splash®

# Service Technician Seminar 2011

SHERWOOD SCUBA®

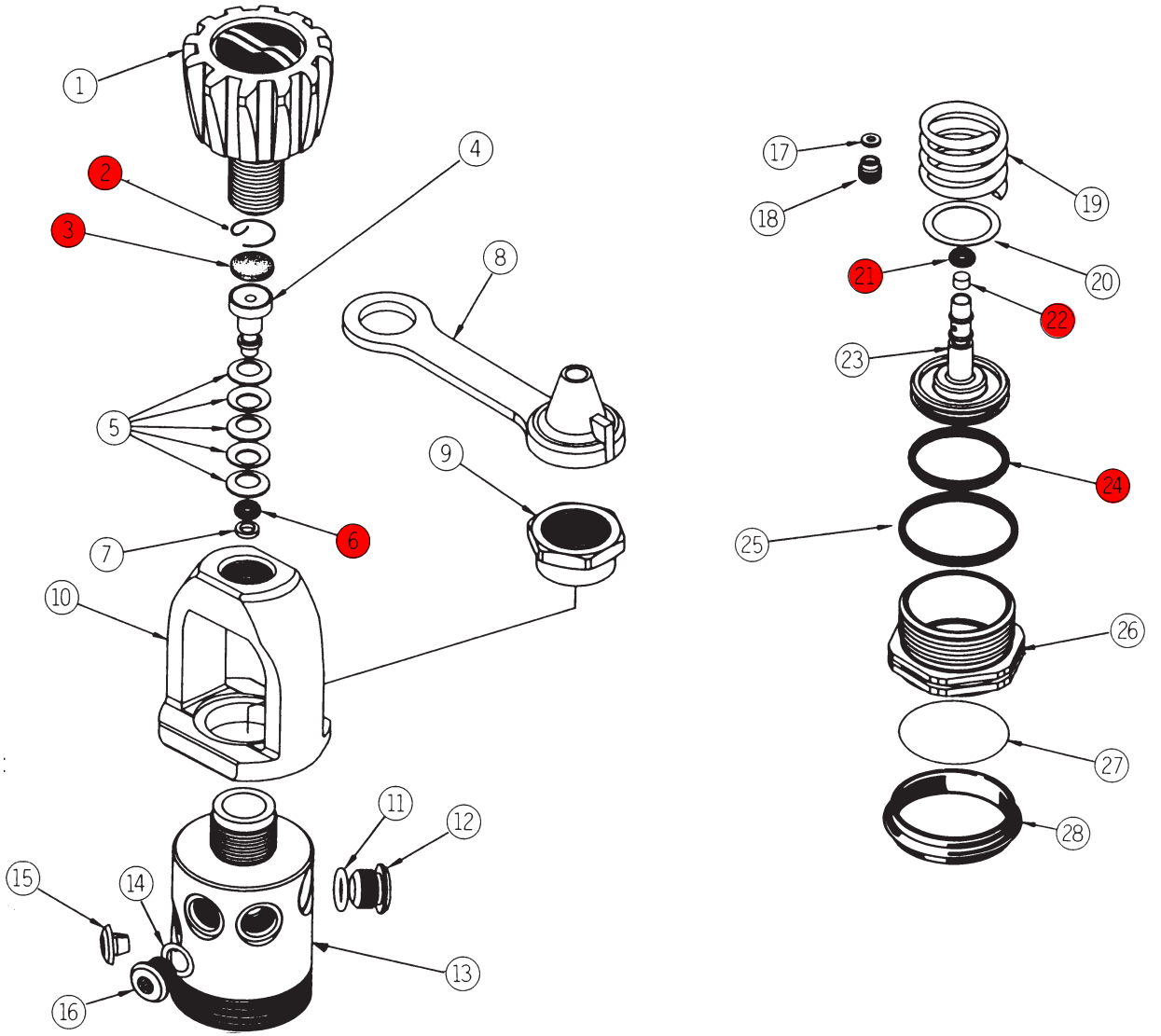
MAXIMUS SRB5600

# SPECIFICATIONS FOR THE SRB5600 MAXIMUS

| | |
|---|---|
| REGULATOR MODEL: | Sherwood SRB5600 Maximus |
| AIR FLOW: | 33 cu. ft. (935 liters)/min. @ 1 atmosphere |
| INHALATION RESISTANCE: | .9" - 1.5" (2.3 - 3.8 cm) w.c @ 1 atmosphere (adjustable) |
| EXHALATION RESISTANCE: | 0.7" (1.8 cm) w.c. max. @ 1 atm. |
| RECOMMENDED LUBRICANT: | Christo-Lube® MCG111 (Sherwood p/n SW-MS150) |

