SWIVEL OCTOPUS

SERVICE PROCEDURE

This Swivel Octopus Product Service Procedure conveys a list of components and service procedures that reflect the Swivel Octopus as it was configured at the time of this writing (5/23/02).

It also contains Supplemental Information intended to assist the Authorized Oceanic Regulator Service Technician who is servicing a Swivel Octopus configured with older components.

SWIVEL (180) OCTOPUS SECOND STAGE

CONTENTS

GENERAL PROCEDURES

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

SPECIFICATIONS

Torques

P/N 6725 Swivel Fitting	85 to 95 in-lbs
LP Hose	50 to 60 in-lbs

Opening Effort (IP = 140 psi)

Preferred Set-up = 1.5 to 2.0 inches of H_2O.
Acceptable = 1.5 to 2.2 inches of H_2O.

TOOLS REQUIRED

Standard Tools

Inch pounds Torque Wrench
5/8" Crows Foot Wrench
3/4" Crows Foot Wrench
11/16" Crows Foot Wrench
1/4" Nut Driver
1/8" Allen Key
3/16" Allen Key
1" Deep Wall Socket

Specialty Tools

P/N 40.3362	Poppet Installation/Removal Tool
P/N 40.9315	Intermediate Pressure Gauge
P/N 40.9520	O-ring Tool Kit
P/N 40.9650	Universal FRONT COVER Tool
P/N 40.2302	Christo-Lube MCG111 - 2 oz

TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
*** Freeflow or leakage present.**	1. LEVER ARM (22) bent. 2. Excessive intermediate pressure. 3. Damaged or worn POPPET SEAT (18). 4. Damaged ORIFICE (17). 5. LOCK NUT (24) overtightened onto POPPET (19) shaft. 6. WASHER (21) bent or distorted. 7. ORIFICE (17) incorrectly adjusted. 8. POPPET SPRING (20) worn or weakened. 9. SWIVEL FITTING (14) 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 (21), SPACER (23), and LOCK NUT (24) 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 (24) overtightened onto POPPET (19) shaft, causing excessive POPPET SPRING (20) tension. 2. LOCK NUT (24) insufficiently tightened onto POPPET (19) shaft, causing LEVER ARM (22) slack. 3. LEVER ARM (22) bent. 4. ORIFICE (17) 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.) 5. Refer to First Stage Troubleshooting Chart.
*** Rattle heard inside Second Stage.**	1. Gravel or sand trapped inside HOUSING (4). 2. LEVER ARM (22) slack present.	1. Remove and clean. 2. Tighten LOCK NUT (22) onto POPPET (19) Shaft. (Refer to tuning section.)
*** Little or no airflow when Purge Button is depressed.**	1. FRONT COVER (1) not sufficiently tightened into HOUSING (4). 2. LEVER ARM (22) slack present. 3. LEVER ARM (22) bent. 4. ORIFICE (17) incorrectly adjusted.	1. Tighten COVER RING (2) until secure. 2. Tighten LOCK NUT (24) onto POPPET (19) Shaft. (Refer to tuning section.) 3. Replace with new. 4. Adjust ORIFICE (17) 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 SWIVEL (13) secure with an 3/4" open end wrench (Fig. 1). Use care not to scratch the finish.

3. Remove the Front Cover Assembly (1, 2) using a universal Front Cover tool if necessary. DO NOT separate the COVER RING (1) and FRONT COVER (2) unless necessary.

4. Grasp the DIAPHRAGM (3) by the raised edges of the center, and lift with a slight upward twist to remove it. Inspect to ensure it is supple and free of any tears, corrosion, or other distortion. Discard if found.

5. Remove the SWIVEL RETAINER (10) by turning it counter clockwise with a 1/4" hex key. Remove the SWIVEL RETAINER O-RING (11) using a brass o-ring tool and inspect for any signs of decay. Discard if found.

6. While holding the HOUSING (4) secure, pull the SWIVEL (13) straight off the SWIVEL FITTING (14). Use a twisting/pulling motion to overcome o-ring resistance (Fig. 2). Inspect the FITTING to ensure that it is free of nicks or burrs.

7. Depress and hold the LEVER ARM (22) while removing the SWIVEL FITTING (14) in a counter clockwise direction, using an Oceanic custom 3/4" Deep Wall Socket (Fig. 3).

CAUTION: DO NOT attempt to remove the SWIVEL FITTING by inserting any type of tool through the machined openings.

