TM 8-6515-009-24&P

TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

DRAINAGE UNIT, PLEURAL CAVITY MODEL 6053

6515-01-259-4307

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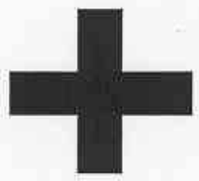
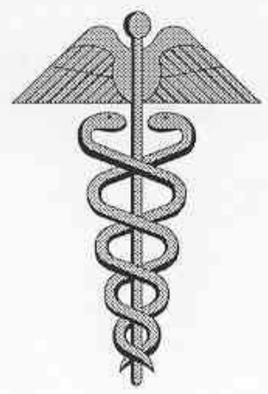
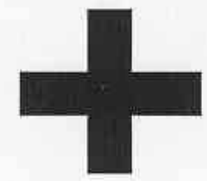
HEADQUARTERS, DEPARTMENT OF THE ARMY

NOVEMBER 1994

SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

Do not try to pull or grab the individual.

If possible, turn off the electrical power.

If you cannot turn off the electrical power, pull, push, or lift the person to safety using a dry wooden pole or a dry rope, or some other insulating material.

Send for help as soon as possible.

After the injured person is free of contact with the source of electrical shock, move the person a short distance away and immediately start artificial resuscitation.

Throughout this manual are WARNINGS, CAUTIONS, and NOTES. Please take time to read these. They are there to protect you and the equipment.

WARNING

Procedures which must be observed to avoid personal injury, and even loss of life.

CAUTION

Procedures which must be observed to avoid damage to equipment, destruction of equipment, or long-term health hazards.

NOTE

Essential information that should be remembered.

ELECTRICAL AND ELECTRONIC HAZARDS

» Severe injury or death can result when any part of your body comes in contact with live electrical circuits. Medical Equipment Repairers must be especially alert to the dangers of exposed circuits, terminals, power panels, and the like.

» The electrical parameter that injures and kills is CURRENT; the force that caused current to flow is called VOLTAGE. Voltage ratings are normally assigned to live electrical circuits, power supplies, and transmission lines. You should consider all voltages of 30 or more to be hazardous.

» The physiological effect of current flowing through the human body is related to the following factors:

- The path of the current through the body.
- The magnitude of the current.
- The duration of the voltage shock or discharge that causes current flow.
- The frequency of the voltage if alternating current.
- The susceptibility of damage to your heart from the current and from repeated shocks.

» Alternating current tends to concentrate near the body's surface because of the phenomenon of "skin effect." The higher the frequency of the alternating current voltage source, the more likely the current will tend to flow in or near the skin and away from internal body organs.

» The effect of current becomes more severe with the length of time that it flows through the body; a prolonged current flow can cause severe internal burns, collapse, unconsciousness, or death.

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DEPARTMENT OF THE ARMY
WASHINGTON, DC 30 NOVEMBER 1994

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) DRAINAGE UNIT, PLEURAL CAVITY MODEL 6053 6515-01-259-4307

You can help improve this manual. If you find any mistakes or if you know a way to improve procedures, please let us know. Mail your memorandum, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 (Recommended Changes to Equipment Technical Publications) located in the back of this manual to: Commander, U.S. Army Medical Materiel Agency, ATTN: SGMMA-M, Frederick, MD 21702-5001. A reply will be furnished directly to you.

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HOW TO USE THIS MANUAL

This manual provides all the information needed to understand the capabilities, functions, and characteristics of this equipment. It describes how to set up, operate, test, and repair the equipment. You must familiarize yourself with the entire manual before operating or beginning a maintenance task.

The manual is arranged by chapters, sections, and paragraphs followed by appendixes, a glossary, an index, and DA Forms 2028-2. Use the table of contents to help locate the chapter or section for the general subject area needed. The index will help locate more specific subjects.

Multiple figures and tables are provided for your ease in using this manual. Words that are both capitalized and in quotation marks are names of components or words that you will actually see on the equipment.

Chapter 3 provides a systematic method of inspecting and servicing the equipment. In this way, small defects can be detected early before they become a major problem causing the equipment to fail. Make a habit of doing the checks and services in the same order each time and anything wrong will be detected quickly.

Only perform maintenance functions specified in the maintenance allocation chart for your level of maintenance. Maintenance functions specified for higher levels of maintenance frequently require additional training; test, measurement, and diagnostic equipment; or tools.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Overview.

This manual describes the drainage unit (fig 1-1); provides equipment technical data; and provides operational and maintenance functions, services, and actions. Additional information follows:

a. Type of manual. Unit, direct support (DS), and general support (GS) maintenance (including repair parts and special tools list).

b. Model number and equipment name. Model number 6053, Drainage Unit, Pleural Cavity.

c. Purpose of equipment.

(1) To evacuate body fluids and/or air that can accumulate between the lung and chest wall (pleural space) following thoracic surgery, penetrating chest wounds, barotrauma, tracheal or bronchial rupture, or as a result of disease or a congenital defect.

(2) To evacuate blood from the mediastinal space following cardiac bypass surgery.

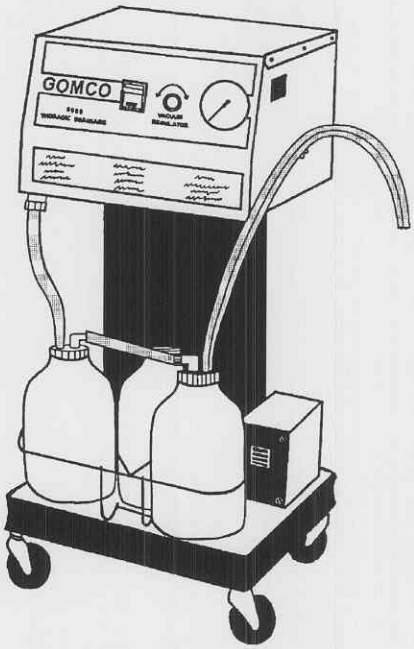

Figure 1-1. Drainage unit.

1-2. Explanation of abbreviations and terms.

Special or unique abbreviations, acronyms, and terms used in this manual are explained in the glossary.

1-3. Maintenance forms, records, and reports.

TB 38-750-2 prescribes forms, records, reports, and procedures.

1-4. Destruction of Army materiel to prevent enemy use.

AR 40-61 contains instructions for destruction and disposal of Army medical materiel. Also, the SB 8-75 series provides periodic information and/or instructions on the destruction of medical materiel.

1-5. Administrative storage.

a. Place the drainage unit in administrative storage for only short periods of time when a shortage of maintenance effort exists. This equipment should be in mission readiness condition within 24 hours or within the time factors determined by the directing authority. During the storage period, keep appropriate maintenance records.

b. Perform preventive maintenance checks and services (PMCS) listed in tables 3-1 and 3-2 before placing Army equipment in administrative storage. When equipment is removed from storage, perform PMCS to ensure its operational readiness.

c. Inside storage is preferred for equipment selected for administrative storage.

1-6. Preparation for storage or equipment.

Procedures to prepare the drainage unit for storing or shipping are listed in chapter 3, section IX.

1-7. Quality control (QC).

TB 740-10/DLAM 4155.5/AFR 67-43 contains QC requirements and procedures.

1-8. Nomenclature cross-reference list.

Table 1-1 identifies official versus commonly used nomenclatures.

Table 1-1. Nomenclature cross-reference list.

Common name	*Official nomenclature*
Brush	Brush, electrical contact
Cap	Bottle top
Cap assembly	Bottle top assembly
Drainage unit	Drainage unit, pleural cavity
Patient bottle	Bottle, 2800 mL
Power switch	Push switch
PVC tubing	Tubing, nonmetallic
Vacuum pump motor	Motor, alternating current
Vacuum regulator	Motor control

NOTE

A drainage unit is also referred to as a thoracic aspirator.

1-9. Reporting and processing medical materiel complaints and/or quality improvement reports.

AR 40-61 prescribes procedures for submitting medical materiel complaints and/or quality improvement reports for the drainage unit.

1-10. Warranty information.

A warranty is not applicable.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-11. Equipment characteristics, capabilities, and features.

a. The drainage unit is a self-contained high volume, low pressure unit with an integral mobile stand designed for indoor use. The motor-driven vacuum pump evacuates body fluids and/or air through tubing inserted surgically in the chest wall and connected to tubing that empty into a collection system. Two separate tubes must be inserted to remove both fluids and air.

b. The drainage unit operates from multiple voltages and frequencies.

c. The integral stand has four non-marking casters. Two casters include brakes.

d. A variable transformer controls the motor-driven vacuum pump to provide a vacuum range of 0 to 50 centimeters of water (cm H_2O).

e. The glass patient bottle and glass trap bottle are marked with graduations to 2800 milliliters (mL).

f. The drainage unit can operate continuously with its internal cooling fan.

1-12. Component and accessory descriptions.

a. Components (fig 1-2).

(1) *Control/pump module.* The control/pump module incorporates the motor-driven vacuum pump, the variable transformer, and the operational controls. A stainless steel cover provides a work surface and a black plastic handle mounted on the rear of the module provides for moving the drainage unit. The control/pump module also includes a night light and a 115-volt electrical receptacle on its underside.

(2) *Electrical power cable assembly.* The electrical power cable assembly, hanging down from the rear of the right side of the control/pump module, is connected directly into a receptacle for 115-volt operation.

(3) *Transformer.* The step-down transformer, located on the right side of the base assembly behind the patient bottle, is used for 230-volt operation.

(4) *Base assembly.* The base assembly incorporates four casters and the transformer for 230-volt operation.

(5) *Upright assembly.* The upright assembly is mounted on the base assembly and provides support for the control/pump module. The right side of the upright assembly provides cable clips for storing the electrical power cable assembly of the transformer. Cable clips mounted on the rear of the upright assembly provide for storage of the drainage unit electrical power cable assembly.

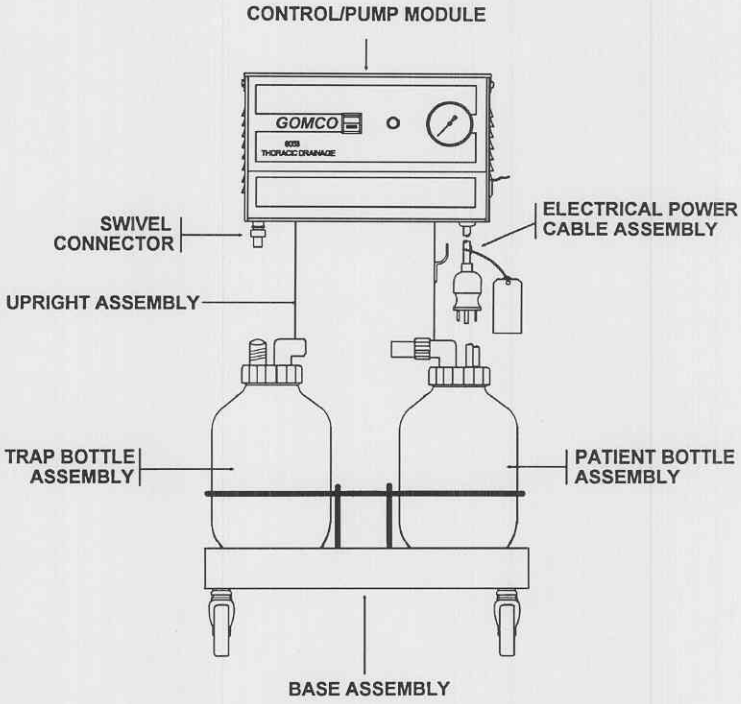

Figure 1-2. Components.

b. Accessories.

(1) *Patient bottle assembly.* The patient bottle assembly consists of a 2800-mL glass bottle and a patient bottle cap assembly.

(2) *Trap bottle assembly.* The trap bottle assembly consists of a 2800-mL glass bottle and a trap bottle cap assembly.

(3) *Patient tube cap.* A patient tube cap is used to seal off one of the two patient tubes when only one patient tube is required for use.

1-13. Tabulated data, decals, and data plates.

The tabulated data provides miscellaneous characteristics, specifications, and other information for the drainage unit.

a. Miscellaneous characteristics and specifications. Table 1-2 and table 1-3 provide a broad range of miscellaneous characteristics and specifications to include operating voltages, vacuum range, flow rate, storing temperature range, dimensions, and weight.

Table 1-2. Miscellaneous characteristics.

Dimensions	
Height	84.46 cm (33.25 in)
Width	45.72 cm (18 in)
Depth	43.18 cm (17 in)
Weight	32.23 kg (71 lb)
Patient bottle capacity	2800 mL
Trap bottle capacity	2800 mL
Duty cycle (w/fan)	Continuous

Table 1-3. Specifications.

Voltages/frequencies	115 VAC, 50/60 Hz or 230 VAC, 50/60 Hz
Vacuum range	0 to 50 cm H_2O
Open flow rate	130 lpm
Vacuum pump motor	0 to 115 VAC
Storage temperature range	-17.78°C (0°F) to 48.9°C (120°F)
Humidity	90% maximum

b. Identification, instruction, and warning plates, decals, or markings.

(1) The drainage unit manufacturer data plate (located on the right side of the control/pump module) is depicted in figure 1-3.

Figure 1-3. Manufacturer data plate.

(2) A decal (located on the right side of the control/pump module) providing operating instructions is depicted in figure 1-4.

NOTE

The drainage unit is referred to as a suction apparatus on the decal.

(3) Imprinting (located on the front panel of the control/pump module) providing danger and caution notices is depicted in figure 1-5.

(4) A voltage conversion decal (located on the top of the transformer cover) is depicted in figure 1-6.

OPERATION PROCEDURE

1. FILL THE "PATIENT BOTTLE" WITH STERILE WATER TO THE 2CM MARK ON THE GRADUATED WATER SEAL TUBES.
2. BE SURE ALL TUBING, AND BOTTLE TOPS ARE TIGHT.
3. THE POWER SWITCH ON THE FRONT PANEL SHOULD BE IN THE OFF POSITION.
4. THE VOLTAGE SUPPLY (115V.50-60 HZ OR 230V.50-60 HZ) OF THE ROOM THAT THE SUCTION APPARATUS IS TO BE USED IN MUST BE DETERMINED. FOR 115 VOLT USE, THE POWER CORD EXTENDING DOWN FROM THE LEFT CORNER OF THE STAND BODY (PARALLEL BLADED PLUG) SHOULD BE PLUGGED DIRECTLY INTO THE 115 VOLT RECEPTACLE. FOR 230 VOLT USED, PLUG THE POWER CORD EXTENDING DOWN FROM THE LEFT CORNER OF THE STAND BODY (PARALLEL BLADED PLUG) INTO THE TRANSFORMER RECEPTACLE AT THE REAR OF THE STAND BASE. PLUG THE POWER CORD EXTENDING OUT OF THE OPPOSITE END OF THE TRANSFORMER (STRAIGHT BLADED PLUG) INTO THE 230 VOLT RECEPTACLE.
5. TURN THE POWER SWITCH TO THE "ON" POSITION. THE LIGHT AND THE SWITCH INDICATES THE POWER IS ON.
6. TURN THE REGULATOR KNOB CLOCKWISE TO INCREASE THE VACUUM LEVEL, COUNTER-CLOCKWISE TO DECREASE THE VACUUM LEVEL. BUBBLING SHOULD BE NOTICED IN THE BOTTLE WITH THE WATER SEAL.
7. WITH THE PUMP RUNNING, PINCH OFF THE TWO (2) PATIENT TUBES AND ADJUST THE VACUUM LEVEL TO THE DESIRED AMOUNT. (THIS SETTING WILL BE THE MAXIMUM VACUUM.) IF ONLY ONE PATIENT TUBE IS USED, THE UNUSED FITTING IN THE PATIENT BOTTLE TOP SHOULD BE CAPPED-OFF WITH PART NO. 3099.
8. YOUR THORACIC PUMP IS NOW READY FOR PATIENT USE.

