



TECHNICAL MAINTENANCE MANUAL



LEGEND ACD FIRST STAGE

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Legend LX ACD First Stage Technical Maintenance Manual

INTRODUCTION

This manual provides factory prescribed procedures for the correct service and repair of the Aqua Lung or Apeks regulator products described in this manual. 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 an Aqua Lung Service & Repair Seminar. If you do not completely understand all of the procedures outlined in this manual, contact Aqua Lung® 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:



WARNINGS indicate a procedure or situation that may result in serious injury or death if instructions are not followed correctly.



CAUTIONS indicate any situation or technique that will result in potential damage to the product, or render the product unsafe if instructions are not followed correctly.



NOTES are used to emphasize important points, tips and reminders.

SCHEDULED SERVICE

If the regulator is subjected to less than 50 dives per year, it is permissible to overhaul it every other year with an inspection procedure being performed on the "off" years. For example:

Year #1 : Inspection

Year #2 : Overhaul

Year #3 : Inspection

Year #4 : Overhaul, and so on.

Both Inspections and Overhauls need to be documented in the Annual Service & Inspection Record in the back of the Owner's Manual to keep the Limited Lifetime Warranty in effect. If a regulator is subjected to more than 50 dives per year, it should receive the complete overhaul.



NOTE: A unit that receives heavy or frequent use, such as rental, instruction, or commercial applications, should be serviced at least twice a 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 Regulator Owner's Manual.)

An Official Inspection consists of:

1. A pressurized immersion test of the entire unit to check for air leakage.
2. Checking for stable medium pressure that is within the acceptable range.
3. Checking for opening effort that is within the acceptable range.
4. Checking for smooth operation of the control knob and venturi switch.
5. A visual inspection of the filter for debris or discoloration.
6. A visual inspection of the exhaust valve to see that it is in good shape and that it's resting against a clean surface.
7. A visual inspection of the mouthpiece looking for tears or holes.
8. Pulling back hose protectors and checking that the hoses are secure in the hose crimps.

If a regulator fails item #1,2,3 or 4, the entire regulator should be overhauled. If a regulator fails #5,6,7 or 8, it will be up to the technician's discretion whether or not a full overhaul is required.

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 product in this manual, 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. As the regulator is disassembled, reusable components should be segregated and not allowed to intermix with nonreusable parts or parts from other units. 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.
4. Use only genuine Aqua Lung parts provided in the overhaul parts kit for this product. DO NOT attempt to substitute an Aqua Lung part with another manufacturer's, regardless of any similarity in shape or size.
5. 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.
6. When reassembling, it is important to follow every torque specification prescribed in this manual, using a calibrated torque wrench. Most parts are made of either marine brass or plastic, and can be permanently damaged by undue stress.
7. In order to make the regulator compatible with nitrox up to 40% O₂ (EAN40), the regulator must be properly cleaned, lubricated and assembled using genuine Aqua Lung® or Apeks replacement parts. In addition, assembly must be carried out in a clean environment using powderless, latex gloves or equivalent. For more detailed information, be sure to read **Procedure A: Cleaning and Lubrication** at the back of this manual.

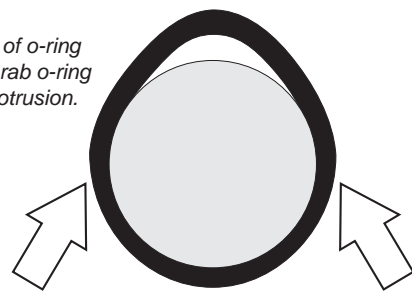
GENERAL CONVENTIONS

Unless otherwise instructed, the following terminology and techniques are assumed:

1. When instructed to **remove**, **unscrew**, or **loosen** a threaded part, turn the part counterclockwise.
2. When instructed to **install**, **screw in**, or **tighten** a threaded part, turn the part clockwise.
3. When instructed to **remove** an o-ring, use the pinch method (see illustration below) if possible, or use a brass or plastic o-ring removal tool. Avoid using hardened steel picks, as they may damage the o-ring sealing surface. All o-rings that are removed are discarded and replaced with brand new o-rings.

Pinch Method

Press upwards on sides of o-ring to create a protrusion. Grab o-ring or insert o-ring tool at protrusion.



4. The following acronyms are used throughout the manual: **MP** is Medium Pressure; **HP** is High Pressure; **LP** is Low Pressure.
5. Numbers in parentheses reference the key numbers on the exploded parts schematics. **For example**, in the statement, "...remove the o-ring (7) from the crown (8)...", the number 7 is the key number to the crown o-ring.

DISASSEMBLY PROCEDURE



NOTE: Before performing any disassembly, refer to the exploded parts 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 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 Remove the hoses from the first stage using the appropriate sized wrenches. Install spare HP and MP port plugs into the empty ports, leaving one MP port and one HP port open.

2 Using an 8 mm hex key, turn the cap (28) CCW to remove. Lift off the ribbed washer (25).

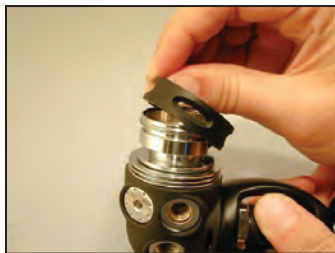


3 With your fingers, remove the secondary diaphragm (27). Turn the first stage over so the piston (26) falls out into your hand.

