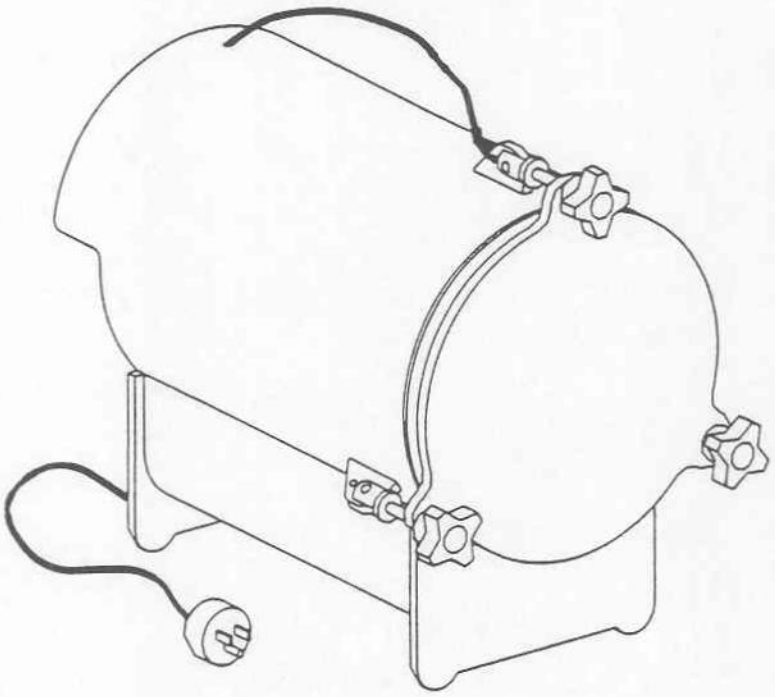
# OPERATOR'S ORGANIZATIONAL MAINTENANCE MANUAL





## STERILIZER, SURGICAL INSTRUMENT AND DRESSING

## (NSN 6530-01-306-9510)

---

MARCH 1995

This page left blank intentionally

**WARNING**

**CARBON MONOXIDE CAN KILL YOU**

Carbon monoxide is a colorless and odorless gas produced by combustion. Breathing carbon monoxide can cause headache, dizziness, loss of muscular control, a sleepy feeling, coma, brain damage, or death, depending on the length of time and amount of exposure. Carbon monoxide can become dangerously concentrated under conditions of no or little air movement, such as in a closed tent or shelter.

When the Sterilizer is heated by a stove, flame, or coals inside a shelter, follow these precautions:

1. ONLY HEAT the Sterilizer in a WELL VENTED AREA.

2. BE ALERT for exposure symptoms. If symptoms are present, remove affected person(s) to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, give artificial respiration. (For artificial respiration, refer to FM 21-11).

3. BE AWARE. The field protective mask for chemical-biological-radiological (CBR) protection will not protect you from carbon monoxide poisoning.

---

**WARNING**

WHEN HEATED, THIS STERILIZER CAN CAUSE BURNS IF TOUCHED WITHOUT PROTECTION.

Use heat protective gloves or hot pads.

---

**WARNING**

HIGH VOLTAGE IS USED IN THE OPERATION OF THIS EQUIPMENT.

DEATH MAY RESULT ON CONTACT

Be careful not to contact high voltage connections when installing or operating this equipment. The power supply to the equipment must be shut off before beginning work on the equipment.

---

This page left blank intentionally

## HOW TO USE THIS MANUAL

This manual provides an easily usable source of reference that will assist you in preparing and operating the Sterilizer, Surgical Instrument and Dressing.

The manual is arranged in three chapters that are further broken down into sections. A List of Appendices, Figures (illustrations), and Tables and an Index are included to help you locate any item of information in this manual.

All paragraphs and figures are assigned numbers keyed to the chapter and sequence in which they appear. For example, figure 2-1 is the first figure chapter 2 and figure 2-2 is the second figure in chapter 2. Pages are in the numerical sequence.

To operate the Sterilizer, you must know:

1. How to use the Sterilizer with different energy sources;
2. How to load, run, and unload the Sterilizer;
3. When it is working properly;
4. How to clean it and perform preventive maintenance checks and services (PMCS);
5. How to use the troubleshooting procedures; and
6. When to call for help.

