SS600-AN-MMA-010

Revision 2

TECHNICAL MANUAL

MAINTENANCE MANUAL
ORGANIZATIONAL AND INTERMEDIATE LEVELS

SUPPLIED AIR RESPIRATOR (SAR) WITH SELF-CONTAINED BREATHING APPARATUS (SCBA) 0910-LP-708-0000

OPERATION AND MAINTENANCE INSTRUCTIONS

DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

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FOREWORD

This technical manual contains procedures for operation and maintenance of the Supplied Air Respirator (SAR) with Self-Contained Breathing Apparatus (SCBA). The information in this manual is presented in eight chapters and two appendices: general information and safety precautions are provided in Chapter 1; operational procedures in Chapter 2; functional description in Chapter 3; maintenance and troubleshooting procedures in Chapters 4, 5, and 6; the parts lists in Chapter 7; and inventory, storage, and shipping data in Chapter 8. Appendix A is a pre-operational checklist. Appendix B contains Department of Transportation (DOT) exemptions for air cylinders and cylinder shipping information.

Ships, training activities, supply points, maintenance activities, Naval Shipyards, and Supervisors of Shipbuilding are requested to arrange for the maximum practical use and evaluation of Naval Sea Systems Command (NAVSEA) technical manuals. All errors, omissions, discrepancies, and suggestions for improvement to NAVSEA technical manuals shall be forwarded to:

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ACKNOWLEDGMENT

This manual contains copyrighted photographs that were reprinted with permission from the Compressed Gas Association, Inc., publication no. CGA C-6.2, 1988, *Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders*.

The information on the PremAire® CADET 15M Respirator was supplied by the manufacturer, Mine Safety Appliances Company (MSA). Much of the information about this respirator also appears in MSA's technical manual, the PremAire® CADET 15M Air-Line Respirator Operation and Maintenance Manual. Though the formats differ between this manual and MSA's, every effort has been made to ensure that the information on the PremAire® CADET 15M Respirator is consistent in both documents. **In the event of contradictions, this manual takes precedence over the manufacturer's manual.**

ACRONYMS/ABBREVIATIONS

A

ANSI . . . . . American National Standards Institute, Inc.

C

CAGE . . . . . Commercial and Government Entity
CASREP . . . . . Casualty Report
CCW . . . . . Counterclockwise
CD-ROM . . . . . Compact Disc Read-Only Memory
CFR . . . . . Code of Federal Regulations
CGA . . . . . Compressed Gas Association
COTS . . . . . Commercial Off-the-Shelf
CPA . . . . . Control Panel Assembly
CW . . . . . Clockwise

D

DOT . . . . . Department of Transportation

E

EGL . . . . . Equipment Guide List

G

GFE . . . . . Gas-Free Engineer
GFEP . . . . . Gas-Free Engineering Personnel

H

Hg . . . . . Mercury
HP . . . . . High Pressure

I

IAW . . . . . In Accordance With
IDLH . . . . . Immediately Dangerous to Life or Health
IPB . . . . . Illustrated Parts Breakdown
ISEA . . . . . In-Service Engineering Agent

L

LP . . . . . Low Pressure
LPM . . . . . Liter Per Minute

M

MDS . . . . . Maintenance Data System
MIP . . . . . Maintenance Index Page
MMR . . . . . Mask-Mounted Regulator
MR . . . . . Maintenance Requirement
MRC . . . . . Maintenance Requirement Card
MSA . . . . . Mine Safety Appliances Company
MSHA . . . . . Mine Safety and Health Administration

N

NAVOSH . . . . . Navy Occupational Safety and Health
NAVSEA . . . . . Naval Sea Systems Command
NID . . . . . Nonionic Detergent
NIOSH . . . . . National Institute for Occupational Safety and Health
NSN . . . . . National Stock Number
NSTM . . . . . Naval Ships' Technical Manual

O

OBA . . . . . Oxygen Breathing Apparatus
OPREP . . . . . Operational Report
OPNAV . . . . . Office of the Chief of Naval Operations
OSHA . . Occupational Safety and Health Administration

P

PASP . . . . . Primary Air Supply Pack
PLAD . . . . . Plain Language Address Directory
PMS . . . . . Planned Maintenance System
PPM . . . . . Parts per million
PSIG . . . . . Pounds per square inch, gauge

Q

QD . . . . . Quick Disconnect

R

RASP . . . . . Reserve Air Supply Pack

S

SAR . . . . . Supplied Air Respirator
SCBA . . . . . Self-Contained Breathing Apparatus
SCF . . . . . Standard Cubic Feet
SFR . . . . . Semiannual Force Revision
SPMIG . . . Standard PMS Materials Identification Guide
SYSCOM . . . . . Systems Command

SAFETY SUMMARY

The following safety guidelines apply to operation and maintenance procedures in general. Personnel must understand and comply with these guidelines during operation and maintenance of the SAR/SCBA.

STANDARD SAFETY PRECAUTIONS

Operating and maintenance personnel must observe all applicable safety regulations and standard precautions. Only approved replacement parts, lubricants, and cleaning solutions specified in this technical manual shall be used with this equipment. Substitution of parts or materials, and omission or alteration of procedures stated herein are not authorized.

FORCES AFLOAT

Forces afloat must also comply with the Navy Occupational Safety and Health (NAVOSH) Program Manual, OPNAVINST 5100.19 series.

SHORE ACTIVITIES

Shore activities must also comply with the Navy Occupational Safety and Health (NAVOSH) Program Manual, OPNAVINST 5100.23 series.

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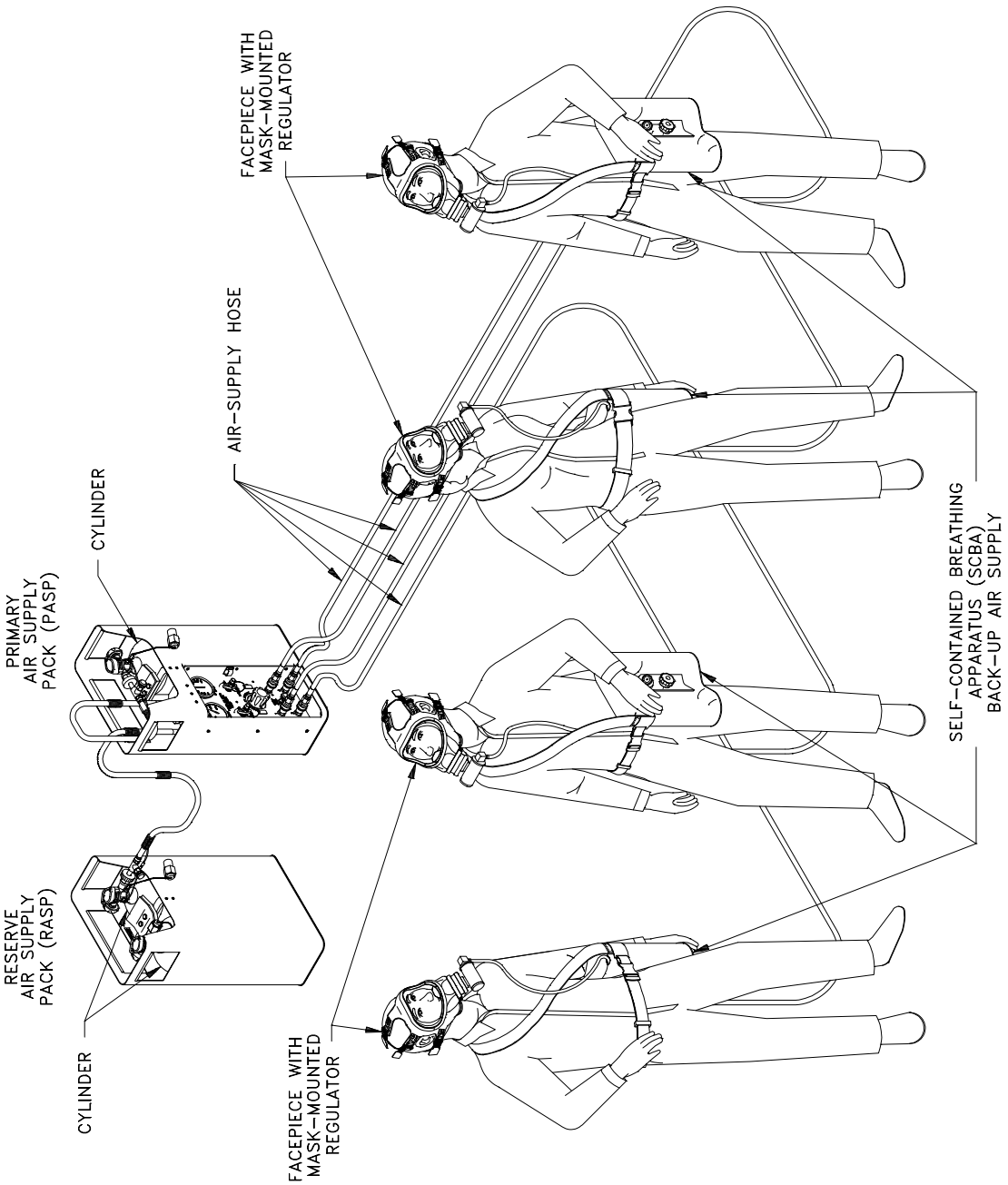


Figure 1-1. Supplied Air Respirator (SAR) with Self-Contained Breathing Apparatus (SCBA) Component Interrelationship Diagram

CHAPTER 1
GENERAL INFORMATION AND SAFETY PRECAUTIONS

1.1 SAFETY PRECAUTIONS.

Personnel using the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA) shall observe all safety precautions and procedures. Precautions and procedures appear in this technical manual and in the SCBA manual, the PremAire® CADET 15M Air-Line Respirator Operation and Maintenance Manual. A safety summary at the front of this manual lists all warnings and cautions that appear throughout this document.

The requirements for a safe and effective respirator program are set forth in the Occupational Safety and Health Administration (OSHA) Regulations, Title 29 Code of Federal Regulations (CFR) 1910.134. An effective program must include a knowledge of hazards, accurate hazard assessment, proper selection and use of equipment, operational training, inspection and maintenance of equipment, and medical surveillance. The SAR/SCBA may only be used after personnel have been properly instructed in its operation. Personnel must use the equipment in accordance with (IAW) instructions, labels, and limitations. Personnel must be thoroughly familiar with all safety practices and understand the potential hazards associated with the SAR/SCBA before using or performing maintenance on the equipment.

1.1.1 Standard Safety Precautions. Standard operational and maintenance safety precautions in the following documents apply to the SAR/SCBA:

- Forces afloat must comply with the Navy Occupational Safety and Health (NAVOSH) Program Manual, OPNAVINST 5100.19 series.
- Shore activities must comply with the Navy Occupational Safety and Health (NAVOSH) Program Manual, OPNAVINST 5100.23 series.

1.1.2 Special Notations. Warnings, cautions, and notes appearing throughout this technical manual must be followed in order to prevent hazards to personnel and damage to equipment.

The following notations define warnings, cautions, and notes as used in the text:

WARNING

Highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury to, or death of, personnel, or long-term health hazards.

CAUTION

Highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in damage to, or destruction of, equipment or loss of operational effectiveness.

NOTE

Highlights an essential operating or maintenance procedure, condition, or statement.

1.2 INTRODUCTION.

1.2.1 Purpose. The purpose of this manual is to provide information and procedures necessary to operate, maintain, troubleshoot, and repair the SAR/SCBA (Figure 1-1). The maintenance information provided will support planned maintenance and repair of the SAR/SCBA at the Organizational and Intermediate levels.

1.2.2 Scope. The information in this manual is presented in eight chapters with two appendices. This manual is organized as follows:

- Chapter 1: "General Information and Safety Precautions" introduces safety considerations and presents an overview of the equipment in addition to its physical and functional characteristics and operational capabilities.
- Chapter 2: "Operation" provides operating instructions necessary to enable operating personnel to efficiently and effectively use the equipment in accomplishing its designated task.
- Chapter 3: "Functional Description" presents the principles of operation of the overall equipment and its functions.
- Chapter 4: "Scheduled Maintenance" consists of general information on scheduled maintenance.
- Chapter 5: "Troubleshooting" contains data and procedures for locating a malfunction or potential fault in an assembly or part, and identifies possible corrective measures.
- Chapter 6: "Corrective Maintenance" provides instructions required to inspect, adjust, remove, repair, and reinstall all parts that are repairable by the user at the Organizational and Intermediate levels. Safety precautions, tools, parts, and test equipment are also identified.
- Chapter 7: "Parts List" contains parts lists and illustrations that display the location of all repair parts. A list of part manufacturers is also provided.
- Chapter 8: "Installation" provides initial inventory, inspection, check-out, storage, and shipping procedures.
- Appendix A: "SAR/SCBA Pre-Operational Checklist" provides a reproducible copy of the checklist that sets forth the procedures to be performed prior to using the SAR/SCBA.
- Appendix B: "Department of Transportation (DOT) Air Cylinder Exemptions and Shipping Requirements" provides copies of DOT exemptions and shipping information.

1.3 TECHNICAL DESCRIPTION.

1.3.1 System Description. In this manual, the Supplied Air Respirator with Self-Contained Breathing Apparatus is referred to as the SAR/SCBA. The SAR/SCBA system was designed to enhance the capability of Gas-Free Engineers (GFE) by increasing the available air supply, thus expanding operational capability and duration.

The SAR/SCBA provides breathing air, Grade D or higher, to shipboard personnel for access to spaces presumed to contain hazardous atmospheres. A hazardous atmosphere is defined as: (1) any atmosphere containing a toxic or disease-producing gas, vapor, dust, fumes, mist, or pesticide, either immediately or not Immediately Dangerous to Life or Health (IDLH); or (2) any oxygen-deficient atmosphere.

The SAR/SCBA can also be used when conditions are presumed to be IDLH. This means that: (1) conditions pose an immediate threat to life or health; or (2) conditions pose an immediate threat of severe exposure to contaminants. These contaminants may also have adverse cumulative or delayed effects on health.

A ship set consists of two PASPs, five RASPs, and eight SCBAs. During IDLH space entry, one PASP is placed into service, and one PASP is on standby for rescue operations. The number of RASPs and SCBAs used for space entry is determined by the GFE IAW the Naval Ships' Technical Manual (NSTM) 074-18. Rescuers and the remaining equipment are placed on standby near the potentially hazardous space.

Procedures for entering IDLH spaces are outlined in NSTM 075-18. Rescue procedures for IDLH are outlined in NSTM 074-20.2.

1.3.1.1 Primary Air Supply Pack (PASP). The PASP is a lightweight assembly with one HP air cylinder and a control panel assembly (CPA) contained within an aluminum case. The air cylinder contains 87 standard cubic feet (scf) of air at 4,500 pounds per square inch, gauge (psig). Cylinders marked “LUXFER X X 97 (or later year date)” are the same model as previously required, but are shorter in length and require a cylinder pad to allow the securing of the cylinder in the case (Figure 7-1, Item 62). The cylinder has an aluminum liner with a fiberglass and epoxy-wrapped exterior. The cylinder valve is an integral assembly consisting of a valve pressure indicator, rupture disk, and CGA-347 air hose connection. Two HP air hoses with hand-operated couplings connect the PASP or RASP cylinder(s) to the CPA. The hoses can be vented for safe connection and disconnection of air cylinders. Two RASP cylinders serve as an additional air source for the PASP. The HP air hose(s) connect RASP cylinder(s) to the PASP. Airflow is controlled by the operator who places charged cylinders on-line as the ones in service are depleted.

The PASP CPA houses valves, fittings, and indicators. A three-way ball valve selects either a PASP or RASP cylinder to be on-line with the CPA. Each cylinder can support one SCBA user up to 55 minutes. Air pressure is monitored by two gauges and by an audible alarm. Each gauge has an isolation valve for gauge calibration and isolation, should the gauge fail. A regulator reduces the HP air to 60-80 psig (nominal) for delivery to the air distribution system. The manifold has four quick disconnects (QDs) to allow up to four SCBA users to simultaneously connect to the PASP. A manifold bleed valve provides a means to depressurize the system.

Air hoses are an integral part of the SAR/SCBA system. Each PASP is equipped with two HP hose assemblies that include a bleed valve, strength member, and handwheel connectors. The rated service pressure for these hoses is 4,500 psig. Each hose is 3 feet long and connects the HP air cylinders (PASP or RASP) to the three-way ball valve on top of the PASP CPA.

1.3.1.2 Reserve Air Supply Pack (RASP). The RASP is a lightweight assembly with two HP air cylinders housed in an aluminum case. The cylinders are removable and identical to the PASP cylinders. Cylinders marked "LUXFER X X 97 (or later year date)" are the same model as previously required, but are shorter in length and require a cylinder pad to allow the securing of the cylinder in the case (Figure 7-3, Item 13). When placed on-line, air flows from the RASP cylinder through a hose that connects to the three-way ball valve on the PASP CPA.

1.3.1.3 Self-Contained Breathing Apparatus (SCBA). The SCBA provides a source of back-up air if the PASP/RASP airflow is depleted, interrupted, or fails. The SCBA equipment consists of two lightweight, escape air cylinders, a full facepiece with a mask-mounted pressure demand (second-stage) regulator (MMR), air-supply hoses, a cylinder valve pressure indicator, a first-stage regulator, and an alarm. A durable carry pouch is provided to protect the air cylinders and other components. The pouch is attached to a nylon shoulder strap and belt. A Navy-approved harness must be worn under the SCBA. The harness must meet the standards of the American National Standards Institute, Inc. (ANSI), ANSI Z359.1-92, Safety Requirements for Personnel Fall Arrest and Subsystem Components. The SCBA is a PremAire® CADET 15M Respirator manufactured by the Mine Safety Appliances (MSA) Company. The two portable, back-up air cylinders are easily rechargeable and designed to utilize Grade D air or higher, as defined in the Compressed Gas Association's (CGA) publication ANSI/CGA G-7.1, Commodity Specification for Air. The SCBA is a Type C, pressure-demand respirator system with an emergency air supply of 15 minutes.

Each SCBA is provided with two, interconnecting LP air-supply hose sections, 75 feet in length. These attach to the QDs on the PASP and serve as the external air supply to the SCBA during normal operations.

1.3.2 Applications and Constraints. The SAR/SCBA was designed primarily to support planned, Gas-Free Engineering Personnel (GFEP) with shipboard inspections. It can be used to inspect fuel, ballast, sewage tanks, and other dry voids. The equipment can also be used in spaces that are suspected of containing flammable, explosive, or toxic atmospheres. The SAR/SCBA can be used for clean-up, rescue, and damage control work in non-IDLH environments as well. It is for respiratory use only.

The SAR/SCBA cannot be used nor was it designed to be a fire-fighting breathing apparatus. In addition, it cannot be used as a diving apparatus for investigating flooded or submerged spaces. Because the equipment was designed for planned GFE operations, it is not suitable for Rapid Response Operations.

1.4 REFERENCE DATA.

Reference data pertaining to the characteristics of the SAR/SCBA is summarized in Table 1-1.

1.5 EQUIPMENT, ACCESSORIES, AND DOCUMENTS SUPPLIED.

Equipment, accessories, and documents supplied with the SAR/SCBA are listed in Table 1-2.

1.6 PUBLICATION REFERENCES.

Table 1-3 provides a list of publications which are required for operation and maintenance but are not supplied with the SAR/SCBA.

Table 1-1. SAR/SCBA Equipment Characteristics

Equipment	Characteristics and Components	Dimensions/Weight (Uncrated)
PASP	Characteristics • HP primary air supply • Portable aluminum case • HP air cylinder, aluminum case, controls and indicators • Supports 1-4 users simultaneously • Reduces HP air to 60-80 psig • Grade D compressed air as defined in ANSI/CGA G-7.1 • 2 HP air hose assemblies Components • 1 HP air cylinder (PASP/RASP) - Volume: 87 scf - Service pressure: 4,500 psig - Duration: 55 minutes - one user - Material: S-2 glass with epoxy/resin exterior, aluminum liner • Control panel assembly - Three-way ball valve - HP gauge - 0-5,000 psi - LP gauge - 0-200 psi - Alarm - sounds at 500 psig - HP gauge isolation valve, 0 - 5,000 psi - LP gauge isolation valve, 0 - 200 psi - Regulator - reduces HP air to 60-80 psig - LP manifold bleed valve - 4 quick disconnects - relief valve set pressure 135 psi	16.5 in. × 7.5 in. × 27 in., 65 lbs. 3 ft. 18.25 lbs.
RASP	Characteristics • HP reserve air supply • Portable aluminum case • 2 HP air cylinders, aluminum case • On-line cylinder connects to PASP three-way ball valve via HP hose assembly Components • 2 HP air cylinders - identical to PASP cylinders	16.5 in. × 7.5 in. × 27 in., 65 lbs.
SCBA	Characteristics • Type C, pressure-demand, positive pressure, back-up air supply • PremAire® CADET 15M Respirator manufactured by MSA Company • Approved by NIOSH and Mine Safety and Health Administration (MSHA) • Interconnecting air-supply hose connects to PASP QDs • Grade D compressed air as defined in ANSI/CGA G-7.1	15 lbs. (operator worn equipment)

Table 1-1. SAR/SCBA Equipment Characteristics - Continued

Equipment	Characteristics and Components	Dimensions/Weight (Uncrated)
SCBA - Continued	Components • 2 interconnecting air-supply hoses • Manifold block - First-stage regulator - reduces HP air to 60-80 psig - Alarm - sounds when air supply is reduced to 20-25% of total air volume - Pressure indicator - 0 to 3,000 psi - Cylinder valve - 2 air cylinders Volume: 26.8 scf per SCBA unit, 13.4 scf per cylinder Service pressure: 3,000 psig Duration: 15 minutes (approximately) - one user Material: fiberglass, composite-wrapped exterior, aluminum liner • Nylon carry pouch • Belt and shoulder strap • Mask-mounted, pressure-demand (second-stage) regulator (MMR) • Ultravue® Facepiece (full facepiece) • Hard-shell carry case • 4 flyers' kit canvas bags for extra interconnecting air-supply hoses (one bag for every 2 SCBAs)	75 ft., 18 lbs. 23.25 in. × 20.75 in. × 9 in., 13 lbs.
Equipment	Limitations for Use	
PASP/RASP/SCBA	**The PASP/RASP/SCBA shall not be used for fire-fighting or underwater applications.** **Do not use the PASP/RASP/SCBA with oxygen.**	
SCBA	The following limitations apply to the PremAire® CADET 15M Respirator and also appear in its operation and maintenance manual: • Approved for respiratory protection and/or escape from hazardous environments • Approved for escape only when using 15-minute self-contained air supply • Approved for use at temperatures above -25°F and below 212°F • Approved only when compressed air container is fully charged (3,000 psig) with air meeting requirements of the ANSI/CGA specification G-7.1-1989 for quality verification level (Grade) D air or equivalent specification. The cylinder shall meet applicable DOT specifications • Approval of SCBA applies only when the device is supplied with respirable air through 8 to 300 feet of air-supply hose within the pressure range of 60 to 80 psig or air from self-contained air supply • A maximum of four sections of (MSA Model No. 5-1002-1) air-supply hoses may be used in making up maximum working length of hose. Do not use hose lengths longer than specified • Use only air pressure ranges specified in operation and maintenance instructions. Air pressure and flow rates must be within NIOSH/MSHA-approved ranges.	

Table 1-2. Equipment, Accessories, and Documents Supplied

Qty.	Item Name	Reference Number
2	Primary Air Supply Pack (PASP)	53711ASSY6314751
4	• HP Air Hose Assemblies (2 per PASP)	53711ASSY6314756
5	Reserve Air Supply Pack (RASP)	53711ASSY6314752
8	Self-Contained Breathing Apparatus (SCBA)	PremAire® CADET 15M Respirator, MSA ASSY812600
16	• Interconnecting Air-Supply Hoses	MSA ASSY812625, Model No. 5-1002-1
8	• SCBA Spare Parts Kit	
1	SAR/SCBA Tool Kit - specialty tools only. (Common tools are Command's responsibility.)	
1	Compact Disc Read-Only Memory (CD-ROM) • Maintenance Manual, Organization and Intermediate Levels • Planned Maintenance System (PMS) - Maintenance Index Page (MIP) - Maintenance Requirement Cards (MRCs) • Interim Parts List • Ordering Information	1 November 1995 SS600-AN-MMA-010
1	Maintenance Manual, Organizational and Intermediate Levels (Hard Copy)	November 2002 SS600-AN-MMA-010
8	PremAire® CADET 15M Air-Line Respirator Operation and Maintenance Manual	1 November 1995
1	SAR/SCBA Orientation Video	27 July 1995

Table 1-3. Publication References (Not Supplied with the SAR/SCBA)

Publication Title	Publication Number	Application
Navy Occupational Safety and Health (NAVOSH) Program Manual (Forces Afloat)	OPNAVINST 5100.19 Series	Operation and Maintenance Safety Precautions (Afloat)
Navy Occupational Safety and Health (NAVOSH) Program Manual (Shore Activities)	OPNAVINST 5100.23 Series	Operation and Maintenance Safety Precautions (Shore)
Naval Ships' Technical Manual	NSTM S9086-CL-STM-010 Chapters 074-18, 074.20.2, and 077	Personnel Protection Procedures and Equipment
National Institute for Occupational Safety and Health (NIOSH) Publication	Publication 94-104	Certified Equipment List for Combined SAR/SCBA
Occupational Safety and Health Administration (OSHA) Standards	Title 29, CFR 1910.34 Title 29, CFR 1910.1025	Respiratory Protection
Commodity Specification for Air	ANSI/CGA G-7.1 - 1989	Air quality classifications, verification tests, sampling, and analytical procedures
Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders	CGA C-6.2 - 1988	Inspecting and testing fiberglass cylinders

CHAPTER 2
OPERATION

2.1 INTRODUCTION.

Chapter 2 provides a description of the controls, indicators, and operating procedures for the Primary Air Supply Pack (PASP), the Reserve Air Supply Pack (RASP), and the Self-Contained Breathing Apparatus (SCBA). Appendix A is a pre-operational checklist and should be reviewed prior to operations. Procedures in this chapter are presented in the sequence of a normal operation, beginning with pre-operational inspections and ending with post-operational procedures. Emergency procedures are also provided in this chapter.

Operation of this equipment in a hazardous atmosphere considered to be Immediately Dangerous to Life or Health (IDLH) shall be conducted in accordance with NSTM S9086-CL-STM-010, Chapters 074-18 and 074-20.2

Prior to entering a hazardous space, the Commanding Officer's permission is required. All SAR/SCBA operations must be supervised by the Gas-Free Engineer (GFE) or the GFE assistant. Attendants and rescuers will be appropriately stationed nearby to respond to possible emergency situations.

The operational information in this chapter is presented as follows:

a. Controls and indicators
b. Pre-operational inspections and setup
c. Operating procedures and shutdown
d. Post-operational procedures
e. Emergency procedures

Figure 2-1 displays the general sequence of operating procedures for the SAR/SCBA.

2.2 CONTROLS AND INDICATORS.

Controls and indicators for the SAR/SCBA are displayed in Figures 2-2 through 2-5. The controls and indicators shown in each figure are identified and functionally described in Tables 2-1, 2-2, and 2-3.

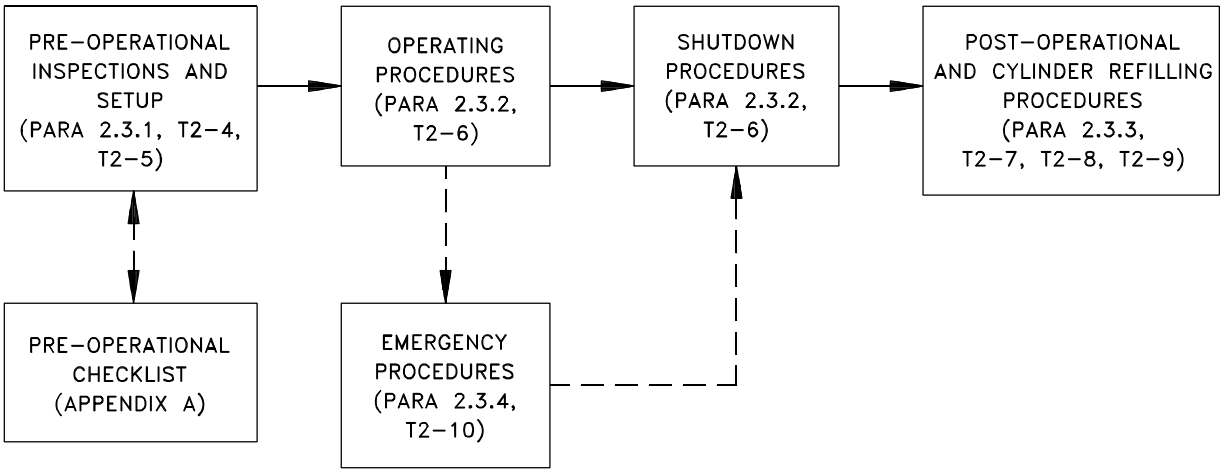


Figure 2-1. Operational Procedures Flowchart

Table 2-1. PASP Controls and Indicators (Figure 2-2)

Nomenclature	Function	Normal Operating Condition
Cylinder valve, primary HP air supply (AHP-V201) with cylinder valve pressure indicator, and rupture disk	Opens/shuts off air flow from cylinder. Indicates pressure. Provides overpressurization relief for cylinder. Connects to PASP via an HP air hose assembly.	Open (for cylinders in use or on standby)
HP air hose bleed valve (AHP-V202) for PASP cylinder (located on hose assembly)	Depressurizes hose prior to disconnecting or shutting down equipment.	Shut (spring-loaded for positive control of bleed)
Three-way ball valve (AHP-V204)	Selects cylinder to be on-line, supplying air.	Open (arrow toward on-line cylinder)
HP gauge (AHP-G201)	Displays HP air from air cylinder (0-5,000 psig).	Variable
LP gauge (ALP-G202)	Displays LP air provided to manifold (0-200 psig).	Variable
Regulator (AHP-V205)	Reduces HP air to 60-80 psig for delivery to manifold.	Open
HP gauge isolation valve (AHP-V206)	Isolates HP gauge from system in case of failure. Allows for in-place comparison calibration of HP gauge.	Open, valve stem cap installed
LP gauge isolation valve (ALP-V207)	Isolates LP gauge from system in case of failure. Allows for in-place comparison calibration of LP gauge.	Open, valve stem cap installed
LP alarm (F-024) (not shown in Fig. 2-2)	Provides audible bell signal when HP air pressure drops to 500 psig.	Silent
LP manifold bleed valve (ALP-V208)	Depressurizes system during equipment shutdown.	Shut (spring-loaded for positive control of bleed)
Quick disconnects (QDs) (F-021)	Connection points for the 75-foot, interconnecting LP air-supply hoses from PASP to SCBA.	N/A

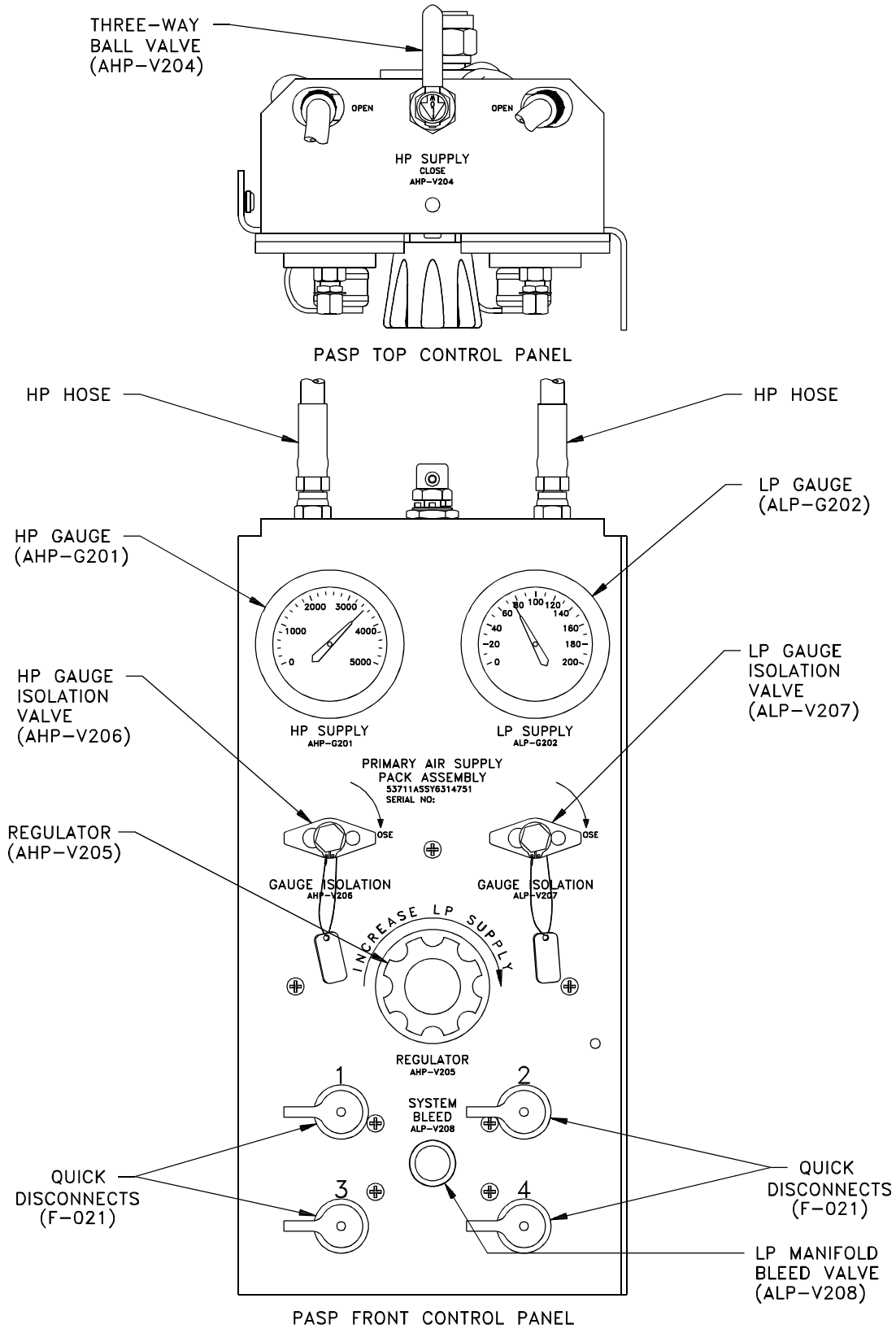
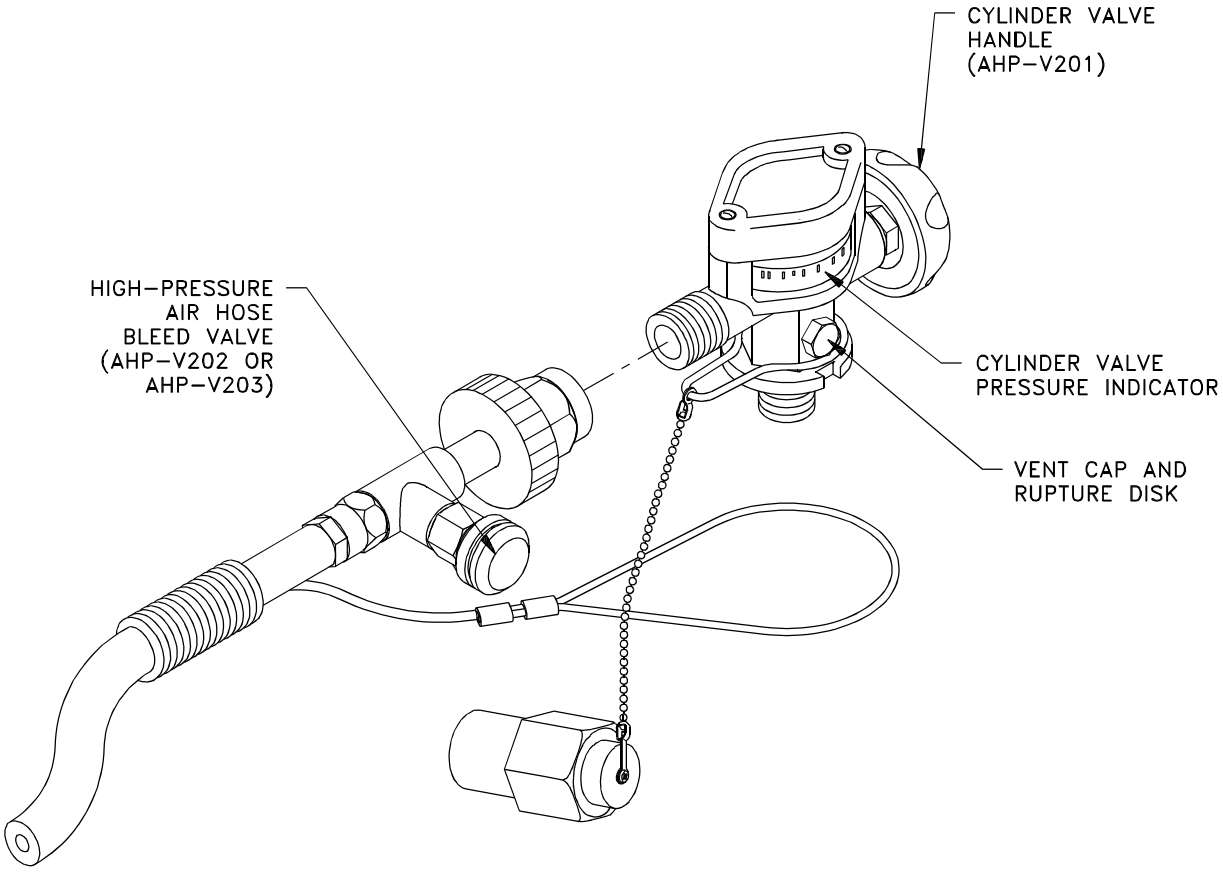


Figure 2-2. PASP Controls and Indicators (Sheet 1 of 2)



HIGH–PRESSURE AIR CYLINDER VALVE
(PASP/RASP)

Figure 2-2. PASP Controls and Indicators (Sheet 2 of 2)

Table 2-2. RASP Controls and Indicators (Figure 2-3)

Nomenclature	Function	Normal Operating Condition
Cylinder valve, primary HP air supply (AHP-V301, AHP-V302) with cylinder valve pressure indicator, handle, and rupture disk	Indicates cylinder pressure. Opens and shuts off airflow from cylinder.	Open (for cylinders in use or on standby)
HP air hose bleed valve (AHP-V203) for RASP cylinder (located on hose assembly)	Depressurizes hose prior to disconnecting or shutting down equipment.	Shut (spring-loaded for positive control of bleed)

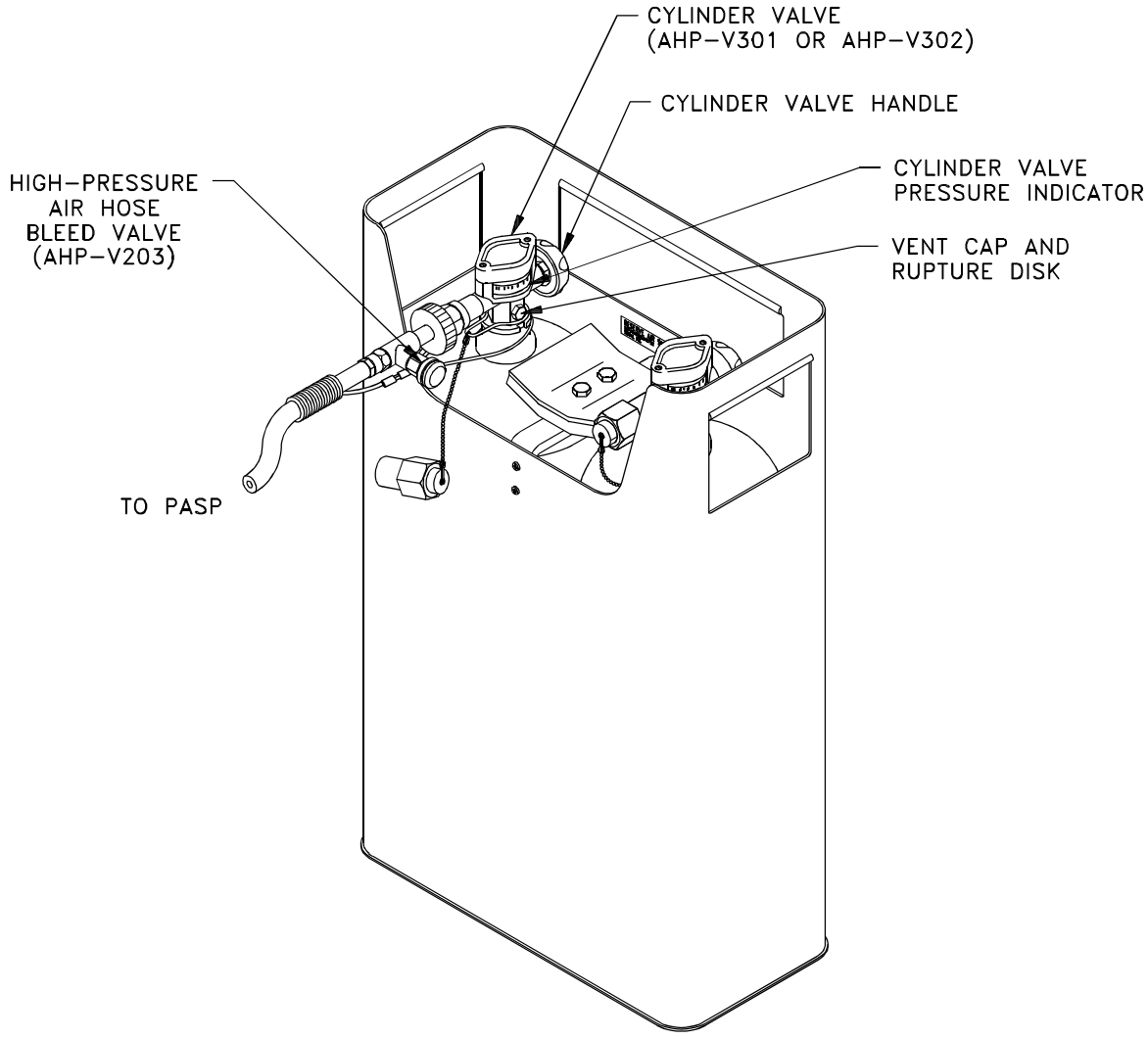


Figure 2-3. RASP Controls and Indicators

Table 2-3. SCBA Controls and Indicators (Figure 2-4)

