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Complete Support & Testing of Underwater Diving Equipment

NEWS LETTER

Mike Ward, June 15, 2009

Hello to All:

Latest KMDSI Bulletins:

Bulletin #2 of 2009. April 14, 2009

New Product Bulletin

Regulator Mount Nut Socket Wrench P/N 525-625

Products Affected: 525-620, Tool Kit w/Pouch



This side is used with the SuperLite 27, 17K Kirby Morgan® 37/57 and current BandMasks® which use the SuperFlow® 350 regulator, 505-069 and 505-560.



This side is used only for the 17B, Pre '99 KMB® 18's, Pre September 2004, KMB® 28's, 505-027 and 'A' regulator 505-026.

Kirby Morgan® is now shipping all SL 27™, KM 37™/57™ and BandMask® toolkits with the new stainless steel Regulator Mount Nut Socket Wrench. This tool is not included in the KM 47, 77 or EXO® mask tool kit.

The socket wrench is also sold separately: P/N 525-625 MSRP \$20.00.

The Regulator Mount Nut Socket Wrench enables easier access to the regulator for installation and proper torque adjustments.

Bulletin #3 of 2009. June 9, 2009
Change To Product
P/N 220-050 Inlet Valve

Products Affected: 220-050, 205-015, 505-561, 525-217 and 525-718

The original Inlet Valve, P/N 220-050, and the Inlet Valve Assembly, P/N 205-015, have been modified to include a co-molded stainless steel balance chamber. The new part numbers with the modification are, 220-050SS, for the valve, and 205-015SS for the valve assembly (includes the silicone seat).

This modification is very obvious, as the stainless steel balance chamber is easily visible at the end of the part, (assembly). The change creates a slightly longer balance chamber that will allow finer adjustment when using supply pressures at the low end of the supply tables. The new Inlet Valve Assembly part number, 205-015 SS, and the individual Inlet Valve part number, 220-050 SS, will be used strictly on SuperFlow® 450 regulator assemblies and associated kits, P/N 505- 561, P/N 525-718 and P/N 525-217

The original Inlet Valve, P/N 220-050, and the Inlet Valve Assembly, P/N 205-015 are available and the ONLY approved parts, at this time, to be used on the NATO switchover regulator and pod assembly, P/N 805-001 and P/N 805-050. The modified parts will fit with this regulator, and will be used at a future date when official military approval has been issued.



New inlet valve P/N 220-050SS (left) and original inlet valve P/N 220-050 (right)

For further information, contact your authorized Kirby Morgan® dealer or sales@kmdsi.com

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Technician Guide Revised:

Dive Lab finally finished revising the KMDSI Helmet and Band Mask Checklists and the Technician Training Guide. The new checklists include the KM-77, KM-57, KM-47 Helmets and the 450 Regulator. It is available on the Dive Lab website www.divelab.com The newly revised Technician Guide is dated April 14, 2009, and is under the training section of the Dive Lab web site.

Checklist for the KMACS-5:

Maintenance checklists for the KMDSI KMACS-5 are almost complete.

Operator / User Guide:

We are working on updating the Operator / User Training Guide and hope to have it done soon.

Emergency Breathing – Surface Supplied:

Dive Lab recently wrote an article on Emergency Breathing. The article deals with emergency breathing, and the falsehoods and breathing off the Pneumofathometer hose if the main gas supply is lost. We encourage the technicians out there to spread this article around to the divers, tenders and supervisors. The article is attached at the end of this document.

Emergency Procedures:

The KMDSI Helmet and Band Mask emergency procedures will be moving the diver first response emergency procedures into the operations section of all manuals. The procedures have been adjusted slightly to make the procedures the same for all the KMDSI Helmets and Band Masks.

New Stuff:

KM-37SS-----Dive Lab recently completed formalized CE certification testing of the new KM-37 stainless steel helmet coming soon to a dealer near you. In addition, the new quad valve “Whisker Wings” were certified and will soon be available for all the KMDSI Helmets and Band Masks. The new whisker wings are similar to the quad wings but have been designed to move the bubbles out and away from the helmet resulting in a significant reduction in exhaust noise and little or no bubble interference when working overhead.

