Brass/Chromed Brass Side Block

Contents

1.1 Brass/Chromed Brass Side Block Assembly

1.1.1 General

The side block should be overhauled at least annually, or whenever components show signs of wear, damage or do not function smoothly or properly. Minimum replacement components during overhaul include all O-rings and washers included in the soft goods overhaul kit. An additional rebuild kit is available for replacement parts, KMDSI P/N 525-311.

The side block does not require removal from the helmet or BandMask® each time an overhaul is being conducted, provided inspection of the internal passages does not reveal contamination or excessive corrosion. However, the side block should be completely removed at least every three years of active use to ensure fasteners are not corroded or frozen.

The side block assembly is held in place on the helmet/mask shell by a stud, flat washer, lock washer, nut, and a machine screw. The screw does some securing but its main function is to prevent rotation of the side block. The stud also extends into the interior of the helmet shell far enough to secure the air train by means of a washer and nut. The air train cup that fits over the stud is made of soft brass and cannot be used for a bearing surface to mount the side block. A special gasket seals the air train cup to the inside of the shell. RTV silicone seal is used to form a gas tight seal between the side block and the exterior of the shell.

1.1.2 Gas Flow Systems

The main gas supply flow from the umbilical enters the system at the adapter and flows through the one way valve to the interior of the side block. The one way valve or “non-return” is a very important component.

The one way valve prevents the flow of gas out of the helmet to the umbilical in the event of a sudden lowering of pressure in the umbilical. This can happen due to an accidental break in the hose or a fitting near the surface. Not only would the emergency gas be lost if the one way valve failed (concurrent with a hose or fitting break on deck), but the diver could suffer from a serious “squeeze” that could cause injury or death.

Although we have selected the valve for its reliability and quality, inspection and maintenance of this valve must be done regularly. It is very easy

to disassemble and inspect. (A rebuild kit for this valve is available, P/N 525-330).

⚠ WARNING

The one way valve must be tested daily, prior to the commencement of diving operations. Failure of one way valve could cause serious injury or death. Follow the procedures for testing the valve in this manual.

The emergency gas comes from a tank of compressed gas worn by the diver. It enters the system through the Emergency Gas valve when the diver turns the control knob on. The flow then enters the side block.

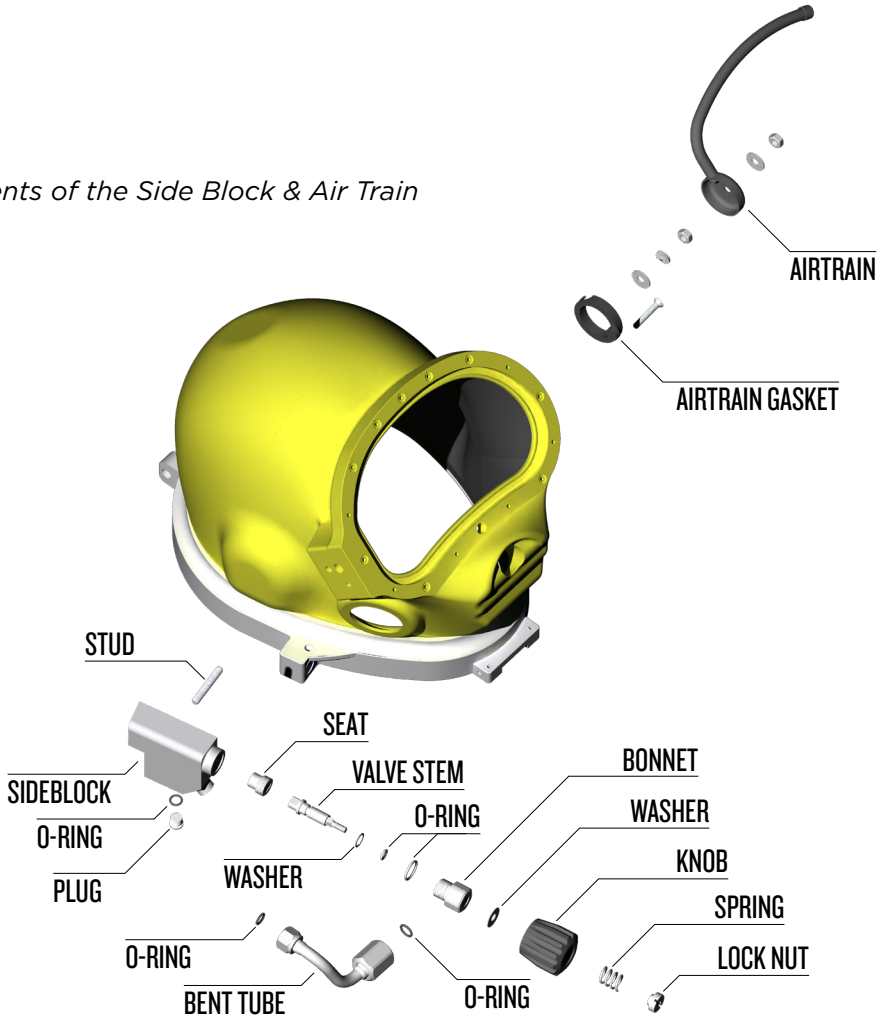
⚠ DANGER

Never connect the main gas supply hose from the diving station/umbilical to the emergency valve. There is no one way valve in the emergency gas valve. If this mistake is made, any break in the supply hose could possibly result in a "squeeze". This could result in serious injury or death.

Both sources of gas flow through the same passage in the side block body to three exits. One exit is always open to supply gas to the demand regulator assembly. The second exit is to the steady flow valve (also known as the free-flow or defogger valve) assembly. The third is to the port on the side block to connect a dry suit inflator hose.

The diver controls the flow of gas through the steady flow system with the control knob. The gas enters the helmet and flows through the air train which directs the gas onto the face port to help eliminate or clear fogging that forms on

Components of the Side Block & Air Train



the face port from the diver's warm breath. In the event water gets inside, the water needs to be evacuated. Some of the air from the airtrain will force this water out through the water dump valve.

