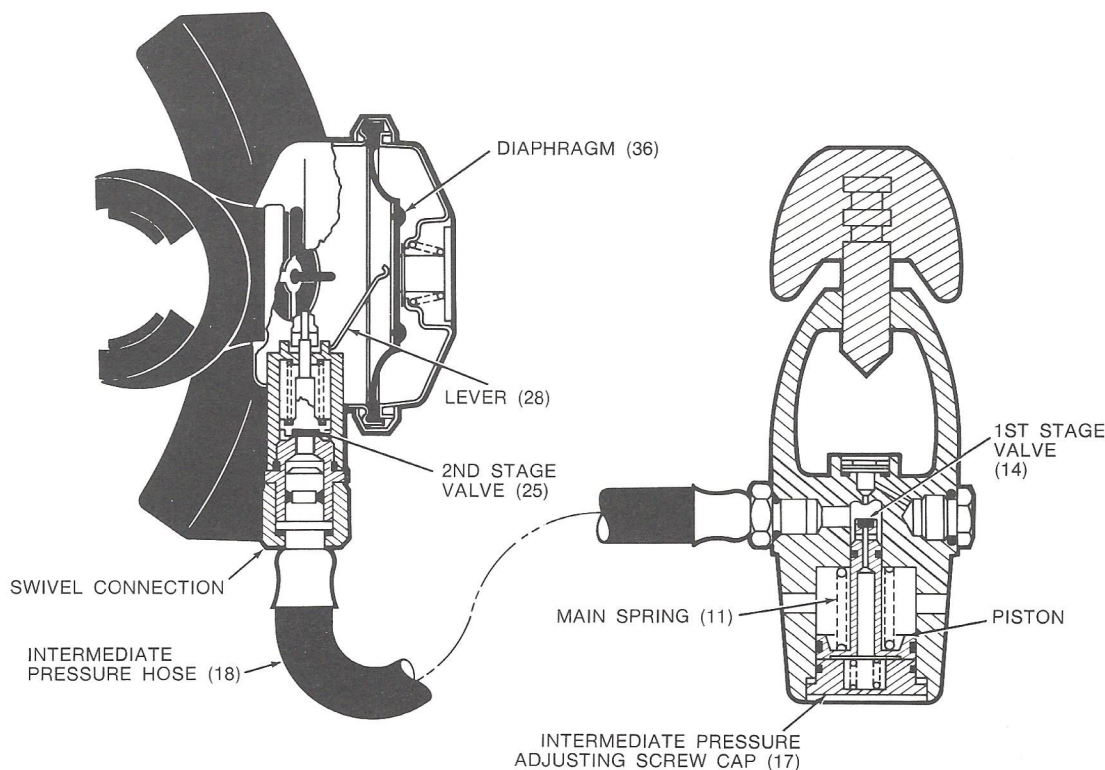




U.S. DIVERS CO.

1086-00 Aquarius

Unbalanced Single Hose Regulator, 3500 PSIG Maximum Service



OPERATION

The Aquarius Regulator reduces high pressure cylinder air to ambient pressure with two separate regulators that are joined together by an intermediate pressure hose. The 1st stage regulator uses a piston operated high pressure valve to reduce cylinder pressure to 130 psig intermediate pressure. The 2nd stage regulator reduces the intermediate pressure to ambient breathing pressure with a downstream, diaphragm and lever operated demand valve.

When the diver inhales, a negative pressure is created inside the 2nd stage regulator, drawing diaphragm (36) inward, opening demand valve (25).

This results in a drop in the intermediate pressure acting on the piston end of the 1st stage valve (14), allowing the main spring (11) to push the valve open.

At the end of the inhalation cycle, the pressure on both sides of diaphragm (36) equalizes, and the diaphragm moves outward allowing the 2nd stage valve (25) to close. Intermediate pressure acting on the piston end of the 1st stage valve then increases to 130 psig, overriding the force of main spring (11), and forcing the 1st stage valve (14) to close.

The 2nd stage valve (25) is "fail-safe," meaning that due to its downstream design, it will relieve over-pressure in the intermediate pressure hose (18) if

leakage of the 1st stage valve (14) should occur. This is a safety feature.

The Aquarius is "depth compensating" because both diaphragm (36) and piston (14) are always in contact with surrounding water pressure. The diaphragm and piston sense any increase or decrease in ambient water pressure, causing both 1st and 2nd stage valves (14) and (25) to adjust accordingly. This insures that air inhaled from the regulator always equals ambient water pressure regardless of changes in depth.

