TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

ANESTHESIA APPARATUS 6515–01–185–8446

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HEADQUARTERS, DEPARTMENT OF THE ARMY
SEPTEMBER 1990

OXYGEN AND OXIDIZING GAS HAZARDS

☐ Oxygen and gas mixtures containing large quantities of oxygen react chemically with organic materials to produce heat. This reaction can take place with explosive violence.

☐ Electrostatic discharge and other potential sources of ignition should be kept away from high concentrations of oxygen or oxygen enriched gas mixtures.

☐ Never permit oil, grease, or other combustible substances to come in contact with cylinders, valves, regulators, hoses, and fittings used for oxidizing gases such as oxygen and nitrous oxide.

☐ Oxygen and gas mixtures containing oxygen pose the potential for oxidation of steel cylinders. The oxidation will reduce the strength of the cylinders. Such cylinders must be periodically inspected and tested.

☐ Human exposure to atmospheres containing 12 percent or less oxygen will result in unconsciousness without warning, and so quickly that you cannot help or protect yourself.

TECHNICAL MANUAL
NO. 8–6515–001–24&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
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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 the anesthesia apparatus. It describes how to set up, operate, test, repair, and perform verification functions. 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 basic information and instructions for the oxygen monitor module. TM 8-6515-002-24&P (to be published) provides detailed information and procedures.

☐ Specific direct-support and general-support maintenance instructions are included. 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. Scope.

This manual describes the anesthesia apparatus; provides maintenance personnel with equipment technical data and installation procedures; 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. 885A, Anesthesia Apparatus, Gas, Nitrous Oxide, Oxygen, and Volatile Liquid Anesthetics, Portable, Four-cylinder Capacity.

c. Purpose of equipment. Dispenses a mixture of medical gases and volatile liquid anesthetics and varies their proportions to control a patient's level of consciousness during surgical procedures in a field environment.

1–2. Explanation of abbreviations and terms.

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

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

TB 38–750–2 prescribes forms 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.

1–5. Preparation for storage or shipment.

Refer to chapter 2, section VI for the procedures used to prepare the anesthesia apparatus for storage or shipment.

1–6. Quality assurance or quality control (QA or QC).

TB 740–10/DLAM 4155.5/AFR 67–43 contains QA or QC requirements and procedures.

1–7. Nomenclature cross-reference list.

Table 1–1 identifies official versus commonly used nomenclatures.

Table 1–1. Nomenclature cross-reference list.

Common name	Official nomenclature
Anesthesia Apparatus	Anesthesia Apparatus, Gas, Nitrous Oxide, Oxygen, and Volatile Liquid Anesthetics, Portable, Four-cylinder Capacity
Anesthetic Agent	Volatile Liquid Anesthetic Agent
Case	Carrying Case
Gas Supply Hose	Hose Assembly, Rubber, Oxygen or Nitrous Oxide
Nitrous Oxide Gauge	Gauge, Pressure, Dial Indicating, Nitrous Oxide
Nitrous Oxide Regulator	Nitrous Oxide Regulator Assembly
O-Ring	Packing, Preformed
Oxygen Gauge	Gauge, Pressure, Dial Indicating, Oxygen
Oxygen Regulator	Oxygen Regulator Assembly
Pressure Sensor Valve	Pressure Sensor Shutoff Valve
Vaporizer	Anesthetic Vaporizer

1–8. 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 anesthesia apparatus.

1–9. Warranty information.

A warranty is not applicable.

Section II. EQUIPMENT DESCRIPTION AND DATA

1–10. Equipment characteristics, capabilities, and features.

a. The anesthesia apparatus consists of four basic subsystems, a functional case, an oxygen monitor, and associated components. The subsystems are a gas supply control circuit, an anesthetic agent control

circuit, a breathing circuit, and a waste gas scavenger circuit. The anesthesia apparatus is designed for field use and operates from multiple medical gas cylinder sizes or from a central medical gas system.

b. The case consists of two sections. The larger, lower section serves as an integral stand for the assembled anesthesia apparatus. When emptied, the smaller, upper section serves as a stool for the anesthesiologist or anesthetist operator.

c. The oxygen monitor is a stand-alone unit used in conjunction with the anesthesia apparatus to meet Department of Defense policy.

1–11. Location and description of significant components.

a. Gas supply components.

(1) *Cylinder adapters.* One oxygen and one nitrous oxide cylinder adapter are stored on threaded posts anchored to the inside bottom of the lower case. The adapters provide a means for mounting yoke-type regulators to threaded outlet cylinder valves. Cylinder adapters have nut- and gland-coded inlet connections and pin-indexed outlet connections. These features help prevent accidental interchange of the connections (for example, an oxygen cylinder adapter inlet will not fit a nitrous oxide cylinder outlet, nor will an oxygen cylinder adapter outlet fit a nitrous oxide regulator inlet).

(2) *Cylinder regulators.* Four cylinder regulators are provided; two for oxygen and two for nitrous oxide. All four regulators are stored in the upper case where they are held securely by latched retainer panels. Each regulator has a yoke-type, pin-indexed inlet which attaches to a post-type, pin-indexed cylinder valve, or to the outlet of a pin-indexed cylinder adapter. Pin indexing helps prevent the accidental interchange of connections between the cylinders or cylinder adapters and the regulator inlets. Each regulator also has a cylinder pressure gauge, a relief valve, and a quick-connect outlet adapter with an integral check valve. The quick-connect outlet adapters are keyed to help prevent accidental interchange of the regulator outlets and the supply hose inlets.

(3) *Gas supply hoses.* Four rubber gas supply hoses with fabric-reinforced cores are stored in the upper case. There are two 114-inch long and two 40-inch long hoses; one each for oxygen and nitrous oxide delivery. The long hoses are wrapped around the upper case center storage compartment; the short hoses are stored within the compartment. To gain access to the hoses, unlatch the hinged lid of the storage compartment. Each hose has a keyed quick-connect male inlet adapter, and a keyed quick-connect female outlet adapter with an integral check valve. Supply hose inlets will fit only the regulator outlets for which they are intended; supply hose outlets will fit only the control head inlets for which they are intended. This keying system helps prevent the cross connections of oxygen and nitrous oxide supply hoses.

b. Control head components. The control head and its stand collapse within the lower carrying case. The items and components described in the following subparagraphs comprise the control head. When resting within the lower carrying case, the back of the control head faces upward.

(1) *Gas inlet connections.* The control head gas inlet adapters for oxygen and nitrous oxide are compatible with their respective supply hose outlets. The inlet adapters are located behind the flowmeters, on the lower control head body.

(2) *Pressure sensor valve.* The pressure sensor valve is located directly above the nitrous oxide inlet adapter. It is a diaphragm operated, normally closed valve that is located in the delivery circuit; so, when the oxygen cylinder pressure decreases to 30 pounds per square inch gauge (psig), the valve begins to close. As the valve closes, the nitrous oxide flow is restricted. In the event of an oxygen supply failure (cylinder pressure falling to approximately 20 psig), nitrous oxide flow will be completely shut off.

(3) *Flowmeters and flow control valves.* The panel of flowmeters extends across the top of the control head. Variable area type flow tubes are provided for metering metabolic oxygen and nitrous oxide. Two series-connected flow tubes are located in the center position for metering oxygen flow for the vaporizer. A transparent plastic shield helps to protect the flowmeters from damage. Flowmeter tubes have large ball floats that are easily visible against the scale background. Flow ranges are given in table 1–3. The flow control valves are found directly under their respective flowmeters. Flowmeter scales and flow control valve knobs are color coded for each metered gas (see para 1–12 below for the color coding description). The metabolic oxygen flow control valve is touch-coded (fluted) for non-visual identification. Positive mechanical stops at each flow control valve's closed position help prevent excessive wear on sealing surfaces. The two vaporizer oxygen flowmeters have a single flow control valve.

(4) *Oxygen flush valve.* The direct flow, self-closing oxygen flush pushbutton is located directly below the high flow oxygen flowmeter. The pushbutton controls a valve which, when open (pushed in), supplies oxygen at a minimum rate of 40 liters per minute (LPM) in addition to the total flow of the metered gases.

(5) *Non-adjustable pressure relief valve.* This valve limits the maximum pressure that can be supplied to the patient. The circuit pressure should remain between 60 and 80 millimeters of mercury (mm Hg). If the pressure exceeds 80 mm Hg, the valve opens and vents gases to the atmosphere.

(6) *Absorber.* The absorber is an integral part of

the control head and is located under the control head body. It has two plastic canisters which will hold either bulk or prepackaged soda lime (3 pound (lb) charges). The canisters are covered by anti-static, cylindrical, metal grid shields, and fit tightly, one on top of the other, between the control head body and the absorber base. When the clamp screw in the absorber crossbar is turned clockwise, the base of the absorber is lowered and the canisters can be removed. There is a condensate reservoir with a drain spigot in the absorber base. The reservoir is emptied by turning the knurled knob on the drain spigot clockwise (as viewed from the top of the machine). A short corrugated rubber tube, located at the front of the absorber, carries circulating gas from the absorber base to the inhalation check valve.

(7) *Inhalation and exhalation check valves.* The inhalation and exhalation check valves control the direction of gas flow in the patient breathing circuit. They extend from the front of the control head body. Transparent windows permit the operator to observe that the valves are operating properly.

(8) *Breathing circuit pressure gauge.* The breathing circuit pressure gauge is located on top of the control head body. The gauge monitors pressure in the patient breathing circuit and is also used to establish the desired pressure adjustment of the adjustable pressure limiting (APL) valve.

(9) *APL valve.* The APL valve is located on top of the control head body. It is a valve that will open when the set patient breathing circuit pressure is exceeded. A knurled control knob adjusts an internal spring loaded diaphragm, allowing a pressure setting range of 2 to 70 mm Hg (+3 to +100 centimeters of water (cm H^20)), and a fully closed position. Since the control knob is non-calibrated, pressure setting adjustments are made by observing the breathing circuit pressure gauge readings.

(10) *Anesthetic vaporizer.* The anesthetic vaporizer extends from the front of the control head body. It is equipped with an "ON-OFF" control knob, a filling funnel with a captive funnel plug, a liquid level indicator, a dial-type Celsius (C) thermometer, and a drain spigot. The vaporizer's brass container minimizes heat loss due to vaporization. The purpose of the vaporizer is to provide concentrations of anesthetic agent vapor in the carrier oxygen. The flow calculator allows the operator to determine the required setting for the vaporizer flowmeters to produce the desired concentration of anesthetic agent vapor within a given total flow of gases. (A detailed explanation of calculator use is provided in the Ohmeda manual identified in app A.) The flow calculator is stored in the lower case and is retained by a hook-and-loop fastener.

c. Breathing circuit items.

(1) *Breathing tubes and fittings.* Two 32-inch long corrugated rubber breathing tubes and a Y-connector are provided. The tubes are stored in the central compartment of the upper carrying case; the Y-connector is stored in the latched compartment at the base of the control head stand. The two 22-mm male taper limbs of the Y-connector fit the 22-mm bushings of the long breathing tubes. These items are used in the adult rebreathing circuit. Tubing for the pediatric partial rebreathing circuit is also stored in the upper case central compartment and includes: a 12-inch corrugated rubber breathing tube with a 15-mm male taper connector at one end and a 15-mm female taper connector at the other; and a pediatric supply hose with a 15-mm female taper connector at one end and a tee connector at the other end.

(2) *Breathing bags and fittings.* Two breathing bags are stored in the upper case central compartment. The large 3-liter (L) bag is for adult use. The small 1-L bag is for pediatric use and has a 15-mm female taper connector at one end, and a scavenging vent valve at the other end.

(3) *Masks and fittings.* Five face masks are stored on posts in the uncovered compartment at the base of the control head stand. There is one mask each in newborn, pediatric, child, medium adult, and large adult sizes. Both adult masks have inflatable cushions so that when they are properly inflated, the masks will fit securely against the contours of a patient's face. Each mask has a 22-mm bushing for the mask elbow. The other end of the mask elbow (15-mm male) will fit the pediatric tee female connector, the short breathing tube female connector, the pediatric breathing bag female connector, or the adult circuit Y-connector. Placement of the mask elbow will depend on the breathing circuit being used. When not in use, the Y-connector is stored in the covered compartment at the base of the control head stand. Each adult mask has a four-hook ring around the 22-mm bushing. The hooks are used to retain the mask. One rubber head strap is stored in the upper case central compartment. The strap has four perforated legs that fasten to the four hooks on the mask.

d. Additional items.

(1) *Instrument tray and cylinder holder.* An instrument tray and cylinder holder are stored on the floor of the lower case and are retained by a hook-and-loop strap. The cylinder holder is nested within the instrument tray. (See para 2–2 below for assembly of both items.)

(2) *Clipboard.* A clipboard is stored in the upper case. It is clipped on the hinged lid of the central compartment. The clipboard may be hung on the assembled apparatus by fitting the tab on the back of the clip into the holes provided in both the left and right support arms.

(3) *Tools.* Two double, open-end wrenches (15/16 in. and 1⅛ in., ⅞ in. and ¾ in.) are retained by a swivel clip on the inside of the left support arm. A

5/16-inch hexagonal (hex) wrench and a cylinder valve wrench are stored in the covered compartment at the base of the control head stand.

(4) *Extra replacement parts.* Three vials containing replacement parts are stored in the covered compartment at the base of the control head stand. The large vial contains vaporizer replacement parts, the medium vial contains cylinder yoke gaskets, and the small vial contains replacement inhalation and exhalation check valve disks. An absorber replacement gasket is retained on the inside of the right support arm.

e. Protective closure devices. Protective closure devices protect openings in the anesthesia apparatus from contamination by foreign material (dust, dirt, etc.) when the apparatus is stored or otherwise not in use. It is particularly important that the devices are securely in place when the apparatus is being transported. There are four types of protective closure devices. The following is a description of each type and where it is used.

(1) Rubber-capped blind Schraeder glands are used to seal each of the four regulator outlets. The blind glands lock into place. These devices are retained on each regulator by a key-ring snap and bead chain.

(2) Small plastic cap plugs are used to seal the outlets of the two cylinder adapters. These devices are retained on each adapter by a wire hook and bead chain.

(3) Rubber stoppers are used to seal the opening of the vaporizer and the openings of the exhalation check valve. These devices are retained by a bead chain that is wrapped around the neck of the exhalation check valve.

(4) Rubber caps are used to seal the control head gas inlet connections. These devices are retained behind the control head by a key-ring snap and bead chain.

1–12. Technical data and specifications.

Tables 1–2 through 1–5 describe size and capacities; temperature, pressure, and flow ranges; component specifications; and color coding information for the anesthesia apparatus.

Table 1–2. Size and capacities.

Dimensions (case closed)	
Width	13 in.
Length	20 in.
Height	18 in.
Cube	4680 cubic in
Weight	
Basic unit	86 lbs.
Case	29 lbs.
Total weight	115 lbs.
Capacities	
Vaporizer liquid anesthetic	250 milliliters
Absorber canister	2.5 to 3 lbs. of soda lime

Table 1–3. Temperature, pressure, and flow ranges.

Vaporizer thermometer	0 to 50°C ±1°
Breathing circuit pressure	−10 to 70 mm Hg and −20 to 100 cm H_2O with ±0.5 mm Hg accuracy
Oxygen flush valve	40 LPM minimum
Gas evacuator/relief valve	2 to 70 mm Hg
Non-adjustable relief valve	opens between 60 and 80 mm Hg
Operating temperature	5°C to 40°C (41°F to 104°F)
Storage temperature	−28°C to 54°C (−20°F to 130°F)
Long-term storage temperature	−28°C to 54°C (−20°F to 130°F)
Nitrous oxide flowmeter	0.2 to 8 LPM
Metabolic oxygen flowmeter	0.2 to 7 LPM
Low flow vaporizer flowmeter	20 to 180 cubic cm per minute (cc/min)
High flow vaporizer flowmeter	100 to 1000 cc/min

Table 1–4. Component specifications.

Regulator outlet pressure setting	40 lbs psi
Pressure sensor valve	shuts off when the pressure of oxygen in the circuit drops to approximately 20 psig
Oxygen regulator	40 psi regulator with gauge markings from 0 to 3000 psi
Nitrous oxide regulator	40 psig regulator with gauge markings from 0 to 3000 psi
Case relief valve	nominal relief pressure rating of 1.5 psi
Flowmeter accuracy (all)	±20% up to flows of 1000 cc/min ±10% above flows of 1000 cc/min

Table 1–5. Color coding.

Nitrous oxide flowmeter scale	blue background with white characters
Metabolic oxygen flowmeter scale	white background with green characters
Oxygen "VAPORIZER FLOW" scales	yellow background with black characters
Nitrous oxide flowmeter knob	blue background with white characters
Metabolic oxygen flowmeter knob	white background with silver characters
Oxygen vaporizer flowmeter knob	yellow background with silver characters
Oxygen regulator tee handle	white with black characters
Nitrous oxide regulator tee handle	blue with white characters
Oxygen supply hose identification disks	white with silver characters
Nitrous oxide supply hose identification disks	blue with silver characters

1–13. Identification, instruction, and warning plates, decals, or markings.

The anesthesia apparatus and case contain multiple identification plates, decals, or markings which are

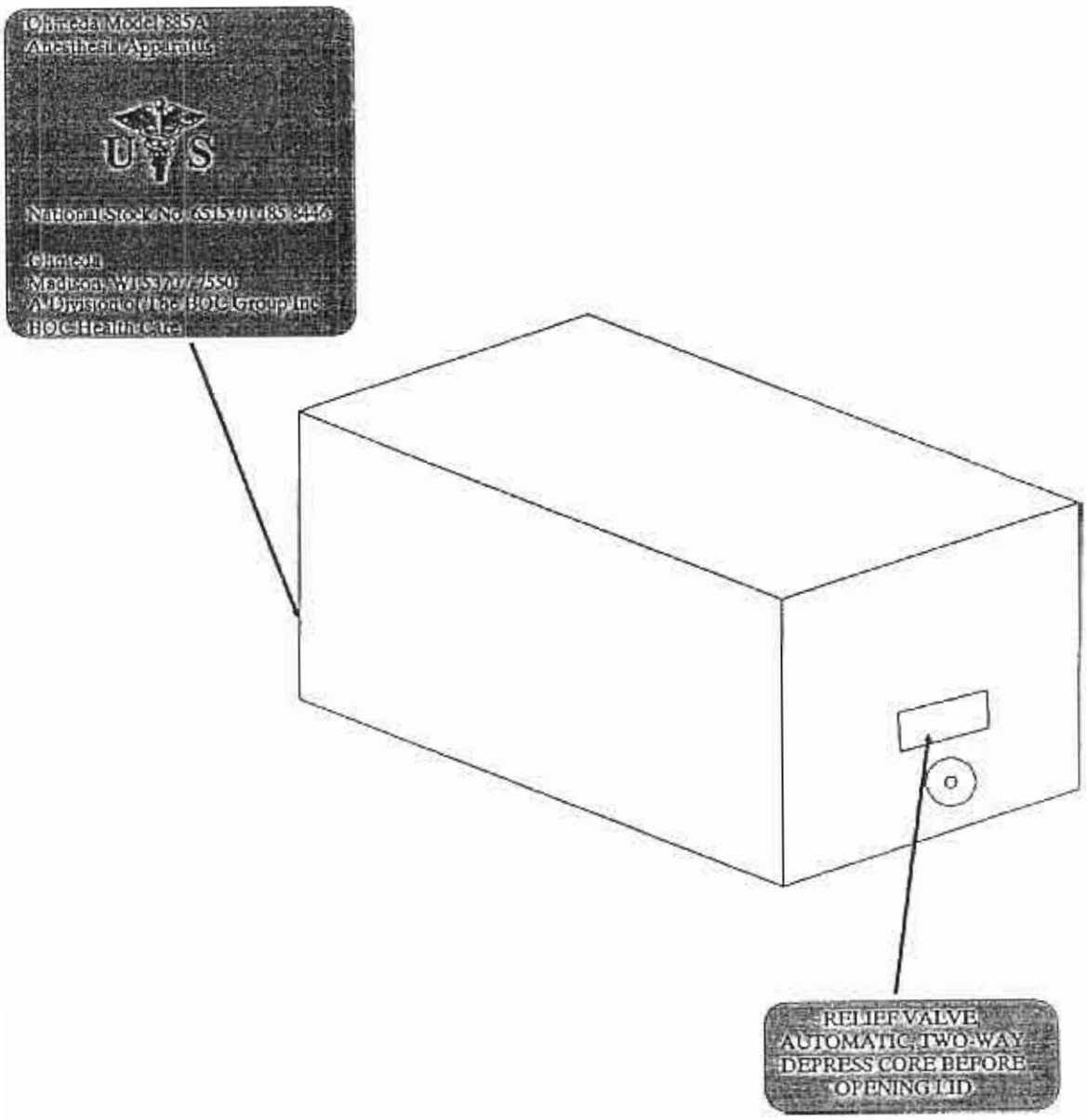


Figure identification plate and instruction decal

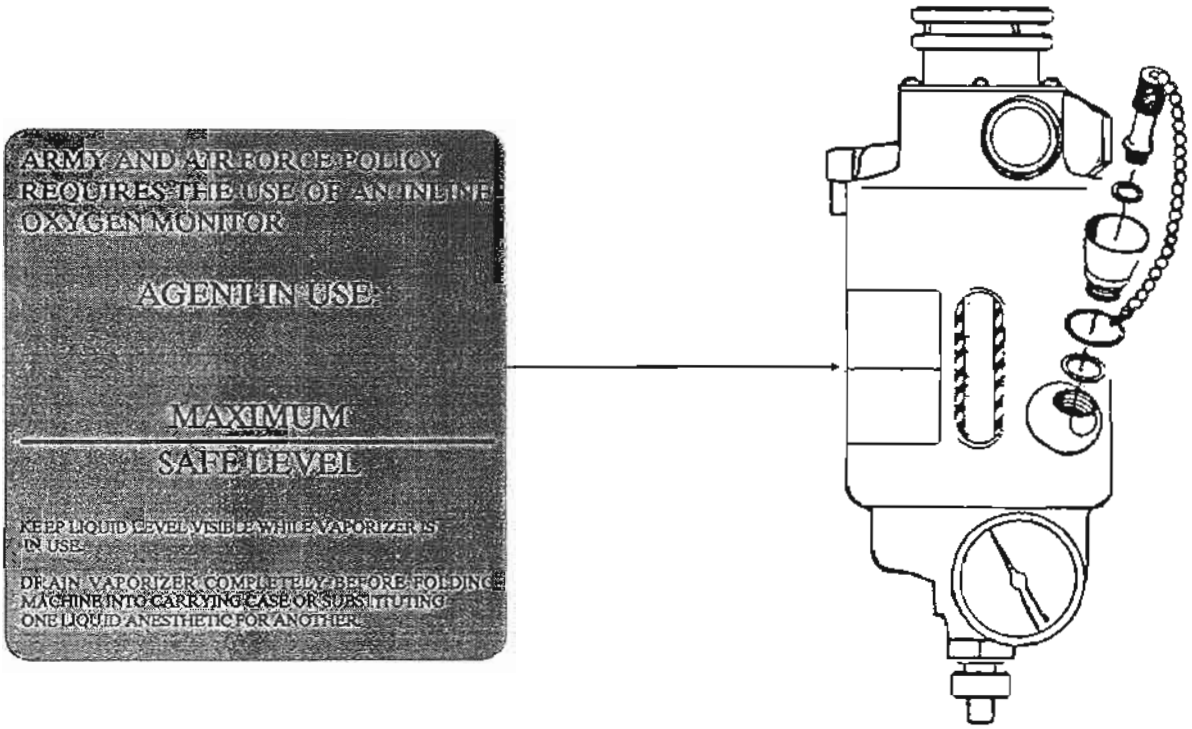
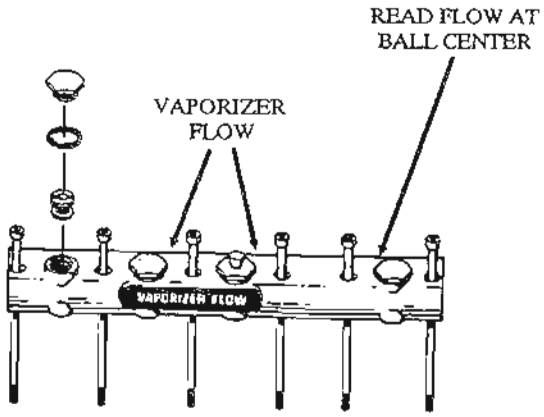


Figure 1–2. Vaporizer decal



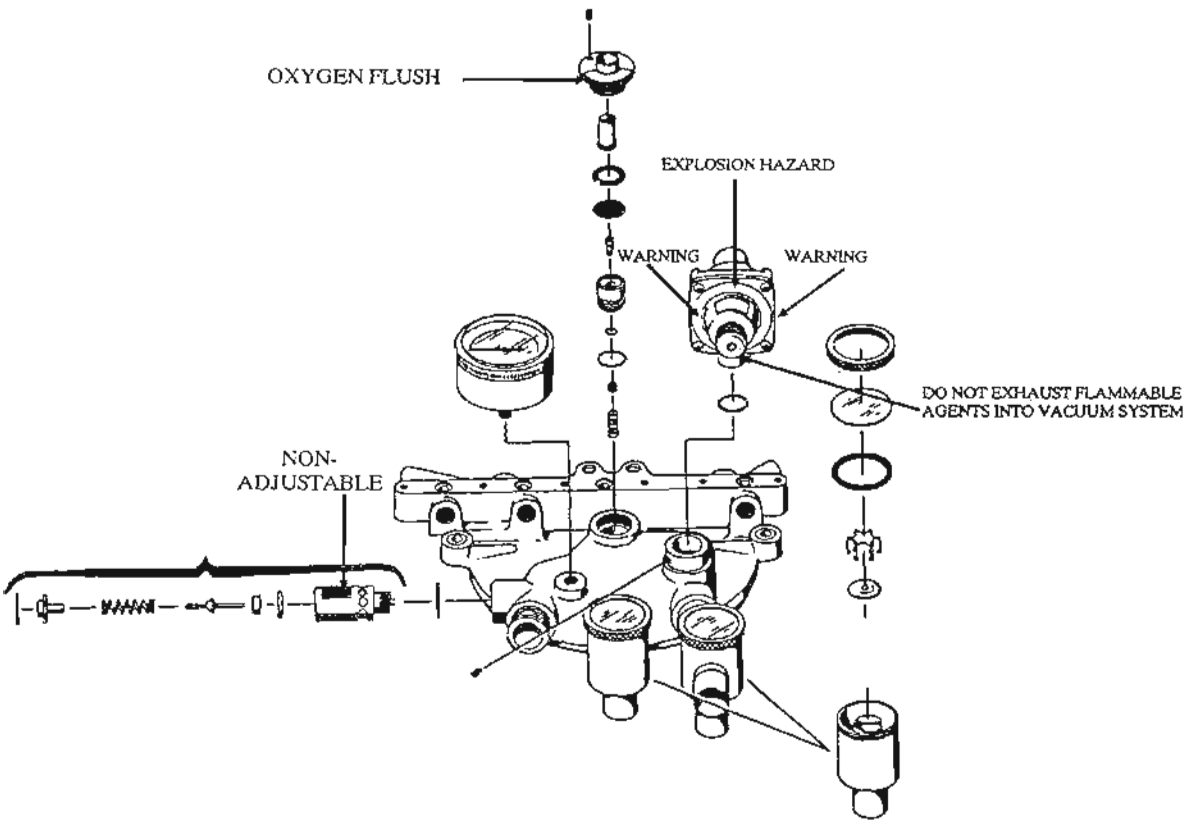


Figure 1–3. Apparatus decals

illustrated or listed in figures 1–1 through 1–3 and table 1–6.

