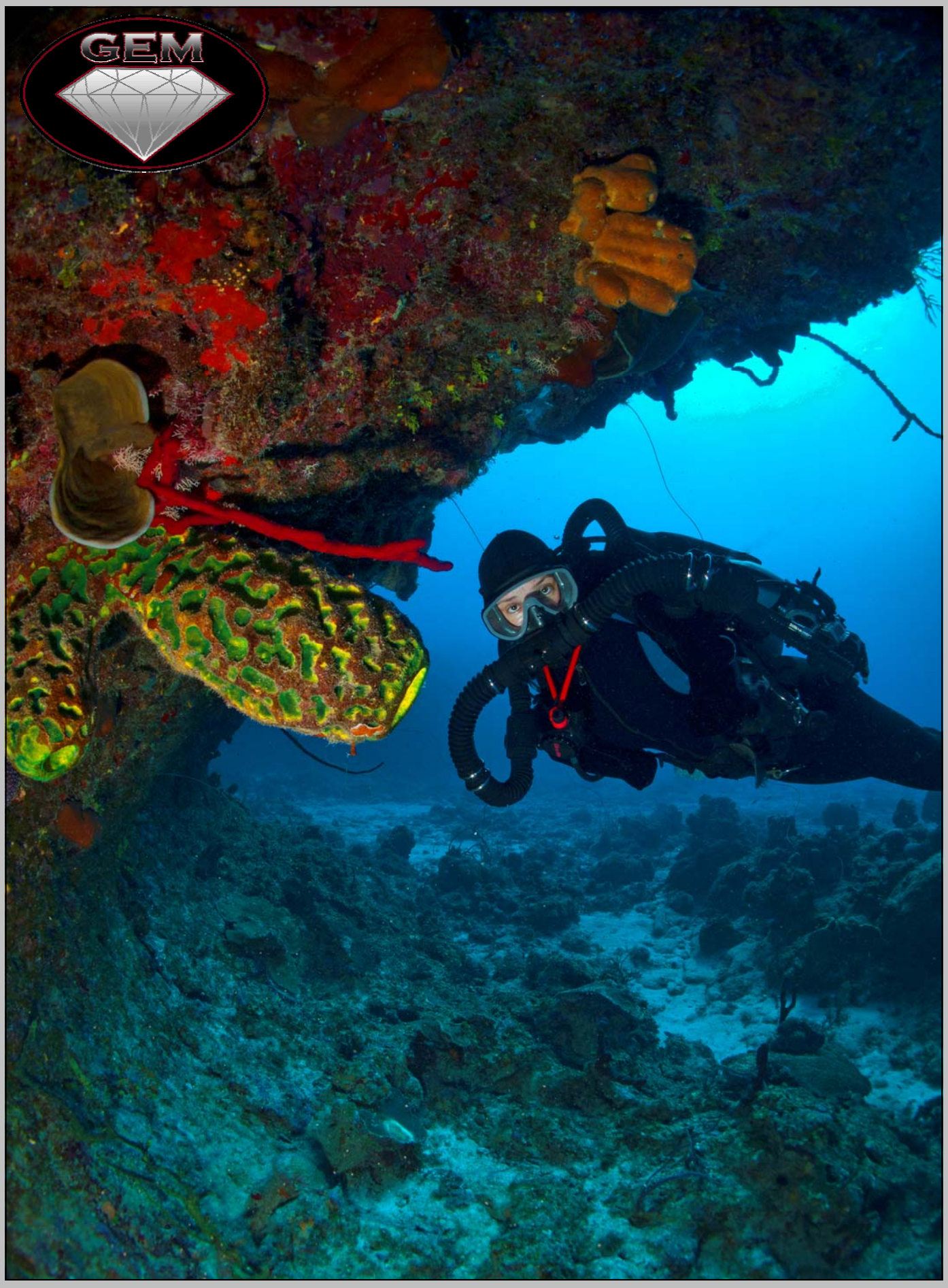

GEM

READ THIS MANUAL

KISS GEM DIVERS MUST READ THIS MANUAL.

IN ORDER TO FULLY UNDERSTAND YOUR NEW GAS EXTENDER/REBREATHER, THE COMPONENTS, HOW THEY WORK, HOW TO HANDLE AND TREAT THEM, YOU MUST READ THE MANUAL IN FULL.

THIS SHOULD BE DONE PRIOR TO DIVING OR SERVICING THIS UNIT!!! SPECIAL ATTENTION SHOULD BE PAID TO ALL NOTES &/OR WARNINGS; THEY MUST BE READ AND UNDERSTOOD!!!! FAILURE TO DO SO, MAY CAUSE SERIOUS INJURY OR DEATH!!!!

THIS MANUAL IN NO WAY REPLACES THE TRAINING REQUIRED FOR DIVING A SEMI-CLOSED REBREATHER. PROPER TRAINING IS EXTREMELY IMPORTANT AS IS GATHERING THE PROPER EXPERIENCE.

YOU MUST BE 18 YEARS OF AGE IN ORDER TO PURCHASE AND DIVE A KISS GEM DIVING SYSTEM

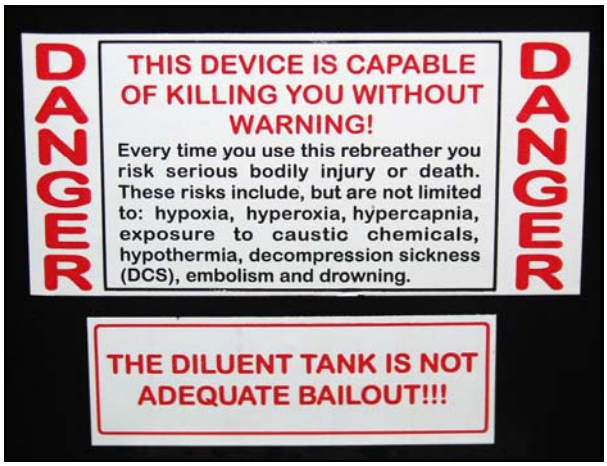
As with all scuba diving equipment, your KISS GEM diving system should be serviced annually by a GEM service technician. For those diving frequently, servicing may be required more often.

ALL INFORMATION IN THIS MANUAL IS SUBJECT TO CHANGE.

PLEASE VISIT OUR WEBSITE, www.kissrebreathers.com/manuals.html,

FOR UPDATED MANUALS.

THIS IS NOT A JOKE!!



Participation in rebreather diving can result in serious injury or death to you, the diver!

The warning on the KISS GEM Gas Extender is not a joke. Before beginning your dive, you must consider the risks involved. The GEM consists of many parts. All of these components will eventually fail. Careful maintenance, assembly, and testing will not prevent this from happening. At best, it will delay the failure. The KISS GEM is not automatic in any way. It requires constant monitoring, a complete awareness of the potential problems likely to be encountered, and full knowledge of how to deal with whatever problems may occur. If you do not have adequate training, equipment, physical conditioning, and a proper mindset, do not get in the water.

The diver, YOU, has the final responsibility for his or her own safety and actions while using this rebreather. All components of the KISS GEM must be in good working order and be properly assembled and tested to reduce the risk of failure. Regardless of the training and experience of the diver and the reliability of the rebreather the risk of serious injury and/or death can never be reduced to zero.

This manual is not a complete text on the maintenance and operation of the KISS GEM. The diver must complete a proper training course covering the maintenance, testing and operation of the semi-closed rebreather before diving this equipment. The rebreather can malfunction while diving even when properly assembled and having passed all pre-dive tests. Only carrying adequate gas and having the training and skills necessary to switch to open circuit gas, can reduce, but never eliminate, the risk of equipment failure.

ACCEPTABLE NITROX MIXTURES & GEM INFORMATION PAGE

Level 1 KISS GEM divers are certified to use Nitrox mixtures from 32% nitrox to 40% nitrox. DO NOT USE MIXTUES WITH LESS THEN 32%!!!!When using acceptable nitrox mixtures there are several things to be aware of:

1. The higher the nitrox mixture, the less chance of hypoxia. Also the shallower maximum operating depth (MOD).
2. The lower the nitrox mixture, the greater chance of hypoxia. Also the MOD will be deeper.
3. Care must be taken to ensure that while doing deeper KISS GEM dives, that divers stay within their training level and are careful to not accumulate unexpected decompression obligations. **DECOMPRESSION DIVING IS RISKY AND INVOLVES SPECIALIZED TRAINING. DO NOT DIVE THE GEM DIVING SYSTEM OUTSIDE YOUR CERTIFICATION LEVEL! LEVEL 1 GEM DIVERS SHOULD NOT BE DOING DECOMPRESSION DIVING!!**
4. Every human body will metabolize the oxygen in the nitrox breathing mixture differently. Therefore, a diver and his buddy may notice that their breathing gas PPO2/FiO2 percentage may not be similar. A small person will use much less oxygen then a larger person.
5. Many divers will find that using a 36% nitrox or higher breathing gas in the KISS GEM diving system will enable them to always have a safe breathing gas underwater. HOWEVER, this may not be true for all divers, or in all situations! **GREAT CARE MUST BE TAKEN TO ALWAYS KNOW WHAT YOU ARE BREATHING!! THE SHALLOWER THE DIVER IS, THE LOWER THE PPO2/FiO2 MAY DROP!! ALSO, IT WILL DROP QUICKLY ON THE SURFACE. DIVERS MUST NOT GO BY THEIR BUDDYS GAUGE; THEY MUST MONITOR THEIR OWN AND ALWAYS BEWARE OF THEIR BREATHING MIXTURE.**

NEVER BREATHE ON THE GEM LOOP WHILE ON THE SURFACE OR IN THE TOP 20 FOOT RANGE!! DIVERS SHOULD BE ON OPEN CIRCUIT OR OPEN LOOP ONLY!!!

6. On descending from the surface to 20 feet, the diver should be using either open circuit or the GEM in open circuit mode; this is also known as open loop. While descending, the diver should exhale out of his nose, and inhale triggering the T-piece second stage or pushing on the T-piece second stage to manually add gas. The PPO2 monitor or computer should be watched continuously during this phase of the descent.
7. On Ascending from 20 feet to the surface, the diver should use either open circuit or dive the GEM in open circuit mode/open loop and also monitor the PPO2 monitor or computer continuously.
8. Divers should be careful to not become complacent in monitoring the gas percentage in their breathing loop. It should be a habit to check the GEM display frequently, especially in shallow water. This means checking it once per minute. Divers may become comfortable using a high mixture such as 36%; then when they decide to do a dive using a lower percentage such as 32%, may forget to monitor the gauge as often as they should. **IT IS IMPORTANT THAT GOOD HABITS ARE FORMED AND THAT AT ALL TIMES WHEN BREATHING ON THE GEM WHILE IN SHALLOW WATER, THE PPO2 MONITOR OR COMPUTER MUST BE CONTINIOUSLY MONITORED. IF DIVING OPEN LOOP, FROM THE SURFACE TO A DEPTH OF 20 FEET, THE BREATHING GAS DISPLAY SHOULD BE MONITORED CONTINOUSLY. AT DEPTH IT SHOULD BE CHECKED EVERY 1 MINUTE!**
9. Divers using lower percentages of nitrox, will find that their PPO2/FiO2 percentages could fall into dangerous zones while either in shallow water or on the surface. **IT IS ESSENTIAL THAT DIVERS DO NOT BREATH ON THE GEM WHILE ON THE SURFACE. IF DIVERS NEED TO SPEND TIME AT THE SURFACE, EITHER SWIMMING, WALKING TO THE WATER OR WAITING, AND THEY REQUIRE A SCUBA SYSTEM TO BREATHE FROM, THEY SHOULD BE BREATHING ON THEIR OPEN CIRCUIT REGULATOR. WHEN THEY ARE READY TO START THE DIVE, THEY MAY SWITCH TO BREATHING OPEN LOOP ON THE GEM DIVING SYSTEM, MONITORING CONTINIOUSLY WHILE DESCENDING THROUGH THE SHALLOW WATER RANGE. ALTERNATIVELY, THE DIVER MAY USE OPEN CIRCUIT IN THE TOP 20 FOOT RANGE AND SWITCH TO THE GEM DIVING SYSTEM ONCE PAST 20 FEET. THE OPEN CIRCUIT REGULATOR IS AN IMPORTANT PART OF THE GEM DIVING SYSTEM AND SHOULD BE USED WHEN REQUIRED.**
10. During the 5 minute pre-breathe, divers must follow the instructions and monitor the PPO2/FiO2 gauge continuously, venting the loop and adding fresh nitrox if the breathing gas percentage falls below air. Depending on the nitrox mixture in the cylinder, this may need to be done frequently or not at all. As mentioned above, every body will metabolize oxygen differently.
11. **REMEMBER, IT IS STRONGLY RECOMMENDED THAT GEM DIVERS USE 36% NITROX OR HIGHER. LOWER PERCENTAGES SHOULD BE USED WITH CAUTION!**

UNDERSTANDING THE KISS GEM - IMPORTANT TO READ & UNDERSTAND

On the previous information page, you will see many notes and warnings.

As the GEM is so easy to dive, many divers many feel that the warnings are not required. It is important to note that the KISS GEM diving system is a sophisticated tool; care and attention are essential to divers safety. There are a couple of important points worth discussing here.

SHALLOW WATER & SWIMMING POOLS

In order for the GEM to vent properly, the unit must be submerged in water. If the unit is NOT submerged, it will not vent properly.

The KISS GEM has a design that allows the system to vent and add gas, as required. This system is designed to vent a very specific amount of gas. If the GEM does not vent gas, **IT WON'T ADD FRESH GAS**. This means that a diver standing in a pool or shallow water, with the unit out of water breathing on the GEM, could go hypoxic. Remember, the diver is rebreathing his exhaled gas and is using up the oxygen in the breathing loop. With each breath the diver takes, the volume of oxygen in the loop will decrease. With no fresh gas being added, the loop will eventually go hypoxic.

As you can see, the venting is key to divers safety.

OTHER GAS MIXTURES

You have seen on the previous page that KISS GEM level 1 divers are certified to use between 32% and 40% nitrox. Those divers that wish to use other mixes, will likely require diving the KISS GEM with a secondary gas. This is why a KISS GEM level 2 class must be taken.

Those divers that wish to learn basic decompression diving on the KISS GEM, will need to take the level 2 training class so that they are taught to use a shallow gas (higher amount of oxygen) in conjunction with their standard nitrox mixture. Of course, this isn't the only thing that these divers must learn to do decompression diving.

