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.

THIS PAGE INTENTIONALLY LEFT BLANK

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.

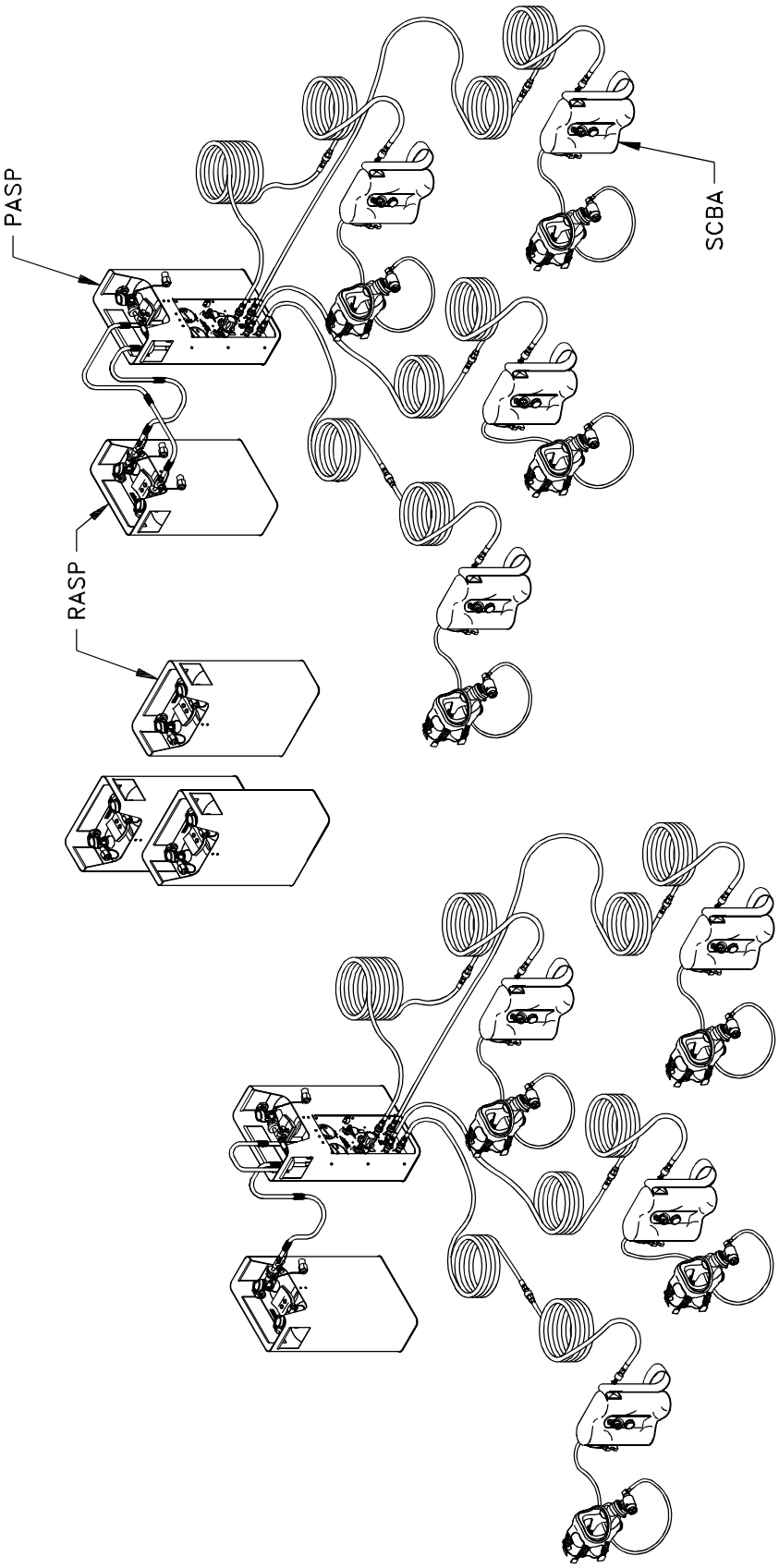