Table 1–6. Assembly instruction plate.

INSTRUCTIONS FOR SETTING UP ANESTHESIA APPARATUS

I. FOR NORMAL USE:
LIFT THIS HINGED LID; REMOVE CLIPBOARD, REBREATHING BAG, HEADSTRAP, TWO CORRUGATED BREATHING TUBES, AND TWO SHORT HOSES. FOR LARGE CYLINDERS, REMOVE TWO LONG HOSES. UNLOCK RETAINER PLATES AND REMOVE REGULATORS.

UNSNAP STRAP AT ONE END OF LOWER CASE SECTION. GRASP CROSS-BAR AT OPPOSITE END, LIFT UNTIL HINGED STAND LATCHES UPRIGHT, GRASP HANDLE FROM WHICH STRAP WAS UNSNAPPED AND LIFT MACHINE UPRIGHT. POSITION HINGED SCREW INTO SLOT PROVIDED IN STAND AND TIGHTEN THUMBNUT. REMOVE MANUALS AND CIRCULAR SLIDE CALCULATOR.

UNFASTEN VELCRO STRAPS IN LOWER CASE, LIFT OUT INSTRUMENT TRAY WITH CYLINDER SPACER ATTACHED. REMOVE CYLINDER SPACER FROM TRAY. FOR LARGE CYLINDERS, REMOVE REGULATOR ADAPTERS.

TO REPLACE GLIDES WITH CASTERS, SNAP CASTER STEMS OUT OF CLIPS AND REMOVE CASTERS. TIP CASE, REMOVE GLIDES, REPLACE WITH CASTERS. PLACE GLIDES IN CASTER RETAINER CLIPS.

HOOK SOCKETS OF INSTRUMENT TRAY OVER POSTS ON REAR OF MACHINE HEAD. LIFT HINGED U-BAR ON REAR OF STAND AND ENGAGE CLIP UNDER EDGE OF INSTRUMENT TRAY.

TO PLACE CYLINDER SPACER ON LOWER CASE, ENGAGE TABS ON ONE EDGE TO END FLANGE OF CASE AND LOCK OPPOSITE EDGE TO SUPPORT BRACKET. PLACE CYLINDERS IN SPACES. MOUNT REGULATORS ON CYLINDER VALVES, USING YOKE GASKETS FOR SEAL.

(FOR LARGE CYLINDERS, ATTACH REGULATOR ADAPTER TO EACH, USING LARGE WRENCH INSIDE STAND. MOUNT REGULATORS ON ADAPTERS. ATTACH LONG HOSES TO REGULATOR OUTLETS.)

ATTACH SHORT HOSES TO GAS INLETS ON REAR OF MACHINE HEAD. SHORT HOSES CAN BE CONNECTED TO LONG HOSES, OR TO REGULATORS ON SMALL CYLINDERS.

TAKE CYLINDER VALVE WRENCH AND "Y" CONNECTOR FROM ACCESSORY COMPARTMENT. PLACE END OF ONE CORRUGATED TUBING OVER OUTLET OF VAPORIZER AND END OF OTHER CORRUGATED TUBING OVER INLET OF EXHALATION CHECK VALVE. SECURE ENDS OF "Y" CONNECTOR INTO FREE ENDS OF CORRUGATED TUBINGS. CENTER CONNECTION OF "Y" ACCEPTS AN ENDOTRACHEAL TUBE ADAPTER OR A MASK ELBOW.

LOOSEN CLAMP SCREW UNDER BASE OF ABSORBER. LOWER BASE. REMOVE CANISTERS: REMOVE COILED SCAVENGING HOSES, AND FILL EACH CANISTER LEVEL TO BRIM WITH LOOSE SODA LIME, OR WITH CARTRIDGE OF SODA LIME. REPLACE CANISTERS AND TIGHTEN IN PLACE.

CLOSE ALL FLOWMETER NEEDLE VALVES. SLOWLY AND COMPLETELY OPEN VALVES OF CYLINDERS CONNECTED FOR USE. PRESS OXYGEN FLUSH BUTTON TO CHECK FLUSH FLOW. INHALE AND EXHALE THROUGH "Y" CONNECTOR TO CHECK OPERATION OF VALVES. CHECK EACH NEEDLE VALVE FOR FLOW.

SET VAPORIZER CONTROL KNOB TO "ON" POSITION. TURN RELIEF VALVE ADJUSTING KNOB CLOCKWISE UNTIL IT STOPS. PLUG BAG CONNECTOR WITH STOPPER. OCCLUDE PATIENT CONNECTION OF "Y" CONNECTOR AND PRESS FLUSH VALVE BUTTON UNTIL CIRCUIT PRESSURE GAUGE READS 20 TO 15 MM HG. RELEASE FLUSH VALVE AND SET LOW FLOW VAPORIZER FLOWMETER TO 100 CC/MIN. SYSTEM IS LEAKING UNACCEPTABLY IF PRESSURE FALLS WITHIN NEXT MINUTE. STOP FLOW. REMOVE STOPPER AND ATTACH REBREATHING BAG TO BAG CONNECTOR.

UNSCREW FUNNEL PLUG AND FILL VAPORIZER WITH 300 CC DESIRED ANESTHETIC AGENT. REPLACE PLUG SECURELY.

THREAD END OF ONE SCAVENGING HOSE THROUGH HOLE IN FLOWMETER SHIELD AND CONNECT TO EXHAUST PORT OF RELIEF VALVE. CONNECT SECOND HOSE TO FIRST AND ATTACH ITS FREE END TO DISPOSAL SYSTEM.

II. REPACKING FOR STORAGE OR SHIPMENT:
TURN OFF ALL CYLINDER VALVES. DISCONNECT ALL HOSES. OPEN DRAIN COCK AND EMPTY LIQUID ANESTHETIC FROM VAPORIZER.

REMOVE ABSORBER CANISTERS. DISCARD SODA LIME. DRAIN AND DRY ABSORBER BASE. REPLACE CANISTERS AND TIGHTEN IN PLACE. INSTALL GLIDES IN SOCKETS FOR SHIPMENT. TAKE APART ASSEMBLED COMPONENTS. REPLACE ALL PARTS IN SPACES PROVIDED (REVERSE OF ASSEMBLY PROCEDURE).

INSTRUCTION MANUAL CONTAINS ADDITIONAL DETAILS OF ALL PROCEDURES OUTLINED HERE.

1–14. Model differences.

Model differences are not applicable since this manual covers a single model. However, design changes in assemblies, subassemblies, or components occur periodically. Information on such engineering changes will be published in supply bulletins and subsequent changes to this manual.

1–15. Equipment configurations.

The variations in the adult rebreathing circuit and the pediatric partial rebreathing circuit are shown in paragraphs 2–9 and 2–10 below.

1–16. Safety, care, and handling.

a. Observe each WARNING, CAUTION, and NOTE in this manual. The associated high pressure medical gases in cylinders and anesthetic agents may be lethal both to medical personnel and patients.

b. Ensure that all protective closure devices are in place when the apparatus is not in use to prevent contamination of internal components.

c. Follow component sterilization procedures without deviation.

Section III. PRINCIPLES OF OPERATION

1–17. Gas supply circuits and controls.

Oxygen and nitrous oxide gases flow from high pressure cylinders through a network of valves, hoses, pipes, and pressure reduction regulators to multiple control valves. The nitrous oxide circuit also incorporates a pressure sensor valve to preclude the flow of nitrous oxide without a simultaneous flow of oxygen.

1–18. Anesthetic agent circuit and controls.

An ancillary circuit allows oxygen to pass through a volatile liquid anesthetic agent and transport the vapor to the patient breathing circuit. Multiple flow controls and a vaporizer assembly control the anesthetic agent.

1–19. Patient breathing circuits.

These circuits deliver a mixture of oxygen, nitrous oxide, and the vapor of a volatile liquid anesthetic to either an adult patient or a pediatric patient. The circuits combine the flows of an oxygen-nitrous oxide mixture and an oxygen-anesthetic agent mixture. The circuits also contain multiple safety relief valves, a gauge, an absorber to remove carbon dioxide, and patient connection devices.

CHAPTER 2
PRELIMINARY INSTRUCTIONS

Section I. PREPARATION FOR OPERATION

2–1. Equipment location.

a. Use the handles installed on the ends of the case to move the anesthesia apparatus to its approximate operating location.

b. Assure that waste anesthetic gases can be routed outside the operating environment.

c. Consider the location of large medical gas cylinders to assure connection to the apparatus.

2–2. Set-up procedures.

a. Push the pressure relief button located on one end of the case.

b. Release the four draw bolts holding the upper and lower sections of the case together.

c. Place the upper case carefully on its back.

d. Assemble the anesthesia apparatus following the instructions in table 2–1. Refer to table 2–2 for a listing and the precise storage location of the apparatus accessories, components of end item, and basic issue items.

Table 2–1. Assembly instructions.

1. Pull the absorber crossbar upward following an arc until the support arms lock in an upright position.

CAUTION

Verify that the support arms are in the locked position before proceeding to the next step.

2. Remove either the set of four casters or the set of four glides, depending on the desired use, from the retaining clips on the floor of the lower case.
3. Place the apparatus carefully on its side, install the casters or glides, and replace the apparatus in its upright position.
4. Level the unit using the sight level mounted on the left support arm.
5. Unsnap the short strap that secures the flowmeter top manifold to the lower case.
6. Grasp the flowmeter top manifold and pull upward following an arc until the control head is upright and aligned with the support arms. Tighten the hinged thumb bolt at the end of the crossbar into the slot in the left support arm until the control head is locked upright.

WARNING

When raising the control head, hold it securely until locked. Otherwise, the control head will fall forward and pinch fingers or damage the apparatus.

7. Unfasten the hook-and-loop strap on the floor of the lower case and lift out the instrument tray.
8. Remove the cylinder holder nested in the instrument tray.

NOTE

If large cylinders will be used, unscrew the cylinder adapters from the posts anchored to the floor of the lower case. Set them aside.

9. Place the sockets of the instrument tray over the short posts at the back of the control head.
10. Lift the U-bracket, hinged to the back of the support arms, and engage it with the clips under the edge of the instrument tray.
11. Open the upper case center storage compartment.
12. Remove either the short or long gas supply hoses depending on the size of the gas cylinders to be used.
13. Open the retaining panels and remove the gas regulators.
14. Engage the tabs on the underside of the cylinder holder with the back flanged edge of the lower case rim. Lock the latch to the bracket at the base of the control head stand.

Table 2–2. Items furnished and their storage locations.

Upper case	Location
Cylinder regulators oxygen (2) nitrous oxide (2)	Retained by hinged panels with ring and groove latches
Gas supply hoses oxygen, long, 114 in. (1) nitrous oxide, long, 114 in. (1)	Long hoses wrapped around center storage compartment
oxygen, short, 40 in. (1) nitrous oxide, short 40 in. (1)	Short hoses wrapped inside center storage compartment
Long breathing tubes (2)	Inside center storage compartment
Short breathing tube with connectors (1)	Inside center storage compartment
Pediatric supply hose with connector and tee	Inside center storage compartment
Breathing bags large (3–L) (1) small (1–L) with connectors and gas scavenging vent valve (1)	Inside center storage compartment
Head strap (1)	Inside center storage compartment
Clipboard (1)	Clipped to back of center storage compartment hinged lid
Protective closure devices for regulators (4) for cylinder adapters (4) for vaporizer and exhalation check valve openings (3) for gas inlets (2)	Installed in assemblies
Lower case	**Location**
Casters or glides	Held by retaining bar on floor of case

Table 2–2. Items furnished and their storage locations. —Continued

Cylinder adapters oxygen (1) nitrous oxide (1)	Threaded onto posts anchored to floor of case
Masks large adult (1) medium adult (1) child (1) pediatric (1) newborn (1)	Held on posts at base of control head stand
Y-connector (1)	In latched compartment at base of control head stand
Mask elbow (1)	In latched compartment at base of control head stand
Replacement parts vials large (1) with vaporizer replacement parts medium (1) with cylinder yoke gaskets small (1) with check valve disks	In latched compartment at base of control head stand
Cylinder valve wrench (1) and hex wrench (⅜ in.) (1)	In latched compartment at base of control head stand
Instrument tray	On case floor held by hook-and-loop strap
Cylinder holder	On case floor nested within instrument tray and held by hook-and-loop strap
Level	Inside right support arm
Double open end wrenches 1⅜ in. and 1⅝ in. (1) ⅞ in. and ¾ in. (1)	Retained by clip on inside left support arm
Absorber gasket replacement (1)	Retained by tape on inside right support arm
Flow calculator (1)	Retained by hook-and-loop strap on right inside case wall
Gas scavenging tubes (2)	One inside each absorber canister
Gas scavenging tubes (2)	One inside each absorber canister

2–3. Gas connection procedures.

a. Small cylinder connection procedures. Small size D and E cylinder connection procedures are listed in table 2–3. Figure 2-1 provides an illustration of small cylinder connections.

Table 2–3. Small cylinder connection procedures.

1. Unscrew the cylinder valve caps.
2. Place the oxygen cylinders in the left side of the holder (as viewed from the rear of the unit).
3. Place the nitrous oxide cylinders in the right side of the holder.

NOTE

Cylinder positions will correspond to their respective flowmeter positions.

4. Use the cylinder valve wrench to slowly open the cylinder valves for several seconds to blow out any foreign matter from the adapter outlets.
5. Install new gaskets on the regulator inlet nipples.

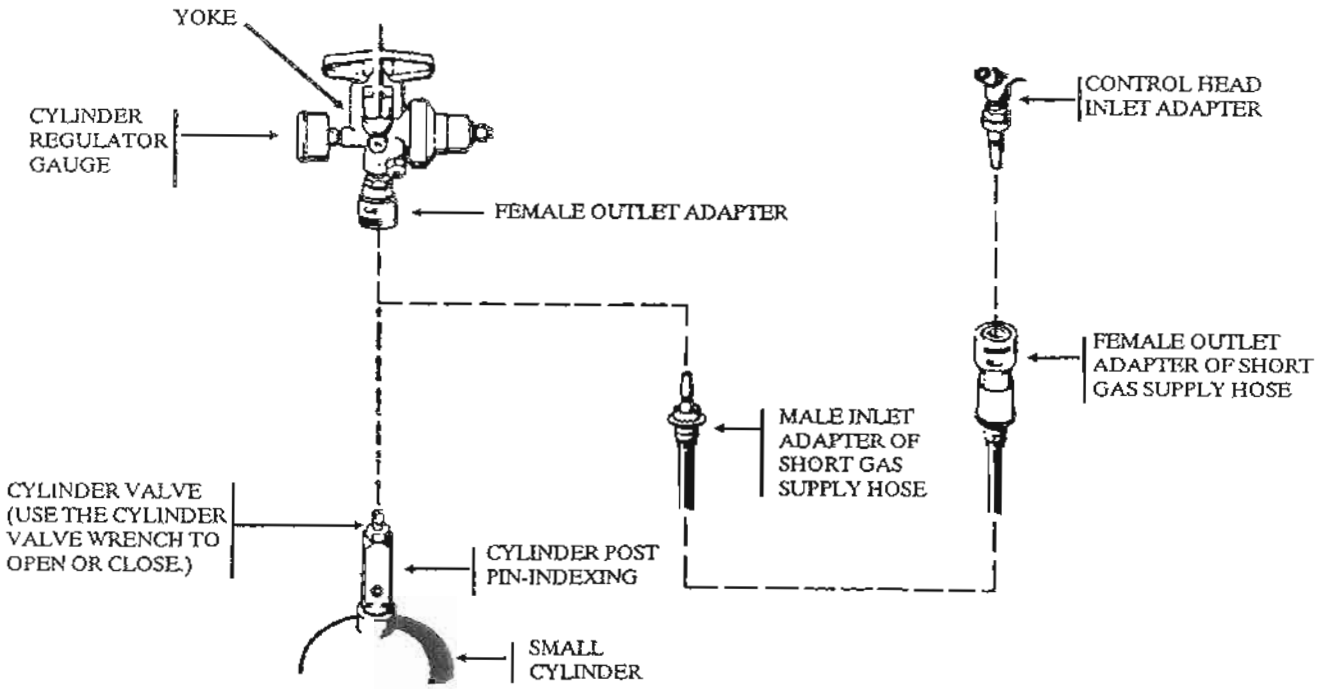
CAUTION

Use only one gasket per yoke. Use of more than one gasket could cause cylinder gas leakage and incorrect engagement with the safety index pins.

NOTE

Assure that the pin indexes of the cylinders and regulators match.

6. Tighten the regulators onto the cylinder valves. Assure that the gauges are visible.
7. Complete all gas supply hose connections using the short hoses.



NOTE: MAKE SURE A CYLINDER GASKET IS IN PLACE AND THE PIN-INDEXING MATCHES.

Figure 2–1. Small cylinder connections

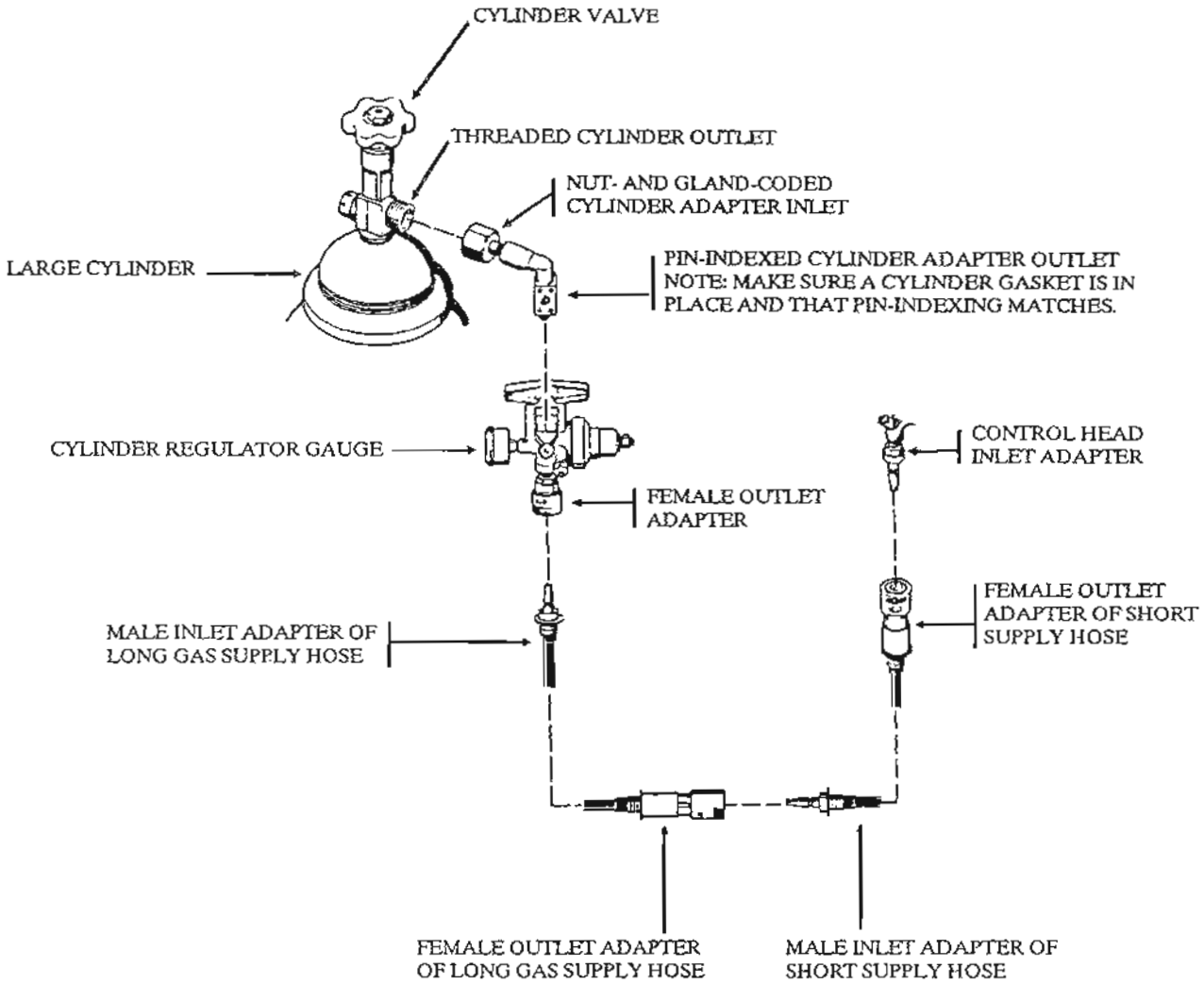
b. Large cylinder connection procedures. Large size M and G cylinder connection procedures are listed in table 2–4. Figure 2–2 provides an illustration of large cylinder connections and cylinder combination connections.

Table 2–4. Large cylinder connection procedures.

