SUMITOMO ELECTRIC LIGHTWAVE

# SUMITOMO RECOMMENDED PROCEDURE

## SRP SP-F04-001

FutureFLEX® AIR-BLOWN FIBER® SOLUTIONS

# BLOWING HEAD EQUIPMENT SET-UP PROCEDURE FOR BE200 & BE200LR



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**1.0 General**

1.1 This procedure describes the steps necessary to set up the Blowing Head Equipment in preparation for installing FutureFLEX® Air-Blown Fiber (ABF) fiber bundles in FutureFLEX tube cables.

NOTE: If installing PF72PVS bundles, follow SRP SP-F04-053 for pre-lubrication of tube routing before fiber bundle installation outlined in SRP SP-F04-002. Blowing head setup outlined herein will always be the same.

1.2 A pressure source (Nitrogen Cylinder, Compressed Air Cylinder, or Air Compressor), a Blowing Head Equipment Kit, and an Air Blown Fiber Bundle reel must be set up at one end of a tube span. The pressure source is connected to the Blowing Head apparatus and the tube span. The Blowing Equipment mounts the fiber reel.

1.3 One person can perform this procedure; two personnel are recommended.

1.4 Various preventive and corrective maintenance procedures associated with the Blowing Head are also described herein.

**2.0 Safety Precautions**

2.1 Pressurized Nitrogen – The use of inert (nonflammable) pressurized nitrogen ($N_2$) gas presents several safety concerns.

2.1.1 $N_2$ is a simple asphyxiate. If large amounts of nitrogen are released into a confined area, the nitrogen can displace the amount of oxygen in air necessary to support life. This can result in a loss of balance, dizziness, rapid reduction in the ability to perform movements, reduced consciousness of surroundings, as well as other symptoms that are included in the MSDS (Material Safety Data Sheet) available upon request from the Gas Supplier. It is recommended that pressurized nitrogen only be released into a well-ventilated area.

2.1.2 When using pressurized nitrogen, there are no risks related to fire, reactivity, or other special hazards. Nitrogen is not listed as a carcinogen by NTP, IARC, or OSHA.

2.2 Compressed Air – The use of nonflammable pressurized compressed air (Atmospheric Air), either from a cylinder / bottle or air compressor, presents no safety concerns.

2.2.1 Air is nontoxic and necessary to support life. There are no ventilation concerns.

2.2.2 Compressed Air at high pressures does present an unusual fire and explosive hazard in that it will accelerate the burning of materials to a greater rate than they would burn at normal atmospheric pressure.

2.2.3 When using pressurized air, there are no risks related to fire, reactivity, or other special hazards. Air is not listed as a carcinogen by NTP, IARC, or OSHA. An MSDS (Material Safety Data Sheet) is available upon request from the Gas Supplier.

2.3 Pressurized Gas Cylinders / Bottles – Transporting and handling pressurized gas cylinders presents several safety concerns.

2.3.1 Any pressurized gas cylinder is dangerous if damaged. Gas bottles must be properly capped when being transported and stored. Gas bottles must be secured in a stable bottle dolly or chained to structure when uncapped for use.

2.3.2 A full size 300 cubic foot volume gas bottle weighs approx. 160 lbs. Two personnel should accomplish any manual lifting or moving of a bottle. Exercise care and use proper lifting techniques.

2.4 Blowing Head Equipment Transit Case – transporting/handling the Blowing Head Equipment Transit Case presents several safety concerns.

2.4.1 The Blowing Head Equipment Transit Case weighs approximately 55 lbs. Normal transport is accomplished by pushing / pulling the Transit Case using its retractable handle and built-in wheels. Use caution and proper lifting techniques.

**3.0 Reference Documents**

3.1 Sumitomo Recommended Procedure, *FutureFLEX Fiber Bundle Installation Procedure*, SRP SP-F04-002.

3.2 Sumitomo Recommended Procedure, Procedure For Lubricating Tubes For 72 Count PVDF Air Blown Fiber Installation FP72PVS SRP SP-F04-053

**4.0 Equipment / Tools Required**

The following equipment and tools are required to complete this procedure.

4.1 Nitrogen Cylinder (Installer provided)

- Industrial Grade Nitrogen; preferred pressure source
- Inert (nonflammable) gas
- Dry or with no more than 4 ppm moisture content ($H_2O$)
- Oil / contaminant free output
- 300 cu. ft. (approx.) volume bottle size
- 2200-to-2500 psi (approx.) pressure charge

***Note:*** *Typically, one 300 cu. ft. bottle of nitrogen will be required to install (approx.) 3000' - 4000' of fiber bundle and last about 35-45 minutes. This "conservative estimate" can vary depending upon tube route orientation, fiber bundle size, tube cable type, and operating practices.*

4.2 Blowing Head Equipment Kit (BE200LRM, BE200LRS, or BE200LRY) includes Transit Case with Blowing Head, Payoff Stand Assembly, and the following items:

- One (1) Pressure Regulator with male quick-release 8mm Tubing Adapter (BEREG01 Two-Stage or BEREG02 Single-Stage)
- One (1) Filter/ Regulator Assembly with Payoff Counter
- One (1) 2-feet length (approx.) of Red 1/4" tubing
- One (1) 6-feet length (approx.) of White 1/4" tubing
- One (1) 1-foot length (approx.) of 8mm Clear Tubing
- One (1) 1/2" x 14" Steel Shaft
- One (1) Toolbox
- One (1) Motor Rate Control Valve with 8mm Fittings
- One (1) Exhaust Muffler
- Two (2) Reel Payoff Cams
- One (1) Fiber Bundle Guide Assembly (two halves)
- Two (2) each / one (1) set Fiber Bundle Drive Wheels for installing 2mm OD fiber bundles (BE02DW); **Consumable Item**
- Two (2) each / one (1) set Fiber Bundle Drive Wheels for installing 3mm OD fiber bundles (BE03DW); **Consumable item**
- One (1) Air Seal for installing 2mm OD fiber bundles (BE02SL)
- One (1) Air Seal for installing 3mm OD fiber bundles (BE03SL)
- One (1) Air Seal for installing 3.7mm OD 48-fiber bundles and 4.0mm OD 72-fiber bundles (BE04SL)
- One (1) Fiber Bundle Blowing Tip for installing 2mm OD fiber bundles (BE2MFT)
- One (1) Fiber Bundle Blowing Tip for installing 3mm OD fiber bundles (BE3MFT)
- One (1) Fiber Bundle Blowing Tip for installing 48 & 72 fiber bundles (BE35MFT)
- One (1) Tubing Cutter (BETC001)
- Two (2) Tee Couplings (DE08MT)
- Two (2) Allen Wrenches (3/32" and 7/64")
- One (1) bottle Air Motor Cleaner Fluid (1/3 fluid ounce)
- Instructions and inventory sheet included

***Note:*** *Items with SEL Part Numbers can be obtained from FutureFLEX Distributors*

4.3 Large Adjustable Wrench (Installer provided); at least 10" suggested

4.4 8 mm tubing (any type) for miscellaneous connections (Installer provided);

4.5 Tube Couplings (DE08MC2) (Installer provided)

4.6 Pressure Regulator Assembly with 8mm Tubing Adapter (BEREG02) (Installer provided and only necessary if using the Dual Tank Isolation Kit set-up)

4.7 Dual-Tank Isolation Valve Kit (BEISOV1) (Installer provided and optional)

4.8 Cylinder Adapter (BEREGCA) (Installer provided); required if using Dry Grade Compressed Air Cylinders as pressure source.

4.9 Reel of FutureFLEX ABF Fiber Bundle (Installer provided)

4.10 Alternate Pressure Source – Although bottled Nitrogen is the preferred pressure source because of its cleanliness, general convenience, inexpensive cost, and ease of portability, compressed air from either a Compressed Air Cylinder or an Air Compressor can be used as an alternate pressure source.

4.11 Compressed Air Cylinder (Installer provided)
- "Dry Grade" Compressed Air
- Nonflammable gas (atmospheric air)
- Dry or with no more than 10 ppm moisture content ($H_2O$)
- Oil / contaminant free
- 300 cu. ft. (approx.) volume bottle size recommended
- 2200-to-2500 psi (approx.) pressure charge

***Note:*** *Different types or "grades" of Compressed Air are available. The "purer" grades with such names as Zero Grade, Vehicle Emission Grade, Scientific Grade, and Accurate Grade undergo additional refining processes so they contain fewer impurities (hydrocarbons) and have less moisture content. It is <u>not</u> necessary to use these more expensive and "purer" grades of air for blowing operations.*

***Note:*** *Performance-wise, "Dry Grade" Compressed Air supplied in a Cylinder performs the same as Nitrogen. There are no differences in the blowability of fiber bundle nor operation of the Blowing Head.*

***Note:*** *Typically, one 300 cu. ft. bottle of "Dry Grade" Compressed Air will be required to install (approx.) 3000' - 4000' of fiber bundle and last about 35-45 minutes. This "conservative estimate" can vary depending upon tube route orientation, fiber bundle size, tube cable type, and operating practices.*

***Important Note:*** *Compressed Air Cylinders are supplied with a Female left-hand thread Bottle fitting (CGA-590). Pressure Regulators BEREG01 or BEREG02 supplied in the Blowing Head Equipment Kit have a Male right-hand thread Nut (CGA-580). A CGA-590 Industrial Air Cylinder-to-CGA-580 Nitrogen Regulator Cylinder Adapter is therefore required to connect the Pressure Regulators to the Bottle fitting. One (1) Cylinder Adapter is required for each Pressure Regulator used.* ***See Fig. 1 and Fig. 2.***

