AQUA LUNG®

## Authorized Technician

# SERVICE & REPAIR MANUAL

# Aquarius & Calypso

## First Stage Regulator



Doc. No. 7802-32 – Rev. 3/2000 (PDF)

# Contents

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AQUA LUNG

# Service & Repair Manual – Calypso & Aquarius First Stage

## Introduction

This manual provides factory prescribed procedures for the correct service and repair of the Calypso & Aquarius (1994 & later model) piston first stage regulator. 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:

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

Regulators should be given the same care and maintenance as life support equipment. It is therefore important to perform scheduled overhaul service for the first stage, complete with second stages, according to the procedures outlined in this manual; at least once a year with normal or infrequent use.

**NOTE**: A regulator 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 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 regulator, 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 maintaining a professional 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 to prevent them from mixing with non-reusable parts or parts from other regulators. Delicate parts, including pistons 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 Aqua Lung when servicing any Aqua Lung product. Substitution with another manufacturer's parts constitutes an after-market modification of the product, and renders the original warranty 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. 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 caused by overtightening.

## Initial Inspection Procedure

### EXTERNAL INSPECTION

1. Visually inspect the sintered filter to check for any signs that contaminants may have entered the system, such as moisture, rust, aluminum oxide, or charcoal.

**NOTE**: A green discoloration positively indicates that moisture has entered the regulator, and internal corrosion is therefore likely to be found in the first stage. A white or rust colored residue usually indicates that the regulator has been used with a corroded aluminum or steel cylinder. Advise the customer of the proper methods for maintaining the regulator, and the possible need to obtain service for their cylinder.

2. Remove the hose protectors, if present, to visually inspect the condition of the hoses along their length, as well as at their fittings.
3. Closely examine the chrome finish of the first stage to check for any flaking, chipping, or other damage to the chrome.

**CAUTION:** DO NOT clean any parts which show damage to their chrome finish inside an ultrasonic cleaner.

4. Closely examine all parts of the first stage for any other signs of external corrosion.

### IMMERSION / LEAK TEST

1. Check to ensure that the regulator is fully assembled and connected to a second stage, and that there are no open ports or hoses. Connect the first stage to a cylinder that is filled with 3,000 psi, and open the cylinder valve to pressurize the regulator.
2. If leakage cannot be heard, or if the source of leakage detected audibly is not obvious, immerse the first stage in fresh water to check further for any signs of air leakage from the following areas:
   a. Beneath the yoke retainer(9), from the inlet boss of the body(14).
   b. Ambient pressure inlet ports of the piston cap(24).
3. Immerse all hoses in fresh water to check for any signs of leakage from along their length or at fittings on both ends.
4. Note the source of any leakage found and refer to Table 1 - Troubleshooting to determine its possible cause.
5. Turn the cylinder valve shut and depress the second stage purge button to depressurize the regulator before performing the next procedure.

## INTERMEDIATE (OVER-BOTTOM) PRESSURE TEST

1. Depress the second stage purge button to determine once again that the system is not pressurized. Connect the intermediate pressure test gauge either to a quick-disconnect inflator hose, or to the female fitting of a second stage IP hose, depending on the connector of the test gauge.

**NOTE**: Whenever possible, Aqua Lung strongly recommends that a fully assembled and properly adjusted second stage be connected to the first stage before pressurizing to test intermediate pressure. This will provide a safety relief valve in the event that the intermediate pressure exceeds 155-170 psi.

**CAUTION**: If a second stage is not connected to the first stage, turn the bleed valve knob of the test gauge counterclockwise to ensure that it is open before pressurizing. Failure to relieve intermediate pressure in excess of 400 psi may result in damage or rupture of the test gauge or IP hose.

2. Slowly open the valve of the supply cylinder only as far as necessary to pressurize the first stage. While closely monitoring the IP test gauge to ensure that the intermediate pressure does not rise above 200 psi, slowly turn the knob of the bleed valve clockwise until it is completely shut.

**CAUTION**: If a second stage is not connected to the first stage and the intermediate pressure continues to rise above 200 psi, immediately reopen the bleed valve of the test gauge and shut the valve of the supply cylinder. Proceed directly to perform the Disassembly Procedures, outlined in the next section.

3. Note the intermediate (over-bottom) pressure indicated by the test gauge, and briefly open and shut the bleed valve of the test gauge to ensure that lockup is achieved without "creeping" or fluctuating back and forth.
4. If the intermediate pressure "creeps" up or otherwise fluctuates after cycling the regulator, wait for it to stabilize (if possible) before making a final note of the intermediate pressure.

**NOTE**: Correct intermediate pressure for the Calypso or Aquarius first stage is 126-146 psi, with an inlet pressure between 2,500 - 3,000 psi.

5. Turn the cylinder valve shut and depress the second stage purge button to depressurize the system before attempting to perform any disassembly.

## Disassembly Procedures

**NOTE**: Before performing any disassembly, refer to Table 4, which references all mandatory replacement parts. These parts must be replaced with new, and must never be reused - 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. Once an O-ring sealing surface has been damaged, the part must be replaced with new in order to prevent the possibility of leakage. DO NOT use a dental pick, or any other steel instrument.

**NOTE**: The Quad Spanner Wrench (P/N 1077-50) is a multi-function specialty tool designed specifically for the disassembly of the Calypso and Aquarius first stage regulators. As its name implies, it is actually four spanner wrenches in one. Refer to Fig. A to identify the individual spanners referenced throughout the Disassembly and Reassembly procedures.

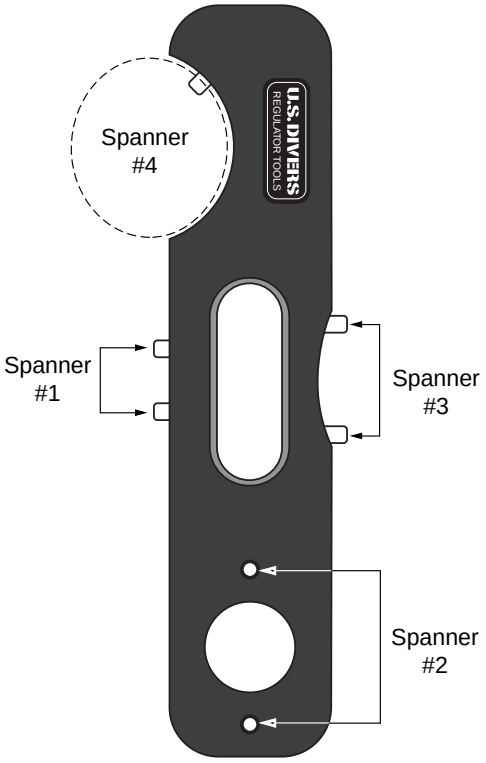



*Fig. A - Quad Spanner Wrench*

1. Before disassembling the first stage, remove the low pressure second stage hoses with a 9/16" open-end wrench, the high pressure hose with a 5/8" open-end wrench, and the low pressure inflator hose with a 9/16" or 1/2" open-end wrench. Remove all remaining port plugs(15&18) with a 4mm hex key.
2. Remove and discard the O-rings on all these items.
3. Turn the yoke screw(1) counterclockwise to loosen and remove from the yoke(2). Set the yoke screw aside.
4. Untie the dust cap(3) from the yoke. Remove and discard the dust cap O-ring(3.1).
5. Install a vise mounting tool (P/N 1003-95) or a discharged $C0_2$ cartridge (P/N 7039-09) connected to a HP port adapter (P/N 1020-85) into one of the HP ports of the first stage body(12).

