# SuperLite® 17A/B Helmet
# Operations and Maintenance Manual

**KMDSI Part # 100-001**

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**⚠ DANGER: Diving with compressed breathing gas is a hazardous activity. Even if you do everything right there is always the danger that you may be killed or injured. No piece of diving equipment can prevent the possibility that you may be killed or injured any time you enter the water.**

*Manual prepared by SaltShaker Marine Industries, Inc., Dive Lab, Inc., and KMDSI. 08/ 04.*

*NOTE: This manual is the most current for the SuperLite 17A/B Helmet.It is page dated August 2004. Future changes will be shown on page III and the changed pages will carry the date of change. Previous manuals may not reflect these updates.*

**The SuperLite-17A/B helmet is CE Approved #16309-01HH and meets or exceeds all performance and testing requirements of all government and non-government testing agencies throughout the world. It is approved for use on all commercial and military work underwater. Only Kirby Morgan masks and helmets have achieved the CR (Commerial Rated) mark, the highest United States of America rating.**



Document # 040809001, Aug. 2004

## WARRANTY INFORMATION

Kirby Morgan Dive Systems, Inc. warrants every new mask, helmet, or KMAC Air Control System to be free from defects in workmanship for a period of ninety (90) days from date of purchase. This warranty covers all metal, fiberglass, and plastic parts. This warranty does NOT cover rubber parts, communications components, or headliners. In addition, due to the electrolytic nature of underwater cutting and welding, chrome plating cannot be warranted when the diver engages in these activities.

Should any part become defective, contact the nearest authorized KMDSI dealer. If there is no dealer in your area, contact KMDSI directly at (805) 928-7772. You must have a return authorization from KMDSI prior to the return of any item, Upon approval from KMDSI, return the defective part, freight prepaid, to the KMDSI plant. The part will be repaired or replaced at no charge as deemed necessary by KMDSI.

**This warranty becomes null and void if:**

1) **The product is not registered with KMDSI within ten (10) days of purchase.**
2) **The product has not been properly serviced and/or maintained according to the appropriate KMDSI manual. In addition, the user is responsible to ensure that all product updates as recommended by KMDSI have been performed.**
3) **Unauthorized modifications have been made to the product.**
4) **The product has been abused or subjected to conditions which are unusual or exceed the product's intended service.**

**NOTE:** Be sure to complete the enclosed warranty card and return it to KMDSI immediately. No warranty claims will be honored without a satisfactorily completed warranty card on file at KMDSI.

# RECORD OF CHANGES

It is the responsibility of the owner of this product to register their ownership with Kirby Morgan Dive Systems, Inc., by sending the warranty card provided. This card is to establish registration for any necessary warranty work and as a means of communication that allows KMDSI to contact the user regarding this product. The user must notify KMDSI of any change of address by the user or sale of the product.

All changes or revisions to this manual must be recorded in this document to ensure that the manual is up to date.

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**⚠ DANGER: Diving with compressed breathing gas is a hazardous activity. Even if you do everything right there is always the potential for serious injury or death. No one piece of diving equipment can prevent the possibility that you may be injured or killed any time you enter the water. We do not herein make any effort to teach the principles of diving. The information in this manual is intended for users of SuperLite helmets and persons that maintain or service SuperLite helmets.**

**Table of Contents**

# DEFINITION OF SIGNAL WORDS USED IN THIS MANUAL

For your protection, pay particular attention to items identified by signal words in this manual. These terms are identified as, CAUTION, WARNING AND DANGER. It is especially important for you to read and understand these sections.

**DANGER: This word indicates an imminently hazardous situation, which if not avoided, could result in death or serious injury.**

**WARNING: This word indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.**

**CAUTION: This word indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.**

If English is not your native language and you have any difficulty understanding the language of any warnings as they appear in the manual, please have them translated.

**WARNING: Este é um aviso importante. Queira mandá-lo traduzir.**

**WARNING: Este es un aviso importante. Sirvase mandario traducir.**

**WARNING: Quest è un avviso importante. Tradurlo.**

**WARNING: Ceci est important. Veuillez traduire.**

**WARNING: Diese Mitteilung ist wichtig. Bitte übersetzen lassen.**

If you have any questions concerning this manual or the operation of your helmet, contact KMDSI (805) 928-7772 or by Email at info@KMDSI.com or Dive Lab Inc. (850) 235-2715 or at Divelab@aol.com

**IMPORTANT:** A word about this manual. We have tried to make this manual as comprehensive and factual as possible. We reserve the right however, to make changes at any time, without notice, in prices, colors, materials, equipment, specifications, models and availability. Since some information may have been updated since the time of printing, please contact your local KMDSI dealer if you have any questions. Periodically KMDSI Operations and Maintenance Manuals are reviewed. Any updates/changes will be posted on the KMDSI website and may be downloaded for insertion/correction.

**Important Safety Information:**
This SuperLite 17 diving helmet is intended for use by trained divers who have successfully completed a recognized training course in surface supplied diving.

**WARNING: Follow all the instructions in this manual carefully and heed all safety precautions. Improper use of this diving helmet could result in serious injury or death.**

**DANGER: Kirby Morgan Dive Systems, Inc. (KMDSI) warns all divers who use the SuperLite 17A/B diving helmet to be sure to use only KMDSI original parts from a KMDSI authorized dealer. Although other parts, O-rings and fittings may appear to fit on the SuperLite 17A/B diving helmet, they may not be manufactured to the same standards maintained by KMDSI. The use of any parts other than KMDSI original parts may lead to equipment failure and accidents.**

**DANGER: Diving in waters that are chemically, biologically, or radiologically contaminated is extremely hazardous. Although the SuperLite 17A/B diving helmet may be adapted for use in some contaminated environments, special training, equipment, and procedures are necessary. Do not dive in a contaminated environment unless you have been thoroughly trained and equipped for this type of diving.**

Read this manual before using or maintaining the helmet, even if you have experience with other diving helmets. **If you have purchased the helmet new from a dealer, be sure to send in the warranty registration card so we may keep you informed of any safety notices that affect this product**. If you resell or loan this helmet to another diver, be sure this manual accompanies the helmet and that the person reads and understands the manual. In addition to the manual a log book should be used to log all repairs, maintenance and use.

**DANGER: Diving is a life threatening occupation. Even if you do everything right you can still be killed or injured. None of the models of Kirby Morgan helmets or masks can prevent accidents, injuries or death due to improper training, poor-health, improper supervision, improper job requirements, improper maintenance or acts of God.**

**WARNING: This helmet was completely checked and should be ready to dive as it was shipped from the factory. However, it is always the diver's responsibility to check all the components of the helmet prior to diving.**

**WARNING: Any and all fiberglass repairs done to this helmet MUST be done by a KMDSI factory trained repair facility. Painting is not recommended by KMDSI. Furthermore, many diving companies will not allow painted helmets to be used because painting can mask previous fiberglass damage. KMDSI certified technicians are not responsible for certifying helmets free from damage during annual overhauls. Helmet shells can be re-gel coated by authorized/certified KMDSI trained technicians that have received fiberglass training by KMDSI. Helmets that are to be painted for cosmetic purposes, should be first, certified free of fiberglass damage by an authorized KMDSI technician certified in fiberglass repair. A log entry should be made in the helmet log that the helmet was free of damage prior to painting. Keep in mind other KMDSI technician can refuse to work on helmet shells that have previously been painted or repaired by non KMDSI certified persons.**

This manual is supplied to the original purchaser of this helmet. If you have any questions about the use of the helmet or you need another copy of this manual, Part Number 100-001, contact KMDSI or your nearest KMDSI dealer or may be downloaded free from the KMDSI website at www.KirbyMorgan.com. If you have any questions regarding the use, maintenance, or operation of this helmet, contact KMDSI at (805) 928-7772, fax: (805) 928-0342, or e-mail: info@kirbymorgan.com.

**DANGER: Kirby Morgan masks and helmets are not cleaned and/or lubricated for oxygen service. Using this helmet with oxygen percentages above 50% by volume without first cleaning it for oxygen service may lead to fire or explosions, which can result in serious injury or death.**

Kirby Morgan helmets and masks must not be used with oxygen breathing mixtures in excess of 50% by volume without first insuring all gas-transporting components have been cleaned for oxygen service. Components requiring lubrication, should only be lubricated with oxygen compatible lubricants such as and Christo Lube®, Flourolube®, or Krytox®.. Lubricants must be used sparingly and should not be mixed with other lubricants.

**DANGER: KMDSI helmets and masks are intended for underwater use only and should only be used by qualified divers that have received proper training in the use of this type of equipment. KMDSI helmets and masks should not be used or worn without the appropriate life support systems, such as air or gas supplies and support personnel as described in this manual. KMDSI helmets and masks should never be used for motor sport racing, aviation / space craft use, or for chemical warfare use. The helmet must never be used by persons in poor physical condition, by persons with previous head neck or back injuries which could be aggrivated by its use. The helmet should not be used by persons under the influence of drugs or alcohol. Furthermore, infants, children, or persons under the age of 18 should never wear KMDSI helmets and masks. Failure to pay heed to the above could result in serious injury or death.**

**DANGER: Never use the helmet without first completing all pre-dive maintenance and set up procedures.**

**DANGER: Do not use KMDSI masks or helmets in currents exceeding 3.0 knots Use in currents greater than 3 knots may allow water to enter the exhaust valve, possibly causing Regulator flooding.**

**WARNING: Surface-supplied diving can be a strenuous activity. The SL-17A/B weighs approximately 26 lbs. KMDSI recommends that persons with a previous neck or back injury seek professional medical approval prior to engaging in surface supplied diving operations using the SL-17A/B. Use of the SL-17A/B with a predisposed physical/medical condition may result in death or serious injury.**

The information contained in this manual is intended to aid the user in optimizing the performance of this helmet. The application of some of this information will depend on the diving situation and the use of associated equipment. Many countries have specific laws and rules regarding commercial diving. It is important for the user to understand the rules, regulations, and philosophy imposed by the governing, regulating bodies whenever using commercial diving equipment. Whenever KMDSI helmets or masks are used in European Countries, which have adopted the C.E. certification programs, they must only be used with C.E. certified components. Diving operations should only be conducted within the limits of the operational specifications, and in accordance with the rules and regulations established by the governing authority in the specific country or geographical location where the diving operations are being conducted. If you have any questions concerning this manual or the operation of your helmet, contact KMDSI (805) 928-7772 or at info@KMDSI.com or Dive Lab Inc. (850) 235-2715 or at Divelab@aol.com

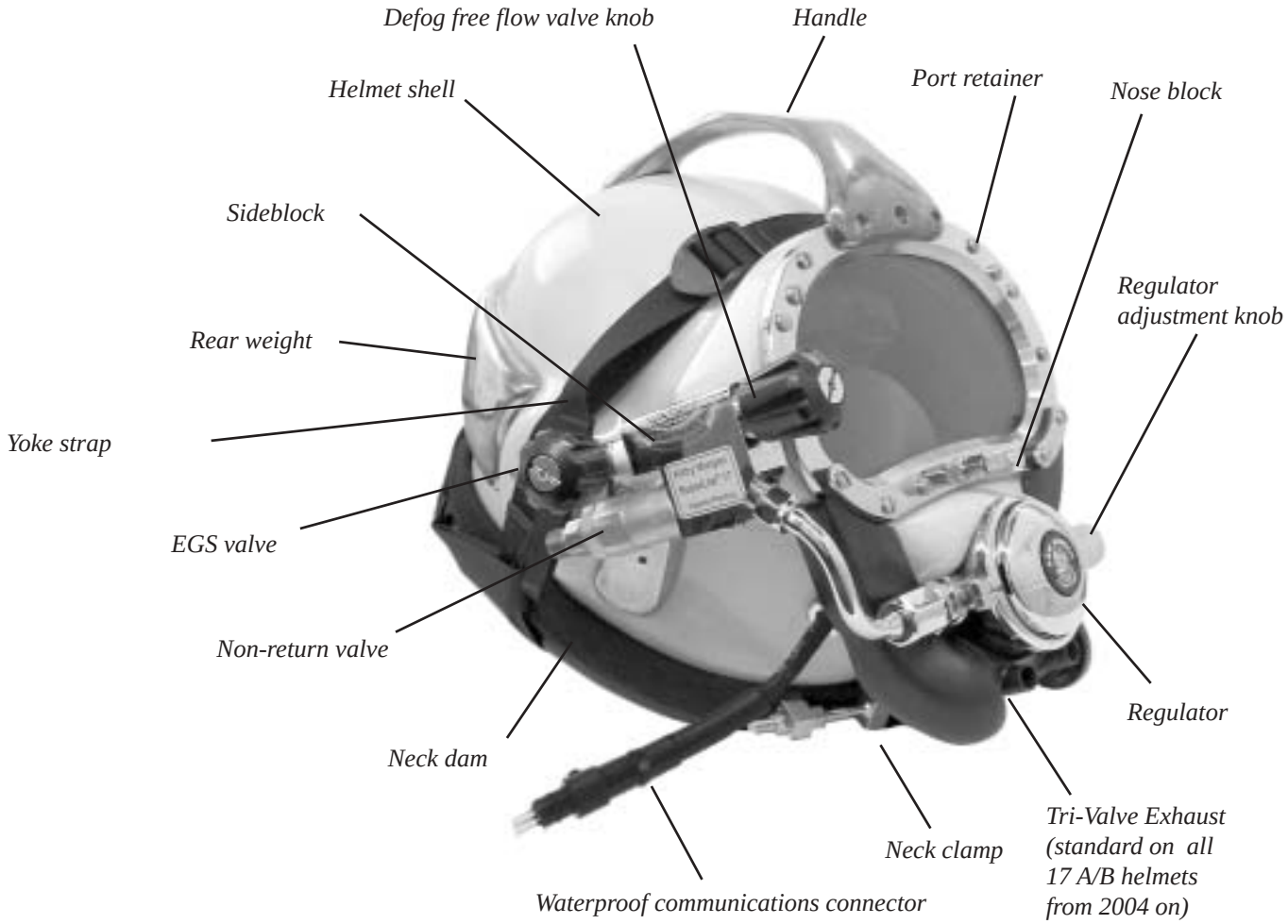




*Fig. 1.1 The SuperLite-17B helmet with optional waterproof connector.*

Note: Neck dam/yoke assembly is shown upside down for purposes of illustration only.

CE CR

**STOP!**
**BEFORE GOING FURTHER-**

This manual will refer to location numbers in specific drawings, or in the exploded view, which is in the back of this manual. These numbers are called “location” numbers. They are used to find the referred to parts in the drawings in this manual only. They are not the part number. Next to the exploded drawing is a list of the “location” numbers that match the Kirby Morgan part numbers along with the name of the part. Always check the part number when ordering to make sure it is correct. When ordering, always specify the helmet model number and serial number as well.

# CHAPTER 1.0
# GENERAL INFORMATION

## 1.1 Introduction

The Kirby Morgan Corporation was started in 1965. The copper and brass “heavy gear” or “Standard Dress” helmets were the first helmets manufactured by the company. Over the years Kirby Morgan designed, manufactured and sold many different helmets and masks for commercial divers.

Staying active in commercial diving has contributed to the successful design innovations of KMDSI products. This may be the primary reason for the acceptance of our designs by professional divers.

Bev Morgan has designed more than Fifty-Seven diving helmets and over 40 diving masks. All employees of KMDSI participate as part of the Kirby Morgan design team. It would not be possible for us to supply the commercial, military, scientific, and public service diving industries with our equipment, without the team of people that make up Kirby Morgan Dive Systems, Inc. (KMDSI)

We feel it is important for the reader to understand that we at KMDSI consider ourselves as only part of the process along the path in diving equipment design. We welcome all input from our customers. The thinking of many good divers, diving equipment engineers, diving medical specialists, diving organization administrators and their supporting personnel has contributed to the current state of the art of diving.

*Fig. 1.2 Bev Morgan*
*Chairman of the board*
*Kirby Morgan Dive Systems*

Each piece of gear we manufacture has in it some of the thinking of those who have gone before us. To all those people who give something of themselves to the men and women who work underwater, we express a thank you.

We have a strong commitment to providing the best diving equipment and service possible. This thinking has been the policy of Kirby Morgan Dive Systems, Inc. and we will continue to take this approach to our work.

Our extensive dealer network makes it easy to obtain genuine Kirby Morgan replacement parts, as well as technical assistance worldwide.

KMDSI has always concentrated on designing and manufacturing diving equipment that allows most repairs, inspections, and all routine maintenance to be performed by the user. The SuperLite-17 A/B is no exception. Most routine preventative and corrective maintenance can be accomplished by the user utilizing this manual, the KMDSI Tool Kit (P/N 525-620) and common hand tools. Technician training is available through Dive Lab Inc., information can be obtained on line at **www.divelab.com** or by telephone at 850-235-2715.

## 1.2 The Kirby Morgan Diving Helmets, Masks and Dive Control System

All Kirby Morgan diving helmets and masks are manufactured by Kirby Morgan Dive Systems, Inc. (KMDSI). Each step of the manufacturing process is carefully controlled to assure the customer of a high quality, durable helmet that will function properly for many years.

There are six Models of Kirby Morgan diving helmets currently in production. They are the SuperLite-17 A/B, MK-21 (U.S. Navy version), the SuperLite-17C, the SuperLite-17K and the SuperLite-27+,Kirby Morgan 37. All are CE approved and CR™ marked.

The **SuperLite-17 A/B** was first developed in 1975 and quickly set a new standard for diving helmet design. Many large and small commercial diving companies, military organizations, scientific divers, and public safety divers are successfully using this design around the world.

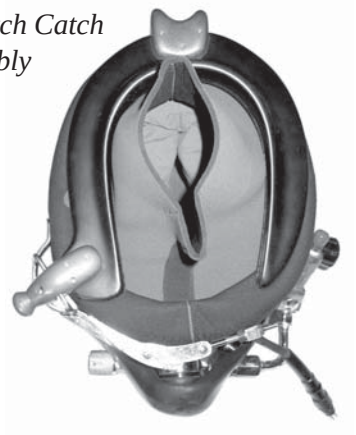
The SL-17 A/B helmet system consists primarily of two major components: the neck dam/yoke assembly, and the helmet. To don the helmet, the diver first slips the angled neck dam with the attached yoke over his head. The helmet is lowered onto the diver's head with the help of a tender, then the yoke hinge tab is hooked onto the alignment screw on the rear weight. The neck clamp is then slipped onto the helmet and locked. The locking system not only seals the neck dam to the helmet but also secures the front of the yoke, fastening the helmet to the diver's head.

The SuperLite-17A/B shares many common breathing system parts with all Kirby Morgan helmets and masks. The breathing system has been man-tested to 1600 FSW by the University of Pennsylvania and approved by the U.S. Navy for surface-supplied diving to 190 FSW with air and 300 FSW with mixed gas. It surpasses all requirements of all governing agencies and it is approved for commercial diving through out the world.

*SuperLite 17A/B*
*CE approved and CR™ marked*

*Kirby Morgan 37*
*CE approved and CR™ marked*

*Yoke and Latch Catch Assembly*



*Neck Pad and Sealed Pull Pins.*

Other features that are common to all Kirby Morgan helmets and Band Masks include:

* Face port and retainer ring
* Communications components
* Oral/nasal mask
* Nose block device
* Air train defogger

The **Kirby Morgan 37** Commercial Diver's Helmet represents what we at Kirby Morgan consider to be the pinnacle of current diving helmet design. The helmet consists of two major assemblies: the helmet shell/helmet ring assembly and the neck dam/neck ring assembly.

The helmet comes with the large tube SuperFlow 350 adjustable demand regulator which provides an easier breathing gas flow during peak work output. A quick change communications module is available with either bare wire posts or a waterproof connector.

The helmet ring houses the Sealed Pull Pins and provides protection for the bottom end of the helmet. The diver is also provided with an externally adjustable chin support. This custom fit and balance seats the helmet comfortably for long periods of time even when working in the face down position.

*SuperLite 27A*
CE *approved and* CR™ *marked*

The **SuperLite 27** Commercial Diver's Helmet has all the same features of the KM37 on a smaller, low volume shell design. This helmet is often preferred by persons with smaller heads.

The chrome plated machined brass Helmet Neck Ring houses the Sealed Pull Pins and provides protection for the bottom end of the helmet. Like the SL-17K, 37 and 17C, the diver is provided with an externally adjustable chin support. This support, along with the adjustable neck pad on the locking collar, gives the diver a comfortable, secure, custom fit.

The quick-change communications module, available with either bare wire posts or a waterproof connector, allows for easy, efficient maintenance of the helmets communications.

The Helmet also features the SuperFlow 350 large tube adjustable demand regulator. The Helmet is available in the umbilical over the shoulder, "B" configuration only.

*SuperLite 18 A/B*
CE *approved and* CR™ *marked*

The **KMB 18 A/B Band Mask** frame is constructed of hand laid fiberglass. The head harness is a molded, strong tear resistant neoprene rubber. The hood, which attaches to the mask frame with welded stainless steel bands, provides warmth for the divers head as well as pockets for the earphones. The communications connections can be either a male waterproof plug in type or bare wire posts.

The **KMB 28B Band Mask** (not shown) is very similar to the KMB 18, with many parts on the KMB 18B being interchangeable with the KMB 28B. The major difference between the 18 and 28 is the material of the mask frame itself. The KMB 18 has a fiberglass frame (yellow) while the KMB 28B frame is an extremely durable injection molded plastic (black).

Other differences include: **1)** The main exhaust body of the KMB 28 is part of the frame itself and uses a #545-041 main exhaust cover **2)** no comfort insert is required on the 28 **3)** the face ports for the 18 and the 28 differ slightly in size.

The **EXO Full Face Mask** is designed for both surface supplied and scuba diving. By enclosing the divers eyes, nose and mouth, the EXO permits nearly normal speech when used in conjunction with most wireless, and all hard-wire underwater communication systems.

The **ORIGINAL EXO** (not shown) design comes with automatic defogging, no oral nasal mask or nose block device (optional conversion kits available). The Mask Frame is black.

*EXO BR*

CE *approved and* CR™ *marked*

The **EXO BR (BALANCED REGULATOR)** shown above is designed to meet or exceed recommended performance goals in both scuba and surface supplied modes and is CE approved. It meets and surpasses European standards for regulator performance. The Balanced Regulator helps reduce the work of breathing for the diver by balancing the intermediate air pressure against the valve sealing pressure inside the regulator. This enables the regulator to instantly adjust to changes in line pressure. The Balanced Regulator is adjustable for a wide range of intermediate pressures between 100 PSI - 230 PSI.

Both models have a modular communications design that permits rapid and simple maintenance. The optional Hard Shell provides surfaces for mounting lights, cameras etc.

*SuperMask M-48 w/ Scuba Pod*

*SuperMask M-48 w/ Rebreather pod*

CE *approved and* CR™ *marked*

The **SuperMask M-48** is an innovative new design in a full-face mask. It provides the diver with all the comfort of a full-face mask with the convenience of changeable second stage regulators as well as the ability to use a snorkel without having to remove the mask.

The mask is comprised of two major components, the mask frame and the interchangeable lower pod. The removable lower pod is a feature unique to the SuperMask full-face mask. When diving, the pod is easily removed and replaced on the mask, providing the diver the capability to buddy-breathe, snorkel, use an octopus or perform an "in water" gas switch.

With the pod sealed to the mask, the flexible, silicone pod cover allows the diver to quickly place the regulator mouthpiece into the mouth or dive with it free of the mouth for communications. With the mouthpiece in, the regulator may be used without the pod being sealed to the mask.

The mask may also be used surface supplied. We are currently developing several different pod configurations for both open circuit and rebreather use. For further information, see the Frequently Asked Questions (FAQ) area on our web site at **www.KirbyMorgan.com/products/faq.html**

The **Kirby Morgan Air Control Systems (KMACS)** is a lightweight, portable control box for use in surface supplied air diving operations. The KMACS controls the diver's air supply, communications and monitors the diver's depth. It allows two divers clear push-to-talk (two wire) or round robin (four wire) communications. The KMACS is also available without communications.

The air supply can be either from a low-pressure compressor or high-pressure cylinders. The adjustable first stage regulator reduces the high-pressure air and supplies low pressure through the umbilical to the diver's breathing system. High pressure yokes permit U.S. standard scuba cylinders to be used. Low-pressure air supply fittings allow for a compressor to be used as the primary air source. A complete pneumo system with dual reading gauges (both US Standard and Metric) is provided for each diver's air, as well as a shut-off/bleed system that uses two high-pressure feed lines which allows changing of used cylinders without interruption of the diving operation. Optional shut off valves allow the isolation of each diver's air supply.

***KMACS***
*w/ No Comunications*

***KMACS***
*w/ Communications*

The Communication Set is a multipurpose intercommunication system that provides reliable and clear communications between a topside operator (tender) and one or more surface-supported divers, recompression chambers, or other submersible systems.

### 1.3 SuperLite 17A/B Design Features

The key features of the SuperLite-17A/B include:

1) The neck dam/yoke (14) design helps to maintain a low volume in this helmet as well as retaining the helmet.

2) The head cushion (1) attaches just inside the bottom of the helmet, keeping it in place when the diver dons the hat. The standard head cushion consists of a brushed nylon bag with an, open cell polyester foam inside

3) The helmet is available in two configurations. The SuperLite-17A (available by special request) accepts the umbilical up the front of the diver's chest. The SuperLite-17B accepts the umbilical over the diver's shoulder.

### 1.4 Operational Specifications: SuperLite-17A/B

**⚠ DANGER: Never use aerosol-propelled sprays near the face port of any Kirby Morgan diving helmet. The propellant used in these aerosols can invisibly damage the face port and cause it to shatter on impact from any strong blow. If the face port fails underwater, risk of injury or death may result.**

**Operational Specifications and Limitations:**

- Maximum depth on air - 220 FSW (67 MSW) with the old style single exhaust or new Tri-Valve Exhaust®.
- Maximum depth on air - 150 FSW (45.73 MSW) when equipped with the old style double exhaust whisker assembly.
- Maximum depth on HEO2 Surface Supplied, 330 FSW (100 MSW)
- Work rate - Heavy - 62.5 - 75 l.p.m. RMV.
- Maximum current - 3 knots with standard exhaust, 5 knots with Tri Exhaust (see caution)
- Umbilical 3/8" Maximum length 600' (183 MSW)
- Breathing Gas Requirements, 4.5 a.c.f.m. at the side block at depth.

**⚠ CAUTION: When diving in heavy current (i.e. exceeding 3 knots) the single exhaust system on all KMDSI masks/helmets could allow water to enter, due to turbulence/eddying. It is important for the user/diver to take excessive currents into consideration. The Tri-Valve Exhaust® system (Part # 525-102) will help prevent water intrusion when diving in heavy currents. Unlike the old double exhaust, the Tri-Valve does not limit the diving depth.**

If you have any questions contact KMDSI (850) 928-7772 or at salesinfo@KirbyMorgan.com or Dive Lab Inc. (850) 235-2715 or at Divelab@aol.com

- Umbilical minimum I.D. 3/8" (9.5 mm) of not more than two sections, total length not to exceed 600 feet (183m).

Required overbottom gas supply pressure for depth is: (fsw x 0.445+14.7) + required p.s.i.g.

| Depth | | Pressure | |
|---|---|---|---|
| FSW | MSW | P.S.I.G. | bar |
| 0-60 | 18.3 | 90 | 6.2 |
| 61-100 | 18.6-30.5 | 115 | 7.9 |
| 101-132 | 30.8-40.2 | 135 | 9.3 |
| 133-165 | 40.6-50.3 | 165 | 11.4 |
| 166-198 | 50.6-60.3 | 200 | 13.8 |
| 198-220 | 60.3-67 | 225 | 15.5 |

***NOTE: The demand regulator and side block assemblies have a maximum design pressure of 225 p.s.i.g. (15.5 bar) overbottom.***

-Gas supply system capable of supplying 4.5 a.c.f.m (127.4 BL/min) to the side block assembly at depth, at the above recommended pressures.

**-Temperature limitations:** Use at water temperatures below 36° F (2.220C) requires use of hot water shroud (P/N 525-100, B configuration only) and hot water.

***NOTE "The Hot Water Shroud (Part #525-100) in conjunction with hot water to the diver should be used whenever diving operations are conducted using HEO2 at water temperatures less than 60 ℉ (15.56 ℃) for the comfort of the diver. KMDSI further recommends that the shroud be used in conjunction with hot water to the diver whenever diving operations are conducted using air or mixed gas, in waters colder than 36 ℉ (2.22 ℃) to reduce the possibility of demand regulator icing.***

***NOTE: Usually the greatest danger of demand regulator icing will be encountered on deck when the surrounding air temperature is less than 32 ℉ (0 ℃). This effect is primarily due to the refrigeration effect of breathing air pressure reduction, and the addition of moisture from the divers exhalation coming in contact with the topside air temperature. If diving where the water temperature is 36 ℉ (2.22 ℃) or warmer but the topside air temperature is below freezing, (32 ℉ (0 ℃) icing of the demand regulator is possible. To help eliminate the possibility of freezing on the surface, warm water should be run over the exterior of the demand regulator prior to water entry, if the hot water system is not used.***

In the past, the optional Double Exhaust System (Part # 525-102) was available to reduce the possibility of back flow of water and contaminants into the helmet . This system has been used successfully for diving in biologically contaminated environments for many years. To further reduce the possibility of water intrusion regardless of the exhaust system being used, the diver should avoid working in an inverted position.

The double exhaust has now been replaced by the Tri-Valve System. The unique design of the Tri-Valve keeps exhalation resistance low while maintaining excellent watertight integrity.

**⚠ CAUTION: Before attempting any diving in any type of contaminated water, a complete diving and topside course in hazardous materials emergencies should be completed. The divers and the topside team must be properly trained and have the proper safety equipment. All helmets and suits can leak water under certain conditions. Divers should use extreme caution when diving in contaminated waters. For more information see the book "Diving in High-Risk Environments" by Steven M. Barsky.**

## 1.5 General Description

### 1.5.1 Helmet Shell

The helmet shell (92) is fabricated of hand laid glass and carbon fiber reinforced polyester resin, which will not carry an electrical charge. This shell is the central structure for mounting all the components that make up the complete helmet. It is designed to allow easy replacement of parts when necessary. **DO NOT PAINT OR REFINISH** your helmet shell. Any repair to the helmet shell must be done at an approved KMDSI repair center. Unauthorized refinishing can hide potentially serious damage to the shell and may result in refusal of repairs or service by KMDSI authorized repair facilities.

### 1.5.2 Gas Flow Systems

The main gas supply flow from the umbilical enters the system at the adapter (67) and flows through the one-way valve (68) to the interior of the side block assembly (43a/b). The one-way valve or "non-return" is a very important component. It must prevent the flow of gas out of the helmet to the umbilical in the event of a sudden lowering of pressure in the supply hose. This can happen due to an accidental break in the hose or a fitting near the surface. Not only would the Emergency gas be lost if the one-way valve failed (concurrent with a hose or fitting break on deck), but also the diver would be "squeezed", and the helmet would instantly flood with water. Although we have selected the valve for its reliability and quality, inspection and maintenance of this valve must be done regu-

larly, Section 6.2.1 and 6.2.2. It is very easy to disassemble and inspect. (A rebuild kit for this valve is available, KMDSI Part #525-330).

**⚠ WARNING: The one-way valve must be visually inspected and flow tested daily prior to commencing diving operations, use checklist A2.3. Follow the procedures for testing the valve in Section 2 of this manual.**

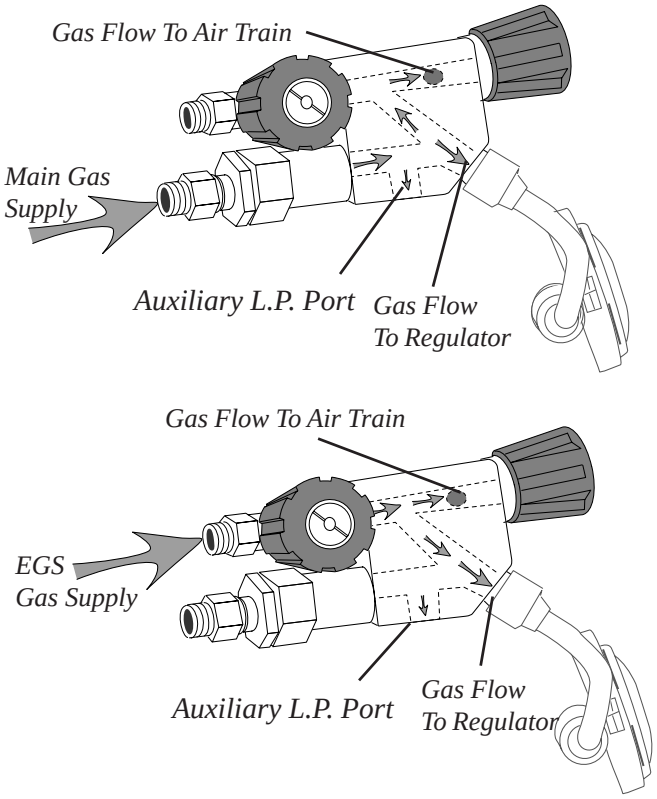
The Emergency gas comes from a tank of compressed gas worn by the diver. It enters the system through the emergency gas valve assembly (58) when the diver turns the control knob (55) on. The flow then enters the side block (43a/b).

**⚠ WARNING: Never connect the main gas supply hose from the diving station/umbilical to the Emergency Gas Valve. The Emergency Gas Valve does not have a one way valve. If this mistake were made, any break in the supply hose would result in a "squeeze" and instant flooding of the helmet. This could result in serious injury or death.**

Both sources of gas flow through the same passages in the side block body (43a/b) to two exits. One exit is always open to supply gas to the demand regulator assembly (138a/b). Another exit is to the defogger valve (free-flow valve) assembly (32-41), and the third is to an auxiliary L.P. port.

The diver controls the flow of gas through the defogger system with the control knob (34). The flow enters the helmet and flows through the air train (99), which directs the gas onto the face port (143) to help defog the face port when moisture accumulates from the diver's warmth and moisture. The flow continues out through the helmet exhaust (water dump) (150-153) valve, and /or into the oral/nasal (83) by means of the oral/nasal valve (84,85), then out into the regulator body (138a/b) and out through the regulator exhaust (137). The diver can breathe from this flow of gas if the demand regulator malfunctions.

Returning to the side block assembly: the other passage for gas is to the demand regulator (138a/b). Going either to a bent tube assembly (45b) on the SL-17B or a hose assembly only on the SL-17A (47a) that connects to the inlet nipple of the demand regulator (130a or 132b). The flow of gas in the demand regulator assembly is controlled by the inlet valve and supplies gas to the diver on inhalation "demand" only, and shuts off during the exhalation cycle.



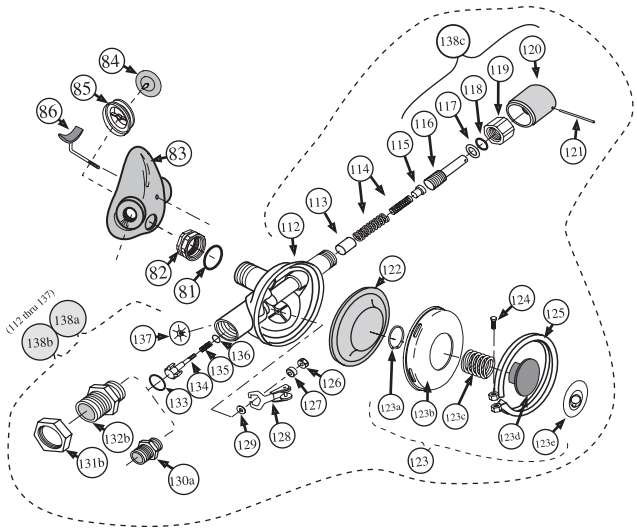




*Fig 1.6 The SuperLite 350 Demand Regulator*

The regulator diaphragm is drawn in during inhalation and opens the flow valve, matching the diver's need. The regulator continues to match the diver's inhalation as the rate increases, peaks, then ebbs and stops. When the diver exhales, as the exhalation gas flows through the regulator body, out the regulator exhaust valve, through the whisker (139), and into the water. The whisker deflects the exhaust bubbles away from the face port (142) to keep the diver's view clear.

The bias adjustment knob (120) allows the diver to control the regulator for a wide range of incoming gas pressures as listed. Additionally, it can be backed off to remove spring tension and allow the regulator to free flow.

Maintain minimum overbottom gas supply pressure for depth (FSW x .445) + recommended supply for depth.

| Depth | | Pressure | |
|---|---|---|---|
| FSW | MSW | P.S.I.G. | bar |
| 0-60 | 18.3 | 90 | 6.2 |
| 61-100 | 18.6-30.5 | 115 | 7.9 |
| 101-132 | 30.8-40.2 | 135 | 9.3 |
| 133-165 | 40.6-50.3 | 165 | 11.4 |
| 166-198 | 50.6-60.3 | 200 | 13.8 |
| 198-220 | 60.3-67 | 225 | 15.5 |

***NOTE: The demand regulator and side block assembly has a maximum design pressure of 225psig(15.5 bar) over bottom pressure (OB).***

The adjustment knob operates by simply increasing or decreasing the amount of spring bias tension on the demand regulator inlet valve. The adjustment knob has a range of approximately 14 turns from full in to full out. The intent of this bias adjustment device is strictly to allow the diver to make adjustments for variations in umbilical supply pressure. This adjustment device is not intended as a minimum-maximum device. Minimum and maximum applies to supply pressure only. The adjustment knob should be adjusted by the diver to be at the easiest breathing setting at all times without the regulator becoming overactive. The exact number of turns required is dependent on the supply pressure. Diving any Kirby Morgan helmet or Band Mask™ with a bias setting greater than that just necessary to keep the demand valve from free flowing, increases the work of breathing and reduces the diver's ability to perform heavy work.

The side block on the "B" model helmet (43b) is drilled and tapped to accept low-pressure inflator hoses. This allows the diver the capability to inflate variable volume dry suits.. It is tapped with a 3/8-24 thread orifice, standard for American first stage scuba regulator's low-pressure auxiliary fittings. The port is shipped plugged (48) at delivery. This inflation capability does not significantly interfere in any way with the breathing characteristics of the regulator during normal use providing a limiting hose is used. When using a dry suit inflation hose, the hose should be equipped with a flow restrictor (P/N 555-210) to limit flow in the event the hose ruptures or is severed.

**⚠ WARNING: The side block inflator port is intended for dry suits only. When using the side block low-pressure inflator port, only good quality hoses and fittings should be used and must incorporate an in-line flow restrictor to reduce gas flow in the event of hose failure. Any hose or fitting failure in this arrangement will subject the diver to a decreased air supply. Do not use the side block inflator port for any purpose other than attaching a dry suit hose.**

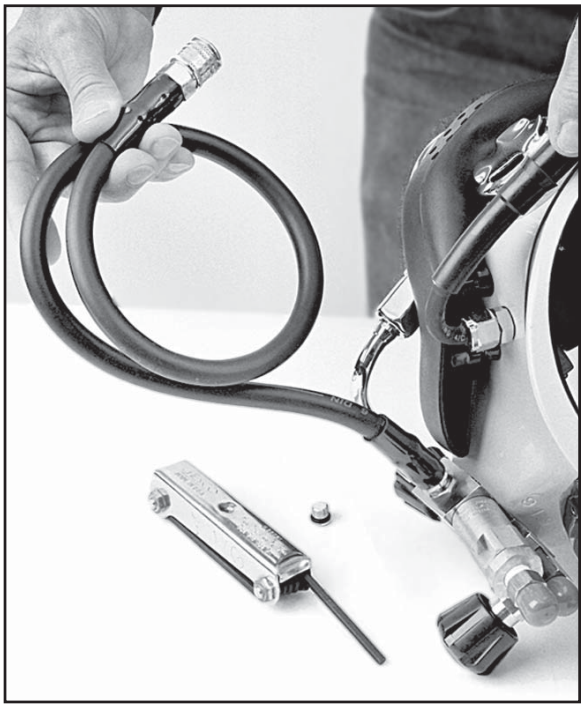


*Fig 1.7 A low pressure inflator hose with flow restrictor installed.*

### 1.5.3 Emergency Gas Supply System (EGS)

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

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

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

***NOTE: This valve can be adjusted for various relief pressures***

Every bailout (Emergency Gas System or EGS) first stage regulator must be fitted with an overpressure relief valve to prevent over pressurization of EGS L.P hose and possible total loss of emergency supply gas in event of regulator failure.

### 1.5.4 Helmet Attachment to the Diver

On the SuperLite-17 A/B, the helmet shell has an O-ring seal (80) around the base of the fiberglass rim. The helmet is held in place on the diver's head by the yoke/neck clamp assembly (14), which mounts on the diver's neck and seals to the bottom rim of the helmet. The adjustment of this clamp is critical for the use of the helmet. Inspection and functional checks of the neck clamp must be performed daily prior to commencement of diving operations. Periodic adjustments to the clamp MUST be made (see section 7 .9.3.1) as the neck dam ages or wears, or any time helmet and yokes are mixed and matched or if converted to a dry suit mount. Over the years various dry suit material thickness has changed as well as the stud length of the clamps. The adjustment must always be checked.

**YOU SHOULD NEVER HAVE TO FORCE THE CLAMP SHUT.**

The head cushion (1) is made from layers of open cell foam inserted in a head shaped nylon bag. Adding or subtracting foam layers from the bag can adjust the fit of the head cushion. The head cushion must be adjusted correctly for the helmet to fit properly.

### 1.5.5 Sealing Arrangement

The neck dam (2) is available in several sizes and is fabricated in a cone shape. The neck dams on all SuperLite-17A/Bs are made of foam neoprene.

The neck dam seals against the diver's neck. The fit of the neoprene neck dam may be made larger by trimming 1/4" off the circumference. Only trim a maximum of 1/4" at a time; trimming too much will result in a loose fit.

***NOTE: If you must trim the neck dam, be careful not to trim off too much material. The neck dam must fit snugly. While it may be a slight bit uncomfortable out of the water, and may feel snug, once in the water the neck dam will loosen slightly.***

**⚠ CAUTION: Pulling the neck dam over the diver's head can be difficult. Stretching (expanding) the seal and placing it part way over the head can help reduce the force needed to install the seal. Proper training is necessary to install the neck seal over the diver's head and onto his neck. Although the possibility is very remote, injury may result if this procedure is not done properly. If a diver does not know how to don the neck seal, he must seek proper instruction before proceeding.**

### 1.5.6 Reducing Carbon Dioxide

It is important to minimize the dead space volume to keep CO2 levels low. Carbon dioxide (CO2) can build up if proper flushing does not occur. A low volume silicone oral/nasal mask (83) fits over the diver's nose and mouth. The oral/nasal mask attaches to the regulator mount nut (82) and separates the breathing gas flow from the rest of the dead-air space inside the helmet, reducing the potential for carbon dioxide buildup.

**⚠ DANGER: Never dive the helmet without the oral/nasal mask and valve installed. Diving without the mask, or without the valve, or the valve installed improperly, will cause an increase in $CO_2$. A high $CO_2$ level can cause dizziness, nausea, headaches, shortness of breath, and blackout, resulting in serious injury or death.**

### 1.5.7 Communications

The communications systems are very simple in all Kirby Morgan diving helmets. In the SuperLite-17A/B, both earphones (71, 72) and microphone (73) are wired in parallel. The communications are connected to either a waterproof connector (165), or binding posts (155) for bare wire connection. Electrical signals are sent to and received from the surface through the umbilical wires. An amplifier boosts the signals to the desired volume for the surface and the diver.

### 1.5.8 Equalizing the Sinuses and Inner Ear

A nose block device (86) allows the diver to block the nose to provide an overpressure in his sinus and inner ear for equalization. The blocking pad on the inside of the oral/nasal mask is attached to a shaft, which passes through a packing gland to the outside of the helmet. A knob attached to the end of the shaft can be pushed in to slide the pad under the diver's nose. When not needed, the knob is pulled out so the pad does not rub under the diver's nose. The pad may also be turned upside down to provide more clearance under the diver's nose, by rotating the shaft.

### 1.5.9 Face Port or Viewing Lens

The face port or viewing lens (143) is an extremely strong, clear polycarbonate plastic. The port retainer is easily removable for replacement of the lens (Section 7.7.2). An O-ring (144), located under the lens, seals the lens to the fiberglass helmet shell.

**⚠ DANGER: The port retainer screws must be tightened to proper torque specifications using a torque screwdriver only (twelve inch pounds), per the instructions in this manual Section 7.7.3. Do not over tighten. Tightening or over tightening the port retaining screws without a torque wrench could damage the inserts, resulting in possible flooding, causing serious injury or death !**

### 1.5.10 Latch Catch Assembly, Pull Pin

The latch catch assembly (22) includes the pull pin and safety pin (18). The purpose of this assembly is to ensure that the neck clamp assembly remains securely fastened around the base of the helmet, so the helmet remains on the diver. This arrangement functions in a similar manner to the old "dummy pin" on a heavy gear helmet.

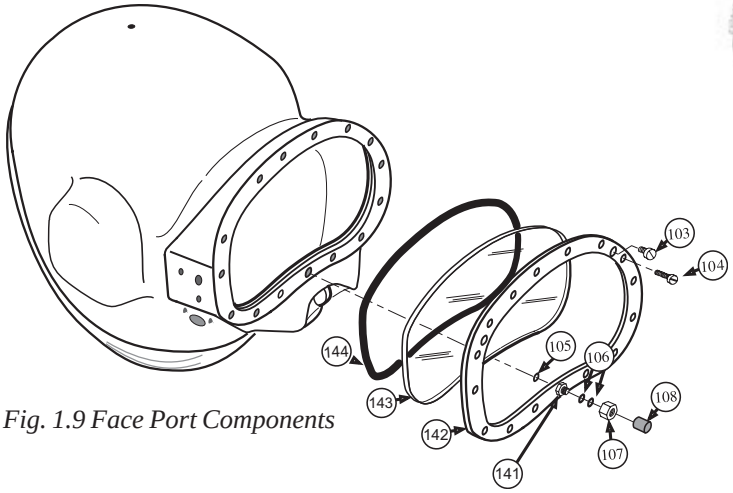



*Fig. 1.9 Face Port Components*

All SuperLite-17A/B & U.S. Navy MK-21 Mod. 0 & Mod. I Helmets sold by KMDSI now have the Pull Pin Latch Catch Assembly, Part Number 505 -010 (brass) or 505-011 (chrome) on the helmet to lock the Yoke in position. The mounting system for the Pull Pin Latch Catch Assembly is identical to the old style Push Pin Latch Catch Assembly, # 505-015, which are now, obsolete.

Each Pull Pin Latch Catch Assembly is shipped with a Safety Pin, Part Number 535-900 which we recommend be used when the user requires a two step release system on the helmet. It can be used with or without a cord attached to prevent loss of the Safety Pin when not in use. All Pull Pin Latch Catch Assemblies, P/N 505-010 or 505-011, which are sold as spare or replacement parts include this Safety Pin, P/N 535-900.

The Latch Catch is designed so that with the Safety pin in place the Pull Pin cannot be pulled keeping the neck clamp closed. It's like two separate locks.

**OLD**

**NEW**

**⚠ WARNING: When purchasing repair or spare parts, use only genuine Kirby Morgan parts obtained from an authorized KMDSI Dealer. Although other parts may look the same, they manufactured to the same standards of quality. Look for the KMDSI diamond. This logo (see below) assures you that you are purchasing the correct parts for your helmet. Improperly manufactured parts can cause accidents resulting in serious injury or death**

KIRBY MORGAN®

# Chapter 2.0
# OPERATING INSTRUCTIONS

**⚠ WARNING: This manual is our effort to explain the operation, maintenance and use of the SuperLite-17A/B diving helmets. We do not herein make any effort to teach the principles of diving. It is our assumption the readers are persons involved in professional diving. All divers must train in the use of any model of commercial diving helmet, under controlled conditions, if they have not previously used or trained in that particular helmet prior to use on the job. All persons performing maintenance and repairs should be thoroughly trained.**

## 2.1 Introduction

This section provides the manufacturer's advice on how to use the SuperLite-17A/B diving helmets. The use of these diving helmets will vary with the type of work and environmental conditions encountered. The basic procedures of donning and removing these helmets will be similar for every job.

Divers using any of the KMDSI helmets should be trained in their use. If the diver is not familiar with the helmet, he or she should not dive it without proper training and or familiarization dives. A shallow "familiarization dive" is recommended prior to the use of this equipment. However, divers familiar and trained in the use of previous Kirby Morgan masks and helmets (i.e., KMB 8, 9, 10, 18, 28, the Navy Mk-1 mask, Navy MK 21 helmet, the SuperLite-27, the SuperLite-17C, SuperLite-17K, Kirby Morgan 37, or the Navy MK 22 mask) will find the regulator adjustment, defogger and emergency valve operation of the SuperLite-17A/B will be virtually identical. All Kirby Morgan helmets and band masks have all the breathing system controls located in the same positions.

The diver must be dressed and tended at all times by a trained, qualified diving tender knowledgeable in surface supplied diving procedures. Never dive without a qualified tender assisting you and holding your diving hose.

## 2.2 Design Purpose

All Kirby Morgan diving helmets are designed for umbilical supplied diving only. The umbilical is usually composed of an air/gas supply hose, communication wire, assembled with waterproof tape. Some umbilicals also have a hose for hot water, a pneumofathometer hose, and a strength member, such as a cable or strong line. It is strongly recommended that the air/gas hose be married to the strength member in a manner that allows the strength member to receive the strain. This procedure will help reduce the possibly of air/gas hose failure. Some umbilicals are manufactured where all members are wound similar to strands in a rope to form a single unit. The umbilical is the diver's lifeline to the diving control station and must be treated with care.

The diving control station can be at the surface, in a diving bell, or out of a submerged habitat. The station can be as simple as a tender with a set of "phones" (communication amplifier), or as complex as a fully manned saturation system.

**⚠ DANGER: 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 SL 17 A/B or any KMDSI helmet cannot prevent this type of injury.**

**⚠ WARNING: Gas supply systems for surface supplied diving with SuperLite-17A/B diving helmets must be capable of supplying a minimum of 4.5 actual cubic feet per minute (a.c.f.m) at the side block, at depth on the diver (see page 6) and at the over bottom pressure recommended for the depth of the dive per Section 1.4 Paragraph 4. The use of SCUBA regulators topside to supply a surface- supplied diver is unacceptable because, there is no provision for adjusting the intermediate pressure to the diver. This can create a dangerous situation where the diver may not receive an adequate supply of air. Only regulators, designed for surface-supplied systems should be used.**

Kirby Morgan manufactures the Kirby Morgan Air Control System, the KMACS™ with optional integrated communications and pneumofathometer. This portable system can be operated on either a high-pressure air supply or on a low-pressure compressor. The KMACS has a spe-

cially designed high-pressure regulator that reduces high-pressure air and provides an adequate flow to support divers to a depth of 130 FSW (40 MSW).

## 2.3 First Use of SuperLite-17A/B

When you first receive your SuperLite-17A/B diving helmet, carefully unpack it and examine it for any damage that may have occurred during shipment. Use the inspection sheet provided to ensure that no damage has occurred during shipment. The purchaser must contact the freight carrier and/or the KMDSI dealer if the helmet has been damaged in shipment.

Be sure to complete the enclosed warranty card and return it to KMDSI immediately. No warranty claims will be honored without a correctly completed warranty card on file at KMDSI.

**⚠ CAUTION: KMDSI must have your current address to assure that you receive all safety notices and other important information concerning the helmet. Please notify KMDSI of any change of address.**

Before using the helmet for the first time, it must be checked and adjusted for proper fit. There are several adjustments that must be made to provide a more comfortable fit when wearing the helmet.

### 2.3.1 Head Cushion

The separate layers of open cell foam sections that fill the head cushion bag (1) primarily determines the fit of the helmet. The diver's head can be moved forward into the oral/nasal mask by increasing the thickness of the 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 require all the foam that comes with a new hat. A diver with a larger head will need to remove some foam in the center top and back of the head cushion. The foam may be cut with scissors to loosen the fit, or more foam can be added to give a tighter fit. The head cushion fit is extremely important. A proper fitting headliner keeps the nose and mouth securely in the oral nasal allowing a good seal and providing maximum regulator performance and $CO_2$ washout.

On the SuperLite-17 there is a chin strap separate from the head cushion bag (1). The chin strap bolts directly to the helmet and is secured around the outside of the head cushion in the chin area. Ensure the chin strap is used. If the chin strap is not fastened or positioned properly, the helmet can float up on the diver's head. This can make the helmet very uncomfortable and may pull the oral/nasal mask (83) away from the face. Additionally, in the unlikely event the helmet was separated from the neck clamp/yoke assembly, the helmet will be retained.

**⚠ DANGER: On older helmets the chin strap is part of the head cushion. All helmets should be changed to have the chin strap bolt directly to the helmet. Old style head cushions with chin straps may be used, but the chin strap that is bolted to the helmet MUST be used. We recommend that the old head cushion chin strap be removed (i.e., cut off) to prevent confusion.**

### 2.3.2 Trimming the Neck Dam (2)

If your helmet is new, or any time you replace the neck dam, it must be adjusted to fit you. New neck dams are cone shaped and may be too tight if not properly trimmed.

**⚠ 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.**

Trim the neck dam until it is still snug. Trim only a maximum of 1/4 inch off the circumference of the neck dam at a time. When you are done, the neck dam must be tight enough so that it does not leak. This may feel a bit snug out of the water, but will be more comfortable underwater once the neoprene compresses from increased pressure.

*Fig. 2.1*

Trim the neck dam with 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 eventually tear. Sew and/or glue the edge of the original seam to keep the stitching from unraveling.

**⚠ CAUTION: 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. If you trim the neck dam too much it will be too loose and will leak. Trim the neck dam until it is snug, and then stretch it before using it.**

A neoprene neck dam that is too large may be tightened up by cutting a wedge out of the open end. Glue the cut back edges back together using wet suit cement, then sew the glued seam together. Be sure to allow the modification to the neck dam 24 hours to dry and solvents to off-gas.

**⚠ DANGER: Be sure to use adequate ventilation when using wet suit cement. Wet suit cement fumes are toxic and can lead to unconsciousness or death if the cement is used in an enclosed space. Wet suit cement fumes can also cause long term damage to body tissues if you are exposed to it at low levels on a frequent basis.**

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 saturation or bell system. As the neck dam becomes worn, the neck clamp will require adjustment and eventually it will need replacement to ensure that it seals properly.

### 2.4 Pre Dress-In Procedure- Utilize APPENDIX A2.3

Before dressing in for a dive, inspection of the helmet system must be made to be sure it is in proper working order. Appendix A2.3 is a synopsis of this section. Additionally, this checklist refers to sections in this manual if guidance is required. This procedure must be done well in advance of the dive, so any problems can be fixed without delaying the dive. The following steps are part of the recommended daily inspection.

### 2.4.1 Pre-Dive Visual Inspection

Visually inspect the exterior and interior of the helmet for missing or loose fasteners or components.

1) The demand regulator cover (123) should not have excessive dents or dents deeper than 1/4". The purge button (123d) must operate freely and should have no less than 1/16" and no more than 1/8" inward travel before gas flow is heard.

2) The neck dam (2) must not be torn or punctured or show excessive wear, damage or anything that would affect its function.

**⚠ WARNING: There must be no holes in the neck dam. If there are any holes in the neck dam the helmet could leak or flood. In addition, the demand regulator will not operate properly.**

3) The O-ring (80) that goes around the base of the helmet (92) shell must be in place and undamaged.

DANGER: The O-ring on the base of the helmet on the SuperLite-17 must be in place and in good condition (see Section 5.3.1) Without a proper functioning O-ring, the helmet will leak and possibly flood. Drowning could result.

4) Inspect the bent tube (45b) (or hose if so equipped) 47a that supplies breathing gas to the regulator. There must be no dents deeper than 1/8 inch in the tube, kinks in the hose assembly, or visible signs of damage.

5) Inspect the face port (143. It must be in good condition, clean, with no cracks, scratches, or gouges deeper than 1/16 inch.

6) Check the port retainer (142) for missing screws (104). If any screws are missing or loose they must be replaced and torqued using a torque wrench to 12 inch pounds, per Section 7.7.

NOTE: Special binder head screws are used in this application for their self-locking characteristics.

**⚠ DANGER: All parts on SuperLite 17A/B diving helmets must be adjusted to their proper torque specifications. See Appendix A1 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 result in serious injury or death.**

7) Be sure the communications wires are hooked up and there are no loose nuts (145) or loose or broken wires.

8) Inspect the oral nasal mask (83) and the oral/nasal mask valve (84). Make sure the mask is on the regulator mount nut (82) properly and the oral/nasal mask valve and body (84,85) are installed so the valve opens inward into the oral/nasal mask.

9) Inspect the yoke/neck clamp (7) and latch catch mechanism (22). They must engage and disengage properly. If the Yoke/Neck Clamp Assembly has been used with a different helmet, it **MUST** be readjusted to fit the current helmet.

10) Make sure the head cushion (1) is properly fastened (snapped) inside the helmet to the snap tabs (78).

11) Make sure the chin strap is the new version (166) that bolts directly to the helmet with tab (97) bolts (76). If the older system is used where the chin strap is part of the head cushion, replace it as soon as possible.

