PremAire®

CADET 15M LEVEL II MAINTENANCE PROCEDURES

System

⚠ WARNING

This manual, including Warnings and Cautions inside, must be read and followed carefully by all persons who will use or maintain the product, including those who have any responsibility involving its selection, application, service or repair. This product will perform as designed only if used and maintained according to the instructions. Otherwise, it could fail to perform as designed, and persons who rely on this 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.

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MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230

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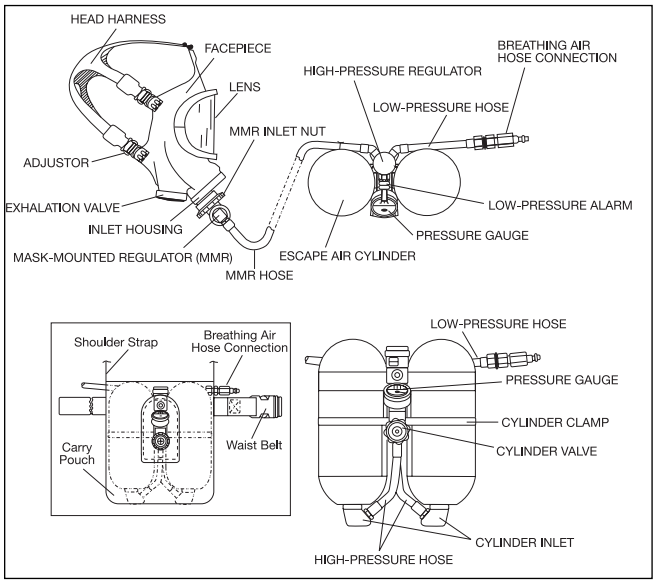
INTRODUCTION

TABLE OF CONTENTS



⚠ WARNING

This manual in intended for use with Department of the Navy SAR/SCBA respirators only. Do not use the procedures in this manual for maintaining self-contained breathing apparatus (SCBA) regulators. Airline regulators are designed for pressures up to 80psig. Their use with an air source in excess of 80psig may result in airline regulator rupture, causing serious personal injury or death.

⚠ 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 manufacturer's recommendations. OSHA 29 CFR Part 1910.134, Par. (f) (4) clearly defines these requirements.

GENERAL NOTES

The General Notes which follow may be applied to all applicable procedures.

NOTE 1: The maintenance procedures authorized in this manual are classified Level II Maintenance. Level II is limited maintenance. It is intended for those trained and certified in using MSA Portable Regulator Testers.

NOTE 2: All O-rings and gaskets which are removed must be replaced with new ones.

NOTE 3: Lubricate all O-rings with a very thin film of Christo-Lube** (P/N 809059) before they are installed. Christo-Lube lubricant is compatible with brass and aluminum.

NOTE 4: 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.

NOTE 5: 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. Apply a thin film of Christo-Lube lubricant to the outer surface of the tape before threading the part into another component.

⚠ WARNING

Do not use Flourolube* lubricant (P/N 27912). It is not compatible with aluminum. Failure to follow this warning can result in serious personal injury or death.

Refer to the appropriate Illustrated Parts List for the apparatus being repaired.

⚠ WARNING

Do not disconnect if pressurized. Always be sure to release all pressure from the system. Removing the coupling nut with the regulator pressurized can result in serious personal injury, death, or damage to equipment.

⚠ CAUTION

Leak test after each repair (see Level I).

* Fluorolube is a registered trademark of Hooker Chemical and Plastics Company.

** Christo-Lube is a registered trademark of Lubrication Technologies.

MASK MOUNTED REGULATOR REPAIR

MASK MOUNTED (SECOND STAGE) REGULATOR REPAIR

All repair procedures assume that the regulator is disassembled from the apparatus and facepiece. To do this:

- Be sure the cylinder valve is completely closed.
- Disconnect the regulator from the facepiece.
- Be sure nothing is blocking the regulator outlet. Allow any trapped pressure to bleed from the apparatus.
- If desired, disconnect the intermediate pressure hose from the first stage regulator.

