DELTA 4

SERVICE PROCEDURE

This Delta 4 Service Procedure conveys a list of components and service procedures that reflect the Delta 4 as it was configured at the time of this writing (10/3/10).

DELTA 4 SECOND STAGE

CONTENTS

GENERAL PROCEDURES

REFER TO ..... DOC. 12-2202

SPECIFICATIONS

Torques

P/N 6956	Coupling	100 to 120 in-lbs
P/N 4787.2	Screw	4 to 5 in-lbs
P/N 6332	Packing Nut	11 to 13 in-lbs
LP Hose		50 to 60 in-lbs

Opening Effort IP = 138 psi (9.5 bar)

1. Leak with ADJUSTMENT KNOB turned fully out, clockwise.
2. No leak with knob turned in, counter clockwise, 1.5 turns.
3. Minimum effort with no leak = 1.2 inches of H_2O, or less.

TOOLS REQUIRED

Standard Tools

Inch pounds Torque Wrench
3/32" Hex Key Socket
5/8" Open End Wrench
3/4" Open End Wrench
15/16" Open End Wrench
Standard Screwdriver - small
Cotton Swab

Specialty Tools

P/N 40.3362	Poppet Tool
P/N 40.4400	Retaining Ring Tool
P/N 40.9315	Intermediate Press. Gauge
P/N 40.9520	O-ring Tool Kit
P/N 40.9650	Universal FRONT COVER Tool

Oceanic approved Halocarbon Based Lubricant (See General Procedure Doc. 12-2202 for approved list)

TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
* **Freeflow or leakage present. ADJUSTMENT KNOB (33) turned in.**	1. LEVER ARM (17) bent. 2. Excessive intermediate pressure. 3. Damaged or worn POPPET SEAT (14). 4. Damaged ORIFICE (11). 5. LOCK NUT (20) overtightened onto POPPET (15) Shaft. 6. WASHER (18) bent or distorted. 7. ORIFICE (11) incorrectly adjusted. 8. POPPET SPRING (16) worn or weakened. 9. SWIVEL COUPLING (12) not sufficiently tightened into Inlet Tube of the HOUSING ASSEMBLY (5). 10. Trapped debris.	1. Replace with new. 2. Refer to First Stage Troubleshooting Chart. 3. Replace with new. 4. Replace with new. 5. Replace with new and readjust. (Refer to Tuning Section.) 6. Replace WASHER (18), SPACER (19), and LOCK NUT (20) with new. 7. Turn in clockwise to adjust. (Refer to Tuning Section.) 8. Replace with new. 9. Follow correct procedure given in Reassembly Section to tighten. 10. Remove and clean.
* **Excessive inhalation resistance. ADJUSTMENT KNOB (33) turned out.**	1. LOCK NUT (20) overtightened onto POPPET (15) Shaft, causing excessive POPPET SPRING (16) tension. 2. LOCK NUT (20) insufficiently tightened onto POPPET (15) Shaft, causing LEVER ARM (17) slack. 3. LEVER ARM (17) bent. 4. ORIFICE (11) incorrectly adjusted. 5. Insufficient intermediate pressure from First Stage.	1. Replace with new and readjust. (Refer to Tuning Section.) 2. Tighten to correct Spring load and LEVER ARM height. (Refer to Tuning Section.) 3. Replace with new. 4. Adjust to correct contact. (Refer to Tuning Section.) 5. Refer to First Stage Troubleshooting Chart.
* **Rattle heard inside Second Stage.**	1. Gravel or sand trapped inside HOUSING ASSEMBLY (5). 2. LEVER ARM (17) slack present.	1. Remove and clean. 2. Tighten LOCK NUT (20) onto POPPET (15) Shaft. (Refer to Tuning Section.)
* **Little or no air flow when Purge Button is depressed.**	1. FRONT COVER (2) not sufficiently tightened into HOUSING ASSEMBLY (5). 2. LEVER ARM (17) slack present. 3. ORIFICE (11) incorrectly adjusted.	1. Tighten COVER RING (1) until secure. 2. Tighten LOCK NUT (20) onto POPPET (15) Shaft. (Refer to Tuning Section.) 3. Adjust ORIFICE (11) to correct contact. (Refer to Tuning Section.)
* **ADJUSTMENT KNOB (33) difficult to turn.**	1. Debris or corrosion present on ADJUSTMENT SHAFT (29). 2. Debris present inside ADJUSTMENT KNOB (33). 3. Debris or corrosion present on or inside ADJUSTMENT SPRING (27).	1. Disassemble and clean. 2. Flush out or disassemble if necessary to clean. 3. Disassemble to clean or replace with new as needed.
* **Water entering Second Stage.**	1. Tear in MOUTHPIECE (9). 2. EXHAUST VALVE (7) distorted or damaged. 3. DIAPHRAGM (4) distorted or damaged. 4. Debris trapped beneath EXHAUST VALVE (7). 5. FRONT COVER (2) insufficiently tightened onto HOUSING ASSEMBLY (5). 6. Cracked or damaged HOUSING ASSEMBLY (5). 7. Mouthpiece TIE WRAP (8) loose or missing.	1. Replace with new. 2. Replace with new. 3. Replace with new. 4. Remove and clean. 5. Tighten until secure and properly aligned. 6. Replace with new. 7. Tighten or install.

DISASSEMBLY PROCEDURE

NOTE: Be sure to perform the steps outlined in the Initial Inspection Procedures (Doc. 12-2202) prior to disassembling the Regulator. Review the Troubleshooting Section to gain a better idea of which internal parts may be worn, and to better advise your customer of the service that is needed.