8. Remove the HOUSING INLET O-RING (15) and two SWIVEL FITTING O-RINGS (12) from the SWIVEL FITTING (14) and inspect for any signs of decay. Discard if found.

9. Remove the ORIFICE (17) from the SWIVEL FITTING (14) by inserting a 3/16" hex keyey in from the swivel end of the FITTING **until it engages in the ORIFICE, then turn it** clockwise (out) until it disengages completely from the threads (Fig. 4).

   Use caution to avoid nicking or scratching the delicate knife edge of the ORIFICE as this is done.

Fig. 1

Fig. 2

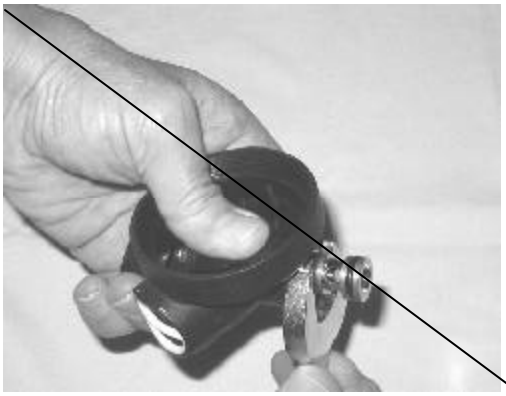


Fig. 3

Fig. 4

10. Remove and discard the ORIFICE O-RING (16). Inspect the ORIFICE (17) 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.

11. Hold the POPPET (19) secure with a Poppet installation tool and using a 1/4" nut driver inserted through the Mouthpiece opening of the HOUSING (4), turn the LOCK NUT (24) counterclockwise until no threads are showing (Fig. 5).

12. Using the Poppet installation tool, push the POPPET (19) inward in the Inlet Tube of the HOUSING (4), compressing the POPPET SPRING (20), and carefully remove the LEVER ARM (22). (Fig. 6)

13. Remove the POPPET (19), POPPET SPRING (20), WASHER (21), SPACER (23), and LOCK NUT (24) by holding the POPPET secure with the Poppet installation tool and turning the LOCK NUT counterclockwise using a 1/4" nut driver inserted through the Mouthpiece opening of the HOUSING (4).

14. Examine the SPACER (23) for deterioration. Discard if found. Discard the LOCK NUT (24) and WASHER (21), and DO NOT attempt to reuse.

15. Examine the LEVER ARM (22) and compare with new to ensure that it is not bent or distorted in any way. Discard if found.

16. Examine the POPPET SPRING (20) with a magnifier and compare with new to ensure correct tension and length. Discard if found to be weakened or corroded.

17. Remove the POPPET SEAT (18) from the POPPET (19) with the use of a dental pick. Discard, and DO NOT attempt to reuse.

18. Using a small blade screwdriver or a thin plastic probe inserted into the small slots in the HOUSING (4), carefully press the upper (or lower) retaining tabs of the EXHAUST GUARD (5) (Fig. 7). Once the EXHAUST GUARD is disengaged, lift it out of the HOUSING. Repeat to remove the other EXHAUST GUARD.

19. Inspect the overall condition of the HOUSING (4), and the EXHAUST GUARD (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.

20. Using a soft probe, inspect the condition of the EXHAUST VALVES (6) to ensure they are supple and free of any tears or corrosion, and that they seal completely around the seating surface(s) of the HOUSING (4).

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

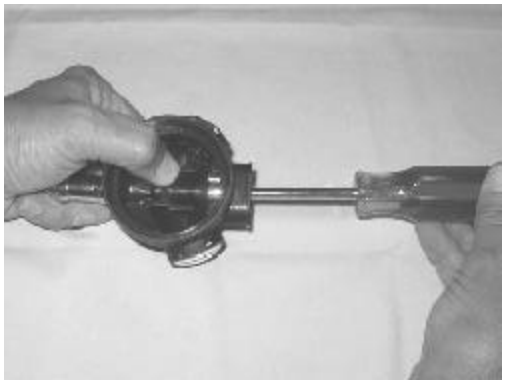


Fig. 5

Fig. 6

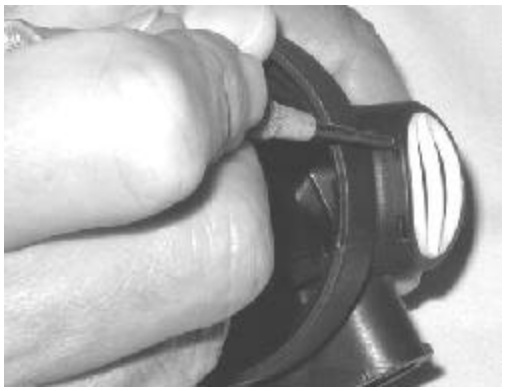


Fig. 7

21. If an 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. Repeat to install the other EXHAUST VALVE.

2. Replace the EXHAUST GUARD (5) into the HOUSING (4) by holding the GUARD at a slight angle to insert the lower Retaining Tabs into the slots in the HOUSING, then carefully pressing downward and inward on the top of the GUARD to insert the upper Retaining Tabs (Fig. 8).