CLEANING

The life of the regulator may be prolonged by proper cleaning after each dive. With cap (2) in place, rinse off entire regulator with warm, fresh water, allowing water to flow inside the mouthpiece (44) and out the exhaust tube (41). Do not push purge button (30) while rinsing, or water will enter the 2nd stage valve (25) and flow into the 1st stage regulator. Also, flow water inside the box top (32) through its side holes to flush out any entrapped sand or dirt. After washing, polish the chrome with a rough towel.

STORAGE

For prolonged storage of the regulator, an airtight plastic bag is recommended to maintain the life of

the rubber parts. The regulator and hose must be thoroughly dried before storage. Place it in the bag, suck all the air from the bag, and twist on a lock wire to seal it shut. Store it in a cool, dry place.

REGULATOR DISASSEMBLY

1. Unscrew hose (18) from 1st stage regulator (1) using a 9/16 inch wrench, and remove O-ring (19) from end of hose.
2. Unscrew opposite end of hose (18) from 2nd stage regulator (22) with an 11/16 inch wrench, and remove O-ring (21) from end of hose.
3. Unscrew and remove cylinder pressure gauge or any other accessories that may be attached to the 1st stage body (17).

1st STAGE DISASSEMBLY

4. Unscrew and remove knob (7) from body (10).
5. Untie cap (2) from body (10), and remove O-ring (2A).
6. Using a sharp pointed tool, remove retainer ring (3) by prying upward on its edges.
7. Turn body (10) upside down and gently tap it against a table top until filter (4) falls out.
8. Remove O-ring (5) with a pointed tool.
9. Using a 1/2 inch wrench, unscrew and remove plugs (8) and O-rings (9).
10. Using a large screwdriver to remove screw cap (17) from body (10), and lift out spring (16).
11. Insert a No. 6 thread tap, or the end of a small round file into center hole of piston (14). Pry sideways and pull outward to remove piston (14), then remove spring (11).
12. Remove O-rings (13) and (15) from piston (14).
13. Remove O-ring (15) from screw cap (17).
14. Insert a sharp pointed tool at the edge of seat (12) and pry upward for removal of seat from piston (14).

2nd STAGE DISASSEMBLY

15. Unscrew (34) and remove rim (33).
16. Lift off box top (32) and remove diaphragm (36).
17. Using circlip pliers (tool 1111-00), remove retainer ring (35), purge button (30), and spring (31) from box top (32).
18. Unscrew and remove inlet fitting (23) and O-ring (24) using a 1/4 inch wrench.
19. Hold special wrench (tool 1100-05) over seat end of disc & retainer (25) and screw nut (38) off opposite end.
20. Remove spacer (37), lever (28), washer (27), spring (26), and disc & retainer (25) from box bottom (39).
21. Snip plastic clamp (43) with wire cutters and pull off mouthpiece (44) and strap (42), if used.
22. To remove exhaust tube (41) from box bottom (39), place regulator in oven at approximately 200°F, or apply hot air or water to area of tube near box bottom. Then, pull one end of tube outward until it peels off. To remove exhaust tube without heat, insert narrow screwdriver under tube near mouthpiece (44) and pry upward.
23. Pull exhaust valve (40) out of box bottom (39).

INSPECTION OF REGULATOR PARTS

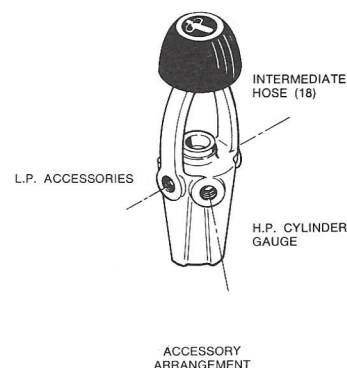
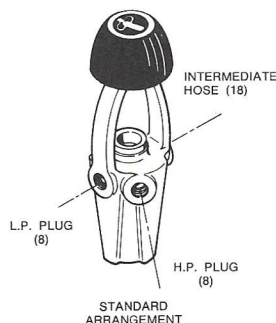
1. Check all O-rings, gaskets, and rubber parts for nicks, cracks, wear, deterioration, etc., and replace if necessary.
2. Check filter (4) for foreign matter and replace if necessary.
3. Check seat surface of 2nd stage valve (25). Note any nicks, wear, lodged foreign particles, or deep embedding on seat face and replace if necessary.
4. Check 1st stage seat in body (10) and 2nd stage seat on inlet fitting (23) for wear, nicks, or dents and reface or replace if necessary.

CLEANING REGULATOR PARTS

1. Clean all metal parts except nut (38) in 15 - 20 percent nitric acid solution and rinse thoroughly in running, fresh water.
2. Extra thick verdigris build-up on parts may be removed using a soft wire buffing wheel or wire brush.
3. Thoroughly wash all rubber and plastic parts in warm, soapy water and rinse in fresh water.

