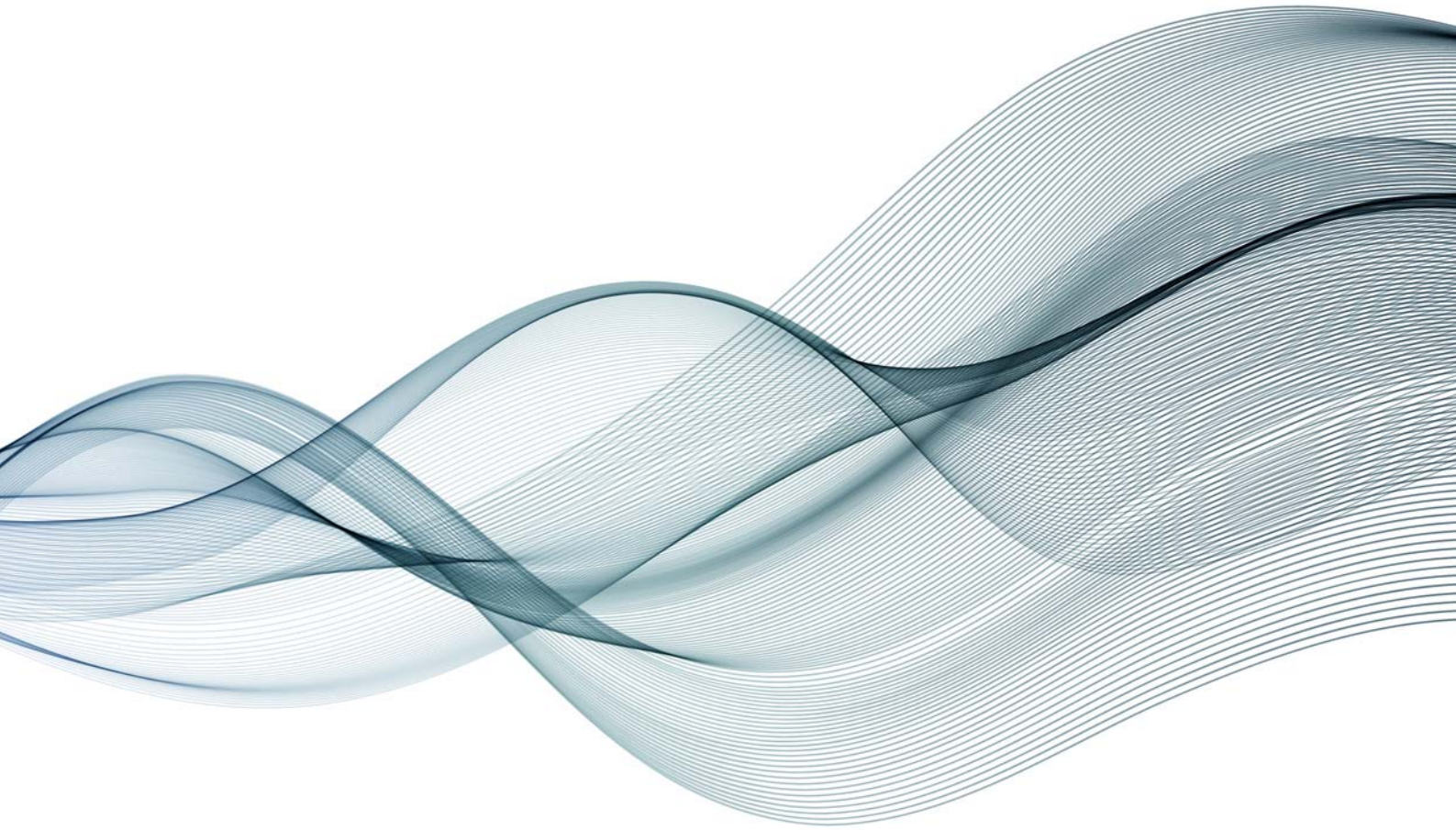

Operation and Maintenance Manual for the 17C ULTRAJEWEL 601 HELMET

Part Number: A10170

17C ULTRAJEWEL 601 AIR DIVE HELMET

Part Number: A10171

Document Number: P1884-OM-56

Revision: 8

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APPROVAL SHEET

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OM056	P1884-OM-56	Ultrajewel 601 Helmet User Guide for Operations & Maintenance	Commercial in confidence	8	01/12/2015

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5	14/11/2011	Debbie Allan	Alastair Naylor	Mark Stevens	ECN 14383
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Original Approvals			
Responsibility	**Name**	**Position**	**Date**
Author	James Bruce	Senior Technician	December 1991
Checked	Hamish Simpson	Manager	December 1991
Approval	Hamish Simpson	Manager	December 1991

Copyright Details

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PREFACE

The following address should be used in all communications with the manufacturer:

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1.1 NATIONAL APPROVALS AND MARKINGS

1.1.1 Ultrajewel 601 Helmet Marking: CE 0088

Divex Limited declares that this Personal Protective Equipment is in conformity with the provisions of Articles 10 and 11 of the EUROPEAN DIRECTIVE 89/686/EEC as a CATEGORY 3 DEVICE and is manufactured under a Quality System approved by Lloyd's Register Q.A. (Notified Body No. 0088).

EC TYPE APPROVAL CONDUCTED BY:

SGS United Kingdom Ltd
Ellesmere Port
Cheshire
CH65 3EN
United Kingdom

NOTIFIED BODY No. 0120

1.1.2 National Approvals

The Divex Limited Quality Management System has been approved by Lloyd's Register Quality Assurance Limited to BS EN ISO 9001.

APPROVAL CERTIFICATE No. 850495

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OPERATIONAL NOTICE

- Please ensure when Ultrajewel 601 helmet is being compressed and decompressed in bell or medical lock that both supply and exhaust hoses are disconnected and jewel regulator exhaust shut off valve is fully open.
- The Ultrajewel 601 helmet emergency air valve stem gland nut must be checked after transit and regularly during operational periods to ensure adequate sealing.
- Only Divex approved spares shall be used on the Ultrajewel 601 helmets in order to maintain CE PPE approval of these products.

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TABLE OF CONTENTS

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CHAPTER 1 - INTRODUCTION

CONTENTS

1.1 INTRODUCTION

The A10170 / A10171 Ultrajewel 601 diver's helmet consists principally of Kirby Morgan Superlite 17C helmet which has been modified by fitting an Ultraflow 601 demand regulator and Jewel 601 exhaust reclaim regulator.

The Ultrajewel 601 is suitable for diving to depths of 500 msw.

The Ultrajewel 601 helmet is capable of being interfaced with a Trelleborg or similar drysuit fitted with an appropriate neck yoke compatible with the helmet.

NOTE
Only one neckseal must be present in the system i.e. if the suit is fitted with a neckseal do not fit one to the helmet neck ring.

1.1.1 System Requirements

Required Supply Pressure at Diver:	8-20 bar over bottom pressure optimum: 12-14 bar
Helmet Gas Supply Hose Connection:	No. 6/8 JIC Male
Helmet Exhaust / Reclaim Connection:	No. 8 JIC Male

It is intended that this helmet is used in conjunction with the short hose assembly, part no. C1506B. This connects between the No. 8 JIC fitting on the helmet and the required No. 8/10 JIC fitting on the exhaust umbilical. This hose incorporates a swivel fitting which allows for easier movement of the diver's head.

Bailout Connection:	9-16UNF female (O-ring seal) i.e. *US Divers* Type regular connection

1.1.2 Operation

It is the User's responsibility to inspect the helmet before every use in accordance with their own diving and safety procedures. This inspection should include but is not limited to:

Demand regulator cover:	Free from dents
Neckdam:	Not torn or punctured

NOTE
Helmet chin support must be fitted to the Helmet and / or neck ring in the form of either a front yoke (as shown in Fig 10.1 and Fig 10.3) or a chin strap.

Neck ring o-ring:	In place / undamaged & lubricated with Christolube or similar
Bent tube assembly:	No dents or kinks
Face port:	Must be in good condition
Oral / nasal assembly:	Fitted correctly
Oral / nasal mushroom valve assembly:	Fitted correctly
Helmet locking pull pins:	Engage / disengage properly
Head cushion:	Properly fastened inside helmet
Exhaust shut-off ball valve:	Function test
Free flow / defogger valve:	Function test
Bailout valve:	Function test
Communications system:	Function test
Open circuit valve:	Function test

The helmet should also be pressure tested as follows:

1. Seal the helmet with an appropriate test plug in the neckdam.

2. Set to closed circuit operation, close the exhaust shut-off valve and introduce some gas into the helmet using the defogger valve.

3. Immerse the helmet in water and check for escaping gas. Any bubbles will indicate a point of potential water ingress/ gas loss in normal use.

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CHAPTER 2 - GENERAL DESCRIPTION & FUNCTION

CONTENTS

2.1 HELMET

The function, operation and maintenance of the helmet are described in the appropriate DSI Manual. However, it is important to note that when used in a gas recovery / closed circuit mode, sealing of the neck dam is particularly important. Any leakage from the neck dam will adversely affect helium recovery rates and the work of breathing.

Leakage may also permit ingress of water to the helmet itself.

2.2 ULTRAFLOW 601 DEMAND REGULATOR

The ULTRAFLOW 601 is a balanced design of demand regulator, which gives excellent gas flow over a wide range of supply pressures.

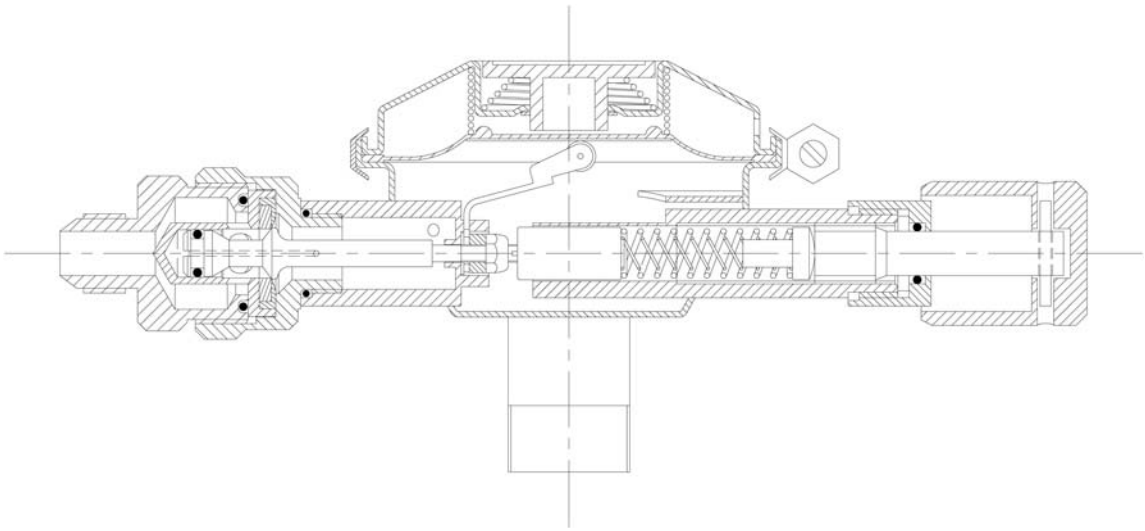

Fig 2.1 Ultraflow 601 Demand Regulator

The components of the inlet valve consist of a 316 SS housing, a brass seat retainer with a specially developed valve seat material and the brass inlet valve, which connects to the lever.

In the closed position the supply pressure acts on both the valve and an ‘O’ ring on the balance piston part of the stem. The balance piston is inside the seat retainer and the pressure on the other side of the piston is equalised to the divers side of the inlet valve via a small hole in the stem connected to a point sensing the pressure in the regulator body. The balance piston is slightly smaller in diameter than the inlet valve and this tends to keep the valve firmly closed using the supply pressure itself. As the diver inhales, this reduces the pressure in the regulator body, which reduces the closing balance force enabling the diaphragm acting on the roller lever to easily lift the valve off of its seat. At the end of the inhale cycle, the dial-a-breath springs will reseal the valve and restore the rest configuration with supply pressure again holding the valve closed.

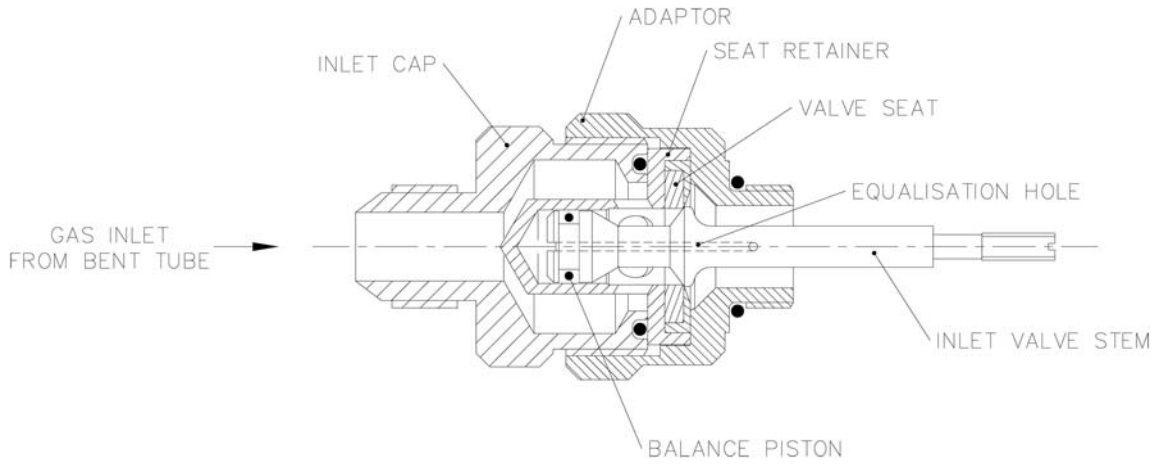

Fig 2.2 Ultraflow 601 Inlet Valve Assembly

NOTE
That the “dial-a-breath” adjustment is crucial to easy breathing. If it is over tightened, a large force will be required to lift the inlet valve, requiring a considerable effort on the part of the diver during inhalation. Similarly, if there are large gas supply pressure changes, the pre-load set by the “dial-a-breath” must be altered. Thus, changes in gas supply pressure over bottom, produced by either a change in the actual gas supply pressure or a change in the divers depth, will require “dial-a-breath” adjustment. As the regulator inlet valve assembly is balanced, the “dial-a-breath” movement is minimal for small pressure changes compared to a standard DSI regulator.

2.3 JEWEL 601 EXHAUST RECLAIM REGULATOR

The JEWEL Exhaust regulator is situated just below the demand regulator to provide slight positive pressure in normal attitudes. It has two stages to make it insensitive to variations in return line suction. The second stage also acts as a safety shut off valve in the event of a first stage failure. An open circuit valve incorporated in the design prevents excess pressure in the helmet. Manual operation allows the helmet / mask to be used in open circuit mode in the event of a failure in the reclaim system. It is manufactured predominantly from 316 stainless steel to make it robust and resistant to corrosion.

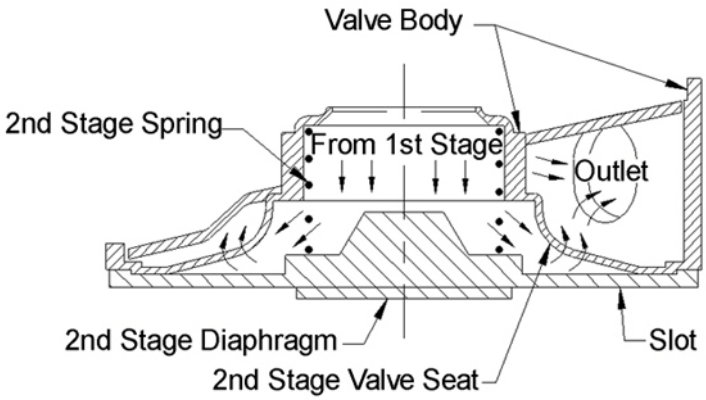

Fig 2.3 Jewel 601 2nd Stage

The first stage diaphragm controls the opening pressure of the regulator. This is situated as close as possible to the demand valve diaphragm in order to minimize the hydrostatic imbalance when the diver changes orientation. When the diver exhales, the helmet pressure increases slightly and this lifts the first stage diaphragm off its seat and allows the exhaled gas into the second stage of the regulator. The larger diameter (19mm) of the valve seat allows very high flows into the second stage. When the diver stops exhaling, the helmet pressure drops slightly below ambient water pressure and the diaphragm is drawn back onto its seat.

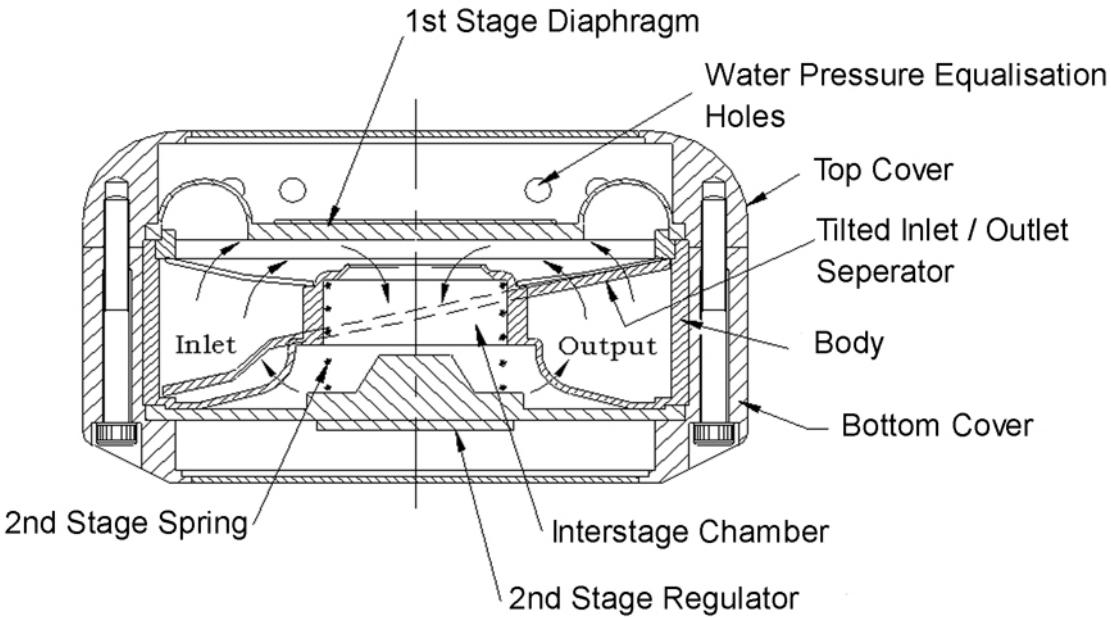

Fig 2.4 Section through Jewel 601 Regulator

Gas flowing into the interstage chamber increases the pressure in it. This increase in pressure, together with the second stage spring, lifts the second stage diaphragm off twelve tapered radial slots and allows the exhaled gas into the return line. The second stage spring regulates the interstage pressure to between 30 and 60cm H2O below the ambient pressure.

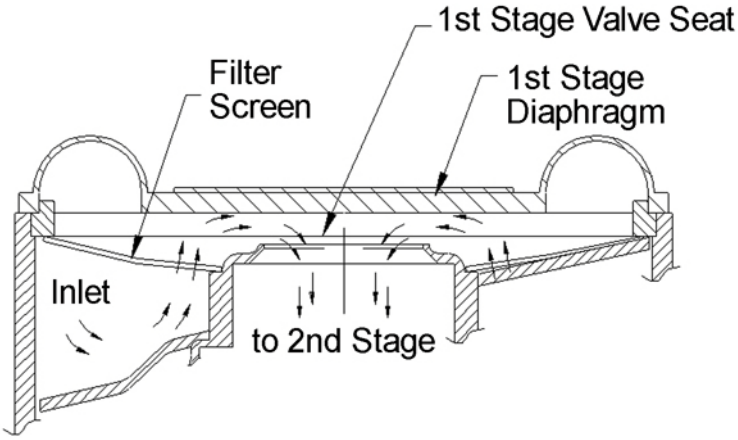

Fig 2.5 Regulator Body

This low suction means that there is only a small force holding the first stage diaphragm on its seat and provides no hazard to the diver in the unlikely event that the first stage fails to open and the Ultraflow demand regulator fails to shut. The slots in the second stage are tapered so that only a small force is required to lift the diaphragm from their tips when there is a high suction in the return line. As the flow increases and the suction in the return line reduces, the diaphragm lifts further to expose more of the slots. This allows the Jewel regulator to operate satisfactorily at suctions varying from 0.5 to 5 BAR below the diver's ambient pressure.

The open circuit valve has two positions; pushed in and turned clockwise for closed circuit operation and turned anti-clockwise for open circuit operation. Then set for closed circuit use, the open circuit valve acts as a helmet/mask relief. The spring exerts a force onto the insert, which holds the mushroom valve closed until the pressure in the valve exceeds 18-23cm H2O above diver ambient. When in the open circuit mode, the spring is unloaded and the mushroom valve can open freely.

A manual shut off valve connected to the Jewel regulator exhaust enables the valve to be isolated from the return line if necessary.

2.4 MODIFICATIONS FROM THE STANDARD DSI SUPERFLOW REGULATOR

The ***inlet tube*** which penetrates the helmet/mask body is increased to 22mm (7/8") bore compared to the Superflow's ¾" bore.

The ***large swirl*** plate in the bottom box is also removed and the ***"dial-a-breath"*** tube is turned down in the area of the milled flat. Both of these changes allow better gas flow through the regulator.

The ***diaphragm*** is changed for one, which has a more flexible material. This improves the effective action of this diaphragm.

Diaphragm P/N DE024 is replaced with diaphragm P/N DE057.

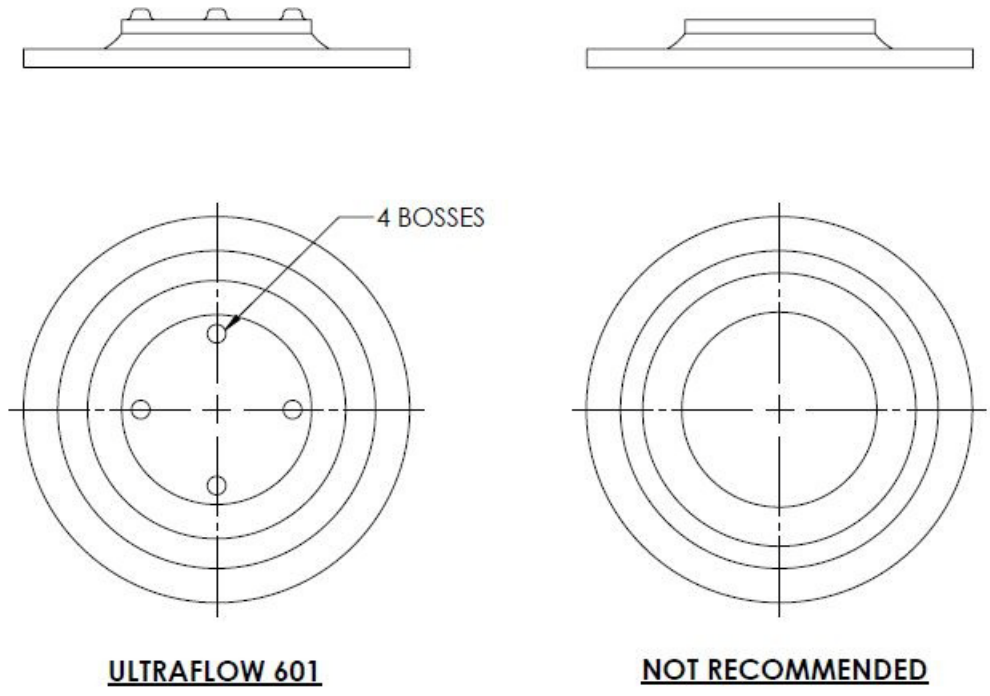

Fig 2.6 Ultraflow 601 Diaphragm

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CHAPTER 3 -SERVICE & MAINTENANCE OF ULTRAFLOW 601 DEMAND REGULATOR

CONTENTS

Technicians who possess valid service technician training certification for this equipment should carry out all service work.

3.1 ULTRAFLOW DISASSEMBLY

To be read in conjunction with drawing on Fig 3.6.

1. Remove the cover Clamp Screw (Item 29) and Cover Clamp (Item 15), lift the Cover (Item 13) off with spring (Item 14) and pull out the Diaphragm (Item 11).

2. The “dial-a-breath” control is removed by backing the Knob (Item 27) out until the Nut (Item 25) is exposed enough to use a wrench. The Knob (Item 27), Nut (Item 25) ‘O’ Ring (Item 28), Washer (Item 24) and Shaft (Item 23) all come out as one. The Knob (Item 27) may be removed from the shaft (Item 23) by punching out the Lock Pin (Item 26). A 3/32” diameter punch should be used. The ‘O’ ring (Item 28) and Washer (Item 24) remain on the Shaft (Item 23) and may now be removed. Tilt the helmet so that the Spacer (Item 22), Spring Set (Item 21) and Piston (Item 20) fall out of the adjustment Shaft Tube of the Regulator Body (Item 8).

3. Remove the Bent Tube Assembly from the Inlet Valve Assembly.

4. Remove the complete Inlet Valve Assembly from the Demand Regulator Body (Item 8), using a wrench on the ULTRAFLOW Adaptor Flats (Item 3).

5. The Inlet Valve Assembly can now be carefully pulled away from the Demand Regulator Body leaving the Valve Stem (Item 1) in place in the Regulator.

6. The Valve Stem can be removed from the Regulator by removing the Nut (Item 19). Use a straight slot screwdriver to rotate the valve Stem (Item 1) while the Retaining Nut (Item 19) is held with the correct spanner from the DSI Service Tool Kit.

7. Undo the Nut (Item 9), which secures the inlet tube to the helmet/bandmask. Remove the Regulator Body (Item 8), Nut (Item 9) and ‘O’ Ring (Item 10). All parts should be thoroughly cleaned and parts replaced as indicated with ‘O’ rings being lubricated only with Christo-lube fluorinated grease before installation.

3.2 ULTRAFLOW 601 ASSEMBLY

To be read in conjunction with the Drawing on Fig 3.6.

During re-assembly of the Demand Regulator, replace all questionable and damaged parts with new. Lubricate all ‘O’ rings and threaded metal parts lightly only with Christo-lube fluorinated grease.

1. Install the Inlet Valve Stem (Item 1) in the Regulator Body. Fit the Washer (Item 16), Lever (Item 17) and Spacer (Item 18) on to the Shaft of the Inlet Valve Stem. Screw the Nut (Item 19) on to the threaded end of the Inlet Valve Stem until the Inlet Valve threads protrude slightly (about 2 threads past the Nut). Use a straight slot screwdriver and special DSI spanner for this operation.

	CAUTION
	The Lock Nut (Item 19) is a Nyloc Nut and should always be replaced with new if removed from the Inlet Valve.

2. Assemble the ULTRAFLOW Adaptor (Item 3), Seat Retainer (Item 4) and Inlet Cap (Item 2).

3. Install the Piston (Item 20), Spring Set (Item 21) and Spacer (Item 22) into the Adjustment Tube of the Regulator Body (Item 8). Generously apply Christo-lube Fluorinated Grease to this assembly.

4. Thread the main adjustment Shaft (Item 23) into the Tube. Slide the Washer (Item 24) and 'O' Ring (Item 28) onto the adjustment Shaft (Item 23). Slide the Packing Nut (Item 25) onto the Shaft and tighten it onto the threaded tube of the Regulator (Item 8).

5. Fit the Knob (Item 27) onto the adjustment Shaft (Item 23) and align the holes for the Retaining Pin (Item 26).

	CAUTION
	Support the adjustment Knob (Item 27) while tapping Retaining Pin (Item 6) to prevent damage to the shaft (Item 23) and the Body (Item 8).

6. Tighten the Inlet Valve Nut (Item 19) until the Lever (Item 7) is snug with no play. Over tightening this Nut will cause the Regulator to free flow.

7. Assemble the Bent Tube Assembly to the Inlet Valve Assembly.

NOTE
The sealing washer should be DIVEX P/N RT011, which improves flow characteristics.

8. Adjust the Regulator as described in section 3.3 .

3.3 ADJUSTMENT

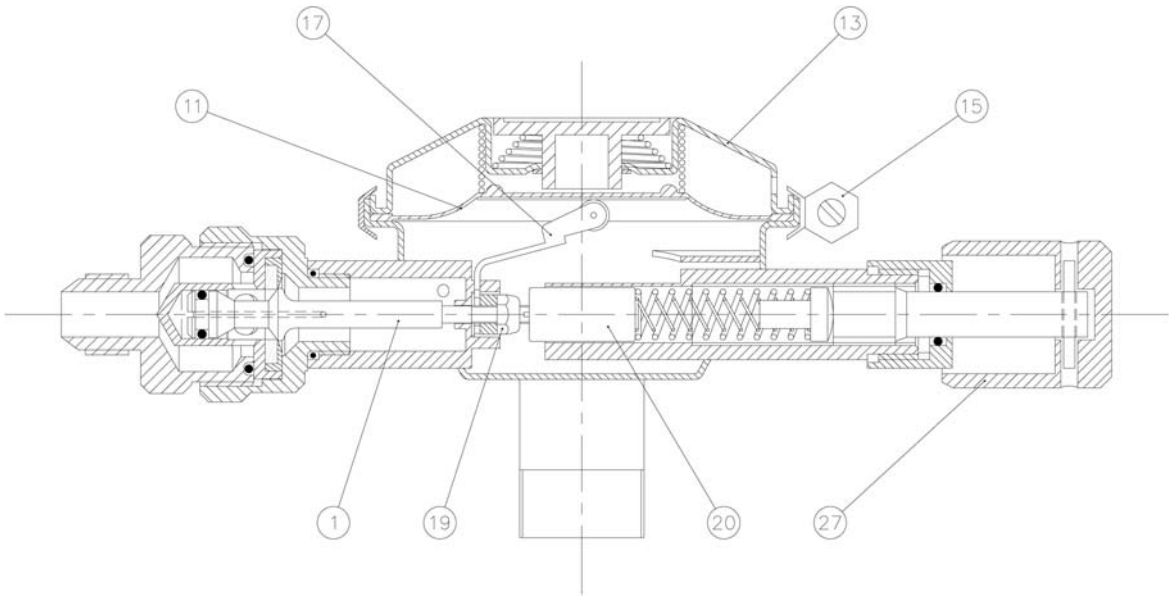

Fig 3.1 Ultraflow 601 Cross Section

1. Remove the Clamp (Item 15), Cover (Item 13), Spring (Item 14) and Diaphragm (Item 11).

2. Fully loosen the "dial-a-breath" (Item 27) by turning counter-clockwise to the stop.

3. Insert the DSI service tool between the Inlet Valve Stem (Item 1) and the Piston (Item 20) as shown in the diagram above. The blade of this tool should be aligned with the small slot in the end of the Stem. This prevents rotation of the Stem.

4. Connect to a gas supply and set pressure between 10-15 BAR.

NOTE
For operational gas supply pressures refer to Regulator Setting Guidelines in Section 9 of this Manual.

5. Tighten the “dial-a-breath” (Item 27) until free flow has just stopped. Depress the roller fork (Item 17) a few times to allow the valve stem to centralise.

6. Adjust the Nut (Item 19) until there is a 4-5mm of free play at the end of the Lever (Item 17).

7. Remove the DSI service tool from the Inlet Valve Stem.

NOTE
The regulator will require the Dial-a-Breath turned in 1 to 2 turns to compensate for the thickness of the DSI tool.

8. Check that there is still 4-5mm of free play at the end of the lever (Item 17).

9. Shut the gas supply to the regulator and vent the remaining gas in the side block by pushing the lever (Item 17).

10. Turn the Nut (Item 19) 90^{o} in a clockwise direction using the DSI spanner.

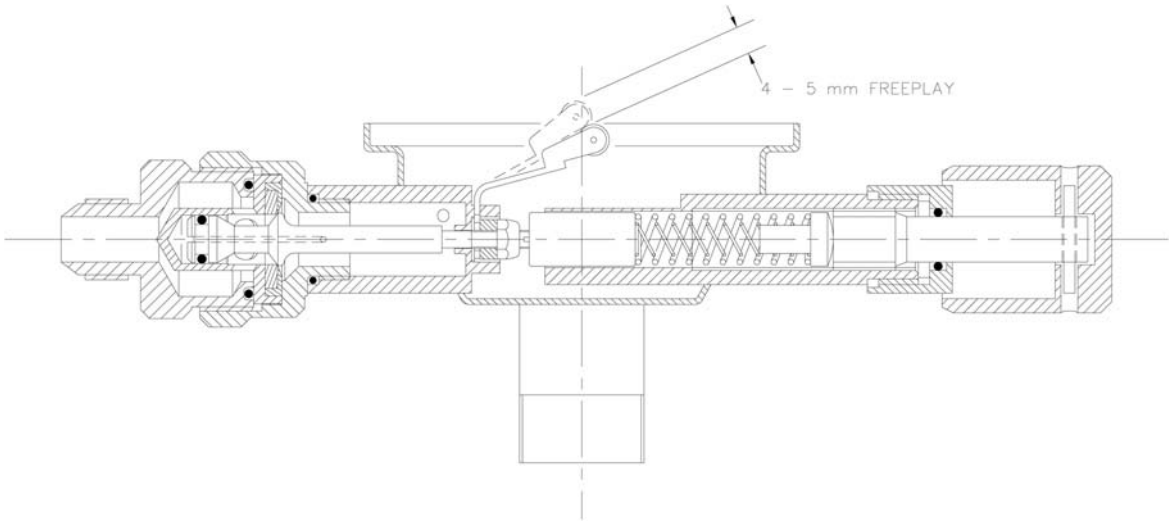

Fig 3.2 Ultraflow 601 Adjustment

11. Repeat steps 4, 8, 9 & 10 until the valve stem has rotated through 360^{o}.

12. If there is less than 4mm of free play at the end of the lever (Item 17) or the regulator free flows, repeat steps 3 to 11 until there is a minimum 4-5mm of free play at the end of lever 17 in all 90^{o} increments of the valve stem movement.

13. Refit the diaphragm (Item 11) and cover (Item 13), holding cover firmly in place by hand.

14. Depress the Purge Button in the centre of the cover (Item 13) ensuring that there is clearance between the Button and the Diaphragm. If the Lever height requires adjustment, it must be bent, as described in Para 15 & 16 below.

15. To decrease the Purge Button clearance, grip the lever with the first finger of the right hand under the lever and with the thumb on top, push down to bend the roller end of the lever upwards.

NOTE
It is essential that undue stress be not placed on the lower arm of the lever, as this will distort the blades resulting in spongy operation.

16. To increase the clearance, place the “disc end” of the DSI service tool inside the Regulator, under the Lever as shown in the diagram (Fig 3.3).

The lever may then be bent down to the desired height by hand (i.e. roller projects approximately 1mm above the top edge of the demand regulator body and this should be checked using a straight edge).

	CAUTION
	Do not bend the Lever too far.

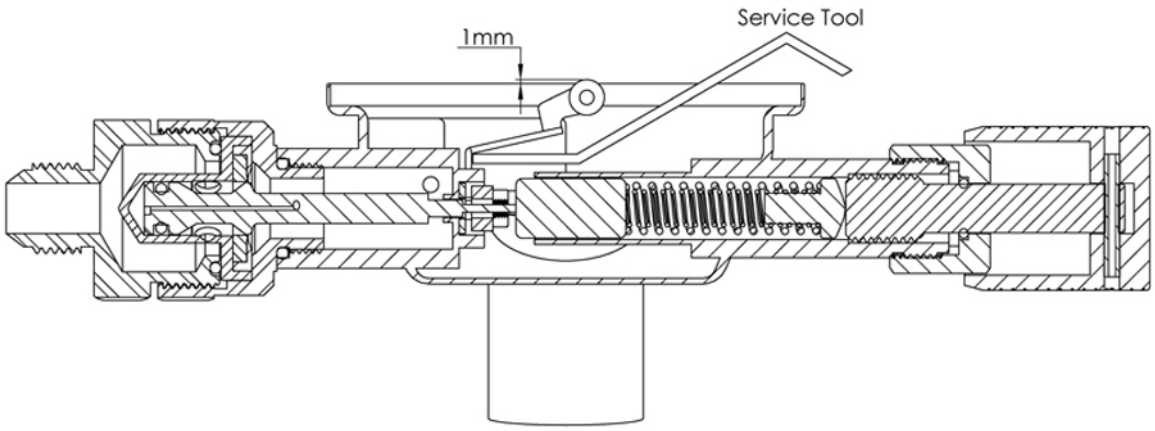

Fig 3.3 Ultraflow 601 Level Position

17. Replace the Diaphragm with Bias Spring and Cover and re-test the Regulator as follows:

18. Tighten the “dial-a-breath” fully and connect to a gas supply of recommended pressure. Depress the Purge Button gently. If there is no gas flow, dismantle the Regulator and re-check adjustment as described in Paras. 1 - 10 above.

19. Re-set the “dial-a-breath” by unscrewing the “dial-a-breath” knob till the Regulator free flows then tighten one (1) full turn.

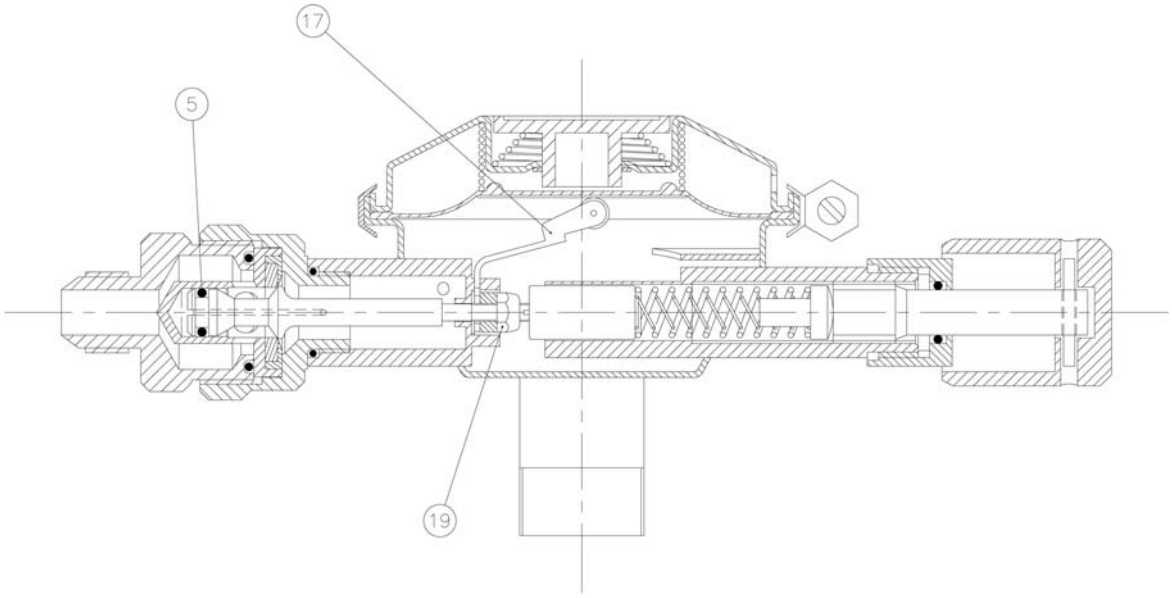

Fig 3.4 Ultraflow 601 “Dial a Breath” Adjustment

NOTES

(1) It is not permissible to loosen the Nut (Item 19) more than one eighth of a turn to adjust the Lever height. If the Nut is loosened beyond this amount, the Regulator will not flow to its maximum rate.

(2) It is essential that all Regulator parts should be free from dirt and rubber components should be inspected for any sign of deterioration.

(3) All internal parts should be lightly lubricated with Christo-lube Fluorinated Grease, especially ‘O’ Ring (Item 5).

(4) The Two opposing blades on the bottom of the Lever (Item 17) must be accurately aligned with each other and be free from tool marks or burrs.

3.4 REPLACEMENT OF DIAPHRAGM

Due to small changes in component dimensions over recent years the “fit” of the Ultraflow regulator diaphragm DE057 has been seen to be variable. In order to address this issue a spacer washer (DE057301) has been introduced. All spares Diaphragms are now supplied with spacer washers and the washer is used if required.

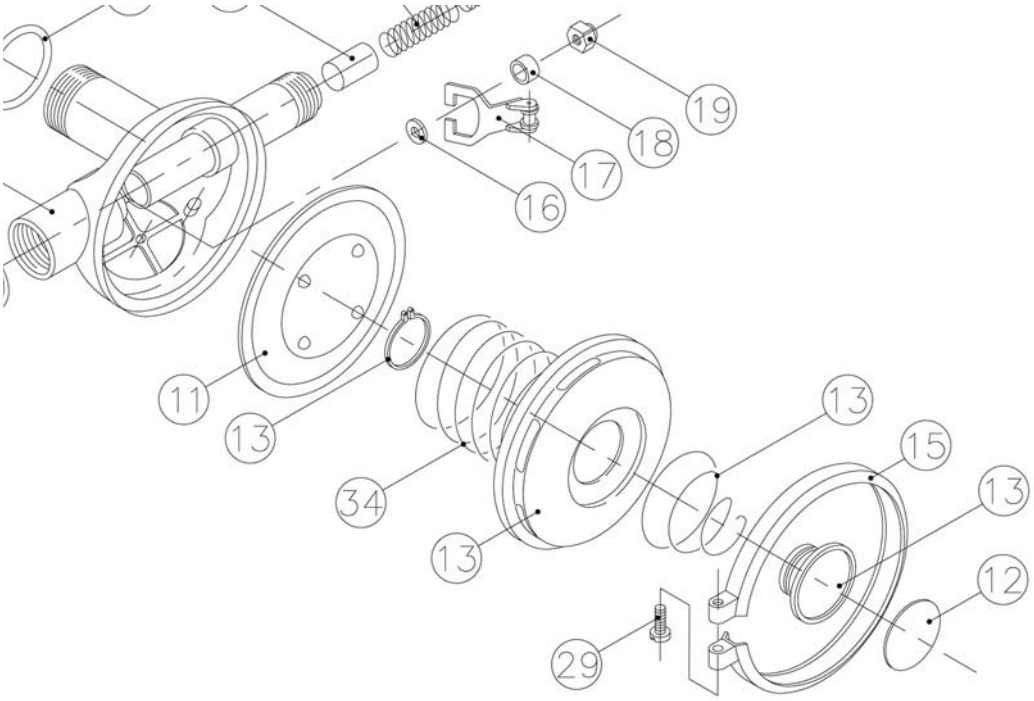

Fig 3.5 Ultraflow 601 Diaphragm Replacement

The spacer washer (DE057301) is fitted between the diaphragm and the regulator cover. It must not be installed in any other position.

Small changes in component tolerances for parts used on the Ultraflow regulator assembly has resulted in some cases with the assembled regulator not having as secure a grip of the diaphragm between regulator body and the cover as is ideal.

Investigation of various options has determined that a spacer washer is the simplest & best solution to this issue.

Trained & competent service technicians can easily judge whether this spacer washer needs to be fitted.

The test is simple: when the regulator body/diaphragm / biasing spring/cover & clamp have been assembled and the clamp screw (#29 on diagram) tightened to the recommended torque setting of 8 inch/pounds.

If when holding the assembled regulator in one hand and holding around the clamp with the other and twisting, the clamp band can be turned without much effort by the technician then the washer should be fitted. If the clamp is secure without the washer being installed then it is not required. No tools should be used to grip either part.

Supplies of the diaphragm now include a washer and an instruction guidance sheet.

Should you have any queries on this matter you should contact enquiries@jfdglobal.com.

3.5 ULTRAFLOW 601 REGULATOR

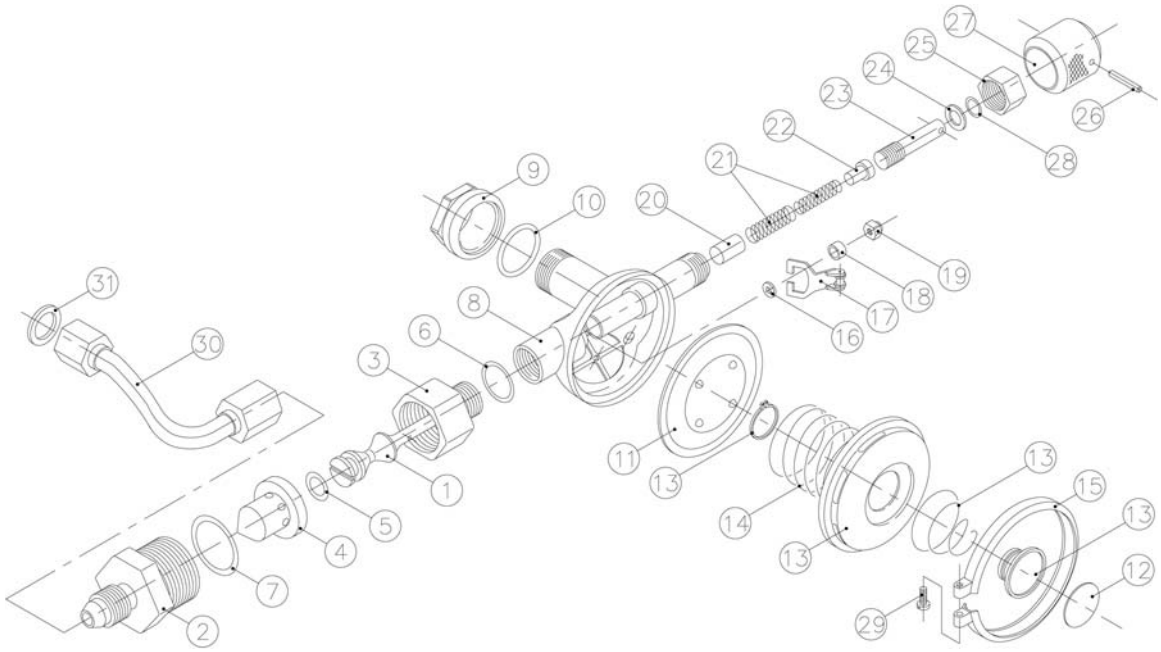

Fig 3.6 Ultraflow 601 Exploded Assembly

Item No	Description	QTY	Part No	Torque Settings Inch Pounds	Nm
1	Valve Stem	1	D1995	-	-
2	Inlet Cap	1	DM1996	100	11.3
3	Adapter	1	DM1996	40	4.5
4	Valve Seat Retainer	1	D1998	-	-
5	O-ring	1	E13991	-	-
6	O-ring	1	RN014-7	-	-
7	O-ring	1	RN017-7	-	-
8	Ultraflow Body	1	D143A	-	-
9	Nut	1	D1433	-	-
10	O-ring	1	RN214-7	-	-
11	Diaphragm	1	DE057	-	-
12	Decal (Ultraflow 501)	1	T14753	-	-
13	Cover Assembly (Black)	1	D1149	-	-
14	Spring, Diaphragm Bias	1	V0201	-	-
15	Clamp	1	DE069	-	-

Item No	Description	QTY	Part No	Torque Settings Inch Pounds	Nm
16	Washer	1	DE067	-	-
17	Roller Lever	1	DE058	-	-
18	Spacer	1	DE068	-	-
19	Nut	1	DE025	-	-
20	Piston	1	DE062	-	-
21	Spring Set	1	D13800	-	-
22	Spacer	1	DE063	-	-
23	Shaft	1	DE064	-	-
24	Washer	1	DE019	-	-
25	Packing Nut	1	DE065	40	4.5
26	Retaining Pin	1	DE021	-	-
27	Adjustment Knob	1	DE066	-	-
28	O-ring	1	DE020	-	-
29	Screw	1	DE022	8	1.0
30	Bent Tube Assembly	1	DM2009	100 / 100	11.3 / 11.3
31	O-ring	1	RT011	-	-

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CHAPTER 4 - SERVICE & MAINTENANCE OF SIDE BLOCK

4.1 SERVICE & MAINTENANCE OF SIDE BLOCK

Maintenance of the Side Block with regard to DIVEX equipment consists of checking the condition of the ‘O’ Ring at the top of the bent tube assembly. If there is any doubt about the condition, replace. For maintenance on the remainder of the side block, refer to the DSI Manual.

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CHAPTER 5 - SERVICE & MAINTENANCE OF ORAL NASAL MASK

5.1 SERVICE & MAINTENANCE OF ORAL NASAL MASK

Remove the Oral Nasal Mask first removing the nose block device by unscrewing the knob and removing the packing nut and 'O' rings. Pull the nose block device out of the oral nasal. Unscrew the outer nuts on the communications posts and remove the microphone wire lugs.

Grasp the oral nasal and slowly pull off the regulator mount nut and the connector. The oral nasal is now out of the headgear and can be inspected. Replace if necessary noting that a light coat of silicone lubricant will preserve the rubber.

Reassembly is the reverse of the above sequence.

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CHAPTER 6 - SERVICE & MAINTENANCE OF JEWEL 601 EXHAUST RECLAIM VALVE

CONTENTS

Technicians who possess valid service technician training certification for this equipment should carry out all service work.

6.1 JEWEL 601 DISASSEMBLY

It is unnecessary to remove the JEWEL 601 from the helmet or mask for maintenance and it is generally undesirable to do so.

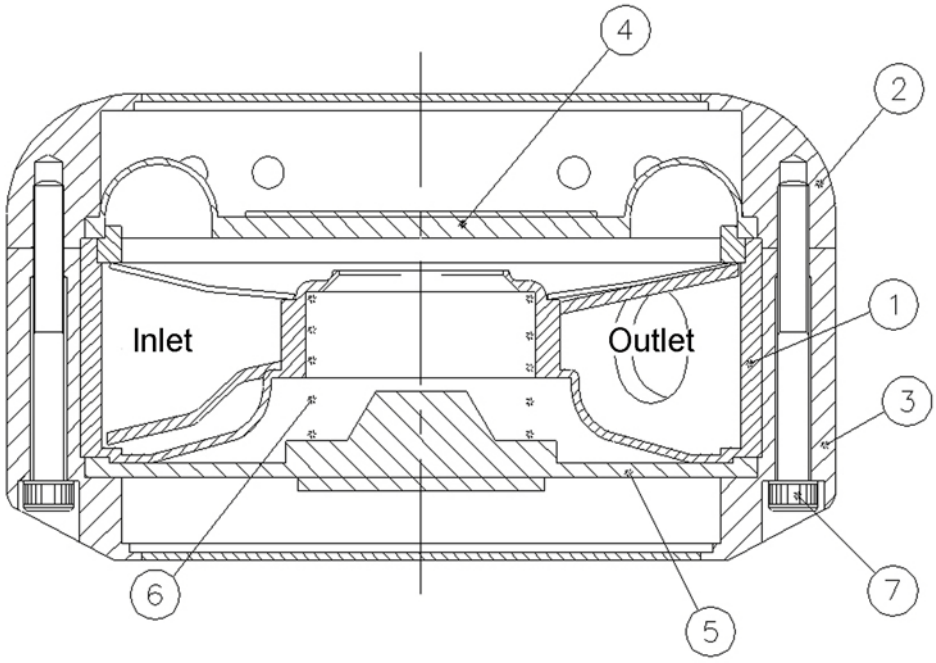

Fig 6.1 Ultrajewel 601 Cross Section

Unscrewing the four socket head screws (7) allows the covers (2) and (3) the 1st stage diaphragm (4), the 2nd stage diaphragm (5) and the 2nd stage spring (6) to be removed. (note: be ready to catch the 2nd stage spring)

Diaphragm item 4 is available in either natural rubber part # D5069R or neoprene D5069N.

For the A10170 helmet the standard diaphragm fitted is the D5069R and for the A10171 the standard diaphragm fitted is the D5069N.

6.2 JEWEL 601 REGULATOR INSPECTIONS

1. 1st stage diaphragm (4) and 2nd stage diaphragm (5): Check if the rubber has separated from metal parts. Inspect for cracks, pinholes, cuts, pinching, wear or abrasion.

2. Valve seats: Check the regulator body (1) around the seat of the 1st stage valve and the sealing face of the 2nd stage around an imaginary circle that joins the points of the slots as shown in the diagram below. There should be no pits or scratches that the diaphragms will not be able to seal over.

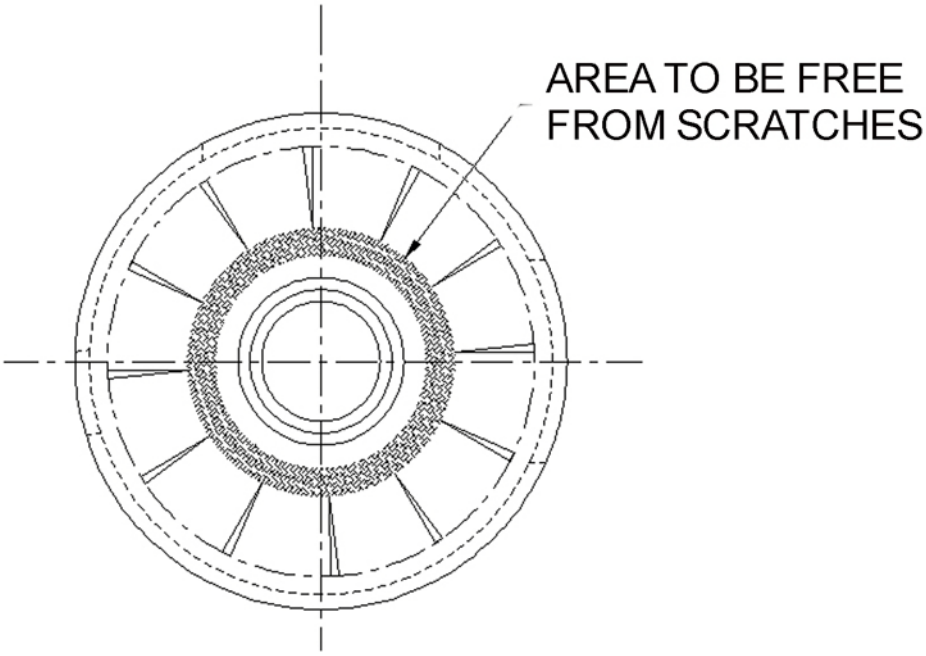

Fig 6.2 2nd Stage Seat

6.3 JEWEL 601 REGULATOR ASSEMBLY

1. Position the 2nd stage spring (6) in the regulator body (1).

IMPORTANT
The last coil on one end of the spring has a larger pitch than the others. This end should be placed against the diaphragm (5) to provide the optimum flow path for the exhaust gas.

Refer to illustration Fig 6.1 and Fig 6.3 for guidance.