1. Locate the large gas cylinders and assure that they are properly fastened in an upright position for use.
2. Unscrew the cylinder valve caps.
3. Use the cylinder valve wrench to slowly open the cylinder valves for several seconds. This action will blow out any foreign matter from the cylinder outlets.
4. Attach the appropriate nut- and gland-coded cylinder adapter inlet to each cylinder outlet using the 1⅛ inch open end wrench.
5. Slowly open the cylinder valves for several seconds to blow out any foreign matter from the adapter outlets.
6. Complete all gas hose connections using the long hoses.

c. Small and large cylinder connection procedures. When large cylinders are to be used as the primary supply of gases and the small cylinders are to be used as the reserve supplies (refer to fig 2–2), the following procedures apply.

(1) Attach an oxygen regulator to a large oxygen cylinder fitted with an adapter.



NOTE: THE LONG GAS SUPPLY HOSE AND THE SHORT GAS SUPPLY HOSE ARE USED WHEN A LARGE CYLINDER IS TO BE USED AS A PRIMARY SUPPLY AND A SMALL CYLINDER IS TO BE USED AS RESERVE SUPPLY. ALSO, LONG AND SHORT GAS SUPPLY HOSES MAY BE CONNECTED IN SERIES TO USE CYLINDERS TOO FAR AWAY FOR A SINGLE LENGTH OF HOSE TO REACH.

Figure 2–2. Large cylinder connections and combination cylinder connections

(2) Attach a nitrous oxide regulator to a large nitrous oxide cylinder fitted with an adapter.

(3) Attach the remaining two regulators to the appropriate small cylinders.

(4) Connect the appropriate long supply hoses to the large cylinder regulator outlets.

(5) Connect the male adapter end of the short supply hoses to each female adapter end of the long supply hoses.

(6) Connect the female adapter end of the short supply hoses to the control head male outlets.

NOTE

When a large cylinder supply becomes depleted, simply disconnect the short supply hose from the long supply hose and connect it to the regulator outlet on the small cylinder.

d. Installation of a regulator on a cylinder adapter.

(1) Install a new gasket on the regulator inlet nipple.

(2) Ensure that the pin indexes of the regulator and the cylinder adapter match.

(3) Tighten the regulator onto the cylinder adapter.

(4) Assure that the gauge is visible.

2–4. Controls and indicators.

The function of anesthesia apparatus controls and indicators are listed in table 2–5.

Table 2–5. Function of controls and indicators.

Control or indicator	Function
APL valve	Determines the pressure at which the breathing circuit is vented
Oxygen and nitrous oxide regulator pressure gauges	Indicate the oxygen or nitrous oxide pressures from an open cylinder
Flow control valves	Control the individual flows from each gas cylinder
Flowmeters	Indicate individual circuit flow rates of each gas
Oxygen flush valve pushbutton	Provides a high rate of oxygen when pressed (minimum of 40 LPM)
Breathing circuit pressure gauge	Indicates the pressure in the breathing circuit
Vaporizer "ON-OFF" control knob	If "ON," the vaporizer oxygen flows through the vaporizing chamber; if "OFF," oxygen bypasses the vaporizing chamber
Inhalation and exhalation check valves	Direct the flow in the breathing circuit
Non-adjustable relief valve	Limits the maximum pressure delivered to the patient
Vaporizer dial thermometer	Indicates the temperature of the liquid anesthetic agent within the vaporizer
Sight level	Indicates the orientation of flowmeters for maximum accuracy

2–5. Adult rebreathing circuit set-up procedures.

The adult rebreathing circuit is set up by following the detailed procedures in table 2–6.

Table 2–6. Adult rebreathing circuit set-up procedures.

1. Remove the two long breathing tubes from the upper case.
2. Remove the Y-connector from the storage compartment in the lower case.
3. Attach one bushing of a breathing tube to the horizontal 22-mm male taper port of the exhalation check valve.
4. Attach one bushing of the second breathing tube to the 22-mm male taper port extending from the vaporizer.
5. Attach the other bushing of each breathing tube to the 22-mm limbs of the Y-connector.
6. Loosen the clamp screw under the absorber crossbar.
7. Remove the absorber canisters and remove the gas scavenger tubes stored within the canisters.
8. Fill each canister with either loose soda lime or soda lime cartridges.

NOTE

Follow the soda lime manufacturer's instructions for properly filling the canisters.

CAUTION

When using prefilled soda lime cartridges, remove the screens from the canister bases to preclude high resistance in the patient breathing circuit. Store the screens to prevent loss.

9. Replace and align the canisters, then tighten the clamp screw to seal the canisters against the control head body.

CAUTION

Do not excessively tighten the clamp screw since the canisters could warp, resulting in gas leakage.

10. Fit one bushing of the scavenging tube over the exhaust port of the APL valve. Thread the other end of the bushing through the opening between the flowmeters to the back of the apparatus.

2–6. Preliminary adult rebreathing circuit check procedures.

The preliminary set up of the adult rebreathing circuit must be checked at this point using the procedures in table 2–7.

Table 2–7. Preliminary adult circuit check procedures.

1. Close all three flow control valves by turning clockwise.
2. Turn the vaporizer control knob to the "OFF" position.
3. Open the oxygen cylinder valve slowly.
4. Open the nitrous oxide cylinder valve slowly.
5. Check the regulator gauges to verify pressure readings.
6. Open each flow control valve slowly to verify that gas flow is indicated on each flowmeter scale. Close the flow control valves.
7. Press the oxygen flush button to verify the flush flow and to verify that the inhalation check valve is opening properly.
8. Perform the following additional inhalation check valve procedures:
   —Disconnect the hoses from the vaporizer outlet port and the exhalation check valve port.
   —Close the APL valve by turning fully clockwise.
   —Plug the vaporizer outlet port with a rubber stopper.
   —Open the absorber drain cock two turns.
   —Set the oxygen flow to 300 cc/min.
   —Observe the breathing circuit pressure gauge for an increased reading.

CAUTION

Do not allow the pressure to exceed 40 cm H^2O.

   —Close the flow control valve.
   —Close the absorber drain cock.
9. Perform the following exhalation check valve procedures:
   —Remove the rubber stopper from the vaporizer outlet port.
   —Connect a breathing tube from the vaporizer outlet port to the breathing bag port.
   —Set the oxygen flow to 300 cc/min.
   —Push the flush valve button to pressurize the breathing circuit to approximately 40 cm H^2O.
   —Observe the breathing circuit pressure gauge to assure that the reading does not decrease.

—Close the flow control valve.
10. Perform the following vaporizer check procedures:
—Remove the rubber stopper from the vaporizer outlet port.
—Connect a breathing tube from the vaporizer outlet port to the breathing bag port.
—Turn the vaporizer control knob to the "ON" position.
—Set the vaporizer flow to 300 cc/min.
—Push the flush valve button to pressurize the breathing circuit to approximately 40 cm H^2O.
—Observe the breathing circuit pressure gauge to assure that the reading does not decrease.
—Close the flow control valve.
11. Perform the following exhalation check valve and APL valve check procedures:
—Disconnect the tube from the breathing bag port and connect it to the exhalation port.
—Turn the vaporizer control knob to the "OFF" position.
—Plug the breathing bag port with a rubber stopper.
—Open the APL valve by turning it fully counterclockwise.
—Push the flush valve button.
—Observe the breathing circuit pressure gauge to assure that the pressure does not exceed 5 cm H^2O.
—Disconnect the breathing tube from the exhalation port.
—Remove the rubber stopper from the breathing bag port.
—Fit one bushing of the other breathing tube onto the horizontal 22-mm male taper port of the exhalation check valve.
—Fit the other bushing of each breathing tube onto the 22-mm limbs of the Y-connector.
—Remove the large breathing bag from the upper case and fit it onto the lower port of the exhalation check valve.
12. Perform the following oxygen pressure sensor check procedures:
—Open both the oxygen and nitrous oxide flow control valves to 1 LPM flow.
—Close the oxygen cylinder valve, and after approximately 30 seconds, check to assure that the nitrous oxide is shut off as the pressure sensor operates
—Close both cylinder valves.

2–7. Pediatric partial rebreathing set-up procedures.

The pediatric partial rebreathing circuit is set up by following the detailed procedures in table 2–8 in lieu of the procedures in table 2–6.

Table 2–8. Pediatric partial rebreathing circuit set-up procedures.

1. Remove the pediatric supply tube, the short corrugated breathing tube, and the small breathing bag from the upper case.
2. Fit the pediatric supply tube male connector into the vaporizer outlet port.
3. Fit the short corrugated breathing tube male connector into the small breathing bag female connector.
4. Fit the pediatric tee male connector into the short corrugated breathing tube female connector.
5. Assure that the scavenging valve is attached to the small breathing bag. Close the scavenging valve.
6. Loosen the clamp screw under the absorber crossbar. Remove the absorber canisters and remove the gas evacuation tubing stored within the canisters
7. Replace and align the canisters, then tighten the clamp screw to seal the canisters against the control head body.
8. Close the APL valve by turning it fully clockwise.
9. Plug both ports of the exhalation check valve with rubber stoppers.
10. Connect the gas evacuation tubing to the scavenging valve.
11. Connect the scavenging tube to the waste gas evacuation system.

NOTE

If more length is required, connect other section(s) of tubing.

NOTE

Each evacuation tube includes a metal connector for joining tubes end to end. Do not discard these connectors.

2–8. Preliminary pediatric partial rebreathing circuit check procedures.

The preliminary set up of the pediatric partial rebreathing circuit must be checked at this point using the procedures in table 2–9.

Table 2–9. Preliminary pediatric circuit check procedures.

1. Close all three flow control valves by turning each valve clockwise to its mechanical stop.
2. Turn the vaporizer control knob to the "OFF" position.
3. Slowly open the oxygen cylinder valve and then the nitrous oxide cylinder valve.
4. Verify pressure readings on the regulator gauges.
5. Open each flow control valve slowly to verify that flow is indicated on each flowmeter scale. Close the valves.
6. Press the oxygen flush button to verify the flush flow and to verify that the inhalation check valve is opening properly.
7. Perform the following oxygen pressure sensor check procedures:
—Open both the oxygen and nitrous oxide flow control valves to 1 LPM flow.
—Close the oxygen cylinder valve, and after approximately 30 seconds, check to assure that the nitrous oxide is shut off as the pressure sensor operates.
—Close both cylinder valves.

Section II. THEORY OF OPERATION

2–9. Adult rebreathing circuit configuration.

A schematic of the items and components of the anesthesia apparatus required for operation in the adult rebreathing circuit configuration is illustrated in figure 2-3. The numbered items on the figure correspond to the numbered items in the following subparagraphs.

a. Gas supply control circuits.

(1) Oxygen and nitrous oxide cylinders (1/2) provide the gas supply for operating the anesthesia apparatus. Cylinder adapters (3/4) allow for the con-

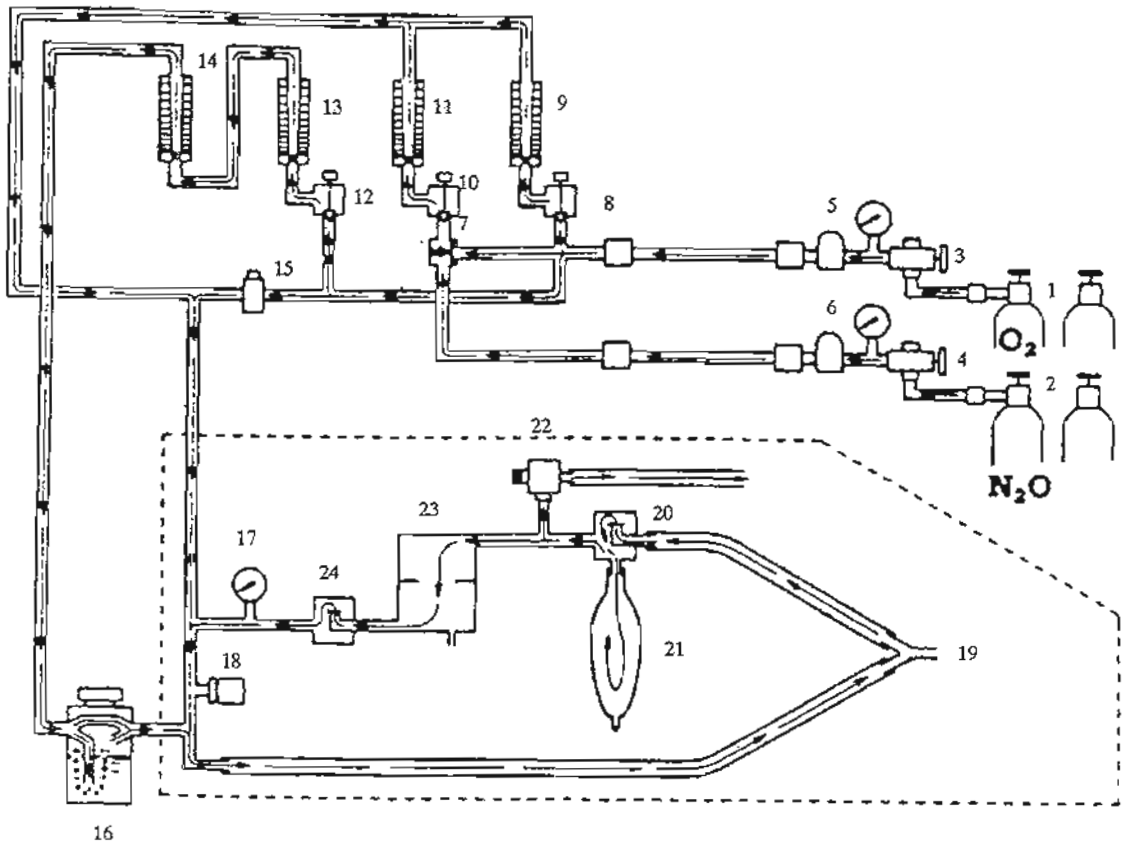


Figure 2–3. Adult rebreathing circuit schematic

nection of different size cylinders. The oxygen and nitrous oxide regulators (5/6) reduce the high pressure gases from the cylinders to about 40 psig for use.

(2) Nitrous oxide flows out of the regulator (6) through supply hoses into the control head inlet. The nitrous oxide then flows through a single path past the normally closed nitrous oxide pressure sensor (7) to the nitrous oxide flow control valve (10).

(3) Oxygen flows out of the regulator (5) through supply hoses into the control head assembly. The oxygen then flows through three paths to the—

(*a*) Metabolic oxygen control valve (8).

(*b*) Normally closed pressure sensor valve (7) in the nitrous oxide flow path.

(*c*) Vaporizer flow control valve (12) and the oxygen flush valve (15).

NOTE

The function of the nitrous oxide pressure sensor valve is to close the nitrous oxide flow in the event of oxygen supply depletion or failure. Oxygen pressure greater than 30 psig allows the valve to remain open.

b. Anesthetic agent control circuit. Oxygen flows from the oxygen "VAPORIZER FLOW" control valve (12) through the series-connected low-flow (13) and high-flow (14) flowmeters. This oxygen does not flow through common passages. It flows directly to the anesthetic vaporizer (16).

c. Breathing circuit.

(1) An open oxygen flow control valve (8), an open nitrous oxide pressure control valve (7), and an open nitrous oxide flow control valve (10) allow both gases to flow through their respective flowmeters (9/11) to a common passage. The oxygen-nitrous oxide mixture flows directly to the breathing circuit.

(2) An open vaporizer control allows oxygen to flow through the vaporizer (16). That is, oxygen is bubbled through the liquid anesthetic agent and becomes saturated with the anesthetic vapor. The oxygen-anesthetic vapor then flows to the breathing circuit and mixes with the oxygen-nitrous oxide mixture.

NOTE

A closed vaporizer control causes the oxygen to bypass the vaporizing chamber and flow directly to the vaporizer outlet port.

NOTE

Close the oxygen "VAPORIZER FLOW" control valve when the vaporizer control knob is "OFF."

(3) The diluted anesthetic vapor and the oxygen-nitrous oxide mixture are delivered through the inhalation breathing tube and the Y-connector (19) to the patient.

(4) The patient's breathing, the inhalation check valve (24), and the exhalation check valve (20) control the direction of flow within the breathing circuit. The breathing circuit pressure gauge (17) registers the pressure within the breathing circuit.

(5) When the patient exhales, the gas is directed through the Y-connector (19), exhalation breathing tube, and exhalation check valve (20). Then, the exhalation check valve opens, the breathing bag (21) expands, and the exhalation check valve closes. When the patient again inhales, the exhalation check valve closes, the breathing bag collapses, and the inhalation check valve (24) opens.

(6) Gas flowing through the exhalation check valve enters the absorber (23) and flows downward through the soda lime filled canisters so that carbon dioxide can be absorbed. A short corrugated tube allows the remainder of the gas to flow from the base of the absorber to the inhalation check valve. Gases flowing through the inhalation check valve rejoin the fresh gas flow and the cycle begins again.

CAUTION

The non-adjustable pressure relief valve opens and releases gas to the atmosphere whenever pressure in the breathing circuit exceeds the range of 60 to 80 mm Hg. Continued use with gas releases will pollute the atmosphere and endanger operators.

d. Waste gas scavenging circuit. The APL valve is adjustable to a specific setting. If the pressure within the breathing circuit exceeds the pre-adjusted setting, the valve will open and release gas to the waste gas evacuation system. The waste gas can only flow from the breathing circuit.

2–10. Pediatric partial rebreathing circuit configuration.

A schematic of the items and components of the anesthesia apparatus required for operation in the pediatric partial rebreathing circuit configuration is illustrated in figure 2–4. The numbered items on the figure correspond to the numbered items in the following subparagraphs.

a. Gas supply control circuits. Refer to paragraph 2–9*a*.

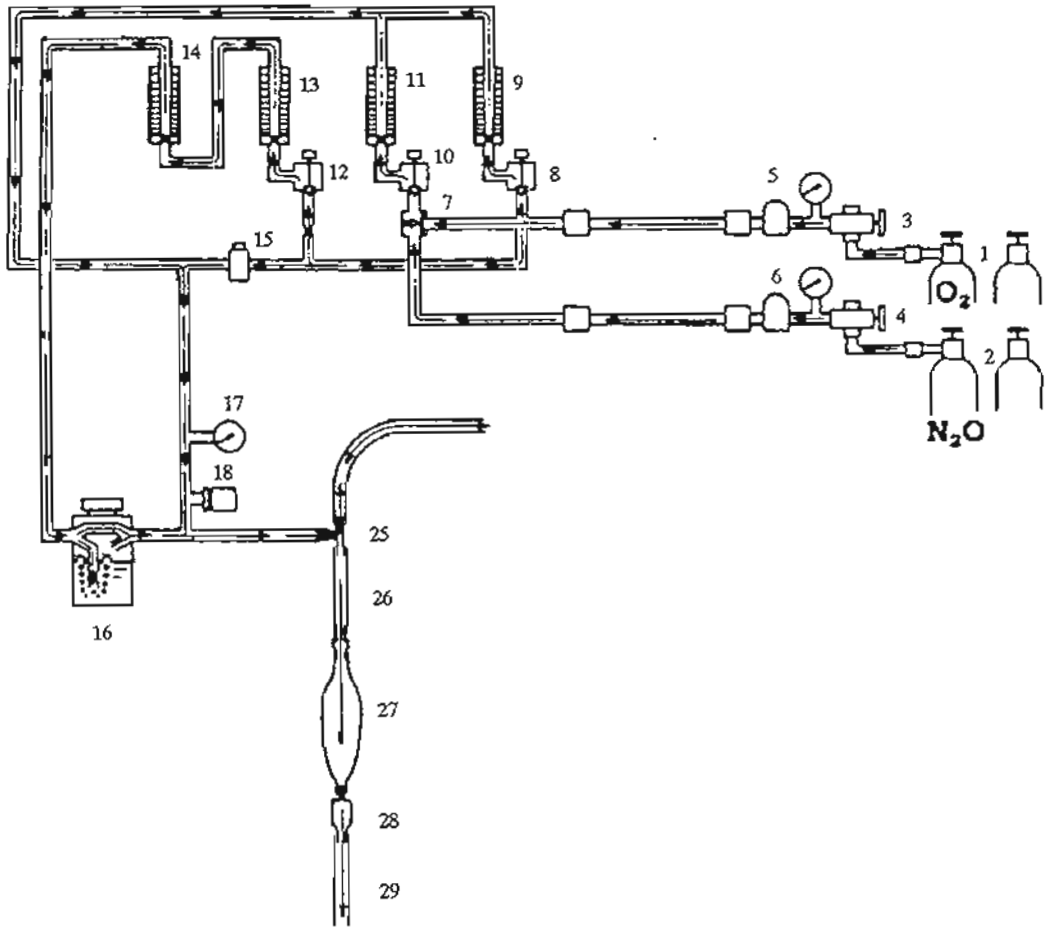


Figure 2–4 Pediatric partial rebreathing circuit schematic

b. Anesthetic agent control circuit. Refer to paragraph 2–9*b*.

c. Breathing circuit.

(1) Refer to paragraphs 2–9*c*(1) and (2).

(2) The adjusted total flow of gases from the vaporizer outlet port travels through the pediatric supply tube to the tee connector (25). The gas then flows through two paths to the patient and to the small breathing bag (27) through the short corrugated breathing tube (26).

(3) Gas that the patient eventually exhales flows to the small breathing bag along with whatever fresh gas was not inhaled.

d. Waste gas scavenging circuit.

Some of the gas that enters the small breathing bag will flow through the scavenging valve (28) and into the waste gas evacuation system. Other gas from within the breathing bag may be administered to the patient by squeezing the breathing bag. The adjustment of the scavenging valve and the amount of gases delivered to the patient from the breathing tube must be determined by the anesthetist.

Section III. PREOPERATIVE PROCEDURES AND TESTS

2–11. Non-adjustable relief valve.

Verify the operation of the valve by following the procedures in table 2–10.

Table 2–10. Non-adjustable relief valve test procedures

1. Ensure that all cylinder valves are closed.
2. Close all flow control valves.
3. Close the APL valve by turning its knurled control knob clockwise.
4. Plug the outlets from the vaporizer and the exhalation check valve with the protective closure devices.
5. Open the oxygen cylinder valve slowly.
6. Open the metabolic oxygen flow control valve to the maximum flow of 4 LPM.
7. Check the breathing circuit pressure gauge and assure that the non-adjustable relief valve opens before the gauge reaches 80 mm Hg.

CAUTION

Do not allow the gauge pressure to increase beyond the maximum gauge scale reading since damage could occur to the gauge.

CAUTION

Do not depress the oxygen flush valve button while the vaporizer output is occluded. Damage could occur to the gauge.

8. Close the metabolic oxygen flow control valve.
9. Close the oxygen cylinder valve.

2–12. Breathing circuit pressure gauge.

Zero the gauge by following the procedures in table 2–11.

Table 2–11. Breathing circuit pressure gauge adjustment procedures.

NOTE

The anesthesia apparatus must be in an upright position for accuracy.

1. Observe the position of the gauge needle.
2. Adjust the needle by turning the small slotted screw under the edge of the gauge body. When the needle rests at zero (±1 mm Hg) the gauge is adjusted.

NOTE

If the gauge cannot be adjusted, it is defective and must be replaced.

2–13. Gas leak test procedures.

WARNING

Gases and vapors leaking from the anesthesia apparatus circuits deprive the patient of metabolic oxygen or the anesthetic agent and may pollute the atmosphere. It is important that the test procedures be performed to determine the source(s) of leaks before each use of the apparatus.

WARNING

If the anesthesia apparatus circuits do not conform to stated specifications and the problem cannot be identified and repaired, DO NOT USE THE APPARATUS.

a. Leak test procedure number 1. Perform procedure number 1 by following the steps in table 2–12.

Table 2–12. Leak test procedure number 1.

1. Disconnect the supply hoses from the control head inlets.
2. Open the cylinder valves slowly.
3. Note the pressure readings on the regulator gauges.
4. Close the cylinder valves.
5. Determine that the pressure reading on both gauges does not decrease more than 100 psig in a 5-minute period for small cylinders or a 7-minute period for large cylinders.

CAUTION

If the pressure decreases at a faster rate, a significant leak exists within the circuit from the cylinder valve to the disconnected end of the supply hose.

b. Leak test procedure number 2. Perform leak test procedure number 2 by following the steps in table 2–13.

Table 2-13. Leak test procedure number 2.

1. Reconnect the supply hoses to the regulator outlets and the control head inlets.
2. Close all flow control valves.
3. Open the cylinder valves to pressurize the circuit.
4. Close the cylinder valves. No flow should be indicated on the flowmeters.

c. Leak test procedure number 3. Perform leak test procedure number 3 by following the steps in table 2-14.

