SHERWOOD SCUBA®

BRUT™
(SRB2100)



Assembly & Maintenance Guide

FIRST STAGE - BRUT™ SRB2100

ITEM #	CATALOG #	DESCRIPTION
	SRB2105	First Stage Complete
1	3701-12	Label for Handwheel
2	3701-70	Handwheel Assembly
3	3504-6	Star Washer
	J2790056B	Filter Retaining Ring
4	1390-7	Filter
5	29-3106-13A	Moving orifice
6	3601-20	Complete Moving Orifice Assembly
7	19-8010-8	Disc Spring
8	MS28774-007	Back-up Ring (for Moving Orifice)
9	G007A	O-ring (for Moving Orifice, 2 ea.)
10	3801-20	Dust Cap
11	1-1665-17	Yoke Nut
12	2-3801-4	Yoke
13	1-3105-6	L.P. Port Plug
14	G011B	O-ring (for L.P. Port Plugs)
15	3106-6	One Way Bleed Valve
16	J07-S1024-08DB	Locking Allen Screw
17	2-3601 -1 A	Main Body
18	G904A	O-ring (for H.P. Port Plug)
19	1-3405-4	H.P. Port Plug
20	G024A	O-ring (fits on large end of Body)
21	2-3601-7	Pressure Adjusting Ring
22	G025A	O-ring (fits on Pressure Adj. Ring)
23	3801-12B	Main Spring
24	G007A	O-ring (for small end of Piston)
25	3801-5	Piston Seat
26	3601-10	Piston Assembly
27	G022A	O-ring (for large end of Piston)
28	2-3601-8	Cap
29	3601-15	Cap Label

