SHERWOOD SCUBA® REGULATORS

magnum® II
(SRB3300)

oasis®
(SRB3400)

oasis+
(SRB3500)

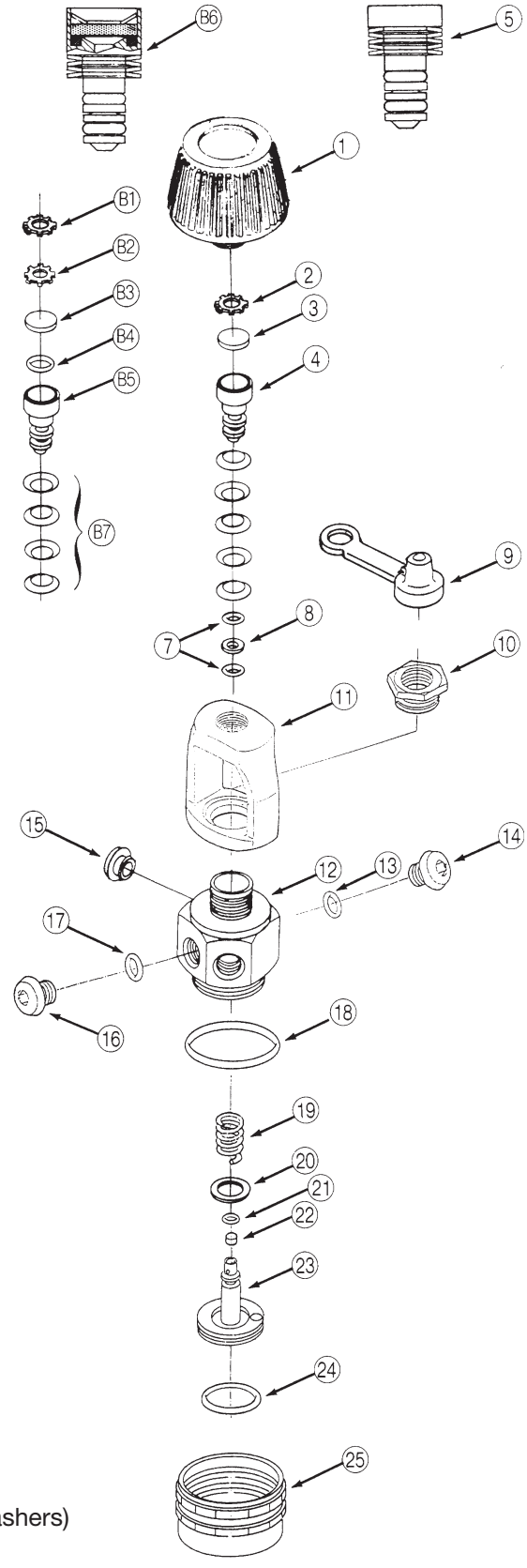


Includes
BLIZZARD®
(SRB3200)

Assembly & Maintenance Guide

FIRST STAGE - MAGNUM®II SRB3300, BLIZZARD® SRB3200, OASIS® SRB3400

NOTE: The Oasis®+ SRB3500 uses the SRB3601 externally adjustable first stage. The parts breakdown and servicing of the SRB3601 is covered in the Oasis2/Blizzard Assembly & Maintenance Guide. Oasis®+ regulators manufactured in 1990 have the SRB3801 first stage with the DSS feature. The servicing of the SRB3801 first stage is covered in the Ultima SRB3800 Assembly & Maintenance Guide. To determine the first stage of a particular regulator, compare the regulator with the pictures and diagrams in this guide as well as the other guides referenced above. For further information, contact your authorized Sherwood Distributor.



ITEM #	CATALOG #	DESCRIPTION
	SRB3305	First Stage Complete
1	3701-70	Handwheel
2	3504-6	Star Washer Retainer
3	1390-7	Filter
4	29-3106-13A	Moving Orifice (bare, no o-rings etc.)
5	3601-20	Moving Orifice Assembly (with o-rings & washers)
6	19-8010-8	Belleville Spring Washers (5 needed)
7	G007A	O-ring (2 needed)
8	MS28774-007	White Backup Washer
9	5705-20	Dust Cap
10	1-1665-17	Yoke Nut
11	2-3801-4	Yoke
12	2-3305-1	Body
13	G904A	O-ring (for H. P. port plug)
14	1-3405-4	H. P. Port Plug
15	3106-6	One Way Bleed Valve
16	1-3105-6	L. P. Port Plug
17	G011B	O-ring (for L. P. port plugs)
18	G122A	O-ring (seals cap to main body)
19	3801-12B	Main Spring
20	19-6526	Shim (to raise hose pressure)
21	G007A	O-ring (for small end of piston)
22	3801-5	Piston Seat
23	3107-10	Piston Assembly (includes seat & O-rings)
24	G022A	O-ring (for large end of piston)
25	2-3305-2	Cap

ORIFICE ASSEMBLY PARTS FOR BLIZZARD FIRST STAGE SRB3205

The following parts are the only parts that differentiate the Blizzard SRB3205 first stage from the standard Magnum II type SRB3305 first stage:

ITEM #	CATALOG #	DESCRIPTION
B1	3504-6	Larger Star Washer (holds orifice in body)
B2	J26005-43B	Smaller Star Washer (holds filter in orifice)
B3	18-3106-14	Filter
B4	G011B	O-ring (seals filter to orifice)
B5	29-3106-13	Moving Orifice (bare, no O-rings etc.)
B6	3106-9	Moving Orifice Assembly (with O-rings & washers)
B7	64-8010-8	Belleville Spring Washers (4 needed)

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BEFORE YOU BEGIN.....

READ THESE INSTRUCTIONS COMPLETELY BEFORE YOU BEGIN SERVICING THE REGULATOR.

THESE INSTRUCTIONS ARE INTENDED FOR PEOPLE WHO HAVE BEEN AUTHORIZED BY SHERWOOD TO REPAIR SHERWOOD SCUBA EQUIPMENT. IF YOU ARE NOT SO AUTHORIZED – STOP.

1.0 INTRODUCTION

1. The procedures in this manual apply to the Sherwood Scuba **MAGNUM II (SRB3300), OASIS (SRB3400), and OASIS+ (SRB3500).**
The most current part numbers can be obtained by calling your Sherwood Sales Representative or Sherwood Scuba Customer Service.

WARNING

NEVER tighten the hose fitting to the first stage with more than 40 in. lbs. (4.5 Joules) of torque. The inlet hose fitting can be weakened by overtightening.

All current Sherwood Scuba Regulators have service kits available which contain the parts which **must** be changed at every annual service no matter what their condition. The standard annual service kit for the Oasis, Oasis+, and Magnum is 4000-15. All other parts not contained in this kit must be inspected by the technician and changed under warranty **only** if they have failed due to problems with material or workmanship.

NOTE: Oxygen Enriched Air conversion kits are available for all current Sherwood regulators and valves. The part number for the models covered in this manual is 4000-15N. These kits are to be installed into properly cleaned and prepared regulators only by technicians trained by one of the major oxygen enriched air training agencies.

2. This manual gives breakdowns of regulator parts, equipment specifications, servicing instructions, troubleshooting recommendations, and guidelines for proper care of these regulators. This manual is intended for use **only** by persons specially trained and authorized to service Sherwood Scuba equipment.