4.12 Air Compressor (Installer provided)
- Output dry or with no more than 10 ppm moisture content ($H_2O$); often requires use of a Secondary Dryer
- Output oil / contaminant free
- Output flow rate (capacity) at least 12 scfm
- Output pressure at least 200 psi

***Note:*** *If an Air Compressor is to be used, additional Air and Coalescer Filters <u>and</u> a secondary Desiccant-type Dryer are strongly recommended. They must also be of compatible output flow and pressure ratings with the Air Compressor. Before considering the use of an Air Compressor, think about the following potential issues first. Power source / requirements? Physical size of Compressor? Portability? Distance Compressor must be set up from Blowing Head? Fittings necessary to connect Compressor output to a Pressure Regulator? Noise if use indoors?*

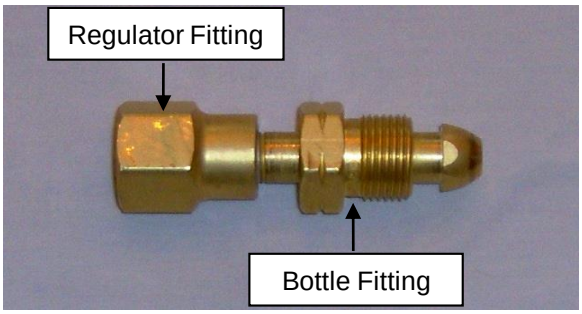


**Figure 1**
CGA-590 Industrial Air Cylinder-to-CGA-580 Nitrogen Regulator Cylinder Adapter

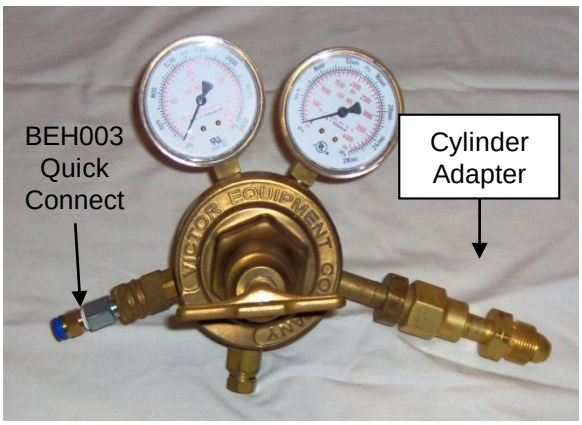


**Figure 2**
Cylinder Adapter needed to connect Pressure Regulator to Compressed Air Cylinder

**5.0 Equipment Layout**

5.1 **See Fig. 3** for Blowing Head Equipment layout.

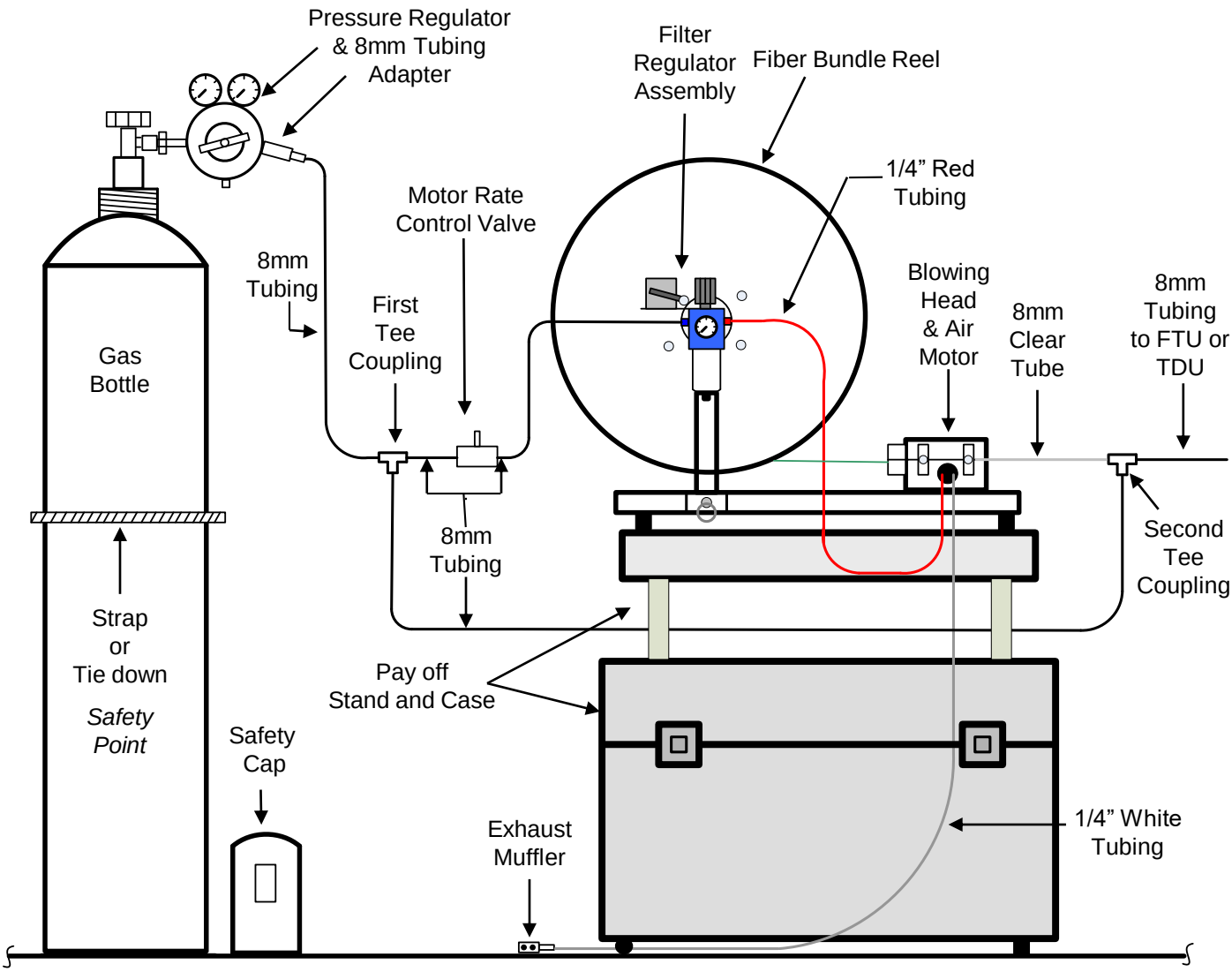


**Figure 3**

Blowing Head Equipment Layout

*Best Practice*

*Always set up Blowing Head Equipment in a neat, organized, and correct manner each and every time!*

**6.0 Transit Case Set-up**

6.1 Use Handle to position Blowing Head Equipment Transit Case in approximate location where fiber bundle installation operations will be performed. **See Fig. 4.**

6.2 Release two (2) latches and open hinged top lid of Transit Case. **See Fig. 5.**

6.3 Remove Inner Case (Payoff Stand and Blowing Head Assembly) by setting aside pegs (for payoff stand), steel shaft (for fiber bundle) and documents. Flip payoff stand over.


**Figure 4**
Transit Case Handle Extended

**Figure 5**
Transit Case Lid Open

6.4 Remove <u>all</u> items remaining inside Transit Case.

6.5 Close and latch top lid of Transit Case.

6.6 Manually screw pegs into predesignated threaded holes on transit case lid. Set the Payoff Stand (Blowing Head Assembly) onto pegs located on top of Transit Case to create a convenient work area. **See Fig. 6**. Blowing Head should be pointed <u>toward</u> the entry point. **See Fig. 7.**


**Figure 6**
All items taken case out and peg supports on top of predesignated holes on transit case.


**Figure 7**
Blowing Head Facing Left

**7.0 Pressure Source Set-Up (One Gas Bottle)**

7.1 Ensure pressurized gas bottle is securely chained / strapped in place and remove Safety Cap. **See Fig. 8.**

7.2 Thread Pressure Regulator fitting onto bottle valve housing and tighten with large adjustable wrench. **See Fig. 9.**

***Note:*** *Do not use serrated jaw tools (e.g.: pipe wrench, vise grips, channel locks, etc.) to tighten brass nut of Pressure Regulator.*

7.3 With Pressure Regulator Valve open, open Bottle Supply Valve and check for leakage around fitting. If leakage is detected, close Bottle Supply Valve retighten with wrench.