## 2.5 Preparing the Helmet for Diving

### 2.5.1 Clean Face Port

Remove any sand or dirt on the interior of the face port. Use a mild solution of soap and water to clean the port.

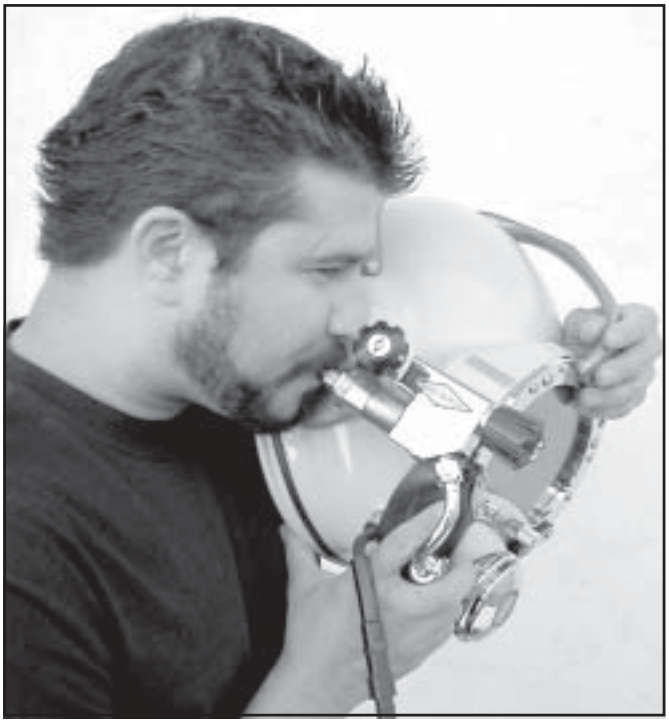
### 2.5.2 Check Moving Parts

the amplifier/speaker feeling the vibration on each earphone and the microphone with your fingertips.

### 2.5.4 One-way Valve Check

There are two ways to check the one-way valve; orally and using the EGS supply. Check both ways if possible. A repair kit is available for these valves (Part # 525-330).

**⚠ 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.**



***NOTE: The oral test is very important. Usually, if the one-way valve (68) is faulty it is primarily due to corrosion or dirt; it will generally fail during the oral test.***

1) Ensure the Emergency Gas (EGS) Valve knob (55) is shut and both the EGS supply L.P-hose and the umbilical are not attached to the helmet. Open the defogger valve fully (counterclockwise) using the defogger control knob (34). Then orally suck on the umbilical adapter (67) attached to the one-way valve (68). You should not be able to draw any air into your mouth. If any airflow is present, the one-way valve is faulty and must be replaced/repaired, per Section 6.2. Next, blow into the umbilical adapter. Airflow should be heard through the open defogger valve – air train (99) assembly. Repeat this process. This will ensure the one-way valve poppet is seating properly.

2) Prior to attaching the umbilical, ensure the EGS helmet Supply Valve Knob (55) is shut. Next, screw (clockwise) the demand regulator adjustment knob (120) all the way “in”. Ensure the defogger control knob (34) is shut. Attach the EGS L.P.-hose to the EGS supply valve (50). With the EGS helmet supply valve still shut. Slowly open the cylinder valve on the EGS supply, pressurizing the LP-hose, to the previously shut EGS helmet supply valve and allow gas pressure to momentarily stabilize. Next, slowly open the EGS helmet supply valve knob (55) fully. If air/gas escapes out of the umbilical adapter (67), the one-way valve is faulty and must be repaired/replaced, per Section 6.2.

**⚠ DANGER: 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 and an immediate flooding of the helmet/mask may result. In extreme cases this could result in serious injury or death. KMDSI highly recommends the one-way valve be tested daily prior to the commencement of diving operations.**

## 2.6 Emergency Gas System (EGS)

If the diver’s incoming main air/gas supply fails, the diver must have another source of breathing gas that will enable a safe return to the diving station. The diver usually wears a tank of compressed breathing gas. Exactly how the tank is carried, and the capacity of the tank, depends on the circumstances of the job, and company or personal preferences.

**DANGER: Do not dive without a diver worn Emergency Gas System.**

***NOTE: KMDSI recommends a diver-worn bailout/emergency gas supply (EGS) for all diving situations. The size of the cylinder should be such that will allow the diver to safely ascend to the surface, or a point where the normal gas supply can be restored. It is highly recommended that the gas supply be of sufficient volume to supply the diver with at least 10 minutes of gas supply at depth based on a respiratory consumption rate of at least 40 ALPM (1.4cfm).***

*Fig. 2.3 Diver donning a complete bail-out/ emergency gas supply (EGS)*

Most commercial and military divers wear a harness (separate from the weight belt) that is used for several purposes. The harness is fitted with large metal rings (usually brass or stainless steel). The umbilical is hooked into one of these rings to keep any strain off the helmet. In addition, the rings on the harness are used to hang tools and other equipment. The harness is also designed to provide a means of lifting an unconscious diver from the water. This harness is the best method of securing the EGS to the diver.

A small tank can be mounted horizontally on the lower rear or front, while larger tanks are usually mounted vertically in the center back, similar to a scuba diver's tank. Some harness designs incorporate a cloth enclosure into which the tank fits. The entire tank, valve, and regulator are enclosed in fabric. This helps to prevent snagging.

The EGS must be fitted with a good quality 1st stage regulator to reduce the supply pressure to between 135-150 p.s.i.g. ambient. The 1st stage regulator reduces the EGS cylinder pressure to the side block assembly. Connect the 1st stage regulator low-pressure hose to the Emergency gas valve assembly located on the side block. The 1st stage regulator must have at least two low-pressure ports. One port is used for the hose to the Emergency Gas Valve and the second is used to install an overpressure relief valve (Part #200-017). The relief valve is necessary because if the first stage develops a leak, the full pressure of the tank could be placed on the low-pressure hose. This could cause the hose to burst. The overpressure relief valve will bleed off any minor leak. This valve is both repairable and rebuild able. KMDSI recommends that the overpressure relief valve be disassembled, cleaned and inspected at least annually and tested at intervals not to exceed once month. Adjust the valve so that it relieves between 180-190 p.s.i.g. per Section 6.12.

*Fig. 2.4 Always use an over-pressure relief valve on your bail-out regulator*

**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.**

**DANGER: Never connect a high-pressure hose directly to the EGS valve assembly (58), as this will transmit the full pressure of the tank to the side block. The side block is not designed for high pressure and may burst. This may result in severe personal injury or death**

**WARNING: It is strongly recommended that a submersible pressure gauge must be connected to the high-pressure port on the first stage so that the tender and diving supervisor can check the EGS pressure prior to each dive.**

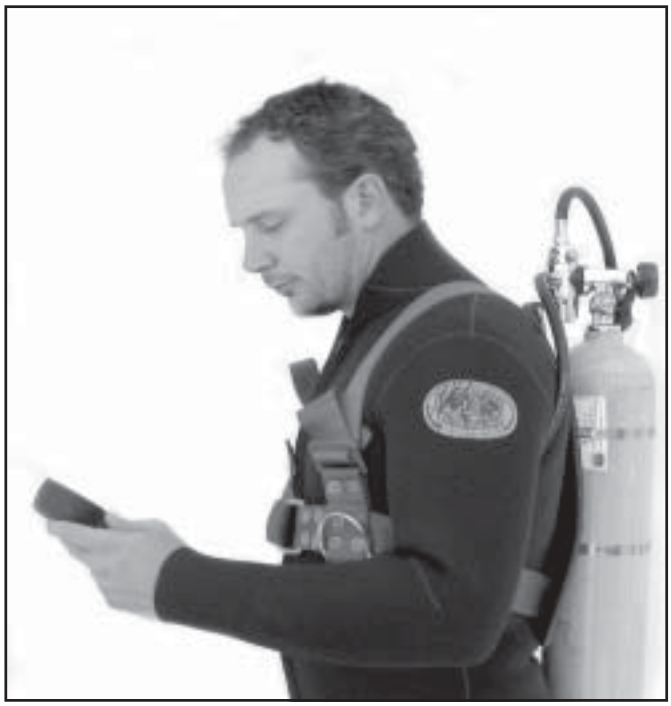


*Fig. 2.5 Always check the pressure in the bail-out bottle before diving*

**⚠ DANGER: Never connect the main gas supply hose from the diving control station to the Emergency Gas Valve Assembly (58). 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" and the helmet will immediately flood with water, possibly resulting in serious injury or death from drowning. The diver, at a minimum, must have his suit, harness, and EGS in place prior to connecting the hose for the emergency supply.**

Make sure the Emergency Gas (EGS) Valve Knob (55) is shut; otherwise the Emergency Gas supply may be used up without the diver's knowledge. Once the Emergency Gas supply hose is connected, the EGS cylinder valve is opened (and left open for the duration of the dive). In the event of an emergency due to a loss of the main gas supply, the Emergency Gas Valve Knob (55) located on the side block is turned on, supplying gas to the side block assembly and the demand regulator assembly.

**⚠ DANGER: Some divers, maintain the EGS gas cylinder valve shut during the dive. Their rational being; in the event of an emergency, they will simply open the EGS 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 EGS valve shut. The reasoning behind this is twofold. First, with the EGS cylinder valve open, gas is immediately available in the event of topside gas interruption via the EGS valve (55) on the side block simply by opening it. 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 and regulator, causing failure of the EGS regulator and resulting in possible injury or death.**

## 2.7 Setting Up to Dive

### 2.7.1 Flushing Out the Umbilical

Before connecting the umbilical to the helmet, the umbilical must be flushed out to remove any dirt, moisture, or other debris. The umbilical connections should be inspected for wear and or damage.

Connect the topside umbilical end to the breathing gas supply or control console. Uncap the helmet end of the umbilical and hold securely while pointing in a safe direction, and 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 5-10 seconds, and then turn the air supply off before attempting to connect the umbilical to the helmet. If the helmet is not going to be used immediately, the umbilical end should be recapped or connected to the helmet.

### 2.7.2 Connecting the Helmet to the Umbilical

When you connect the umbilical to the helmet, be sure to use a wrench to hold the adapter (67) or inlet fitting, with a second wrench to turn the fitting on the hose. If this is not done, the adapter will turn inside the one-way valve (68). If this happens repeatedly, the threads will wear and the valve will need to be replaced. The connection between the hose and the helmet must only be made up "snug". Excessive force will deform and ruin the adapter and/or umbilical fitting. 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.

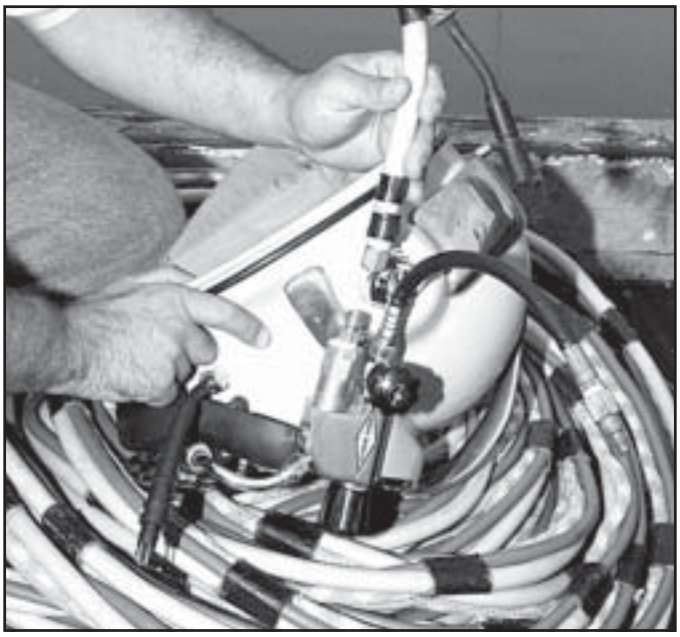


*Fig.2.6 Connect the hose to the adapter.*

**⚠ DANGER: If the one-way valve or the adapter is loosened, breathing gas will leak out of the breathing system. This could also result in a loss of pressure to the helmet, compromising breathing performance.**

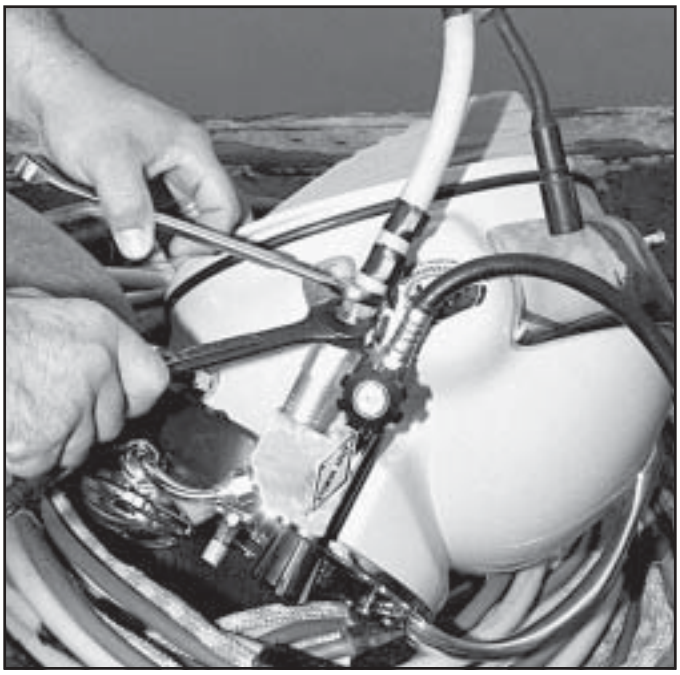


*Fig.2.7 Use two wrenches to tighten the hose.*

If you are using waterproof connectors (158) for your communications, take extra care in handling these pieces. To connect the male and female parts, align the large pin on the male connector with the yellow mark on the female connector. Press the two connectors together until you hear a distinct "pop". Never twist the connectors, twisting will damage the connection pins.

*Fig. 2.8 connect the waterproof connectors*

Tape the two connectors with at least one complete wrap of electrical tape around the connection point to prevent them from pulling apart. To separate the connectors, remove the tape, grasp them at the thickest part, place your thumbs against each other, and push apart until the connectors are disconnected. Never twist the connectors. Never pull them apart while holding onto the thinner part of the wire that is away from the connectors.

### 2.7.3 Opening the Helmet Breathing Gas Supply

Prior to turning on the air supply for the helmet, check to see that the defogger valve knob (34) is shut. If the regulator adjustment knob (120) is screwed out all the way, in its storage position, screw it in all the way. The umbilical air, or gas supply, is turned on slowly, pressurizing the side block assembly. Now unscrew the regulator adjustment knob until a slight steady flow is present, then turn it back in until it just stops, depress the purge button several times and ensure no free flow is present.

**⚠ CAUTION: KMDSI recommends when Dressing-In the Diver, a tender should assist. The tender should ensure the helmet liner is fastened to the helmet shell (A2.3 step 2.c.) and the chin strap is properly fastened under the divers chin once the helmet is donned, prior to Yoke/neck clamp assembly closure (A2.3 step 9). Make sure the chin strap is bolted directly to the helmet. This is standard on 17 A/B helmets starting in January 2004.**

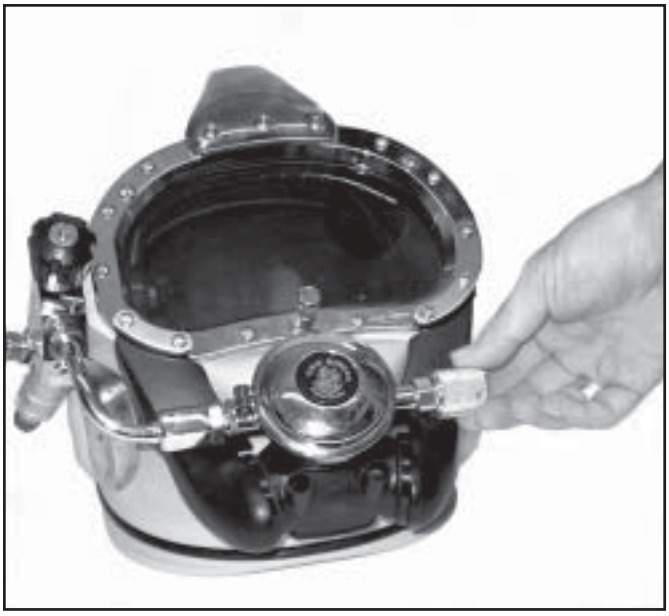


*Fig. 2.9 Screw in the regulator adjustment knob before you turn the air on to the helmet.*

***NOTE: The diver's "tender" is a surface member of the diving team who works closely with the diver on the bottom. The tender should be a qualified diver. When circumstances require the use of a non-diver as a tender, the Supervisor should ensure the tender has been thoroughly trained and instructed in the required duties which include; While dressing-in the diver the tender checks the diver's equipment and the topside air/gas supply for proper operation and assists the diver. Once the diver is in the water, the tender constantly tends the umbilical to eliminate any excess slack or tension. The tender also exchanges any line-pulls with the diver and keeps the Supervisor informed of any signs of emergency.***

### 2.7.4 Fogging Prevention

A thin film of anti-fogging solution may be applied with a soft rag or paper towel to the interior of the face port (143) prior to the dive to help prevent fogging during the dive. The diver should use whatever solution he has found satisfactory in the past. However, do not use any aerosol spray on the port lens. The propellants in some aerosol dispensers cause damage to the port lens.

**⚠ DANGER: Never use aerosol-propelled sprays near the face port of the SuperLite-17. 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.**

### 2.7.5 Donning the SL-17, utilize Appendix A2.3

If the yoke/neck clamp assembly (14) is connected to the helmet, it must be removed before you can don the helmet. To release the neck clamp, you must first remove the safety pin (18) that engages the latch catch assembly (22). Pull the pull pin knob (17) out, away from the helmet. While holding the knob out, lift the neck clamp handle (3) up and out to release the tension on the clamp. Swing the handle forward, toward the front of the helmet. Slide the yoke/neck clamp assembly backwards away from the helmet until the rear hinge tab (26) disengages from the alignment sleeve (88).

**⚠ CAUTION: KMDSI recommends when dressing-In the diver, a tender should assist. The tender should ensure the helmet liner is fastened to the helmet shell (A2.3 step 2.c.) and the chin strap is properly fastened under the divers chin once the helmet is donned prior to Yoke/Neck Clamp Assembly closure (A2.3 step 9). Be sure the chin strap is bolted directly to the helmet.**

**Diver** - To don the **yoke assembly**, hold the yoke/neck clamp in your hands in front of your body. Swing the neck clamp assembly (7) up towards your chest. Lift the entire unit over your head until the opening for the yoke (31) is positioned at the back of your neck. Slide the yoke forward until it is centered on your neck.

*Fig. 2.10 Lift the yoke/neck dam over your head*

**Diver** - Reach over your head and insert the four fingers of each hand in the opening of the neck dam (2). Keep your thumbs on the outside of the neck dam. Spread the neck dam by pulling against the palms of each hand. Pull the neck dam over your head.

*Fig 2.11 Don the neck dam by carefully pulling it over your head.*

Tender - Ensure the neck dam is turned so that the top edge is up and folded down (out) away from the divers neck.

**⚠ WARNING: The neck dam must always be turned up and folded out, away from the divers neck. This is essential. With the neck dam turned in, the helmet will vent air from the neck dam causing the regulator to free flow. This will make the helmet very uncomfortable and could lead to a rapid depletion of the breathing supply when using bottled breathing gas. Always keep the neck dam turned up and folded out, away from the divers neck.**

***NOTE: Tender, ensure the nose clearing device knob is "pulled out" fully prior to placing the helmet on the divers head.***

**⚠ CAUTION: KMDSI recommends when Dressing-In the Diver, a tender should always be present to assist. The tender should ensure the helmet liner is fastened to the helmet shell (A2.3 step 2.c.) and the chin strap is properly fastened under the divers chin once the helmet is donned prior to Yoke/neck clamp assembly closure (A2.3 step 12).**

**Tender** - Assist the diver with this portion of dressing-in.

**Diver**- Place the helmet face port down and locate the tab on the end of the chin strap of the head cushion (1). Loosen the tab completely. Grab the base of the helmet with both hands while you hold the head cushion open. Lift the helmet over your head and carefully lower it.

*Fig. 2.12 Adjust the neck dam so that it is turned up and out.*

*Fig. 2.13 Locate the end of the chin strap.*

**Diver** - Push your head into the rear of the helmet.

**Diver** - Pull the helmet down and from side to side until it is comfortable on your head. Position the neck strap under your chin.

*Fig. 2.14 Grab the head cushion and spread it while grasping the side of the helmet and holding the chin strap.*

*Fig. 2.15 Lift the helmet over your head.*

**Tender** - Pull the strap down and back towards the divers right until it is snug, but comfortable. Reach up inside the helmet and fasten the strap under the divers chin by attaching it to the Velcro® tab on the right side of the head cushion. Take care to prevent the end of the strap from becoming fastened between the helmet shell and the neck dam. Tucking the end into the helmet will ensure this. Make sure the chin strap bolts directly to the helmet. If not, replace it at the earliest opportunity.

**⚠ CAUTION: Be sure to fasten the chin strap. If the chin strap is not fastened properly, the helmet will float up on the diver's head. This can make the helmet very uncomfortable.**

**Tender** - Assists diver with this portion of dressing-in.

**Diver** - Tilt your head back and push the entire yoke/neck clamp assembly backwards on your neck. This is to engage the hinge tab on the alignment sleeve. The front edge of the neck clamp (7) should be under and past the front edge of the helmet.

**Diver** - Keep your head tilted back, and lift the front of the helmet up with one hand.

**Tender** - Find the rear hinge tab (26) on the back of the yoke. Lift the rear hinge tab out away from the helmet and up until it can slide over the alignment sleeve on the back of the helmet. Slide the tab over the sleeve.

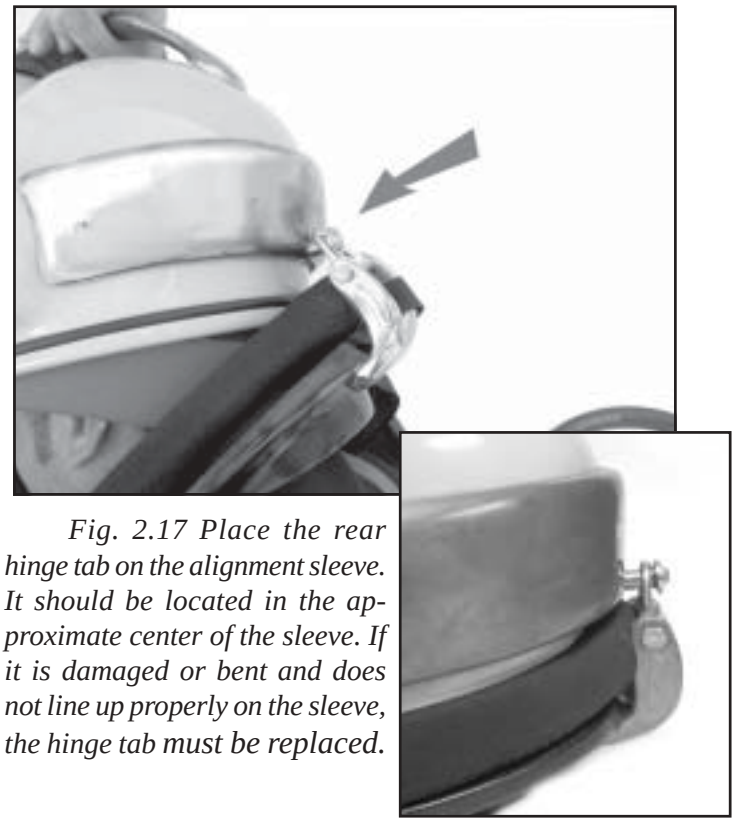


*Fig. 2.17 Place the rear hinge tab on the alignment sleeve. It should be located in the approximate center of the sleeve. If it is damaged or bent and does not line up properly on the sleeve, the hinge tab must be replaced.*

**⚠ DANGER: If the hinge tab is not mounted on the alignment sleeve correctly, the yoke/neck clamp assembly could come off. Helmet flooding, drowning and death may result.**

**Tender** – Grasp the handle on the neck clamp assembly and swing it to the diver's right. This action will open the clamp fully.

While the diver holds the helmet down, push up on the neck clamp assembly (see above) until the clamp is completely seated against the bottom of the helmet. **DO NOT USE THE HANDLE AS A LEVER TO LIFT THE CLAMP**. This will damage the clamp mechanism.

While maintaining pressure on both the helmet and the clamp, swing the clamp handle to the diver's left until it passes "over-center" and closes. Open the latch catch assembly by pulling out on the pull pin.

Lift up on the yoke assembly until the latch catch engages the bail on the neck clamp handle, and release the pull pin. The spring loaded pull pin should bottom in the latch catch assembly capturing the handle bale. The helmet is now locked into place and the diver can test the breathing system properly.

***NOTE: If you are ready to dive, ensure the tender installs the safety pin before you enter the water.***

If used, the yoke strap (168) is now placed over the top of the helmet (but under the handle) and secured in place. The yoke strap is standard on all 17 A/B helmets shipping after January 2004. It's use is strongly recommended.

**⚠ DANGER: KMDSI highly recommends the utilization of the safety pin part # 540-080. This pin is inserted just below the cam-lock bail. If a safety pin is not used, there is a possibility the clamp on the yoke latching system could be inadvertently opened during the course of the dive by unintentional depression of the "old style" plunger lock. Helmet flooding, drowning and death may result.**

KMDSI recommends that all old style "push style" pin latch catch assemblies be replaced with new Pull Pin Latch Catch part# 505-010 (see page 7, Chap. 1). The old push-pin latch catch assemblies are no longer available nor are replacement parts. Additionally the pull type latch catch should also employ the use of the safety pin to avert accidental opening of the latch catch during diving operations. Additional guidance is available by contacting Dive Lab Inc. at (850) 235-2715 or E-Mail DiveLab@aol.com

*Fig. 2.21 The diver must satisfy himself that the helmet is operating properly.*

### 2.7.6 Testing the Breathing System

Test the defogger system by turning on and off the defogger control knob (34). It should not leak. The regulator should be adjusted by turning the adjustment knob (120) 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, back out on the adjustment knob (120) if necessary. Press in on the purge button (123d) in the regulator cover (123b). This should produce a strong burst of breathing gas.

## 2.8 Diving Procedures

### 2.8.1 Standing By to Dive

The diver may wear the neck dam ring assembly without discomfort if he is standing by to make a dive. However, the helmet itself must always be the last thing put on before the diver enters the water. Everything else must be ready to go before the diver puts the helmet on so he won't have to support the weight of the helmet while out of the water.

**⚠ CAUTION: KMDSI recommends when dressing-In the diver, a tender should assist. Once the helmet is donned and prior to Yoke/neck clamp assembly closure (A2.3 step 12), the tender should ensure the helmet liner is fastened to the helmet shell (A2.3 step 2.c.) and the chin strap is properly fastened under the diver's chin with no strap sticking out.**

### 2.8.2 Attaching the Umbilical to the Harness

The umbilical must now be hooked to the diver's harness by means of a suitable clip or shackle that is bound to the umbilical. Some divers and companies prefer a quick release clip and others prefer a clip or shackle that is screwed together so the diver cannot easily remove it from his harness. The securing of the umbilical keeps the pull of the hose at the diver's harness and not on the helmet.

**⚠ WARNING: Never dive without attaching the umbilical to some type of harness assembly. Never allow the umbilical to pull on the helmet directly, or the diver could suffer a neck injury.**

### 2.8.3 Diver Dons Helmet

The diver dons the helmet as per Section 2.7.5. Make sure the yoke strap (167-168) is fastened if used.

### 2.8.4 Diver Check Gas Flow Systems

The diver must check out the breathing system himself as the tender finishes dressing him. Operate the defogger valve, the demand regulator, and the purge button to assure proper operation before entering the water.

### 2.8.5 Communications Check

The communications system, sending and receiving, must be checked at this point.

*Fig. 2.23 Be sure to check the communications again once the diver has donned the helmet.*

### 2.8.6 Diver Ready, Supervisor utilize appendix A2.4

The diver is now ready to enter the water. He should be assisted to the water, if needed, by the tender. If a welding lens or shield is being used, make sure it is hinged up all the way and the diver holds the lens if the diver is making a jump entry. We do not recommend jump entries when using a welding lens or shield. A quick overall inspection by the supervisor or his designate is done and the diver is given the OK.

### 2.8.7 Water Entry and Descent

The tender must make sure there is a sufficient length of umbilical clear if the diver is using a jump entry and there are no obstructions the diver may land on. There must be no chance of the umbilical hanging up when the diver jumps. Also, the defogger valve may be turned on to overpressure the helmet to help prevent the possibility of water pressure inverting the helmet exhaust valve when hitting the water on a jump entry.

***NOTE: Supervisor utilize appendix A2.5***

The diver must check in with the surface immediately after the entry. It is a good policy to descend 10 or 20 feet (3-6 MSW), pause to conduct in-water checks i.e. check helmet integrity, check the suit for leaks and inflation valve (if applicable), readjust second stage regulator breathing resistance using the regulator adjustment knob (120) to ensure proper adjustment for the least breathing resistance.

***NOTE: The purpose of this adjustment knob is to allow the diver the ability to compensate for variations in umbilical supply pressure. This adjustment device operates by simply increasing or decreasing the amount of spring bias tension on the demand regulator inlet valve. The intent of this bias adjustment device is strictly to allow the diver to make adjustments for variations in umbilical supply pressure. This adjustment device is not intended as a minimum-maximum device. Minimum and maximum applies to supply pressure only. The adjustment knob should be adjusted by the diver to be at the easiest breathing setting at all times. Diving a KMDSI helmet or band mask with a bias setting greater than that just necessary to keep the demand valve from free flowing increases the work of breathing and reduces the diver's ability to perform heavy work.***

Communicate with the surface, and then descend to the job. If a bell is being used, after the bell is at depth, the diver enters the water and pauses for a short time outside the trunk until he is sure all systems are operating properly.

During the descent the communications must be checked again. It may be necessary to readjust the demand regulator by means of the adjustment knob (120) during descent. The demand regulator should always be adjusted for maximum ease of breathing, just short of having the regulator free flow for existing conditions.

## 2.9 Emergency Procedures

### 2.9.1 Flooding

In the unlikely event of partial or complete flooding, the diver may clear the helmet quickly by getting the helmet in an upright position (normal working position) and opening counterclockwise the defogger control knob (34) or by pressing in on the manual purge button in the center of the regulator cover.

The main helmet exhaust valve (or water dump) (150-153) is located at the bottom front of the SuperLite-17. The opening in this valve is much larger than the opening in the regulator exhaust valve and provides a rapid means of purging water from the helmet.

After clearing, cautiously check for additional flooding. If the helmet continues to take on water, return to the diving station, walking or swimming with the exhaust valve positioned at the lowest part of the hat: i.e., closest to the bottom of the lake, river, or ocean. Keep the free flow knob on with only enough flow to keep the water out. This increases the air/gas pressure slightly inside the hat and keeps the water out. Any incoming water is automatically ejected.

### 2.9.2 Inhalation Resistance

If breathing becomes difficult, adjust the regulator by turning the adjustment knob out counterclockwise. At some point, the regulator will start free flowing. Turn the knob back in 1/2 turn at a time until the free flow stops. If breathing did not get noticeably better or the regulator did not start free flowing after being adjusted out 2-3 turns, notify topside and have them check the supply pressure. Next, press the purge button in the regulator cover. If a surge of gas does not flow with this action, go on EGS by opening EGS Control Valve (50), notify topside "on EGS" and prepare to abort dive. NOTE: Always notify topside whenever you go on EGS. Return to the diving station after ensuring your umbilical is not tangled.

***NOTE: If umbilical supply has been lost, insure that the defogger valve control knob (34) is shut and open EGS helmet supply valve using the EGS control knob (55).***

### 2.9.3 Loss of Umbilical Pressure

Loss of umbilical pressure can be caused by a topside loss due to valve misalignment, component failure or due the umbilical being pinched by a heavy object. If the umbilical gets pinched in the water near the diver, the loss will be sudden because there is very little volume. If the loss is topside the diver may notice the breathing resistance slowly increasing. The most dangerous loss is at the diver where there will be little or no warning. In the event of a sudden loss of gas the diver will be unaware until he or she goes to inhale at which point there may be very little or no air available to breathe. For this reason it is important that the diver always has a fully operational EGS lined up to the emergency gas valve on the side block. In the event umbilical supply is lost the diver must first open the Emergency Valve (50) by opening the EGS Knob (55) and notify topside. If there is still no flow from the demand regulator, the Side Block Defogger Valve Control Knob (34) must be opened. Keep in mind that if the defogger valve is left open, the EGS cylinder will be expended very quickly, particularly if the diver is deep.

Immediately return to the diving station using the Emergency Gas Breathing Supply. Avoid making a rapid ascent if at all possible.

**⚠ DANGER: Rapid ascent is dangerous. It can lead to air embolism and/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 he is in immediate danger of death by drowning or asphyxiation.**

**⚠ DANGER: Always provide a passageway for air/breathing gas to escape your lungs during any ascent. Exhale or breathe normally - never hold your breath underwater.**

Once at the surface, or inside the bell, the diver may remove the helmet if needed.

**⚠ DANGER: Ditching the helmet underwater must be avoided in all but the most extreme circumstances. If the diver ditches the helmet underwater he will not be able to see. 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 underwater unless you are completely out of breathing gas and it is impossible to return to the surface due to entanglement of your equipment or similar circumstances.**

### 2.9.4 Demand Regulator Free Flow

If the demand regulator free flows, adjust the knob (120) in (clockwise) until it stops. If it cannot be stopped, and the flow is strong, the dive should be aborted. Even if there is no serious problem to the diver, communications will be very poor.

### 2.10 Post Dive Procedures,

Utilize appendix A2.6

### 2.10.1 Removing the Equipment

After the diver is well clear of the water the helmet may be removed. If the diver is working out of a stage, the helmet should not be removed until the stage is on deck.

**⚠ DANGER: Never remove the diving helmet while you are on the stage. If you fall off the stage with the helmet off but still attached to your harness, serious injury or death may result.**

### 2.10.2 Removing the SuperLite-17 A/B

On the SuperLite-17 A/B, the tender must first remove the safety pin before you can remove the helmet. Slide the pin out and away from the latch catch. If the yoke safety strap is used, release it now.

**Tender** - Pull out on the pull pin knob (17) on the latch catch assembly and let the yoke fall away. Next grab the handle on the neck clamp assembly (7) and pull outwards away from the helmet, until the handle is in front of the divers face. This action will break the seal of the neck dam around the base of the helmet and the neck dam and

clamp will fall away from the bottom front of the helmet.

**Tender** - While having the diver tilt his head back, reach behind the back of the helmet and lift the rear hinge tab (26) off the alignment sleeve (88) in the back of the helmet. Reach underneath the front of the helmet and loosen

the chin strap that holds the helmet in position.

**Diver** -Lift the helmet over your head with both hands, one on either side of the helmet to support its weight.

**Tender** - After the helmet is removed, the tender takes it from the diver and carefully lays it aside, on a soft surface, such as coil of umbilical.

**Diver** - Reach in and spread the neck dam, pulling against the sides of the neck dam with the palms of both hands. Lift the neck dam over your head. Slide the yoke backwards away from your neck to remove it. The diver's harness and EGS cylinder is then removed.

### 2.10.3 Storage of the Helmet Between Dives, ensure A2.6 is accomplished.

If the helmet is not going to be used for a period of time, the head cushion, should be removed. The head cushion must be dried and replaced in the hat before storage. The regulator adjustment knob (120) must be rotated (unscrewed) all the way out (counterclockwise) until the next dive. When the helmet is completely dry, or the diver is ready to leave the job, the helmet should be stored in the carrying bag to protect it.

Always place the yoke/neck clamp on the bottom of the SuperLite-17 to protect the bottom edge of the helmet from damage.

If the head cushion becomes wet it may be dried out by removing it from the helmet, squeezing excess water out, and letting the head cushion hang dry or putting it in a clothes drier.

**⚠ WARNING: Use only the air-dry setting when drying head cushion foam in a drier. Use of a higher setting could cause the foam to melt or start a fire.**

***NOTE: Prior to removing a KMDSI helmet from storage for use, review applicable maintenance log to ensure proper start-up maintenance is performed.***

# Notes

# SECTION 3.0
# TROUBLESHOOTING

## 3.1 GENERAL

The SuperLite-17 A/B is a highly reliable diving helmet which should not malfunction if proper preventative maintenance procedures are followed. Most problems encountered in using the helmet can be easily remedied. The following information covers most potential operating difficulties.

## 3.2 COMMUNICATIONS MALFUNCTION

| SYMPTOMS | PROBABLE CAUSE | REMEDY |
|---|---|---|
| **No sound at either com box or helmet.** | **Communication box not on.** | **Activate switch and adjust volume.** |
| | Communications incorrectly hooked up. | Switch terminal wires. |
| | Communications not hooked up. | Plug into terminals. |
| | Communicator not functional. | Replace communicator. |
| | Communicator Battery Dead | Replace Battery |
| **Communications weak or broken up.** | **Terminals in helmet covered with corrosion.** | **Clean terminals (154) with wire brush to bright, shiny metal.** |
| Communications only work when wire is wiggled back and forth. | Break in diver's communication wire. | Splice wire if damage is minor. Replace wire if damage is major. |
| **Communications only work when connector (165) is wiggled back and forth.** | **Break in waterproof connector.** | **If connector is suspect, remove from line and test line for integrity prior to replacing connector.** |
| Diver speech weak or not working. | Microphone in helmet damaged/dead. | Replace microphone as per manual. (Section 7.8.3 ) |

## 3.3 ONE WAY VALVE MALFUNCTION

| SYMPTOMS | PROBABLE CAUSE | REMEDY |
|---|---|---|
| **One way valve (68) allows back flow.** | **Foreign matter in valve or dry valve due to lack of lubrication.** | **Disassemble valve, clean, and rebuild. (Section 6.2)** |
| One way valve doesn't flow any gas. | Foreign matter in valve or excessive corrision causing valve to stick. | Disassemble valve, clean, and rebuild. (Section 6.2) |
| | **No gas flow through umbilical.** | **Turn on gas supply.** |

## 3.4 SIDE BLOCK MALFUNCTION

| SYMPTOMS | PROBABLE CAUSE | REMEDY |
|---|---|---|
| **Defogger valve can't be shut off. Helmet free flows through defogger.** | **Seat assembly (41) damaged.** | **Replace seat assembly.** |
| | Possible nick in Block Seat | Replace Block |
| **Defogger valve will not flow gas.** | **No air in umbilical.** | **Turn air on to diver's supply topside.** |
| Defogger valve will not flow gas. | Foreign matter in side block (43a/b), or one way valve (68). | Disassemble side block and clean. |
| **Defogger valve knob (34) hard to turn.** | **Valve stem (40) bent.** | **Replace valve stem.** |

## 3.5 DEMAND REGULATOR MALFUNCTION

| SYMPTOMS | PROBABLE CAUSE | REMEDY |
|---|---|---|
| **Regulator (138a/b) continuously free flows.** | **Adjustment knob (120) not screwed in.** | **Screw in adjustment knob.** |
| | Supply pressure too high. | Adjust supply pressure lower than 225 P.S.I. (Section 1.4) |
| | Regulator out of adjustment. | Adjust regulator. (Section 6.8.10) |
| **Regulator (138a/b) continuously free flows when underwater only.** | **Neck dam (2) turned down.** | **Neck dam must be turned up.** |
| | Hair caught between base of helmet (92) and yoke/neck clamp. | Clear hair out. |
| | Neck dam torn. | Repair or replace neck dam. (Section 7.9.4) |
| | Improperly adjusted regulator. | Adjust to stop freeflow. |
| **Regulator is hard breathing.** | **Adjustment knob screwed too far in.** | **Screw adjustment knob out.** |
| Regulator does not supply gas. | Gas supply pressure too low. | Increase supply pressure to minimum of 115 PSI over ambient. (Section 1.4) |
| | Regulator is out of adjustment. | Adjust regulator. (Section 6.8.10) |
| | No gas in umbilical. | Turn diver's gas supply on topside. |
| | Blockage in breathing system. | Disassemble regulator, clean, and adjust. (Section 6.8.10) |

## 3.6 WATER LEAKAGE INTO HELMET

| SYMPTOMS | PROBABLE CAUSE | REMEDY |
|---|---|---|
| **Water leakage into helmet.** | **Water Dump valve (15), damaged or stuck open or dirty/corroded seating surface.** | **Seat or replace valve. (Section 6.11)** |
| | Exhaust valve (137) damaged or stuck open or dirty/corroded seating surface. | Seat or replace valve. (Section 6.8.2) |
| | **Waterproof connector O-ring (160) extruded or damaged** | **Replace O-ring (Section 7.8.5)** |
| | Diaphragm (122) damaged or not seated properly. | Seat or replace diaphragm. (Section 6.8.2) |
| | **O-ring (80) at base of helmet damaged or missing.** | **Replace O-ring (Section 5.3.1)** |
| | Port reatiner screws (104) loose. | Torque Screws. (Secton 7.7.3) |
| | **Neck dam (2) torn.** | **Repair or replace neck dam. (Section 7.9.4)** |
| | Hair caught between base of helmet (92) and yoke/neck clamp. | Remove hair from this space. |
| | **Water Movement i.e. current of pneumatic tools interfering with normal exhaust valve operation.** | **Recover Diver, refer to Section 1.4 for guidance.** |
| | **Neck Clamp requires adjustment due to neck dam aging or clamp used on a different helmet.** | **Readjust Neck clamp assembly (Section 7.9.3.1)** |

## 3.7 EGS VALVE MALFUNCTION

| SYMPTOMS | PROBABLE CAUSE | REMEDY |
|---|---|---|
| **Bail out bottle drained without diver opening valve (58).** | **Stem (51) fails to seat in valve body (50).** | **Replace valve body.** |
| | Leaking over-pressure valve on bail-out regulator. | Service valve. |
| | **Leaking bail-out regulator on bottle.** | **Service regulator.** |
| Stem (51) difficult to turn. | Stem (51) bent. | Replace stem. |
| **Valve (58) will not flow gas.** | **Foreign matter in valve.** | **Disassemble, clean, reassemble.** |

# SECTION 4.0

# INSPECTION MAINTENANCE TIMETABLE FOR SUPERLITE-17 A/B

The following service intervals are recommended minimums for helmets being used under good conditions. Helmets used in contaminated water, burning or welding operations, or heavy jetting must be serviced more frequently.

## 4.1 DAILY MAINTENANCE

Use Appendix A2.6 SL 17-B Post Dive Cleaning Maintenance and Inspection.
See Section 5.4 for additional details of daily maintenance.

## 4.2 MONTHLY MAINTENANCE

Use Appendix A2.2 Monthly Helmet Inspection.
See Section 5.5 for additional details of monthly maintenance.

## 4.3 ANNUAL OR 400 OPERATING HOURS

Use Appendix A2.1 SL 17-B Recommended Annual Maintenance, Inspection and Overhaul

# NOTES

# Section 5.0
# General Preventative Maintenance

Part #525-360
SL 17 A/B Soft Goods Overhaul Kit

*Fig. 5.1 -Tools required to do proper maintenance on the SuperLite-17*

| Part # | Description | Qty | Location |
|---|---|---|---|
| 510-550 | Valve, Oral Nasal | 1 | 84 |
| 510-552 | Exhaust Valve | 1 | 137 |
| 510-553 | Diaphragm | 1 | 122 |
| 510-561 | Valve, Main Exhaust | 1 | 151 |
| 510-580 | Seat, Inlet Valve | 1 | 134a |
| 510-776 | Tri-Valve Exhaust | 2 | 140e |
| 520-030 | Washer | 1 | 35 |
| 520-031 | Washer | 1 | 38 |
| 520-032 | Washer | 1 | 117 |
| 520-752 | Tie Wraps | 6 | 140f |
| 525-301 | O-Ring Kit, SL 17 A/B | 1 | N/A |
| 525-330 | One-Way Valve Kit | 1 | N/A |
| 530-303 | Lock Nut | 1 | 126 |
| 530-320 | Lock Nut | 1 | 6 |
| 530-601 | Retaining Pin | 1 | 16 |
| 540-095 | Packing Washer | 1 | 52 |

## 5.1 Introduction

This section covers the preventative maintenance necessary on the SuperLite-17 helmet. A helmet that is kept clean and in good repair will offer far better service to the user. This helmet is designed for easy access to all areas for proper inspection and servicing. Numbers appearing in parentheses below are “location” numbers that are used in the blow-apart illustration at the end of this manual.

## 5.2 Required Tools, Cleaning Agents, Lubrication

All Kirby Morgan Helmets and Masks are designed with the professional diver in mind. Most maintenance and repairs can be performed using common tools and this manual. All owners/users should know how to perform inspections and basic adjustments. KMDSI highly recommends persons performing repairs and overhauls be trained and certified as KMDSI technicians. There are some repairs however, that should only be accomplished by KMDSI trained and authorized repair technicians.

Fiberglass repairs as well as helmet neck ring, and face port inserts should only be performed by KMDSI technicians that have been trained and certified. For technical assistance please telephone your nearest authorized dealer or call KMDSI at (805) 928-7772 or Dive Lab at (850) 235-2715.

Every diver should have access to sufficient tools and spare parts to maintain his helmet 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 some parts. The following wrenches and tools are required to maintain the SuperLite-17:

**Torque wrench with the following attachments:**
1 3/8 inch socket
7/16 inch open-end wrench
9/16 inch open-end wrench
5/8 inch open-end wrench
11/16 inch open-end wrench
3/4 inch open-end wrench
13/16 inch open-end wrench
7/8 inch open-end wrench
1 inch open-end wrench

**Torque screwdriver with the following attachments:**
1/8 inch flat blade screwdriver
1/4 inch flat blade screwdriver
3/8 inch flat blade screwdriver
#2 Phillips blade screwdriver
7/64 inch Allen wrench driver
9/64 inch Allen wrench driver
5/32 inch Allen wrench driver

**Open-end wrenches in the following sizes:**

3/8 inch 7/16 inch
9/16 inch 3/4 inch
7/8 inch 1 inch

Two adjustable wrenches 6 and 8 inches in length.
3/8 inch flat blade screwdriver with a notch in the center of the tip.
1/4 inch flat blade stubby screwdriver
2 needle nose pliers
diagonal cutting pliers
slip joint pliers
3/32 inch punch
putty knife
O-ring removal tool
KMDSI regulator repair tools: Part #525-620
ball peen hammer

Consumable Items
11 inch by 3/16 inch tie wraps
Silicone grease, Dow Corning 111®
Oxygen compatible lubricants such as Christo Lube ™ Halocarbon® or Krytox ™
Loctite® 222 Thread locker
#320, 400, 600-wet/dry sandpapers
rubbing compound
automotive wax rags
Hand Dishwashing detergent
White Vinegar
Fresh Water
Brass Tooth Brush Type Brush
3/8" Tube Brush
Cleaning Cloths

***NOTE: All parts on the helmet that require lubrication must be lubricated sparingly with the appropriate lubricant. DO NOT USE AEROSOL SPRAY LUBRICANTS. Many aerosol propellants will damage plastic. Avoid lubricant contact with plastic parts/components. Food grade silicone grease on all non-gas transporting components is acceptable. KMDSI recommends Dow corning 111 or equivalent. KMDSI strongly recommends using Christo Lube ™ for aIl gas system lubrication. If the helmet is intended to be used with breathing mixtures greater than 50% oxygen, it should be cleaned for oxygen service, and components requiring lubrication should be lubricated with a suitable oxygen compatible lubricant such as Christo Lube ™ Halocarbon Flourolube® or Krytox ™. Silicone grease is not recommended for helmets used with oxygen. (Avoid mixing lubricants to preclude incompatibility).***

**⚠ DANGER: All SuperLite 17A/B parts must be adjusted to their proper torque specifications. See Appendix 1 for a complete listing of torque specifications for each part. Failure to use the recommended torque specifications could lead to helmet failure and accidents. This could result in serious injury or death.**

**⚠ DANGER: Never use aerosol-propelled sprays on or near the helmet or helmet components. The propellants used in these aerosols can invisibly damage the polycarbonate 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.**

**⚠ DANGER: The standard SuperLite 17A/B is not intended for oxygen service as it comes from the factory. If the user intends to use this helmet for such service, all parts must be cleaned for oxygen service, and gas transporting components requiring lubrication should be lubricated sparingly with an oxygen compatible lubricant such as Christo Lube ®, Flourolube ® Or Krytox ®. Care must be taken to avoid contamination of gas system components during use when air is used as a breathing media.**

**Teflon Tape:**

The pipe thread fittings used on the umbilical adapter (67) and the emergency gas valve (50) are the only fittings that require sealing with Teflon tape. The use of liquid sealants is not recommended. However, if they are to be used, they should be used sparingly. When sealing using Teflon tape on pipe threads, apply the tape starting one thread back from the end of the fitting. Apply the tape in a clockwise direction under tension. 11/2 wraps are all that is needed. The use of more than 11/2 wraps could cause excess Teflon tape to travel into the breathing system. Companies or organizations that do not allow the use of Teflon Tape, should substitute the tape with an oxygen compatible sealing compound that is recognized by industry for such use.

**⚠ DANGER: Do not allow excess Teflon tape to cover the end of the pipe thread fittings. Loose pieces of Teflon tape can interfere with the performance of helmet components and may block the diver's air supply. This could lead to death through suffocation.**

**RTV Sealant:**

Certain components used in KMDSI helmets and masks use RTV adhesive / sealant to provide bonding and sealing. KMDSI recommends Dow Corning ™ RTV 732-multi-purpose sealant or equivalent. When sealant is applied, the user must use care to ensure excess sealant is wiped clean so as not to interfere with other components. Sealant should be allowed to cure for 24 hours before equipment is used.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**Thread Locker:**
KMDSI recommends Loctite ™ 222 as the thread-locking compound that should be used on components that call for a thread locker. Other non permanent thread lockers may also be used. Threads should be clean and dry prior to applying thread locker. Ensure that all excess thread locker has been removed. Allow thread locker to cure for at least 3 hours prior to using the component.

## 5.3 General Cleaning and Inspection Procedures

Each diver must establish minimum standards for the care of his/her helmet. We offer recommendations with the suggestion that the divers establish for themselves what is necessary to provide a good working unit. Use of the helmet in fresh water will require a timetable for maintenance procedures different from that when the helmet is used in salt water. Using the helmet in seawater while jetting, cutting or burning will necessitate increased maintenance. Use of the helmet in a heavy oil environment or other chemicals will make it necessary to replace rubber parts whenever necessary to assure proper function. Regardless, all 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.

***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 helmet/neck dam yoke as soon as feasibly possible, followed by a vigilant inspection of the interior of the helmet to ensure that no contaminant has entered. Pay particular attention to the following parts prior to re-use; whisker (139), demand regulator diaphragm (122), demand regulator exhaust valve (137), exhaust valve (151), Tri-Valve Exhaust Valve(s) (140e), communications post(s) (154) or communications connector assembly (164), neck dam (2) if applicable, [for 17a, regulator hose (47a).***

**⚠ 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 usage of them may result in injury or death to personnel and damage to equipment.**

**⚠ CAUTION: 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.**

**⚠ CAUTION: Cleanliness is imperative in maintaining and handling the SL17-A/B. 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.**

### 5.3.1 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 detergent solution.***

**O-Ring Removal:**
Do not use screwdrivers or 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 from an O-ring removal kit (brass pick). A plastic cable tie makes an effective O-Ring removal tool. Use of an appropriate tool helps prevents 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 must be replaced whenever scheduled overhauls are being completed. The Large O-ring at the base of the helmet can remain in service as long as inspection reveals no damage or deterioration. During routine repairs or maintenance in between the overhauls, O-rings and soft goods may be reused providing after cleaning a careful inspections reveals no wear or damage.

Place the O-rings in a cleaning basin, cover with mild detergent 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.

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

**O-Ring Lubrication:**
The SL17-A/B was designed to operate with only minimal lubrication of O-rings. Excess lubrication will cause accumulation of dirt or loose particles in the O-ring groove that can cause leaks in the seal and damage to the O-ring, reducing its life. All O-rings for non-breathing air/gas applications can be lubricated with a food grade silicone grease or oxygen compatible lubricants. KMDSI recommends Dow Corning 111® for breathing air service or on all non-gas transporting components. For breathing gas applications using mixed gas at oxygen concentrations greater than 50%, KMDSI recommends oxygen compatible lubricants such as Christo Lube ™ Halocarbon® or Krytox ™. While wearing clean (hydrocarbon free) latex gloves, place a small amount of lubricant between thumb and index finger (doubling over larger O-rings) and pull the O-ring between your fingers to spread the lubricant. Always avoid mixing different brands/types of lubricants to preclude incompatibility. Use strict care to keep parts clean to avoid introducing contaminants or foreign substances. Helmets intended for use in oxygen mixtures greater than 50% should be cleaned for oxygen use and software lubricated with only oxygen compatible lubricants.

### 5.3.2 General Cleaning Guidelines

Cleaning and sanitizing of the SL17-A/B 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 uses by different users during the same operation.***

#### 5.3.2.1 Detergent Solution for General Cleaning and Leak Detector Use

Maintenance procedures include cleaning with a general-purpose detergent solution of a mild diluted hand dishwashing detergent such as Joy® or Palmolive®. Cleaning solution is prepared by mixing approximately one teaspoon of detergent 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 detergent 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 detergent used, all components must be thoroughly rinsed post cleaning to remove all traces of detergent.

#### 5.3.2.2 Acidic Cleaning Solution and Procedures

Metal parts that have visible corrosion should first be cleaned using the detergent 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 will be best to replace the components.

#### 5.3.2.3 Germicidal Cleaning Solutions and Procedure

Sanitizing of the oral-nasal mask/regulator of SL17-A/B-A/B is accomplished using one of four approved germicidal cleansing solutions. There are four examples of solutions shown below, along with the necessary ordering information and mixing instructions.

***NOTE: Ensure helmet liner and cushion are 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

**⚠ 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.**

**Sanitizing Procedure:**
Unless otherwise directed, use the following procedure to disinfect the SL17-A/B 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 period. KMDSI defines "A mission is defined as use of the SL17-A/B over a seven-day period."***

### 5.4 Daily Maintenance/Lubrication
### Utilize in conjunction with Appendix A2.6

Silicone Grease Dow Corning 111® or lubricants such as Christo Lube ™, or Krytox ™

The following steps must be performed daily at the completion of diving operations.

1) Disconnect the helmet from the diving hose and EGS cylinder. Make sure the air is off and the breathing system of the helmet is unpressurized. To vent the system, open the defogger valve knob (34) and Emergency Gas valve knob (55) until all gas flow stops.

**⚠ WARNING: Never disconnect any hose from the helmet unless all gas has been vented. Disconnecting a pressurized hose can result in serious injury.**

2) Place a protective cap over both the air inlet (67) and the Emergency Gas Valve inlet (50) to prevent foreign matter from entering the valves.

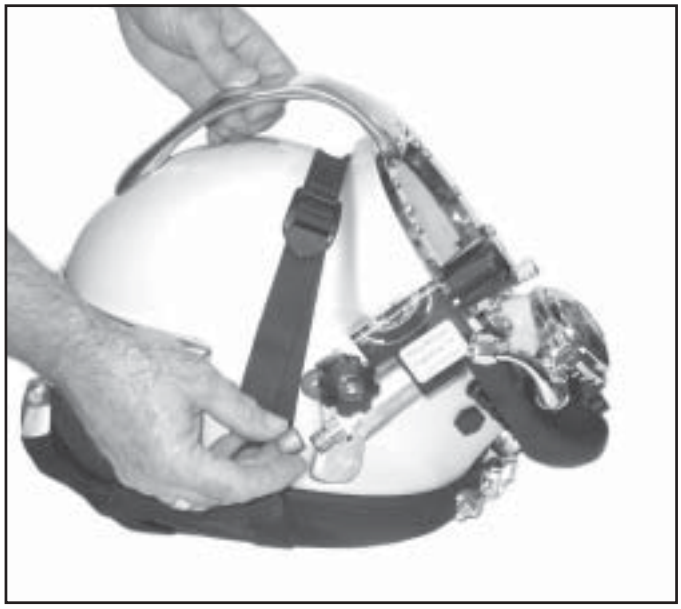
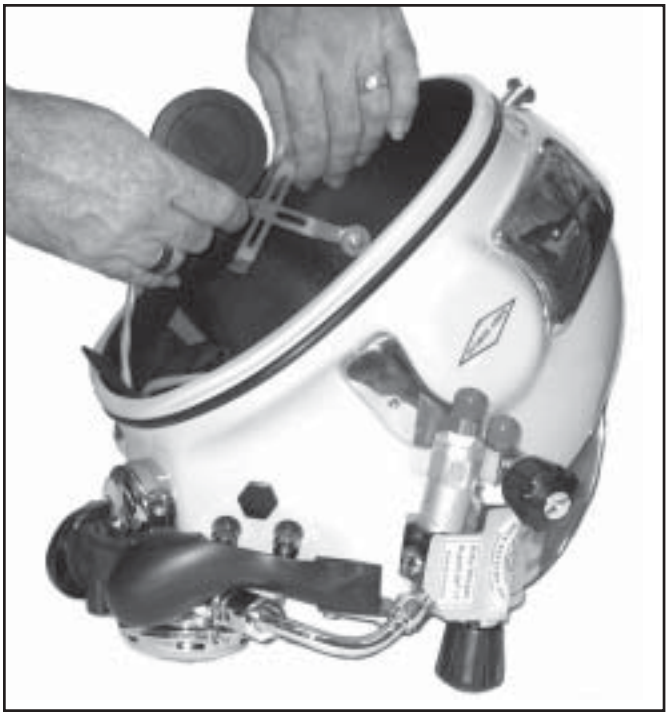


*Fig. 5.2 Cover the air inlet and auxiliary valve openings with dust caps when not in use.*

3) If the head cushion is wet, remove it from the helmet and rinse it with fresh water. Squeeze excess water out and let the cushion air dry or put it in front of a fan to accelerate drying. The head cushion is fastened into the helmet with snap tabs and pulls out easily. To ensure that the head cushion is dry for future use, you may want to remove the head cushion foam.

