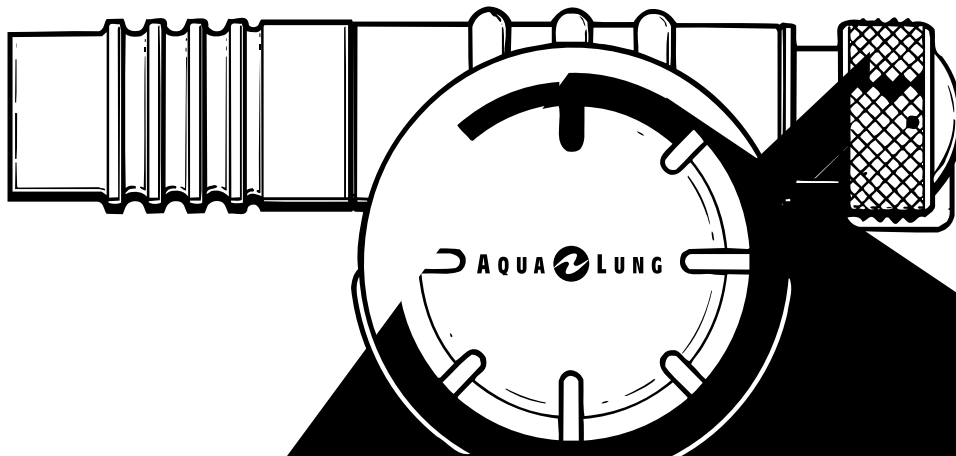




Authorized Dealer

SERVICE & REPAIR MANUAL



Micra ABS Second Stage Regulator

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Service & Repair Manual - Micra ADJ Second Stage

Introduction

This manual provides factory prescribed procedures for the correct service and repair of the Micra ADJ second stage. It is not intended to be used as an instructional manual for untrained personnel. The procedures outlined within this manual are to be performed only by personnel who have received factory authorized training through a U.S. Divers®/Aqua-Lung® Service & Repair Seminar.

If you do not completely understand all of the procedures outlined in this manual, contact U.S. Divers Co., Inc. to speak directly with a Technical Advisor before proceeding any further.

Warnings, Cautions, & Notes

Pay special attention to information provided in warnings, cautions, and notes that are accompanied by one of these symbols:



A **WARNING** indicates a procedure or situation that may result in serious injury or death if instructions are not followed correctly.



A **CAUTION** indicates any situation or technique that will result in potential damage to the product, or render the product unsafe if instructions are not followed correctly.



A **NOTE** is used to emphasize important points, tips, and reminders.

Scheduled Service

Because the Micra ADJ regulator, complete with a first stage, is considered to be a life-supporting product, it is extremely critical that it receives service according to the procedures outlined in this manual on a regularly scheduled basis; at least once a year with normal or infrequent use.



NOTE: A unit that receives heavy or frequent use, such as in rental, instruction, or commercial applications, should be serviced at least twice each year - or more often - depending on the conditions of use and the manner in which it is maintained. (Refer to the care and maintenance procedures outlined in the Micra ADJ Owner's Manual.)

GENERAL GUIDELINES

1. In order to correctly perform the procedures outlined in this manual, it is important to follow each step exactly in the order given. Read over the entire manual to become familiar with all procedures before attempting to disassemble the Micra ADJ, and to learn which specialty tools and replacement parts will be required. Keep the manual open beside you for reference while performing each procedure. Do not rely on memory.
2. All service and repair should be carried out in a work area specifically set up and equipped for the task. Adequate lighting, cleanliness, and easy access to all required tools are essential for an efficient repair facility.
3. Before beginning any disassembly, it is important to first perform the Initial Inspection procedure, and refer to Table 1 - Troubleshooting to determine the possible cause of any symptoms which may be present.
4. As each regulator is disassembled, reusable components should be segregated and not allowed to intermix with non-reusable parts or parts from other regulators. Delicate parts, including inlet fittings and crowns which contain critical sealing surfaces, must be protected and isolated from other parts to prevent damage during the cleaning procedure.
5. Use only genuine factory parts purchased directly from U.S. Divers (or an authorized distributor outside of the U.S.) when servicing any U.S. Divers/ Aqua-Lung product. Substitution with another manufacturer's parts constitutes an after-market modification of the product, and renders all warranties null and void.
6. Do not attempt to reuse mandatory replacement parts under any circumstances, regardless of the amount of use the product has received since it was manufactured or last serviced.
7. Do not overtighten parts beyond their torque specification when reassembling. Most parts are made of either marine brass or plastic, and can be permanently damaged by undue stress.

Initial Inspection Procedure

EXTERNAL INSPECTION

1. Visually inspect the first stage filter to check for any signs that contaminants, such as moisture, rust, aluminum oxide, or charcoal may have entered the LP hose and second stage.



NOTE: An orange, rust colored residue on the filter usually indicates that the regulator has been used with a corroded steel cylinder. Gray or white discoloration may indicate use with a corroded aluminum cylinder. Advise the customer of this, and the possible need to obtain service for their cylinder. A green discoloration positively indicates that moisture has entered the regulator, and internal corrosion is therefore likely to be found.

2. Slide back the hose protectors to inspect the condition of the LP hose at its fittings and along its length. Check closely for any signs of deterioration or damage, including blistering and abrasion, and corrosion of the fittings.
3. Inspect the condition of the mouthpiece to check for torn bite tabs, holes, or deterioration.

PRESSURE TEST


1. Prior to performing any disassembly, ensure that the second stage is connected to a first stage with a stable intermediate pressure of 140 psi (± 5), with no open ports or hoses.
2. Connect the first stage to a cylinder that is filled with 3,000 psi, and open the cylinder valve to pressurize the regulator.
3. Turn the second stage adjustment knob completely out counter-clockwise. A slight leak of airflow should be present.
4. Slowly turn the adjustment knob clockwise, noting the measure of turns required to stop the airflow. Airflow should stop between $\frac{1}{2}$ – $\frac{3}{4}$ turn.
5. Turn the adjustment knob completely in clockwise, and listen closely to check for any signs of leakage from the second stage. If necessary, immerse the second stage in water to locate the source of any leakage found and refer to Table 1 - Troubleshooting to determine its possible cause.




CAUTION: If the second stage freeflows uncontrollably, immediately shut the cylinder valve and proceed directly to the Disassembly Procedure. Do not attempt to further inspect the regulator while pressurized.

6. Depress the purge button to determine whether sufficient airflow is provided to clear the second stage of water. Immediately after releasing the purge button, listen closely to ensure that the second stage does not continue to flow any air.
7. Turn the cylinder valve shut and depress the second stage purge button to depressurize the regulator before proceeding to the following Disassembly Procedure.

