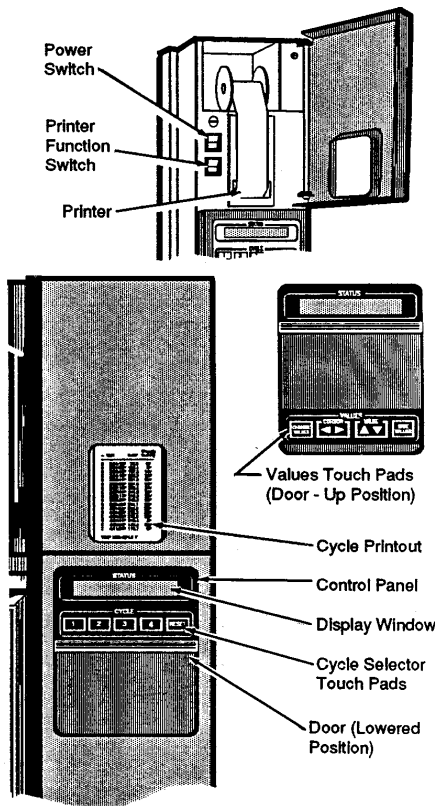


Figure 3-2. Turn Power On

- **Sixth Time** - Automatic Utilities Control, day **of** week and days **in** week.
 - **Seventh Time** - Automatic Utilities Control, shutdown and restart hours/minutes.
3. Change cycles and cycle values as follows:
 - a. Press and release the CHANGE VALUES touch pad the same number of times as the cycle number to be changed (i.e. press and release once to change cycle 1, twice to change cycle 2, etc.*). Cycle name will blink.
 - b. Press the VALUE touch pad up or down to view the available cycles (PREVAC**, EXPRESS***, FLASH, GRAVITY or LIQUIDS) and release VALUE touch pad when cycle desired is displayed. Cycle displayed (and the default values for that type cycle) are now set for that cycle number.
 - c. Move cursor (the blinking display position) to the digit (sterilize temperature, sterilize time or dry time) you wish to change by pressing CURSOR direction pad (left or right).
 - d. Increase or decrease the value (of blinking digit) by pressing the VALUE direction pad (up or down). See TABLE 3-1, TABLE 3-2 or TABLE 3-3 for recommended sterilize temperature, sterilize time and dry time settings.
 - e. Repeat steps a, b, c and d until all desired cycle, sterilize temperature, sterilize time and dry time changes have been made.
 - f. Press the CHANGE VALUES touch pad to continue sequence of displays to change any of the control values.
 - g. Move cursor (the blinking display position) to the digit (of control value) you wish to change by pressing CURSOR direction pad (left or right).
 - h. Increase or decrease the value (of blinking digit) by pressing the VALUE direction pad (up or down).
 - i. Repeat steps f, g and h until all desired control value changes have been made.
 - j. Press SAVE VALUES touch pad to record the new values and to advance control to the ready mode. Printout of **all** new values will also be furnished.
 4. Proceed to the appropriate paragraph of Section 4 for running of cycles now set.

* *These message displays will not appear if cycle is locked out by access code feature. Press CHANGE VALUES touch pad when NO is blinking to advance to first cycle that is **not** locked out.*

** *For routine loads, set sterilize time for four minutes. For wrapped goods dry time can vary (usually between five and twenty minutes) depending on pack density, instrument tray weight, pack preparation technique including type of wrapping material used, and sterilizer loading procedures (refer to Section 5).*

*** *The EXPRESS Cycle has been designed primarily for use in small operating room type (16x16x26" and 20x20x38" chamber sizes) prevacuum sterilizers only. It is an abbreviated cycle that has only two pressure pulses at the beginning of the cycle and is designed for sterilizing instrument trays with a single wrapper. It is useful in providing quick turnaround of instruments using the wrapped technique for transport from the sterilizer to the point of use. Up to three trays in the above sized units in single wrappers may be processed at one time. At the immediate conclusion of cycle, the wrapper will be dry. The instruments will be hot and, therefore, caution is advised in handling to avoid injury, or contamination of the set contents because of condensation striking through the wrapper. Instrument trays processed using the EXPRESS Cycle are intended for immediate use. NOTE: While medium sized sterilizers have the express option in the cycle menu, the cycle is not ordinarily used with 24x36" sized sterilizers because they are more appropriately used for volume production of sterile goods in the Central Supply and are double wrapped for longer storage.*

WARNING – BURN HAZARD: Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

WARNING – SLIPPING HAZARD: To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

Operate sterilizer by referring to the appropriate paragraph in this section for the cycle to be run. Refer to Section 3 if it is necessary to change cycles, cycle values or control values.

4.1 Automatic Operation: Flash Cycle (See Figure 4-1)

NOTE: To view current cycle values, press and hold the corresponding number touch pad (1, 2, 3 or 4) for the cycle (sterilizer power must be ON).

NOTE: Review Paragraph 4.9, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle or if unit fails to complete a cycle.

1. Check that chamber drain strainer is clean and in place and that chamber interior is clean (See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if cleaning is necessary).
2. Open the upper access door.
 - a. Check that manual control is turned to OFF.
 - b. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
 - c. Set Hi-Lo valve to Hi for 270 F (132 C) cycle.
3. Open the printer door and position the POWER switch to ON.
 - Display panel lights up and alternately displays current cycles and status of the sterilizer.
 - The printer records the time and date that the power is turned ON.

NOTE: When power to **Vacumatic** sterilizer is switched ON, display will show the following series of messages:

First Message: PERFORM LEAK TEST? Press cycle selector **touch pad 2 for NO**, or if a vacuum leak test is desired, refer to Paragraph 4.6.

Second Message: PERFORM DART TEST? (BOWIE-DICK) Press cycle selector **touch pad 2 for NO**, or if a DART (Bowie-Dick) test is desired, refer to Paragraph 4.7.

4. Close the printer door and check display for correct time and date.
5. Check paper roll.
 - A colored warning stripe is visible when roll is near its end.
 - See VOLUME 1 of this manual if replacement is necessary.

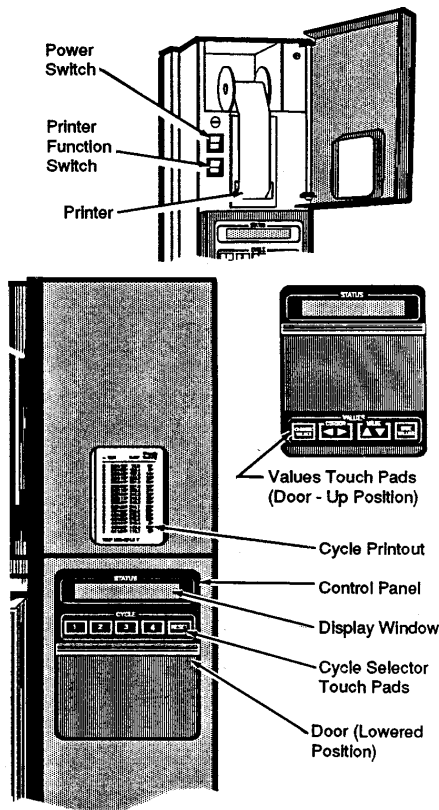


Figure 4-1. Turn Power On

6. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)

- Display alternately shows . . . (example)

DOOR UNLOCKED	T = (TEMP.) P = 0 PSIG
--------------------------	-----------------------------------

and

1. EXPRESS 2. PREVAC	3. FLASH 4. GRAVITY
---------------------------------	--------------------------------

- Printer records . . .

NOT READY (time of day)
DOOR UNLOCKED

7. Load the chamber.

8. Close and lock chamber door. (See Paragraph 2.5 or 2.6)

- Display shows current cycles for five seconds and then alternately shows . . . (example)

READY (TIME OF DAY)	T = (TEMP.) P = (PRESS.)
--------------------------------	-------------------------------------

and

1. EXPRESS 2. PREVAC	3. FLASH 4. GRAVITY
---------------------------------	--------------------------------

NOTE: Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

9. Check that jacket pressure has stabilized at 30-32 psig before starting cycle.

10. Press corresponding number touch pad (1, 2, 3 or 4) for FLASH cycle and release, then press and release touch pad a second time **within five seconds** to begin cycle. Sterilizer will automatically progress through cycle as follows: (See Message Sequence Chart 4-1)

- FLASH . . . and start of cycle message and cycle parameters are printed.
- Chamber is purged with steam. Start of condition is printed.
- Chamber is charged with steam. Start of steam charge is printed.
- Start of sterilize phase is printed when the chamber reaches set temperature.
- Chamber temperature is printed every minute (or selected print interval control value). Chamber is controlled at set point plus overdrive.

DISPLAY WINDOW MESSAGE SEQUENCE FOR GRAVITY OR FLASH CYCLES

PURGE T = (temp.)
(time rem.) P = (press.)

First Message of cycle when cycle starts.

CHARGE T = (temp.)
 P = (press.)

Second Message -- after PURGE completed.

STERILIZE T = (temp.)
(time rem.) P = (press.)

Third Message — after CHARGE completed.

**FAST
EXHAUST** T = (temp.)
 P = (press.)

Fourth Message — after STERILIZE time completed.

DRYING T = (temp.)
(time rem.) P = (press.)

Fifth Message -- only if DRY time selected.

VENT T = (temp.)
 P = (press.)

Sixth Message — after EXHAUST or DRY completed (GRAVITY UNITS).

AIR BREAK T = (temp.)
 P = (press.)

Sixth Message — after EXHAUST or DRY completed (VACAMATIC UNITS).

COMPLETE T = (temp.)
(time of day) P = (press.)