Those divers that wish to learn to use gas mixtures with less oxygen, must also take the level 2 training class. They will be taught to use lighter nitrox mixtures. These divers will also need to use a secondary gas mixture which has a higher amount of oxygen.

It is essential that divers understand that using nitrox mixtures of less then 32% greatly increases the risk of hypoxia in shallow water and on ascents.

A KISS GEM diver using air CAN NOT make a direct ascent to the surface. As the diver ascends, the gas will vent from the GEM diving system 2 ways; by the discharge ports on the mouthpiece and also by the over pressure valve on the scrubber head.

It is important to remember that as the diver goes up the gas in the diving system will expand (even though the unit is venting), thus providing the diver with an adequate amount of gas to breathe. As the breathing loop is full of gas, the T-piece second stage **MAY NOT** add fresh gas. As explained above, if fresh gas is not being added to the diving system, the amount of oxygen in the loop will decrease with every breath, which will eventually cause the gas in the loop to become hypoxic.

The GEM gas addition works just like an open circuit regulator. When the diver inhales, the change of pressure triggers the regulator to add gas. On the GEM, the diver inhales the gas from the breathing loop, then as the lungs go flat and there is no more gas to inhale, the positive pressure on the lungs causes the T-piece second stage to add fresh gas.

What does this all mean?

- Recreational level 1 GEM divers just need to remember that their gas mixtures are between 32% and 40%, and we recommend 36% or higher.
- Technical divers need to take the level 2 training class .

KISS GEM diving is easy, fun and safe. GEM gives divers 3 times the amount of gas to breathe, in a light weight, portable system. The rules for GEM diving are no more difficult then those for open circuit diving, just different.

KISS *GEM*

FINALLY, THE BENEFITS OF DIVING A REBREATHER IN A LIGHT WEIGHT, ECONOMICAL, EASY TO USE GAS EXTENDING SYSTEM!

The GEM system is the latest addition to the KISS rebreather family. The GEM, like all KISS systems, is *DURABLE, RELIABLE, EASY TO USE,* & *ECONOMICAL.*

The KISS GEM, as the name implies - Gas Extending Mechanism - is a simple system that extends the time your gas will last underwater. The GEM system will allow the gas in your cylinder to last ***THREE TIMES AS LONG!***

The GEM utilizes a nitrox mixture, allowing you to experience the benefits of diving enriched air nitrox. Other benefits that GEM diving offers include the exceptionally small size, the light weight, fewer parts and complexity then diving a fully closed rebreather. Yet GEM still provides the same benefits that rebreather diving offers; warm moist air to breath, no noisy rush of bubbles to scare fish away, and the benefits of diving enriched air.

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Front and back cover photos by Alan Studley

GEM SPECIFICATIONS & PARTS LIST

Congratulations on purchasing the KISS GEM. This is a system for divers who want the luxury of having their breathing gas last three times as long!

This system is for recreational divers who wish to extend their gas, experience the benefits of rebreather diving, yet keep the system easy to use and economical.

- Weight of the KISS GEM, including the canister, base cross piece, mouthpiece, all loop hoses and T-pieces, counterlungs, counterlung covers, wing/harness, mounting system is, 18 pounds / 8 kg. Without the wing/harness system it is 13 pounds / 5.9 kg.
- Height of the canister to the top of the hose attachment towers is approximately 13.5 inches / 34.3 cm. The diameter of the canister is approximately 5.5 inches / 14 cm, not including the cylinder mount.
- The wing & harness system, including the crotch strap weighs approximately 4.9 pounds / 2.2 kg. This system is designed to fold down to a very small package!

PARTS INCLUDED:

- 1 GEM scrubber head includes, 2 hose attachment towers, 1 exhaust valve, gasket & cir clip, O-ring.
- 1 GEM canister. Includes threaded tube, base, internal base cross support.
- 1 cylinder attachment system. Includes GEM mount with 2 SS hose clamps attached to canister, & cylinder mounting system attached to cam strap on wing.
- 1 17" standard loop hose. This hose will be attached to the right hand/2nd stage regulator T piece with counterlung ring attached. Opposing end will have a quick disconnect hose stub attached.
- 1 22" standard loop hose. This hose will be attached to the left hand/Display T piece with counterlung ring attached. Opposing end will have a quick disconnect hose stub attached.
- 2 GEM specific 17" loop hoses. These will have the mouthpiece hose attachments on one end and a quick disconnect hose stub on the other. 3 ballast rings will be installed on each hose.
- Sensor housing with single display. OR, Fischer cable attached to sensor housing for use with GEM computer.
- 1 sensor housing O-ring. This will be packaged inside the scrubber canister.
- 2 counterlungs with counterlung covers and adjustment straps. Counterlungs will be inserted in the covers.
- 1 mouthpiece (DSV)
- 2 black cir clips for securing the hose attachments to the mouthpiece. Cir clips will be packaged inside the scrubber canister.
- 1 wing/harness system. Includes, 35 lb back inflate wing, webbing harness, crotch strap, 2 cam straps, inflator. GEM mounting system will be attached to the cam strap. (Wing/harness/crotch strap is an optional item)
- 1 LP regulator hose (t-piece second stage to your first stage)
- 1 2nd stage regulator necklace. This is for your bailout regulator. This will be packaged in the scrubber canister.
- 1 CD with manual. This will be in your envelope with your warranty card.

EXTRAS

- Quick Disconnect for T-piece second stage to LP hose. If ordered at the time of purchasing GEM, it will be installed on your unit.
- HP/LP swivel elbows
- Spare parts &/or spare parts kit. See back of manual for details.

ADDITIONAL REQUIRED GEAR

- Personal gear: mask, snorkel, fins, boots, gloves
- Weight belt
- Exposure suit
- First stage with pressure & depth gauge, 2nd stage
- Computer (optional)
- 1 sensor for the display system. Analytical Industries (AI) PSR-11-39-MD or Maxtec inc., Max - 305.

RECEIVING YOUR GEM & CONFIGURATION

Your new KISS GEM diving system will be shipped directly to your dealer. For those that will take delivery of the GEM themselves and have not yet been certified, certain components &/or the mouthpiece will need to be shipped separately to your instructor. This may mean a higher shipping charge. This ensures that no diving will take place prior to the proper training being received.

First, unpack your GEM and using the parts list on page 7, ensure that all components have been received and there hasn't been any shipping damage. If anything seems to be damaged from shipping, please contact either your dealer or the Jetsam offices in a timely fashion so that we may replace your damaged parts.

The KISS GEM diving system you have purchased is for recreational diving and should be configured as instructed in this manual.

SCRUBBER HEAD

You will receive your scrubber head with the hose attachment towers and Apeks exhaust - Over Pressure Valve (OPV) already attached to the scrubber head. The O-rings have been installed. The towers have been factory installed and do not require divers to remove them.

On the inside of the head, you will see the rubber gasket which has been installed and secured with a cir clip. The gasket has been factory installed and will not require divers to remove it.

The scrubber head O-ring has been installed for you. See the photo right for location. Apply lubricant to the installed O-ring.

The exhale tower is the tower in which dives will see the air passage tube and it will have an "X" engraved beside it. The inhale tower is the tower in which the diver will see the grey baffle and it will have an "I" engraved beside it.

Your scrubber head is now prepared. Prior to diving, divers should ensure that the O-ring is clean and lubricated; that the gasket is in good condition; the OPV is tightened all the way down; the towers are not damaged.

SCRUBBER HEAD O-RING:

The O-ring in the scrubber head was changed to a slightly larger one. The original O-ring required proper attention to ensure that it was properly seated and adequately lubricated prior to every dive. The new O-ring, as it is larger, fits much snugger into the groove which makes it unlikely to dislodge.

Installation of this O-ring requires using the procedure described below. As you will notice, it will seem that the O-ring is too large for the groove. This is why it is important that the procedure below be followed.

To install this O-ring, first ensure that the O-ring groove is clean of any debris and then apply silicone grease to the groove. Also lubricate the O-ring well. We have found that using a standard silicone lubricant works best.

Push the O-ring into the groove; you will wind up with a portion looped up and out of the groove. Once you get to this point ensure that your fingers don't have an excess amount of lubricant on them. Then grasp the loop at the top - right area and holding it firmly, push it to the left, into its self. You will see that the loop will slowly start to get smaller. When the loop is substantially decreased, the O-ring will snap into the groove. This is very easy to do.

*** WARNING: The OPV which is part of the GEM diving system is required to assist in venting the system on ascent. It is NOT for the sole purpose of venting for you while diving. The GEM diving system should be dove with the OPV in a fully closed position. If it is not fully closed, you may be venting during the dive when you shouldn't be; this will cause you to use an excess amount of gas!**

CANISTER & BASE

You will receive the canister already threaded onto the scrubber base. This is a factory install and divers are not required to remove it.

Servicing the scrubber base and scrubber base O-ring should only be attempted by a qualified GEM service technician.

Empty all items out of the canister and set aside. The only component that is required for the canister is the base cross support. The cross support sits in the center bottom of the canister. See photo to the right. Attached to the canister will be the cylinder mounting system. Please see page 12 for instructions of use.

***WARNING: The KISS GEM canister & head is a key component to the diving system. Proper care and maintenance should be taken with regards to this item. It should be inspected and serviced annually. The rubber head gasket should only be serviced by a qualified GEM service technician. Improper use &/or care may result in serious injury or death!**

CANISTER LOADING

Canister duration's are listed on page 39.

To load the GEM canister you will need a Micropore 5" large bore cartridge, part #SR-0801C. Micropore has several different cartridges available which all have similar part numbers. Please be certain that you use the correct cartridge, double checking the part number and ensuring that it is the large bore cartridge prior to use.

***NOTE: There is more then one type of Micropore cartridge for recreational rebreathers. Ensure that you are using the correct cartridge! It must be the large bore cartridge. If the carton does not say large bore on the side, do not use it!**

Prepare your scrubber head by ensuring that the gasket is properly inserted and in good condition. Also, ensure that the scrubber head O-ring is clean and lubricated. The head should also be clean and ready to dive.

Lubricate the top edge and the outer side of the canister. This is a sealing surface and requires lubricant. See photo to the right.

Open the container that holds the cartridge and slide the cartridge out and remove it from the plastic bag. Once out of the packaging, handle it only by the sides.

***WARNING: Be certain to only hold the cartridge by the sides as the top and bottom ends are caustic and will burn your skin!**

First push the cartridge into the scrubber head, ensuring that it is inserted all the way. Next push the base cross piece onto the bottom of the cartridge. Again ensure that it is inserted all the way. See photos to the right.

Place the partially assembled cartridge gently into the canister assembly. The base cross piece will sit on the nipple which is in the centre of the base. This placement will allow the canister to spin freely while the head is tightened. Place the canister on a flat surface with the mount against a wall. This will ensure that the canister sits straight as you secure the head. Prior to tightening the head, turn it counter clockwise (left) to ensure that the head settles properly into position and the threads are lined up. Then tighten the head. As you turn the head you will feel after about 3 turns the O-ring start to engage. After another 1.5 approximate turns, you will not be able to turn it anymore. It will take approximately 4.5 turns to secure the head. Ensure that it is properly attached!!

***NOTE: it is important to pay attention to how difficult it is to tighten the head. As mentioned, you will feel the O-ring engage and it will become more difficult to turn the head. If it is so tight that you have to use a lot more force, back the head off, and check the O-ring. If it is pinched, replace it as it will likely lead once pinched. As you start diving the GEM, you will be familiar with how it is supposed to feel, and if it is ever different, you will know that something has changed and you need to verify that your O-ring is ok. We recommend that divers purchase a spare set of O-rings.**

When the head is tightened all the way, the exhaust valve and inhale tower on the head will be aligned with the mount, as per the photo to the right.

If you draw an imaginary line from the left side of the inhale tower, it should line up with the right side of the GEM cylinder attachment. This placement ensures proper hose routing once the canister is attached to the harness.

WING/HARNESS SYSTEM

The KISS GEM ships complete with wing/harness system. This system is very light weight, and packs well. As it has a webbing harness, divers of all shapes and sizes will be comfortable using this system. It also ships with an adjustable crotch strap.

Webbing harness systems are easy to don and simple to adjust. With this harness system, you simply pull the waist strap and the shoulder straps will tighten. Slide the crotch strap loop over the waist strap and then secure the waist buckle.

Some divers may prefer to add a weight belt slide and/or D-ring to each hip. This not only provides a place to clip off gauges, it ensures that the webbing strap doesn't slide back through the lower slot; it will keep it from unthreading.

When you put the diving system on, you need to be certain that you have cinched your waist strap up properly. If you leave it loose, the cylinder will sit lower on your back. This will cause the counterlungs and T-pieces to sit higher then they should and the entire diving system will feel sloppy on the divers back.

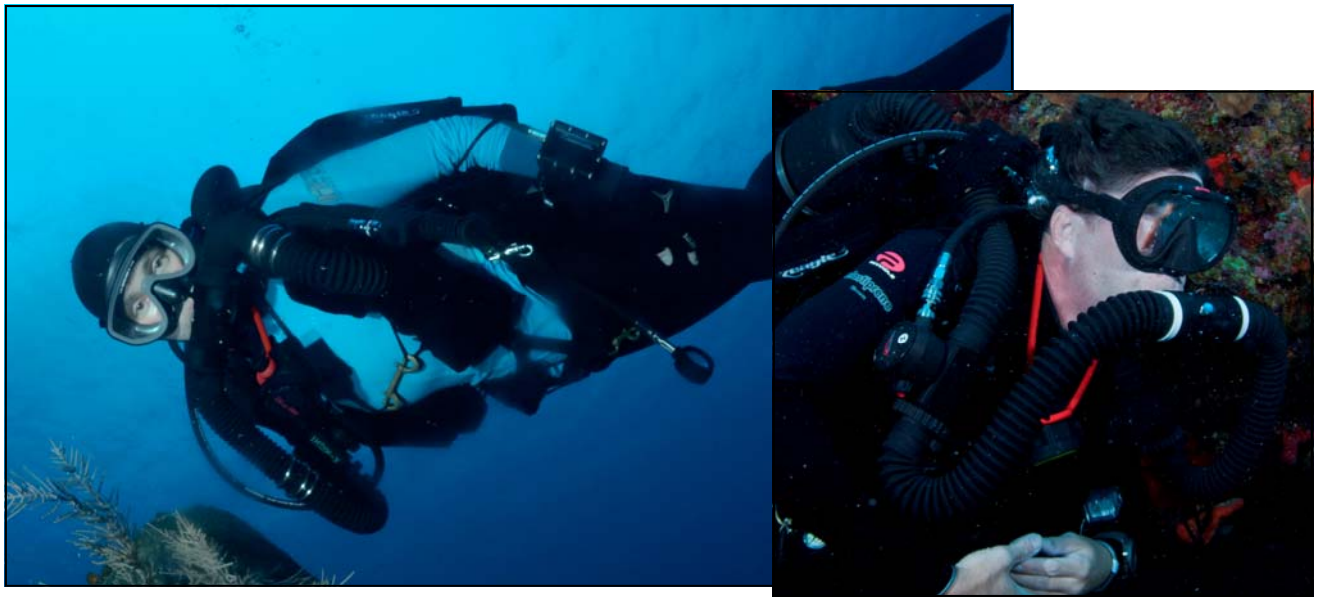
The crotch strap that ships with the Jetsam harness system is adjustable. Using an adjustable crotch strap means that divers may easily adjust it underwater. As described in the next section, having this ability means that divers can quickly and easily adjust where the counterlung covers sit. It also means that once it has been adjusted, it is unlikely that divers will need to readjust the system.

