



# **212 Regulator Second Stage Service Procedure**

**This 212 Service Procedure conveys a list of components and service procedures that reflect the 212 as it was configured at the time of this writing (2/5/09).**

Hollis 212 Service Procedure, Doc. No. 12-4031  
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## General Procedures

Refer To      Doc. # 12-4025

## Specifications

### Terminology

**IP** Intermediate Pressure.

**IWC** Inches Water Column.

**Leak** Low volume release of air, audible & detectable in water.

**Free Flow** High flow rate, stops when airstream is obstructed.

**Over Purge** High flow rate, will not stop when airstream is obstructed.

### Torques

Screw (35)	3 to 4 in-lbs (0.34-0.45 N-m)
Packing (33) or Spacer (9/8) nut	11 to 13 in-lbs (1.2-1.5 N-m)
LP Hose	50 to 60 in-lbs (5.6-6.8 N-m)

### Opening Effort {IP @ 144 psi (9.9 bar), Venturi Switch set negative}

1. No leak with Adjustment Knob turned fully out counterclockwise.
2. Inhalation Effort not to exceed 1.4 IWC.
3. No free flow allowed when Venturi Switch set negative (switch forward).
4. Free flow allowed when Venturi Switch set positive (switch backward).
5. No over purge allowed.

## Tools Required

### Standard Tools

Inch Pounds Torque Wrench  
5/8" Open End Wrench  
11/16" Open End Wrench  
3/32" Hex Key  
5/8" Socket  
3/32" Hex Driver  
Small Flat Blade Screwdriver  
Cotton Swab  
Wooden or Plastic Dowel  
Magnifying Light  
Small Pin Punch  
Magnehelic Gauge (Magnehelic is a registered trademark of Dwyer Instruments)  
Magnifying Lens  
Soft Probe (Wooden Dowel)  
Needle Nose Pliers  
Adjustable Wrench

### Specialty Tools

PN 220.9102      Tribolube 71  
OR  
PN 220.9101      Christo-Lube MCG111 (2oz)  
PN 240.9105      IP Gauge  
PN 240.9106      O-Ring Tool Set  
PN 240.9107      Inline Adjustment Tool  
                         (Non-Swivel Version)

## TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
<b>Free flow or leak present with Adjustment Knob (34) turned fully out counterclockwise.</b>	<ol style="list-style-type: none"> <li>1. <b>Demand Lever (23)</b> bent.</li> <li>2. Excessive intermediate pressure.</li> <li>3. Damaged or worn <b>Poppet Seat (18)</b>.</li> <li>4. Damaged <b>Orifice (14)</b>.</li> <li>5. <b>Orifice (14)</b> incorrectly adjusted.</li> <li>6. LP Hose to <b>Valve Housing (15 / 16)</b> inlet tube connection loose.</li> <li>7. Trapped sand or debris.</li> <li>8. Score inside sealing surface of <b>Adjustment Tube (24)</b>.</li> <li>9. Weak or damaged <b>Poppet Spring (28)</b>.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace <b>Demand Lever (23)</b>.</li> <li>2. Readjust IP of 1<sup>st</sup> stage to specification.</li> <li>3. Replace <b>Poppet Seat (18)</b>.</li> <li>4. Replace <b>Orifice (14)</b>.</li> <li>5. Readjust <b>Orifice (14)</b> (refer to Final Adjustment section).</li> <li>6. Torque LP Hose to specification.</li> <li>7. Remove sand or debris and clean.</li> <li>8. Replace <b>Adjustment Tube (24)</b>.</li> <li>9. Replace <b>Poppet Spring (28)</b>.</li> </ol>
<b>Excessive inhalation effort with Adjustment Knob (34) turned fully out counterclockwise.</b>	<ol style="list-style-type: none"> <li>1. <b>Demand Lever (23)</b> bent.</li> <li>2. <b>Orifice (14)</b> incorrectly adjusted.</li> <li>3. Insufficient Intermediate Pressure from 1<sup>st</sup> stage.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace <b>Demand Lever (23)</b>.</li> <li>2. Readjust <b>Orifice (14)</b> (refer to Final Adjustment section).</li> <li>3. Readjust IP of 1<sup>st</sup> stage to specification.</li> </ol>
<b>Rattle noise heard inside second stage.</b>	<ol style="list-style-type: none"> <li>1. Gravel or sand trapped inside <b>Housing (10)</b>.</li> <li>2. Excessive <b>Demand Lever (23)</b> slack.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove and clean.</li> <li>2. Readjust <b>Orifice (14)</b> (refer to Final Adjustment section).</li> </ol>
<b>Little or no airflow when purge is depressed.</b>	<ol style="list-style-type: none"> <li>1. <b>Diaphragm Retaining Ring (3)</b> not tightened correctly.</li> <li>2. Excessive <b>Demand Lever (23)</b> slack.</li> <li>3. <b>Orifice (14)</b> incorrectly adjusted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten <b>Diaphragm Retaining Ring (3)</b> until secure.</li> <li>2. Readjust <b>Orifice (14)</b> (refer to Final Adjustment section).</li> <li>3. Readjust <b>Orifice (14)</b> (refer to Final Adjustment section).</li> </ol>
<b>Adjustment Knob (34) difficult to turn.</b>	<ol style="list-style-type: none"> <li>1. Debris or corrosion present on <b>Adjustment Shaft (30)</b>.</li> <li>2. Debris present inside <b>Adjustment Knob (34)</b>.</li> <li>3. <b>Spring Follower (29)</b> damaged or cross-threaded.</li> <li>4. <b>Poppet Spring (28)</b> damaged or corrosion present.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disassemble and clean.</li> <li>2. Flush out or disassemble to clean.</li> <li>3. Replace <b>Spring Follower (29)</b>.</li> <li>4. Clean or replace <b>Poppet Spring (28)</b>.</li> </ol>

## DISASSEMBLY PROCEDURE

**NOTE:** Be sure to perform the steps outlined in the General Service Procedure (Doc. No. 12-4025) prior to disassembling the Regulator. Review the Troubleshooting section to better understand which internal parts may need replacing, and to be able to better advise the customer of the service required.

1. Carefully snip the **Tie Wrap (38)** on the **Mouthpiece (39)**; remove **Mouthpiece (39)** and inspect for holes, tears or deformation. Discard if any found.
2. Remove the LP Hose from the **Valve Housing (15 or 16)** using an adjustable wrench. For the **Swivel 2<sup>nd</sup> stage 212 ONLY** remove the **O-ring (6)** and **Swivel Packing Washer (7)** with a brass pick (O-ring Tool Kit 220.9106) from the **Valve Housing (15 or 16)** and discard (schedule A); **DO NOT REUSE.** (Fig. 1) For the non-swivel 2<sup>nd</sup> stage 212 remove the hose with an adjustable wrench.



Fig. 1

**NOTE:** On Swivel 2<sup>nd</sup> stage 212's ONLY, the washer located inside the LP Hose behind the swivel ball is not serviceable and is NOT to be removed.

3. Remove the **Front Cover Ring (1)** and **Purge Cover (2)** by turning counter clockwise. (Fig. 2)



Fig. 2

4. Remove the **Diaphragm Retaining Ring (3)** by turning counter clockwise. (Fig.3)



Fig. 3

5. Carefully grasp the **Diaphragm (5)** by the raised edges of the center and lift with a slight upward twist to remove. Be careful not to pinch or damage the **Diaphragm (5)** with the **Diaphragm Washer (4)**. **(Fig. 4)** Hold up to the light and inspect for holes, tears or deformation; discard if any found.