Noise exposure is addressed in the new European CE surface supply diving standard EN 15333 and noise is a big target at the moment. Dive Lab has been tasked by KMDSI to test, measure and quantify the breathing noise levels of all the KMDSI Helmets and Band Masks and to determine the safe exposure times based on the European noise exposure requirements. Testing will look at work rates of 10 RMV to 75 RMV at the surface and at 165’ fsw (50 msw).



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Surface Supplied Emergency Breathing

Mike Ward 5-6-09

Emergency breathing is probably best defined as being able to breathe when your normal supply or breathing system has been interrupted or lost. The loss of your primary breathing supply can be sudden and dramatic, or it can sneak up slowly. Regardless, if you survive a loss of gas incident it can be a life altering experience that will change the way you dive from that point on.

Once the diver is in the emergency breathing mode all focus must shift to getting back on a normal supply or getting to a point of safety. In either case, the dive should be terminated unless the loss was momentary, is clearly identified, remedied, and it is certain that there is no damage to equipment that could threaten the safety of the diver and the diver still has enough EGS gas.

A loss of normal umbilical supply can be caused from a pinched or severed umbilical, umbilical obstruction, topside valve alignment error, topside component failure, or helmet component failure. Probably the two most common causes are a pinched umbilical or improper topside valve alignment. A sudden loss will usually come from one of two causes, a severed umbilical, or a pinched umbilical at / or close to the diver. All other losses will usually result in more gradual loss of umbilical pressure that will probably be noticed by the diver in the form of increased inhalation effort that gets progressively harder with each breath. The longer the umbilical, the greater the warning because the pressure drop will be slower. If the umbilical is pinched off within 10-20 feet of the diver, or the umbilical gets severed, there will probably be little or no warning until he tries to inhale at which point the diver will experience the loss during inhalation at which point there is no gas to inhale and none to vibrate the vocal cords, resulting in the inability to talk, scream, or yell to topside. This is where panic can get a foot hold fast because the diver only has 20-30 seconds at best before unconsciousness sets in and here is where a fully functional emergency gas system becomes the most important thing in the diver's life.

Regardless of the type or brand helmet or full face mask used, it should always be used with a fully functional EGS system that can be activated quickly and easily. There is no excuse or reason for not having a EGS system. Companies and/or organizations that condone the practice of not using a fully functional EGS system for all dives do so against the recommendation of KMDSI and Dive Lab and may face serious LIABILITY issues in the event of an accident or death. A diver with empty lungs will pass out much sooner than a person with full lungs. History has shown that in almost all cases, divers that think they are tough enough to make it to the surface without a fully functional EGS during an out of gas experience are usually “Dead Wrong”.

Kirby Morgan pioneered the side block / demand regulator system over 40 years ago and that basic design remains the most copied, and the standard by which all others are judged. All KMDSI helmets have a side block that allows two separate sources of breathing gas to be attached. Both supply sources feed a common manifold system that allows gas to be sent to the demand regulator via the bent tube and at the same time directly into the helmet via the steady flow defogger valve. Some divers keep the EGS cylinder valve shut, thinking that they won't have to worry about EGS gas leakage if the EGS valve gets bumped and open slightly. Keeping the EGS cylinder valve shut is not recommended because the first stage regulator will suffer a squeeze and will flood with water. Flooding of the regulator will ruin it, but worse than that, the flooded regulator may very well extrude the yoke sealing o-ring when pressurized in an actual emergency resulting in a total loss of the EGS. In addition, diving with the EGS cylinder valve shut will require the diver turn on both the cylinder valve, and the side block EGS valve in order to get gas. For these reasons, it is strongly recommended that the diver leave the side block EGS valve shut and the cylinder valve open. It is also extremely important that the EGS first stage be equipped with a pressure relief valve connected to a low pressure port so if the first stage seat develops a slight creep you don't blow the hose. With this line up, the EGS regulator and whip stay pressurized to the EGS valve on the side block allowing gas immediately if needed. This line up practice is standard for all US military surface-supplied diving, and is recognized internationally as the safest way to configure an open circuit EGS system.

