GT

SERVICE PROCEDURE

This GT Product Service Procedure conveys a list of components and service procedures that reflect the GT as it was configured at the time of this writing (9/19/02).

GT SECOND STAGE

CONTENTS

GENERAL PROCEDURES

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

SPECIFICATIONS

Torques

P/N 4330	Coupling	100 to 120 in-lbs
LP Hose		50 to 60 in-lbs

Opening Effort (IP = 140 psi)

Preferred Primary Set-up	1.2 to 1.4 inches of H_2O
Acceptable (Primary)	1.1 to 1.5 inches of H_2O
Preferred Octopus Set-up	1.5 to 2.0 inches of H_2O
Acceptable (Octopus)	1.5 to 2.2 inches of H_2O

TOOLS REQUIRED

Standard Tools

P/N N/A	Inch pounds Torque Wrench
P/N N/A	5/8” Crows Foot Wrench
P/N N/A	3/4” Crows Foot Wrench
P/N N/A	11/16” Crows Foot Wrench
P/N N/A	Standard Screwdriver - small
P/N N/A	Needle Nose Pliers
P/N N/A	1/4” Nut Driver
P/N N/A	Allen Key - 3/32”
P/N N/A	Cotton Swab (Q-Tip)
P/N N/A	Soft Jawed Vise
P/N N/A	Dental Type Pick

Specialty Tools

P/N 40.2302	Christo-Lube MCG111 - 2 oz
P/N 40.3367	Poppet Tool
P/N 40.4400	Retaining Ring Installation Tool
P/N 40.9315	Intermediate Pressure Gauge
P/N 40.9510	In-line Adjustment Tool
P/N 40.9512	Modified 1/4" Open End Wrench
P/N 40.9520	O-ring Tool Kit
P/N 40.9650	Universal Front Cover Tool

TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
*** Freeflow or leakage present.**	1. LEVER ARM (17) bent. 2. Excessive intermediate pressure. 3. Damaged or worn POPPET SEAT (14). 4. Damaged MOLDED ORIFICE (11). 5. LOCK NUT (20) overtightened onto POPPET (15) shaft. 6. WASHER (18) bent or distorted. 7. MOLDED ORIFICE (11) incorrectly adjusted. 8. POPPET SPRING (16) worn or weakened. 9. INLET COUPLING (12) not sufficiently tightened into HOUSING (4) Inlet Tube. 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.**	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 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 (4). 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 airflow when Purge Button is depressed.**	1. FRONT COVER (2) not sufficiently tightened into HOUSING (4). 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.)
*** Water entering Second Stage.**	1. Tear in MOUTHPIECE (8). 2. EXHAUST VALVE (6) distorted or damaged. 3. DIAPHRAGM (3) distorted or damaged. 4. Debris trapped beneath EXHAUST VALVE (6). 5. FRONT COVER (2) insufficiently tightened onto HOUSING (4). 6. Cracked or damaged HOUSING (4).	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.

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 (7) that holds the MOUTHPIECE (8), 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.

2. Remove the Hose from the Second Stage, using an 11/16" open end wrench, while holding the hex portion of the INLET COUPLING (12) secure with a 3/4" open end wrench.

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

4. Grasp the DIAPHRAGM (3) by the raised edges of the center, and lift with a slight upward twist to remove. 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 INLET COUPLING (12) in a counter clockwise direction, using a 3/4" open end wrench (Fig. 1).

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

7. Using a narrow slotted blade screwdriver, remove the MOLDED ORIFICE (11) by turning it counter clockwise inside the INLET COUPLING (12). When it has disengaged completely from the threads, press it out with the use of a cotton swab (Fig. 2).

   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.

8. Using a Poppet Tool, push the POPPET (15) inward in the Inlet Tube of the HOUSING (4), compressing the POPPET SPRING (16), and carefully remove the LEVER ARM (17) (Fig. 3).