7.4. Close Bottle Supply Valve.

7.5 Install male quick-disconnect BEH003 8mm Tubing Adapter into female quick-disconnect fitting on Pressure Regulator. Turn in on Pressure Regulator Valve to vent Pressure Regulator (both Gauges read zero). **See Fig. 10.**

***Note:*** *If fiber bundle blowing distance will exceed the normal capacity of one 300 cu. ft. bottle of gas (about 3000'-4000'), two (2) bottles can be connected together to double the supply volume. See Para. 12.0 Dual-Tank Set-Up for details.*


**Figure 8**
Gas Bottle Safety Cap Installed

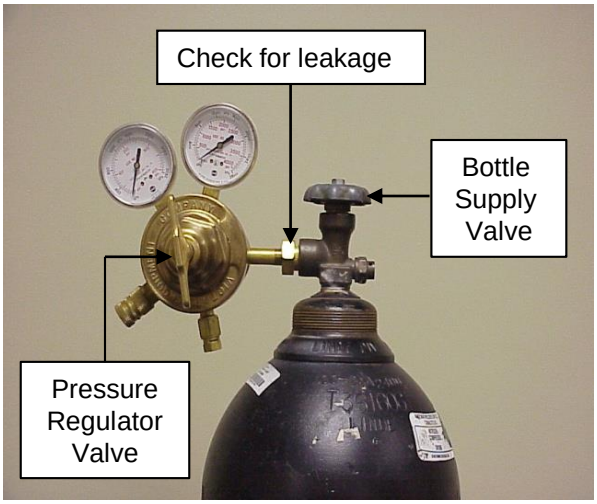


**Figure 9**
Pressure Regulator Connected to Gas Bottle

**Figure 10**
8mm Tubing Adapter Installed to Pressure Regulator

**8.0 Blowing Head Equipment Set-Up**

8.1 Raise Payoff Stand fiber reel support legs to vertical position and insert quick-release pins (provided on Payoff Stand) to lock legs in place. **See Fig. 11.**

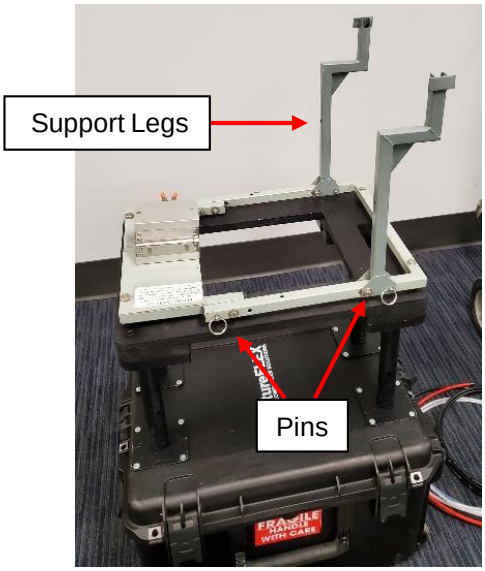


**Figure 11**
Raise Payoff Stand
Support Legs and Pins

8.2 Mount Filter / Regulator Assembly on fiber reel support leg. Locate Assembly on same side of Payoff Stand as Blowing Head Air Motor. **See Fig. 12.**

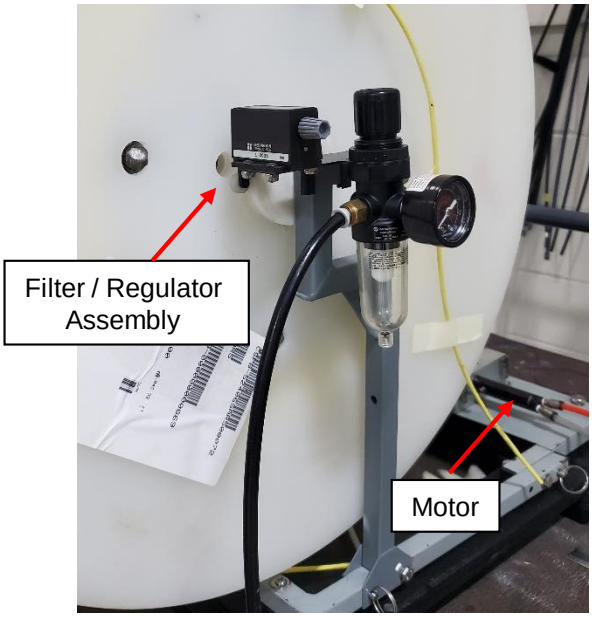


**Figure 12**
Install Filter / Regulator Assembly

***Note**: Always inspect tubing ends before connecting push-fit couplings. Use Tubing Cutter provided in Blowing Head Equipment Kit to trim tubing ends with straight, clean cut for best seat and seal in push-fit couplings.*

***Note:** The following steps establish the "air connections" to the Blowing Head Air Motor.*

8.3 Remove Storage Plugs and Caps from Air Motor Fittings, Filter / Regulator Assembly Fittings, and 1/4" Red Tubing ends. Store in Small Plastic Bag provided in Blowing Head Equipment Tool Box. These Plugs and Caps prevent an excessive debris build-up from accumulating inside the Air Motor which can lead to Air Motor failure (seizing or freezing up).

8.4 Push-fit Installer-provided length of 8mm tubing between Pressure Regulator's 8mm Tubing Adapter and "First" Tee Coupling. (3' - 4' length suggested.) **See Fig. 13.**

8.5 Push-fit Installer-provided 8mm tubing between First Tee Coupling and one of the 8mm fittings on Motor Rate Control Valve. (6" - 9" length suggested.) **See Fig. 13.**

8.6 Push-fit Installer-provided 8mm tubing between the other 8mm fitting on Motor Rate Control Valve and the 8mm fitting on the Filter / Regulator Assembly. (2' - 3' length suggested.) **See Fig. 13.**

***CAUTION:** Failure to connect the Blowing Head Air Motor supply and exhaust lines as described will cause the Air Motor to run in reverse and may result in fiber bundle damage.*

8.7 Push-fit 1/4" Red tubing between 1/4" Red outlet fitting on Filter / Regulator Assembly and 1/4" Red "F" / inlet fitting on Blowing Head Air Motor. ("F" / inlet fitting is typically identified with red paint mark.) **See Fig. 14 and Fig. 15.**

8.8 Push-fit 1/4" White tubing between 1/4" White "R" / exhaust fitting on Blowing Head Air Motor and Exhaust Muffler. ("R" / exhaust fitting is not paint marked or White.) **See Fig. 16.**

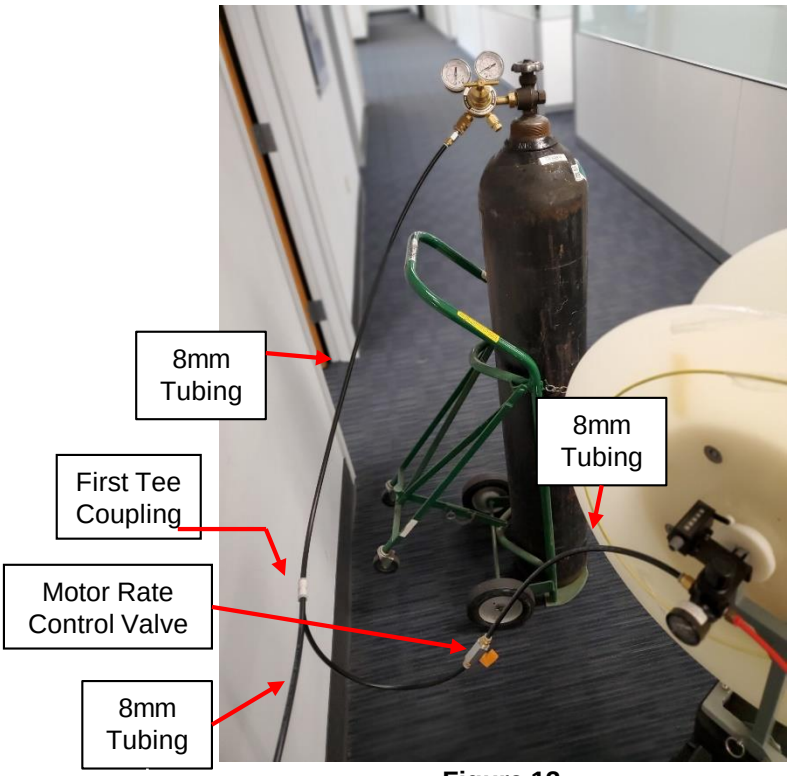


**Figure 13**
Connect 8mm Tubing from Pressure Regulator to First Tee Coupling to Motor Rate Control Valve to Filter / Regulator Assembly

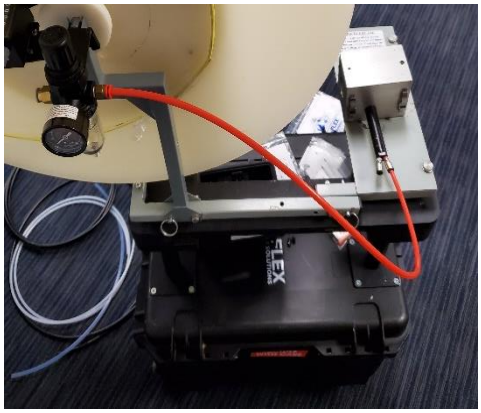

**Figure 14**
Connect 1/4" Red Tubing from Filter / Regulator Assembly to Air Motor

**Figure 15**
Connect 1/4" Red Tubing to Red ("F") Inlet Fitting

Connect 1/4" White Tubing to White ("R") Exhaust Fitting

Letters "F" and "R" are stamped on back of Air Motor next to Fittings

**Figure 16**
Connect Exhaust Muffler to 1/4" White Tubing

***Note:*** *The following steps establish the "air connection" to the tube span.*

8.8 Push-fit Installer-provided length of 8mm tubing between First Tee Coupling and branch leg of "Second" Tee Coupling. (3' - 4' suggested so Second Tee Coupling is about 1-foot in front of Blowing Head.) **See Fig. 17.**

8.9 Push-fit 8mm Clear Tube into one side of Second Tee Coupling. **See Fig. 17.**

8.10 If necessary, re-position Transit Case to where it makes the most sense.

Two (2) Key considerations:

1) Easy and convenient access to Blowing Head Equipment and Gas Bottle / Pressure Regulator during blowing operations.

2) Have no hard or sharp bends in jumper tubing leading to the fiber bundle entry point.