Those using a webbing harness for the first time, may find that some adjustment is required for the first dives. This is normal. It is only through experience that the diver will know exactly where they wish the various D-rings to be placed.

IMPORTANCE OF COUNTERLUNG AND T-PIECE PLACEMENT

The T-pieces should be placed either centre chest or slightly above centre chest. (the centre chest is the nipple line) Having the T pieces placed in this area, ensures that the lower loop hoses are properly situated. This means that there won't be excess hose getting in the divers way or loose in the water. The photos below that the hoses curl nicely when the T-pieces are properly placed. It also ensures that divers will easily be able to see their wrist display or computer, and be able to find their Wing inflation, pressure gauges and be able to handle the gear properly.

With the T piece situated on the breast, the counterlungs will sit directly over the divers lungs; this position means the work of breathing will be at its best. For your comfort, we can't emphasize enough the importance of having the counterlungs and T-pieces properly placed. While the work of breathing may seem ok if the T-pieces are higher, it will be much better once they are situated properly on the divers breast. Also, Proper placement is important as the GEM will not discharge properly if the T-pieces are too high. This will cause the PPO2 to fluctuate; proper placement means that the PPO2 will be much more stable.



SECURE THE HARNESS TO THE CYLINDER

Attach the system to your cylinder in the same manner as any buoyancy compensator. You will notice that your canister attachment mount is already secured to the lower cam strap. When tightening this strap ensure that the mount is positioned so that the canister will sit behind your right shoulder. See photo to the right.

SECURE THE COUNTERLUNG COVERS

THE INSTRUCTION BELOW ARE FOR DIVER'S THAT ARE USING THE JETSAM WING/ HARNESS AS WELL AS FOR THOSE DIVER'S WHO ARE USING THEIR OWN BOUYANCY COMPENSATING SYSTEM.

Divers may use their own BCD or wing/harness system instead of the standard system on their new KISS GEM. Those divers that wish to use their own system will need to let either their dealer/ instructor or Jetsam Technologies head office know; we will need to ask you a few questions about your buoyancy compensating system in order to ensure suitability. Almost all systems will work.

The main anchor point is where the counterlung covers are secured to the divers waist strap. The system described below is different from the original mounting system. This system is easier to use and adjust, as well as being easier to don and doff.

1. Place one of the 2 inch quick links (included in the kit) around the webbing strap on the BCD/Harness waist band. Position the quick link so that the opening is facing outwards. On the bottom side of the counterlung cover is a small black plastic D-ring. Put the D-ring through the quick link on the waist strap and tighten the quick link. This method works well when attaching the cover to the waist strap which holds the buckle. If the counterlung covers need to be removed from the harness/BCD, then simply open the quick link and release the cover. Tighten the quick link so that it will stay secure to the webbing.
2. For the open end of the waist strap, it may be easier to reverse the above process. First attach the quick link to the counterlung cover D-ring, and then slide the link onto the open end of the waist strap; it will be snug. Using this method on the open end of the waist strap will ensure that you do not lose the quick link if you remove the cover from your harness/BCD.
3. ***The above system will work for most divers as it puts the counterlung cover's in the correct position, as the bottom anchor points control the placement.***
4. The back of the counterlung covers have a Velcro strap. Secure the Velcro around the webbing on the harness. Many recreational BCD's will also have a place to anchor the Velcro; if not, it is not required as the bottom anchor points will hold the lungs in position.
5. A GEM diving system that uses a technical harness will likely require a crotch strap. An adjustable crotch strap will provide the diver with the ability to shift the waist strap into different positions, which will then move the position of the counterlung cover's. This gives a range of adjustment which provides superior comfort and control. The adjustable crotch strap is included in the Jetsam wing/harness package. It can also be purchased separately for those who have their own BCD system.
6. *If a recreational BCD is used, no crotch strap is required as long as the BCD fits the diver properly. However, should the diver wish to have the ability to shift the covers up or down, an adjustable crotch strap can be added to most recreational BCD's.*
7. Also for both the recreational BCD and technical harness, adding weight to the pouches on the back of the counterlung covers may also eliminate the need for the adjustable crotch strap. Start with 2 pounds in each pocket and then transition to 1 pound in each pocket. Diver's may then choose what amount of weight works best for them. ***We advise all new GEM divers to start with weight in the counterlung cover pouches.***
8. Using the above method will also make it easier for diver's to put the GEM unit on and also to remove it, compared to using the v-strap. This method also provides easier adjustment of the counterlung system as the counterlung covers are properly placed from the start. The V-strap was a system used on early GEM units.
9. The straps on the top of the counterlung cover, will need to be secured to the shoulder area of the divers harness. On the top side of the CL cover is a small black plastic D ring. To this D ring a loop of 1" webbing will be attached that has a cinch adjustment along with a black plastic snap.

10. If the diver's harness does not have a D-ring attached below the shoulder or does not have a D-ring in the correct position, attach a D-ring with a slide to this shoulder area. A set of D-rings and slides is included with the basic GEM kit.
11. Clip the black plastic snap to the D-ring, while the diver is wearing the GEM diving system. As mentioned above, the waist strap (and crotch strap for those using it) will place the T piece and counterlung cover in the correct position and will anchor the lungs and T-piece into place. Now the diver just needs to adjust the top strap so that most of the slack is taken up; it shouldn't be too tight
12. ***The top strap is not critical. It is useful as it assists divers in keeping the harness system stable while climbing into the gear.***
13. Secure a chest strap. This will prevent the covers from sliding side to side if the diver rotates in a side-ways position while diving. The chest strap should be located in the centre of the lung cover which will anchor it properly.

SECURING THE MOUNTING SYSTEM:

It is important that the mounting system is properly located. On the buoyancy compensating system that Jetsam provides with the GEM, it is positioned on the lower cam strap. While this works on our system, it may not on others. Some systems have wider spacing on the cam straps and positioning the mount on the lower strap will make the GEM sit too far down. This will cause pulling on the hoses, pull the T-pieces too high, and stress on the mount. Those that have the earlier versions, without the locking pin, may find that the GEM can become disconnected from the mount.

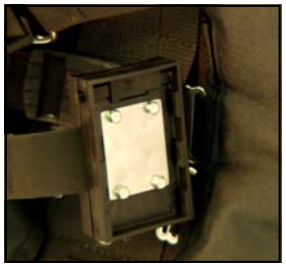
To avoid this problem, the mount may be attached to an individual cam strap, and positioned on the cylinder prior to the buoyancy compensator being secured. This extra strap works on most BCD's. However, there are some that it may not work with.

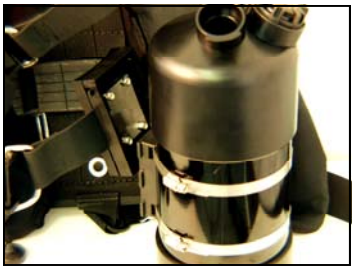
****WARNING: it is very important that the counterlungs and the GEM canister are properly secured and positioned, to the buoyancy compensator. Divers must work with their GEM instructor to ensure that the system is properly rigged. Improper placement can cause serious injury or death!**

GEM MOUNTING SYSTEM

Your KISS GEM is shipped with the cylinder mounting system already attached to the lower CAM strap on your wing/harness system. The GEM mounting parts have also been attached to the canister.

To use this system, simply push the mating pieces together where they match up, push the canister into position and let it slide down to secure. See photos below.





Ensure that the latch is properly positioned and the gem canister properly secured prior to picking up the cylinder and diving. Those that have the system with the locking pin, should ensure that it is properly inserted.

Those divers that are using a different wing/harness or BCD system, should pay attention to where they place the mounting bracket. On the system that we sell, the mount is located on the lower band. With this system, the mount is in the best position if the top band is placed as close to the top curve as possible. (where the writing is usually stamped) The bands on other systems may not be spaced the same. Our system has approximately 6.5 inches in between the bands.

If the GEM canister is mounted low, it will cause the loop hoses to pull and the T-pieces/counterlungs will sit high, causing a high work of breathing. If the GEM canister is mounted high, the loop hoses will be excessively long and cumbersome. Either of these situations could make diving the GEM uncomfortable.

For best placement, the strap with the mount should be approximately 8.5 inches from the top curve of the cylinder. This is measured from the curve where the writing is usually stamped, to where the top edge of the strap is located. Depending on the system that divers choose to use, the ideal solution may be to use a dedicated band that is just for mounting the GEM canister.

LOOP HOSES, T-PIECES & QUICK CONNECT SYSTEM

As mentioned on the parts list, the components have already been assembled.

First attach the right side loop hose to the exhale tower. The right side loop hose is the shorter hose with the second stage attached. Secure the quick disconnect to the tower which has the "X" on it; lubricate the O-rings on the hose stub, push into position and then push and turn the ring to tighten.

***NOTE: As the tolerances are tight on these fittings, it is important that the hose stub O-rings are properly lubricated! Be certain to properly lubricate the O-rings on all 4 GEM hose stubs. After attaching the hose stub to the towers, take care to inspect the area to be certain that no O-rings were pinched.**

See photos below.

Next attach the left side loop hose to the inhale tower. The left side loop hose is the longer hose. It has the port for the sensor housing. Secure the quick disconnect to the tower; lubricate the O-rings on the hose stub, push into position and then push and turn the ring to tighten. See photos below.

Now the remaining two loop hoses can be attached. These are the hoses with the stainless steel ballast rings. They will have the quick disconnect hose stubs on one end and the mouthpiece hose attachments on the other. These two hoses are identical. Attach the quick disconnect hose stubs to the end of each T-Piece. Ensure that the O-rings on the hose stubs have been lubricated. As per the warning above, ensure that the O-rings have not been pinched. See photos below.

***WARNING: The KISS GEM Loop hose assemblies listed above are key components in the diving system. Proper care should be take with the care and maintenance of these items. Annual servicing is required. Improper use &/or care may result in serious injury or death!**

COUNTERLUNGS & COUNTERLUNG COVERS

The KISS GEM ships with 2 four liter size counterlungs. They have been inserted for you into the counterlung covers.

It is simple to remove and replace the counterlungs in the cover. To remove, unzip the top of the cover and remove the lung. After sanitizing the lungs, they can easily be replaced into the cover. Grasp the bottom tip of the lung, and push it to the bottom of the cover. Push the threaded opening of the lung, through the hole. If you are having difficulty with this, wet the cover; it will be much easier. Smooth out the lung inside the cover with your hand. After you close the zipper, to ensure that the lung is sitting properly, you can blow into the open lung hole. This will force the lung to expand and sit properly. If you notice that it doesn't expand all the way, open the zipper again and double check that the lung is sitting properly.

The top of the cover is the end which attaches to the T-piece. When the covers are attached to the harness, ensure that the bottom end of the cover is pointing down.

The counterlung covers have had bungee attached to the sides, which have been secured to the sides. It is best to keep the bungee loose, so that it doesn't restrict breathing.

The counterlungs need to be attached to the T-pieces. A small amount of lubricant may be applied to the inside of the lung to aid in pushing them into position. See photo below. Lubricant should also be applied to the O-ring on the counterlung attachment.

Push the lung onto the counterlung attachment, which is located on the under side of the T-piece. The lungs must be pushed on evenly; do not tilt. Once it has been properly pushed into position, tighten the counterlung ring. See photo below.

***NOTE: It is very important that the counterlung is pushed all the way into position and then the ring properly secured. Turn the ring until no threads are visible. Keep in mind that it is not necessary to over-tighten this ring; this would eventually cause damage.**

***WARNING: The counterlungs are a key component in the KISS GEM diving system. Proper care should be taken with the care and maintenance of these components. They should be inspected regularly to ensure that they are in proper working order. Improper use &/or care may result in serious injury or death!**

There will be a select few number of GEM divers who have a very large lung capacity. If you fall into this category, you will know this by doing the following test. If while underwater, with the lung covers and T-pieces properly placed, if the breathing is still difficult, open the zippers on the top of the counterlung covers. If the lung volume is the problem, opening the zippers should immediately solve this problem and the diver will notice the difference.

Larger lung covers may be ordered, should they be required. If you know that you have a very large lung capacity, then the KISS GEM may be ordered with the larger lung covers.

LUNG VOLUME TROUBLE SHOOTING

The KISS GEM diving system is a very simple design and easy to use. Pages 11 & 12 outline the reasons for the counterlung placement as well as the rigging instructions. Those instructions should be followed, in order for the diver to properly learn and understand how the system is supposed to breathe and how to learn about adjustments.

There are several important points to understand:

- It will be impossible to put the KISS GEM on your back, and expect to have the lung volume adjusted correctly at the start of the first dive. This WILL be a gradual process. Any expectations otherwise will leave divers disappointed and frustrated. If the instructions are followed, then the diver can expect to have their lung volume close to where they wish it to be, quickly. Remember, this is all about gradual adjustments of the crotch strap and also the amount of lead in the pockets. Gradual adjustment ensure that the diver properly determines what is best for them and it ensures that divers truly understand how the system works. Diver's who dive in a dry suit or are photographers should recall the time involved to learn the new equipment. Learning to dive a rebreather is no different; they should expect that there will be an adjustment period.
- It is worth noting that those divers who are certified and experienced with Closed Circuit Rebreathers must understand that the KISS GEM is NOT a CCR; it is a unique diving system and as such the rules are different then those for CCR's. In our experience, some CCR divers first feel that the lower loop hoses are very long and don't understand why this is so. Also, that the counterlungs should sit higher. Shorter hoses, improperly placed lungs and T-Pieces will make for a difficult dive. It is important that experienced CCR divers keep an open mind and learn to dive the GEM the way it has been designed.
- The T-piece must sit either on the divers centre chest or slightly above centre chest(the nipple line). This positioning ensures that the GEM will function properly. If the lungs and T-pieces are too high, the work of breathing will be higher and the GEM's gas addition systems won't work properly. Previously we had stated that the lungs should be positioned by lining up the top of the lung cover with the clavicle bone. We have found this isn't true for all body types. As such, it is important that current recommendations are followed.
- As the T-pieces sit on the divers chest, the lower loop hoses need to be long enough to reach from under the T-Piece and have the mouthpiece reach the divers mouth comfortably, without effecting his ability to turn and move his head. CCR divers who are accustomed to short loop hoses, must understand that this is not a CCR, but is new technology that works differently then a CCR. Those of us who are experienced with both CCR and GEM diving, have found no difficulty in using these longer hoses; it's just different. See the photo on the bottom of page 10 to see how the T-pieces are placed and note that the hoses are the perfect length. If the hoses were shorter, the T-pieces would be forced to sit higher. .

