SHERWOOD SCUBA® REGULATORS

magnum®
(SRB5300)

BLIZZARD®
(SRB5900)

BRUT™
(SRB5100)

OASIS®
(SRB5700)



Assembly & Maintenance Guide

FIRST STAGE - OASIS™ SRB5700, BLIZZARD™ SRB5900, MAGNUM® SRB5300, BRUT™ SRB5100

To determine the first stage of a particular regulator, compare the regulator with the pictures and diagrams in this guide. The model number of the regulator is laser stamped on the first stage between two of the outlet ports. For further information, contact Sherwood at 1(888) 50-SCUBA.

ITEM #	CATALOG #	DESCRIPTION
1	5105-70	[

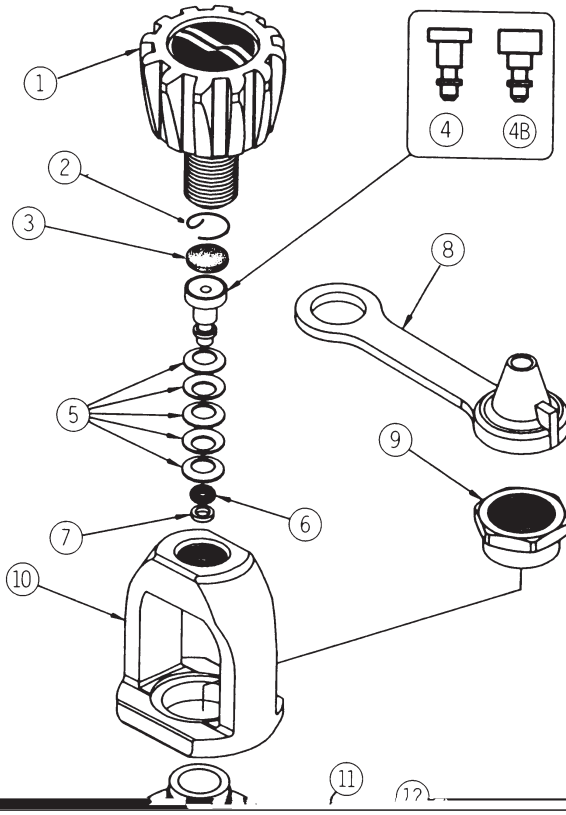


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BEFORE YOU BEGIN.....

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 **SRB5900 Blizzard, SRB5700 Oasis, SRB5300 Magnum and SRB5100 Brut regulators** only. The older SRB3900 Blizzard, SRB3700 Oasis, SRB3300 Magnum and SRB2100 Brut regulators have different part and service procedures. They have their own manuals that are to be used for guidance during their servicing (Part Numbers T-SC07A93 and T-SC07B93). 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 Blizzard, Oasis, Magnum, and Brut 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 Sherwood Scuba or your Sherwood Sales Representative or Sherwood Scuba Customer Service.

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 Scuba Customer Service.

2.0 SPECIFICATIONS

2.1 SPECIFICATIONS FOR THE SRB5900 BLIZZARD, SRB5700 OASIS, AND SRB5300 MAGNUM

REGULATOR MODEL:	Sherwood SRB5900 Blizzard, SRB5700 Oasis, SRB5300 Magnum
AIR FLOW:	33 cu. ft. (935 liters)/min. @ 1 atmosphere
INHALATION RESISTANCE:	.9" (2.3 cm) w.c @ 1 atmosphere
EXHALATION RESISTANCE:	0.7" (1.8 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. 11 oz. (.77kg)
INTERSTAGE PRESSURE:	135 -150 psi (9-10 bar)
MAXIMUM INLET PRESSURE:	232 Bar for SRB5900CE, SRB5700CE, and SRB5300CE 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 UNF)
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:	5.1 oz. (.15 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® (clear blue) Exhaust Valve – Thermoplastic elastomer (blue) Mouthpiece – C-Flex®

Maximum certified depth is 50m

2.2 SPECIFICATIONS FOR THE SRB5100 BRUT REGULATOR

REGULATOR MODEL:	Sherwood SRB5100 Brut
AIR FLOW:	30 cu. ft. (850 liters)/min. @ 1 atmosphere
INHALATION RESISTANCE:	1" (2.5 cm) w.c @ 1 atmosphere
EXHALATION RESISTANCE:	0.7" (1.8 cm) w.c. max. @ 1 atm.
RECOMMENDED LUBRICANT:	LTI Christo-Lube®

