

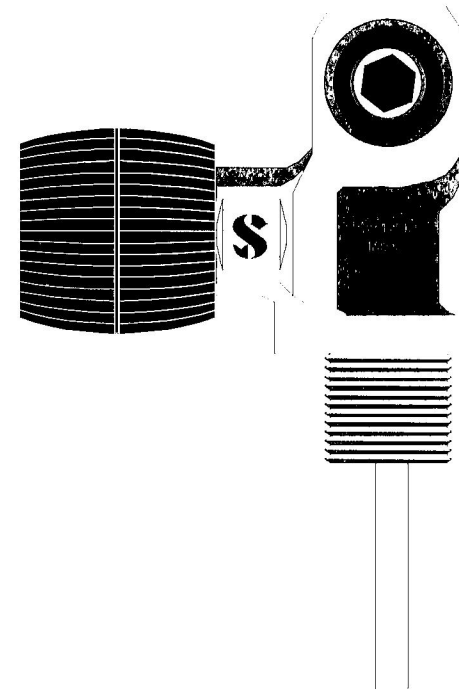
# SCUBAPRO®

## Technical Service Reference & Repair Guide

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# Tank Valves



**Important Note:**

The following information is not designed to be a complete training guide for in-field servicing of SCUBAPRO tank valves. All SCUBAPRO technicians are required to attend an annual service clinic to insure safe handling and servicing of SCUBAPRO products.

## THE SCUBAPRO VALVE SYSTEM

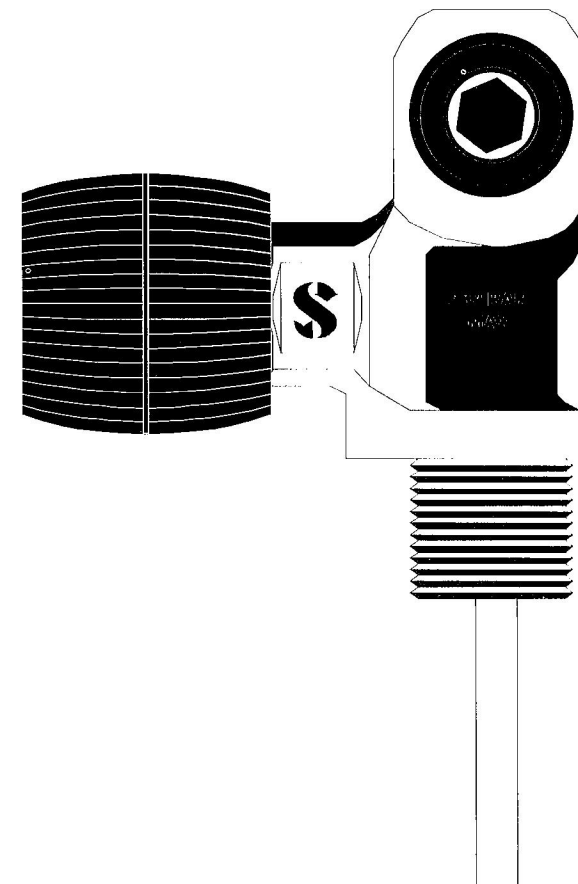
SCUBAPRO valves offer the discriminating consumer options which make it easy to add accessories for easier, safer, and more enjoyable diving.

All SCUBAPRO valves can be configured to accept both DIN and yoke-style regulators. This means that the valve system can be used under a variety of diving conditions, and with a choice of cylinder pressures.

The Modular Valve System allows the diver to expand the basic valve. Options include:

- **Dual Valve Outlet** - designed for attaching an additional regulator system to a single tank. This means the diver can have additional safety by using a completely redundant regulator system as an alternate air source.
- **Straight Connector** - designed to create a basic twin tank manifold. When the need arises for staying longer or going deeper, this system allows the diver to easily create a set of doubles from their existing tanks and valves, while permitting the diver to use a redundant breathing system as an alternate air source.
- **Isolator Valve Connector** - used to create a twin tank manifold with the capability of isolating each cylinder. As with the straight connector, a set of double tanks can be created using existing tanks and valves, but with the added safety of being able to isolate each of the redundant breathing systems from the other.

The single tank valve shown to the right can be configured to accept either a DIN or a yoke-style regulator first stage.



**Single Tank Valve**

P/N 14.148.000 (2250 psi) & P/N 14.149.000 (3000 psi)

**Figure 1**

## THE SCUBAPRO MODULAR VALVE SYSTEM

### Left Modular Tank Valve and H.P. Plug

The left modular valve, illustrated here, adds the versatility of future upgrades and is the best choice for the initial valve purchased with the tank. The external port is simply plugged until it is needed and the plug can be easily removed to accommodate other SCUBAPRO valve components.

The right modular valve (not shown) is identical to the left, except the add-on port and hand wheel are facing in the opposite direction. This valve can also be plugged and used as an individual tank valve. The right modular valve is not recommended as a starter valve because the add-on dual outlet valve (see below) will not fit the right hand model.