Last Message — after VENT or AIR BREAK completed.

```

=====
==== GRAVITY ====
=====
CYCLE START AT 9:39:47A
                ON 12/14/88

CYCLE COUNT   00001
OPERATOR -----
STERILIZER -----

    STER TEMP = 270.0°F
    CONTROL TEMP = 273.0°F
    STER TIME = 15 MIN
    DRY TIME = 5 MIN

- TIME        T=°F   P=psig
C 9:39:47A    189.1   0
C 9:40:47A    268.9   24
S 9:40:53A    270.1   27
S 9:45:53A    272.7   29
S 9:50:53A    272.9   29
S 9:55:53A    272.8   29
E 9:55:53A    271.5   25
E 9:56:36A    229.2   3
E 10:01:36A   225.8   0
Z 10:01:47A   224.0   0

LOAD                    121402

TEMP MAX=273.2°F
TEMP MIN=270.1°F

CONDITION    = 1:06
STERILIZE    = 15:01
EXHAUST      = 5:54
TOTAL CYCLE = 22:01

=====
=  READY TO UNLOAD  =
=====

* NOT READY    10:02:05A
DOOR UNLOCKED
    
```

```

=====
==== FLASH ====
=====
CYCLE START AT 9:31:24A
                ON 12/14/88

CYCLE COUNT   00002
OPERATOR -----
STERILIZER -----

    STER TEMP = 270.0°F
    CONTROL TEMP = 273.0°F
    STER TIME = 3 MIN
    DRY TIME = 1 MIN

- TIME        T=°F   P=psig
C 9:31:24A    218.4   0
C 9:32:25A    260.8   20
S 9:32:40A    270.1   26
S 9:33:41A    272.3   28
S 9:34:41A    272.8   28
S 9:35:41A    272.7   28
E 9:35:41A    272.2   27
E 9:36:20A    229.5   3
E 9:37:20A    221.0   0
Z 9:37:31A    218.5   0

LOAD                    121401

TEMP MAX=272.8°F
TEMP MIN=270.1°F

CONDITION    = 1:16
STERILIZE    = 3:01
EXHAUST      = 1:50
TOTAL CYCLE = 6:07

=====
=  READY TO UNLOAD  =
=====
    
```

Chart 4-1. Message Sequences

- Start of exhaust is printed and chamber is exhausted to three psig (or selected P3 control value).
- **If Selected** - Start of dry is printed and display counts down dry time remaining.
- Chamber is vented to atmospheric pressure.
- Complete buzzer* sounds.
- Cycle summary and end of cycle messages are printed.

11. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)

- Control automatically resets to current cycle values.
- Display shows . . . DOOR UNLOCKED . . .
- Printer records time door is unlocked and prints DOOR UNLOCKED.

NOTE: Printer will automatically reprint complete cycle data now if set for duplicate print (service adjustment). If not set for duplicate print and one is desired, press top of printer switch for Print to obtain one. First line of duplicate printout always reads DUPLICATE PRINT.

12. Remove load from chamber and if duplicate print obtained, place with completed load.

*Service adjustable to silence complete buzzer.


4.2 Automatic Operation: Gravity Cycle (Wrapped and Unwrapped Goods) (See Figure 4-2)


NOTE: For sterilize temperatures **below 250 F (121 C)** refer to VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES.

NOTE: Review Paragraph 4.9, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle or if unit fails to complete a cycle.

NOTE: To view current cycle values, press and hold the corresponding number touch pad (1, 2, 3 or 4) for the cycle (sterilizer power must be ON).

1. Check that chamber drain strainer is clean and in place and that chamber interior is clean. (See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if cleaning is necessary).
2. Open the upper access door.
 - a. Check that manual control is turned to OFF.
 - b. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
 - c. Set Hi-Lo valve to Hi for 270 F (132 C) cycle or to LO for 250 F (121 C) cycle.
3. Open the printer door and position the POWER switch to ON.
 - Display panel lights up and alternately displays current cycles and status of the sterilizer.
 - The printer records the time and date that the power is turned ON.

 **WARNING – BURN HAZARD:** Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

 **WARNING – SLIPPING HAZARD:** To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

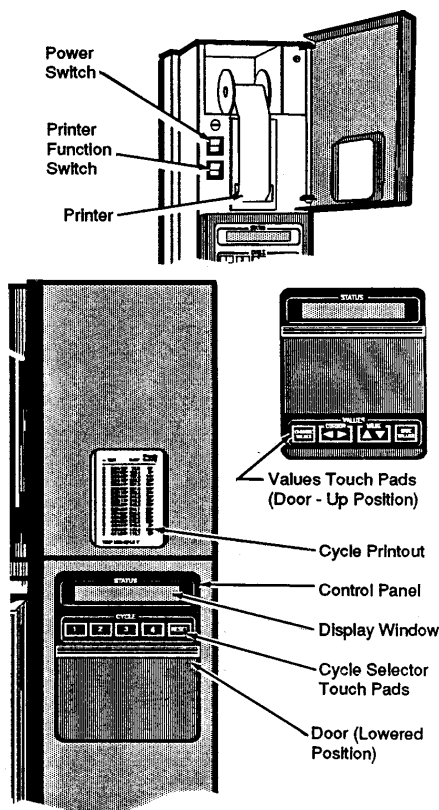


Figure 4-2. Turn Power On

NOTE: When power to **Vacumatic** sterilizer is switched **ON**, display will show the following series of messages:

First Message: PERFORM LEAK TEST? Press cycle selector **touch pad 2 for NO**, or if a vacuum leak test is desired, refer to Paragraph 4.6.

Second Message: PERFORM DART TEST? (BOWIE-DICK) Press cycle selector **touch pad 2 for NO**, or if a DART (Bowie-Dick) test is desired, refer to Paragraph 4.7.

4. Close the printer door and check display for correct time and date.
5. Check paper roll.
 - A colored warning stripe is visible when roll is near its end.
 - See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if replacement is necessary
6. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)
 - Display alternately shows . . . (example)

DOOR	T = (TEMP.)
UNLOCKED	P = 0 PSIG

and

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

- Printer records . . .
- NOT READY (time of day)
DOOR UNLOCKED

7. Load the chamber.
8. Close and lock chamber door. (See Paragraph 2.5 or 2.6)
 - Display shows current cycles for five seconds and then alternately shows . . . (example)

READY	T = (TEMP.)
(TIME OF DAY)	P = (PRESS.)

and

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

NOTE: Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

9. Check that jacket pressure has stabilized at the following pressure before starting cycle:
 - **HI Setting** - 30 to 32 psig for 270 F (132 C) cycles
 - **LO Setting** - 18 to 20 psig for 250 F (121 C) cycles
10. Press corresponding number touch pad (1, 2, 3 or 4) for GRAVITY cycle and release, then press and release touch pad a second time **within five seconds** to begin cycle. Sterilizer will automatically progress through cycle as follows: (See Message Sequence Chart I.)
 - GRAVITY . . . and start of cycle message and cycle parameters are printed.
 - Chamber is purged with steam. Start of condition is printed.
 - Chamber is charged with steam. Start of steam charge is printed.
 - Start of sterilize phase is printed when the chamber reaches set temperature.
 - Chamber temperature is printed every five minutes (or selected print interval control value). Chamber is controlled at set point plus overdrive.
 - Start of exhaust is printed and chamber is exhausted to three psig (or selected P3 control value).
 - **If Selected** - Start of dry is printed and display counts down dry time remaining.
 - Chamber is vented to atmospheric pressure.
 - Complete buzzer* sounds.
 - Cycle summary and end of cycle messages are printed.

11. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)
 - Control automatically resets to current cycle values.
 - Display shows . . . DOOR UNLOCKED . . .
 - Printer records time door is opened and prints DOOR UNLOCKED.

NOTE: Printer will automatically reprint complete cycle data now if set for duplicate print. If not set for duplicate print and one is desired, press top of printer switch for Print to obtain one. First line of duplicate printout always reads **DUPLICATE PRINT**.

12. Remove load from chamber and if duplicate print obtained, place with completed load.

* Service adjustable to silence complete buzzer.

4.3 Automatic Operation: Liquids Cycle (See Figure 4-3)

NOTE: For sterilize temperatures below 250 F (121 C), refer to **VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES**.

NOTE: Review Paragraph 4.9, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle or if unit fails to complete a cycle.

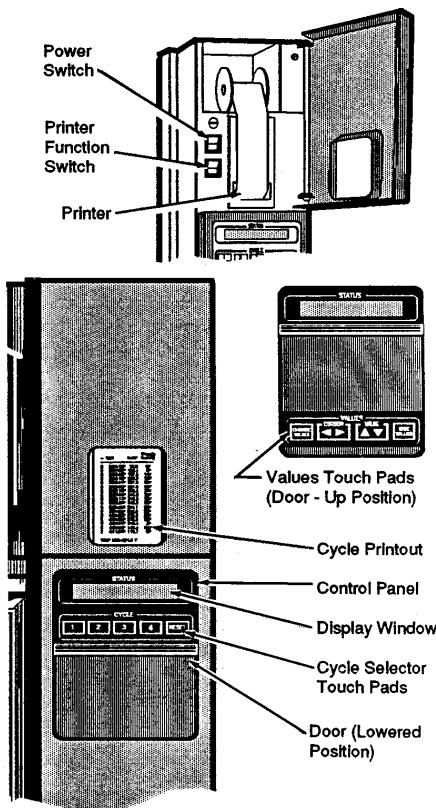


Figure 4-3. Turn Power On



WARNING – BURN HAZARD: Sterilizer and rack/shelves will be **HOT** after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.



WARNING – SLIPPING HAZARD: To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.



WARNING – EXPLOSION HAZARD: This sterilizer is not designed to process flammable liquids.