Nomenclature	Function	Normal Operating Condition
Exhalation valve	Maintains positive pressure in facepiece. Releases exhaled air to ambient atmosphere.	Shut (except during exhalation)
Speaking diaphragm assembly	Provides a means of communication between SCBA users. Located in the facepiece.	N/A
Inlet check valve	Automatically starts airflow to the facepiece. Governs flow rate.	Open (except during exhalation)
Mask-mounted (second-stage) regulator (MMR)	Pressure-demand regulator that reduces airflow to a breathable pressure level.	Variable
Semiautomatic push button (don/doff)	Conserve air when donning and doffing the facepiece. Located on the MMR.	Open (don)
MMR nut	Allows operator to manually attach MMR to facepiece.	Tightened
First-stage regulator	Reduces HP air to 60-80 psig.	Open
Alarm	Provides audible whistle when 75-80% of air in cylinders is depleted. Alarm sounds until all air is depleted.	Silent
Cylinder valve	Allows operator to manually activate (open) the SCBA air cylinders.	Shut
Check valve	Prevents the self-contained air supply from bleeding when external air supply is disconnected or fails.	Open
CGA-346 nut	Allows operator to manually connect/disconnect first-stage regulator from manifold.	Tightened
Cylinder valve pressure indicator	Indicates air pressure levels in SCBA air cylinders.	Variable
Hydrostatic test label	Indicates date of last hydrostatic test.	Attached

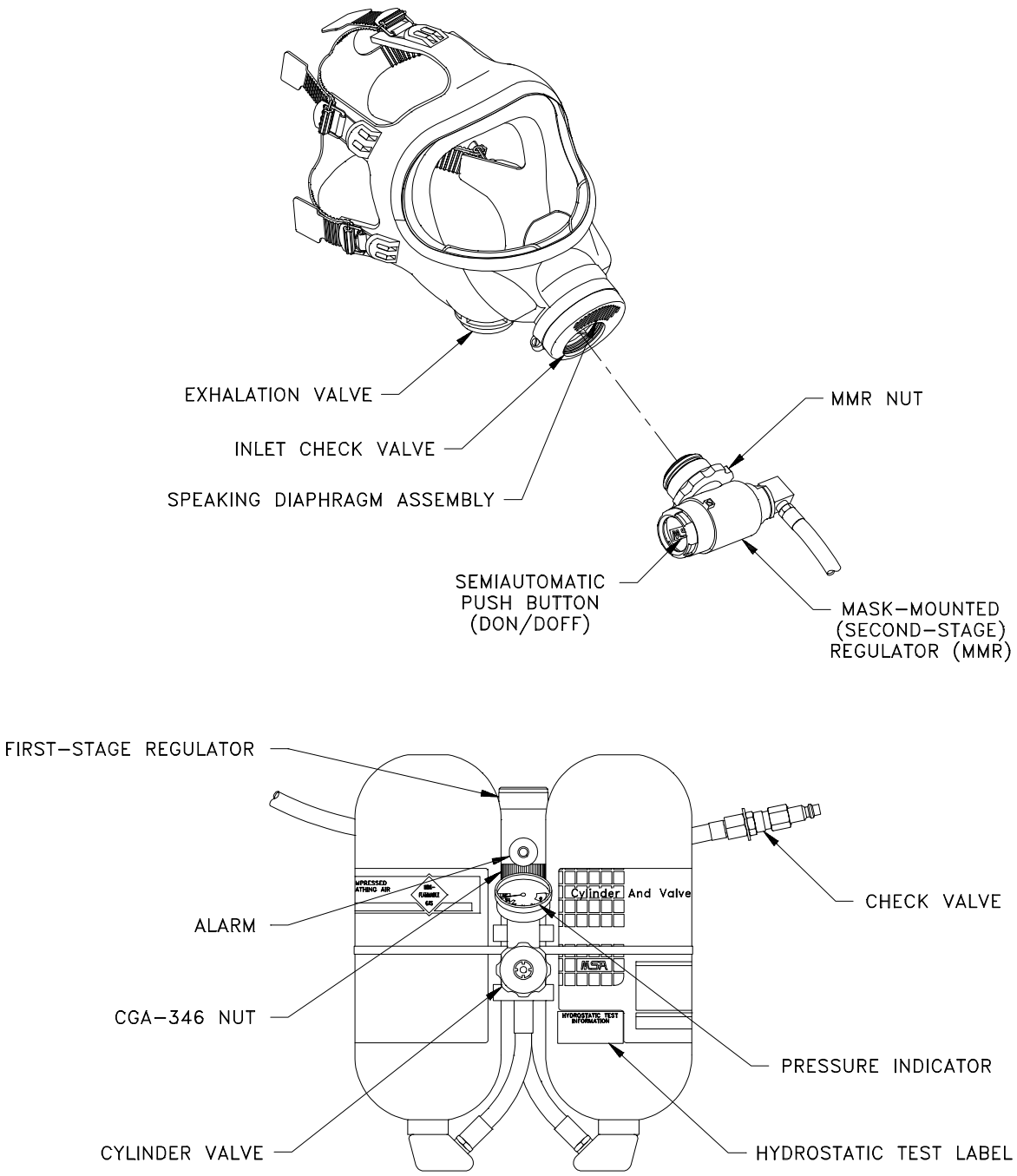


Figure 2-4. SCBA Controls and Indicators

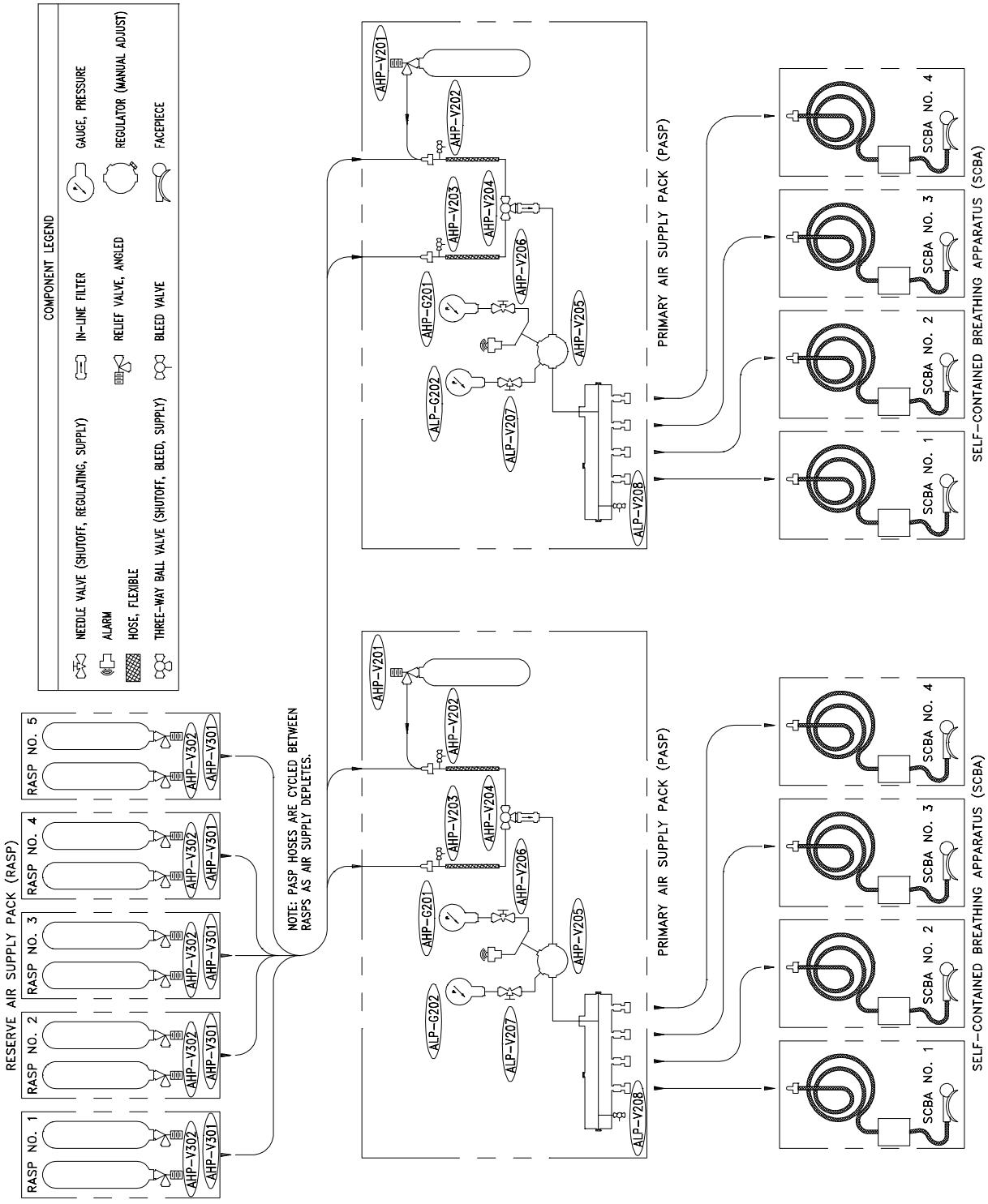


Figure 2-5. SAR/SCBA Controls and Indicators Designation

2.3 OPERATING PROCEDURES.

WARNING

PASP/RASP operators and SCBA user personnel shall perform the operating procedures presented in this manual. Failure to perform prescribed procedures may result in equipment failure, injury, or death to personnel.

The SCBA PremAire® CADET 15M Respirator will perform as designed only if used and maintained IAW this manual. Failure to follow instructions may result in damage to equipment, injury, or death to personnel.

To ensure proper protection, SCBA facepiece fit shall be checked before each operation. Ensure that facial hair, including beard, sideburns, and mustache, and articles, such as skull caps, do not prevent a proper face seal. Leakage caused by hair or caps may lead to serious injury or death.

Spectacles, if worn, must be approved for use with Oxygen Breathing Apparatus (OBA) or those recommended by the SCBA manufacturer. Accidental exposure to contaminated air can cause serious eye injuries or blindness.

Use SCBA with adequate skin protection when worn in gases and vapors that may harm skin.

2.3.1 PASP, RASP, and SCBA Pre-Operational Inspections and Setup. The pre-operational inspection and setup procedures are performed to ensure specific operational conditions are in effect prior to use of the SAR/SCBA in a potentially hazardous atmosphere. Pre-operational inspections include equipment checkout for damage and degradation and appear in Tables 2-4 and 2-5. A pre-operational checklist is provided in Appendix A.

Prior to operating any of the equipment, all PASP/RASP operators, SCBA users, and rescuers/attendants must become thoroughly familiar with its capabilities and procedures. Additionally, operators and users should ensure that the appropriate Planned Maintenance System (PMS) has been performed on the equipment prior to placing it into operation.

2.3.2 Operating Procedures. Operating procedures for the SAR/SCBA are presented in Table 2-6. The setup procedures are necessary to bring the equipment from the STANDBY condition to the operating mode. Prior to deployment, SCBA users shall test the system to ensure there is an adequate air supply to the facepiece. The shut-down procedures include all steps necessary to bring the equipment from full operation to the OFF condition.

2.3.3 Post-Operational and Air Cylinder Refilling Procedures. Upon completion of SAR/SCBA operations, all the equipment is shut down, and SCBA users separate from the system by disconnecting from the QD(s). Table 2-7 provides post-operational procedures that need to be performed prior to storage. Post-operational procedures for refilling cylinders appear in Tables 2-8 and 2-9.

NOTE

If it is anticipated that either PASP/RASP HP air cylinders or SCBA HP air cylinders will be depleted/recharged more often than every other day, on average, during the 15-year life of these cylinders, contact the SAR/SCBA In-Service Engineering Agent (ISEA) (see paragraph 4.3).

Detailed procedures for inspecting, cleaning, and testing the SAR/SCBA are provided in the PMS requirements. Procedures for preparing the equipment for storage are provided in Chapter 8, Installation.

Maintaining adequate air purity is essential when refilling SAR/SCBA cylinders. Air quality for all cylinders must meet or exceed standards established by the Compressed Gas Association (CGA). This means that air quality must be Grade D or higher. The standards require that the air contain no more than 10 parts per million (ppm) of carbon monoxide, no more than 1,000 ppm of carbon dioxide, and no more than 5 milligrams per cubic meter of oil vapor or oil particulates. Water content of compressed breathing air must be equal to or less than a dew point of -65°F. SAR/SCBA system users and operators are responsible for ensuring the cylinders are properly recharged and filled.

2.3.3.1 Refilling PASP/RASP Air Cylinders.

WARNING

Do not fill if damage to fiberglass overwrap is evident.

The PASP/RASP HP cylinders shall be refilled after the completion of each operation. Table 2-8 provides the step-by-step procedures.

2.3.3.2 Refilling SCBA Air Cylinders.

WARNING

SCBA cylinders which show evidence of exposure to high heat or flame, e.g., paint turned brown or black color, decals charred or missing, gauge lens melted, or elastomeric materials distorted, shall be removed from service and hydrostatically tested prior to recharging. Failure to follow this warning could result in serious injury or death.

Use a regulated air supply set to 3,000 psig for SCBA cylinders. Failure to use a regulated air supply set to proper pressure could result in serious injury or death.

CAUTION

Use air conforming to the ANSI/CGA Specification G-7.1-1989 for quality verification level (Grade) D air or higher (ANSI Standard Z86.1). Air delivered to LP air-supply hose must be respirable. Air must have a dew point of –65°F or lower.

Do not partially charge SCBA cylinders. Always charge to 3,000 psig. Partially charged cylinders reduce emergency air supply.

The SCBA air cylinders shall be refilled after the completion of each operation. Personnel recharging the cylinders shall read and comply with all directions on the label. Table 2-9 provides the step-by-step procedures.

Prior to recharging, the SCBA cylinders shall be examined externally for signs of exposure to high heat, corrosion, or other damage. If there is any doubt about the suitability of the cylinder for recharging, return it to a DOT-certified hydrostatic test facility for examination and retesting.

2.3.4 Emergency Procedures.

WARNING

If SCBA user experiences breathing difficulties or smells contaminants, user must immediately exit to a safe area. Failure to follow this warning could result in serious injury or death.

Contaminants can enter an air-line respirator system when air-supply hoses are reconnected in a contaminated atmosphere. User must determine potential risk and take necessary precautions, which may require that NO disconnection of air-supply hoses be permitted in a contaminated atmosphere. If in doubt, DO NOT disconnect. Failure to follow this warning could result in serious injury or death.

NOTE

The supervisor shall be immediately informed of any air supply problems.

The emergency procedures (Table 2-10) cover equipment operations during emergency conditions, such as loss of air-flow. As a final corrective action, the user may activate the SCBA cylinders by opening the cylinder valve. Use this method only for escape. When the SCBA cylinder valve is opened, the cylinders contain approximately 15 minutes of air to allow the user time to escape the work space. Once the cylinder valve is open, the SCBA user is required to exit to a safe area.

Table 2-4. PASP/RASP Pre-Operational Inspections and Setup

Step	Procedure
1. Inspect PASPs/RASPs.	a. Inspect air cylinder(s) pressure indicator reading. Air cylinder(s) pressure should be 4,500 psig. **NOTE** HP air supply requirements for the operation may allow for an initial air supply of less than 4,500 psig. b. Visually inspect PASP and RASP weldments (case assemblies) for cracks and other damage that could cause difficulty in handling the unit. c. Visually inspect PASP control panel assembly for missing hardware, including wire rope or damaged components. d. Ensure PASP and RASP HP air cylinder hold-down bracket bolts are tight. **NOTE** Cylinders marked "LUXFER X X 97 (or later year date)" are the same model as previously required, but the manufacturer has changed the outer dimensions. The cylinders are shorter in length and require a cylinder pad to allow the securing of them in PASP/RASP cases. e. Inspect HP air hose assemblies for damage to seat on male CGA-347 fittings that connect to HP air cylinder valves; frayed, damaged, or missing wire rope or nylon serving cord attaching wire rope to hose; damaged or missing caps. Ensure bleed valve turns freely and is intact.
2. Inspect PASP HP and LP gauge calibration stickers.	Do not operate PASP if calibration dates are not current. a. Check the HP gauge (AHP-G201) and the LP gauge (ALP-G202) on the PASP control panel assembly. Ensure the labels are readable and that the gauges are in calibration; i.e., the current date is earlier than the calibration due date. b. If the gauges are not in calibration, calibrate IAW ship's calibration program (METCAL).
3. Check all moving parts on PASPs/RASPs.	**CAUTION** Do not jam valves in OPEN or SHUT positions. a. On charged PASP/RASP air cylinders, leave all charged air cylinder valves shut to avoid depleting air supply. b. Cycle valves; valves should operate smoothly with moderate effort, Return valves to designated position: (1) Three-way ball valve (AHP-V204) OPEN-CLOSED-OPEN-CLOSED. (2) Regulator (AHP-V205) fully CW - fully CCW (closed). (3) HP gauge isolation valve (AHP-V206) fully CW - fully CCW (open). (4) LP gauge isolation valve (ALP-V207) fully CW - fully CCW (open).

Table 2-4. PASP/RASP Pre-Operational Inspections and Setup - Continued

Step	Procedure
3. Check all moving parts on PASPs/RASPs. **- continued**	b. (5) LP manifold bleed valve (ALP-V208) fully open CW, spring return to fully shut CCW position. (6) HP air hose assembly bleed valves (AHP-V202 and AHP-V203) fully open CW, spring return to fully shut CCW position. **NOTE** If valve(s) do not operate properly, remove and replace in accordance with Chapter 6 of SAR/SCBA technical manual.
4. Inspect all PASP/RASP HP air hoses including all end fittings.	**CAUTION** Hose and fittings shall not be painted; however, replacement is not necessary when only a few drops of paint have fallen on hose or fitting. Do not attempt to remove paint; solvents and abrasives will damage hose. a. Inspect hose and fittings for large painted area. b. Inspect fittings for pitting, cracks, and corrosion or damage, particularly to seating surfaces. c. Inspect hose for cuts, tears, gouges, cracks, or loose fittings. **NOTE** If any of these conditions are noted or, for any reason, the hose is suspected of being weak, hydrostatically test IAW PMS requirements.
5. Attach HP air hose assemblies to selected PASP/RASP cylinders.	a. Ensure three-way ball valve (AHP-V204) is in OFF (closed) position. b. Determine which HP air cylinders will supply air for initial use (PASP or RASP). c. Loop wire rope lanyard around base of air cylinder valve. d. Attach air hoses to selected primary and secondary air cylinder valves (AHP-V201 and AHP-V301 or AHP-V302) by connecting CGA-347 hand-tight nut fittings.
6. Verify that HP gauge isolation valve (AHP-V206) is open.	**WARNING** Caps on HP gauge isolation valve (AHP-V206) and LP gauge isolation valve (ALP-V207) are under pressure. Do not remove caps when system is pressurized. Operator must wear protective eyewear when opening either gauge valve. Opening caps when system is pressurized may cause injury or death. Ensure (AHP-V206) is open (fully counterclockwise (CCW)).
7. Select HP air cylinder.	Turn three-way ball valve (AHP-V204) handle to OPEN position (arrow toward HP air hose from selected cylinder).

Table 2-4. PASP/RASP Pre-Operational Inspections and Setup - Continued

Step	Procedure
8. Place HP air cylinder on-line.	a. Turn selected HP air cylinder valve (AHP-V201, AHP-V301, or AHP-V302) fully CCW. b. Ensure HP gauge (AHP-G201) reads 4,500 psig (nominal). **NOTE** (HP air supply requirements for the operation may allow for an initial air supply of less than 4,500 psig.)
9. Verify LP gauge isolation valve (ALP-V207) position, LP gauge pressure (ALP-G202), and adjust regulator (AHP-V205).	a. Ensure ALP-V207 is open (fully CCW). b. Slowly turn AHP-V205 (CW) to obtain 80 psig on LP gauge (ALP-G202).
10. Perform gross leak test of SAR.	a. Shut HP air cylinder valve (AHP-V201, AHP-V301, or AHP-V302). b. Note HP gauge (AHP-G201) reading. c. Wait 1 minute. d. Note pressure on HP (AHP-G201). e. If difference between initial reading and 1 minute reading on HP gauge is less than 50 psig, test is complete (system not leaking). If a pressure drop greater than specified above is noted, perform leak diagnostic test and applicable repairs IAW Chapter 6 of SAR/SCBA technical manual. f. Turn three-way ball valve (AHP-V204) handle to other air cylinder (arrow toward HP air hose from other air cylinder). g. Turn selected HP air cylinder valve (AHP-V201, AHP-V301, or AHP-V302) fully CCW. h. Repeat Steps 10a through 10e with the other HP air hose pressurized.
11. Turn three-way ball valve (AHP-V204) to closed position.	Turn AHP-V204 to closed position (arrow toward center).
12. Bleed down PASP and test LP alarm.	Turn AHP-V208 clockwise (CW) and hold open. This is a spring-loaded valve that will spring shut unless held open manually. Bleed down LP manifold until HP gauge (AHP-G201) reads 500 ± 50 psig at which time alarm should sound. After alarm sounds, continue bleeding air until LP gauge (ALP-G202) reads 0 psig.
13. Set regulator (AHP-V205).	Turn AHP-V205 fully CCW.
14. Place HP air cylinder(s) on-line.	Turn HP air cylinder valve(s) (AHP-V201, AHP-V301, and/or AHP-V302) fully CCW.
THE SAR (PASP/RASP) IS NOW IN THE READY CONDITION.	All PASP/RASP airflow valves are open except the three-way ball valve (AHP-V204) and the regulator (AHP-V205). Proceed to Table 2-6.

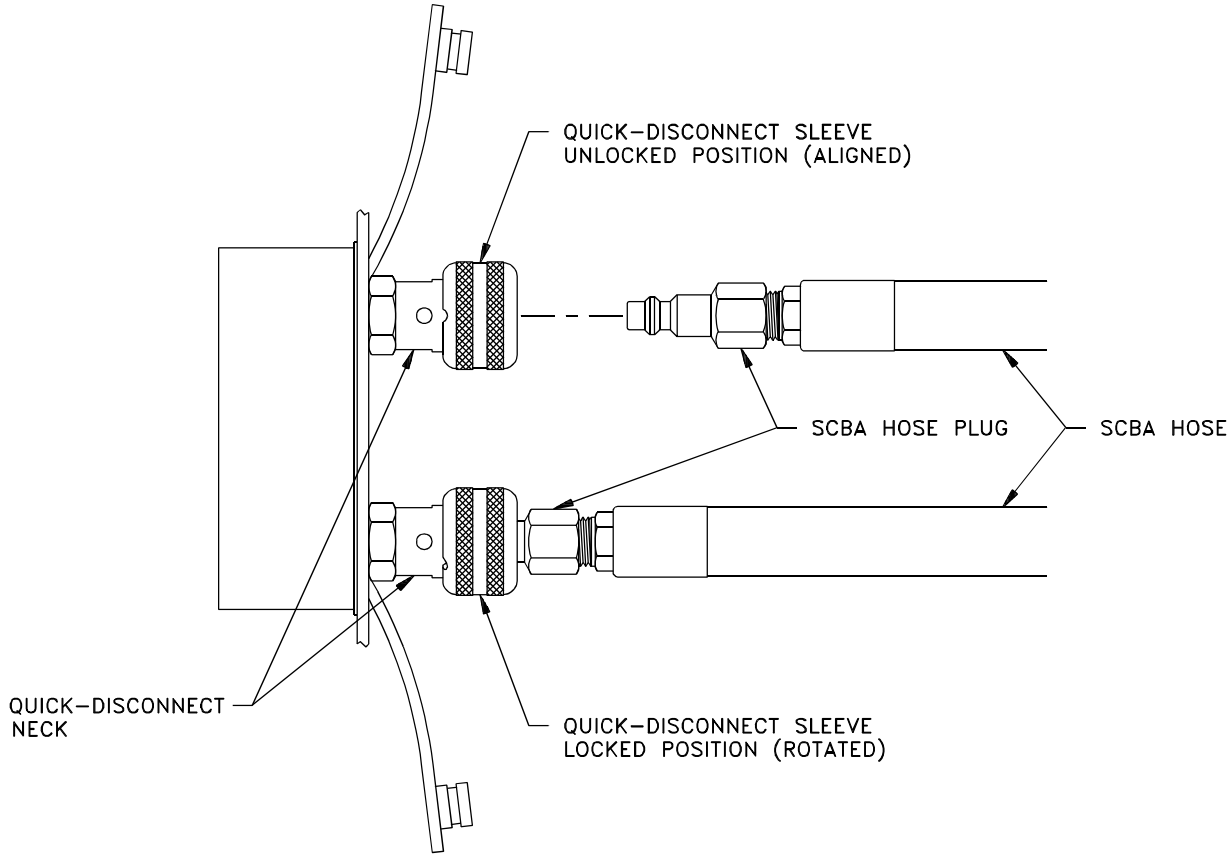


Figure 2-6. Connecting SCBA Hose to PASP Quick Disconnects (QDs)

Table 2-5. SCBA Pre-Operational Inspections and Setup

Step	Procedure
1. Inspect SCBA(s) air cylinder pressure and connections.	**CAUTION** If SCBA air cylinder pressure is below 2,500 psig, cylinder should be refilled to 3,000 psig before use. a. Inspect SCBA(s) air cylinder valve pressure indicator reading. Air cylinder pressure should be 3,000 psig. b. Inspect air cylinder hose connections for damage or abrasions.
2. Inspect SCBA breathing apparatus (the fit test for the facepiece shall be done yearly).	a. Inspect facepiece and hoses for pliability and deterioration; stretch rubber and inspect for cracks. b. Inspect head harness for cuts and tears. c. Remove MMR from facepiece. Inspect MMR O-ring between regulator and facepiece for dry rot and damage. d. Inspect Ultravue® Facepiece lens for cracks, scratches, and tight seal with facepiece rubber. e. The facepiece exhalation valve must be clean and easy to operate. To check operation, reach into facepiece and depress and release center valve stem several times. Valve must move off seat and return when released. If valve sticks, open by pushing on center of valve stem inside facepiece and flush with fresh water. Ensure valve works properly prior to stowing facepiece. f. Inspect plastic facepiece inlet assembly for damage or cracks. Check to be sure spider gasket and inhalation disk valve are present and not damaged or deteriorated. g. Inspect SCBA carry pouch, waist belt, and shoulder strap for tears or other damage.
3. Determine how many sections of 75-foot, LP air-supply hoses will be required.	**CAUTION** MSA air-supply hoses have various temperature limitations. DO NOT use the SCBA whenever ambient or inlet air temperatures are below -25°F or above 212°F. Determine how many sections of LP air hose are required per SCBA (maximum of four).
4. Inspect all LP air hoses and interconnect required LP hoses.	**CAUTION** Hose and fittings shall not be painted; however, replacement is not necessary when only a few drops of paint have fallen on hose or fitting. Do not attempt to remove paint; solvents and abrasives will damage hose. a. Inspect hose and fittings for large painted areas. b. Inspect fittings for pitting, cracks, and corrosion or damage, particularly to seating surfaces.

Table 2-5. SCBA Pre-Operational Inspections and Setup - Continued

Step	Procedure
4. Inspect all LP air hoses and interconnect required LP hoses. **-Continued**	c. Inspect hose for cuts, tears, gouges, cracks, or loose fittings. **NOTE** If any of these conditions are noted, or for any reason the hose is suspected of being weak, hydrostatically test IAW PMS requirements. **CAUTION** Failure to rotate sleeve on quick disconnect (QD) after connection is made may result in separation of couplings during use. Do not use other types of quick disconnect couplings to interconnect Model 5-1002-1 air-supply hose. d. Interconnect required number of LP air hoses. (1) To interconnect 75-foot LP air hoses, grasp female QD, align recess on QD sleeve with dimple on QD neck. Slide sleeve toward 75-foot hose. (2) Insert male plug into female QD and release sleeve on QD. (3) Rotate QD sleeve so that recess and dimple are no longer aligned. Gently pull on two sections of coupling to test connection.
5. Don personnel protective clothing, Navy-approved body harness, and SCBA unit.	**CAUTION** Users must wear suitable protective clothing, and precautions must be taken so that SCBA is not worn in atmospheres that may harm device. a. Don suitable personnel protective clothing. b. Don Navy-approved body harness. c. Don SCBA unit. (1) Grasp shoulder strap and place over head and on shoulder. (2) Connect waist strap and tighten by pulling free end through buckle. (3) Adjust shoulder strap to desired position by pulling on the adjusting strap. (4) Slide carry pouch on waist strap to position of comfort. (5) Check to make sure that pressure indicator is visible and cylinder valve is accessible.
6. Connect LP air hoses to SCBAs.	**CAUTION** Failure to rotate sleeve on SCBA QD after connection is made may result in separation of couplings during use.

Table 2-5. SCBA Pre-Operational Inspections and Setup - Continued

Step	Procedure
6. Connect LP air hoses to SCBAs. **- continued**	a. Grasp female SCBA QD and align recess on QD sleeve with dimple on QD neck. Slide sleeve toward 75-foot hose. b. Insert male plug into female SCBA QD and release sleeve on QD. c. Rotate QD sleeve so that recess and dimple are no longer aligned. Gently pull on two sections of coupling to test connection.
7. Don facepiece and conduct Air Tightness Test before each use. Perform this test any time the facepiece is donned.	a. Remove MMR from facepiece speaking diaphragm assembly by turning MMR nut CCW. b. Don facepiece. (1) Fully extend facepiece straps and don the facepiece by inserting the chin into the chin cup, then pulling headbands back over head. (2) Tighten the neck (lower) straps, then tighten the temple straps. Tighten the forehead (top) strap as needed. c. Conduct Air Tightness Test before each use of SCBA to ensure facepiece is sealed tightly. (1) Cover MMR facepiece connection with palm of hand. Inhale and hold breath for approximately 10 seconds. Facepiece should collapse and remain collapsed. (2) Remove hand from MMR facepiece connection. (3) Take a deep breath. Again place palm of hand over MMR facepiece connection, then exhale. If exhalation valve is stuck, a rush of air will be felt escaping around face-to-facepiece seal. For a stuck exhalation valve, remove facepiece and correct problem before using SCBA.
8. Check flow of air from SCBA air cylinders.	a. Turn SCBA air cylinder valve CCW to open. b. Momentarily depress and hold the don/doff button on the MMR. Check that air flows from SCBA air cylinders through MMR. c. Turn SCBA air cylinder valve CW to shut.
THE SCBAs ARE NOW IN THE STANDBY CONDITION.	SCBA air cylinder valve is shut, LP air hose(s) are connected to the SCBA, and the MMR is not connected to the facepiece. Proceed to Table 2-6.

Table 2-6. SAR/SCBA Operating Procedures

Step	Procedure
OPERATING PROCEDURES	
1. Ensure SCBA users and PASP operators have performed necessary SAR/SCBA pre-operational tests and inspections.	a. PASP operator obtain verbal confirmation to determine if the SCBA user has donned equipment and is ready to commence operations. b. SCBA user obtain verbal confirmation to determine if the PASP operator is ready to commence operations.
2. Connect the LP air-supply hose(s) to PASP QD(s) (see Figure 2-6). Up to four SCBA users may be connected (no more than four LP air hoses shall be interconnected).	**CAUTION** Failure to rotate sleeve on PASP QD after connection is made may result in separation of couplings during use. a. Remove protective dust cap from QD(s) on PASP manifold. b. Connect hose end fitting to PASP QD(s). (1) Align recess on female PASP QD sleeve with dimple on QD neck. Slide sleeve toward panel. (2) Insert male plug on SCBA hose into female, PASP QD and release sleeve on QD. (3) Rotate QD sleeve so that recess and dimple are no longer aligned. Gently pull on two sections of couplings to test connection.
3. Select HP air cylinder.	Turn three-way ball valve (AHP-V204) handle to open position (toward the HP air hose leading to the selected HP cylinder). Then ensure cylinder valve (AHP-V201, AHP-V301, or AHP-V302) is open (fully CCW) on cylinder and on next cylinder to be used.
4. Set regulator (AHP-V205).	Slowly turn regulator (AHP-V205) until pressure reads 60-80 psig on LP gauge (ALP-G202).
5. Check flow of air from PASP air cylinders to SCBA users.	a. Momentarily depress and hold the don-doff button on the MMR. Check that air flows from PASP air cylinders through MMR. (Ensure that the SCBA air cylinder valve is SHUT.) b. Screw MMR into facepiece and hand-tighten. Inhale sharply to start the airflow; the don-doff button should pop out automatically. c. Breathe on the system for 30 seconds to ensure good air quality and proper system function.
THE SAR/SCBA SYSTEM IS NOW IN THE STANDBY CONDITION.	SCBA users have confirmed airflow through the MMRs and proper function for the system. SCBA users are ready to deploy.

Table 2-6. SAR/SCBA Operating Procedures - Continued

Step	Procedure
6. Deploy SCBA users and monitor gauges. Enter work area connected to PASP. Do not open SCBA air cylinder valve unless SCBA is needed for emergency egress.	**WARNING** SCBA air cylinders must be fully charged before entering a contaminated atmosphere. Entry with less than full cylinders can result in insufficient air during escape. Do not enter contaminated atmosphere using only SCBA air cylinders. Do not enter a contaminated atmosphere that may require escape time greater than service life of cylinders, approximately 15 minutes, depending on SCBA user's respiratory rate. **Contaminants can enter an air-line respirator system when air-supply hoses are reconnected in a contaminated atmosphere. User must determine potential risk and take necessary precautions, which may require that NO disconnection of air-supply hoses be permitted in a contaminated atmosphere. If in doubt, DO NOT disconnect. Failure to follow this warning could result in serious injury or death.** FAILURE TO FOLLOW ABOVE WARNINGS COULD RESULT IN SERIOUS INJURY OR DEATH. **CAUTION** Opening SCBA air cylinder valve while in supplied-air mode will deplete cylinder's air supply prematurely. Keep valve closed until escape air supply is needed. a. PASP operator monitors LP gauge (ALP-G202) and maintains pressure at 60-80 psig by adjusting regulator (AHP-V205) as required. b. Monitor HP gauge (AHP-G201).
7. ALARM SOUNDS Audible alarm bell will sound when air pressure reaches 500 psig (as indicated by HP gauge (AHP-G201). Immediately switch to next charged HP air cylinder.	**CAUTION** PASP operator shall immediately switch to a new air cylinder. a. Turn three-way ball valve (AHP-V204) toward the HP air hose leading to next HP air cylinder. The regulator (AHP-V205) may require adjustment when next cylinder is placed on-line.

Table 2-6. SAR/SCBA Operating Procedures - Continued

Step	Procedure
7. ALARM SOUNDS **- continued** Air should be flowing from next HP air cylinder at this point.	b. Ensure HP gauge (AHP-G201) reads approximately the same as selected HP air cylinder pressure indicator.
8. Confirm regulator (AHP-V205) adjustment.	Slowly adjust regulator (AHP-V205) until pressure reads 60-80 psig on LP gauge (ALP-G202).
9. Shut down depleted HP air cylinder.	Turn HP air cylinder valve handle CW on depleted cylinder.
10. Bleed (open) HP air hose connected to depleted air cylinder.	**WARNING** Before bleeding (opening) HP air hose bleed valve (AHP-V202 or AHP-V203), ensure all personnel stand clear of area to avoid injury from flying debris. Operator shall announce "Bleeding down" to warn nearby personnel. Operator must wear protective eyewear when bleeding system to prevent eye injuries or blindness. a. Slowly turn AHP-V202/AHP-V203 valve handle CW and hold open until all air is released. b. Release HP air hose bleed valve (AHP-V202/AHP-V203). It is spring-loaded and will automatically snap shut, turning CCW.
11. Disconnect HP air hose from depleted primary HP air cylinder.	Turn CGA-347 fitting CCW to disconnect HP air hose and remove lanyard.
12. Connect HP air hose to charged air cylinder.	a. Loop wire rope lanyard around base of air cylinder valve of next air cylinder (AHP-V201, AHP-V301, or AHP-V302). b. Attach HP air hose to air cylinder valve connection; turn CGA-347 fitting CW to connect.
13. Pressurize HP air hose.	For newly attached HP air cylinder, turn HP air cylinder valve (AHP-V201, AHP-V301, or AHP-V302) CCW.
14. Replace cap on depleted HP cylinder valve air hose connection.	Replace cap by turning CW and hand-tighten.
15. Return to Step 6 to repeat cycle. When ready to leave the work area, proceed to an area not requiring respiratory protection.	**WARNING** Ensure the HP air hose assembly connected to a depleted HP air cylinder is vented (using AHP-V202/AHP-V203) before disconnecting the CGA-347 fitting on the air cylinder. Remain connected to air-supply hose until this "safe" area is reached.

Table 2-6. SAR/SCBA Operating Procedures - Continued

Step	Procedure
16. Remove facepiece and doff the SCBA unit when "safe" area is reached.	**WARNING** If working in a contaminated atmosphere or if user is exposed to contaminants while in work area, take proper precautions to decontaminate facepiece and head area prior to doffing facepiece. User must determine potential risk and take necessary precautions. Failure to follow this warning could result in serious injury or death. a. Loosen headband harness straps so that all ends are near their respective buckles. b. Depress semiautomatic push button (don/doff) on side of MMR to stop flow of air into facepiece. c. Lift facepiece away from face and remove from head. d. Close the SCBA air cylinder valve, if it was opened for emergency escape. e. Unbuckle waist belt and lift shoulder strap over head to remove SCBA unit. f. Remove Navy-approved body harness. g. Clean and sanitize facepiece before storing. See Table 2-7, SAR/SCBA Post-Operational Procedures.
SHUT-DOWN PROCEDURES	
17. Shut down HP air to PASP.	Turn three-way ball valve (AHP-V204) to center (closed) position.
18. Shut down HP air cylinders.	Turn HP air cylinder valves (AHP-V201, AHP-V301 and/or AHP-V302) fully CW until valve(s) seat.
19. Bleed (open) LP manifold bleed valve (ALP-V208).	**WARNING** Before bleeding (opening) LP manifold bleed valve (ALP-V208), ensure all personnel stand clear of area to avoid injury from flying debris. Operator shall announce "Bleeding down" to warn nearby personnel. Operator must wear protective eye wear when bleeding system to prevent eye injuries or blindness. a. Turn ALP-V208 CW and hold open until both gauges read zero. b. Release ALP-V208. It will snap shut automatically, moving CCW. c. Both gauges (AHP-G201, ALP-G202) should read zero.

Table 2-6. SAR/SCBA Operating Procedures - Continued

Step	Procedure
20. Bleed MMR air hose.	Depress and hold don/doff button on side of MMR to bleed air from the unit.
21. Set regulator (AHP-V205).	Turn AHP-V205 fully CCW.
22. Disconnect SCBA LP air hose(s).	**WARNING** Ensure the LP manifold is vented before disconnecting LP air hose(s) from PASP. a. To disconnect 75-foot SCBA hose(s) from PASP QD(s), align recess on female PASP QD sleeve with dimple on QD neck. Slide sleeve toward panel to release SCBA male hose plug. b. To disconnect 75-foot SCBA hose(s) from SCBA unit(s), align recess on female SCBA QD sleeve with dimple on QD neck. Slide sleeve toward 75-foot hose to release male hose plug.
23. Conduct HP air filter test.	a. Ensure that an HP air cylinder with at least 500 $\pm$ 50 psig is connected to the PASP. b. Ensure HP air cylinder valves (AHP-V201, AHP-V301, and AHP-V302) are SHUT. c. Ensure PASP is vented using bleed valves (AHP-V202, AHP-V203, and ALP-V208. d. Install flow adapter in PASP QD. e. Check PASP controls: (1) Three-way ball valve (AHP-V204) CLOSED. (2) HP gauge isolation valve (AHP-V206) OPEN (fully CCW). (3) LP gauge isolation valve (ALP-V207) OPEN (fully CCW). (4) Regulator (AHP-V205) SHUT (fully CCW). f. Select an HP air cylinder with the three-way ball valve (AHP-V204) and open HP air cylinder valve (AHP-V201, AHP-V301, or AHP-V302). g. Don hearing protection and safety glasses or goggles.

Table 2-6. SAR/SCBA Operating Procedures - Continued

Step	Procedure
23. Conduct HP air filter test. **- continued**	**WARNING** Airflow through airflow adapter could cause eye damage and/or hearing impairment if protective goggles and hearing protection are not worn. h. Adjust regulator (AHP-V205) CW until LP gauge (ALP-G202) reads 40 psig. Air will flow from flow adapter. If regulator cannot be adjusted to 40 psig, replace HP air filter with new or cleaned unit IAW Chapter 6 of SAR/SCBA technical manual. **NOTE** Disregard LP alarm. i. Note HP gauge (AHP-G201) pressure, then turn regulator (AHP-V205) fully CCW. Allow LP manifold to bleed down through airflow adapter. j. Shut on-line HP air cylinder valve and ensure associated HP air hose is bled down using bleed valve (AHP-V202 or AHP-V203). k. Remove double hearing protection and safety goggles. l. Disconnect flow adapter. Reinsert plastic protective plugs into PASP QD.
24. Bleed (open) HP air hose(s) connected to all HP air cylinders.	**WARNING** Before bleeding (opening) HP air hose bleed valve (AHP-V202 or AHP-V203), ensure all personnel stand clear of area to avoid injury from flying debris. Operator shall announce "Bleeding down" to warn nearby personnel. Operator must wear protective eyewear when bleeding system to prevent eye injuries or blindness. a. Slowly turn AHP-V202 or AHP-V203 valve handle CW and hold open until all wire is released. b. Release HP air hose bleed valve (AHP-V202 or AHP-V203). It is spring-loaded and will automatically snap shut, turning CCW.
25. Position three-way ball valve.	Turn three-way ball valve (AHP-V204) to center (closed) position.
26. Disconnect and restow HP air hose assemblies.	a. Restow HP air hose assemblies in PASP. See Figure 8-8. b. Place protective caps on QDs and HP air cylinder valves.
ALL EQUIPMENT IS SHUT DOWN AT THIS POINT.	

