KIRBY MORGAN®

455 Balanced Regulator Installation Guide

™

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⚠ WARNING

Diving with compressed breathing gas is a hazardous activity. Even if you do everything properly 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.

The 455 balanced regulator meets or exceeds all performance and testing requirements of all government and non-government testing agencies throughout the world. Only Kirby Morgan masks and helmets have achieved the Dive Lab®, CR (Commercial Rated) mark.

SuperLite, SuperFlow, SuperMask, REX, DSI, Diving Systems International, 27, EXO, BandMask, KMB-Band Mask, Miller Diving, Kirby Morgan Diamond, Kirby Morgan Dive Systems, Kirby Morgan and the color YELLOW when used on diving helmets are all registered trademarks of Kirby Morgan Dive Systems, Inc. **Use of these terms to describe products that are not manufactured by KMDSI is illegal.**

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Installing the 455 Balanced Regulator onto a KM 77

NOTICE

Every effort is made to ensure that the 455 balanced regulators, and other KMDSI regulators, are interchangeable among the wide variety of helmets and masks we produce. Please be aware that the final alignment of the regulator may vary from unit to unit, and this in no way will affect its function or performance.

The original language of the Kirby Morgan Manuals is English. Translation into other languages will be provided upon request. KMDSI may charge a fee for these services.

NOTE The tools required to remove the SuperFlow® 350 regulator and install the 455 Balanced regulator into the helmet shell are the same and will only be listed once at the beginning of this installation guide.

The following instruction is valid for the following products:

SL 17C	KMB 18**
SL 27*	KMB 28**
KM 37	KM 37SS
KM 57	KM 77

*Mounting to the SL 27® requires installation by a dealer certified in fiberglass repair (for SL 27® helmets built before October 2015).

**Pre '99 KMB 18s and pre 2004 KMB 28s will not accept the 455 balanced regulator.

1.1 CE Certification

The helmet has been tested and conforms to the performance requirements as set forth in Annex II of Regulation (EU) 2016/425 and, as far as applicable, the EN15333-1 (class B). It is fully CE marked with the 455 balanced demand regulator and oral nasals P/N 510-690 and P/N 510-747.

Original code for the CE Mark 190829001.

NOTE The sticker (CE mark) inside the helmet or BandMask® regards only the helmet/BandMask® without the regulator.

Category of PPE: III

⚠ WARNING

The helmet has been tested with air and CE certificated 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.

1.1.1 CE Marking

On the inside of the helmet shell or BandMask® frame the CE mark is affixed.

EN15333-1 CLASS B	**KIRBY MORGAN**	**KIRBY MORGAN DIVE SYSTEMS. INC.** 1430 Jason Way, Santa Maria, CA 93455
HELMET MODEL: _____		
YEAR OF PRODUCTION: _____		CE 0477

CE Mark on Helmets

EN15333-1 CLASS C	**KIRBY MORGAN**	**KIRBY MORGAN DIVE SYSTEMS, INC.** 1430 Jason Way, Santa Maria, CA 93455
BANDMASK® MODEL: _____		
YEAR OF PRODUCTION: _____		CE 0477
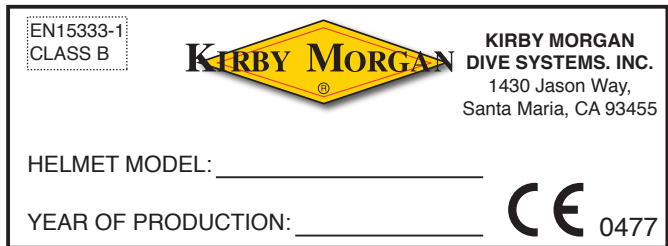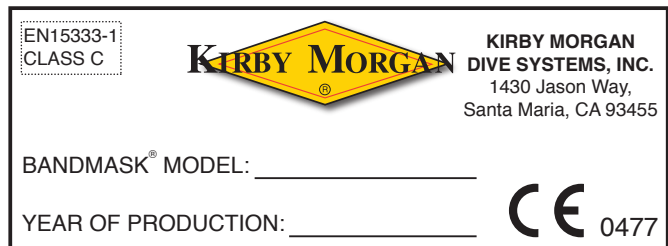
CE Mark on BandMasks®

In the mark the data reported are the following:

1.   The name and the address of the manufacturer;

2.   Harmonized reference standard: EN 15333-1;

3.   PPE model;

4.   The year of production;

5.   CE marking: CE;

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6.   Number of notified body.

> ## ⚠ CAUTION
>
> **The user cannot:**
>
> **• Remove the mark from the shell 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.**

1.1.2 Notified Body

The Notified Body is:
            Eurofins Product Testing Italy Srl

Address: Via Courgné
            21-10156 Torino,
            ITALY

Identification number: 0477.

Installing the 455 Balanced Regulator onto a KM 37SS

Parts Included in the 525-765 Kit:

Part #	Description	Qty
100-100	Warranty Card	1
100-204	Installation Guide, 455 Regulator Kit	1
505-455	455 Balanced Regulator	1
520-042	Tie Wrap	2

VIDEO

How To: Convert KM 37SS with SuperFlow® 350 to 455 Regulator

https://www.youtube.com/watch?v=TM5QuReGoAU

1.1 SuperFlow® 350 Regulator Removal

Tools Required:

- Socket Wrench

- 1 ⅜″ socket or Regulator Mount Socket Wrench P/N 525-625 (Found in 525-620 Tool kit).

- ⅜″ Drive Extension—Minimum 3″ in Length

- ¼″ flat blade screwdriver

- $\frac{7}{16}$″, $\frac{11}{16}$″ and two ⅞″ Open end wrenches

- Slip Joint Pliers and a cloth

1.1.1 Bent Tube Removal

1. Always start removal at the side block end. Loosen the tube with the $\frac{11}{16}$ inch wrench. The free swiveling mount nut on this end of the bent tube can be unthreaded completely and can slide down the tube.

Always start removal at the side block end.

2. Loosen the lower bent tube nut by using the two ⅞ inch wrenches. Place one wrench on the bent tube mount nut and the second on the regulator inlet jam nut. **Turn only the outer nut on the bent tube to loosen the bent tube.**

The bent tube mount nut can then be rotated until free of the bent tube adapter threads.