Note: Use only specified thread sealants in their specified locations. Use of sealants other than the ones specified may damage MMR (Second Stage) components.

Removing the Shut-Off Cap, Spring, and Stop Spring

1. Remove the setscrew from the regulator housing.

2. Unthread the shut-off cap and remove the button and spring.

3. Pull the stop spring out of the groove at the bottom of the shut-off hub.

4. Remove any RTV Adhesive from the shut-off hub.

5. Fit the large spanner wrench on the socket driver. Unthread the shut-off hub from the regulator housing.

6. Using the small spanner wrench, unthread the adjusting screw from the shut-off hub.

7. Remove the diaphragm spring.
8. Clean sealant residue from parts.

Note: Use extreme care when removing the diaphragm. Do not bend, twist, or distort the lever assembly. Do not touch the exposed lever assembly after removing the diaphragm.

9. Lift the diaphragm and spacer ring from the housing.

Note: If the regulator diaphragm is torn or has any visible damage, it must be replaced.

Installing a New Diaphragm or Spring

1. Lay the diaphragm on a flat, clean surface and place the spacer ring into the diaphragm's outer rim. The flange side must be "up."

2. Install this assembly into the regulator housing by pushing gently on the spacer ring.

MASK MOUNTED REGULATOR REPAIR

⚠ CAUTION

Push gently on the diaphragm or damage to the lever assembly could affect regulator operation.

3. Thread the shut-off hub into the regulator housing.

4. Fit the large spanner wrench on the inch-pound torque wrench and torque to 10-15in.lbs.

5. Insert the small diaphragm spring through the center hole in the shut-off hub so it rests over the center nipple of the diaphragm. This spring has to fit around the rib on top of the diaphragm.
6. Thread the adjusting screw into the shut-off hub.
7. Adjust the static pressure. (see Static Pressure)
8. Perform the Static Pressure Test and the Flow Test to check the final assembly.

Removing the Valve Core

Note: Internal parts of the valve core are not replaceable. The valve core must be replaced as a complete unit. However, the screen may be removed and replaced, as can the O-ring at the swivel block end.

1. Remove the end cap, diaphragm, and spring. (see Removing the Shut-off Cap, Spring and Stop Spring)
2. Disconnect the unpressurized mask mounted regulator from the facepiece.

3. Using a 1" open-end wrench, unthread the knob securing the hose to the regulator.

4. Pull the swivel shaft gently out of the regulator body.

5. Using the O-ring removal tool, pull the inlet screen from the regulator. Inspect the screen for corrosion, dirt, or debris. Replace the screen if necessary.

6. Visually inspect the two O-rings on the inlet swivel shaft. Replace the O-rings if they are worn or damaged.

⚠ CAUTION

Do not press on the lever assembly or unthread the valve and lever assembly from the valve body. This could affect operation.

7. To remove the valve core from the regulator body, hold the body as shown. Gently push the end of the valve core with your thumbs to unseat the O-ring and valve core.

8. Cup one hand under the body and support the valve core as it slides out of the body.

9. Remove and discard the external sleeve O-ring.

MASK MOUNTED REGULATOR REPAIR

Removing the Inlet Screen, Internal Sleeve, O-Ring, Power Stage Spool, and Power Stage Diaphragm

⚠ CAUTION

Do not press on the lever assembly. Do not unthread the base and lever assembly or the divider skirt from the valve core. This could damage the bottom lever pad and affect operation.

1. Place a 1" wrench on the hex flats to secure base and lever assembly.

2. Turn the sleeve counter-clockwise to unthread it from base/lever.

3. Remove and discard the internal sleeve O-ring.

4. Inspect the inlet screen and replace it if it is damaged.

5. Remove the power stage diaphragm and discard it. Use the plastic stick if necessary to remove the diaphragm.

Installing the Inlet Screen, Sleeve O-Ring, Power Stage Spool, and Power Stage Diaphragm

1. Clean any debris from inside the valve core before reassembly.

2. Place a new diaphragm into the valve and lever assembly. Ensure the flat side of the diaphragm faces up and that the diaphragm rib nests into the matching groove inside the assembly. Use the plastic stick if necessary to be sure the diaphragm is seated.