**Fig. 4**

6. Turn the **Adjustment Knob (34)** out completely counter clockwise. Remove the **Adjustment Knob Screw (35)** with a 3/32 inch hex key and remove the **Adjustment Knob (34)** from the **Adjustment Shaft (30)**. **(Fig. 5)**



**Fig. 5**

7. Remove the **Packing Nut (33)** by turning clockwise from the **Adjustment Tube (24)** with a 5/8 inch open-end or adjustable wrench being careful not to lose the **Thrust Washer (32)**. **(Fig. 6)**



**Fig. 6**

**NOTE: The Adjustment Shaft (30) subassembly is under spring load and may pop out when the Packing Nut (33) is removed; be careful not to lose any components during disassembly.**

8. Remove the **Thrust Washer (32)** from the **Adjustment Shaft (30)**; if missing; it may be inside the **Packing Nut (33)**.

9. Grasp the **Adjustment Shaft (30)** and pull it straight out of the **Adjustment Tube (24)**. **(Fig. 7)**



Fig.7

10. Remove the **Poppet Spring (28)** and **Balance Shaft (27)**. If the **Balance Shaft (27)** does not come out, gently tap the **Adjustment Tube (24)** into your hand to remove it. Examine the **Balance Shaft (27)** and compare it to a new one to insure that it is not bent or deformed; discard if damaged.
11. Remove the **Stem O-ring (31)** from the **Adjustment Shaft (30)** and inspect for any signs of damage; discard if found.

**NOTE: Do not remove the Spring Follower (29) from the Adjustment Shaft (30) unless it is damaged and needs replacing, or debris needs to be removed to clean it. In this case, remove by turning the Spring Follower (29) clockwise while holding the Adjustment Shaft (30) in your other hand. Note that the thread is left-handed.**

12. Examine the **Poppet Spring (28)** under magnification; inspect the coils and ends for cracks, corrosion and deformation (out of round). Compare it to a new one to insure correct length and tension. If any damage is found, discard and do not reuse.
13. Grasp the **Venturi Switch (22)** and pull it straight out. **(Fig. 8)**



Fig. 8

14. Remove the **Spacer Nut (8 or 9)** by turning counterclockwise with a 13/16 inch or adjustable wrench. **(Fig. 9)**



Fig. 9

15. Remove **Valve Housing (15 or 16)** and **Adjustment Tube (24)** by pressing the metal end of the assembly through the **Housing (10)**. Be careful to press the **Lever (23)** in to avoid damaging it during assembly removal. **(Fig. 10)**



**Fig. 10**

16. Remove the **Adjustment Tube (24)** from the **Valve Housing (15 or 16)** by using an adjustable wrench turn clockwise to loosen while holding the tube secure with another adjustable wrench. **(Fig. 11)**



**Fig 11**

17. If the **Poppet (19)** did not come out with the removal of the **Adjustment Tube (24)**, tip the **Valve Housing (15 or 16)** to one side and gently tap it into your open hand.
18. Remove the **Poppet Seat (18)** with your fingers and discard (schedule A); **DO NOT REUSE**.
19. Remove the **Poppet O-rings (20)** by squeezing them with your fingers and working them over the end of the **Poppet (19)**. **DO NOT** use a dental pick or any tool to remove them. Discard the **Poppet O-rings (20)** (schedule A) and **DO NOT REUSE**.
20. Remove the **Adjustment Tube O-ring (25)** by squeezing with your fingers and discard.
21. Remove the **Balance Shaft O-ring (26)** located inside the small opening end of the **Adjustment Tube (24)** by pressing it out with a toothpick or dull pin punch. Discard the **Balance Shaft O-ring (26)** (schedule A) and **DO NOT REUSE**.
22. Examine the **Lever (23)** to insure that it is not bent or deformed. If the **Lever (23)** is deformed, remove by pulling outward on one leg of the lever with your fingers until it is removed from the hole in the side of the **Valve Housing (15 or 16)**; repeat with the other side.

**NOTE: It is not necessary to remove the Demand Lever (23) unless it is damaged. The Valve Housing (15 or 16) may be cleaned with the Demand Lever (23) attached.**

23. Remove the **Valve Housing O-ring (17)** by squeezing it with your fingers and carefully work it over the molded portion of the **Valve Housing (15 or 16)**, not over the metal threads. Examine the **Valve Housing O-ring (17)** for damage; discard if found.