Disassembly Procedures

 **NOTE:** Before performing any disassembly, refer to the schematic drawing, which references all mandatory replacement parts. These parts should be replaced with new, and must not be reused under any circumstances - regardless of the age of the regulator or how much use it has received since it was last serviced.

 **CAUTION:** Use only a plastic or brass O-ring removal tool (P/N 9440-22) when removing O-rings to prevent damage to the sealing surface. Even a small scratch across an O-ring sealing surface could result in leakage. Once an O-ring sealing surface has been damaged, the part must be replaced with new. DO NOT use a dental pick, or any other steel instrument.

1. Slide back the hose protector(10) to expose the connection of the LP hose at the second stage.
2. While holding the hex nut(13) of the second stage secure with a $\frac{3}{4}$ " open-end wrench, apply a $\frac{11}{16}$ " open-end wrench to the female fitting of the LP hose(8). Turn the fitting counter-clockwise to loosen and remove the hose from the second stage. Remove the O-rings(7&9) from the hose and discard. Set the hose aside.
3. Carefully snip the plastic mouthpiece clamp(18) and remove the mouthpiece(17) from the box bottom. Inspect the mouthpiece to ensure it is free of any tears or cuts that may cause leakage of water into the second stage or other discomfort. Discard the mouthpiece or set it aside to be reused, depending on its condition.
4. Turn the color ring(1) counter-clockwise by hand to loosen and remove from the second stage box bottom(14).
5. Place the Circlip/ Retaining Ring Tool (P/N 1078-46) directly over the purge cover with the two pins facing down on each side. Firmly press straight down on the tool to depress the purge cover so that the pins are securely engaged into two opposite slots of the retaining ring(2). (See Fig. 1.) While holding the tool securely engaged, turn the retaining ring counter-clockwise to loosen and remove.
6. Lift out the purge cover(3) and demand diaphragm(4). Inspect each of these items closely to ensure that they are perfectly round and free of any tears, deterioration, or other damage. If damage or deterioration is found, discard the item(s) and do not reuse.
7. Turn the adjustment knob(32) slightly in either direction until the retaining pin(33) can be seen facing up inside the through-hole. While holding the second stage securely in place, apply a $\frac{1}{16}$ " drift pin punch to the end of the retaining pin, and tap the punch lightly with a small mallet to drive the pin out through the opposite side of the knob. When at least half of

the pin has exited, grasp the free end with pliers and pull to remove it completely. Examine the condition of the pin, and discard if it is found to be bent or damaged.

8. While holding the second stage secure, firmly grasp the adjustment knob and pull it straight off the outer shaft of the adjustment screw(28). Closely examine the knob to ensure that no signs of cracking or other damage are present, and set it aside.
9. Carefully apply either a 1/2" box wrench or socket with hand driver to the cap nut(31) and turn counter-clockwise to disengage from the threads of the valve body. When the cap nut is completely loosened, grasp the stem of the adjustment screw firmly between thumb and forefinger, and pull outward to remove the cap nut, adjustment screw and lever retaining sleeve(27).

△ NOTE: If the adjustment screw and retaining sleeve do not freely exit the valve body, this indicates that the retaining sleeve is an earlier revision part - Revision A - and should be replaced with the current version - Revision B. Please determine this, and refer to the appropriate procedure for disassembly in the following instructions.

VALVE DISASSEMBLY PROCEDURE - REVISION A

- A10. Pull the cap nut off the stem of the adjustment screw and examine closely to ensure that no signs of cracking or other damage are present. If damage is found, discard the cap nut and replace with new.
- A11. Turn the adjustment screw clockwise (left hand thread) by hand to loosen and remove from the retaining sleeve inside the valve body. Remove and discard the O-ring(29), and set the adjustment screw aside.
- A12. Apply a medium blade screwdriver to the slotted head of the adjustable crown(12), and turn the crown in clockwise to the full extent of its thread engagement until resistance is felt.
- A13. Firmly grasp the lever between thumb and forefinger and pull straight out of the valve body to remove.
- A14. Apply 3/4" open-end wrench to the hex nut(13) and turn it counter-clockwise to loosen and remove.
- A15. While holding the box bottom(14) secure, grasp the valve body between thumb and forefinger, and press firmly against the inlet end of the valve body to remove it from the opposite side of the box bottom. Remove and discard the O-ring(30), and set the box bottom aside.
- A16. Examine the adjustment end of the valve body to locate the recessed head of the pin(22) which holds the retaining sleeve in place (see Fig. 2a). Turn the valve body so that the head (larger end) of the pin is facing straight down, and press the retaining sleeve inward. This will allow the pin to easily fall



Fig. 2a - Recessed Pin (Rev. A)

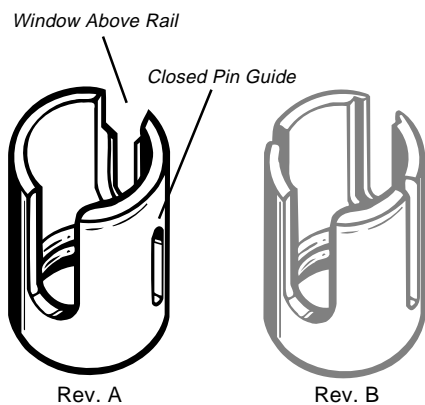


Fig. 3a - Retaining Sleeve Comparison

out, unless corrosion or salt buildup is present. Set the pin aside, and slowly release pressure on the retaining sleeve to prevent the sudden ejection of parts.

NOTE: If necessary, the Seat Extraction Tool (P/N 1094-36) or similar probe can be used to press out the pin.

A17. Remove the lever retaining sleeve, and examine closely to compare its features with those shown in Figure 3a to positively identify it as Revision A.

CAUTION: Do not attempt to reuse the lever retaining sleeve if it is identified as Revision A. Discard and replace with new, using the current Revision B part (see Fig. 3b).

VALVE DISASSEMBLY PROCEDURE - REVISION B

B10. Pull the cap nut off the stem of the adjustment screw and examine closely to ensure that no signs of cracking or other damage are present. If damage is found, discard the cap nut and replace with new.

B11. While holding the lever retaining sleeve secure, turn the adjustment screw clockwise by hand to loosen and remove from the sleeve (left hand thread). Remove and discard the O-ring(29), and set the adjustment screw aside.

B12. Apply a medium blade screwdriver to the slotted head of the adjustable crown(12), and turn the crown clockwise to the full extent of its thread engagement until resistance is felt.

B13. To remove the lever, insert the slotted end of the Lever Removal/ Installation Tool (P/N 1008-84) into the adjustment end of the valve body, and rotate the tool slightly until the keyed slots fit over the pin and lever inside (see Fig. 4). Press the tool into the valve body to compress the poppet spring, and hold with one hand while pulling the lever straight out with the other. Remove the tool and inspect the lever to check for any signs of bending, distortion, or excessive wear of the plating. If any of these conditions are found, discard the lever and do not attempt to reuse.

