KISS REBREATHERS
KISS CLASSIC EXPLORER MANUAL

READ THE MANUAL!!!!

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

ORCA SPIRIT OWNERS SHOULD READ THE OS MANUAL; SPORT KISS OWNERS SHOULD READ THE SPORT KISS MANUAL; KISS CLASSIC, & KISS CLASSIC EXPLORER OWNERS SHOULD READ THE KISS CLASSIC EXPLORER MANUAL; HOLLIS EXPLORER OWNERS SHOULD READ THE HOLLIS MCCR CONVERSION MANUAL, AND USE IT IN CONJUNCTION WITH THEIR HOLLIS MANUALS. ANY DIVER WHO HAS UPGRADED COMPONENTS TO THEIR REBREATHER SHOULD BECOME FAMILIAR WITH THOSE COMPONENTS, AND RECEIVE TRAINING.

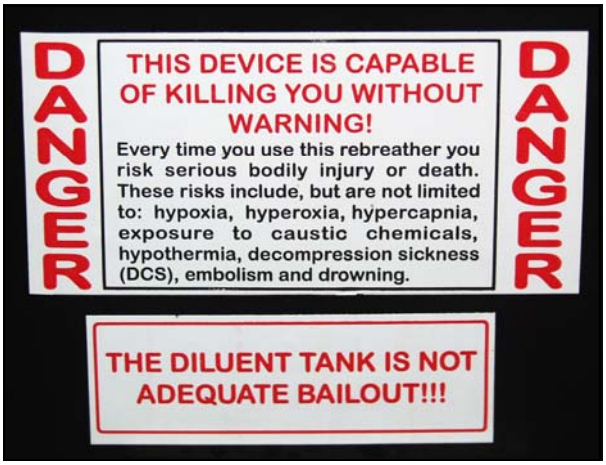
THIS SHOULD BE DONE PRIOR TO DIVING OR SERVICING THIS UNIT!!! SPECIAL ATTENTION SHOULD BE PAID TO ALL NOTES &/OR WARNINGS; THEY MUST BE READ AND UNDERSTOOD!!!! FAILURE TO DO SO, MAY CAUSE SERIOUS INJURY OR DEATH!!!!

YOU MUST BE A LEGAL ADULT IN THE AREA IN WHICH YOU LIVE IN ORDER TO PURCHASE AND DIVE A KISS REBREATHER.

As with all scuba diving equipment, your KISS rebreather components should be serviced annually by a trained 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
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 Classic KISS rebreather is not a joke. Before beginning your dive, you must consider the risks involved. The Classic KISS 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 Classic KISS 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 mind-set, 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 Classic KISS 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 Classic KISS. The diver must complete a proper training course covering the maintenance, testing and operation of the 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 bailout gas and having the training and skills necessary to utilize the bailout system can reduce, but never eliminate, the risk of equipment failure.

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The photographs in this manual were taken by Curt Bowen, Alan Studley, Doug Ebersole, and Kim Mikusch.

INFORMATION

Welcome to the Classic KISS users manual. This manual covers a variety of information. It will assist you in preparing a new unit with instructions on O-ring insertion and general assembly. It will also provide you with information on adjusting and servicing your rebreather. It is important that this manual be read if full prior to diving the unit.

Purchasing a rebreather is a big decision for most divers. KISS Rebreathers would like to help you make the best decision possible. We want you to choose a unit which suits your diving, your budget, and where you get the features that you desire in a rebreather. You will, no doubt, be diving this rebreather for many years and we would like you to think about your decision carefully. When analyzing the data try to think beyond your upcoming training course and the next few dives. Try and think about the long term benefits or problems you may experience.

There are many questions that you should ask prior to making a decision. The answers to these questions will help you understand how the rebreather works, and help you focus on what features are important to you. If you don't get an answer from your dealer or instructor, I would suggest going directly to the manufacturer. I have listed many questions below with my answers. Any questions or concerns about my questions and comments are welcome. Please feel free to email or call.

Mike Young, Owner

30 QUESTIONS….

1. Does the manufacturer provide clear and detailed information on what the unit comes with, what it does not come with, and what the cost is?

The KISS brochures and price sheets outline what is included and what isn't. But recently I have redesigned them so that the information is even clearer. In talking with divers, I have found that many people have been frustrated with hidden costs on other units. We at Jetsam don't want to fall into that category and I have made an effort to be very clear!!

2. Does the manufacturer have a proven track record on excellent customer service and will they listen to your comments and concerns? Will they answer your questions honestly and will they be straight forward?

The KISS rebreathers have been selling since 1998 with the first units designed in 1996. Jetsam Technologies Ltd. has proven to have excellent customer service, and we always love to hear from KISS divers. Any comments and concerns are looked at and responded to immediately. I know that every unit has features that divers like, and some that they don't prefer. Any questions that you ask us about the features on the KISS rebreathers will be answered truthfully and we can go over the pro's and con's of all the features together. (Every rebreather on the market will have pro's & cons)

3. How many components make up the rebreather? How much is there to go wrong or break? If something does break, is it easily repairable and can it be done at a reasonable cost?

The KISS rebreathers are easily the most straight forward and simple units on the market. We work with the philosophy that anything and everything will eventually break. And when you take a piece of equipment into water, especially salt water, that could happen sooner rather than later. Due to this, we have built the KISS rebreathers to have the least amount of components possible and to make the components that we use durable and easily repairable if required. You can choose to do all repairs yourself, have your local KISS dealer do them for you, or send your components back to us.

4. Do you need to send any components back to the manufacturer for regular servicing?

All parts of the KISS units can be serviced by either the diver or by an authorized dealer. Should you choose to, parts can be returned to Jetsam for servicing.

5. Can I modify the unit, should I choose to do so?

Over the years, KISS divers have made various modifications to their units. The position of Jetsam Technologies Ltd. is that modifications to the KISS rebreathers are extremely dangerous and are strictly prohibited. Any user making their own modifications are violating the terms of the End User Acknowledgment and Waiver and does so at their own risk. It has come to our attention that some modifications are deemed unsafe and dangerous. As a result we have had to change our policy to only allow approved modifications.

6. How far from home are you comfortable taking your rebreather and still feel confident that you will be able to dive? Is your spare parts kit and tool kit small and easy to carry and transport?

The KISS rebreathers are known to be the most reliable rebreathers on the market. KISS divers rarely miss a dive. The units are so robust that it isn't often that something goes wrong. Also, spare parts are well priced, easy to install onto the units and most of them fit into a small zip lock bag!

7. What happens if you damage your display? Are backups reasonably priced and easy to carry? Is it a reasonable cost to repair the damaged display?

Unlike fully electronic units, the KISS rebreathers have affordable displays. All of our display options are reasonably priced and easy to install. You can choose to purchase any of our displays as spares. They are small and light which makes them easy to pack for a trip. The Jetsam display is user repairable, or it can be sent back to us for a quick repair at a reasonable cost.

8. Does the rebreather you are looking at purchasing offer you a variety of displays or the option of buying it with no display? Are they giving you choices?

The KISS rebreathers are available with many display options. You can decide for yourself which features are important to you. Or, you can opt to buy your KISS rebreather without a display system. With any display system that you choose, remember that there are pros and cons. Questions to ask include, what is the cost, how easy is it to change or charge the battery, how durable is the case, and probably most importantly, how easy is it to calibrate the display. If you buy a display system that is not approved by Jetsam, you must be certain that it works appropriately!

9. Is the unit capable of keeping a good positive and negative seal? Or is it always a struggle to keep the unit water tight?

With the KISS rebreathers, you know that you should have both a good positive and negative test. If you don't, there is a leak. If you aren't sure if the test is good, then you probably have a small leak. Testing is easy to do, as both the lungs and loop hoses are accessible and are the key components which need to be watched while testing. If one of the tests fails, it isn't difficult to find the leak as the units have a simple design.

10. Are the manual addition gas valves easy to access, and can you choose where to run the hoses and valve so that it suits you?

The gas addition valves on the KISS rebreathers are designed so that they sit over your shoulder. The valve can be accessed with either hand. Also, it can be secured to any part of your front area. Additionally the hoses can be swapped around so that the valve comes around your side, by your waist and secured in that area. Again, this way the valve can be accessed by either hand. KISS divers can determine what suits them best and dive accordingly.

11. How easy is it to assemble and test the unit? Is it complicated or simple?

The KISS rebreathers are well known for their simplicity and ease of assembly. Whether you are preparing for a dive, or cleaning your unit, you will find that your pre-dive checks, or changing your absorbent and washing your loop will take only minutes.

12. How many points of entry to the loop are there? Are there many fittings and tubing? Are they well sealed? If something goes wrong, is it easy to fix?

The KISS rebreathers have limited entries to the breathing loop. This means that leaks are easier to find, and leaks are less likely. Also, all O-rings are easy to clean, and easy and quick to change if required to do so. The Sport has mostly single O-rings seals, and the Classic has mostly double O-ring seals.

13. Is the unit easy to pack in a carry-on or suitcase? Does it travel well, or are parts at risk of damage? If there are delicate parts, are they easy to protect in the suitcase? Does it take a lot of time to get the unit ready to dive once you are at your destination?

The KISS rebreathers are easy to travel with. They are 2 of the lightest rebreathers on the market. For travel, you have a choice on what you would like to put in your carry-on baggage or in your checked luggage. The entire Sport unit can fit into a carry-on bag. (Cylinders excluded). The Classic head, displays and other key parts can also fit into a carry-on bag. But, due to the durability of the units, they can both easily be packed into checked luggage.

14. What kind of a rebreather diver do you want to be? Do you want to be in charge of the rebreather, or do you want a unit which takes control?

The KISS rebreathers have a mechanical system which moves the oxygen through the system. Upon the occasion when more oxygen is required, a simple push of the oxygen button will deliver it to you. As you are in control of the rebreather, you will be aware of what your PPO2 is, and should notice any problems as they arise. KISS divers are less likely to become complacent as they know they need to monitor their system.

15. How many tools are required to maintain the unit, or clean and prepare the unit? Are any of them specialized so that you must buy them from the manufacturer?

The KISS rebreathers don't require any special tools that can't be purchased from your local hardware store. We ship the unit with a nut driver, and the Classic also with a special KISS tool. (You can also buy this in your local store should you need another). A basic multi tool and adjustable wrench is all that most KISS divers carry with them. If you dive the Jetsam triple display, you will need to carry a small jewellers screwdriver for calibration. This is included with your unit also.

16. How easy is it to access the counterlungs? Are you able to remove them for cleaning and inspection, and to let them dry properly? Are replacements available at a reasonable cost?

The KISS rebreathers both have easily accessible counterlungs. They are both back mounted lungs and both of the KISS units provide the diver with the option of matching their own lung volume to the rebreathers lung volume. This makes for exceptional buoyancy control at all depths, even in water as shallow as 2 or 3 feet!! The Sport lungs are conveniently located at the bottom of the scrubber canister. The Classic lungs are inside the protective counterlung case. As there are access holes in the case and the manifold is removable, these lungs are easy to access for removal and cleaning. Also, as you can see them (sport, feel them in the case) you will be able to easily determine if your positive and negative tests are working as they should. Watching/feeling the lungs is a very important part of the pre-dive testing. A great feature with the back mounted lungs is that your chest area is clear of clutter. This is one of the reasons that explorers and photographers choose to dive the KISS rebreathers.

17. Does the unit require special absorbent or a pre-packaged canister style absorbent? How easy is it to source while at home? What about when you are on holiday? Can you ship the absorbent to your destination?

The KISS units were tested with Sofnolime 797 grade. As this is the only absorbent we have tested, it is the only one we can recommend. Please see the back of the manual for more information on absorbent and run times. Absorbent can easily be obtained at most dive resorts and is easy to pack for travel, should the need arise. The Classic KISS has an axial flow design.

18. Are there any special batteries or power packs required? If yes, are they easy to get and are they available at a reasonable price? Do you need to carry a charger?

The only batteries in the KISS rebreathers are in the displays. The Jetsam triple wrist display uses 3 photography batteries. They should be readily available worldwide, but some have had difficulty in obtaining them. They are available for purchase from Jetsam. The VR pendent display uses a AA size battery. Lithium is preferred, but if not available, it will run on a standard AA battery. The VRx has a built in rechargeable battery which charges in a short time period. A charger is required & is included.

19. Does the unit have first stages which are easy to repair and source for parts?

The KISS rebreathers are sold with top quality DIN first stages. These first stages and their parts are available world wide. They are known for their superior performance and also are known to be straightforward to service.

20. Does the unit you are looking at come standard with a bailout mouthpiece?

The KISS rebreathers are always shipped with a bailout mouthpiece. We feel that this is one of the most important features of a rebreather; the ability to bailout without removing the mouthpiece from your mouth. If our bailout mouthpiece is used in conjunction with our off-board accessory, bailout gas can be accessed without using the redundant bailout regular on your stage bottle.

21. How does the ADV work? What provisions have been made to deal with failures such as free flow?

The KISS ADV system, if not working properly will either free flow or not flow at all. The system is very simple and easy to keep working. This component should not be disassembled unless there is a problem. The most difficult part is proper reassembly. If you follow the proper reassembly procedures, then it is easy. In case of the ADV not delivering gas, diluent can be added to the breathing loop via the mouthpiece. In case of the ADV delivering too much gas, the tank valve can be turned off, and opened as required. (following proper training procedures is recommended with this type of gear failure) . The KISS ADV system works in a hands free mode. This means that a busy diver dropping in the water isn't required to push a button to get a breathable volume in his loop. All KISS divers need to do is inhale & the diluent gas is delivered.

22. Where will you get basic replacement parts such as O-rings? Does a spare set come with the unit? If you need to purchase them, does the manufacturer offer them at a reasonable fee and do they make the O-ring numbers available to you so you can source your own?

When you buy a KISS, 1 spare bag of O-rings is included and additional spares can be purchased at a reasonable price from us or one of our authorized dealers. Also, we list the part numbers for the O-rings in the back of the manual so that you can source your own, should you choose to.

23. What type and size of cylinders will work with the unit? Are you locked into a certain size or type of cylinder due to a cover for the unit, or because of the valve style? If yes, how will this effect your traveling? Will you need to carry the tanks with you or will you be able to rent cylinders at your travel destination?

Any type of standard aluminum or steel cylinder with a DIN valve can be used with the KISS rebreathers. The Classic KISS can be used with the standard 13 to 19 cu.ft. cylinders or can even handle larger ones. If larger cylinders are used, you will need to upgrade your tank mounting system. The KISS rebreathers have easily accessible cylinders and mounting areas.

24. Is the oxygen add valve reliable and a well tested design?

The KISS oxygen add valve design is tried and tested. It is the same design that has been used since we first started selling rebreathers, over 10 years ago. The body design has been updated a few times, but the working parts are the same.

25. How is off-board gas added to the rebreather, for either bailout or for multiple gas dives?

If either diluent gas or oxygen needs to be added to the system, it can be done with the use of the off-board accessory. Those doing technical dives, where being able to add redundant gas to the system is a must, find this a simple, reliable system.

26. What kind of diving are you planning on doing and is the unit that you are looking at appropriate for this type of diving? Is it flexible and will it meet all your diving needs?

The Classic KISS is an exceptional unit for explorers of all kinds as it is extremely reliable and flexible. Cave, wreck, and deep divers choose it as it is easy to travel with, light enough to carry into remote areas, and for those that just want to do a basic reef dive, it's small and easy to use. The Sport KISS is very small and light weight and will also take divers past regular recreational limits. Many photographers choose the KISS units due to ease of use, size, and weight.

27. Does the manufacturer have an excellent safety record?

Jetsam Technologies Ltd. has one of the best safety records for rebreather manufacturers.

28. Is the unit supported worldwide with both divers and a dealer network?

Jetsam has a world wide dealer network, and also has divers world wide. There is no difficulty in finding dive buddies in any part of the world.

29. Is the manufacturer ISO registered?

Jetsam Technologies Ltd. is an ISO 9001:2008 registered company.

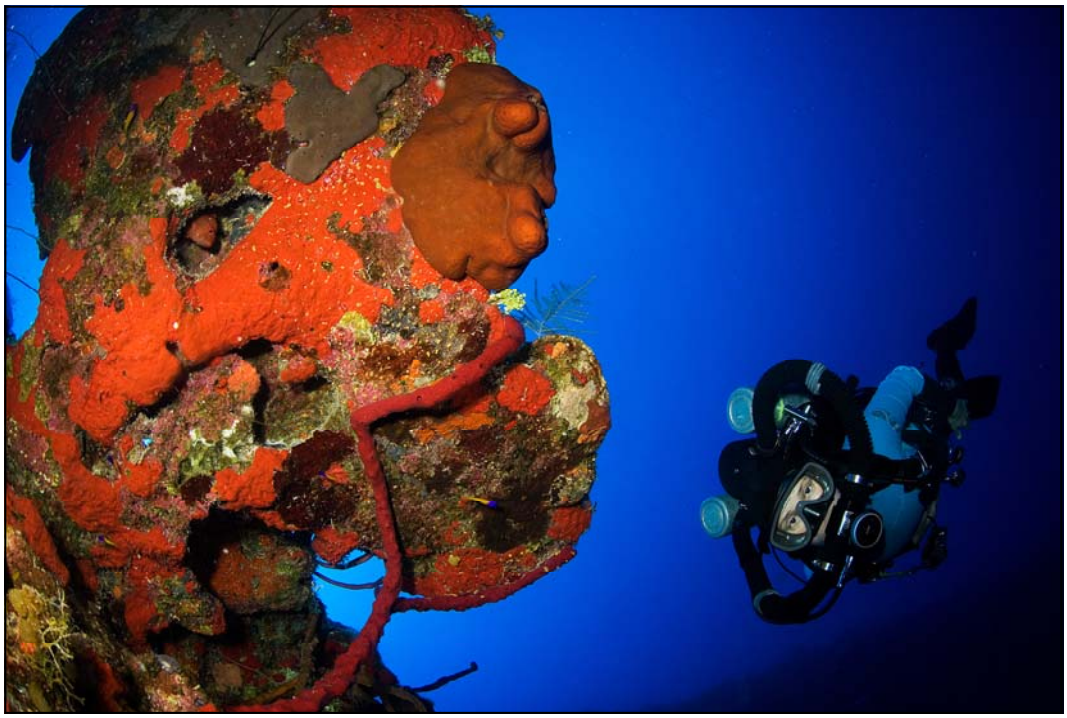
30. Are you considering purchasing a used rebreather? If you are, what risks are you taking in purchasing a rebreather, sight unseen?

As the KISS rebreathers are known to be durable and tough, there is a healthy used market for them. Things to think about if you are considering purchasing a used KISS: which display does the system have, how do you know that the display system is working properly, if it isn't working properly are you willing to pay for repairs or a new one, are you prepared to give the unit a good cleaning and inspection, could anything else be damaged? When purchasing a used unit, remember that you can't expect it to be perfect, as you don't know the units history. With a new unit, you are starting fresh.

SPECIFICATIONS: KISS Classic Explorer

- Weight of a standard Classic Explorer with full 13 cu.ft. aluminum tanks, full scrubber, but no BC back plate or harness is 51 lb (22 kg).
- Dimensions are 21” x 14” x 8” (54cm x 36cm x 20cm).
- PLEASE SEE OUR PARTS LIST ON THE NEXT PAGE FOR A FULL LIST OF WHAT IS INCLUDED AND WHAT IS NOT. The Classic Explorer ships in either a pre-set package or as a BASIC unit.
- It is a mechanical rebreather which adds O2 continuously by a feed orifice and manually as needed.
- Compatible with Trimix.
- Scrubber holds 5.7 lb (2.7 g) of absorbent.
- The KISS Classic Explorer is a closed circuit rebreather designed for recreational and technical sport diving to the depth of 300 feet (91 meters). Proper training, outside the basic KISS rebreather course is required for any deep or technical diving. For some types of diving, extra gear must be carried or alternate gear configurations will be required. Ensure you have the proper training, gases and gear to conduct your planned dive.
- A bailout system is required for all dives. The bailout system should be appropriate for the dive that is planned. KISS Rebreathers strongly recommends that a second stage regulator is attached to the bailout first stages, using a LP hose. KISS does not recommend using quick connects on regulator hoses, which have a regulator attached.

The Classic KISS Rebreather Kit comes with the O-rings NOT installed. You will have to do this yourself. However, the O-rings for the mouthpiece, ADV, manual add valve and the displays are already in place.



KISS Classic Explorer—BASIC kit parts list

1 KISS Classic:

- 1 Counterlung case with detachable manifold, cylinder webbing straps, detachable tank rails, and back plate mounting system.
- 1 Scrubber head with all required parts (CL attachments and rings, towers, elbow, exhaust valve, new style draw nut)
- 2 Counterlungs: includes a 2 liter and a 4 liter unless otherwise specified - no charge for different combination
- 1 Manual add valve, with filter and with 2 oxygen rated LP hoses
- 1 ADV assembly: cover, diaphragm, valve bolt, valve stem, LP swivel elbow
- 1 LP diluent hose with hose adapter (ADV swivel to manifold)
- 1 Scrubber canister with base & inner tube, which is packed with:

    4 small lined hose clamps - to attach quick connect system to loop hoses
    2 O-ring sets - One is a spare
    2 hex bolts, 1 1/2 inch - for back plate attachment, if required
    1 counterlung ring, spare

- 2 loop hoses: the retractable loop hoses are included. No charge to switch to 22 inch hoses.
- 2 quick connect hose stubs for loop hoses.
- Delrin plug for oxygen first stage (contact KISS for a list of approved first stages).

DISPLAY OPTIONS, IF ORDERED:

- No display
- HUD - hardwired to sensor plate
- Fischer cable - hardwired to sensor plate
- Shearwater Petrel PPO2 only display, Petrel decompression computer, or NERD. All available as either hardwired or with Fischer connector.

NOT INCLUDED:

- Sensors (3 K-22D) , pressure gauges (2), wing and back plate assembly. Additional LP and HP swivels.
- 1 Diluent first stage with, OPV, and swivel elbow.
- 1 LP diluent hose and hose adapter (manifold to diluent first stage).
- 1 Oxygen first stage with OPV, and swivel elbow.
- 8 SS ballast rings.
- 1 bailout mouthpiece with LP hose.
- 2 quick connect hose stubs for loop hoses to connect to mouthpiece.
- Bailout system.

Schematic

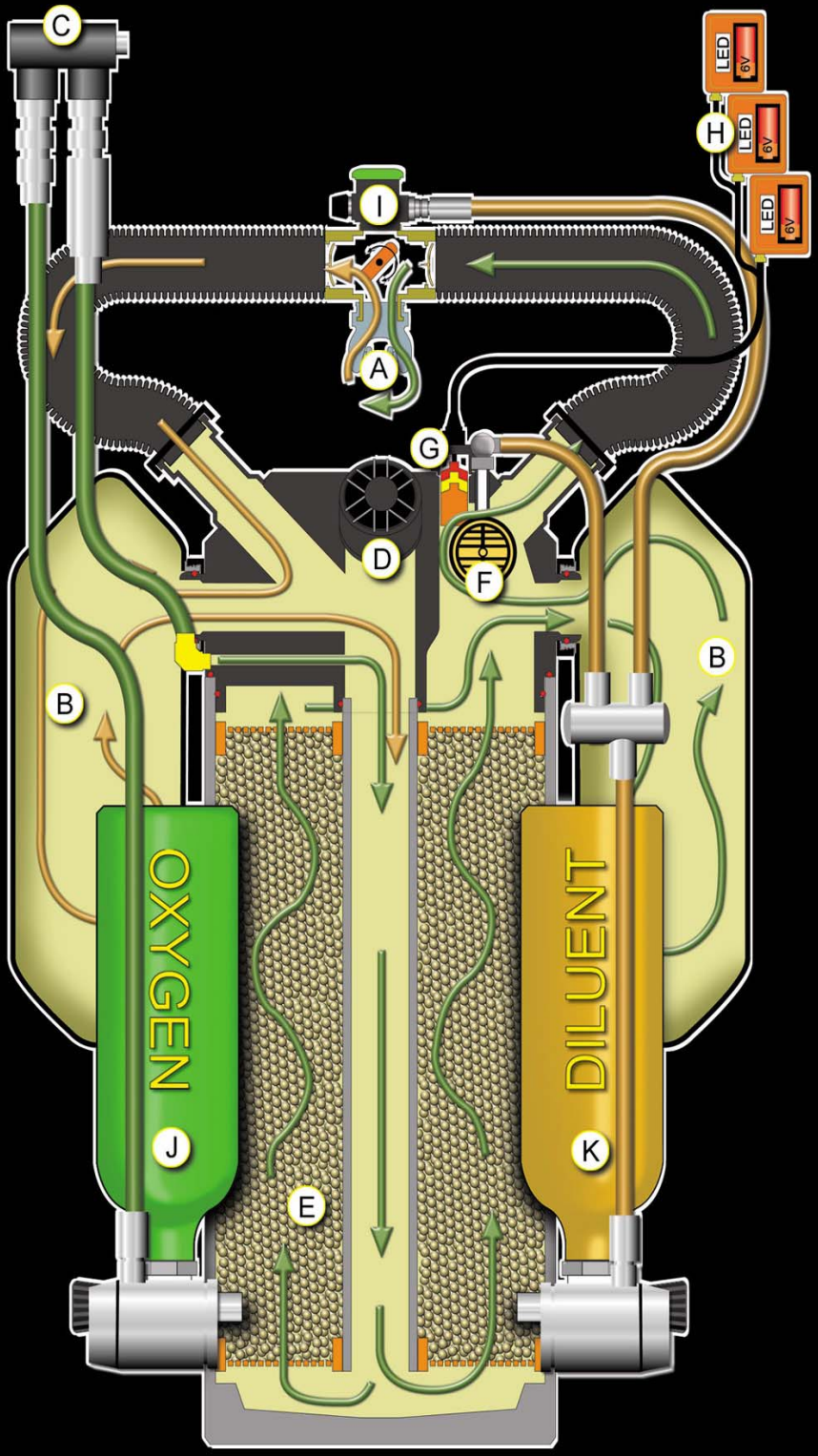


Illustration By Curt Bowen,
Advanced Diver Magazine
www.advanceddivermagazine.com

Components

A. Mouthpiece

B. Counterlungs: 2 liter &/or 4 liter

C. Oxygen Manual Add Valve with 15 micron filter

D. Exhaust Valve

E. Scrubber Canister: Approximately 6 lbs (2.7 kg)

F. ADV: Automatic Diluent Valve

G. Triple Sensor Well: For oxygen sensors

H. PPO2 Displays: Three independent PPO2 displays. Jetsam triple: with its own housing, battery and sensor, or VR technologies triple pendent.

I. Bail-out Second Stage: The bail-out second stage is incorporated into the DSV. To switch from closed circuit to open circuit bail-out, simply close the breathing loop. The bail-out second stage is plumbed to the diluent tank. NOTE: The bail-out second stage is for getting a sanity breath only. Divers should carry a redundant bail-out system for emergencies.

J. Oxygen Tank and First Stage: 13 cuft tanks are recommended.

K. Diluent Tank and First Stage: The Classic KISS is compatible with either air or trimix as a diluent gas. 13 cuft tanks are recommended.

Classic KISS BASIC Rebreather Kit

INFORMATION & INSTRUCTIONS FOR KEY UPGRADE COMPONENTS.

As rebreathers are becoming more and more main stream in the dive industry, we are seeing many new dealers and divers interested in our products. One of the popular requests that we get is - can I buy the Classic KISS without the mouthpiece? Another one is - can I buy the Classic KISS without the first stages? Well, now the answer is YES!!

Based on customer comments and requests we have completely reworked our pricing structure! We now have the CLASSIC KISS BASIC, which is a bare bones system. Dealers and divers can now add on the KISS components they wish to buy, and supply the balance of the kit themselves!

This means that dealers can now personalize the units for their customers and provide their own first stages, wings, back plates, harness's, LP & HP hose's, & BOV's (rebreather mouthpiece).

Should dealers and divers wish to purchase some of the components from us, they can pick and choose what they would like. See the Classic KISS price sheets for a complete list.

***NOTE: The upgrade prices are prices that are discounted from the regular parts pricing. This pricing is only valid at the time the rebreather is ordered, and must be included on the original invoice for the rebreather.**

***NOTE: The Dealer's KISS instructor must be authorized to assemble the KISS Classic BASIC kit. If the shop has a KISS Instructor on staff, the Sales Agent may authorize this instructor.**

If the shop does not have a KISS instructor on staff, then the shop must have a KISS Rebreather Instructor who is authorized to assemble the KISS Classic BASIC kit or Sales Agent on retainer in order to properly assemble the unit before use.

REQUIRED READING

***WARNING: It is extremely important that dealers and divers who opt to purchase a Classic KISS BASIC rebreather kit, understand the importance of the various components that they must add on to their system in order to make it complete. Failure to do so, may cause injury or death.**

The sections covered in the following two pages are for the BOV (rebreather mouthpiece), the loop hose ballast rings, oxygen first stage regulator, and the diluent first stage regulator. These pages are required reading for those who have purchased a Classic KISS BASIC.

BOV - BAILOUT VALVE

The BOV, or rebreather mouthpiece, is a key component in the Classic KISS diving system. Should divers choose to source their own BOV, it is extremely important that they choose a product from a reputable company and that it comes fitted with a bailout 2nd stage regulator. The integrated 2nd stage regulator is a key safety component for the diver. Should the dealer or diver choose not to use a bailout type rebreather mouthpiece, the warranty on that diving system will be revoked. We can't stress enough the importance of this feature.

Required Parts:

The Classic KISS BASIC will ship with the loop hoses, as well as the parts to attach these hoses to the scrubber head. The customer will need to purchase a BOV which can be secured to these hoses.

It is important that when choosing a method to secure the loop hoses to the BOV, that the BOV can be removed easily. This is important as the BOV mushroom valves (valve disks) must be inspected prior to every dive.

LOOP HOSE BALLAST RINGS

The ballast rings may seem like an insignificant part of the rebreather but in reality they are an important part of the diving system. Having either too much or too little weight on the loop hoses will cause much discomfort and stress to divers.

When the ballast is supplied by KISS Rebreathers, 8 rings, 4 per side, are used. The total weight of our ballast rings are 1.04lb; or .13lb each. This is important information as other SS rings on the market, while looking very similar, are actually a lighter weight. If you choose to use these rings, ensure that you know what the total weight will be and that you purchase enough of them.

There are also other ballast systems on the market. Again, be certain that you know what the total weight of those systems will be.

Good features to watch for in a ballast system is the ability to move the weight up or down the hoses, while underwater. This is why SS rings work so well; they are easily moved during the dive. It is important to be able to move them during the dive as this is the only time the diver will truly know if the weight is properly positioned. Moving the rings up or down slightly can make a difference in the comfort of the diver.

OXYGEN FIRST STAGE REGULATOR

The oxygen first stage regulator is located on the right hand side of the diving system. This is the same side as the yellow miflex LP hoses and manual add valve.

Dealers and divers that choose to use their own first stages must choose a first stage from the approved list below.

Prior to final assembly of the rebreather the oxygen first stage must be modified. The top ring of the first stage must be removed, the environmental plug and seal removed and the KISS delrin plug with O-ring inserted. To do this:

- Loosen the top ring of the first stage.
- Tip the first stage over and the environmental plug will fall out.
- The top ring has a seal inserted into it; use your fingers to push it out and remove it.
- Lubricate the O-ring with oxygen compatible grease, and ensure it is secured to the delrin plug.

- Push the delrin plug firmly into position.
- Secure the top ring to the first stage body. While turning the top ring in, you will need to push the centre of the delrin plug to hold it firmly in position. If you don't do this, the delrin plug will want to push up and out making it difficult to secure the ring.
- Ensure that the ring is properly secured.

Once the delrin plug has been installed, an OPV will need to be inserted into one of the low pressure ports. The OPV is an important part of the first stage regulator and divers should not dive the KISS Classic without one present.

It is important that both the delrin plug and the OPV be properly installed on the oxygen first stage. ***If the delrin plug is not installed the oxygen delivery system on the Classic KISS will not work properly!***

Approved first stage regulator's:

- Dive Rite - RG1208 ICE with environmental kit
- Apeks - DS4 with environmental kit

DILUENT FIRST STAGE REGULATOR

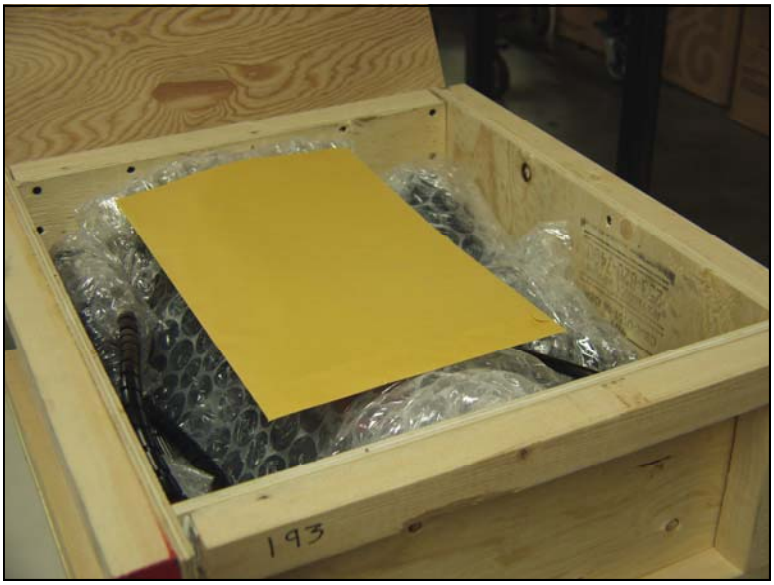
The diluent first stage regulator is on the left hand side of the diving system. This is the same side as the manifold. While this first stage is not modified in any way, we still require dealers and divers to choose a first stage from the approved list. See above.

An OPV must be secured to one of the low pressure ports on the diluent first stage regulator.

The OPV is an important part of the first stage regulator and divers should not dive the KISS Classic without one present.