Table 2-7. SAR/SCBA Post-Operational Procedures

Step	Procedure
1	If exposed to salt air environment or dirt, wipe down all equipment using fresh water.
2	Inspect equipment for damage, such as cracks, dents, punctures, and abrasions.
3	Ensure that exteriors of all hoses are clean and dry.
4	Ensure all equipment is clean and dry prior to storage. Clean and sanitize SCBA facepiece.
5	Refill PASP, RASP, and SCBA air cylinders IAW Tables 2-8 and 2-9.
6	Ensure all post-operational maintenance has been performed IAW PMS requirements. Post operational maintenance includes cleaning and inspecting all SAR/SCBA equipment.

Table 2-8. Procedures for Refilling PASP/RASP HP Air Cylinders

Step	Procedure
	CAUTION Do not recharge an HP air cylinder that requires maintenance or if any damage to fiberglass overwrap is evident.
1	Check expiration date and inspect external surfaces.
2	Orient cylinder in PASP or RASP so that charging connection is easily accessible. Ensure cylinder is stabilized.
3	Remove protective cylinder valve cap. Attach CGA-347 nut on charging hose to cylinder valve connection.
4	Ensure charging hose is connected to a source of Grade D (or higher) HP air (dew point -65°F or lower).
5	Slowly open cylinder valve to pressurize charging hose, then open valve at least two turns.
6	Shut air source charging valve when charging pressure reaches 4,500 psig. Verify air cylinder pressure indicator reads 4,500 psig. **NOTE** PASP/RASP HP air cylinders may be recharged to 3,000 psig in event 4,500 psig air unavailable. The lower air pressure will result in reduced cylinder capacity (see Table 3-1).
7	Shut air cylinder valve and bleed charging hose.
8	Remove charging hose from cylinder valve connection and reinstall protective cylinder valve cap.

Table 2-8. Procedures for Refilling PASP/RASP Air Cylinders - Continued

Step	Procedure
9	**CAUTION** If charging air is suspected to contain excessive moisture content, a charged cylinder should be inverted and cylinder valve cycled to check for condensed moisture. Water vapor under high pressure accelerates corrosion of aluminum cylinder liners. Any cylinder containing condensed moisture should be scheduled for inspection. The cylinder charging system should be inspected and scheduled for corrective maintenance if charging air contains excessive water vapor. Allow HP air cylinder to cool 2-4 hours, then recheck cylinder valve pressure indicator. If cylinder pressure falls below 4,500 psig, repeat Steps 2-8.

Table 2-9. Procedures for Refilling SCBA Air Cylinders

Step	Procedure
1	Disconnect SCBA from external air supply. Ensure SCBA air cylinder valve is shut and that MMR semiautomatic push button (don/doff) has been placed in DOFF position to vent SCBA LP air circuit.
2	Open Velcro® on SCBA pouch and fold down two back flaps to expose first-stage regulator.
	WARNING Fill SCBA cylinders at maximum flow rate of 200 psi/min. Failure to follow this warning could result in serious injury or death.
3	Disconnect first-stage regulator CGA-346 nut by hand, or use 1-1/8 inch open-end wrench, if necessary.
	WARNING SCBA cylinders which show evidence of exposure to high heat or flame, e.g., paint turned brown or black color, decals charred or missing, gauge lens melted, or elastomeric materials distorted, shall be removed from service and hydrostatically tested prior to recharging. Failure to follow this warning could result in serious injury or death.

Table 2-9. Procedures for Refilling SCBA Air Cylinders - Continued

Step	Procedure
	WARNING Use a regulated air supply set to 3,000 psig for SCBA cylinders. Failure to use a regulated air supply set to proper pressure could result in serious injury or death.
4	Check expiration date and inspect external surfaces on HP air cylinders to be recharged.
5	Stabilize SCBA cylinders in a rack or on a table top before charging.
6	Attach CGA-346 nut on charging hose to SCBA cylinder valve connection.
7	Ensure charging hose is connected to a source of Grade D (or higher) HP air (dew point of -65°F or lower).
8	Slowly open cylinder valve to pressurize charging hose, then open valve fully CCW.
9	Shut air source charging valve when charging pressure reaches 3,000 psig. Verify SCBA air cylinder pressure indicator reads 3,000 psig.
10	Shut SCBA air cylinder valve and bleed charging hose.
11	Remove charging hose from SCBA cylinder valve connection.
	CAUTION If charging air is suspected to contain excessive moisture content, a charged cylinder should be inverted and cylinder valve cycled to check for condensed moisture. Water vapor under high pressure accelerates corrosion of aluminum cylinder liners. Any cylinder containing condensed moisture should be scheduled for inspection. The cylinder charging system should be inspected and scheduled for corrective maintenance if charging air contains excessive water vapor.
12	Allow SCBA air cylinders to cool 2-4 hours, then recheck cylinder valve pressure indicator. If cylinder pressure falls below 3,000 psig, repeat Steps 5-11.
13	Carefully reinstall first-stage regulator by reconnecting CGA-346 nut connector on regulator to fitting on HP manifold.
14	Leak test the SCBA IAW PMS requirements.
15	Close the Velcro® pouch and return the SCBA to service or its storage container.

Table 2-10. Emergency Procedures for the SAR/SCBA

Symptom	Effect	Corrective Action
Unsteady or diminished air flow through hose	Difficulty breathing	Straighten air hose, if kinked. If hose has damaged spot, activate SCBA air cylinder (open cylinder valve) and immediately exit space.
Loss of main air supply	Difficulty breathing, dizziness, or distress	Activate SCBA back-up escape air cylinder (open cylinder valve) and immediately exit space.
Contaminated air enters air supply or facepiece	Difficulty breathing, dizziness, distress, taste or smell contaminants	Activate SCBA back-up escape air cylinder (open cylinder valve) and immediately exit space.
SCBA LP alarm (whistle) sounds	Loss of SCBA back-up air supply while still breathing off main air supply	Immediately exit work area using main air supply.

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CHAPTER 3
FUNCTIONAL DESCRIPTION

3.1 INTRODUCTION.

This chapter defines the functions of the major equipment groups for the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA). A description of how the equipment operates and supporting illustrations are also included.

3.2 OVERALL FUNCTIONAL DESCRIPTIONS.

The SAR/SCBA is a life-support system that supports Gas-Free Engineer (GFE) operations aboard ships. The major function of the equipment is to allow personnel to safely enter spaces that may contain hazardous atmospheres. All of the equipment is portable and can be set up quickly. The SAR/SCBA is a Type C, pressure-demand system. The system is illustrated in Figure 3-1. Figure 3-2 is a functional block diagram of the overall system.

3.2.1 Supplied Air Respirator (SAR). The main components of the SAR are the Primary Air Supply Pack (PASP) and Reserve Air Supply Pack (RASP). These units serve as the external air source for the SCBA user(s). During operations, the PASP and RASP are stationed and operated outside the potentially hazardous space. PASP/RASP operators place HP air cylinders on-line and then reduce the air pressure to 60-80 psig. The reduced air travels to the SCBA user(s) from the PASP control panel assembly (CPA) via interconnecting air-supply hoses. As the SCBA user(s) enters the potentially hazardous space, the user remains connected to the PASP by use of the interconnecting hoses. Should the airflow from the PASP become inadequate, the user will activate the SCBA and exit the space.

3.2.2 Self-Contained Breathing Apparatus (SCBA). The main components of the SCBA are: a full facepiece, two regulators, air-supply hoses, and two back-up escape air cylinders with a pressure indicator, and an alarm. A full-body harness is worn under the equipment. A speaking diaphragm inside the facepiece allows SCBA users to communicate among themselves inside the work space. Portable air cylinders, used for emergency escape only, can be activated if the external air source becomes inadequate. Should this occur, the SCBA user will receive up to 15 minutes of air and must exit the space. Activating the SCBA is an emergency procedure. When performing the emergency procedure, the SCBA user may or may not disconnect the air-supply hose from the PASP. The external air supply may not be reconnected if disconnected.

3.3 MAJOR FUNCTIONAL DESCRIPTIONS.

The major functions performed by the PASP, RASP, and SCBA are described in the following paragraphs. A component functional relationship diagram is provided in Figure 3-3.

3.3.1 Primary Air Supply Pack (PASP). The PASP is a lightweight air system with a CPA and one HP air cylinder, both housed within an aluminum case. On top of the CPA, two HP hoses connect the PASP and RASP cylinders to a three-way ball valve.

3.3.1.1 PASP Control Panel Assembly (CPA). The PASP CPA houses numerous controls and indicators that activate and monitor airflow. By turning the three-way ball valve, the operator selects the cylinder to be on-line. A PASP or RASP cylinder is selected by turning the handle in the appropriate direction. The outlet for the three-way ball valve is connected to an in-line air filter that traps small particles. The filter is located behind the CPA and cannot be seen on the panel. A regulator is located on the center of the panel and reduces the HP air to 60-80 psig (nominal) for delivery to the air distribution manifold. During an operation, the CPA operator adjusts the regulator to maintain 60-80 psig. An LP gauge monitors the pressure as air travels through the system. The face of the LP gauge displays a range from 0 to 200 psi. An HP gauge displays the air pressure upstream of the regulator. The face of the HP gauge displays a range from 0 to 5,000 psi. Both gauges are the Bourdon-tube type.

When the supply pressure drops to 500 psig, an LP audible alarm should sound, and the PASP/RASP operator should switch to a new air cylinder. The alarm is located behind the LP gauge isolation valve and cannot be seen on the panel. Gauge isolation valves are provided for the HP and LP gauges, and allow the operator to isolate the gauges in case of gauge failure. The distribution manifold area is located at the bottom portion of the CPA. Four brass quick disconnects (QDs) are located on the front of the manifold. SCBA hose(s) connect to the QD(s). A protective dust cap is attached to each QD and covers the opening when the unit is not in service. An LP manifold bleed valve is also located in the air distribution manifold area. This bleed valve, which is a spring-loaded valve that snaps shut when not in use, allows the operator to bleed excess air from the system after operations are completed.

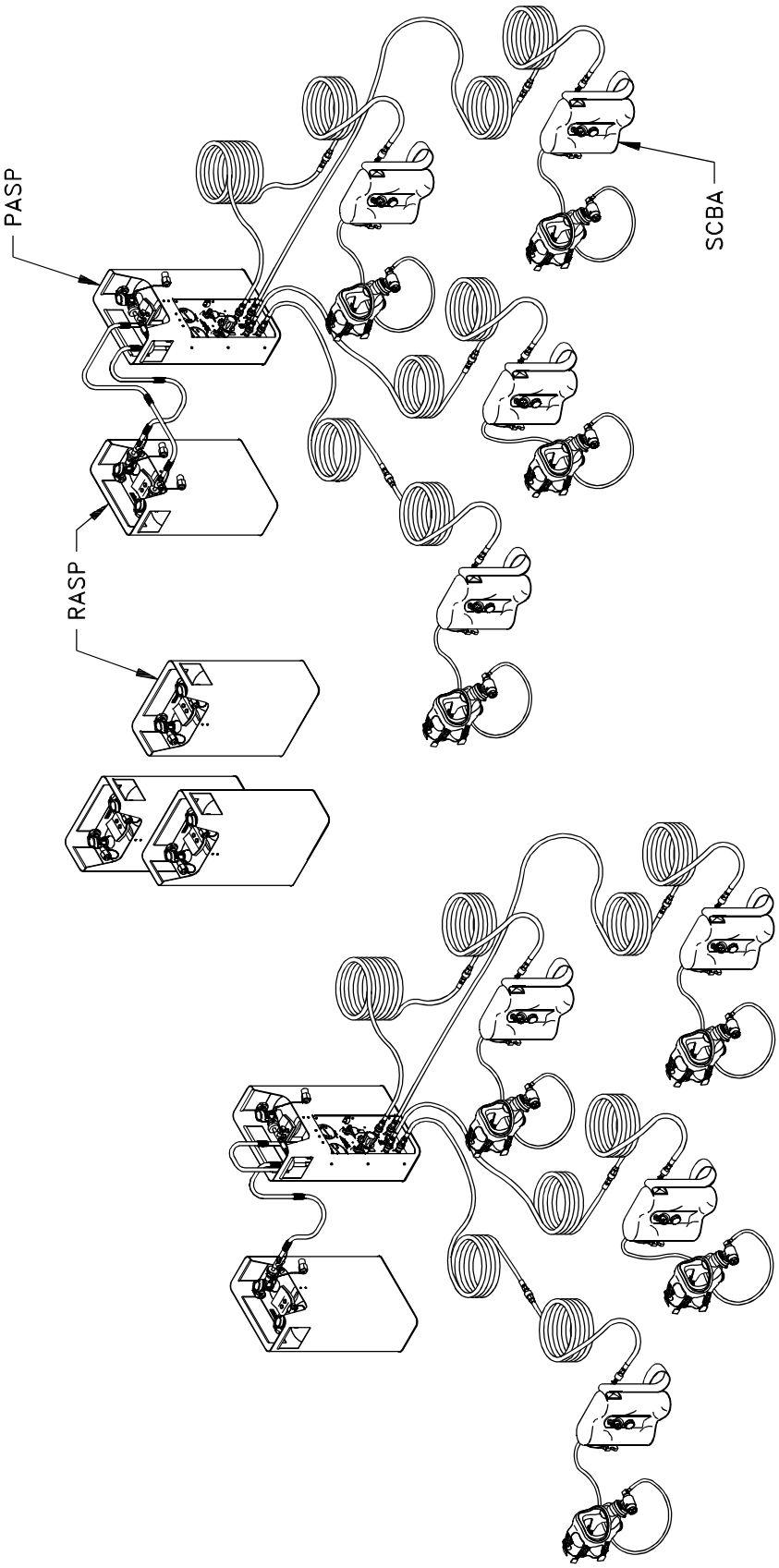

Figure 3-1. SAR/SCBA System

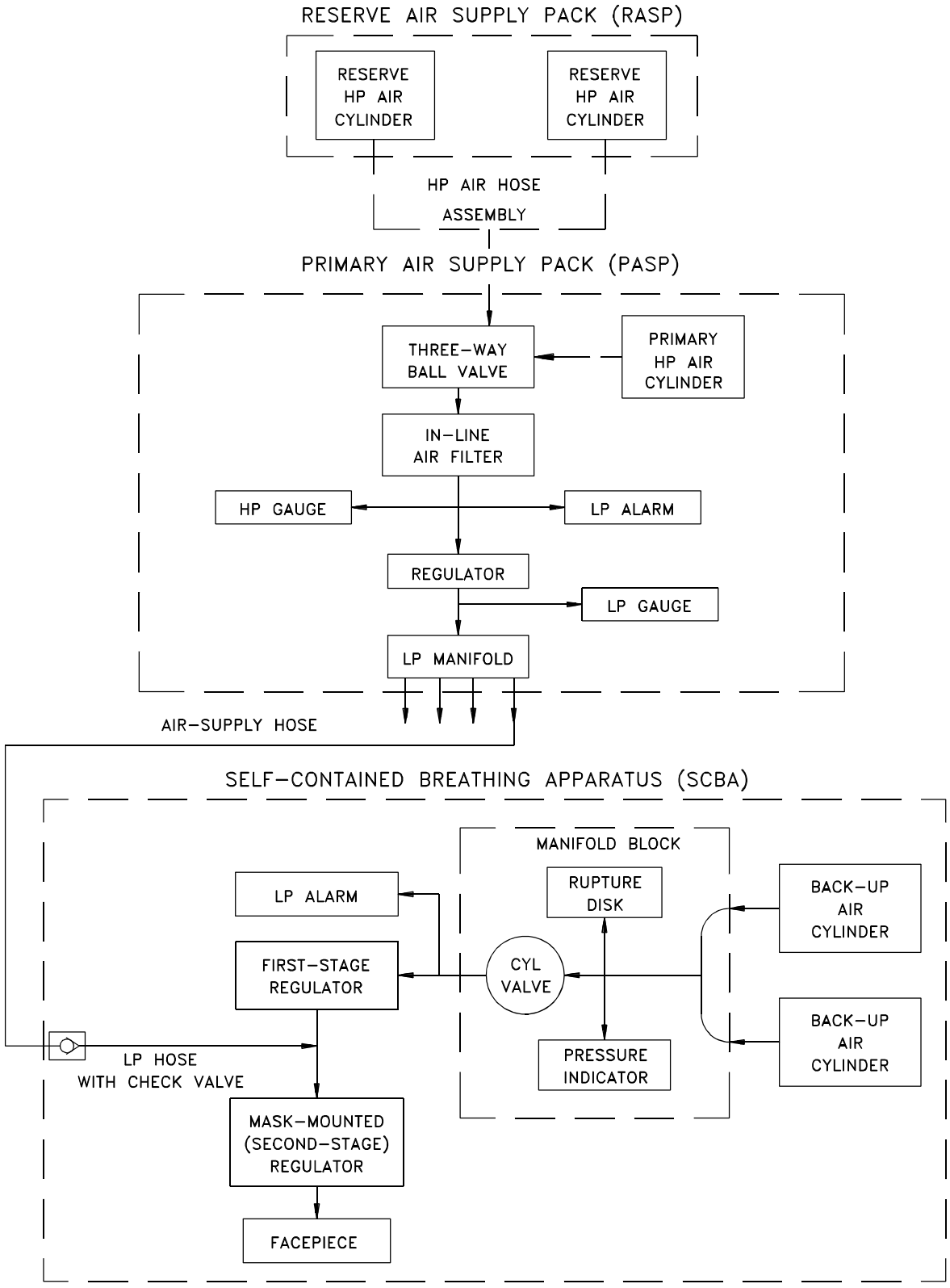

Figure 3-2. SAR/SCBA Functional Block Diagram

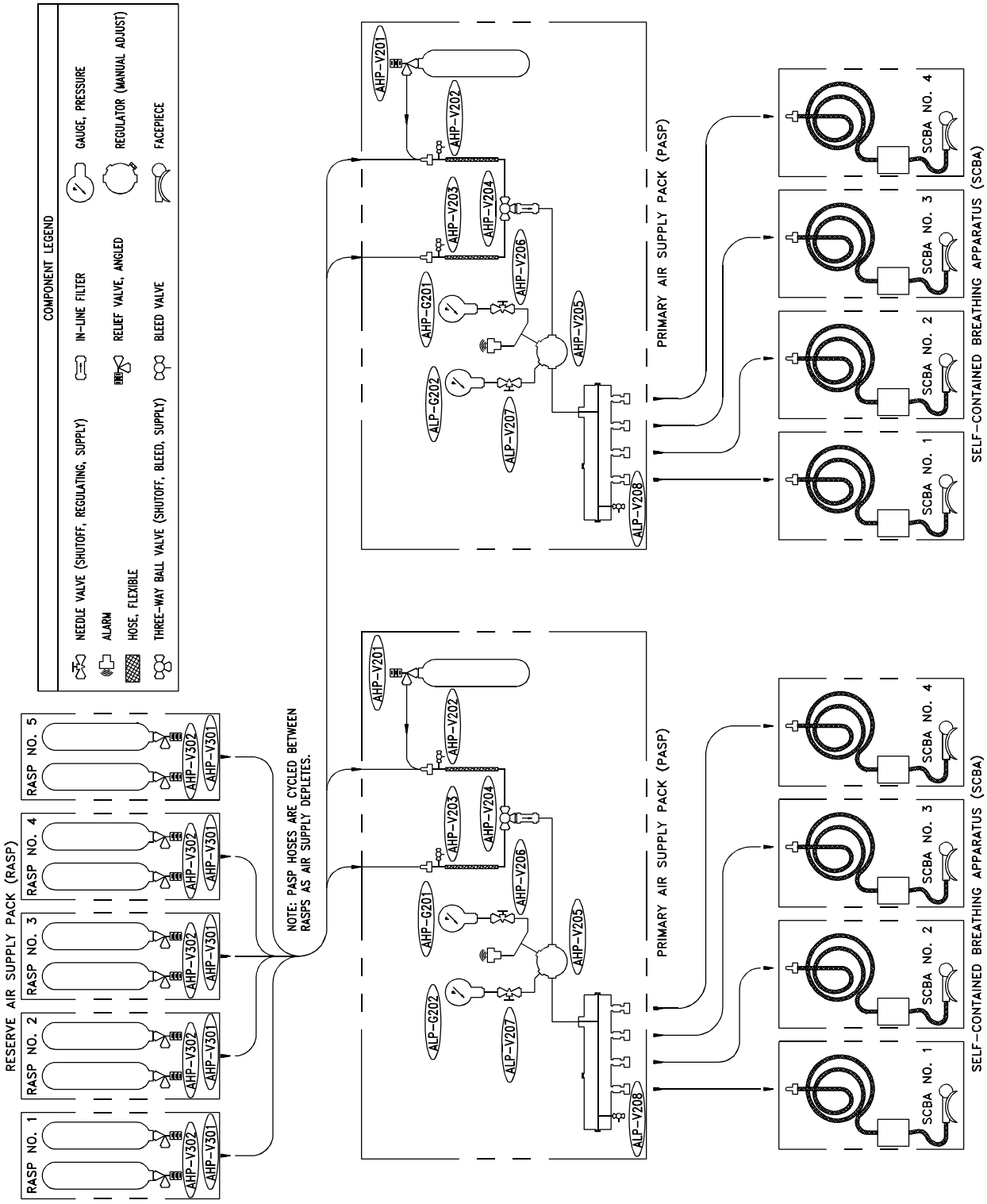

Figure 3-3. SAR/SCBA Component Functional Relationship Diagram

Table 3-1. Approximate Air Consumption Rates for PASP/RASP Cylinders

Number of Users	Number of Fully Charged Cylinders*					
	1	2	3	4	5	6
Approximate Air Consumption Rates in Minutes (at 40 liters per minute (lpm)-moderate work rate)						
1	55 (34)	105 (65)	165 (103)	219 (136)	274 (171)	329 (205)
2	27 (16)	55 (34)	82 (51)	110 (68)	137 (85)	165 (103)
3	18 (11)	37 (23)	55 (34)	73 (45)	91 (56)	110 (68)
4	14 (8)	27 (16)	41 (25)	55 (34)	69 (43)	82 (51)

*Fully charged to 4,500 psig (3,000 psig) and discharged to 500 psig

3.3.1.2 HP Air Cylinders and Valves (PASP/RASP). The PASP and RASP use the same model HP air cylinder, which is a commercial-off-the-shelf (COTS) item. Each cylinder holds up to 87 scf of compressed air at a rated service pressure of 4,500 psig. A full cylinder can supply up to 55 minutes of air, depending on the number of users and respiration rates. Approximate air consumption rates according to number of users are shown in Table 3-1 above. Each air cylinder contains an aluminum liner and is wrapped with a fiberglass-epoxy composite material. Each cylinder weighs 18.25 lbs. when unpressurized and must be filled with Grade D air or higher. Each cylinder has an integral assembly consisting of a handwheel, a cylinder valve pressure indicator, and a rupture disk. The handwheel opens airflow from the cylinder to the PASP. The air pressure inside the cylinder is monitored by a pressure indicator located on the top portion of the assembly. The indicator displays air pressure levels from 0 to 4,500 psi in increments of 1,000 psi. If air pressure builds up, the excess air is released through a rupture disk. When connecting to the PASP, the HP air hoses connect a hand-tight nut (CGA-347) to the outlet on the cylinder valve.

3.3.1.3 HP Hose Assemblies. Each PASP is equipped with two HP hose assemblies. The HP hose assembly is displayed in Figure 3-4. The hoses are made of thermoplastic and connect the PASP and RASP cylinders to the three-way ball valve on top of the PASP control panel. The

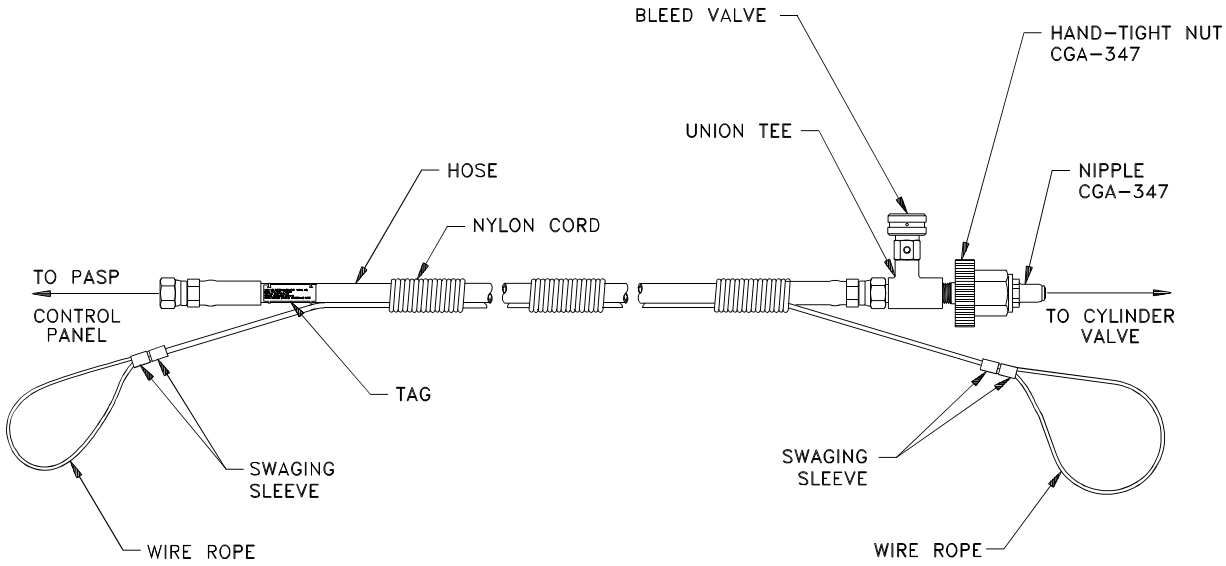

Figure 3-4. High-Pressure Hose Assembly

major components of the hose assembly are a 3-foot hose with fittings, wire rope, bleed valve, and hand-tight nut (CGA-347) air connection. The bleed valve is mounted on a union tee and allows the operator to safely release air from the hose. This valve is spring-loaded and automatically snaps shut when not in use. It is identical to the LP manifold bleed valve located on the PASP CPA. The hand-tight nut (CGA-347) allows for the connection of the hose to the cylinder valve. All of the above major components have a working pressure rating of 4,500 psig. The HP hose assembly is also equipped with a wire rope lanyard with loops at opposite ends to prevent the hose from presenting a whip hazard in the event of failure. Nylon cord binds the wire rope to the hose. All male pipe threads are wrapped with Teflon® tape.

A tag on each hose assembly contains the following information:

Assy No. 53711ASSY6314756
Serial No. _____
Hose Type/Size 4-100R8
Service & Breathing Air
System Pressure 4,500 PSI
Start Service (Date of Hydrostatic Test)

3.3.2 Reserve Air Supply Pack (RASP). The RASP is a reserve air system which supplies air directly to the PASP. Lightweight and portable, the RASP contains two HP air cylinders within an aluminum case. These components are identical to those used on the PASP. (See paragraph 3.3.1.2.)

3.3.3 Self-Contained Breathing Apparatus (SCBA). The SCBA is a source of back-up air in the event air from the PASP/RASP is depleted or fails. The SCBA is a PremAire® CADET 15M Respirator which is a COTS item. The equipment has been jointly approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). The SCBA is approved only when the equipment is operated and maintained in accordance with this manual.

The main components of the SCBA are the manifold block, two escape air cylinders, air cylinder valve, pressure indicator, alarm, first-stage regulator, mask-mounted (second-stage) regulator (MMR), facepiece, two 75 ft. interconnecting hoses, carry pouch, and shoulder strap and belt. All of these components are stored in a hard-shell carry case, except the extra 75-ft., interconnecting hose.

3.3.3.1 Manifold Block. The main component of the SCBA system is the manifold block, which is located between the cylinders. When the SCBA is fully activated, the manifold block serves as the air distribution center for the system. Carried in a pouch, the manifold block houses the following components: the first-stage regulator, the air cylinder control valve, the connections for the two cylinders and HP air hoses, the rupture disk, and the connection for the pressure indicator. The rupture disk is an over-pressurization control which protects the cylinders from HP air building up and causing a rupture.

3.3.3.1.1 First-Stage Regulator. The first-stage regulator is located on the manifold block. The first-stage regulator reduces the air pressure from the SCBA back-up air cylinders to the MMR. Air enters the first-stage regulator through an HP air inlet and exits through the regulator outlet. A hose connects the first-stage regulator to the MMR located at the base of the facepiece.

The first-stage regulator provides an airflow rate adequate to maintain a positive pressure in the facepiece. The maximum inlet pressure is 3,000 psig, and the outlet pressure is 60-80 psig.

When the user inhales, a pressure imbalance occurs across the regulator's piston assembly. The piston assembly is unseated, which allows HP air to flow to the downstream cavity that supplies the MMR. If the user requires more air, pressure builds in the cavity. This results in a pressure imbalance in the opposite direction, sealing the HP flow of air.

3.3.3.1.2 Alarm. The SCBA alarm is an audible warning device mounted on the first-stage regulator. The alarm sounds when the cylinder air supply is reduced to 20 - 25% of the total air volume. The alarm emits a whistle when it goes off and sounds until the air cylinder is depleted.

3.3.3.1.3 Pressure Indicator. The SCBA pressure indicator is a Bourdon-tube type gauge located on the manifold block. The pressure indicator constantly monitors SCBA cylinder air pressure. Readings on the dial face range from 0 to 3,000 psi in increments of 500 psi. The dial face is phosphorescent which allows the user to read it in red or low-light conditions.

3.3.3.2 Air Cylinders and Cylinder Valves. The SCBA's back-up air is supplied by two air cylinders. Each cylinder holds 13.4 scf of compressed air, and a total of 26.8 scf per escape unit. The rated service pressure for each cylinder is 3,000 psig. Full cylinders supply 15 minutes of air per user. The cylinders must be filled with Grade D air or higher. The cylinders have an aluminum liner with a fiberglass-epoxy exterior. Each cylinder is attached to the manifold by a short HP hose.

The two SCBA air cylinders share one cylinder valve. By manually turning the valve, the user can start and stop the flow of air from the cylinders. The cylinder valve is located on the manifold block and protrudes through the carry pouch for easy access.

3.3.3.3 Mask-Mounted (Second-Stage) Regulator (MMR). The MMR reduces the air pressure from about 70 psig to a breathable level. The regulator maintains airflow at a maximum rate of 250 lpm. A semiautomatic push button (don/doff) on the regulator stops the airflow when donning and doffing the facepiece. Once the facepiece is in place, the user inhales to restart the system. As the user inhales, a pilot diaphragm and a power stage diaphragm are activated to respond to the breathing demands.

When the SCBA is not activated, the user relies upon air supplied by the PASP/RASP, the external air source. Air traveling from this external source initially enters the LP manifold of the first-stage pressure regulator, then flows to the MMR via a short hose.

3.3.3.4 Facepiece. The SCBA is equipped with an Ultravue® Facepiece, a full-face mask with five suspension points and adjustable straps. The facepiece has a scratch-proof, polycarbonate lens that provides a wide field of vision. Other features include an inlet check valve, an exhalation valve, and a speaking diaphragm for voice communication.

An exhalation valve in the lower exterior portion of the facepiece maintains positive pressure. The exhalation valve is spring-loaded and is shut during normal operations. Whether exhaling or inhaling, a slight positive air pressure is maintained inside the facepiece. The pressure inside the facepiece is above that of the outside atmospheric pressure. Maintaining a positive pressure prevents contaminants from entering the facepiece in the event of an inadequate seal.

3.3.3.5 SCBA Hoses. The SCBA is equipped with four types of hoses: two 75-foot interconnecting air-supply hoses, an LP air-supply hose, an MMR hose, and two HP air cylinder hoses.

3.3.3.5.1 Interconnecting Air-Supply Hoses. Each SCBA includes two sections of 75-foot interconnecting hoses. The male end of the hose consists of a stainless-steel plug and connects to the PASP QD. The female end of the hose is also a QD and connects to the LP air-supply hose plug. No more than four sections of interconnecting hose may be linked without voiding the NIOSH/MSHA approval.

3.3.3.5.2 LP Air-Supply Hose. This hose is 6-inches long and connects the 75-foot air-supply hose coming from the PASP to the first-stage regulator manifold. In an emergency, the LP air-supply hose may be disconnected from the 75-foot air-supply hose. The LP air-supply hose is equipped with a male plug and a check valve to prevent SCBA air from flowing toward the PASP when the SCBA is activated. An external washer near the male plug facilitates the connection of the two hoses.

3.3.3.5.3 MMR Hose. This hose is 2-feet long and connects the first-stage regulator to the MMR. At the MMR, the hose is attached to a swivel block.

3.3.3.5.4 HP Air Cylinder Hoses. These two short HP air hoses connect the SCBA air cylinders to the manifold. The hoses are fixed and should remain in place.

3.3.3.6 Carry Pouch, Shoulder Strap, and Belt. The SCBA carry pouch is worn by the user and contains the SCBA hardware. The pressure indicator, alarm, and cylinder valve protrude through rubber access holes in the pouch.

The carry pouch is constructed of urethane-coated nylon for durability. The pouch shoulder strap is adjustable and attaches via a snap-in buckle. The adjustable belt is threaded through two slits at the top of the pouch and can be removed from the pouch. This configuration allows the pouch to slide on the belt for maximum comfort. To facilitate donning and doffing, the belt is also equipped with a snap-in buckle. The belt and strap are 2-inches wide, and the pouch's dimensions are 13 in. × 10.5 in. × 4.6 in.

3.3.3.7 Hard-Shell Carry Case. A hard-shell carry case is provided with the SCBA. All SCBA components, except one 75-ft. hose, can be stored in the case. When initially provided to the Fleet, the case also contains the manufacturer's operation and maintenance manual, spare parts kit, and filter cartridge.

3.4 SAR/SCBA AIRFLOW PROCESS.

3.4.1 SAR Airflow Process. High-pressure air, Grade D or higher, supplies the SAR/SCBA system. Under normal operating conditions, PASP/RASP HP air cylinders serve as the external source of air for SCBA users. Figure 3-5 illustrates the airflow process. Compressed air flows from the PASP and RASP air cylinders through HP air hoses connected to the PASP CPA. A three-way ball valve on the PASP CPA allows the operator to select the on-line cylinder. When the three-way ball valve is in the open position, the airflow process begins. An air filter below the three-way ball valve collects particulate matter before the air reaches the regulator. The HP and LP gauges monitor airflow pressure to and from the regulator. The LP alarm sounds when the air pressure drops to 500 psig. The alarm alerts the PASP/RASP operator to switch to the on-line cylinder.

The regulator reduces the air pressure to approximately 60-80 psig. Air travels through the regulator and exits the PASP through QDs on the PASP manifold. The reduced air travels through 75-foot air-supply hose sections to reach the SCBA user in the work space.

3.4.2 SCBA Airflow Process. The PASP/RASP air cylinders supply the external air source to the SCBA. Figure 3-6 illustrates the airflow within the SCBA. The SCBA is connected to the PASP by hose sections. Each air-supply hose connects to an LP air-supply hose with a check valve. From the LP hose, the air flows through the first-stage regulator and then air travels to the MMR. The MMR reduces the air pressure from 60-80 psig to a breathable level. Two diaphragms on the MMR sense and respond to the user's breathing requirements. Exhaled air is expelled through a spring-loaded exhalation valve at the bottom of the facepiece.

If the external air source is interrupted, depleted, or fails, the SCBA cylinders will be activated as an emergency procedure. Once the emergency air reaches the first-stage regulator, it follows the same path as the external air supply. Emergency procedures are outlined in Table 2-10.

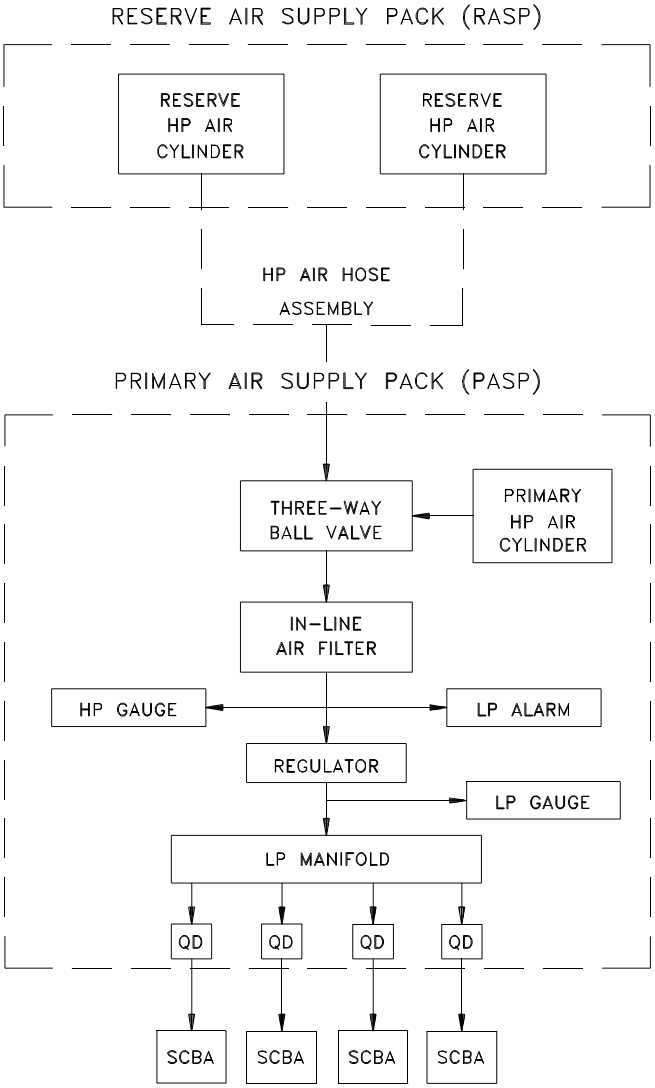

Figure 3-5. SAR/SCBA Airflow Diagram

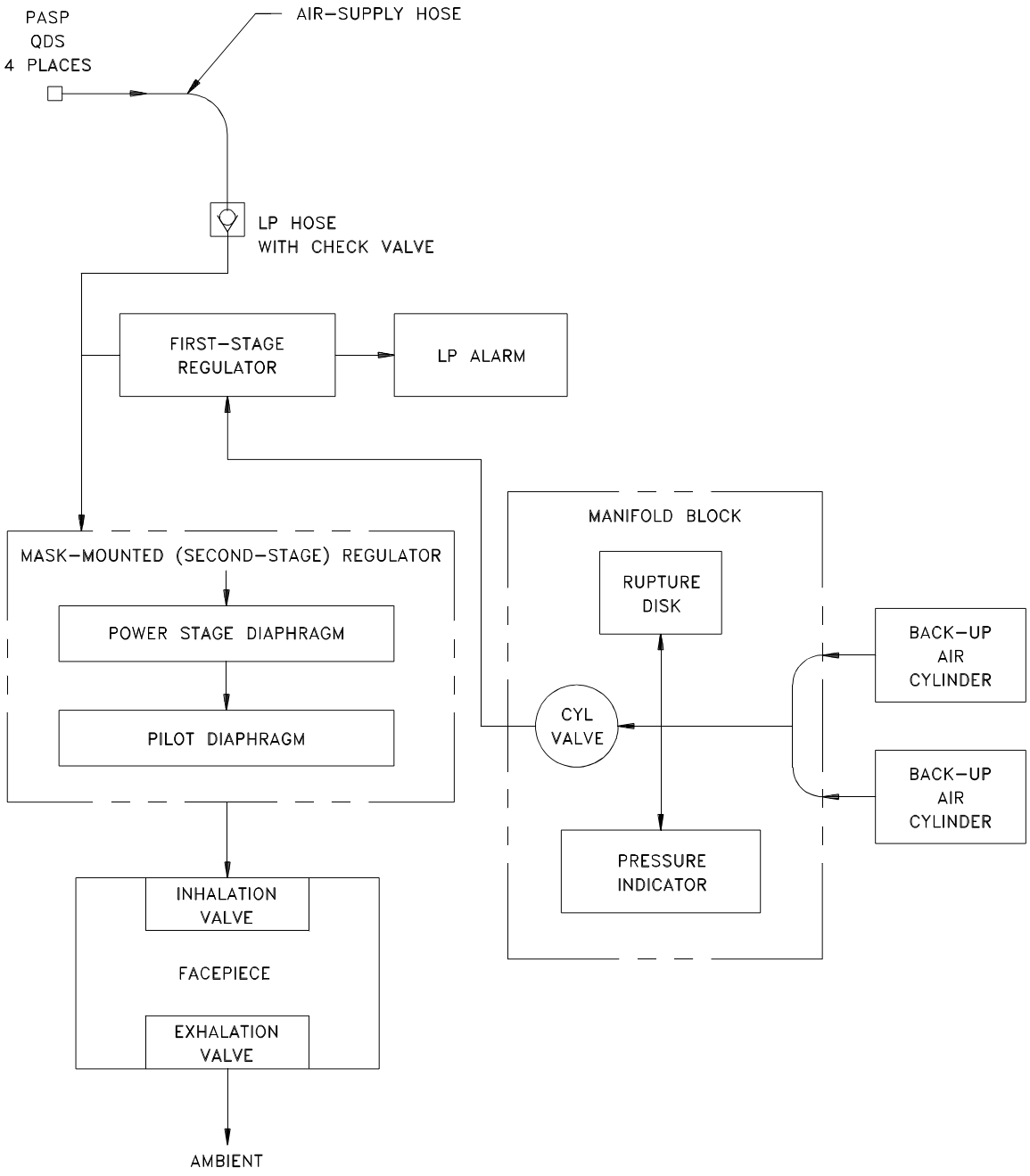

Figure 3-6. SCBA Airflow Diagram

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CHAPTER 4
SCHEDULED MAINTENANCE

4.1 INTRODUCTION.

WARNING

Properly performed scheduled maintenance is essential to safe, dependable operation of the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA). Omission or negligent performance of prescribed maintenance procedures could result in equipment failure, injury, or death to personnel.

This chapter provides general information to assist personnel in reporting problems, and planning and scheduling maintenance activities for the SAR/SCBA.

4.2 SCOPE.

The scope of this chapter includes general maintenance information and reporting requirements. Maintenance activities for the SAR/SCBA are based upon the Navy 3-M Planned Maintenance System (PMS). This system classifies maintenance into two categories: scheduled and unscheduled.