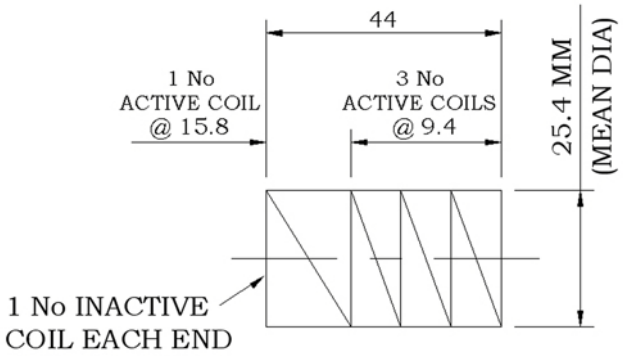

Fig 6.3 Unconstrained Springs

Fig 6.4 Assembly Tool

2. Position the second stage diaphragm in the bottom cover with the pins of the diaphragm support tool centrally supporting the diaphragm disc and ensuring that the diaphragm remains properly seated, centralise the spring on the diaphragm and assemble the cover, diaphragm and tool against the regulator body. Ensure that the diaphragm remains flat and the ridge at the circumference of the diaphgram is fully engaged in the groove on the regulator body, there is no space between the body or the cover and the diaphgram and that the diaphragm protrudes evenly between the cover and body around the whole circumference of the assembly. View the spring through the first stage to ensure alignment is maintained.

NOTE
The scalloped portion of the bottom cover fits closest to the helmet or mask.

3. Still holding the bottom cover in position, place the 1st stage diaphragm (4) in the top cover (2) and hold in place against the body.

4. Holding the two covers together, screw in the four socket-head screws. The cover legs should be tightened against each other to provide the correct amount of squeeze on the diaphragms.

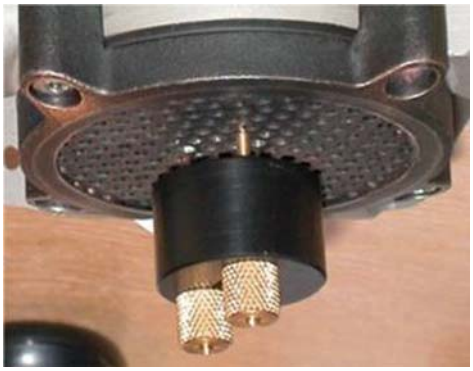

Fig 6.5 Assembly tool in position under Jewel Valve

6.4 JEWEL 601 REGULATOR CHECK

1. Test the first stage differential using a manometer and vacuum source. Plug the oral-nasal port with the rubber bung. Connect to manometer and open the vacuum. The manometer reading should be 0-2 centimetres negative water gauge when the regulator is fitted with D5069R diaphragm and 0-4 centimetres negative when the regulator is fitted with D5069N diaphragm.

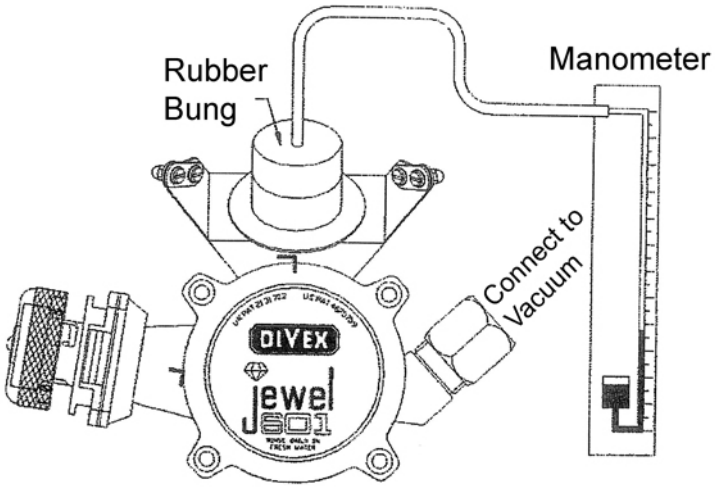

Fig 6.6 Ultrajewel 601 Vacuum Check

2. To read the second stage pressure, upset the first stage diaphragm with a blunt probe by passing it through one of the holes in the first stage cover and pushing on to the edge of the metal portion of the diaphragm. Take care not to damage the rubber. The manometer reading should remain steady at 30-60 cm's negative water gauge. This completes the second stage test.

3. Should any of the above tests give a steady reading, but outside specification, suspect that there is foreign matter present on the relevant valve face, an incorrectly mounted diaphragm or a damaged diaphragm.

4. Before entering the helmet into service test for leaks at the exhaust regulator. This is done by first inserting the bung into the oral-nasal duct inside the helmet, immersing the front of the mask and exhaust regulator in a container of water and blowing into the helmet via the bung. Leaks around the valve will be evident as a stream of bubbles. The open-circuit relief valve should be held down during this test, but may blow off at relief pressure as normal.

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CHAPTER 7 -SERVICE & MAINTENANCE OF UPRATED OPEN CIRCUIT VALVE

CONTENTS

7.1 DISASSEMBLY OF THE OPEN CIRCUIT VALVE

1. Remove the four countersunk screws to release the Open Circuit Valve from the Regulator Body. The spacer (1) and the mushroom (2) can also be removed. This allows the mushroom (2) and the mushroom support (3) to be checked.

2. The mushroom support (3) is sealed with RTV silicone sealer and should only be removed if it is to be replaced.

3. If the Open Circuit Valve mechanism is not operating satisfactorily, then it can be dismantled by removing the screw (5) and washer (6) which will permit the knob (7), valve insert (8), inner spring (9), outer spring (10) and body (11) to be released as individual components.

NOTE
The knob (7) comprises an inner housing with black cover and 3 driving pegs, which are bonded together and cannot be dismantled further.

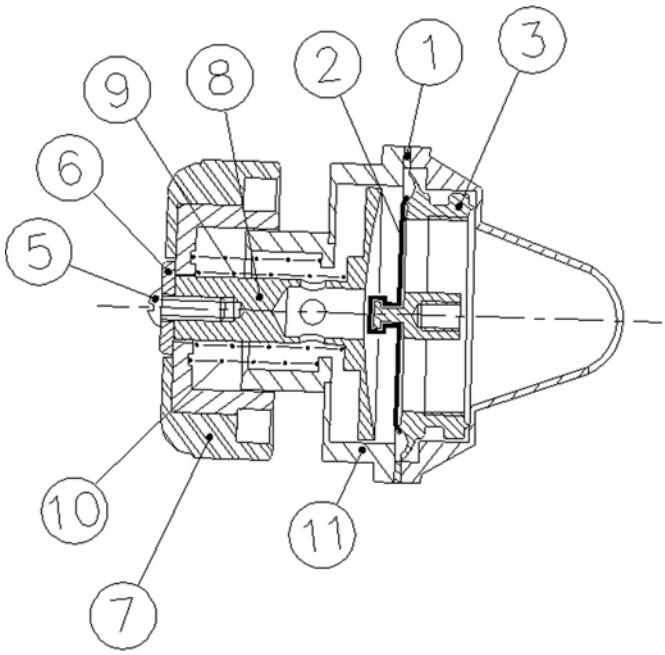


Fig 7.1 Open Circuit Valve Cross Section

7.2 OPEN CIRCUIT VALVE INSPECTION

1. Check the mushroom (2) and mushroom support (3) for damage around the sealing edge.

2. Check the mushroom (2) for damage at the centre where it is retained by the securing nipple.

3. Ensure that the Open circuit valve mechanism operates freely.

7.3 OPEN CIRCUIT VALVE ASSEMBLY

Assembly of the open circuit valve is the reverse of disassembly. It the mushroom support (3) is replaced, it should be sealed with silicone sealant. Although this material hardens in a short time, it requires 12 hours to fully cure during which time toxic vapour is given off. The helmet should not be dived for 12 hours following applications of this silicone sealant.

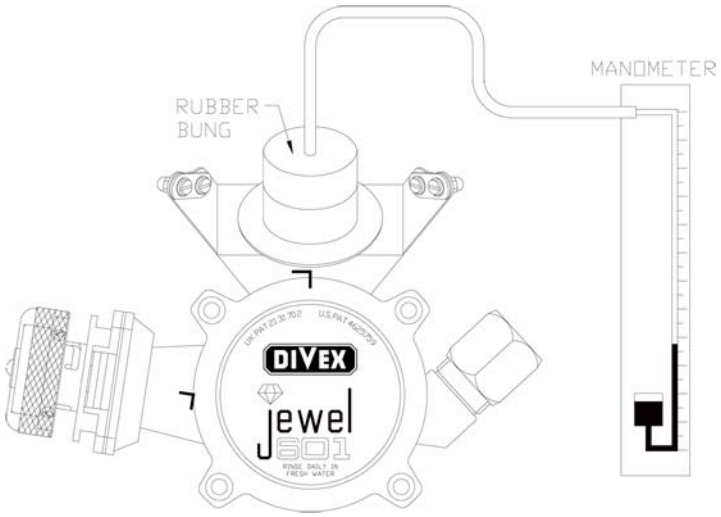


Fig 7.2 Open Circuit Valve Check

7.4 OPEN CIRCUIT VALVE CHECK

Plug the oral-nasal port with a rubber bung, which is connected to a manometer. With the Open Circuit Valve set for Closed Circuit use, supply a light gas flow through the regulator exhaust port. The pressure in the regulator should rise to between 18 and 23cm H_2O before the Open Circuit Valve opens. Turning the valve to the Open Circuit mode should drop the pressure to below 1 cm H_2O.

7.5 ROUTINE MAINTENANCE

7.5.1 Maintenance Schedule

24 hours next due at hrs.

Clean and inspect mask or helmet inside and out.

Check operation of all moving parts.

Flush fresh water through the Jewel regulator in reverse direction to the gas flow so that it comes out of the open-circuit valve and into the helmet.

NOTE
Take care not to soak the communications.

Check adjustment of neck rings.

Check the neck ring o-ring is in useable condition.

Inspect neck dams for tears or deterioration, which could lead to failure.

Refer to appropriate DSI Manual for detailed procedures.

Weekly next due

Dismantle, clean and inspect JEWEL valve (see Chapter 6).

This check should be made daily if grouting or grit blasting, grinding or jetting.

Monthly next due

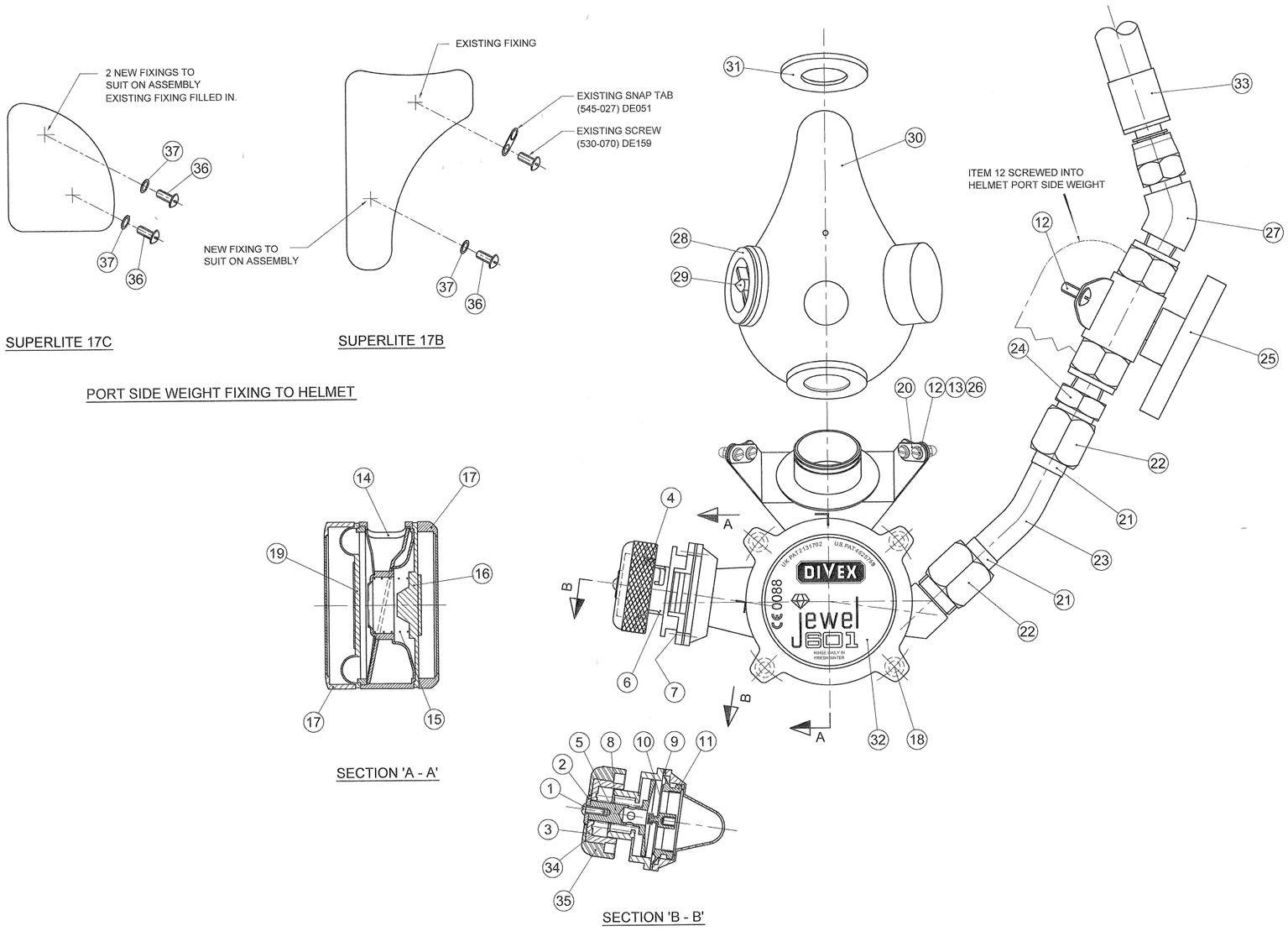
Inspect oral nasal for signs of deterioration.

Inspect and adjust demand regulator (see chapter 3).

Lubricate packing on nose clearing device as described in DSI Manual.

Test Check valve on main supply connection as described in DSI Manual.

CHAPTER 8 JEWEL 601 EXHAUST REGULATOR EXPLODED PARTS



THIRD ANGLE PROJECTION		MATERIAL: MTO : P1831-MT-200					FINISH: -				DIVEX OWNS THE COPYRIGHT OF THIS DOCUMENT AND ANY DESIGN RIGHT EMBODIED HEREIN. IT IS SUPPLIED IN CONFIDENCE AND MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED WITHOUT PERMISSION IN WRITING FROM THE OWNERS.	DIVEX LIMITED ENTERPRISE DRIVE WESTHILL ABERDEEN, AB32 6TQ UNITED KINGDOM	TEL : +44 (0) 1224 740145 FAX : +44 (0) 1224 740172 email : info@divex.co.uk www.divex.co.uk	A1	
4	PART NUMBER CHANGED	5123	PW	02.08.04	WJ	2.8.04	WJ	2.8.04	WJ	2.8.04	ALL DIMENSIONS IN MM (UOS)	SCALE 1 : 1	PRODUCT ULTRAJEWEL	TITLE ULTRAJEWEL REGULATOR (UPRATED II OPEN CIRCUIT) GENERAL ARRANGEMENT
3	UPDATED	3554	PW	20.08.01	RTW	20.08.01	RTW	20.08.01	RTW	20.08.01	ALL DIMENSIONS BEFORE PLATING (UOS)			
2	UPDATED	3519	PW	31.07.01	RTW	31.07.01	RTW	31.07.01	RTW	31.07.01	REMOVE SHARP EDGES & BURRS	PART No C10110		
0	ISSUED FOR MANUFACTURE	N/A	RD	04.11.91	ML	08.11.91	ML	08.11.91	DWC	08.11.91	DIMENSIONAL TOLERANCES: NO DECIMAL PLACES ±1.0 ONE DECIMAL PLACE ±0.2 TWO DECIMAL PLACES ±0.05 ANGULAR TOLERANCE ±0.5°			
REV	DESCRIPTION OF REVISION	ECN	DRAWN BY	DATE	DRAFTING CHECK BY	DATE	ENGINEER CHECK BY	DATE	APPROVAL BY	DATE		CAD REF No. 4020-4	DRG No. P1831-DG-200	SHT 1 REV 4

Fig 8.1 Ultrajewel Regulator
(Drawing P1831200S1)

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8.1 JEWEL 601 EXHAUST REGULATOR EXPLORED PARTS DESCRIPTION

Item No	Description	QTY	Divex Part No	Torque Settings Inch Pounds	Nm
1	4BA x 10 LG Slotted M/C Screw, Pan HD	1	FB246	-	-
2	Open Circuit Valve - Washer	1	D1144	-	-
3	Open Circuit Valve - Cover Assembly	1	DM108	-	-
4	Open Circuit Valve - Assembly	1	C10503	-	-
5	Open Circuit Valve - Spring	1	D5073	-	-
6	Open Circuit Valve - Body	1	D1154	-	-
7	4BA x 8 LG Slotted M/C Screw, C/Sunk HD	4	FB241	16	1.8
8	Open Circuit Valve - Insert	1	D1155	-	-
9	Open Circuit Valve - Spacer	1	D1142	-	-
10	Open Circuit Valve - Mushroom	1	DE149	-	-
11	Open Circuit Valve - Mushroom Support	1	D1146	-	-
12	M5 x 12 LG Slotted M/C Screw, Pan HD	6	FB231	18	2.0
13	M5 Acorn Nut	4	FN061	18	2.0
14	Body	1	DM020	-	-
15	2nd Stage Spring	1	V0200	-	-
16	2nd Stage Diaphragm	1	D5070	-	-
17	Cover	1	DM022	-	-
18	M5 x 35 LG Socket Head Capscrew	4	FB240	20	2.3
19	1st Stage Diaphgram Natural Rubber (Std for A10170) Neoprene Rubber (Std for A10171)	 1 1	 D5069R D5069N	-	-
20	Mounting Bracket	2	D1147	-	-
21	No 10 JIC Fitting Sleeve	2	NJ506	-	-
22	No 10 JIC Nut	2	NJ504	100	11.3
23	316 St.St. Tube, 5/8”OD x 0.049 Wall	1	TM599	-	-
24	3/8” NPT (M) - No 10 JIC Connector	1	NJ505	-	-
25	Shut Off Valve c/w Mounting Bracket	1	DM021	-	-
26	M5 Flat Washer	4	FW078	-	-
27	3/8” NPT (M) x No 8 JIC Connector	1	FJ495	-	-

Item No	Description	QTY	Divex Part No	Torque Settings Inch Pounds	Nm
28	Oral Nasal Mushroom Body	1	DE150	-	-
29	Oral Nasal Mushroom	1	DE004	-	-
30	Oral Nasal	1	D1148	-	-
31	Oral Nasal Retaining Washer	1	D5045	-	-
32	Sticker	1	T9210	-	-
33	Whip Assembly	1	C1506B	-	-
34	Open Circuit Valve - 2nd Spring	1	D1135	-	-
35	Open Circuit Valve - Cover Assembly	1	DM108	-	-
36	10 UNC Pan HD	2	DE2713	18	2.3
37	10 UNC Washer	2	DE094	-	-

CHAPTER 9 - FAULT FINDING ON ULTRAJEWEL 601 HELMETS

9.1 DEMAND VALVE FAULTS

Problem: Diver complains of a continuous free flow.

a. The Diver should check and adjust the “dial a breath” knob.

b. The Demand Regulator is in need of servicing and adjustment.

Problem: Diver complains of difficult to breathe.

a. The Diver should check and adjust the “dial a breath” knob.

b. The supply pressure should be checked to ensure it is within the recommended range and is not restricted in any way.

c. The Demand Regulator is in need of servicing and adjustment.

9.2 EXHAUST FAULTS

Problem: Leaking of gas is evident from the jewel valve.

a. Check all mushroom valves and diaphragms for condition and cleanliness and clean as necessary or if faulty replace.

b. Check for any sign of leakage from the umbilical end connections.

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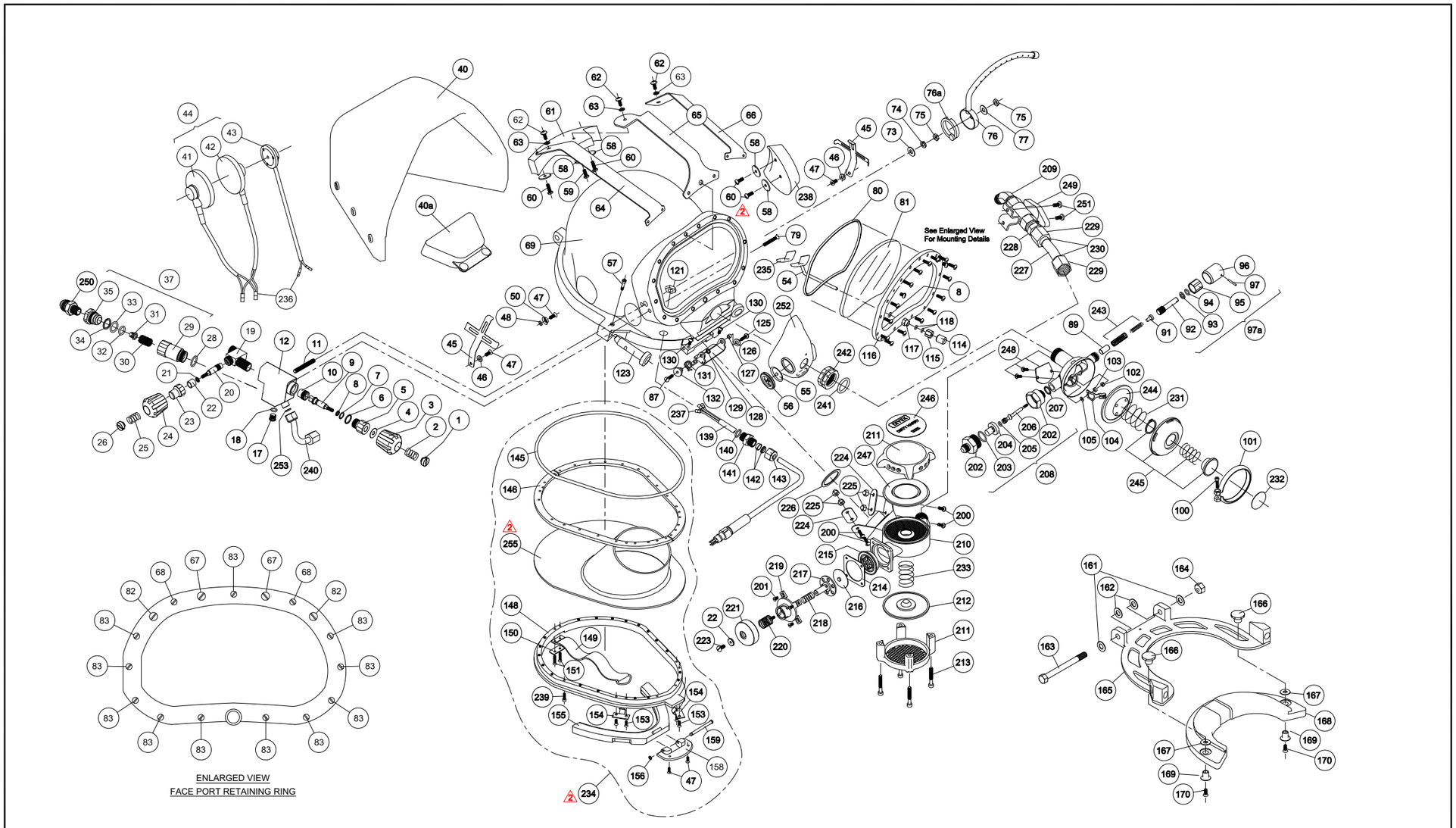
CHAPTER 10 SUPERLITE 17C EXPLODED PARTS



NOTES

1. ITEM NUMBERS UP TO 200 MATCH KIRBY MORGAN SUPERLITE 17C HELMET ASSEMBLY DRAWING DOCUMENT #081016011. EXCEPTIONS ARE INSTANCES WHERE KIRBY MORGAN HAVE GIVEN THE SAME PART MULTIPLE ITEM NUMBERS. IN THESE CASES THE FIRST ITEM NUMBER HAS BEEN RETAINED.
2. PARTS LIST ON SHEET 2

2 - DENOTES CHANGES MADE AT THIS REVISION.

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
ALL DIMENSIONS BEFORE PLATING (UOS)
REMOVE ALL SHARP EDGES AND BURRS

DIMENSIONAL TOLERANCES

MACHINING		FABRICATION	
NO DECIMAL PLACES	±1.0	SIZE >0 <100	±0.5
ONE DECIMAL PLACE	±0.2	SIZE >100 <500	±1.5
TWO DECIMAL PLACE	±0.05	SIZE >500	±3.0
ANGULAR TOLERANCE	±0.5°	ANGULAR TOLERANCE	±0.5°

MATERIAL: SEE PARTS LIST (SHEET 2)

FINISH: N/A

THIRD ANGLE PROJECTION

REV	DESCRIPTION	ECN No	BY	DATE	AUTH. BY
R06					
R05					
R04					
R03					
R02	SEE SHEET 2	14956	ZD	23/08/12	MS
R01	O-RING DE083 REPLACED WITH RT011	14383	ZD	03/11/11	MS
R00	ISSUED FOR MANUFACTURE		ZD	24/06/10	CC

DO NOT SCALE DRAWING

TITLE: ASSEMBLY, HELMET, ULTRAJEWEL 601 (17C)

DRAWING No. P18312000S1 | REV R02

PART No. A10170 | PRODUCT / PROJECT No. ULTRAJEWEL

SIZE A2 | SCALE NTS | SHT 1 OF 2

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Fig 10.1 Assembly, Helmet, Ultrajewel 601 (17C)
(Drawing P18312000S1)

Item No.	Divex No.	Description	Qty.
1	DE093	Locknut	1
2	DE177	Spring	1
3	DE035	Knob, Control	1
4	DE036	Washer	1
5	DE181	Bonnet	1
6	DE037	O - Ring	1
7	DE038	Washer	1
8	DE016	O-Ring	1
9	DE156	Valve Stem	1
10	DE040	Seat Assem.	1
11	DE182	Stud	1
12	DE125	Side Block	1
17	DE005	L.P. Plug	1
18	DE2702	O-Ring	1
19	DE1851	Emergency Valve Body	1
20	DE1581	Stem	1
21	DE1571	Washer	1
22	DE0411	Packing	1
23	DE1841	Packing Nut	1
24	DE0351	Knob, Control	1
25	DE177	Spring	1
26	DE093	Locknut	1
28	DE043	O-Ring	1
29	DE162	Body	1
30		Spring	1
31		Poppet	1
32		O-Ring	1
33		O-Ring	1
34		Wiper	1
35		Seat	1
37	DE189	One - Way Valve	1
38	DE1321	One - Way Valve Assem.	1
40	DE1732	Head Cushion	1
40a	DE1751	Chin Cushion	1
41	DE077	Earphone Right	1
42	DE042	Earphone Left	1
43	DE097	Microphone	1
44	DE086	Communications Set	1
45	DE054	Earphone Retainer	2
45a	DE1041	Visor	1
46	DE1760	Washer	2
47	DE2710	Screw	2
48	DE1740	Washer, Snap support	1
50	DE1741	Snap	1
54	DE003	Nose Block Device	1
55	DE004	Oral Nasal Valve	1
56	DE150	Oral Nasal Valve Body	1
57	DE2713	Screw	2
58	DE094	Washer	5
59	DE1710	Screw	1
60	DE159	Screw	4
61	DE1748	Weight, Top Rear	1
62	DE1761	Screw	3
63	DE047	Washer	3
64	DE1762	Mount Bracket- Starboard Side	1
65	DE1713	Handle	1
66	DE1764	Mount Bracket Port Side	1
67	DE017	Screw	2
68	DE052	Screw	2
69	DE1769	Helmet, Fiberglass C/W Ring	1
73	DE175	Washer	1
74	DE173	Washer, Lock	1
75	DE171	Nut	3
76	DE080	Air Train	1
76a	DE0801	Air Train Gasket	1
77	DE175	Washer	2
79	DE010	Screw	1

Item No.	Divex No.	Description	Qty.
80	DE011	O-Ring	2
81	DE012	Faceport /Lens (Lexan)	1
82	DE014	Screw	2
83	DE013	Screw	13
87	DE017	Screw	2
89	DE062	Piston	1
91	DE063	Spacer	1
92	DE064	Shaft	1
93	DE019	Washer	1
94	DE020	O-Ring	1
95	DE065	Packing Nut	1
96	DE066	Knob, Adjustment	1
97	DE021	Reataining Pin	1
97a	DE2793	Reg. Adjustment Knob Assem	1
100	DE022	Screw	1
101	DE069	Clamp	1
102	DE025	Locknut	1
103	DE068	Spacer	1
104	DE058	Roller Lever	1
105	DE067	Washer	1
114	DE161	Knob, Nose Block	1
115	DE190	Packing Nut	1
116	DE193	Port Retainer	1
117	DE1716	Nose Block guide	1
118	DE015	O-Ring	2
121	DE087	Nut	1
123	DE1727	Sealed Pull Pin	2
125	DE013	Screw	1
126	DE2792	Washer	1
127	DE108	Spacer	1
128	DE2785	Swing Tongue Catch	1
129	DE2786	Washer	1
130	DE2726	Screw	5
131	DE2787	Spring	1
132	DE2788	Spring Spacer	1
138	DE2794	Terminal, eyelet	1
139	DE070	Waterproof Connector	1
140	DE032	O-Ring	1
141	DE084	Packing Gland	1
142	DE0341	Ferrule Set	1
143	DE085	Packing Nut	1
144	DE1767	W.P. Connector Assem.	1
145	DE2745	O-Ring	1
146	DE2748	Split ring	2
148	DE2749	Stepped Ring	1
149	DE30207	Pull Strap Assem.	1
150	DE2752	Strap Plate	1
151	DE2753	Screw	2
153	DE2757	Screw	4
154	DE1721	Catch Front Yoke	2
155	DE1734	Front Yoke	1
156	DE2791	C Clip	1
158	DE1771	front Yoke Hinge Block	1
159	DE2790	Pin	1
161	DE2761	Washer	2
162	DE2762	Washer	2
163	DE676	Hinge Bolt	1
164	DE286	SS Nut	1
165	DE2768	Locking Collar	1
166	DE1745	Adjustment Nut	2
167	DE2782	Washer	2
168	DE2781	Neck Pad	1
169	DE2770	T-Washer	2
170	DE2771	Screw	2

Item No.	Divex No.	Description	Qty.
200	FB231	Screw	4
201	FB241	Screw	4
202	DM1996	Inlet Valve Body Cap	1
203	RN017-7	O-Ring	1
204	D1998	Seat Retainer	1
205	E13991	O-Ring	1
206	D1995	Valve Stem	1
207	RN014-7	O-Ring	1
208	C2001A	U/F 500Inlet Valve Assy	1
209	FJ495	45 Elbow	1
210	DM020	Jewel 601 Body Assy	1
211	DM022	Cover Assy	1
212	D5070	2nd Stage Diaphragm	1
213	FB240	Screw	4
214	D1142	O/C Valve Spacer	1
215	D1146	O/C Mushroom Support	1
216	DE149	O/C Mushroom	1
217	D1155	O/C Insert	1
218	D5073	O/C Spring	1
219	D1154	O/C Body	1
220	D1135	O/C Spring Uprated	1
221	DM108	O/C Cover Assy	1
222	D1144	O/C Washer	1
223	FB246	Screw	1
224	D1147	Mounting Bracket	2
225	FN061	Clinch Nut	4
226	D5045	Retaining Ring	1
227	TM599	Tube	1
228	NJ505	Male Connector	1
229	FJ5041	Nut, 10 Jic, St, St	2
230	NJ506	Sleeve	2
231	V0201	Bias Spring	1
232	T14755	Badge, Ultraflow 601	1
233	V0200	Spring	1
234	DE1451	Neck Dam, Cold Water	1
235	DE0031	Nose Block Pad	1
236	DD420320	Bullet Connector, Male, 5mm	4
237	EM037	Crimp, Bullet, Female	4
238	DE239	Weight, Port Side	1
239	FB140	Screw	24
240	DM2009C	Bent Tube Assy	1
241	RN214-7	O-Ring	1
242	D1433	Regulator Mount Nut	1
243	D13800	Spring Set	1
244	DE057	Diaphragm	1
245	D1149	Cover (Black)	1
246	T9210	Sticker, Jewel 601, CE Marked	1
247	D5069R	1st Stage Diaphragm	1
248	DM023	Regulator Body Assy	1
249	DM021	Shutoff Valve C/W Mounting Bracket	1
250	FJ413	Connector, Male 8JIC - 1/4" MNPT	1
251	FB277	Screw	2
252	D1148	Oral Nasak Mask	1
253	RT011	O-Ring	1
254	C1506B	Whip Assembly (not shown)	1
255	-	Neck Dam, Neoprene	1

NOTES:

1. ITEM NUMBERS UP TO 200 MATCH KIRBY MORGAN SUPERLITE 17C HELMET ASSEMBLY DRAWING DOCUMENT #081016011. EXCEPTIONS ARE INSTANCE WHERE KIRBY MORGAN HAVE GIVEN THE SAME PART MULTIPLE ITEM NUMBERS. IN THESE CASES THE FIRST ITEM NUMBER HAS BEEN RETAINED.

2 - DENOTES CHANGES MADE AT THIS REVISION.

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
ALL DIMENSIONS BEFORE PLATING (UOS)
REMOVE ALL SHARP EDGES AND BURRS

DIMENSIONAL TOLERANCES

MACHINING		FABRICATION	
NO DECIMAL PLACES	±1.0	SIZE >0 <100	±0.5
ONE DECIMAL PLACE	±0.2	SIZE >100 <500	±1.5
TWO DECIMAL PLACE	±0.05	SIZE >500	±3.0
ANGULAR TOLERANCE	±0.5°	ANGULAR TOLERANCE	±0.5°

MATERIAL: SEE PARTS LIST
FINISH: N/A
THIRD ANGLE PROJECTION

REV	DESCRIPTION	ECN No.	BY	DATE	AUTH.BY
R06					
R05					
R04					
R03					
R02	PARTS LIST UPDATED	14956	ZD	23/08/12	MS
R01	O-RING DE083 REPLACED WITH RT011	14383	ZD	03/11/11	MS
R00	ISSUED FOR MANUFACTURE		ZD	24/06/10	CC

DO NOT SCALE DRAWING

TITLE: ASSEMBLY, HELMET, ULTRAJEWEL 601 (17C)
DRAWING No.: P18312000S2
REV: R02
PART No.: A10170
PRODUCT / PROJECT No.: ULTRAJEWEL
SIZE: A2
SCALE: NTS
SHT 2 OF 2

DIVEX LIMITED
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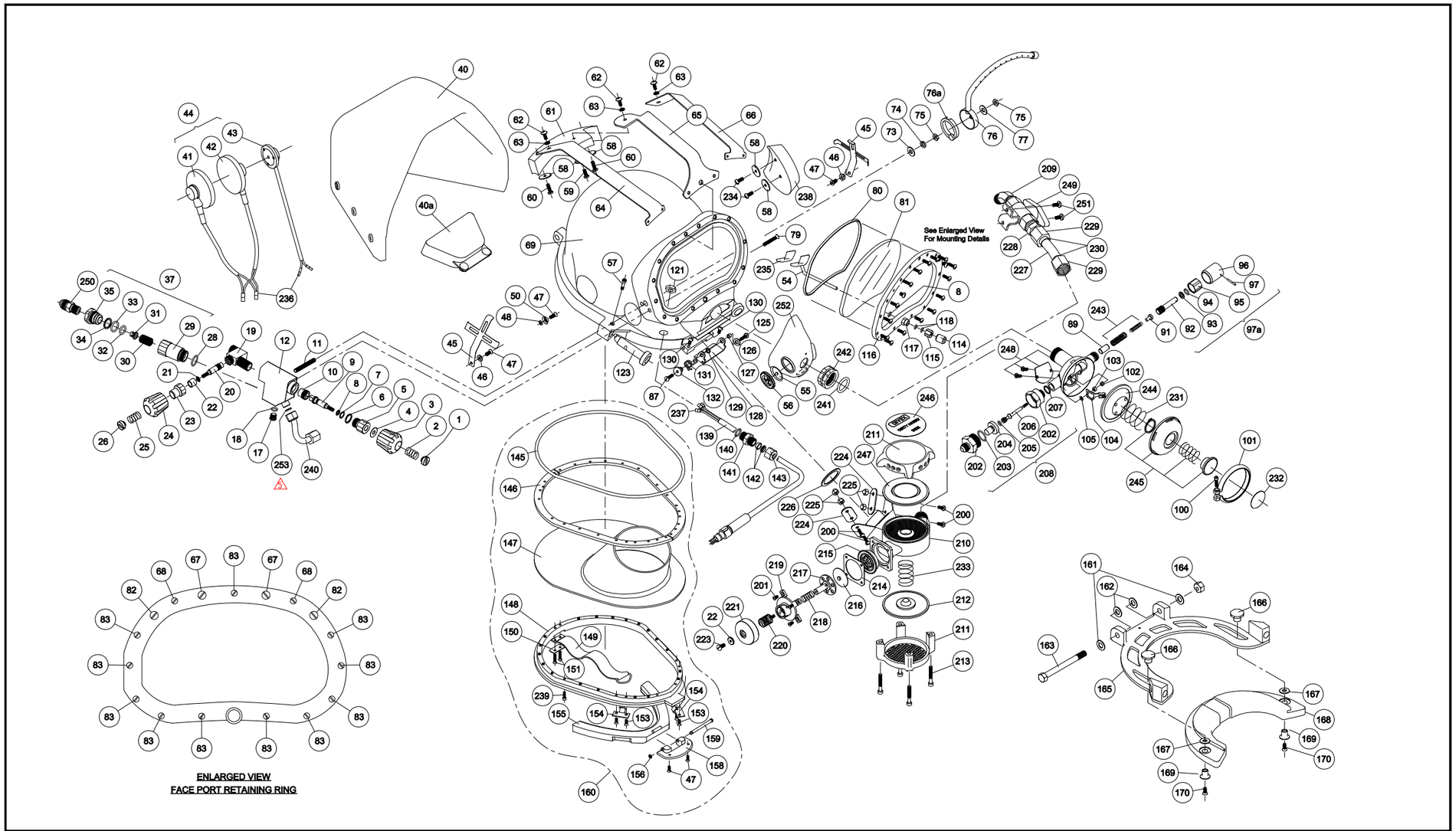
www.divexglobal.com

Fig 10.2 Assembly, Helmet, Ultrajewel 601 (17C) Parts List
(Drawing P1831200S2)



NOTES

1. ITEM NUMBERS UP TO 200 MATCH KIRBY MORGAN SUPERLITE 17C HELMET ASSEMBLY DRAWING DOCUMENT #081016011. EXCEPTIONS ARE INSTANCES WHERE KIRBY MORGAN HAVE GIVEN THE SAME PART MULTIPLE ITEM NUMBERS. IN THESE CASES THE FIRST ITEM NUMBER HAS BEEN RETAINED.
2. PARTS LIST ON SHEET 2

△5 - DENOTES CHANGES MADE AT THIS REVISION

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
ALL DIMENSIONS BEFORE PLATING (UOS)
REMOVE ALL SHARP EDGES AND BURRS

DIMENSIONAL TOLERANCES

MACHINING		FABRICATION	
NO DECIMAL PLACES	±1.0	SIZE >0 <100	±0.5
ONE DECIMAL PLACE	±0.2	SIZE >100 <500	±1.5
TWO DECIMAL PLACE	±0.05	SIZE >500	±3.0
ANGULAR TOLERANCE	±0.5°	ANGULAR TOLERANCE	±0.5°

MATERIAL: SEE PARTS LIST
FINISH: N/A
THIRD ANGLE PROJECTION

REV	DESCRIPTION	ECN No	BY	DATE	AUTH. BY
R06					
R05	O-RING DE083 REPLACED WITH RT011	14383	ZD	03/11/11	MS
R04	DRAWING TITLE UPDATED	13596	ZD	25/06/10	CC
R03	REFER TO ECN	13268	ZD	23/02/10	SW
R02	UPDATE	4393	TP	16/07/03	RTW
R01	UPDATE	4342	TP	19/06/03	RTW
R00	ISSUED FOR MANUFACTURE		KB	13/09/02	RTW

DO NOT SCALE DRAWING

TITLE: ASSEMBLY, HELMET, AIR DIVE, ULTRAJEWEL 601 (17C)
DRAWING No.: P2027100S1
REV: R05
PART No.: A10171
PRODUCT / PROJECT No.: DIRTY HARRY
SIZE: A2 SCALE: NTS SHT 1 OF 2

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Email : info@divexglobal.com
www.divexglobal.com

Fig 10.3 Assembly, Helmet, Air Dive, Ultrajewel 601 (17C)
(Drawing P2027100S1)

Item No.	Divex No.	Description	Qty.
1	DE093	Locknut	1
2	DE177	Spring	1
3	DE035	Knob, Control	1
4	DE036	Washer	1
5	DE181	Bonnet	1
6	DE037	O - Ring	1
7	DE038	Washer	1
8	DE016	O-Ring	1
9	DE156	Valve Stem	1
10	DE040	Seat Assem.	1
11	DE182	Stud	1
12	DE125	Side Block	1
17	DE005	L.P. Plug	1
18	DE2702	O-Ring	1
19	DE1851	Emergency Valve Body	1
20	DE1581	Stem	1
21	DE1571	Washer	1
22	DE0411	Packing	1
23	DE1841	Packing Nut	1
24	DE0351	Knob, Control	1
25	DE177	Spring	1
26	DE093	Locknut	1
28	DE043	O-Ring	1
29	DE162	Body	1
30		Spring	1
31		Poppet	1
32		O-Ring	1
33		O-Ring	1
34		Wiper	1
35		Seat	1
37	DE189	One - Way Valve	1
38	DE1321	One - Way Valve Assem.	1
40	DE1732	Head Cushion	1
40a	DE1751	Chin Cushion	1
41	DE077	Earphone Right	1
42	DE042	Earphone Left	1
43	DE097	Microphone	1
44	DE086	Communications Set	1
45	DE054	Earphone Retainer	2
45a	DE1041	Visor	1
46	DE1760	Washer	2
47	DE2710	Screw	2
48	DE1740	Washer, Snap support	1
50	DE1741	Snap	1
54	DE003	Nose Block Device	1
55	DE004	Oral Nasal Valve	1
56	DE150	Oral Nasal Valve Body	1
57	DE2713	Screw	2
58	DE094	Washer	3
59	DE1710	Screw	1
60	DE159	Screw	2
61	DE1748	Weight, Top Rear	1
62	DE1761	Screw	3
63	DE047	Washer	3
64	DE1762	Mount Bracket- Starboard Side	1
65	DE1713	Handle	1
66	DE1764	Mount Bracket Port Side	1
67	DE017	Screw	2
68	DE052	Screw	2
69	DE1769	Helmet, Fiberglass C/W Ring	1
73	DE175	Washer	1
74	DE173	Washer, Lock	1
75	DE171	Nut	3
76	DE080	Air Train	1
76a	DE0801	Air Train Gasket	1
77	DE175	Washer	2
79	DE010	Screw	1

Item No.	Divex No.	Description	Qty.
80	DE011	O-Ring	2
81	DE012	Faceport /Lens (Lexan)	1
82	DE014	Screw	2
83	DE013	Screw	13
87	DE017	Screw	2
89	DE062	Piston	1
91	DE063	Spacer	1
92	DE064	Shaft	1
93	DE019	Washer	1
94	DE020	O-Ring	1
95	DE065	Packing Nut	1
96	DE066	Knob, Adjustment	1
97	DE021	Reataining Pin	1
97a	DE2793	Reg, Adjustment Knob Assem	1
100	DE022	Screw	1
101	DE069	Clamp	1
102	DE025	Locknut	1
103	DE068	Spacer	1
104	DE058	Roller Lever	1
105	DE067	Washer	1
114	DE161	Knob, Nose Block	1
115	DE190	Packing Nut	1
116	DE193	Port Retainer	1
117	DE1716	Nose Block guide	1
118	DE015	O-Ring	2
121	DE087	Nut	1
123	DE1727	Sealed Pull Pin	2
125	DE013	Screw	1
126	DE2792	Washer	1
127	DE108	Spacer	1
128	DE2785	Swing Tongue Catch	1
129	DE2786	Washer	1
130	DE2726	Screw	5
131	DE2787	Spring	1
132	DE2788	Spring Spacer	1
138	DE2794	Terminal, eyelet	1
139	DE070	Waterproof Connector	1
140	DE032	O-Ring	1
141	DE084	Packing Gland	1
142	DE0341	Ferrule Set	1
143	DE085	Packing Nut	1
144	DE1767	W.P. Connector Assem.	1
145	DE2745	O-Ring	1
146	DE2748	Split ring	2
147	DE1731	Neck Dam , Neoprene (Med)	1
148	DE2749	Stepped Ring	1
149	DE30207	Pull Strap Assem.	1
150	DE2752	Strap Plate	1
151	DE2753	Screw	2
153	DE2757	Screw	4
154	DE1721	Catch Front Yoke	2
155	DE1734	Front Yoke	1
156	DE2791	C Clip	1
158	DE1771	front Yoke Hinge Block	1
159	DE2790	Pin	1
160	DE2759	Neck Ring Assem. (Latex)	1
161	DE2761	Washer	2
162	DE2762	Washer	2
163	DE676	Hinge Bolt	1
164	DE286	SS Nut	1
165	DE2768	Locking Collar	1
166	DE1745	Adjustment Nut	2
167	DE2782	Washer	2
168	DE2781	Neck Pad	1
169	DE2770	T-Washer	2
170	DE2771	Screw	2

Item No.	Divex No.	Description	Qty.
200	FB231	Screw	4
201	FB241	Screw	4
202	DM1996	Inlet Valve Body Cap	1
203	RN017-7	O-Ring	1
204	D1998	Seat Retainer	1
205	E13991	O-Ring	1
206	D1995	Valve Stem	1
207	RN014-7	O-Ring	1
208	C2001A	U/F 500Inlet Valve Assy	1
209	FJ495	45 Elbow	1
210	DM020	Jewel 601 Body Assy	1
211	DM022	Cover Assy	1
212	D5070	2nd Stage Diaphragm	1
213	FB240	Screw	4
214	D1142	O/C Valve Spacer	1
215	D1146	O/C Mushroom Support	1
216	DE149	O/C Mushroom	1
217	D1155	O/C Insert	1
218	D5073	O/C Spring	1
219	D1154	O/C Body	1
220	D11335	O/C Spring Uprated	1
221	DM108	O/C Cover Assy	1
222	D1144	O/C Washer	1
223	FB246	Screw	1
224	D1147	Mounting Bracket	2
225	FN061	Clinch Nut	4
226	D5045	Retaining Ring	1
227	TM599	Tube	1
228	NJ505	Male Connector	1
229	FJ5041	Nut, 10 Jic, St, St	2
230	NJ506	Sleeve	2
231	V0201	Bias Spring	1
232	T14755	Badge, Ultraflow 601	1
233	V0200	Spring	1
234	FB017	Screw	2
235	DE0031	Nose Block Pad	1
236	DD420320	Bullet Connector, Male, 5mm	4
237	EM037	Crimp, Bullet, Female	4
238	DE239	Weight, Port Side	1
239	FB140	Screw	24
240	DM2009C	Bent Tube Assy	1
241	RN214-7	O-Ring	1
242	D1433	Regulator Mount Nut	1
243	D13800	Spring Set	1
244	DE057	Diaphragm	1
245	D1149	Cover (Black)	1
246	T14756	Sticker, Dirty Harry	1
247	D5069N	1st Stage Diaphragm	1
248	DM023	Regulator Body Assy	1
249	DM021	Shutoff Valve C/W Mounting Bracket	1
250	FJ301	Connector, Male 6JIC x 1/4" MNPT	1
251	FB277	Screw	2
252	D1148	Oral Nasal Mask	1
253	RT011	O-Ring	1

5

NOTES

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
ALL DIMENSIONS BEFORE PLATING (UOS)
REMOVE ALL SHARP EDGES AND BURRS

5 - DENOTES CHANGES MADE AT THIS REVISION.

DIMENSIONAL TOLERANCES

MACHINING		FABRICATION	
NO DECIMAL PLACES	±1.0	SIZE >0 <100	±0.5
ONE DECIMAL PLACE	±0.2	SIZE >100 <500	±1.5
TWO DECIMAL PLACE	±0.05	SIZE >500	±3.0
ANGULAR TOLERANCE	±0.5°	ANGULAR TOLERANCE	±0.5°

MATERIAL: SEE PARTS LIST

FINISH: N/A

THIRD ANGLE PROJECTION

REV	DESCRIPTION	ECN No	BY	DATE	AUTH.BY
R06					
R05	O-RING DE083 REPLACED WITH RT011	14383	ZD	03/11/11	MS
R04	DRAWING TITLE UPDATED	13596	ZD	25/06/10	CC
R03	REFER TO ECN	13268	ZD	23/02/10	SW
R02	UPDATE	4393	TP	16/07/03	RTW
R01	UPDATE	4342	TP	19/06/03	RTW
R00	ISSUED FOR MANUFACTURE	X	KB	13/09/02	RTW

DO NOT SCALE DRAWING

TITLE: ASSEMBLY, HELMET, AIR DIVE, ULTRAJEWEL 601 (17C)

DRAWING No. P2027100S2 | REV R05

PART No. A10171 | PRODUCT / PROJECT No. DIRTY HARRY

SIZE A2 | SCALE NTS | SHT 2 OF 2

DIVEX LIMITED
ENTERPRISE DRIVE
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email : info@divexglobal.com
www.divexglobal.com

Fig 10.4 Assembly, Helmet, Air Dive, Ultrajewel 601 (17C) Parts List
(Drawing P2027100S2)

CHAPTER 11 - KIRBY MORGAN SUPERLITE 17C HELMET MANUAL

(Intentionally Blank)

Kirby Morgan SuperLite® 17C Helmet Operations and Maintenance Manual

KMDSI Part # 100-006

Kirby Morgan Dive Systems, Inc.
1430 Jason Way
Santa Maria, CA 93455, USA
Telephone (805) 928-7772, FAX (805) 928-0342
E-Mail: KMDSI@KirbyMorgan.com, Web Site: www.KirbyMorgan.com

Manual prepared by KMDSI, and Dive Lab, Inc.

NOTE: This manual is the most current for the Kirby Morgan SuperLite®-17C Helmet. It is page dated February 2014. 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.

⚠ WARNING

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.

Document Number 140204001

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 three hundred sixty five (365) 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.

 Document #140204001

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. Quantities marked in parenthesis.

Change Number	Date	Description of Change
1	11/06/2009	Chapter 2: Addition of CE Conforming Criteria.
2	02/12/2010	Chapter 7: Update a reference from “See section 2.5” to “’Appendix 3 Supply Pressure Requirements & Tables’ on page 132” in section 7.7.2.
3	06/14/2011	Updated warranty information. Changed 61 meters to 67 meters in Appendix 3 Table 3 SuperFlow® / SuperFlow® 350 Regulator High Pressure Regulated Source. Updated earphones throughout manual. Added, “Terminal Connections in the Waterproof Connector” section. Updated MWPC wiring diagram.
4	10/17/2011	Updated CE notifying body number from 0496 to 2049
5	10/21/2011	Updated CE notifying body address
6	06/18/2012	Update copyright date to roman numerals
7	03/07/2013	Update chapter 3 with new head cushion “See section 3.4.1 Head Cushion Section” to section 3.4.2 Trimming the Neck Dam”
8	06/01/2013	Updated communications area.

⚠ WARNING

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 Kirby Morgan helmets and persons that maintain or service Kirby Morgan 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.

NOTICE

This word is used to address practices not related to personal injury.

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 Kirby Morgan 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.

⚠ CAUTION

Kirby Morgan Dive Systems, Inc. (KMDSI) warns all divers who use the Kirby Morgan 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 Kirby Morgan diving helmets, 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 Kirby Morgan diving helmets 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.

⚠ WARNING

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.

NOTICE

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.

NOTICE

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 100-006, 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.

⚠ WARNING

Kirby Morgan masks and helmets are cleaned and lubricated for oxygen service when they come from the factory. However, if the helmet is used with an oil lubricated air compressor, contamination with hydrocarbons may result. If the breathing system in the helmet is exposed to hydrocarbons, it must be cleaned for oxygen service and lubricated with oxygen safe lubricants before using it again with breathing mixtures containing a high percentage of oxygen. If this is not done, fires and explosions may result, exposing the user to serious personal injury or death.

Components requiring lubrication, should only be lubricated with oxygen compatible lubricants such as Christo-Lube®, Flourolube®, or Krytox®. Lubricants must be used sparingly and should not be mixed with other lubricants.

⚠ WARNING

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 aggravated 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.

⚠ WARNING

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

⚠ WARNING

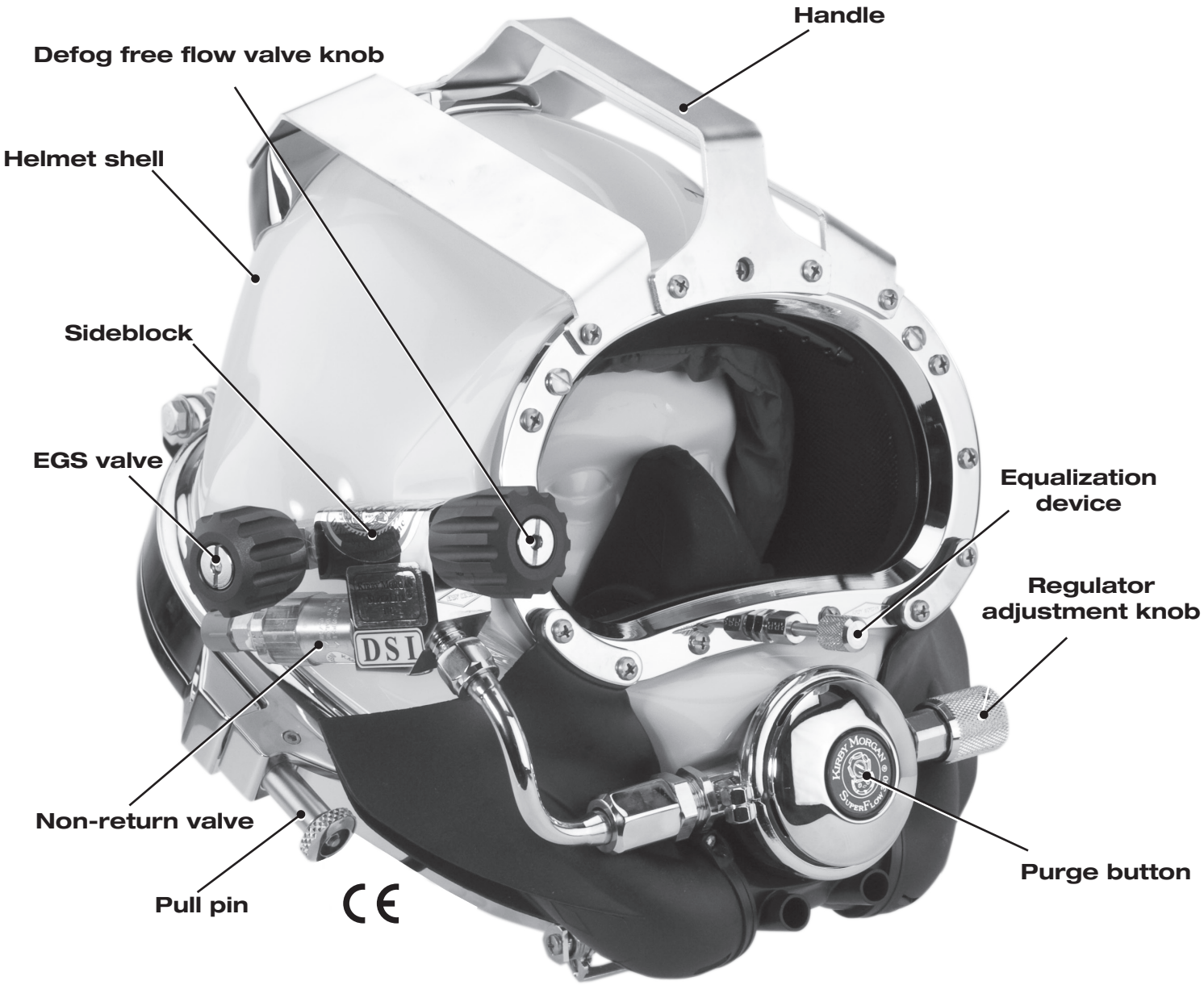
Do not use KMDSI masks or helmets in currents exceeding 3.0 knots Use in currents greater than 3 knots may allow water to enter the exhaust valve, possibly causing regulator flooding.