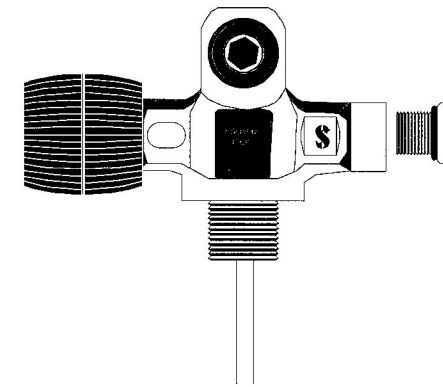
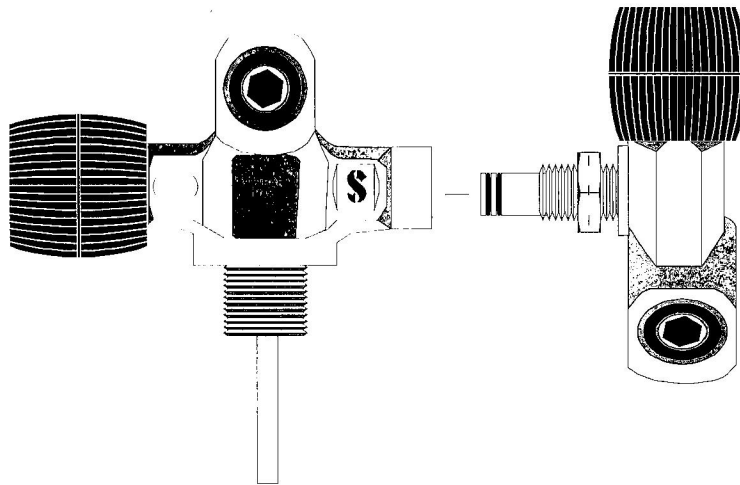


Figure 2

### Left Modular Valve & H.P. Plug

Left Valve P/N 14.184.000 (2250 psi) & P/N 14.185.000 (3000 psi)  
Right Valve P/N 14.184.010 (2250 psi) & P/N 14.185.010, (3000 psi)

Figure 3



### Dual Outlet Valve

Complete Assembly P/N 14.284.100 (2250 psi) & P/N 14.285.100 (3000 psi)  
Second Outlet Only P/N 14.180.005 (2250 psi & 3000 psi)

### Dual Outlet Valve

The SCUBAPRO dual outlet valve is one of the special modifications that can be fitted to the left modular valve. The plug can be removed and the second outlet valve can be installed in its place (see illustration). This feature allows a complete regulator to be attached to a single tank for cold water, diving in overhead environments or other usage.

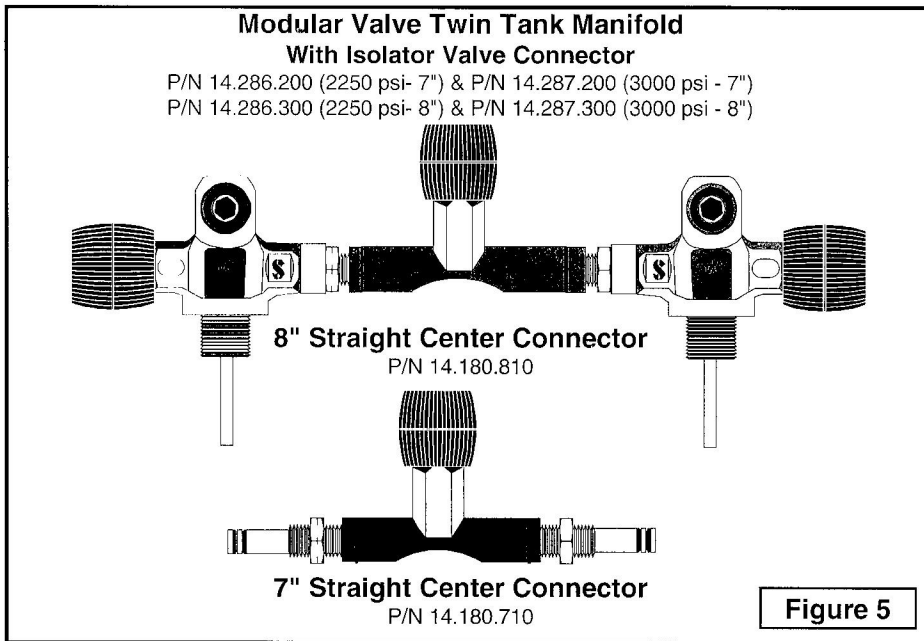
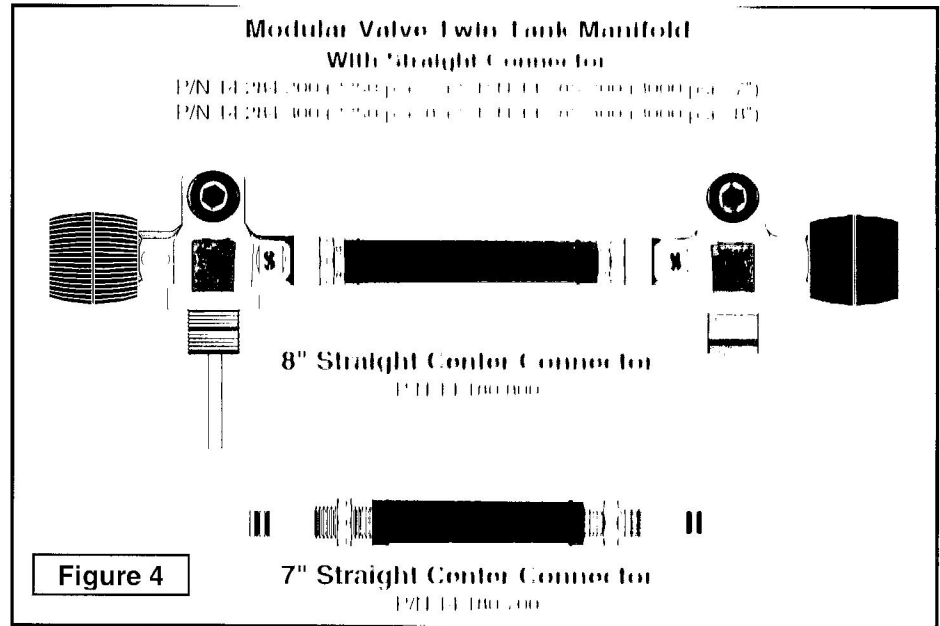
The dual outlet valve can be purchased as a complete unit or as an add-on valve, provided that the left modular valve is already in the tank.