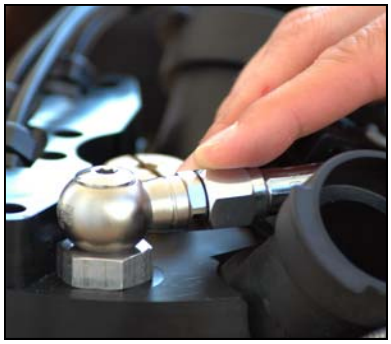
***WARNING: IT IS VERY IMPORTANT THAT THESE INSTRUCTIONS ARE CAREFULLY FOLLOWED. THE PROPER BOV MUST BE SELECTED FROM A REPUTABLE COMPANY WHICH HAS AN INTEGREATED 2ND STAGE FOR BAIL OUT. AS WELL, THE APPROPRIATE AMOUNT OF BALLAST FOR THE LOOP HOSES MUST BE SECURED. THE DELRIN PLUG MUST BE PROPERLY INSERTED INTO THE OXYGEN FIRST STAGE. OPV'S MUST BE SECURED TO BOTH THE OXYGEN AND DILUENT FIRST STAGES. FAILURE TO DO ANY OF THESE, MAY CAUSE INJURY OR DEATH!**

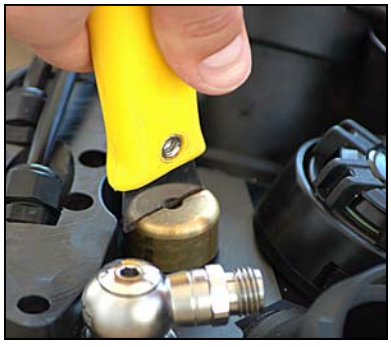
Unpacking & Disassembly



After removing your new Classic KISS from the crate, ensure that you have a DSV, 2 breathing hoses, 4 hose stubs, displays (if ordered), 2 counterlungs, and of course, the rebreather.

First, various components will need to be disassembled in order to install the O-Rings. Start with the counterlungs (if attached); turn the counterlung attachment counter clockwise to loosen the lung and then remove it. Next, remove the top cap on the scrubber head.





Remove the two large screws on the counterlung case shown in the photo, above right. Removing these screws will detach the scrubber head from the counterlung case. Unscrew the diluent add hose that runs from the LP manifold to the diluent add elbow. Undo the large brass draw nut that secures the scrubber canister to the scrubber head. There is a special tool for this job, but as it has been packed inside the scrubber canister you will need to find a substitute.

Once loose, remove the head from the scrubber canister.

Inside the scrubber canister you will find 2 packages of O-Rings, additional back plate bolts, small lined clamps, ballast, and a spare counterlung ring.

Set aside all the parts from the inside of the canister except for 1 bag of O-Rings. From that bag, set aside the bags labeled “mouthpiece” and “MAV” These O-Rings are spares. The unit comes with the O-rings installed in the DSV, manual add valve, ADV and the displays.

O-Ring Installation

Using the O-ring diagram at the back of the manual, separate the remaining O-rings by size. The O-rings that need to be installed are for the scrubber canister, exhaust valve, sensor cover, counterlungs, sensor/kidney plate and the draw nut. All other O-rings have been installed. As with any piece of scuba diving equipment, the various components and O-rings should be checked annually, and serviced as required. For those doing extensive diving, the various components and O-rings should be checked more frequently. Servicing of your Classic KISS can be done by you, your dealer, or the parts can be returned to us. You are now ready to start installing the O-rings. First, unscrew the counterlung attachments and the exhaust valve and remove them from the scrubber head.

***NOTE: ALL O-RINGS SHOULD BE LIGHTLY LUBRICATED!! DO NOT USE EXCESS AMOUNTS OF LUBRICANT; THE O-RINGS SHOULD ONLY BE SLIGHTLY SHINY.**

- The counterlung attachments take a 028 O-ring around the threaded section. This O-ring should be worked into the groove which is machined into the face of the attachment. On the other side of the counterlung attachment a 224 O-ring should be installed. This has a larger groove than the 028. This O-ring will need to be snapped into the groove. Once the O-rings are installed, insert the counterlung attachment into the scrubber head and hand tighten. Ensure that you do not pinch the collar under the attachments. The collar should spin freely.

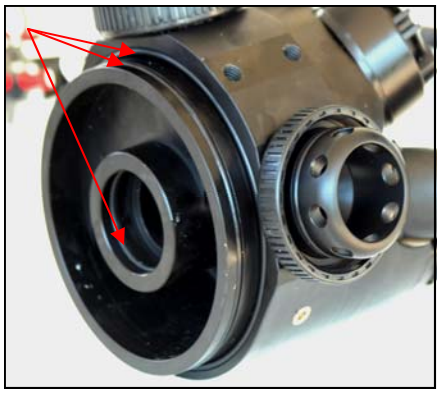
- The exhaust valve takes a 220 O-ring which goes around the threaded area. This O-ring seals the valve against the top of the scrubber head. Once the O-ring is installed, reattach the valve to the scrubber head by hand tightening. When tightening, hold the exhaust valve by the body. Do not force it by holding onto the valve adjustment. If you force it, it can pop past its adjustment latch and the valve may no longer be adjustable. Once reattached, this valve should be run closed.

***NOTE: Any damage to the valve, or any debris caught in the valve may cause a malfunction &/or leak. Care should be taken when servicing the valve and also when filling the scrubber canister. Any of the absorbent material which falls into the center tube, can wind up inside the valve, if the diver turns upside down!!**

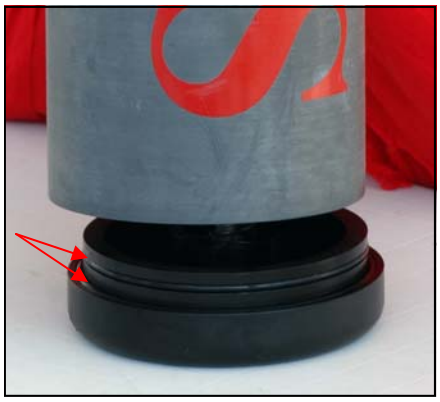
- The scrubber draw nut requires a 114 & 111 O-ring. The larger O-ring should be installed against the face of the nut and the smaller should be stretched over the body and snaped into the groove.

- The Classic KISS ships with the new style draw nut that no longer requires a tool to tighten or loosen. The plastic hat is also no longer required. The old style draw nut shown on the right, is still available for purchase for those that wish to use it.

- The scrubber head requires a 248, 250 & 223 O-ring. The 248 O-ring goes into the radial groove around the scrubber head. It must be carefully worked down and pressed into the groove. The larger 250 axial O-ring gets pressed into the groove which forms a face seal. The final O-ring for the scrubber head is a 223 which fits inside the scrubber tube and slides into the internal groove.

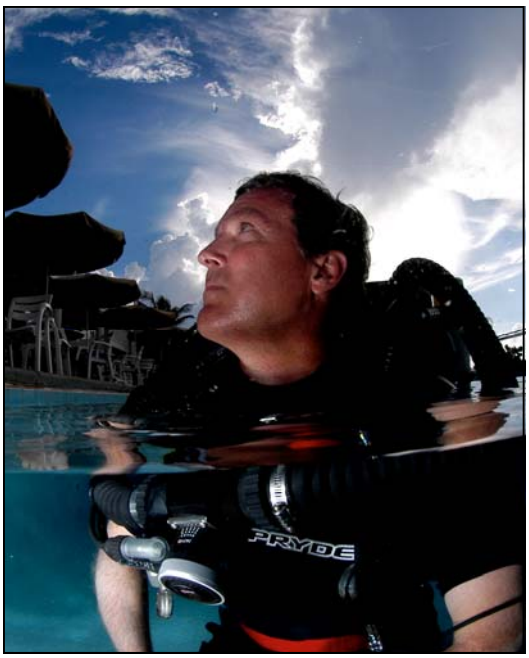


- Install the last 2 large O-rings, a 248 and a 250 on the bottom of the scrubber canister. The 248 goes in the radial grove and the 250 in the axial groove.



***WARNING: IT IS IMPORTANT THAT ALL O-RINGS ARE IN GOOD CONDITION, THAT THE COMPONENTS ARE NOT DAMAGED AND THAT THE SEALING AREAS ARE CLEAN. IF THEY AREN'T, THE O-RINGS MAY LEAK CAUSING THE REBREATHER TO FLOOD. THIS MAY LEAD TO SERIOUS INJURY OR DEATH!!!**

ALSO, IF THE THREADED ROD IS DAMAGED, IT MAY BE DIFFICULT OR IMPOSSIBLE TO ATTACH THE DRAWNUT. IF THE DRAWNUT IS EXTREMELY DIFFICULT TO ATTACH, IT MAY PULL THE ROD OUT OF THE BOTTOM FIXTURE!! IF THIS HAPPENS, YOU WILL NOTICE THAT IT IS VERY DIFFICULT TO ATTACH AND THAT THE HEIGHT OF THE ROD HAS CHANGED!



Assembly

Once the O-rings have been installed, the balance of the assembly can begin. Start with the ballast. Units are shipped with 8 stainless steel rings. 4 rings should be placed on each breathing hose.

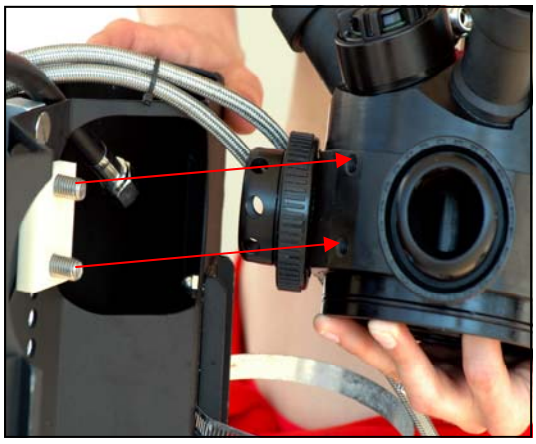
The weights can be moved up and down the hoses underwater for proper placement. With the loop hoses properly adjusted with no twists, and the ballast properly placed, the DSV will be weightless underwater!

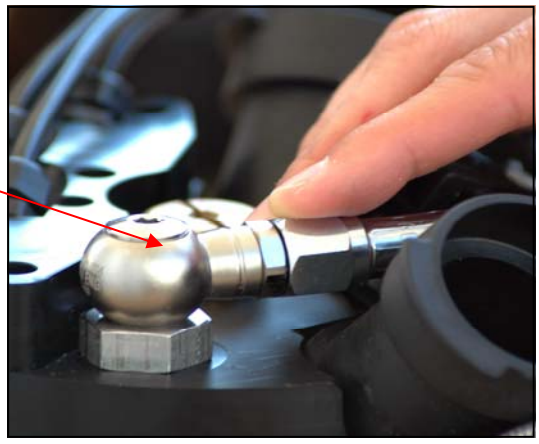
The ballast rings should be placed approximately a third of the way up the loop hoses if you are diving the older mouthpiece. For those who have the new BOV, the rings should be much closer to the actual mouthpiece as it is much lighter. Attach the mouthpiece to the hoses, and then lift it so that it is level with the top of the unit. Look at the loop hoses; they should have a gentle curve. If they are twisted, adjust them by turning the end of the hose by the mouthpiece. These steps are important. If this isn't done, then the mouthpiece will be uncomfortable.

The ballast rings will need to be adjusted again, once in the water. Positioning will be different for every diver. While in the pool, your instructor will demonstrate neutral mouthpiece buoyancy. Ideally the mouthpiece will float neutrally in front of the divers face, if the rings are placed properly and the loop hoses are not twisted. If when doing this skill, the mouthpiece is not floating in the desired area, ensure that your hoses are not twisted and adjust your ballast rings. To adjust the hoses underwater, simply hold the mouthpiece with one hand, and gently turn the hose with the other. Again, once the rings are properly placed, they do not need adjusting again.

These steps are important. If this isn't done, then the mouthpiece will be uncomfortable.

***NOTE: For the mouthpiece to be comfortable, the above instructions must be followed. If you feel the mouthpiece either pulling up or down while diving, adjust it by holding onto the mouthpiece and gently turning the hose by holding the end with your other hand.**





To assemble the scrubber canister, place the canister over the bottom cap and push down gently. While pushing, rock the canister slightly to ease the tube over the O-rings. Once assembled, check the base to ensure that the O-rings are not protruding. When secure, place the scrubber tube inside the canister.

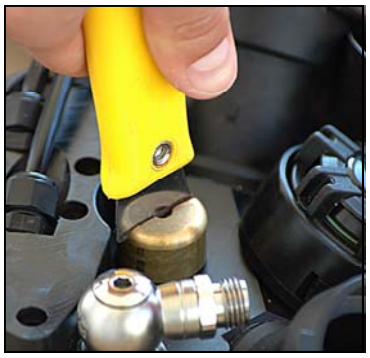
Reattach the scrubber head to the counterlung case using the two large flat head screws. It should be securely attached without over-tightening. Reattach the diluent addition hose.

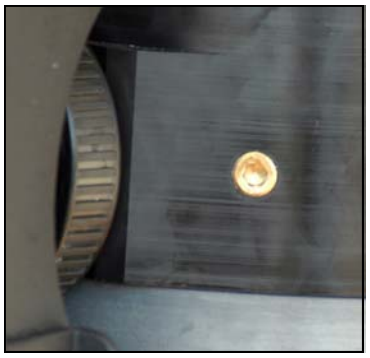
To attach the scrubber canister, lay your Classic KISS, counterlung side down. See Page 25 for instructions on filling the scrubber. Slide the canister onto the scrubber head. When the canister reaches the first O-ring, gently rock the canister back and forth until the O-ring is compressed inside the tube. If too much force is used, the O-ring will dislodge and a leak will occur. If that happens, and the O-ring is badly pinched, you may need to replace the O-ring. An indentation could cause another leak!

Once the scrubber canister is pushed onto the scrubber head, insert the draw nut and start to hand tighten it. Once hand tight, stand the Classic KISS up and tighten using the KISS tool. Attach the hat. For those who wish to attach a fourth sensor to read a dive computer, the port on the left hand side of the scrubber head can be used.

***WARNING: Unless the left hand port is utilized, the two plugs must remain in place. Failure to do so, will cause water intrusion, &/or will cause gas to bypass from its intended path. Either of these could cause injury or death!!**

Once you have re-attached the scrubber canister and scrubber head to the counterlung case, you are ready to attach the counterlungs.





***NOTE: FOR EASE OF ATTACHMENT, A VERY SMALL AMOUNT OF LUBRICANT CAN BE APPLIED TO THE INSIDE OF THE COUNTERLUNG OPENING.**

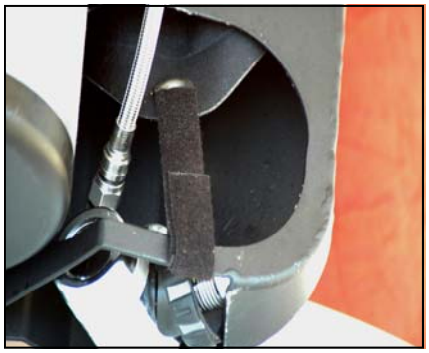
COUNTERLUNGS:

The Classic KISS uses two back mounted counterlungs that are available in two sizes; 2 & 4 liter capacity. A combination of these will normally provide a good match between the counterlung volume and the divers tidal volume. Most divers will use a 2 and a 4 liter lung. Smaller people, including women, will normally use two 2 liter lungs and larger people, two 4 liter lungs. This allows for precise buoyancy control at any depth, including shallow water. Back mounted counterlungs leave the chest area clear and reduce the number of hoses and fittings compared to over the shoulder counterlungs found on other CCR designs. These lungs are inexpensive and easy to replace.

To attach the counterlungs, insert the lungs either through the top or bottom of the case. If required, the manifold can be popped off the case to make more room. To pop the manifold off, either pull up by hand, or use a flat screwdriver as a lever. It is supposed to be somewhat difficult to remove, so that it does not come off accidently during a dive.

Push the counterlung onto the counterlung attachment firmly. Then using 2 or 3 fingers, start pushing at the top of the lung. This is to help push it into position. Move around the lung, clockwise, pushing firmly as you go. You are moving in small increments only, ensuring that you press on every part of the lung. As you get to the inside edge, it will feel like it will not attach properly. Just keep pushing firmly, and continue around the circle. It won't pop into position the first time around. Once at the top of the lung again, continue to push, doing another circle. This time when you get to the inside edge, push a little harder, and it should snap past the resistance point. This will get easier after the first few times. Ensure that the lung is pushed straight onto the attachment, and turn the ring clockwise to secure. When the counterlung is tight, there should be an 1/8 inch gap between the ring and the face of the counterlung, and the gap should be even. Do not apply excess force when tightening the ring. It is not required and the ring will break. Using a tool to tighten this ring usually results in damage or breakage to the ring.

Once attached, secure the Velcro to the bottom of the counterlung case.



***WARNING: IT IS IMPORTANT THAT THE LUNGS ARE PROPERLY SECURED TO THE BOTTOM OF THE COUNTERLUNG CASE USING THE VELCRO SUPPLIED. IF THE LUNGS ARE NOT SECURED, THEY WILL FLOAT UP AND BREATHING WILL BE DIFFICULT. ENSURE THAT THE LUNGS ARE PUSHED ON STRAIGHT AND THAT THE RINGS ARE NOT OVER-TIGHTENED AS THEY WILL SPLIT!!**

DETERMINING THE CORRECT COUNTERLUNG SIZE:

To determine if the counterlungs are a suitable size, first put the mouthpiece into your mouth, open the loop and inhale the gas into your lungs and then out of your nose until the loop is completely empty. When the loop is empty, close the DSV without allowing any air to enter. Then, take a large breath, as much as you can hold, put the DSV into your mouth, open the loop and exhale all your air completely into the loop and then close the DSV.

Ideally, the lung size should be as evenly matched to your own lungs as possible. If you find that when doing this test you can get more than one full breath into the loop before it is full, then possibly smaller lungs should be used. However, never use counterlungs where the volume is smaller than your own! Smaller people will find that they use a 2&2 liter, while most people will use 2&4 liter lungs. Larger people will use 4&4 liter lungs.

In matching your tidal volume to the counterlung volume, you will find that your buoyancy in shallow water can be exceptional. Only KISS divers can hold their position in water that is only 3 to 4 feet deep. If you are finding buoyancy difficult in water this shallow, this is due to either being new on the rebreather or the counterlungs are too large.

While doing this test at the surface, remember that underwater your required volume won't change. If you find that your surface test went well, but it feels like the lungs are too small underwater, you probably have too much gas in the loop. To correct this, exhale some of the gas out of your nose. Or, you failed to attach the Velcro to the bottom of the case and the lungs are floating up. This will cause either a decrease in lung volume &/or will increase the work of breathing. See the note at the top of the page.

***NOTE: The closer you can match the counterlung volume with your own, the better your buoyancy will be. Diving the Classic KISS with counterlungs that are too large will result in greater buoyancy changes. This can cause the user to lose control of their buoyancy which can lead to injury or death!!**

MANIFOLD:

In the past, Classic KISS units were shipped with the manifold attached to the counterlung case, via plate and screws. New units are now shipped with the manifold attached to the case via a quick release system.

This system allows the diver to pull up on the manifold to move it away from the case which would allow better access to the counterlung area. The system is set up so that it is difficult to pull the manifold off. The system can be adjusted so that it is harder or easier to remove the manifold. This is done by adjusting the set screws. Right to make it harder and left to make it easier. See the photo to the right.

To attach the manifold, line up the pins with the holes in the case, and push straight down.

To remove, either hold the manifold under the edges and pull straight up. Or alternatively, place a flat head screw driver between the manifold and the case and lever the manifold up.

It is designed to be difficult to remove as we want to ensure that it does not come loose while diving.

As this system caused the manifold to sit further back, a 11.5 inch hose is required for the ADV attachment.

AUTOMATIC DILUENT VALVE (ADV):

The ADV will add diluent gas to your breathing loop after the loop volume has been reduced by either descending or "breathing down" the volume of oxygen. The diver will get the feeling that there is no more air in the loop to breath. All the diver needs to do is suck hard to trigger the ADV and it will feed him more gas. This is similar to the action of a second stage regulator.

The ADV has been setup "tight" enough that it doesn't add diluent without the diver being aware. But it adds enough gas so that a reasonable descent rate can be maintained. Anytime the ADV triggers you need to check your PPO2. you have either descended and compressed the gas in the loop or you have consumed enough oxygen to reduce the PPO2 significantly . This may also have caused you to lose buoyancy and descend.

The position of the diver will effect the ADV. If the diver is horizontal or face down, the ADV will trigger easily. If the diver is vertical, then it is more difficult to trigger. (A well fitting harness is important; this will greatly reduce the difficulties of being vertical in the water). Also, rolling to your right side, while horizontal, will assist in triggering the ADV.

Diluent can also be added to the breathing loop via the mouthpiece. Simply go to open circuit mode, take a breath and then open the loop again and exhale the gas into the breathing loop.

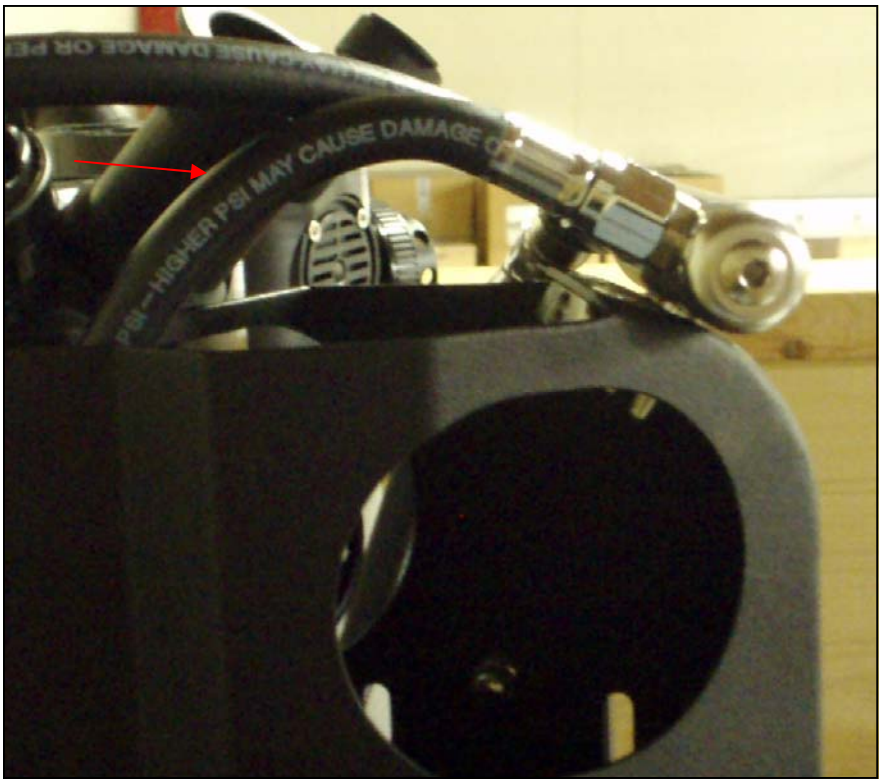
Another way to add gas to the loop via the mouthpiece is to close the loop only a 1/4 inch, for a second. You may need to lightly push the purge button on the front of the 2nd stage. A small amount of gas will blow directly into the breathing loop.

21” LP MANIFOLD TO DILUENT FIRST STAGE HOSE

This hose is standard on the Classic KISS as it is required to bring the diluent on-board gas through the rebreather using the ADV. It is attached to the diluent first stage and then to the manifold. See the photo on the right for placement.

***Warning: Some divers may feel that this hose is redundant and wish to remove it. These divers should be aware that if it is removed, the ADV and the open circuit mode of the mouthpiece will not work until a cylinder is attached to the rebreather via the off-board accessory!!!**

This hose should not be used if the diver is using pure oxygen in the left side cylinder. The ADV system is not meant for high oxygen mixtures.

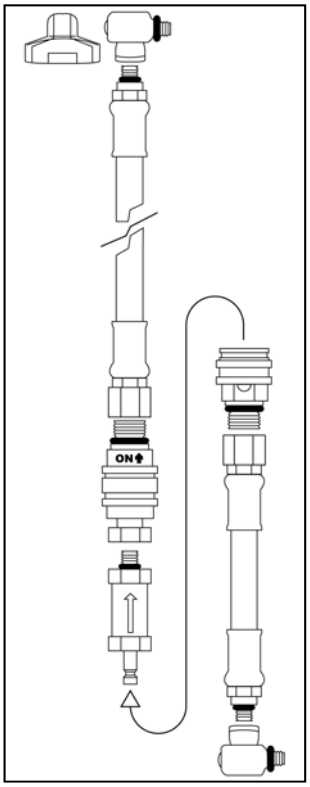


OFF-BOARD ACCESSORY:

One of the options for the Classic KISS is the Off Board Gas Accessory. This accessory is used to plumb the side mount gas into the unit through the manifold. The kit includes the rebreather side whip and the side mount cylinder side kit.

Some divers choose to dive with two complete off-board accessories. Using two sets means that if two side mount cylinders are hooked up, the diver does not need to detach the quick connects from one cylinder to another. This version, while practical does add extra O-rings to the rig.

Alternatively, the diver can choose to purchase only additional cylinder side whips. If the diver has this whip on each side mount cylinder, then in order to bring the gas into the rebreather loop, the diver must connect his rebreather side whip to that particular cylinder. This version cuts down on the number of O-rings on the rig and also is cleaner.



The off-board accessory rebreather side includes: 1 swivel elbow, 1 30inch LP hose, 1 shut-off valve, 1 check valve with quick disconnect male.

The off-board accessory cylinder side includes: 1 swivel elbow, 1 6inch LP hose, 1 quick disconnect female.

The shut off valve is open when it is pushed up, following the direction of the arrow or pushing it towards the LP hose. It is closed when it is pushed down or away from the LP hose. The valve has been designed this way so the diver must make a conscious decision to open the valve. When doing your positive & negative pressure tests, remember to close this valve or your tests will fail!!

Prior to connecting the rebreather side whip to the off board cylinder, you must open the rebreathers on-board diluent cylinder to pressurize the whip. Ensure that the shut off valve is open, with the arrow pushed up towards diver. This confirms that the one way check valve has seated. No gas should exit the off board whip. The check valve has three internal parts; a spring, a poppet, and an O-ring. This process insures the poppet has seated in the O-ring. Make this part of your pre-dive check list.

With this system, the diver can have the off-board cylinders open through out the dive. Even if the quick disconnect is not connected. The check valve in the manifold whip will prevent any water from entering the system.

AS WITH ANY NEW DIVING EQUIPMENT, USING THIS ACCESSORY WILL REQUIRE THE DIVER TO LEARN NEW SKILLS AND CREATE NEW MUSCLE MEMORY.

WHEN USING NEW EQUIPMENT SUCH AS THE OFF-BOARD ACCESSORY ON A KISS REBREATHER, THE DIVER MUST ACCEPT THIS RISK AND THAT THE ABOVE MENTIONED NEW SKILLS WILL NEED TO BE LEARNED. FAILURE TO LEARN THE PROPER USE OF THE OFF-BOARD ACCESSORY CAN CAUSE THE DIVER SERIOUS INJURY OR DEATH.

Quick Disconnects

The Classic KISS is shipped with the QR hose adapters already installed on the mouthpiece and the QR hose attachment towers already installed on the scrubber head.

***NOTE: IN THE PAST, THE TOWERS WERE SEALED ONTO THE SCRUBBER HEAD AND WERE NOT TO BE REMOVED. THE TOWERS NOW SEAL WITH AN O-RING. THE O-RINGS HAVE BEEN INSTALLED FOR YOU. WHILE THE TOWERS ARE DIFFICULT TO TURN, IT IS STILL IMPORTANT THAT THEY ARE NOT ACCIDENTLY UNSCREWED WHILE REMOVING OR INSTALLING THE BREATHING HOSE. A LOOSE TOWER WILL LEAK!!!**

***NOTE: The old method of attaching the loop hoses to the quick disconnect hose stubs, required the black plastic ring and a standard hose clamp. In the past this method was required due to the lack of the quick disconnect system.**

As we now have the quick connect system and are not continuously attaching and removing the hose clamps, we can move to a simpler and better system. Our new system uses lined hose clamps, which have been designed to protect soft hoses. As they are lined, we will no longer be shipping new units with the black plastic rings.

If for any reason, the clamps are removed and attached continuously, the hoses should be inspected each time for wear and damage. The black plastic rings will be available with the original hose clamps, as parts sales only.

The assembly procedure below shows how to attach the original system. This new system is the same, except for the lack of the black rings. At this point, your ballast rings should already be in place.

To prepare the QR system, the hose stubs need to be attached to the breathing hoses. To do this you will need the 4 hose stubs and the set of 4 small hose clamps and plastic rings. You will also need the nut driver.

Place a plastic ring and small hose clamp over the end of the breathing hose and push the hose into position on the hose stub. Ensure that the hose is pushed onto the hose stub as in the photo below. You can leave a space of 1 or 2 millimeters. Place the hose ring and hose clamp over the hose and hose stub, and secure. Repeat with the remaining 3 hose stubs.

Finally to attach the breathing hoses to the DSV, push the hose stubs onto the DSV hose adapters, push down and turn right. Repeat to attach the other hose ends to the hose attachments. Use the same method to attach the breathing hose to the QR hose attachment towers. Note that the attachment method is similar to opening and closing a child proof medicine bottle.

***SERVICE: THE O-RINGS ON THE HOSE STUBS AND THE CORRESPONDING SURFACES ON THE DSV ADAPTERS AND HOSE ATTACHMENTS SHOULD BE LUBRICATED ON A REGULAR BASIS. PRIOR TO DIVING, ENSURE THAT HOSES HAVE BEEN PROPERLY ATTACHED TO THE TOWERS AND TO THE DSV!!! FAILURE TO DO SO COULD CAUSE INJURY OR DEATH!!!**

Tank/BCD Installation

In the past, the Classic was shipped with hose clamps to secure the cylinders. Currently, the unit is shipped with small cam straps. We have included instructions for both systems here.

To attach the cylinders to the Classic KISS, first insert the large hose clamps through the slots on the counterlung case. Slide the tanks into position with the oxygen on the right and the diluent on the left and secure the first stages.

Adjust the position of the cylinders: The handles should be out at the sides, parallel with the counterlung case so the diver can easily reach them when wearing the unit. The first stages should not be resting on the counterlung case. Once positioned, tighten the hose clamps using the enclosed nut driver. Once secure, turn the unit over and attach the harness and wing. Any buoyancy compensating system can be used as long as it has bolt holes with 11 inch centres.

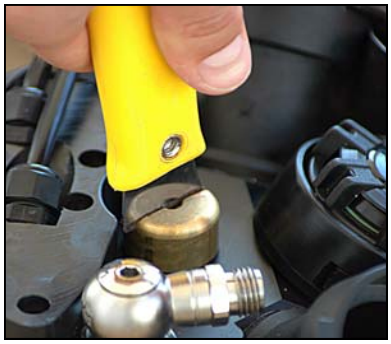
The Classic KISS should be positioned so that it sits as high as possible on the divers back. Also, the harness system should keep the rebreather tight to your back. If the unit is sitting low or loose, the work of breathing will increase.

Finally, secure the manual add valve to the right shoulder strap or D-ring.

If the webbing straps are being used, they can be locked under the tank mount brackets on the case. Loosen the tank mount brackets, and instead of sliding the straps through the slots on the case, slide them under the tank mount bracket instead. Position the strap so that the buckle is located where you want it and then tighten the tank mount bracket again. This will keep the straps from sliding around while you attach your cylinders.

Changing The Scrubber

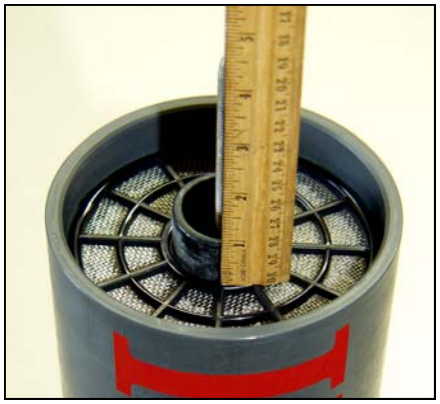
The scrubber canister holds approximately 5.7 lbs of scrubber. It is an axial flow design which is resistant to "channeling". The Classic KISS has one of the most efficient scrubber canisters on the market today. Please see our Scrubber Duration page at the back of the manual for more details. The KISS units were tested using Sofnolime 797 grade; this is the brand we recommend.



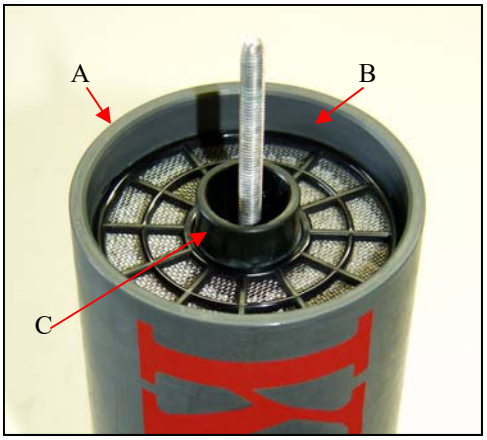
Changing the scrubber on the Classic KISS is an easy process. Start by removing the top hat and the large brass draw nut which secures the scrubber canister to the scrubber head and then remove the canister.

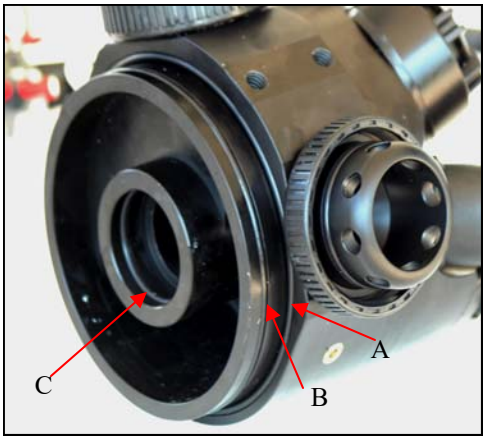
NOTE: The inner scrubber assembly is a key part of the scrubber canister and care should be taken to ensure that it is not damaged and is working properly.

Plug the scrubber tube to prevent any scrubber material from entering it. This is very important as debris from the bottom of the canister can find its way back up into the exhaust valve and cause a LEAK! Fill the canister with approximately 5.7 pounds of absorbent to .75 inch (19 mm) from the top and install the top screen.



