
ATOMIC
AQUATICS, INC.
TECHNICAL TRAINING
1st Stages
2003

T1x, T1, M1, B1,B2, Z1

Model Features

FIRST STAGES	T1x, T1	M1	B1,B2	Z1
Compact Size	✓	✓	✓	✓
Balanced Piston Design	✓	✓	✓	✓
First Stage Materials	Titanium/Stainless	Brass/Monel	Brass/Stainless	Brass/Stainless
Optional Freeze Protection	Standard (T1x)	Standard	✓	✓
NITROX (EAN) Ready	✓	Up to 80%	✓	✓
# HP Ports	2	2	2	2
# LP Ports	5	5	5	6
Lp Swivel	✓	✓	✓	-
SECOND STAGES	**T1**	**M1**	**B1,B2**	**Z1**
Pressure Balanced	✓	✓	✓	✓
AFC Automatic Flow Control	✓	✓	✓	✓
Seat Saving Orifice	✓	✓	✓	✓
Rapid Adjustment knob	✓	✓	✓	✓
Titianium Orifice, Lever, Spring	✓	✓	✓	✓
Valve Body Material	Titanium	Zirconium/Brass, Stainless	Titanium	Zirconium/Brass
Limited Lifetime Warranty	✓	✓	✓	✓
COMPLETE SYSTEMS	**T1**	**M1**	**B1,B2**	**Z1**
Weight (Yoke)	1.66 lb (754g)	2.6 lb (1191g)	2.43 lb (1104g)	2.30 (1044g)
Weight (DIN)	1.5 lb (685g)	2.27 lb (1030g)	2.07 lb (944g)	1.94 lb (844g)
Service Interval	2 Years	2 Years	2 Years	1 Year

Notice that the Z1 has a fixed 6-port cap versus the 5 port swivel on the B1, T1, & T1X. The Z1 also comes from the factory with a zirconium coated inlet tube.

Limited Lifetime Warranty

Atomic Aquatics warrants this regulator against defects in materials and workmanship for the lifetime of the original owner with the exception of mouthpieces, hoses, o-rings, filters, or valve seats which are warranted for 2 years (T1x, T1, M1, B1) or 1 year (Z1). Atomic Aquatics will at its option repair or replace any components it finds defective.

This warranty does not cover regulators purchased from other than authorized Atomic Aquatics dealers, or regulators purchased via internet or mail order sources.

During the first 2 years, Atomic Aquatics warrants all parts of this regulator against defects in materials and workmanship. It is recommended that maintenance include an annual safety inspection to be performed by an authorized ATOMIC AQUATICS dealer or by the factory. Factory or authorized dealer servicing is required at intervals of 300 dive hours or 2 years, whichever occurs first (T1x, T1, M1, B1) or annually (Z1). This service will include disassembly, cleaning, replacement and lubrication of all o-rings and seals, and safety check.

Without going into great detail, the warranty is a two year or 1 year warranty dependent upon model, which will cover parts and labor. At the 1 year or 2 year mark has passed the warranty will stay in effect for the lifetime of the original owner with an exception of wearable parts. Our warranty differs in that we will not void a warranty if a regulator is not factory serviced each year. Our company policy also prohibits mail order and internet sales and will void the warranty if such a sale occurs.

Specific Enriched Air (NITROX) Limitations

⚠ WARNING

1. **(T1x, T1, B1, Z1): THESE REGULATORS MAY BE USED TO A MAXIMUM 40% OXYGEN CONCENTRATION AT A MAXIMUM PRESSURE OF 3500 PSI. THESE REGULATORS MUST BE DEDICATED FOR EAN USE AND NOT BE CONTAIMINATED BY USE WITH COMPRESSED AIR THAT DOES NOT MEET ANDI OXYGEN GAS PURITY STANDARD.**
2. **(M1): THE M1 MAY BE USED INTERCHANGEABLY WITH AIR OF EAN MIXES UP TO 50% OXYGEN CONCENTRATION AT 3500 PSI MAXIMUM.**

   THE M1 REGULATOR MAY ALSO BE USED TO A MAXIMUM OF 80% OXYGEN WHEN USED ON A DEDICATED SYSTEM, AND KEPT IN AN O^2 CLEAN CONDITION.