NOTE: PLEURAL VACUUM IS DETERMINED BY SUBTRACTING THE PRESSURE HEAD OF THE WATER SEAL FROM THE VACUUM INDICATED ON THE GAUGE.

EXAMPLE: THE READING ON THE GAUGE (CM H_2O) MINUS THE DISTANCE THE WATER SEAL TUBE IS IMMERSED (CM) EQUALS THE APPROXIMATE NEGATIVE PRESSURE AVAILABLE.

Figure 1-4. Operating instructions decal.

DANGER	CAUTION
POSSIBLE EXPLOSION HAZARD IF USED IN PRESENCE OF FLAMMABLE ANESTHETICS	ELECTRIC SHOCK HAZARD. DO NOT REMOVE COVER. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

Figure 1-5. Front panel imprinting.

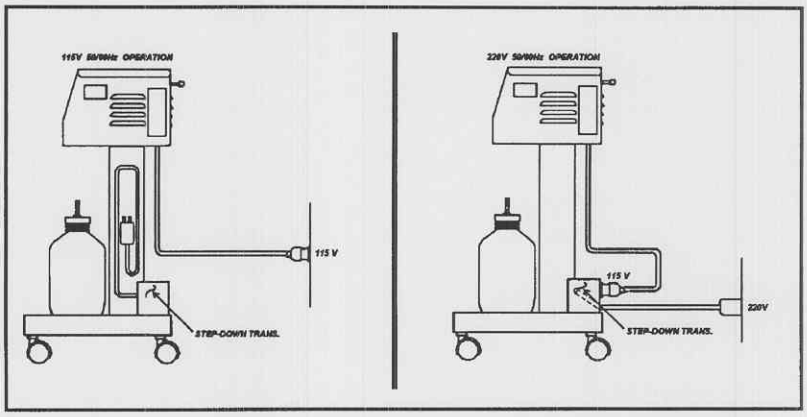

Figure 1-6. Voltage conversion decal.

NOTE

The decal on top of the transformer cover should reflect 230 V, not 220 V.

(5) A cardboard tag (fastened to the electrical power cable assembly) providing electrical information is depicted in figure 1-7.

(6) A decal (located on the rear of the upright assembly) providing information about the transformer fuse is depicted in figure 1-8.

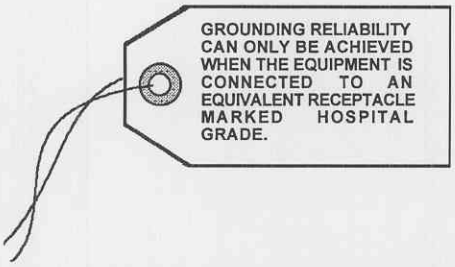

Figure 1-7. Cardboard instruction tag.

FUSE REPLACEMENT

1. Disconnect the transformer from its 230 volt power source.
2. Unscrew the fuse cap located on the transformer.
3. Discard the blown fuse and insert a new 3 amp type AGC-3 fuse.
4. Screw the fuse cap on to the transformer.

Figure 1-8. Transformer fuse decal.

1-14. Model differences.

Model differences are not applicable since this manual covers a single model.

1-15. Safety, care, and handling.

a. Observe each WARNING, CAUTION, and NOTE in this manual.

b. Read the operating instructions in this manual before operating the unit. Refer servicing to qualified Medical Equipment Repairer personnel.

c. Empty the patient bottle when patient fluids reach its last graduation (2800 mL) to prevent overflow into the trap bottle which protects the vacuum pump motor against fluids.

d. Prevent kinks in the tubing which could reduce or stop aspiration of patient fluids or air.

e. Operator/user personnel will not remove the control/pump module cover. There is a danger of electric shock.

f. Do not use the drainage unit in the presence of flammable anesthetics to preclude a possible explosion.

Section III. PRINCIPLES OF OPERATION

1-16. Basic Operation (fig 1-9).

a. The vacuum for the drainage unit is developed by a two-stage vacuum pump controlled by a variable voltage transformer. Increasing the output voltage of the variable voltage transformer increases the revolutions per minute (rpm) of the vacuum pump motor which increases the amount of vacuum.

b. Patient fluids and/or air are drawn into the patient bottle, in which a water seal was formed by submerging the open ends of the tubes into two centimeters (cm) of sterile water, in the bottom of the patient bottle. This water seal maintains the vacuum in the drainage unit and prevents any patient fluids and/or air from re-entering the pleural cavity if the unit loses electrical power or is accidentally turned off. A second bottle, placed between the patient bottle and the vacuum pump, protects the unit against the overflow of patient fluids.

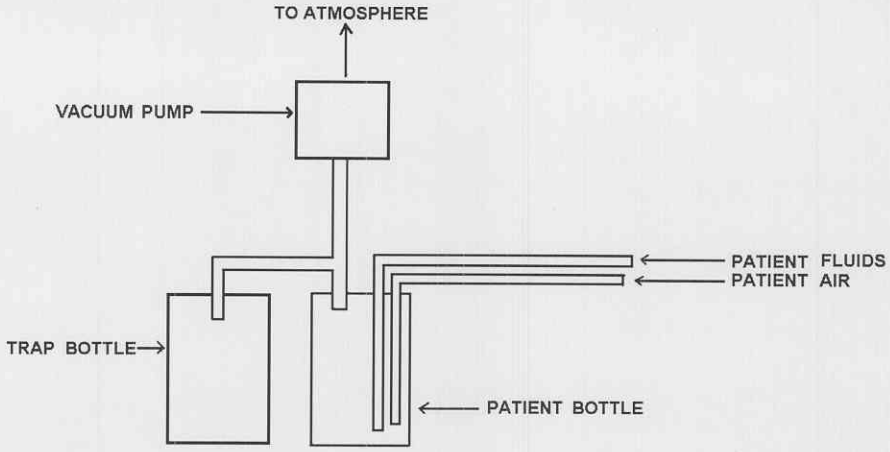

Figure 1-9. Vacuum cycle.

1-17. Noise Suppression.

Noise created by the operation of the vacuum pump motor is suppressed by lining the pump/control module with an insulation materiel.

CHAPTER 2

OPERATING INFORMATION AND INSTRUCTIONS

Section I. PREPARATION FOR OPERATION

2-1. Scope.

This manual is primarily intended to provide information, instructions, and procedures for the maintenance of the drainage unit. The operating information and instructions, while valid, do not provide sufficient information for use of the drainage unit on a patient. Only qualified medical personnel are trained in specific drainage techniques and procedures.

2-2. Assembly.

a. Patient bottle (fig 2-1).

(1) Unscrew the cap assembly from the patient bottle. Set the bottle aside.

(2) Install the two water seal tubes onto the cap assembly.

(3) Replace the cap assembly onto the patient bottle.

(4) Place the patient bottle into its brackets on the right side of the base assembly.

b. Trap bottle (fig 2-2).

(1) Unscrew the cap assembly from the trap bottle. Set the bottle aside.

(2) Install the splash tube onto the cap assembly.

(3) Replace the cap assembly onto the trap bottle.

(4) Place the trap bottle into its brackets on the left side of the base assembly.

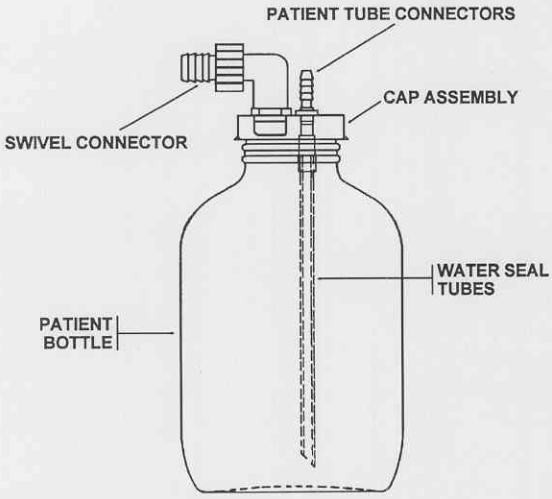

Figure 2-1. Patient bottle.

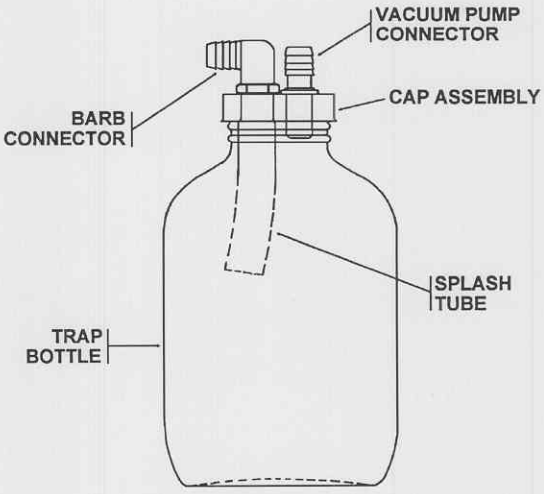

Figure 2-2. Trap bottle.

c. Tubing (fig 2-3).

(1) Connect the bottle to pump tube from the trap bottle cap assembly to the vacuum pump swivel connector located on the underside of the control/pump module.

(2) Install the bottle to bottle tube between the patient bottle swivel connector and the barb connector on the trap bottle.

(3) Connect each patient tube onto the patient bottle cap assembly.

NOTE

If only one patient tube is required, close the unused fitting on the patient bottle cap assembly with a patient tube cap.

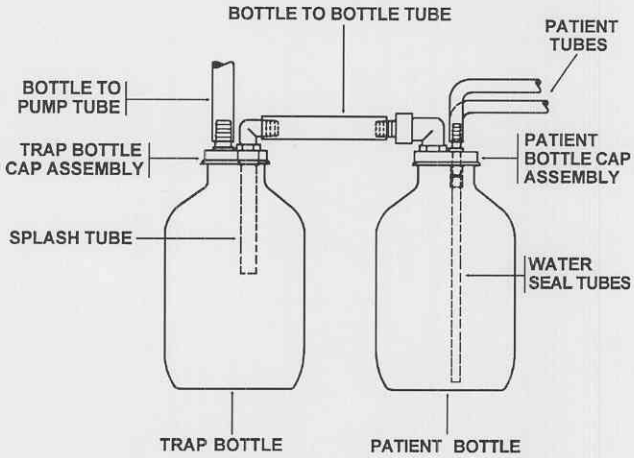

Figure 2-3. Patient drainage system.

Section II. OPERATING INFORMATION

2-3. Controls and indicators (fig 2-4).

a. Power switch. The white rocker switch with a built-in indicator controls electrical power to the drainage unit. The indicator illuminates in the "ON" position.

b. "VACUUM REGULATOR." The vacuum regulator is used to increase ("INC") or decrease ("DEC") the vacuum level as required.

c. Vacuum gauge. The analog vacuum gauge displays the vacuum as determined by the vacuum regulator.

d. Light switch. The rocker switch is used to supply electrical power to the night light to illuminate the patient drainage system during hours of darkness.

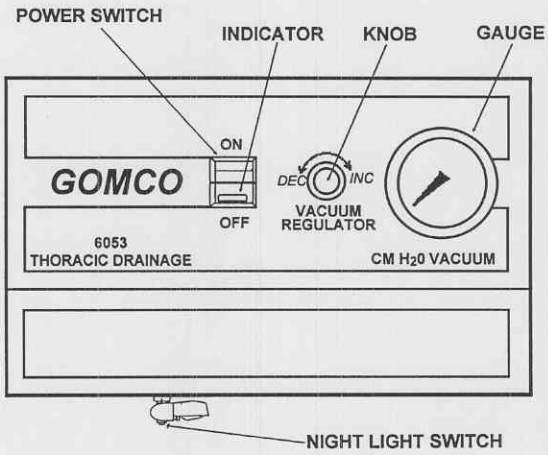

Figure 2-4. Controls and indicators.

Section III. OPERATING INSTRUCTIONS

2-4. Initial start-up procedures.

a. Roll the drainage unit either to an equipment preparation area or to the area of use.

b. Ensure that the power switch is in its "OFF" position or depress the switch to its "OFF" position.

c. Remove the coiled electrical power cable assembly from the cable clips mounted on the rear of the upright assembly.

d. Connect the electrical power cable assembly into a 115-volt electrical receptacle.

NOTE

Voltage conversion procedures are provided in paragraph 3-31 if only 230-volt electrical receptacles are available.

e. Disconnect the tubes from the patient bottle cap assembly and then remove the cap assembly.

f. Pour sterile water into the patient bottle until it reaches the 2-cm mark on the graduated water seal tubes as illustrated in figure 2-5.

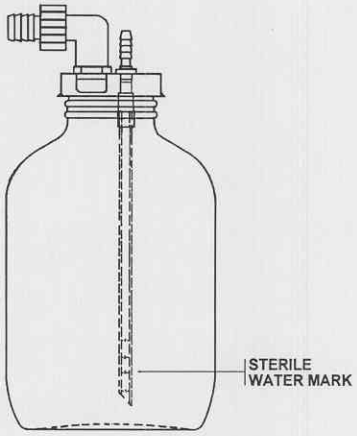

Figure 2-5. Water seal.

g. Replace the patient bottle cap assembly and then reinstall the tubes.

h. Verify that the patient drainage system is in place and assembled in accordance with the procedures contained in paragraph 2-2.

i. Turn the vacuum regulator knob to its maximum counterclockwise position.

j. Depress the power switch to the "ON" position.

NOTE

The red indicator within the white power switch will illuminate.

k. Pinch or clamp the two patient tubes.

l. Rotate the vacuum regulator knob clockwise until the vacuum gauge indicates the desired vacuum (fig 2-6).

m. Reopen the patient tubes. The drainage unit is now ready for patient use.

Figure 2-6. Vacuum gauge.

2-5. Routine start-up procedures.

Routine start-up procedures will follow the initial start-up procedures except for differences involving assembly in accordance with your unit's standard operating procedures.

2-6. Operating procedures.

a. Observe periodically the level of liquid in the patient bottle and empty it in accordance with your unit's standard operating procedures.

b. Observe the patient bottle for bubbling and observe the patient tube for the flow of patient fluids.