Table 2-14. Leak test procedure number 3.

NOTE This procedure is applicable only when the adult rebreathing circuit is used.
1. Remove the 3-L bag from the lower exhalation check valve port. Insert one of the protective closure devices in place of the breathing bag.
2. Turn the APL valve knob clockwise to the closed position.
3. Connect the adult breathing tubes, one to the vaporizer port and one to the exhalation check valve port.
4. Attach the Y-connector.
5. Close all flow control valves.
6. Open the oxygen valve slowly.
7. Open the oxygen flow control valve gradually and establish a 200 cc/min flow.
8. Block the Y-connector.
9. Observe the breathing circuit pressure gauge. The pressure should be not less than 35 mm Hg.
CAUTION Do not allow the gauge pressure to increase beyond the maximum gauge pressure or damage could occur to the gauge.
CAUTION Do not depress the oxygen flush valve button while the vaporizer output is occluded or damage could occur to the gauge.

d. Leak test procedure number 4. Perform leak test procedure number 4 by following the steps in table 2-15.

Table 2-15. Leak test procedure number 4.

NOTE This procedure is applicable only when the pediatric partial rebreathing circuit is used.
1. Close the scavenging valve.
2. Close all flow control valves.
3. Close the APL valve.
4. Connect the pediatric partial breathing circuit to the vaporizer port.
5. Open the oxygen cylinder valve slowly.
6. Open the oxygen flow control valve gradually and establish a 200 cc/min flow.
7. Block the opening in the pediatric tee connector.
8. Pinch and hold the small breathing bag nipple at a point above the scavenging valve.
9. Observe the breathing circuit pressure gauge. The pressure should increase to at least 35 mm Hg.
10. Open the scavenging valve three or four turns counterclockwise.
11. Release the breathing bag nipple and adjust the oxygen flow to 500 cc/min. The breathing circuit gauge must not exceed 3 mm Hg.

2-14. Vaporizer.

The percentage of anesthetic agent vapor in the total flow delivered to the patient depends on the following factors:

a. Temperature. A change in anesthetic agent vapor temperature will affect the amount of vapor that can be transported to the oxygen. The vapor thermometer is provided to show the liquid anesthetic agent temperature within the vaporizing chamber.

b. Pressure. Pressure changes within the vaporizer will cause the ratio of vapor to oxygen to change. The pressure within the vaporizer can essentially be considered constant at the ambient pressure of the breathing circuit (usually atmospheric pressure).

c. Anesthetic agent saturation ratio. The saturation ratio is the amount of oxygen divided by the amount of agent vapor in the oxygen. Each anesthetic agent's saturation ratio is determined by temperature and pressure.

d. Oxygen "VAPORIZER FLOW" rate. A change in this flow rate through the vaporizing chamber will change the flow rate of agent vapor delivered to the combined flow of other diluting gases.

e. Total flow setting. The total flow is the flow of the saturated oxygen plus the combined flow of the other diluting gases. It will be necessary to use these factors when calculating the—

(1) Oxygen vaporizer flowmeter setting required to procure a desired concentration of anesthetic agent vapor in a desired total flow.

(2) Concentration of anesthetic agent vapor in a total flow resulting from known flowmeter settings.

2-15. Sterilization.

a. Sterilization methods.

(1) *Cold sterilization.* Components for which cold sterilization is suitable (see table 2-16) may be washed with a mild alkali detergent and then sterilized in a cold germicidal solution.

Table 2-16. Sterilization methods.

Component (Assembly)	Steam	Ethylene oxide	Liquid agents
Plastic canisters (absorber)	*	X	X
Windows, check valves (absorber)	—	X	X
Disks (absorber)	—	X	X
Absorber	X	X	—
Inhalation check valve (less window and disk)	X	X	**
Exhalation check valve (less window and disk)	X	X	—
APL valve	X	X	—
Rubber goods	X	X	X
Apparatus	—	X	—

*Steam sterilization could warp disks and prevent the check valves from functioning properly

**Liquid sterilization may leave a residue in these components that would interfere with proper operation.

(2) *Steam sterilization.* Components for which steam sterilization is suitable (see table 2-16) may be steam sterilized at 121°C (250°F) and 15 psig for 15 minutes or boiled for 15 minutes. Following sterilization, allow the components to dry. Drying can be accelerated by heating for 2 hours at 71°C (160°F).

(3) *Gas sterilization.* All components may be sterilized in an ethylene oxide mixture at 52 to 57°C (125 to 135°F). Room temperature sterilization is also effective by exposing components to 100 percent ethylene oxide for 12 hours.

CAUTION

Following sterilization with ethylene oxide, components should be quarantined in a well-ventilated area to allow dissipation of residual ethylene oxide gas absorbed by rubber and plastic. In some cases, an aeration period of 7 days or more may be required.

b. *Sterilization instructions.*

(1) Do not sterilize the two lightweight plastic corrugated evacuation tubes. These tubes are used only for the purpose of gas evacuation and should never come in contact with the patient.

(2) Steam sterilization of masks is not recommended.

(3) The component parts of the absorber and check valves must be segregated before sterilization. Refer to table 2-16.

CAUTION

Do not steam sterilize the anesthesia apparatus. High temperatures and residual water condensate may be detrimental to particular components.

2-16. Oxygen monitor.

Refer to chapter 3 of this manual for information and instructions on the oxygen monitor.

Section IV. ANESTHESIA APPARATUS OPERATION

2-17. General.

The anesthesia apparatus is a stand-alone unit. However, its use on a patient is always in conjunction with numerous items of associated materiel.

2-18. Authorized use.

This apparatus can only be used on a patient by licensed anesthesiologists or nurse anesthetists under their purview. Therefore, specific instructions and procedures for use on a patient are not applicable in this manual.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

2-19. General.

The use of this apparatus under normal conditions requires extreme care and attention because of potential danger to the patient, operator, and associated personnel. Therefore, operation under unusual conditions requires continuous vigilance.

2-20. Environmental factors.

The use of anesthetizing gases and volatile liquid anesthetizing agents may pollute the atmosphere if the apparatus leaks or malfunctions in a confined environment. The waste gas evacuation system will always be used to maintain a safe environment.

Section VI. DISASSEMBLY AND STORAGE

2–21. Postoperative procedures.

a. Draining the vaporizer. Refer to table 2–17 for procedures to drain a liquid anesthetic agent from the vaporizer.

Table 2–17. Draining the vaporizer.

WARNING

Never drain a liquid anesthetic agent into an unmarked container. To prevent a serious accident, always drain the liquid into a container labeled for the same agent.

1. Place a properly labeled container under the drain spigot, unscrew the drain plug two or three turns, and allow the liquid agent to drain into the container.
2. Turn the vaporizer control knob to the "ON" position.
3. Remove any tubes or fittings from the vaporizer port.
4. Set the oxygen "VAPORIZER FLOW" control so that a flow of 200 cc/min is indicated on the flowmeter. Flow oxygen for approximately 30 minutes or until the odor of anesthetic agent is no longer detectable at the vaporizer port.
5. Turn the vaporizer control knob and the oxygen "VAPORIZER FLOW" control valve off.
6. Reseal the drain spigot.

b. Cleaning.

(1) *Flowmeters.* Clean the transparent flowmeter shield with a soft cloth and water. Do not use abrasive cleaners.

(2) *Absorber.*

(*a*) Clean any accumulated residue from the base of the absorber using a soft cloth and water.

(*b*) Use warm water and a stiff-bristle brush to scrub the accumulated dust from both sides of the canister bottom.

(*c*) Clean the interior side walls using a soft cloth and water.

(*d*) Clean the screens using a soft-bristle brush and water.

(3) *Rubber goods.* Wash with a soft cloth and a mild alkali detergent.

c. Disassembly. Use the instructions listed in table 2–18 to disassemble and pack the anesthesia apparatus.

Table 2–18. Disassembly for storage procedures.

1. Close all flow control valves and cylinder valves.
2. Check that the vaporizer has been drained and dried, tighten the funnel plug and drain spigot, assure that the vaporizer control knob is "OFF," and install the protective closure device in the outlet port.
3. Empty the soda lime from the absorber canisters.
4. Remove the evacuation tubing from the gas evacuation relief valve.
5. Turn the APL valve to its fully open position (valve knob turned fully counterclockwise).
6. Disassemble, clean, inspect, and store the following items in their designated storage locations within the carrying case:
   —Gas supply hoses
   —Cylinder adapters (with protective closure devices installed)
   —Regulators (with protective closure devices installed)
   —Cylinder wrench and hex wrench
   —Vials of replacement parts
   —Masks and head strap
   —Mask elbow and Y-connector
   —Breathing tubes
   —Supply hose (pediatric)
   —Breathing bags
   —Clipboard
   —Gas evacuation tubing
   —Socket wrenches
   —Flow calculator
7. Remove the small cylinders from the cylinder holder.
8. Remove the instrument tray and clip the U-bracket into its storage position.
9. Remove the cylinder holder and nest it within the instrument tray so that the ring-and-groove latch is at the same edge as the post sockets.
10. Place the instrument tray with the nested cylinder holder in its lower case storage location and fasten the hook-and-loop strap over the tray. The cylinder holder should be facing toward the floor of the case.
11. Install protective closure devices in the control head inlets and the exhalation check valve port.
12. Latch the regulator retainer panels and the lower case accessory compartment.
13. Latch the upper case central storage compartment.
14. Remove either the set of casters or the set of glides. Place the set within the lower case retaining clips.
15. Loosen the thumb bolt at the right support leg, firmly hold the control head, remove the bolt, and allow the control head to slowly swing down into place.
16. Hold the absorber crossbar firmly, then pull the nylon release strap (extending from the base of the support stand) abruptly forward, and lower the apparatus into the case while ensuring that all retaining chains are free from other parts of the apparatus.
17. Place the upper case in position over the lower case and latch the four draw bolts.

CHAPTER 3
OXYGEN MONITOR MODULE

Section I. GENERAL INFORMATION

3–1. Overview.

a. The anesthesia apparatus includes an oxygen monitor that must be used during the administration of anesthetic agents to a patient.

b. The oxygen monitor is a stand-alone unit.

c. This manual includes the basic information and instructions for the oxygen monitor during use with the anesthesia apparatus.

d. Refer to TM 8–6515–002–24&P (to be published) for detailed information and maintenance instructions.

Section II. PREPARATION FOR OPERATION

3–2. Unpacking procedures.

The oxygen monitor is removed from the anesthesia apparatus case by following the procedures listed in table 3–1.

Table 3–1. Oxygen monitor unpacking procedures.

1. Pull the absorber crossbar upward following an arc until the support arms lock in an upright position.

CAUTION

Verify that the support arms are in the locked position before proceeding to the next step.

2. Remove either the set of four casters or the set of four glides, depending on the desired use, from the retaining clips on the floor of the lower case.
3. Place the apparatus carefully on its side, install the casters or glides, and replace the apparatus in its upright position.
4. Level the unit using the sight level mounted on the left support arm.
5. Unsnap the short strap which secures the flowmeter top manifold to the lower case.
6. Grasp the flowmeter top manifold and pull upward following an arc until the control head is upright and aligned with the support arms. Tighten the hinged thumb bolt at the end of the crossbar into the slot in the left support arm until the control head is locked upright.

WARNING

When raising the control head, hold it securely until locked. Otherwise, the control head will fall foward and pinch fingers or damage the apparatus

7. Open the hook-and-loop strap that holds the monitor case closed.
8. Pull the strap out of the slot at the end of the monitor case.
9. Lift the case cover upward and remove the monitor and batteries (stored in a plastic vial) and set them aside.
10. Place the empty plastic vial back into the case and strap the case cover closed.
11. Remove the sensing cable and tee for the oxygen monitor from the latched compartment at the base of the anesthesia apparatus control head stand. Set these items aside.
12. Remove the sensor cartridge from the box stored beside the mask storage posts in the uncovered compartment at the base of the anesthesia apparatus control head stand. Set the cartridge aside.

3–3. Installation procedures.

The oxygen monitor is installed on the anesthesia apparatus by following the procedures listed in table 3–2.

Table 3–2. Oxygen monitor installation procedures.

1. Locate the oxygen monitor mounting bracket on the post behind the flowmeter panel.
2. Loosen the set screw in the "wrench-shaped" segment of the bracket using the 5/64 in. hex wrench.
3. Remove the bracket from the post and set it aside.
4. Install the monitor batteries by referring to TM 8–6515–002–24&P (to be published) or the manufacturer's manual.
5. Position the "wrench-shaped" segment of the bracket on the post behind the flowmeter panel so that the straight segment of the bracket extends beyond the left side of the flowmeter panel when viewed from the rear.
6. Tighten the set screw to secure the bracket.
7. Align the threaded hole in the back of the monitor with the socket head screw extending from the front of the bracket.
8. Thread the screw into the monitor.
9. Install the sensor cartridge in the probe as described in TM 8–6515–002–24&P (to be published) or the manufacturer's manuals.
10. Align the cable connector with the modular jack in the monitor's back panel and gently push the connector into the jack. The release tab should snap into place.
11. Fit the 22-mm outer leg of the sensor tee over the nipple extending from the vaporizer so that the sensor port points upward.
12. Fit the sensor probe into the sensor port.

Section III. PREOPERATIVE PROCEDURES AND CHECKS

3–4. Calibration.

The oxygen monitor should be calibrated at periodic intervals. Procedures to calibrate the monitor are listed in table 3–3.

Table 3–3. Oxygen monitor calibration procedures.

WARNING

Assure that the area is properly ventilated for waste anesthetic gas prior to performing the following procedures.

1. Place the sensor in room air and adjust the calibration "CAL" control until the display indicates 20 percent oxygen.
2. Readjust the "CAL" control to display 21 percent oxygen.
3. Press and hold the "CIRCUIT TEST" switch and note that—
   —the alarm tone beeps once
   —the display indicates 88 to 102 percent oxygen
   —all four messages are on, and
   —the red and yellow alarm indicators are on
4. Release the "CIRCUIT TEST" switch and only the "BATT OK" message and backlight will remain on for approximately 5 seconds.
5. Mount the sensor in the patient inhalation circuit.
6. Assure that the vaporizer control knob is in the "OFF" position.
7. Set the oxygen flowmeter at 3 LPM and the nitrous oxide flowmeter at 1 LPM. The oxygen monitor should indicate approximately 75 percent oxygen.
8. Set the oxygen flowmeter at 2 LPM and the nitrous oxide flowmeter at 2 LPM. The oxygen monitor should indicate approximately 50 percent oxygen.
9. Set the oxygen flowmeter at 1 LPM and the nitrous oxide flowmeter at 3 LPM. The oxygen monitor should indicate approximately 25 percent oxygen.
10. Turn the nitrous oxide flowmeter valve to the off position; press the oxygen flush button and hold it for 30 seconds; and the oxygen monitor should indicate 100 percent oxygen.
11. Turn off the oxygen flowmeter valve; turn the nitrous oxide flowmeter valve to 4 LPM for approximately 10 to 15 seconds; and the oxygen monitor should indicate zero percent.

WARNING

If the oxygen monitor fails the calibration procedures, DO NOT USE IT.

Section IV. DISASSEMBLY AND STORAGE

3–5. Postoperative procedures.

a. Cleaning. All parts of the oxygen monitor except for the sensor cartridge can be cleaned with a cloth moistened in a mild liquid detergent solution. Isopropyl alcohol may be used if further cleaning is required.

CAUTION

Use a cleaning solution or alcohol sparingly; do not saturate or immerse the monitor.

b. Sterilization. The front portion of the probe housing and the sensor tee can be autoclaved or cold sterilized. Follow the instructions in TM 8–6515–002–24&P (to be published) or the manufacturer's manual.

3–6. Disassembly.

Use the procedures listed in table 3–4 to disassemble the monitor for storage.

Table 3–4. Oxygen monitor disassembly procedures.

1. Remove the sensor probe from the sensor socket.
2. Disconnect the sensor cable from the monitor.
3. Remove the sensor cartridge from the sensor probe.
4. Place the sensor cartridge in the original plastic container with the three gold-colored terminal rings making contact with the foil. Tape the plastic container closed.
5. Remove the sensor tee from the exhalation port.
6. Return the sensor cable assembly, cartridge, and tee to their proper storage compartments within the case (see table 3–1).
7. Remove the monitor from the mounting bracket.
8. Remove the batteries from the monitor.
9. Unstrap the monitor case cover to—
   —return the batteries to the plastic vial.
   —place the monitor and batteries in the monitor case, and
   —strap the monitor case closed.
10. Loosen the bracket set screw and pivot the bracket back to its storage position. Tighten the set screw.

3–7. Sensor storage.

a. Life expectancy.

(1) The service life of an oxygen sensor is dependent upon storage time and conditions, as well as the percent of oxygen the sensor was exposed to while in storage. Reduced temperature and increased relative humidity will help to prevent the sensor from drying out.

(2) A sensor will typically function for 438,000 percent-hours. For example, it would last for 1 year at 50 percent oxygen or 6 months at 100 precent oxygen.

CAUTION

Continuous exposure to carbon dioxide may also shorten the life of the sensor.

b. New sensors.

(1) New sensors are packaged in an inert atmosphere to maximize shelf life. Do not puncture or open a package prior to placing the sensor in service.

(2) Unopened sensors may be stored in a refrigerator at 68°F (20°C) to extend their shelf lives.

WARNING

Do not freeze.

CHAPTER 4
UNIT-LEVEL MAINTENANCE

Section I. GENERAL INFORMATION

4–1. Overview.

Maintenance functions, both preventive and corrective, that are beyond the scope of the user are assigned to unit-level medical equipment repairer personnel. These personnel will perform the majority of maintenance required for the anesthesia apparatus except for some tasks involving the vaporizer, case, and oxygen monitor. This chapter provides instructions and information to aid in performing the required tasks.

4–2. Tools and test equipment.

Common tools and test equipment required for unit-level maintenance are listed in appendix B, section III of this manual. Refer to your unit modified table of organization and equipment 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 of this manual.

4–4. Expendable supplies.

Expendable supplies and materials required for unit-level maintenance are listed in appendix D, section II of this manual.

4–5. Repair parts.

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

4–6. Special tools.

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

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

4–7. General.

a. An inventory and initial inspection will be accomplished when an anesthesia apparatus is received in the unit. Use table 2–2 of this manual for the inventory.

b. All assembly and preoperative tasks can be handled by the operator and associated surgical technicians. However, assistance may be required in moving and/or replacing gas cylinders.

4–8. Preventive maintenance checks and services (PMCS).

Operator PMCS are provided in TM 8-6500-001-10-PMCS, appendix B.

Section III. MAINTENANCE INSTRUCTIONS AND PROCEDURES

4–9. General information.

An anesthesia apparatus that is not functioning properly should not be used until all necessary maintenance functions, services, and actions are completed, the apparatus tested, and the apparatus meets specifications.

WARNING

Never cover the anesthesia apparatus with any type of fabric or plastic covering. Removal of the cover may cause static electricity with the possibility of a resultant fire or explosion.

NOTE

The following maintenance instructions and procedures assume the anesthesia apparatus is assembled and operational.

4–10. Regulators.

Internal maintenance services should not be accomplished on regulators unless the capability exists to test and calibrate them.

CAUTION

Do not use organic based thread sealants on any portion of the oxygen regulator. Use only the approved thread-sealing tape or thread compound.

4–11. Flow control valves.

The repair of leaking flow control needle valves is accomplished by following the detailed instructions in table 4–1. Repair parts are identified in appendix E, section II.

Table 4–1. Flow control valve maintenance procedures.

1. Open the oxygen cylinder valve.
2. Loosen the two set screws in the knob and remove the knob.
3. Assure that the packing nut is tight.
4. Turn the value stem clockwise until the leak stops.
5. Replace the knob and turn it clockwise until its mechanical stop is reached.
6. Tighten the set screws.

NOTE

If the flow control valve is still leaking, perform the additional procedures.

7. Loosen the set screws in the knob and remove the knob.
8. Remove the packing nut.
9. Remove and inspect each valve part for damage or wear and replace as required.
10. Install each part in the reverse order of removal.
11. Retest the valve for leakage and proper operation.

4–12. Flowmeters.

Repair of the flowmeters is accomplished by following the procedures in table 4–2.

Table 4–2. Flowmeter maintenance procedures.

1. Turn off the cylinder valve and the applicable flow control valve.
2. Remove the sealing cap.
3. Remove and inspect each part as identified in appendix E, section II, and replace as necessary.
4. Install each part in the reverse order of removal.
5. Replace the sealing cap and test the flowmeter.

WARNING

Flowmeter parts are not interchangeable. Flowmeter tubes are imprinted with numbers which correspond to numbered positions on the flowmeter top manifold. If replacement of a flowmeter tube is required, the number imprinted on the flow tube replacement will match the number of the position requiring the replacement. In addition, replacement of a flowmeter tube, scale, or float alone will destroy the accuracy of the flowmeter. Replacement of all three parts will be made with a precalibrated kit.

4–13. Inhalation and exhalation check valves.

a. Replacement of worn or damaged parts of the check valves is performed by following the procedures listed in table 4–3.

Table 4–3. Check valve maintenance procedures.

1. Close the flow control valves.
2. Remove the knurled retainer ring.
3. Remove the window, gasket, and valve cage.
4. Remove and inspect the disk for wear.
5. If required, put a new disk in place with the conical tip pointing up.
6. Reassemble the check valve.

b. Extra check valve disks are supplied with the apparatus in the small vial stored in the lower case accessory compartment.

NOTE

The spare check valve disk should be requisitioned and replaced in the case upon receipt.

4–14. Vaporizer.

a. Vaporizer sight glass. Follow the procedures listed in table 4–4 to replace a broken sight glass. The vaporizer and sight glass assembly are illustrated in figures 4–1 and 4–2.

Table 4–4. Vaporizer sight glass maintenance procedures.

1. Prepare a clean and flat surface on which to disassemble the vaporizer. Use paper towels or similar material to cover a work surface of approximately 2 square feet.
2. Gather the following tools:
   —Wrenches, open-end
   ½ in., to loosen compression fitting
   11/16 in., to remove thermometer
   1 15/16 in., to remove vaporizer assembly nut and vaporizer disconnect
   —Wrenches, hex key
   5/16 in., for the vaporizer disconnect
   ¼ in., to remove the sight glass retainer
   —Screwdriver with a thin, narrow blade to remove plastic gaskets
   —Pliers, needle nose, to remove the gasket, broken glass, etc.

NOTE

The parts should be placed on the prepared work surface in the order of removal.

3. Loosen the union-type connector between the apparatus and the vaporizer.
4. Loosen and remove the compression nut by allowing it to slide down the metal oxygen "VAPORIZER FLOW" pipeline.
5. Remove the socket-head screws from the vaporizer mounting arm.
6. Support the vaporizer with one hand, completely loosen the union-type connector, and remove the vaporizer from the apparatus.
7. Place the vaporizer on the prepared work surface.
8. Remove the thermometer.
9. Remove the vaporizer drain plug and captive security chain.
10. Examine the threads on the drain plug for damage. Replace as required.

NOTE

Extra plugs are provided in the larger plastic vial stored in the lower case accessory compartment.

11. Remove the nut from the bottom of the vaporizer to release the entire baffle assembly.
12. Grip the vaporizer body with one hand and gently lift upward on the top portion of the control head assembly. The control head and the internal baffle assembly will be released.
13. Remove the threaded sight glass retaining plug.
14. Remove the broken sight glass and seal adapter.
15. Remove the sealing gasket and discard it.
16. Turn the vaporizer upside down and the plastic gaskets will drop out. If necessary, use the thin-blade screwdriver to lift the gaskets from their seats to assist in removal.
17. Examine the plastic gaskets. Replace as required.
18. Inspect and replace all specified repair parts.
19. Clean as required.
20. Reassemble the vaporizer in the reverse order of disassembly.