The front cover quick index will help you locate the answers to your problems quickly. Just turn to the chapter that deals with your question and follow the instructions.

This page left blank intentionally

OPERATOR'S ORGANIZATIONAL MAINTENANCE MANUAL

STERILIZER, SURGICAL INSTRUMENT AND DRESSING

## TABLE OF CONTENTS

This page left blank intentionally

## LIST OF FIGURES



## LIST OF TABLES

This page left blank intentionally

# CHAPTER 1

# INTRODUCTION

## Section I.
## GENERAL INFORMATION

### 1-1 SCOPE

a. Type of Manual: Operator's Manual

b. Equipment Name: Sterilizer, Surgical Instrument and Dressing

c. Purpose of Equipment: Provides a small, lightweight, rapid sterilization capability for surgical instruments and dressings in the field, utilizing electricity, gas, or open flame for an energy source.

### 1-2 MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those described by TM 38-750-2, Maintenance Management Procedures for Medical Equipment.

### 1-3 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your Sterilizer, Surgical Instrument and Dressing needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance. Prepare a DA Form 2407 in accordance with AR 40-61.

## Section II.
## EQUIPMENT DESCRIPTION AND DATA

### 1-4 PURPOSE OF THE STERILIZER SURGICAL INSTRUMENT AND DRESSING

The Sterilizer, Surgical Instrument and Dressing, hereafter referred to as the Sterilizer, is a lightweight, portable device designed to sterilize small surgical packs and instruments in the field.

### 1-5 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

The illustration presented below (figure 1-1) identifies the major components of the Sterilizer.