WARNING – BURN HAZARD: When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedure:

- Use liquids cycle only. No other cycle is safe for processing liquids.
- Use only vented closures — do not use screw caps or rubber stoppers with crimped seal.
- Use only Type I borosilicate glass bottles — do not use ordinary glass bottles or any container not designed for sterilization.
- Avoid sudden full opening of door at end of cycle. Open sterilizer door no more than one inch and wait at least 10 minutes before unloading sterilizer.
- Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.
- Allow bottles to cool to touch before attempting to move them from sterilizer cart to storage area.

NOTE: To view current cycle values, press and hold the corresponding number touch pad (1,2,3 or 4) for the cycle (sterilizer power must be ON).

1. Check that chamber drain strainer is clean and in place and that chamber interior is clean. (See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if cleaning is necessary).
2. Open the upper access door.
 - a. Check that manual control is turned to OFF.
 - b. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
 - c. Set Hi-Lo valve to LO for 250 F (121 C) cycle.
3. Open the printer door and position the POWER switch to ON.
 - Display panel lights up and alternately displays current cycles and status of the sterilizer.
 - The printer records the time and date that the power is turned ON.

NOTE: When power to **Vacumatic** sterilizer is switched ON, display will show the following series of messages:

First Message: PERFORM LEAK TEST? Press cycle selector **touch pad 2 for NO**, or if a vacuum leak test is desired, refer to Paragraph 4.6.

Second Message: PERFORM DART TEST? (BOWIE-DICK) Press cycle selector **touch pad 2 for NO**, or if a DART (Bowie-Dick) test is desired, refer to Paragraph 4.7.

4. Close the printer door and check display for correct time and date.
5. Check paper roll.
 - A colored warning stripe is visible when roll is near its end.
 - See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if replacement is necessary
6. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)
 - Display alternately shows . . . (example)

DOOR	T = (TEMP.)
UNLOCKED	P = 0 PSIG

and

1. EXPRESS	3. LIQUID
2. PREVAC	4. GRAVITY

- Printer records. . .

NOT READY (time of day)
DOOR UNLOCKED

7. Load the chamber.

8. Close and lock chamber door. (See Paragraph 2.5 or 2.6)

- Display shows current cycles for five seconds and then alternately shows . . . (example)

READY (TIME OF DAY)	T = (TEMP.) P = (PRESS.)
--------------------------------------	---

and

1. EXPRESS	3. LIQUID
2. PREVAC	4. GRAVITY

NOTE: Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

9. Check that jacket pressure has stabilized at 18-20 psig for 250 F (121 C) cycles before starting cycle.

10. Press corresponding number touch pad (1, 2, 3 or 4) for LIQUIDS cycle and release, then press and release touch pad a second time **within five seconds** to begin cycle. Sterilizer will automatically progress through cycle as follows: (See Message Sequence Chart 4-2)

- LIQUID . . . and start of cycle message and cycle parameters are printed.
- Chamber is purged with steam. Start of condition is printed.
- Chamber is charged with steam. Start of steam charge is printed.
- Start of sterilize phase is printed when the chamber reaches set temperature.
- Chamber temperature is printed every five minutes (or selected print interval control value). Chamber is controlled at set point plus overdrive.
- Start of exhaust is printed and chamber is slow exhausted to three psig (or selected P3 control value).
- Chamber vents to atmospheric pressure
- Complete buzzer* sounds and cycle summary, end of cycle messages, and WARNING HOT LIQUIDS OPEN DOOR 1 in. (3cm) AND UNLOAD IN 10 MINUTES, are printed.

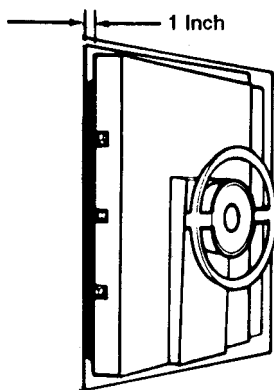


Figure 4-4. Open Door One Inch

11. Unlock and open chamber door **one inch** and wait at least **10 minutes** for all boiling and bubbling of solutions to cease. (See Paragraph 2.5 or 2.6)

- Display shows . . . DOOR UNLOCKED . . .
- Printer records the time the door is unlocked and prints "DOOR UNLOCKED."
- Display begins countdown from 10 minutes and alternately shows . . . UNLOAD IN . . . , (time remaining) and . . . WARNING: HOT LIQUIDS
- Buzzer sounds at end of 10 minutes and display shows . . . READY TO UNLOAD . . .

* Service adjustable to silence complete buzzer.

NOTE: Printer will automatically reprint complete cycle data now if set for duplicate print. If not set for duplicate print and one is desired, press top of printer switch for Print to obtain one. First line of duplicate printout always reads **DUPLICATE PRINT.**

12. Remove load from sterilizer, and if duplicate print is obtained, place with completed load.

**DISPLAY WINDOW MESSAGE
SEQUENCE FOR LIQUIDS CYCLES**

PURGE T = (temp.)
 (time rem.) P = (press.)

First Message of cycle when cycle starts.

CHARGE T = (temp.)
 P = (press.)

Second Message -- after PURGE completed.

STERILIZE T = (temp.)
 (time rem.) P = (press.)

Third Message — after CHARGE completed

**SLOW
EXHAUST** T = (temp.)
 P = (press.)

WARNING T = (temp.)
HOT LIQUIDS P = (press.)

Fourth Messages — after STERILIZE time completed (alternate every four seconds).

VENT T = (temp.)
 P = (press.)

WARNING T = (temp.)
HOT LIQUIDS P = (press.)

Fifth Messages — after SLOW EXHAUST completed (alternate every four seconds).

COMPLETE T = (temp.)
 (time of day) P = (press.)

WARNING T = (temp.)
HOT LIQUIDS P = (press.)

Last Messages — after VENT completed, before door is unlocked (alternate every four seconds).

```

=====
===== L I Q U I D =====
=====
CYCLE START AT 10:28:30A
                ON 12/14/88

CYCLE COUNT    00002
OPERATOR       -----
STERILIZER     -----

          STER TEMP = 250.0°F
          CONTROL TEMP = 253.0°F
          STER TIME = 30 MIN

- TIME        T=°F    P=psig
-----
C 10:28:30A    185.2    0
C 10:29:30A    250.8    18
S 10:29:30A    250.8    18
S 10:34:31A    254.5    16
S 10:39:31A    253.5    15
S 10:44:31A    253.5    15
S 10:49:30A    253.7    15
S 10:54:30A    253.3    15
S 10:59:30A    253.1    15
E 10:59:30A    253.0    15
E 11:03:41A    228.9    3
Z 11:04:03A    222.8    1

LOAD            121405

TEMP MAX=250.8°F
TEMP MIN=250.1°F

CONDITION     = 1:01
STERILIZE     = 30:01
EXHAUST       = 4:33
TOTAL CYCLE   = 35:35

+++++
+        WARNING        +
+        HOT LIQUIDS    +
+    OPEN DOOR 1in.(3cm) +
+    AND UNLOAD IN 10min. +
+++++
+    DOOR OPEN 11:04:26A +
+++++

=====
=    READY TO UNLOAD    =
=====
          
```

Chart 4-2. Message Sequences

! WARNING – BURN HAZARD: Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

! WARNING – SLIPPING HAZARD: To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

4.4 Automatic Operation: Express Cycle (Wrapped Instruments) (See Figure 4-4)

NOTE: To view current cycle values, press and hold the corresponding number touch pad (1, 2, 3 or 4) for the cycle (sterilizer power must be ON).

NOTE: Review Paragraph 4.9, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle or if unit fails to complete a cycle.

1. Check that chamber drain strainer is clean and in place and that chamber interior is clean. (See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if cleaning is necessary).
2. Open the upper access door.
 - a. Check that manual control is turned to OFF.
 - b. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
 - c. Set Hi-Lo valve to Hi for 270 F (132 C) cycle.
3. Open the printer door and position the POWER switch to ON.
 - Display panel lights up and alternately displays current cycles and status of the sterilizer.
 - The printer records the time and date that the power is turned ON.

NOTE: When power to *Vacumatic* sterilizer is switched ON, display will show the following series of messages:

First Message: PERFORM LEAK TEST? Press cycle selector **touch pad 2 for NO**, or if a vacuum leak test is desired, refer to Paragraph 4.6.

Second Message: PERFORM DART TEST? (BOWIE-DICK) Press cycle selector **touch pad 2 for NO**, or if a DART (Bowie-Dick) test is desired, refer to Paragraph 4.7.

4. Close the printer door and check display for correct time and date.
5. Check paper roll.
 - A colored warning stripe is visible when roll is near its end.
 - See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if replacement is necessary.
6. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)
 - Display alternately shows . . . (example)

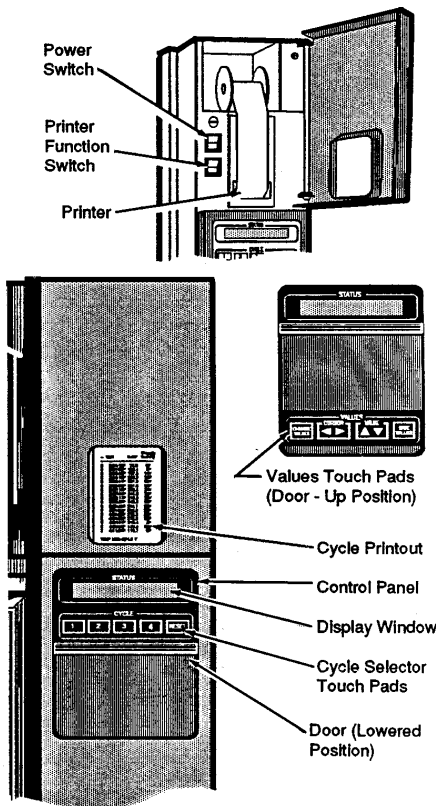


Figure 4-4. Turn Power On

DOOR	T = (TEMP.)
UNLOCKED	P = 0 PSIG

and

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

- Printer records. . .