The gas flow continues into the oral nasal mask by means of the oral nasal valve. The diver can breathe from this flow of gas if the demand regulator malfunctions. The gas then flows into the regulator and out through the regulator exhaust. From there it can exit through either of the exhaust valves and out through the whiskers.

Returning to the side block assembly: the other flow path for gas is to the demand regulator. It goes to the bent tube assembly that connects to the inlet nipple of the demand regulator. The flow of gas in the demand regulator assembly is controlled by the inlet valve that supplies gas to the diver on"demand" inhalation only, and shuts off during the exhalation cycle.

The bottom of the side block is drilled and tapped to accept a low-pressure inflator hoses. This allows the diver the capability to inflate variable volume dry suits and buoyancy compensators. It is tapped with a ⅜-24 thread orifice, standard for American first stage SCUBA regulators low-pressure auxiliary fittings.

As an added precaution, Kirby Morgan P/N 555-210 Restrictor Adapter must be used to limit gas flow in the event of an inflator hose parting or rupture. The restrictor adapter ensures the loss of gas supply would not be great enough to significantly affect the diver's breathing at moderate to heavy work rates. It would also help prevent filling the dry suit too rapidly.

⚠ WARNING

The side block inflator port is intended for dry suits and buoyancy compensators only - NOT AIR TOOLS. When using the side block low-pressure inflator port, only good quality hoses and fittings should be used and must incorporate an in-line flow restrictor to reduce gas flow in the event of hose failure. Any hose or fitting failure in this arrangement will subject the diver to a decreased air supply.

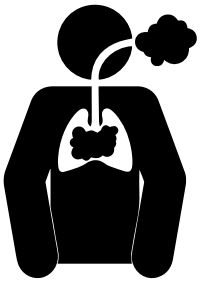
⚠ WARNING

When using the side block low pressure inflator port, the diver must only use high quality hoses with an integrated flow restrictor.

The low pressure inflator port is shipped plugged at delivery. This inflation capability does not significantly interfere in any way with the breathing characteristics of the regulator during normal use providing a limiting hose is used. The low-pressure inflation hose should be one that is restricted to flow less than 100 LPM.

The demand regulator senses the start of the divers inhalation and opens the inlet valve, matching the diver's need. The regulator continues to match the diver's inhalation as the rate increases, peaks, then ebbs and stops. When the diver exhales, the supply gas stays off as the exhalation gas flows through the regulator body, out the regulator exhaust valve, through the whisker, and out into the water. The whisker wings deflect the exhaust bubbles away from the face port to keep the diver's view clear.

⚠ WARNING



Use silicone sealant in a well ventilated area. Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube and Material Safety Data Sheet.

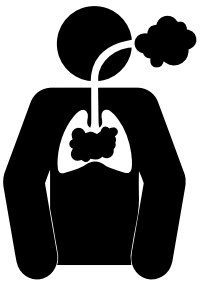
⚠ WARNING

Do not dive the helmet or BandMask® until the sealant has had time to cure. Check the directions on the tube of sealant for curing time. If the helmet/mask goes into the water before the sealant has cured it could leak through the side block mounting stud hole, screw hole, or air flow hole. This could lead to drowning.

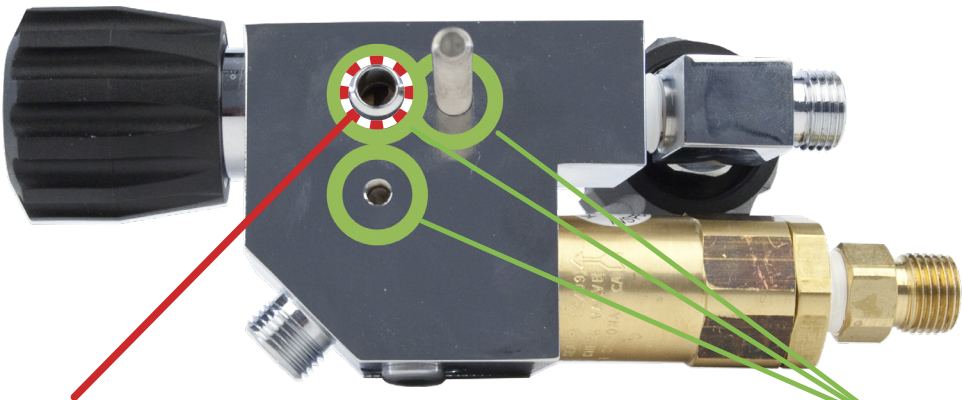
⚠ WARNING

If silicone sealant is blocking the air flow into the helmet it must be cleaned out. If it is not, the diver may not be able to properly defog or clear a flooded helmet or BandMask® quickly. In addition, if the demand regulator is not delivering air properly, the diver cannot use the free flow system as a source of breathing air. This could lead to suffocation.

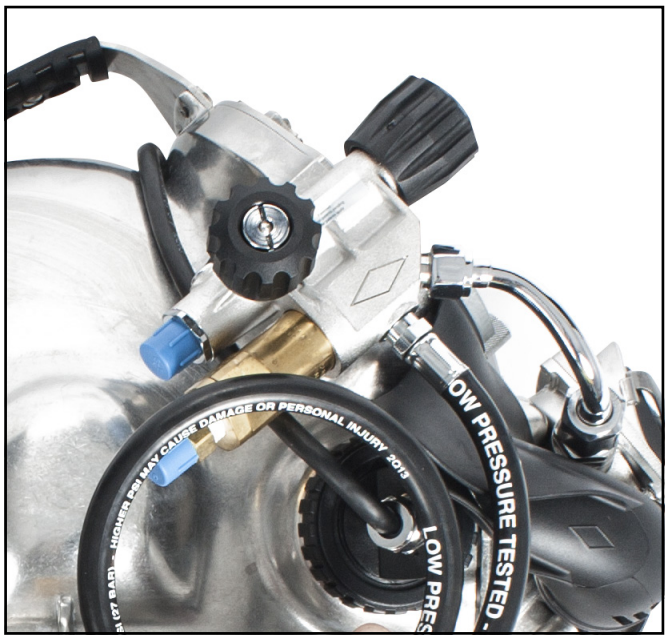
⚠ WARNING



Avoid breathing fumes from silicone sealant and use in a well ventilated area. Breathing fumes can lead to nervous system damage, unconsciousness, and death.