Figure 3-1. SAR/SCBA System

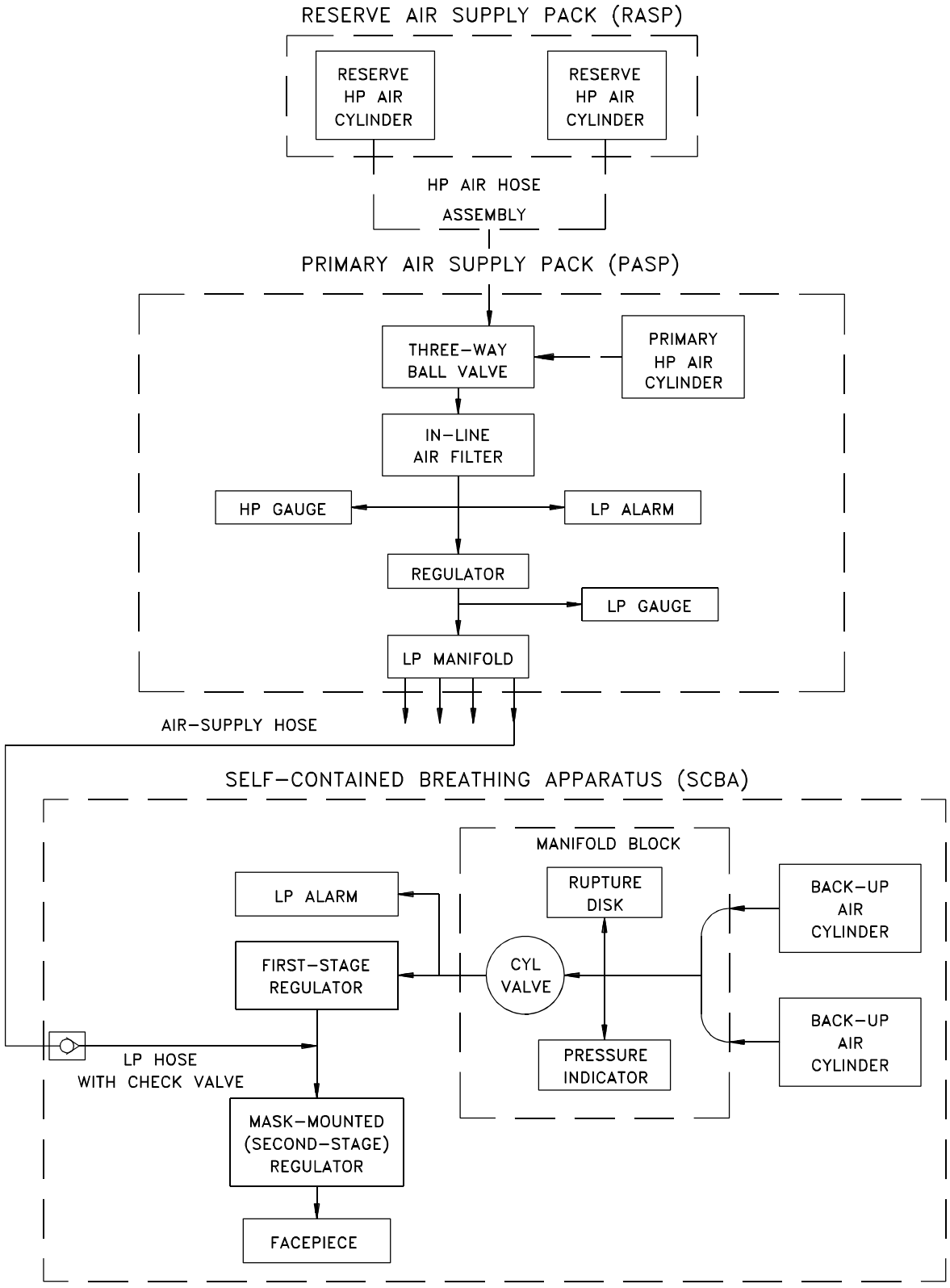

Figure 3-2. SAR/SCBA Functional Block Diagram

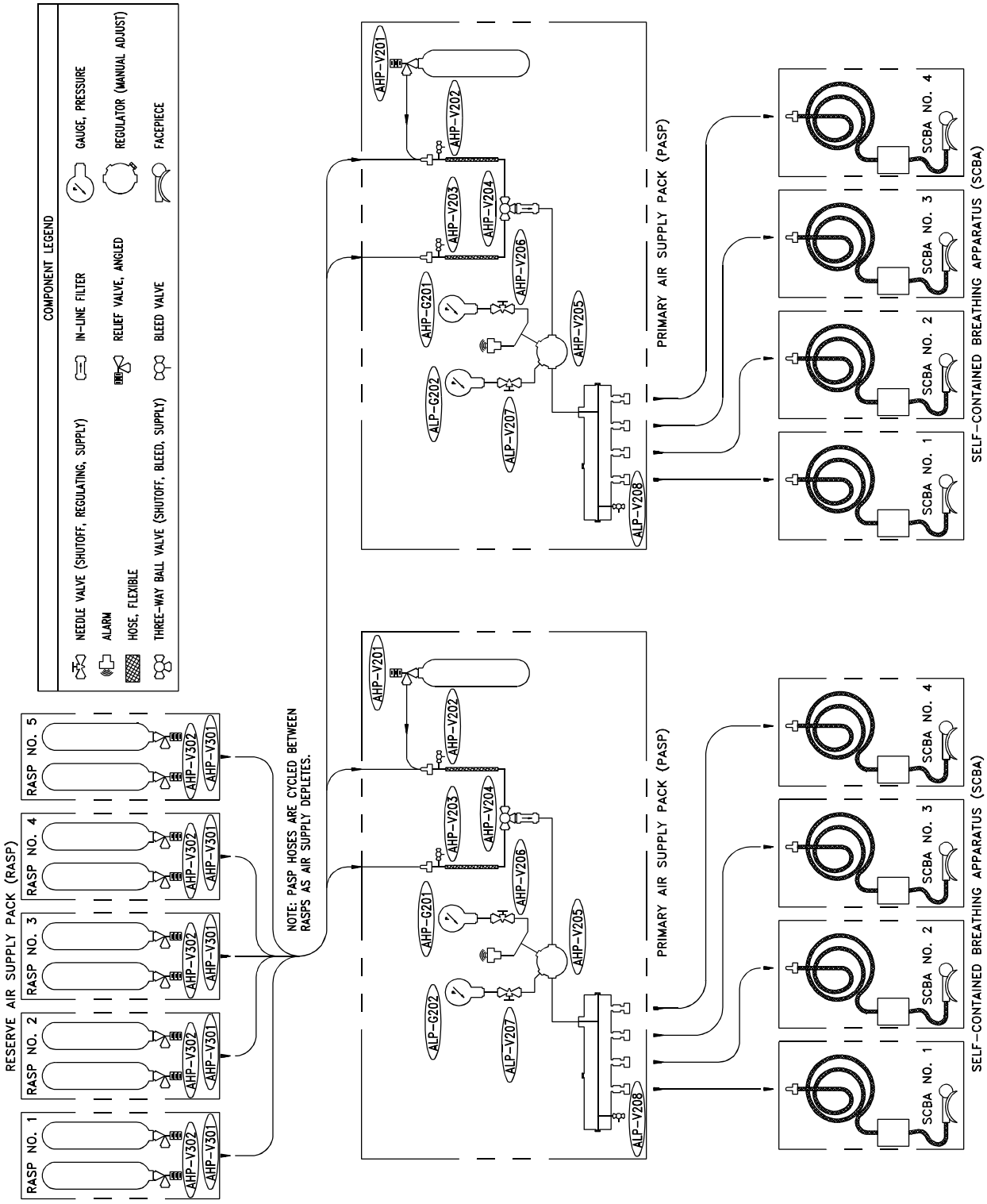

Figure 3-3. SAR/SCBA Component Functional Relationship Diagram