2-7. Shut-down procedures.

Shut-down procedures are as follows:

a. Disconnect the patient tubes.

b. Depress the power switch to its "OFF" position. Observe that its red indicator also turns off.

c. Refer to this chapter, section V for cleaning, disinfecting, and sterilizing procedures.

Section IV. OPERATION OF AUXILIARY EQUIPMENT

2-8. Associated support items of equipment.

The drainage requires no associated support items of equipment other than an electrical power generator, which is shared with multiple items of surgical equipment for electrical power.

2-9. Associated material.

Associated material is identified in appendix D and appendix E.

Section V. CLEANING, DISINFECTING, AND STERILIZING PROCEDURES

2-10. General.

a. The drainage unit and operating accessories should be clean at all times. Specific cleaning, disinfecting, and/or sterilizing procedures are provided in subsequent paragraphs.

b. Follow your unit's standard operating procedures for the use of personal protective equipment when cleaning or disinfecting the components and accessories. Personal protective equipment may include goggles, mask, gloves, and gown or other suitable clothing.

2-11. Drainage unit.

a. Cleaning.

(1) Disconnect the electrical power cable assembly from the electrical receptacle.

(2) Disconnect the bottle to pump tube from the swivel connector on the underside of the control/pump module.

(3) Remove the bottle to bottle tube.

(4) Remove the trap bottle assembly and patient bottle assembly from the base assembly. Set them aside.

(5) Wipe the drainage unit using a mild detergent and a soft cloth.

(6) Dry the drainage unit with a soft cloth.

b. Disinfecting. Disinfect the drainage unit by wiping it with a liquid disinfectant or lightly spraying it with disinfectant in accordance with your unit's standard operating procedures.

2-12. Patient Bottle Assembly.

a. Cleaning.

(1) Remove the patient tubes from the patient bottle cap assembly.

(2) Disconnect the bottle to bottle tube from the swivel connector on the patient bottle cap assembly.

(3) Unscrew the patient bottle cap assembly.

(4) Remove the two water seal tubes from the patient bottle cap assembly.

(5) Dispose of patient fluids in accordance with your unit's standard operating procedures.

(6) Immerse the patient bottle, cap assembly, water seal tubes, and patient tubes in a warm detergent solution.

(7) Scrub all components using a nylon bristle brush.

(8) Rinse the components in water and then aerate.

b. Sterilizing. Sterilize all components in a steam sterilizer at 121°C (250°F) for 15 minutes.

WARNING

DO NOT flash sterilize the patient bottle.

NOTE

Ethylene oxide (EtO) may also be used for sterilization.

2-13. Trap bottle assembly.

a. Cleaning.

(1) Remove the bottle to bottle tube from the barb connector on the trap bottle cap assembly.

(2) Remove the bottle to pump tube from the trap bottle cap assembly and the pump swivel connector.

(3) Unscrew the trap bottle cap assembly.

(4) Remove the splash tube from the trap bottle cap assembly.

(5) Immerse the trap bottle assembly, cap assembly, bottle to pump tube, and bottle to bottle tube in a warm detergent solution.

(6) Scrub all components using a nylon bristle brush.

(7) Rinse all components in water and then aerate.

b. Sterilizing. Sterilize all components in a steam sterilizer at 121°C (250°F) for 15 minutes.

WARNING

DO NOT flash sterilize the trap bottle.

NOTE

EtO may also be used for sterilization.

Section VI. OPERATION UNDER UNUSUAL CONDITIONS

2-14. General.

The drainage unit is designed to operate only within a medical treatment facility.

CHAPTER 3

UNIT LEVEL MAINTENANCE

Section I. GENERAL INFORMATION

3-1. Overview.

a. Unit level maintenance. This level of maintenance is the responsibility of and performed by a using unit on its assigned equipment. Responsibilities are stratified as follows:

(1) *Operator maintenance.* This segment of unit level maintenance is performed by operator/user personnel and consists of equipment operational functions; routine services like cleaning, dusting, washing, checking for frayed cables, and stowing items not in use; and checking for loose hardware, replacing operator accessories, and replacing operator repair parts. Replacing operator parts will not require extensive disassembly or assembly of the end item, critical adjustments after replacement, or the extensive use of tools.

(2) *Specialist maintenance.* This segment of unit level maintenance is performed only by trained Medical Equipment Repairers. The functions and services include—

(a) Scheduling and performing PMCS, electrical safety inspections and tests, and calibration/verification/certification (CVC) services.

(b) Performing unscheduled maintenance functions with emphasis on replacing assemblies, modules, or PCBs, when available.

(c) Operating a repair parts program to include Class VII repair parts as well as other commodity class repair parts used on medical equipment.

(d) Maintaining a library of technical manuals (TMs), manufacturers' literature, repair parts information, and related materials.

(e) Conducting inspections on new or transferred equipment.

(f) Establishing administrative procedures for the control and administration of maintenance services in accordance with TB 38-750-2.

(g) Notifying support maintenance battalions of requirements and/or evacuating unserviceable equipment, assemblies, or modules.

b. Maintenance functions. Maintenance functions, both preventive and corrective, which are beyond the scope of the operator/user are assigned to unit level Maintenance Equipment Repairer personnel. These personnel will perform the majority of maintenance required for the equipment except some tasks involving the vacuum pump, PCB, or stand.

3-2. Tools and test equipment.

Common tools and test equipment required for unit level maintenance of the equipment are listed in appendix B, section III of this manual. Refer to your unit's modified table of organization and equipment (MTOE) for authorized items.

3-3. Components of end item and basic issue items.

Components of end item and basic issue items are listed in appendix C, sections II and III of this manual.

3-4. Expendable supplies.

Expendable and durable supplies and materials required for maintenance of the equipment are listed in appendix D, section II of this manual.

3-5. Repair parts.

Repair parts required for unit level maintenance are listed in appendix E, section II of this manual.

3-6. Special tools.

Special tools required for unit level maintenance of the equipment are listed in appendix E, section III of this manual.

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

3-7. Unpacking the drainage unit.

a. Remove the straps from the cardboard shipping container.

b. Open the top flaps of the container.

c. Lift upward on the shipping container body and remove it. Set it aside.

d. Remove the foam blocks from under the base assembly. Set them aside.

e. Lift and roll the drainage unit off the shipping container base. Set it aside.

f. Open the small cardboard carton setting on the base assembly and remove the contents. Set the box aside.

g. Verify receipt of the following materiel:

(1) Drainage unit.

(2) Operation, maintenance and service manual (2).

(3) Patient bottle w/cap assembly.

(4) Trap bottle w/cap assembly.

(5) Bottle, 2800 mL (spare).

(6) Patient tube (2).

(7) Bottle to bottle tube.

(8) Bottle to pump tube.

(9) Water seal tube (2).

(10) Splash tube.

(11) Patient tube cap.

Section III. LUBRICATION INSTRUCTIONS

3-8. General.

No lubrication of the drainage unit is required.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-9. General.

a. The drainage unit must be inspected and serviced systematically to ensure that it is ready for operation at all times. Inspection will allow defects to be discovered and corrected before they result in serious damage of failure.

b. Table 3-1 contains a list of items to be performed by unit level operator/user personnel. This PMCS table is also referred to as "-10 PMCS" requirements. Preventive maintenance by operator/user personnel is not limited to performing the checks and services in table 3-1. There are things operator/user personnel should do any time they need to be done, such as checking general cleanliness, observing for improper operational indicators, and maintaining the proper quantities of accessories.

c. Table 3-2 contains a list of items to be performed by unit level Medical Equipment Repairers. This PMCS table is also referred to as "-20 PMCS" requirements.

d. Some items to be inspected will be listed in both table 3-1 and table 3-2 to stress their importance, to provide a quality control check on multiple operator/user personnel, and to identify more comprehensive procedures to be accomplished by unit level Medical Equipment Repairers.

e. The following is a list of both PMCS table column headings with a description of the information found in each column:

(1) *Item No.* This column shows the sequence in which to do the PMCS, and is used to identify the equipment area on the Equipment Inspection and Maintenance Worksheet, DA Form 2404.

(2) *Interval.* This column shows when each PMCS item is to be serviced: **B**-Before Operation, **D**-During Operating, **A**-After Operation, **Q**-Quarterly, and **S**-Semiannually. **B**, **D**, and **A** should be performed with daily use of the equipment.

NOTE

When the drainage unit must be kept in continuous operation, check and service only those items that will not disrupt operation. Perform the complete daily checks and services when the equipment can be shut down.

(3) *Item to be Inspected and Procedure.* This column identifies the general area or specific part to be checked or serviced.

(4) *Equipment is not Ready/Available if:.* This column lists conditions that make the equipment unavailable or unusable.

3-10. Reporting deficiencies.

Operator/user personnel will report problems with the drainage unit discovered during their "-10 PMCS" that they are unable to correct. Refer to TB 38-750-2 and report the deficiency using the proper forms. Consult with your unit Medical Equipment Repairer if you need assistance.

Table 3-1. Operator preventive maintenance checks and services.

ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
1						**Drainage unit.**	
	X		X	X		*a.* Ensure that all components and accessories are on hand.	Missing components or accessories prevent operation of the drainage unit.
	X	X	X	X		*b.* Verify drainage unit operation.	Operation indicates a malfunction or a hazardous situation.
2						**Control/pump module.**	
	X		X		X	*a.* Check for a broken, damaged, or inoperable power switch.	A broken, damaged, or inoperable switch prevents operation.

Table 3-1. Operator preventive maintenance checks and services - continued.

ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
	X		X		X	*b.* Check for a broken or inoperable power switch indicator.	A broken or inoperable indicator prevents operation.
	X				X	*c.* Check that the vacuum regulator rotates easily from its maximum counterclockwise position to its maximum clockwise position.	An inoperable vacuum regulator prevents proper operation.
	X				X	*d.* Inspect the electrical power cable assembly for cuts, fraying, or other physical damage.	The condition of the cable assembly prevents operation or causes a safety hazard.
	X				X	*e.* Rotate the vacuum regulator and ensure the vacuum gauge varies from 0 to 50 cm H_2O.	A defective vacuum gauge causes a safety hazard to a patient.
3	X				X	**Upright assembly.** Check that the upright assembly is tightly connected to the control/pump module and the base assembly.	The physical assembly of the drainage unit prevents safe operation.
4						**Base assembly.**	
	X	X			X	*a.* Ensure that the bottle bracket holds the patient bottle and trap bottle in place.	Missing or broken bottle bracket would allow the patient bottle or trap bottle to fall off the base assembly.
	X				X	*b.* Check the transformer for tight mounting to the base assembly.	A loose transformer could fall from the base assembly and interrupt patient treatment.
5	X		X		X	**Drainage system.** Check the drainage system for proper assembly as illustrated in figure 2-3.	Improper assembly prevents operation.

Table 3-2. Repairer preventive maintenance checks and services.

ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
1						**Drainage unit.**	
				X		*a.* Verify that components have been inventoried and/or requisitioned by operator/ user personnel.	Missing components prevent operation.
				X		*b.* Verify the results of operator/ user tests.	Operator/user tests indicate improper operation.
				X		*c.* Verify operation by performing repairer PMCS.	PMCS results indicate improper or unsafe operation.
2						**Control/pump module.**	
					X	*a.* Check for a broken, damaged, or inoperable power switch.	A broken, damaged, or inoperable switch prevents operation.
					X	*b.* Check for a broken or inoperable power switch indicator.	A broken or inoperable indicator prevents safe operation.
					X	*c.* Check that the vacuum regulator varies the vacuum with a corresponding increase or decrease on the vacuum gauge.	An inoperable vacuum regulator prevents proper operation.
					X	*d.* Verify the range of available vacuum.	A proper range of vacuum is not obtainable.
					X	*e.* Inspect the electrical power cable assembly for cuts, deterioration, fraying, or other physical damage.	The condition of the cable assembly prevents operation or causes a safety hazard.
3					X	**Upright assembly.** Check that the upright assembly is tightly connected to the control/pump module and the base assembly.	The physical assembly of the drainage unit prevents safe operation.
4						**Base assembly.**	
					X	*a.* Ensure that the bottle bracket holds the patient bottle and trap bottle in place.	A missing or broken bottle bracket would allow the bottles to fall off the base assembly.
					X	*b.* Check the transformer for tight mounting to the base assembly.	A loose transformer could fall from the base assembly and interrupt patient treatment.

Section V. OPERATIONAL TESTING

3-11. General.

This section contains procedures for operational testing of the drainage unit by both operator/user personnel and Medical Equipment Repairer personnel. Deficiencies identified by operator/user personnel should be reported to Medical Equipment Repairer personnel.

3-12. Operator/user tests.

a. Vacuum pump test.

(1) Verify that the components of the drainage unit are assembled in accordance with the procedures contained in paragraph 2-2 and illustrated in figure 3-1.

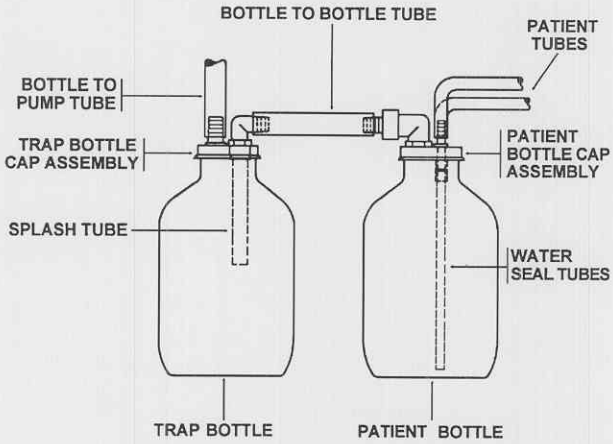

Figure 3-1. Patient drainage system.

(2) Ensure that the power switch is in its "OFF" position or depress the switch to its "OFF" position.

(3) Disconnect the two patient tubes and the bottle to bottle tube from the patient bottle cap swivel connector.

(4) Unscrew the patient bottle cap assembly.

(5) Pour sterile water into the patient bottle until it reaches the 2-cm mark on the graduated water seal tubes as illustrated in figure 3-2.

(6) Replace the patient bottle cap assembly.

(7) Reconnect the two patient tubes and the bottle to bottle tube to the patient bottle cap assembly.

NOTE

Only one patient tube is required to test the vacuum pump, but the unused fitting on the patient bottle cap assembly must be closed with the patient tube cap.

(8) Remove the coiled electrical power cable assembly from the cable clips mounted on the rear of the upright assembly.

(9) Connect the electrical power cable assembly into a 115-volt electrical receptacle.

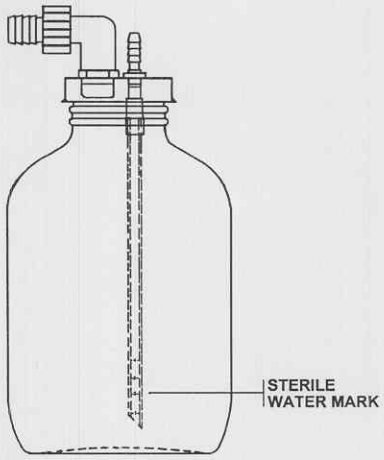

Figure 3-2. Water seal.