1. Snip the plastic TIE WRAP (8) that holds the MOUTHPIECE (9), and remove the MOUTHPIECE. Inspect the condition of the MOUTHPIECE to ensure that it is supple and free of any tears or corrosion. Discard if found.

NOTE: For Swivel Versions 1 & 2 use step 2S. For Non-Swivel Versions use Step 2N. For Version identification see the Exploded-View Diagram.

2S. Pull the Hose Protector back and remove the LP HOSE (38) from the Second Stage by turning it counter clockwise using a 15/16" open end wrench, while holding the HOUSING (5) secure (Fig. 1). Remove the LP HOSE O-RING (40) and LP HOSE WASHER (39 **ONLY USED on Swivel Version 1**) (Fig. 2). Discard both and DO NOT attempt to reuse them.

2N. Pull the Hose Protector back and remove the LP HOSE (45) from the Second Stage by turning it counter clockwise using a 9/16" open end wrench, while holding the HOUSING (5) secure.

3. Remove the COVER RING (1), using a Front Cover Tool if necessary, and remove the FRONT COVER (2) and INNER FRONT COVER (3) to expose the DIAPHRAGM (4).

4. Grasp the DIAPHRAGM (4) by the raised edges of the center, and lift with a slight upward twist to remove it. Inspect the DIAPHRAGM to ensure it is supple and free of any tears, corrosion, or other distortion. Discard if found.

5. Depress and hold the LEVER ARM (17) to remove the SWIVEL COUPLING (12) in a counter clockwise direction, using a 3/4" open end wrench (Fig. 3).

6. Remove the COUPLING O-RING (13) from the SWIVEL COUPLING (12) and inspect for any signs of decay. Discard if found.

7. Using a narrow slotted blade screwdriver, remove the ORIFICE (11) by turning it counter clockwise inside the SWIVEL COUPLING (12). When it has disengaged completely from the Threads, press it out with the use of a cotton swab (Fig. 4). Use caution to avoid nicking or scratching the delicate Knife Edge of the ORIFICE as this is done. Remove and discard the ORIFICE O-RING (10). Inspect the ORIFICE carefully with the use of a magnifier to ensure that it is perfectly free of any scoring or nicks. If found, discard and DO NOT attempt to reuse.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

8. Turn the ADJUSTMENT KNOB (33) out completely until resistance is felt. Remove the ADJUSTMENT KNOB SCREW (34) turning it counter clockwise with a 3/32" hex key and slide the KNOB off the ADJUSTMENT SHAFT (29).

9. Remove the PACKING NUT (32) by turning it counterclockwise using a 5/8" open end wrench. Remove the THRUST WASHER (31) from the ADJUSTMENT SHAFT (29).

10. Using the Poppet Tool, push the POPPET (15) inward in the Inlet Tube of the HOUSING ASSEMBLY (5), which will push the SPRING PAD (26), ADJUSTMENT SPRING (27), and ADJUSTMENT SHAFT (29) with PISTON SPRING FOLLOWER (28) through the outer end of the ADJUSTMENT TUBE (24) (Fig. 6). If the SPRING PAD does not come out, gently tap the HOUSING ASSEMBLY in your hand to remove it.

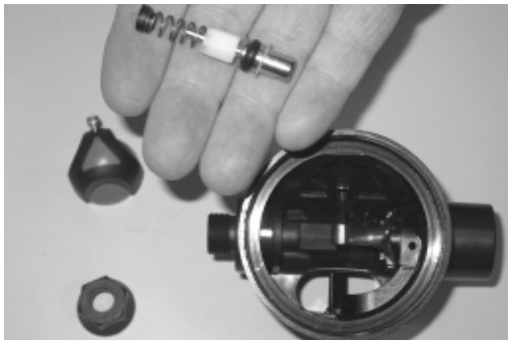


Fig. 6

11. Remove the STEM O-RING (30) from the ADJUSTMENT SHAFT (29) and examine it for signs of decay or distortion. Discard if found.

△ **NOTE: Removal of the PISTON SPRING FOLLOWER (28) from the ADJUSTMENT SHAFT (29) should not be necessary unless it is broken or needs to be replaced. In this case remove it by holding the ADJUSTMENT SHAFT in one hand and turning the PISTON SPRING FOLLOWER clockwise with your other hand. Note the thread is left handed.**

12. Examine the ADJUSTMENT SPRING (27) with a magnifier and compare with new to ensure correct tension and length. Discard if found to be distorted, weakened, or corroded.

13. Using your finger, push the ADJUSTMENT TUBE(24) into the HOUSING ASSEMBLY (5) and remove it by tilting and lifting it out (Fig. 7). The BALANCE SHAFT (21) will retract into the TUBE during removal.

Fig. 7

14. Remove the ADJUSTMENT TUBE O-RING (25) from the ADJUSTMENT TUBE (24) and inspect it for any signs of decay. Discard if found.

15. Remove the BALANCE SHAFT (21) by pushing it out of the ADJUSTMENT TUBE (24) using a cotton swab. Examine the SHAFT and compare with new to ensure that it is not bent or distorted in any way. Discard if distortion is found. Remove the SNAP WASHER (22) by gently inserting a small screwdriver through one of the slots in the ADJUSTMENT TUBE. Examine the SNAP WASHER for deterioration. Discard if found. Remove the BALANCE SHAFT O-RING (23) (Fig. 8). Discard the O-RING and DO NOT attempt to reuse it.