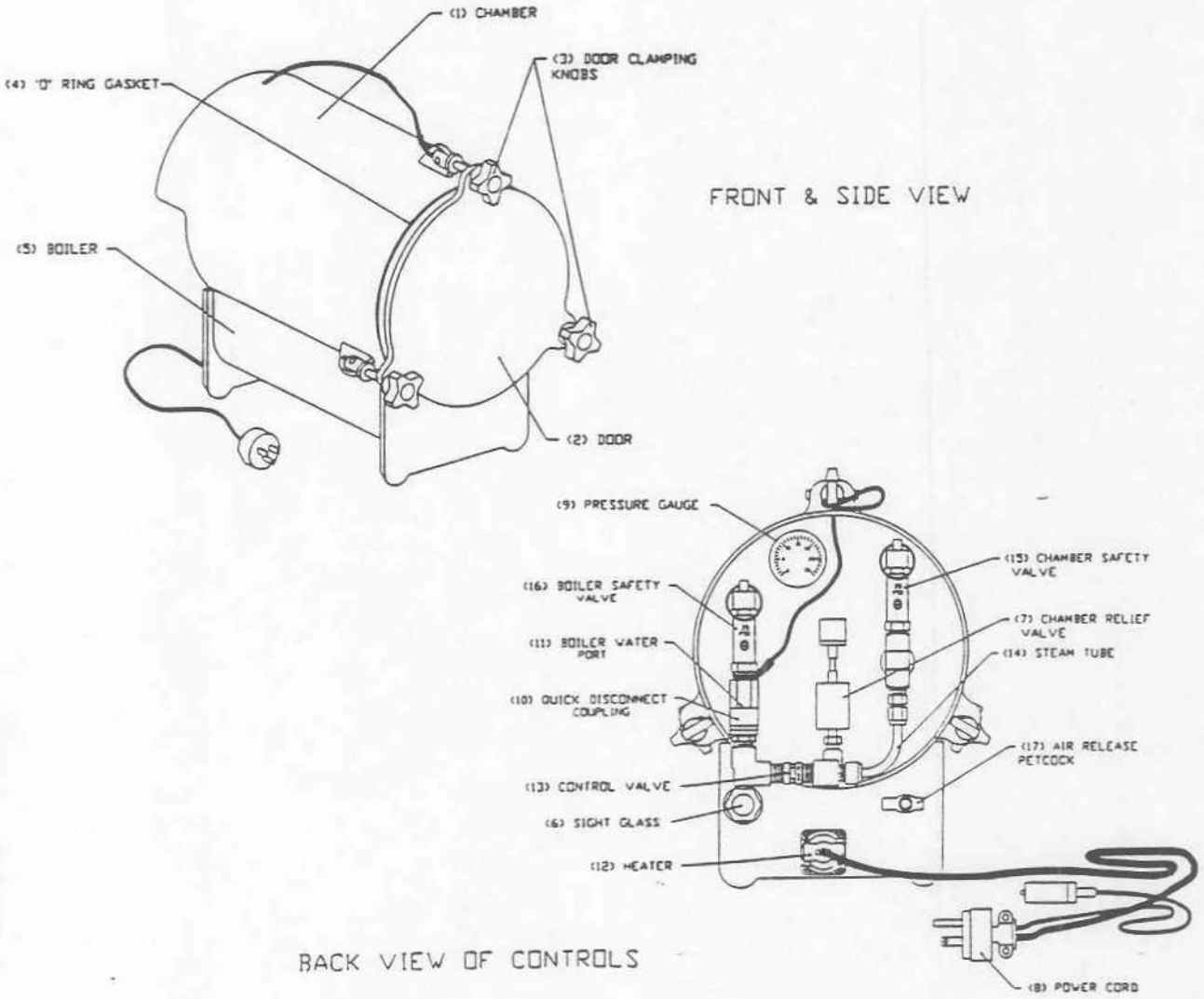



**FIGURE 1-1. MAJOR COMPONENTS OF THE STERILIZER**

A brief description of the sterilizer components shown in Figure 1-1 is as follows:

CHAMBER (1) - holds the instruments and/or dressings to be sterilized.

DOOR (2) - seals the chamber during sterilization.

DOOR CLAMPING KNOBS (3) - secures the door tightly during sterilization. To close and tighten the door, the knobs are turned clockwise. To open the door the knobs are turned counterclockwise.

"O" RING GASKET (4) - seals the door to prevent steam loss.

BOILER (5) - reservoir directly beneath the chamber that is filled with water to produce the steam.

SIGHT GLASS (6) - a small glass window that allows the operator to determine the level (amount) of water in the boiler.

CHAMBER RELIEF VALVE (7) - controls the chamber pressure by allowing excess steam to escape. The valve is raised manually to release steam at the end of the sterilization cycle.

POWER CORD (8) - connects the heater to the electrical power source when using electricity.

PRESSURE GAGE (9) - measures the pressure in the chamber..

QUICK DISCONNECT COUPLING (10) - attaches to seal the water port and detaches to allow the water port to be used when filling or draining the sterilizer.

BOILER WATER PORT (11) - allows water to be added to or drained from the boiler when the quick disconnect coupling is removed.

HEATER (12) - heats the water in the boiler electrically.

CONTROL VALVE (13) - controls the boiler pressure-chamber pressure differential.

STEAM TUBE (14) - connects the control valve to the sterilizer chamber.

CHAMBER SAFETY VALVE (15) - allows steam to escape if the chamber pressure exceeds 22 psig.

BOILER SAFETY VALVE (16) - allows steam to escape if the boiler pressure exceeds 37 psig.

AIR RELEASE PETCOCK (17) - releases air from the boiler when opened. To open, turn the knob counterclockwise, To close, turn the knob clockwise.

1-6 PHYSICAL DATA The physical data is as follows:

a. Dimensions:

| | |
|---|---|
| Length | 15.75 inches |
| Width | 9.25 inches |
| Height | 12.25 inches |
| Weight | 14.0 pounds |
| Boiler Capacity | 91 cubic inches |
| Chamber Size | 7.75 inches dia. x 10.0 inches lgth |

b. Pressure Vessel Data:

| | |
|---|---|
| Boiler Pressure | 30 pounds per square inch gauge (psig) |
| Boiler Safety Valve | 37 psig overload protection |
| Chamber Safety Valve | 22 psig overload protection |
| Chamber Pressure | 15 psig (during sterilization) |
| Boiler Heating Time (from a cold start to 15 psig) | 20 minutes |
| Sterilization Time (at 15 psig) | 30 minutes |
| Reheating Time | 10 minutes |
| Number of Cycles per Boiler Refill | 1 cycle |

c. Power or Fuel Requirement:

AC - 110 volt, 60 Hz, 1 Phase, 10 amp, 1000 watts; minimum generator size is 1.5 kilowatts, or

Fuels - Wood, charcoal, propane, butane, alcohol gasoline , kerosene or heat tablets.

d. Quality assurance requirements:

The Sterilizer must be tested with Bacillus stearothermophilus spores (see AR 40-19) in a fixed facility (hospital) before deployment.