## First Stage Regulator:

| | |
|---|---|
| TYPE: | Flow-by piston with Moving Orifice Balancing, Dry Air Bleed, and Air Sensing Channel Boost – **U.S. Pat. # 4,226,257, U.S. Pat. #5,662,100** |
| WEIGHT: | 1 lb. 11 oz. (.77kg) |
| INTERSTAGE PRESSURE: | 135 -150 psi (9-10 bar) |
| MAXIMUM INLET PRESSURE: | 300 bar ( with 300 bar DIN adapter ) |
| POSITIVE AIR PURGE FLOW RATE: | 13-27 cc/minute |
| # LOW PRESSURE PORTS: | 5 (3/8"-24 UNF) |
| # HIGH PRESSURE PORTS: | 2 (7/16"-20 UNF) |
| MATERIALS: | Body – CDA-36000 Brass<br>O-rings – Buna-N (Viton Nitrox o-ring kit available)<br>Bleed Valve – Ethylene Propylene<br>Piston Seat – Teflon® |




● ANNUAL SERVICE REPLACEMENT PARTS:

| | | |
|---|---|---|
| 2 | 451270 | Filter Retaining Ring |
| 3 | 450100 | Filter |
| 6 | 451140 | O-ring |
| 21 | 451140 | O-ring (for small end of piston) |
| 22 | 450670 | Piston Seat |
| 24 | 161530 | O-ring (for large end of piston) |

| ITEM | PINNACLE # | DESCRIPTION |
|---|---|---|
| 1 | 450860 | Handwheel |
| 2 | 451270 | Filter Retaining Ring |
| 3 | 450100 | Filter |
| 4 | 450420 | Moving Orifice (bare, no O-rings) |
| 5 | 450300 | Belleville Spring Washers (5 needed) |
| 6 | 451140 | O-ring |
| 7 | 451280 | White Backup Washer |
| 8 | 450970 | Dust Cap |
| 9 | 450120 | Yoke Nut |
| 10 | 451020 | Yoke |
| 11 | 451225 | O-ring (for H. P. port plug) |
| 12 | 790579 | H. P. Port Plug |
| 13 | 451040 | Body |
| 14 | 161500 | O-ring (for L.P. Port Plugs) |
| 15 | 450450 | One Way Bleed Valve |
| 16 | 790581 | L. P. Port Plug |
| 17 | 450850 | Gasket for Flow Control Element |
| 18a | 450831 | Flow Restrictor Screw |
| 18b | 450832 | Filter |
| 19 | 450830 | Main Spring |
| 20 | 450870 | Shim (to raise hose pressure) |
| 21 | 451140 | O-ring (for small end of piston) |
| 22 | 450670 | Piston Seat |
| 23 | 450390 | Piston (bare, no seat or O-rings) |
| 24 | 161530 | O-ring (for large end of piston) |
| 25 | 161540 | O-ring (for cap) |
| 26 | 451030 | Cap |
| 27 | 450925 | Cap Label |
| 28 | 180000 | Trim Ring |

## TOOLS REQUIRED FOR FIRST STAGE SERVICING

Bench vise

3/32" Allen wrench

5/32" Allen wrench

6" or 8" adjustable wrenches

15" adjustable wrench or 1" socket

Phillips screwdriver

Retaining ring or star washer

Sherwood 50 cc Graduated Cylinder (p/n TL110) for dry air bleed flow test

Piston Seat Removal Tool

Plastic Probe to push out moving orifice assembly

Regulator Support Handle

Intermediate Pressure Gauge

Annual Service Kit #4000-4 (same as older style Maximus) 450 700

Nitrox Conversion Kit #4000-4N 450 680

Christo-Lube®, 2 oz. tube of oxygen compatible lubricant

O-ring picks

## TORQUE SETTINGS

Flow element control, torque to 3 in. lbs. (.4 nm)

Tighten the cap onto the body until it bottoms on the thread. Do not tighten further.

Tighten the yoke nut snugly.

# SRB5600 FIRST STAGE

# DISASSEMBLY

Pre-test regulator and one-way bleed valve prior to dissasembly. Check intermediate pressure (135-150psi - 9-10 bar). Check work of breathing. 1 to 1.5' of water - perform dry air bleed flow test (13-27 cc per minute).

# DISCONNECT AND INSPECT ALL HOSES

# UNSCREW AND REMOVE THE HANDWHEEL AND DUST CAP

# REMOVE THE YOKE NUT AND YOKE


15" Adjustable wrench or 1' Socket extension drive.