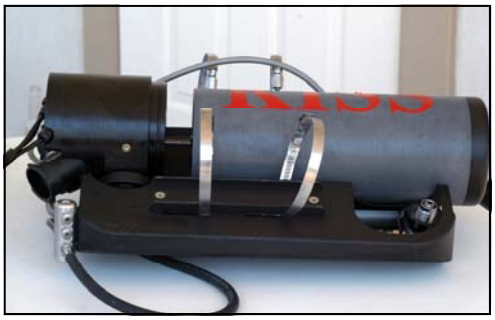
While pressing down on the top screen, tap the outside of the canister with the handle of a screwdriver or similar tool. This will compress the absorbent. When installed properly, the top of the screen will be at least .75 inch (19 mm) below the top edge of the canister but no more than 1 inch (25mm) below the tube.





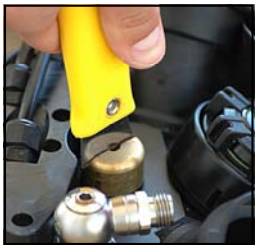
Wipe away any dust from the top and inside edge of the canister and also from the outside of the inner tube. These surfaces, A, B, C, should be lightly lubricated. On the bottom of the scrubber head are three O-rings, A, B, C, these should also be lightly lubricated.

Gently, lay the canister down and push into place. Do this by keeping the canister square to the bottom of the scrubber head, and then gently push and rock it into place. This should keep the radial O-ring from becoming dislodged. If you push the canister on crooked, this O-ring may pop out of position. This is most likely to happen when the O-ring is first installed. Once the canister has been in place for several hours or a few dives, it is unlikely that this O-ring will easily be dislodged. If this O-ring does get pinched, you may need to change it, as the indentation could cause a leak!



***WARNING: IF CANISTER O-RING IS PINCHED AND THERE IS A LEAK, YOU WILL HAVE A SERIOUS FLOOD!!! THIS COULD CAUSE SERIOUS INJURY OR DEATH!!**

Lightly lubricate the draw nut O-rings prior to installing and tightening. Note that newer Classic models have a draw nut that does not require a tool.



POSITIVE / NEGATIVE TESTING:

Once the Classic KISS has been completely assembled, you are ready to do the positive and negative pressure tests. While these tests will give you the best indication of any leaks in the system, it is still a good idea to do a quick bubble check when you enter the water. That's where buddies come in handy.

***WARNING: IT IS VERY IMPORTANT THAT THE POSITIVE/NEGATIVE PRESSURE TESTS ARE COMPLETED AND THAT THEY ARE DONE PROPERLY. ANY LEAKS THAT ARE PRESENT ARE MOST LIKELY TO BE CAUGHT WHILE DOING THESE TESTS!!**

WHEN DOING YOUR TESTS, YOU SHOULD BE VERY CERTAIN THAT THEY PASS. IF YOU HAVE ANY DOUBT AND ARE UNSURE THAT THE TEST PASSED, YOU PROBABLY HAVE A SMALL LEAK. FIND IT!! THE KISS UNITS HOLD VERY GOOD POSITIVE AND NEGATIVE TESTS.

To do the negative test, put the DSV into your mouth, turn the knob and inhale the gas from the loop into your lungs and exhale it out of your nose until it is impossible to inhale any further. When the loop is empty, there should be no leakage into the rebreather and you shouldn't feel any extra gas sneaking into your mouth. If you don't feel any extra gas, close the loop while inhaling. The breathing hoses should be tighter as there is a vacuum in the loop. This will cause the DSV to sit higher than usual and the ridges on the hoses to be close together. If you watch the hoses while you are drawing the gas out of the loop, you will see how they constrict. Also, look at the counterlungs. They should be completely flat. Once you close the mouthpiece, watch the hoses and lungs closely. Don't look away. You need to notice if anything changes, such as a slight droop in the hoses and/or the mouthpiece dropping or the lungs shift slightly showing that gas might be going back into them. Leave the loop closed for a few moments, 60 seconds is adequate, to see if the vacuum holds and then open the loop to let air back in. (Longer is not necessary and will damage the diaphragm.)

The next most important part of doing your negative test (watching the lungs and hoses is the first) is when you release the pressure and open the mouthpiece. You should hear a "whoosh" as pressure is released. If you don't hear this sound, you have a leak! Or if the "whoosh" isn't as strong as it usually is, you have a leak. After diving the unit for a while, you will learn what sound to expect when releasing the pressure. When you hear that sound, you will feel confident that you did a good test. If you have any uncertain feeling, then you may have a small leak. The exhaust valve should be fully closed during these tests.

***WARNING - It is important to not leave the vacuum in the loop for more than a few moments as this will cause the ADV diaphragm to stretch and get baggy. If this happens, the ADV will not work properly. It will either stop working altogether or will continuously feed the diver diluent.**

***NOTE: When doing your test, it is VERY important to not suck so hard that you are damaging the diaphragms. When you do the negative test, suck until you get a good seal, and then immediately close off the BOV. 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 valves and diaphragms. Suck just until you feel that pressure, then close the valve.**

Our new BOV has a larger bore and much better work of breathing then the older DSV. In order to get that good work of breathing, the valves are more flexible. This means that with this new product, we need to ensure that 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.

Also ensure that the area where the valve seals is clean. build up in this area will cause the diaphragm to leak.

***NOTE: if the unit is failing pressure testing due to a replaced ADV diaphragm, ensure that proper diaphragm installation procedures are followed. This is very important. Please see page 58.**

To do the positive test, tighten the exhaust valve by turning it fully clockwise. Put the DSV into your mouth, turn the knob and exhale into the loop until you hear the exhaust valve release. Alternatively, open the diluent tank valve and press the button in the centre of the ADV cover. The counterlungs should be expanded to their maximum size. Once inflated, close the diluent tank valve, and press the button in the centre of the ADV cover to vent the gas in the hoses from the diluent tank. Listen carefully for any air leaks and ensure that the counterlungs remain firm for at least five minutes. The oxygen tank valve and mouthpiece should be closed during these tests. After the test is complete and you open the DSV, again you will hear the sound of the pressure being released. This is important!

Sensor Installation

***WARNING: THERE ARE VARIOUS DISPLAY SYSTEMS AVAILABLE FOR THE KISS REBREATHERS. THEY INCLUDE, BUT ARE NOT LIMITED TO THE JETSAM TRIPLE DISPLAY, AND SHEARWATER. As with all electronics, these components must be treated with care and respect. This includes taking care to not drop, bang, or roughly handle them. Also, do not leave these components in a hot environment, such as a car or direct sunlight. The heat &/or sun, can and will damage any electronic components.**

The Jetsam triple wrist display and the Shearwater products both use K-22D sensors. The unit price does not include sensors. Should you wish to order them from KISS Rebreathers, they will need to be added to the order. 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. Sensors should be changed annually, 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 K-22D sensors are safe to dive if the millivolt reading is between 9 and 13, AND they can be calibrated in both air and oxygen. The Shearwater products will read the millivolts of the sensors or a volt meter can be purchased at your local hardware or electronics store.

***WARNING: It is extremely important that the sensors millivolt readings are in the correct range, and that they can be calibrated in both oxygen and air, and are less than 1 year old. If even just one of these 3 items doesn't comply, DO NOT DIVE!!!! Failure to ensure that the sensors are working properly, can result in serious injury or death!!!**

***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!!**

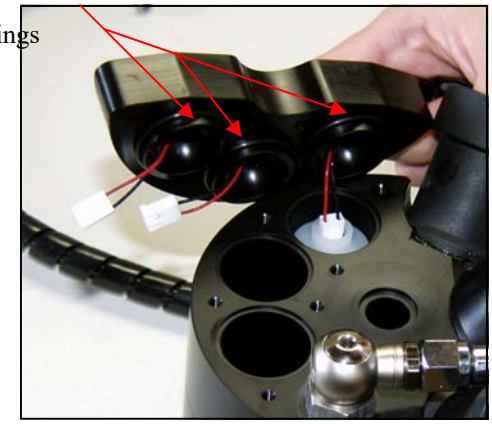
First, remove the hat from the scrubber head. Then, remove the 6 screws securing the kidney using a 5/32 alan wrench. Lift the kidney off the scrubber head.

The sensors fit into the three wells underneath the kidney. Remove the O-rings from the sensors as they are not needed. Removing the O-rings from the sensors will enable you to screw them slightly further into the well which will slightly improve the response time.

Drop the sensors into the well, connector side up and turn into place. Ensure that they are turned all the way in. The sensors should be turned in until they are snug, but they shouldn't be excessively tight. You may wish to use needle-nose pliers to aid you in securing them.

***WARNING: It is important that the sensors are properly installed. If the O-ring is left on, or they are not turned all the way into the head, the response times may be delayed!!**

026 O-rings



Once the sensors are in place, install the 026 O-rings around the boses on the kidney plate. Then, secure the Molex connectors to the top of the sensors.

***NOTE: Ensure that the O-rings are in good condition, that the area is clean and the components are not damaged.**

Replace the kidney plate on the scrubber head, ensuring that the wires are not pinched under the plate.

***WARNING: If the wires are pinched under the plate, the scrubber head will 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!!**

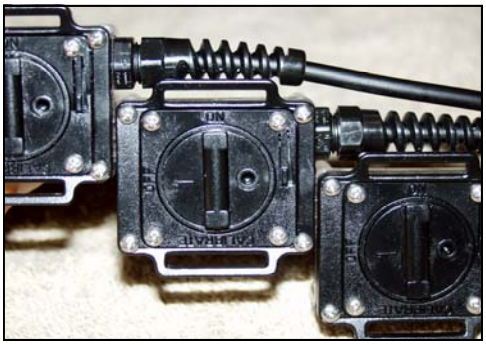
Using a 5/32 Allen wrench, secure the 6 screws which hold the kidney plate in place.

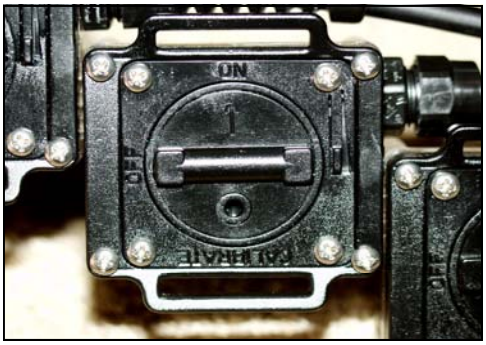
***WARNING: Do not over tighten the screws that secure the kidney plate as the head can be stripped. Use just 2 fingers on the Allen wrench to tighten. Remember, you just need to squeeze the O-rings to seal!!!**

JETSAM TRIPLE WRIST DISPLAY

The Jetsam triple wrist display is a triple redundant system with each display having it's own case, cable, battery and circuitry. Each display will read an individual oxygen sensor. This display will show the PPO2 of the oxygen. That is it's only function. KISS Rebreather's no longer sells or ships this display; the instructions are included here for those who still dive them.

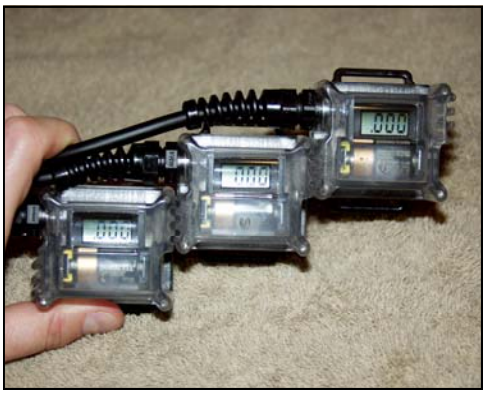
The divers that prefer this display are those who truly want to "Keep It Simple" and appreciate the triple redundancy. Things to remember with this display is that the back port must be closed prior to jumping into the water and also any water must be tapped out of the display prior to opening the port as well. A single drop of sea water on to the board will damage it. Do not use compressed air!

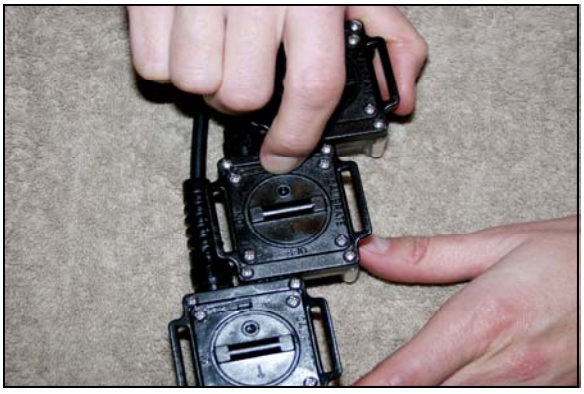


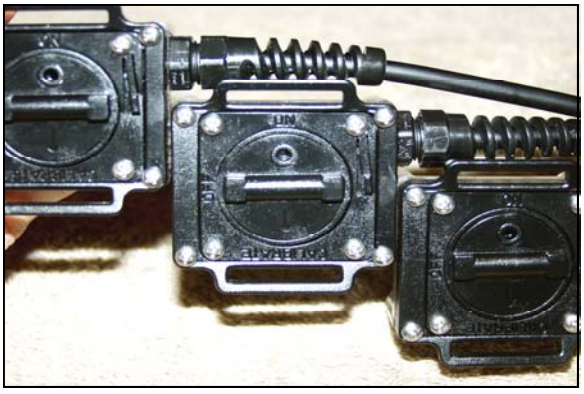


Those who are mechanically inclined will find that they are able to service this display themselves; Others may find it challenging. But servicing, if required can be done by the dealers or by sending in the parts to head office.

To turn the displays on, rotate the dial on the back, clockwise.

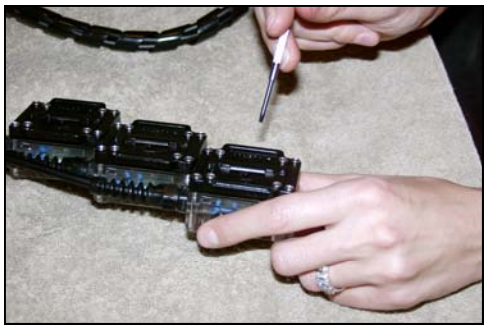






To calibrate the original KISS displays, the dial will need to be turned counter-clockwise while pushing the lever to the right. The lever must be pushed over in order for the dial to be turned in this direction. Once in this position, a small port will open to allow access to the meter. Insert the jewellers screwdriver into the port and gently turn the screw to adjust the reading.

***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.**

The displays should be calibrated with oxygen. The procedure for this, is as follows:

1. Ensure that the diluent and oxygen tank valves are closed.
2. Draw all of the gas out of the loop. Do this by putting the DSV into your mouth, open the loop, inhale the gas into your lungs and then exhale it out of your nose.

***Note: it is important that you do not exhale any gas back into the loop while doing this.**

3. With the loop closed, open the oxygen tank and press the manual add valve button, adding oxygen into the loop until the exhaust valve burps. (the exhaust valve should be fully closed)
4. Repeat steps 2 & 3 until the loop has been completely flushed with oxygen. This usually takes 3 to 4 flushes.
5. Once the loop has been completely flushed, close the oxygen cylinder and open and close the mouthpiece quickly to bring the gas in the loop to ambient pressure. With the loop closed, calibrate to 1.00.

The readings should be verified with air. To verify with air, first ensure that both tank valves are turned off. Then, remove the loop hose which is attached to the exhaust side of the mouthpiece. Put the mouthpiece into your mouth, open the loop and breathe. This will draw fresh air through the loop and eliminate the pure oxygen which you flushed the loop with. It will take a few minutes for the oxygen percentage to drop.

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

***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 rebreather should be flushed with oxygen on every dive to ensure that the displays are reading correctly, and re-calibrated every time the absorbent is changed.

ORIGINAL JETSAM DISPLAY BATTERY WARNING!!

The batteries used in the displays are Duracell PX28L 6 volt camera batteries 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.

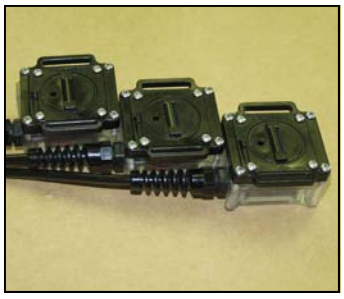
With the backlighting enabled the displays will operate for 20 hours after which the backlighting will become dim and fade out. The display will continue operating for another 20 hours before it fails. **If the backlight option is selected but the light does not come on CHANGE THE BATTERIES! DO NOT GAMBLE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

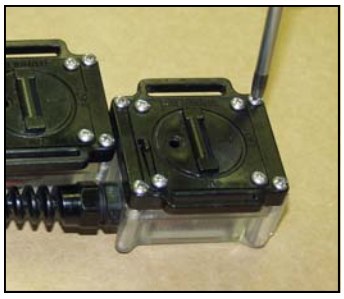
To change the batteries, remove the four outer screws on the back of the display case and carefully remove the cover. After changing the battery and logging the date, ensure that the o-ring is LIGHTLY lubricated and clean prior to replacing the cover.

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.



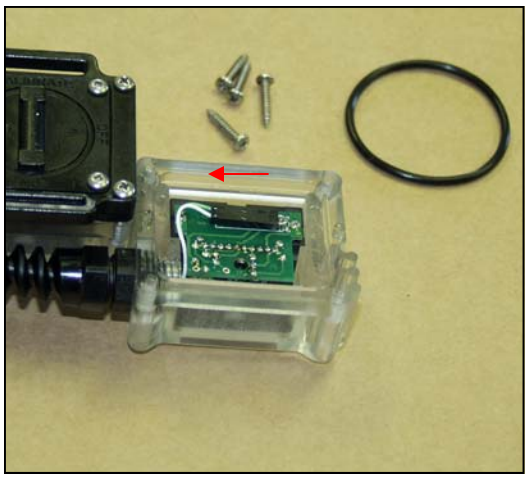


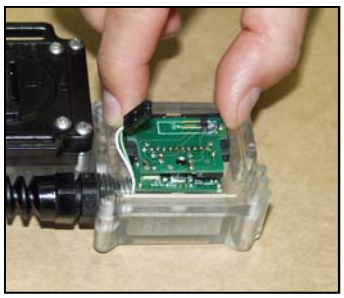
Take the display and with the calibration port side down gently tap the display on your thigh to remove any water droplets that could still be on the display back. GENTLY!! Even if you have been out of the water for some time, you should still do this.

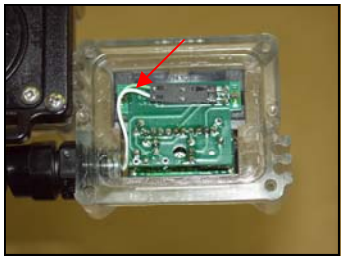
***NOTE: Water should be tapped out when ever the case is opened or when the calibration port is opened. Do not use compressed air!**

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.





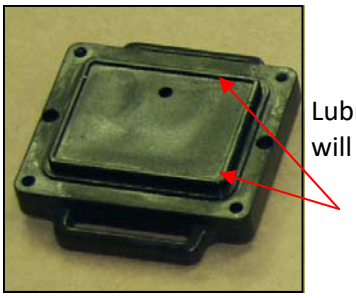


Once you have repaired or replaced the required parts, insert the circuit board back into the case. Push firmly, straight down while ensuring the wire is not pinched on the side. Once in place, plug the wire back in. Use a tiny screwdriver to push the wire into the side of the board, by where it comes 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.

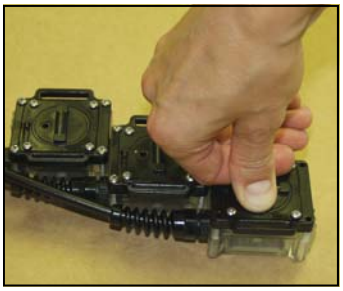
***NOTE: This is important as a flawed O-ring will allow water to enter the case!!**

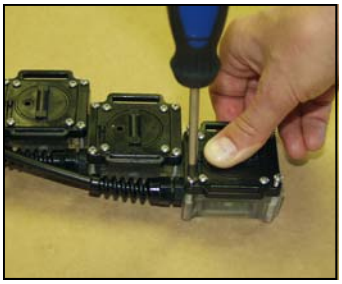
Apply lubrication generously to the O-ring. The lubricant will help the O-ring remain in place and will also assist in positioning the display back properly.



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.



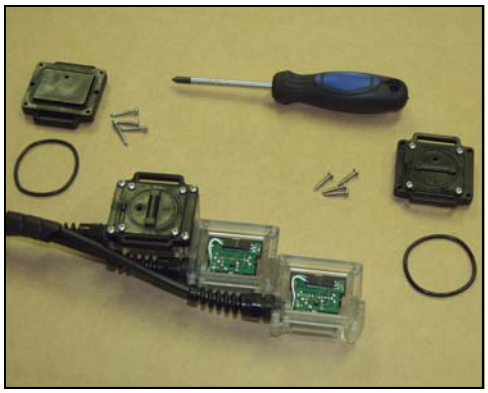


Place the back on the display case. Ensure that you have placed it correctly with the calibration port in the correct position. You will need to push it firmly down into position and must be able to hold it in place while you insert and tighten the screws. This is easiest to do by pushing down on the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

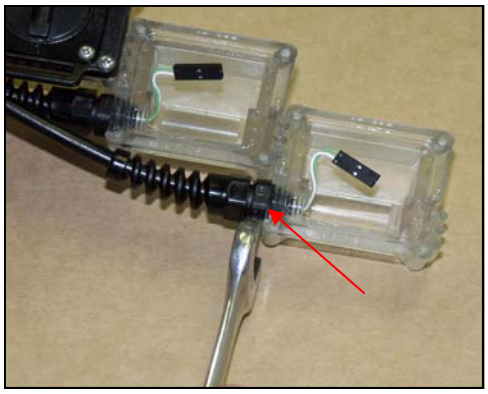
Place the screws in the holes and turn them slightly counter clockwise until you feel them drop into the old threads. Then tighten the screws until the back is secure and seated properly. While it is important that the screws are tight enough, it is also important that they are not over tightened. Remember,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

Replacing A Single Display Case

In order to remove the clear cover, you will need to remove the back from the case , as well as the case next to the one you are working with. If you are working with the middle case, you will need to remove all 3 display backs.

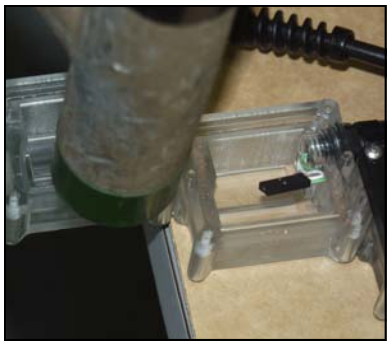


To change the clear display cover, start by following the directions on page 38.. As well as having the display backs off on the case that you would like to change, the O-ring, wire and circuit board assembly must be removed.



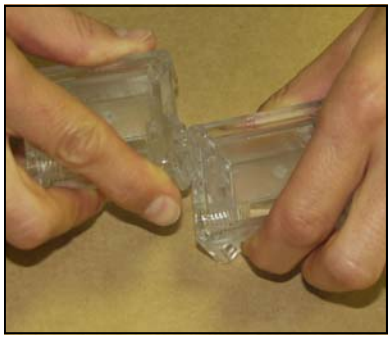
The strain relief/wire assembly will need to be removed from the clear cover. This is done by loosening the hex nut on the strain relief which is closest to the case. Once it is loose, the wire/strain relief assembly can be removed.

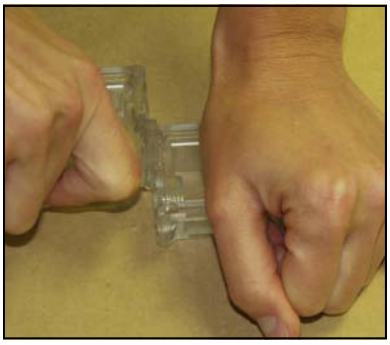
***NOTE: Do not touch the other nut on the strain relief. This is used to attach the strain relief to the wire. Generally, a strain relief can only be used once. If you loosen it or remove it, it should be replaced. Also, it is normal for the 2 nuts to have a gap between them.**



Lay the displays on the edge of your work table. The case to be removed should be sitting over the edge. With a rubber mallet, gently tap the case in the area where it is attached to the second case. See above right photo for the correct tapping location. If you tap on any other part of the case, use too much force or twist it, you can damage the case which could cause breakage at a later date.

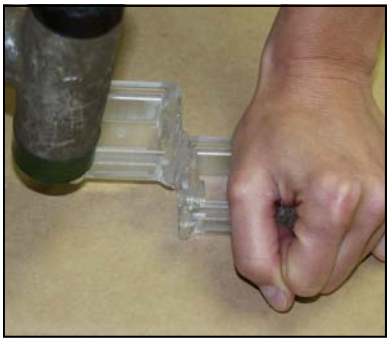
To attach a new clear display cover, reattach the strain relief and wire first. First, twist the wire counter clockwise 6 to 8 full revolutions. Then insert into the clear cover and tighten by hand. Insert the wire through the hole on the case. Secure the strain relief to the case. Tighten by hand first and then using a wrench, turn it another 1/2 to full turn more until seated. Twisting the wire prior will ensure a straight wire once you have finished reassembling the display case.

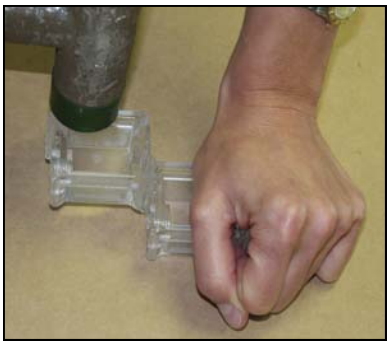




Apply lubricant to the puzzle pieces which join the displays together and then push the pieces together by hand. (ensure that you have them oriented the correct way). You should be able to push them about 1/8 to 1/4 inch together. Then, lay the cases on the table and gently tap with a rubber mallet until the edges on the back are even. Tap gently in the area where the cases join. See photo.

WRONG!!





WRONG!!

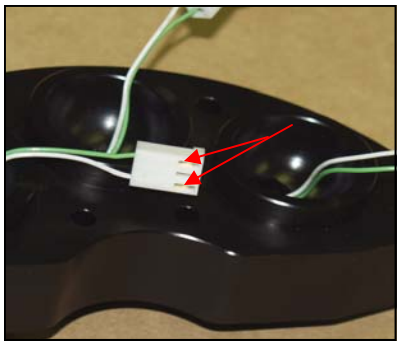
***NOTE: Only tap the cases by the puzzle pieces, as per above instructions. If you tap the cases on the outer edges, as shown in the two above photos, you will stress the plastic. This will cause breakage.**

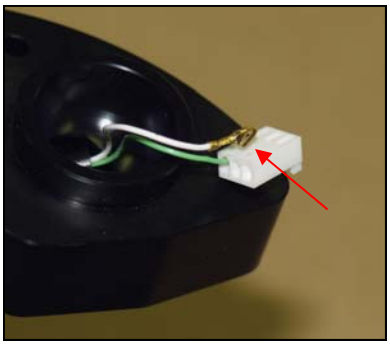
Following the directions on page 39, insert the circuit board assembly into the case, reattach the wire to the board, insert the O-ring and seal the case.

Replacing the Wire

Remove the spiral wrap and set aside. Then, following the directions on page 38, prepare your work area, remove the display back, unplug the wire, remove the circuit board assembly and then the strain relief/wire assembly from the clear cover.

To remove the wire from either the Classic KISS sensor plate or the Sport KISS three hose connector, you will need to remove the white molex connector.





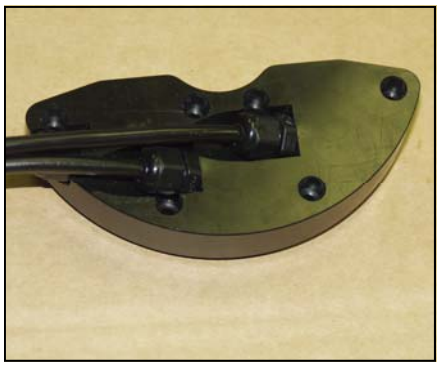
To remove the molex connector, push down on the two gold contacts as shown in the upper left photo. You will need to use a small tool such as a dental pick. Gently pull the wire out as you are pushing down. Take note on how the connector comes out of the contact. It will need to be attached in the same way. Also make a note on what position each wire is in. If you reattach the wires backwards, you will have a - sign in front of your digital PPO2 read out.

Now you are ready to remove the wire from the Classic KISS sensor block.

Remove the strain relief on the wire which you wish to change. Your new wire will already have the strain relief attached to it. Hand tighten on to the sensor block and then using a wrench tighten another 1/2 to full turn, until seated. In this application, you can use the second nut on the strain relief to tighten the wire to the senor block. It is easier to access with a tool and will not damage the strain relief.

Ensure that the strain relief is threaded in straight. The bottom of the hex nut should be flat against the area where it is seated against.

Once the wires have been secured to the sensor block, the other end can be attached to the display case. First, twist the wire counter clockwise 6 to 8 full revolutions. Then insert into the clear cover and tighten by hand. For the last 1/2 to full turn, use a wrench and tighten until seated. Twisting the wire prior will ensure a straight wire once you have finished reassembling the display case. Follow the directions on page 39 for reassembling the case properly.



Display Troubleshooting

FLICKERING OR FLUCTUATING DISPLAYS:

Your displays 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? Showing a gradual PPO2 drop as you metabolize the gas in the loop. The more you dive your KISS rebreather, the sooner you will learn how the oxygen sensors act.

If the displays 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.

SENSORS

When you open up your new K-22D sensors, they will have a millivolt reading between 9 and 13 millivolts. As per Vandagraph., as long as they are in that range, they are safe to use.

***WARNING: You also need to ensure that they can be calibrated in Oxygen and that they read correctly in air. 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. All sensors should be changed annually.**

*****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's should be changed annually. Sooner 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 hoses or scrubber canister off overnight to allow air to circulate through the scrubber head. Leaving the unit sealed up will not allow the condensation to evaporate.

*****If the Classic KISS has moisture in the head 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 head 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 canister and let the head dry. This will help keep your wires in good working order.**

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!!!!

CARE FOR YOUR FISCHER CONNECTOR AND THE CABLES

Having Fischer connectors on a rebreather 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.

DISPLAY WARNING

Never risk your life on only one source of information. Use a second computer or tables. If you choose to make riskier dives, obtain the proper training and work up to them slowly to gain experience.

All display system's will fail. It is not whether it will fail but when it will fail. Do not depend on it. Always have a plan on how to handle failures. Automatic systems are no substitute for knowledge and training. No technology will keep you alive. Knowledge, skill, and practiced procedures are your best defense. (Except for not doing the dive, of course.)

KISS PPO2 Display - Crystal Monitor 1

Some of the basic Crystal information is included here. This information has been obtained from the Crystal manual. Please note that this information is subject to change; for full and current information on this product, diver's should download the most current manual from the KISS website.

The Oxygen Monitor is designed to be a very basic and easy to use instrument for your rebreather. It has very few operations or pieces of information other than the PPO2 read out of oxygen from 1, 2, or 3 sensor cells while in Dive Mode and the ability to calibrate the sensors while in Surface Mode. There is only 1 diving screen which will display the individual output of each cell along with the battery level. This is not a diving computer, it has no other purpose other than to read oxygen levels.

There are 2 operational modes available to you when you turn it on. Surface Mode and Dive Mode. Dive Mode only allows you to see the oxygen level display. Surface Mode allows you to calibrate, change settings, and run diagnostics.

Basics:

Turning On:

- 5 to 10 taps on the cable side

Turning Off:

- Dive Mode: 3 taps on the cable side (followed by 2 taps outside, then cable side)
- Surface Mode: Rotate (outside taps) through to the OFF screen and select.

Calibration:

- Select Surface Mode, rotate to Millivolt Screen.
- Flush with either air or oxygen, 2 cable side taps to initiate
- 1 pt calibration: Automatic detection of either air or oxygen
- 2 pt calibration: Do a successive flush with opposite gas and recalibrate.
  2pt calibration is automatic
  Sensor Linearity is displayed
- Adjustments (Humidity, Altitude): Manual in Setup Mode

Battery:

It will run on either 4 AAA batteries or 1 9volt battery. The battery type can be selected in the setup menu but that only affects the battery level display.

HUD

INTRODUCTION TO THE HUD

In order to explain the logic behind the design of the HUD (originally designed & built by Shearwater Research Inc.), we have included the original Shearwater introduction in this write-up. The logic of the HUD is as follows:

The first point to consider is, there are “bad” alarms and “good” alarms. For example a fire bell is a bad alarm. It is bad because the absence of a ringing bell doesn’t mean there is no fire. It just means the alarm isn’t ringing. The fire bell may not be ringing because the battery is dead, the smoke detector isn’t in the right place, the installer screwed up the installation, there is a foreign object stuck in the ringer, etc. It doesn’t mean that everything is ok.

A good alarm is one where there is an obvious difference between the lack of function and the lack of an alarm. A solid green light doesn’t do that.

The second point to consider is, there are integrated HUD’s and redundant HUD’s. Integrated HUD’s can notify you for features such as deco ceilings and distance from set-point. But they can’t do that and be redundant also. If you wish to have redundancy, then the HUD needs to be calibrated separately and it can’t display “deco” information unless it has a separate decompression computer with its own set of tissues, gases, etc., built into it.

The third point to consider is that there are HUD’s that just display the set-point or PPO2 of the gas in the rebreather. This version is very useful for scootering, low visibility, filming, and manually maintaining set-point.

With the HUD, we tried to find the best of all worlds. It displays the PPO2 only, which makes it a redundant PPO2 meter. Since it uses three LED’s simultaneously, it can display them quickly. A typical 1.3 takes about 2 seconds to read. After a few dives, many divers have said that they do not need to consciously “read” the displays; they look at the display and their brain recognizes the number of flashes.

When there is a problem with a sensor, it is noticeable immediately as one of the LCD’s flashes different from the others. As the diver knows what to expect, when something different happens it really jumps out at them.

The HUD does not display continuously; there is usually 5 seconds between the displays. Also, as the PPO2 gets farther from 1.0, the light DENSITY gets higher. If you are more than 0.50 away from 1.00, the power is turned up to the high intensity LED’s; so they get brighter! At 0.20 you have three very bright red LED’s flashing just about continuously in the corner of your eye.