Atomic Aquatics wants to emphasize the importance of cleaning and fallowing the guidelines set out by us as well as other agencies when it comes to diving and safe handling of our equipment around high percentages of Oxygen. We mandate that our regulators not be used with higher percentages of oxygen than 40% and pressures higher than 3500 psi. When a regulator is sent from the factory to a customer, the regulator in its current state is allowed at the pressures stated before.

General Notes: Enriched Air (NITROX) Use

- **REGULATORS MAY ONLY BE USED WITHIN SPECIFIC LIMITS AND GUIDELINES**

1. **NEVER PRESSURIZE ATOMIC AQUATICS REGULATORS WITH PURE OXYGEN.**
2. **EAN MIXTURES MUST MEET ANDI PURITY STANDARDS FOR OXYGEN COMPATIBLE AIR.**
3. **EAN MIXTURES MUST NOT BE CONTAIMINATED BY COMPRESSED AIR THAT DOES NOT MEET ANDI OXYGEN GAS PURITY STANDARD.**
4. **EQUIPMENT THAT HAS BEEN CONTAMINATED MUST BE RE-CLEANED BEFORE RE-USE WITH EAN.**
5. **CLEANING OF PARTS MUST BE DONE WITH BLUE GOLD OR ANDI APPROVED OXYGEN CLEANING SOLUTION.**
6. **DURING REGULATOR SERVICING, ONLY ATOMIC AQUATICS FACTORY SUPPLIED O-RINGS AND SPARE PARTS MAY BE USED.**
7. **CHRISTO-LUBE MCG 111 OR MCG 129 MUST BE USED FOR LUBRICATION. DO NOT USE SILICONE GREASE IN OR AROUND EAN EQUIPMENT.**

Atomic Aquatics regulators are never to be used with with pure oxygen and Christo-lube 111, or 129 is to used exclusively as a lubricant weather it is to be used in a Nitrox environment or not. The use of other than factory supplied o-rings and seals is strictly prohibited and can cause serious damage to the product

Service Kit, and O-ring: Replacement

⚠ WARNING

USE ONLY AUTHORIZED ATOMIC AQUATICS COMPONENTS, SERVICE PARTS KITS AND O-RINGS WHILE PERFORMING SERVICE OF ATOMIC AQUATICS EQUIPMENT.
TIGHTEN ALL THREADED COMPONENTS TO PROPER TORQUE.
TIGHTENING SPECIFATIONS CAN BE FOUND IN YOUR WRITTEN PROCEDURES.

ATOMIC AQUATICS REGULATORS ARE TO BE SERVICED ONLY WITH ATOMIC AQUATICS PARTS. THE USE OF OTHER MANUFACTURERS O-RINGS, AND OR OTHER PARTS CAN LEAD TO MALFUCTION OF THE EQUIPMENT.

THIS "SERVICE CLINIC" PRESENTATION WAS DESIGNED TO SHOW AS MUCH TECHNICAL INFORMATION AND PROCEDURES AS POSSIBLE, HOWEVER THERE ARE SOME LIMITATIONS AND WRITTEN PROCEDURES THAT SHOULD ALWAYS BE USED IN CONJUCTION WITH THIS PRESENTAION.

For the simplicity of this clinic we will not be replacing o-rings or tightening the regulator components to their proper torque specifications. However I want you to know that the written procedures which are in front of you call out the proper part numbers and torque specifications, and should be used in conjunction with this media when servicing a regulator in the future.

Regulator Cleaning

GENERAL CLEANING

Pre-clean all parts in hot soapy water. Corrosion products can be removed by further cleaning in a 50% white vinegar/ water solution or commercial cleaner such as DT-2001.*

SPECIAL CLEANING FOR NITROX USE

We recommend the use of an ultrasonic cleaner with a solution of Blue Gold or other approved oxygen cleaners.
Blue Gold is to be diluted to a 1:20 ratio with clean water, and the solution heated to 140° F, (60° C).

Rinse thoroughly in clean water, and air dry.

