TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
* **Freeflow or leakage present. (Adjustment knob turned in.)**	1. Trapped debris prohibiting movement of purge button. 2. Lever arm bent. 3. Excessive intermediate pressure. 4. Damaged or worn LP seat. 5. Damaged adjustable orifice. 6. Locking nut (20) overtightened onto poppet shaft. 7. Washer(18) bent or distorted. 8. Adjustable orifice(11) incorrectly adjusted. 9. Spring(16) worn or weakened. 10. Inlet coupling (12) not sufficiently tightened into inlet tube.	1. Remove and clean. 2. Replace with new. 3. Refer to first stage troubleshooting chart. 4. Replace with new. 5. Replace with new. 6. Replace with new and readjust. (Refer to tuning section.) 7. Replace washer, spacer, and locking nut with new. 8. Turn in clockwise to adjust. (Refer to tuning section.) 9. Replace with new. 10. Follow correct procedure given in reassembly section to tighten.
* **Excessive inhalation resistance. (Adjustment knob turned out.)**	1. Locknut(20) overtightened onto poppet shaft, causing excessive spring tension. 2. Locknut(20) insufficiently tightened onto poppet shaft, causing lever slack. 3. Lever arm bent. 4. Adjustable(17) orifice 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. 2. Lever slack present.	1. Remove and clean. 2. Tighten locking nut onto poppet shaft. (Refer to tuning section.)
* **Little or no airflow when purge button is depressed.**	1. Front cover not sufficiently tightened onto housing. 2. Lever slack present. 3. Adjustable(11) orifice incorrectly adjusted.	1. Tighten until perfectly snug. 2. Tighten locking nut onto poppet shaft. (Refer to tuning section.) 3. Adjust orifice to correct contact. (Refer to tuning section.)
* **Adjustment knob difficult to turn.**	1. Debris or corrosion present on adjustment shaft. 2. Debris present inside 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. 2. Exhaust valve diaphragm(6) distorted or damaged. 3. Demand diaphragm(3) distorted or damaged. 4. Demand diaphragm washer(2) not present. 5. Front cover(1) insufficiently tightened onto housing. 6. Cracked or damaged housing(4).	1. Replace with new. 2. Replace with new. 3. Replace with new. 4. Install new. 5. Tighten until perfectly snug and properly aligned. 6. Replace with new.

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DISASSEMBLY PROCEDURE

NOTE: Be sure to perform the steps outlined in the Initial Inspection Procedures 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) which 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.

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 front cover(1) to expose the diaphragm(3), using a Delta II front cover tool if necessary, and remove the diaphragm washer(2). Pink and black washers should be replaced with one white washer (P/N 4590).

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 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 orifice(11) by turning it counter clockwise inside the 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 o-ring(10). Inspect the orifice(11) 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 installation 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).

9. Turn the adjustment knob(33) out completely until resistance is felt. Remove the adjustment knob cap screw(7) using a 5/32" hex key and slide the knob off the adjustment shaft.

10. Remove the packing nut(32) by turning it counterclockwise using a 5/8" open end wrench. Remove the thrust washer(31) from the adjustment stem(29).



Fig. 1



Fig. 2



Fig. 3

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11. Using the poppet installation tool, push the poppet(15) inward in the inlet tube of the housing which will push the spring pad(26), adjustment spring(27), and adjustment stem(29) with spring follower(28) through the outer end of the adjustment tube(24). (Fig. 4). If the spring pad does not come out, gently tap the housing in your hand to remove it.

12. Remove the o-ring(30) from the adjustment stem(29) and examine for signs of decay or distortion. Discard if found.

    Note: Removal of the piston spring follower(28) from the adjustment stem should not be necessary unless it is broken

Fig. 4

Fig. 5

Fig. 6

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21. Remove the poppet seat(14) from the poppet(15) with the use of a dental pick. (Fig. 7) Discard, and DO NOT attempt to reuse.

22. Inspect the overall condition of the housing(4) to ensure it is free of any stress cracks or other distortions, and that the outer threads are in good condition. Discard if distortion is found.