B14. Apply a $\frac{3}{4}$ " open-end wrench to the hex nut(13) and turn it counter-clockwise to loosen and remove.

B15. While holding the box bottom(14) secure, grasp the valve body between thumb and forefinger, and press firmly against the inlet end of the valve body to remove it from the opposite side of the box bottom. Remove and discard the O-ring(30), and set the box bottom aside.

B16. Examine the adjustment end of the valve body to locate the pin(22) which holds the poppet(24), spring(25), and washer(26) in place (see Fig. 2b). Insert the slotted end of the Lever Installation Tool into the open end of the valve body, over the pin. Press the tool inward and turn the valve body so that the head (larger end) of the pin is facing straight down. This will allow the pin to easily fall out,

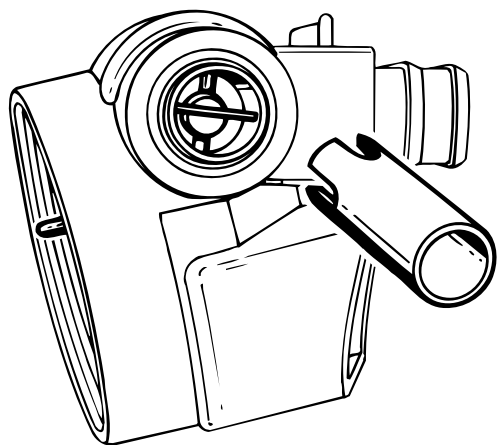


Fig. 4 - Lever Tool Alignment

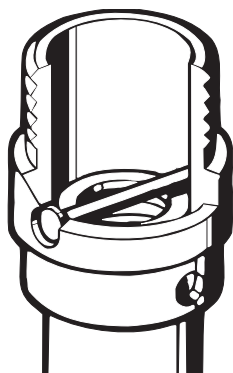


Fig. 2b - Recessed Pin (Rev. B)

unless corrosion or salt buildup is present. Set the pin aside, and slowly release pressure on the tool to prevent the sudden ejection of parts.

NOTE: If necessary, the Seat Extraction Tool (P/N 1094-36) or similar probe can be used to press out the pin.

- B17. Closely examine the lever retaining sleeve and compare its features with those shown in Figure 3 to positively identify it as a Revision B part. Further inspect the condition of the sleeve through a magnifier to check for any signs of wear or damage to the railed channel which engages with the lever arm. If wear or damage is found, discard the lever retaining sleeve and replace with new.

18. Tilt the valve body vertically to drop out the washer(26), spring(25), and poppet(24) with LP seat(23).
19. Remove and discard the O-ring(20), and set the valve body aside.
20. Closely examine the washer to check for any signs of damage, including cracking, breakage, or distortion. Discard if found, and do not attempt to reuse.
21. Closely examine the poppet spring through a magnifier, checking for any signs of damage or corrosion. If it is found to be damaged (bent) or corroded, discard and do not attempt to reuse.
22. Using a plastic or brass O-ring tool, lightly stick the center of the LP seat(23) inside the head of the poppet and lift the seat out, being very careful to avoid damaging the poppet. Discard the seat, and inspect the plastic head of the poppet to check for any nicks, scratches, or other signs of damage. The through-hole beneath the LP seat cavity should be clear and free of any obstructions. If any signs of damage are found, discard the poppet and do not attempt to reuse.
23. While holding the valve body secure, apply a medium blade screwdriver to the slotted head of the adjustable crown, and turn the crown completely out counter-clockwise to disengage its threads.

NOTE: Because the crown is O-ring sealed, it will not freely exit the valve body after it has been unthreaded. The following step must be performed correctly in order to remove the crown without damaging its delicate sealing surface.

24. When the crown has been unthreaded from the valve body, carefully insert the pin of the Seat Extraction Tool (P/N 1094-36) through the opposite end of the valve body and through the opening in the center of the crown. Gently press the crown out (see Fig. 5). Remove and discard the O-ring(11).
25. Closely examine the crown with the use of a magnifier, checking for any scoring, nicks, or other damage to the

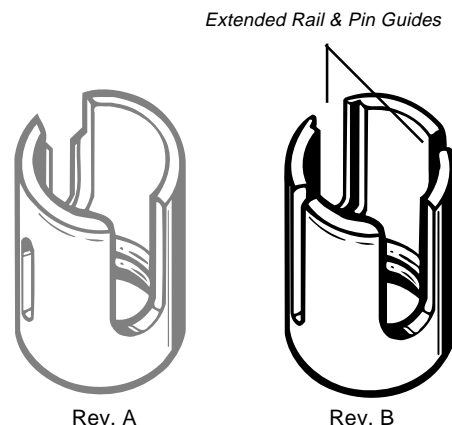


Fig. 3a - Retaining Sleeve Comparison

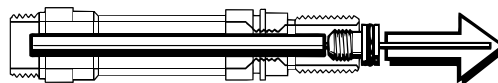


Fig. 5 - Crown Removal



Reassembly Procedures

NOTE: Before performing any reassembly, it is important to inspect all parts, both new and those that are being reused, to ensure that every part and component is perfectly clean and free of any dust, corrosion, or blemishes. Before dressing each O-ring with silicone grease, check to ensure that it is clean, supple, and free of any blemish.

WARNING: Use only genuine U.S. Divers parts, subassemblies, and components whenever assembling U.S. Divers products. DO NOT attempt to substitute a U.S. Divers part with another manufacturer's, regardless of any similarity in shape, size, or appearance. Doing so will void the warranty.