Fig. 8

16. Remove the POPPET (15), POPPET SPRING (16), WASHER (18), SPACER (19), LEVER (17), and LOCK NUT (20) by holding the POPPET with the Poppet Tool while turning the LOCK NUT counterclockwise using a 1/4" nut driver. To avoid a sudden ejection as they are disengaged, continuously apply a slight amount of inward pressure to the POPPET and the LOCK NUT.

17. Examine the SPACER (19) for deterioration. Discard if found. Discard the LOCK NUT (20) and WASHER (18), and DO NOT attempt to reuse them.

18. Examine the LEVER ARM (17) and compare with new to ensure that it is not bent or distorted in any way. Discard if distortion is found.

19. Examine the POPPET SPRING (16) with a magnifier and compare with new to ensure correct tension and length. Discard if found to be weakened or corroded.

20. Remove the POPPET SEAT (14) from the POPPET (15) with the use of a dental pick. Discard and DO NOT attempt to reuse it.

21. Using the flat end of a brass O-ring Tool or a thin plastic probe, carefully lift the Retaining Tab Slats of the EXHAUST COVER (6) from the Retaining Tabs located on the base of the HOUSING ASSEMBLY (5) (Fig. 9). Once the EXHAUST COVER is disengaged from the retaining tabs, push straight down on the Exhaust Porting of the EXHAUST COVER to remove it from the HOUSING ASSEMBLY.

22. Inspect the overall condition of the HOUSING ASSEMBLY (5), and the EXHAUST COVER (6) to ensure they are free of any stress cracks or other distortions. Ensure that all Threading on the HOUSING ASSEMBLY is in good condition. Discard either if any distortion or damage is found.

23. Using a soft probe, inspect the condition of the EXHAUST VALVE (7) to ensure that it is supple and free of any tears or corrosion, and that it seals completely around the Seating Surface of the HOUSING ASSEMBLY (5).

△ **NOTE: Provided that the EXHAUST VALVE (7) is in good condition, removing it is not necessary. The HOUSING ASSEMBLY (5) may be cleaned with the EXHAUST VALVE attached. (Refer to the Cleaning Section of this manual.)**

24. If the EXHAUST VALVE (7) requires replacement, it may be removed by grasping it at the Flange and pulling it straight out, snipping the Retainer Stem if necessary. Discard.

25. Inspect the VENTURI SWITCH (35) for smooth even operation, ensuring there is no resistance throughout its range of movement. Inspect for signs of debris trapped within the VENTURI SWITCH Mechanism, and ensure there is no corrosion or rust on the SWITCH RETAINING RING (37).

Fig. 9

NOTE: Provided that the VENTURI SWITCH Mechanism is in good condition, removing it is not necessary. The HOUSING ASSEMBLY (5) may be cleaned with the VENTURI SWITCH attached. (Refer to the Cleaning Section of this manual.)

26. If disassembly of the VENTURI SWITCH Assembly is needed, proceed by closely adhering to the following steps:

    A. Remove the SWITCH RETAINING RING (37) by pushing on the exposed Tip of the RETAINING RING with a brass O-ring Tool until the Body of the RETAINING RING is no longer seated in the Groove on the VENTURI SWITCH (35) (Fig. 10).

    B. Place the end of the brass O-ring Tool through the Mouthpiece opening in the HOUSING ASSEMBLY (5) and into the space between the Body of the SWITCH RETAINING RING (37) and the VENTURI SWITCH (35). Using caution not to damage the HOUSING ASSEMBLY, slowly pull the SWITCH RETAINING RING away from the VENTURI SWITCH to remove it (Fig. 11).

    C. Grasp the VENTURI SWITCH (35) by the Adjustment Tab and pull it straight up and out of the HOUSING ASSEMBLY (5) to remove it. Remove and discard the VENTURI SWITCH O-RING (36), and DO NOT reuse it.

    D. Closely examine the VENTURI SWITCH (35) and the SWITCH RETAINING RING (37) for signs of distortion, cracks, corrosion, rust, or other damage. Discard if found.

Fig. 10

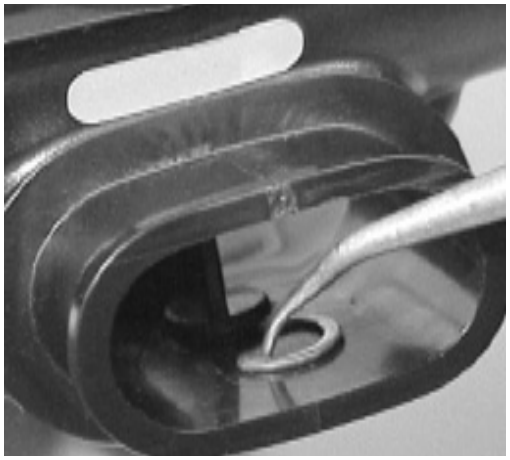


Fig. 11

REASSEMBLY PROCEDURE

NOTE: Prior to Reassembly, it is necessary to inspect all Parts, both new and those that are being reused. Check to ensure that O-rings are clean and supple, and that every Part and Component has been thoroughly cleaned and dried.

WARNING: Use only genuine Oceanic Parts, Subassemblies, and Components whenever assembling Oceanic products. DO NOT attempt to substitute an Oceanic Part with another manufacturer's, regardless of any similarity in shape, size, or appearance. Doing so may render the product unsafe, and could result in serious injury or death of the user.