**CAUTION**: DO NOT use a $C0_2$ cartridge which has not been discharged. Doing so may cause the cartridge to rupture, resulting in serious personal injury.

6. Secure the vise mounting tool inside a bench vise so that the first stage is positioned standing vertical outside the vice with the yoke facing straight up.
7. Apply a 26mm open-end wrench over the yoke retainer(7) (see Fig. 1). Using firm, steady force, turn the yoke retainer counter-clockwise to loosen and remove from the inlet boss of the first stage body. Lift the yoke retainer and yoke off the inlet boss, and set the yoke aside.

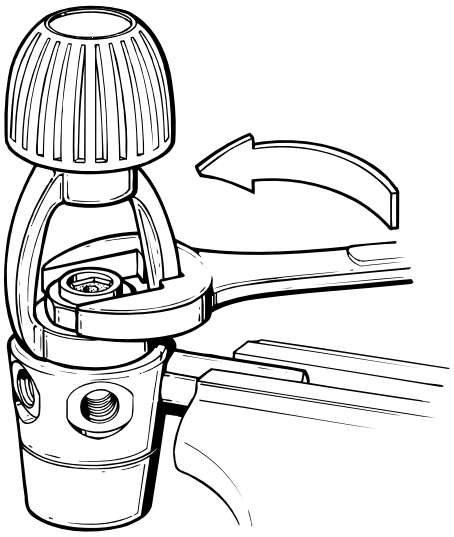


*Fig. 1 - Yoke retainer removal*

**CAUTION**: It is important that the wrench is securely seated over the entire hex portion of the yoke retainer to prevent any damage to the part. Do not use impact to loosen.

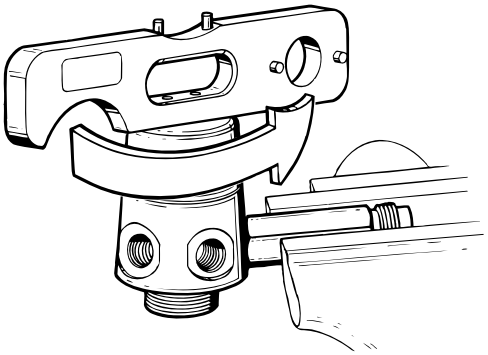


*Fig. 2a - Loosening piston cap w/ Quad Spanner Wrench*

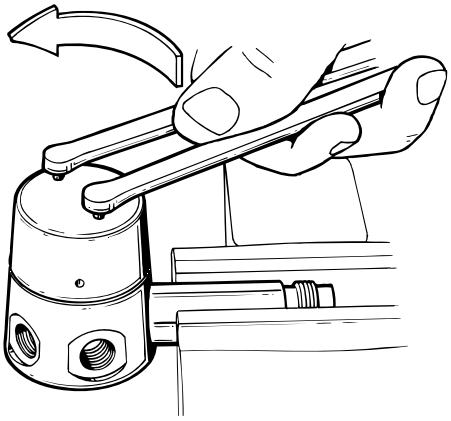


*Fig. 2b - Loosening piston cap w/ Adjustable Face Spanner*

8. While holding the yoke retainer secure, apply a pair of circlip pliers (P/N 1111-00) to the circlip(4) and squeeze the circlip until it has disengaged from the yoke retainer. Remove the circlip from the inlet boss, along with the filter(5) and recessed O-ring(6). Discard the filter and O-ring, and do not reuse.

**NOTE:** Earlier models may contain a pentagon shaped filter retaining clip. To remove this clip, apply a flat bladed jeweler's (2.0mm) screwdriver to carefully press one side of the filter retainer(6) inward and lift up to remove, using caution to avoid scratching the yoke retainer. Discard the pentagon shaped retaining clip, and do not reuse.

10. Remove and discard the yoke O-ring(11) from the inlet boss.
11. Loosen the vise and turn the first stage over so that the piston cap faces straight up, and refasten the vise securely onto the vise mounting tool. Apply the No. 3 spanner of a Quad Spanner Wrench (P/N 1077-50) or an Adjustable Face Spanner (P/N 1073-94) to loosen the piston cap(22) from the main body in a counter-clockwise direction (see Fig. 2a & 2b).

**NOTE:** Be certain both pins of the spanner wrench are well seated inside the bore holes of the piston cap. Damage to the finish will result if the wrench is allowed to slip.

12. Turn the piston cap counter-clockwise by hand until it is completely loosened from the first stage body. Lift the piston cap, with the piston inside it, straight up and off the body, and set it aside with the shaft of the piston facing up.
13. Carefully lift the valve spring(17) out of the body or off the shaft of the piston. Closely examine the spring with the use of a magnifier, checking for any signs of pitting, rusting, or other corrosion which permeates the surface of the metal. If permanent corrosion is found, discard and do not attempt to reuse.

**CAUTION:** If the initial intermediate pressure was lower than 130 psi, indicating that the valve spring has weakened, replace the spring and do not attempt to reuse.

14. While holding the piston cap secure, carefully lift out the piston by grasping the piston shaft between thumb and forefinger and pulling it straight up with slow, steady force. Do not rock back and forth to remove.
15. Remove and discard the piston head O-ring(21) and piston shaft O-ring(18).
16. Wipe off any excess silicone grease that may be present from the head of the piston with a clean towel.
17. To remove the high pressure seat(19) from the end of the piston shaft, carefully insert a Seat Extraction/ Installation Tool (P/N 1094-36) through the opening in the center of the piston head (see Fig. 3). Press the rod portion of the tool through the piston until the seat exits the end of the shaft. (Do

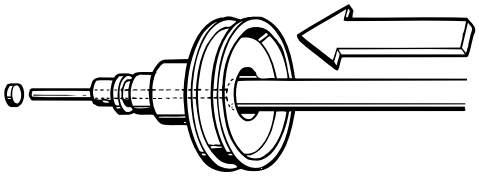


*Fig. 3 - HP seat removal*

not use impact to drive out the seat.) Discard the seat and do not attempt to reuse. Set the piston aside.

18. Closely examine the crown retainer(8) inside the inlet boss of the first stage body to determine if it is a current revision part which can be reused, or an earlier version which must be discarded and replaced with new. A current revision crown retainer (P/N 1073-09) can be identified by the hex opening in its center, and is threaded to fasten over the crown inside the inlet boss. Earlier revisions include a non-threaded cylindrical sleeve, or a locking star washer (see Fig. 4).
    a. To remove a non-threaded cylindrical sleeve, simply turn the first stage body over to allow it to fall out.
    b. To remove a locking star washer, use a jeweler's (2.0 mm) blade screwdriver to carefully bend back three of the six prongs inside the inlet boss, using caution to avoid damaging the walls of the inlet boss cavity, and remove it with small needle nose pliers.
    c. Apply a 6mm hex key to a current revision crown retainer, and turn it counter-clockwise to loosen and remove.

