

# Operating Instructions

## **⚠ WARNING**

This module is our effort to explain the operation, maintenance and use of Kirby Morgan helmets and BandMasks®. WE DO NOT HEREIN MAKE ANY EFFORT TO TEACH THE PRINCIPLES OF DIVING. It is our assumption the reader is a qualified commercial diver. We highly recommend that all divers should receive proper training, under controlled conditions, in the use of any model of commercial diving helmet that they have not previously used or trained in, prior to use on the job.

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## 1.1 Introduction



All divers should be properly trained prior to the use of any Kirby Morgan products.

### NOTE

The use of Kirby Morgan diving helmets and BandMasks® will vary with the type of work and environmental conditions. The basic procedures of donning and doffing the helmets and BandMasks® will be similar.

Divers that are familiar and trained in the use of previous Kirby Morgan helmets and BandMasks; i.e., Navy MK. 21 helmet, the SuperLite® helmets and KMB 8, 9, 10, the Navy MK 1 mask, will find that all Kirby Morgan diving helmets and BandMasks® have the breathing system controls located in the same position. The operation of these helmets and BandMasks® will also be similar. The diver must be tended at the surface at all times by a trained, qualified commercial diving tender.

## 1.2 Design Purpose

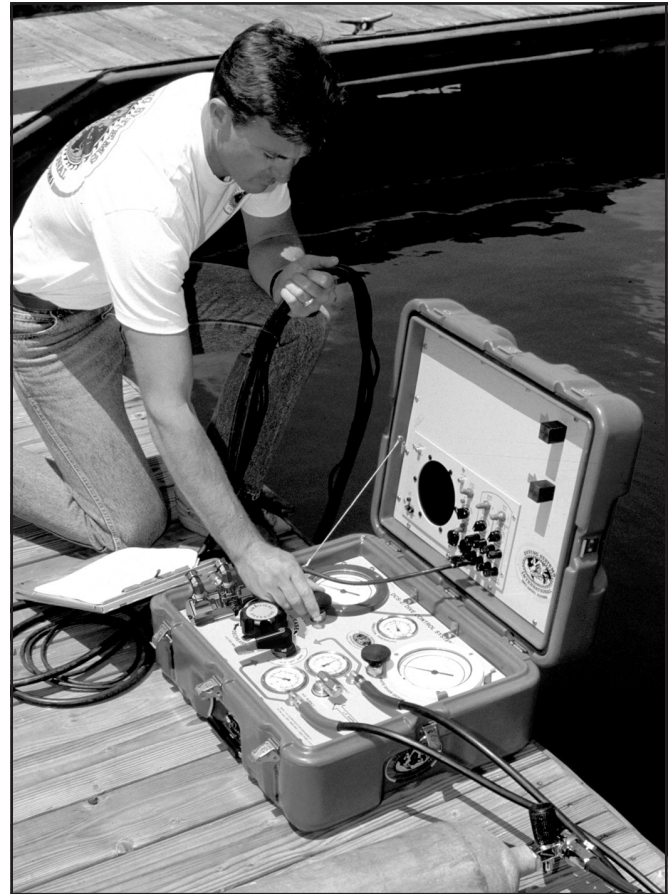
All Kirby Morgan helmets and BandMasks® are designed for surface supply umbilical use and are **not recommended to be used in SCUBA mode.**

### **⚠ WARNING**

**Kirby Morgan® diving helmets and BandMasks® are not intended for use with a self contained gas supply (scuba). There is no provision for surface swimming once the scuba air supply is depleted. This could lead to suffocation or drowning, which could be fatal.**

The umbilical is the diver's lifeline to the diving control station. The umbilical is usually composed of at least a gas supply, communications and strength member, with pneumofathometer and sometimes a hot water hose for cold water diving to form a single unit.

It is required that the air gas umbilical be married together in a manner that the strength member receive the strain and can meet the requirements in accordance with required by industry standards.



*The diver must be tended at the surface at all times by a trained, qualified commercial diving tender.*

The diving control station can be at the surface, in a diving bell, or in a submerged habitat. The diving control station manages the air/gas supply and communications with the diver.

The demand regulator and side block assemblies have been designed to operate in a large range of supply pressures. This wide operating range allows flexibility when using various gas supply pressures to the greatest range of depths.

When using a high-pressure console, for maximum breathing performance it is desirable to maintain a proper over bottom pressure for the depth. Follow the topside supply tables found in the Torque Specs & Supply Pressure Requirements module from our modular manual for the regulator being used. With the many different gas supply console configurations in use, it is important to ensure that the gas supply system used, is capable of supplying the helmet with the necessary pressure and flow of gas to allow the diver to work safely and efficiently.

**⚠ WARNING**

**High pressure supply regulators and associated piping systems for surface supplied diving with Kirby Morgan helmets and masks must be capable of delivering a minimum of 2.6 acfm to the diver at depth. Only systems that can deliver the required gas flow should be used.**

When using a low-pressure compressor (100–250 PSI (6.8–7.2 bar) follow the recommendations in "Supply Pressure Requirements & Tables" on page SUPR-1 for optimum performance.

In countries that have adopted CE standards only CE certified supply systems and components may be used in conjunction with the helmet.

**⚠ WARNING**

**Decompression diving always involves the risk of decompression sickness. Omitted decompression due to loss of gas supply or other accidents can cause serious injury or death. The use of the Kirby Morgan® helmets and BandMasks cannot prevent this type of injury.**

### 1.3 First Use of Your Kirby Morgan® Diving Helmet or BandMask®

When you first receive your Kirby Morgan diving helmet and/or BandMask®, carefully unpack it and examine it for any damage that may have occurred during shipment. The purchaser must contact the freight carrier and/or the KMDSI dealer if the helmet has been damaged in shipment.

Check with your authorized KMDSI dealer to confirm they have registered your helmet/BandMask® for warranty. No warranty claims will be honored for products that are not registered.