Parts should be cleaned until there is no trace of hydrocarbon residue. Reassemble in a clean work area, with clean hands, and minimize handling to reduce contamination. Lubricate with Christo-lube 111 or 129.

**** DT-2001 Manufactured by Diving Technologies Int. (954) 748-4772***

**** Blue Gold distributed by Metal Lube Corp. (909) 279-9181***

As far a cleaning the parts during a service we recommend the use of an ultrasonic cleaner with a O2 approved cleaner, you need to pay special attention after you are done cleaning as to rid the parts of all hydrocarbon residues and if possible minimize handling the parts once they have been thoroughly rinsed.

Regulator Cleaning

SPECIAL NOTE: SIMPLE GREEN

ALTHOUGH A POPULAR CLEANER, WE DO NOT RECOMMEND THE USE OF SIMPLE GREEN FOR NITROX CLEANING BECAUSE IT WILL BREAK DOWN IF HEATED ABOVE 130^0 F (54^o C) AND MAY LEAVE QUESTIONABLE RESIDUES.

Reference: For further information on Nitrox cleaning.

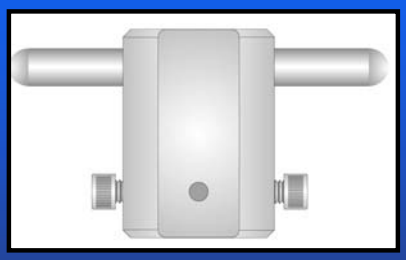
1998 Directory of Cleaning Agents for Oxygen Service. Compressed Gas Association, Inc.
CGA G-4.1 Cleaning Equipment for Oxygen Service.
ASTM G-127-95 Standard Guide For the Selection of Cleaning Agents for Oxygen Systems.

Again as far cleaning the parts during a service we do not recommend the use of Simple Green., Either for low pressure applications or high for the possibility of cross contamination as well as the articles which are referenced below

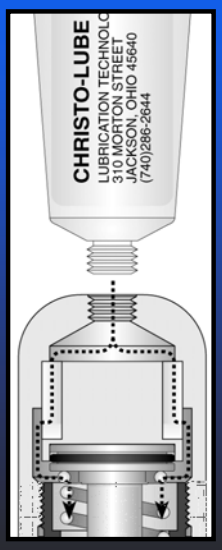
1st STAGE DISASSEMBLY

1st Stage Regulator Tools

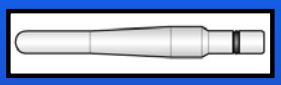
First Stage Pin Lock Tool



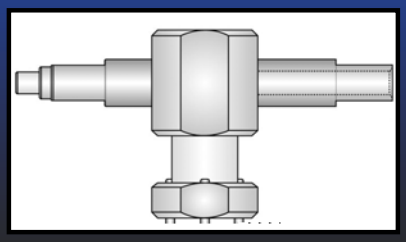
Environmental Sealing Tool



Piston Bullet



1st Stage T-handle wrench



Hex wrenches

(1/8, 5/32, 7/32)

Open end wrenches

(9/16/ 11/16, 13,16)

Torque wrench is required.

The tools we will be using to disassemble and assemble the regulators today are the 2nd stage t-handle tool which is designed exclusively for our 2nd stage, the piston bullet for installing the piston and other functions as well as the 1st stage t-handle wrench used for various procedures on our 1st stage regulators. Some of the other tools that you will need for a standard service are basic shop tools such as the wrenches mentioned on this slide.

Loosen the Swivel Cap

LOOSEN CAP-DO NOT REMOVE

PLACE ENTIRE 1ST STAGE ON AN EMPTY TANK VALVE OR BENCH VALVE.

(T1x, T1, M1, B1, B2, Z1) Loosen the swivel cap with the pin lock first stage spanner. Align the holes in the tool with the indentations in the swivel cap. Engage the nylon hex screws and loosen the cap from the body.

Loosen the Z1 Cap

LOOSEN CAP-DO NOT REMOVE

PLACE ENTIRE 1ST STAGE ON AN EMPTY TANK VALVE OR BENCH VALVE.

