



# **GENERAL PROCEDURES**

## **FOR**

### **REGULATOR EQUIPMENT**

The section of the Oceanic Product Service Guide conveys General information and Procedures that is common to the various Regulator First and Second Stages and auxiliary equipment available at the time of this writing (4/24/02).

It also contains Supplemental Information intended to assist the Authorized Oceanic Regulator Service Technician who is servicing an Oceanic product.

## GENERAL PROCEDURES

## CONTENTS

PRIOR TO PERFORMING SERVICE .....	3
WHILE THE CUSTOMER IS STILL THERE .....	3
EXTERNAL INSPECTION .....	3
INTERMEDIATE PRESSURE TEST .....	4
LEAK DETECTION TEST .....	4
EVALUATION OF SYMPTOMS .....	4
PRIOR TO DISASSEMBLY .....	4
CLEANING AND LUBRICATION .....	5
TOOLS AND CLEANING SUPPLIES .....	5
DISASSEMBLY .....	5
CLEANING TIPS .....	6
CLEANING - PROCEDURE .....	6
PRE ASSEMBLY .....	7
ASSEMBLY .....	7

## REGULATOR SERVICE PROCEDURES

ADMINISTRATION .....	DOC. 12-2201
DX4 FIRST STAGE .....	DOC. 12-2203
CDX FIRST STAGE .....	DOC. 12-2204
DXI FIRST STAGE .....	DOC. 12-2205
DX3 FIRST STAGE .....	DOC. 12-2206
'95 BALANCED DIAPHRAGM FIRST STAGE .....	DOC. 12-2207
EXPLORERS FIRST STAGE** .....	DOC. 12-2208
CDX5 FIRST STAGE .....	DOC. 12-2209
PX2 FIRST STAGE .....	DOC. 12-2210
'95 BALANCED PISTON FIRST STAGE .....	DOC. 12-2211
PR '95 BALANCED PISTON FIRST STAGE .....	DOC. 12-2212
SP4 FIRST STAGE .....	DOC. 12-2213
SPORT PISTON FIRST STAGE .....	DOC. 12-2214
UNBALANCED PISTON FIRST STAGE .....	DOC. 12-2215
SECOND STAGE SWIVEL .....	DOC. 12-2219
ZETA SECOND STAGE .....	DOC. 12-2220
OMEGA 2 SECOND STAGE .....	DOC. 12-2221
DELTA 3 SECOND STAGE .....	DOC. 12-2222
DELTA 2 SECOND STAGE .....	DOC. 12-2223
ALPHA 7 SECOND STAGE .....	DOC. 12-2224
ALPHA 4 SECOND STAGE .....	DOC. 12-2225
GAMMA SECOND STAGE .....	DOC. 12-2226
SLIMLINE OCTOPUS SECOND STAGE .....	DOC. 12-2227
AIR XS SECOND STAGE/REGULATOR .....	DOC. 12-2228
AIR XS2 SECOND STAGE/REGULATOR .....	DOC. 12-2229
SWIVEL 180 OCTOPUS SECOND STAGE .....	DOC. 12-2230
EXPLORERS SECOND STAGE** .....	DOC. 12-2231
GAMMA 2 SECOND STAGE .....	DOC. 12-2232

\*\* BEING DEVELOPED AT THE TIME OF THIS WRITING

Doc. 12-2202-r02 (4/24/02)

## **PRIOR TO PERFORMING SERVICE**

### **WHILE THE CUSTOMER IS STILL PRESENT**

- Ask to see the original sales receipt or invoice showing the Date of Purchase.
- If over one year old, ask to see the Record(s) of previous service to learn which parts were replaced and if there were any previous problems with the equipment.
- Ascertain the Type of Service to be performed (annual routine service or a specific repair).
- If a Problem is being reported, determine the Level of Customer Satisfaction and attempt to Resolve Any Dissatisfaction by offering to instruct the customer how to better use and maintain the product. Refer to the Recommended Maintenance Procedures outlined in the Administration section (Doc. 12-2201) of the Product Service Guide.
- Ask the Frequency of Use since the last service, and what Types of Diving Conditions and Environments the equipment has been exposed to.
- Ask How Often the Equipment is Rinsed during and after a dive trip, and the Methods of Rinsing and Storage.
- Determine the Status of Warranty based upon the Terms and Conditions of Warranty for the Regulator. Refer to the Warranty Guidelines outlined in the Administration section (Doc. 12-2201) of the Product Service Guide.
- Determine if the Benefits of the Parts Replacement Program apply for the regulator. Refer to the Parts Replacement Program Guidelines outlined in the Administration section (Doc. 12-2201) of the Product Service Guide.