## Section III.
## TECHNICAL PRINCIPLES OF OPERATION

1-7. DESCRIPTION OF OPERATING PRINCIPLES:

1-7.1. Boiler: The Sterilizer is powered either by electricity or an open flame (i.e. fire built beneath the Sterilizer floor or liquid or gas fueled stove) to heat the boiler water. When using electricity, the heater heats the water to 276 degrees Fahrenheit (F) and maintains this temperature.

1-7.2 Sterilizer Chamber and Control Valve: Regardless of the energy source, pressure builds in the boiler until it reaches 15 psig. At this pressure the control valve opens and steam flows through the steam tube and into the Sterilizer chamber. The pressure differential between the chamber and the boiler is regulated by the control valve.

1-7.3 Chamber Relief Valve: When the chamber pressure reaches 15 psig, the chamber relief valve opens, purging air from the chamber. When the chamber pressure falls below 15 psig, the valve closes. When the sterilization cycle is completed, the chamber relief valve must be raised to allow steam to escape from the chamber. This must be accomplished carefully since the valve is HOT. Do not use unprotected fingers. A stick or knife can be used to raise the valve. Once steam has stopped escaping and the pressure gauge reads 0 psig, the valve can be dropped back onto the steam tube and the chamber door can be cracked opened.

1-7.4 Safety Valves: There are two safety valves located in the Sterilizer. The chamber safety valve allows steam to escape if the pressure in the chamber exceeds 22 psig. The boiler safety valve allows steam to escape if the pressure in the boiler exceeds 37 psig.

This page left blank intentionally

# CHAPTER 2

# OPERATING INSTRUCTIONS

## Section I.
## DESCRIPTION AND USE OF INDICATORS

2-1 PRESSURE GAUGE: The pressure gauge measures the pressure in the sterilizer chamber. When the gauge reads 0 psig, there is no pressure in the chamber. When the gauge reads 15 psig, the heat and pressure in the chamber are at the minimum for sterilizing. When the gauge reads 15 psig, steam will escape through the chamber relief valve, purging air from the chamber. A minimum of 15 psig must be maintained for a total of 30 minutes to ensure sterilization has taken place (see figure 2-1).

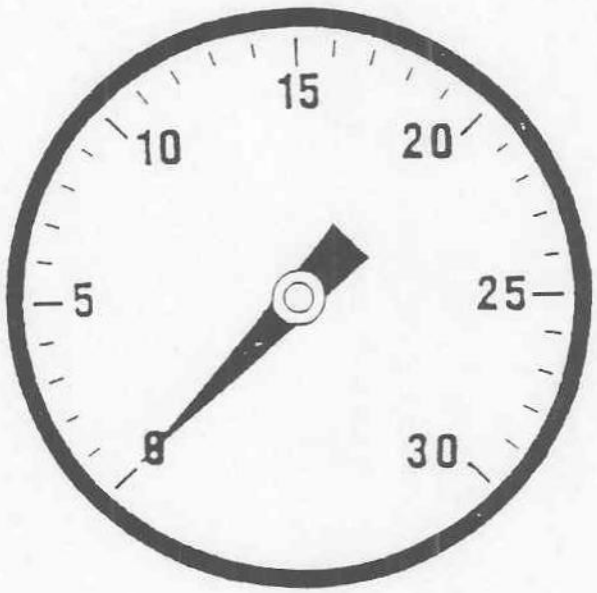



FIGURE 2-1. PRESSURE GAUGE

2-2 SIGHT GLASS: The sight glass allows the operator to determine the level of the water in the boiler. When the boiler is filled, the level should reach the middle of the sight glass. If the level is below the bottom of the sight glass, more water must be added to the boiler (see paragraph 2-4).

## Section II.
## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3 PMCS TABLE: Table 2-1 provides instructions for PMCS at the operator's level. Each item to be checked is numbered in the first column. This number is to be used for the TM number column on the DA Form 2404, Equipment Inspection and Maintenance Worksheet, when recording the results of PMCS.