NOTE

Voltage conversion procedures are provided in paragraph 3-31 if only 230-volt electrical receptacles are available.

(10) Turn the vacuum regulator knob to its maximum counterclockwise position.

(11) Depress the power switch to its "ON" position.

NOTE

The red indicator within the power switch will illuminate.

(12) Pinch or clamp the patient tube(s) closed.

(13) Turn the vacuum regulator knob to its maximum clockwise position.

(14) Observe that the vacuum gauge (fig 3-3) indicates a minimum of 50 cm H_2O. Record the vacuum level.

(15) Open the patient tube(s) momentarily until the vacuum gauge indicates "0" and then pinch or clamp the patient tube(s) again.

NOTE

The vacuum gauge may indicate a slight vacuum when the drainage unit is operating and vacuum regulator knob is turned fully counterclockwise because of the vacuum pump design.

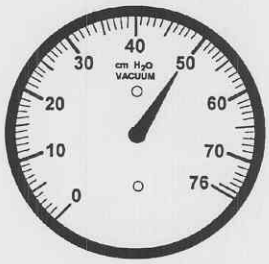

Figure 3-3. Vacuum level requirement.

(16) Observe and record the vacuum level.

(17) Notify your unit Medical Equipment Repairer if the vacuum gauge indicates less than 50 cm H_2O.

(18) Open the patient tube(s) and perform the next test.

b. Vacuum regulator test.

NOTE

Follow procedures (1) through (12) of the preceding vacuum pump test if this test is performed independently.

(1) Turn the vacuum regulator knob clockwise approximately 1/4-turn.

(2) Observe the vacuum gauge for approximately 1 minute and verify that the vacuum gauge stabilizes at that level.

(3) Repeat procedures (1) and (2) above until the vacuum regulator knob is fully clockwise.

(4) Open the patient tube(s) and shut down the drainage unit by following the procedures in paragraph 2-7.

NOTE

Notify your Medical Equipment Repairer if the vacuum gauge does not stabilize at each of the four positions.

3-13. Medical Equipment Repairer tests.

a. Vacuum test.

(1) Verify that the components of the drainage unit are assembled in accordance with the procedures contained in paragraph 2-2 and illustrated in figure 3-1.

(2) Ensure that the power switch is in its "OFF" position or depress the switch to its "OFF" position.

(3) Disconnect the two patient tubes and the bottle to bottle tube from the patient bottle cap swivel connector.

(4) Unscrew the patient bottle cap assembly.

(5) Pour sterile water into the patient bottle until it reaches the 2-cm mark on the graduated water seal tubes as illustrated in figure 3-2.

(6) Replace the patient bottle cap assembly.

(7) Reconnect the two patient tubes and the bottle to bottle tube to the patient bottle cap assembly.

NOTE

Only one patient tube is required to test the vacuum pump, but the unused fitting on the patient bottle cap assembly must be closed with the patient tube cap.

(8) Remove the coiled electrical power cable assembly from the cable clips mounted on the rear of the upright assembly.

(9) Connect the electrical power cable assembly into a 115-volt electrical receptacle.

NOTE

Voltage conversion procedures are provided in paragraph 3-31 if only 230-volt electrical receptacles are available.

(10) Turn the vacuum regulator knob to its maximum counterclockwise position.

(11) Depress the power switch to its "ON" position.

NOTE

The red indicator within the power switch will illuminate.

(12) Connect the calibrator-analyzer into one of the patient tubes. Set it up to measure the value of vacuum developed.

(13) Pinch or clamp the second patient tube to close it.

NOTE

Only one patient tube is required to test the vacuum pump, but the unused fitting on the patient bottle cap assembly must be closed with the patient tube cap.

(14) Turn the vacuum regulator knob clockwise until the calibrator-analyzer indicates 10, 20, 30, 40, and 50 cm H_2O while observing and recording the drainage unit vacuum gauge indications. Refer to figure 3-4.

NOTE

The drainage unit vacuum gauge should be ±2 graduations of the calibrator-analyzer values.

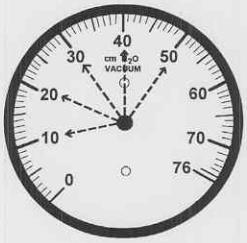

Figure 3-4. Vacuum test values.

(15) Turn the vacuum regulator knob fully clockwise.

(16) Observe and record both values.

(17) Perform the applicable troubleshooting procedures in accordance with this chapter, section VI, if any vacuum gauge value deviates more than ±2 mm H_2O or exceeds 60 mm H_2O.

(18) Shut down the drainage unit by following the procedures in paragraph 2-7.

(19) Remove the calibrator-analyzer from the patient tube.

b. Flow rate test.

(1) Verify that the components of the drainage unit are assembled in accordance with the procedures contained in paragraph 2-2 and illustrated in figure 3-1.

(2) Ensure that the power switch is in its "OFF" position or depress the switch to its "OFF" position.

(3) Disconnect the two patient tubes and the bottle to bottle tube from the patient bottle cap swivel connector.

(4) Unscrew the patient bottle cap assembly.

(5) Pour sterile water into the patient bottle until it reaches the 2-cm mark on the graduated water seal tubes as illustrated in figure 3-2.

(6) Replace the patient bottle cap assembly.

(7) Reconnect the two patient tubes and the bottle to bottle tube to the patient bottle cap assembly.

NOTE

Only one patient tube is required to test the vacuum pump, but the unused fitting on the patient bottle cap assembly must be closed with the patient tube cap.

(8) Remove the coiled electrical power cable assembly from the cable clips mounted on the rear of the upright assembly.

(9) Connect the electrical power cable assembly into a 115-volt electrical receptacle.

NOTE

Voltage conversion procedures are provided in paragraph 3-31 if only 230-volt electrical receptacles are available.

(10) Turn the vacuum regulator knob to its maximum counterclockwise position.

(11) Depress the power switch to its "ON" position.

NOTE

The red indicator within the power switch will illuminate.

(12) Connect the calibrator-analyzer into one of the patient tubes. Set it up to measure air flow.

(13) Pinch or clamp the second patient tube to close it.

(14) Turn the vacuum regulator knob fully clockwise.

(15) Observe the flow rate value on the calibrator-analyzer and verify that the open flow is 130 lpm.

(16) Perform the applicable troubleshooting procedures in accordance with this chapter, section VI, if the free flow is less than 130 lpm.

(17) Shut down the drainage unit by following the procedures in paragraph 2-7.

(18) Remove the calibrator-analyzer from the patient tube.

Section VI. TROUBLESHOOTING

3-14. General.

a. Troubleshooting information for drainage unit operator/user personnel and for Medical Equipment Repairer personnel is provided in this section. Corrective actions beyond the capability or authority of operator/user personnel will be indicated by the phrase "Notify your unit's Medical Equipment Repairer."

b. This manual cannot list all possible malfunctions. If a malfunction is either not listed or is not determined by routine diagnostic procedures, notify your appropriate maintenance support unit.

3-15. Operator/user troubleshooting.

Operator/user troubleshooting procedures are provided in table 3-3. Each symptom is followed by possible causes and corrective actions.

Table 3-3. Operator/user troubleshooting.

SYMPTOM / POSSIBLE CAUSE	CORRECTIVE MAINTENANCE
1. POWER INDICATOR DOES NOT ILLUMINATE.	
Power switch not depressed to "ON" position.	Depress power switch.
Electrical power cable assembly not connected to a source of electrical power.	Connect the electrical power cable assembly to the correct electrical receptacle.
Electrical power cable assembly is defective.	Notify your unit's Medical Equipment Repairer.
2. NO SUCTION (VACUUM PUMP WORKING).	
Loose or open tubing connection(s).	Check and tighten tubing connections.
Defective gauge.	Notify your unit's Medical Equipment Repairer.
Cap assembly loose.	Tighten cap assembly.
Defective vacuum regulator.	Notify your unit's Medical Equipment Repairer.
3. LOW SUCTION.	
Loose tubing connections.	Tighten tubing connections.
Defective vacuum regulator.	Notify your unit's Medical Equipment Repairer.
Defective patient bottle assembly.	Replace assembly.
Defective trap bottle assembly.	Replace assembly.

3-16. Medical Equipment Repairer troubleshooting.

a. Medical Equipment Repairer troubleshooting procedures are provided in table 3-4. Each symptom is followed by possible causes and corrective actions.

Table 3-4. Medical Equipment Repairer troubleshooting.

SYMPTOM / POSSIBLE CAUSE	CORRECTIVE MAINTENANCE
1. POWER INDICATOR DOES NOT ILLUMINATE.	
Electrical power cable assembly is defective.	Repair or replace assembly.
Defective 115-volt electrical receptacle.	Notify your unit's power distribution personnel or correct the problem within the International Standards Organization (ISO) shelter.
Defective power switch.	Replace switch.

Table 3-4. Medical Equipment Repairer troubleshooting - continued.

SYMPTOM POSSIBLE CAUSE CORRECTIVE MAINTENANCE
2. NO SUCTION (VACUUM PUMP WORKING).
Loose or open tubing connections.
Check and tighten or replace tubing.
Cap assembly loose.
Tighten cap assembly.
Defective vacuum gauge.
Replace gauge.
3. NO SUCTION (VACUUM PUMP NOT WORKING).
Defective power switch.
Replace switch.
Unserviceable vacuum pump.
Repair or replace pump.
Defective vacuum regulator.
Repair or replace regulator.
4. LOW SUCTION.
Defective patient bottle assembly.
Repair or replace assembly.
Defective trap bottle assembly.
Repair or replace assembly.
Defective vacuum pump.
Repair or replace pump.

b. An electrical schematic for troubleshooting is provided in figure 3-5.

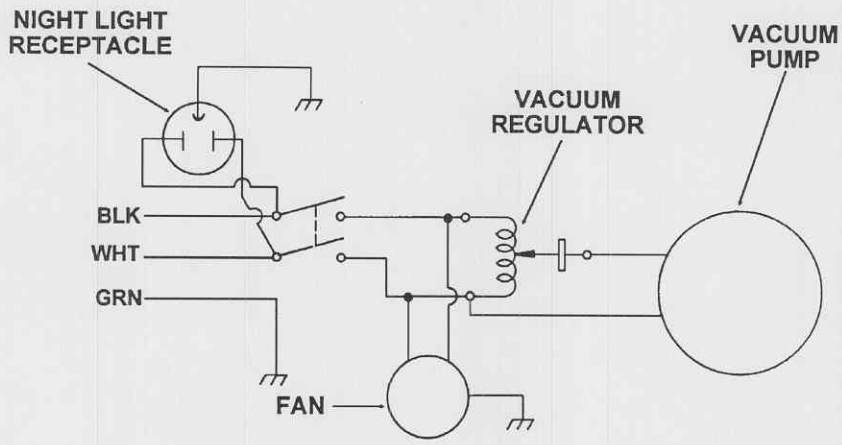

Figure 3-5. Electrical schematic.

Section VII. REPAIR PROCEDURES

3-17. General.

a. Procedures for disassembly, repair or replacement of components, services, and reassembly are provided in this section of the manual.

b. Repair procedures are continuous from the first disassembly to the final reassembly step.

WARNING

Hazardous voltages are accessible beneath the control/pump module cover when it is removed for testing and/or repairs.

c. Test the drainage unit after each repair.

3-18. Power switch (fig 3-6).

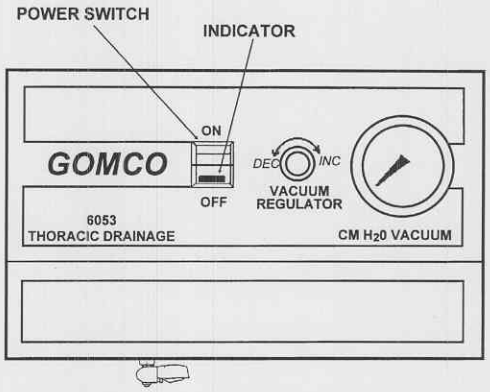

Figure 3-6. Power switch.

a. Disassembly.

(1) Depress the power switch to its "OFF" position.

(2) Disconnect the electrical power cable assembly from the wall receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

(5) Remove the stainless steel cover by pulling it upward. Set it aside.

(6) Record the colors and terminal locations of the electrical wires on the power switch.

(7) Remove the electrical terminal connectors from the switch.

CAUTION

Do not remove the terminal connectors by pulling on the electrical wires. Grasp the terminal connectors.

(8) Squeeze the switch mounting tabs together and push the switch forward out of its control panel mounting hole.

b. Maintenance service.

(1) Verify that the switch is unserviceable. Discard it.

(2) Acquire a replacement switch.

c. Reassembly.

(1) Orient the replacement switch as illustrated in figure 3-6 and insert it into its mounting hole until its mounting tabs lock it into place.

(2) Reconnect the electrical terminal connectors onto the switch in accordance with previously recorded electrical wire color positions.

(3) Reinstall the stainless steel cover.

(4) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

3-19. Electrical power cable assembly.

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Remove the six Phillips screws fastening the stainless steel cover. Set them aside.

(4) Remove the stainless steel cover by lifting it upward. Set it aside.

(5) Record the electrical power cable assembly wire colors and their connections.

(6) Remove the wires.

NOTE

The green, electrical ground wire is fastened to the central ground point of the control/pump module. Remove the nut and lockwasher (fig 3-7).

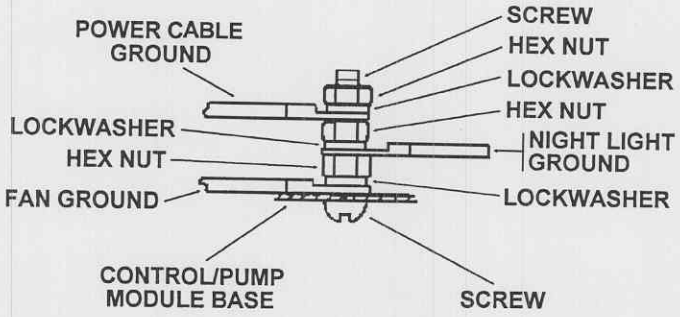

Figure 3-7. Electrical ground connections.

(7) Using pliers, pinch the strain relief grommet, fastening the electrical power cable assembly into the bottom of the control/pump module, while pulling the grommet downward from the underside of the module.

(8) Pull the electrical power cable assembly out of the control/pump module.

b. Maintenance services.

(1) Acquire a replacement electrical power cable assembly.

NOTE

A replacement strain relief grommet may also be required.

(2) Prepare the replacement electrical power cable assembly to meet the requirements of the replaced electrical power cable assembly. For example, spade terminals, electrical ground wire ring terminal, etc.

c. Reassembly.

(1) Insert the electrical cable into the strain relief grommet allowing sufficient cable length for connections inside the control/pump module.

(2) Squeeze the strain relief grommet with pliers while pushing it upward into its mounting hole in the bottom of the control/pump module.