3. Anyone attempting to service or repair Sherwood Scuba regulators **must** have a thorough understanding of the principles of operation of scuba regulators and valves, as well as the appropriate mechanical ability. The technician **must** be properly trained in the safe use of compressed air and the various tools and cleaning solutions involved in the procedures outlined in this manual.

4. The best source for current part numbers for any of the parts listed in this manual is your current parts and price list from Sherwood.

5. Because of the many unique features found in Sherwood regulators, Sherwood conducts seminars on a regular basis throughout North America to train technicians in proper service and repair procedures for all current Sherwood regulators. In addition, all Sherwood dealers and their staff members are encouraged to attend the seminars to gain an in-depth understanding of the construction, special features and operation of Sherwood regulators. For information on the dates and locations of upcoming Sherwood service seminars near you, contact your Sherwood Sales Representative.

NOTE: You must be authorized by Sherwood to work on Sherwood Scuba equipment. You can obtain proper authorization by attending all appropriate seminars given in your area. This is the only way you can become an authorized Sherwood technician.

6. Companion instructional VHS videotapes to this and other Sherwood Scuba repair manuals are available from Sherwood Scuba at a nominal cost. Ask your Sherwood Scuba Sales Representative for details.

7. If you have any questions, or need more information, contact your Sherwood Scuba Sales Representative or Sherwood Distributor.

2.0 SPECIFICATIONS

2.1 SPECIFICATIONS FOR THE SRB3300 MAGNUM® II, SRB3400 & SRB3500 OASIS®

REGULATOR MODELS:	Sherwood Magnum II SRB3300, Oasis SRB3400 & SRB3500
AIR FLOW:	28-29 cu. ft. (793-821liters)/min. @ 1 atmosphere
INHALATION RESISTANCE:	1.1” (2.8 cm) w.c. @ 1 atmosphere
EXHALATION RESISTANCE:	0.8” (2 cm) w.c. max. @ 1 atm.
RECOMMENDED LUBRICANT:	LTI Christo-Lube®

A. First Stage Regulator:

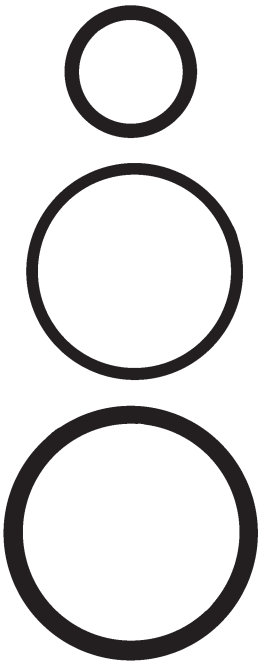
TYPE:	Flow-by piston with Moving Orifice Balancing and Dry Air Bleed - **U.S. Pat. # 4,226,257**
WEIGHT:	1 lb. 3 oz. (.54kg)
INTERSTAGE PRESSURE:	135 -150 psi (9-10 bar)
MAXIMUM INLET PRESSURE:	232 Bar for SRB3300CE, SRB3900CE, SRB3400CE & SRB3500CE Models
POSITIVE AIR PURGE FLOW RATE:	13-27 cc/minute
# LOW PRESSURE PORTS:	4 (3/8”-24 UNF)
# HIGH PRESSURE PORTS:	2 (7/16”-20 UN)
MATERIALS:	Body - CDA-360 Brass O-rings - Buna-N Bleed Valve - Ethylene Propylene Piston Seat - Teflon®

B. Second Stage Regulator:

TYPE:	Downstream valve, diaphragm, Variable Fulcrum **- U.S. Pat. #3,991,785**
WEIGHT:	7.6 oz. (.22 kg) (w/o hose)
HOSE LENGTH:	31 in. (.79 m)
MATERIALS:	Cover - Thermoplastic Vinyl Case - Thermoplastic Triax® Poppet Seat - Buna-N Poppet Seat - Buna-N O-Rings - Buna-N Diaphragm - Tufel® (black) Exhaust Valve - Thermoplastic Elastomer (blue) Mouthpiece - Liquid Silicone Rubber

Maximum certified depth is 50m

3.0 O-RINGS REFERENCE CHART



G907A
Seals second stage orifice to case

G022A
Large End of piston

G122A
Seals cap to body



G007A
Moving orifice, small end of piston



G0101A
Outlet end of hose



G011B
L.P. port plug, inlet end of hose



G904A
Under filter in first stage H.P. port plug

1. Before you begin disassembly of the regulator, test the first and second stages for output pressures and leakage. Pre-testing in this way will help the technician to pinpoint any specific problems requiring repair.

2. The work area must be clean and well lighted, with clean compressed air available to blow sand and dirt from parts.

4.0 FIRST STAGE PROCEDURES

4.1 TOOLS REQUIRED FOR FIRST STAGE SERVICING

– Bench vise

– 3/32" Allen wrench

– 5/32" Allen wrench

– 6" or 8" adjustable wrenches

– 15" adjustable wrench

– Phillips screwdriver

– #10 Torx screwdriver

– Sherwood 50 cc Graduated Cylinder (p/n TL110)

– Sherwood Piston Seat Removal Tool (p/n TL112)

– Sherwood Plastic Probe (p/n TL111) to push out orifice

– Sherwood Regulator Support Handle (p/n TL113)

– Sherwood Intermediate Pressure Gauge (p/n TL119)

– Sherwood Inlet Filter Installation Tool (p/n TL115)

– Sherwood O-ring Installation Cones:
Brass-colored - p/n TL106 (for installing small O-ring on piston tip)
Green-colored - p/n 38-TL107 (for installing 1st O-ring onto moving orifice)
Black-colored - p/n 29-TL108 (for installing 2nd O-ring onto moving orifice)

– Sherwood Oxygen Compatable Lubricant (Crystolube LTI) p/n SW-MS150

NOTE: For more information on Sherwood tools and their uses, see Sherwood's Tools, Repair Kits and Accessories - Assembly & Maintenance Guide, available from Sherwood.

4.2 DISASSEMBLY OF FIRST STAGE

To view all the parts used in the first stage, fold out the front cover of this manual. The circled numbers below refer to the corresponding numbers on the drawing.

1. Use 6” or 8” adjustable wrenches to disconnect all hoses from the first stage. Pull back the hose protector from the inlet end of the hose. Inspect the hoses for wear. Pay particular attention to the area where the metal ferrules meet the rubber hose material. Replace hoses if necessary.

2. Unscrew and remove the handwheel (1).

3. Remove the dust cap (9).

4. Use a 5/32” Allen wrench, and a small adjustable wrench to remove all port plugs (14) (16) and hoses from the body.

5. Install a Sherwood regulator support handle (p/n TL113) into one of the low-pressure ports. Use the support handle and a 15” adjustable wrench or bench vise to loosen the yoke nut (10) from the body (12). See Photo #1.