*Fig. 5.4 Remove the foam from the head cushion if it is wet.*



4) Remove the earphones (71,72) from the retainer clips (147).

Remove the earphone covers from the earphones so they can dry completely.

5) Rinse the helmet thoroughly with fresh water. Avoid getting water on the oral nasal microphone and earphones. **Do not** depress the purge button (123d) while rinsing the regulator, as this action will permit foreign matter back into the inlet valve and seat. Turn (exercise) the defogger valve knob (34), Emergency Gas Valve knob (55), and regulator adjustment knob (120) while rinsing to prevent salt from accumulating under these valves. Run water under the regulator cover (123) and in the regulator body (112) through the air delivery tube located in the oral nasal (83).

6) Wipe the inside of the helmet with a clean, damp rag.

7) Rinse the yoke/neck clamp assembly separately from the helmet. Operate the neck clamp and actuate the latch catch mechanism as you run fresh water over them.

8) Screw the demand regulator adjustment knob all the way out, away from the regulator body. This will prolong the life of the inlet valve seat on the valve stem (134) and help keep the internal adjustment correct.

9) If the shaft of the nose block device (86) appears dry or stiff, lightly lubricate the shaft .

10) Remove the O-ring (80) from the base of the helmet, clean and lubricate per Section 5.3.1. Clean the groove with a soft brush.

11) If the neck dam is damaged (2) it must be replaced per Section 7.9.4.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## 5.5 Monthly Maintenance, (or Between Jobs) Utilize in conjunction with Appendix A2.2

***NOTE: By definition "Monthly" is the minimum recommended maintenance that should be performed at least once a month with the helmet in continuous use, (used for more than 20 diving days a month) or at least every two months with the helmet used less than 10 diving days a month. Appendix A2.2 should also be performed any time the serviceability of the helmet is in question."***

### 5.5.1 Yoke/Neck clamp Assembly

Inspect the neck dam (2) and yoke assembly carefully. There must be no holes in the neck dam. The neoprene should be firm and not deformed. Do not patch the neck dam if possible. Always replace the neck dam to avoid weak areas.

**⚠ DANGER: Never patch a torn or punctured neck dam. If the patch comes off underwater the helmet could flood and/or cause the demand regulator to freeflow. Serious injury, drowning or death may result. A damaged neck dam must be replaced per Section 7.9.4.**

The neck clamp (7) must operate smoothly and easily. If it is bent or out of alignment, it should be brought to an authorized KMDSI repair facility for repairs. Do not dive with a bent or misaligned neck clamp.

### 5.5.2 Helmet O-Ring

Inspect the O-ring (80) per Section 5.3.1 on the base of the helmet. It must be in good condition with no nicks, tears, or cracking. Replace the O-ring if it shows signs of wear per Section 7.10.

### 5.5.3 Head Cushion

Remove the foam from the head cushion (1) and inspect it for wear. If the foam is worn or crumbling it should be replaced (Part #510-523).

***NOTE: The head cushion must fit properly to support and reduce dead air space within the helmet. Most importantly the head cushion helps maintain a good oral/nasal seal, which reduces carbon dioxide buildup and maximizes demand regulator performance. This reduces the likelihood of the diver being exposed to excessive carbon dioxide possibly leading to exhaustion and/or blackout.***

### 5.5.4 Communications Inspection

Visually inspect the earphones (71,72), microphone (73), wires, lugs, and communications posts (154). Test each component for proper operation. Connect to the deck amplifier and talk back and forth. Repair or replace any components in question.

Open the earphone rubber covers and remove the protectors. Allow to air dry, thoroughly. Inspect the solder joint for cracks/damage. Replace earphones if excessive corrosion is present or earphones do not perform properly.

### 5.5.5 Lubricate Nose Block O-Rings (105, 106 (2))

Tools Required:
7/16 inch Open-end wrench

1) Unscrew the nose block device-packing nut (107).

2) Wipe clean and inspect/lubricate the two O-rings (106) and the main shaft (86).

3) Retighten the nut just to the point where the nose block device will still slide, but it requires a firm push or pull. Test the shaft to ensure that it will still slide freely at this time. If it does not, loosen or tighten the nut (107) just enough to permit the shaft to slide properly.

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### 5.5.6 Emergency Valve Assembly (58)

Without gas to the helmet, check "exercise" the Emergency Gas Supply valve ensuring the valve operates smoothly. Replacement/overhaul guidance will be found in Section 6.5 of this manual.

### 5.5.7 Steady Flow/Defogger Valve (32-41)

Without gas to the helmet, check, i.e., "exercise" the Steadyflow/Defogger valve ensuring the valve operates smoothly. Replacement/overhaul guidance will be found in Section 6.4 of this manual.

### 5.5.8 Bias Device (138c) Adjustable Section of Demand Regulator (113-121)

Remove regulator cover clamp (125), cover (123b) and diaphragm (122) and inspect the interior of the regulator body (112) for corrosion and contamination, guidance 6.8.2. Carefully inspect the diaphragm for cuts, tears and deterioration. If any damage is present replace the diaphragm, per Section 6.8.2 of this manual.

Attach an air source to the umbilical adapter and set the supply pressure to between 135-150 p.s.i.g. (9.3-11.4 bar). Adjust the regulator knob out, until a slight free flow develops, then, adjust in until the free flow just stops and check the lever play. It should be between 1/16" – 1/8" (1.5 – 3.0 mm). Adjust if necessary, per Section 6.8.10. Reinstall the diaphragm, the cover and the clamp.


 Document # 040809001, Aug. 2004

# Chapter 6
# Breathing System Maintenance and Repairs

## 6.1 Introduction

The breathing system on all Kirby Morgan helmets and masks is simple and highly reliable. The fact that they can continue to operate when the components are not in a well-maintained condition can cause divers to become complacent about maintenance. **YOUR LIFE DEPENDS ON THE CORRECT FUNCTION OF THIS EQUIPMENT.** While Kirby Morgan helmets and masks are simple to maintain, like any type of life support equipment, they do require regular periodic maintenance to function properly.

This chapter covers the maintenance and repair of all components of the breathing system. The breathing system includes the one-way valve, the emergency gas valve, the side block, the Bent Tube Assembly on the SuperLite-17B, the Hose Assembly on the SuperLite-17A, the demand regulator, and the oral/nasal mask.

## 6.2 One-way Valve

***NOTE: The one-way valve assembly (69) should be disassembled, cleaned and the three O-rings should be replaced at least annually. Damaged and/or corroded parts should be replaced.***

### 6.2.1 Disassembly of the One-way Valve

Tools Required:
Soft Jaw Vice
1 inch open end wrench
Torque wrench
1 inch Open-end Wrench Attachment on Torque Wrench
(If no Vise is available, use an additional backup 1 inch open-end wrench)
***Note: The standard helmet overhaul kit also contains the parts required to overhaul the one way valve. The one way kit is also available separately as PN#525-330***

**⚠ CAUTION: Do not use pliers on the main body of the one-way valve. You may damage the valve if pliers are used.**

*Fig. 6.1 Remove the one way valve from the side block*

1) The one-way valve assembly must be removed from the side block (43a/b). Use the 1 inch open-end wrench to remove it.
2) After the one-way valve has been removed, use two wrenches or hold the hex part of the body (60) in a soft jaw vise while removing the seat (66) with a wrench.

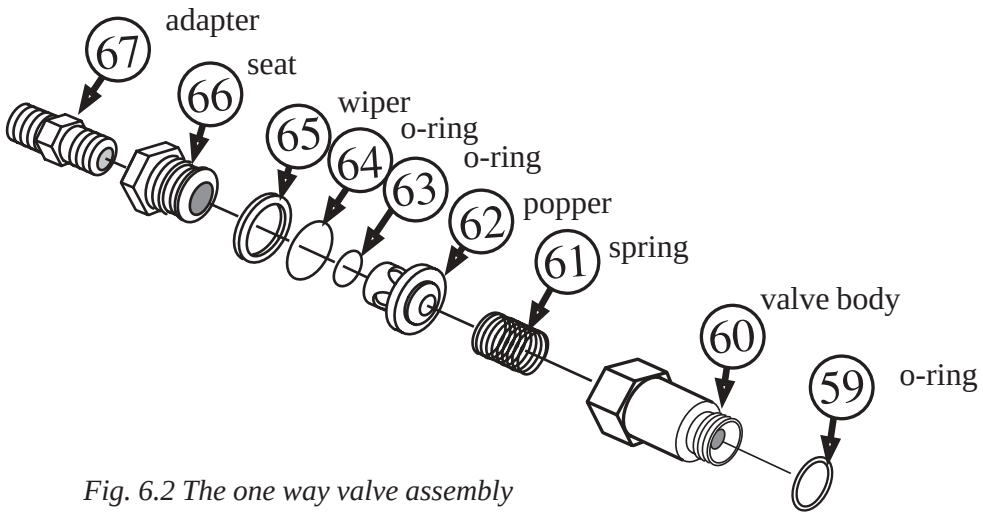



*Fig. 6.2 The one way valve assembly*

As the seat is removed, the wiper (65) and the O-ring (64) slide out in place in a groove on the seat. The poppet (62) and the poppet O-ring (63) usually comes out in the seat being followed by the spring (61). The only functional part remaining in the valve body is a non-moving, pressed-in cage (This part does not require removal). The function of the cage is to prevent the poppet O-ring (63) from blowing out of place during high flows.

3) Inspect and clean the valve body and cage. Clean in accordance with the cleaning instructions per Section 5.3.2. If corrosion is present clean using the acidic solution in accordance with Section 5.3.2 if necessary.

4) Inspect the seat, wiper, O-ring, poppet O-ring and poppet for wear, replace if necessary. Ensure each part is clean and all components are lightly lubricated with the appropriate lubricant. A repair kit is available for replacement parts (Part #525-330),

5) Lightly lubricate the components, then wipe clean with a non-lint producing cloth. Be careful to wipe the poppet (62) and poppet O-ring (63) thoroughly, removing excess lubricant to prevent foreign materials from sticking to these components.

6) Replace the spring (61).

### 6.2.2 Reassembly of the One-way Valve

1) Slide the new O-ring (63) over the poppet (62).

2) Insert the new spring (61) into the valve body (60), followed by the poppet.

3) Next, install the new O-ring (64) and new wiper (65) on the seat (66). Thread the seat into the valve body.

4) Tighten the seat to 150 inch pounds with a torque wrench, while holding the body in a soft jaw vice or wrench.

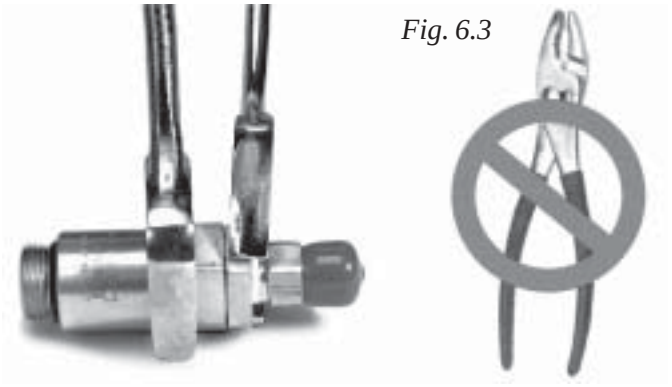


*Fig. 6.3*

**⚠ CAUTION: Use two wrenches or hold the hex part of the body in a vise while removing or turning the seat with a wrench. Do not use pliers on the main body of the one-way valve. You may damage the valve if pliers are used.**

***NOTE: Because the umbilical inlet adapter (67) is exposed to severe use, KMDSI recommends the inlet adapter be replaced if any damage or wear is present or suspected.***

5) If the adapter (67) is being replaced or has been removed, the threads should be cleaned and re-taped with Teflon tape on the tapered pipe threads and reinstalled at this time. Re-tape starting 1 thread back, 1-1/2 wraps. Hold the one-way valve with a back up wrench and tighten the adapter using the torque wrench to 240 inch lbs .

**⚠ DANGER: Do not allow Teflon tape to cover the end of the adapter, or to enter the one-way valve. Loose pieces of Teflon tape can interfere with the performance of the one-way valve or regulator and may block the diver's air supply. This could lead to death through suffocation.**

6) Test the operation of the one way valve by attempting to orally suck air from the brass adapter (67), end of the assembled one-way valve (68).

7) Place the new O-ring (59) on the body (60) end of the one-way valve assembly and reinstall the valve assembly in the side block (43a/b). Tighten to 24 inch pounds with a torque wrench.

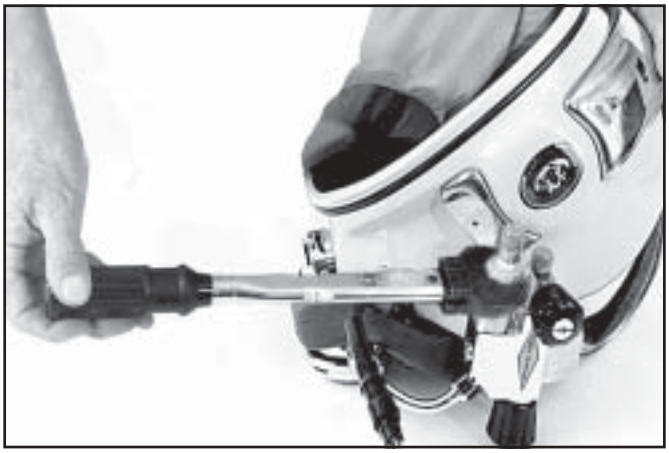


*Fig. 6.4 Tighten the one way valve to 24inch lbs (270kg.cm) with torque wrench*

## 6.3 Side Block Assembly

### 6.3.1 General

The side block should be overhauled at least annually, or whenever components show signs of wear, damage or do not function smoothly or properly. Minimum replacement components during overhaul includes all O-rings.

The side block does not require removal from the helmet each time an overhaul is being conducted providing inspection of the internal passages does not reveal contamination or excessive corrosion. However, the side block should be completely removed at least every three years of active use to ensure fasteners are not corroded or frozen. The side block assembly is held in place on the helmet shell by a stud, secured with a flat washer, lock washer, and nut. A machine screw is also adjacent the stud. The screw does some securing but its main function is to prevent rotation of the side block. The stud also extends into the interior of the helmet shell to secure both the side block and the air train by means of a washer and nut. The air train cup that fits over the stud is made of soft brass and cannot be used for a bearing surface to mount the side block. RTV silicone rubber compound is used to form a water / gas tight seal between the side block and the exterior of the helmet shell. During routine and annual overhauls all O-rings should be replaced.

### 6.3.2 Side Block Assembly Removal

Tools Required:
11/16 inch Open-end Attachment on Torque Wrench
7/8 inch Open-end Wrench Attachment on Torque Wrench
7/16 inch Open-end Wrench
1/4 inch Flat Blade Stubby Screwdriver
Dow Corning® RTV 732 Multi Purpose sealant
Flat screwdriver for the torque wrench

On the SuperLite-17B, the Bent Tube Assembly (45b) must be loosened and disconnected from the side block before removal of the side block assembly is started. On the SuperLite-17A, it is only necessary to release the hose (45a) from its connection with the regulator (138a/b)

#### 6.3.2.1 Removal of Bent Tube Assembly (17B)

1) Completely unthread the Bent Tube Assembly nut (45b) from the side block.

2) Using two 7/8 inch open-end wrenches, hold the nut at the regulator end of the Bent Tube Assembly with one wrench. With the other wrench, loosen the jam nut (131b) by turning the wrench DOWN.

3) Unthread the nut until it comes free, then pull the Bent Tube Assembly straight out of the regulator inlet nipple (132b).

*Fig. 6.5 On the SuperLite-17b, you must disconnect the bent tube to remove the side block.*

4) The side block assembly (43b) is ready for removal procedure.

### 6.3.2.2 Disconnecting the Hose Assembly (17A)

1) Use a backup wrench to hold the inlet nipple (130a) on the regulator (112).

2) Loosen the nut on the end of the Hose Assembly (45a) and completely disconnect it from the inlet nipple.

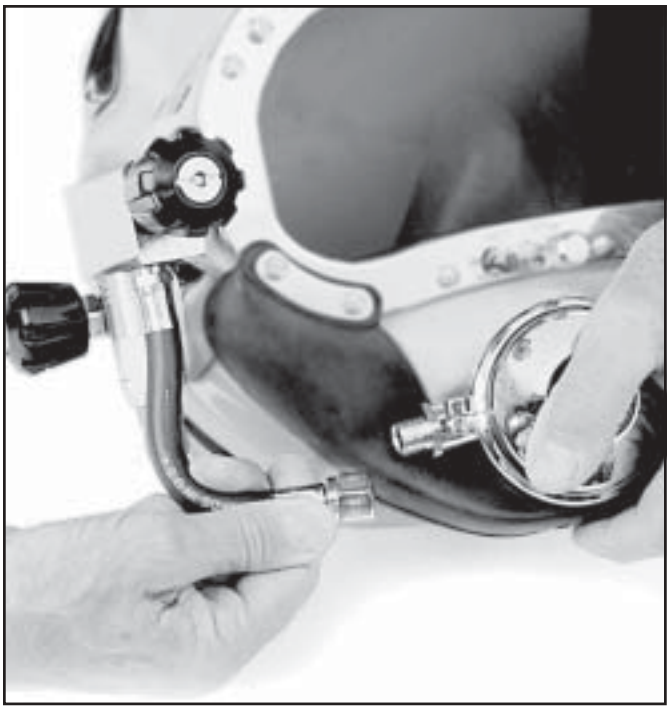


*Fig 6.6 Disconnect the hose at the regulator*

### 6.3.3 Separating the Side Block Assembly (70a/b) from the Helmet Shell (92)

Tools Required:
Putty Knife
7/16 inch Open-end Wrench
1/4 inch Flat Blade Stubby Screwdriver

1) Removal of the side block assembly (43a/b) requires removing the air train (99).

2) Remove the nut (101) and washer (100), then the air train.

***NOTE: The alignment screw (102) is located in a recess in the fiberglass next to the stud. This recess is normally filled with RTV. The RTV must be scraped free to reveal the screw.***

*Fig. 6.7 Remove the nut that secures the air train.*

3) The stud nut (98) is removed next, with the lock washer (97) and flat washer (96).

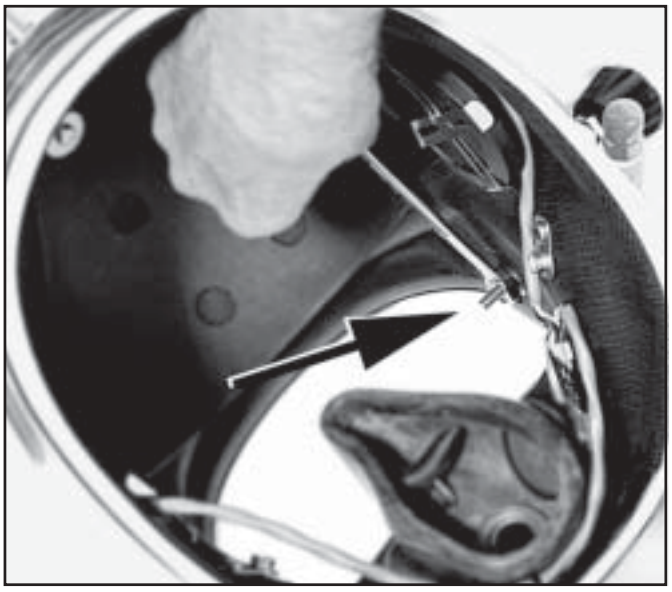


*Fig. 6.8 Remove the nut from the stud.*

4) Next, the alignment screw (102) is removed.

5) The side block assembly is now unfastened, but held in place by the Silicone sealing compound (silicone sealant). It may be necessary to rock just slightly, or pry the side block from the helmet shell. A thin putty knife can be pushed between the side block and the helmet shell to help free it. Do not use a screwdriver or chisel, as damage to the shell could result. Be sure to peel or scrape the old silicone sealant away from both sealing surfaces before reassembling.

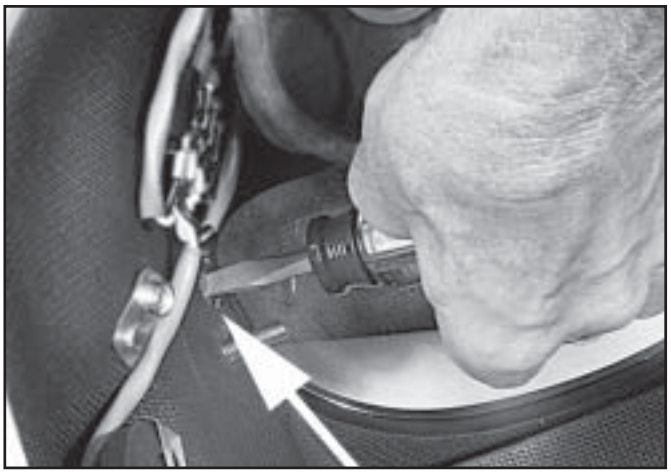


*Fig. 6.10 Remove the screw that threads into the block.*

*Fig. 6.9 Use a putty knife to separate the block from the helmet shell.*

6) If you plan to rebuild the side block assembly, it should be done at this time, while the side block is off the helmet. Overhaul the defogger valve and emergency valve in accordance with Section 6.4, 6.5. Overhaul the one-way valve (68) in accordance with Section 6.2.

### 6.3.4 Side block Assembly Replacement

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

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow silicone to cure for a minimum of 24 hours before using your helmet.**

1) An application of silicone sealant approximately 1/32" (the thickness of a matchbook cover) must be evenly applied to the side block (43a/b) prior to installation on the helmet shell. Use Dow Corning® RTV 732 Multi Purpose sealant or equivalent. Care must be taken to avoid sealant entering the air opening in the side block. Be sure to remove all excess silicone sealant before it sets up.

2) Thread the screw (102) through the helmet shell (92) and lightly tighten into the side block body. **DO NOT OVERTIGHTEN.**

3) Slide the flat washer (96) and the lock washer (97) onto the stud (42). Run the stud nut (98) down the stud and tighten with torque wrench (20 inch pounds). **DO NOT OVERTIGHTEN.**

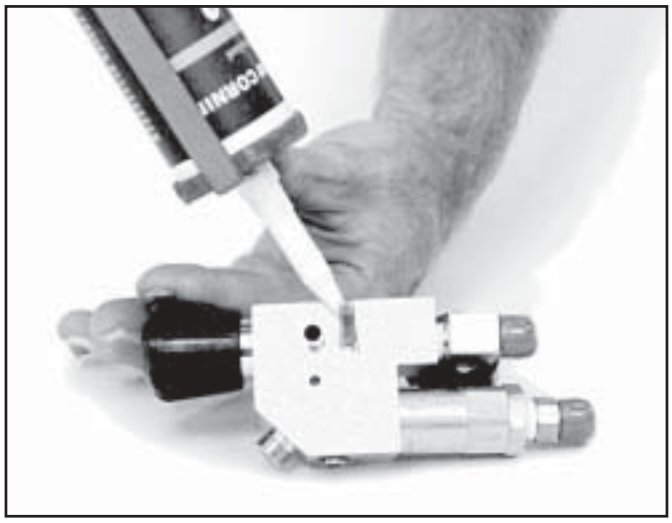


*Fig. 6.11 - An even application of silicone sealant must be applied to the side block prior to installation on the helmet shell. Use only Dow Corning™ RTV 732 Multi Purpose sealant.*

4) Tighten the screw (102) with a torque wrench to the correct torque of (20 inch pounds). Then fill the screw hole with enough RTV that the air train cup will seal over the hole area.

5) Slip the air train (99) over the stud. Align the air train with the upper edge of the view port opening in the helmet shell.

6) Place the washer (100) on the stud and using a torque wrench tighten the nut (101) to (20 inch pounds) until the washer lays flush on the air train. **DO NOT OVER-TIGHTEN.**

7) After the RTV has completely set up (24 hrs), test the side block prior to diving to ensure that no silicone sealant is blocking the airflow to the helmet. If it is, it must be cleaned out prior to diving.

**⚠ DANGER: If RTV silicone sealant is blocking the airflow into the helmet, it must be cleaned out. If it is not, the diver may not be able to properly defog the helmet or clear a flooded helmet quickly. In addition, if the demand regulator is not delivering air properly, the diver cannot use the free flow system as a source of breathing gas.**

### 6.4 Defogger Valve

***NOTE: The emergency valve control knob (55) is not interchangeable with the Defogger valve control knob (34).***

### 6.4.1 Disassembly of the Defogger Valve (32-41)

Tools Required:
3/8 inch Slotted Flat Blade Screwdriver
13/16 inch Open-end torque wrench attachment
Torque Wrench

**The defogger valve components are disassembled as follows:**

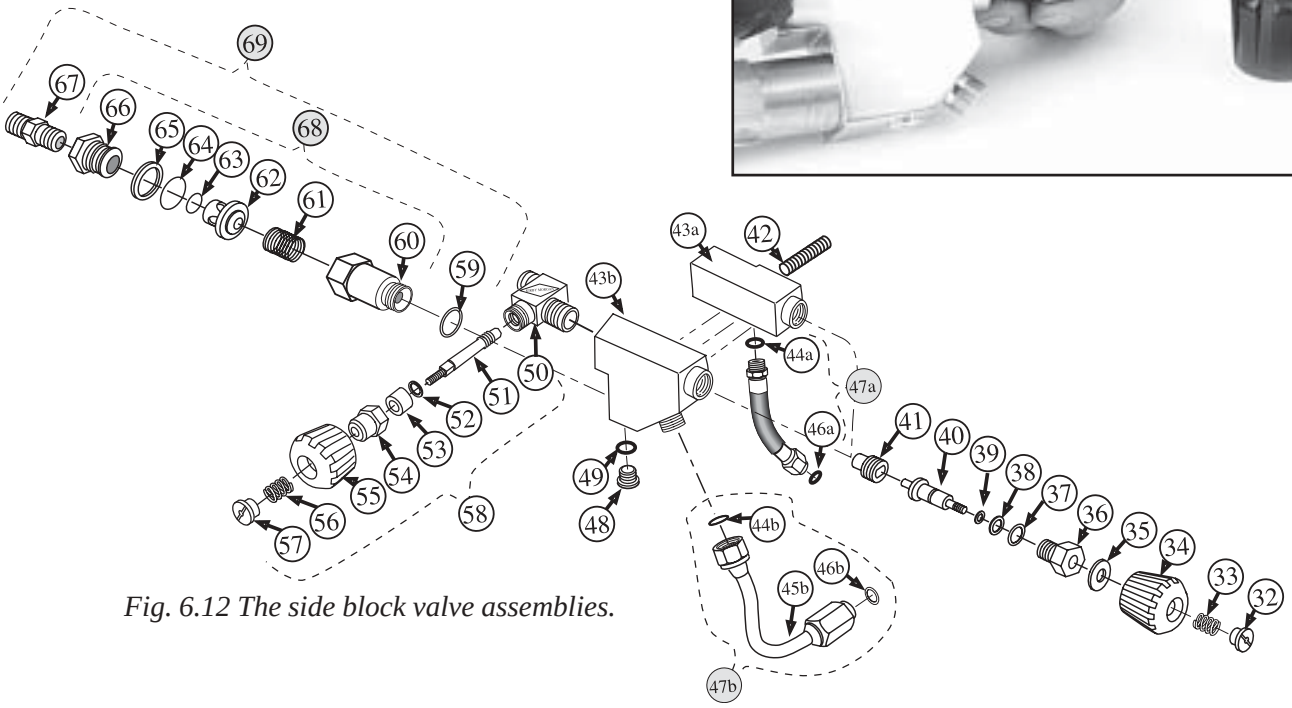



*Fig. 6.12 The side block valve assemblies.*

1) First, unscrew the lock nut (32) and remove the spring (33), control knob (34), and washer (35).

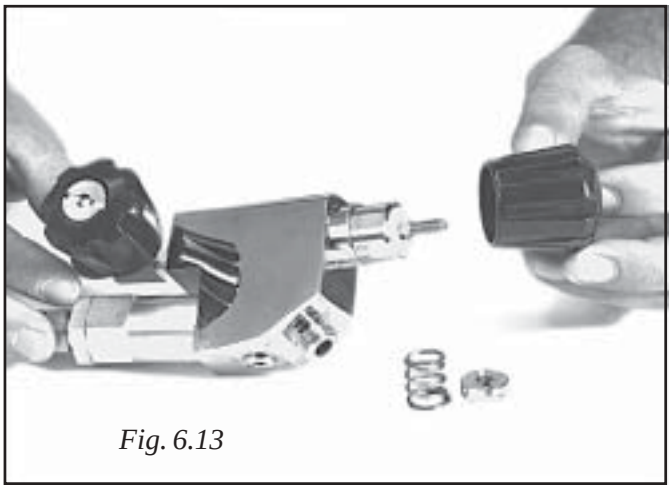


*Fig. 6.13*

2) Next, unscrew the bonnet (36). Its O-ring (37) will come off with it. The valve stem (40), O-ring (39), and washer (38) usually come out with the bonnet and can be pushed out of the bonnet once removed from the side block body.

3) If the stem (40) remains in the side block body, it can be lifted out after the bonnet (36) is removed.

4) The seat assembly (41) can be unscrewed from the side block body with the stem or a screwdriver.

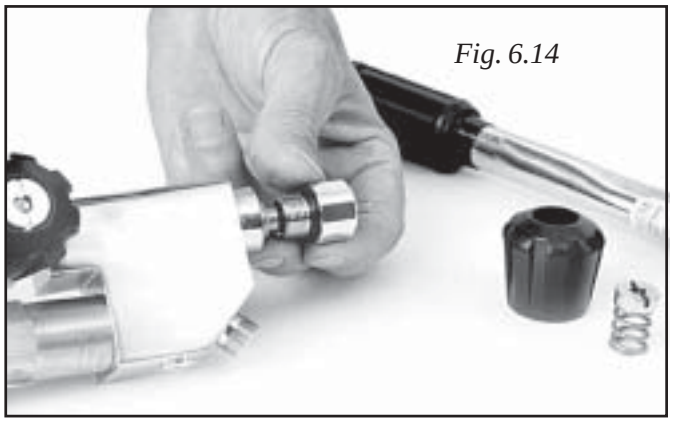


*Fig. 6.14*

### 6.4.2 Cleaning and Lubricating use Section 5.3.2

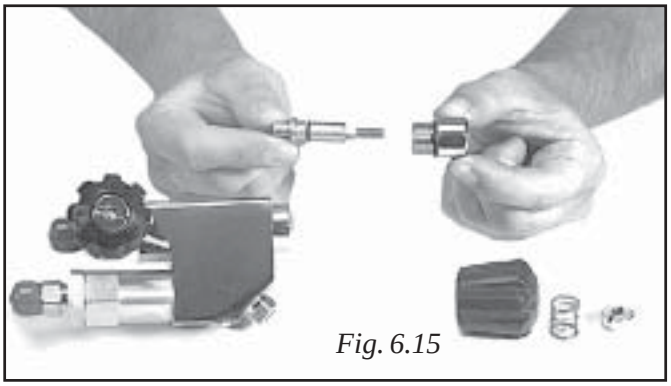


*Fig. 6.15*

1) Clean all the metal parts first in the soapy water solution and then in a 50/50 dilute solution of white vinegar/ water per Section 5.3.2.2. Rinse in fresh water.

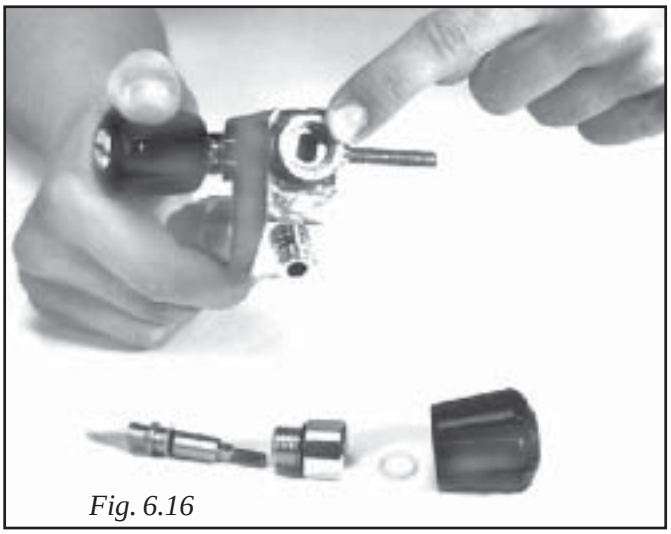


*Fig. 6.16*

2) Check the seat assembly (41) for wear or contamination and replacement is only necessary if worn or damaged. Damage includes a rough face, cuts or wear. Replace if doubt exists.

*Fig. 6.17*

3) The Teflon® washer (38) and O-ring (39) must be replaced during overhauls. Inspect and lubricate the O-ring (37) per Section 5.3.1.

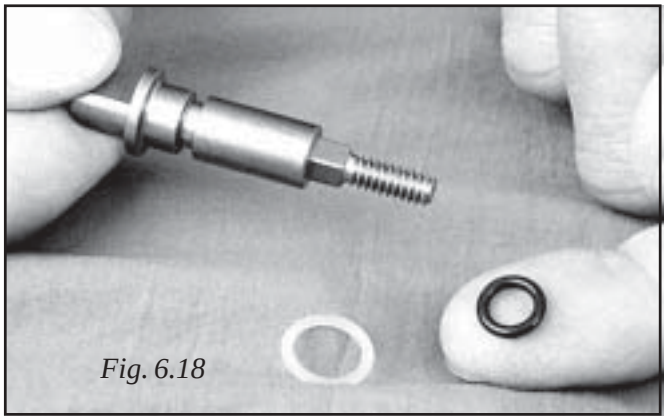


*Fig. 6.18*

4) Lightly lubricate all internal moving parts, O-rings, and washers. However, do not lubricate the Teflon® seat, as this will attract dust and debris.

### 6.4.3 Reassembly of the Defogger Valve

Tools Required: 3/8 inch Slotted Flat Blade Screwdriver
Torque wrench
13/16 Open-end Attachment on Torque Wrench
Minimum mandatory replacement parts during overhaul:
Washer 35, O-ring 37, washer 38, O-ring 39
Lubricant

1) Reinstall the seat assembly (41) and screw it in until it is even with the front of the side block body (43a/b).

2) Next, install the new washer (38) and new O-ring (39) onto the stem (40), then lightly lubricate the stem.

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

4) Lightly lubricate the new O-ring (37), per Section 5.3.1, and install on the bonnet (36).

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

6) Torque the bonnet (36) with a torque wrench to ( 75 inch lbs). (see Fig. 6.19)


*Fig.. 6.19*


*Fig. 6.20 Don't forget to install the washer before installing the valve knob.*

7) Place the new Teflon® washer (35) and the Defogger control knob (34) on the valve stem (40) test to ensure the knob and stem rotate smoothly. The stem and control knob must turn smoothly without any binding or "hard spots" when rotated. The valve knob (34) and valve (40) stem should be inspected carefully for worn flats that will cause a sloppy fit. Replace the knob and or stem if the fit allows the valve to rotate loosely more than 1/8th of a turn.
8) Install the spring (33), and locknut (32). Tighten the locknut until its top is flush with the top of the knob (34).

## 6.5 Emergency Valve Assembly (58)

***NOTE: The emergency valve control knob (55) is not interchangeable with the Defogger valve control knob (34).***
The Emergency Valve Assembly (58) is not built into the side block. It is a separate component that can be removed and replaced, or disassembled in place on the side block assembly. The emergency valve control knob (55) is not interchangeable with the defogger valve control knob (34). The emergency valve should be disassembled cleaned inspected at least annually. If any of the components show signs of wear or damage they should be replaced. The stem as well as all threaded surfaces should be lightly lubricated.

***NOTE: The emergency gas valve body (50) does not require removal for normal servicing or pair, but should be removed whenever the side block is removed for overhaul and cleaning or at least every three years. If the emergency valve body is not going to be removed from the side block the knob (55), packing nut (53) and stem (51) should be removed with the valve in place. If it is to be removed, remove the one way valve first. When reinstalling the emergency valve body first tape with Teflon tape 11/2 wraps starting two threads back. Tighten using good engineering practice. Do NOT over-tighten!***

### 6.5.1 Disassembly of the Emergency Valve Assembly (58)

Tools Required:
11/16 inch Open-end Wrench
3/8 inch Slotted Flat Blade Screwdriver
1 inch Open-end Wrench
8 inch Adjustable Wrench
1/8" flat screwdriver
Lubricant

1) Remove the lock nut (57), spring (56), and knob (55)

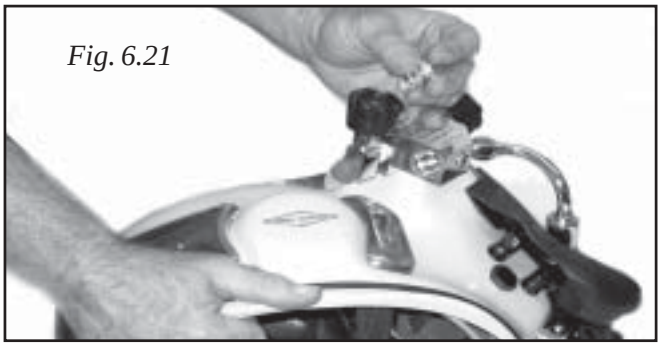


*Fig. 6.21*

2) Unscrew the packing nut (54).


*Fig. 6.22*

3) When the packing nut is free of the threads of the emergency valve body (50), back out the stem (51) until it is free of the emergency valve body (50).

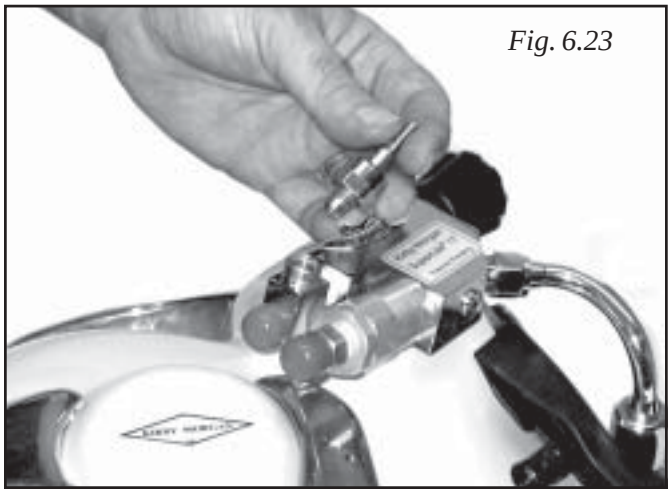


*Fig. 6.23*

4) Remove the packing nut, packing (53), and washer (52) from the stem (51).

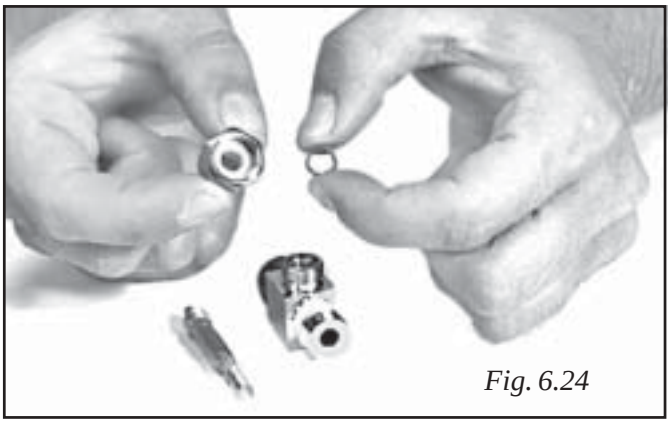


*Fig. 6.24*

5) If the valve body (50) is being removed, remove by turning counterclockwise with the 11/16" wrench. **Note:** the one way valve should be removed first. If the valve is being cleaned and inspected in place proceed to 6.5.2.

*Fig. 6.25*

### 6.5.2 Cleaning (*See Section 5.3.2 and Lubricating section 5.3.1*)

1) Clean all the metal parts with the detergent and water solution followed by cleaning with a 50/50 diluted solution of white vinegar/water per Section 5.3.2.2. Rinse with fresh water.

2) Inspect the packing (53), normally the packing will last a very long time and does not require replacement as long as the valve operates smoothly and does not leak. To replace the packing place the packing nut in a vise and carefully work the packing out with a small screw driver, taking care not to damage the threads of the packing nut. Replace the washer (52).

3) Inspect the stem seat (51) (shaft) for damage. Damage will include damaged threads, rounded flats that engage the control knob (55). Also inspect the shaft to ensure it is straight and the conical seat surface is smooth and free of corrosion or damage.

4) Check the seat in the emergency valve body (50) for wear or unevenness, galling and corrosion. To clean up the seat surface use a pencil eraser to buff the surface. Inspect all threaded surfaces for damage. Replace the emergency valve body (50) if any damage is found.

5) If the emergency valve body (50) was removed, clean and inspect the pipe thread and inspect for damaged threads, cracking or distortion. . Replace the emergency valve if any damage is present. Re-tape threads with Teflon tape, 11/2 wraps starting two threads back, tighten using good engineering practice. To reinstall the emergency valve body from the side block (43a/b), the One-Way Valve Assembly (69) must be removed first.

### 6.5.3 Reassembly of Emergency Valve (50)

Tools Required:
11/16 inch Open-end Wrench
1 inch Open-end Wrench
Torque Wrench Attachments & Torque Wrench
3/8 inch Slotted Flat Blade Screwdriver
Soft Jaw Vice
Lubricant
Teflon Tape
Normal minimum overhaul replacement parts:
None

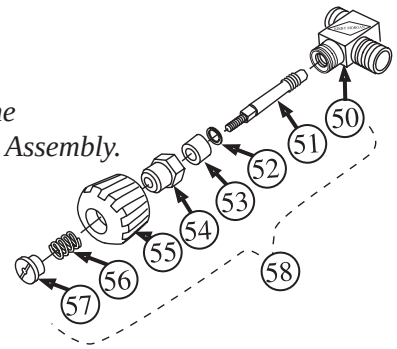



*Fig. 6.26 The Emergancy Valve Assembly.*

**Reinstallation**

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

2) Replace the washer (52) and packing (53) on the stem (51), then lightly lubricate the stem shaft and threads..

*Fig. 6.27 Wrap the pipe threads with pipe tape prior to reinstalling the valve body.*

***NOTE: There are two different packing (s) and washers supplied in the kit, for rebuilding both the older style and the newer high flow emergency gas valve. Match the removed packing and washers to the new ones supplied and discard the others.***

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

4) Rotate the stem until it is seated all the way in then, back it out -1/2 turn.

5) Thread the packing nut (54) onto the emergency valve body (50). Run the nut in and tighten slightly with a wrench.

6) Inspect the emergency gas valve knob (55) for wear and damage. Ensure the flats that engage the valve stem shaft (51) are not rounded, cracked or damaged. The valve knob should not have rotational play greater than 1/16th of a turn.

***NOTE: This knob is not interchangeable with the defogger valve knob.***

7) Place the emergency gas valve knob (55) onto the stem and rotate the stem all the way out, then back again. The rotation must be smooth. If “hard spots” or unevenness are felt during the rotation, the stem may be bent and could need replacement.

8) Tighten the packing nut (54) with a torque wrench until moderate resistance is felt when turning the knob. Torque to 50 inch pounds after seating.

9) Place the spring (56), and locknut (57) onto the stem securing the knob.

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

***NOTE: If the valve was removed from the side block (43a/b) testing of the emergency gas valve (50) is easily accomplished by attaching the valve, by itself in the shut position, on to the intermediate whip of the first stage. Pressurized to a minimum 135 p.s.i.g. (9.3bar) using the EGS Cylinder and dropping it into a bucket of clean water a minimum 30 seconds to check for leaks.***

11) Before installing any pipe sealant, check the fit of the valve assembly pipe threads to the mating threads of the side block. There should be 2 turns of hand make up before needing to use a wrench. If there is less make up, then the threads will need to be chased with a 1/4” NPT tap to obtain the proper make up. If tapping is required, the Bent Tube Assembly, the One Way Valve assembly and steady flow components must all be removed and the side block body must be thoroughly cleaned to remove any loose particles. Remove the valve assembly from hand tight.

12) Before installing the valve assembly, wrap the pipe threads with 1-1/2 turns of teflon tape starting after the first thread (Fig. 6.27). The amount of tape used should be based on what is found in the fit check . Apply the tape with slight tension to allow the tape to fill into the threads. If another type of sealant is used, it must be oxygen compatible as well as not pose any health hazard to the diver. Hand tighten the valve, then continue an additional 1-1/2 to 2 turns with a wrench keeping in mined the proper alignment of the control knob to the side block. Also, there should be at least one male thread visible. Check to be certain the valve is tight by

trying to loosen the fit by hand. **DO NOT TIGHTEN THE VALVE BODY TIGHTER THAN NECESSARY! OVER TIGHTENING MAY OVERSTRESS THE PART AND CAUSE THE PART TO FAIL.**

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

a) Attach supply whip from the EGS first stage to EGS helmet valve (50).

b) Ensure the defogger valve knob (34) is open and the EGS Valve (50) is shut.

c) Pressurize EGS Valve (50) to a minimum of 135 p.s.i.g. (9.3bar) using the EGS cylinder as supply. Allow system pressure to stabilize , and then shut the EGS supply cylinder valve. Note time and final stabilized system pressure.

d) Perform the leak check for minimum of five minutes, using the mild detergent solution, per Section 5.3.2.1. Ensure there is no gas flowing or pressure drop in the system. There should be no visible signs of external leakage if the valve is operating properly.

**⚠ WARNING: A leaking Emergency Gas Valve assembly (58) can cause the diver to exhaust his entire EGS (bailout) without his knowledge. This may lead the diver to mistakenly assume his EGS supply is available when it is not. This could lead to panic or drowning in an emergency. Any worn or damaged components must be replaced.**

## 6.6 Bent Tube Assembly

### 6.6.1 General

The Bent Tube Assembly (47b) provides breathing gas flow from the side block assembly to the regulator assembly on the SuperLite-17B. Both ends of the Bent Tube Assembly disconnect for complete removal. The O-ring (46b) and the Teflon O-ring (44b) should be replaced during normal overhauls or any time these components are deemed unserviceable. These components do not require replacement during field repairs providing a careful visual inspection does not reveal wear or damage. All soft goods should be carefully cleaned in accordance with Section 5.3.2 prior to inspection for reuse.

### 6.6.2 Removal of the Bent Tube Assembly

Tools Required:
11/16 inch Open-end Attachment on Torque Wrench
7/8 inch Open-end Attachment on Torque Wrench
7/8 inch Open-end Wrench

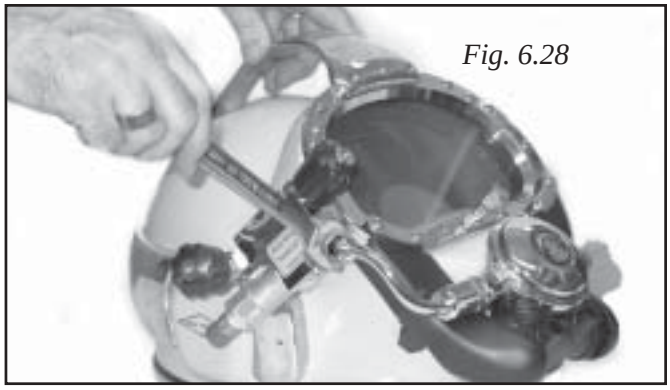


*Fig. 6.28*

1) Always start removal at the side block end. The free swiveling mount nut on this end of the bent tube can be unthreaded completely and can slide down the tube.

2) The inlet nipple has a jam nut (131b) that locks the mount nut in place. With one wrench, hold the bent tube mount nut. With another wrench, turn DOWN the jam nut, backing it away from the mount nut. The mount nut can then be rotated until free of the regulator inlet nipple (132b) threads. It can be pushed up the bent tube.

3) With the two mount nuts free; the Bent Tube Assembly can be pulled straight out of the regulator inlet nipple. The Bent Tube Assembly can be rotated back and forth to aid removal.

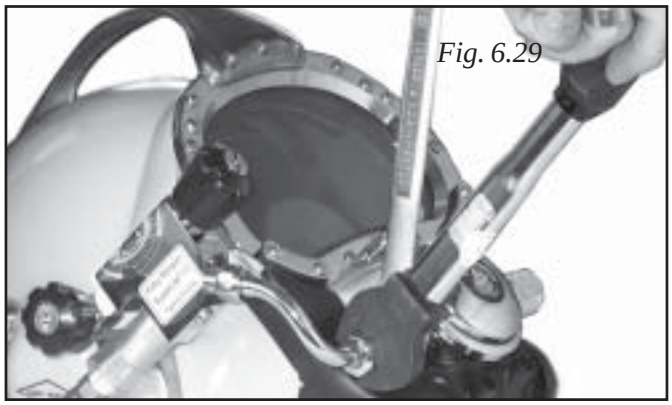


*Fig. 6.29*

*Fig .6.30*

### 6.6.3 Inspection of Bent Tube Assembly

Clean the bent tube in accordance with Section 5.3.2. The O-ring at the regulator end (46b) should be cleaned and inspected per Section 5.3.1 whenever the bent tube is removed. Replace the bent tube if it is excessively scratched dented or compressed deeper than 1/8 inch. If the helmet has been used for burning jobs, carefully check for erosion of the metal or severe corrosion. Replace if any erosion is present or integrity is in question. Keep in mind the bent tube is a critical component that routs breathing gas to the helmet systems.

### 6.6.4 Reinstallation of the Bent Tube Assembly

If a new bent tube is being installed or the side block has been removed, refer to Section 6.3 for installation instructions.

Tools Required:
11/16 inch Open-end Torque Wrench Attachment
7/8 inch Open-end Torque Wrench Attachment
7/8 inch Open-end Wrench
Normal minimum replacement parts during overhaul:
O-ring 46b, Teflon ring 44b

1) Lightly lubricate the bent tube O-ring (46b) and install in the O-ring groove at the regulator end of the bent tube, then install new Teflon® O-ring (44b) at the side block end with the new ones supplied.

2) Push the O-ring end of the Bent Tube Assembly into the regulator inlet nipple (132b). Slide it in until the side block end is aligned with the threads for the mount nut.

3) Be sure the new Teflon® O-ring (44b) is in place on the side block end of the bent tube then engage the threads to the side block and hand tighten.

4) Start the "regulator to bent tube" mount nut onto the inlet nipple of the demand regulator and run it up by hand as far as it will go.

***NOTE: Run the mount nut up on the inlet nipple hand tight only.***

5) Using a torque wrench, tighten the Bent Tube Assembly (45b) nut onto the side block (43b) to (75 inch lbs).

6) Hold the mount nut on the end of the bent tube with a wrench and tighten the jam nut (131b) against it with a torque wrench to 40 inch pounds.

### 6.7 Hose Assembly (SL-17A only)

The Hose Assembly (47b) provides for breathing gas flow from the Side Block Assembly to the regulator for the SuperLite-17A. Both ends of the Hose Assembly disconnect for complete removal. Regardless of the hose condition it must be replaced at least every two years and o-rings should be replaced at least annually.


*Fig. 6.32*

### 6.7.1 Hose Assembly Removal

Tools Required:
9/16 inch Open-end Wrench
11/16 inch Open-end Wrench
13/16 inch Open-end Wrench
O-ring Removal Tool
Torque wrench

1) Loosen the Hose Assembly (47a) at the regulator end first, while holding the regulator inlet nipple (130a) with a second wrench.

2) Disconnect the hose from the inlet nipple (130a).

3) Loosen the hose at the side block connection (43a).

4) Disconnect the hose from the side block.

### 6.7.2 Hose Assembly Inspection "A style side block"

Inspect the hose fittings for slippage and thread damage.

Inspect the hose for gouges, cuts, blisters, abrasions or any obvious signs of damage or deterioration. If the hose is worn or damaged it must be replaced. Inspect the O-rings (44a, 46a) per Section 5.3.1. If they are worn or cracked they must be replaced. Replace hose O-ring during overhauls and or annually.

***NOTE: KMDSI recommends the Hose Assembly (47b) be replaced at least every two (2) years even if the condition appears good.***

### 6.7.3 O-Ring Replacement

1) Remove the O-ring (44a) from the side block end of the Hose Assembly by pinching it with your fingers and sliding it up the threaded end of the assembly per Section 5.3.1. Install a new O-ring that has been lightly lubricated.

2) To remove the O-ring (46a) on the regulator end of the hose, you will need to use an O-ring pick made of brass or plastic. Care must be taken not to scratch or damage the sealing surface on the hose fitting when removing the O-ring. If the fitting is gouged it will leak breathing gas.

### 6.7.4 Hose Assembly Replacement

1) Thread the Hose Assembly into the side block and tighten with a wrench.

2) Install the Hose Assembly fitting onto the end of the regulator inlet nipple (130a). Tighten the fitting while holding the nipple with a second wrench.

## 6.8 Demand Regulator

While the regulator system on all Kirby Morgan helmets is simple and highly reliable, the breathing resistance will increase if the demand regulator is not maintained or adjusted properly. The demand regulator must receive regular maintenance to assure the best performance possible. However, in the event the demand regulator is damaged, there is always a backup supply of steady flow gas available from the defogger valve.

If the regulator does not breathe easily, the diver cannot work hard and will tire rapidly. Simply put: If the demand regulator does not work properly the diver cannot work properly. This makes the maintenance of the Demand Regulator Assembly essential.

For the gas inlet valve and adjustment system to operate properly, the components in the demand regulator MUST be in good condition and MUST be periodically adjusted internally.

Four (4) special tools, the inlet valve holder (Part #525-616), the regulator adjustment wrench (Part #525-611), the socket wrench (Part #525-612), and the castle wrench (Part #525-618) should be used to work on the regulator whenever possible.
Disassembly, assembly, and adjustment can be done without these tools, but the work is much easier and the adjustment is better if these tools are used. The above 4 tools are available together along with a tool case. The "Tool Kit with Case" is Part #525-620.

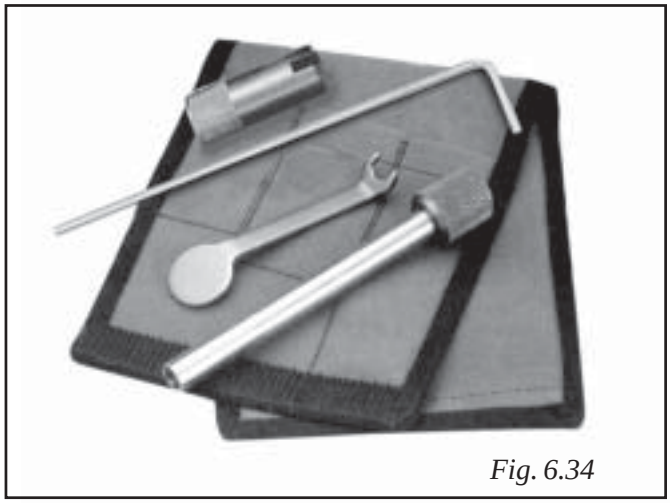


*Fig. 6.34*

### 6.8.1 Demand Regulator Test for Correct Adjustment, Regulator Fully Assembled

To maintain optimum performance of the demand regulator, it should be checked for proper function and adjustment prior to commencement of diving each diving day, in accordance with the KMDSI Daily Set Up and Functional Checklist, Appendix A2.3 or Section 2.7.6

Check the regulator for adjustment and proper function with the assembly complete, and supplied with a breathing gas supply pressure of 135 to 150 p.s.i.g.