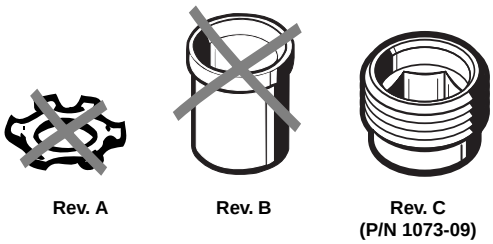



*Fig. 4 - Crown Retainer revision identification*

**CAUTION:** Do not reuse a revision A or revision B crown retainer under any circumstances. For more information about this important retrofit advisory, refer to Technical Bulletin No. 13 on page 22.

19. Stand the main body vertically on the inlet boss over a padded surface, and insert the large end of the seat extractor tool through the central opening. Gently press downward until the crown exits the body (see Fig. 4). Lift the body up and off the crown, and set aside.
20. Remove and discard the crown O-ring. Using a magnifier, closely examine the crown seating surface to check for any signs of damage or deterioration. If found, discard the crown and do not attempt to reuse.

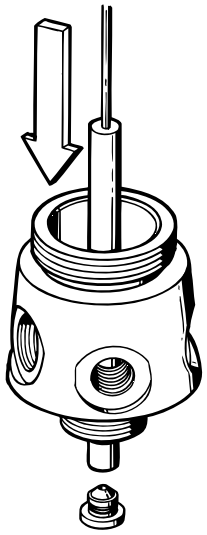


*Fig. 5 - Crown removal*

**This concludes the disassembly of the Calypso First stage. Refer directly Procedure A and Table A, titled Cleaning & Lubrication, before proceeding to the Reassembly Procedures.**

## 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 silicone grease, check to ensure it is clean, supple, and free of any blemish.

**WARNING:** Use only genuine Aqua Lung parts, subassemblies, and components whenever assembling Aqua Lung products. 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. Install the piston shaft O-ring(18) onto the shaft of the piston(20), and the piston head O-ring(21) onto the piston head.

**NOTE**: It is important to apply a sufficient amount of grease when dressing the piston head O-ring, since it is dynamic and sustains continuous friction during use.

2. Install the HP seat(19) into the end of the piston shaft, and check to ensure that it seats completely flush inside the cavity.
3. Lay the piston cap(22) flat with the open end facing up. Mate the head of the piston into the piston cap and press straight down, being careful not to unseat the O-ring.
4. Apply a light film of grease to both ends of the spring(17) and place the spring over the stem of the piston. Set the piston cap with piston and spring aside.
5. Install the crown O-ring(10) onto its grooved sealing surface on the crown(9). Place the crown down over the rod portion of the Seat Installation Tool (P/N 1094-36) with its sealing edge facing up. Insert the tool into the inlet boss of the main body(12), and press the crown firmly into place (see Fig. 6).
6. Turn the body over so that it stands vertically with the inlet boss facing up. Mate a current revision crown retainer into the inlet boss with the unthreaded, smaller diameter end facing down (see Fig. 7). Apply a calibrated torque wrench with a 6mm hex key socket to tighten the crown retainer clockwise to a torque measurement of 42 inch-lbs (±2).
7. While holding the piston cap with piston and spring securely together, carefully mate the main body down over the piston and onto the piston cap. Firmly press straight down while turning clockwise to engage the threads, and continue to tighten by hand until snug.
8. Carefully stretch the O-ring(11) over the threads of the inlet boss to install it into the groove at the base of the threads.
9. Install the O-ring(6) into the recessed groove inside the yoke retainer(7).

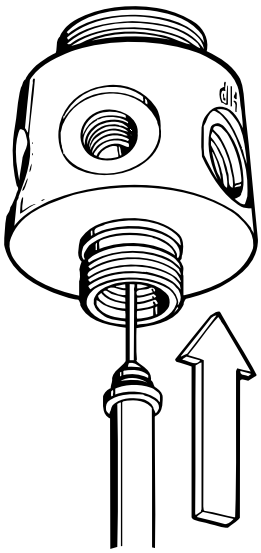


*Fig. 6 - Crown installation*

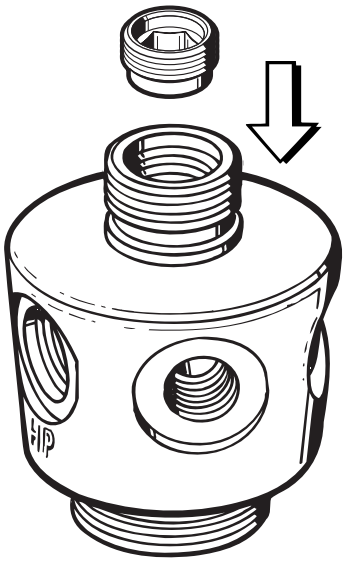


*Fig. 7 - Crown retainer installation*

10. Install a new filter(5) into the yoke retainer with the conical portion facing downward, and press it firmly into place to ensure that it seats inside the recessed O-ring. Using internal circlip pliers, install a circlip(4) to secure the filter.

**NOTE:** Install the circlip with the flat side facing up to ensure greater holding strength.

11. Mate the yoke retainer through the yoke(2) and onto the inlet boss of the main body. Tighten by hand until snug.
12. Install a vise mounting tool (P/N 1003-95) or a discharged $C0_2$ cartridge (P/N 7039-09) connected to a HP port adapter (P/N 1020-85) into one of the HP ports of the first stage body.

**CAUTION**: DO NOT use a $C0_2$ cartridge which has not been discharged. Doing so may cause the cartridge to rupture, resulting in serious personal injury.

13. Secure the vise mounting tool inside a bench vise so that the first stage is positioned standing vertical outside the vice with the piston cap facing straight up.
14. Apply the No. 3 spanner of a Quad Spanner Wrench (P/N 1077-50), or an Adjustable Face Spanner (P/N 1073-94), to tighten the piston cap clockwise until completely snug (see Fig. 8).

**CAUTION:** Be certain both pins of the spanner wrench are well seated inside the bore holes of the piston cap. Damage to the chrome finish will result if the wrench is allowed to slip.

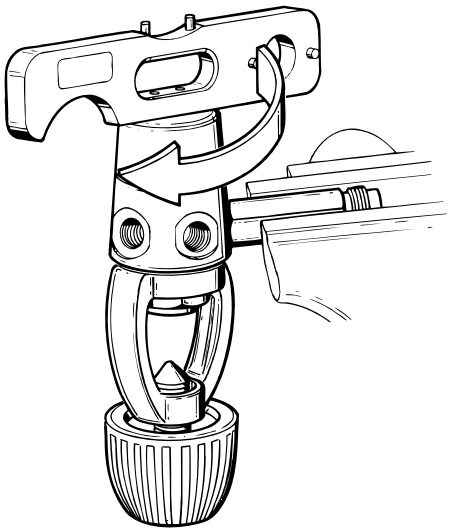


*Fig. 8 - Tightening piston cap*

15. Loosen the vise and turn the first stage over so that the yoke faces straight up, and refasten the vise securely onto the vise mounting tool. Apply a torque wrench with modified 26mm crow's foot to the yoke retainer, and tighten to a pre-set measurement of 20 (±2) foot-lbs (see Fig. 9).
16. Install the O-ring(3.1) into the dust cap(3). Wrap the nylon cord around one leg of the yoke, and pass the cap through the loop to form a loose knot. Or, fit the loop of a rubber dust cap over the threads of the yoke screw(1).
17. Lightly lubricate the threads of the yoke screw with pure silicone grease. Turn the yoke screw clockwise to install it into the yoke.
18. Install all O-rings(14&15) onto all hoses and port plugs. Install all LP and HP hoses and port plugs(13&16) into the body, tightening clockwise until snug.