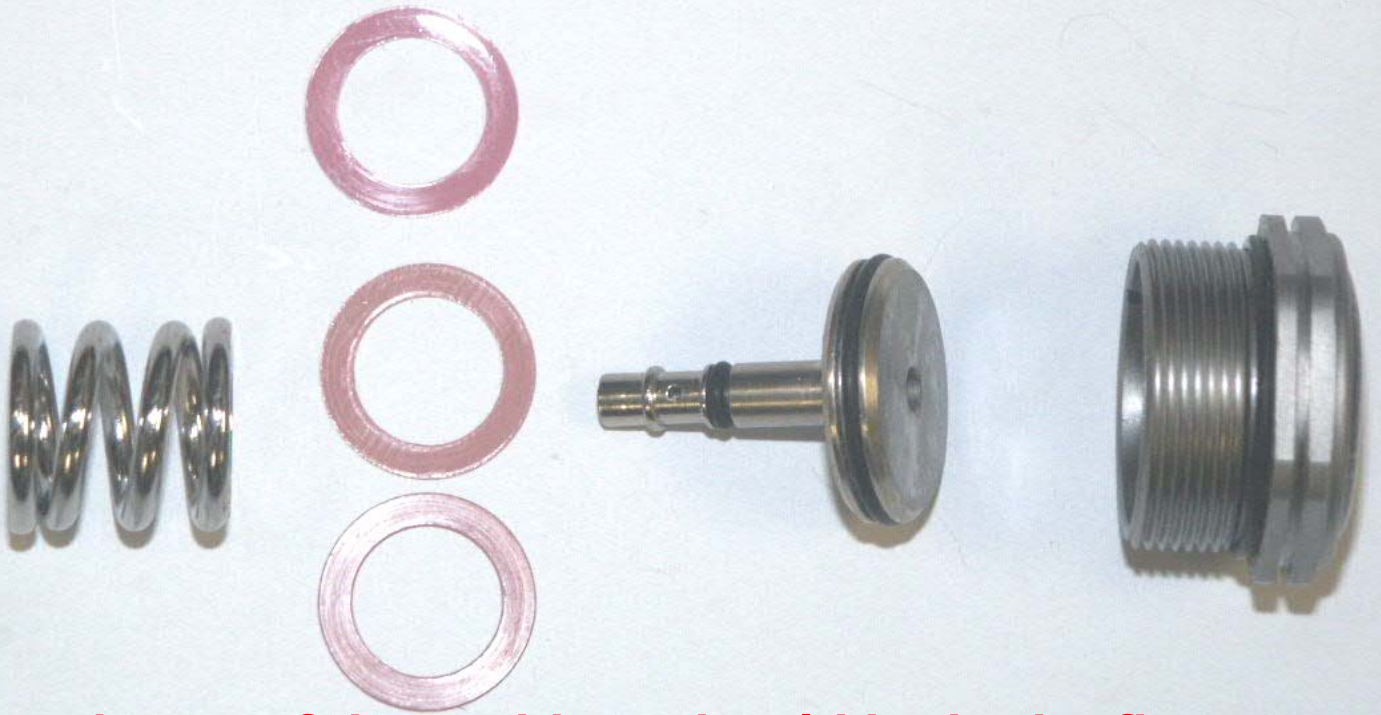
# REMOVE ANY REMAINING PORT PLUGS


5/32" Allen key.

# REMOVE THE CAP AND TRIM RING FROM THE MAIN BODY

15" Adjustable wrench.