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

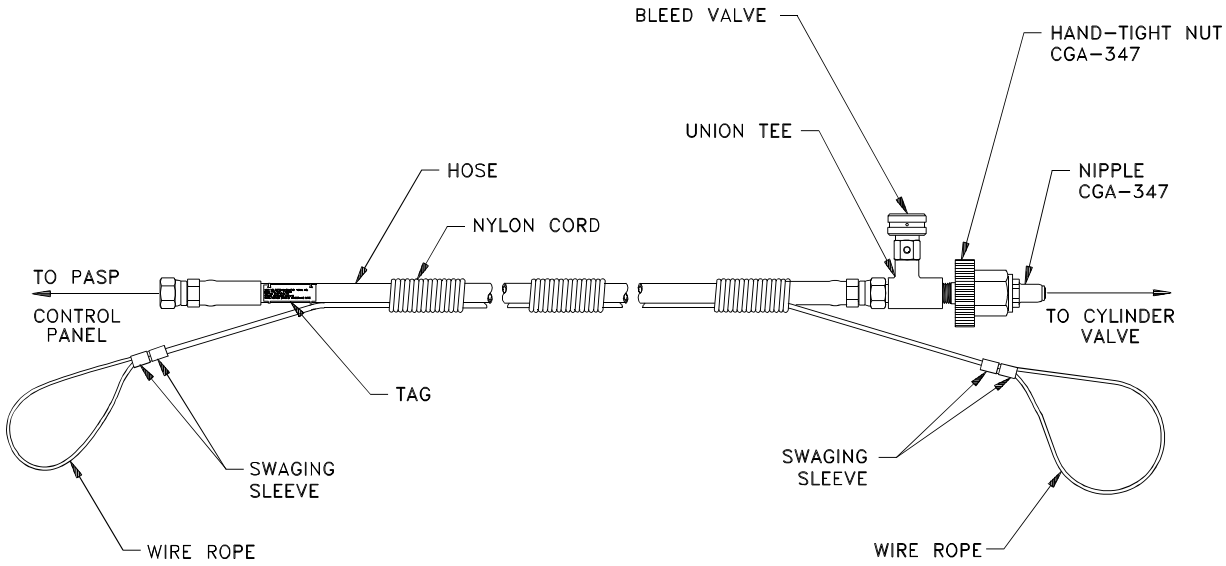

Figure 3-4. High-Pressure Hose Assembly

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.