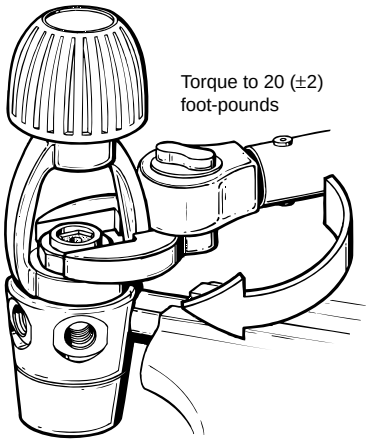



*Fig. 9 - Torquing yoke retainer*

**CAUTION:** Be certain not to install any low pressure hose into the high pressure port via an adapter. Doing so will cause the hose to rupture when pressurized, and may result in severe personal injury.

**This concludes the reassembly of the Aquarius first stage. Refer directly to the following section, titled Final Testing.**

## Final Testing Procedures

1. Connect the intermediate pressure test gauge either to a quick-disconnect inflator hose, or to the female fitting of a second stage IP hose, depending on the connector of the test gauge.

**NOTE**: Whenever possible, Aqua Lung strongly recommends that a fully assembled and properly adjusted second stage be connected to the first stage before pressurizing to test intermediate pressure. This will provide a safety relief valve in the event that the intermediate pressure exceeds 155-170 psi.

**CAUTION**: If a second stage is not connected to the first stage, turn the bleed valve knob of the test gauge counter-clockwise to ensure that it is open before pressurizing. Failure to relieve intermediate pressure in excess of 400 psi may result in damage or rupture of the test gauge or IP hose.

2. Connect the first stage to a cylinder that is filled with 300 psi and slowly open the valve of the supply cylinder only as far as necessary to pressurize the first stage. While closely monitoring the IP test gauge to ensure that the intermediate pressure does not rise above 146 psi, slowly turn the knob of the bleed valve clockwise until it is completely shut.

**CAUTION**: If a second stage is not connected to the first stage and the intermediate pressure continues to rise above 200 psi, immediately reopen the bleed valve of the test gauge and shut the valve of the supply cylinder. Refer directly to Table 1 - Troubleshooting, and remedy as needed before proceeding any further.

3. When the intermediate pressure has been determined to be no more than 146 psi, turn the cylinder valve completely shut and open the bleed valve of the test gauge or purge the second stage to depressurize the system. Loosen the yoke screw and remove the first stage from the cylinder. Connect the first stage to a cylinder that is filled with 2,500 - 3,000 psi.

**NOTE**: Correct intermediate pressure for the Calypso or Aquarius first stage is 126-146 psi, with an inlet of 3,000 psi. Due to the variance of intermediate pressure at lower inlet pressures, it is not possible to obtain a completely accurate measurement with inlet pressures less than 2,500 psi.

4. Open the cylinder valve while monitoring the IP test gauge once again to ensure that the intermediate pressure does not rise above 146 psi. If the intermediate pressure rises above 146 psi, immediately reopen the bleed valve of the test gauge and shut the valve of the supply cylinder. Refer directly to Table 1 - Troubleshooting, and remedy as needed before proceeding.
5. Repeatedly purge the second-stage or open and shut the test gauge bleed valve at least 15 times to ensure that the interme-

diate pressure locks up consistently and remains stable between 126-146 psi, with no signs of creeping or fluctuation.

6. After determining that the intermediate pressure holds stable between 126-146 psi, refer to the Final Adjustment & Testing procedures outlined to perform the final tuning of the second stage while connected to the newly serviced first stage.
7. External Leak Test - After reassembly first stage and final adjustment of the second stage has been completed, submerge the entire regulator in a test tank of clean water while pressurized with 2,500-3000 psi. 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 (30 psi) air. Disassemble and remedy the problem, referring to Table 1 - Troubleshooting.

8. Subjective Breathing Test - 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. Also, depress the purge button fully to ensure that an adequate volume of air needed to clear the second stage flows through the mouthpiece.
9. When the second stage has been adjusted and tested according to the prescribed procedures, turn the supply cylinder valve completely shut, and purge the second stage or open the test gauge bleed valve to depressurize the system. Loosen the yoke screw to remove the first stage from the cylinder, and seal the dust cap over the inlet fitting. If necessary, dry the regulator completely with a clean towel.

***This concludes annual service procedures for the Calypso and Aquarius First Stage regulators.***

# Table 1
# Troubleshooting Guide
# Calypso First Stage

| SYMPTOM | POSSIBLE CAUSE | TREATMENT |
|---|---|---|
| **Restricted airflow/ high inhalation resistance through entire system.** | 1. Cylinder valve not completely opened.<br>2. Cylinder valve requires service.<br>3. Conical filter(5) contaminated.<br>4. Insufficient intermediate pressure. | 1. Open valve, check fill pressure.<br>2. Connect to a different cylinder.<br>3. Replace filter w/ new.<br>4. See below. |
| **Insufficient intermediate (over-bottom) pressure.** | 1. Low inlet pressure.<br>2. Piston cap (22) loose.<br>3. Main spring(17) weakened. | 1. Refill test cylinder.<br>2. Tighten piston cap until flush with body.<br>3. Replace main spring. |
| **High intermediate pressure (leakage or freeflow through second stage).** | 1. HP seat(19) damaged or worn.<br>2. Dynamic O-rings(18&21) damaged or worn.<br>3. Crown O-ring(10) damaged.<br>4. Crown(9) sealing surface damaged.<br>5. Body(12) damaged internally. | 1. Replace HP seat.<br>2. Replace O-rings.<br>3. Replace O-ring.<br>4. Replace crown.<br>5. Replace body. |
| **Leakage of air from ambient ports of piston cap.** | 1. Piston shaft O-ring(18) damaged or worn.<br>2. Piston head O-ring(21) damaged or worn. | 1. Replace O-ring.<br>2. Replace O-ring. |
| **Leakage of air beneath yoke.** | 1. Inlet boss O-ring(11) damaged. | 1. Replace O-ring. |