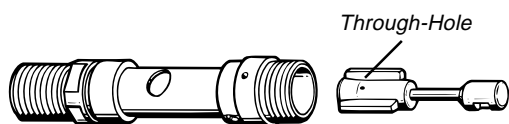


Fig. 12 - Valve Body / Poppet Alignment

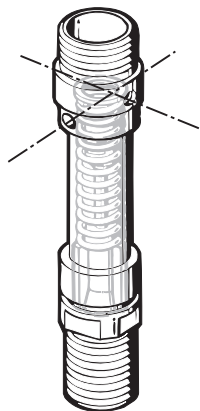


Fig. 13 - Valve Body Features



Fig. 14 - Tool / Valve Body Alignment



Fig. 15 - Pin Installation

7. Apply a medium blade screwdriver to the slotted head of the adjustable crown, and turn the crown clockwise to engage the threads. Continue turning the crown clockwise into the valve body to the full extent of its thread engagement, and stop turning when resistance is felt.
8. Install the O-ring(20) into the groove of the valve body near the indexed (squared) portion of the inlet, being careful to avoid rolling the O-ring down over the threads.
9. Lay the LP seat(23) into the cavity on the plastic end of the poppet(24), checking first to ensure that the smooth side of the seat is facing out, and firmly press the seat into place.
10. Hold the valve body positioned with the inlet end facing to the left, and the large hole in the center of its tube facing directly up. Examine the plastic head of the poppet to locate the small through-hole between two of the three ribs. Insert the head of the poppet into the adjustment end of the valve body, so that the through-hole is aligned directly with the center of the large hole in the valve body (see Fig. 12). Slide the poppet completely into the valve body, being careful to maintain this alignment. If correction of the alignment is necessary, gently rotate the poppet with a small probe through the large hole of the valve body.
11. Stand the valve body vertical on its inlet end, with the head of the poppet facing down inside. Gently place the spring(25) down over the metal shaft of the poppet, so that it rests flush over the ribbed head inside the valve body.
12. Place the washer(26) down inside the valve body so that it rests flush over the spring.
13. Without disturbing the alignment of the poppet inside, carefully rotate the valve body to examine the two small holes which are on opposite sides, closest to the adjustment end, and the two larger holes which are offset below them by ninety degrees (see Fig 13). Note that one of the smaller holes is recessed, and rotate the valve body until it stands with this recessed hole clearly visible at 6 o'clock, with the smaller hole facing directly away at 12 o'clock.
14. While holding the valve body standing vertical, place the slotted end of the Micra ADJ Lever Installation Tool inside the valve body, directly over the washer. Carefully align the tool so that one of the open channels is positioned above the recessed hole at 6 o'clock (see Fig. 14).
15. While holding the valve body secure, press the Lever Installation Tool down over the washer and spring, until the washer is positioned below the recessed hole in the valve body. Hold the tool depressed to insert the small end of the pin(22) into the recessed hole, and through the smaller hole on the opposite side of the valve body (see Fig. 15). If necessary, rotate the tool slightly in either direction to align more precisely. Slowly release pressure on the tool, and check to ensure that

the head of the pin is seated completely inside the recessed opening of the valve body. Set the tool aside.

NOTE: The valve body and box bottom are both indexed with four flat surfaces where their inlet portions mate. Closely examine the features of each part to become familiar with their correct orientation before performing the next step.

16. Insert the inlet end of the valve body through the round opening in the adjustment side of the box bottom. Rotate the valve body until the large hole in the center of the tube is facing towards the vane inside the outlet boss, and the indexed (squared) shoulder is correctly aligned with the indexed opening of the box bottom (see Fig. 16). Gently press the valve body into place, until it is securely seated and the indexed shoulder is flush with the surrounding outer surface of the box bottom.

CAUTION: Do not apply undue force to press the valve body into place. Doing so may cause the O-ring(20) to bind up and become unseated, which may allow water to leak into the box bottom (see Fig. 17). If bind up occurs, remove the valve body and check to ensure that the O-ring has been dressed with a sufficient amount of silicone grease.

17. Thread the hex nut(13) clockwise by hand onto the inlet of the valve body, with the shoulder side facing in towards the box bottom. While holding the box bottom secure, apply a torque wrench with $\frac{3}{4}$ " crow-foot to tighten the hex nut snug to a torque measurement of 45-55 inch-lb.'s.
18. Before proceeding, it is important to become completely familiar with the relationship of the lever(5) and the lever retaining sleeve(27). Closely read the instructions given in steps a-c before performing any further assembly. Carefully follow each step, and refer to the corresponding illustrations for further clarification.
 - a. Stand the retaining sleeve vertical, so that the slotted end faces up. Closely examine the sides of the lever retaining sleeve(27) to identify the four open channels which are offset from each other by 90 degrees. Locate the widest channel, and then the channel which faces opposite of it by 180 degrees. Closely examine the inner barrel of the sleeve around this channel to see that it contains a stepped rail which engages with the lever (see Fig. 18a).
 - b. Closely examine the lever to see that it contains a small groove beside the notch. Position this groove above the railed channel of the retaining sleeve, and lower the lever into place as shown in Fig. 18b. This will illustrate how the railed channel of the sleeve rides back and forth over the grooved feature of the lever as the adjustment knob is turned in and out.
 - c. Examine the other two opposing pin guides to see that they are narrower and uniform in size.