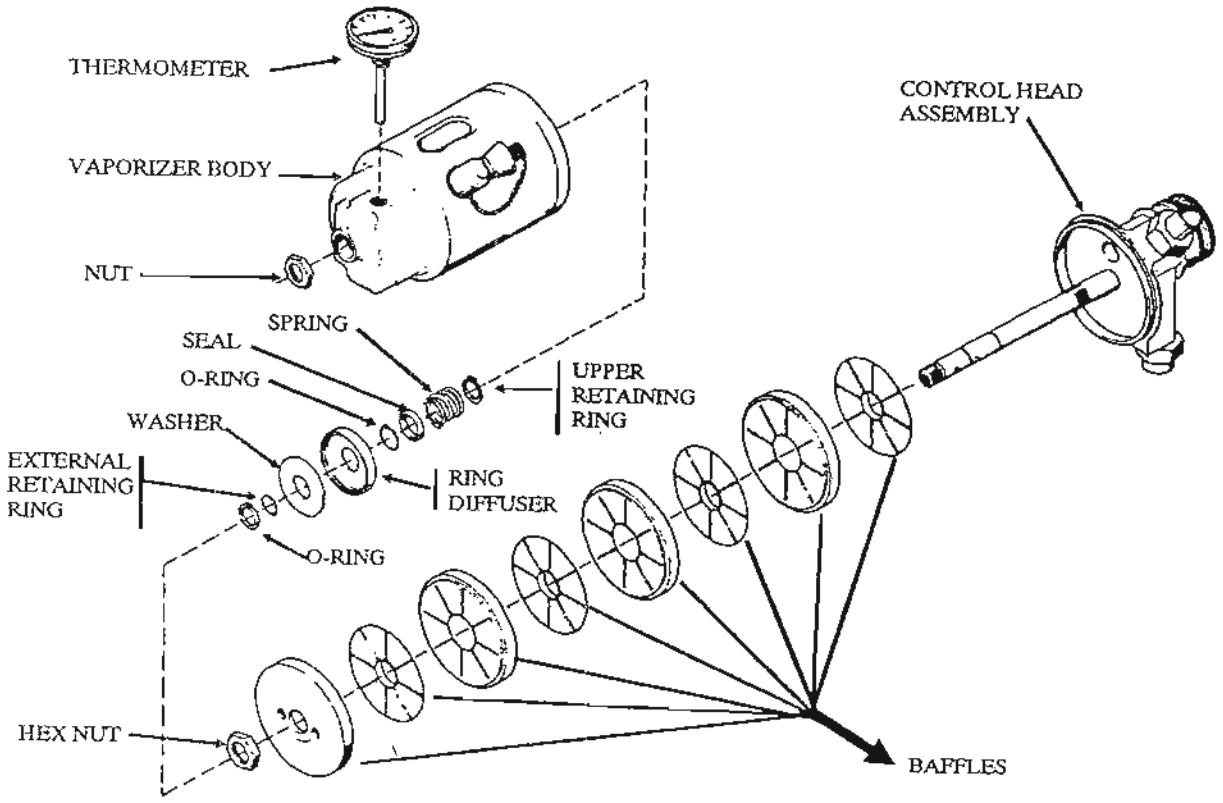


Figure 4–1. Vaporizer assembly

b. Vaporizing chamber. Follow the procedures listed in table 4–5 to service and clean the chamber components. Figures 4–1 and 4–2 are applicable.

Table 4–5. Vaporizing chamber maintenance procedures.

1. Gather the following materials in addition to the items identified in table 4–1.
   —Pliers, external, retaining ring
   —Wrench, open end, 1 in.
   —Alcohol, ethyl, 95 to 100 percent
2. Repeat steps 3 through 12 listed in table 4–4.
3. Set the control head and baffle assembly on the prepared work surface.
4. Remove the O-ring from the assembly shaft.
5. Compress the spring with thumb and forefinger by forcing the washer and other parts against the upper retaining ring.
6. Remove the external retaining ring from the shaft.
7. Release the spring tension slowly and slide the parts from the shaft.

NOTE

The O-ring and ring diffuser may appear to be a single assembly because of the close tolerance when fitted together. These items must be taken apart for cleaning in alcohol.

8. Remove the upper retaining ring.
9. Remove the hex nut from the shaft.
10. Remove the remaining baffles.
11. Inspect all parts for deposits and wear.
12. Soak all parts in alcohol for approximately 20 minutes.
13. Check the inside of the vaporizing chamber for deposits. If deposits are visible—
    —replace the thermometer or plug the mounting hold.
    —replace the drain plug.
    —position the vaporizer body in a stable, upright position.
    —soak the vaporizing chamber with alcohol for 20 minutes.

CAUTION

Do not scrape the parts to remove deposits.

NOTE

It may be necessary to agitate the alcohol or use a soft brush to remove some residue.

14. Dry the parts for 1 hour prior to reassembly.
15. Inspect all parts again for wear and replace as required.

NOTE

The plastic baffles should be replaced as a set if one or more cannot be cleaned by soaking and brushing.

16. Reassemble the vaporizing chamber in the reverse order of disassembly.

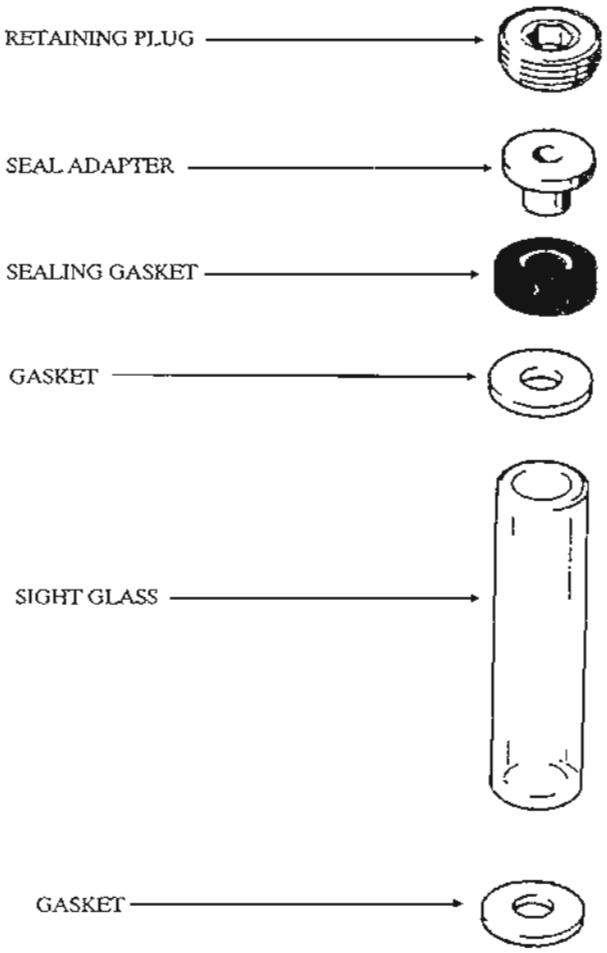


Figure 4–2. Sight glass assembly

c. *Control head.* Follow the procedures listed in table 4–6 to repair the control head assembly. The control head assembly is illustrated in figure 4–3.

Table 4–6. Control head assembly maintenance procedures.

1. Prepare a work surface (refer to table 4–4).

NOTE

The control head assembly can be repaired while the vaporizer is mounted on the anesthesia apparatus.

2. Turn the vaporizer control knob to the "ON" position.
3. Loosen the four phillips-head screws on the flange of the control knob assembly using a No. 1 phillips screwdriver.

NOTE

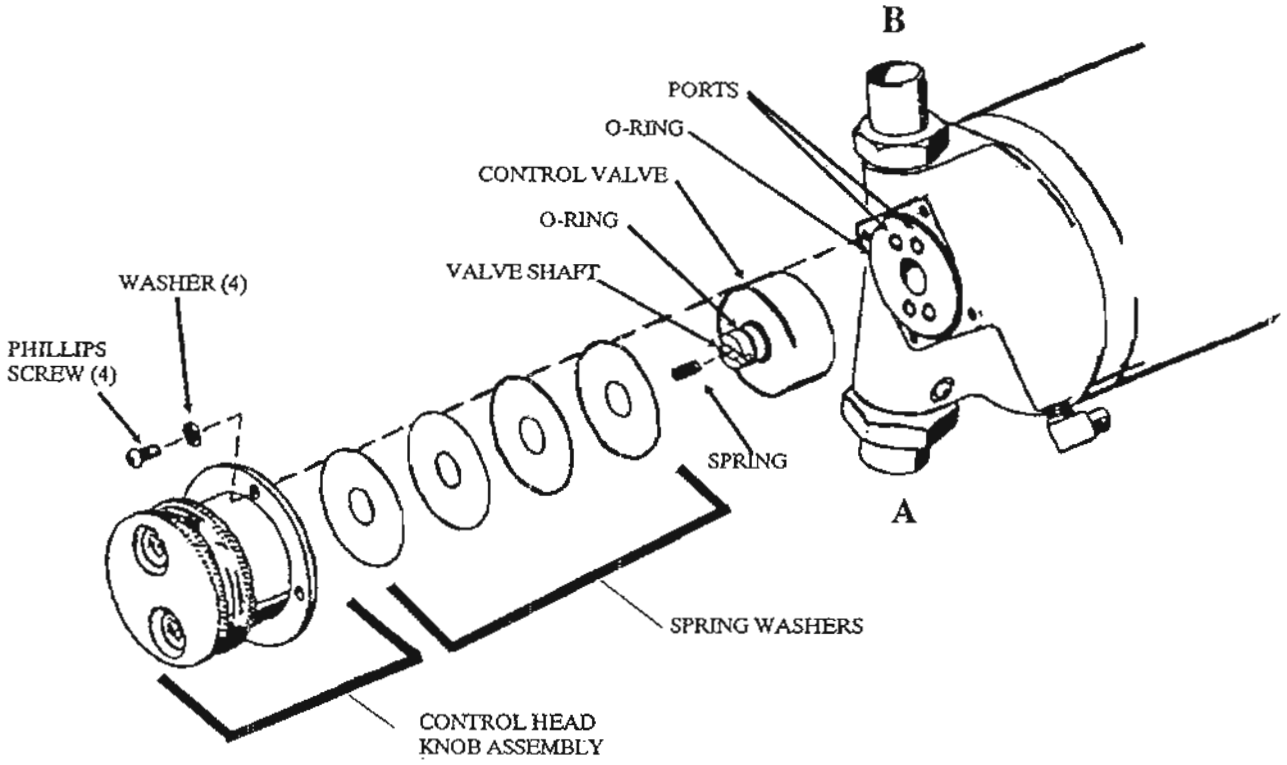
The upper portion of the assembly is lightly spring-loaded.

4. Remove the phillips screws one at a time while gently pushing down on the knob assembly.
5. Remove the assembly using care to keep the components enclosed within the upper part. Set the screws aside for reassembly.
6. Remove the internal parts.

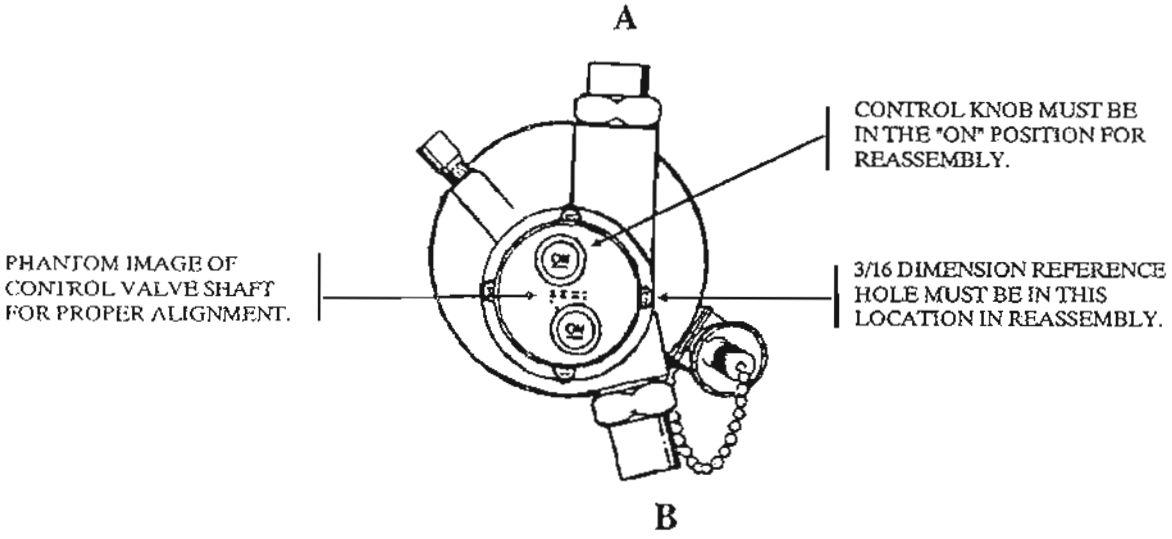
CAUTION

Do not move the vaporizer control knob from the "ON" position. This alignment is critical for reassembly.

7. Inspect all parts for wear.
8. Check the four phosphor bronze spring washers. Simply lay them on a flat surface and determine that they have a curved bend (warp).
9. Check that the control valve surface and the surface of the ports are smooth and unblemished for contact.
10. Inspect all parts for wear and replace as required.
11. Replace all O-rings using an approved lubricant.
12. Reassemble the control head in the reverse order of disassembly.



SIDE VIEW



TOP VIEW, ALIGNMENT DETAIL-REASSEMBLY

Figure 4–3. Control head assembly

d. Vaporizer funnel and drain plugs.

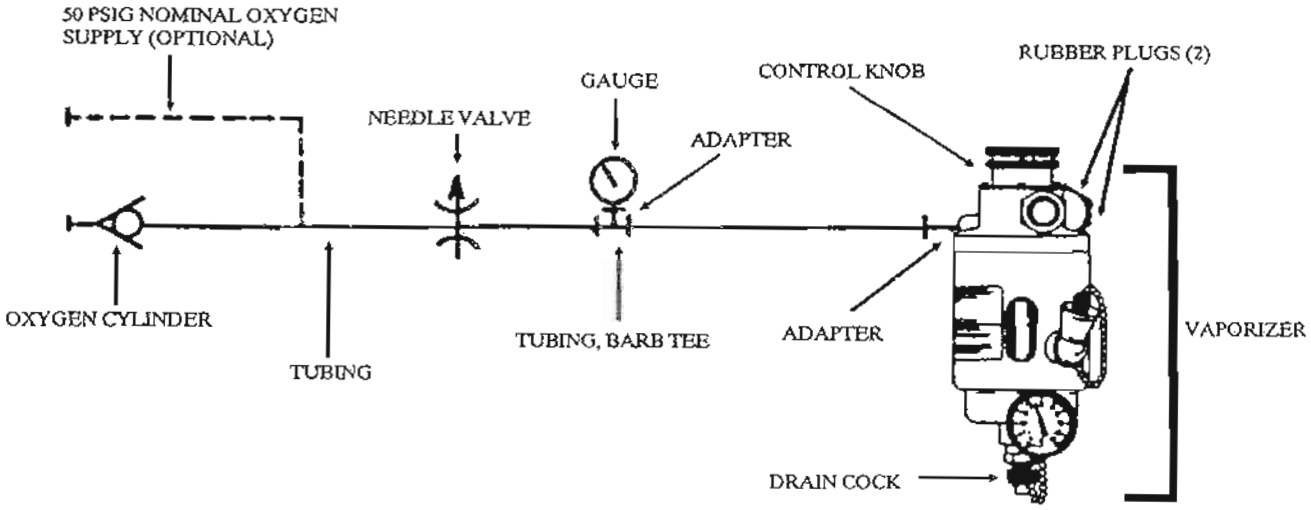
(1) The vaporizer funnel and drain plugs are identified in appendix E, section II.

(2) The funnel and drain plugs may need to be replaced periodically if excessive tightening has caused thread wear.

(3) Extra plugs are provided in the large plastic vial stored in the lower case accessory compartment.

e. Vaporizer external leak test. The external leak test procedures illustrated in figure 4–4 will be performed after disassembly or repair of the vaporizer. The test components are identified in appendix E, section III.

f. Vaporizer flow capacity test. The flow capacity test procedures illustrated in figure 4–5 will be performed after disassembly or repair of the vaporizer. The test components are identified in appendix E, section III.



1. Remove the vaporizer from the anesthesia apparatus.

2. Install two rubber plugs in the vaporizer ports.

3. Assemble the vaporizer, test components (tubing, needle valve, gauge, barb tee tubing, adapters, and plugs), and a source of oxygen as illustrated.

4. Close the drain cock.

5. Turn the vaporizer control knob to the "ON" position.

6. Close the needle valve.

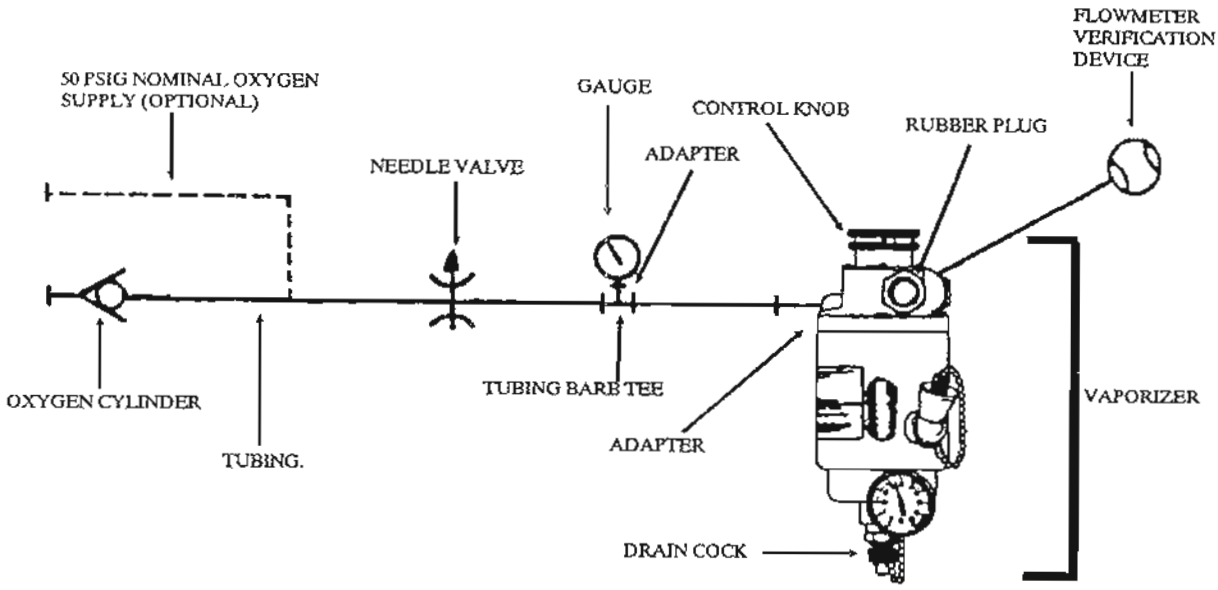
7. Turn on the oxygen supply.

8. Open the needle valve slowly and pressurize the vaporizer to 100 mm Hg on the gauge.

9. Close the needle valve.

10. Observe the gauge to ensure that the decrease in pressure is less than 10 mm Hg in one minute.

Figure 4–4. Vaporizer external leak test



1. Remove the vaporizer from the anesthesia apparatus.

2. Install a rubber plug in the vaporizer port.

3. Assemble the vaporizer, test components (tubing, needle valve, gauge, barb tee tubing, adapters, plug, and flowmeter verification device), and a source of oxygen as illustrated.

4. Close the drain cock.

5. Turn the vaporizer control knob to the "ON" position.

6. Close the needle valve.

7. Turn on the oxygen supply.

8. Open the needle valve slowly to produce a flow of 10 L/min on the flowmeter verification device.

9. Disconnect the flowmeter device. The pressure gauge should not exceed 10 mm Hg.

Figure 4–5. Vaporizer flow capacity test

4–15. Non-adjustable relief valve.

Frequently a sticking or hesitantly operating valve problem can be corrected without disassembly and parts replacement. Use the procedures listed in table 4–7 to release the valve seat.

Table 4–7. Sticking valve maintenance procedures.

1. Close all flow control valves.
2. Open the oxygen cylinder valve slowly.
3. Open the oxygen flow control valve to approximately 0.4 LPM.
4. Use your hand to seal the outlet of the vaporizer.
5. While observing the patient circuit pressure gauge, allow the pressure to increase to the maximum on the gauge scale or until the gauge indicates that the relief valve has opened.
6. Repeat step 5.

CAUTION

Do not allow the gauge pressure to increase beyond the maximum of the gauge scale. Damage could occur to the gauge.

7. If the preceding steps fail to release the relief valve, repeat steps 4 and 5 and continue with the following additional steps.
8. Insert a screwdriver carefully through one of the vent holes on the valve body.
9. Press gently on the white plastic disk to move it slightly toward the top of the valve while the pressure is building.
10. Verify the proper operation of the valve at a pressure between 60 to 70 mm Hg.
11. Repeat steps 7 through 9 several times. If the preceding steps fail to release the sticking valve, disassemble it for cleaning or replacement of parts.

4–16. Absorber.

Gasket replacement procedures are accomplished by following the procedures listed in tables 4–8 and 4–9.

Table 4–8. Absorber control head body gasket replacement procedures.

1. Pull the absorber crossbar upward until the support arms lock in an upright position.
2. Loosen the clamp screw under the absorber crossbar and remove the canisters.
3. Remove the old gasket.
4. Clean both the control head body and new gasket with ethyl alcohol.
5. Apply a uniform coat of adhesive to the gasket groove in the control head body.
6. Place the new gasket into the groove and press firmly around the gasket.
7. Clean any excess adhesive with ethyl alcohol.
8. Replace the absorber canisters and tighten the clamp screw.

CAUTION

Do not over-tighten the clamp screw to preclude warping of the canisters and gas leakage during operation of the anesthesia apparatus.

9. Allow the adhesive to dry for approximately 15 minutes.
10. Perform the leak test procedures in table 2–14.

Table 4–9. Canister gasket replacement procedures.

1. Pull the absorber crossbar upward until the support arms lock in an upright position.
2. Loosen the clamp screw under the absorber crossbar and remove the canisters.
3. Remove the defective gasket from the canister.
4. Clean both the canister and new gasket with ethyl alcohol.
5. Apply a uniform coat of adhesive to the canister.
6. Place the new gasket on the canister and press down firmly around the gasket.
7. Clean any excess adhesive with ethyl alcohol.
8. Allow the adhesive to dry for approximately 15 minutes.
9. Perform the leak test procedures in table 2–14.

Section IV. TROUBLESHOOTING

4–17. General.

a. Specific troubleshooting information for locating and correcting most of the operating malfunctions which may develop in the anesthesia apparatus is incorporated into the text and tables of this manual. Chapter 2, section II will also be helpful in troubleshooting malfunctions or gas leaks.

b. This manual cannot identify all malfunctions that may occur, nor all inspections and corrective actions. If a malfunction cannot be identified when following this manual, notify your support maintenance unit.

CHAPTER 5
DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

Section I. GENERAL INFORMATION

5–1. Overview.

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

5–2. Support maintenance services.

Specified components or assemblies identified in appendix B, section II, are only authorized for servicing by support level maintenance units.

Section II. TROUBLESHOOTING

5–3. General.

There are no specific troubleshooting procedures at these levels of maintenance.

APPENDIX A
REFERENCES

A–1. Army regulations.

AR 40–61	Medical Logistics Policies and Procedures
AR 700–68/DSAR 4145.25/NAVSUPINST 4440.128B/MCO 10330.2B/AFR 67–12	Storage and Handling of Compressed Gases and Gas Cylinders
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
AR 750–2	Army Materiel Maintenance Wholesale Operations
AR 750–43	Test, Measurement, and Diagnostic Equipment

A–2. Technical manuals.

TM 8–6500–001–10–PMCS	Operator's Preventive Maintenance Checks and Services for Reportable Medical Equipment (Consolidated)
TM–DPSC–6500–RPL	Medical Repair Parts Reference List

A–3. Technical bulletins.

TB 38–750–2	Maintenance Management Procedures for Medical Equipment
TB 43–180	Calibration and Repair Requirements for the Maintenance of Army Materiel
TB 740–10/DLAM 4155.5/AFR 67–43	Quality Control, Depot Storage Standards, Appendix M, Medical Supplies
TB 750–8–1	Maintenance Expenditure Limits for Medical Materiel: FSC Groups (Medical Only)

A–4. Supply bulletins.

SB 700–20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items
SB 708–48	Cataloging Handbook H4/H8, Commercial and Government Entity (CAGE) Sections A & B

A–5. Other publications.

(These publications may be obtained from Commander, U.S. Army Medical Materiel Agency, ATTN: SGMMA–M, Frederick, MD 21702–5001.)