**NOTE:** This is a partial list of possible problems and recommended treatments. For more information, contact Aqua Lung's Technical Services 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
# Recommended Tool List
# Calypso First Stage

| PART NO. | DESCRIPTION | APPLICATION |
|---|---|---|
| 1116-10 | I.P. test gauge | Intermediate pressure testing |
| N/A | 0-120 inch-lbs torque wrench | Small fittings |
| N/A | 10-50 foot-lbs torque wrench | Large fittings |
| 9440-22 | O-ring tools | O-ring removal & installation |
| N/A | Bench vise | First Stage disassembly/reassembly |
| 1003-95 | Vise mounting tool | First stage disassembly/reassembly |
| 7039-09 w/ 1020-85 | Empty $C0_2$ cartridge w/ adapter | (Can be used instead of vise mounting tool) |
| N/A | Magnifier w/ illumination | Sealing surface inspection |
| N/A | Ultrasonic cleaner | Brass & stainless steel parts cleaning |
| N/A | 4mm or 5⁄32" hex key | Port plug removal & installation |
| N/A | 9⁄16" open-end wrench/ crow-foot | Low pressure hose removal & installation |
| N/A | 5⁄8" open-end wrench/ crow-foot | High pressure hose removal & installation |
| N/A | 2.0mm (jeweler's) screwdriver | Filter retainer & crown retainer removal |
| N/A | 26mm open-end wrench/ crow-foot | Inlet fitting removal |
| 1077-50 | Quad Spanner Wrench | First stage disassembly & reassembly |
| 1073-94 | Adjustable Face Spanner | Swivel retainer removal (alternative method) |
| 1094-36 | Seat extraction/installation tool | HP seat & crown removal, crown installation |
| N/A | 6mm hex key & socket | Crown retainer installation |

# Table 3
# Standard Parts Replacement Schedule
# Calypso First Stage

| PART NUMBER | DESCRIPTION | KEY NUMBER | QTY |
|---|---|---|---|
| 8201-20 | O-ring | 5 | 1 |
| 1068-29 | Conical Filter | 7 | 1 |
| 8200-14 | O-ring | 8 | 1 |
| 8200-07 | O-ring | 12 & 20 | 2 |
| 8200-08 | O-ring | 13 | 1 |
| 8200-11 | O-ring | 16 | 4 |
| 9570-04 | O-ring | 17 | 1 |
| 1067-26 | HP Seat | 21 | 1 |
| 1067-37 | O-ring | 23 | 1 |

# Table 4
# Torque Specifications
# Calypso First Stage

| PART NUMBER | DESCRIPTION / KEY NUMBER | TORQUE |
|---|---|---|
| 1067-36 | Yoke Retainer / 9 | 20 (±2) foot-lbs |
| 1043-04 | LP Hose or Port Plug / 15 | 40 (±2) inch-lbs |
| 1020-03 | HP Hose or Port Plug / 18 | 40 (±2) inch-lbs |
| 1073-09 | Crown Retainer | 42 (±2) inch-lbs |

# Table 5
# Test Bench Specifications – Calypso Regulator (First & Second Stage)

| TEST | CONDITION | ACCEPTABLE RANGE |
|---|---|---|
| Leak test | Inlet 2,500-3,000 psi | None |
| Intermediate pressure | Inlet 2,500-3,000 psi | 126-146 psi |
| Intermediate pressure creep | Inlet 2,500-3,000 psi | 5 psi max between 5 to 15 seconds after cycling regulator (purge) |
| Opening effort | Inlet 2,500-3,000 psi, intermediate pressure 126-146 psi | +.08 to +2.0 inch $H_20$ |
| Flow effort | Intermediate pressure 126-146 psi at 10 SCFM | +6 inches $H_20$ (maximum) |
| Purge flow | Intermediate pressure 126-146 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® MCG-111 (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.

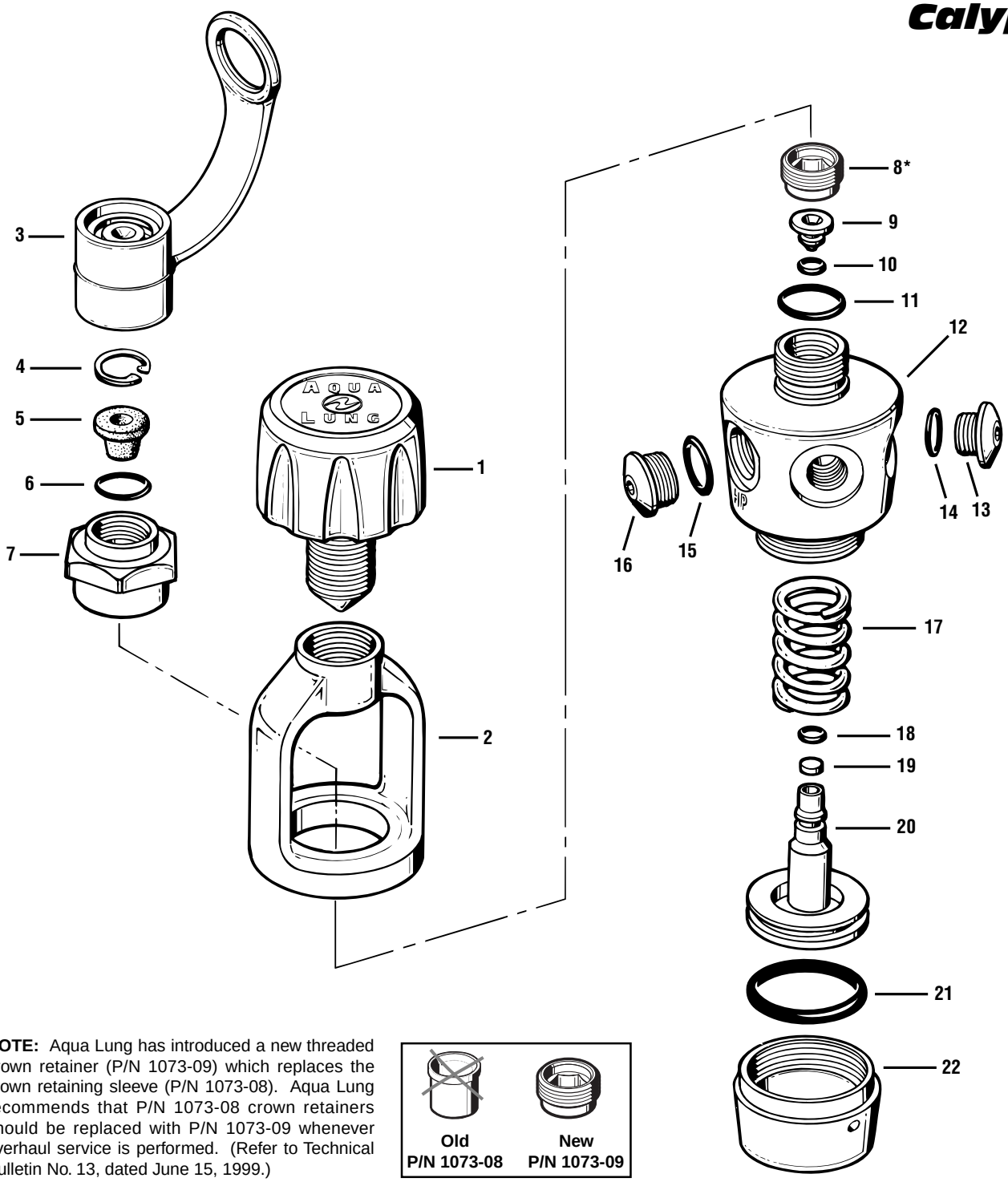
 

# Table A
# Recommended Lubricants & Cleaners
# (All Aqua Lung Regulators)

| LUBRICANT / CLEANER | APPLICATION | SOURCE |
|---|---|---|
| Christo-Lube® MCG-111 | All O-rings seals; cylinder valve threads (preferred for high pressure DIN systems) | Lubrication Technologies<br>310 Morton Street<br>Jackson, OH 45640<br>(614) 286-2644 |
| Dow Corning® 111 (pure silicone grease) | All O-ring seals | Dow Corning Corp.<br>P.O. Box 1767-T<br>Midland, MI 48640<br>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.<br>P.O. Box 996<br>Bellingham, WA 98227<br>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 | M.A.S. cylinder adapter - female threads<br>Micra ADJ adjustment screw | Permatex Industrial Corp.<br>705 N. Mountain Rd.<br>Newington, CT 06111<br>(860) 520-5000 |
| ChromeSafe™ (ultrasonic cleaning solution) | Degreaser and acid bath for reusable stainless steel and brass parts. | Aqua Lung P/N 0201-05<br>(1 quart) |
| Oakite #31 | Acid bath for reusable stainless steel and brass parts. | Oakite Products, Inc.<br>50 Valley Road<br>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<br>400 E. 345th St.<br>Willoughby, OH 44094<br>440-951-7100 |