(3) Reconnect the electrical terminal connectors in accordance with previously recorded electrical wire colors and locations.

(4) Reinstall the stainless steel cover.

(5) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

(6) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

3-20. Casters.

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the trap and patient bottle assemblies.

(5) Grasp the handle on the rear of the control/pump module and gently tip the drainage unit over and lower it to the floor.

(6) Grasp the defective caster and pull outward to remove it from its mounting socket.

NOTE

Two casters include a brake and these may be located as desired for convenient access.

b. Maintenance services. Acquire a replacement caster or casters.

c. Reassembly.

(1) Grasp the replacement caster and push it tightly into its mounting socket.

(2) Grasp the handle on the rear of the control/pump module and lift the drainage unit onto its casters.

3-21. Vacuum regulator (fig 3-8).

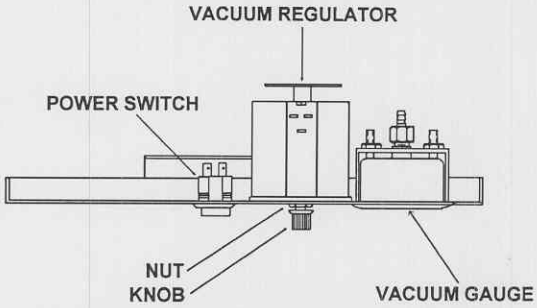

Figure 3-8. Vacuum regulator (top view).

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

(5) Remove the stainless steel cover by lifting it upward. Set it aside.

(6) Remove the knob from the vacuum regulator (mounted on the front panel) by using a 1/16 inch Allen wrench and then pulling it off the control shaft.

(7) Record the colors and electrical terminal locations of the electrical wires connected to the vacuum regulator.

(8) Remove the electrical terminal connectors from the vacuum regulator.

(9) Remove the mounting nut from the control shaft of the vacuum regulator with one hand while holding the vacuum gauge in place with your other hand.

(10) Pull the vacuum regulator into the control/pump module and then lift it upward when the control shaft is free of its mounting hole. Set it aside.

b. Maintenance service. Acquire a replacement vacuum regulator.

NOTE

Repair parts are not available for the vacuum regulator.

c. Reassembly.

(1) Insert the control shaft of the vacuum regulator into its mounting hole in the front panel.

CAUTION

Ensure that the 3/16 inch boss is fully into the mounting hole of the control shaft.

(2) Install the mounting nut onto the control shaft and tighten it.

CAUTION

Ensure that the vacuum regulator is correctly oriented inside the control pump module.

(3) Reinstall the knob and tighten it with a 1/16 inch Allen wrench.

(4) Reconnect the electrical terminal connectors onto the vacuum regulator in accordance with previously recorded electrical wire color positions.

(5) Reinstall the stainless steel cover.

(6) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

CAUTION

Perform the vacuum test procedures listed in paragraph 3-13a prior to patient use.

3-22. Vacuum gauge (fig 3-9).

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

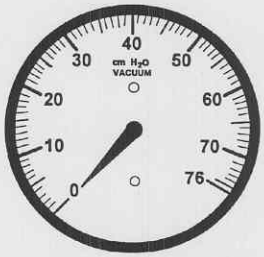

Figure 3-9. Vacuum gauge.

(5) Remove the stainless steel cover by lifting it upward. Set it aside.

(6) Remove the polyvinyl chloride (PVC) tubing from the barb connector on the back of the vacuum gauge.

(7) Remove the two hex nuts and lockwashers from the vacuum gauge mounting bracket. Set them aside.

(8) Hold the vacuum gauge in place by pressing it inward. Then, remove its mounting bracket.

(9) Remove the vacuum gauge by pushing it out of the front panel from inside the control/pump module. Set it aside.

b. Maintenance service. Acquire a replacement vacuum gauge.

c. Reassembly.

(1) Insert the replacement vacuum gauge through its mounting hole from the front of the control panel.

(2) Hold the vacuum gauge in place and then install its mounting bracket.

NOTE

Ensure that the dial of the vacuum gauge is positioned with "0" to the left of center.

(3) Reinstall the two hex nuts and lockwashers to fasten the vacuum gauge into place.

(4) Reconnect the PVC tubing onto the barb connector on the back of the vacuum gauge.

(5) Reinstall the stainless steel cover.

(6) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

3-23. Fan assembly (fig 3-10).

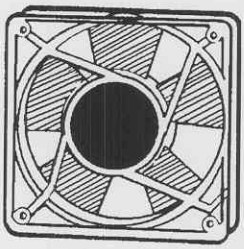

Figure 3-10. Fan assembly.

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

(5) Remove the stainless steel cover by lifting it upward. Set it aside.

(6) Record the colors and the electrical terminal locations of the electrical wires connected to the fan assembly.

(7) Disconnect the electrical terminal connectors.

NOTE

Do not remove the terminal connectors by pulling on the electrical wires. Grasp the terminal connectors.

(8) Remove the fan assembly ground wire from electrical ground terminal as illustrated in figure 3-7.

(9) Remove the four Phillips screws and lockwashers fastening the fan assembly to the right side of the control/pump module (fig 3-11). Remove the fan and set it aside.

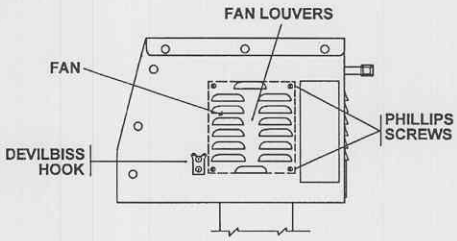

Figure 3-11. Fan assembly removal.

b. Maintenance. Acquire a replacement fan assembly.

c. Reassembly.

(1) Position the fan assembly into place on the right side of the control/pump module and then reinstall the four Phillips screws and lockwashers.

(2) Reinstall the fan assembly ground wire by reassembling the ground terminal.

(3) Reconnect the two electrical terminal connectors to the fan assembly in accordance with previously recorded electrical wire color positions.

(4) Reinstall the stainless steel cover.

(5) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

3-24. Night light (fig 3-12).

a. Disassembly. Grasp the night light and pull it downward out of the electrical receptacle mounted in the bottom of the control/pump module.

b. Maintenance services.

(1) Test the lamp and replace it as required.

(2) Test the night light switch and replace it as required.

(3) Acquire a replacement lamp or night light as required.

c. Reassembly. Install the night light by inserting its built-in electrical connector into the night light receptacle.

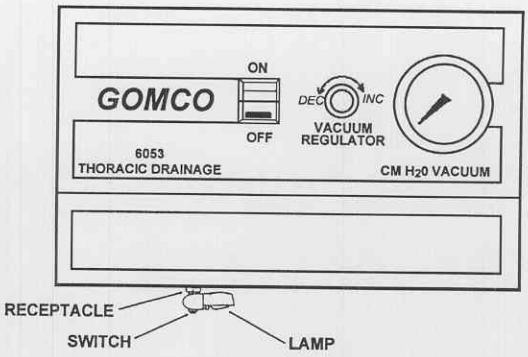

Figure 3-12. Night light.

3-25. Night light receptacle.

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

(5) Remove the stainless steel cover by lifting it upward. Set it aside.

(6) Remove the slotted screw from the center of the night light receptacle inside the control/pump module. Set it aside.

(7) Remove the receptacle cover. Set it aside.

(8) Record the electrical wire colors and their positions on the electrical receptacle.

(9) Remove the three electrical wires.

(10) Remove the ground wire from the electrical ground terminal. Refer back to figure 3-7.

(11) Squeeze the receptacle mounting tabs together and push the electrical receptacle downward to remove it from the bottom of the control/pump module.

b. Maintenance service. Acquire a replacement receptacle.

c. Reassembly.

(1) Install the replacement receptacle by pushing it up through the bottom of the control/pump module until its mounting tabs lock into place.

(2) Reconnect the three electrical wires to the electrical receptacle in accordance with the previously recorded wire colors and locations.

(3) Reconnect the ground wire to the electrical ground terminal. Refer back to figure 3-7.

(4) Reinstall the electrical receptacle terminal cover.

(5) Reinstall the slotted screw into the center of the electrical receptacle terminal cover to refasten it.

(6) Reinstall the stainless steel cover.

(7) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

3-26. Vacuum pump motor carbon brushes (fig 3-13).

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

(5) Remove the stainless steel cover by lifting it upward. Set it aside.

(6) Remove the electrical wire from each brush assembly.

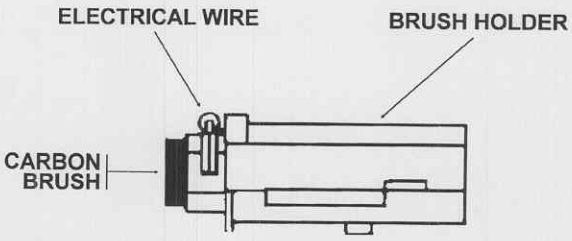

Figure 3-13. Brush assembly.

(7) Remove the two Phillips screws from each vacuum pump motor bracket holding the two brush assemblies in place. Set them aside.

(8) Remove the two brush assemblies. Set them aside.

b. Maintenance services.

NOTE

The maintenance services will include some reassembly procedures.

(1) Clean the two brush assemblies and inspect for excessive wear or damage or acquire replacement brush assemblies.

(2) Reinstall the electrical wire to each brush holder.

(3) Reinstall both brush assemblies onto the vacuum pump motor frame while ensuring that their locating pins are seated in their pockets.

(4) Reinstall both brush assemblies by reinstalling the two Phillips screws into both brush assemblies.

(5) Seat the brushes as follows:

(a) Operate the drainage unit by following the procedures in paragraph 2-4.

WARNING

Hazardous voltages are accessible in the control/pump module while operating the drainage unit to seat the brushes.

CAUTION

Do not pinch or clamp the patient tubes.

NOTE

Rotate the vacuum regulator to its maximum clockwise position.

(b) Operate the drainage unit for 30 minutes to seat the brushes for proper operation.

(6) Shut down the drainage unit.

c. Reassembly.

(1) Reinstall the stainless steel cover.

(2) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

3-27. Vacuum pump motor (fig 3-14).

a. Disassembly.

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Remove the six Phillips screws from the sides of the stainless steel cover. Set them aside.

(5) Remove the stainless steel cover by lifting it upward. Set it aside.

(6) Remove the four hex nuts and lockwashers from the bottom of the control/pump module. Set them aside.

(7) Record the electrical wire colors and their positions on the vacuum regulator.

(8) Disconnect the three electrical wire terminals from the vacuum regulator.

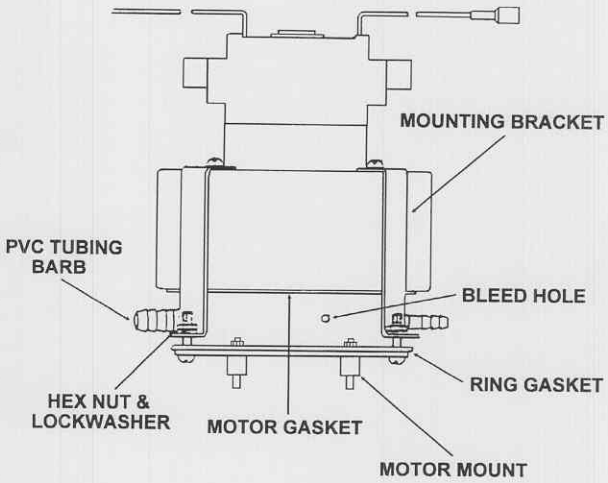

Figure 3-14. Vacuum pump motor.

(9) Cut and remove the plastic cable ties.

(10) Remove the PVC tubing from the vacuum pump motor connector barb.

(11) Lift the vacuum pump motor from the control/pump module.

b. Maintenance services.

(1) Remove the four hex nuts and lockwashers from the bottom of the mounting brackets. Set them aside.

(2) Lift the vacuum pump motor off the plastic mounting ring and plate.

(3) Remove the four Phillips self-tapping screws fastening the four mounting brackets to the vacuum pump motor. Remove the brackets and set them aside.

(4) Remove the motor gasket and install a new motor gasket.

(5) Install the four mounting brackets onto the vacuum pump motor using the four Phillips self-tapping screws.

(6) Center the plastic mounting ring on the mounting plate and then set the vacuum pump motor onto the plastic mounting ring.

(7) Fasten the vacuum pump motor onto the mounting ring and plate using the four screws, lockwashers, and nuts.

(8) Install female spade terminals onto both vacuum pump motor electrical wires.

(9) Reinstall replacement plastic cable ties.

c. Reassembly.

(1) Install the new vacuum pump motor into the control/pump module.

(2) Reinstall the four hex nuts and lockwashers onto the vacuum pump motor screws projecting through the bottom of the control/pump module.

(3) Reconnect the three electrical terminals onto the vacuum regulator.

(4) Reinstall the stainless steel cover.

(5) Reinstall the six Phillips screws into the sides of the stainless steel cover to refasten it.

(6) Seat the brushes on the new vacuum pump motor by operating the drainage unit for 30 minutes while following the initial start-up procedures in paragraph 2-4.

CAUTION

Do not pinch or clamp the patient tubes.

3-28. Other components.

Disassembly and reassembly of the drainage unit to repair or replace other components such as the electrical cable clips, the bottle assembly bracket, or the transformer do not require detailed instructions.

Section VIII. VOLTAGE CONVERSION INSTRUCTIONS

3-29. General.

a. This section of the manual contains the procedures for changing the source of electrical power for operation of the drainage unit on 115 or 230 volts.

b. Electrical connections for 115-volt and 230-volt use are illustrated in figure 3-15.

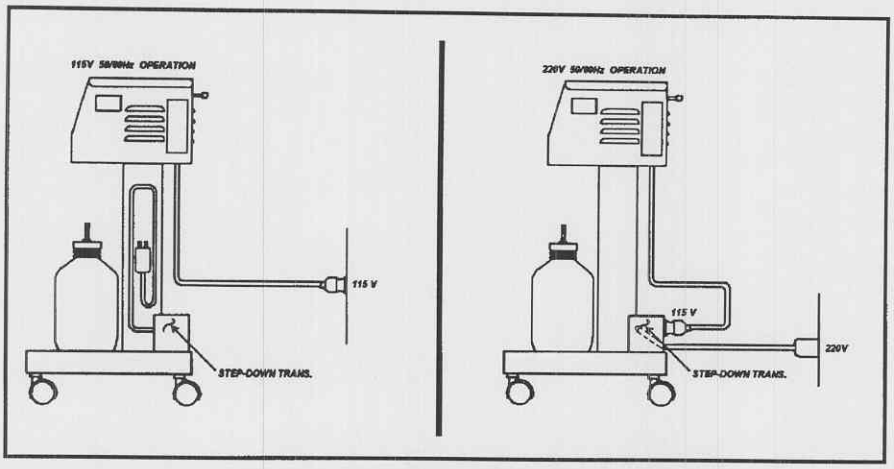

Figure 3-15. Electrical connections.