***NOTE: 135 to 150 p.s.i.g. over ambient is the standard supply pressure to be used when adjusting all KMDSI helmets and band-mask demand regulators.***

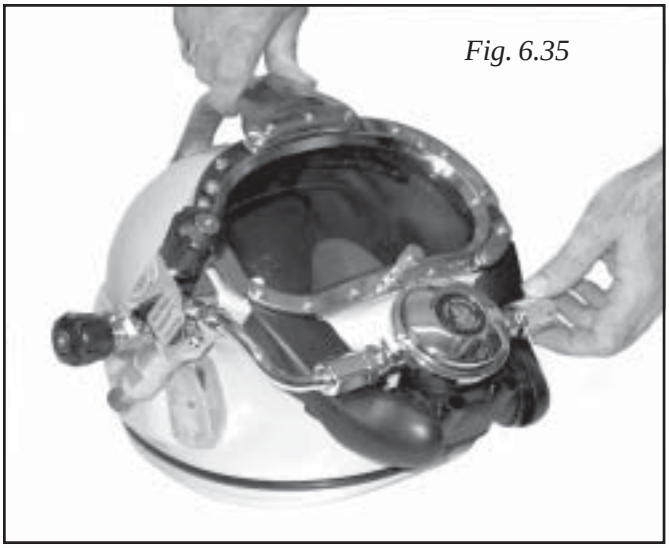


*Fig. 6.35*

***NOTE: When storing the helmet for any length of time, ensure that the regulator adjustment knob (120) is turned "out" fully counterclockwise to avoid stressing the bias springs. This will prolong the life of both the inlet valve, seat, and bias springs.***

1) Ensure the supply pressure properly adjusted to 135 to 150 p.s.i.g.

2) Rotate the adjustment knob (120) out counterclockwise slowly, until a slight steady flow develops.

3) Slowly rotate the adjustment knob in clockwise, until the free flow stops. Lightly depress the purge button several times to ensure the gas flow has stopped.

4) Lightly depress the purge button. There should be between 1/16" and 1/8" free travel in the button before gas flow starts. When the button is fully depressed, a strong surge of gas must be heard.

5) If the purge button travels less than 1/16" or greater than 1/8" before free flow is heard, the demand regulator requires internal adjustment, per Section 6.8.10.

6) When no supply pressure is going to be on the helmet for a period of time, the regulator adjustment knob (120) should be backed all the way out counterclockwise. This will prolong the life of both the inlet valve and the bias springs.

### 6.8.2 Inspection of Regulator Body Interior

Tools Required:
1/4 inch Flat Blade Attachment on Torque Screwdriver

1) On the demand regulator remove the demand regulator clamp (125) by removing the clamp screw (124).

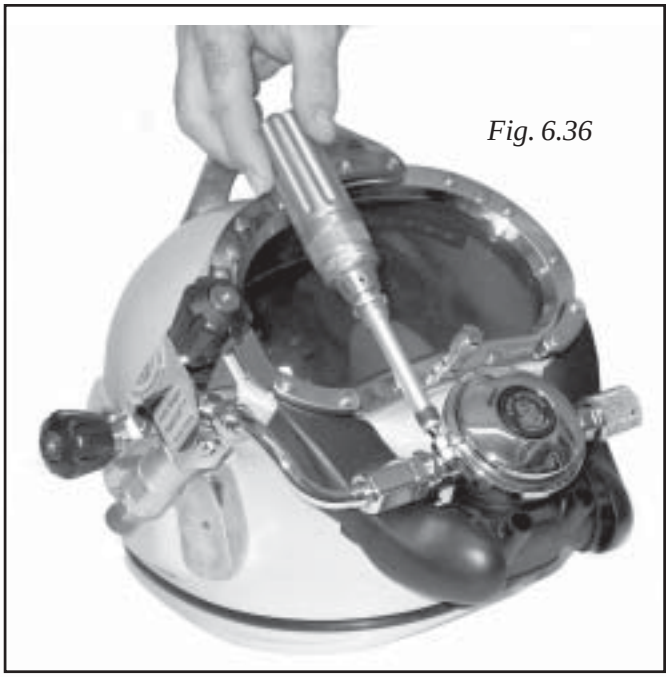


*Fig. 6.36*

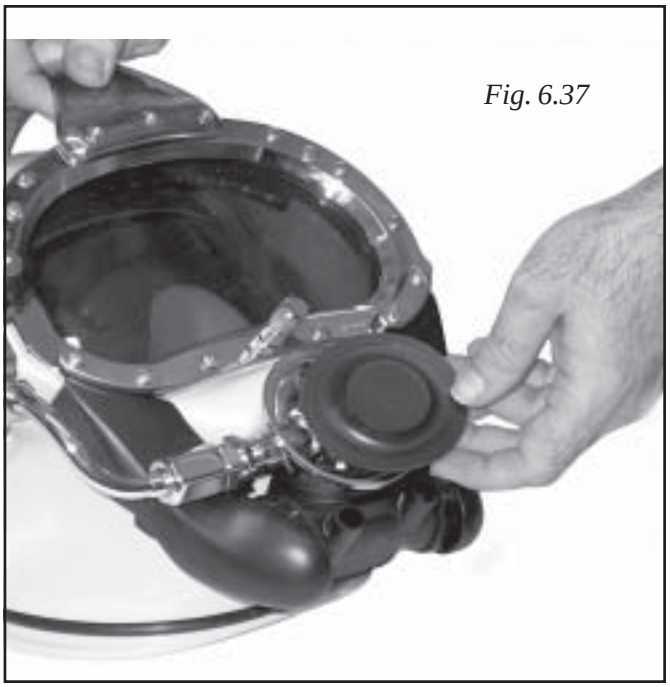


*Fig. 6.37*

2) Lift off the demand regulator cover (123) and diaphragm (122).

3) Clean the diaphragm (122) with the detergent solution, per Section 5.3.2 and wipe dry. Inspect the diaphragm for holes, tears or any signs of deterioration by holding it up to a white light and stretching and pulling. Check for a good bond between the metal disc and the silicone. Replace diaphragm if any doubt exists.

4) Inspect the interior of the demand regulator body (112) for damage, corrosion and cleanliness. Clean the interior of the regulator body if necessary per Section 5.3.2.

**⚠ CAUTION: Use only replacement diaphragms manufactured by Kirby Morgan. Use of other diaphragms may degrade performance and may cause increased breathing resistance. This can lead to fatigue and the inability to work at full capacity.**

6) Reinstall the diaphragm, cover, and clamp. Tighten the clamp screw to the recommended torque to 12 inch pounds using a torque screwdriver.

***NOTE: Older regulator clamps, when properly torqued, had a gap of approximately 1/32" to 1/16" between the interior retaining clamp surfaces when fully tightened. All new clamps when properly torqued, have little or no gap between the interior retaining clamp surfaces.***

### 6.8.3 Demand Regulator Bias Adjustment Servicing, Demand Regulator on the Helmet

***Note: This procedure should be used when replacing the O-ring on the adjustment shaft and or cleaning and lubricating the shaft threads during field repairs with the demand regulator on the helmet. Start at the adjustment knob end of the regulator:***

Tools Required:
3/4 inch Open-end Wrench Attachment on Torque Wrench
3/32 inch Punch & Small Block of Wood
Ball-Peen Hammer
Regulator Adjustment Tool Kit, Part #525-620
Torque Wrench

1) Unscrew the adjustment knob (120) until it stops and a wrench can be placed on the nut (119). If the knob wobbles as you turn it, or is extremely hard to turn, the shaft is bent and needs to be replaced

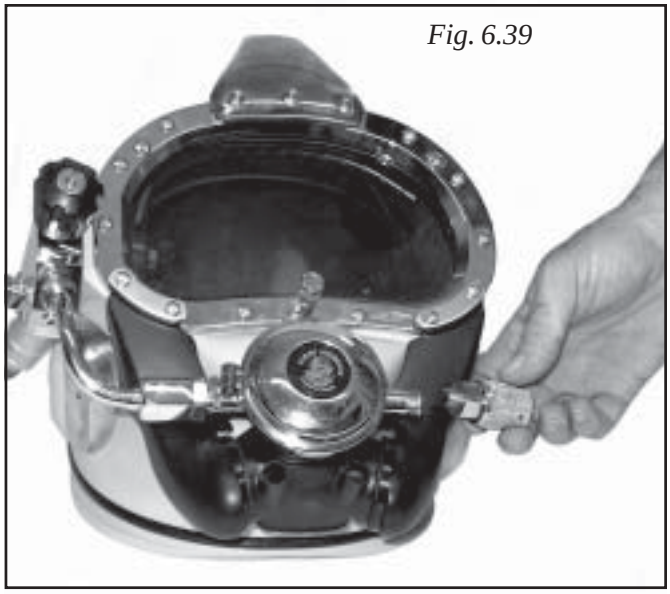


*Fig. 6.39*

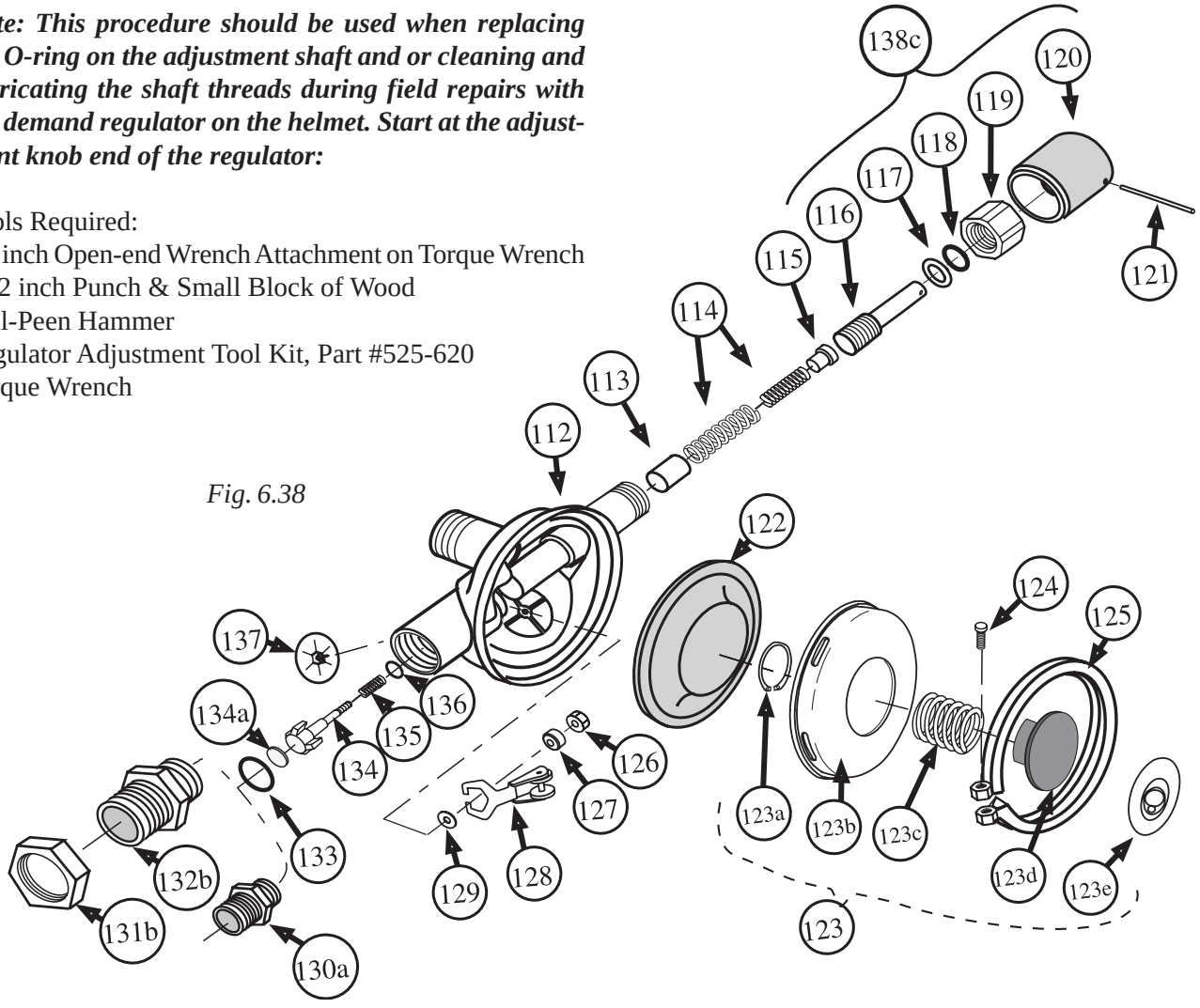



*Fig. 6.38*

2) Loosen the nut (119), then rotate the adjustment knob (120) counterclockwise until the adjustment knob and the adjustment shaft (116) are free, then remove the spring pad (115), springs (114), and piston (113). At his point the threads can be cleaned and lubricated as well as the adjustment shaft (116).

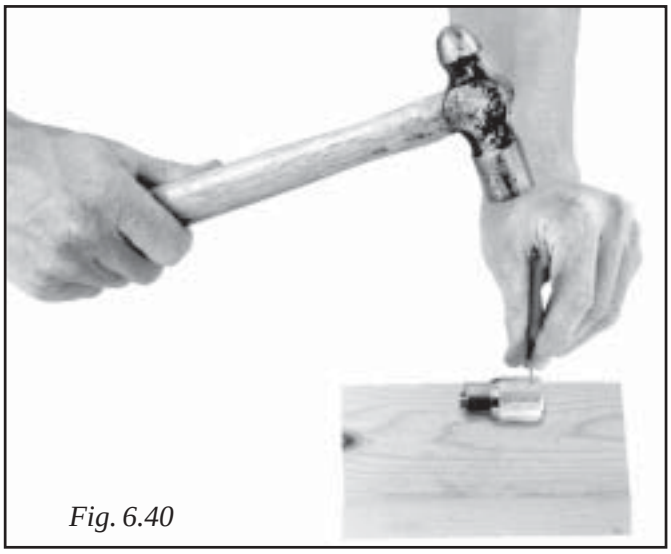


*Fig. 6.40*

3) Punch out the roll pin (121) using a 3/32 punch. Use a block of wood with a 1/4" hole drilled through it to support the knob. Position the knob so the roll pin is over the hole. The adjustment knob can be held against the wood block allowing the roll pin to be driven into the 1/4" hole.

4) Remove the adjustment knob (120), the washer (117) and O-ring (118).

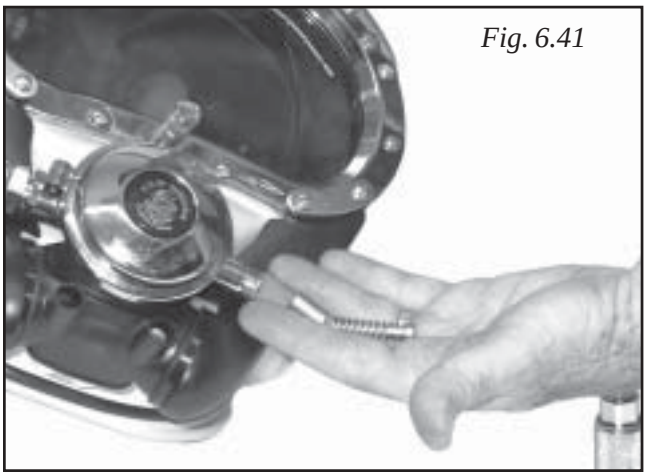


*Fig. 6.41*

5) Turn the helmet on its side, side block up, and shake out the spacer (115), spring set (114), and piston (113).

***NOTE: If the spacer (115) and the spring set (114) are stuck, this could indicate corrosion or possible saltwater intrusion into the adjustment tube and assembly, or that the adjustment tube is bent. The demand regulator should be removed from the helmet and cleaned and inspected, per Sections 6.8.5 and 5.3.2.***

6) Carefully inspect all parts for corrosion, paying particular attention to threaded surfaces and the spring set (114). Clean and lightly lubricate parts per Section 5.3.2.

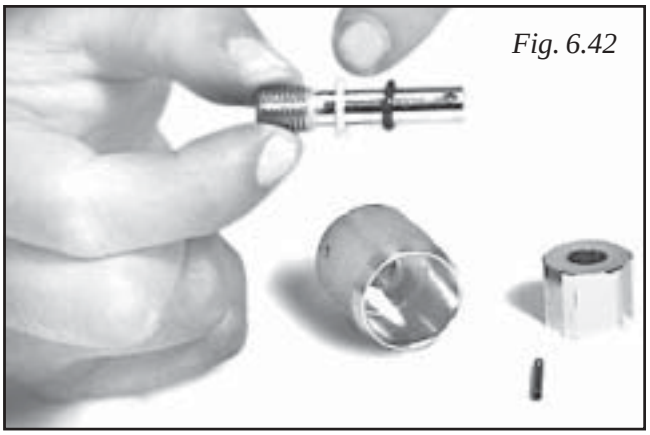


*Fig. 6.42*

***NOTE: Carefully inspect the adjustment shaft to insure it is straight, Check for damaged threads. Replace the adjustment shaft if any damage is found. Replace the O-ring (118) per Section 5.3.1.***

7) Replace the O-ring (118) per Section 5.3.1

8) Replace washer (117).

9) Inspect the inside of the adjustment tube on the regulator body (112) to be sure there is no corrosion and the adjustment assembly can travel freely. Ensure the alignment tube is not bent or misaligned from impact.

***NOTE: If the inside of the adjustment tube is corroded, this indicates saltwater intrusion into the adjustment tube and assembly. The demand regulator requires removal from the helmet and cleaning per Sections 6.8.5 and 5.3.2.***

### 6.8.4 Reassembly of Adjustment System

Tools Required:
3/4 inch Open-end Wrench Attachment on Torque Wrench
Silicone grease, or oxygen compatible grease if used for oxygen service.

1) Lightly lubricate the piston and spacer and place the piston (113) back in the regulator adjustment tube, followed by the spring set (114), and spacer (115).

2) Lightly lubricate the adjustment shaft end and threads, install the washer (117) and the lightly lubricated O-ring (118) on the adjustment shaft (116).

3) Slip the packing nut (119) over the adjustment shaft (116) followed by the adjustment knob (120).

4) Hold the shaft and rotate the knob until the pin holes line up. Use the inlet valve holder from the regulator tool kit to accurately align these holes. Using a small hammer drive the pin (121) back into place, until it is flush with the surface of the adjustment knob (120).

5) Screw the adjustment shaft (116) clockwise back into the regulator body (112) leaving enough packing nut exposed to get the wrench on it.

***NOTE: Ensure the adjustment shaft (116) rotates smoothly.***

6) Thread the packing nut (119) onto the regulator body (112) and tighten with the 3/4" torque wrench to (40 inch pounds) after seating, turn the knob in slightly making sure there is no interference.

### 6.8.5 Demand Regulator Assembly Removal from Helmet

Tools Required:
Torque Wrench and 1 3/8 inch Socket
1 /4 inch Flat Blade Attachment on Torque Screwdriver
Torque Wrench and 11/16 Open-end Attachment
Torque Wrench and 13/16 Open-end Attachment
Torque Wrench and 7/8 inch Open-end Attachment
7/8 inch Open-end Wrench

1) To remove the regulator (138a/b) from the helmet, the bent tube (47b) or Hose Assembly (47a) should be disconnected first. If your helmet is the 17B, the Bent Tube Assembly should be loosened at the side block and disconnected from the regulator. It may now be swiveled out of the way or completely removed. If your helmet is the 17A, you can just disconnect the Hose Assembly from the regulator, leaving the upper end of the hose connected to the side block (43a).

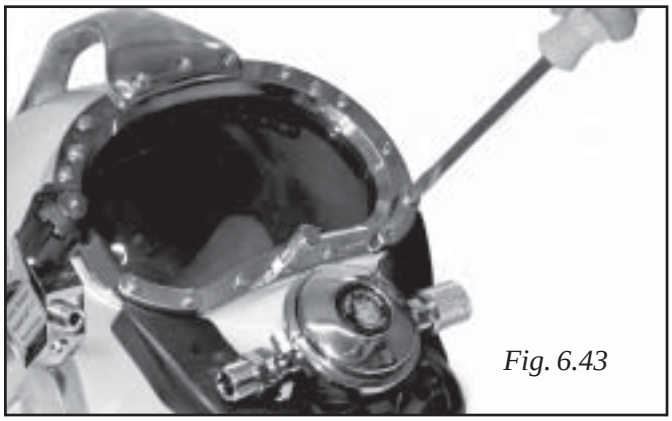


*Fig. 6.43*

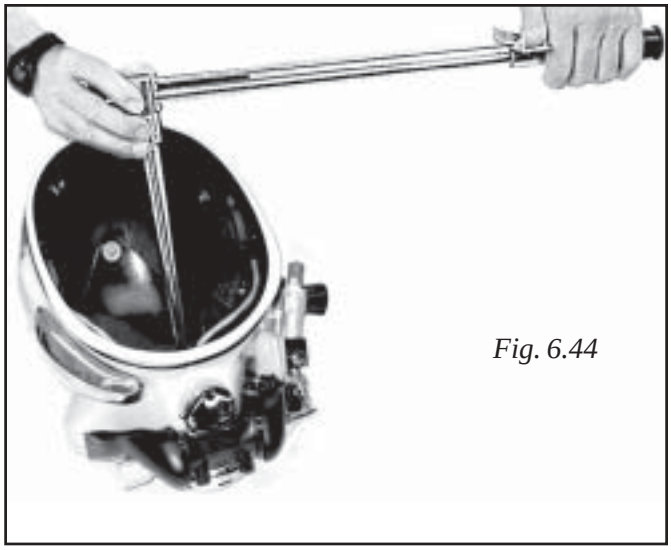


*Fig. 6.44*

2) Remove the whisker (139) from the port retainer (141) by removing the screws (111). Take care not to lose the spacers (109) or kidney plates (110).

3) The regulator mount nut (82) is removed along with the sealing O-ring (81).

4) Now the regulator assembly can be pulled out of the helmet.

5) The center section of the exhaust whisker, named the Tri-Valve exhaust main body (140c) has a tie wrap holding it in place. Remove the tie wrap (140f) then stretch the body off the regulator exhaust flange.

6) Older model double or single exhaust whiskers are removed the same way.

### 6.8.6 Disassembly of the Demand Regulator

Tools Required:
1/4 inch Flat Blade Screwdriver on Torque Wrench
7/8 inch Open-end Attachment on Torque Wrench
3/4 inch Open-end Attachment on Torque Wrench
3/32 inch Punch 7/8 inch Open-end Wrench
Small Ball Peen Hammer
KMDSI Tool Kit Part #525-620
Silicone Adhesive Dow Corning 732 or equivalent
Minimum Mandatory Replacement Parts for Annual Overhaul:
Inlet valve Soft Seat (134a) 510-580
Adjustment shaft O-ring (118) 510-011
Adjustment Shaft Washer (117) 520-032
Adjustment Nut (126) 530-303
Diaphragm (122) 510-553
Inlet Nipple O-ring (133) 510-014
Exhaust valve (137) 510-552

1) Remove the clamp screw (124) and clamp (125).

2) Remove the cover (123) and the diaphragm (122).

3) Adjustment knob (120) removal is started by unscrewing the adjustment knob until it stops.

4) The packing nut (119) is now exposed enough to use a wrench on it for removal. As the nut is backed off, unscrew the knob also.

5) The O-ring (118) and washer (117) will remain on the adjustment shaft (116).

6) Tilt the helmet so that the spacer (115), spring set (114), and piston (113) fall out of the adjustment shaft tube.

***NOTE: If the spacer (115) and the spring set (114) are stuck, this indicates possible corrosion or saltwater intrusion into the adjustment tube or the adjustment tube may be bent. The demand regulator requires removal from the helmet and cleaning per Sections 6.8.5 and 5.3.2. If the spacer and spring set are stuck and there is no indication of saltwater intrusion into the assembly, the adjustment tube may be bent. This occurs if the helmet were dropped on the adjustment knob or the diver hit the adjustment knob against a rigid object. Repairs must be made by a certified KMDSI technician.***

7) On the adjustment knob, drive out the roll pin (121) using a 3/32 punch (see illustration fig. 6.4). Use a block of wood with a 1/4 ” hole drilled through it to support the knob. Position the knob so the roll pin is over the hole. The adjustment knob can be held against the wood block allowing the roll pin to be driven into the 1/4 ” hole.

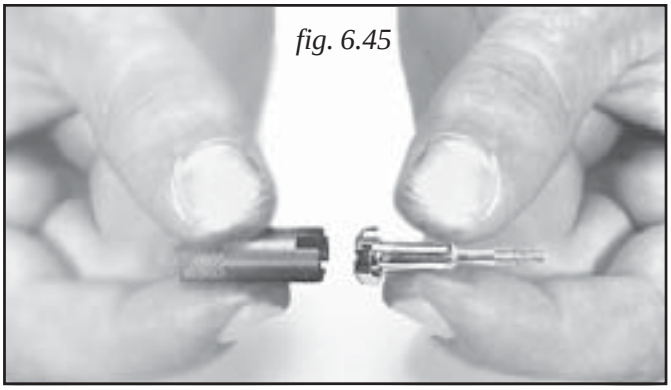


*fig. 6.45*

8) Remove the inlet nipple (130a or 132b) from the regulator body. The O-ring should be replaced if a scheduled overhaul is being performed.

9) Place the castle wrench in the inlet nipple side of the demand regulator over the soft seat of the inlet valve (134) to prevent the inlet valve from rotating.

Install the socket wrench from the KMDSI Tool Kit (Part #525-620) through the adjustment tube and engage the adjustment nut (126) on the inlet valve (134). Loosen and remove the adjustment nut (126) by rotating the socket wrench counterclockwise.

*Fig. 6.46 The inlet side of the demand regulator.*

10) Tilt the regulator and drop out the inlet valve, spring (135), and washer (136).

11) The spacer (127), lever (128), and washer (129) will now fall out of the regulator body (112).

***NOTE: Ensure that both washers (129&136) come out with the rest of the components.***

### 6.8.7 Inspection of Demand Regulator Parts

After the regulator has been disassembled, clean and inspect all parts. Any parts showing signs of wear, damage or deterioration must be replaced. If this is an annual overhaul KMDSI recommends mandatory replacement of the inlet valve seat (134a), adjustment nut (126), O-ring on inlet valve (133), O-ring on adjustment shaft (118), washer on the adjustment shaft (117). If any parts show any signs of damage, deterioration or any damaged threads, the part must be replaced. The adjustment nut (126) must never be reused. Reuse of the adjustment nut will not allow the regulator to maintain proper adjustment.

***NOTE: The adjustment nut (126) must never be reused. Reuse of the adjustment nut will not allow the regulator to maintain proper adjustment.***

**1 ) Inlet valve:** Check the condition of the rubber seat for wear and/or deep grooves. If the red silicone seat surface is stained to a dark color, this is an indication that the air supply being used was dirty, Check the condition of the Inlet nipple (130a/132b). The inlet nipple knife-edge must be in good condition, free of nicks chipped chrome or any damage. If the inlet nipple knife-edge has nicks or missing chrome, the inlet nipple as well as the soft seat will require replacement. During annual overhaul the inlet valve soft seat (134a ) should be replaced.


*Fig.6.47*

**2) Inlet Valve Soft Seat Replacement:** To replace the soft seat use a small screwdriver or O-ring pick to pry the soft seat from the chrome plated brass valve body. Using a sewing needle clean all old silicone sealant from the vent hole in the bottom of the cup area, and from the cupped area itself. **Note:** Replace the entire inlet valve (134 ) if any chrome is missing or if the shaft is bent or thread damage is present.

**3) Dab** a small amount of silicone adhesive Dow Corning 732 or equivalent on one side of the new soft seat then press the seat into the cup area of the inlet valve assembly then using a clean cloth, wipe all excess silicone from the valve assembly.

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow silicone to cure for a minimum of 24 hours before using helmet.**

**4) Diaphragm:** Check to determine if rubber has separated from the metal disc. Hold the diaphragm to a bright white light, while aggressively pulling and stretching to reveal damage, deterioration, or holes. Diaphragms showing any indication of damage must be replaced. The diaphragm should always be replaced during scheduled annual overhauls.

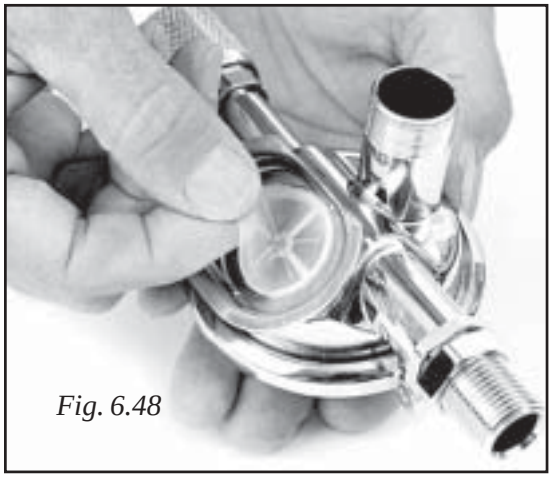


*Fig. 6.48*

**5) Exhaust valve:** Ensure the silicone exhaust valve shows no signs of damage, brittleness or any deformities. The exhaust valve should lay flat against the seat. If conducting an Annual Overhaul, the exhaust should be replaced. Ensure the seat spokes that hold the exhaust valve are smooth, even and not bent. Slight bends in the spokes may be removed by pressing with a thumb. The exhaust valve seating area should be free of dirt and corrosion to ensure the valve can lay flat and seal properly. **NEVER** lubricate the valve. Lubricating the valve can allow dirt to stick to the seat causing poor performance and wet breathing.

6) Inspect the whisker, see Fig. 6.59. Replace the whisker if it shows signs wear, aging or any damage. See Section 6.10.4 for the Tri-Valve Exhaust System that is standard on the 17 A/B starting in January 2004.

***NOTE: If you are using the old double exhaust whisker refer to Section 8.6 or 6.10.3.***

### 6.8.8 Cleaning and Inspection of Demand Regulator Parts

Clean/inspect all metal parts per Section 5.3.2. Replace any parts that are worn or damaged. All regulator parts must be free of damage, dirt, and corrosion. All rubber components must be in good condition. All O-rings should be replaced during scheduled or annual overhaul. If the inlet valve (134) has been removed, the nylon adjustment nut (126) must never be reused. Replace this with a new nut (126).

### 6.8.9 Reassembly of the Demand Regulator

***NOTE: Use the blow-apart in the back of the manual to help ensure correct assembly.***

1) Install the new exhaust valve (137) into the regulator and trim off any excess stem that may interfere with the movement of the lever or inlet valve.

2) Install the spring (135) and washer (136) on the inlet valve.

3) Press the head of the inlet valve (134) into the castle wrench (Part #525-618). Place the spring (135), and

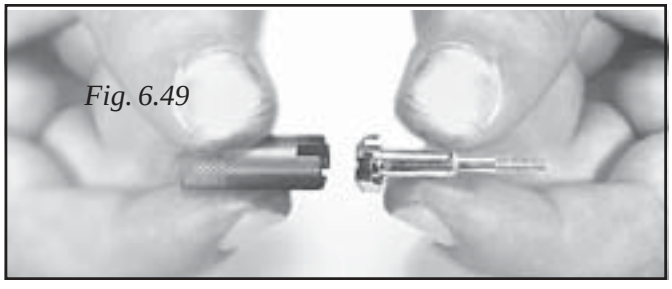


*Fig. 6.49*

washer (136) on the inlet valve shaft then insert it into the inlet tube in the regulator body (112).

4) Push in on the castle wrench compressing the spring while forcing the threaded portion of the shaft stem into the interior of the regulator body. Place the washer (129) and the spacer (127) over the end of the inlet valve stem (134). As an alternate procedure, the washer and spacer may be placed in the recess in the inside of the regulator body (112) before inserting the inlet valve stem (134).

5) Using the socket wrench nut driver from the tool kit, run the nut (126) onto the inlet valve stem (134) approximately 1 1/2 to 2 turns, leaving enough slack to allow installation of the lever (128). With the inlet valve pressed in, the washer and spacer must be loose on the inlet valve stem so that the lever can be installed.

6) Check the roller lever (128). The lever (128) legs MUST be parallel to each other and free of any nicks or burrs. Check them with a straight edge and align them if necessary by carefully bending them with pliers. With the inlet valve stem (134) depressed into the regulator body (112), insert the lever legs between the washer (129) and spacer (127) then release the pressure on the inlet valve.

7) Hold the inlet valve with the castle wrench so that it cannot rotate, tighten the nut (126) until three threads are visible past the nut. This will be close enough for initial set up.

8) While holding the lever down, install the inlet nipple (130a or 132b) with its O-ring (133) into the regulator body (112). Using the torque wrench, tighten the inlet nipple to 40 inch pounds.

9) Lightly lubricate the piston (113) and spacer (115). Install the piston, spring set (114) and spacer into the adjustment tube of the regulator body (112), as shown in the blow-apart drawing located in the Appendix.

10) Reassemble the Adjustment Knob Assembly; lightly lubricate the new O-ring (118) then install the new washer (117), O-ring (118) on the adjustment shaft (116).

11) Slide the packing nut (119) onto the adjustment shaft, then slip the knob (120) onto the end of the shaft. Hold the shaft and rotate the knob until the pinholes line up. Use the inlet valve holder from the regulator tool kit to accurately align these holes.

12) Install the retaining pin (121) by tapping it in with a small hammer until it is flush with the outer surface of the knob.

13) Lightly lubricate the shaft end and the threads with the appropriate lubricant, and then thread the adjustment shaft (116) clockwise, using the adjustment knob (120), into the tube until the packing nut can be started. Back out the adjustment knob (120) once the packing nut is engaged on the demand regulator body to access the packing nut with the torque wrench. Using a torque wrench, tighten the packing nut (119) to 40 inch pounds after seating.

14) Rotate the adjustment knob in i.e, clockwise, several turns, then recheck the torque one more time. Ensure the the adjustment shaft (116) rotates smoothly and there is no binding.

*Fig. 6.50*

15a) Stretch the Tri-Valve main exhaust body (140e) onto the exhaust flange of the regulator. Rotate as needed so the port (140b) and starboard (140a) whiskers can be installed. Next, place the exhaust valves (140e) into the exhaust valve inserts (140d). Then place the assemblies into the main body (140c). Install the port and starboard whiskers onto the main body and make sure the alignment is correct. Then install the tie wraps (104f). The tie wraps can be installed after the regulator is mounted on the helmet for easier alignment, if desired.

15b) For the old double exhaust or single exhaust, stretch the exhaust whisker (139) onto the exhaust flange of the regulator.

16) Mount the regulator to the mask or helmet. Lightly lubricate and install the sealing O-ring (81) and thread on the regulator mount nut (82).

17) If you have the 17B, install the Bent Tube Assembly (47b) per Section 6.6.4 before tightening the regulator mount nut. If you have the 17A, you can attach the Hose Assembly (46a) per Section 6.7.4 last.

***NOTE: KMDSI recommends replacement of the Hose Assembly (47a) on the 17A, at least every 2 years even if the condition appears excellent.***

.

***NOTE: If this maintenance is during an annual overhaul, replace the Teflon ring (44b) at the side block end***

*Fig. 6.51 Always use a torque wrench and a 7/8" open end wrench to Properly torque the jam nut (131b)*

***of the bent tube and the O-ring (46b) at the demand regulator inlet side of the bent tube.***

Using the appropriate lubricant per Section 5.4.1, lightly lubricate the O-ring (46b) on the Bent Tube Assembly. Slide the O-ring end of the Bent Tube Assembly into the regulator inlet nipple (132b) until the side block end is aligned with the threads for the bent tube mount nut. Rotating clockwise, thread the large nut on the Bent Tube Assembly onto the inlet nipple 1 to 2 threads. Ensure that the Teflon® ring is in place and engage the bent tube nut to the side block fully until it is hand tight. You may need to gently rock the regulator body and/or the bent tube to fully engage side block nut. Next, fully engage (clockwise) the large nut on the bent tube into the regulator inlet until hand tight. This will ensure the nut is bottomed on the shoulder on the bent tube. Do not tighten further. Loosen the jam nut on the regulator inlet (counterclockwise), and engage the jam nut fully to the large nut on the

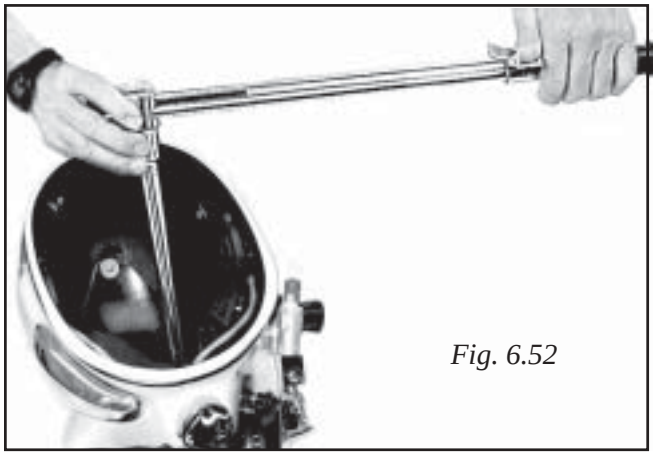


*Fig. 6.52*

bent tube. Using a torque wrench and an 7/8" open end wrench hold the large nut on the regulator end of the bent tube and tighten the jam nut (131b) to 40 inch pounds.

18) Ensuring the O-ring (81) is in place, use a torque wrench a 1 3/8" socket and an extension, torque the regulator mount nut (82) to 75 inch pounds. Next using a torque wrench with an 11/16" adapter, torque the bent tube nut to the side block to 75 inch pounds.

19) Attach the whisker (139) to each side of the face port retainer (141) using the screws (111), plates (110) and spacers (109). Using a torque wrench with a flat blade screwdriver adapter, carefully torque these screws to 12 inch pounds.
20) Adjust the regulator following instructions in Section 6.8.10.

21) Install the diaphragm (122), cover (123), clamp (125) and screw (124). Tighten the screw to 12 inch pounds using a torque screwdriver.

22) If you have the 17A, connect the Hose Assembly (46a) to the inlet nipple. Tighten the nut on the hose with a torque wrench while holding the inlet nipple (130a) with a second wrench, to prevent it from turning. Torque to (30 inch pounds)

23) Check the regulator for proper operation and fine-tune the adjustment if necessary.

### 6.8.10 Tuning the Regulator

1) Remove the clamp (125), cover (123) and diaphragm (122).

2) Screw (clockwise) the adjustment knob (120) all the way in, towards the regulator body (112).

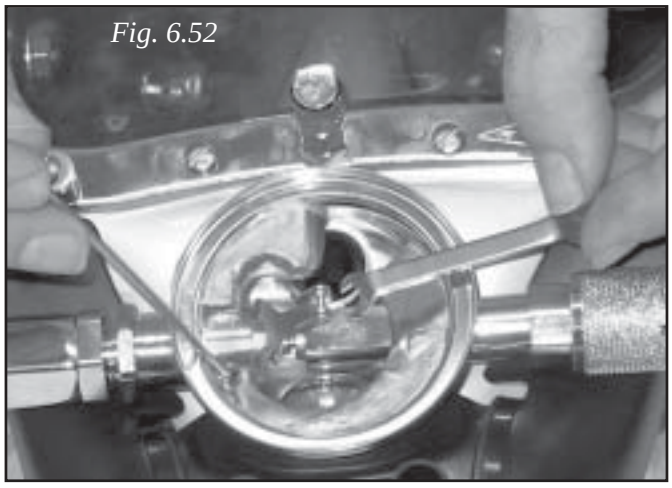


*Fig. 6.52*

3) Pressurize the regulator to between 135-150 p.s.i.g. of supply pressure.

4) Screw the adjustment knob out (counterclockwise) until the regulator starts to free flow, then screw the adjustment knob in (clockwise) until the free-flow just stops. Depress the lever several times to ensure the free-flow has stopped.

5) Insert the inlet valve holding tool into the balance hole on the inlet tube. Push forward on the tool to stop the inlet valve (134) stem from turning. Adjust the nut (126) until there is 1/16 inch (1.5 mm) to 1/8 inch (3.0 mm) of free play at the end of the lever (128).

6) Remove the inlet valve holder tool.

7) Put the diaphragm (122) and cover (123b) in place, depressing the cover tightly to simulate a properly tightened clamp.

8) Depress the purge button (123d) in the center of the cover.

9) There must be 1/16 inch (1.5 mm) to 1/8 inch (3.0 mm) of free travel before the purge button (123d) actuates, resulting in a slight flow of gas. If a slight flow of gas develops with the purge button depressed less than 1/16 inch (1.5 mm) the lever will require bending down. If the purge button travels further than a 1/8" (3.0 mm) before gas flow starts, the lever will require bending upward.

***NOTE: Before bending the lever, double-check the adjustments. It is rare that the lever requires bending. Usually levers only require bending because of they were improperly serviced previously, or because of damage during disassembly.***

10) To bend the lever up, grip the lever from the side with a pair of long nosed pliers and bend the roller end up with your finger.

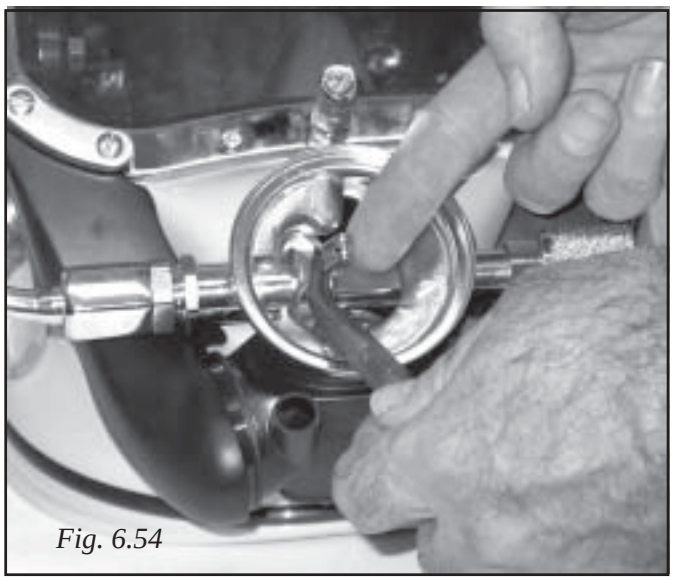


*Fig. 6.54*

***NOTE: Be very careful to not place undue stress on the lower arms of the lever as this will disfigure the lower blades and cause spongy operation.***

11) To bend the lever down, place the disk end of the KMDSI 1/4 " wrench onto the flat area of the adjustment

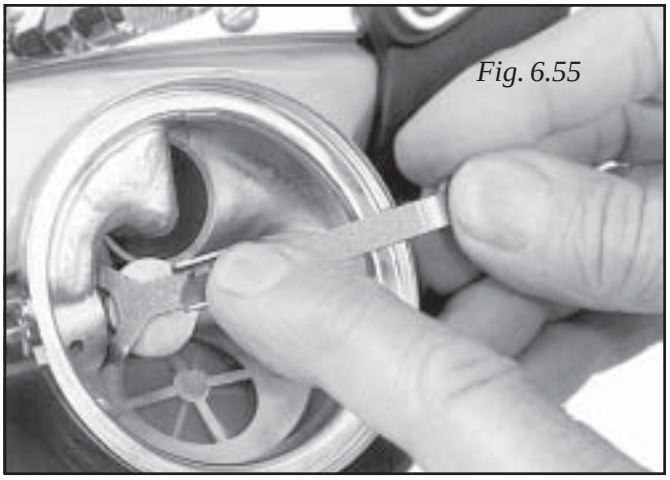


*Fig. 6.55*

tube within the regulator, sliding the disk as far as possible under the lever (128). With your finger, slightly bend the lever down over the disk to the desired height. Be careful not to bend the lever too far! Bend it slightly then check it.

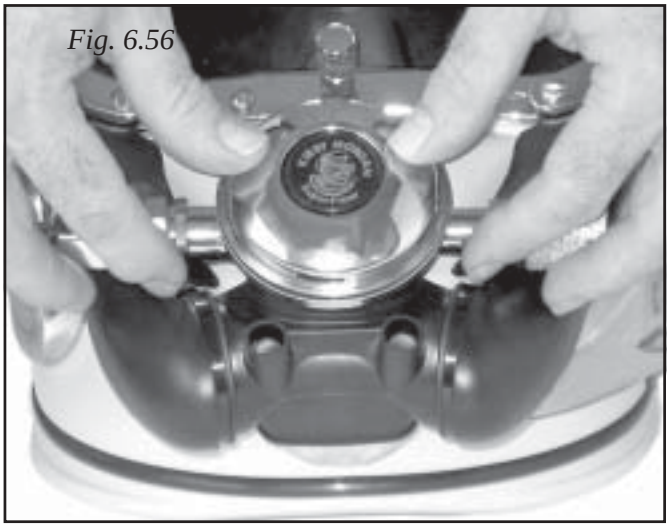


*Fig. 6.56*

12) Replace the diaphragm and the cover. Test the purge button. Continue until proper tolerances are reached.

## Important Notes on Regulator Adjustment:

1) If a new inlet valve (134) or soft seat (134a) has been installed, allow the regulator to sit for 24 hours with the adjustment knob (120) turned in all the way with the rubber seat and the nipple making contact before adjusting. This will allow the soft seat in the inlet valve stem (134) to take a set against the inlet nipple (130a or 132b). If the regulator is to be used immediately, be aware that the rubber seat will take a set, changing the adjustment and the regulator's performance. This will require the readjustment of the regulator after the first day of use.

2) Normally, if the regulator free flows, the nut (126) is too tight, and must be loosened until the lever has between 1/16" to 1/8" (1.5-3.0 mm) of free play at the end. (see Note in Section 6.8.11 below)

3) If the regulator continues to free flow after proper adjustment has been made, ensuring a correct supply pressure of 135-150 p.s.i.g. (9.3-10.1bar) both the inlet valve soft seat (134a) and/or the inlet nipple (130a/132b) must be inspected for damage. Generally, if the inlet nipple has missing chrome or a bent or damaged sealing edge, the soft seat may not make a proper seal and may also be damaged. Best practice requires replacement of both the inlet nipple and the soft seat.

### 6.8.11 Regulator Steady Flows When Pressured Up - Key items to check per Section 6.8.10

1) Ensure supply pressure is adjusted between 135-150 p.s.i.g. (9.3-10.3bar).

2) Adjust demand regulator bias adjustment knob (120) clockwise (in) until the free flow stops.

***NOTE: If demand regulator bias adjustment knob (120) is turned fully "in" and gas continues to flow, the demand regulator requires adjustment, per Section 6.8.10.***

3) Recheck lever play at the purge button ensuring 1/16 inch (1.5 mm) to l/8 inch (3.0 mm) of free travel before the purge button (123d) comes in contact with the diaphragm (123) actuating a slight flow of gas. If a slight flow of gas develops with the purge button depressed less than 1/16 inch (1.5 mm) or greater than 1/8 inch (3.0 mm) the lever will require adjusting, per Section 6.8.10.

### 6.8.12 Regulator has Low or No Flow When Pressurized

Tools Required:
Regulator Adjustment Tools, (Part #525-620)
1/4 inch Flat Blade Attachment on Torque Screwdriver

***NOTE: If there is low or no flow when the regulator is pressurized, and the lever (128) is very loose (travels more than 1/8 inch at the roller end), the nut (126) must be tightened, per Section 6.8.10.***

1) Adjust demand regulator bias adjustment knob (120) "in", i.e., clockwise.

2) Ensure supply pressure is adjusted between 135-150 p.s.i.g. (9.3-10.3bar).

3) Back the demand regulator bias adjustment knob (120) out counterclockwise until a slight steady flow develops. Then adjust the knob in clockwise until the free-flow just stops. Depress the lever several times to ensure the regulator is stabilized.

4) Recheck the lever play at the purge button ensuring 1/16 inch (1.5 mm) to l/8 inch (3.0 mm) of free travel before the purge button (123d) comes in contact with the diaphragm (123) actuating a slight flow of gas. If a slight flow of gas develops with the purge button depressed less than 1/16 inch (1.5 mm), the lever will require slightly more play. If the purge button travels greater than 1/8 inch (3.0 mm), the lever will require a reduction of play by adjusting per 6.8.10.

5) Recheck that gas source pressure is set between 135-150 p.s.i.g. Gas source must be capable of supplying 4.5 a.c.f.m. (127.4 BL/min per diver) at the required over bottom pressures for the depth of the dive per Section 1.4.

6) If the preceding steps were satisfactory, check the following helmet/mask parts for foreign debris in the air/gas passages:

a. One-way valve (68), per Section 6.2
b. Side block assembly (43b/43a)
    1. Defogger valve (32-41), per Section(s) 6.4.1, 6.4.2,6.4.3
    2. Emergency Valve Assembly (58), per section(s) 6.5.1, 6.5.2, 6.5.3
    3. Bent Tube Assembly (47b), per Section(s) 6.6.2, 6.6.3, 6.6.4
       or the Hose Assembly (47a), per Section(s) 6.7.1, 6.7.2, 6.7.4

### 6.8.13 Unexplained Demand Regulator Free Flow

Any leak in the neck dam when the diver is face down will cause gas to vent out into the water from the inside of the helmet. This causes the demand regulator to steady flow, making up for the vented gas. Even if the adjustment knob is turned in, the leak may continue.

1) One method to check for this is for the diver to place the demand regulator above the neck dam by looking up. Free flow from a leaky neck dam should cease as long as the helmet is in the upright position.

2) Ensure the demand regulator bias adjustment knob (120) is properly adjusted for the supply pressure.

3) During ascent the regulator will free flow if the supply pressure to the helmet is not backed off (topside) or, the diver does not adjust "in" (clockwise), the demand regulator adjustment knob (120) as the diver's depth and the ambient pressure decreases.

4) If the preceding steps were checked and the demand regulator still steady flows the regulator requires adjustment per Section 6.8.10.

## 6.9 Oral/Nasal

### 6.9.1 Oral/Nasal Removal

Tools Required:
7/16 inch Open-end Wrench

**The oral/nasal mask is easily replaced.**

1) Remove the nose block device (86) first. See Section 7.3.

**⚠ CAUTION: The nose block device MUST be removed and reinstalled when installing a new oral nasal mask. Simply stretching the oral nasal mask over the nose block device can cause the oral nasal mask to tear.**

*Fig. 6.57*

2) Remove the microphone (73).

3) The oral/nasal mask can then be pulled off the regulator mount nut (82). It is held on by a snap fit.

### 6.9.2 Inspection of Oral/Nasal

1) Inspect the oral/nasal mask (83). If it is torn, damaged or aged it must be replaced.

2) Inspect the oral/nasal valve (84). If it is torn or damaged it must be replaced.

3) Remove the valve body (85) by pushing it out of the oral nasal.

4) Remove the old valve (84) by pulling it out.

5) Install the new valve by feeding the thin tail through the valve body and pulling on it until the valve is seated.

6) Install the valve body in the Oral Nasal. The valve MUST be on the inside of the Oral Nasal.

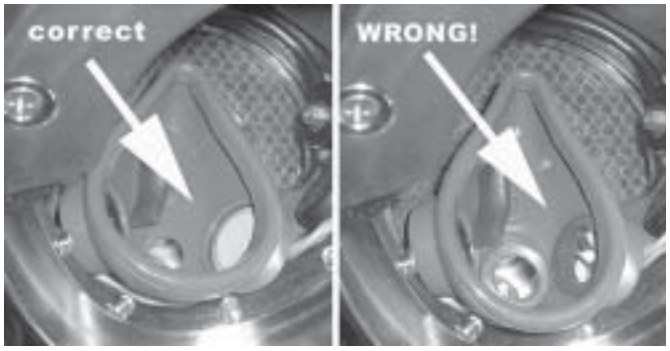



*Fig. 6.58*

**⚠ DANGER: The oral/nasal valve must be replaced correctly to provide gas flow in the proper direction. The flow through the valve must be from the interior of the helmet into the oral nasal mask. This will allow the diver to breathe the gas from the defogger valve freely, yet help to reduce carbon dioxide inside the helmet. If the valve is not replaced properly this could make it difficult to breathe the gas supplied by the defogger and expose the diver to an excess of carbon dioxide. This could lead to exhaustion and blackout resulting in serious injury or death.**

### 6.9.3 Oral/Nasal Replacement

1) Snap the oral/nasal over the regulator mount nut (82).

2) Reinstall the microphone (73).

3) Reinstall the nose block device (86).

## 6.10 Whisker Exhaust Systems

There are three exhaust systems in use on the SL-17A/B helmet. The standard single exhaust, PN# 510-554, the latex double exhaust, PN# 525-102 and the New Tri-Valve Exhaust® PN#525-752. The New Tri-Valve Exhaust® system now comes standard on the SL-17 and is intended to replace all other exhaust systems previously employed.

**⚠ Warning: Using the SL-17 A/B helmet with the standard single exhaust, double exhaust or Tri-Valve Exhaust® will not guarantee the total exclusion of water from the helmet of breathing system. The purpose of the exhaust system is to minimize and reduce back flow of water only, thus minimizing or reducing exposure risks. Diving in contaminated waters should only be undertaken by those divers specially trained for contaminated water diving. All helmets and equipment should be carefully tested to insure there is no leakage prior to engaging in contaminated water diving operations.**

### 6.10.1 Standard Old Style Single Exhaust Whisker' PN# 510-554

***Note: The Standard old style exhaust whisker (139) PN# 510-554 has been used since 1976. This whisker as well as the double exhaust whisker PN# 525-102 has now been replaced by the new Tri-Valve Exhaust® whisker PN# 525-752. The following procedure covers the servicing of the old style whisker PN# 510-554. For the new Tri-Valve Exhaust® system refer to Section 6.10.4 of this manual.***

Tools Required:
Torque Screwdriver
1/4 inch Screw Flat Blade Attachment.
7/8" Torque Wrench 0-200 ft lb
7/8" Crow Foot Adapter
5/8" Crow Foot Adapter
7/8" Open End Wrench

1 I/4" Socket (regulator nut)

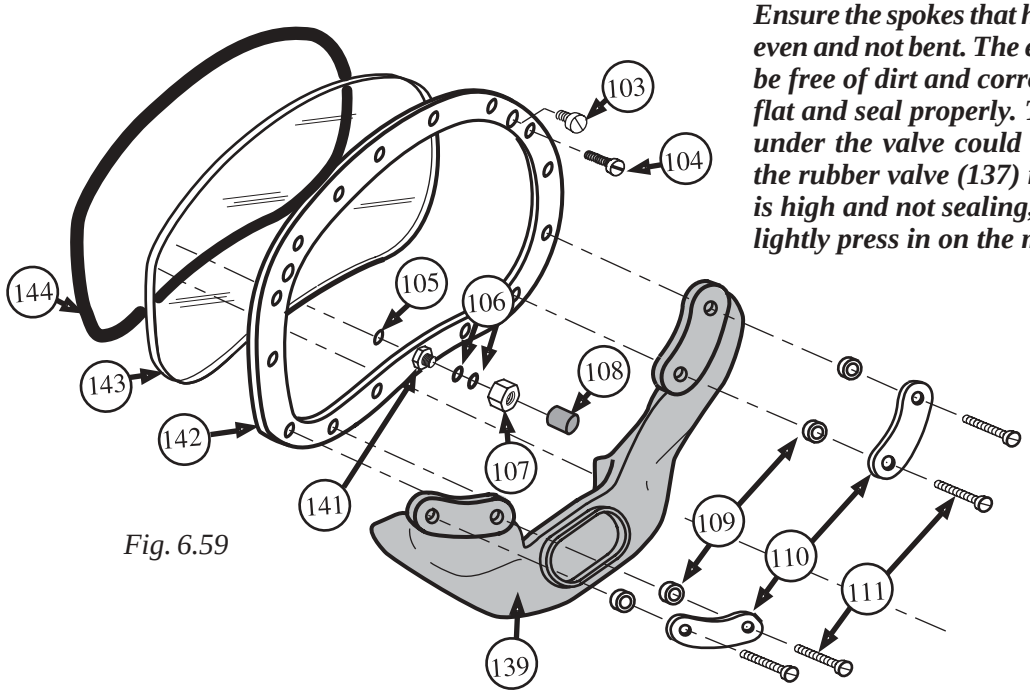



*Fig. 6.59*

1/16" Crow Foot Adapter

1.Loosen the two bent tube retaining nuts, and remove the bent tube (45b).

2. Remove the nose block knob (108), packing nut (107), and nose block shaft (86).

3. Remove the regulator mount nut (82) and O- ring 81).

4. Remove the oral nasal mask (83).

5. Loosen and remove the whisker retaining screws (111), remove the retaining plates (110) then pull the regulator and whisker free. Use caution not to lose the whisker spacers (109). The rubber whisker (139) is removed by stretching and pulling the rubber away from the back of the regulator (112) "whisker flange". The "whisker flange" forms the exhaust valve seat and surrounds the regulator silicone exhaust valve. The whisker is held in place at the regulator body by being stretched over the whisker flange., To remove it, pull the whisker free.

6. Clean the valve and valve land area of the regulator body.

***Note: Whenever the whisker is removed or replaced, the exhaust valve (137) should be carefully cleaned and inspected. Replace the valve (137) if any damage or deterioration is found. All exhaust valves should be replaced during scheduled overhauls or at least once a year.***

***Note: Before removing the regulator exhaust valve, carefully inspect the area around the edges to assure the silicone exhaust valve is in contact with the regulator body. Ensure the spokes that hold the exhaust valve are smooth, even and not bent. The exhaust valve seating area should be free of dirt and corrosion to ensure the valve can lay flat and seal properly. The metal cross-area of the body under the valve could be slightly bent out resulting in the rubber valve (137) not sealing. If the exhaust valve is high and not sealing, with the exhaust valve in place, lightly press in on the metal cross, bending the metal in slightly until the spokes are flat and the valve seats.***

3) Replace the regulator exhaust valve in accordance with the regulator overhaul procedure 6.8.9. The silicone exhaust valve is removed by pulling it out. A new valve can then be installed. The valve should be replaced during scheduled overhauls or at least once a year.