Scheduled maintenance primarily involves actions required to ensure the reliable operation of the SAR/SCBA. Scheduled maintenance requirements include such actions as inspections, cleaning, leak tests, and operational tests. Scheduled maintenance procedures for the SAR/SCBA are set forth in the Maintenance Index Page (MIP) and Maintenance Requirement Cards (MRCs). The initial release MIP and MRCs are effective only until the Semiannual Force Revisions (SFRs) are issued through regular PMS channels. In the event of conflict between this manual and the PMS, the PMS requirements prevail.

4.2.1 Maintenance Index Pages (MIPs). One MIP, included as part of the PMS, provides an index to all MRCs for the SAR/SCBA. The MIP contains a cross-reference to the appropriate MRC for a particular maintenance action. The MIP includes:

- a title that identifies the MRC set
- reference publications
- configuration data for the equipment
- SYSCOM maintenance requirement card control number and periodicity code
- all maintenance requirements for a given system, subsystem, or equipment
- a designator to indicate the MRCs that include one or more tests
- recommended rates, estimated hours, and a periodicity code for related maintenance

The alphanumeric periodicity code, as it appears on the MIP for each maintenance action, is also included on the MRC. This code identifies the frequency of each maintenance action.

4.2.2 Maintenance Requirement Cards (MRCs). SAR/SCBA scheduled maintenance is accomplished on a scheduled and periodic basis, or on a situation-dictated basis. Maintenance procedures are provided on MRCs. Each MRC includes:

- a brief description of the task
- a periodicity code
- recommended rates, estimated hours, and a periodicity code for related maintenance
- required safety precautions
- required tools, parts, and test materials
- detailed procedures

The frequency of individual PMS maintenance actions is described by the periodicity codes shown in Table 4-1. For example, M-1R indicates that the action be performed on a quarterly basis or whenever a specific situation occurs, such as after an operational use.

Unscheduled maintenance includes actions required to locate equipment faults and correct failures or performance degradations. Unscheduled maintenance, such as repair and certain replacement procedures, is normally performed by maintenance technicians trained in service requirements. Unscheduled maintenance actions are identified in Chapter 5, Troubleshooting and in Chapter 6, Corrective Maintenance.

Table 4-1. Periodicity Codes

Code	Periodicity
Calendar	
D	Daily
W	Weekly
M	Monthly
Q	Quarterly
S	Semiannually
A	Annually
18M	Each 18 months
24M	Each 24 months
Non-Calendar	
R	Situation requirement
U	Unscheduled maintenance
Inactive Equipment Maintenance	
LU	Lay-up maintenance
PM	Periodic maintenance
SU	Start-up maintenance
OT	Operational test

4.3 U. S. NAVY 3-M SYSTEM COVERAGE AND PROBLEM REPORTING.

The provisions of the U. S. Navy 3-M Manual (OPNAVINST 4790.4B) apply to the SAR/SCBA. Accordingly, problems and corrective maintenance arising from PMS should be properly reported using OPNAV Form 4790/2K to ensure timely and accurate Maintenance Data System (MDS) documentation of SAR/SCBA performance in the Fleet. In addition to Fleet requirements, SAR/SCBA MDS input from Fleet units is used by the In-Service Engineering Agent (ISEA) to identify and correct problems with the system, documentation, and provisioning, including Coordinated Shipboard Allowance List support.

The ISEA for the SAR/SCBA may be contacted as follows:

Mail: Commanding Officer
Coastal Systems Station, Code A53
Panama City, FL 32407-7001

Telephone: 850-234-4653 (Commercial)
436-4653 (Defense Switch Network)

Fax: 850-234-4775 (Commercial)
436-4775 (Defense Switch Network)

Naval Message Plain Language Address Directory (PLAD): NAVSURFWARCEN COASTSYSTA PANAMA CITY FL (2530)

Units and activities are requested to make the SAR/SCBA ISEA an ACTION or INFO addressee, as appropriate, on messages pertaining to this equipment, particularly Casualty Reports (CASREPs), Operational Reports (OPREPs), Safety Reports, and message work requests that may require ISEA action.

Discrepancies or problems with this technical manual, should be reported immediately on the NAVSEA/SPAWAR Technical Manual Deficiency/ Evaluation Report (TMDER), NAVSEA 4160/1 (REV 3/2001). The form is located in the back of this manual.

The form should be submitted to:

Commander
NAVSURFWARCENDIV
Code 5B31, Bldg. 1388
4363 Missile Way
Port Hueneme, CA 93043-4307

Additionally, OPNAVINST 4790.4B (3-M Manual) requires that a PMS feedback report (PMS FBR), OPNAV 4790/7B Form, be submitted for any PMS-related documentation or technical problem.

4.4 GENERAL MAINTENANCE INSTRUCTIONS.

WARNING

Repair or replace worn or damaged parts with authorized replacement parts. Failure of SAR/SCBA during operations may result in injury or death to operators.

Do not disassemble components while SAR/SCBA is pressurized. Before performing maintenance, ensure that air supply has been shut down and all pressure has been vented (bled) from the system. Accidental exposure to escaping HP air may result in damage to equipment, serious injury, or death to personnel.

4.4.1 Disassembly and Replacement Parts. Disassemble the equipment only as necessary for scheduled maintenance, cleaning, inspection, and repair. Maintenance

required at the Organizational and Intermediate levels is specified in the MRCs. Use only approved SAR/SCBA replacement parts.

4.4.2 Cleaning and Leak-Check Solutions.

WARNING

Accomplish all procedures in a **clean** environment. Contamination of the breathing air system could result in serious injury or death to personnel.

Refer to the PMS MRCs for cleaning and leat test solutions and requirements.

4.4.3 Lubricants. Use only the lubricants authorized on the MRCs. Apply lubricants sparingly.

4.4.4 O-rings and Seals. Visually inspect O-rings and seals. Avoid unnecessary disassembly which may cause undue wear. Do not use metal screwdrivers or picks to remove O-rings. Remove O-rings and other non-metallic seals or packings with fingers. If this cannot be easily done, use the appropriate tool, such as an O-ring removal tool. Upon inspecting O-rings or seals, they may be reinstalled if undamaged. Damaged O-rings and seals, however, should be cut and discarded.

4.5 SCHEDULED MAINTENANCE

The following paragraphs summarize scheduled maintenance requirements for the SAR/SCBA. Refer to the PMS for detailed requirements.

4.5.1 Quarterly Maintenance. Quarterly maintenance includes general cleaning and inspection of the PASP, RASP, and SCBA units. Inspections are performed to identify any damage which could affect operation of the equipment. In addition, system tightness tests are performed on the PASPs, and the SCBA units are leak tested. The equipment must also be operated at least once every quarter. The operational test must include all the PASP and SCBA units.

4.5.2 Annual Maintenance. Annual maintenance includes inspecting all HP and LP air hoses and fittings. As part of the inspection, the hydrostatic test data should be checked on the hose tag to identify hoses which need to be hydrostatically tested. In addition, the PASP regulator is tested and adjusted annually.

4.5.3 Eighteen-Month Maintenance. The HP and LP pressure gauges located on the PASP CPA must be calibrated every eighteen months.

4.5.4 Three-Year Maintenance. Air cylinders must be hydrostatically tested every three years. This includes both PASP/RASP air cylinders and the SCBA air cylinders. A list of facilities authorized to retest DOT cylinders is located on the DOT internet web page at **http://hazmat.dot.gov/files/approvals/hydro/hydro_retesters.htm**. The breathing apparatus must be flow tested every three years.

4.5.5 Six-Year Maintenance. Breathing apparatus must be overhauled every six years. Overhaul must be performed at an MSA authorized service facility. For the location of th enearest MSA authorized service facility, call 1-800-MSA-2222.

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CHAPTER 5
TROUBLESHOOTING

5.1 INTRODUCTION.

This chapter contains the troubleshooting procedures and data to assist personnel in locating malfunctions after faulty operation of the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA). The troubleshooting procedures are designed for the operator and the SCBA user. Table 5-1 displays potential problems and corrective actions.

5.2 GENERAL INSTRUCTIONS.

Troubleshooting is based on locating potential faults in the equipment and taking timely corrective action. In the event that serious problems arise during an operation, follow the emergency procedures in Chapter 2, Operation.

NOTE

The manual does not list all malfunctions or causes that may apply, nor all tests, inspections, or corrective actions. If a malfunction is not listed or is not remedied by the corrective actions, notify the supervisor. Also, complete and submit Technical Deficiency/Evaluation Report (TMDER) located at end of this manual.

Table 5-1. Troubleshooting Guidelines for the SAR/SCBA

Symptom(s)	Probable Cause(s)	Corrective Action(s)
Difficulty breathing (lack of air supply)	a. Damaged hose	a. Repair/replace hose IAW MRC 5519 A-2R or Chapter 6
	b. Twisted hose	b. Remove kinks
	c. On-line HP air cylinder low on air	c. Shift to full air cylinder
	d. PASP regulator improperly adjusted	d. Turn regulator knob CW until PASP LP gauge (ALP-G202) indicates 80 psig (nominal)
	e. PASP in-line HP air filter clogged	e. Inspect IAW MRC 5519 R-2 and perform associated maintenance
	f. SCBA first-stage regulator failed	f. Return to authorized maintenance facility for regulator replacement
	g. SCBA MMR (second-stage) regulator failed	g. Return to authorized maintenance facility for repair/replacement
Breach of isolated environment, exposure to atmospheric contaminant (e.g., smell of fumes, irritation to eyes)		**NOTE** Exit space. Remove SAR/SCBA and perform following corrective actions, as applicable:
	a. Facepiece leaks	a. Retighten harness straps or replace facepiece
	b. Hose(s) leaks	b. Replace hose
	c. Lens leaks	c. Replace lens and/or gasket IAW Chapter 6
	d. SCBA speaking diaphragm leaks	d. Replace speaking diaphragm IAW Chapter 6

Table 5-1. Troubleshooting Guidelines for the SAR/SCBA - Continued

Symptom(s)	Probable Cause(s)	Corrective Action(s)
Breach of isolated environment, exposure to atmospheric contaminant (e.g., smell of fumes, irritation to eyes) - **Continued**	e. SCBA inhalation or exhalation valve leaks	e. Replace defective valve IAW Chapter 6
	f. SCBA MMR (second-stage) leaks externally	f. Inspect O-ring. If defective, replace IAW Chapter 6. If leak continues, return to authorized maintenance facility for repair
Primary air supply cylinder valve (AHP-V201, AHP-V301, or AHP-V302) on PASP/RASP cylinder fails OPEN, SHUT, or in an intermediate position	Defective cylinder valve	Shift to a different HP air cylinder; repair or replace IAW Chapter 6
Three-way ball valve (AHP-V204) fails in CLOSED position or cannot be aligned with a charged HP air cyl-inder	Defective three-way ball valve	Activate SCBA and exit space; repair or replace valve IAW Chapter 6
HP/LP gauge (AHP-G201/ALP-G202) displays incorrect readings	Defective gauge	Activate SCBA and exit space; calibrate or replace gauge(s) IAW MRC 5519 18M-1R or Chapter 6
PASP regulator (AHP-V205) free flows; LP gauge (ALP-G202) pressure may be excessive, regulator may not control pressure, first-stage regulator in SCBA may relieve	Failed, contaminated, or defective regulator seat	Close three-way ball valve. Shift to SCBA and exit space; repair or replace PASP regulator IAW Chapter 6
PASP regulator (AHP-V205) control fails	Defective or loose knob	Activate SCBA and exit space; repair or replace knob
Rapid loss of air throughout PASP/RASP subsystems		In each case, activate SCBA and exit space, then:
	a. HP/LP hose assembly or PASP/RASP air cylinder seal ruptures	a. Replace defective hose IAW Chapter 6. Return HP air cylinder to authorized maintenance facility for repair
	b. PASP piping system or component rupture	b. Replace defective piping or component IAW Chapter 6
Rapid loss of air from SCBA subsystem		EXPEDITE EXITING SPACE:
	a. HP/LP hose assembly or SCBA air cylinder O-ring ruptures	a. Replace defective hose IAW Chapter 6. Return SCBA air cylinder to authorized repair facility if O-ring rupture is suspected
	b. SCBA air circuit component rupture, such as check valve	b. Replace defective piping or component IAW MRCs or Chapter 6. If not repairable, return to authorized maintenance facility, if appropriate

Table 5-1. Troubleshooting Guidelines for the SAR/SCBA - Continued

Symptom(s)	Probable Cause(s)	Corrective Action(s)
SCBA cylinder valve fails SHUT or OPEN	Defective SCBA cylinder valve	Return to authorized maintenance facility for cylinder valve replacement EXPEDITE EXITING SPACE if SCBA cylinder valve fails SHUT
SCBA regulator [(first-stage or MMR (second-stage)] has low-flow performance	a. Air cylinder valve not fully open, or pressure at wrong setting	a. Be sure air cylinder valve handwheel is fully open and that inlet pressure is between 60-80 psig
	b. MMR (second-stage) inlet filter screen may be clogged	b. Return to authorized maintenance facility for repair
	c. MMR (second-stage) may require adjustments	c. Return to authorized maintenance facility for repair
Air leaking at MMR (second-stage)	a. Inlet air hose swivel not fully engaged	a. Manually tighten swivel block
	b. Inlet air hose swivel O-rings leaking	b. Replace IAW Chapter 6
	c. Facepiece connection leaking	c. Rethread; if leak persists, return to authorized maintenance facility for repair
Air leaking at SCBA LP hose and/or fittings	a. Fitting is loose	a. Tighten fitting with wrenches
	b. Hose is damaged	b. Disassemble fitting, apply new tape, reassemble IAW Chapter 6; or replace damaged part
Air leaking at CGA 346 nut on SCBA first-stage regulator	a. Loose nut	a. Tighten loose nut
	b. Damaged or missing O-ring	b. Replace O-ring IAW with Chapter 6
Air leaking in SCBA HP hose and/or fittings	Connections are loose or seals are defective	Return to authorized maintenance facility for repair
Head harness strap is worn or broken	Excessive use, misuse, or improper storage	Replace harness IAW Chapter 6
Lens is damaged or hard to see through	Excessive use, misuse, or improper storage	Replace lens IAW Chapter 6
Speaking diaphragm O-ring leaks	a. Retainer ring is loose	a. Tighten retainer ring
	b. O-ring is worn or missing	b. Replace O-ring IAW with Chapter 6
Exhalation valve does not seal	a. Dirty exhalation valve	a. Clean valve assembly IAW MRC 5519 M-1R
	b. Worn exhalation valve assembly	b. Replace valve assembly IAW Chapter 6

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CHAPTER 6
CORRECTIVE MAINTENANCE

6.1 INTRODUCTION.

The corrective maintenance information presented in this chapter includes actions and procedures required to restore the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA) equipment to a fully operational condition. The chapter presents both general repair information and maintenance repair procedures to facilitate the repair and replacement of inoperative parts or assemblies. The repair procedures are provided for personnel working at the Organizational and Intermediate levels.

The corrective maintenance procedures identify the action to be accomplished; safety precautions to be observed; tools, parts, and materials required; and step-by-step instructions with supporting illustrations to accomplish the maintenance task.

To assist in evaluating failure rates, all failed parts shall be returned to: Commanding Officer, Code A53, Coastal Systems Station, Panama City, FL 32407-7001. Do not return parts that have worn out from normal use.

6.2 SAFETY REQUIREMENTS.

WARNING

Before performing corrective maintenance on the SAR/SCBA, maintenance personnel shall review and become thoroughly familiar with general safety notices and precautions listed in Safety Summary and this chapter. Repair or replacement procedures, along with corresponding warnings and cautions, shall also be read before performing corrective maintenance. Failure to follow safety precautions could cause serious injury or death.

Repair or replace worn or damaged parts with authorized replacement parts. Failure of SAR/SCBA during operations may cause serious injury or death to operators.

Accomplish maintenance procedures in a **clean** environment. Contamination of breathing air system may result in injury or death to SCBA user.

WARNING

Before performing maintenance on SAR/SCBA, ensure that air supply has been shut OFF and all pressure has been vented (bled) from system. Accidental exposure to escaping HP air could cause injury or death to maintenance personnel.

Ensure O-rings in good condition are installed in SAR/SCBA. Failure of an O-ring in SAR/SCBA components could cause damage to equipment, operational abort, injury, or death to SAR/SCBA user.

CAUTION

Remove O-rings by hand or with O-ring removal tool. Take care not to damage O-rings during removal. Inspect all O-rings removed while performing maintenance. Ensure O-rings are checked for unacceptable deformation, cuts or nicks, embrittlement, or excessive stretch. Defective O-rings must be replaced. Lightly lubricate reusable or replacement PASP O-rings with silicone compound (MIL-S-8660) and SCBA O-rings with Christo-Lube® (MIL-G-27617E).

6.3 ADJUSTMENTS AND ALIGNMENTS.

6.3.1 Organizational Level. Adjustments or post-repair alignments are not applicable to the Organizational level.

6.3.2 Intermediate Level. The corrective maintenance performed on the repairable equipment at the Intermediate level requires the following adjustments and alignments:

a. Test stand verification of PASP/RASP HP air cylinder valve pressure indicator operation.

b. Calibration of PASP HP and LP gauges in the event no field calibration activity certification is maintained by the operational unit.

c. For the SCBA, no Intermediate-level maintenance is authorized unless the Intermediate Level Maintenance Activity (IMA) has been certified to perform SCBA maintenance by the equipment manufacturer.

6.4 TOOLS AND SUPPORT EQUIPMENT.

Tables 6-1 through 6-3 list recommended tools, supplies, and vendors.

Table 6-1. Tool List

Tool	Vendor	Part or Identifying No.	NSN	CAGE Code	SPMIG No.
Ratchet handle, 3/8" drive	Snap-on	FN720A	5120-01-335-0729	55719	0624
Extension, socket wrench 3/8" sq. drive, 6"	Snap-on	FXK6	5120-00-227-8107	55719	0407
Screwdriver, cross-tip, #2	K-D Tools	40-507	5120-01-344-6898	08292	-
Screwdriver, flat-tip, 1/8"	GSA	GGG-S-121 TY1CL85T2	5120-00-236-2140	80244	1187
Socket, 1/2" × 3/8" drive	Snap-on	SF161	5120-01-335-0906	55719	3451
Socket, 9/16" × 3/8" drive	Snap-on	SF181	5120-01-335-0907	55719	3671
Wrench, Allen, 3/32"	Snap-on	GAW3	5120-01-300-1172	55719	-
Wrench, adjustable, 8"	Snap-on	AD8	5120-01-367-3392	55719	1463
Wrench, open-end, 11/32"	Snap-on	OEX11A	5120-01-335-1231	55719	-
Wrench, open-end, 3/8"	Snap-on	OEX12A	5120-01-335-1232	55719	-
Wrench, open-end, 7/16"-1/2"	Snap-on	S1416	5120-00-187-7123	55719	3494
Wrench, open-end, 1/2" - 9/16" slim	Snap-on	LTA1618	5120-01-335-1204	55719	-
Wrench, open-end, 5/8" - 11/16" Wrench, open-end, 5/8" - 11/16" slim	Snap-on Snap-on	V02022 LTA2022	5120-01-335-1189 5120-01-335-1205	55719 55719	-
Wrench, open-end, 3/4" - 13/16"	Snap-on	V02426	5120-01-335-1192	55719	-
Wrench, open-end, 7/8" - 15/16"	Snap-on	V02820	5120-01-335-1215	55719	-
Wrench, open-end, 1" -15/16" slim	Snap-on	LTA3032	5120-01-335-1207	55719	1763
Wrench, open-end, 1-1/2"	Snap-on	OEX48	5120-00-277-8834	55719	2587
Wrench, open-end, 1-1/8"	Snap-on	VO3638B	5120-01-335-1219	55719	-
O-ring removal tool	Parker-Hannifin	887-200 EXKIT	5120-01-021-7381	02697	2077
Crowfoot, 11/16", 3/8" drive	Snap-on	FC22A	5120-01-335-1154	55719	-
Crowfoot, 3/4"	Snap-on	FC24A	5120-01-335-1155	55719	-
Tweezers, craftsman's general purpose, fine-tip 4-1/2"	Marshall-Swartchild	43110	5120-00-247-0867	58692	1411

Table 6-2. Specialty Tools (Supplied with SAR/SCBA)

Tool	Vendor	Part or Identifying No.	CAGE Code	Use
Pressure-demand exhalation wrench (spanner wrench)	MSA	461828	55799	Unscrew retaining ring for SCBA speaking diaphragm and exhalation valve retaining nut
Quick detachable plug, 1/4" NPT (male QD with female thread)	Foster Mfg. Co., Inc.	11-3B	14127	MRCs 5519 A-1R, R-2
Polypropylene tube connector, straight	AIN Plastics	Z19724	0DFJ8	MRCs 5519 M-1R

Table 6-3. Consumable Supplies

Description	NSN	Use
Leak-test solution, MIL-L-25567	6850-00-186-2963	Leak diagnostic test, HP air hose tightness test, 8-oz. bottle
Silicone compound, MIL-S-8660	6850-00-880-7616	PASP O-ring replacement, 2-oz. tube
Tape, Teflon®	8030-00-889-3534	LP QD replacement, HP air hose assembly nipple replacement
Christo-Lube® lubricant, MIL-G-27617E	9150-01-441-9016	SCBA O-ring lubricant, 2-oz. tube

6.5 PASP CORRECTIVE MAINTENANCE.

The PASP consists of an HP air cylinder assembly, control panel assembly (CPA), and HP air hose assembly mounted in a welded aluminum case. Unless otherwise noted, corrective maintenance of the PASP is limited to removal and replacement of failed components.

6.5.1 HP Air Cylinder Assembly Repairs.

Refer to Chapter 8 for HP air cylinder inspection criteria and repair information.

Minor repairs to the overwrap on an HP air cylinder must be performed by an IMA or other activity that can both accomplish such repairs and hydrostatically test the repaired cylinders.

Minor repairs to cylinder overwrapping must be performed using any commercial, room-temperature cure, two-component epoxy resin system. Loose fibers should be trimmed away before coating affected area with resin. After resin applied to damaged area cures, the repaired cylinder must be hydrostatically tested before being returned to service. Flaw sites must be observed for lifting or peeling of the repaired overwrap that may have occurred during hydrostatic testing. If such lifting or peeling occurs after properly repairing and testing the composite cylinder, the cylinder must be rejected.

6.5.2 Control Panel Assembly (CPA).

6.5.2.1 Control Panel Assembly (CPA) Removal and Replacement (Figure 6-1).

a. Tools, Parts, Materials, and Test Equipment.

(1) Ratchet handle, 3/8" drive
(2) Screwdriver, cross-tip, #2
(3) Socket, 9/16"
(4) Wrench, open-end, 3/8"
(5) Parts: See Chapter 7 for part numbers and CAGE codes

b. CPA Removal.

(1) Place the PASP in an upright position. Remove HP air cylinder, if installed, as follows: Using a 3/8" ratchet and 9/16" socket, remove two 3/8" cap screws (1); remove mounting plate (2), pad (3), and spacers (4) attached to U-brace (5). Remove cylinder (6).

(2) Using a #2 cross-tip screwdriver, remove six panel retaining screws (7) and spacer screw (8). Hold CPA firmly and remove bracket screw (9). CPA will slide down and rest at bottom of PASP case assembly. Ensure HP air hose assemblies are disconnected and routed through top of PASP case assembly.

(3) Turn three-way ball valve (AHP-V204) handle toward either HP SUPPLY position so handle is parallel to front of CPA.

(4) Lift CPA by grasping three-way ball valve (AHP-V204) (11) with one hand. With other hand, hold regulator handle (12) and lift CPA until bottom clears the PASP case assembly. Pull on regulator handle and slide CPA out of front of weldment, bottom first, turning CPA as required to clear adhesively affixed clamp (10). Set weldment aside and place CPA on work table.

c. CPA Replacement.

(1) Loosen stiffener by untightening screw (14) on back of PASP to ensure spacer tube (13) wobbles slightly.

(2) Turn three-way ball valve (AHP-V204) handle toward either HP SUPPLY position so handle is parallel to front of CPA.

(3) Holding CPA as in Step b.(2), route HP air hose assemblies up through front of weldment; reach through top of weldment and grasp three-way ball valve (AHP-V204) (11), holding regulator handle (12) with other hand.

(4) Pull CPA into PASP case assembly, turning it as required to clear clamp (10), and loosely install top bracket (10-24 1/2") screw (9).

(5) Install stiffener (10-24 3/8") screw (8), reaching into the PASP case assembly and aligning screw to stiffener as necessary. Do not tighten screw.

(6) Install six (10-24 1/2") screws (7); do not tighten screws.

(7) Tighten three bracket screws (9), stiffener screws (8) and spacer screw (14), and six panel screws (7).

(8) Ensure three-way ball valve (AHP-V204) is in the CLOSE position.

(9) Reattach left HP air hose to the adhesively affixed hose clamp.

(10) Ensure U-brace (5) is tight. If required, replace PASP air cylinder (6). Install spacers (4), pad (3), and mounting plate (2); tighten two 3/8" cap screws (1) with 3/8" drive ratchet and 9/16" socket.

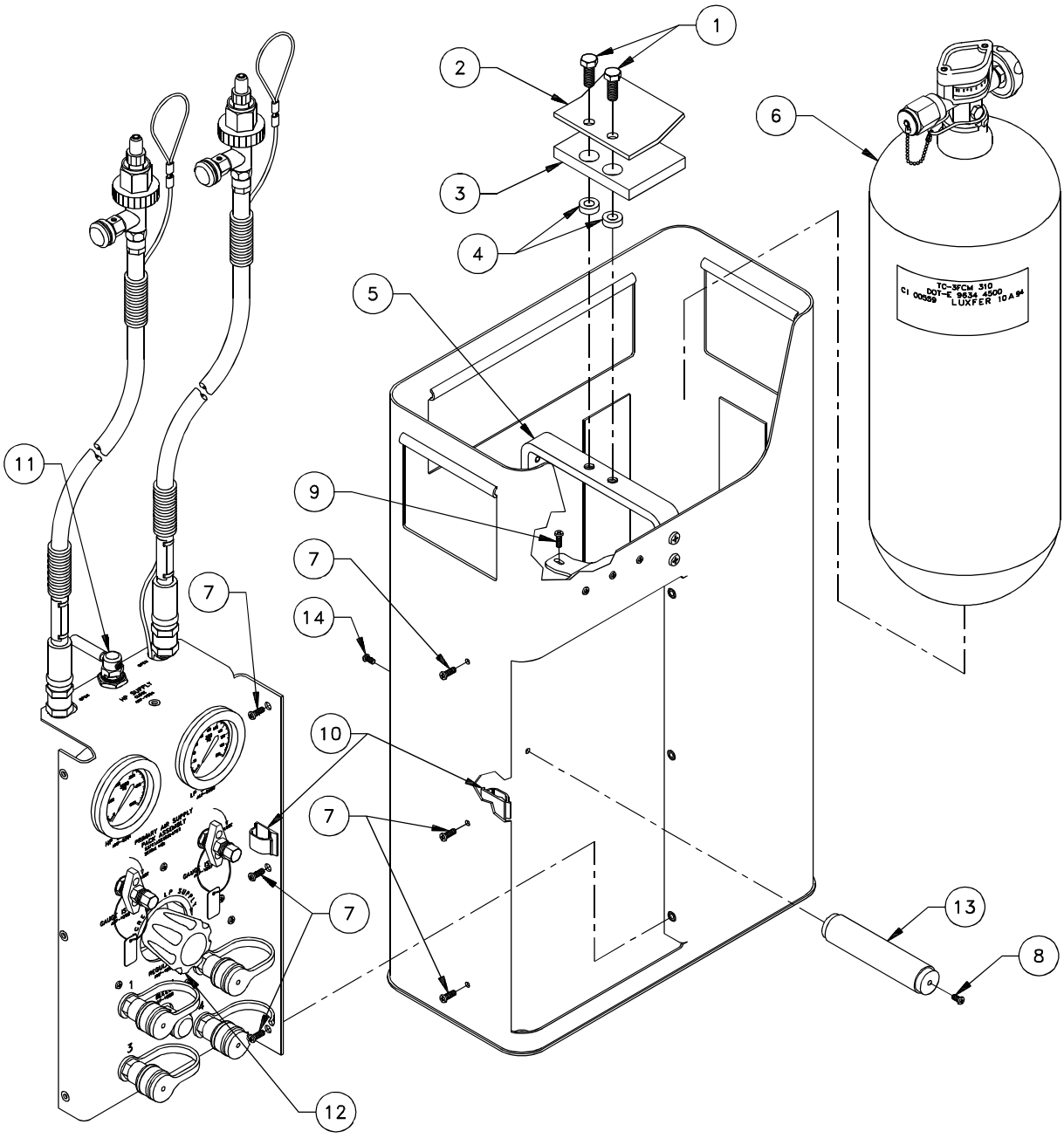

Figure 6-1. Exploded View of PASP

6.5.2.2 System Tightness Test (Figure 6-2).

a. Tools, Parts, Materials, and Test Equipment.
None

b. System Tightness Test.

(1) Test may be performed with CPA installed in PASP case assembly or laying on bench. Refer to paragraph 6.5.2.1 to remove CPA from weldment.

(2) Connect a PASP HP air hose assembly (1) to HP air cylinder (2). It is not necessary to connect two cylinders unless both hose assemblies or three-way ball valve has been replaced or loosened. The cylinder must be fully charged to 4,500 psig. The tightness test procedure requires each HP air hose assembly be tested, so a portion of the procedure below is repeated to permit testing each hose.

(3) Ensure HP air cylinder valve ((AHP-V201) (3), (AHP-V301) (4), or (AHP-V302) (5)) is shut.

(4) Align the following PASP valves as follows:

(a) Three-way ball valve (AHP-V204) (6): closed

(b) HP gauge isolation valve (AHP-V206) (7): ensure open

(c) LP gauge isolation valve (ALP-V207) (8): ensure open

(d) Regulator valve (AHP-V205) (9): fully CCW

(5) Slowly open HP air cylinder valve ((AHP-V201) (3), (AHP-V301) (4), or (AHP-V302) (5)) on fully charged HP air cylinder (2).

(6) Slowly position three-way ball valve (AHP-V204) (6) toward pressurized HP air cylinder.

(7) Adjust regulator (AHP-V205) (9) CW until LP gauge (ALP-G202) (11) reads 80 psig. Shut HP air cylinder valve ((AHP-V201) (3), (AHP-V301) (4), or (AHP-V302) (5)).

(8) Note HP gauge (AHP-G201) (10) reading.

(9) Wait 10 minutes.

(10) Note pressure on HP and LP gauges ((AHP-G201) (10) and (ALP-G202) (11)).

(11) If no difference between initial reading and 10 minute reading exists, the test is completed and the system is not leaking (a leak could cause the LP gauge to increase). If there is a difference in readings, perform leak diagnostic test IAW paragraph 6.5.2.3.

(12) Bleed down HP air hose assembly (1) using bleed valve (AHP-V202) (12) or (AHP-V203) (13).

(13) Disconnect HP air hose assembly (1) from HP air cylinder valve and connect second hose assembly to cylinder valve. Repeat Steps b.(5) through b.(11).

(14) Bleed down PASP using bleed valve ((AHP-V202) (12) or (AHP-V203) (13)).

(15) Position three-way ball valve (AHP-V204) (6) to shut position.

(16) Set regulator (AHP-V205) (9) fully CCW.

NOTE

Leave gauge isolation valves ((AHP-V206) (7) and (ALP-V207) (8)) open.

6.5.2.3 Leak Diagnostic Test.

a. Tools, Parts, Materials, and Test Equipment.

Leak-test solution, MIL-L-25567

b. Leak Diagnostic Test.

(1) Remove CPA IAW para 6.5.2.1, if not already removed.

(2) With CPA face down, perform system tightness test in paragraph 6.5.2.2 until leak is detected by applying leak-test solution on all joints and looking for bubbles at leak sites.

(3) When leak detected, perform applicable portions of maintenance procedure for closest major component to correct leak.

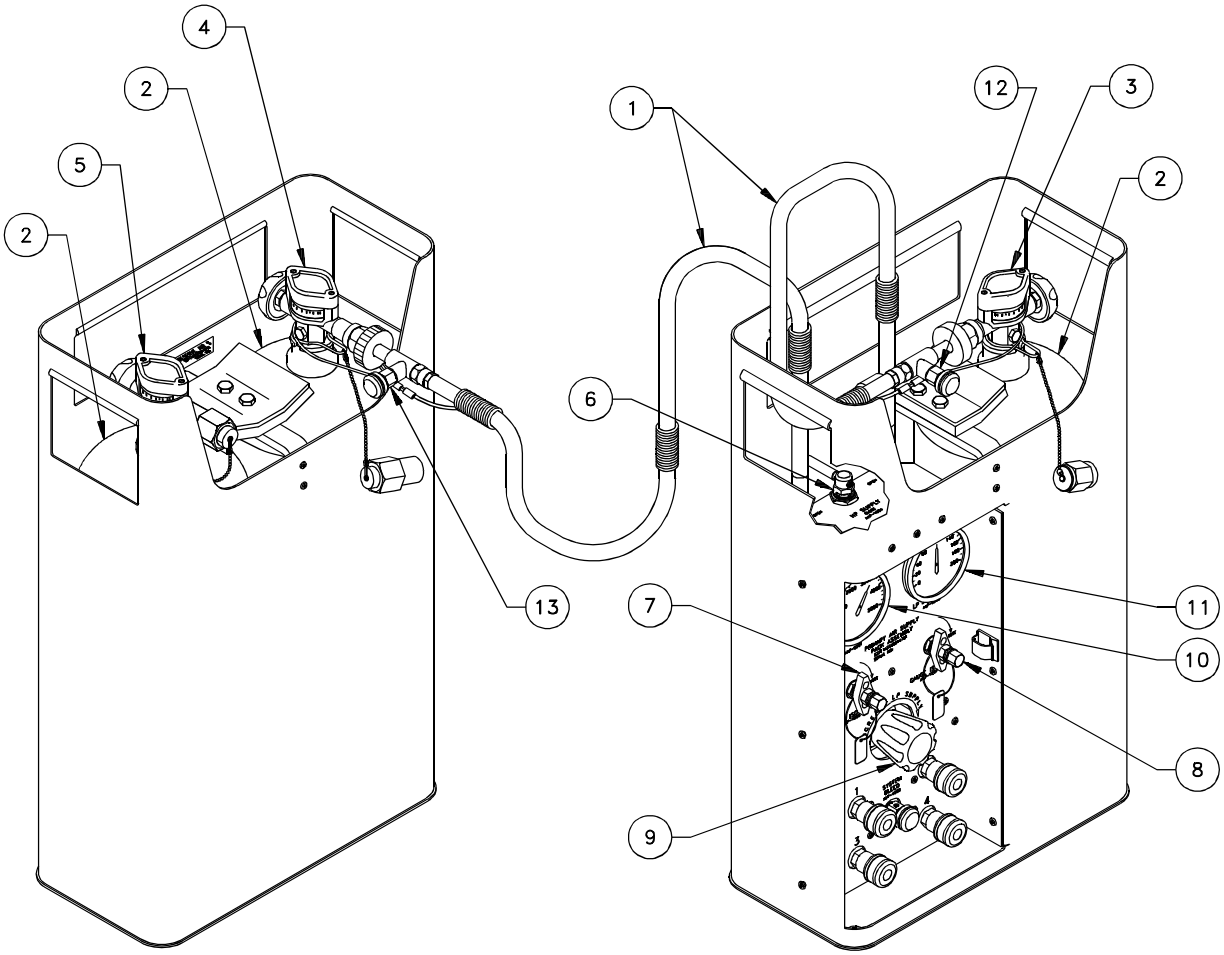

Figure 6-2. System Tightness Test (RASP is Optional)

6.5.2.4 Three-Way Ball Valve (AHP-V204) Removal and Replacement (Figure 6-3).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, Allen, 3/32"
(2) Wrench, open-end, 5/8"
(3) Wrench, open-end, 11/16"
(4) Wrench, open-end, 3/4"
(5) Wrench, open-end, 15/16"
(6) Two wrenches, open-end, 1"
(7) Parts: See Chapter 7 for part numbers and CAGE codes
(8) Silicone compound, MIL-S-8660

b. Three-Way Ball Valve Removal.

(1) Remove CPA IAW paragraph 6.5.2.1.

(2) Place CPA face down with three-way ball valve (1) facing the front of work table.

(3) Holding connector (4) with 15/16" open-end wrench, loosen tubing (5) nut with 1" wrench.

(4) Holding connector (6) with 15/16" wrench, loosen tubing (5) nut with 1" wrench. Remove tubing (5). Remove both O-rings (7, 8). Remove HP air hose assembly wire rope lanyards (17).

(5) Using 11/16" wrench, remove HP air hose assemblies (2). Remove both O-rings (3).

(6) Hold valve body with 1" wrench and remove filter (9) using 1" wrench. Leave connector (4) attached. Remove O-ring (10).

(7) Using 3/4" wrench, loosen both elbow (11) retaining nuts.

(8) Using 3/32" Allen wrench, remove set screw (12) in end of three-way ball valve handle (13); remove handle by pulling straight off stem.

(9) Loosen valve mounting nut (14) with 1" wrench; remove valve. Retain spacers (15).

(10) Remove both elbows (11) from valve. Remove both O-rings (16).

c. Three-way Ball Valve Replacement.

(1) Install O-rings (16) on elbows (11). Install elbows on valve as follows: screw completely into valve body; back off elbows until openings are parallel with valve stem. Hold each elbow (11) with 5/8" wrench and tighten elbow nuts with 3/4" wrench, maintaining elbows in proper orientation to valve stem.

(2) Install spacer(s) (15) on valve; position valve stem so that handle set screw hole is perpendicular to the wide part of the valve.

(3) Install valve (1) so that stop pin on top of valve is on the left side of the CPA as viewed from the front.

(4) Install valve mounting nut (14) and tighten with 1" wrench. Ensure valve body is parallel with edge of control panel, and elbows are centered in control panel holes.

(5) Install O-ring (10) on filter (9). Install filter into valve body hand-tight. Hold valve body with 1" wrench and tighten filter with 1" wrench.

(6) Feed wire rope lanyard (17) from each HP air hose assembly (2) through the control panel elbow holes. Place each loop around connector (4).

(7) Install new O-rings (3) on elbows (11).

(8) Install HP air hoses (2) on elbows (11); tighten using 11/16" wrench.

(9) Install O-rings (7, 8) on connectors (4, 6). Carefully fit tube (5) between connectors (4, 6) and hand-tighten two tube nuts. Hold nuts on tubes while holding connectors.

(10) Install valve handle (13) with handle lever pointing up (away from "HP SUPPLY"). Install set screw (12) and tighten with 3/32" Allen wrench.

(11) Perform system tightness test IAW paragraph 6.5.2.2.

(12) Reinstall CPA IAW paragraph 6.5.2.1.

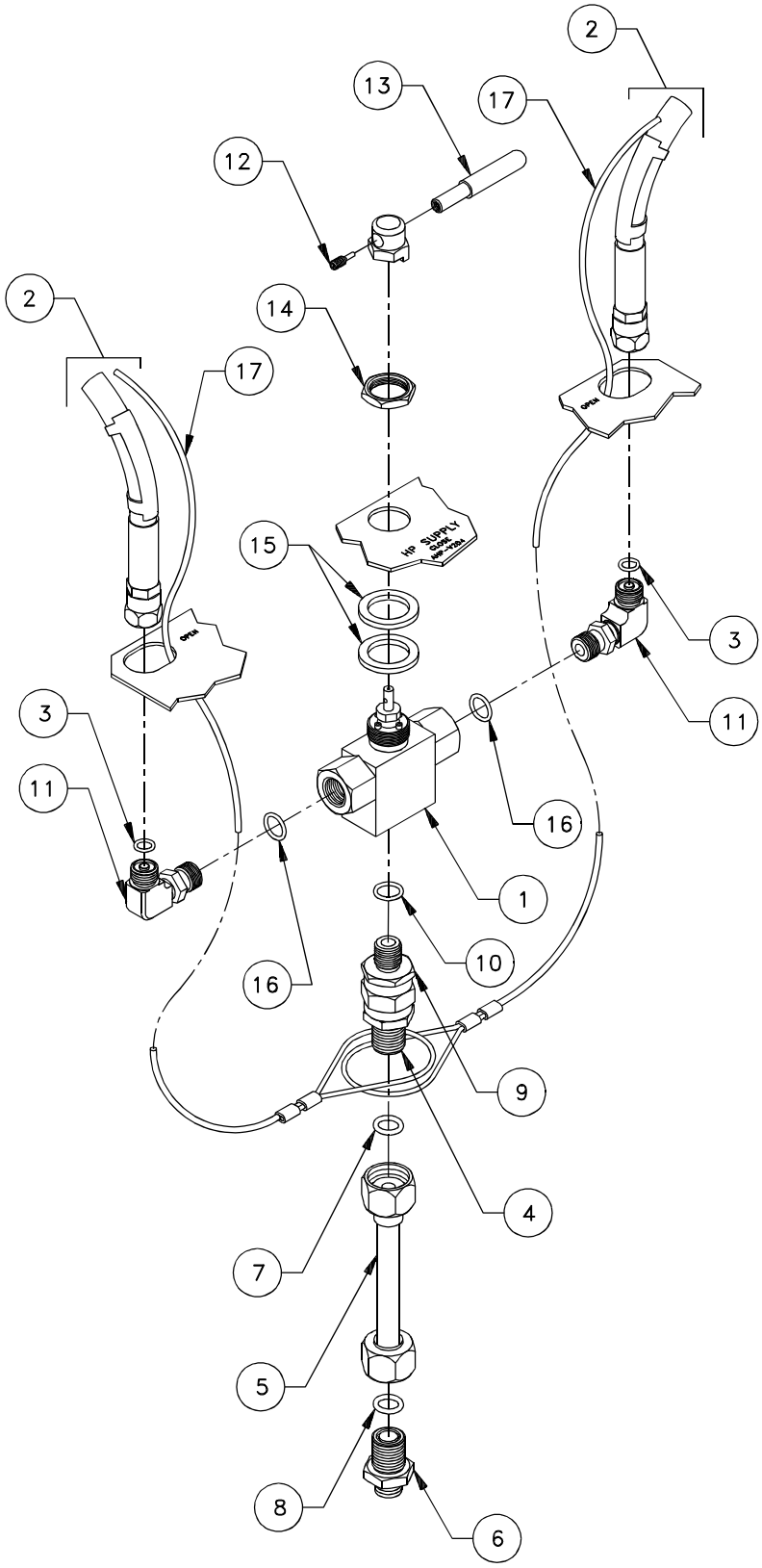

Figure 6-3. Three-Way Ball Valve (AHP-V204)

6.5.2.5 Filter Assembly (F-022) Removal and Replacement (Figure 6-4).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 15/16"
(2) Two wrenches, open-end, 1"
(3) Parts: See Chapter 7 for part numbers and CAGE codes
(4) Silicone compound, MIL-S-8660

b. Filter Removal.