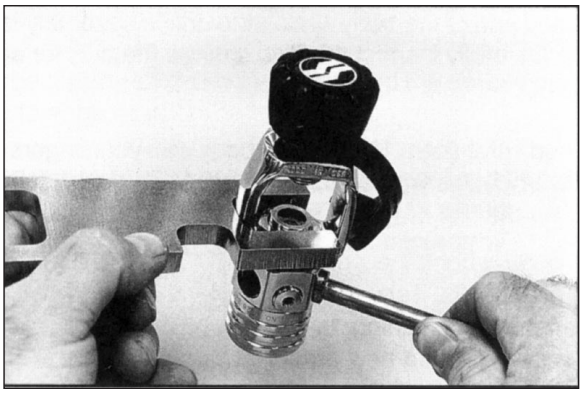


Photo #1

NOTE: If a Sherwood DIN adapter (p/n SAA5200, or SAA5300) is installed in place of the more common yoke assembly, remove it at this time. See Sherwood Technical Bulletin #104 for servicing procedures for the DIN adapter.

6. Remove the yoke (11) and yoke nut (10) from the body.

7. Use the Sherwood regulator support handle and a 15” adjustable wrench or a bench vise to remove the cap (25) from the main body.

8. Remove the spring (19) any shims (20) and the piston assembly (23) from the cap. Remove both piston O-rings and discard them.

9. Remove the piston seat (22) by pushing through the stem with the Sherwood piston seat removal tool (p/n TL112) from the large end. The seat will then pop out. Discard the old seat.

CAUTION

If any grease or oil gets on the piston flow control element, the air flow through the Dry Air Bleed System will be impeded.

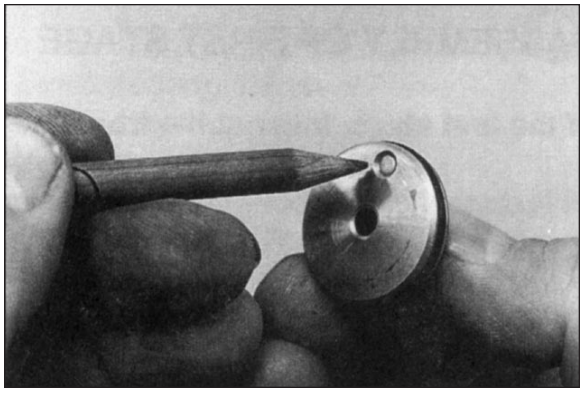


Photo #2

a. Keep greasy fingertips away from the flow element during servicing.

b. Use a clean, dry cloth to wipe the piston surface if it needs cleaning.

c. Do not put the piston in a cleaning solution or ultrasonic cleaner. If there is any oil on the surface, it will coat the piston.

d. A coating of grease or oil will interfere with the air flow through the flow control element in the face of the piston (see Photo #2). It may also cause the Dry Air Bleed System to cease working. Although this is not dangerous to the diver, it may increase the difficulty of breathing though the regulator upon descent.

e. If no air is bubbling from the one-way bleed valve, this is a good indication that the positive air purge system is not working.

10. Use a pocket screwdriver to remove the star washer (2) that holds the inlet filter (3) in place. Most units used a star washer (a flat disc washer with six outwards facing legs) Units made in 1997 use a wire retaining ring with inward hook. The only first stage bodies that can use this re-usable ring have a groove machined into the area above the filter for the ring to fit snugly into. Always discard the used inlet filter. Old style star washers are discarded, newer style retaining rings are saved for reuse.

11. Remove the moving orifice assembly (4) from the body by pushing it with the Sherwood plastic probe (p/n TL111) from the large threaded end of the body. Catch the orifice assembly in your hand as it comes out the yoke nut thread end of the body. Carefully inspect the disc springs (6) for any cracks. Replace all five disc springs if any cracks are found.

12. Remove the one way bleed valve (15) from the body with your fingers or a soft plastic probe. **DO NOT** use a metal screwdriver or blade since this will scratch the sealing surface against which the bleed valve seals. A scratch may allow water to enter the first stage spring chamber during use.

The sealing surface on the body where the one-way valve seals must be totally clean of deposits. If any deposits remain on the sealing surface after initial cleaning, take a **fine** abrasive polishing stick or a pencil with a new eraser and polish the surface to remove deposits (see Photo #3).

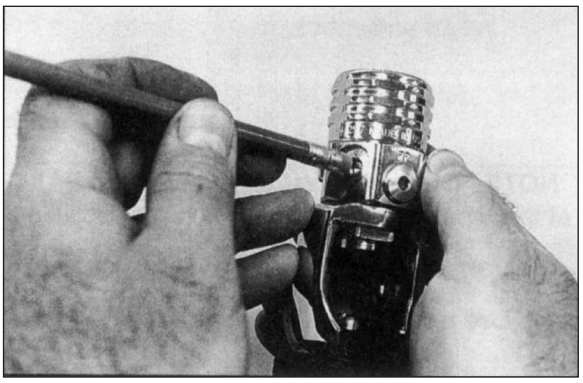


Photo #3

13. Blow all residue from the body after polishing.

14. Remove the large O-ring (18) from the body. This O-ring can usually be reused.

15. If necessary, clean all metal parts of the first stage **except piston** in an ultrasonic cleaner or cleaning solution. Remove the O-rings before cleaning any metal parts; most cleaning solutions can damage the O-ring material. See Section 6.3 for recommendations on cleaning solutions. If major visible corrosion or deposits exist on parts, use a bristle brush, wooden, or plastic stick to rub the deposits off. Allowing acidic cleaning solutions to do all of the work if deposits are severe, will result in damage to internal chrome plating which will make parts even more susceptible to future corrosion.