OPERATION

The HUD has a single button on the box, which is used for powering on/off, and calibration.

Power On/Off:
One push of the HUD button will turn the HUD on, while one subsequent push will turn the HUD off.

Calibration:
The Shearwater HUD calibrates only to oxygen; 0.98 to be exact. This allows for imperfect oxygen flushes and water vapour.

To calibrate, push the HUD button three times within 1 second. This may take a little practice, but it is intended to prevent accidental calibrations. Once you successfully do the calibration sequence, all three lights will come on bright red for 5 seconds. If this doesn’t happen, then you didn’t do the calibration command successfully; try again.

DISPLAY DESCRIPTIONS

After calibration, each of the sensors should be flashing one orange. That means the PP02 is between 0.95 and 1.05. Remember, the actual value it uses for calibration is 0.98.

If a sensor fails calibration, it will flash one red and one green. It can be useful to look at the millivolts on your alternate display to see why a sensor didn't calibrate. In these two example pictures, sensor one has failed and is alternating between red and green

GENERAL FLASH PATTERN:

The number of green flashes is the number of tenths above 1.0. Therefore, 3 green flashes is 1.3 PPO2.

The number of red flashes is the number of tenths below 1.0. Therefore, 2 red is 0.8 PPO2

Example:

0.80 is RR_____ RR_____ RR_____

0.20 is RRRRRRRR__RRRRRRRR __RRRRRRRR__

1.3 is GGG_____GGG_____GGG_____

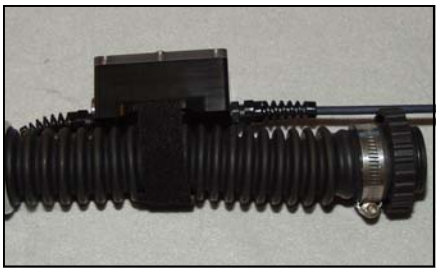
You will notice from the above example's that the farther away from 1.0, the shorter the interval between flash sets.

BATTERY WARNING:

When you turn the HUD on, if it flashes orange for 30 seconds, this indicates a low battery.

The battery is contained in the box with the processor. To change the battery, you will need to remove the top cover. Replace the battery with a 3.6 volt Lithium - Saft 14500. Ensure when replacing the cover that the O-rings are properly secured, cleaned and lubricated.

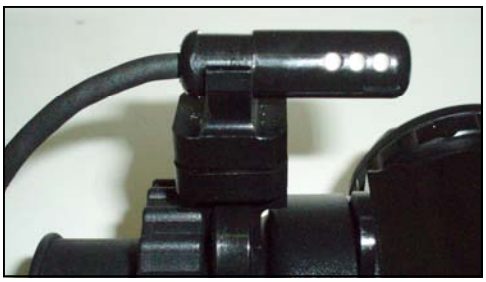
It would be beneficial to carry a spare battery in your spares kit, as they aren't available in some remote areas. This should not be a cause for concern as the battery should last many months, even years.



REBREATHER ATTACHMENT

The box should be attached to the loop hose, behind the divers head. Use the enclosed Velcro for this. In this location it will not be in the way and it is also possible to reach the button.

Attach the HUD tie to either side of the BOV. It is handy to attach it to the left side so that dumping the right loop hose after a dive isn't effected.



Wrap the cable for the HUD around the loop hose, and then snap on to the attachment.

The HUD attachment consists of 2 pieces; one part attaches to the BOV with the tie and the other the HUD snaps into. The two parts are joined by magnets. These are extremely strong magnets! Slide magnets apart and back together only.

Manual Add Valve/Metering Orifice

The manual add valve is for adding oxygen to the loop. The o-rings should be changed annually or if the flow rate changes, more frequently. The inlet of the valve is protected by a 15 micron filter. This filter will NOT stop seawater from contaminating the orifice. All components in the add valve must be clean, oil free, with the o-rings lightly lubricated with oxygen compatible grease.

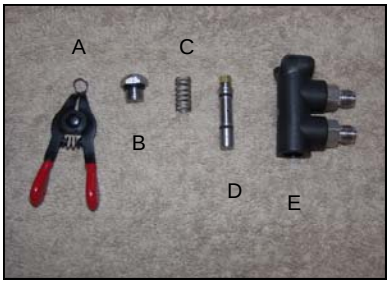


The tools required to disassemble the valve are a wrench or alan key, small snap ring pliers and a jewellers screwdriver. First, insert the snap ring pliers into the snap ring on the button end of the valve and remove.



Remove the nut with either the wrench or alan key, depending on which nut you have; pull out the spring. The spool and orifice are all that is left inside the valve.





DO NOT SCRAPE OR GOUGE THE BORE!!!!!!

To remove the spool and orifice push in the button using a jewellers screwdriver. This will force the spool and orifice out the other end. When you have the spool removed, cut the old o-rings away with a sharp knife and replace them with new V75-008 O-rings which have been lubricated with an oxygen compatible lubricant such as Christolube. Do not scratch the O-ring grooves. The orifice does not need to be removed unless it is damaged or plugged.

The parts in the valve are: A. snap ring; B. nut; C. spring; D. spool & orifice; E. valve body

***WARNING: When reassembling the valve, ensure that you do not over-tighten the nut. Remember, when screwing any metal screws into plastic use only two fingers on the wrench. If you over-tighten the nut, it will strip the threads and the valve will leak.**



When attaching the valve to the filter and the hoses, it is very important that you use a second wrench to hold the nut next to the valve body in place. Do not allow this nut to spin as it will over-tighten and strip the plastic. This will cause the valve to leak. The valve body is not a substitute for a wrench.

Older Classic KISS units were shipped with the Swagelok SS/Teflon hoses. New units are shipped with the Miflex hoses. When attaching the manual add valve to these hoses, remember that the inlet port is the one nearest the add button. The hose which is attached to the oxygen first stage is attached to the inlet port.

***NOTE: The oxygen delivery system attaches to the rebreather via the elbow on the side of the scrubber head. Please note that the male end of the elbow which screws into the head is NPT, or pipe thread. This is a tapered thread, NOT a straight thread. If you screw a fitting with a straight thread, such as a swivel elbow, into this port, it will damage the rebreather head! If this happens, it is NOT repairable. Prior to modifying your rebreather, please be certain that you understand what fittings are required.**

***NOTE: The Miflex hoses are tested and rated for oxygen use. As they have standard regulator hose fittings, they can be replaced with other rubber LP hoses. If you do so, please ensure that the hoses you use are rated for oxygen use!!**

Also, all low pressure hoses on the Classic KISS should be inspected periodically to ensure that they are not damaged and in good working order. This includes the oxygen hoses, diluent hose, DSV 2nd stage regulator hose, ADV hose.

The KISS rebreathers are mechanically controlled. The oxygen manual add valve houses a orifice which allows oxygen to flow into the loop at all times. In the event that more oxygen is required, the button on this valve will need to be pushed. The difference between diving a KISS rebreather manually and other rebreathers is that the constant flow of oxygen keeps our divers from getting too busy underwater. Diving other rebreathers manually means that the only way oxygen gets into the loop is by pushing the button.

What does this mean to the diver? It means that when you get to your maximum depth, you will adjust your PPO2 and then unless you are working hard or going up and down in the water column, you will only be pushing the button every 10 to 20 minutes. This depends also on where the constant flow has been set. If you find yourself pushing the button all the time, then you need to increase the flow. If you find that your oxygen is creeping up during normal diving activities, then you will want to decrease the flow.

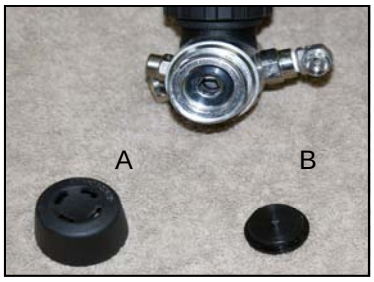
Adjusting the O2 Flow Rate

The oxygen injection rate can be adjusted to suit each individual diver. The required flow rate depends on the physical size of the diver and the degree of exertion used during the dive. If the flow rate is too high the P02 will climb to dangerous levels and the breathing loop will have to be purged to reduce the oxygen partial pressure to a safe level. If the flow rate is set too low oxygen will have to be manually added more often during the dive.

TOO LOW IS BETTER AS IT IS QUICKER TO ADD OXYGEN TO THE LOOP, THEN TO FLUSH IT!!

To adjust the flow rate, disconnect the oxygen delivery line where it attaches to the stainless steel elbow on the side of the scrubber head. Attach a 0-1 litre per minute flow meter (Dwyer VFB-60-SSV or equivalent) to this line.

Disconnect the manual add valve supply line where it attaches to the add valve filter and connect a 0-300 psi gauge between these fittings.



Remove the clamp ring from the oxygen regulator, (A) and lift the black plastic plug, (B) out of the regulator cap. Connect the regulator to an oxygen cylinder which has at least 800 psi remaining. Slowly (oxygen, remember) open the oxygen valve. Note the gauge pressure and flow meter reading. The relationship between the pressure setting and the O2 flow rate should match the table on the following page.

For those of you using the Miflex hoses. The following photos show how the flow system can be checked and which parts you need. All parts can be purchased through one of your local fittings suppliers. This is just one method that can be used.
First, remove the miflex hose from the filter and attach an IP gauge. Determine where the IP is set, before you make any changes. After you record that information, reattach the hose. Then remove the miflex hose which is attached to

the plug side of the valve. Attach your flow meter and short LP hose (see above photo). As per the instructions on the next page, adjust your flow. Once you have adjusted the flow, you can remove the flow meter and hose, and reattach the IP gauge. This will allow you to verify your flow reading with the IP of the first stage, using the chart on the next page.

NOTE: IT IS VERY IMPORTANT THAT TWO WRENCH'S ARE USED WHEN REMOVING HOSES OR FITTINGS FROM THE MANUAL ADD VALVE!!! ONE MUST BE USED TO ENSURE THAT THE FITTING ON THE VALVE DOES NOT SPIN!! SEE THE PHOTOS AT THE TOP OF PAGE 53 (THE PREVIOUS PAGE) WHICH SHOW HOW TO DO THIS PROPERLY.

0.0035 orifice

8.0 Bar (117.6 psi)	0.520 LPM
8.5 Bar (125 psi)	0.550 LPM
9.0 Bar (132.3 psi)	0.570 LPM
9.5 Bar (139.7)	0.600 LPM
10.0 Bar (147 psi)	0.630 LPM
10.5 Bar (154.4 psi)	0.660 LPM
11.0 Bar (161.7 psi)	0.70 LPM
11.5 Bar (169 psi)	0.730 LPM
12.0 Bar (176.4 psi)	0.770 LPM
12.5 Bar (183.8 psi)	0.800 LPM
13 Bar (191.1 psi)	0.830 LPM

Note that some of these pressure settings are beyond the recommended adjustment range of the regulator and may result in erratic performance. Use at your own risk!

These figures are typical but not absolute due to slight variations in the accuracy of the gauge and the tolerance of the metering orifice. If your flow rates are more than 15% different than these, see the troubleshooting guide to determine the problem.

To change the pressure use a 6mm hex key to turn the regulator adjustor under the black plastic plug. Clockwise increases the pressure, counter clockwise reduces the pressure. Turn the wrench slowly and do not insert it too far into the regulator or it will hit the diaphragm and cause the pressure to surge.

So where should the flow rate be set? 0.75 LPM is a good starting point. If you find you have to constantly add oxygen, try increasing the setting by 0.05 LPM. The P02 should slowly rise when you are hanging motionless in the water but you should have to add 02 at regular intervals during the dive when maintaining a constant depth. The metering orifice flow rate will decrease as the depth (ambient pressure) increases. The amount it decreases depends on the upstream pressure (regulator pressure setting) versus the downstream pressure (depth). This is not a fault, it is physics.

WARNING!

The oxygen injector is a convenience. It is not a controller in any way. The only device regulating the oxygen partial pressure is your brain. The automatic oxygen add does not reduce the need to monitor the three partial pressure displays. It only reduces the number of times you have to press the oxygen add button. The displays should be checked constantly during the dive. The oxygen regulator can fail and stop delivering 02 or it can fail and increase the flow drastically. The orifice can become plugged and stop delivering oxygen. The add valve O-rings can fail and increase the amount of 02 being added to the breathing loop. Any of these things can kill you but any of these problems can be overcome if you are aware of the conditions in the breathing loop.

DIVER SHOULD BE CHECKING THEIR PPO2 DISPLAYS EVERY MINUTE.
KNOW YOUR PPO2 AT ALL TIMES...*OR YOU WILL DIE!!*

LEFT SIDE GAS ADDITION VALVE & MIFLEX HOSES:

A left side Gas Addition Valve, GAV, may now be added to the Classic KISS. This valve may be used for oxygen, air, nitrox, or trimix. Unlike the standard manual gas addition valve that the KISS units have always shipped with, this valve does NOT have an orifice. The only way for gas to enter the breathing loop with this valve, is by pushing the button.

In order to determine which valve is which, we have engraved the larger fitting on the valves. The fitting which is secured into the housing on the button side, will be engraved.

***WARNING: If you remove your valve from the unit, keep spare valves, or keep different valves in your kit, be certain that you know what they are for! Read the inscriptions and use the correct valve for your planned dive.**

As the left side valve does not have an orifice, the left side first stage is not modified. It is a standard first stage. This means that the left side valve will add gas at any depth. This is especially handy for those divers who prefer to run their right side valve at a lower flow, and are unable to add oxygen at depth.

For those upgrading older Classic KISS units to a left side valve, note that both an elbow and tube are required. When installing the elbow and tube on the left side, the outer brass plug and inner stainless steal plug must be removed. Once removed, put them someplace safe; if you ever want to remove the elbow assembly, then BOTH of these plugs must be reinserted. In the event that you don't want to use the elbow, it may be easier to remove the hoses, and plug the elbow using a standard 3/8 first stage plug.

***WARNING: IF THE 2 PLUGS ARE REMOVED, IT IS IMPORTANT THAT THE TUBE IS USED WITH THE ELBOW. THIS IS CRITICAL FOR PROPER GAS ROUTING. ALSO, IF THE ELBOW ASSEMBLY IS REMOVED, IT IS ALSO CRITICAL THAT BOTH PLUGS ARE RE-INSTALLED! FAILURE TO DO SO WILL ALSO CAUSE INCORRECT GAS ROUTING. EITHER OF THESE PROBLEMS, COULD CAUSE INJURY OR DEATH!**

Those that are installing the elbow themselves, should first apply Teflon tape to the threads. While this is not a pressure fitting and tape really isn't required, it will help protect the threads. When attaching the elbow, ensure that it is not cross threaded. Also, do not over tighten. It is not required. Four to five turns is enough. The best tool to tighten the elbow is a 5/8 wrench. Use it to cup the bottom of the elbow to help turn it into position. You should only need the wrench on the last turn. The first few turns can be done by hand.

***NOTE: The right and left side elbows, which attach to the rebreather head, are NPT or pipe thread. This is a tapered thread, NOT a straight thread. If you screw a fitting with a straight thread, such as a swivel elbow, into this port it will damage the rebreather head! If this happens, it is NOT repairable. Prior to modifying your rebreather, please be certain that you understand what fittings are required.**

***NOTE: Prior to servicing the gas addition valves or adding a left side valve, it is important that the add valve maintenance section has been read, and understood. It is very easy to damage the plastic housing. Once it is damaged, it can not be repaired.**

The hoses for the left side gas addition valve are both LP hoses which are rated for oxygen use. As the Classic has two similar gas addition valves, it is important to differentiate between them. Therefore, the right side valve hoses which have always been for pure oxygen, will be green, and the left side hoses will be black.

WARNING FOR RIGHT & LEFT SIDE ADD VALVES!

The oxygen injector, is a convenience. It is not a controller in any way. The only device regulating the oxygen partial pressure is your brain. The automatic oxygen add does not reduce the need to monitor the three partial pressure displays. It only reduces the number of times you have to press the oxygen add button. As with any rebreather, the displays should be checked constantly during the dive. The oxygen regulator can fail and stop delivering 02 or it can fail and increase the flow drastically. The orifice can become plugged and stop delivering oxygen. The add valve O-rings can fail and increase the amount of 02 being added to the breathing loop. Any of these things can kill you but any of these problems can be overcome if you are aware of the conditions in the breathing loop.

KNOW YOUR PO2 AT ALL TIMES !

Manual Add Valve Troubleshooting

If the flow rate is lower than it should be in relation to the pressure, one of the following things has happened:

- The filter has become clogged and should be replaced.
- The orifice has become partially plugged and must be replaced.

DO NOT TRY TO CORRECT A LOW FLOW RATE BY INCREASING THE REGULATOR PRESSURE!

If the flow rate is higher than it should be in relation to the pressure one of the following things has happened:

- The orifice has become loose where it screws onto the valve.
- The valve o-ring is worn or damaged.
- The spring is broken or weakened and is not holding the valve closed.

The oxygen first stage will have a plastic plug installed to prevent the pressure from increasing with depth and increasing the oxygen flow rate. If the pressure is inconsistent the high pressure seat or diaphragm may be damaged. The regulator should be serviced regularly and maintained in an oxygen clean condition.

***WARNING: It is very important that this valve is in good working order, with proper flow rates and good O-rings. Ensure that you rinse your gear after diving in salt water, and if you flood your rebreather, and you think water has gotten into the valve, service it!! If you pay attention to how often you usually add oxygen to your rebreather during a typical dive, it will be easier for you to notice a problem.**

***NOTE: The Add Valve hoses are rated for oxygen use. As they have standard regulator hose fittings, they can be replaced with other rubber LP hoses. If you do so, please ensure that the hoses you use are rated for oxygen use!**

Also, all low pressure hoses on the KISS Explorer should be inspected periodically to ensure that they are not damaged and in good working order. This includes the oxygen hoses, diluent hoses, mouthpiece 2nd stage regulator hose and ADV hose.

ADD VALVE QUICK CONNECT SYSTEM

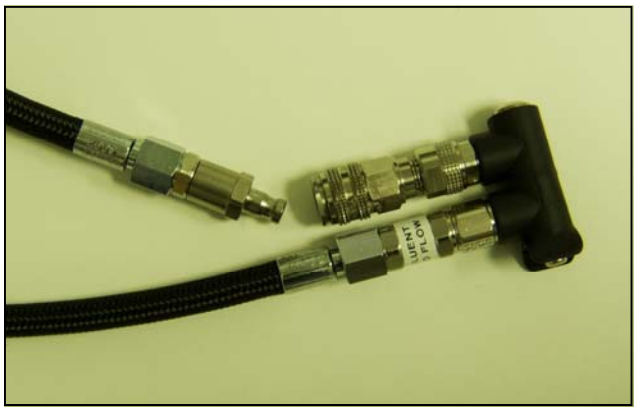
We recommend that the quick connect system is attached to the add valve, on the out flow side. This ensures that the small amount of water which sits in the front of the check valve, will get atomized into the low pressure hose. The amount of water is very slight, and it does get atomized. Even still, it should be after the add valve and filter set up.

What this means is that when the quick connect system is apart, the add valve will be attached to the side mount cylinder. Care should be taken to secure the valve to the side of the cylinder with bungees and/or clips, to ensure that it does not get damaged. Treat it as you would a second stage regulator, with care and respect.

When attaching the fittings to the add valve, remember to put one wrench on the add valve fitting and one on the quick connect. Do not allow the fitting, which is directly attached to the valve, to spin. It could strip the threads of the housing. See page 17 for more information on this subject and wrench placement photos.

When your Explorer is rigged for travel mode, you must still do a full positive and negative test. This must be done with the complete loop intact. This means that the first stages must be secured to the side mount cylinders, and the quick connects pushed together. This is the only way to ensure that the positive and negative tests pass. Don't forget to push the shut-off valve closed, on the off-board accessory. If you don't, it will leak and the test will fail.

While the entire loop is together, take the time to pressurize the off-board whip. Simply open up the off-board cylinder, while the off-board accessory is connected to it. This will pressurize the whip, and will confirm that the one way check valve has seated. Ensure that the shut-off valve is open, while you do this. This should be done prior to entering the water. See the off-board section for full details.



***WARNING: The add valve quick connect is required if the diver chooses to use NO on board gas cylinders. When only side mount gas is used, the quick connect is required in order for the diver to secure and remove the cylinders easily. Using advanced components and configurations such as this, requires additional training, knowledge, and muscle memory in order to master new skills. Failure to acquire the proper training and knowledge may cause serious injury or death!**

SET-UP OPTIONS & COMPONENTS

This section of the manual discusses the various options for rigging the KISS Classic. Classic owners should read carefully the sections below to determine which rigging methods are appealing. There are some components which are not included in the standard package, which are required for some of these methods. We chose not to include all the parts for every rigging style, as not every diver will require them. This helps to keep the cost of the unit down, and divers can then purchase what they need.

Once you determine which style suits you, turn to the appropriate section in the manual for further explanation of that rigging system.

CYLINDER RIGGING OPTIONS

1. **ON-BOARD CYLINDERS: Standard, diluent and oxygen; with additional diluent/bailout as side-mount.** With this system, divers can choose any mix they like for the left side cylinder. Divers may plumb their side mount cylinders into the rebreather using the off-board accessory. .

2. **ON-BOARD CYLINDERS: Oxygen only; with diluent/bailout as side-mount.** With this system, divers would plumb their side mount cylinders into the rebreather using the off-board accessory. One off-board accessory kit (rebreather side and cylinder side) is required. It attaches to the unit through the manifold. It can easily be rigged with 2 full off-board kits, if desired. This way, 2 side mount cylinders can be plumbed into the rebreather, and no disconnecting of the off-board is necessary. Or just 1 off-board rebreather side whip can be used. With this set up, the quick disconnect would be utilized when switching to other cylinders.

3. **OFF-BOARD CYLINDERS ONLY: diluent and oxygen as side-mount only.** This method does not use on-board cylinders. Cylinders of any size can be used, as they are side-mounted. With this rigging method, divers will have their diluent cylinder plumbed to the off-board accessory, and they will also have use of a left side gas addition valve, if you choose to dive with it.
   it does not require an off-board accessory.

GAS ADDITION VALVES

1. **Right side, oxygen manual add valve with flow. This** is standard and is included in all Classic packages. This is the original manual add valve which is used on all KISS rebreathers.

2. **Left side gas addition valve, oxygen no-flow.** This valve is the same as the right side valve, but it DOES NOT HAVE AN ORIFICE! Instead it is plugged. Gas will only go into the rebreather from this valve if the button is pushed. This valve may be used for oxygen, nitrox, trimix, or air. Divers should be aware that if they use this valve for diluent, it will NOT have enough flow (when the button is pushed) to do a quick diluent flush.

GAS ADDITION VALVES WITH QUICK DISCONNECT FITTINGS
(the quick disconnect fittings are an optional product and not included with the EXPLORER package.)

1. **QD fittings not attached to the manual gas addition valves:** Unless the KISS Explorer is set up for the no on-board cylinder/travel version, these fittings are not required. While they can be used, divers should remember that the more fittings on the rebreather, the more failure points it has. This QD fitting is not recommended, unless it is required.

2. **QD fittings attached to the manual gas addition valves:** The QD fittings enable the diver to dive without on-board cylinders, using side mounted cylinders only. (the QD fittings must be ordered extra). With this rigging method,

the rebreather first stages are used as the side mount first stages. These QD fittings are required if the diver wishes to use heavy cylinders which must be attached in the water. The QD allows the add valve hose system to split, making this possible. This method would require the diver to attach the bailout regulators to these first stages. Please see the Classic—No Cylinders section for a full description.

GAS ADDITION VALVE ROUTING

The Explorer ships with the add valves sitting over the divers shoulders. You may choose to route the valve so that the hoses wrap around your waist with the valve clipped on the lower part of your harness. To do this, you will need to turn the scrubber head elbow so that it turns down. Then attach the longer Miflex hose to the elbow, and the shorter hose to the first stage. Basically, you are switching them from how they are shipped. Remember, the hose from the first stage should be attached to the filter on the add valve.

LEFT SIDE GAS ADDITON VALVE

It's worth noting that this valve does not need to be used on every dive. It is included in the Explorer kit as it is a feature that some divers require on their technical dives. If you find that it isn't a feature that you need at this point in your diving, it can be removed.

The easiest way to do this is to remove the miflex hose from the elbow and use a standard LP first stage port plug to close the elbow. This way, it doesn't need to be removed and the add valve can easily be reinstalled when required.

CLASSIC WITH ON-BOARD OXYGEN ONLY

This system is for divers who wish to have redundant oxygen. These divers feel that having only one oxygen cylinder for a technical dive, is the weak link of the system. With this configuration, the divers diluent gas is the side mount/ bailout gas.

***WARNING: As always, all dives should be conducted with the appropriate gear, training and mind set. If any one of these is lacking, death could result!**

With this system, divers would plumb their side mount cylinders into the Explorer using the off-board accessory. With the side mount cylinders attached to the loop via the off-board accessory, gas can be added to the loop in two ways. First by using the ADV and second by using the mouthpiece. Also, open circuit gas can be breathed via the rebreather mouthpiece. As the side mount cylinder is also the bail out cylinder, divers should have a bail out regulator attached to these cylinders.

***WARNING: Diving the bail out/side mount cylinders WITHOUT second stages should not be done. If the rebreather mouthpiece for any reason fails, then the bail out gas would not be accessible. Also, divers should ensure that they plan their dives appropriately and take in consideration their gear configuration as well as their buddies gear configuration. Ensure that all divers are properly trained for the planned dives and that they understand each others gear. Failure to do so, may result in injury or death!**
***WARNING: If you are going to dive this system, *with two on-board oxygen cylinders,* you MUST remove the 21" LP hose and adapter, which runs from the manifold to the diluent first stage. If you do not do this, you will be adding both pure oxygen from the left on-board cylinder and also diluent from your side mount cylinder through the ADV!! The ADV should ONLY add the gas from the side mount diluent cylinder!! If oxygen is in the left side cylinder, it must ONLY be added to the rebreather using the left oxygen gas addition valve. Diving in this manner presents challenges and therefore it is only for those with advanced diving experience and adequate training!!! If divers are using large side mount cylinders that are attached to the system in the water, *they need to understand that the ADV will not work until the side mount cylinder is attached,* using the off-board accessory. Having two on-board oxygen cylinders means that divers need to pay special attention to their PPO2's!! The PPO2 will creep up if no diluent is being added! *The ADV and the mouth-piece/open-circuit will not work until the off-board accessory is connected!* The KISS Classic in this configuration was meant to be used with the off-board accessory in place. Diving without it means that not all the components will work!! If you are planning on diving this configuration, ensure that you have the proper training and skills. This is not meant for beginner rebreather divers! It is for experience rebreather divers with proper training and experience!**

Those that wish to dive this configuration should choose the left side oxygen gas addition valve with no flow. It is oxygen clean. The diluent valve should not be used as the flow is high for oxygen! This valve is similar to the right side oxygen manual add valve, but it DOES NOT HAVE AN ORIFICE. It is plugged. The only way the oxygen goes into the breathing loop is by pushing the button. This is a multi purpose valve as it can be used with other gas mixtures.

CLASSIC WITH ON-BOARD OXYGEN AND DILUENT

This system is for divers who wish to have both on board diluent and side mount diluent/bail out gas. These divers prefer to dive the rebreather with a standard configuration, with a breathable on-board gas in the diluent cylinder. With this configuration, the divers on-board gas and side mount/bail out gas can be any mixture which is appropriate for the dive.

***WARNING: As always, all dives should be conducted with the appropriate gear, training and mind set. If any one of these is lacking, death could result!**

With this system, divers may plumb their side mount cylinders into the Classic using the off-board accessory. With the side mount cylinders attached to the loop via the off-board accessory, gas can be added to the loop in two ways. First by using the ADV and second by using the mouthpiece. Also, open circuit gas can be breathed via the rebreather mouthpiece.

As the side mount cylinder is also the bail out cylinder, divers should have a bail out regulator attached to these cylinders.

***WARNING: Diving the bail out/side mount cylinders WITHOUT second stages should not be done. If the rebreather mouthpiece for any reason fails, then the bail out gas would not be accessible. Also, divers should ensure that they plan their dives appropriately and take into consideration their gear configuration as well as their buddies gear configuration. Ensure that all divers are properly trained for the planned dives and that they understand each others gear. Failure to do so, may result in injury or death!**

CLASSIC—NO CYLINDERS

This system is for divers who DO NOT WISH to have on-board cylinders; they wish to use side mount cylinders only. Divers who prefer this configuration are usually explorers who require their gear to be as light as possible for transport to the diving location, or only have large cylinders available. Travellers also like this configuration. The simple changes for this configuration convert KISS Classic into a light weight travel unit. It is different only due to it using off-board cylinders only. This configuration allows divers to rent cylinders at their destination. As the cylinders are side-mounted, they can be any size; 30, 40, 60, 80 cubic feet.

This system utilizes the same first stages and gas addition hose system. However, an additional quick connect system is required with the existing hose system. These are not included in the Explorer kit and must be purchased extra. See the appropriate section for instructions & further information on this system. This quick connect system is required for those that wish to put the cylinders on in the water. If smaller cylinders are being used, they can be rigged top-side, and then the quick connect system is not required. It is recommended that the quick connect hose system only be used if the Explorer is rigged for this configuration. Otherwise O-rings (failure points) are being added to the system, which serve no purpose.

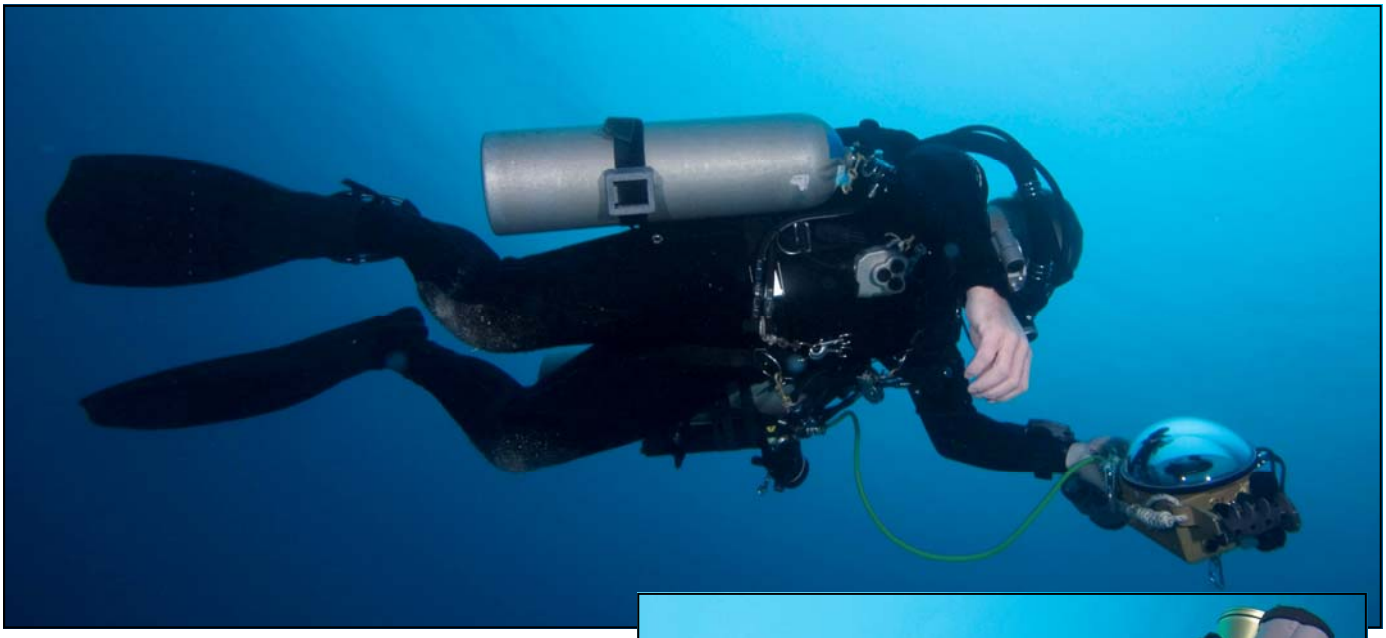
The left side diluent/bail out cylinder is attached to the loop by both the off-board accessory and also the left side gas addition valve. The right side oxygen cylinder is attached to the loop by the oxygen manual add valve.

***WARNING: As always, all dives should be conducted with the appropriate gear, training and mind set. If any one of these is lacking, death could result!**

With this system, divers would plumb their left, side mount cylinder into the Explorer using the off-board accessory. With the side mount cylinder attached to the loop via the off-board accessory, gas can be added to the loop in two ways. First by using the ADV and second by using the mouthpiece. Also, open circuit gas can be breathed via the re-breather mouthpiece also. As the side mount cylinder is also the bail out cylinder, divers should have a bail out regulator attached to these cylinders.

***WARNING: Diving the bail out/side mount cylinders with NO second stage should not be done. If the rebreather mouthpiece for any reason fails, then the bail out gas would not be accessible. Also, divers should ensure that they plan their dives appropriately and take into consideration their gear configuration as well as their buddies gear configuration. Ensure that all divers are properly trained for the planned dives and that they understand each others gear. Failure to do so, may result in injury or death!**

***WARNING: If divers are using large side mount cylinders, attaching to the system in the water, they need to understand that the ADV, open circuit mouthpiece, rebreather loop and both the gas addition valves will not work until the diver hooks up the cylinders and secure the quick connects. The unit was meant to dived with the off-board accessory and both gas addition valves in place. Diving without these parts means that not all the components will work!! Divers should be aware that these are advanced diving procedures and that experience and training are required to dive this configuration.**



Exhaust Valve, ADV & Work of Breathing

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

See page 58 for instructions on changing the ADV diaphragm.

BUBBLING APEKS EXHAUST VALVE

There are several things that can cause this problem. Over the next few pages, 6 situations are listed and described.

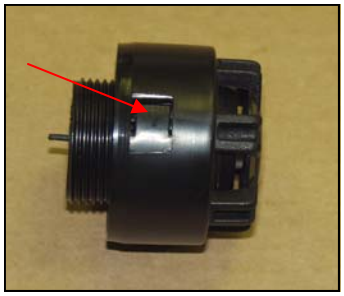
1. ***The exhaust valve is not tightened down all the way or there is debris in the valve.*** To tighten the valve, simply turn the dial clockwise. To remove debris, open the valve all the way and rinse well. If you need to take the valve apart, see the instructions below.