(1) Remove CPA IAW paragraph 6.5.2.1. Place CPA face down on work table.

(2) Holding connector (1) with 15/16" wrench, loosen tube (2) upper nut with 1" wrench.

(3) Holding connector (3) with 15/16" wrench, loosen tube (2) lower nut with 1" wrench.

(4) Remove tube (2); remove O-rings (4, 5). Remove HP air hose assembly wire rope lanyards from around connector (1).

(5) Holding filter (6) with 1" wrench, loosen connector (1). Remove connector and remove O-ring (7).

(6) Holding body of three-way ball valve (8) with 1" wrench, loosen filter (6) with 1" wrench. Remove filter. Remove O-ring (9).

c. Filter Replacement.

(1) Carefully install O-ring (9) on filter (6).

(2) Screw filter into three-way ball valve (8) body; hand-tighten.

(3) Holding three-way ball valve (8) with 1" wrench, tighten filter (6) with 1" wrench.

(4) Install O-ring (7) on connector (1); screw connector into filter (6); hand-tighten.

(5) Holding filter (6) with 1" wrench; tighten connector (1) with 15/16" wrench.

(6) Check to ensure lower connector (3) is tight using a 15/16" wrench.

(7) Place HP air hose assembly wire rope lanyards around connector (1).

(8) Install O-rings (4, 5) into connectors (1, 3). Carefully fit tube (2) between connectors (1, 3) and hand-tighten two tube nuts. Tighten nuts while holding connector.

(9) Perform system tightness test IAW paragraph 6.5.2.2.

(10) Reinstall CPA IAW paragraph 6.5.2.1.

(11) Perform filter test IAW MRC 5519 R-2.

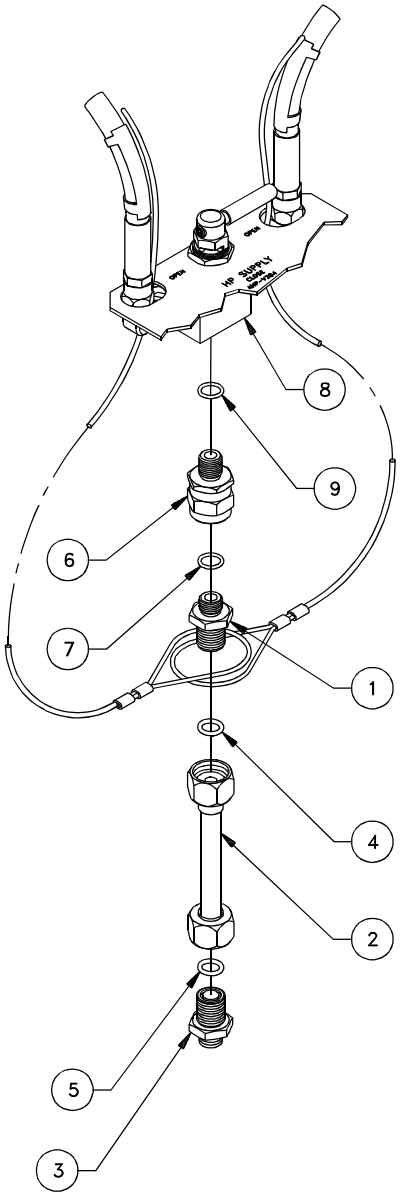

Figure 6-4. Filter Assembly (F-022)

6.5.2.6 HP Gauge (AHP-G201) or LP Gauge (ALP-G202) Removal and Replacement (Figure 6-5).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 11/32"
(2) Wrench, open-end, 9/16"
(3) Wrench, open-end, 11/16"
(4) Parts: See Chapter 7 for part numbers and CAGE codes
(5) Silicone compound, MIL-S-8660

b. Gauge Removal.

(1) Remove CPA IAW paragraph 6.5.2.1. Place CPA face down on work table.

(2) Holding gauge (1) connection fitting with 9/16" wrench, loosen coupling assembly (2) upper nut with 11/16" wrench. Slide coupling nut away from gauge fitting.

(3) Place hand beneath CPA and hold HP gauge in place.

(4) Loosen both gauge nuts (3) with 11/32" wrench.

(5) Remove nuts (3) and gauge bracket (4).

(6) Lift CPA by three-way ball valve and remove gauge through front of CPA.

(7) Remove and retain gauge spacer (5).

(8) Remove O-ring (6).

c. Gauge Replacement.

NOTE

Ensure gauge to be installed has been calibrated and that calibration sticker reflects 18-month periodicity.

(1) Install O-ring (6) on coupling assembly (2).

(2) Install gauge spacer (5) on gauge (1). Remove protective cap (if any) from gauge connection fitting.

(3) Lift CPA by three-way ball valve and place gauge (1) through hole in CPA. Orient gauge so that connection fitting is toward coupling assembly (2). Maintain gauge orientation while performing Steps (4) and (5).

(4) Install bracket (4); install and hand-tighten both nuts (3).

(5) Ensure coupling assembly (2) lower nut is tight using 11/16" wrench.

(6) Ensure gauge fitting connection is pressed firmly against upper surface of coupling face. Screw coupling assembly (2) upper nut onto gauge (1); hand-tighten.

(7) Hold gauge (1) connection fitting with 9/16" wrench; tighten coupling assembly (2) upper nut with 11/16" wrench.

(8) Tighten nuts (3) with 11/32" wrench until threaded stud is even with top of nut. Do not over-tighten.

(9) Perform system tightness test IAW paragraph 6.5.2.2 and observe proper gauge operation.

(10) Reinstall CPA IAW paragraph 6.5.2.1.

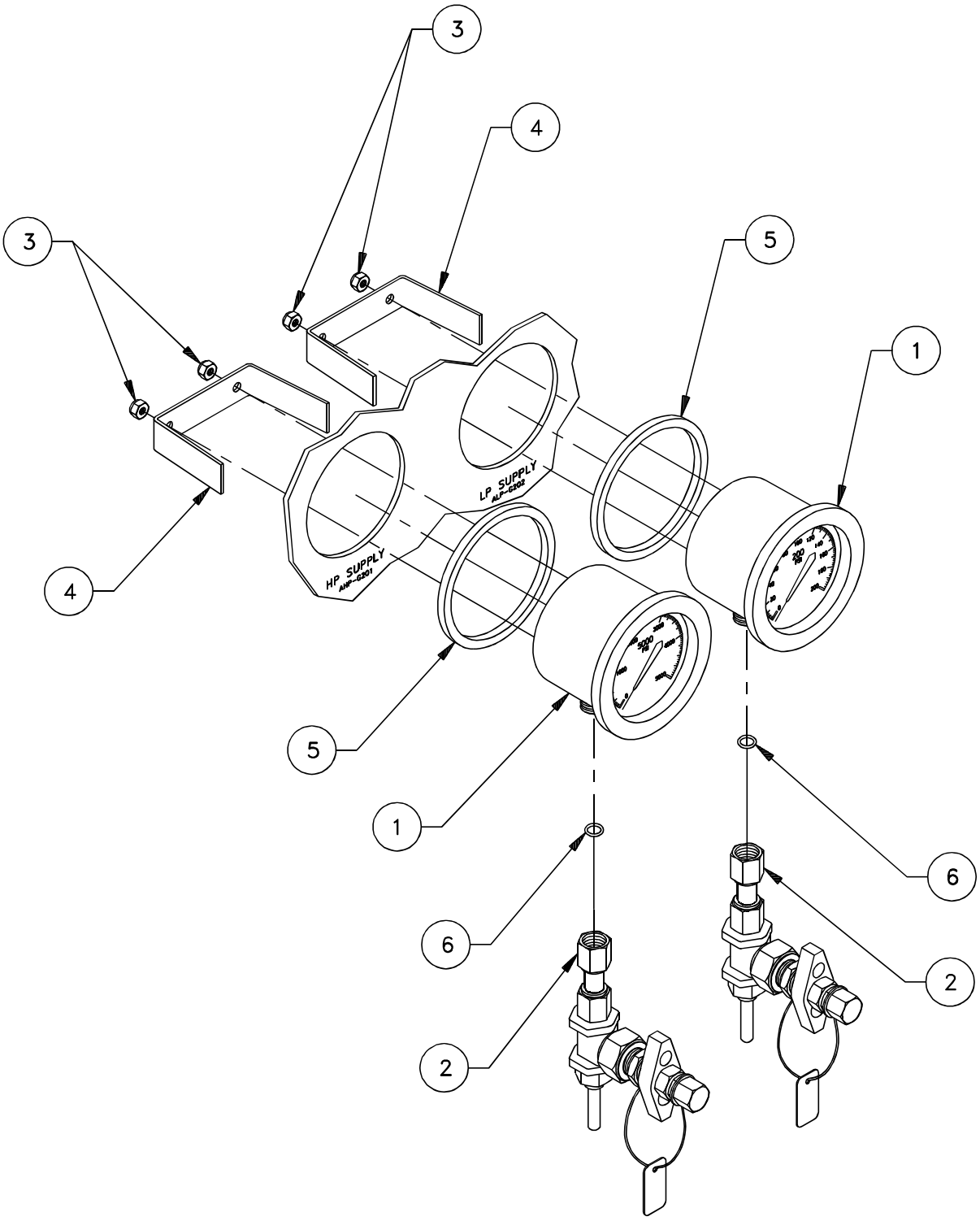

Figure 6-5. HP Gauge (AHP-G201) or LP Gauge (ALP-G202)

6.5.2.7 HP Gauge Isolation Valve (AHP-V206) or LP Gauge Isolation Valve (ALP-V207) Removal and Replacement (Figure 6-6).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, adjustable, 8"
(2) Wrench, open-end, 9/16"
(3) Wrench, open-end, 5/8"
(4) Wrench, open-end, 11/16"
(5) Wrench, open-end, 3/4"
(6) Parts: See Chapter 7 for part numbers and CAGE Codes
(7) Silicone compound, MIL-S-8660

b. HP/LP Gauge Isolation Valve Removal.

(1) Remove CPA IAW paragraph 6.5.2.1. Place CPA face down on work table.

(2) Remove isolation valve cap (4) with 9/16" wrench, holding the valve knob nut (2) with 5/8" wrench.

(3) Turn valve (1) fully CCW.

(4) Loosen valve knob nut (2) with 5/8" wrench; remove nut and valve knob (3).

(5) Remove lanyard with cap (4).

(6) Loosen valve lock washer nut (5) using 3/4" wrench; remove lock washer nut (5) and lock washer (6).

(7) Using 11/16" wrench, loosen union assembly (7) lower nut and tube (8) upper nut.

(8) Remove valve (1). Remove spacer (9).

(9) Remove both O-rings (10).

c. HP/LP Gauge Isolation Valve Replacement.

(1) Install spacer (9) on valve (1); observe direction of arrow on valve. Arrow should point up toward valve. (AHP-G201 or ALP-G202).

(2) Install both O-rings (10). Then carefully install valve in CPA. Hand-tighten union assembly (7) lower nut and tube (8) upper nut.

(3) Install lock washer (6) and lock washer nut (5).

(4) Hold valve (1) to maintain proper orientation while tightening valve lock washer nut (5) with 3/4" wrench.

(5) Tighten union assembly (7) lower nut and tube (8) upper nut with 11/16" wrench.

(6) Install valve cap lanyard with valve cap (4) over valve stem.

(7) Install valve knob (3) with smooth portion of handle facing toward CPA.

(8) Install valve knob nut (2) with recessed portion of nut toward handle; hand-tighten.

(9) Ensure valve (1) turned fully CCW.

(10) Holding knob (3) with 8" adjustable wrench, tighten valve knob nut (2) with 5/8" wrench.

(11) Install valve cap (4); hand-tighten.

NOTE

In Step (12) below, do not attempt to hold valve knob nut (2) with wrench, as it may loosen.

(12) Holding valve knob (3) with 8" adjustable wrench, tighten cap (4) with 9/16" wrench. Do not over-tighten. Cap is equipped with an internal seating surface that can be damaged by over-tightening.

(13) Reinstall CPA IAW paragraph 6.5.2.1.

(14) Perform system tightness test IAW paragraph 6.5.2.2, modified as follows:

(a) Skip Step b.(13).

(b) After conducting Step 14, place gauge isolation valve in the fully shut position (fully CCW) and repressurize PASP by slowly opening cylinder valve ((AHP-V201) (3), (AHP-V301) (4), or (AHP-V302) (5)) on charged HP air cylinder (2).

Gauge (AHP-G201 or ALP-G202) should read 0 psig.

NOTE

If gauge registers any pressure, valve may leak.

(c) Slowly open gauge isolation valve, and conduct Steps b.(14) through b.(17).

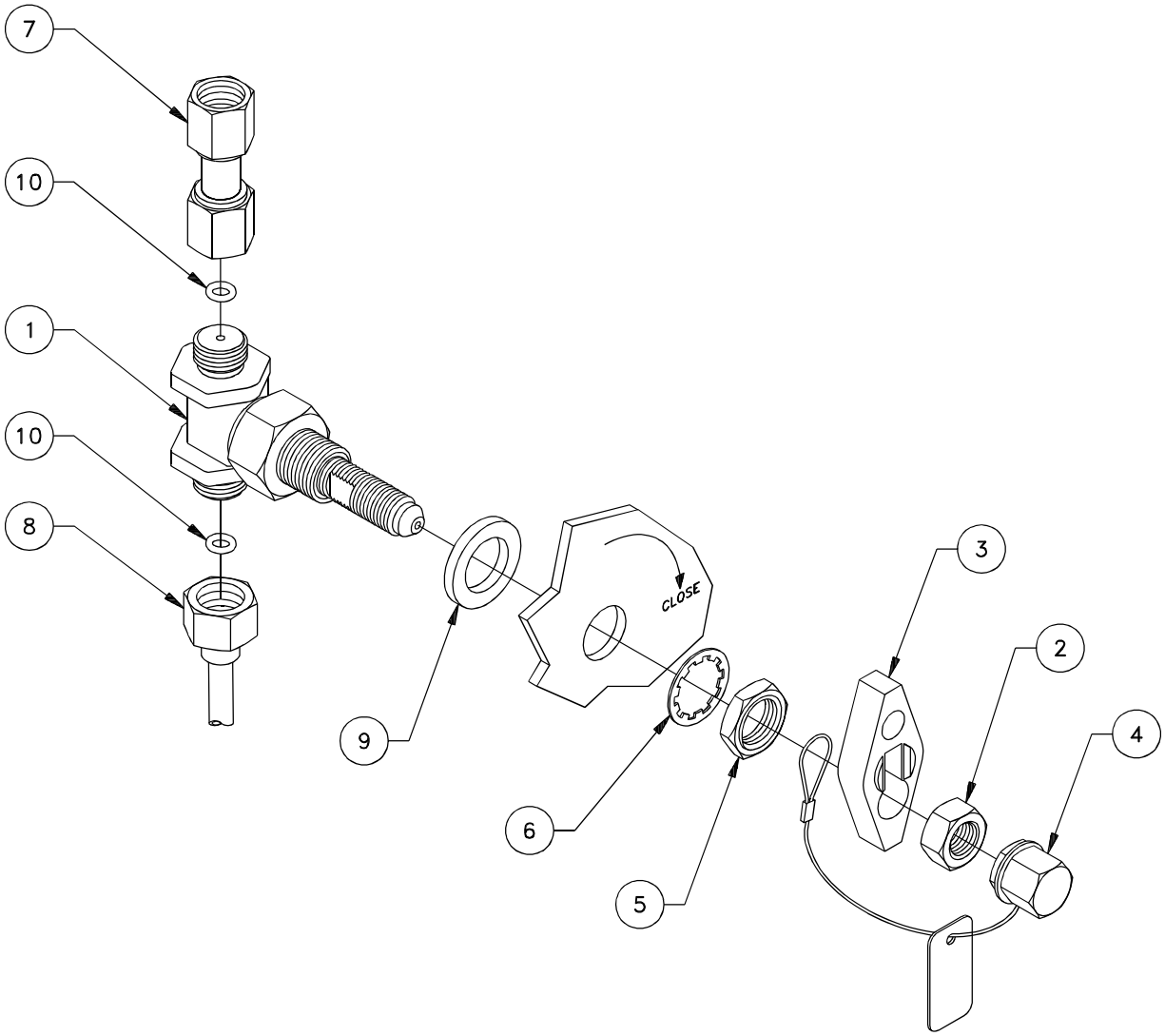

Figure 6-6. HP Gauge Isolation Valve (AHP-V206) or LP Gauge Isolation Valve (ALP-V207)

6.5.2.8 LP Alarm (F-024) Removal and Replacement (Figure 6-7).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 9/16"
(2) Wrench, open-end, 11/16"
(3) Wrench, open-end, 3/4"
(4) Parts: See Chapter 7 for part numbers and CAGE codes
(5) Silicone compound, MIL-S-8660

b. LP Alarm Removal.

(1) Remove CPA IAW paragraph 6.5.2.1.

(2) Using 11/16" wrench, loosen lower union nut (1) while holding LP alarm (2).

(3) Remove alarm (2) with union (1).

(4) Remove O-ring (3) from tee (4).

(5) With LP alarm (2) on work table, hold alarm body with 3/4" wrench, and loosen union (1) with 9/16" wrench. Remove union.

(6) Remove O-ring (5).

c. LP Alarm Replacement.

(1) Install O-ring (5) on union (1). Install union (1) on alarm (2); hand-tighten.

(2) Place LP alarm (2) on work table; hold body with 3/4" wrench and tighten union (1) with 9/16" wrench.

(3) Install O-ring (3) in tee (4).

(4) Situate alarm as shown in Figure 6-7, positioning LP alarm body beneath tube (6). Hand-tighten lower union nut (1) onto tee (4).

(5) Grip LP alarm (2) and tube (6) and tighten lower union nut (1) with 11/16" wrench. Ensure alarm does not touch tube (6) or LP gauge isolation valve (ALP-V207).

(6) Check to ensure tee (4) retaining nut is tight with 9/16" wrench and tube (7) nut is tight against tee (4) with 11/16" wrench.

(7) Conduct system tightness test IAW paragraph 6.5.2.2, modified as follows:

(a) Skip Step b.(13).

(b) As Step 14 (bleeding down PASP) is being conducted, note pressure on HP gauge (AHP-G201).

(c) As HP gauge pressure falls to 500 psig ± 50 psig, alarm should actuate. If alarm does not actuate, it is defective.

(d) If alarm does not silence as HP air pressure increases above 1,000 psig (nominal), it is defective.

(8) Reinstall CPA IAW paragraph 6.5.2.1.

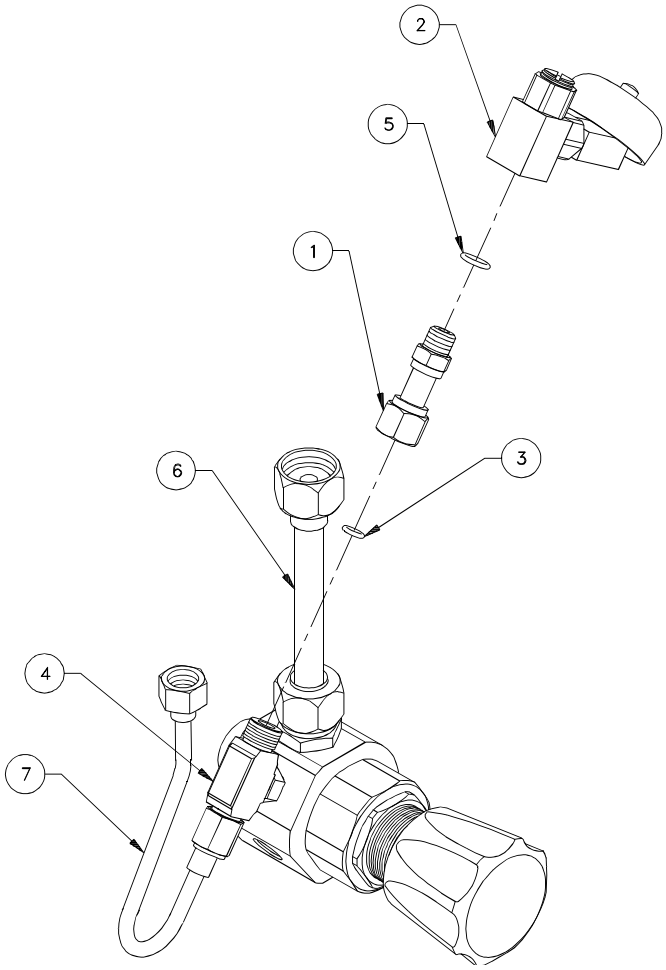

Figure 6-7. LP Alarm (F-024)

6.5.2.9 Regulator (AHP-V205) Removal and Replacement (Figure 6-8).

a. Tools, Parts, Materials, and Test Equipment.

(1) Ratchet handle, 3/8" drive
(2) Screwdriver, cross-tip, #2
(3) Screwdriver, flat-tip, 1/8"
(4) Socket, 1/2"
(5) Wrench, open-end, 3/8"
(6) Wrench, open-end, slim, 9/16"
(7) Wrench, open-end, 11/16"
(8) Wrench, open-end, 15/16"
(9) Wrench, open-end, 1"
(10) Wrench, open-end, 1-1/2"
(11) Parts: See Chapter 7 for part numbers and CAGE codes
(12) Silicone compound, MIL-S-8660

b. Regulator Removal.

(1) Remove CPA IAW paragraph 6.5.2.1. Place CPA face down on work table.

(2) Using 11/16" wrench, loosen tube (1) nuts and remove tube. Remove O-rings (2, 3).

(3) Holding LP alarm (4), loosen and remove union (5) and alarm (together) using 11/16" wrench. Remove O-ring (6).

(4) Using 11/16" wrench, loosen tube (7) nuts; remove tube from tee (8) and isolation valve. Remove O-rings (9,10).

(5) Holding connector (11) with 15/16" wrench, loosen tube (12) upper nut with 1" wrench. Holding connector (13) with 15/16" wrench, loosen tube (12) lower nut with 1" wrench. Remove tube (12); remove both O-rings (14).

(6) Using 15/16" wrench, remove connector (13) from regulator (15); remove O-ring (16).

(7) Loosen tee (8) retaining nut using 9/16" wrench; unscrew tee from regulator. Remove O-ring (17).

(8) Loosen elbow (18) retaining nut with 9/16" wrench; unscrew elbow from regulator. Remove O-ring (19).

(9) Loosen connector (20) large nut with 1" wrench and slide tube nut back.

(10) Loosen connector (20) small nut with 11/16" wrench. Do not unscrew.

(11) Remove screws (21) with #2 cross-tip screwdriver, holding lock nuts (22) with 3/8" wrench. Remove bracket assembly (23) and regulator from CPA.

(12) Remove O-ring (24) from elbow (25).

(13) Remove connector (20) from regulator; remove O-ring (26).

(14) With 1/8" flat-tip screwdriver, remove cap (27).

(15) Using 3/8" ratchet handle and 1/2" socket, hold control knob and remove nut (28) from regulator stem.

(16) Unscrew regulator handle (29) from regulator stem.

(17) Using 1-1/2" wrench, remove mounting nut (30) and separate regulator bracket (23) from regulator.

NOTE

Do not remove relief remaining on back of regulator. Return regulator (with relief) to authorized maintenance facility for repair.

c. Regulator Replacement.

(1) Install bracket (23) on regulator. Align center screw hole in bracket with inlet port on regulator. Install nut (30) and tighten with 1-1/2" wrench.

(2) Install O-ring (16) on connector (13). Screw connector into regulator inlet port; hand-tighten.

(3) Ensure tee (8) retaining nut is fully backed off of O-ring seating surface. Install O-ring (17) on tee (8). Screw tee into regulator port next to inlet adapter and hand-tighten. Orient tee parallel to back face of regulator and hand-tighten tee retaining nut.

(4) Ensure elbow (18) retaining nut is fully backed off of O-ring seating surface. Install O-ring (19) on elbow (18). Screw elbow (18) into regulator port adjacent to tee; hand-tighten.

(5) Install O-ring (26) on connector (20). Screw connector (20) into regulator; hand-tighten.

(6) Install O-ring (24) in elbow (25) on back of LP manifold.

(7) Place regulator (15) and bracket (23) on CPA so that inlet port is pointed toward three-way ball valve.

(8) Screw connector (20) large nut onto elbow (25); hand-tighten.

(9) Install three screws (21) and locknuts (22) using #2 cross-tip screwdriver and 3/8" wrench. Do not tighten.

(10) Using 15/16" wrench, tighten connector (13) onto regulator.

(11) Using 11/16" wrench, tighten connector (20) small nut onto regulator.

(12) Install O-ring (6) on union (5). Hand-tighten union (5) nut onto tee (8), turning tee slightly, as required. Situate LP alarm (4) as shown in Figure 6-8, positioning alarm body beneath tube (12).

(13) Install O-rings (9, 10) on tube (7). Install tube between HP gauge isolation valve and tee (8). Position tee slightly, as required; hand-tighten tube nuts.

(14) Install both O-rings (14) on connector (11) and connector (13). Carefully install tube (12); hand-tighten tube nuts.

(15) Holding connector (11) with 15/16" wrench, tighten tube (12) upper nut with 1" wrench. Holding connector (13) with 15/16" wrench, tighten tube (12) lower nut with 1" wrench.

(16) Using 1" wrench, tighten connector (20) large nut.

(17) Using 11/16" wrench, tighten tube (7) nuts (between HP isolation valve and tee (8)).

(18) Grip LP alarm (4) and tube (12), and tighten union (5) nut with 11/16" wrench. Ensure alarm does not touch tube (12) or LP gauge isolation valve (ALP-V207).

(19) Using 11/16" wrench, ensure tube (7) nut is tight against tee (8).

(20) Using slim 9/16" wrench, tighten tee (8) retaining nut.

(21) Install O-rings (2, 3) on tube (1). Install tube (1) assembly between LP gauge isolation valve and elbow (18), positioning elbow to accommodate tube. Hand-tighten tube nuts. Using 11/16" wrench, tighten tube nuts. Using slim 9/16" wrench, tighten elbow (18) retaining nut.

(22) Using #2 cross-tip screwdriver and 3/8" wrench, tighten regulator bracket screws (21) and nuts (22).

(23) Perform MRC 5519 A-1R (regulator control knob adjustment and regulator test).

(24) Perform system tightness IAW paragraph 6.5.2.2, modified as follows: Skip Step b.(13).

(25) Install CPA in PASP IAW paragraph 6.5.2.1.

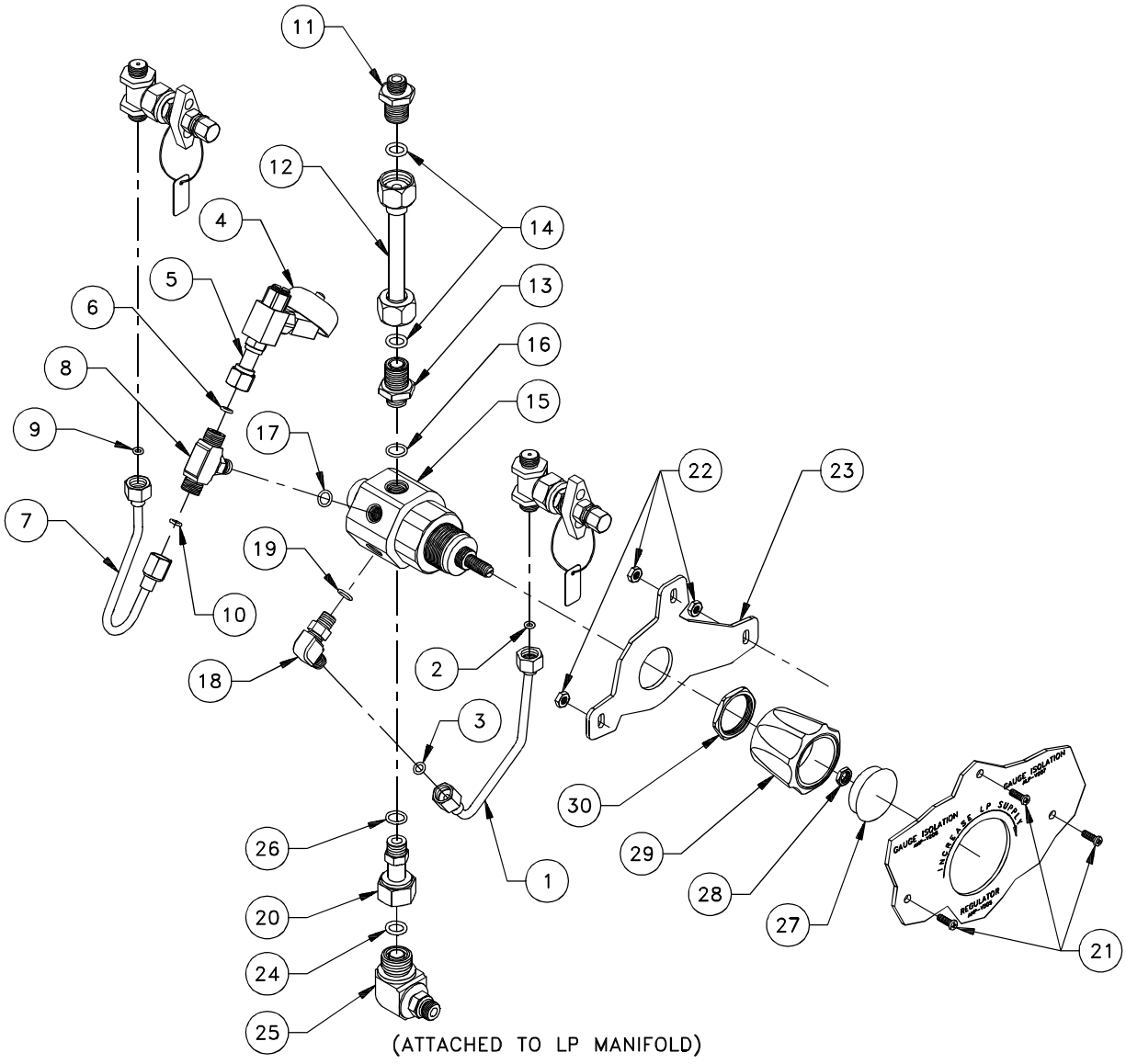

Figure 6-8. Regulator (AHP-V205)

6.5.2.10 LP Manifold Bleed Valve (ALP-V208) Removal and Replacement (Figure 6-9).

a. Tools, Parts, Materials, and Test Equipment.

(1) Ratchet handle, 3/8" drive
(2) 6" extension, 3/8" sq. drive
(3) Parts: See Chapter 7 for part numbers and CAGE codes
(4) Crowfoot, 11/16"
(5) Silicone compound, MIL-S-8660

b. LP Manifold Bleed Valve Removal.

(1) Place CPA on right side (face-up), if removed from PASP weldment.

(2) Using 3/8" ratchet handle, 6" extension, and 11/16" crowfoot, loosen LP bleed valve (1).

(3) Unscrew valve from manifold and remove.

(4) Remove O-ring (2).

c. LP Manifold Bleed Valve Replacement.

(1) Install O-ring (2) on bleed valve (1).

(2) Screw valve into manifold and hand-tighten. Tighten using 3/8" ratchet handle, 6" extension, and 11/16" crowfoot.

(3) Perform system tightness test IAW paragraph 6.5.2.2, modified as follows: Skip Step b.(13).

(4) Install CPA in PASP IAW paragraph 6.5.2.1, if installation required.

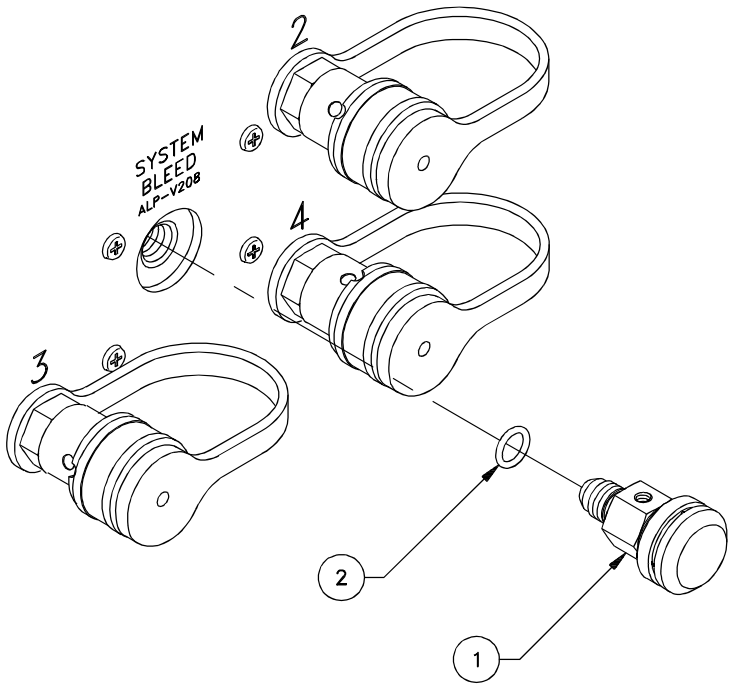

Figure 6-9. LP Manifold Bleed Valve (ALP-V208)

6.5.2.11 LP Quick Disconnect (QD) Removal and Replacement (Figure 6-10).

a. Tools, Parts, Materials, and Test Equipment.

(1) Ratchet handle, 3/8" drive
(2) 6" extension, 3/8" sq. drive
(3) Wrench, open-end, 3/4" (if CPA removed from PASP weldment)
(4) Crowfoot, 3/4"
(5) Parts: See Chapter 7 for part numbers and CAGE codes
(6) Teflon® tape

b. LP QD Removal.

(1) Place CPA on right side (face-up), if removed from PASP weldment.

(2) Using 3/8" ratchet handle, 6" extension, and 3/4" crowfoot, loosen QD (1). A 3/4" wrench may be used where convenient, if CPA removed from PASP weldment.

NOTE

It is easiest to engage crowfoot or wrench on rounded body of QD; this may separate the body of the QD from the fitting that screws into the manifold. If this happens, remove outer half of QD, being careful not to lose internal spring. Use 3/4" wrench to loosen fitting that screws into LP manifold; remove by hand along with dust cap. Reconnect both halves of the QD.

(3) Unscrew and remove QD fitting from manifold, along with dust cap (2).

c. LP QD Replacement.

CAUTION

Ensure all previously applied tape is removed from threads. Apply Teflon® tape to threaded QD by wrapping 1-1/2 turns in a CCW direction beginning at second thread. Do not wrap tape on first thread as pieces of tape can break off and reduce airflow.

(1) Clean threads on QD (1). Apply Teflon® tape on threads.

(2) Install dust cap (2).

(3) Screw QD (1) into manifold; tighten with 3/8" ratchet handle, 6" extension, and 3/4" crowfoot. A 3/4" wrench may be used where convenient if CPA removed from PASP weldment.

(4) Perform system tightness test IAW paragraph 6.5.2.2, modified as follows: Skip Step b.(13).

(5) Install CPA in PASP IAW paragraph 6.5.2.1, if installation required.

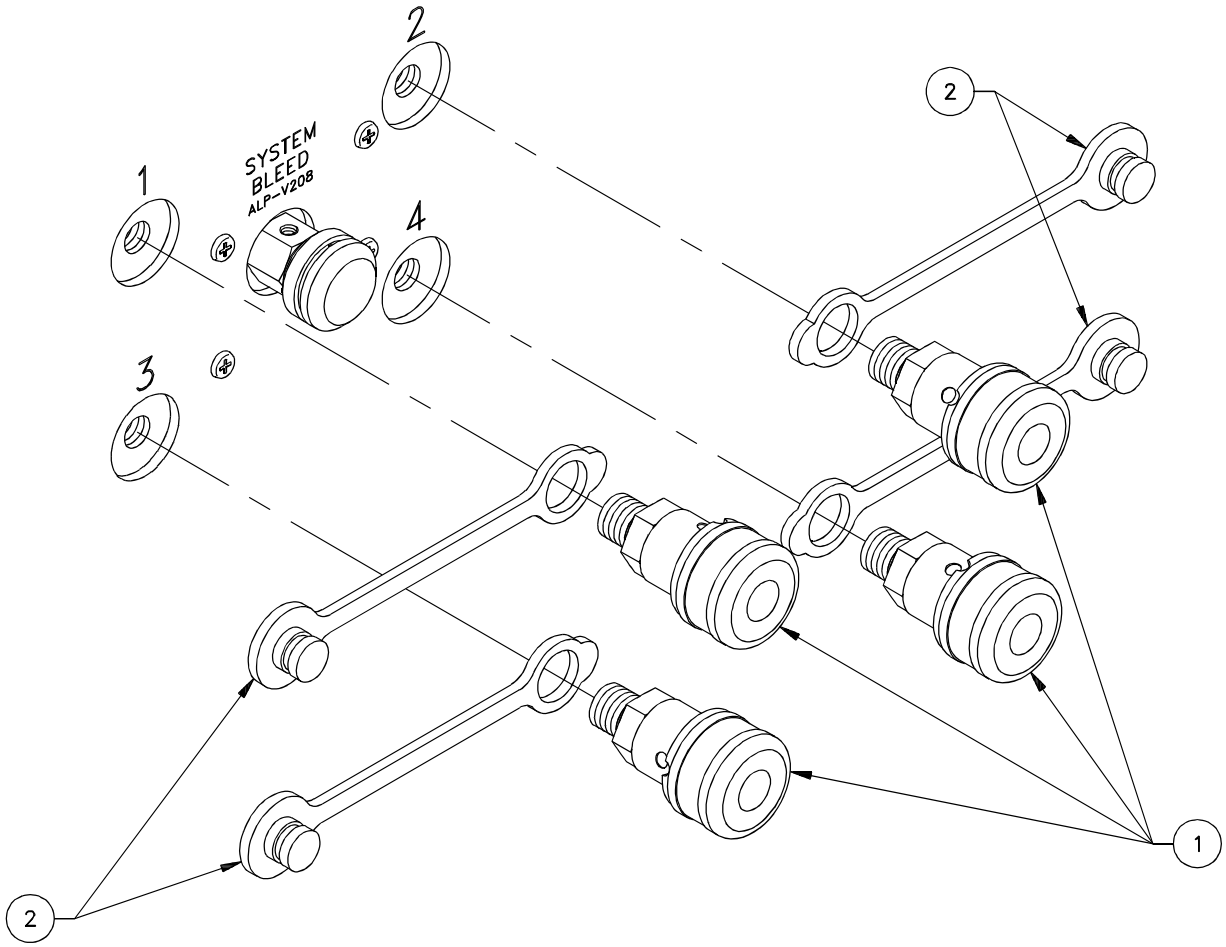

Figure 6-10. LP Quick Disconnects

6.5.2.12 LP Manifold Removal and Replacement (Figure 6-11).

a. Tools, Parts, Materials, and Test Equipment.

(1) Screwdriver, cross-tip, #2
(2) Wrench, open-end, 3/8"
(3) Wrench, open-end, slim, 11/16"
(4) Wrench, open-end, 7/8"
(5) Wrench, open-end, 1"
(6) Parts: See Chapter 7 for part numbers and CAGE codes
(7) Silicone compound, MIL-S-8660

b. LP Manifold Removal.

(1) Remove CPA IAW paragraph 6.5.2.1.

(2) Remove LP manifold bleed valve IAW paragraph 6.5.2.10.

(3) Remove four LP QDs IAW paragraph 6.5.2.11.

(4) Using 11/16" wrench, loosen tube (1) nuts. Unscrew and remove tube (1); remove O-rings (2, 3).

(5) Using 1" wrench, loosen connector (4) large nut and slide nut back on connector.

(6) Using 7/8" wrench, loosen and remove plug (5); remove O-ring (6).

(7) Using 11/16" wrench, loosen and remove two plugs (7); remove both O-rings (8).

(8) Using 3/8" wrench to hold nuts (9), unscrew each of four screws (10) with #2 cross-tip screwdriver; remove screws and nuts.

(9) Remove LP manifold (11) and gasket (12).

(10) Using slim 11/16" wrench, loosen retaining nut on elbow (13); remove elbow; remove O-rings (14, 15).

c. LP Manifold Replacement.

(1) Install O-rings (6, 8) onto plugs (5, 7), then screw plugs into manifold (11) and hand-tighten. Tighten two smaller plugs (7) with 11/16" wrench; tighten larger plug (5) with 7/8" wrench.

(2) Ensure elbow (13) retaining nut is fully backed off of O-ring seating surface. Install O-ring (15) on elbow (13); screw elbow completely into manifold and hand-tighten retaining nut. Orient elbow parallel to short side of manifold.

(3) Insert two of the four screws (10) diagonal from one another through front of CPA and install gasket (12).

(4) Install O-ring (14) in elbow (13).

(5) Ensure connector (4) large nut is pushed up against the connector small nut.

(6) Install LP manifold (11), carefully pushing two installed screws through manifold, being careful not to damage O-ring (14) in elbow.

(7) Install nuts (9) on installed screws (10) and hand-tighten. Install two remaining screws and nuts, and hand-tighten.

(8) Screw connector (4) large nut onto elbow (13) and hand-tighten.

(9) Using 3/8" wrench and #2 cross-tip screwdriver, tighten four screws (10) and nuts (9).

(10) Tighten connector (4) large nut with 1" wrench.

(11) Install O-rings (2, 3) on tube (1). Install tube (1) between elbow and LP gauge isolation valve. Tighten tube (1) nuts with 11/16" wrench.

(12) Using slim 11/16" wrench, tighten elbow (13) retaining nut.

(13) Install four LP QDs IAW paragraph 6.5.2.11, modified as follows: Skip Steps c.(4) and c.(5).

(14) Install LP manifold bleed valve IAW paragraph 6.5.2.10, modified as follows: Skip Steps c.(3) and c.(4).

(15) Perform system tightness test IAW paragraph 6.5.2.2, modified as follows: Skip Step c.(13).

(16) Install CPA in PASP IAW paragraph 6.5.2.1.