23. Using a soft probe, inspect the condition of the exhaust valve diaphragm(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. Examine the exhaust tee cover(5) to ensure that it is securely fastened onto the housing.

⚠ **NOTE: Provided that the exhaust valve diaphragm(6) is in good condition and the exhaust tee cover(5) is intact, further disassembly is not necessary. The housing may be cleaned with these parts assembled, as one part. (Refer to the cleaning section of this manual.)**

24. If further disassembly is needed, either to replace the diaphragm or replace the exhaust tee cover, remove the exhaust tee cap screws(7) with a 3/32" hex key. Remove the exhaust tee cover(5) by lifting the bottom portion. The top portion of the cover acts similar to a hinge (Fig. 8).

25. The exhaust valve diaphragm(6) may now be removed by grasping it at the flange and pulling it straight out, snipping the retainer stem if necessary. Discard.

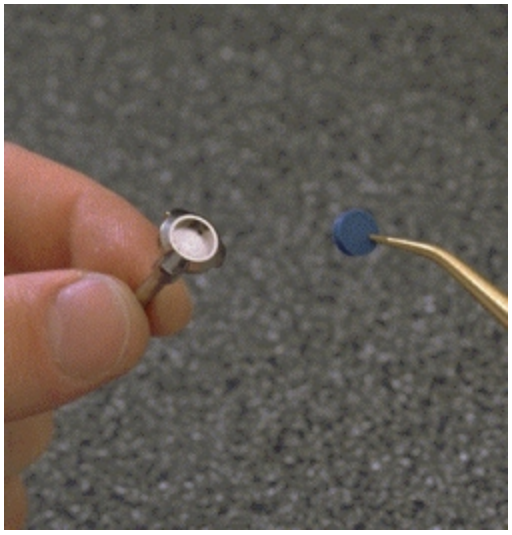


Fig. 7



Fig. 8

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 diaphragm(6), if removed, into the housing(4) by gently pulling the retainer stem through the housing(4) until the retaining flange is inside the housing and properly seated. (Fig. 9)



Fig. 9

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2. If removed, replace the exhaust tee 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. Thread the two cap screws(7) into the housing and tighten each 1/4 turn at a time using a 3/32" hex key to a torque of 4 in/lbs. DO NOT over tighten.

3. 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.

4. Apply a light film of lubricant to each end of the spring(16) and place onto the poppet(15). 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. 10).

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 locking nut(20) clockwise onto the poppet threads with your finger tips until threading is started. (Fig. 10) Then, while still compressing the spring(16) with the poppet installation tool, insert a 1/4" nut driver through the open adjustment port of the housing(4) and turn the locking nut(20) further onto the poppet until 3 threads are showing beyond the outer surface of the locking nut. (Fig.10 insert). Remove the tools.

⚠ **CAUTION: It is very important that a minimum of 2-3 threads of the poppet shaft are adjusted outside the locking nut. The lever arm may otherwise become caught on the end of the poppet shaft, resulting in an uncontrolled free flow.**

R 6. 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(24) directly over the balance shaft o-ring(23), causing the washer to "snap" securely into position. (Fig. 11) Insert the balance shaft(21) into the small opening end of the adjustment tube(24) through the snap washer(22) and balance shaft o-ring(23). (Fig. 12).

7. Lubricate and install the 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 and angle it into the adjustment tube opening in the side of the housing. 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.

8. If previously removed, install the piston spring follower(28) on the adjustment stem(29). Screw it on counterclockwise, flat side first. DO NOT tighten with a wrench.