**Important note:** The dual outlet valve can only be added to the left modular valve. This is because the threads are left-hand in both units. The right modular valve has right-hand threads. Torque specification for the dual outlet valve connection is 100 - 150 inch pounds.

### Modular Valve Twin Tank Manifold

The left and right valves can be connected to form a twin tank manifold. The illustration to the right shows the manifold joined with a straight connector. There are two different connector lengths available (7" and 8"), which allows accommodation of several different tank diameters.

Torque specification for the straight connection is 100 - 150 inch pounds.



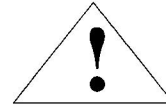
### Modular Valve Twin Tank Manifold with isolator valve connector

The modular valve twin tank manifold can also be assembled with a center connector that has an isolator valve. This valve allows the air supply to be controlled in each tank individually.

Torque specification for the isolator valve connection is 100 - 150 inch pounds (both sides).



## ***Servicing the Cylinder Valve***



### **WARNING**

It is imperative that the technician follow these steps when servicing high-pressure cylinder valves. Failure to do so could result in personal injury to the technician and to others. NEVER work on a cylinder or valve which contains any pressure. To avoid this problem, ALWAYS work on the cylinder and valve with the valve in the "OPEN" position, and ALL air drained from the tank.

Tank valves should be serviced annually, when the cylinder is brought in for its annual visual inspection. Encourage your customers to take advantage of this service to ensure that their diving experience will be trouble-free.

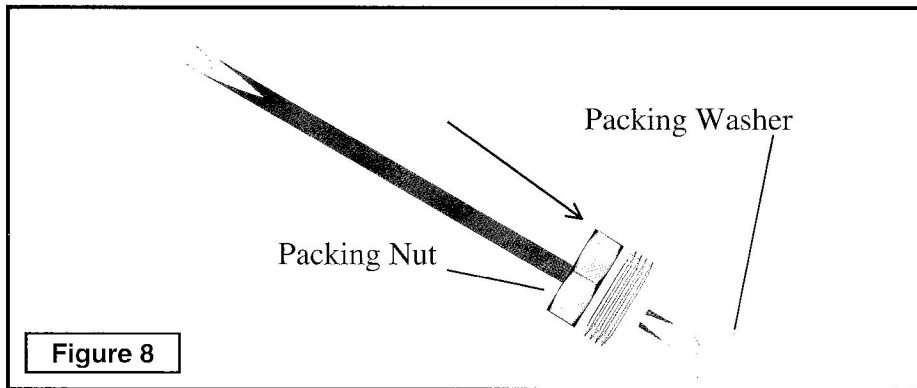
### ***Disassembly:***

#### **DRAINING AIR FROM THE CYLINDER**

Open the tank valve SLOWLY and drain ALL of the air from the cylinder. NEVER work on a cylinder or valve which contains any pressure. To avoid this problem, ALWAYS work on the cylinder and valve with the valve in the "OPEN" position. It may help to carefully place the cylinder in the water cooling tank where cylinders are normally filled. This will reduce the amount of condensation which will occur as the cylinder is emptied.

With all of the air drained from the cylinder, and the valve in the OPEN position, it is safe to remove the valve knob and the various internal parts. The technician may choose to leave the valve temporarily attached to the cylinder, or may elect to remove the valve immediately. If removing the valve before removing the knob and internal parts, it will be necessary to lock the valve in a soft-jawed vice or other holding device which can hold the valve firmly without scarring the brass. Skip down to the steps for removing the valve from the cylinder if this is necessary. Otherwise, follow these step-by-step instructions.