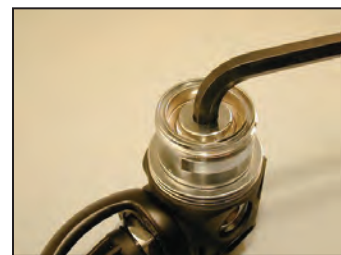


CAUTION: Inspect the secondary diaphragm for signs of damage or wear and replace if necessary. If it is in good condition it can be reused.

4 With your fingers, stretch the spacer (24) and slide it off the spring retainer (20).



5 Using an 8mm hex key, turn the adjustment screw (23) CCW to remove. Lift out the washer (22) and the main spring (21).



NOTE: The washer may be inside the adjustment screw. If so, gently tap the adjustment screw against the work bench and the washer will fall out.

6 Install a vise mounting tool (pn 5116230) into one of the HP ports. Secure the vise mounting tool in a bench vise with the spring retainer (20) facing upward. Using a 32mm open-end wrench, turn the spring retainer CCW to remove it from the body. If you have a Legend Glacia, use a 17mm hex key to remove the spring retainer.



7 Lift out the spring pad (19). Using an o-ring tool, remove the thrust washer (18a). Remove the first stage from the vise.



8 To remove the diaphragm (18b), insert a low pressure air nozzle into the open MP port. While holding your thumb over the diaphragm, inject a small blast of air into the MP port to pop out the diaphragm.



CAUTION: DO NOT attempt to pry the diaphragm out of the first stage with a metal instrument. Doing so will permanently damage the seating shoulder in the first stage, requiring replacement of the body.

- 9** Lift out the pin support (17). Turn the regulator over and allow the pin (7) to fall out into your hand.



- 10** Using an 8mm hex key, turn the HP plug (1) CCW to remove. Turn the regulator over so the spring (5) and HP seat (6) fall out into your hand.



- 11** Using a o-ring tool, remove the o-ring (2) from the HP plug (1). Next, carefully remove the o-ring (4) and backup ring (3) from inside the HP plug.

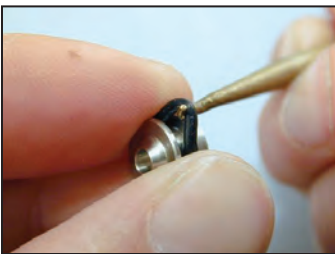


CAUTION: The slightest scratch or scar across the sealing surface inside the HP plug may cause leakage and could prevent the regulator from achieving a stable lock-up of MP.



CAUTION: Before proceeding, make sure you are working over a padded work surface; otherwise, the crown (9) may be damaged during removal.

- 12** Insert the pin end of seat extraction tool (pn 109437) into the center hole on the diaphragm side of the first stage body. While keeping the pin slightly tilted, press inward to remove the crown (9). Carefully remove the o-ring (8) from the crown.



13 Disassembly Of The Yoke Version

- a** Using the vise mounting tool (pn 5116230), secure the first stage screw (36) and then the dust cap (35) from the yoke screw. Using a large 15" adjustable wrench, turn the yoke retainer (29) counter-clockwise and lift off the yoke (34). Loosen the vise and remove the first stage. Remove the vise mounting tool from the HP port.



- b** Using the seat extraction tool (pn 109437) remove the filter (13) and the o-ring (12) from the yoke retainer (29).



- c** Place the yoke retainer (29) back into the yoke (34). Compress the plastic dust cap (35) between the yoke retainer and the yoke screw (36) by tightening the yoke screw.



- d** Carefully clamp the yoke retainer (29) in the bench vise by the wrench flats. Using a 3mm hex key, turn the yoke shutter valve (33) **"Clockwise"** three 360 degree turns to loosen.



CAUTION: The yoke shutter valve (33) is a reverse thread.

- e** Loosen the vise and remove the yoke screw (36) and the dust cap (35) to disassemble the ACD valve.



f Remove the o-ring (31) from the shutter valve (33) and then push the shutter valve out of the yoke crown (32).



g Carefully remove the o-ring (12) from the inside groove of the yoke crown (32).



14 Disassembly Of The DIN Version

a Remove the dust cap (46) from the first stage. Take a DIN/Yoke adapter tool (pn 125237) and thread it clockwise onto the DIN handwheel (38).



b Using a vise mounting tool (pn 5116230), secure the first stage into a bench vise with the DIN handwheel facing up. Using a 4mm hex key, turn the DIN shutter valve (45) CCW and remove.



NOTE: Early versions of the DIN shutter valve (45) use a 3mm hex key.

c Remove the DIN/Yoke adapter. Next, lift off the shutter crown (43) and the spring (41).



d Remove the two o-rings (42 & 44) from the shutter crown.



e Using a socket wrench and a 7/16" socket, remove the DIN screw (40) by turning it CCW. Next, remove the o-ring (39).