### 1.4 Initial Adjustments to your Helmet (NOT the SL 17B)

Before using any helmet it should be properly fitted and adjusted (Neck Dam, Neck Pad, Head Cushion) and all systems checked prior to enter-

ing the water. There are several adjustments that must be made to provide a more secure and comfortable fit when wearing the helmet.



*The head cushion, head cushion foam spacer (HCFS) and chin cushion are easily removed.*

#### 1.4.1 Head Cushion

The fit of the helmet is primarily determined by the head cushion. Open cell foam is used to provide the support and padding and can be adjusted. Over a period of time use of the open cell foam may result in wear that will not provide a comfortable, snug fit. Inspection of the foam must be done from periodically to evaluate the condition of the foam.

The foam used in the center top/rear foam of the Kirby Morgan® head cushion is very dense to reduce compression and spring-back. This reduces the tendency of the helmet to ride up and down when underwater. Do not replace this dense foam with a soft foam. A softer foam is used on the sides and around the bottom of the head cushion.

The diver's head can be moved forward into the

oral nasal mask by adding layers of additional foam at the rear of the head cushion. The diver's head can be moved up or down in the helmet by decreasing or increasing the foam pads at the top of the head cushion. Usually, a diver with a small head will use all the foam, Head Cushion Foam Spacer and Chin Cushion that comes with a new helmet. A diver with a larger head will need to remove a layer of foam in the center top and back of the head cushion.

The chin cushion can also be used, if necessary, for sizing.

### 1.4.2 Trimming the Neck Dam

If your helmet is new, or any time you replace the neck dam, it must be properly fitted to the diver.

**It is not possible to convert a small neck dam into a large by adding material.**

#### **⚠ WARNING**

**Never dive with a neck dam that is too tight. A neck dam that is too tight could cause the diver to pass out due to pressure on the carotid artery in the neck. This could lead to severe personal injury or death.**

To properly trim the neck dam, use the largest, sharpest scissors available, in order to make as few cuts as possible. There must be no jagged edges on the neck dam or it may tear.

1) Start by trimming only a 1/4 inch off the neck dam at a time. Trimming should be limited to a total length of 1". When you are done, the neck dam must be just tight enough so that it does not leak. This may feel a bit snug out of the water, but should be comfortable underwater.



*Trimming the neck dam.*

If you have a large neck, a neoprene neck dam may also need to be stretched for it to fit properly. This can be done by sliding it over a Scuba tank and allowing it to sit overnight. If the neck dam is still too tight, trim the neck dam until it is still snug. Do not trim more than 1/4 inch at a time.

#### **⚠ WARNING**

**Avoid trimming neoprene neck dams too much. Neoprene neck dams will loosen over time as they are used and the cells of the foam neoprene break down. This is particularly true if the helmet is locked in and out of a bell or saturation system. If the neck dam is too loose it may leak leading to serious injury or death.**

As the neoprene neck dam ages, it will become looser, due to a natural breakdown of the cells. This is particularly true if the helmet is locked in and out of a bell or saturation system. As the neck dam becomes worn it will need replacement to ensure that it seals properly. There should be no attempts to modify a worn neck dam into a tighter fitting neck dam. **A WORN NECK DAM THAT NO LONGER SEALS AROUND THE DIVER'S NECK MUST BE REPLACED.**

**⚠ WARNING**

**There must be no holes or tears in the neck dam. If there are holes or tears in the neck dam the helmet could leak and flood. In addition, the demand regulator will not operate properly. Serious injury or drowning could result.**

**1.4.3 Adjusting the Neck Pad**

The main component that secures the head in the helmet is the neck pad on the locking collar. The neck pad must be adjusted to fit each diver. Two adjustment screws mount the neck pad to the locking collar. Use these screws to adjust the neck pad.

The following procedure requires a diver and tender. You do not need to have the air on to the helmet if you do not use the neck dam ring assembly. If the neck dam assembly is used, the diver must have air to the helmet to breathe.

1) With the neck ring assembly removed, slightly loosen the screws until the neck pad can slide back and forth and move it to the back position. Be sure each of the head cushion snaps are attached to their corresponding snap inside the helmet. The head cushion should already be fitted and installed.

2) Don the helmet so that the oral nasal is in the proper position on your face.



If the Oral Nasal is not properly positioned on your face the Head Cushion may need to be adjusted first.

3) Rotate the locking collar closed and latched.

4) Standing upright and looking forward adjust the neck pad forward until it is snug and comfortable. Mark the position of the neck pad on the locking collar using a marker.

5) Remove the helmet. Position the neck pad on the locking collar at the marked position and tighten the adjustment screws on each side. Don the helmet again, and move your head in various positions to ensure the pad is adjusted correctly.

The helmet is now adjusted for your head. It should need no further adjustment unless another diver uses the helmet.

**1.4.4 Adjustment BandMask®**

Unlike our helmets, which have a neck dam that must be sized for the individual diver's neck, the Kirby Morgan BandMasks® are designed to be adjustable to fit most divers. No special pre-dive adjustment must be made other than securing the Head Harness (spider) with the proper tension for the diver's head.

**1.4.5 Custom Hood BandMask®**

If you are using a KMB Hood with a Molded Face Seal, ensure it is the correct size for the diver.

**1.5 Pre Dress-In Procedure**

Before dressing in for a dive, inspection of the helmet and BandMask® components must be made to ensure it is in proper functioning order. This should be done well in advance of the dive so any problems can be fixed. The following steps are part of the recommended daily maintenance.

**1.5.1 Pre-Dive Visual Inspection**

**The helmets and BandMasks® each have their own daily set up and functional checklists which can be found under the support tab at [kirbymorgan.com](http://kirbymorgan.com) under checklists.**

**Follow the respective A2.3 checklist for the system you are using and visually inspect the exterior and interior of the system.**

- 1) The demand regulator cover assembly should not be dented and the purge button must work.
- 2) **HELMETS ONLY:** The neck dam must not be torn or punctured, and must fit the diver properly.