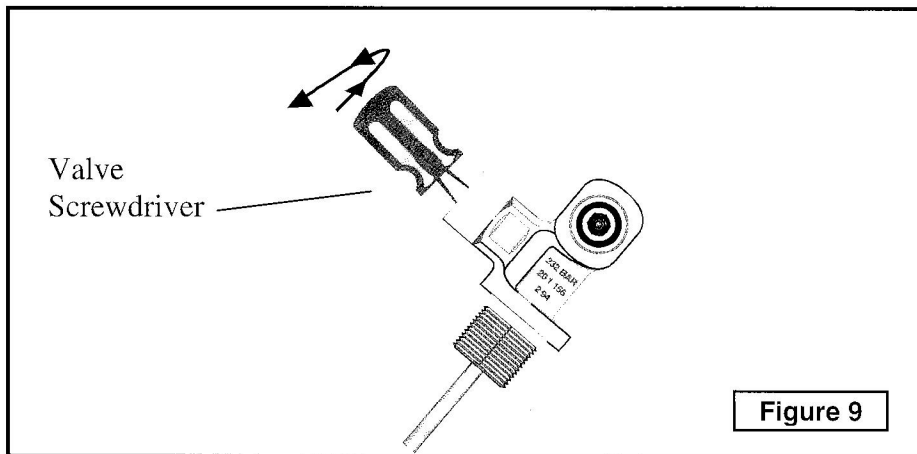


### REMOVING THE PACKING WASHER

The packing washer can be removed from the packing nut by using a brass o'ring pick. It may be best to "push" the packing washer out from the top of the packing nut, rather than to attempt to "pick" it out from the underside. It may require a combination of "pushing" and "picking" to successfully remove the old packing washer. The washer is discarded and replaced with a new part. DO NOT place the old washer back in the packing nut. It is unlikely that a satisfactory seal will be achieved.

The next part to be removed is the "seat driver" or "stem." It should be possible to "pull" the stem from the valve body without use of special tools. AVOID using any tool for this procedure as a hard tool (such as "vice grips" or pliers) may damage both the stem threads and the brass threads of the valve opening.

It is also possible that the stem o'ring is lodged in the packing nut. This will become apparent when the technician tries to remove the packing washer. The stem o'ring will be a different color than the packing washer, and may actually be seen as "bits" of rubber, if the valve has not had regular service.



### REMOVING THE SEAT ASSEMBLY

Since the technician started out with the valve in the full open position, the seat should be easy to remove. Using fingers or the slotted valve screwdriver, unthread the seat all the way out of the valve body. The seat has a right-hand thread. If the valve screwdriver is used, avoid making contact with the valve opening threads. The seat assembly should be replaced annually.

### REMOVING THE DIN PLUG

Remove the DIN plug, if the plug is in the valve body. This is accomplished using a 5/16 " or 8 mm hex wrench (for parts manufactured prior to February, 1996), or a 6mm hex wrench (for parts manufactured after February, 1996). Be sure to use the correct size, as it is possible to "round" the edges if the incorrect size wrench is used. Discard the outside o-ring (annual replacement), and inspect the internal o-ring for wear or flatness. Replace if worn or flattened severely.