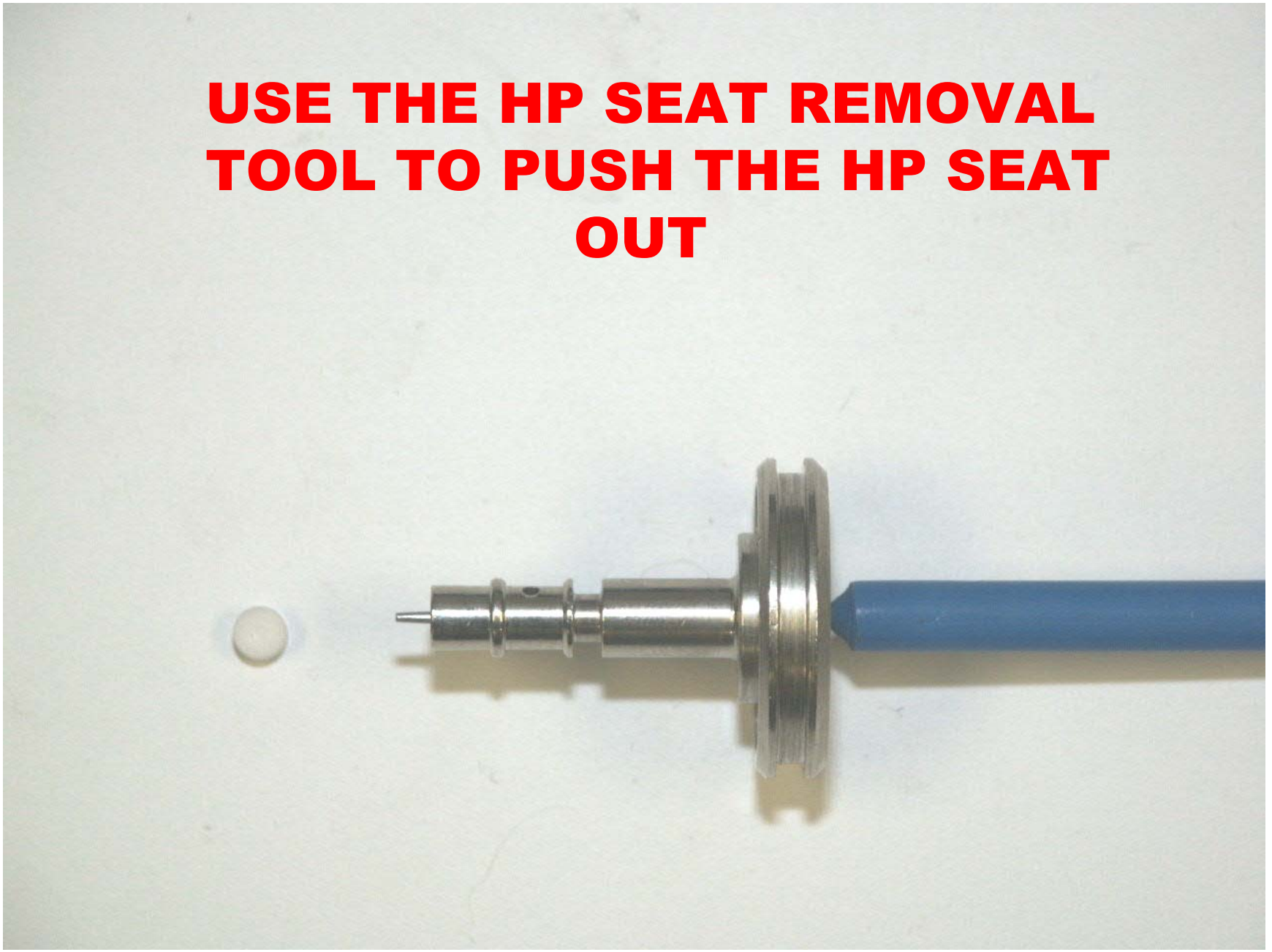
# REMOVE THE PISTON, SPRING AND SHIMS FROM THE CAP



A maximum of three shims should be in the first stage.

# REMOVE THE PISTON SEAT AND O-RINGS FROM THE PISTON

# USE THE HP SEAT REMOVAL TOOL TO PUSH THE HP SEAT OUT



# REMOVE THE FLOW CONTROL ELEMENT ASSEMBLY

CAUTION: If any grease or oil gets on the flow control element assembly, the aire flow will be impeded. This would result in damage to the flow element, possible flooding of the first stage spring chamber and greater inhalation effort at depth.

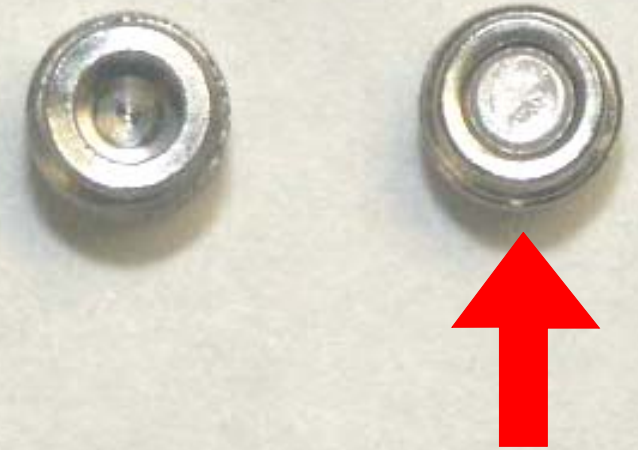
- Keep greasy finger tips away from the flow element during servicing
- Do not put the flow control element assembly in cleaning solution or in an ultrasonic cleaner


If the regulator is clean inside, and the flow control element is working properly during the pretest, there is no need to remove the flow control element.

# OLD STYLE FLOW CONTROL ELEMENT ASSEMBLY 5105-5S

If the 5105-5S is working properly there is no need to replace it.

If you do need to replace the 5105-5S, replace it with the 5105-13 and 5105-14.