3. Place the power stage spool into the valve assembly with the ring of holes against the power stage diaphragm.

4. Center the screen on the power stage spool. Ensure the open end of the screen faces up.

5. Place a thin film of Christo-Lube lubricant on a new O-ring and install it in the groove in the sleeve.

6. Place one drop of Loctite* #222 adhesive on the large threads of the sleeve.

Note: Ensure the sleeve O-ring stays in its groove on the end of the sleeve during reassembly.

⚠ CAUTION

Do not grasp the lever base during the next step. Hold the valve body hex, not the base and lever assembly.

7. Place a 1" wrench on the hex flats of the base and lever assembly. Thread the sleeve into the valve and lever assembly clockwise hand-tight.

Installing the Valve Core

1. Place transparent tape over the exposed threads of the valve core to protect the new external O-ring.
2. Place a thin film of Christo-Lube lubricant on the new external sleeve O-ring.

3. Roll the O-ring in place in the groove closest to the valve body.
4. Remove all tape.

5. Line up the wide rectangular slot in the valve body hex with the lug inside the regulator housing.

⚠ CAUTION

Do not push on the top lever while installing the valve core. This could damage the pad seal and affect operation. Place your fingertips on the two shoulders on either side of the lever arms.

6. With the slot and lug lined up, press the valve core gently into the housing. Resistance will develop as the O-ring is forced into its seat.

⚠ CAUTION

Do not turn the valve and lever assembly relative to the valve core. This could damage the pad seal and affect operation.

7. Place one drop of adhesive on the exposed valve core threads. Do not permit thread sealant to contact the regulator housing.
8. Re-install the knob, swivel block, and hose on the regulator housing and tighten using a 1" wrench. (see Removing the Valve Core)
9. Re-install diaphragm, spring, shut-off hub, and the adjusting screw in the regulator housing. (see Adjusting the Static Pressure Setting)

⚠ CAUTION

Do not press on the lever assembly or unthread the valve and lever assembly from the valve body. This could affect operation.

10. Perform the Static Pressure Test and the Flow Test to check the final assembly.

* Loctite is a registered trademark of Loctite Corporation

SECOND STAGE REGULATOR STATIC PRESSURE TEST

SECOND STAGE REGULATOR STATIC PRESSURE TEST

Adjusting the Static Pressure Setting

1. Remove the shut-off cap, the shut-off push button, the shut-off spring (P/N 492238), and the stop spring from the regulator housing. (see Removing the Shut-off Cap, Spring, and Stop Spring)
2. Using the small spanner wrench, unthread the thrust ring from the shut-off hub.

Note: Be sure that the adjusting screw remains in the shut-off hub.

3. Attach the regulator to the tester suitable for the MMR Airline Apparatus (PosiChek3 Tester).

Note: MSA recommends using the biosystems PosiChek3 Computerized Performance Tester to conduct flow tests.

4. Connect and test the Premaire CADET15M by following the user's instructions for Airline apparatus supplied with the PosiChek3 tester.
5. Attach the Airline Adaptor and pressurize the system.
6. Adjust the static pressure by turning the adjusting screw with the small spanner wrench. The static pressure should be 1.1 to 1.3 inches water column.
7. Using a toothpick, place one drop of RTV Adhesive in the joint between the adjusting screw and shut-off hub.