1st STAGE ASSEMBLY

1. Insert a new seat (12) into piston (14), pressing it fully into place.
2. Install O-rings (13) and (15) onto piston (14).
3. Install O-ring (15) onto screw cap (17).
4. Place spring (11) onto piston (14) and insert piston into body (10), small end first.
5. Hold body (10) with yoke pointing upward, and install screw cap (17) with spring (16) inside, up into body (10) until it is recessed inside the body approximately 1/16 inch.
6. Insert O-ring (5), filter (4), and retainer ring (3) into body (10). Lock retainer ring (3) into place by pushing downward on its six tabs with a blunt tool.
7. Screw knob (7) into body (10).
8. Install O-rings (19) and (21) onto hose (20).
9. Screw hose (18), plugs (8) with O-rings (9), and cylinder pressure gauge or any accessories used, into body (10) as shown below.



10. Install O-ring (2A) into cap (2) and tie cap onto yoke of body (10).

1st STAGE ADJUSTMENT

11. Attach intermediate pressure test gauge (tool 1116-00) to end of hose (18) using threaded adapter (tool 1100-01).
12. Attach regulator (1) to 2500 ± 50 psig air supply.
13. Open bleeder screw on test gauge.
14. Turn on air supply, and after flow begins, slowly close bleeder screw. The test gauge needle will indicate the intermediate pressure. The recommended intermediate pressure setting is 130 ± 5 psig.
15. If further intermediate pressure adjustment is required, turn screw cap (17) using a screwdriver, either "out" to increase pressure, or "in" to decrease pressure. Be sure to open test gauge bleeder valve each time before turning screw cap (17). If test gauge needle will not hold at one pressure setting, leakage exists in either the 1st stage regulator or intermediate hose assembly. In either case, see "Troubleshooting" section on this regulator for remedy.
16. After proper setting is made, bleed air and recheck gauge pressure several times to check stability of setting. If correct pressure holds for one minute, adjustment is complete; turn off high pressure air supply. Unscrew test gauge and adapter from end of intermediate hose. Leave 1st stage regulator mounted to high pressure supply for later adjusting of 2nd stage regulator.

2nd STAGE REASSEMBLY

17. Drop spring (26) and disc & retainer (25) into place in box bottom (39).
18. Hold disc & retainer (25) with special wrench (tool 1100-05) and place washer (27), spacer (37), and nut (38) on threaded end. Turn on nut (38) with several turns.
19. Push inward on wrench; then insert lever (28) into its groove between spacer (37) and washer (27).
20. Hold nut (38) with $\frac{1}{4}$ inch wrench, and turn disc & retainer (25) with special wrench (tool 1100-05) until top of nut is approximately one thread below slot in end of stem.
21. Screw inlet fitting (23), with O-ring (24), into box bottom (39).
22. Insert exhaust valve (40) into box bottom (39)

and pull on end of stem until barb pulls through hole into box bottom.

23. Install spring (31), purge button (30), and retainer ring (35) into box top (32).
24. Reheat exhaust tube (41), and stretch it over flange of box bottom (39). Make sure tab on exhaust tube aligns with notch in flange. Cool in water. (Refer to disassembly step No. 22.)
25. Install neck strap (42), if used.
26. Push mouthpiece (44) onto box bottom (39) and fasten in place with clamp (43), using pliers to tighten and wire cutters to snip off extra length. Position clamp so its lock is on side of mouthpiece. The mouthpiece can be moved to its "in" or "out" position after clamping by forcing it to slide inward or outward on the metal tube.

2nd STAGE ADJUSTMENT

27. Connect intermediate hose (18) to inlet fitting (23) and turn on high pressure air supply to 1st stage regulator. If sudden leakage through 2nd stage regulator occur, turn off air supply. Hold disc & retainer stem (25) with small, bent-shank screwdriver, and loosen nut (38) until air supply can be turned on without a leak.
28. With air supply turned on and intermediate pressure set at 130 psig, hold disc & retainer (25) with screwdriver and adjust nut (38) so top of lever (28) is even with top surface of box bottom (39).
29. Place diaphragm (36) into box bottom (39) so both rubber tabs of diaphragm straddle lever (28) and will not interfere with its action.
30. Place box top (32) on top of diaphragm (36).
31. Install clamp rim (33) with its opening facing inlet fitting (23), so screw (34) will point downward.
32. Tighten clamp screw (34) in place.
33. Push in on purge button (30) and release. If free flow, or very little flow occurs, see "Troubleshooting" section on this regulator for remedy.
34. Test breathe the regulator. If free flow, or hard breathing occurs, see "Troubleshooting" section for remedy.
35. Upon completion of adjustment, turn off air supply, depress purge button (30), remove 1st stage (1) from air source, and clamp cap (2) in place with knob (7).

