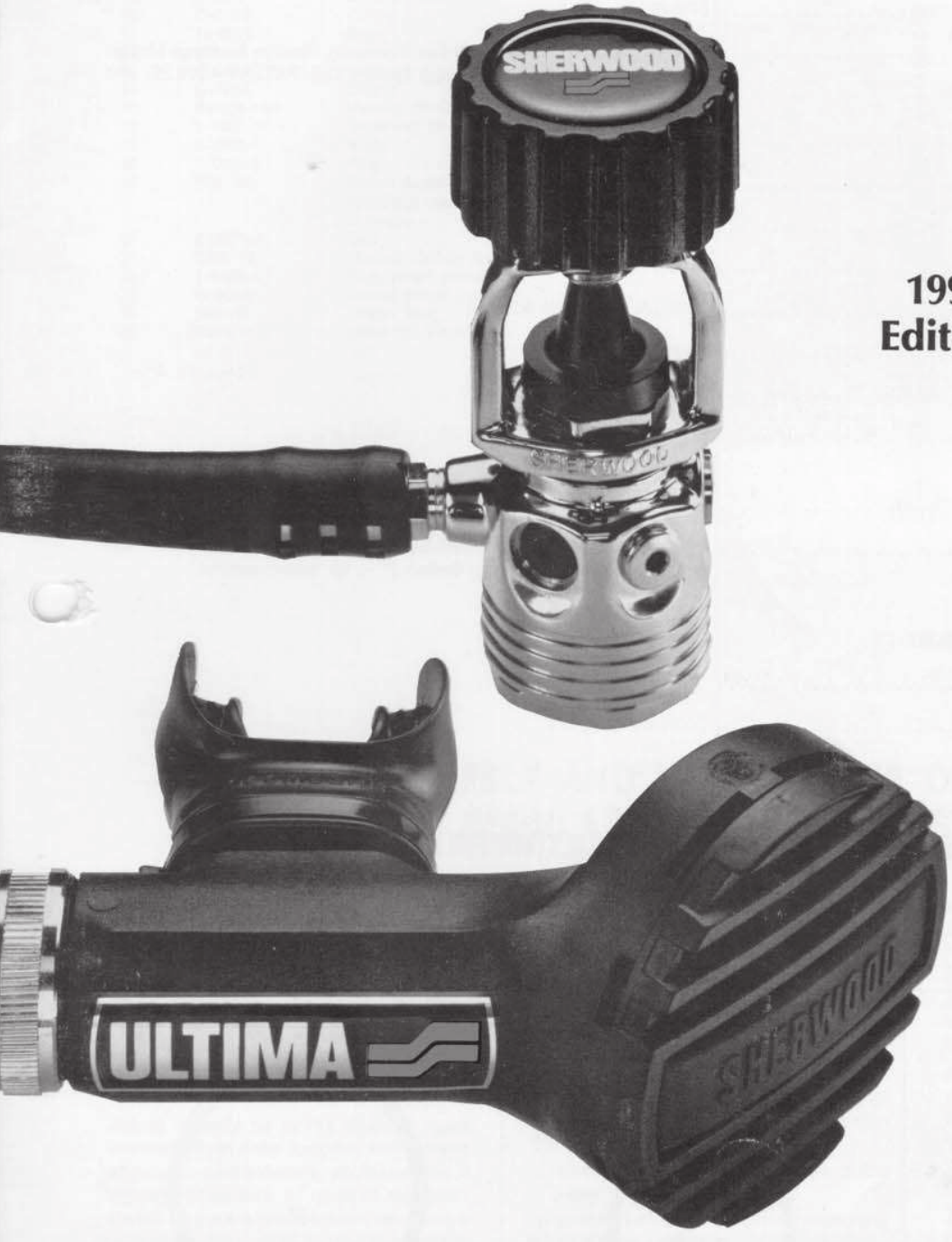
ASSEMBLY AND MAINTENANCE GUIDE

FOR REFERENCE ONLY
SOME PARTS MAY NO LONGER BE AVAILABLE
SOME TECHNICAL BULLETINS MAY APPLY TO THIS REGULATOR



1990
Edition

ULTIMA

SHERWOOD

SRB 3800 REGULATORS

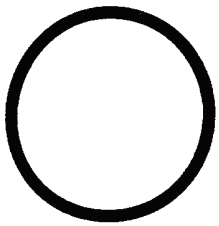
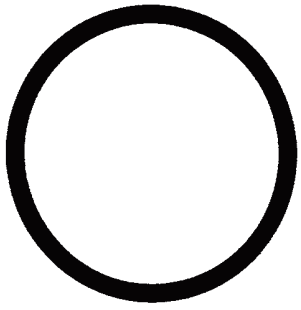
SPECIFICATIONS

REGULATOR MODEL	Sherwood Ultima SRB-3800
AIR FLOW	65 cu. ft./min. @ 1 atmosphere
INHALATION RESISTANCE	1.57" w.c. max. @ 1 atmosphere
EXHALATION RESISTANCE	0.78" w.c. max. @ 1 atmosphere
FIRST STAGE REGULATOR	SRB-3801
TYPE	Flow-by piston with Moving Orifice Balancing, Positive Air Purge (dry air bleed), and Down Stream Sensing System. U.S. PATENT 4,226,257 and U.S. PATENT PENDING
WEIGHT	1 lb. 14 oz.
INTERSTAGE PRESSURE	140 ± 10 psig.
MAX. # SPRING SPACERS	5
INCREASE HOSE PRESS./SPACER	3 psig (approx.)
MAX. INLET PRESSURE	3500 psi (with DIN adapter)
POSITIVE AIR PURGE FLOW RATE	13-25 cc/minute
# LOW PRESSURE PORTS	4 (UNF 3/8")
# HIGH PRESSURE PORTS	1 (UNF 7/16")
SECOND STAGE REGULATOR	SR-3802
TYPE	Upstream, Diaphragm, Balanced, Servo Assisted, with Safety Relief. Purge Bar for clearing. Sensitivity Switch (+ -) for added control.