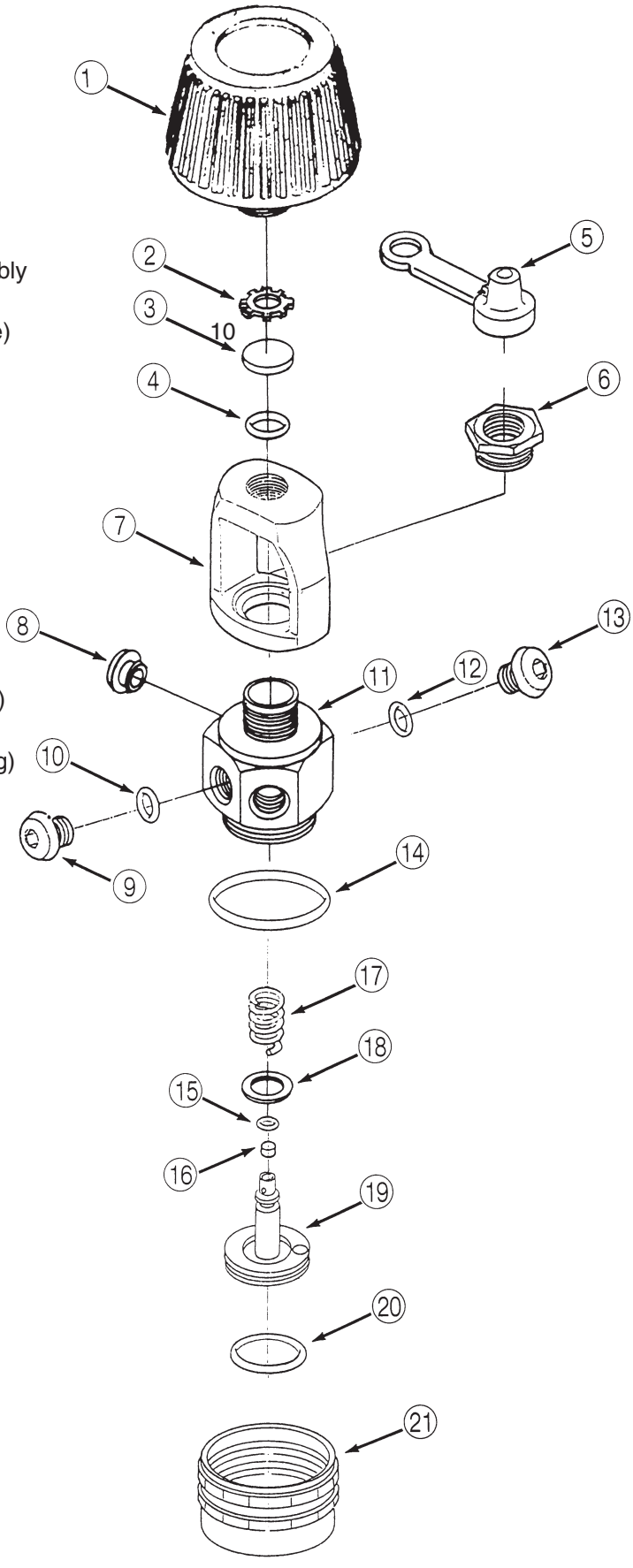


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IMPORTANT

Read all instructions and procedures in this manual carefully **before** servicing the regulator. The procedures in this manual apply to all Brut regulators. Parts have changed cosmetically over the years, but newer style parts can usually be used in place of older parts. The most current part numbers can be obtained by calling your Sherwood Distributor. If you have any questions, contact your Sherwood Sales Representative or Sherwood Distributor.

INTRODUCTION

This manual is a guide for the annual servicing and maintenance of the Sherwood Brut SRB2100 regulator. It 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.

Because of the many unique features found only 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.

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.

For information on the dates and locations of upcoming Sherwood service seminars near you, contact your Sherwood Distributor or Sherwood Sales Representative.

IMPORTANT

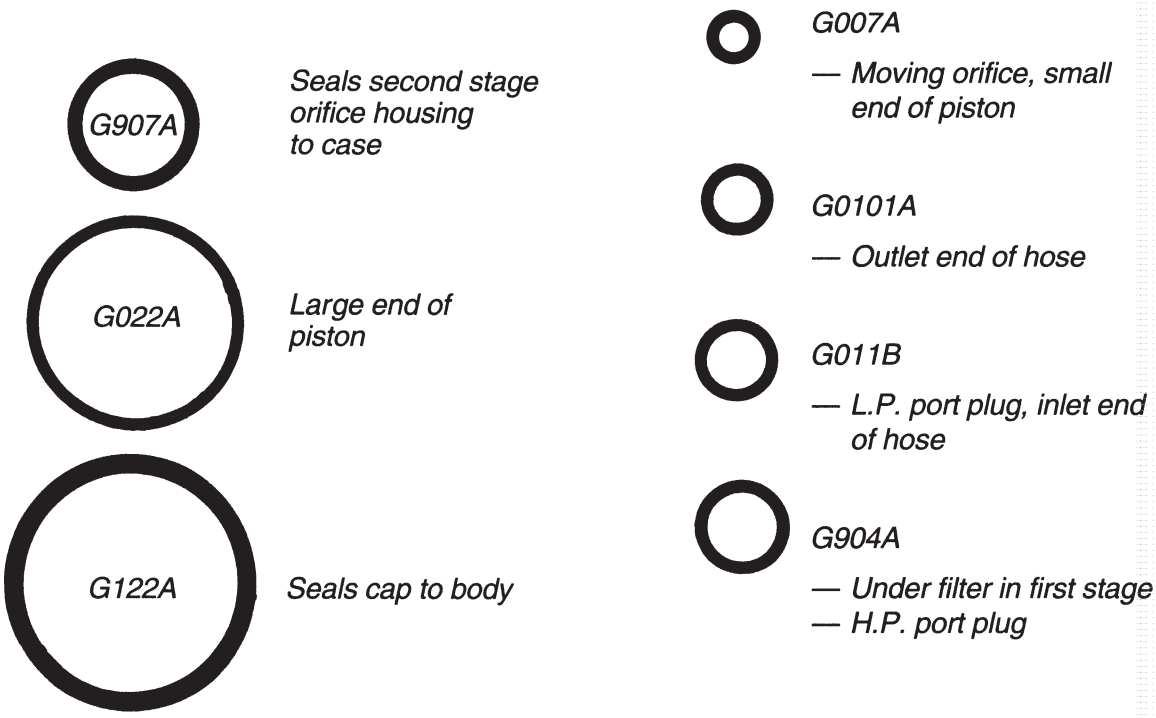
Anyone attempting to service or repair Sherwood Scuba regulators **must** have a thorough understanding of the principles of operation of scuba regulators and valves, as well as the appropriate mechanical ability. The technician must also be properly trained in the safe use of compressed air and the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