# NEW STYLE FLOW CONTROL ELEMENT ASSEMBLY

# REFERENCE TECHNICAL BULLETIN 119

**All technical bulletins are available at:**

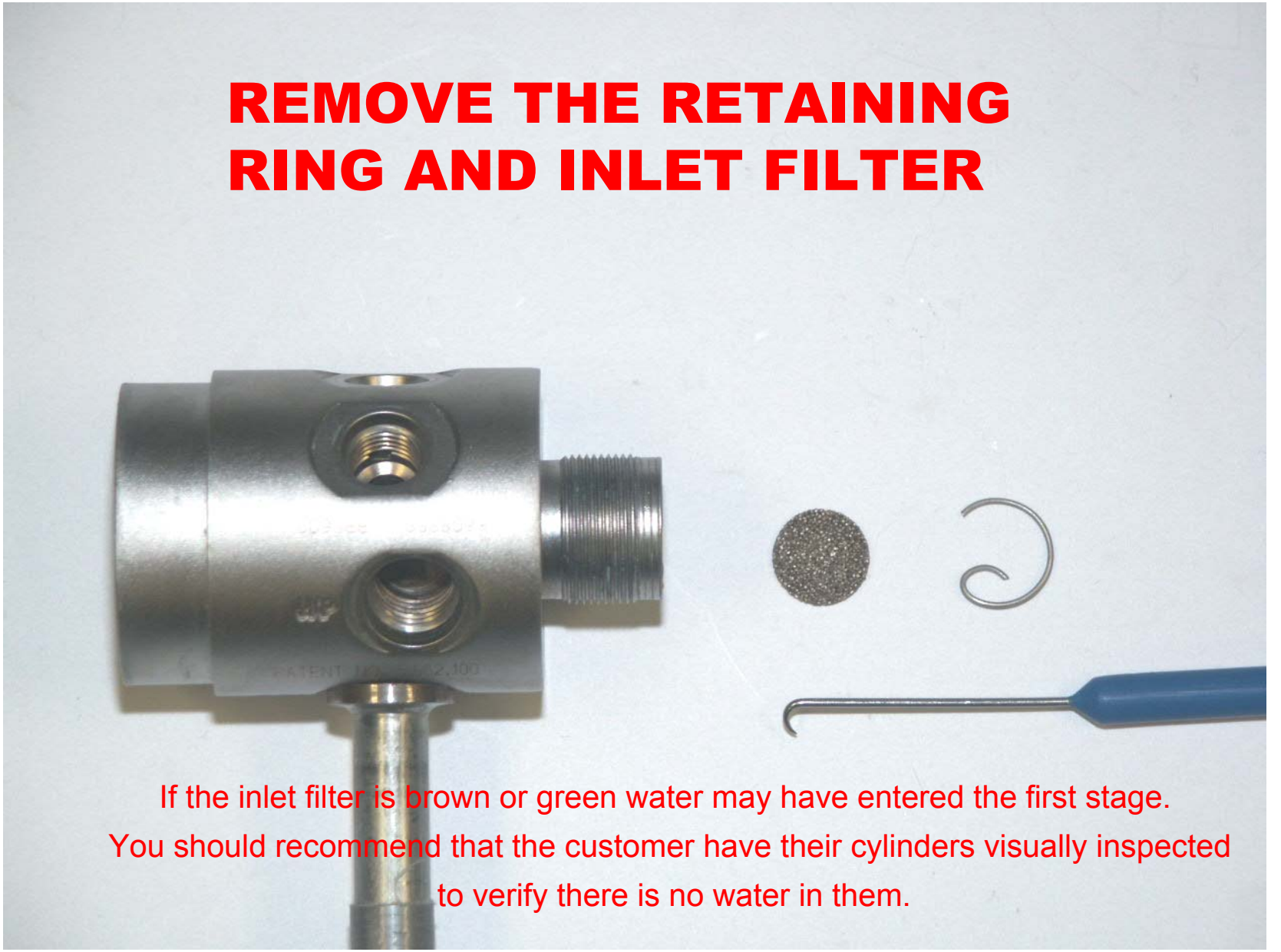
**http://www.splash.co.nz in the dealer zone**

# REMOVE THE BLACK GASKET

**There is no need to remove this gasket**
**unless you have excess bubbles coming from the one-way bleed valve**
**or you need to ultrasonically clean the first stage body.**

Service kit now comes with a star washer.