REGULATOR HOSE WITH INTEGRAL RELIEF

HOSE LENGTH	31"
RELIEF PRESSURE	200 psig (approx.)
HOSE WORKING PRESSURE	200 psig

O-RING IDENTIFICATION CHART FOR ULTIMA FIRST STAGE LIFE SIZE SILHOUETTE

ITEM NO. (6) G-007A	ITEM NO. (13) G-022A	ITEM NO. (14) G-126A
		
Used on...Moving Orifice, and Piston (small end)	Piston (large end)	Cap

SHERWOOD TECHNICAL BULLETIN

NO. 103
DECEMBER, 1988

SUBJECT: **Ultima SRB-3800 Specification Change Notice**
RECOMMENDATION: **Store this bulletin inside your Ultima Repair Manual**

Ultima regulators made after December 1988 have been enhanced with a new locking ring, part number 3405-PS. This locking ring further secures the low pressure sleeve, part number 2836-PS, in position on the sleeve holder, part number 2837-PS. To avoid confusion, Sherwood recommends that the new locking ring be installed on all Ultima Regulators as they come in for regular service. This will bring all Ultimas up to 1989 specifications. Installation tool, part number 3414-PS, is available through your distributor. With care, a twelve point 5/16 socket can be used as an installation tool if the dive store does not yet have a 3414-PS tool.

INSTALLATION:

- Closely examine the new locking ring, 3404-PS, to determine in which direction the outer lip faces.
- Place the locking ring into the groove on the installation tool or on the top edge of the twelve point 5/16 socket with outer lip facing upwards (Fig. 1).
- Press sleeve holder (with sleeve installed) pointed end first, into the locking ring (Fig. 2).
- A distinct snap or click will indicate that the locking ring is properly in place (Fig. 3).
- Check to see that the locking ring is properly in place and not damaged.

REMOVAL:

- Turn sleeve inside-out as in normal removal, and pull it off the sleeve holder.
- Discard the used locking ring.

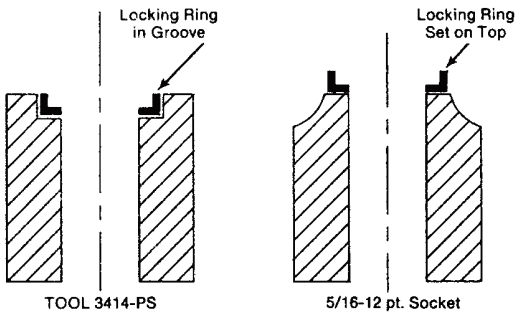


FIG. 1

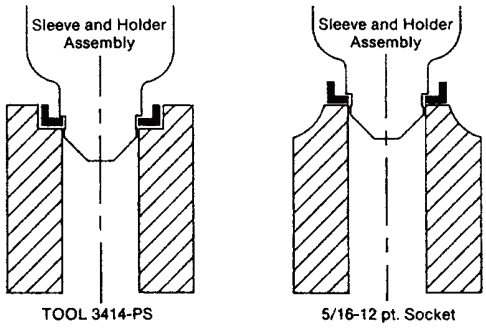


FIG. 2

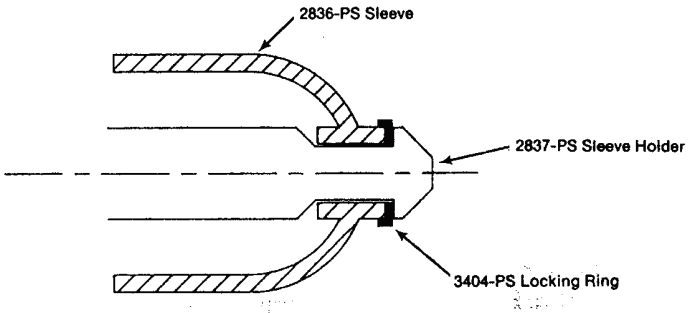


FIG. 3

SHERWOOD
A division of HARSCO corporation
Gas Control Products:
120 Church St./Lockport, NY 14094
716/433-3891/Telex 9-1208/Fax 716/439-960

SHERWOOD TECHNICAL BULLETIN

NO. 106
FEBRUARY, 1990

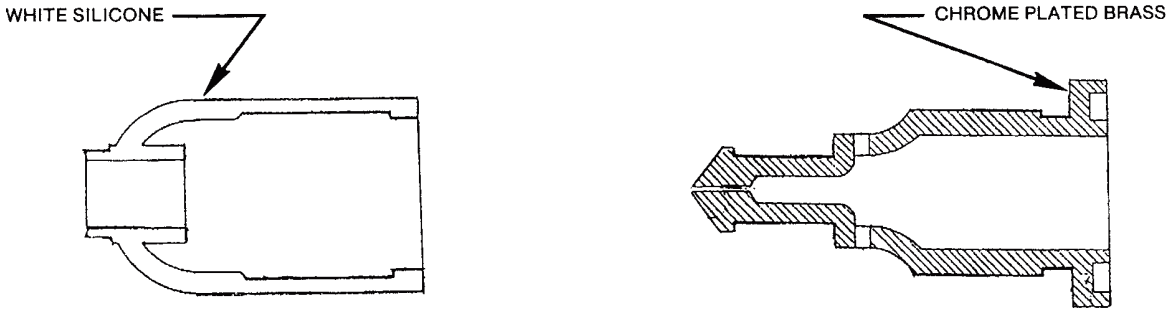
SUBJECT: **Manufacturing & Servicing Changes to Ultima SRB-3800**
Place this bulletin with your Ultima Repair Manual

As of January 1990, all SHERWOOD Ultima Regulators SRB-3800 are being manufactured with a new style sleeve and sleeve holder in the second stage.