NOT READY (time of day)
DOOR UNLOCKED

7. Load the chamber.

8. Close and lock chamber door. (See Paragraph 2.5 or 2.6)

Display shows current cycles for five seconds and then alternately shows . . .
(example)

READY	T = (TEMP.)
(TIME OF DAY)	P = (PRESS.)

and

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

NOTE: Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

9. Check that jacket pressure has stabilized at 30-32 psig before starting cycle.

10. Press corresponding number touch pad (1, 2, 3 or 4) for EXPRESS cycle and release, then press and release touch pad a second time **within five seconds** to begin cycle. Sterilizer will automatically progress through cycle as follows: (See Message Sequence Chart 4-3)

- EXPRESS . . . and start of cycle message and cycle parameters are printed.
- Chamber is purged with steam. Start of condition is printed.
- Pressure point is printed and chamber is evacuated.
- Vacuum point is printed and pressure/vacuum pulse is repeated.
- After last vacuum pulse, chamber is charged with steam until set sterilize temperature is reached.
- Start of sterilize phase is printed when the chamber reaches set temperature.
- Chamber temperature is printed every five minutes (or selected print interval control value). Chamber is controlled at set point plus overdrive.
- Start of exhaust is printed and chamber is exhausted to three psig (or selected P3 control value).
- **If Selected** - Start of dry is printed and display counts down dry time remaining.
- Chamber is vented to atmospheric pressure.
- Complete buzzer* sounds.
- Cycle summary and end of cycle messages are printed.

DISPLAY WINDOW MESSAGE SEQUENCE FOR EXPRESS, PREVAC OR DART CYCLES

PURGE T = (temp.)
(time rem.) P = (press.)

First Message of cycle when cycle starts.

PULSE
#1 (then 2, 3, etc.)

Second Message -- after PURGE completed will continue for number of pressure/vacuum pulses set for current cycle.

CHARGE T = (temp.)
P = (press.)

Third Message -- after PULSE sequence completed.

STERILIZE T = (temp.)
(time rem.) P = (press.)

Fourth Message — after CHARGE completed.

FAST EXHAUST T = (temp.)
P = (press.)

Fifth Message — after STERILIZE time completed.

DRYING T = (temp.)
(time rem.) P = (press.)

Sixth Message — only if DRY time selected.

AIR BREAK T = (temp.)
P = (press.)

Seventh Message — after EXHAUST or DRY completed.

COMPLETE T = (temp.)
(time of day) P = (press.)

Last Message — after AIR BREAK complete.

```

=====
===== P R E V A C =====
=====
CYCLE START AT 11:10:06A
ON 11/21/88

CYCLE COUNT      00003
OPERATOR -----
STERILIZER -----

STER TEMP = 270.0°F
CONTROL TEMP = 273.5°F
STER TIME = 4 MIN
DRY TIME = 5 MIN

- TIME          T=°F    P=psia
                U=inHg

C 11:10:06A    188.1    0P
C 11:11:07A    243.6    13P
C 11:12:20A    131.6    26V
C 11:13:07A    273.1    26P
C 11:14:27A    130.3    27V
C 11:15:00A    270.5    26P
C 11:16:27A    131.6    27V
C 11:17:09A    272.0    26P
C 11:18:20A    131.0    27V
C 11:18:20A    129.7    27V
S 11:19:00A    270.1    24P
S 11:21:00A    270.6    28P
S 11:23:00A    271.2    28P
E 11:23:00A    271.1    29P
E 11:23:20A    224.5    3P
E 11:28:21A    96.2     30V
Z 11:29:13A    113.6    2U

LOAD              112101

TEMP MAX=273.9°F
TEMP MIN=270.1°F

CONDITION = 8:54
STERILIZE = 4:01
EXHAUST = 6:13
TOTAL CYCLE =19:08

=====
=  READY TO UNLOAD  =
=====

* NOT READY 11:30:17A
DOOR UNLOCKED
=====

```

```

=====
===== E X P R E S S =====
=====
CYCLE START AT 2:37:23P
ON 12/15/88

CYCLE COUNT      00003
OPERATOR -----
STERILIZER -----

STER TEMP = 270.0°F
CONTROL TEMP = 273.0°F
STER TIME = 4 MIN
DRY TIME = 3 MIN

- TIME          T=°F    P=psia
                U=inHg

C 2:37:23P    144.6    0P
C 2:38:24P    254.7    15P
C 2:39:41P    211.7    11V
C 2:40:17P    266.2    26P
C 2:41:39P    149.9    24V
C 2:41:39P    148.8    21V
S 2:42:32P    270.1    28P
S 2:44:33P    270.0    28P
S 2:46:33P    270.2    28P
E 2:46:33P    270.3    28P
E 2:46:52P    223.9    3P
E 2:49:52P    109.5    30V
Z 2:50:44P    121.0    2U

LOAD              121500

TEMP MAX=272.2°F
TEMP MIN=269.9°F

CONDITION = 5:09
STERILIZE = 4:01
EXHAUST = 4:11
TOTAL CYCLE =13:21

=====
=  READY TO UNLOAD  =
=====

```

Chart 4-3. Message Sequences

11. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)

- Control automatically resets to current cycle values.
- Display shows . . . DOOR UNLOCKED . . .
- Printer records time door is opened and prints "DOOR UNLOCKED".

NOTE: Printer will automatically reprint complete cycle data now if set for duplicate print. If not set for duplicate print and one is desired, press top of printer switch for Print to obtain one. First line of duplicate printout always reads **DUPLICATE PRINT**.

12. Remove load from chamber and if duplicate print obtained, place with completed load.

**Service adjustable to silence complete buzzer.*

4.5 Automatic Operation: Prevacuum Cycle (Wrapped and Unwrapped Goods) (See Figure 4-5)

NOTE: To view current cycle values, press and hold the corresponding number touch pad (1, 2, 3 or 4) for the cycle (sterilizer power must be ON).

NOTE: Review Paragraph 4.9, "Control Monitoring and Communication Systems," in order to identify the cause of any abnormal condition during a sterilization cycle or if unit fails to complete a cycle.


1. Check that chamber drain strainer is clean and in place and that chamber interior is clean. (See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if cleaning is necessary).
2. Open the upper access door.
 - a. Check that manual control is turned to OFF.
 - b. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
 - c. Set Hi-Lo valve to Hi for 270 F (132 C) cycle.
3. Open the printer door and position the POWER switch to ON.
 - Display panel lights up and alternately displays current cycles and status of the sterilizer.
 - The printer records the time and date that the power is turned ON.


NOTE: When power to **Vacumatic** sterilizer is switched ON, display will show the following series of messages:

First Message: PERFORM LEAK TEST? Press cycle selector **touch pad 2 for NO**, or if a vacuum leak test is desired, refer to Paragraph 4.6.

Second Message: PERFORM DART TEST? (BOWIE-DICK) Press cycle selector **touch pad 2 for NO**, or if a DART (Bowie-Dick) test is desired, refer to Paragraph 4.7.

4. Close the printer door and check display for correct time and date.
5. Check paper roll.
 - A colored warning stripe is visible when roll is near its end.

 **WARNING – BURN HAZARD:** Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

 **WARNING – SLIPPING HAZARD:** To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

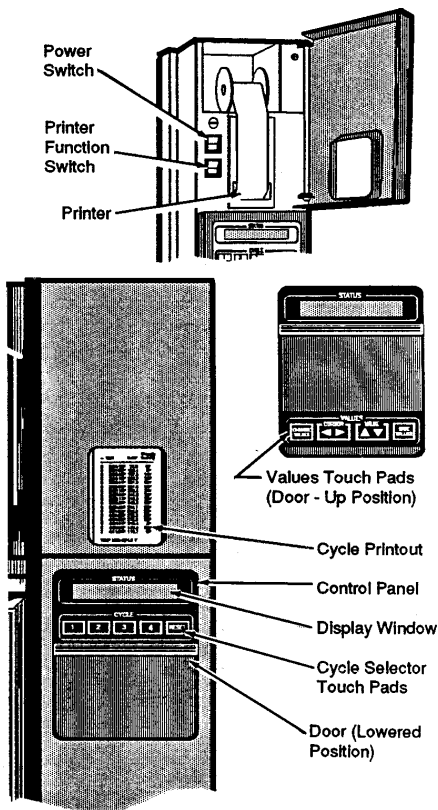


Figure 4-5. Turn Power On

- See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if replacement is necessary.
6. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)
- Display alternately shows . . . (example)

DOOR UNLOCKED	T = (TEMP.) P = 0 PSIG
------------------	---------------------------

and

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

- Printer records. . .

NOT READY (time of day)
DOOR UNLOCKED

7. Load the chamber.
8. Close and lock chamber door. (See Paragraph 2.5 or 2.6)
- Display shows current cycles for five seconds and then alternately shows . . . (example)

READY (TIME OF DAY)	T = (TEMP.) P = (PRESS.)
------------------------	-----------------------------

and

1. EXPRESS	3. FLASH
2. PREVAC	4. GRAVITY

NOTE: Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

9. Check that jacket pressure has stabilized at 30-32 psig before starting cycle.
10. Press corresponding number touch pad (1, 2, 3 or 4) for PREVACUUM cycle and release, then press and release touch pad a second time **within five seconds** to begin cycle. Sterilizer will automatically progress through cycle as follows: (See Message Sequence Chart 4-3)
- PREVACUUM . . . and start of cycle message and cycle parameters are printed.
 - Chamber is purged with steam. Start of condition is printed.
 - Pressure point is printed and chamber is evacuated.
 - Vacuum point is printed and chamber is charged with steam.