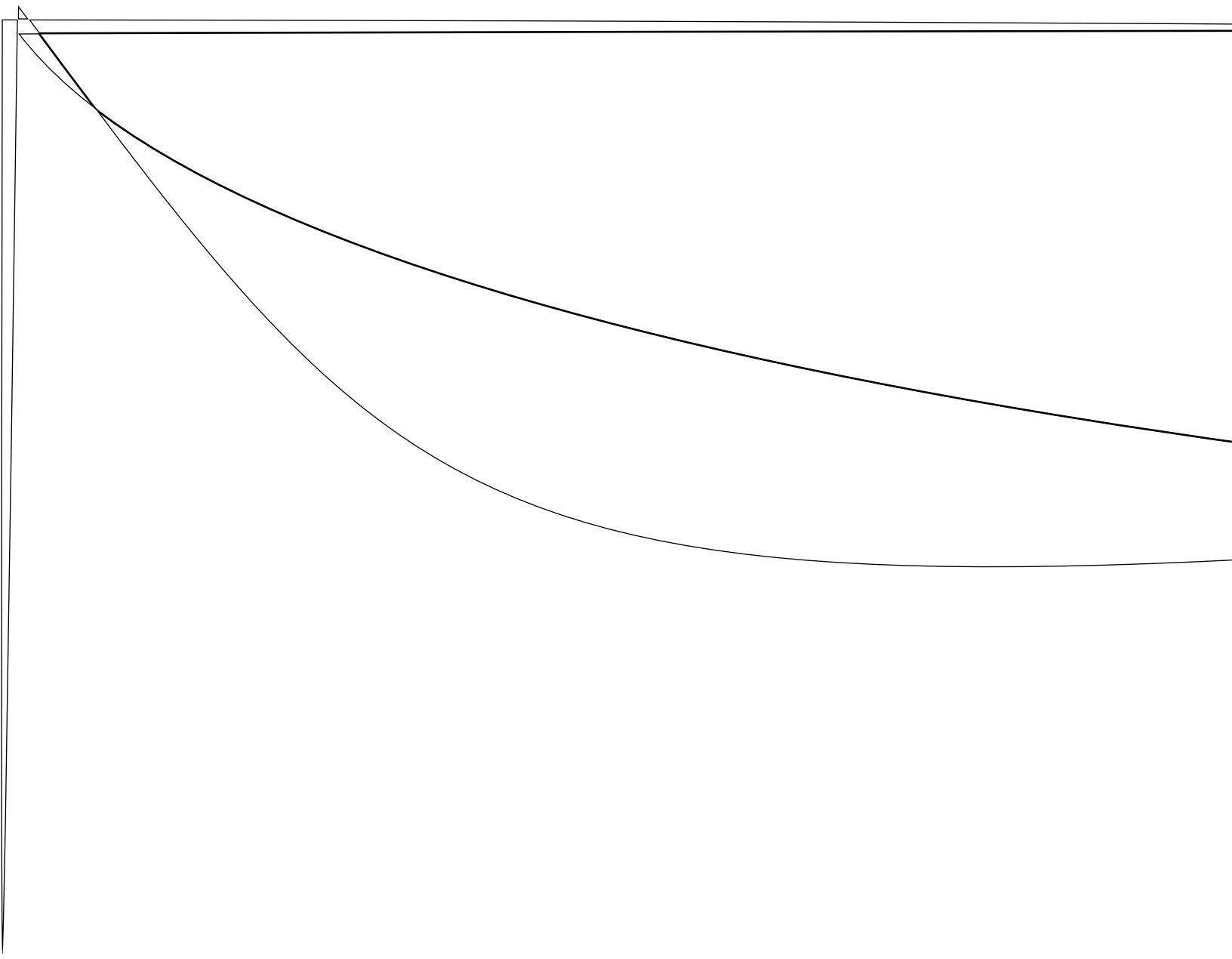
16. Remove the regulator parts from the cleaning solution. Blow all internal passageways dry with clean, dry compressed air.

17. Inspect the bores in which the piston and orifice O-rings move for corrosion or wear. If the bores are leaking air because of wear, replace the parts. If some corrosion deposits persist, carefully wipe them away with a plastic scrubbing cloth. Blow any resulting dust out of the regulator parts.

18. Remove and discard the two black O-rings (7) from the moving orifice (4). Save the white backup washer; it can be reused. Inspect the moving orifice's sealing surface (located at the top edge of the orifice cone). Any nicks, scratches, or corrosion at the top of the cone can allow air to pass, which will result in creeping hose pressures. Polish out the defects using a **fine** abrasive polishing stick or pencil eraser. When polishing, apply a **light** pressure to prevent excessive wear on the cone. Use compressed air to blow away any dust created by the polishing process. You do not have to polish or smooth the relatively rough lower/outer edge of the orifice cone. This is not a sealing surface.

4.3 ASSEMBLY OF FIRST STAGE

1. The part number for each regulator kit can be found in Sherwood's **Tools, Repair Kit and Accessories - Assembly & Maintenance Guide**. The kits contain the minimumparts that must be replaced at every annual service interval. The technician will also evaluate the condition of 1849.4JUsing atgaeach reasvh softrp each robs,



13. Install the handwheel (1) and the dust cap (9) onto the yoke.

14. If the first stage has a SAA-5300 DIN adapter installed instead of a standard yoke, see the installation instructions given in Sherwood Technical Bulletin #104 for overhaul and installation instructions of the DIN adapter.

4.4 TESTING OF FIRST STAGE

NOTE: For safety, always test the first stage regulator with at least one second stage installed.The demand valve on the second stage acts as a relief valve in the event of a malfunction.

A. Before You Begin Testing

1. Install an intermediate pressure test gauge (p/n TL119) into one of the low pressure ports of the first stage. Plug any open outlet ports with suitable port plugs.

2. Install the first stage onto a tank valve, and introduce 2700 - 3500 psig (186-240 bar) to the inlet of the regulator. Flow air through the regulator by pushing the purge button on the second stage several times to get all parts properly seated.

B. Dry Air Bleed Flow Test

1. Submerge the first stage under several inches of water.

2. A small stream of bubbles should be escaping from the one-way bleed valve on the first stage and nowhere else on the body (see Fig. 1). The number and size of the bubbles may vary from regulator to regulator, but the volume of air should be 13 - 27 cc per minute. To check this, use the following steps:

   a. Invert a small (50 cc capacity) graduated cylinder (p/n TL110) filled with water over the underwater flow of bubbles (see Fig. 1). The air entering the cylinder will gradually empty some of the water out of the cylinder.

   b. After one minute, remove the graduated cylinder from the air flow and raise the cylinder to the surface so that the air/water dividing line inside the cylinder matches the water level outside the cylinder. The measurement at this point should be between 13 and 27 cc.

   c. If the reading is significantly higher than 27 cc, check the O-rings and sealing surfaces mated to the piston. If the reading is below 13 cc, check the flow control element in the piston (see photo 2) to determine if it has been clogged by grease or other foreign matter. If it is clogged, the piston must be replaced.

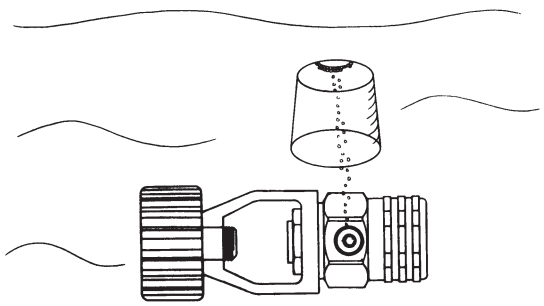


Figure #1

C. Intermediate Pressure Test

NOTE: This test determines the regulator's lock-up pressure (the pressure put out by the first stage during a no-flow condition).

1. Attach any Sherwood second stage to one of the low pressure ports, and the Sherwood intermediate pressure gauge (p/n TL119) to another low pressure port. Plug all other ports with appropriate port plugs.

2. Attach the regulator to a tank valve giving a source pressure of between 2700 and 3500 psig (186-240 Bar).

3. Turn the supply air on **slowly** while listening for any unusual air leaks. If any are heard, turn the air off immediately and determine the source of the leak. If no leaks are found, watch the pressure gauge reading rise as you continue turning the air on **slowly**. It should stop around 145 psig (10 bar).

4. If the pressure gauge continues to rise above 155 psig (10.4 bar), turn the air supply off immediately and inspect the regulator to determine the cause.

5. Once the air pressure stops rising, the internal parts should be worked into place by allowing air to escape from the second stage several times by pushing the purge button.

6. If you have depressed the purge button several times and the pressure is below 135 psig (9.3 bar), you can add shims (20) to increase the pressure. **Do not use more than three shims.**

7. If the pressure is too high, above 150 psig (10.3 bar), remove the necessary shims.

8. After the correct pressure has been reached, let the regulator sit for several minutes and then depress the purge button again to check that the regulator returns to the proper pressure.

Never set the output pressure of the first stage above 150 psig (10.3 bar).