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

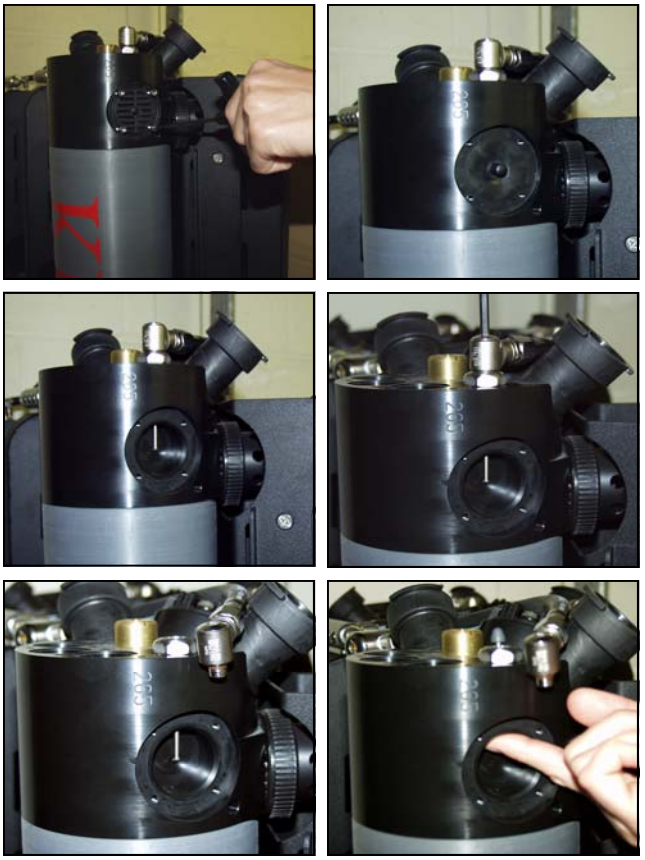
2. ***Counterlungs are the wrong size (too small).*** The loop volume is at its maximum so the counterlungs are completely full. As oxygen or diluent is added, the exhaust valve will purge. This could happen if the counterlung volume is too small for the diver. On page 23 there are instructions for determining if the counterlungs are the correct size. The counterlung volume should be as close to your own lung volume as possible, but never any smaller! Ensure that you have the correct lung size!!

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 will find that the air 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.

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 Classic KISS.

4. ***ADV problem.*** If your counterlung volume is correct and the exhaust valve is in good working order, and you still have a leaking exhaust with the feeling of too much gas in the loop, you could have a problem with your ADV adding too much gas into the system. If this is happening you will also notice that your PPO2 is reading lower than usual and that your buoyancy is off. This could be caused by a stretched, damaged or torn ADV diaphragm, an old style ADV valve stem where the O-ring has come loose, a newer ADV valve stem which is damaged and also if the seating area of the ADV valve stem has debris in it. Inspect the diaphragm and valve stem for damage or fault.

   When reinserting the ADV valve stem, clean the underside of the valve's head and apply a small amount of lubricant to it. This will keep it in good condition and help it to seal. Also thoroughly clean the seating area.

***NOTE: ensure that the seating area of the valve stem is clean and debris free!! If there is the slightest amount of dirt in this area, the valve stem will leak!**

To determine if this is the problem, shut off the diluent gas. First you will notice your PPO2 stabilize and stop dropping. Also, the lungs will stop filling up all the way and the exhaust valve should stop purging.

The diaphragm is simple to check. Open the cover and pull the assembly out. It should be fairly flat, and not damaged. You may need to look quite closely for small tears or holes. Sometimes holding it up to the light and gently pulling the rubber will help.

HAVING SAID THAT THE DIAPHRAGM IS EASY TO CHECK, IT IS ALSO WORTH NOTING THAT IF YOU ARE NOT HAVING A PROBLEM WITH THE DIAPHRAGM ASSEMBLY, DO NOT DISSAMBLE IT. WITH PROPER USE, THE DIAPHRAM WILL LAST FOR YEARS IF NOT DISTURBED.

5. ***Check the IP on the diluent first stage.*** It should be between 8 (117.6 psi) and 10 bar (147 psi).

6. ***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.

SEE BELOW FOR INSTRUCTIONS ON REINSTALLING THE ADV DIAPHRAGM.

Note that proper assembly procedures must be followed. Prior to removing the ADV diaphragm, it would be good to have a spare diaphragm handy as reinstalling an old diaphragm can be tricky if it is stretched.

***NOTE: A damaged ADV diaphragm assembly &/or valve stem will either deliver too much diluent gas, or none at all.**

***NOTE: It is important that the proper installation procedures are followed or the diaphragm will leak!! It is also important that proper testing procedures are followed so that the diaphragm is not stretched out!!!**

INSTALLING THE ADV DIAPHRAGM

When you are ready to attach either the original diaphragm or a new one, first inspect it. If you are reinstalling the original one, this is very important. If the diaphragm has stretch marks by the screw holes, it would be best to use a new one instead. A diaphragm in this condition is very difficult to reinstall. The stretch marks are a result of doing long negative tests on the unit. Remember, a negative test should only be about 1 minute long. Please see page 27 for the proper testing instructions. Again, if you are planning on opening up the diaphragm area, I would strongly suggest that you have a new diaphragm on hand.

Insert the screws through the ADV cover until one or two threads are showing and then push the diaphragm through the screws. Carefully place the assembly against the scrubber head and hold it firmly in place with one hand, while turning the screws with the other. If while placing the assembly against the head, the diaphragm shifts, start again. It must be aligned properly.

Turn each screw only a half turn or so before alternating to another screw. Watch carefully and stop turning as soon as the bottom of the screw touches the plastic cover. There will be no gap between the underside of the screw and the cover, but the screws will not have started getting more difficult to turn yet. Look at the diaphragm and ensure that it looks proper. It should not be twisted. Turn the screws another 1 to 2 mm. Then turn them another 1 mm. Remember not to over tighten the screws. If the screws are over tightened, the diaphragm will leak. If you are having a problem in this area, do a positive pressure test and then back the screws off slightly until the leak stops. The adjustment will be very slight.

We have tested this method both with and without lubricant on the diaphragm holes. We have found that it is better to NOT use lubricant in this area, as it can make it more difficult.

If you are using a new diaphragm, ensure that when you attach the plastic button and screw to it, that you do not over tighten this assembly. Again, this is a case where over tightening can cause a leak. On the other hand, if the button assembly is loose, air can leak through this area.

***NOTE: Severely over tightening the ADV diaphragm screws can damage the threads on the KISS head!!!**

ADV IS DIFFICULT TO TRIGGER

The position of the diver will effect the ADV. If the diver is horizontal or face down, the ADV will trigger easily. If the diver is vertical, then it is more difficult to trigger. (A well fitting harness is important; this will greatly reduce the difficulties of being vertical in the water). Also, rolling to your right side, while horizontal, will assist in triggering the ADV.

If preferred, diluent can be added via the mouthpiece. Turn the knob about a 1/4 inch and diluent gas should flow into the loop. Depending on where your IP is set, and which second stage you are using, you may need to lightly hit the purge button.

Lastly, check the IP on the diluent first stage. Ensure that it is in the correct range. Remember, the ADV is not meant to be easy to trigger. It was designed this way so that the diver would know when they were triggering it. If it was too easy, then diluent gas could be fed into the breathing loop without the diver being aware of what was happening.

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. Also, if this happens, it won't be possible to trigger the ADV. This can also happen if the ADV is faulty and it is leaking diluent gas into the loop.

2. ***Check the fit of your harness.*** If the unit is sitting either low on your back or the harness is not snug then this could be the problem. The unit should sit as high on your back as possible with the diver still able to reach the tank valves. Also, the unit must be tight to the divers back. It should not move up/down or side ways at all. It needs to be completely tight.

3. ***What is your position in the water?*** With rear mounted counterlungs, the unit will breath best in a horizontal position. Slightly head down or head up are the positions that most divers prefer. Being vertical in the water column will be more difficult and being on your back will be the hardest of all. This is why having a proper fitting harness is important. If the fit is good, the difficulties of being vertical are greatly decreased.

MOUTHPIECE DISASSEMBLY

DIVE RITE AND APEKS SECOND STAGES

*NOTE: This is an older style KISS mouthpiece which is no longer produced or sold.

The KISS bailout mouthpiece can go from closed circuit mode to open circuit, with a turn of the switch. It provides divers with an alternate method of adding diluent gas or even an alternate diluent depending on the connection and if the off-board accessory is being used. It offers an easy way to purge the rebreather for verifying the sensor readings. If the need for a sanity breath or emergency bailout arises, this mouthpiece will provide the diver with a fast, simple way of getting a breath.

The mouthpiece is in closed circuit mode when the switch is positioned with the word, “KISS” horizontal.

First the hose attachments should be removed. Do this by removing the U-clips, then pull the hose attachments away from the body.

Next, the switch will need to be removed. Remove the screw which holds the switch in place; pull the switch off.

Unscrew the front cover.

Now the inner barrel needs to be removed. If it is difficult to pull out, push the switch onto the inner barrel stub, and then turn and pull. This method should easily allow the barrel to be pulled out.

Finally, the mushroom valve carriers can be removed. From the inside of the body, using either a blunt instrument or your finger, carefully push on the EDGE of the valve carrier. DO NOT PUSH ON THE CENTER AS IT WILL DAMAGE THE CARRIER.

IF THE MUSHROOM VALVES ARE DISTORTED OR DAMAGED THEY MUST BE REPLACED!!! When attaching (or removing) the mushroom valves BE CAREFUL!!! PULL ON THE STEM GENTLY & ONLY HOLD THE STEM WHEN REMOVING THE VALVE.

THESE VALVES ARE EXPENSIVE; TAKE CARE TO NOT DAMAGE THEM!

To remove the second stage regulator, remove the metal U-clip and pull the adapter loose. The second stage is permanently attached to the adapter.

MOUTHPIECE PARTS LIST

DIVE RITE AND APEKS SECOND STAGES

1. Body
2. Inner barrel
3. Switch
4. Switch screw
5. Front cover
6. Hose attachments (2)
7. Plastic U-clips (2)
8. Metal U-clip (1)
9. 2nd stage regulator and adapter
10. Mushroom valve carrier (2)
11. Mushroom valves (2)

O-rings:

Mushroom valve carrier, 1 per side: 38 x 1.5 mm

Inner barrel, side port, 2 per barrel: 30 x 3 mm

Inner barrel, end, 2 per barrel: 46 x 2.5 mm

Hose end, 2 per side: 45 x 3 mm

2nd stage adapter, 1 per adapter: 28 x 2.5 mm

UNLESS OTHERWISE SPECIFIED, O-RINGS SHOULD ONLY BE LIGHTLY GREASED.
INSPECT ALL O-RINGS FOR CRACKS AND OTHER DAMAGE REGULARLY.
DISINFECT ALL BREATHING LOOP PARTS REGULARLY.

MUSHROOM VALVES SHOULD BE TESTED PRIOR TO EVERY DIVE AND AFTER REASSEMBLY. WITH THE MOUTHPIECE IN YOUR MOUTH THE GAS FLOW IS FROM LEFT TO RIGHT. SUCK IN AND THE LEFT SIDE VALVE OPENS AND EXHALE AND THE RIGHT SIDE VALVE OPENS.

DO NOT POSITION THE MUSHROOM VALVES IN ANY OTHER DIRECTION!!!!

MOUTHPIECE REASSEMBLY

DIVE RITE AND APEKS SECOND STAGES

- Inspect the mushroom valve carriers and the mushroom valves for damage. Ensure that they are clean, washed and disinfected, and remove any debris. IF THE MUSHROOM VALVES ARE DISTORTED OR DAMAGED THEY MUST BE REPLACED!!! When attaching (or removing) the mushroom valves BE CAREFUL!!! PULL ON THE STEM GENTLY & ONLY HOLD THE STEM WHEN REMOVING THE VALVE.
- Ensure that the mushroom valve carrier O-rings are clean, free of debris and in good condition. Lubricate the O-rings and insert them onto the carriers. These O-rings need only LIGHT lubrication.
- Clean, disinfect and inspect the mouthpiece body. Hold the body with the rubber mouth bite towards you and the port for the 2nd stage regulator facing down. Position the right side mushroom valve carrier with the valve facing out. This is the exhale side and you will notice that this valve does not have a stem showing. Position the left side mushroom valve carrier with the valve on the inside of the carrier. You will notice that the left side valve has the stem facing out. Ensure that the O-rings do not extrude out of their grooves when you push them into place. Push the carriers all the way in, until you feel them push against the body. These mushroom valves have a higher cost then those for the older KISS mouthpiece; be gentle with them!
- Clean, disinfect and inspect the inner barrel and the inner barrel O-rings for damage. There are 2 side port O-rings and 2 end O-rings. Lubricate these O-rings, place them in their grooves, and then apply a touch more lubricant. If upon testing small leaks are apparent, applying silicone grease to the inner barrel O-rings could solve this problem. Apply lubricant only to the O-ring areas; clean off the excess from the surrounding areas. Lubricant on the non O-ring areas of the inner barrel will make it difficult to turn the switch!
- To make the inner barrel easier to insert, the switch can be pushed onto the barrel stub. Insert the barrel, twisting it slightly to ensure the port side O-rings do not move out of their grooves. Push and turn the barrel so it moves properly into position. Watch the O-rings while you do this, to ensure that they stay in position.
- Replace the front cover, ensuring that it is securely attached, but not over tightened. If it is over tightened, it will be difficult to remove.
- Replace the switch. Once the switch is attached, rotate it from open to closed circuit mode and back, several times to ensure correct action of the O-rings. Do this while looking into the second stage port to ensure that the O-rings stay in their grooves.
- Clean, inspect and re-fit the 4 hose attachment O-rings; there are 2 per side.
- Clean, disinfect and inspect the 2 hose attachments and secure them to the mouthpiece using the 2 plastic U-clips. To attach, push the hose attachments all the way against the body, and then push the clip into the slots. The hose attachments have a tight fit. When pushing them into position, be certain that the O-rings are not dislodged from their grooves. Applying a touch of lubricant to the inside sealing area of the hose attachment may help in pushing it into position.

***NOTE: when attaching and removing the mouthpiece from the loop hoses, the quick disconnects should be used. Do not use the hose attachments and plastic clips for this. They are not designed to be removed and replaced daily.**

- Clean, disinfect and inspect the rubber mouth bite. Attach it to the body using a zip tie and remove the sharp edges.
- Clean, disinfect and inspect the 2nd stage regulator adapter and the O-ring. Lubricate the O-ring and secure it to the adapter. Push the adapter into position and secure with the metal U-clip. Be gentle while pushing in the U-clip and push it in straight. It must be inserted fully to secure the adapter. If the clip is bent, it will be difficult to insert it properly.

MOUTHPIECE TEST

In closed circuit mode, cover the right (exhale) side and the LP hose inlet, and blow (gently!!) into the mouthpiece. The mushroom valve should seal and no gas should exit out of the second stage port or the front switch plate.

Problems:

- Mushroom valve on the left could leak. Remove the carrier and inspect it again.
- 2nd stage port leak. Remove the inner barrel and inspect/replace the 2 side port O-rings.
- Front switch plate leak. Remove the inner barrel and inspect/replace the 2 barrel end O-rings.

In closed circuit mode, cover the left (inhale) side and the LP hose inlet, and suck (gently!!) into the mouthpiece.

Problems:

- Mushroom valve on the right could leak. Remove the carrier and inspect it again.
- 2nd stage port leak. Remove the inner barrel and inspect/replace the 2 side port O-rings.
- Front switch plate leak. Remove the inner barrel and inspect/replace the 2 barrel end O-rings.

Other leaks. Cover both the inhale and exhale sides of the mouthpiece, as well as the LP hose inlet to the 2nd stage, while gently blowing into the mouthpiece. Also do this test while gently sucking from the mouthpiece. These tests will determine if the rubber mouthpiece has a leak or if the 2nd stage regulator a fault. The 2nd stage adapter O-ring could also be causing a leak.

CLEAN AND INSPECT THE MOUTHPIECE AND SECOND STAGE AS REQUIRED. SERVICING OF THE SECOND STAGE SHOULD BE DONE BY A QUALIFIED SERVICE TECH.

Mouthpiece Servicing & Troubleshooting (Old & New)

*** WARNING: Those using the Mares Prestige second stage, must use the bottom screw to assist in securing it to the old mouthpiece!**
***Warning: Your KISS mouthpiece or DSV (dive surface valve) (including the 2nd stage), should be serviced yearly or more often if required. When to service depends on how often you dive, the environment you dive in and also how well it is cleaned after every dive. It is important that it is kept clean and the knob should always turn smoothly. Keeping your DSV clean is important as grit inside the moving parts can score the plastic. Your local KISS dealer can assist you with servicing the DSV if you prefer not to do it.**
****Also, be aware that if you wash your DSV with a powerful hose, the valve disks may be blown off!! After cleaning, be certain to inspect your gear and follow the pre-dive check's!!**

IF THE MUSHROOM VALVES ARE DISTORTED OR DAMAGED THEY MUST BE REPLACED!!! When attaching (or removing) the mushroom valves BE CAREFUL!!! When attaching (or removing) the NEW valves, PULL ON THE STEM GENTLY & ONLY HOLD THE STEM WHEN REMOVING THE VALVE. DO NOT CARRY THE VALVE OR VALVE CARRIER BY THE STEM!

When you clean and service your OLD DSV, it is important to apply lubricant to the O-rings and the Spool Guide. On the spool guide, lubricant should be added from the tip to the base. See arrows in right hand photo.

TROUBLESHOOTING

BUBBLING SECOND STAGE
First determine if the diluent first stage IP is creeping. If it is, you will probably have to replace the HP seat in the first stage. Once you know that your first stage is in good working order, check to see where the IP is set. Ideally it should be around 8 to 10 bar, with 10 bar (147 psi) being the maximum.

Once the IP has been set, you will want to ensure that the 2nd stage is adjusted properly.
Turn the adjustment knob on the second stage so that it is in the middle position. (If there is an adjustment knob). Remove the LP hose opposite of the knob. The adjustment screw is on the inside on the 2nd stage where you removed the LP hose. Use a screw driver to adjust the flow. Your adjustments should be minimal; only a millimeter or so at a time. Most 2nd stages are very sensitive and require a light touch. After each adjustment check to see if your second stage is still bubbling and adjust as necessary. Once the bubbling has stopped and the flow has been adjusted to your liking, you can dive the unit with the adjustment knob on the left turned all the way in. This will also limit the chances of the regulator free flowing. When you want to breath on the 2nd stage, you will just need to dial it out to where you find it comfortable.

If after all that you still have a bubbling 2nd second stage the problem could be with the seat, inhale diaphragm, exhale diaphragm or it could be debris. Your local dive shop should be able to service the 2nd stage for you.

***NOTE: When doing your negative pressure test, it is possible to damage the exhaust diaphragm in the second stage. If your inhalation is extremely hard, for an extended period of time, this can happen. Also, on the new BOV, the 2nd stage exhaust diaphragm can be distorted if the negative is too hard causing the test to fail.**

WATER INTRUSION

First determine if the water is sea water (from diving) or fresh water (if you are not fresh water diving, this could be condensation).

If it is sea water, service your DSV and ensure that the O-rings are all in good shape. Also clean and lubricate at this time.

Inspect the inhalation and exhalation diaphragms on the second stage. Look for any tears or punctures. You may need to hold these parts up to the light and gently pull on the rubber to check for damage.

If you have an older DSV, you may need to up grade to the new selector knob O-ring. This is a N90P025.5 metric O-ring.

Check your rubber mouth bit for damage and for a proper fit onto the mouthpiece. They generally come in a variety of attachment sizes. Ensure that the one you choose fits properly. There are some specialized rubber mouth bits which while a pleasure to dive, just do not fit properly on our mouthpiece. Seacure is one of them and after time it will always leak.

Also check for a tear underneath the zip tie which holds the rubber mouth bit in place. Damage here will also cause water to leak into the system.

Many cases of water into the loop come from torn or damaged rubber mouth pieces.

Loose lips.

IT SHOULD BE NOTED THAT A LEAK ON THE MOUTHPIECE, INCLUDING THE RUBBER MOUTH BIT, WILL NOT BE DETECTED ON THE POSTIVE AND NEGATIVE TESTS!! THIS IS WHY IT IS VERY IMPORTANT TO KEEP YOUR MOUTHPIECE PROPERLY SERVICED AND CLEANED. ALSO, ALWAYS CARRY A SPARE RUBBER MOUTHBIT. MOST MOUTHPIECE LEAKS ARE FROM THIS!!

Pre-dive Checklist's

This pre-dive checklist is a combination of the Jetsam checklist, and what some of the A.N.D.I. instructors are using. The instructors and divers who use this checklist have reported that their skill level on the rebreather increased quicker and that they understood their units better, which made them more organized and safe divers.

I have edited the check list to make it work for a KISS diver to use for every dive. The first part of our new check list, 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 check list are items that are usually checked shortly before a dive. This list can also be printed out, but other options are to copy it onto a dive slate or wet-notes in a permanent ink marker.

A point worth noting is that all pilots have a check list which they go through every time they fly. Diving a rebreather should be no different. While rebreather diving 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 check list 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 disks (mushroom valves) are 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.

Predive Checklist

NAME: _____ DATE: _____

DIVE LOCATION: _____ PLANNED DEPTH: _____

PLANNED SET POINT: _____ TODAY'S DIVE NUMBER: _____

INITIALS ↓

____ I have checked my bailout system and it is in perfect working order.

____ My bailout system is appropriate for the dive depth I am planning of, _____feet/meter.

____ My sensors are _____ months old.

____ The millivolt readings on my sensors is: _____; _____; _____.

____ My PPO2 display uses _____ batteries and they have _____ hours left on them.

____ I have analysed my O2 cylinder and it has _____% O2

____ I am diving with _____ diluent in my on-board diluent cylinder. I have analysed it and have confirmed what percentage of O2/Helium/Nitrogen it contains.

____ I am diving with _____ mix in my first off-board cylinder. I have analysed it and have confirmed what percentage of O2/Helium/Nitrogen it contains.

____ I am diving with _____ mix in my second off-board cylinder. I have analysed it and have confirmed what percentage of O2/Helium/Nitrogen it contains.

____ If I am using more off-board cylinders I will also write down the mixture and ensure that I have analysed them and have confirmed what percentage of O2/Helium/Nitrogen they contain.

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

____ My dive computer is in perfect working order.

____ The battery voltage on my computer is _____.

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

____ My surface interval before this dive is _____.

____ My CNS before this dive is _____.

____ I am using _____ lb/kg of weight.

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 Valve Disks (mushroom valves) on the Valve Plates are flat and smooth. I have done a DSV positive and negative diaphragm test to ensure that they are sealing properly. I have also ensured that they have been installed correctly and the gas flow is going in the correct direction, left to right.

____ I have done a breathing hose positive and negative pressure test to ensure that my loop hoses are not damaged.

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

____ I have done a positive pressure test on the fully assembled KISS rebreather and it maintains full pressure. I have ensured that the counterlungs are hanging freely and that the Velcro is attached to the bottom of the counterlung case.

____ I have turned my displays on.

____ I've opened my diluent valve and checked that the cylinder is full. It has _____ PSI/BAR in it. I've checked the pressure gauge for any sign of leakage of diluent in the system. I've ensured that the ADV and the bailout regulator are working correctly. (The diluent gas I am using is appropriate for the dive that I am planning)

____ I've opened the oxygen valve and checked that the cylinder is full. It has _____ PSI/BAR in it. I've ensured that the manual add valve is working by pushing the button and watching the displays, while breathing on the unit. Also, I've ensured that the constant flow is working by listening for the flow.

____ I've calibrated the sensors in oxygen. (If I am using the Jetsam displays, I will ensure that they are in the "ON" position, NOT the calibrate position before I jump in the water.) I have verified the sensor readings in air.

____ I've ensured that the size of my bail-out gas cylinder is adequate for the dive that I am planning, that it is full and that the regulator is working correctly. I have also ensured that my wing and drysuit inflation are working correctly.

____ I have pre-breathed my KISS rebreather for at least 5 minutes before entering the water.

____ I will double check that my oxygen and diluent cylinders are open, that my displays are on, and my computer is properly programmed before I enter the water.

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

The diluent tank is NOT an adequate gas supply for emergency situations.

INFORMATION SHEET

KISS Rebreather LLC - Information Sheet For New Divers

What is KISS doing to ensure that divers understand how to safely use their products?

KISS Rebreathers has been building and selling diving systems since 1998. For over 20 years KISS has been dedicated to building rebreathers that are simple, safe, and reliable. During this time, we have watched our industry change from a handful of manufacturers' that wouldn't give each other the time of day, to a group of companies and individuals that are dedicated to the growth of our industry, as well as ensuring the education and safety of our divers.

It is the duty of all rebreather manufacturers to ensure that when a diving system is sold, our clients are able to confidently choose a Training Agency and Instructor that will fulfill the training requirement.

In our goal to help divers become the best rebreather diver's possible, KISS has a Training Quality Assurance program (TQA), which outlines our standards and expectations.

As a KISS rebreather owner, there are some things we would like you to know:

1. KISS Rebreathers has 2 private Facebook groups, KISS Rebreather Divers, and KISS Rebreather Instructors. We strongly recommend that all KISS rebreather owner's join the KISS divers' group, and all instructors join the KISS instructor group. While these lists may not be terribly active, it is where we release important information such as manual updates, issues, recalls, etc.

   KISS rebreather owners should search Facebook for, **KISS Rebreather Divers – Official Page.** KISS rebreather instructors should search for, **KISS Rebreather Instructors – Official Page.** If anyone is having difficulty finding these pages, please email us at, info@kissrebreathers.com for help.

   Upon asking to join, you will be asked a few questions. Upon receipt of your request and answers, your membership will be granted.

2. You will find a copy of the KISS Rebreather LLC minimum training standards in the back of your manual. We have published it here as we feel it is important for all KISS divers to understand what the minimum training requirements are for each level of training. KISS approved training agencies are able to add to these standards, but not take away from them.

3. Also, in the back of your manual are copies of the KISS Rebreather course evaluation forms. There are 4 forms, one each for each level of training. As you can see these forms list all the required skills, and your score. At the completion of the program, all students and instructors are required to sign off/date this form. Your instructor will email the final copy of the form to KISS Rebreathers.

   Again, we have published these forms so that all KISS owners know what to expect in their training program. As a KISS diver, you have made an investment in a specialized piece of diving equipment, and in a specific training program. As such, you deserve to receive the equipment as promised, and all the training that you have paid for. If at any time you feel that this hasn't happened, please contact us directly at, info@kissrebreathers.com.

4. Anyone that purchases a KISS rebreather, must have the appropriate training. Those that purchase a KISS Classic Explorer, KISS Spirit LTE, or KISS Orca Spirit, are required to do the standard KISS training program.

Those that hold this certification (or new KISS divers) that wish to purchase a KISS Spirit Sidewinder, or KISS Sidekick must do either a cross over or take the full course.

5. The KISS Rebreather LLC Training Quality Assurance (TQA) information is listed on our website www.kissrebreathers.com. Here you will find copies of the minimum training standards, course evaluation forms, Instructor Registration forms, and other information.

6. As a number of our sales go through our dealers, we don't have contact information for all our divers. We ask that all KISS rebreather divers ensure that they are registered with us, so we are able to reach you should the need arise. As mentioned, we do publish information on our private Facebook groups, and in other places, but having your name and email address (at a minimum) on file with us would help insure that we can reach you in the event that we have important information. Ideally please email us your: full name, address, phone number, email address, the name of the unit you are diving, and your serial number. This information can be sent directly to, info@kissrebreathers.com.

As a rebreather manufacturer, KISS Rebreather LLC has a duty to their clients to ensure that KISS divers understand how to safely use their products. We take this very seriously. If anyone ever has a concern, comment, observation, we would love to hear from you. Our goal is to be the best that we can, and feedback from our clients will help us achieve that. Any feedback may be emailed directly to us at, info@kissrebreather.com.

Classic Scrubber Duration

The duration of the Classic KISS scrubber canister is based on independent testing done at the ANSTI test facilities in the United Kingdom. Testing was conducted to the CE standard of EN14143.

The CO2 duration for this design of rebreather has been tested in accordance with EN14143 and at a depth of 40 m (131 ft), water temperature of 4° C (39.2° F), 40 litre/minute breathing rate, and 1.6 liter of CO2 generation, was found to have a duration of 2 hours and 37 minutes to 5 millibar of CO2 and 2 hours and 50 minutes to 10 millibar of CO2. Two tests were conducted.

Depth	Temperature	Breathing Rate	CO2 Generation	Duration
40 meters/131 ft	**4°C/39.2°F**	**40 liter/minute RMV**	**1.6 liter/minute**	**157 min - 5mbar CO2**

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.**

We believe that the design of the Classic KISS scrubber canister is one of the most efficient axial canisters, per weight of absorbent, available today.

As gas density (depth), water temperature, and CO2 generation (divers work rate) vary, the canister duration will either improve or degrade.

While most divers can't maintain a breathing rate of 1.6 litres of CO2 per minute, don't dive in 4°C (39.2°F) water, and/or deep dive, these tests are still good indicators of scrubber duration. They show that scrubber duration should not be rated as a single value; that the type of diving that is being done must be taken into consideration. Also, it shows that any test results, from testing done at the surface, will not provide realistic canister durations.

All testing was conducted using Sofnolime 797 grade and this is what we recommend divers use. Any diver who use an absorbent which changes colour, should not use the colour-change as an indicator for time remaining on the canister.

Duration, standard scrubber canister: Cold water, 3 hours
Duration, with syntactic foam canister: Cold water, 4 hours, 4C (39F) to 17C (62F)
Duration, with syntactic foam canister: Warm water, 5 hours, 17C (62F) or warmer

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.
- 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 us at info@kissrebreathers.com to let us know about 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 Rebreather LLC 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 the USA. Note that if you ship via a courier such as UPS or Federal Express, there will be a brokerage 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.

Classic KISS O-Ring List

GENERAL

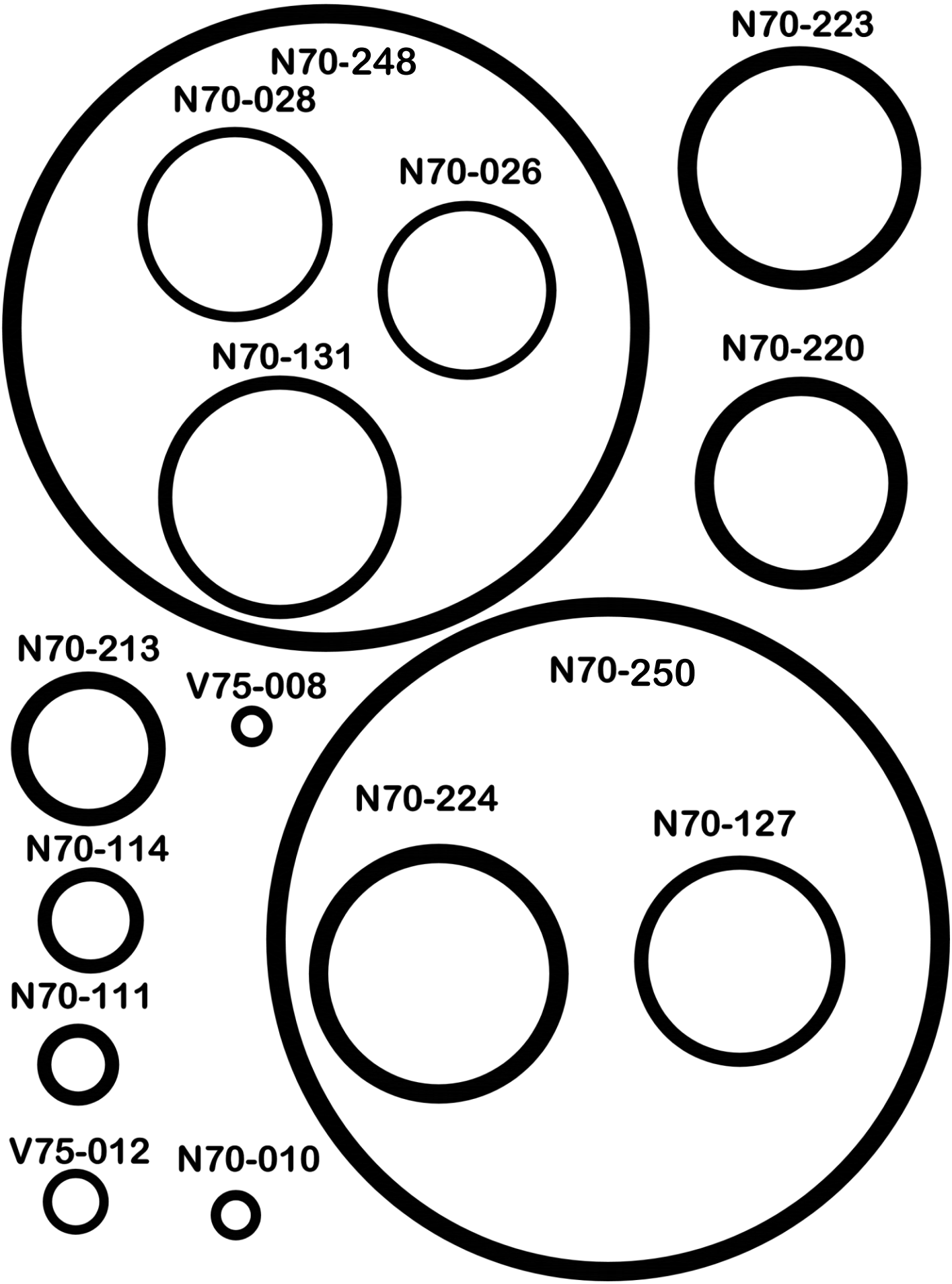
Number	Where used/quantity	ID	OD	CS
N70-248	SCRUBBER X2	4-3/4	5	1/8
N70-250	SCRUBBER X2	5	5-1/4	1/8
N70-223	SCRUBBER CENTER TUBE X1	1-5/8	1-7/8	1/8
N70-220	EXHAUST VALVE X1	1-3/8	1-5/8	1/8
N70-127	QR HOSE STUBS X 8	1-7/16	1-5/8	3/32
N70-026	SENSOR COVER X3	1-1/4	1-3/8	1/16
N70-028	COUNTERLUNGS X2	1-3/8	1-1/2	1/16
N70-224	COUNTERLUNGS X2	1-3/4	2	1/8
N70-131	DISPLAY COVER X3	1-11/16	1-7/8	3/32
N70-114	DRAWBAR NUT X1	5/8	13/16	3/32
N70-111	DRAWBAR NUT X1	7/16	5/8	3/32
N70-213	OXYGEN REGULATOR PLUG X1	5/16	1-3/16	1/8
V75-008	02 ADD VALVE X2	3/16	5/16	1/16
N70-028	TOWERS X 2	1-3/8	1-1/2	1/16

MOUTHPIECE O-RINGS - Jetsam with Mares

Number	Where used/quantity	ID	OD	CS
N70-016	SPOOL X1	5/8	3/4	1/16
N70-023	SPOOL X1 & 2ND STAGE X 1	1-1/16	1-3/16	1/16
N70-026	SPOOL SEAT (MOUTHBIT END OF BODY) X1	1-1/4	1-3/8	1/16
N70-028	VALVE PLATES X2	1-3/8	1-1/2	1/16
N70-028	SPOOL GUIDE X1	1-3/8	1-1/2	1/16
N70-030	SIDE PORTS OF THE BODY (QD ATTACHMENT AREA) X2	1-5/8	1-3/4	1/16
N90P025.5	SELECTOR KNOB X1	25.2mm	32.2mm	3.5mm

MOUTHPIECE O-RINGS - Dive Rite/Apeks second stage

Number/size	Where used/quantity
38 x 1.5 mm	VALVE DISK CARRIER X 2
30 x 3 mm	INNER BARREL SIDE PORT X 2
46 x 2.5 mm	INNER BARREL END PORT X 2
45 x 3 mm	HOSE ATTACHMENT X 4
28 x 2.5 mm	2ND STAGE ADAPTER X 1


N70-248
N70-028
N70-026
N70-131
N70-223
N70-220
N70-213
V75-008
N70-250
N70-224
N70-127
N70-114
N70-111
V75-012
N70-010

CCR DIVER

INTENT

The CCR Diver program provides divers with the knowledge and training necessary to independently plan and conduct unit specific no decompression closed-circuit rebreather (CCR) dives to a maximum depth of 30 meters/98 feet, using a manufacturer approved CCR unit with air as diluent utilizing CCR Diving procedures with a dive buddy diving on a rebreather or diving open circuit.