⚠ WARNING

Surface-supplied diving can be a strenuous activity. Most Kirby Morgan helmets weigh in excess of 27 pounds. KMDSI recommends that persons with a previous neck or back injury seek professional medical approval prior to engaging in surface supplied diving operations using any Kirby Morgan helmet. Use of any Kirby Morgan helmet with a pre-existing 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.

 Document #140204001



The Kirby Morgan 17C helmet

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
General Information KMDSI Products

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.

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 gave 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.

Bev Morgan, Chairman of the Board
Kirby Morgan Dive Systems, Inc.

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. 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 Full-Face Masks and Manifolds

KMB® 18 A/B

CE *approved and* CR™ *marked*

The **KMB 18B 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. Both this mask and the KMB 28B feature the new Tri-Valve™ Exhaust System.

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.

Both the KMB 18 and KMB 28 are CE approved.

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 **EXO BR (BALANCED REGULATOR)** shown here 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.

EXO® BR

CE *approved and* CR™ *marked*

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 90 PSIG – 250 over ambient pressure (6.2 – 17 bar).

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

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 when used with the proper accessories. 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/FullFaceMasks/M48.html.**

SuperMask M-48
w/ Rebreather pod

CR™ *marked*

KMACS-5
w/ No Communications

KMACS-5
w/ Communications

The **Kirby Morgan Air Control System-5 (KMACS)** is a lightweight, portable control box for use in surface supplied air diving operations. The KMACS-5 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-5 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 or DIN equipped 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.

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 Kirby Morgan Diving Helmets

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 eight models of Kirby Morgan diving helmets currently in production. They are the SuperLite®-17B, (MK-21- U.S. Navy version), SuperLite® 17C the SuperLite® 27, and Kirby Morgan models 37, 37SS, 47, 57, and 77. All are 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. This helmet is CE marked.

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 their 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 was 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 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 a turning point in modern 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 internally 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.

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 internally 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® 27®

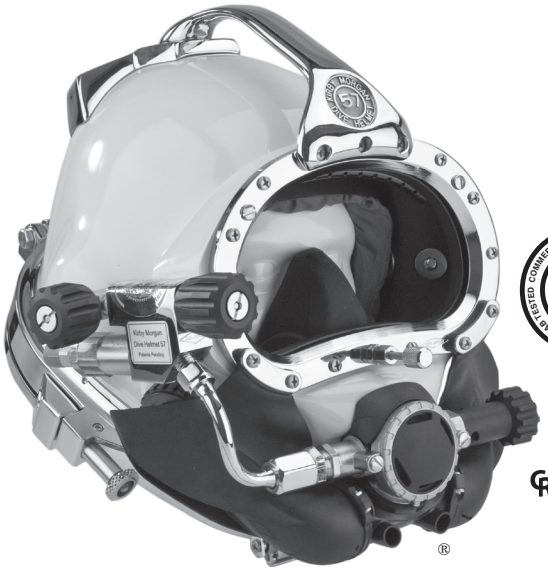
CE *approved and* CR™ *marked*

Kirby Morgan® 47

CE *approved and* CR™ *marked*

The **Kirby Morgan® 47** offers the ultimate in a high performance breathing regulator. This helmet has an entirely new breathing system, oral nasal mask, and water ejection system. The REX® Demand Valve, with it's fully adjustable balanced piston is a breakthrough design that exceeds the requirements of all government or other testing agencies.

It has the best work-of-breathing performance when compared to ANY other commercial diving helmet. The Kirby Morgan 47 Dive Helmet has been tested and meets or exceeds European CE requirements and is fully commercially rated. In all other respects, this helmet is nearly identical to the Kirby Morgan 37.



marked

The **Kirby Morgan® 57** helmet features our revolutionary new SuperFlow® 450 Stainless Balanced Regulator. It's machined from a stainless steel casting for the ultimate in performance and reliability.

Like all KMDSI regulators on our helmets and Band Masks®, we use only regulators that are specifically designed for surface-supplied diving, that will perform over the wide range of pressures delivered by low pressure compressors. An ordinary SCUBA regulator mounted on a diving helmet is not capable of delivering the gas you need at heavy work loads. This commercially rated fully diver adjustable regulator delivers all the breathing gas you might require for the most demanding work underwater.

The **Kirby Morgan® 57** also includes our Quad Valve™ Exhaust System. It's recommended for diving in biologically contaminated water, when you're properly trained and equipped, using recommended procedures. This new exhaust has exceptionally low exhalation resistance that you must experience to appreciate.

⚠ WARNING

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.

approved and marked

The **Kirby Morgan® 77** represents the first in a new generation of stainless steel diving helmets that provide an alternative for the diver who prefers a metal helmet. The helmet features a stainless steel version of our new REX® regulator, which offers the best performance of any Kirby Morgan system.

It has the best work-of-breathing performance when compared to ANY other commercial diving helmet. The Kirby Morgan 77 Dive Helmet has been tested and meets or exceeds European CE requirements and is fully commercially rated.

The advantages of this all stainless steel helmet include the following:

• No refinishing required if the surface is scratched or gouged.

• Faster production of helmets for customer delivery.

• Elimination of threaded inserts for securing the port retainer to the helmet shell.

• No need to remove the handle to remove the port retainer.

• One piece sideblock includes both the free-flow valve and the Emergency Gas System valve.

• The helmet ring is an integral part of the helmet.

CE approved and CR™ marked

The **Kirby Morgan® 37SS** features an all stainless steel shell, as well as a stainless sideblock, helmet ring, bent tube, handle, and other key components. The SuperFlow® 350 is standard on this helmet.

The Kirby Morgan 37SS features a quick change communications module, available with either bare wire posts or a waterproof connector, and allows for easy, efficient maintenance of the helmet's communications.

The advantages of this stainless steel helmet include the following:

• Rugged helmet shell and other components

• No refinishing required if the surface is scratched or gouged

• Elimination of threaded inserts for securing port retainer to helmet shell

Chapter 2
Description & Operational Specifications SuperLite®-17C

⚠ WARNING

This manual is our effort to explain the operation, maintenance and use of the Kirby Morgan helmet. We do not herein make any effort to teach the principles of diving. It is our assumption the reader is a qualified diver. We highly recommend that all divers should train, under controlled conditions, in the use of any model of commercial diving helmet that they have not previously used or trained in, prior to use on the job, until they have mastered the skills required to use their helmet correctly. Kirby Morgan helmets are intended for professional use only and are not intended for recreation use by persons not trained in surface supplied procedures and practices.

This chapter includes a detailed description of the SuperLite®-17C as well as important operational specifications.

2.1 CR Marking

The helmet meets or exceeds all standards established by Dive Lab of Panama City, Florida, and is CR (Commercially Rated) marked.

2.2 CE Certification

The helmet has been tested and conforms to the performance requirements as set forth in Annex II of Directive 89/686/EEC and, as far as applicable, the EN 250:2000, EN 250/A1:2006 and EN 15333-1:2008 (class B). It is fully CE marked with demand regulator SuperFlow® 350 and oral nasals P/N 510-690 and P/N 510-747.

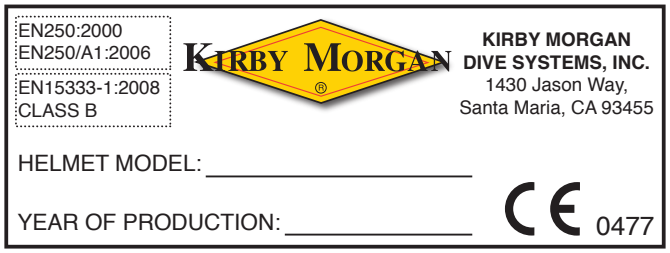
Category of PPE: III

⚠ WARNING

The helmet has been tested with air and CE certificates for use with air up to 50 meters. Compressed air must be compliant with the EN 12021.
All the tables reporting the technical data and the pressure of use are relative to compressed air.

2.2.1. CE Marking

On the frame of the helmet the CE mark is affixed.



CE Mark

In the mark the data reported are the following:

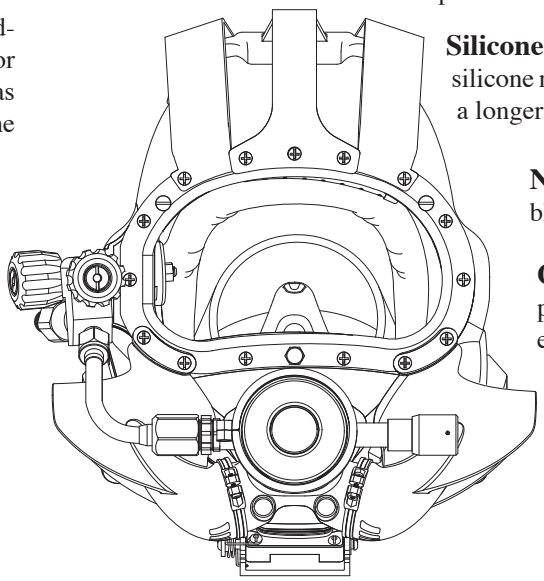
1. The name and the address of the manufacturer;
2. Harmonized reference standard: EN 250:2000, EN 250/A1:2006 and EN 15333-1;
3. Helmet model;
4. The serial number;
5. The year of production;
6. CE marking: CE;
7. Number of notified body.

FEATURES OF THE SL-17C

Steady Flow Valve provides an additional flow of air into the helmet for ventilation and defogging. The air/gas flow is through the air train, across the faceplate into the oral nasal mask.

Emergency Gas SupplyValve provides the emergency breathing gas to the diver.

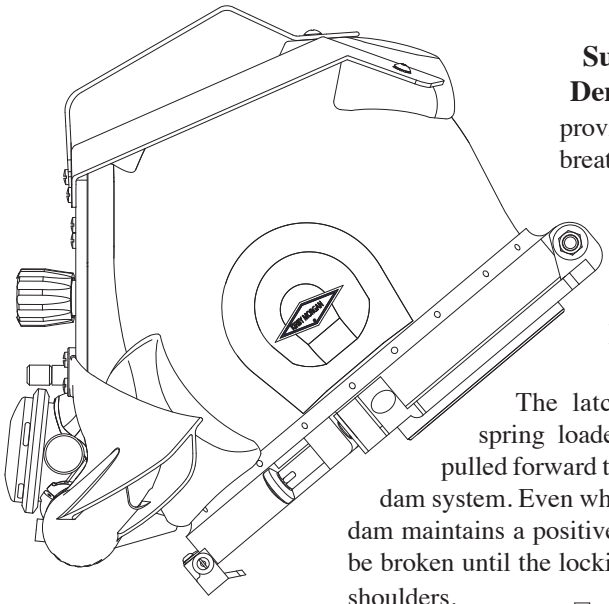
Air Train diffuses the incoming breathing air/gas onto the face plate to defog the lens.



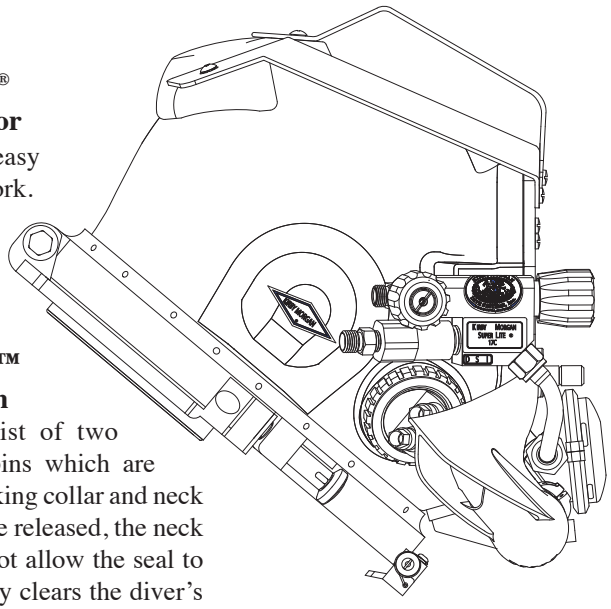
Silicone Oral Nasal Mask is made of a superior silicone material which is hypo-allergenic and has a longer work life than latex.

Nose Block Device allows the diver to block the nose to equalize the ears.

Gas Supply Non-Return Valve prevents loss of gas pressure in the event of umbilical damage, preventing a "squeeze".



SuperFlow® 350® Demand Regulator provides adjustable, easy breathing for hard work.

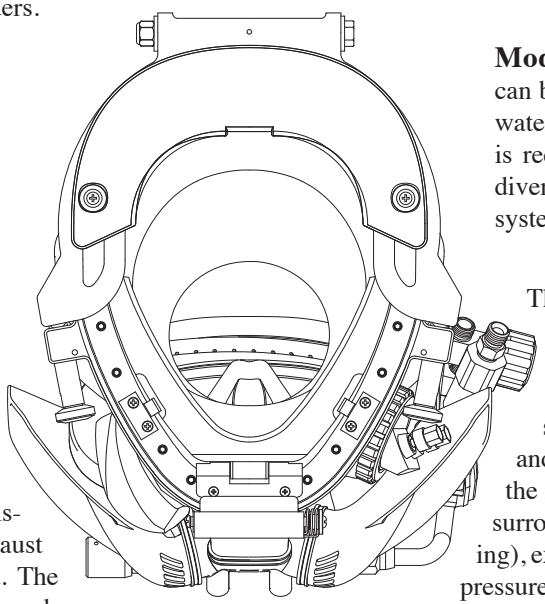


Positive-Lock™ Latch System

The latch catches consist of two spring loaded sealed pull pins which are pulled forward to release the locking collar and neck dam system. Even when the latches are released, the neck dam maintains a positive seal and will not allow the seal to be broken until the locking collar actually clears the diver's shoulders.

Neck Dam/Neck Ring Assembly secures the helmet to the diver's head and positively prevents accidental removal.

Neck Dam Swing Catch
The Swing Catch rotates out of the way to allow the neck dam assembly to be unsealed from the helmet. This simplifies getting out of the helmet.



Modular Communications System can be either bare wire posts as shown or a waterproof connector. The waterproof type is recommended when a "round robin" or diver/tender both mics "on" communications system is used.

Quad-Valve™ Exhaust System
The new Patents Pending Quad-Valve™ Exhaust System has less breathing resistance than the older single valve exhaust while providing an extremely dry hat. The entire exhaust system and Whiskers™ are made of a chemical resistant compound and are quite robust.

The **Quad-Valve™** is a very important advance in design. It provides a separate exhaust chamber after the exhaust gases exit the regulator. This traps any small drips of water within this chamber and ejects them, keeping the interior of the regulator very dry and isolated from the surrounding water. The unique, (patent pending), exterior channeling creates a relative low-pressure area on the exterior of the exhaust valve. This low-pressure area lowers the work of breathing and adds another barrier to water leaking in.

 Document #140204001

⚠ CAUTION

The user can not:
• remove the mark from the frame of the helmet;
• modify or counterfeit the data reported on the mark.

⚠ CAUTION

The mark must be visible and legible throughout the life of the PPE. If the mark deteriorates or is not legible the user should contact the manufacturer.

2.2.2 Notified Body

The Notifying Body is	Eurofins-Modulo Uno S.p.A.
Address:	Via Cuorgne, 21-10156 Torino, ITALY
Identification number:	0477

2.3 Product Specifications

Weight: 30.6 Pounds
Construction: Helmet Shell - Fiberglass, Polyester Resin, And Carbon Fiber.
Hardware - Stainless Steel, Chromed Brass, Polished Brass,
Control Knobs - ABS Plastic
Neck Dam - Latex
A Neoprene Neck Dam Is Optional.
O-rings - Buna-N
Head Cushion Bag - Nylon
Foam - #4 Polyester
Recommended Lubricants: Dow-Corning® Silicone Lubricant, and Christo-Lube® Krytox® And Halocarbon are also acceptable.

⚠ WARNING

When the helmet is used for air diving in countries that conform to C.E. regulations it must be used to a maximum depth of 164fsw (50msw). I.A.W. EN 15333-1.

⚠ DANGER

Never use any aerosol propelled sprays near the face port of the SuperLite®-17C. The Freon propellent 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 the helmet will flood and drowning may result.

2.4 Regulator Performance

2.4.1 SuperFlow® and SuperFlow® 350 Demand Regulators

The SuperFlow® 350 non balanced regulator is the standard demand regulator found on the SL-27, SL17K, SL17C, SL17B, KM-37, KM-37SS and KMB 18/28 Band Masks. **NOTE: Pre Sep. 2004 KMB 28 plastic frames will only except the smaller mount tube found on the SuperFlow® (non 350) regulator.** The SuperFlow® 350 is fully CE marked and CR rated. Breathing performance is greatly affected by the support equipment used, as well as the supply pressure to the helmet or mask.

2.5 Cage Code

The cage code for identifying KMDSI products for U.S. government purchase purposes is 58366.

2.6 Operational Specifications & Limitations

- Maximum depth on air - 220 fsw (67 msw) with the standard exhaust whisker assembly.

- Maximum depth on air - 100 fsw (30 msw) when equipped with the double exhaust whisker assembly*.

Work rate - moderately heavy - 62.5 lpm rmv.

-Umbilical minimum I.D. 3/8" (9.5 mm) of one continuous length (no splice), total length not to exceed 600 feet (182m).

-Required over-bottom supply pressure,
0-l00 fsw (0-30 msw), 115-135 psig (8-9.3 bar).
100-150 fsw (30-50 msw),135-225 psig (9.3-15.5 bar).
100-220 fsw (30-67 msw),175-225 psig (12.0-15.5 bar).

-Gas supply system capable of supplying 4.5 acfm (127.4 BL/min) to the side block assembly at depth.

-Temperature limitations: Use at water temperatures below 36° F requires use of hot water shroud and hot water.

The umbilical assembly should be composed of good quality diving hose that meets industry standards. Generally, gas hose will be married to the communications wire, pneumofathometer hose, and strength member in a manner that will allow the strength member to receive all the strain. There are also good quality umbilicals available that are assembled at the factory using a twisted method which does not require marrying. Regardless of the system used, the umbilical is the divers life line and should always be of excellent quality and maintained carefully.

⚠ WARNING

It is important for the user/diver to take excessive currents into consideration. The Quad-Valve™ Exhaust PN#525-759 is now standard on the SL-17C. Unlike the old latex double exhaust, the quad system is not limited to a maximum depth of 150 FSW (46 msw) due to exhalation pressure.

⚠ WARNING

The demand regulator and side block assemblies have a maximum design pressure of 225 p.s.i.g. (15.5 bar) over-bottom. Higher pressures could lead to component failure and serious personal injury.

⚠ DANGER

Decompression diving always involves the risk of decompression sickness. Omitted decompression due to loss of gas supply or other accidents can cause serious injury or death. Use of a SuperLite® 17C cannot prevent this type of injury.

⚠ WARNING

Gas systems used to supply Kirby Morgan helmets and masks must be capable of supplying gas to the diver at the required pressure and flow rates as stated in the operational specifications. The use of unregulated gas sources is extremely dangerous. The use of standard SCUBA type regulators is unacceptable, as there are no provisions for adjusting the intermediate pressure to the diver. Only proven systems that allow for varying the gas supply pressure to the diver should be used for umbilical diving.

2.7 Helmet Features

The SuperLite®-17C helmet is 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. The following is a description of the features of the SuperLite®-17C for those who are familiar with the SuperLite®-17A/B:

1) The fiberglass shell remains unchanged in the front where the face port (or view port), demand regulator and water dump valve are located. The side block and bent tube assembly that transports air/gas to the demand regulator from the side block are the same as the SuperLite®-17A/B. Most of the components in these areas are interchangeable between the 17A/B and the 17C.

2) The bottom of the 17C fiberglass helmet mates with a metal ring that is installed at the factory. This metal ring receives the neck dam ring which seals to the helmet with an O-ring. The seal is very air/water tight. The metal bottom of the 17C is more durable in normal use, but care should be taken not to hit about the helmet bottom on the deck.

3) The neck dam on the 17C is positioned between the neck dam rings, securely holding it in place. Replacement neck dams install easily. Latex or foam neoprene neck dams are available.

4) When the neck dam/neck ring is locked into place on the helmet neck ring, it is located up inside of a protective metal receiving shroud (that the neck ring O-ring seals to) which protects the neck ring and neck dam from side impact damage during the dive.

5) The neck dam design (latex and neoprene) has been changed to help position the helmet correctly

and be more comfortable. Replacement neck dams should only be genuine Kirby Morgan neck dams to assure proper operation and comfort. A front yoke is positioned on the neck seal ring. It, along with the design of the new neck dams, holds the 17C in position and prevents the front of the hat from riding up.

6) A new locking collar design holds the neck ring in the sealed position. It is not necessary for the locking collar to exert an upward pressure on the neck ring to maintain a seal. The O-ring seal is continuous once the neck ring enters the helmet ring.

7) Attached to the locking collar is an adjustable neck pad that should be adjusted to the diver prior to diving. This will improve the fit and performance of the 17C.

8) Two sealed pull pin locks are on the 17C. One lock is located on each side of the helmet. The spring and sliding shaft of these locks are inside an O-ring sealed shaft. The interior of the shaft is filled with silicon fluid. No fine sand or other debris can reach the interior of these locks to interfere with their operation.

9) A head cushion attaches just inside the bottom of the helmet, keeping it better in place when the diver dons the hat. The design of the head cushion is different from the 17A/B. The 17A/B head cushion should not be used in the 17C. Only genuine Kirby Morgan 17C head cushions should be used to assure proper operation and comfort.

10) A handle is fitted to the top of the 17C. The port and starboard mounting brackets for lights, TV cameras, etc. are provided for this purpose.

11) Only one balancing weight is required on the 17C. This weight is located on the lower front port side of the helmet. This weight balances the side block assembly which is located on the opposite (starboard) side of the hat. This weight is not on the 17CR (Reclaim) model of the 17C. The 17CR is equipped with the Divex Jewel® reclaim regulator which balances the helmet without the weight.

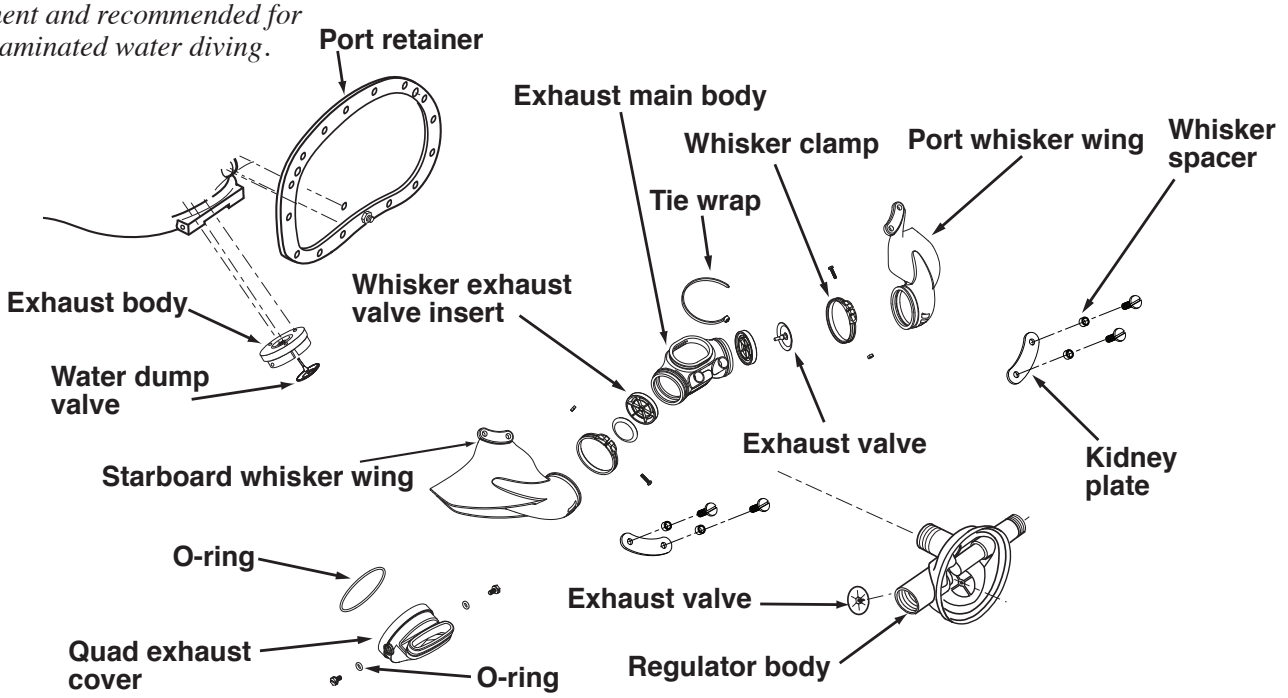
12) A High Flow Auxiliary Valve Assembly comes on the 17C. Although it replaces the older valve assembly and will install on all past Kirby Morgan masks and helmets, the internal parts are not interchangeable. The new valve has increased flow capacity.

13) Many of the parts on the SuperLite®-17C® are interchangeable with our SuperLite®-17A/B®, the SuperLite® 27®, the Kirby Morgan Band Mask® 18 and the Kirby Morgan Band Mask® 28. This helps reduce inventory costs for diving companies.

It is our hope that the SuperLite®-17C will provide an improvement to your diving.

Kirby Morgan Dive Systems, Inc. (KMDSI) has a worldwide dealer network that makes it possible to get parts or your SuperLite®-17C almost anywhere in the world.

The Quad-Valve™ Exhaust is standard equipment and recommended for contaminated water diving.



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.

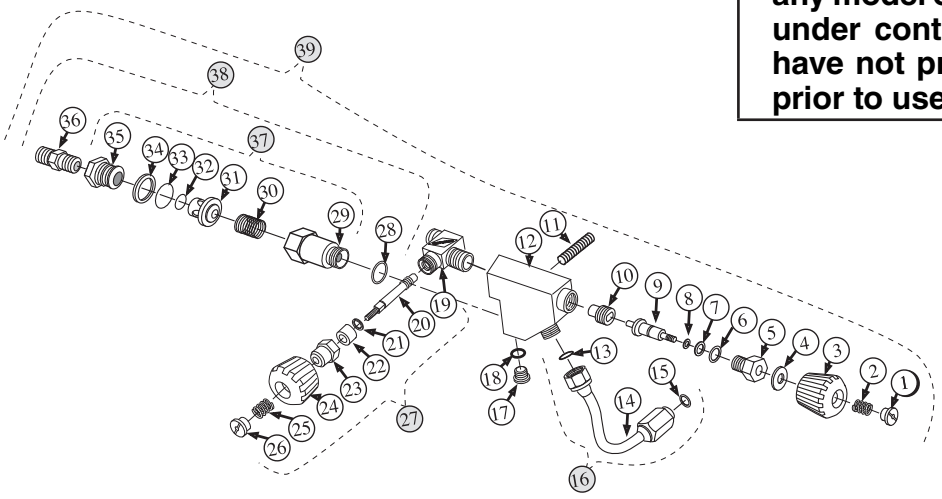
The double exhaust was replaced by the Tri-Valve™ and subsequently by the Quad-Valve™ System. The unique design of the Quad-Valve™ helps keep exhalation resistance low while maintaining excellent watertight integrity.

⚠ WARNING

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.

The Quad-Valve™ exhaust system is now standard equipment for the SL-17C. This superior exhaust system has exceptionally low exhalation resistance, and helps to keep the helmet free of contaminants in polluted water. The Quad-Valve™ is the first exhaust that isolates the breathing system from the surrounding water with a four valve, low breathing resistance design, (Patents Pending).

Fig. 2.2 - Components of the "B" Side Block Assembly



⚠ 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 Quad-Valve™ Exhaust system will help prevent water intrusion when diving in heavy currents, up to 5 knots. Unlike the old double exhaust, the Quad-Valve™ does not limit the diving depth.

The Quad-Valve™ is designed to couple the regulator exhaust with the helmet main exhaust and route them into a single plenum chamber, mounted between the regulator body and main exhaust body. The exhaust gas then must pass through either one of two (or both) exhaust valves that are part of the bubble deflector (whisker). By having an exhaust valve in both sides of the bubble deflector, exhalation resistance is minimized, while still helping to maintain the isolation of the main helmet and regulator exhaust valves.

⚠ WARNING

This manual is our effort to explain the operation, maintenance and use of the SuperLite®-17C. We do not herein make any effort to teach the principles of diving. It is our assumption the reader is a qualified diver. We highly recommend that all divers should train in the use of any model of commercial diving helmet, under controlled conditions, that they have not previously used or trained in prior to use on the job.

2.8 SuperLite®-17C Configuration

The SuperLite®-17C is manufactured in one configuration. The SuperLite®-17C side block assembly receives the main and auxiliary gas supplies from hoses that run over the diver's shoulder.

2.9 Design Purpose

The SuperLite®-17C is designed for use with an umbilical.

⚠ WARNING

Only under very controlled conditions, i.e., non-moving water (such as swimming pools or calm lakes), should this helmet be used with a self contained gas supply. There is no provision for surface swimming once the SCUBA air supply is depleted. Adequate support personnel for the conditions should be assisting the diver to assure his/her safety.

The umbilical is usually composed of at least a gas or air supply hose and communication wire, assembled with tape (and in some umbilicals wound similar to strands in a rope) to form a single unit. Some umbilicals also have included a hose for hot water, a pneumofathometer hose, and a strength member, such as a cable or strong line. On the SuperLite®-17CR (Reclaim) a return hose for reclaimed exhaust gas is included. The umbilical is the diver's lifeline to the diving control station.

The diver must be tended at the surface at all times by a trained, qualified commercial diving tender. Never dive alone!

The diving control station can be at the surface, in a diving bell, or out of a submerged habitat. The diving control station is the center of the air/gas supply, communications with the diver, and diving procedures. The station can be as simple as a tender with a set of "phones" (communication amplifier), or as complex as a control van in the midst of a saturation system.

Kirby Morgan Dive Systems manufactures a complete KMACS-5 with integrated communications and pneumofathometer. This portable systems can be operated on either a high pressure air supply or on a low pressure compressor. The KMACS-5 has specially designed high pressure regulators that reduce high pressure air and provide an adequate flow to support divers to a depth of 130 FSW.

2.10 General Description

2.10.1 Helmet Shell/Metal Helmet Ring

The helmet shell is fabricated of noncorrosive, rigid fiberglass 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. Any repair to the helmet shell must be done at an approved KMDSI repair center.

A machined, chrome plated, brass helmet ring is attached to the base of the helmet shell at the KMDSI factory and should not be removed by anyone other than the factory or a KMDSI approved repair center. The Helmet Ring provides the sealing surface for the neck dam ring.

2.10.2 Gas Flow Systems

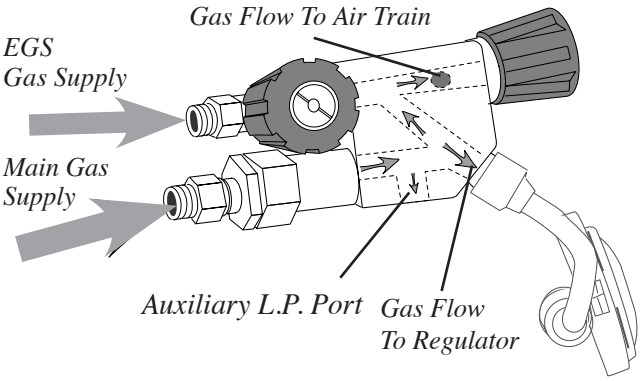
The main gas supply flow from the umbilical enters the system at the adapter and flows through the one way valve to the interior of the side block. The one way valve or "non-return" is a very important component.

⚠ DANGER

Never attempt to remove or service the chromed ring on the base of the helmet shell. Improper servicing of this ring can lead to helmet flooding and death.

The one way valve prevents the flow of gas out of the helmet to the umbilical in the event of a sudden lowering of pressure in the umbilical. This can happen due to an accidental break in the hose or a fitting near the surface. Not only would the Auxiliary gas be lost if the one way valve failed (concurrent with a hose or fitting break on deck), but the diver could suffer from a serious "squeeze" that could cause injury or death.

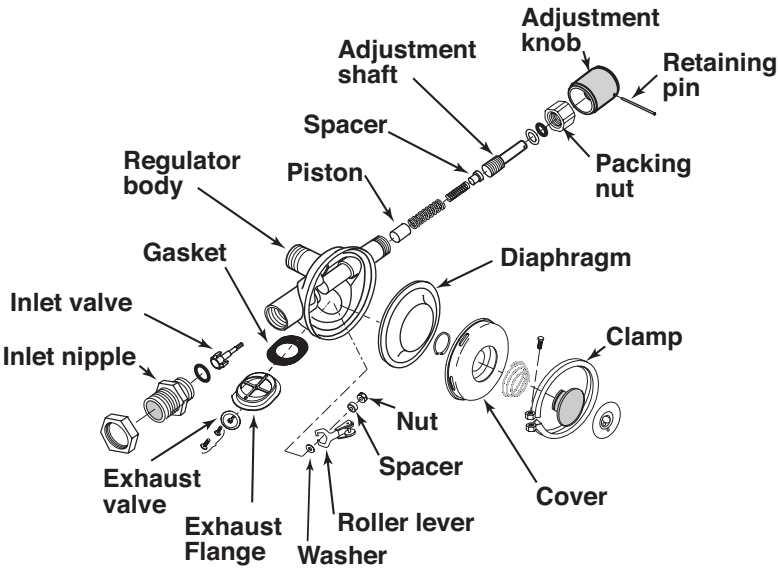
Although we have selected the valve for its reliability and quality, inspection and maintenance of this valve must be done regularly. It is very easy to disassemble and inspect. (A rebuild kit for this valve is Part #525-330).



⚠ WARNING

The one way valve must be tested daily, prior to the commencement of diving operations. Failure of one way valve could cause serious injury or death. Follow the procedures for testing the valve in 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 when the diver turns the control knob on. The flow then enters the side block.



The SuperFlow® 350 Demand Regulator

⚠ DANGER

Never connect the main gas supply hose from the diving station/umbilical to the auxiliary valve. There is no one way valve in the emergency gas valve. If this mistake is made, any break in the supply hose could possibly result in a "squeeze". This could result in serious injury or death.

Both sources of gas flow through the same passage in the side block body to three exits. One exit is always open to supply gas to the demand regulator assembly. The second exit is to the defogger valve (also known as the free-flow or steady-flow valve) assembly. The third is to the port on the side block to connect a dry suit inflator hose.

The diver controls the flow of gas through the defogger system with the control knob. The gas enters the helmet and flows through the air train which directs the gas onto the face port to help eliminate or clear fogging that forms on the port from the diver's warm breath.

The gas flow continues out through the water dump (helmet exhaust) valve, or into the oral nasal mask by means of the oral/nasal valve. The diver can breathe from this flow of gas if the demand regulator malfunctions. The gas then flows into the regulator and out through the regulator exhaust into the exhaust main body of the Quad-Valve™ exhaust. From there it can exit through either of the exhaust valves and out through the whiskers.

Returning to the side block assembly: the other passage for gas is to the demand regulator. It goes to a bent tube assembly that connects to the inlet nipple of the demand regulator. The flow of gas in the demand regulator assembly is controlled by the inlet valve that supplies gas to the diver on inhalation "demand" only, and shuts off during the exhalation cycle.

The SuperFlow® demand regulator senses the start of the divers inhalation and opens the inlet 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, the supply gas stays off as the exhalation gas flows through the regulator body, out the regulator exhaust valve, through the whisker, and out into the water. The whisker deflects the exhaust bubbles away from the face port to keep the diver's view clear.

All KMDSI Helmets and Band Masks are equipped with a multi-turn demand regulator adjustment knob. This adjustment knob allows the diver to make corrections to compensate for a wide range of incoming gas supply pressures.

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 13 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. The exact number of turns required is dependent on the supply pressure.

⚠ CAUTION

The regulator adjustment knob should be adjusted to the easiest breathing setting at all times. Adjusting the regulator further in than necessary to keep from free-flowing increases breathing resistance.

⚠ CAUTION

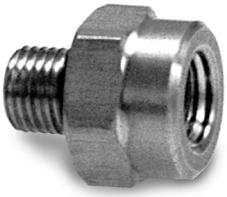
Diving a KMDSI helmet or bandmask with a bias setting greater than that just necessary to keep the demand valve from free flowing increases the work of breathing and reduces the diver's ability to perform heavy work.

The side block on the helmet 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 ⅜-24 thread orifice, standard for American first stage scuba regulator's low-pressure auxiliary fittings. The port is shipped plugged 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.

Low pressure hoses may be connected to the side block.



The KMDSI Restrictor Adaptor, KMDSI Part #555-210.

⚠ WARNING

When using the side block low pressure inflator port, the diver should only use high quality hoses with an integrated flow restrictor or a KMDSI flow restrictor PN# 555-210. All hoses must have an in-line restrictor to reduce the gas flow in the event of hose failure.

Do not use fitting adapters. Standard adapters do not provide an adequate flow restriction. The use of many off-the-shelf adapters on the side block assembly could expose the low pressure hose fittings to excessive stress. Any failure of an inflation hose will subject the diver to a decreased supply pressure.

2.10.3 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 Supply Valve (EGS).

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.

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.

⚠ 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, with possible serious injury or death.

The over-pressure relief valve should be installed on every first stage used for bailout.

KMDSI Part #200-017

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

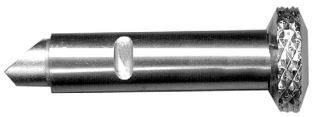
2.10.4 Helmet Attachment to the Diver

On the SL-17C, the ring on the base of the helmet shell has a machined O-ring sealing surface. The O-ring that seals against this surface sits inside the neck dam ring assembly. The neck dam ring is actually a two part ring, consisting of the upper split ring and the lower stepped ring. The neck dam is captured (sandwiched) between these parts.

The locking collar and neck pad assembly has a smaller opening than a diver's head so the helmet is almost impossible to accidentally dislodge. The neck pad pushes against the neck dam and lower portion of the head cushion firmly securing the helmet to the diver's head. The neck pad also helps prevent neck dam ballooning. Each diver must personally adjust the fit on his helmet by adjusting the neck pad, as well as the head cushion. All of these parts together help provide a good fit.

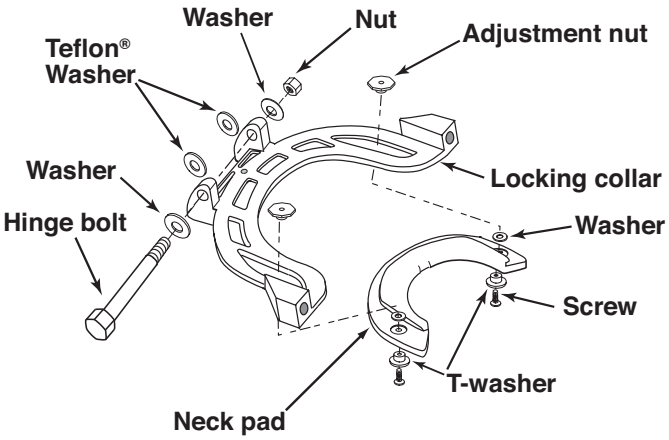
On the SL-17C, both sides of the helmet locking collar have a latch catch block to receive the locking sealed pull pins. If the sealed pull pins are turned to the locking position while the locking collar is open, the locking collar will snap into the locked position when it is pushed up into the helmet neck ring. The sealed pull pin on each side must be pulled to release the locking collar to remove the helmet. This system provides an extremely secure method of attaching the helmet to the diver.

A special locking sealed pull pin filled with silicone fluid helps to prevent fine sand or mud from entering the mechanism and helps to avoid jamming.

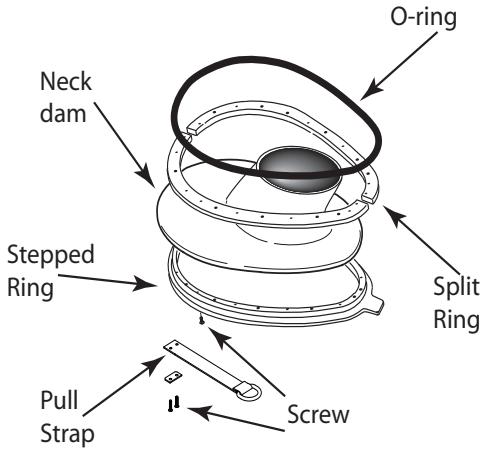


The locking sealed pull pins can only be serviced by KMDSI or an authorized dealer.

The head cushion 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.



The Locking Collar Assembly.



The neck dam assembly.

The relationship between the locking collar assembly, head cushion, chin cushion, and helmet shell all affect the fit of the SL-17C.

⚠ WARNING

The locking sealed pull pins should only be serviced by KMDSI technicians that have been trained in pull pin overhaul. Pins serviced improperly could result in the helmet becoming detached, which could result in injury or death to the diver.

⚠ CAUTION

The fit of the SL-17C is partially determined by the adjustment of the neck pad. If the neck pad is not properly adjusted it may be very uncomfortable on the diver's neck. Take the time to adjust the neck pad properly and check the fit prior to each dive to ensure the adjustment has not changed.

2.10.5 Sealing Arrangement

The neck dam, available in several sizes, is fabricated from latex in a cone shape. An optional neoprene neck dam is also available. The neck dam seals against the diver's neck. The fit of the neck dam may be made large by trimming the neck dam. The neck dam should fit snugly. The molded rubber of the latex dam provides a superior fit and seal. For divers who prefer foam neoprene, an optional neck dam of this material is available.

2.10.6 Reducing Carbon Dioxide

It is important to reduce the volume of air/gas space that the diver is breathing through. Carbon dioxide can build up if proper flushing does not occur. A rubber oral nasal mask is located inside the helmet to fit over the diver's nose and mouth. The oral nasal attaches to the regulator mount nut. This separates the breathing gas flow from the larger gas space on the interior of the helmet, and this in turn reduces carbon dioxide buildup.

⚠ WARNING

Always be sure the oral nasal valve is properly mounted in the oral nasal mask. If the valve is mounted improperly or is absent this can lead to a higher CO2 level inside the helmet. A higher CO2 level can cause dizziness, nausea, headaches, shortness of breath, or blackout.

2.10.7 Communications

The SuperLite®-17C communications system is very simple; the left earphone with the longer wire, and the right earphone with the shorter wire, are wired in parallel with the microphone to the terminal block. A male waterproof connector assembly is also wired to this terminal block. This assembly attaches to the female end on the umbilical.

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.

2.10.8 Equalizing the Sinuses and Inner Ear

A nose block device allows the diver to block his 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.

2.10.9 Face Port or Viewing Lens

The face port or viewing lens, is extremely strong polycarbonate plastic.

The port retainer is easily removable for replacement of the lens. An O-ring, located under the lens, seals the lens to the fiberglass helmet shell.

⚠ DANGER

Never use any aerosol propelled sprays near the face port of the SuperLite®-17C. The Freon propellent 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 the helmet will flood and drowning may result.

2.11 Locking Sealed Pull Pin

A special locking sealed pull pin has been designed for the SuperLite®-17C, similar in principle to the "dummy pin" used on old heavy gear (or "standard") helmets. This sealed pull pin is filled with silicon fluid and sealed with two O-rings at the factory. Fine sand or other substances that could interfere with the movement of the internal spring and shaft cannot

enter the mechanism, preventing possible jamming of this locking device.

2.12 Eye Protection For Welding

The welding lens assembly (part #525-403) may be installed on the port retainer using the pre drilled and tapped holes that are provided. These holes are plugged with blanking screws when a new helmet is shipped from our plant. The weld lens itself is standard 2 × 4 ½ inches, identical to the lens size used in topside welding hoods. It may be replaced quickly without tools by means of a stainless snap ring, part # 535-901

Installation of the weld lens assembly

⚠ CAUTION

Be sure to use only the specific mount screws provided with the weld lens assembly. Longer screws can damage the port retainer mounting inserts and cause the face port O-ring to leak. (See Appendix 1)

2.13 Hot Water Shroud

Kirby Morgan Dive Systems, Inc. manufactures a hot water shroud kit for the SuperLite®-17C. The shroud completely encases the side block, bent tube assembly, and demand regulator to provide efficient gas heating for especially deep or cold dives. Heating the diver's breathing gas is especially important in cold water or when breathing mixtures of helium and oxygen.

The hot water shroud can also be used as a sealed unit, filled with a hypersaline solution, when there is no continuous hot water supply available. Many research divers have used the shroud in this way for diving in the Antarctic. The part number for the hot water shroud kit is KMDSI Part #525-100.

Installation of the Hot Water Shroud.

2.14 Importance Of Proper Maintenance

Although the SuperLite®-17C is a rugged piece of equipment, proper care and maintenance is essential. The demand breathing system is simple in design but will not operate properly if not maintained on a regular basis. Normal wear requires periodic internal adjustment to the regulator. The interior should be inspected and cleaned at regular intervals (See "Chapter 6 General Preventative Maintenance" on page 57). This will assure the diver easy breathing.

2.15 Special Regulator Tools

Three special tools are available for internal adjustment of the demand regulator assembly; the inlet valve holder, regulator adjustment wrench, and socket wrench. These three wrenches make regulator adjustment much easier. A tool kit pouch made from durable material, 600 × 600 Denier Polyester, and large enough to fit all the tools that are currently in either Kirby Morgan tool kit (P/N 525-620 or 525-768) is available.(KMDSI Part #525-613).

The KMDSI Regulator Adjustment Tool Kit, KMDSI Part # 525-620.

2.16 Helmet Transport And Storage

- The kind of package is a cardboard box with air filled pillows with styrofoam inserts to stabilize the helmet;
- The weight of the box is usually 40 pounds (18 Kg);
- The package dimension is 18 × 18 × 15 inches (460 × 460 × 380 mm);
- One helmet is packed per box;
- The helmets are sent to dealers by plane and truck. Depending on how the dealer wants it sent.

Packaging Step 1

Packaging Step 2

Packaging Step 3

Packaging Step 4

Packaging Step 5

Packaging Step 6

2.16.1 Helmet Carrying Bag

To help protect your SL 17, the helmet carrying bag should be used to transport and store your helmet between jobs.

The KMDSI Helmet Bag, Part #500-901.

The KMDSI bag is made from extra heavy duty, black, ripstop nylon. The bottom of the bag is padded for additional protection. Grommeted drain holes allow the bag to breathe. The bag is also equipped with large carrying straps and side pockets. The bag is not intended for shipping your helmet as air cargo.

2.17 Use of Kirby Morgan Original Replacement Parts

Users of Kirby Morgan life support equipment are cautioned to always use Kirby Morgan original replacement parts. Parts manufactured by third party companies can cause accidents.

KIRBY MORGAN ®

Look for the Kirby Morgan logo on Kirby Morgan products. This is your assurance that you are getting genuine Kirby Morgan replacement parts.

Chapter 3
Operating Instructions

⚠ WARNING

This manual is our effort to explain the operation, maintenance and use of the SL 17C. We do not herein make any effort to teach the principles of diving. It is our assumption the reader is a qualified diver. We highly recommend that all divers should train under controlled conditions, in the use of any commercial diving helmet that they have not previously used, or trained in, prior to use on the job.

3.1 Introduction

This section provides advice on how to use the SL-17C. The use of these diving helmets will vary with the type of work and environmental conditions. The basic procedures of donning and removing these helmets will be similar for every job.

A proper training program in a calm, clear body of water should be undertaken. If the diver has not used the SL-17C before, he must not dive with these helmets without proper training.

However, divers that are familiar and trained in the use of previous Kirby Morgan masks; i.e., KMB 8, 9, 10, 18, 28, the Navy MK. 1 mask, Navy MK. 21 helmet, or the Navy Mk. 22 mask or the SuperLite® helmets, will find that all Kirby Morgan diving helmets and masks have the breathing system controls located in the same position. The operation of this helmet will also be similar. The diver must be tended at the surface at all times by a trained, qualified commercial diving tender.

3.2 Design Purpose

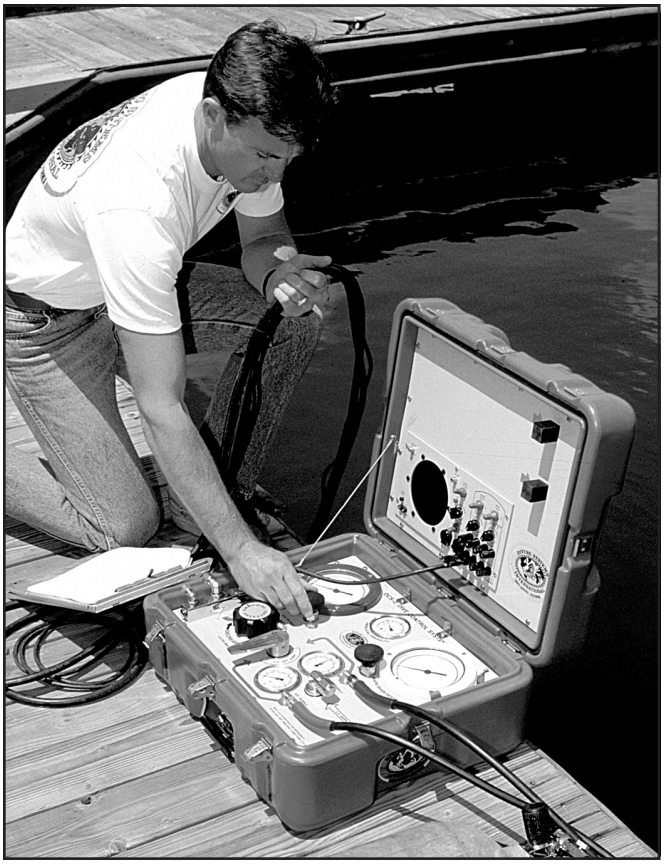
All Kirby Morgan diving helmets are designed for use with an umbilical.

The umbilical is usually composed of at least a gas or air supply hose and communication wire, assembled with waterproof tape (and in some umbilicals wound similar to strands in a rope) to form a single unit. Some umbilicals also have included 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 umbilical be married to a strength member in a manner that allows the strength member to receive the strain. This will help reduce the possibility of umbilical and umbilical fitting fatigue and possible failure.
The umbilical is the diver's lifeline to the diving control station.

⚠ WARNING

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



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

The diver must be tended at the surface at all times by a trained, qualified commercial diving tender. Never dive without a qualified tender holding your diving hose.

The diving control station can be at the surface, in a diving bell, or in a submerged habitat. The diving control station is the center of the air/gas supply, communications with the diver, and diving procedures. The station can be as simple as a tender with a set of "phones" (communication amplifier), or as complex as a control van in the midst of a saturation system.

⚠ WARNING

Decompression diving always involves the risk of decompression sickness. Omitted decompression due to loss of gas supply or other accidents can cause serious injury or death. The use of the SL-17C cannot prevent this type of injury.

KMDSI manufactures a complete Air Control System, the KMACS 5™ with integrated communications and pneumofathometer. This portable system can be operated on either a high pressure air supply or on a low pressure compressor. The Air Control System has a specially 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)

The helmet demand regulator and side block assemblies have been designed to operate with a supply pressure from 130 p.s.i.g. (8.8 bar) over ambient pressure to 225 p.s.i.g. (16 bar) over ambient pressure. This wide operating range allows flexibility when using various gas supply systems.

When using a high-pressure console, for maximum breathing performance it is desirable to maintain an over bottom supply pressure of 150-165 p.s.i.g. (10.2 bar) when diving to depths of 100 fsw (30 msw), and 175-200 p.s.i.g. (11.2-13.6 bar) over bottom when diving to depths in excess of 100 fsw (30 msw). With the many different gas supply console configurations in use, it is important to ensure that the gas supply system used, is capable of supplying the helmet with the necessary pressure and flow of gas to allow the diver to work safely and efficiently. See "Appendix 3 Table 3 SuperFlow® / SuperFlow® 350 Regulator High Pressure Regulated Source" on page 143 as a guide to supply pressure requirements.

⚠ WARNING

High pressure supply regulators and associated piping systems for surface supplied diving with Kirby Morgan helmets and masks must be capable of delivering a minimum of 4.5 acfm to the diver at depth. Only systems that can deliver the required gas flow should be used.

When using a low-pressure compressor (200-225 p.s.i.) follow the recommendations in "Appendix 3 Supply Pressure Requirements & Tables" on page 140 for optimum performance.

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

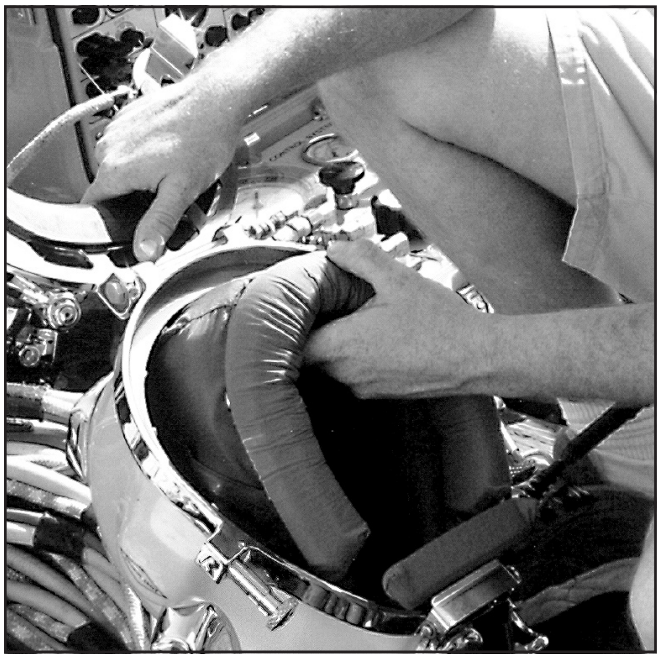
3.3 First Use of Your Kirby Morgan Diving Helmet

When you first receive your Kirby Morgan 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. 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.

3.4 Initial Adjustments to Your Helmet

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.



The head and chin cushions are easily removed.

3.4.1 Head Cushion

The fit of the head cushion is critical to both comfort and safety. In general the head cushion should be snug fitting and help hold the helmet to your head. The head cushion should also be adjusted so that it assist in the proper fit of the oral nasal mask to the face.