NOTE

The decal on top of the transformer cover should reflect 230 V, not 220 V.

3-30. Procedures for 115-volt use.

a. Ensure that the power switch is in its "OFF" position or depress the switch to its "OFF" position.

b. Remove the coiled electrical power cable assembly from the cable clips mounted on the rear of the upright assembly.

NOTE

The uncoiled electrical power cable assembly is connected to the underside of the control/pump module in the right rear corner. The electrical power cable assembly for the transformer should remain coiled on the cable clips on the right side of the upright assembly.

c. Connect the electrical power cable assembly to a 115-volt electrical receptacle.

3-31. Conversion procedures (115 volts to 230 volts).

a. Ensure that the power switch is in its "OFF" position or depress the switch to its "OFF" position.

b. Remove the coiled electrical power cable assembly from the cable clips mounted on the rear of the upright assembly. Then, connect it into the 115-volt electrical receptacle on the rear of the transformer (fig 3-16).

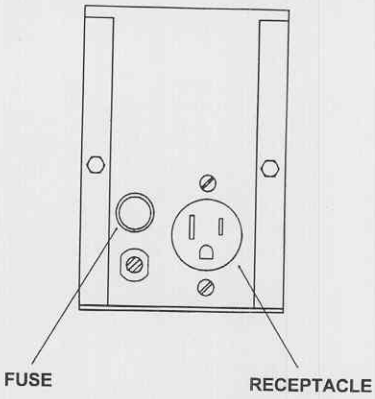

Figure 3-16. Electrical receptacle (115 volts).

c. Remove the coiled electrical power cable assembly from the cable clips mounted on the right side of the upright assembly.

d. Connect the electrical power cable assembly into a 230-volt electrical receptacle.

NOTE

The connector on the 230-volt electrical power cable assembly may require replacement to conform to the available 115-volt electrical receptacle.

Section IX. STORING AND SHIPPING PROCEDURES

3-32. General.

This section contains the procedures for preparing the drainage unit for storing and shipping.

3-33. Preparation for storing.

a. Shut-down procedures for the drainage unit are as follows:

(1) Depress the power switch to the "OFF" position.

(2) Disconnect the electrical power cable assembly from the electrical receptacle.

(3) Coil the electrical power cable assembly onto the cable clips mounted on the rear of the upright assembly.

(4) Ensure that the electrical power cable assembly from the step-down transformer is coiled onto the cable clips mounted on the right side of the upright assembly.

(5) Clean, disinfect, and sterilize the drainage unit and components in accordance with the procedures in chapter 2, section V.

b. Inventory the components. Replace unserviceable or missing items.

c. Pack the components and manufacturer's manuals into a small container.

d. Place the shipping container base on a flat surface and lift the drainage unit onto it.

e. Place the foam blocks under the base assembly of the drainage unit.

f. Lift the shipping container body over the drainage unit and lower it around the drainage unit. Ensure that the shipping container body is inside the shipping container base.

g. Close the top flaps of the shipping container.

h. Install appropriate strapping or tape vertically around the shipping container base and body.

3-34. Preparation for shipping.

a. The drainage unit, packed in the original shipping carton, is suitable for shipping.

b. The drainage unit, packed in a military chest or other available container, will also be appropriately packed for shipping. Notify your unit transportation point for assistance, if necessary.

CHAPTER 4

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

Section I. GENERAL INFORMATION

4-1. Overview.

This chapter provides for maintenance that is beyond the capability, capacity, and authorization for unit level maintenance personnel. The procedures in this chapter will not be attempted at the unit level.

4-2. Tools and test equipment.

Common tools and test equipment required for support maintenance of the equipment are listed in appendix B, section III. Refer to your unit's MTOE or installation table of distribution and allowances (TDA) for authorized items.

4-3. Components of end item and basic issue items.

Components of end item and basic issue items are listed in appendix C, sections II and III.

4-4. Expendable supplies.

Expendable and durable supplies and materials for support maintenance are listed in appendix D, section II.

4-5. Repair parts.

Repair parts required for support maintenance are listed in appendix E, section II.

4-6. Special tools.

Special tools required for support maintenance are listed in appendix E, section III.

Section II. MAINTENANCE PROCEDURES

4-7. General.

a. There are no specific troubleshooting procedures for DS/GS levels of maintenance.

b. Repair procedures for the drainage unit have not been developed.

APPENDIX A

REFERENCES

A-1. Army regulations.

AR 40-61	Medical Logistics Policies and Procedures
AR 710-2	Supply Policy Below the Wholesale Level
AR 725-50	Requisitioning, Receipt, and Issue System
AR 750-1	Army Materiel Maintenance Policy and Retail Maintenance Operations

A-2. Technical manual.

TM-DPSC-6500-RPL	Medical Materiel: Medical Repair Parts Reference List

A-3. Technical bulletins.

TB MED 7	Maintenance Expenditure Limits for Medical Materiel
TB 8-6500-MPL	Mandatory Parts List for Medical Equipment
TB 38-750-2	Maintenance Management Procedures for Medical Equipment
TB 740-10/DLAM 4155.5/AFR 67-43	Quality Control, Depot Storage Standards, Appendix M, Medical Supplies

A-4. Field manual.

FM 21-11	First Aid for Soldiers

A-5. Supply bulletin.

SB 8-75-( )-series	Army Medical Department Supply Information

A-6. Other publications.

(This publication may be obtained from Commander, U.S. Army Medical Materiel Agency, ATTN: SGMMA-M, Frederick, MD 21702-5001.)

Operation, Maintenance and Service Manual (August 1989), Allied Healthcare Products, Inc., GOMCO Division, 1720 Sublette Avenue, St. Louis, MO 63110.

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance levels.

c. Section III lists the tools and test equipment required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions, explanatory notes, and/or illustrations required for a particular maintenance function.

B-2. Explanation of columns in section II.

a. Group Number, Column 1. The assembly group number (Group No.) column is a numerical group assigned to each assembly. The applicable assembly groups are listed in the maintenance allocation chart (MAC) in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.

b. Assembly Group, Column 2. This column contains a brief description of the components of each assembly group.

c. Maintenance Functions, Column 3. This column lists the various maintenance functions (A through K) and indicates the lowest maintenance level authorized to perform these functions. The symbol designations for the various maintenance levels are as follows:

C - Operator or crew

O - Unit maintenance

F - Direct support maintenance

H - General support maintenance

D - Depot maintenance

The maintenance functions are defined as follows:

A - Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B - Test. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C - Service. To clean, to preserve, to charge, and to add lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

D - Adjust. To rectify to the extent necessary to bring into proper operating range.

E - Align. To adjust specified variable elements of an item to bring it to optimum performance.

F - Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G - Install. To set for use in an operational environment such as tents or International Standards Organization shelters.

H - Replace. To replace unserviceable items with serviceable like items.

I - Repair. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage to a specific failure. Repair may be accomplished at each level of maintenance.

J - Overhaul. Normally the highest degree of maintenance performed by the Army in order to minimize time work in process consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by a maintenance standard in technical publications for each item of equipment. Overhaul normally does not return an item to like new condition.

K - Rebuild. The highest degree of material maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance level.

d. Tools and Equipment, Column 4. This column is provided for referencing by code, the tools and test equipment (sec III) required to perform the maintenance functions.

e. Remarks, Column 5. This column is provided for referencing by code, the remarks (sec IV) pertinent to the maintenance functions.

B-3. Explanation of columns in section III.

a. Reference Code, Column 1. This column correlates to section II, column 4.

b. Maintenance Level, Column 2. This column identifies the maintenance levels using the tools and test equipment.

c. Nomenclature, Column 3. This column identifies the tools and test equipment.

d. National Stock Number, Column 4. This column provides the national stock number of the specific tools or test equipment.

B-4. Explanation of columns in section IV.

a. Reference Code, Column 1. This column correlates to section II, column 5.

b. Remarks, Column 2. This column provides supplemental information or explanatory notes pertinent to the maintenance function in section II.

Section II. MAINTENANCE ALLOCATION CHART FOR DRAINAGE UNIT

(1) GROUP NO.	(2) ASSEMBLY GROUP	(3) MAINTENANCE FUNCTIONS A	B	C	D	E	F	G	H	I	J	K	(4) TOOLS AND EQUIPMENT	(5) REMARKS
00	Drainage Unit	O 0.3	O 0.5		O 0.6				O 0.3	O 1.1	F 3.0	D 6.5	01,02,03, 04,05	A,B
01	Control/Pump Module												01,02,03, 04,05	A,B
	Vacuum Regulator	O 0.1							O 0.5					
	Vacuum Gauge		O 0.3						O 0.2					
	Power Switch		O 0.3						O 0.3					
	Electrical Power Cable Assembly		O 0.2						O 0.3					
	Vacuum Pump	O 0.2	O 0.3						O 0.6	O 1.0				
	Control Panel	O 0.1							O 1.1					
	Housing	O 0.2								D 3.2				
	Fan		O 0.2						O 0.5					
02	Upright Assembly												01,02	A
	Housing	O 0.2							D 1.0	D 1.2				
	Cable Clips	O 0.1							O 0.2					

Section II. MAINTENANCE ALLOCATION CHART FOR DRAINAGE UNIT

(1) GROUP NO.	(2) ASSEMBLY GROUP	(3) MAINTENANCE FUNCTIONS A	B	C	D	E	F	G	H	I	J	K	(4) TOOLS AND EQUIPMENT	(5) REMARKS
03	Base Assembly												01,02,03, 04	A
	Housing	O 0.1							D 1.2	D 0.9				
	Casters	O 0.1							O 0.3	O 0.1				
	Transformer	O 0.3							O 0.3	O 0.2				
	Trap Bottle Assembly	0 0.2	0 0.3						0 0.2					
	Patient Bottle Assembly	0 0.2	0 0.3						0 0.2					

Section III. TOOLS AND TEST EQUIPMENT FOR DRAINAGE UNIT

(1) REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER
01	O,F,H,D	Tool Kit, Medical Equipment Maintenance and Repair: Repairmans	5180-00-611-7923
02	O,F,H,D	Tool Kit, Medical Equipment Maintenance and Repair: Organizational	5180-00-611-7924
03	O,F,H,D	Multimeter, UN/USM 486	6625-01-145-2430
		or	
		Multimeter, AN/PSM 45A	6625-01-265-6000
04	O,F,H,D	Tester, Current Leakage, TS 2514/P	6625-01-142-8233
05	O,F,H,D	Calibrator-Analyzer, Hospital Equipment (Test Vacuum Gauge/Test Flowmeter)	6695-01-255-2855

Section IV. REMARKS FOR DRAINAGE UNIT

(1) REFERENCE CODE	(2) REMARKS
A	Tools and test equipment are listed for each assembly group.
B	Perform an annual electrical safety inspection and test. Perform the inspection and test after repair or replacement of electrical/electronic components.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

C-1. Scope.

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

C-2. General.

The Components of End Item and Basic Issue Items lists are divided into the following sections.

a. Section II. Components of End Item. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the equipment in operation, to operate it, and to perform emergency repairs. Basic issue items must be with the equipment during operation and whenever it is transferred between property accounts. This manual is your authority to request or requisition basic issue items, based on MTOE authorization of the end item.

C-3. Explanation of columns.

The following provides an explanation of columns found in both listings:

a. Item Number, Column 1. This column indicates the item number assigned to the item.

b. National Stock Number, Column 2. This column indicates the national stock number assigned to the item.

c. Description, Column 3. This column indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the commercial and government entity (CAGE) code in parentheses followed by the part number.

d. Unit of Measure, Column 4. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation. These abbreviations are listed in the glossary.

e. Quantity, Column 5. This column indicates the quantity (QTY) of the item(s) provided with the equipment.

Section II. COMPONENTS OF END ITEM FOR DRAINAGE UNIT

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) UNIT OF MEASURE	(5) QTY
1	6120-01-280-0561	Transformer, Step-down (25415)	EA	1
2		Patient Bottle Assembly (25415) 01-90-2522	EA	1
		Consists of:		
	6515-01-382-4482	Bottle, 2800 mL (Patient) (25415) 01-90-3105	EA	1
	6515-01-253-8297	Cap, Assembly, (Patient Bottle) (25415) 01-90-2497	EA	1
		Tube, Water, Seal (25415) 01-90-2846	EA	1
	6515-01-372-0450	Swivel Connector (25415) 01-90-2532	EA	1
3		Trap Bottle Assembly (25415) 01-90-2521	EA	1
		Consists of:		
	6515-01-382-4482	Bottle, 2800 mL (Trap) (25415) 01-90-3105	EA	1
	6515-01-253-8296	Cap Assembly (Trap Bottle) (25415) 01-90-2496	EA	1
		Tube, Splash (25415) 01-90-2853	EA	1
4	6515-01-253-8298	Tube, Patient (25415) 01-90-2535	EA	2
5		Tube, Bottle to Pump (25415) 01-90-3970	EA	1
6		Tube, Bottle to Bottle (25415) 01-90-3968	EA	1
7		Night Light (25415) 01-90-3966	EA	1

Section III. BASIC ISSUE ITEMS FOR DRAINAGE UNIT

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) UNIT OF MEASURE	(5) QTY
1		Operation, Maintenance and Service Manual (August 1989) (25415) None	EA	2
2	6515-01-382-4482	Bottle, 2800 mL (Spare) (25415) 01-90-3105	EA	1

APPENDIX D

EXPENDABLE AND DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. Scope.

This appendix lists expendable and durable supplies and materials that are required to maintain the equipment. This listing is authorization to requisition and retain the items if not otherwise authorized.

D-2. Explanation of columns.

a. Item Number, Column 1. The item number (Item No.) is sequentially assigned.

b. Level, Column 2. This column identifies the lowest level of maintenance that requires the listed item. An explanation of the alphabetical character is provided in appendix B, section I of this manual.

c. National Stock Number, Column 3. This column indicates the national stock number assigned to the item.

d. Description, Column 4. This column indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE code in parentheses followed by the part number.

e. Unit of Measure, Column 5. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by an alphabetical abbreviation. These abbreviations are listed in the glossary.

f. Quantity, Column 6. This column indicates the quantity (QTY) of the item(s) provided with the equipment.

Section II. EXPENDABLE AND DURABLE SUPPLIES AND MATERIALS LIST FOR DRAINAGE UNIT

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) UNIT OF MEASURE	(6) QTY
1	O	7920-01-004-7847	Cloth, Cleaning (97327) Rymple Cloth 301	RO	1
2	O	5970-00-419-4290	Tape, Insulation, Electrical (81349) MIL-I-24391	RO	1
3	O	6840-00-783-0050	Disinfectant, Spray, 7 oz (73820) Lysolspray	CN	AR
4	O	6840-00-782-2691	Disinfectant, Liquid, 1 gal (58536) A-A-1140	EA	AR

APPENDIX E

REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

E-1. Scope.

This manual lists spare and repair parts, special tools, special test equipment; and other special support equipment required for the performance of unit level, direct support, general support, and depot level maintenance. It authorizes the requisitioning and issue of spare and repair parts in consonance with the MAC (app B).