REQUIRED INSTRUCTOR RATING

An active status unit-specific CCR Instructor or higher may conduct the unit-specific CCR Diver program.

TEACHING RATIOS

- The maximum number of students for CCR training is 3:1
- The maximum number of students for no-decompression CCR training where one (1) student is making a crossover or doing a refresher is 4:1

These ratios should be reduced as required if the situation and/or environmental conditions call for it.

STUDENT PREREQUISITES

- Nitrox certification
- Have logged 20 open water dives
- Minimum age: 18
- For KISS Sidekick CCR only:
  - Student must have some level of technical diver training. At a minimum advanced nitrox or recreational trimix or equivalent.
  - Students must be able to rig a sidemount rebreather as well as 2 cylinders.

DURATION

- Recommended hours for course completion: 40
- Minimum number of days: 4
- Minimum number of hours for Academics and Dry practical: 8

MATERIALS AND EQUIPMENT

The minimum required student and Instructor equipment for this program includes:

A complete KISS CCR Unit that:

- Is compliant to local laws, is approved by the training agency and is properly functioning
- Has no non-manufacturer approved modifications
- Depth gauge & bottom timer, or dive computer
- A single off-board bailout gas suitable for a safe return to the surface from the planned maximum depth including all safety and decompression stops in the event of an emergency
- For Open water and lake environments with the exception of cave/overhead environments a Delayed Surface Marker Buoy (DSMB) and a spool / reel appropriate for the planned dive depth.
- cutting device
- Access to an appropriate gas analyzer

The minimum required student and instructor materials for this program includes:

- KISS Rebreather unit specific user manual
- Agency student training manual or online training course
- Agency instructor manual (electronic instructor manuals meet this requirement)

- Course liability release and assumption of risk (in accordance with local laws)
- Training agency approved medical document
- Unit specific checklist (units equipped with a built in electronic checklist, meet this requirement)
- Manufacturer's sign off sheet/course completion document

All skills must be demonstrated by the instructor on the specific unit being trained

REQUIREMENTS FOR COMPLETION

Academics

Students shall have sufficient understanding and knowledge in the following subject areas listed. They should be capable of planning dives in the typical local conditions and environment and be able to plan for typical emergency situations.

1. Practical mechanics of a CCR
   - Assembly and disassembly specific to KISS rebreather being used. Use unit specific manual as a guide
   - Unit Specific Check list
   - Design and overview of the KISS unit
   - Insert O-rings where required
   - O-ring location and condition
   - Absorbent canister
   - Breathing loop
   - Automatic Diluent Valve: automatic and manual use
   - Manufacturer's supported add-ons: BOV, etc
   - KISS Sidekick: understand risk of high work of breathing & importance of securing unit, cylinders

2. Loop volume - minimum / optimum
   - Determine the correct counterlung size, & understand how to attain and maintain proper loop volume

3. Gas Physiology
   - Oxygen risks, Hypoxia, Hyperoxia
   - Carbon dioxide (CO_2) toxicity, Hypercapnia
   - Nitrogen absorption

4. Proper scrubber filling; in accordance with KISS recommendations
   - Manufacturer's recommended scrubber medium, & procedures according to KISS user manual

5. Electronic or Manual or Mechanical Systems Design and Maintenance
   - Oxygen (O_2) metabolizing calculations
   - Oxygen Sensors, limitations, care and replacement regime
   - System electronics functionality and calibration procedures
   - KISS manual gas addition valve design and function. (raising and lowering of constant flow; determining correct flow rate for each individual)

6. Dive Tables
   - Constant partial pressure of oxygen (PPO_2) theory
   - Central nervous system (CNS) and Oxygen Tolerance Unit (OTU) tracking and awareness

7. Dive Computers
   - Mix adjustable

- Constant PO_2
- Decompression conservatism / Gradient factor selection
- Oxygen (O_2) integrated

8. Dive Planning
   - Operational planning
   - Gas consumption
   - Scrubber duration
   - Gas requirements including bailout scenarios
   - Oxygen limitations
   - Nitrogen limitations

9. Emergency Procedures
   - Flooded loop
   - Cell warnings
   - Battery warnings
   - Electronic failures

Skills

1. Pre-dive checks
   - Specific Unit Checklist
   - Verify diluent and oxygen (O_2) cylinder contents using gas analyzers
   - Unit build-up
   - Scrubber canister filling
   - Breathing loop check including mouthpiece one way valves and positive and negative check
   - Sensor calibration in oxygen, with verification in air
   - 5 minute pre-breathe
   - Bailout bottle/stage cylinder rigging
   - KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging/rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures including
   - Limits based on system performance
   - Limits based on oxygen exposures at chosen PO_2 levels
   - Limits based on nitrogen absorption at planned depth and PO_2 set point
   - Appropriate selection of decompression conservatism / gradient factors for the planned dive
   - Thermal constraints

3. Underwater verification
   - Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   - Counterlung & Over Pressure Valve adjustment, if necessary

4. Mouthpiece familiarity skills
   - BOV: switch between open and closed circuit
   - DSV: switch to bailout system

5. Adding diluent gas/ADV familiarity skills
   - ADV: Adding diluent gas and understand how it works
   - BOV: Use BOV to add diluent gas to the loop – 2 ways

- Bail out second stage: Use to add diluent gas to the loop
- Dual button MAV: Adding diluent gas (if unit is shipped with this item)

6. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2 "diver emergencies" that the student must react to.
   - Practical bailout skills: including 2 open circuit ascents from approximately 18 meter/59 feet.
   - Gas shutdowns and loss of gas
   - Broken hoses
   - Flooded absorbent canister
   - Carbon dioxide (CO_2) breakthrough
   - Low oxygen drills
   - High oxygen drills
   - Flooding loop
   - Electronics, sensor, and battery failure
7. Practice transferring to open circuit bailout
8. Rescue skill session as outlined by the training agency
9. Use of a buoyancy control system
   - Buoyancy/trim control during dive
   - Buoyancy/trim control at safety stop
10. Controlling and monitoring for PPO2 levels:
    - Raising/lowering PPO2
    - Starting PPO2
    - PPO2 monitoring every minute
    - Manual Add Valve verification: static at constant depth, monitor change over several minutes
    - Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)
11. Electronic systems use:
    - Use and adjustment of Heads Up Display, position, brightness, colour
    - Use and adjustment of PPO2/depth/time display, position, brightness, colour
    - Use and adjustment of decompression computer, set up/gas switching, battery verification, etc
12. Use of lift bag / DSMB and reel (where relevant and applicable)
13. Mask removal and replacement
14. Proper execution of the dive within all pre-determined dive limits
15. Demonstration of safety stops at pre-determined depths (on all dives)
16. Constant loop volume management
17. Cell validation checks with appropriate use of diluent and oxygen
    - Oxygen sensor verification at depth
    - Linearity check of sensors at approximately 5 meter/16 feet on pure oxygen
18. Post dive clean of unit
    - Mouth piece and hoses
    - Clean and disinfect unit

- Inspect components of unit

19. Diver maintenance of unit
    - Cell removal and replacement
    - Mouthpiece care
    - Replacing or re-charging of batteries

EXTRA REQUIREMENTS FOR COMPLETION

- Demonstrate an adequate level of fitness by completing a minimum of a 50m/164 feet surface diver tow with both the rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program.
- Complete all academic sessions and unit specific assessments as specified in the training material of the Training Agency and the Manufacturer.
- Complete a minimum of seven (7) training dives, including confined water skill development of at least one (1) hour, and six (6) core open water training dives with a minimum run time of 30 minutes each.
- Complete at least a minimum of 420 minutes of total in-water time on the applicable CCR unit.
- Be able to independently complete a full dive plan
- Complete a final course exam as set out by the training agency and / or manufacturer with a required minimum pass rate of 80% with 100% remediation.
- When the feature is available on a rebreather, download the student's dive logs of all training dives and retain for a minimum of seven years.
- If the feature is not available on a rebreather, download the dive logs from the students dive computer and retain for a minimum of seven years
- Fill in and sign a course completion form confirming all academics and practical sessions have been completed

Dive logs and student-signed course completion form are to submitted to the manufacturer of the specific unit on request

DEPTH LIMITATIONS

- Open Water Training Dives shall be initially shallow, progressively increasing in depth.
- Two (2) dives must be deeper than 20 meters/65 feet for certification
- All dives must be conducted at a depth shallower than 30 meters/98 feet.

NOTES

- All training dives must be planned within the no-decompression limits of the Combined Air/EAN Tables or the student's personal dive computer or computer-generated decompression profiles.
- Bailout cylinder gas is to be based on a maximum PPO_2 of 1.6 at the maximum depth of the dive.
- Divers should not carry an on-board diluent gas with a ppO_2 higher than 1.1 bar at the bottom.
- The maximum loop set point is 1.3 bar.
- 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.
- Only approved training agencies and instructors may teach a KISS rebreather course.

Diving in an overhead environment

This course shall not be conducted in an overhead environment. Subject to training agency approval certain dive sites can be deemed suitable for the CCR Diver course under the following conditions:

- The student must remain in the daylight zone where there is no need for the use of a dive light
- The student must never be a distance of more than 132 linear feet / 40 linear meters from the surface

SEQUENCE

Open Water Training Dives 1 and 2 may only be conducted after completing the equipment configuration section, the surface diver tow and all confined water sessions.

CERTIFICATION

The unit specific CCR Diver certification entitles the holder to dive with a buddy, diving on a rebreather or diving open circuit, utilizing CCR diving procedures to make non decompression dives to depths of up to 30 meters/98 feet, providing that dives are conducted in environments similar to those of the diver's training and experience.

CCR DECOMPRESSION DIVER

INTENT

The intent of the Decompression CCR Diver program is to provide divers with the training necessary to independently plan and conduct unit specific decompression dives using air or Trimix with a minimum of 20% oxygen and a maximum of 35% Helium, to a maximum depth of 40 meters/131 feet with air diluent or 45 meters/147 feet with Trimix, using decompression mixtures of up to 100% oxygen and utilizing CCR diving procedures with a dive buddy diving on a rebreather or diving open circuit.

Note: The CCR Decompression Diver with Trimix curriculum is near identical to the Air-diluent program. Air should only be used if Helium is not an option.

REQUIRED INSTRUCTOR RATING

An active status unit-specific Decompression CCR Instructor or higher may conduct the unit-specific Decompression CCR Diver program. The instructor must be qualified as a unit-specific CCR Trimix 45m Instructor or higher to conduct the Decompression CCR Diver program with Trimix (min 20% O_2 and maximum 35% He) as diluent.

TEACHING RATIOS

- The maximum number of students for CCR training is 3:1
- The maximum number of students for no-decompression CCR training where one (1) student is making a crossover or doing a refresher is 4:1

These ratios should be reduced as required if the situation and/or environmental conditions call for it.

STUDENT PREREQUISITES

- An advanced level of Nitrox understanding. This is to include but not limited to the use of gases up to 100% Oxygen for decompression, tracking of CNS and OTU's, gas planning and accelerated decompression.
- Have logged 40 open water dives
- Minimum Age: 18
- For KISS Sidekick CCR only:
    - Student must have some level of technical diver training. At a minimum advanced nitrox or recreational trimix or equivalent.
    - Students must be able to rig a sidemount rebreather as well as 2 cylinders.

OR

- CCR diver with minimum 20 dives / 20 hours on the specific unit
- Minimum age: 18
- For KISS Sidekick CCR only:
    - Student must have some level of technical diver training. At a minimum advanced nitrox or recreational trimix or equivalent.
    - Students must be able to rig a sidemount rebreather as well as 2 cylinders.

DURATION

- Recommended hours for course completion: 40
- Minimum number of days: 4
- Minimum number of hours for Academics and Dry practical: 8

MATERIALS AND EQUIPMENT

The minimum required student and Instructor equipment for this program includes:

A complete CCR Unit that:

- Is compliant to local laws, is approved by the training agency, is properly functioning and is appropriate for bailout and accelerated decompression diving
- Has no non-manufacturer approved modifications
- Depth gauge & bottom timer, or dive computer

- A single off-board bailout gas suitable for a safe return to the surface from the planned maximum depth including all safety and Decompression stops in the event of an emergency
- Backup OC/CCR computer for bailout in the event of a system failure
- For Open water and lake environments with the exception of cave/overhead environments a Delayed Surface Marker Buoy (DSMB) and spool / reel appropriate for the planned dive depth
- A back up Delayed Surface Marker Buoy (DSMB) and spool / reel appropriate for the planned dive depth
- cutting device
- Access to appropriate gas analyzers

The minimum required student and instructor materials for this program includes:

- KISS Rebreather unit specific user manual
- Agency student training manual or online training course
- Agency instructor manual (electronic instructor manuals meet this requirement)
- Course liability release and assumption of risk (in accordance with local laws)
- Training agency approved medical document
- Unit specific checklist (units equipped with a built in electronic checklist, meet this requirement)
- Manufacturer's sign off sheet/course completion document

All skills must be demonstrated by the instructor on the specific unit being trained.

REQUIREMENTS FOR COMPLETION

Academics

Students shall have sufficient understanding and knowledge in the following subject areas listed. They should be capable of planning dives in the typical local conditions and environment and be able to plan for typical emergency situations.

1. Practical mechanics of a CCR
   - Assembly and disassembly specific to KISS rebreather being used. Use unit specific manual as a guide
   - Unit Specific Check list
   - Design and overview of the KISS unit
   - Insert O-rings where required
   - O-ring location and condition
   - Absorbent canister
   - Breathing loop
   - Automatic Diluent Valve: automatic and manual use
   - Manufacturer's supported add-ons: BOV, ADV, etc
   - KISS Sidekick: understand risk of high work of breathing & importance of securing unit, cylinders

2. Loop volume - minimum / optimum
   - Determine the correct counterlung size, & understand how to attain and maintain proper loop volume

3. Gas Physiology
   - Oxygen risks, Hypoxia, Hyperoxia
   - Carbon dioxide (CO_2) toxicity, Hypercapnia
   - Nitrogen absorption
   - Advantages of Trimix with 20% Oxygen and 35% Helium

4. Proper scrubber filling; in accordance with KISS recommendations
   - Manufacturer's recommended scrubber medium, & procedures according to KISS user manual

5. Electronic or Manual or Mechanical Systems Design and Maintenance
   - Oxygen (O_2) metabolizing calculations
   - Oxygen Sensors, limitations, care and replacement regime
   - System electronics functionality and calibration procedures
   - KISS manual gas addition valve design and function. (raising and lowering of constant flow; determining correct flow rate for each individual)

6. Dive Tables
   - Constant partial pressure of oxygen (PPO_2) theory
   - Central nervous system (CNS) and Oxygen Tolerance Unit (OTU) tracking and awareness

7. Dive Computers
   - Mix adjustable
   - Constant PO_2
   - Decompression conservatism / Gradient factor selection
   - Oxygen (O_2) integrated

8. Dive Planning
   - Operational planning
   - Gas consumption
   - Scrubber duration
   - Gas requirements including bailout scenarios
   - Oxygen limitations
   - Nitrogen limitations

9. Emergency Procedures
   - Flooded loop
   - Cell warnings
   - Battery warnings
   - Electronic failures

Skills

1. Pre-dive checks
   - Specific Unit Checklist
   - Verify diluent and oxygen (O_2) cylinder contents using appropriate gas analyzers
   - Unit build-up
   - Scrubber canister filling
   - Breathing loop check including mouthpiece one way valves and positive and negative check
   - Sensor calibration in oxygen, with verification in air
   - 5 minute pre-breathe
   - Stage cylinder rigging
   - KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging/rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures including
   - Limits based on system performance
   - Limits based on oxygen exposures at chosen PO_2 levels
   - Limits based on nitrogen absorption at planned depth and PO_2 set point

- Appropriate selection of decompression conservatism / gradient factors for the planned dive
- Thermal constraints

3. Underwater verification
   - Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   - Counterlung & Over Pressure Valve adjustment, if necessary

4. Mouthpiece familiarity skills
   - BOV: switch between open and closed circuit
   - DSV: switch to bailout system

5. Adding diluent gas/ADV familiarity skills
   - ADV: Adding diluent gas and understand how it works
   - BOV: Use BOV to add diluent gas to the loop – 2 ways
   - Bail out second stage: Use to add diluent gas to the loop
   - Dual button MAV: Adding diluent gas (if unit is shipped with this item)

6. Emergency procedures: demonstrate appropriate response to the following ; each dive should have a minimum of 2 "diver emergencies" that the student must react to.
   - Practical bailout skills: including 2 open circuit ascents from approximately 18 meter/59 feet.
   - Gas shutdowns and loss of gas
   - Broken hoses
   - Flooded absorbent canister
   - Carbon dioxide (CO_2) breakthrough
   - Low oxygen drills
   - High oxygen drills
   - Flooding loop
   - Electronics, sensor, and battery failure

7. Practice transferring to open circuit bailout

8. Rescue skill session as outlined by the training agency

9. Use of a buoyancy control system
   - Buoyancy and trim control at safety stop
   - Buoyancy and trim control during dive

10. Controlling and monitoring for PPO2 levels:
    - Raising/lowering PPO2
    - Starting PPO2
    - PPO2 monitoring every minute
    - Manual Add Valve verification: static at constant depth, monitor change over several minutes
    - Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)

11. Electronic systems use:
    - Use and adjustment of Heads Up Display, position, brightness, colour
    - Use and adjustment of PPO2/depth/time display, position, brightness, colour
    - Use and adjustment of decompression computer, set up/gas switching, battery verification, etc

12. Use of lift bag / DSMB and reel (where relevant and applicable)

13. Mask removal and replacement
14. Proper execution of the dive within all pre-determined dive limits
15. Demonstration of safety stops at pre-determined depths
16. Constant loop volume management
17. Cell validation checks with appropriate use of diluent and oxygen
    - Oxygen sensor verification at depth
    - Linearity check of sensors at approximately 5 meter/16 feet on pure oxygen
18. Post dive clean of unit
    - Mouth piece and hoses
    - Clean and disinfect unit
    - Inspect components of unit
19. Diver maintenance of unit
    - Cell removal and replacement
    - Mouthpiece care
    - Replacing or re-charging of batteries
20. Decompression related in water skills
    - Demonstrate the ability to drop and retrieve one (1) bailout cylinder while maintaining position in the water column
    - Demonstrate appropriate reaction to gas hemorrhage from bailout valve, first stage, second stage or SPG
    - Demonstrate appropriate reaction to simulated free-flowing deco regulator
    - Demonstrate the ability to Buddy breathe from a decompression gas
    - Oxygen rebreather mode at less than six (6) meter/19 foot stop
    - Complete two (2) bailout scenario at depth to include decompression obligation on open circuit

EXTRA REQUIREMENTS FOR COMPLETION

- Demonstrate an adequate level of fitness by completing a minimum of a 50m/164 ft surface diver tow with both the rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program
- Complete all academic sessions and unit specific assessments as specified in the training material of the Training Agency and the Manufacturer.
- Complete a minimum of seven (7) training dives, including confined water skill development of at least one (1) hour, and six (6) core open water training dives with a minimum run time of 30 minutes each.
- Complete at least a minimum of 420 minutes of total in-water time on the applicable CCR unit.
- Be able to independently complete a full dive plan
- Complete a final course exam as set out by the training agency and / or manufacturer with a required minimum pass rate of 80% with 100% remediation.
- When the feature is available on a rebreather, download the student's dive logs of all training dives and retain for a minimum of seven years.
- If the feature is not available on a rebreather, download the dive logs from the students dive computer and retain for a minimum of seven years
- Fill in and sign a course completion form confirming all academics and practical sessions have been completed

Dive logs and student-signed course completion forms are to submitted to the manufacturer of the specific unit on request

DEPTH LIMITATIONS

Air as diluent:

- Open Water Training Dives shall be initially shallow , progressively increasing in depth.

- Two (2) dives must be deeper than 30 meters/98 feet for certification
- All dives must be conducted at a depth shallower than 40 meters/131 feet.

Trimix as diluent:

- Open Water Training Dives shall be initially shallow , progressively increasing in depth.
- Two (2) dives must be deeper than 35 meters/114 feet for certification
- All dives must be conducted at a depth shallower than 45 meters/147 feet.

CREDIT

- Students upgrading from CCR Diver to CCR Decompression Air Diluent Diver need to perform an evaluation dive, plus a minimum of four (4) open water divers with two (2) dives greater than 30m/98 feet.
- Students upgrading from CCR Diver to CCR Decompression Diver with Trimix need to perform an evaluation dive, plus a minimum of four (4) open water divers with two (2) dives greater than 35m/114 feet.
- Students upgrading from CCR Decompression Air diluent diver to CCR Decompression diver with Trimix need to complete a minimum of two (2) dives deeper than 35m/114 feet.

NOTES

- Bailout cylinder gas is to be based on a maximum PPO_2 of 1.6 at the maximum depth of the dive.
- Divers should not carry an on-board diluent gas with a ppO_2 higher than 1.1 bar at the bottom.
- The maximum loop set point is 1.3 bar.
- 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.
- Only approved training agencies and instructors may teach a KISS rebreather course.

Diving in an overhead environment

This course shall not be conducted in an overhead environment. Subject to training agency approval certain dive sites can be deemed suitable for the CCR Diver course under the following conditions:

- The student must remain in the daylight zone where there is no need for the use of a dive light.
- The student must never be a distance of more than 132 linear feet / 40 linear meters from the surface

SEQUENCE

Open Water Training Dives 1 and 2 may only be conducted after completing the equipment configuration section, the Surface Diver tow and all confined water sessions.

CERTIFICATION

The unit-specific Decompression CCR Diver (with or without Trimix) certification entitles the holder to dive with a buddy, diving on a rebreather or diving open circuit, on dives utilizing CCR diving procedures to depths of up to 40m /131 feet with air diluent and 45m/147 feet with Trimix and requiring staged decompression stops providing that dives are conducted in environments similar to those of the diver's training and experience.

TRIMIX CCR DIVER 60m

INTENT

The intent of the CCR Trimix 60m Diving program is to provide divers with the training necessary to independently plan and conduct unit specific multiple-stop decompression dives to depths of up to 60m/196 feet using trimix with a minimum of 16% oxygen and utilizing CCR diving procedures with a buddy diving on a rebreather or diving open circuit.

REQUIRED INSTRUCTOR RATING

An active status unit specific CCR Trimix 60m Diving Instructor or higher may conduct the unit specific CCR Trimix 60m Diving program.

TEACHING RATIOS

- The maximum number of students for CCR training is 3:1

This ratio should be reduced as required if the situation and/or environmental conditions call for it.

STUDENT PREREQUISITES

- Decompression CCR Diver
- Have logged a minimum of 50 CCR dives over a minimum of 50 hours, including at least 20 dives deeper than 30m/98 feet and at least ten (10) dives requiring staged decompression.
- At least 25 dives / 25 hours are required on the specific unit.
- Minimum Age: 18

DURATION

- Minimum hours for course completion: 40
- Minimum number of days: 4

MATERIALS AND EQUIPMENT

The minimum required student and Instructor equipment for this program includes:

A complete CCR Unit that:

- Is compliant to local laws, is approved by the training agency, is properly functioning and is appropriate for bailout and accelerated decompression diving
- Has no non-manufacturer approved modifications
- Depth gauge & bottom timer, or dive computer
- Two off-board stage cylinders, one for bottom bailout, one for decompression suitable for a safe return to the surface including all safety and decompression stops in the event of an emergency
- Backup OC/CCR computer for bailout in the event of a system failure
- For Open water and lake environments with the exception of cave, a Delayed Surface Marker Buoy (DSMB) and spool / reel appropriate for the planned dive depth
- A back up Delayed Surface Marker Buoy (DSMB) and spool / reel appropriate for the planned dive depth
- Backup mask
- Cutting device
- Access to appropriate gas analyzers

All skills must be demonstrated by the instructor on the specific unit being trained.

The minimum required student and instructor materials for this program includes:

- KISS Rebreather unit specific user manual
- Agency student training manual or online training course

- Agency instructor manual (electronic instructor manuals meet this requirement)
- Course liability release and assumption of risk (in accordance with local laws)
- Training agency approved medical document
- Unit specific checklist (units equipped with a built in electronic checklist, meet this requirement)
- Manufacturer's sign off sheet/course completion document

REQUIREMENTS FOR COMPLETION

Academics

Students shall have sufficient understanding and knowledge in the following subject areas listed. They should be capable of planning dives in the typical local conditions and environment and be able to plan for typical emergency situations.

1. Gas Physiology
   - Oxygen (O_2) toxicity, Hypoxia, Hyperoxia
   - Central nervous system (CNS) tracking
   - Oxygen tracking units (OTU)
   - Oxygen (O_2) metabolizing calculations
   - Carbon dioxide (CO_2) Toxicity, Hypercapnia
   - Nitrogen absorption
   - Equivalent narcosis depth theory
   - Helium absorption
   - HPNS
2. Gas mixing
3. Formula Work
4. Manually controlled closed circuit rebreathers
5. Dive Tables.
   - Creation of custom dive tables appropriate to dive depths
   - Creation of lower percentage of oxygen (PO_2) diluent to support loop flushing and bailout at depth
6. Dive Computers.
   - Mix adjustable
   - Constant PO_2
   - Decompression Conservatism / Gradient Factor selection
   - Oxygen (O_2) integrated
7. Dive Planning
   - Operational planning
   - Scrubber Duration
   - Gas requirements including bailout scenarios
   - Gas consumption
   - Gas management
8. Decompression on a CCR
   - Oxygen limitations
   - Nitrogen limitations
   - Helium limitations

9. Unit Assembly
   - Loop configurations

10. Unit Specific Check list

11. Equipment Maintenance
    - Fuel cell management
    - Date stamps
    - Replacement

12. Additional fitted equipment and modifications
    - Auto diluent addition
    - Dual mode mouthpieces
    - Heads up display
    - Additional manual injectors
    - Integrating oxygen monitors for dive computers

Skills

1. Pre-dive checks
   - Specific Unit Checklist
   - Verify diluent and oxygen (O_2) cylinder contents using appropriate gas analyzers
   - Unit build-up
   - Scrubber canister filling
   - Breathing loop check including mouthpiece one way valves and positive and negative check
   - Sensor calibration in oxygen, with verification in air
   - 5 minute pre-breathe
   - Stage cylinder rigging
   - KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures including
   - Limits based on system performance
   - Limits based on oxygen exposures at chosen PO_2 levels
   - Limits based on nitrogen absorption at planned depth and PO_2 set point
   - Appropriate selection of decompression conservatism / gradient factors for the planned dive
   - Thermal constraints

3. Underwater verification
   - Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   - Counterlung & Over Pressure Valve adjustment, if necessary

4. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2 “diver emergencies” that the student must react to.
   - Properly execute a recovery from a system failure and conclude the dive and decompression on open circuit gases carried
   - Gas shutdowns and loss of gas, correct choice and switching to off board gases
   - Broken hoses, catastrophic failure scenarios
   - Flooded absorbent canister
   - Cell errors

5. Demonstrate competence managing two (2) bailout cylinders, including drop and recovery while maintaining position in the water

column

6. Rescue skill session as outlined by the training agency
7. Use of Buoyancy control system
   - Buoyancy and trim control at safety stop
   - Buoyancy and trim control during dive
   - Demonstrate buoyancy control; ability to hover at fixed position in water column without moving hands or feet
8. Controlling and monitoring for PPO2 levels:
   - Raising/lowering PPO2
   - Starting PPO2
   - PPO2 monitoring every minute
   - Manual Add Valve verification: static at constant depth, monitor change over several minutes
   - Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)
9. Electronic systems use:
   - Use and adjustment of Heads Up Display, position, brightness, colour
   - Use and adjustment of PPO2/depth/time display, position, brightness, colour
   - Use and adjustment of decompression computer, set up/gas switching, battery verification, etc
10. Use of lift bag/DSMB and reel
    - Use of lift bag/DSMB and reel at depth, and mid water
    - Simulate failed lift bag/DSMB deployment
    - On two (2) of the dives, demonstrate an ascent with ascent reel and lift bag and perform staged decompression
11. Mask removal and replacement
12. Proper execution of the dive within all pre-determined dive limits
13. Demonstration of decompression stops at pre-determined depths
14. Cell validation checks with appropriate use of diluent and oxygen
    - Oxygen sensor verification at depth
    - Linearity check of sensors at approximately 5 meters/16 feet on pure oxygen
15. Decompression related in water skills
    - Demonstrate proper understanding and implementation of team diving procedures to conduct bailout from a depth greater than 30 meters/98 feet.
    - Demonstrate ability to plug in and share off-board gas, including sharing/swapping of off-board bailouts
    - Oxygen rebreather mode in depths less than six (6) meters/19 feet
16. Show good awareness of buddy and other team members through communications, proximity and team oriented dive practices

EXTRA REQUIREMENTS FOR COMPLETION

- Demonstrate an adequate level of fitness by completing a minimum of a 50m/164 feet surface diver tow with both the rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program
- Complete all academic sessions and unit specific assessments as specified in the training material of the Training Agency and the Manufacturer.
- Complete at least six (6) training dives, including one open water skill development session of at least one (1) hour, and a

minimum of five (5) open water training dives, with a minimum runtime of at least 30 minutes each.

- Complete a minimum of 360 minutes of total in-water time on the applicable CCR unit.
- Be able to independently complete a full dive plan
- Complete a final course exam as set out by the training agency and / or manufacturer with a required minimum pass rate of 80% with 100% remediation.
- When the feature is available on a rebreather, download the student's dive logs of all training dives and retain for a minimum of seven years.
- If the feature is not available on a rebreather, download the dive logs from the students dive computer and retain for a minimum of seven years
- Fill in and sign a course completion form confirming all academics and practical sessions have been completed

Dive logs and student signed course completion forms are to be submitted to the manufacturer of the specific unit on request

DEPTH LIMITATIONS

- Open Water Training Dives shall be initially shallow, progressively increasing in depth.
- Two (2) dives should be deeper than 30 meters/98 feet
- And an additional two (2) dives should be deeper than 50 meters/164 feet for certification
- All dives must be conducted at a depth shallower than 60 meters/196 feet.

NOTES

- Dives 1 and 2 must be planned within the no-decompression limits of the Combined Air/EAN Tables or the student's personal dive computer or computer-generated decompression profiles.
- The planned decompression obligation (total ascent time including all decompression stops) for training dives must not exceed 30 minutes for dives 3 and 4, and must not exceed 60 minutes for dives 5 and 6.
- At least one (1) dive must have a total run time in excess of 60 minutes.
- If environmental or water conditions make it unsafe or impractical to meet the cumulative time requirement in six (6) dives, additional training dives should be scheduled.
- Bailout cylinder gas to be based on a maximum PPO_2 of 1.6 at the maximum depth of the dive.
- Divers should not carry an on-board diluent gas with a PPO_2 higher than 1.2 bar at the bottom.
- The maximum loop set point is 1.3 bar.
- The maximum END for the Diluent for the bottom part of the dive, cannot be greater than 30m/98 feet

Diving in an overhead environment

- All skills must be demonstrated in an open water environment prior to entering the overhead environment
- The Instructor must be an active status overhead instructor for the particular environment
- The Diver must hold the user level overhead certification for the particular environment

SEQUENCE

Open Water Training Dive 2 may only be conducted after completing the surface diver tow and all the open water skill development session.

CERTIFICATION

The unit-specific CCR Trimix 60m Diving certification entitles the holder to dive autonomously with a buddy, diving on a rebreather or diving open circuit, on dives using Trimix with a minimum of 16% oxygen, utilizing CCR procedures to depths of 60m/196 feet, and requiring unlimited staged decompression
stops with a maximum of two bail out gas mixtures, providing that dives are conducted in environments similar to those of the diver's training and experience.