LUNG VOLUME ADJUSTMENTS AND WORK OF BREATHING TROUBLE SHOOTING

The GEM volume control system is comprised of 4 important parts: the counterlungs in the counterlung cover, the bungee on the outer part of the CL cover, the waist strap attachment, and the adjustable crotch strap. These components all work in harmony and are an integral part of the gem system. Time will need to be spent with new gem divers to properly adjust this system. It is important that all new divers understand how the system works and how they can achieve the appropriate tidal volume for themselves. To troubleshoot the rigging of the GEM system, go over the points below.

1. Divers will likely attach the GEM wing system to the cylinder, with the top cam strap, at or close to the top curve of the cylinder. This positioning will assist in the divers not having the cylinder valve push into the back of their head. As well, it ensures that the GEM mount is properly situated for most divers. Also, divers should avoid using a DIN first stage with yoke adapter, to a yoke cylinder. This could cause the assembly to be long enough so that the diver can feel it at the back of their head. Use DIN only or Yoke only.
2. When the diver is wearing the unit and standing up, the lower loop hoses and mouthpiece should be adjusted so that the mouthpiece rubber mouth-bite is pointing to the ground or slightly forward. This is important as it makes the loop hoses sit properly underwater and also will prevent any pulling on the mouthpiece. Orientation can be then adjusted underwater, to the preferred position.
3. Ensure that the counterlung is properly inserted into the cover, and is not restricted.
4. Ensure that the bungee's on the sides of the cover's are completely loose. The bungee allows divers to run gauges beside the counterlung covers to assist in securing them; they should not be used to restrict the size of the covers.

5. Ensure that the T-pieces are either at or slightly above centre chest and that the bottom of the counterlung covers are secured to the waist band of your BCD. If required, use an adjustable crotch strap. Tightening and loosening of the crotch strap, while in the water, will shift the counterlungs up and down. This is the main adjustment and anchor point. We recommend using the adjustable crotch strap. The counterlungs should not be floating up and away from the divers body.
6. To ensure that the T-pieces are properly situated the GEM canister mounting system must not be too low. This will cause the loop hoses to pull on the T-pieces forcing them too high. Also, the LP regulator hose must not be too short. 20" or longer is recommended. A short LP hose will also pull the T-piece out of its proper position.
7. Ensure that you put weight into the pockets on the back of the counterlung cover. Adjusting this weight will assist in the counterlung cover placement. This will be very important for divers that do not wish to use a crotch strap. However, should the diver have difficulty in counterlung cover placement, we recommend that an adjustable crotch strap be utilized.
8. Ensure that a chest strap is attached and properly secured. A chest strap will ensure that the T-pieces are secured and properly placed. We recommend this for all divers, however it is especially important for those divers who have a large chest/torso.
9. If you have an exceptionally large lung volume, then the larger size covers may be required.

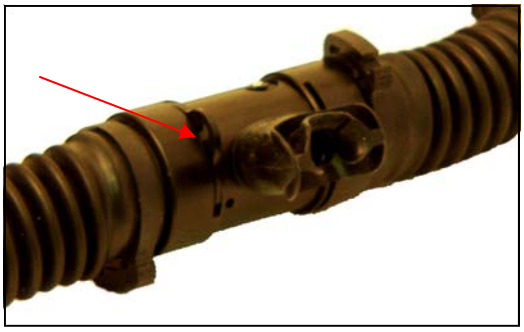
While it will take time for new gem divers to gain experience, by the completion of the KISS GEM course the adjusting of lung volume control system will be second nature.

MOUTHPIECE

You will receive the KISS GEM mouthpiece fully assembled, tested and ready to dive. The black plastic cir clips are used to attach it to the loop hose, hose attachment's. When you receive your GEM, the cir clips will be stored inside the scrubber canister. The mouthpiece will be packed in the box beside the unit and loop hoses. For those who are taking delivery of the GEM and do not have training, parts of the unit and/or mouthpiece may be sent to your GEM instructor so that the unit can not be dove prior to training.

To attach the mouthpiece to the loop hoses, push the hose end with the hose attachment onto the mouthpiece. Be certain to lubricate the O-rings well first. Use standard silicone grease for these O-rings as it works better. The tolerances are tight between the hose attachments and the mouthpiece ends. Be certain that the hose attachment pushes all the way to the mouthpiece, so that the cir clip goes in smoothly. See photo below. Inspect to be certain that no O-rings were pinched. (the mouthpiece should be placed so that the diver sees the white arrow when wearing the unit. The mushroom valve is on the left and the moving piston valve is on the right.)

Once attached, insert the cir clip into the slots to secure. See photo below.



The mouthpiece is the key to the GEM diving system. The design allows gas to be eliminated from the breathing loop every time you exhale. Whether you are relaxed and not breathing hard, or you have a high work load, you will always vent the same percentage.

When the GEM mouthpiece discharges the gas, small stream's of bubbles will vent. These bubbles will come from the discharge ports on the mouthpiece. As the diver can see the bubbles, it will be immediately obvious if there is a problem and no bubbles are venting. If this happens, the diver should also notice that the T piece second stage is not adding gas. It won't add gas, as the volume in the system has not been depleted.

***WARNING: if the mouthpiece is not venting, the gas mixture you are breathing could drop to a dangerous level. This could cause injury or death, especially at shallower depths!!**

Prior to diving, divers should visually check the left side, or inhale mushroom valve and ensure that it is laying properly and not damaged. Divers should also gently shake the mouthpiece to ensure that they hear/feel the right side valve components moving freely back and forth. These parts must move freely for the mouthpiece to work properly. If they don't move freely the mouthpiece must be serviced. Having the mouthpiece serviced by a trained GEM service technician is important. If the servicing of the valve is not done properly, and lubricant is applied to the wrong parts, the valve will stick and not work!! Lubricant in the right side valve area, will cause the inner valve to stick either open or closed.

If the right side one way valve sticks open, you will notice excess bubbles venting from the mouthpiece. The unit should not be dove in this manner as the gas is not flowing properly and could cause a problem with carbon dioxide. If the valve sticks closed, it would be difficult to exhale. A sharp exhale would dislodge it, but the proper action would be to end the dive and service the mouthpiece.

***WARNING: If the mouthpiece right side valve is sticking, do not dive the rebreather; have the mouthpiece served first! Diving the GEM with a mouthpiece that is not functioning properly could cause injury or death!**

On the ascent to the surface at 20 feet, divers should switch from GEM diving to GEM open loop diving or open circuit. Your instructor will teach you about open loop diving.

Also, on descent from the surface to 20 feet, divers should dive the GEM in either open loop diving or open circuit.

***WARNING: Be aware that even though you have an over pressure relief - exhaust valve on your canister, it can not be solely relied upon to relieve excess loop volume on a rapid ascent. If the ascent is rapid or un-natural, the diver on the breathing system will feel resistance; like they are blowing up a balloon. Exhaling out of your nose will help to relieve the pressure.**

***WARNING: Servicing of the GEM mouthpiece should only be attempted by a qualified GEM service technician. Do not attempt servicing the mouthpiece without the proper training!!!**

Purging the mouthpiece

During your training you will be required to close the mouthpiece and switch to your bailout regulator. When you are ready to go back on the breathing loop, you will need to purge the GEM mouthpiece prior to pushing the lever open. To do this, put the GEM mouthpiece in your mouth and exhale hard. You will push the water out of the vent hole. You only need to do this for seconds as it is a minute amount of water. Once you see bubbles, the water is gone. After purging push the lever to the open position and then you may continue to breath on the loop.

While doing the above exercise, be certain to not cover the vent hole with your hand as you move the lever. Covering the vent hole with your hand will prevent it from purging the water.

Diaphragm's & Buttons

The KISS GEM mouthpiece has 3 discharge port diaphragms and buttons. Since the GEM has been released, there have been some modifications to both the diaphragms and the buttons. Information on these changes was sent to the KISS dealers when they occurred.

The most current diaphragm style is the one that is grey. The originals were black. If you are still using the black ones, It is highly recommended that you upgrade to the newer version. The new ones, are a different material then the original and are not likely to hold a memory. The original ones will start to curl. When this happens they would need to be replaced before diving. Diaphragms can be replaced by contacting head office or your dealer.

The current button style will ensure that the diaphragm is both protected from being brushed off, yet still allows free movement and visual inspection of the diaphragm. See photo to the right. As with the diaphragms, it is recommended that this version of the button be used.

Diaphragms and buttons should be visually inspected prior to every dive to ensure that the diaphragms are sitting flat, and properly placed.

***WARNING: The KISS GEM mouthpiece is a key component to this diving system. Proper care and servicing is essential in order to maintain proper working order. Key areas of importance include, but are not limited to, ensuring the piston is moving properly, the mushroom valve is working as it should, and the discharge port diaphragms are sitting flat and not damaged. Improper use &/or care may result in serious injury or death!**

POSITIVE & NEGATIVE TESTING

Mouthpiece positive & negative testing

It is essential that prior to every dive, a mouthpiece positive and negative test must be performed, along with a good visual inspection of the mushroom valve. The instructions for this procedure are as follows:

1. Visually inspect the mouthpiece. Ensure that the mushroom valve is undamaged and in good condition. Insure that the left side Valve Disk is sitting properly and that you feel the right side valve assembly move freely.

***WARNING: The visual inspection is an important part of this testing; be certain to take your time when doing this to ensure the mushroom valve is not damaged! Failure to inspect the mushroom valve can cause serious injury or death!**

2. Attach the lower loop hoses to each side of the mouthpiece and put the mouthpiece in the closed position.
3. Blow into the left side loop hose, while holding the right side loop hose to your cheek. You should feel the air move freely through the mouthpiece and against your skin as it exits the right side hose.
4. Suck gently on the same left side hose. You should feel the Valve Disk seal against the Valve Plate. Do not suck hard. It is not necessary and could damage the valve. These valves are expensive; take care of them. You should feel the valve seal. If there is a slight leak, rinse the mouthpiece in fresh water. Excess saliva or sea water in this area (from a previous dive) can cause the valve to leak. Rinsing will solve this problem.
5. Suck on the right side loop hose and place the left side hose against your cheek. You should feel the valve assembly move and allow the air to move through the mouthpiece.
6. Blow in the right side loop hose. You should feel the valve assembly seal and no air should pass through.

It is important that the mouthpiece lever is in the closed position for the above tests. If left in the open position, the discharge ports will vent and the testing will fail.

KISS GEM full positive & negative testing

It is essential that any time your KISS GEM diving system is disassembled, for any reason, that full positive and negative tests are conducted prior to diving. This means that anytime you assemble the unit with fresh absorbent, a positive and negative test is done. It also means that any time you remove any single component from the diving system, that full positive and negative tests are done again. If you break the seal, test the unit! The instructions for these procedures are as follows:

1. Assemble your KISS GEM diving system as per the instructions.
2. Place the diving system on a table or chair; the loop hoses should be hanging freely.
3. Place the mouthpiece in your mouth with the lever in the open position, and inhale. You want to create a negative vacuum in the loop. Draw all the gas out of the loop, until you can not inhale any further, and close the mouthpiece. It should be noted that it is not necessary to inhale so hard that you feel pressure building in the back of your throat, or that your face turns red. This is too hard and could damage the valve disks!
4. Once you have closed the mouthpiece, watch the counterlungs and the bottom of the loop hoses close to where they attach to the hose attachments. If there is a leak, the counterlungs will shift, as will the loop hoses.
5. After about 1 minute, open the mouthpiece. You will hear the sound of the gas moving in the diving system. This is important.
6. Place the mouthpiece back in your mouth and exhale into it. Exhale until you see/feel the counterlungs are full and then close the mouthpiece, while still exhaling. As you are exhaling, you will feel the discharge ports vent. This is normal. Once the lever is in the closed position, the venting will stop.
7. Once you have closed the mouthpiece, watch the counterlungs. If there is a leak, they will shift.
8. After about 1 minute, open the mouthpiece. You will hear the sound of the gas moving in the diving system. This is important.

***NOTE: When doing your test, it is VERY important to not suck so hard that you are damaging the mushroom valve. When you do the negative test, suck until you get a good seal, and then immediately close off the mouthpiece. If you suck so hard that you feel the pressure building in the back of your throat/neck area, your ears pop, or you feel your face turning red for exertion, this is way too hard. There is no need for this and it will damage the valve. Suck just until you feel that pressure, then close the valve.**

The mouthpiece has a large bore. In order to get a good work of breathing, the valve is very flexible. This means that we need to ensure we have good testing habits. Those divers who learned the testing procedures years ago, have to understand that the equipment has now changed, and that our habits must also change.

If your unit has failed the negative and positive tests, ensure that all hoses are properly attached. Double check the counterlung rings. If the rings are not secured all the way, this could cause a leak; there should be no threads exposed in this area.

Also, if your unit has a consistently leaky mouthpiece and yet passes the negative test, first ensure that you are using the most current mouthpiece diaphragm's and buttons. Also, hard negative tests should be avoided. A hard negative test can and will dislodge the mouthpiece diaphragm's. It is not necessary to do a hard negative test to ensure that the GEM is properly assembled. If you feel this could be a problem, ensure that the diaphragms are properly secured and be gentle when doing a negative test. Once the diaphragms are not seated properly, they will need to be properly placed again.