3. With the two mount nuts free; the bent tube assembly can be pulled straight out and away from the regulator. The bent tube assembly can be rotated back and forth to aid removal, if necessary.

Removing the bent tube.

1.1.2 Nose Block Device Removal

> ### ⚠ CAUTION
> **The nose block device MUST be re-moved 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. A torn oral nasal mask may lead to an increase in CO2, causing headaches, difficulty and possibly an accident.**

1. Hold the nose block knob with a pair of pliers padded by a cloth, while unscrewing the nose block device with your hand from inside the helmet.

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.

1.1.3 Oral Nasal Mask and Microphone Removal

1. Verify that the nose block device is removed from the helmet.

2. Push the microphone out of the oral nasal mask.

3. Pull the oral nasal mask off the regulator mount nut. It is held on by a snap fit.

1.1.4 SuperFlow® 350 Removal from Helmet/Mask

1. Verify that the bent tube has been removed from the helmet.

2. Remove the screws that secure the whiskers to the port retainer. Take care not to lose the zinc anodes, if so equipped, screws, whisker spacers or kidney plates if present.

Take care not to lose the whisker spacers.

3. Remove regulator mount nut and sealing O-ring from inside the helmet.

Removal of the regulator mount nut.

4. Cut the tie wrap that fastens the whisker main

body to the water dump/exhaust outlet on the pod/water dump adapter cover.

5. Pull the regulator body with exhaust whiskers away from the helmet.

If using this exhaust system for the 455 regulator installation, cut the tie wrap that secures the whisker assembly to the regulator body and remove. Inspect this assembly and replace parts as needed.

1.2 455 Balanced Regulator Installation

Tools Required

- Torque Wrench

- ⅞″ and 1¹⁄₁₆″ Open End Attachments

- Socket Wrench, Regulator Mount Nut, P/N 525-625 (in Tool Kit Included with Helmet) or a 1 ⅜″ Socket

- ⅜″ Drive Extension—Minimum 3″ in Length

- Torque screwdriver

- ¼″ flat blade screwdriver attachment

- ⅞″ Open End Wrench

- Christo-Lube® or equivalent oxygen compatible lube

- Loctite® 248 or equivalent medium strength thread locker

Before beginning step one ensure the exhaust main body with attached whiskers is secured to the exhaust flange of the regulator body with the correct tie wrap.

NOTE

Every effort is made to ensure that this, and any of Kirby Morgan's regulators, are interchangeable among the wide variety of helmets and masks that Kirby Morgan produces. 40 plus years of producing thousands of helmets has resulted in some variations. Please be aware that the final alignment of the regulator may have variation from unit to unit, and this in no way will affect the function and/or performance of the finished 455 regulator.

EXHAUST SYSTEM NOTE: Each Quad and Tri-Valve exhaust assembly can be removed and replaced onto the exhaust flange of the regulator as a complete unit. If assembled using the individual components, special attention is required to ensure the exhaust valves are correctly orientated and seated inside the exhaust whiskers. If replacing valves or rebuilding the exhaust valve assembly by individual components see Quad Valve and Tri-Valve section in our modular manual

1.2.1 Exhaust System Installation

1. Insert the opening on the exhaust main body onto the exhaust outlet of the water dump valve, while at the same time aligning and inserting the threaded mounting tube on the regulator, into the mounting hole on the pod.

2. Install the tie wrap around the quad main exhaust body and tighten. Cut and remove excess tie wrap.

3. Install the sealing O-ring and regulator mount nut. DO NOT FULLY TIGHTEN THE NUT AT THIS TIME.

1.2.2 Bent Tube Assembly and Regulator Installation

1. Clean the bent tube in accordance with the cleaning procedures in "1.3 General Cleaning & Inspection Procedures" on page GENPRE-4. 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 ⅛ inch (3.18 mm). If the helmet has been used for burning jobs, carefully check for erosion of the metal or severe corrosion. Replace if any erosion is present or integrity is in question. Keep in mind the bent tube is a principle component that routes breathing gas to the regulator system.

NOTE If this maintenance is during an annual overhaul, replace the Teflon® O-ring at the side block end of the bent tube and the O-ring at the demand regulator inlet side of the bent tube.

NOTE Before beginning the first step, ensure that the jam nut, located on the inlet nipple, is turned entirely in towards the regulator body and away from the bent tube. If it is not, rotate jam nut to this correct starting position for bent tube installation.

2. Lightly lubricate the O-ring on the bent tube assembly.

3. Inspect the regulator mount nut for contaminants and damage. Use a tooth brush to clean threads as needed. Lightly lubricate the regulator mounting tube threads and the sealing O-ring with Christo-Lube®.

4. Install the sealing O-ring, then thread the regulator mount nut onto the regulator, finger tight ONLY.

5. Ensure that the Teflon® O-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 the side block nut.

6. Thread the large nut on the bent tube assembly onto the inlet nipple two to three threads.

7. Using a torque wrench, tighten the bent tube mount nut onto the Side Block. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque

8. Next, fully engage (clockwise) the large nut on the bent tube into the bent tube adapter hand tight until resistance is felt. Do not tighten further. This will ensure the nut is bottomed on the shoulder of the bent tube.

9. Engage the jam nut fully against the large nut on the bent tube.

10. Using a ⅞ inch open end wrench hold the large nut on the regulator end of the bent tube. Use a torque wrench and torque the jam nut against the bent tube mount nut to lock it in place. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

Tighten the bent tube to the proper torque value.

11. Use a torque wrench inside the helmet with a 1 ⅜ inch socket or regulator mount tool P/N 525- 625 found in the KMDSI tool kit P/N 525-630 and extension to torque the regulator mount nut. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

12. **For stainless steel helmets ONLY:** Place a small amount of Loctite® 248 onto the last two or three threads at the end (end opposite the screw head) of each of whisker screws.

13. Attach the whisker to each side of the face port retainer using the spacers, zinc anodes or kidney plates and screws. Using a torque screwdriver, carefully torque these screws to the correct torque for the helmet shell. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

1.2.3 Oral Nasal Mask and Microphone Installation

1. Snap the oral nasal mask over the regulator mount nut. Take extra care to make sure the mask has snapped into position all the way around the mount nut.