The new sleeve and sleeve holder assembly, part number 3440-PS, replaces the sleeve, part number 2836-PS, and the sleeve holder, part number 2837-PS (See Diagram), on all Ultimas made after 1-1-90 starting with serial number U 103400.

These parts are interchangeable, however. If you have the older style as parts, they can be used in current Ultimas. The new style can also be used in older Ultimas.

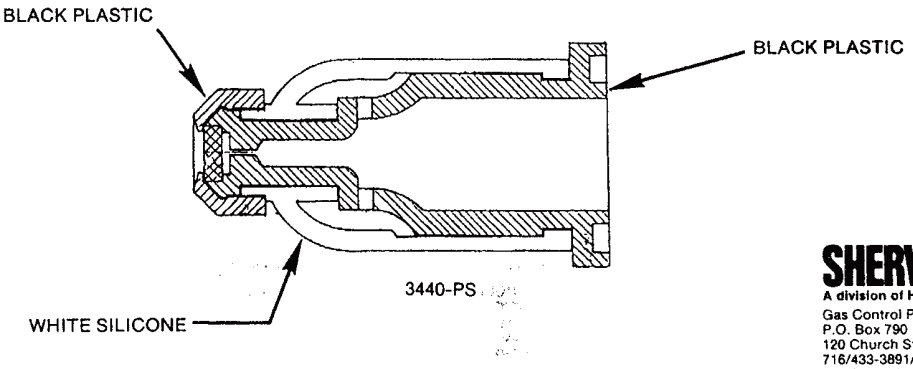
OLDER STYLE



2836-PS

2837-PS

NEWER ONE-PIECE ASSEMBLY

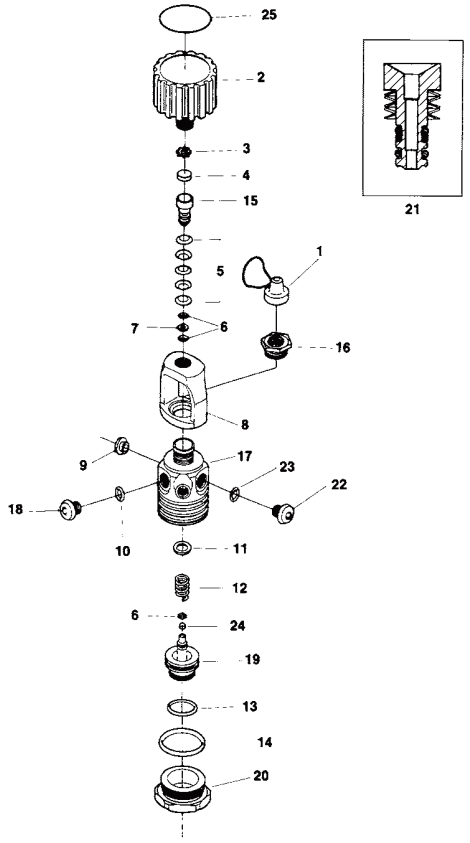


3440-PS

SHERWOOD
A division of HARSCO corporation
Gas Control Products:
P.O. Box 790
120 Church St./Lockport, NY 14095-0790
716/433-3891/Telex 9-1208
Fax 716/433-1275: General Office
Fax 716/439-9601: Accounting

ULTIMA

NO.	CAT. NO.	DESCRIPTION
1	3801-20	Cap & Cord Assembly
2	3801-10	Knob Assembly (Molded)
3	3504-6	Star Washer
4	1390-7	Filter
5	19-3106-11	Spring, Disc
6	G-007A	O-ring
7	MS-28774-007	Back-up ring
8	2-3801-4	Yoke
9	3106-6	Bleeder Valve
10	G-011B	O-ring
11	19-6526	Shim
12	3529-3	Spring
13	G-022A	O-ring
14	G-126A	O-ring
15	9-3106-13A	Moving Orifice
16	1-1665-17	Retaining Nut
17	2-3801-1	Body
18	1-3105-6	Plug
19	3801-40	Piston Assembly (Includes restrictor, seat, O-rings)
20	2-3801-2	Cap
21	3305-10	Moving Orifice Assembly
22	1-3405-4	Plug (High pressure)
23	G-904A	O-ring (High pressure)
24	3801-5	Piston Seat
25	3801-11	Label for knob



ASSEMBLY AND MAINTENANCE OF THE ULTIMA REGULATOR—SRB-3801 FIRST STAGE

DISASSEMBLY

Note: The Ultima First Stage achieves extraordinary performance through the use of the Sherwood DSS (Downstream Sensing System). This system functions through the critical dimensioning and porting of three major components: the body, piston, and cap. All other components are shared with the Magnum Series and Brut Regulators and should already be in the dealer's stock inventory. Even if the customer mentions no particular performance problems, as a standard procedure, all types of regulators should be given a pre-teardown test using a water manometer at the second stage mouth piece and an intermediate pressure gauge (Sherwood P/N SYA4700). With experience, the results of these pre-teardown tests will help the technician zero in on potentially worn out or damaged parts, before the visual inspection begins. Use of these instruments is covered during Sherwood factory authorized repair seminars. Standard inspection of components shall be performed during disassembly of the regulator.