<b>⚠ WARNING</b>
<b>There must be no holes or tears in the neck dam. If there are holes or tears in the neck dam the helmet could leak and flood. In addition, the demand regulator will not operate properly. Serious injury or drowning could result.</b>

- 3) **HELMETS ONLY:** Inspect the O-ring on the neck dam ring assembly. The O-ring must be in place, undamaged, and lubricated.

<b>⚠ WARNING</b>
<b>The O-ring on the neck dam ring assembly must be in place and in good condition. It must be properly lubricated for smooth operation. Without a proper functioning O-ring the helmet will leak and possibly flood. Drowning could result.</b>

- 4) Inspect the bent tube that supplies breathing gas to the regulator. There must be no dents or kinks in the assembly.
- 5) Inspect the face port. It must be in good condition.
- 6) Be sure the communications wires are secured and there are no loose nuts or securing screws inside the module. For the BandMask check the wire lugs to make sure they are not touching each other. This would cause a short (no communications).
- 7) Inspect the oral/nasal mask. Make sure it is on the regulator mount nut properly and the valve is installed properly.
- 8) **HELMETS ONLY:** Inspect the sealed pull

pin on each side of the helmet. They must engage and disengage properly.

- 9) **HELMETS ONLY:** Make sure the head cushion, chin cushion and chin strap are properly fastened inside the helmet.

**1.5.2 Additional BandMask ONLY Pre-Dive Visual Inspection**


- 1) The hood and face seal must not be torn or punctured. The hood must be in good condition with no tears or rips. The face seal must be properly glued to the hood. If it is not, or there are tears in the face seal this will cause the regulator to free flow.

- 2) The Head Harness (spider) must be in good condition. The rubber must not be torn or cracked.

<b>⚠ WARNING</b>
<b>The Head Harness must be in good condition. If it is worn or cracked it could fail during the dive. This could cause the mask to flood or come off the diver's head. This could lead to drowning.</b>

<b>⚠ WARNING</b>
<b>There must be no holes in the face seal. If there are any holes in the face seal the demand regulator will free flow. This could lead to rapid depletion of the bailout air supply. This could cause serious injury or death.</b>

- 3) Check the screws that hold the bands in position. They must be adjusted to the proper torque setting. See "Torque Specs" module. When the screws are adjusted properly the hood and face seal cannot be moved under the bands.

 **NOTE** As hoods age and the cells of the neoprene break down it will be possible to tighten the bands to the point where the bands almost touch.

- 4) Check the bands themselves. The welds must show no signs of cracking or parting.
- 5) Confirm the two Bands Keepers are installed, secured and adjusted to the proper torque. See "Torque Specs" module.

**NOTE**

Maximum torque, bands should have no less than an 1/8 inch even gap between the bands. On installation, a marine grade anti-seize may be used on this screw

## 1.6 Preparing the Helmet for Diving

### 1.6.1 Clean Face Port

Thoroughly clean the face port with a soft cloth and a mild liquid detergent solution. **DO NOT USE ANY AEROSOL SPRAYS ON THE POLYCARBONATE PORT!**

### 1.6.2 Fogging Prevention

Prior to the dive, a thin film of anti-fogging solution may be applied to the interior of the polycarbonate face port to help prevent fogging during the dive. Approved solutions include: mild dish soap and other commercially available anti-fogging solutions that are proven safe for use on polycarbonate.

### 1.6.3 Check Moving Parts

Check all moving parts, such as the regulator adjustment knob, the defogger control knob, emergency (EGS) knob, and the nose block device knob and all locking collar parts to ensure smooth and proper operation.

### 1.6.4 Check Communications

Check the communications system for proper operation. Put the helmet on and talk to an assistant to ensure proper functioning and volume levels. Check the fit and tightness of the communications module mount or packing nut.

### 1.6.5 Check One Way Valve

The one way valve must be tested daily, prior to commencement of diving operations.

## ⚠ WARNING

**The one way valve must be tested daily, prior to commencement of diving operations. Failure of the one way valve could cause serious injury or death.**

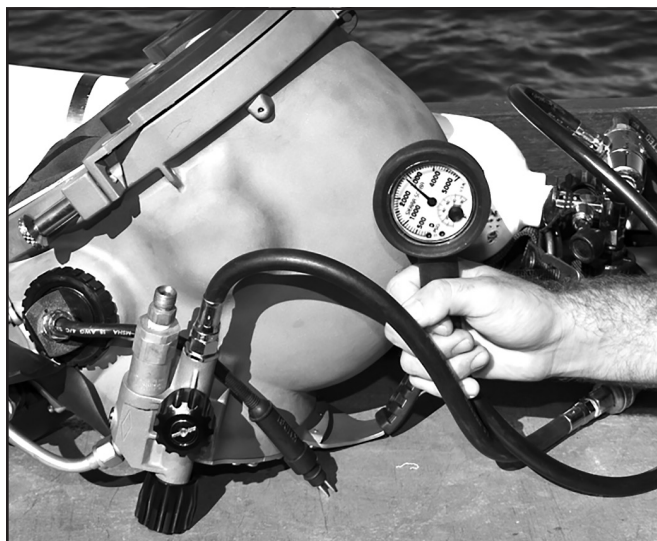
1) With the main gas supply hose removed from the one way valve and the EGS gas supply at-

tached, close the steady flow/defogger control knob and screw in the adjustment knob on the regulator all the way.

2) Slowly pressurize the EGS system and open the EGS Valve. If any gas escapes out the end of the adapter on the one way valve, it is faulty and must be rebuilt or replaced. A one way valve repair kit is available for rebuilding these valves (Part # 525-330).