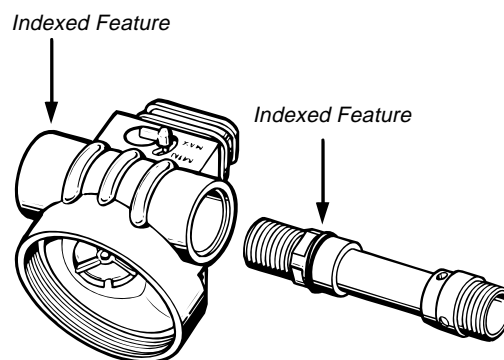


Fig. 16 - Valve Body / Box Bottom Alignment

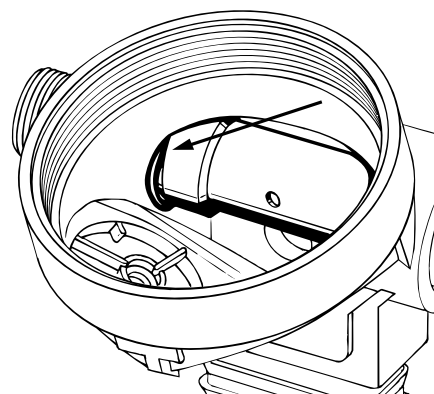


Fig. 17 - Valve Body O-ring Bind-Up

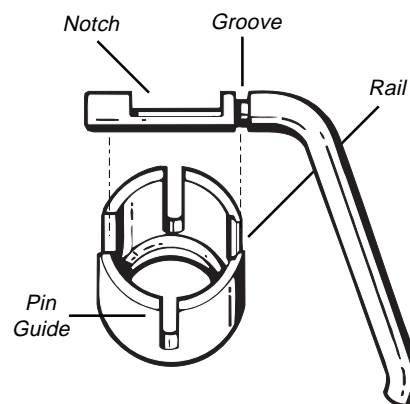


Fig. 18a - Lever Retaining Sleeve Features

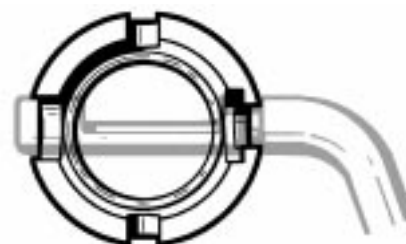


Fig. 18b - Retaining Sleeve/ Lever Engagement



Fig. 19 - Lever Installation Tool Engagement

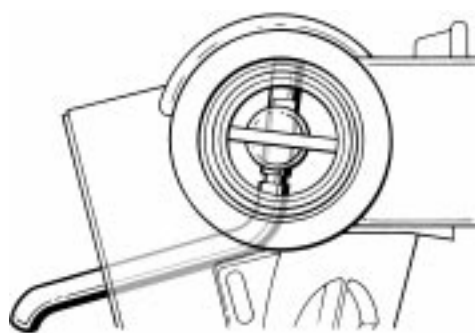


Fig. 20 - Lever Inspection



Fig. 21 - Retaining Sleeve Installation

19. Insert the slotted end of the Lever Installation Tool into the open end of the valve body and over the pin, so that it is seated directly over the washer. While holding the box bottom with valve body secure, press the tool inward until the poppet spring is fully compressed, and hold.
20. Locate the hole of the valve body that is directly adjacent to the inside wall of the box bottom, above the right exhaust valve. While holding the tool depressed, carefully insert the notched end of the lever(5) into this hole, straight through the tail of the poppet inside, and into the hole in the opposite side of the valve body (see Fig. 19).
21. Remove the Lever Installation Tool to inspect the engagement of the lever inside the valve body, to ensure that the end of the lever is inserted as far as possible into the hole in the opposite side of the valve body (see Fig. 20).
22. Install the O-ring(29) onto the adjustment screw(28).



NOTE: The adjustment screw is designed with left hand threads, which is opposite of common threading.

23. Lightly lubricate the threads of the adjustment screw with a food grade, anti-seize lubricant. Thread the adjustment screw counter-clockwise by hand into the lever retaining sleeve; only until lightly snug.
24. While holding the box bottom with the adjustment end of the valve body facing straight up, position the retaining sleeve above the opening to align the railed channel of the sleeve with the grooved feature of the lever arm. When these two parts are in exact alignment, gently lower the sleeve with adjustment screw into the valve body so that the two narrower grooves seat down evenly over the pin.



CAUTION: Do not press the retaining sleeve into the valve body, over the lever arm. Doing so may cause damage that will impair the correct movement of the lever, and adversely affect the function of the regulator. If necessary, remove the retaining sleeve from the valve body to correct the position of the lever and/ or the retaining sleeve before proceeding.

25. Continue holding the box bottom with the valve body standing vertically straight up, and grasp the lever firmly between thumb and forefinger. Without applying any pressure to the retaining sleeve, move the lever very slightly outward until the sleeve drops lower inside the valve body (see Fig. 21). This will positively indicate that the railed channel of the sleeve has correctly seated over the grooved feature of the lever.



NOTE: It is important to continue holding the box bottom with the valve body facing up, in order to prevent the retaining sleeve from falling off of the lever arm and out of the valve body.

26. Install the O-ring(30) securely into the groove between the adjustment end of the valve body and box bottom.

27. Ensure that the adjustment screw is turned completely counter-clockwise into the retaining sleeve, and fit the cap nut(31) over its end. While holding the adjustment screw secure, thread the cap nut clockwise onto the end of the valve body until flush with the box bottom. Apply a torque wrench with ½" hex socket to tighten the cap nut until it is flush against the box bottom, to a torque measurement that does not exceed 24 inch-pounds.
28. Apply a medium blade screwdriver to turn the adjustable crown counter-clockwise inside the valve body. Watch closely as the lever arm begins to rise after 2-3 turns, and continue to slowly turn the adjustable crown counter-clockwise until the top of the lever stands just below the rim of the box bottom; exactly even with the first thread (see Fig. 22).



CAUTION: If the lever does not readily engage with the retaining sleeve inside the valve body, this may indicate that the retaining sleeve was incorrectly installed. Disassemble to correct as needed, and closely inspect the condition of the retaining sleeve to ensure that the railed channel has not been damaged as a result of incorrect installation. If any signs of damage are found, replace the sleeve with new. Damage to the lever retaining sleeve may seriously impair the proper engagement of the lever.

29. Examine the exhaust cover(34) and the box bottom to identify the locking tabs and grooves of each respective part. Press one corner of the exhaust cover onto the box bottom until the mating tab snaps audibly into place. Press the center tab next, followed by the tab of the opposite corner, and check to ensure that all three are securely locked into their grooves.
30. Install the diaphragm(4) into the box bottom with its raised center facing up, and check to ensure it is evenly seated onto the shoulder at the base of the threads.
31. Place the purge cover(3) directly over the diaphragm, and rotate it as needed to align the logo horizontally straight.
32. Fit the retaining ring(2) down over the purge cover, and apply one pin of the Circlip/ Retaining Ring Tool (P/N 1078-46) to a slot in the retaining ring. While holding the purge cover securely in place, turn the retaining ring clockwise until it is lightly snug. Check to ensure that the purge cover has not rotated and correct if necessary. Place the tool directly over the purge cover with the two pins facing down on each side, and firmly press straight down to depress the purge cover so that the pins are securely engaged into two opposite slots of the retaining ring(2). While holding the tool securely engaged, turn the retaining ring clockwise to tighten until snug.
33. Thread the color ring(1) onto the box bottom and turn by hand until snug.
34. Position the adjustment knob(32) over the end of the adjustment screw so that the through holes of both parts are in exact alignment. Press the adjustment knob firmly onto the end of

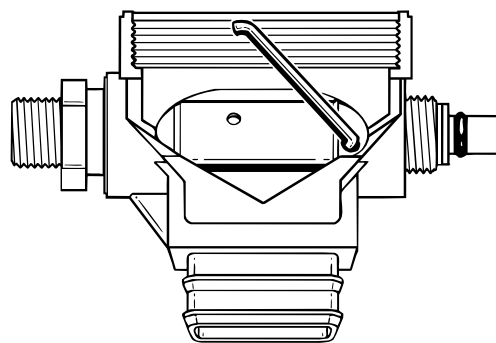


Fig. 22 - Lever Height Preliminary Setting

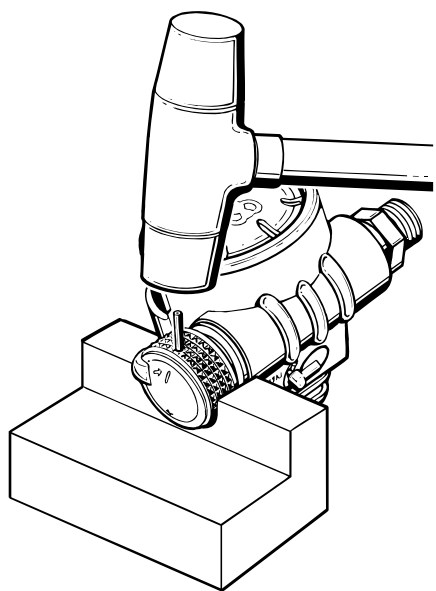


Fig. 23 - Adjustment Knob Pin Installation

the adjustment screw, and further check the alignment of these parts by inserting the pin of a Seat Extraction Tool (P/N 1094-36) completely through the hole. If it does not pass through easily, remove the knob and repeat before proceeding further.