1. Replace the EXHAUST VALVE (7), if removed, into the HOUSING ASSEMBLY (5) by gently pulling the Retainer Stem through the HOUSING ASSEMBLY until the Retaining Flange is inside and properly seated.

2. Replace the EXHAUST COVER (6) onto the Exhaust Tee portion of the HOUSING ASSEMBLY (5) by holding the EXHAUST COVER at a slight angle to the HOUSING ASSEMBLY with the Bottom raised and mating the Top of it with the Hinge Tabs on the HOUSING ASSEMBLY. Ensure that the Top is aligned, then

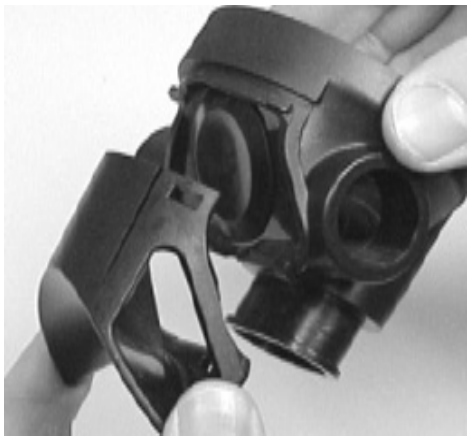


Fig. 12

press the EXHAUST COVER in toward the HOUSING ASSEMBLY until it snaps into place (Fig. 12).

3. Replace the VENTURI SWITCH ASSEMBLY if removed by closely adhering to the following steps:

   A. Lightly lubricate and install the VENTURI SWITCH O-RING (36) onto the VENTURI SWITCH (35), ensuring the O-RING is properly seated in the Groove.

   B. Holding the ASSEMBLY by the Adjustment Tab, lower the VENTURI SWITCH (35) into the HOUSING ASSEMBLY (5), ensuring that the Adjustment Stop Post is seated in the Adjustment Groove located on the HOUSING ASSEMBLY. Ensure the Retaining Ring Groove on the VENTURI SWITCH is visible when looking into the HOUSING ASSEMBLY through the Mouthpiece opening.

   C. Place the SWITCH RETAINING RING (37) into the Retaining Ring Tool so that the Rounded Side of the SWITCH RETAINING RING is against the Cradle of the Tool, and the Flat Side is facing up and out (Fig. 13).

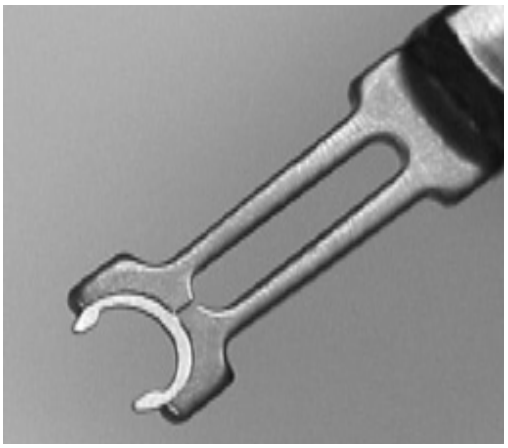


Fig. 13

   D. Insert the Retaining Ring Tool with the SWITCH RETAINING RING (37) into the HOUSING ASSEMBLY (5) through the Mouthpiece opening. Press the SWITCH RETAINING RING into the VENTURI SWITCH (35) Groove until it is completely seated, ensuring that the Flat Side of the SWITCH RETAINING RING is against the HOUSING ASSEMBLY (5). Remove the Tool (Fig. 14).

   E. Turn the VENTURI SWITCH (35) back and forth through its complete range of motion ensuring smooth movement without any restriction. Verify that the SWITCH RETAINING RING (37) is completely seated into the Groove on the VENTURI SWITCH, and does not rotate.

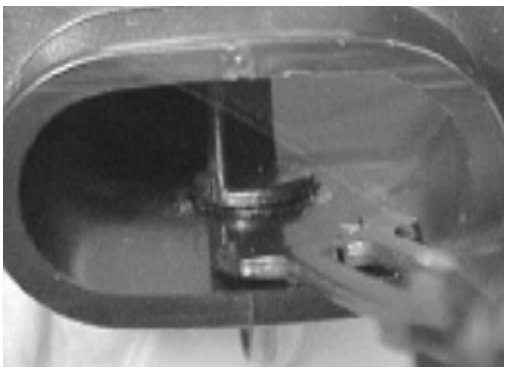


Fig. 14

4. Replace the POPPET SEAT (14) into the POPPET (15), with the side that is perfectly smooth facing out. Ensure that it is completely seated, flush with the Rim of the POPPET. DO NOT use adhesive.

5. Apply a light film of lubricant to each end of the POPPET SPRING (16) and place it onto the POPPET (15). Fit the POPPET into the Pronged End of the Poppet Tool and insert the POPPET Shaft completely through the Inlet Tube of the HOUSING ASSEMBLY (5) compressing the POPPET SPRING until the Threaded portion of the Shaft is completely visible inside the HOUSING ASSEMBLY. Hold in position by grasping the Tool with your fingers and the Outer Rim of the HOUSING ASSEMBLY with your thumb.

6. Place the WASHER (18) over the Threads of the POPPET (15) and onto the Shaft. Place the SPACER (19) onto the POPPET Shaft. Turn the LOCK NUT (20) clockwise onto the POPPET Threads with your finger tips until threading is started (Fig. 15).