SPECIFICATIONS

REGULATOR MODEL	Sherwood Brut SRB2100
AIR FLOW	27 cu. ft. / min. @ 1 atmosphere
INHALATION RESISTANCE	1. 1" w.c @ 1 atmosphere
EXHALATION RESISTANCE	0.8" w.c. max. @ 1 atm.
RECOMMENDED LUBRICANTS	LTI Christo-Lube #11 1® Dow Corning 111 Compound®, Parker Super O-Lube®, or equivalent
FIRST STAGE REGULATOR	SRB2105
TYPE	Flow-by piston with Dry Air Bleed — **U.S. Pat. #4,226,257**
WEIGHT	1 lb.
INTERSTAGE PRESSURE	140-150 psi
MAXIMUM INLET PRESSURE	3600 psi (with DIN adaptor)
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®

SECOND STAGE REGULATOR	SR2104P
TYPE	Downstream valve, diaphragm, with Variable Fulcrum **U.S. Pat. #3,991,785**
WEIGHT	7.6 oz. (w/o hose)
HOSE LENGTH	31 in.
MATERIALS	Cover -Thermoplastic Triax® Case -Thermoplastic Triax® Poppet Seat - Buna-N O-rings - Buna-N Diaphragm —Tufel® (Blue) Exhaust Valve -Thermoplastic Elastomer Mouthpiece - C-Flex®

O-RING REFERENCE CHART



NOTE: Before you begin disassembly of the regulator, test the first and second stages for output pressures and leakage. Pretesting in this way will help you to pinpoint any specific problems requiring repair.

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

TOOLS REQUIRED FOR FIRST STAGE SERVICING

— Bench vise

— 5/32" Allen wrench

— 6" or 8" adjustable wrenches

— Pocket screwdriver
— Small Phillips screwdriver
— Sherwood Combination Wrench (p/n 9-TL101), or 15" adjustable wrench
— Sherwood O-ring Installation Cones, brass-colored (p/n TL106) -for O-ring on piston tip
— Sherwood 50 cc Graduated Cylinder (p/n TL110)
— Sherwood Piston Seat Removal Tool (p/n TL112)
— Sherwood Regulator Support Handle (p/n TL113)
— Sherwood Hose Protector Installation Tool (p/n TL114)
— Sherwood Inlet Filter Screen Installation Tool (p/n TL115)
— Sherwood Intermediate Pressure Gauge (p/n TL119)

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

DISASSEMBLY OF FIRST STAGE

To view the complete parts list of the first stage, fold out the front cover of this manual.

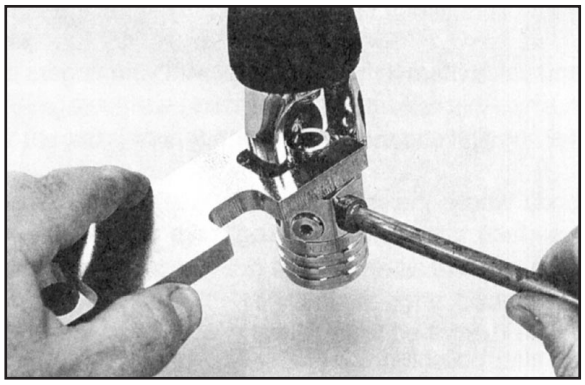
(1) Use 6" or 8" adjustable wrenches to disconnect all hoses from the first stage. Pull back the hose protectors using the Sherwood hose protector installation tool (p/n TL114). Inspect the hoses for wear. Pay particular attention to the area where the metal ferrules meet the rubber hose material. Replace hoses if necessary.

(2) Unscrew and remove the handwheel (item 1).

(3) Remove the dust cap (item 5).