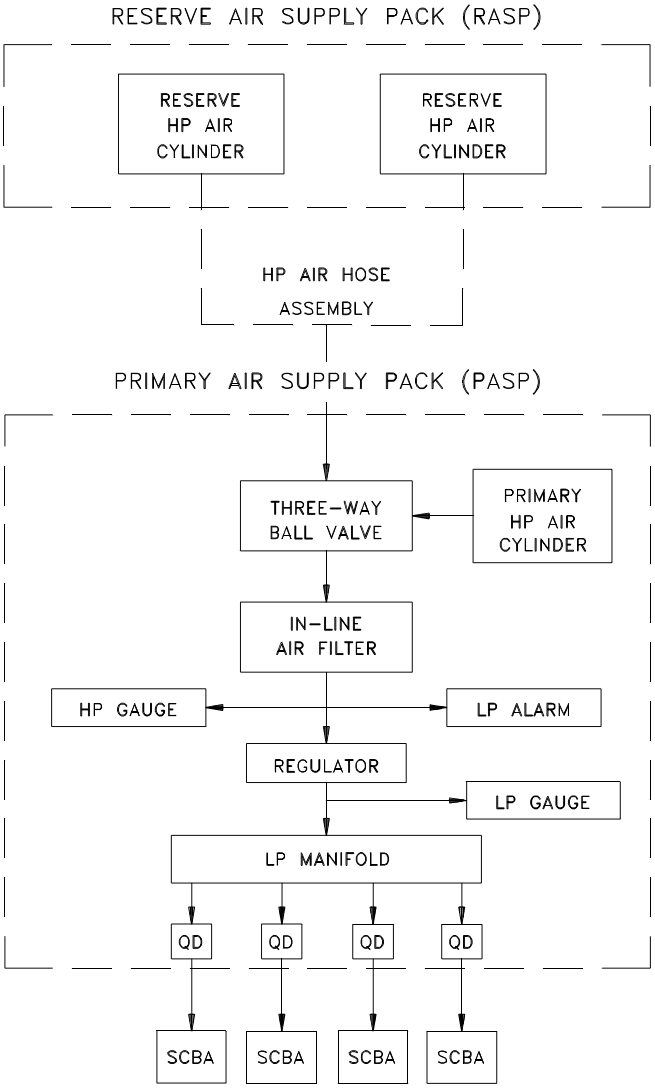

Figure 3-5. SAR/SCBA Airflow Diagram

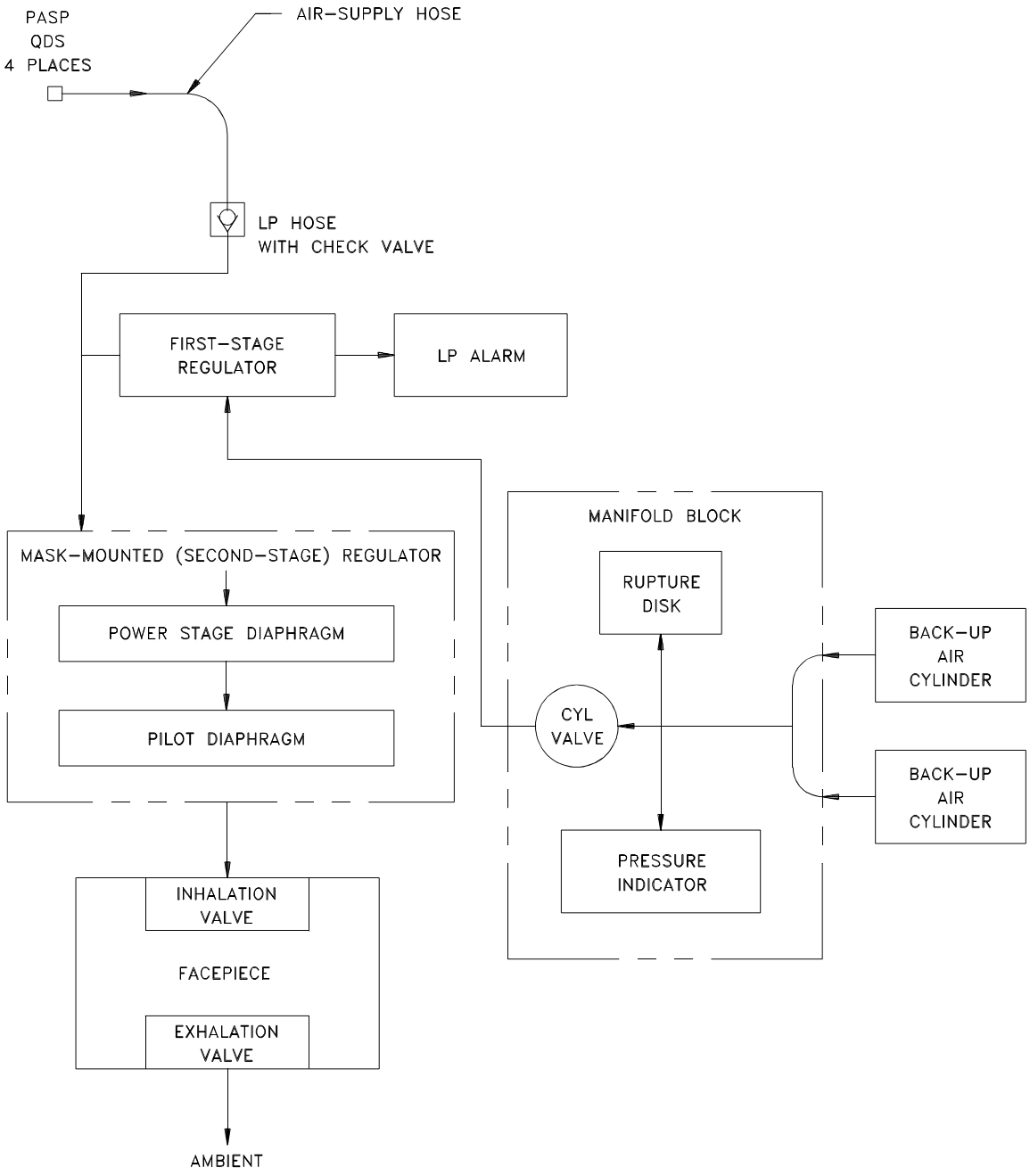

Figure 3-6. SCBA Airflow Diagram

THIS PAGE INTENTIONALLY LEFT BLANK

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