5.0 SECOND STAGE PROCEDURES

5.1 TOOLS REQUIRED FOR SECOND STAGE SERVICING

– Two good quality 6" or 8" (15 or 20 cm) adjustable wrenches

– #10 Torx screwdriver

– Small Phillips ACR Screwdriver

– Size 0 Square Drive (Robertson Head) screwdriver

– Side cutting pliers

– Sherwood In-line Adjusting Tool (p/n TL102)

– Sherwood Plastic Probe (p/n TL111) to push out orifice

– Sherwood Lever Height Adjusting Tool (p/n TL123)

5.2 DISASSEMBLY OF SECOND STAGE

WARNING

NEVER tighten the hose fitting to the first stage with more than 40 in. lbs. (4.5 joules) of torque. The inlet hose fitting can be weakened by overtightening.

To view the complete parts list of the second stage, fold out the back cover of this manual.

1. Pull back the hose protector (27) from the inlet end ferrule. Remove the hose assembly (26) from the orifice housing (22). Inspect the hose assembly for any cuts or cracks, especially on the hose at the metal ferrules. Replace the hose assembly if any cuts or cracks are found.

2. Remove the mouthpiece (18) by cutting the mouthpiece tie (19) with side cutting pliers. Discard the old mouthpiece tie. Examine the condition of the mouthpiece. Pay particular attention to the area on top just behind where the old tie tightened. This is a prime area for small holes to develop. If the mouthpiece is in good condition, it can be reused.

3. Remove the exhaust tee retaining screw (15) with a Phillips or Square Drive screwdriver.

4. Remove the exhaust tee (14) from the case by pulling it back and off the top edge.

5. Remove the front cover (5) from the case by turning the bezel ring by hand. Some older units (manufactured before 1986) have a metal bezel ring with a small metal locking tab in the mouthpiece area. Remove this ring with a small slotted screwdriver.

A. Purge Button Change:

NOTE: At this point, the purge button can be removed from the cover. This will be necessary only if the button travel is impeded by silt deposits, or if the logo (1) is to be changed to a different color. If it is necessary to remove the purge button, follow the next sub-steps A to E. Otherwise, go on to Step 6.

a. Place the cover assembly with the purge button logo face down on a clean flat surface.

b. From the inside of the cover assembly, push the four barbed tabs holding the purge button assembly in place in towards each other. This will release the purge button assembly from the cover.

NOTE: The purge button spring is located behind the purge button, with the wide end of the coil toward the cover. Be sure to replace the spring with the wide end facing the cover.

c. If only the label insert (1) was purchased for installation, carefully remove the old label insert from the purge button (2) with a thin flat-blade screwdriver, and install the new colored label insert in its place.

d. Reverse the disassembly procedure to reassemble the case assembly with the new color logo installed.

6. Gently remove the diaphragm (6) from the case. Hold the diaphragm up to a light source. Gently stretch the diaphragm and look for tears or pinholes. If any are found, replace the diaphragm. Otherwise, the diaphragm can be reused. If you are repeatedly tearing diaphragms during this visual inspection, you are using too much force. You cannot return diaphragms torn in this way for warranty credit.

7. Clamp the Sherwood modified 3/4" deep socket (p/n TL118) in a bench vise. Lower the lever (9) into the socket until the 3/4" hex of the lever support (10) is engaged in the socket. Use a 13/16" wrench to loosen and remove the orifice housing (22).

NOTE: Some regulators (Oasis, Blizzard, Classic) will have heat transfer fins (10B) attached to the lever support. The modified 3/4" socket will still fit onto the lever support with the fins attached. You can leave the fins attached throughout your servicing. If the fins are damaged and need to be replaced, use the Sherwood 5/32" drive socket to remove and replace the two 5/32" hex head screws (10A).

8. Use the Sherwood in-line adjusting tool (p/n TL102) to back the adjusting orifice out of the orifice housing until the threads disengage. Remove the in-line adjusting tool, and push the adjusting orifice the rest of the way out of the orifice housing with the Sherwood Plastic Probe (p/n TL111).

9. Remove the O-ring (23) from the adjustable orifice.

10. Before removing the exhaust valve (16) from the case, bend it over as far as it will go from the top, bottom, left, and right sides. If it fails to snap back quickly, and does not lie perfectly flat against the case, the valve should be replaced. If it does snap back satisfactorily, remove it and inspect the sealing edges. If they appear smooth, and the locking tab on the nipple is good, the valve can be reused.

11. Remove the spacing washer (21), and the O-ring (20) from the threads of the lever support (10). Remove the lever support from the inside of the case (17).

12. Normally, you will simply need to change the poppet stem seat insert (13) to restore the second stage to maximum performance. To change the stem seat insert (13), leave the lever assembly together. With a penknife or similar object, carefully remove the old seat insert. Put the new seat insert on a clean flat surface and lower the poppet cavity (from which the old seat insert was removed) over the new seat insert. The new style black molded seat (p/n 978-9BN) should be installed with the identifying Sherwood symbol facing outward.

13. If parts of the lever assembly (stem, spring, lever, etc.) need to be replaced, take apart the assembly with the Sherwood stem socket tool (p/n TL124) Clamp the stem socket tool in a bench vice. Insert the square head of the poppet stem into the tool. With a Phillips screwdriver, or preferably a size 0 Square Drive (Robertson Head) screwdriver, loosen the screw (7) that holds the assembly together.

NOTE:If only the lever (9) is to be replaced, do not totally remove the screw. You can remove the lever from under the washer (8) by pushing the poppet into the lever support when the screw is almost all the way out.

14. Rinse all plastic and silicone parts in clean fresh water, and then blow the parts dry with compressed air to remove any sand and dust particles.

15. **If necessary**, clean all metal parts of the second stage in an ultrasonic cleaner or cleaning solution. Remove the O-rings before cleaning any metal parts; most cleaning solutions are damaging to the O-ring material. See Section 6.3 for recommendations on cleaning solutions.

NOTE: If you use an ultrasonic cleaner to clean the second stage adjustable orifice (22) , use a plastic container to prevent the orifice from vibrating against other metal parts which could damage the orifice seal.

16. Inspect the case (17) for any cracks. Look particularly closely at the area where the orifice housing and the lever support clamp down. Replace the case if any cracks are found.

17. Inspect the orifice sealing cone (where the poppet insert seals) for any nicks, scratches, or corrosion. Corrosion or minor scratches can be polished out using a fine-grit rubberized polishing stick or a clean new pencil eraser. Do not apply heavy pressure when rotating the polishing stick. Stop polishing immediately after the corrosion or scratch disappears. An orifice will not be accepted for warranty replacement simply because it is dirty or corroded. The technician must clean the orifice sealing surface at every service interval.

18. Blow all dust and debris out of the orifice housing with clean compressed air.

NOTE: Prior to this point, you should have cleaned and inspected all parts, following proper servicing procedures. Do not continue until this has been done.

5.3 ASSEMBLY OF SECOND STAGE

1. Re-install the cleaned and lubricated O-ring (23) onto the adjustable orifice (24). Install the adjustable orifice back into the orifice housing. Push it in with your finger as far as it will go.

2. Install the exhaust valve (16) into the case by inserting the nipple into the small hole from the outside of the case. Reach inside the case and pull the nipple firmly with the fingers until you hear or feel it “click” into place. Inspect the exhaust valve to see that it is properly seated.

