Introduction

MAINTENANCE AND REPAIR

⚠ WARNING

This Maintenance Procedures Binder must be read carefully by all persons who have or will have the responsibility for servicing the product. Like any complex piece of equipment, SCBA from MSA will perform as designed only if used and serviced according to the instructions. OTHERWISE, THE PRODUCT COULD FAIL TO PERFORM AS DESIGNED, AND PERSONS WHO RELY ON THE PRODUCT COULD SUSTAIN SERIOUS PERSONAL INJURY OR DEATH.

The warranties made by MSA with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following the instructions. Please read and observe the WARNINGS and CAUTIONS inside. For any additional information relative to use or repair, write or call 1-800-MSA-2222 during regular working hours.

For More Information, call 1-800-MSA-2222 or Visit Our Website at www.MSAsafety.com

MSA The Safety Company

MINE SAFETY APPLIANCES COMPANY
CRANBERRY TWP., PENNSYLVANIA, U.S.A. 16066

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IMPORTANT NOTICE

Note: A thorough understanding of the SCBA is essential before attempting to service or maintain this SCBA. An Operation and Instructions Manual is supplied with each new SCBA. Refer to the Operation and Instructions for specific user information, such as NIOSH Approval Information, donning and doffing, or cleaning and disinfecting.

NOTE: SCBA CRITICAL REPAIR PARTS CONTAINED WITHIN THE BLACK OUTLINED BOX MUST ONLY BE INSTALLED BY C.A.R.E. TRAINED AND CERTIFIED REPAIR TECHNICIANS AND TESTED WITH AN MSA APPROVED DYNAMIC FLOW TESTER.

⚠ WARNING

Do not attempt repairs beyond those specified in this manual. Only trained or certified personnel, authorized by MSA, are permitted to maintain and repair this apparatus.

Breathing apparatus must not be repaired beyond the manufacturer's recommendations. 29 CFR Part 1910.134, Par. (f) (4) makes these requirements clear: Replacement or repairs shall be done only by experienced persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair.

Failure to follow this warning may result in serious personal injury or death.

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This C.A.R.E. Maintenance Binder contains all maintenance procedures for this SCBA. You must be thoroughly familiar with the SCBA before performing any maintenance.

- This SCBA will perform as designed only if used and maintained according to the manufacturer's instructions. You must read and understand these instructions before trying to use or service this product. We encourage our customers to call for information on this product before using it.
- If the SCBA does not perform as specified in this manual, it must not be used until it has been repaired.
- Do not alter, modify, or substitute any components without the approval of the manufacturer. Such alterations will void the NIOSH approval.
- Inspect the SCBA regularly and maintain it according to the manufacturer's instructions. Repairs must be made by properly trained personnel only, and according to the procedures in this Binder.
- Test the performance of the entire apparatus as a unit to ensure that all parts perform according to MSA specifications. For example, if you are testing a Quick-Fill® System apparatus, test it as a Quick-Fill System unit. If the apparatus is a dual-purpose apparatus, test it as a dual-purpose unit.

Follow the procedures and maintenance schedules given in the apparatus instruction manual and as specified below. If an apparatus does not pass all tests, remove it from service until it has been repaired and passes all tests.

GENERAL NOTES

Some maintenance and repair procedures involve techniques and skills you will use over and over again. Whenever you use them, follow the general notes below. Since there are several models in the series, consult the instruction manuals that come with your SCBA.

IMPORTANT
You must read and understand the General Notes, Warnings, and Cautions below before performing Disassembly and Repair. General Notes is a collection of procedures common to many repairs.

WARNING
This symbol identifies a potentially hazardous situation, which if not avoided may cause serious injury or death. Heed the warning. Follow its instructions exactly.

CAUTION
This symbol identifies a potentially hazardous situation, which if not avoided will result in major or minor injury. It also may be used to alert against unsafe actions. Read and understand the implications of the caution. Carefully consider its relevance to your actions.

Note
Notes provide additional information, useful tips, or emphasize an important point.

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Details of repetitive procedures are listed below. Details are not repeated each time the procedure is done. Instead, a reference to the General Note appears in the text.

Note 1: Lubricate all designated O-rings with a very thin film of Christo-Lube™ lubricant (P/N 604070) before they are installed. Christo-Lube lubricant is compatible with brass and aluminum. Do not store parts after lubricating them because Christo-Lube may collect dirt and contaminants.

Note 2: Pipe-sealing tape is used on fittings with tapered threads. Wrap 1 to 1-1/2 turns of tape in a clockwise direction (looking into the threaded end of the fitting). Start at the second thread. Do not put tape on the first thread. Pieces of tape can break off and reduce air flow.

⚠ CAUTION

Do not over-tighten parts or you may damage the part or the fitting threads.

Note 3: All repair procedures assume that the Audi-Larm assembly is disconnected from the apparatus cylinder.

These procedures are intended for use with SCBA manufactured exclusively by MSA.

⚠ WARNING

Do not use the procedures in this manual for maintaining airline regulators. Airline regulators are designed for pressures up to 100psig. Their use with an air source in excess of 100psig may result in airline regulator rupture, causing serious personal injury or death.

