Second Stage Regulator - 1/4 Turn

MAINTENANCE AND REPAIR

For More Information, call 1-800-MSA-2222 or Visit Our Website at www.MSAnet.com

MSA The Safety Company

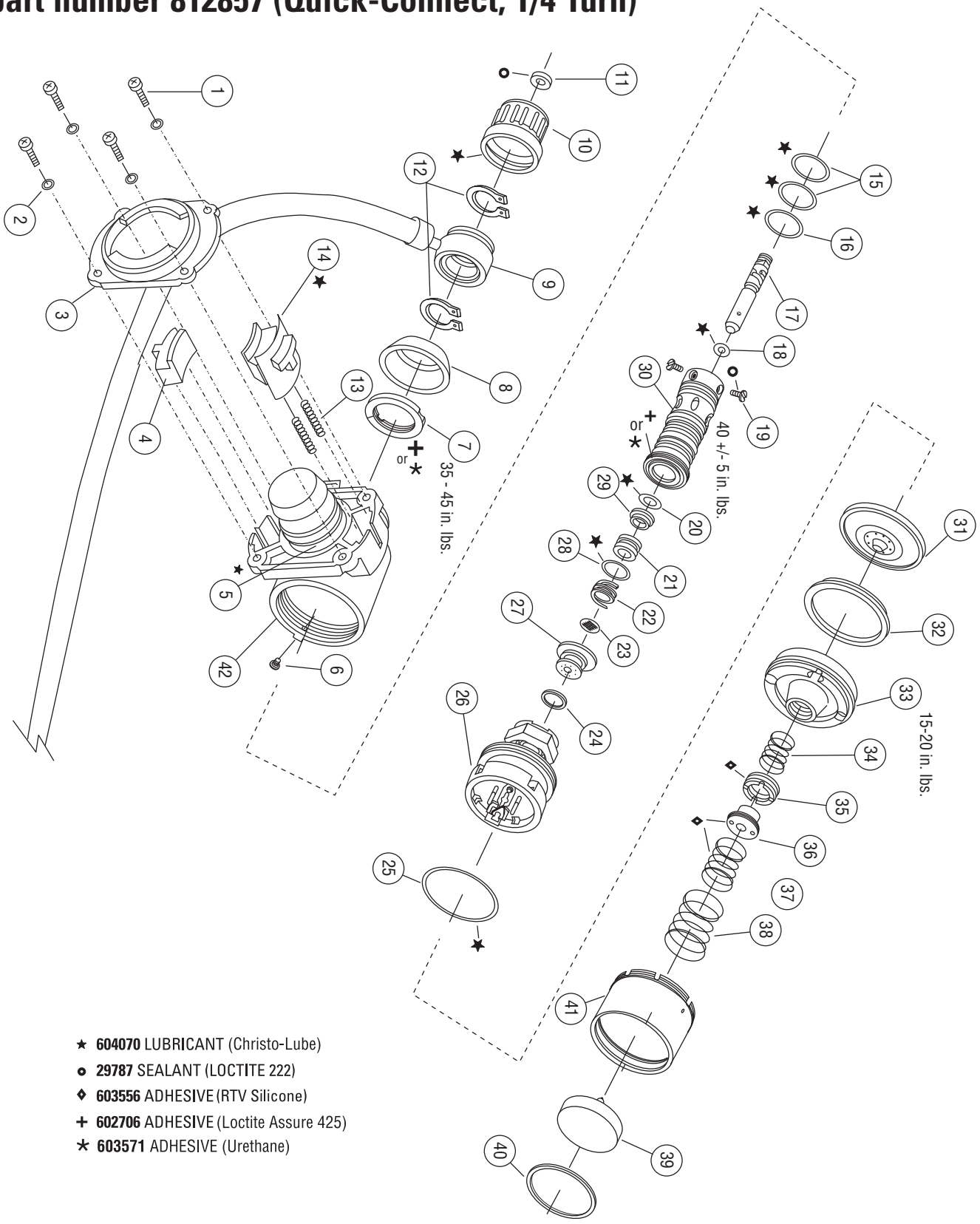
MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230