TRIMIX CCR DIVER 100m

INTENT

The intent of the CCR Trimix 100m Diving program is to provide divers with the training necessary to independently plan and conduct unit specific staged decompression dives to depths of up to 100m/328 feet using hypoxic Trimix mixtures and utilizing CCR diving procedures with a buddy diving on a rebreather or diving open circuit.

REQUIRED INSTRUCTOR RATING

An active status unit-specific CCR Trimix 100m instructor or higher may conduct the unit-specific CCR Trimix 100m program.

STUDENT PREREQUISITES

- CCR Trimix 60m Diving certification or equivalent.
- Have logged a minimum of 100 CCR dives over a minimum of 100 hours, including at least 30 dives deeper than 30m/98 feet, at least ten (10) dives deeper than 50m/164 feet and at least 20 dives requiring staged decompression.
- At least 50 dives / 50 hours are required on the specific unit.
- Minimum Age: 18

TEACHING RATIOS

- The maximum number of students for CCR training is 3:1

This ratio should be reduced as required if the situation and/or environmental conditions call for it.

DURATION

- Recommended hours for course completion: 30

MATERIALS AND EQUIPMENT

The minimum required student and Instructor equipment for this program includes:

A complete CCR Unit that:

- Is compliant to local laws, is approved by the training agency, is properly functioning and is appropriate for bailout and accelerated decompression diving
- Has no non-manufacturer approved modifications
- Depth gauge & bottom timer, or dive computer
- Three (3) bailout stage cylinders, one for bottom bailout, all with 1-2 meter hose second-stage and SPG, low-pressure inflator hose or quick-connect compatible with the unit if applicable, Oxygen cleaned as required
- Backup OC/CCR computer for bailout in the event of a system failure
- Delayed Surface Marker Buoy (DSMB) and spool / reel appropriate for the planned dive depth
- A back up Delayed Surface Marker Buoy (DSMB) and spool / reel appropriate for the planned dive depth
- Backup mask
- Cutting devices
- Emergency spool
- Access to emergency decompression gas, by team sharing, staging, or from support divers
- Access to appropriate gas analyzers

All skills must be demonstrated by the instructor on the specific unit being trained.

The minimum required student and instructor materials for this program includes:

- KISS Rebreather unit specific user manual
- Agency student training manual or online training course
- Agency instructor manual (electronic instructor manuals meet this requirement)

- Course liability release and assumption of risk (in accordance with local laws)
- Training agency approved medical document
- Unit specific checklist (units equipped with a built in electronic checklist, meet this requirement)

REQUIREMENTS FOR COMPLETION

Academics

Students shall have sufficient understanding and knowledge in the following subject areas listed. They should be capable of planning dives in the typical local conditions and environment and be able to plan for typical emergency situations.

1. Gas Physiology
   - Oxygen (O_2) toxicity, Hypoxia, Hyperoxia
   - Oxygen (O_2) metabolizing calculations
   - Central nervous system (CNS) tracking
   - Oxygen tracking units (OTU)
   - Carbon dioxide (CO_2) toxicity, Hypercapnia
   - Nitrogen absorption
   - Equivalent narcosis depth theory
   - Helium absorption
   - HPNS
2. Gas mixing
3. Formula Work
4. Manually controlled closed circuit rebreathers
5. Dive Tables.
   - Creation of custom dive tables appropriate to dive depths
   - Creation of lower percentage of oxygen (PO_2) diluent to support loop flushing and bailout at depth
6. Dive Computers.
   - Mix adjustable
   - Constant partial pressure of oxygen (PPO_2)
   - Decompression Conservatism / Gradient Factor selection
   - Oxygen (O_2) integrated
7. Dive Planning
   - Operational planning
   - Scrubber Duration
   - Gas requirements including bailout scenarios
   - Gas management
   - Gas consumption
8. Decompression on a CCR
   - Oxygen limitations
   - Nitrogen limitations
   - Helium limitations
9. Unit Assembly
   - Loop configurations

10. Unit Specific Check list

11. Equipment Maintenance
    - Oxygen Sensor management
    - Date stamps
    - Replacement

12. Additional fitted equipment and modifications
    - Auto diluent addition
    - Dual mode mouthpieces
    - Heads up display
    - Additional manual injectors
    - Integrating oxygen monitors for dive computers

Skills

1. Pre-dive checks
    - Specific Unit Checklist
    - Verify diluent and oxygen (O_2) cylinder contents using appropriate gas analyzers
    - Unit build-up
    - Scrubber canister filling
    - Breathing loop check including mouthpiece one way valves and positive and negative check
    - Sensor calibration in oxygen, with verification in air
    - 5 minute pre-breathe
    - Stage cylinder rigging
    - KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures including
    - Limits based on system performance
    - Limits based on oxygen exposures at chosen PO_2 levels
    - Limits based on nitrogen absorption at planned depth and PO_2 set point
    - Appropriate selection of decompression conservatism / gradient factors for the planned dive
    - Thermal constraints

3. Underwater verification
    - Stop at 3-6 meters/9-19 feet on descent for leak bubble check
    - Counterlung & Over Pressure Valve adjustment, if necessary

4. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2 “diver emergencies” that the student must react to.
    - Properly execute a recovery from a system failure and conclude the dive and decompression on open circuit gases carried
    - Gas shutdowns and loss of gas, correct choice and switching to off board gases
    - Broken hoses, catastrophic failure scenarios
    - Flooded absorbent canister
    - Cell errors

5. Demonstrate competence managing three (3) bailout cylinders, including drop and recovery while maintaining position in the water column

6. Ability to manage multiple failures in adverse conditions

7. Rescue skill session as outlined by the training agency

8. Use of Buoyancy control system
   - Buoyancy and trim control at safety stop
   - Buoyancy and trim control during dive
   - Demonstrate buoyancy control; ability to hover at fixed position in water column without moving hands or feet

9. Controlling and monitoring for PPO2 levels:
   - Raising/lowering PPO2
   - Starting PPO2
   - PPO2 monitoring every minute
   - Manual Add Valve verification: static at constant depth, monitor change over several minutes
   - Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)

10. Electronic systems use:
    - Use and adjustment of Heads Up Display, position, brightness, colour
    - Use and adjustment of PPO2/depth/time display, position, brightness, colour
    - Use and adjustment of decompression computer, set up/gas switching, battery verification, etc

11. Use of lift bag/DSMB and reel
    - Use of lift bag/DSMB and reel at depth, and mid water
    - Simulate failed lift bag/DSMB deployment
    - On two (2) of the dives, demonstrate an ascent with ascent reel and lift bag and perform staged decompression

12. Mask removal and replacement

13. Proper execution of the dive within all pre-determined dive limits

14. Demonstration of decompression stops at pre-determined depths

15. Cell validation checks with appropriate use of diluent and oxygen
    - Oxygen sensor verification at depth
    - Linearity check of sensors at approximately 5 meters/16 feet on pure oxygen

16. Decompression related in water skills
    - Demonstrate proper understanding and implementation of team diving procedures to conduct bailout from a depth greater than 40 meters/131 feet.
    - Demonstrate ability to plug in and share off-board gas, including sharing/swapping of off-board bailouts
    - Oxygen rebreather mode in depths less than six (6) meters/19 feet

17. Show good awareness of buddy and other team members through communications, proximity and team oriented dive practices

18. Demonstrate of surface support/support divers in dealing with bailout scenario

EXTRA REQUIREMENTS FOR COMPLETION

- Demonstrate an adequate level of fitness by completing a minimum of a 50m/164 feet surface diver tow with both the rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program
- Complete all academic sessions and unit specific assessments as specified in the training material of the Training Agency and the Manufacturer.
- Complete at least six (6) training dives, including one open water skill development session of at least one (1) hour, and a

minimum of five (5) open water training dives, with a minimum runtime of at least 30 minutes each.

- Complete a minimum of 360 minutes of total in-water time on the applicable CCR unit.
- Be able to independently complete a full dive plan
- Complete a final course exam as set out by the training agency and / or manufacturer with a required minimum pass rate of 80% with 100% remediation.
- When the feature is available on a rebreather, download the student's dive logs of all training dives and retain for a minimum of seven years.
- If the feature is not available on a rebreather, download the dive logs from the students dive computer and retain for a minimum of seven years
- Fill in and sign a course completion form confirming all academics and practical sessions have been completed

Dive logs and student signed course completion forms are to be submitted to the manufacturer of the specific unit on request

DEPTH LIMITATIONS

- Open Water Training Dives shall be initially shallow, progressively increasing in depth.
- Two (2) dives should be deeper than 40 meters/131 feet
- And an additional two (2) dives should be deeper than 70 meters/229 feet for certification
- All dives must be conducted at a depth shallower than 100 meters/328 feet

Local rules or regulations may dictate the maximum depth permitted. If so, the local rules would supercede any other standards.

NOTES

- Dives 1 must be planned within the no-decompression limits of the Combined Air/EAN Tables or the student's personal dive computer or computer-generated decompression profiles.
- The primary planned decompression obligation (total time of all decompression stops including deep stops, if used) for training dives must not exceed 30 minutes for dives 2, 3 and 4, and 60 minutes for dives 5 and 6.
- At least one (1) dive must have a total run time in excess of 60 minutes.
- If environmental or water conditions make it unsafe or impractical to meet the cumulative time requirement in six (6) dives, additional training dives should be scheduled.
- Bailout cylinder gas to be based on a maximum PPO_2 of 1.6 at the maximum depth of the dive.
- Divers should not carry an on-board diluent gas with a PPO_2 higher than 1.1 bar at the bottom.
- The maximum loop set point is 1.3 bar.
- The maximum END for the Diluent for the bottom part of the dive, cannot be greater than 30m/98 feet
- Preliminary dives 1 and 2 must have a minimum run time of 30 minutes.

Diving in an overhead environment

- All skills must be demonstrated in an open water environment prior to entering the overhead environment
- The Instructor must be an active status overhead instructor for the particular environment
- The Diver must hold the user level overhead certification for the particular environment

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SEQUENCE

Open Water Training Dives 2 may only be conducted after completing the surface diver tow and the open water skill development session.

CERTIFICATION

The unit-specific CCR Trimix 100m Diver certification entitles the holder to dive autonomously with a buddy, diving on a rebreather or diving open circuit, on dives using Hypoxic Trimix and utilizing CCR procedures to depths of 100m,/328 feet providing that dives are conducted in environments similar to those of the diver's training and experience.

CCR DIVER CROSSOVER

INTENT

The intent of the program is to provide divers already certified on a unit with additional unit specific training to get certified on an additional unit, following RESA minimum training standards.

REQUIRED INSTRUCTOR RATING

An active status unit specific CCR instructor at the level the candidate is crossing over for

ADMINISTRATIVE REQUIREMENTS

- Course liability release and assumption of risk (in accordance with local laws)
- Health screening document
- Anything else as required by the Training Agency or manufacturer

STUDENT PREREQUISITES

- Be certified as a CCR Diver or Decompression CCR Diver from a RESA recognized training agency
- Show proof of 10 logged CCR dives in the last 12 months
- Minimum age 18 years

NOTE

- Crossover is not allowed for certifications on SCR or PSCR, or for CCR certifications that only allow a lesser dive depth: in all these cases a full course is mandatory
- Crossover applies to rebreathers of different brand/manufacturers
- Crossovers between similar units of the same brand/manufacturer may require an upgrade course as specified by the manufacturer
- Standard KISS CCR/KISS Spirit Sidewinder to KISS Sidekick CCR: minimum of 60 minutes of confined water time, with an additional 140 minutes of in-water time. Overview of the KISS Sidekick CCR operating system.
- Standard KISS CCR/KISS Sidekick to KISS Spirit Sidewinder CCR: minimum of 180 minutes of open water training, conducted over 3 open water dives. Overview of the KISS Spirit Sidewinder configuration, and unit setup.

MATERIALS AND EQUIPMENT

- As specified in the specific diver level course standard

DURATION

- Recommended hours for course completion: 16 to 24
- The number of classes, hours and sessions per day are set by the training agency.

REQUIREMENTS FOR COMPLETION

The crossover course will include:

- CCR assembly workshop.
- A 60 minute water skills evaluation in a confined skill session. All skills from the level the candidate is crossing over at must be demonstrated successfully prior to open water dives.
- Complete a minimum of 4 open water dives and a total accumulated dive time of minimum 240 minutes, demonstrating proficiency in all skills from the level the diver is crossing over at
- Complete a final exam with a passing score as specified by the Training Agency and the Manufacturer.

CCR Trimix 60m Diver

- A diver certified as a CCR Trimix 60m diver may crossover that rating on the new unit after successfully meeting the crossover requirements for Decompression CCR diver on the new unit.

All CCR Trimix 60m diver standards must be met except; Minimum of 120 minutes open water training to be completed over a minimum of 2 dives to a maximum depth of 60m/196ft

- Must demonstrate proficiency in all required academics and skills at the CCR Trimix 60m diver level

CCR Trimix 100m Diver

- A diver certified as a CCR Trimix 100m diver may crossover that rating on the new unit after successfully meeting the crossover requirements for CCR Trimix 60m diver on the new unit.

All CCR Trimix 100m diver standards must be met except: Minimum of 120 minutes open water training to be completed over a minimum of 2 dives to a maximum depth of 100m/328ft

- Must demonstrate proficiency in all required academics and skills at the CCR Trimix 100m diver level

KISS Rebreather LLC. – CCR Diver Course Evaluation Form

As per the KISS minimum required training standards, the course must be completed with the minimum required dives and minutes, along with discussion on required academic topics, and all required skills. The student must achieve a minimum score of 8 out of 10 points in all the following skill areas.

KISS minimum training standards may differ from approved training agency standards. As KISS minimum training standards are the minimum required standard, the approved training agencies may add to them. Instructors should check with the appropriate training agency to ensure that all standards have been met.

Student: _____ Instructor: _____
Course start date: _____ Course completion date: _____
KISS rebreather name & serial number: _____

Skills:

1. Pre-dive checks: Average score: ____
   - ____ Specific unit checklist
   - ____ Verify diluent and oxygen (O2) cylinder contents using gas analyzers
   - ____ Unit built up
   - ____ Scrubber canister filling
   - ____ Breathing loop check including mouthpiece one way valves and positive and negative check
   - ____ Sensor calibration in oxygen, with verification in air
   - ____ 5 minute pre-breathe
   - ____ Bailout bottle/stage cylinder rigging
   - ____ KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures: Average score: ____
   - ____ Limits based on system performance
   - ____ Limits based on oxygen exposures at chosen PO2 levels
   - ____ Limits based on nitrogen absorption at planned depth and PO2 set point
   - ____ Appropriate selection of decompression conservatism/gradient factors for the planned dive
   - ____ Thermal constraints

3. Underwater verification: Average score: ____
   - ____ Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   - ____ Counterlung and Over Pressure Valve adjustment, if necessary

4. Mouthpiece familiarity skills: Average score: ____
   - ____ BOV: switch between open and closed circuit
   - ____ DSV: switch to bailout system

5. Adding diluent gas/ADV familiarity skills: Average score: ____
   - ____ ADV: Adding diluent gas and understand how it works
   - ____ BOV: Use BOV to add diluent gas to the loop – 2 ways

____ Bail out second stage: Use to add diluent gas to the loop
____ Dual button MAV: Adding diluent gas (if unit is shipped with this item)

6. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2, "diver emergencies" that the student must react to: Average score: ____
   ____ Practical bailout skills: including 2 open circuit ascent's from approximately 18 meters/59 feet
   ____ Gas shut downs and loss of gas
   ____ Broken hoses
   ____ Flooded absorbent canister
   ____ Carbon dioxide (CO2) breakthrough
   ____ Low oxygen drills
   ____ High oxygen drills
   ____ Flooding loop
   ____ Electronics, sensor, and battery failure

7. Practice transferring to open circuit bailout: Score: ____

8. Rescue skill session as outlined by Training Agency: Score: ____

9. Use of buoyancy control system: Average score: ____
   ____ Buoyancy and trim control at safety stop
   ____ Buoyancy and trim control during dive

10. Controlling and monitoring for PPO2 levels: Average score: ____
    ____ Raising/lowering PPO2
    ____ Starting PPO2
    ____ PPO2 monitoring every minute
    ____ Manual Add Valve verification: static at constant depth, monitor change over several minutes
    ____ Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)

11. Electronic systems use: Average score: ____
    ____ Use and adjustment of Heads Up Display, position, brightness, colour
    ____ Use and adjustment of PPO2/depth/time display, position, brightness, colour
    ____ Use and adjustment of decompression computer, set up/gas switching, battery verification, etc

12. Use of lift bag/DSMB and reel (where relevant and applicable): Score: ____

13. Mask removal and replacement: Score: ____

14. Proper execution of the dive within all pre-determined dive limits: Score: ____

15. Demonstration of safety stops at pre-determined depths (on all dives): Score: ____

16. Constant loop volume management: Score: ____

17. Cell validation checks with appropriate use of diluent and oxygen: Average score: ____
    ____ Oxygen sensor verification at depth
    ____ Linearity check of sensors at approximately 5 meter/16 feet on pure oxygen

18. Post dive cleaning of unit: Average score: ____

____ Mouthpiece and hoses
____ Clean and disinfect unit
____ Inspect components of unit

19. Diver maintenance of unit: Average score: ____
    ____ Cell removal and replacement
    ____ Mouthpiece care
    ____ Replacing or re-charging of batteries

20. Demonstrate an adequate level of fitness by completing a minimum of a 50 meter/164 feet surface diver tow with both rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program: Score: ____

21. Complete all academic sessions and unit specific assessments as specified in the training material of the training agency and the manufacturer: Completed: ____

22. Complete a minimum of seven (7) training dives, including confided water skill development of at least one (1) hour, and six (6) core open water training dives with a minimum run time of 30 minutes each: Completed: ____

23. Complete a minimum of 420 minutes of total in-water time (including confined water) on the applicable unit: Completed: ____

24. Be able to independently complete a dive plan: Completed: ____

25. Complete the final course exam as set out by the training agency with a required minimum pass rate of 80% with 100% remediation: Completed: ____

Student Signature: _____ Date: _____
Instructor signature: _____Date: _____

In order to complete the students KISS certification, this document must be completed in full, and emailed to: info@kissrebreathers.com.

PLEASE PRINT CLEARLY - IF WE CAN'T READ YOUR WRITING, WE CAN NOT PROCESS THIS FORM. THANK YOU!

KISS Rebreather LLC. – CCR Decompression Diver Course Evaluation Form

As per the KISS minimum required training standards, the course must be completed with the minimum required dives and minutes, along with discussion on required academic topics, and all required skills. The student must achieve a minimum score of 8 out of 10 points in all the following skill areas.

KISS minimum training standards may differ from approved training agency standards. As KISS minimum training standards are the minimum required standard, the approved training agencies may add to them. Instructors should check with the appropriate training agency to ensure that all standards have been met.

Student: _____ Instructor: _____
Course start date: _____ Course completion date: _____
KISS rebreather name & serial number: _____

Skills:

1. Pre-dive checks: Average score: ____
   ____ Specific unit checklist
   ____ Verify diluent and oxygen (O2) cylinder contents using gas analyzers
   ____ Unit built up
   ____ Scrubber canister filling
   ____ Breathing loop check including mouthpiece one way valves and positive and negative check
   ____ Sensor calibration in oxygen, with verification in air
   ____ 5 minute pre-breathe
   ____ Stage cylinder rigging
   ____ KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures: Average score: ____
   ____ Limits based on system performance
   ____ Limits based on oxygen exposures at chosen PO2 levels
   ____ Limits based on nitrogen absorption at planned depth and PO2 set point
   ____ Appropriate selection of decompression conservatism/gradient factors for the planned dive
   ____ Thermal constraints

3. Underwater verification: Average score: ____
   ____ Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   ____ Counterlung and Over Pressure Valve adjustment, if necessary

4. Mouthpiece familiarity skills: Average score: ____
   ____ BOV: switch between open and closed circuit
   ____ DSV: switch to bailout system

5. Adding diluent gas/ADV familiarity skills: Average score: ____
   ____ ADV: Adding diluent gas and understand how it works
   ____ BOV: Use BOV to add diluent gas to the loop – 2 ways

____ Bail out second stage: Use to add diluent gas to the loop
____ Dual button MAV: Adding diluent gas (if unit is shipped with this item)

6. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2, "diver emergencies" that the student must react to: Average score: ____
   ____ Practical bailout skills: including 2 open circuit ascent's from approximately 18 meters/59 feet
   ____ Gas shut downs and loss of gas
   ____ Broken hoses
   ____ Flooded absorbent canister
   ____ Carbon dioxide (CO2) breakthrough
   ____ Low oxygen drills
   ____ High oxygen drills
   ____ Flooding loop
   ____ Electronics, sensor, and battery failure

7. Practice transferring to open circuit bailout: Score: ____

8. Rescue skill session as outlined by Training Agency: Score: ____

9. Use of buoyancy control system: Average score: ____
   ____ Buoyancy and trim control at safety stop
   ____ Buoyancy and trim control during dive

10. Controlling and monitoring for PPO2 levels: Average score: ____
    ____ Raising/lowering PPO2
    ____ Starting PPO2
    ____ PPO2 monitoring every minute
    ____ Manual Add Valve verification: static at constant depth, monitor change over several minutes
    ____ Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)

11. Electronic systems use: Average score: ____
    ____ Use and adjustment of Heads Up Display, position, brightness, colour
    ____ Use and adjustment of PPO2/depth/time display, position, brightness, colour
    ____ Use and adjustment of decompression computer, set up/gas switching, battery verification, etc

12. Use of lift bag/DSMB and reel (where relevant and applicable): Score: ____

13. Mask removal and replacement: Score: ____

14. Proper execution of the dive within all pre-determined dive limits: Score: ____

15. Demonstration of safety stops at pre-determined depths (on all dives): Score: ____

16. Constant loop volume management: Score: ____

17. Cell validation checks with appropriate use of diluent and oxygen: Average score: ____
    ____ Oxygen sensor verification at depth
    ____ Linearity check of sensors at approximately 5 meter/16 feet on pure oxygen

18. Post dive cleaning of unit: Average score: ____
    ____ Mouthpiece and hoses
    ____ Clean and disinfect unit
    ____ Inspect components of unit

19. Diver maintenance of unit: Average score: ____
    ____ Cell removal and replacement
    ____ Mouthpiece care
    ____ Replacing or re-charging of batteries

20. Decompression related in-water skills: Average score: ____
    ____ Demonstrate the ability to drop and retrieve one (1) bailout cylinder while maintaining position in the water column
    ____ Demonstrate appropriate reaction to gas hemorrhage from bailout valve, first stage, second stage or SPG
    ____ Demonstrate appropriate reaction to simulated free-flowing deco regulator
    ____ Demonstrate the ability to Buddy Breathe from a decompression gas
    ____ Oxygen rebreather mode at less than six (6) meter/19 foot stop
    ____ Complete two (2) bailout scenario at depth to include decompression obligation on open circuit

21. Demonstrate an adequate level of fitness by completing a minimum of a 50 meter/164 feet surface diver tow with both rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program: Score: ____

22. Complete all academic sessions and unit specific assessments as specified in the training material of the training agency and the manufacturer: Completed: ____

23. Complete a minimum of seven (7) training dives, including confided water skill development of at least one (1) hour, and six (6) core open water training dives with a minimum run time of 30 minutes each: Completed: ____

24. Complete a minimum of 420 minutes of total in-water time (including confined water) on the applicable unit: Completed: ____

25. Be able to independently complete a dive plan: Completed: ____

26. Complete the final course exam as set out by the training agency with a required minimum pass rate of 80% with 100% remediation: Completed: ____

Student Signature: _____ Date: _____
Instructor signature: _____Date: _____

In order to complete the students KISS certification, this document must be completed in full, and emailed to: info@kissrebreathers.com.

PLEASE PRINT CLEARLY - IF WE CAN'T READ YOUR WRITING, WE CAN NOT PROCESS THIS FORM. THANK YOU!

KISS Rebreather LLC. – Trimix CCR Diver 60m – Diver Course Evaluation Form

As per the KISS minimum required training standards, the course must be completed with the minimum required dives and minutes, along with discussion on required academic topics, and all required skills. The student must achieve a minimum score of 8 out of 10 points in all the following skill areas.

KISS minimum training standards may differ from approved training agency standards. As KISS minimum training standards are the minimum required standard, the approved training agencies may add to them. Instructors should check with the appropriate training agency to ensure that all standards have been met.

Student: _____ Instructor: _____
Course start date: _____ Course completion date: _____
KISS rebreather name & serial number: _____

Skills:

1. Pre-dive checks: Average score: ____
   ____ Specific unit checklist
   ____ Verify diluent and oxygen (O2) cylinder contents using gas analyzers
   ____ Unit built up
   ____ Scrubber canister filling
   ____ Breathing loop check including mouthpiece one way valves and positive and negative check
   ____ Sensor calibration in oxygen, with verification in air
   ____ 5 minute pre-breathe
   ____ Stage cylinder rigging
   ____ KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures: Average score: ____
   ____ Limits based on system performance
   ____ Limits based on oxygen exposures at chosen PO2 levels
   ____ Limits based on nitrogen absorption at planned depth and PO2 set point
   ____ Appropriate selection of decompression conservatism/gradient factors for the planned dive
   ____ Thermal constraints

3. Underwater verification: Average score: ____
   ____ Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   ____ Counterlung and Over Pressure Valve adjustment, if necessary

4. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2, ”diver emergencies” that the student must react to: Average score: ____
   ____ Properly execute a recovery from a system failure and conclude the dive and decompression on open circuit gases carried
   ____ Gas shutdowns and loss of gas, correct choice and switching to off board gases.
   ____ Broken hoses, catastrophic failure scenarios
   ____ Flooded absorbent canister

____ Cell errors

5. Demonstrate competence managing two (2) bailout cylinders, including drop and recovery while maintaining position in the water column: Score: ____

6. Rescue skill session as outlined by Training Agency: Score: ____

7. Use of buoyancy control system: Average score: ____
   ____ Buoyancy and trim control at safety stop
   ____ Buoyancy and trim control during dive
   ____ Buoyancy and trim control hover at fixed position in water column without moving hands or feet

8. Controlling and monitoring for PPO2 levels: Average score: ____
   ____ Raising/lowering PPO2
   ____ Starting PPO2
   ____ PPO2 monitoring every minute
   ____ Manual Add Valve verification: static at constant depth, monitor change over several minutes
   ____ Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)

9. Electronic systems use: Average score: ____
   ____ Use and adjustment of Heads Up Display, position, brightness, colour
   ____ Use and adjustment of PPO2/depth/time display, position, brightness, colour
   ____ Use and adjustment of decompression computer, set up/gas switching, battery verification, etc

10. Use of lift bag/DSMB and reel: Average score: ____
    ____ Use of lift bag/DSMB and reel at depth, and mid water
    ____ Simulate failed lift bag/DSMB deployment
    ____ On two (2) of the dives, demonstrate an ascent with ascent reel and lift bag and perform staged decompression

11. Mask removal and replacement: Score: ____

12. Proper execution of the dive within all pre-determined dive limits: Score: ____

13. Demonstration of decompression stops at pre-determined depths (on all dives): Score: ____

14. Cell validation checks with appropriate use of diluent and oxygen: Average score: ____
    ____ Oxygen sensor verification at depth
    ____ Linearity check of sensors at approximately 5 meter/16 feet on pure oxygen

15. Decompression related in-water skills: Average score: ____
    ____ Demonstrate proper understanding and implementation of team diving procedures to conduct bailout from a depth greater than 30 meters/98 feet
    ____ Demonstrate ability to plug in and share off-board gas, including sharing/swapping of off-board bailouts
    ____ Oxygen rebreather mode at less than six (6) meter/19 foot stop

16. Show awareness of buddy and other team members through communications, proximity and team oriented dive practices: Score: ____

17. Demonstrate an adequate level of fitness by completing a minimum of a 50 meter/164 feet surface diver tow with both rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program: Score: ____

18. Complete all academic sessions and unit specific assessments as specified in the training material of the training agency and the manufacturer: Completed: ____

19. Complete a minimum of six (6) training dives, including confided water skill development of at least one (1) hour, and five (5) core open water training dives with a minimum run time of 30 minutes each: Completed: ____

20. Complete a minimum of 360 minutes of total in-water time (including confined water) on the applicable unit: Completed: ____

21. Be able to independently complete a dive plan: Completed: ____

22. Complete the final course exam as set out by the training agency with a required minimum pass rate of 80% with 100% remediation: Completed: ____

Student Signature: _____ Date: _____
Instructor signature: _____Date: _____

In order to complete the students KISS certification, this document must be completed in full, and emailed to: info@kissrebreathers.com.

PLEASE PRINT CLEARLY - IF WE CAN'T READ YOUR WRITING, WE CAN NOT PROCESS THIS FORM. THANK YOU!

KISS Rebreather LLC. – Trimix CCR Diver 100m – Diver Course Evaluation Form

As per the KISS minimum required training standards, the course must be completed with the minimum required dives and minutes, along with discussion on required academic topics, and all required skills. The student must achieve a minimum score of 8 out of 10 points in all the following skill areas.

KISS minimum training standards may differ from approved training agency standards. As KISS minimum training standards are the minimum required standard, the approved training agencies may add to them. Instructors should check with the appropriate training agency to ensure that all standards have been met.

Student: _____ Instructor: _____
Course start date: _____ Course completion date: _____
KISS rebreather name & serial number: _____

Skills:

1. Pre-dive checks: Average score: ____
   ____ Specific unit checklist
   ____ Verify diluent and oxygen (O2) cylinder contents using gas analyzers
   ____ Unit built up
   ____ Scrubber canister filling
   ____ Breathing loop check including mouthpiece one way valves and positive and negative check
   ____ Sensor calibration in oxygen, with verification in air
   ____ 5 minute pre-breathe
   ____ Stage cylinder rigging
   ____ KISS Sidekick: unit rigging, diluent/oxygen cylinder rigging for best work of breathing/how to resolve incorrect rigging

2. Demonstrate correct pre-dive planning procedures: Average score: ____
   ____ Limits based on system performance
   ____ Limits based on oxygen exposures at chosen PO2 levels
   ____ Limits based on nitrogen absorption at planned depth and PO2 set point
   ____ Appropriate selection of decompression conservatism/gradient factors for the planned dive
   ____ Thermal constraints

3. Underwater verification: Average score: ____
   ____ Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   ____ Counterlung and Over Pressure Valve adjustment, if necessary

4. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2, ”diver emergencies” that the student must react to: Average score: ____
   ____ Properly execute a recovery from a system failure and conclude the dive and decompression on open circuit gases carried
   ____ Gas shutdowns and loss of gas, correct choice and switching to off board gases.
   ____ Broken hoses, catastrophic failure scenarios
   ____ Flooded absorbent canister

____ Cell errors

5. Demonstrate competence managing three (3) bailout cylinders, including drop and recovery while maintaining position in the water column: Score: ____

6. Ability to manage multiple failures in adverse conditions: Score: ____

7. Rescue skill session as outlined by Training Agency: Score: ____

8. Use of buoyancy control system: Average score: ____
   ____ Buoyancy and trim control at safety stop
   ____ Buoyancy and trim control during dive
   ____ Buoyancy and trim control hover at fixed position in water column without moving hands or feet

9. Controlling and monitoring for PPO2 levels: Average score: ____
   ____ Raising/lowering PPO2
   ____ Starting PPO2
   ____ PPO2 monitoring every minute
   ____ Manual Add Valve verification: static at constant depth, monitor change over several minutes
   ____ Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)

10. Electronic systems use: Average score: ____
    ____ Use and adjustment of Heads Up Display, position, brightness, colour
    ____ Use and adjustment of PPO2/depth/time display, position, brightness, colour
    ____ Use and adjustment of decompression computer, set up/gas switching, battery verification, etc

11. Use of lift bag/DSMB and reel: Average score: ____
    ____ Use of lift bag/DSMB and reel at depth, and mid water
    ____ Simulate failed lift bag/DSMB deployment
    ____ On two (2) of the dives, demonstrate an ascent with ascent reel and lift bag and perform staged decompression

12. Mask removal and replacement: Score: ____

13. Proper execution of the dive within all pre-determined dive limits: Score: ____

14. Demonstration of decompression stops at pre-determined depths (on all dives): Score: ____

15. Cell validation checks with appropriate use of diluent and oxygen: Average score: ____
    ____ Oxygen sensor verification at depth
    ____ Linearity check of sensors at approximately 5 meter/16 feet on pure oxygen

16. Decompression related in-water skills: Average score: ____
    ____ Demonstrate proper understanding and implementation of team diving procedures to conduct bailout from a depth greater than 40 meters/131 feet
    ____ Demonstrate ability to plug in and share off-board gas, including sharing/swapping of off-board bailouts
    ____ Oxygen rebreather mode at less than six (6) meter/19 foot stop

17. Show awareness of buddy and other team members through communications, proximity and team oriented dive practices: Score: ____

18. Demonstrate of surface support/support divers in dealing with bailout scenario: Score: ____

19. Demonstrate an adequate level of fitness by completing a minimum of a 50 meter/164 feet surface diver tow with both rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program: Score: ____

20. Complete all academic sessions and unit specific assessments as specified in the training material of the training agency and the manufacturer: Completed: ____

21. Complete a minimum of six (6) training dives, including confided water skill development of at least one (1) hour, and five (5) core open water training dives with a minimum run time of 30 minutes each: Completed: ____

22. Complete a minimum of 360 minutes of total in-water time (including confined water) on the applicable unit: Completed: ____

23. Be able to independently complete a dive plan: Completed: ____

24. Complete the final course exam as set out by the training agency with a required minimum pass rate of 80% with 100% remediation: Completed: ____

Student Signature: _____ Date: _____
Instructor signature: _____Date: _____

In order to complete the students KISS certification, this document must be completed in full, and emailed to: info@kissrebreathers.com.