⚠ WARNING

Never dive with a Kirby Morgan helmet without a properly functioning oral/nasal mask. Without an oral/nasal, dangerous levels of carbon dioxide may accumulate in the helmet. This can lead to unconsciousness and death.

The head cushion is part of a helmet cushion system that includes the head cushion, the head cushion foam spacer and the chin cushion.

3.4.1.1 Head Cushion Removal

1) Remove head cushion from helmet.

2) Open zipper on head cushion and remove old foam. You may want to keep the old foam for sizing reference later. Clean out any old foam particles.

3.4.1.2 Clean and Inspect

1) Clean head cushion bag using mild soap and water. Rinse thoroughly and hang dry.

2) Inspect head cushion bag to ensure that there are no rips or tears in the materials and that the sewing and zipper are still in good working condition. Replace if needed; order head cushion bag.

3.4.1.3 Stuffing

1) Read "3.4.1.4 Head Cushion Adjustment" on page 27 of these instructions first.

2) Compare to old foam and trim for adjustment.

3) Stuff head cushion.

3.4.1.4 Head Cushion Adjustment

Fit test (follow these instructions if refitting or resizing the head cushion.

Note: *The head cushion system consists of three separate components. The head cushion, the head cushion foam spacer and the chin cushion.*

1) Snap the chin cushion in place on the helmet.

2) Start with a new head cushion. Snap the head cushion into the helmet and try the helmet on.

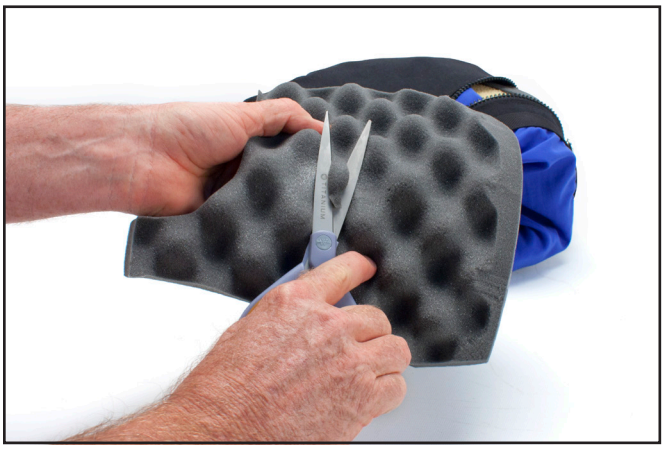
Note: For divers with smaller sized heads, install the head cushion foam spacer before installing the head cushion into the helmet.

Note: Make sure the neck pad on the locking collar is adjusted correctly and also check the fit of the head cushion with the locking collar in the closed position.

3.4.1.5 Foam Trimming tips

Note: The side foams do not have ear holes. This is intentional. Ear holes may be cut in if preferred. Trim Foam for adjustment.

The tips of the "egg shell" side can be trimmed off if the side foams are too tight.



The chin cushion can also be trimmed for comfort if needed.

3.4.1.6 Foam Stuffing Tips

There is no one way of stuffing the head cushion. Different combinations of foam can be set up and foam can be trimmed depending on desired fit.

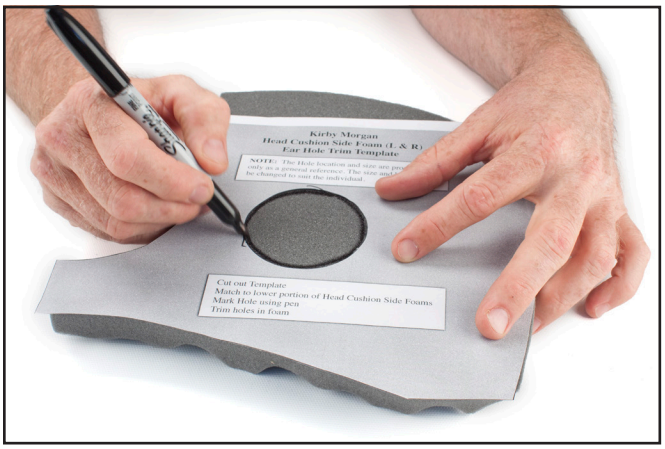
1) The neck pad block can go on either side of the top foams, against the neck or against the helmet shell or, the neck pad block can be removed.

1 or 2 pieces of top foam may be used

The "egg shell" side of the Left & Right Side Foams usually faces outward against the Helmet Shell.

Earphone holes may be cut into the side foams if desired (see drawing "Ear Hole Trim Template" on page 29 for general size and location)

3.4.1.7 Adding Earphone Holes to the Head Cushion

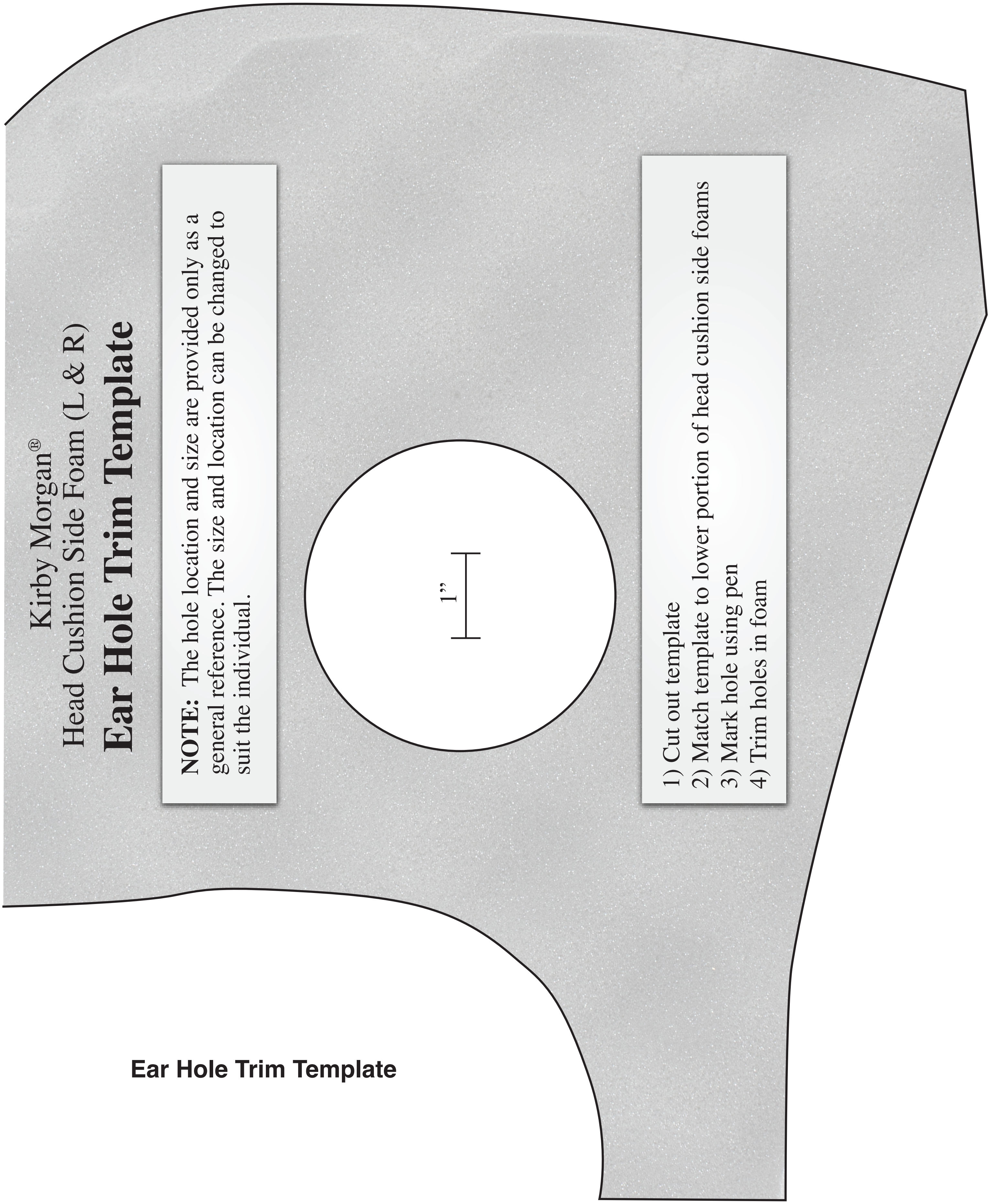


No earphone holes are included on the side foams. These may be trimmed in if desired. Using the template for general size and location, mark the desired area for cut out.

Trim the ear hole into the foam using the guide line made from the Ear Hole Template

3.4.2 Head Cushion Foam Spacer (HCFS)

The head cushion foam spacer (HCFS) is a simple length of foam that is nested into the head cushion.



Ear Hole Trim Template

The spacer helps properly position the top and back of the head in the helmet by using a larger foam piece in the lower neck area which helps push the head forward, and the nose and mouth into the oral nasal mask.

3.4.2.1 Installation of Head Cushion Foam Spacer (HCFS)

Note: In September of 2012 the head cushion foam spacer (HCFS) was upgraded with an elastic/Velcro strap at the top front part of the HCFS bag. This new feature is intended for use with head cushions P/N 510-754, or the 510-521 which will soon have the mating Velcro patches.

Note: If using the HCFS with P/N 510-682 or a P/N 510-521 without a Velcro patch, the elastic/Velcro strap can simply be folded over the top front portion between the head cushion and the helmet shell, or it may be trimmed off if desired.

1. Install the HCFS into the top inside portion of the head cushion. Wrap the elastic/Velcro strap around the front top edge and attach onto the mating Velcro patch in front of the hanging loop.

The tag on the HCFS and sewing seam should be facing the back against the head cushion

Align the front of the HCFS with the front edge of the head cushion, wrap the elastic/ Velcro Strap around to the top of the head cushion and secure.

Proper installation and alignment of the HCFS in the helmet.

3.4.2.2 Donning the Head Cushion Foam Spacer (HCFS)

Hold the HCFS towards the back of the helmet when donning.

⚠ CAUTION

Ensure that the HCFS is properly positioned against the back of the head/neck and does not get caught between the helmet ring and the neck dam rings when closing the helmet. Failure to do so could result in an improper seal.

3.4.2.3 Maintenance of the Head Cushion Foam Spacer (HCFS)

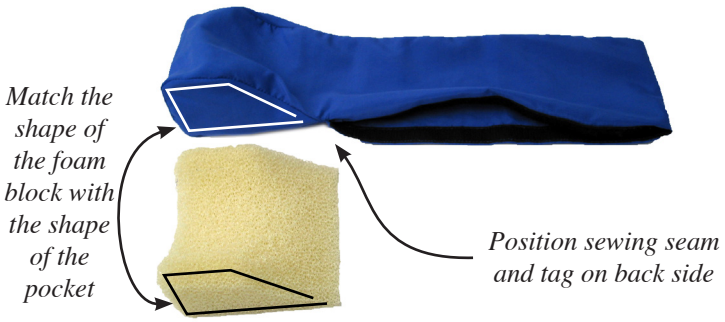
Daily: Post dive rinse with fresh water, air dry.

Periodic: Remove foam and fresh water rinse. Hand wash the HCFS bag using a mild soap, rinse with fresh water and air dry.

3.4.2.4 Stuffing the Head Cushion Foam Spacer (HCFS)

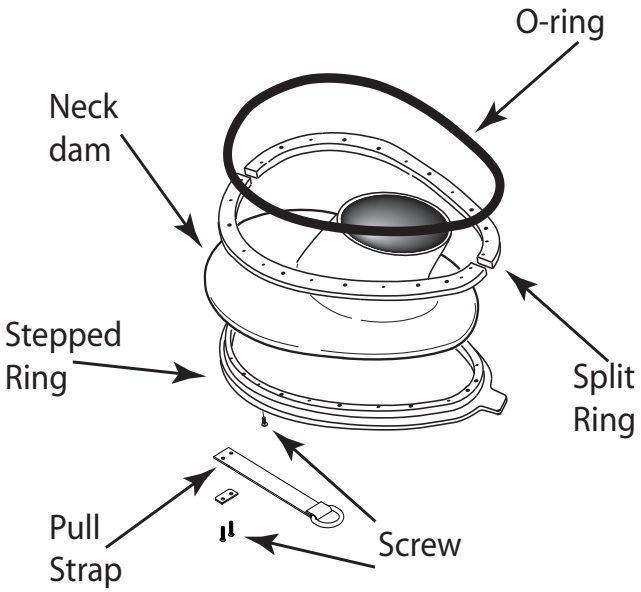
1. Stuff the neck foam block and top foam into the HCFS bag. Close the Velcro.

Note: Match the shape of the neck foam block with the shape of the HCFS bag.



3.4.3 Trimming the Neck Dam

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 will probably be too tight if not properly trimmed.



Neck dam components.

The neck dam must be trimmed to fit your neck. To trim the neck dam, have your tender hold the neck dam opening so that the two "edges" of the neck dam are parallel. The neck dam must be under slight tension but must not be stretched beyond its normal length. 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 tear.

⚠ WARNING

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

⚠ 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, then stretch it before use.

Trimming the neck dam.

Trim only ¼ inch off the neck dam at a time. When you are done, the neck dam must be just tight enough so that it does not leak. This may feel a bit snug out of the water, but should be comfortable underwater.

If you have a neoprene neck dam, it may also need to be stretched for it to fit properly. Trim the neck dam until it is still snug, then stretch it by sliding it over a Scuba tank and allowing it to sit overnight. If you still cannot get the proper fit by stretching the neck dam, it must be trimmed further. Do not trim more than ¼ inch at a time.

As the neoprene neck dam ages, it will become looser, due to a natural breakdown of the cells. This is particularly true if the helmet is locked in and out of a bell or saturation system. As the neck dam becomes worn it will need replacement to ensure that it seals properly.

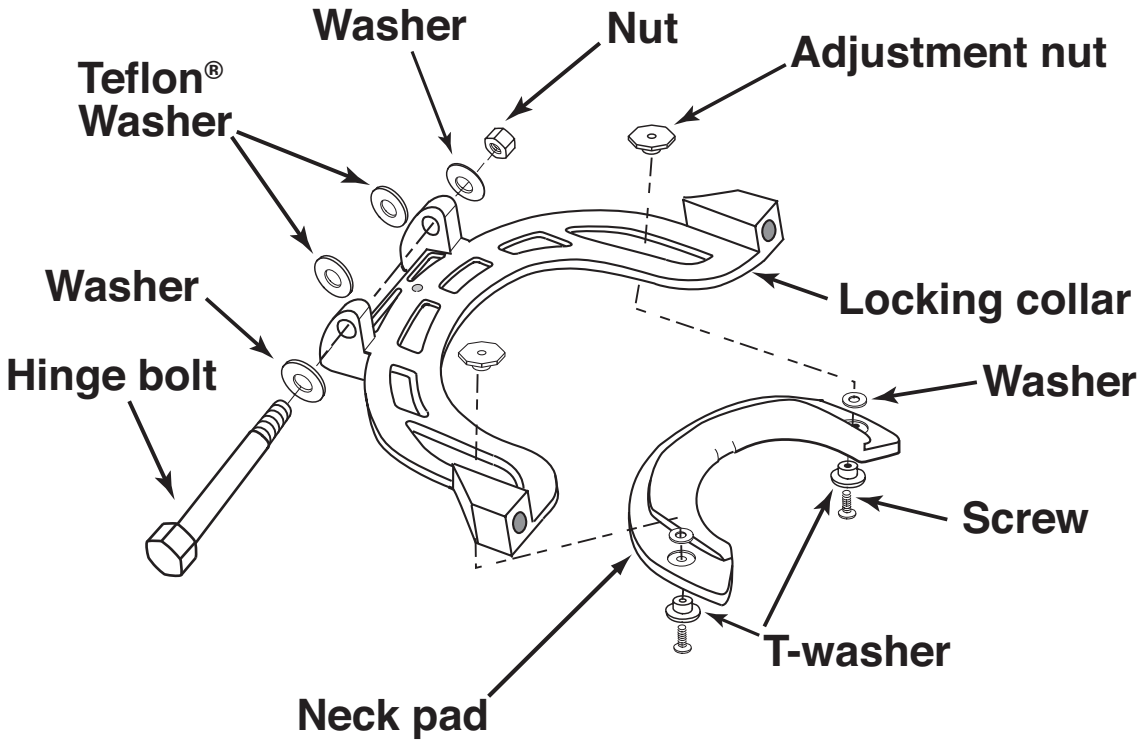
⚠ WARNING

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

3.4.4 Adjusting the Neck Pad

Another component that controls the fit of the SL-17C is the adjustable neck pad. The neck pad, which is mounted on the locking collar, slides back and forth along the locking collar body for adjustment to fit different divers. Two screws and mount nuts lock the neck pad plate to the locking collar. Loosening these screws from the mount nuts allows the neck pad to be adjusted.

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



Locking Collar components.

With the helmet face down on a suitable surface, pull and turn each of the sealed pull pins until they are locked open. Swing the locking collar/neck pad assembly out away from the base of the helmet. Slightly loosen the screws until the neck pad can slide back and forth. Be sure each of the head cushion snaps are attached to their corresponding fitting inside the helmet.

Pick up the helmet and pull the nose block device knob out fully. Position the helmet on your head so the oral nasal is in the proper position on your face, covering your nose and mouth. Turn the sealed pull pins to the locking position with the ridge on the pins engaging the notch in the sleeve and the pins fully retracted.

Tilt your head forward so the locking collar/neck pad assembly may be swung forward and locked up into its closed position. The sealed pull pins must snap into place on the locking collar.

Lift your head back up and slide the neck pad forward until it is snug but comfortable. Mark the position of the neck pad on the locking collar using an indelible marker. Pull the sealed pull pins out to their unlocked position and let the locking collar open.

Remove the helmet. Position the neck pad plate on the locking collar at the marked position and tighten the screws on each side. After the adjustment screws are tightened, don he helmet again, tilt your head forward and lock the locking collar/neck pad assembly. Move your head in various positions to make sure the pad is adjusted for comfort.

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

3.5 Pre Dress-In Procedure

Before dressing in for a dive, inspection of the helmet systems must be made to be sure it is in proper working order. This 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 maintenance.

3.5.1 Pre-Dive Visual Inspection

Visually inspect the exterior and interior of the helmet.

1) The demand regulator cover assembly should not be dented and the purge button must work.

2) The neck dam must not be torn or punctured, and properly trimmed to fit.

⚠ 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. Drowning could result.

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

⚠ WARNING

The O-ring on the neck dam ring assembly on the SL-17C must be in place and in good condition. It must be properly lubricated for smooth operation. Without a proper functioning O-ring the helmet will leak and possibly flood. Drowning could result.

4) Inspect the bent tube that supplies breathing gas to the regulator. There must be no dents or kinks in the assembly.

5) Inspect the face port. It must be in good condition.

6) Be sure the communications wires are hooked up and tested.

7) Inspect the oral/nasal mask. Make sure it is on the regulator mount nut properly and the valve is installed properly.

8) Inspect the sealed pull pin on each side of the helmet. They must engage and disengage properly.

9) Make sure the head cushion and chin cushion are properly fastened inside the helmet.

10) Check the screws on the port retainer . They must be adjusted to the proper torque setting specifications noted in "Appendix 1: Torque Specifications" on page 136 of this manual. Binder head screws are used in this application for their self locking characteristics. Overtightening may strip out the threaded inserts in the helmet shell.

⚠ WARNING

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

3.6 Preparing the Helmet for Diving

3.6.1 Clean Face Port

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

3.6.2 Check Moving Parts

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

3.6.3 Check Communications

Check the communications system for proper operation. Put the helmet on and talk to an assistant on the amplifier. If you are by yourself, with the helmet off take the helmet near the amplifier and tap on each earphone and the microphone, listening to the taps on the amplifier/speaker. Talk into the amplifier/speaker feeling the vibration on each earphone and the microphone with your fingertips. Check the fit and tightness of the comm module mount nut.

3.6.4 One Way Valve Check

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

1) Prior to attaching (or pressuring up) the umbilical, close the emergency valve knob, attach and pressure up the emergency hose. Shut off the defogger control knob and screw in the adjustment knob on the regulator all the way.

2) With the emergency hose pressurized, turn on the emergency valve knob. If any gas escapes out the end of the adapter, the one way valve is faulty and must be rebuilt or replaced. A one way valve repair kit is available for rebuilding these valves (Part # 525-330).

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

⚠ 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.

⚠ WARNING

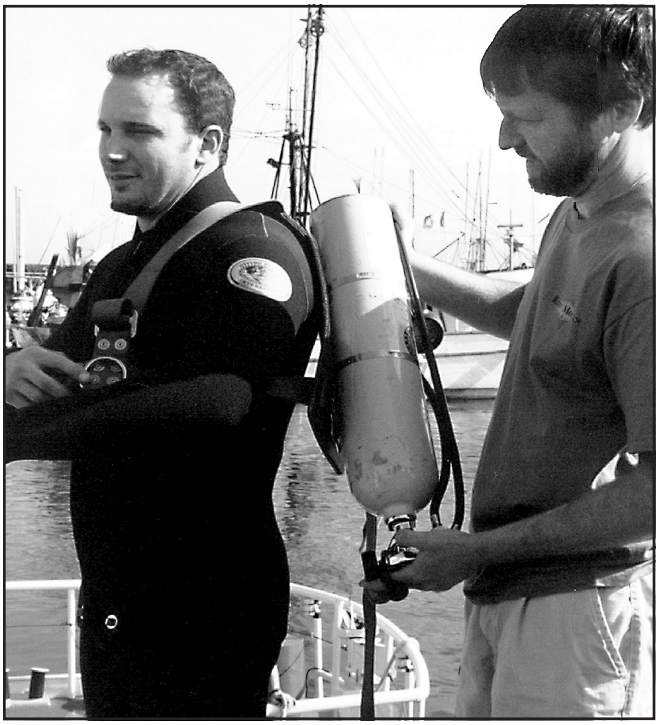
Never dive if the one way valve is not operating properly. If the hose or breathing gas/air fitting breaks near the surface a serious injury could result to the diver's lungs and/or eyes. In extreme cases this could be fatal. The one way valve must be tested daily prior to the commencement of diving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

3.7 Emergency Gas System (EGS)

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

⚠ WARNING

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



Diver donning a complete bail-out system.

Most commercial 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. Usually 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 emergency breathing gas to the diver.

⚠ WARNING

Never dive without attaching the umbilical to some type of harness or clip on the diver's body. Never allow the umbilical to pull on the helmet directly or the diver could suffer a neck injury.

The diving harness must have a provision for attaching the emergency gas supply and a place to attach the diver's umbilical.

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.

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

European C.E. ONLY

In European countries that have adopted C.E. certification, only C.E. certified cylinders are allowed to be used and must have a minimum charged capacity available to the diver of 1400 N/l (50 scf). The emergency gas supply must only be fitted with a KMDSI first stage regulator and have a KMDSI over pressure relief valve installed (Part # 200-017). The relief must be adjusted to start lifting at approximately 20 p.s.i.g.

(1.4 bar) above the regulator intermediate setting. The purpose of the relief valve is to allow pressure to vent off in the event the first stage regulator develops a leak or creeps. Without a pressure relief valve, the hose could rupture and the emergency gas supply would be lost.

⚠ WARNING

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

Use a good quality first stage for your emergency gas supply.

The emergency air/gas tank must be fitted with a good quality first stage regulator to reduce the pressure to less than 225 p.s.i.g. (16 bar) ambient diver pressure. The KMDSI SuperFlow® First Stage Scuba regulator (Part #305-161) is an excellent device for this use. These regulators reduce the tank pressure to approximately 145 p.s.i.g. (9.9 bar). Other quality high performance Scuba regulators may also be used. Connect the first stage hose with a set of quick disconnecting locking sleeves to the emergency valve assembly located on the side block.

The first stage regulator must have at least two low pressure ports. One port is used for the connector hose to the emergency valve and the second is used to install an overpressure relief valve (Part #200-017). 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 leak.

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

⚠ 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.

Make sure the emergency valve knob is turned off, otherwise the emergency gas supply will be used up without the diver's knowledge. Once the emergency supply hose is connected, the tank valve is turned on to pressurize the hose. In the event of an emergency due to a loss of the main gas supply, the emergency valve knob located on the side block is turned on supplying gas to the side block assembly and the regulator.

⚠ WARNING

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

There are risks with each method of configuring your bail-out system. There is a risk that if you have the bail-out bottle on and the emergency valve on the helmet closed, that the emergency gas could be lost if the hose or the first stage itself develops a leak. However, KMDSI believes that this method poses the least amount of risk for the diver.

Probably the most serious problem with any of the other possible configurations is that the first stage will

almost certainly flood if it is not pressurized while you are underwater.

If the regulator floods and is not promptly serviced, it will not perform properly when you need it in an emergency. As a diver, you always must decide how much risk and what types of risk you are willing to expose yourself to when you dive. It's up to each individual to make an informed choice regarding how to configure your bail-out system. We cannot make this choice for you.

Always be sure to check the pressure in your bail-out bottle before you dive.

KMDSI strongly recommends the use of a submersible pressure gauge with every bail-out system. Not only does this make it very easy to check your emergency gas pressure prior to diving, it also allows you, in most cases, to periodically check the pressure in your system while you dive. In this way, if you have a leak, you will probably figure it out and will be able to take appropriate action.

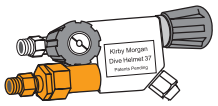
There are several possible ways to configure your emergency gas system, although at KMDSI we only recommend one method. The configuration we recommend is as follows:

Cylinder Valve Open - EGS Valve on Helmet Closed

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

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

Possible Emergency Gas Supply Cylinder & EGS Valve Configurations

Configuration	Cylinder Valve	EGS Valve	Advantages/Disadvantages
			
Configuration 1 (Regulator pressurized)	**On**	**Off**	**Advantages** **• One valve to open** **• First stage won't nomally flood** **Disadvantages** **• If hose or first stage leaks some or all EGS gas will be lost**
Configuration 2* (No pressure in regulator)	**Off**	**On**	**Advantages** **• One valve to open** **• No loss of gas from cylinder if hose leaks or regulator leaks** **Disadvantages** **• First stage will flood and must be serviced after each day of diving**
Configuration 3* (Regulator pressurized then cylinder valve closed)	**On momentarily then Off**	**Off**	**Advantages** **• No loss of cylinder gas if hose or regulator leaks** **Disadvantages** **• Two valves to open in emergency** **• Slow leak on long dive may result in flooded 1st stage** **• If dive depth exceeds pressure in first stage, first stage will flood**
Configuration 4*	**Off**	**Off**	**Advantages** **• No use of cylinder gas unless emergency occurs** **Disadvantages** **• Regulator will flood and need service daily** **• Two valves to open in emergency**

*** Requires ability to reach cylinder valve without difficulty**

⚠ WARNING

Some divers, keep the EGS gas cylinder valve shut during the dive. Their rationale being; in the event of an emergency, they will simply open the 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 cylinder 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 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.

3.8 Setting Up to Dive

3.8.1 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. Connect the topside umbilical end to the topside diver control console. Ensure there is no pressure in the divers umbilical.

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

3.8.2 Connecting the Umbilical to the Helmet

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

Connecting the umbilical to the helmet.

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

⚠ WARNING

If the one way valve or the adapter is loosened this will allow breathing gas to leak out of the breathing system. This could also result in a loss of all pressure to the helmet, leaving the diver with nothing to breathe.

If you are using waterproof connectors 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". Do not twist the connectors. Tape the two connectors with a bit of electrical tape to prevent them from pulling apart.

Connecting the waterproof connectors.

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

Do not twist the connectors. Do not pull them apart by pulling on the thin part of the wires.

3.8.3 Opening the Breathing Gas Supply to the Helmet

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

Slowly bring up the gas pressure to the helmet to 150 (10.2 bar). Slowly back out on the regulator adjustment knob until a slight free flow develops, then turn the adjustment knob in (clockwise) until the free flow just stops.

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

3.8.4 Fogging Prevention

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

The diver should use a solution which has been found satisfactory in the past. *However, do not use aerosol spray on the polycarbonate lens*. The propellants in some aerosol dispensers cause damage to the lens.

⚠ WARNING

Never use any aerosol propelled sprays near the face port of the any Kirby Morgan helmet or band mask. The propellant 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.

3.8.5 Donning The SL-17C

All donning procedures must be done by the diver until he is thoroughly at home with the helmet. This will train for familiarity. However, the tender must be present to assist the diver and check to ensure that the diver has properly donned his equipment. It is impossible for the diver to see whether he is properly dressed in once the helmet is on his head.

⚠ WARNING

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

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

To don the neck dam, hold the neck dam/ring assembly vertically, in front of your chest, so that the large end of the assembly where the pull strap is mounted is on top. The pull strap should both be facing your chest. Lift the neck ring assembly over your head, grasping the front and rear of the neck ring assembly. Pull the neck dam down over your head. The neck dam should be as low as possible on your neck.

The neck dam is always turned up against the diver's neck. This is very important! With the neck dam turned down, the helmet will vent air from the neck dam causing the regulator to free flow. This will make the helmet very uncomfortable.

The neck dam ring assembly must be oriented so the brass "tongue" on the front of the neck dam ring assembly is pointed to the front of your body, in front of and below your chin. You should be able to look down and see the brass tongue sticking out from underneath the neck dam ring assembly when you are wearing the assembly and it is oriented properly.

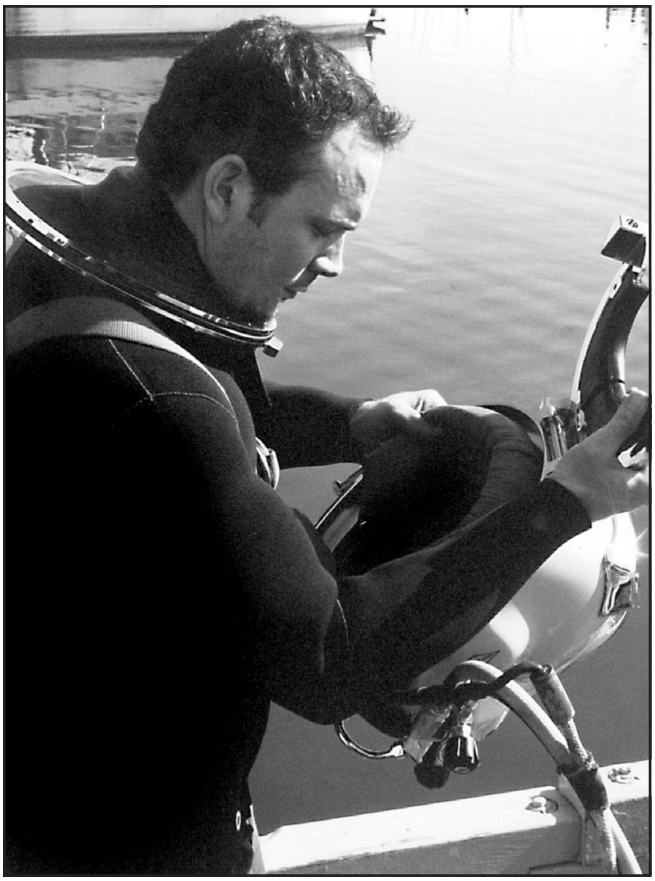
Donning the neck dam.

Be sure to loosen the chin strap inside the helmet prior to donning the helmet. To loosen the strap, hold the neck dam/ring assembly with your right hand, place your thumb under the rounded end of the plastic buckle and lift away from the neck dam.

With the diver holding the helmet, the tender should now connect the quick disconnect fittings for the bailout supply. Open the regulator adjustment knob and the defogger control knob for a steady flow from both just prior to the diver dressing into the helmet.

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

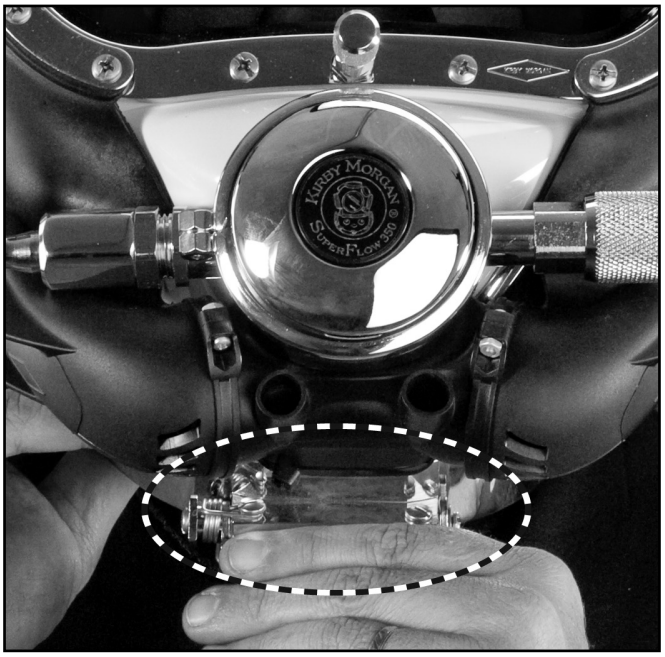
With the locking collar/neck pad assembly fully open, lift the helmet and place it over your head. Lower the helmet onto the back of your head first, then pivot it forward until your face is in position against the oral nasal mask. The locking collar/neck pad assembly must be open and hanging down behind your shoulders.



Open the locking collar/neck pad assembly fully.

Reach up inside the front of the helmet and tighten the chin strap until it is just snug. The chin strap tightens on the outside of the chin cushion. It does not sit against the diver's chin directly.

Now, the neck dam/ring assembly is resting directly under the hat on the diver's shoulders. The diver inserts the tongue on the neck dam/ring assembly into the swing tongue catch on the bottom front of the helmet.



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

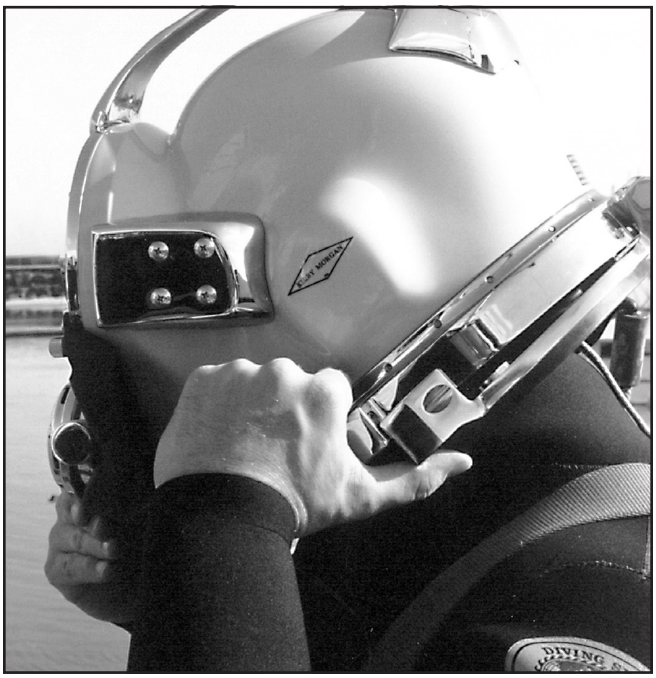
Grasp the base of the helmet with your fingers and push the neck dam/ring up into the neck ring on the base of the helmet. The neck dam ring fits very snugly in the neck ring. The diver then tilts his head and the helmet forward and swings the locking collar up over his shoulders.

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

The sealed pull pins must be in the locking position. If they are in the open position, rotate until they snap into the locking position. Grab the neck ring on the helmet with your fingers on the outside of the ring and using your thumbs, push the locking collar/neck pad assembly up into position until it locks with the sealed pull pins.

Rotate the sealed pull pins into the locking position.

If you have not positioned the sealed pull pins into the locking position you may do it now with the locking collar/neck pad assembly in place.



Both sealed pull pins must properly click into position on the base of the helmet.

⚠ WARNING

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

3.8.6 Testing the Breathing System

Test the defogger system by turning on and off the defogger control knob. The regulator should be adjusted by turning the adjustment knob out until a slight steady flow starts, then back in until the flow just stops.

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

3.8.7 Adjust Regulator for Low Work Rates

At very low work rates, such as when the diver is resting, or during in-water decompression, the diver's respiratory rate may be quite slow (10-15 breaths per minute). When this occurs, the diver's exhalations may not be sufficient to move enough breathing gas through the mask exhaust to adequately wash out carbon dioxide (CO_2).

⚠ WARNING

Excess carbon dioxide (CO2) is dangerous. Too much carbon dioxide in the diver's breathing system can cause the diver to feel that he cannot breathe for comfort. In extreme circumstances, carbon dioxide can cause unconsciousness. This could lead to suffocation and death.

In order to ensure that carbon dioxide does not accumulate in the mask, divers who are at rest underwater should screw the regulator adjustment knob "out," i.e., away from the regulator, until a slight steady flow occurs and the regulator can be heard to hiss. This will help to eliminate any excess carbon dioxide from the mask.

3.8.8 Sealing Integrity Check

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

Turn the supply gas off at the dive control system and bleed the umbilical.

⚠ WARNING

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

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

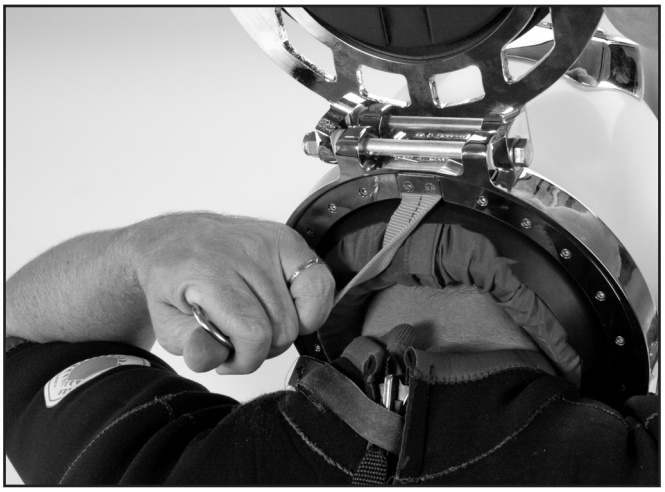
To perform this test, the diver must have an assistant standing by. The assistant should be in control of the gas supply console in the event the diver needs air or he must be ready to lend a hand. The diver must be next to the dive control manifold so that the air may be turned on instantly, or the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

With the neck dam ring on the diver's head, the helmet is installed and the locking collar closed. When the diver attempts to inhale, a suction on the neck dam is formed, indicating he is achieving a good seal. The diver must then turn the air on immediately so that he can breathe. If the diver does not turn the air on he will not be able to breathe, unless the neck dam is pulled away from his neck.

3.9 Removing the Helmet

To remove the SL-17C, start by pulling out (forward) on each sealed pull pin and turning so each remains in the open position. Tilt your head, and the helmet, forward and swing the locking collar assembly back behind your shoulders.

Tilt your head upright again and push the swinging tongue catch forward with one hand and hold it in this position. Grasp the pull strap and pull down on it, towards your shoulders. This will break the seal between the neck dam/neck ring and the helmet neck ring on the base of the helmet. Once the seal is broken the neck ring assembly will come loose from the helmet.



Once the pull pins are disengaged, you will need to grasp the pull strap and pull down on it in order to break the seal for the neck ring to remove the helmet.

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

Grab the neck ring at the front and use your fingers to gather the neck dam away from your neck in the front. Pull the neck dam/neck ring assembly forward so your chin will clear the chin strap. Lift the neck dam over your head.

3.10 Diving Procedures

3.10.1 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.

3.10.2 Attaching the Umbilical to the Harness

The umbilical must now be hooked to the diver's harness by means of a suitable clip that is bound to the umbilical. Some divers and companies prefer a quick release clip and others prefer a clip 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 or clip on the diver's body. Never allow the umbilical to pull on the helmet directly or the diver could suffer a neck injury.

3.10.3 Diver Dons Helmet

The diver dons the helmet as per "3.8.5 Donning The SL-17C" on page 42.

3.10.4 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 yourself of proper operation before entering the water.

3.10.5 Communications Check

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

3.10.6 Diver Ready

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

3.10.7 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. There must be no chance of the umbilical hanging up when the diver jumps. Also, the defogger valve should be turned on to overpressure the helmet to prevent the possibility of water pressure from inverting the helmet exhaust valve when hitting the water.

The diver must report to the surface immediately after the entry. It is a good policy to descend 10 or 20 FSW (3-6 MSW), pause and check the regulator adjustment knob to ensure adjustment for the least breathing resistance.

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.

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.

Then the diver checks in with the surface before descending to the job. If a closed bell is being used, the diver enters the water from the bell and pauses for a short time outside the trunk until he is sure all systems are operating properly.

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

3.11 Emergency Procedures

3.11.1 Flooding

In the event of partial or complete flooding, the diver may clear the helmet quickly by tilting the helmet down and activating the defogger control knob or by pressing in on the manual purge button in the center of the regulator cover.

The water dump valve is located under the regulator. By placing this valve in the lowest position on the helmet, water will exit more easily.

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

3.11.2 Inhalation Resistance

If breathing becomes difficult, adjust the demand regulator adjustment knob, for easier breathing by rotating the adjustment knob counter clockwise. If the breathing does not get noticeably better, press the purge button in the regulator cover. If a surge of gas does not flow with this action, open the emergency valve.

If the flow is noticeably better, immediately notify topside that you are on emergency gas. Insure your umbilical is clear and return to the stage or decent line. The diver should stay in communication with topside personnel and make preparations to abort the dive. The console operator should check to ensure the supply pressure to the diver is at the proper pressure.

3.11.3 Gas Flow Stops

A stop of flow in the demand regulator usually indicates the main gas supply has stopped. The diver should first open the emergency valve by turning the knob. If there is still no flow from the demand regulator, the defogger valve knob should be opened. Keep in mind that if the defogger valve is left open, the bailout bottle will drain very quickly, particularly if the diver is deep.

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

⚠ DANGER

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

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

⚠ DANGER

Ditching the helmet underwater must be avoided. 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.

3.11.4 Demand Regulator Free Flow

If the demand regulator free flows, adjust the knob in (clockwise) until it stops. If the free flow cannot be

stopped, the dive should be aborted. Even if there is no serious problem to the diver, the dive should be aborted and the problem with the regulator corrected.

3.12 Post Dive Procedures

3.12.1 Removing the Equipment

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

⚠ WARNING

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

3.12.2 Removing the Helmet

Remove the helmet by pulling the sealed pull pins out (forward) and turning them until they are locked open in the extended position. Tilt your head and the helmet forward and swing the locking collar back behind your shoulders. You will need to pull down on the chin strap and the swing tongue catch to break the seal between the neck dam ring and the helmet ring and to disengage the neck ring from the swing tongue catch. A good tender will be prepared to help the diver with the removal of the helmet as required.

The emergency gas supply hose may be disconnected while the diver leaves the helmet on or while he holds the hat after removal. The quick disconnect makes this procedure very easy.

The tender should then unfasten the umbilical from the harness and take the helmet from the diver and set it aside. (Closing the locking collar/neck pad assembly onto the helmet before setting the hat down on a rough deck will help protect the helmet neck ring from damage). The harness and bailout bottle is then removed.

3.12.3 Storage of the Helmet Between Dives

The helmet should be maintained per “3.4.1.4 Head Cushion Adjustment” on page 27.

If the helmet is not going to be used for a period of time, the head cushion, should be removed. The head cushion should be dried and replaced in the hat before storage. The regulator adjustment knob should be 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.

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 on air dry only.

⚠ 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.

Chapter 4
Troubleshooting

4.1 General

Kirby Morgan diving helmets are highly reliable life support equipment 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.

4.2 Communication Malfunction

Symptoms	Probable Cause	Remedy
No sound at either com box or helmet.	**Communications 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.
	Broken/damaged comm wire	Check continuity replace wire or umbilical.
	Battery Dead	Recharge
Communications weak or broken up.	Terminals in comm module corroded.	Clean terminals with wire brush. Terminals should be bright, shiny metal.
	Battery weak.	Recharge.
	Loose wire.	Clean and repair.
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 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 can't be heard.	Microphone in helmet dead or damaged.	Replace microphone as per manual.

4.3 One Way Valve Malfunction

Symptoms	Probable Cause	Remedy
One way valve allows back-flow.	Foreign matter in valve.	Disassemble valve, clean and rebuild. Replace if needed.
One way valve doesn't flow any gas.	Foreign matter in valve.	Disassemble valve, clean and rebuild. Replace if needed.

4.4 Side Valve Malfunction		
Symptoms	**Probable Cause**	**Remedy**
Defogger can't be shut off. Helmet free flows through defogger.	Seat assembly damaged or debris under seat.	Clean and/or replace seat assembly.
	Sideblock damaged by debris	Replace sideblock.
Defogger valve will not flow gas.	No air in umbilical.	Turn air on to diver's supply topside.
	Foreign matter in side block or one way valve.	Disassemble side block one way valve and clean.
Defogger valve knob hard to turn.	Valve stem bent.	Replace valve stem.

4.5 Water Leakage Into Helmet		
Symptoms	**Probable Cause**	**Remedy**
Water leakage into helmet.	Exhaust valve damaged or stuck open.	Seat or replace valve.
	Communications module O-ring extruded or damaged.	Replace o-ring.
	Communications module not properly tightened.	
	Comm module Damaged.	
	Binding posts or connector seal damaged.	
	Diaphragm damaged or not seated properly.	Seat or replace diaphragm.
	O-ring in neck dam ring damaged or missing.	Replace o-ring.
	Port retainer screws loose.	Tighten screws.
	Neck dam torn or damaged.	Replace neck dam.
	Hair caught between o-ring and base of helmet.	Remove hair from this space.
	Head cushion or chin strap caught under o-ring at neck dam.	Clear cushion or dam
	Regulator assembled improperly.	Check for proper assembly.
	Damaged or loose reg pod.	Tighten/ repair pod
	Damaged gasket	Replace gasket

4.6 Demand Regulator Malfunction		
Symptoms	**Probable Cause**	**Remedy**
Regulator continuously free flows.	Adjustment knob not screwed in.	Screw in adjustment knob.
	Bent tube damaged causing misalignment of adjustment nipple.	Check the inlet nipple and soft seat. Replace as necessary.
	Supply pressure too high.	Adjust supply pressure lower than 225 p.s.i. over ambient.
	Regulator out of adjustment.	Adjust regulator
Regulator continuously free flows when underwater only.	Neck dam turned down, or too large for divers neck.	Neck dam must be turned up. Replace neck dam with proper size.
	Hair caught between o-ring and base of helmet.	Clean hair out.
	Neck dam torn.	Repair or replace neck dam.
	Poor seal in neck dam ring Assembly	Replace O-rings
Regulator is hard breathing.	Adjustment knob screwed too far in.	Screw adjustment knob out.
	Supply pressure too low.	Increase supply pressure.
	Regulator improperly set up.	
Regulator does not supply gas.	Gas supply pressure too low.	Increase supply pressure to minimum required for depth.
	Regulator is out of adjustment.	Adjust regulator
	No gas in umbilical	Turn diver's gas supply on topside.
	Blockage in breathing system.	Disassemble regulator, clean, and adjust.

4.7 Emergency Gas Supply Valve		
Symptoms	**Probable Cause**	**Remedy**
Bail-out bottle drained without diver opening EGS valve	Stem fails to seat in valve body.	Replace EGS valve body.
	Debris under sea causing leakage.	Service valve.
	Leaking over-pressure relief valve on bail-out regulator.	Service valve.
	Leaking bail-out regulator on bottle.	Service regulator.
	Leak in supply line 1st stage	Service regulator.
Knob difficult to turn.	Stem bent.	Replace stem.
Valve will not flow gas.	Foreign matter in valve.	Disassemble, clean, and reassemble.
	Stripped control knob.	Replace knob.

Chapter 5
Inspection and Maintenance

5.1 Routine Maintenance

Routine and preventative maintenance is critical and must be done on a regular basis. All parts and components of the helmet have a useful service life and eventually will require replacement. Some items, when properly maintained, can go many years before replacement becomes necessary. Each helmet or mask should have a logbook that tracks the usage, maintenance and repairs.

It is essential to safety of the user that a routine and periodic schedule of maintenance, inspection, and testing be carried out. Helmets should be inspected pre-dive on a daily basis. Helmets in continuous use around the clock should be rotated out every 24 hours and have a daily pre-dive inspection performed. Post dive cleaning and inspections should be completed each time helmet or mask use is finished for the day. To minimize the spread of germs, sanitizing should be performed after use, and in between use by different divers. Sanitizing procedures and recommended solutions are described and explained in the General preventative section of each KMDSI helmet and mask manual. If the user is in doubt about the serviceability or has questions in general, please contact your local KMDSI authorized repair facility or KMDSI at Tel. 805-928-7772. Check the Dive Lab website at www.divelab.com for the most up-to-date maintenance procedures.

KMDSI Maintenance Checklist are located on the KMDSI and Dive Lab websites. The checklists are intended for all helmet and mask models. There are also checklists for the KMB-18/28 band masks which are done up the same as the helmet checklists.

A2.1. All SL and KM helmets (all models) Recommended Annual Maintenance Inspection and Overhaul
A2.2. Monthly Maintenance
A2.3. Daily Set-Up and Functional Checklist
A2.4. Supervisor's Equipment Checks Prior to Entry
A2.5. Supervisor's Equipment Checks In-Water
A2.6. Post Dive Cleaning

5.1.1 Daily Pre-Dive Maintenance A2.3

The helmets and masks should be set up in accordance with the Daily Set-Up and Function Checklist A2.3. The checklist can be laminated placed on a clipboard and checked off with a grease pencil. Completion should be logged in both the supervisors log and the helmet or mask log book. The daily pre-dive is minimum daily checks KMDSI recommends. The daily pre dive may be modified to suit the needs of the user providing the basic intent of the checklist is being completed in a manner with the original intent.

5.1.2 Daily Post Dive Maintenance A2.6

The helmets and masks should be cleaned in accordance with the A2.4 checklist The checklist can be laminated placed on a clipboard and checked off with a grease pencil. Completion should be logged in both the supervisor's log, and the helmet or mask log book. The daily pre-dive is minimum daily checks KMDSI recommends. The daily post-dive may be modified to suit the needs of the user providing the basic intent of the checklist is being completed in a manner consistent with the original intent.

5.1.3 Supervisors Equipment Checks A2.4 and A2.5

These checks should be conducted by the diving supervisor or by persons designated by the supervisor in accordance with company policy.

5.2 Monthly Maintenance

A monthly inspection should be performed IAW the A2.2 checklist on a monthly or as directed by the A2.2 and / or anytime serviceability of the helmet or mask is in doubt. Helmets or masks used in contaminated waters or for welding, burning, and jetting operations will require service and inspection more frequently. If a situation arises that casts any doubt as to the serviceability of a part or component it should be replaced.

Use the appropriate manual for the model helmet or mask being serviced.

5.3 Yearly Maintenance

5.3.1 Overhaul/Inspection Checklist A2.1

The A2.1 checklist procedure fulfills all requirements for complete inspection. The checklist should be performed at least annually and or more often if daily and monthly inspections reveal signs of excessive corrosion, contamination, improper operation or signs of damage or if the helmet log shows the unit had previously been used in a questionable environment. The daily and monthly inspections will determine the necessity for overhaul with greater accuracy than

simply placing a number of hours on the overhaul schedule. All O-ring's, exhaust valves, and soft goods should be replaced at least once a year. In between overhauls the soft goods can be cleaned inspect and reused providing a careful inspection reveals no damage or deterioration. Again, logged questionable previous diving environments will be determining factor as well. The A2.1 checklist should be filled out and retained in the maintenance files and provides an excellent record of maintenance. All maintenance should be annotated in the helmet log.

The Overhaul Checklist Procedure A2.1 is intended to aid persons performing routine overhauls of KMDSI SuperLite® Helmets and Band Masks. 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 and the helmet or mask log book should be updated. The checklist's are intended to be used for all models of KMDSI SuperLite® and KM Helmets and band masks. All KMDSI helmet and band mask manuals can be downloaded free at www.kirbymorgan.com.

Chapter 6
General Preventative Maintenance

6.1 Introduction

This section covers the preventative maintenance necessary on the SL-17C diver's helmet. A helmet that is kept clean and in good repair will offer far better service to the user. These helmets are designed for easy access to all areas for proper inspection and servicing.

6.2 Required tools, Cleaning Agents, Lubrication

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

Every diver should carry sufficient tools and spare parts to maintain his 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 soft brass parts. The following wrenches and tools are required to maintain the SL-17C:

Tools required to do proper maintenance on the SL-17C.

Torque wrench with the following attachments:
1 ⅜ inch crows foot
7⁄16 inch open end wrench
9⁄16 inch open end wrench
⅝ inch open end wrench
11⁄16 inch open end wrench
¾ inch open end wrench
13⁄16 inch open end wrench
⅞ inch open end wrench
1 inch open end wrench

Torque screwdriver and these attachments:
⅛, ¼, and ⅜ inch flat blade screwdrivers
#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:
⅜ inch
7⁄16 inch
9⁄16 inch
¾ inch
⅞ inch
1 inch

Two adjustable wrenches, 6 & 8 inches in length.
⅜ inch flat blade screwdriver with a notch in the center of the tip.
¼ 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
Whisker Clamp Replacement Kit: Part # 525-032
Tie wraps: Part # 520-042
Silicone grease
Loctite® 222 Thread locker
#320, 400, 600 wet/dry sandpaper
Rubbing compound
Automotive wax
Clean rags

⚠ WARNING

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

6.2.1 Component and Parts Cleaning

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

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

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

6.2.2 Component and Parts Lubrication

All helmets are lubricated at KMDSI with Christo-Lube®. Helmets used for air diving or diving or with oxygen mixtures containing less than 50 % oxygen can be lubricated with food grade silicone such as Dow-Corning® 111 or equivalent.

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

⚠ WARNING

Never use any aerosol propelled sprays near the face port of Kirby Morgan helmets. The propellent 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.

NOTE: All parts on the helmet that require lubrication must be lubricated sparingly with the appropriate lubricant.

Silicone grease is not recommended for helmets used with oxygen. (Avoid mixing lubricants to preclude incompatibility).

⚠ WARNING

Kirby Morgan diving helmets are lubricated for use with oxygen rich mixtures as they come from the factory. If the user intends to use a Kirby Morgan helmet for oxygen service, the helmet must not be used with an oil lubricated compressor and proper procedures for diving with mixtures containing high partial pressures of oxygen must be followed.

Only lubricants such as Krytox®, Fluorolube®, or Christo-Lube® are acceptable for oxygen service. Care must be taken to avoid contamination of gas system components with hydrocarbons when air is used as a breathing medium. Contamination of Kirby Morgan masks and helmets with hydrocarbons can lead to fire or explosions when this equipment make a contact with high oxygen partial pressures.

6.2.3 Teflon® Tape

All pipe thread fittings used on our helmets, masks and components require sealing with Teflon® tape. **DO NOT USE LIQUID SEALANT**. When installing Teflon® tape on pipe threads, apply the tape starting two threads back from the end of the fitting.

Apply the tape in a clockwise direction under tension. 1½ wraps is all that is needed. Applying more than 1½ wraps of tape is not recommended. The use of more than 1½ wraps could cause excess Teflon® tape to travel into the breathing system.