(4) Install a Sherwood regulator support handle (p/n TL113) into one of the low-pressure ports. Use the support handle and a Sherwood combination wrench (p/n 9-TL101) or bench vise to loosen the yoke nut (Item 6) from the body (Item 11). See Photo #1.

PHOTO #1



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

(5) Remove the yoke (item 7) and yoke nut from the body.

(6) Use a 5/32" Allen wrench to remove all remaining port plugs (Items 9 & 13) from the body.

(7) Use a Sherwood regulator support handle (p/n TL113) and a 15" adjustable wrench or bench vise to remove the cap (item 21) from the main body.

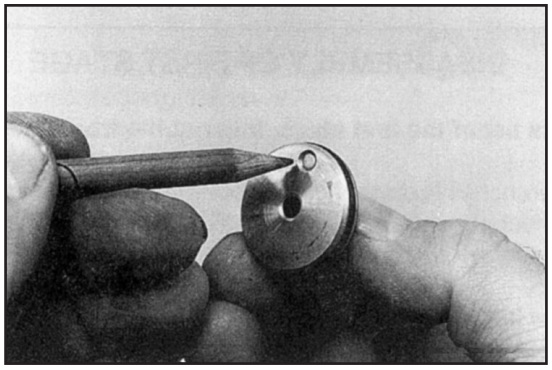
(8) Remove the spring (Item 17), any shims (Item 18), and piston assembly (Item 19) from the cap. Remove both piston O-rings and discard them.

(9) Remove the piston seat (Item 16) 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, the air flow will be impeded.

- Keep greasy fingertips away from the flow element during servicing.
- Use a clean, dry cloth to wipe the piston surface if it needs cleaning.
- **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.
- 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 through the regulator upon descent.
- 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.

PHOTO #2



(10) Use a pocket screwdriver to remove the star washer (Item 2) that holds the inlet filter in place (Item 3). Discard both the star washer and the inlet filter.

(11) Remove the one-way bleed valve (Item 8) 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).

Blow all residue from the body after polishing.

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

(13) If necessary, clean all metal parts of the first stage **except the 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 page 14 for recommendations on cleaning solutions.

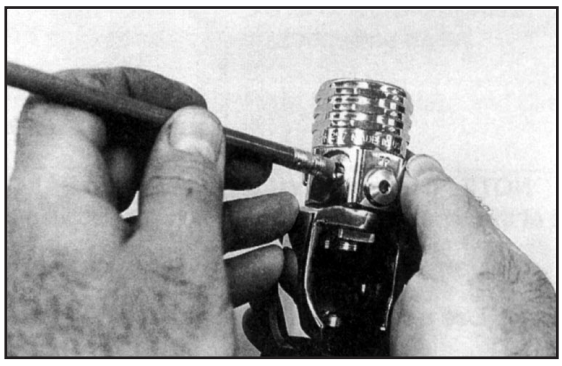


PHOTO #3

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

(15) Inspect the bores in which the piston 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.

(16) Inspect the orifice sealing surface located inside the body where the small tip of the piston seals when the regulator is assembled. Any nicks, scratches or corrosion at the top of the cone can allow air to pass, which will result in creeping hose pressures.

Polish the defects out using a **fine** abrasive polishing stick or pencil eraser. When polishing, apply a **light** pressure to prevent excessive wear on the or if ice cone. Use compressed air to blow away any dust created by the polishing process.

ASSEMBLY OF FIRST STAGE

(1) The minimum parts to be replaced at every annual service interval can be found in the Minimum Parts Replacement Kit for the Brut regulator (p/n 4000-1).

(2) Before installing new O-rings on the piston, lubricate them with one of the recommended lubricants (see "Specifications" section of this manual). Installation of the small O-ring (item 15) on the piston is made much easier by using the brass-colored Sherwood O-ring installation cone (p/n TL106). 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) Using a greased soft probe, **lightly** lubricate the first 1/8" of the **small** bore in the body (item 11) where the small piston O-ring seals.

(5) Place the O-ring (Item 4) into the main body (yoke end). Place the inlet filter (item 3), rough side up, on top of the O-ring. Place the star washer (Item 2) on top of the filter. Use Sherwood's filter installation tool (p/n TL115) to push against the star washer with the short round center section of the tool until the flat part of the handle comes in contact with the end of the regulator body. This ensures that the filter has been installed squarely to the proper depth, without distorting the filter.