Fig. 1

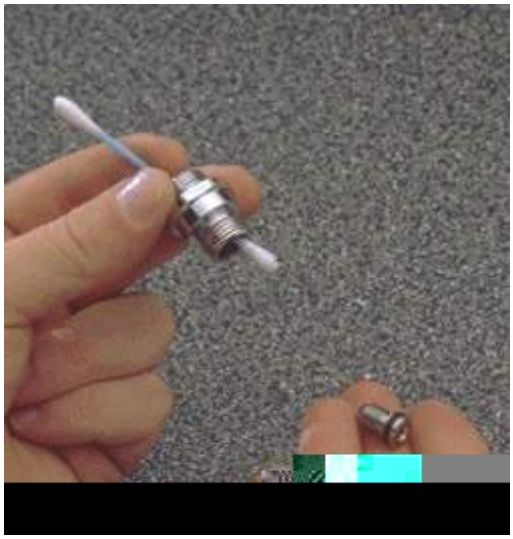

Fig. 2

Fig. 3

9. Using a small blade screwdriver, remove the HOUSING PLUG RETAINING RING (21) by carefully prying the edges inward (Fig. 4). Discard the RING and DO NOT attempt to reuse it.

10. While squeezing the Inner Tabs (Fig. 4a) with your fingers, remove the HOUSING PLUG (23) by pulling it out and away from the HOUSING (4). Inspect the HOUSING PLUG O-RING (22) for any signs of decay. Discard if found and DO NOT attempt to reuse it.

11. Remove the POPPET (15), POPPET SPRING (16), WASHER (18), SPACER (19), and LOCK NUT (20) by holding the POPPET secure with the Poppet Tool while turning the LOCK NUT counterclockwise using a 1/4" nut driver inserted through the Housing Plug opening of the HOUSING (4) (Fig. 5). To avoid a sudden ejection as they are disengaged, continuously apply a slight amount of inward pressure while turning the POPPET out of the LOCK NUT.

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

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

14. 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.

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

16. 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 (5) from the retaining tabs located on the base of the HOUSING (4) (Fig. 6). 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.

17. Inspect the overall condition of the HOUSING (4), and the EXHAUST COVER (5) to ensure they are free of any stress cracks or other distortions. Ensure that all threading on the HOUSING is in good condition. Discard either if any distortion or damage is found.

Fig. 4

Fig. 5

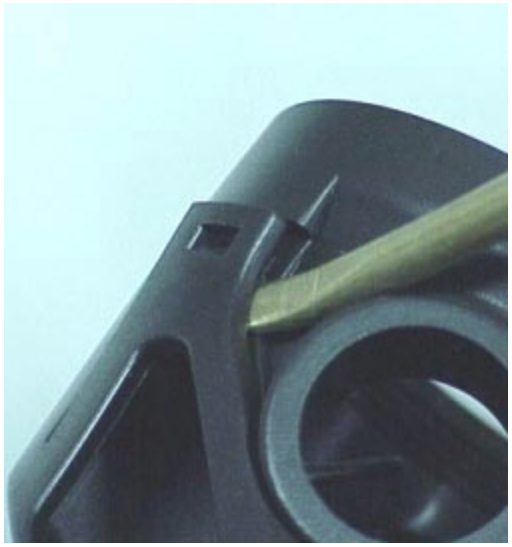

Fig. 6

18. Using a soft probe, inspect the condition of the EXHAUST VALVE (6) 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 (4).

NOTE: If the EXHAUST VALVE (6) is in good condition, it is not necessary to remove it. The HOUSING (4) may be cleaned with it attached.

19. If the EXHAUST VALVE (6) requires replacement, it may be removed by grasping it at the flange and pulling it straight out, snipping the Retainer Stem if necessary. Discard.

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 (6), if removed, into the HOUSING (4) by gently pulling the Retainer Stem through the HOUSING until the Retaining Flange is inside the HOUSING and properly seated.

2. Replace the EXHAUST COVER (5) onto the Exhaust Tee portion of the HOUSING (4) by holding the COVER at a slight angle to the HOUSING with the Bottom raised and mating the Top of it with the Hinge Tabs on the HOUSING. Ensure that the Top is aligned, then press the COVER in toward the HOUSING until it snaps into place. (Fig. 7)

3. Place a new 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.

4. 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 (4) compressing the SPRING until the threaded portion of the Shaft is completely visible inside the HOUSING. Hold in position by grasping the tool with the fingers and the outer rim of the HOUSING with the thumb.