2. Reinstall the microphone.

1.2.4 Nose Block Device Installation

1. Prior to reassembly, lubricate the two o-rings.

2. Slide the shaft through the oral nasal mask in the helmet or mask shell.

Install the nose block device through the interior of the oral nasal mask.

3. Place both O-rings on the shaft, followed by the packing nut and the knob.

4. Tighten the knob with the pliers, padded by a cloth, while holding the nose pad end inside the helmet with your hand.

5. Tighten the packing nut with the ⁷⁄₁₆ inch wrench until snug. Do not over tighten, as this will make it difficult to slide the nose block device in and out.

Properly installed nose block device.

1.3 Test the regulator for proper function

NOTE

When checking the regulator by depressing the purge button, the regulator may free flow without back pressure inside the oral nasal mask. This is completely normal. Placing a finger or hand over the outlet tube of the regulator will prevent free flow.

See "1.2.2 Adjusting the 455 Balanced Regulator" on page 455BAL-3 in module 455 Balanced Regulator for proper adjustment.

NOTE

For all maintenance and adjustment procedures, refer to the 455 Balanced Regulator module found in the "Manuals and Exploded Views" link under the "Support" link at www.kirbymorgan.com.

Installing the 455 Balanced Regulator onto a SL 17C, SL 27®, KM 37 or KM 57 Helmet

Parts Included in the 525-765 Kit:

Part #	Description	Qty
100-100	Warranty Card	1
100-204	Installation Guide, 455 Regulator Kit	1
505-455	455 Balanced Regulator	1
520-042	Tie Wrap	2

VIDEO

How To: Conversion Kit, 455 Regulator for KM 37, KM 57, SL 17C or SL 27® Helmet

https://www.youtube.com/watch?v=qCucRRcp1fo

1.1 SuperFlow® 350 Regulator Removal

Tools Required:

- Socket Wrench

- 1 ⅜″ inch socket and/or P/N 525-625 Regulator Mount Socket Wrench (Found in 525-620 Tool Kit)

- ⅜″ Drive Extension—Minimum 3″ in Length

- #1 Phillips Head Screwdriver

- Open-End Wrench ⁷⁄₁₆″ and (2) ⅞″ and ¹¹⁄₁₆″

- Slip Joint Pliers and a Cloth

1.1.1 Bent Tube Removal

1. Always start removal at the side block end. Loosen the tube with the ¹¹⁄₁₆ inch wrench. The free swiveling mount nut on this end of the bent tube can be un-threaded completely and can slide down the tube.

Always start removal at the side block end.

2. Loosen the lower bent tube nut by using the two ⅞ inch wrenches. Place one wrench on the bent tube mount nut and the second on the regulator inlet jam nut. **Turn only the outer nut on the bent tube to loosen the bent tube.**

3. With the two mount nuts free; the bent tube assembly can be pulled straight out and away from the regulator. The bent tube assembly can be rotated back and forth to aid removal, if necessary.

Removing the bent tube.

1.1.2 Nose Block Device Removal

> ### ⚠ CAUTION
>
> **The nose block device MUST be removed and reinstalled when installing a new oral nasal mask. Simply stretching the oral nasal mask over the nose block device can cause the oral nasal mask to tear. A torn oral nasal mask may lead to an increase in CO2, causing headaches, difficulty and possibly an accident.**

1. Hold the nose block knob with a pair of pliers padded by a cloth, while unscrewing the nose block device with your hand from inside the helmet.

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.

1.1.3 Oral Nasal Mask and Microphone Removal

1. Verify that the nose block device is removed from the helmet.

2. Push the microphone out of the oral nasal mask.

3. Pull the oral nasal mask off the regulator mount nut. It is held on by a snap fit.

1.1.4 SuperFlow® 350 Removal from Helmet/Mask

1. Verify that the bent tube has been removed from the helmet.

2. Remove the screws that secure the whiskers to the port. Take care not to lose the zinc anodes or kidney plates and whisker spacers.

Take care not to lose the whisker spacers.

3. Remove the regulator mounting nut and sealing O-ring from inside the helmet.

Removal of the regulator mount nut.

NOTE If you are installing the 455 balanced regulator on an SL 27® skip to step 5.

4. Cut the tie wrap sealing the whisker main body

to the water dump on the water dump adapter cover.

5. Pull the regulator body with exhaust whiskers away from the helmet.

If using this exhaust system for the 455 regulator installation, cut the tie wrap that secures the whisker assembly to the regulator body and remove. Inspect this assembly and replace parts as needed.

1.2 455 Balanced Regulator Installation

Tools Required

- Torque Wrench
  ⅞″ and ¹¹⁄₁₆″ Open End Attachments

- 1 ⅜″socket and/or P/N 525-625 regulator mount socket wrench (found in 525-620 tool kit)

- ⅜″ Drive Extension—Minimum 3″ in Length

- Torque Screwdriver
  #1 Phillips Head Screwdriver attachment

- ⅞″ Open End Wrench

- ⅜″ Nut Driver or ⅜″ Open End Wrench

- ⁵⁄₃₂″ Hex Key (Ball End is Helpful)

- Christo-Lube® or equivalent

- Loctite® 248 or equivalent medium strength thread locker

NOTE Every effort is made to ensure that this, and any of Kirby Morgan's regulators, are interchangeable among the wide variety of helmets and masks that Kirby Morgan produces. 40 plus years of producing thousands of helmets has resulted in some variations. Please be aware that the final alignment of the regulator may have variation from unit to unit, and this in no way will affect the function and/or performance of the finished 455 regulator.

EXHAUST SYSTEM NOTE: Each Quad and Tri-Valve exhaust assembly can be removed and replaced onto the exhaust flange of the regulator as a complete unit. If assembled using the individual components, special attention is required to ensure the exhaust valves are correctly orientated and seated inside the exhaust whiskers. If replacing valves or rebuilding the exhaust valve

assembly by individual components see Quad Valve and Tri-Valve section in our modular manual

NOTE (This does NOT apply to the SL 27®). Before beginning step one ensure the exhaust main body with attached whiskers is secured to the exhaust flange of the regulator body with the correct tie wrap.