8. Clean any excess RTV Adhesive from the threads of the thrust ring.
9. Place one drop of RTV Adhesive on the threads of the shut-off hub above the adjusting screw.
10. Thread the thrust ring into the shut-off hub until it is flush with the top surface of the base or until it contacts the adhesive screw. Do not over-tighten.
11. Using a toothpick, place a small bead of RTV Adhesive (P/N 603556) in the groove at the bottom of the shut-off hub.
12. Place the stop spring (P/N 800685) over the shut-off hub. Push down on the spring until the bottom coil snaps into place.
13. Replace the shut-off button and the spring in the shut-off cap.
14. Thread the shut-off cap on the regulator housing until the shut-off cap touches the shut-off hub.
15. Further tighten the cap clockwise until the next indexing mark lines up with the setscrew hole in the regulator housing.

Note: The cap slot locations are the six marks above the threads on the cap.

16. Carefully thread the setscrew in until the top of the setscrew is snug in the regulator housing.
17. Re-check the static pressure setting. The final setting must be 1.2 to 1.4 inches water column.
18. Flow test to check the final assembly.

Note: When flow testing Premaire CADET 15M System, refer to the test procedures in the instructions for Airline supplied with the tester to be used.

CYLINDER VALVE REPAIR

CYLINDER VALVE DISASSEMBLY AND REPAIR

⚠ WARNING

Before repairing the cylinder valve, all air must be bled from the cylinder. Open the cylinder valve handwheel 1/2 turn and leave it open until all air has been exhausted. Wear hearing protection if this is done in an enclosed area to avoid possible hearing damage. Do not attempt to repair the valve if pressure is shown on the cylinder pressure gauge. If pressure cannot be relieved by opening the cylinder valve handwheel, the cylinder must be repaired. Failure to follow these warnings can result in serious personal injury or death.

Removing the Handwheel

1. Using the spanner wrench, remove the locknut and spring.
2. Remove the handwheel from the top of the valve stem.
3. Place a 7/8" socket (deep-well) on the packing gland from the valve body. Pull the stem out of packing gland.

4. Remove the O-ring and valve stem washer from the packing gland.

Note: The O-ring removal tool can be used to remove the O-ring from the packing gland.

5. Replace the handwheel on the valve stem.

6. Place the valve stem back in the valve body. Turn the stem until the slot drops onto the insert.
7. Turn the handwheel counter-clockwise until the insert can be removed.

Note: If the insert shows signs of wear or damage it must be replaced.

Installing the Insert

1. Using the valve stem, install the insert in the valve body. Thread the stem clockwise until the insert is finger-tight.
2. Place a thin film of Christo-Lube lubricant on a new O-ring.
3. Place the O-ring on the packing gland.
4. Place a new washer into the packing gland. Press the washer down to its seal.
5. Insert the stem into the valve body. Turn the stem until the slot drops on the insert. Thread the packing gland into the cylinder valve until it is finger-tight.
6. Turn the valve stem counter-clockwise until the stem stops. Be sure the gland does not turn.
7. Using the inch-pound torque wrench with a 7/8" socket (deep-well), tighten the packing gland to 85-105 in.lbs.
8. The valve stem square must fit into the square hole in the handwheel. Place the handwheel on the stem and check the valve for proper motion. The handwheel should move freely.
9. Replace the spring. Ensure the valve is fully open to allow the locknut to be installed more easily.
10. Put one drop of Loctite #222 on the stem threads.
11. Using the locknut spanner wrench, press the locknut against the spring and tighten clockwise until it is flush with the top of the handwheel.
12. Open and close the valve completely several times to seat the stem, insert, and the valve stem gasket.
13. Leak test the valve (see Level I).

CYLINDER VALVE REPAIR

Removing the Burst Disc

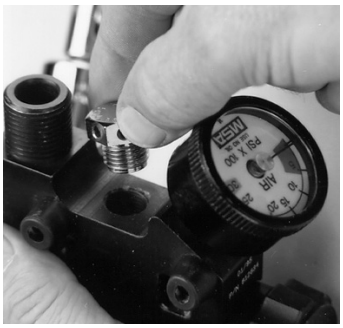
⚠ WARNING

Before repairing the cylinder valve, all air must be bled from the cylinder. Open the cylinder valve handwheel 1/2 turn and leave it open until all air has been exhausted. Wear hearing protection if this is done in an enclosed area to avoid possible hearing damage. Do not attempt to repair the valve if pressure is shown on the cylinder pressure gauge. If pressure cannot be relieved by opening the cylinder valve handwheel, the cylinder must be repaired by MSA Level III repairperson. Failure to follow these warnings can result in serious personal injury or death.