   Ensure that all of the Retaining Tabs are properly engaged. Repeat to install the other EXHAUST GUARD.

3. Place a new POPPET SEAT (18) into the POPPET (19), 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 (20) and place it onto the POPPET (19). Fit the POPPET into the Pronged End of the Poppet installation 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. 9).

5. Place the WASHER (21), then the SPACER (23), over the Threads of the POPPET (19) and onto the POPPET Shaft.

6. Using a 1/4" nut driver, turn the LOCK NUT (24) clockwise onto the POPPET Threads until no threads are showing beyond the outer surface of the LOCK NUT (Fig. 10). Remove the tools.

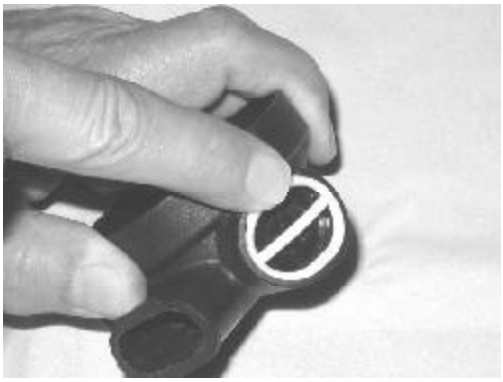


Fig. 8

Fig. 9

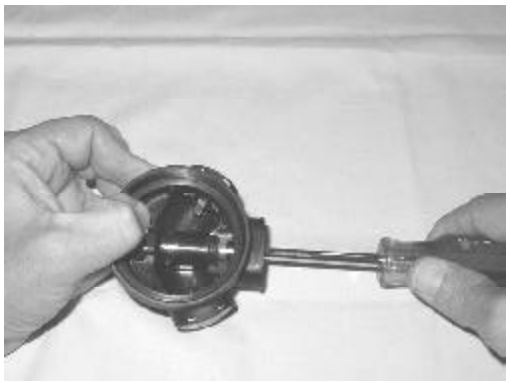


Fig. 10

7.

14. Lubricate and install the two SWIVEL FITTING O-RINGS (12) into the grooves of the SWIVEL FITTING (14).

NOTE: One end of the SWIVEL (13) is slightly larger than the other (Fig. 15).

15. Slide the SWIVEL (13), larger end first, straight onto the SWIVEL FITTING (14). Ensure that it rotates freely through 180 degrees.

16. Lubricate and install the SWIVEL RETAINER O-RING (11) onto the SWIVEL RETAINER (10).

17. Thread the SWIVEL RETAINER (10) clockwise into the SWIVEL FITTING (14) and tighten **to a torque of 40 in/lbs**.

18. 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.

19. Position the FRONT COVER ASSEMBLY (1, 2) onto the HOUSING (4), taking care to ensure that it is correctly seated on the threads. Hand tighten by turning it clockwise until secure. Use the universal front cover tool, if necessary. DO NOT over tighten.

20. Secure the MOUTHPIECE (8) onto the HOUSING (4) with a TIE WRAP (7), positioning the Locking Tab of the TIE WRAP towards the lower/left position.

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

22. Lubricate and replace the O-ring inside the Second Stage Coupling End of the LP Hose. Install the Hose onto the Second Stage SWIVEL, and tighten **to a torque of 55 in/lbs** with an 11/16" crows foot wrench, while holding the SWIVEL (13) secure with an 3/4" open end wrench (Fig. 16). Use care not to scratch the finish.

Fig. 15

Fig. 16

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 Swivel Octopus 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.

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 Swivel Octopus, verify the following:

   A. 2 to 3 threads on the Shaft of the POPPET (19) extend past the outer surface of the LOCK NUT (24).

   B. All components are securely installed into the HOUSING (4).

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

2. Pressurize the Regulator with a pure breathing gas source of 3,000 PSI, and listen to determine that no airflow is present.