0178–1683–000, Instruction and Service Manual with Illustrated Parts List, March 1990—Revised, Ohmeda—BOC Group Inc.

Operation and Maintenance Manual, Model 5120 Oxygen Monitor, Ohmeda—BOC Group Inc.

Service Manual, 5120 Oxygen Monitor, Ohmeda—BOC Group Inc.

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B–1. General.

a. This section provides a general explanation of all maintenance and repair functions, services, fault location or troubleshooting, removal and installation, and actions authorized at various maintenance levels.

b. Section II of this appendix designates authority and responsibility for the performance of maintenance functions on the identified end item or component. It also provides the work measurement time required to perform the function by designated maintenance levels. The application of the maintenance functions to the end item or component must be consistent with the capabilities and capacities of the designated maintenance levels, which are shown on the maintenance allocation chart (MAC) in column (4) as—

UNIT, which includes two subcolumns: C (operator) and O (unit maintenance).

SUPPORT, which includes three subcolumns: F (direct support), H (general support), and D (depot-level support).

c. Section III of this appendix lists the tools and test equipment required for each maintenance function as referenced in section II of this appendix.

B–2. Maintenance functions.

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination by sight, sound, or feel.

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, and/or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. To keep an item in proper operating condition (clean, preserve, drain, paint, or replenish fuel, lubricants, hydraulic fluids, and compressed gas supplies).

d. Adjust. To maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to specifications in this manual.

e. Align. To adjust specified variable elements of an item to optimum or desired performance.

f. Inspect or test electrical safety. To determine conformance to electrical safety parameters and make or report corrections.

g. Calibrate, verify, and certify. To determine compliance of medical equipment with applicable specifications or standards and to make the necessary corrections. To compare the item with a certified device, tool, or test equipment standard.

h. Remove and install. To remove and then install the same item when required to perform service or other maintenance functions. Installation may involve emplacing, seating, or fixing into position an assembly, subassembly, module, or component to allow proper functioning of the end item.

i. Replace. To remove an unserviceable item and install a serviceable counterpart in its place.

j. Repair. To apply maintenance services, fault location or troubleshooting, removal and installation or disassembly and assembly procedures, and maintenance actions to identify troubles and to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, module, assembly, or end item.

k. Overhaul. To perform prescribed periodic maintenance in order to restore an item to a completely serviceable and operational condition as required by depot maintenance work requirements in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Normally, overhaul does not return an item to like-new condition.

l. Rebuild. To perform those services and actions necessary to restore unserviceable equipment to a like-new condition in accordance with the original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment and/or components.

B–3. Explanation of columns in the MAC for anesthesia apparatus (sec II).

a. Column (1), GROUP NUMBER. This column lists functional group numbers. They are used to identify subassemblies, modules, and components with the next higher assembly.

b. Column (2), COMPONENT/ASSEMBLY. This column contains assemblies, subassemblies, modules, and components for which maintenance is authorized.

c. Column (3), MAINTENANCE FUNCTION.

This column lists the functions to be performed on the item listed in column (2).

d. Column (4), MAINTENANCE LEVEL. This column specifies, by a work-time figure (expressed as man-hours and shown as whole hours or decimals), the level of maintenance authorized to perform the function listed in column (3). The work-time figure represents the average time required to restore an item (assembly, subassembly, module, or component) to a serviceable condition under typical field operating conditions. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work-time figures will be shown for each level. This time includes preparation time and quality assurance or quality control time in addition to the time required to perform the specific tasks identified for the authorized maintenance functions. An X indicates that a work-time figure is not applicable. The symbol designations for the various maintenance levels are as follows:

C.....	operator
O.....	unit level maintenance
F.....	direct support maintenance
H	general support maintenance
D	depot level maintenance

e. Column (5), TOOLS AND EQPT (equipment). This column specifies, by code (sec III of this app), those common tool sets (not individual tools) and test equipment required to perform the designated function.

f. Column (6), REMARKS. This column specifies, by code (listed in sec IV of this app), supplemental instructions and explanatory notes for a particular maintenance function.

B–4. Explanation of columns in tool and test equipment requirements for anesthesia apparatus (sec III).

a. Column (1), REFERENCE CODE. The tool and test equipment reference code correlates with the code used in section II, column (5).

b. Column (2), MAINTENANCE LEVEL. This column identifies the lowest level of maintenance authorized to use the tool set or test equipment.

c. Column (3), NOMENCLATURE. This column lists the name of the tool set or test equipment.

d. Column (4), NATIONAL STOCK NUMBER. This column identifies the national stock number (NSN) assigned to the specific tool set or item of test equipment.

e. Column (5), LINE ITEM NUMBER. This column shows the line item number identified in SB 700-20.

B–5. Explanation of columns in remarks for anesthesia apparatus (sec IV).

a. Column (1), REFERENCE CODE. This column provides a code that correlates to the code used in section II, column 6.

b. Column (2), REMARKS. This column contains supplemental information and explanatory notes pertinent to the maintenance function being performed as indicated in section II of this appendix.

Section II. MAINTENANCE ALLOCATION CHART FOR ANESTHESIA APPARATUS

(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	Anesthesia Apparatus	O	O 0.5	O	O	O	O 2.5	O	O	O 4.0	F 12.0	O	01, 02	A,B
01	Case, Storage	O 0.2								F 4.0			01,02	A,B
02	Absorber Assembly	O 0.2							O 0.4				01	A,B
03	Vaporizer	O 0.2								D 3.0			01,02	A.B
04	Regulator Assembly, Oxygen		F 0.2						O 0.3			D 1.5	01,02, 03,04	A,B
041	Oxygen Gauge		O 0.1						O 0.1	O 0.4			01,02	
05	Regulator Assembly, Nitrous Oxide		O 0.2						O 0.3			D 1.5	01,02	A,B
051	Nitrous Oxide Gauge		O 0.1						O 0.1	O 0.4			01,02	
06	Control Head Assembly									O 0.5	D 6.0		01,02	A,B
07	Manifold Assembly									O 0.5			01,02	A,B
071	Stem, Flow Valve								O 0.2				01	
072	Stud, Flow Valve								O 0.2				01	
073	Seat, Flow Valve								O 0.2				01	
074	Float, Tube and Ball, High Flow Oxygen		O 0.2						O 0.5				01	
075	Float, Tube and Ball, Low Flow Oxygen								O 0.5				01	

(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
076	Float, Tube and Ball, Oxygen with White Flow Scale								O 0.5				01	
077	Float, Tube and Ball, Nitrous Oxide, with Blue Flow Scale								O 0.5				01	
078	Sleeve, Sealing								O 0.2				01	
079	Gasket, Sealing								O 0.2				01	
0710	Pressure Gauge								O 0.3				01	
0711	Disk, Check Valve								O 0.1				01	
0712	Cage, Vaporizer								O 0.1				01	
0713	Gasket, Check Valve								O 0.1				01	
0714	Window, Check Valve								O 0.1				01	
08	Relief Valve		O 0.3						O 0.6				01	A,B
081	Disk, Check Valve								O 0.3				01	
082	Stem, Valve								O 0.3				01	
083	Gasket								O 0.2				01	
09	Pressure Sensor Valve		O 0.2						O 0.6				01,02	A,B
091	Diaphragm								O 0.2				01	

(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
092	Seat, Spring								O 0.3				01	
093	O-ring								O 0.2				01	
094	Gasket								O 0.2				01	
10	Rubber Goods		O 0.3											A,B
11	Oxygen Monitor		O 0.2				F 0.2		O 0.3	F 0.5 D 3.0			01,02, 03,04	A,B
111	Batteries								O 0.1					
112	Control Board								O 0.5			D 4.0	01,02, 03,04	
113	Display Board								O 0.5			D 4.0	01,02, 03,04	
114	Oxygen Sensor								O 0.2					

Section III. TOOLS AND TEST EQUIPMENT FOR ANESTHESIA APPARATUS

(1) REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER
01	O	Tool Kit, Medical Equipment Maintenance and Repair: Repairmans	5180-00-611-7923
02	O	Tool Kit, Medical Equipment Maintenance and Repair: Organizational	5180-00-611-7924
03	O	Multimeter, Digital: AN/PSM 45	6625-01-139-2512
		or	
		AN/PSM45A	6625-01-265-6000
04	O	Calibrator Analyzer, Hospital Equipment	6695-01-255-2855

Section IV. REMARKS
FOR
ANESTHESIA APPARATUS

(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 of the equipment to help you inventory the items required for safe and efficient operation.

C–2. General.

The components of the end item and basic issue items lists are divided into the following sections:

a. Section II. COMPONENTS OF END ITEM FOR ANESTHESIA APPARATUS. These items are part of the equipment and will be with the end item whenever it is issued or transferred between property book accounts.

b. Section III. BASIC ISSUE ITEMS FOR ANESTHESIA APPARATUS. These are the minimum essential items required to place the equipment in operation, to operate it, and to perform emergency repairs. This manual is the authority to requisition replacement basic issue items, based on table(s) of organization and equipment or modified table(s) of organization and equipment authorization of the end item.

C–3. Explanation of columns.

The following explanation of columns apply to both section II and section III.

a. Column (1), ITEM NUMBER. This column indicates sequential numbers for items.

b. Column (2), NSN AND CAGE code/PART NO. (number). This column indicates the NSN or the CAGE and part number for the item to be used for requisitioning purposes.

c. Column (3), DESCRIPTION. This column indicates the Federal item name and, if required, a minimum description to identify and locate the item.

d. Column (4), U/M (unit of measure). This column indicates the measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN).

e. Column (5), QTY (quantity). This column indicates the quantity of the item used in the anesthesia apparatus.

Section II. COMPONENTS OF END ITEM FOR ANESTHESIA APPARATUS

(1) ITEM NUMBER	(2) NSN CAGE/PART NO.	(3) DESCRIPTION	(4) U/M	(5) QTY
1	6515-01-130-1379	Monitor, Oxygen	EA	1

Section III. BASIC ISSUE ITEMS FOR ANESTHESIA APPARATUS

(1) ITEM NUMBER	(2) NSN CAGE/PART NO.	(3) DESCRIPTION	(4) U/M	(5) QTY
1	44503/0178-1683-000	Instruction and Service Manual, Model 885A Anesthesia Apparatus	EA	2
2	44503/Not avail.	Operation and Maintenance Manual, Model 5120 Oxygen Monitor	EA	2
3	44503/Not avail.	Service Manual, Model 5120 Oxygen Monitor	EA	2
4	44503/0203-2131-300	Wrench, Open End, 1-1/8 in. and 1-5/16 in.	EA	1
5	44503/0203-2119-300	Wrench, Open End, 3/4 in. and 7/8 in.	EA	1
6	44503/0205-7101-810	Flow Calculator	EA	1
7	6515-01-224-3307	Handwheel, Cylinder Valve (Wrench, Tee Valve)	EA	1
8	44503/0203-2061-300	Wrench, Allen, Hex, 3/16 in.	EA	1
9	44503/0205-7369-300	Vial, Plastic, Small	EA	1
10	6515-00-933-5116	Disk, Check Valve	EA	2

Section III. BASIC ISSUE ITEMS FOR ANESTHESIA APPARATUS

(1) ITEM NUMBER	(2) NSN CAGE/PART NO.	(3) DESCRIPTION	(4) U/M	(5) QTY
11	44503/0205-7372-300	Vial, Plastic, Medium	EA	2
12	44503/0205-7433-810	Gasket, Cylinder	EA	10
13	44503/0205-7377-300	Vial, Plastic, Large	EA	1
14	44503/0216-1925-700	Plug, Funnel with Chain	EA	1
15	44503/0216-1931-700	Plug, Funnel with Chain	EA	1
16	44503/0415-9015-300	Glide, Case	EA	4
17	44503/0415-8120-300	Caster, Case	EA	4
18	44503/0210-1210-300	Gasket, Absorber	EA	1
19	6515-01-085-8031	Kit, Protective Closure	KT	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. Column, (1), ITEM NUMBER. This number is sequentially assigned.

b. Column (2), LEVEL. 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. Column (3), NSN AND CAGE code/PART NO. (number). This is the NSN or the CAGE code and part number; use it to request or requisition the item.

d. Column (4), DESCRIPTION. This column indicates the Federal item name and, if required, the common name in parenthesis for the item.

e. Column (5), U/M. 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. If the unit of measure differs from the unit of issue, requisition the lowest unit of issue to satisfy the requirement.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST FOR ANESTHESIA APPARATUS

(1) ITEM NUMBER	(2) LEVEL	(3) NSN CAGE/PART NO.	(4) DESCRIPTION	(5) U/M
1	O	9150-00-961-8995	Grease,Aircraft,Instrument (Antiseize Compound)	TU
2	O	44503/0220-0091-300	Lubricant, 1 oz.	TU
3	O	6135-00-120-1010	Battery, Dry, Carbon, 1.5 volt	PG
4	O	6505-00-655-8366	Alcohol, Isopropyl	PT

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, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of unit-level, direct-support, and general-support maintenance. It authorizes the requisitioning and issue of spare and repair parts in consonance with the MAC (app B).

E–2. General.

This appendix also contains the following sections.

a. Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS. A list of spare and repair parts authorized for use in the performance of maintenance. This list also includes parts which must be removed for replacement of the authorized parts.

b. Section III. SPECIAL TOOLS LIST FOR ANESTHESIA APPARATUS. A list of special tools, special TMDE, and other special support equipment authorized for the performance of maintenance.

E–3. Explanation of columns in repair parts list (sec II).

a. Column (1), ILLUST (illustration) (FIG. NO. AND ITEM NO.). The figure number refers to the appropriate drawing. The item number is sequentially assigned and corresponds to the call-out number for the figure in this same column.

b. Column (2), NSN AND CAGE code/PART NO. This column indicates the NSN or the CAGE code and part number for the item to be used for requisitioning purposes. Refer to TM–DPSC–6500–RPL to verify the NSN and nomenclature or to identify substitute and/or interchangeable parts.

c. Column (3), NOMENCLATURE. Indicates the Federal item name and/or manufacturer name of the spare or repair part.

d. Column (4), QTY. This column indicates the total quantity of the item contained in the illustration.

e. Column (5), U/I (unit of issue). This column indicates the U/I to requisition items. The U/I is expressed by a two-character alphabetical abbreviation.

E–4. Explanation of columns in special tools list (sec III).

a. Column (1), MAINTENANCE LEVEL. This column provides codes that denote the applicable level(s) requiring the special tools identified in this manual.

b. Column (2), REQUIRED QTY. This column identifies the required and authorized quantity of special tools at each maintenance level.

c. Column (3), NSN AND CAGE code/PART NO. This column identifies the NSN or CAGE and part number, when assigned. This information should be used for requisitioning.

d. Column (4), NOMENCLATURE. This column provides the name and identifying data.

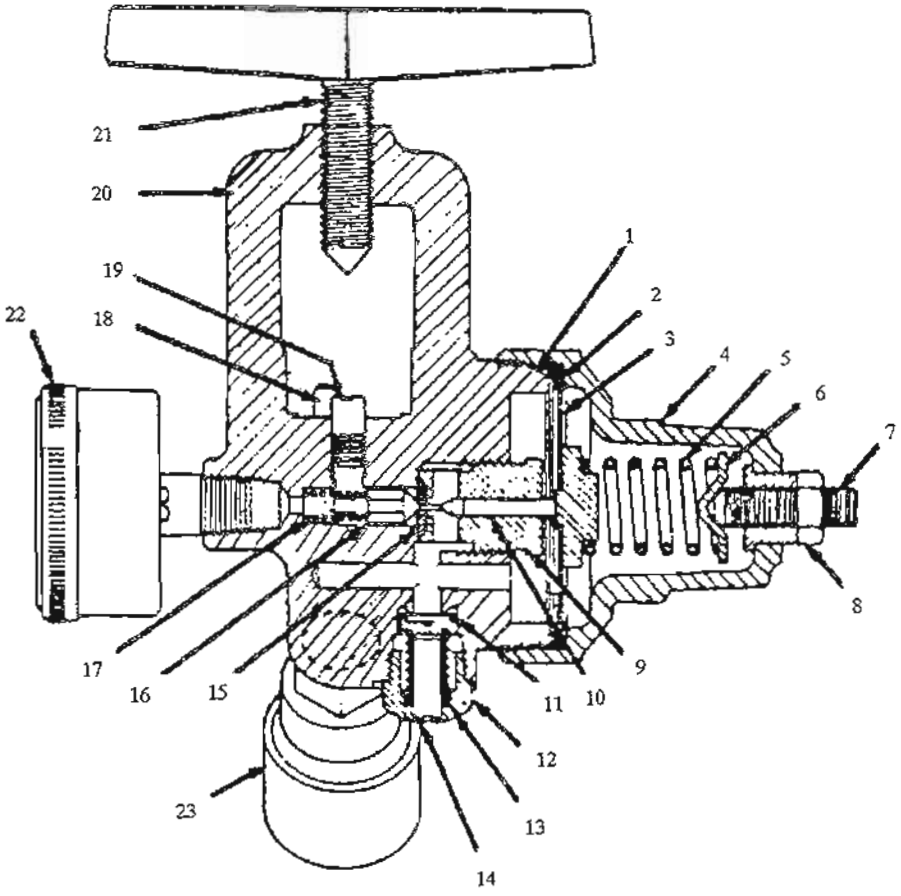


Figure E-1. Oxygen regulator

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-1	1	5330-01-278-6305	Packing, Preformed	1	EA
E-1	2	44503/0830-2677-325	Ring, Slip	1	EA
E-1	3	4820-01-276-4635	Diaphragm, Regulator	1	EA
E-1	4	44503/0830-1774-325	Case, Spring Assembly	1	EA
E-1	5	5360-01-279-9640	Spring, Helical Compression	1	EA
E-1	6	44503/0830-1689-325	Spring, Button	1	EA
E-1	7	44503/0141-4140-132	Screw, Set, 5/16-18	1	EA
E-1	8	44503/0144-3340-113	Nut, Hex, 5/16-18	1	EA
E-1	9	44503/0830-3247-325	Retainer	1	EA
E-1	10	44503/0206-0169-525	Pin, Regulator	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-1	11	44503/0206-0152-325	Seat, Valve	1	EA
E-1	12	44503/0803-0882-335	Cap, Relief Valve	1	EA
E-1	13	44503/0203-3314-325	Spring, Relief Valve	1	EA
E-1	14	44503/0206-0151-525	Holder, Seat	1	EA
E-1	15	44503/0206-0168-525	Seat, Fixed	1	EA
E-1	16	44503/0206-0167-525	Seat, Movable	1	EA
E-1	17	5360-01-269-1953	Spring, Helical Compression	1	EA
E-1	18	44503/0143-3210-410	Pin, Groove	2	EA
E-1	19	4730-00-216-1967	Strainer Element, Sediment	1	EA
E-1	20	44503/0206-0153-235	Body, Regulator, Oxygen	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-1	21	44503/0219-3389-600	Tee Handle, Oxygen	1	EA
E-1	22	6680-00-933-5368	Gauge, Pressure, Dial Indicating, Oxygen (Oxygen Gauge)	1	EA
E-1	23	4730-00-933-5133	Coupling, Half, Quick Disconnect, Oxygen	1	EA
E-1	*	6680-00-933-5124	Regulator Assembly, Pressure, Medical Gas (Oxygen Regulator)	1	EA
E-1	*	44503/0205-2215-300	Dial, Oxygen	1	EA

* Indicates parts that are not shown in the illustration.

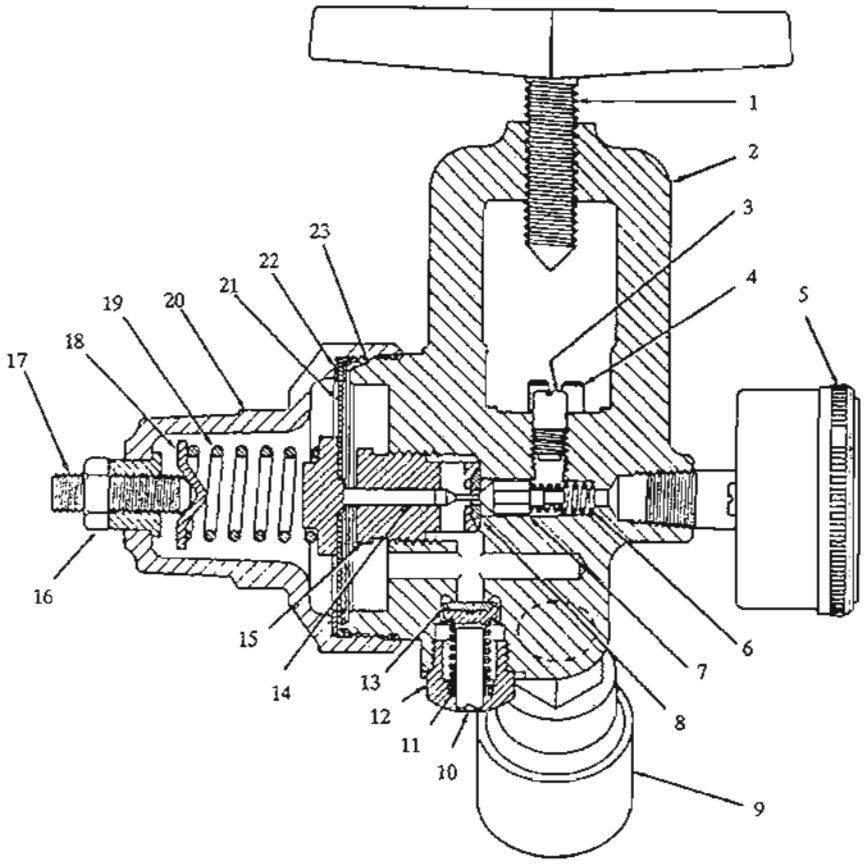


Figure E–2. Nitrous oxide regulator

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-2	1	44503/0219-3381-600	Tee Handle, Nitrous Oxide	1	EA
E-2	2	44503/0206-0154-235	Body, Regulator, Nitrous Oxide	1	EA
E-2	3	4730-00-216-1967	Strainer Element, Sediment	1	EA
E-2	4	44503/0143-3210-410	Pin, Groove	2	EA
E-2	5	6680-00-933-5369	Gauge, Pressure, Dial Indicating, Nitrous Oxide (Nitrous Oxide Gauge)	1	EA
E-2	6	5360-01-269-1953	Spring, Helical Compression	1	EA
E-2	7	44503/0206-0167-525	Seat, Movable	1	EA
E-2	8	44503/0206-0168-525	Seat, Fixed	1	EA
E-2	9	4730-00-933-5132	Coupling, Half, Quick Disconnect, Nitrous Oxide	1	EA
E-2	10	44503/0206-0151-525	Holder, Seat	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-2	11	44503/0203-3314-325	Spring, Relief Valve	1	EA
E-2	12	44503/0830-0882-335	Cap, Relief Valve	1	EA
E-2	13	44503/0206-0152-325	Seat, Valve	1	EA
E-2	14	44503/0206-0169-525	Pin, Regulator	1	EA
E-2	15	44503/0830-3247-325	Retainer	1	EA
E-2	16	44503/0144-3340-113	Nut, Hex, 5/16-18	1	EA
E-2	17	44503/0141-4140-132	Screw, Set, 5/16-18	1	EA
E-2	18	44503/0830-1689-325	Button, Spring	1	EA
E-2	19	5360-01-279-9640	Spring, Helical Compression	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-2	20	44503/0830-1774-325	Case, Spring Assembly	1	EA
E-2	21	4820-01-276-4635	Diaphragm, Regulator	1	EA
E-2	22	44503/0830-2677-325	Ring, Slip	1	EA
E-2	23	5330-01-278-6305	Packing, Preformed	1	EA
E-2	*	6680-00-933-5120	Regulator Assembly, Pressure, Medical Gas (Nitrous Oxide Regulator)	1	EA
E-2	*	44503/0205-2201-300	Dial, Nitrous Oxide	1	EA

* Indicates parts that are not shown in the illustration.