1. Place a 3/4" socket on the safety plug hex flats and turn the plug counter-clockwise to remove the safety plug.
2. Using a screwdriver, punch a hole in the burst disc.
3. Pull the burst disc out of the cylinder valve body.
4. Discard the disc.
5. Using the O-ring removal tool, lift the gasket out of the cylinder valve body. Be careful not to scratch the surface of the cylinder valve body.

Installing a New Burst Disc

1. Insert a new gasket into the cylinder valve body.
2. Place a thin film of Snoop on the new burst disc.
3. Place the new burst disc on top of the gasket. Ensure the gasket and disc lay flat.



⚠ WARNING

Be sure the gasket, then the burst disc, are installed in the order described. Failure to install properly may cause burst disc malfunction and can result in serious personal injury or death.

⚠ CAUTION

Do not re-use the burst disc or the copper gasket.

4. Thread the safety plug into the cylinder body.
5. Using a torque wrench and socket, tighten the plug to the torque of 26-30 ft.lbs.
6. Leak test the assembly (see Level I).

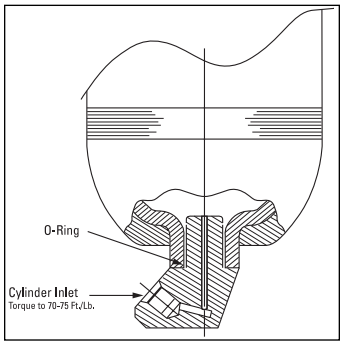
This completes the burst disc repair procedure.

Replacing the Cylinder Inlet Body

1. To remove the cylinder inlet body from the cylinder:

⚠ WARNING

Before repairing the cylinder valve, all air must be bled from the cylinder. Open the cylinder valve handwheel 1/2 turn and leave it open until all air has been exhausted. Wear hearing protection if this is done in an enclosed area to avoid possible hearing damage. Do not attempt to repair the valve if pressure is shown on the cylinder pressure gauge. If pressure cannot be relieved by opening the cylinder valve handwheel, the cylinder must be repaired. Failure to follow these warnings can result in serious personal injury or death.



   a. Secure the cylinder in a suitable fixture.
   b. Place a 1 1/8" crowsfoot wrench on the flats on the end of the cylinder valve. Turn the valve counter-clockwise until the cylinder valve is completely out of the cylinder.
   c. Roll the O-ring over the threads.
   d. If the cylinder valve inlet is damaged it must be removed.
2. Use a high intensity light to inspect the inside of the cylinder for contamination. Be sure the cylinder interior is completely dry.

⚠ CAUTION

Do not use the cylinder if it has an odor, is contaminated internally, or has any visible signs of damage. If the cylinder appears damaged return it to a Certified Level III MSA Air Mask Service Center for repair.

3. Clean the O-ring sealing surface on the cylinder with a clean, dry, lint-free cloth. Be sure the cylinder sealing surface is undamaged and free from contaminants, such as dirt or tape residue.
4. Inspect the cylinder neck area. Do not use the cylinder if it has scratches, cuts, or grooves which may prevent an air-tight seal.
5. Install a new O-ring on the cylinder valve following the steps below:

⚠ CAUTION

Apply Christo-Lube lubricant to the O-ring and the O-ring groove just before installing the cylinder valve. Do not store these parts after lubricating them. Christo-Lube lubricant may collect dirt and/or contaminants.

a. Place a thin film of Christo-Lube lubricant on the new O-ring.
b. Place two small diameter drops of Christo-Lube into the O-ring groove at locations 180 degrees apart.
c. Place a plastic thread protector or thin piece of paper over the threads, then roll the O-ring to the bottom (male thread) end of the valve body.
d. Remove the thread protector.