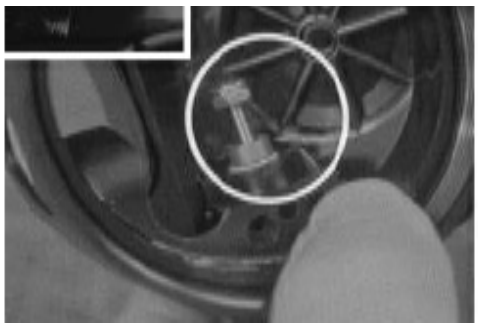


Fig. 15

7. While still compressing the POPPET SPRING (16) with the Poppet Tool, insert a 1/4" nut driver through the open Adjustment Port of the HOUSING ASSEMBLY (5) and turn the LOCK NUT (20) further onto the POPPET (15) until 3 Threads are showing beyond the Outer Surface of the LOCK NUT (Fig. 16). Remove the Tools.

⚠ **CAUTION: It is very important that a minimum of 2-3 threads of the POPPET (15) Shaft are adjusted outside the LOCK NUT (20). The LEVER ARM (17) may otherwise become caught on the End of the POPPET Shaft, resulting in an uncontrolled free flow.**

8. Lubricate and install the BALANCE SHAFT O-RING (23) into the small opening end of the ADJUSTMENT TUBE (24). Install the SNAP WASHER (22), smooth end down, into the ADJUSTMENT TUBE directly over the BALANCE SHAFT O-RING, causing the SNAP WASHER to snap securely into position. Insert the BALANCE SHAFT (21) into the small opening end of the ADJUSTMENT TUBE through the SNAP WASHER and BALANCE SHAFT O-RING (Fig. 17).

9. Lubricate and install the ADJUSTMENT TUBE O-RING (25) onto the ADJUSTMENT TUBE (24). Holding the smaller end of the ADJUSTMENT TUBE, insert it, Threaded end first, down into the HOUSING ASSEMBLY (5) and angle it into the ADJUSTMENT TUBE Opening in the Side of the HOUSING ASSEMBLY. Ensure that the ADJUSTMENT TUBE Flange mates flat against the Inner Wall of the opening. If necessary, grasp the Outer Threads and rotate the TUBE until the surfaces mate.

10. If previously removed, install the PISTON SPRING FOLLOWER (28) on the ADJUSTMENT SHAFT (29). Screw it on counter clockwise, Flat Side first. DO NOT tighten with a wrench.

11. Lubricate and install the STEM O-RING (30) onto the ADJUSTMENT SHAFT (29).

12. Holding the ADJUSTMENT SHAFT (29) vertically, install the ADJUSTMENT SPRING (27) over the Stem so it rests in the Concave End of the PISTON SPRING FOLLOWER (28), then place the SPRING PAD (26) on top with the small Rounded End in the ADJUSTMENT SPRING (Fig. 18).

13. Holding the HOUSING ASSEMBLY (5) with the ADJUSTMENT TUBE (24) facing down and your index finger inside pressing the ADJUSTMENT TUBE against the Inner Wall of the HOUSING, ASSEMBLY, insert the ADJUSTMENT SHAFT (29), ADJUSTMENT SPRING (27), and SPRING PAD (26) up into the ADJUSTMENT TUBE (Fig. 19). This will push the BALANCE SHAFT (21) partially out of the other end of the ADJUSTMENT TUBE and up against the POPPET (15). Ensure that the BALANCE SHAFT is properly aligned with the POPPET. Spring tension will hold the parts in place.

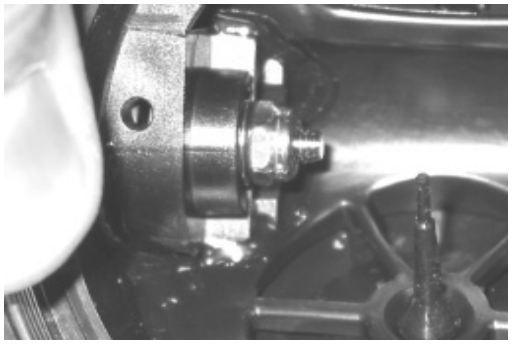


Fig. 16

Fig. 17

Fig. 18

Fig. 19

14. Install the THRUST WASHER (31) onto the ADJUSTMENT SHAFT (29), then slide the PACKING NUT (32) over the SHAFT and thread it onto the ADJUSTMENT TUBE (24) until secure. Tighten with a 5/8" open end wrench **to a torque of 12 in/lbs**.

⚠ **CAUTION: DO NOT over tighten! Doing so will damage the HOUSING ASSEMBLY or other parts, requiring their replacement.**

15. Install the ADJUSTMENT KNOB (33) over the ADJUSTMENT SHAFT (29) and PACKING NUT (32). Insert the ADJUSTMENT KNOB SCREW (34) and tighten in a clockwise direction with a 3/32" hex key **to a torque of 4 in/lbs**.

16. Using a Poppet Tool, push the POPPET (15) into the HOUSING ASSEMBLY (5) to expose the WASHER (18) and SPACER (19) inside the HOUSING ASSEMBLY. Place the Forks of the LEVER ARM (17) over the POPPET Shaft between the WASHER and the SPACER. Relax the POPPET and watch to ensure that the LEVER ARM stands upright.

17. Lubricate and install the COUPLING O-RING (13) onto the SWIVEL COUPLING (12). Install the SWIVEL COUPLING into the Inlet Tube of the HOUSING ASSEMBLY (5) with the Smaller Opening facing in. Tighten clockwise with a 3/4" open end wrench **to a torque of 110 in/lbs**.