The second column of the table shows the interval at which the check is to be performed. A bullet (•) is shown in the appropriate subcolumn to identify the frequency with which it should be performed.

The third column describes the item to be inspected.

The fourth column of the table provides instructions for performing the check. If corrective action is indicated, the required instructions are provided here.

The fifth column describes conditions which indicate the Sterilizer should not be used until repaired.

## TABLE 2-1. OPERATOR'S PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

NOTE

Within designated interval, these checks are to be performed in the order listed.

B - Before operation D - During operation A - After operation

| Item No. | Interval* B | D | A | Item to be Inspected | Procedure | Equipment is not Ready/Available if: |
|---|---|---|---|---|---|---|
| 1 | • | | • | Outer surfaces, knobs, gauge, and valves. | Visually check for dents, cracks, corrosion, or missing parts. Repair or replace as necessary. | Damage or corrosion interfere with operation or if any component is missing. |
| 2 | • | • | • | Door and "0" ring gasket. | Visually check door for seal, lubricate with petroleum jelly, replace, if needed. | Door won't seal. |
| 3. | | • | | Boiler, chamber, and fittings. | Check for water or steam leaks. Repair as needed. | Major leaks are present. |

*Frequency interval at which the appropriate items should be inspected and PMCS performed.

This page left blank intentionally

## Section III.
## OPERATING INSTRUCTIONS

### 2-4 PREPARATION FOR USE:

To prepare the Sterilizer for use, follow these steps:

a. If the "0" ring located in the door does not have a light coat of petroleum jelly on its surface, lubricate the ring lightly so the door will seal.

b. Open the air release petcock by turning it counterclockwise as far as possible to allow air to escape while filling the boiler.

c. Remove the quick disconnect coupling by pulling down on the knurled ring and fill the boiler with potable water (distilled, if available). Be sure the water level reaches the middle of the sight glass before heating to prevent overheating and damage to the Sterilizer.

d. Close the air release petcock by turning it clockwise as far as possible to prevent steam from escaping during sterilization.

e. Replace the quick disconnect coupling to prevent steam from escaping from the water port during sterilization.

f. Turn the Sterilizer knobs counterclockwise about four turns to loosen the door. Rotate the bottom of the door up above the Sterilizer body and lay the door down onto the top of the Sterilizer (figure 2-2).

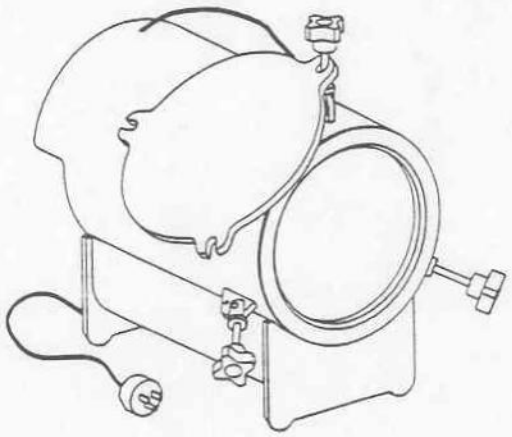


**FIGURE 2-2. THE STERILIZER DOOR OPENED**

2-4 PREPARATION FOR USE: (continued)

g. Load the chamber and close the door by sliding the door down into place.

h. Tighten the knobs (clockwise) so that the clearance between the edge of the door and the chamber is approximately equal all the way around the door for proper "0" ring compression.

**NOTE**

**When tightening the knobs for proper sealing, the clearance between the edge of the door and chamber must be equal around the perimeter of the door.**

i. To use electricity, attach the power cord of the sterilizer by aligning the connector locating key and pushing the connector onto the mating receptacle on the heater. Plug the power cord into a 110V outlet.

**WARNING**

**The sterilizer becomes very hot. Handle with heat resistant gloves or hot pads and use caution.**

j. If electricity is not available, one of the alternative heat sources listed in section 1-6.c. must be used. When using an open flame or coals, the fire must be kept away from the back of the Sterilizer (end with the controls, gauges, and valves). Only heat the front half of the Sterilizer boiler. Direct flames will damage the sight glass and pressure gauge, melt the electrical cord, and damage the other controls. If a wood fire is used, heat only with the coals scooped from the fire.