Pneumofathometer

The pneumofathometer (pneumo) hose and supply system is primarily used for tracking the diver's depth on the bottom and during ascent for decompression control. Besides accurately tracking, the pneumo can be used for filling lift bags, clearing silt, and as a last resort in some cases for emergency breathing. The practice of using the pneumo hose for emergency breathing has been around since the pneumo was first employed in the 1940's. Emergency breathing with the pneumo works pretty well with free flow helmets like the old Mk-V and the like as long as they are used with a dry suit open to the helmet. The way the pneumo is used for emergency breathing with the free flow helmet and suit was pretty straight forward, the diver would simply insert the hose up under the wrist cuff or cut a hole with his knife in the sleeve to insert the pneumo and then notify topside with voice communications or line pull signals to open up the pneumo valve and allow air into the divers dress. Sounds pretty simple right? Well it was in the days of free flow helmet diving, but not so fast, today most surface supplied diving practices employ demand

mode helmets. Demand mode helmets operate on a different principal than free flow helmets. Think carefully, and try to come up with a couple scenarios where you might have to use the pneumo to feed the diver with air with a demand mode helmet like the SL-17 or KM-37 or any other demand mode helmet. You will find it does not make a whole lot of sense. I am not saying it cannot be done, but it's not something that can be relied on as a viable option and certainly not as a replacement for a proper emergency gas system (EGS). Yes it does work on the stage or ladder under controlled conditions at dive school during drill time when everyone knows what's coming, but other than that breathing on the pneumo hose is pretty much "Hollywood" and here is why.

Using the pneumo all started with "Deep Sea Free Flow Heavy Gear" (Copper Hard Hat). Here's a little background. In the old days compressors were powered by human pumping. There were small single man units, and larger two manned units. As time went on volume tanks were added to help smooth out gas delivery and allow the pumpers to take a break long enough to light up their pipes or cigars. The volume tank also worked as a condenser allowing the water to be drained off, keeping the air to the divers much drier. By the 1940's the man power was replaced by machinery power and compressors could put out more volume at higher pressures.

Now think about the pneumo thing for a minute, make a list of how and why you might ever have to use the pneumo hose for supplying the diver with breathing air. First of all, most diver air supply systems also have that same air supply feeding the pneumo so if you lost air to the umbilical you also lost it to the pneumo. If the diver lost air because the umbilical got severed, "guess what", the pneumo probably got severed "too!" Now, let's say only the diver's umbilical gas was lost and we still air to the pneumo, with heavy gear the pneumo could and would work because with heavy gear you had to use a dry suit that was open to the helmet. The suit had quite a bit of compliant volume (expandable volume). The compliant volume helped insulate the diver, allowed for variable buoyancy, but most importantly the suit provided compliant volume for breathing. In essence the suit became a big breathing bag. With heavy gear, the air control valve worked like a sink faucet valve, simply allowing the diver to open and close the valve as necessary to allow air into the helmet and into the suit which supplied the volume for breathing. The exhaust valve was also adjustable. If air was lost the diver closed off the exhaust valve and breathed off the suit, the suit held enough air volume to allow the diver to re-breathe the suit air for at least 3-5 minutes before the oxygen percent dropped too low, and hypoxia set in. Now, because the diver could breathe in the suit, he could also talk to topside as long as the communications still worked or as long as he had a line for line pull signals. The standby diver could usually get to the stranded diver within 3-5 minutes and get his pneumo into the cuff of a stranded diver to supply him with air while he attached a spare gas hose. The pneumo in this case could supply enough air to keep CO₂ levels from rising too fast providing the diver remains calm and did not try to exert too much energy. Keep in mind with free flow helmets even at very light work it will require at the very least 1 actual cubic foot minute (ACFM) of air at depth to flush enough CO₂ from the diving rig to keep the Co₂ from rising too fast and becoming toxic after as little as 10 minutes or so. Even though there is enough oxygen in the breathing gas, the CO₂ level quickly rises and once the level gets to around 4-6 percent the diver will have serious

problems and nap time is right around the corner. Still, the pneumo could in this case provide enough ventilation for emergency breathing. Free Flow Heavy Gear is the best case for using the pneumo for emergency breathing. “But guess what”!!!. In the modern world of commercial diving, very few of the old deep sea dresses are still in use. Demand mode helmets like the Superlight make up at least 90 percent of what is used in modern commercial diving. Unlike free flow systems, all true demand mode helmets have little or no usable compliant volume in the neck dam area, which is not enough for even one moderate breath. Having a large compliant volume within a demand mode helmet will not allow the demand valve to work. The helmet must remain separated from the suit. No compliant volume translates into nothing to draw from, and “NO AIR”.. If you try to use the pneumo in a real world emergency with a demand mode helmets you will “Probably Die”, and here is why.