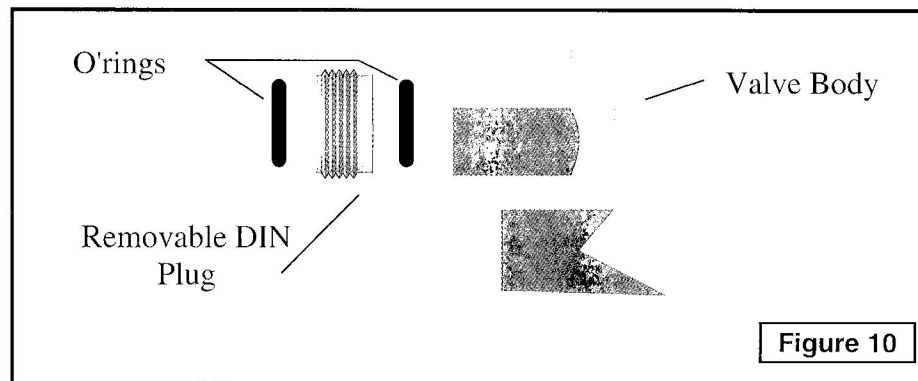


Figure 10

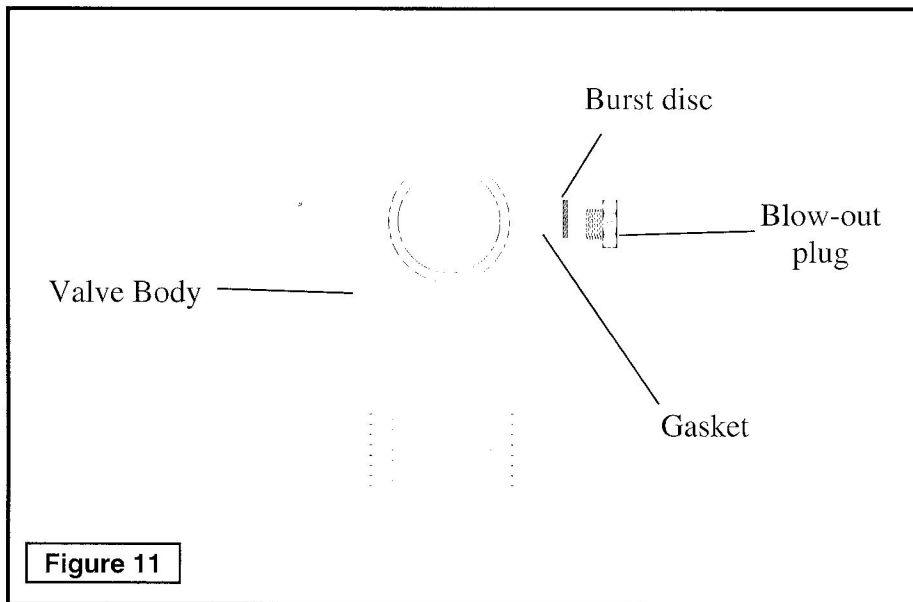
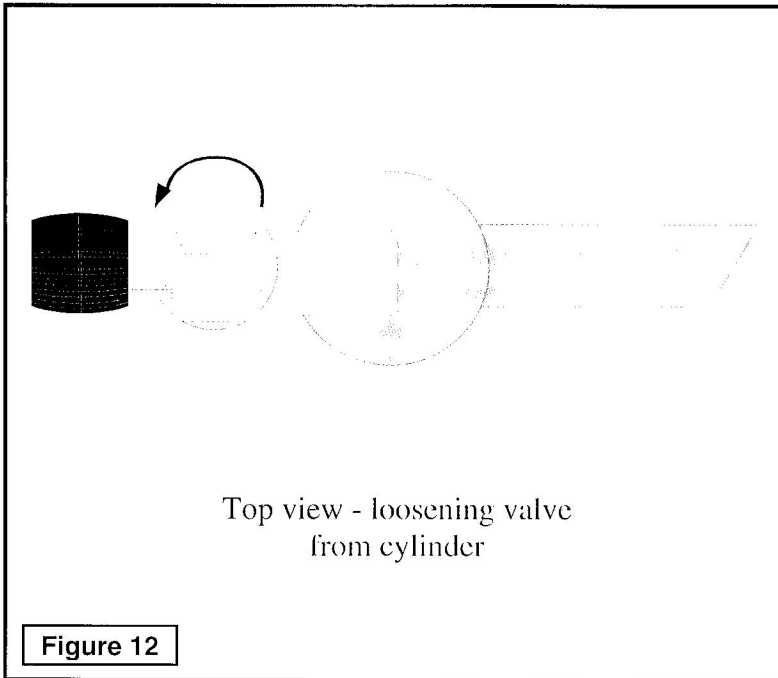


Figure 11

### REMOVING THE BURST DISC

Using a 1/2 " socket, remove the burst disc assembly, which includes the disc, gasket and blow-out plug. This entire assembly should be discarded and replaced as a unit. **DO NOT MIX OLD AND NEW PARTS.** Doing so could change the blow-out range of the disc. This is explained in more detail under "Assembly."



### REMOVING THE VALVE FROM THE CYLINDER

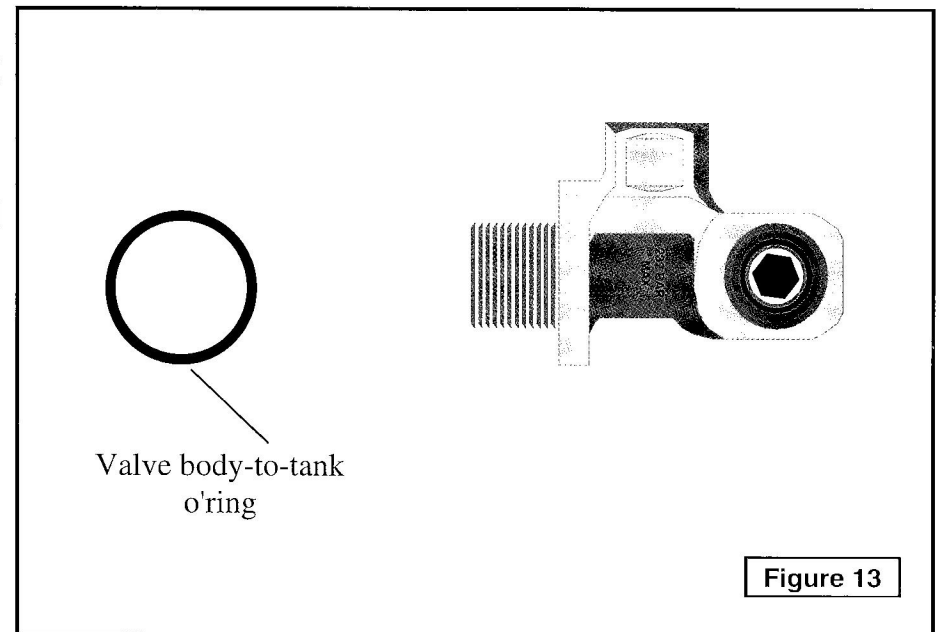
Once ALL of the air is drained from the cylinder, and the valve is in the "OPEN" position with all internal parts removed, it is safe to remove the valve from the cylinder. The easiest way to accomplish this is to lock the cylinder into a strap vice or chain vice, and loosen the valve from the tank. If the valve was serviced and installed properly during the last service, it should be possible to loosen the valve easily. If it has been some time since the last proper service, a wrench may be necessary. Use a 12" adjustable wrench. The valve uses a right-hand thread. If an adjustable wrench is used, care must be taken to ensure that the jaws are locked onto the valve securely, to avoid scarring the soft brass. It is best to place the wrench ACROSS THE FACE of the valve, rather than to place the jaws alongside the face. With the jaws across the face, any slippage of the wrench will not cause so much damage that the valve is rendered unusable. Place a soft cloth between the valve body and the wrench jaws to reduce the possibility of scarring.