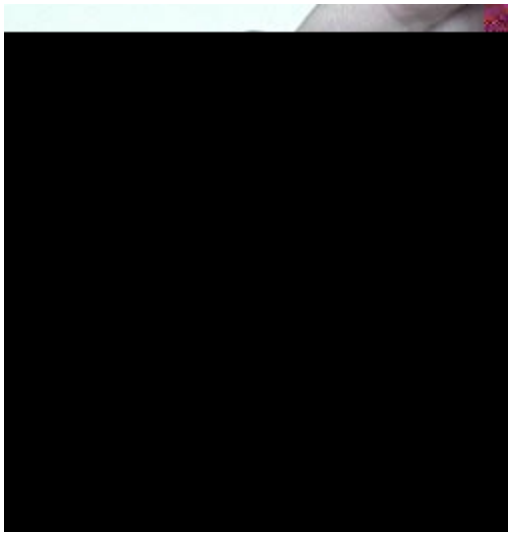

Fig. 7

5. 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. 8).

6. Using a 1/4" open end wrench to hold the LOCK NUT (20) secure, turn the POPPET (15) clockwise with the Poppet Tool until 3 threads are showing beyond the outer surface of the LOCK NUT (Fig. 8 - insert).

   Then, while still compressing the SPRING (16) with the Poppet Tool, and insert a 1/4" nut driver through the open Port of the HOUSING (4) and turn the LOCK NUT further onto the POPPET until 3 threads are showing beyond the outer surface of the LOCK NUT (Fig. 8 - insert). 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.**

7. Lubricate and install the O-RING (22) onto the PLUG and press the PLUG into the open Port of the HOUSING (4) until the 3 Retaining Tabs snap into place on the inner rim of the Port.

8. Place a new HOUSING PLUG RETAINING RING (21), curved side first, onto the Shaft of the HOUSING PLUG (23) (Fig. 9) and slide it down until it is completely and evenly seated against the inner wall of the HOUSING (4).

9. Using a Poppet Tool, push the POPPET (15) into the HOUSING (4) to expose the WASHER (18) and SPACER (19) inside the HOUSING. 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.

10. Lubricate and install the INLET COUPLING O-RING (13) onto the INLET COUPLING (12). Install the INLET COUPLING into the Inlet Tube of the HOUSING (4) with the smaller opening facing in. Tighten clockwise with a 3/4" open end wrench **to a torque of 110 in/lbs**.

11. 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 INLET COUPLING (12) with the knife edge facing in (Fig. 10).

⚠ **CAUTION: Be careful to protect the delicate knife edge as this is done.**

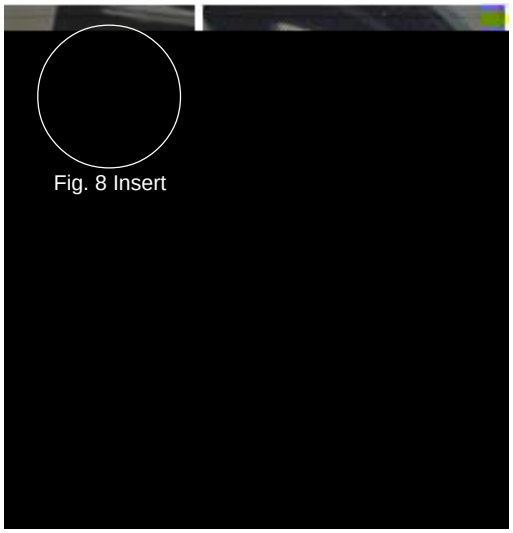

Fig. 8


Fig. 9


Fig. 10

△ **NOTE: For best sensitivity of touch during Step #12, place your forefinger gently on the LOCK NUT (20) while slowly turning the ORIFICE (11). As soon as contact is made, you will feel the LOCK NUT begin to turn. Hold the screwdriver by the shaft rather than the handle.**

12. 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) (Fig. 11). DO NOT continue to turn the ORIFICE any further beyond this point, which will cause the LEVER ARM (17) to drop. Doing so will damage the POPPET SEAT, requiring its replacement.