### 6.10.2 Reinstalling the Whisker

1) If a scheduled overhaul is being performed, or the exhaust valve is questionable, replace the regulator exhaust valve (137).

***Note: NEVER lubricate the exhaust valve. Lubricating the valve will attract dirt and may allow leakage.***

2) Stretch the whisker onto the exhaust flange of the regulator (112).

**⚠ DANGER: Always be sure to use a torque screwdriver whenever checking the port retainer screws. Over tightening can cause damage to the threaded inserts in the fiberglass shell and cause them to loosen. Without the correct tension the port retainer may come loose and the helmet could leak resulting in flooding of the helmet. This could lead to serious injury or death.**

3) Place the regulator into the helmet opening, then attach the screws (111), spacers (109) and plate (110), on each side of the port retainer and using a torque screwdriver torque to 12 inch pounds. See Appendix 1.

4) Lightly lubricate a new O-ring (81) and place on the regulator inlet tube then thread the retaining nut (82) on hand tight only.

5) Clean and inspect the bent tube O-ring (46b) and side block seal (44b). These components can be reused during normal field service but should be replaced during normal overhauls or if damage is detected.

6) Lightly lubricate the bent tube O-ring (46b) and install the bent tube into the inlet nipple and thread the nut on several revolutions.

7) Swing the bent tube into place on the side block, engage the bent tube side block nut and hand tighten.

8) Install the regulator retaining nut (82) and O-ring (81). Torque the regulator retaining nut to 75 inch pounds.

9) Lightly tighten both the side block nut and nipple tube nut until resistance is felt then torque the side block nut to 100 inch lbs, and the inlet nipple jam nut (131b) against the inlet nipple nut to 35 inch pounds.

10) Clean and inspect the oral nasal mask and install on the regulator mount nut.

11) Clean and inspect the nose block O-rings (106), shaft (86), and nut (107) replace damaged components. Lightly lubricate the shaft and O-rings, reinstall and torque the packing nut (107) to 20 inch pounds.

**⚠ Warning: The double exhaust system, PN# 525-102 increases exhalation resistance and should not be used for dives deeper than 150 FSW.**

### 6.10.3 Double Exhaust Whisker Cleaning and Overhaul, Whisker PN# 525-102

The double exhaust system helps minimize or reduce the possibility of back flow of biological and chemical contaminants. This system has been used successfully for diving in biologically contaminated environments. However, there are certain chemicals (i.e.. Toluene, Acetic acid etc.) that will attack the rubber in the valves in the exhaust assembly. The double exhaust system has been recently replaced by the "New Tri-Valve Exhaust® System", however the Double Exhaust system is still available. Refer to the exploded view available on the KMDSI web page at www.kmdsi.com

Old Double Exhaust (Part # 525-102)

| Location | Part Number | Description |
|---|---|---|
| 1 | 530-032 | Screws (3) |
| 2 | 550-087 | Double Exhaust Main Body |
| 3 | 520-042 | Tie Wrap (2) |
| 4 | 510-561 | Exhaust Valve |
| 5 | 520-020 | Valve Body |
| 6 | 510-550 | Exhaust Valve |
| 7 | 525-103 | Double Exhaust Whisker |

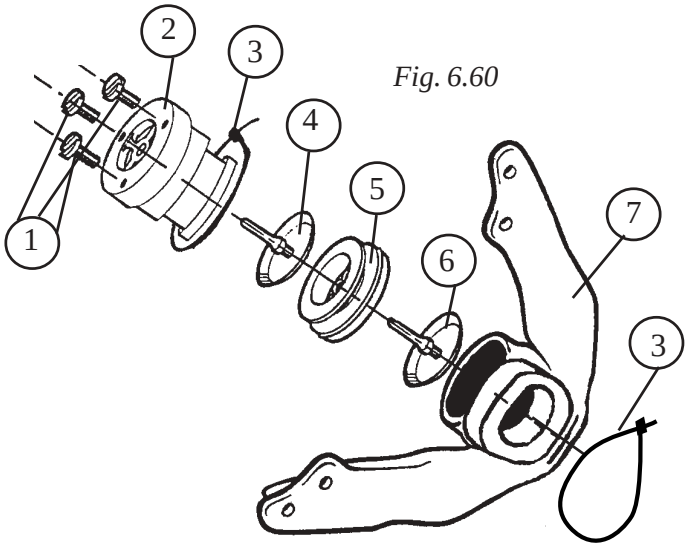



*Fig. 6.60*

**BE AWARE OF WHAT YOU ARE DIVING IN**! More information on contaminated water diving may be found in the publication "Diving in High-Risk Environments" by Steven Barsky, published by Hammerhead Press.

Tools Required:
Torque Screwdriver
1/4 inch Screw Flat Blade Attachment.
7/8" Torque Wrench 0-200 ft lb
7/8" Crow Foot Adapter

5/8" Crow Foot Adapter
7/8" Open End Wrench
1 I/4" Socket (regulator nut)
1/16" Crow Foot Adapter
1) Loosen the two bent tube retaining nuts, and remove the bent tube (45b).

2) Remove the nose block knob (108), packing nut (107), and nose block shaft (86).

3) Remove the regulator mount nut (82) and O- ring 81).

4) Remove the oral nasal mask (83).

5) Loosen and remove the whisker retaining screws (111). Remove the retaining plates (110) then pull the regulator and whisker free. Use caution not to lose the whisker spacers (109). The rubber whisker (7) is removed by stretching and pulling the rubber away from the back of the regulator (112) "whisker flange". The "whisker flange" forms the exhaust valve seat and surrounds the regulator silicone exhaust valve. The whisker is held in place at the regulator body by being stretched over the whisker flange and secured with a tie wrap. (3)To remove, cut the tie wrap and pull the whisker free.

6) Remove the inner valve cage assembly . Clean and inspect the valve and cage. Replace the valve (6) if any damage or deterioration is present or if a routine overhaul is being performed. **Note:** This is the same valve, and cage as used in the oral nasal.Clean and inspect the valve. Replace the valve (4) if any damage or deterioration is present or if a routine overhaul is being performed.

***Note: Before removing the regulator exhaust valve (137), carefully inspect the area around the edges to assure the silicone exhaust valve is in contact with the regulator body. Ensure the spokes that hold the exhaust valve are smooth, even and not bent. The exhaust valve seating area should be free of dirt and corrosion to ensure the valve can lay flat and seal properly. The metal cross-area of the body under the valve could be slightly bent out resulting in the rubber valve (137) not sealing. If the exhaust valve is high and not sealing, with the exhaust valve in place, lightly press in on the metal cross, bending the metal in slightly until the spikes are flat and the valve seats.***

7) Clean the valve (137) and valve seat area of the regulator body. Replace the exhaust valve in accordance with the regulator overhaul procedure 6.8.9. The silicone exhaust valve is removed by pulling it out.

***Note: Whenever the whisker is removed or replaced the exhaust valve(137) should be carefully cleaned and inspected. Replace the rubber whisker and or valve if any damage or deterioration is found. All exhaust valves should be replaced during scheduled overhauls or at least once a year and anytime damage or deterioration is present. 5).***

8) Stretch the double exhaust whisker (7) onto the regulator flange and install tie-wrap (3) loosely around whisker on the regulator flange. Install tie-wrap (3) snugly around whisker on the exhaust body flange making sure that the tie wrap is in the slot on the exhaust body! This is very important to the sealing of the exhaust! Tighten the regulator flange tie-wrap snugly around the whisker, insuring that it does not become pinched between the helmet/mask frame & regulator. Cut off excess tie wrap ends.

***NOTE: In newer exhaust whisker kits, the second exhaust valve (6) and body (5) are already installed in the whisker. If whisker replacement is being done the valve and cage needs to be installed.***

9) Place the regulator back into the mount hole of the helmet/mask frame. Stretch the double exhaust kit whisker over the special main exhaust body ensuring the whisker is seated properly on the main exhaust body flange.

10) Place the regulator into the helmet opening, then attach the screws (111), spacers (109) and plate (111), on each side of the port retainer and using a torque screwdriver torque to 12 inch pounds. (Per Appendix 1).

11) Attach the whisker using the screws, plate, and spacers on each side of the port retainer. Tighten to 12 inch pounds with a torque adjustable screw driver. **SPECIAL CARE must always be taken to not over torque any port retainer screws!**

12) Lightly lubricate a new O-ring (81) and place on the regulator inlet tube then thread the retaining nut (82) on hand tight only.

13) Clean and inspect the bent tube O-ring (46b) and side block seal (44b ). Components can be reused during normal field service but should be replaced during normal overhauls or if damage is detected.

14) Lightly lubricate the bent tube O-ring (46b ) and install bent tube into the inlet nipple and thread the nut on several revolutions.

15) Swing the bent tube into place on the side block, engage bent tube side block nut and hand tighten.

16) Torque regulator retaining nut (82) to 75 inch pounds.

17) Lightly tighten both the bent tube retaining nuts, then torque the side block nut to 100 inch lbs, and the inlet nipple jam nut against the inlet nipple nut to 40 inch pounds.

18) Clean and inspect the oral nasal mask and install on the regulator mount nut.

19) Clean and inspect the nose block O-rings (106), shaft

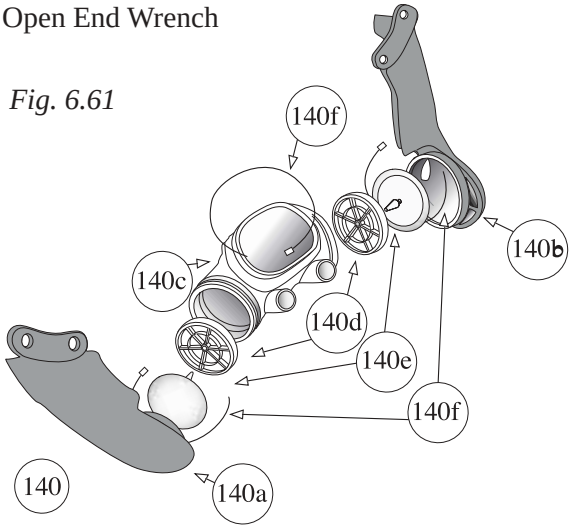
(86), and nut (107). Replace damaged components, lightly lubricate the shaft and O-rings, reinstall and torque the packing nut (107) to 20 inch pounds.

***Note: The new Tri-Valve Exhaust® system has been designed to replace the double exhaust system PN#525-102. The new Tri-Valve Exhaust® allows less exhaust restriction than both the standard single exhaust, and double exhaust systems, thus reducing exhalation effort, resulting in a lower work of breathing. The Tri-Valve Exhaust® is intended to minimize/Reduce the backflow of water and contaminants into the demand regulator breathing cavity.***

### 6.10.4 Tri-Valve Exhaust® Whisker

Tools needed:
Medium size flat blade screwdriver
Torque screwdriver with medium size flat blade
Small cutting pliers
Needle nose pliers
1 3/8" Socket on Torque Wrench
Flat Blade Attachment on Torque Screwdriver
11/16" Open End Attachment on Torque Wrench
13/16" Open End Attachment on Torque Wrench
7/8" Open End Attachment on Torque Wrench
7/8" Open End Wrench

*Fig. 6.61*




### Demand Regulator Assembly Removal:

1) To Remove the regulator from the helmet, the Bent Tube or Regulator Hose Assembly w/O-Rings ("A" style side block) must be removed first. The Bent Tube Assembly must be removed before regulator removal.

2) Loosen and remove the regulator mount nut (82) and O-ring (81).

3) Remove the whisker for the Tri-Valve Exhaust® System from the port retainer, held on each side of the Helmet by two screws (111), stand off spacers (109) and one plate (110) on each side. Take care not to lose the four spacers.

4) Removal of a Tri-Valve Exhaust® System will require the tie wrap that holds the Tri-Valve Exhaust® Main Body to the regulator exhaust flange to be cut off. After removing the tie wrap, remove the Tri-Valve Exhaust® main body by stretching it over and off of the regulator exhaust flange.

### Replacing the Regulator Exhaust Valve:

1) Remove the existing regulator exhaust valve (137) by pulling it out of its mount hole. If the valve tears, make sure that is removed without any valve material is left in the inside of the regulator.

***NOTE: Before installing the new valve, ensure that the spokes that hold the exhaust valve are smooth, even and not bent. Slight bends in the spokes may be removed utilizing slight pressure with a thumb. (Do not bend the spokes in.) The exhaust valve seating area should be free of dirt and corrosion to insure the valve can lay flat and seal properly. NEVER lubricate the valve.***

2) Remove the regulator clamp screw (124) and clamp (125)

3) Remove the cover (123b) and the diaphragm (122)

4) Install the new regulator exhaust valve ( 137) by placing the stem of the valve in through the hole in the hub of the spokes from the outside of the regulator. Gently, (using needle nose pliers) from the inside of the regulator, pull the stem of the valve through the hole in the hub of the spokes until it pops into its seating area.

5) Reinstall the diaphragm, cover, clamp and clamp screw.

### Tri-Valve Exhaust® Valve Replacement.

1) Remove the Tri-Valve Exhaust® Assembly

2) Using small cutting pliers, carefully cut & remove the two tie wraps (140f) that hold the Deflector Whiskers™ (140a, 140b) to the main exhaust body(140c).

3) Remove the two exhaust valve Inserts, and valves. (140d,140e). **CAREFULLY NOTE** which side the valves are installed into and which way they face when mounted in the body. They MUST be reinstalled facing the same way. (See Fig. 6.61)

4) Install a new exhaust valve (140e) into each whisker exhaust valve insert (140d) on the correct side (see fig 6.61) by feeding valve tail through hole in center of valve insert and pulling on it until valve is seated

***NOTE: The exhaust valve/whisker exhaust valve inserts assembly must be placed into Tri-Valve Exhaust® main body (140c) correctly to provide gas flow in the proper direction. The flow must be from the inside of Tri-Valve Exhaust® main body out to whiskers (140a,140b).***

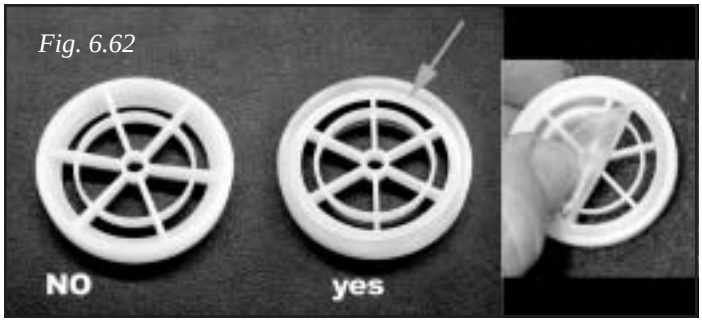


*Fig. 6.62*

5) Install an exhaust valve/whisker exhaust valve insert assembly into both seating areas on each side of Tri-Valve Exhaust® main body.

6) Slide the starboard whisker (140a) onto the starboard side of the main body (140c), making sure that you do not dislodge exhaust valve/whisker exhaust valve insert assembly from its seating area. The parting line on bottom of the exhaust whiskers should be 5/16 inch behind the parting line on the main body. See Fig 6.63

7) Repeat this procedure for the port side.

8) Place tie-wraps (140f) around the tie wrap grooves in each of the two whiskers. Before doing the final tightening of the tie-wraps, make sure that the heads of the tie wraps are positioned on the body as shown in Fig. 6.63


*Fig. 6.63*

**Installing the Tri-Valve® Exhaust System onto the Regulator:**

1) The Tri-Valve Exhaust® Main Body opening mates to the regulator exhaust flange. This opening needs to be worked onto the flange.

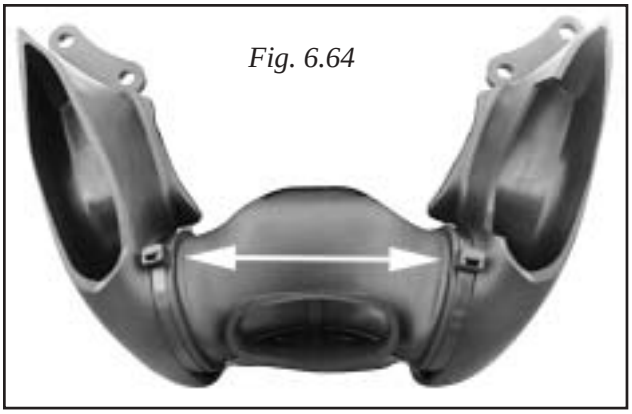


*Fig. 6.64*

**IMPORTANT NOTE: DO NOT** attempt to stretch the whisker onto the regulator flange by pulling on the long part of the whisker. Doing this could possibly loosen or separate the parts. Grasp the main body area of the whisker as shown, while stretching the rubber onto the flange. Make sure that the Tri-Valve Exhaust System is facing the correct direction and is not upside down.


*Fig. 6.65*

2) Place the tie wrap around the tie wrap seating surface and tighten, making sure that the tie wrap end is positioned as shown in Fig. 6.65 Cut off the excess tie wrap tail.

**Installing the Regulator with the Tri-Valve Exhaust® System into the Helmet/Band Mask**

1) Place the regulator into the helmet opening, then attach the screws (111), spacers (109) and plate (110), on each side of the port retainer and using a torque screwdriver torque to 12 inch pounds. (Per Appendix 1).

2) Attach the whisker using the screws, plate, and spacers on each side of the port retainer. Tighten to 12 inch pounds with a torque adjustable screw driver.
SPECIAL CARE must always be taken to not over torque any port retainer screws!

**⚠ DANGER: Always be sure to use a torque screwdriver whenever checking the port retainer screws. Over tightening can cause damage to the threaded inserts in the fiberglass shell and cause them to loosen. Without the correct tension the port retainer may come loose and the helmet could leak resulting in flooding of the helmet. This could lead to serious injury or death.**

3) Lightly lubricate a new O-ring (81) and place on the regulator inlet tube then thread the retaining nut (82) on hand tight only.

4) Clean and inspect the bent tube O-ring (46b) and side block seal (44b) these components can be reused during normal field service but should be replaced during normal overhauls or if damage is detected.

5) With silicone grease, lightly lubricate the O-ring (46b)on the Bent Tube Assembly. Slide the O-ring end of Bent Tube Assembly into the regulator inlet nipple until the side block end is aligned with the threads for the bent tube mount nut. Thread the large nut on the Bent Tube Assembly onto the inlet nipple 1 or 2 threads. Ensure that the Teflon ring is in place and engage the bent tube nut to the side block fully until it is hand tight. You may need to rock the regulator Body and/or the bent tube to fully engage side block nut. Next, fully engage (clockwise) the large nut on the bent tube into the regulator inlet until hand tight. This will ensure the nut is bottomed on the shoulder on the bent tube. Do not tighten further. Loosen the jam nut on the regulator Inlet (counterclockwise), and engage the jam nut fully to the large nut on the bent tube. Using a 7/8" open end wrench, hold the large nut on the regulator end of the bent tube and tighten the jam nut against it using a torque wrench with a 7/8" adapter to 100 inch pounds.

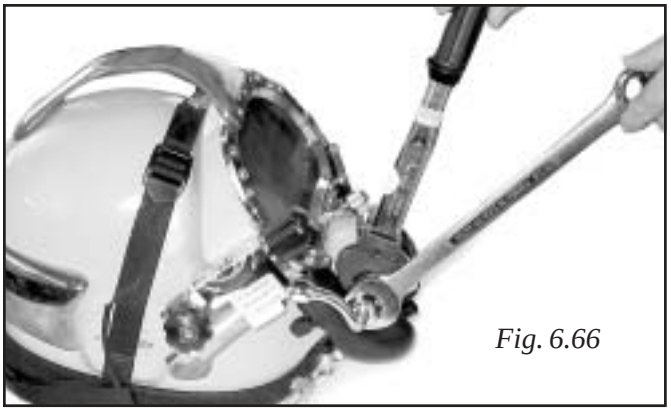


*Fig. 6.66*

## 6.11 Exhaust Assembly

The Main Exhaust Assembly (149-153) is held in place by the three screws (148) that are installed from the inside the helmet shell. RTV silicone sealant is used to seal the main exhaust body (149) to the helmet shell (92).

*Fig. 6.67*

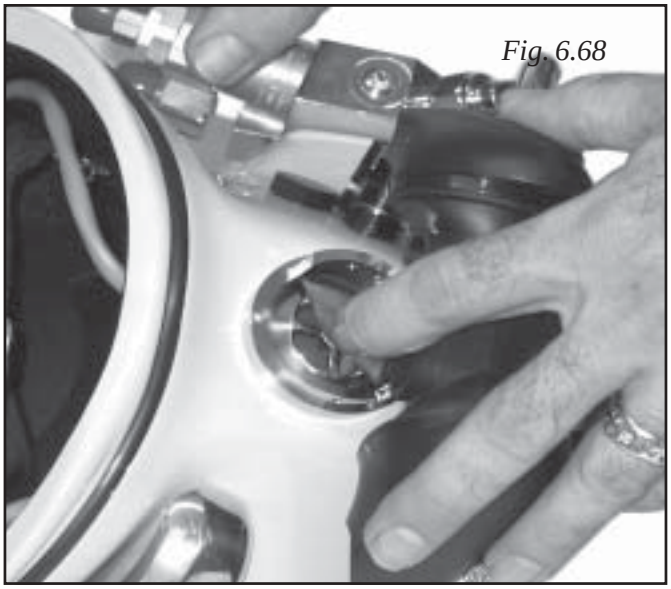


*Fig. 6.68*

### 6.11.1 Main Exhaust Valve Removal

Tools Required:
Flat blade screwdriver

1) The main exhaust cover (153) can be removed by removing the two screws (152) on either side of it.
2) The main exhaust valve (151) must be replaced at the slightest sign of deterioration or aging of the rubber. Simply grasp the valve and pull to remove.
3) The main exhaust body seat (150) must be clean with no sand or other debris.

### 6.11.2 Main Exhaust Valve Replacement

1) The main exhaust valve (151) installs by inserting the center stem through the main exhaust body (150), and then pulling from inside the helmet shell (92) until it snaps into place.

2) Replace the main exhaust cover.

### 6.11.3 Main Exhaust Body

The main exhaust body does not normally need to be removed except if replacing due to corrosion or damage. Below is the procedure for removal and replacement.

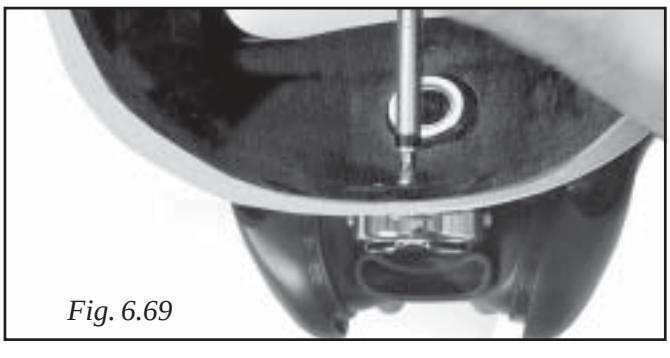


*Fig. 6.69*

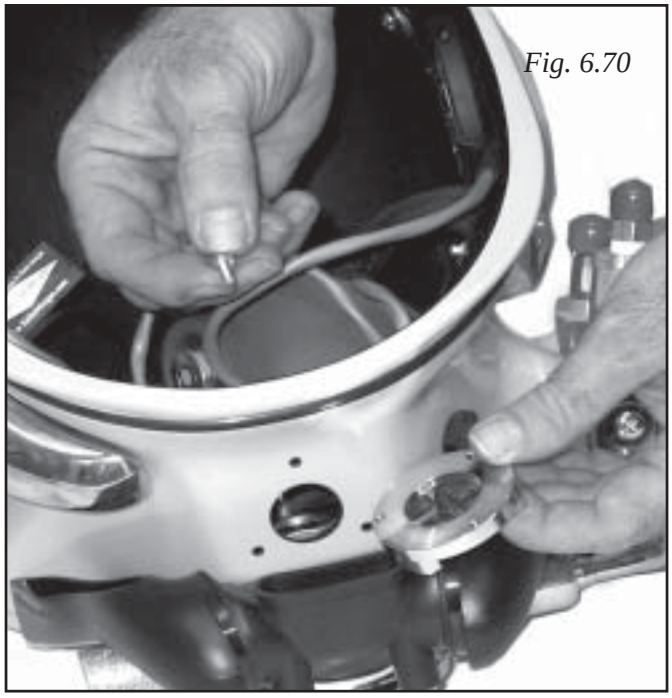


*Fig. 6.70*

**Main Exhaust Body Removal**

Tools Required:
1/4 ” Flat Blade Attachment on Torque Screwdriver

1) Unscrew the 3 screws (149) inside the helmet shell (92).
2) Carefully pry the main exhaust body (150) away from the helmet shell (92).

3) Clean off old silicone sealant on the main exhaust body and helmet shell.

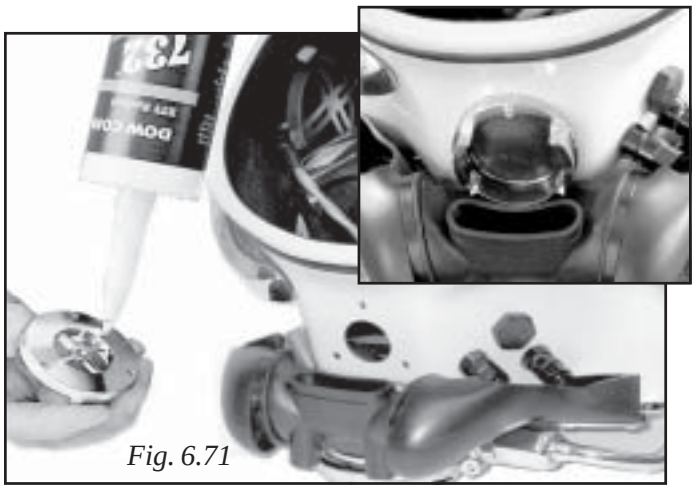


*Fig. 6.71*

**6.11.4 Main Exhaust Body Replacement**

Tools Required:
1/4 inch Flat Blade Attachment on Torque Screwdriver
Dow Corning® RTV 732 Multi Purpose sealant

1) Apply silicone sealant Dow Corning® RTV 732 Multi Purpose sealant to the base of the exhaust body (149). Take care not to block the opening for the main exhaust valve (150).

2) Position the main exhaust body on the helmet shell (92). Note orientation of body. Install the screws (149) and using a torque screwdriver, Tighten the screws to (12 inch pounds) of torque. Wipe off any excess sealant.

3) Allow 24-hour cure time before using the helmet. Install the new valve (151).

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow silicone to cure for a minimum of 24 hours before using helmet.**

**6.12 Overpressure Relief / Bleed Valve Overhaul Procedure:**

Over Pressure Relief Valve Component breakdown

| Loc.# | Part# | Description | Quantity |
|---|---|---|---|
| 5 | 510-011 | O-ring | 1 |
| 3 | 245-010 | Poppet | 1 |
| 2 | 235-005 | Spring | 1 |
| 1 | 250-010 | Adjustment Screw | 1 |

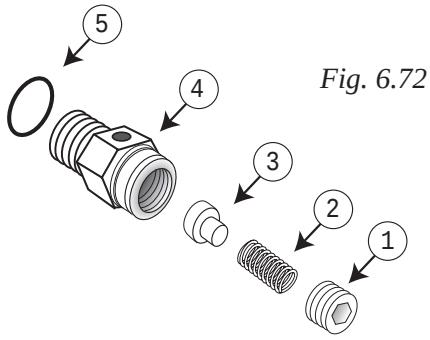



*Fig. 6.72*

**6.12.1 Overpressure Relief Valve**

The bleed/relief valve should **ALWAYS** be used on all Emergency Gas Supply (EGS/bail-out) first stage regulators to prevent the hose from rupturing in the event the first stage pressure creeps. The Kirby Morgan relief body is made of stainless steel. The basic components last a long time but the valve should be disassembled cleaned and inspected at least once a year or whenever it fails testing. The valve should be tested monthly. Cleaning and overhaul is easily performed using a nylon toothbrush and a 50/50 solution of vinegar and fresh water. Cleaning for

15 minutes in an ultrasonic sink, if available, with the 50/50 vinegar solution is highly recommended.

Repair parts are available . Normal replacement parts include the O-ring, soft seat, spring, and hex nut. The O-ring should be replaced at least annually. The other parts require replacement only if worn or damaged. An exploded view of the valve is located in all KMDSI Helmet and Band Mask Operations and Maintenance Manuals. See Fig. 6.72.

Tools Required.
Torque wrench
1/2" open-end wrench attachment for torque wrench
1/8" Allen wrench
Nylon toothbrush
Vinegar
Fresh water
Mild dish detergent
Ultrasonic sink, if available
Magnifying glass
New valve body o-ring

### 6.12.2 Overpressure Relief Valve Disassembly and Cleaning

**⚠ WARNING: DO NOT use cleaning solvents (i.e. mineral spirits, bleach, etc.) when cleaning the bleed/relief valve. The use of cleaning solvents may lead to failure of the bleed/relief valve.**

1) Secure gas pressure to the first stage regulator, then bleed off. Remove the first stage regulator from the air/breathing gas source so it cannot be accidentally turned on, i.e., pressurized. Make sure the intermediate pressure in the regulator hose is also fully drained of pressure.

2) Remove the bleed/relief valve from the regulator body using the 1/2" open-end wrench.

3) Remove, cut, and discard the bleed/relief valve body O-ring (5).

4) Using the 1/2" open-end wrench to hold the bleed/ relief body, use the 1/8" Allen wrench to remove the Allen head adjustment screw. Then, shake out the spring and soft seat.

5) Place all parts in the 50/50 solution of vinegar and water and allow to soak for 15 to 30 minutes. If using an ultrasonic sink, reduce time to 15 minutes.

6) Using the nylon toothbrush, brush all components to remove corrosion and mineral deposits. Then, rinse with fresh water and blow or air dry.

7) Using the magnifying glass, carefully inspect all components for excessive corrosion and/or damage. Replace the spring and/or adjustment nut, if either part is excessively corroded or shows signs of wear and/or damage. Inspect the soft seat for nicks, cuts, and wear and replace if any damage is found. Replace the entire assembly if any damage to the valve body is present.

***NOTE: A deep groove in the soft seat is normal. Replacement is only necessary if the rubber seat is deteriorated, cut, and/or chipped.***

### 6.12.3 Overpressure Relief Valve Reassembly

1) After cleaning, inspection and/or parts replacement, reassemble the valve by installing the soft seat, spring, and adjustment nut. Screw the adjustment nut down until it is approximately 1/2 thread from being flush with the top of the valve body.

2) Lightly lubricate a new body O-ring (5), then install on the valve body.

3) Test the bleed/relief valve according to the test procedure below.

### 6.12.4 Overpressure Relief Valve Lift Check/Setting

Tools required:

Adjustable first stage scuba regulator or controlled adjustable pressure source

Intermediate pressure test gauge

Torque wrench

1/2" open-end wrench adapter for torque wrench

1/8" Allen wrench

HP air source {SCUBA tank) with at least 500 p.s.i.g. (34.4 bar).

Mild dish detergent

The purpose of lift checking the bleed/relief valve is to ensure it operates properly, allowing excess pressure to escape in the event the first stage develops a slight leak. Without the bleed/relief valve, high-pressure gas will continue to increase until the emergency supply hose ruptures, possibly causing injury and a complete loss of the Emergency Gas System (EGS). This procedure explains the steps necessary for readjusting the bleed/relief valve after it is cleaned, overhauled or any time the valve is tested.

**⚠ WARNING: Ensure the bleed/relief valve is only installed in a low-pressure port of the first stage regulator. Installation in a high-pressure port will lead to loss of EGS supply and possible serious personal injury if the valve fails.**

**⚠ DANGER: Do not use oxygen, or mixed gas containing more than 23% oxygen by volume, for lift checking the bleed/relief valve. The use of oxygen, or mixed gas, in a high-pressure supply system not designed and cleaned for oxygen service, can result in a fire or explosion causing serious injury or death.**

***NOTE: The bleed/relief valve is lift checked and/or adjusted using an adjustable first stage regulator, equipped with a low-pressure test gauge, which is used for adjusting the intermediate pressure of scuba regulators. The check/adjustment can be performed using a standard scuba test stand, or a gas control console, using air or mixed gas with an oxygen content below 23% by volume. If a first stage scuba regulator is used, it must be able to be adjusted to the desired lifting pressure. The pressure gauge should be compared to a gauge of known accuracy.***

***NOTE: If the Allen screw on the bleed/relief valve hex nut is rotated too far, too fast, the bleed/relief valve will pop open. This could possibly require the air to be secured at the cylinder or supply source to reset the seat before the adjustment can be accomplished.***

***NOTE: The bleed/relief valve can be installed in any first stage regulator, providing the first stage has an intermediate setting of 135 - 165 p.s.i.g. (9.3 – 11.4 bar).***

1) Install the relief valve in a low-pressure port on an adjustable 1st stage regulator. Or install on the scuba test stand.

2) Install the intermediate pressure gauge in one of the low-pressure ports of the first stage regulator.

3) Install the 1st stage regulator on the cylinder. Ensure the relief valve and intermediate pressure gage are attached to low-pressure ports.

4) Wet the relief valve with soapy water to help indicate gas flow

5) Slowly bring up air pressure while watching the intermediate pressure gage until the pressure gage indicates 180- 200 p.s.i.g. (12.40-13.78 bar). If the relief valve starts venting at a pressure below 180- 200 p.s.i.g. (12.40-13.78 bar), secure the air supply and adjust the adjustment screw (1) in (clockwise) 1/8th turn. Slowly bring up pressure and recheck. Continue this procedure as necessary until the relief valve consistently vents at a pressure between 180- 200 p.s.i.g. (12.40-13.78 bar). If the valve does not start venting when the gauge reads 200 p.s.i.g. (13.78 bar), slowly back out on the adjustment screw (counter clockwise) until the valve starts venting, forming bubbles in the soap solution.

6) After the valve has been adjusted, adjust the 1st stage regulator intermediate setting to 135 p.s.i.g. (9.3bar), rewet the valve, then slowly increase the intermediate pressure on the 1st stage regulator one last time to recheck the lift pressure. The valve should start forming bubbles or venting at between 180- 200 p.s.i.g. (12.40-13.78 bar).

7) After final lift check reset the regulator to the appropriate overbottom setting. Remove the intermediate pressure gage.

## TROUBLESHOOTING

***Problem:***
**Valve pops open and will not stop flowing:**
***Check:***
If while setting the bleed/relief valve the valve pops open and will not stop flowing, secure the air supply valve and allow the valve to reseat. Try the procedure again, ensuring that the supply valve is only slightly cracked open, allowing full test pressure but minimizing high flow potential.

***Problem: After*** **resetting the first stage to 135 p.s.i.g. (9.3 bar), the valve continues to leak:**

***Check:***
This indicates the valve body, seating surface or the soft seat is either dirty or damaged. Usually, cleaning both the metal body, seating surface in the valve body and the soft seat will fix the problem. If, after cleaning, the problem persists, replace the soft seat and spring and retest the unit. If the seat continues to leak, then replacement of the complete valve will be necessary.

The purpose of lift checking the valve is to ensure the relief operates properly allowing excess pressure to escape in the event the first stage develops a slight leak. This procedure also explains the steps necessary for readjusting after cleaning or overhaul.

***Note: Be sure to read caution on next page!***

**⚠ CAUTION: Ensure the overpressure valve is installed in a low-pressure port. Installation in a high-pressure port will lead to loss of EGS supply and possible serious personal injury if the valve fails.**

# NOTES

# Chapter 7.0
# Corrective Maintenance

## 7.1 General

This section covers the maintenance and repair of all non-breathing system components of the SuperLite-17 diver's helmet. Correct repairs will result in better communications and improved overall diver comfort and performance in getting the job done. Numbers appearing in parentheses below are "location" numbers that are used in the blow-apart drawing at the rear of this manual.

***NOTE: For O-ring Removal/Inspection/Cleaning & Installation see Section 5.3.1 For General Cleaning Guidelines, including KMDSI recommended cleaning, sanitizing solutions, and procedures, see Section 5.3.2.***

**⚠ WARNING: Use only Kirby Morgan original replacement parts when repairing your helmet. The use of other manufacturer's parts will interfere with the performance characteristics of the helmet and may compromise diver safety.**

***NOTE: All Kirby Morgan Parts are specifically manufactured for Kirby Morgan designed helmets and Band Masks™.***

**⚠ DANGER: All parts on the SuperLite-17 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 result in serious injury or death.**

## 7.2 Yoke/Neck Clamp Assembly (14) and Helmet Shell (92) Inspection

In 1999 all fiberglass Yokes of the Yoke/Neck clamp Assembly (14) were replaced with a urethane and stainless steel composite. Original Yoke(s) were constructed of hand laid fiberglass. Both function the same and are assembled and mounted to the clamp assembly the same way.

1) Remove the yoke / neck clamp assembly from the helmet. Perform a visual inspection of all components. Ensure the neck dam has no holes, tears, or damage. The neoprene must be firm, and the neck dam should fit snug, but should not be uncomfortable or tight. See Section 7.9.4.

2) Visually inspect all metal parts of the clamp assembly for damage. Check the hinge pins for a loose fit, signs of cracking, distortion or any damage. See Section 7.9.3.1.

3) Visually inspect the adjustment stud for signs of cracking, distortion, bending, stripped or damage threads or corrosion. See Section 7.9.3.

4) Check the rear hinge tab (26) and hinge (23) for signs of cracking bending, distortion, and loose fasteners.

5) Check the latch catch assembly (22) for proper operation. Check for corroded, worn or damaged parts, loose or missing screws. Ensure the proper safety pin (18) is present. See Section 7.9.2.

6) Test mate the yoke / neck dam / clamp to the helmet. Check for proper clamp adjustment and smooth operation. Repair, replace, and adjust parts as necessary. See Section 7.9.2.2 – 7.9.4.

The helmet shell (92) is constructed using hand laid fiberglass cloth, carbon fiber, mat, and strands, impregnated with polyester resin. It is extremely durable but can be damaged. Helmets that have suffered damage can often be repaired, but repairs to the helmet shell must only be accomplished by KMDSI technicians that have been trained and certified in fiberglass repair by KMDSI. Many Kirby Morgan fiberglass helmets and masks still in use today are more than 30 years old.

7) Visually inspect the helmet shell exterior for obvious signs of fiberglass damage including cracks, gouges or depressions.

***NOTE: All gouges and scrapes should be covered with tape or paint to reduce absorbtion of moisture in the fiberglass until repairs can be made. The helmet should not be used if it has any gouges deeper than 1/8 inch. Fiberglass and gel coat repairs should only be completed by a KMDSI trained and certified repair technician that has received certification for helmet shell repairs by KMDSI or Dive Lab Inc. Any signs of cracks or depressions with fractures or other damage should be checked by an authorized KMDSI repair facility or a technician certified in fiberglass repair by KMDSI.***

Polyester gel coat covers the exterior of the shell. Although this material is far more durable than paint, it can be scratched and chipped. Light scratches can be removed by using an automotive rubbing compound and waxing. Authorized KMDSI factory trained technicians can repair chips and scratches.

**⚠ DANGER: Do not attempt to install new thread inserts in the helmet shell for the port retainer screws by yourself. If the installation is done improperly, the port retainer can come loose and the helmet could flood resulting in drowning. Fiberglass and insert repairs should be only be completed by technicians specifically trained and certified in these procedures.**

## 7.3 Nose Block Assembly

### 7.3.1 Nose Block Assembly Removal

Tools Required:
Slip Joint Pliers and a Rag or cloth
7/16 ” Open-End Wrench

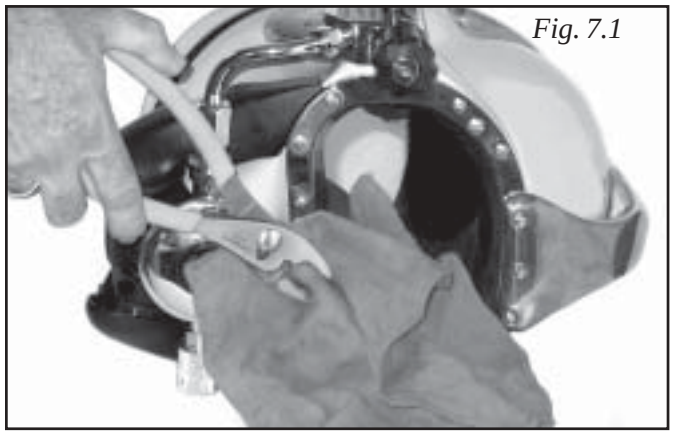


*Fig. 7.1*

1) Hold the nose block knob (108) with a pair of pliers padded by a cloth, while unscrewing the nose block device (86) with your hand.

2) After the knob (108) is removed, loosen and remove the packing nut (107).

3) Slip the two O-rings (106) off the end of the shaft of the nose block device (86) and slide the nose block device out through the oral nasal mask.

4) The padded end of the shaft may be bent with pliers to better fit an individual. A larger pad of rubber can also be glued onto this pad.

### 7.3.2 Nose Block Device Replacement

1) Prior to reassembly, lubricate the two O-rings (106).

2) Slide the shaft (86) through oral nasal mask (83) in the helmet shell (92).

3) Place both O-rings (106) on the shaft (86), followed by the packing nut (107) and the knob (108).

4) Tighten the packing nut (107) until snug. Do not over tighten, as this will make it difficult to slide the nose block device in and out.

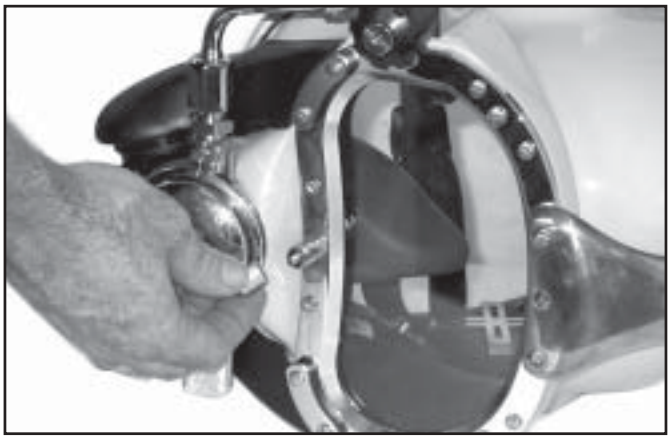


*Fig. 7.2 Reinstall the knob and tighten it securely.*

5) Tighten the knob (108) with the pliers, padded by a cloth, while holding the Pad end with your hand.

## 7.4 Handle and Weights

### 7.4.1 Handle Removal

Tools Required:
Flat blade screwdriver
Torque screw driver and flat blade attachment Dow Corning® RTV 732 Multi Purpose sealant or equivalent

The handle is a convenient location to mount television cameras, lights, and other instruments. If the handle is to be drilled to accept any of these items, it must be removed to prevent accidental damage to the helmet shell.

***NOTE: Weights only need to be removed if fiberglass damage of the helmet shell (92) is suspected or mounting holes are to be drilled and tapped into the weights for camera or light mounting.***

1) The handle is removed by first unscrewing the top three port retainer screws (94).

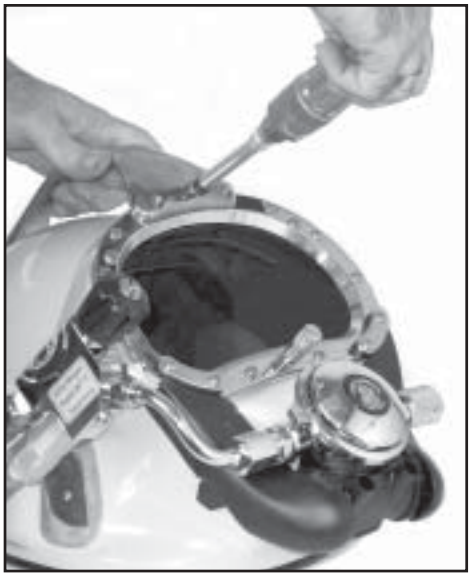


*Fig. 7.3 the handle is removed by unscrewing the top three port retainer screws.*

2) Remove the rear handle mount screw (90) and washer (91).

3) Pry up at the front of the handle (93) to break loose the RTV.

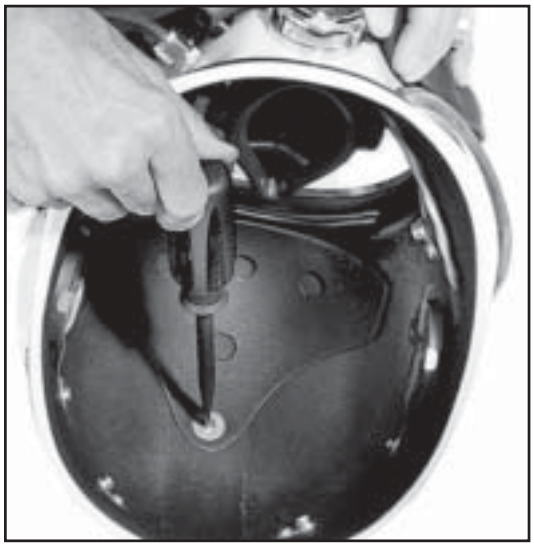


*Fig. 7.4 Remove the rear handle mount screw and washer.*

### 7.4.2 Handle Replacement

1) Clean off all the old RTV (silicone sealant) remaining on the handle (93) and the helmet shell (92) and screw hole.

2) Place a liberal amount of RTV Dow Corning® RTV 732 or equivalent Multi Purpose sealant on the rear mount surface of the handle and in the mount screw hole in the helmet shell (92).

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow silicone to cure for a minimum of 24 hours before using helmet.**

3) Position the handle (93) and run in the front screws (94) only until snug.

4) Hold the handle in place and thread the rear mount screw (90) with its washer (91). Torque to 35 inch pounds.

5) Tighten the front mount screws (94) to 12 inch pounds.

6) Wipe off any excess RTV from the helmet shell.

### 7.4.3 Weight Removal

Tools Required:
Torque screwdriver and flat blade attachment
Flat blade screwdriver
Wooden wedges,
Dow Corning® RTV 732 Multi Purpose sealant or equivalent

The weights are held on by fasteners as well as the RTV sealant. Do not use sealants other than RTV. Before removing the weights (75, 89, 95) take NOTE of the position of the snap tabs (78) and earphone retainer clips (147). If the snap tabs are not installed correctly, it will be difficult to reinstall your head cushion.

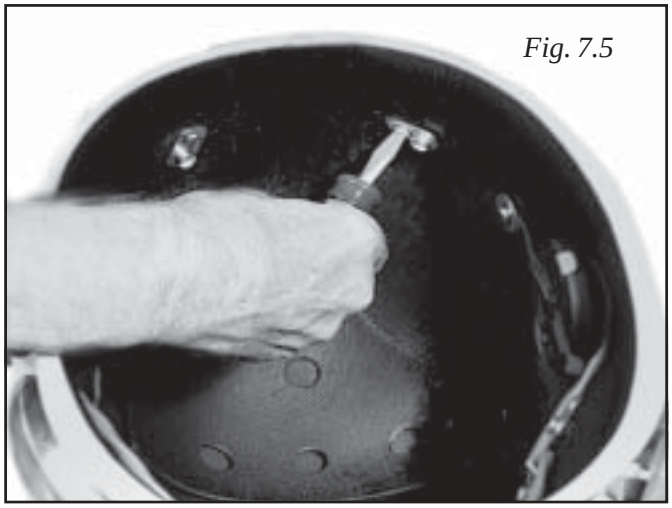


*Fig. 7.5*

1) Unscrew the snap tab screws (79) and earphone retainer screws (76).

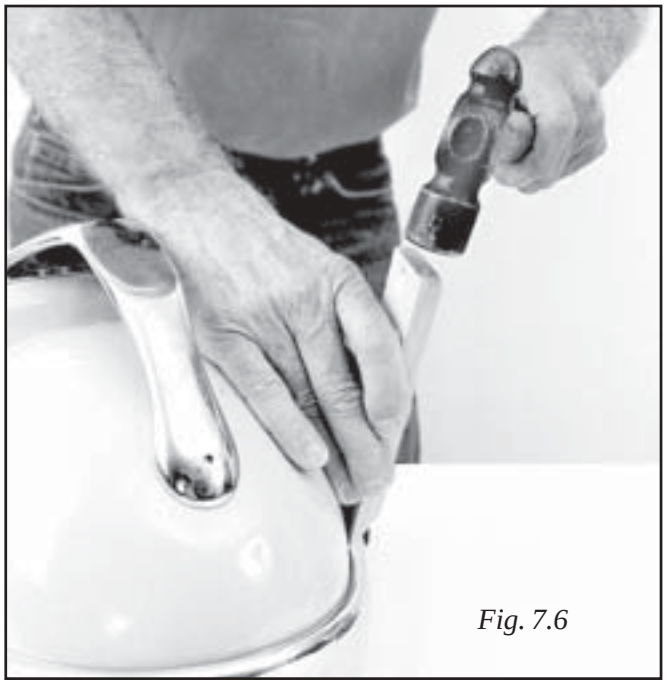


*Fig. 7.6*

2) Use the wooden wedges inserted under the edges of the weights to gently pry the weight off of the helmet shell.

**⚠ CAUTION: Do not use a screwdriver or similar sharp instrument, as it will damage the fiberglass finish. Use only wooden wedges under corners edges of the weights.**

3) On the side weights, (75, 95) this is best done starting along the bottom edge.

4) On the rear weight (89), start removal at the corners.

*Fig. 7.7*

5) Be patient and take your time because the RTV is an excellent adhesive and makes removal of the weights difficult. If you are hasty you may damage the helmet shell.

### 7.4.4 Weight Replacement

1) Clean off old RTV as necessary using a block of wood or the wooden wedges.

2) If the original weights are reinstalled they will fit the shape of the helmet and hole position. Replacement weights may need to be adjusted and aligned. Extra RTV can be used to help bed the weights evenly to the shell.

3) Check the fit of the replacement weights. If the holes in the shell do not line up with the holes in the weights the holes may be enlarged with a round file. Do not make the holes too big. Extend them only as necessary to fit the screws. If the holes are too big there will be insufficient material to keep the snap tabs (78) in place.

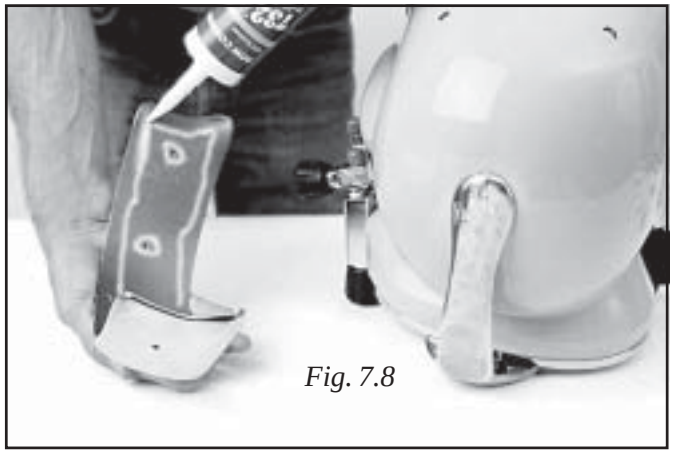


*Fig. 7.8*

4) Surround the holes with RTV (silicone sealant) to seal all penetrating screws. Be liberal with the RTV as it must seal the weights to prevent water entry.

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow at least 24 hour cure time before using the helmet.**

5) Install the screws (76, 79, 90) and washers (77) and tighten using a torque wrench with screwdriver adapter to the required torque values (35 inch pounds). Make sure all snap tabs and earphone retainer clips are in their original positions.

6) Wipe off all excess RTV that has oozed out from under the weights.

7) Allow 24 hours for the sealant to cure before using the helmet.

### 7.5 Alignment Sleeve

*Beginning in November, 2003, all SuperLite 17A/B and MK-21 Helmets come equipped with a new style Alignment sleeve. The new part, Part #550-339, has a flange on its outer end which helps to ensure that the rear hinge tab Loop cannot become dislodged from its correct position over the Alignment sleeve. The old style straight sleeve, Part # 550-039 is discontinued and no longer available.*

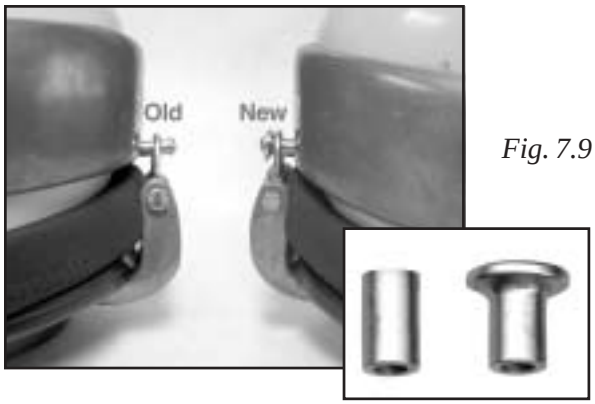



*Fig. 7.9*

The alignment sleeve (88) provides the attachment point for the rear hinge tab (26). It should never need replacing, unless it is bent or otherwise seriously damaged. KMDSI recommends at a minimum, yearly removal & inspection of the Alignment screw (87) from the Rear Weight (89). Conduct a visual inspection of the tapped threads in the rear weight and the male threads of the alignment screw (87). Replace the weight and or screw if threads are damaged.

***The new sleeve part number (550-339), may not work with some dry suits without modification to the dry suit.***

#### 7.5.1 Sleeve Removal and Inspection

Tools required:
Torque Screwdriver
Flat blade screwdriver adapter for torque wrench
Wire Brush, stainless steel or brass bristles only
Locktite 222, or equivalent

1) To remove the sleeve, simply unscrew it from its attachment to the rear weight (89). The sleeve slips over the screw (87) that holds it in place.

2) Visually inspect the sleeve (88) ensure it is not damaged or deformed. Replace as necessary. Clean all residual Loctite™ from the alignment screw (87) using a stainless or brass wire brush and thoroughly inspect all threaded surfaces for corrosion or degradation; replace if questionable / required.

***NOTE: The use of a mild steel wire brush to clean fasteners will possibly leave steel residue on the stainless components that will later corrode making the stainless fasteners appear corroded.***

#### 7.5.2 Sleeve Replacement

1) Apply Loctite® 222 or equivalent to the alignment screw (87) and screw it into the rear weight until the alignment screw (87) just bottoms out, then torque to 35-inch pounds.

### 7.6 Port Retainer

The port retainer (142) is made of chrome-plated brass. We exercise extreme care in installing the nose block guide (141) located in the lower center front. It is fastened in place using Loctite 222® or equivalent. Under normal use, the port retainer should never need replacement.

### 7.7 Face Port

#### 7.7.1 General

The face port (143), or viewing lens, is made of a polycarbonate plastic. Small scratches on the exterior are not important, as they tend to disappear underwater. However, the face port is easily replaced by removing the port retainer (142) and reinstalling a new O-ring and face port. The face port should be replaced anytime cracks are present or anytime nicks and scratches deeper than 1/16" are present or anytime the condition is questionable.

**⚠ DANGER: Never use aerosol-propelled sprays near the face port of the SuperLite-17. 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.**

#### 7.7.2 Face Port and Nose Block Device Removal

Tools Required:
7/16 " Open-end Wrench
1/4 " Flat Blade Attachment on Torque Screwdriver
Slip Joint Pliers and a Rag or cloth

***NOTE: Wrap a rag around the nose block knob while removing to prevent chrome damage when turning with pliers.***

*Fig. 7.9 Remove the nose block device packing nut.*

1) First remove the nose block device knob (108) then the packing nut (107) and slip the O-rings (106) off the nose block shaft (86)

2) Pull the nose block device out through the interior of the oral/nasal mask (83).

3) Remove the handle (93) as per Section 7.4.1.

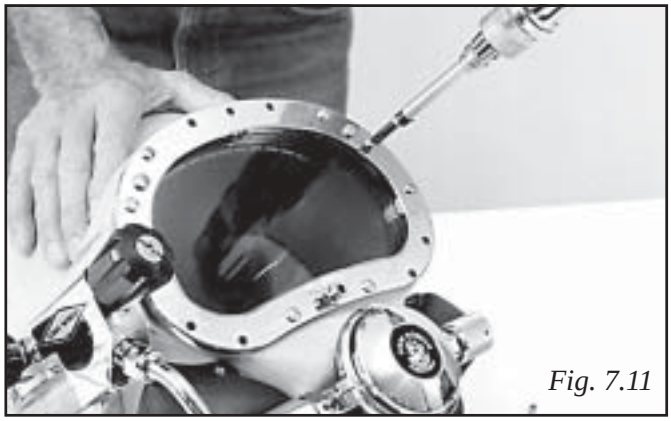


*Fig. 7.11*

4) Next, unscrew the remaining twelve port retainer screws (104, 111). Pull the retainer (142) clear of the helmet shell.

5) Be sure not to lose the O-ring (105) that is located on the back side of the port retainer at the nose block device packing.