6. Carefully insert the cylinder inlet into the cylinder neck so that the sealing surface of the cylinder is not damaged.
7. Use the foot-pound torque wrench with a 1 1/8" crowsfoot wrench to tighten the cylinder inlet to 70-75 ft.lbs.
8. Leak test the assembly (see Level I).

This completes the cylinder replacement procedure.

⚠ WARNING

Before repairing the cylinder valve, all air must be bled from the cylinder. Open the cylinder valve handwheel 1/2 turn and leave it open until all air has been exhausted. Wear hearing protection if this is done in an enclosed area to avoid possible hearing damage. Do not attempt to repair the valve if pressure is shown on the cylinder pressure gauge. If pressure cannot be relieved by opening the cylinder valve handwheel, the cylinder must be repaired. Failure to follow these warnings can result in serious personal injury or death.

Removing the Cylinder Pressure Gauge

1. Remove or loosen the cylinder band.
2. Position the cylinder valve so that the gauge is upside-down to prevent dirt and debris from falling into the bore of the valve assembly.

3. Place a 7/16" open-end wrench on the gauge flats. Turn the gauge counter-clockwise to loosen.
4. Clean out the threads in the cylinder valve body to be sure no tape residue remains.

Installing a New Pressure Gauge

1. Place pipe-sealing tape on the gauge threads. (see General Note 5)
2. Place a 7/16" open-end wrench on the gauge flats. Turn the gauge clockwise to tighten.
3. Position the gauge so that it can be read in the "as-worn" position. Do not over-tighten.
4. Replace or tighten cylinder band.
5. Leak test all connections.

This completes the cylinder pressure gauge replacement procedures.

HIGH PRESSURE REGULATOR

HIGH PRESSURE REGULATOR DISASSEMBLY AND REPAIR

⚠ CAUTION

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

Note: All repair procedures assume that the regulator is disconnected from the apparatus cylinder.

- Be sure the cylinder valve is completely closed.
- Be sure that nothing blocks the regulator outlet.
- Relieve pressure in the system.

⚠ WARNING

Do not disconnect the first coupling nut when pressure is shown on the harness gauge. Always be sure that all pressure is released from the regulator. Removing the coupling nut with the regulator pressurized can result in serious personal injury or death.

- Unthread the First Stage Regulator coupling nut from the cylinder valve.

HIGH PRESSURE REGULATOR INLET O-RING

1. Insert the O-ring removal tool under the O-ring (P/N 633553) and remove it. Be careful not to scratch the regulator inlet O-ring groove.
2. Apply a light film of Christo-Lube lubriant to the new O-ring.
3. Roll the new O-ring over the end of the insert and seat it into the O-ring groove. If the O-ring is not seated, air may leak.

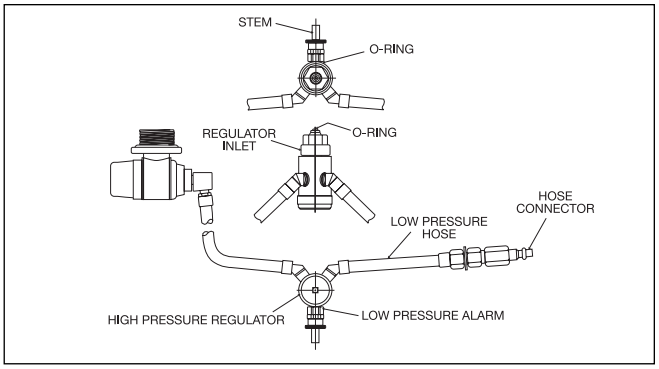
LOW PRESSURE ALARM

Removing the Low Pressure Alarm (Whistle)

1. Using a 11/16" wrench, turn the whistle counter-clockwise.
2. Unthread the alarm from the High Pressure Regulator.

Installing the Low Pressure Alarm (Whistle)

1. Insure that O-ring is seated and not damaged.
2. Apply a thin film of Christo-Lube lubricant to the O-ring.



3. Thread the alarm into the High Pressure Regulator clockwise by hand. Tighten with an 11/16" crowsfoot wrench and torque to 15±5 ft.lbs.