### **EXTERNAL INSPECTION**

- Visually inspect the First Stage Cone Filter for any visible residue present.
- Remove the Hose Protectors, if present, to visually inspect the condition of the Hoses along their length, as well as at their Fittings.
- Closely examine all Parts of the First Stage for any signs of external corrosion.
- If the First Stage has a chrome finish, check closely for any flaking or chipping. DO NOT clean any Parts found to be flaking or chipping chrome in an ultrasonic cleaner.
- Remove the Front Cover(s) of the Second Stage(s), and check the Diaphragm(s) for any signs of distortion.
- Remove the Second Stage Diaphragm(s) and determine if it is supple or brittle. Note the condition of the exposed Metal Parts, checking for any indication of corrosion.
- If the Second Stage Lever Arm is configured with a Roller, spin it with your fingertip to determine that it turns freely, and depress the Lever Arm repeatedly checking that it moves smoothly and returns to a full upright position.
- If the Second Stage is configured with an Adjustment Knob, turn it out counter clockwise and check for any buildup of salt, silt, or debris along its Shaft.
- If the Second stage is a Servo-Assisted model, remove the Valve Module from the Housing Assembly.
  - Inspect the condition of the Housing, and Exhaust and Control Diaphragms.
  - Check that the Control Valve Lever is not bent or distorted,
  - Check that the Control Valve Spring is intact and free of debris.
  - Check that the slotted Control Valve Pin is facing directly upward (Omega models only).

## INTERMEDIATE PRESSURE TEST

- Connect the First Stage of the Regulator Assembly to a 3,000 PSI air source and connect a recently calibrated Intermediate Pressure Test Gauge to the Low Pressure Inflator Hose, or connect it to a spare Low Pressure Port using a standard Low Pressure Hose.
- Pressurize the equipment slowly with the Pressure Gauge(s) held facing away from you until fully pressurized. Note the Intermediate Pressure, and purge the Second Stage to ensure that the Test Gauge Needle instantly returns to the original pressure reading without creeping or fluctuating back and forth.
- Allow the Regulator to stabilize again, and note the Intermediate Pressure. Refer to the Specifications given in Service Procedure for the specific Regulator First Stage being tested.
- Remove the Intermediate Pressure Gauge from the Regulator.

## LEAK DETECTION TEST

- While the First Stage is still connected to the 3,000 PSI air source, apply a Liquid Leak Detector solution (Snoop® or equivalent) to the First Stage, or immerse it in water, and note any signs of air leakage from the following areas:
  - Beneath the Saddle from the Main Body.
  - Ambient pressure Inlet Ports of the Main Body.
  - End Plug of the Main Body.
  - If a Piston type First Stage, the Swivel Area between Swivel Cap and Piston Cap.
- Apply the Liquid Leak Detector Solution to all Hoses to check for any signs of leakage from along the length or at the Fittings on both ends, or check if immersed in water.
- If the Second Stage is a Servo-Assisted model, immerse it in fresh water while connected to the pressurized First Stage with its Valve Module removed from the Housing Assembly. Note any signs of air leakage from the following areas:
  - Between the Control Valve Flange and Control Valve Block.
  - Outlet Ports of the Inlet Chamber.
  - Beneath the Control Valve Lever Seat and Orifice Cone.

## EVALUATION OF SYMPTOMS

- If any abnormal conditions are discovered during the evaluation of the Regulator equipment, refer to the Troubleshooting Chart provided in the Service Procedure for the specific Regulator First and/or Second Stage being tested.

## PRIOR TO DISASSEMBLY

- Be certain to perform the Initial Inspection and Troubleshooting Procedures prior to beginning any Disassembly. Doing so will provide clues as to which Internal Parts may be worn, and therefore allow you to better advise the customer with an accurate estimate of the Service that is needed.
- Review the complete Disassembly and Reassembly sections provided in the Service Procedure for the specific Regulator First and/or Second Stage being serviced, and the Cleaning Procedure that follows in this section, prior to beginning any Procedure.
- Ensure that the Service Facility is well equipped with all of the Tools and Parts needed to perform a Complete Service. **DO NOT attempt to perform the Service if not equipped with the proper Tools and Parts.**

**GENERAL PROCEDURES**

- **Perform the outlined steps in the order given, without exception.** The Reassembly Procedures have been outlined with the assumption that the service technician first followed the Disassembly Procedures as outlined.
- Before reusing or throwing away any Parts during Service, refer to the Parts Replacement Schedule Letter Codes (a, b, c) that follow the Exploded View Diagram Numbers. Save all Parts that were replaced to show them to the customer prior to disposing of them. This increases credibility and trust, and reinforces the Value of Service. DO NOT allow old parts to be reused.
- O-rings are classified as being either dynamic or static. Dynamic O-rings are mounted directly on a moving Part, or they create a Seal against a moving Part. Static O-rings create a Seal between two non-moving Parts. Since Dynamic O-rings sustain friction and movement, they are to be discarded and replaced during every Service, regardless of age or appearance. Static O-rings are less subject to wear and after passing close Inspection may sometimes be reused, although this is not necessarily recommended.
- To help avoid any confusion during Disassembly, those Parts that are not to be replaced automatically should be Inspected after Disassembly is completed. They should be laid out in the Order they are Removed, and compared with Identical New Parts to better discern their condition before Reassembly is performed.
- O-rings should be Inspected using a Magnifier to ensure they are supple, well rounded, and completely free of any scoring or corrosion that would impair proper Sealing. Replace any O-rings in questionable condition.