A. First Stage Regulator:

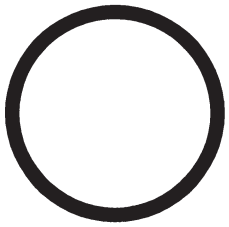
TYPE:	Flow-by piston with Removable Orifice and Dry Air Bleed – **U.S. Pat. # 4,226,257**
WEIGHT:	1 lb. 11 oz. (.77kg)
INTERSTAGE PRESSURE:	135 -150 psi (9-10 bar)
MAXIMUM INLET PRESSURE:	232 Bar for SRB5100CE Model
POSITIVE AIR PURGE FLOW RATE:	13-27 cc/minute
# LOW PRESSURE PORTS:	3 (3/8"-24 UNF)
# HIGH PRESSURE PORTS:	1 (7/16"-20 UNF)
MATERIALS:	Body – CDA-360 Brass O-rings – Buna-N Bleed Valve – Ethylene Propylene Piston Seat – Teflon®

B. Second Stage Regulator:

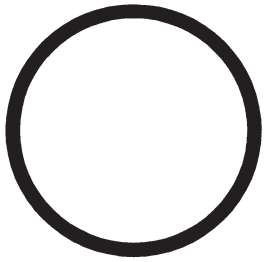
TYPE:	Downstream valve, diaphragm, Variable Fulcrum – **U.S. Pat. #3,991,785**
WEIGHT:	5.1 oz. (.15 kg) (w/o hose)
HOSE LENGTH:	31 in. (.79 m)
MATERIALS:	Cover – Thermoplastic vinyl Case – Thermoplastic Triax® Poppet Seat – Buna-N Poppet Seat – Buna-N O-Rings – Buna-N Diaphragm – Tufel® (clear blue) Exhaust Valve – Thermoplastic elastomer (blue) Mouthpiece – C-Flex®

Maximum certified depth is 50m

3.0 O-RINGS REFERENCE CHART



G022A
– FOR LARGE END OF PISTON



G025A
– FOR CAP



G007A
– MOVING ORIFICE, SMALL END OF PISTON



G010A
– OUTLET END OF HOSE, ADJUSTABLE ORIFICE



G011B
– INLET END OF HOSE, L.P. PORT PLUG



G904A
– 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:
White-colored – p/n TL109 (for installing O-ring on piston tip)
Green-colored – p/n 38-TL107 (for installing O-ring onto moving orifice)

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 (8).

4. 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 (9) from the body (13). See Photo #1.



Photo #1

5. Remove the yoke (10) and yoke nut (9) from the body.

6. Use a 5/32" Allen wrench to remove all remaining port plugs (12) (16) from the body.

7. Use the Sherwood regulator support handle and a 15" adjustable wrench or a bench vise to remove the cap (26) from the main body. If the regulator is an Oasis or Blizzard model, the trim ring (28) will slide off at this time.

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.

10. Using a 3/32" Allen wrench, remove the flow control element assembly (18) from inside the large end of the main body. There are two styles of flow control assemblies. The old style with a sintered stainless steel flow restrictor and the new style flow restrictor that is laser drilled P/N 5105-13 with a white filter P/N 5105-14. The new style complete assembly part number is 5105-15. If the regulator has the old style flow restrictor and it is functioning (13 to 27 cc/min) it can be reused, however if it needs to be replaced use the new style. The black gasket can be reused. The new style restrictor can be cleaned if it becomes plugged. Remove the white filter and discard it. The white filter must be replaced P/N 5105-14. The laser drilled flow restrictor can be cleaned in an ultrasonic cleaner and reused. The flow requirement for the new flow control assembly is 20 to 30 cc/min.

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

CAUTION

If any grease or oil gets on the flow control element assembly, the air flow will be impeded.