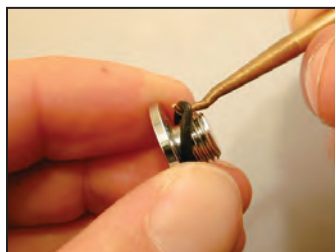
f Lift off the DIN handwheel (38). Using a 17mm wrench, turn the filter holder (37) CCW to remove.



g Using a seat extraction tool (pn 109437), push the filter (13) and o-ring (12) out of the filter holder (37).



15 Loosen the vise and remove the first stage. Remove the vise mounting tool from HP port. Using a 4mm hex key, remove all the port plugs (15 & 16) by turning them CCW. Remove the o-rings (12 & 14) from the plugs.



16 Pull on the narrow end of the protective sheath (11) and slide it off the body (10).



THIS CONCLUDES DISASSEMBLY

NOTE: Before beginning reassembly, perform parts cleaning and lubrication in accordance with **Procedure A: Cleaning & Lubricating** located at the back of the manual.

REASSEMBLY PROCEDURE

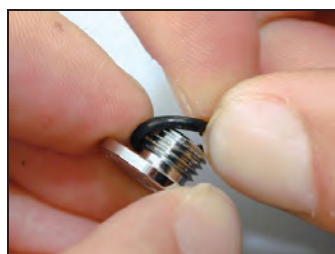
NOTE: Before performing any reassembly, it is important to inspect all parts, both new and those that are being reused, to ensure that every part and component is perfectly clean and free of any dust, corrosion, or blemishes. Before dressing each o-ring with ChristoLube®, check to ensure it is clean,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

WARNING: Use only genuine Aqua Lung® parts, subassemblies, and components whenever assembling any Aqua Lung® product. DO NOT attempt to substitute an Aqua Lung® part with another manufacturer's, regardless of any similarity in shape, size or appearance. Doing so may render the product unsafe, and could result in serious injury or death.

1 Slide the protective sheath (11) on the first stage body (10). Make sure all the ports and inlet fitting opening align with the holes in the sheath.



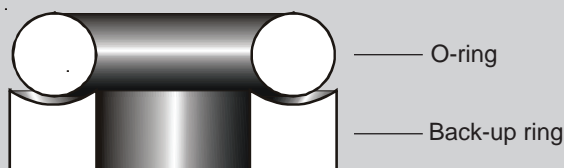
2 Install o-rings (12 & 14) on all the port plugs (15 & 16). Using a 4mm hex key, install all the port plugs clockwise until snug, leaving one HP and one MP port empty.



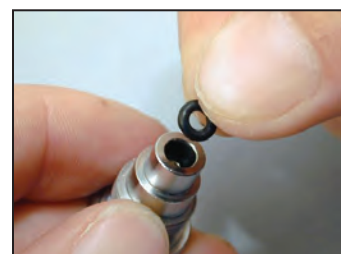
3 Install o-ring (8) onto the crown (9). Slide the crown onto the seat extraction tool (pn 109437) with the sealing edge against the plastic handle. Insert the crown into the body and press it into place. Use the blunt end of the seat extraction tool to make sure the crown is properly seated.



NOTE: Before continuing, closely examine the back-up ring (3). You will note that it has a flat side and a concave side. For correct assembly, the concave side should be against the o-ring (4), as shown in the picture below.



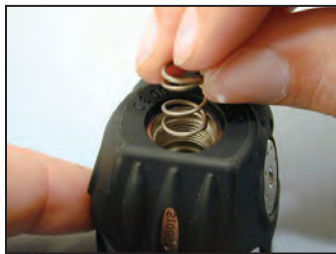
4 Install the new backup ring into the HP plug (1) with the concave side facing outward. Install o-ring (4) into the HP plug, against the backup ring. Visually inspect the o-ring to make sure it is seated evenly.



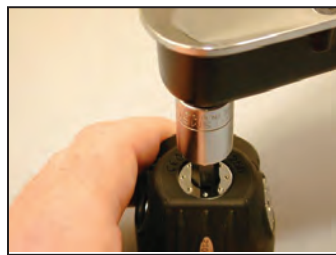
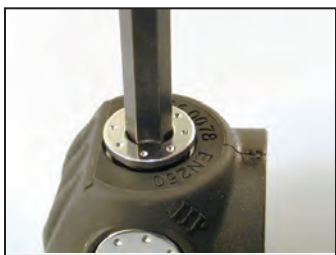
5 Install o-ring (2) onto the HP plug (1).



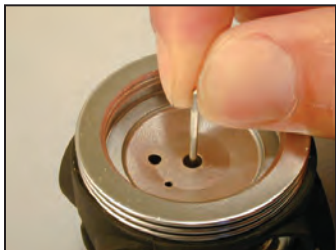
6 Drop a new HP seat (6), blue sealing side first, into the body (10). Inspect the seat to make sure it is standing straight. Place the spring (5) over the seat.



7 Insert an 8mm hex key into the HP plug (1). Insert the plug into the body (10). Push down on the plug to compress the spring (5) while at the same time turning clockwise to screw it into the body. Tighten the HP plug until it stops turning. Attach an 8mm hex key adapter to an in-lb torque wrench and tighten the HP plug to 45 in-lbs (4.9 Nm).