A generous application of silicone sealant must be applied to the side block prior to installation on the helmet shell or mask frame. Use only DOWSIL™ 732 or an equivalent RTV sealant.



Low pressure hoses may be connected to the side block.

All KMDSI Helmets and BandMasks are equipped with a multi-turn demand regulator adjustment knob. This adjustment knob allows the diver to make corrections to compensate for a wide range of incoming gas supply pressures and diver positions.

The adjustment knob operates by simply increasing or decreasing the amount of spring bias tension on the demand regulator inlet valve. The adjustment knob has a range of approximately 13 turns from full in to full out for the SuperFlow® 350 and eight for the 455 Balanced Regulator. The intent of this bias adjustment device is strictly to allow the diver to make adjustments for variations in umbilical supply pressure and diver position.

This adjustment device is not intended as a minimum-maximum device. Minimum and maximum applies to supply pressure only. The adjustment knob should be adjusted by the diver to be at the easiest breathing setting at all times. The exact number of turns required is dependent on the supply pressure, depth and position of the diver.

⚠ CAUTION

Diving a KMDSI helmet or BandMask® with a bias setting greater than the smallest amount necessary to keep the demand valve from free flowing increases the work of breathing and reduces the diver's ability to perform heavy work.

⚠ CAUTION

The regulator adjustment knob should be adjusted to the easiest breathing setting at all times. Adjusting the regulator further in than necessary to keep from free-flowing increases breathing resistance.

1.1.3 Free Flow

All KMDSI helmets and BandMasks can be used in a free flow mode through the use of the steady flow valve (also known as the free flow or defogger valve), or by the use of the demand regulator bias setting. Sometimes both are used together.

Using the helmet in the free flow dive mode increases noise levels and uses much more gas than when using in normal demand mode. However, it is recommended that the diver set up a very slight free flow when at rest and during decompression. A very slight free flow will keep CO_2 levels very low. Typically, with all dive helmets, CO_2 can build up inside the helmet during periods of inactivity due to the ratio of CO_2 produced compared to the amount of gas being breathed by the diver. By adjusting the helmet to a very slight free flow, just enough flow so it does not affect communications or become an annoyance, this will keep CO_2 levels very low when the diver is inactive and at rest.

Running a continuous HEAVY FREE FLOW IS NOT RECOMMENDED because it makes communications difficult and subjects the diver to high levels of noise and increased exhalation resistance.

1.1.4 Emergency Gas Supply System (EGS)

KMDSI strongly recommends that the working diver carry an independent supply of compressed gas (or air) fitted with a first stage regulator, Overpressure Relief Valve (OPRV), and hose that is connected to the inlet of the Emergency Gas

Supply Valve (EGS). The emergency gas supply must only be used for emergency breathing air.

The KMDSI Overpressure Relief Valve, (part number 200-017) is fully adjustable and serviceable and has been designed to relieve any over-pressurization of the first stage regulator greater than the desired setting.

Every bailout (Emergency Gas System or EGS) first stage regulator must be fitted with an over-pressure relief valve to prevent over pressurization of EGS L.P hose in the event the first stage develops a "creep" (i.e., leaks pressure).

⚠ WARNING

Be sure the Emergency air/gas first stage regulator is fitted with a relief valve for over-pressurization of the emergency gas supply hose. A leaky first stage can overpressure the hose causing hose rupture. This would cause a loss of the entire emergency gas supply, resulting in possible serious injury or death.

The over-pressure relief valve must be installed on every first stage used for bailout.

KMDSI Part #200-017

NOTE

This valve can be adjusted for various relief pressures.

The diver should always be equipped with an emergency gas system.

1.1.5 Side Block Assembly Removal

Tools required:

- 7/16, 11/16, and 7/8 (× 2) inch Open End Wrenches
- 11/16 and 7/8 inch Open End Wrench Attachment on Torque Wrench
- 1/4 inch Flat Blade Stubby Screwdriver

The bent tube assembly must be entirely removed before removal of the side block assembly is started.

1. Completely unscrew the bent tube assembly nut from the side block.

2. Using two wrenches, hold the nut at the regulator end of the bent tube assembly with the first

wrench. With the other wrench, loosen the jam nut by turning the wrench DOWN.

Loosening the bent tube from the side block.

3. Unscrew the bent tube nut until it comes free, then pull the bent tube assembly straight out of the regulator inlet nipple.

4. The side block assembly is ready to start removal.

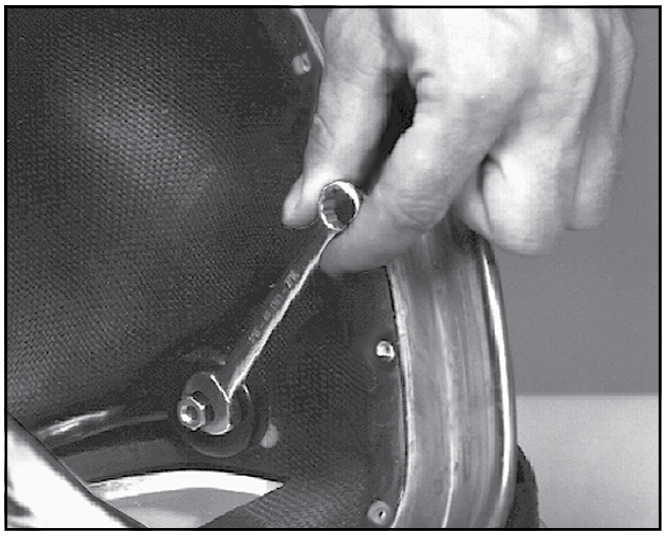
1.1.6 Separating the Side Block Assembly from the Helmet/Mask Shell

Tools required:

- Wooden or Plastic Wedge
- 7⁄16 inch Open End Wrench
- ¼ inch Flat Blade Stubby Screwdriver

1. Removal of the side block assembly requires removing the air train.

2. Remove the nut and washer, air train and air train gasket.



Loosening the nut that holds the air train.