18. Lubricate and install the ORIFICE O-RING (10) onto the ORIFICE (11). Lubricate the Threads of the ORIFICE with a very thin film of lubricant and insert the ORIFICE into the SWIVEL COUPLING (12) with the Knife Edge facing in (Fig. 20).

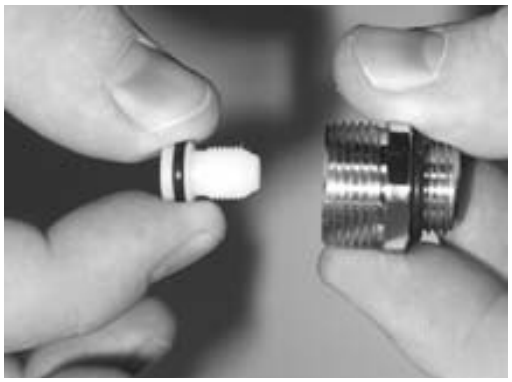


Fig. 20

⚠ **CAUTION: Be careful to protect the delicate Knife Edge as this is done.**

19. Using a narrow shafted, slotted blade screwdriver, gently turn the ORIFICE (11) clockwise into the INLET COUPLING (12) until the Knife Edge is barely contacting the POPPET SEAT (14). DO NOT continue to turn the ORIFICE any further beyond this point, which will cause the LEVER ARM (17) to drop. Doing so will also damage the ORIFICE Seat requiring its replacement.

△ **NOTE: This is an important preliminary setting for the ORIFICE. For best sensitivity of touch, hold the screwdriver by the shaft rather than the handle.**

20. Place the DIAPHRAGM (4) inside the HOUSING ASSEMBLY (5) with the Raised Center facing up, and ensure that it seats flush at the Base of the Inner Threads.

21. Place the FRONT COVERS (2/3) directly over the DIAPHRAGM (4), and ensure that they seat flush. Position the COVER RING (1) onto the HOUSING ASSEMBLY (5), ensuring that it is correctly seated on the Threads. Hand tighten until secure, ensuring the

Fig. 21

FRONT COVERS are properly aligned (Fig. 21). Use the Front Cover Tool, if necessary. DO NOT over tighten.

22. Secure the MOUTHPIECE (9) onto the HOUSING ASSEMBLY (5) with a TIE WRAP (8), positioning the Locking Tab of the TIE WRAP towards the Hose.

△ **NOTE: Oceanic's patented Orthodontic Mouthpieces are designed to accommodate the natural overbite of the human jaw. Ensure that it is properly positioned.**

△ **NOTE: Step 23 is ONLY FOR SWIVEL VERSION 1. If you are working with another Version disregard Step 23 and proceed to the next step. For Version identification see the Exploded View Diagram.**

23. With the Flat side facing down, push the LP HOSE WASHER (39) into the Inlet of the SWIVEL COUPLING (12).

△ **NOTE: Step 24 is ONLY FOR SWIVEL VERSIONS 1 & 2. If you are working with a NON-SWIVEL VERSION disregard Step 24 and proceed to the next step. For Version identification see the Exploded View Diagram.**

24. Lubricate the LP HOSE O-RING (40) and place it on top of the Swivel Ball located in the SWIVEL COUPLING (12).

△ **NOTE: FOR SWIVEL VERSIONS 1 & 2 follow Step 25S. If you are working with a NON-SWIVEL VERSION use Step 25N. For Version identification see the Exploded View Diagram.**

25S. While holding the Second Stage vertically with the SWIVEL COUPLING (12, Swivel Version 1 or 47 Swivel Version 2) on top, install the LP HOSE ASSEMBLY (38) on to the SWIVEL COUPLING and tighten **to a torque of 55 in/lbs** with an 11/16" crow's foot wrench, while holding the Second Stage secure (Fig. 23).

25N. Hold the Second Stage, and install the LP HOSE ASSEMBLY (45) on to the COUPLING (46) and tighten **to a torque of 55 in/lbs** with an 9/16" crow's foot wrench, while holding the Second Stage secure.

Fig. 23

FINAL TUNING AND TESTING

FIRST STAGE TESTING

1. Perform the Leak Detection Test specified in the Initial Inspection procedure.

△ **NOTE: Refer to the Trouble Shooting Section to determine the possible cause and treatment of any air leaks that may be found.**

2. Connect the Delta 4 Second Stage LP Hose to a Low Pressure Port of the First Stage. Ensure that all other Ports are sealed with Port Plugs, with the exception of an additional Low Pressure Quick Disconnect Hose.

3. Connect a recently calibrated Low Pressure Test Gauge to the additional Low Pressure Hose, and connect the First Stage to a pure breathing gas source of 3,000 PSI (200 BAR).

4. Slowly open the valve to pressurize the Regulator, and check the Test Gauge to ensure that the Intermediate Pressure is set as recommended in the Specifications for the First Stage being used.

△ **NOTE: If the Intermediate Pressure is found to be other than recommended, refer to that Regulator's Trouble Shooting Section to determine possible cause and treatment.**

TUNING

1. Prior to tuning the Delta 4, check the following items:
   A. 2 to 3 threads on the Shaft of the POPPET (15) should extend past the Outer Surface of the LOCK NUT (20) inside the HOUSING ASSEMBLY (5).
   B. The FRONT COVERS (2/3) should be secure and properly aligned.
   C. The ADJUSTMENT KNOB (33) should be turned counter clockwise 1-1/2 turns from fully open (or out).
   D. Connect an In-Line Adjustment Tool between the Low Pressure Hose and SWIVEL COUPLING (12).
   E. The MOUTHPIECE (9) should be cleaned and disinfected with warm, soapy water.