(Z1) In August 2002 the Z1 6 port cap has changed to a 7 port cap with a spanner hole to be used to loosen it from the body.

(Z1) Install the threaded end of the pin lock first stage spanner into a side port of the Z1 cap. Loosen the cap from the body.

Loosen the Seat Retainer

LOOSEN SEAT RETAINER-DO NOT REMOVE

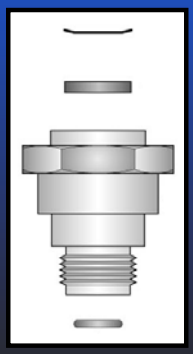
Loosen the seat retainer with the first stage T-handle wrench.

Yoke: Removal

Unscrew and remove the yoke knob.

Unscrew the yoke retainer with the special 1” yoke nut socket and socket extension placed through the yoke. These parts are securely fastened and may require use of a long handled wrench and the proper vise or holding fixture to secure the first stage.

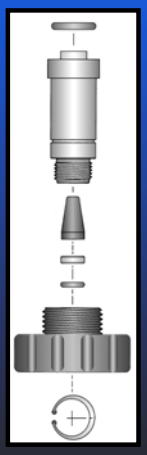
Remove the yoke retainer and filter retainer, flat filter and o-ring.



DIN: Removal

Unscrew the DIN nipple with a ¼" hex wrench or hex socket. These parts are securely fastened and may require use of a long handled wrench and the proper vise or holding fixture to secure the first stage.

Remove the o-rings, metal washer, and conical filter.

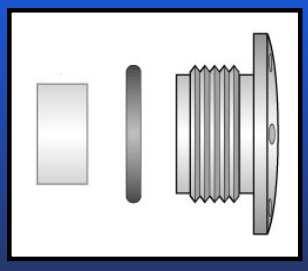


HP Seat: Removal

Remove the seat retainer from the body.

Use a small blast of air from a low pressure air supply to the hole in the back of the seat retainer to dislodge the high pressure seat.

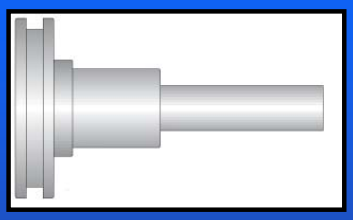
Take care and aim the seat into a cloth so it does not fly out and injure someone.



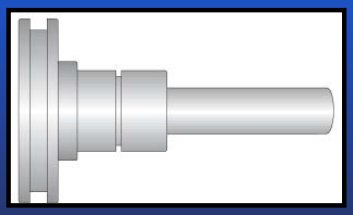
Use an air gun to dislodge the seat. If stuck, freeze the seat retainer and try again.

HP Piston & Jet Seat System

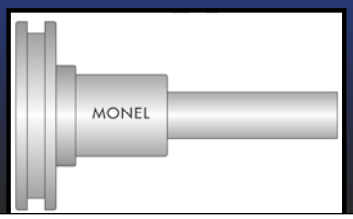
REFER TO SERVICE BULLETIN #2 FOR CORRECT SEAT AND PISTON CONFIGURATIONS



Original Production Piston
Must be used with older style seat



New Piston
Blunt edge w/groove for identification
Must be used with new style "Jet Seat"



New Piston Monel (M1 Only)
The piston has been etched for easy identification.
Blunt edge w/groove for identification
Must be used with new style "Jet Seat"

HP Jet Seat (1/2002)

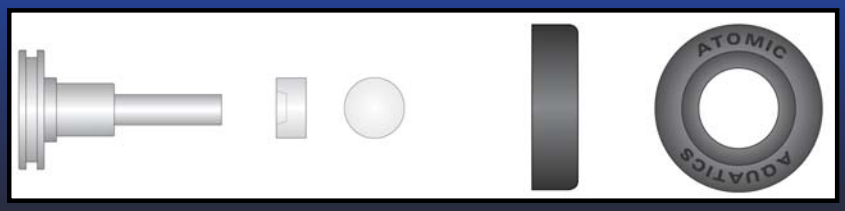
New First Stage Piston and Seat Configuration ("Jet Seat") for all Atomic Aquatics First Stages.