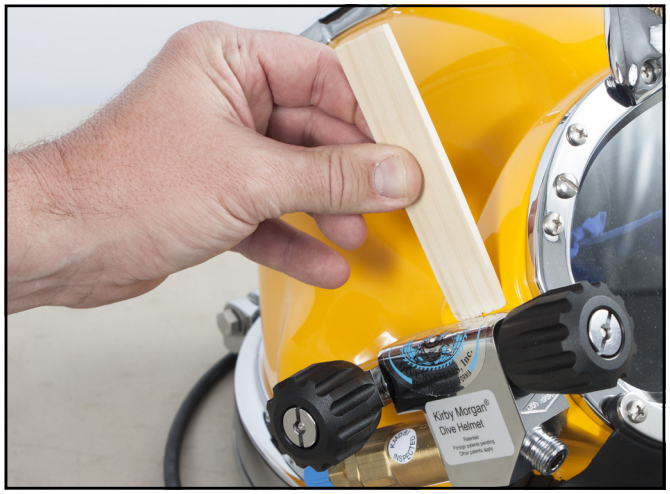
3. The stud nut is removed next, with the lock washer and flat washer.

4. Next, the screw is removed.

NOTE

The alignment screw is located in a recess in the fiberglass next to the stud. In older units without the air train gasket, this recess was normally filled with RTV. The RTV must be scraped free to reveal the screw.

5. The side block assembly is now unfastened, but held in place by the rubber sealing compound (silicone sealant) that acts as a glue. It may be necessary to rock just slightly, or pry the side block from the helmet shell. A wooden wedge can be pushed between the side block and the helmet shell to help free it.



A wooden wedge helps to remove the side block.

Do not use a screwdriver or chisel to remove the side block as damage to the shell could result. Be sure to peel or scrape the old silicone sealant away from both sealing surfaces before reassembling.

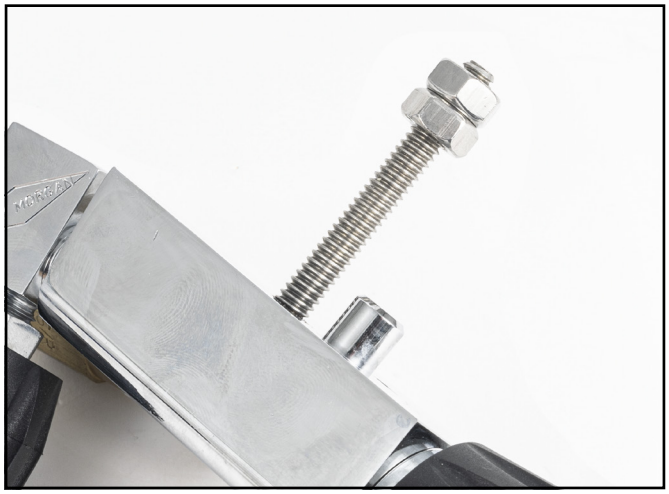
6. If you plan to rebuild the side block assembly, it should be done at this time, while the side block is off the shell. Overhaul the steady flow valve and emergency valve in accordance with "1.2 Steady Flow Valve" on page SB-10. Overhaul the one-way valve in accordance with "1.1 One Way Valve" on page OWV-1.

1.1.7 Stud Removal

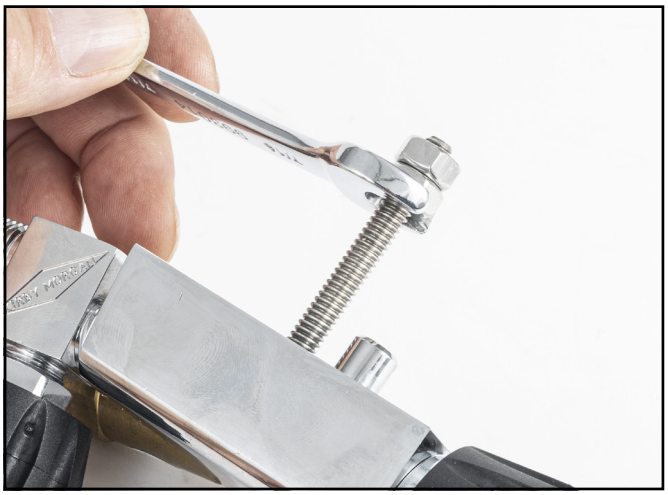
Tools required:

- Two 7⁄16" Open-Ended Wrenches
- Two ¼-20 UNC Nuts (KMDSI P/N 530-317)

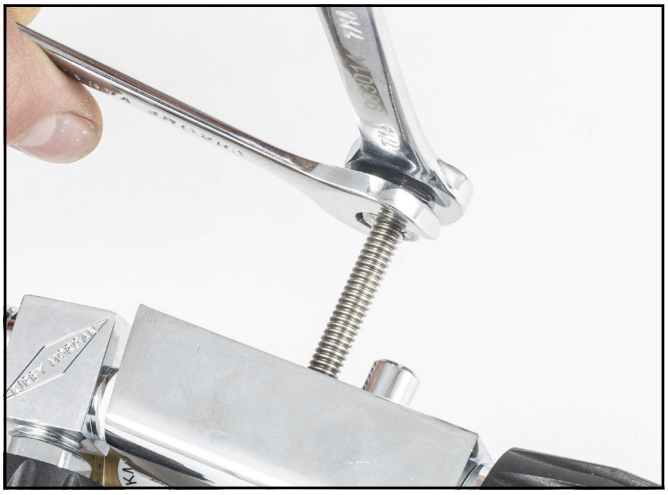
1. Install two ¼-20 UNC nuts on the side block stud and tighten them together.