E-2. General.

The Repair Parts and Special Tools List is divided into the following sections:

a. Repair Parts, Section II. A list of repair parts authorized for the performance of maintenance in figure number and item number sequence.

b. Special Tools, Test, and Support Equipment, Section III. A list of special tools, test, and support equipment authorized for the performance of maintenance.

E-3. Explanation of columns in section II.

a. Illustration, Column 1.

(1) *Figure Number.* This column indicates the figure number (FIG NO.) of the illustration on which the item is shown.

(2) *Item Number.* This column indicates the item number (ITEM NO.) used to identify each item on the illustration.

b. National Stock Number, Column 2. This column indicates the national stock number assigned to the item.

c. Description, Column 3. This column indicates the federal item name of the item. The last line for each item indicates the CAGE code in parentheses followed by the part number.

d. Unit of Measure, Column 4. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation.

e. Quantity, Column 5. This column indicates the quantity (QTY) of the item(s) to be used with or on the illustrated component, assembly, module, or end item.

E-4. Explanation of columns in section III.

a. Item Number, Column 1. This number is sequentially assigned.

b. Level, Column 2. This column identifies the lowest level of maintenance that requires the listed item. An explanation of the alphabetical character is provided in appendix B, section I of this manual.

c. National Stock Number, Column 3. This column indicates the national stock number assigned to the item.

d. Description, Column 4. This column indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE code in parentheses followed by the part number.

e. Unit of Measure, Column 5. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation.

f. Quantity, Column 6. This column indicates the quantity (QTY) of the item(s) to be used with or on the illustrated component, assembly, module, or end item.

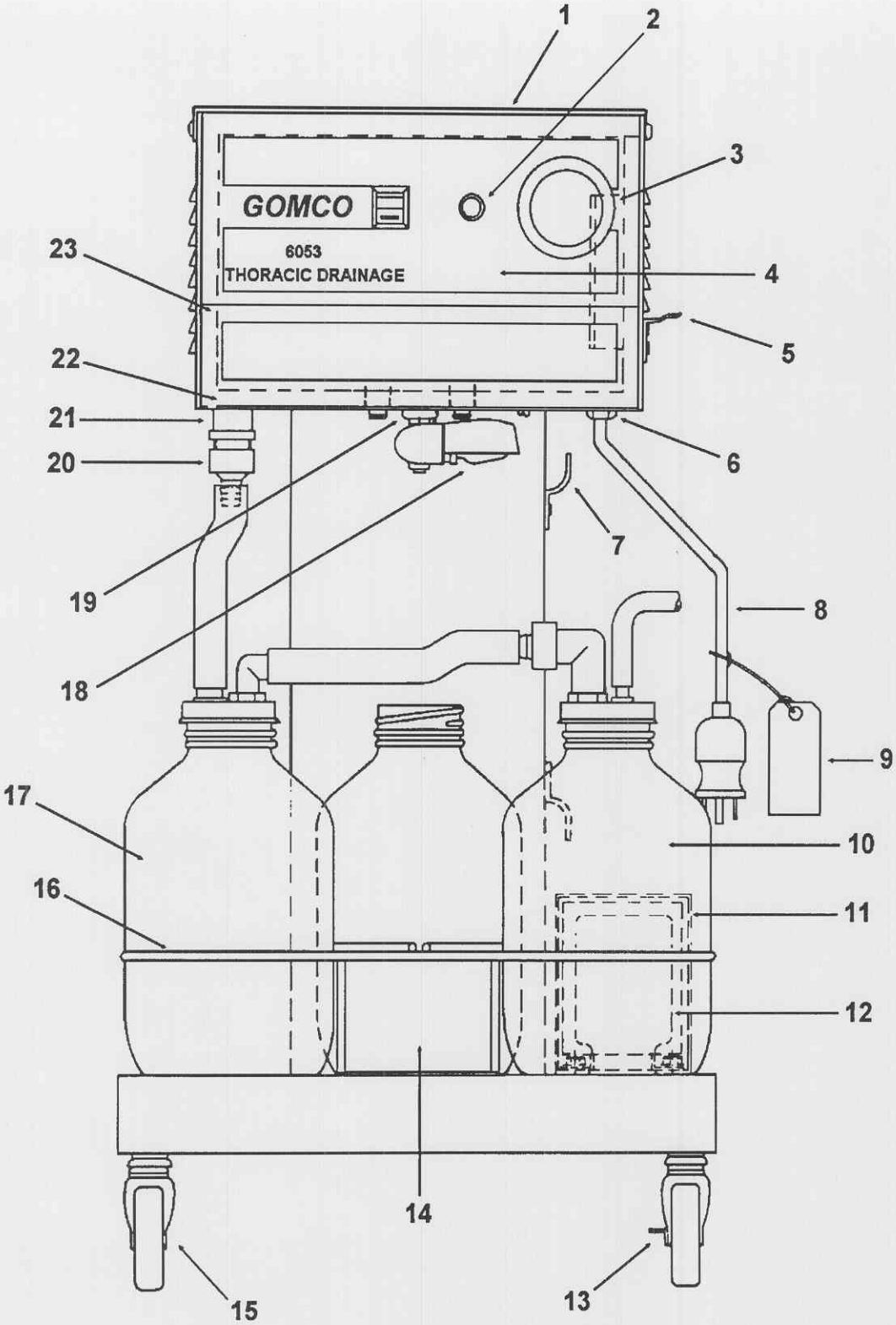

Figure E-1. Drainage unit components.

Section II. REPAIR PARTS LIST FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-1	1		Cover, Stainless Steel (25415) 01-90-3631	EA	1
E-1	2	5355-01-371-9593	Knob (25415) 01-90-2351	EA	1
E-1	3	6685-01-367-1125	Gauge, Vacuum (25415) 01-90-2518	EA	1
E-1	4		Panel, Front (25415) 01-90-3963	EA	1
E-1	5		Devilbiss Hook (25415) 01-90-2742	EA	1
E-1	6		Strain Relief (25415) 01-90-2028-2	EA	1
E-1	7		Clip,Cable (25415) 01-90-1294	EA	4
E-1	8		Electrical Power Cable Assembly (25415) 01-90-2737	EA	1
E-1	9		Tag, Grounding Instructions (25415) 01-90-2340-2	EA	1
E-1	10	6515-01-382-4482	Bottle, 2800 mL (Patient) (25415) 01-90-3105	EA	1
E-1	11		Cover, Transformer (25415) 01-90-3886	EA	1
E-1	12	6120-01-280-0561	Transformer, Step-down (25415) 01-90-3726	EA	1
E-1	13		Caster, w/Brake (25415) 01-90-3922	EA	2
E-1	14	6515-01-382-4482	Bottle, 2800 mL (Spare) (25415) 01-90-3105	EA	1
E-1	15		Caster, w/o Brake (25415) 01-90-3921	EA	2
E-1	16		Bracket, Bottle (25415) 01-90-3958	EA	1
E-1	17	6515-01-382-4482	Bottle, 2800 mL (Trap) (25415) 01-90-3105	EA	1

Section II. REPAIR PARTS LIST FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-1	18		Night Light (25415) 01-90-3966	EA	1
E-1	19		Receptacle, Electrical, Single (25415) 01-90-3969	EA	1
E-1	20		Connector, Swivel (25415) 01-90-2531	EA	1
E-1	21		Adapter, Connector (25415) 01-90-2531	EA	1
E-1	22		Insulation, Bottom (25415) 01-90-3447	EA	1
E-1	23		Insulation, Sides (25415) 01-90-3434	EA	4
E-1	*		Vacuum Pump Assembly (25415) 01-90-2527	EA	1
E-1	*	5950-01-367-1060	Regulator, Vacuum (Power Autotransformer) (25415) 01-90-3961	EA	1
E-1	*		Socket, Caster (25415) 01-90-2908	EA	4
E-1	*		Decal, Voltage (25415) 01-90-3941	EA	1
E-1	*		Decal, Warning (25415) 01-90-3263	EA	1
E-1	*		Base, Assembly (25415) 01-90-3931	EA	1
E-1	*		Bumper, Rubber (25415) 01-90-2816	EA	1

* Not illustrated

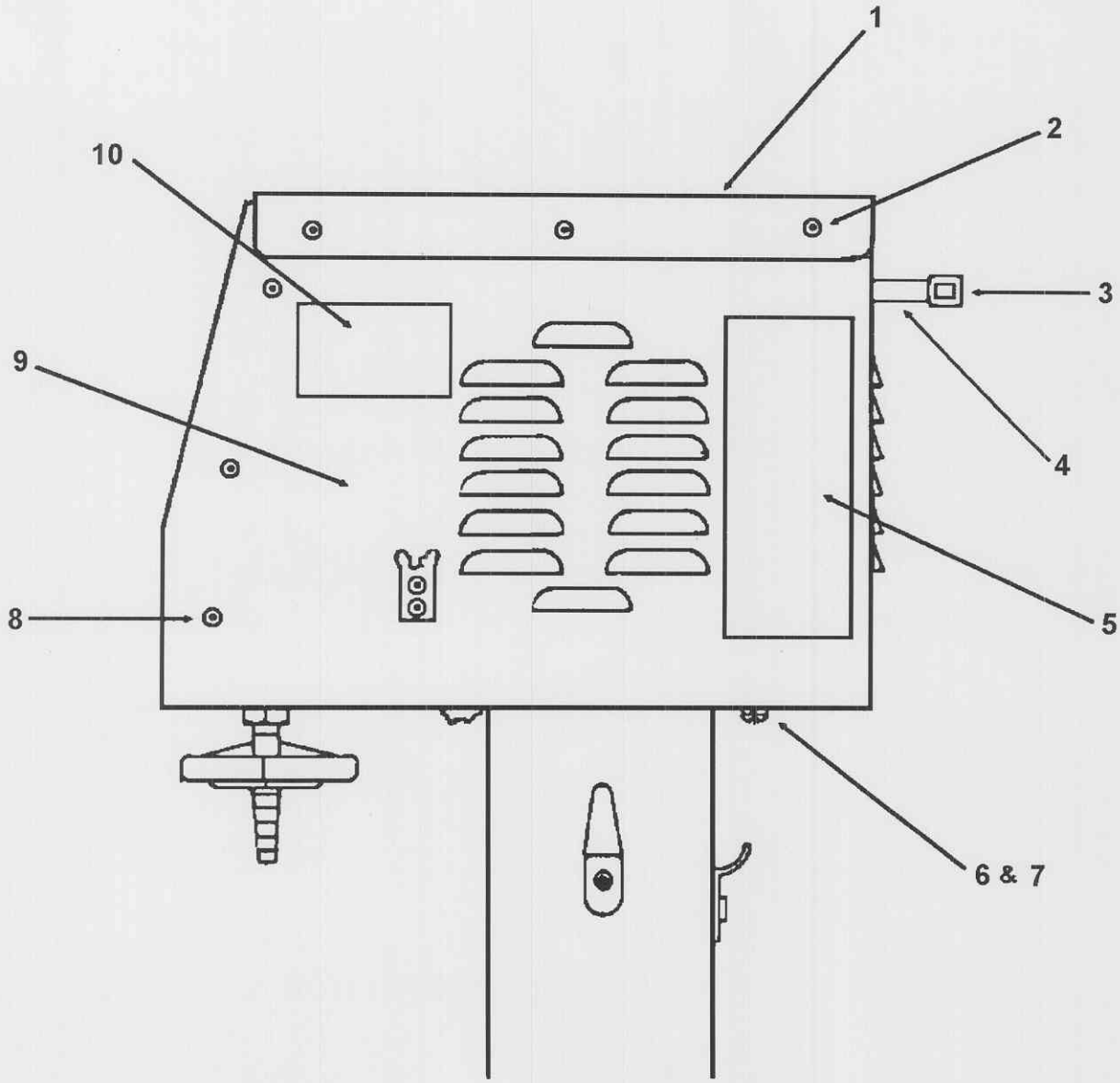

Figure E-2. Control module (side view).

Section II. REPAIR PARTS LIST FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-2	1		Cover, Stainless Steel (25415) 01-90-2573	EA	1
E-2	2		Screw, Phillips, Sheet Metal, No. 8 by 3/8-in Bench Stock	EA	6
E-2	3		Handle (25415) 01-90-2271	EA	1
E-2	4		Spacer, Handle (25415) 01-90-2270	EA	2
E-2	5		Decal, Operational Instructions (25415) 01-90-3940	EA	1
E-2	6		Screw, Slotted, 10 - 32 by 7/8-in Bench Stock	EA	1
E-2	7		Upright Assembly (25415) 01-90-3932	EA	1
E-2	8		Rivet, Plated (25415) 01-90-2604-2	EA	7
E-2	9		Control/Pump Module (25415) 01-90-2570	EA	1
E-2	10		Decal, Manufacturer Data (25415) 01-90-3938	EA	1

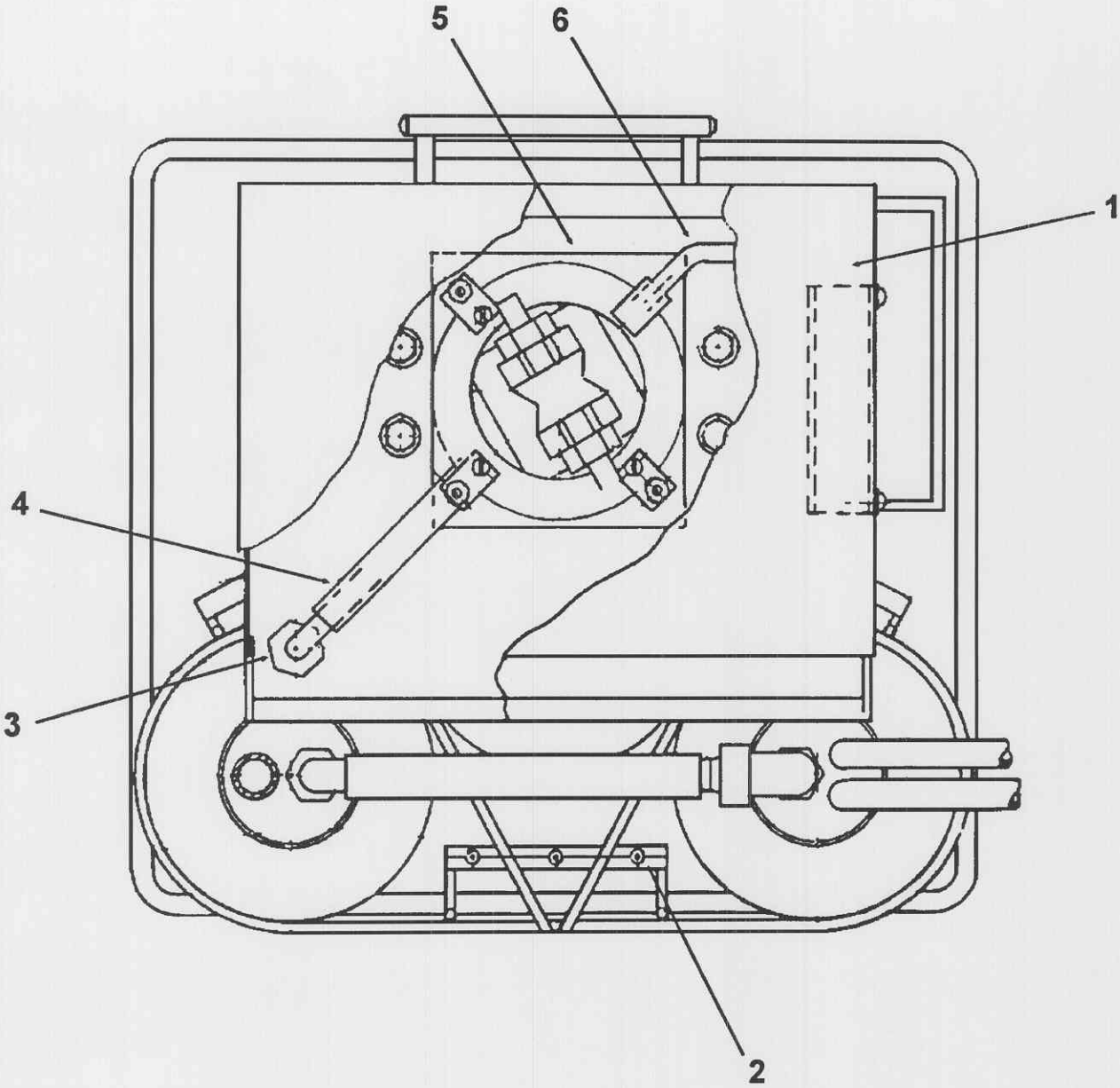

Figure E-3. Drainage unit (top view).