8 Turn the body over so the MP side is facing upward. Drop the pin (7) through the center hole. Place the pin support (17) over the pin. Press on the pin support a few times, it should feel like a spring-loaded button.



9 Press a new diaphragm (18b) into the body (10). Run your finger around the edge of the diaphragm to make sure it is properly seated. Install the thrust washer (18a) on top of the diaphragm and make sure it is seated flat against the diaphragm.

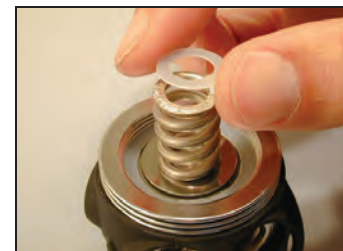


10 Place the spring pad (19), flat side down, in the center of the diaphragm (18b).



For Legend Glacia, go directly to step 13

11 Set the main spring (21) on the spring pad (19) and place the washer (22) on top of the spring. Using an 8mm hex key, thread the adjustment screw (23) clockwise into the spring retainer (20) until the first two threads are engaged. Thread the spring retainer clockwise onto the body (10) until hand tight.



12 Screw a vise mounting tool into the open HP port and secure it in vise with the spring retainer (20) facing upward. Using a ft-lb torque wrench and the spring retainer socket (pn 122152), tighten the spring retainer clockwise to 18 ft-lbs (24.5 Nm).



13 For Legend Glacia Only

a Thread the spring retainer (20) clockwise onto the body (10) by hand until snug.



b Screw a vise mounting tool into the body (10) and secure it in a vise. Using a ft-lb torque wrench with a 17mm hex key adapter, torque the retainer (20) to 18 ft-lbs (24.5 Nm).



c Install the main spring (21) into the body, set the washer (22) on top of the spring.



d Using a 8mm hex key, install the adjustment screw (23) clockwise into the spring retainer (20). Turn in and capture several threads.



14 Continue to tighten the adjustment screw (23) until it is flush with the inside ledge of the spring retainer (20).



15 Reassembly Of The Yoke Version

a Using the plastic end of the seat extraction tool (pn 109437) as a guide, install a new o-ring (12) into the groove in the yoke crown (32).



b Install the shutter valve (33) into the yoke crown (32) and then the o-ring (31) onto the shutter valve.



c Set the spring (30) into the yoke retainer (29). Place the yoke crown (32) onto the spring.



d Insert the sub-assembly into the yoke (34).



e Install the dust cap (35) between the yoke (34) and the yoke crown (32). Install and tighten the yoke screw (36) so that the spring (30) is compressed and the yoke screw becomes difficult to turn.



f Holding the yoke (34) with threads facing upward, use a 3mm hex key to tighten the shutter valve (33) "**Counter-clockwise**" three full turns.



CAUTION: The yoke shutter valve (33) is a reverse thread.

g Tighten the yoke screw (36) clockwise so that the dust cap (35) is now snug against the yoke retainer (29).



h Carefully clamp the yoke retainer (29) by the two wrench flats into a bench vise. Using a torque wrench and a 3mm hex key adapter, torque the yoke shutter valve (33) **"Counter-clockwise"** to 27 in-lbs (3 Nm).



i Loosen the vise and remove the assembly. Remove the yoke screw (36), dust cap (35) and yoke retainer (29) from the yoke (34).



j Check that the yoke crown shoulder (32) is approximately 1.5 mm (0.06 inches) above the yoke retainer (29).



k Push down with your finger against the yoke crown (32) to confirm the ACD is opening.



l Turn the yoke retainer (29) over and install a new **"unlubricated"** o-ring (12) and a new filter (13).



m Pass the yoke retainer (29) through the yoke (34). While holding the first stage with the inlet opening facing downward, carefully screw the yoke retainer clockwise up into the first stage body until finger tight. Secure the first stage back in the bench vise with the yoke facing upward.



CAUTION: Care must be taken when threading the yoke retainer into the body so as not to dislodge the o-ring and filter

n Place the inlet fitting socket (pn 111001) over the yoke retainer. Attach a 3" socket extension to a ft/lb torque wrench. Pass the socket extension through the top of the yoke (34) and insert it into the socket. Tighten the yoke retainer (29) clockwise to 18 ft-lbs (24.5 Nm). Remove the torque wrench and socket.



o Slide the dust cap (35) over the yoke screw threads (36) with the Aqua Lung logo facing outward. Thread the yoke screw clockwise into the yoke (34).



16 Reassembly Of The DIN Version

a Fit the o-ring (42) and an **"unlubricated"** o-ring (44) into the grooves of shutter crown (43).



b Install the o-ring (39) on top of the DIN screw (40).



c Insert the filter holder (37) into the DIN handwheel (38). Thread the DIN screw (40) clockwise into the filter holder.



d Using a 7/16" socket, snug the DIN screw (40) by hand.



e Turn the DIN assembly over and install a new "unlubricated" o-ring (12). Next, insert a new filter (13) into the filter holder (37).



f Remove the first stage from the vise. Hold the first stage with the inlet area opening facing downward. Using a 7/16" socket, thread the DIN subassembly clockwise into the body until snug.