***NOTE: If you are using an Atomic 2nd stage for your bailout regulator, your GEM diving system will not pass the negative test. The Atomic 2nd stage has floating poppet which will cause a vacuum leak.**

Discharge port diaphragms

The discharge port diaphragms are an essential component of the mouthpiece. It is important that they are in good working order. When visually inspecting your mouthpiece, ensure that they are not torn or damaged in any way, and that they are laying flat. If they are not laying flat, either flip the diaphragm over or install a new one otherwise water can enter the breathing loop.

Prior to removing the screw and button that holds the discharge port diaphragm, note how tight the screw is. It is important that the screw is not over tightened when reassembling the mouthpiece. Watch closely when tightening this screw. If the diaphragm lifts at all, on any edge, back the screw off.

***NOTE: If you have a failed discharge port diaphragm, it will bubble constantly.**

Right side inner valve assembly

The right side of the valve houses the inner valve assembly and the outer valve assembly. The inner valve assembly is the inner piece that moves back and forth. The outer valve assembly is the component that is screwed to the right side housing.

If the inner valve assembly starts to stick either open or closed, it is likely that the mouthpiece either needs to be cleaned or that some lubricant has worked its way into the area, If a single drop of lubricant is in that area in which the valve moves back and forth, it could cause the valve to stick.

If this happens, remove the outer and inner valve assembly. Using a perfectly clean cloth - their can't be any lubricant on it at all - carefully clean the inner part of the mouthpiece. All traces of lubricant must be removed. Clean the inner valve assembly and then reattach the outer assembly.

***NOTE: if the valve gets stuck, it could happen in the open or closed position.**

T PIECE SECOND STAGE USE

The second stage is located on the right T-piece; it is the assembly with the Mikron cover. The second stage is designed to add gas to the breathing loop every time you inhale. Whether you are relaxed and not breathing hard, or you have a high work load, you will always add approximately the same percentage.

Gas goes into the GEM diving system through the LP hose which is attached to the second stage and runs to the first stage on your cylinder. When securing the hose to your 2nd stage, tighten the nut finger tight; a tool is usually not required. Alternatively, divers may upgrade and add a quick disconnect to this area so as to simply this process.

Your first stage IP should be adjusted by a qualified service technician and the pressure should be between 135 and 145 PSI. If the Add Regulator adds gas to easily to your diving system, have the IP checked.

As each diver will have their own first stage, the Mikron second stage may need to be adjusted by your dealer or instructor prior to diving. Divers can also adjust the ease of nitrox addition by turning the knob on the side of the 2nd stage. Your GEM is shipped with this knob turned all the way in. To make the nitrox addition to the breathing loop easier, simply turn the knob out until it breaths better.

Note that turning the adjustment knob out all the way may result in the second stage free flowing. This will add an excess amount of gas to the breathing loop, which will waste the gas. Also, it may make the loop feel like it is excessively "full". If this is happening, exhale out of your nose to dump the excess loop volume and then adjust the knob back down until it no longer free flows.

The GEM second stage assembly is also a very important part of the GEM diving system. Each time you inhale, gas will be added to the breathing loop. You may be able to feel and possibly hear this happening. If for some reason there is a problem with the second stage assembly, you may notice that you won't feel the gas being added. If you do not notice this, then you should notice that the volume of gas in the breathing loop is diminishing and their isn't enough gas to breath comfortably. If you are not certain it is adding gas, you can push the purge button on the second stage and add gas manually. Doing this manually, makes it easier to hear and feel the gas being added.

*WARNING: if the Add Regulator is not adding gas properly, then you will need to bail out to your back up regulator which is attached to the necklace around your neck (or alternatively located in the appropriate area as per open water training) Alternatively, bail out to your buddies second stage if necessary.

SENSOR INFORMATION

The KISS GEM uses the large diving sensors which are made to receive a molex connector. Current suppliers of this sensor include Analytical Industries, (AI) PSR-11-39-MD or Maxtec inc., Max - 305. The unit is not shipped with sensors; you will need to order them from your dealer or local sensor supplier. Prior to installing them, it is best to open the bags and let them sit for at least 24 hours prior to calibration as they need to go through a "wake up" period. Ideally, open the bags about a week prior to use if possible.

New sensors will read low when first installed and will creep up slightly over the course of a week or so. After that, they seem to be stable for months on end. Don't waste time calibrating the sensors if they are reading within a 1/2 percent. These sensors should last for at least 1 to 1 1/2 years, if they are not damaged or abused. Oxygen sensors work on the same basis as a battery. The more that they are used, the more often they will need to be replaced.

An easy way to remember your sensors anniversary date is to write the date on the bag when you open it, and keep the bag in safe place. The AI PSR-11-39-MD sensors are safe to dive if the millivolt reading is between 8.5 and 13, AND they can be calibrated in both air and verified in your nitrox mixture. The VR & Shearwater displays will read the millivolts of the sensors or a volt meter can be purchased at your local hardware or electronics store.

Your new AI PSR-11-39-MD sensors will have a millivolt reading between 8.5 and 13 millivolts. As per Analytical Industries Inc., as long as they are in that range, they are safe to use. But also remember that you must still be able to calibrate in air, verify in nitrox, and they must not be older then 1 1/2 years.

The Maxtec 305 sensor will have a millivolt reading between 9 and 12 millivolts.

***WARNING: You also need to ensure that they can be calibrated properly in air and that they can be verified in the nitrox mixture you plan to dive. This is very important. Even if a sensor is reading in the proper range, as it ages you may no longer be able to calibrate it properly.**

*****IF THIS HAPPENS, THE SENSOR MUST BE DISCARDED. FAILURE TO USE A PROPER SENSOR WILL CAUSE SERIOUS INJURY OR DEATH!!!!!!!!!!**

In diving applications the sensor will last one to 1.5 years, depending on how often you dive and how they are stored. Sensors should be allowed to dry out after your day of diving, especially if you are diving in a humid environment. This means that you need to leave the loop hose off overnight to allow air to circulate through the T-piece. Leaving the unit sealed up will not allow the condensation to evaporate.

*****If the KISS GEM has moisture in the T-piece from diving or from being in a humid environment, and it is then sealed up tight, the wires from the end of the display will start to corrode!!!! If this happens, whatever display or computer you are using, will not work properly!!!! It is extremely important that the T-piece is allowed to dry out if the unit is to be sealed up. This means that after a dive trip, don't just drop the unit on your work bench and walk away from it!!! At the very least, drop the T-piece hose and let the T-piece dry. This will help keep your wires in good working order. Storing the sensor and/or sensor T-piece in an air conditioned room will help it dry out also.**

Other points to consider are:

- Sea water on the sensors will probably cause them to fail.
- As your sensors start to age you will notice that they are harder to calibrate, slower to react and will drift more after calibration.
- Electrolyte, which is a gel like substance is inside the sensors. If you notice this substance leaking out of the sensors, do not touch it as it is caustic. Do not dive with a leaking sensor. The readings will be high!!!!

***WARNING: On the following pages are the calibration instructions for the displays systems. It is essential that the calibration procedures are followed properly. Failure to do so can cause injury or death!!**

SENSOR INSTALLATION & DISPLAY ATTACHMENT

After you have taken the sensor from its bag, and it has had sufficient time to "wake-up", it can be installed into the GEM diving system. First remove the O-ring on the sensor. It is not required and will also prevent the sensor from being inserted all the way into the T-piece. Once the O-ring on the sensor has been removed, screw the sensor into position . See photo right.

Once the sensor has been installed, the display can be attached. First be certain that the O-ring is inserted onto the sensor housing. It should be clean and lubricated. Push the white molex plug into the sensor. Be certain to push it firmly into place. You should be able to hear or feel a slight click. Gently pull on the white connector to ensure that it does not come out.

***WARNING: This next step is important! This must be done prior to securing the sensor housing.**

It takes about 2 full turns to secure the sensor housing to the T-piece. As such, before attaching the sensor housing to the T-piece, but after you have plugged in the white molex connector, turn the housing counter clockwise or to the left, 2 full turns. Do this slowly and carefully and start with the wires straight and be certain that they are not twisted. Once you've turned it counter clockwise 2 turns, you will notice that this caused the wires to twist. Now insert the housing into the T-piece and tighten the housing into position. Tighten firmly with your hands. You want it to be tight and not spin loose while diving. Once tight, the wires will have straightened themselves and now sit properly inside the housing. You will notice that the wire for the display is facing forward so that the cable will run comfortably towards your wrist.

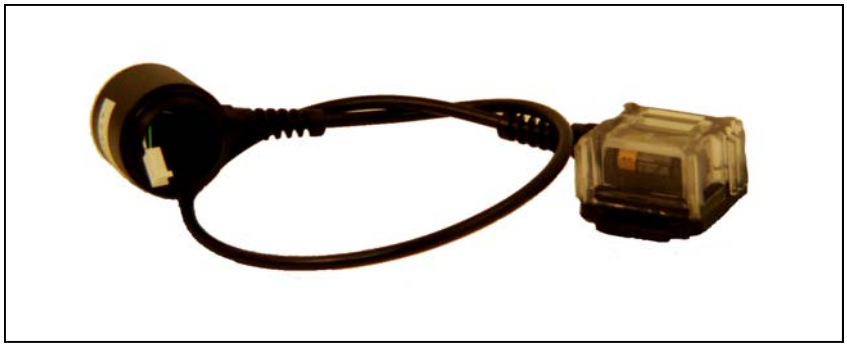
***NOTE: Ensure that the O-rings are in good condition, that the area is clean and the components are not damaged. Also ensure that while tightening the housing, that the wires are not pinched. If they are, the assembly may not be water tight! Water damage in this area will ruin the sensors and/or the electronics. If the wires do get pinched, inspect them for damage!!**

*BE CERTAIN TO MONITOR YOUR PPO2 DISPLAY OR COMPUTER, EVERY MINUTE OF THE DIVE!!

JETSAM WRIST DISPLAY & CALIBRATION

To turn the Jetsam wrist display on, rotate the dial on the back clockwise. This is the position it should be in while diving.

For calibration, the dial will need to be turned counter-clockwise while pushing the lever to the right. The lever must be pushed over in order for the dial to be turned in this direction.



***WARNING: When inserting the screwdriver into the port to adjust the meter, DO NOT PUSH THE SCREW DRIVER INTO THE METER WITH FORCE. GENTLY PLACE THE TIP OF THE SCREWDRIVER INTO THE ADJUSTMENT SCREW ON THE METER.**

***WARNING: After diving, gently tap the display on your thigh to remove any water trapped in the back of the display before opening the calibration port. A single drop of salt water on the electronic board or meter will ruin them!!! Gently means, do NOT use compressed air!!**

***WARNING: The PPO2 display cases have internal magnets. Divers should not wear a compass on the same wrist or near the displays as the magnets will cause the compass to read incorrectly.**

***SERVICE: Note that the display backs are disposable and are not meant to be serviced.**

***WARNING: The KISS GEM display system & sensor housing is a key component to the diving system. Proper care should be taken when handling, cleaning and diving. Improper use &/or care may result in serious injury or death!**

The displays should be calibrated to air and then verified with the nitrox mix you will be diving. The procedure is below:

First ensure that the cylinder valve is turned off. Then, remove the lower exhaust side loop hose where it attaches to the second stage T piece. Put the mouthpiece into your mouth, open the loop and breathe. This will draw fresh air through the loop and eliminate any higher percentages of nitrox which may be present. Depending on what the percentage of nitrox was in the loop, it may take a few minutes to clear out. Your display reading should be dropping close to the air range.

With the display back in the calibrate position, a small port will open to allow access to the meter. Insert a jewellers screwdriver into the port and gently turn the screw to adjust the reading. Adjust to .209/air.

Now verify the reading with your nitrox mixture. Do this by opening the cylinder valve, reattaching the loop hose to the T piece, and then inhale from the open mouthpiece and exhale out of your nose. This will flush the loop with fresh nitrox by triggering the second stage on the T piece. Expect the reading to be close to what your analyzed percentage is, but not exactly the same. It will be slightly lower.

***WARNING: REMEMBER THAT IT IS STRONGLY RECOMMENDED THAT THE KISS GEM HAVE A NITROX PERCENTAGE OF 36 OR HIGHER. DIVING LOWER PERCENTAGES OF NITROX IN THE GEM DIVING SYSTEM COULD BE DANGEROUS. ALSO BE CERTAIN THAT YOU HAVE PERSONALLY ANALYZED YOUR CYLINDER AND KNOW WHAT MIX YOU ARE DIVING!**

Once the displays have been calibrated, close the calibration port on the back of the display.

***WARNING: DO NOT FORGET TO CLOSE THE CALIBRATION PORTS ON THE DISPLAYS. THE DISPLAYS WILL NOT BE WATER-TIGHT WITH THE PORTS OPEN!!**

The KISS GEM should be flushed on every dive to ensure that the display is reading correctly, and re-calibrated every time the absorbent is changed.

In general, electronic rebreather displays of any sort should not be left sitting in the hot sun without protection. Try to cover your unit with a towel and keep it in a shady area.

*BE CERTAIN TO MONITOR YOUR PPO2 DISPLAY OR COMPUTER, EVERY MINUTE OF THE DIVE!!

ORIGINAL JETSAM DISPLAY BATTERY WARNING!!

The battery used in the display is a Duracell PX28L 6 volt camera battery or equivalent.

DO NOT SUBSTITUTE ALKALINE BATTERIES!

These batteries should be replaced any time the backlighting will not turn on, every three months, or more often. Do not attempt to use the batteries to the failure point.

***WARNING: WHEN THE BATTERY VOLTAGE DROPS, THE DISPLAY READS HIGH. THIS IS A POTENTIALLY DEADLY SITUATION. IF THE DISPLAYS HAVE BEEN ACCIDENTALLY LEFT ON FOR AN EXTENDED PERIOD THE BATTERIES MUST BE REPLACED.**

Make a note of the installation date of the batteries. Also note the number of hours each battery is used. Your life depends on the accuracy of the sensors, batteries, and displays.

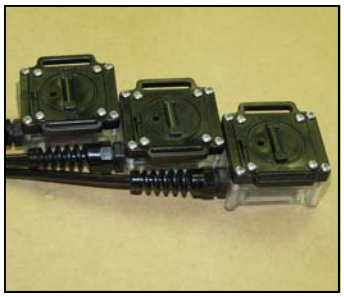
With the backlighting enabled the displays will operate for 20 hours after which the backlighting will become dim and fade out. The display will continue operating for another 20 hours before it fails. **If the backlight option is selected but the light does not come on CHANGE THE BATTERIES! DO NOT GAMBLE AND GUESS THE AMOUNT OF TIME YOU HAVE LEFT!!!!!**

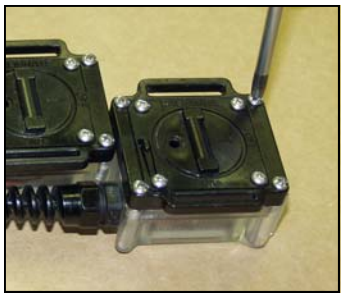
To change the batteries, remove the four outer screws on the back of the display case and carefully remove the cover. After changing the battery and logging the date, ensure that the o-ring is LIGHTLY lubricated and clean prior to replacing the cover.