## ⚠ WARNING

**Never dive if the one way valve is not operating properly. If the hose or breathing gas/air fitting breaks near the surface a serious injury could result to the diver's lungs and/or eyes. In extreme cases this could be fatal. The one way valve must be tested daily prior to the commencement of diving operations.**



*Checking the one way valve. With the bail-out bottle connected to the emergency valve, no gas should escape through the one-way valve when the EGS valve and cylinder valve are opened.*

## 1.7 Emergency Gas System (EGS)

The configuration we recommend is as follows:

- Cylinder Valve Open
- EGS Valve on Helmet Closed

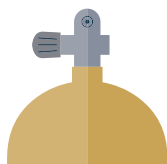


This is the only method that we recommend. The advantages of this method are as follows:

- You only need to open one valve to activate your emergency supply.
- There is little danger of flooding your first stage regulator and ruining it.

KMDSI believes that this method poses the least amount of risk for the diver.

**CYLINDER VALVE**



**EGS VALVE**



If the diver's main gas supply fails, the diver must have another source of gas that will enable them to return to the dive station or to a point where a normal gas supply can be reestablished. For this reason, **an emergency gas supply (bailout) cylinder must be used on all dives.** The bailout cylinder is worn on the back using a combination backpack and lifting harness.

**⚠ WARNING**

**Do not dive without a diver worn Emergency Gas System. If the main gas supply is lost, you will have nothing to breathe and may drown.**

Most commercial divers wear a harness (separate from the weight belt) that is used for several purposes. The harness should be equipped with metal rings. These rings are used to connect the umbilical to keep any strain off the helmet. In addition, the rings are used to hang tools and other equipment and provide a means of lifting an unconscious diver from the water. A harness is the best method of securing the emergency breathing gas to the diver.

**⚠ WARNING**

**Never dive without attaching the umbilical to a proper harness assembly that meets industry standards and can be used to safely lift an unconscious diver out of the water. The lift point must be done in a way so there is no pull on the divers helmet. Never allow the umbilical to pull on the helmet directly or the diver could suffer a neck injury.**

When determining the size of the emergency gas cylinder to use, several factors must be considered. The divers depth, the length of time the diver may be without the main gas supply, and the gas consumption rate. Regardless of the cylinder size used, it should be of sufficient volume to allow the diver to ascend at a normal rate or transit to a point where a normal gas supply can be reestablished.

**Bail Out 1<sup>st</sup> Stage Regulator**

The emergency gas supply must be fitted with a good quality first stage regulator that has an over pressure relief valve installed into one of the low pressure ports. The over pressure relief must be adjusted to relieve between 180-190 psig. The purpose of the relief valve is to allow pressure to vent off in the event the first stage regulator develops an intermediate pressure leak or creep. Without a pressure relief valve, the hose could rupture and the emergency gas supply would be lost.

**⚠ WARNING**

**Never dive without an over pressurization relief valve installed on the EGS regulator (1st stage). Without the relief valve if the EGS regulator develops an internal leak, or carries-away, the full pressure of the EGS cylinder would be placed on the low-pressure EGS hose and the Emergency Valve. This could cause the low-pressure hose to burst resulting in the complete loss of the EGS system.**

The first stage regulator should be set to between 135–165 psig over bottom. If quick disconnects are used on the first stage hose use a set of good quality quick disconnects with locking sleeves to

the emergency valve assembly located on the side block.



*An over-pressure relief valve must be installed on the first stage used for the Emergency Gas Supply.*

To ensure no loss of emergency gas supply, make sure the emergency valve on the helmet is turned off, when diving under normal operation, this way the emergency gas supply will not be used up without the diver's knowledge. Once the emergency supply hose is connected, the **tank valve is turned on to pressurize the hose**. In the event of an emergency due to a loss of the main gas supply, the emergency valve knob located on the side block is turned on supplying gas to the side block assembly and the regulator.

## ⚠ WARNING

Some divers keep the EGS gas cylinder valve shut during the dive. Their rationale being; in the event of an emergency, they will simply open the cylinder valve thus eliminating any EGS air/gas unknowingly being lost due to either a 1st stage failure or EGS hose failure.

KMDSI strongly recommends never diving with the cylinder valve shut. The reasoning behind this is twofold. First, with the cylinder valve open, gas is immediately available via the EGS valve on the side block. Secondly, and most importantly, if the EGS regulator (1st stage) is not pressurized, during descent it is possible that sea water will leak through the first stage intermediate circuit of the 1st stage regulator, that may cause failure of the EGS regulator resulting in possible injury or death.

## ⚠ WARNING

**Never connect the main gas supply hose from the diving control station to the Emergency Gas valve assembly (EGS). If this is done there is no one way valve protection for the diver in the event of damage to the umbilical or related equipment. The diver could be exposed to a serious "squeeze". This can result in serious personal injury or death.**

If the 1<sup>st</sup> Stage regulator floods and is not promptly serviced, it will not perform properly when you need it in an emergency. It's up to each individual to make an informed choice regarding how to configure your bail-out system.

KMDSI strongly recommends the use of a submersible pressure gauge with every bail-out system. Not only does this make it very easy to check your emergency gas pressure prior to diving, it also allows you, in most cases, to periodically check the pressure in your system while you dive. The diving supervisor should have the diver report the EGS pressure at least every 30 minutes. This reading should be logged. In this

way, if you have a leak, you will be able to take appropriate action.

### **⚠ WARNING**

**A standard Scuba submersible pressure gauge must be connected to the high pressure port on the first stage so that the diver can monitor their emergency supply.**

## **1.8 Setting Up to Dive**

### **1.8.1 Flushing Out the Umbilical**

Before connecting the umbilical to the helmet/BandMask®, the umbilical must be flushed out to remove any dirt, moisture, or other debris. Connect the topside umbilical end to the topside diver control console. Ensure there is no pressure in the diver's umbilical.

Carefully uncap the helmet/BandMask® end of the umbilical and hold securely while pointing in a safe direction, then slowly bring up gas pressure to approximately 25-40 p.s.i.g. (1.7-2.7 bar). Allow the gas to flow for at least 15 seconds. If it is not going to be used immediately, the umbilical should be recapped.

### **1.8.2 Connecting the Umbilical to the Helmet**

When connecting the hose to the helmet/BandMask® be sure to use a backup wrench to hold the adapter, or inlet fitting, and a second wrench to tighten the swivel fitting on the hose. If this is not done, the adapter will turn inside the one way valve. If this happens repeatedly the threads will wear and the valve will need to be replaced.