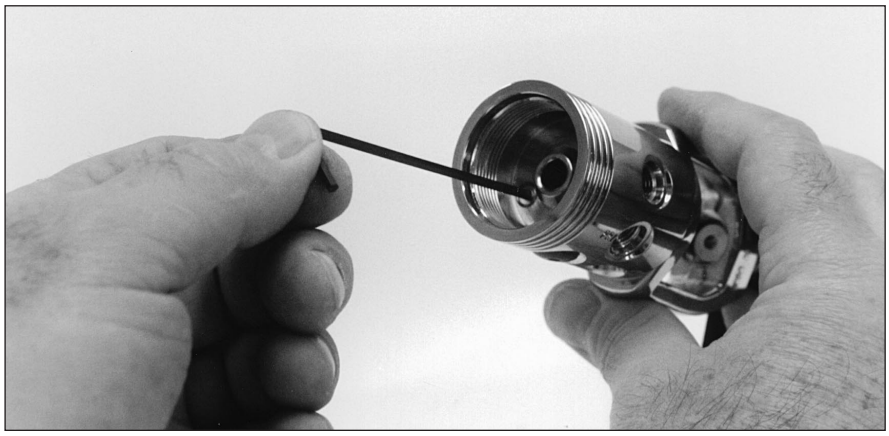


Photo #2

NOTE: 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.

11. Use a pocket screw driver to remove the black washer (17) that was beneath the element assembly. Save this washer as it can usually be reused. Be careful not to scratch the metal surface under the washer.

12. Use a pocket screwdriver to remove the retaining ring or star washer (2) that holds the inlet filter (3) in place. Older units used a star washer (a flat disc washer with six outward facing legs). Newer units use a wire retaining ring with inward hook. Always discard the used inlet filter. Old style star washers are discarded, newer style retaining rings are saved for reuse.

13. 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 (5) for any cracks. Replace all five disc springs if any cracks are found.

14. 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

15. Blow all residue from the body after polishing.

16. Remove the large O-ring (26) from the cap. This O-ring can usually be reused.

17. If necessary, clean all metal parts of the first stage **except the flow control element assembly** (18) 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.

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

19. 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.

20. Remove and discard the black O-ring 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.

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 parts that are always replaced at every annual service interval. The kit number for the regulators covered in this manual is 4000-15.

2. Before installing new O-rings on the piston and moving orifice, lubricate the O-rings with LTI Christo-Lube. Installation of the small O-ring (21) on the piston is made much easier by using the white-colored Sherwood O-ring installation cone (p/n TL109). Place the cone over the tip of the piston. Slide the lubricated O-ring over the cone until it slips into the piston groove.

3. Place the new piston seat on a clean piece of paper on a hard flat surface. Press the piston tip firmly over the seat until it is fully installed. The piston is now rebuilt and ready for installation.

4. Use the Sherwood installation cone to prevent damage to the new O-ring during installation onto the moving orifice. Use the green O-ring installation cone (p/n 28-TL107) to install first the new O-ring (6) and then the used backup washer (7) onto the groove on the moving orifice. Position them so that the black O-ring is closest to the wide end of the moving orifice.

5. Using a greased soft probe, **lightly** lubricate the first 1/8" of the **small** bore in the body (13) where the small piston and moving orifice O-rings seal.

6. With your finger, push the moving orifice assembly, pointed orifice end first, into the yoke end of the main body as far as possible. Place the inlet filter (3), rough side up, on top of the moving orifice. Place the retaining ring or star washer (2) on top of the filter. Push the retaining ring or star washer firmly into place with a dowel or screwdriver.

7. Install the used black washer (17) into the hole in the main body where the flow element is placed. A new washer may be installed if necessary.

8. Install the flow control element (18) into the main body. Tighten the element with a 3/32" Allen wrench with a torque of 3 in. lbs. (.4 nm). Do not overtighten.

9. Replace the cleaned and lightly lubricated O-ring (25) on the cap (26).

10. Install the piston assembly (23) squarely into the cap (26). If any shims were found when the regulator was disassembled, place them over the piston stem. Then place the main spring (19) over the piston stem.

11. Install the cap assembly onto the body. Hand-tighten the assembly as tightly as possible, then install the Sherwood regulator support handle into one of the low pressure ports. Using a 15" adjustable wrench or a bench vice to hold the cap, tighten the cap onto the body until it bottoms on the thread. **Do not tighten further**.

12. Using your index finger, install the clean and dry one-way bleed valve (15) into the body. No particular orientation is necessary.

13. Lightly lubricate the body yoke nut threads with grease, and install the yoke (10) and the yoke nut (9) onto the body.

14. Using the regulator support handle (p/n TL113) in one of the LP pressure ports of the body and a 15" adjustable wrench, tighten the yoke nut snugly (see Photo #1).