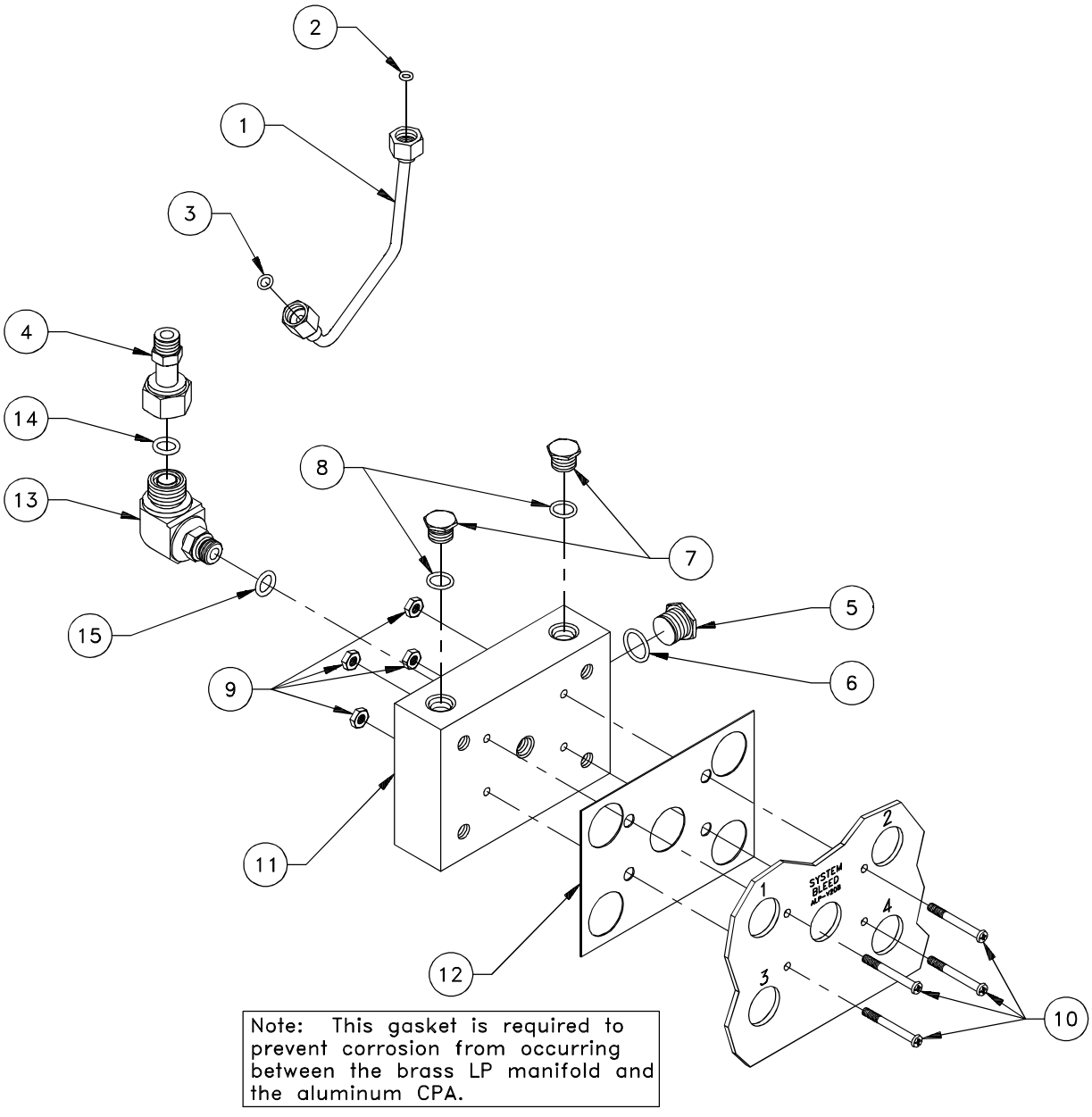

Figure 6-11. LP Manifold

6.5.3 HP Air Hose Assembly.

6.5.3.1 Nipple and/or O-Ring Removal and Replacement (Figure 6-12).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 11/16"
(2) Wrench, open-end, 3/4"
(3) Wrench, open-end, 15/16"
(4) Wrench, open-end, 1"
(5) O-ring removal tool
(6) Parts: See Chapter 7 for part numbers and CAGE codes
(7) Teflon® tape
(8) Silicone compound, MIL-S-8660

b. Nipple/O-ring Removal.

(1) To remove nipple, hold tee (1) with 3/4" wrench. Slide hand nut (2) back from end of fitting and, using 11/16" wrench, loosen nipple (3).

(2) Remove nipple (3) and O-ring (4). Use O-ring removal tool.

c. Nipple/O-ring Replacement.

(1) Ensure threads are clean and apply Teflon® tape to threads.

(2) Reinstall hand nut (2) back over inner portion of fitting and thread nipple (3) into tee hand-tight. Hold tee with 3/4" wrench and tighten nut using 11/16" wrench.

(3) Install O-ring (4).

(4) Perform HP air hose tightness test IAW paragraph 6.5.3.5.

6.5.3.2 Bleed Valve Removal and Replacement (Figure 6-12).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 11/16"
(2) Parts: See Chapter 7 for part numbers and CAGE codes
(3) Silicone compound, MIL-S-8660

b. Bleed Valve Removal.

(1) Place tee (1) in vise or hold firmly on work table.

(2) Loosen bleed valve (5) with 11/16" wrench. Unscrew valve; remove O-ring (6).

c. Bleed Valve Replacement.

(1) Install O-ring (6).

(2) Screw valve (5) into tee (1) hand-tight; place tee in vise or hold firmly and tighten bleed valve with 11/16" wrench.

(3) Perform HP air hose tightness test IAW paragraph 6.5.3.5.

6.5.3.3 Air Hose Removal and Replacement (Figures 6-12 and 6-13).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 11/16"
(2) Wrench, open-end, 3/4"
(3) Wrench, open-end, 15/16"
(4) Wrench, open-end, 1"
(5) Leak-test solution, MIL-L-25567
(6) Parts: See Chapter 7 for part numbers and CAGE codes
(7) Silicone compound, MIL-S-8660

b. Air Hose Assembly/HP Air Hose Removal.

NOTE

Refer to Figure 6-13 for Steps b.(1) through b. (5).

(1) Remove CPA IAW paragraph 6.5.2.1.

(2) Place CPA face down with three-way ball valve (1) facing the front of work table.

(3) Holding connector (4) with 15/16" open-end wrench, loosen tubing (5) nut with 1" wrench.

(4) Holding connector (6) with 15/16" wrench, loosen tubing (5) nut with 1" wrench. Remove tubing (5). Remove both O-rings (7, 8). Remove HP air hose assembly wire rope lanyard.

(5) Using 11/16" wrench, remove HP air hose assembly (2); remove O-ring (3).

NOTE

Refer to Figure 6-12 for Steps b.(6) through b.(8).

(6) Place tee (1) in vise or hold firmly with 3/4" wrench.

(7) Loosen nut swivel fitting (7) with 11/16" wrench.

(8) Remove hose (8) with lanyard from tee. Remove O-ring (9).

c. Air Hose Replacement.

NOTE

Ensure new hose inspected and hydrostatically tested IAW MRCs 5519 A-2R and R-1.

NOTE

Refer to Figure 6-12 for Steps c.(1) through c.(3) below.

(1) Install O-ring (9) on tee (1).

(2) Screw hose fitting (7) onto tee (1) and hand-tighten.

(3) Place tee (1) in vise or hold with 3/4" wrench; tighten fitting (7) with 11/16" wrench.

NOTE

Refer to Figure 6-13 for Steps c.(4) through c.(8).

(4) Feed wire rope lanyard (17) from HP air hose assembly (2) through the control panel elbow hole. Place loop around connector (4).

(5) Install new O-ring (3) on elbow (11).

(6) Install HP air hose (2) on elbow (11); tighten using 11/16" wrench.

(7) Install O-rings (7, 8) on connectors (4, 6). Carefully fit tube (5) between connectors (4, 6) and hand-tighten two tube nuts. Hold connector (4) with 15/16" wrench and tighten tube upper nut with 1" wrench; hold connector (6) with 15/16" wrench and tighten tube lower nut with 1" wrench.

(8) Perform HP air hose system tightness test IAW paragraph 6.5.3.5. Use a brush to wipe leak-test solution over connections of HP air hose assembly during test.

(9) Reinstall CPA IAW paragraph 6.5.2.1.

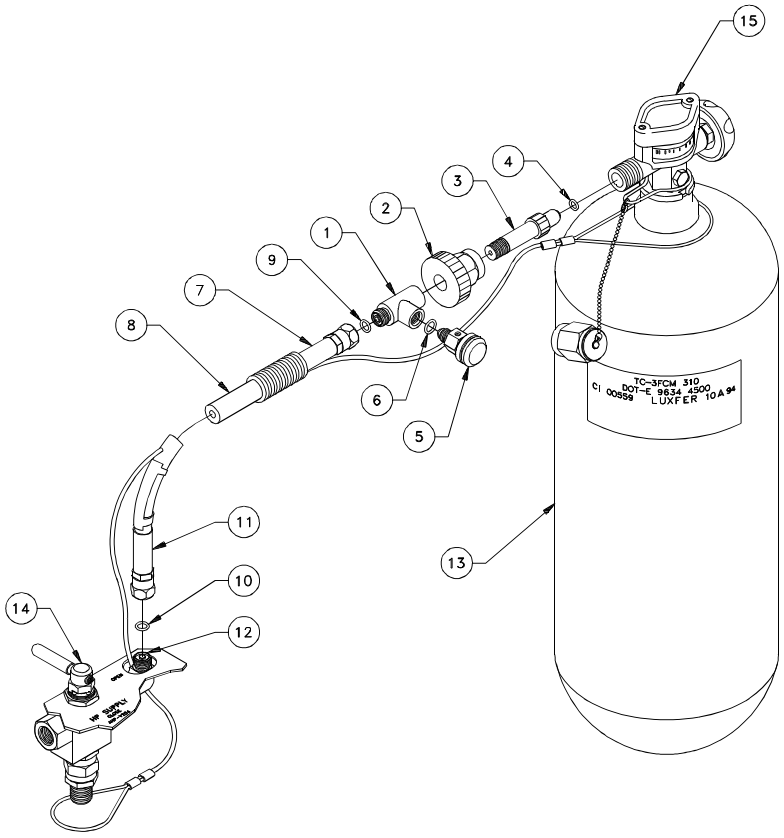

Figure 6-12. HP Air Hose Assembly

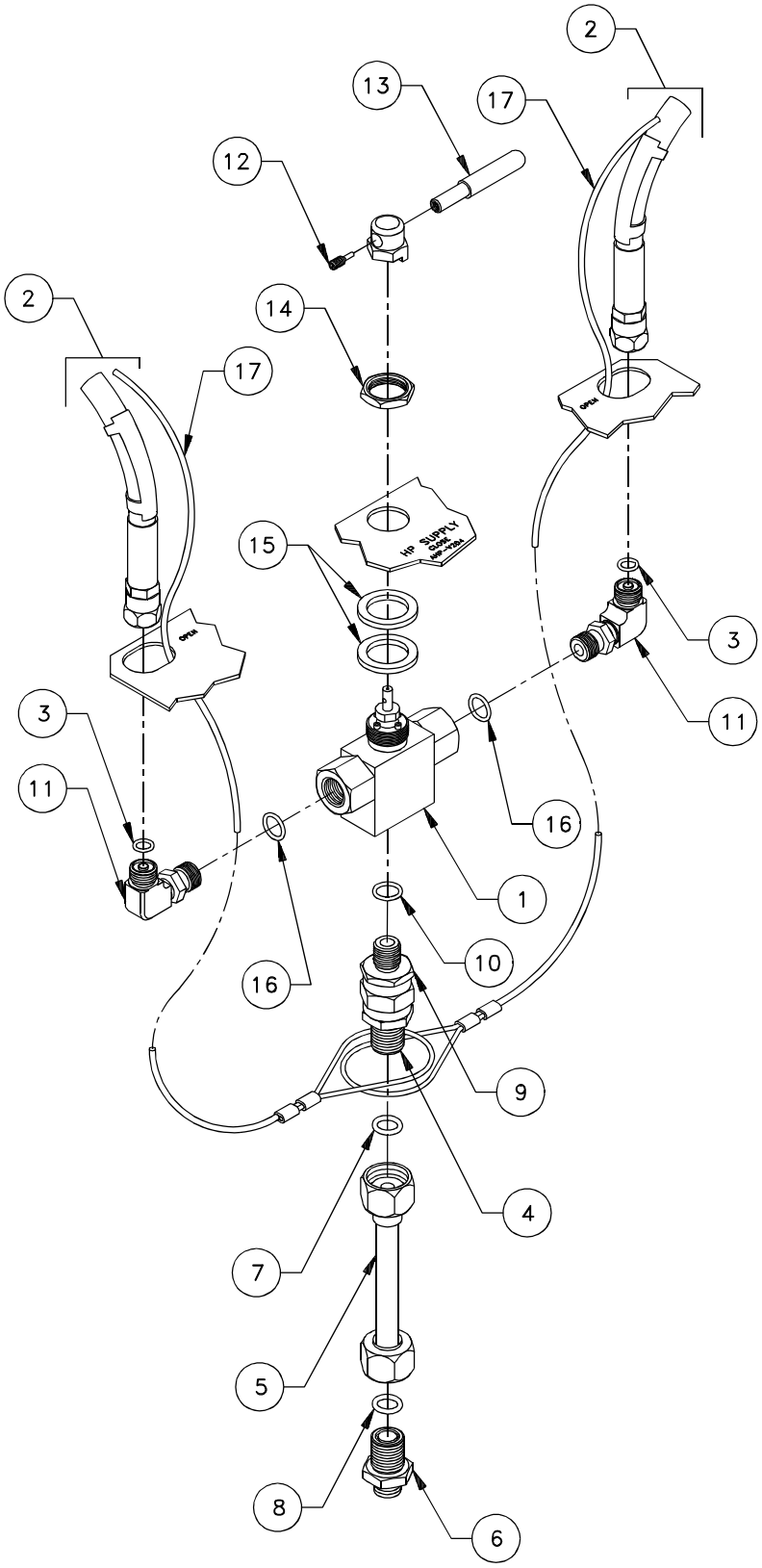

Figure 6-13. Three-Way Ball Valve (AHP-V204)

6.5.3.4 Lanyard Replacement. The HP air hose is equipped with a lanyard that must be installed for safety (in case the hose ruptures). The lanyard is fabricated and installed IAW drawing no. 6314576 and should be replaced IAW this drawing. Do not substitute nylon tie wraps or any other material to attach lanyard to hose.

To replace lanyard, first perform the steps in paragraph 6.5.3.3 to remove HP air hose assembly. Replace lanyard IAW the drawing specified above. Reinstall the HP air hose assembly IAW paragraph 6.5.3.3.

6.5.3.5 HP Air Hose Tightness Test (Figure 6-14).

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 11/16"
(2) Parts: See Chapter 7 for part numbers and CAGE codes
(3) Leak-test solution, MIL-L-25567
(4) Silicone compound, MIL-S-8660

b. Test Procedure.

(1) Connect PASP HP air hose assembly (1) to be tested to HP air cylinder (2). The cylinder must be fully charged to 4,500 psig.

(2) Ensure HP air cylinder valves ((AHP-V201) (3), (AHP-V301) (4), or (AHP-V302) (5)) is shut.

(3) Align the following PASP valves as follows:

(a) Three-way ball valve (AHP-V204) (6): closed

(b) HP gauge isolation valve (AHP-V206) (7): ensure open

(c) LP gauge isolation valve (ALP-V207) (8): ensure open

(d) Regulator valve (AHP-V205) (9): fully CCW

WARNING

HP air leaking from HP air hose assembly can cause severe cuts to skin or cause debris to enter body. DO NOT check for leaks by passing hands or other parts of body over pressurized components. Failure to observe this warning could cause serious injury.

(4) Slowly open HP air cylinder valve ((AHP-V201 (3), AHP-V301 (4), or AHP-V302 (5)) on fully charged HP air cylinder (2).

(5) Slowly position three-way ball valve (AHP-V204) (6) toward pressurized HP air cylinder. Shut HP air cylinder valve ((AHP-V201) (3), (AHP-V301) (4), or (AHP-V302) (5)).

(6) Note HP gauge (AHP-G201) (10) reading.

(7) Wait 10 minutes.

NOTE

Check for leaks by using brush to wipe leak-test solution over connections of PASP and HP air hose fittings during test.

(8) Note pressure on HP gauge (AHP-G201) (10).

(9) If no difference between initial reading and 10 minute reading exists, test is complete (system is not leaking). If there is a difference in readings, perform leak diagnostic test IAW paragraph 6.5.2.3.

(10) Close three-way ball valve (AHP-V204) (6). Bleed down HP air hose assembly (1) using bleed valve ((AHP-V202 (12) or (AHP-V203) (13)).

(11) If second HP air hose assembly was removed, disconnect first tested HP air hose assembly (1) from HP air cylinder valve and connect second hose assembly to cylinder valve. Repeat Steps b.(5) through b.(10).

(12) Bleed down PASP using bleed valve ((AHP-V202) (12) or (AHP-V203) (13)).

(13) Position three-way ball valve (AHP-V204) (6) to shut position.

(14) Leave gauge isolation valves ((AHP-V206) (7) and (ALP-V207) (8)) open.

6.5.4 PASP Case Assembly. PASP case assembly repairs should restore the components to the configuration reflected in the following drawings:

PASP Case Assembly: 53711ASSY6314766
Components: 53711ASSY6314758, Rev B
PASP Shell Weldment: 53711ASSY6314754, Rev B

6.6 RASP CORRECTIVE MAINTENANCE.

Refer to paragraph 6.5.1 and Chapter 8 for cylinder repair information. RASP weldment or case assembly repairs should restore the components to the configuration reflected in the following drawings:

RASP Case Assembly: 53711ASSY6314767
RASP Label: 53711ASSY6314769
Components: 53711ASSY6314758, Rev B
RASP Shell Weldment: 53711ASSY6314755

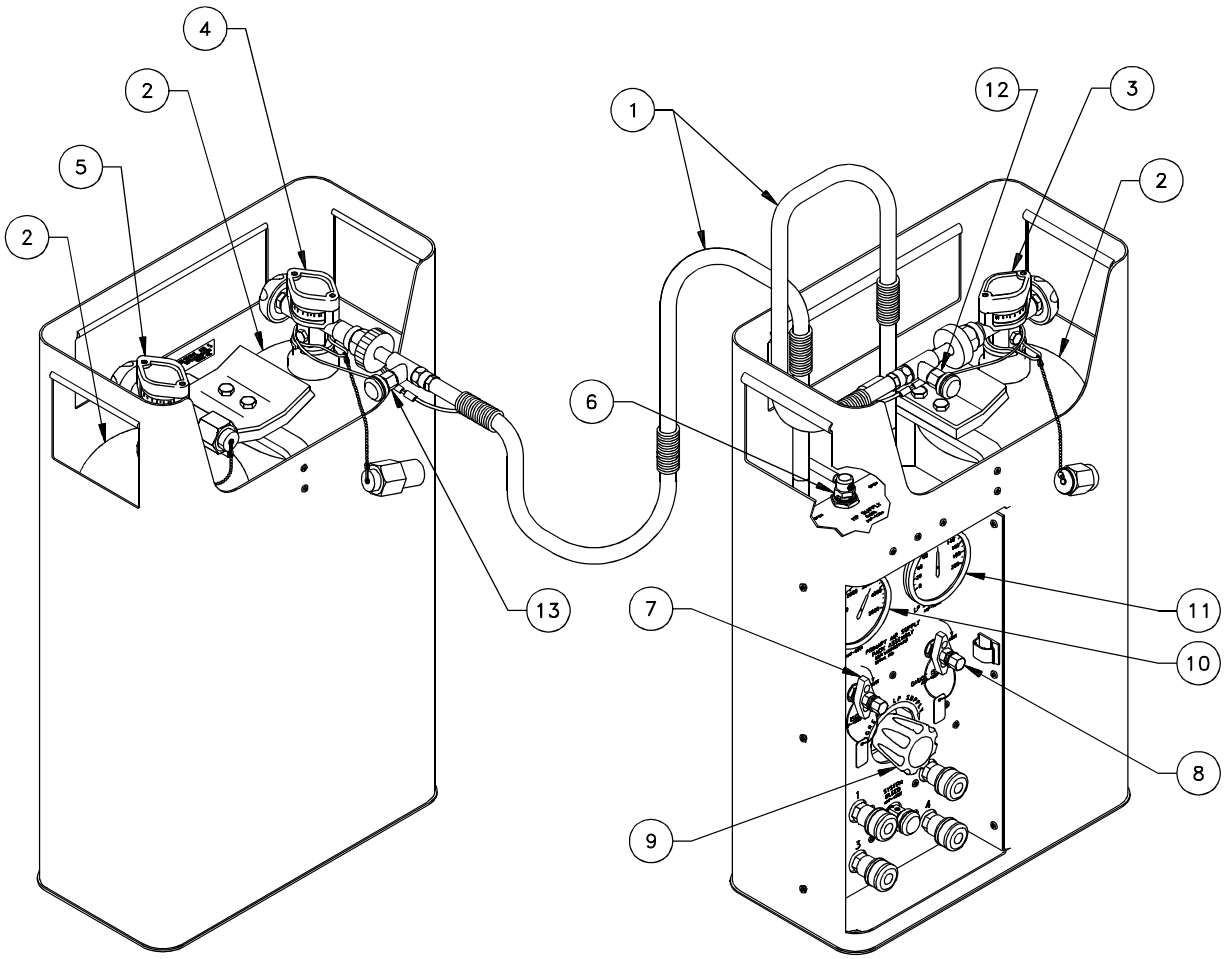

Figure 6-14. HP Air Hose Tightness Test

6.7 SCBA CORRECTIVE MAINTENANCE.

WARNING

Do not tighten fittings or connectors when system is pressurized. Failure to follow this warning could result in serious injury or death.

Inspect SCBA regulators regularly and maintain according to the manufacturer's instructions. Regulator repairs must only be made by properly trained personnel. Failure to follow these instructions could result in serious injury or death.

Never alter or modify this device, except as directed by MSA during installation of NIOSH/MSHA-approved kits. Use only MSA or Navy-approved replacement parts. If other than approved parts are used, NIOSH/MSHA approval will be voided. Failure to follow these instructions could result in serious injury or death.

CAUTION

Do not attempt repairs beyond those specified in this manual. Only trained or certified personnel authorized by MSA are permitted to maintain and repair the PremAire® CADET 15M Respirator. The respirator must not be repaired beyond manufacturer's recommendations. Title 29 CFR Part 1910.134, Paragraph (f) (4) makes these requirements clear.

For the SCBA to function properly, correct maintenance and repair procedures must be followed. As parts of the PremAire® CADET 15M Respirator show signs of wear, they must be replaced immediately. Only MSA parts or their equivalent, designed for use with this equipment, shall be used for repairs or maintenance. Most parts for the PremAire® CADET 15M Respirator are not interchangeable with similar devices produced by other manufacturers.

Limited repairs at the user level are authorized on the SCBA. These repairs are set forth in this chapter and are classified as Level 1 repairs in the PremAire® CADET 15M Air-Line Respirator Operation and Maintenance Manual. Though no special training is required to perform authorized (Level 1) repairs, personnel must have a thorough knowledge of the equipment prior to initiating any repairs. Repairs beyond those described here shall be performed by the manufacturer's authorized repair facility. These repairs are referred to as Level II and Level III maintenance in the manufacturer's manual. Only trained respirator repair personnel are authorized to perform Level II or Level III repairs and servicing. These repairs include SCBA respirator problems, as well as repairs to the LP and HP pressure areas. Authorized repairs at the user level (Level I) are described below.

6.7.1 Facepiece Test.

WARNING

A functional facepiece test must be conducted after any repair to facepiece. Failure to follow this warning could cause injury or death.

a. Tools, Parts, Materials, and Test Equipment.
None.

b. Facepiece Test. To perform the facepiece test after repairs, don facepiece and check face-to-facepiece seals as follows:

(1) Remove regulator from facepiece.

(2) Place one hand over facepiece inlet.

(3) Inhale and hold breath for 10 seconds.

(4) The facepiece should collapse toward your face and stay there until you exhale or remove your hand, allowing air to enter.

c. Leaks. If a leak is detected, locate cause, repair, and repeat each step before using the facepiece.

6.7.2 Facepiece Rubber Head Harness Removal and Replacement (Figure 6-15).

a. Tools, Parts, Materials, and Test Equipment.
Parts: See Chapter 7 for part numbers and CAGE codes.

b. Head Harness Removal.

(1) Place facepiece on a clean table or other flat surface.

(2) Pull back of each buckle (2) away from head harness (1) and pull slightly so head harness end tab (3) is at buckle (2).

(3) Fold end tab (3) sides together, then pull each end tab (3) through its buckles (2).

c. Head Harness Replacement.

(1) Place new head harness (1) flat with MSA logo facing up.

(2) Pick head harness (1) up by strap labeled "FRONT." Insert strap into buckle at top of mask. Strap should pass between wire roller and buckle clamp.

(3) Pull wire roller down against the strap.

(4) Refold end tab (3) and push it through the buckle (2) again, this time passing over wire roller.

(5) Repeat previous steps for each remaining strap.

(6) Check that installed head straps are not twisted.

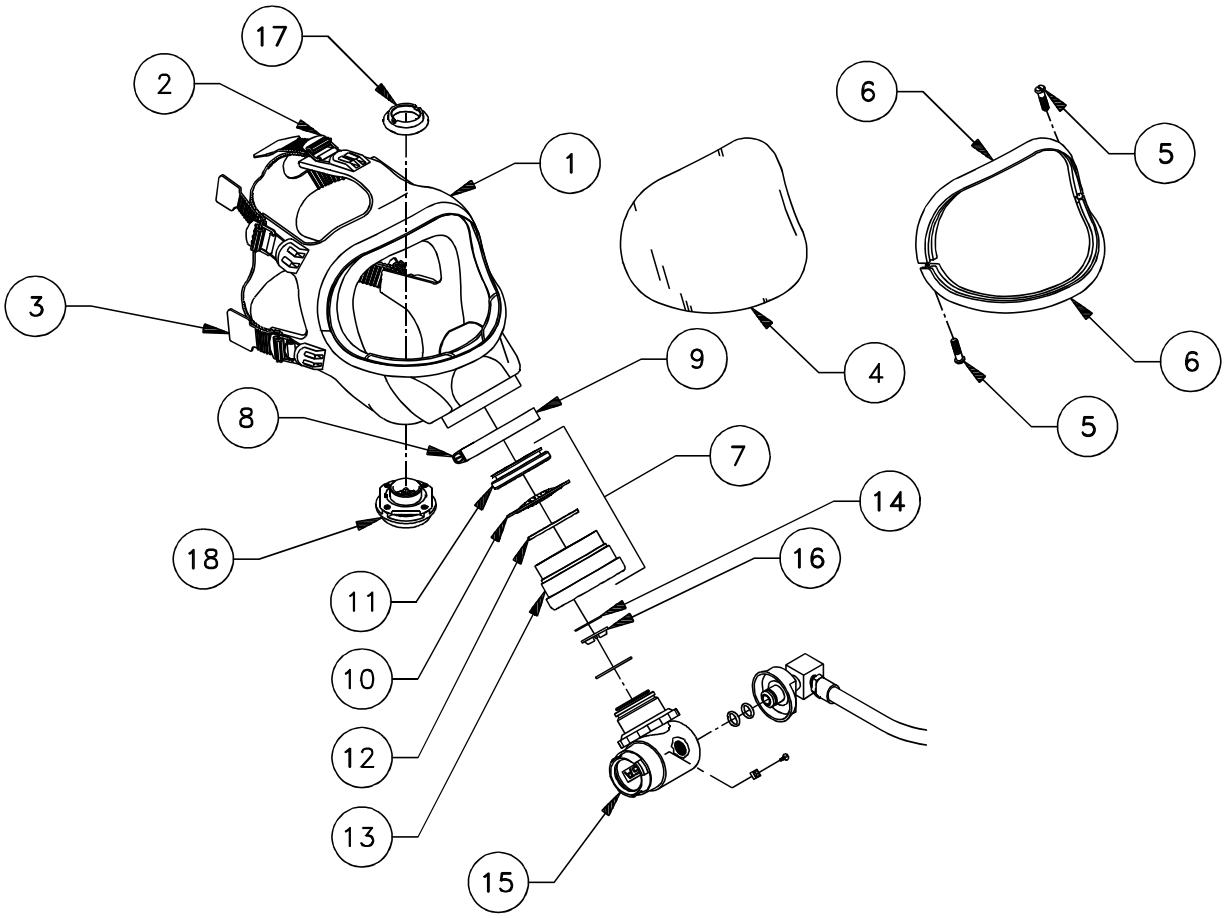

Figure 6-15. Facepiece and Components

6.7.3 Facepiece Lens and Ring Removal and Replacement (Figure 6-15).

CAUTION

Protective papers on new lens should not be taken off until lens installed in facepiece.

a. Tools, Parts, Materials, and Test Equipment.

(1) Screwdriver, flat-tip, 1/8"
(2) Parts: See Chapter 7 for part numbers and CAGE codes.

b. Facepiece Lens and Ring Removal.

(1) Loosen and remove the screw (5) from each side of facepiece lens retaining ring (6) with 1/8" flat-tip screwdriver.

(2) Remove two retaining ring (6) halves.

(3) Fold facepiece flange back and pull lens (4) out of groove.

c. Facepiece Lens and Ring Replacement.

(1) Remove dirt, lens fragments or other debris from groove. Align lens centerline marks (top and bottom) with facepiece centerline mark, then insert lens (4) into groove.

(2) Work facepiece rubber flange around lens (4) to fully seat lens (4) in the groove.

(3) Align lens retaining ring (6) centerline with facepiece rubber flange centerline mark.

(4) Press ring (6) in place. Mount other ring (6) half in the same way.

(5) Press ring (6) halves together at the top and bottom of facepiece so that ends mate.

(6) Install screw (5) on each side of retaining ring (6) halves.

(7) Start screws (5); they should thread easily. If not, remove and reinstall screws to avoid cross-threading. Maintain hand-pressure on both ring (6) halves.

CAUTION

Do not overtighten screws (5). Rubber must not show between lens ring ends at the joint. If a gap occurs, reassemble.

(8) As ring (6) halves come together, alternate tightening left and right screws (5) to be sure ring seats thoroughly on rubber flange.

(9) Remove all lens protective papers from new lens.

(10) Don facepiece and check face-to-facepiece seal following procedures outlined in paragraph 6.7.1.

(11) Install cover lens to protect facepiece polycarbonate lens during storage.

CAUTION

Do not use cover lens in high temperature environment, such as fire-fighting. High temperature may distort cover lens, or moisture trapped between cover lens and facepiece lens may condense and distort vision. Always remove cover lens before donning facepiece.

6.7.4 Inlet Assembly and Speaking Diaphragm Removal and Replacement (Figure 6-15).

a. Tools, Parts, Materials, and Test Equipment.

(1) Screwdriver, flat-tip, 1/8"
(2) Pressure-demand exhalation wrench (spanner wrench), (special tool, MSA part no. 461828)
(3) Parts: See Chapter 7 for part numbers and CAGE codes.

b. Inlet Assembly Removal.

(1) Loosen screw (8) on the band clamp (9).

(2) Remove clamp (9) and pull inlet assembly (7) out of facepiece.

c. Inlet Assembly Replacement.

(1) Slide band clamp (9) on facepiece. Slide inlet assembly (7) into facepiece. Check that air ducts in housing assembly are lined up with ducts in facepiece.

(2) Ensure inlet assembly (7) is pressed completely into facepiece.

(3) Band clamp (9) must be positioned so that screw (8) is at the 5 or 7 o'clock position. Screw head must be positioned to left so that it will not rub facepiece rubber.

(4) Tighten band clamp (9) until inlet assembly (7) is fixed. Be sure that band clamp does not pull facepiece rubber away from assembly. Do not overtighten. If facepiece rubber "bulges" out through slots in the clamp (9), clamp (9) is too tight and must be loosened and retightened.

(5) Don facepiece and check face-to-facepiece seal following the procedures outlined paragraph 6.7.1.

d. Speaking Diaphragm Removal.

(1) Unscrew retainer ring (11) using spanner wrench.

(2) Turn inlet assembly (7) upside down and shake out metal speaking diaphragm (10).

(3) Check speaking diaphragm (10) for damage. Replace it if worn or damaged.

(4) Check speaking diaphragm O-ring (12) (or gasket). Replace the O-ring (12), if either is worn or damaged.

e. Speaking Diaphragm Replacement.

(1) Place O-ring (12) in groove of speaking diaphragm housing (13).

(2) Place speaking diaphragm (10) in housing (13) so that outer lip rests on O-ring (12).

(3) Be sure that crimped side of speaking diaphragm (10) is facing toward you.

(4) Replace retainer ring (11) and tighten using spanner wrench.

(5) Don the facepiece and check face-to-facepiece seal following the procedures outlined in paragraph 6.7.1.

6.7.5 Facepiece Inhalation Disk Valve Removal and Replacement (Figure 6-15).

a. Tools, Parts, Materials, and Test Equipment.

Parts: See Chapter 7 for part numbers and CAGE Codes.

b. Inhalation Disk Valve Removal.

(1) Remove MMR (15) from facepiece.

(2) Lift spider gasket (16) out of housing (13), using one of two tabs.

(3) Remove valve disk (14) from speaking diaphragm housing (13). If you cannot grasp disk (14) with your fingers, use blunt object to lift one edge, then remove disk (14). Be careful not to tear soft disk (14).

(4) Inspect disk (14) for tears or punctures. Disk (14) should be very soft and pliable. Install new disk (14) if it is damaged or hardened.

c. Inhalation Disk Valve Replacement.

(1) Press valve disk (14) onto pin in speaking diaphragm housing (13).

(2) Carefully tuck all edges of disk (14) under housing lip.

(3) Replace spider gasket (16) (tabs up) and press it on pin. Work the groove into place to stabilize gasket (16).

(4) Screw MMR (15) on facepiece.

6.7.6 Facepiece Exhalation Valve Removal and Replacement (Figure 6-15).

a. Tools, Parts, Materials, and Test Equipment.

(1) Pressure-demand exhalation wrench (spanner wrench) (special tool, MSA part no. 461828)
(2) Parts: See Chapter 7 for part numbers and CAGE codes.

b. Exhalation Valve Removal.

(1) Fold chin cup away from exhalation valve (18) opening, then use spanner wrench to loosen valve retaining nut (17).

(2) Unscrew retaining nut (17), then remove exhalation valve (18) from facepiece (1).

c. Exhalation Valve Replacement.

(1) Push exhalation valve (18) through opening in facepiece, positioning valve so that the MSA logo is right side up with respect to the facepiece. Ensure facepiece is flush with flat portion of valve so that all valve inlet threads fully protrude through rubber.

(2) Fold chin cup down and install exhalation valve retaining nut (17) on valve threads. Hand-tighten nut.

(3) Use spanner wrench to tighten retaining nut (17).

(4) Don the facepiece and check the face-to-facepiece seal following the procedures outlined in paragraph 6.7.1.

6.7.7 LP Hose Assembly Repair (Figure 6-16).

CAUTION

Ensure all previously applied tape is removed from threads. Apply Teflon® tape to threaded fitting by wrapping 1-1/2 turns of tape in a clockwise direction beginning at second thread. Do not wrap tape on first thread as pieces of tape can break off and reduce airflow to respirator.

NOTE

Leaks in LP hose can be repaired by retightening fittings, disassembling fittings and replacing sealing tape, or replacing parts.

a. Tools, Parts, Materials, and Test Equipment.

(1) Wrench, open-end, 7/16"
(2) Wrench, open-end, 5/8"
(3) Wrench, open-end, 9/16"
(4) Wrench, open-end, 3/4"
(5) Teflon® tape
(6) Parts: See Chapter 7 for part numbers and Cage codes
(7) Leak-test solution, MIL-L-25567

b. Hose Leak Repair.

(1) Use 7/16" open-end wrench to hold hose fitting and 5/8" open-end wrench on the swivel block to tighten plug (1)

NOTE

If the previous step does not correct the leak, disassemble fitting, reapply Teflon® tape, and reassemble.

(2) Check fittings for leaks IAW leak-test procedure in MRC 5519 M-1R.

(3) A leak in check valve (2), or quick disconnect (3) can be corrected in same manner. Use 9/16" open-end wrench to hold hose fitting while holding quick disconnect (3) with 3/4" open-end wrench to tighten.

NOTE

If the previous step does not correct leak, disassemble fitting, reapply Teflon® tape, and reassemble.

(4) Check plug (1), for leaks IAW leak-test procedure in MRC 5519 M-1R.

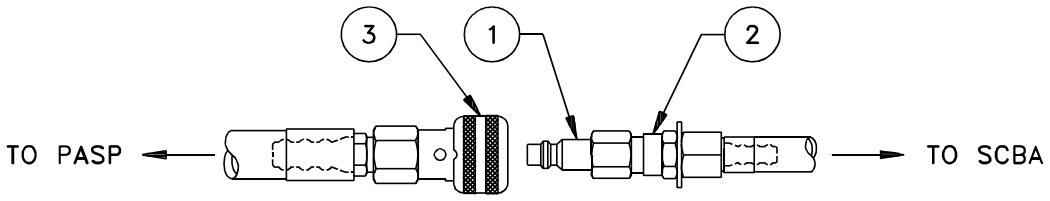

Figure 6-16. LP Hose Assembly

6.7.8 Mask-Mounted (Second-Stage) Regulator (MMR) Removal and Replacement (Figure 6-15).

a. Tools, Parts, Materials, and Test Equipment.

(1) O-ring removal tool
(2) 1" wrench
(3) Tweezers
(4) Christo-Lube® lubricant, MIL-G-27617
(5) Parts: See Chapter 7 for part numbers and CAGE codes

b. MMR Removal.

WARNING

Disconnect MMR from system prior to this procedure. Do not replace MMR if system under pressure. Failure to observe this warning could cause injury or death.

(1) Unthread MMR from front of facepiece.

(2) Push nut (1) on MMR body to expose O-ring (2).

CAUTION

Be careful not to damage seat area or other areas of MMR during removal of O-ring.

(3) Remove O-ring (2) with O-ring removal tool and inspect O-ring. If defective, obtain new O-ring.

(4) Using 1" wrench, remove MMR inlet hose swivel block (3). Inspect MMR inlet filter screen (4) for debris. If necessary, tap inlet port on table top to shake loose debris, taking care not to damage threads. Carefully use tweezers to remove any remaining debris, taking care not to puncture screen. MRC 5519 M-1R MR-3 pertains to cleaning screen.

(5) Apply a thin film of Christo-Lube® lubricant to new O-ring (2) and stretch new O-ring (2) into the groove in MMR body.

c. MMR Replacement.

(1) Replace flattened or damaged MMR swivel block O-rings (5). Use O-ring removal tool to remove O-rings for inspection. Lubricate O-rings then reinstall. Reassemble swivel block to MMR and tighten swivel block (3) with 1" wrench.

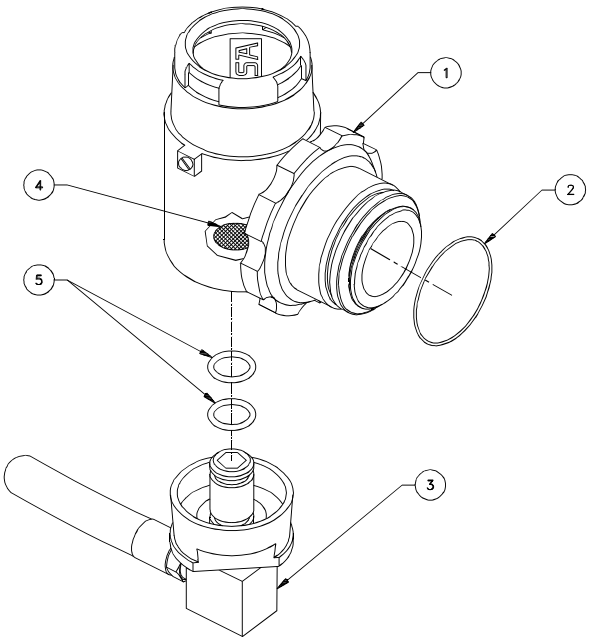

Figure 6-17. Mask-Mounted Regulator (MMR)

(2) Screw MMR into front of facepiece.

(3) Conduct a facepiece leak test IAW MRC 5519 M-1R.

6.7.9 CGA-346 Hand-Tight Nut-Type Connector, O-Ring Removal and Replacement (Figure 6-18).

a. Tools, Parts, Materials, and Test Equipment

(1) Wrench, open-end, 1-1/8"
(2) O-ring removal tool
(3) Christo-Lube® lubricant, MIL-G-27617
(4) Leak-test solution, MIL-L-25567

b. O-ring Removal.

(1) Ensure that SCBA cylinder valve is shut, LP air-supply hose disconnected, and the SCBA LP air circuit is fully vented by cycling semiautomatic push button (don/doff) on MMR.

(2) Loosen the CGA-346 hand-tight nut-type connector (1) by turning the nut (2) CCW. If the nut is too tight, a 1-1/8" open-end wrench can be used to loosen the connector.

(3) When the CGA-346 connector is loose, carefully separate the first-stage regulator (3) from the air cylinder valve block (4).

(4) Remove O-ring (5).

c. O-ring Replacement.

(1) Lightly lubricate O-ring (5) with Christo-Lube®. Carefully install O-ring in O-ring groove.

(2) Carefully fit male CGA-346 connector (1) into HP air cylinder valve block (4) until stem is fully seated.

(3) Hand-tighten CGA-346 connector (1), holding first-stage regulator (3) to prevent binding.

(4) If CGA-346 connector (1) cannot be tightened by hand, use a 1-1/8" open-end wrench to tighten fitting. Do not overtighten.

(5) Perform SCBA leak test IAW MRC 5519 M-1R.