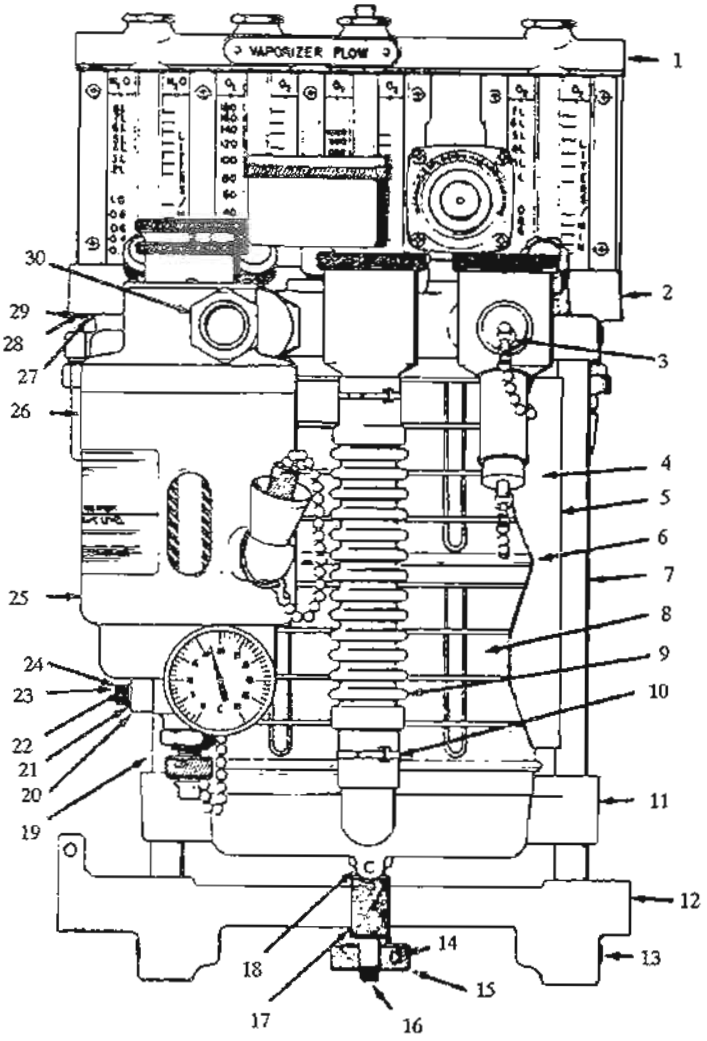


Figure E–5. Apparatus head assembly

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-3	1	44503/0216-6058-801	Head Assembly	1	EA
E-3	2	44503/0144-2136-216	Screw, 1/4-20	2	EA
E-3	3	44503/0216-4604-800	Plug and Chain Assembly	1	EA
E-3	4	44503/0214-1175-435	Retainer	2	EA
E-3	5	44503/0140-5131-103	Screw, 10-32	6	EA
E-3	6	44503/0202-3438-340	Washer, Lock	6	EA
E-3	7	44503/0216-1340-552	Rod Guide	1	EA
E-3	8	4240-00-933-5125	Canister	2	EA
E-3	9	6515-00-933-5119	Tube, Absorber	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-3	10	1660-00-945-5527	Clamp, Tube and Mask	2	EA
E-3	11	44503/0219-1701-743	Base, Absorber	1	EA
E-3	12	44503/0216-1333-249	Bracket, Mounting	1	EA
E-3	13	44503/0144-2136-216	Screw, 1/4-20	2	EA
E-3	14	44503/0141-4136-116	Screw, 1/4-20	1	EA
E-3	15	44503/0216-4844-550	Knob	1	EA
E-3	16	44503/0400-3149-500	Screw, Absorber Clamp	1	EA
E-3	17	44503/0216-4892-700	Body, Drain Valve	1	EA
E-3	18	44503/0216-4895-535	Nipple, Drain Valve	1	EA
E-3	19	44503/0216-1340-552	Rod, Guide	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-3	20	44503/0216-3186-550	Tie Bar	1	EA
E-3	21	44503/0202-3415-340	Washer, Lock	2	EA
E-3	22	44503/0144-2136-212	Screw, 1/4-20	2	EA
E-3	23	44503/0202-3438-340	Washer, Lock	1	EA
E-3	24	44503/0144-2131-214	Screw, 10-32	1	EA
E-3	25	6515-01-277-6380	Vaporizer, Anesthetic	1	EA
E-3	26	44503/0213-1308-535	Tube	1	EA
E-3	27	44503/140-6127-105	Screw, 8-32	2	EA
E-3	28	44503/0202-3434-300	Washer, Lock	2	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-3	29	44503/0214-1178-300	Retainer	1	EA
E-3	30	44503/0219-0108-535	Adapter, 1-1/8 in.	1	EA
E-3	*	44503/0216-4604-800	Plug and Chain Assembly consisting of:	1	EA
		44503/0203-0100-300	Coupling, Bead Chain	6	EA
		44503/0203-0103-300	Ring, Split	3	EA
		44503/0211-2229-300	Stopper, Rubber	2	EA
		44503/0401-0415-500	Stopper, Retainer	2	EA
E-3	*		Control Head Assembly consisting of (in addition to parts listed):		
		44503/0216-1340-552	Canister Rods, Absorber	2	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
		6515-00-933-5119	Tube, Absorber	1	EA
		44503/0213-1308-535	Tube, Top Manifold, Vaporizer	1	EA
		44503/0214-1178-300	Bracket, Tube Retaining	1	EA
		44503/0216-1386-550	Bar, Vaporizer Support	1	EA
		1660-00-945-5527	Clamp, Tube and Mask	2	EA
		44503/0219-0108-535	Adapter, Vaporizer Outlet	1	EA
		44503/0205-2216-300	Label, Oxygen Flow Control Knob	1	EA
		44503/0205-2201-300	Label, Nitrous Oxide, Flow Control Knob	1	EA
		44503/0205-2213-300	Label, Oxygen, Vaporizer Flow Control Knob	1	EA
		44503/0205-4043-300	Label, Oxygen, Flush Valve	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
		44503/0205-4452-300	Label, Vaporizer Flow	1	EA
		44503/0205-4453-300	Label, Serial Number	1	EA
		44503/0205-4454-300	Label, Non-adjustable Relief Valve	1	EA
		5310-00-926-9237	Gasket, Cork	4	EA
		44503/0213-1014-535	Tube, Oxygen Supply to Pressure Sensor Shutoff Valve	1	EA
		44503/0219-1729-500	Pin, Throttling, "VAPORIZER FLOW"	1	EA
		44503/0211-0658-735	Inlet, Control Head, Oxygen	1	EA
		44503/0221-0659-735	Inlet, Control Head, Nitrous Oxide	1	EA
		44503/0400-3149-500	Clamp, Screw, Absorber	1	EA
		44503/0216-4844-550	Clamp, Screw, Knob	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
		44503/0141-4136-116	Screw, Set, Clamp, Screw Knob	1	EA
E-3	*		Drain Valve, Absorber consisting of:		
		44503/0216-4895-535	Nipple	1	EA
		44503/0216-4892-700	Body, Drain Valve	1	EA
E-3	*	44503/0213-5025-335	Nipple, Pressure Sensor Shutoff Valve	1	EA
E-3	*	44503/0413-3510-335	Plug	2	EA
E-3	*	44503/0413-8590-335	Connector, 3/16 in. Tube, Compression	1	EA
E-3	*	44503/0413-8591-335	Connector, 1/4 in. Tube, Compression	1	EA
E-3	*	6515-01-085-8031	Protective Closure Kit consisting of:	1	EA
		44503/0216-1401-700	Schraeder Glands for Regulators	4	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
		44503/0216-1402-700	Rubber Stoppers for Control Head Inlets	2	EA
		44503/0216-1403-700	Rubber Stoppers for Vaporizer Port	1	EA
		44503/0216-1404-700	Cap Plugs for Large Cylinder Adapters	2	EA
E-3	*	44503/0216-1406-300	Level	1	EA

* Indicates parts that are not shown in the illustration.

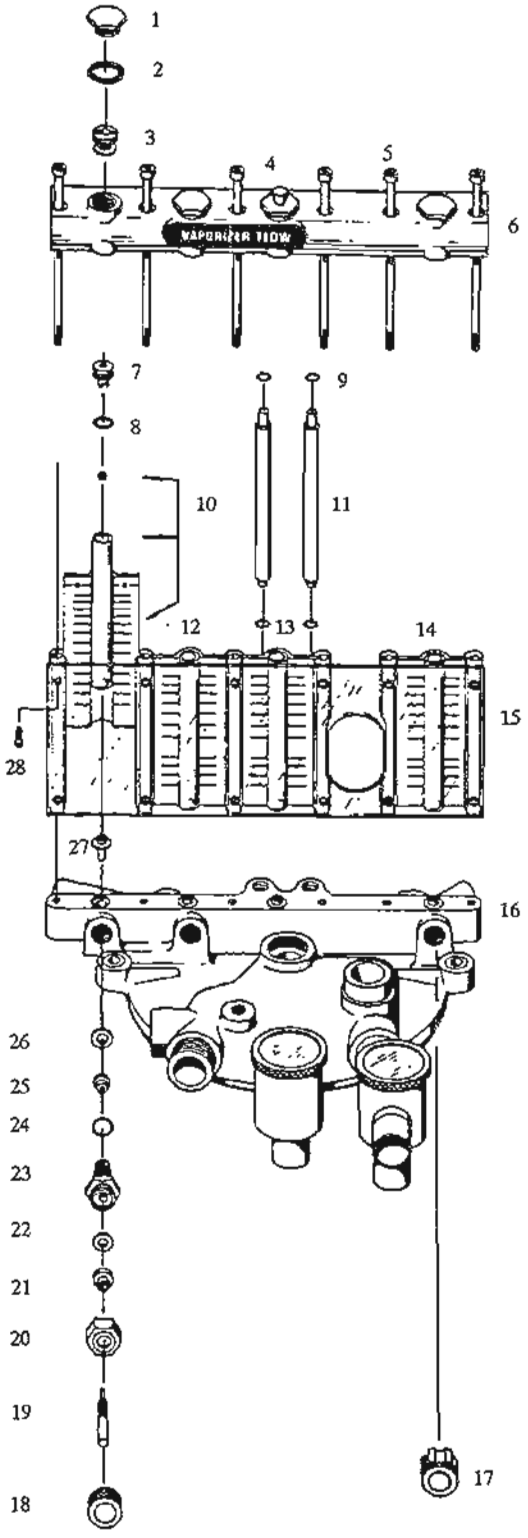


Figure E–4. Control head assembly

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-4	1	44503/0216-1343-535	Cap, Sealing	3	EA
E-4	2	5330-00-926-9240	Gasket, Rubber	4	EA
E-4	3	44503/0216-1342-400	Sleeve, Sealing	4	EA
E-4	4	44503/0216-1388-535	Cap, Sealing with Snap	1	EA
E-4	5	44503/0400-3124-300	Screw, Cap, 1/4-20	6	EA
E-4	6	44503/0216-1398-700	Manifold, Top	1	EA
E-4	7	4820-01-276-3156	Disk, Valve	4	EA
E-4	8	5330-00-933-5365	Packing, Preformed	3	EA
E-4	9	5330-01-264-9972	Packing, Preformed (O-Ring)	4	EA
E-4	10	6515-00-933-5129	Float, Tube and Ball, Nitrous Oxide, with Blue Flow Scale	1	KT

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-4	11	44503/0216-1391-535	Sleeve	2	EA
E-4	12	6515-01-072-8329	Float, Tube and Ball, Low Flow Oxygen	1	KT
E-4	13	6515-01-072-8328	Float, Tube and Ball, High Flow Oxygen	1	KT
E-4	14	6515-00-933-5127	Float, Tube and Ball, Oxygen with White Flow Scale	1	KT
E-4	15	44503/0212-1015-300	Shield, Flowmeter	1	EA
E-4	16	44503/0219-1727-742	Head, Control Body	1	EA
E-4	17	44503/0207-0069-530	Knob, Touch-Coded (Fluted), Oxygen Only	1	EA
E-4	18	44503/0207-0066-535	Knob, Knurled, Flow Control Valve	2	EA
E-4	19	6515-00-933-5112	Stem, Needle Valve	3	EA
E-4	20	4730-01-268-7028	Nut, Tube Coupling	3	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-4	21	44503/0207-5376-500	Bonnet, Flow Control Valve	3	EA
E-4	22	5330-01-264-9973	Packing, Preformed	3	EA
E-4	23	6515-00-933-5114	Body, Needle Valve	3	EA
E-4	24	5330-00-933-5365	Packing, Preformed (O-Ring)	3	EA
E-4	25	6515-00-933-5113	Seat, Needle Valve	3	EA
E-4	26	6515-00-933-5115	Gasket, Needle Valve	3	EA
E-4	27	44503/0216-1395-500	Stop, Lower	4	EA
E-4	28	44503/0140-6127-105	Screw, 8-32	12	EA

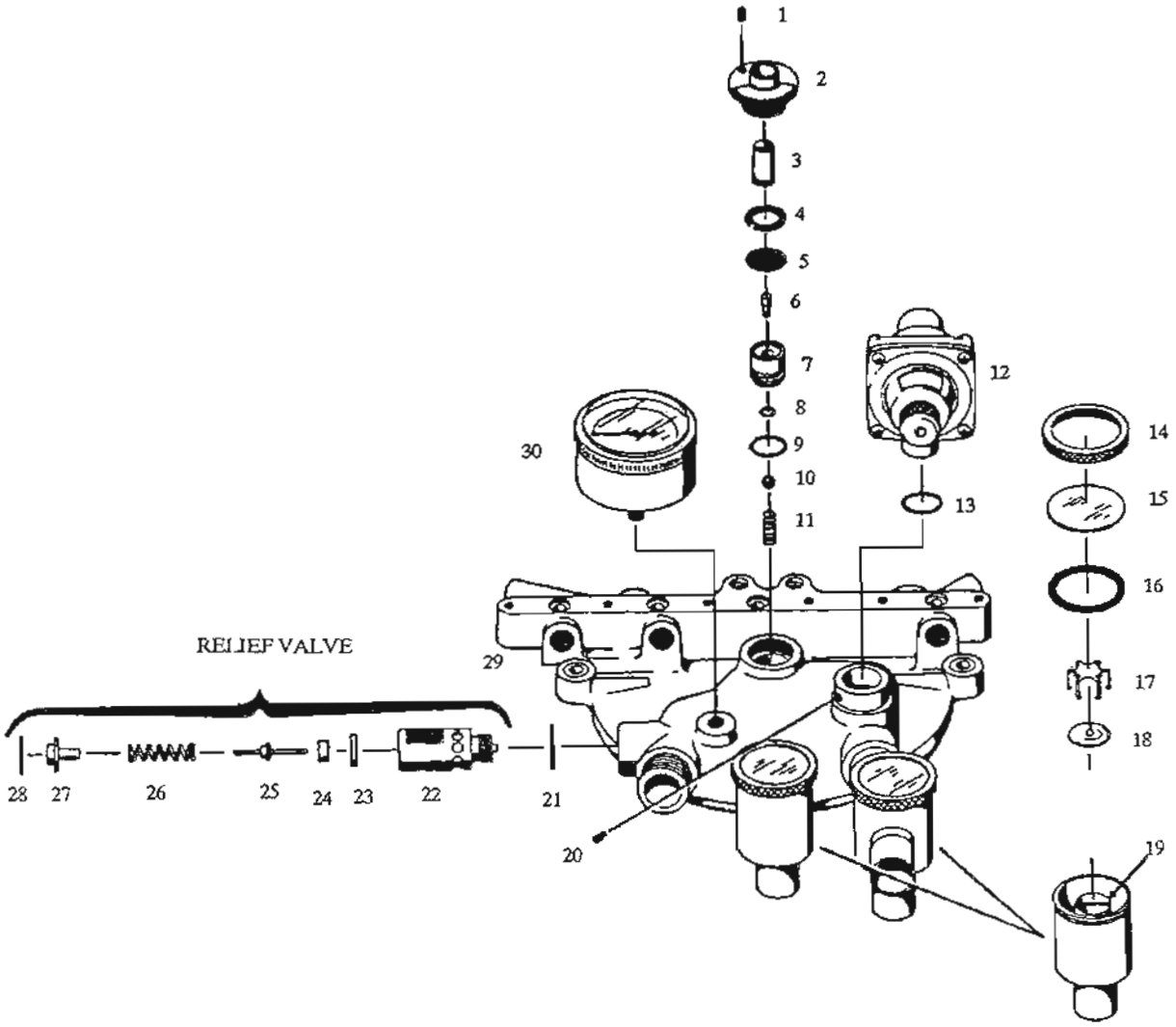


Figure E–5. Control head body

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-5	1	44503/0141-4124-106	Screw, Set, 6-32	1	EA
E-5	2	44503/0216-1338-552	Guide, Knob, Oxygen Flush Valve	1	EA
E-5	3	44503/0207-2178-550	Knob, Oxygen Flush Valve	1	EA
E-5	4	44503/0210-5245-300	Gasket, Oxygen Flush Valve	1	EA
E-5	5	44503/0210-7203-300	Diaphragm, Oxygen Flush Valve	1	EA
E-5	6	44503/0207-2179-500	Pin, Thrust	1	EA
E-5	7	44503/0207-2180-500	Guide, Thrust Pin	1	EA
E-5	8	5330-01-264-9970	Packing, Preformed (O-Ring)	1	EA
E-5	9	5330-01-149-9678	Packing, Preformed	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-5	10	44503/0409-1686-300	Ball, Stainless Steel	1	EA
E-5	11	5360-01-273-1807	Spring, Helical Compression	1	EA
E-5	12	44503/0207-8199-800	Diaphragm, Relief Valve	1	EA
E-5	13	5330-01-264-9971	Packing, Preformed (O-Ring)	1	EA
E-5	14	44503/0219-1322-535	Ring, Knurled	2	EA
E-5	15	9330-00-926-4573	Window, Observation	2	EA
E-5	16	5330-00-926-9238	Gasket, Rubber	2	EA
E-5	17	6515-00-933-5117	Disk, Valve Assembly, Gas	2	EA
E-5	18	6515-00-933-5116	Disk, Valve, Gas	2	EA
E-5	19	5365-01-252-5565	Spacer, Plate	1	EA
E-5	20	44503/0141-9527-106	Screw, Set, 8-32	3	EA
E-5	21	5330-00-171-4485	Washer, Flat, Fiber	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-5	22	44503/0207-1376-535	Body, Relief Valve (Non-adjustable)	1	EA
E-5	23	44503/0210-6524-300	Seal, Silicone	1	EA
E-5	24	44503/0207-1712-100	Spacer, White, Delrin	1	EA
E-5	25	6515-00-933-5152	Guide, Stem	1	EA
E-5	26	44503/0203-3336-300	Spring, Compression	1	EA
E-5	27	44503/0207-1375-535	Cap, Relief Valve	1	EA
E-5	28	44503/0203-5262-300	Ring, Truarc, Retaining	1	EA
E-5	29	44503/0219-1727-742	Body, Control Head	1	EA
E-5	30	6685-01-268-7058	Gauge, Pressure, Dial Indicating	1	EA

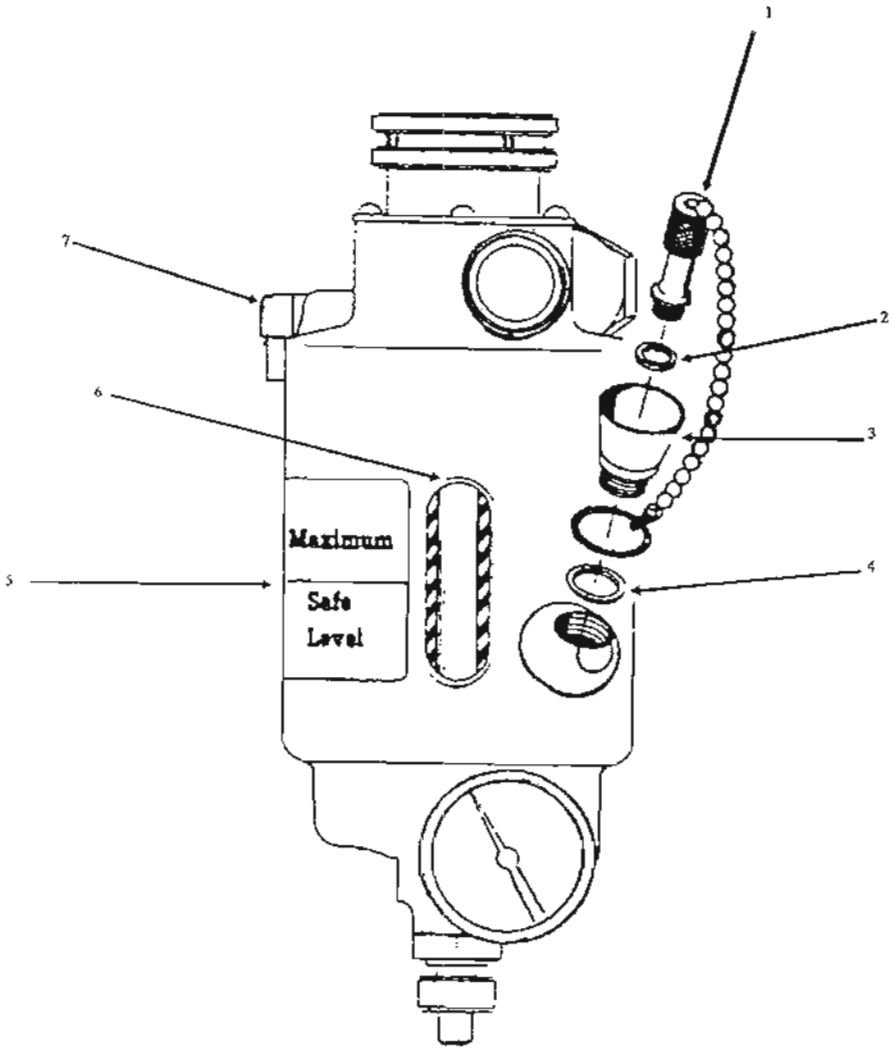


Figure E–6. Anesthetic vaporizer (external)

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-6	1	44503/0216-1925-700	Plug, Funnel	1	EA
E-6	2	44503/0210-0680-300	Gasket, Plug, Funnel	1	EA
E-6	3	44503/0216-1027-531	Funnel	1	EA
E-6	4	5330-00-435-8950	Packing, Preformed	1	EA
E-6	5	44503/0205-2107-300	Label, Background, Liquid Level Indicator	1	EA
E-6	6	44503/0205-4451-300	Label, Sight Glass	1	EA
E-6	7	44503/0413-8567-335	Elbow, 1/4 in. Tube, Compression	1	EA

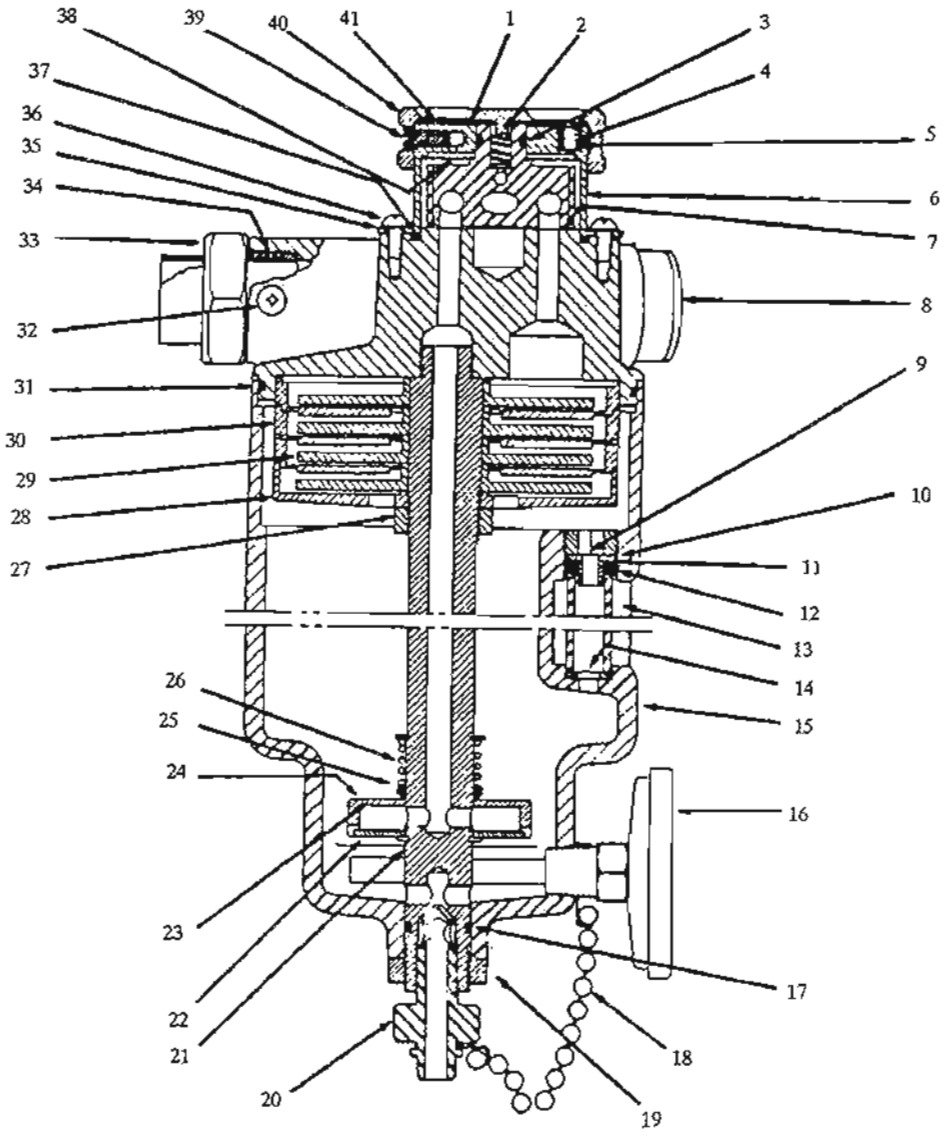


Figure E–7. Anesthetic vaporizer (internal)