24. Using a narrow flat blade screwdriver, carefully remove the **Orifice (14)** by turning it counter clockwise in the **Valve Housing (15 or 16)** until the threads disengage. **(Fig. 12)** Once the threads are fully disengaged, press out the **Orifice (14)** with a cotton swab. **(Fig. 10b)** Remove the **Orifice O-ring (13)** and discard (schedule A); **DO NOT REUSE**.



Fig. 12



Fig. 10b

**NOTE: When removing the Orifice (14), be careful not to damage or nick the knife-edge sealing surface; doing so will result in a leak upon reassembly requiring its replacement. Examine the knife-edge with a magnified light source for any nicks or dents; discard if any found.**

25. Remove the **Exhaust Cover (37)** by pulling it straight back and downwards, disengaging it from the housing lip. **(Fig. 13)**



Fig. 13

26. Remove the **Ratchet Detent (12)** by pushing it out from the backside with a dull pin punch or Allen key. **(Fig. 14)** Remove the **Ratchet Detent O-Ring (11)** by squeezing it with your fingers and working it over the end. **DO NOT** use a dental pick or any tool to remove it and discard (schedule A); **DO NOT REUSE**.



Fig. 14

27. Examine the overall condition of the **Housing (10)** and **Exhaust Cover (37)** to insure there are no stress fractures or deformation. Insure that all threading on the **Housing (10)** is in good condition and free from sand or debris. Discard either if any damage is found.



28. Examine the **Exhaust Valve (36)** with a soft probe to insure that it is resilient and no holes or tears are present; discard if any found. Inspect the sealing surface under the **Exhaust Valve (36)** on the **Housing (10)** to insure there is no debris or scores.

**NOTE: It is not necessary to remove the Exhaust Valve (36) if it is in good condition; the Housing (10) may be cleaned without removing it.**

29. If the **Exhaust Valve (36)** requires replacement, remove by grasping it with your fingers and pull straight out from the **Housing (10)**, snipping the stem if necessary and discard.

## **REASSEMBLY PROCEDURE**

**NOTE: Prior to Reassembly, it is important to inspect all parts, both new and those being reused, for defects and damage. Inspect to insure that all o-rings are clean and supple, and all parts and components have been thoroughly cleaned and dried in accordance to the General Service Procedure (Doc. No. 12-4025). Inspect all critical sealing surfaces for scratches or imperfections.**

**WARNING: Use only genuine Hollis parts, subassemblies and components whenever assembling Hollis products. DO NOT substitute any Hollis part with a part from another manufacturer, regardless of any similarity in shape, size or appearance. Doing so may render the product unsafe, and could result in serious injury or death to the user.**

1. If it was removed, install a new **Exhaust Valve (36)** into the **Housing (10)** by gently pulling the valve stem through the **Housing (10)** with needle nose pliers, insuring that the retaining nipple is pulled inside the **Housing (10)** and properly seated. Installation may be aided with the use of soapy water.

**WARNING: DO NOT use any lubricant on the Exhaust Valve (36) to install; doing so may result in the Exhaust Valve (36) slipping from the Housing (10) rendering the product unsafe, and could lead to serious injury or death.**

2. Reinstall the **Ratchet Detent (12)** with a new **Ratchet Detent O-Ring (11)** by pressing it in place. (Fig. 15)



**Fig 15**

3. Reinstall the **Exhaust Cover (37)** by pressing it firmly over the housing lip. Be certain to fully seat the **Exhaust Cover (37)**.
4. Lubricate and carefully work the **Valve Housing O-ring (17)** onto the plastic portion of the **Valve Housing (15 or 16)** tube until seated into the groove; do not roll the o-ring over the metal threads on the opposite end of the housing tube.