The self-contained breathing apparatus (SCBA), as well as its dual-purpose breathing apparatus (DPBA) counterpart from MSA, must be maintained and repaired carefully. Only trained certified personnel, authorized by MSA, are permitted to maintain and repair the apparatus, using replacement parts from MSA only to assure proper performance.

Thorough understanding of all instructions, inspection procedures, cautions, and warnings which originally accompanied your breathing apparatus is a prerequisite. Most repairs can be accomplished with standard tools. However, certain special tools, tapes, and lubricants from MSA are required.

⚠ WARNING

Wear eye or face protection to avoid eye injury. Failure to observe this warning may result in serious personal injury.

We cannot over-emphasize how important it is for all repair personnel to follow maintenance procedures to the letter when working on MSA SCBA components. Why? Failure to perform any part of any procedure, or doing something contrary to the instructions in the maintenance procedures, could have serious implications.

Follow the C.A.R.E. Maintenance Procedures exactly, and understand that any deviation from the written repair procedures in this C.A.R.E. Maintenance Procedures Binder is absolutely unacceptable, unless approved by MSA corporate office personnel. Do not deviate from the written instructions in any way. If you have any doubt about how to address a repair or maintenance problem, contact MSA at 1-800-MSA-2222.

Unless specified otherwise, torques are calculated for dry threads. Applying any lubricant causes additional stress on the threads when the component is tightened. This additional stress could cause the threads to fail, causing possible separation of components. Lubricants, adhesives, and sealants must be used only as stated in this Binder. Any deviation from the written procedures must be approved in writing by MSA corporate office personnel.

Be sure to calibrate your torque wrenches, gauges, and other test instruments regularly. It's good quality-assurance practice.

Follow torques specified in the detailed procedures in this Binder. It's good repair procedure. All torques are listed in the following sections.

Test gauges and regulator tester are sold separately.

When applying adhesives, keep in mind that more is not better. Use adhesives sparingly. Although both adhesives and sealants seal and hold parts in place, never interchange them. Use each adhesive and sealant only where specified since each has properties uniquely suited to the designated application.

All O-rings and gaskets which are removed must be replaced with new ones.

When installing O-rings over threads, use transparent tape, a thin piece of paper, or other thread protector to avoid damage to the O-ring.

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⚠ WARNING

Do not inspect the apparatus before cleaning if there is a danger of contacting hazardous contaminants. Clean and sanitize first, then inspect. Failure to follow this warning may cause inhalation or skin absorption of the contaminant and result in serious personal injury or death.

FLOW TEST AND OVERHAUL REQUIREMENTS: REGULATORS AND AUDIBLE ALARMS

Note: The MSA apparatus inspecting tag contains a checklist of the procedures that must be performed *after each use and monthly.*

CYLINDERS

Breathing apparatus cylinders should be recharged as soon as possible after use. Cylinders should not be stored partially charged for two reasons:

- If used without recharge, the service time of the apparatus is reduced.
- The cylinder burst disc vents excess pressure if a full cylinder is over-exposed to fire or heat. If the cylinder is not full, it may be damaged before the burst disc vents.

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

Note: Check cylinder pressure weekly.

REQUIRED EQUIPMENT AND TOOLS

You must have the following equipment to perform the test and repair procedures this binder:

- A complete SCBA or DPBA
- A fully-charged cylinder
- The PosiChek^3

COMMON TOOLS

Common tools are everyday tools. You can either purchase MSA Special Tools Kits that already contain the common tools, or purchase the special tools from MSA and the common tools from a local supplier. If you buy them locally, be sure they are high-quality tools. You will need one of each of the following common tools to maintain and repair equipment.

MMR

Torque wrench, 0-150 in. lbs., 3/8” drive
Torque wrench, 10-100 ft. lbs., 3/8” drive
Breaker bar, 3/8” drive
Socket adapter, 3/8” female to 1/2" male
Socket adapter, 1/2” female to 3/4” male
Socket, 1/4", 6 point, 3/8” drive, deepwell
Socket, 7/16”, 6 point, 3/8” drive
Socket, 9/16”, 6 point, 3/8” drive
Socket, 5/8”, 6 point, 3/8” drive
Socket, 11/16”, 6 point, 3/8” drive
Socket, 7/8”, 6 point, 3/8” drive
Socket, 1-5/8”, 6 point, 1/2" or 3/4” drive
Socket screwdriver bit, Phillips, No. 2, 3/8” drive
Crows foot, 9/16”, 3/8” drive
Crows foot, 5/8”, 3/8” drive
Crows foot, 11/16”, 3/8” drive
Crows foot, 13/16”, 3/8” drive
Crows foot, 7/8”, 3/8” drive
Crows foot, 1”, 3/8” drive
Wrench, open end, 1/2"
Wrench, open end, 9/16”
Wrench, open end, 5/8”
Wrench, open end, 1”
Key, hex, 3/16”
Key, hex, 1/4"
Screwdriver, 1/8” blade
Screwdriver, 1/4” blade
Punch, drive pin, 1/8” diameter
Pliers, Needle nose
Channel locks
Pliers, retaining ring, convertible