⚠ WARNING

Do not allow any 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.

⚠ WARNING

Use only thin Teflon® tape to avoid damage to threads.

6.2.4 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. When sealant is applied the user must use care to insure 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.

6.2.5 Thread Locker

KMDSI recommends Loctite® 222 as the thread locking compound that should be used on components that call for a thread locker. 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.

6.3 General Cleaning & Inspection Procedures

Each diver must establish his own minimum standards for the care of his helmet. We offer recommendations here with the suggestion that the diver establish for himself what is necessary to provide a good working unit. Use of the 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 sea water while jetting in sand will necessitate increased maintenance. Use of the

helmet in a heavy oil and/or chemical environment may make it necessary to replace rubber parts 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, if needed.

NOTE: Certain fuel oils and/or chemicals will cause premature degradation of soft goods and seals by making them become soft, swell or break down. Upon exiting the contaminant, KMDSI recommends a thorough external decontamination/washing of the 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; the Quad-Valve™ assembly, demand regulator diaphragm, demand regulator exhaust valve, communications post(s)) or communications connector assembly, and neck dam.

⚠ WARNING

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

⚠ WARNING

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

6.3.1 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:

⚠ WARNING

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

⚠ WARNING

Always sanitize the helmet prior to use by another person. Failure to do could result in the transmission of communicable diseases, some of which may cause long term disability or death.

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

O-ring Removal:

Do not use screwdrivers or hard metal picks to remove O-rings. When possible, only use fingers to remove O-rings. If an O-ring fits too tightly in its groove to be removed using the fingers, use the appropriate tool 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 prevent scratching the O-ring groove, which can cause leakage or premature failure of the seal.

O-ring Inspection:

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

O-ring Reuse:

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

Place the O-rings in a cleaning basin, cover with mild soap solution, and brush gently with a soft bristle brush to remove all traces of old lubricant and contamination. Rinse cleaned O-rings with fresh water and wipe clean with lint-free cloths, then allow to air dry, carefully inspect for cracking, cuts, abrasions and deformities. Replace O-rings if any damage is found or suspected.

6.3.2 General Cleaning Guidelines

Cleaning and sanitizing of the helmet 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.

6.3.2.1 Mild Soap Solution for General Cleaning and Leak Detector Use

Maintenance procedures include cleaning with a general-purpose solution of a mild diluted hand dishwashing soap such as Joy® or Palmolive®. Cleaning solution is prepared by mixing approximately one teaspoon of soap to ½ gallon of warm fresh water. This solution may also be used as a leak detector solution. Place all parts and components in a clean washbasin or sink and immerse in soap solution.

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

6.3.2.2 Acidic Cleaning Solution and Procedures

Metal parts that have visible corrosion should first be cleaned using the soap solution scrubbed with a nylon bristle brush, then soaked in a solution of 50% white vinegar and water for less than 60 minutes. They may also be placed in a ultrasonic sink followed by a light brushing and thorough rinsing with fresh water and air-dried. If corrosion is such that 5% vinegar will not clean components, it will be best to replace the components.

6.3.2.3 Germicidal Cleaning Solutions and Procedure

Sanitizing of the oral-nasal mask/regulator of SL-17C 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.

⚠ WARNING

Wear eye protection to prevent cleaning and germicidal cleansing solutions from contacting eyes. If contact occurs, rinse eyes with copious amounts of water and consult medical help immediately.

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

Sanitizing Procedure:

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

1) Wet or immerse all components to be sanitized. Allow components to stay in contact with the solution for at least 10 minutes.

2) If the solution appears to be drying, apply more solution to keep it wet for the full 10 minutes.

3) After 10 minutes, thoroughly rinse components under running potable water.

NOTE: The purpose of this procedure is to sanitize the components exposed to each of the divers. KMDSI recommends sanitizing be accomplished daily in between use by different divers, after each use, or when future use is anticipated within the mission (job) period. KMDSI defines "A mission is defined as use of the SL-17C over a seven-day period."

⚠ CAUTION

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

6.4 Daily Maintenance

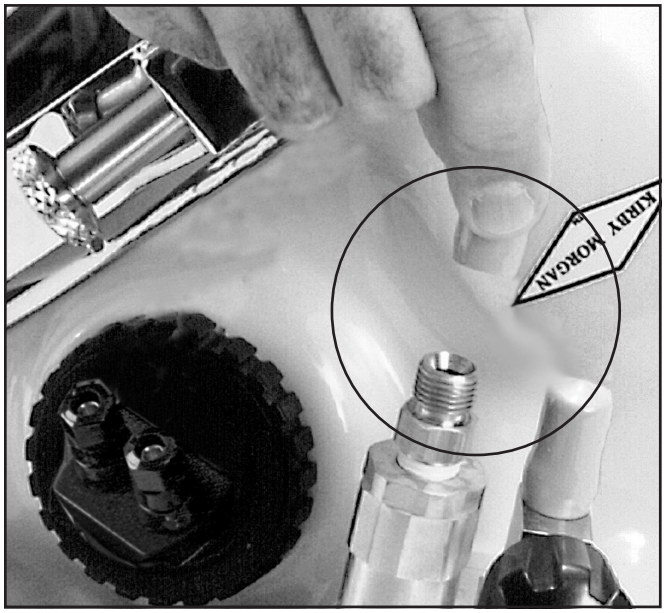
The following steps must be performed daily at the completion of diving operations.

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 and emergency gas valve knob until all gas flow stops.

⚠ WARNING

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

2) Place a protective cap over both the air inlet and the emergency valve inlet to prevent foreign matter from entering the valves.



Cover the air inlet and emergency gas 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. 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. However, do not remove the foam unless it is absolutely necessary. The head cushion will dry properly without removing the foam.

Removing the head cushion.

4) If the head cushion is wet, the chin cushion is probably wet, too. Like the head cushion, the chin cushion is fastened into the helmet with snaps. Remove it from the helmet, rinse it with fresh water, and allow it to dry.

5) Remove the communications assembly from the helmet so it can dry completely. Remove the communication cover, P/N 510-630 to allow adequate drying and to avoid corrosion of the communication assembly. Avoid getting water on the oral nasal microphone and earphones. Remove the earphone covers from the earphones so they can dry completely.

Uncover the earphones so they may dry.

6) Rinse the helmet thoroughly with fresh water. Turn the defogger valve knob, emergency valve knob, and regulator adjustment knob while rinsing to prevent salt from accumulating under these valves.

Run water under the regulator cover, and in the regulator body through the air delivery tube located in the oral nasal. Operate the sealed pull pins as you run water over them.

Wipe the inside of the helmet out with a clean, damp rag. Do not depress the purge button while rinsing the regulator as this action will permit foreign matter back into the inlet valve and seat.

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

8) Lubricate the shaft of the nose block device with silicone grease.

9) Rinse the neck dam assembly and allow to dry. Remove the O-ring from the neck dam ring, clean and lubricate.

10) If the neck dam is damaged it should be replaced.

⚠ WARNING

Avoid patching 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 should be replaced.

6.5 Monthly Maintenance (or between jobs)

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."

6.5.1 Locking Collar Assembly & Helmet Ring

Check the two sealed pull pins to make sure they operate smoothly and engage the pins on the locking collar properly. If the sealed pull pins stick or do not provide adequate tension it is essential to return your helmet to your dealer or KMDSI for service. ***Do not attempt to service these mechanisms by yourself.***

⚠ WARNING

The sealed pull pins must operate smoothly with a positive action. If the pins do not release properly the diver may not be able to remove the helmet quickly if necessary. If the pins do not lock with a positive action the locking collar assembly will not lock properly and the helmet may come off the diver's head. If this happens underwater, drowning could result.

6.5.2 Neck Dam Ring Assembly

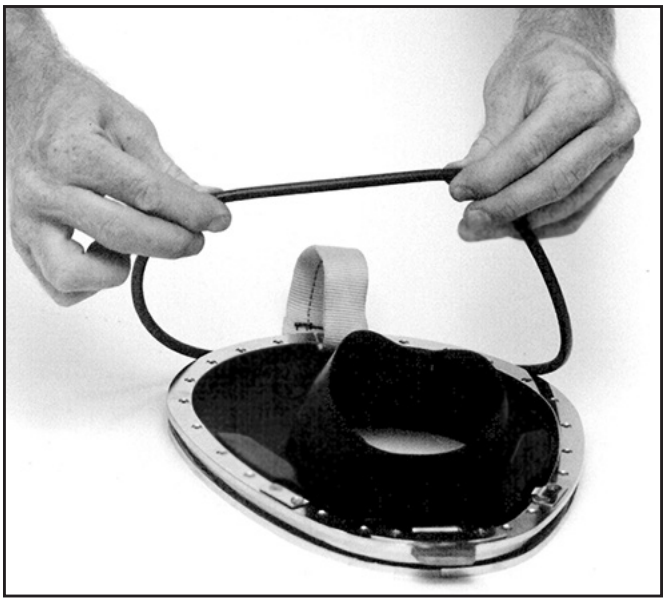
Inspect the neck dam carefully. There must be no holes in the neck dam. The latex must be firm, not sticky. If there is any damage to the latex the neck dam must be replaced. Do not patch a latex neck dam.

⚠ WARNING

Avoid patching a torn or punctured neck dam. If the patch comes off underwater the helmet could flood and/or the demand regulator assembly may not function properly. A damaged neck dam should be replaced.

Check the neck dam for holes.

Inspect the O-ring on the neck dam ring assembly. It must be in good condition with no nicks, tears, or cracking. Replace the O-ring if it shows signs of wear.



Inspect the O-ring on the neck dam.

6.5.3 Head Cushion and Chin Cushion

Remove the foam from the head cushion and inspect it for wear. If the foam is worn or crumbling it must be replaced (order Part #510-672).

Inspect the chin cushion. It, too, must be in good condition. Replace it if the foam is worn or has started to crumble.

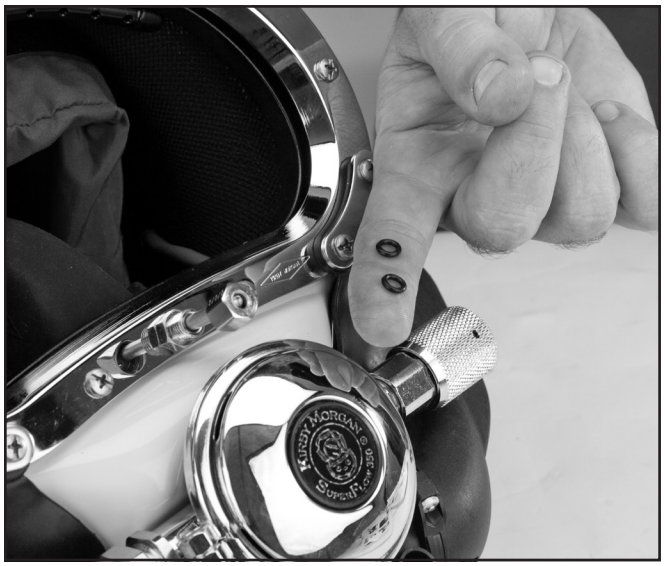
6.5.4 Communications Inspection

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

6.5.5 Lubricate Nose Block O-rings

Tools Required:
7⁄16 inch Open End wrench

1) Unscrew the nose block device packing nut and lubricate the two O-rings and nose block shaft. Retighten the nut just to the point where the nose block device will still slide, but requires a firm push or pull.



The nose block O-rings must be regularly lubricated.

2) Test the shaft to ensure that it will still slide freely at this time. If it does not, loosen or tighten the packing nut just enough to permit the shaft to slide properly.

3) Retighten the nose block knob.

6.6 Inspect the Exhaust Valve

1) Carefully cut the tie wrap that connects the Quad exhaust cover to the exhaust main body.

2) Remove the two screws that hold the Quad exhaust cover to the exhaust body.

3) Remove the Quad exhaust cover and inspect the exhaust valve.

Inspect the exhaust valve for cracks or tears, replace if needed. Lubricate the valve with a small amount of silicone grease. Rub the grease into the valve thoroughly leaving no excess lubricant to collect sand or other debris.

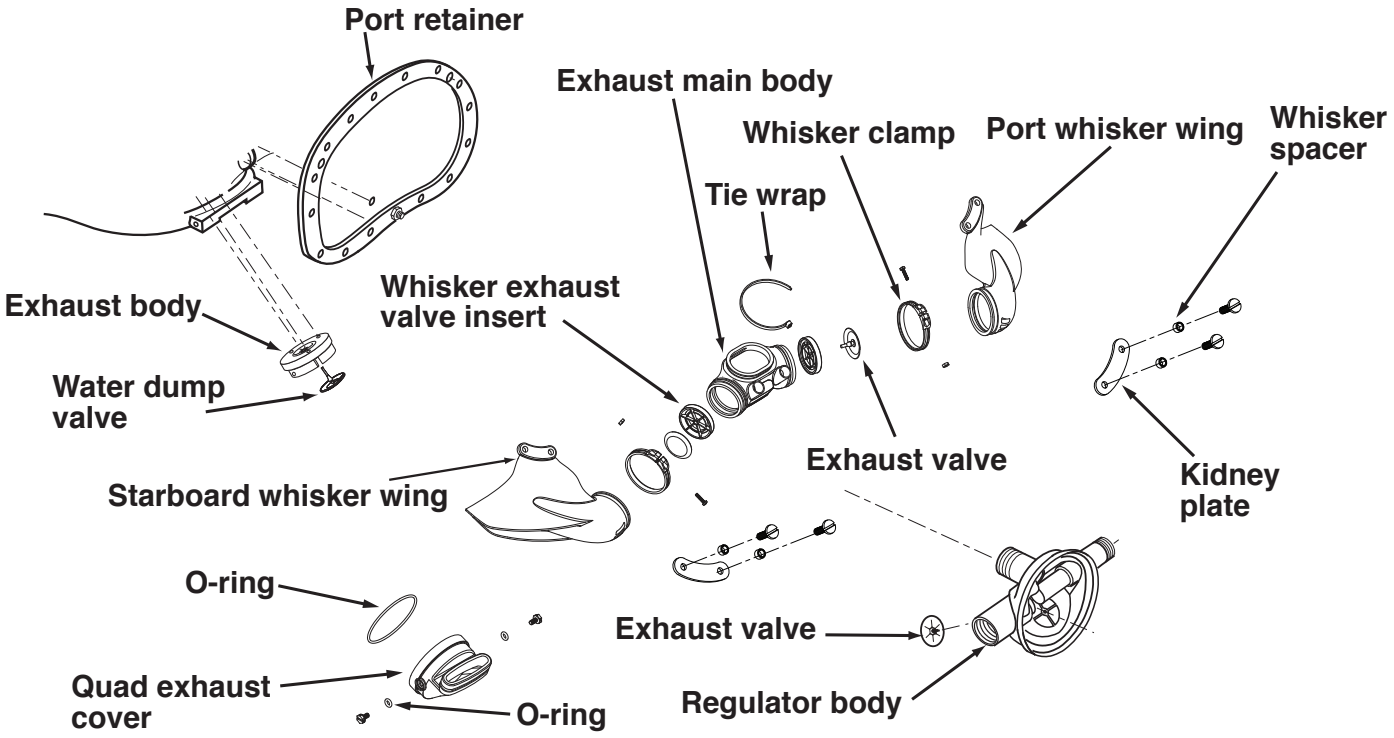
4) Reinstall the Quad exhaust cover so that it connects to the exhaust main body and the exhaust body.

5) Install the screws and tighten to "12" inch pounds.

6) Install the tie wrap that fastens the exhaust main body to the Quad exhaust cover and tighten until snug.

⚠ WARNING

Use only KMDSI original replacement spares when repairing your helmet. 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 all warranties offered by KMDSI.



The Quad-Valve™ Exhaust System

Chapter 7
Breathing System Maintenance and Repairs

7.1 Introduction

This chapter covers the maintenance and repair of all components of the breathing system. The breathing system includes the one way valve, the emergency valve, the side block, the bent tube assembly, the demand regulator, and the oral/nasal mask.

The breathing systems on all Kirby Morgan helmets and masks are 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!

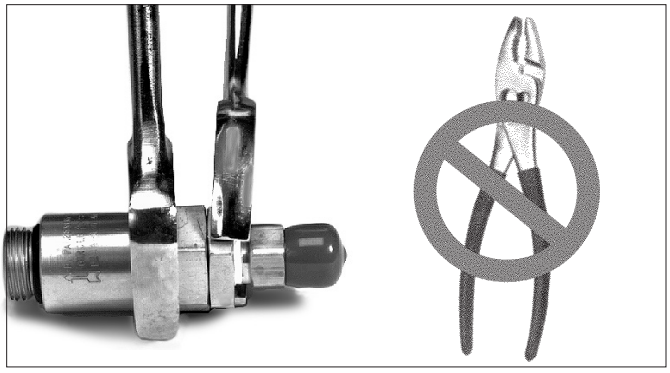
While Kirby Morgan helmets and masks are simple to maintain, like any type of life support equipment, they do require regular periodic maintenance to function properly.

All parts disassembled should be thoroughly cleaned using the methods described in the Appendix in the rear of this manual. Components that require the use of lubricants, sealing and thread locking compounds should also be maintained.

Most fasteners have a torque value, it is imperative that all fasteners which have a torque value be tightened to the torque specifications as outlined by the procedure, or as listed in appendix 1. If in doubt as to the proper torque setting, contact your local authorized repair facility or KMDSI.

7.2 One Way Valve

NOTE: The one-way valve assembly should be disassembled, cleaned and the three O-rings should be replaced at least annually. Damaged and/or corroded parts should be replaced. A repair kit is available for replacement parts (525-330).



⚠ 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.

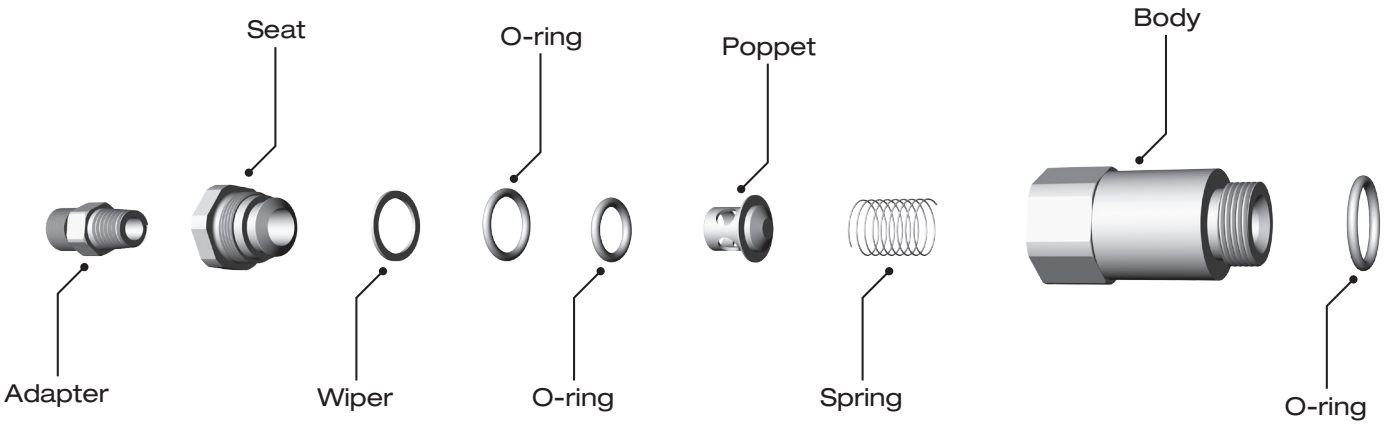
7.2.1 Disassembly Of The One Way Valve

Tools Required:
Soft Jaw Vice
1 inch Open End Wrench Attachment on Torque Wrench
(If no vise is available use a backup 1 inch open end wrench)

To disassemble and inspect the one way valve assembly:

1) The one way valve assembly must be removed from the side block. Use the 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 in a soft jaw vise while removing the seat with a wrench.



Correct assembly order of the one way valve.

As the seat is removed, the wiper and the O-ring will slide out in place in a groove on the seat. The poppet and the poppet O-ring usually come out in the seat being followed by the spring.

The only functional part remaining in the valve body is a non-moving, pressed-in cage. The function of the cage is to prevent the poppet O-ring from blowing out of place during high flows. Do not remove the pressed in cage. This can only be done at the factory.

3) Inspect the body interior for foreign matter of any type and clean, if necessary. Clean in accordance with the cleaning instructions in Chapter 6. If corrosion is present, clean using the acidic solution as outlined in Chapter 6.

4) Inspect the seat, wiper, O-ring, poppet O-ring and poppet for wear, replace if necessary. Be sure 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) Be careful to wipe the poppet and poppet O-ring thoroughly, removing nearly all silicone to prevent foreign materials from sticking to these components.

6) Replace the spring.

7.2.2 Reassembly of the One Way Valve

1) Slide the new O-ring over the poppet.

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

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

4) Tighten the seat to "150" inch lbs. ("17" Newton meters) with a torque wrench while holding the body in a soft jaw vice or wrench.

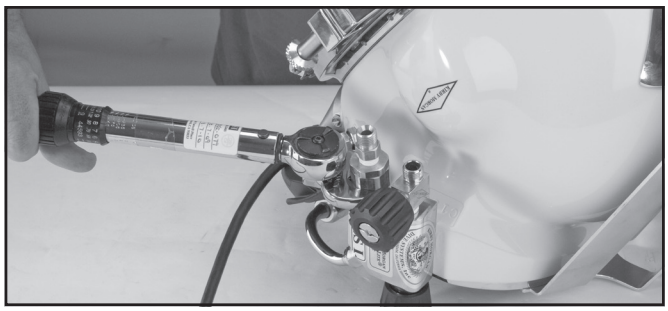
5) If the adapter has been removed, it must be cleaned and wrapped with Teflon® tape.

⚠ WARNING

Do not allow any 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 the regulator and may block the diver's air supply. This could lead to death through suffocation.

6) Test the operation of the valve.

7) Place the new O-ring on the end of the one way valve assembly and reinstall the valve assembly in the



Tighten to "150" inch lbs. ("17" Newton Meters) with a torque wrench.

side block. Tighten to "150" inch lbs. ("17" Newton Meters) with a torque wrench.

7.3 Side Block Assembly

7.3.1 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. A repair kit is available for replacement parts (Part #525-311).

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, flat washer, lock washer, nut, and a machine screw. 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 far enough to secure the air train by means of the 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 gas tight seal between the side block and the exterior of the helmet shell.

7.3.2 Side Block Assembly Removal

Tools Required:
7/16,11/16, and 7/8 inch Open End Wrenches
11/16 and 7/8 inch Open End Wrench Attachment on Torque Wrench
1/4 inch Flat Blade Stubby Screwdriver

The bent tube assembly must be entirely removed before removal of the side block assembly is started.

1) Completely unscrew the bent tube assembly nut from the side block.

2) Using two wrenches, hold the nut at the regulator end of the bent tube assembly with the first wrench. With the other wrench, loosen the jam nut by turning the wrench DOWN.

3) Unscrew the bent tube nut until it comes free, then pull the bent tube assembly straight out of the regulator inlet nipple.

Loosening the bent tube from the side block.

4) The side block assembly is ready to be separated from the helmet shell at this time.

7.3.3 Separating the Side Block Assembly from the Helmet Shell

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

1) Removal of the side block assembly requires removing the air train.

2) Remove the nut and washer that secure the air train, then the air train itself.

Loosening the nut that holds the air train.

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

4) Next, the alignment screw is removed.

NOTE: The alignment screw is located in a recess in the fiberglass next to the stud. This recess is normally

A thin putty knife helps to remove the side block.

filled with RTV. The RTV must be scraped free to reveal the screw.

5) The side block assembly is now unfastened, but held in place by the rubber sealing compound (silicone sealant) that acts as a glue. 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. Acetone helps remove this, but must be used sparingly since it will also remove the flat black finish inside the helmet.

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 this chapter. Overhaul the one-way valve in accordance with this chapter.

7.3.4 Side Block Assembly Replacement

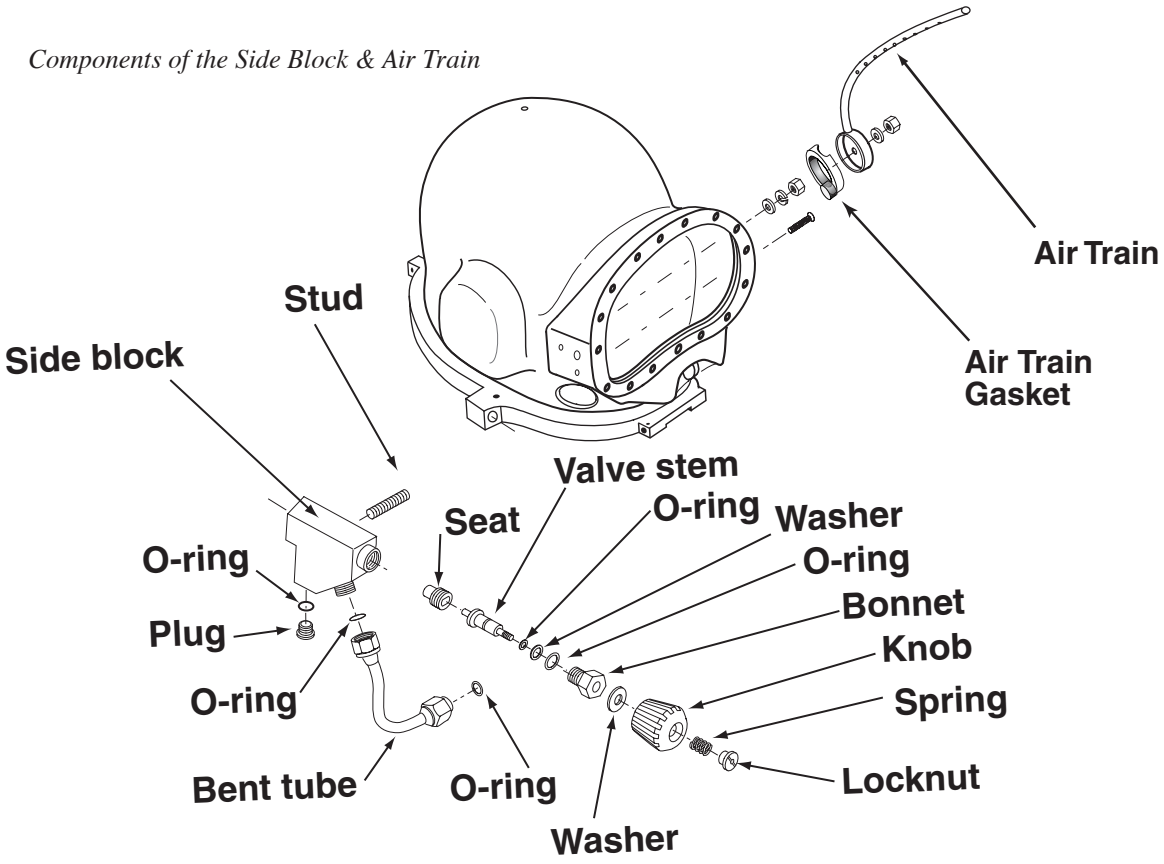
If a new side block is being installed, make sure it aligns correctly in the holes of the helmet shell before applying RTV silicone sealant.

1) A generous application of silicone sealant must be applied to the side block prior to installation on the helmet shell. The sealant should surround the stud, alignment screw, and air inlet on the block. Use only Dow-Corning® RTV 732 Multi Purpose sealant. This work must be done a well-ventilated area.

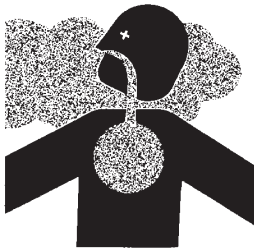
Care must be taken to avoid sealant entering the air opening in the side block. Be sure to remove all excess silicone sealant before it sets up. Acetone can be used to dissolve uncured sealant, after tightening.

2) Fit the side block to the helmet shell.

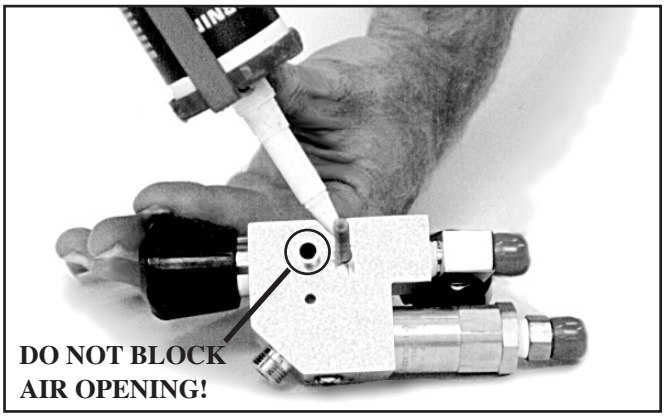
Components of the Side Block & Air Train



⚠ WARNING



Use silicone sealant in a well ventilated area. 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 and Material Safety Data Sheet.



A generous 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.

3) Thread the screw through the helmet shell and lightly tighten into the side block body.

4) Slide the flat washer and the lock washer onto the stud. Run the stud nut down the stud and tighten to "35" inch pounds ("3.95" Newton meters). **Do not overtighten**!

5) Tighten the screw to the correct torque, "20" inch pounds. Clean off all excess silicone sealant.

6) Place the air train gasket on the base of the air train. The knob on the base of the air train gasket is designed to cover the recessed hole where the bolt that helps maintain the position of the air train is installed. Slip the air train over the stud. Align the air train with the upper edge of the view port opening in the helmet shell.

7) Place the washer on the stud and tighten the nut until the washer lays flush on the air train, "15" inch pounds. **Do not overtighten**!

⚠ WARNING

Do not dive the helmet until the sealant has had time to cure. Check the directions on the tube of sealant for curing time. If the helmet goes into the water before the sealant has cured it could leak through the side block mounting stud hole, screw hole, or air flow hole. This could lead to drowning.

⚠ WARNING

If silicone sealant is blocking the air flow 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 air. This could lead to suffocation.

⚠ WARNING

Avoid breathing fumes from acetone and use in a well ventilated area. Breathing fumes can lead to nervous system damage, unconsciousness, and death.

⚠ WARNING

Avoid skin contact with acetone. Wear rubber gloves. Acetone can damage the nervous system.

⚠ WARNING

Avoid eye contact with acetone. This chemical is an irritant and may cause tissue damage.

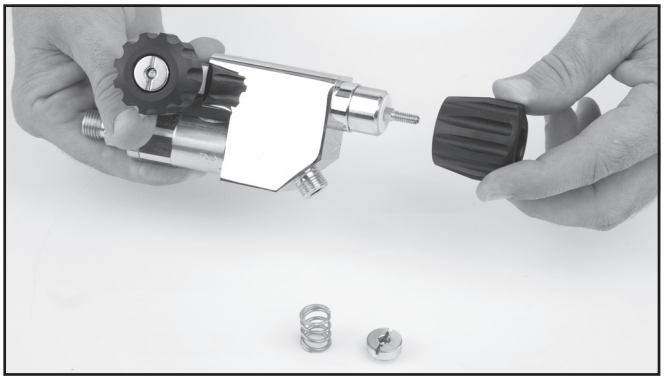
7.4 Defogger Valve

7.4.1 Disassembly of the Defogger Valve

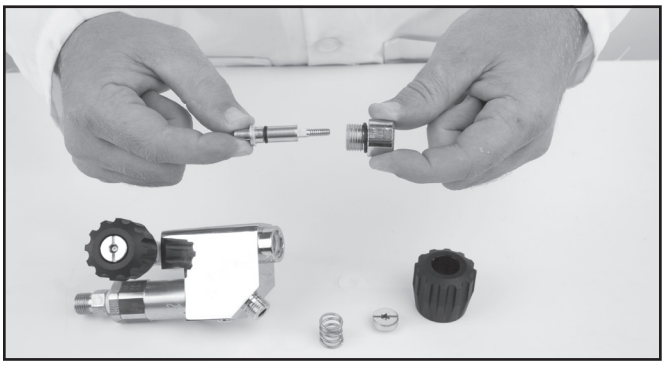
Tools Required:
3/8 inch Slotted Flat Blade Screwdriver
13/16 inch Open End Attachment on Torque Wrench

The defogger valve components are disassembled as follows:

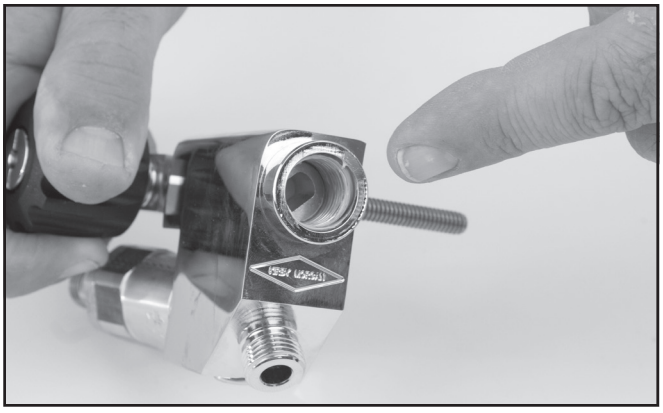
1) First, unscrew the control knob lock nut and remove the spring, control knob, and washer.



Remove the defogger control knob.



The valve stem usually comes out with the bonnet.



The seat should be removed for inspection.

2) Next, unscrew the bonnet. Its o-ring will come off with it. The valve stem, o-ring, and washer usually come out with the bonnet and can be pushed out of the bonnet once removed from the side block.

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

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

7.4.2 Cleaning and Lubricating

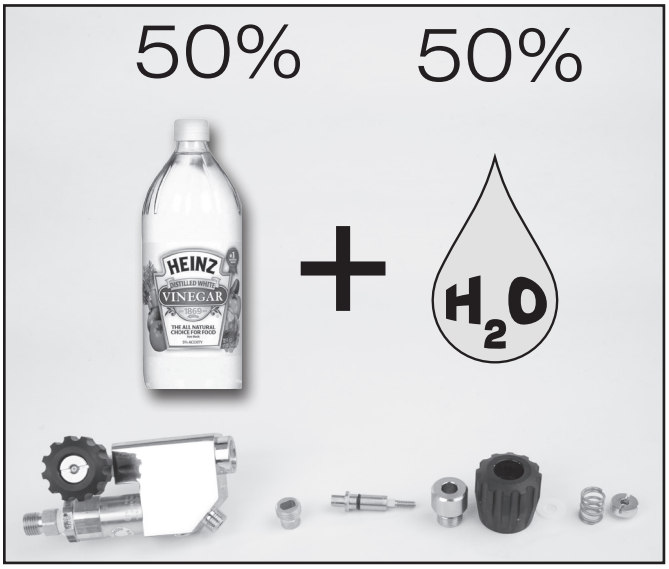
1) Clean all the metal first in the soapy water solution and then in a 50/50 dilute solution of white vinegar/water. Rinse in fresh water.

2) Check the Teflon® seat for wear and/or contamination, and replace if necessary. Damage such as a rough face or cuts to the seat indicate it must be replaced.

3) The Teflon® washer and O-ring must be replaced if worn.

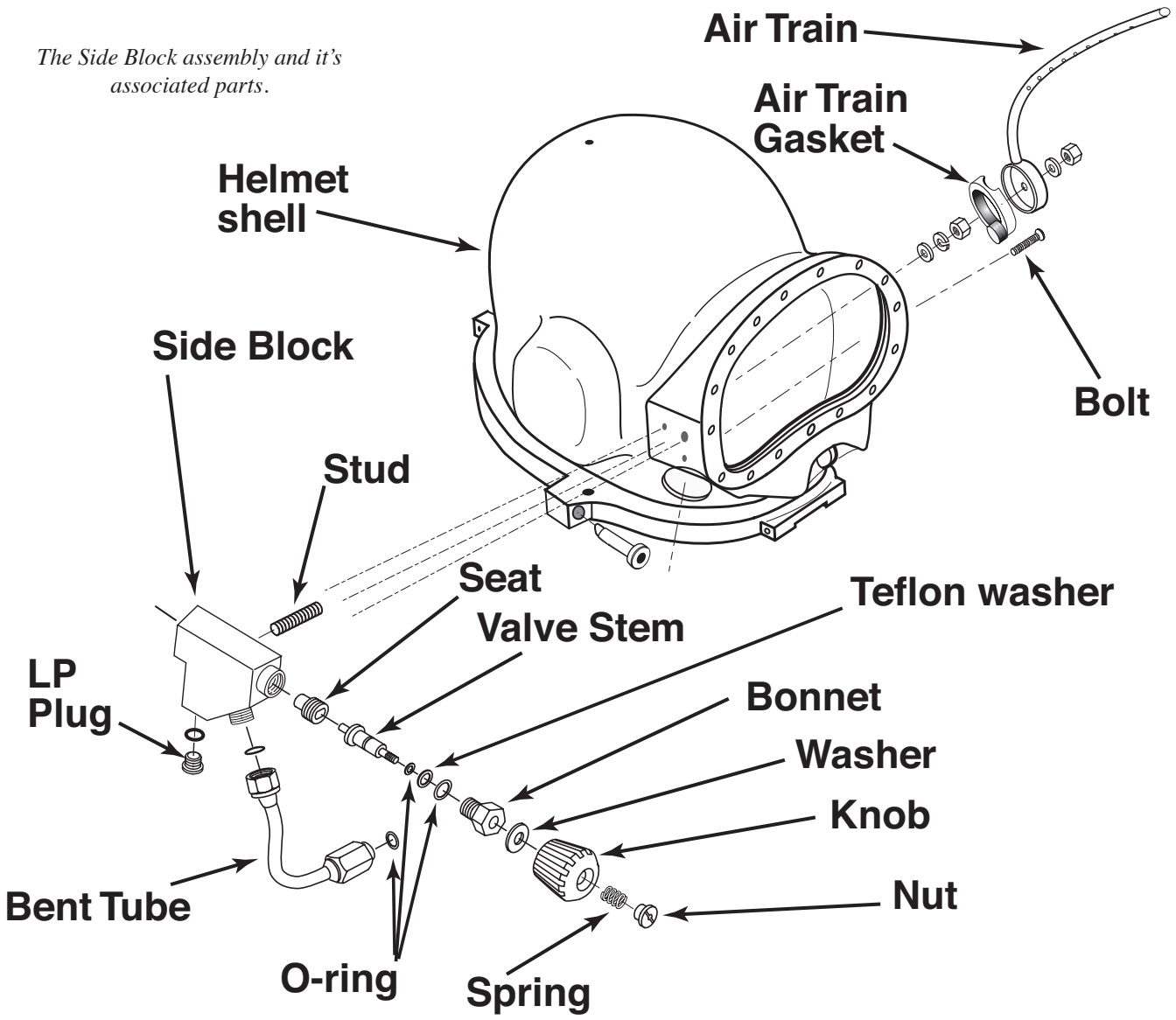
4) Be sure to place a light coating of silicone grease on all internal moving parts, O-rings, and washers. However, do not lubricate the Teflon® seat, as this will attract dust and debris.

5) Inspect the seat area inside the side block and replace the block if damaged.



Clean all the metal parts to remove salts.

The Side Block assembly and it's associated parts.



8) Test the side block prior to diving to ensure that no silicone sealant is blocking the air flow to the helmet. If it is, it must be cleaned out prior to diving.

7.4.3 Reassembly of the Defogger Valve

Tools Required:
3/8 inch Slotted Flat Blade Screwdriver
13/16" Open End Attachment on Torque Wrench
Minimum recommended replacement parts during overhaul:
Washers, O-rings

1) Screw in the new seat assembly until it is even with the front of the side block body.

2) Next, install the Teflon® washer and O-ring onto 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) Lubricate the O-ring and install on the bonnet.

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

6) Tighten the bonnet with a torque wrench to "100" inch lbs.

7) Place the new Teflon® washer and the control knob on the stem and rotate the stem counterclockwise until the seat assembly tops out fully open. The control knob must turn smoothly without any binding.

Binding (or "hard spots") in the rotation could be an indication of a bent stem that should be replaced. 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 new Teflon® washer, new knob, and the spring, and locknut. Tighten the locknut until it is flush with the knob.

⚠ WARNING

The control knob for the emergency valve and the defogger knob are not interchangeable. Use only the correct knob for the appropriate valve.

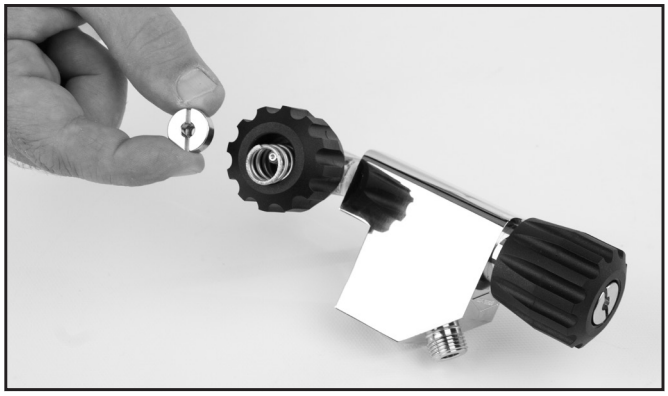
7.5 Emergency Valve Assembly

The Emergency valve control knob is not interchangeable with the defogger valve control knob.

7.5.1 Disassembly of the Emergency Valve

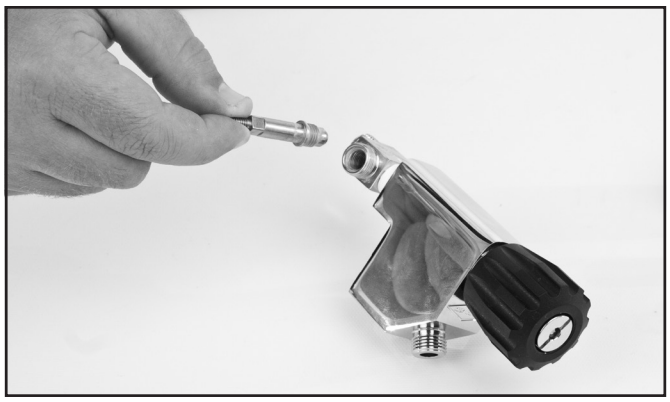
Tools Required:
11/16 inch Open End Wrench
1 inch Open-end Wrench
Torque Wrench Attachments & Torque Wrench
3/8 inch Slotted Flat Blade Screwdriver
Soft Jaw Vice
Lubricant
Teflon® Tape

1) Remove the lock nut, spring, and knob.



Remove the lock nut, spring and knob.

Undo the packing nut.



Remove the valve stem.

2) Undo the packing nut, and remove the packing, and washer.

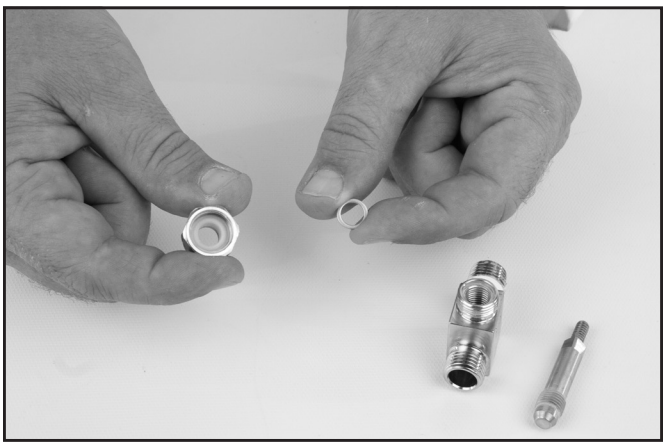
3) When the packing nut is free of the threads of the emergency valve body, back out the stem until it is free of the emergency valve body.

7.5.2 Cleaning and Lubricating

1) Clean all the metal parts in a soap and water solution, followed by cleaning with a 50/50 dilute solution of white vinegar/water. Rinse with fresh water. Clean all parts. See the cleaning instructions in Chapter 6.

2) Inspect the packing and washer for wear and replace if necessary. 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 if needed.

3) Inspect the stem seat for unevenness or wear and replace if necessary. It must also be replaced if the stem is bent. Damage will include damaged threads, rounded flats that engage the control knob. Also inspect the shaft to ensure the conical seat surface is smooth and free of corrosion or damage.



Inspect the packing and washer.

4) Check the seat in the emergency valve body for wear or unevenness, galling and corrosion. Check the seat on the emergency valve stem. 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 if any damage is found.

5) To remove the emergency valve body from the side block the one way valve assembly must first be removed.

6) If the emergency valve body 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 onto the side block, the one-way valve assembly must be removed first.

7.5.3 Reassembly of Emergency Valve

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

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

NOTE: There are two different packing (s) and washers supplied in the kit (525-311), 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.

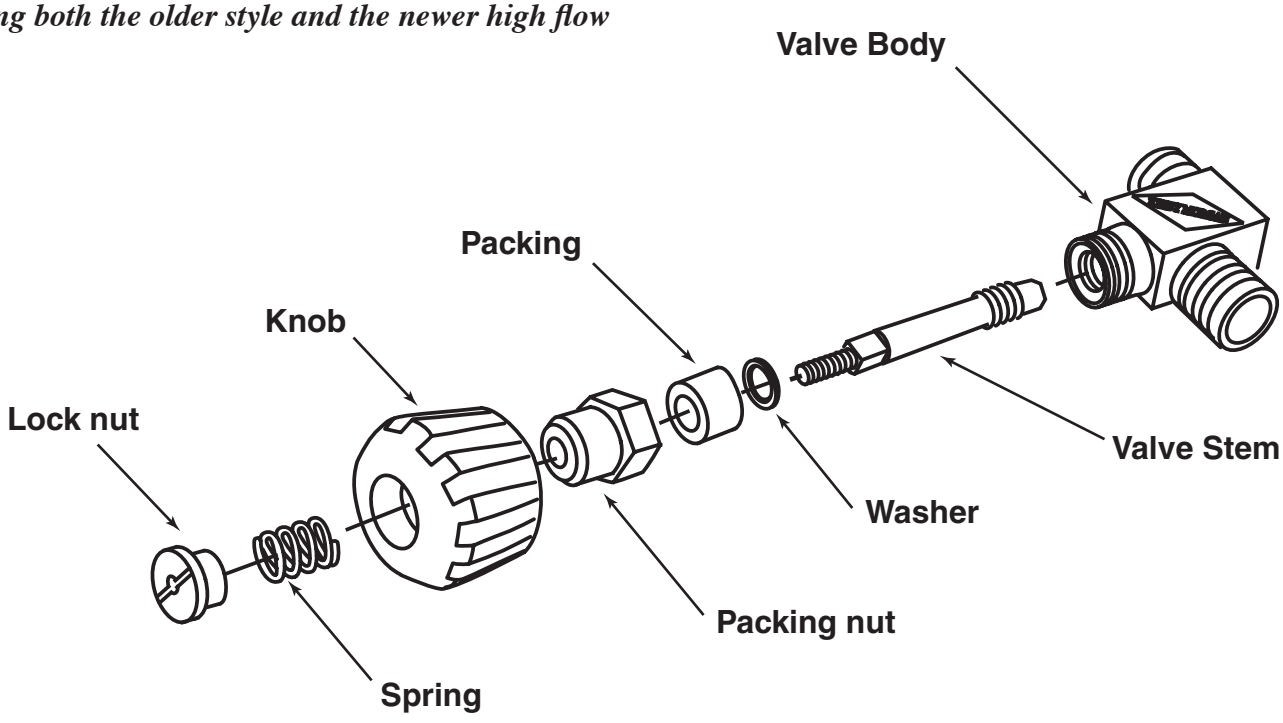
Installing the valve stem in the emergency valve.

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 onto the emergency valve body. Run the nut in and tighten slightly with a wrench.

6) Inspect the emergency gas valve knob for wear and damage. Ensure the flats that engage the valve stem shaft are not rounded, cracked or damaged. The valve



The emergency valve

⚠ WARNING

The control knob for the emergency valve and the defogger knob are not interchangeable. Use only the correct knob for the appropriate valve.

knob should not have rotational play greater than 1/8th of a turn.

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

7) Place the emergency gas valve knob 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 with a torque wrench until moderate resistance is felt when turning the knob. Torque to 50 inch pounds after seating.

9) Place the spring, and locknut 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 testing of the emergency gas valve is easily accomplished by attaching the valve, by itself in the shut position, on to the bail-out whip from the first stage. Pressurized to a minimum 135 p.s.i.g. (9.3 bar) using

⚠ WARNING

Use only thin Teflon® tape when installing the Emergency Gas Supply valve in the side block. Thick tape can lead to thread damage, which may make it impossible to install the EGS valve in the side block properly. This could lead to a loss of breathing gas.

the EGS Cylinder and dropping it into a bucket of clean water a minimum 30 seconds to check for leaks.

11) Before wrapping the threads with pipe tape, 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 thread chasing 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.

12) Before installing the valve assembly, wrap the pipe threads with 1-1/2 turns of Teflon® tape starting after the first thread. Apply the tape with slight tension to allow the tape to fill into the threads.

Hand tighten the valve, then continue an additional 1-1/2 to 2 turns with a wrench keeping in mind 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.

7.5.4 Leak Testing the EGS Valve

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

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

c) Pressurize EGS Valve to a minimum of 135 p.s.i.g. (9.3 bar) 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.

⚠ WARNING

A leaking Emergency Gas Valve assembly 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.

A submersible pressure gauge should always be used with the EGS system to help minimize this risk.

d) Perform the leak check for minimum of five minutes, using the mild soapy solution, per Chapter 6. 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.

7.6 Bent Tube Assembly

7.6.1 General

The bent tube assembly provides breathing gas flow from the side block assembly to the regulator assembly on the Super Lite® 17C. Both ends of the bent tube assembly disconnect for complete removal. The O-ring and the Teflon® O-ring 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 Chapter 6 prior to inspection for reuse.

7.6.2 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

Always start removal at the side block end.

Loosening the jam nut.

1) Always start removal of the bent tube 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.

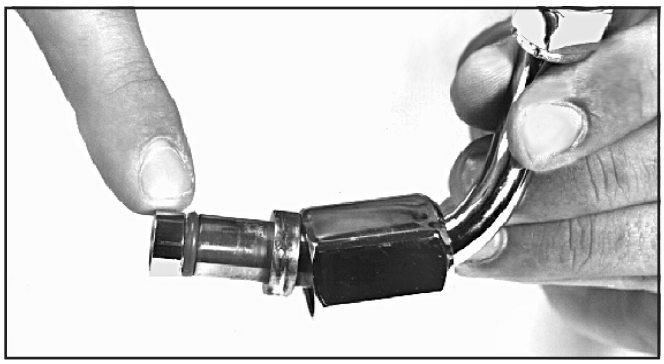
2) The inlet nipple has a jam nut that locks the mount nut in place. With one wrench, hold the bent tube mount nut. With another wrench, turn DOWN the jam nut, backing it away from the mount nut. The mount nut can then be rotated until free of the regulator inlet nipple threads. It can be pushed up the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

7.6.3 Inspection of Bent Tube Assembly

Clean the bent tube in accordance with Chapter 6. The O-ring at the regulator end should be cleaned and inspected 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



Replace the O-ring on the bent tube if it is worn or damaged.

⚠ WARNING

Do not wrap the bent tube with tape, ropework, springs, hose wrap, or other items. This will prevent daily inspection of the bent tube. In addition, some of these items may trap moisture, which could lead to corrosion and failure of the bent tube.

If the tube fails, this could lead to a rapid depletion of the diver's breathing gas supply. This could lead to serious personal injury or death.

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.

7.6.4 Installation of the Bent Tube Assembly

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, Teflon® ring

1) Lightly lubricate the bent tube O-ring and install in the O-ring groove at the regulator end of the bent tube, then install new Teflon® O-ring at the side block end.

2) Push the regulator end of the bent tube assembly into the inlet nipple. Slide it in until the side block end of the tube is aligned with the threads for the mount nut.

3) Be sure the Teflon® O-ring is in place on the side block end of the bent tube, then engage the threads on the tube 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 in 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 mount nut onto the side block to ("100" inch lbs).

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

7.7 SuperFlow® 350 Demand Regulator

7.7.1 General Regulator Information

While the regulator systems on all Kirby Morgan helmets are simple and highly reliable, the breathing resistance will increase if the demand regulator on your helmet 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 inspected and adjusted.

Four 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 SuperFlow® 350 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 Pouch” is Part #525-620. This kit is included with each new Kirby Morgan helmet that is equipped with the SuperFlow® 350 regulator.

Tool Kit with pouch - Part #525-620.

7.7.2 SuperFlow® 350 Demand Regulator Test for Correct Adjustment, 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. See the Dive Lab website (www.divelab.com) for the latest procedures for set-up.

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 equipped with the SuperFlow® 350 regulator. See "Appendix 3 Supply Pressure Requirements & Tables" on page 140 for recommended pressures during use.

NOTE: When storing the helmet for any length of time, ensure that the regulator adjustment knob 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) Rotate the regulator adjustment knob in, towards the regulator body.

2) Ensure the supply pressure is connected and properly adjusted to 135 to 150 p.s.i.g.

3) Turn on the gas supply.

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

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

6) 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.

7) 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 this chapter.

Remove the demand regulator clamp.

7.7.3 Inspection of SuperFlow® 350 Regulator Body Interior

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

1) Remove the demand regulator clamp by removing the clamp screw.

2) Lift off the regulator cover and diaphragm.

3) Clean the diaphragm with the soapy solution, per Chapter 6 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 for damage, corrosion and cleanliness. Clean the interior of the regulator body if necessary per Chapter 6.

⚠ WARNING

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.

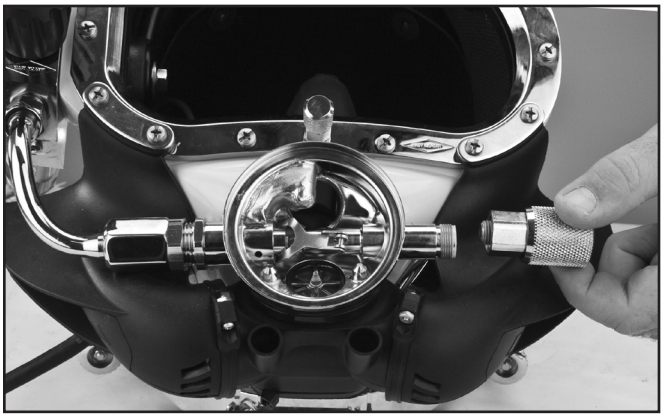
6) Reinstall the diaphragm, cover, and clamp. Tighten the clamp screw to the recommended torque to "12" inch pounds using a torque screwdriver.