## Calypso




*** NOTE:** Aqua Lung has introduced a new threaded crown retainer (P/N 1073-09) which replaces the crown retaining sleeve (P/N 1073-08). Aqua Lung recommends that P/N 1073-08 crown retainers should be replaced with P/N 1073-09 whenever overhaul service is performed. (Refer to Technical Bulletin No. 13, dated June 15, 1999.)



**Old P/N 1073-08** **New P/N 1073-09**

| Key # | Part # | Description |
|---|---|---|
| ----- | 1051-11 | First Stage, Calypso, Yoke |
| ----- | 9000-02 | Overhaul Parts Kit |
| 1 ----- | 1075-07 | Yoke Screw |
| 2 ----- | 1068-43 | Yoke |
| 3 ----- | 1051-62 | Dust Cap |
| 4 ----- | 8630-51 | Circlip |
| ***5 -----*** | ***1068-29*** | ***Filter*** |
| ***6 -----*** | ***8200-14*** | ***O-ring*** |
| 7 ----- | 1067-36 | Yoke Retainer |
| 8 ----- | 1073-09***** | Crown Retainer |
| 9 ----- | 1067-67 | Crown |
| ***10 ----*** | ***8200-07*** | ***O-ring*** |
| ***11 ----*** | ***8200-88*** | ***O-ring*** |

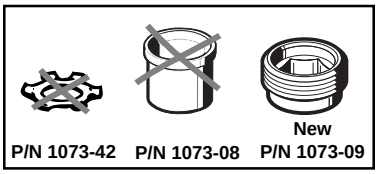
| Key # | Part # | Description |
|---|---|---|
| 12 ---- | 1051-01 | Body |
| 13 ---- | 1031-33 | LP Port Plug |
| ***14 ----*** | ***8200-11*** | ***O-ring*** |
| ***15 ----*** | ***9570-04*** | ***O-ring*** |
| 16 ---- | 1031-37 | HP Port Plug |
| 17 ---- | 1067-71 | Spring |
| ***18 ----*** | ***8200-07*** | ***O-ring*** |
| ***19 ----*** | ***1067-26*** | ***HP Seat*** |
| 20 ---- | 1067-69 | Piston |
| ***21 ----*** | ***1067-37*** | ***O-ring*** |
| 22 ---- | 1051-02 | Piston Cap |

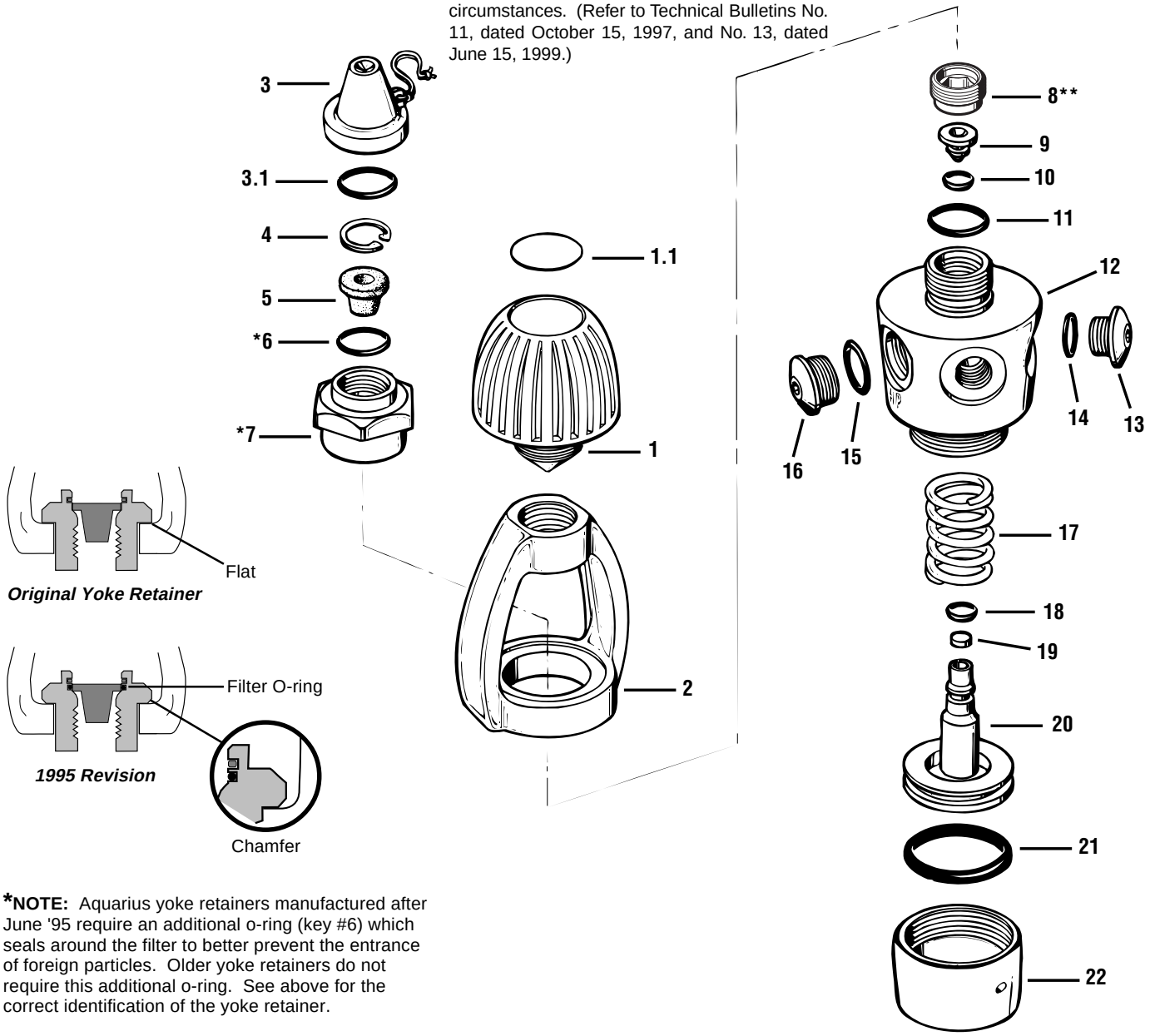
Part numbers in ***BOLD ITALICS*** indicate standard overhaul replacement part.