The connection between the hose and the helmet/BandMask® must only be made up “snug”. Excessive force will deform and ruin the adapter. A second wrench must be used when the helmet is disconnected as well, otherwise the adapter and/or the one way valve assembly may become loose and fail to make a seal.

### **⚠ WARNING**

**If the one way valve or the adapter is loosened this will allow breathing gas to leak out of the breathing system. This could also result in a loss of all pressure to the helmet/BandMask®.**



*ALWAYS use two wrenches when connecting the umbilical to the helmet.*

If you are using waterproof connectors for your communications, take extra care in handling. To connect the male and female waterproof connectors, align the large pin on the male connector with the large hole on the female connector. Press the two connectors together until you hear a distinct “pop”. Do not twist the connectors. Tape the two connectors with a bit of electrical tape to prevent them from pulling apart.



*Connecting the waterproof connectors.*

To separate the connectors remove the tape, grasp them at the thickest part, push your thumbs against each other, and at the same time, pull apart until the connectors are disconnected.

**Do not twist the connectors. Do not pull them apart by pulling on the wire part of the communication cable. Use the thick connector part of the communication cables to pull them apart.**

### 1.8.3 Opening the Breathing Gas Supply to the Helmet

Prior to turning on the air supply for the helmet, check to see that the EGS valve and free flow valve are closed and the regulator adjustment knob is all the way in.

On the Kirby Morgan® 455 Balanced regulator, when you turn the regulator knob all the way in, a clicking can be heard with each revolution of the knob when the knob has “bottomed out.” This is an audible indication the adjustment spring tension is as tight as it will get. The adjustment knob will never stop turning in this direction, so listen carefully for this indicating click.

Slowly bring up the gas pressure to the helmet/BandMask®. See "Supply Pressure Requirements & Tables" module. **Slowly back out on the reg-**

**ulator adjustment knob until a slight free flow develops, then turn the adjustment knob in (clockwise) until the free flow just stops.**

To properly check the breathing system you must completely don the helmet/BandMask®.

### 1.8.4 Fogging Prevention

A thin film of anti-fogging solution may be applied to the interior of the polycarbonate face port prior to the dive to help prevent fogging during the dive. A mild liquid dish washing detergent, or other commercially available anti-fogging solutions, may be applied with a soft rag or paper towel to the interior of the port.

Do not use an aerosol spray on the polycarbonate lens. The propellants in some aerosol dispensers cause damage to the lens.

<b>⚠ WARNING</b>	
	<p><b>Never use aerosol-propelled sprays near the face port of the helmet or BandMask. The propellant used in these aerosols can invisibly damage the face port and cause it to shatter upon impact from any strong blow. If the face port fails underwater, the helmet will flood and drowning may result.</b></p>

### 1.8.5 Donning the Metal Bottom End Helmets

All donning procedures must be done by the diver until they are thoroughly familiar with the helmet and this procedure. However, the tender must be present to assist the diver and check to ensure that the diver has properly donned their equipment. It is impossible for the diver to see whether they are properly dressed in once the helmet is on their head.

**⚠ WARNING**

**The tender must always be present to assist the diver while dressing and whenever the diver has their helmet on their head while they are out of the water. It is difficult for the diver to walk while they are dressed in and they can stumble and fall, resulting in serious personal injury.**

To dress in, the neck dam ring assembly must first be pulled down over the diver's head.

To don the neck dam, orientate the neck dam/ring assembly vertically, in front of your chest, so that the large end of the assembly where the pull strap is mounted is on top. The pull strap should be facing your chest. Lift the neck ring assembly over your head, grasping the sides of the neck ring assembly and the leading edge of the neck dam. Spread the opening wide and pull the neck dam down over your head. The neck dam leading edge should be as low as possible on your neck.

**The neck dam is always turned up against the diver's neck. This is very important!** With the neck dam turned down (or inside), the helmet will vent air from the neck dam causing the regulator to free flow. This will make the helmet very uncomfortable and waste breathing gas.

The neck ring assembly must be oriented so the "tongue" on the front of the neck dam ring assembly is pointed to the front of your body and below your chin.

Be sure to loosen the chin strap inside the helmet prior to donning the helmet.

With the diver holding the helmet, the tender should now connect the quick disconnect fittings for the bailout supply.

With the helmet face down, pull the sealed pull pins and to release the locking collar/neck pad assembly. Be sure the head cushion is properly fitted and attached to the helmet. Pull the nose block device knob out all the way.

With the locking collar/neck pad assembly fully open, lift the helmet and place it over your head. Lower the helmet onto the back of your head

first, then pivot it forward until your face is correctly positioned in against the oral nasal mask. Release the locking collar/neck pad assembly, let it hang down behind your shoulders.



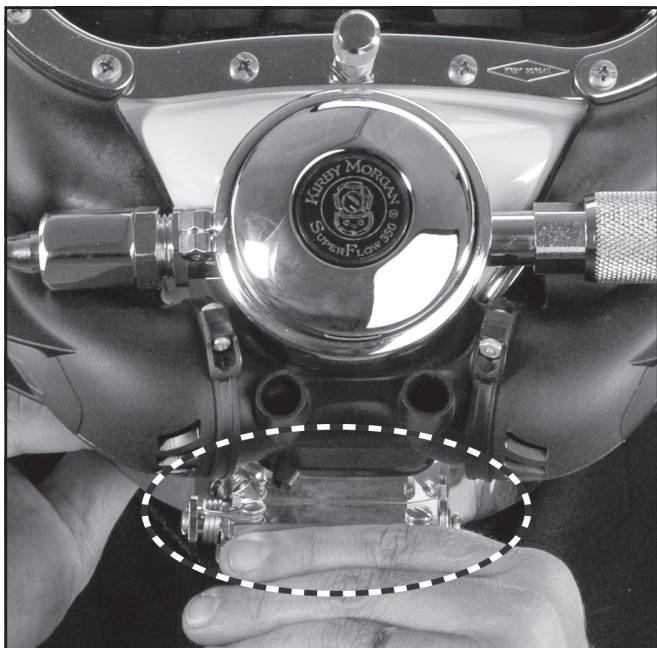
*Open the locking collar/neck pad assembly fully.*