35. Place the second stage on a padded surface with the purge cover facing up, so that it rests on the exhaust cover and outlet boss. Lay a small, 1" thick block of wood next to the second stage, beneath the knob. Insert the pin(33) into the hole of the knob, and gently tap it completely through with a small mallet, until it is seated evenly on both sides (see Fig. 23).
36. Install the mouthpiece(17) onto the box bottom, and lightly fasten a mouthpiece clamp(18) onto the groove of the mouthpiece. Turn the clamp so that the locking tab is facing toward the inlet side of the box bottom, and pull the end sufficiently snug. Snip the extra length with a small pair of scissors or wire cutters.
37. Direct low pressure air (50 psi) through the LP hose(8) to flush out any debris that may be inside. Install O-rings (7&9) onto the hose, and set it aside.

This concludes the reassembly of the Micra ADJ second stage. Refer directly to the following section, titled Final Adjustment & Testing.

Final Adjustment & Testing Procedures



NOTE: Before performing the following procedure, refer to Table 5, titled Test Bench Specifications - Micra ADJ



CAUTION: Prior to adjusting and testing the Micra ADJ second stage regulator, the accompanying first stage must be correctly serviced, adjusted to a stable intermediate pressure of 140 psi, and fully tested. Refer to either the Conshelf SE Service Manual (P/N 7802-08) or the SEA Service Manual (P/N 7802-12) before attempting to perform the adjustment and testing of the Micra ADJ second stage.

1. Thread the male fitting of the LP hose into the preferred low pressure port of the first stage, and apply a torque wrench with $1\frac{1}{16}$ " crow-foot to tighten to 40 inch-pounds (± 2).
2. Connect an intermediate pressure test gauge (P/N 1116-10) to the first stage via a separate low pressure hose.
3. Attach the female fitting of the second stage low pressure hose to the Micra In-Line Adjustment Tool (P/N 1001-95) by mating the swivel nut onto the male threaded end of the tool. Turn the swivel nut clockwise by hand until finger snug.
4. Pull back the knob of the tool to retract the adjusting stem, and mate the female threaded end of the tool onto the second stage inlet fitting. While holding the tool secure, turn the second-stage clockwise until lightly snug (see Fig. 24).

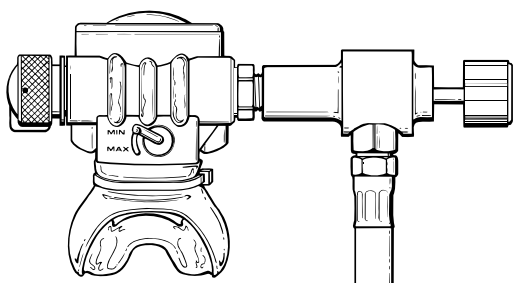


Fig. 24 - Inline Adjustment Tool Connection

5. Turn the second stage adjustment knob completely out counter-clockwise, and set the vane adjustment switch to the "MIN" position (see Fig. 25).
6. Connect the first stage to a filtered air source of 3,000 psi.

△ NOTE: The preferred air source for final tuning and testing is a flow bench with accurately calibrated gauges. If a flow bench is not available, a scuba cylinder may be used, following the subjective breathing test provided on page 16.

7. Slowly open the valve of the air supply to fully pressurize the regulator. Press the knob of the inline adjustment tool inward, and gently turn the knob until it can be felt that the adjustment stem has mated into the slotted head of the crown. Continue to hold the knob inward, in order to prevent it from being pressed outward by the internal air pressure.
 - a. If airflow cannot be heard, slowly turn the crown out counter-clockwise only until a very slight leak is present.
 - b. If strong airflow beyond a slight leak is present, slowly turn the crown clockwise in very small increments of adjustment while simultaneously depressing the purge of the second stage, and pause to listen after each adjustment until only a slight leak remains. It is important to adjust the crown in this manner only until the airflow has stopped, without over-adjusting. When only a slight amount of airflow is present, release the knob of the adjustment tool to ensure that it no longer makes contact with the crown.
8. When a slight leak has been established, turn the second stage adjustment knob between $\frac{1}{2}$ – $\frac{3}{4}$ turn clockwise. Purge the second stage, and then listen closely to determine whether any airflow can still be heard.
 - a. If airflow can still be heard, re-engage the inline adjustment tool with the crown as described in step 7, and turn the crown slightly in clockwise only until the airflow has stopped. Release the knob of the adjustment tool to ensure that it no longer makes contact with the crown.

⚠ CAUTION: Over-adjustment of the crown will cause excessive spring load in the second stage valve, and will severely degrade the performance of the regulator.

9. To test the setting of the crown, turn the second stage adjustment knob completely out counter-clockwise to initiate a slight flow of air, and then slowly turn it back in clockwise to verify that the airflow has stopped completely before it has been turned $\frac{1}{2}$ turn. If more than $\frac{1}{2}$ turn is required to shut off the airflow, it will be necessary to readjust the crown as described in step 8a.
10. After turning the adjustment knob $\frac{1}{2}$ turn clockwise to stop the airflow, purge the second-stage regulator several times and listen for any leaks. Perform any follow-up adjustments as needed at the source to eliminate the leakage.

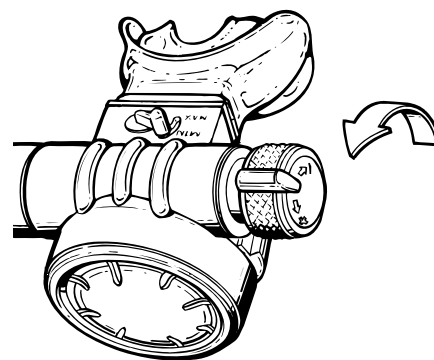


Fig. 25 - V.A.S. & Adjustment Knob Settings



NOTE: If leakage persists after performing the above procedures, refer to Table 1, Troubleshooting, and disassemble as required to remedy the problem.

11. Turn the valve of the air source completely shut, and purge the second stage to depressurize the system. Disconnect the in-line adjustment tool from the second stage, and connect the female fitting of the IP hose to the second stage inlet. Apply a torque wrench with $1\frac{1}{16}$ " crow-foot to tighten the IP hose fitting to a torque measurement of 40 inch-lbs (± 3).



NOTE: If an accurately calibrated airflow test bench is not available, proceed to Subjective Tuning Procedures provided on the following page.

SECOND STAGE AIR FLOW TEST

1. With the regulator still connected to the test bench, pressurize the system to 3000 psi (± 100) and place the second-stage mouthpiece over the mouthpiece adapter.
2. Turn the second stage adjustment knob in clockwise between $\frac{1}{2}$ – $\frac{3}{4}$ turn, only until the airflow has stopped.
3. Slowly turn the flowmeter control knob until the flow reaches a minimum of 15 SCFM (425 liters per minute). The reading on the Magnahelic gauge (inhalation / exhalation effort gauge) should indicate no more than +6.0" H₂O. If the reading exceeds +6.0" H₂O, refer to Table 1 - Troubleshooting for corrective guidelines and specific procedures.

