

## Chapter 4

# Post Dive Procedures And General Maintenance

### 4.1 Introduction

This section covers the preventative maintenance necessary on the EXO Full-Face Mask. A mask that is kept clean and in good repair will offer far better service to the user. These masks are designed for easy access to all areas for proper inspection and servicing.

### 4.2 Required tools, Sealing, Cleaning Agents, Lubrication

All KMDSI helmets and masks are designed with the professional diver in mind. Most maintenance can be performed by the diver using common tools and this manual. There are some repairs however, that must be accomplished only by KMDSI authorized repair facilities. This includes fiberglass and helmet neck ring repairs, face port inserts and sealed pin overhauls. For technical assistance please telephone your nearest authorized dealer or call KMDSI at (805) 928-7772.

Every diver should carry sufficient tools and spare parts to maintain his mask in top working condition. It is very important to use wrenches of the correct size rather than adjustable wrenches when possible. Adjustable wrenches tend to slip and can round the edges of soft brass parts.



*Special tools are required to do proper maintenance on the EXO mask.*

### 4.3 Component and Parts Cleaning

The mask and components should only be cleaned using a mild solution of dish washing soap such as JOY™ or Dawn™ hand dish washing soap.

Parts that have corrosion should be washed and scrubbed with a nylon bristle brush and then soaked in a solution of 50% white vinegar and water for 30-60 minutes followed by a light brushing and a good fresh water rinse. Rubber components should be cleaned using a mild soapy solution followed by a good rinsing and air-dried.



*Ordinary dish soap is acceptable for cleaning.*


**DO NOT** use hair dryers or high heat to dry the rubber components, high temperatures will severely reduce their serviceability. To clean parts heavily encrusted with salt we recommend a dilute solution of white vinegar and a toothbrush.

#### 4.3.1 Component and Parts Lubrication

All masks are lubricated at KMDSI with ChristoLube. Masks used for air diving or diving or with oxygen mixtures containing less than 50 % oxygen can be lubricated with food grade silicone such as Dow corning 111 or equivalent. ChristoLube is the preferred lubricant.

**Do not use aerosol spray or lubricants.** Many aerosol propellants will damage plastic. Avoid lubricant contact with plastic parts.

**! WARNING**



**Do not use any type of chemical locking solutions, such as Loctite®, on this mask. They can attack and severely damage the mask frame. This can cause the frame to fail unexpectedly, causing flooding of the mask and drowning.**

#### 4.4 Disconnecting the Mask from the Diving System

To disconnect the mask from the surface-supplied system:

- 1) Disconnect the mask from the diving hose and EGS cylinder. Make sure the air is off and the breathing system of the mask is unpressurized. To vent the system, open the bail-out valve on the manifold block on the diver's harness and push the purge button on the mask.
- 2) If you have a quick-disconnect fitting on the low-pressure hose between the mask and manifold block, you can separate the mask here. Otherwise, you will need to disconnect the low-pressure hose from the manifold block once the air has been vented.

To disconnect the mask when used in the scuba mode:

- 1) Turn off the scuba cylinder at the valve.
- 2) Depress the purge button on the mask until all air is vented from the first stage regulator, hose, and second stage in the mask.
- 3) Disconnect the first stage from the scuba cylinder and cap the high-pressure inlet filter on the regulator.

**! WARNING**

**Never disconnect any hose from the mask unless all gas has been vented from the hose first. If the hose is disconnected with pressure in the line the fittings may be damaged. In addition, the hose can whip about causing injury to anyone standing nearby.**

**! WARNING**

**Different brands of grease should never be mixed. Ensure all old grease is removed prior to applying new grease.**

## 4.5 Daily Maintenance

The mask should be rinsed thoroughly with fresh clean water and the post dive procedures followed after each day of diving. Cleaning is usually performed after the mask has been disconnected from the air supply.

1) Wash the exterior of the mask with a mild soapy water solution and rinse thoroughly with fresh water.

Do not depress the purge button while rinsing the regulator as this action will permit foreign matter back into the inlet valve and seat.