**⚠ WARNING**

**ALL KMDSI helmets must be equipped with an internal helmet chin strap. The chin strap will help to retain the helmet to the diver's head in the rare event the locking collar and neck ring assembly separates from the bottom of the helmet. However, even if the helmet stays on the diver's head, it may flood, which can lead to drowning, unconsciousness, serious personal injury, or death.**

Reach up inside the front of the helmet and tighten the chin strap until it is snug and comfortable. The chin strap tightens on the outside of the chin cushion, when the chin cushion is used.

Insert the tongue on the neck dam/ring assembly into the swing tongue catch on the bottom front of the helmet.



*The diver inserts the tongue on the neck dam /ring assembly into the swing tongue catch. The tender must check to see that this is properly engaged.*

Grasp the base of the helmet with your fingers and push the neck ring assembly up into the helmet ring on the base of the helmet, make certain that nothing (chin strap, head cushion, hair, etc.) is caught between the neck ring assembly and the base of the helmet to ensure a water tight seal. The neck ring assembly fits very snugly in the helmet ring. The diver then tilts their head and the helmet forward and swings the locking collar up over their shoulders.



*Push the neck dam /ring up into the neck ring on the base of the helmet .*

The sealed pull pins must be in the locking posi-

tion. If they are in the open position, rotate until they snap into the locking position. Rotate the Locking Collar/Neck Pad assembly closed, ensuring that the Sealed Pull Pins are fully engaged and in the closed positions.

### **⚠ WARNING**

**Both sealed pull pins must properly seat into position into the Locking Collar. If the pins are not engaged correctly the neck dam/ring assembly may not seal and the helmet could flood. The diver could drown as a result.**



*Rotate the sealed pull pins into the LOCKED position.*

### **1.8.6 Testing the Breathing System**

Test the steady flow system by rotating the steady flow knob on and off a few times to confirm a strong flow of gas is present. **The regulator should be adjusted by turning the adjustment knob out until a slight steady flow starts, then back in until the flow just stops.**

Next, the demand regulator system is checked for proper function: breathe in and out. Inhalation and exhalation effort should be minimal. Press in on the purge button on the regulator cover. This should produce a strong burst of breathing gas.

### **1.8.7 Adjust Regulator for Work Rates**

At very low work rates, such as when the diver is resting, or during in-water decompression, the

diver's respiratory rate may be quite slow (10-15 breaths per minute). When this occurs, the diver's exhalations may not be sufficient to move enough breathing gas through the helmet exhaust to adequately wash out carbon dioxide (CO<sub>2</sub>).

### ⚠ WARNING

**Excess carbon dioxide (CO<sub>2</sub>) is dangerous. Too much carbon dioxide in the diver's breathing system can cause the diver to feel that they cannot breathe for comfort. In extreme circumstances, carbon dioxide can cause unconsciousness. This could lead to suffocation and death.**

In order to ensure that carbon dioxide does not accumulate in the helmet or BandMask®, divers who are at rest underwater should slightly open the steady flow valve so that there is a very slight, but noticeable hiss of air coming into the helmet. This should also be done when the diver is operating at heavy or extreme work rates. This will help to eliminate any excess carbon dioxide from the oral nasal mask and helmet.

#### 1.8.8 Sealing Integrity Check (Helmet Only)

If there is any doubt that the helmet (neck dam) is sealing properly, perform the following test prior to diving.

1) To perform this test, the diver must have an assistant standing by. The assistant should be in control of the gas supply console in the event the diver needs air or they must be ready to lend a hand. The diver must be next to the dive control manifold so that the air may be turned on instantly, or the diver must be ready to run a hand between their neck and the seal of the neck dam in order to pull the neck dam away from the neck to allow breathing.

2) With the helmet donned, turn the supply gas off at the dive control system and bleed the umbilical.

### ⚠ WARNING

**Do not perform this test unless the diver and their tender are stationed immediately adjacent to the diver's air manifold and you are certain the air is on to the manifold. If the diver is unable to flow air to the helmet, either through the umbilical or the bailout, they may not be able to remove the helmet easily.**

**To break the seal in this situation, the diver must put their hand between the neck dam and the neck, and pull the neck dam away from the neck. A tender must be standing by to assist the diver in removing the helmet if needed. Suffocation could result.**

3) With the main air supply off, when the diver attempts to inhale, a suction on the neck dam is formed, indicating they are achieving a good seal. The diver's gas supply must immediately be turned on so that they can breathe. If the diver does not turn the air on they will not be able to breathe, unless the neck dam is pulled away from their neck or EGS is activated at the side block.

#### 1.8.9 Sealing Integrity Check (BandMasks®)

If there is any doubt whether or not the BandMask® is sealing properly, perform the following test prior to diving.

Turn the supply gas off at the dive control system and bleed the umbilical. Pull the nose block device knob all the way out, away from the mask. Have the diver fit the mask on their face, but **do not fasten the head harness (spider)**. With the mask held firmly against their face, there must be a suction on the diver's face when they inhale. This will indicate that the mask is forming a good seal.

### 1.9 Removing the Helmet

After the diver is well clear of the water they may remove the helmet/BandMask®. If the diver is working out of a stage they must not remove the helmet/BandMask® until the stage is on deck. Start by releasing the locking collar from the helmet ring by pulling out (forward) each sealed pull pin and turning the pull pin knob so that they

remain in the open position. Tilt your head, and the helmet, forward and swing the locking collar assembly open and behind your shoulders.

Grasp the pull strap at the back of the neck dam assembly and pull down on it. This will remove the neck dam ring assembly from the helmet ring, breaking the seal. Once the seal is broken the neck ring assembly will come loose from the helmet.