1.2.1 Exhaust System Installation

1. Insert the opening on the exhaust main body onto the exhaust outlet of the water dump valve, while at the same time aligning and inserting the threaded mounting tube on the regulator, into the mounting hole on the pod. If this is being installed on an SL 27 then align and insert the threaded mounting tube on the regulator, into the mounting hole on the helmet shell.

NOTE If you are installing the 455 balanced regulator on an SL 27® skip to step 3.

2. Install the tie wrap around the quad main exhaust body and tighten. Cut and remove excess tie wrap.

3. Install the sealing O-ring and regulator mount nut. DO NOT FULLY TIGHTEN THE NUT AT THIS TIME.

1.2.2 Bent Tube Assembly and Regulator Installation

1. Clean the bent tube in accordance with the cleaning procedures in "1.3 General Cleaning & Inspection Procedures" on page GENPRE-4.

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 ⅛ inch (3.18 mm). If the helmet has been used for burning jobs, carefully check for erosion of the metal or severe corrosion. Replace if any erosion is present or integrity is in question. Keep in mind the bent tube is a principle component that routes breathing gas to the regulator system.

NOTE If this maintenance is during an annual overhaul, replace the Teflon® O-ring at the side block end of the bent tube and the O-ring at the demand regulator inlet side of the bent tube.

NOTE Before beginning the first step, ensure that the jam nut, located on the inlet nipple, is turned entirely in towards the regulator body and away from the bent tube. If it is not, rotate jam nut to this correct starting position for bent tube installation.

2. Lightly lubricate the O-ring on the bent tube assembly.

3. Inspect the regulator mount nut for contaminants and damage. Use a tooth brush to clean

threads as needed. Lightly lubricate the regulator mounting tube threads and the sealing O-ring with Christo-Lube®.

4. Install the sealing O-ring, then thread the regulator mount nut onto the regulator, finger tight ONLY.

5. Ensure that the Teflon® O-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 the side block nut.
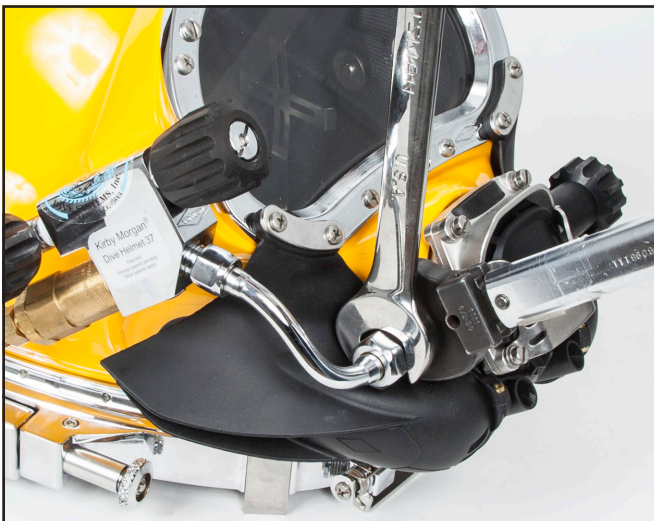
6. Thread the large nut on the bent tube assembly onto the bent tube adapter two to three threads.

7. Using a torque wrench, tighten the bent tube mount nut onto the side block. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

8. Next, fully engage (clockwise) the large nut on the bent tube into the regulator inlet nipple hand tight until resistance is felt. Do not tighten further. This will ensure the nut is bottomed on the shoulder of the bent tube.

9. Engage the jam nut fully against the large nut on the bent tube.

10. Using a ⅞ inch open end wrench hold the large nut on the regulator end of the bent tube. Use a torque wrench and torque the jam nut against the bent tube mount nut to lock it in place. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

Tighten the bent tube to the proper torque value.

11. Use a torque wrench inside the helmet with a 1 ⅜ inch socket or regulator mount tool P/N 525-625 found in the KMDSI tool kit P/N 525-630 and extension to torque the regulator mount nut. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

12. Attach the whisker to each side of the face port retainer using the spacers, zinc anodes or kidney plates and screws. Using a torque screwdriver, carefully torque these screws to the correct torque for the helmet shell you are installing the whisker wings onto. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

1.2.3 Oral Nasal Mask and Microphone Installation

1. Snap the oral nasal mask over the regulator mount nut. Take extra care to make sure the mask

has snapped into position all the way around the mount nut.

2. Reinstall the microphone.

1.2.4 Nose Block Device Installation

1. Prior to reassembly, lubricate the two o-rings.

2. Slide the shaft through the oral nasal mask in the helmet shell.

Install the nose block device through the interior of the oral nasal mask.

3. Place both O-rings on the shaft, followed by the packing nut and the knob.

4. Tighten the knob with the pliers, padded by a cloth, while holding the nose pad end inside the helmet with your hand.

5. Tighten the packing nut with the ⁷⁄₁₆ inch wrench until snug. Do not over tighten, as this will make it difficult to slide the nose block device in and out.

Properly installed nose block device.

1.3 Test the regulator for proper function

NOTE

When checking the regulator by depressing the purge button, the regulator may free flow without back pressure inside the oral nasal mask. This is completely normal. Placing a finger or hand over the outlet tube of the regulator will prevent free flow. See "1.2.2 Adjusting the 455 Balanced Regulator" on page 455BAL-3 in module 455 Balanced Regulator for proper adjustment.

NOTE

For all maintenance and adjustment procedures, refer to the 455 Balanced Regulator module found in the "Manuals and Exploded Views" link under the "Support" link at www.kirbymorgan.com

Installing the 455 Balanced Regulator onto a KMB 18/28 Band Mask®

Parts Included in the 525-765 Kit:

Part #	Description	Qty
100-100	Warranty Card	1
100-204	Installation Guide, 455 Regulator Kit	1
505-455	455 Balanced Regulator	1
520-042	Tie Wrap	2

VIDEO

How To: Convert KM BandMask with SuperFlow® 350 to 455 Regulator

https://www.youtube.com/watch?v=3g7j7M-UvbI

1.1 SuperFlow® 350 Regulator Removal

Tools Required:

- Socket Wrench

- 1 ⅜″ socket or Regulator Mount Socket Wrench P/N 525-625 (Found in 525-620 Tool Kit).