Replacing Batteries/Meters/Circuit Boards

The following instructions are for replacing the batteries, meters (LCD read-out) or circuit boards. Note that these instructions are for replacing the circuit boards with the plug-in wires.

Before you start, ensure that your work area, tools and your hands are clean and dry. This is quite important as a single drop of sea water will ruin your electronic display.



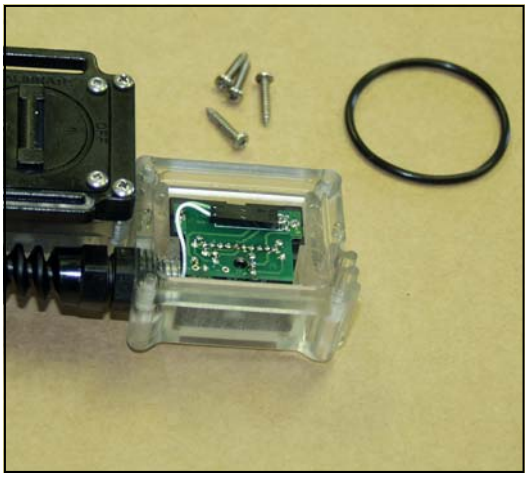


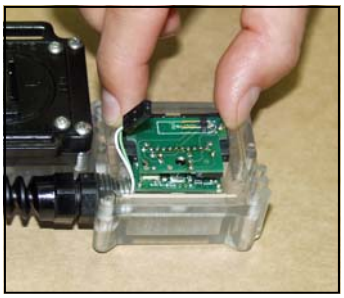
Take the display and with the calibration port side down gently tap the display on your thigh to remove any water droplets that could still be on the display back. GENTLY!! Even if you have been out of the water for some time, you should still do this.

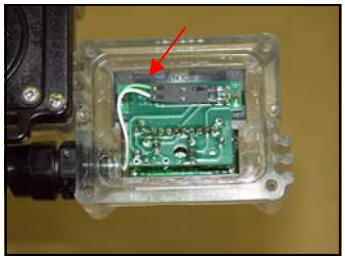
***NOTE: Water should be tapped out when ever the case is opened or when the calibration port is opened. Do not use compressed air!**

Place the display port side up on the table and remove the 4 outer screws on the display that you wish to service. You will need a Philips screwdriver. As you are removing the screws try and remember how tight they are. The case is sealed by an O-ring and the screws should not be over tightened. When you close up the case again, this will assist you in sealing the case properly.

The wire will need to be removed from the back of the circuit board. To unplug it, gently pull the black plug towards the wire. Once the wire has been unplugged, the circuit board can be removed. Pull it straight up and out. It will be snug. If you like, you can use a tool such as a dental pick to assist you or one of the small jewellers screw drivers from your tool kit. HOWEVER, be very careful that you do not damage the circuit board!! Replace the battery, meter or circuit board, as required.





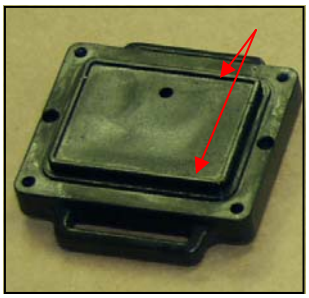


Once you have repaired or replaced the required parts, insert the circuit board back into the case. Push firmly, straight down while ensuring the wire is not pinched on the side. Once in place, plug the wire back in. Use a tiny screw-driver to push the wire into the side of the board, by where it comes in. Also, keep wire on bottom side of Souder bump located at the top left side of board. This will help keep a small amount of pressure on the connector, so it doesn't come undone.

Now you are ready to install the O-ring. Check it for nicks and indentations and if you find any, discard the O-ring and install a new one. If you dent the O-ring while re-attaching the display back, discard it and use a new one.

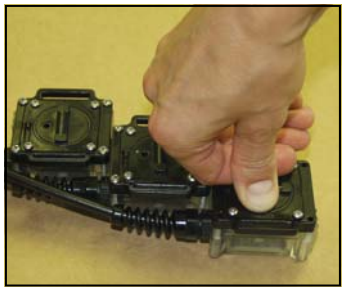
***NOTE: This is important as a flawed O-ring will allow water to enter the case!!**

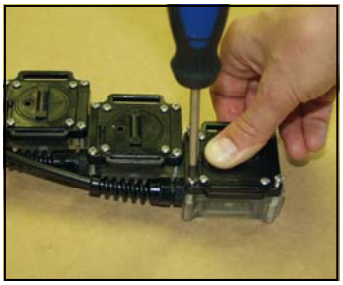
Apply lubrication generously to the O-ring. The lubricant will help the O-ring remain in place and will also assist in positioning the display back properly.



Lubricant should also be applied to the raised edge, on the inside of the display back. This will ensure that the raised plastic slides past the O-ring without catching it.

Replace the O-ring in the case. If you are reusing an O-ring, it will have kept its shape. It can go back into the case in the same orientation that it was in before. The lubricant will assist in keeping it in position.





Place the back on the display case. Ensure that you have placed it correctly with the calibration port in the correct position. You will need to push it firmly down into position and must be able to hold it in place while you insert and tighten the screws. This is easiest to do by pushing down on the back, standing and using your body weight to help hold it in place.

Place the screws in the holes and turn them slightly counter clockwise until you feel them drop into the old threads. Then tighten the screws until the back is secure and seated properly. While it is important that the screws are tight enough, it is also important that they are not over tightened. Remember, the O-ring creates the seal.

Display Troubleshooting

FLICKERING OR FLUCTUATING DISPLAY:

Your display may flicker slightly on the surface with no sensor attached. This is normal. It is called random noise.

On the surface with a sensor attached your displays will also fluctuate. This is normal.

Once diving or breathing on the unit the displays will stabilize and act normal. What is normal? While diving, expect the PPO2 display to change as you metabolize the gas you are breathing. This changes from person to person. It depends on your workload, and physical makeup.

If the display are fluctuating during a dive this could mean the sensors are old, the battery needs to be replaced, the wire could be damaged or the magnet isn't registering (some of the older display backs had this problem).

HARD TO CALIBRATE:

The potentiometer (PPO2 adjustment screw) is turned all the way in one direction. You will need to do at least one full turn, maybe two in the opposite direction and then try and calibrate again.

The sensor or battery may be old.

PPO2 READ OUT IS ZERO OR -1:

If the read out is -1 then sea water has come in contact with the circuit board and/or meter. Any parts that have come in contact with sea water must be replaced.

If the read out is zero, then it could also be a dead sensor.

DETERMINING THE PROBLEM AREA:

To determine where the problem lies, first take the sensor from the faulty display and swap it with a functioning one. Did the problem follow the supposedly faulty sensor? If yes, the sensor is bad. If the display still does not work, then it probably isn't the sensor.

Next, swap the meter with a functioning one. Again, did the problem follow the meter? Or is the faulty display still not working? If this is the case, the circuit board could be bad. If the meter is working on a known good display, it might be ok. When sea water comes in contact with electronics, even if it is just a small amount it is difficult to determine where and how bad the damage is. It could even be in the wire. When in doubt, change the wire, circuit board and meter.

CARE FOR YOUR FISCHER CONNECTOR AND THE CABLES

Having Fischer connectors on the GEM display system is a convenience that many divers enjoy. While a lot of maintenance is not required, some care is important in order to ensure that they operate properly.

The fischer connector port is watertight and any water that gets in to the port cannot harm your plate, computer, HUD or pendent. However, should sea water get inside the port or the ends of your linking cable, flush them with fresh water as soon as possible afterwards then leave them to dry completely BEFORE refitting the cap.

Regular maintenance should include:

1. Inspect the connectors and look for any signs of corrosion; parts will start to turn green.

2. If you see green/corrosion, rinse the connectors briefly with white vinegar and use a fine toothbrush to remove the build-up. Rinse well and let dry completely before refitting the protective caps.

3. Keep the inner O-ring lubricated by either applying a SMALL amount of grease on the metal end of the cable end that slides into the computer fischer connector to lubricate the inner O ring of the bulkhead connector. Filling the connector with food grade mineral oil once a year will also work. This will serve to improve the seal and make the connection more reliable. If you have a sensor which is reading erratically, this could be a solution.

If you use the mineral oil, drain any excess prior to replacing the caps.

4. Use the protective caps. The caps will help keep your connectors clean, keep the lubricant in and any debris and water out.

Remember, the cleanliness of the contacts is essential to the integrity of the link. Following these simple steps will ensure that your system works properly. Look after your cable and connectors and they will look after you.

SHEARWATER GEM DIVING COMPUTER

***WARNING: The Shearwater diving computers are sophisticated components. They should be treated with respect. Proper care should be taken when diving, cleaning, and handling. Improper use &/or care may result in serious injury or death! The write-up in this manual is for informational purposes only. Divers must read and understand the user manual from Shearwater Research prior to diving this piece of equipment.**

*BE CERTAIN TO MONITOR YOUR PPO2 DISPLAY OR COMPUTER, EVERY MINUTE OF THE DIVE!!

The Shearwater Research diving computers are sophisticated components and should be treated with respect. Prior to diving a Shearwater computer, their manufacturers manual should be read and understood. The Shearwater write-up in this manual is for informational purposes only. For more detailed information on diving the Shearwater computers, please refer to the Shearwater Research user manual.

Those that purchase a Shearwater GEM computer will find that it ships with the computer in semi-closed (SC) mode. Those that are diving a standard Shearwater computer must put it into SC mode themselves.

1. Turn the computer on, by pushing both buttons. The left button is called the menu button and the right button is called the select button. You will use the left menu button to scroll through the various menu items and the right select button to accept the current choice. BE CERTAIN THAT YOU ARE SAVING THE SETTINGS YOU CHOOSE. IT IS IMPORTANT THAT YOU READ THE SHEARWATER RESEARCH USERS MANUAL TO FAMILIARIZE YOURSELF WITH THE PROPER PROCEDURES IN OPERATING THIS COMPUTER!
2. Scroll through the computer menu items by pushing the left button. Go to ***System Setup***. Push the right button to accept.
3. Again, scroll through these items using the left button until you see ***O2 Setup***. It will be the fourth item in this section. Push the right button to accept.
4. You are now in the area that allows you to choose a diving mode: SC enable (semi closed), OC only (open circuit), and those who have a fully open computer can choose CCR mode.
5. Once SC is enabled, the computer will allow you to choose which display option you would like use while monitoring your oxygen; PPO2 or FiO2.
6. The ***System Setup*** menu is also where you will find the ***Calibration Gas*** sub menu setting. Prior to being able to calibrate the computer, you will need to set a calibration gas! In SC mode, you will be able to calibrate the computer using any mix from air to oxygen. Shearwater recommends that you calibrate using air as it is a known gas. Then verify your nitrox mix afterwards. With the Shearwater computers, you need only set the calibration gas once; you will not need to re-enter this gas very time you calibrate. You only need to change it if you decide to calibrate using a different gas. If you do change the calibration PPO2, you will need to recalibrate your computer prior to diving. For calibration at altitude, refer to your Shearwater Research users manual.

*Note: Changing from semi closed to closed circuit operation will only require recalibration is you are going from semi closed to closed circuit and the calibration PPO2 was below .70. The closed circuit calibration PPO2 must be above .70. Changing the display between PPO2 and FiO2 will not require recalibration.

***NOTE: Remember that any changes to the *System Setup* menu, will discard your current calibration. If you enter this menu, be certain to re calibrate your computer!**

Divers should be aware that when the computer is in SC mode, it will require an oxygen sensor to operate. The external sensor can not be disabled. This means that in order to use the computer in SC mode, it must be linked via the cable to the GEM diving system and sensor. Those who dive both the GEM and open circuit can move between SC and OC by changing the setting in the ***O2 Setup*** menu, as per #2 above.

See the following page for calibration instructions.

Shearwater GEM Calibration

To calibrate your Shearwater computer, the computer should be calibrated to air and then verified with the nitrox mix you will be diving. At this point, you should have already set the calibration gas to "air". The instructions for this are on the previous page. The procedure for calibration is below:

1. First ensure that the cylinder valve is turned off. Then, remove the lower exhaust side loop hose where it attaches to the second stage T piece. Put the mouthpiece into your mouth, open the loop and breathe. This will draw fresh air through the loop and eliminate any higher percentages of nitrox which may be present. Depending on what the percentage of nitrox was in the loop, it may take a few minutes to clear out. Your display reading should be dropping close to the air range.
2. Push the left menu button until you see ***Calibrate.*** Push the right select button. On the top line you will see millivolt reading of your sensor. The AI PSR-11-39-MD sensors will have a millivolt reading between 8.5 and 13 millivolts. See page 18 for full sensor information.
3. While on this screen, pushing the left menu button will prevent calibration and pushing the right select button will calibrate. Push the right select button to calibrate; the reading should be 0.209 for air. If the display shows the word ***FAIL***, then the calibration has failed because the millivolt reading is not in the proper range.
4. If you push the right select button and the word FAIL does not appear, you have successfully calibrated the computer.

*NOTE: For calibration in altitude and full calibration information, please refer to your Shearwater Research users manual.

Now verify the reading with your nitrox mixture. Do this by opening the cylinder valve, reattaching the loop hose to the T piece, and then inhale from the open mouthpiece and exhale out of your nose. This will flush the loop with fresh nitrox by triggering the second stage on the T piece. Expect the reading to be close to what your analyzed percentage is, but not exactly the same. It will be slightly lower.

DIVING THE KISS GEM

While you will find the transition to diving the KISS GEM short, there are several points worth consideration. While these points have been covered in other parts of this manual, we feel that they are worth repeating.