(6) Install the piston (item 19) squarely into the cap (item 21). If any shims were found when the regulator was disassembled, place them over the piston stem. Then place the main spring (Item 17) over the piston stem.

(9) Replace the lightly lubricated O-ring (Item 14) on the body.

(10) 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 Sherwood combination wrench or bench vise to hold the cap, tighten the cap onto the body until it bottoms on the thread. **Do not tighten further.**

(11) Using your index finger, install the clean and dry one-way bleed valve (item 8) into the body.

Note: If you use the bleed valve with the Sherwood logo molded into it P/N you will notice a “dot” molded near the right side of the logo. Install the bleed valve with the “dot” oriented closet to the inlet of the regulator (toward the yoke).

(12) Lightly lubricate the body yoke nut threads with grease, and install the yoke (item 7) and the yoke nut (Item 6) onto the body.

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

(14) Install the handwheel (Item 1) and the dust cap (item 5) onto the yoke.

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

IMPORTANT

If the regulator serviced is still covered under the Sherwood Lifetime Warranty, fill out and return the white 8 1/2 x 11 " Warranty Service Form to your authorized Sherwood Distributor. **Print clearly.**

FAILURE TO SEND IN THE WARRANTY SERVICE FORM WILL CAUSE YOUR CUSTOMER'S WARRANTY TO EXPIRE. If you have any questions about this, or need more forms, call your authorized Sherwood Distributor.

To receive credit for parts replaced under warranty, a **description** of the defect for which you are returning the part **must** be written clearly in the appropriate section on the Warranty Service Form, or **no credit will be issued.**

TESTING OF SRB2105 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.

(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 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.

DRY AIR BLEED FLOW TEST:

(3) Submerge the first stage under several inches of water.

(4) A small stream of bubbles should be escaping from the one-way bleed valve on the first stage.

No bubbles should be escaping from anywhere 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 piston's flow element to determine if it has been clogged by grease or other foreign matter. A grease-clogged element in the piston can sometimes be cleared by washing the grease off with an application of fresh soapy water or other food grade solvent in an ultrasonic cleaner. This is the only time the piston should be cleaned in solvent, since the clogging has already occurred.

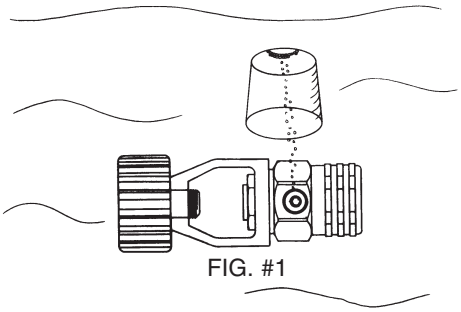


FIG. #1

NOTE: If this situation occurs repeatedly with your customers' regulators, make sure that all technicians at your store are being especially careful during servicing not to use a spray lubricant on the piston, or in any other way overlubricate so that the flow control element in the piston is covered over with grease.

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).

(5) 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.

Attach the regulator to a tank valve giving a source pressure of between 2700 and 3500 psig.

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.

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

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.

If you have depressed the purge button several times and the pressure is below 140 psig, you can add shims to increase the pressure. **Do not use more than three shims.**

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

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.

IMPORTANT: Never set the output pressure of the first stage above 150 psig.

TOOLS REQUIRED FOR SECOND STAGE SERVICING

— 13/16" wrench (box or open end)
— Phillips screwdriver
— Side cutting pliers
— Sherwood In-line Adjusting Tool (p/n TL102)
— Sherwood Plastic Probe (p/n TL111) to push out orifice
— Sherwood Modified 3/4" Deep Socket (p/n TL118) to hold lever assembly
— Sherwood Lever Height Adjusting Tool (p/n TL123)
— Sherwood Stem Socket Tool (p/n TL124)

DISASSEMBLY OF SECOND STAGE

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

(1) Pullback the hose protector (Item 27) from the inlet end ferrule. Remove the hose assembly (Item 26) from the orifice housing (Item 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 (Item 18) by cutting the mouthpiece tie (Item 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 (Item 15) with a Phillips screwdriver.