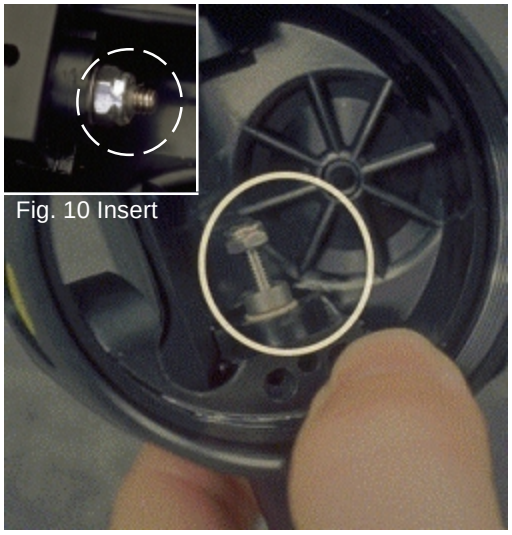
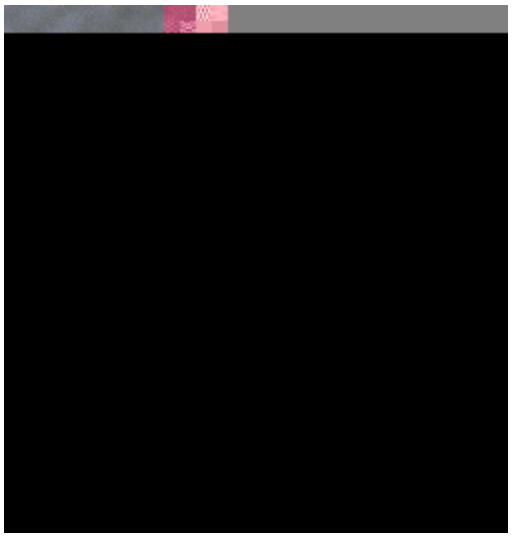
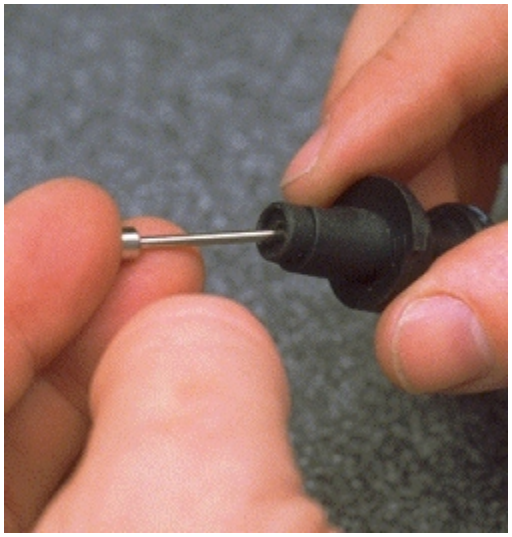


Fig. 10


Fig. 11


Fig. 12

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9. Lubricate and install the o-ring(30) onto the adjustment stem(29).

10. Holding the adjustment stem(29) vertically, install the adjustment spring(27) over the stem so it rests in the concave end of the follower(28), then place the spring pad(26) on top with the small rounded end in the spring (Fig. 13).

11. Holding the housing(4) with the adjustment tube(24) facing down and your index finger inside pressing the tube against the inner wall of the housing, insert the adjustment stem(29), spring(27) and spring pad(26) up into the tube. (Fig. 14). This will push the balance shaft(21) partially out the other end of the tube and up against the poppet. Ensure that the balance shaft is properly aligned with the poppet. Spring tension will hold parts in place.

12. Install the thrust washer(31) onto the adjustment stem(29), then slide the packing nut(32) over the stem 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 or other parts, requiring their replacement.**

13. Install the adjustment knob(33) over the adjustment stem(29) and packing nut(32). Insert the adjustment knob cap screw(7) and tighten with a 3/32" hex key to a torque of 4 in/lbs.

14. Using a poppet installation tool, push the poppet(15) into the housing 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.

15. Lubricate and install the o-ring(13) onto the inlet coupling(12). Install the 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.