Scenario: Super Diver is using his SL-17B with a wet suit and decided he did not need a EGS system because he was only diving in 40 feet of water. Topside lowers a 1000 lb concrete clump to the bottom and it settles on right on top of the divers umbilical about 10 feet from him. The diver inhales and suddenly feels the high inhalation resistance, he immediately exhales and tries to inhale again and realizes that not only is there no air but his lungs are empty. At that very moment, the divers need for air is “great” and if he could suddenly inhale he would demand (suck) air much faster than a little old ¼” pneumo hose could deliver. In disbelief the diver tries one more time and only manages to suck water into the helmet thru the neck dam he finally confirms what he already knew, “There is No Air!” WOW” “what’s a diver to do”? Lets check our options he can’t tell topside because he has nothing in his lungs to make the vocal cords wiggle, and he can’t resort to line pull signals without getting to the free end of the umbilical on the other side of the clump. Taking the helmet off is not an option, or is it. The diver then makes the decision, and charges over the clump, grabs the umbilical, and starts frantically jerking in the hope the tender will figure out what happened. Now even if the diver was to stick the pneumo under the neck dam how would topside know to give him air? It’s only been 10 seconds since the diver lost air, but because his lungs are empty the diver is really starving and is now in a full blown panic. He involuntarily inhales, and draws water up into the helmet from the neck dam again while at the same time choking and sputtering, now the helmet is about half full of water and the water is sloshing around, the water in helmet is cold and makes his head feel like a lead weight. Another 5 seconds pass and he realizes he cannot hold his breath because he does not have any breath to hold. “Think about it!” There is a big difference between holding your breath with a lung full air, and holding your breath with your lungs empty. At this point, he inhales again and the helmet is now full of water, the diver frantically rips at the yoke clamp and latch catch, and gets the helmet off. It’s only been 25 seconds since the last exhale but seems like an eternity. With the helmet off, he has now increased his weight by about 28 lbs because that’s what the helmet weighs when void of air and full of water. He grabs the umbilical and starts to climb and then he feels something is holding him, he suddenly realizes! &%%\$% the snap shackle!! Oh no!! , another 5 seconds passes as he fumbles with the shackle, adrenaline is pumping, his head is pounding, he starts ripping at the snap shackle, then suddenly everything feels fine and things become surreal as he drifts back and lays on the clump next to his helmet. It’s only been 33 seconds.

Meanwhile, topside, amidst the noise of the crane and compressor, the tender realizes that there must be something wrong with the communication box because they cannot hear the diver breathing. Topside makes several attempts to communicate while at the same time the tender tries line pull signals. The tender suddenly realizes there is no bubbles!. It's now been 50 seconds.

The supervisor orders air to the pneumo, and the standby into the water. The standby diver was really quick, he finished getting dressed in 20 seconds and made it to the diver in 1 minute. Once there, he noticed Super Diver with his helmet lying next to him. The standby diver ordered up on the clump and was able to clear the umbilical within 30 seconds it then took another minute to re-shackle the diver and tie the helmet off to keep it from tangling, then another 2 minutes to get the diver to the surface because the standby was trying to maintain an airway on Super Diver to keep him from embolizing. After hitting the surface it took another minute for up and over on deck. All in all it's been about 6 minutes since Super Diver took his last breath, to now laying on his back having CPR. What do you think his chances are? The above times would be about as short as possible and in the real world it would probably take quite a bit longer.

Now let's look at the same scenario with a fully functional, properly configured EGS system. When Super Diver's umbilical got pinched and the he could not inhale, he immediately opened the EGS valve on the side block and took a couple deep breaths to come off the adrenaline rush, notified topside he was on EGS, because he lost gas. In short order topside figured out about the pinched umbilical, picked up the clump, and had Super Diver clear the umbilical, shut the EGS then test the normal supply, and resume breathing on normal supply. After that, the dive was terminated and Super Diver surface normally as directed by topside. All this took less than 2 minutes. Is using the pneumo viable? You make the call!