Effective January of this year, Atomic Aquatics has changed to a new style piston and seat assembly in all first stages. This change improves both flow performance and high pressure seat life, especially with high pressure systems. The change consists of a new style piston, seat and rubber end cap to identify the new configuration.

HP Old Style Seat (Pre2002)

When servicing, the new components must not be interchanged with the old style. Do not mix up old style pistons with new style seats or vice versa. Doing so may cause difficulty in setting up correct intermediate pressures.

Parts for both styles are available.



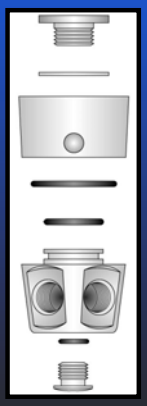
Swivel Cap: Disassembly (T1x, T1, B1, B2, Z1)

Remove the swivel cap from the body.

Install the threaded end of the first stage handle into a side port of the 5-port swivel.

Unscrew the swivel retainer from the swivel cap with a 7/32” hex wrench.

Remove all low pressure plugs and o-rings.



Swivel Cap: Disassembly (M1)

Use the same disassembly process as the (T1x, T1, B1, B2, Z1).

Swivel Cap: Disassembly (T1x, T1, B1, B2, Z1)

Remove the swivel cap from the body.

Install the threaded end of the first stage handle into a side port of the 5-port swivel.

Unscrew the swivel retainer from the swivel cap with a 7/32" hex wrench.

Remove all low pressure plugs and o-rings.

Notice that the swivel retainer is made out of Monel. Monel is a material chosen specifically for its high ignition point so as to be used in high oxygen environments.

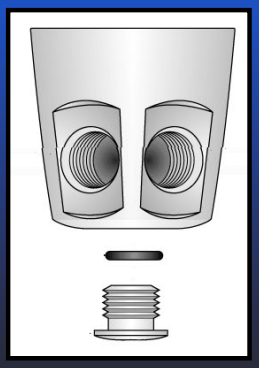
The swivel retainer has been etched for easy identification.

Z1 Cap: Removal

Remove the low pressure port cap from the body.

Install the threaded end of the first stage handle into a side port of the low pressure cap.

Unscrew the low pressure cap and low pressure plugs and o-rings.



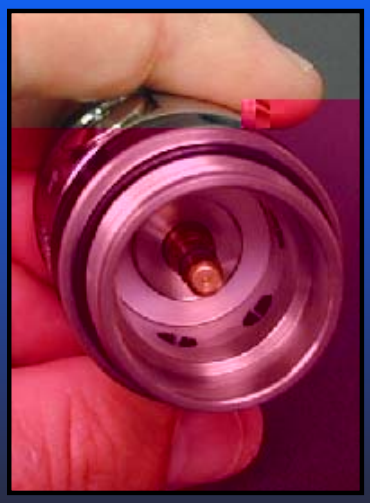
HP Piston & Seal: Removal

Remove the piston and spring by pulling it out of the body. Place the piston in a safe place as to not damage the knife edge.

Remove small seal retaining spring.

HP Piston & Seal: Removal

Use the piston bullet in reverse (o-ring side toward the body) to push the Teflon washer, seal retaining washer, and high pressure o-ring out of the body.



Remove the two (2) High Pressure plugs.

1st STAGE REASSEMBLY

Z1 Cap: Reassembly

Install the low pressure plugs and o-rings.

Install the threaded end of the first stage handle into a side port of the Z1 cap.

Thread the 6-port cap on the body and securely tighten.

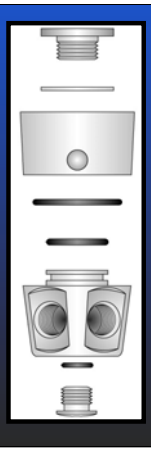
Swivel & Cap: Reassembly (T1x, T1, B1, B2)

Replace and lubricate the o-rings on the 5-port swivel and low pressure plugs.

Install the threaded end of the first stage handle into a side port of the swivel.

Insert the thrust washer between the swivel cap and swivel retainer.