1. Remove knob (2), retaining nut (16), and yoke (8) from body (17).

2. Remove the end cap (20) and remove large O-ring (14) from cap.

3. Remove the piston (19) from the body. Visually inspect the O-rings. If any cuts deformities, or abrasions are noted replace O-ring. Other-wise O-rings can be re-used in first stage.

4. Remove the spring (12), and any shims (11), from the piston cavity.

Be sure the Teflon seat (24) in the piston (19) is free of nicks, scratches, and imperfections. Any imperfection will increase the lock-up pressure above the desired setting or the lock-up pressure will slowly creep to a higher pressure after the initial lock up is obtained. If Teflon seat appears damaged, it can be removed by pushing through the stem with a number (53) drill (.059") from the large end. The seat will then pop out. Place new piston seat (24) on clean piece of paper on a hard flat surface. Press piston tip firmly over seat until it is fully installed. Piston is now rebuilt and ready for installation in the "ASSEMBLY" portion of this guide.

5. Remove the star washer (3) and the inlet filter (4) from the inlet side of the regulator first stage and discard.

6. Using a wooden probe or a Q-tip, push the moving orifice assembly (15) out of the regulator body (insert probe and push from large piston opening through to the filter end of the body). Use extreme caution not to damage the orifice edge.

7. If filter end of moving orifice is salt corroded and needs cleaning, remove the O-rings (6) and Teflon back up washer (7) from the moving orifice assembly. If orifice assembly is clean, then simply leave O-rings and washer in place.

8. Grasp bleeder valve (9) with fingers and pull out. Pay particular attention to the flat sealing surface in the body cavity that the bleeder valve (9) seals against. It must be totally clean of deposits. If any deposits

remain on the sealing surface after initial cleaning, take a pencil with a new clean eraser and use the eraser to polish the surface. Blow all residue off the body after cleaning.

9. Remove all remaining parts (dust cap, port plugs, hoses etc.)

10. Clean any salt deposits or corrosion from metal parts **except the piston** in a suitable solution, in an ultra-sonic bath. Wash in clear water and dry thoroughly.

11. Clean the piston manually. Avoid placing liquid or grease on the bleed control restrictor (a shiny plug located on piston face).

ASSEMBLY

1. Insure that the disc springs (5) are in the proper orientation on the moving orifice (15) (see item 21).

2. Lubricate and, if removed, re-install the O-rings (6) and back up ring (7) onto the moving orifice.

3. Lubricate piston, O-rings (6, 13) and install.

4. Place any shims (11) over piston stem into piston cavity.

5. Place the spring (12) over the shim(s). Gently place the piston (19) into the body (17).

6. Replace cleaned and lubricated cap O-ring (14) over large threaded end of cap. Screw cap (20) into body (17). Tighten snugly to 40 ft. lbs. torque.

7. Wipe cavity and bleeder valve (9) clean and re-install in body.

8. Insert the moving orifice (15) into the regulator body firmly with finger until it bottoms.

9. Insert the new filter (4) and star washer (3) to hold orifice (15) in place.

10. Install yoke (8), retaining nut (16), and yoke screw (2) (lightly lubricate retaining nut threads).

11. Install remaining parts—dust cap, port plugs, hoses, etc. Keep in mind that the Ultima has a primary port which protrudes from the body farther than all other ports. The primary regulator must be screwed into this port.

FIRST STAGE TEST AND TROUBLESHOOTING

Always test the first stage regulator with Sherwood's test gauge and relief valve P/N SYA-4700. (The demand valve acts as a relief valve in the event of a malfunction).

1. Introduce 2700-3000 psig to the system. If new piston seat and/or orifice have been installed, demand regulator may pop slightly during seating process. Flow air through demand valve on test gauge several times to get all parts properly seated.

2. Submerge first stage regulator into water.

3. Bleed Air Test—a small stream of bubbles should be escaping from the one-way check valve only (see Fig. 1). Number and size of bubbles may vary but the amount of escaping bubbles should be equal to 13-25 cc per minute. To check this, invert a small graduated cylinder (25 cc Capacity) over the escaping bubbles under water (Fig. 1). The water displaced will slowly empty the cylinder. After exactly one minute, raise the graduated cylinder to the surface so that the air/water dividing line on the inside of the cylinder matches the outside water level. The reading should be between 13 and 25 cc If reading is 25 cc or above, check O-rings and O-ring sealing surfaces for potential leak paths. If reading is 12 cc or below, check piston's flow restrictor for grease or foreign matter. Replace piston if necessary. A one ounce container can also be used for this test. It should take approximately two minutes to empty the container.

4. Connect pressure gauge to a low pressure port with the remaining outlet ports suitably plugged.

5. Interstage Pressure Test: If bleed air test is satisfactory, check 1st stage lock-up pressure; (that is outlet pressure of the first stage regulator during a no flow condition). The lock-up pressure shall be 140 ± 10 at 2700-3000 psig inlet pressure. If lock-up pressure is low, add shims. (If original spring has been reused, replace original shims). If lock-up pressure is high, remove shims.