- ⅜″ Drive Extension—Minimum 3″ in Length

- ¼″ Flat Blade Screwdriver

- ⁷⁄₁₆″, ¹¹⁄₁₆″ and (2) ⅞″ Open End Wrenches

- Slip Joint Pliers and a Cloth

1.1.1 Bent Tube Removal

1. Always start removal at the side block end. Loosen the tube with the ¹¹⁄₁₆ inch wrench. The free swiveling mount nut on this end of the bent tube can be un-threaded completely and can slide down the tube.

Always start removal at the side block end.

2. Loosen the lower bent tube nut by using the two ⅞ inch wrenches. Place one wrench on the bent tube mount nut and the second on the regulator inlet jam nut. **Turn only the outer nut on the bent tube to loosen the bent tube.**

3. With the two mount nuts free; the bent tube assembly can be pulled straight out and away from the regulator. The bent tube assembly can be rotated back and forth to aid removal, if necessary.

Removing the bent tube.

1.1.2 Nose Block Device Removal

> ## ⚠ CAUTION
>
> **The nose block device MUST be removed and reinstalled when installing a new oral nasal mask. Simply stretching the oral nasal mask over the nose block device can cause the oral nasal mask to tear. A torn oral nasal mask may lead to an increase in CO2, causing headaches, difficulty and possibly an accident.**

1. Hold the nose block knob with a pair of pliers padded by a cloth, while unscrewing the nose block device with your hand from inside the mask.

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.

1.1.3 Oral Nasal Mask and Microphone Removal

1. Verify that the nose block device is removed from the Band Mask®.

2. Push the microphone out of the oral nasal mask.

3. Pull the oral nasal mask off the regulator mount nut. It is held on by a snap fit.

1.1.4 SuperFlow® 350 Removal from Helmet/Mask

1. Verify that the bent tube has been removed from the Band Mask.

2. Remove the screws that secure the whiskers to the port. Take care not to lose the zinc anodes or kidney plates and whisker spacers.

Take care not to lose the whisker spacers.

3. Remove regulator mounting nut and sealing O-ring from inside the helmet.

Removal of the regulator mount nut.

4. Pull the regulator body with exhaust whiskers away from the Band Mask®.

If using this exhaust system for the 455 regulator installation, cut the tie wrap that secures

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the whisker assembly to the regulator body and remove. Inspect this assembly and replace parts as needed.

1.2 455 Balanced Regulator Installation

Tools Required

- • Torque Wrench
  ⅞″ and 1¹¹⁄₁₆″ Open End Attachments

- 1 ⅜″ socket and/or P/N 525-625 regulator mount socket wrench (found in 525-620 tool kit)

- ⅜″ Drive Extension—Minimum 3″ in Length

- Torque Screwdriver
  #1 Phillips Head Screwdriver attachment

- ⅞″ Open End Wrench

- ⅜″ Nut Driver or ⅜8″ Open End Wrench

- Christo-Lube® or equivalent

NOTE
Every effort is made to ensure that this, and any of Kirby Morgan's regulators, are interchangeable among the wide variety of helmets and masks that Kirby Morgan produces. 40 plus years of producing thousands of helmets has resulted in some variations. Please be aware that the final alignment of the regulator may have variation from unit to unit, and this in no way will affect the function and/or performance of the finished 455 regulator.

EXHAUST SYSTEM NOTE: Each Quad and Tri-Valve exhaust assembly can be removed and replaced onto the exhaust flange of the regulator as a complete unit. If assembled using the individual components, special attention is required to ensure the exhaust valves are correctly orientated and seated inside the exhaust whiskers. If replacing valves or rebuilding the exhaust valve assembly by individual components see Quad Valve and Tri-Valve section in our modular manual

1. Align and insert the threaded mounting tube on the regulator, into the mounting hole on the Band Mask®.

2. Inspect the regulator mount nut for contaminants and damage. Use a tooth brush to clean threads as needed. Lightly lubricate the regulator mounting tube threads and the sealing O-ring with Christo-Lube®.

3. Install the sealing O-ring, then thread the regulator mount nut onto the regulator, finger tight ONLY.

1.2.1 Bent Tube Assembly and Regulator Installation

1. Clean the bent tube in accordance with the cleaning procedures in "1.3 General Cleaning & InspectionProcedures"onpageGENPRE-4.TheO-ring at the regulator end should be cleaned and inspect-ed whenever the bent tube is removed.

Replace the bent tube if it is excessively scratched, dented or compressed deeper than ⅛ inch (3.18 mm). If the helmet has been used for burning jobs, carefully check for erosion of the metal or severe corrosion. Replace if any erosion is present or integrity is in question. Keep in mind the bent tube is a principle component that routes breathing gas to the regulator system.

NOTE If this maintenance is during an annual overhaul, replace the Teflon® O-ring at the side block end of the bent tube and the O-ring at the demand regulator inlet side of the bent tube.

NOTE Before beginning the first step, ensure that the jam nut, located on the inlet nipple, is turned entirely in towards the regulator body and away from the Bent Tube. If it is not, rotate jam nut to this correct starting position for Bent Tube installation.

2. Lightly lubricate the O-ring on the bent tube assembly.

3. 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.

4. Ensure that the Teflon® O-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 the side block nut.

5. Thread the large nut on the bent tube assembly onto the bent tube adapter two to three threads.

6. Using a torque wrench, tighten the bent tube mount nut onto the side block. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

7. Next, fully engage (clockwise) the large nut on

the bent tube into the regulator inlet nipple hand tight until resistance is felt. Do not tighten further. This will ensure the nut is bottomed on the shoulder of the bent tube.

8. Engage the jam nut fully against the large nut on the bent tube.

9. Using a ⅞ inch open end wrench hold the large nut on the regulator end of the bent tube. Use a torque wrench and torque the jam nut against the bent tube mount nut to lock it in place. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

Tighten the bent tube to the proper torque value.

10. Use a torque wrench inside the helmet with a 1 ⅜ inch socket or regulator mount tool P/N 525-625 found in the KMDSI tool kit P/N 525-630 and extension to torque the regulator mount nut. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

11. Attach the whisker to each side of the face port retainer using the spacers, zinc anodes or kidney plates and screws. Using a torque screwdriver, carefully torque these screws to the correct torque for the mask frame you are installing the whisker wings onto. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

1.2.2 Oral Nasal Mask and Microphone Installation

1. Snap the oral nasal mask over the regulator mount nut. Take extra care to make sure the mask has snapped into position all the way around the mount nut.