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

7.7.4 SuperFlow® 350 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 of the demand regulator on the helmet. Start at the adjustment knob end of the regulator:

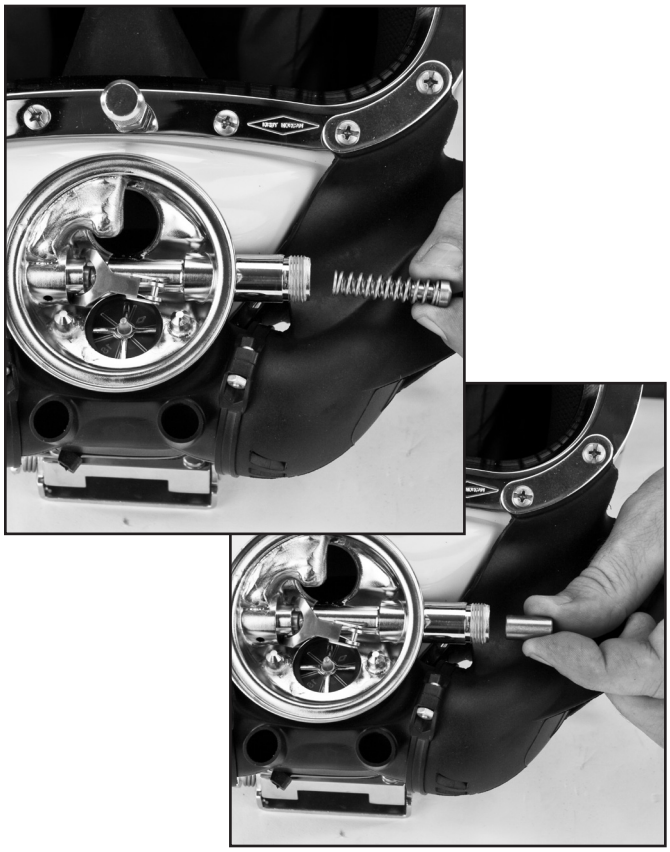
Tools Required:
3/4 inch Open-end Wrench Attachment on Torque Wrench
3/32 inch Punch & Small Block of Wood
Ball-Peen Hammer
Regulator Adjustment Tool Kit, Part #525-620
Torque Wrench



Screw the regulator adjustment knob out for removal.

1) Unscrew the regulator adjustment knob until it stops. If the knob wobbles as you turn it, or is extremely hard to turn, the shaft is bent and needs to be replaced.

2) Loosen the nut, then rotate the adjustment knob counterclockwise until the adjustment knob and the adjustment shaft are free.



Shake out the spacer, spring set, and piston.

3) Remove the spacer, springs, and piston. At this point the threads can be cleaned and lubricated as well as the adjustment shaft.

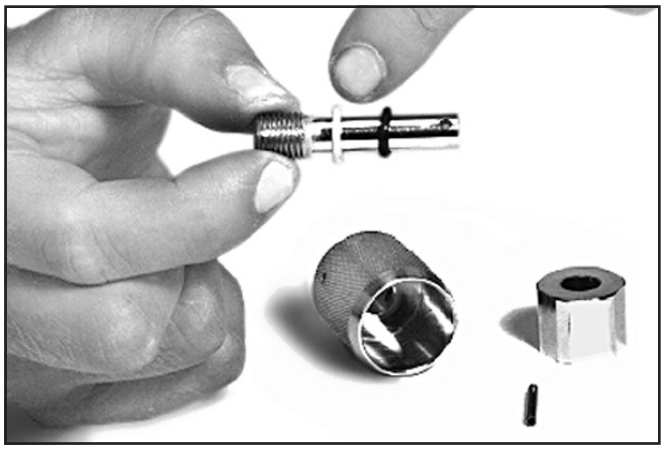
4) Punch out the roll pin using a 3/32 punch. Use a block of wood with a 1/4" hole drilled through it to support the knob. Position the knob so the roll pin is over the hole. The adjustment knob can be held against the wood block allowing the roll pin to be driven into the 1/4" hole.

5) Remove the adjustment knob, the washer and O-ring.

NOTE: If the spacer and the spring set 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 this Chapter..

6) Carefully inspect all parts for corrosion, paying particular attention to threaded surfaces and the spring set. Clean and lightly lubricate parts per the instructions in this chapter.

NOTE: Carefully inspect the adjustment shaft to ensure it is straight, Check for damaged threads.



Inspect the washer and o-ring.

Replace the adjustment shaft if any damage is found. Replace the O-ring.

7) Replace washer.

8) Replace the O-ring.

9) Inspect the inside of the adjustment tube on the regulator body 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, and that the threads are clean.

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 this Chapter.

7.7.5 Reassembly of the SuperFlow® 350 Regulator 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 back in the regulator adjustment tube, followed by the spring set, and spacer.

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

3) Slip the packing nut over the adjustment shaft followed by the adjustment knob.

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 retaining pin back into place, until it is flush with the surface of the adjustment knob.

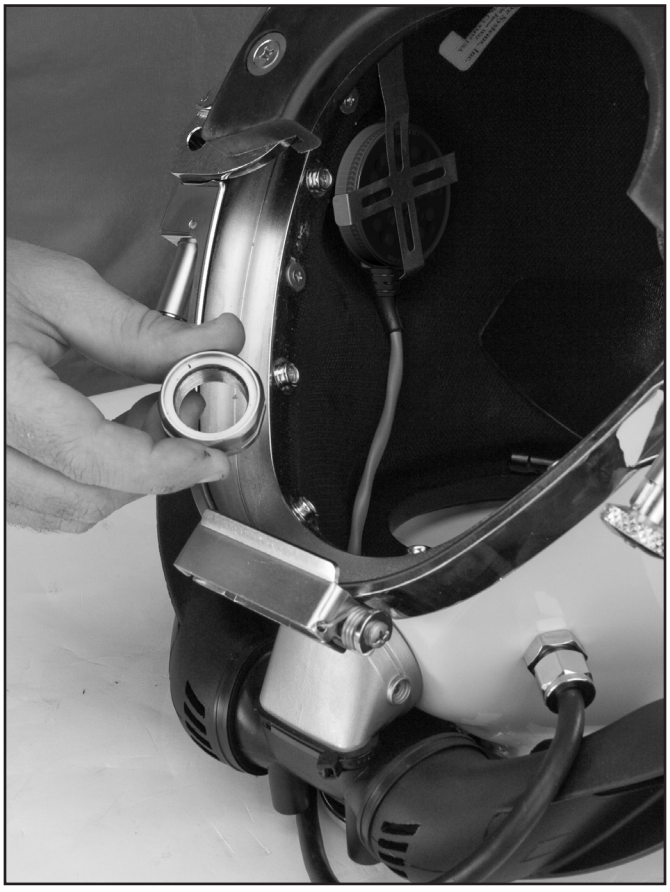
5) Screw the adjustment knob assembly clockwise back into the regulator body leaving enough packing nut exposed to get the wrench on it.

NOTE: Ensure the adjustment shaft (85) rotates smoothly.

6) Thread the packing nut onto the regulator body (81) and tighten with the 3/4" torque wrench to "40 (after seating)" inch pounds after seating, turn the knob all the way in and all the way out making sure there is no interference.

7.7.6 SuperFlow® 350 Demand Regulator 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



The regulator mount nut must be removed to remove the regulator.

7/8 inch Open-end Wrench

1) To remove the regulator from the helmet, the bent tube should be disconnected first. 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.

2) Remove the whiskers from the port retainer (108) by removing the screws. Take care not to lose the spacers or kidney plates.

3) Remove the nose block device per Chapter 8.

4) Remove the oral nasal mask.

5) The regulator mount nut is removed along with the sealing O-ring.

6) Cut the tie wrap that connects the regulator body to the Quad-Valve™ cover.

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

8) The center section of the exhaust whisker, named the exhaust main body has a tie wrap holding it in place. Remove the tie wrap then stretch the body off the regulator exhaust flange.

9) Older model double or single exhaust whiskers are removed similarly.

7.7.7 Disassembly of the SuperFlow® 350 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 Recommended Replacement Parts for Annual Overhaul:
Inlet valve Soft Seat 510-580
Adjustment shaft O-ring 510-011
Adjustment Shaft Washer 520-032
Adjustment Nut 530-303
Diaphragm 510-553
Inlet Nipple O-ring 510-014
Exhaust valve 510-552

1) Remove the regulator cover clamp screw and clamp.

2) Remove the regulator cover and the diaphragm.

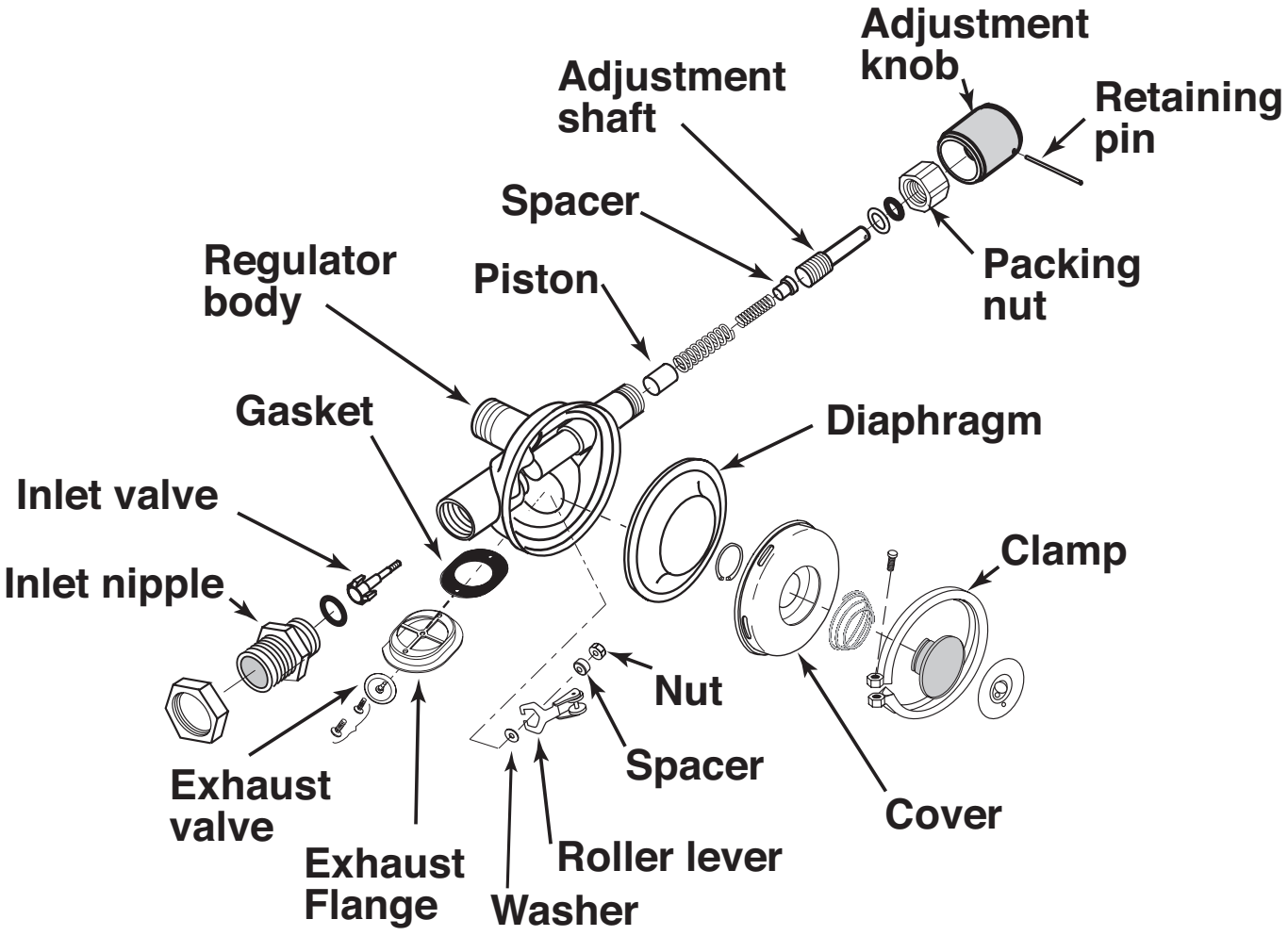
3) Adjustment knob removal is started by unscrewing the adjustment knob until it stops.

4) The packing nut 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 and washer will remain on the adjustment shaft.

6) Tilt the helmet so that the spacer, spring set, and piston fall out of the adjustment tube of the regulator.

NOTE: If the spacer and the spring set are stuck, this indicates possible corrosion or saltwater intrusion into the adjustment tube or the adjustment tube

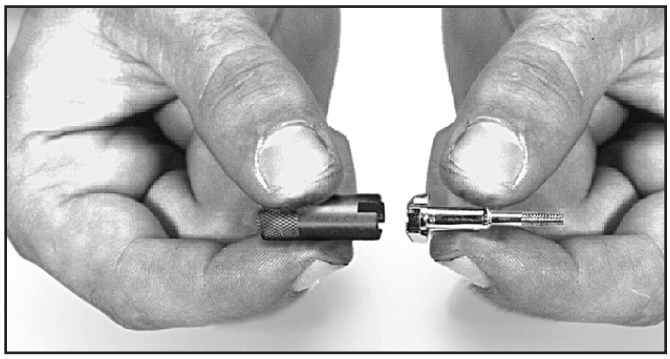


The SuperFlow® 350 regulator assembly.

may be bent. The demand regulator requires removal from the helmet and cleaning per this Chapter. and 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 trained KMDSI technician.

7) On the adjustment knob, drive out the roll pin 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.

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



The Castle Wrench and inlet valve.

9) Place the castle wrench in the inlet nipple side of the demand regulator over the soft seat of the inlet valve 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 on the inlet valve. Loosen and remove the adjustment nut by rotating the socket wrench counterclockwise.

10) Tilt the regulator and drop out the inlet valve and washer.

11) The spacer and lever will now fall out of the regulator body.

⚠ CAUTION

The inlet valve adjustment nut must never be reused. Reuse of the adjustment nut will not allow the regulator to maintain proper adjustment.

NOTE: Ensure that the washer comes out with the rest of the components.

12) Remove the screws that hold the exhaust flange in position. Remove the flange and gasket from the regulator body.

13) Remove the exhaust valve from the exhaust flange.

7.7.8 Inspection of SuperFlow® 350 Demand Regulator Parts

After the regulator has been disassembled, clean and inspect all parts. Any parts showing signs of wear, damage or deterioration should be replaced. If this is an annual overhaul KMDSI recommends replacement of the inlet valve seat, adjustment nut, O-ring on inlet valve, O-ring on adjustment shaft, washer on the adjustment shaft. A rebuild kit is available for replacement parts (Part #525-309).

If any parts show any signs of damage, deterioration or any damaged threads, the part should be replaced. The adjustment nut must never be reused. Reuse of the adjustment nut will not allow the regulator to maintain proper adjustment.

1) 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

The exhaust valve must be in good condition.

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.

2) 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. 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 should be replaced.

3) 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 if any chrome is missing or if the shaft is bent or thread damage is present.

4) 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.

5) 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 should be replaced. The diaphragm should always be replaced during scheduled annual overhauls.

6) Inspect the whisker. Replace the whisker if it shows signs of wear, aging or any damage.

The new whiskers used in the Quad-Valve™ are much more rugged than the older latex double exhaust system and will give a much longer service life and provide better breathing performance at depth. Older latex double exhaust systems should be replaced with the new Quad-Valve™ exhaust system.

7.7.9 Reassembly of the SuperFlow® 350 Demand Regulator

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

⚠ WARNING

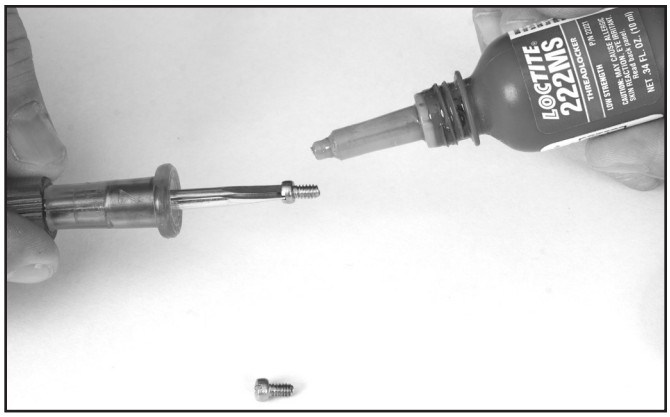
The gasket that sits between the regulator exhaust flange and regulator body must be in place. Without this flange, the regulator will leak and drowning could result.

⚠ WARNING

Use silicone sealant in a well ventilated area. 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 and Material Safety Data Sheet.

The gasket must be installed between the flange and regulator body.

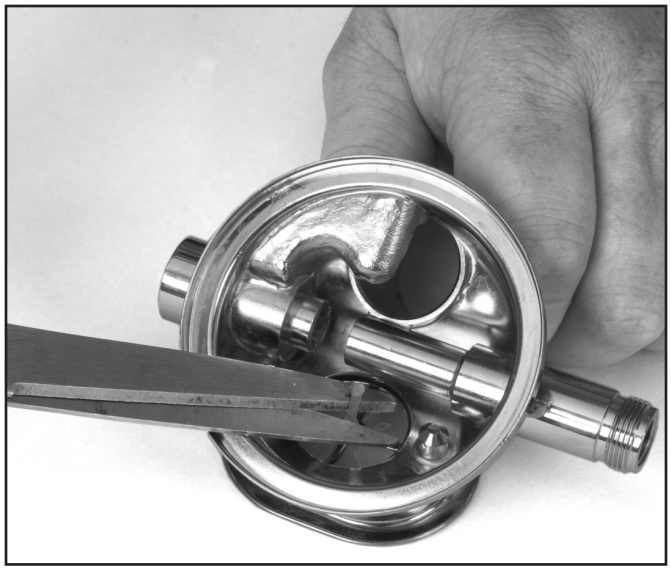
If the flange is tightened too much, the gasket will protrude into the exhaust valve opening and interfere with proper regulator performance.



Be sure to use Loctite® to install the screws in the regulator body.

The exhaust valve is installed on the outside of the flange.

The screws that hold the flange on the regulator body should be tightened to "6" inch pounds.



The "tail" of the exhaust valve that sticks into the regulator body must be trimmed.

1) Install the exhaust flange, gasket, and screws onto the regulator body. Use Loctite® 222 to secure the screws. Tighten the screws to "6" inch pounds.

2) Trim off any excess material from the gasket that might interfere with the operation of the exhaust valve.

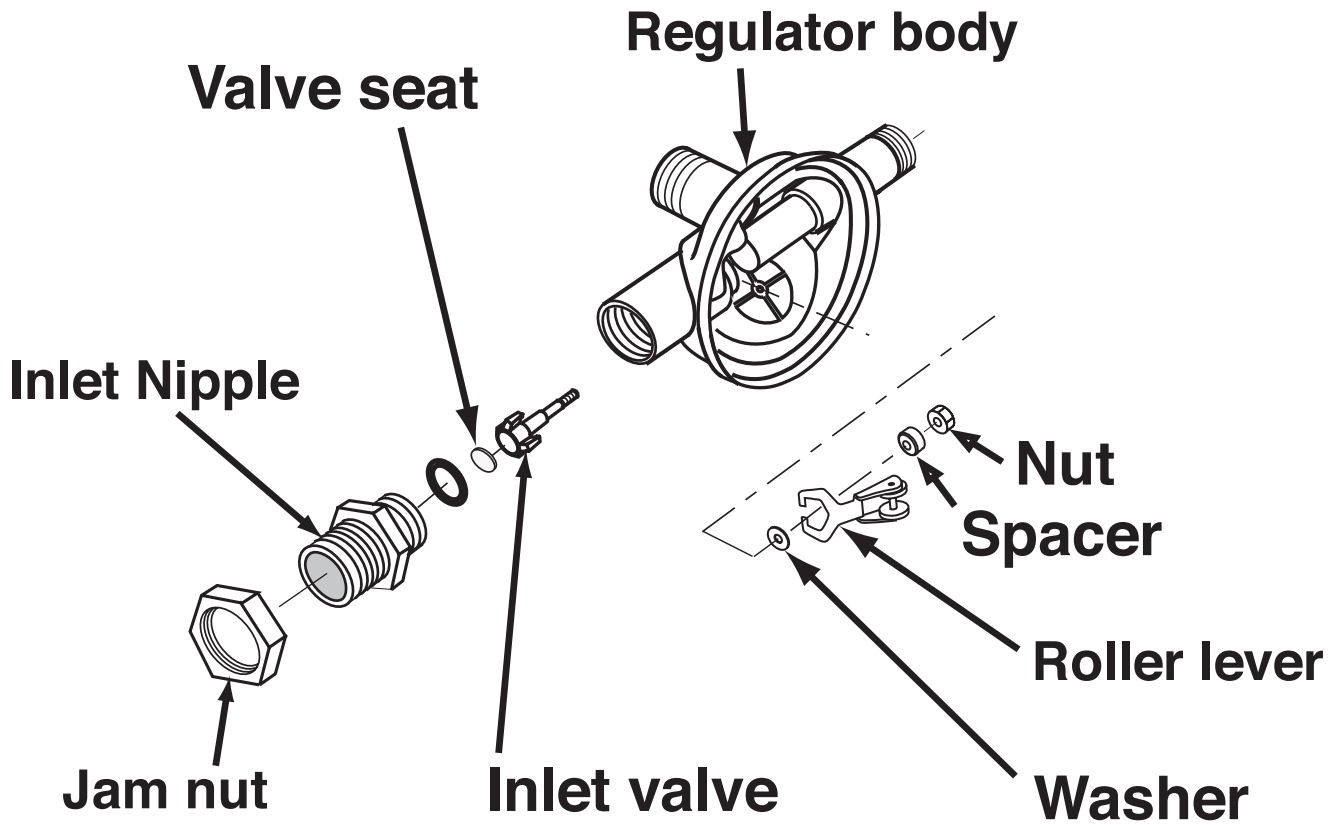
3) Install the new exhaust valve into the regulator and trim off any excess stem that may interfere with the movement of the lever or inlet valve.

4) While using the castle wrench to hold the inlet valve, insert the valve into the bent tube end of the regulator body. First place the washer, then the spacer over the end of the inlet valve stem. As an alternate procedure, the washer and spacer may be placed in the recess in the inside of the regulator body before inserting the inlet valve stem.

5) Using the nut driver from the tool kit, run the nut onto the inlet valve stem approximately 1 ½ to 2 turns, leaving enough slack to allow installation of the lever. With the inlet valve pressed in, the washer

⚠ CAUTION

Be sure that the washer and spacer that are installed on the inlet valve shaft are installed in the correct order. If they are not, the regulator will not perform properly.



SuperFlow® 350 regulator body with roller lever assembly and inlet valve.

and spacer must be loose on the inlet valve stem so the lever can be installed.

6) Check the roller lever. The lever 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.

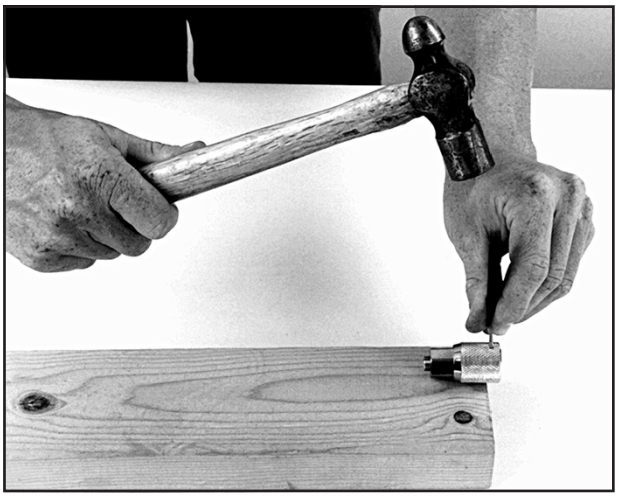
7) Hold the inlet valve with the castle wrench so that it cannot rotate, tighten the nut until three threads are visible past the nut. This will be close enough for initial set up.

8) While holding the lever down, install the inlet nipple with its O-ring into the regulator body. Using the torque wrench, tighten the inlet nipple to "40" inch pounds.

9) Lightly lubricate the piston and spacer. Install the piston, spring set and spacer into the adjustment tube of the regulator body, as shown in the blow-apart drawing.

10) Lightly lubricate the new O-ring then install the new washer and O-ring on the adjustment shaft.

11) Slide the packing nut onto the adjustment shaft, then slip the knob onto the end of the shaft. Hold the shaft and rotate the knob until the pinholes line up.

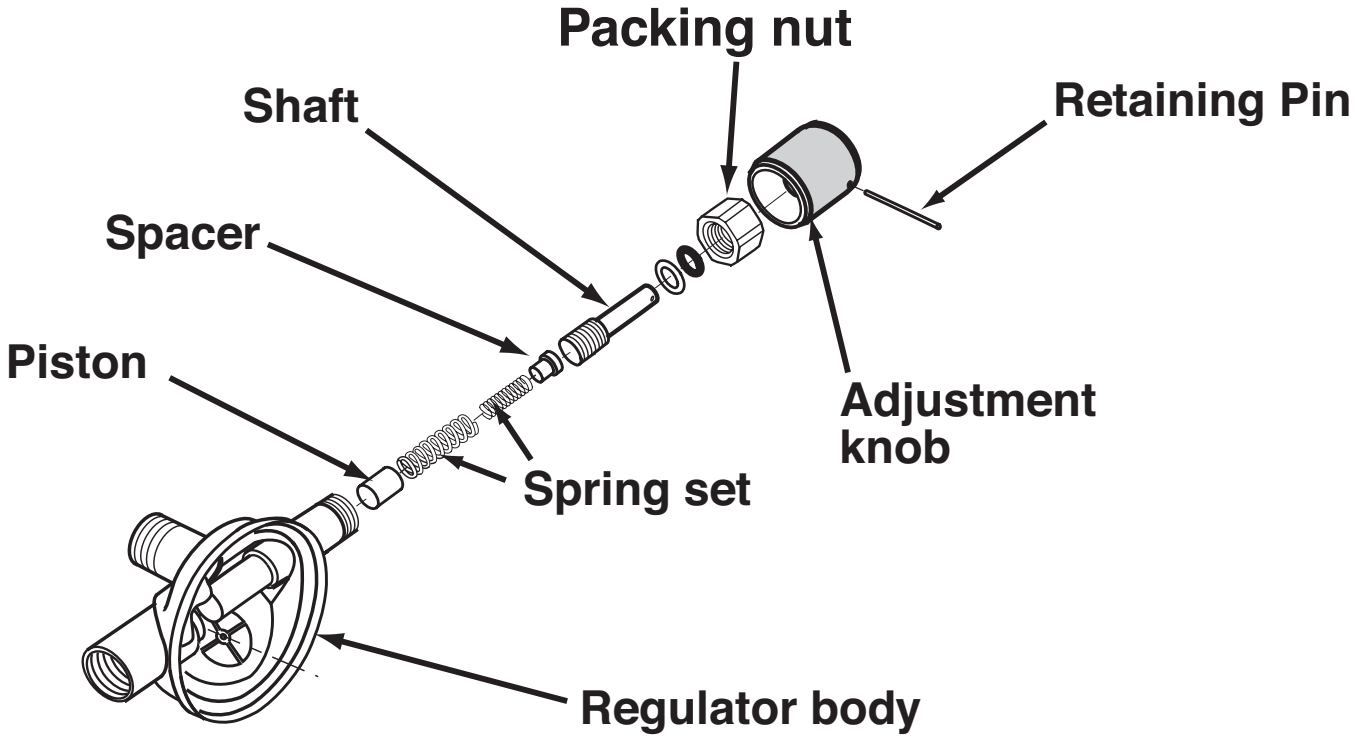


Install the retaining pin in the adjustment knob.

Use the inlet valve holder - the “L” shaped tool (or a 3/32” punch), from the regulator tool kit to accurately align these holes.

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

13) Lightly lubricate the end of the shaft and the threads with the appropriate lubricant, and then thread the adjustment shaft clockwise, using the adjustment knob, into the regulator tube until the packing nut can be started.



Adjustment end of the SuperFlow® 350 regulator.

Back out the adjustment knob 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 to "40 (after seating)" inch pounds.

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

15) Stretch the Quad-Valve™ main exhaust body onto the exhaust flange of the regulator. Rotate as needed so the port and starboard whiskers can be installed.

16) For the old double exhaust or single exhaust, stretch the exhaust whisker onto the exhaust flange of the regulator. Fasten the double exhaust to the regulator with a cable tie and tighten.

17) Mount the regulator to the helmet. Lightly lubricate and install the sealing O-ring and thread on the regulator mount nut.

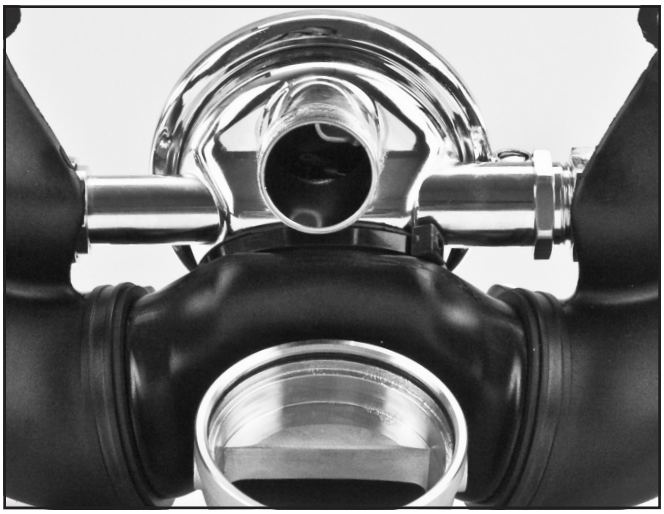
18) Install the bent tube assembly before tightening the regulator mount nut, finger tight

NOTE: If this maintenance is during an annual overhaul, replace the Teflon® ring at the side block end of the bent tube and the O-ring at the demand regulator inlet side of the bent tube.

Lightly lubricate the O-ring on the bent tube assembly. Slide the O-ring end of the bent tube assembly into the regulator inlet nipple 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.



The Quad-Valve™ must be properly connected to the regulator and the quad exhaust cover.

Loosen the jam nut on the regulator inlet (counter-clockwise), and engage the jam nut fully to the large nut on the 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 to "40" inch pounds.

19) Ensuring the O-ring is in place, use a torque wrench with a 1 3/8” socket and an extension to tighten the regulator mount nut to "100" inch pounds. Next using a torque wrench with an 11/16” adapter, torque the bent tube nut to the side block to "100" inch pounds.

20) Attach the whisker to each side of the face port retainer using the screws, plates and spacers. Using a torque wrench with a flat blade screwdriver adapter, carefully torque these screws to "12" inch pounds.

21) Connect the Quad exhaust cover to the exhaust body and install the screws on the Quad exhaust

22) Adjust the regulator following instructions in this chapter.

23) Install the diaphragm, cover, clamp and screw. Tighten the screw to "12" inch pounds using a torque screwdriver.

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

7.7.10 Tuning the SuperFlow® 350 Regulator

1) Remove the clamp, cover and diaphragm.

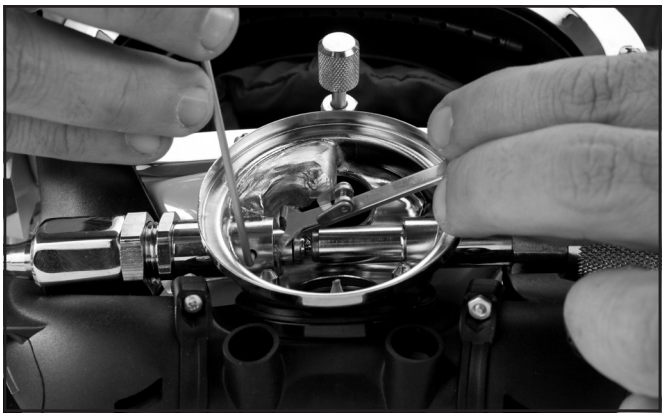
2) Screw the adjustment knob (clockwise) all the way in, towards the regulator body.

3) Pressurize the regulator to between 120-150 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.

If the free flow does not stop, the adjustment nut is too tight. If the roller lever is sloppy (loose) the adjustment nut is too loose.

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 stem from turning. Adjust the nut 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.



Insert the inlet valve holding tool into the balance hole on the inlet tube.

6) Remove the inlet valve holder tool.

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

8) Depress the purge button 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 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.

Test the response of the purge button.

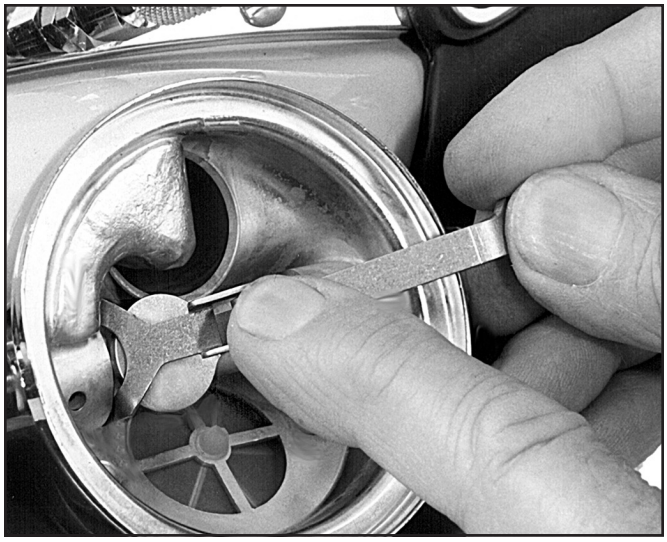
If the purge button travels further than a 1⁄8" (3.0 mm) before gas flow starts, the lever will require bending upward.

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, you'll need to remove the lever and carefully place it in a vice. Grip the lever from the side with a pair of long nosed pliers and bend the roller end up with your finger. Bend it only a small amount at a time.

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.

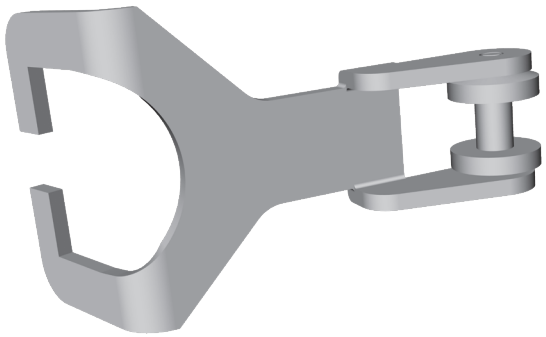
11) To bend the lever down, place the disk end of the KMDSI 1⁄4" wrench onto the flat area of the adjustment tube within the regulator, sliding the disk as far as possible under the lever. With your finger, slightly bend the lever down over the disk to the desired height. Be careful not to bend the lever too far! Bend it slightly then check it.



Use the disk end of the KMDSI wrench to bend the lever down.

⚠ CAUTION

The legs of the lever must be properly aligned in the same plane. If one leg is up and the other is down, the regulator will not perform properly.



Note that the legs of the lever must be properly aligned and in the same plane for the lever to work correctly.

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

7.7.11 SuperFlow® 350 Regulator Steady Flows When Pressured Up: Special Tools Used

Tools Required:
Small flat blade screw driver.
Small jewelers screw driver or metal scribe.
Needle nose pliers.
KMDSI regulator tool kit if available.

A few words about the demand regulator: The demand regulator is rugged and reliable. However, to maintain optimum performance it should be checked prior to each diving day in accordance with the brief procedure **Demand Regulator Test for Correct Adjustment, Fully Assembled**.

If after completing the demand regulator test as outlined in this chapter, adjustment is necessary and the special KMDSI tool kit is not available proceed as follows:

1) Remove the regulator clamp, cover and diaphragm.

2) Adjust the regulator adjustment knob all the way in. Finger tight only.

3) Pressurize the regulator to between 120-150 p.s.i.g. (8.5-10 bar).

4) If the regulator is not free flowing, slowly back out on the adjustment knob until a slight free flow is heard and then rotate the adjustment knob in (clockwise) 1/4 turn and depress the purge button momentarily. Repeat this procedure until the gas flow stops.

Usually at this point the regulator adjustment knob will be between 5 and 7 turns out. ***Note: If when backing the adjustment knob out from the full "in" position, the regulator starts free flowing at less than five turns, then this usually indicates insufficient free play at the lever.***

There are several issues that could cause the regulator to free flow, even when the adjustment knob is turned all the way in. These are as follows:

A) The regulator was rebuilt and the adjustment nut is too tight. If this is the case, the nut must be loosened.

B) The washer was never removed from the regulator and a second one has accidentally been installed. If this is the case, the second washer must be removed.

C) The regulator body has never been properly serviced and there is corrosion inside the body, making proper inlet valve travel impossible.

5) Check the free play at the lever. The lever should have between 1⁄16-⅛ inch (1.5-3.0 mm) play. If adjustment is necessary, adjust using the KMDSI tools.

6) KMDSI tools: Using the inlet valve holding rod, (L shaped rod), insert the end of the rod into the balance hole. Lightly apply force by pushing on the rod making it act as a lever to put friction against the

⚠ WARNING

The lock nut must always be replaced if removed from the inlet valve. The plastic material that locks the nut is not designed for multiple reuse. If the nut comes loose during a dive the regulator would free flow heavily. In the situation where the diver is using bottled breathing gas this would result in a rapid consumption of breathing gas.

⚠ CAUTION

The nut must not be loosened more than 1/8 turn to lower the height of the lever. If more adjustment is necessary the lever should be bent downward. If the nut is loosened more than 1/8 turn the lever will not have enough travel for proper flow rates.

Press the cover over the diaphragm.

inlet valve shaft. At this point, the KMDSI wrench can be used to rotate the lever nut. Rotate the nut "In" (clockwise) to reduce lever play or "Out" (counter clockwise) to increase lever play.

Only rotate the nut ⅛ turn at a time. Remove the tools and depress the lever several times after adjusting to ensure the correct play is achieved. It may be necessary to repeat this procedure several times, as the method requires estimating the correct position of the nut. Note: if there is little (less than 1/16 inch /1.5 mm) or no lever play, the regulator will free flow. If there is too much free play, (more than ⅛ inch / 3.0 mm) the regulator will not be capable of full demand flow potential.

7) If the free flow did not stop after this procedure, refer to regulator disassembly and cleaning procedures.

Alternate method: If a KMDSI tool kit is not available, a small jeweler's screwdriver or metal scribe can be inserted in the slot on the end of the inlet valve to keep it from rotating, and needle nose pliers may be used to rotate the lever nut. Holding the slot of the inlet valve from rotating, carefully rotate the nut "In" (clockwise to remove lever play and "Out" (counterclockwise) to increase lever play.

Only turn the adjustment nut ⅛ turn at a time. Depress the lever momentarily after each adjustment and observe the lever play. It may be necessary to complete this procedure several times, as the procedure requires estimating the proper position of the nut. If the regulator free flow did not stop after this procedure, refer to regulator disassembly and cleaning sections of this manual.

8) When adjustment is complete, place the diaphragm and cover in place, and press tightly down on the cover to simulate the action of the clamp.

9) With the cover pressed tight against the diaphragm, if the regulator starts to free flow, the lever may need to be bent down slightly. If the regulator does not free flow, slowly depress the purge button until a slight free flow develops. The purge button should depress no further than ⅛ inch (3.0 mm) before the regulator develops a flow.

If the regulator does not develop a slight free flow when the purge button is depressed in ⅛ inch (3.0 mm), then the lever will require slight upward bending.

Before bending the lever, double check the adjustments. It is rare that the lever requires bending in a regulator that has been in service. Usually levers only require bending in new installations or because of damage during disassembly.

10) Install the clamp and clamp screw. Tighten the screw to the correct torque (see appendix for torque specifications).

11) Again, press on the purge button in the cover. It must have 1/16 inch (1.5 mm) minimum and ⅛ inch (3.0 mm) maximum free travel before it contacts the diaphragm. If there is more than ⅛ inch (3.0 mm) travel, the lever must be bent upward, per this chapter. If the button has only slight or no free travel, the lever must be bent down.

12) If the purge button travel is correct, the adjustment is complete.

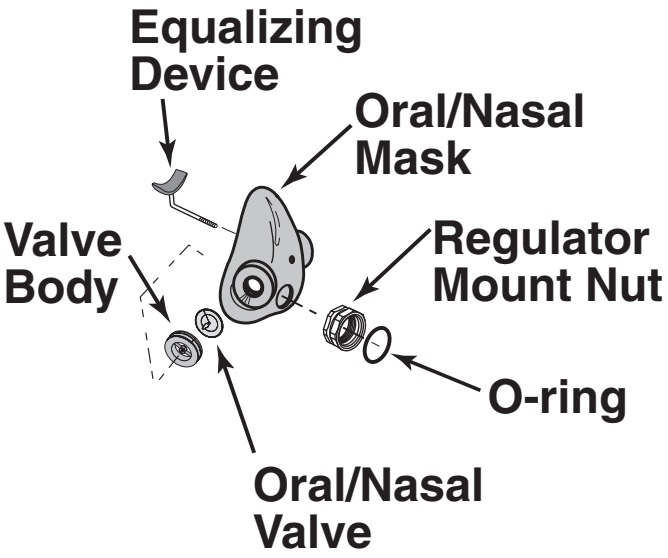
7.8 Oral/Nasal

7.8.1 Oral Nasal General Information

The oral/nasal mask is used to control and maintain low carbon dioxide (CO2) levels in the helmet and to isolate the microphone for more intelligible speech.

⚠ WARNING

Never dive with a Kirby Morgan helmet without a properly functioning oral/nasal mask. Without an oral/nasal, dangerous levels of carbon dioxide may accumulate in the helmet. This can lead to unconsciousness and death.



The oral nasal mask and the parts associated with it are easy to access.

7.8.2 Oral/Nasal Removal

Tools Required:
7/16 inch Open-end Wrench

The oral/nasal mask is easily replaced.

1) Remove the nose block device first. See chapter 8.

2) Remove the microphone.

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

⚠ WARNING

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. Do not use a torn oral/nasal mask. This can lead to dangerous levels of carbon dioxide in the helmet.

7.8.3 Inspection of Oral/Nasal

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

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

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

4) Remove the old valve 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. Cut off the excess "tail."

6) Install the valve body in the oral nasal. The valve MUST be on the inside of the oral nasal.

7.8.4 Oral/Nasal Replacement

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

2) Reinstall the microphone.

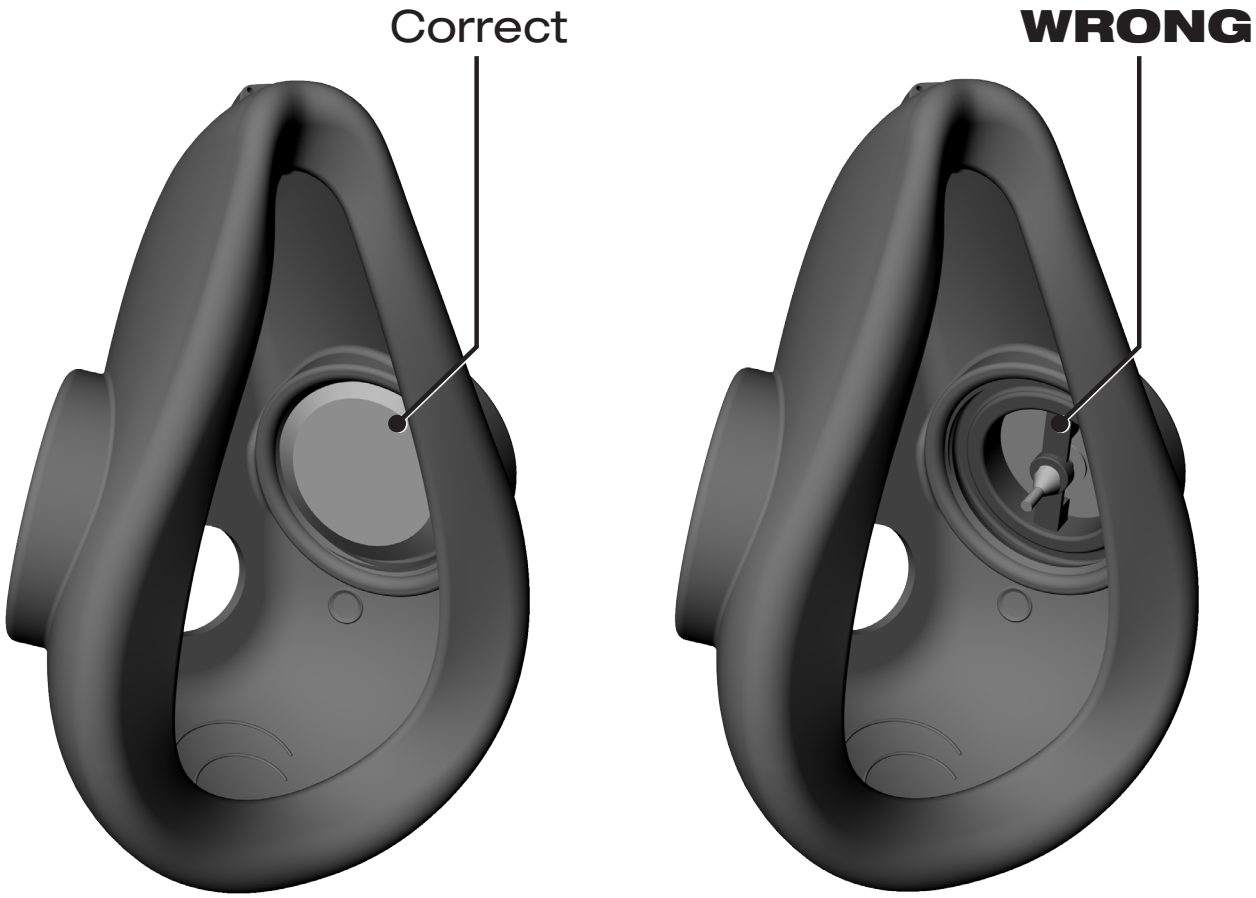
3) Reinstall the nose block device.

4) Ensure that the oral/nasal valve has been installed correctly.

⚠ WARNING

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.



Correct installation of the oral nasal valve is extremely important to your safety.

7.9 Quad-Valve™ Exhaust Assembly

The Quad-Valve™ exhaust became standard on the Super Lite® 17C helmet as of March 2005. This is a superior exhaust system that ties together the regulator exhaust and the helmet exhaust into one unit with exceptionally low exhalation resistance.

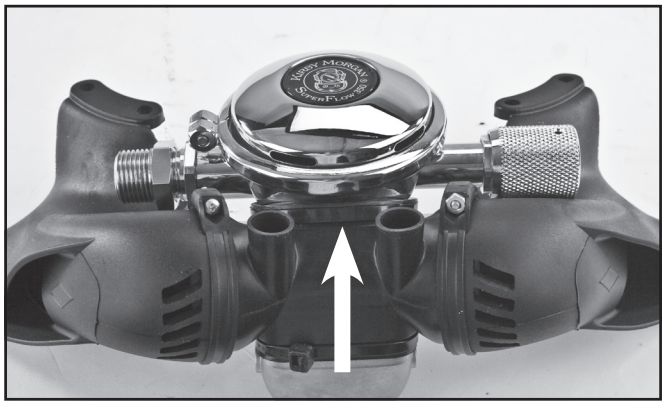
The Quad-Valve™ is nearly identical in design to the previously standard Tri-Valve™ . The difference between the two units is that the Quad-Valve™ uses the quad exhaust cover to connect the exhaust body to the exhaust main body. All other parts are identical. If you have an older SL-17C helmet you are strongly encouraged to upgrade your helmet to the Quad-Valve™ design with the Quad-Valve™ cover.

7.9.1 Quad-Valve™ Assembly Removal

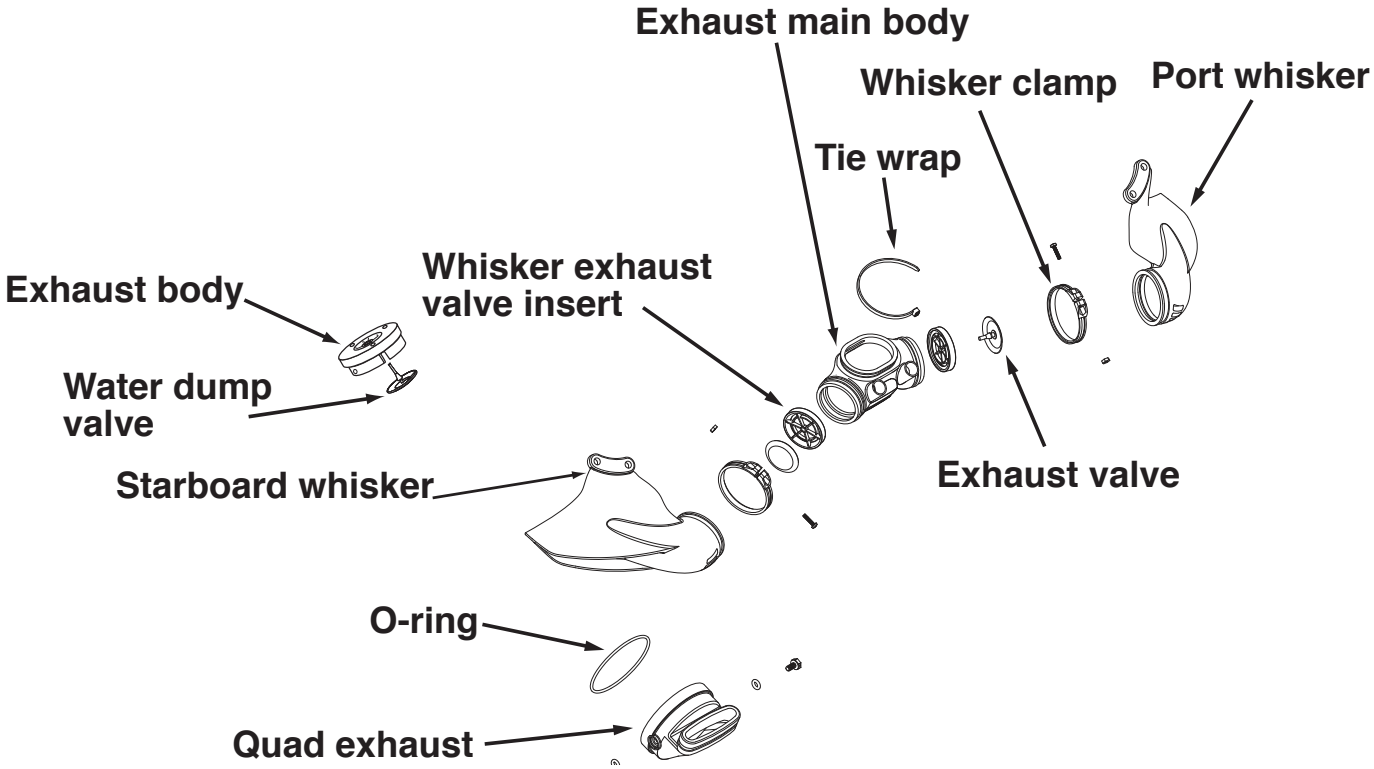
Tools Required: Screwdriver
Small cutting pliers

NOTE: *It is necessary to first remove the regulator and Quad-Valve™ exhaust assembly from the helmet to separate the Quad-Valve™ Assembly from the regulator.*

1) Removal of the Quad-Valve™ Assembly is started by cutting the tie wrap that holds the assembly to the regulator. After removing the tie wrap, stretch the exhaust main body over and off of the regulator exhaust flange.



To remove the Quad-Valve™ exhaust from the helmet you must first cut the tie-wrap that secures the exhaust main body to the regulator.



Exploded view of the Quad-Valve™ exhaust system.

7.9.2 Quad-Valve™ Exhaust Valves

NOTE: It is necessary to first remove the regulator and exhaust assembly from the helmet to replace the exhaust valves.

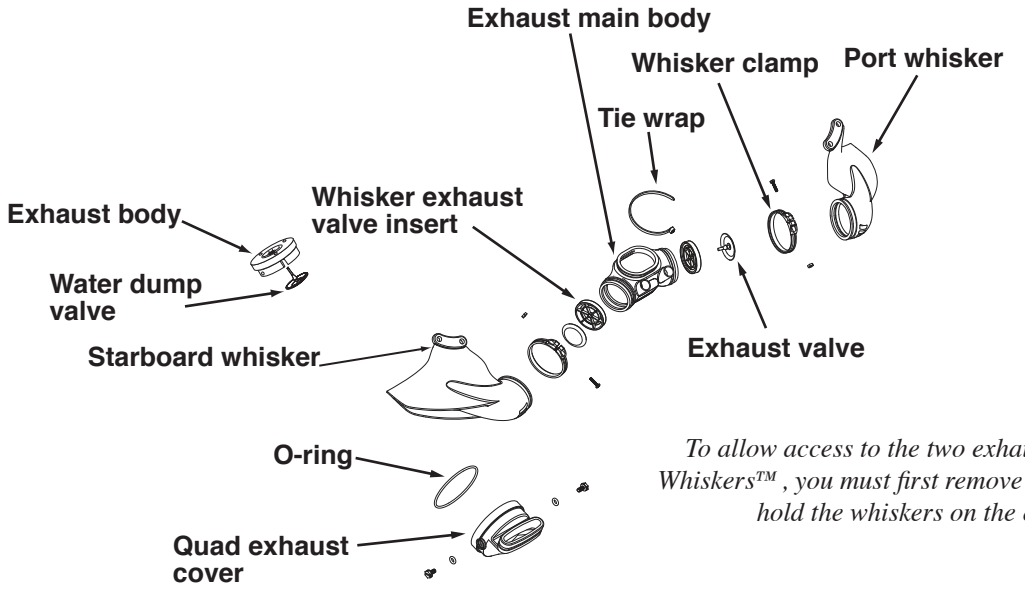
7.9.2.1 Quad-Valve™ Exhaust Valve Replacement

1) Remove the Quad-Valve™ Assembly from the regulator.

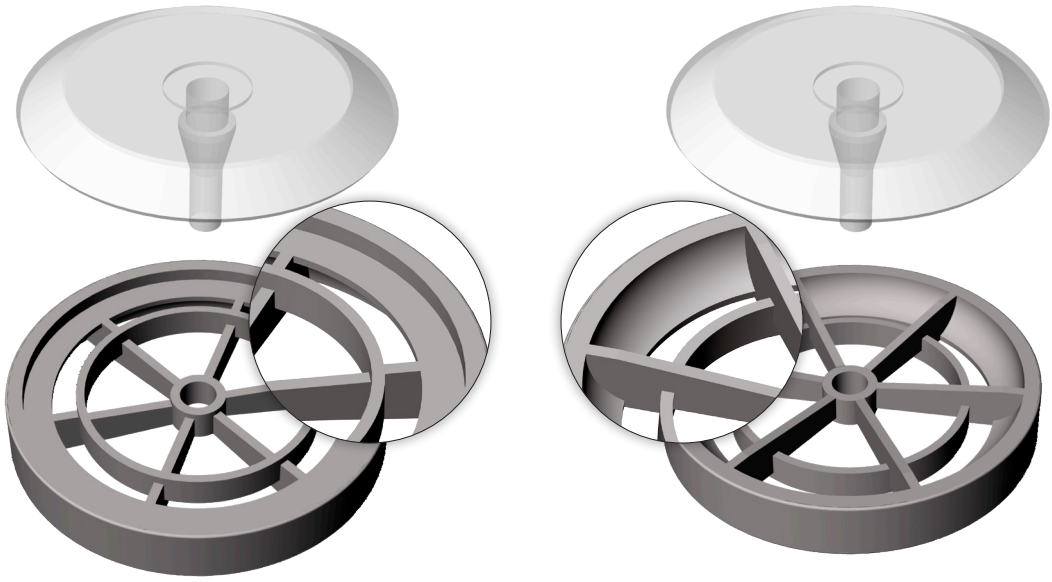
2) Carefully remove the two whisker clamps that hold the deflector whiskers to the main exhaust body.