1/4 TURN SECOND STAGE REGULATOR

SECOND STAGE REGULATOR COMPONENTS					
Item	**Part No.**	**Description**	**Item**	**Part No.**	**Description**
1	**636227**	Screw (4)	22	**488779**	Spring, Bypass
2	**632036**	Lock Washer (4)	23	**488808**	Screen, Bypass
3	**812849**	Retaining Plate	24	**488782**	Diaphragm, Power Stage
4	**818179**	Button	24	**488782**	Diaphragm, Power Stage
5	**639796**	O-Ring	25	**634814**	O-Ring
6	**637904**	Screw	26	**800040**	Valve & Lever Assembly
7	**488811**	Locknut, Bypass	27	**488796**	Spool, Power Stage
8	**488785**	Cap, Bypass	28	**635243**	O-Ring
9	**490676**	Hose Assembly	29	**489355**	Valve
10	**495277**	Handwheel Assembly	30	**488812**	Sleeve, Bypass
11	**637089**	Locknut, Handwheel	31	**488783**	Diaphragm
12	**635244**	Retaining Ring	32	**488755**	Ring, Spacer
13	**637895**	Spring (2)	33	**803135**	Base, Shutoff
14	**812841**	Release Tab	34	**803134**	Diaphragm Spring
	816952	**VALVE CORE ASSEMBLY**	35	**488740**	Screw, Adjusting
15	**635242**	O-Rings (2)	36	**488741**	Ring, Thrust
16	**635243**	O-Ring	37	**800685**	Stop Spring
17	**816951**	Slide	38	**492238**	Spring, Shutoff
18	**635240**	O-Ring	39	**813712**	Pushbutton, Shutoff
19	**488810**	Screw, Guide, Bypass (3)	40	**638141**	Retaining Ring
20	**635241**	O-Ring	41	**813713**	Cap Shutoff
21	**490656**	Spool	42	**10004539**	Housing Assembly w/ Quick-Connect

Second Stage Regulator

part number 812857 (Quick-Connect, 1/4 Turn)



SECOND STAGE REGULATOR DISASSEMBLY

All repair procedures assume that the regulator is disassembled from the apparatus and facepiece. To do this:

- Be sure the cylinder valve is completely closed.
- Disconnect the regulator from the facepiece.
- Be sure nothing is blocking the regulator outlet. Crack the bypass valve to release any trapped air.
- If desired, disconnect the intermediate-pressure hose from the first stage regulator at the hose fitting using a 11/16" open-end wrench. Refer to the INTRODUCTION Tab of this Binder for General Notes and required tools.

Note: Refer to the appropriate illustrated parts lists for the apparatus being repaired.

REMOVING THE SHUT-OFF CAP, SPRING, AND STOP SPRING

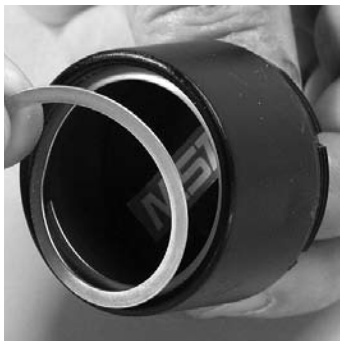
1. Remove the setscrew from the regulator housing. Unthread the shut-off cap with push button and remove spring.

2. Remove the stop spring out of the groove at the bottom of the shut-off base hub. Remove any RTV adhesive from the shut-off base.

3. Turn the shut-off cap so the threads are pointing down. Place a small screwdriver under the notched end of the spiral retaining ring.

4. Turn and lift the small screwdriver to remove the end of the spiral retaining ring out of the shut-off cap groove.

5. Grasp the spiral retaining ring with your fingers and pull the spiral retaining ring out of the shut-off cap groove. Discard the spiral retaining ring. Do not reuse the spiral retaining ring.



6. Turn the shut-off cap upside down to remove the push button.

REPLACING THE REGULATOR QUICK-CONNECT O-RING

1. Insert the O-ring removal tool under the O-ring and remove it. Be careful not to scratch the O-ring groove.

Note: If an O-ring removal tool is not available, refer to Lubricating, Cleaning, or Replacing the Release Tab for easier access to the O-ring.

REMOVING THE SHUT-OFF BASE

1. Fit the large spanner wrench on the socket driver. Unscrew the shut-off base from the regulator housing.

2. Using the small spanner wrench, remove the thrust ring.

3. Using the small spanner wrench, unscrew the adjusting screw from the shut-off base. Remove the diaphragm spring. Clean sealant residue from the parts.

SECOND STAGE REGULATOR DISASSEMBLY

REMOVING THE DIAPHRAGM

Note: Use extreme care when removing the diaphragm. Do not bend, twist, or distort the lever assembly. Do not touch the exposed lever assembly after removing the diaphragm.

1. Use the plastic stick to lift the diaphragm and spacer ring from the housing.

Note: If the diaphragm is torn or has any visible damage, it must be replaced.