2. Reinstall the microphone into the oral nasal mask.

1.2.3 Nose Block Device Installation

1. Prior to reassembly, lubricate the two o-rings.

2. Slide the shaft through the oral nasal mask in the mask shell.

Install the nose block device through the interior of the oral nasal mask.

3. Place both o-rings on the shaft, followed by the packing nut and the knob.

4. Tighten the knob with the pliers, padded by a

cloth, while holding the nose pad end inside the helmet with your hand.

5. Tighten the packing nut with the 7/16 inch wrench until snug. Do not over tighten, as this will make it difficult to slide the nose block device in and out.

Properly installed nose block device.

1.3 Test the regulator for proper function

NOTE   When checking the regulator by depressing the purge button, the regulator may free flow without back pressure inside of the oral nasal. This is completely normal. Placing a finger or hand over the outlet tube of the regulator will prevent free flow.

See "1.2.2 Adjusting the 455 Balanced Regulator" on page 455BAL-3 in module 455 Balanced Regulator for proper adjustment.

NOTE   For all maintenance and adjustment procedures, refer to the 455 Balanced Regulator module found in the "Manuals and Exploded Views" link under the "Support" link at www.kirbymorgan.com.

Installing the 455 Balanced Regulator onto a KM 77

To remove the REX regulator on the KM 77 and replace it with a 455 Balanced Regulator, the REX Pod must be removed. The regulator and REX pod can be removed as one unit.

Along with the corresponding equipment manuals, a two part video illustrating this process can be viewed at the Kirby Morgan YouTube channel or by locating the 525-769 kit in the Kirby Morgan website.

Parts Included in the 525-769 Kit:

Part #	Description	Qty
100-100	Warranty Card	1
100-097	Manual, KMDH 97	1
100-204	Installation Guide, 455 Regulator Kit	1
505-776	455 Regulator Pod Assembly	1
510-403	Pod Gasket	1
510-747	Oral Nasal Mask	1
520-042	Tie Wrap	3
525-630	Tool Kit, 455 Regulator	1
530-145	Lock Nut	8
555-155	Bent Tube w/O-rings	1

1.1 REX® Pod System and Regulator Removal

How To: Conversion Kit, 455 Regulator for KM 77 | Part 1

https://www.youtube.com/watch?v=RemxBjTTnlM

Tools Required:

- Regulator Mount Nut Tool P/N 325-640 (in Tool Kit P/N 525-768 Included with Helmet)
- ⅜″ Drive Extension—Minimum 3″ in Length
- ⅜″ Nut Driver or ⅜″ Open End Wrench
- ⁵⁄₃₂″ Hex Key (Ball End is Helpful)
- REX® Regulator Adjustment Tools P/N 540-550 and 540-552 (in Tool Kit P/N 525-768 Included with Helmet) or 2 ea. ¹³⁄₁₆″ Open Ended Wrenches
- ⁷⁄₁₆″ and ¹¹⁄₁₆″ Open End Wrenches
- #1 Phillips Head Screwdriver
- Slip Joint Pliers and a Cloth

1. Remove the chin strap by removing the screws that secure it.

2. Remove the two snap tabs adjacent to the swing catch assembly.
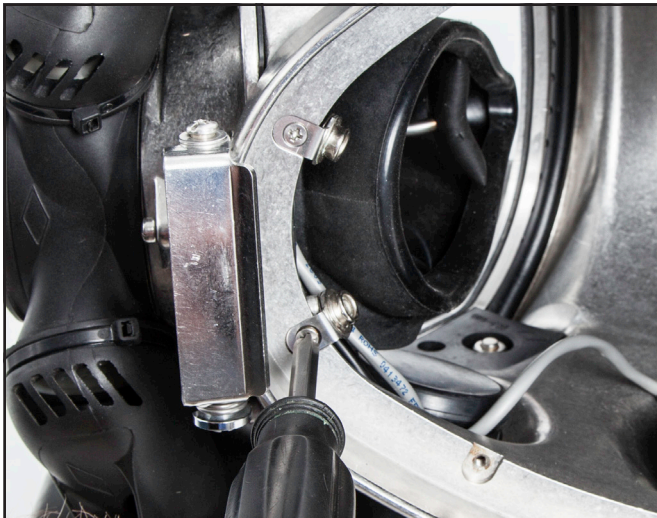
3. Remove the screws that secure the whisker to the port retainer. Take care not to lose the whisker spacers and the zinc anodes. If the helmet has no anodes (standard on stainless steel helmets since late 2012) it will have kidney plates on the whiskers.


4. Remove the bent tube assembly as per "1.4.1 Removal of the Bent Tube Assembly" on page BNT-5.

5. Remove the nose block device as per "1.2.1 Nose Block Assembly Removal" on page FCPRT-6.

6. Remove the communication module from the helmet per "1.3.3 Removal of Communications Assembly" on page COM-3.

7. Remove the oral nasal mask by pulling it off the regulator mount nut.

NOTE That the bottom two nuts attach on the exterior of the pod, while the remaining nuts attach on the interior of the pod.