5. If the **Lever (23)** was removed, reinstall by holding the **Valve Housing (15 or 16)** with the small flat molded onto the plastic part of the housing tube facing upwards. Carefully insert one leg of the **Lever (23)** without excessively bending it into the square tapered hole on one side of the **Valve Housing (15 or 16)** tube; pull the opposite leg of the **Lever (23)** outwards and insert the end into the square tapered hole in the opposite side of the **Valve Housing (15 or 16)** tube. The **Lever (23)** should now rest on the flat molded on top of the housing tube; this will insure that the square aspiration hole on one side of the tube will face the mouthpiece opening inside the **Housing (10)**.
6. Inspect and install a new **Poppet Seat (18)** onto the **Poppet (19)**, large flat end facing out until it is fully seated and flush with the edge of the **Poppet (19)** (**Fig. 16**). Examine the hole in the center of the **Poppet Seat (18)** to insure that it is clear and not plugged. Do not use any adhesive or lubricant.



**Fig. 16**

7. Lightly lubricate and install both **Poppet O-rings (20)** into the narrow grooves of the shaft of the **Poppet (19)**.

**NOTE: When installing the Poppet (19) into the Valve Housing (15 or 16), it must be orientated with the side having 2 fins facing Demand Lever (23).**

**CAUTION: Failure to align the components precisely as described may prevent the Poppet (19) from engaging the legs of the Demand Lever (23) rendering the unit inoperable.**

8. Install the **Poppet (19)** into the **Valve Housing (15 or 16)** making sure the side with only 2 fins is directly facing the **Demand Lever (23)**. (**Fig. 17**)



**Fig. 17**

9. Lightly lubricate and install the **Adjustment Tube O-ring (25)** onto the narrow groove on the outer threaded end of the **Adjustment Tube (24)**.
10. Lightly lubricate and install the **Adjustment Shaft O-ring (31)** into the small opening of the **Adjustment Tube (24)** by pressing it into place with the stem of a poppet. Look into the small opening of the **Adjustment Tube (24)**; you should be able to see clear through. If not, remove o-ring and reinstall until correctly seated.

11. Install the **Balance Shaft (27)** through the large end of the **Adjustment Tube (24)**. Press it into place with a Q-tip or similar tool.
12. Install the **Adjustment Tube (24)** into the **Valve Housing (15 or 16)** tightening counterclockwise to a torque of 11 to 13 in-lbs (1.2-1.5 N-m) using a torque wrench with 5/16 in driver and an adjustable wrench. If the **Valve Housing (15 or 16)** is held vertically with the metal threads pointing down the **Demand Lever (23)** will keep the **Poppet (19)** from turning inside the **Valve Housing (15 or 16)** (**Fig. 18**).



Fig. 18

13. Install the **Valve Housing (15 or 16)** and the **Adjustment Shaft (30)** into the **Housing (10)** with the **Lever (23)** facing the purge opening. Make sure to seat the assembly fully. (**Fig. 19**)



Fig. 19

14. Thread the **Spacer Nut (8 or 9)** onto the metal end finger tight for now. (**Fig. 20**)



Fig. 20

15. Lubricate and install the **Venturi O-ring (21)** over the **Venturi Switch (22)**.
16. Install the **Venturi Switch (22)** by pressing straight onto the **Housing (10)** being careful to orient it properly as it is keyed for proper orientation. (**Fig. 21**)



Fig. 21

17. While holding the regulator with the **Venturi Switch (22)** facing up, install the **Poppet Spring (28)**.
18. The components of the **Adjustment Shaft (30)** assembly must be first assembled prior to installation into the **Adjustment Tube (24)**. Lightly lubricate and install the **Adjustment Shaft O-ring (31)** onto the groove on the **Adjustment Shaft (30)**.
19. If removed, install the **Spring Follower (29)** flat side first onto the **Adjustment Shaft (30)**, screwing by hand counter clockwise until it stops; do not tighten with a wrench or any tool. Insure that you do not cross thread during assembly.
20. Install the **Adjustment Shaft (30)** into the **Adjustment Tube (24)**. (Fig. 22)