*Once the locking collar has been opened, you will need to grasp the pull strap and pull down on it in order to break the seal for the neck ring to remove the helmet.*

Pull the nose block device knob out from your face and lift the helmet off of your head. A good tender will be prepared to help the diver with the removal of the helmet as required.

Do off the neck ring assembly in the reverse order of donning.

### 1.9.1 Removing the BandMask®

Pull the nose block device knob away from your face before you start to remove the mask. A good tender will be prepared to help the diver with the removal of the mask as required.

The diver can shed the BandMask by first releasing the bottom two Head Harness straps then grasp the bottom of the mask with both hands pushing out and up. The mask can be removed in the event of an emergency in this way even if

the zipper is closed and the Head harness straps are secured.

Under normal circumstances, the diver should support the weight of the mask as the tender opens the zipper on the hood and unfastens the Head Harness straps.

It is recommended that during normal diving operations that only the bottom left side strap be removed from the band. Complete removal is not necessary. This will help prevent loss of the spider.

## 1.10 Diving Procedures

### 1.10.1 Standing By to Dive

If you are the standby diver, the helmet/BandMask® itself will be the last thing put on before you enter the water. You should have your neck dam, weights, fins, and gloves on, your umbilical should already be attached to your harness, and all you should need to do is don the helmet/mask and slip over the side, in the event you need to go to the assistance of another diver.

### 1.10.2 Attaching the Umbilical to the Harness

The umbilical must be hooked to the diver's harness by means of a suitable clip that is bound to the umbilical strength member—NOT THE GAS SUPPLY HOSE! The securing of the umbilical to the harness keeps the pull of the hose at the diver's harness and not on the helmet/BandMask®.

### **⚠ WARNING**

**Never dive without attaching the umbilical to some type of harness. Never allow the umbilical to pull on the helmet directly or the diver could suffer a personal injury.**

### 1.10.3 Diver Dons Helmet

The diver dons the helmet as per section "1.8.5 Donning the Metal Bottom End Helmets" on page OPIN-12.

### 1.10.4 Donning the BandMask®

All donning procedures must be done by the diver until they are thoroughly at home with the mask. This will train for familiarity. However, the ten-



der must be present to assist the diver and check to ensure that the diver has properly donned their equipment. It is impossible for the diver to see whether they are properly dressed in once the mask is on their head.

To prepare the mask for donning by yourself, close the zipper until only the last six inches are open. Fasten every “leg” of the head harness, except the one on the bottom left.

Pick the mask up with both hands and fold the spider over the front of the mask. Pull the hood onto your head and close the zipper, taking care not to catch your hair in the zipper. While you support the mask with one hand use your other hand to fasten the remaining leg of the head harness. As a standby diver, it is essential for you to be able to don your mask yourself during an emergency.

With the diver holding the mask, the tender should now connect the quick disconnect fittings for the bailout supply. Briefly open and then shut the Steady Flow just prior to the diver dressing into the mask.

For most divers, the mask is most comfortable when the spider is adjusted so that the top three legs of the spider are tighter than the bottom two. If you have an “average” size head, the adjustment most divers find comfortable is three holes back from the edge of the top three legs of the spider, and two holes back from the edge of the outermost two legs of the spider. You may find a different adjustment to be more comfortable depending on the size of your head.

### **⚠ WARNING**

**The tender must always be present to assist the diver while dressing and whenever the diver has their mask on their head while they are out of the water. It is difficult for the diver to walk while they are dressed in and they can stumble and fall, resulting in serious personal injury.**

The mask should feel comfortably snug against your face out of the water. There will be some compression of the face seal when it is adjusted properly. While the weight of the mask is heavy

out of the water, it will be almost unnoticeable underwater.

Your tender may assist you in donning your mask if you prefer. In this case, the procedure is the same as donning by yourself, except that your tender will close the zipper on the hood and fasten the spider. You will still need to support the weight of the mask while your tender fastens you in.

To help keep the bib of your hood from floating up, you tuck the bib of the hood under your harness.

## **1.10.5 Diver Check Gas Flow Systems**

Test the Steady Flow by opening and closing the control knob. The regulator should be adjusted by turning the adjustment knob out until a slight steady flow starts, then back in until the flow just stops.

Next, the demand regulator system is checked for proper function: breathe in and out. Inhalation and exhalation effort should be nearly unnoticeable. Press in on the purge button in the regulator cover. This should produce a strong burst of breathing gas.

It is the responsibility of the diving supervisor to always ensure that all pre-dive checks have been properly conducted, prior to allowing the diver to enter the water. Refer to the Kirby Morgan website ([www.kirbymorgan.com](http://www.kirbymorgan.com)) for the most current pre-dive checks.

## **1.10.6 Communications Check**

Check the communications system, sending and receiving, should be checked and volume level set at this point. If using four wire configuration, check communication between diver and standby diver.

## **1.10.7 Diver Ready**

The diver is now ready to enter the water. They should be assisted in and out of the water if needed. If a welding lens is being used, make sure it is hinged up all the way. **We do not recommend jump entries.** An overall inspection by the tender should be performed and supervisor checks

completed prior to giving the diver the OK to descend to depth.

### 1.10.8 Water Entry and Descent

The steady flow valve should be turned on to slightly overpressure the helmet and prevent the possibility of water pressure, inverting the helmet exhaust valve when entering the water, if performing a heigten entry..

The diver must report to the surface immediately after the entry. It is a good policy to descend 2–10 feet, pause to check leaks and the regulator adjustment knob to ensure adjustment is optimal for supply pressure work rate and depth.

Once the diver completes their underwater/surface checks, the diving supervisor must conduct all appropriate checks to ensure that the helmet./mask is functioning properly while the diver is submerged. These checks must be conducted prior to committing the diver to depth.

Then the diver checks in with the surface before descending to the job.