8. Loosen the screws that secure the pod to the helmet shell gradually in a staggered pattern. This is much easier to do if you loosen the regulator mount nut so that the regulator is free to turn and allows access to the mounting screws.
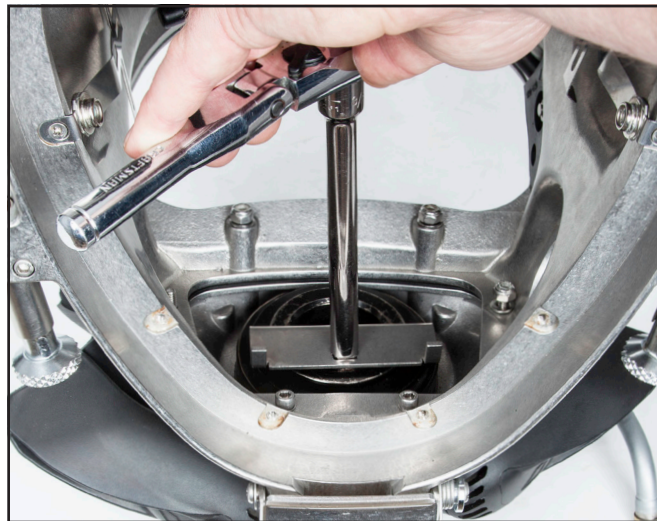
Loosen the regulator for easier removal of the pod screw.
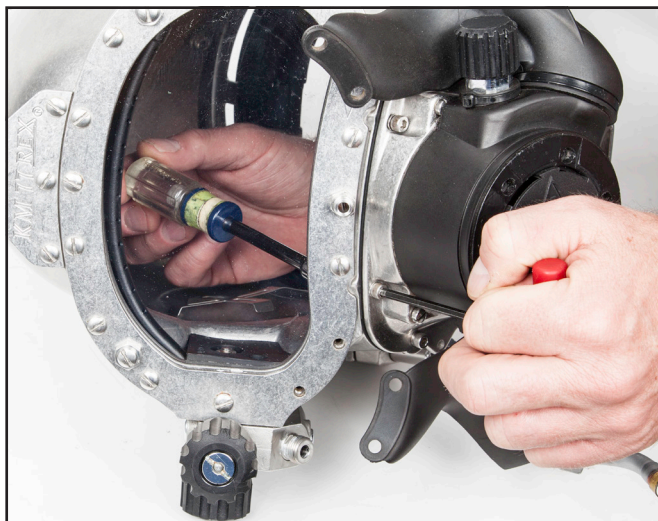
9. Separate the pod/regulator assembly from the helmet assembly.

10. Discard gasket and lock nuts and set aside the screws and washers for conversion process.

Converting a KM 77 into a KM 97 requires installing different components not found on the KM 77. These include:

- Regulator Mount Pod, 350

- Bent Tube

- Oral Nasal Mask

- Whisker Wings

- Regulator Mount Nut plus O-ring

- 455 Balanced Regulator

1.2 455 Balanced Regulator Installation

How To: Conversion Kit, 455 Regulator for KM 77 | Part 2

https://www.youtube.com/watch?v=ybWm1K1MAjk

1.2.1 Regulator Mount Pod, 350, Installation

Tools Required:

- ⅜″ Nut Driver or ⅜″ Open End Wrench

- ⁵⁄₃₂″ Hex Key (Ball End is Helpful)

1. Locate the screws and washers that were used to secure the REX pod and set aside along with the lock nuts found in the conversion kit.

2. Use the new gasket from the conversion kit to install onto the Regulator Mount Pod, 350. Make sure that the ridge on the gasket is properly seated in the groove in the pod.

NOTE

Thread all of the screws through the gasket slowly so as not to damage the holes in the gasket with possible sharp edges of the thread. These holes have small sealing rings molded around them to seal the threads to the holes in the metal parts. It is recommended to thread the screws through the gasket rather than push them through.

The two **long screws** are installed in the **top two holes** of the pod and the two bottom screws are secured in the **opposite orientation** of the rest of the screws used (lock nuts are on the outside of the pod).

There is a washer on each side of the pod; the **thinner** washer is used on the **outside** of the pod and the **thicker** washer on the **inside** of the pod.

3. Thread all the allen screws and washers through the pod and gasket, **with the exception of the bottom two, do not insert the two bottom screws.** *The screws will help to align the pod and gasket to the helmet.*

4. Mate the pod to the helmet shell.

5. Install the remaining two bottom screws, washers and nuts. Run all the nuts up until they are finger tight. *Except the two bottom screws all of the nuts are positioned on the inside of the pod.*

6. Using the hex key and/or wrench along with the nut driver, tighten the nuts gradually in a staggered pattern. The lock nuts should be tightened to the point where the gasket can be seen just barely starting to extrude out (squeeze out) from between the pod and shell.

1.2.2 455 Balanced Regulator Installation

Tools Required:

- Torque Wrench
  $\frac{7}{8}$″ and $\frac{11}{16}$″ Open End Attachments

- Socket Wrench, Regulator Mount Nut, P/N 525-625 (in Tool Kit Included with Helmet) or a 1 $\frac{3}{8}$″ Socket

- $\frac{3}{8}$″ Drive Extension—Minimum 3″ in Length

- Torque screwdriver
  $\frac{1}{4}$″ flat blade screwdriver attachment

- $\frac{7}{8}$″ Open end wrench

- Christo-Lube® or equivalent oxygen compatible lubricant

- Loctite® 248 or equivalent medium strength thread locker

Before beginning step one ensure the exhaust main body with attached whiskers is secured correctly to the exhaust flange of the regulator body with the correct tie wrap. Use section ″1.1.4 Quad Valve and Tri-Valve® Assembly Installation″, in module QUAD beginning on page QUAD-7 as a reference guide.

1.2.3 Exhaust System Installation

NOTE

Every effort is made to ensure that this, and any of Kirby Morgan's regulators, are interchangeable among the wide variety of helmets and masks that Kirby Morgan produces. 40 plus years of producing thousands of helmets has resulted in some variations. Please be aware that the final alignment of the regulator may have variation from unit to unit, and this in no way will affect the function and/or performance of the finished 455 regulator.

EXHAUST SYSTEM NOTE: Each Quad and Tri-Valve exhaust assembly can be removed and replaced onto the exhaust flange of the regulator as a complete unit. If assembled using the individual components, special attention is required to ensure the exhaust valves are correctly orientated and seated inside the exhaust whiskers. If replacing valves or rebuilding the exhaust valve assembly by individual components see Quad Valve and Tri-Valve section in our modular manual

1. Insert the opening on the exhaust main body onto the exhaust outlet of the water dump valve, while at the same time aligning and inserting the threaded mounting tube on the regulator, into the mounting hole on the pod.

2. Install the tie wrap around the quad main exhaust body and tighten. Cut and remove excess tie wrap. *This tie wrap can also be preinstalled prior to step one.*

4. Install the sealing O-ring, then thread the regulator mount nut onto the regulator, finger tight ONLY.

3. Inspect the regulator mount nut for contaminants and damage. Use a tooth brush to clean threads as needed. Lightly lubricate the regulator mounting tube threads and the sealing O-ring with Christo-Lube®.