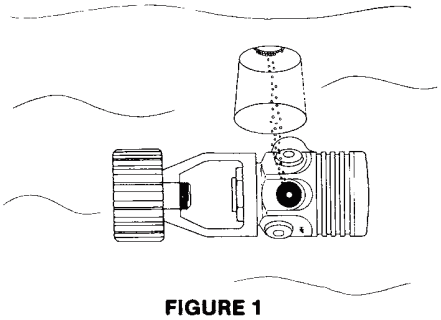
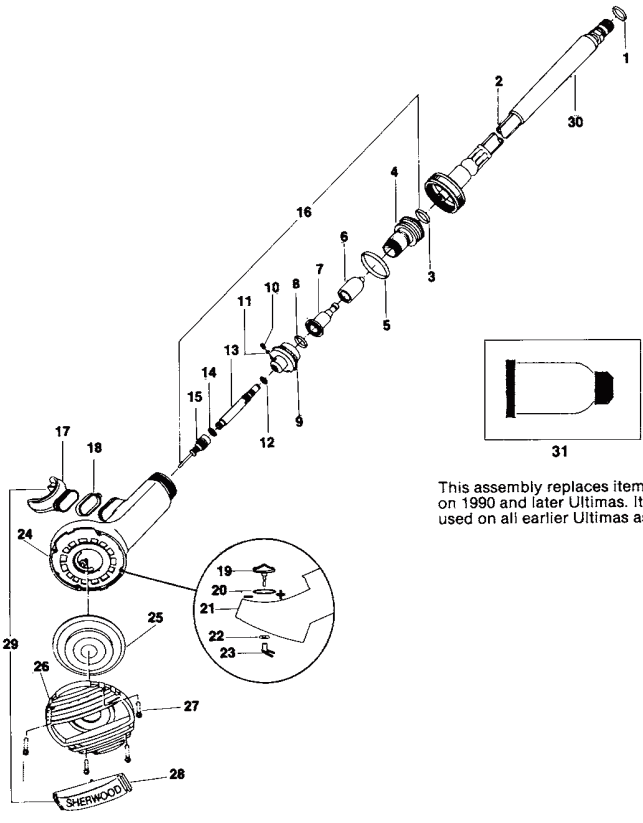


FIGURE 1

NO.	CAT. NO.	DESCRIPTION
	SR3802	Second stage complete
1	G011A	O-ring (Connection UNF ⅜")
2	2943-PS	LP-hose UNF ⅜"
3	G012A	O-ring
4	2857-PS	LP-pressure valve housing
5	G2210-160A	O-ring
6	2836-PS	LP-pressure sleeve
7	2837-PS	Sleeve holder
8	G1110-160A	O-ring
9	2974-PS	Nut, valve housing
10	2875-PS	Stop screw
11	2787-PS	Rubber plate
12	G300-100A	O-ring
13	2839-PS	Valve tube
14	G310-160A	O-ring
15	2786-PS	Servo valve complete
16	3088-PS	LP-valve complete incl. 3-15
17	2573-PS	Mouth-piece silicone
18	3786-9	Locking strap
19	2711-PS	Switch
20	G1510-160A	O-ring
21	3121-PS	Housing
22	2794-PS	Lock washer
23	2712-PS	Diaphragm cam
24	3122-PS	Housing incl. 19-23
25	2578-PS	Diaphragm silicone
26	2707-PS	Cover for second stage
27	2851-PS	Screw
28	3287-PS	Purge bar
29	3124-PS	Housing complete
30	3801-8	Hose protector
31	3440-PS	All plastic sleeve and holder assembly



This assembly replaces items #6 & 7 on 1990 and later Ultimas. It can be used on all earlier Ultimas as well.

SECOND STAGE DEMAND REGULATOR FOR ULTIMA SYSTEM

DISASSEMBLY

1. Disconnect the low pressure hose from the second stage manually.

2. Remove the low pressure valve assembly (16) with a screw driver (see Fig. 2). Make sure the servo valve shaft is not bent during this operation.

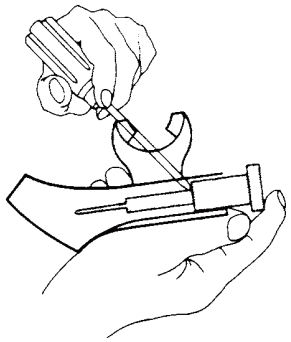


FIGURE 2

3. Put low pressure servo valve assembly aside at this point and work on plastic housing.

4. If mouth piece (17) has deteriorated to the point where it needs replacement, cut off the locking strap (18) with cutting pliers. Remove the mouth piece (17).

5. Unscrew the four cover screws (27) with a slotted screw driver.

6. Remove the cover (26) and the diaphragm (25).

7. Remove rectangular purge bar (28) from cover.

8. The "Dive-Predive" switch **can** be removed at this time, however, it **should not** be removed during regular servicing unless it has been damaged.

Removal of Damaged Switch:

a. Pull out the diaphragm cam (23).

b. Cut off the switch (19) with a pair of cutting pliers close to the locking washer (22). Remove the switch.

c. Remove the O-ring (20).

Switch Replacement:

a. Fit in O-ring (20), grease with silicone.

b. Fit in the switch with the wider part of the ramp against the "Plus" sign on the second stage.

c. Install the locking washer (22) on the switch (19). Press it on with a hollow drift. Tighten the locking washer so that there is sufficient resistance when setting the switch.

d. Attach the diaphragm cam (23) onto the switch (19).