15. Install the handwheel (1) and the dust cap (8) onto the yoke.

16. 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:

   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 for the old style flow control elements and 20-30 cc for the new laser drilled flow control elements.

   c. If the reading is significantly higher than 30 cc, check the O-rings and sealing surfaces-mated to the piston. If the reading is below 13 cc, check the flow control element (18) to determine if it has been clogged by grease or other foreign matter. If it is clogged, it must be replaced (old style sintered stainless steel) or cleaned (new laser drilled element).

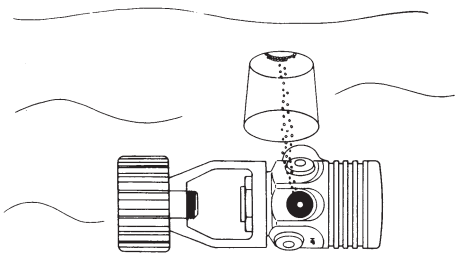


FIG. #1

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 and 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 or 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

– 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. Remove the hose assembly (24) from the orifice housing (20). 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 (17) by cutting the mouthpiece tie (18) 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 screws (16) with a #10 Torx or slotted screwdriver.

4. Remove the exhaust tee (15) from the case by pulling it back and off the top edge.

5. Remove the cover (2) from the case by inserting the thumb nail under the edge opposite the hose. Slide the cover assembly off of the orifice housing.

6. Remove the diaphragm retaining ring (3) from the case using the fingers.

7. Gently remove the diaphragm (4) 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.

8. Use a 6" or 8" (15 or 20 cm) adjustable wrench to loosen and remove the orifice housing (20). The case assembly has been reinforced to allow doing this without holding the lever support with another wrench.

9. 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).

10. Remove the O-ring (21) from the adjustable orifice.

11. Before removing the exhaust valve (14) 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.

12. Remove the lever support (7) from the inside of the case (19). Note: The Blizzard and Oasis style lever support can be removed with the heat transfer fins (8) (9) still attached. These fins do not usually have to be removed from the lever support during servicing.

13. 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 pick 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.

14. If parts of the lever assembly (stem, spring, lever, etc.) need to be replaced, it can be done with a minimum number of tools. With the original poppet seat (13) in place, and the orifice (22) installed in the orifice housing (20), screw the orifice housing and lever support together (without the case) until the lever begins to droop. Use a #10 Torx screwdriver to remove the screw (5). Unscrew the orifice housing and lever support, and the poppet and spring will be exposed for replacement. Reverse the procedure to install the new parts. Remember to use the old seat to perform this procedure since the seat is likely to be damaged due to excess friction. Install a new seat (13) when you have reassembled the lever assembly.

NOTE: If only the lever (6) is to be replaced, do not totally remove the screw. You can remove the lever from under the screw (5) when the screw is almost all the way out.

15. 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.

16. **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** in this manual 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.

17. Inspect the case (19) 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.

18. 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.

19. 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 (22). 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 (14) 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 support assembly (7) into the proper hole in the case (19) from the inside. Note that the Blizzard and Oasis style lever assambly will be installed with the heat transfer fins (8) (9) still attached. The fins must be installed into the mouthpiece on the correct side of the locating tabs in the top and bottom of the mouthpiece tube. When looking through the case mouthpiece tube from the outside (mouthpiece end) the fins must be on the right side of the locating tabs. Screw the orifice housing (20) onto the threads of the lever support (7). Use a 6" or 8" adjustable wrench to tighten the orifice housing onto the lever support assembly snugly **70 in. lbs. (8 joules).**

NOTE: Do not allow lubrication (grease on fingers, silicone overspray, etc.) to get on the case (19), the diaphragm (4), the retaining ring (3), or the exhaust valve (14). This may cause these parts to slip or deteriorate.

THE FOLLOWING STEPS (4 - 10) ARE INCLUDED HERE FOR CONTINUITY. THEY MUST BE PERFORMED AFTER THE REGULATOR SECOND STAGE IS ADJUSTED (see Section 5.4, Set-Up of Second Stage).

4. Install the diaphragm (4) into the case so that it sits evenly on the ledge.

5. Install the retaining ring (3) into the diaphragm recess.

6. Install the cover (2) onto the case by sliding the retaining loop over the orifice housing, and then working the cover over the case until it sits properly in its groove in the cover.