1.2.4 Bent Tube Assembly Installation

1. Clean the bent tube in accordance with the cleaning procedures in ""1.3 General Cleaning & Inspection Procedures" on page GENPRE-4. 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 ⅛ inch (3.18 mm). If the helmet has been used for burning jobs, carefully check for erosion of the metal or severe corrosion. Replace if any erosion is present or integrity is in question. Keep in mind the bent tube is a principle component that routes breathing gas to the regulator system.
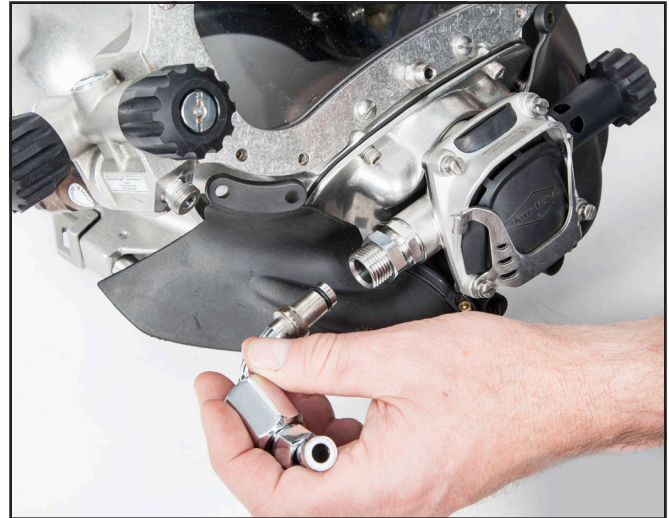
NOTE　If this maintenance is during an annual overhaul, replace the Teflon® O-ring at the side block end of the bent tube and the O-ring at the demand regulator inlet side of the bent tube.

NOTE　Before beginning the first step, ensure that the jam nut, located on the inlet nipple, is turned entirely in towards the regulator body and away from the bent tube. If it is not, rotate jam nut to this correct starting position for bent tube installation.

2. Lightly lubricate the O-ring on the bent tube assembly.

3. 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.

4. Ensure that the Teflon® O-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 the side block nut.

5. Thread the large nut on the bent tube assembly onto the bent tube adapter two to three threads.
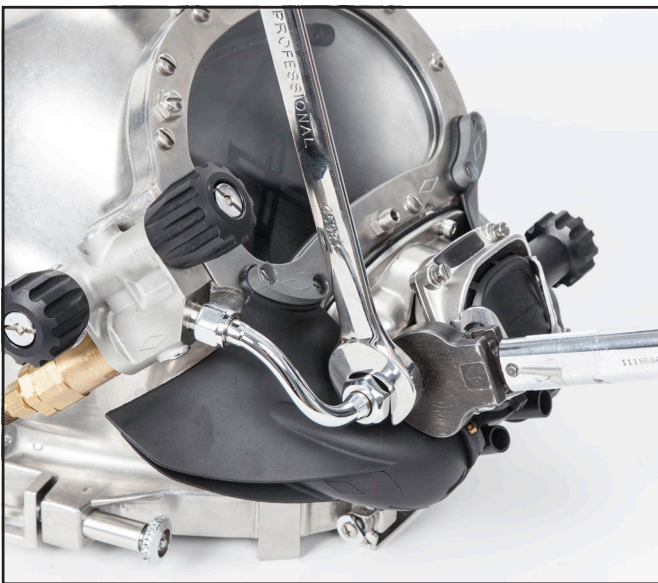
6. Using a torque wrench, tighten the bent tube mount nut onto the side block. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

7. Next, fully engage (clockwise) the large nut on the bent tube into the regulator inlet nipple hand tight until resistance is felt. Do not tighten further. This will ensure the nut is bottomed on the shoulder of the bent tube.

8. Engage the jam nut fully against the large nut on the bent tube.

9. Using a ⅞ inch open end wrench hold the large nut on the regulator end of the bent tube. Use a torque wrench and torque the jam nut against the bent tube mount nut to lock it in place. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

10. Use a torque wrench inside the helmet with a 1 ⅜ inch socket or regulator mount tool P/N 525-625 found in the KMDSI tool kit P/N 525-630 and extension to torque the regulator mount nut.

ALWAYS REFERENCE the Torque Specs module in the modular manual to confirm correct torque.

11. Place a small amount of Loctite® 248 onto the last two or three threads at the end (end opposite the screw head) of each of whisker screws.

12. Attach the whisker to each side of the face port retainer using the spacers, zinc anodes or kidney plates and screws. Using a torque screwdriver, carefully torque these screws to the correct torque for helmet shell you are installing the whisker wings onto. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

1.2.5 Oral Nasal Mask and Microphone Installation

1. Snap the oral nasal over the regulator mount nut. Take extra care to make sure the mask has snapped into position all the way around the mount nut.

2. Reinstall the communications module.

1.2.6 Nose Block Device Installation

1. Prior to reassembly, lubricate the two O-rings.

2. Slide the shaft through oral nasal mask in the helmet or mask shell.

3. Place both O-rings on the shaft, followed by the packing nut and the knob.

4. Tighten the knob with the pliers, padded by a cloth, while holding the nose pad end inside the helmet with your hand.

5. Tighten the packing nut with the $7/16$ inch wrench until snug. Do not over tighten, as this will make it difficult to slide the nose block device in and out.

1.2.7 Chin Strap Replacement

NOTE The adjustment strap should pull toward the right side of the helmet when it is on your head.

1. Put Loctite® 248 on the screws that secure the tabs that hold 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 with a torque screwdriver in accordance to the correct torque specification. **ALWAYS REFERENCE** the Torque Specs module in the modular manual to confirm correct torque.

1.2.8 Head Cushion Snaps

1. Install the two snap tabs adjacent to the swing catch assembly.

1.3 Test the regulator for proper function

NOTE

When checking the regulator by depressing the purge button, the regulator may free flow without back pressure inside of the oral nasal. This is completely normal. Placing a finger or hand over the outlet tube of the regulator will prevent free flow.

See "1.2.2 Adjusting the 455 Balanced Regulator" on page 455BAL-3 in module 455 Balanced Regulator for proper adjustment.

NOTE

For all maintenance and adjustment procedures, refer to the 455 Balanced Regulator module found in the "Manuals and Exploded Views" link under the "Support" link at www.kirbymorgan.com.

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