(4) To remove the exhaust tee (Item 14) from the case, grasp the top edge and pull the exhaust tee back and off

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

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 (Item 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 D. 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: On the Brut, 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 (Item 1) was purchased for installation, carefully remove the old label insert from the purge button (Item 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 (Item 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.

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

(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 (item 23) from the adjustable orifice.

(10) Before removing the exhaust valve (Item 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 (item 21) and the O-ring (Item 20) from the threads of the lever support (item 10). Remove the lever support from the inside of the case (Item 17).

(12) Normally, you will simply need to change the poppet stem seat insert (Item 13) to restore the second stage to maximum performance. To change the stem seat insert (Item 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.

(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, loosen the screw (Item 7) that holds the assembly together.

NOTE: If only the lever (item 9) is to be replaced, do not totally remove the screw. You can remove the lever from under the washer (Item 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 page 14 for recommendations on cleaning solutions.

NOTE: If you use an ultrasonic cleaner to clean the second stage adjustable orifice (Item 24), use a plastic container to prevent the orifice from vibrating against other metal parts which could damage the orifice seal.

(16) Inspect the case (item 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. 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.**

ASSEMBLY OF SECOND STAGE

(1) Re-install the cleaned and lubricated O-ring (item 23) onto the adjustable orifice (Item 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 (item 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 (item 20) on the threads of the orifice housing. Install the spacing washer (item 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 (item 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 (Item 10) inside the case, tighten the orifice housing and the lever assembly together snugly (70 in. lbs.).

NOTE: Do not allow lubrication (grease on fingers, or silicone over-spray) to get on the case (item 17), the diaphragm (item 6), or the exhaust valve (Item 16) as it 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 "Set-Up of Second Stage," page 10).

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

(7) Install the cover (item 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 (Item 4) over the cover and tighten it firmly by hand onto the case.

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

(9) Install the retaining screw (Item 15) through the screw hole in the exhaust tee and into the hole in the case using a #1 Phillips 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 (item 18) and mouthpiece tie (item 19).

SET- UP OF SECOND STAGE

NOTE: For the following adjustments, remove the cover and diaphragm.

(1) Install Sherwood's in-line adjusting tool (p/n TL102) between the orifice housing (Item 22) and the hose assembly (Item 26). Use the tool to screw the adjustable orifice (item 24) clockwise. Watch the end of the lever (Item 9) as you do this. As soon as the tip of the lever begins to drop, stop turning the tool.

NOTE: The slight amount of friction this operation produces between the orifice and the stem seat will not harm the stem seat.

(2) Attach 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.

(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.

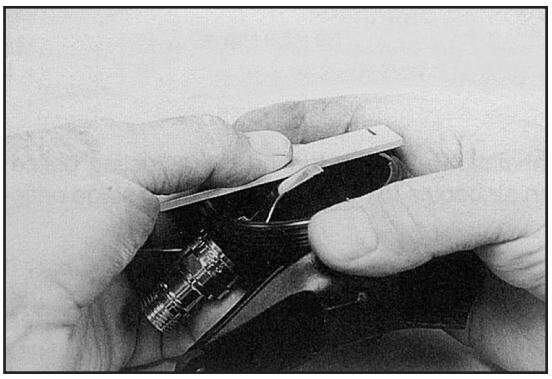
(4) Turn on the air. Use the in-line adjusting tool to turn the adjusting orifice (item 24) counter-clockwise until you hear a slight hissing. Then turn the adjusting orifice clockwise just enough to stop the hissing.

NOTE: 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 TL1 23). Use the tool as a gauge by laying it across the top of the case as shown in Photo #4.