SECOND STAGE HOUSING INSPECTION

1. Inspect all plastic housing parts for cracks or serious gouges. Replace if necessary.

2. Inspect the diaphragm (25), check that the sealing surface of the diaphragm is even. Also check that there are no holes in the diaphragm and that the diaphragm center wear button is properly fixed in position.

3. Put second stage housing aside and turn attention to the second stage valve assembly.

REPAIR INSTRUCTIONS: SECOND STAGE DEMAND VALVE ASSEMBLY DISASSEMBLY

1. Unscrew the servo valve (15).

2. Unscrew the stop screw (10) using a 1.5mm allen wrench and remove the valve tube (13). Remove the O-rings (14, 12). Make sure the sealing surfaces are not damaged.

3. Remove the rubber plate (11).

4. To open valve housing place a 25¢ coin or washer of similar dimensions in a vise as shown in figure 3. Lower the valve housing slot onto coin or washer. Use a 24mm open end wrench, or 8 inch adjustable wrench on the wrench flats to loosen housing.

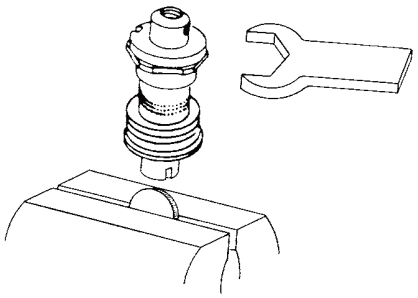


FIGURE 3

5. Remove the O-ring (8). Make sure the sealing surfaces are not damaged.

6. **Pre 1990 Ultima:** The Sleeve Holder will be obviously heavy, chrome plated brass. Pull out the Sleeve Holder (7). Remove the Sleeve (6) by turning it inside out.

7. **1990 and later Ultima:** The Sleeve Holder will be obviously a light, black plastic material. Do not disassemble this unit any further. Refer to SHERWOOD Technical Bulletin #106.

8. Remove the O-rings (5, 3). Make sure the sealing surfaces are not damaged.

NOTE: WHEN SERVICING THE 2ND STAGE REGULATOR, THE FOLLOWING PARTS SHOULD BE INSPECTED AND REPLACED **IF** DEFORMED OR GOUGED.

A. All O-rings (including the ones in the low pressure hose).

B. **Pre 1990 Ultima:** The Sleeve (6).

C. **1990 and later Ultima:** The all plastic Sleeve and Holder Assembly (31).

NOTE: BEFORE REINSTALLING, CHECK THE FOLLOWING:

A. The Servo Valve (15)—Check to make sure that the valve stem is not bent or off center.

B. The Sleeve Holder (7)—Blow the Sleeve Holder clean. Check to make sure that the extremely small orifice in the center of the Sleeve Holder is not clogged.

SECOND STAGE DEMAND VALVE RE-ASSEMBLY IMPORTANT:

A thin layer of silicone grease or oil should be applied to all O-rings and threads during re-assembly.

1. Mount the O-ring (5) on the valve housing (4). Mount the O-ring (3) inside the valve housing (4) (see diagram Fig. 4).

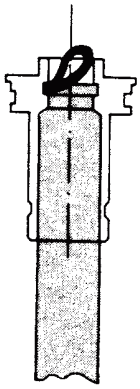


FIGURE 4

2. **Pre 1990 Ultima:** With the sleeve (6) inside out, snap it in place over the sleeve holder (7), flipping it right side out as you go.
1990 and later Ultima: Proceed to step 3.

3. Grease the sleeve with a very thin coating of silicone. Install the sleeve holder (7) and the sleeve (6), or the newer sleeve and holder assembly (31) into the cleaned valve housing (4).

4. Place the O-ring (8) in the groove of the sleeve holder (7). Lubricate the thread. Install the valve housing nut (9).

5. To close valve housing place a 25¢ coin or washer of similar dimensions in a vise as shown in figure 3. Lower the valve housing slot onto coin or washer. Use a 24mm open end wrench, or 8 inch adjustable wrench on the wrench flats to tighten housing.

6. Install the O-rings (12, 14) on the valve tube (13). Grease the threads and the O-rings lightly.

7. Screw in the valve tube (13) until about .078" (2mm) space remains (if you don't have a .078" gauge or micrometer the edge of a U.S. nickel can be inserted as a gauge). (See Fig. 6)

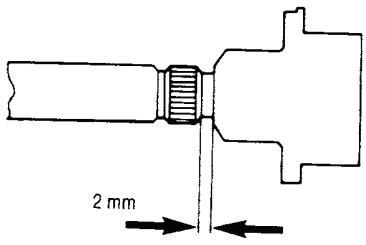


FIGURE 6

8. Install the rubber plate (11), screw in the stop screw (10), but do not tighten at this point.

9. Screw the servo valve (15) on the valve tube (13). Tighten up snugly. Be careful not to bend the valve stem.

10. The second stage demand valve assembly is now re-assembled and ready for adjustment and testing.

LOW PRESSURE HOSE WITH SAFETY VALVE

1. Check the hose for cracks or other deformation. Check the sealing surfaces and threads.

2. Fit the O-ring (1).

3. Attach the hose to the primary outlet of an Ultima First Stage which has been properly serviced and adjusted.

TESTING AND ADJUSTING THE SECOND STAGE REGULATOR

The second stage of the Sherwood Ultima Regulator is adjusted by screwing the valve tube (13) in and out of the valve housing (9). This turning of the valve tube (13) changes the position of the servo valve stem (15) in relation to the main diaphragm (25). Screwing the valve tube (13) away from the diaphragm (25) makes the regulator more difficult to breathe. Turning valve tube (13) so that the servo valve lever (15) is closer to the diaphragm (25) makes the regulator progressively easier to inhale until the point of free-flow is reached when the servo valve stem is permanently pushed open by the diaphragm ("+" "-" switch must be in "+" position during assembly and adjusting procedure). The optimum adjustment can best be found with a water manometer and is covered in the following paragraphs:

1. Install the servo valve assembly into the second stage plastic housing which still does not have diaphragm and cover installed. Use the guide tab in the second stage and the slot in the servo housing to guide the housing into its proper position.