REMOVING THE VALVE CORE FROM THE SECOND STAGE REGULATOR

1. Remove the shut-off assembly and diaphragm.

2. Remove the intermediate-pressure hose from the second stage.

3. Using the retaining-ring pliers, remove the retaining ring which was exposed when the hose assembly was removed.
4. Remove the bypass cap.

5. Fit the large spanner wrench on the socket driver. Unscrew and remove the bypass locknut.

⚠ CAUTION

Do not press the lever assembly or unscrew the base and lever assembly from the valve body. This could affect operation.

6. Gently push the end of the bypass sleeve toward the regulator housing to unseat the O-ring and remove the valve core.

Remove and discard the O-rings.

REMOVING THE POWER STAGE DIAPHRAGM

1. Remove the valve core.

⚠ CAUTION

The bypass spring and bypass screen may fall out of the assembly; take care not to misplace them.

2. Place a 1" open-end wrench on the valve and lever assembly hex. Temporarily place the bypass handwheel on the slide.

⚠ CAUTION

Do not press on the lever assembly. Do not unscrew the base and lever assembly or the divider skirt from the valve body. This could damage the bottom lever pad and cause inconsistent operation.

SECOND STAGE REGULATOR DISASSEMBLY

3. Turn the handwheel counter-clockwise to separate the valve and lever assembly from the bypass sleeve. Set the spring aside. Discard the screen.

4. Remove the power stage spool from the valve and lever assembly.

Note: If necessary, turn the valve body so the hex end is down, then tap the hex gently on a hard surface.

5. Remove the power stage diaphragm and discard it. Use the plastic stick if necessary to remove the diaphragm.

6. Remove and discard the bypass sleeve O-ring from the large end of the bypass sleeve.

REMOVING THE BYPASS VALVE

1. Remove the valve core.
2. Unscrew the bypass sleeve from the valve and lever assembly (see valve core disassembly and repair). Take care not to misplace the bypass spring, bypass screen, or power stage spool. Discard the bypass sleeve O-ring.

3. Using the flat-blade screwdriver, remove the three bypass guide screws.

4. Push the threaded end of the slide toward the bypass sleeve until the slide is completely out of the sleeve. This will push out the bypass spool, valve, and O-ring.

SECOND STAGE REGULATOR REASSEMBLY

Refer to the INTRODUCTION Tab of this Binder for General Notes and required tools.

INSTALLING A PUSH BUTTON INTO THE SHUT-OFF CAP

1. Place the push button into the non-threaded end of the shut-off cap. The arrow end goes into the shut-off cap first and points down.

INSTALLING A NEW SPIRAL RETAINING RING

1. Place one end of the new spiral retaining ring into the shut-off cap groove.

2. Separate the spiral ring and work the ring into the groove by moving it around the shut-off cap.

3. Place a small screwdriver in the notch end of the spiral retaining ring. Push the notch end into the shut-off cap groove. Ensure that the new spiral retaining ring is in the shut-off cap groove.

SECOND STAGE REASSEMBLY

LUBRICATING, CLEANING, OR REPLACING THE RELEASE TAB

1. Before starting this procedure, place a #4 rubber stopper (P/N 060380) in the second stage regulator outlet to prevent debris, water, or hardware from dropping into the regulator.

2. Remove the screws, lock washers, and the retaining plate.

Note: The retaining plate slotted area allows the release tabs to move up and down freely inside the retaining plate.

3. Carefully remove the release tabs and springs.
4. Clean the release tabs with either water or a mild soapy solution. Rinse and wipe dry.
5. Clean the springs with either water or a mild soapy solution and rinse.
6. Verify that the #4 rubber stopper is inserted firmly in the second stage regulator outlet. Clean and rinse the cavity that the release tabs slide into. The cavity is located on the quick-connect body on the second stage regulator. Wipe dry.
7. Remove and replace the O-ring if necessary.

REPLACING THE REGULATOR QUICK-CONNECT O-RING

1. Apply a light film of Christo-Lube lubricant to the new O-ring.
2. Roll the new O-ring over the end of the probe and seat it into the O-ring groove. If the O-ring is not seated, air may leak.

REASSEMBLING THE RELEASE TABS

1. Before reassembly, inspect all parts for damage (wear, cracking, chipping, etc.). If necessary, replace with new parts.

2. Apply a skim coat of Christo-Lube lubricant to the release tab rubbing surfaces and the release tab cavity (on the regulator quick-connect housing).
3. Insert the springs into the release tab. The springs seat into the release tab pocket.

Note: Turn the regulator body so that the quick-connect is facing on an angle to ensure that the springs stay in the release tab, and that the springs seat in the quick-connect housing small pockets.