Fig. 22

21. Install the **Thrust Washer (32)** over the end of the **Adjustment Shaft (30)**. (Fig. 23)

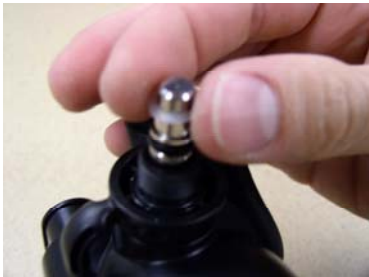


Fig. 23

22. Thread the **Packing Nut (33)** onto the **Adjustment Tube (24)** by turning counterclockwise finger tight for now.
23. Tighten the **Spacer Nut (8 or 9)** to 11-13 in/lbs (1.2-1.5 N-m) clockwise onto the **Valve Housing (15 or 16)**. (Fig. 24)



Fig. 24

24. Tighten the **Packing Nut (33)** with a 5/8 inch socket attached to a calibrated torque wrench and torque to **11-13 in/lbs (1.2-1.5 N-m)**.

**CAUTION: Over tightening the Packing Nut (33) and/or Spacer Nut (6 or 9) may result in the failure of the fastener rendering it unusable, requiring its replacement.**

25. Install the **Adjustment Knob (34)** onto the **Adjustment Shaft (30)**. Insert the **Cap Screw (35)** and tighten clockwise; attach a 3/32 inch hex driver to a calibrated torque wrench and torque to **3-4 in/lbs (0.34-0.45 N-m)**. (Fig. 25)



Fig. 25

26. Carefully examine the knife sealing edge of the **Orifice (14)** for nicks or imperfections. Lightly lubricate and install the **Orifice O-ring (13)** onto the groove of the **Orifice (14)**. Insert the **Orifice (14)** into the **Valve Housing (15 or 16)** knife-edge first. (Fig. 26)



Fig. 26

**CAUTION: Be careful to protect the knife edge sealing surface of the Orifice (14) during installation.**

27. Using a narrow flat blade screwdriver, engage the slotted head of the **Orifice (14)** and slowly turn in clockwise into the **Valve Housing (15 or 16)** until the knife-edge of the **Orifice (14)** barely makes contact with the **Poppet Seat (18)**. This will be indicated by the slight drop of the **Demand Lever (23)**; when this occurs depress the **Demand Lever (23)** and slightly turn the **Orifice (14)** out counter clockwise, bringing the **Demand Lever (23)** upright.

**CAUTION: Continuing to turn the Orifice (14) inward any further may result in damage to the Poppet Seat (18), requiring its replacement.**

28. Install the **Diaphragm (5)** into the **Housing (10)** with the raised center facing up and the smooth strike plate facing the **Demand Lever (23)**. Examine the raised lip or the **Diaphragm (5)** edge to insure it is fully seated into the groove at the base of the threads of the **Housing (10)**.
29. Place the **Diaphragm Washer (4)** over the **Diaphragm (5)** (**Fig. 27**) and tighten the **Diaphragm Retaining Ring (3)** until it is secure.



**Fig. 27**

30. Place the **Purge Cover (2)** into the **Cover Ring (1)**. It is designed to fit in only one orientation inside the **Cover Ring (1)**. Match the each tab on the **Purge Cover (2)** with the same sized slot in the **Cover Ring (1)**.
31. Install the **Purge Cover (2)** and **Cover Ring (1)** being careful not to cross thread or over tighten. (**Fig. 28**)



**Fig. 28**

32. **On Swivel 2<sup>nd</sup> stage 212's ONLY** lightly lubricate the **Swivel Packing Washer (7)** and install into the opening of the **Valve Housing (15)** flat side in, beveled side facing out. Lightly lubricate and insert the **Swivel Packing O-ring (6)** next to the **Swivel Packing Washer (7)**.
33. **On Non-Swivel 2<sup>nd</sup> stage 212's ONLY** lightly lubricate the inside of the **Valve Housing (16)** before installing the LP Hose.

## **FINAL ADJUSTMENT AND TESTING**

**NOTE: Adjustment and testing of the 212 second stage is done with an inlet Intermediate Pressure of 144 psi (+/- 2 psi) [9.9 Bar (+/- 0.14 Bar)] and supply pressure of 3000 psi (207 Bar).**

1. Connect the second stage LP Swivel Hose to a LP Port of a properly adjusted first stage; connect a LP QD Inflator Hose to another LP port. Install port plugs to seal all the other ports of the first stage.