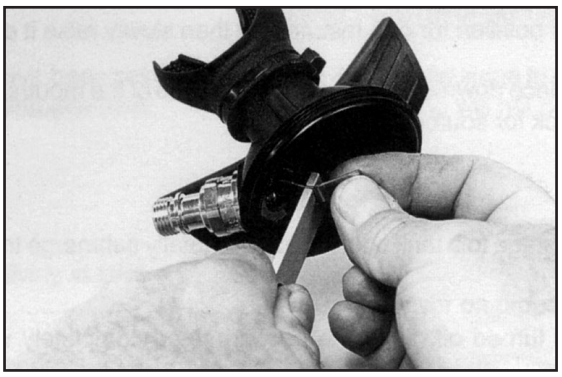
PHOTO #4



Look across the case and gauge tool. The tip of the lever should be even with the top surface of the gauge. If you are reusing the same major parts of the regulator, this measurement will most likely be correct, and no adjustment will be needed.

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



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.

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.

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.

TESTING OF SECOND STAGE

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. at cracking. It should drop to about 3/4" w.c. 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 (Item 24) clockwise. Discontinue clockwise adjusting when the lever assembly (Item 9) becomes loose against the lever support (Item 10).

(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.

EXHALATION EFFORT:

If you do not use instruments to check the exhalation effort, the flow should feel smooth and unrestricted. If you use a water column, it should not exceed 1/2" w.c. at one atmosphere. Brand new exhaust valves will sometimes adhere slightly to the case, causing a slight increase in exhalation effort. This condition will disappear with use.

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" 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.

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 "Testing of First Stage," page 6, for the proper method.

TROUBLESHOOTING

POSSIBLE CAUSE	RECOMMENDED ACTION
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 (Item 8). 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 the section of this manual entitled "Set-Up of Second Stage."
FREE FLOWING:	
1. Intermediate pressure too high	Adjust the first stage's outlet pressure to below 150 psig.
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 978-913).
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 the section of this manual entitled "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 (this chilling will not occur in normal diving).
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.
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.

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:

First, 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 may be 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.

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.

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.

SOME EXAMPLES OF 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 min. cleaning time.
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.
Cleaning solutions recommended by ultrasonic cleaner manufacturers	The preferred choice. Check with the manufacturer for strengths and recommended uses for their cleaners.

CUSTOMER MAINTENANCE & HANDLING TIPS

How your customers treat their regulators will directly influence the unit's function and durability. Here are a few tips that you can pass on to your customer to help assure the durability of their **BRUT SRB2100:**

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.

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, keep salt water out of the regulator inlet when changing tanks. 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, 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 you apply air pressure 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.

SCHEDULED MAINTENANCE:

To keep the owner warranty in effect, your customers **must** have their regulators inspected and serviced annually (within 30 days before or after the anniversary of the date of purchase) by an authorized Sherwood Dealer. **Failure to do so invalidates the warranty.** Even with infrequent use, the regulator **must** be serviced annually to ensure proper performance and satisfy warranty requirements. In older Sherwood regulators (manufactured before Jan. 1, 1993) which still have a valid Sherwood Lifetime Warranty, you must send in the white 8-1/2 x 11 " Warranty Service Form to your authorized Sherwood Distributor. The information will be recorded by Sherwood to determine whether or not the warranty on that particular regulator is still in effect.