### REMOVING THE VALVE BODY-TO-TANK O-RING

Remove the valve body-to-tank o-ring, and discard. This o-ring should be replaced annually.

Generally the "dip tube" or valve snorkel should not be removed and will not need replacement. However, it is a good idea to inspect the tube for corrosion or damage, and replace or clean if needed. Under most circumstances, it is best to leave it in place.

Next, if necessary, clean the valve body and reusable parts using SCUBAPRO Reg-Wash. No other solvent should be used. Follow the directions supplied with the Reg-Wash for either sonic cleaners (preferred) or for aqueous bath cleaning.



## Assembly:

The assembly procedure will vary slightly from that stated here when a technician uses a soft-jawed vice to hold the valve during the process. The procedure outlined in this addendum assumes that the tank will be used to hold the valve body, and the cylinder is held in place using a strap or chain vice. Whichever method is used, the assembly of the valve's internal parts is the same. Only the sequence involving placement on the cylinder will vary.

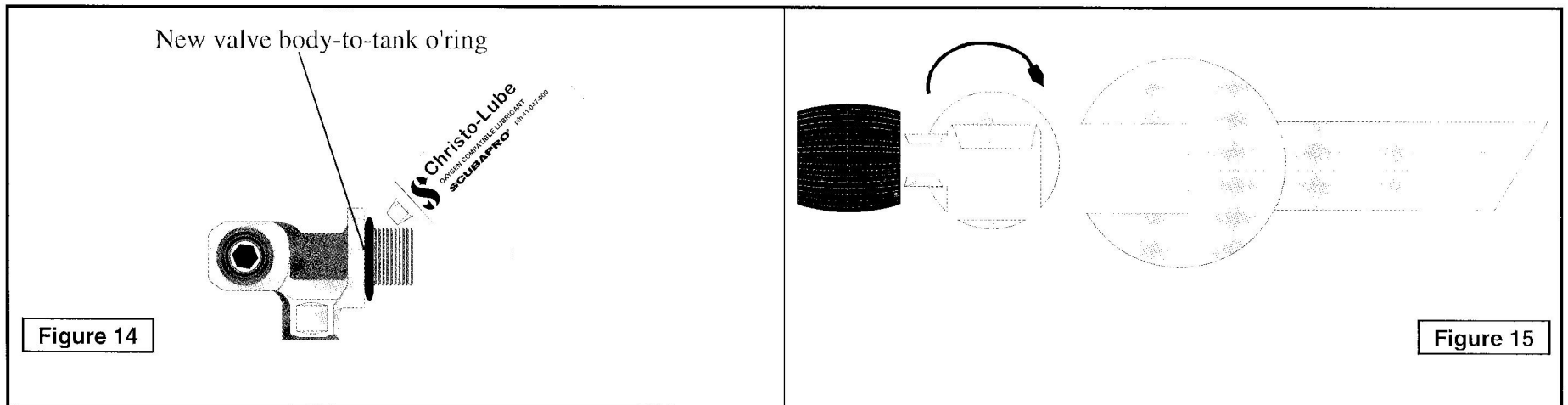
Carefully complete a visual inspection of the cylinder in accordance with appropriate standards and procedures. Clean the threads and cylinder using the correct tools, procedures and solutions for the cylinder material in question. Also carefully inspect the valve body for signs of corrosion or other problems, and correct these prior to re-installing the valve on the cylinder.

### PLACING THE VALVE BODY IN THE CYLINDER

If the dip tube was removed during cleaning and service, replace the tube into its opening in the bottom of the valve body. Then, using Christo-Lube, lubricate and replace a *new* valve body-to-tank o-ring over the cylinder threads and push it up to the smooth o-ring seating surface above the threads. Do not re-use the old o-ring. Place a medium coating of Christo-Lube on all of the valve threads (figure 14). This will help to reduce the potential electrolytic action between the valve threads and the cylinder. This procedure is especially important if the cylinder used is made of an aluminum alloy.

Thread the valve body into the cylinder and tighten (figure 15). Be especially careful not to cross-thread.

Hold the cylinder in a chain-vice or strap vice while installing the valve's internal parts.



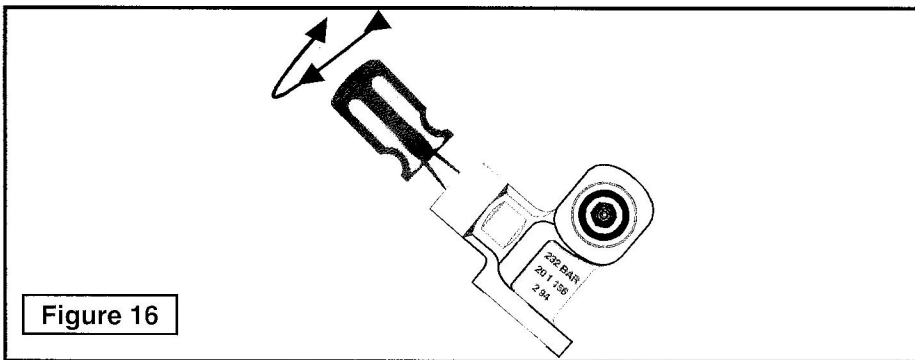


Figure 16

**REPLACING THE SEAT ASSEMBLY**

Use only the valve seat with the relief hole drilled through the back of the brass valve seat retainer. It is not interchangeable with any other seat assembly. A *new* seat assembly is required. Do not re-use the old seat assembly.