- Pressure point is printed and vacuum/pressure pulses are repeated.
- After last vacuum pulse, chamber is charged with steam until set sterilize temperature is reached.
- Start of sterilize phase is printed when the chamber reaches set temperature.
- Chamber temperature is printed every five minutes (or selected print interval control value). Chamber is controlled at set point plus overdrive.
- Start of exhaust is printed and chamber is exhausted to three psig (or selected P3 control value).
- **If Selected** - Start of dry is printed and display counts down dry time remaining.
- Chamber is vented to atmospheric pressure.
- Complete buzzer* sounds.
- Cycle summary and end of cycle messages are printed.

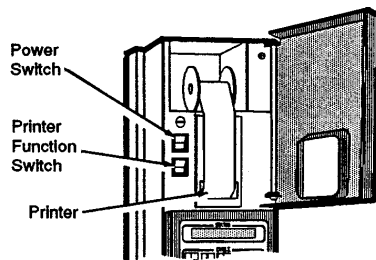
11. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)

- Control automatically resets to current cycle values.
- Display shows . . . DOOR UNLOCKED . . .
- Printer records time door is opened and prints "DOOR UNLOCKED".

NOTE: Printer will automatically reprint complete cycle data now if set for duplicate print. If not set for duplicate print and one is desired, press top of printer switch for Print to obtain one. First line of duplicate printout always reads DUPLICATE PRINT.

12. Remove load from chamber and if duplicate print obtained, place with completed load.

* Service adjustable to silence complete buzzer.



4.6 Vacuum Leak Test Cycle (See Figure 4-6)

A VACUUM LEAK TEST CYCLE may be run as the **first** cycle only after positioning power switch to ON. If any cycle has been run after switching power ON, the leak test cycle **cannot** be started until power is switched OFF, and then ON again. In this cycle the sterilizer automatically checks for vacuum leaks in the piping and door seal.

The measured leak rate (mm Hg per minute) is calculated by the control over a timed 10 minute period and included in the cycle printout.

NOTE: Cycle requires 30-35 minutes to complete.

1. Open upper access door and perform the following:

- Set HI-LO valve to HI for 270 F (132 C) cycle.
- Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
- Check that STEAM and WATER valves are ON and that manual control is OFF.

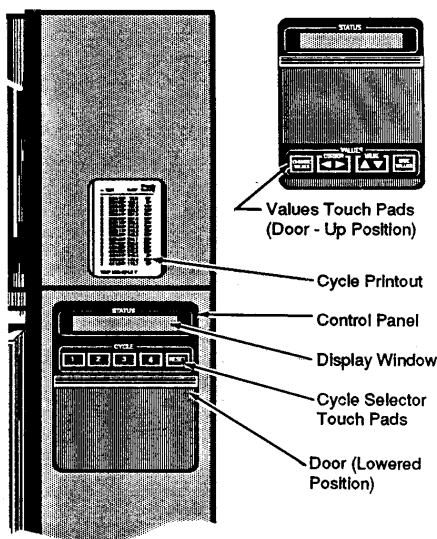


Figure 4-6. Turn Power On

2. Unlock chamber door and check that chamber is empty, then close and lock chamber door(s).

NOTE: Wait until jacket pressure has stabilized (30 to 32 psig) before starting cycle.

3. Turn sterilizer power switch ON.
 - Display(s) asks ...

PERFORM LEAK TEST?
1 = YES 2 = NO

4. Press cycle selector touch pad "1" to **select** the cycle.
 - Display shows... (for five seconds)

CHECK STEAM

- Display(s) asks...

READY TO TEST?
1=YES RESET=CANCEL

NOTE: Pressing **RESET** will advance sterilizer to **READY MODE**.

5. Press cycle selector touch pad "**1**" to **start** the cycle and sterilizer will automatically progress through Leak Test Cycle as follows: (See Message Sequence Chart 4-4.)

- Printer records cycle start and chamber is purged; printer records end of purge.
- Two vacuum and pressure pulses then occur and printer records each.
- Temperature rises to 270 F after the pressure pulses and when reached, unit begins to pull a vacuum for 10 minutes. (Printer records temperature and pressure at beginning of 10 minute vacuum time.)
- Printer records temperature and vacuum at end of evacuation time.
- Two minute stabilization period begins after 10 minute evacuation is completed.
- Ten minute leak test period begins after two minute stabilization is completed.
- Printer records calculated leak rate (mm Hg per minute) after ten minute leak time.
- Chamber is returned to atmospheric pressure, complete buzzer sounds and cycle summary and end of cycle messages are printed.

6. Unlock and open chamber door.
 - Control automatically resets to current cycle values.
 - Display(s) alternately shows ... (example)

DOOR UNLOCKED	T = (TEMP.) P = 0 PSIG
------------------	---------------------------

and

1=EXPRESS 2=PREVAC	3=FLASH 4=GRAVITY
-----------------------	----------------------

- Printer records time door is opened and prints "NOT READY ... DOOR UNLOCKED".

NOTE: Printer will automatically reprint complete cycle data now if set for duplicate print. If not set for duplicate print and one is desired, press top of printer switch for Print to obtain one. First line of duplicate printout always reads DUPLICATE PRINT.

7. File duplicate print in maintenance records.

NOTE: Sequential records of tests should be kept to detect if any major changes in leak rates are occurring. In this manner, maintenance can be scheduled to correct any loose fittings, bad gaskets, etc.

DISPLAY MESSAGE SEQUENCE FOR VACUUM LEAK TEST CYCLE

PURGE (time rem.)	T = (temp.) P = (press.)
----------------------	-----------------------------

First Message of cycle when cycle starts

PULSE #1 (then #2)

Second Message -- after PURGE completed, will repeat twice for the two vacuum pulses

CHARGE	T = (temp.) P = (press.)
--------	-----------------------------

Third Message -- after PULSES completed.

LEAK TEST EVACUATING	T = (temp.) P = (press.)
-------------------------	-----------------------------

LEAK TEST (time rem.)	T = (temp.) P = (press.)
--------------------------	-----------------------------

Fourth Messages -- shown during 10 minute evacuation (alternate every four seconds).

LEAK TEST STABILIZING	T = (temp.) P = (press.)
--------------------------	-----------------------------

Fifth Message -- shown during two minute stabilization period.

LEAK TEST (time rem.)	T = (temp.) P = (press.)
--------------------------	-----------------------------

Sixth Message -- shown during 10 minute measured leak rate time.

AIR BREAK	T = (temp.) P = (press.)
-----------	-----------------------------

Seventh Message -- shown at completion of measured leak rate time.

COMPLETE (time of day)	T = (temp.) P = (press.)
---------------------------	-----------------------------

Last Message -- after AIR BREAK complete.

```

=====
== LEAK TEST ==
=====
CYCLE START AT 1:43:09P
                ON 12/15/88

CYCLE COUNT    00002
OPERATOR -----
STERILIZER -----

          P=PSIG
- TIME      T=°F  U=inHg
-----
C 1:43:09P  125.2   0P
C 1:44:10P  243.3  14P
C 1:45:28P  192.9  14U
C 1:46:10P  266.2  26P
C 1:47:34P  135.8  25U
C 1:47:34P  134.6  25U
L 1:48:23P  272.1  26P
L 1:50:22P   84.8  30U
L 2:00:22P   88.2  30U
LEAK RATE IS:
      0.7 mmHg Per min.
L 2:10:26P  102.3  29U
Z 2:11:16P  117.6   2U

TOTAL CYCLE = 0:28:08
=====

```

Chart 4-4. Message Sequences

4.7 DART (Bowie-Dick) Test Cycle (See Figure 4-7)

A DART (BOWIE-DICK) TEST CYCLE may be run as the **first or second cycle only** after positioning power switch to ON. Chamber **must** be at operating temperature when DART (BOWIE-DICK) TEST is performed. A LEAK TEST or a WARM-UP cycle should be completed prior to performing DART (BOWIE-DICK) TEST. Tests such as the DART or Bowie-Dick are designed to document the removal of residual air from a sample challenge load and should be run before sterilizer use each day (see Paragraph 5.3.2).

1. Open upper access door and perform the following:
 - a. Set HI-LO valve to HI for 270 F (132 C) cycle.
 - b. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
 - c. Check that STEAM and WATER valves are ON and that manual control is OFF.
2. Unlock chamber door and check that chamber is empty, then close and lock chamber door(s).

NOTE: Wait until jacket pressure has stabilized (30 to 32 psig) before starting cycle.

3. Turn sterilizer power switch ON.
 - Display(s) asks ...

PERFORM LEAK TEST?
1 = YES 2 = NO

4. Press cycle selector touch pad number "2" for NO, or if a vacuum leak test is desired, refer to Paragraph 4.6.
 - The following message will be shown at the completion of Leak Test or after pressing "2".

PERFORM DART TEST?
(BOWIE-DICK) 1=Y 2=N

5. Press cycle selector touch pad number 1 for YES and display will show the following:

IS A WARM-UP CYCLE
REQUIRED? 1=Y 2=N

If A Warm-Up Cycle Is Required . . . Press cycle selector touch pad number 1 for YES if sterilizer is not at operating temperature (i.e., no Vacuum Test performed, just starting unit up).

- Display will show CHECK STEAM for five seconds, then show the following message:

DISPLAY WINDOW MESSAGE SEQUENCE FOR EXPRESS, PREVAC OR DART CYCLES

PURGE T = (temp.)
(time rem.) P = (press.)

First Message of cycle when cycle starts.

PULSE
#1 (then 2, 3, etc.)

Second Message -- after PURGE completed, will continue for number of pressure/vacuum pulses set for current cycle.

CHARGE T = (temp.)
P = (press.)

Third Message -- after PULSE sequence completed.

STERILIZE T = (temp.)
(time rem.) P = (press.)

Fourth Message — after CHARGE completed.

FAST EXHAUST T = (temp.)
P = (press.)

Fifth Message — after STERILIZE time completed.

DRYING T = (temp.)
(time rem.) P = (press.)