NOTE: An In-Line Adjustment Tool <u>cannot</u> be used to tune the Swivel Octopus while pressurized. If adjustment is required, it must be depressurized to allow the SWIVEL RETAINER (10) to be removed to gain access to the ORIFICE (17). The LP Hose does not have to be removed.

CAUTION: To avoid cutting the POPPET SEAT (18) with the knife edge of the ORIFICE (17), always depress the Purge Button while turning the ORIFICE in or out.

3. To tune the Swivel Octopus, use a 3/16" hex key to turn the ORIFICE (17) (Fig. 17). Use the flat side of the hex key as a guide to small fraction 1/12 (30 degree) turns.

   <u>Clockwise</u> turns the ORIFICE <u>out</u> toward the POPPET SEAT (18).

   <u>Counter clockwise</u> turns the ORIFICE <u>in</u>, away from the SEAT.

CAUTION: Turning the ORIFICE (17) out further than necessary to stop airflow could cut the POPPET SEAT (18).

4. Replace the SWIVEL RETAINER (10), pressurize the Regulator, and listen carefully for airflow or leakage.

5. Hold the Second Stage with the MOUTHPIECE (8) facing directly down, and gently shake it up and down. Listen carefully for any rattle that may be present, indicating LEVER ARM (22) slack.

Fig. 17

If a rattle is found, perform the following procedure:

A. Purge the Regulator of pressure.

B. Perform Disassembly Procedure Steps # 2 to 8 to gain access to the POPPET (19). DO NOT remove O-rings or discard parts.

C. Using a 1/4" nut driver, turn the LOCK NUT (24) clockwise further onto the POPPET (19) Shaft with small fractions of a turn, while holding the POPPET secure using the Poppet Installation tool.

D. Use the correct method given in Steps #12, 15, and 17 to 20 of the Reassembly Procedure to replace the SWIVEL after each adjustment, and again determine whether slack is eliminated.

NOTE: Avoid tightening the LOCK NUT (24) any further than is necessary to eliminate LEVER ARM (22) slack. It may be necessary to repeat Step #5 several times to arrive at the correct setting.

CAUTION: Be careful to avoid over adjusting! If airflow returns, replace the LOCK NUT (24) and POPPET SEAT (18) with new, and start over after rereading the above procedures.

6. 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.

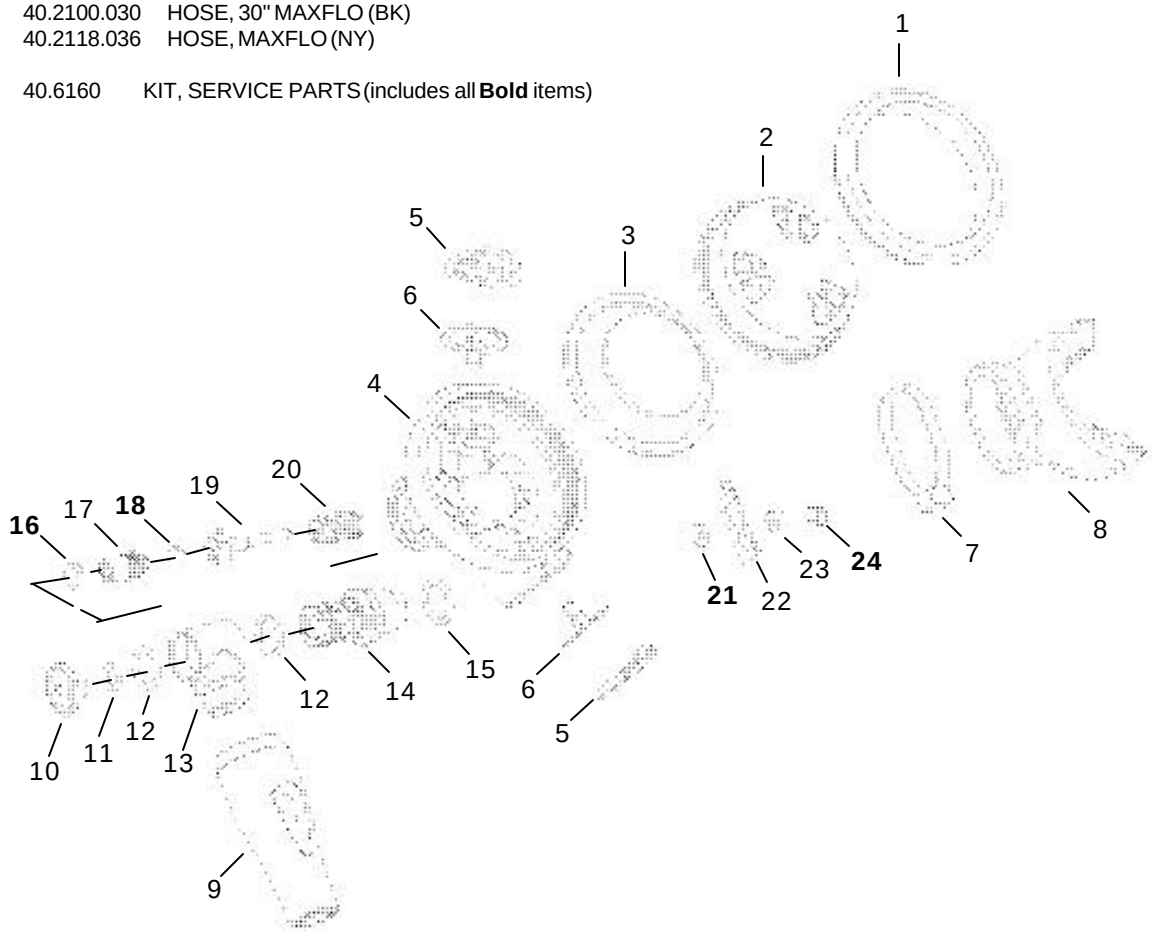
7. Clean and disinfect the MOUTHPIECE (8) in warm, soapy water before returning the Swivel Octopus to the customer.