Thread the valve seat assembly into the opening of the valve body. Using the valve screwdriver, turn the valve all the way in until it stops.

**REPLACING THE STEM (SEAT DRIVER)**

Replace the stem o-ring. Lubricate it with Christo-Lube to dynamic o-ring specifications. Slip the o-ring past the stem threads and seat it all the way down on the head. Turn the cylinder or valve so that the opening of the valve body is facing "up." Place the stem into the valve body, and ensure that the groove cut into the stem meshes with the riser on the seat assembly (see figure 15).

**REPLACING THE PACKING AND PACKING NUT**

A *new* packing washer should be placed in the packing nut. Do not re-use the old packing washer. Using the flat brass o-ring pick, carefully push the packing washer into the opening on the bottom of the packing nut. The eraser end of a pencil also works well for this task. Be sure to push the packing washer all the way in, until it "bottoms out."

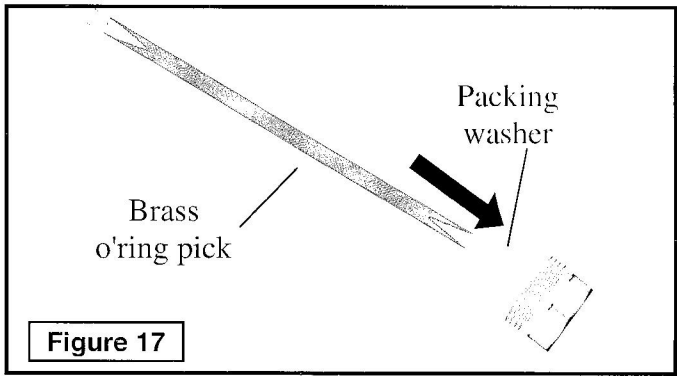


Figure 17

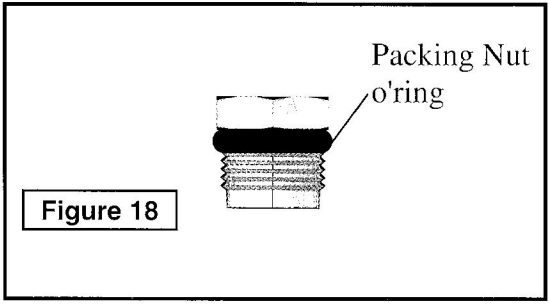


Figure 18

Next, inspect the packing nut o-ring for damage or wear. If the o-ring is satisfactory, it is permissible to re-use it. Otherwise, it should be replaced. The packing nut o-ring should be lubricated to static o-ring specifications. Place the o-ring over the packing nut threads and push it to the smooth o-ring seating surface above the threads.

With the washer, stem o'ring and packing nut o'ring in place, the packing nut can be threaded into the valve body. The packing nut is a right-hand thread. Tighten using a torque wrench, and apply between 125 and 175 inch pounds of torque.

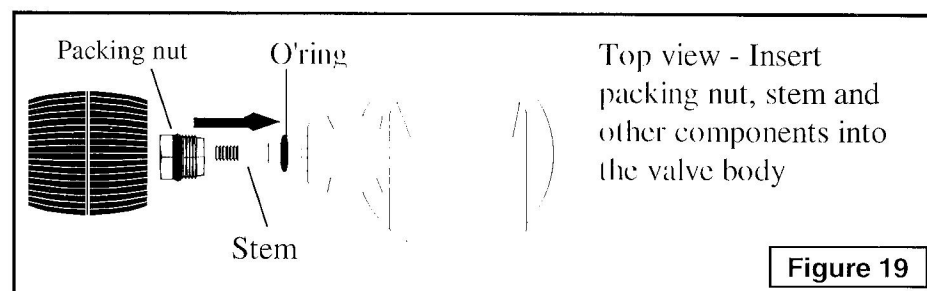


Figure 19

### REPLACING THE HANDWHEEL (KNOB)

Note that the valve knob has a square-broached hold in the center. This is designed to fit over the square-broached surface of the stem. SCUBAPRO knobs also have the words "SCUBAPRO" and "OPEN" inscribed on the OUTSIDE knob surface. Be sure that these words are facing away from the valve body when the knob is installed. The outside of the knob also has a smaller opening than does the side of the knob designed to face toward the valve body.

Slide the valve knob over the threads of the stem and onto the square surface at its center. Be certain that the knob has engaged the stem by turning it approximately one-quarter turn in both directions (see figure 19).

Replace the knob spring into the opening on the knob, followed by the slotted nut (spring retainer). Tighten the spring retainer using the valve screwdriver.