# REMOVE THE RETAINING RING AND INLET FILTER



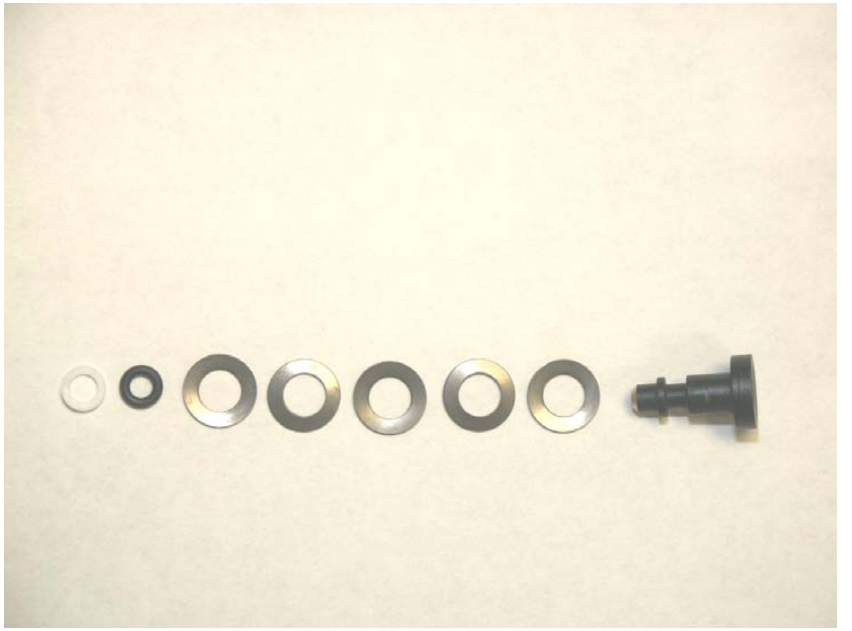
If the inlet filter is brown or green water may have entered the first stage.
You should recommend that the customer have their cylinders visually inspected to verify there is no water in them.

# REMOVE THE MOVING ORIFICE ASSEMBLY

Use a soft tipped tool to remove the orifice to prevent damage to the knife edge sealing surface.

# DISASSEMBLE AND INSPECT THE ORIFICE ASSEMBLY

- Inspect the belleville washers for cracks.
- If any cracks are found replace all of the washers.
- The customer probably wouldn't notice the change in performance due to cracked belleville washers because the regulator will just become unbalanced.
- The technician will notice it during the annual service.



# REMOVE THE ONEWAY BLEED VALVE


**Inspect the sealing surface.**

**A flooded spring chamber could result from a poor or corroded sealing surface.**

# REMOVE AND INSPECT THE CAP O-RING

# INSPECTION & CLEANING

***Only if necessary, clean all metal parts of the first stage in an ultrasonic cleaner or cleaning solution. See section 6.3 on page 22 of the SRB 5600 Assembly & Maintenance Guide for recommended cleaning solutions.***

***Clean the orifice separately from other parts.***

***The new flow restrictor screw can be cleaned in an ultrasonic cleaner, refer to technical bulletin 119.***

***Clean all plastic parts in warm soapy water.***

***Inspect all bores and parts for damage, corrosion, or wear and replace if necessary.***

***Replace all parts provided in the annual service kit.***

# SRB5600 FIRST STAGE


# ASSEMBLY

# FIRST STAGE ASSEMBLY

***The annual service kit part number for the SRB5600 Maximus is 450700. For the Nitrox kit use part number 450690. Replace all parts included in the annual service kit.***

***Relubricate all O-rings with Crysto-Lube 451277.***

***Lubricate the internal bores for the piston and moving orifice within the first stage body and cap.***

# LUBRICATE AND INSTALL THE NEW PISTON O-RINGS

# The new seat material is made of Hastaflon.

OLD SEAT NEW SEAT

## SAME PART NUMBER 450670

**Holds up much better than Teflon to new high pressure cylinders that divers are using today**

# INSTALL THE NEW HP SEAT

Use a Clean **surface**. Ie Paper on a flat hard surface

# REASSEMBLE THE ORIFICE ASSEMBLY WITH A NEW LUBRICATED O-RING

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# Belleville Washers

- Note the orientation of the belleville washers
- They need to be opposed to act as a spring
- Also, note that the o-ring is upstream of the teflon backup ring
- This backup ring reduces o-ring extrusion and improves the performance of the regulator.


LIGHTLY LUBRICATE
THE INTERNAL BORE
Be sure to inspect the internal bore for damage or
scoring that could cause a leak in the sealing surface

# INSTALL THE MOVING ORIFICE ASSEMBLY

# INSTALL THE NEW FILTER AND RETAINING RING


(Rough to smooth)

**Install the inlet filter with the flat surface against the moving orifice.**

# INSTALL THE FLOW CONTROL ELEMENT GASKET

**Forgetting to install the flow control element gasket will result in an excess amount of bubbles coming from the one-way bleed valve.**

# IF THE FILTER WAS REMOVED FROM THE FLOW RESTRICTOR SCREW, REPLACE IT WITH A NEW ONE

# INSTALL THE FLOW CONTROL ELEMENT ASSEMBLY

Torque to 3in.lbs (.4nm)

Do not over-tighten.

