

Bent Tube

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1.1 Bent Tube Assembly

1.1.1 General

The bent tube assembly provides breathing gas flow from the side block assembly to the regulator assembly. 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 found to be unfit.

These components should not require field replacement, provided a careful visual inspection does not reveal wear or damage. All soft goods should be carefully cleaned in accordance with KMDSI procedures prior to inspection for reuse.

NOTE: KMDSI makes two types of bent tube. The bent tube for the REX® regulator (KM 77, 47) is a unique design, not interchangeable with the bent tubes or regulators on any other Kirby Morgan helmets or masks.

The remainder of this module will be separated into three main sections:

- 1) SuperFlow® & SuperFlow® 350 Regulators
- 2) SuperFlow® 450 and 455 Balanced Regulators
- 3) REX® Regulator

1.2 SuperFlow® & SuperFlow® 350

1.2.1 Removal of the Bent Tube Assembly

Tools Required:

- 1¼" open end wrench
- 2 ea. ⅞" open end wrenches

1) Always start removal at the side block end. Loosen the bent tube with the 1¼ inch wrench. The free swiveling mount nut on this end of the bent tube can be un-threaded completely and can slide down the bent tube.



Always start removal at the Side Block end.

2) Loosen the lower bent tube nut by using the two $\frac{7}{8}$ inch wrenches. Place one wrench on the bent tube mount nut and the second on the regulator inlet jam nut. Only turn the outer nut on the bent tube to loosen the bent tube.

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, if necessary.



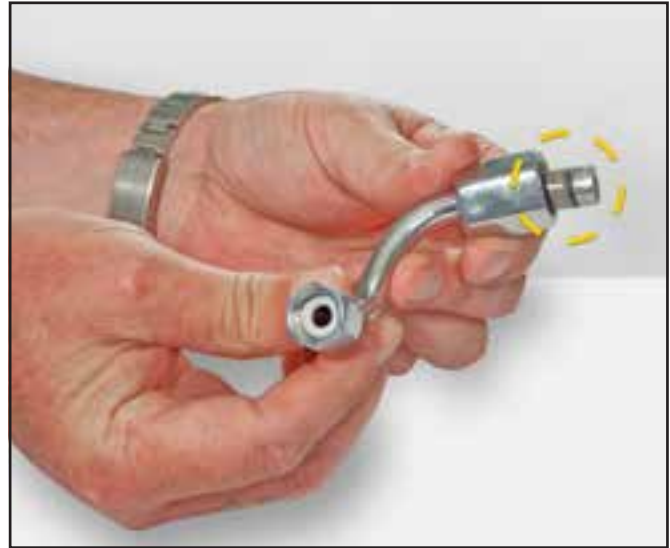
Removing the bent tube.

1.2.2 Inspection of Bent Tube Assembly

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 $\frac{1}{8}$ 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 critical component that routes breathing gas to the regulator system.



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

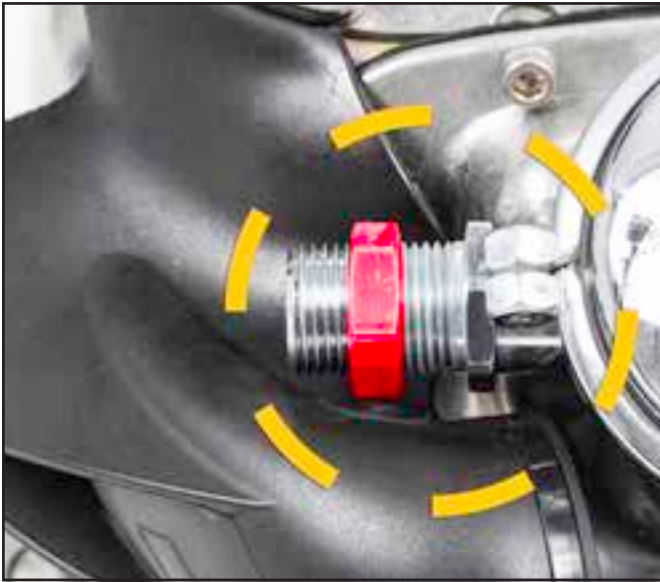
1.2.3 Installation of the Bent Tube Assembly

Tools Required:

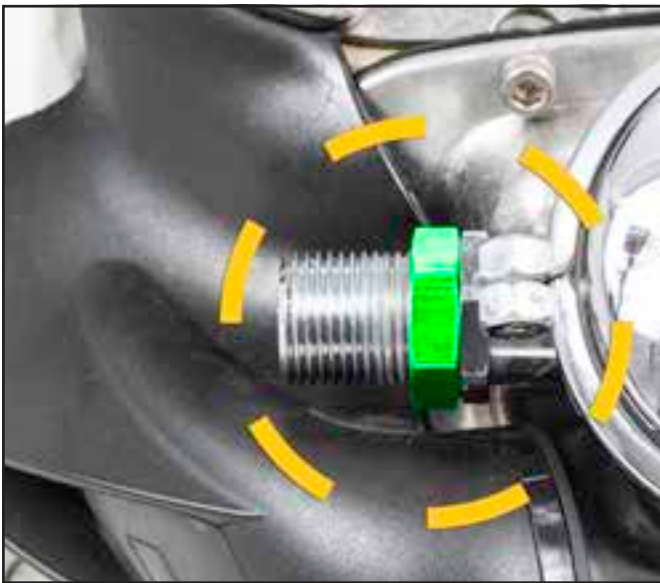
- Torque Wrench
- $\frac{1}{16}$ ", $\frac{7}{8}$ " Open end attachments
- $\frac{7}{8}$ " open end wrench
- $\frac{3}{8}$ " Drive Extension—Minimum 3" in Length
- 1 $\frac{3}{8}$ " Socket or Regulator Mount Nut, P/N 525-625 (in Tool Kit Included with Helmet)

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. See the following two pictures.



***INCORRECT** Jam Nut position prior to attaching the Bent Tube Assembly.*



***CORRECT** Jam Nut position prior to attaching the Bent Tube Assembly.*

1) Use the torque wrench inside the helmet with a 1 3/8" socket or Regulator Mount Tool P/N 525-625 found in the KMDSI Tool Kit P/N 525-620 and extension to loosen the regulator mount nut to a point where the regulator body can move slightly. This will assist in proper alignment of the bent tube to the side block and regulator body.

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® ring is in place and engage the bent tube mount 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 regulator inlet nipple two to three threads.

6) Using a torque wrench, tighten the bent tube mount nut onto the side block. **ALWAYS REFERENCE** Appendix Contents, Torque Specs starting on page APNDX-19 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 7/8" 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** Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.



Tighten the jam nut to the proper torque value. See "Torque Specs" on page APNDX-19 for correct torque.

10) Use a torque wrench inside the helmet with a 1 3/8" socket or Regulator Mount Tool P/N 525-625 found in the KMDSI Tool Kit P/N 525-620 and extension to torque the regulator mount nut. ALWAYS REFERENCE Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.

1.3 SuperFlow® 450 and 455 Balanced

1.3.1 Removal of the Bent Tube Assembly

Tools Required:

- 1 1/16" open end wrench
- 2 ea. 7/8" open end wrenches

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

2) Loosen the lower bent tube nut by using the two 7/8 inch wrenches. Place one wrench on the bent tube mount nut and the second on the bent tube adapter. Only turn the outer nut on the bent tube to loosen the bent tube.

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, if necessary.

3) Remove the bent tube.

1.3.2 Inspection of Bent Tube Assembly

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 1/8" (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 critical component that routes breathing gas to the regulator system.

1.3.3 Installation of the Bent Tube Assembly

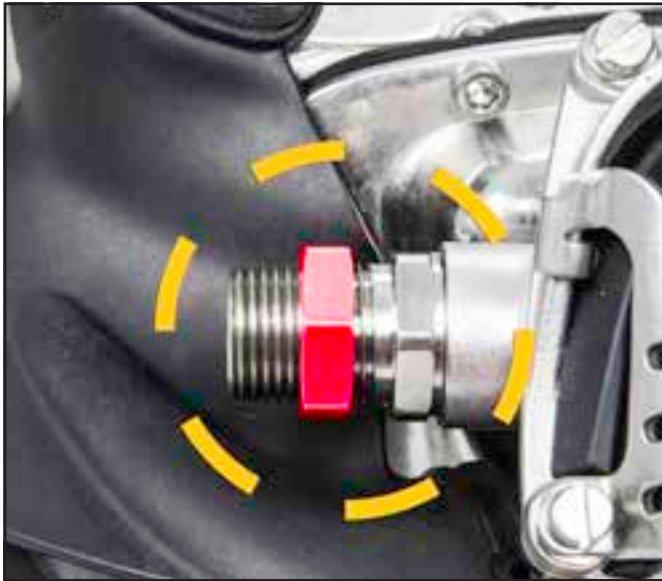
Tools Required:

- Torque Wrench
- 1 1/16", 7/8" Open end attachments
- 7/8" open end wrench
- 3/8" Drive Extension - Minimum 3" in Length
- 1 3/8" Socket or Regulator Mount Nut, P/N 525-625 (in Tool Kit Included with Helmet)

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.

NOTE: Before beginning the first step, ensure that the jam nut, located on the bent tube adaptor, 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. The regulator mount nut will also have to be loosened to a point where the regulator body can move slightly. This will assist

in proper alignment of the bent tube to the side block and regulator body.



INCORRECT jam nut position prior to attaching the bent tube assembly.



CORRECT jam nut position prior to attaching the bent tube assembly.

1) Use the torque wrench inside the helmet with a 1 3/8" socket or Regulator Mount Tool P/N 525-625 found in the KMDSI tool kit P/N 525-620 and extension to loosen the regulator mount nut to a point where the regulator body can move slightly. This will assist in proper alignment of the bent tube to the side block and regulator body.

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 bent tube adapter until the side block end is aligned with the threads for the bent tube mount nut.

4) Ensure that the Teflon® ring is in place and engage the bent tube mount 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** Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.

7) 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.

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

9) Using a 7/8" 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** Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.



For the SuperFlow® 450 and 455 Balanced regulators, torque the jam nut against the bent tube mount nut. See "Torque Specs" on page APNDX-19 for correct torque.

10) Use a torque wrench inside the helmet with a 1 3/8" socket or regulator mount tool P/N 525-625 found in the KMDSI Tool Kit P/N 525-620 and extension to torque the regulator mount nut. ALWAYS REFERENCE Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.

1.4 REX®

1.4.1 Removal of the Bent Tube Assembly

Tools Required:

- 1 1/16" Open End Wrench
- 2 Ea. 1 3/16" Open End Wrenches or Back Up Wrenches from Regulator Tool Kit

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

2) Loosen the lower bent tube nut by using the two 1 3/16" wrenches. Place one wrench on the bent tube mount nut and the second on the nipple tube hex. Only turn the outer nut on the bent tube to loosen the bent tube.

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, if necessary.

3) Remove the bent tube.

1.4.2 Inspection of Bent Tube Assembly

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 1/8 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 critical component that routes breathing gas to the regulator system.

1.4.3 Installation of the Bent Tube Assembly

Tools Required:

- Torque Wrench
- 1 1/16", 1 3/16" Open End Attachments
- 1 3/16" Open End Wrench or Back Up Wrenches From Regulator Tool Kit

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.

NOTE: Before beginning the first step ensure that the adjustment lock nut is tight against the REX® regulator body. This will safeguard that the nipple tube will not move out of adjustment when installing the bent tube. See the following picture.



Ensure that the adjustment lock nut is tight against the REX® regulator body



For the REX regulator, torque the bent tube nut against the nipple tube hex. See "Torque Specs" on page APNDX-19 for correct torque.

- 1) Lightly lubricate the O-ring on the bent tube assembly.
- 2) Slide the O-ring end of the bent tube assembly into the regulator nipple tube.
- 3) 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 tube portion of the bent tube to fully engage the side block nut.
- 4) Thread the large nut on the bent tube assembly onto the nipple tube until it stops. **HAND TIGHT ONLY.**
- 5) Using a torque wrench, tighten the bent tube mount nut onto the side block. **ALWAYS REFERENCE** Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.
- 6) Using a 1³/₁₆" open end wrench or back up wrench from regulator tool kit, hold the nipple tube hex while using a torque wrench to torque the nut on the regulator end of the bent tube against the nipple tube. **ALWAYS REFERENCE** Appendix Contents, Torque Specs starting on page APNDX-19 in the modular manual to confirm correct torque.