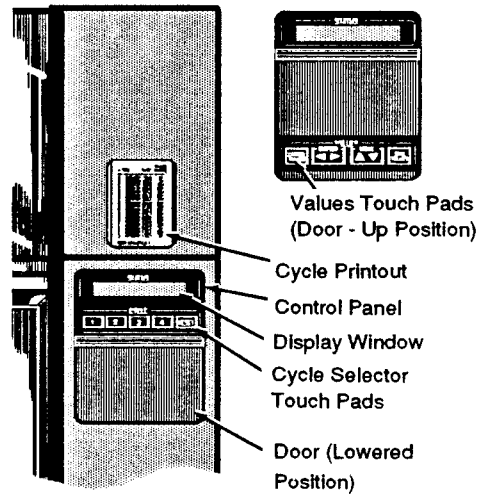
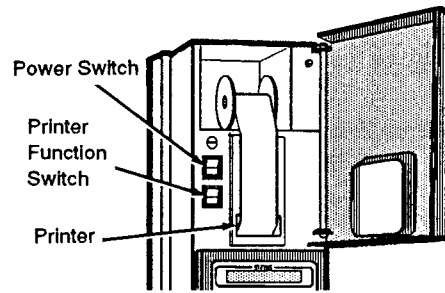
Sixth Message — only if DRY time selected.

AIR BREAK T = (temp.)
P = (press.)

Seventh Message — after EXHAUST or DRY completed.

COMPLETE T = (temp.)
(time of day) P = (press.)

Last Message — after AIR BREAK complete.



=====		
===== D A R T =====		
=====		
CYCLE START AT 2:13:18P		
08 12/15/88		
CYCLE COUNT	00001	
OPERATOR	-----	
STERILIZER	-----	
STER TEMP =	270.0°F	
CONTROL TEMP =	273.0°F	
STER TIME =	3.5 MIN	
DRY TIME =	1 MIN	
	P=ppis	
- TIME	T=°F	U=inHg

C 2:13:18P	152.3	0P
C 2:14:18P	245.7	16P
C 2:15:37P	204.3	13V
C 2:16:12P	265.9	26P
C 2:17:35P	145.1	24U
C 2:18:19P	267.8	26P
C 2:19:38P	130.3	27U
C 2:20:25P	270.9	26P
C 2:21:44P	128.0	28U
C 2:21:44P	127.8	28U
S 2:22:31P	270.1	26P
S 2:23:01P	272.3	28P
S 2:24:01P	270.8	28P
S 2:25:01P	270.4	28P
S 2:26:01P	270.9	28P
E 2:26:01P	270.2	27P
E 2:26:21P	224.1	3P
E 2:27:22P	128.8	27U
Z 2:28:10P	149.1	2U
TEMP MAX=	272.4°F	
TEMP MIN=	270.1°F	
CONDITION =	9:13	
STERILIZE =	3:31	
EXHAUST =	2:08	
TOTAL CYCLE =	14:52	
=====		
= READY TO UNLOAD =		
=====		

Figure 4-7. DART (Bowie-Dick) Test Cycle

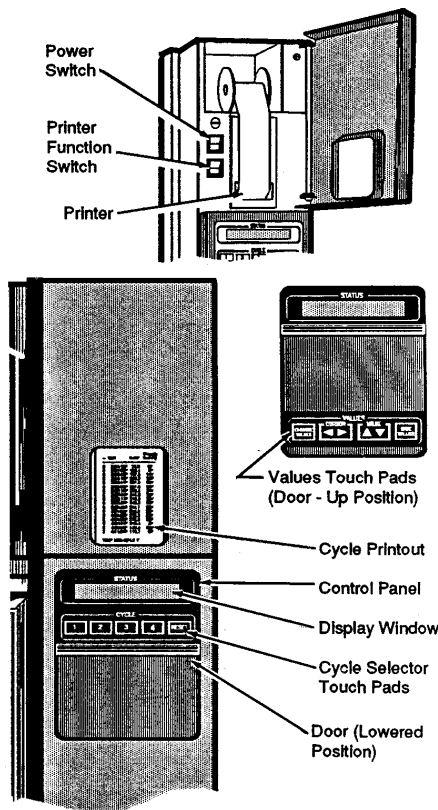


Figure 4-8. Turn Power On

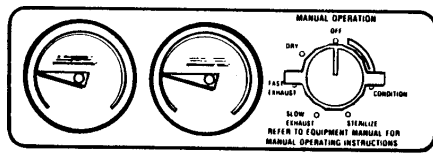


Figure 4-9. Manual Control

**READY TO TEST?
1=YES RESET=CANCEL**

Press cycle selector touch pad "1" and sterilizer will automatically proceed to run a flash type warm-up cycle with three minute sterilize and 1 minute dry times (see Paragraph 4.1 for sequence of cycle events).

- At completion of warm-up cycle, display will show following message:

**LOAD DART PACK
PRESS 1 TO TEST**

If A Warm-Up Cycle Is Not Required . . . Press cycle selector touch pad number 2 for NO if sterilizer is at operating temperature (i.e., Leak Test just performed, unit has been in operation).

- Display will show following message:

**LOAD DART PACK
PRESS 1 TO TEST**

6. Load DART or Bowie-Dick type test pack (see Paragraph 5.3.2) and press cycle selector touch pad "1" to perform test cycle.

- Sterilizer will automatically proceed through a prevacuum test cycle with four pressure/vacuum pulses and three and one half minute sterilize and one minute dry times (see Paragraph 4.5 for sequence of cycle events).

7. Unlock and open door at end of cycle and check DART or Bowie-Dick type test pack for results and keep a record of all test results (see Paragraph 5.3.2).

4.8 Manual Operation: Gravity (Wrapped or Unwrapped Goods) or Liquids Cycle Only (See Figure 4-8)

1. Check that chamber drain strainer is clean and in place and that chamber interior is clean. (See VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if cleaning is necessary.)
2. Open printer door and verify sterilizer POWER switch is OFF.
3. Open upper access door and check that manual control is turned to ON.
4. Turn STEAM and WATER valves to ON.
 - Steam enters jacket and begins to warm chamber.
5. Select desired processing temperature from Table 3-1 or 3-3.
6. Set HI-LO valve to 250 F* (121 C) for LIQUIDS cycle or to 250 F* (121 C) or 270 F (132 C) for GRAVITY cycle.

* Chamber temperature when normal "LO" setting is used for manual operation will be approximately 258 F (126 C). If temperatures precisely at or below 250 F (121 C) are required see VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES.

⚠ WARNING – BURN HAZARD: Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

⚠ WARNING – SLIPPING HAZARD: To avoid slippery floor conditions, immediately wipe up any spillage or condensation in sterilizer loading area.

⚠ WARNING – BURN HAZARD: When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedure:

- Use liquids cycle only. No other cycle is safe for processing liquids.
- Use only vented closures — do not use screw caps or rubber stoppers with crimped seal.
- Use only Type I borosilicate glass bottles — do not use ordinary glass bottles or any container not designed for sterilization.
- Avoid sudden full opening of door at end of cycle. Open sterilizer door no more than one inch and wait at least 10 minutes before unloading sterilizer.
- Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.
- Allow bottles to cool to touch before attempting to move them from sterilizer cart to storage area.

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

8. Unlock and open chamber door. (See Paragraph 2.5 or 2.6)

9. Load the chamber.

10. Close and lock chamber door. (See Paragraph 2.5 or 2.6)

NOTE: Once chamber is pressurized, an integral pressure-actuated lock will prevent door from being opened.

11. Turn Manual Operation selector to CONDITION and wait sixty seconds, then proceed to next step.

12. Turn selector to STERILIZE and wait until chamber reaches desired pressure.

13. Time the desired sterilization period and when completed, proceed to step **14.a.** if a LIQUIDS cycle, **14.b.** if a GRAVITY Cycle (Wrapped Goods), or **14.c.** if a GRAVITY Cycle (Unwrapped Goods).

14. Cycles:

a. **LIQUIDS Cycle:** (See Figure 4-10)

1) Turn selector to SLOW EXHAUST and keep it in this position until chamber pressure is atmospheric (0 psig).

2) Turn selector to OFF position (omit Dry phase).

3) Open door **one inch** and wait at least **10 minutes** until bubbling and boiling of solutions has ceased.

b. **GRAVITY Cycle (Wrapped Goods)**

1) Turn selector to FAST EXHAUST and keep it in this position until chamber pressure is between 4 and 6 psig (0.28 and 0.42 kg/sq.cm).

2) Turn selector to DRY.

3) Time the desired dry period and when completed, turn selector to OFF.

c. **GRAVITY Cycle (Unwrapped Goods)**

1) Turn selector to FAST EXHAUST and keep it in this position until chamber pressure is atmospheric (0 psig).

2) Turn selector to OFF position (omit DRY phase*).

15. Open door (see Paragraph 2.5 or 2.6) and unload chamber.

* Dry time is not required for unwrapped goods, however, a dry time of one or two minutes will help reduce excess steam vapor when opening chamber door at end of cycle.

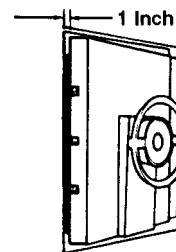


Figure 4-10. Open Door One Inch

! WARNING – BURN HAZARD: When sterilizing liquids, avoid sudden full opening of door at end of cycle. Unlock and open sterilizer door no more than one inch and wait at least 10 minutes before unloading sterilizer.

! WARNING – BURN HAZARD: A steam supply malfunction may cause the sterilizer-chamber to fill with scalding water. Do not open chamber door if the unit fails to complete an automatic cycle or if water leaks past the door gasket upon unlocking the door.

4.9 Control Monitoring and Communication Systems

To ensure the validity of the sterilizing process the automatic control continually monitors the cycles. Should one of the following abnormal conditions occur, it will be shown as indicated.