3) Remove the two exhaust valve inserts and valves. 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 the illustrations below.

4) Install a new exhaust valve into each whisker exhaust valve insert on the correct side by feeding valve tail through hole in center of valve insert and pulling on it until valve is seated.



To allow access to the two exhaust valves in the Deflector Whiskers™ , you must first remove the two whisker clamps that hold the whiskers on the exhaust main body.



The exhaust valve inserts are recessed on one side to accept the exhaust valves so they sit flush in the inserts. The exhaust valves must be installed properly in the inserts or they will not seal or perform properly.

⚠ WARNING

The exhaust valve inserts must be installed in the correct orientation in exhaust main body. If the inserts are installed backwards, the diver will be unable to exhale. This could lead to suffocation and death.

NOTE: The exhaust valve and whisker exhaust valve inserts must be placed into the Quad-Valve™ exhaust main body correctly to provide gas flow in the proper direction. The flow must be from the inside of the Quad-Valve™ exhaust main body out to starboard whisker and port whisker.

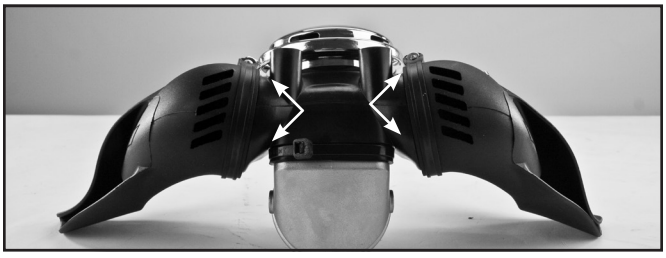
5) Install an exhaust valve/whisker exhaust valve insert assembly into both seating areas on each side of the exhaust main body.

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

7) Repeat this procedure for the port side.

8) Place whisker clamps around the grooves on each of the two whiskers. Before doing the final tightening of the clamps, make sure that parting line on bottom of wings is 5/16" behind the parting line on the main body, and the clamps are positioned properly on the body.

The correct orientation of the whiskers relative to the exhaust main body are as shown in the photo here. Tighten the screws that hold the clamps until the screws are snug. The threaded ends of the screws should be at least flush with the outer edge of the nut that holds them. Do not overtighten.



The whiskers must be aligned properly on the exhaust main body.

7.9.2.2 SuperFlow® 350 Regulator Exhaust Valve Replacement

Before removing the regulator exhaust valve, carefully inspect the area around the edges to assure the rubber exhaust valve is in contact with the regulator body. The metal cross area of the body under the valve could be slightly bent out resulting in the valve not sealing.

If the exhaust valve is high and not sealing, lightly press in on the metal cross, bending the metal in slightly until the rubber valve seats. Remove the existing regulator exhaust valve by pulling it out of its mount hole. If the valve tears, make sure that it is removed without any valve material left inside the regulator.

NOTE: Before installing the new Valve, ensure that 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 insure the valve can lay flat and seal properly. NEVER lubricate the valve.

1) Remove the regulator clamp screw and clamp.

2) Remove the regulator cover and the diaphragm.

3) Install the new regulator exhaust valve 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.

4) Reinstall the diaphragm, regulator cover, clamp and clamp screw.

7.9.3 Quad-Valve™ Assembly Installation

1) The Quad-Valve™ Main Body opening mates to the regulator exhaust flange. This opening needs to be worked onto the flange. Make sure that the Quad-Valve™ exhaust system is facing the correct direction and is not upside down.

2) Place the tie wrap around the tie wrap groove and tighten, making sure that the tie wrap end is positioned properly. Cut off the excess tie wrap tail.

3) Reinstall the regulator/exhaust assembly on the helmet.

7.10 Water Dump Exhaust Body

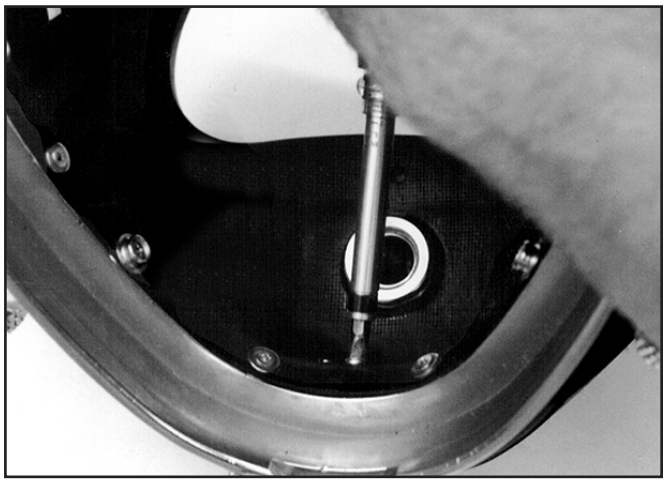
The water dump exhaust assembly is mounted onto the bottom of the helmet by three screws that are installed on the inside of the helmet shell. RTV silicone sealant is used to seal the water dump body to the helmet shell.

7.10.1 Water Dump Valve Removal

Tools Required:
Flat Blade Screwdriver

1) The Quad-Valve™ cover can be removed by unscrewing the two screws. If the cover is badly dented so that it interferes with the performance of the exhaust valve it should be replaced.

2) The rubber exhaust valve should be replaced at the slightest sign of deterioration or aging of the rubber. Simply grasp the valve and pull to remove.



To remove the exhaust body you must remove the three screws inside the helmet shell.

7.10.2 Water Dump Valve Replacement

1) The rubber exhaust valve is installed by inserting the center stem through the exhaust body then pulling from the inside of the helmet shell until it snaps into place.

2) When installing the quad exhaust cover be sure to never use longer screws that would protrude into the interior of the exhaust body as this would interfere with the operation of the rubber exhaust valve.

7.10.3 Water Dump Valve Body Removal

1) The water dump body should never need servicing. If it is to be removed, you must first remove the three screws inside the helmet shell.

After this is done, gently twist the valve body off of the helmet shell. A putty knife may be used to slide between the valve body and the shell to break the RTV sealant.

7.10.4 Water Dump Valve Body Remounting

1) To replace the main exhaust body, first be sure to clean the helmet and the main exhaust body of the old silicone sealant prior to remounting.

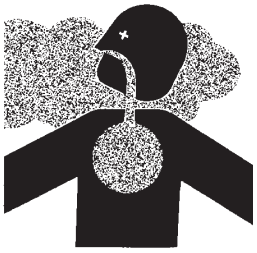
Place a coating of RTV silicone sealant on the mounting surfaces and around the mounting holes, and mate the body to the helmet and start to tighten the mount screws on the interior of the helmet. Wipe off the excess RTV silicone sealant that is squeezed out. Tighten the screws to "12" inch pounds.

7.11 Reinstalling the Quad-Valve™ Exhaust Assembly

Once the Quad-Valve™ exhaust has been reassembled, it may be mounted back on the helmet.

1) Begin to re-install the demand regulator into the mounting hole in the helmet shell, but insert it only

⚠ WARNING



Use silicone sealant in a well ventilated area. 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 and Material Safety Data Sheet.

about halfway in. This will allow the stainless steel adapter cover to align easier with the main exhaust body.

Start the cover straight onto the main exhaust body, then alternate back to inserting the regulator. Do this until both are in their proper positions. Lubricate the regulator seal o-ring and hand start the regulator mount nut.

2) Lubricate and install the 2 O-rings and install onto the washer head screws. Using either a flat blade screwdriver or a ¼" nut driver, fully engage the screws. Tighten until snug. TIP: the ¼" hex tool found in the Kirby Morgan regulator tool kit works very well for this purpose. (Part #525-620)

3) Reinstall the bent tube assembly and tighten the jam nut to "40" inch pounds.

4) Retighten the regulator mount nut to "100" inch pounds.

5) Reinstall the 4 spacers, kidney plates and screws and torque to "12" inch pounds.

6) Attach any other components that may have been displaced to aid in this installation.

⚠ WARNING

Use only KMDSI original replacement spares when repairing your helmet. 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 all warranties offered by KMDSI.

The Quad-Valve™ exhaust cover must be properly fastened to the main helmet exhaust.

Chapter 8
Corrective Maintenance

8.1 General

This section covers the maintenance and repair of all non-breathing system components of the SL-17C Diver's Helmets. 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 blowapart drawing at the rear of this manual.

⚠ WARNING

Use only KMDSI original replacement spares when repairing your helmet. 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 all warranties offered by KMDSI.

All the spare parts in our catalog were specifically manufactured for Kirby Morgan designed helmets and masks. When ordering spares, insist on KMDSI original parts.

NOTE: For O-ring Removal/Inspection/Cleaning & Installation see Chapter 6 for General Cleaning Guidelines, including KMDSI recommended cleaning, sanitizing solutions, and procedures.

⚠ WARNING

All parts on the SL-17C must be adjusted to their proper torque specifications. See Appendix 1 for a complete listing of torque specifications for each part. Failure to adjust parts to the recommended specifications could lead to helmet failure and accidents. This could be fatal.

8.2 Helmet Shell Inspection

The helmet shell 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.

1) 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 to reduce absorption of moisture in the fiberglass only until repairs can be made. The helmet should not be used if it has any gouges deeper than ⅛ 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.

⚠ WARNING

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 Kirby Morgan repair procedures.

8.3 Nose Block Assembly

8.3.1 Nose Block Assembly Removal

Tools Required:
Slip Joint Pliers and a Rag or cloth
7⁄16" Open-End Wrench

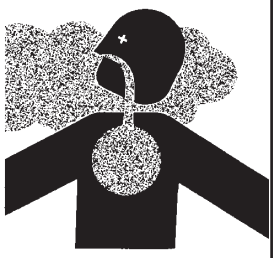
1) Hold the nose block knob with a pair of pliers padded by a cloth, while unscrewing the nose block device with your hand.

2) After the knob is removed, loosen and remove the packing nut.

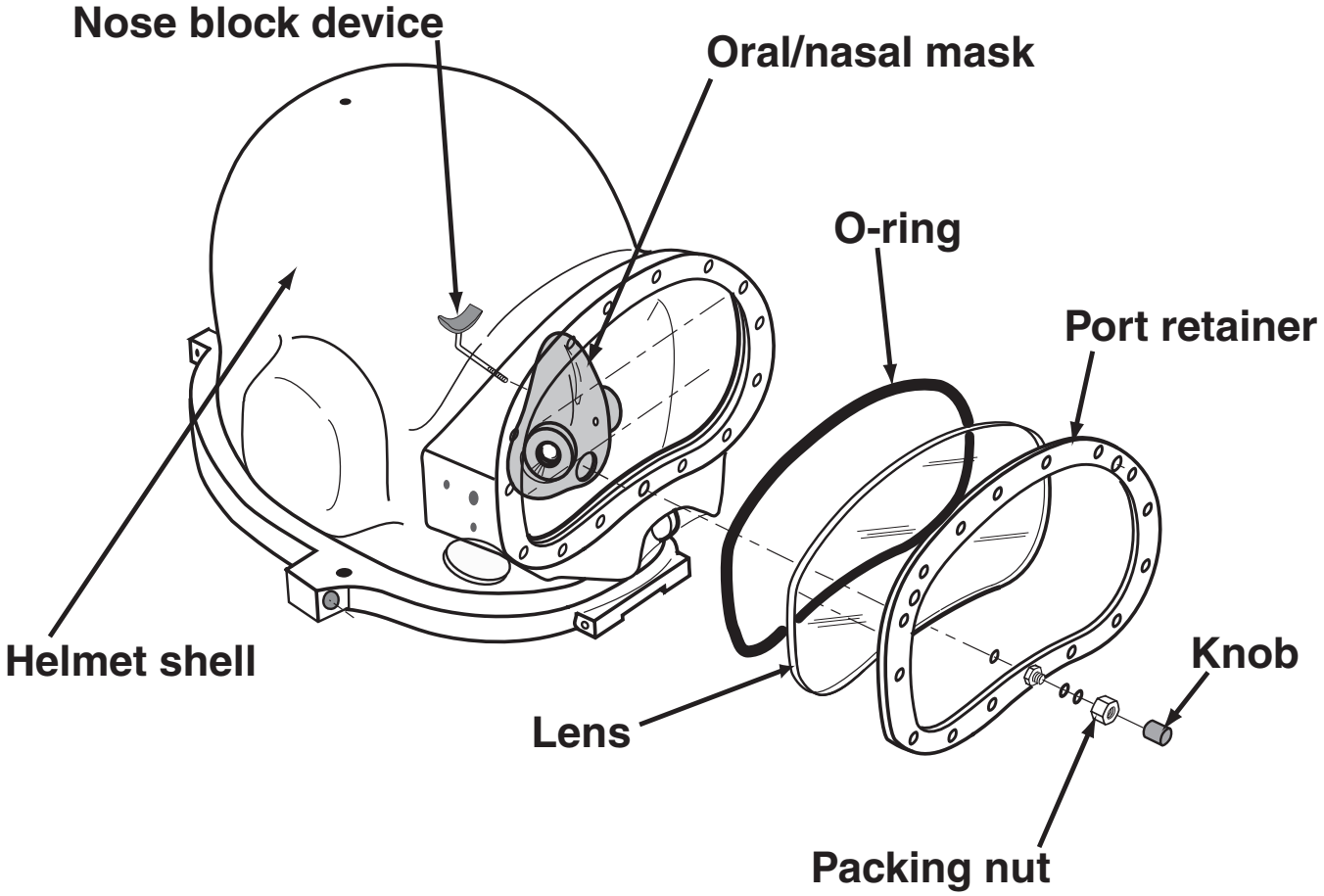
3) Slip the two O-rings off the end of the shaft of the nose block device and slide the nose block device out through the oral nasal mask.

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.

⚠ WARNING



Use neoprene cement only in a well-ventilated area. Do not breathe the fumes from uncured neoprene cement. 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 neoprene cement can and Material Safety Data Sheet.. Allow neoprene cement to cure for a minimum of 24 hours before using helmet.



Blowapart drawing of the nose block device and supporting hardware.

8.3.2 Nose Block Device Replacement

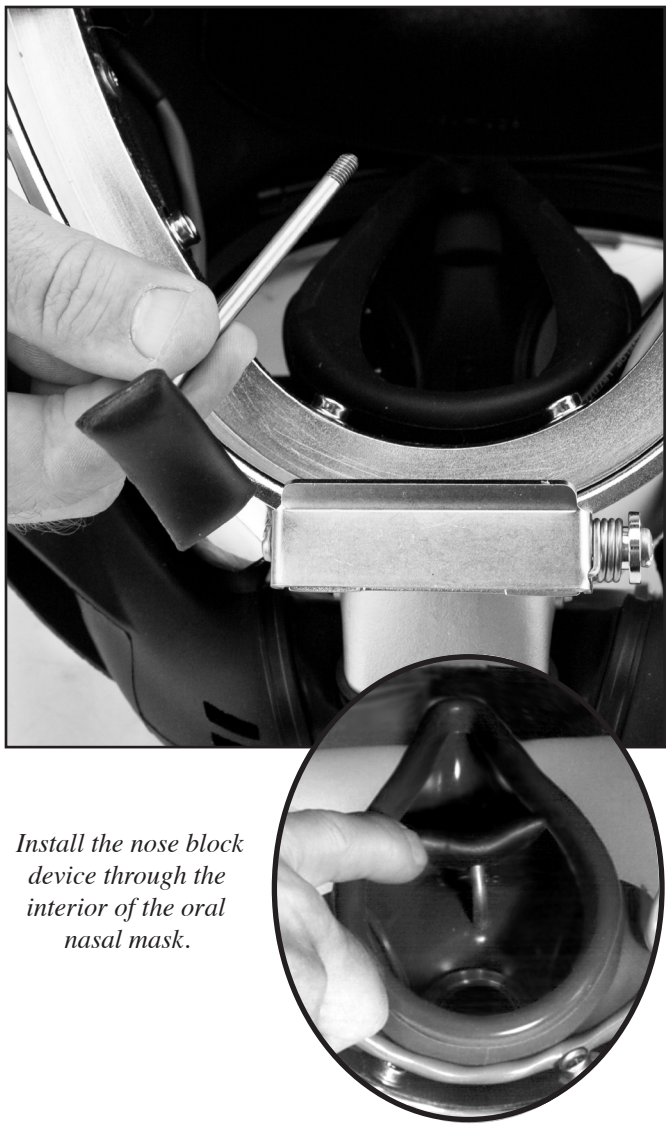
1) Prior to reassembly, lubricate the O-rings.

2) Slide the shaft through oral nasal mask in the helmet shell.

3) Place both O-rings on the shaft, followed by the packing nut and the knob.

4) Tighten the packing nut until snug. Do not over tighten, as this will make it difficult to slide the nose block device in and out.

5) Tighten the knob with the pliers, padded by a cloth, while holding the pad end with your hand.



Install the nose block device through the interior of the oral nasal mask.

8.4 Handle and Weights

8.4.1 Handle Removal

Tools Required:
1/4 inch flat blade attachment on torque screwdriver
2 point Phillips attachment on torque screwdriver

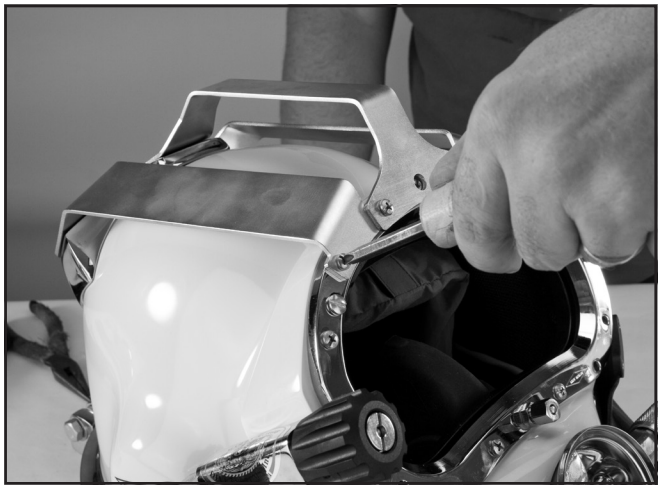
The handle is located at the center top of the SuperLite®-17C.

1) The front of the handle is removed by unscrewing the two port retainer screws.

2) Remove the rear handle mount screw and locking star washer from the top rear helmet weight.

8.4.2 Handle Replacement

1) The port and starboard side mount brackets must be installed prior to installing the handle. Position the handle on the helmet and screw in the two front mount screws until snug, not tight. Be sure to use the correct screws to avoid damage to the SuperLite®-17C. If the side brackets are not on the helmet, shorter mount screws must be used.



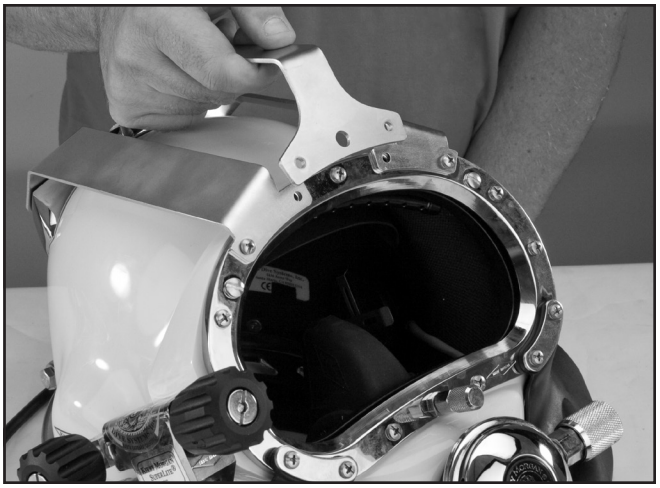
Remove the front mount screws

Remove the screw at the rear of the handle.

2) Hold the handle in place and thread the rear mount screw with its washer into the helmet weight. Turn this screw until it is snug, not tight.

3) Tighten the front mount screws to their proper torque setting. (see Appendix 1)

4) Tighten the rear mount screw to its proper torque setting. (see Appendix 1)



Position the handle on the helmet.

8.4.3 Mount Bracket-Starboard Side Mount Bracket-Port Side

The handle must be removed before the mount brackets can be can be removed.

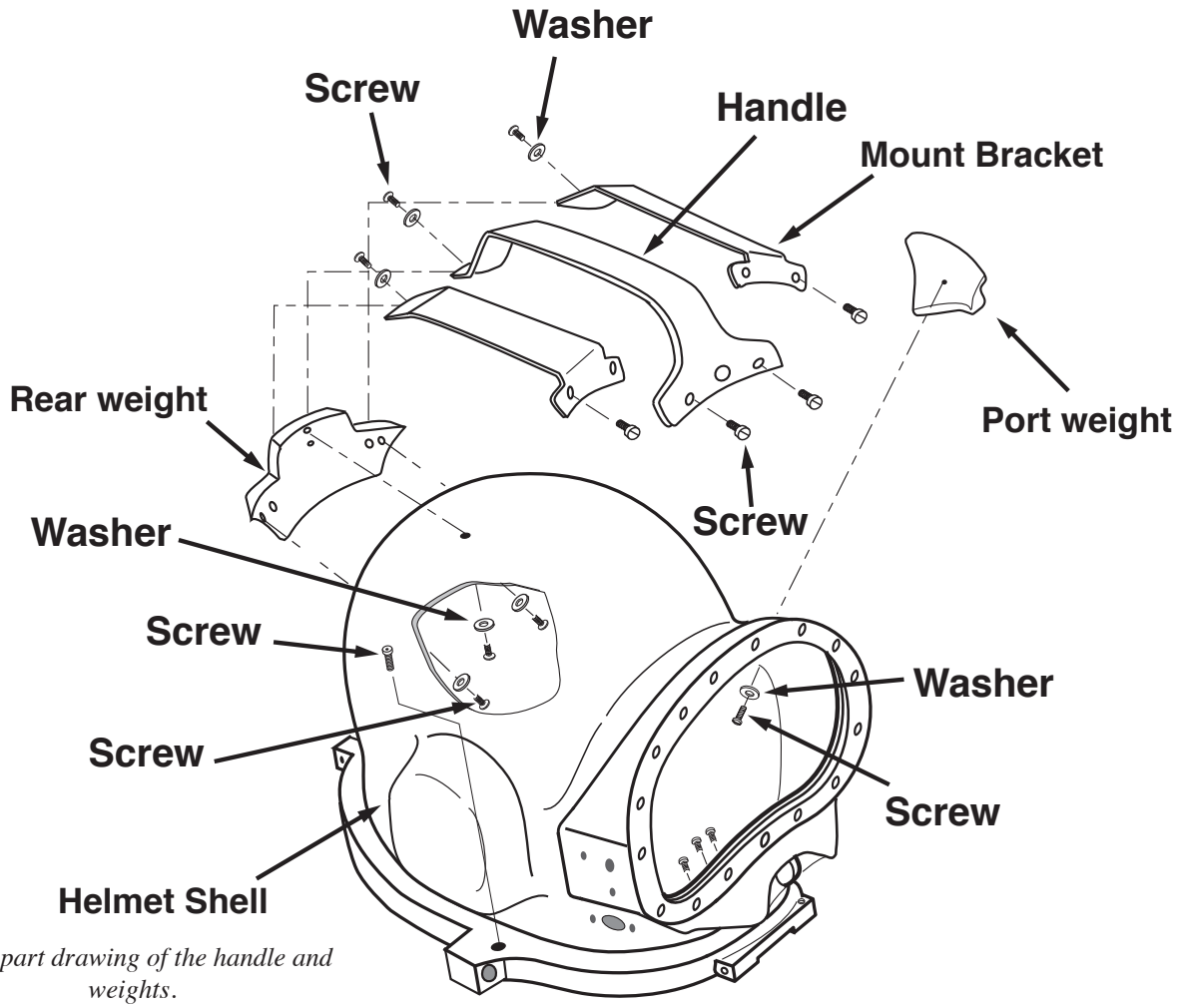
1) Remove the handle.

2) The front of the mount brackets are removed by unscrewing the remaining two port retainer screws.

3) Remove the rear handle mount screws and locking star washers from the helmet weight. One mount bracket may be removed without removing the other, but the handle must still be removed first. When installing mount brackets and handle always tighten the screws to the specified torque. (see appendix 1)

⚠ CAUTION

Do not use a screwdriver or similar sharp instrument, as it will damage the fiberglass finish. Use only wooden wedges under the corner edges of the weights.



Blowapart drawing of the handle and weights.

Use a wooden wedge and the mallet to break the seal between the weight and the helmet shell. ***DO NOT USE A SCREWDRIVER OR CHISEL TO REMOVE THE WEIGHT.*** *This could damage the helmet shell, requiring expensive repair.*

8.4.4 Side Weight Removal

Tools Required:
Flat Blade Screw Driver
Wooden wedge
Rubber mallet

To allow easier access to the port weight it may be beneficial to remove the screws and kidney plate holding the port side whisker in place.

1) To remove the port side weight, first unscrew and remove the screw and washer on the inside of the helmet.

2) Use a wooden wedge and a mallet to break the seal between the weight and the helmet shell.

3) Remove the weight and clean off all the old RTV (silicone sealant) from the shell and the weight.

8.4.5 Port Weight Replacement

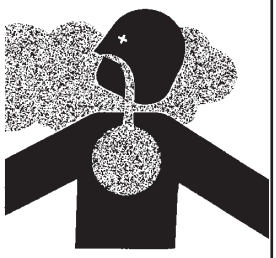
1) Apply silicone sealant to the **sides** and **top** of the weight as shown, leaving the bottom open. Be sure to apply sealant to the holes where the screws attach to the weight.

2) Thread the screw and washer into the weight. Tighten securely.

Apply silicone to the interior view of the port weight as indicated by the white lines.

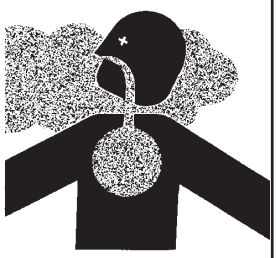
3) Wipe off any excess silicone sealant. Be sure to remove all excess silicone sealant before it sets up. Acetone can be used to dissolve uncured sealant, after tightening.

⚠ WARNING



Use silicone sealant in a well ventilated area. 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 and Material Safety Data Sheet.

⚠ WARNING



Avoid breathing fumes from acetone and use in a well ventilated area. Breathing fumes can lead to nervous system damage, unconsciousness, and death.

⚠ WARNING

Avoid skin contact with acetone. Wear rubber gloves. Acetone can damage the nervous system.

⚠ WARNING

Avoid eye contact with acetone This chemical is an irritant and may cause tissue damage.

8.4.6 Top Weight

The top weight is also a mount area for the handle and mount brackets.

8.4.6.1 Top Weight Removal

Tools Required:
Flat Blade Torque Screwdriver
Rubber Mallet
Wooden Wedge

To remove the top weight the handle must be removed first as outlined in section in this chapter. If you have the optional accessory brackets mounted, they must also be removed.

1) To remove the top weight, unscrew and remove the three screws and washers inside the helmet. Remove the screws completely.

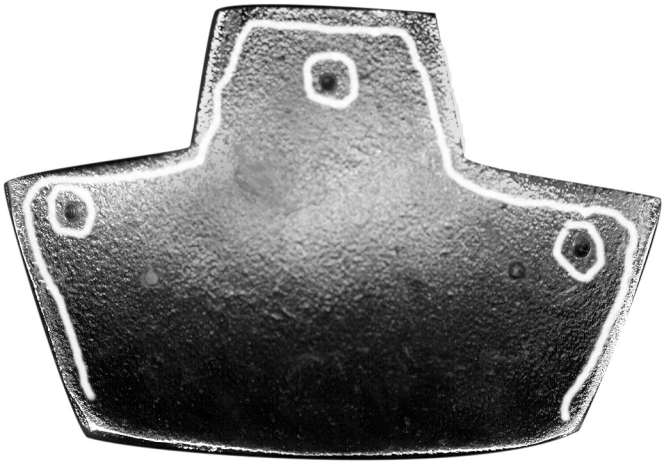
2) Use the wooden wedge and mallet to loosen the weight.

3) Clean off all traces of silicone sealant (RTV) using acetone.

8.4.6.2 Top Weight Replacement

1) Apply silicone sealant to the **sides** and **top** of the weight as shown, leaving the bottom open. Be sure to apply sealant to the holes where the screws attach to the weight.

2) Place the washers on the screws and thread the top screw through the helmet shell hole and into the weight but do not tighten it yet.



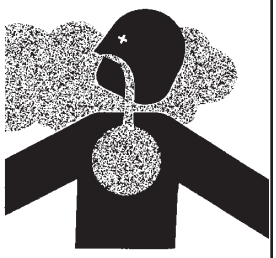
Apply silicone to the interior view of the top weight as indicated by the white lines.

3) Move the weight up slightly on the shell to align the two lower screw holes and thread the screws into the hole, but do not tighten them yet.

4) Mount the handle to the helmet, front screws first and then the rear weight screw. Tighten it down and then tighten the weight mount screws securely to "20" inch pounds.

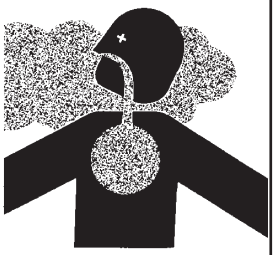
5) Wipe off any excess silicone sealant. Be sure to remove all excess silicone sealant before it sets up. Acetone can be used to dissolve uncured sealant, after tightening.

⚠ WARNING



Use silicone sealant in a well ventilated area. 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 and Material Safety Data Sheet.

⚠ WARNING



Avoid breathing fumes from acetone and use in a well ventilated area. Breathing fumes can lead to nervous system damage, unconsciousness, and death.

⚠ WARNING

Avoid eye contact with acetone This chemical is an irritant and may cause tissue damage.

⚠ WARNING

Avoid skin contact with acetone. Wear rubber gloves. Acetone can damage the nervous system.

8.5 Face Port

8.5.1 General

The face port, 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 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.

⚠ WARNING

The O-ring used to seal the face port on Kirby Morgan helmets and band masks 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.

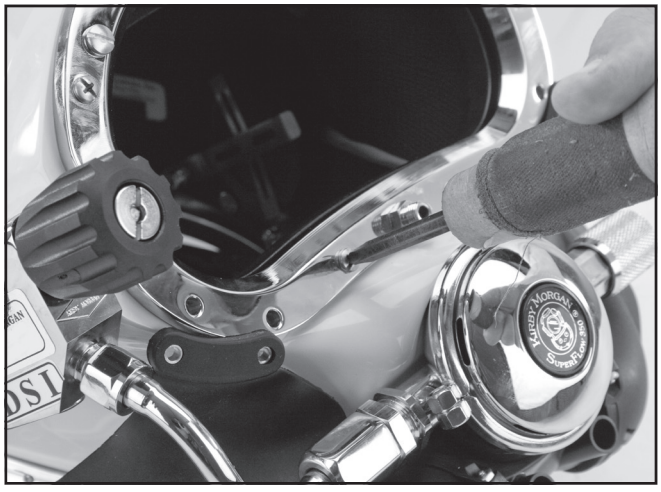
8.5.2 Face Port and Nose Block Device Removal

Tools Required:

7/16" Open-end Wrench
¼" 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.

1) First remove the nose block device knob then the packing nut and slip the O-rings off the nose block shaft.



Remove the port retainer screws.

2) Pull the nose block device out through the interior of the oral/nasal mask.

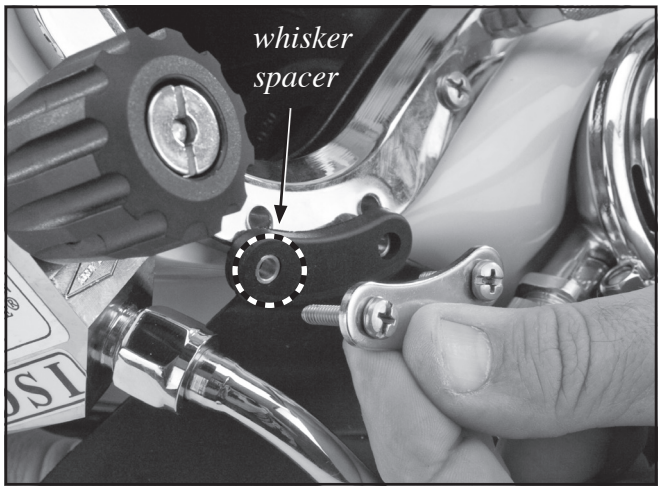
3) Remove the handle as per the instructions in this chapter.

4) Next, unscrew the remaining twelve port retainer screws. Pull the retainer clear of the helmet shell.

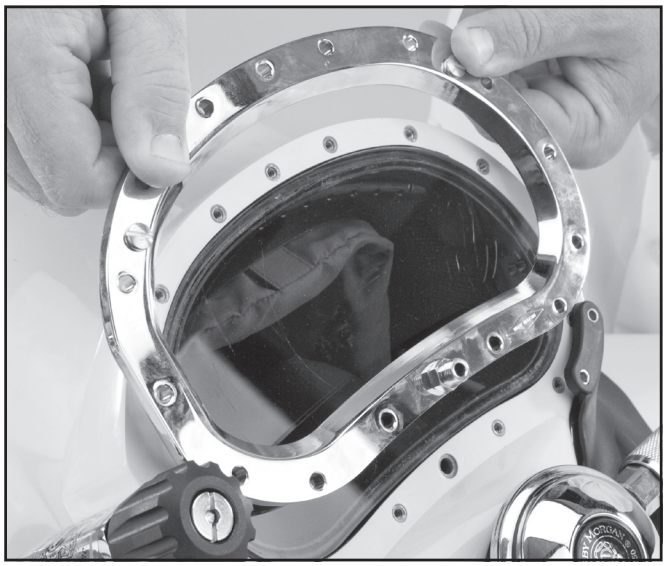
5) Be sure not to lose the O-ring that is located on the back side of the port retainer at the nose block device guide.

6) The four whisker spacers should not be misplaced. They will usually be found lodged in the whisker.

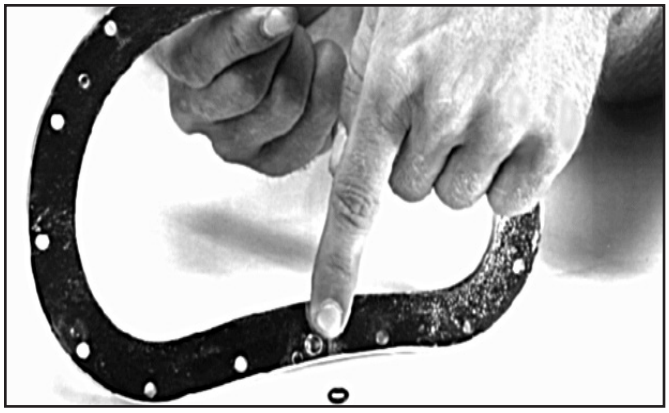
7) Remove the old port and sealing O-ring.



Don't misplace the whisker spacers.



Remove the port retainer.



Don't misplace the small o-ring on the back of the port retainer.

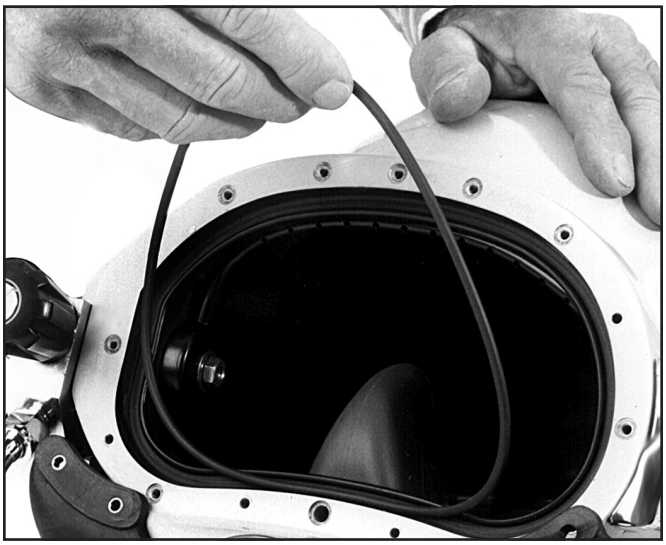
Clean the O-ring groove.

8.5.3 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 with DC111 lubricant or equivalent and replace in the helmet shell.

3) Place the face port into the helmet shell making sure the O-ring has been lightly lubricated and is in its groove.



Lubricate the port O-ring and install in the O-ring groove.

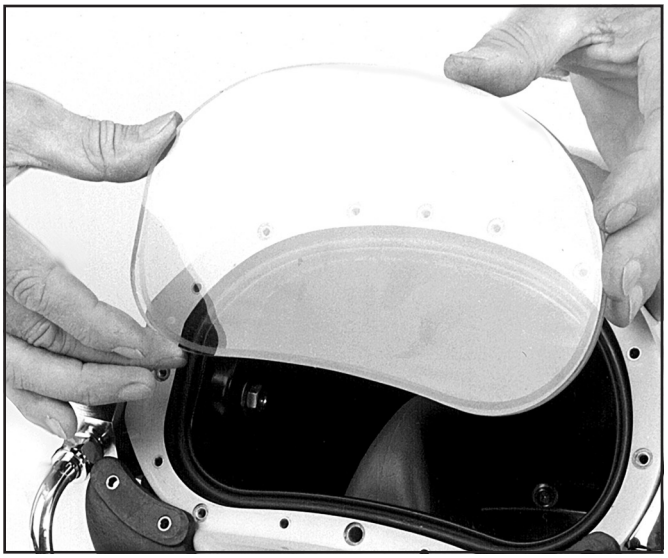
4) Clean and lubricate the small O-ring behind the port retainer.

5) Slip the O-ring on the small tube that protrudes from the rear of the port retainer nose block guide. Place the port retainer onto the helmet shell, holding it in place against the face port and face port O-ring while the twelve screws are all run in loose. Replace the handle as per this chapter.

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 has completely sealed the face port.

NOTE: Testing of the inserts should be performed 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



Place the new face port into the helmet shell.

Always use a torque screwdriver to check the tension of the port retainer screws.

⚠ WARNING

Always be sure to use a torque screwdriver to check the tension of the port retainer screws. Overtightening 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.

when tightening the port retainer screws. 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 from the interior of the oral/nasal mask and out through the nose block guide on the port retainer.

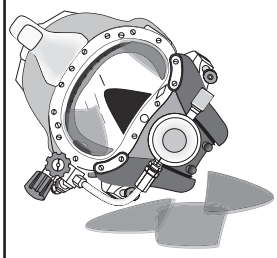
8) Slide the two lubricated O-rings onto the shaft of the nose block device.

9) The packing nut is threaded into place followed by the nose block device knob.

10) Tighten the packing nut until some resistance is felt when the nose block device knob is pushed in and out. Tighten the nut until it cannot be loosened 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 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 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 dishwashing soap or organic soaps to clean the face port. Improper application of cleaning agents may cause the port to fail without warning. This could lead to drowning.

8.5.4 Special Note Regarding Ports

NOTE: There are two different face ports available for KMDSI helmets and masks. One port specifically fits the Kirby Morgan 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, Kirby Morgan 37 and the KMB 18 Band mask is Part #520-004. The face port for the KMB 28 Band Mask is Part #520-128.

⚠ WARNING

The face port for the Kirby Morgan helmets and KMB 28 are not interchangeable. Do not attempt to use a face port from a KMB 28 in a Kirby Morgan helmet. Although the port will fit into the helmet shell, it will not seal properly. This could lead to flooding of the helmet, resulting in serious personal injury or death.

⚠ WARNING

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.

8.6 Neck Ring Assembly

8.6.1 Removal of the Neck Dam

Tools required:
7⁄64 inch Allen wrench attachment on torque screwdriver
#2 Phillips head attachment on torque screwdriver
X-acto® knife or razor blade
Needle nose pliers
Small punch
Note: Removal procedures are the same for both the latex and neoprene neck dams.

1) Remove the O-ring from the groove on the outside of the neck ring assembly.

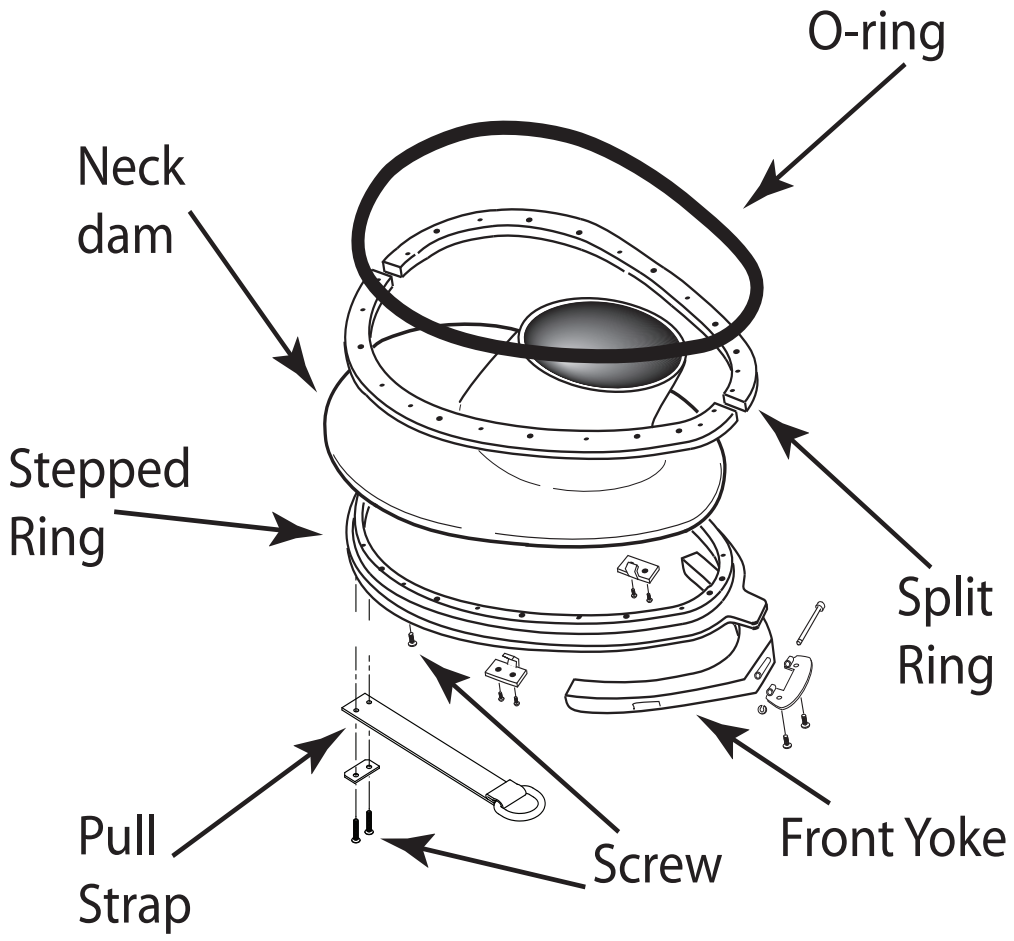
2) Remove the pull strap.

3) Use the hex key and unscrew all the screws from the stepped ring.

4) Separate the split neck dam rings and neck dam from the stepped ring.

5) Discard the old neck dam, if necessary.

6) Clean all parts as needed.



Blowapart drawing of neck dam assembly for SuperLite® 17C helmet.

8.6.2 Latex Neck Dam Replacement

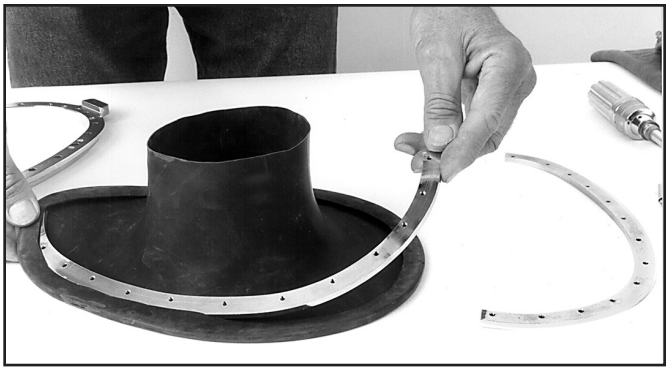
Tools Required:
7⁄64" Allen Wrench.
#2 Phillips Screwdriver
Torque Screwdriver with a 7⁄64" Allen wrench attachment and #2 Phillips head screwdriver attachment.
Silicone Grease.
Felt Tip pen.
Sharp Razor Blade

New neck dams are supplied without mounting screw holes punched in them. As the mounting screws are inserted and tightened they cut their own holes in the neck dam.

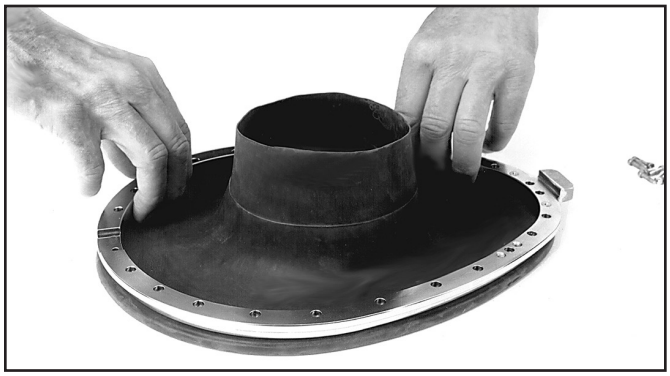
Note that latex neck dams should be trimmed to fit prior to installing them on the neck rings. Trimming a latex neck dam once it is installed is very difficult.

1) Install the split rings inside the trimmed outer lip of the neck dam. Turn the neck dam over so the trimmed outer lip is facing down and lay it flat on the work surface. The split rings will now be hidden by the neck dam.

2) Place the stepped neck dam ring on top of the neck dam.



Install the split rings inside the trimmed outer lip of the neck dam.



Center the split rings by pressing on the dam and feeling the inside edge of the stepped ring and the split rings.

⚠ CAUTION

The neck dam, stepped ring and split rings MUST be properly aligned in order to get the screws to thread correctly.

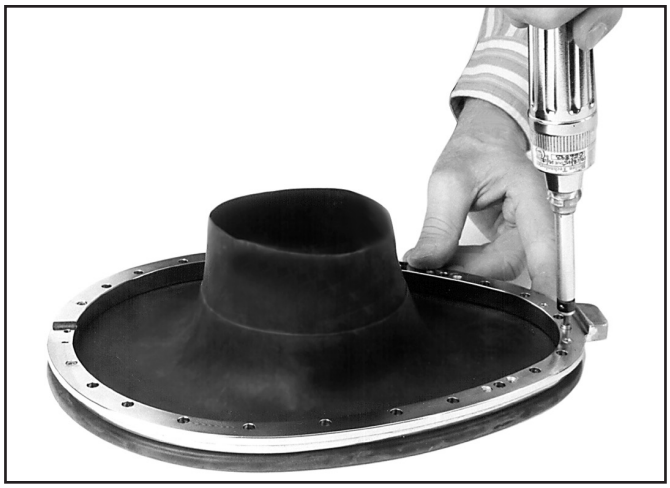
⚠ CAUTION

The center screws cannot be torqued with a torque screwdriver, "hand torquing" these with a 7⁄64" Allen wrench is sufficient.

3) Align and center the stepped ring to the split rings by looking at both ends. Feel the inside edge of the stepped ring and the split rings by pressing on the dam. This will help you center the split rings.

4) Lubricate the tips of the neck dam mounting screws lightly with silicone grease. This will prevent them from grabbing and twisting the rubber.

5) Use the punch to align the holes, if necessary, and start mount screws into each one of the split rings, one on either side of the groove where the pull strap is mounted. This will help hold and align everything while the other screws are being put in.



Use the screw to punch through the neck dam.

6) Use a torque screwdriver with a 7/64" Allen wrench attachment. Press down and turn the screw at the same time. This will punch the hole in the neck dam and start the mount screw into the split ring.

7) Tighten the screws to "10" inch lbs ("1.1" Newton Meters) of torque.

8) Install a second set of screws in the two holes immediately adjacent to the tongue on stepped ring.

9) Once the 4 "holding" screws are in place, screw the rest of the neck dam mount screws in until just snug.

10) Install the pull strap.

11) Torque the neck dam mount screws in a staggered pattern, taking up the tension a little bit at a time, until "10" inch lbs ("1.1" Newton Meters) is reached on each individual screw.

12) Use a sharp razor blade to trim the excess latex off the outside flap on the neck dam.

Use a sharp razor blade to trim the excess latex.

⚠ WARNING

When trimming the excess latex from the ring, do not make an "under" cut. The neck dam should be trimmed straight and even with the edge of the split rings. If you cut underneath the edge of the ring, there will not be sufficient latex material left to hold the neck dam in place. This could allow water to enter the helmet and drowning could result.

8.6.3 Trimming a Latex Neck Seal

Tools Required:
Large, sharp scissors

Anytime you replace the neck dam, it may need to be adjusted (trimmed) to fit properly. This should be done prior to installing the neck dam on the neck ring. New neck dams are cone shaped and may be too tight if not properly fitted to the diver's neck.

1) To trim the neck dam, have your tender hold the neck dam open so that the two "edges" of the neck dam are parallel. The neck dam should be under slight tension but should not be stretched beyond its normal length.

2) Trim the neck dam with the largest, sharpest scissors available in order to make as few cuts as possible. There should be no jagged edges on the neck dam or it may tear. Trim only 1/4 inch (6.0 mm) off the neck dam at a time, trying it on after each trim.

3) When you are done, the neck dam should be just snug enough that it does not leak. This may feel a bit snug above water, but will be very comfortable under water.

Trim latex neck dams with the largest, sharpest scissors available.

⚠ WARNING

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

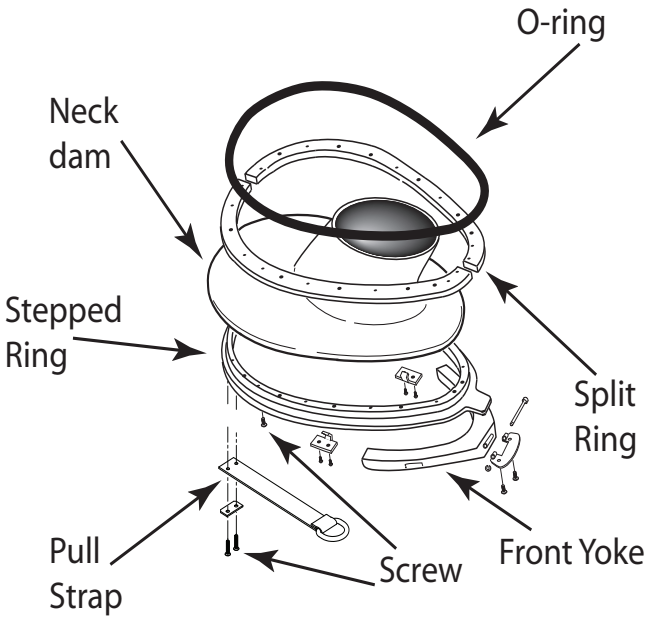
8.7 Pull Strap

8.7.1 Pull Strap Removal

Tools Required:
#2 Phillips attachment on torque Screwdriver

The pull strap may become worn through use. If it is only slightly frayed it is possible to singe the nylon with a match to help prevent further deterioration.

1) Unscrew the two screws that secure the strap plate to the stepped neck dam ring and remove the assembly.



8.7.2 Pull Strap Replacement

1) Position the strap plate over the pull strap.

2) Screw the two screws through the strap plate until the heads of the screws bottom out against the strap plate. Do not overtighten.

8.8 Chin Strap

8.8.1 Chin Strap Removal

Tools Required:
Phillips screwdriver
The chin strap must be replaced as a complete unit.

1) Remove the two screws that secure the chin strap to the helmet shell. Clean any sealant or debris from the holes.

2) Remove the worn chin strap and discard.

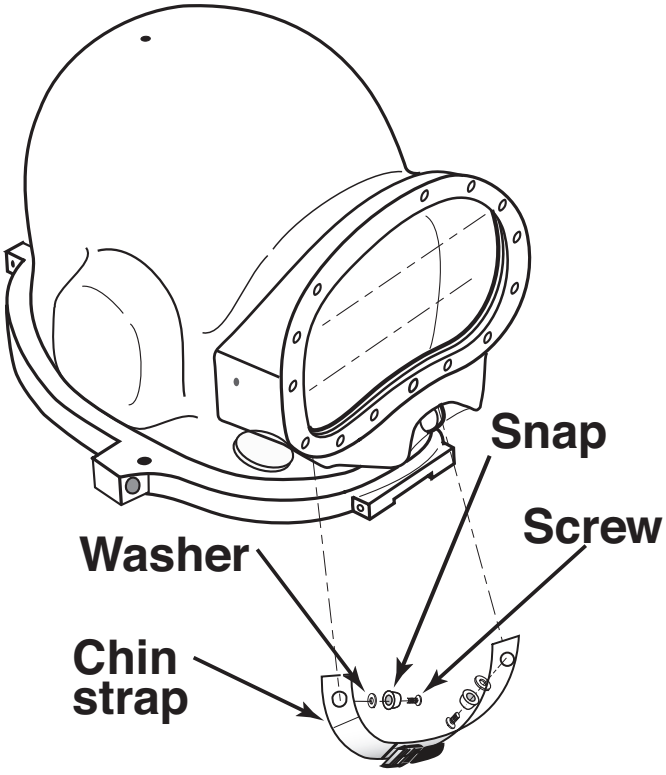
8.8.2 Chin Strap Replacement

1) Using a syringe, inject silicone sealant into the holes that secure the chin strap.

2) Install the two screws that hold the chin strap in position, using the two screws supplied with the chin strap replacement kit.

3) Tighten the screws until they are flush with the mounting plates.

4) The adjustment strap should pull toward the right side of the helmet when it is on your head.

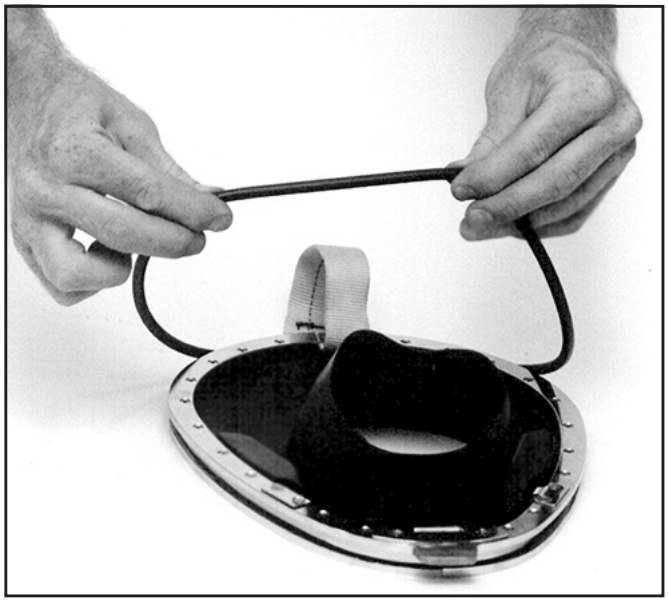


The chin strap mounts inside the helmet.