13. Place the DIAPHRAGM (3) inside the HOUSING (4) with the raised center facing up, and ensure that it seats flush at the base of the inner threads.

14. Place the FRONT COVER (2) directly over the DIAPHRAGM (3), and ensure that it seats flush. Position the COVER RING (1) onto the HOUSING (4), taking care to ensure that it is correctly seated on the threads. Hand tighten until secure and ensure the FRONT COVER is properly aligned, with the logo right side up (Fig. 12). Use the universal front cover tool, if necessary. DO NOT over tighten.

15. Secure the MOUTHPIECE (9) onto the HOUSING (4) with an all plastic, noncorrosive 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.**

16. Lubricate and replace the O-ring inside the Second Stage Coupling End of the LP Hose. Install the Hose onto the Second Stage, and tighten **to a torque of 55 in/lbs** with an 11/16" crows foot wrench, while holding the hex portion of the INLET COUPLING (12) secure with a 3/4" crows foot wrench.

Fig. 11

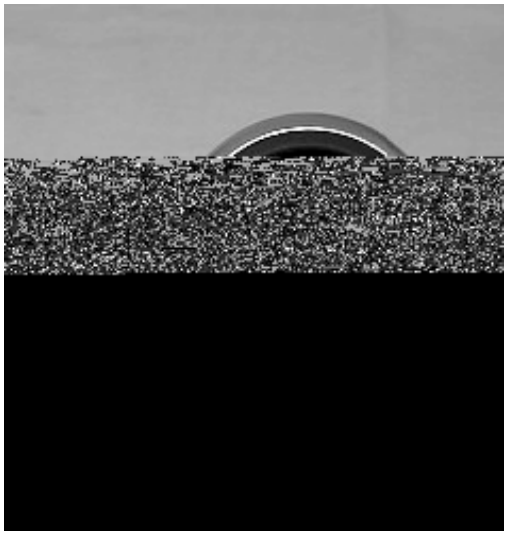

Fig. 12

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 gas leaks that may be found.**

2. Connect the GT 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 (20.5 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 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 GT, verify the following:

   A. 2 to 3 threads on the Shaft of the POPPET (15) extend past the outer surface of the LOCK NUT (20).

   B. The HOUSING PLUG (23), DIAPHRAGM (3), AND FRONT COVER (2) are securely installed into the HOUSING (4).

   C. An In-Line Adjustment tool is connected between the low pressure Hose and INLET COUPLING (12).

   D. The MOUTHPIECE (8) has been cleaned and disinfected.

2. Pressurize the Regulator with a pure air source of 3,000 PSI (20.5 BAR), and listen to determine that a slight airflow is initially present. If necessary, use the In-Line Adjustment tool to turn the ORIFICE (11) counter clockwise, slightly out, to initiate this airflow.

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 airflow is no longer present. Pause to listen carefully for airflow or leakage after each adjustment.

NOTE: Turning the ORIFICE (11) in further than necessary to stop airflow will result in lever 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 (8) facing directly down, and gently shake 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 COVER (2), and DIAPHRAGM (3) to gain access to the Valve Assembly.

   B. Purge the Regulator of air.

   C. Depress the LEVER ARM (17) and hold it down to remove the INLET COUPLING (12) from the Inlet Tube of the HOUSING (4), 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 Installation tool and 1/4" open end wrench. Use the correct method given in step 11 of the Reassembly Procedure to replace the INLET 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 airflow returns, replace the LOCK NUT and POPPET SEAT (14) with new, and start over after rereading the above procedures.**

5. Purge the Regulator of air, remove the In-Line Adjustment tool, and connect the LP Hose directly onto the INLET COUPLING (12), using two wrenches as prescribed in step 17 of the Reassembly Procedure.

6. Replace the DIAPHRAGM (3), FRONT COVER (2), COVER RING (1), and ADJUSTMENT PORT PLUG (23), if removed, and pressurize the Regulator again with a pure breathing gas source of 3,000 PSI (20.5 BAR).

7. Inhale lightly through the MOUTHPIECE (8) 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 (8) in warm, soapy water before returning the GT to the customer.

GT SECOND STAGE