Conditions and Indications	Recommended Operator Actions
<p>CONDITION: Sterilize did not complete conditioning phase in preset time.</p> <p>INDICATION: Buzzer sounds intermittently and printer records: . . . time . . . TOO LONG TO CHARGE</p>	<ol style="list-style-type: none"> 1. Touch cycle selector to stop buzzer (sterilizer will continue to operate). 2. Refer to VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES to see if problem can be determined and *ALARM corrected without interrupting cycle. 3. Press cycle RESET touch pad to abort cycle if problem cannot be corrected so that condition phase can be completed. <ul style="list-style-type: none"> • Printer records time RESET touch pad is pressed and prints abort message. • Display alternates WARNING: HOT LIQUIDS and PRESSURE IN CHAMBER if a liquids cycle. 4. Wait until chamber is at atmospheric pressure. 5. Unlock chamber door and: <ol style="list-style-type: none"> a. Crack door open one inch if a Liquids Cycle was in progress and leave door in this position for at least 10 minutes. <ul style="list-style-type: none"> • Printer records time door is unlocked and prints DOOR UNLOCKED. b. Open door. 6. Correct problem and reprocess load.

Conditions and Indications	Recommended Operator Actions
<p>CONDITION: Temperature drops 2 F below set point.</p> <p>INDICATION: Display shows: STERILIZE T = ____; UNDERTEMP P = ____ and printer records *UNDERTEMP and time. Sterilize time resets to initial value. be corrected so that sterilize phase can be completed.</p>	<ol style="list-style-type: none"> 1. Let cycle continue to completion if sterilize temperature is reattained. 2. Refer to VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES if condition happens repeatedly, to see if problem can be determined and corrected without interrupting cycle. 3. Press cycle RESET touch pad to abort cycle if problem cannot be corrected. <ul style="list-style-type: none"> • Printer records time RESET touch pad is pressed and prints abort message. • Display alternates WARNING: HOT LIQUIDS and PRESSURE IN CHAMBER if a liquids cycle. 4. Wait until chamber is at atmospheric pressure. 5. Unlock chamber door and: <ol style="list-style-type: none"> a. Crack door open one inch if a Liquids Cycle was in progress and leave door in this position for at least 10 minutes. <ul style="list-style-type: none"> • Printer records time door is unlocked and prints DOOR UNLOCKED. b. Open door. 6. Correct problem and reprocess load.
<p>CONDITION: Cycle started, but chamber door not sufficiently tightened to keep door lock switch actuated.</p> <p>INDICATION: Buzzer sounds intermittently and printer records DOOR UNLOCKED.</p>	<ol style="list-style-type: none"> 1. Observe unit for the following: <ul style="list-style-type: none"> • Printer records the time and prints abort message. • Display alternates WARNING: HOT LIQUIDS and PRESSURE IN CHAMBER if a liquids cycle. • Cycle automatically aborts. 2. Wait until chamber is at atmospheric pressure. 3. Unlock chamber door and: <ol style="list-style-type: none"> a. Crack door open one inch if a Liquids Cycle was in progress and leave door in this position for at least 10 minutes. b. Open door. 4. Correct door or door switch operation and reprocess load.

Conditions and Indications	Recommended Operator Actions
<p>CONDITION: Sterilizer did not complete exhaust phase in preset time.</p> <p>INDICATION: Buzzer sounds intermittently and printer records: *ALARM . . . time . . . TOO LONG IN FAST EXHAUST TOO LONG IN SLOW EXHAUST or TOO LONG IN VENT.</p>	<ol style="list-style-type: none"> 1. Touch cycle selector to stop buzzer (sterilizer will not continue to operate). 2. Refer to VOLUME 1, SERVICE AND MAINTENANCE PROCEDURES to see if problem can be determined and corrected without interrupting cycle. 3. Press cycle RESET touch pad to abort cycle if problem cannot be corrected so that condition phase can be completed. <ul style="list-style-type: none"> • Printer records time RESET touch pad is pressed and prints abort message. • Display alternates WARNING: HOT LIQUIDS and PRESSURE IN CHAMBER if a liquids cycle. 4. Wait until chamber is at atmospheric pressure 5. Unlock chamber door and: <ol style="list-style-type: none"> a. Crack door open one inch if a Liquids Cycle was in progress and leave door in this position for at least 10 minutes. <ul style="list-style-type: none"> • Printer records time door is unlocked and prints DOOR UNLOCKED. b. Open door. 6. Correct problem and reprocess load.
<p>CONDITION: Loss of electricity.</p> <p>INDICATION: Display goes dark.</p>	<ol style="list-style-type: none"> 1. Wait until power is restored to sterilizer. <ul style="list-style-type: none"> • Printer records *POWER FAIL IN CYCLE *POWER UP and time. • Cycle resumes at point where power failed. <p>If resuming cycle is unacceptable, proceed as follows:</p> <ol style="list-style-type: none"> a. Press cycle RESET touch pad, and wait until chamber is at atmospheric pressure. <ul style="list-style-type: none"> • Printer records the time the RESET touch pad is pressed and prints abort message. b. Unlock and crack chamber door open one inch if a liquids cycle was in progress. Leave door in this position for at least 10 minutes. <ul style="list-style-type: none"> • Printer records time door is unlocked and prints DOOR UNLOCKED. c. Reprocess load.
<p>CONDITION: Power failure during exhaust in liquids cycle.</p> <p>INDICATION: Continuous unload and ten-minute countdown loop.</p>	<ol style="list-style-type: none"> 1. Loop can be cleared by resetting twice. (Reset; wait for printout; reset again.)

```
*****  
*      EAGLE 3000      *  
* VACAMATIC STERILIZER *  
*   MADE IN U.S.A.   *  
*****  
* POWER UP      9:36:24A
```

```
* WARNING      9:30:33A  
PRESSURE IN CHAMBER
```

```
* RESET      11:21:37A
```

```
* ALARM      9:36:26A  
FAILURE READING PRESSURE
```

Additional Printout Examples

Additional printouts are provided whenever:

1. The RESET button is pressed.
2. The power is turned on.
3. Temperature sensor failure is detected.
4. Pressure sensor failure is detected.

Additional Message For Integral Steam Generator Equipped Units

For the Eagle 3000 Sterilizers equipped with an integral steam generator, the following communications will be furnished by the control system if water is sensed in the jacket feed water line.

Condition and Sterilizer Indication

CONDITION: Water is sensed in the jacket feed water line.

INDICATION: Buzzer sounds intermittently and printer records:

*ALARM.....(time of day)

.....BOILER FLOODED

Display also shows ...BOILER FLOODED... and indicator light on generator control box comes on (located inside of lower access door).

Automatic Sterilizer Control Actions

1. Warnings are sounded and displayed as shown above.
2. Cycle is aborted.
3. Steam generator is turned off.
4. Steam to jacket valve is closed to prevent any water from reaching the sterilizer chamber.
 - At this point, the sterilizer and generator **cannot** be operated.

Recommended Operator Actions

Do not attempt to operate the unit or open chamber door.

Shut power to unit off.

Have qualified service technician investigate and correct the problem.

Reprocess load if there is any uncertainty of load sterility.

⚠ WARNING – EXPLOSION HAZARD: This sterilizer is not designed to process flammable liquids.

⚠ WARNING – BURN HAZARD: When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedure:

- Use liquids cycle only. No other cycle is safe for processing liquids.
- Use only vented closures — do not use screw caps or rubber stoppers with crimped seal.
- Use only Type I borosilicate glass bottles — do not use ordinary glass bottles or any container not designed for sterilization.
- Avoid sudden full opening of door at end of cycle. Open sterilizer door no more than one inch and wait at least 10 minutes before unloading sterilizer.
- Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.
- Allow bottles to cool to touch before attempting to move them from sterilizer cart to storage area.

The information in this section is intended as a guide to steam sterilization techniques for the most common types of steam sterilizable articles and materials. Preparatory to sterilization, all materials and articles must be thoroughly cleaned. After sterilization, most goods should be stored for no longer than thirty days, depending on wrapping materials. **For sterilization of articles or materials not covered in this section, contact the manufacturer of the article for the recommended procedure. Cycle times and temperatures not covered in this section should always be validated for efficacy before processing loads.**

For in-depth training, STERIS offers a wide range of education/training programs designed to meet the educational needs of Health-Care Industries. Contact STERIS for details.

5.1 Fabrics and Hard Goods: Use Prevacuum or Gravity Cycle (See Figure 5-1)

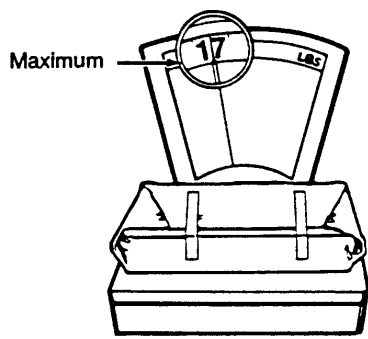
5.1.1 Preparation

1. Use freshly laundered 140 thread count muslin (or equivalent).^{*} This helps prevent superheating and provides longer life of the textiles.
2. Limit the size and density of each muslin pack. (Maximum size: 12" x 12" x 20"; maximum weight: 12 pounds. No pack should have a density factor in excess of 7.2 pounds per cubic foot.) This ensures complete steam permeation, and assists drying.
3. Limit the size and density of wrapped instrument sets in order to minimize "wet pack" problem. (Maximum number 100 instruments; maximum weight 17 pounds.)
4. Do not stack or nest utensils unless they are separated by muslin (or equivalent).^{*}
5. Use two double-thickness 140 thread count muslin (or equivalent)^{*} wrappers for surgical supplies. This provides protection after sterilization.