2. Using the bottom nut, unscrew the stud.



3. Use a backup wrench to hold the bottom nut in place while using an additional 7⁄16" wrench to loosen the nuts away from each other.



1.1.8 Stud installation

Tools required:

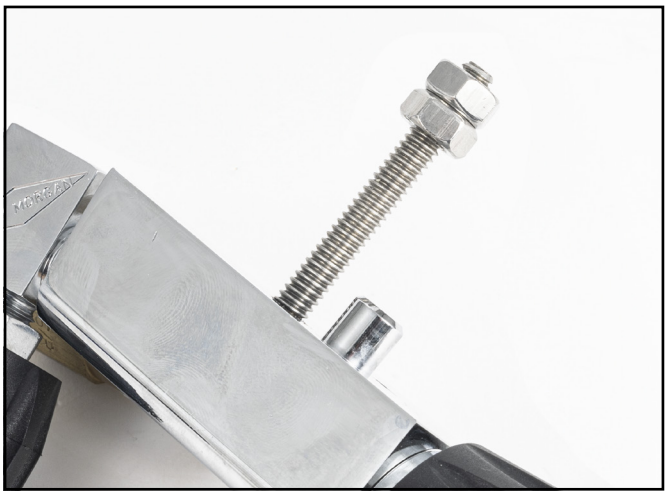
- Loctite® 248 or an equivalent medium strength thread locker
- Two 7⁄16" Open-Ended Wrenches
- Torque Wrench with 7⁄16" Attachment
- Two ¼-20 UNC Nuts (KMDSI P/N 530-317)

1. Remove old Loctite® and clean the stud threads.

2. Install two ¼-20 UNC nuts on the stud and tighten them together.

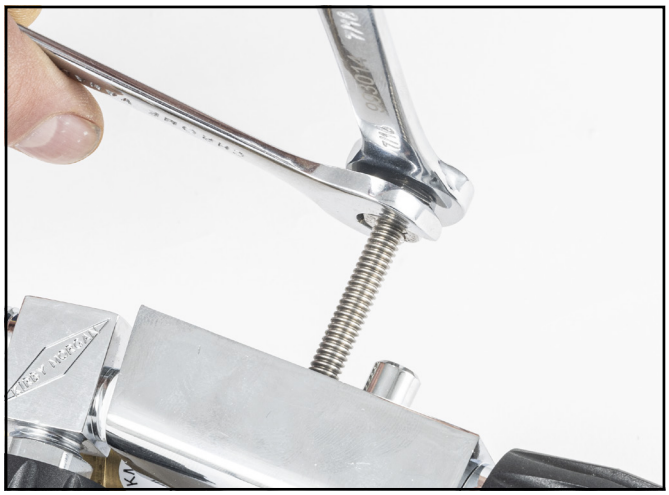
3. Apply Loctite® 248 or an equivalent medium-

strength thread locker to the other end of the stud and hand-thread it into the side block.



4. Using the top nut, torque to the specified value. See “Torque Specs” module.

5. Use a backup wrench to hold the bottom nut in place while using an additional 7⁄16” wrench to loosen the nuts away from each other and remove the nuts from the stud.



1.1.9 Side Block Assembly Replacement

If a new side block is being installed, make sure it aligns correctly in the holes of the shell by dry fitting, before applying RTV silicone sealant.

1. A generous amount of silicone sealant must be applied to the side block prior to installation onto the shell. Use DOWSIL™ 732 or an equivalent RTV sealant.

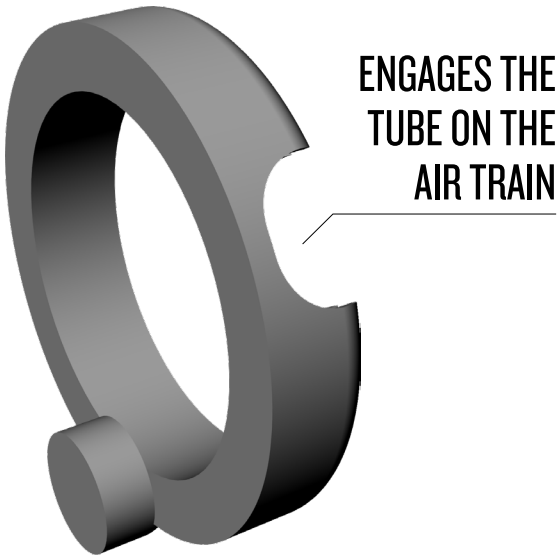
Care must be taken to avoid sealant entering the air opening in the side block. Be sure to remove all excess silicone sealant before it sets up.

2. Thread the screw through the shell and lightly tighten into the side block body. A good indication that enough silicone has been applied will be extrusion of the silicone to the outer edges of the side block. Be sure to remove all excess silicone sealant before it sets up. Acetone can be used to dissolve uncured sealant.

3. Slide the flat washer and the lock washer onto the stud. Run the stud nut down the stud and tighten. See “Torque Specs” module. **DO NOT OVERTIGHTEN.**

Tighten the screw to the correct torque. See “Torque Specs” module. Recheck for excess silicone extrusion and reclean as necessary.

4. Install the air train gasket **(not used on the KMB 28)** onto the air train cup that is held in position by the stud and nut. The gasket has a cut-out to accept the tube of the air train and a plug designed to cover the head of the alignment screw that helps to maintain the correct position for the side block.



The air train gasket forms a seal between the air train and the interior helmet shell.

5. Slip the air train over the stud. Align the air train with the upper edge of the view port opening in the helmet shell.

6. Place the washer on the stud and tighten the nut until the washer lays flush on the air train. See "Torque Specs" module. **DO NOT OVERTIGHTEN.**

7. Test the side block prior to diving to ensure that no silicone sealant is blocking the air flow. If it is, it must be cleaned out prior to diving.