TROUBLESHOOTING

Problem	Probable Cause	Remedy
Free Flow (Won't shut off)	<ul style="list-style-type: none"> a. Purge button (30) jammed open b. Lever (28) set too high c. Lever (28) bent d. 1st stage failure 	<ul style="list-style-type: none"> a. Remove and clean b. Turn nut (38) outward c. Replace d. Overhaul regulator
Weak Purge Flow	<ul style="list-style-type: none"> a. Lever (28) set too low b. Lever (28) bent 	<ul style="list-style-type: none"> a. Turn nut (38) inward b. Replace
Hard to breathe	<ul style="list-style-type: none"> a. Lever (28) set too low b. Intermediate pressure set too low c. Filter (4) clogged 	<ul style="list-style-type: none"> a. Turn nut (38) inward b. Turn screw (17) outward c. Clean or replace
Hissing Sound from 2nd Stage	<ul style="list-style-type: none"> a. Lever (28) set too high b. Intermediate pressure set too high c. Disc & retainer (25) dirty, damaged, or worn d. Inlet fitting (23) dirty, damaged, or worn e. H.P. leak 	<ul style="list-style-type: none"> a. Turn nut (38) outward b. Turn screw (17) inward c. Clean or replace d. Reface or replace e. See "H.P. Leak from 1st Stage" (below)
H.P. Leak from 1st Stage	<ul style="list-style-type: none"> a. Plastic seat (12) in piston (14) dirty, damaged or worn b. H.P. seat in body (10) dirty, damaged, worn, or refaced improperly; out-of-square with axis 	<ul style="list-style-type: none"> a. Clean or replace b. Clean, reface, or replace body (10)
Air Leakage	<p>(Immerse pressurized regulator in water to locate source of leak)</p> <ul style="list-style-type: none"> a. Diaphragm (36) damaged or improperly sealed between box top (32) and box bottom (39) b. Loose clamp rim (33) c. Loose inlet fitting (23) d. O-ring (24) dirty, damaged or worn e. O-rings (13) or (15) dirty, damaged, or worn f. Plugs (8) loose g. O-rings (9) dirty or damaged h. Hose (18) connection loose i. Hose O-rings (19) & (21) dirty, damaged or worn j. Hose (20) cracked or worn out 	<ul style="list-style-type: none"> a. Remove silicone lube from sealing surfaces to prevent slipping out; replace damaged diaphragm b. Tighten screw (34) c. Tighten d. Clean or replace e. Clean or replace f. Tighten g. Clean or replace h. Tighten i. Clean or replace j. Replace
Water Leakage	<ul style="list-style-type: none"> a. Exhaust valve (40) dirty, damaged or worn out b. Check a thru f under "Air Leakage" (above) 	<ul style="list-style-type: none"> a. Clean or replace

RECOMMENDED SPARE PARTS

Items

2, 2A, 3, 4, 5, 9, 12, 13, 15, 18, 19, 21, 23, 24, 25, 27, 28, 34,
35, 36, 37, 38, 40, 41, 42, 43, 44

Key No. Part No. Description	Key No. Part No. Description
1st STAGE REGULATOR 1—1075-08—1st Stage Complete 2—1010-12—Cap Assembly 2A—8201-12—O-Ring 3—1024-09—Retainer Ring 4—1051-06—Filter 5—8200-12—O-Ring 6—1075-10—Decal 7—1075-06—Knob 8—9109-12—Plug 9—8200-11—O-Ring 10—1075-01—Body 11—1075-07—Spring 12—1055-08—Seat 13—8200-07—O-Ring 14—1075-04—Piston 15—8201-13—O-Ring 16—1075-02—Spring 17—1075-03—Screw Cap HOSE ASSEMBLY 18—1048-04—Hose Assembly Complete 19—8200-11—O-Ring 20—1048-05—Hose Without O-Rings 21—8200-10—O-Ring	2nd STAGE REGULATOR 22—1085-00—2nd Stage Complete 23—1049-02—Inlet Fitting 24—8200-14—O-Ring 25—1049-08—Disc & Retainer 26—1085-04—Spring 27—8450-22—Washer 28—1037-29—Lever 29—1075-10—Decal 30—1037-04—Purge Button 31—1027-08—Spring 32—1070-01—Box Top 33—1019-14—Clamp Rim 34—8340-20—Screw 35—8600-37—Retainer Ring 36—1037-32—Diaphragm 37—1025-17—Spacer 38—1025-10—Nut 39—1049-22—Box Bottom 40—1051-39—Exhaust Valve 41—1049-20—Exhaust Tube 42—1058-76—Strap Assembly (Accessory) 43—1049-13—Mouthpiece Clamp 44—1058-78—Mouthpiece