Screw the swivel retainer into the swivel cap using a 7/32” hex wrench, and torque to specifications.



Swivel & Cap: Reassembly (M1)

The monel piston and swivel retainer must be used to maintain the special M1 enriched air rating. Do not substitute any other parts from any other models.

Use the same reassembly process as the (T1x, T1, B1, B2, Z1), using the monel swivel retainer.

Swivel & Cap: Reassembly (T1x, T1, B1, B2)

Replace and lubricate the o-rings on the 5-port swivel and low pressure plugs.

Install the threaded end of the first stage handle into a side port of the swivel.

Insert the thrust washer between the swivel cap and swivel retainer.

Screw the swivel retainer into the swivel cap using a 7/32" hex wrench, and torque to specifications.

The swivel retainer has been etched for easy identification.

Piston Seal & O-ring: Reassembly

Clean and examine the the piston bore carefully. It must be smooth and perfectly clean. Lubricate the the bore with Christo-Lube.

Install the High Pressure piston o-ring followed by the Teflon washer, on the 1st Stage T-handle wrench.

Replace the two (2) High Pressure plugs and tighten to specifications.

Piston Seal & O-ring: Reassembly

Generously Lubricate both with Christo-Lube and carefully push them into the body until you feel the seal snap into place.

Withdraw the tool, leaving the Teflon washer and o-ring in the body.

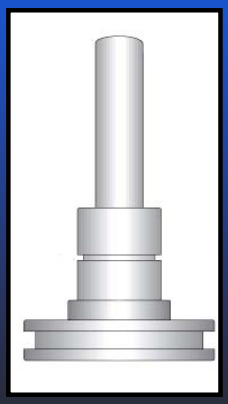
Install the monel seal retaining washer.

Piston: Pre-assembly

(Start with 2 shims on the piston and 1 in the body)

Place the piston bullet completely into the piston and lubricate the bullet and piston shaft with a small amount of Christo-Lube.

Insert the 1st stage T-handle (hollow end) into the body until it sits on top of the metal seal retaining washer.



Piston: Pre-assembly (M1)

The monel piston and swivel retainer must be used to maintain the special M1 enriched air rating. Do not substitute any other parts from any other models.

Use the same reassembly process as the (T1x, T1, B1, B2, Z1) using the monel piston.

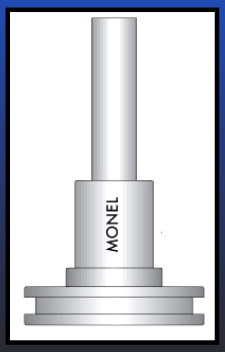
The piston has been etched for easy identification.

Piston: Reassembly

(Start with 2 shims on the piston and 1 in the body)

Place the piston bullet completely into the piston and lubricate the bullet and piston shaft with a small amount of Christo-Lube.

Insert the 1st stage T-handle (hollow end) into the body until it sits on top of the metal seal retaining washer.



Piston: assembly into body

Place the T-handle in a vice or hold it in place and install the piston, with spring and bullet through the body and seal, and into the 1st stage T-handle.

Remove the 1st stage handle from the body and piston bullet, being careful to keep the seal retaining washer in place.

Low pressure swivel to body: Reassembly

Thread the 5-port swivel or low pressure cap on the body to keep the piston in place.

HP seat seals: Replacement

There are two o-rings that seal the seat, one in the body and the second one on the seat retainer. Make sure that the o-ring in the body is seated in the groove. It is marked by a white dot.

Visually check that metal seal retaining washer is in place and install the seat retaining spring on top of it and into the bore of the body.

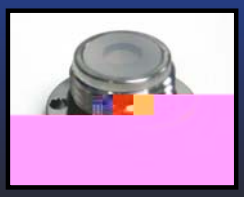
HP Seat: Replacement

REFER TO SERVICE BULLETIN #2 FOR CORRECT SEAT AND PISTON CONFIGURATIONS

Check to see that the HP seat is concave side out. (Visible)

On Jet Seat models, check to see that the the letter "J" that is stamped onto the seat is facing the back of the seat retainer. (2002 models)

Thread seat retainer into the body.