8.11 To span distance between Blowing Head and the entry point , connect an appropriate length of Installer-provided 8mm jumper tubing and a Tube Coupling between Second Tee Coupling and tube / tube cable scheduled to receive fiber bundle. Jumper tubing length must be determined on site. **See Fig. 18.**

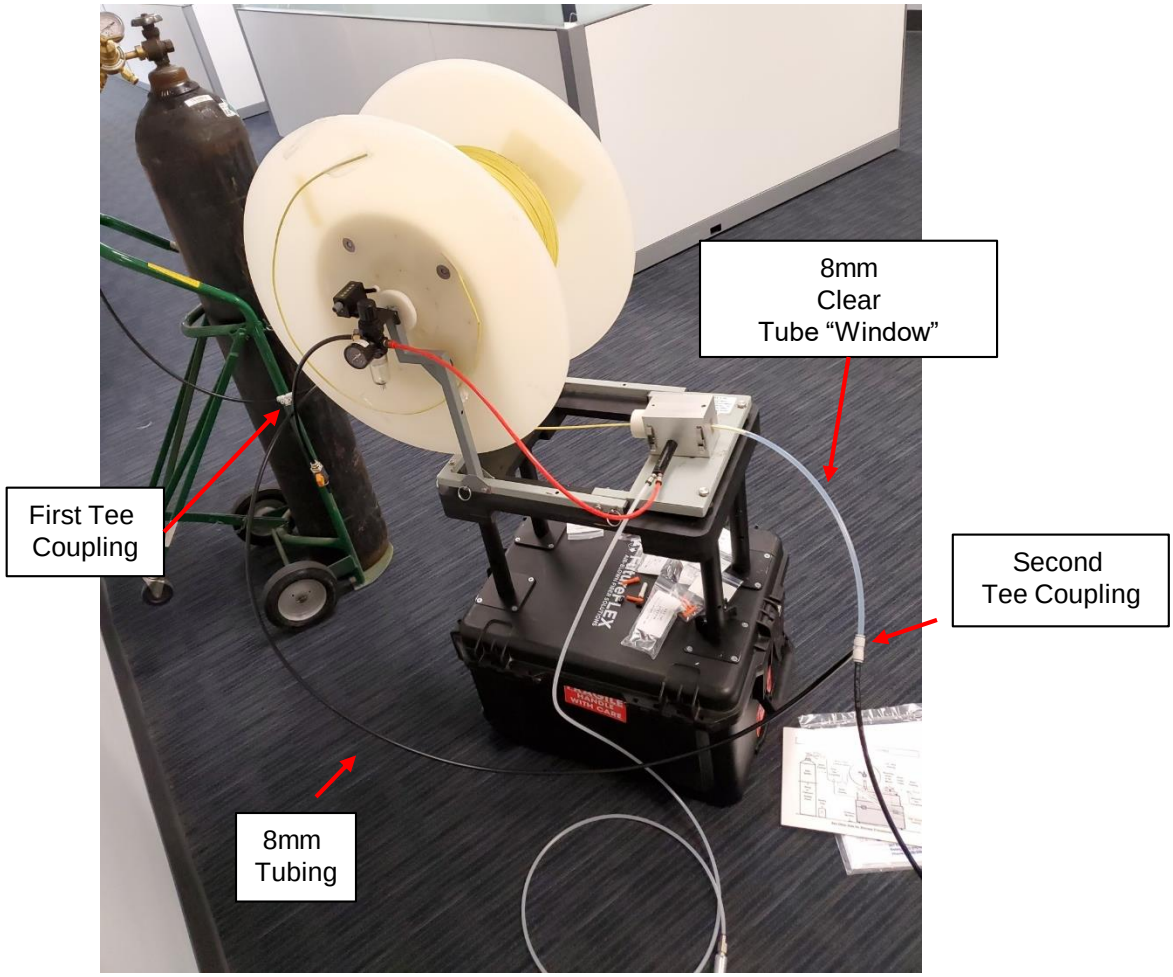


**Figure 17**
Connect 8mm Tubing from First Tee Coupling to Second Tee Coupling and 8mm Clear Tube from Second Tee Coupling to Blowing Head

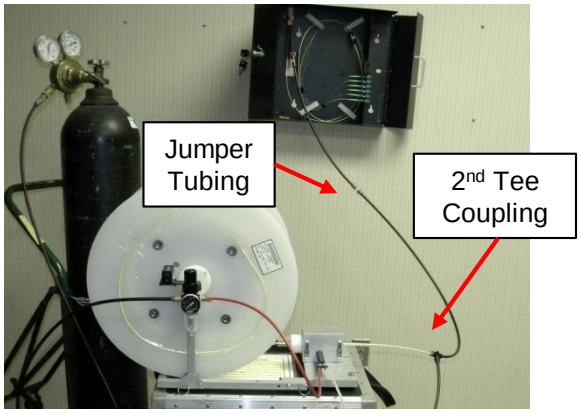


**Figure 18**
Smooth Transition (no sharp bends) in 8mm Jumper Tubing leading from Blowing Head to Fiber Bundle Entry Point

**9.0 Fiber Bundle Reel Set-up**

9.1 Remove plastic protective cover (Clamshell) or protective wrapping from fiber reel. Larger 600 Bobbins do not have a clamshell. Do not cut, damage, or discard protective cover. Save for re-use during fiber reel storage. **See Fig. 19.**


**Figure 19**
Opening Fiber Bundle Reel Clamshell
Do NOT Cut … Open at Flap

9.2 Install two Reel Payoff Cams into fiber reel bushings and insert Steel Shaft through center of Payoff Cams. **See Fig. 20.**

***Note:*** *Make sure Payoff Reel Cams sit flat on reel flanges by inserting Allen Screw Head into one of the four (4) small drilled holes in flange.*

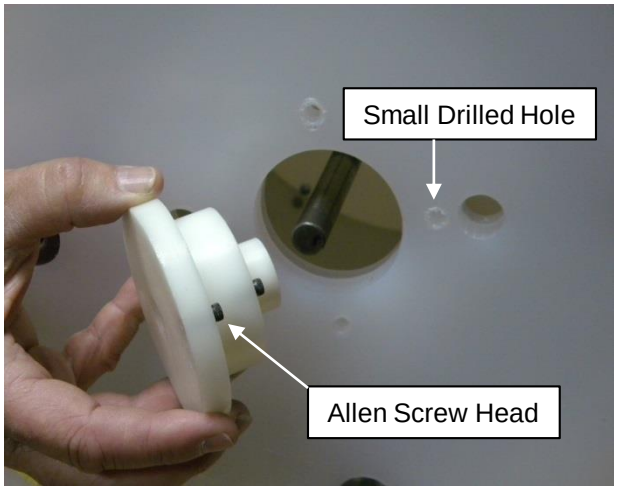


**Figure 20**
Installing Fiber Bundle Reel Payoff Cams and Reel Shaft

9.3 Position fiber reel so fiber bundle pays from bottom of reel towards motor. Carefully lift reel and guide Steel Shaft ends into Payoff Stand support legs. Ensure Payoff Counter actuating arm / roller on Filter / Regulator Assembly rides on back side of Payoff Cam surface. **See Fig. 12,**

***Note:*** *If Payoff Counter actuating arm / roller fails to contact or only partially contacts Payoff Cam, the fiber reel support legs may have gotten loose and spread apart. Remove fiber reel, tighten nuts / bolts on Payoff Stand legs, and, if necessary, carefully "squeeze" support legs inward. Re-seat fiber reel and verify Payoff Counter actuating arm / roller aligns with and rides on Payoff Cam surface.*

9.4 Manually rotate / spin fiber reel and verify Payoff Counter operates properly (counts). If Payoff Counter actuating arm / roller adjustment is required, see Para. 13.4 Maintenance Procedures.

**10.0 Prepare to Load Blowing Head**

All tubing, couplings, and the fiber bundle reel are in place. Now you must load the fiber into the blowing head properly.

10.1 Open hinged top half of Blowing Head by releasing two latches. **See Fig. 21.**

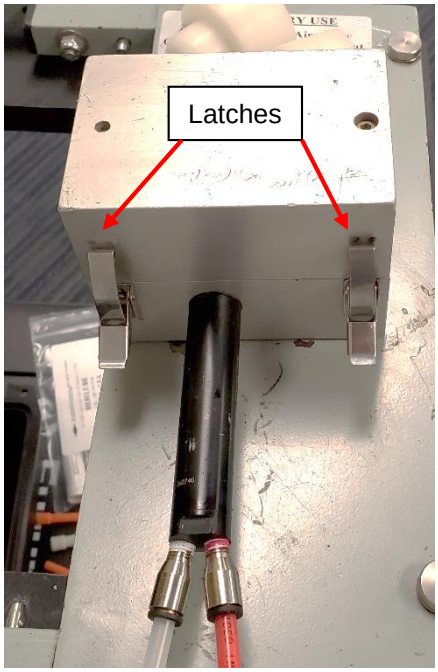


**Figure 21**
Blowing head latches released

10.2 Verify installed Fiber Bundle Drive Wheels are correct type / size for fiber bundle to be installed and inspect for wear. To change / replace Fiber Bundle Drive Wheels, see Para. 13.5 Maintenance Procedures.

Note: Red Drive Wheels (small groove) are used to install 2mm OD 2-, 4-, 6- and 12-fiber bundles. Black Drive Wheels (large groove) are used to install 3mm OD 24, 3.5mm OD 48, and 72-fiber bundles.