#### **⚠ WARNING**

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

If a closed bell is being used, the diver enters the water from the bell and pauses for a short time outside the trunk until they are sure all systems are operating properly.

During the descent the communications must be checked again and the diver supply pressure should be monitored and adjusted as necessary to maintain the required over-bottom pressure. It may be necessary for the diver to readjust the demand regulator by means of the adjustment knob once at the work site to compensate for the variation in umbilical supply pressure.

## 1.11 Emergency Procedures

### 1.11.1 Flooding

In the event of partial or complete flooding, the diver may clear the helmet quickly by tilting the helmet/BandMask® down and activating the steady flow control knob. Pressing in on the manual purge button in the center of the regulator cover will evacuate water from the regulator, if any still remains.

The water dump valve for the SL 27® is located low on the left side of the helmet. By placing this valve in the lowest position on the helmet the water will exit more easily.

After purging/clearing the helmet/BandMask®, cautiously check for additional flooding. If the helmet/BandMask® continues to take on water, abort the dive and return to the diving station, swimming with the water dump valve positioned at the lowest part of the helmet/BandMask®: with the diver's face forward and slightly tilted down. Keep the steady flow valve on. This increases the air/gas pressure slightly over pressurizing inside the helmet and keeps the water out. Any incoming water is automatically purged.

### 1.11.2 Inhalation Resistance

If breathing becomes difficult, adjust the regulator for easier breathing by rotating the adjustment knob counter clockwise (OUT). If the breathing does not get noticeably better, press the purge button in the regulator cover. If a surge of gas does not flow, notify topside to see if they can quickly fix the problem and if not, open the EGS valve.

Notify topside that you are on emergency gas. Ensure your umbilical is clear and return to the stage or descent line. The diver should stay in communication with topside personnel and make preparations to abort the dive. The console operator should check to ensure the supply pressure to the diver is at the proper pressure.

### 1.11.3 Gas Flow Stops

A stop of flow in the demand regulator usually indicates that there is a problem with the main gas supply. The diver should first open the emergency valve by turning the EGS knob. If there

is still no flow from the demand regulator, the steady flow valve knob should be opened. *Keep in mind that if the steady flow valve is left open, the bailout bottle will drain very quickly, particularly if the diver is deep.*

Immediately notify topside, check to ensure your umbilical is clear and return to the diving station using the emergency breathing supply. Avoid making a rapid ascent if at all possible.

Once at the surface, or inside the bell, the diver may remove the helmet/BandMask® if needed. **Never ditch the helmet/BandMask® underwater unless conditions absolutely require that.**

### **⚠ DANGER**

**Rapid ascent is dangerous. It can lead to air embolism or decompression sickness. Air/gas embolism can cause immediate loss of consciousness and/or death. Even on a no decompression dive, a rapid ascent may cause decompression sickness. A diver must only make a rapid ascent when they are in immediate danger of death by drowning or asphyxiation.**

### **⚠ DANGER**

**Ditching the helmet/BandMask® underwater must be avoided. In many instances, even if the air supply is interrupted, topside will be able to get it back on line quickly. Do not ditch the helmet/BandMask® underwater.**

#### **1.11.4 Demand Regulator Free Flow**

If the demand regulator free flows, adjust the knob in (clockwise) until it stops. If the free flow cannot be stopped, the dive should be aborted and the problem with the regulator corrected.

## **1.12 Post Dive Procedures**

### **1.12.1 Removing the Equipment**

After the diver is well clear of the water they may remove the helmet/BandMask®. If the diver is working out of a stage they must not remove the helmet/BandMask® until the stage is on deck.

### **⚠ WARNING**

**Never remove the diving helmet/BandMask® while you are in the stage. If you fall out of the stage with the helmet/BandMask® off but still attached to your harness it may be very difficult to swim. Drowning may result.**

### **1.12.2 Disconnecting the Helmet/BandMask®**

Remove the diver from the helmet by following section "1.9 Removing the Helmet" on page OPIN-15. Remove the diver from the BandMask® by section "1.9.1 Removing the BandMask®" on page OPIN-16. A good tender will be prepared to help the diver with the removal of the helmet as required.

The emergency gas supply hose may be disconnected while the diver leaves the helmet/BandMask® on or while they hold the helmet/BandMask® after removal. The use of a quick disconnect fitting with the EGS can make this procedure very easy.

The tender should then unfasten the umbilical from the harness and take the helmet/BandMask® from the diver and set it aside. (Closing the locking collar/neck pad assembly onto the helmet before setting it down will help protect the helmet neck ring from damage). The harness and bailout bottle is then removed. Once the main gas supply is closed off to the helmet/BandMask® the breathing system can be depressurized by opening the steady flow valve. When it is confirmed that no gas pressure remains in the system the main supply gas hose can be removed from the helmet/BandMask®.

### **1.12.3 Storage of the Helmet/BandMask® Between Dives**

The helmet/BandMask® should be maintained per the checklists, available on the Kirby Mrgan website at: <https://www.kirbymorgan.com/support/checklists>.

If the helmet is not going to be used for a period of time, the head cushion, should be removed. The head cushion should be dried before storage. The regulator adjustment knob should be rotated all the way out (counterclockwise) until the next

dive. When the helmet is completely dry, the helmet should be stored in the carrying bag to protect it. Refer to the post dive checklist for detailed instructions.

If the head cushion becomes wet it may be dried out by removing it from the helmet, rinsing with fresh water, squeezing excess water out, and letting the head cushion hang dry.

The pull strap on the neck ring assembly has a 1" Stainless Steel "D" ring to hang the neck ring assembly to allow proper drying.



*The pull strap assembly has a 1" Stainless Steel "D" ring sewn on the end to hang the neck ring assembly to allow proper drying*

If the BandMask® is not going to be used for a period of time, the hood should be removed and the earphone covers removed. These parts must be dried before storage. When the BandMask® is completely dry, or the diver is ready to leave the job, the BandMask® should be stored in the carrying bag to protect it. KMDSI's mask bag, Part Number 500-901, is designed for this purpose.