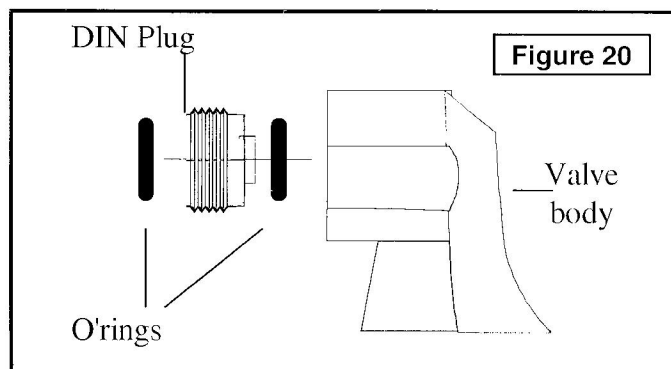


Figure 20

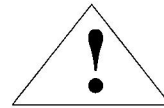
### REPLACING THE DIN PLUG

If the DIN plug is to be placed in the valve body, inspect the plug's internal o'ring and replace with a new o'ring if flattened or worn. Otherwise, lubricate this o'ring (with Christo-Lube) to static o'ring specifications, and re-install. Using a 5/16" or 8 mm hex wrench (for parts manufactured prior to February, 1996), or a 6 mm hex wrench (for parts manufactured after February, 1996, re-install and tighten the DIN plug. Remove and discard the external o'ring and replace with a *new* one.



## REPLACING THE BURST DISC

Refer to the burst disc chart to determine the proper kit for the particular cylinder pressure for which the valve is being used.



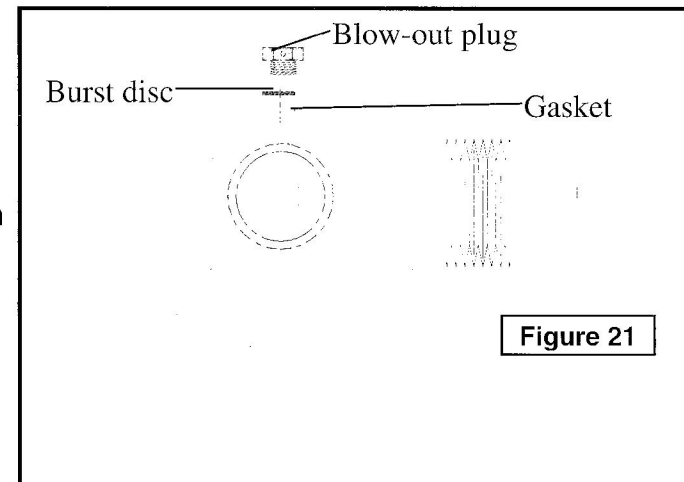
### WARNING

Burst discs are rated for specific service pressures as shown in the following table. Be sure to install the correct assembly for the rated pressure of the cylinder. Use of higher pressure discs on cylinders rated for lower working pressures could fail to relieve excess pressures and cause serious personal injury. Use of low pressure discs on higher pressure cylinders could cause premature rupture of the disc.

When replacing the relief assembly, always replace the gasket, burst disc and blow-out plug together as an assembly. **DO NOT MIX OLD PARTS WITH NEW. ALWAYS USE NEW COMPONENTS.** Re-use of old parts may change the blow-out range of the disc. SCUBAPRO burst discs are designed to be used only with SCUBAPRO gaskets and blow-out plugs. Do not mix components from other manufacturers. Not following these recommendations could result in serious injury.

RATED CYLINDER WORKING PRESSURE	RELIEF ASSEMBLY P/N	DISC MARKING	BURST RANGE
1800 - 2015 psi	01.024.010	3000	2700 - 3000
2250 - 2400 psi	01.024.011	3400	3150 - 3500
3000 - 3300 psi	01.024.012	4200	3960 - 4400

Turn the cylinder or valve so that the opening for the burst disc assembly is facing "up." Carefully place the gasket into the opening and use the brass o'ring pick or the eraser side of a pencil to ensure that it is laying flat. Next, place the burst disc in, also ensuring that it is laying flat in the opening and atop the gasket. Finally thread in the blow-out plug. Tighten the plug with a torque wrench, applying between 90 and 110 inch pounds of torque.



**NOTES:**

When servicing a valve or cylinder, always label the cylinder and valve in such a way as to indicate that service is in progress. This will prevent someone from accidentally attempting to fill the cylinder. Failure to take this action could result in personal injury, if the cylinder is filled when valve parts are loose or missing.

When replacing the valve, use approximately 25 -75 inch pounds of torque, or follow the cylinder manufacturer's recommendations

When filling the cylinder for the first time following valve service, always fill the tank in stages and check for leaks. For example, at the very least, a leak check of all of the components should be made at the following tank pressures: 100 psi, 300 psi , 500 psi , 1500 psi, 2000 psi, 2500 psi, 3000 psi.

Leak checks are best made using either a soapy water solution, or by submerging the cylinder and valve completely in the water used to cool tanks during filling. Be sure that any leaks are corrected before continuing to higher pressures. This may require slowly draining the tank in order to tighten loose fittings.