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HOLLIS BOV (Bail Out Valve)

SPECIFICATIONS

Torques
Inlet Coupling 35 to 40 in-lbs (4-4.5 N-m)
LP Hose 35 to 40 in-lbs (4-4.5 N-m)

Intermediate Supply Pressure
Preferred 138 psi (9.5 bar)
Acceptable 137 to 139 psi (9.4-9.6 bar)

Opening Effort IP = 138 psi (9.5 bar)
Recommended Setup Range (Octopus) 1.5 to 2.2 inches of Water

TOOLS REQUIRED

Standard Tools

Inch Pounds Torque Wrench
3/4" Open End Wrench
1/8" Allen Key
Flat Blade (narrow) Jeweler's Screwdriver
1/4" Open End Wrench
11/16" Open End Wrench
3/32" Allen Key
Cotton Swab (Q-Tip)

Specialty Tools

Tribolube 71
Christo-Lube MCG 111
Intermediate Pressure Gauge
O-ring Tool Kit
In-line Adjustment Tool

BOV SPOOL TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Failed mushroom valve checks	obstructed or damaged **mushroom valves (26), valve holders (22, 23)**, or **O-rings (24, 25)**	clean/replace **mushroom valves (26)**, **valve holders (22, 23)**, and **O-rings (24, 25)**
Leaking gas out of Breathing Loop	worn **O-rings (18, 24, 25, 29)**	replace **O-rings (18, 24, 25, 29)**
Rough **spool (16)** operation	dirty or damaged mating surfaces	clean/lubricate/replace **O-rings (18, 29)**, **housing (1)**, or **spool (16)**
Water **spool (16)**	1. **mouthpiece (27)** or **Ty-Strap (28)** damaged, loose, or missing 2. bad **O-rings (18, 24, 25, 29)** 3. Leak in Breathing Loop	1. replace **Ty-Strap (9)** and/or **mouthpiece (27)** 2. replace **O-rings (18, 24, 25, 29)** 3. see the "Breathing Hoses and Counterlungs" chapter

BOV MODES

Figure 1

The BOV has two modes that are alternated by moving the **lever (34)** *(Fig. 1)*:

- OC (Open Circuit Position) - used for bail out off of the rebreather
- CC (Closed Circuit Position)

BOV SPOOL DISASSEMBLY

NOTE: O-rings must be changed any time they show signs of decay or damage.

Figure 2

1. Using an 11/16" open end wrench, remove the LP hose end from the **coupling (2)** on the BOV *(Fig. 2)*.

NOTE: To avoid internal corrosion and damage, NEVER submerge the BOV assembly in liquid with the LP Hose removed from the COUPLING (2).

Figure 3

2. Slide the silicone hose clamp covers off of the Oetiker clamps.

3. Using Oetiker style pliers, remove the Oetiker clamps that retain the BOV hose adapters into the inhalation and exhalation breathing hoses *(Fig. 3)*.

4. Unscrew the breathing hose nuts, and remove the BOV breathing hoses and adapters.

Figure 4

5. Pinch the hose adapter O-rings to remove as shown *(Fig. 4)*. Inspect the O-rings and seating surfaces for deterioration and damage. If found, discard.

Figure 5

6. Peel back the exhalation **mushroom valve (6)**, gently hold it open. Then using the rubberized end of a pencil, wooden dowel, or other blunt instrument, insert the tool through the **exhalation valve holder (22)**, and gently push out the **inhalation valve holder (23)** assembly *(Fig. 5)*.

NOTE: DO NOT push on the center of the INHALATION VALVE HOLDER (23). ONLY push on the outer edge.

7. Turn the BOV over and press out the **exhalation valve holder (22)** in the same fashion as in step 6.

Figure 6

8. Remove the valve holder **O-rings (24, 25)**, and clean the **O-ring (24, 25)** grooves *(Fig. 6)*. Inspect the **O-rings (24, 25)** for damage. If found, discard.

9. The **mushroom valves (26)** may be removed by grasping them at the flange and pulling them straight out, snipping the retainer stem if necessary *(Fig. 7)*. Discard.

Figure 7

10. Examine the **valve holders (22, 23)** for cracks and other damage, discard if found. Otherwise, wash, sanitize, and remove any debris from the **valve holders (22, 23)**.

11. Snip the plastic **ty-strap (28)** that holds the **mouth- piece (27)**, and remove the **mouthpiece (27)**. Inspect the condition of the **mouthpiece (27)** to ensure that it is supple and free of any tears or corrosion. Discard if found.

12. Using a 1/8" L-shaped Allen key, remove the **lever screw (33)**, **lever (34)**, and **O-ring (35)** by turning counterclockwise *(Fig. 8)*. Inspect the **O-ring (35)** for any signs of decay. Discard if found.

Figure 8

NOTE: Be careful not to damage the sealing surface of the inner METAL SPOOL (16) and BOV HOUSING (1).

13. Using your thumbs, gently press the **spool (16)** out of the BOV **housing (16)** *(Fig. 9)*.

Figure 9

14. Remove the four **O-rings (18, 24, 25, 29)** from the grooves of the **spool (16)**. Discard the schedule A **O-rings (18, 29)**. Inspect the other **O-rings (24, 25)** for any signs of decay. Discard if found.

15. Inspect the spool (16), **O-rings (18, 24, 25, 29)** channels, the lever **O-ring (35)** mounting face, and inside the BOV **housing (1)** for damage (nicks, gouges, etc.) that would prevent the **O-rings (18, 24, 25, 29, 35)** from sealing properly. If damage is found, the damaged part must be replaced.

BOV SPOOL REASSEMBLY

1. Lubricate the O-ring channels for the 3 spool **O- rings (18)**, in the metal **spool (16)** *(Fig. 10)*. Then install the four O-rings **(18, 24, 25, 29)**.

Figure 10

NOTE: Using a syringe simplifies this task and reduces waste. Lubricating the 3 spool O-ring grooves directly also improves SPOOL (16) rotational movement.

2. Lightly lubricate the internal walls of the BOV **housing (1)**.

3. Being careful not to pinch any O-rings, press the **spool (16)** into the BOV **housing (1)** *(Fig. 11)*.

Figure 11

NOTE: Ensure that the holes for the installation of the LEVER (34) are aligned when installing the SPOOL (16).

4. Holding the **lever screw (33)** in one hand, place the **O-ring (35)** in the groove as shown *(Fig. 12)*.

Figure 12

5. Hold the **lever (34)** in place, and start the **lever screw (33)** by hand clockwise. Then continue tightening the **lever screw (33)** with a 5/32" L-shaped Allen key *(Fig. 13)*. **DO NOT** over-tighten.

Figure 13

NOTE: Be careful not to damage the sealing surface of the INNER SPOOL (16) and BOV HOUSING (1).

NOTE: If replacing the MUSHROOM VALVES (26), ensure not to place damaging stress on the VALVE HOLDERS (22, 23).

6. If removed, replace the mushroom valves (26) by gently pulling the retainer stem through the **valve holders (22, 23)**, while twisting, until the retaining flange is completely inside the **valve holders (22, 23)** and properly seated *(Fig. 14)*.

DANGER: DO NOT put lubricant on the MUSHROOM VALVES (26).

Figure 14

7. Lightly lubricate and refit the valve holder **O-rings (24, 25)**. Then press the **valve holders (22, 23)** back into place *(Fig. 15)*. Be careful not to pinch the **O-rings (24, 25)**.

8. Lightly lubricate and install the hose adapter O-rings onto the hose adapters.

Figure 15

9. Slide the hose nuts and silicone sleeves over the ends of the breathing hoses. Then install the BOV hose adapters onto the breathing hose ends *(Fig. 16)*.

Figure 16

10. Using Oetiker style pliers reattach the Oetiker clamps *(Fig. 17)*.

Figure 17

11. Slide the silicone hose clamp covers back into place *(Fig. 18)*.

Figure 18

12. Secure the **mouthpiece (27)** onto the BOV **housing (1)** with a new **ty-strap (28)**, positioning the locking tab of the **ty-strap (28)** towards the breathing hose.

13. Using an 11/16" open end wrench, tighten the LP hose end to the **coupling (2)** clockwise onto the BOV **housing (1)** *(Fig. 19)*.

14. Screw the hose nuts clockwise onto the BOV.

15. Install the HUD bracket and HUD to the exhalation hose nut. Attach an O-ring to the underside of the HUD bracket to secure it.

Figure 19

NOTE: To avoid damage, slide the HUD bracket over the hose nut from the side.

WARNING: Check for leaks and proper operation before use of the BOV.

DANGERS: Ensure the mushroom valves are installed correctly with gas flow from diver's left (inhalation side) to diver's right (exhalation side) as shown by the arrow *(Fig. 20)*.

Figure 20

SECOND STAGE TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Free flow or leakage present.	1. Excessive **lever (9)** height. 2. Excessive intermediate pressure from first stage. **3. Lever (9)** bent. 4. Damaged or worn **poppet seat (5)**. 5. Damaged **orifice (3)**. **6. Lock nut (11)** over-tightened onto shaft of **poppet (6)**. **7. Poppet washer (8)** bent or distorted. 8. Poppet **spring (7)** weakened, worn, or incorrect part. **9. Orifice (3)** incorrectly adjusted.	1. Adjust **orifice (3)** and **lock nut (11)** to arrive at correct spring load tension and **lever (9)** height. Refer to Tuning section. 2. Refer to First Stage Trouble- shooting chart. 3. Replace with new. 4. Replace with new. 5. Replace with new. 6. Replace with new and re-adjust. Refer to Tuning section. 7. Replace **Poppet washer (8)**, **spacer (10)**, and **lock nut (11)** with new. 8. Replace with new. 9. Turn in clockwise to adjust. Refer to Tuning
Excessive inhalation resistance.	**1. Lock nut (11)** over-tightened onto **poppet (6)** shaft, causing excessive **spring (7)** tension. **2. Lock nut (11)** insufficiently tightened onto **poppet (6)** Shaft, causing **lever (9)** slack. **3. Lever (9)** bent. **4. Orifice (3)** incorrectly adjusted. 5. Insufficient intermediate	1. Replace with new and re-adjust. Refer to Tuning section. 2. Tighten to correct spring load and **lever (9)** height. Refer to Tuning section. 3. Replace with new. 4. Adjust to correct contact. Refer to Tuning section. 5. Refer to First Stage Trouble- shooting chart.
Rattle heard inside Second Stage.	1. **Lever (9)** slack present.	1. Tighten **lock nut (11)** onto POPPET (9) Shaft. Refer to
Little or no air flow when Purge Button is depressed.	**1. Lever (9)** slack present. **2. Lever (9)** bent. **3. Orifice (3)** incorrectly adjusted.	1. Tighten **lock nut (11)** onto **poppet (6)** shaft. Refer to Tuning section. 2. Replace with new. 3. Adjust **orifice (3)** to correct contact. Refer to Tun-

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Water entering Second Stage.	1. Tear in **mouthpiece (27)**. 2. **Exhaust valve (13)** distorted or damaged. 3. **Diaphragm (21)** distorted or damaged. 4. **Cover ring (30)** not tight on **housing (1)**. 5. Cracked or damaged **housing (1)**. 6. Mouthpiece **ty-strap (21)** loose or missing.	1. Replace with new. 2. Replace with new. 3. Replace with new. 4. Tighten until secure. 5. Replace with new. 6. Tighten or install.

SECOND STAGE DISASSEMBLY

NOTE: Be sure to check and record the intermediate pressure prior to disassembling the Explorer BOV. Review the Troubleshooting section to better understand which internal parts may need replacing, and to better advise the customer of the service required.

1. Snip the plastic **ty-strap (21)** that holds the **mouthpiece (27)**, and remove the **mouthpiece (27)**. Inspect the condition of the **mouthpiece (27)** to ensure that it is supple and free of any tears or corrosion. Discard if found.

2. Remove the LP hose from the Second Stage, using an 11/16" open end wrench, while holding the Hex portion of the **coupling (2)** secure with a 3/4" open end wrench.

Figure 21

CAUTION: Ensure the Regulator is free of sand when removing the COVER RING (30).

3. Turning counterclockwise, remove the **cover ring (30)** *(Fig. 21)*. Then lift the **purge cover (31)** and **inner ring (32)** to expose the **diaphragm (21)**.

Figure 22

4. Grasp the **diaphragm (21)** by the raised edges of the center, and gently lift it out with a slight upward twist to remove *(Fig. 22)*. Inspect the **diaphragm (21)** to ensure it is supple and free of any tears, corrosion, or other distortion. Discard if found.

5. Depress the **lever (9)**. While holding it down, remove the **coupling (2)** in a counterclockwise direction using a 3/4" open end wrench (Fig. 23). Remove the coupling **O-ring (19)** from the **coupling (2)** and inspect for any signs of decay. Discard if found.


Figure 23

6. Using a narrow slotted blade screwdriver, remove the **orifice (3)** by turning it counter clockwise inside the **coupling (2)**. When it has disengaged completely from the threads, press it out with the use of a cotton swab. Use caution to avoid nicking or scratching the delicate knife edge of the **orifice (3)** as this is done. Remove and discard the orifice **O-ring (17)**. Inspect the **orifice (3)** carefully with the use of a magnifier to ensure that it is perfectly free of any scoring or nicks. If found, discard and **DO NOT** attempt to reuse it.

7. While tilting, lift the **poppet chamber (4)** and **poppet (6)** assembly out of the BOV **housing (1)** *(Fig. 25)*.

Figure 25

Figure 26

8. Place the **poppet chamber (4)** and **poppet (6)** assembly open end down on the workbench. Using a narrow flat blade jeweler's screw driver, hold the **poppet (6)** secure. At the same time, remove the **lock nut (11)** with a 1/4" open end or box wrench in a counter clockwise direction *(Fig. 26)*.

NOTE: There will be a sudden ejection as the poppet (6) disengages from the LOCK NUT (11). Ensure the open end of POPPET CHAMBER (4) and POPPET (6) assembly is facing down against a padded section workbench. This will prevent damage or loss of parts.

9. Remove the **poppet (6)**, **spring (7)**, **poppet washer (8)**, **lever (9)**, **spacer (10)**, and **lock nut (11)**. Discard the **lock nut (11)** and **poppet washer (8)**.

Figure 27

10. Examine the **lever (9)** and compare it with a new one to ensure that it is not bent or distorted in any way. Discard if distortion is found.

11. Examine the **spring (7)** with a magnifier and compare it with a new one to ensure correct tension and length. Discard if found to be weakened or corroded.

12. Remove the **seat (5)** from the **poppet (6)** with the use of a dental probe and discard *(Fig. 27)*. **DO NOT** attempt to reuse it.

Figure 28

13. Examine the internal threads of the **poppet chamber (4)** to ensure they are clean and in good condition. Refer to the Cleaning Section of the General Procedures (Doc. No.12-4025) for instructions regarding the cleaning of these threads.

14. Turn the **housing (1)** face down. Turning counter- clockwise, remove the exhaust cover **screws (15)** with a 3/32" Allen key *(Fig. 28)*. Then lift the **exhaust cover (14)** from the **housing (1)**.

15. Inspect the overall condition of the **housing (1)** and the **exhaust cover (14)** to ensure

they are free of any stress cracks, distortions, an are in good condition. Ensure that all threading on the **housing (1)** is in good condition. Discard either if any distortion or damage is found.

16. Using a soft probe, inspect the condition of the **exhaust valve (13)** to ensure that it is supple and free of any tears or corrosion, and that it seals completely around the seating surface of the **housing (1)**.

NOTE: If the EXHAUST VALVE (13) is in good condition, it is not necessary to remove it. The HOUSING (1) may be cleaned with it attached.

17. If the **exhaust valve (13)** requires replacement, it may be removed by grasping it at the flange and pulling it straight out, snipping the retainer stem if necessary. Discard.

NOTE: If replacing the EXHAUST VALVE (13) ensure not to place damaging stress on the HOUSING (1). Very little pressure is enough to crack one of the ribs in the EXHAUST VALVE (13) support.

Figure 29

18. It is not necessary to remove the **housing plug (12)** unless installing a right hand **poppet chamber (4)**. To remove the **housing plug (12)** release the locking tabs, and press the **housing plug (12)** out of the **housing (1)** *(Fig. 29)*.

WARNING: To change the hose outlet side it is necessary to change the POPPET CHAMBER (4) with a "right hand" version. The two parts are not interchangeable. Mounting one of the POPPET CHAMBER (4) on the wrong side would cause performance issues.

SECOND STAGE REASSEMBLY

NOTE: Prior to Reassembly, it is necessary to inspect all parts, both new and those that are being reused. Check to ensure that O-rings are clean and supple, and that every part and component has been thoroughly cleaned and dried.

WARNING: Use only genuine Hollis parts, subassemblies, and components whenever assembling Hollis products. DO NOT attempt to substitute another manufacturer's part for a Hollis part, regardless of any similarity in shape, size, or appearance. Doing so may render the product unsafe, and could result in serious injury or death of the user.

1. If removed, replace the **exhaust valve (13)** by gently pulling the retainer stem through the **housing (1)** until the retaining flange is completely inside the **housing (1)** and properly seated *(Fig. 30)*.

Figure 30

2. Replace the **exhaust cover (14)** onto the exhaust portion of the **housing (1)** by pressing it in place with the tabs and screw holes aligned. Then using a 3/32" Allen key, tighten the **screws (15)** clockwise until tight (Fig. 31). **DO NOT** over-tighten.

Figure 31

3. Replace the **poppet seat (5)** into the **poppet (6)** with the side that is perfectly smooth facing out. Ensure that it is completely seated, flush with the inner rim of the **poppet (6)**. **DO NOT** use adhesive.

4. Apply a light film of lubricant to each end of the **spring (7)** and place it into the **poppet chamber (4)**. Next fit the **poppet (6)** into **poppet chamber (4)**. Turn the parts over onto a clean ¼" drive ¼" deep wall socket with the same diameter as the **poppet (6)**. Then compress the **spring (7)** until the threaded portion of the shaft is completely visible. Hold it in this position.

NOTE: It is ideal to match the socket size so the socket walls match the metal rim of the POPPET without contacting the POPPET SEAT (5). It is possible to use another clean smooth surface object. Select wisely to prevent accidentally cutting the POPPET SEAT (5).

5. Place the **poppet washer (8)** over the threads of the **poppet (6)** and onto its shaft. Place the **spacer (10)** onto the **poppet (6)**. Thread the **lock nut (11)** clock- wise onto the **poppet (6)** threads with your fingertips.

6. Place the forks of the **lever (9)** over the **poppet (6)** shaft, between the **poppet washer (8)** and **spacer (10)**. Relax the **poppet (6)** and watch to ensure that the **lever (9)** is held in place.

7. Hold the **poppet (6)** stationary with a flat blade jewelers screwdriver. Then using a 1/4" open end wrench, tighten the **lock nut (11)** until 3 Threads are showing beyond the outer surface of the **lock nut (11)** *(Fig. 32)*. Remove the tools, and depress the **lever (9)** repeatedly to ensure smooth movement.

Figure 32

NOTE: Using a screwdriver that is wider than the slotted end of the POPPET (6) will damage the LOCK NUT (11).

8. Slide the **poppet chamber (4)** into the **housing (1)**, as shown *(Fig. 33)*.

Figure 33

9. Lubricate and install the coupling **O-ring (19)** onto the **coupling (2)**. Install the **coupling (2)** into the inlet tube of the **housing (1)** with the smaller opening facing in. Turn clockwise using a 3/4" open end wrench to a torque of 35 to 40 in-lbs (4-4.5 N-m) *(Fig. 34)*.

Figure 34

10. Lubricate and install the orifice **O-ring (17)** onto the **orifice (3)**. Lubricate the threads of the **orifice (3)** with a very light film of lubricant and insert the **orifice (3)** into the **coupling (2)** with the Knife Edge of the **orifice (3)** facing in.

CAUTION: Be careful to protect the delicate knife edge of the ORIFICE (3) as this is done.

11. Using a narrow shafted, slotted blade screwdriver, gently turn the **orifice (3)** clockwise into the **coupling (2)** until the knife edge is barely contacting the **poppet seat (5)**. **DO NOT** continue to turn the **orifice (3)** any further beyond this point, which will cause the **lever (9)** to drop. Doing so will also damage the **poppet seat (5)** requiring its replacement.

NOTE: For best sensitivity of touch during step 11, place your finger gently on the LOCK NUT (11) while slowly turning the ORIFICE (3). As soon as contact is made, you will feel the LOCK NUT (11) begin to turn. Hold the screwdriver by the shaft rather than by the handle.

12. Place the **diaphragm (21)** inside the **housing (1)** with the raised Center facing up, and ensure that it seats flush into the groove of the **housing (1)** *(Fig. 35)*. Set the **inner ring (32)** in place over the **diaphragm (21)**. Ensure that it sits flush.

Figure 35

13. Place the **purge cover (31)** into the **cover ring (30)**. Then install the **purge cover (31)** and **cover ring (30)** in a clockwise direction into the **housing (1)**. Ensure that the **cover ring (30)** is correctly seated on the threads. Hand tighten until secure *(Fig. 36)*.

14. Secure the **mouthpiece (27)** onto the **housing (1)** with a new **ty-strap (28)**, positioning the locking tab of the **ty-strap (28)** towards the LP hose.

Figure 36

TUNING THE SECOND STAGE

1. Prior to tuning the second stage, check the following items:
   a. The demand **diaphragm (21)**, **purge cover (31)** and **cover ring (30)** should be properly installed into the **housing (1)**, with the Front **cover ring (30)** tightened until secure.
   b. Connect an In-Line Adjustment Tool between the low pressure hose and **coupling (2)**.
   c. The **mouthpiece (27)** should be cleaned and disinfected with warm, soapy water.

NOTE: While pressurized, the slotted blade of the In-Line Tool will be held away from the ORIFICE (3) and will therefore need to be pushed inward and held while turning the ORIFICE (3) in either direction. Locate the slotted head of the ORIFICE (3) by touch before attempting any adjustment.

Clockwise turns of the In-Line Adjustment Tool turns the **orifice (3)** in toward the **seat (5)** increasing the opening effort. Counterclockwise turns of the In-Line Adjustment Tool turns the **orifice (3)** out away from the **seat (5)** reducing the opening effort.

2. Pressurize the regulator with a pure air source of 3,000 PSI (206 BAR) and listen to determine that a slight air flow is initially present.

3. Use the In-Line tool to turn the **orifice (3)** clockwise with very small fractions of a turn, just until airflow is no longer present, and pause to listen carefully for airflow or leakage after each adjustment. Adjust the **orifice (3)** as required to achieve the desired opening effort.

NOTE: Turning the ORIFICE (3) further than necessary to stop airflow will result in LEVER (9) slack and excessive spring load tension, impairing proper performance.
CAUTION: To avoid cutting the POPPET SEAT (10) with the knife edge of the ORIFICE (11), depress the PURGE BUTTON (31) while turning the ORIFICE (11) in or out.

4. Hold the Second Stage with the **mouthpiece (27)** facing directly down, and gently shake it up and down, listening carefully for any rattle that may be present, indicating **lever (9)** slack. If slack is indicated, the second stage must be disassembled and corrected.

5. Purge the Regulator of all air to remove the In-Line adjustment tool, and connect the LP hose directly onto the **coupling (2)** using an 11/16" open end wrench. Tighten to a torque of 35 to 40 in-lbs (4-4.5 N-m).

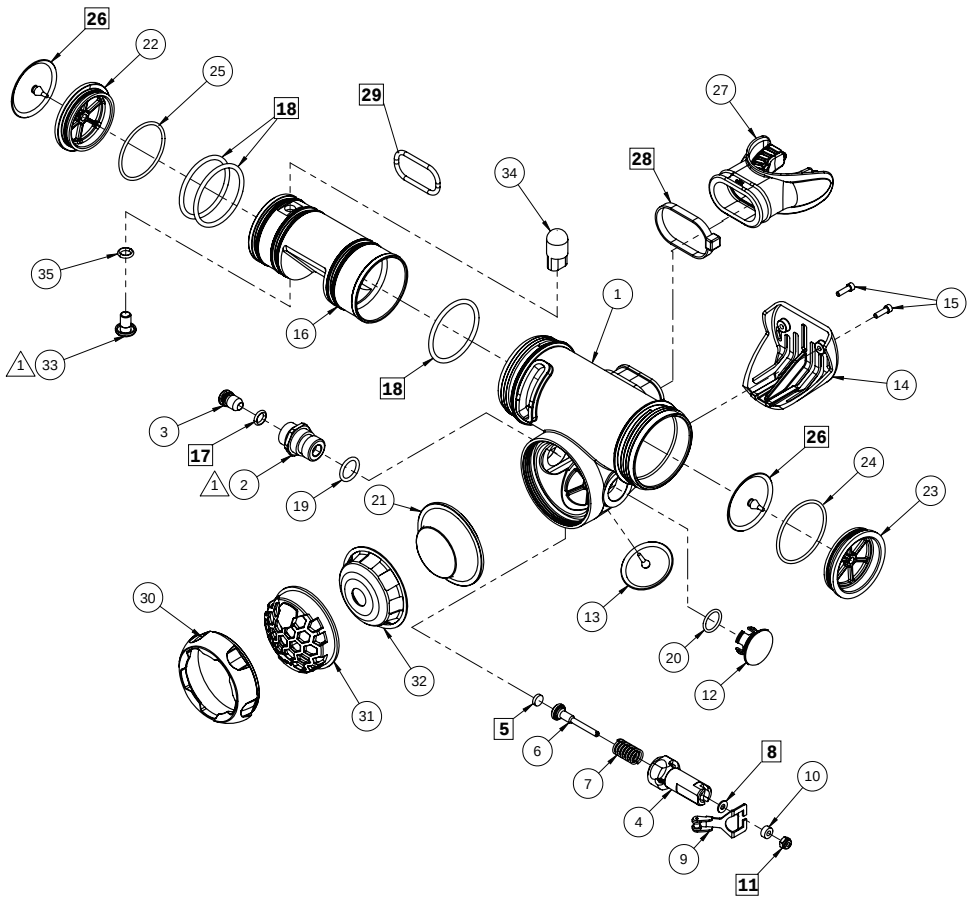
6. Pressurize the Regulator again with a pure air source of 3,000 PSI (206 BAR). Inhale lightly through the **mouthpiece (27)**. Air should flow easily and smoothly, without any hesitation or lag.

NOTE: If hesitation or lag is detected, refer to the Troubleshooting Section to determine possible cause and treatment.

7. Clean and disinfect the **mouthpiece (27)** in warm, soapy water before returning the BOV equipment to the customer.

BOV DIAGRAM

1 TORQUE TO 35 - 40 in-lbs

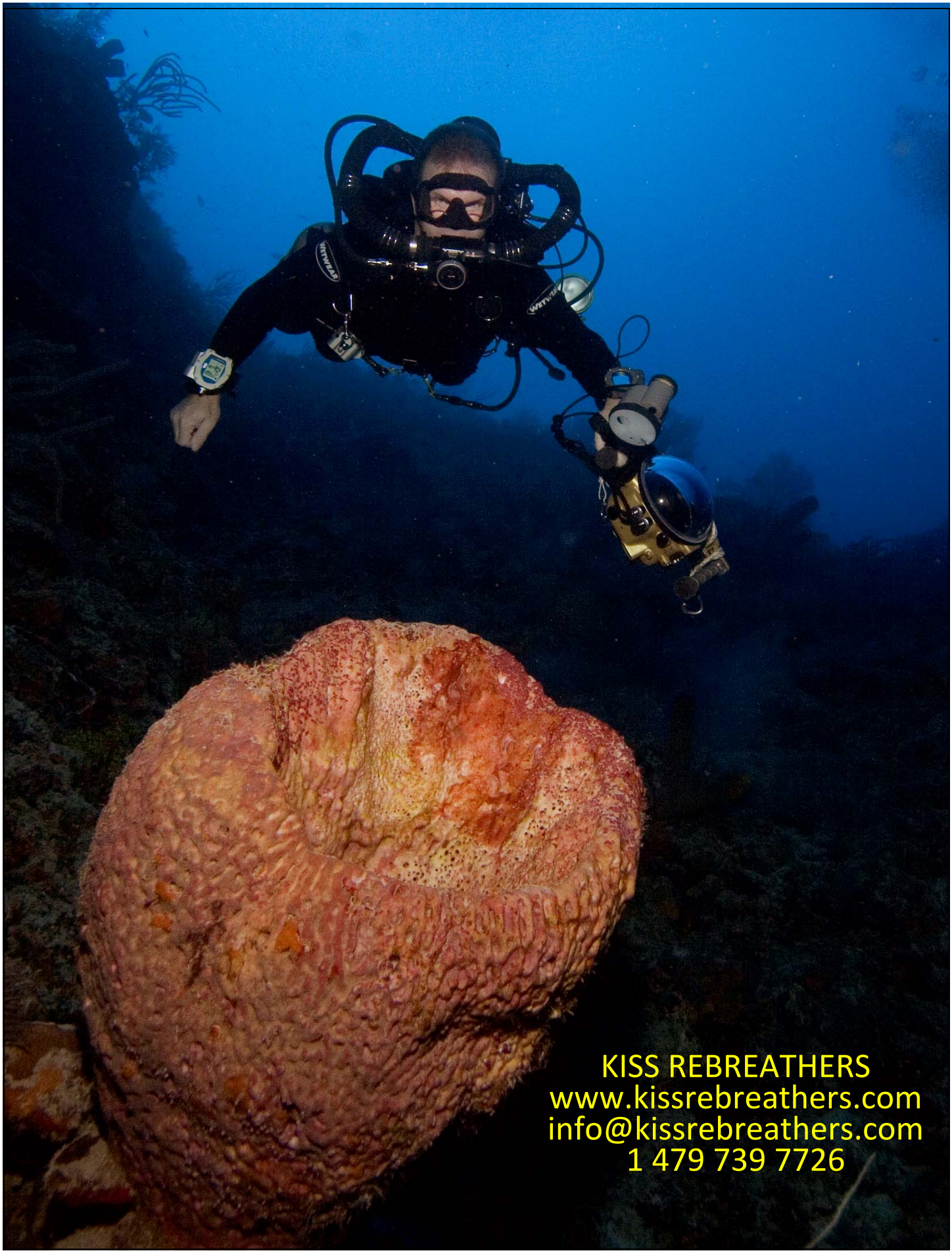


DIA.	CAT.	P/N	DESCRIPTION	NOTES
1	c	9220.XX.X	HOUSING	
2	c	25390	COUPLING	
3	c	6621	ORIFICE	
4	c	25394	POPPET CHAMBER	right hand version
5	**a**	**4340**	**SEAT**	
6	c	25391	POPPET	
7	c	5074	SPRING	
8	**a**	**5117**	**POPPET WASHER**	
9	c	4587	LEVER	
10	c	4335	SPACER	
11	**a**	**4336**	**LOCKING NUT**	
12	c	25398.XX	PLUG, HOUSING	
13	b	6326	EXHAUST VALVE	
14	c	25397.XX	EXHAUST COVER	
15	c	4787	SCREW	QTY: 2

DIA.	CAT.	P/N	DESCRIPTION	NOTES
16	c	9052	SPOOL	
17	**a**	**2.010**	**O-RING**	
18	**a**	**2.127.50**	**O-RING**	**QTY: 3**
19	b	3.906	O-RING	
20	b	2.014	O-RING	
21	b	6979	DIAPHRAGM	
22	c	25388	VALVE HOLDER, EXHALATION	
23	c	25389	VALVE HOLDER, INHALATION	
24	b	2.029	O-RING	
25	b	2.028	O-RING	
26	**a**	**7765**	**MUSHROOM VALVE**	**QTY: 2**
27	b	8616.XX	MOUTHPIECE	
28	**a**	**1978.07**	**TY-STRAP**	
29	**a**	**9136**	**O-RING**	
30	c	8996	COVER RING	
31	b	8997	PURGE COVER	
32	c	8998	INNER RING	
33	c	9049	SCREW, LEVER	
34	c	9053	LEVER, 2-POSITION	
35	b	2.010	O-RING	

RESA recommends, Dive Rebreathers safely by following this 10 point plan:

1. Be wary of "internet advice". Check the manufacturers and training agencies for best practise/configuration information and if you can't find the information you need, contact them.
2. Take time to learn your rebreather and practise using all the controls regularly.
3. Use a checklist before every dive, for assembly and pre-dive checks, ensuring that when you get in the water you haven't forgotten something stupid.
    - Ensuring everything is okay BEFORE you get in the water increases the chances exponentially of it being a successful, trouble free dive.
    - We're all human, we all forget things, but you're entering an environment where even trivial issues on the surface can be fatal underwater.
    - No matter what your experience level, it is stupid not to use a checklist system, whether it be electronic or paper – use a checklist.
4. Unless the manufacturer of your unit advises differently, change your oxygen sensors every 12 months — O2 sensors/cells are a consumable. Their useful life is much less in a rebreather than in a surface O2 analyser.
    - Several diving professionals have lost their lives over the past few years because they didn't change their cells in a timely fashion.
    - Understanding what current limiting is and what to do about it are important skills. Test for it on every dive by adding a little bit of oxygen to see whether the cell rises by 0.1 bar or not, and if not start reducing your setpoint down below 1.0 bar or more or bailout to open circuit.
5. Dive with a buddy. Be a buddy. Most rebreather divers are capable of diving alone but it is always useful to have a friend to help identify that your dry suit hose isn't connected yet or is on hand to help reach components. A good buddy is a good diver. A good diver is a good buddy.
6. Take your time. Take time to sit and think about the dive, about your equipment. Is everything connected? Is everything working properly?
7. Plan your bailout requirements
    - Ensure you have enough bailout gas for the planned dive
    - Ensure you can reach bailout.
    - Test your bail-out pre-dive and early in the dive
    - If your "emergency plan" is your open circuit bailout, make sure you use it. Too many divers die carrying bailout.
8. Use only the CO2 absorbent and grade recommended by the manufacturer, that is the grade tested in their machine and has known performance.
    - Some absorbents are totally unsuitable for diving, they just don't absorb CO2 quickly enough.
    - If you do use a different diving grade absorbent to that recommended, you MUST reduce the usage time. If the absorbent has a larger granule size than that in the recommended absorbent, reduce the usage time by at least one third.
    - Changing it early is much better than changing it late. Push the scrubber to it's limits and one day you will be caught out.
9. Don't be afraid to cancel a dive. You are part of the pre –dive analysis. If you don't feel right or have misgivings about the dive, just cancel it, walk away. The dive will be there tomorrow and the next day and the day after that. Be a good buddy, respect your buddy's wishes – if s/he wants to cancel then so be it, they're safer on the boat.
10. Do pre-jump tests & re-check with appropriate safety drills when you jump in:
    - Check PO2 on HUD and handset and continue to do so regularly during the dive
    - Check both tanks are on
    - Check buddy
    - Leak check prior to dive and always bubble check in the water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