2. Grease the external threads on the second stage and the internal thread on the safety valve hose.

3. Screw on the low pressure hose.

4. Open the air supply to the first stage VERY slowly.

5. Submerge the second stage in water and look through both mouth-piece opening and diaphragm opening to observe any leaks in the demand valve assembly. If any are seen at this point the valve must be disassembled again and the cause corrected before proceeding. If no leaks are detected the housing diaphragm and cover are now installed.

Second Stage Housing Re-Assembly:

a. Fit the purge bar on the cover (26) for the second stage. Make sure that the spring is not damaged.

b. Position the diaphragm (25) with the diaphragm wear plate facing downward and the hole positioned as illustrated in figure 5.

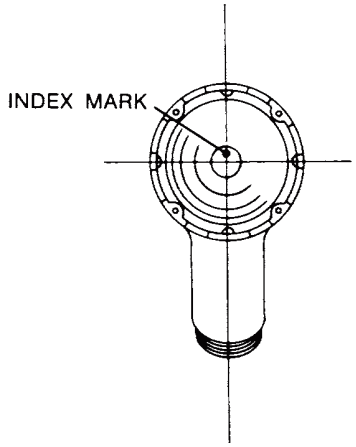


FIGURE 5

c. Place the cover (26) in position on the second stage housing. Insert the screws (27) and tighten snugly with a screwdriver.

d. Replace mouth piece and nylon tie if these have been removed due to abnormal wear.

e. The second stage is now ready for performance adjustments.

6. Connect the mouth piece of a water manometer or similar test instrument to the second stage mouth piece.

7. With air supply turned on test breathe very carefully so that the highest value of the inhalation can be checked on the water manometer. This should be between (30mm) 1.2 in. and (40mm) 1.6 in. of water column. If the value is too low, or air hisses continuously from servo housing continue to screw the valve tube (13) away from the diaphragm. If the value is too high, screw the valve tube (13) toward the diaphragm. When proper value is reached, tighten the stop screw (10) with an allen wrench. CAUTION: Use reasonable force on this screw (do not over-tighten).

8. Check second stage again for leaks or free flowing while breathing chamber is flooded in a water basin. Correct if necessary.

CHECKING UP THE PURGE BUTTON FUNCTION

1. Press the purge button. The second stage will now provide a generous supply of air. Release the purge button and this flow should stop.

2. Cover the mouth piece with thumb and press the purge button. The second stage valve should now supply a reduced air flow through the exhaust valve.

3. Close the tank supply valve. Push the purge bar to completely evacuate the first and second stage. A slight pop may be heard. This is normal.

4. If purge does not seem correct check the small spring behind the purge bar. Compare it to a new unit for proper extension.

The regulator is now assembled and testing is complete.

ULTIMA TROUBLE SHOOTING TIPS

BRIEF ESCAPE OF AIR FROM SECOND STAGE EACH TIME TANK VALVE IS FIRST TURNED ON.

This is a normal part of the operation of any pilot type second stage and is normal. To minimize the flow turn tank valve on *SLOWLY.*

SMALL CONTINUOUS AIR LEAKAGE AT THE SECOND STAGE

A. Remove the cover (26) and the diaphragm (25) from the second stage. If this stops the hissing, then the problem is that the valve tube (13) is adjusted out too far, and is hitting the diaphragm (25) continuously when the regulator is together. Refer to the valve tube (13) adjusting procedure on page 5. If hissing continues even with cover (26) and diaphragm (25) off, proceed to step B below.

B. With supply air turned on, immerse the second stage in water to see where air is leaking from. If air is leaking out of main air flow holes in LP valve housing (4) go to next item "C". If air is exiting from servo valve (15), replace the entire servo valve (15)—it is a non-repairable part.

C. A small particle of sand or grit may have found its way between the sleeve (6) and valve housing (4). Disassemble, clean, reassemble.

D. If tank pressure is extremely low (100 psi or below) slight leakage is normal.

E. If a new sleeve has been installed and the air still leaks by it under pressure, it may be due to poor storage conditions. The sleeve (6) should never be stored in a squashed or flattened shape since it will "remember" that shape and not fit the LP-valve housing (4) properly. If this happens, stand the deformed sleeve (6) upright on a clean, flat surface at room temperature for 24 hours and then install it. It will return to its' original shape.

F. Check tiny hole in end of sleeve holder (7) for obstructions. Blow clean if necessary.

AIR FLOW DOES NOT SHUT OFF QUICKLY, WHEN INHALATION STOPS

If this condition is something that the user describes as having started as a barely noticeable hesitation that has progressed so that they tend to describe it later as a free flow, the problem is probably a plugging of the extremely small hole in the second stage orifice holder (7). When this hole is restricted, the sleeve (6) takes longer than normal to reinflate, so the air flow does not stop as quickly as it should. To fix this condition try to clean out the small orifice using the ultrasonic cleaner.