# *Aquarius (1994-1997 Model)*

****NOTE:** Aqua Lung has introduced a new threaded crown retainer (P/N 1073-09) which replaces previous versions, including the crown retaining sleeve (P/N 1073-08) and the original lock washer (P/N 1073-42). Aqua Lung recommends that P/N 1073-09 should be installed whenever overhaul service is performed. Do not attempt to reuse the original lock washer (P/N 1073-42) under any circumstances. (Refer to Technical Bulletins No. 11, dated October 15, 1997, and No. 13, dated June 15, 1999.)




***NOTE:** Aquarius yoke retainers manufactured after June '95 require an additional o-ring (key #6) which seals around the filter to better prevent the entrance of foreign particles. Older yoke retainers do not require this additional o-ring. See above for the correct identification of the yoke retainer.

| Key # | Part # | Description |
|---|---|---|
| ----- | 9000-02 | Overhaul Parts Kit |
| 1.1 | --- 1003-88 | Decal |
| 1 | ----- 1075-06 | Yoke Screw |
| 2 | ----- 1068-42 | Yoke |
| 3 | ----- 1010-12 | Dust Cap |
| ***3.1*** | ***--- 8201-20*** | ***O-ring*** |
| 4 | ----- 8630-51 | Circlip |
| ***5*** | ***----- 1068-29*** | ***Conical Filter*** |
| ***6*** | ***----- 8200-14**** | ***O-ring*** |
| 7 | ----- 1067-36 | Yoke Retainer w/ Chamfer* |
| 8 | ----- 1073-09** | Crown Retainer |
| 9 | ----- 1067-67 | Crown |
| ***10*** | ***---- 8200-07*** | ***O-ring*** |
| ***11*** | ***---- 8200-88*** | ***O-ring*** |

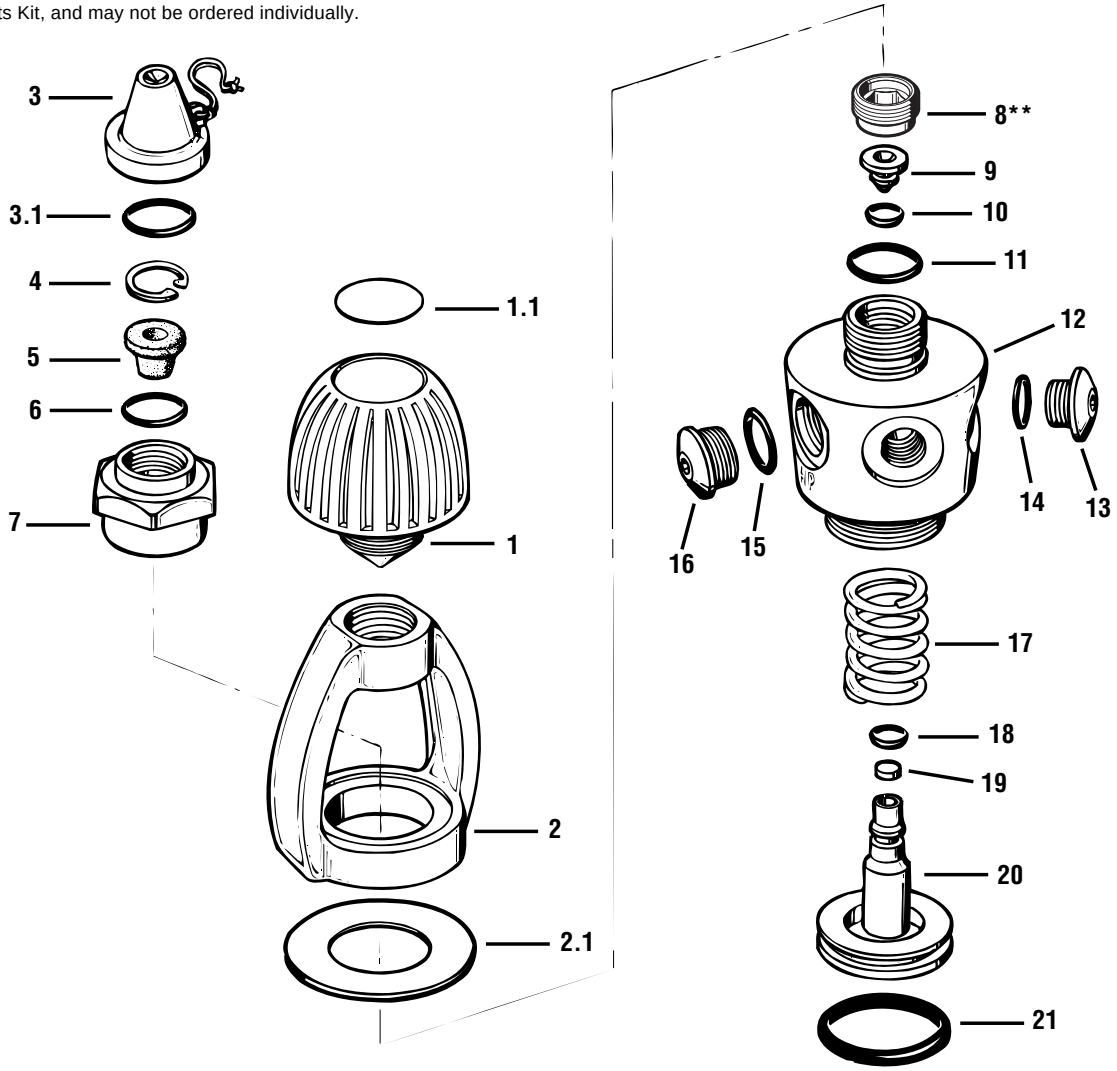
| Key # | Part # | Description |
|---|---|---|
| 12 | ---- 1073-01 | Body |
| 13 | ---- 1043-04 | LP Port Plug |
| ***14*** | ***---- 8200-11*** | ***O-ring*** |
| ***15*** | ***---- 9570-04*** | ***O-ring*** |
| 16 | ---- 1020-03 | HP Port Plug |
| 17 | ---- 1067-71 | Spring |
| ***18*** | ***---- 8200-07*** | ***O-ring*** |
| ***19*** | ***---- 1067-26*** | ***HP Seat*** |
| 20 | ---- 1067-69 | Piston |
| ***21*** | ***---- 1067-37*** | ***O-ring*** |
| 22 | ---- 1073-13 | Piston Cap |

Part numbers in ***BOLD ITALICS*** indicate standard overhaul replacement part.

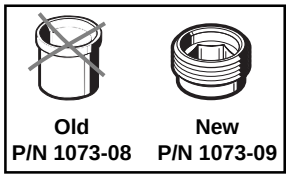
 

# Aquarius & Calypso (EAN Configurations)

***NOTE:** Parts purchased individually for use in any Aqua Lung EAN product must be cleaned and inspected according to the procedures outlined in the Enriched Air Cleaning & Service Manual, Doc. #9002-08. O-rings are included with the Overhaul Parts Kit, and may not be ordered individually.