8.9 O-ring Seal Replacement

The O-ring on the neck dam ring assembly must be replaced annually, or whenever it shows signs of wear. The O-ring makes the seal between the helmet ring on the base of the helmet and the neck dam ring assembly.

To replace the O-ring, simply stretch it over the bottom of the sides of the neck dam ring assembly. The O-ring must be lubricated with a light coating of silicone grease before each diving day.



Lubricate the O-ring with a light coating of silicone grease before each diving day.

⚠ WARNING

The O-ring on the neck dam ring of the Kirby Morgan helmets 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 KMDSI O-ring. Failure to do so could lead to seal failure. This could lead to drowning.

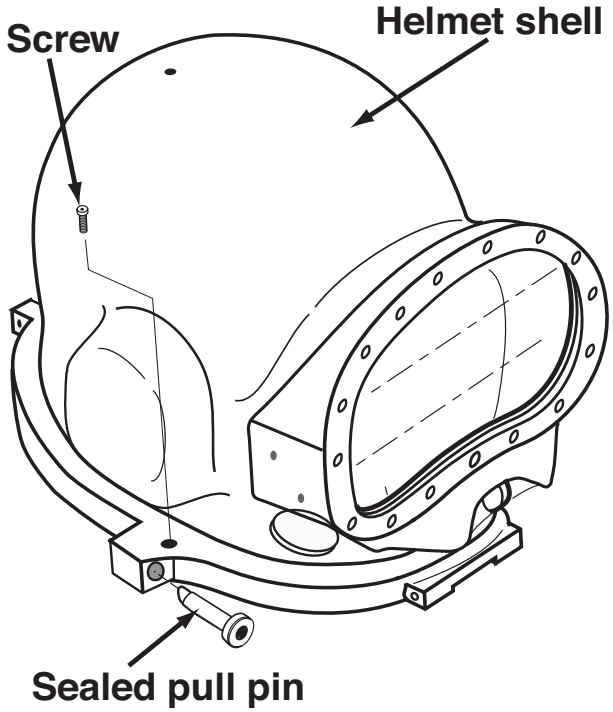
8.10 Helmet Ring

8.10.1 Helmet Ring Repairs

The metal ring on the base of the helmet is permanently installed at the KMDSI factory. The helmet ring is not designed to be removed by the diver. If the ring is damaged, such as damage to the sealing surface, or the ring is bent, the helmet must be returned to KMDSI through your authorized dealer for repair or replacement.

⚠ WARNING

The sealed pull pins must operate properly. If they do not lock properly the helmet could come off the diver underwater and drowning could result. If they do not release when needed, they could make it impossible to remove the helmet in an emergency situation. Do not use the helmet unless the pins are operating correctly.



The sealed pull pins must be serviced annually.

8.11 Sealed Pull Pins

The sealed pull pins that lock the helmet on the diver cannot be serviced in the field. If these pins do not work properly the pins must be returned to an authorized dealer for replacement.

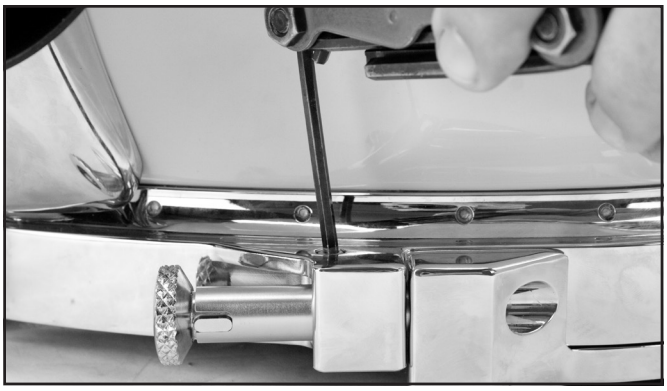
KMDSI recommends that these pins be serviced annually. Your KMDSI dealer can provide you with either new pins (Part # 505-110) or factory refurbished ones (Part # 505-115). Refurbished pins are hand engraved with a "S/R" on the body.

8.11.1 Removal of Sealed Pull Pins

Tools Required:
7/64 Hex Key on Torque Screwdriver

1) Unscrew the hex head screws from the helmet ring on the base of the helmet.

2) Remove the sealed pull pins by pulling them out of the helmet ring.



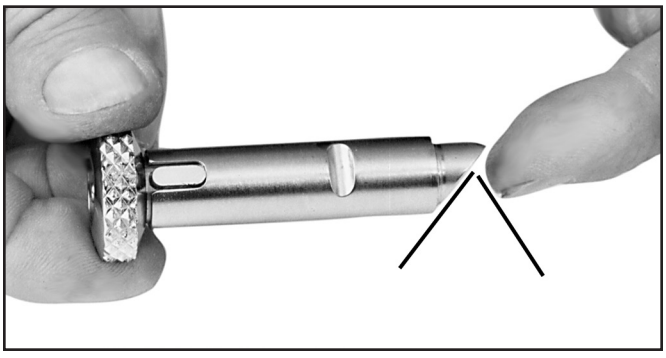
Unscrew the hex head screws

3) Return the pins to your authorized dealer for replacement.

8.11.2 Replacement of Sealed Pull Pins

1) Insert the pin(s) into the helmet ring on the base of the helmet. The strike angle must be correct for the pins to work.

2) Apply a small amount of Loctite® 222 small screw thread locker on the ends of the screws.



The strike angle must be correct for the pins to work properly.

3) Insert the screws into the helmet ring and tighten to "12" inch lbs ("1.3" Newton Meters) of torque.

8.12 Swing Tongue Catch

The swing tongue catch assembly helps to provide alignment for the front of the neck ring assembly, as well as making it easier to remove the helmet. The swing tongue catch should rarely need attention or service, unless damaged accidentally.

8.12.1 Disassembly of the Swing Tongue Catch

Tools Required:
Screw driver

1) Remove the screw on the right side of the swing tongue catch.

2) Remove the spring spacer. Take care not to lose the Teflon® washer that is attached to the inside of the swing tongue catch. If it comes loose it must be glued back in place. (A quick dry rubber cement works well).

3) Remove the screw from the left side of the swing tongue catch.

4) Remove the washer and the spacer. The swing tongue catch should disengage from the spring now.

5) If the spring needs to be replaced this requires the removal of the regulator and whisker in order to remove the screw. See Chapter 7 for instructions on how to remove the regulator and whisker.

8.12.2 Reassembly of the Swing Tongue Catch

Note: A drop of Loctite® 222 should be used on all screws.

1) Make sure the Teflon® washer is glued into the proper place on the swing tongue catch.

2) Insert the hooked end of the spring into the small hole in the swing tongue catch. Slip the swing tongue catch over the tongue of the helmet ring on the base of the helmet. The spring end goes on the right side. Make sure you have not dislodged the Teflon® washer.

3) Insert screw and spring spacer into the spring and thread the screw into the tongue on the helmet ring. Run the screw in until it is just snug.

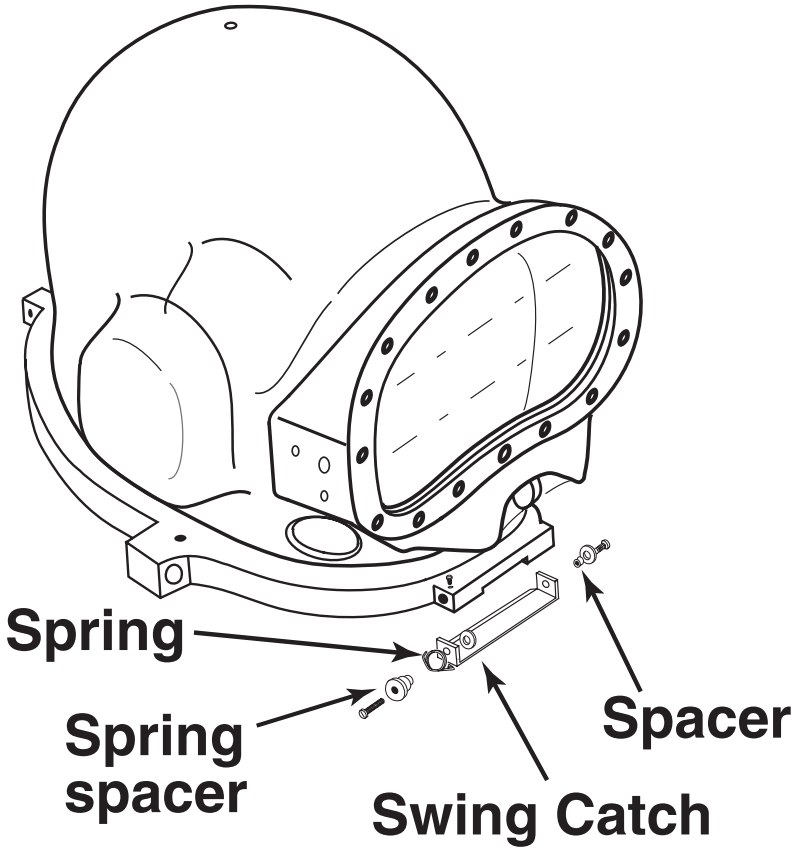


Diagram of the swing tongue catch.

4) Place the washer and spacer on screw and insert the screw through the hole on the left end of the swing catch.

5) Tighten screw while ensuring that the spacer fits through the hole in the swing catch and washer and no binding occurs.

6) Tighten all three screws to "20" inch pounds ("2.25" Newton Meters.) of torque.

Make sure you have not dislodged the Teflon® washer.

7) Test the function of the swing catch. Also, test prior to diving with the system to ensure proper operation.

8.13 Locking Collar/Neck Pad

Proper function of the locking collar is essential since this device helps hold the helmet on the diver's head.

8.13.1 Locking Collar Removal

Tools Required:
9⁄16 inch Open End Attachment on Torque Wrench
9⁄16 inch Open End Wrench

If the locking collar is damaged through careless handling it may need to be replaced.

1) Use the open end wrench and torque wrench to remove the bolt from the hinge.

2) Slide the bolt out of the hinge. Take care not to lose the two Teflon® washers that sit between the locking collar and the rear hinge mounts on the helmet ring.

3) Turn the sealed pull pins until they are disengaged and lift the locking collar away.

4) Clean all parts that will be reused.

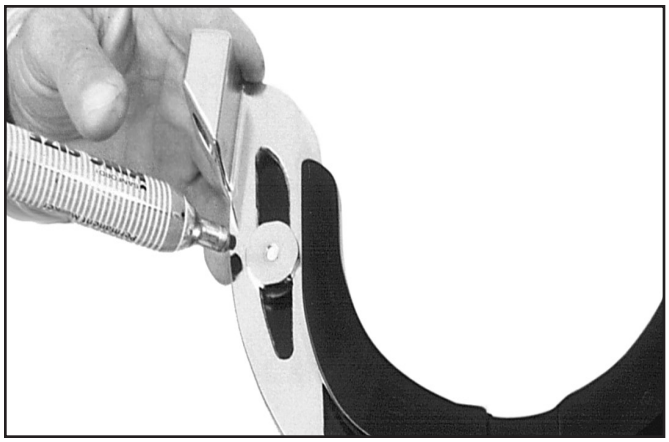
Slide the bolt out from the hinge.

Loosen the bolt to remove it from the hinge.

Take care not to lose the Teflon® washers

8.13.2 Locking Collar Disassembly

Tools Required:
⅜" Slot blade attachment on torque screwdriver
⅞" Open end wrench



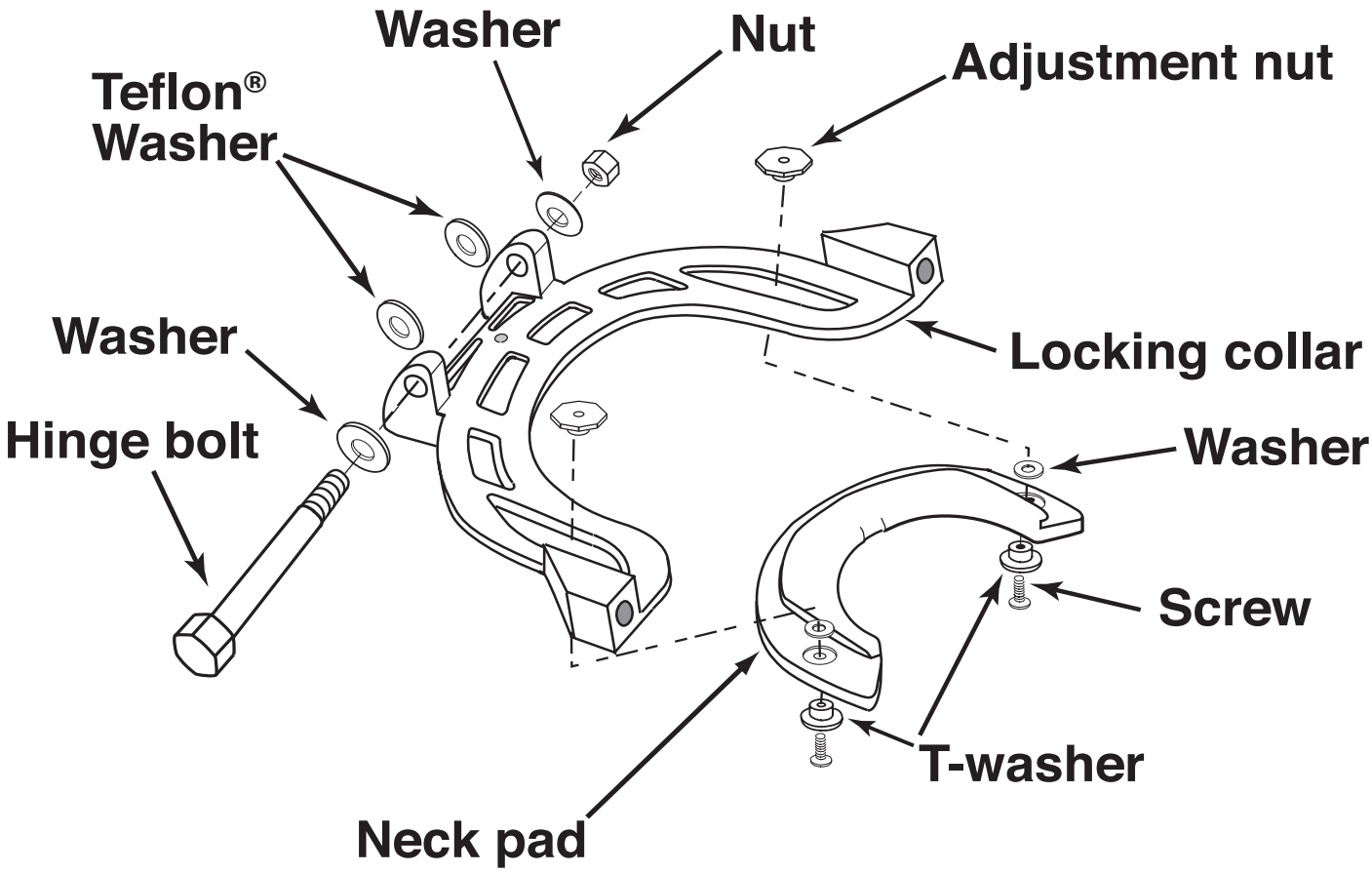
Prior to disassembly of the locking collar, mark the position of the washers.

Unscrew the two screws that hold the neck pad.

1) Prior to disassembly of the locking collar, mark the position of the adjustment nuts on the collar so that it will be easy to reinstall the neck pad in the same position.

2) Unscrew the two screws that hold the neck pad. Take care not to lose the T-washers or adjustment nuts.

3) Slide the neck pad off the locking collar.



Exploded view of the locking collar assembly.

Slide the neck pad off the locking collar.

4) If the neck pad needs replacement, remove and save the screws T-washers and adjustment nuts for reuse.

8.13.3 Locking Collar Reassembly

Tools Required:
⅜" Slot blade attachment on torque screwdriver
⅞" Open end wrench

1) Inspect the Teflon® washers for wear. Replace if necessary.

2) Inspect the neck pad. Replace if damaged.

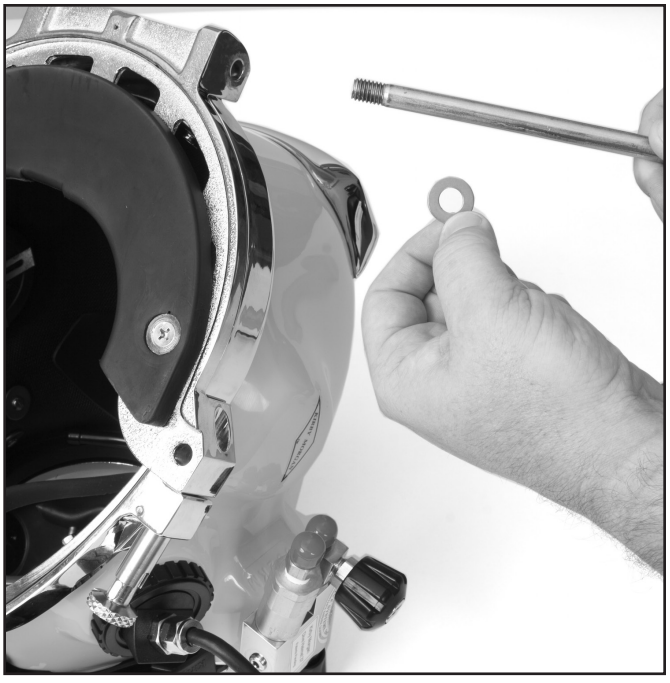
3) Install the T-washers in the recesses in the neck pad.

4) Slide the neck pad onto the locking collar. The neck pad must be oriented so that the groove for the pull strap will be on the inside of the helmet. The large flange on the neck pad must be on the outside of the locking collar.

5) Align the neck pad using the previous position of the mount nuts. Insert the screws and tighten them with the adjustment nuts.

6) With the helmet resting face down, place the locking collar in position on the hinge on the bottom of the helmet ring, but do not close the catch mechanism.

Place the locking collar in position on the helmet.



Be sure to install the washers on the bolt.

7) Insert the bolt through one of the washers and through the locking collar hinge just far enough so that the tip of the hinge pin shows at the first bolt hole on the locking collar hinge.

8) Slide one of the Teflon® washers between the locking collar and hinge block on the rear of the helmet ring.

It may be necessary to tap the bolt gently with a plastic or rubber hammer.

The Teflon® washers are essential to smooth operation of the locking collar.

The nut can be started by hand but must be tightened with a socket and back-up wrench.

There is no torque value for this nut, but it must be tightened until the bolt is flush with the top edge of the nut.

9) Push the bolt through the opening in the washer and all the way through both hinge blocks until the tip of the bolt just protrudes from the opening in the second hinge block.

10) Slide the second Teflon® washer between the hinge block and the locking collar.

11) Push the bolt through the opening in the second Teflon® washer and the locking collar until it protrudes from the locking collar.

12) Install the second washer onto the protruding hinge pin.

13) Tighten the nut to until the bolt just protrudes past the end of the nylock insert.

8.14 Head Cushion & Chin Cushion

8.14.1 Head Cushion Foam

The head cushion foam must be replaced when the foam begins to crumble. Order Replacement Foam Kit (Part #510-672). A loose head cushion will create a sloppy fit to the helmet and cause discomfort to the diver.

1) To replace the foam in the head cushion, open the Velcro™ seams along the vertical top center line of the head cushion, at the center of the collar, and the diagonal seams along each side.

2) Pull the old foam out and remove any small pieces.

3) Install the new foam, taking care to prevent it from bunching up.

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.

⚠ WARNING

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.

8.14.2 Chin Cushion Foam

Like the head cushion, the foam in the chin cushion must be replaced when the foam begins to crumble. The foam for the chin cushion is included when the kit for the head cushion is ordered and is replaced in the same manner.

1) The head cushion is fastened into the helmet with snap tabs and pulls out easily.

2) The separate layers of open cell foam sections that fill the head cushion bag 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.

The head cushion foam is easily replaceable.

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 installed.

Note: If the head moves, the helmet should follow.

The chin cushion.

8.15 Communications System

8.15.1 General

The communications system in the SL-17C requires regular attention and maintenance for proper function. Clear two way speech communications between the diver and the surface crew is one of the most important capabilities of surface supplied diving operations.

8.15.2 Earphone Inspection

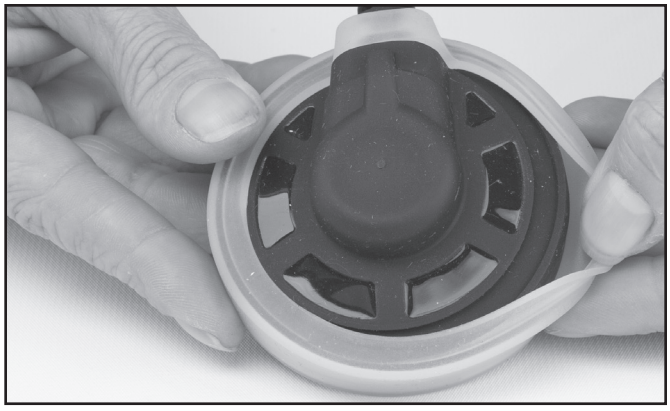
To service the earphones, first remove the head cushion from the helmet. The earphones can be carefully pulled out of the retainers in the helmet shell for inspection and disassembly.

1) The rubber front cover is removed first, the rear cover is next removed. The protector is now free.

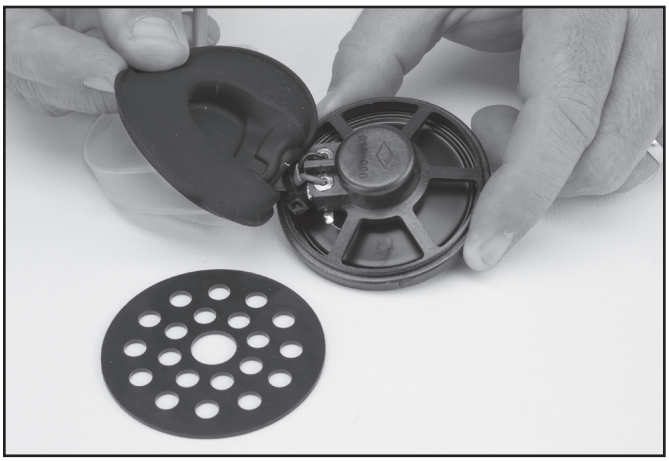
2) Check the wire connections. They should be solid.

3) Check the mylar diaphragm. If the mylar is torn or loose, replace the entire unit with a corrosion resistant, chrome plated mylar speaker, P/N 515-090.

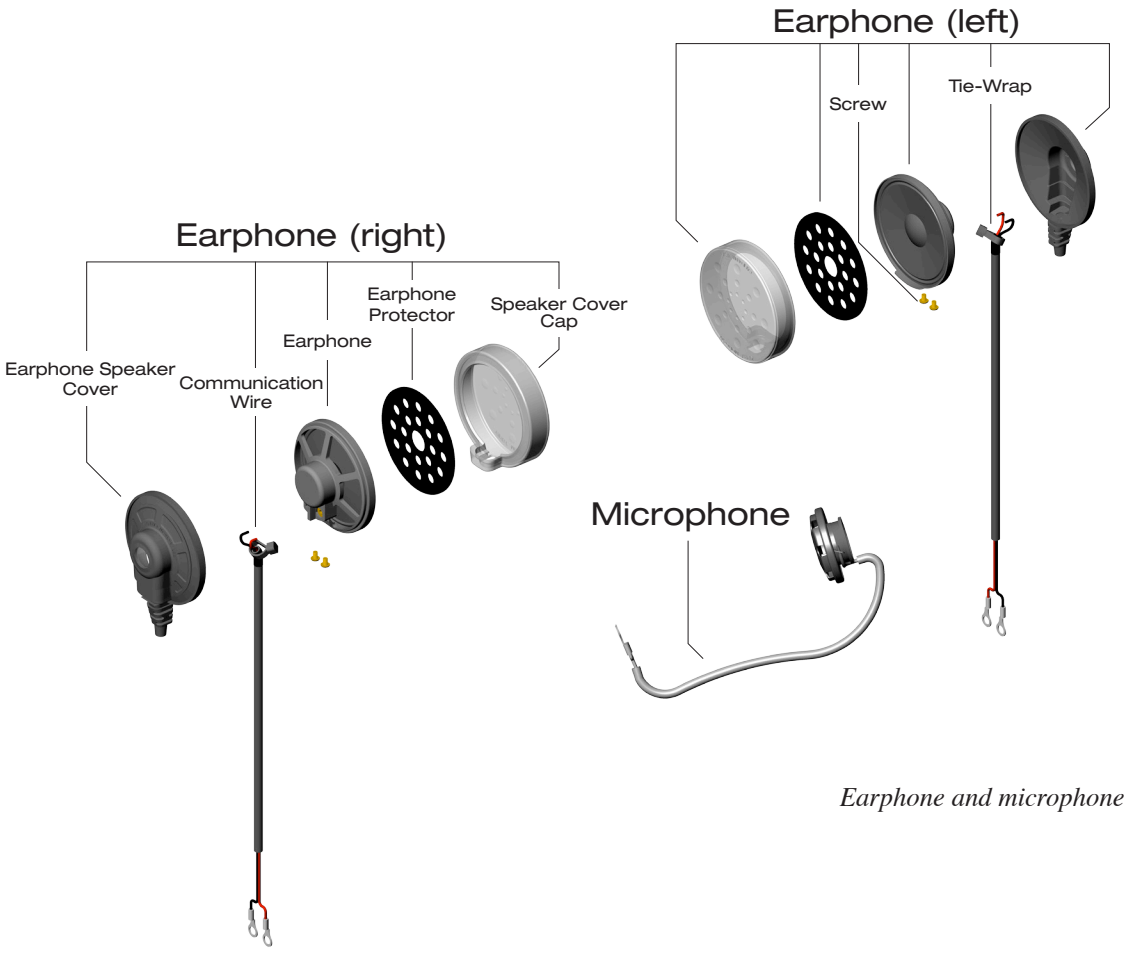
4) If the rubber covers are also worn or damaged, replace the complete earphone assembly, P/N 515-005 or 515-006.



Removing the rubber cover from the earphone.



Inspect the mylar earphone.



Earphone and microphone assemblies

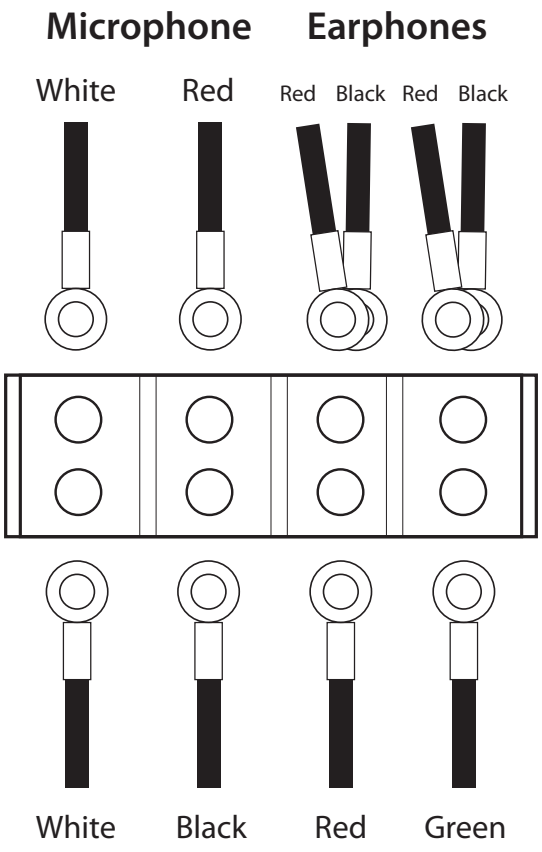
8.15.3 Earphone Replacement

Tools Required:
Flat blade screwdriver for waterproof connector terminal block.

1) Slide the earphones out of the retainers.

2) Remove the earphone wire lugs from the terminal block on interior of the helmet.

3) When installing the replacement earphones, each wire from the earphones must go to a separate wire from the waterproof connector on the terminal block. Never place both wires from one earphone on one wire from the waterproof connector on the terminal block.



Wiring Diagram for SuperLite® 17C

8.15.4 Microphone Replacement

The entire microphone is replaced the same as the earphones by removing the wire lugs from the terminal block, and replacing the entire unit.

Install the microphone in the oral nasal mask.

8.15.5 Waterproof Connector

The wires of the waterproof connector are subject to failure if the helmet receives rough handling. To replace the connector use this procedure:

8.15.6 Connector Removal

Tools Required:
3/8 inch open end wrench
5/8 inch open end wrench
11/16 inch open end wrench
3/4 inch open end wrench

1) Remove the earphone wire lugs from the interior of the helmet communications terminal block.

2) Remove the nut from the packing gland in the interior of the helmet.

3) Separate the connector/packing gland assembly from the helmet.

4) Place the packing gland in a vice and unscrew the packing nut.

5) Pull the connector through the gland. Note: It will be much easier to do this if the lugs are cut off the end of the connector first. Save the inboard and outboard ferrules, and the packing nut.

8.15.7 Connector replacement

1) Lubricate the new connector jacket with silicone grease.

2) Slide the packing nut and the ferrules onto the new connector wire.

3) Feed the connector wire through the packing gland.

4) Check the O-ring on the packing gland. Replace or lubricate as necessary.

5) Install the connector/packing gland assembly in the helmet.

6) Tighten the packing gland mount nut on the packing gland to 20 inch pounds.

7) If a new connector is used the wires must be stripped and lugs soldered in place on the wires.

8) Connect the wire lugs on the connector to the communications terminal block on the interior of the helmet.

Chapter 9
Accessories for the SuperLite® 17C

9.1 Introduction
This section provides the manufacturer's advice on how to install KMDSI accessories including the hot water shroud, low pressure inflator hoses, the weld lens assembly, and accessory mounting brackets.

9.2 Hot Water Shroud for SL-17C
The Hot Water Shroud (Part #525-100) should be used whenever diving in water colder than 35.6° F (2° C). The KMDSI hot water kit is designed to be integrated with a hot water supply to help maintain breathing gas temperature at an acceptable level for the diver.

In addition the hot water reduces the possibility of ice forming in the demand regulator or gas train components. Even with water temperatures of 40° F (4° C) the diver can experience discomfort and severe heat loss through the respiration process. For this reason, KMDSI recommends installing the hot water shroud when diving in waters colder than 40° F (4° C).

Water supply to the shroud assembly should be at least 1 gallon (3.7 liters) per minute at a minimum temperature of 105° F (42° C). When diving operations are conducted during severe cold surface temperatures a hot water shroud should be used to prevent ice from developing in and on gas train components while the diver is on the surface.

9.2.1 Hot Water Shroud Installation Procedures for SL-17C
Tools Required:
¼ inch flat blade screwdriver
⅞ inch open end wrench
Torque wrench
⅞ inch open end attachment for torque wrench
1 1/16 inch open end attachment for torque wrench

1) Disconnect the bent tube assembly at the side block end only. Loosen the jam nut at the regulator. If the bent tube will not swivel freely, you must loosen the large nut at the regulator.

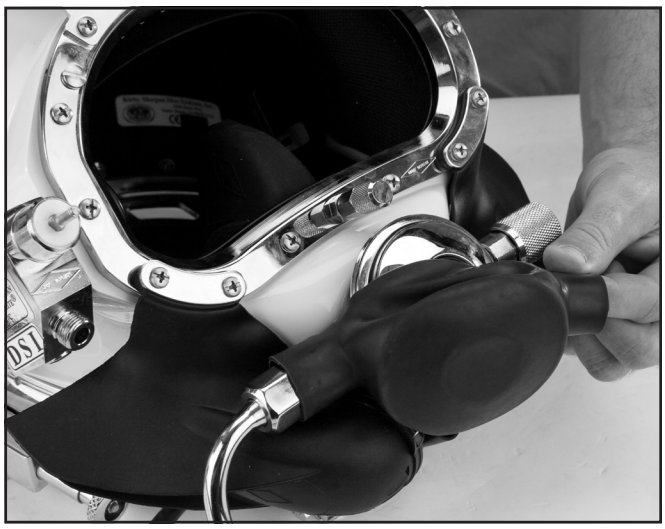
2) Remove the defogger knob, locknut, and spring.

3) Remove the emergency valve knob, nut, and spring.

4) Screw the regulator adjustment knob in all the way.

5) To install the rubber regulator cover, slide it over the bent tube assembly and stretch it over the regulator adjustment knob.

Loosen the bent tube.



Pull the shroud over the regulator.

Position the shroud over the side block.

Slide one of the PVC pieces over the bent tube and insert it into the regulator shroud.

6) Install the rubber side block cover. Start by inserting the non-return valve through the square hole on the back side of the cover. All the other holes will then line up correctly.

7) Slide one of the PVC Flanges (Part #520-046) over the bent tube and insert it into the reg shroud.

8) Slide the corrugated tube over the bent tube. The PVC flange previously installed in the reg shroud mates with the corrugated tube, with the tube rubber going over the PVC Flange and the reg shroud rubber.

9) Install the second PVC flange in the other end of the corrugated tube. (¼ of the flange should still show).

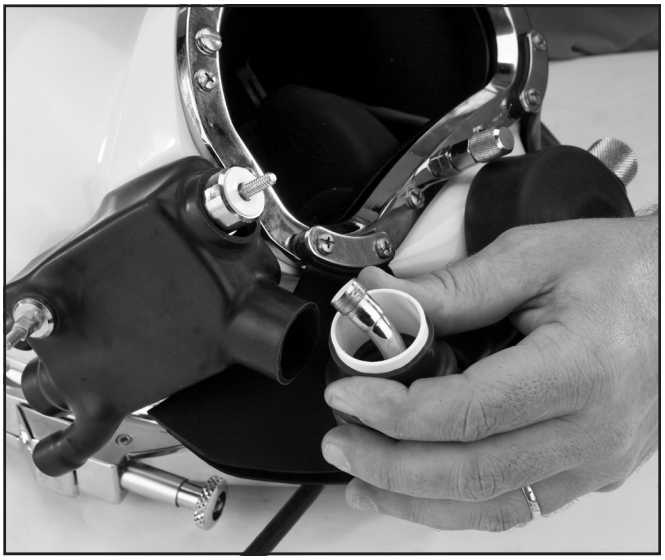
10) Attach the side block end of the bent tube to the side block assembly. Using the torque wrench and 11/16 attachment, tighten to "100" inch lbs ("11.3" Newton Meters). if the regulator end of the bent tube was loosened, torque the jam nut to "40" inch lbs ("4.5" Newton Meters).

11) Retighten jam nut. Slide the PVC flange up towards the side block and install it in the side block rubber tube. (¼ of the flange should still show).

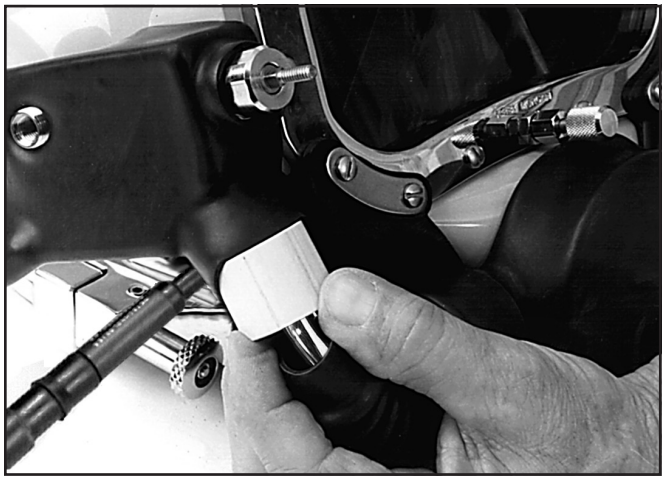
12) Stretch the corrugated tube over the PVC flange and the side block rubber tube.

13) Wrap the tie wraps around the corrugated tube at the PVC stiffeners and tighten.

14) Trim the excess ends from the tie wraps.



Install the corrugated tube.



Install the second PVC flange in the side block shroud tube.

Pull the corrugated tube over the PVC flange at the sideblock.

Fasten the tie-wraps and trim the excess off the ends.

15) Reinstall the defogger knob, spring, and lock nut. Tighten with a flat blade screwdriver until the valve stem is flush with the lock nut face.

16) Reinstall the emergency valve knob, spring, and nut. Tighten the locknut with a flat blade screwdriver until the valve stem is flush with the lock nut face.

The completed installation.

17) The completed installation should appear as pictured above.

9.3 Low Pressure Inflator Hose

The low pressure inflator system may be used with

either conventional buoyancy compensators or dry suit systems. 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.

9.3.1 Installation of the Low Pressure Inflator Hose

Tools Required:
5/32 inch allen wrench attachment on torque wrench

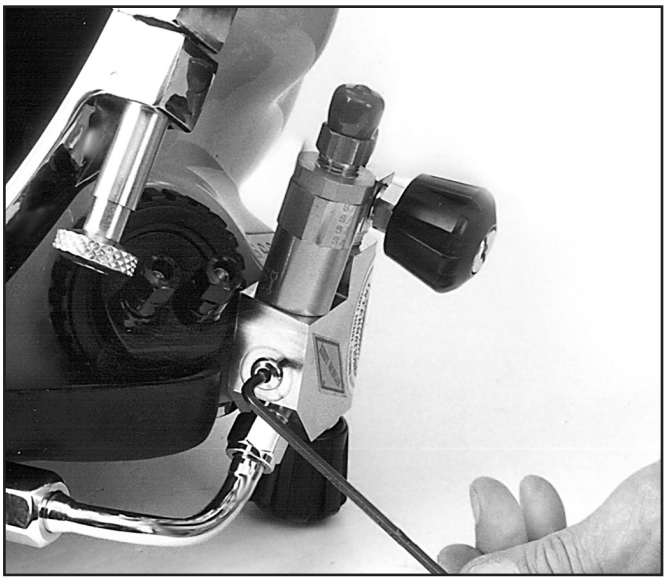
1) Remove the plug from the side block.
Save this plug.

2) Check the O-ring on the low pressure whip to be sure it is present and in good condition. Carefully screw the low pressure whip into the side block.

3) Tighten fitting to the specifications provided by the dry suit manufacturer. Do not overtighten.

4) Pressurize helmet and test connection for leaks.

Tighten the fitting on the side block



Remove the plug from the side block.

⚠ WARNING

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.

9.4 Weld Lens Assembly

9.4.1 Weld Lens Assembly Installation

Tools Required:
⅜ inch Open End Wrench
¼ inch Flat Blade Attachment on Torque Screwdriver

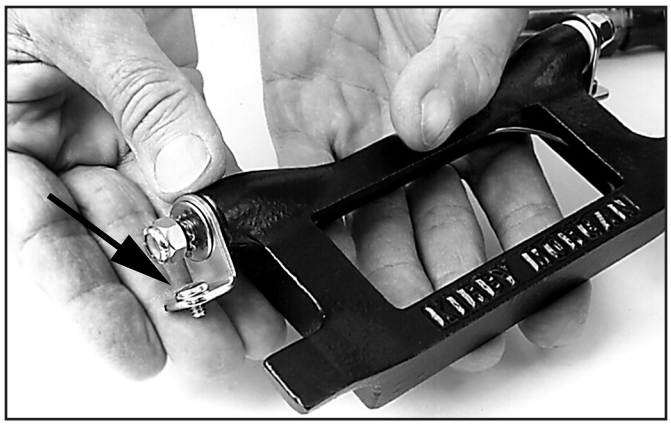
1) Remove the two plug screws from the port retainer. Refer to the drawing included with the weld lens assembly kit for the remainder of the location numbers.

2) Insert the screws through the mount ears.

3) With the shield facing out of the helmet or mask, install and tighten the two mount screws into the port retainer.

4) Tighten the two lock nuts on the ends of the hinge studs so that the welding lens assembly can be flipped up, but will not fall down from its own weight.

Remove the two plug screws from the port retainer.



Install the screws through the mount ears.

⚠ WARNING

Use only the screws provided with the Weld Lens Kit for installation of this assembly. Longer screws will damage the helmet shell and/or the threaded inserts. This could cause flooding through the port.

Tighten the weld lens assembly.

9.5 Weld Shield Assembly

9.5.1 Weld Shield Assembly Installation

Tools Required:

⅜ inch Open End Wrench

¼ inch Flat Blade Attachment on Torque Screwdriver

1) Remove the two plug screws from the port retainer. Refer to the drawing included with the weld shield assembly kit for the remainder of the location numbers.

2) Insert the mount screws through the spacer washers and then through the mount ears.

3) With the shield facing out of the helmet or mask, install and tighten the two mount screws into the port retainer.

Weld Shield Assembly

9.6 Use of Quick Disconnect

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. All quick disconnects used must be of good quality and be capable of supplying gas without any additional flow restriction. All quick disconnects used in countries that adhere to CE standards must be CE approved.

A quick disconnect is designed to be installed in any low pressure port of the diver's bailout 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.

One end of the connector is designed to be attached to the emergency valve assembly, while the other end of the connector is designed to attach to any of the standard low pressure ports on the KMDSI SuperFlow® first stage regulator (or any high performance regulator) used for the bail-out supply.

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 × 231 = 1617. To convert units appearing in 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	ºC × 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 (ºF - 32)	Temperature (ºC)	0.5555
Tons (U.S.)	Pounds	2000
Watts	Horsepower	0.001341

 Document #140204001

Appendix 1: Torque Specifications

Loc. #	Part #	Description	Torque in inch pounds	Torque in Newton Meters
9	555-154	Bent Tube Assy, side block end	100	11.3
3 and 13	530-070	Screw, Top Weight	35	4
14	530-035	Screw, Water Dump Body	12 RTV Sealant	1.3 RTV Sealant
15	530-070	Screw, Port Weight	35	4
18	530-078	Screw, Top Weight	35	4
19	530-040	Screw, Bracket	12	1.3
22	530-062	Screw, Rear Handle and Bracket	35	4
26	530-045	Screw, Handle	12	1.3
28	530-050	Screw, Side Block	35	4
31	530-317	Nut, Air Train Inner	35	4
34	530-317	Nut, Air Train Outer	15	1.6
35	530-052	Screw, Port Plug	20	2.25
36	530-035	Screw, Port Retainer	12	1.3
37	550-062	Knob, Nose Block	*Tighten to bottom out*	
46	530-015	Screw, Pull Pin	24	2.7
47	530-032	Screw, Swing Catch Spring	20 *Loctite® 222*	2.25 *Loctite® 222*
53	530-019	Screw, Water Dump Cover (Exhaust)	12	1.3
67	530-045	Screw, Kidney Plate	12	1.3
72	530-035	Screw, Swing Catch	20 *Loctite® 222*	2.25 *Loctite® 222*
77	530-045	Screw, Swing Catch	20 *Loctite® 222*	2.25 *Loctite® 222*
81	530-018	Screw	24 *Loctite® 222*	2.7 *Loctite® 222*
87	530-064	Screw, Neck Pad	*Snug—to no movement*	
111	550-081	Nut Regulator Mount	100	11.3
115	530-018	Screw, Earphone Retainer	16	1.8
118	530-031	Screw, Chin Strap	14	1.6
141	555-117	Adapter, Brass	See Note 1	See Note 1
142		Seat, One Way Valve	150	17
148		Body, One Way Valve	150	17
148	555-195	One Way Valve	150	17
152	550-024	Stud, Side Block	20 *Loctite® 262*	2.25 *Loctite® 262*
158	550-020	Bonnet Defogger Valve	100	11.3

Loc. #	Part #	Description	Torque in inch pounds	Torque in Newton Meters
163	550-095	L.P. Plug, w/O-ring	20	2.25
165	550-140	Emergency Valve Body	See Note 1	See Note 1
169	550-091	Packing Nut	45 after seating	5.65 after seating
174	550-050	Jam Nut	40	4.5
175	550-048	Inlet Nipple	40	4.5
187	550-055	Packing Nut	40 after seating	4.5 after seating
195	530-030	Screw, Regulator Clamp	12	1.3
212	530-018	Screw	24 *Loctite® 222*	2.7 *Loctite® 222*
213	530-024*	Screw	14	1.6
214	530-022	Screw	14 *Loctite® 222*	1.6 *Loctite® 222*
215	530-220	Screw, Pull Strap Plate	14 *Loctite® 222*	1.6 *Loctite® 222*
—	200-017	Overpressure Relief Valve	20	2.25
—	530-210	Weld Lens Mount Bolt	23	2.6
—	555-210	Restrictor Adaptor	20	2.25

Note on Torque Specifications

Note 1: Use Teflon® tape for one to two wraps, starting two threads back from the pipe thread end of the fitting to avoid getting Teflon® tape in the valve. Tighten pipe thread using good engineering practices. Two turns by hand, two turns by wrench.

* For a neoprene neck dam, turn the screw three turns. Screws may need adjustment after several dives.

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 affect 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 does not need to be removed from the helmet annually, providing, after removal of side block components, there is no corrosion and verdigris. Kirby Morgan recommends that every three years the side block assembly be physically removed from the helmet per Section 7.3. 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 and the emergency gas valve 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. 1-1½ wraps is all that is needed. The use of more than 1½ wraps could cause excess Teflon® tape to travel into the breathing system. Do not overtighten when installing.

Chapters 6, 7 and 8 of this 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 . 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 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.

Kirby Morgan 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 Kirby Morgan 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. Helmet 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 safe gas handling.

⚠ WARNING

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 Chapter 7 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 and work done recorded in an maintenance log.

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 kmdsi@kirbymorgan.com or telephone Dive Lab, Inc., at 1-850-235-2715 or E-mail them at divelab@aol.com.

Appendix 3
Supply Pressure Requirements & Tables

Table 1 should be used whenever low pressure compressors are used or when using surface control panels that are limited to outlet pressures within the range of 220 psig or less.
It is important to insure the required outlet pressure from the table can be maintained in a stable manner at the surface to insure adequate supply at depth. When used with high pressure consoles that can regulate pressures greater than 220 psig use Appendix 3 Table 3 SuperFlow® / SuperFlow® 350 Regulator High Pressure Regulated Source.

Diver Work Rates

The divers work rate, also known as respiratory minute volume (RMV), is basically how hard the diver breathes. As the diver's physical exercise increases, so does the ventilation rate. Proper training teaches the diver to never push the work rate beyond normal labored breathing. (This is in the 30-50 RMV range). To put things in perspective, heavy work for a physically fit person:

Swimming at one knot is about	38 RMV
Running at 8 miles per hour is about	50 RMV

Once the diver hits 55 RMV, he is entering the extreme range. Many fit divers can do 75 RMV for one to two minutes providing the inhalation resistive effort of the breathing system is not much above 1-1.3 J/L. The divers work rate should never be so heavy that the diver cannot maintain a simple conversation with topside.

When the work rate gets into the moderately heavy to heavy range 40-50 RMV the diver needs to slow down!

Working to the point of being excessively winded should be avoided at all costs!

Working at rates greater than 58 RMV underwater is extreme, and can pose hazards that are not present when doing extreme rates on the surface. When underwater, inhalation and exhalation resistive effort increases due to the density of the breathing gas and resistive effort of the equipment. The increase in resistive effort can cause an increase in blood level CO_2 because the diver cannot ventilate as freely as when breathing at the surface. When breathing air at the deeper depths, nitrogen narcosis can mask CO_2 symptoms which can then snowball into even heavier breathing, often resulting in confusion, panic, and in rare cases muscle spasm, unconsciousness, sometimes resulting in death.
In some rare cases high ventilation rates has been suspected as the cause of respiratory barotraumas, including arterial gas embolism. The possibility of suffering a respiratory over inflation event during high work rates while underwater could be even greater for divers that smoke, or have previous known or unknown lung disease or respiratory damage. The safest course for the diver is to keep the equipment properly maintained for peak performance and to know and understand the capabilities and limitations of the equipment including all breathing supply systems they use.
The output capability of the supply system including umbilicals should be known to all that use it and periodic tests should be done to insure flow capability.

Use Of Low Pressure Supply Table

The low pressure supply tables were developed to simplify calculation of supply pressure. In order to get the required volume to the diver, you need to have the proper supply pressure. The table starts at 90 psig and increases in 10 psig increments. The user simply selects the lowest pressure that best represents the low cycling pressure of the compressor being used. The table basically shows the maximum depth that can be attained while breathing at RMV's (breathing rates in liters per minute) listed. It is strongly recommended that divers plan for a minimum supply pressure that will allow the diver to work at no less that 50 - 62.5 RMV.

Appendix 3 Table 1 Work Rate Expressed as Respiratory Minute Volume (RMV)*

Work Load	RMV	Cubic Feet/Minute (CFM)	Equivalent Land Based Exercise
Rest	7-10 RMV	0.2 - 0.35 CFM	
Light Work	10-20 RMV	0.35 - 0.7 CFM	Walking 2 miles per hour
Moderate Work	20-37 RMV	0.7 - 1.3 CFM	Walking 4 miles per hour
Heavy Work	37-54 RMV	1.3 - 1.9 CFM	Running 8 miles per hour
Severe Work	55-100 RMV	1.94 - 3.5 CFM	
** source: U.S. Navy Diving Manual*			

Appendix 3 Table 2 Compressor Supply Table SuperFlow® and SuperFlow® 350

Supply Pressure Requirements for Helmets & Masks equipped with SuperFlow® and SuperFlow® 350 Non-balanced regulators when used with low pressure compressors

Supply Pressure	RMV	Depth		ATA	Required SLPM	w/20% safety margin	Required SCFM
		FSW	MSW				
90 PSIG / 6.21 BAR	**40**	76	23	3.30	132.12	158.55	5.60
	50	63	19	2.91	145.45	174.55	6.17
	62.5	44	13	2.33	145.83	175.00	6.18
	75	33	10	2.00	150.00	180.00	6.36
100 PSIG / 6.9 BAR	**40**	86	26	3.61	144.24	173.09	6.11
	50	72	22	3.18	159.09	190.91	6.74
	62.5	55	17	2.67	166.67	200.00	7.06
	75	42	13	2.27	170.45	204.55	7.23
110 PSIG / 7.59 BAR	**40**	100	31	4.03	161.21	193.45	6.83
	50	83	25	3.52	175.76	210.91	7.45
	62.5	67	20	3.03	189.39	227.27	8.03
	75	50	15	2.52	188.64	226.36	8.00
120 PSIG / 8.28 BAR	**40**	112	34	4.39	175.76	210.91	7.45
	50	91	28	3.76	187.88	225.45	7.96
	62.5	71	22	3.15	196.97	236.36	8.35
	75	57	17	2.73	204.55	245.45	8.67
130 PSIG / 8.97 BAR	**40**	122	37	4.70	187.88	225.45	7.96
	50	100	31	4.03	201.52	241.82	8.54
	62.5	82	25	3.48	217.80	261.36	9.23
	75	60	19	2.82	211.36	253.64	8.96
140 PSIG / 9.66 BAR	**40**	137	42	5.15	206.06	247.27	8.73
	50	108	33	4.27	213.64	256.36	9.06
	62.5	84	26	3.55	221.59	265.91	9.39
	75	65	20	2.97	222.73	267.27	9.44
150 PSIG / 10.35 BAR	**40**	145	44	5.39	215.76	258.91	9.15
	50	120	37	4.64	231.82	278.18	9.83
	62.5	95	29	3.88	242.42	290.91	10.28

Appendix 3 Table 2 Compressor Supply Table SuperFlow® and SuperFlow® 350
Continued

Supply Pressure	RMV	Depth		ATA	Required SLPM	w/20% safety margin	Required SCFM
		FSW	MSW				
	75	69	21	3.09	231.82	278.18	9.83
160 PSIG / 11.04 BAR	**40**	157	48	5.76	230.30	276.36	9.76
	50	124	38	4.76	237.88	285.45	10.08
	62.5	100	31	4.03	251.89	302.27	10.68
	75	76	23	3.30	247.73	297.27	10.50
170 PSIG / 11.73 BAR	**40**	167	51	6.06	242.42	290.91	10.28
	50	135	41	5.09	254.55	305.45	10.79
	62.5	107	33	4.24	265.15	318.18	11.24
	75	86	26	3.61	270.45	324.55	11.46
180 PSIG / 12.42 BAR	**40**	181	55	6.48	259.39	311.27	11.00
	50	148	45	5.48	274.24	329.09	11.62
	62.5	115	35	4.48	280.30	336.36	11.88
	75	93	28	3.82	286.36	343.64	12.14
190 PSIG / 13.11 BAR	**40**	190	58	6.76	270.30	324.36	11.46
	50	154	47	5.67	283.33	340.00	12.01
	62.5	122	37	4.70	293.56	352.27	12.44
	75	100	31	4.03	302.27	362.73	12.81
200 PSIG / 13.8 BAR	**40**	192	59	6.82	272.73	327.27	11.56
	50	166	51	6.03	301.52	361.82	12.78
	62.5	132	40	5.00	312.50	375.00	13.25
	75	102	31	4.09	306.82	368.18	13.01
210 PSIG / 14.49 BAR	**40**	212	65	7.42	296.97	356.36	12.59
	50	175	53	6.30	315.15	378.18	13.36
	62.5	137	42	5.15	321.97	386.36	13.65
	75	108	33	4.27	320.45	384.55	13.58
220 PSIG / 15.18 BAR	**40**	220	67	7.67	306.67	368.00	13.00
	50	182	56	6.52	325.76	390.91	13.81
	62.5	147	45	5.45	340.91	409.09	14.45
	75	111	34	4.36	327.27	392.73	13.87

Appendix 3 Table 3 SuperFlow® / SuperFlow® 350 Regulator High Pressure Regulated Source

Depth		Regulator Setting Surface Gauge in P.S.I.G.		Regulator Setting Surface Gauge in BAR	
FSW	MSW	Minimum P.S.I.G.	Maximum P.S.I.G.	Minimum Bar	Maximum Bar
0-60	0-18	150	225	10.3	15.5
61-100	19-30	200	250	13.8	17.2
101-132	31-40	250	275	17.2	18.9
133-165	41-50	250	300	17.2	19.6
*166-220	51-67	300	325	20.6	22.4

*May not be capable of performing at 75 RMV deeper than 165 FSW.

Performance is based on a minimum of 75 RMV to 165 FSW (50 MSW) and 62.5 RMV to 220 FSW (67 MSW) using a 3/8" (9.5 mm) umbilical 600 foot (183 meters) long, made up of two 300 foot (91 meter) sections.

Appendix 4 Standard Kirby Morgan Surface Supply Pressure Formula - Old Method

Old Pressure Table Calculation:

The old method of determining supply pressure was to multiply the dive depth by .445 PSI and then add the over-bottom pressure called out in the depth ranges for the depth from the KMDSI operations manual. The old method was based on a minimum RMV of 62.5. This method can still be used. The old method used the formula and called out over bottom pressures for depth as follows [(FSW x .445) + PSIG for depth] from the table below.

Depth in Feet and Meters		Over Bottom Pressure	
0-60 FSW	(0-18 MSW)	90 PSIG	(6.2 Bar)
61-100	(18-30)	115	(7.9)
101-132	(30-40)	135	(9.3)
133-165	(40-50)	165	(11.4)
166-220	(50-67)	225	(15.5)

For more information on determining supply pressure related information check the Dive Lab web site at www.divelab.com.