4. Insert the release tab into the quick-connect housing cavity. Also, be sure to seat the springs into the small pockets in the housing cavity surface.
5. Repeat for the second release tab.

6. Secure the retaining plate to the regulator using the four screws and four lockwashers. Tighten the screws.

Note: The lockwasher must be used to lock the screws into the housing.

7. Check to verify that each release tab moves freely in the cavity and snaps back after activation.
8. Engage the regulator quick-connect to a facepiece adapter to verify proper operation.

SECOND STAGE REASSEMBLY

INSTALLING THE BYPASS VALVE

1. Remove the valve from the spool and discard the valve. Using the O-ring removal tool, remove the O-ring from the spool. Discard the O-ring.
2. Place a new bypass valve on the end of the spool. Be sure the valve seats in the recess.

Note: Do not lubricate the valve seat.

3. Place a thin film of Christo-Lube on the new bypass spool O-ring and install the O-ring in the groove.

4. Place a thin film of Christo-Lube lubricant on the new slide O-ring, starting at the bullet-nosed end. Push the O-ring into the groove on the slide.

5. Insert the slide into the bypass sleeve, threaded-end first. This is inserted into the large end of the bypass sleeve.

6. Install the complete valve and spool assembly into the bypass sleeve, with the rubber bypass valve end inserted first. Push until the valve is firm against its seat.

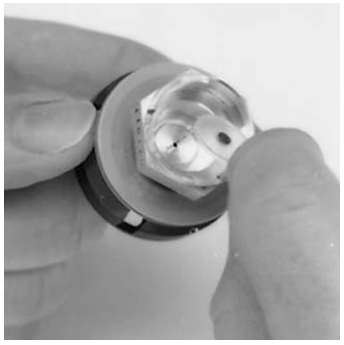
7. Turn the slide until its grooves line up with the tapped holes in the bypass sleeve.

8. Place one drop of Loctite #222 on the threads only of each guide screw before installation. Using the flat-blade screwdriver, tighten each guide screw. Be careful not to overtighten.
9. To re-install the bypass valve, refer to installing the valve core.

INSTALLING THE POWER STAGE DIAPHRAGM

Note: Remove any debris before reassembling.

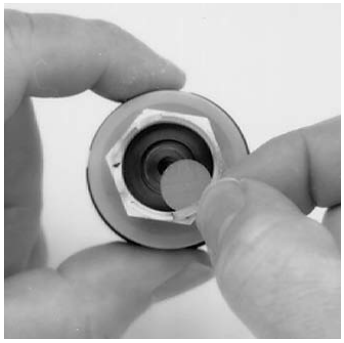
1. Place a new diaphragm into the valve and lever assembly. Make sure the flat side of the diaphragm **faces up** and that the diaphragm rib nests into the matching groove inside the assembly. Use the plastic stick if necessary to be sure the diaphragm is seated.



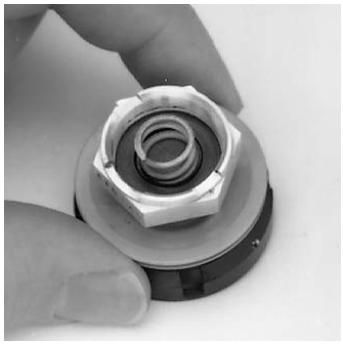
2. Place the power stage spool into the valve assembly. The ring of holes should be against the power stage diaphragm.

SECOND STAGE REASSEMBLY

3. With the base and lever assembly facing down, place a new bypass screen into the power stage spool.



4. Place the bypass spring on top of the screen.



⚠ CAUTION

Do not grasp the lever base during the next step.

5. Place two drops of Urethane Adhesive (P/N 603571) or Loctite Assure #425 (P/N 602706) on the large threads of the bypass sleeve.

⚠ CAUTION

Hold the valve body hex, not the base and lever assembly, ensuring the base and lever will not change calibration.

Note: Make certain that the bypass sleeve O-ring remains in its groove on the end of the bypass sleeve during reassembly.

6. Place a 1" open-end wrench on the hex flats of the valve and lever assembly.
7. Place a crow's foot on inch lbs torque wrench. Place a 1/4 inch crow's foot on hex flats of slide. Torque the slide into the valve and lever assembly to a torque of 40 +/- 5 inch lbs.
8. Install the valve core.

INSTALLING THE VALVE CORE

1. Place transparent tape over the exposed threads of the valve core to protect the O-ring.
2. Place a thin film of Christo-Lube™ lubricant on the **new** valve core O-ring.