16. Lubricate and install the 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. 15)

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

⚠ **NOTE: For best sensitivity of touch during Step #17, place your forefinger gently on the locknut while slowly turning the orifice. As soon as contact is made, you will feel the locknut begin to turn. Hold the screwdriver by the shaft rather than the handle.**

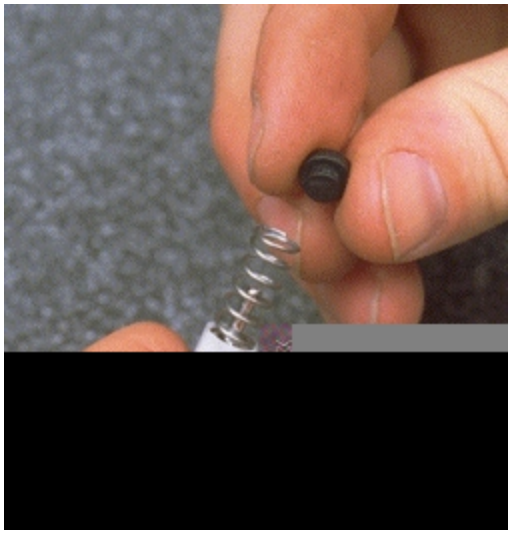


Fig. 13



Fig. 14



Fig. 15

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17. Using a narrow shafted, slotted blade screwdriver, gently turn the orifice(11) clockwise into the 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 to drop. Doing so will damage the poppet seat, requiring its replacement. (Fig. 16)



Fig. 16

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. Place the diaphragm washer(2) directly over the diaphragm(3), and ensure that it seats flush also.

19. Position the front cover(1) onto the housing(4), taking care to ensure that it is correctly seated on the threads. Hand tighten until secure and in alignment, attained when a small pin located on the underside of the cover below the lower inlet port snaps into a small groove located at the bottom of the housing rim. Use the front cover tool, if necessary. DO NOT over tighten.

20. 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. (Fig. 17)

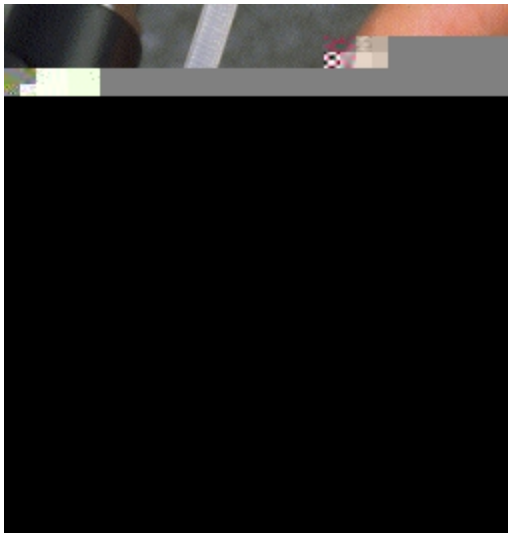


Fig. 17

△ **NOTE: Oceanic's patented Orthodontic Mouthpieces are designed to accommodate the natural overbite of the human jaw.**

21. 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 secure with either a 3/4" or 13/16" open end wrench. (Fig. 18)



Fig. 18

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 Delta II second stage low pressure 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 3,000PSI.

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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 troubleshooting section to determine possible cause and treatment.**

TUNING

1. Prior to tuning the Delta II regulator, check the following items:
   A. 2-3 threads on the shaft of the poppet should extend past the outer surface of the locking nut inside the housing.
   B. The front cover should be secure and properly aligned.
   C. The adjustment knob 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 inlet coupling.
   E. The mouthpiece should be cleaned and disinfected with warm, soapy water.

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

⚠ **NOTE: While pressurized, the slotted blade of the In-Line tool will be held away from the orifice, 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 tool to turn the orifice 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 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 LP seat with the knife edge of the orifice,depress the purge button while turning the orifice in or out.**

4. Hold the second stage with the mouthpiece facing directly down, and gently shake up and down. Listen carefully for any rattle that may be present, indicating lever slack. If found, perform the following procedure:
   A. Remove the front cover, diaphragm washer, and diaphragm to gain access to the valve assembly.
   B. Purge the regulator of air.
   C. Depress the lever arm and hold to remove the inlet coupling from the inlet tube, using a 3/4" open end wrench.

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D. Turn the locking nut further clockwise onto the poppet 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 15 of the reassembly procedure to replace the inlet coupling after each adjustment, and again determine whether slack is eliminated.