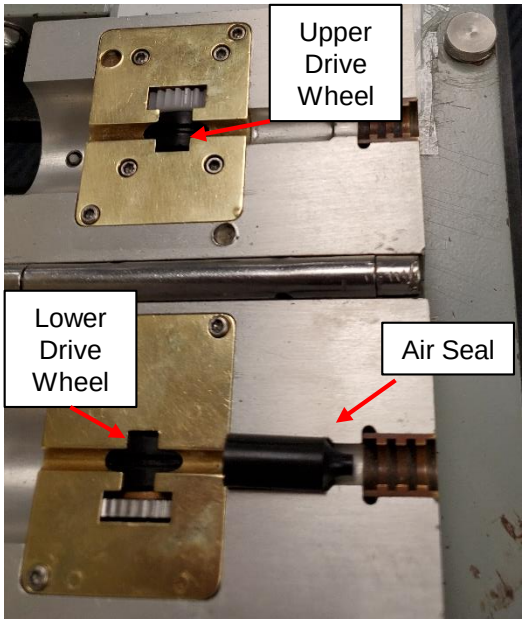


**Figure 22**
3mm Air Seal and 3mm Drive Wheels

10.3 Select correct type / size Fiber Bundle Air Seal for fiber bundle to be installed and inspect for wear. There should be a 3mm Air Seal already Installed in your Blowing Head. **See Fig. 22**.

Note: All Air Seals are black in color and visual inspection is necessary to determine correct size. The 2mm Air Seal used to install 2mm OD 2-, 4-, 6- and 12-fiber bundles has small opening in front tip end. The 3mm Air Seal is used to install 3mm OD 24-fiber bundles. The largest 4.0mm Air Seal is used to install both 48-fiber and 72-fiber bundles.

CAUTION: Only use correct size Drive Wheels and Air Seals to install different fiber bundle sizes. Do not attempt to install 2mm OD fiber bundle with 3mm OD components and vice versa. Excessive Blowing Head air leakage and possible fiber bundle damage may result if incorrect components are used.

**11.0 Load Fiber Bundle into Blowing Head**

11.1 Remove fiber bundle end from reel.

11.1.1 If fiber bundle end is secured to an H-clip mounted on outside of reel flange, remove fiber bundle from H-clip and pull through hole in reel flange. Cut off (typically) first 6" - 10" to eliminate bends.

11.1.2 If fiber bundle end is secured to reel flange with tape, remove and discard tape. Cut off (typically) first 6" - 10" of fiber bundle to eliminate adhesive contaminated section.

11.2 Screw correct type / size Fiber Bundle Blowing Tip onto end of fiber bundle. Ensure Blowing Tip is threaded on straight and firmly attached. **See Fig. 23.**

***Note:*** *The Small Red Blowing Tip is used on 2mm OD fiber bundles. The Black Blowing Tip is used on 3mm OD fiber bundles. The Green Blowing Tip is used for 3.5m OD fiber bundles. For 48 PEF fiber bundles it is recommended to use 3mm blowing tip since the 4mm tip is too large.*

***NOTE: For 48-fiber bundles remove the PEF outer jacket on the bundle and screw the 3mm tip onto the 4 nylon sub-units, not onto the PEF outer jacket. USE THE 4MM Air Seal!***

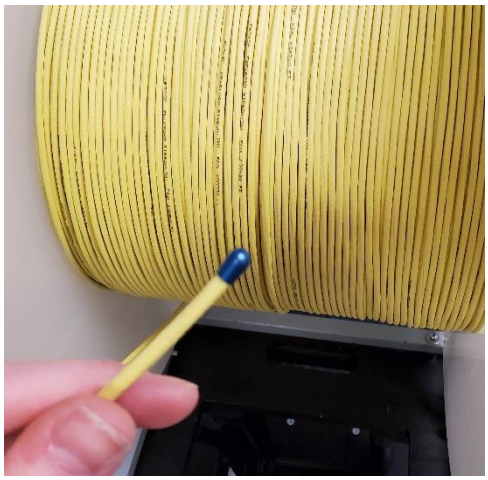

**Figure 23**
4 mm Blowing Tip threaded on to 72 fiber bundle

11.3 Insert fiber bundle through large opening end (back) of Air Seal. Insert small opening end (front tip) of Air Seal into 8mm Clear Tube. Manually feed fiber bundle through tubing until it travels about 1' - 2' past Second Tee Coupling.

11.4 Carefully place Air Seal and 8mm Clear Tube into front of lower Blowing Head section. Install Air Seal with it's slit in a vertical plane (**slit up or slit down** direction). This technique helps reduce any potential air leakage from Blowing Head. **See Fig. 24 and 25.**

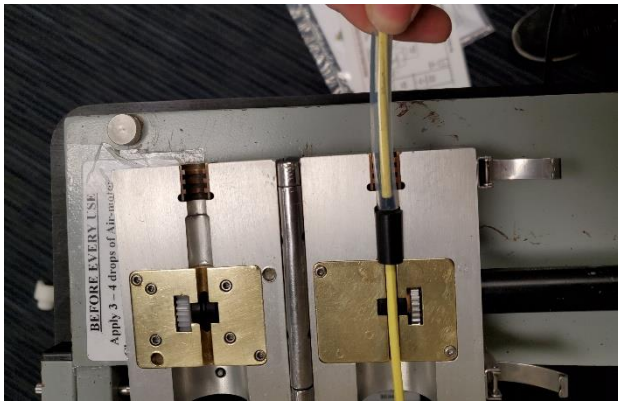


**Figure 24**
Fiber Bundle pushed through air seal and into clear "window" tubing


**Figure 25**
Install Air Seal with Slit in Vertical Plane (Either Up or Down Direction)

11.5 Push Air Seal and 8mm Clear Tube "forward" and away from lower Brass Plate. A "gap" of approximately 1/64" between the back of the Air Seal and the lower Brass Plate should be observed. Hold in place with 8mm Clear Tube. This technique helps prevent damaging / cutting back of Air Seal when top half of Blowing Head is closed. **See Fig. 24.**

11.6 Verify fiber bundle is centered in lower Brass Plate groove and aligned with lower Fiber Bundle Drive Wheel. **See Fig. 26.**

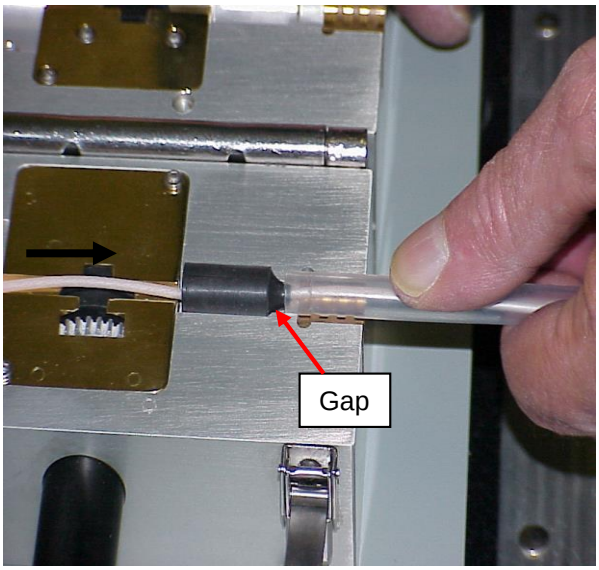


**Figure 26**
Air Seal and 8mm Clear Tube in Place
Gap Observed Between Air Seal & Brass Plate
Fiber Bundle Centered in Groove

11.7 Slowly close upper Blowing Head section being careful to not pinch / damage fiber bundle and Air Seal. With a light pressure, push "back" towards the back of the blowing head on the 8mm Clear Tube and Air Seal to close the 1/64" gap. Then push down on upper Blowing Head section and engage front latch only. **See Fig. 27.**

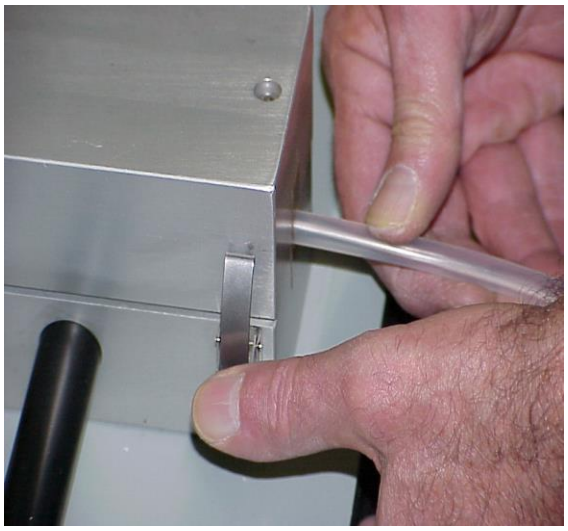

**Figure 27**
Slowly Close Front Latch

11.8 Insert and seat Fiber Bundle Guides into back of Blowing Head. Both Fiber Bundle Guides are identical. Install with their joint in the horizontal plane. Install lower Guide first followed by upper Guide and then engage rear latch. **See Fig. 28.**

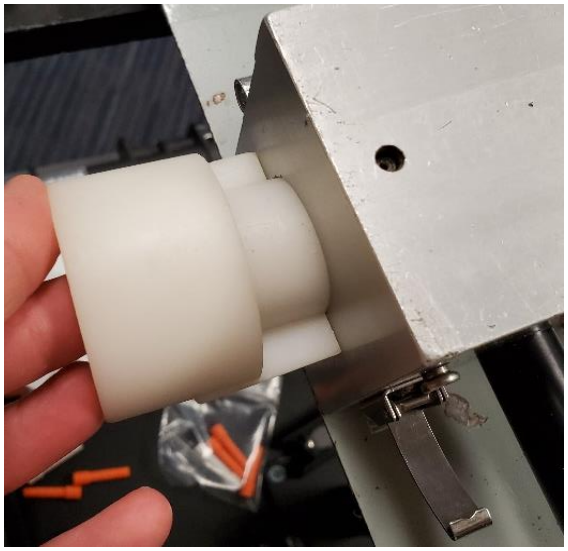

**Figure 28**
Install Fiber Guides with Joint Horizontal
Engage Rear Latch After
Fiber Guides are in Place

11.9 Carefully remove any fiber bundle slack on reel by rotating it slowly.

11.10 Reset Filter / Regulator Assembly's Payoff Counter to ZERO (to read all zeros; 00000) by carefully rotating Counter's Reset Knob counter clockwise.