1. For those still using the original V-strap - Crotch strap ring location. (divers using the large 2 inch crotch strap have the ability to position the D-ring) It would be the divers tendency to put the ring in a high position on the strap. In fact, it must be placed on the strap so that it sits over the pubic bone, on the divers pelvis. Due to the required placement of the chest mounted counterlungs, the ring must be in this position in order to secure the lower counterlung cover straps properly. For those divers who do not enjoy the low placement of the crotch strap, there is another option available. A diver may have the crotch strap sit higher at the waist, as long as they add an additional D-ring which can be adjusted to sit at the proper location, over the pubic bone. Using a crotch strap which is adjustable, is preferred.
2. The GEM works well with a technical style harness, such as the one included. If you choose to use a technical harness a crotch strap is important. GEM also works with a standard BCD, without a crotch strap. However the BCD must fit the diver properly, If the BCD is loose, then a crotch strap might be required. We do recommend an adjustable crotch strap to aid in ensuring the lungs and T-pieces are situated in the correct spot.
3. The GEM mounting system is factory installed onto the webbing cam strap so that the canister sits to the right of the cylinder. Divers may choose to slide the mount so that the canister is situated either closer to the divers back or further away. This is personal choice.
4. When upgrading to the GEM there is a transition, though brief. You must be aware of your body position. In your first few days of training, you will find the horizontal position offers the easiest breathing. When in a vertical position you may notice slight upward pressure on the mouthpiece. By the time you finish your training program, it is unlikely that you will notice the difference.
5. It is imperative that all the connecting O-rings are kept well lubricated; hose stubs & mouthpiece attachments. These are all double O-ring seals and the tolerances are tight. If the O-rings are not lubricated, it will be difficult to install these components and you could possibly damage &/or dislodge the O-rings.
6. The T-pieces should sit either at the divers center chest (nipple line) or slightly above centre chest. If the lungs sit too high, the breathing will be difficult and the loop hoses will be too long and cumbersome.
7. The location of the KISS GEM mounting system is important. Ensure that it is not too low as this will cause the T-pieces to pull up, causing a harder work or breathing.
8. If you have a leak or a problem there are several things to check.
    - First check that the mouthpiece discharge port diaphragms are still in place and not curling away from the housing. If they are not sitting flat, flip them over or replace. (Water will be in the exhale hose/lung.) It is recommended that the newest version of the diaphragm and button are being used Mouthpiece lever is securing tightened. (water will be in the exhale hose/lung.)
    - Is the negative test being done is too hard, and dislodging the discharge port diaphragms. Check the diaphragms and do a gentle negative test.
    - The 4 quick disconnect hose stubs all have well lubricated O-rings and that they have not been pinched.
    - Sensor housing O-ring is in place and properly lubricated.
    - Mouthpiece hose attachment ends are well lubricated and that the O-rings are not pinched.
    - Hose attachment towers on the canister head are securely tightened.
    - Exhaust valve on the head is properly secured with the O-ring. Also, the dial should be turned all the way in.
    - O-ring in the canister head has not been pinched. Proper lubricant has been applied to this O-ring and to the mating parts on the canister. If it has been pinched once, it needs to be replaced as it will leak on future dives. Upgrading to the larger head O-ring is important and recommended.
    - The head has been properly secured, and is firmly tight. If necessary, have your buddy help you tighten the canister or use a strap wrench.
    - The quick disconnect on the LP hose has not spun loose.
    - The LP reg hose is not too short, causing the T-Piece to pull up, making the work of breathing difficult.

***BE CERTAIN TO MONITOR YOUR PPO2 DISPLAY OR COMPUTER, EVERY MINUTE OF THE DIVE!!**

PRE-DIVE CHECKLISTS

Using the provided checklists are easily one of the most important parts of preparing for a dive. The instructors and divers who use these checklists have reported that their skill level on the diving systems increased quicker and that they understood their units better, which made them more organized and safe divers.

The first part of the checklist, are items that must be addressed and/or confirmed prior to suiting up for the dive. Those that are using this tool, usually keep several blank copies in a small binder with their dive gear.

The second part of the checklist are items that are usually checked shortly before a dive. This list can also be printed out and carried in a small binder in your dive bag.

A point worth noting is that all pilots have a checklist which they go through every time they fly. A diving system such as the KISS GEM should be no different. While diving a KISS GEM system doesn't necessarily take more preparation or clean up time than open circuit diving, there are very specific things that need to be checked and confirmed prior to getting into the water.

Using this checklist will only add a few seconds more time to your preparation, but could make all the difference in having a pleasurable time in the underwater environment. It certainly assists in creating competent, happy divers.

**One part of the 2nd check sheet is worth discussion. That is the 5 minute pre-breath that is required prior to diving. Note that this pre-breath is NOT to warm up the scrubber. It is to determine if the scrubber and the rebreather are working properly. It gives you a chance to monitor your display system to ensure that it is working. And most importantly, to determine how you feel during and after the pre-breath. It will help you determine if your scrubber has been properly packed, if you forgot to change the absorbent, or if the canister is completely empty!!! Also if your mouthpiece valve disk (mushroom valve) is in place and working properly. While some of these things may sound silly, very experienced divers have jumped into the water with either no absorbent, or with completely used up absorbent. The pre-breath is a minimum of 5 minutes as this much time is required for our bodies to tell us that something is wrong. The bottom line is that this 5 minute pre-breath confirms your system check has been done and that all is working.

DIVERS SHOULD FOLLOW THE PREDIVE CHECKLISTS BEFORE EVERY DIVE AND KEEP A COPY OF THE CHECKLIST WITH THE KISS REBREATHER AT ALL TIMES!!

KISS GEM 5 MINUTE PRE-BREATH

As per the check sheets, the pre-breath is done after the diving system is assembled and all other tests have been completed.

To do a pre-breath on the KISS GEM, ensure that the cylinder is open, your display is turned on, and put the mouthpiece in your mouth and start breathing. Plug your nose so that you don't accidently inhale fresh gas into the loop. Also, have a timer handy so that you can be certain that you pre-breath for at least 5 minutes. Plan to either wear the GEM or stand close to it, for good work of breathing.

The higher the nitrox mix to be used, the less likely it is that you will be breathing a hypoxic mixture while doing the pre-breathe. ***To be safe, you should plan on monitoring your PPO2/FIO2 gauge continuously while doing this exercise. In the event that the percentage falls below air, you should fully exhale out of your nose (don't inhale!) and then draw fresh nitrox into the breathing loop using the T-Piece second stage.***

The pre-breath should be done on the surface in a safe environment. It should not be done while in the water or where you are in danger of falling in the water.

Predive Checklist

NAME: _____ DATE: _____

DIVE LOCATION: _____ PLANNED DEPTH: _____

TODAY'S DIVE NUMBER: _____

INITIALS ↓ ***YOU MUST CHECK YOUR PPO2 DISPLAY OR COMPUTER EVERY MINUTE DURING THE DIVE!!!!!!!!!***

____ I have analyzed the gas in my cylinder and it is _____% nitrox.

____ My nitrox mixture of _____%, is appropriate for the dive that I am planning.

____ My nitrox mixture of _____% gives me a maximum operating depth (MOD) of _____.

____ My nitrox mixture of _____% which gives me a maximum operating depth of _____, is within my certification level.

____ My dive buddies name is _____

____ I have attached my regulator set to my cylinder; I have verified that my regulator is working properly and that my gauges are also working properly.

____ I am using a dive cylinder which has an appropriate amount of gas in it for the dive that I am planning, including enough gas to bail out, if necessary. It also has enough gas to safely provide lift for my wing.

____ I have the necklace for my bailout regulator attached to the mouthpiece so I can hang it around my neck. Alternatively, I will place my bailout regulator on my chest area as instructed during my open water class.

____ I have installed my sensor, and reattached the sensor housing and display.

____ My sensor is _____ months old.

____ the millivolt reading on my sensor is _____

____ I have calibrated my display and verified the reading in nitrox.

____ My display uses a _____ battery and it has _____ hours left on it.

____ My absorbent has been used for _____ hours, which means that I have _____ hours left on it.

____ I am using an absorbent cartridge which is fresh and still appropriate for diving.

____ My dive computer, if I am using one, is in perfect working order. If I am not using a computer, I will use a timing device which is in perfect working order.

____ If I am not using a compatible GEM computer, I will use air tables & a timer to calculate my no deco time.

____ The battery voltage on my computer is _____

____ My buddy and I have practiced bailout procedures and know what to do in an emergency.

____ My surface interval before this dive is _____

____ I am using _____ lb/kg of weight.

____ I have assembled the GEM canister & diving system following the directions in the retail manual. I have verified that all hoses and fittings are properly secured and tightened.

____ My CNS before this dive is _____. My OTU before this dive is _____.

____ I will check my PPO2 display or computer, to monitor my breathing gas, every minute during the dive.

This pre-dive check should be done after your unit has been assembled, your scrubber canister filled, lungs attached, all fittings/hoses checked & secure, etc. It should be done prior to entering the water.

INITIALS ↓

____ I have ensured that the Mushroom Valve on the Valve Plate is flat and smooth. I have ensured that it is facing the correct direction so that gas flow is going left to right.

____ I have done a mouthpiece & lower loop hose positive and negative test on the left side Valve Disk and the right side valve assembly and have ensured that they are working properly. I have visually inspected the Mushroom valve and it is not damaged.

____ I have verified that the discharge ports on the mouthpiece are discharging properly and that the diaphragms are in good condition.

____ With the mouthpiece in the closed position, I have exhaled to ensure that the vent hole is unobstructed and is venting properly.

____ I have turned my display on.

____ I have opened my cylinder and checked that it has the appropriate amount of gas for the dive that I am planning and it also has enough gas in it to bailout, if necessary. It also has enough gas to safely provide lift to my wing.

____ After opening the cylinder and noting the amount of gas for the dive, I have turned the cylinder off and watched the pressure gauge to verify that there isn't a leak. I have opened the cylinder valve after this test is completed.

____ I have calibrated my sensor in air. (If I am using a Jetsam display, I will ensure that it is in the "ON" position, NOT the calibrate position before I enter the water.) I have verified the sensor reading with the analyzed contents of my cylinder.

____ I have done a negative test on the fully assembled KISS GEM and it maintains full vacuum pressure.

____ I have done a positive test on the fully assembled KISS GEM and it maintains full pressure.

____ I have ensured that my wing inflation and drysuit inflation (if used) are working properly. I have ensured that that I have an appropriate amount of gas in my cylinder for the dive, for my bailout and for wing/drysuit inflation. I have ensured that the V-strap on my CL cover is in good condition.

____ I have pre-breathed my GEM for at least 5 minutes before entering the water. While I am pre-breathing the GEM, I will be watching my displays carefully and pressing the T piece second stage to add nitrox to the loop when required. I will not let the PPO2 drop below 0.21/air.

____ I will double check that my cylinder is open, my display is on and my computer is properly programmed before I enter the water.

____ My counterlungs are properly positioned as per my training course.

____ Once I am in the water, I will do a bubble check with my buddy to double check that there are no leaks in my diving system.

ALWAYS ENSURE THAT YOU HAVE ENOUGH GAS IN YOUR CYLINDER TO CONDUCT YOUR PLANNED DIVE, FOR BAILOUT AND ALSO FOR WING/DRYSUIT INFLATION!!!

POST DIVE CHECK LIST - GEM DISASSEMBLY

After diving the KISS GEM, your diving system will need to be disassembled and cleaned. The following procedures should be followed:

1. Turn off your cylinder and remove the first stage. Rinse your regulator set in fresh water.
2. Remove the lower loops hoses and mouthpiece. Remove the cir clips, (put them someplace safe) from the mouthpiece and pull the loop hoses free. Set aside for rinsing and sanitizing.
3. Loosen the counterlung rings and pull the T pieces from the lungs.
4. Remove the upper loop hoses from the scrubber head. From the left side inhale loop hose, remove the sensor housing and sensor. Set aside for rinsing and sanitizing. Sensor and housing to be replaced after the hose has been sanitized and is dry.
5. Remove the canister from the mounting bracket. Spin open the canister, discard the used up cartridge, and set aside the parts for rinsing and sanitizing. If you have difficulty in opening the canister, have your buddy assist you. The head will spin free easily with you holding the base and your buddy turning the head.
6. Detach the counterlung covers, and remove the counterlungs from the covers. Set aside for rinsing and sanitizing.
7. Remove the Wing/harness from the cylinder. Rinse in fresh water.

Your KISS GEM components should be rinsed and sanitized after diving. In order to disinfect the components, a product such as Virkon must be used. Virkon is a product that comes in powder form which must be mixed with water. Follow the package directions for use.

After sanitizing, rinse all components in fresh water. Set out to dry. Counterlungs can easily be dried by turning them partially, inside out.

Once your components are dry, the unit may be stored for future use.

TRAINING

As with most rebreathers, training is a requirement for purchasing a KISS GEM diving system. Training can be done prior to purchasing a unit or in conjunction with purchasing a unit.

KISS courses are set up through a number of training agencies. Links to their websites are available on the Jetsam website at www.kissrebreathers.com. The instructor you choose must be a KISS GEM certified and insured instructor that works with one of these agencies.

During your KISS rebreather training you will be required to learn and do various skills. It is very important that during your course, these skills are learned and mastered. And after training, reviewed on a regular basis.

It is important that all the skills covered in your training course are learned and mastered. Under no circumstances should anyone dive a KISS GEM diving system until they have completed an approved training course.

On the following page are the KISS GEM minimum training standards. These are the minimum standards that students should expect. The training agencies may add to these standards.

KISS GEM MINIMUM TRAINING STANDARDS

GENERAL DIVER REQUIRMENTS:

- Diver must be a minimum of 18 years of age.
- Academic portion minimum of 6 hours. This includes classroom and briefing.
- Equipment overview and maintenance, minimum of 2 hours.
- Minimum of 1 hour confined water.
- Minimum of 200 minutes and 5 open water dives.
- Minimum of 2 dives deeper than 15m/50 feet.
- Open water certified students have a depth limit of 60 18m/60 feet.
- Advanced open water certified students have a depth limit of 30m/100 feet.
- Minimum course duration is 2 days, however we recommend 3 days.
- Student to Instructor ratio for academic portion, unlimited as long as practical.
- Student to Instructor ratio for confined water, 4 students per active instructor.
- Student to Instructor ratio for open water, 4 students per active instructor. This ratio should be reduced as required if the situation and/or environment conditions call for it.
- It is recommended that the student finish the training course within 6 weeks of the starting date.
- It is recommended that the student have access to or purchase a unit within 3 months of completing the training program.
- Safety stops must be conducted on all dives; minimum 3 minutes at 6m/20 feet.
- Depth limit not to exceed the diver's current certification or experience levels or the limit imposed by the training agencies course outline.
- Written exam: pass of 80% or higher.
- Only approved training agencies can teach KISS rebreathers.