7. Install the exhaust tee (15) onto the case using the two screws (16).

NOTE: Depending on the owner’s needs, either the Blizzard & Oasis style extended tee for maximum bubble dispersion, or the Magnum/Brut style shorter tee for minimum weight and drag, can be installed on any of the three models.

8. Tighten the screws using a # 10 Torx screw driver just enough to seat them snugly. There is no reason to turn these screws beyond the first contact point. **Do not overtighten**. This screw is threading into plastic, which will hold well in service but is easily stripped if overtightened.

9. Install the mouthpiece (17) . Be sure to position the mouthpiece so that the word “Sherwood” is on the top.

10. Install a new mouthpiece tie (18) .

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 (20) and the hose assembly (24) . Use the tool to screw the adjustable orifice (22) clockwise. Watch the end of the lever (6) 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 (22) 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.

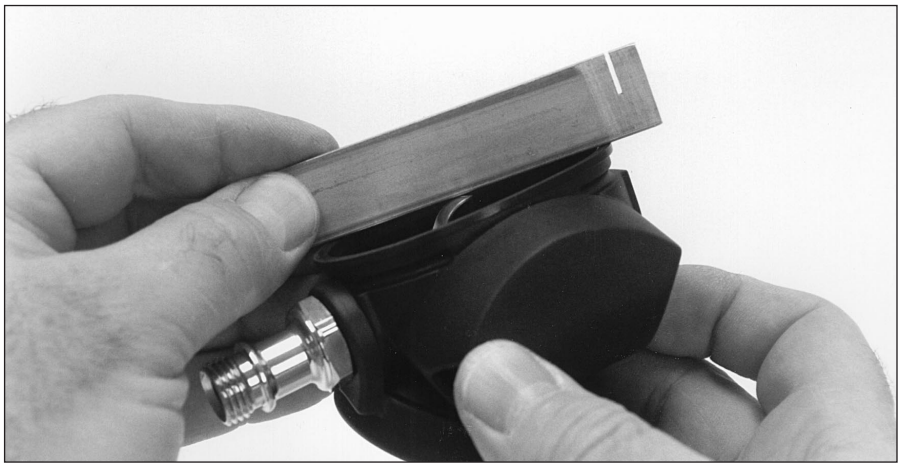


Photo #4

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.

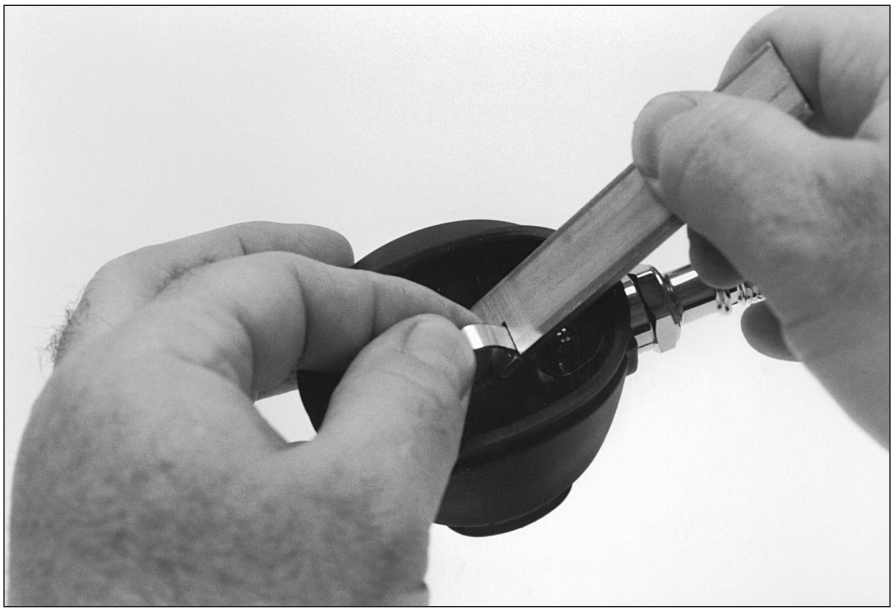


Photo #5

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. On newer levers there are two indentations at the proper bend point.

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 (22) clockwise. However, discontinue clockwise adjusting when the lever (6) becomes loose against the lever support (7) .

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 unrestricted.