11.11 This completes the basic Blowing Equipment Set-up process. See Sumitomo Recommended Procedure SRP SP-F04-002 to install fiber bundles.

***Important Note:*** *When storing Blowing Head Equipment, re-install Plugs and Caps in Air Motor Fittings, Filter / Regulator Fittings, and on 1/4" Red Tubing ends removed during set-up. These Plugs and Caps help prevent an excessive debris build-up in these components while they are in storage. Failure to do so can contribute to Air Motor failures (seizing or freezing up).* ***See Figure 29.***

**12.0 Dual Tank Set-up (Two Gas Bottles)**

***Note:*** *Typically, one 300 cu. ft. gas bottle will be required to install (approx.) 3000' - 4000' of fiber bundle and last about 35-45 minutes. This "conservative estimate" can vary depending upon tube route orientation, fiber bundle size, tube cable type, and operating practices.*

12.1 If fiber bundle blowing distance will exceed the normal capacity of one (1) gas bottle, two (2) bottles can be connected together to double the supply volume. Installer-provided equipment required will be two (2) gas bottles, two (2) Pressure Regulators (BEREG01 or BEREG02), and a Dual-Tank Isolation Valve Kit (BEISOV1). **See Fig. 30.**

***Note:*** *If using Compressed Air Cylinders instead of Nitrogen Cylinders as pressure source, two (2) Cylinder Adapters will be required to connect the Pressure Regulators to the Compressed Air Cylinder fittings.*

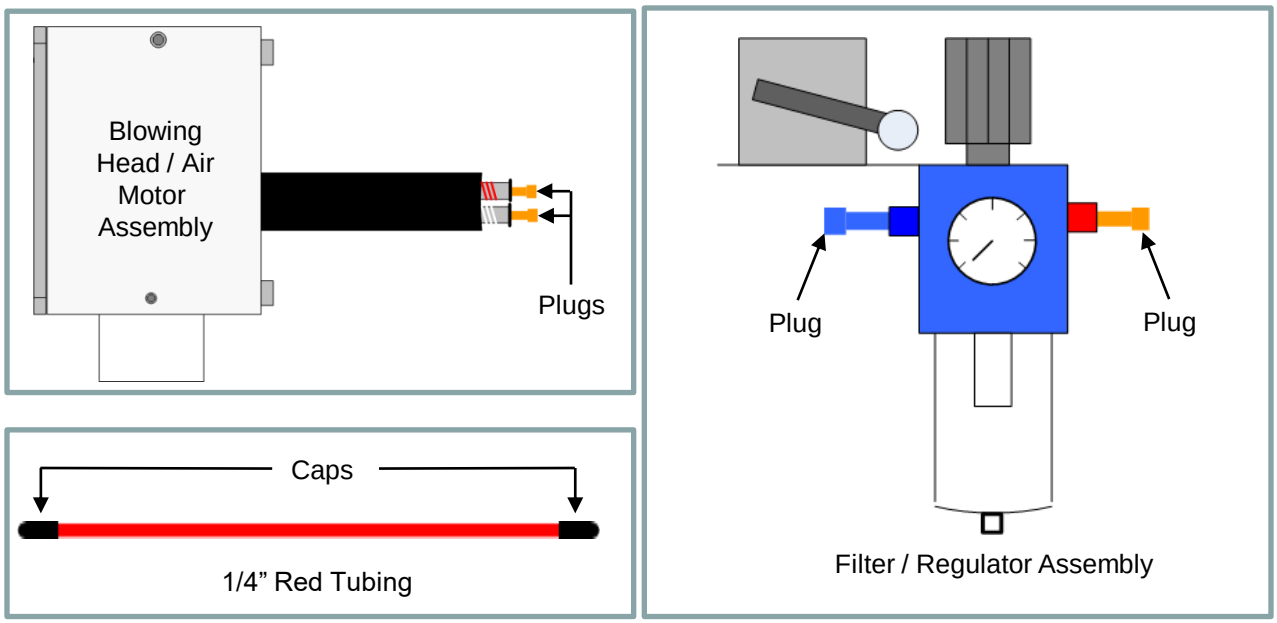


**Figure 29**
Storage Plugs in Air Motor and Filter Regulator Assembly Fittings and Storage Caps on 1/4" Red Tubing

12.2 Begin set-up by ensuring pressurized gas bottles are securely chained in place and remove valve caps.

12.3 Thread Pressure Regulator fittings into bottle valve housings and tighten with large adjustable wrench.

***Note:*** *Do <u>not</u> use serrated jaw tools (e.g.: pipe wrench, vise grips, channel locks, etc.) to tighten brass fittings of Pressure Regulators.*

12.4 Open each Bottle Supply Valve and check for leakage around fitting. If leakage is detected, close Bottle Supply Valve and see Para. 13.0 Maintenance Procedures.

12.5 Close Bottle Supply Valves.

12.6 Install male quick-disconnect 8mm Tubing Adapters into female quick-disconnect fittings on both Pressure Regulators.

12.7 Push-fit Installer-provided lengths of 8mm tubing between Pressure Regulator #1 and #2 8mm Tubing Adapters and the Tee Couplings supplied in the Dual Tank Isolation Valve Kit. (3' - 4' length suggested.) **See Fig. 31.**

12.8 Push-fit Installer-provided length of 8mm tubing between the Tee Couplings supplied in Dual Tank Isolation Valve Kit. (1' - 2' length suggested.) **See Fig.** 31**.**

12.9 Push-fit Installer-provided length of 8mm tubing between Bottle #2 Tee Coupling and Tube Cap supplied in Dual-Tank Isolation Valve Kit. (3" - 4" suggested.) **See Fig. 31.**

12.10 Push-fit Installer-provided length of 8mm tubing between Bottle #1 Tee Coupling and the First Tee Coupling at the Blowing Head. (3' –4' length suggested.) **See Fig. 31.**

12.11 See Sumitomo Recommended Procedure SP-F04-002 for Dual-Tank operating procedures.

***Tip:*** *It is best to set up Dual Tank equipment in configuration / arrangement as shown in* ***Fig. 31.*** *Excess tubing lengths are <u>not</u> desired. Keep things organized to improve access to both Isolation Valves later.*