2. Pressurize the Regulator with a pure air source of 3,000PSI (205 BAR) and listen to determine that a slight air flow is initially present. If necessary, use the In-Line Adjustment Tool to turn the ORIFICE (11) counter clockwise, slightly out, to initiate this air flow.

△ **NOTE: While pressurized, the slotted blade of the In-Line Adjustment Tool will be held away from the ORIFICE (11), and will therefore need to be pushed inward and held while turning in either direction. Locate the Slotted Head of the ORIFICE by touch before attempting any adjustment.**

3. Use the In-Line Adjustment Tool to turn the ORIFICE (11) in clockwise using small fractions of a turn just until air flow is no longer present. Pause to listen carefully for air flow or leakage after each adjustment.

△ **NOTE: Turning the ORIFICE (11) in further than necessary to stop air flow will result in LEVER ARM (17) slack and excessive Spring load tension, prohibiting peak performance.**

⚠ **CAUTION: To avoid cutting the POPPET SEAT (14) with the Knife Edge of the ORIFICE (11), depress the Purge Button while turning the ORIFICE in or out.**

4. Hold the Second Stage with the MOUTHPIECE (9) facing directly down, and gently shake it up and down. Listen carefully for any rattle that may be present, indicating LEVER ARM (17) slack. If found, perform the following procedure:
   A. Remove the COVER RING (1), FRONT COVERS (2/3), and DIAPHRAGM (4) to gain access to the Valve Assembly.
   B. Purge the Regulator of air.
   C. Depress the LEVER ARM and hold to remove the SWIVEL COUPLING (12) from the Inlet Tube of the HOUSING (5), using a 3/4" open end wrench.
   D. Turn the LOCK NUT (20) further clockwise onto the POPPET (15) Shaft with small fractions of a turn, using the Poppet Tool and 1/4" open end wrench. Use the correct method given in step 16 of the Reassembly Procedure to replace the SWIVEL COUPLING after each adjustment, and again determine whether slack is eliminated.

△ **NOTE: Avoid tightening the LOCK NUT (20) any further than is necessary to eliminate LEVER ARM (17) slack. It may be necessary to repeat step 4D several times to arrive at the correct setting.**

⚠ **CAUTION: Be careful to avoid over adjusting! If air flow returns, replace the LOCK NUT and POPPET SEAT (14) with new, and start over after rereading the above procedures.**

5. Replace the DIAPHRAGM (4), FRONT COVERS (2/3), and COVER RING (1), if removed, and pressurize the Regulator again with a pure air source of 3,000 PSI (205 BAR). Determine the range of adjustment by performing the following procedure:
   A. Turn the ADJUSTMENT KNOB (33) completely out, counter clockwise. A slight to moderate air flow should be present.
   B. Turn the ADJUSTMENT KNOB completely in, clockwise, and fully depress the Purge Button. This should initiate a slight air flow.

△ **NOTE: If air flow is greater or less than specified for each adjustment, refer to the Trouble Shooting Section to determine possible cause and treatment.**

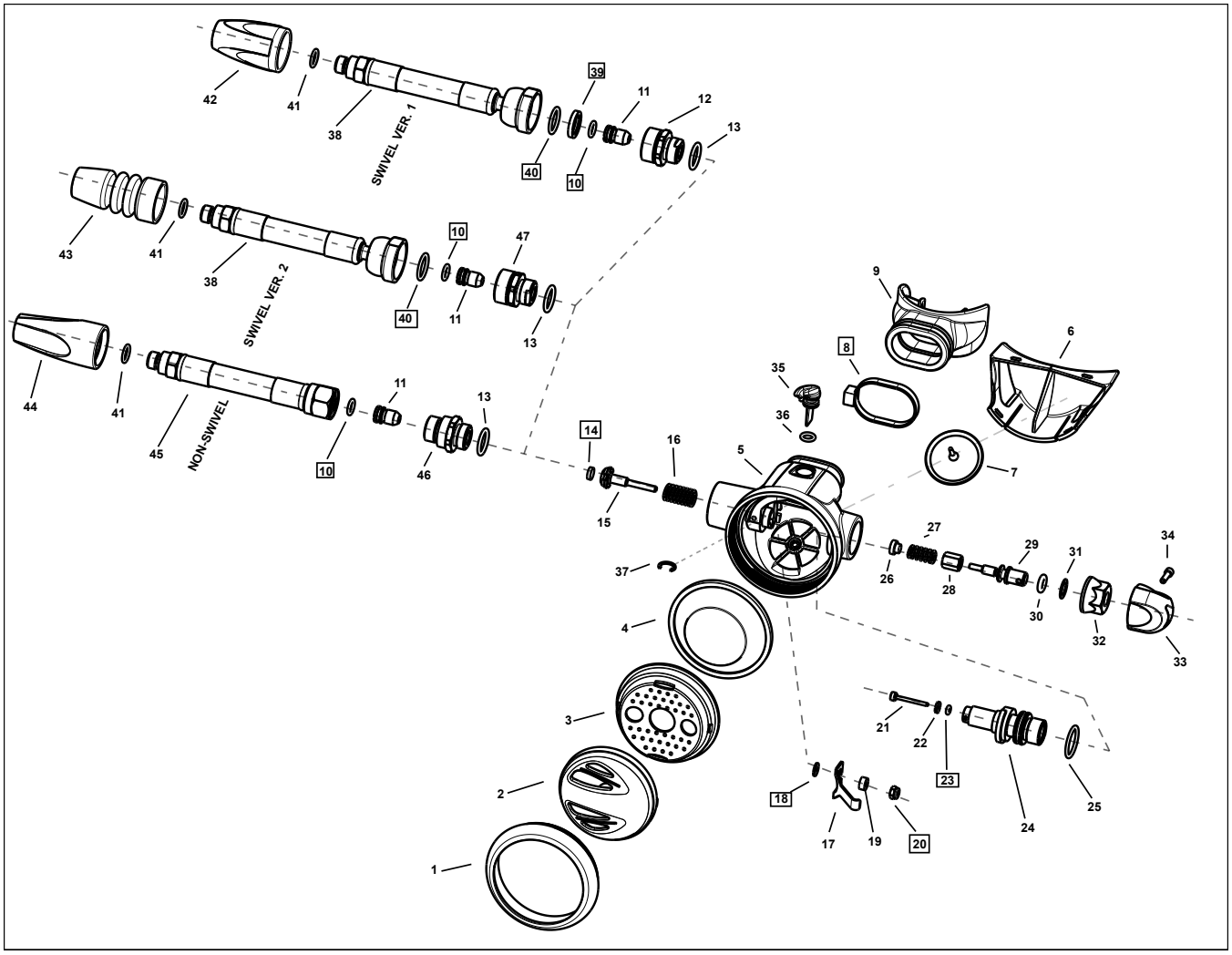
6. Purge the Regulator of air, remove the In-Line Adjustment Tool and connect the LP Hose directly onto the SWIVEL COUPLING (12), as described in step 25 of the Reassembly Procedure.