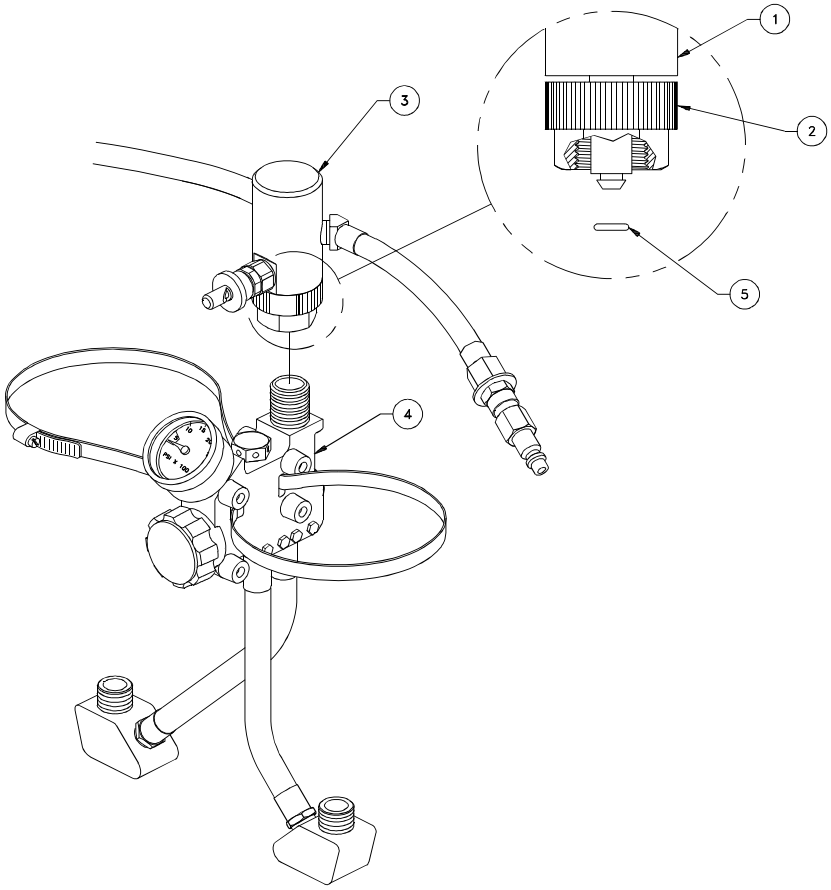

Figure 6-18. CGA-346 Connector and O-Ring

6.7.10 Waist Belt Assembly Removal and Replacement (Figure 6-19).

a. Tools, Parts, Materials, and Test Equipment.

Parts: See Chapter 7 for part numbers and CAGE codes.

b. Waist Belt Assembly Removal.

(1) Unthread waist strap (1) from plastic buckle (2). Note path of waist belt strapping through buckle assembly (2).

(2) Unthread waist strap (1) from carry pouch (3).

c. Waist Strap Assembly Replacement.

(1) Unthread new strap (1) from buckle assembly (2).

(2) Thread waist strap through carry pouch (3).

(3) Thread new strap (1) through belt buckle (2).

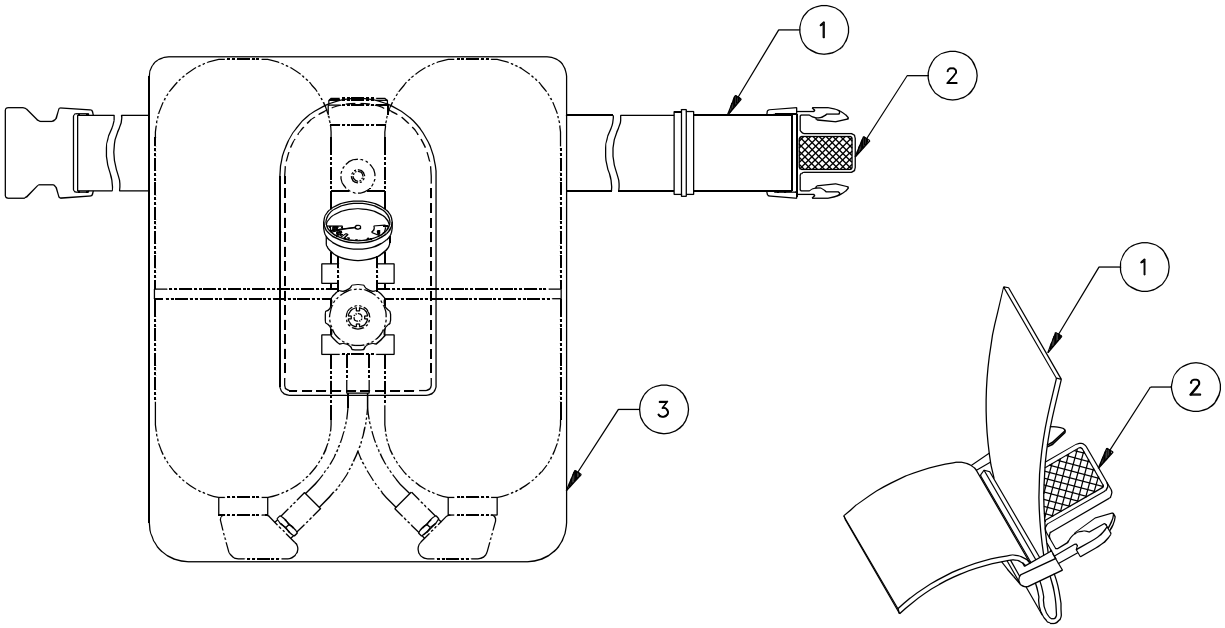

Figure 6-19. Waist Belt Assembly

CHAPTER 7
PARTS LIST

7.1 INTRODUCTION.

This chapter provides an Illustrated Parts Breakdown (IPB) for the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA). The IPB consists of lists of parts and figures which illustrate part locations. A list of part manufacturers, their Commercial and Government Entity (CAGE) codes, and contact information is provided at the end of this chapter.

7.2 LIST OF MAJOR COMPONENTS.

The major components of the SAR/SCBA consist of: the Primary Air Supply Pack (PASP), the Reserve Air Supply Pack (RASP), and the SCBA. The HP hose and associated parts are broken out as a separate assembly in this chapter. For reference, the following index lists the principle assemblies for the SAR/SCBA.

7.3 PARTS LISTS.

Tables 7-1 through 7-4 list the parts for the major components of the SAR/SCBA. Corresponding illustrations are provided in Figures 7-1 through 7-4. For major components, exploded views of the disassembled parts are presented.

7.4 LIST OF MANUFACTURERS.

Table 7-5 lists the manufacturers that supply parts for the SAR/SCBA. Their addresses and CAGE codes are also provided to facilitate the parts ordering process.

Unit No.	Nomenclature	Table No.	Page No.	Fig. No.	Page No.
53711ASSY6314751	Primary Air Supply Pack (PASP)	7-1	7-1	7-1	7-5
53711ASSY6314756	HP Hose Assembly, 4,500 psig	7-2	7-7	7-2	7-7
53711ASSY6314752	Reserve Air Supply Pack (RASP)	7-3	7-8	7-3	7-9
55799ASSY812600	Self-Contained Breathing Apparatus (SCBA)	7-4	7-10	7-4	7-13

Table 7-1. PASP Maintenance Parts List

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
Fig. 7-1	PASP assembly	1	53711	6314751 NSN 1660-01-425-7914
1	PASP case assembly	1	53711	6314766
2	Tube, Tygon®, 5.25 LG	1	-	L-T-790
3	Stiffener	1	53711	6314758-6
4	Screw, machine, pan head, .190-24UNC-2A × .38 LG	2	96906	MS51957-61, NSN 5305-00-050-9227
5	Hose mounting bracket	1	53711	6314761
6	Hose nut fitting	2	53711	6314765
7	Nut, plain, hex	2	96906	MS35649-2384, NSN 5310-00-477-6768

Table 7-1. PASP Maintenance Parts List - Continued

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
8	O-ring	2	81349	M83248/2-115, NSN 5330-01-099-2558
9	Screw, machine, pan head, .190-24UNC-2A × .75 LG	13	96906	MS51957-65, NSN 5305-00-050-9231
10	Nut, hex, self-locking, .190-24UNC-3B	10	96906	MS17830-3C, NSN 5310-00-436-3290
11	Screw, machine, pan head, .250-20UNC-2A	4	96906	MS51957-80, NSN 5305-00-071-1316
12	Screw, cap, hex head, .375-16UNC-2A × 1.0 LG (1-in. bolt)	2	96906	MS35307-360, NSN 5305-00-576-5417
13	Plate, mounting, PASP	1	53711	6314758-2
14	Rubber, mounting, PASP	1	53711	6314758-4
15	Spacer, mounting	2	53711	6314758-12
16	U-brace, PASP	1	53711	6314758-9
17	Cylinder	1	59450	C-L087-45T64-H4A
18	Cylinder valve	1	70292	YV4501
18a	Gasket	1	70292	6510N, NSN 5330-01-090-8341
18b	Burst disc	1	70292	6509-72
18c	Safety plug	1	70292	9-4000-6
19	Seal	1	53711	6314771
20	HP hose assembly, 4,500 psig	2	53711	6314756
20a	Hose assembly	1	61424	520N-JCJC-4-4-4-36C
20b	Union tee	1	79926	S4-4-4TFFPB
20c	Nut, hand-tight, CGA-347	1	16166	SS-6347-2
20d	Nipple	1	58553	NP 765-SS-W
21	Control panel and assembly	1	53711	6314757-panel 6314764-assembly
22	Clip, spring, tension	2	06383	ACC62-A-C
23	Valve, three-way ball	1	62295	3K63K-131-131
23a	Valve handle	1	62295	A-3580-01
23b	Valve handle, set screw	1	62295	A-3535-01

Table 7-1. PASP Maintenance Parts List - Continued

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
23c	Valve mounting nut	1	62295	A-3533-01
23d	Hub	1	62295	A-3579-01
24	Washer, flat	as required	85446	1.125 × .938 × .062, 301SS
25	O-ring	9	81349	M83248/2-906
26	Elbow	2	79926	S4-6 GE
27	O-ring	3	81349	M83248/2-011
28	Filter	1	59165	U-10006
29	Connector	2	11649	SS-8-VCO-1-6ST
30	O-ring	3	81349	M83248/2-111, NSN 5330-01-090-4117
31	Tube, three-way to regulator	1	53711	T-202
32	Regulator	1	33538	44-1819-36-038
32a	Regulator panel mounting nut	1	33538	8686-1, NSN 5310-01-260-3138
32b	Regulator handle (handknob)	1	33538	60476-1
32c	Regulator handle, nut (hex)	1	33538	60482-1
32d	Regulator handle, cap (hole cap)	1	33538	61017-0125
33	Regulator bracket	1	53711	6314760
34	O-ring	4	81349	M83248/2-904, NSN 5330-01-096-8824
35	Elbow, positionable	1	11649	SS-4-VCO-9P-4ST
36	O-ring	3	81349	M83248/2-010, NSN 5330-01-090-4116
37	Tube, Regulator to LP gauge isolation	1	53711	T-204
38	O-ring	6	81349	M83248/2-008, NSN 5330-01-099-2556
39	Valve, gauge isolation	2	99565	PLC-10669
39a	Valve lock washer	2	99565	-
39b	Valve lock washer nut	2	99565	-
39c	Valve knob	2	99565	-

Table 7-1. PASP Maintenance Parts List - Continued

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
39d	Valve knob nut	2	99565	-
39e	Valve cap	2	99565	-
40	Spacer, isolation valve	2	53711	6314758-11
41	Union assembly	2	99565	PLA-11628
42	Tube, regulator to HP gauge isolation	1	53711	T-203
43	Tee	1	11649	SS-4-VCO-TP-4ST
44	Connector	1	11649	SS-4-WVCO-1-4ST
45	LP alarm	1	0DAA4	300274-500
46	Connector	1	11649	SS-8-WVCO-1-6ST
47	Elbow, positionable	1	11649	SS-8-VCO-9P-6ST
48	Plug	2	11649	SS-6-PST
49	Plug	1	08752	8-P50N-SS
50	O-ring	1	81349	M83248/2-908, NSN 5330-01-097-2778
51	Manifold block	1	53711	6314753
52	Manifold gasket	1	53711	6314762
53	Screw, machine, pan head, .190-24UNC × 2.0 LG	4	96906	MS51957-71, NSN 5305-00-050-9237
54	Bleed valve	2	91816	HV50-63
55	Protective dust cap (black)	4	73992	P-SDC1-HK
56	Quick disconnect (with Viton® seal)	4	14127	SL 3103 W
57	HP gauge, 0-5,000 psig	1	52159	25502-35Y11MCG
58	Spacer, gauge	2	53711	6314758-10
59	LP gauge, 0-200 psig	1	52159	25502-25Y11MCG
60	Panel mounting kit	2	52159	RS-426-1
60a	Panel mounting nut	4	52159	-
61	CGA cap assembly	1	16166	9347
62	Spacer, cylinder (cylinder pad)*	2	53711	6314773-1

* Cylinder pads are for use with cylinders marked “LUXFER X X 97 (or later year date)” only.

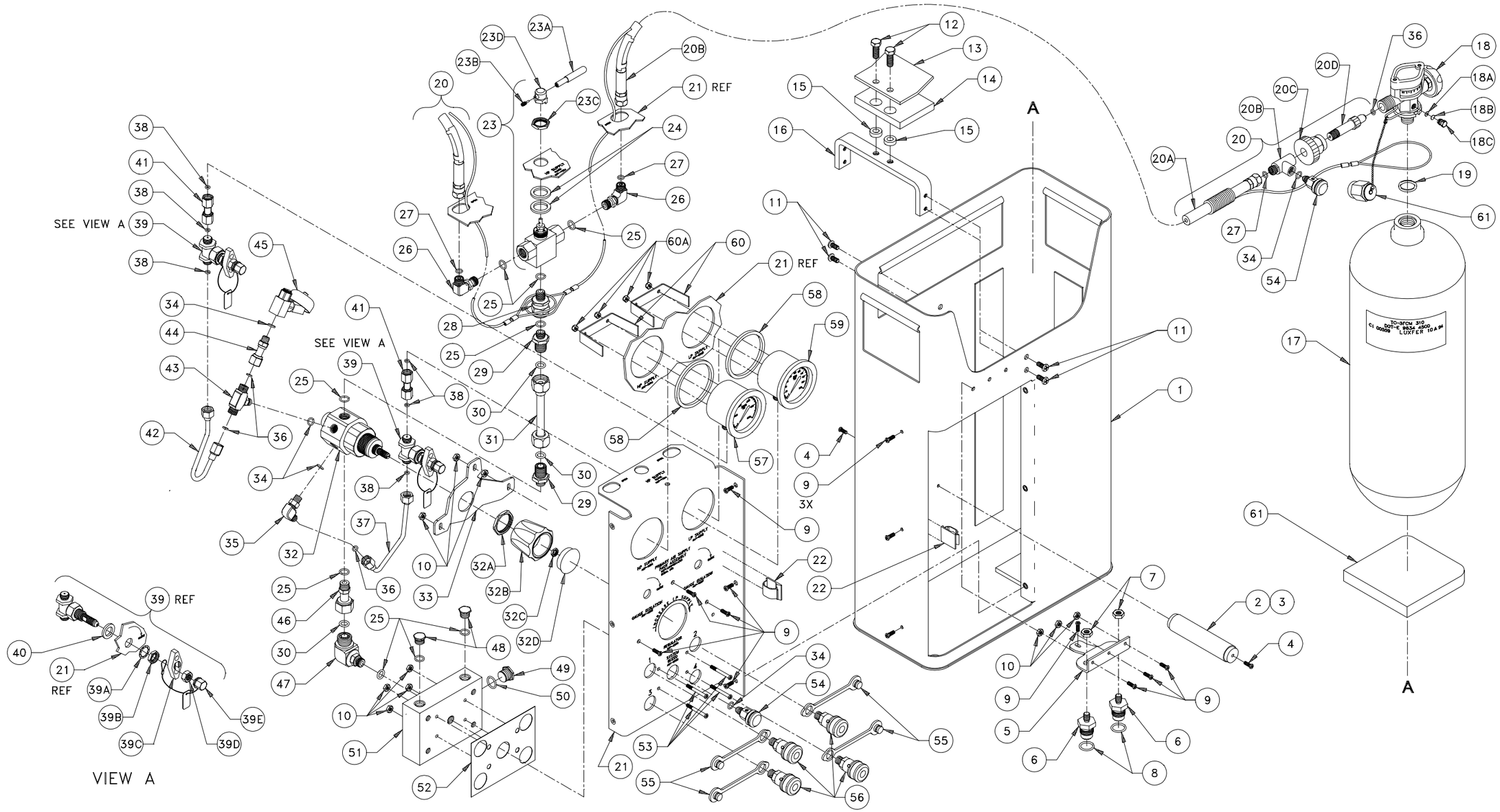

Figure 7-1. Primary Air Supply Pack (PASP)

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Table 7-2. High-Pressure Hose Assembly Maintenance Parts List

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
Fig. 7-2	HP hose assembly, 4,500 psig	1	53711	6314756
1	Hose assembly	1	61424	520N-JCJC-4-4-4-36C
2	Union tee	1	79926	S4-4-4TFFPB
3	Nut, hand-tight, CGA-347	1	16166	SS-6347-2
4	Nipple, CGA-347	1	16166	SS-3470-3
5	Bleed valve	1	91816	HV50-63
6	Wire, rope	-	81349	M83420/4-004, NSN 4010-01-215-2603
7	Sleeve, swaging	4	96906	MS51844-63, NSN 4030-01-142-0456
8	Cord, .12 diameter	-	53711	4666860
9	O-ring	1	81349	M83248/2-010, NSN 5330-01-090-4116
10	O-ring (not shown)	1	81349	M83248/2-904, NSN 5330-01-096-8824
11	O-ring (not shown)	1	81349	M83248/2-011
12	Tag	1	96906	MIL-P-15024/15

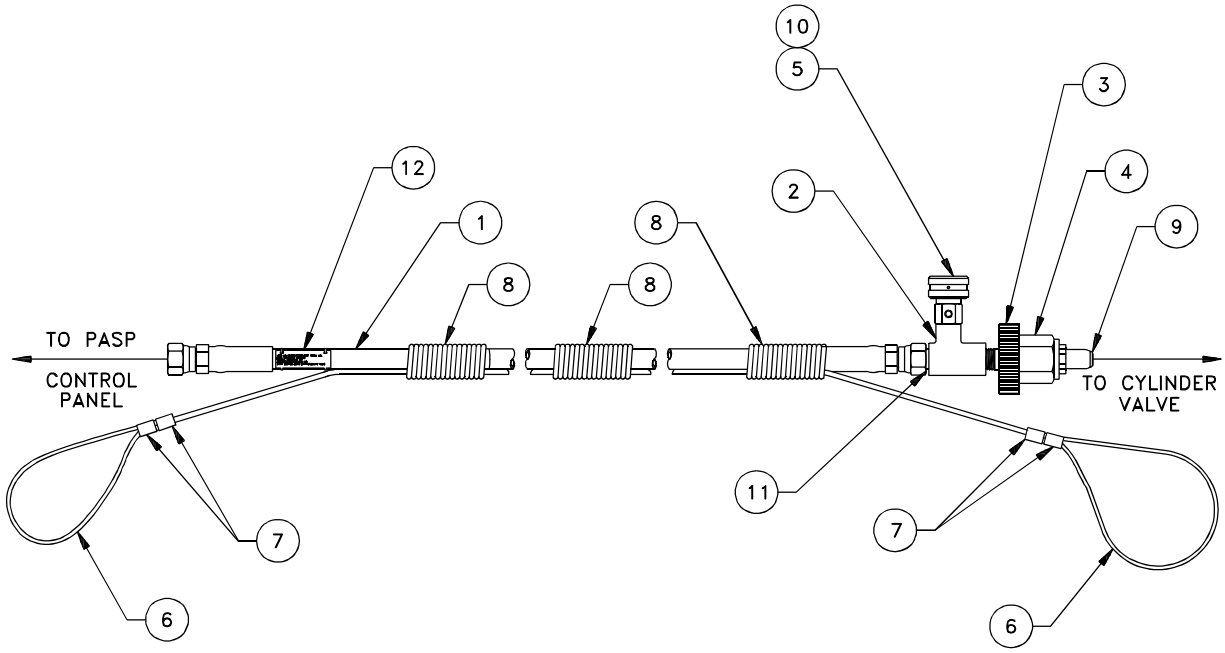

Figure 7-2. High-Pressure Hose Assembly

Table 7-3. RASP Maintenance Parts List

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
Fig. 7-3	RASP assembly	1	53711	6314752
1	RASP case assembly	1	53711	6314767
2	RASP U-brace	1	53711	6314758-1
3	Mounting spacer	2	53711	6314758-12
4	RASP rubber, mounting	1	53711	6314758-5
5	RASP plate, mounting	1	53711	6314758-3
6	Screw, cap, hex head, .375-16UNC-2A × 1.0 LG (1-in. bolt)	2	96906	MS35307-360, NSN 5305-00-576-5417
7	Cylinder valve	2	70292	YV4501
7a	Gasket	1	70292	6510N, NSN 5330-01-090-8341
7b	Burst disc	1	70292	6509-72
7c	Safety plug	1	70292	9-4000-6
8	Seal	2	07322	6314771
9	Cylinder	2	59450	6893418
10	Screw, machine, pan head, .190-24UNC-2A × .62 LG	4	96906	MS51957-64, NSN 5305-00-050-9229
11	Protective coil sleeve	1	99565	4554-16000
12	CGA cap assembly	2	16166	9347
13	Spacer, cylinder (cylinder pad)*	2	53711	6314773-1

* Cylinder pads are for use with cylinders marked “LUXFER X X 97 (or later year date)” only.

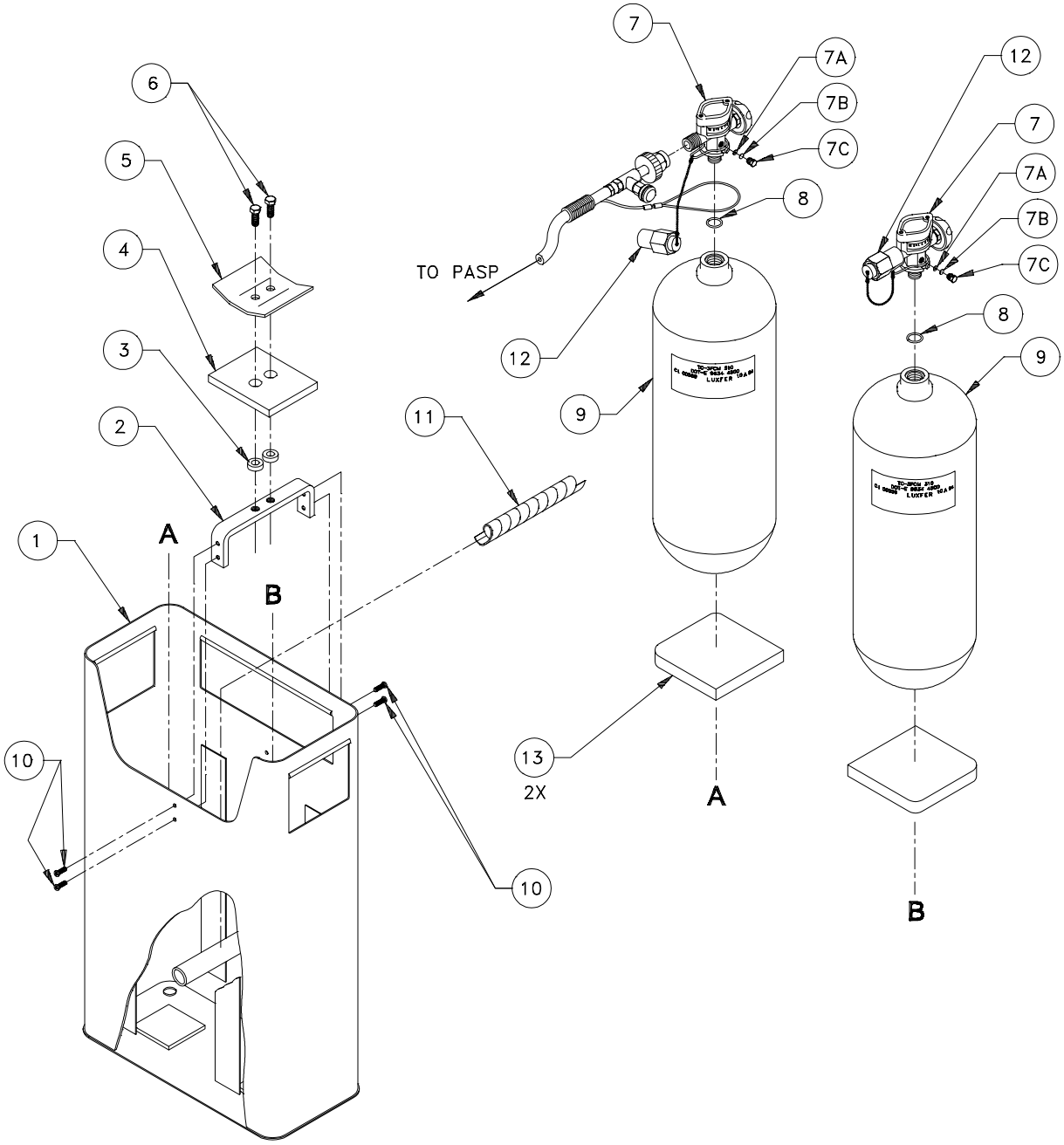

Figure 7-3. Reserve Air Supply Pack (RASP)

Table 7-4. SCBA Maintenance Parts List

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
Fig. 7-4	SCBA assembly	1	55799	812600
* 1	Facepiece, Ultravue®	1	55799	496646 Small 496630 Medium 496662 Large
* 2	Buckle assembly with ring	3	55799	96662, NSN 5340-01-177-5527
* 3	Harness, head	1	55799	458173, NSN 4240-01-178-4434
* 4	Lens	1	55799	801127, NSN 5250-01-110-1255
☐ * 5	Lens ring kit	1	55799	471249 Small 464358 Medium 471250 Large NSN 4240-01-055-8347
* 5a	Lens ring	2	55799	470909 Small 462709 Medium 470910 Large
5b	Screw	2	55799	60532
* 6	Clamp	1	55799	458212, NSN 5340-01-050-3811
* 7	Ring, retainer	1	55799	96666, NSN 5365-01-179-2314
* 8	Diaphragm, speaking	1	55799	488875, NSN 4240-01-250-8271
* 9	O-ring	1	-	M83248/2-133, MSA P/N 629935 NSN 5330-01-049-6595
* 10	Housing, speaking diaphragm	1	55799	473698, NSN 4240-01-382-1843
* 11	Inlet valve	1	55799	813103
* 12	Spider, gasket valve	1	55799	491934
* 13	Cartridge, mask-mounted	1	55799	487807
* 14	Exhalation valve	1	55799	484678, NSN 4240-01-388-9502

* Removable and/or replaceable parts
☐ Kit supplied with SCBA

Table 7-4. SCBA Maintenance Parts List - Continued

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
* 15	Retaining nut	1	55799	461610
* 16	Buckle assembly with "D" ring	2	55799	457190, NSN 5340-01-177-4535
17	Air cylinder, 3,000 psig	2	55799	812640
18	Regulator assembly	1	55799	812632
* 19	LP hose, 1/4 ID × 1/2 OD	1	55799	604055
20	Washer	1	55799	634613
* 21	Check valve	1	91816	2259B-2MM, MSA P/N 630326
* 22	Plug, QD	2	14127	11-3S/S, MSA P/N 637851
23	Manifold (valve assy)	1	55799	812634
24	Alarm	1	55799	637841
25	Cylinder valve pressure indicator	1	55799	095278
26	Cylinder band	1	55799	812644
27	Air cylinder valve	1	55799	812634
28	HP cylinder hose	2	55799	815199
29	Cylinder inlet assembly	2	55799	812641
* 30	Belt	1	55799	9961, NSN 4240-01-250-8280
31	Carry pouch	1	55799	812629
* 32	Swivel block	1	55799	496238
* 33	Knob	1	55799	496266
* 34	Shaft	1	55799	496240
* 35	O-ring	2	81349	M83248/2-012, MSA P/N 635241, NSN 5330-01-099-2557
* 36	O-ring, 1.1875 ID	1	81349	M83248/2-123, MSA P/N 637842 NSN 5330-00-166-1101
37	Push button, semiautomatic	1	55799	804279

* Removable and/or replaceable parts

Table 7-4. SCBA Maintenance Parts List - Continued

Figure/ Index No.	Description	Quantity	CAGE Code	Part Number/ Identifying Number
* 38	Mask-mounted regulator assembly (second-stage)	1	55799	812635
* 39	Screw, #2-56 × 1/4 LG	1	55799	636088
40	Filter screen	1	55799	497197
* 41	Hose assembly (MMR)	1	55799	497102
* 42	Quick disconnect socket	1	55799	SL 3103 W, MSA P/N 637852
* 43	Hose, assembly, 75-foot	2	55799	812625
* 44	Nut, hand-tight, CGA-346	1	55799	-
* 45	O-ring	1	81349	M83248/2-010, MSA P/N 633553, NSN 5330-01-090-4116
*Not shown	Nosecup assembly	1	55799	471710 Small 471711 Medium 471712 Large
*Not shown	Hard-shell carry case	1	65442	1600, NSN 6760-01-258-0449
* Not shown	SCBA spare parts kit	1	55799	812628
* Not shown	Canvas kit bag, flyers (interconnecting hoses)	1	-	NSN 8460-00-606-8366

* Removable and/or replaceable parts

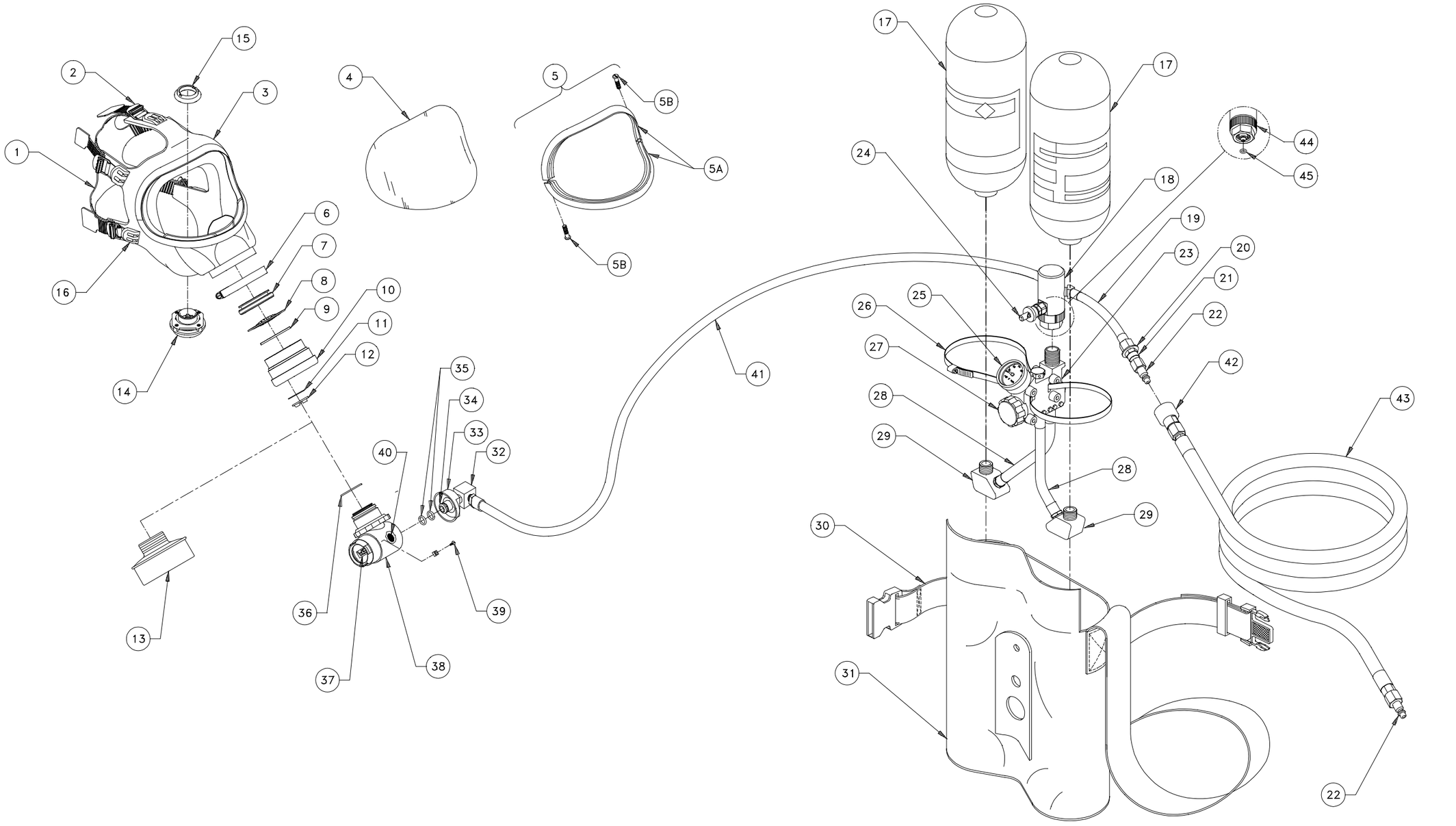

Figure 7-4. Self-Contained Breathing Apparatus (SCBA)

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Table 7-5. List of Manufacturers

CAGE Code	Manufacturer/Address
0DAA4	Respiratory Systems, Inc. 1040 E. Howell Ave. Anaheim, CA 92805-6406 (714) 939-0900 / (714) 939-0600
06383	Panduit Corp. 17301 Ridgeland Tinley Park, IL 60477-3048 (708) 532-1800
07322	Minnesota Rubber Co. 3630 Woodale Avenue P.O. Box 1236 Minneapolis, MN 55440 (612) 927-1400
08752	Parker-Hannifin Corp. Hydraulic Valve Division 520 Ternes Avenue, PO Box 4026 Elyria, OH 44035-4026 (440) 366-5200 / (800) 272-7537
11649	Cajon Company 9760 Shephard Road Macedonia, OH 44056-1124 (440) 248-4600
14127	Foster Manufacturing Co., Inc. 2324 W. Battlefield Springfield, MO 65807-4004 (417) 881-6600
16166	Western Enterprises Manufacturing Plant 875 Bassett Rd. W. Lake, OH 44145 (440) 871-2160
33538	Tescom Corp. Instrument Division 12616 Industrial Boulevard Elk River, MN 55330-2445 (612) 441-6330
52159	3-D Instruments, Inc. 15542 Chemical Lane Huntington Beach, CA 92649-1505 (714) 894-5351
53711	NAVSEA / COASTSYSTA DAHLGREN Division Panama City, FL 32407-7001

Table 7-5. List of Manufacturers - Continued

CAGE Code	Manufacturer/Address
55799	Mine Safety Appliances Co. P.O. Box 428 Pittsburgh, PA 15230 (412) 733-9280 (800) MSA-2222 (day) or (800) MSA-5555 (evening or emergencies)
58553	Superior Valve Co. 2200 N. Main Street Washington, PA 15301-6150 (412) 225-8000
59165	Norman Equipment Co. 9850 S. Industrial Drive P.O. Box 1349 Bridgeview, IL 60455-2307 (708) 430-4000
59450	Luxfer, Inc. Composite Cylinder Division 3016 Kansas Ave. Riverside, CA 92507 (909) 684-5110
61424	Parker-Hannifin Corp. Fluid Connector Group Parflex Division 1300 N. Freedom Street Ravenna, OH 44266-9137 (330) 296-2871 / (800) 272-7537
62295	Butech Pressure Systems Division of Ber-Lo Mfg. Co., Inc. 4928 Pittsburgh Avenue Erie, PA 16509-6207 (814) 833-4904
65442	Pelican Products 23215 Early Avenue Torrance, CA 90505 (310) 326-4700
70292	Harsco Corp. Sherwood Division 120 Church Street Lockport, NY 14094-2825 (716) 283-1010 / (888) 507-2822
73992	Tuthill Corp. Hansen Coupling Division 1000 W. Bagley Road Berea, OH 44017 (216) 826-1115

Table 7-5. List of Manufacturers - Continued

CAGE Code	Manufacturer/Address
79926	SSP Fittings Corporation 8250 Boyle Parkway Twinsburg, OH 44087-2200 (330) 425-4250
81349	Military Specification
85446	Bokers, Inc. 3104 Snelling Avenue Minneapolis, MN 55406-1913 (612) 729-9365 (800) 448-7492
91816	Circle Seal Controls, Inc. A Watts Industries, Inc., Company 2301 Wardlow Circle P.O. Box 3300 Corona, CA 91718 (909) 270-6200
96906	Military Standard
99565	CPV Manufacturing, Inc. 851 N. Preston Philadelphia, PA 19104-1598 (215) 386-6508

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CHAPTER 8
INSTALLATION

8.1 INTRODUCTION.

This chapter provides instructions for unpacking, inventorying, inspecting, checking-out, storing, and shipping the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA). No special installation procedures are required.

8.2 UNPACKING AND INVENTORY PROCEDURES.

8.2.1 Unpacking. Upon receipt of the equipment, carefully unpack shipping crates. Avoid puncturing hoses and damaging gauges and indicators when opening the shipment. As each item is removed from its container, perform a thorough inspection for damage and manufacturing defects. Report all damage or deficiencies to the supply or transportation department. If items are damaged or defective, they should not be placed in service until repaired or replaced.

8.2.2 Inventory. To ensure receipt of all equipment, inventory all components. Verify that all equipment serial numbers correspond with those on the packing list. Open and identify all the parts listed in Table 8-1, SAR/SCBA Ship's Issue Set.

8.3 INSPECTION.

Carefully remove each item from its packing container. Perform a thorough inspection, noting any discrepancies caused by the packing and manufacturing processes. Inspect for completeness of assemblies, faulty workmanship, dirt, cracks, corrosion, or deterioration. Specific items to be inspected are discussed in the following paragraphs.

NOTE

Cylinders manufactured after the year 2000 are the same model as previously required, but are shorter in length and require a cylinder pad to allow the securing of the cylinder in PASP/RASP cases.

8.3.1 Primary Air Supply Pack (PASP). Check the PASP for damage to the aluminum case or the control panel. This unit shall be inspected to ensure that all controls and indicators are in good operating condition.

a. Check the PASP for signs of structural damage, such as dents or cracks on the aluminum case.

b. Check all valves and handles to ensure smooth and proper operation. Ensure that no handles are missing or broken.

c. Check gauges and indicators for damage.

d. Ensure gauges have current calibration dates.

e. Inspect QDs for dents, chips, scratches, or gouges.

f. Inspect for loose, damaged, or missing nuts and screws.

8.3.2 Reserve Air Supply Pack (RASP). Check the RASP for possible damage to the aluminum case. This unit shall be inspected to ensure that no structural damage, such as dents, scratches, or corrosion, has occurred.

8.3.3 Self-Contained Breathing Apparatus (SCBA). Check the SCBA thoroughly for possible shipping damage. Replace any damaged components prior to use. Open the SCBA hard-shell carry cases and identify the following parts:

a. Facepiece and mask-mounted (second-stage) regulator (MMR),

b. Mask-mounted filter cartridge,

c. Carry pouch, waist belt, and strap,

d. One interconnecting air-supply hose (75 ft.) in case, one packed separately,

e. PremAire® CADET 15M Air-Line Respirator Operation and Maintenance Manual, and

f. Spare parts kit.

8.3.4 Hoses. Check all PASP, RASP, and SCBA hoses and fittings. Inspect the hoses and fittings to ensure they are in good operating condition.

a. Inspect fittings for chips, dents, scratches, or gouges.

b. Inspect each hose for blisters or abrasions.

c. Inspect each hose for cuts, cracks, or punctures.

d. Inspect each hose to ensure fittings are firmly attached.

e. Ensure each hose has a current hydrostatic test date.

8.3.5 Air Cylinders. Pursuant to Department of Transportation (DOT) regulations, a copy of Appendix B to this manual must be retained on board all ships and aircraft

Table 8-1. SAR/SCBA Ship's Issue Set

Ship's Set Inventory
2 Primary Air Supply Packs (PASPs)
5 Reserve Air Supply Packs (RASPs)
8 Self-Contained Breathing Apparatus (SCBAs) with hard-shell carry cases • 8 interconnecting air-supply hoses (75 ft.) - packed separately • 4 canvas bags (excess hose storage) • 1 SCBA Spare Parts Kit
1 SAR/SCBA Tool Kit - Specialty Tools Only • Pressure-demand exhalation wrench (spanner wrench) • Quick disconnect airflow adapter 1 SAR/SCBA Maintenance Manual, Organizational and Intermediate Levels, (hard copy), SS600-AN-MMA-010 1 CD-ROM • SAR/SCBA Maintenance Manual, Organizational and Intermediate Levels, SS600-AN-MMA-010 • Planned Maintenance System (PMS) • Interim Parts List • Ordering Information 1 SAR/SCBA Orientation Video

used to transport SAR/SCBA HP air cylinders. Note that the PASP/ RASP HP air cylinders are assigned designation DOT-E-9634, and the SCBA air cylinders are assigned the designation DOT-E-7277. Each cylinder requires hydrostatic testing every 3 years IAW 49 CFR 173.34(e) as prescribed for DOT 3HT cylinders, except that the rejection elastic expansion criteria does not apply and permanent volumetric expansion may not exceed 5% of total volumetric expansion at test pressure (5/3 service pressure). Reheat treatment or repair of rejected cylinders is not authorized. The service life of SAR/SCBA composite-type HP air cylinders is 15 years. See "Special Provisions" section (paragraph 8) of Appendix B. Appendix B also addresses the packaging of HP air cylinders IAW 49 CFR 173.301(k).

The cylinders shall be inspected IAW PMS requirements and this chapter to ensure that they meet U.S. Navy specifications for safety and operations. The cylinders should be clean and free of labels, dirt, or other attachments that may hinder an inspection. The manufacturer's labels shall not be removed from the air cylinders. No paint shall be removed.

The following paragraphs and figures illustrate the types of damage associated with fiberglass/epoxy cylinders, and describe cylinder repairs.