2. If you use a water column, it should not exceed 1/2" w.c. (.02 bar) at one atmosphere.

3. Brand new exhaust valves will sometimes adhere slightly to the case, causing a slight increase in inhalation effort. This condition will disappear with use.

C. Leak Test

1. Disconnect the air supply. Purge the regulator of all positive air pressure.

2. Slowly immerse the second stage in a pan of water with the mouthpiece pointing straight up.

3. Immerse the regulator until the water is 1/4" to 1/8" (.64 to .32 cm) from the lip of the mouthpiece.

4. Hold the regulator in this position for one minute and then slowly raise it out of the water.

5. Tip the regulator mouthpiece downward and watch the inside of the mouthpiece tube. If any water escapes from the mouthpiece tube, check for source of leakage.

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** in this manual 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. Remove shims (20).
2. Damaged or worn H.P. piston seat.	Replace seat (p/n 3801-5).This also gives high intermediate pressure.
3. Damaged or worn L.P. poppet stem seat.	Replace 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 up to room temperature (this chilling will not occur in normal diving).

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.	Visually check position of diaphragm.
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.

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
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.
Cleaning solutions recommended by ultrasonic cleaner manufacturers	The preferred choice. Check with the manufacturer for strengths and recommended uses for their cleaners.

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. 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.

3. Turn the tank valve on **slowly** and listen for leaks. If any leaks are found, replace or repair parts as recommended.

4. **Never** lift the tank/BCD assembly by the regulator or hoses.

5. Surface-test the regulator by breathing lightly through the mouthpiece. Depressing the purge button above the water's surface is **not** 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. Neglecting these simple 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 the Sherwood Scuba Two Year Limited Warranty, please refer to Sherwood Scuba Technical Bulletin #112. You can also contact Sherwood Customer Service if you still have questions about the warranty.

2. In most situations, 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 or 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 6 weeks before or after the anniversary of the date of purchase) by an authorized Sherwood dealer. **Failure to do so invalidates the warranty.**

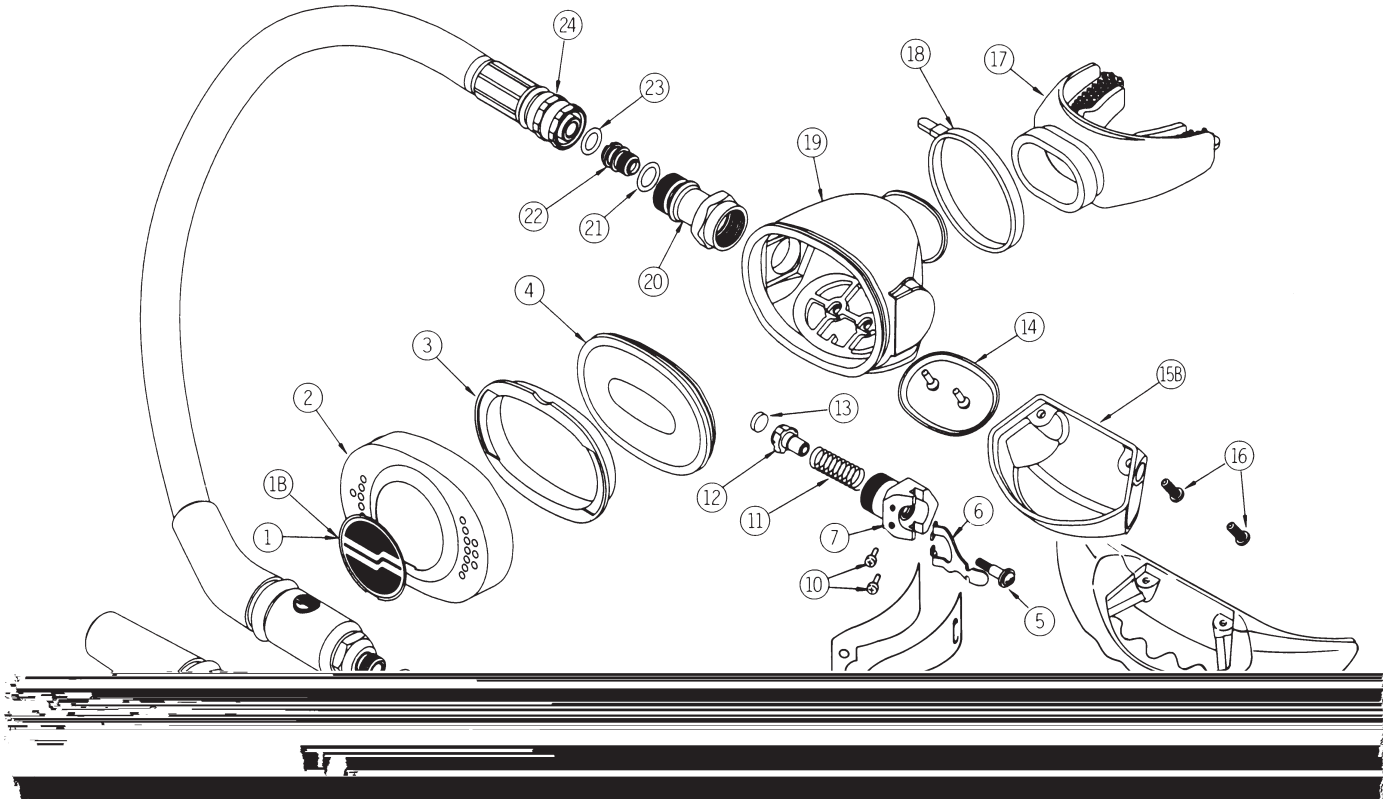
2. Even with infrequent use, the regulator should be serviced annually to ensure proper performance and satisfy warranty requirements.