CROSS OVER INFORMATION:

A diver who is certified by a KISS approved training agency on an approved semi-closed rebreather, with current experience (must have a dive on the approved SCR within the last 3 months), must meet all the KISS GEM training standards. The exceptions are the dive numbers and times; see below. The 60 minute confined water is mandatory.

A minimum of 3 dives and 120 minutes of open water training is required.

EQUIPMENT REQUIRED:

- KISS GEM diving system, unmodified and in good working condition.
- Approved CO2 cartridge, such as ExtendAir.
- Depth gauge & bottom timer, or dive computer.
- Mask, fins & weight.
- Line cutter or knife.
- Wetnotes or slate, and pencil

- Exposure suit suitable for the required dive.
- Oxygen analyzer or access to one.
- GEM manufacturer's owners manual.
- Printed checklists from the GEM owners manual.
- Training material as outlined by approved training agencies.

EQUIPMENT FAMILIARITY:

The following objectives need to be completed by the diver.

- Fully disassemble and reassemble the GEM diving system, with reference to the Jetsam user's manual, paying attention to O-ring location and condition. This must be done a total of 6 times during the class.
- Assembly & scrubber packing procedures: Divers must use the Jetsam manuals and checklists to assemble their unit and carry out the assembly checks.
- Lung volume control system: Divers must understand how the lung volume control system works. Proper adjusting will be done in the confined water session and on going adjustments during the course. By the end of the course, the diver should be familiar with the adjustment techniques of the lung volume control system.

UNIT OPERATION:

The diver must demonstrate proficiency with the following skills:

- Pre-dive checks before every dive, minimum of 6 times.
- Proper assembly of unit prior to every dive, minimum of 6 times.
- Proper packing of scrubber canister, minimum of 2 times.
- Analyze gas prior to dive.
- Pre-dive planning and execution of planned dives.
- Understanding of how GEM works and the necessity of diving the required nitrox mixtures and why shallow water and top side breathing rules are in place.
- Calibration and verification of oxygen sensors, (calibrate in air, verify in oxygen).
- Proper fitting and adjustment of the lung volume control system. Also proper adjustment of this system while underwater.
- Pre-breathing for 5 minutes before every dive.
- Adjust starting orientation of mouthpiece topside and re-adjust underwater.
- Bubble checks at the start of every dive.
- Open loop or open circuit anytime when at 20 feet (6m) or shallower. The exception is confined water training, where a minimum of 40% (50% recommended) is required, with no breathing on GEM unless submerged.
- Buoyancy and trim control during the dive and during the safety stop.
- Mouthpiece familiarity: changing from SCR to OC and back again. Understanding how to purge the mouthpiece prior to breathing on the GEM.
- Practice breathing in different positions and note the change in the work of breathing in each position.
- PPO2 monitoring and control, once per minute during both confined water and open water.
- Demonstrate appropriate responses to: Hyperoxia, Hypoxia, Hypercapnia, gas loss, Sensor failure, dive computer failure, PPO2 display failure, water in loop.
- Post dive cleaning of unit.

DURATION OF CARTRIDGE

The durations for the KISS GEM cartridge are based on independent testing done at the Micropore Inc. test facility. The testing was done using the Micropore 5" large bore cartridge, part #SR-0801C. Multiple tests were conducted, including testing to the CE standard of EN14143. (ensure that you use the correct cartridge; the part numbers on the various Micropore cartridges are very similar)

The first test was done in accordance with EN14143. The parameters for this standard are depth of 40 m (131 ft), water temperature of 4° C (39.2° F), 40 liter/minute breathing rate, and 1.6 liter of CO2 generation.

DEPTH	TEMPERATURE	BREATHING RATE	DURATION
(EN14143 Standards) 40 meters/131 ft	4°C/39.2°F	40 liter/minute RMV	68 Minutes

In order to better explain what these results mean, below is a table outlining RMV's, CO2 generation, and how long they are sustainable.

Breathing Rate	CO2 Generation	Explanation (CO2 = 85% of VO2 and VO2 = 4% of RMV
22.5 liter/minute RMV	0.77 lpm CO2	Most relaxed divers, doing little or no swimming, can sustain an RMV of 22.5 lpm almost indefinitely.
37.5 liter/minute RMV	1.28 lpm CO2	A physically fit diver, taking slow deep breaths while swimming hard can sustain an RMV of 37.5 lpm for a few minutes.
75 liter/minute RMV	2.55 lpm CO2	A diver with the conditioning of a Navy S.E.A.L., doing severe work, can sustain an RMV of 75 lpm for one or two minutes.

Based on the various tests conducted, the diving durations for the KISS GEM Micropore cartridge are as follows:

- Cold water, 4°C/39.2°F: 2 hours
- Moderate water, 10°C/50°F: 3 hours
- Warm water, 24°C/75°F: 4 hours

RECOMMENDED SPARE PARTS

The following is a list of recommended spare parts & accessories, for KISS GEM owners:

1. Scrubber head, hose attachment tower, with O-ring
2. V-strap assembly for counterlung covers
3. Mouthpiece cir clips, 2
4. Mouthpiece discharge port diaphragm and button set
5. Base cross piece
6. Canister mount lever
7. Bailout regulator necklace
8. Weight keepers for the harness
9. Weight keepers and D- ring sets, for the harness
10. O-ring set: 1 x scrubber head, 1 x sensor housing, 2 x hose attachment tower, 8 x hose stub, 4 x mouthpiece hose attachments, 2 x counterlung O-rings
11. Display battery & O-ring, Jetsam display
12. Spare Shearwater GEM battery
13. Sensor housing and Jetsam single display or computer cable

SPARE PART SERVICING

***NOTE: It is recommended that all servicing for the KISS GEM be done by your dealer or instructor. For those who feel that they would like to be able to install the spares listed on the previous page, it is strongly recommended that instruction be take from your dealer or instructor to ensure that the repairs are done correctly.**

HOSE ATTACHMENT TOWERS

The hose attachment towers have been secured using a tool. You may need a strap wrench in order to remove this part.

After you have removed the old Tower, lubricate the O-ring for the new Tower, place it around the threaded area, and turn the Tower into the head. The Tower must be properly secured. Be certain to securely tighten it. Use a strap wrench for this. The Tower should not be easily removed by hand.

***WARNING: if the Tower is not secured properly, then the action of attaching the loop hose may cause the Tower to turn unexpectedly. If this happens and you do not notice it, there will be a leak!! This could cause serious injury or death!**

MOUTHPIECE DISCHARGE PORT DIAPHRAGMS & BUTTON

To change the discharge port diaphragm, centre the diaphragm on the ridge and attach the button and screw. Turn the screw all the way in, and then back it off half a turn. Using either the Allan wrench or your fingers, rub the diaphragm gently to ensure that it spins freely and isn't caught or bound. Tighten screw down all the way.

The button should be positioned so that the wide area is at the top. This allows the diaphragm to move freely.

Ensure that the diaphragms are laying flat. If they are not flat, water may enter the breathing loop.

Exhaust Valve, T-Piece Second Stage & Work of Breathing

In this section, you will find information about the exhaust valve, T-piece 2nd stage and work of breathing. We have helpful hints and trouble shooting. The Apeks exhaust valve and the T-piece 2nd stage work in harmony. If you are having difficulties with either one, it makes sense to check both.

BUBBLING APEKS EXHAUST VALVE

There are several things that can cause this problem. Over the next two pages, 5 situations are listed and described.

1. ***The exhaust valve is not tightened down all the way or there is debris in the valve.*** To tighten the valve, simply turn the dial clockwise. To remove debris, open the valve all the way and rinse well. If you need to take the valve apart, see the instructions below.

***NOTE: Please take care to not spill anything down the centre scrubber tube. If this happens, and you go upside down, the item will likely find its way inside your apeks exhaust valve which will cause a leak!!**

2. ***Counterlung bungee is cinched down to tight, the V-strap is too tight, or the lung covers are too small.*** The loop volume is at its maximum so the counterlungs are completely full. As nitrox is added, the exhaust valve will purge. The first thing to check is that the bungee on the sides of the covers is all the way loose. Next insure that the V-strap is not to tight. Lastly, if the diver has an exceptionally large lung volume, then the diver may need to upgrade to larger lung covers.

It should be noted that if the lungs on the unit are full, and you then open the mouthpiece and start breathing while on the surface, you may find that the gas is difficult to exhaust through the exhaust valve. If this happens, it will feel like you can't properly inhale or exhale fully. This generally happens after a diver does his pre-dive testing and pre-breathe and the unit's lungs are inflated. To solve this problem, simply exhale gas out of the loop through your nose. Underwater, the exhaust valve will dump the gas for you or again, you may exhale out of your nose to reduce the loop volume.

3. ***Stretch the valve's spring.*** If the valve is clean and it was tightened all the way, you may need to stretch the valve spring. To do this, turn the valve counter clockwise as far as it will go. Do not force it. When you can not turn it anymore, stop. There is a tab which must be lifted in order to allow the valve to be opened. It is the small tab on the side of the valve. Very carefully lift the tab with a dental pick and then carefully continue to turn the valve counter clock wise. The tab will only need to be lifted while you turn the valve past it. Then it can be released and you can continue to open the valve. This is easiest to do if the bottom of the valve is pushed into the side of your knee. Then as you lift the tab, push on the top of the valve while continuing to turn it counter clock wise. Be very careful to not break the tab!! If you do, the entire valve is garbage.

Once the valve is open, you will see a small white button sitting on top of the spring. Carefully remove the button and set it aside (remember which way it came out). Remove the spring and stretch it out a slight amount and then replace it. Re-insert the button, replace the top of the valve and tighten.

As you are tightening, push in on the valve as you turn it. This will aid in turning the valve past the tab. If required, use the dental pick to lift the tab slightly. When you pass the tab, you will feel it click. Tighten all the way and ensure that the valve is working properly by pushing down on the top. Look inside the valve. You should see the spring compressed with the white button sitting evenly. Then, unscrew the valve; ensure that it stops turning when it reaches the tab. Your valve is now ready to be replaced on your KISS GEM.

4. ***Check the IP on your first stage.*** It should be between 135 and 145 psi.

5. ***First stage needs to be serviced.*** If the first stage is not functioning properly, it could have a leak, which could cause excess diluent gas to flow into the rebreathers loop.

T-PIECE SECOND STAGE IS DIFFICULT TO TRIGGER

When upgrading to the GEM there is a transition, though brief. You must be aware of your body position. In your first few days of training, you will find the horizontal position offers the easiest breathing. When in a vertical position you may notice slight upward pressure on the mouthpiece. By the time you finish your training program, it is unlikely that you will notice the difference.

Divers will be able to adjust the T-piece second stage by turning the knob on the side. This can be done while underwater. Each diver will discover how they prefer the Mikron to breath and set the knob accordingly. Note that if the divers have the knob turned all the way out, the 2nd stage may free flow. To prevent this, simply have them turn the knob back down.

Also, check the IP on the first stage. Ensure that it is in the correct range, 135 to 145 PSI.

WORK OF BREATHING

There are several things that can cause a high work of breathing.

1. ***Too much gas in the loop.*** This can happen if the loop has gas in it, the mouthpiece is closed and then the diver puts the mouthpiece in his mouth and blows more gas into the loop. The exhaust valve will probably not release any gas if the diver is on the surface. It will feel like you can not get a full breath and the breathing will be difficult. Dump part of the loop (exhale out of your nose). If this is the cause, you will notice the difference immediately. Excess gas can also enter the loop if the Mikron is not adjusted properly. The Mikron is factory shipped at the correct setting; there is no need to adjust it. If too much gas is being added to the loop, then the adjustment knob should be adjusted.
2. ***Check the position of the counterlungs.*** Proper positioning of the counterlung covers is imperative. Remember, the lungs should be chest mounted, not shoulder mounted. The T-pieces should sit at the centre chest or slightly above center chest. If the lungs are too high, the work of breathing will be greatly increased and the T-piece second stage will not add gas properly! Also, the counterlung covers must be properly secured to the harness system. If they are loose and floating up, the work of breathing will also be very difficult. Currently, the KISS GEM units are being shipped with a 20" LP regulator hose. Earlier units were shipped with a shorter hose. While the shorter hose works for some divers, a longer one is required for anyone with either a large chest or who is tall. If the LP hose is too short, it will pull on the T-piece causing it to sit higher then it should. This will certainly effect the work of breathing. Also, ensure that the GEM canister is mounted high enough. If it is too low, it will pull the T-piece and counterlung up and out of position.

3. ***What is your position in the water?*** As mentioned above, when in a horizontal position, the KISS GEM will have the best work of breathing, with vertical being slightly more difficult. This will be most noticeable at the start of the training course. After several dives, most divers hardly notice the difference.

Warranty

The KISS Rebreather LLC, rebreathers, boosters, displays and mouthpieces are warranted for the period of 1 year. All warranty and service work should be returned to our warehouse.

- The warranty applies to the original owner only.
- Mistreatment or neglect of the products will void the warranty.
- Parts not covered by the warranty are batteries and sensors.
- Circuit boards and meters sold separately (without the case) are not covered under the warranty.
- Warranty cards shipped with rebreathers, boosters, displays and mouthpieces must be completed and re-turned to KISS for the warranty to be valid.
- Completed liability waivers must be on file for the rebreather warranty to be valid.
- Modifications to the KISS rebreather will void the warranty. Only approved modifications are allowed.
- We are unable to determine if the parts are covered by the warranty until they have been inspected.

PROCEDURES FOR WARRANTY & SERVICE WORK

Prior to shipping, please contact Mike Mizell at kissrebreather@yahoo.com to inform of the shipment. You will need to print out the warranty/service form, fill it in and ship it with your item. This form can be obtained from the KISS website at www.kissrebreathers.com

Your product should be returned to us with the following items:

- A copy of your original purchase receipt.
- The warranty/service form.

Carefully box up the items being returned. KISS is not responsible for any damage incurred during shipping. Ensure that the items are properly padded and shipped in a strong box, and also that it is well sealed. (Don't forget to insert the above mentioned paperwork!) Please write in large clear letters, WARRANTY RETURN, MADE IN USA on the outside of the parcel and on any paperwork. This is important as otherwise USA Customs will charge us a brokerage fee and duties.

The parcel may be shipped via the post office or a courier. All shipments must be prepaid and insured. Any fees that KISS incurs must be paid for by the shipper. This includes duties and brokerage fees for the item re-entering USA. Note that if you ship via a courier such as UPS or Federal Express, there will be a broker-age fee, even if there are no duties. While there may be no charges for the warranty work, this brokerage fee must be paid for by the shipper.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