8.3.5.1 Types of Air Cylinder Damage.

CAUTION

Significant repairs on HP air cylinders are generally not performed at Shipboard Organizational level. Cylinder repairs shall be performed by authorized repair activities using repair standards and procedures designed for HP air cylinders.

a. Scuffs — Minor abrasion damage (Level 1 damage) to protective coating (e.g, paint) on cylinders (Figure 8-1).

b. Abrasions — Greater loss of surface with numerous fibers visible. Can be caused by sliding contact with a rough surface. Flat spots evident on the surface could indicate excessive loss of composite thickness (Figure 8-2).

c. Cuts — Defects in the cylinder caused by a sharp object (Figure 8-3).

d. Impact Damage — Defects caused by dropping or a blow from a blunt object.

(1) Dents or Bruises — Damage may appear as crazing (hairline cracking) or frosting of the fiberglass/epoxy (Figure 8-4).

(2) Delamination — Delamination is a separation between the plies of the overwrap or at the overwrap-liner interface. Damage may appear as a whitish patch, like a blister or air space beneath the surface (Figure 8-5).

e. Structural — Indicates severe damage to the cylinder. This damage is extreme and may involve damage to the liner, as well as to the exterior (Figure 8-6).

f. Fire — Cylinders with signs of fire damage will be condemned (Figure 8-7).

8.3.5.2 Levels of Air Cylinder Damage. The following inspection criteria apply to fiberglass/epoxy-wrapped cylinders and are summarized in Table 8-2.

a. Level 1 Damage (Acceptable) — Level 1 damage is minor and is considered normal, having no adverse effects on the safety of the cylinder and its continued use. Scratched paint, nicks, or dings that have no appreciable depth, or no significant quantity of frayed fibers, are considered Level 1.

b. Level 2 Damage (Rejectable, additional inspection or repairs required) — Level 2 damage may be cuts or gouges which are deeper or longer than those of Level 1, or may include a group of severed fibers. This level of damage may be repairable. If an evaluation is made that the cylinder has Level 2 damage, it should be returned to the appropriate maintenance authority for further evaluation and repair.

c. Level 3 Damage (Condemned - not repairable) — Level 3 damage is a cylinder that has been rendered unfit for continued service and cannot be repaired. Discovery of such damage shall be recorded in writing, including notation of the cylinder serial number. The cylinder will be condemned and disposed of as directed in Table 8-2.

8.3.5.3 Air Cylinder Inspection Criteria. The following inspection criteria apply to fiberglass/epoxy-wrapped cylinders and are summarized in Table 8-2.

a. Abrasions — Level 1: Minor abrasions, such as scuffs, are acceptable unless the damage is deep enough to expose groups of fibers. Abrasions must not exceed a depth of 0.005 inch to qualify as Level 1 damage for PASP, RASP, and SCBA cylinders.

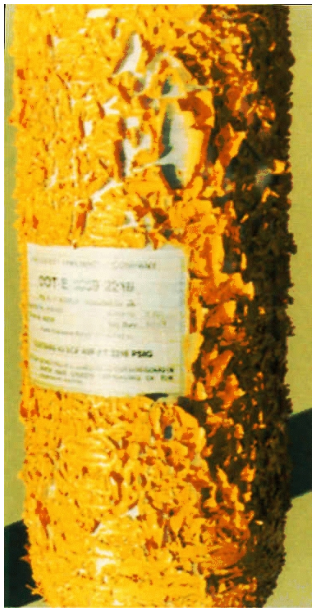
Level 2: Abrasions in this category must not exceed a depth of 0.045 inch for PASP/RASP cylinders (0.010 inch for cylindrical section and 0.0055 inch for dome section of SCBA cylinder), and a maximum of 1 inch in length transverse to the fiber.

Level 3: Cylinder abrasions exceeding a depth of 0.045 inch for PASP/RASP cylinders (0.010 inch for cylindrical section and 0.0055 inch for dome section of SCBA cylinder) are condemned.

Figure 8-1. Cylinder Scuffs*

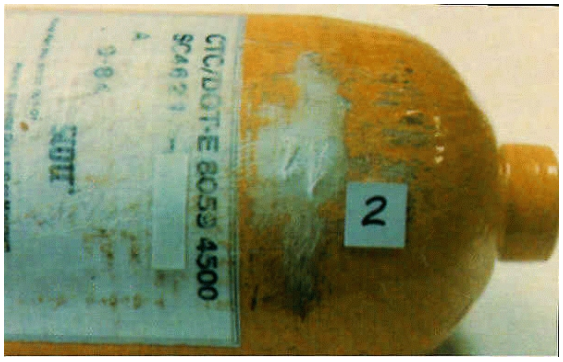
*All photographs (Fig. 8-1 through 8-7) of damaged air cylinders were reprinted with permission from the Compressed Gas Association publication *Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders*, CGA C-62, 1988.

ABRASION DAMAGE

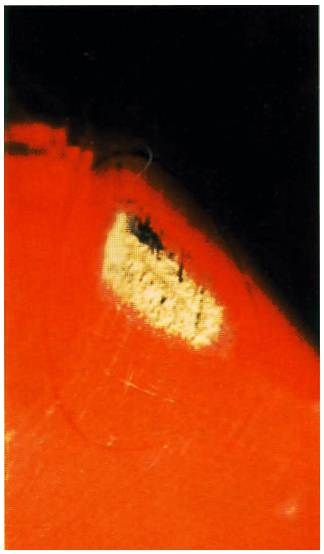


Paint stripping (condemned)

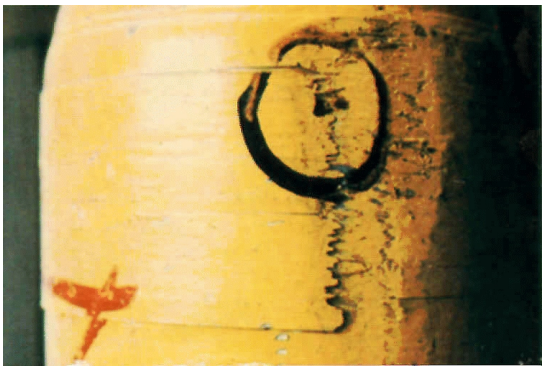
Level 1 abrasion
(acceptable)



Level 1 abrasion
(acceptable)



Level 2 abrasion
(repair and hydrotest needed)

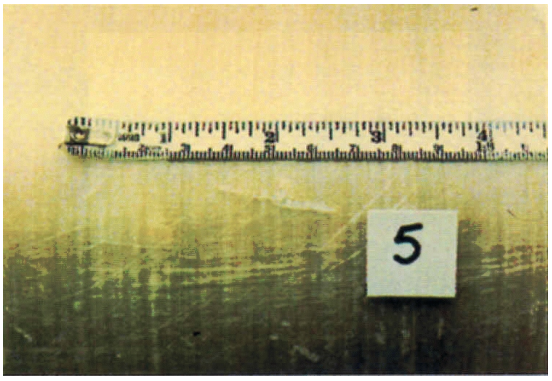


Level 3 abrasion (condemned)

Level 3 abrasion
(condemned)

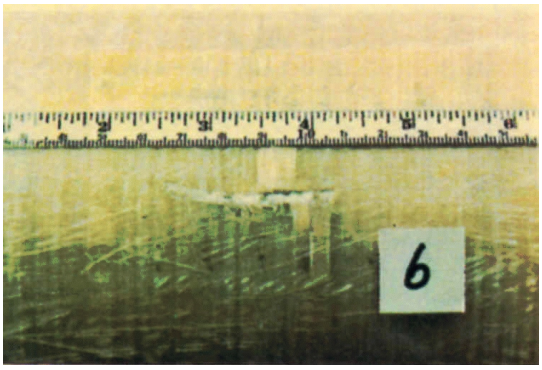
Figure 8-2. Cylinder Abrasions*

CUT DAMAGE

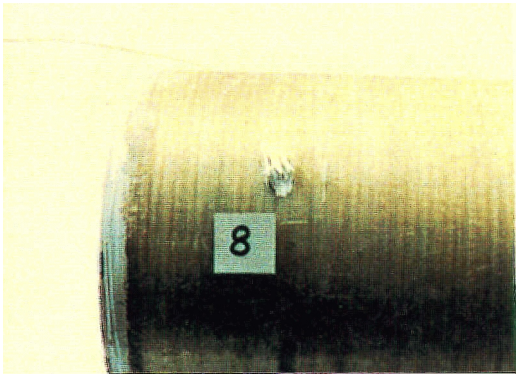


Level 1 cuts (acceptable)

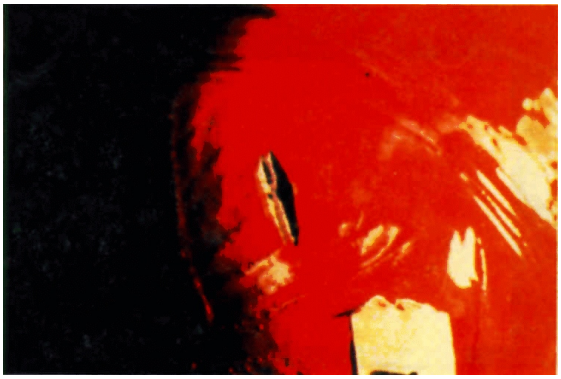
Level 1 cuts (acceptable)



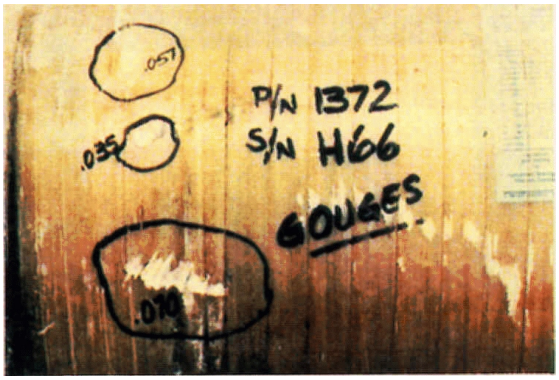
Level 3 cuts (condemned)



Level 3 cuts (condemned)

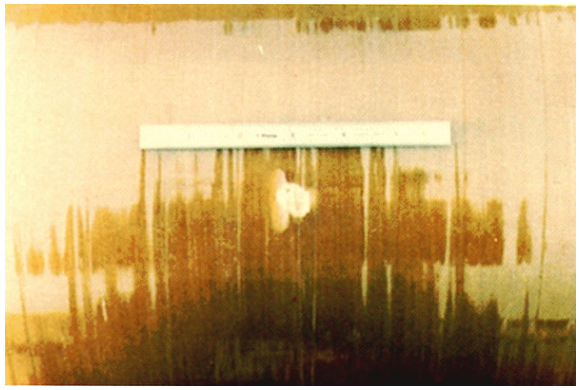


Level 3 cuts (condemned)



Level 3 cuts (condemned)

Figure 8-3. Cylinder Cuts*



Level 1 impact damage (acceptable)

Level 3 impact damage (condemned)

Figure 8-4. Cylinder Dents*

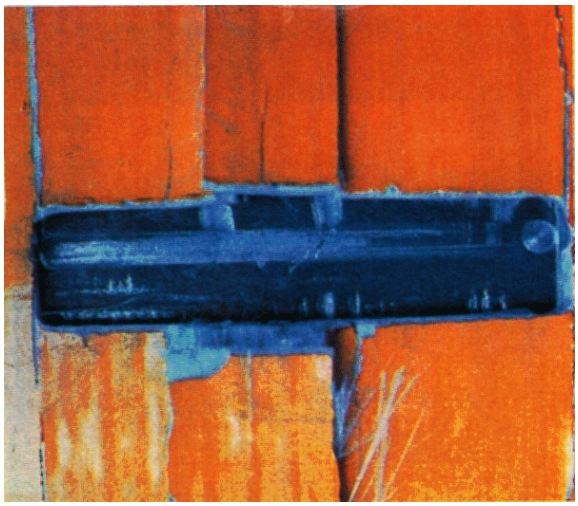


Figure 8-5. Cylinder Delamination*

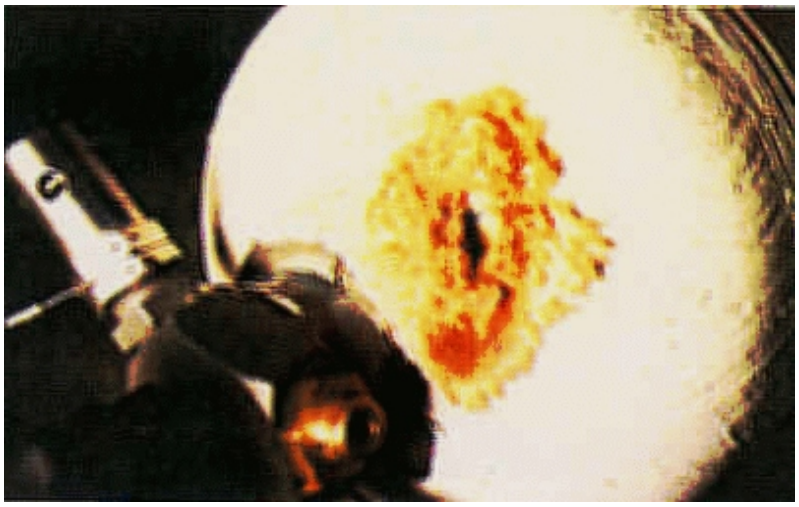
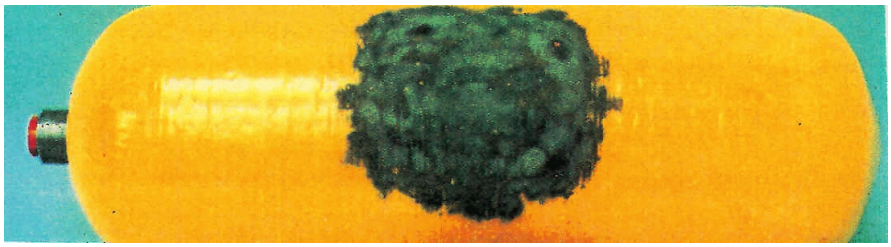


Figure 8-6. Cylinder Structural Damage*

Level 3 fire damage (condemned)



Level 3 fire damage (condemned)

Figure 8-7. Cylinder Fire Damage*

b. Cuts — Level 1: Cuts or scratches less than 0.005 inch deep are acceptable for PASP, RASP, and SCBA cylinders.

Level 2: Cuts or gouges with a maximum depth of 0.090 inch for PASP/RASP cylinders (0.020 inch for cylindrical section and 0.011 inch for dome section of SCBA cylinder) and with a maximum of 1 inch in length transverse to the fiber are repairable. Cuts should be epoxy-coated with a room-temperature-cure, using a two-component epoxy resin system. Loose fibers should be trimmed away before coating with resin. All repaired cylinders must be subjected to hydrostatic testing before being returned to service. No cut enlargement or lift/peeling of the overwrap is allowed after hydrostatic testing.

Level 3: Cylinders with cuts deeper than 0.090 inch (PASP/RASP) and 0.020 inch for cylindrical section and 0.011 inch for dome section (SCBA) are condemned. Cylinders with bare metal showing through a cut in the wrapping are also condemned.

c. Dents — If the dent affects structural configuration, the cylinder will be condemned. Dents existing in localized areas of the fiberglass wrapping only are acceptable. If damage includes delamination or exposed fiber ends and is less than 0.005 inch (PASP/RASP/SCBA), the area must be repaired with an epoxy coating. If delamination or exposed fiber ends exceed a depth of 0.005 inch, the cylinder is to be returned to the proper maintenance authority for evaluation and repair.

d. Delamination — Delaminations are acceptable only if repaired by coating all exposed fibers with epoxy. If the delaminated area shows evidence of broken fibers or flaw growth after hydrostatic testing, the cylinder must be condemned.

e. Structural — Structural damage is severe damage, usually with visual evidence of a change in envelope configuration. A cylinder must be condemned for any evidence of bulges, cocked end fitting, or concave areas on the domes or on the cylinder section. If visual inspection of the interior indicates exterior damage causing deformation of the liner, the cylinder must be condemned.

f. Fire Damage — Cylinder with signs of fire damage shall be condemned. Fire damage may be evident by charring or burning of the composite, labels, paint, or plastic components of the valve. If, however, the protective coating is only soiled from smoke or other debris and is found by examination to be intact underneath, the cylinder shall not be considered affected.

8.3.5.4 Interior Inspection of Air Cylinders. Inspect cylinder for last hydrostatic test date. If three or more years have elapsed, perform visual and hydrostatic tests in accordance with MRC 5519 S-1R. The interior of SCBA cylinders shall be inspected by the authorized repair facility only. The interior of all PASP/RASP fiberglass/epoxy cylinders will be inspected as indicated below.

a. Threads — Inspect threads for nicks, cuts, cracks, and damage.

b. O-Ring Gland — Make sure O-ring gland is clean and free from damage.

c. Interior — Inspect interior with a borescope.

(1) Moisture — If moisture appears in cylinders, a review of the charging filter system is required to prevent further damage.

(2) Pitting — Any pitting in new cylinders is cause for return to the appropriate maintenance authority. Random, minor shallow pitting is permissible in used cylinders; however, groups of shallow pits, a line of shallow pits, or deep pitting (shadow cast in bottom of pit) require that the cylinders be returned to the appropriate maintenance authority.

(3) Dents — Dents which are visible on the interior are cause for condemnation of the cylinder.

(4) Cracks — Cracks which are visible on the interior are cause for condemnation of the cylinder.

(5) Foreign material — If any foreign material is found in the cylinder, it must be identified and its source located before using cylinder.

8.3.5.5 Manufacturer's Label. The manufacturer's label is located on the sidewall near the end of the cylinder's valve outlet. The label contains the information below.

a. Department of Transportation (DOT) exemption number followed by service pressure

b. Numerical serial number followed by inspector's mark

c. Manufacturer's identification

d. Date of manufacture

If the label is missing, the cylinder shall be condemned. If the label is illegible, the manufacturer shall be asked for the information. Missing data shall be placed on a label and the label securely affixed to the cylinder and overcoated with epoxy.

Table 8-2. Summary of Inspection Criteria for Fiberglass/Epoxy Composite Cylinders

(PART A - LEVEL 1 DAMAGE)		
Levels of Damage	Inspection Criteria and Type of Damage	Maintenance Actions
Category 1 (Acceptable, no repairs required.)	1. Abrasions in this category must not exceed a depth of 0.005 inch (PASP/RASP/SCBA); if they do, refer to Category 2.	1. Depth less than 0.005 inch, repair IAW MRC Q-2R.
	2. Cuts in this category must not exceed a depth of 0.005 inch (PASP/RASP/SCBA); if they do, refer to Category 2.	2. Depth less than 0.005 inch, repair IAW MRC Q-2R.
	3. There must be no significant amount of loose or broken fibers; if there is, refer to Category 2.	3. No repairs allowed.
	4. There must be no metal visible through the fiberglass/epoxy wrapping; if there is, refer to Category 3.	4. No repairs allowed.
	5. All information on the DOT label must be legible; if not, refer to Category 2.	5. No repairs allowed.
	6. Hydrostatic test date must not have expired; if it has, refer to Category 2.	6. No repairs allowed.
(PART B - LEVEL 2 DAMAGE)		
Level of Damage	Inspection Criteria and Type of Damage	Maintenance Action
Category 2 (Rejectable, additional inspection or repairs required.)	1. Abrasions in this category must not exceed a depth of 0.045 inch (PASP/RASP) or 0.010 inch for cylindrical section and 0.0055 inch for dome section (SCBA), and a maximum of 1 inch in length transverse to the fiber; if they do, refer to Category 3.	Further evaluation and/or repairs required. (Send to authorized repair facility.)
	2. Cuts in this category must not exceed a depth of 0.090 inch (PASP/RASP) or 0.020 inch for cylindrical section and 0.011 inch for dome section (SCBA), and a maximum of 1 inch in length transverse to the fiber; if they do refer to Category 3.	
	3. There can be small, isolated patches of visible loose or broken fibers (see item 1 above).	
	4. All information on the DOT label not legible.	
	5. Expired hydrostatic test date.	
	6. All cylinders in Category 2 must pass a hydrostatic retest prior to returning to service.	

Table 8-2. Summary of Inspection Criteria for Fiberglass/Epoxy Composite Cylinders - Continued

(PART C - LEVEL 3 DAMAGE)		
Level of Damage	Inspection Criteria and Type of Damage	Maintenance Action
Category 3 (Condemned, not repairable.)	1. Cylinder abrasions exceeding a depth of 0.045 inch (PASP/RASP) or 0.010 inch for cylindrical section and 0.0055 inch for dome section (SCBA).	Not repairable. (Depressurize and drill hole in cylinder through DOT label.) Dispose of in accordance with applicable organization supply and ship/facility procedures.
	2. Cylinder cuts exceeding a depth of 0.090 inch (PASP/RASP) or 0.020 inch for cylindrical section and 0.011 inch for dome section (SCBA).	
	3. Metal visible through the wrapping.	
	4. Cylinders with severe structural damage affecting cylinder configuration.	
	5. Cylinders with signs of fire damage (evidence of charring or burning of composite, labels, paint, or plastic components of valve).	

8.4 CHECK-OUT PROCEDURES.

To check-out the SAR/SCBA equipment, follow the pre-operational procedures in Chapter 2, Operation.

8.5 STORAGE PROCEDURES.

The SAR/SCBA is a life-support system; therefore, careful storage of its components is required.

8.5.1 Storage Precautions. Short-term and long-term storage precautions are listed below.

a. The equipment shall not be stored in an area that is hot, near a potential heat source, or near flammable materials. Components shall not be stored in temperatures higher than 150°F (65.6°C) or lower than 0°F (-17°C).

b. Components shall not be stored in direct sunlight due to the deteriorating effects of sunlight on the hoses.

c. Store in a clean, dry space to prevent dust from setting in the interior of the facepiece and being stirred up and breathed during the next use of the device.

d. Components shall be clean and dry when stored. Ensure that there is no moisture inside the hoses prior to storage. The outside of all hoses should be free of residue, dirt, or grease.

e. Hoses shall not be stored in a distorted position which may cause permanent damage. To store HP PASP hose, disconnect from cylinder and coil hose around brackets inside PASP control panel (Figure 8-8).

f. Components shall not be stacked when stored. This will prevent damage caused by pressure, weight, or from falling.

8.5.2 Storage Procedures. General storage procedures are listed below.

a. Wash system exterior with NID solution. Rinse with fresh water and dry thoroughly.

b. Ensure hose interiors are dry.

c. Check entire system for damage, cracks, etc.

d. Accomplish applicable PMS actions.

e. Cover QDs with protective dust caps.

Follow the instructions below when storing the SCBA.

a. Open the hard-shell carry case and remove any dust or debris that may be in the case.

b. Repack the sections of air-supply hose along the outer walls of the hard-shell carry case.

c. Place the cylinder pack in the center of the case in the "pocket" formed by the air-supply hose.

d. For maximum safety, the SCBA cylinders should be stored completely full or empty (pressure above ambient but less than 100 psig).

e. Store the Ultravue® Facepiece in the drawstring plastic bag, furnished with the respirator, and place the facepiece in the case.

f. Place the manual and repair kit on top of the hose so that it will not interfere with the lid of the case when it is closed.

g. Close and lock the case. Store the case in a clean, dry place to prevent dust from settling in the interior of the case. The place of storage should be away from direct sunlight and moderately cool, since heat and sunlight will shorten the life of the rubber parts.

h. Return the extra interconnecting air supply hose (75 ft.) to its storage container.

8.6 SHIPPING PROCEDURES.

Specific shipping procedures can be obtained from the ship/station supply or transportation department. Advance planning will ensure a smooth and timely shipment. Figure 8-9 provides the equipment dimensions to assist with packing and shipping. For packing purposes, the lip on the handles of the PASP/RASP extends the length approximately 1/2 inch to 16.5 inches. When preparing air cylinders for transporting, the DOT regulations and restrictions outlined in Appendix B apply.

NOTE

All cylinders must have a positive pressure of 25 psi or less when shipping.

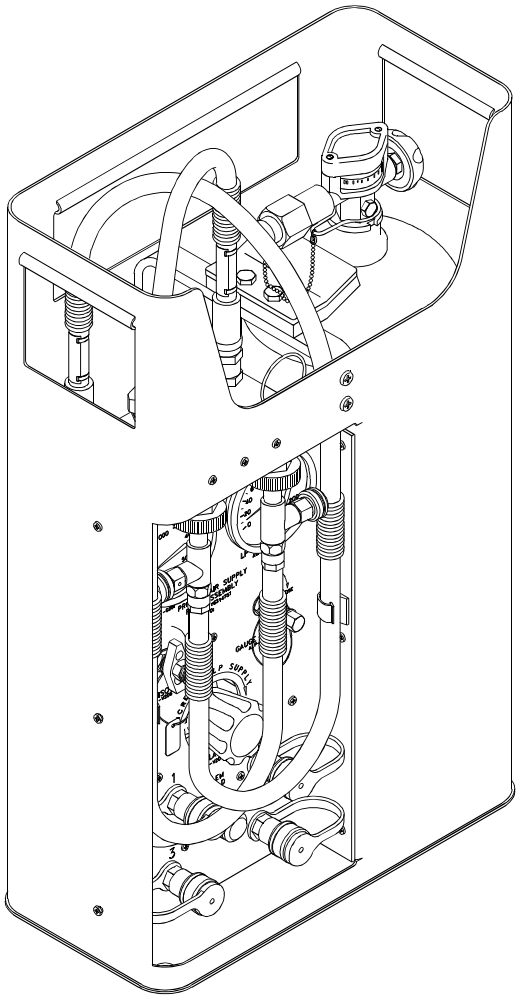


Figure 8-8. High-Pressure Storage Configuration

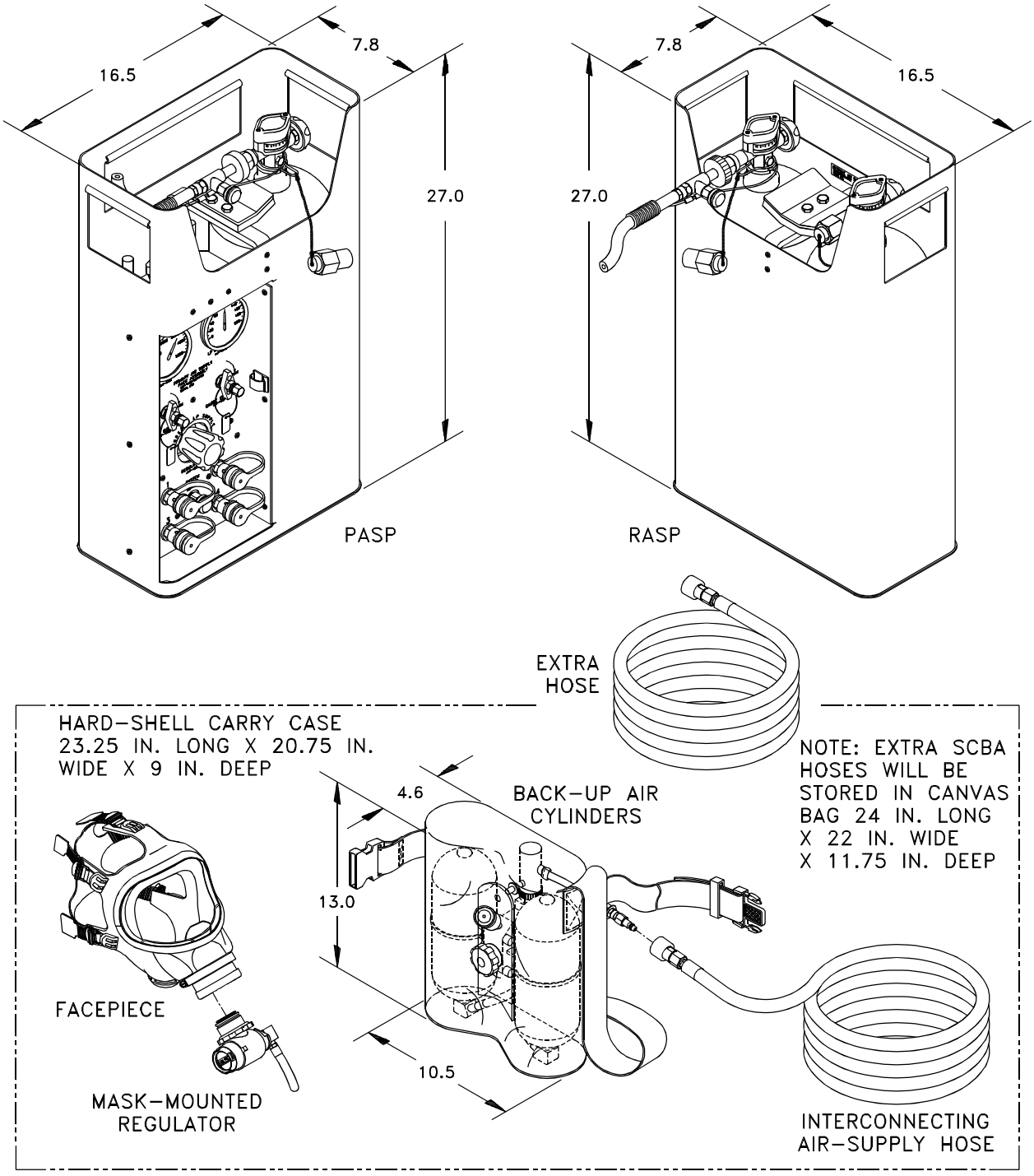


Figure 8-9. SAR/SCBA Dimensions

APPENDIX A

SAR/SCBA PRE-OPERATIONAL CHECKLIST

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SAR/SCBA Pre-Operational Checklist

NAME: _____ RATE: _____ DATE: _____

LOCATION: _____ PRE-OPERATION START TIME: _____

Initials	PASP/RASP
_____	1. Inspect PASPs/RASPs.
_____	2. Inspect PASP HP and LP gauge calibration stickers. Do not operate PASP if calibration dates are not current.
_____	3. Check all moving parts on PASPs/RASPs.
_____	4. Inspect all PASP/RASP HP air hoses including all end fittings.
_____	5. Attach HP air hose assemblies to selected PASP/RASP cylinders.
_____	6. Verify that HP gauge isolation valve (AHP-V206) is open. Ensure (AHP-V206) is open (fully counterclockwise (CCW)).
_____	7. Select HP air cylinder. Turn three-way ball valve (AHP-V204) handle to OPEN position (arrow toward HP air hose from selected cylinder).
_____	8. Place HP air cylinder on-line.
_____	9. Verify LP gauge isolation valve (ALP-V207) position, LP gauge pressure (ALP-G202), and adjust regulator (AHP-V205).
_____	10. Perform gross leak test of SAR.
_____	11. Turn three-way ball valve (AHP-V204) to closed position. Turn AHP-V204 to closed position (arrow toward center).
_____	12. Bleed down PASP and test LP alarm. Turn AHP-V208 clockwise (CW) and hold open. This is a spring-loaded valve that will spring shut unless held open manually. Bleed down LP manifold until HP gauge (AHP-G201) reads 500 ± 50 psig at which time alarm should sound. After alarm sounds, continue bleeding air until LP gauge (ALP-G202) reads 0 psig.
_____	13. Set regulator (AHP-V205). Turn AHP-V205 fully CCW.
_____	14. Place HP air cylinder(s) on-line. Turn HP air cylinder valve(s) (AHP-V201, AHP-V301, and/or AHP-V302) fully CCW.
Initials	SCBA
_____	1. Inspect SCBA(s) air cylinder pressure and connections.
_____	2. Inspect SCBA breathing apparatus (the fit test for the facepiece shall be done yearly).
_____	3. Determine how many sections of 75-foot, LP air-supply hoses will be required.
_____	4. Inspect all LP air hoses and interconnect require LP hoses.
_____	5. Don personnel protective clothing, Navy-approved body harness, and SCBA unit.
_____	6. Connect LP air hoses to SCBAs.
_____	7. Don facepiece and conduct Air Tightness Test before each use. Perform this test any time the facepiece is donned.
_____	8. Check flow of air from SCBA air cylinders.

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APPENDIX B

DEPARTMENT OF TRANSPORTATION (DOT) AIR CYLINDER EXEMPTIONS AND SHIPPING REQUIREMENTS

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OCT 28 1999

U.S. Department of Transportation
Research and Special Programs Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 9634
(THIRD REVISION)

EXPIRATION DATE: September 30, 2001

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Luxfer Gas Cylinders
Riverside, CA

2. PURPOSE AND LIMITATIONS:

This exemption authorizes the manufacture, marking and sale of a non-DOT specification cylinder conforming with all regulations applicable to a DOT FRP-1 cylinder, except as specified herein to be used for the transportation in commerce of certain Division 2.1 or 2.2 materials. This exemption provides no relief from any Hazardous Materials Regulation other than as specifically stated herein.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302(a)(1), 173.304(a),(d) and 175.3 in that the use of a non-DOT specification package is authorized.

5. BASIS: This exemption is based on the application of Luxfer Gas Cylinders dated October 4, 1999, submitted in accordance with § 107.109.

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Continuation of DOT-E 9634 (3rd rev.) Page 2

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous materials description -- proper shipping name	Hazard Class/ Division	Identi-fication Number	Packing Group
Hydrogen and methane mixture, compressed	2.1	UN2034	N/A
Natural gas, compressed (*with high methane content*)	2.1	UN1971	N/A
Other Division 2.2 gases under specific commodity names (air, compressed, carbon dioxide, helium, compressed, nitrogen, compressed, oxygen and oxygen-nitrogen mixture, containing not over 39% oxygen classified as nonflammable gases).	2.2	As appro-priate	N/A

7. PACKAGING(S) and SAFETY CONTROL MEASURES:

PACKAGING - Packaging prescribed is a non-DOT specification fiber reinforced plastic (FRP) full composite (FC) cylinder in full conformance with Luxfer drawing L45T45-6 Rev. 0 on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA), and in conformance with the requirements of DOT FRP-1 Standard, Revision 2 dated February 15, 1987 (Basic Requirements for Fiber Reinforced Plastic (FRP) Type 3FC Composite Cylinders) except as follows:

§ 178.AA-5 Authorized material and identification of material.

(a) Aluminum liner must be 6061 and T6 temper. Cylinders constructed with aluminum liner

OCT 28 1999

6351 before January 1, 1990 can remain in service if requalified in accordance with paragraph 8(j) of this exemption.

§ 178.AA-6 Manufacture.

(a) Add to end of the paragraph: Each cylinder must be a seamless cylinder and may be produced by cold or hot backward extrusion, cold drawing, or from an extruded tube with swaged or spun ends.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

b. A person who is not a holder of this exemption, but receives a package covered by this exemption, may reoffer it for transportation provided no modifications or changes are made to the package and it is offered for transportation in conformance with this exemption and the HMR.

c. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

d. Each cylinder manufactured under the authority of this exemption must be marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.

e. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.

f. Cylinders manufactured under this exemption are not authorized for use fifteen (15) years after the date of manufacture.

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g. Use of these cylinders for underwater breathing is not authorized.

h. Cylinders used in oxygen service must be in compliance with § 173.302(a)(5)(i) through (iv).

i. Cylinders must be packaged in accordance with § 173.301(k).

j. Each cylinder must be reinspected and hydrostatically retested every three years in accordance with § 173.34(e) as prescribed for DOT 3HT cylinders, except that the rejection elastic expansion criteria does not apply, permanent volumetric expansion must not exceed 5 percent of total volumetric expansion at test pressure and retest dates must be steel stamped on the outer exposed metallic surface of the cylinder neck, or marked on a label securely affixed to the cylinder and over coated with epoxy. Reheat treatment or repair of rejected cylinders is not authorized.

k. Transportation of flammable gas is not authorized aboard cargo vessel or passenger-carrying aircraft.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo aircraft only and passenger-carrying aircraft.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel and aircraft used to transport packages covered by this exemption. The shipper shall furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.

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- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing of any incidents involving the package and shipments made under the terms of this exemption.

Issued at Washington, D.C.

for Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

10/28/99
(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

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Continuation of DOT-E 9634 (3rd rev.) Page 6

Copies of exemptions may be obtained from the AAHMS, U.S. Department of Transportation, 400 7th Street, S.W., Washington, DC 20590-0001, Attention: Records Center, 202-366-5046.

Dist: USCG, FHWA, FAA, FRA
PO: KFW/sdc

U.S. Department of Transportation
Research and Special Programs Administration

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DOT-E 7277
(FIFTEENTH REVISION)

400 Seventh Street, S.W.
Washington, D.C. 20590

EXPIRATION DATE: August 31, 2001

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Structural Composites Industries
Pomona, California

2. PURPOSE AND LIMITATIONS:

This exemption authorizes the manufacture, marking and sale of non-DOT specification cylinders to be used for the transportation in commerce of certain Division 2.1 and 2.2 gases. This exemption provides no relief from any regulation other than as specifically stated herein.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302(a)(1), 173.304(a),(d), and 175.3.

5. BASIS: This exemption is based on the application of Structural Composites Industries dated August 24, 1999, submitted in accordance with § 107.109.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous materials description -- proper shipping name	Hazard Class/ Division	Identification Number	Packing Group
Air, compressed	2.2	UN1002	N/A
Argon, compressed	2.2	UN1006	N/A
Carbon dioxide	2.2	UN1013	N/A
Helium, compressed	2.2	UN1046	N/A
Nitrogen, compressed	2.2	UN1066	N/A
Nitrous oxide, compressed	2.2	UN1070	N/A
Oxygen, compressed	2.2	UN1072	N/A
Methane, compressed	2.1	UN1971	N/A
Hydrogen, compressed	2.1	UN1049	N/A

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7. PACKAGING(S) and SAFETY CONTROL MEASURES: Packaging prescribed is a non-DOT specification fiber reinforced plastic (FRP) full composite (FC) cylinder in full compliance with SCI's specification SCI Special Report 7338 on file with the Office of Hazardous Materials Safety (OHMS), and with DOT FRP-1 Standard, Revision 1 dated March 15, 1982 (178.AA), contained in Appendix A of this exemption except as follows.

178.AA-4 Duties of Inspector.

* * *

(b) Add an additional sentence which reads: In lieu of testing for filament material properties by the exemption holder, a certificate by the filament manufacturer is acceptable provided that the procurement document specifies strength and quality requirements and that the supplied material is certified to those requirements.

178.AA-5 Authorized Material and Identification of Material.

(a) Aluminum liner must be 6351 or 6061 alloy, T6 temper or 6010 alloy subjected to a solution heat treat and aging appropriate for the alloy as indicated in the application. Aluminum alloy 6351 is not authorized for new construction.

* * * * *

178.AA-9 Thermal treatment.

(a) The aluminum liner must be solution heat treated and aged as follows after all forming operations and prior to pressurizing or overwrapping.

(1) 6351 and 6061 alloy liners must be solution heat treated and aged to the T6 temper.

(2) 6010 alloy liners must be solution heat treated and aged as appropriate for the alloy indicated in the application.

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178.AA-12 Destructive tests.

* * *

(b)(1) Applies except that the rate of cycling may not exceed 10 cycles per minute.

178.AA-18 Design qualification tests.

* * *

(d) Applies except that the rate of cycling may not exceed 10 cycles per minute.

* * * * *

8. SPECIAL PROVISIONS:

a. Cylinder service life must not exceed 15 years.

b. Use of these cylinders for underwater breathing is not authorized.

c. Cylinders used in oxygen service must be in compliance with §§ 173.302(a)(5)(i) through (a)(5)(iv).

d. Cylinder must be packaged in accordance with § 173.301(k).

e. Each cylinder must be reinspected and hydrostatically retested every three years in accordance with § 173.34(e) as prescribed for DOT 3HT cylinders, except that the rejection elastic expansion criteria does not apply, permanent volumetric expansion must not exceed 5 percent of total volumetric expansion at test pressure and retest dates must be steel stamped on the outer exposed metallic surface of the cylinder neck, or marked on a label securely affixed to the cylinder and overcoated with epoxy. Reheat treatment or repair of rejected cylinders not authorized.

f. Transportation of flammable gas is not authorized aboard cargo vessel or passenger-carrying aircraft.

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g. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

h. A person who is not a holder of this exemption, but receives a package covered by this exemption, may reoffer it for transportation provided no modifications or changes are made to the package and it is offered for transportation in conformance with this exemption and the HMR.

i. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

j. Each packaging manufactured under the authority of this exemption must be either (1) marked with the name of the manufacturer and location (city and state) of the facility at which it is manufactured or (2) marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.

k. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo aircraft only, and passenger-carrying aircraft.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel, or aircraft used to transport packages covered by this exemption. The shipper shall furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
- Registration required by § 107.601 et seq., when applicable.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing, as soon as practicable of any incidents involving the package and shipments made under this exemption.

Issued at Washington, D.C.

OCT 1 1999

(DATE)

Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Dist: FHWA, FRA, FAA, USCG
PO: AM(99)

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SHIPPING INSTRUCTIONS

Reference: 49 CFR 173.301(k). See paragraph 8e on pages B-5 and B-9.

Specific Guidance: PASP/RASP and SCBA air cylinders must be shipped in strong containers with sufficient external packaging. External packaging must protect cylinder and cylinder valve from accidental functioning and damage.

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VALIDATION AND VERIFICATION INCORPORATION CERTIFICATE	
TECHNICAL MANUAL SS600-AN-MMA-010, Maintenance Manual, Supplied Air Respirator (SAR) with Self-Contained Breathing Apparatus (SCBA)	**DATE** Nov. 2002
CONTRACT NO. N61331-97-D-0024, DO 0129	**TMCR NO.** NDMS 940191-000

I — VALIDATION AND VERIFICATION

All discrepancies recorded during validation and verification of the technical manual identified above have been corrected or resolved in accordance with the disposition column of the Validation and Verification Discrepancy/Disposition Record as approved and/or modified by:

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Cognizant COASTSYSTA Authority

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Letter/Message Date

II — REMARKS

QUALITY ASSURANCE MANAGER SIGNATURE	DATE

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NAVSEA/SPAWAR TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER)

INSTRUCTION: Continue on 8 ½" x 11" paper if additional space is needed.
1. Use this report to indicate deficiencies, problems, and recommendations relating to a publication.
2. For CLASSIFIED TMDERs see OPNAVINST 5510H for mailing requirements.
3. Print clearly and carefully.
4. For TMDERs that affect more than one publication, submit a separate TMDER for each.
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7. RECOMMENDED CHANGES TO PUBLICATION

7a Page #	7b Para #	7c RECOMMENDED CHANGES AND REASONS

8. ORIGINATOR'S NAME and WORK CENTER	9. DATE	10. PHONES Commercial/DSN/FAX Include extensions	11. TMMA of manual (NSDSA will complete)

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