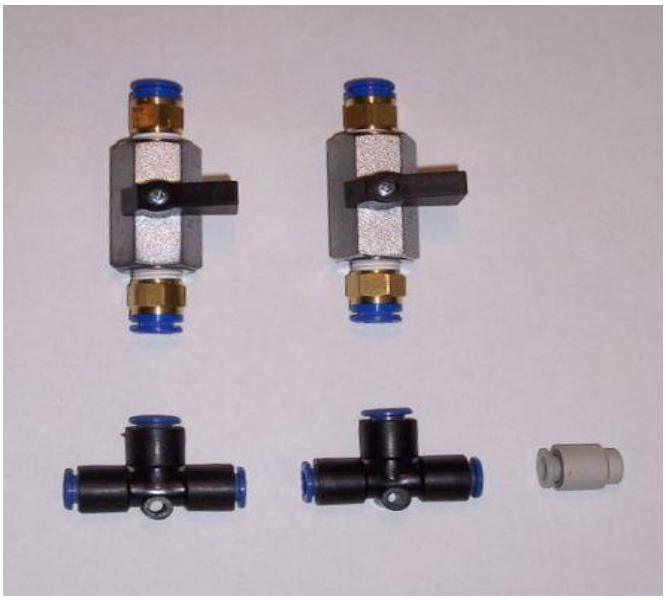

**Figure 30**
Dual Tank Isolation Valve Kit

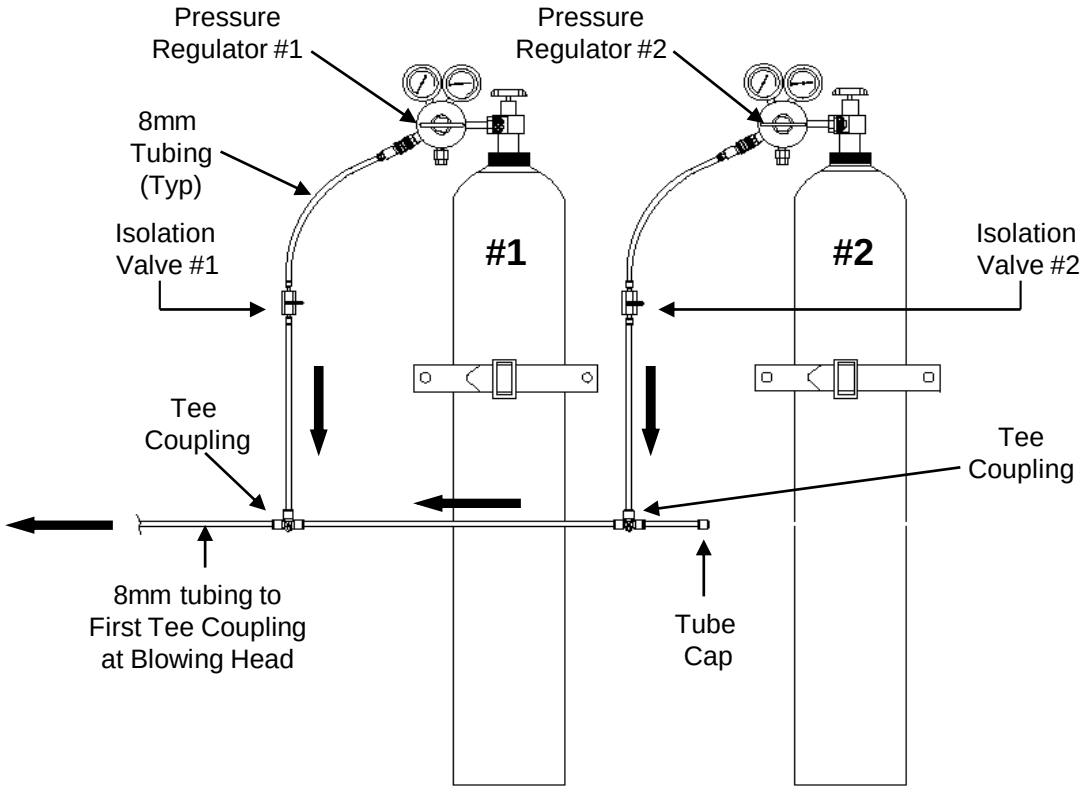


**Figure 31**
Dual-Tank Isolation Valve Set-up

*Best Practice*

*Run tubing and components in a neat and orderly manner as shown above with good accessibility to Isolation Valves*

**13.0 Maintenance Procedures**

**13.1** Blowing Head General and Routine Cleaning

Perform general cleaning with a soft, clean, dry cloth. Perform routine / more extensive cleaning with a soft, clean cloth and denatured alcohol (i.e.: a damp wipe). Remove Fiber Bundle Drive Wheels to clean inside upper and lower Blowing Head drive mechanism areas. **See Fig. 32.**

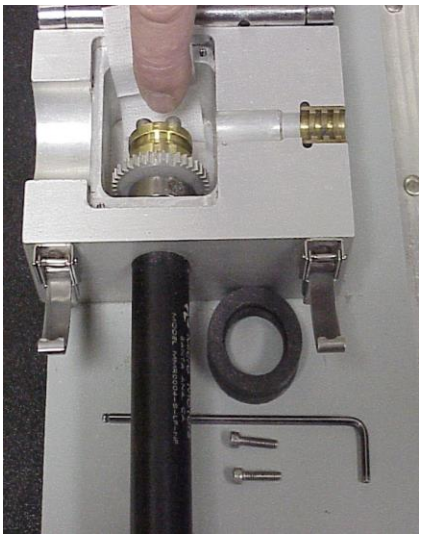

**Figure 32**
Routine Cleaning of Blowing Head

**13.2** Blowing Head Air Motor Maintenance

To prevent an excessive debris build-up inside the Air Motor, a 1/3 fluid ounce tube of special Air Motor Cleaner Fluid is provided in each Blowing Head Equipment Kit. It is used flush out any dirt or debris that may have accumulated inside the Air Motor. Do not use any substitute fluid. Contact SEL if replacement fluid is required.

13.2.1 Cleaner Fluid may be applied with or without fiber bundle loaded in the Blowing Head. If Cleaner Fluid is applied without fiber bundle loaded in the Blowing Head, simply run Air Motor for about ten (10) seconds at a low air pressure (10 - 20 psi). A more efficient procedure is to apply Cleaner Fluid with fiber bundle loaded in the Blowing Head and just begin normal blowing operations.

13.2.3 Cleaner Fluid application procedure begins by uncoupling Red 1/4" tubing from Filter / Regulator Assembly. Add 3 - 4 drops into open end of Red 1/4" tubing and re-connect to Filter / Regulator Assembly. **See Fig. 33.**

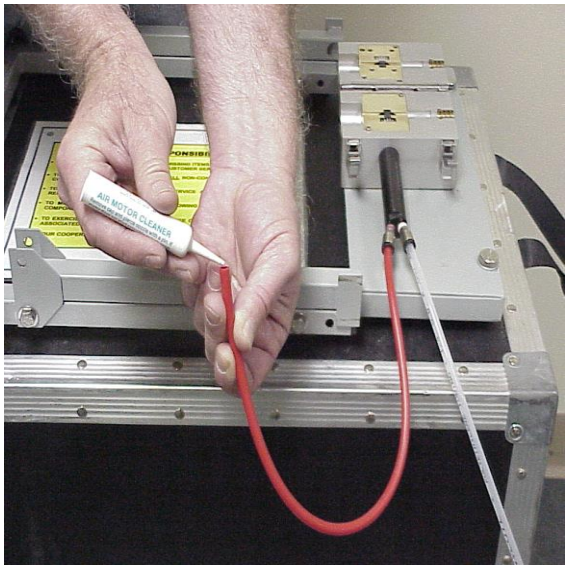


**Figure 33**
Adding Air Motor Cleaner Fluid
to Blowing Head Air Motor

13.2.4 Open Gas Bottle Supply Valve, adjust Pressure Regulator Valve, and slowly open Motor Rate Control Valve to inject / blow Cleaner Fluid into and through Air Motor. Any dirt or debris will be discharged into White 1/4" tubing connected to Exhaust Muffler.

13.2.5 Ideally, Cleaner Fluid discharge should be fairly clean and clear. However, if the discharge appears to be excessively dirty / black, stop operations, and apply another 3 - 4 drops of Cleaner Fluid. Repeat as necessary until discharge is fairly clean and clear. Repeated applications will not harm the Air Motor.

13.2.6 Frequency? Apply Air Motor Cleaner Fluid to the Blowing Head Air Motor **BEFORE EVERY USE.**

**13.3** Gas Bottle / Pressure Regulator Leakage
If leakage is detected at the Gas Bottle / Pressure Regulator connection when Bottle Supply Valve is opened, stop operations and repair leakage before proceeding. Typically, the fitting is just not tight enough.

13.3.1 Ensure Bottle Supply Valve is closed.

13.3.2 Vent Pressure Regulator pressure to zero by inserting male quick-disconnect 8mm Tubing Adapter into female quick-disconnect fitting on Pressure Regulator and verify bottle supply gauge reads zero.

***Note:*** *Do not tighten fitting while it is under pressure.*

13.3.3 Firmly re-tighten Pressure Regulator fitting with large adjustable wrench and re-check for leakage.

***Note:*** *Use of thread sealing tape (e.g.: Teflon tape) is not recommended on High Pressure Brass Fittings.*

13.3.4 If leakage continues, inspect contact surfaces on Gas Bottle and Pressure Regulator connection / mating points.

**13.4** Adjust Payoff Counter Actuating Arm
If required, the Payoff Counter actuating arm on the Filter / Regulator Assembly may be adjusted to obtain proper Payoff Counter operation.

***Note:*** *Do not bend or twist plastic actuating arm to make any adjustments. It attaches to a metal splined shaft by a clamp-type fit and, if forced, the plastic arm can be easily damaged.*

13.4.1 Use small screwdriver (Installer provided) to loosen actuating arm's clamp screw and slide arm off splined shaft.

13.4.2 Reposition arm on splined shaft, ensure roller is riding on Payoff Cam surface, and re-tighten screw. See Figure 12.

13.4.3 Rotate fiber reel and verify Payoff Counter operates properly. Repeat "Trial and Error" adjustment steps as necessary.

**13.5** Change Fiber Bundle Drive Wheels Fiber Bundle Drive Wheels must be changed whenever their centerline grooves show signs of excessive wear (will cause fiber bundle slip) or when switching from installing one fiber bundle size to another (i.e.: 2mm OD to 3mm OD and vice versa).