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-7	1	44503/0205-2105-300	Dial, Vaporizer On-Off Control	1	EA
E-7	2	44503/0203-3058-300	Spring	1	EA
E-7	3	44503/0210-0533-300	Packing, Preformed (O-Ring)	1	EA
E-7	4	44503/0216-1378-500	Cap, Spring	3	EA
E-7	5	44503/0203-3058-300	Spring	3	EA
E-7	6	44503/0216-1380-535	Cap, Vaporizer Valve	1	EA
E-7	7	44503/-216-1396-700	Valve	1	EA
E-7	8	44503/0216-1399-742	Head, Vaporizer	1	EA
E-7	9	44503/0216-1871-500	Nut, 9/16 in.	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-7	10	44503/0216-1928-540	Adapter	1	EA
E-7	11	5310-00-433-9034	Washer, Flat	1	EA
E-7	12	5310-00-433-9035	Washer, Flat	1	EA
E-7	13	44503/0212-0161-300	Tube, Liquid Level Indicator	1	EA
E-7	14	5310-00-433-9035	Washer, Flat	1	EA
E-7	15	44503/0216-1397-743	Chamber, Vaporizing	1	EA
E-7	16	6685-01-268-7046	Thermometer, Self Indicating	1	EA
E-7	17	5330-01-277-5308	Packing, Preformed (O-Ring)	1	EA
E-7	18	44503/0203-0050-700	Chain, Bead	1	EA
E-7	19	44503/0402-1777-535	Nut, Hex, 11/16-20	1	EA
E-7	20	44503/0216-1375-500	Plug, Drain	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-7	21	5365-01-281-8797	Ring, Retaining	1	EA
E-7	22	44503/0402-1108-335	Washer	1	EA
E-7	23	44503/0210-0544-300	O-Ring	1	EA
E-7	24	44503/0216-1376-535	Ring, Diffuser	1	EA
E-7	25	44503/0216-1379-535	Ring, Seal Loading	1	EA
E-7	26	5360-01-276-9519	Spring, Helical Compression	1	EA
E-7	27	44503/0402-1778-535	Nut, Hex, 3/4-20	1	EA
E-7	28	44503/0216-1377-535	Clamp, Baffle	1	EA
E-7	29	44503/0212-1201-100	Baffle, Inner	4	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-7	30	44503/0212-1200-100	Baffle, Outer	3	EA
E-7	31	5330-01-277-5309	Packing, Preformed (O-Ring)	1	EA
E-7	32	44503/0140-6127-105	Screw, 8-32 by 3/8 in.	1	EA
E-7	33	44503/0204-6679-535	Union Unit	1	EA
E-7	34	44503/0204-8151-300	Union Stud	1	EA
E-7	35	44503/0202-3436-300	Washer, Lock	4	EA
E-7	36	44503/0140-6127-105	Screw, 8-32 by 5/16 in.	4	EA
E-7	37	5330-01-277-9356	Packing, Preformed (O-Ring)	1	EA
E-7	38	5310-01-279-2384	Washer, Spring Tension	AR	EA
E-7	39	44503/0402-1522-500	Screw, Stop	3	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-7	40	44503/0216-1381-300	Knob, Vaporizer	1	EA
E-7	41	44503/0210-6914-300	Disk, Label Mounting	1	EA

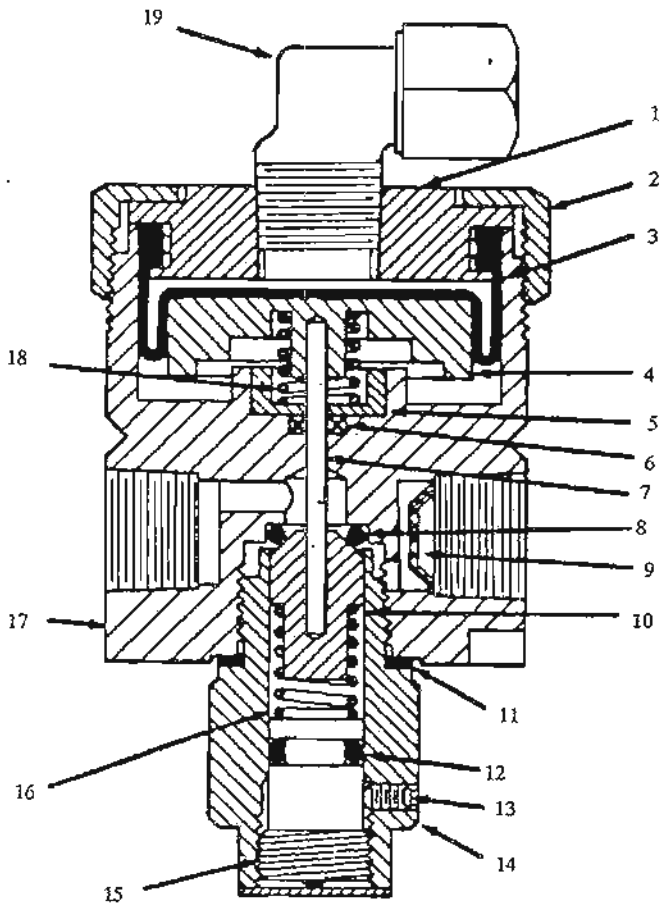


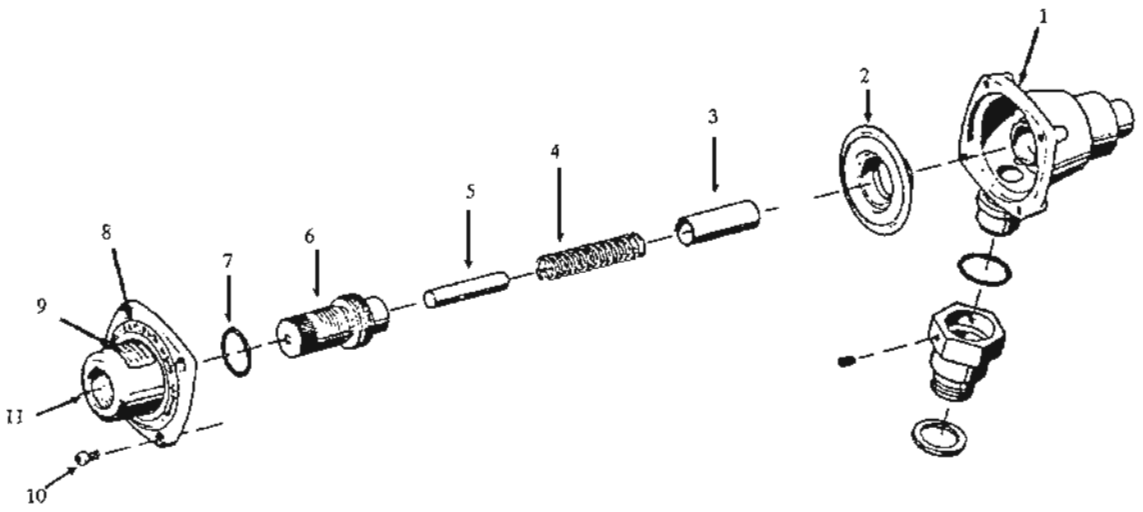
Figure E–8. Pressure sensor valve

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-8	1	44503/0207-1977-535	Diaphragm	1	EA
E-8	2	44503/0402-1672-535	Cap	1	EA
E-8	3	44503/0210-7236-300	Diaphragm	1	EA
E-8	4	44503/0207-1976-500	Piston	1	EA
E-8	5	44503/0207-1980-500	Seat, Spring	1	EA
E-8	6	44503/0210-0516-300	Quad-Ring	1	EA
E-8	7	44503/0401-5285-300	Pin, Thrust	1	EA
E-8	8	44503/0210-0526-300	O-Ring	1	EA
E-8	9	44503/0214-7107-325	Screen, Gas Inlet	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-8	10	44503/0207-1972-500	Core, Valve	1	EA
E-8	11	44503/0210-5200-300	Gasket	1	EA
E-8	12	44503/0210-0669-300	Packing, Preformed (O-Ring)	1	EA
E-8	13	44503/0141-4117-104	Screw, Set, 4-40	1	ST
E-8	14	44503/0207-1973-535	Guide, Valve	1	EA
E-8	15	44503/0207-1974-535	Screw, Tension Adjust	1	EA
E-8	16	44503/0203-3188-300	Spring, Compression	1	EA
E-8	17	44503/0207-1969-535	Body, Pressure Sensor Valve	1	EA
E-8	18	44503/0203-3185-342	Spring, Compression	1	EA
E-8	19	44503/0413-8566-355	Elbow, 3/16 in. Tube, Compression	1	EA



NOTE: WHEN REPLACING THE DIAPHRAGM/DISK ASSEMBLY (ITEM 2), BE SURE TO REPLACE THE SPRING (ITEM 4) TO ENSURE PROPER FUNCTION.

NOTE: THE SPRING (ITEM 4) AND THE LABEL (ITEM 9) ARE INCLUDED IN DIAPHRAM/DISK ASSEMBLY KIT (ITEM 2).

Figure E–9. APL valve

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-9	1	44503/0207-1399-300	Body	1	EA
E-9	2	4810-01-267-1502	Diaphragm, Valve	1	KT
E-9	3	44503/0207-1389-500	Spring, Sleeve	1	EA
E-9	4	44503/1400-3011-000	Spring	1	EA
E-9	5	44503/0401-5654-300	Pin	1	EA
E-9	6	44503/0207-1390-535	Knob	1	EA
E-9	7	44503/0210-0594-300	Packing, Preformed (O-Ring)	1	EA
E-9	8	44503/0205-4349-300	Label, Warning	1	EA
E-9	9	44503/0205-4465-300	Label	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
E-9	10	44503/0140-6427-105	Screw, 8-32	4	EA
E-9	11	44503/0207-1394-300	Cap	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
N/A	1		Hose Assembly, Rubber, Oxygen (Gas Supply Hose)		
		4720-00-933-5213	9 ft., 4 in.	1	EA
		4720-00-933-5212	3 ft., 4 in.	1	EA
N/A	2	6680-00-129-5658	Regulator, Pressure, Medical Gas, Oxygen	2	EA
N/A	3	6515-00-386-9708	Harness, Head, Rubber, Conductive	1	EA
N/A	4	6515-00-302-1500	Tube, Inhaler	2	EA
N/A	5	6515-01-265-0078	Tube, Inhaler	1	EA
N/A	6	6515-01-269-1782	Bag, Rebreathing, (1 Liter) including:		
		44503/0219-4909-538	Bushing	1	EA
		44503/0207-8114-800	Valve, Scavenging	1	EA
N/A	7	6515-01-030-8636	Bag, Rebreathing (3 Liter)	1	EA
N/A	8	44503/0216-4600-800	Clipboard	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
N/A	9	6680-01-130-2010	Regulator, Pressure, Medical Gas, Nitrous Oxide	2	EA
N/A	10		Hose Assembly, Rubber, Nitrous Oxide (Gas Supply Hose)		
		4720-00-933-5215	9 ft., 8 in.	1	EA
		4720-00-933-5214	3 ft., 4 in.	1	EA
N/A	11		Hose, Pediatric Supply, including:		
		44503/0216-4612-550	Connector	1	EA
		44503/0219-4912-738	Adapter	1	EA
N/A	12	44503/0219-1567-800	Canister and Housing consisting of:	2	EA
		44503/0219-1571-300	Guard, Metal		
		44503/0203-5120-300	Clip, Grounding		
		44503/0212-1071-200	Canister		
		5330-01-926-9242	Gasket		

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
		44503/0210-1218-300	Seal		
		44503/0219-1723-100	Screen		
N/A	13	44503/0203-2131-300	Wrench, Open End, 1-1/8 in. and 1-5/16 in.	1	EA
N/A	14	44503/0203-2119-300	Wrench, Open End, 3/4 in. and 7/8 in.	1	EA
N/A	15	44503/0205-7101-810	Flow Calculator with Mounting Pad	1	EA
N/A	16	44503/0219-3405-700	Wrench, Tee Valve	1	EA
N/A	17	44503/0203-2061-300	Wrench, Allen, Hex, 3/16 in.	1	EA
N/A	18	44503/0219-4532-100	Y-Inhaler	1	EA
N/A	19	44503/0219-4943-100	Elbow, Mask	1	EA

Section II. REPAIR PARTS LIST FOR ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
N/A	20		Masks		
		6515-00-347-2200	Oronasal, Medium, Adult	1	EA
		6515-00-299-8297	Oronasal, Large, Adult	1	EA
		6515-01-033-3695	Oronasal, Child	1	EA
		6515-01-033-3694	Oronasal, Pediatric	1	EA
		6515-01-033-3693	Oronasal, Newborn	1	EA
N/A	21	44503/0205-7369-300	Vial, Small, Plastic	1	EA
		6515-00-933-5116	Extra Disks, Check Valve	2	EA
N/A	22	44503/0205-7372-300	Vial, Medium, Plastic	1	EA
		44503/0205-7433-810	Extra Gaskets, Cylinder	10	EA
N/A	23	44503/0205-7377-300	Vial, Large, Plastic	1	EA
		44503/0216-1925-700	Extra Plug, Funnel with Chain	1	EA

Section II. REPAIR PARTS LIST
FOR
ANESTHESIA APPARATUS

(1) ILLUST. FIG NO.	(1) ILLUST. ITEM NO.	(2) NSN CAGE/PART NUMBER	(3) NOMENCLATURE	(4) QTY	(5) U/I
		44503/0216-1931-700	Extra Drain Plug with Chain	1	EA
N/A	24	44503/0415-9015-300	Glides	4	EA
N/A	25	44503/0415-8120-300	Casters	4	EA
N/A	26		Adapters, Large Cylinder		
		6515-01-180-6989	Oxygen	1	EA
		44503/0204-2660-802	Nitrous Oxide	1	EA
N/A	27	6515-01-085-8031	Devices, Protective Closure	1	KT
N/A	28	5330-00-926-9242	Gaskets, Absorber (Extra)	1	EA
N/A	29	6515-01-253-8146	Tray, Instrument	1	EA
N/A	30	6515-01-250-8934	Holder, Cylinder	4	EA
N/A	31	4720-01-269-1735	Tubing Assembly	2	EA
N/A	32	44503/0213-2957-500	Connector, 19-mm	1	EA
N/A	33	44503/0215-0531-300	Tray, Instrument	1	EA

Section III. SPECIAL TOOLS LIST
FOR
ANESTHESIA APPARATUS

(1) MAINTENANCE LEVEL	(2) REQUIRED QTY	(3) NSN CAGE/PART NUMBER	(4) NOMENCLATURE
O	1	44503/0203-2119-300	Wrench, Open End, 3/4 in. and 7/8 in.
O	1	44503/0203-2131-300	Wrench, Open End, 1-1/8 in. and 1-5/16 in.
O	1	44503/0219-3405-700	Wrench, Tee Valve
O	1	44503/0203-2061-300	Wrench, Allen, Hex, 3/16 in.
O	1	44503/0995-6435-010	Tube, 1/4 in. id
O	1	44503/0207-6067-800	Valve, Needle
O	1	44503/0205-8636-300	Gauge
O	1	44503/0206-5120-300	Adapter, 1/8 in. npt Female to 1/4 in. od Tube
O	1	44503/0206-5128-300	Adapter, 1/8 in. npt Male to 1/4 in. od Tube
O	2	44503/0175-2356-000	Plug, Rubber
O	1	44503/0309-1324-810	Verification Device, Flowmeter
O	1	44503/0204-8844-300	Tube, Barb Tee, 1/4 in.

GLOSSARY

APL valve	Adjustable pressure limiting (valve).
AR	As required.
C	Operator maintenance.
CAGE	Commercial and government entity.
cc/min	cubic centimeters per minute.
cm H_20	Centimeters of water.
Component/ module	A combination of parts mounted together in manufacture, which may be tested, replaced as a unit, or repaired (for example, vaporizer, canister, APL valve, and pressure valve. The term "module" is normally associated with electronic equipment.
D	Depot-level maintenance.
°C	Degrees Celsius.
°F	Degrees Fahrenheit.
DS	Direct support.
Disassembly/ assembly	The step-by-step removal of parts from a module or end item to obtain access to a defective part for replacement and the subsequent step-by-step process of fitting the module or end item together.
EA	Each.
EQPT	Equipment.
F	Direct support maintenance.
Fault location/ trouble-shooting	Investigating and detecting the cause of equipment malfunction; isolating a fault within a unit under test.
FSCM	Federal supply code for manufacturers. (Obsolete term, see CAGE.)
ft.	Foot (feet).
GS	General support.
H	General support maintenance.
Hex	Hexagonal.
illust	Illustration.
in (IN)	Inch.
KT	Kit.
lbs	Pounds.
LPM	Liter(s) per minute.
MAC	Maintenance allocation chart.
Maintenance actions	Welding, grinding, riveting, straightening, facing, remachining, and resurfacing an item of equipment.
Maintenance capability	Availability of those resources—facilities, tools, TMDE, drawings, technical publications, trained maintenance personnel, engineering and management support, spares, and repair parts required to perform maintenance operations.
Maintenance capacity	A quantitative measure of maintenance capability usually expressed as the number of man-hours of direct labor that can be applied within a specific maintenance activity or shop, during a 40-hour week (1 shift, 5 days).
Maintenance services	Inspecting, testing, servicing, adjusting, aligning, calibrating and/or replacing an item of equipment.
mm	Millimeter(s).
mm HG	Millimeters of mercury.
NO	Number.
npt	National pipe thread.
NSN	National stock number.
O	Unit maintenance.
od	Outer diameter.
oz	Ounce.
PG	Package.
PMCS	Preventive maintenance checks and services.
psi	Pounds per square inch.
psig	Pounds per square inch gauge.
PT	Pint.
QA/QC	Quality assurance and/or quality control.
QTY	Quantity.
ST	Set.
TMDE	Test, measurement, and diagnostic equipment.
TU	Tube.
U/I	Unit of issue.
U/M	Unit of measure.

INDEX

This index is organized alphabetically by topic and by subtopic within a topic. Topics and subtopics are identified by paragraph number.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:
THOMAS F. SIKORA
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
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ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
1	X			X		**Anesthesia unit.**	
						a. Conduct an inventory to ensure that all components and accessories are on hand.	Missing components or accessories preclude proper operation.
						b. Ensure that the unit is assembled properly.	Unit cannot be assembled properly.
						c. Inspect the case and stand for structural damage.	Structural damage precludes proper operation.
2	X			X		**Gas supply equipment.**	
						a. Inspect cylinder adapters and regulator assemblies for damage. Verify proper operation.	Damage precludes proper operation.
						b. Inspect gas supply hoses for damage or deterioration.	Hoses are damaged.
3	X			X		**Control head.**	
						a. Verify proper operation of the pressure sensor shutoff valve.	Valve does not function properly.
						b. Verify operation of the flowmeters and flow control valves.	Flowmeters or valves do not function properly.
						c. Verify operation of the oxygen flush valve.	Valve does not operate properly.
						d. Verify operation of the non-adjustable valve (para 2-11).	Valve does not operate properly.
						e. Inspect absorber cannisters for damage.	Absorber is damaged.
						f. Verify proper operation of the inhalation and exhalation check valves.	Valves do not function properly.
						g. Verify operation of breathing circuit pressure gauge (para 2-12).	Gauge does not operate properly.
						h. Inspect the vaporizer for damage. Perform the gas leak test procedures (para 2-13).	Vaporizer is damaged or fails leak test.
4	X			X		**Breathing circuit items.**	
						a. Visually inspect breathing tubes and fittings for damage or deterioration.	Tubes or fittings are damaged.
						b. Inspect breathing bags and masks for deterioration, swelling, tackiness, or cracking.	Deterioration exists.

ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
5	X			X		**Oxygen monitor.**	
						Verify calibration of the oxygen monitor (para 3-4). Ensure that the monitor operates properly.	Monitor does not function properly or is not calibrated.
6	X			X		**Adult rebreathing circuit.**	
						Perform adult rebreathing circuit set-up procedures (para 2-5) and verify proper operation by performing preliminary adult rebreathing circuit check procedures.	Circuit does not function properly.
7	X			X		**Pediatric partial rebreathing circuit.**	
						Perform pediatric partial rebreathing set-up procedures (para 2-7) and verify proper operation by performing preliminary pediatric partial rebreathing circuit check procedures (para 2-8).	Circuit does not function properly.

ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
1					X	**Anesthesia unit.**	
						a. Verify that an inventory was conducted for all components and accessories.	Missing components or accessories preclude proper operation.
						b. Ensure that the unit is assembled properly.	Unit cannot be assembled properly.
						c. Inspect the case and stand for structural damage.	Structural damage precludes proper operation of the anesthesia unit.
2					X	**Gas supply equipment.**	
						a. Inspect cylinder adapters and regulator assemblies for damage. Verify proper operation.	Cylinder adapters or regulator assemblies are damaged or do not operate properly.
						b. Inspect gas supply hoses for damage or deterioration.	Damage or deterioration exists.
3					X	**Control head.**	
						a. Verify proper operation of the pressure sensor shutoff valve. Inspect valve diaphragm for damage or deterioration.	Diaphragm is damaged or valve does not function properly.
						b. Verify operation of the flowmeters and flow control valves. Inspect plastic shield for damage. Inspect valves for leaks.	Flowmeters or flow control valves do not operate properly.
						c. Verify proper operation of the oxygen flush valve.	Valve does not operate properly.
						d. Verify operation of the non-adjustable relief valve (para 2-11).	Valve does not operate properly.
						e. Inspect absorber cannisters for damage. Inspect gasket for deterioration.	Absorber is damaged in any way.
						f. Verify proper operation of the inhalation and exhalation check valves. Inspect valve disks for dirt or deterioration.	Valves do not operate properly.
						g. Ensure that the breathing circuit pressure gauge (para 2-12) zeros and operates properly.	Gauge does not zero or fails to operate properly.
						h. Inspect the vaporizer for damage. Inspect gasket for deterioration. Perform the gas leak test procedures (para 2-13).	Vaporizer is damaged or fails leak test.

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ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
4					X	**Breathing circuit items.**	
						a. Visually inspect breathing tubes and fittings for damage or signs or deterioration.	Tubes or fittings are damaged.
						b. Inspect breathing bags and masks for deterioration, swelling, tackiness, or cracking.	Deterioration exists.
5					X	**Oxygen monitor.**	
						Verify calibration (para 3-4) of the oxygen monitor. Ensure that the monitor operates properly.	Monitor does not function properly or is not calibrated.
6					X	**Adult rebreathing circuit.**	
						Perform adult rebreathing circuit set-up procedures (para 2-5) and verify operation by performing preliminary adult rebreathing circuit check procedures (para 2-6).	Circuit does not function properly.
7					X	**Pediatric partial rebreathing circuit.**	
						Perform pediatric partial rebreathing set-up procedures (para 2-7) and verify proper operation by performing preliminary pediatric partial rebreathing circuit check procedures (para 2-8).	Circuit does not function properly.