3. Install the lever assembly into the case.

4. Install the O-ring (20) on the threads of the orifice housing. Install the spacing washer (21) around the outside of the O-ring.

NOTE: The spacing washer must be installed with the outer lip facing upward toward the orifice housing.

5. Screw the orifice housing (22) onto the threads of the lever assembly. With a 13/16" wrench on the orifice housing and a Sherwood modified 3/4" deep socket (clamped in a vise) on the hex of the lever support (10) inside the case, tighten the orifice housing and the lever assembly together snugly (70 in. lbs. / 8 Nm).

NOTE: Do not allow lubrication (grease on fingers, or silicone over-spray) to get on the case (17), the diaphragm (6), or the exhaust valve (16). This may cause slippage or deterioration of these parts.

NOTE: THE FOLLOWING STEPS (6 - 10) ARE INCLUDED HERE FOR CONTINUITY. THEY MUST BE PERFORMED AFTER THE REGULATOR SECOND STAGE IS ADJUSTED (see 5.4 Setup of Second Stage).

6. Install the diaphragm (6) into the case so that it sits evenly on the ledge.

7. Install the cover (5) onto the case by sliding it carefully and firmly into place. Keep the cover straight so that the cover vent holes and the purge button emblem are properly aligned. Install the bezel ring (4) over the cover and tighten it firmly by hand onto the case.

8. Install the exhaust tee (14) onto the case flange by sliding it up from the bottom.

9. Install the retaining screw (15) through the screw hole in the exhaust tee and into the hole in the case using a # 1 Phillips, or Size 0 Square Drive screwdriver.

DO NOT OVER-TIGHTEN. This screw is threading into plastic, which will hold well in service but is easily stripped if over-tightened.

10. Install a new mouthpiece (18) and mouthpiece tie (19).

11. Install one end of the hose into a serviced first stage, tighten snugly.

WARNING

NEVER tighten the hose with more than 40 in. lbs. (4.5 joules) of torque. The inlet hose fitting can be weakened by overtightening.

5.4 SET- UP OF SECOND STAGE

For the following adjustments, remove the cover and diaphragm.

1. Install Sherwood's in-line adjusting tool (p/n TL102) between the orifice housing (22) and the hose assembly (26). Use the tool to screw the adjustable orifice (24) clockwise. Watch the end of the lever (9) as you do this. As soon as the tip of the lever begins to drop, stop turning the tool. The slight amount of friction this operation produces between the orifice and the stem seat will not harm the stem seat.

2. Attach the in-line tool and the second stage to its accompanying overhauled and properly adjusted first stage, and mount on an air tank filled to between 2700 and 3500 psig (186 and 240 bar).

3. **Slowly** turn on the tank valve. If you hear any leaks, determine the location of the leak, shut the air off, and repair the leak as necessary.

4. Turn on the air. Use the in-line adjusting tool to turn the adjusting orifice (24) counter-clockwise until you hear a slight hissing. Then turn the adjusting orifice clockwise just enough to stop the hissing. HINT: A slight clockwise turn past the point where the hissing just stops will reduce wear and tear on regulators used heavily in rental or training situations.

5. Depress the lever assembly in the second stage five or six times to get the internal parts seated in their proper positions. Listen for any hissing. Adjust if necessary.

6. After setting the adjusting orifice, check the relationship between the diaphragm wear plate and the tip of the lever assembly. To do this, use the Sherwood lever height gauge and adjusting tool (p/n TL123). Use the tool as a gauge by laying it across the top of the case as shown in Photo #4.

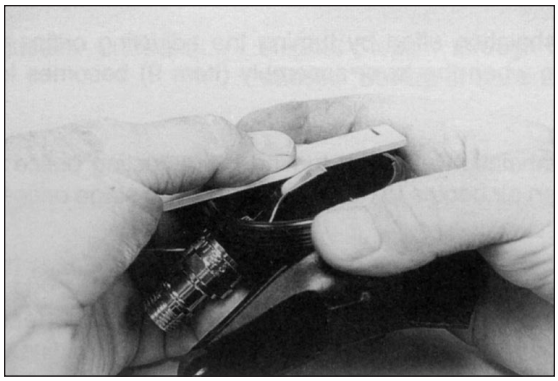


Photo #4

7. Look across the case and gauge tool. The tip of the lever should be even with the bottom surface of the gauge. If you are re-using the same major parts of the regulator, this measurement will most likely be correct, and no adjustment will be needed. In fact bending the lever should be avoided unless necessary to get the tip of the lever in the proper position.

8. If you have installed a new lever, and the lever tip is noticeably high, bend it lower by installing the lever in the slot of the tool as shown in Photo #5.

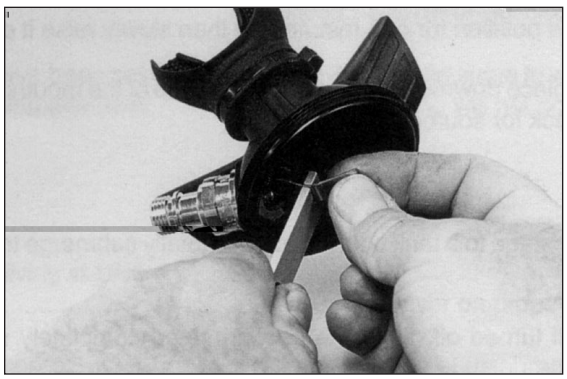


Photo #5

9. Holding the tool in one hand, with the tip of the lever toward the fingers, bend the lever carefully. Do not hold on to the case when making this adjustment, as this can result in the lever bending at the wrong area (near the lever support instead of at the mid-point of the lever). If necessary, bend the lever upward using the same holding method.

10. After the regulator is assembled, turn on the air. If the regulator hisses slightly, but stops hissing when the diaphragm is removed, the lever is too high. Use the lever bending tool to bend the lever slightly downward.

11. Replace the diaphragm. Continue to test the gap between the lever and the diaphragm after each bending until the lever is in the correct position.

12. Return to Section 5.3.4 of this manual to complete assembly of the regulator.

5.5 TESTING OF SECOND STAGE

A. Inhalation Effort

Check the inhalation effort of the second stage with a pan of water about five inches deep.

1. Slowly immerse the second stage with the front cover down and level. The regulator should flow as soon as the diaphragm is a little deeper than level with surface of the water.

2. If you use a water column or water manometer to check inhalation effort, it should not exceed 1” w.c. (2.5 cm) at cracking. It should drop to about 3/4” w.c. (1.9 cm) at one atmosphere and a moderate flow rate. You can alter the inhalation effort within a certain range.

3. You can increase the inhalation effort by turning the adjusting orifice clockwise. However, discontinue clockwise adjusting when the lever becomes loose against the lever support .

4. You can decrease the inhalation effort by turning the adjusting orifice counter-clockwise. Discontinue counter-clockwise adjusting when air begins to hiss past the second stage orifice.

5. Install the second stage on the end of the hose. Use two wrenches to tighten the hose fitting with 40 in. lbs. (4.5 Joules) of torque

B. Exhalation Effort

1. If you do not use instruments to check the exhalation effort, the flow should feel smooth and

D. External Air Leaks

1 Attach the regulator first stage to a tank short enough to totally submerge the first and second stage in your filling station cooling water.