1.1.9.1 Air Train, Applying RTV Silicone KMB 28

Tools Required:

- Torque Wrench
- 7⁄16 inch Attachment
- DOWSIL™ 732 or an Equivalent RTV Sealant

1. Apply a thin bead of silicone sealant around the base of the air train.

2. Fill the screw depression above the side block screw with silicone sealant on the inside of the Band Mask Shell.

3. Install the air train onto the stud of the side block, secure with washer and nut.

4. Using a 7⁄16 inch wrench, tighten the nut to 15 inch pounds (1.7 Nm).

5. Wipe off excess silicone leaving the air train and screw depression sealed. Allow sealant to dry for 24 hours before use.

1.2 Steady Flow Valve

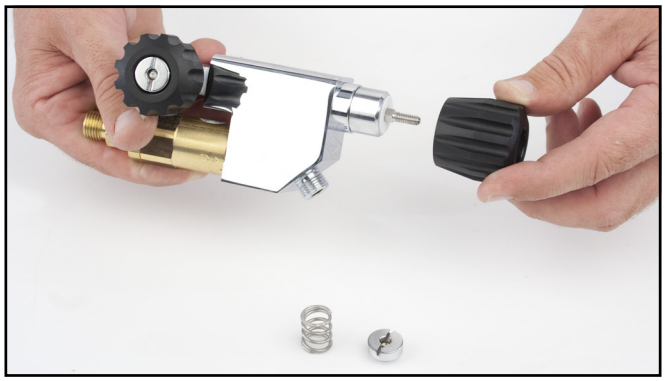
1.2.1 Disassembly of the Steady Flow Valve

Tools required:

- 3⁄8 inch Slotted Flat Blade Screwdriver
- 13⁄16 inch Wrench and Open End Attachment on Torque Wrench

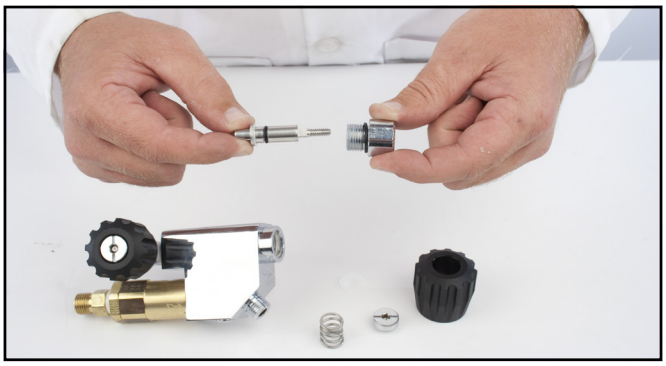
The steady flow valve components are disassembled as follows:

1. First, unscrew the lock nut and remove the spring, control knob, and washer.



Remove the steady flow control knob.

2. Next, unscrew the bonnet. Its O-ring will come off with it. The valve stem, O-ring, and washer usually come out with the bonnet and can be pushed out of the bonnet once removed from the side block.



The valve stem usually comes out with the bonnet.

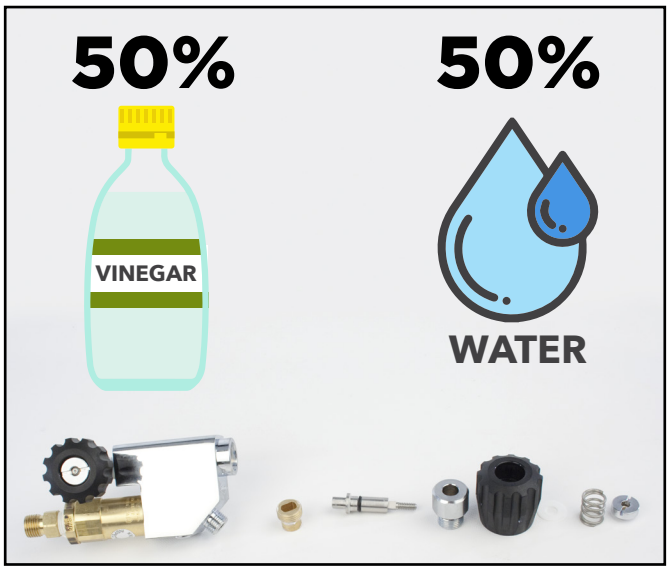
3. If the stem remains in the side block body it can be lifted out after the bonnet is removed.

4. The seat assembly can be unscrewed from the side block body with the stem or a screwdriver.

The seat should be removed for inspection.

1.2.2 Cleaning and Lubricating

1. Clean all the metal first in the soapy water solution and then in a 5% dilute solution of white vinegar/water. Rinse in fresh water.



Clean all the metal parts to remove salts.

2. Check the nylon seat for wear and/or contamination, and replace if necessary. Damage such as a rough face or cuts to the seat indicate it must be replaced.

3. The Teflon® washer and O-ring must be replaced if worn.

4. Be sure to place a light coating of proper lubricant on all internal moving parts, O-rings, and washers. However, do not lubricate the nylon seat, as this will attract dust and debris.

1.2.3 Reassembly of the Steady Flow Valve

Tools required:

- 3/8 inch Slotted Flat Blade Screwdriver
- 13/16 inch Wrench and Open End Attachment on Torque Wrench
- Minimum mandatory replacement parts during overhaul:

  Washers and O-rings

⚠ WARNING

The control knob for the emergency valve and the steady flow knob are not interchangeable. Use only the correct knob for the appropriate valve.

1. Screw in the new seat assembly until it is even with the front of the side block body.

2. Next, install the new nylon washer and new O-ring onto the stem.

3. Insert the proper end of the stem into the seat assembly and turn clockwise until the seat lightly bottoms out. Leave the stem in place.

4. Lubricate the new O-ring and install on the bonnet.

5. Slide the bonnet over the stem and thread the bonnet into the side block.

6. Tighten the bonnet with a torque wrench. See "Torque Specs" module.

7. Place the new Teflon® washer and the control knob on the stem and rotate the stem counter-clockwise until the seat assembly tops out fully open. The control knob must turn smoothly without any binding.