△ **NOTE: Avoid tightening the locking nut any further than is necessary to eliminate lever slack. It may be necessary to repeat step D several times to arrive at the correct setting.**

⚠ **CAUTION: Be careful to avoid over adjusting! If airflow returns, replace the locking nut and seat with new, and start over after rereading the above procedures.**

5. Replace the diaphragm, diaphragm washer, and front cover if removed, and pressurize the regulator again with a pure air source of 3,000PSI. Determine the range of adjustment by performing the following procedure:
   A. Turn the adjustment knob completely out counter clockwise. A slight to moderate airflow should be present.
   B. Turn the adjustment knob completely in clockwise and fully depress the purge button. This should initiate a slight airflow.

△ **NOTE: If airflow is greater or less than specified for each adjustment, refer to the troubleshooting 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 inlet coupling, using two wrenches as prescribed in the reassembly procedure.

7. Pressurize the regulator again with a pure air source of 3,000PSI. Return the adjustment knob to its mid range position to make a subjective test of airflow and cracking effort. Inhale lightly through the mouthpiece to determine that air flows easily and smoothly, without any hesitation or lag.

△ **NOTE: If hesitation or lag is detected, refer to the troubleshooting section to determine possible cause and treatment.**

8. Clean and disinfect the mouthpiece in warm, soapy water before returning to the customer.

SPECIFICATIONS

Torques

P/N 4330	Coupling	100 to 120 in-lbs
P/N 4787	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 = 140 psi)

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.

Specialty Tools

P/N 40.9313	5/32" Allen Key
P/N 40.9510	In Line Adjustment Tool
P/N 40.3367	Poppet Holding Tool
P/N 40.9512	Modified 1/4" Open End Wrench
P/N 40.6458	Front Cover Tool
P/N 40.2300	VFC-23 Cleaner - Pint
P/N 40.2308	VFC-23 Cleaner - Gallon
P/N 40.2302	Christo-Lube MCG111 - 2 oz
P/N 40.9520	O-ring Tool Kit

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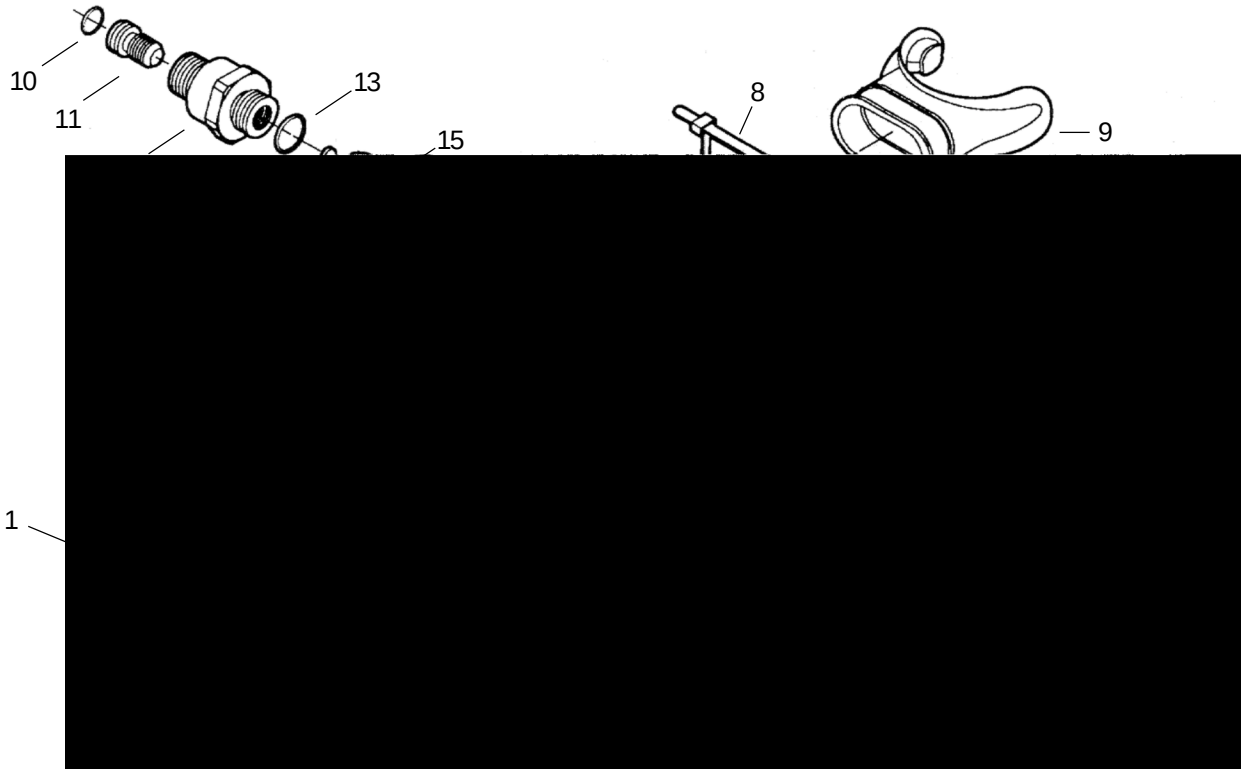
DELTA II SECOND STAGE