**WARNING**

**When using a stove, flame, or coals, carbon monoxide gas is given off. Carbon monoxide is a poisonous gas that can cause death. Make sure the area where the Sterilizer is used is WELL VENTILATED.**

k. When the pressure gauge reads 15 psig, start timing the process for 30 minutes. The heat source must provide enough heat to maintain 15 psig for a total of 30 minutes. If the gauge falls below 15 psig during this period, increase the heat source until the gauge is above 15 psig. The entire 30 minutes must be repeated at 15 psig. Sterilization is pressure, temperature, and time dependent. To ensure that sterilization has occurred, 15 psig must be maintained for 30 consecutive minutes.

l. When 15 psig has been maintained for 30 minutes, unplug the Sterilizer, remove the heat source, or remove the Sterilizer from the fire.

m. Raise the hot chamber relief valve carefully with a stick, knife, or other instrument until all the steam has escaped and the pressure gauge reads 0 psig.

n. When the top outside of the sterilizer is cool enough to touch, the door clamping knobs can be loosened (turn counterclockwise) and the door cracked open, allowing the chamber to cool.

o. Once the chamber is cool, rotate the bottom of the door up above the Sterilizer and lay the door down on the top of the Sterilizer. If the pack is dry, it can be removed. If it is not dry, close the door and allow to dry for a longer period.

p. Before another load is sterilized, check the water level in the sight glass. The level should be no lower than the middle of the sight glass.

**CAUTION**

**If the boiler must be refilled, first allow the Sterilizer to cool. The quick disconnect valve must be cool enough to touch with bare hands to prevent steam burns.**

q. Refill the boiler if the water level is low. (See section 2-4.a-e.).

r. To sterilize another load of supplies, repeat steps 2-4.a-o.

## 2-5. PREPARATION OF STERILIZER FOR STORAGE:

When you are finished using the Sterilizer and it has been unloaded, proceed with the following steps:

a. Allow the sterilizer to cool until it can be held with bare hands. This will ensure that the boiler water will not cause burns when emptied.

2-5 PREPARATION OF STERILIZER FOR STORAGE: (continued)

b. Open the air release petcock by turning the knob counterclockwise.

c. Remove the quick disconnect coupling, turn the sterilizer up on end with the door facing up and allow the water to run out of the boiler water port and air release petcock.

d. Hand dry the chamber with a clean towel and leave the door open to allow any residual moisture to evaporate.

e. Reattach the quick disconnect coupling to the water port.

f. Close the door and fasten knobs (only enough to keep door from moving).

g. The Sterilizer is now ready for storage.

**Section IV.**
**OPERATION UNDER UNUSUAL CONDITIONS**

2-6 COLD, WET, AND WINDY WEATHER

Cold, wet, and windy weather increases the rate of heat loss. The sterilizer must be shielded from the wind, rain, and cold as much as possible. The pressure gauge must be monitored closely because pressure drops can occur quickly and might prevent sterilization. If the gauge reads less than 15 psig during sterilization, additional heat must be added to bring the pressure above 15 psig.

**WARNING**

**If using a stove, flame or coals to heat the Sterilizer in a closed shelter or tent, adequate ventilation must be provided to prevent carbon monoxide poisoning.**

2-7 DIRTY WATER (MUDDY)

If the only source of water is contaminated with mud or other particulate contaminants, allow the water to settle in a container for a period of time. Then slowly strain the water through several layers of cloth into another container, leaving most of the particulate matter in the bottom of the first container. The strained water can then be used in the boiler. When clean water is available, the heater and sight glass must be cleaned and the boiler thoroughly rinsed.

# CHAPTER 3

# OPERATOR MAINTENANCE

## Section I.
## LUBRICATION INSTRUCTION

3-1 LUBRICATION INSPECTION:

The "0" ring gasket should receive a light application of petroleum jelly (K-Y jelly, Vaseline, or equivalent) before initial use and thereafter as needed (to prevent leaking).

## Section II.
## TROUBLESHOOTING PROCEDURES

3-2. TROUBLESHOOTING PROCEDURES:

Table 3-1 lists the common malfunctions which you may find during the operation of the Sterilizer or its components. You should perform the tests/inspections and corrective actions in the order listed.