Binding (or "hard spots") in the rotation could be an indication of a bent stem that must be replaced. Replace the knob and or stem if the fit allows the valve to rotate loosely more than ⅛ of a turn.

8. Install the spring, and locknut. Tighten on the locknut until it is flush with the knob.

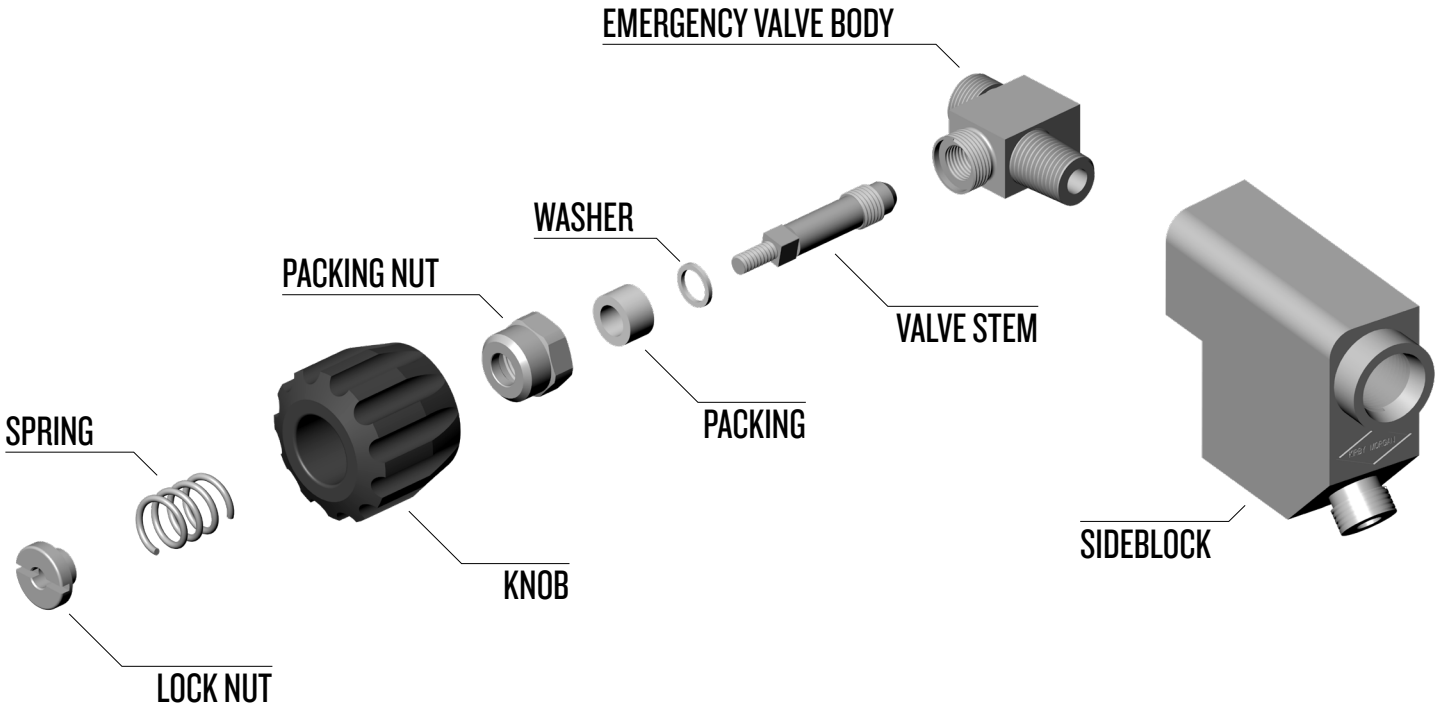
1.3 Emergency Valve Assembly

The emergency valve assembly (aka the Emergency Gas Supply or EGS valve) is not built into the side block. It is a separate component that can be removed and replaced, or disassembled in place on the side block assembly. *The side block control knobs are not interchangeable.*

1.3.1 Disassembly of the Emergency Valve

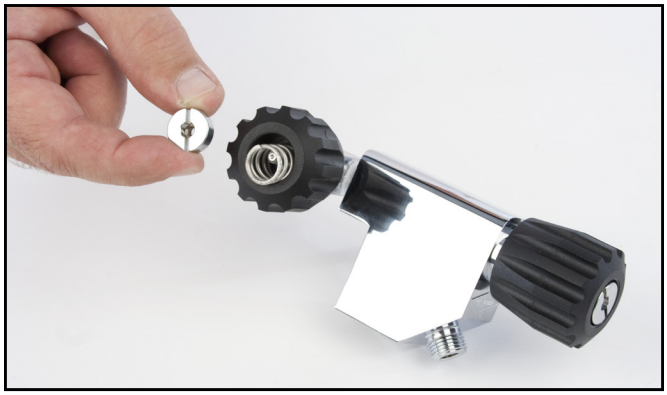
Tools required:

- 11⁄16 inch Open End Wrench
- 1 inch Open-end Wrench
- Adjustable Wrench to Remove Emergency Valve Body Body from the Side Block
- ⅜ inch Slotted Flat Blade Screwdriver
- Soft Jaw Vice
- Lubricant
- Teflon® Tape
- Normal minimum overhaul replacement parts: None



The emergency valve

1. Remove the lock nut, spring, and knob.



Remove the lock nut, spring and knob.

2. Undo the packing nut. When the packing nut is free of the threads of the emergency valve body, back out the stem until it is free of the emergency valve body.

Undo the packing nut.