Dia. No.	Part #	Description
1c	6321.01.A	Front cover - Blue
	6321.07.A	Front cover - Black
	6321.11.A	Front cover - White
	6321.13.A	Front cover - Yellow (Nitrox)
	6321.18.A	Front cover - Yellow
	6321.19.A	Front cover - Green
	6321.20.A	Front cover - Pink
	6321.23.A	Front cover - Graphite
	6321.30.A	Front cover - Purple
2c	4590	Washer - Diaphragm
3b	4575	Diaphragm - Demand
4c	6320.A	Housing Assembly
5c	6328	Cover - Exhaust Tee
6b	6326	Valve - Exhaust
7c	4787 (3)	Screw - Adj. Knob
8a	**1978.10**	**Tie Wrap**
9c	4485.10	Mouthpiece - Orthodontic (Clear)
	4485.07	Mouthpiece - Orthodontic (Black)
10a	**2.010**	**O-ring - Orifice**
11c	4332	Orifice
12c	4330	Coupling - Inlet
13b	3.906	O-ring - Coupling
14a	**4340**	**Seat - Poppet**
15c	4333	Poppet
16c	4593	Spring - Poppet
17c	4587	Lever Arm
18a	**5117**	**Washer**
19b	4335	Spacer
20a	**4336**	**Nut - Lock (Nylon)**
21c	4970	Shaft - Balance
22b	4969	Washer - Snap
23a	**2.004**	**O-ring - Balance Shaft**

Dia. No.	Part #	Description
24c	4972	Tube - Adjustment
25b	2.016	O-ring - Adj. Tube
26c	4971	Pad - Spring
27c	4589	Spring - Adjustment
28c	6331	Follower - Piston Spring
29c	6330	Stem - Adjustment)
30b	2.107	O-ring - Stem
31b	5054	Washer - Thrust
32c	6332	Nut - Packing
33c	6324	Knob - Adjustment
34c	6322	Inlet - Top Cover
	6322.21	Inlet - Top Cover (Nitrox)
35c	6329.01	Decal - Blue
	6329.11	Decal - White
	6329.18	Decal - Yellow
	6329.19	Decal - Green
	6329.20	Decal - Pink
	6329.23	Decal - Graphite
	6329.30	Decal - Purple
n/s	6325	Protector - Hose
n/s	40.2100.033	Hose - MaxFlo - 33"
n/s	40.2100.036	Hose - MaxFlo - 36"
n/s	40.4690.01	Delta II Color Kit - BL
n/s	40.4690.07	Delta II Color Kit - BK
n/s	40.4690.11	Delta II Color Kit - WH
n/s	40.4690.18	Delta II Color Kit - NY
n/s	40.4690.19	Delta II Color Kit - NG
n/s	40.4690.20	Delta II Color Kit - NP
n/s	40.4690.21	Delta II Color Kit - NITROX
n/s	40.4690.23	Delta II Color Kit - GC
n/s	40.4690.30	Delta II Color Kit - PR

ANNUAL SERVICE PARTS KIT

40.6160 Service Kit (Includes all **Bold** items)



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