7. Pressurize the Regulator again with a pure air source of 3,000 PSI (205 BAR). Return the ADJUSTMENT KNOB (33) to its mid range position. Inhale lightly through the MOUTHPIECE (9) to determine that air flows easily and smoothly, without any hesitation or lag.

⚠ NOTE: If hesitation or lag is detected, refer to the Trouble Shooting Section to determine possible cause and treatment.

8. Clean and disinfect the MOUTHPIECE (9) in warm, soapy water before returning the Delta 4 to the customer.

DELTA 4 SECOND STAGE



DELTA 4 SECOND STAGE

Dia. No.	Part #	Description
1c	6949.23	RING, COVER (METAL)
	6930.07	RING, COVER (BK)
2c	6931.07	COVER, FRONT (BK)
	6931.18	COVER, FRONT (YL)
3b	6932.11	COVER, INNER FRONT (BL)
	6932.18	COVER, INNER FRONT (YL)
	6932.34	COVER, INNER FRONT (BK)
4b	5236	DIAPHRAGM
5c	5248.07	ASSEMBLY, HOUSING
6c	5234.07	COVER, EXHAUST
7b	6326	VALVE, EXHAUST
8a	**1978.07**	**WRAP, TIE**
9b	4485.07	MOUTHPIECE
10a	**2.010**	**O-RING, ORIFICE**
11c	6621	ORIFICE
12c	6956	COUPLING (SWIVEL ONLY)
13b	3.906	O-RING, COUPLING
14a	**4340**	**SEAT, POPPET**
15c	4333	POPPET
16c	4593	SPRING, POPPET
17c	5254	ARM, LEVER
18a	**5117**	**WASHER**
19b	4335	SPACER
20a	**4336**	**NUT, LOCK**
21c	5244	SHAFT, BALANCE
22b	4969	WASHER, SNAP
23a	**2.004**	**O-RING, BALANCE SHAFT**
24c	5245	TUBE, ADJUSTMENT
25b	2.016	O-RING, ADJUSTMENT TUBE
26c	4971	PAD, SPRING
27c	4589	SPRING, ADJUSTMENT
28c	6684	FOLLOWER, PISTON SPRING

Dia. No.	Part #	Description
29c	6685	SHAFT, ADJUSTMENT
30b	2.107	O-RING, STEM
31b	5054	WASHER, THRUST
32c	6332	NUT, PACKING
33c	6971.18	KNOB, ADJUSTMENT (BK/YL)
	6971.29	KNOB, ADJUSTMENT (BK/GY)
34c	4787.2	SCREW, ADJUSTMENT KNOB (BK)
35c	6924	SWITCH, VENTURI
36b	2.009	O-RING, VENTURI SWITCH
37b	5251	RING, SWITCH RETAINING
38c	40.2120.030	ASSEMBLY, SWIVEL HOSE (Swivel Version 1 & 2 ONLY)
39a	**6959**	**WASHER, LP HOSE (Swivel Version 1 ONLY)**
40a	**6968**	**O-RING, LP HOSE (Swivel Version 1 & 2 ONLY)**
41b	3.903	O-RING, LP HOSE (First Stage End)
42c	6948	HOSE PROTECTOR (Swivel Version 1)
43c	TBD	HOSE PROTECTOR (Swivel Version 2)
44c	6438.07	HOSE PROTECTOR (Non-Swivel Version)
45c	40.2100.030	HOSE (Non-Swivel), MAXFLO, 30" (BK)
46c	TBD	COUPLING (NON-SWIVEL ONLY)
47c	7026	COUPLING (Swivel Version 2)
N/S	40.6162	KIT, SERVICE PARTS (includes all **Bold** items)