3. Roll the O-ring in place in the groove closest to the valve body. Remove all tape.

⚠ CAUTION

Do not push the top lever while installing the valve core. This could damage the pad seal and affect operation.

4. Line up the slot on the valve body with the lug inside the regulator housing. Press the valve core gently into the housing.

Note: Resistance will develop when the O-ring is forced into its seat. The valve core is seated when it will not rotate.

5. Screw on the bypass locknut. Using the inch-pound torque wrench and the large spanner wrench, **tighten to 35-45 inch pounds.**

SECOND STAGE REASSEMBLY

6. **Place two drops of urethane adhesive (P/N 603571) or loctite Assure #425 (P/N 602706)** on the exposed threads of the valve core. Do not permit thread sealant to contact the regulator housing.

7. Install the bypass cap.
8. Install the **new** retaining ring **flat-side down** to secure the bypass cap.
9. Install the intermediate-pressure hose and bypass handwheel.
   a. Place a thin film of Christo-Lube lubricant on the new O-rings. Place transparent tape over the bypass guide screws to protect the O-rings. Slide the new O-rings in place, using care not to nick them. Be sure to remove all transparent tape.

   b. Position the swivel with its grooved end away from the regulator housing. Push the swivel end of the hose over the bypass sleeve and onto the O-rings until the swivel contacts the retaining ring.

   c. Place a new retaining ring in the groove on the bypass sleeve.

   d. Place a thin film of Christo-Lube lubricant in the groove on the hose swivel, where the rubber rim of the handwheel fits.

   e. Place the bypass handwheel on the slide, making sure to line up its square hole with the square on the slide.

   f. Place a single drop of Loctite #222 thread sealant on the exposed threads of the bypass slide.

   g. Use the 7/16" wrench to thread the handwheel locknut on the slide.

   h. To install the intermediate pressure hose on the first stage.
   i. Pressurize the system and leak test the hose.

10. Adjust static pressure.

INSTALLING A NEW DIAPHRAGM AND SPRING

1. Lay the diaphragm on a flat, clean surface and place the spacer ring into the diaphragm outer rim.

   Push gently on the spacer ring. Damage to the lever assembly could affect operation.

SECOND STAGE REASSEMBLY

2. Install the assembly into the regulator housing by pushing gently on the spacer ring.

3. Fit the large spanner wrench on the inch-pound torque wrench.
4. Screw the shut-off base into the regulator housing.

5. Torque to 15-20 inch-pounds.

6. Insert the small diaphragm spring through the center hole in the shut-off base so it rests over the center nipple of the diaphragm. The spring has to fit around the rib on the top of the diaphragm.
7. Thread the adjusting screw into the shut-off base.

ADJUSTING THE STATIC PRESSURE SETTING

1. Remove the setscrew from the regulator housing. Unthread the shut-off cap with push button and remove the spring (if not disassembled).
2. Using the small spanner wrench, unscrew the thrust ring from the shut-off base.

Note: Be sure that the adjusting screw remains in the shut-off base.

3. Attach the regulator to a tester suitable for the MMR SCBA. Refer to the test procedures in the TESTER instructions.
4. Reassemble the intermediate pressure hose to the first stage (if disconnected) and pressurize the system.
5. Adjust the static pressure by turning the adjusting screw with the small spanner wrench. The static pressure should be 1.1 to 1.5 inches water column.

6. Using a toothpick, place one drop of RTV silicone adhesive in the joint between the adjusting screw and shut-off base.

7. Clean any excess RTV adhesive from the thrust ring threads. Place one drop of RTV adhesive on the shut-off base threads (above the adjusting screw).
8. Screw the thrust ring into the shut-off base until it is flush with the top surface of the base, or it contacts the adjusting screw. Do not over-tighten.

INSTALLING THE STOP SPRING

1. Place the stop spring over the shut-off base hub. Push down on the spring until the bottom coil snaps into place. Do not distort or stretch the spring, or shut-off performance may be affected.

INSTALLING THE SHUT-OFF BUTTON AND SPRING IN THE SHUT-OFF CAP

1. Place the shut-off button and the spring into the shut-off cap.

2. Screw the shut-off cap on the regulator housing until the shut-off cap touches the shut-off base. Further tighten the cap clockwise until the next indexing mark lines up with the setscrew hole in the regulator housing.

Note: The cap slot locations are the six marks above the threads on the cap.

SECOND STAGE REASSEMBLY

3. Carefully thread the setscrew in until the top of the setscrew is snug in the regulator housing.

4. Re-check the static pressure setting. The final setting must be 1.1 to 1.5 inches water column. Also flow test to check the final assembly.