2) Remove the regulator cover ring, regulator cover, washer and diaphragm, then clean all components and swab out the interior of the regulator with the sanitizing solution as per the sanitizing procedure. Note: avoid depressing the purge button to minimize water entering the inlet valve.

After cleaning and sanitizing, rinse thoroughly.

3) Screw the demand regulator adjustment knob all the way out. This will prolong the life of the inlet valve and keep the internal adjustment correct.

4) Remove the earphones from the earphone pockets. Remove the earphone covers from the earphones so they can dry completely. Clean the microphone with sanitizing solution, rinse it, and allow it to dry.

5) Allow the entire mask to dry in a cool, dry location prior to storage.

6) Lay the mask face down so that no water will collect in the ear pockets. DO NOT dry the mask or let it sit in the direct sun light for long periods of time, as this will degrade the rubber.

7) For additional details on daily maintenance, consult the Dive Lab website at [www.divelab.com](http://www.divelab.com)



*The regulator adjustment knob should be backed all the way out for storage.*



*Uncover the earphones so they may dry.*



### WARNING

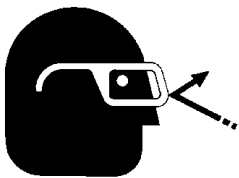
**Use only mild hand dish washing soap and water to clean this mask. Do not use any solvents or petroleum based chemicals. These may damage the mask frame, leading to failure, flooding of the mask, and drowning.**

**! WARNING**

If in doubt about the serviceability of a part, repair or replace it immediately. Use only Genuine Kirby Morgan replacement parts. The use of unauthorized parts may result in injury or death to the user.

**! WARNING**

Do not use solvents or bleach for cleaning. These agents are toxic and use of them may result in injury or death to personnel and damage to equipment.

**! WARNING**

Wear eye protection to prevent cleaning and germicidal cleansing solutions from contacting eyes. If contact occurs, rinse eyes with

copious amounts of water and consult medical help immediately.

**! WARNING**

Cleanliness is imperative in maintaining and handling Kirby Morgan masks and helmets. All tools, parts, and components must be kept free of oil, grease, rust, and other contamination. Foreign substances within an assembly may result in equipment failure and possible injury or death to personnel.

## 4.6 Inspection Procedures

Each diver must establish his own minimum standards for the care of his mask. We offer recommendations here with the suggestion that the diver establish for himself what is necessary to provide a good working unit. Use of the mask in fresh water will require a timetable for maintenance procedures different from that when the mask is used in salt water.

Using the mask in sea water while jetting in sand will necessitate increased maintenance. Use of the mask in a heavy oil and/or chemical environment may make it necessary to replace rubber parts to assure proper function. Regardless, all diving helmets and masks should be disassembled, cleaned and inspected at least once a year. All soft goods should be replaced at least once a year, if needed.

*NOTE: Certain fuel oils and/or chemicals will cause premature degradation of soft goods and seals by making them become soft, swell or break down. Upon exiting the contaminant, KMDSI recommends a thorough external decontamination/washing of the maske as soon as feasibly possible, followed by a vigilant inspection of the interior of the mask to ensure that no contaminant has entered.*

*Pay particular attention to the following parts prior to re-use; the regulator assembly, demand regulator diaphragm, demand regulator exhaust valve, and communications connector assembly.*

### O-Ring Removal/Inspection/Cleaning and Lubrication

Strict cleanliness and proper lubrication are extremely important during O-ring installation. Comply with the following instructions to ensure proper installation:

*NOTE: Ensure all parts are clean throughout the assembly procedure. Dirt or loose particles in the O-ring groove can cause leaks in the seal and damage to the O-ring, reducing its life. During cleaning of equipment, carefully clean O-ring grooves, using a soft bristle brush and mild soap solution.*

#### O-Ring Removal:

Do not use screwdrivers or hard metal picks to remove o-rings. When possible, only use fingers to remove o-rings. If an o-ring fits too tightly in its groove to be removed using the fingers, use the appropriate tool such as a brass pick (or a wooden toothpick).

A plastic cable tie makes an effective o-Ring removal tool. Use of an appropriate tool helps prevent scratching the o-ring groove, which can cause leakage or premature failure of the seal.