4. Refer to the User's Instructions to perform the Leak and Function Tests.

Leak and Function Testing of Low Pressure Alarm

1. Ensure that Mask Mounted Regulator is attached to the Pressure Regulator.
2. Pressurize the system.
3. Use leak test solution to test the connection of the whistle at the regulator body.
4. Use the valve to slowly bleed off the pressure.
5. The whistle should sound as pressure goes to zero.

INTERMEDIATE PRESSURE HOSE

Removing the Intermediate Pressure Hose from the High Pressure Regulator

1. Disconnect the intermediate hose from the High Pressure Regulator.
2. Use a 9/16" open-end wrench, turn the 45 (degrees) adapter counter-clockwise.

Installing the Intermediate Pressure Hose on the High Pressure Regulator

1. Remove the old tape. Be careful not to damage the metal seat area.
2. Install a new tape. (Refer to General Note 5)
3. Reconnect the intermediate hose if no further repair to the regulator is required. Tighten with a 9/16" wrench.

HIGH PRESSURE REGULATOR

Removing the Airline Hose from the High Pressure Regulator

1. Use a 9/16" wrench to unthread the hose from the regulator body.

Installing the Airline Hose on the High Pressure Regulator

1. Thread the airline hose into the regulator body.
2. Using a 5/8" wrench, tighten the airline hose.

Replacing the Check Valve Adapter on the Airline Hose

1. Remove the check valve from the hose. Ensure the washer is present.
2. Using a 11/16" open-end wrench on the hose and a 5/8" open-end wrench on the adapter, separate the hose from the check valve adapter.
3. Hold the adapter with 5/8" open-end wrench and 5/8" wrench on male disconnect.
4. Remove and replace the tape on both ends of check valve.
5. Thread the hose on the new adapter. Using a 5/8" on the adapter and a 11/16" wrench on the hose and tighten.
6. Thread the male disconnect onto the check valve adapter and tighten.

HIGH PRESSURE HOSE

All repair procedures assume that the cylinders are depressurized.

Removing the High Pressure Hose from Cylinder Valve Body

1. Using a 1/4" socket, remove the four (4) screwpins from the cylinder valve.
2. Pull firmly on the high pressure hose to remove it from the cylinder valve body.
3. Remove the old O-ring and back-up ring. Be careful not to damage the O-ring seal area.

Removing the High Pressure Hose from Cylinder Inlet

1. Place a 9/16" wrench on the hex flats of the hose fitting.
2. Unthread in a counter-clockwise direction to remove the high pressure hose.
3. Using the O-ring removal tool, remove the tape from the hose fitting. Be careful. Do not damage the O-ring seal area.

Installing the High Pressure Hose on the Cylinder Inlet

1. Use tape to cover the hose fitting threads.
2. Install new tape on the high pressure hose fitting. Lubricate the tape.
3. Hand-thread the hose fitting clockwise into the cylinder inlet outlet.
4. Tighten with a 9/16" crowsfoot wrench to a torque of 90 in.lbs.

Installing the High Pressure Hose on the Cylinder Valve Body

1. Install a new back-up ring and a new O-ring on the hose fitting.
2. Insert the high pressure hose into the cylinder valve.
3. Insert a new screw pin into each of the holes in the cylinder valve body. Use a 1/4" socket to tighten pins.

This completes the high pressure hose replacement procedure.

For More Information: Call (1-800-MSA-2222) or Visit Our Website at (ww.MSAnet.com)

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