# LUBRICATE AND REINSTALL THE CAP O-RING


LIGHTLY LUBRICATE
THE INTERNAL BORE

# INSTALL THE PISTON INTO THE CAP

It is easier to install the piston if you do not cover

# INSTALL A MAXIMUM OF 3 SHIMS INTO THE PISTON

There can be anywhere from 0 to 3 shims installed.

If you need more than three, or if the intermediate pressure is too high and there are no shims installed,

something else is wrong and needs to be determined.

# INSTALL THE MAIN SPRING

# INSTALL THE TRIM RING

Use a 15" adjustable wrench. Tighten the cap onto the body until it bottoms on the thread.
Do not tighten further.


INSTALL THE CAP ASSEMBLY

# INSTALL THE ONE-WAY BLEED VALVE

- Installing the one-way bleed valve with the dot toward the inlet creates a more convoluted path for water to leak in
- It is not critical that the bleed valve be installed this was but it can help to prevent leakage if the customer is not properly cleaning their regulator.

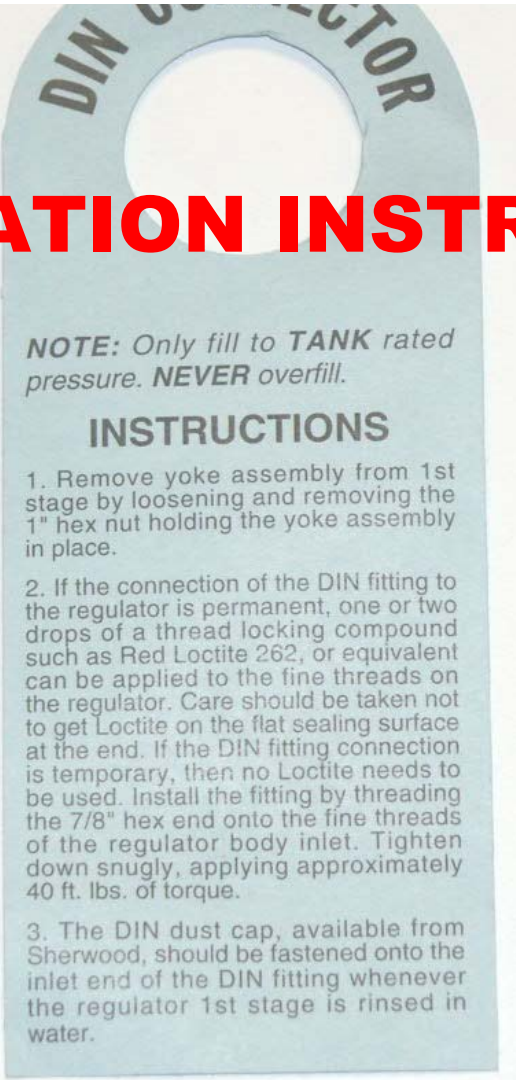

Tighten the yoke nut snugly.

# INSTALL THE YOKE AND SNUGLY TIGHTEN THE YOKE NUT

# INSTALL THE DUST CAP & YOKE SCREW

# 300 BAR DIN ADAPTER

# INSTALLATION INSTRUCTIONS




***NOTE:*** *Only fill to* ***TANK*** *rated pressure.* ***NEVER*** *overfill.*

## INSTRUCTIONS

1. Remove yoke assembly from 1st stage by loosening and removing the 1" hex nut holding the yoke assembly in place.

2. If the connection of the DIN fitting to the regulator is permanent, one or two drops of a thread locking compound such as Red Loctite 262, or equivalent can be applied to the fine threads on the regulator. Care should be taken not to get Loctite on the flat sealing surface at the end. If the DIN fitting connection is temporary, then no Loctite needs to be used. Install the fitting by threading the 7/8" hex end onto the fine threads of the regulator body inlet. Tighten down snugly, applying approximately 40 ft. lbs. of torque.

3. The DIN dust cap, available from Sherwood, should be fastened onto the inlet end of the DIN fitting whenever the regulator 1st stage is rinsed in water.

# SAA5300 DIN ASSEMBLY

- You should never need to disassemble the DIN assembly.
- If required for cleaning or a leaking internal o-ring be careful not to strip the allen hex
- DINs are Loctited together and if another technician used too much Loctite you will strip the DIN tip
- If it is too tight, try heating the DIN in hot water or lightly with a bench torch.  Do not heat to the point that the chrome plating changes colors.