****NOTE:** Aqua Lung has introduced a new threaded crown retainer (P/N 1073-09) which replaces the sleeve version crown retainer (P/N 1073-08). Aqua Lung recommends that P/N 1073-08 crown retainers should be replaced with P/N 1073-09 whenever overhaul service is performed. (Refer to Technical Bulletin No. 13, dated June 15, 1999)




| Key # | Part # | Description |
|---|---|---|
| ----- | 1051-71 | First Stage, Calypso EAN, Yoke |
| ----- | 9002-04 | Overhaul Parts Kit |
| 1.1 | --- 1063-94 | Decal, EAN |
| 1 | ----- 1075-06 | Yoke Screw, Aquarius |
| ----- | 1075-07 | Yoke Screw, Calypso |
| 2 | ----- 1068-42 | Yoke, Aquarius |
| ----- | 1068-43 | Yoke, Calypso |
| 2.1 | --- 1073-24 | Color Ring, EAN |
| 3 | ----- 1073-28 | Dust Cap, Green |
| ***3.1*** | ***--- n/a**** | ***O-ring (EAN)*** |
| 4 | ----- 8630-51 | Circlip |
| ***5*** | ***----- 1068-29*** | ***Conical Filter*** |
| ***6*** | ***----- n/a**** | ***O-ring (EAN)*** |
| 7 | ----- 1067-36 | Yoke Retainer |
| 8 | ----- 1073-09** | Crown Retainer |
| 9 | ----- 1067-67 | Crown |
| ***10*** | ***---- n/a**** | ***O-ring (EAN)*** |
| ***11*** | ***---- n/a**** | ***O-ring (EAN)*** |

| Key # | Part # | Description |
|---|---|---|
| 12 | ---- 1073-01 | Body, Aquarius |
| ----- | 1051-01 | Body, Calypso |
| 13 | ---- 1043-04 | LP Port Plug, Aquarius |
| ----- | 1031-33 | LP Port Plug, Calypso |
| ***14*** | ***---- n/a**** | ***O-ring (EAN)*** |
| ***15*** | ***---- n/a**** | ***O-ring (EAN)*** |
| 16 | ---- 1020-03 | HP Port Plug, Aquarius |
| ----- | 1031-37 | HP Port Plug, Calypso |
| 17 | ---- 1067-71 | Spring |
| ***18*** | ***---- n/a**** | ***O-ring (EAN)*** |
| ***19*** | ***---- 1067-26*** | ***HP Seat*** |
| 20 | ---- 1067-69 | Piston |
| ***21*** | ***---- n/a**** | ***O-ring (EAN)*** |
| 22 | ---- 1073-13 | Piston Cap, Aquarius |
| ----- | 1051-02 | Piston Cap, Calypso |

Part numbers in ***BOLD ITALICS*** indicate standard overhaul replacement part.

TECHNICAL BULLETIN

AQUA LUNG®

June 15, 1999
No. 13

# Calypso & Aquarius First Stage Retrofit Service Advisory

**ATTENTION: All Authorized Aqua Lung Dealers**

Effective immediately, Aqua Lung has introduced a new threaded crown retainer (P/N 1073-09) for all Calypso and Aquarius model first stages, which replaces the current cylindrical sleeve (P/N 1073-08) and the original star washer (P/N 1073-42) used in earlier models.

The cylindrical sleeve was designed to provide more consistent retention of the crown than was provided by the original star washer. It was also completely reusable, easier to remove, and could be reinstalled by simply dropping it into place above the crown, and then installing the yoke retainer and yoke above it. (See Technical Bulletin No. 11, dated October 15, 1997.)

The use of this prior version, however, relied on the correct installation of the yoke retainer with its required torque value (20 foot-lbs ±2 ). Without sufficient torque, it is possible for the yoke retainer to become loosened from the body, which can eventually result in leakage if the sleeve and crown are not held securely in place beneath it.

As an added safeguard against this possibility of improper assembly, the new threaded crown retainer fastens directly into the body and is held in place by its own torque value, independent of the yoke retainer.

Aqua Lung therefore recommends that the threaded crown retainer (P/N 1073-09) should be installed as a standard retrofit procedure during scheduled service, or whenever overhaul service is performed. The installation procedure is very similar to that of the sleeve:

1. Install the crown according to the instructions provided in the Aquarius Service & Repair Manual (Doc. No. 7802-32).
2. Mate the threaded crown retainer into the bore of the inlet boss, with the unthreaded end facing inward towards the crown (see Fig. A).
3. Apply a 6mm hex key to turn the retainer clockwise until lightly snug, and then apply a calibrated torque wrench with hex key socket to tighten to 42 inch-lbs (±2).
4. Install the yoke and yoke retainer according to the instructions provided in the Aquarius Service & Repair Manual.

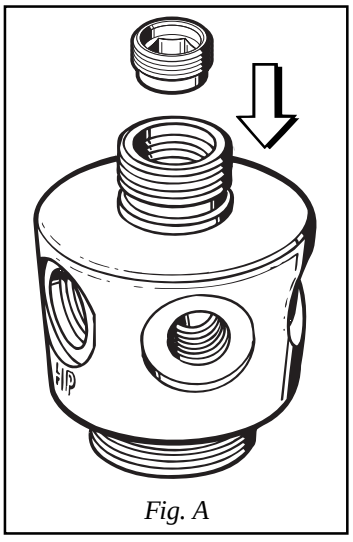
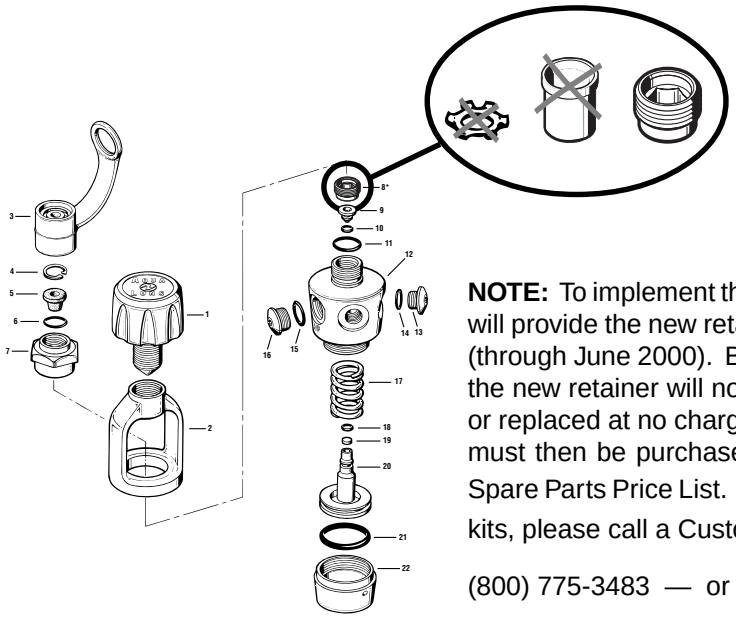


*Fig. A*



**NOTE:** To implement this revision in the field, Aqua Lung America, Inc. will provide the new retainer inside annual service kits for one full year (through June 2000). Beyond this one year phase-in period, however, the new retainer will no longer be provided with the overhaul parts kit or replaced at no charge under the Passport Service Agreement, and must then be purchased separately at the current price listed in the Spare Parts Price List. To order individual retainers and overhaul parts kits, please call a Customer Service Representative at:

(800) 775-3483 — or fax order to: (800) 882-3483