CAUTION: Care must be taken when threading the DIN subassembly into the body so as not to dislodge the o-ring and filter.

g Resecure the first stage in the vise with the DIN handwheel (38) facing upward. Using a torque wrench with a 7/16" socket, tighten the DIN screw (40) to 18 ft-lbs (24.5 Nm).



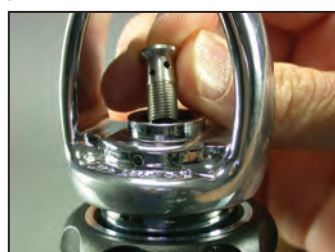
h Place the spring (41) into the DIN handwheel (38). Set the shutter crown (43) onto the spring.



i Thread the DIN/Yoke adapter (pn 125237) onto the DIN handwheel (38) clockwise until snug, compressing the ACD spring (41).



j Place the DIN shutter valve (45) with threaded end down into the center of the DIN/Yoke adapter.



k Using a 4mm hex key, turn the DIN shutter valve (45) clockwise to just engage the threads. Use a torque wrench with a 4mm hex key adapter to tighten it to 27 in-lbs (3 Nm).



NOTE: Early versions of the DIN shutter valve (45) will require a 3mm hex key and hex key adapter.

l Remove the DIN/Yoke adapter.



- 17** Loosen the vise and remove the first stage. Unthread the vise mounting tool. Install the HP port plug (15) into the body.

ADJUSTING THE FIRST STAGE

- 1** Attach a MP test gauge (p/n 111610) to a MP hose and thread the hose into the open MP port. Next, open the bleed valve. If your test gauge does not have an overpressure relief valve, then it is vital that a properly adjusted second stage is attached to the first stage to act as an overpressure valve in the event of a HP leak.



CAUTION: Before pressurizing the first stage, it is important to have a properly adjusted second stage attached to the first stage. This will provide a safety relief valve if the MP exceeds 145 psi (10 bar). Failure to relieve increasing MP may result in damage to the test gauge or the MP hose.



WARNING: If the pressure gauge rapidly exceeds 145 psi (10 bar), there is a HP leak. Quickly close the cylinder valve and purge the second stage, or reopen the bleed valve of the test gauge and close the cylinder. Failure to do so may cause a rupture to the MP hose and/or MP gauge, which in turn can lead to personal injury. Refer to *Table 1: Troubleshooting Guide*, located at the back of the manual for the causes of high or unstable MP.



WARNING: Be certain not to install a MP hose into the HP port via an adapter. Doing so may cause the hose to rupture when pressurized, and could result in serious personal injury.

- 2** Attach the first stage to a fully charged 3000 psi (206 bar) cylinder. While closely monitoring the MP test gauge, slowly open the cylinder valve to pressurize the regulator. Then slowly turn the knob of the bleed valve clockwise until it is completely shut.

- 3** If no leaks are detected, use a 8mm hex key to adjust the MP by turning the adjustment screw (23): Turning the adjustment screw clockwise increases the MP; turning the adjustment screw CCW decreases the MP. Turn the adjustment screw in 1/8 turn increments and cycle the bleed valve or second stage purge button several times after each adjustment. Set the MP to 130-145 psi (9-10 bar) (standard Legend) or 116-130 psi (8-9 bar) (Legend Supreme). Once the MP has been adjusted, cycle the bleed valve or second stage purge button 10-15 times. After cycling, watch the gauge needle. The first stage MP should "lock-up" and be stable at the desired setting. Make any further adjustments as necessary. Leave the regulator under pressure for several minutes and check that the MP remains stable. If the MP rises more than 5 psi, this indicates a leak. Refer to *Table 1: Troubleshooting Guide*, located at the back of the manual for possible causes.



- 4** Close the cylinder valve and depressurize the regulator by opening the gauge bleed valve or by pressing the second stage purge button. Close the gauge bleed valve and repressurize the system. The MP should still read the original MP setting. If the pressure reading is different than the original setting, repeat steps 3 and 4 until the MP is stable.

FINAL ASSEMBLY

- 1** Orient the spacer (24) so the side with straight edges are facing upward. Align the straight edges of the spacer with the wrench flats on the spring retainer. Work the spacer over the spring retainer until it sits against the body. Place the ribbed washer (25) on top of the spacer.



NOTE: Steps 2 and 3 must be performed while the regulator is still pressurized.

- 2** With the regulator still pressurized, insert the piston (26) into the spring retainer (20). With the cupped side of the secondary diaphragm (27) facing downward, insert the edge of the diaphragm into the outer groove in the spring retainer.



- 3** Thread the end cap (28) clockwise onto the spring retainer (20) until hand-tight. Using a torque wrench and an 8mm hex key adapter, tighten the end cap to 35 in-lbs (3.9 Nm). Recheck the MP to make sure it is still at the desired settings.



- 4** Close the cylinder valve and depressurize the regulator. Remove the test gauge and reinstall the port plug(s).

THIS ENDS REASSEMBLY

FINAL TESTING

Immersion Test

1 With the port plugs and at least one properly adjusted second stage installed, slowly open the cylinder valve and pressurize the first stage. Completely submerge the first stage in fresh water and check for leaks.