# BEFORE YOU BEGIN TESTING

***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.***

***Install an intermediate pressure gauge into one of the LP ports and plug all remaining ports.***

***Install the first stage onto a cylinder valve and slowly introduce 2700 to 3500 psi to the regulator inlet.***

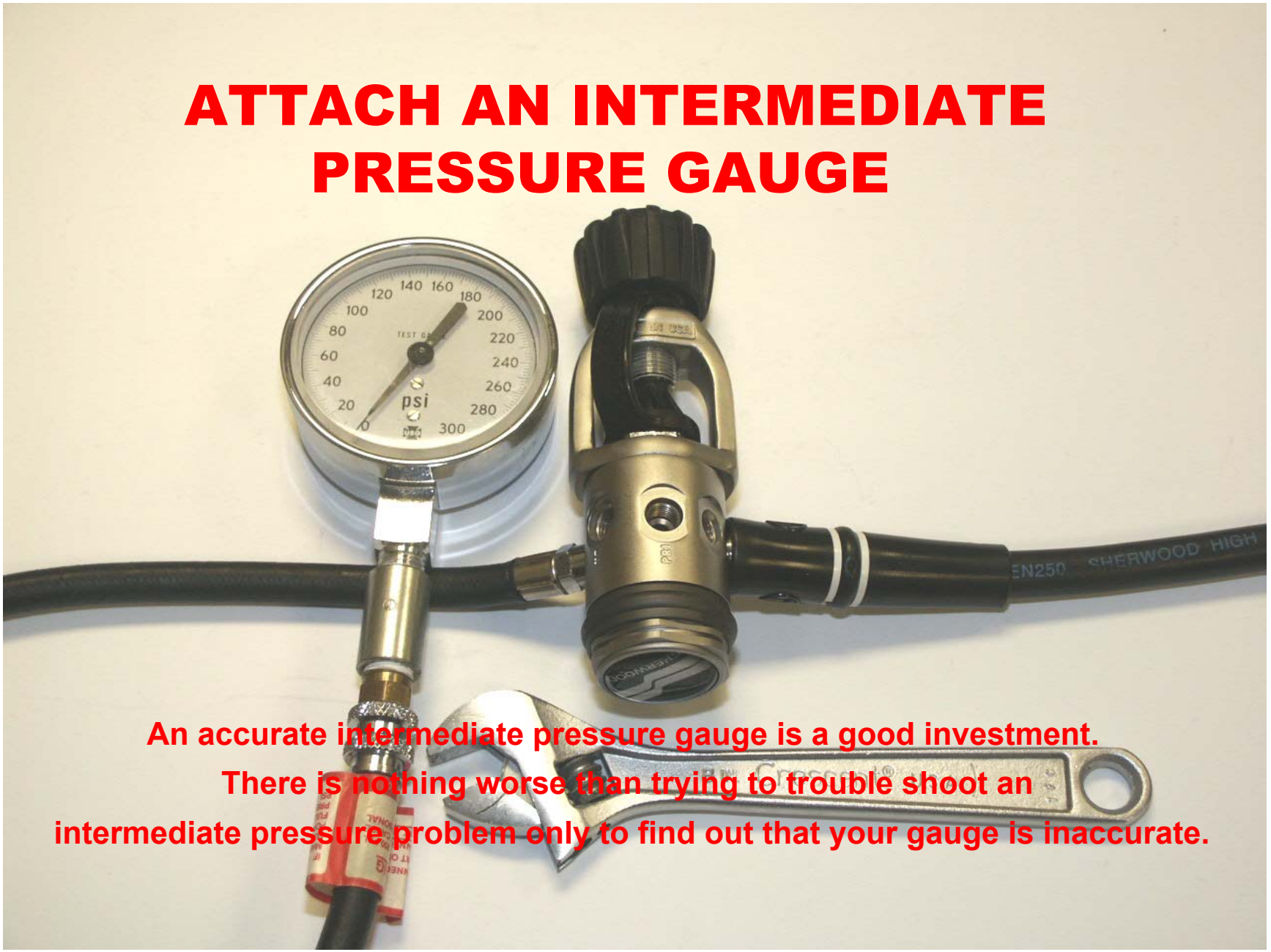
***Cycle the regulator several times to properly seat all parts by depressing the second stage purge button.***

***If any leaks are detected or interstage pressure exceeds 150 psi, turn the air off immediately.***

# ATTACH A FUNTIONING SECOND STAGE


**A functioning second stage will act as a safety relief valve should the first stage malfunction.**

# ATTACH AN INTERMEDIATE PRESSURE GAUGE




**An accurate intermediate pressure gauge is a good investment.**

**There is nothing worse than trying to trouble shoot an intermediate pressure problem only to find out that your gauge is inaccurate.**


PLUG ALL REMAINING PORTS
PRI

# TEST THE INTERMEDIATE PRESSURE, 135 - 150 PSIG

- Test the regulator on a cylinder filled to the pressure that the diver will most often be using
- Cycle the regulator several times, allow it to sit under pressure for 10 to 15 minutes, and recheck the intermediate pressure
- This will allow the new components to take a seat and give a more accurate measurement of the intermediate pressure