2. Connect the first stage to a pure supply air source of **3000 psi (207 BAR)**. Connect a calibrated Intermediate Pressure Gauge to the LP QD Inflator hose (make sure that there is an overpressure relief device connected to the IP Gauge to relieve pressure in excess of 175 psi). Slowly open the supply valve to pressurize the regulator, purging the second stage several times to cycle the first stage to stabilize the IP. Check the IP Gauge to insure that the intermediate pressure is **144 psi (+/- 2 psi) [9.9 Bar (+/- 0.14 Bar)]**.

**NOTE: If the Intermediate Pressure is other than recommended, readjust the first stage IP to specification. If necessary, refer to the Trouble Shooting section of the first stage to determine possible cause and resolution.**

3. Prior to Adjusting the second stage, check the following items: The **Purge Cover (2)** on tight and secure; the **Adjustment Knob (34)** is turned out fully counter clockwise; the **Venturi Switch (22)** is set negative (switch up); the mouthpiece has been removed.
4. **Lever Height Adjustment:** If available, attach an Inline Adjustment Tool between the second stage and the LP Swivel Hose to adjust the lever height. Pressurize the regulator and listen to determine that no air flow is present; if none present, engage the slotted head of the **Orifice (14)** with the Inline Adjustment Tool and turn the **Orifice (14)** counterclockwise in small increments until a slight leak is present. Now turn the Inline Adjustment Tool clockwise until the leak just stops, then turn in an additional 1/12 turn more. Make sure to depress the **Purge Cover (2)** while turning the **Orifice (14)** to prevent damaging the **Poppet Seat (18)**. If a leak was present upon initial pressurization, turn the Inline Adjustment Tool clockwise in small increments until the leak just stops, then turn in an additional 1/12 turn more.
5. If no Inline Adjustment Tool is available, fully depressurize the regulator and remove the LP Swivel Hose from the second stage. Use a narrow flat blade screwdriver and adjust the **Orifice (14)** as outlined in step 4 above.

**NOTE: Turning the Orifice (14) clockwise in further than necessary to stop airflow will result in excessive Demand Lever (23) slack and excessive spring tension, preventing peak performance.**

**CAUTION: To avoid cutting the Poppet Seat (18) with the knife edge of the Orifice (14), always depress the Purge Cover (2) while adjusting the Orifice (14); failure to do so will result in damaging the Poppet Seat (18), requiring its replacement.**

6. After attaining correct lever height, install the LP Swivel Hose by turning clockwise and torque to **50-60 in/lbs** using a torque wrench and crows foot.
7. Pressurize the regulator again and listen for leaks or airflow; none should be present. If a leak is present, repeat steps 3 through 5.
8. Hold the second stage with the **Purge Cover (2)** facing downwards; gently shake up and down, listening for any rattle sound indicating excessive lever slack. If a rattle sound is found, readjust the **Orifice (14)** as outlined in steps 4 and 5.
9. **Inhalation Effort Test:** Attach the correctly adjusted second stage to a \*Magnehelic Gauge via the mouthpiece adapter; slowly inhale on the mouthpiece while watching the IP Gauge. The moment the needle of the IP Gauge moves left from 140 psi indicating the precise moment the first stage has opened, look at the Magnehelic Gauge and record the Inhalation Effort in Inches Water Column (IWC); this is also referred to as Cracking Effort. Inhalation Effort is not to exceed **1.4 IWC**. If available, attach the correctly adjusted



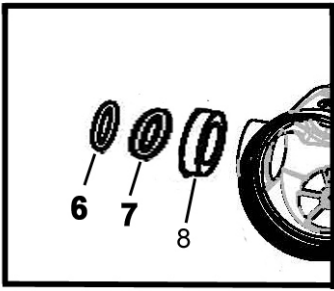
second stage to a flow meter that is connected to a Magnehelic Gauge via the mouthpiece adapter. Initiate airflow through the flow meter with the needle valve while watching the IP Gauge. The moment the IP Gauge needle moves left from 140 psi indicating the precise moment the first stage has opened, look at the Magnehelic Gauge and record the Inhalation Effort in IWC. Inhalation effort is not to exceed **1.4 IWC**.