**O-Ring Inspection:**

If during routine corrective maintenance o-rings are to be reused, only reuse o-rings that pass a visual inspection. Inspect for deformities or compression set, hardening or brittleness, nicks or cuts, pits or blisters, or any other signs of damage. Cut and discard damaged o-rings and replace them with new ones.

**O-Ring Reuse:**

All o-rings and soft goods should be replaced whenever scheduled overhauls are being completed. During routine repairs or maintenance in between the overhauls, o-rings and soft goods may be reused after cleaning provided a careful inspection reveals no wear or damage.

Place the o-rings in a cleaning basin, cover with mild soap solution, and brush gently with a soft bristle brush to remove all traces of old lubricant and contamination.

Rinse cleaned o-rings with fresh water and wipe clean with lint-free cloths, then allow to air dry, carefully inspect for cracking, cuts, abrasions and deformities. Replace o-rings if any damage is found or suspected.

## 4.7 General Cleaning Guidelines



Cleaning and sanitizing of the mask should be accomplished upon completion of use and/or prior to storage. Clean is defined as free of dirt, rust particles, grease and oil and other contaminants as viewed by the unaided eye.

Sanitizing is defined as eliminating germs and microorganisms. Sanitizing should be accomplished post use or prior to use by another user. KMDSI recommends sanitizing be accomplished any time the unit is to be used by another person during the mission or operation.

**NOTE:** *The Sanitizing Procedure should be accomplished if possible between dives when two or more divers are making consecutive dives with the same mask.*

*Both the regulator cover and diaphragm should be removed for cleaning and sanitizing. The inside of the regulator and whisker must also be sanitized. Read this manual completely for instructions on how to remove and replace these components properly.*

*See the most up-to-date procedures for cleaning on the Dive Lab website at [www.divelab.com](http://www.divelab.com).*

	<b>WARNING</b>
	<p><b>Always sanitize the mask prior to use by another person. Failure to do could result in the transmission of communicable diseases, some of which may cause long term disability or death.</b></p>

### 4.7.1 Mild Soap Solution for General Cleaning and Leak Detector Use

Maintenance procedures include cleaning with a general-purpose solution of a mild diluted hand dish washing soap such as Joy® or Palmolive®. Cleaning solution is prepared by mixing approximately one teaspoon of soap to 1/2 gallon of warm fresh water. This solution may also be used as a leak detector solution. Place all parts and components in a clean washbasin or sink and immerse in soap solution.

Allow parts/components to soak for at least five minutes, and then scrub using a nylon brush. Carefully brush all surfaces, paying close attention to O-ring grooves and threaded surfaces ensuring all greases are removed. Regardless of the soap used, all components must be thoroughly rinsed post cleaning to remove all traces of soap.

### 4.7.2 Acidic Cleaning Solution and Procedures

Metal parts that have visible corrosion should first be cleaned using the soap solution scrubbed with a nylon bristle brush, then soaked in a solution of 50% white vinegar and water for less than 60 minutes. They may also be placed in a ultrasonic sink followed by a light brushing and thorough rinsing with fresh water and air-dried. If corrosion is such that 50/50 vinegar will not clean components, it is best to replace the components.

### 4.7.3 Germicidal Cleaning Solutions and Procedure

Sanitizing of the oral-nasal mask/regulator of Kirby Morgan masks is accomplished using one of four approved germicidal cleansing solutions. There are four examples of solutions shown here, along with the necessary ordering information and mixing instructions.

**NOTE:** *Ensure optional face cushion is removed prior to sanitizing the oral-nasal mask/regulator.*

1. **SaniZide Plus:** P/N: 34805 (spray) or 34810 (gallon), Ready to use; do not dilute.  
SAFETEC of America, Inc  
1055 E. Delavan Ave.  
Buffalo, NY 14215 USA  
1-800-456-7077

**2. Advance TBE:** P/N: AD160 (spray) or AD1128 (gallon), Infection Control Technology ): Ready to use.

Infection Control Technology  
1751 So. Redwood Rd.  
Woodscross, UT 84087 USA  
1-800-551-0735

**3. Bi-Arrest 2:** P/N: BP201 (4 ounces) or BP 222 (32 ounces), Infection Control Technology. Mix two pumps of the concentrate with 16 ounces of fresh water.