SECOND STAGE OPENING EFFORT TEST

1. With the second stage adjustment knob turned in clockwise $\frac{1}{2}$ – $\frac{3}{4}$ turn, turn the flowmeter control knob shut, and then slowly reopen while watching both the Magnahelic gauge and the intermediate pressure gauge.
2. When the intermediate pressure gauge begins to drop below the intermediate pressure "lockup," the magnahelic gauge should indicate an opening effort of +.6" of H₂O to 1.0" of H₂O.
3. Turn the second stage adjustment knob completely in clockwise, and repeat the above procedure to ensure that the opening effort does not exceed 2.7" of H₂O. If the opening effort is not within these prescribed ranges, refer to Table 1 - Troubleshooting.


SECOND STAGE PURGE FLOW TEST

1. Turn off the flowmeter control knob.
2. While the second-stage is still mounted on the mouthpiece adapter, watch the flowmeter gauge and fully depress the purge cover. The flowmeter gauge must indicate a minimum of +5.0 SCFM (142 L.P.M.). If the purge flow is less than +5.0 SCFM, refer to Table 1 - Troubleshooting.

3. When purge flow is correct, remove the second-stage from the mouthpiece adapter on the flow test bench. Shut the valve of the test bench, and purge the second stage to depressurize the system. Remove the regulator.

EXTERNAL LEAK TEST

1. After disconnecting the regulator from the flow bench, connect to a scuba cylinder filled to approximately 3,000 psi. Open the cylinder valve to repressurize the regulator, and submerge the entire system in a test tank of clean water.
2. Observe any bubbles arising from the submerged regulator over a one minute period. The recommended time is necessary due to slower bubble formation that occurs in smaller leaks. Bubbles indicate a leak, which requires that the system must be disassembled at the source to check sealing surfaces, assembly sequence and component positioning in order to correct the problem(s).

 **NOTE:** Extremely small leaks may be better detected by applying a soap solution or Snoop™ to the leak area. Bubble streams will indicate the source of the leak. Before disassembling to correct any leaks, rinse the entire regulator thoroughly with fresh water and blow out all residual moisture with filtered, low-pressure (50 psi) air. Disassemble and remedy the problem, referring to Table 1 - Troubleshooting.

SUBJECTIVE BREATHING TEST

1. While the regulator is connected to a cylinder containing 3,000 psi and pressurized, turn the second stage adjustment knob completely out counterclockwise to the full positive position, and verify that a slight leak of airflow is present.
2. Slowly turn the adjustment knob in clockwise to verify that the airflow stops between 1/2–3/4 turn.
3. Turn the adjustment knob completely in clockwise to the full negative position, and depress the second stage purge to ensure that an adequate volume of air needed to clear the second stage flows through the mouthpiece..
4. Turn the adjustment knob back to 1/2–3/4 turn negative, and breathe from the second stage. A properly serviced and adjusted regulator should deliver air upon deep inhalation without excessive inhalation effort, freeflow, or “fluttering” of the second-stage diaphragm. When exhaling, there should be no fluttering or sticking of the exhalation valve. If any of these problems occur, refer to Table 1 - Troubleshooting.

This concludes annual service procedures for the Micra ADJ

Table 1
Troubleshooting Guide
Micra ADJ Second-Stage

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Leakage or freeflow from second stage NOTE: Test with second stage adjustment knob turned in clockwise between $\frac{1}{2}$ & $\frac{3}{4}$ turn.	1. High first-stage intermediate pressure. (should be 140 ± 5 psi) 2. LP seat(15) damaged or worn. 3. Crown(12) incorrectly adjusted, lever(5) set too high. 4. Crown(12) sealing surface damaged. 5. Poppet spring(25) damaged.	1. Refer to first-stage Troubleshooting Guide. 2. Replace LP seat. 3. Reset crown and perform Final Tuning & Testing procedures. 4. Replace crown. 5. Replace poppet spring.
Low purge or excessive work of breathing (full cylinder)	1. Low intermediate pressure. (should be 140 ± 5 psi) 2. Lever(5) not properly engaged with retaining sleeve(27). 3. Crown(12) incorrectly adjusted, lever(5) set too low. 4. Intermediate pressure hose(8) clogged or obstructed.	1. Refer to first-stage Troubleshooting Guide. 2. Disassemble and inspect condition of retaining sleeve. 3. Reset crown and perform Final Tuning & Testing procedures. 4. Clean or replace hose.
External air leakage	1. Intermediate pressure hose loose. (Immersion Test) 2. Crown O-ring(11) damaged. 3. Box bottom(14) damaged.	1. Tighten to 40 inch-lbs at female second-stage fitting. 2. Disassemble and replace O-ring. 3. Disassemble and replace box bottom.
Water entering second-stage	1. Hole in mouthpiece(17).	1. Replace mouthpiece.
CAUTION: Recommended treatments which require disassembly of the regulator must be performed during a complete overhaul, according to the prescribed procedures for scheduled, annual service. Do not attempt to perform partial service.		

Table 2

Recommended Tool List

7803-00	Aqua-Lung Service Manual	All Aqua-Lung regulators
1116-00	I.P. test gauge	Intermediate pressure testing
N/A	0-120 inch-lbs torque wrench	Small fittings
9440-22	O-ring tools	O-ring removal & installation
N/A	Magnifier w/ illumination	Sealing surface inspection
N/A	Ultrasonic cleaner	Brass & stainless steel parts cleaning
N/A	Medium blade screwdriver	Crown removal/ installation
N/A	$\frac{3}{4}$ " open-end wrench	Hex nut removal/ installation
N/A	$1\frac{1}{16}$ " open-end wrench & crow-foot	IP hose fitting
N/A	$\frac{1}{2}$ " box wrench & hex socket	Cap nut
1078-46	Circlip & Retaining Ring Tool	C-clip & retaining ring removal/ installation
1094-36	Seat extraction/installation tool	Crown removal & installation
1001-95	In-line adjustment tool	Final adjustment & tuning
1008-84	Lever Removal/ Installation Tool	Lever & pin removal/ installation

Table 3

Standard Parts Replacement Schedule

PART NUMBER	DESCRIPTION	KEY NUMBER	QTY
1001-22	Exhaust Valve Diaphragm	6	2
9570-25	O-ring	7	1
8200-10	O-ring	9, 11, 15, & 29	4
1049-13	Mouthpiece Clamp (Blk)	18	1
8200-46	O-ring	20	1
1085-10	Low Pressure Seat	23	1
8200-16	O-ring	30	1