SWIVEL (180) OCTOPUS SECOND STAGE

Dia. No.	Part #	Description
1c	6743.07	RING, COVER (BK)
2c	6744.18	COVER, FRONT (NY)
3b	6380	DIAPHRAGM
4c	6721	HOUSING (BK)
5c	6727.18	GUARD, EXHAUST (NY)
6b	6670	VALVE, EXHAUST
7c	1978.07	WRAP, TIE (BK)
8c	6651.07	MOUTHPIECE (SILICONE - BK)
9c	6732.07	PROTECTOR, HOSE (BK)
10c	6726	RETAINER, SWIVEL
11b	3.902	O-RING, SWIVEL RETAINER
12b	2.013	O-RING, SWIVEL FITTING
13c	6724	SWIVEL
14c	6725	FITTING, SWIVEL
15c	3.906	O-RING, HOUSING INLET
16a	**2.010**	**O-RING, ORIFICE**
17c	6730	ORIFICE
18a	**4340**	**SEAT, POPPET**
19c	4333	POPPET
20c	4593	SPRING, POPPET
21a	**5117**	**WASHER**
22c	6723	ARM, LEVER
23b	4335	SPACER
24a	**4336**	**NUT, LOCK**

N/S	40.2100.030	HOSE, 30" MAXFLO (BK)
N/S	40.2118.036	HOSE, MAXFLO (NY)

N/S	40.6160	KIT, SERVICE PARTS (includes all **Bold** items)



SUPPLEMENTAL INFORMATION

Due to design enhancements that have been made since the Swivel Octopus was released, the unit being serviced may not have the same components previously described.

The intent of this Supplemental Information is to assist the Oceanic Regulator Service Technician with identification of previous component parts and provide guidelines for their reuse or replacement.

The exploded view diagram on page 11 can be used as a reference for older units.

Dia. Part No. 1 - COVER RING

current p/n 6743.07
Compatible with the new Cover (p/n 6744.18) only.

older p/n 6733.07
Compatible with the old Cover (p/n 6728.18) only.

Dia. Part No. 2 - FRONT COVER

current p/n 6744.18
Compatible with the new Cover Ring (p/n 6743.07) only.

older p/n 6728.18
Compatible with the old Cover Ring (p/n 6733.07) only.

Dia. Part No. (not shown) - DIAPHRAGM WASHER

current p/n - none
Not required with the new Front Cover (p/n 6744.18) and Cover Ring (p/n 6743.07)

older p/n 6381 (was old Diagram Part No. 3)
Not compatible with new Front Cover (p/n 6744.18) and Cover Ring (p/n 6743.07)
Must be used with old Front Cover (p/n 6728.18) and Cover Ring (p/n 6733.07)

Dia. Part No. 11 - SWIVEL RETAINER O-RING

current p/n 3.902
Compatible with other old and new parts.

older p/n 2.902 (was old Diagram Part No. 12)
Replacement with the newer part is not required, but is allowed at your discretion.
Compatible with other old and new parts.