If a leak is detected, note the source of the leak and refer to **Table 1: Troubleshooting Guide**, located at the back of the manual for possible causes and corrective actions.



NOTE: Do not confuse bubbles from trapped air with a true leak. If there is an air leak, bubbles will come out in a constant stream.



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, LP air. Disassemble and remedy the problem by referring to **Table 1: Troubleshooting Guide**, located at the back of the manual.

2 When completed, close the cylinder valve and depressurize the regulator. Remove the first stage from the valve and secure the dust cap in place.

THIS CONCLUDES THE SERVICE PROCEDURES FOR THE LEGEND ACD FIRST STAGE

TABLE 1: TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TREATMENT
High or Unstable MP	1. The HP seat (6) is worn or damaged	1. Replace HP seat
	2. The crown (9) is damaged	2. Replace crown
	3. The crown o-ring (8) is worn or damaged	3. Replace o-ring
	4. The HP plug (1) internal wall damaged	4. Replace HP plug
	5. The o-ring (4) is damaged	5. Replace o-ring
	6. The body to crown sealing area is damaged	6. Replace body
	7. The HP plug spring (5) is weakened or damaged	7. Replace spring
	8. The first stage is improperly adjusted	8. Readjust the adjustment screw (23)
External Air Leak or Secondary Diaphragm Distended or Burst	1. The port plug o-rings (12 & 14) are worn or damaged	1. Replace o-rings
	2. The diaphragm (18b) is worn or damaged	2. Replace diaphragm
	3. The diaphragm seating surface is damaged	3. Replace body
	4. Spring retainer (20) is loose	4. Tighten spring retainer
	5. The diaphragm (27) is worn or damaged	5. Replace diaphragm
	6. Inlet fitting o-ring (12) is worn or damaged	6. Replace o-ring
	7. HP plug o-ring (2) is worn or damaged	7. Replace o-ring
Restricted air flow or high inhalation resistance through entire system	1. The cylinder valve not completely open	1. Open valve and check cylinder psi
	2. The cylinder valve needs service	2. Try another cylinder
	3. The filter (13) is clogged	3. Replace filter



NOTE: This is a partial list of possible problems and recommended treatments. For more information, refer to the second-stage troubleshooting guide, or contact Aqua Lung Technical Service Department for assistance with problems not described here.



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: TOOL LIST & SERVICE KITS
















PART #	DESCRIPTION	APPLICATION
111610	MP Gauge 0-400 psi 	Checking medium pressure
944022	Brass O-ring Tool Set 	Removal and installation of o-rings
103102	O-ring Tool (Plastic) 	
125237	DIN to Yoke Converter 	Disassembly and assembly of DIN ACD connection
111001	Inlet Fitting Socket 	Apply torque to parts listed in Table 3: Torque Specifications
122152	Spring Retainer Socket 	Apply torque to parts listed in Table 3: Torque Specifications
N/A	3" Socket Extension 	Use with inlet fitting and spring retainer sockets to apply proper torque
109437	Seat Extraction Tool 	Crown (14) Disassembly/assembly
5116230	Vise Mounting Tool 	For holding first stage in vise
N/A	Torque Wrench ft-lbs and in-lbs 	Apply torque to parts listed in Table 3: Torque Specifications
N/A	Hex Key (3mm, 4mm, 8mm, 17mm) 	Loosen/tighten/adjust parts
N/A	Hex Key Adapter (3mm, 4mm, 8mm, 17mm) 	Apply torque to parts listed in Table 3: Torque Specifications
N/A	Open-end Wrench (1/2", 9/16", 5/8", 17mm, 26mm, 32mm) 	Loosen/tighten/adjust parts
N/A	15" Adjustable Wrench 	Loosen parts
N/A	Socket Wrench 	Remove DIN screw (40)

TABLE 2: TOOL LIST & SERVICE KITS




PART #	DESCRIPTION	APPLICATION
N/A	Socket (7/16") 	Remove and replace the DIN screw (40)
N/A	Crowfoot (26mm, 32mm) (1/2", 9/16", 5/8") 	Apply torque to parts listed in Table 3: Torque Specifications
N/A	Magnifier w/Illumination 	Sealing surface and spring inspection
N/A	Ultrasonic Cleaner	Brass & stainless steel parts cleaning
900017	Service Kit LEGEND ACD	

TABLE 3: TORQUE SPECIFICATIONS



PART #	DESCRIPTION / KEY ITEM #	TORQUE
129122	Spring Retainer (20)	18 ft-lbs (24.5 Nm)
129212	Yoke Retainer (29)	18 ft-lbs (24.5 Nm)
129213	DIN Screw (40)	18 ft-lbs (24.5 Nm)
129120	HP Plug (1)	45 in-lbs (4.9 Nm)
129118	HP Port Plug (15) or hose	40 in-lbs (4.5 Nm)
129119	MP Port Plug (16) or hose	40 in-lbs (4.5 Nm)
129207	Yoke Shutter Valve (33)	27 in-lbs (3 Nm)
129202	DIN Shutter Valve (45)	27 in-lbs (3 Nm)
129196 129349	Cap (28)	35 in-lbs (3.9 Nm)