**NOTE: If the inhalation effort is greater or less than specification, refer to the Trouble shooting section on page 3 to determine the possible cause and resolution.**

10. Depressurize and remove the second stage from the Magnehelic Gauge. Attach a clean **Mouthpiece (39)** to the mouthpiece tube and secure with a **Tie Wrap (38)**.
11. Install the protector cap on the first stage yoke retainer and tighten down with the yoke screw. If using a DIN model 1<sup>st</sup> stage for testing, make sure to seal the opening in the DIN Filter Retainer. Making sure that all other ports on the first stage are sealed close, lightly inhale on the second stage to determine vacuum integrity; you should not be able to draw air through the second stage. If you can, refer to the Trouble Shooting section on page 3 to determine the possible cause and resolution.
12. Check all fittings to insure none are loose and are correctly torqued before returning the regulator to the customer.



<b>ITEM</b>	<b>NON-SWIVEL QTY</b>	<b>SWIVEL QTY</b>	<b>PART #</b>	<b>DESCRIPTION</b>
1	1	1	27084	Cover Ring
2	1	1	27047.07	Purge Cover
3	1	1	27046	Diaphragm Retaining Ring
4	1	1	27045	Diaphragm Washer
5	1	1	25236	Diaphragm
<b>6</b>		<b>1</b>	<b>22-014</b>	<b>Swivel O-ring</b>
<b>7</b>		<b>1</b>	<b>26959</b>	<b>Swivel Packing Washer</b>
8		1	26959	Swivel Spacer Nut
9	1		25469	Non-swivel Spacer Nut
10	1	1	27059	Housing
<b>11</b>	<b>1</b>	<b>1</b>	<b>22-003</b>	<b>O-ring</b>
12	1	1	27051	Ratchet Detent
<b>13</b>	<b>1</b>	<b>1</b>	<b>22-010</b>	<b>O-ring</b>
14	1	1	26621	Orifice
15		1	27041	Swivel Valve Housing
16	1		27097	Non-Swivel Valve Housing
17	1	1	22-017	O-ring
<b>18</b>	<b>1</b>	<b>1</b>	<b>25465</b>	<b>Poppet Seat</b>
19	1	1	25464	Poppet
<b>20</b>	<b>2</b>	<b>2</b>	<b>25474</b>	<b>O-ring</b>
<b>21</b>	<b>1</b>	<b>1</b>	<b>22-018</b>	<b>O-ring</b>
22	1	1	27067	Venturi Switch
23	1	1	25463	Lever
24	1	1	27038	Adjustment Tube
<b>25</b>	<b>1</b>	<b>1</b>	<b>22-014</b>	<b>O-ring</b>
<b>26</b>	<b>1</b>	<b>1</b>	<b>25473</b>	<b>O-ring</b>
27	1	1	25468	Balance Shaft
28	1	1	27822	Poppet Spring
29	1	1	25475	Spring Follower
30	1	1	27040	Adjustment Shaft
<b>31</b>	<b>1</b>	<b>1</b>	<b>22-107</b>	<b>O-ring</b>
32	1	1	25054	Thrust Washer
33	1	1	27099	Packing Nut
34	1	1	27107	Adjustment Knob
35	1	1	24787-2	Adjustment Knob Screw
36	1	1	26326	Exhaust Valve
37	1	1	27050	Exhaust Cover
<b>38 N/S</b>	<b>1</b>	<b>1</b>	<b>21978.07</b>	<b>Tie Wrap</b>
39 N/S	1	1	27031.07	Mouthpiece
<b>N/S</b>		<b>1</b>	<b>240.9201</b>	<b>212 Swivel Service Kit</b>
<b>N/S</b>	<b>1</b>		<b>240.9202</b>	<b>212 Non-Swivel Serv Kit</b>



**Swivel Version**  
Use these items in place of (9) when using the Swivel version of the Valve Housing (15).