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Basic Emergency Procedures

For all Kirby Morgan Helmets and KMB 18/28 Band Masks

Mike Ward – Revised May 01, 2009

The emergency procedures listed are primarily intended as the diver's first response to a situation or event that could be life threatening if swift immediate action is not taken. All emergency procedures assume that the helmet is being dived with two independent breathing supplies to the diver umbilical so that one is in use, and one is in standby. In addition it is also assumed that the helmet is being used with a fully functional emergency gas supply that is lined up to the side block so that only the side block emergency valve needs to be opened to supply gas to the side block. Surface supply systems must be capable of delivering the required pressure and volume to satisfy the diver respiratory requirements. All users of KMDSI Helmets and Full-Face masks should be professionally trained in the helmets use, set-up, adjustment procedures, as well as all applicable user level maintenance. All persons involved in the diving operations should memorize the emergency procedures and protocol. All topside support personnel should be trained and qualified to perform the duties for which they are being employed. These emergency procedures list only what the diver should do. Each organization / company should develop policy, emergency, and operational procedures in accordance with (IAW) governing regulations and / or industry standards and consensus and the guidelines given by the manufacturer of the equipment.

The guidelines that dictate when or how a diver should abort a dive must be established by the organization /company. These guidelines need to be based on governing regulations, industry and consensus guidelines. In some cases, the diver may be the one making the decision to abort and in other cases, (i.e. deep air, mixed gas, decompression obligation) the decision might be made by the topside supervisor. Regardless, all users must have a plan and protocol, and all members of the dive team must know the plan and protocol. The overall responsibility rests with the Diving Supervisor.

1. Loss of Communications:

- a. Revert to line-pull signals and abort the dive when directed by topside or in accordance with (IAW) organizational / company protocol.

2. Loss of Umbilical Gas Supply:

- a. Diver shifts to the man worn emergency gas system (EGS), notify topside of gas loss if communications are still functional or use line pull signals.
- b. Diver checks umbilical clear, surface slowly if ascent line is available or standby to surface (IAW) organizational or company protocol.
- c. If surface supply is restored, the diver should shift back to the primary source by closing the EGS valve on the side block, then notify topside and abort as directed.

3. Severed or Damaged Gas Supply Umbilical

- a. Diver open EGS valve on the helmet side block.
- b. If communications are functional, notify topside.
- c. Check umbilical clear and abort dive when directed from topside or IAW organizational or company protocol.

4. Demand Regulator Fails (no demand function)

- a. Crack open steady flow defogger valve 1/4 -1/2 turn, if still no air, diver opens EGS valve then and open and close steady flow as necessary, notify topside.
- b. Back out counter clockwise 1-2 turns on regulator adjustment knob, if demand function resumes, notify topside then try the normal demand supply by securing the EGS valve and steady flow. If normal demand mode function does not function, go back on the EGS check the umbilical clear and stand by to abort. Abort IAW instructions from topside.

Note: If the diver has to stay on the EGS while using the steady flow, the diver should open steady flow during inhalation only and close during exhalation to conserve air. Keep in mind in this situation the diver stops everything and just concentrates on getting to a place where normal breathing can be restored.

5. Severe Demand Regulator Free Flow:

- a. Diver adjusts regulator adjustment knob in (clockwise) until free flow stops or diminishes.

- b. If free flow does not stop, diver adjusts regulator in fully to lessen severity and augments supply as necessary using the steady flow defogger valve.
- c. Notify topside, check umbilical clear and abort dive (IAW) organizational or company protocol and stand by to abort dive.

6. Major Water leakage into the helmet

- a. For all KMDSI Helmets and Band Masks except the SL-27helmet, maintain the helmet in a face forward slight down position and use the steady flow defogger ¼- 1/2 turn as necessary to dewater the helmet.
- b. The SL-27 helmet has the dewatering valve on the lower left side of the helmet, the diver should tilt the his head so the left side of the helmet is lower allowing all water to pool in the lower left side, then use the steady flow defogger ¼ to ½ turn open to dewater the helmet.
- c. Notify topside, check umbilical clear and abort dive (IAW) organizational or company protocol and stand by to abort dive.

Warning: All surface supply systems must be capable of supplying at least two different sources of breathing gas to the diver. In addition, the diver must always have a fully functional man worn EGS system that can get the diver to the surface or to a point were breathing supply can be re-established. In cases where the hazard of the dive is such that the umbilical might become entangled or pined, a spare umbilical and the proper wrenches must be available for emergency replacement by the standby diver.

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Reminder: Please don't hesitate to call or e-mail technical questions or problems. It is important to include e-mails to KMDSI as well. KMDSI is interested in any and all comments, problems and anything that can make it better for the user/maintainer.

Dive Safe
From Everyone at Dive Lab