TABLE 4: TEST BENCH SPECIFICATIONS

TEST	CONDITION	SPECIFICATION
Leak Test	Inlet 3,000 psi (206 bar)	No leaks allowed
MP	Inlet 3,000 psi (206 bar)	130-145 psi (9-10 bar) Standard 116-130 psi (8-9 bar) Supreme/Glacia
MP creep	Inlet 3,000 psi (206 bar)	5 psi (.3 bar) max between 5 to 15 seconds after cycling regulator (purge)



TABLE 5: RECOMMENDED CLEANERS & LUBRICANTS

LUBRICANT/CLEANER	APPLICATION	SOURCE
Christo-Lube® MCG 111	All o-rings	Aqua Lung, PN 820466, or Lubrication Technologies 310 Morton Street Jackson, OH 45640 (800) 477-8704
 CAUTION: Silicone rubber requires no lubrication or preservative treatment. DO NOT apply grease or spray to silicone rubber parts. Doing so may cause a chemical breakdown and premature deterioration of the material.		
Oakite #31	Acid bath for reusable stainless steel and brass parts	Oakite Products, Inc. 50 Valley Road Berkeley Heights, NJ 07922
 CAUTION: Do not use muriatic acid for the cleaning of any parts. Even if strongly diluted, muriatic acid can harm chrome plating and may leave a residue that is harmful to o-ring seals and other parts.		
White distilled vinegar	Acid bath for reusable stainless steel and brass parts	"Household" grade
Liquid dishwashing detergent (diluted with warm water)	Degreaser for brass and stainless steel parts; general cleaning solution for plastic and rubber	"Household" grade

PROCEDURE A: CLEANING & LUBRICATING

Aqua Lung and Apeks Regulators and Nitrox

When it comes to issues of nitrox safety and compatibility, the concerns lie primarily with the first stage as it is subjected to high inlet pressures. High inlet pressures lead to adiabatic compression or heating of the gas. The Aqua Lung or Apeks regulator product described in this manual, when properly cleaned and assembled, is authorized for use with enriched air nitrox (EAN) that does not exceed 40% (EAN 40). It is authorized because the second stage will only see MP levels of (10 bar) or less and the authorized service kit components and lubricants are compatible in elevated oxygen environments. During cleaning, a mild detergent must be used to remove condensed hydrocarbons (compressor oils) from the inside passageways of the first stage. For the first stage to remain EAN40 compatible, only use hyper filtered compressed gas (hydrocarbons < 0.1 mg/m³). Ordinary compressed breathing air (Grade E) usually does not meet this criterion. Once ordinary breathing air is used, the first stage is no longer EAN40 compatible until it is cleaned and serviced again.

Although regulator second stage components are not exposed to high pressure EAN, Aqua Lung recommends that the same cleaning procedures be followed for the complete regulator. This prevents the possibility of cross contamination and guarantees the cleanliness of the entire regulator.

Cleaning Brass and Stainless Steel Parts

1. Preclean in warm, soapy water* using a nylon bristle tooth brush.
2. Thoroughly clean parts in an ultrasonic cleaner filled with soapy water. If there are stubborn deposits, household white distilled vinegar (acetic acid) in an ultrasonic cleaner will work well. DO NOT place plastic, rubber, silicone or anodized aluminum parts in vinegar.
3. Remove parts from the ultrasonic cleaner and rinse with fresh water. If tap water is extremely "hard," place the parts in a bath of distilled water to prevent any mineral residue. 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.

Cleaning 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. Rinse in fresh water and thoroughly blow dry, using low pressure filtered air.



CAUTION: Do not place plastic and rubber parts in acid solutions. Doing so may alter the physical properties of the component, causing it to prematurely degrade and/or break.

Cleaning Hoses

1. Hose fittings: Ultrasonically clean with soapy water*; vinegar OK on tough corrosion
2. Run soapy water through hose if needed
3. Thoroughly rinse with fresh water
4. Blow out hose before installing