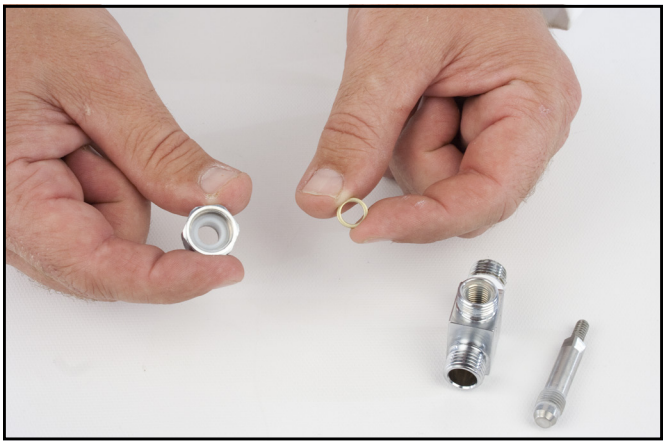
3. Remove the packing nut, packing, and washer from the stem.

Remove the valve stem.

1.3.2 Cleaning and Lubricating

1. Clean all the metal parts in a soap and water solution, followed by cleaning with a 5% dilute solution of white vinegar/water. Rinse with fresh water. Clean all parts. See the cleaning instructions in “1.3 General Cleaning & Inspection Procedures” on page GENPRE-3.

2. Inspect the packing and washer for wear and replace if necessary. Normally the packing will last a very long time and does not require replacement as long as the valve operates smoothly and does not leak. To replace the packing place the packing nut in a vise and carefully work the packing out with a small screw driver, taking care not to damage the threads of the packing nut. Replace the washer.



Inspect the packing and washer.

3. Inspect the stem seat for unevenness or wear and replace if necessary. The stem must be replaced if it is bent. Check for damaged threads, and/or rounded flats that engage the control knob. Also inspect the shaft to ensure the conical seat surface is smooth and free of corrosion or damage.

4. Check the seat in the emergency valve body for wear or unevenness, galling and corrosion. To clean up the seat surface use a pencil eraser to buff the surface. Inspect all threaded surfaces for damage. Replace the emergency valve body if any damage is found.

5. To remove the emergency valve body from the side block, the one way valve assembly must first be removed.

6. When the emergency valve body is removed, clean and inspect the pipe thread and inspect for

damaged threads, cracking or distortion. Replace the emergency valve if any damage is present.

Re-tape threads with 2 ½ wraps of Teflon® tape, starting two threads back, tighten using standard pipe threading procedure. To reinstall the emergency valve body onto the side block, the one-way valve assembly should not yet be installed.

1.3.3 Reassembly of Emergency Valve

⚠ WARNING

The control knob for the emergency valve and the steady flow knob are not interchangeable. Use only the correct knob for the appropriate valve.

1. Lightly lubricate the stem threads in the body as well as the bonnet threads.

2. Replace the washer and packing on the stem, then lightly lubricate the stem shaft and threads.

3. Holding these components in place on the stem, screw the stem into the emergency gas valve body.

4. Rotate the stem until it is seated all the way in then, back it out -½ turn.

Installing the valve stem into the emergency valve.

5. Thread the packing nut onto the emergency valve body. Run the nut in and tighten slightly with a wrench.

6. Inspect the emergency valve knob for wear and damage. Ensure the flats that engage the valve stem shaft are not rounded, cracked or damaged. The valve knob should not have rotational play greater than 1/16 of a turn.

NOTE

The side block control knobs are not interchangeable.

7. Place the emergency valve knob onto the stem and rotate the stem all the way out, then back again. The rotation must be smooth. If “hard spots” or unevenness are felt during the rotation, the stem may be bent and need replacement.

8. Tighten the packing nut with a torque wrench until moderate resistance is felt when turning the knob. See “Torque Specs” module.

9. Place the spring, and locknut onto the stem securing the knob.

10. Tighten the locknut until its top is flush with the top of the knob. The assembly is now complete and ready for testing.

NOTE

At this time, with the valve separated from the side block, testing of the emergency valve is easily accomplished by attaching the valve, by itself, in the shut position, onto the intermediate whip of the first stage. Using the EGS (Emergency Gas Supply) cylinder, pressurize the valve to a minimum of 135 p.s.i.g (9.3 bar) and drop it into a bucket of clean water for at least 30 seconds to check for leaks.

11. Before installing the valve assembly, wrap the pipe threads with 2 ½ turns of Teflon® tape starting after the first thread. Apply the tape with slight tension to allow the tape to fill into the threads. Use only Teflon® tape.

⚠ WARNING

Use only thin Teflon® tape when installing the Emergency Gas Supply valve in the side block. Thick tape can lead to thread damage, which may make it impossible to install the EGS valve in the side block properly. This could lead to a loss of breathing gas.

Hand tighten the valve, then continue an additional 1 ½ to 2 turns with a wrench keeping in mind the proper alignment of the control knob to the side block. Also, there should be at least one male thread visible. Check to be certain the valve is tight by trying to loosen the fit by hand.

DO NOT TIGHTEN THE VALVE BODY TIGHTER THAN NECESSARY! OVER TIGHTENING MAY

OVERSTRESS THE PART AND CAUSE THE PART TO FAIL.

It is NOT necessary to have the control knob for the emergency gas supply valve perfectly "square," i.e., at a 90 degree angle to the side block. Any angle is acceptable provided that 1) the valve handle can be turned easily and 2) the diver can locate the handle easily.

a) Attach supply whip from the EGS first stage to EGS helmet valve.

b) Ensure the steady flow valve knob is open and the EGS Valve is shut.

c) Pressurize EGS Valve to a minimum of 135 p.s.i.g. (9.3 bar) using the EGS cylinder as supply. Allow system pressure to stabilize , and then shut the EGS supply cylinder valve. Note time and final stabilized system pressure.

d) Perform the leak check for minimum of five minutes, using a mild soap solution. Ensure there is no gas flowing or pressure drop in the system. There should be no visible signs of external leakage if the valve is operating properly.

⚠ WARNING

A leaking Emergency Gas Valve assembly can cause the diver to exhaust their entire EGS (bailout) without their knowledge. This may lead the diver to mistakenly assume their EGS supply is available when it is not. This could lead to panic or drowning in an emergency. Any worn or damaged components must be replaced.
A submersible pressure gauge should always be used with the EGS system to help minimize this risk.