Section II. REPAIR PARTS LIST FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-3	1	6515-01-367-8458	Fan Assembly (25415) 01-90-2830	EA	1
E-3	2		Rivet, Pop, Black (25415) 01-90-2604-1	EA	5
E-3	3		Elbow, Nylon (25415) 01-90-3004	EA	1
E-3	4		Tubing, PVC, ½-in dia (25415) 01-90-3006	EA	1
E-3	5	6105-01-367-1085	Motor (25415) 01-90-2519	EA	1
E-3	6		Tubing, PVC (25415) 01-90-2797	EA	1

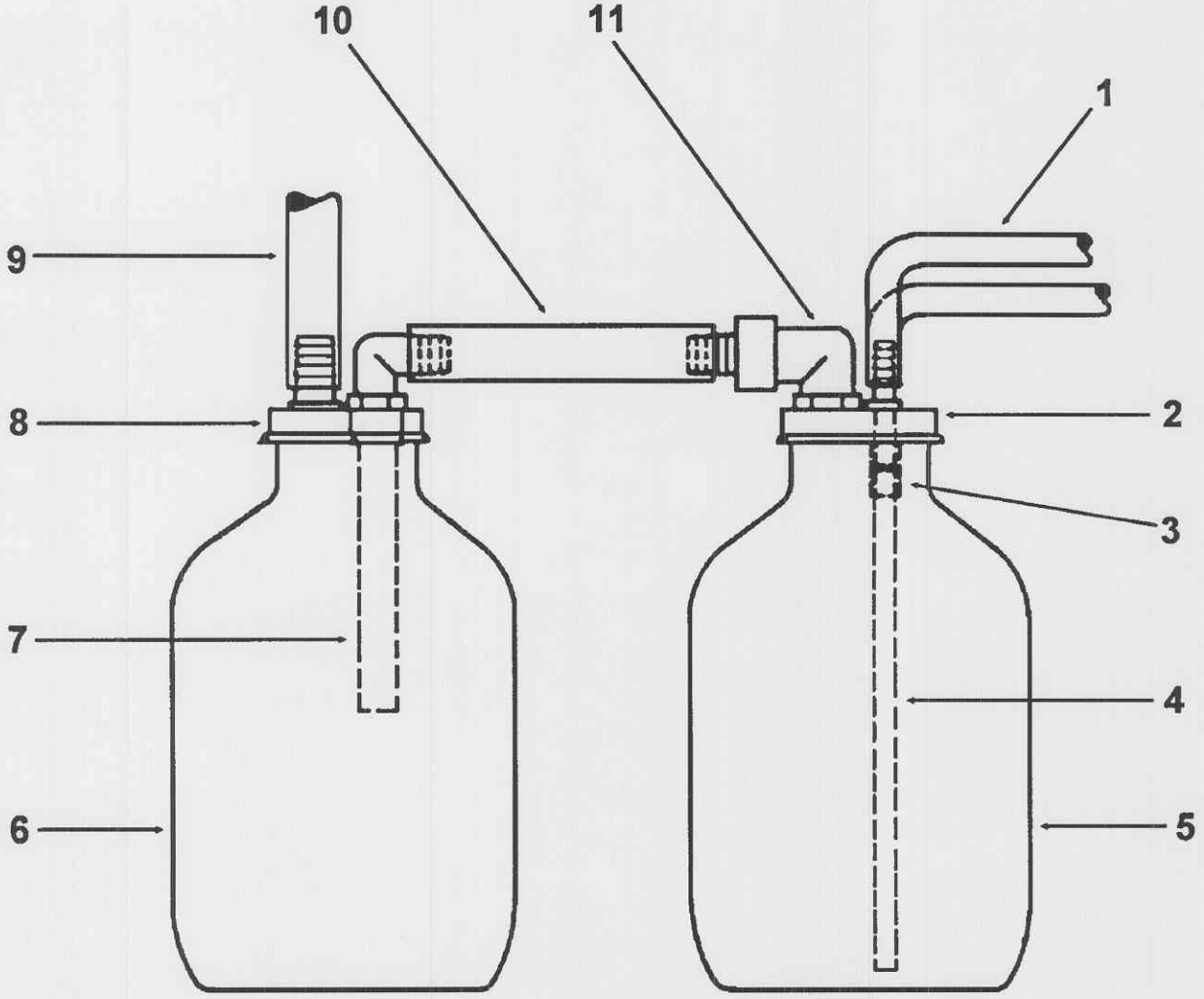

Figure E-4. Patient fluids drainage system.

Section II. REPAIR PARTS LIST FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-4	1	6515-01-253-8298	Tube, Patient (25415) 01-90-2535	EA	2
E-4	2	6515-01-253-8297	Cap Assembly, Patient Bottle (25415) 01-90-2497	EA	1
E-4	3		Tube, Splice, Silicone Rubber (25415) 01-90-2842	EA	1
E-4	4		Tube, Water Seal (25415) 01-90-2846	EA	2
E-4	5	6515-01-382-4482	Bottle, 2800 mL, Patient (25415) 01-90-3105	EA	1
E-4	6	6515-01-382-4482	Bottle, 2800 mL, Trap (25415) 01-90-3105	EA	1
E-4	7		Tube, Splash (25415) 01-90-2853	EA	1
E-4	8	6515-01-253-8296	Cap Assembly, Trap Bottle (25415) 01-90-2496	EA	1
E-4	9		Tube, Bottle to Pump (25415) 01-90-3970	EA	1
E-4	10		Tube, Bottle to Bottle (25415) 01-90-3968	EA	1
E-4	11	6515-01-372-0450	Swivel, Nylon (25415) 01-90-2532	EA	1
E-4	*		Cap, Patient Tube (25415) 01-90-3099	EA	0

* Not illustrated

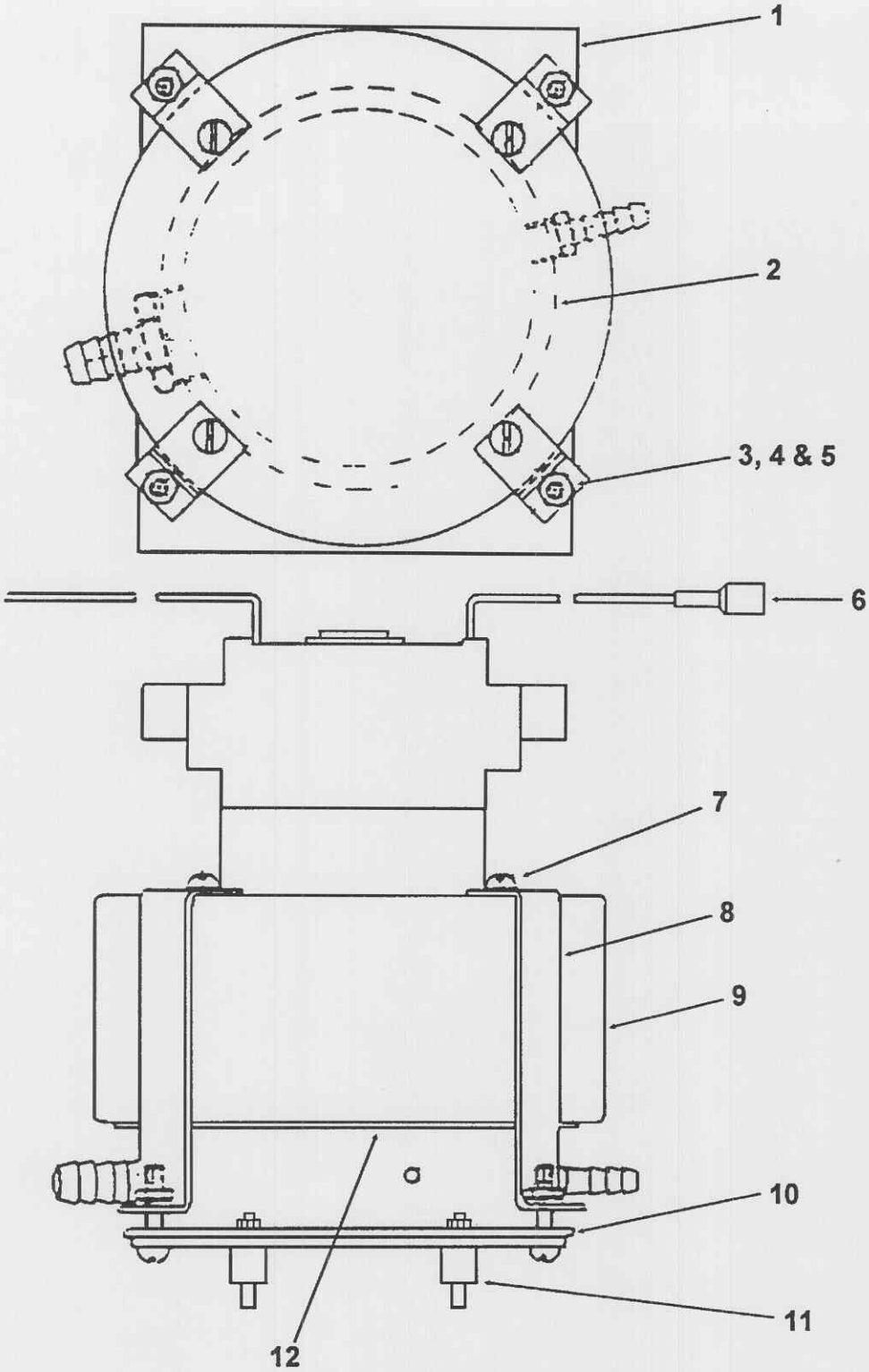

Figure E-5. Vacuum pump.

Section II. REPAIR PARTS LIST FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-5	1		Plate, Motor (25415) 01-90-3444	EA	1
E-5	2		Ring Assembly (25415) 01-90-2528	EA	1
E-5	3		Screw, Slotted,10 - 32 by ¾-in Bench Stock	EA	4
E-5	4		Lockwasher, No. 10 Bench Stock	EA	8
E-5	5		Hex Nut, 10 - 32 Bench Stock	EA	8
E-5	6		Terminal, Insulated (25415) 01-90-2339-4	EA	1
E-5	7		Screw, Self-tapping, 10 - 32 Bench Stock	EA	4
E-5	8		Bracket, Mounting (25415) 01-90-3471	EA	4
E-5	9	6105-01-367-1085	Motor (25415) 01-90-2519	EA	1
E-5	10		Ring Gasket (25415) 01-90-2358	EA	1
E-5	11		Mount, Motor (25415) 01-90-2599	EA	4
E-5	12	5330-01-367-1057	Gasket, Motor (25415) 01-90-2390	EA	1

Section III. SPECIAL TOOLS, TEST, AND SUPPORT EQUIPMENT FOR DRAINAGE UNIT

(1) ILLUSTRATION		(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) UNIT OF MEASURE	(5) QTY
FIG NO.	ITEM NO.				
		THERE ARE NO SPECIAL TOOLS, TEST, OR SUPPORT EQUIPMENT APPLICABLE FOR THIS END ITEM.			

GLOSSARY

AFR	Air Force regulation
Amp	Ampere
app	Appendix
AR	Army regulation
AR	As required
BLK	Black
C	Operator/crew
CAGE	Commercial and government entity
cm	Centimeter
CN	Can
CTA	Common table of allowances
CVC	Calibration/verification/certification
°C	Degrees Celsius
°F	Degrees Fahrenheit
D	Depot level maintenance
D	Diode
DA	Department of the Army
DC	Direct current
DEC	Decrease
dia	diameter
DLA	Defense Logistics Agency
DLAM	Defense Logistics Agency manual
DPSC	Defense Personnel Support Center
DS	Direct support
EA	Each
EtO	Ethylene oxide
F	Direct support maintenance
FIG (fig)	Figure
FM	Field manual
FSC	Federal supply class

FSCM	Federal supply code for manufacturers. This is an obsolete term. CAGE (commercial and government entity) is the correct acronym.
ft	Feet
gal	Gallon
GRN	Green
GS	General support
H	General support maintenance
hex	Hexagonal
Hz	Hertz
H_2O	Water
in	Inch
INC	Increase
ISO	International Standards Organization
JTA	Joint table of allowances
kg	Kilogram
lb	Pound
lpm	Liter per minute
MAC	Maintenance allocation chart
MAN	Manual
mL	Milliliter
MPL	Mandatory parts list
MTOE	Modified table of organization and equipment
NO.	Number
NSN	National stock number
O	Unit maintenance
oz	ounce
para	Paragraph
PCB	Printed circuit board
PMCS	Preventive maintenance checks and services
PVC	Polyvinyl chloride
QC	Quality control
QTR YR	Quarter year

QTY	Quantity
RO	Roll
RPL	Repair parts list
rpm	Revolutions per minute
SB	Supply bulletin
sec	Second
SER	Serial
TB	Technical bulletin
TDA	Table of distribution and allowances
TM	Technical manual
TRANS.	Transformer
V	Volts
VAC	Volts alternating current
VDC	Volts direct current

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TM 8-6515-009-24&P	6 Feb 88	Drainage Unit, Pleural Cavity, Model 6053

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2-7	2-5		
E-11		E-4	

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REASON: Corrects nomenclature.

Reverse call-out numbers 4 and 8.

REASON: Correctly identifies part

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