This manual can't list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by any listed corrective actions, notify your supervisor.

**WARNING**

**Unplug power cord or remove from heat source, reduce steam pressure to 0 psig (sec. 2.4.1.), and allow the Sterilizer to cool before making tests or inspections.**

## TABLE 3-1. TROUBLESHOOTING PROCEDURES

| MALFUNCTION | TEST OR INSPECT | CORRECTIVE ACTION |
|---|---|---|
| 1. CHAMBER PRESSURE FAILS TO REACH 15 PSIG | | |
| A. No electrical power. | (1) Check external electrical power source for defect. | Notify Organizational Maintenance if defective. Another heat source could be used. |
| | (2) Check for tight connection between power source and sterilizer plug. | Reconnect tightly. |
| | (3) Check power cable or plug for defect. | Notify Organizational Maintenance if defective. Another heat source could be used. |
| B. Not enough heat from stove or fire. | (1) Check Sterilizer for close proximity to heat source. | Increase fuel; move closer to heat source. Protect fire and Sterilizer from cold/wind/rain. |
| C. Water not heating. | (1) Check for no or low water level in sight glass. | Wait until boiler cools; fill boiler with water until level reaches top of sight glass.<br><br>Notify Organizational Maintenance. Heater may be defective. Another heat source could be used. |

TABLE 3-1. TROUBLESHOOTING PROCEDURES (Continued)

| MALFUNCTION | TEST OR INSPECT | | CORRECTIVE ACTION |
|---|---|---|---|
| D. Other causes. | (1) | Check door and "0" ring gasket for leaks. | Lubricate gasket lightly if needed. Notify Organizational Maintenance if gasket is defective. |
| | (3) | Check quick disconnect coupling for proper coupling. | Recouple properly. If coupling defective, notify Organizational Maintenance. |
| | (4) | Check fitting joints and steam tube for leaks. | Notify Organizational Maintenance if leaks occur. |
| | (5) | Check safety valves for steam leaks. | Notify Organizational Maintenance if leaks occur. |

## Section III.
## OPERATOR MAINTENANCE

### 3.3 REPAIR PARTS

A list of the components for repair parts is found in Appendix C.

This page left blank intentionally

## APPENDIX A

## COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

A.1 SCOPE

This appendix lists components of end item for the sterilizer to help you inventory items required for safe and efficient operation.

A.2 ITEMS LIST:

| ITEM | QUANTITY |
|---|---|
| Power Supply Cord Assembly, 110 V. | 1 |
| Sterilizer tray | 1 |

This page left blank intentionally

## APPENDIX B

## EXPENDABLE SUPPLIES AND MATERIALS LIST

### B.1 SCOPE

This appendix lists expendable supplies and materials needed to operate the sterilizer.

Petroleum Jelly, NSN 6505-00-254-5527

Gloves, Heat Protective, Type II, NSN 8415-01-092-3910

This page left blank intentionally

## APPENDIX C

## REPAIR PARTS LIST

C-1 REPAIR PARTS LIST.

This appendix lists repair parts for the sterilizer (reference Figure 1-1).

C-2 COMPONENT LIST:

| PART | QTY | FIGURE 1-1 | PART NUMBER | MANUFACTURER |
|---|---|---|---|---|
| Heater Assembly | 1 | 12 | F-1556 | Flextron Industries |
| Valve, Control | 1 | 13 | B-4CPA2-3 | NUPRO |
| Valve, Safety Boiler | 1 | 16 | 37 psig 115-1/4 | F. C. Kingston |
| Valve, Safety Chamber | 1 | 15 | 22 psig 115-1/4 | F. C. Kingston |
| Stem, Quick Disconnect | 1 | 10 | SS-QF4-S-4PF | Crawford |
| Body , Quick Disconnect | 1 | 10 | SS-QF4-S-4PM | Crawford |
| Petcock Air Release | 1 | 17 | 130 | Dana |
| Gauge | 1 | 9 | J0242 | General Signal |
| "O" Ring | 1 | 4 | MS28775-440 | Parker Hannifin |

This page left blank intentionally

## ALPHABETICAL INDEX