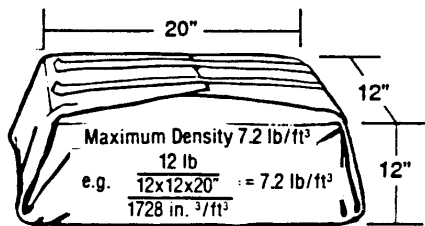
^{*} *Muslin of 140 thread count is the present standard for steam sterilization. The manufacturers of other materials should show data that indicates their product is equivalent to the muslin profile in steam sterilization, drying and sterility maintenance.*

5.1.2 Loading The Sterilizer

1. STERILIZE LIQUIDS SEPARATELY from other supplies or materials. See Paragraph 5.2.
2. Place all fabric packs on edge, and arrange load in chamber to allow for maximum exposure (i.e., minimal resistance for steam passage through the load).
3. Place jars, canisters, and all other nonporous containers of dry material on sides, with covers ajar or removed. This permits rapid displacement of air and quick contact of steam with all surfaces of containers and contents. Drying is also facilitated.
4. Place utensils and treatment trays on edge so they will be sterilized and dried properly.



Wrapped Instrument Tray.



Muslin Pack.

Figure 5-1. Loading Parameters

5. Place instrument set in tray having perforated bottom (or equivalent). Place flat for sterilization.
6. In mixed loads combining fabrics and hard goods, place the hard goods on lower shelves of loading car. This prevents wetting of muslin packs from condensate dripping from hard goods load.
7. DO NOT OVERLOAD STERILIZER. Allow for steam penetration between packs. Avoid contact of load components with the walls of the chamber.

5.2 Liquids: Use Liquids Cycle Only

Your STERIS Sterilizer is designed to process liquids only when borosilicate flasks with vented closures are used. Sterilization of liquids in any other flask or with the use of non-vented closures requires a sterilizer specially designed for that purpose.

Vented closures are recommended because, by design, they will relieve excess pressure by automatically venting a flask.

Borosilicate glass is recommended because it is a superior glass for the sterilization process due to its ability to resist thermal shock (such as cold air striking the hot glass), and to withstand repeated handling.

Only self-venting types of closures should be used for capping liquid filled borosilicate glass containers, i.e., STERIS Disposable closures (for laboratory use, Morton type and/or cotton stopper type). STERIS Disposable closures and bottles offer a safe and economical approach for processing sterile solutions. The AutoPour bottles are manufactured of high quality borosilicate glass and the closure system provides both self-venting and self-sealing capability with the convenience of a visual check. Contact your STERIS representative for additional information.

If other types of glass (such as flint or soda lime glass) and non-venting (sealed) closures are used to sterilize liquids in your STERIS Sterilizer, a **dangerous condition**, capable of causing personal injury and property damage, is created. When bottling and capping the liquid, an atmosphere of air is also trapped within the neck of the bottle. Upon heating, the air in a sealed container expands. At the same time, air compressed by vapors is released from the heated liquid, causing pressures to rise within the bottle. These pressures rise to approximately one atmosphere greater than the external pressure exerted on the outer walls of the container by steam in the chamber.

Following sterilization, the liquid exhaust phase of the cycle **slowly** relieves the chamber pressure, which if self-venting type closures are used, allows the internal pressure of the bottle to equalize and track the pressure change of the chamber. The liquid is also cooled through vaporization that occurs as a result of the pressure change.

With sealed containers, the pressurized condition will remain until the load is cooled through the walls of the glass container by conduction. **There is insufficient time in the liquid exhaust phase for the sealed container system to significantly cool**, thereby reducing the internal temperatures and pressures. Unlike a vented flask that relieves the excess pressure, the pressures within **sealed** glass containers will remain long after the cycle is completed. Thus, potential exists for the flask to burst as the result of either thermal shock (opening of the door and contact with room temperature air) and/or sudden jarring or striking of one bottle against another while unloading.

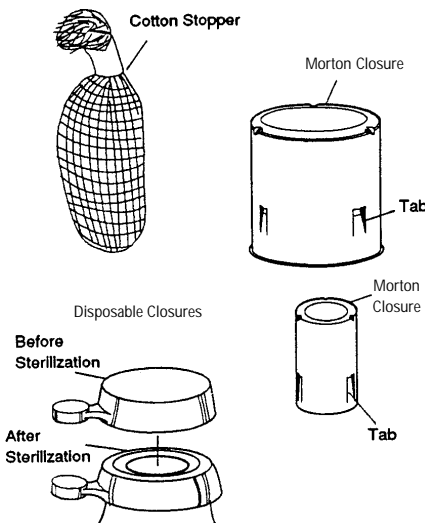


Figure 5-3. Vented Closures

The bursting of one bottle or the result of a chain reaction of multiple bursting of bottles can cause property damage and severe personal injury.

IMPORTANT: Place small bottles in a basket and retain basket on shelf during cart movement. Taller bottles may be placed directly on shelves, but care must be taken to prevent bottles from falling off during cart movement.

5.3 Control Measures For Verifying Sterilization Process

5.3.1 Biological Monitors

The best way to ascertain the sterility of an article or to verify the sterilization process is to use a biological monitor.

A live spore test utilizing *B. stearothermophilus* is the most reliable form of biological monitoring. STERIS recommends that a qualified biological monitor be used daily to test the sterilizer. These products utilize controlled populations of a controlled resistance so that survival time and kill time can be demonstrated. Steam sterilizers should be tested at least weekly, preferably daily to minimize the impact of a possible recall. Place the biological monitor in a test pack and place pack at the bottom front of the rack. Qualified biological monitors are available from your local STERIS representative.

5.3.2 Testing For Prevacuum Efficiency

The first prevacuum cycle of each day should be used to test the adequacy of air removal from the chamber and load during the prevacuum phase, so that when steam is subsequently admitted its penetration of the load may be virtually instantaneous. It is not a test for adequate exposure to heat in terms of time-at-temperature.

Tests such as the Bowie-Dick or the STERIS **DART**[®] (Daily Air Removal Test)* are designed to expose the pattern or document the removal of residual air from a sample challenge load.

In the case of the Bowie-Dick, following exposure in a **prevacuum** sterilizing cycle, the pack is opened, the tape examined and conclusions are drawn as to the pattern of residual air, if any, that remained in the pack during the sterilizing cycle.

STERIS recommends a Daily Air Removal Test (DART) or a test package. SAMI Standard test package consist of 24 towels approximately 18x33" (457x838mm) folded 3 times to give 6 layers of fabric, forming an approximate size of 8-1/2x11" (216x279mm). Towel material is a coarse, absorbent, durable cotton (OR towel). Stack towels, placing a single Chemdi Daily Record Sheet* between the 12th and 13th towel. Wrap towels in 2 double thickness 36x36" (914x914mm) muslin wrappers and secure with tape. Place the DART or pack positioned on its back, on the lower rack near the chamber drain. Acceptable results are achieved if all of the indicator bars on the DART or the Daily Record Sheet show a complete color change. If desired, record and file with daily printed record.

NOTE: *With the DART (Daily Air Removal Test) product, a simple color change from yellow to black of the six (6) indicator bars verifies that air has been removed from the challenge load area of the DART product.*

*Available from your local STERIS representative.

The **Vacuum Leak Test Cycle** (Paragraph 4.6) measures the integrity of the sealed pressure vessel and associated piping to assure air is not being admitted to the sterilizer during the vacuum draw downs.

After running a vacuum leak test, a value or leak rate will be printed on the printer tape. This value will help define a trend over a period of time if the integrity of the system begins to deteriorate (i.e., allowing air to enter the system). By running a vacuum leak test cycle daily or weekly, the operator or maintenance personnel can always monitor the air-tightness of the system and make repairs or adjustments when necessary.

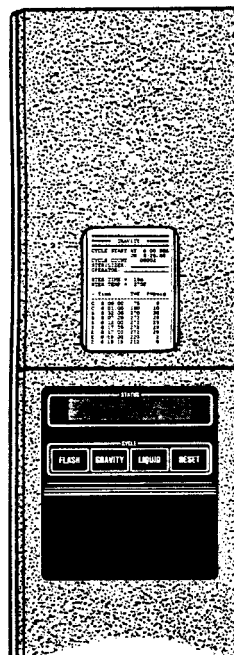
5.3.3 Auxiliary Controls (See Figure 5-3)

5.3.3.1 Printed Records and Display Messages

Observe print record and display messages during and after each cycle to determine if correct time/temperature relationship has been attained and maintained as necessary for a particular sterilizer load. An example of the record printed for a normal prevacuum cycle is shown.

5.3.3.2 Chemical Controls

1. **Sterilizer Tape** — Used for securing wrapper/package ... serves only as an index of exposure to the sterilant system.
2. **Chemical Indicator** — Placed in center of pack/package indicate physical conditions of temperature, time, moisture have been reached in that portion of the pack/package.



Stage 2™ Control Column

```

=====
===== F L A S H =====
=====
CYCLE START AT 9:31:24A
DN 12/14/88

CYCLE COUNT      00002
OPERATOR         -----
STERILIZER       -----

STER TEMP = 270.0°F
CONTROL TEMP = 273.0°F
STER TIME = 3 MIN
DRY TIME = 1 MIN

- TIME      T=°F  P=psi
C 9:31:24A  218.4   0
C 9:32:25A  266.8  20
S 9:32:40A  270.1  26
S 9:33:41A  272.3  28
S 9:34:41A  272.8  28
S 9:35:41A  272.7  28
E 9:35:41A  272.2  27
E 9:36:20A  229.5   3
E 9:37:20A  221.0   0
Z 9:37:31A  218.5   0

LOAD          121401

TEMP MAX=272.0°F
TEMP MIN=270.1°F

CONDITION    = 1:16
STERILIZE    = 3:01
EXHAUST      = 1:50
TOTAL CYCLE  = 6:07

=====
=  READY TO UNLOAD  =
=====

```

Figure 5-3. Auxiliary Controls