HIGH INHALATION RESISTANCE

A. Valve tube (13) may be adjusted too far in from diaphragm. See the valve tube (13) adjusting procedure on page 5.

B. In rare instances the regulator hisses from the second stage unless the valve tube (13) is screwed all the way in with no gap (when compared to fig. 6 on page 5). This seems to force the technician to set the regulator up to be hard breathing. The problem under these circumstances is often the very small spring attached to the backside of the purge bar (28). This spring should have a slight gap between it, and the diaphragm. If it is too long, it will be in constant contact with the diaphragm (25), pushing the diaphragm towards the servo valve (15) as you screw the valve tube inward away from the diaphragm. To correct this, use a sharp pair of side cutters to snip just the end coil off of the spring. Then follow the valve tube adjusting procedure on page 5.

HIGH INHALATION RESISTANCE ONLY AT GREATER DEPTHS OR LOW TANK PRESSURE

A. Replace first stage inlet filter (4).

B. Check for air flow from first stage air bleed valve (9).

FIRST STAGE OUTPUT PRESSURE RISES SLOWLY (CREEPS) AFTER INITIAL LOCK-UP

A. Replace piston seat (24). In extreme cases it may be necessary to change movable orifice (15).

WATER OR SALT RESIDUES IN FIRST STAGE MAIN SPRING CHAMBER

A. Check flat sealing surface on first stage where bleeder valve (9) seals. If corrosion is evident, clean with flat end of pencil eraser.

B. Inspect and clean sealing edge of bleeder valve (4). Replace if necessary.

STICKY EXHALATION

A. Replace exhalation valve (diaphragm).

WATER IN SECOND STAGE

A. A deteriorating diaphragm/exhaust valve.

B. The sealing surface in the polymer housing at the exhalation valve or diaphragm may be scratched or cracked.

C. Water may be leaking in due to a loose +, - selector switch on the second stage. To tighten the switch, carefully remove the white fork on the inside of the switch stem. With the switch knob on the corner of a table or vise, place a hollow punch or old tank valve inlet tube over the inside switch stem on top of the locking washer. A couple of gentle taps on the hollow punch will tighten up the locking washer.

NOISY INHALATION (HUMMING OR BUZZING)

Caused by spring mass resonance. Depending on what parts are resonating **one or more** of the following actions will stop the buzzing.

A. If in first stage—Rotate main spring end to end and reinstall, or install a new piston or install a new spring.

B. If regulator is brand new, the parts are often not "set in" to their final configuration. Simply by leaving the regulator attached to a full tank of air with valve turned on and no air flowing for 1 or 2 hours the buzzing is usually cured.

PARTS CLEANING

Regulators which see heavy use, particularly those used in a salt environment, often need extra effort to remove dirt and corrosion from plated parts. There are more cleaning solutions and methods being used successfully in service departments than we have room to list here, but there are a few general suggestions we can make.

First, don't expect your cleaning solution to do all the work. Use a soft bristle tooth brush to help the solution clean the parts. Only immerse those parts which are actually in need of cleaning. With Sherwood's patented "Positive Air Purge System" (dry air bleed) the interior of the regulator is always clean and dry so the piston, spring, and spacers never need cleaning. In fact immersing the clean Sherwood piston in contaminated cleaning solution can plug the flow control orifice in the face of the piston which would slow or stop the air flow through the P.A.P. System.

Many of the acid solutions used for cleaning are damaging to nitrile compounds found in O-rings. This is another reason for not immersing the piston. Also the plug O-rings should be removed if the plugs are going to be put in the solution.

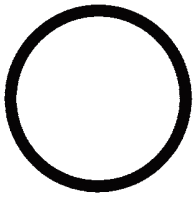
If the Sherwood "Moving Orifice" from the first stage is corroded due to salt water entry through the inlet filter, an attempt should first be made to clean it with a rag or soapy water and soft tooth brush. If a cleaning solution and ultra-sonic cleaner must be used, the orifice should be placed sitting vertically, (alone) in a plastic cup filled with solution in the ultra-sonic cleaner. This will prevent damage to the orifice.

If the servo valve in the second stage has external corrosion, it should be cleaned with a rag, or a soft brush in soapy water. Acid solutions are not recommended since they may damage the compounds used in the sealing surfaces inside the valve. The servo valve also should not be immersed in an ultra-sonic cleaner since the high frequencies may cause the soft compounds to "flow" which would cause a sealing failure.

SOME EXAMPLES OF COMMONLY USED CLEANING SOLUTIONS

SOLUTION	COMMENTS
Vinegar and Water	Easily available but slow acting.
15% Hydrochloric Acid, 85% Water (Muriatic Acid)	Very fast acting but damaging to chrome and O-rings. Not recommended.
"Bransonic"	A commercial cleaning solution sold by an ultra-sonic cleaner manufacturer. Recommended.
"Micro"	A commercial ultra-sonic cleaning solution available through scientific supply houses and other outlets. Highly recommended.

O-RING IDENTIFICATION CHART FOR ULTIMA 2ND STAGE

LIFE SIZE SILHOUETTE	ITEM #	PART #	LOCATION
	(12)	G300-100A	End of valve tube (13) screwed into valve housing nut (9).
	(14)	G310-160	End of valve tube (13) screwed into servo valve (15).
	(3)	G012A	Inside sealing groove of LP valve housing (4).
	(8)	G1110-160A	In face seal groove of sleeve holder (7).
	(5)	G2210-160A	Outer sealing groove of LP valve housing (4).

SHERWOOD
A division of HARSCO corporation
Gas Control Products:
120 Church St./Lockport, NY 14095
716/433-3891/Telex 9-1208/Fax 716/439-9601