Infection Control Technology  
1751 So. Redwood Rd.  
Woodscross, UT 84087 USA  
1-800-551-0735

**4. Confidence Plus:** P/N: 10009971 (32 ounces) Mix one ounce of concentrate with one gallon of fresh water.

Mine Safety Appliances 1-800-MSA-2222

#### Sanitizing Procedure:

Unless otherwise directed, use the following procedure to disinfect the oral-nasal mask/regulator:

- 1) Wet or immerse all components to be sanitized. Allow components to stay in contact with the solution for at least 10 minutes.
- 2) If the solution appears to be drying, apply more solution to keep it wet for the full 10 minutes.
- 3) After 10 minutes, thoroughly rinse components under running potable water.

**NOTE:** *The purpose of this procedure is to sanitize the components exposed to each of the divers. KMDSI recommends sanitizing be accomplished daily in between use by different divers, after each use, or when future use is anticipated within the mission (job) period. KMDSI defines “A mission is defined as use of the mask over a seven-day period.”*

#### CAUTION

Germicidal cleansing solutions must be carefully diluted if required in accordance with the manufacturer's recommendation. If solution is not of the recommended strength, it will not act as an effective disinfectant. Failure to thoroughly rinse germicidal cleansing solution from diving equipment may result in lung irritation and/or long-term degradation of rubber and silicone components of this equipment.

#### WARNING

Do not use solvents or bleach for cleaning. These agents are toxic and use of them may result in injury or death to personnel and damage to equipment.

#### WARNING

Cleanliness is imperative in maintaining and handling the Kirby Morgan masks and helmets. All tools, parts, and components must be kept free of oil, grease, rust, and other contamination. Foreign substances within an assembly may result in equipment failure and possible injury or death to personnel.

#### WARNING

Use only mild hand dish washing soap and water to clean this mask. Do not use any solvents or petroleum based chemicals. These may damage the mask frame, leading to failure, flooding of the mask, and drowning.

### 4.8 Communications Inspection

Visually inspect the earphones, microphone, wires, lugs, and communications posts if installed. Test each component for proper operation. Connect to the deck amplifier and talk back and forth. Replace any weak earphone or microphone. Open the earphone rubber covers and remove the protectors. Allow to dry thoroughly. Replace defective earphones.



*Regularly inspect and test the communications components.*

### 4.9 Reassembling the Mask After Cleaning

Ensure that all the parts and assemblies are completely dry before assembling or storing.

- 1) Install the oral nasal and equalizer if they were removed.
- 2) If so equipped, install the communications in accordance with this manual. If no communications are used, the hole in the microphone cup in the oral nasal must be plugged. Use KMDSI oral nasal microphone plug, part # 320-001.
- 3) When storing the mask, make sure the regulator adjustment knob is backed all the way out. This will prevent wear to the regulator seat and lengthen its useful life. Store the mask with the earphone pockets facing straight back or inward. This will help the rubber keep its shape better than stored with the earphone pockets facing outward.

All the O-rings should be replaced at least once a year. The inlet valve on the EXO Standard and Original should also be replaced once a year. The EXO BR inlet valve will not require annual replacement as long as it is routinely cleaned and lubricated and there is no evidence of corrosion or damage.

All the EXO masks were designed for minimal maintenance. It is important to carefully inspect the mask after post dive maintenance to ensure it has been properly cleaned and dried prior to storage.

Your entire regulator should be rebuilt every year. To perform an entire regulator rebuild (including the exhaust valve) or to replace the face seal, the regulator mounting tools must be purchased.

**⚠ WARNING**

**All parts on Kirby Morgan masks and helmets must be adjusted to their proper torque specifications. See Appendix 1 for a complete listing of torque specifications for each part. Failure to adjust parts to the recommended specifications could lead to helmet failure and accidents. This could be fatal.**

**⚠ WARNING**

**Different brands of grease should never be mixed. Ensure all old grease is removed prior to applying new grease.**