MSA FLOW TEST POLICY

MSA recommends using an MSA approved Test Bench to flow test SCBA at a minimum:

- Before putting a new SCBA into service. (Note: MSA flow tests every new SCBA before it leaves our factory. The flow test results are shipped with the product.)
- At least annually
- After a repair or user reported condition before returning the SCBA into service:
  - o Facepieces: If a lens or parts within the component housing and /or nose cup are replaced, perform a facepiece flow test and function test.
  - o Pneumatics: If a 1st stage regulator, 2nd stage regulator, or Audi-Larm is repaired, adjusted or replaced, perform a flow test and function test.
  - o Other Assemblies: If a Hose or Control Module is replaced, perform a leak test and a function check. If a power module is replaced, perform a function check

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FLOW TEST AND OVERHAUL REQUIREMENTS

The Second Stage Regulator, First Stage Regulator and Audi-Larm Audible Alarm must be flow tested and overhauled at the intervals determined by use. MSA air masks must be flow tested annually using an MSA-approved flow test device.

SPECIAL TOOLS

Special tools are devices MSA manufactures or has manufactured to its specifications for use in maintaining and repairing MSA equipment. They are available only from MSA. In the table below, column one lists complete tool kits (containing both special and common tools); column two lists Special Tools Kits containing only the special tools. Column three lists the individual special tools by part number. You may order the complete tool kits, the Special Tools Kits, or the individual special tools from MSA.

Required Overhaul and Flow Test Frequency

Average Air Mask Use*	CBRN Firehawk® Second Stage Regulator Overhaul Frequency**	Non-CBRN Second Stage Regulator, First Stage Regulator and Audi-Larm Assembly Overhaul Frequency	Flow Test Frequency
One (1) or more 30 minute cylinders per day	Every 1 year	Every 3 years	Every year
One (1) 30 minute cylinder every other day	Every 3 years	Every 8 years	
Up to one (1) 30 minute cylinder per week	Every 10 years	Every 15 years	

*The unit of air mask use is defined as the consumption of one thirty (30) minute cylinder. For example, if three cylinders are consumed consider the air mask used three times. If air mask use cannot be determined, overhaul every three years.
**Replace the Spring Cap (P/N 10047528) and Tetraplex™ CBRN Shield (P/N 10044026) as per overhaul frequency.

See **Audi-Larm Audible Alarm Maintenance and Repair (P/N 10042833), First Stage Regulator Maintenance and Repair (P/N 10051132), and Second Stage Regulator Maintenance and Repair (P/N 10042827, 10051134)** for instructions.

Retiring an Air Mask
Base the decision to retire an air mask on performance data. Retire air masks that do not meet specified performance levels.

SPECIAL TOOLS				
Complete Tool Kit	**Special Tool Kit**	**Special Tool Part Number**	**Description**	**Use**
494352	**497704**	***User level special tools***		
	•	636060	O-ring removal tool	Removing O-ring and gaskets
	•	633411	plastic stick	Replacing O-ring and gaskets
	•	494447	1/4 in. deepwell socket	Pin for high-pressure hose
	•	479853	gauge wrench	High-pressure cylinder gauge
		496317	adapter tool	
	497705	***User level lubricants, sealants, and adhesives***		
	•	28907	Teflon tape	Audi-Larm coupling nut
	•	604070	Christo-Lube	All O-rings
	•	600920	leak detector	Leak testing
		29787	#222 Loctite	Handwheel locknut, bypass sleeve, harness assembly
		26875	#271 Loctite	Audi-Larm bell screws
		602706	#425 Assure Adhesive	
494353	**497706**	***Certified Technician level Special Tools***		
		494261	spanner wrench	Base shut-off and locknut
		466008	locknut wrench	Handwheel locknuts
		496268	spanner	Thrust ring and adjusting screw
	497707	***Certified Technician level adhesives***		
		603556	RTV clear adhesive	Second-stage regulator, adjusting screw, thrust ring
		602706	Assure adhesive	Second-stage regulator bypass locknut
494422	**497708**	***Certified Technician level lubricant and adhesive***		
	•	494992	Silicone lubricant	First-stage regulator, piston shaft O-ring, backup rings
	•	602976	Black Max[§] adhesive	First-stage regulator, piston shaft
	497709	***Certified Technician level Special Tools***		
	•	494445	spanner wrench	First-stage regulator
		482426	extraction tool	Audi-Larm testing
		494446	plug with 0-ring	Audi-Larm testing
	•	496041	punch (small brass rod)	First-stage valve seat
	PosiChek[3]			
	•	10006007	First Stage Interface (1/4 Turn First Stage only)	
	•	496568	Airline Adapter	
	•	10064117	First Stage Test Manifold, FireHawk, Threaded	
	•	10064120	First Stage Test Manifold, FireHawk, QuickConnect	
	•	10069386	PR14 Test Bracket	
	•	10050211	FireHawk Lever Height Gauge (for Valve Assembly P/N 10030664)	
	•	10090457	FireHawk Lever Height Gauge (for Valve Assembly P/N 10087295)	