Table 4

Torque Specifications

PART NUMBER	DESCRIPTION / KEY NUMBER	TORQUE
1005-35	LP Hose Female Fitting / 8	40 (±3) inch-lbs
1001-36	Hex Nut / 13	50 (±5) inch-lbs
1008-41	Cap Nut / 31	Not to exceed 24 inch-lbs

Table 5

Test Bench Specifications


TEST	CONDITION	ACCEPTABLE RANGE
Leak test	Inlet 2,500-3,000 (±100) psi Knob turned full out counterclockwise Knob turned in clockwise ½-¾ turn	Slight leak None
Intermediate pressure	Inlet 2,500-3,000 (±100) psi	140 (±5) psi
Intermediate pressure creep	Inlet 2,500-3,000 (±100) psi	5 psi max between 5 to 15 seconds after cycling regulator (purge)
Opening effort	Inlet 2,500-3,000 (±100) psi, intermediate pressure 140 (±5) psi Knob turned in clockwise ½-¾ turn (no leak) Knob turned full in clockwise	+0.6 to +1.0 inch H ₂ O +2.0 to +2.7 inch H ₂ O
Flow effort	Intermediate pressure 140 (±5) psi at 15 SCFM	+6 inches H ₂ O (maximum)
Purge flow	Intermediate pressure 140 (±5) psi	5.0 SCFM flow rate (minimum)


Procedure A


Cleaning & Lubrication

(All Aqua Lung Regulators)

1. **Acid Bath** - Aqua Lung strongly recommends ChromeSafe™ regulator cleaner (P/N 0201-05) for cleaning all reusable brass and stainless steel parts. ChromeSafe™ is a specially formulated cleaner that does not harm rubber or Teflon parts, yet effectively removes silicone grease, corrosion, and grime from metal parts, leaving only a brilliant shine. For best results, soak parts in an ultrasonic cleaner for 5 to 15 minutes, unless the chrome finish is chipped or flaking. Parts with damage to their chrome finish should be cleaned separately outside the ultrasonic cleaner to avoid agitation. Be certain to isolate more delicate parts, such as orifice cones, to prevent damage to sealing surfaces.

 **CAUTION:** Harsh acids, such as muriatic acid, may cause damage to parts and must be strictly avoided. White vinegar, although less effective, is one suitable substitute for ChromeSafe™.

 **CAUTION:** Ultrasonic cleaning times in excess of 15 minutes may damage the chrome finish of certain parts. Be certain to use a timer, and do not leave parts unattended while cleaning.

 **NOTE:** Although ChromeSafe™ contains a degreasing agent, cleaning heavily greased parts in ChromeSafe™ will shorten the effective life of the solution, and require it to be replaced on a more frequent basis. Heavily greased parts may be degreased in a solution of warm water and mild dish detergent prior to being placed in the acid bath.

2. **Fresh Water Rinse** - If tap water is extremely “hard,” distilled water may be used to prevent any mineral residue. Remove parts from the acid bath and place directly into this rinse. Agitate lightly, and allow to soak for 5-10 minutes. Remove and blow dry with low pressure (25 psi) filtered air, and inspect closely to ensure proper cleaning and like-new condition.

ANODIZED ALUMINUM, PLASTIC & RUBBER PARTS

Anodized aluminum parts and parts made of plastic or rubber, such as box bottoms, box tops, dust caps, etc., may be soaked and cleaned in a solution of warm water mixed with mild dish soap. Use only a soft nylon toothbrush to scrub away any deposits. Thoroughly blow dry, using low pressure filtered air.


HOSES

If buildup of corrosion is severe, it is permissible to soak only the hose fittings in ChromeSafe™ cleaner as needed, and not allow any solution to enter the hose. Rinse in fresh water and allow to dry with the cleaned ends hanging down. Blow filtered air through them prior to installing onto the regulator.

LUBRICATION AND DRESSING

All O-rings should be lubricated with either Christo-Lube® (preferred for high pressure systems) or Dow Corning® 111 food grade silicone grease. Dress the O-rings with a very light film of grease, and remove any visible excess by running the O-ring between thumb and forefinger. Avoid applying excessive amounts of silicone grease, as this will attract particulate matter that may cause damage to the O-ring.

Hoses and other black rubber parts may be dressed and preserved using a clean cloth impregnated with a pump silicone milk.

 **CAUTION:** Aerosol spray silicone must be strictly avoided. Do not attempt to use as a substitute for silicone grease.


 **CAUTION:** Do not apply any form of silicone lubricant to silicone rubber parts, as this will cause them to deteriorate prematurely.

Table A

Recommended Lubricants & Cleaners

(All Aqua Lung Regulators)

LUBRICANT / CLEANER	APPLICATION	SOURCE
Christo-Lube®	All O-rings seals; cylinder valve threads (preferred for high pressure DIN systems)	Lubrication Technologies 310 Morton Street Jackson, OH 45640 (614) 286-2644
Dow Corning® 111 (pure silicone grease)	All O-ring seals	Dow Corning Corp. P.O. Box 1767-T Midland, MI 48640 800-248-2481
CAUTION: Silicone rubber requires no lubrication or preservative treatment. DO NOT apply silicone grease or spray to silicone rubber parts. Doing so will cause a chemical breakdown and premature deterioration of the material.		
Silicone Pump™ (non-aerosol silicone milk spray)	General preservative/conditioner for hoses, instrument console boots, etc.	McNett Corp. P.O. Box 996 Bellingham, WA 98227 800-221-7325
CAUTION: Aerosol spray silicone should be avoided because (1) common aerosol propellants may attack plastic and rubber parts, and (2) because only a slight amount of silicone remains after the solvent evaporates, and provides no lasting benefit.		
Anti-Seize Lubricant #80208 (food grade - U.S.D.A. approved for conformance to MIL-A-907-E)	M.A.S. cylinder adapter - female threads Micra ADJ adjustment screw	Permatex Industrial Corp. 705 N. Mountain Rd. Newington, CT 06111 (860) 520-5000
ChromeSafe™ (ultrasonic cleaning solution)	Degreaser and acid bath for reusable stainless steel and brass parts.	Aqua Lung P/N 0201-05 (1 quart)
Oakite #31	Acid bath for reusable stainless steel and brass parts.	Oakite Products, Inc. 50 Valley Road Berkeley Heights, NJ 07922
White distilled vinegar (100 gr.)	Acid bath for reusable stainless steel and brass parts.	"Household" grade
CAUTION: DO NOT use muriatic acid for the cleaning of any parts. Muriatic acid, even when strongly diluted, can harm chrome plating, and may leave a residue that is harmful to O-ring seals and other parts.		
Liquid dishwashing detergent (diluted with warm water)	Degreaser for brass and stainless steel parts, general cleaning solution for plastic, rubber, and anodized aluminum parts.	"Household" grade
Snoop™	Leak testing	Nupro Company 400 E. 345th St. Willoughby, OH 44094 440-951-7100

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