IMPORTANT

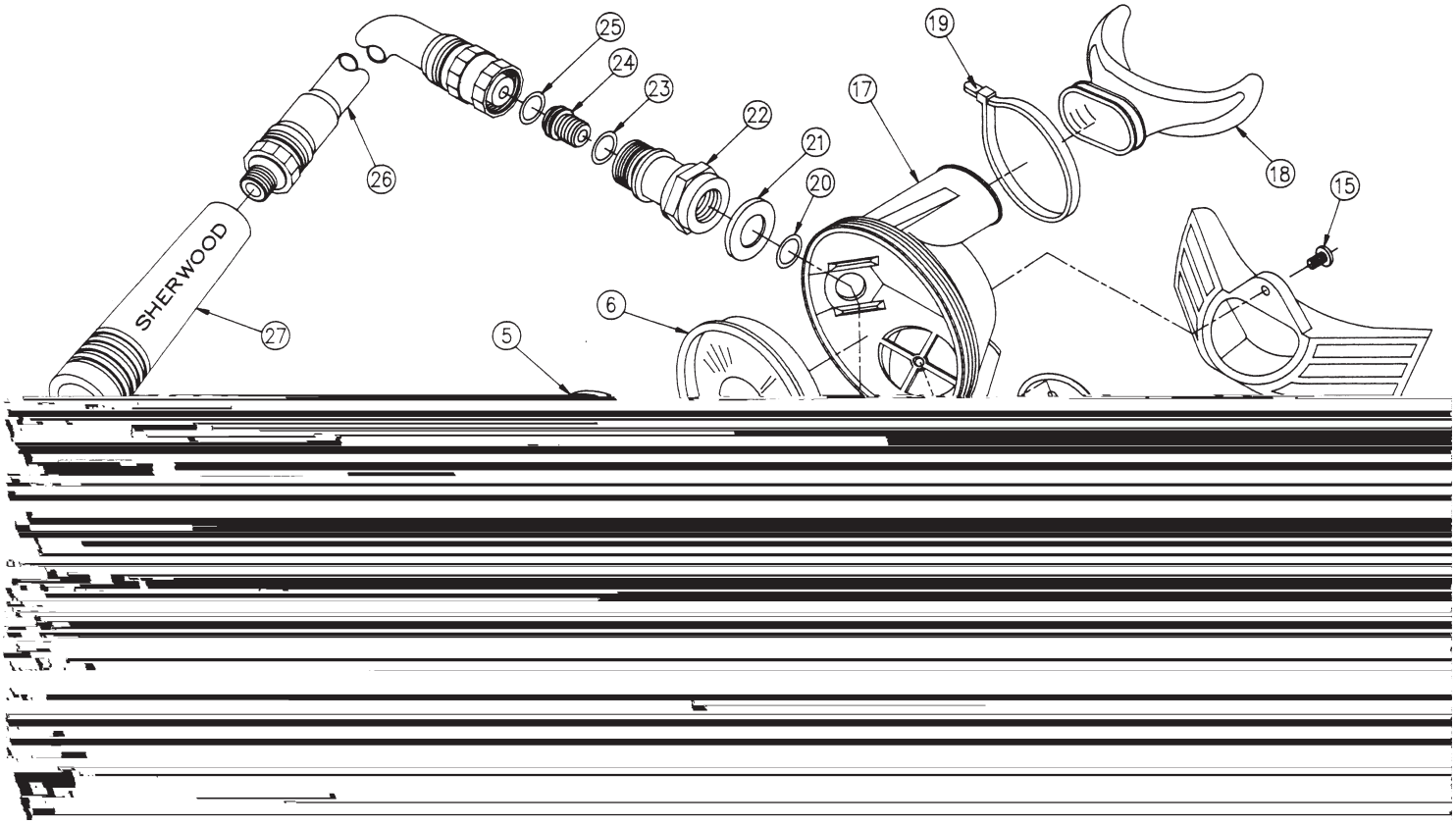
FAILURE TO SEND IN THE WARRANTY SERVICE FORM WILL CAUSE YOUR CUSTOMER'S WARRANTY TO EXPIRE. If you have any questions about this, or need more forms, please contact your authorized Sherwood Distributor.

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

NOTE: Part numbers and specifications are subject to change without notice. Changes will be announced by technical bulletins. You, the repair technician, should have ready access to these bulletins. Your authorized Sherwood Distributor is your most current source of correct part numbers and information.

SECOND STAGE - BRUT

ITEM #	CATALOG #	DESCRIPTION
1	2100-8WH	Label Insert (White, comes on reg. from factory)
1	2100-8BU	Label Insert (Blue)
1	2100-8PK	Label Insert (Pink)
1	2100-8RD	Label Insert (Red)
1	2100-8Y	Label Insert (Yellow)
1	2100-8NG	Label Insert (Green)
1	2100-8PR	Label Insert (Purple)
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	4006-13	Diaphragm (blue Tufel®)
7	J12C04045B	Screw (combination Phillips/square drive)
8	19-4006-17	Washer
9	19- 4006-9A	Lever
10	1- 3004-8RH	Lever Support
11	19-978-10	Spring
12	46-4006-18	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	3809-50-31	Hose Assembly with hose protector (31")
27	3602-27	Hose Protector
28	G011B	O-ring (hose inlet end)



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