*Fig. 7.12*

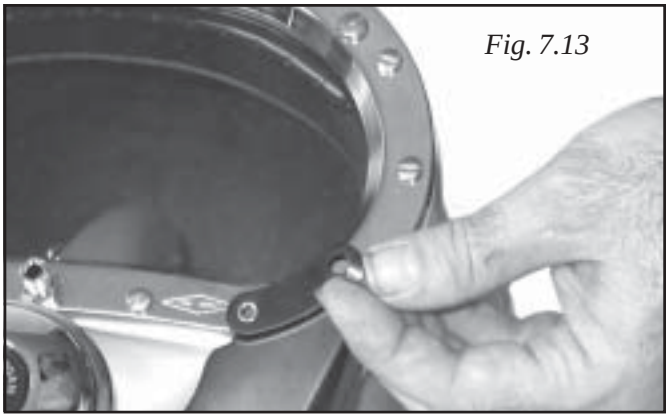


*Fig. 7.13*

6) The four whisker spacers (109) must not be misplaced. They will usually be found lodged in the whisker.

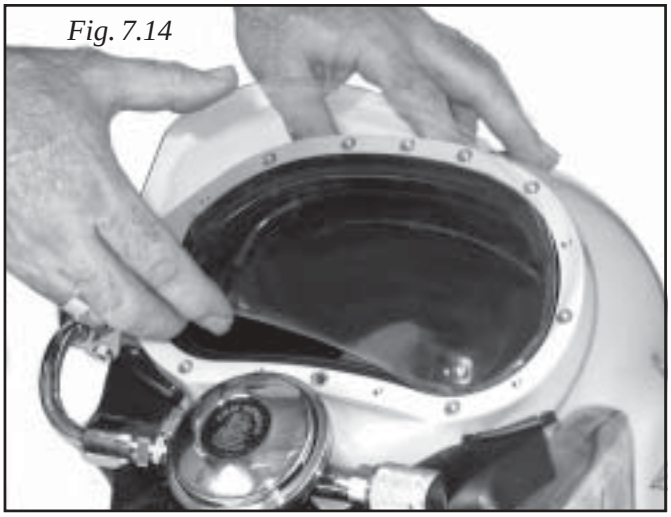


*Fig. 7.14*

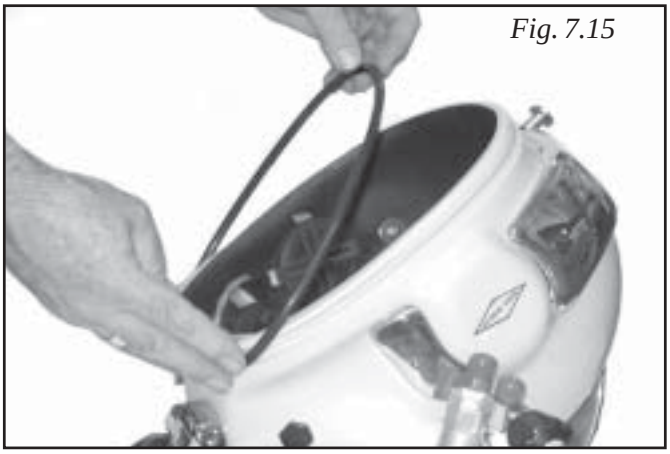


*Fig. 7.15*

7) Remove the old port (143) and sealing O-ring (144).

### 7.7.3 Face Port and Nose Block Replacement

1) Clean the face port O-ring groove, carefully inspecting it for any damage.

2) Lightly lubricate the O-ring (144) with DC111 lubricant or equivalent per Section 5.3.1 and replace in the helmet shell (92).

**⚠ WARNING: The O-ring used with the face port of the SuperLite-17A/B is made from a special compound and has unique dimensions. It is a softer durometer O-ring than is commonly available. There are no equivalent O-rings manufactured by other vendors. This O-ring must be replaced with a new KMDSI O-ring. Failure to do so could lead to seal failure resulting in leaks or flooding.**

3) Place the face port (143) into the helmet shell (92) making sure the O-ring (144) has been lightly lubricated and is in its groove.

4) Clean and lubricate the small O-ring (105) Per Section 5.3.1.

5) Slip the O-ring (105) on the small tube that protrudes from the rear of the port retainer (142) nose block guide. Place the port retainer (142) onto the helmet shell (92), holding it in place against the face port (143) and face port O-ring (144) while the twelve screws (111, 104) are all run in loose. Replace the handle (93) as per Section 7.4.

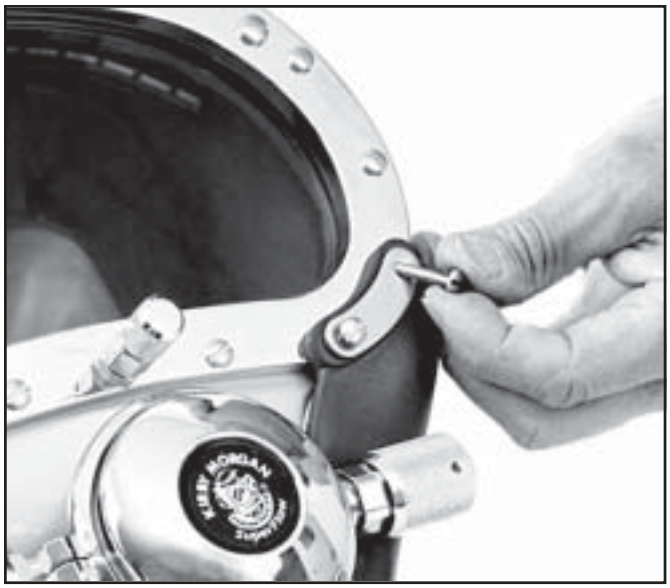


*Fig. 7.16 the kidney plate screws, like any screws that go through the port retainer, must be tightened with a torque screwdriver.*

6) using a torque screwdriver slightly tighten each opposing screw evenly, i.e. 12 o'clock position, 6 o'clock position, 9 o'clock position, 3 o'clock etc.. Repeat this process, one after another, until all screws are evenly torqued to 12 inch pounds of and the O-ring (144) has completely sealed the face port (143).

**⚠ DANGER: Always be sure to use a torque screwdriver to check the tension of the port retainer screws. Over tightening can cause damage to the threaded inserts in the fiberglass shell and cause them to loosen. Without the correct tension the port retainer may come loose and the helmet could flood. This could lead to drowning.**

***NOTE: Testing of the inserts should be accomplished ONCE A YEAR or whenever damage is suspected. Part #525-115 Thread Insert Testing Block Kit.***

When testing the Thread Inserts, or when removing and replacing the port retainer, it is crucial that the KMDSI recommended torque specs be followed when tightening the port retainer screwss. Any over torque of a screw greater than 14 inch pounds can result in serious damage to the surrounding fiberglass in the port area. This can lead to loosening of the port retainer and in extreme instances to flooding of the helmet.

The test procedure is designed to identify any inserts that have been damaged, or become loose, requiring replacing. Replacement of inserts should only be completed by an authorized / trained KMDSI technician that has received certification in insert replacement. Minor fiberglass and gel coat repairs must only be completed by technicians that have received fiberglass and gel coat training and certification by KMDSI.

7) Install the nose block device (86) from the interior of the oral/nasal mask (83) and out through the nose block guide (141) on the port retainer (142).

8) Slide the two lubricated O-rings (106) onto the shaft of the nose block device (86).

9) The packing nut (107) is threaded into place followed by the nose block device knob (108).

10) Tighten the packing nut (107) until some resistance is felt when the nose block device knob is pushed in and out. Tighten the nut until it cannot be loosend by hand, then another half turn. If the packing nut is too tight the nose block device cannot slide in and out.

11) The nose block device knob (108) should be tightened to the shaft using a padded pair of pliers, while holding the nose block pad on the inside of the helmet.

**⚠ WARNING: The face port (143) is very strong. However, certain chemicals will attack the port and weaken it. Some solvents used for grease removal will also attack the port. Use only mild detergents or organic soaps to clean the face port Section 5.3.2.1.**

### 7.7.4 Special Note Regarding Ports

***NOTE: There are two different face ports available for KMDSI helmets and masks. One port specifically fits the SuperLite Helmets and the KMB 18. One port only fits the KMB 28 Band Mask. These two ports are not interchangeable. The face port for the SuperLite-17A/B the SuperLite-17K, SuperLite-27, sl-17C and the KMB 18 Band mask is Part #520-004. The face port for the KMB 28 Band Mask is Part #520-128.***

**⚠ DANGER: The face port for the SuperLite-17 and KMB 28 are not interchangeable. Do not attempt to use a face port from a KMB 28 in a SuperLite-17. Although the port will fit into the Helmet Shell (92), it will not seal properly. This could lead to flooding of the helmet, resulting in serious personal injury or death.**

**⚠ DANGER: Use only genuine KMDSI face ports. An aftermarket face port's thickness or outer periphery may be incorrect and cause the helmet to flood. It could also be made of inferior materials causing it to fail. This could result in serious injury or death.**

### 7.8 Communications System

### 7.8.1 General

The communications system in the SuperLite-17 A/B requires regular attention and maintenance for proper function. Clear two-way speech communications between the diver and surface crew is one of the most important capabilities of surface-supplied diving operations.

### 7.8.2 Earphone Inspection

To service the earphones, remove the head cushion (1) from the helmet first by releasing the snaps inside the helmet. The earphones (71, 72) can be carefully pulled out of the helmet (92) by lifting the earphone retainers (148) and sliding the earphones out from underneath them.

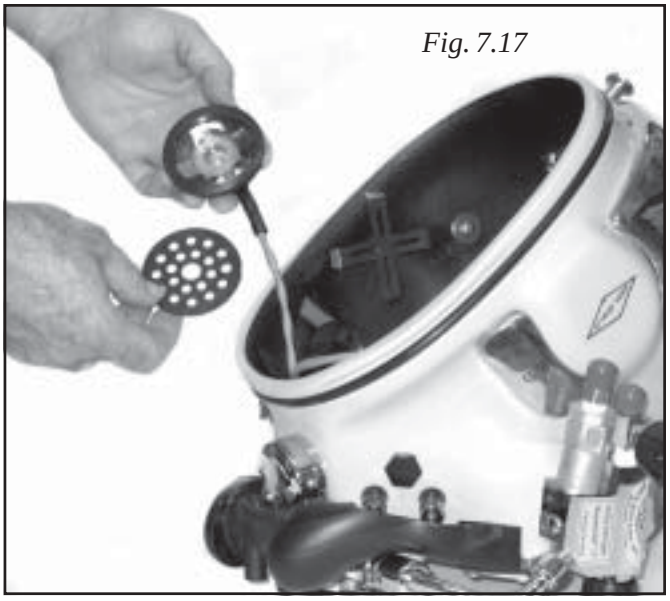


*Fig. 7.17*

1) The rubber front cover is removed from the earphone first; the rear cover is next removed. This exposes the plastic "cookie" that protects the earphone and the earphone cone itself.

2) Check the wire connections. They must be solid. Clean and repair/re-solder wires as necessary.

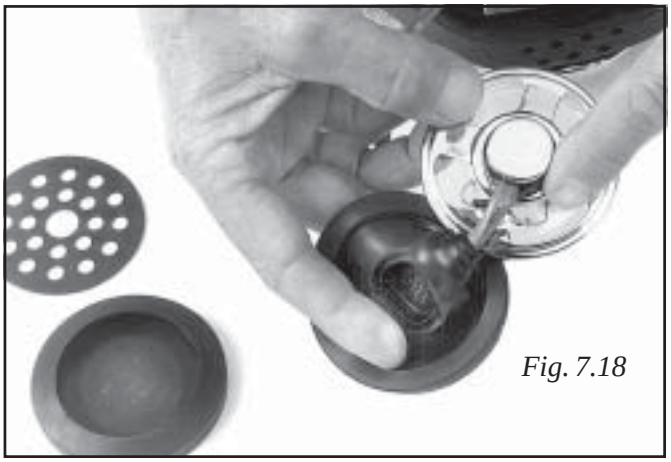


*Fig. 7.18*

3) Check each speaker's plastic diaphragm. If it is torn, or loose, the speaker will need to be replaced.

4) Replace the rubber covers if damaged or deteriorated.

### 7.8.3 Microphone Removal and Replacement

Tools Required:
1/8 " Flat Blade Screwdriver
3/8" Open End Wrench

The entire microphone (73) is replaced the same as the earphones by removing the wire lugs from the communications posts (155) and replacing the entire unit. If a wire is broken it can usually be cleaned and soldered.

1) Remove the nuts (146) and washers (142) from the communications posts (155). If you are using the optional terminal block (154) this may be where the wires from the earphone and microphone are connected.

2) Lift the terminal lugs off of the communications posts. **NOTE the position of the terminal wires.** They need to be installed in the same order.

3) Slowly pull the microphone (73) out of the oral nasal mask (83). The wires that connect it to the communications posts (155) will follow.

4) Install the terminals for the new microphone. **NOTE** that the wires must go on separate terminals as before.

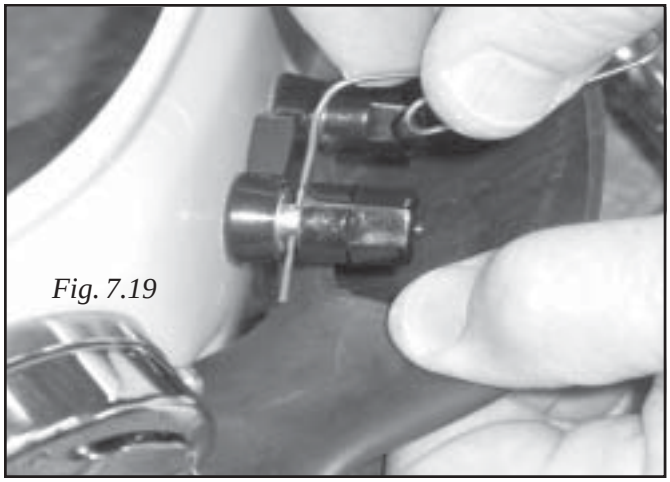


*Fig. 7.19*

5) On helmets with terminal nuts, tighten the terminal nuts (146) carefully, using a small drill bit, pin punch or opened large paper clip in the post hole to keep the post from turning. If the posts turn, it means that the seal made by the silicone sealant on the helmet shell has been broken. If this happens the posts (155) will allow water to leak into the helmet.

**⚠ CAUTION: Take care not to break the seal made by the silicone sealant where the communications posts penetrate the helmet shell. If these posts turn, the helmet will leak and resealing using silicone sealant will be necessary.**

### 7.8.4 Earphone Removal and Replacement

Tools Required:
1/8 ” flat Blade Screwdriver
***NOTE: The earphones may be replaced individually if needed.***

1) Remove the nuts (146) and washers (147) from the communications posts (155). If you are using the optional terminal block (154) this may be where the wires from the earphone and microphone are connected.

2) Lift the terminal lugs off of the communications posts. NOTE the position of the terminal wires.

3) Install the terminals for the new earphones (71, 72). **NOTE** that the wires must go on separate terminals as before.

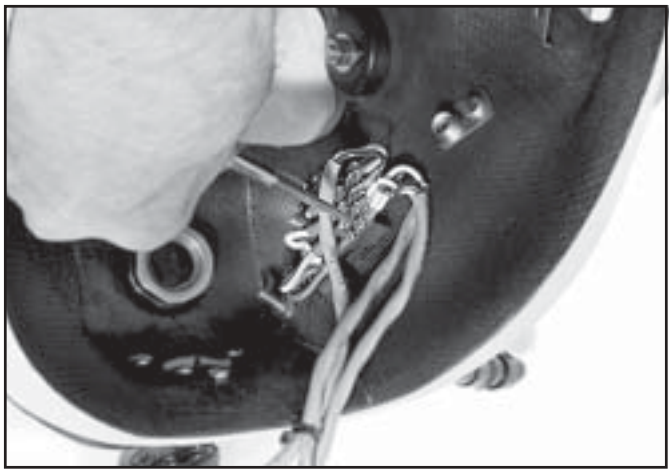


*Fig. 7.20 The teminal block is where the earphones and microphone will be connected inside the helmet.*

4) Tighten the terminal nuts (146) carefully, using a small drill bit, pin punch or opened large paper clip in the post hole to keep the post from turning. If the posts turn, it means that the seal made by the silicone sealant on the helmet shell has been broken. If this happens the posts (155) will allow water to leak into the helmet requiring resealing.

**⚠ CAUTION: Take care not to break the seal made by the silicone sealant where the communications posts penetrate the helmet shell. If these posts turn, the helmet will leak.**

### 7.8.5 Waterproof Connector

*Fig. 7.21*

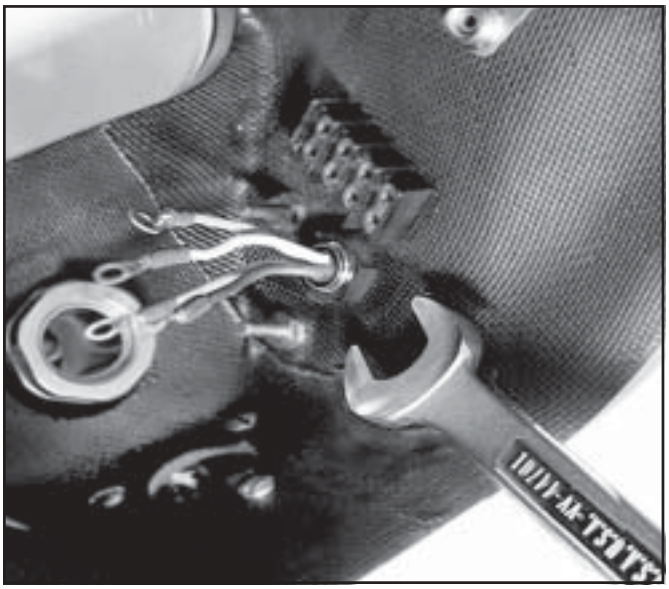
SuperLite-17 helmets are supplied either with a set of terminal posts or an optional waterproof connector (165). The waterproof connector is durable but can fail if the wire and fitting receives rough handling. To replace the connector use the following procedure.

### 7.8.5.1 Connector Removal

Tools Required:
3/8" Open-end Wrench
5/8" Open-end Wrench

11/16 " Open-end Wrench
Torque Wrench with11/16 Open End Attachment

1) Remove the earphone wire lugs from the interior of the communications posts (155) or terminal block.



2) Remove the nut (145) from the packing gland (161) on the interior of the helmet shell (92).

3) Separate the connector/packing gland assembly (165) from the helmet shell (92).

4) Place the packing gland (161) in a vice and unscrew the packing nut (164).

5) Pull the connector (159) through the gland (161).

***NOTE: It will be much easier to do this if the lugs are cut off the end of the connector first. Save the front and back ferrules (162,163) and the packing nut (164).***

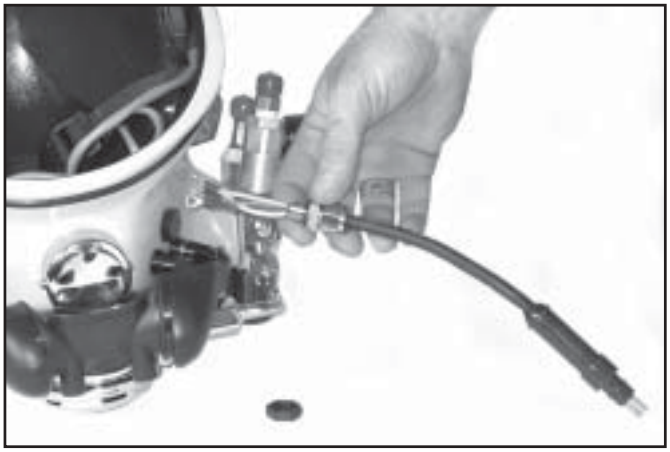
### 7.8.5.2 Connector Replacement

1) Lubricate the new connector (159) with silicone grease (or recommended equivalent).

2) Slide the packing nut (164) and ferrules (162,163) onto the new connector.

5) Feed the connector through the packing gland (161).

4) Check the O-ring (160) (use Section 5.3.1) on the packing gland. Replace or lubricate as necessary.



5) Install the W.P Connector assembly (165) in the helmet shell (92).

6) Tighten the nut (145) on the packing gland until snug.

7) Connect the wire lugs on the connector to the communications posts (155) or terminal block (154) as preferred.

### 7.8.6 Communications Posts

### 7.8.6.1 Communications Post Removal

Tools Required;
3/8" Open-end Wrench
Dow Corning® RTV 732 Multi Purpose sealant

1) Disconnect the communications set (74) as per Sections 6.83 and 6.84.

2) Remove the nuts (146) and washer (147).

3) Pull the communications post (155) away from the helmet shell (92).

### 7.8.6.2 Communications Post Replacement

1) Clean off all the old RTV silicone sealant from the helmet shell (92) and communications posts (155).

2) Apply fresh RTV to the communications post(s) (155). Check posts for cracks and smooth turning for proper wire capture. Replace post if necessary.

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow at least 24-hour cure time before using the helmet.**

*Fig. 7.24 Apply fresh RTV to the communications posts.*

3) Insert the communications posts (154) into the helmet shell (92). Before bottoming it against the shell, rotate it slightly to ensure an even spread of the RTV to completely seal the hole.

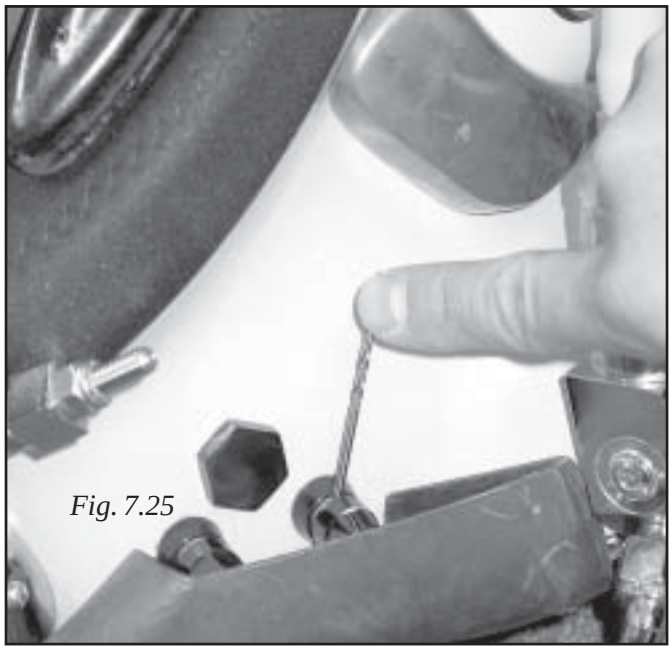


*Fig. 7.25*

4) The hole in the post should end up angled towards the earphone area of the helmet (see above).

5) Install the washer (147) followed by the nuts (146). Tighten the nuts to 15 inch pounds of torque, using a small drill bit, pin punch or opened large paper clip in the post hole to keep the post from turning.

6) Wipe off all the excess silicone sealant from the helmet shell (92).

## 7.9 Neck Clamp/Yoke Assembly

### 7.9.1 Yoke

### 7.9.1.1 Yoke Removal and Disassembly

Tools Required:
Flat blade screwdriver
Loctite® 222 Thread locker
Torque wrench
Flashlight or penlight to aid visual inspection
Wire Brush – either stainless steel or brass bristles, only

***NOTE: The use of a mild steel wire brush to clean fasteners will possibly leave steel residue on the stainless components that will later corrode making the stainless fasteners appear corroded.***

***NOTE: Yokes manufactured after 1999 are now made of a composite of stainless steel and urethane.***

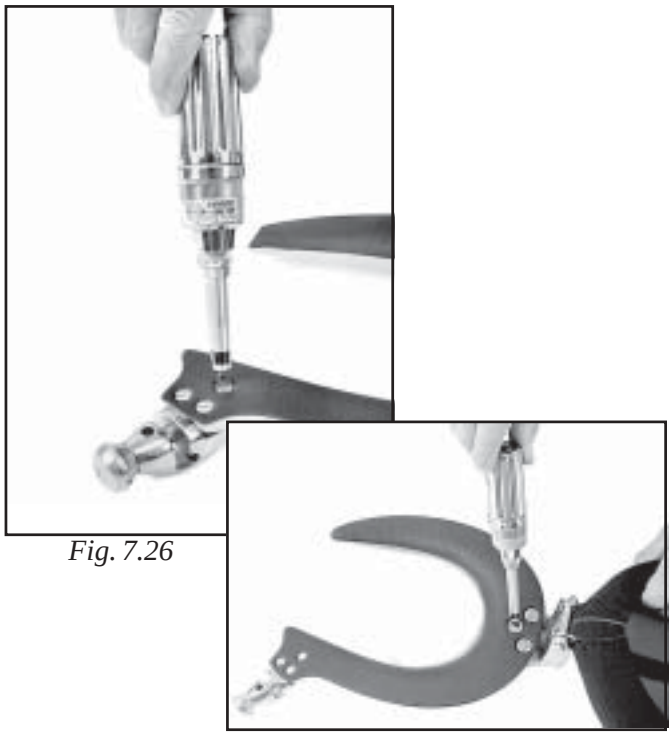


*Fig. 7.26*

1) Unscrew the three screws (15) that fasten the latch catch assembly (22) to the yoke (31). Using the stainless or brass wire brush clean all residual Loctite™ from all screws. Thoroughly inspect all threaded surfaces for corrosion or degradation; replace if questionable / required.

2) Remove the three screws (29) and washers (30) that secure the hinge (23) to the yoke. Using the stainless or brass wire brush clean all residual Loctite™ from all screws. Thoroughly inspect all threaded surfaces for corrosion or degradation; replace if questionable / required.

3) Perform all functional test / inspection on the Latch Catch Assembly. After removal using the flashlight / penlight, shine the beam into the drain hole(s) top and bottom of the Latch Catch Assembly body (19) that houses the stainless steel spring (20). Visually inspect the spring (20) and the plunger (21) for corrosion or degradation. Pull, rotate and release the knob (17) repeatedly ensuring the spring actuates and the plunger does not bind and is not bent. Determine that the plunger fully engages the Latch Catch body towards the Yoke. If overhaul or corrective maintenance is required; see section 7.9.2.1

4) Remove the two bolts (25) from the hinge (23). Clean and inspect bolts for damage, inspect the sleeve (24) for cracking and damaged threads. Remove the four screws (28) and the star washers (27) that fasten the rear hinge tab (26) to the neck clamp. Thoroughly clean and inspect the screw(s) and the star washers, inspect the hinge tab for signs of damage. Replace any parts that show signs of wear or damage.

5) Reinstall the rear hinge tab (26) using the star Washers (27) and the screws (28) and using a torque screwdriver torque the screws to 35 inch pound.

***NOTE: KMDSI recommends Locktite 222 or ND Industries Vibra-Tite or equivalent be used on the screws (28). The star washers also provide locking***

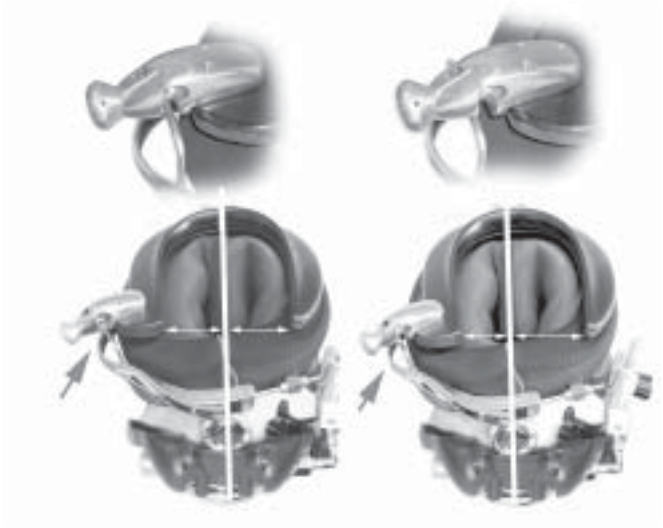
7) Reinstall the hinge (23) back on to the rear hinge tab (26) using the sleeve (24) and the two bolts (25). Loctite™ 222 is used on the bolts which are torqued to 35 inch pounds.

### 7.9.1.2 Yoke Replacement and Reassembly

1) Use Loctite™ per the manufacturer's instructions and insert the three screws (15) through the yoke (31) and thread them into the Latch Catch Assembly (22). Tighten with the torque screwdriver to 35 inch pounds.

2) Use Loctite™ thread locker or equivalent and install the three screws (29) and washers (30) at the rear of the yoke and into the hinge (23). Tighten so they are just snug but you can still shift the yoke on the hinge. You are now going to fine tune the yoke alignment to the helmet.

3) With the helmet resting face down on the face port,



mount the yoke/clamp assembly on the helmet completely and close the clamp without catching the bail in the catch. Looking directly at the front of the helmet (see above), the yoke should be centered on the hat and the catch slot should be over the bail. If the yoke is not centered, shift it on the hinge until it is centered, then gently lift the yoke up without shifting it out of position and using a torque screwdriver tighten the screws to 35 inch pounds of torque.

### 7.9.2 Latch Catch Assembly

### 7.9.2.1 Latch Catch Mechanism Disassembly

Tools Required:
Block of wood,
Pin punch
Ball peen hammer
Vicegrip™ pliers
Torque Screw Driver Flat Blade Attachment

Remove the three screws (15).

2) With the Latch Catch Assembly (22) positioned on the edge of a block of wood, drive the pin (16) through the knob (17).

3) Unscrew the knob. Use the safety pin to keep the plunger

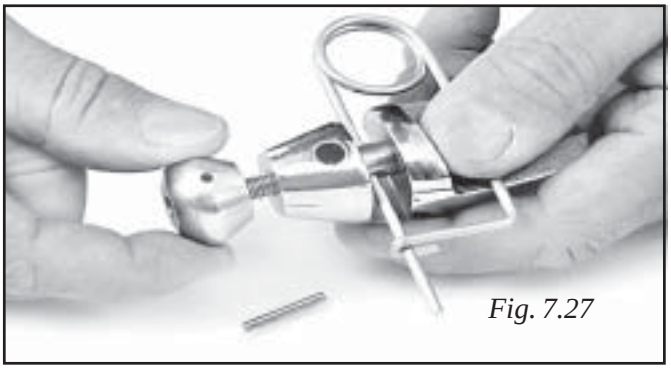


*Fig. 7.27*

shaft (21) from turning while you unscrew the knob.

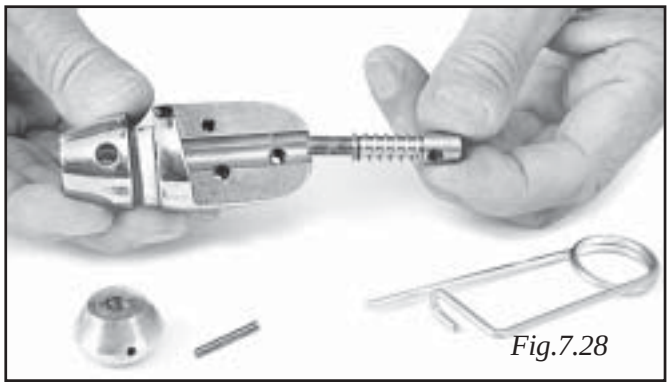


*Fig.7.28*

4) Remove the safety pin and remove the shaft (21) and spring (20).

5) Clean all parts in a mild solution of white vinegar and water, removing all traces of corrosion from the shaft. Clean all of the threads.

6) Carefully inspect for signs of wear or damage. Replace any parts that show signs of damage.

### 7.9.2.2 Latch Catch Mechanism Reassembly

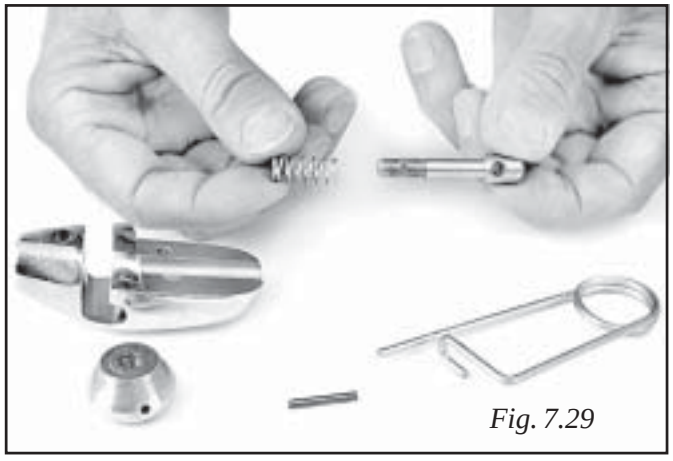


*Fig. 7.29*

1) Slide the spring (20) onto the shaft.

2) Insert the shaft (21) into the latch catch body.

3) Screw the knob onto the shaft.

4) Align the hole in the knob with the hole in the end of the shaft.

5) Drive the pin through the hole in the knob and the shaft until the end of the pin is flush with the side of the knob.

### 7.9.3 Neck Clamp Assembly

### 7.9.3.1 Neck Clamp Assembly Adjustment /Inspection

Tools Required
7/16” Open-end wrench
Wire Brush – either stainless steel or brass bristle

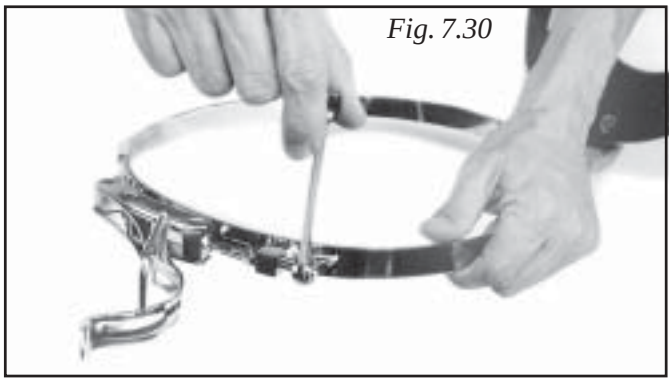


*Fig. 7.30*

***NOTE: The neck clamp assembly (7) will periodically need adjustment as the neck dam ages and grows thinner. Replacement of the neck dam will also require neck clamp adjustment.***

***NOTE: Dry suits used with neck clamps must not cause the clamp to close with excessive force. The clamp must work properly with the dry suit. If the adjustment stud adjustment nut is backed out all the way and the clamp closes with excessive force, do not use.***

Adjustments must be made with the yoke/neck clamp assembly open.

1) Visual inspection of the adjustment stud portion of the neck clamp (3) is accomplished by loosening the lock nut (6) with the washer (5) all the way to the shoulder (towards the clamp), until the entire threaded portion is exposed. Then squeeze the clamp and expose the previously hidden portion to the adjustment stud. Inspect the entire threaded surface for corrosion or degradation and ensure the entire surface is thoroughly inspected and /or cleaned with the stainless or brass wire brush, or replace the neck clamp (3) if required.

**I*MPORTANT SAFETY NOTE: The neck clamp assembly, like all other mechanical parts, will wear over time, thus requiring routine maintenance and eventual replacement. KMDSI strongly recommends that all Kirby Morgan SuperLite-17 A/B Neck Clamp Assemblies (14) should be carefully and thoroughly inspected for signs of damage and wear at least monthly and visually inspected daily for obvious signs of damage. The clamp***

***should also be checked daily for proper adjustment prior to commencement of dive operations. Worn or damaged neck clamps and especially those damaged from improper adjustment pose a potentially serious safety hazard to the user. All neck clamp assemblies will eventually become worn to a point where they must be replaced. Proper routine inspection should reveal wear and any damage before it becomes a danger to the user.***

In April of 1999 KMDSI started embossing all new neck clamp assemblies with the date of manufacture and identification number. All newly manufactured neck clamps (3) undergo inspection and testing in accordance with AWS Standard D1.1.

KMDSI recommends a maximum service life of five years for neck clamps that are used in harsh environments (i.e. welding, cutting, and contaminated waters) or other practices that can degrade the metal components of the neck clamp. All neck clamps should be visually inspected at least monthly in detail with the neck dam fabric removed or pulled free so all welds can be visually inspected for signs of cracking or damage as well as bends in the clamp. Neck clamps (3) kept in service after 5 years should be inspected more frequently. Additionally, the three pins and clevis welds should be carefully inspected, as well as the adjustment stud. All metal parts should be carefully inspected for signs of wear or damage. The stainless nylon lock nut will wear out over time and will require replacement. If any metal components appear worn or damaged, the neck clamp must be replaced. This inspection is considered the minimum. The use of other nondestructive test methods such as dye penetrate testing can be used to validate suspected damage.

Neck Clamp Assemblies (3), which are bent or deformed due to mis-adjustment or accidental damage, may be returned to KMDSI, via your local dealer, for possible repair Users must keep in mind that there are limits to restoring used or abused parts. KMDSI uses a fixture that resembles the bottom of a SL 17A/B to adjust all new neck clamps and this same fixture can often be used to reshape bent or deformed neck clamps. If there is any question regarding the condition of the neck clamp, don't use it. Suspected worn or damaged neck clamp assemblies should be taken to a KMDSI dealer to be sent on to KMDSI for a factory inspection.

Check fit and adjustment of the neck clamp by installing the clamp on the helmet, ensuring that the neck clamp (3) is seated properly over the O-ring area of the helmet. When closing the lever, the lever should get tight at the mid-point of travel, and once the lever is past the mid-point of travel, the clamp should close easily. **DO NOT FORCE THE CLAMP SHUT. If it does not close as described**, you **MUST** adjust the clamp by loosening the adjustment-lock nut (6). From the closed position, if you pull out on the lever approximately 1-2 inches, the lever should snap closed when released. As the neck dam ages it compresses. The clamp must be adjusted by tightening the adjustment-locking nut (4) so that the clamp operates as described above. The stainless steel nylon lock nut (6) will require periodic replacement due to the periodic adjustments to the clamp that MUST be made as the neck dam ages or you change to a dry suit mount or a new neck dam. **YOU SHOULD NEVER HAVE TO FORCE THE CLAMP SHUT**. Helmets being used with dry suites made to be sealed and held in place by the clamp should not hamper proper adjustment of the clamp. Always check the clamp adjustment after the first dive. After the first dive with a new neck dam the neoprene will compress from the water pressure and will usually require the clamp to be adjusted in slightly. The tension should be checked prior to each dive.

Proper adjustment of the neck clamp should place the bail squarely in the groove of the latch catch body when the clamp is closed.

2) Loosen the lock nut (6) and adjust the position of the nut (4) as necessary.

3) The outer lock nut (6) has a nylon insert. This lock nut (6) should be replaced when it no longer offers resistance on the neck clamp stud. The nut (6) should have a running torque of at least 6 inch pounds.

4) When the neck clamp assembly is correctly adjusted, the clamp should fit tight at the middle of its travel when mated to the helmet shell (92). Once the lever is past midline, movement of the lever should be easy. From the closed position, the diver should be able to pull the lever open about one to two inches and when released, the lever should snap closed. Proper adjustment of the neck clamp (7) places the bail of the neck clamp squarely in the groove of the latch catch body (19) when the clamp is closed.

5) If the neck clamp binds and does not close correctly after adjustment, the neck clamp must be straightened, or an authorized KMDSI Service Center must accomplish this procedure.

**⚠ Danger: The neck clamp must be closed properly for the helmet to stay on the diver correctly. If the neck clamp does not function properly the helmet could come off the divers head. Drowning could result.**

### 7.9.4 Neck Dam

### 7.9.4. Neck Dam Replacement

Available Neck Dams Pre-84

| Part Number | Description |
|---|---|
| 510-649 | Neck Dam Pre-84 Small |
| 510-528 | Neck Dam Pre-84 Medium |
| 510-650 | Neck Dam Pre-84 Large |
| 510-651 | Neck Dam Pre-84 X-Large |

Draw String Type

| Part Number | Description |
|---|---|
| 510-533 | Neck Dam, Drawstring |
| 510-643 | Neck Dam, Drawstring X-Large |

Cold Water

| Part Number | Description |
|---|---|
| 510-652 | Neck Dam, Cold Water, Small |
| 510-531 | Neck Dam, Cold Water, Medium |
| 510-530 | Neck Dam, Cold Water, Large |
| 510-653 | Neck Dam, Cold Water, X-Large |

**General:**

The Neck Dam Clamp and Yoke Assembly (14) are bolted together and are used as a single unit. KMDSI offers three distinctly different style neck dams (previously listed) which are mission specific, but the style is often dictated by personal preference due to size constraints. It should be noted that use of the Pre-1984 and Cold Water Neck Dams, which are preferred by some divers, have some maintenance issues. Due to the required monthly visual inspection of the weld points and the clamp assembly, these neck dams will require additional maintenance, labor time and will require replacement more often than the drawstring type due to additional wear and tear of the inspection. For this reason the pre-84 neck dams are not as popular as the drawstring type.

**Pre-84 and Cold Water Type Neck Dam Installation**

Tools Required:
Two 7/16” wrenches
Pliers
Flat Tip Screwdriver, Medium
One pair of sharp scissors
Thread Locker, Loctite222 or equivalent
New neck dam (part# 510-649 or 510-528 or 510-650 or 510-651)

1) Remove the Neck Dam Yoke Assembly completely from the helmet. Remove old neck dam (2) per 7.9.4.1 and properly dispose.

2) Remove the hinge sleeve (24) from the yoke and the clamp by removing one of the two hinge bolts (25) and sliding the sleeve out by using the pair of pliers to pull on the other bolt to separate the yoke and the Clamp Assembly.

3) Unscrew the four yoke hinge (26) mount screws (28) with the star washers (27) from the yoke hinge and retain for future use. Remove the yoke hinge from the neck clamp and the neck dam.

*Fig. 7.31*

4) Remove the neck clamp lock nut (6) and slip the threaded portion of the adjustment arm out of the retaining block. Remove the lock washer (5) and the nut (4) and retain for future use.

5) With the clamp lock nut removed from the threaded neck clamp adjustment bolt pull the front of the neck clamp open by pressing down on the block end of the neck clamp and up on the lever end.

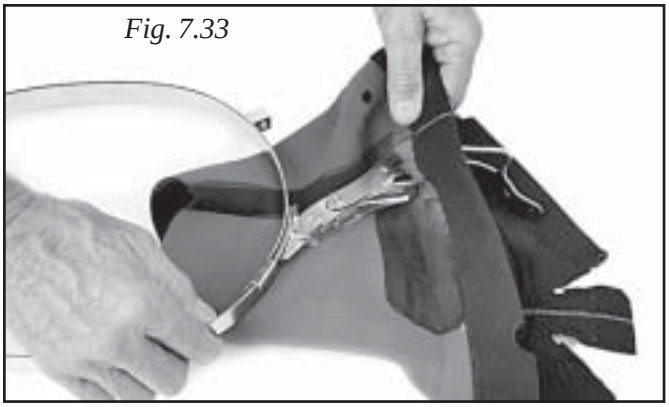
*Fig. 7.32*

6) The neck dam has two holes in the upper sleeve. The starting hole is the larger of the two next to the sewn (and glued) seam. The second (smaller) hole is used for the block that receives the threaded portion of the adjustment arm (7) on the clamp.

***NOTE: Installation of Pre-84 or the Cold Water Neck Dam can be difficult and time-consuming process and requires patience so the neck dam is not damaged. KMDSI recommends that a solution of warm soapy water be poured into the starting hole of the neck dam to aid in clamp insertion.***

7) Set the neck clamp down with the open ends facing you with the lever end on your right with the locking loop down. Place the Neck Dam inside the Clamp in the position it should be when assembled. (Rubber side in-cloth out, with the outer edge rolled up towards the clamp).

*Fig. 7.33*



8) Start feeding the end of the neck clamp that does not have the lever into the (large hole) of the new neck dam. Work the rubber around the neck clamp assisting it over the block and the guide tracks on the clamp. Carefully work the rubber around the clamp continually lifting it over the block ensuring the internal rubber is not compromised. When the rear-sewn seam is just past the hinge tab mount plate on the rear of the neck clamp stop feeding the rubber. This is the correct position. Even out the rubber on the neck dam so it is uniform in stretch all about the neck clamp.

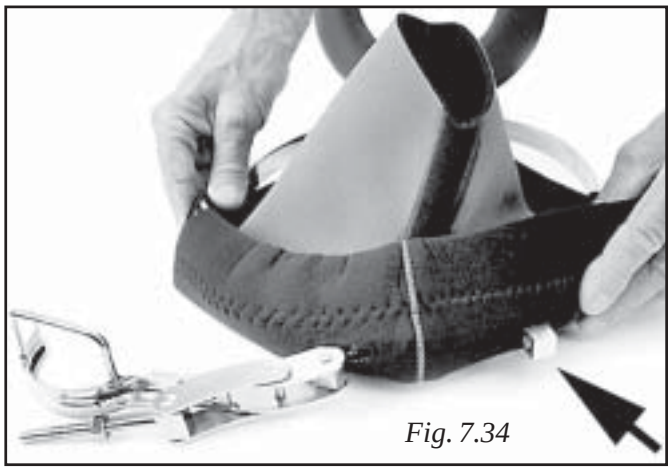


*Fig. 7.34*

9) The two ends of the neck clamp are now overlapping. The lever end of the neck clamp must now be inserted into the guide tracks of the lever end of the neck clamp. The block that receives the threaded adjustment arm should be in the correct position to be accepted by the second (smaller) hole that was present in the new neck dam. Ensure the sleeve is not stretched unevenly (the hole at the base of the handle should not be pulling or stretched into elongation).

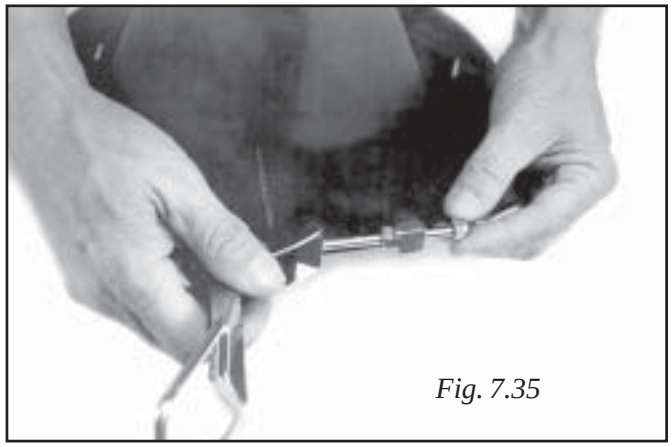


*Fig. 7.35*

10) Run the nut (4) onto the threaded adjustment bolt arm about $^1/_2$ inch, slip on the lock washer (5) and insert the adjustment arm through the block and run on the lock nut (6). Work the lever of the neck clamp back and forth, checking that the ends of the clamp are engaged, tracking correctly and not binding.

11) Make sure the rear sewn seam of the neck dam is next to, but not on, the hinge tab of the neck clamp where the rear hinge tab (26) is mounted. Install the clamp on the helmet shell and close. The purpose for this is to ensure the neck dam material is properly aligned. **Note:** The clamp will require adjusting so that the neoprene gets compressed tightly against the helmet. At this point feel for the hinge tab mounting surface under the neoprene, and once located use a marker to trace the outline staying just slightly inside the so that after the neoprene patch is cut, the cut out opening will be slightly smaller than the hinge tab mounting plate.

***NOTE: There are two ways to mount the neck dam over the hinge tab screws. The first is to cut individual holes for each of the hinge tab screws (28), and then sandwich the neoprene between the hinge tab and clamp. The other way is to cut a small rectangular piece of material from the area where the hinge tab mounting surface is for the screws (28). Sandwiching is preferred by many, saying the neck dam lasts longer and remains drier. Both ways will work. However if the neoprene is to be sandwiched using four hole method the screws must have thread locker applied and re-torque after 24 hours of the initial torque. Torque screws (28) to 30 inch pounds.***

## Four Hole Method

**a.) Feel** for the hinge tab mounting surface under the neoprene, and once located use a heated nail or metal scribe to burn a hole for each of the screws. Use care not to damage the surrounding area and ensure the hole diameters are as large as the screws.

**b.)** Visually inspect each screw (28) prior to reuse, if any abnormalities are present replacement is recommended.

**NOTE:** KMDSI recommends use of a non-locking thread locker such as Locktite 222, ND Industries Vibra-Tite or equivalent (3) in this application along with the use of the star washers (27).

**c.)** Install the hinge tab (26) and secure using the four screws (28) and washers (27). Torque to 30 inch pounds. Allow to set for at least 24 hours, then remove one screw apply thread locker, and torque to 30 inch pounds. Repeat this procedure with the other three screws.

**Patch Method:**

**a.)** Using a sharp pair of scissors carefully cut out a square from the neck dam over the hinge plate, slightly smaller than the hinge plate itself.

**b.)** Visually inspect each screw (28) prior to reuse, if any abnormalities are present replacement is recommended.

***NOTE: KMDSI recommends use of a non-locking thread locker such as Locktite 222, ND Industries Vibra-Tite or equivalent (3) in this application along with the use of the star washers (27).***

**c.)** Using the screws and the washers mount the rear hinge tab (26) on the neck clamp hinge tab mounting plate. Ensure that none of the neoprene from the neck dam is in between the tab and the tab mounting plate. Using a torque screwdriver torque screws to 35 inch pounds.

***NOTE: KMDSI recommends the employment of Black Magic® on the edges of the square cut out of the neck-dam in step 12, to avoid any inadvertent tearing or shredding of neck dam material.***

12) Visually inspect the previously removed bolts (25) and the sleeve (24) prior to reuse, if any abnormalities are present replacement is recommended. Sleeve bolt the rear hinge tab (26) to the hinge (23) of the yoke using a torque wrench. Ensure that the bolts are properly torqued to 35 inch pounds.

13) Adjust Neck Clamp per 7.9.3.1.

**Drawstring Type Neck Dam Installation:**
Tools Required:
7/16” wrench
New neck dam (part# 510-533 or 510-643)
Thread Locker, Loctite222 or equivalent

1) Remove the old neck dam (2). Remove the nylon lock nut (6) from the adjustment stud on the neck clamp assembly. Place the lock nut and washer (5) aside so they are not lost.

2) Place the yoke/neck clamp assembly in your lap, or on a table, upside down. Swing the yoke (31) up until it is against your chest. Hold the neck clamp (7) handle and the adjustment stud together in your right hand.

3) Do this step very carefully. Locate the large hole in the neck dam (2), which is found between the front seam and the large reinforcing patch.

4) Feed the stud and handle through the hole from the same side the patch is located on to the opposite side of the neck dam.

5) Position the neck dam so that it doesn't slide any further onto the neck clamp assembly (7). Slide the open end of the neck clamp assembly onto the opposite side of the clamp, engaging the tracks of the clamp. Hold the neck dam (2) and the neck clamp assembly so the clamp does not come apart.

6) Feed the small hole in the neck dam over the adjustment block on the neck clamp assembly.

7) Place the lock washer (5) on the adjustment stud on the neck clamp (7).

8) Insert the adjustment stud through the adjustment block on the neck clamp assembly (7). Thread the lock nut (6) onto the adjustment stud. (Replace the lock nut if the nylon insert is worn.) Do not tighten at this time.

***NOTE: Due to periodic readjustment and wear . KMDSI recommends replacement of the neck clamp Nylock nut (6) whenever worn or when it can be rotated by hand Nylon Lock type nuts are designed to maintain initial torque however repeated use would disable the nut's designed "locking" capability.***

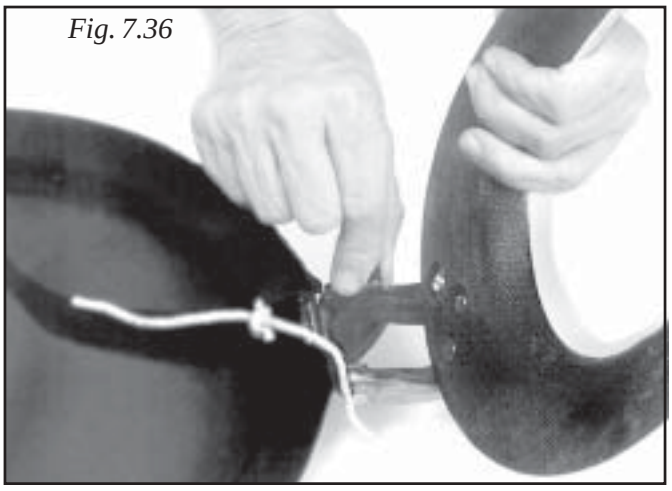


*Fig. 7.36*

9) Feed the tab at the rear of the neck dam (2) through the space between the sleeve (24) and the rear hinge tab (26). Pull the tab up as far as it will go.

***NOTE: You may find it easier to pull the tab through this space by tying a separate loop of string through the tab and feeding it through first.***

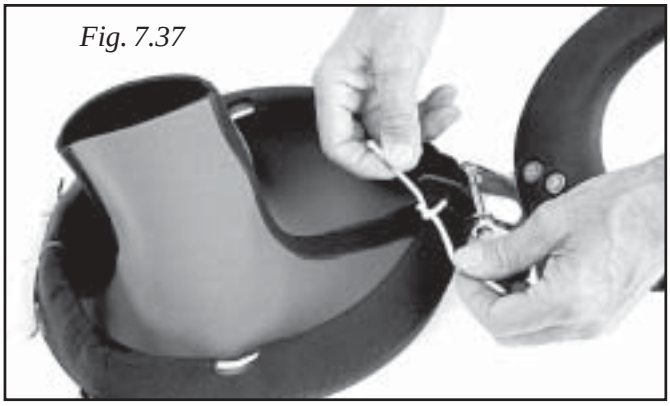


*Fig. 7.37*

9) Feed one end of the string through the tab in the neck dam. Draw up on the string until the neck dam material is snug. Do not over tighten. Tie a series of square knots (at least three) with the string. Tape the knots with electrical tape. Tuck the knots into the sleeve of the neck dam. Adjust the neck dam clamp per section7.9.3.1.

## 7.10 O-Ring Seal Replacement

(reference Section 5.3.1)

Tools Required:
Silicone grease Dow Corning 111® or equivalent.
Clean rag or Q-tips
New O-ring (part# 510-446)

The O-ring (80) on the base of the helmet shell (92) is tough and lasts at least a year. The O-ring should be replaced at least once a year, whenever it starts showing signs of wear. It must be in good condition with no visible nicks, tears or cracking. The O-ring makes the seal between the helmet shell and the yoke/neck clamp/neck dam assembly.

To replace the O-ring (80), lightly lubricate with silicone grease. Clean the O-ring groove in the helmet with a clean rag or Q-tips™ and inspect the groove for damage, cracks etc.

Install the new/clean/lubricated O-ring by stretching it over the bottom of the helmet shell.

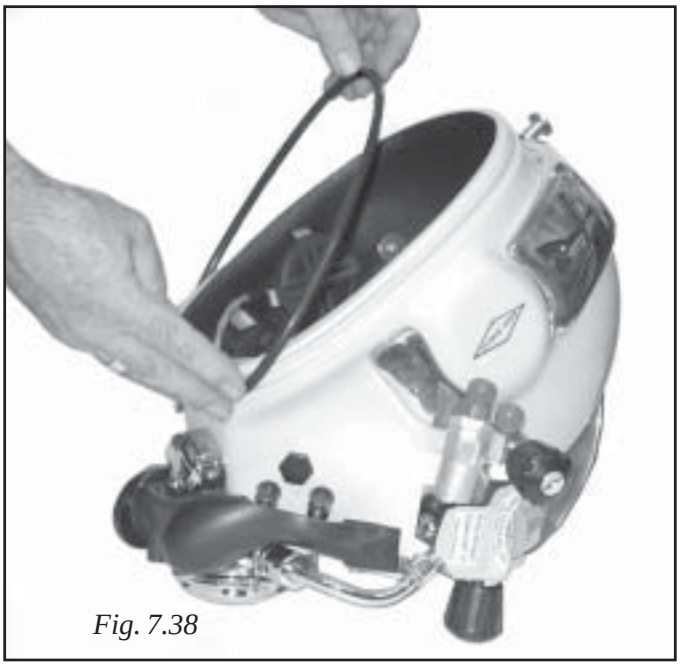


*Fig. 7.38*

### 7.11 Head Cushion Foam Replacement

The head cushion (1) foam should be replaced when the foam begins to crumble. Order replacement kit, Part #510-523. A loose head cushion will create a sloppy fit and cause discomfort for the diver and may cause poor oral/nasal mask fit-up increasing the risk of CO2 buildup in the helmet.

**⚠ DANGER: A loose fitting head cushion will cause poor oral/nasal mask fit resulting in $CO_2$ buildup in the helmet. This condition could lead to a build up in $CO_2$ (Hypercapnia), possibly resulting in unconsciousness, serious injury or death.**

1) The head cushion is fastened into the helmet with snap tabs and pulls out easily.

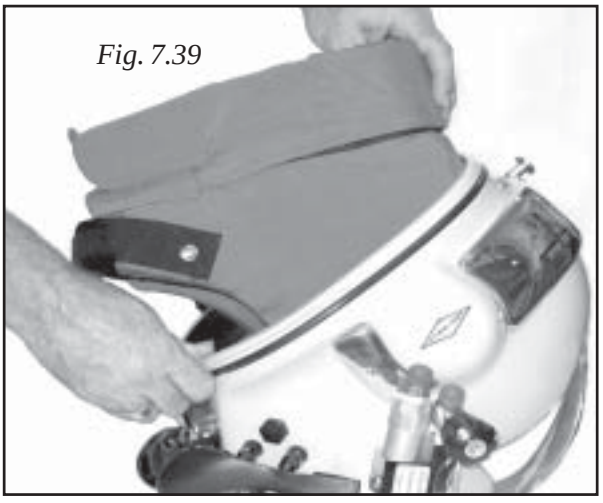


*Fig. 7.39*

*Fig. 7.40*

2) The separate layers of open cell foam sections that fill the head cushion bag (1) primarily determine the fit of the helmet. The diver's head can be moved forward into the oral/nasal mask by increasing the thickness of the 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 require all the foam that comes with a new hat. A diver with a larger head will need to remove some foam in the center top and back of the head cushion.