3. In Sherwood 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 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 REGULATORS - OASIS™ SRB5700, BLIZZARD™ SRB5900, MAGNUM® SRB5300, BRUT™ SRB5100

NOTE: Labels (Item 1 below) in white, purple, pink, green, blue and yellow are available. Call Sherwood for part numbers.

ITEM #	CATALOG #	DESCRIPTION
1	.5100-7WH	Label Insert for the Brut
1	.5300-7WH	Label Insert for the Magnum
1	.5700-7Y	Label Insert for the Oasis (yellow on gray)
1	.5700-7BK	Label Insert for the Oasis (black on gray)
1	.5900-7BL	Label Insert for the Blizzard (blue on gray)
1	.5900-7BK	Label Insert for the Blizzard (black on gray)
2	.5700-8	Grey Cover (for Blizzard & Oasis)
2	.5100-8	Black Cover (for Magnum and Brut)
3	.5100-6	Retainer Ring
4	.3108-13	Diaphragm (blue Tufel®)
5	J12P04105SB	Screw (silver combination # 10 Torx / slot drive)
5	29-5900-J12	Screw (black Teflon® coated for Blizzard)
6	.3108-3	Lever (plain stainless for Brut, Magnum, Oasis)
6	.29-3108-3	Lever (black Teflon® coated for Blizzard)
7	9-5100-3	Lever Support (for Blizzard & Oasis, with fin screw holes)
7	9-5100-3	Lever Support (for Magnum & Brut, no screw holes)
8	.25-5700-21	Heat Transfer Fin (flat end) (Blizzard & Oasis)
9	.25-5700-22	Heat Transfer Fin (dimpled end) (Blizzard & Oasis)
10	J113481874BACR	Screws for Heat Transfer Fins (Blizzard & Oasis)
11	.5100-29	Spring
12	.5100-1	Stem (no seat insert installed)
13	.978-9BN	Seat Insert (for Stem)
14	.3602-6A	Exhaust Valve
15A	.5700-9	Exhaust Tee (longer gray one, Blizzard/Oasis style)
15B	.5100-9	Exhaust Tee (shorter black one, Brut/Magnum style)
16	.3702-5	Screw (combination # 10 Torx / slot drive)
17	.3602-3LS	Mouthpiece (larger Wisdom® style for Blizzard, Oasis & Magnum)
17	.3602-3	Mouthpiece (shorter style for Brut)
18	.3786-9W	Mouthpiece Tie
19	.5100-5	Case
20	1-5100-4	Orifice Housing
21	G010A	O-ring (for Adjustable Orifice)
22	41-4006-20A	Adjustable Orifice (no O-ring)
23	G010A	O-ring (for hose outlet end)
24	.5016-20-33A	Hose Assembly (33”-84cm), includes 2 hose protectors (Blizzard & Oasis)
24	.5016-20-33	Hose Assembly (33”-84cm), includes hose protector (Magnum & Brut)
25	.5100-27	Hose Protector
26	G011B	O-ring (hose inlet end)





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