2. With the tank valve still turned off, flood the second stage completely with water, and then position it mouthpiece up.

3. Turn the tank air valve on **slowly** and then watch for any leaks in the first or second stage (except for the normal flow of air from the one-way bleed valve on the first stage).

4. Repair any leaks.

5. Check for the correct positive air purge flow rate. **See Section 4.4** "**Testing of First Stage**," for the proper method.

6.0 HELPFUL HINTS

6.1 TROUBLESHOOTING REGULATORS

POSSIBLE CAUSE	***RECOMMENDED ACTION***
A. High Inhalation Effort at Depth:	
1. Inlet filter clogged.	Replace the filter.
2. No air flowing through the dry air bleed system.	Check the flow rate coming out of the one-way bleed valve (15). If no or low air flow is detected, clean the flow element in the piston, or replace the piston.
3. High pressure air supply insufficient.	Verify the supply air pressure. Make sure the customer had the tank valve turned **all** the way on.
4. Second stage improperly adjusted.	Repeat Steps 1 through 6 in **Section 5.4,** "**Set-Up of Second Stage**."
B. Free Flowing:	
1. Intermediate pressure too high.	Adjust the first stage's outlet pressure to below 150 psig. Removing some 1st stage shims (20).
2. Damaged or worn H.P. piston seat.	Replace 1st stage seat (p/n 3801-5). This also gives high intermediate pressure..
3. Damaged or worn L.P. poppet stem seat.	Replace 2nd stage seat (p/n 978-9BN).
4. Nicked or corroded orifice sealing.	Dress the orifices in the first and second stages with a polishing stick, or replace the orifices.
5. Demand lever in second stage bent too high.	Adjust or replace the lever.
6. Weak spring in second stage.	Replace the spring.
7. Second stage improperly adjusted.	Repeat Steps 1 through 6 in **Section 5.4, "Set-Up of Second Stage**."
8. Parts in the second stage have been severely chilled due to repeated purging and have shrunk, allowing air to flow.	Allow the second stage to warm back up to room temperature. If the regulator is to be used for Ice diving, set the second stage up after cooling it in Ice water. This will help prevent this type of leakage from occuring due to cold water conditions.

C. Wet Breathing:

1. Improper clearing, or diver diving in total head-down position.	Instruct the diver on proper clearing technique.
2. Diaphragm improperly installed.	Check position of diaphragm visually.
3. Hole in the mouthpiece at tie area.	Replace the mouthpiece.
4. Hole in the diaphragm.	Replace the diaphragm.
5. Damaged exhaust valve, or edges of the exhaust valve not firmly seated on the case.	Replace exhaust valve.
6. Crack in case.	Replace case.

D. Humming or Buzzing During Inhalation:

1. Harmonic resonance between the springs and the mass of the piston.	Disassemble the first stage and flip the main spring over. Change the position of the piston in its bore. If resonance is still present, install a new piston and spring.
1. Harmonic resonance between the 2nd stage lever assembly springs, and the mass of the diaphragm.	This “honking” effect in the second stage can be lessened by installing one of Sherwoods new denser black diaphragms shipped under the same 4006-13A part number as the older blue diaphragm (available since 1997).

6.2 PARTS CLEANING RECOMMENDATIONS

Regulators which see heavy use, particularly those used in salt water, often require extra effort to remove dirt and corrosion from the parts of the regulator. Some suggested cleaning solutions are listed at the end of this section, and there are probably many others being used successfully. Here are a few general suggestions we can make:

1. Don't expect your cleaning solution to do all the work in a matter of seconds. If the solution cleans extremely rapidly, it is probably too strong and is etching the finish on the parts. Use a wooden or plastic stick or a **soft** bristle brush to help get rid of the thickest deposits. Take special care not to damage orifice sealing areas. Dress the orifice sealing areas with a fine grit polishing stick or pencil eraser after drying the parts.

2. Immerse only those parts which really need cleaning. With Sherwood's Dry Air Bleed System, the interior of the first stage is always clean and dry, so the piston and spring should never need cleaning. Immersing the clean Sherwood piston in contaminated cleaning solution can plug the flow control element in the face of the piston, which could slow or stop the flow through the positive air purge system.

3. Many of the solutions used for cleaning metal parts can damage the nitrile compounds found in O-rings. For this reason, remove all O-rings before placing parts in a cleaning bath.

6.3 COMMONLY USED CLEANING SOLUTIONS

SOLUTION	COMMENTS
Cleaning solutions recommended by ultrasonic cleaner manufacturers	The preferred choice. Check with the manufacturer for strengths and recommended uses for their cleaners.
Soapy water	Good for plastic and silicone parts.
Vinegar and water (equal part solution)	Ingredients easily available. Approx. 15 minutes cleaning time. May damage chrome finish.
1000 cc water 60 gr. sulfuric acid 60 gr. potassium dichromate	Fast-acting solution that must be made and used with care. Use gloves and safety glasses. Can damage chrome finish.

6.4 HANDLING TIPS

How your customers treat their regulators will directly influence the unit's function and durability. Following are a few tips that you can pass on to your customers to help assure the durability of their Sherwood Scuba regulator.

A. Pre-Dive Checks

1. Check the hoses and hose connections for cuts, abrasions or other signs of damage **before** mounting the regulator on the tank valve. Slide the hose protectors back to inspect the areas of the hose normally covered. Be sure all hose connections are tight.
2. Too prevent a common source of internal corrosion and contamination of the Dry Air Bleed System, ALWAYS turn the tank air valve on briefly before mounting the regulator. Many valve contain contaminated water in the outlet because of rain or splashing.
3. After mounting the regulator first stage, but before turning on the tank air valve, check to make sure that the yoke nut or DIN connection is tight and the regulator body is aligned properly, with no kinks in the hoses.
4. Turn the tank valve on **slowly** and listen for leaks. If any leaks are found, replace or repair parts as recommended.
5. **Never** lift the tank/BCD assembly by the regulator or hoses.
6. Surface-test the regulator by breathing lightly through the mouthpiece. Depressing the purge button above the water's surface is **not** meaningful an appropriate method for testing the function of the regulator.

B. Post-Dive Care

1. After the dive, blow all water out of the dust cap with clean dry air and place the cap securely on the regulator inlet. On multiple tank dives, use great care to keep salt water out of the regulator inlet when tanks are changed. Briefly release air from the valve before mounting the regulator on the valve. Neglecting thesesimple procedures is the greatest cause of corrosion and wear in scuba regulators. When used properly, Sherwood's exclusive Dry Air Bleed System keeps all other water-borne contamination out of the first stage body.

NOTE: A tiny stream of air bubbles escaping from a small black valve on the first stage indicates that the Dry Air Bleed System is working. The amount of air used is negligible (13 - 27 cc/min.). Check the system periodically (see Section 4.3B in this manual), particularly after servicing, to ensure that there is some air escaping from the black one-way bleed valve. If no air is escaping from the valve when air pressure is applied to the first stage, have the regulator inspected.

2. With the dust cap securely in place, rinse the first and second stages in **clean fresh water. DO NOT** depress the purge button before or during rinsing since this may introduce water into the second stage and the low pressure hose. Shake or blow all excess water from the second stage and allow the entire regulator to air-dry before storing.
3. Store the regulator in a clean bag or storage box, away from sunlight, excessive heat and humidity.