The foam may be cut with scissors to loosen the fit, or more foam can be added to give a tighter fit. Inspect the cushion bag for broken snaps, tears, or rips, repair/replace as necessary. On the SuperLite-17 there is a chin strap to further help adjust the fit of the head cushion. Ensure the chin strap on the head cushion is in good condition and is used. If the chin strap is not fastened properly, the helmet will float up on the diver's head. Ensure the cushion bag is properly reinstalled back into the helmet with the head cushion bag "snapped back" into the interior helmet shell using the snap tabs (78) installed.

***Note: If the head moves, the helmet should follow.***

# NOTES

# Chapter 8
# Accessories

## 8.1 Introduction

This section provides the manufacturer's advice on how to install KMDSI accessories including the Hot Water Shroud, Low Pressure Inflator Hoses, and the Weld Lens and Weld Shield assemblies.

## 8.2 Hot Water Shroud Installation Procedures

The Hot Water Shroud (Part #525-100) in conjunction with hot water to the diver should be used whenever diving operations are conducted using HEO2 at water temperatures less than 60°F (15.56°C) primarily for the comfort of the diver. KMDSI further recommends that the shroud be used in conjunction with hot water to the diver whenever diving operations are conducted using air diving, in waters colder than 37°F (2.22°C) to reduce the possibility of demand regulator icing.

***NOTE: Regulator icing in surface supplied diving is rare because the umbilical gas supply is at the same temperature as the water. Usually the greatest danger of demand regulator icing will be encountered on deck when the surrounding air temperature is less than 32°F (0°C). This effect is primarily due to the refrigeration effect of breathing air pressure reduction, and the addition of moisture from the divers exhalation coming in contact with the topside air temperature. When the topside environment air temperature is colder than 32°F (0°C), icing of the demand regulator while on the surface may be avoided, if the hot water shroud is not installed, by running warm water over the exterior of the demand regulator prior to water entry.***

Tools Required:
1/4 " Flat Blade Screwdriver
7/8 " Open end wrench
7/8 " Open End Attachment on Torque Wrench
11/16 " Open End Attachment on Torque Wrench
Small pair of snips (to trim tie wraps)

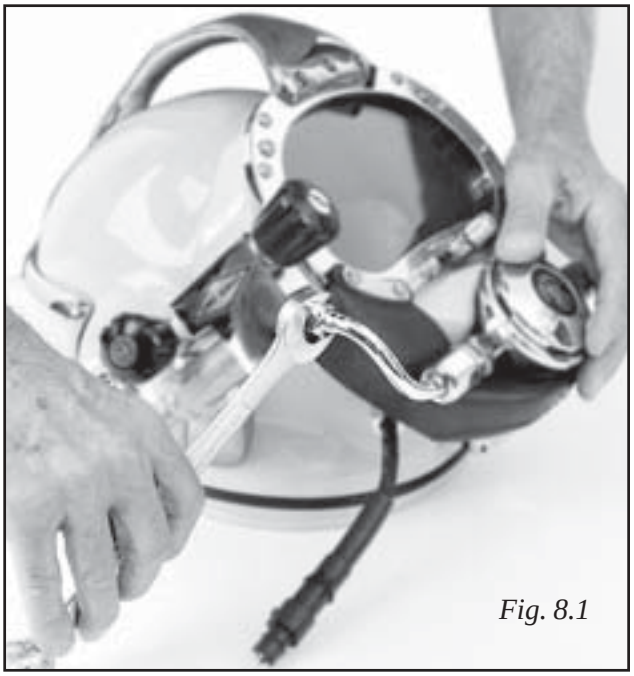


*Fig. 8.1*

1) Disconnect the bent tube assembly (45b) at the side block end only. Loosen the jam nut (131b) at the regulator. If the bent tube will not swivel freely, you must loosen the large nut at the regulator.

2) Remove the free flow knob (34), locknut (32) and spring (33).

3) Remove the EGS valve knob (55), nut (57), and spring (56).

4) Remove the one-way valve.

5) Screw the regulator adjustment knob (120) in all the way.

6) To install the rubber regulator cover, slide it over the bent tube assembly and stretch it over the regulator adjustment knob.

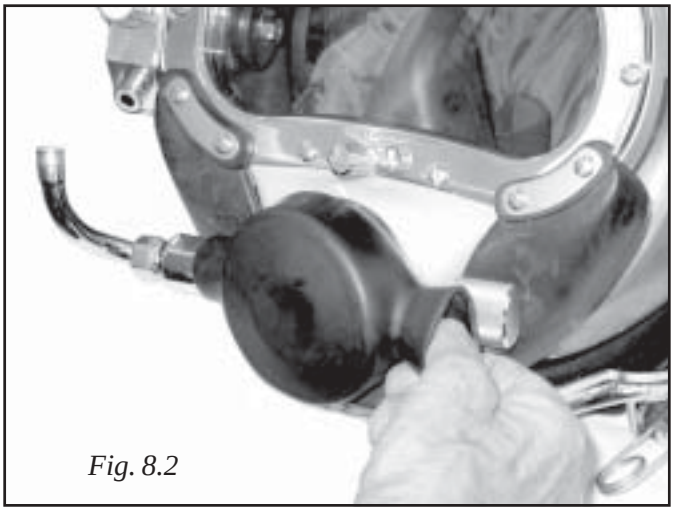


*Fig. 8.2*

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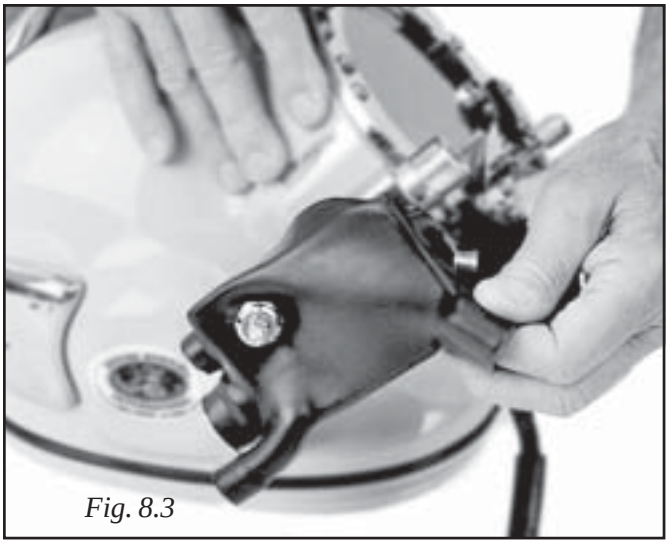


*Fig. 8.3*

7) Install the rubber side block cover. Start by inserting the non-return valve (68) through the square hole on the back side of the cover. All the other holes will then line up correctly.

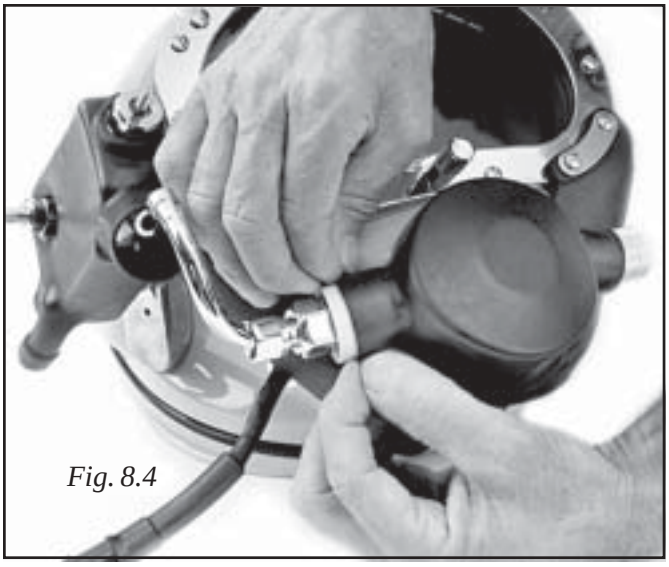


*Fig. 8.4*

8) Slide one of the PVC flanges (Part #520-046) over the bent tube (45b) and insert it into the regulator shroud.

9) Slide the corrugated tube over the bent tube.

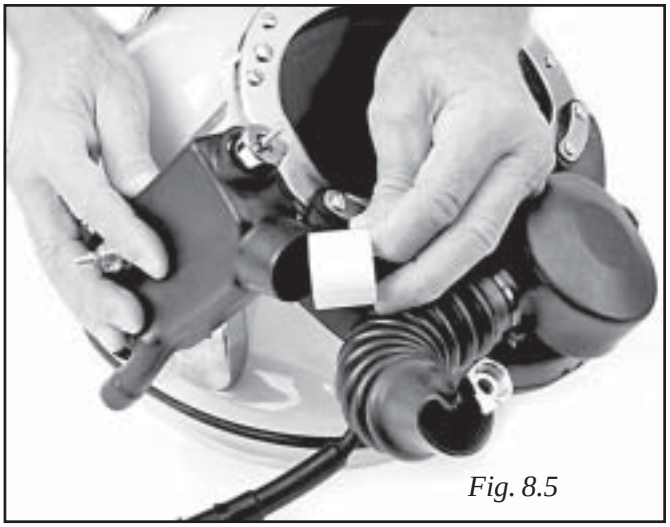


*Fig. 8.5*

10) Install the second PVC flange in the side block shroud (1/4 of the flange should still show).

11) Attach the side block end of the bent tube to the side block assembly (43b) and using a torque wrench torque to 75-100 inch pounds.

12) Re-torque jam nut (131b) using a torque wrench torque to 40 inch pounds.

13) Stretch the corrugated tube over PVC flanges on the regulator and the side block.

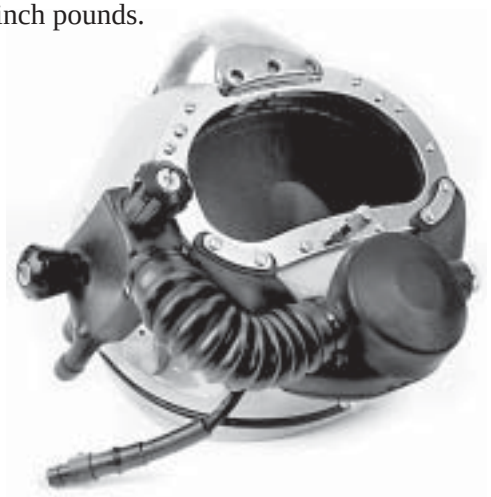
14) Install the tie wraps on the corrugated tube over the PVC stiffeners and tighten, then trim excess tail off.

15) Trim the excess ends from the tie wraps.

16) Reinstall the free flow knob (34), spring (33), and lock nut (32).

17) Reinstall the EGS (Emergency Gas Supply) knob (55), spring (56), and nut (57).

18) Reinstall the one-way valve and using a torque wrench tighten to 150 inch pounds.



The completed Hot Water Shroud installation.

## 8.3 Low Pressure Inflator Hose Installation on the B Sideblock

The low-pressure inflator system is intended for use with dry suits. For certain pieces of equipment it may be necessary to use a longer inflator hose than is originally supplied by the manufacturer of the low-pressure system. Regardless all inflator hoses should have a limiting orifice that does not allow a flow of more than 100 l.p.m.

Tools Required:
5/32 ” Allen Wrench Attachment on Torque Wrench

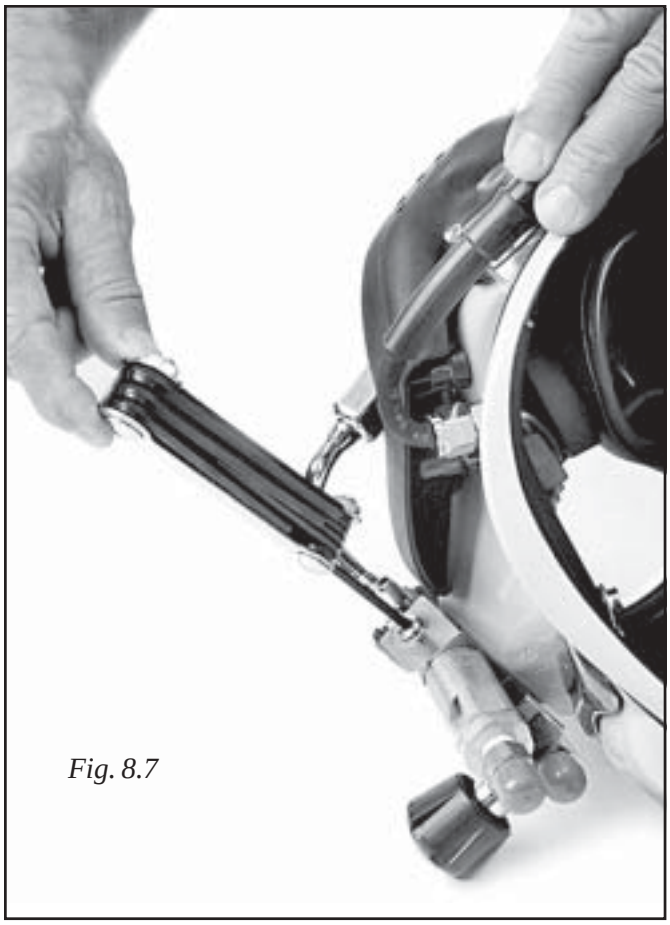


*Fig. 8.7*

1) Remove the plug (48) from the side block. Save this plug.

2) Check the O-ring on the low-pressure whip to be sure it is present and in good condition.

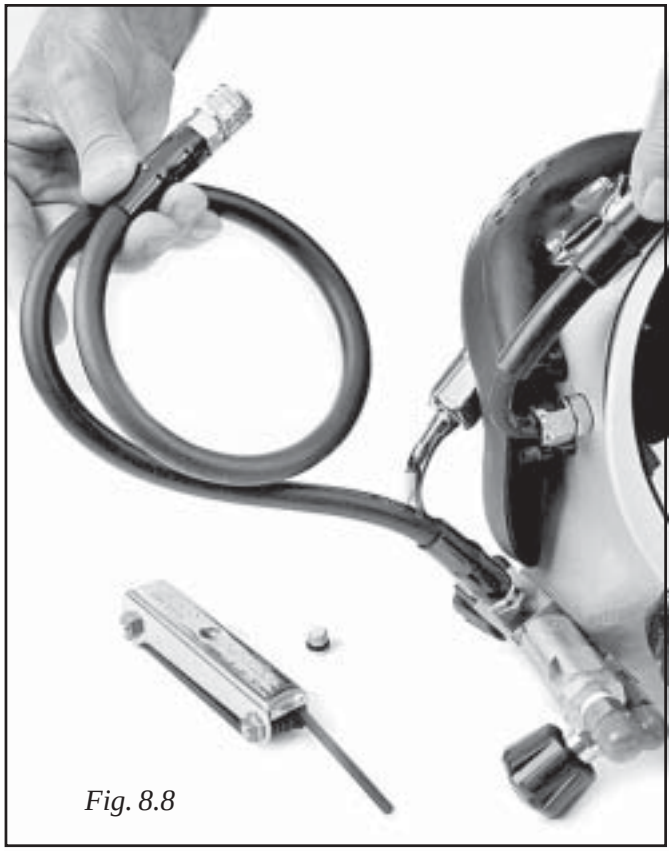


*Fig. 8.8*

3) Carefully screw the low-pressure whip into the side block.

4) Tighten fitting to the specifications provided by the dry suit manufacturer. Do not overtighten.

5) Pressurize helmet and test connection for leaks.

**⚠ CAUTION! When using the low-pressure port on the side block for attachment of a low-pressure hose, a hose with built in flow restriction or the KMDSI Flow Restrictor Adapter, P/N 555-210 must be used. Without a restrictor, a hose failure could deplete the Emergency Gas Supply very rapidly leading to suffocation. This could result in serious personal injury or death.**

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## 8.4 Weld Lens & Weld Shield Assemblies

Tools Required:
3/8 ” Open End Wrench
1/4 ” Flat Blade Attachment on Torque Screwdriver

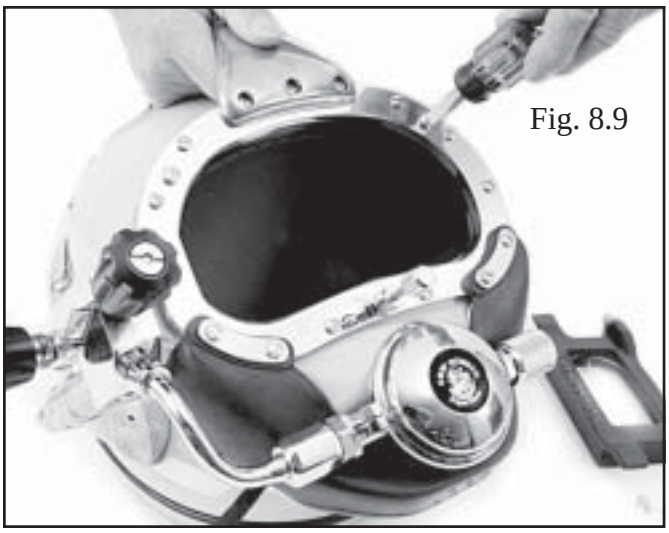


Fig. 8.9

1) Remove the two plug screws (103) from the port retainer (141). Refer to the drawing included with the weld lens or weld shield assembly kit for the remainder of the location numbers.

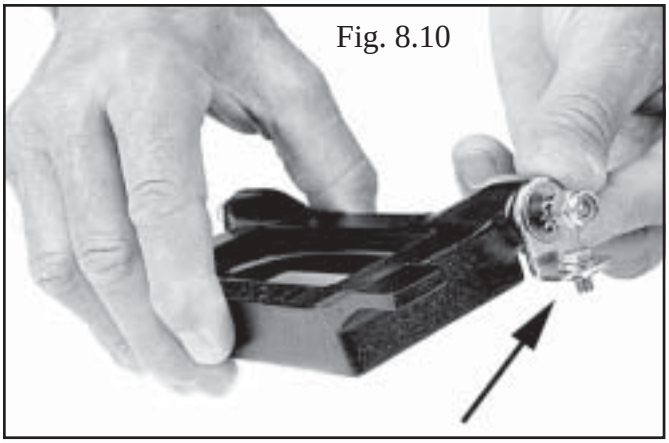


Fig. 8.10


Fig. 8.11

2) Insert the screws through the spacer washers and then through the mount ears (Fig 8.9 Weld Lens Assembly, Fig 8.10 Weld shield assembly).

3) Mount the weld lens assembly with the rubber bumpers facing the inside of the helmet. The Weld Shield mounts with the lens and spring side facing inside the helmet.

4) Install and tighten the two mount bolts into the port retainer.

**⚠ DANGER: Use only the bolts provided with the kits for installation of these assemblies. Longer bolts will damage the helmet shell and/or the threaded inserts. This could cause flooding through the port. Drowning could result.**

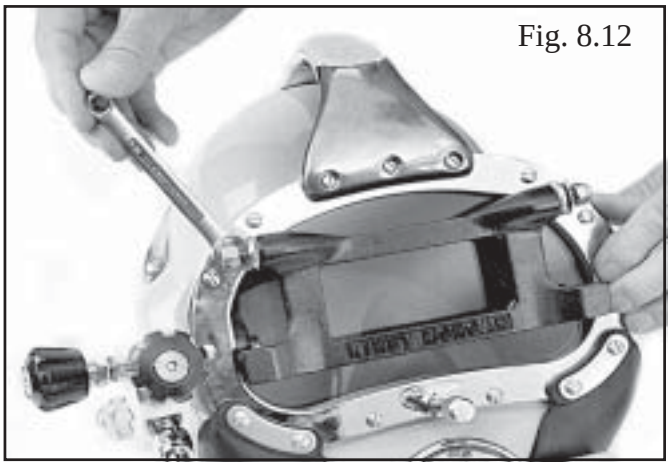


Fig. 8.12

5) On the Weld Lens Assembly, tighten the two lock nuts on the ends of the hinge studs so that the assembly can be flipped up, but will not fall down from its own weight. The Weld Shield Assembly comes pre-tightened from the factory and should not need any adjustment.

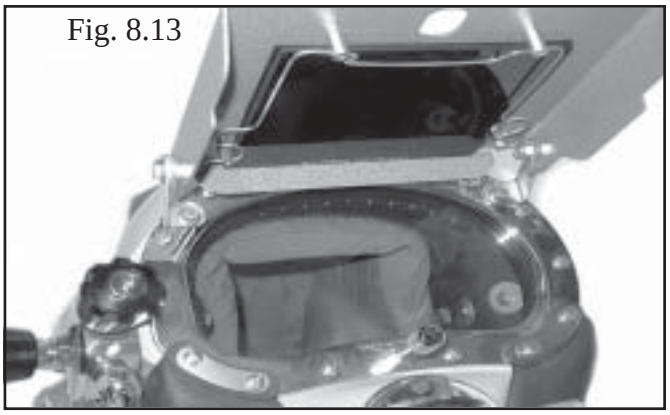


Fig. 8.13

**⚠ WARNING: These assemblies are designed to provide visual protection only. We highly recommend that extreme caution be exercised by all divers, regardless of helmet or band mask used, to avoid the possibility of underwater explosions when cutting or welding. It cannot be over stressed that any underwater explosion can result in serious personal injury or death.**

### 8.5 Use of Quick Disconnect

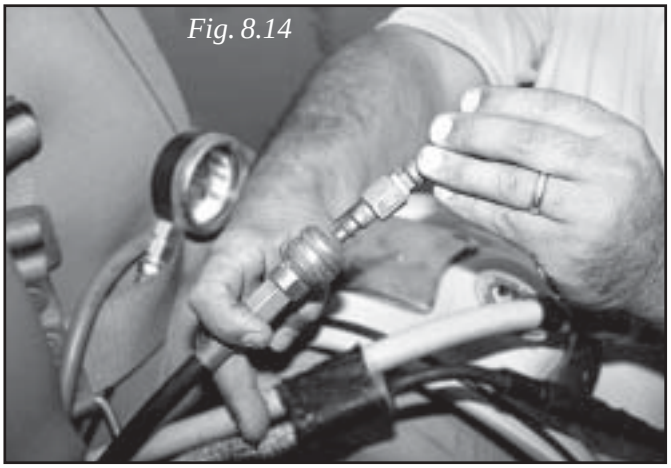


*Fig. 8.14*

A quick disconnect can be used with all bail out systems. It provides greater convenience on deck while dressing the diver. It also makes it possible to separate the attachment of the bail-out from the helmet should the diver become entangled underwater.

The quick connect is designed to be installed in any low pressure port of the diver's bail-out regulator. The connector splits the hose into two halves, with a male connector on one end and a female connector on the other. The female connector should be equipped with a sleeve lock that must be properly aligned before the hose can be disengaged. Double shut off quick connects are recommended over open quick connects.

One end of the connector is designed to be attached to the EGS valve assembly (27), while the other end of the connector is designed to attach to any of the standard low pressure ports on the SuperFlow first stage regulator (or any high performance regulator) used for the bail-out supply.

### 8.6 Double Exhaust Installation

This assembly has been replaced by the Tri-Valve Exhaust® System which is standard on all 17s, see Section 6.10.4. This section is included for those who are still using this system. We highly recommend that this double exhaust system be replaced by the improved Tri-Valve Exhaust® System.

The double exhaust system helps prevent a backflow of biological and certain chemical contaminants into the helmet. This system has been used successfully for diving in biologically contaminated environments. However, there are certain chemicals (i.e.. Toluene, Acetic acid etc.) that will attack the rubber in the valves in the exhaust assembly .

**BE AWARE OF WHAT YOU ARE DIVING IN!** More information on contaminated water diving may be found in the book "Diving in High-Risk Environments" by Steven Barsky, published by Hammerhead Press.

**⚠ DANGER: Diving in contaminated water is extremely hazardous. Do not dive unless you know exactly what contaminants are in the water and you are certain they are compatible with all parts of your diving system.**

Tools Required:
1/4 " Flat Blade Attachment on Torque Screwdriver
Small pair of snips (to trim tie wraps)

1) Remove the two whisker kidney plates and spacers and screws. These will be used in the installation/reassembly.

2) Following the instructions in Section 6.8.5, remove the regulator and exhaust whisker. This will require removal of the nose block device, oral nasal and bent tube.

3) Remove the main exhaust body (149) and clean off all traces of the old silicone sealant.

4) Mount the double exhaust whisker to the regulator exhaust flange.

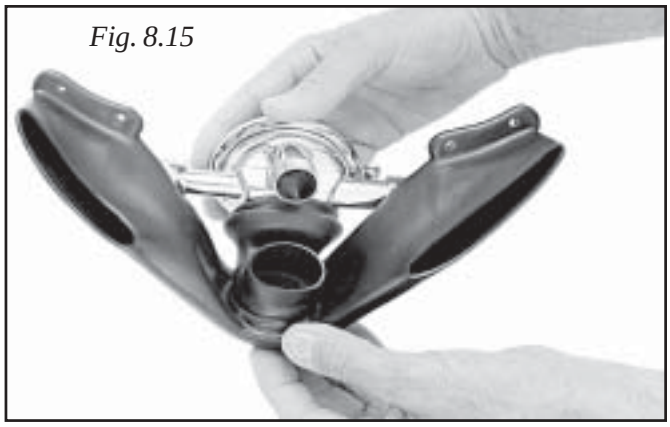


*Fig. 8.15*

5) Secure it with a tie wrap and trim off the excess tail.

6) Apply silicone sealant to the double exhaust body to seal it to the helmet.

7) Install the double exhaust body on the helmet using the three screws that originally held the main exhaust body in position.

8) Install the regulator in the helmet, with the regulator mount nut hand tight.

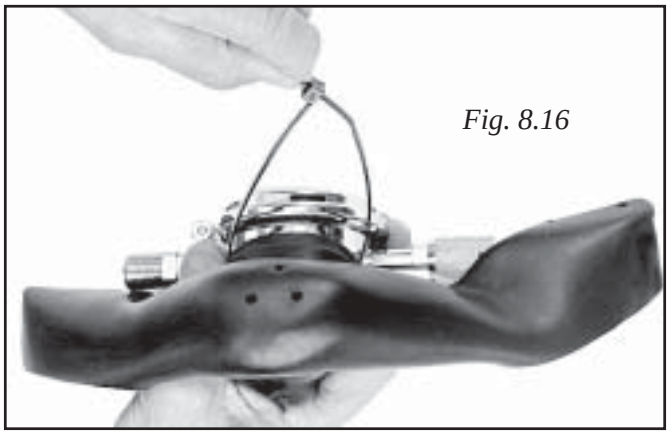
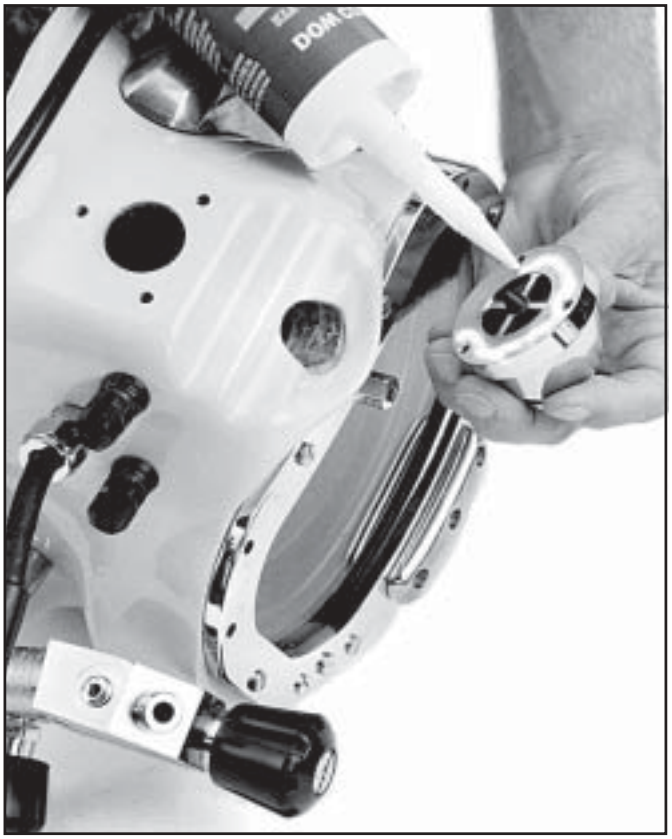
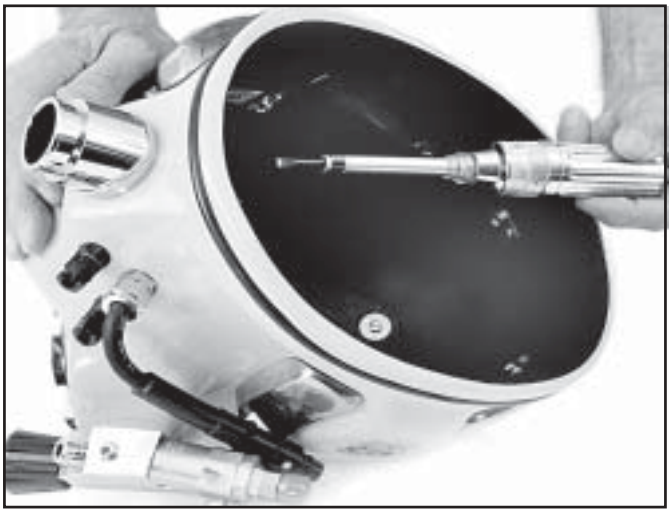
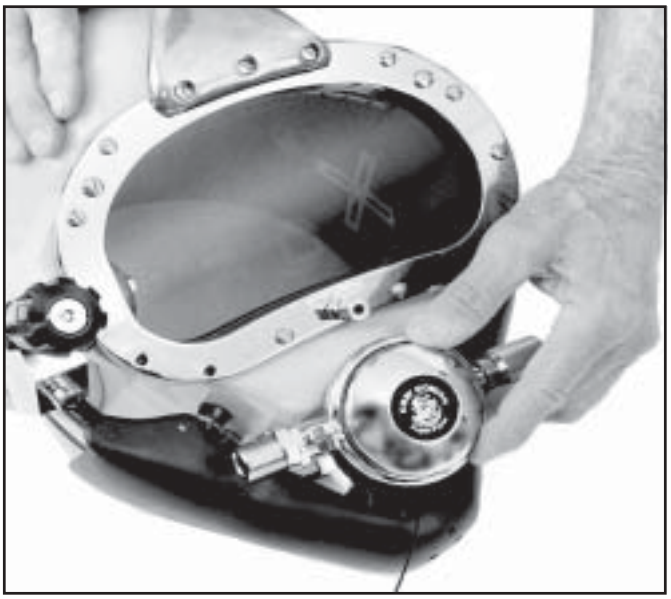


*Fig. 8.16*







9) Attach the double exhaust whisker to the main exhaust body. Make sure the internal rubber ridge is in the groove in the main exhaust body.

10) Secure the exhaust whisker to the main exhaust with a tie wrap and trim off excess tail.

11) Attach the bent tube.

12) Secure the whisker to the port retainer with the screws, spacers and kidney plate removed earlier.

13) Tighten the regulator mount nut and bent tube attachments.

14) Reinstall the oral/nasal and nose block device.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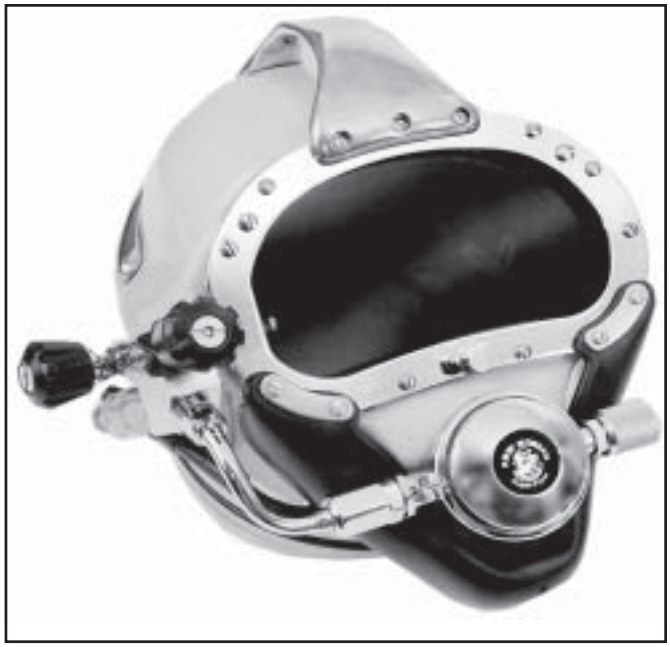

15) Allow 24 hours for the silicone sealant to cure before diving with the helmet. Test the helmet for leakage before diving in contaminated water.

**⚠ DANGER: Do not breathe the fumes from uncured silicone sealant. These fumes are dangerous and can cause unconsciousness. They can also cause long term damage to body tissue. Read and follow all precautions listed on the silicone sealant tube. Allow silicone to cure for a minimum of 24 hours before using helmet.**

**⚠ DANGER! Any helmet / dry suit system must be leak tested according to the manufacturer's instructions before EVERY dive in contaminated water!**

**⚠ Danger: The exhaust valves used in the double exhaust system and regulator must be regularly inspected and replaced whenever they show the slightest signs of wear. If this is not done, leakage into the helmet and breathing systems may occur. This can be fatal, depending on the type of contaminant to which the diver is exposed.**

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# Notes


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# SuperLite-17 A/B Helmet

KIRBY MORGAN® Genuine Parts

| Location Number | Part No. | Description |
|---|---|---|
| 1 | 510-521 | Head Cushion |
| | 510-523 | Replacement Foam |
| 2 | 510-533 | Drawstring Neck Dam |
| 3 | Neck Clamp | (Order Comp. see #7) |
| 4 | 530-317 | Nut |
| 5 | 530-415 | Washer |
| 6 | 530-320 | Nut, Lock |
| 7 | 505-055 | Neck Clamp Assembly |
| 8 - 13 | not used | |
| 14 | 505-008 | Neck Clamp Yoke Assembly Comp. |
| 15 | 530-066 | Screw |
| 16 | 530-601 | Roll Pin |
| 17 | 550-255 | Knob |
| 18 | 535-900 | Safety Pin |
| 19 | 560-051 | Latch Catch Body |
| 20 | 535-808 | Spring |
| 21 | 550-257 | Plunger |
| 22 | 505-010 | Latch Catch Assem., Pull Pin |
| 23 | 560-026 | Hinge |
| 24 | 550-018 | Sleeve |
| 25 | 530-201 | Bolt |
| 26 | 545-013 | Rear Hinge Tab |
| 27 | 530-406 | Washer |
| 28 | 530-025 | Screw |
| 29 | 530-080 | Screw |
| 30 | 530-530 | Washer |
| 31 | 520-117 | Urethane Yoke |
| | 520-060 | Fiberglass Yoke |
| 32 | 550-019 | Locknut |
| 33 | 535-802 | Spring |
| 34 | 520-016 | Knob, Control |
| 35 | 520-030 | Washer |
| 36 | 550-020 | Bonnet |
| 37 | 510-015 | O-Ring |
| 38 | 520-031 | Washer |
| 39 | 510-010 | O-Ring |
| 40 | 550-022 | Valve Stem |
| 41 | 550-023 | Seat Assembly |
| 42 | 550-024 | Stud |
| 43a | 550-026 | A Side Block |
| 43b | 550-029 | B Side Block |
| 44a | 510-011 | O-Ring |
| 44b | 520-033 | O-Ring (teflon) |
| 45b | 555-154 | Bent Tube Assembly |
| 46a | 510-010 | O-Ring |
| 46b | 510-012 | O-Ring |
| 47a | 555-152 | Reg. Hose Assem. w/O-Rings |
| 47b | 555-155 | Bent Tube Assem. w/O-Rings |
| 48 | 550-095 | L.P. Plug, w/O-ring |
| 49 | 310-003 | O-Ring |
| 50 | 550-140 | Emergency Valve Body |
| 51 | 550-138 | Stem |
| 52 | 540-095 | Washer |

| Location Number | Part No. | Description |
|---|---|---|
| 53 | 520-024 | Packing |
| 54 | 550-091 | Packing Nut |
| 55 | 520-025 | Knob, Control |
| 56 | 535-802 | Spring |
| 57 | 550-019 | Locknut |
| 58 | 505-070 | Emergency Valve Assembly |
| 59 | 510-483 | O-Ring |
| 60 | Body | |
| 61 | Spring | |
| 62 | Poppet | |
| 63 | O-Ring | |
| 64 | O-Ring | |
| 65 | Wiper | |
| 66 | Seat | |

Order Complete see Loc. # 68 | For Replacement Parts Order Kit #525-330

| | | |
|---|---|---|
| 67 | 555-117 | Adapter, Brass, 1/4" NPT/$0_2$ |
| 68 | 555-195 | One-Way Valve |
| 69 | 505-060 | One-Way Valve Assem. |
| 70a | 505-022 | "A" Side Block Assem. Complete |
| 70b | 505-024 | "B" Side Block Assem. Complete |
| 71 | 515-005 | Earphone Right |
| 72 | 515-006 | Earphone Left |
| | 510-542 | Earphone Cover set |
| | 515-008 | Speaker |
| | 520-015 | Speaker Protector |
| 73 | 515-009 | Microphone |
| 74 | 515-030 | Communications Set |
| 75 | 560-023 | Starboard Weight |
| 76 | 530-070 | Screw |
| 77 | 530-540 | Washer |
| 78 | 545-027 | Snap Tab |
| 79 | 530-078 | Screw |
| 80 | 510-446 | O-Ring |
| 81 | 510-211 | O-Ring |
| 82 | 550-038 | Nut, Regulator Mount |
| 83 | 510-690 | Mask, Oral/Nasal (silicone) |
| 84 | 510-550 | Valve, Oral/Nasal Intake |
| 85 | 520-020 | Body, Oral/Nasal Intake Valve |
| 86 | 545-015 | Nose Block device |
| | 510-575 | Nose Block Pad |
| 87 | 530-090 | Alignment Screw |
| 88 | 550-339 | Alignment Sleeve |
| 89 | 560-005 | Rear Weight |
| 90 | 530-070 | Screw |
| 91 | 530-540 | Washer |
| 92 | 520-065 | Helmet, Fiberglass |
| 93 | 560-014 | Handle |
| 94 | 530-040 | Screw |
| 95 | 560-019 | Port Weight |
| 96 | 530-535 | Washer |
| 97 | 530-415 | Washer |
| 98 | 530-317 | Nut |
| 99 | 545-016 | Air Train |
| 100 | 530-535 | Washer |

| Location Number | Part No. | Description |
|---|---|---|
| 101 | 530-317 | Nut |
| 102 | 530-050 | Screw |
| 103 | 530-052 | Screw, Port Plug Screw |
| 104 | 530-035 | Screw |
| 105 | 510-010 | O-Ring |
| 106 | 510-008 | O-Ring |
| 107 | 555-180 | Packing Nut |
| 108 | 550-062 | Knob, Nose Block |
| 109 | 550-061 | Spacer |
| 110 | 540-015 | Plate |
| 111 | 530-045 | Screw |
| 112 | 545-022 | Regulator Body |
| 113 | 550-060 | Piston |
| 114 | 535-807 | Spring Set |
| 115 | 550-059 | Spacer |
| 116 | 550-057 | Shaft |
| 117 | 520-032 | Washer |
| 118 | 510-011 | O-Ring |
| 119 | 550-055 | Packing Nut |
| 120 | 550-053 | Knob, Adjustment |
| 121 | 530-601 | Retaining Pin |
| 122 | 510-553 | Diaphragm |
| 123 | 545-018 | Cover Assembly |
| 123a | 535-905 | Retaining Clip |
| 123b | 540-055 | Cover |
| 123c | 535-810 | Spring, Purge Button |
| 123d | 520-017 | Purge Button |
| 123e | 520-077 | Purge Button Sticker |
| 124 | 530-030 | Screw |
| 125 | 545-020 | Clamp |
| 126 | 530-303 | Nut |
| 127 | 550-052 | Spacer |
| 128 | 545-038 | Roller Lever |
| 129 | 530-506 | Washer |
| 130a | 550-046 | Inlet Nipple "A" |
| 131b | 550-050 | Jam Nut "B" |
| 132b | 550-048 | Inlet Nipple "B" |
| 133 | 510-014 | O-Ring |
| 134 | 545-026 | Inlet Valve |
| 134a | 510-580 | Valve Seat |
| 135 | 535-804 | Spring |
| 136 | 530-505 | Washer |
| 137 | 510-552 | Exhaust Valve |
| 138a | 505-026 | Demand Reg. Assem. "A" |
| 138b | 505-027 | Demand Reg. Assem. "B" |
| 138c | 505-028 | Reg. Adjustment Knob Assem. |
| 139 | 510-554 | Whisker™, Rubber (Pre 2004) |

| Location Number | Part No. | Description |
|---|---|---|
| 140 | 525-752 | Tri-Valve™ Exhaust (140a-140f) |
| 140a | 510-767 | Starboard Whisker™ |
| 140b | 510-766 | Port Whisker™ |
| 140c | 510-761 | Tri-Valve™ Exhaust Main Body |
| | 510-??? | Quad-Valve™ Exhaust Main Body |
| 140d | 520-200 | Whisker™ Exhaust Valve Insert |
| 140e | 510-552 | Exhaust Valve |
| 140f | 520-042 | Tie Wrap |
| 141 | 550-116 | Nose Block Guide |
| 142 | 560-070 | Port Ret. Assembly |
| 143 | 520-004 | Face Port |
| | 520-128 | Face Port, pre 1979 |
| 144 | 510-260 | O-Ring |
| 145 | 550-040 | Nut |
| 146 | 530-308 | Nut |
| 147 | 530-525 | Washer |
| 148 | 540-054 | Earphone Retainer |
| 149 | 530-035 | Screw |
| 150 | 550-063 | Exhaust Body |
| 151 | 510-561 | Exhaust Valve |
| 152 | 530-021 | Screw |
| 152a | 530-019 | Screw, Quad Exhaust |
| 152b | 510-007 | O-Ring, Quad Exhaust Screw |
| 153 | 545-024 | Exhaust Cover |
| 153a | 560-530 | Exhaust Cover, Quad Exhaust |
| 153b | 520-042 | Tie Wrap, Quad Exhaust |
| 153c | 510-033 | O-Ring, Quad Exhaust |
| 154 | 515-061 | Terminal Block |
| 155 | 515-035 | Communications Post |
| 156 | 510-481 | O-Ring |
| 157 | 550-043 | Plug |
| 158 | 515-049 | Terminal |
| 159 | 515-045 | Waterproof Conn, Male |
| 160 | 510-481 | O-Ring |
| 161 | 555-175 | Packing Gland |
| 162 | 520-035 | Ferrule, Front |
| 163 | 520-036 | Ferrule, Back |
| 164 | 555-178 | Packing Nut |
| 165 | 505-047 | W.P. Connector Assembly |
| 166 | 505-130 | Chin Strap |
| 167 | 505-134 | Strap Guide |
| 168 | 505-138 | Yoke Strap |

**Kirby Morgan Dive Systems, Inc.® 1430 Jason Way, Santa Maria, CA 93455 USA**
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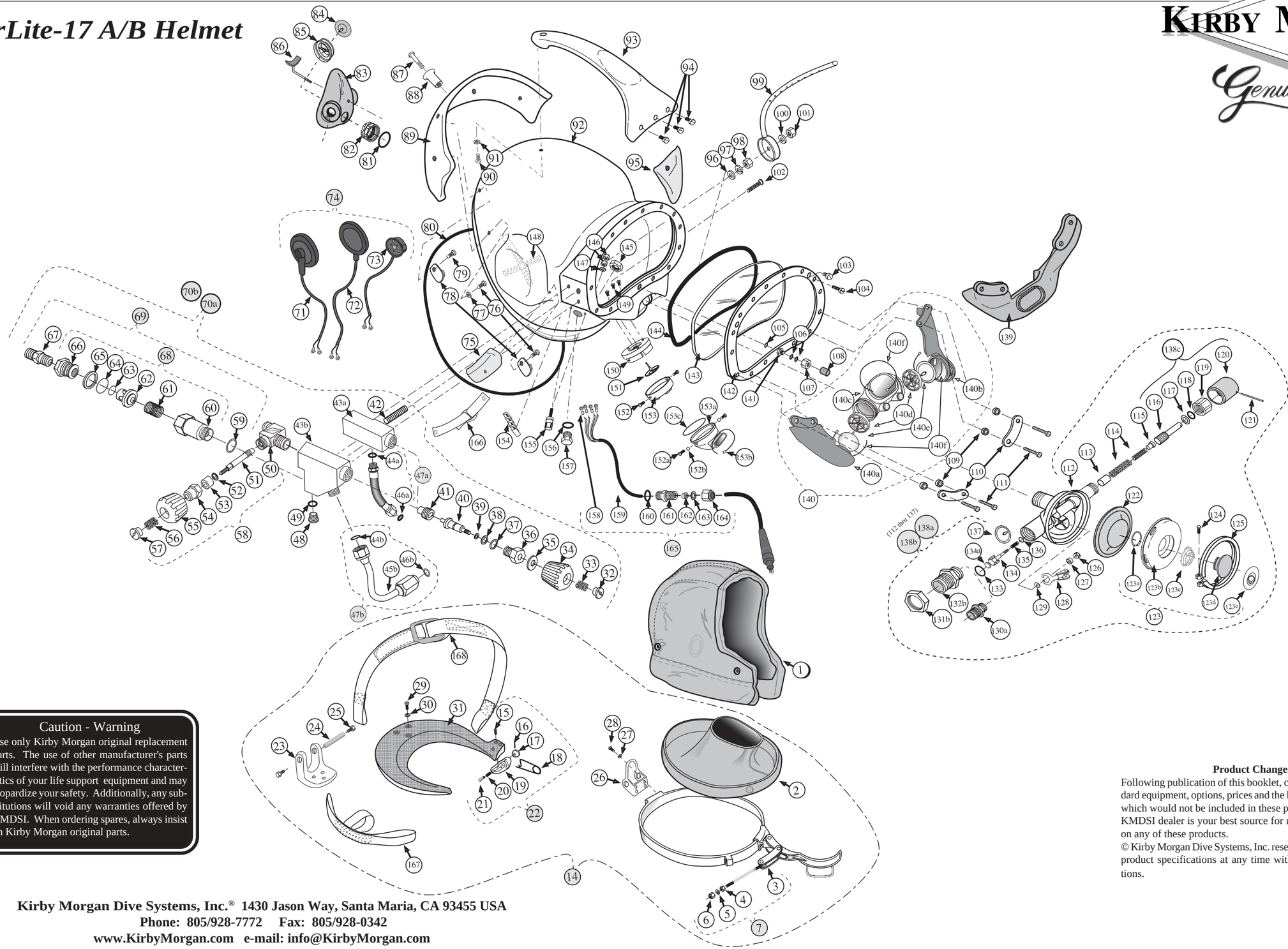
 Docu # 040809001, Aug. 2004

# *SuperLite-17 A/B Helmet*

KIRBY MORGAN®
Genuine Parts




### Caution - Warning

Use only Kirby Morgan original replacement parts. The use of other manufacturer's parts will interfere with the performance characteristics of your life support equipment and may jeopardize your safety. Additionally, any substitutions will void any warranties offered by KMDSI. When ordering spares, always insist on Kirby Morgan original parts.

**Product Changes**

Following publication of this booklet, certain changes in standard equipment, options, prices and the like may have occurred which would not be included in these pages. Your Authorized KMDSI dealer is your best source for up-to-date information on any of these products.



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# Table of Equivalents

To convert units appearing in Column 1 (left column) into equivalent values in Column 2 (center column), multiply by factor in Column 3. Example: To convert 7 gallons into cubic inches, multiply 7 x 231 = 1617. To convert units appearing i Column 2 (center) into equivalent values of units in Column 1 (left), divide by factor in Column 3. Example: To convert 25 horsepower into Btu per minute, divide 25 by 0.02356 = 1061

| TO CONVERT INTO | INTO TO CONVERT | MULTIPLY BY DIVIDE BY |
|---|---|---|
| Atmospheres | Feet of Water | 33.9 |
| Atmospheres | Inches of Mercury (Hg) | 29.92 |
| Atmospheres | PSI (LBS per Sq. Inch | 14.7 |
| BTU | Foot Pounds | 778.3 |
| BTU per hour | Watts | 0.2931 |
| BTU per minute | HorsePower | 0.02356 |
| Celsius (Centigrade) | Fahrenheit | °C x 1.8 + 32 |
| Centimeters | Inches | 0.3937 |
| Cubic Centimeters | Gallons (U.S. Liquid) | 0.0002642 |
| Cubic Centimeters | Liters | 0.0001 |
| Cubic Feet | Cubic Inches | 1728 |
| Cubic Feet | Gallons (U.S. Liquid) | 7.48052 |
| Cubic Inches | Cubic Feet | 0.0005787 |
| Cubic Inches | Gallons (U.S. Liquid) | 0.004329 |
| Days | Seconds | 86.400 |
| Degrees (Angle) | Radians | 0.01745 |
| Feet | Meters | 0.3048 |
| Feet | Miles | 0.0001894 |
| Feet of Water | Atmospheres | 0.0295 |
| Feet of Water | Inches of Mercury (Hg) | 0.8826 |
| Feet of Water | PSI (Lbs per Sq. Inch) | 0.4335 |
| Feet per Minute | Miles per Hour | 0.01136 |
| Feet per Second | Miles per Hour | 0.6818 |
| Foot-Pounds | BTU | 0.001286 |
| Foot-Pounds per Minute | Horsepower | 0.0000303 |
| Foot-Pounds per Second | Horsepower | 0.001818 |
| Gallons (U.S. Liquid) | Cubic Feet | 0.1337 |
| Gallons (U.S. Liquid) | Cubic Inches | 231 |
| Gallons of Water | Pounds of Water | 8.3453 |
| Horsepower | BTU per Minute | 42.44 |
| Horsepower | Foot-Pound per Minute | 33,000 |
| Horsepower | Foot Pounds per Second | 550 |
| Horsepower | Watts | 745.7 |
| Hours | Days | 0.04167 |
| Hours | Weeks | 0.005952 |
| Inches | Centimeters | 2.54 |
| Inches of Mercury (Hg) | Atmospheres | 0.03342 |
| Inches of Mercury (Hg) | Feet of Water | 1.133 |
| Inches of Mercury (Hg) | PSI (Lbs. per Sq. Inch) | 0.4912 |
| Inches of Water | PSI (Lbs. per Sq. Inch) | 0.03613 |
| Liters | Cubic Centimeters | 1000 |
| Liters | Gallons (U.S. Liquid) | 0.2642 |
| Micron | Inches | 0.00004 |
| Miles (Statute) | Feet | 5280 |
| Miles per hour (MPH) | Feet per Minute | 88 |
| Miles per hour | Feet per Second | 1.467 |
| Ounces (Weight) | Pounds | 0.0625 |
| Ounces (Liquid) | Cubic Inches | 1.805 |
| Pints (Liquid) | Quarts (Liquid) | 0.5 |
| Pounds | Grains | 7000 |
| Pounds | Grams | 453.59 |
| Pounds | Ounces | 16 |
| PSI (Pounds per Sq. Inch) | Atmospheres | 0.06804 |
| PSI (Pounds per Sq. Inch) | Feet of Water | 2.307 |
| PSI (Pounds per Sq. Inch) | Inches of Mercury (Hg) | 2.036 |
| Quarts | Gallons | 0.25 |
| Square Feet | Square Inches | 144 |
| Temperature (°F - 32) | Temperature (°C) | 0.5555 |
| Tons (U.S.) | Pounds | 2000 |
| Watts | Horsepower | 0.001341 |

# Appendix 1: Torque Specifications

| Location Number | Part # | Description | Torque in Inch Pounds |
|---|---|---|---|
| 36 | 550-020 | Bonnet, Defogger Valve | 100 |
| 42 | 550-024 | Stud, Side Block | 50 |
| 45b | 555-154 | Bent tube assy. side block end | 100 |
| 48 | 550-094 | Low pressure plug | 50 |
| 50 | 550-140 | Emergency valve body | 3 turns by hand |
| 54 | 550-091 | Packing nut, emergency valve | 45 after seating |
| 60 | | One way valve body | 240 |
| 66 | | One way valve seat | 240 |
| 67 | 555-117 | Adapter, brass | 240 |
| 68 | 555-195 | One way valve | 240 |
| 82 | 550-081 | Regulator mount nut | 100 |
| 76, 90 | 530-070 | Screw, for mounting weights | 30 |
| 94 | 530-045 | Screw, handle | 12 |
| 101 | 530-317 | Nut, air train | 20 |
| 98 | 530-317 | Nut, air train | 20 |
| 102 | 530-050 | Screw, sideblock | 18 |
| 148 | 530-035 | Screw, main exhaust body | 12 |
| 108 | 550-062 | Knob, nose block | 23 |
| 104 | 530-035 | Screw, port retainer | 12 |
| 103 | 530-052 | Screw, port plug | 18 |
| 119 | 550-055 | Packing nut, regulator | 40 after seating |
| 124 | 530-030 | Screw, regulator clamp | 8 |
| 132b | 550-048 | Inlet nipple, regulator B | 40 |
| 130a | 550-046 | Inlet nipple, regulator A | 40 |
| 131b | 550-050 | Jam nut, regulator | 100 |
| 111 | 530-045 | Screw, whisker kidney plate | 12 |
| 87 | 530-090 | Screw, Alignment | 35-50 |
| 25 | 530-201 | Bolt, rear hinge tab | 70 |
| 28 | 530-025 | Screw | 60 |
| 29 | 530-080 | Screw, yoke | 20 |
| 15 | 530-066 | Screw, yoke | 20 |

# Appendix A2
# Maintenance and Inspection Procedures

The following section describes the maintenance and inspection procedures that are used to complete the Annual, Monthly and Daily Checklists, to ensure optimum reliability and performance. These procedures are additionally utilized in conjunction with the daily pre and post dive maintenance checklists. The following service intervals are the minimum recommended for helmets being used under good conditions. Helmets used in harsh conditions, i.e., contaminated water, welding / burning operations, or jetting may require more frequent servicing.

The intention of the maintenance and overhaul program is to help maintain all helmet components in good working order in accordance with KMDSI factory specifications. It will also help to identify worn or damaged parts and components before they effect performance and reliability. Whenever the serviceability of a component or part is in question, or doubt exists, replace it. All helmet components and parts have a service life and will eventually require replacement.

***NOTE:*** The side block (43a or 43b) does not need to be removed from the helmet annually, providing, after removal helmet components do not show excessive corrosion and verdigris. KMDSI recommends that every THREE years the side block assembly be physically removed from the helmet per Section 6.3.3. Clean and inspect the stud and securing screw, replace if bent, stripped, or any damage is detected.

***NOTE:*** The pipe thread fittings used on the umbilical adapter (67) and the emergency gas valve (50) are the only fittings that require sealing with Teflon tape. DO NOT USE LIQUID SEALANT. When installing Teflon tape on pipe threads, apply the tape starting one thread back from the end of the fitting. Apply the tape in a clockwise direction under tension. 1-1/2 wraps is all that is needed. The use of more than 1-1/2 wraps could cause excess Teflon tape to travel into the breathing system. Do not overtighten when installing.

Chapters 5, 6, 7, and 8 of the SuperLite 17-A/B, Operations and Maintenance manual gives guidance on all routine and corrective maintenance and repairs. Disassembly and reassembly of components is explained in a step-by-step manner that may not necessarily call out that all O-rings and normal consumable items will be replaced. The manual is written in this way so that if an assembly, component, or part is being inspected or disturbed between normal intervals it is acceptable to reuse O-rings and components providing they pass a visual inspection per Section 5.3.1. When conducting annual or scheduled overhauls all O-rings should be replaced. The side block should be removed from the helmet at least every three years (or 400 operating hours) so that the stud and securing screw can be inspected. All O-rings should be lightly lubricated with the applicable lubricant.

Lubrication / Cleanliness:
Helmets intended for use with breathing gas mixtures in excess of 50% oxygen by volume, should be cleaned for oxygen service. They must only be lubricated with oxygen compatible lubricants such as Christo-Lube® or Krytox®. All air supply systems must be filtered and must meet the requirements of grade D quality air or better. Helmet breathing gas systems / gas train components used for air diving should only can be lubricated with silicone grease Dow Corning 111® or equivalent. KMDSI uses Christo-Lube® at the factory for lubrication of all gas train components requiring lubrication, and highly recommends its use.

Before 1999, Kirby Morgan Dive Systems, Inc., used Danger and Warning Notices in the helmet and mask owner's manual limiting the breathing gas percentage to less than 23.5 percent oxygen. This was due primarily to cleaning issues in regards to possible fire hazards and was in compliance with the recommendations of the Association of Standard Test Methods (ASTM), National Fire Protection Agency (NFPA), and the Compressed Gas Association (CGA) as well as other industry standards. During the 1990's, open circuit scuba use of enriched-air (Nitrox) by technical and recreational divers became very popular, and as use increased, so did the number of combustion incidents during the mixing and handling of the breathing mixtures. These combustion incidents brought attention to the dangers and inherent risks associated with oxygen and oxygen enriched gas mixtures.