## **CLEANING and LUBRICATION**

### **TOOLS AND CLEANING SUPPLIES**

- Tools to be used must be clean and free of contaminants such as dirt, dust, silicone grease, and oil.
- An Ultrasonic Cleaner should be used if possible.
- VFC-23 Regulator Cleaner, or an equivalent, can be used for initial cleaning of all Reusable Metal Parts.
- An acidic bath of stabilized Trichloroethylene, or White Vinegar, should be used for final cleaning. Use of eye protection and adequate ventilation is recommended. An eye wash station should be readily available.
- A supply of warm to hot clean fresh water will be needed for Rinsing. Distilled water is recommended to prevent any mineral residue.
- For blow drying Parts and Components, a Low Pressure Air Supply is to be used.


### **DISASSEMBLY**

- Again, prior to beginning Disassembly perform the Inspection and Troubleshooting Procedures.
- Disassemble the Regulator in accordance with the Disassembly section(s) provided in the Service Procedure(s) for the specific Regulator First and/or Second Stage being serviced

## GENERAL PROCEDURES

## CLEANING TIPS

 **CAUTION:** DO NOT use a metal wire brush.

 **WARNING:** If salt or grit is found on any O-rings, discard them and replace them with new ones. DO NOT attempt to clean and reuse them.

- Prior to Cleaning, carefully remove any existing thread locking residue from the Threads using a brass or plastic dental instrument.
- During Cleaning, use special care not to damage Components such as those with delicate Seating Surfaces.

## CLEANING - GENERAL

Hose End Fittings

- When cleaning, soak the Fittings only in cleaning solutions. Do not allow any solution to enter the Hoses.
- After cleaning as described below, allow the Hoses to dry with the cleaned Ends hanging down.
- Blow low pressure air through the Hoses prior to installing them onto the Regulator.

Knob Assembly

- Follow cleaning procedure steps 1 - 4.
- DO NOT place the complete assembly in an acidic bath. The Threads may be dipped into an acidic bath, holding the plastic portion out of the cleaner.

Soft parts

- Reusable soft Parts, such as Yoke Saddles and Protector Caps, may be soaked and cleaned in a solution of warm water mixed with mild dish soap.
- To scrub away deposits, use only a soft nylon toothbrush.

## CLEANING - PROCEDURE

Step 1.

Wipe all excess Lubricant from the components using a clean lint free cloth or clean paper towels.

Step 2.

Bathe all Metal Parts in a clean acidic bath to remove grease, corrosion, and scale.

- Oceanic recommends VFC-23 regulator cleaner. White vinegar is an acceptable substitute.
- Clean Parts in which the chrome finish is chipped or flaking separately and avoiding severe agitation.
- Protect more delicate parts, such as Orifice Cones and Piston Shafts, when combining them with other Parts.
- For best results, agitate Parts in an Ultrasonic Cleaner for 5 minutes.

 **CAUTION:** Ultrasonic cleaning times in excess of 10 minutes may damage the chrome finish of certain Parts.

 **CAUTION:** Harsh acids, such as muriatic acid, should be strictly avoided.

Step 3.

Remove the Parts from the acid bath and place them directly into a clean neutralizing bath (1 part sodium bicarbonate to 100 parts hot water) and agitate for 2 minutes to Rinse.

Step 4.

Remove the Parts from the neutralizing bath and ensure that all residue is removed.

**GENERAL PROCEDURES**Step 5.

Inspect the Parts, using a magnifier as necessary, to ensure that no contamination (particles) is visible. Repeat Steps- 4, if necessary.

Step 6.

Bathe the Parts in a clean fresh water bath to remove any remaining contaminants.

- For best results, use only distilled water to prevent mineral residue.
- Agitate lightly, and allow to soak for 30 minutes.

Step 7.

Remove the Parts from the fresh water bath, and dry thoroughly using a clean lint free cloth and low pressure air.

Step 8.

Inspect all Parts, using a magnifier as necessary, to ensure that they are absolutely clean and free of contaminants or residue, and nicks or burrs. Repeat Steps 6 - 7, if necessary.

**PRE ASSEMBLY**

- To ensure that the Parts do not become contaminated, assemble the Regulator immediately after completion of Cleaning and Final Inspection.
- Ensure that all Replacement Parts used are those specified in the Service Procedure(s) for the specific Regulator First and/or Second Stage being serviced

**Lubrication**

- Lubricate O-rings and other components as described in the Reassembly Procedure for that Regulator.
- Dress the O-rings with a very light film of Lubricant.
- Avoid applying excessive amounts of Lubricant, as this will attract contaminants.
- Use only Christo-Lube MCG111 Halocarbon Based Lubricant.



**CAUTION: Although equivalent Halocarbon Based Lubricants could be used, they may not provide the same level of Operational Performance.**

**ASSEMBLY**

- Assemble the Regulator according to the Reassembly Procedures described in the Service Procedure(s) for the specific Regulator First and/or Second Stage being serviced
- Perform Final Tuning and Testing as described for the specific Regulator Second Stage(s).