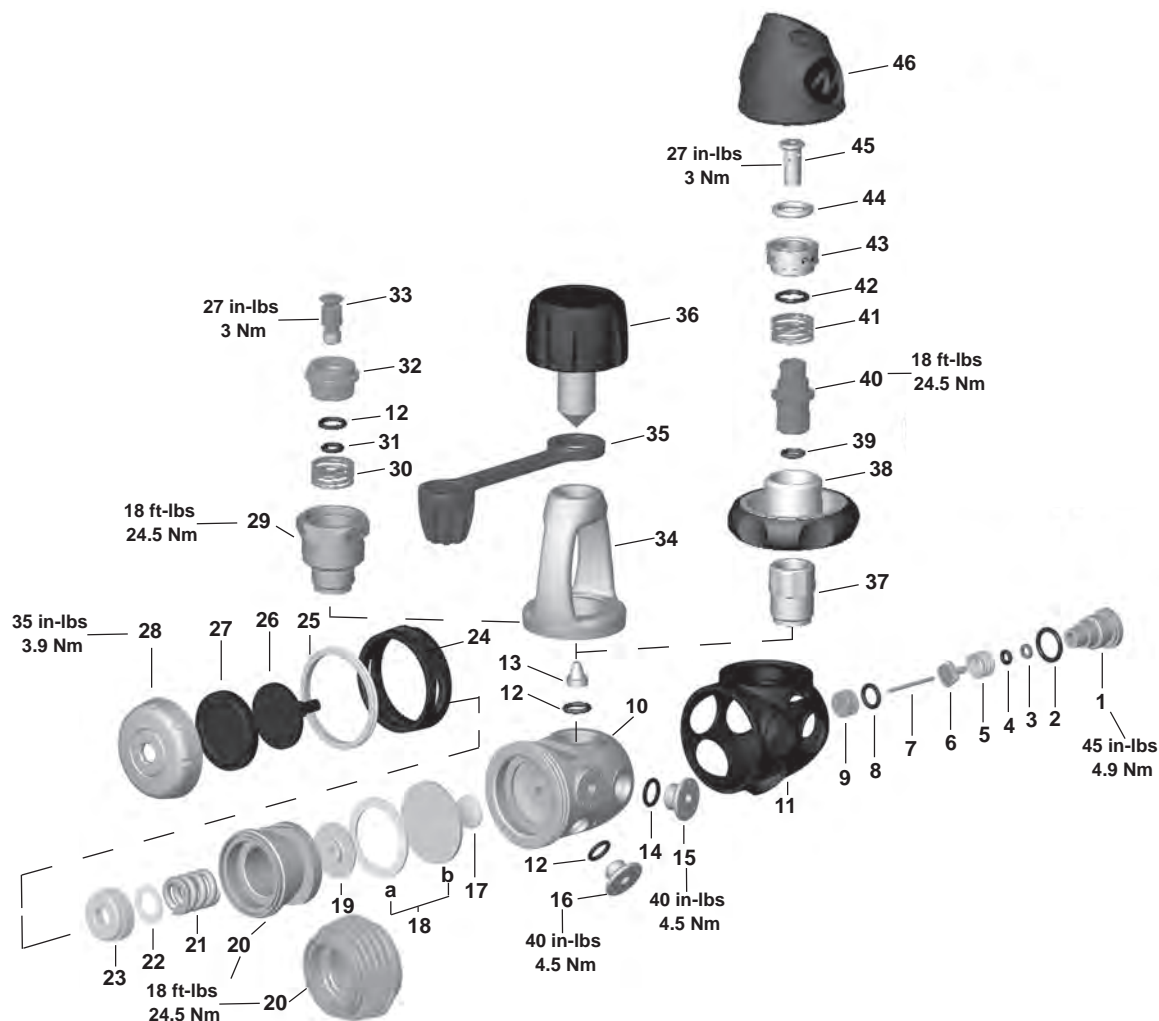
Lubrication and Dressing

Wear powderless, latex gloves when handling and lubricating o-rings. Keeping internal parts free from skin oils and other contaminants is important when running enriched air nitrox through a first stage. All o-rings should be lubricated with Christo-Lube® MCG-111. 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 Christo-Lube® grease, as this will attract particulate matter that may cause damage to the o-ring.

*Soapy water is defined as "household" grade liquid dishwashing detergent diluted in warm water.

MAINTENANCE NOTES

LEGEND ACD



Key # . Part #	Description
.....129346	First Stage, Glacia Legend, Yoke
..... 900017	Overhaul Parts Kit ACD (Yoke and DIN)
1129120	HP Plug
2824407P	O-ring (20 pk)
3119129	Backup ring
4820080P	O-ring (25 pk)
5122244	Spring
6105940	HP Seat
7102002	Pin
8820038P	O-ring (20 pk)
9106027	Crown
10129111	Body
11129112	Protective Cover
12820011P	O-ring (25 pk)
13129209	Filter, ACD
14820072P	O-ring, HP Port (20 pk)
15129118	Plug, HP Port, 7/16 inch
16129119	Plug, MP Port, 3/8 inch
17129121	Pin Support
18103425	Diaphragm Kit (includes thrust washer 19a and diaphragm 19b)
19124560	Spring Pad
20129122	Spring Retainer
.....129341	Spring Retainer, Glacia
21106356	Main Spring
22845097	Washer
23106026	Adjustment Screw

Key # . Part #	Description
24129128	Spacer
25129127	Ribbed Washer
26129123	Piston
27129126	Diaphragm, Secondary
28129196	Cap, Chrome
.....129349	Cap, Glacia
29129212	Yoke Retainer, ACD
30129204	Spring, ACD
31820009P	O-ring (10 pk)
32129205	Yoke Crown, ACD
33129207	Yoke Valve, ACD
34124611	Yoke, Chrome
35124555	Dust Cap
36107507	Yoke Screw
37129214	DIN Filter Holder
38128119	DIN Handwheel, ACD
39820010P	O-ring (25 pk)
40129213	DIN Screw, ACD
41129204	Spring, ACD
42820322P	O-ring (10 pk)
43129203	DIN Shutter Crown, ACD
44820094P	O-ring (20 pk)
45129202	DIN Shutter Valve, ACD
46129216	DIN Cap, ACD

Part numbers in bold indicate standard overhaul replacement part.



Authorized Technician
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LEGEND ACD FIRST STAGE

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