KMDSI cannot dictate or override regulations or recommendations set forth by industry standards or governing bodies pertaining to enriched gas use. However, it is the opinion of KMDSI that breathing gas mixtures up to 50% oxygen by volume should not pose a significant increased risk of fire or combustion in Kirby Morgan helmets and masks low-pressure components and does not warrant the need for the stringent specialized oxygen clean post-sampling and particulate analysis normally accomplished for components used in high pressure oxygen valves, regulators, and piping systems. The decision for using 50% has been primarily based on a long history of operational field use.

As long as Kirby Morgan helmets and masks are cleaned and maintained in accordance with the maintenance manual, the equipment should not pose a significant increased risk of a fire or ignition originating in the helmet or mask low-pressure (<250 p.s.i.g. /<17.2 bar or less) components when used with enriched gases of up to 50% oxygen. However, CAUTION should be exercised any time enriched gases are handled or used.

In general, helmets and masks used primarily for mixed gas use are subject to far less oil and particulate contamination than those used for air diving. For this reason, helmets and masks commonly used with both air and enriched breathing gases should be cleaned and maintained with greater care and vigilance. It is important that all internal gas-transporting components, i.e., side block, bent tube, and demand regulator assemblies remain clean and free of hydrocarbons, dirt, and particulates. Whenever the equipment is depressurized, all exposed ports or fittings should be plugged/capped to help maintain foreign material exclusion.

Gas train components should be cleaned according to the procedures outlined in the operations manual at least annually and/or whenever contamination is suspected or found. Accessible interior and exterior surfaces should be cleaned at least daily at the completion of daily diving operations. Helmets and masks used in waters contaminated with oils and other petroleum or chemical contaminants may require cleaning after each dive.

Helmet and mask components requiring lubrication should be lubricated sparingly with lubricants approved for oxygen use such as Christo-Lube®, Krytox®, or Flourolube®. KMDSI highly recommends using Christo-Lube®, and uses Christo-Lube® during the assembly of all KMDSI gas train components.

Regardless of the approved lubricant used, never mix different kinds of lubricants. Persons mixing handling and working with breathing gases should be properly trained in all aspects of gas safety handling and use.

**⚠ CAUTION: Do not use lubricants of any kind on the diaphragm or exhaust valves. Use of lubricants can attract and hold debris that could interfere with the proper operation of the regulator.**

***NOTE: Refer to Chapters 6, 7, and 8 for removal and disassembly / reassembly procedures.***

***NOTE: The helmet weights do not need to be removed from the helmet unless fiberglass damage is present or suspected.***

***NOTE: During annual overhauls, all O-rings and soft goods, i.e., valve seats and washers should be replaced. KMDSI offers kits that have all the necessary parts.***

***NOTE: The neck dam rubber need not be replaced if the inspection reveals no damage or significant wear and the rubber components are not dried out.***

***NOTE: The oral nasal mask and oral nasal valve requires replacement, only if inspection reveals damage, distortion, or signs of damage.***

***NOTE: All threaded fasteners and parts require careful cleaning and inspection as well as the mating parts. Replace any and all threaded parts or components that show signs of wear or damage.***

KMDSI highly recommends a certified KMDSI repair technician make all repairs and that only genuine KMDSI repair and replacement parts be used. Owners of KMDSI products that elect to do their own repairs and inspections should only do so if they possess the knowledge and experience. All inspections, maintenance and repairs should be completed using the appropriate KMDSI Operation and Maintenance Manual.

Persons performing repairs should retain all replacement component receipts for additional proof of maintenance history. Should any questions on procedures, components, or repairs arise, please telephone Kirby Morgan Dive Systems, Inc., at 1-805-928-7772 or E-mail them at www.KirbyMorgan.com or telephone Dive Lab, Inc., at 1-850-235-2715 or E-mail them at divelab@aol.com.

***NOTE: The maintenance log Appendix 3 of the Operations and Maintenance Manual may be used as a template for creating blank pages to record all the maintenance performed.***

# ANNUAL OVERHAUL, MAINTENANCE, AND INSPECTION CHECKLIST
## Checklist A2.1- Page 1 of 8

**THIS INSPECTION AND MAINTENANCE MUST BE PERFORMED AT LEAST ANNUALLY AND AS DICTATED BY CONDITION REVEALED DURING DAILY/MONTHLY INSPECTION. MONTHLY INSPECTIONS DETERMINE NECESSITY FOR OVERHAUL WITH MORE ACCURACY THAN SIMPLY PLACING A NUMBER OF HOURS OF USE.**

This checklist is intended to aid persons performing routine overhauls of Kirby Morgan helmets. The checklist should be used in conjunction with the applicable Operations and Maintenance Manual for the model helmet being serviced and is primarily intended to guide and document the maintenance as it is completed. Specific detailed procedures for each section of this checklist can be found in the Operations and Maintenance Manuals. This checklist when completed should be retained in the equipment maintenance files. This checklist is intended to be used for all models of Kirby Morgan Helmets.

**NOTE:** KMDSI strongly recommends that all repairs be performed by trained Personnel.

**NOTE:** When performing the A2.1, all O-rings must be replaced.

**NOTE:** This checklist does not currently match all the Kirby Morgan Helmet Operations and Maintenance Manuals, chapter, page, and paragraph.

**NOTE:** Helmets being used in polluted waters, or extreme environments, will require more frequent inspection.

**NOTE:** This checklist must be used in conjunction with the most current Operations and Maintenance Manual. For the latest Manual revisions please check the Kirby Morgan web page at www.KirbyMorgan.com.

Date:

Helmet Serial #:

Associated Equipment Serial # (s):

Technician (print name):

Remarks:

| **Annual Overhaul, Maintenance, and Inspection Procedures**<br>**Checklist A2.1- Page 2 of 8** | **Initials** |
|---|---|
| **SL-17A/B YOKE / NECK CLAMP ASSEMBLY**<br>**Helmet Attachment Components** | |
| **Note: For Kirby Morgan SL-17K, SL-17C, and SL-27, skip to page 3 of this checklist, and start at step 1.** | |
| 1. Remove Yoke / Neck Clamp Assembly (14) from helmet. Remove the latex or neoprene neck dam and carefully inspect for tears, holes, and damaged areas and deterioration. Replace or repair the neck dam if any damage is present or if the material shows signs of deterioration. See 17A/B O&M Manual 7.9.3.1-4.2 | |
| 2. Disassemble the rear hinge tab (26), Hinge (23), and sleeve (24) from the Yoke/neck clamp and inspect for cracking, bending, distortion, and/or corroded fasteners. Replace parts as necessary. KMDSI recommends replacing the two hinge bolts (25) annually. Reassemble and torque fasteners (28, 29) to 20 inch pounds and torque bolt (25) to 50 inch pounds. See SL-17 A/B O&M Manual. | |
| 3. Remove the Nylock nut (6), Lock Nut (4) and washer (5) from the clamp adjustment stud. Clean the stud with a wire brush and inspect for signs of line cracking, pitting, or corrosion damage. If any damage is present, the neck clamp will require replacement. See SL-17 A/B O&M Manual | |
| 4. Remove the Latch Catch Assembly (22) from the Yoke (31). Inspect the mounting screws (15). Replace screws if any damage is found. Inspect the spring (20) spring and plunger shaft (21), for signs of corrosion; test operate the mechanism, dissemble and clean and overhaul if any corrosion or damage is found. Repair/replace parts as necessary, reassemble. See SL-17A/B O&M Manual 7.9.2.2 | |
| 5. Reassemble all Yoke/Neck Clamp/Dam Components. Replace the Nylock nut (6). If the Nylock nut does not have at least 12 inch pounds of running torque. See SL-17 O&M Manual 7.9.3 | |
| 6. Test-mate the Yoke/neck clamp to the helmet. Check for clamp adjustment and smooth clamp operation. When properly adjusted, the clamp should close with moderate resistance as the handle approaches the center of travel, and then should snap firmly against the helmet due to the cam tension. When adjusting, a deep well socket should be used with a torque wrench on nut (6), and a back-up wrench, on nut (4). After neck clamp is adjusted, torque the Nylock lock nut (6) 50 inch pounds. Repair/replace parts as necessary. See SL-17 A/B O&M Manual 7.9.3.1 | |

| Annual Overhaul, Maintenance, and Inspection Procedures<br>Checklist A2.1- Page 3 of 8 | INITIALS |
|---|---|
| **SL-17K, SL-17C, SL-27 Neck Ring / Assembly<br>HELMET ATTACHMENT COMPONENTS** | |
| **Note: The Neck Ring / Dam components of the Kirby Morgan SL-17K, C, and SL-27 are virtually identical and use the same components and parts. However, when performing maintenance or repairs refer to the specific manual for the helmet model being serviced.** | |
| 1. Remove the Neck Ring / Dam Assembly from the helmet. Remove and discard the O-ring. Clean the O-ring groove and inspect Neck Ring for signs of damage, dents, bent or deformed plates. Check to ensure all neck dam screws are present. Lightly lubricate and install new O ring. See applicable O&M Manual. | |
| 2. Remove the four neck strap retainer screws, then remove the neck strap assembly. Inspect the neck strap for signs of wear or damage. Replace the strap if any wear or damage is found. See applicable O&M Manual. | |
| 3. Carefully inspect the neck dam material for signs of wear, holes, tears, or any damage, replace if any damage is found. See applicable O&M Manual. | |
| **Note: The Sealed Pull Pins are filled at the factory with silicon oil. The pins are not serviceable by the owner / user. The pins should only be serviced by an authorized KMDSI repair facility.** | |
| 4. Remove the Sealed Pull Pin Assemblies, clean, and inspect the pin recess. Inspect the pins for the presence of silicon oil, which would indicate that the seal is bad. Check for proper function. If the pins do not function smoothly, or if oil is present, the pins should be serviced by an authorized KMDSI repair facility. Replace parts and components as necessary; reassemble See applicable O&M Manual. | |
| 5. Locking Collar: Disassemble locking collar components including the hinge pins and neck pad components. Clean and inspect, replace components as necessary. See applicable O&M Manual. | |
| 6. Disassemble the swing tongue catch Assembly, clean, and inspect all components. Replace components as necessary and reassemble, See O&M Manual. | |

| Annual Overhaul, Maintenance, and Inspection Procedures<br>Checklist A2.1- Page 4 of 8<br>**HELMET ASSEMBLY** | **INITIALS** |
|---|---|
| 1. On the SL-17A/B only, KMDSI recommends yearly removal/replacement of the alignment screw (87) from the rear weight (89). Also, conduct a visual inspection of the tapped threads used by the alignment screw (87) in the rear weight. Ensure the threads are in good condition. See applicable O & M Manual | |
| 2. On the SL-17A/B only, visually inspect the sleeve (88) and ensure it is not damaged and/or deformed. Replace as necessary. Clean all residual Loctite™ from the alignment screw (87), using a stainless or brass wire brush. Thoroughly inspect all threaded surfaces for corrosion and/or degradation. See applicable O & M Manual. | |
| 3. On the 17 A/B only, apply Loctite™ 222 to the alignment screw (87) and insert into the Rear Weight (89), torque to 35 inch pounds. See O & M Manual. | |
| **NOTE: Any gouges into the fiberglass deeper than 1/16" must be repaired. KMDSI Technician that has received certification for helmet shell repairs by KMDSI or Dive Lab, Inc should only accomplish fiberglass and gel coat repairs. Only an Authorized KMDSI Repair Facility should repair any cracks, depressions and/or fractures.** | |
| 4. Remove and inspect the helmet liner/cushion. Check the condition of the foam and the liner material. Check the snaps and neck strap. Repair/replace as necessary. See applicable O & M Manual. | |
| 5. Remove earphones and microphones from their holders. Remove covers from earphones and inspect. Remove microphone from oral nasal mask. Perform a communications check. See O & M Manual. | |
| **CAUTION: The nose block device MUST be removed when removing or installing the oral nasal mask. Stretching the oral nasal mask over the nose block device can cause the oral nasal mask to tear.** | |
| 6. Remove the nose clearing device. Clean and inspect the nose clearing pad, shaft. Replace O-rings. See applicable O & M Manual. | |
| 7. Remove oral nasal mask and oral nasal valve as an assembly. Clean valve and valve body as an assembly. Clean and inspect mask and valve assembly for damage. See applicable O & M Manual | |
| 8. Remove the helmet O-ring (80) at the base of the helmet (SL-17A/B). Clean and inspect the O-ring groove for damage. Lightly lubricate a new O-ring and install. See O&M Manual. | |
| 9. Remove the demand regulator from the helmet and set aside. See applicable O & M Manual. | |
| **NOTE: The demand regulator must be removed prior to removing the whisker. Annual demand regulator maintenance is discussed in the demand regulator Section of each, applicable O & M manual.** | |
| 10. Remove the whisker from the regulator body, then clean and inspect. Clean and inspect the Double Exhaust Whisker, if used. Main Exhaust and Double Exhaust Valves should be replaced at least annually or any time they show any signs of deterioration, wear, and/or damage. See applicable O & M Manual. | |
| **NOTE: If using the Double Exhaust Whisker refer to applicable section of the pertinent O & M Manual** | |

| | |
|---|---|
| 11. Perform a View Port Insert Pull Test (Authorized Repair Technician only). Replace/repair inserts as necessary. Replace View Port O-ring. See applicable O & M Manual. | |
| **NOTE: Testing of the port inserts should be done ONCE A YEAR, and/or whenever port insert damage is present or suspected. (KMDSI P/N 525-115, Thread Insert Testing Block Kit) See applicable O& M manual.** | |
| 12. On the 17 A/B, 17C, and 17K, remove the main exhaust valve cover and replace the main exhaust/Dewatering valve. Clean and inspect the Seat for damage and/or contamination. For SL-27 cut the tie wrap and remove the cover clean and inspect the Seat for damage replace dewatering valve. See applicable O & M Manual | |
| **Annual Overhaul, Maintenance, and Inspection Procedures**<br>**Checklist A2.1- Page 5 of 8** | **INITIALS** |
| **SIDE BLOCK**<br>All helmet Models | |
| **NOTE: The Side Block does not need to be physically removed from the helmet shell every year in order to overhaul the Steady Flow, Emergency and One Way Valve providing excessive internal corrosion is not present** in the side block passages or valve components. However all valves must be overhauled and soft goods changed in accordance with the Operations and Maintenance manual. The emergency valve can be overhauled in place providing excessive corrosion or contamination is not present. **However, KMDSI recommends at least every *THREE (3) years* the Side Block Assembly be physically removed from the helmet, overhauled and reinstalled, per applicable O & M Manual.** | |
| 1. Remove and replace Umbilical adapter with a new one. | |
| 2. Remove, disassemble, and overhaul the One-Way Valve. See applicable O & M manual. | |
| 3. Remove, disassemble, and overhaul the Emergency Valve and Steady Flow Valve components, replace all O-rings. See applicable O& M Manual | |
| **PROCEDURES** | |
| **DEMAND REGULATOR** | |
| **NOTE: KMDSI recommends the following parts on the demand regulator be replaced on an annual basis or every 400 hours of use. The inlet valve seat (P/N 510- 580) on the inlet valve (P/N 545-026), nut (P/N 530-303), inlet nipple O-ring (P/N 510-014), exhaust valve (P/N 510-552), adjustment shaft washer (P/N 520-032), and O-ring (P/N 510-011).** | |
| **NOTE: The demand regulators used in the various models of helmets use the same adjustment and set-up procedures**. | |
| 1. Disassemble the demand regulator per O& M Manual. Visually inspect the interior of the regulator body for corrosion and/or contamination. Clean as necessary. See applicable O& M Manual. | |
| 2. After the regulator has been disassembled, clean and inspect all parts per O& M Manual. Replace **all** O-rings and the inlet valve seat. The nylon adjustment lock-nut on the inlet valve shaft must never be reused. If the adjustment nut is reused, the regulator may not maintain proper adjustment. See applicable O& M Manual | |
| 3. Re-assemble the demand regulator. See applicable O&M Manual. | |

**Annual Overhaul, Maintenance, and Inspection Procedures**
**Checklist A2.1- Page 6 of 8**

| | |
|---|---|
| 4. Ensure adjustment shaft rotates smoothly and there is no binding. | |
| 5. Mount the regulator in the helmet. See applicable O& M Manual | |
| **NOTE: KMDSI recommends replacement of the Hose Assembly (47a) on the SL-17A every TWO years, regardless of its condition.** | |
| **NOTE: Replace the Teflon™ O-ring at the Side Block end of the bent tube and the O-ring at the demand regulator inlet side of the bent tube.** | |
| 6. On the SL-17 A/B, 17-C, 17K, and SL-27, re-install the exhaust whisker onto the exhaust flange of the regulator and attach the whisker to each side of the face port retainer. See applicable O& M Manual. | |
| 7. Reinstall Oral Nasal Mask Valve Assembly and nose block device. See applicable O& M Manual | |
| 8. Adjust the demand regulator in accordance with the O& M Manual and fine-tune as necessary. See applicable O& M Manual. | |

**IMPORTANT NOTES ON REGULATOR ADJUSTMENT**

• Whenever a new Inlet valve or soft seat is installed, allow the regulator to sit for 24 hours with the adjustment knob turned in all the way, before adjusting. This will allow the rubber in the Inlet valve stem to set against the inlet nipple. If the regulator is to be used immediately, be aware that the rubber seat will take a set, changing the adjustment and the regulator's performance. This requires a readjustment of the regulator after the first day of use.

• Normally, if the regulator leaks breathing gas, the regulator adjustment nut is too tight and must be loosened until the lever has 1/16th - 1/8th of an inch of freedom at the end.

• If the regulator continues to free flow after proper adjustment has been made, check to ensure the gas supply pressure is between 135 - 150 p.s.i.g. (9.3 – 10.3 bar). If the pressure is correct but the free flow continues, both the Inlet valve soft seat and/or the inlet nipple must be inspected for damage. Generally, if the inlet nipple has missing chrome or a bent/damaged knife-edge it will damage the soft seat and will not make a proper seal. Best practice if the inlet nipple requires replacement; replace the soft seat as well.

**Annual Overhaul, Maintenance, and Inspection Procedures**
**Checklist A2.1- Page 7 of 8**

| PROCEDURES | |
|---|---|
| **EMERGENCY GAS SUPPLY (EGS)**<br>**Perform steps 1 thru 9 if applicable.** | |
| **NOTE: The Emergency Gas System consists of a good quality first stage regulator an Over-Pressure Bleed/Relief Valve, and an emergency gas supply hose that connects to the Emergency Valve on the helmet Side Block**. | |
| 1. Check the hydrostatic date and last visual inspection record ("VIP") of the cylinder. Ensure date(s) are within the specified range. The VIP is done at least annually and the hydrostatic test is done at least every five years. | |
| 2. Check the maintenance record of the EGS components to ensure the first stage regulator's maintenance has been performed in accordance with the manufacturer's recommendations. | |
| 3. Check all hoses for signs of blisters, cover slippage, cuts, and/or abrasions. Replace any hose(s) that show signs of leakage/damage. If a Quick Connect EGS Hose is being used, inspect Quick Connect and fittings for signs of wear/damage service in accordance with the manufactures recommendations. | |
| 4. If a submersible pressure gauge is used, ensure it has been compared to a gauge of known accuracy. | |
| 5. Overhaul and test the first stage Bleed/Relief Valve. See applicable O& M Manual, or KMDSI Bleed/Relief Valve Cleaning, Inspection, and Overhaul Procedure. | |
| 6. Log the lifting pressure _____ p.s.i.g. | |
| **NOTE: An adjustable first stage regulator and a gas cylinder with a minimum of 500 p.s.i.g. (34.5 bar) available is required for this step.** | |
| **NOTE: The Bleed/Relief Valve should be adjusted to start relieving between 180 - 200 p.s.i.g. (12.4 – 13.8 bar) when tested.** | |
| 7. Check the over bottom setting of the first stage to ensure it is within the manufacturer's specified pressure range. For KMDSI helmets and masks, the minimum over bottom for the emergency supply is 135 p.s.i.g. and the maximum 165 p.s.i.g. (9.3-11.38 bar). Log the intermediate<br>pressure. | |
| 8. Perform a leak check of all EGS components and fittings using soapy water in a pressurized condition. Repair/replace items as necessary. | |
| 9. Inspect the Harness Assembly for signs of wear and/or damage. Repair/replace as necessary. | |

**Annual Overhaul, Maintenance, and Inspection Procedures**
**Checklist A2.1- Page 8 of 8**

Technician Signature:_____Date:_____
Comments:_____

KMDSI **highly** recommends that a certified KMDSI Repair Technician make all repairs and that only genuine KMDSI repair and replacement parts be used. Owners of KMDSI products that elect to do their own repairs and inspections should only do so if they possess the knowledge and experience. All inspections, maintenance, and repairs should be completed using the appropriate KMDSI Operations and Maintenance Manual(s). Persons performing repairs should retain all replacement component receipts for additional proof of maintenance history. Should any questions on procedures, components, or repairs arise, please contact Kirby Morgan Dive Systems, Inc., by telephone at (805) 928-7772 or via e-mail at info@kmdsi.com, or contact Dive Lab, Inc., by telephone at (850) 235-2715 or via e-mail at divelab@aol.com.

**NOTE:** The Maintenance Log, Appendix 3, of the Operations and Maintenance Manual may be used as a template for creating blank pages to record all the maintenance performed on any Kirby Morgan helmet or mask by the owners/users of Kirby Morgan products. This copyrighted material may not be used in any way by any others without written permission.

# MONTHLY INSPECTION AND MAINTENANCE CHECKLIST

## Appendix A2.2

This inspection is the minimum recommended maintenance and **must be** performed at least **ONCE A MONTH** with helmet(s) in continuous use (used for more than 20 diving days in a month) or at least every **TWO (2) MONTHS**, with helmet(s) used less than 10 diving days a month. This checklist is intended to aid persons performing routine maintenance and inspections of KMDSI SuperLite helmets. This checklist should be used in conjunction with the applicable Operations and Maintenance Manual for the model helmet being serviced and is primarily intended to guide and document the maintenance as it is completed. Specific detailed procedures for each section of this checklist can be found in the Operations and Maintenance Manuals. This checklist when completed should be retained in the equipment maintenance files. This checklist is intended to be used for all models of KMDSI SuperLite helmets.

**NOTE:** KMDSI strongly recommends that all repairs be performed by trained Personnel**.**

**NOTE:** Helmets being used in polluted waters, or extreme environments, will require more frequent inspection and maintenance.

**NOTE:** This checklist should be used in conjunction with the most current Operations and Maintenance Manual. For the latest Manual revisions please check the KMDSI web page at www.KirbyMorgan.com.

**NOTE:** This draft checklist does not match the current Operations and Maintenance Manual chapter, page and paragraph.

**NOTE:** During removal of components for inspection, O-rings and other consumable items may be reused, providing they are clean and a visual inspection does not reveal any damage or deterioration.

**NOTE:** Perform the Yoke/neck clamp Assembly, helmet, and Side Block/Demand regulator inspection procedures with gas supplies not connected to the Side Block. Attach the gas supply at Step 5 of the “Side Block/Demand Regulator” inspection procedure.

| |
|---|
| Date: |
| Helmet Serial #: |
| Associated Equipment Serial #: |
| Technician (print name): |

| PROCEDURES | INITIALS |
|---|---|
| **SL-17A/B YOKE / NECK CLAMP ASSEMBLY**<br>**Helmet Attachment Components** | |
| **Note:** For SL-17K, SL-17C, and SL-27, skip to step 1, page 3 of this checklist. | |
| **Note:** KMDSI recommends that neck clamps older than five years old be removed from service and replaced. However, neck clamps that show no signs of damage and or deterioration and are kept in service, should be inspected at least weekly I.A.W. steps 1-6 of this procedure. | |
| 1. Remove the Yoke/Neck Clamp Assembly from the helmet. Perform a visual inspection of all components. Ensure the neck dam has no holes, tears, and/or damage. The neoprene must be firm. The neck dam should fit snug, but should never fit a diver tight enough to cause discomfort. See Section 7.9.4.2 SL-17A/B O&M manual | |
| 2. Visually inspect all metal parts of the Clamp Assembly for damage. Check the hinge pins for loose fit, signs of cracking, distortion, and/or any damage. See Section 7.9.3.1 SL-17A/B O&M manual | |
| 3. Visually inspect the adjustment stud on the neck clamp for signs of cracking, distortion, bending, stripped and/or damaged threads by loosening Nut (4) all the way to the shoulder of the stud, and manually squeezing the neck dam clamp to expose the portion of the stud that is normally hidden by the stud block. If any damage is present the, Neck clamp requires replacement. See Section 7.9.3 SL-17A/B O&M manual. | |
| 4. Check the rear hinge tab (26) and Hinge (23) for signs of cracking, bending, distortion, and/or loose fasteners. See Section 7.9.4 SL-17A/B O&M manual. | |
| 5. Check the Latch Catch Assembly (22) for proper operation. Check for worn and/or damaged parts as well as loose and/or missing screws. Ensure the proper safety pin (18) is present. See Section 7.9.2.2 SL-17A/B O&M manual | |
| 6. Test mate the Yoke/Neck Clamp to the helmet. Check for proper clamp adjustment and **smooth operation. When properly adjusted, use a 7/16 inch open end wrench on nut (4) as a back-up wrench and a 7/16 inch deep well socket with a torque wrench. Ensure lock nut (6) is torqued to 60 inch pounds. Repair/replace and/or adjust parts as necessary. See Section 7.9.3.1 17A/B O&M Manual.** | |

| PROCEDURES | INITIALS |
|---|---|
| **HELMET MODELS SL-17K, SL-17C, SL-27<br>HELMET ATTACHMENT COMPONENTS (Neck Ring Assembly)** | |
| 1. Remove the Neck Ring Assembly from the helmet. Remove and inspect the O-ring for damage or deterioration, nicks and / or cuts. Clean and inspect the O-ring groove for damage. Lightly lubricate with recommended lubricant and reinstall. See applicable O&M manual. | |
| 2. Inspect the chin strap and chin strap attachment components for signs of wear or damage. See applicable O&M manual. | |
| 3. Inspect the neck dam material for signs of wear or damage. Ensure the neck dam has no holes, tears, and/or damage. The neoprene must be firm. The neck dam should fit snug, but should never fit a diver tight enough to cause discomfort. Check to ensure it is free of deterioration. See applicable O&M manual. | |
| 4. Visually inspect the locking collar for signs of damage. Check to ensure the neck pad can slide to allow for proper adjustment. Check for loose or missing fasteners. See applicable O&M manual. | |
| 5. Check the two sealed pull pins for smooth operation. Visually inspect for signs of oil leakage. See applicable O&M manual. | |
| **Caution:** If Sealed Pull Pins do not operate smoothly, or if oil is leaking, From the Pull Pins, the Pull Pins should be serviced by an Authorized / Certified KMDSI Repair Technician trained to overhaul Pull Pins. | |
| 6. Visually inspect the metal helmet ring at the base of the helmet for signs of damage to the sealing surface. Any damage requires an inspection by an Authorized KMDSI Technician. See Applicable O&M Manual. | |
| 7. Check the swing tongue catch for worn or damage parts and components.<br>See O&M manual. | |

| PROCEDURES | INITIALS |
|---|---|
| **HELMET SHELL, All MODELS** | |
| 1. Visually inspect helmet shell exterior for loose and/or missing fasteners and obvious signs of fiberglass damage; including cracks, gouges, and/or depressions. | |
| **NOTE:** Any gouges deeper than 1/16" must be repaired. Fiberglass and gel coat repairs must be completed by a technician that has received certification for helmet shell repairs by KMDSI or Dive Lab, Inc. An Authorized KMDSI Repair Facility must check any cracks or depressions with fractures. | |
| 2. Remove and inspect helmet liner/cushion for tears, broken snaps and/or Neck Strap damage. Check the condition of the foam. Repair/replace as necessary. See Section 7.11 | |
| 3. Remove the earphones and microphones from their holders. Remove the covers from the earphones and inspect. Remove microphone from oral nasal mask. Clean and repair/replace as necessary. Perform a communications check. See Section 7.8.1 – 7.8.4 | |
| 4. Remove the nose clearing device and oral nasal mask. Remove the oral nasal valve body as an assembly . Clean the oral nasal valve and valve body as an assembly. Clean the oral nasal mask. Inspect mask and Valve Assembly for damage and/or deterioration. Replace the oral nasal mask if any damage is found. Replace the oral nasal valve if it appears dried, stiff,<br>or does not lay flat. Clean and inspect the nose clearing pad, shaft and O-rings for wear. Replace the pad if deteriorated and/or damaged. Replace O-rings if any signs of wear or damage is present. Lightly lubricate the shaft O-rings and the shaft, then reinstall. Reinstall oral nasal mask and valve Assembly. See Section 6.9.1 and 7.3.1 | |
| 5. On The SL-17 A/B Remove helmet O-ring (80) at the base of the helmet. Wipe O-ring and O-ring groove with a clean cloth. Inspect the O-ring groove for damage. Inspect the O-ring for cracking, cuts, and/or signs of damage/deterioration and replace if necessary. Lightly lubricate the neck dam O-ring and reinstall on the helmet. See Section 5.5.2 | |
| 6. Without air to the helmet, check the operation of the Steady Flow Valve and Emergency Supply Valve. If the valves do not operate smoothly they should be disassembled, cleaned, and lubricated. See applicable O&M manual. | |
| 7. Remove the main exhaust valve cover and inspect the main exhaust/dewatering valve and seat for damage and/or contamination. Ensure the valve material is not hardened, distorted, and/or warped. Replace the valve if questionable. Reinstall the cover. See applicable O&M manual. | |

| PROCEDURES | INITIALS |
|---|---|
| **SIDE BLOCK/DEMAND REGULATOR** | |
| **NOTE:** Ensure gas supplies **ARE NOT** attached to the helmet. **DO NOT** open the Steady Flow/ Defogging Valve. | |
| 1. Check the umbilical supply One-Way Valve for proper operation by sucking on the umbilical adapter with the Emergency Valve open. No gas should be drawn through the One-Way Valve. See applicable O&M manual. | |
| 2. Remove the regulator cover clamp, cover, and diaphragm. Visually inspect the interior of the regulator body for corrosion and/or contamination. Clean as necessary. See applicable O&M manual. | |
| 3. Carefully inspect the diaphragm for cuts, tears, and/or deterioration. If any damage is found, replace the diaphragm. See applicable O&M manual. | |
| 4. Carefully check the regulator Exhaust valve (137) for warping, distortion, stiffness, and/or damage. This is checked by pressing on the flapper valve from inside the regulator. Check the regulator body valve seat spokes. The spokes should be flat and even. Straighten if deformed. If the valve shows signs of damage and/or deterioration, replace the valve. See applicable O&M Manual. | |
| 5. Attach an air supply source to the umbilical adapter and set the supply pressure to between 135 - 150 p.s.i.g. (9.3 – 10.3 bar). Adjust the regulator adjustment knob out, until a slight free flow develops, then adjust in until the free flow just stops and check the lever play. There should be between 1/16” - 1/8” of play in the lever. Adjust as necessary. See applicable O&M manual. Reinstall the diaphragm, the cover, and the clamp. | |
| 6. Depress the purge button. The button should travel 1/16” – 1/8” before gas starts to flow and a strong purge should be felt when the button is fully depressed. If the regulator purge travel is less than 1/16” or greater than 1/8”, readjust the Lever. See O&M Manual. | |
| 7. Check the Steady Flow valve for proper operation. | |
| **NOTE:** The Steady Flow Valve will rotate approximately two complete revolutions from closed to full open. With the air pressure to the helmet between 135 - 150 p.s.i.g. (9.3 - 10.3 bar), turning the Steady Flow Valve one full rotation should result in a strong flow of gas through the defogger train.<br>8. Secure the gas supply, then bleed down and remove the umbilical from the inlet adapter. | |
| 9. Attach a regulated gas supply (normally the EGS system), adjusted to between 135 – 150 p.s.i.g. (9.3 – 10.3 bar), to the Emergency Valve on the Side Block. On the Side Block, open the Emergency Supply Valve all the way, and then slowly open the regulated gas supply. Check the function of the regulator Purge, regulator adjustment knob, and the Steady Flow Valve in accordance with previous steps 6 and 7. Check for gas exiting from the One-Way Valve. There should be no gas exiting the Umbilical adapter. | |
| **NOTE:** The Emergency Gas System consists of a good quality first stage regulator equipped with, an Over-Pressure Bleed/Relief Valve, and an emergency gas supply hose that connects to the Emergency Valve on the helmet Side Block. | |

## IMPORTANT NOTES ON REGULATOR ADJUSTMENT

• If a new inlet valve or soft seat is installed, allow the regulator to sit for 24 hours with the adjustment knob turned all the way in (clockwise) before adjusting. This will allow the rubber in the Inlet valve Stem to set against the inlet nipple. If the regulator is to be used immediately, be aware that the rubber seat will take a set, changing the regulators adjustment and performance. This requires a readjustment of the regulator after the first day of use.

• Normally, if the regulator leaks breathing gas, the regulator adjustment nut is too tight and must be loosened until the lever has 1/16th - 1/8th of an inch of freedom at the end.

• If the regulator continues to leak after proper adjustment has been made, ensure a correct supply pressure of 135 - 150 p.s.i.g. (9.3 – 10.3 bar). Both the Inlet valve soft seat and/or the inlet nipple must be inspected for damage. Generally, if the inlet nipple has missing chrome or a bent/damaged knife-edge it will damage the soft seat and will not make a proper seal. Best practice is to replace the inlet nipple and the soft seat.

| PROCEDURES | |
|---|---|
| **EMERGENCY GAS SUPPLY (EGS)** | |
| 1. Check the hydrostatic date and the last visual inspection record ("VIP") of the cylinder. Ensure the date(s) are within the specified range. The VIP is done at least annually and the hydrostatic test is done at least every five (5**)** years. | |
| 2. Check the maintenance record of the EGS components to ensure the first stage regulator maintenance has been performed in accordance with the manufacturer's recommendations. | |
| 3. Check all of the Hoses for signs of blisters, cover slippage, cuts, and/or abrasions. Replace any Hose(s) that shows signs of leakage/damage. If a quick connect EGS hose is being used, inspect the quick connect and fittings for signs of wear/damage. | |
| 4. If a submersible pressure gauge is used, ensure has been compared to a gauge of known accuracy. | |
| 5. Test the first stage regulator's Bleed/Relief Valve. See Section 6.12 or as per "Enclosure 1: Bleed/Relief Valve Cleaning, Inspection, and Overhaul Procedures". | |
| 6. Perform a leak check of all EGS components and fittings using soapy water in a pressurized condition. Repair/replace items as necessary. | |
| 7. Inspect the harness assembly for signs of wear or damage. Repair/replace as necessary. | |

Technician Signature: Date

Comments:

KMDSI **highly** recommends that a certified KMDSI Repair Technician make all repairs and that only genuine KMDSI repair and replacement parts be used. Owners of KMDSI products that elect to do their own repairs and inspections should only do so if they possess the knowledge and experience. All inspections, maintenance, and repairs should be completed using the appropriate KMDSI Operations and Maintenance Manual(s). Persons performing repairs should retain all replacement component receipts for additional proof of maintenance history. Should any questions on procedures, components, or repairs arise, please contact Kirby Morgan Dive Systems, Inc., by telephone at (805) 928-7772 or via e-mail at info@kmdsi.com, or contact Dive Lab, Inc., by telephone at (850) 235-2715 or via e-mail at divelab@aol.com.

**NOTE:** The Maintenance Log, Appendix 3, of the Operations and Maintenance Manual may be used as a template for creating blank pages to record all the maintenance performed.

# HELMET AND EMERGENCY GAS SYSTEM DAILY SET-UP AND FUNCTIONAL CHECKLIST APPENDIX A2.3

**THIS DAILY SET-UP AND FUNCTIONAL CHECKLIST MUST BE COMPLETED PRIOR TO COMMENCEMENT OF DAILY DIVING OPERATIONS.**

**NOTE:** This draft checklist does not match the current Operations and Maintenance Manual chapter, page, and paragraph.

**NOTE:** During removal of components for inspection, O-rings and other consumable items may be reused, providing they are clean and a visual inspection does not reveal any damage or deterioration.

**⚠ WARNING: These are recommended minimum checks when using Kirby Morgan helmets or masks. Additional checks may be required as dictated by the conditions and tasks being performed. Failure to perform in-water checks may result in serious injury or death.**

**⚠ CAUTION: All diving conducted using Kirby Morgan helmets or Band Masks must include the use of a fully functional, properly maintained Emergency Gas System ("EGS"). The EGS should be maintained in accordance with the applicable Operations and Maintenance Manual(s).**

**NOTE:** Steps 3(a) - 3(d) use the EGS for setting up and checking the helmet systems. For a proper check of the demand regulator adjustment, the first stage regulator must have an intermediate supply pressure output between 135 – 150 p.s.i.g. (9.3 – 10.3 bar). The first stage Bleed/Relief Valve should be set between 180 - 200 p.s.i.g. (12.4 – 13.8 bar). Do not attach the Umbilical until Step 6.

| |
|---|
| Date: |
| Helmet Serial #: |
| Associated Equipment Serial #(s): |
| Technician (print name): |

| STEP | PROCEDURES | INITIALS |
|---|---|---|
| **SL-17 A/B YOKE / NECK CLAMP ASSEMBLY STEP 1.1**<br>Helmet Attachment Components | | |
| **Note: For SL-17K, SL-17C, and SL-27, skip to step 1.2** | | |
| **⚠ WARNING: Any time helmets and Neck Clamps /Yoke Assemblies are mixed, the neck clamp must be checked for proper function, fit and adjustment prior to diving.** | | |
| **1.1 Yoke/Neck Clamp Assembly SL-17 A/B**<br><br>**Note:** Applicable to SL-17 A/B ONLY. For all other helmet models skip to step 1.2 | **Diver/Tender- Check the following (a - c):**<br>a. Visually inspect the Yoke/Neck Clamp Assembly for signs of damage. Check the neck dam for tears, holes, and/or cuts. Ensure the neck dam is of the proper size and fit.<br>b. Test- mate the Yoke Assembly to the helmet and check for proper neck clamp adjustment. If adjustment is necessary, use a 7/16" open-end wrench on Nut (4) as a back-up wrench and a 7/16" deep well socket with a torque wrench and ensure Lock Nut (6) is torqued to 60 inch pounds. Repair/replace and/or adjust parts as necessary. See Section 7.9.3.1<br>c. Ensure the Latch Catch Assembly works properly, is not bent or deformed. Also check that the safety pin is present and attached with lanyard. See Section 7.9.2 | |
| **1.2 Neck Dam Ring Assembly SL-17K, SL-17C, SL-27** | **Diver/Tender – Check the following (a-d):** | |
| | a. Visually inspect the Neck Dam Ring Assembly for signs of damage. Check the neck dam for tears, holes, and/or cuts. Ensure the neck dam is of the proper size and fit. | |
| | b. Lightly lubricate the neck ring O-ring if the O-ring appears dry. | |
| | c. Test-mate the Neck Dam Ring Assembly to the helmet and check for proper adjustment. | |
| | d. Ensure the sealed pull pins work properly. | |

| STEP | PROCEDURES | INITIALS |
|---|---|---|
| **2. Visually Inspect the Helmet** | **Diver/Tender- Check the following (a - d):** | |
| | a. Visually inspect helmet shell interior and exte rior for damage and/or contamination. Check that the oral nasal valve is correctly installed and the oral nasal mask is installed on the regulator mount nut. Ensure the nose clearing device operates smoothly. Lubricate as necessary. See O&M Manual. | |
| | b. Ensure the earphones and microphones are installed correctly. See applicable O&M Manual. | |
| | c. Inspect the head cushion for proper fit, broken snaps, tears, and/or rips. See applicable O&M Manual. | |
| | d. Check the O-ring at the base of the helmet for signs of damage. Ensure the O-ring is lightly lubricated. (SL- 17 A/B only) | |
| **3. EGS Inspection**<br><br>**NOTE:**<br>The EGS being used must be properly maintained and fully functional. | **Diver/Tender- Check the following (a - d):** | |
| | a. Visually inspect all EGS Hoses for signs of damage. | |
| | b. Check to ensure the cylinder is within the VIP and the hydrostatic date. | |
| | c. Ensure the first stage regulator pressure and the Over-Pressure Bleed/Relief Valve settings have been checked within the past month. | |
| | d. Inspect the safety harness and cylinder retainer for wear and/or damage. Repair/replace as necessary. See Section 2.6. | |
| **4. Check the helmet EGS** | **Diver/Tender- Check the following (a - f):** | |
| | a. Orally check the One-Way Valve. See Section 2.5.4 | |
| | b. Connect the first stage regulator to the EGS Cylinder and the helmet Emergency Supply Valve. With the cylinder turned OFF, open and close the Side Block Emergency Valve to check for smooth operation. Then open and close the Steady Flow/Defogger Valve to verify smooth operation. | |
| | c. Rotate the regulator adjustment knob in fully (clockwise), then rotate out (counterclockwise) 3 – 4 rotations to check for smooth operation. | |
| | d. Open the EGS supply valve on the cylinder. Log the pressure _____ p.s.i.g.. Next open the Emergency Supply Valve on the Side Block. | |
| | e. Momentarily open the helmet Steady Flow 3/4 to 1 full turn. Check for a strong flow of gas out of the defogging train, and then close. | |
| | f. Check for gas escaping from the One-Way Valve, If any gas flow is detected the One-Way valve should be overhauled or replaced. | |

| STEP | PROCEDURES | INITIALS |
|---|---|---|
| **5. Check the Demand Regulator adjustment**<br><br>**NOTE:** If the purge button travels further than 1/8" before gas starts flowing, or has a weak flow of gas when fully depressed, the adjustment of the regulator is necessary. See Section 6.8.10 | **Diver/Tender- Check the following (a - d):** | |
| | a. Rotate the demand regulator adjustment knob out (counterclockwise) until a slight free flow develops. Next rotate in (clockwise) until the free flow stops | |
| | b. Slowly depress the purge button to check for excessive travel. The purge button should travel no less than 1/16" and no more than 1/8" (1.5 – 3.0 mm) before gas flow is heard. | |
| | c. Depress the purge button all the way and verify a strong surge of gas. | |
| | d. Ensure the Side Block Emergency Valve is shut and the Bail Out Cylinder Valve is open. Log the cylinder pressure _____ p.s.i.g. | |
| **6. Attach the Umbilical** | **Tender:**<br>Blow down the Umbilical and attach it to the Umbilical Adapter on the One-Way Valve. | |
| **7. Check the Communications** | **Diver:**<br>Perform communications check. | |
| **8. Check the Hot Water Supply (if applicable)** | **Tender:**<br>Check hot water supply connections if applicable. | |
| **9. Check the Dry Suit Inflation Hose (if applicable)** | **Tender:**<br>Check the dry suit Inflation Hose Connection. Ensure the dry suit Inflation Valve and Exhaust Valve function properly. | |
| **10. Tender-Check the Entire Rig** | **Tender:**<br>Soap and leak check the helmet/mask gas fittings and connections including the EGS. | |
| **11. Neck Clamp pin 17A/B only** | **Tender-**Check to ensure the following | |
| | a. Neck Clamp properly adjusted and Safety Locking Pin present. | |
| | b. Diver's Safety Harness is in good condition | |
| | c. Umbilical Strain Release. | |
| | d. EGS Hose Quick Disconnect in good working order | |
| | e. Boots, gloves, knife, and other accessories. | |
| **12. Tender** | Note comments or discrepancies below in the comments section. Log maintenance in the applicable maintenance log. | |

Technician Signature: Date _____

Comments:_____

_____

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**NOTE:** The Maintenance Log, Appendix 3, of the Operations and Maintenance Manual may be used as a template for creating blank pages to record all the maintenance performed.

# SUPERVISOR'S EQUIPMENT CHECKS PRIOR TO ENTRY INTO WATER APPENDIX A2.4

(Note: These checks should be made by the diving supervisor or his qualified appointee. The appointee may be any members of the dive crew who the supervisor has determined is qualified to carry out this check list.)

**NOTE:** This checklist is intended to be used with all KMDSI SuperLite helmet models.

**NOTE:** This draft checklist may not match all of the current Operations and Maintenance Manuals chapter, pages and paragraphs on all helmet models.

**NOTE:** Helmet(s) being used in polluted waters, or extreme environments, will require more frequent inspection.

**⚠ CAUTION: KMDSI strongly recommends the use of a tender to assist the diver when "dressing-in". The tender should ensure the helmet liner is fastened to the helmet shell and the chin strap is properly fastened under the diver's chin, once the helmet is donned. Prior to closing the Yoke/Neck Clamp Assembly, ensure that the Clamp is installed.**

**⚠ WARNING: These are recommended minimum checks when using Kirby Morgan Helmets or Masks. Additional checks may be required as dictated by the conditions and tasks being performed. Failure to perform in-water checks may result in serious injury or death.**

**⚠ CAUTION: All surface supplied diving with Kirby Morgan helmets must include a fully functional, properly maintained Emergency Gas System ("EGS"). The EGS should be maintained in accordance with the applicable Operations and Maintenance Manual(s).**

| |
|---|
| Date: |
| Helmet Serial #: |
| Associated Equipment Serial #(s): |
| Technician (print name): |

KMDSI **highly** recommends that a certified KMDSI Repair Technician make all repairs and that only genuine KMDSI repair and

| STEP | PROCEDURES | INITIALS |
|---|---|---|
| **1. Supply Gas** | **Supervisor:**<br>a. Ensure gas to the diver. | |
| **2. Check Breathing System** | **Diver- Check the following (a - e):** | |
| | a. Open and close the Steady-Flow Valve to ensure proper operation. | |
| | b. Check breathing resistance. Set demand regulator adjustment knob for minimum inhalation effort. | |
| | c. Press purge button to check gas purge function. | |
| | d. Ensure nose block device slides freely. | |
| | e. Ensure Emergency Valve opens and closes properly. Then, ensure Emergency Valve is closed and the Bail Out Cylinder valve is open. | |
| **3. Check Communications** | **Diver:**<br>Perform communications check. | |
| **4. Check Hot Water Supply (if applicable)** | **Tender:**<br>Check hot water supply connections. Ensure topside hot water supply has been switched to diver and verify flow to hot water shroud and suit (if used). | |
| **5. Check Dry Suit Inflation Hose (if applicable)** | **Tender:**<br>Check dry suit Inflation Hose Connection. Ensure dry suit Inflation valve and Exhaust valve function properly. | |
| **6. Check Entire Rig** | **Tender:**<br>Soap and leak check helmet/mask gas fittings and connections, including Emergency Gas System. | |
| **SL-17A/B Step 7 & 8 Only, SL17 C, K, SL-27 steps 8 & 9** | | |
| **7. Check Diver's Entire Rig**<br>**NOTE:** On the SL-17A/B, this procedure will ensure theNeck Clamp w/ Yoke Assembly is properly adjusted prior to descent.<br>**NOTE:** All equipment must be adjusted properly and functioning correctly. The helmet/mask must be breathing easily and properly. | **Supervisor/Tender- Check adjustment/fit of the entire rig, including the following (a – f):** | |
| | a. On SuperLite 17 A/B, ensure the rear hinge tab (26) is fully engaged on the alignment sleeve (88). Using thumb on the bottom of regulator body, (112) and middle finger on neck clamp (3), attempt to "pop" Neck Clamp w/Yoke Assembly (14) from bottom rim of helmet (92). | |
| | b. Diver's safety harness. | |
| | c. Umbilical strain release. | |
| | d. EGS Hose Quick Disconnect. | |
| | e. Boots, gloves, knife, and other accessories. | |
| | f. Helmet supply pressure, minimum 115 p.s.i.g. | |
| | | |

| | | |
|---|---|---|
| **8. Check Breathing** | **Diver:**<br>Check to ensure helmet is breathing easily. Diver report: Breathing OK. | |
| **9. Check Diver's Entire Rig**<br><br>**Danger**: **Both Pull Pins must engage correctly Or the neck dam Ring Assembly could flood. Drowning may result.** | **Supervisor/Tender- Check adjustment/fit of the entire rig, including the following (a – f):** | |
| | a. Ensure the sealed Pull Pins are fully engaged on the base of the helmet Ring into the Locking Collar/Neck Pad Assembly. | |
| | b. Diver's Safety Harness. | |
| | c. Umbilical strain release. | |
| | d. EGS Hose Quick Disconnect | |
| | e. Boots, gloves, knife, and other accessories | |
| | f. Helmet supply pressure, minimum 115 p.s.i.g. (7.93 bar). | |
| **10. Check Breathing** | **Diver:**<br>Check to ensure helmet is breathing properly.<br><br>**NOTE: All equipment must be adjusted properly and functioning correctly. The helmet/mask must be breathing easily and properly.** | |

Technician Signature: _____ Date: _____

Comments: _____

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replacement parts be used. Owners of KMDSI products that elect to do their own repairs and inspections should only do so if they possess the knowledge and experience. All inspections, maintenance, and repairs should be completed using the appropriate KMDSI Operations and Maintenance Manual(s). Persons performing repairs should retain all replacement component receipts for additional proof of maintenance history. Should any questions on procedures, components, or repairs arise, please contact Kirby Morgan Dive Systems, Inc., by telephone at (805) 928-7772 or via e-mail at info@kmdsi.com, or contact Dive Lab, Inc., by telephone at (850) 235-2715 or via e-mail at divelab@aol.com.

**NOTE:** The Maintenance Log, Appendix 3, of the Operations and Maintenance Manual may be used as a template to create blank pages to record all the maintenance performed.

# SUPERVISORS IN-WATER CHECKS
# APPENDIX A2.5

**NOTE:** This Checklist does not match the current Operations and Maintenance Manual chapter, page, and paragraph.

**⚠ WARNING: These are recommended minimum checks when using Kirby Morgan helmets or masks. Additional checks may be required as dictated by the conditions and tasks being performed. Failure to perform in-water checks may result in serious injury or death. See Chapter 2 of the KMDSI SuperLite 17A/B Operations and Maintenance Manual for air supply requirements.**

**⚠ CAUTION: Diving with Kirby Morgan helmets must include a fully functional, properly maintained Emergency Gas System ("EGS"). The EGS should be maintained in accordance with the applicable Operations and Maintenance Manual(s).**

**⚠ WARNING: If diving is conducted with less than the minimum recommended supply pressure, the diver must tailor the work to prevent over breathing the system, resulting in exhaustion.**

| |
|---|
| Date: |
| Helmet Serial #: |
| Associated Equipment Serial #(s): |
| Technician (print name): |

| STEP | PROCEDURES | INITIALS |
|---|---|---|
| **1. Check Breathing** | **Diver:**<br>Ensure helmet is breathing properly. Set the demand regulator adjustment knob for minimum inhalation ef fort. Report: Breathing OK | |
| **2. Check helmet/ Equipment for Leaks** | **Diver:**<br>Ensure helmet/mask is watertight.<br>**NOTE: If the diver is wearing a dry suit, diver reports that a proper seal has been made after check ing for water leakage.** | |
| **3. Maintain Gas Supply Over-Bottom Pressure**<br>**NOTE:** If the above over-bottom pressure cannot be supplied, the diver will have to tailor his workload to avoid exhaustion.<br>**NOTE: The** Demand Regulator and Side Block Assembly have a maximum design pressure of 225 p.s.i.g.(15.5 bar) over-bottom. | **Console Operator:**<br>Maintain minimum over-bottom gas supply pressure for depth (FSW x 0.445) + required over bottom for depth.<br>Required over-bottom for depth:<br>0 - 60 fsw (0 - 18.3 msw), 90 p.s.i.g. (6.2 bar)<br>61 - l00 fsw (18.6 - 30.5 msw), 115 p.s.i.g. (7.9 bar)<br>101 - 132 fsw (30.8 - 40.2 msw), 135 p.s.i.g. (9.3 bar)<br>133 -165 fsw (40.6 - 50.3 msw), 165 p.s.i.g. (11.4 bar)<br>166 -220 fsw (50.6 - 67.1 msw), 225 p.s.i.g. (15.5 bar)<br>**NOTE: The above pressures and depths are not currently presented in all the Kirby Morgan Operations and Maintenance Manual(s) exactly as above. The above pressure recommendations pertain to all KMDSI SuperLite helmets and KMB Band Masks.** | |

Technician Signature:_____Date:_____

Comments:_____

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KMDSI **highly** recommends that a certified KMDSI Repair Technician make all repairs and that only genuine KMDSI repair and replacement parts be used. Owners of KMDSI products that elect to do their own repairs and inspections should only do so if they possess the knowledge and experience. All inspections, maintenance, and repairs should be completed using the appropriate KMDSI Operations and Maintenance Manual(s). Persons performing repairs should retain all replacement component receipts for additional proof of maintenance history. Should any questions on procedures, components, or repairs arise, please contact Kirby Morgan Dive Systems, Inc., by telephone at (805) 928-7772 or via e-mail at info@kmdsi.com, or contact Dive Lab, Inc., by telephone at (850) 235-2715 or via e-mail at divelab@aol.com.

**NOTE:** The Maintenance Log, Appendix 3, of the Operations and Maintenance Manual may be used as a template to create blank pages to record all the maintenance performed.

# KIRBY MORGAN SUPERLITE DEEP SEA DIVING HELMET MODELS 17 A/B, 17-C, 17-K, AND 27 DAILY POST DIVE CLEANING, MAINTENANCE, AND INSPECTION CHECK-LIST APPENDIX A2.6

**NOTE:** This checklist may not match all the current Operations and Maintenance Manual's chapter, page, and paragraph for all SuperLite helmet models.

**NOTE:** Helmet(s) being used in polluted waters, or extreme environments, will require more frequent cleaning, inspection and maintenance.

**NOTE:** During removal of components for inspection, O-rings and other consumable items may be reused, providing they are clean and a visual inspection does not reveal any damage or deterioration.

**NOTE:** This cleaning and maintenance schedule is recommended for all SuperLite Helmets, and should be performed at least on a **DAILY** basis.

**NOTE:** Detailed instructions are located in the applicable O & M Manual.

| |
|---|
| Date: |
| Helmet Serial #: |
| Associated Equipment Serial #(s): |
| Technician (print name): |



KMDSI **highly** recommends that a certified KMDSI Repair Technician make all repairs and that only genuine KMDSI repair and

| PROCEDURES | INITIALS |
|---|---|
| 1. Secure and bleed down gas supplies. | |
| 2. Disconnect and cap (or bag and tape) the helmet gas connections and disconnect the communication wires. Cap (or bag and tape) the umbilical end. | |
| 3. Wash the exterior surface of the helmet with a solution of mild detergent and fresh water, then rinse. Inspect for signs of damage. | |
| 4. Remove the head cushion. Inspect for damage. If the head cushion has gotten wet with perspiration or water, clean and hang-up for drying or airing. | |
| 5. Remove the demand regulator clamp, cover, and diaphragm assembly. Wash the interior of the demand regulator with mild detergent and fresh water, then rinse thoroughly. | |
| 6. Dislodge the earphones. If the interior of the helmet and liner has gotten wet, remove the earphone protective covers, wash with mild detergent solution, rinse with fresh water and allow to dry. | |
| 7. Remove the microphone from the oral nasal mask. Wash with a mild detergent solution and rinse with fresh water. | |
| 8. Wipe interior of the helmet, including the oral nasal mask. Wash with a mild detergent solution and rinse with fresh water. For sanitizing procedures, refer to "Enclosure 3: Quick Sanitizing Procedure." | |
| 9. Rotate the regulator adjustment knob fully out (counter clockwise). Close the Emergency Supply and Steady Flow Valves. | |
| 10. Clean the neck dam and neck clamp and Latch Catch (SL-17A/B Assembly with a mild detergent solution. Operate the neck clamp and latch catch (SL-17A/B), rinse with fresh water. Clean the neck ring, and Pull Pin Assemblies ( SL-17K,C sl-27) with mild detergent solution, thoroughly rinse with fresh water. | |
| 11. Wipe all surfaces with a clean, dry towel to remove water droplets. Allow to air dry. | |
| 12. Cap (or bag and tape) the emergency gas whip on the first stage regulator. Wash the exterior of all EGS components, the first stage regulator, the gas cylinder, the Submersible pressure gauge, and the harness assembly with a mild detergent solution and rinse with fresh water. | |
| 13. Note any damage or discrepancies fund during cleaning. | |

Technician Signature: _____ Date: _____

Comments: _____

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replacement parts be used. Owners of KMDSI products that elect to do their own repairs and inspections should only do so if they possess the knowledge and experience. All inspections, maintenance, and repairs should be completed using the appropriate KMDSI Operations and Maintenance Manual(s). Persons performing repairs should retain all replacement component receipts for additional proof of maintenance history. Should any questions on procedures, components, or repairs arise, please contact Kirby Morgan Dive Systems, Inc., by telephone at (805) 965- 8538 or via e-mail at info@kmdsi.com, or contact Dive Lab, Inc., by telephone at (850) 235-2715 or via e-mail at divelab@aol.com.

**NOTE:** The Maintenance Log, Appendix 3, of the Operations and Maintenance Manual may be used as a template to create blank pages to record all the maintenance performed.