Yoke: Reassembly

Replace o-ring and filter in the yoke retainer.

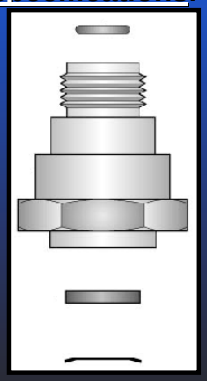
Turn the yoke retainer upside down to keep the o-ring in place.

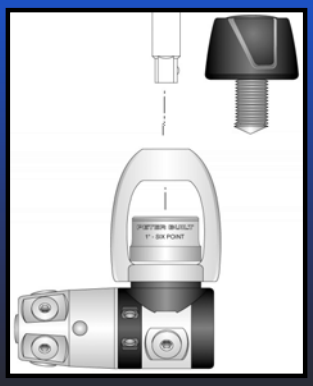
Place the yoke retainer through the yoke, dust cap, & saddle.

Tighten yoke retainer nut hand tight.

Insert a 1” yoke nut socket, and socket extension through the yoke to complete tightening.

Torque to specifications.





DIN: Reassembly

Replace conical filter, washer, o-rings , dust cap, and saddle in the DIN nipple.

Install the DIN into the body.

Tighten to specifications with a hex wrench.

Seat Retainer: Reassembly

Securely tighten the seat retainer with the 1st stage T-handle.

(Pre 1/2002)

(Jet Seat)

Seat Retainer & Jet Seat: Reassembly

Install the end cap.

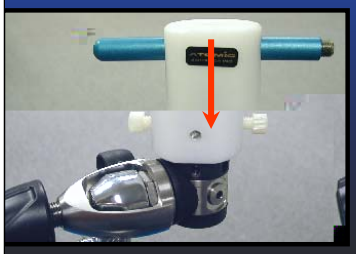
(Jet Seat)

Swivel cap & Z1 Cap: Reassembly

PLACE ENTIRE 1ST STAGE ON AN EMPTY TANK VALVE OR BENCH VALVE.

(B1, B2, T1, & T1x) Securely tighten the swivel cap with the pin lock first stage spanner.

(Z1) Install the threaded end of the first stage handle into a side port of the Z1 cap and securely tighten.



1st Stage Adjustment

Test at 500 and 3000 psi.

Intermediate pressures should be between 125-145 psi with a spread no more than 15 psi.

To adjust IP, add or remove piston shims as required. Each shim will alter the IP approximately 4-5 psi.

The intermediate pressure should remain stable and not drift upward.

A drift of 2-3 psi is allowable provided that the pressure does not continue to increase.

Water test and look for air leaks or bubbles.

Cold Water Use

⚠ WARNING

- **DO NOT USE SILICONE GREASE IN OR AROUND EAN EQUIPMENT**

For diving in waters below 50^{O}F (10^{0}C) we recommend having the first stage sealed with the optional environmental seal kit. The first stage ambient chamber is filled with Christo-Lube MCG 111 and a rubber sleeve is fitted over the ambient chamber to prevent icing. The seal kit also reduces outside contaminants that could enter the ambient ports.

Environmental Seal: Installation

Remove the swivel cap and trim ring.

Slip the environmental seal over the Environmental packing tool and thread the 2oz tube of Christo-Lube 111 onto the tool.

Thread the packing tool onto the body and squeeze the tube until the Christo-Lube is slightly protruding from the ambient chamber ports.

Use a low pressure air gun to rid the chamber of any entrapped water before filling.

Environmental Seal: Installation

Slide the environmental boot over the tool and onto the the first stage body.

Wipe off any excess lubricant around the environmental boot.

Unthread the the tool carefully! If the piston does not disengage from the tool, rock the tool sideways gently to break the piston free before removing the tool completely. Wipe off any excess lubricant from the top of the piston.

Environmental Seal: Installation

Check the environmental boot for holes.

Be sure that the proper amount of Christo-Lube was used by inspecting the boot and checking to see that it is flush with the body when pressurized. The boot will then draw inward when it is depressurized.

REGULATOR PRESSURIZED

REGULATOR DEPRESSURIZED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