7.0 TWO YEAR WARRANTY AND MAINTENANCE INFORMATION

7.1 PROPER PROCEDURE FOR WARRANTY PAPERWORK

1. For detailed information on the operation of Sherwood Scuba Two Year Limited Warranty, please refer to Sherwood Scuba Technical Bulletin # 112. You can also contact your Sherwood Distributor if you still have questions about the warranty.

2. In most situation no paperwork will be necessary. The customer will bring his or her regulator in for one of its two annual servicings under the warranty. No parts other than those contained in the standard annual service kits will be needed. Discard all old parts replaced by new kit parts. **Please do not return these used parts to Sherwood Scuba!**

3. Remove one of the colored annual service rings from the main hose protector. When you have collected several of these rings (25-50), contact your Sherwood Distributor for a Return Goods Authorization Number. The color of the ring will determine the credit of type of service kit you will receive.

4. If you replace parts other than those contained in the standard annual servicing kit, you **will have to submit paperwork.** If the regulator meets the conditions of the two-year warranty, and the warranty is still active fill out the Sherwood Warranty Replacement Parts Form. You **must** describe the problem with the part you are returning in **Part Five** of the form. If this area is blank, you will not receive credit for that part.

5. In Sherwood Scuba regulators **manufactured before Jan. 1, 1993** which still have a valid Lifetime Limited Warranty you, the dealer, must send the white Warranty Service Form to Sherwood. The information will be recorded by Sherwood to determine whether or not the warranty on that particular regulator is still in effect.

7.2 SCHEDULED MAINTENANCE

1. To keep the owner warranty in effect, your customers must have their regulators inspected and serviced annually (within six weeks before or after the anniversary of the date of purchase) by an authorized Sherwood Dealer. **Failure to do so invalidates the warranty.**

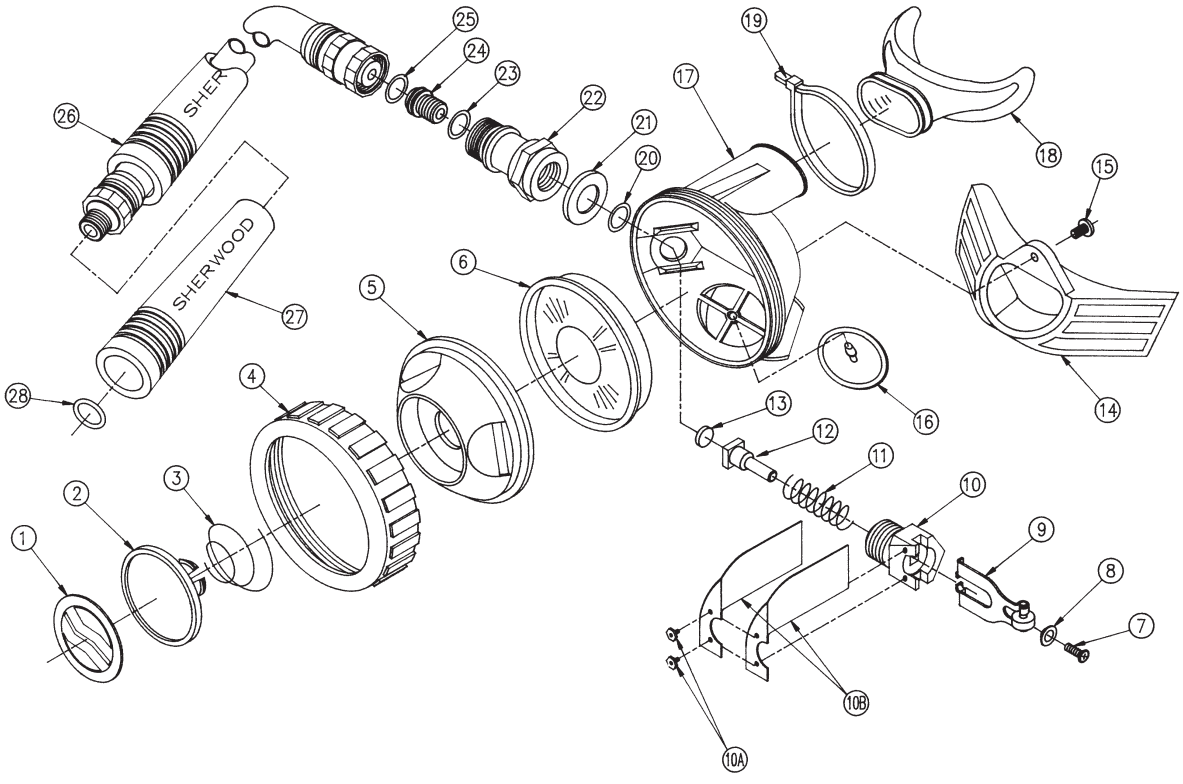
2. Even with infrequent use, the regulator should be serviced annually to ensure proper performance and satisfy warranty requirements.

3. In Sherwood regulators **manufactured before Jan. 1, 1993** which still have a valid Lifetime Limited Warranty, you, the dealer, must send in the white Warranty Service Form in to Sherwood. The information will be recorded by Sherwood to determine whether or not the warranty on that particular regulator is still in effect.

SECOND STAGE REGULATOR - MAGNUM® II SRB3300, BLIZZARD® SRB3200, OASIS® SRB3400, OASIS® (SRB3500)

NOTE: Labels (Item 1 below) are also available in different colors.

ITEM #	CATALOG #	DESCRIPTION
1	3207-2	Label
2	3004-1	Purge Button (no label insert)
3	19-4006-12	Purge Button Spring
4	3302-7	Bezel Ring
5	3302-6BK	Cover
6	4006-13A	Diaphragm (black Tufel®)
7	J12C04045B	Screw (combination Phillips/square drive)
8	19-4006-17	Washer
9	46-3302-20	Lever (for Blizzard)(black Teflon®-coated)
9	3302-20	Lever (for Mag II, Oasis, Oasis+, Classic)
10	1-3004-8RH	Lever Support (for Magnum II, no screw holes)
10	1- 3106-17R	Lever Support (for Blizz.,Oasis,Oasis+,Classic)
10A	J113481874BARC	Screws (2 needed)(for Blizz.,Oasis,Oasis+,Classic)
10B	25-3106-16	Fins (2 needed)(for Blizz.,Oasis,Oasis+,Classic)
11	19-978-10	Spring
12	9-4006-18	Stem (no seat insert installed)
13	978-9BN	Seat Insert (for Stem)
14	3302-2	Exhaust Tee
15	J12C04045B	Screw (combination Phillips/square drive)
16	4006-15	Exhaust Valve
17	3302R-1	Case
18	3208-9S	Mouthpiece
19	3786-9W	Mouthpiece Tie
20	G907A	O-ring
21	1-3004-12	Spacing Washer
22	1-3004-4A	Orifice Housing
23	G010A	O-ring (for adjustable orifice)
24	43-4006-20	Adjustable Orifice (no O-ring)
25	G010A	O-ring (for hose outlet end)
26	5016-20-31	Hose Assembly (31")(includes hose protector)
27	5100-27	Hose Protector
28	G011B	O-ring (hose inlet end)





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