13.5.1 Change Lower Drive Wheel Procedure

13.5.1.1 Open hinged top of Blowing Head by releasing two latches.

13.5.1.2 Use small 3/32" Allen wrench to remove two (2) long machine screws that secure Lower Brass Plate to lower Blowing Head section. **See Fig. 34.**

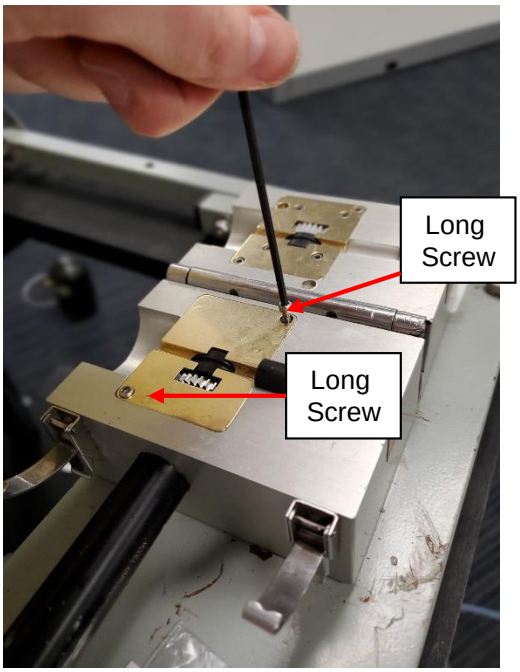


**Figure 34**
Remove 2 *Long* Machine Screws
from Lower Brass Plate

13.5.1.3 Carefully remove Lower Brass Plate. Do not force. If a tight fit is encountered, very gently pry plate out being extremely careful not to gouge brass plate. **See Fig. 35.**

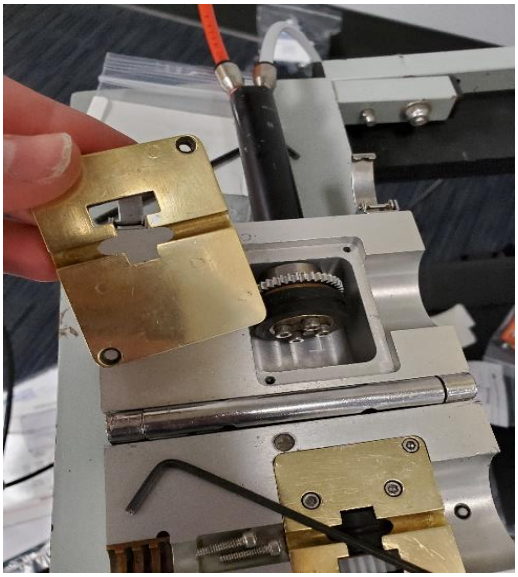

**Figure 35**
Remove Lower Brass Plate

13.5.1.4 Remove Drive Wheel by peeling it from hub. **See Fig. 36.**

**Figure 36**
Remove Lower Drive Wheel from Hub

13.5.1.5 Push replacement Drive Wheel onto hub. **See Fig. 37.**

**Figure 37**
Install Lower Drive Wheel onto Hub

13.5.1.6 Manually rotate hub / metal gear and continue seating Drive Wheel. Proper wheel fit and fiber bundle groove alignment is obtained when raised ridge on inside of Drive Wheel is fully seated in hub groove.

13.5.1.7 Replace Lower Brass Plate and lightly tighten two (2) long machine screws.

***CAUTION:*** *Use care when installing machine screws. Do not cross-thread. Do not over tighten / over torque. Lightly tighten to a "snug" fit only.*

13.5.1.8 **Important Note.** When properly assembled, the heads of the two (2) long machine screws that secure Lower Brass Plate to lower Blowing Head section will protrude above brass plate by about 1/16" (i.e.: not be flush with brass plate). This is correct. Do not attempt to tighten machine screws any further. Protruding screw heads fit into recesses located in upper Blowing Head section and act as aligning pins when Blowing Head is closed. **See Fig. 38.**

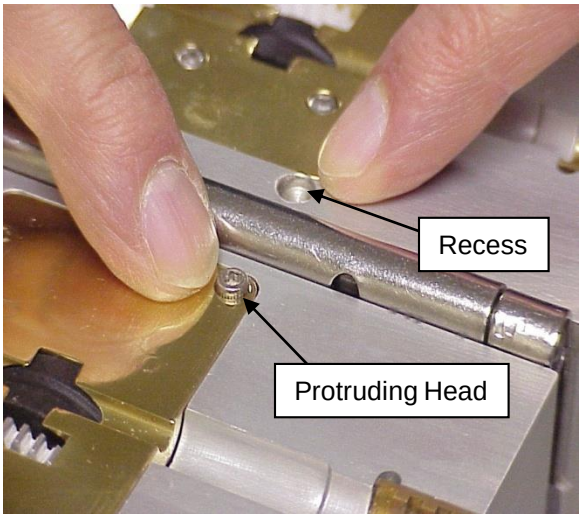


**Figure 38**
Correct Height for Lower Brass Plate Screws
DO NOT OVERTIGHTEN

13.5.2 Change Upper Drive Wheel Procedure

13.5.2.1 Use small 3/32" Allen wrench to remove two (2) long machine screws that secure Upper Brass Plate & Drive Assembly to upper Blowing Head section. **See Fig. 39.**

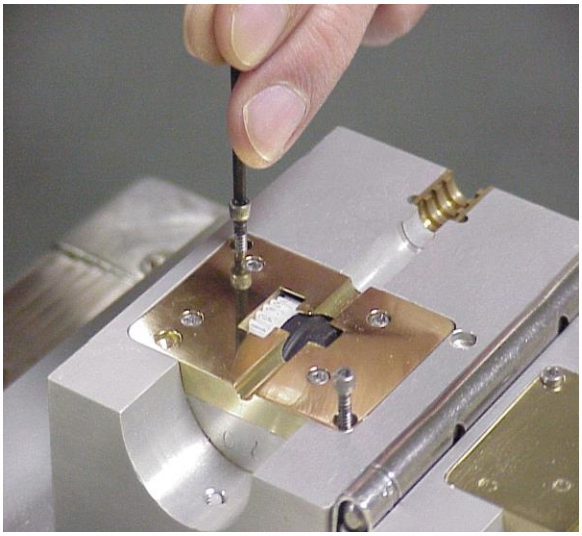

**Figure 39**
Remove 2 *Long* Machine Screws from
Upper Brass Plate

13.5.2.2 Carefully remove Upper Brass Plate & Drive Assembly. Do not force. If a tight fit is encountered, very gently pry plate out being extremely careful not to gouge brass plate.

13.5.2.3 Use small 3/32" Allen wrench to remove four (4) short machine screws that secure Bearing Hangers. **See Fig. 40.**

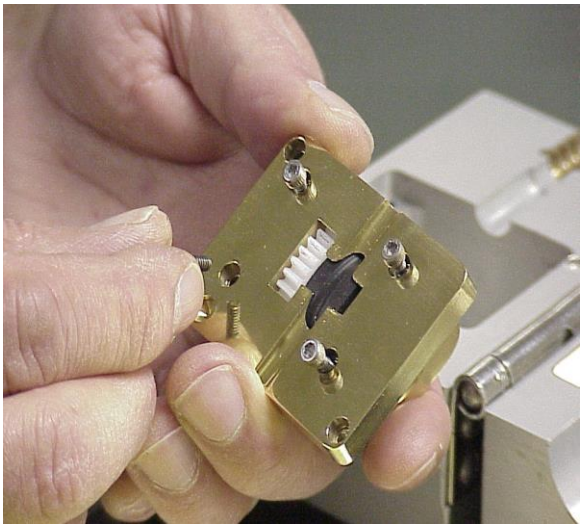

**Figure 40**
Remove 4 *Short* Machine Screws
from Bearing Hanger Assembly

13.5.2.4 Separate Bearing Hanger Assembly from Upper Brass Plate. **See Fig. 39.**

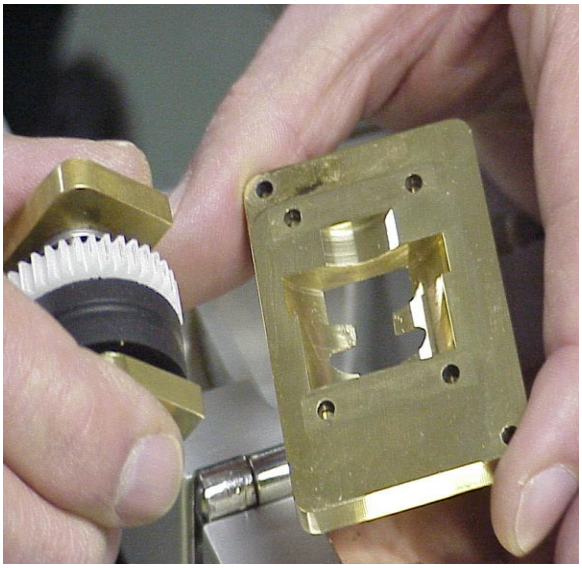

**Figure 39**
Remove Bearing Hanger Assembly
from Upper Brass Plate

13.5.2.5 Slide Gear-side Bearing Hanger off hub shaft. **See Fig. 40**

**Figure 40**
Remove Gear-side Bearing Hanger

13.5.2.6 Slide Drive Wheel-side Bearing Hanger off hub shaft. **See Fig. 41.**

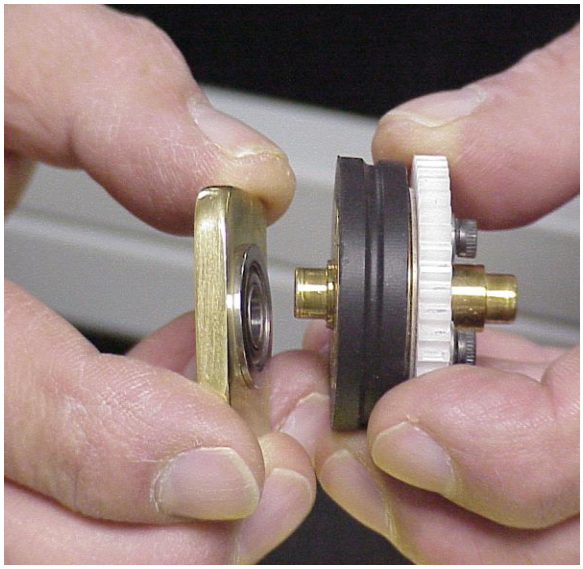

**Figure 41**
Remove Drive Wheel-side Bearing Hanger

13.5.2.7 Remove Upper Drive Wheel by peeling it from hub. **See Fig. 42.**

**Figure 42**
Remove Upper Drive Wheel from Hub

13.5.2.8 Push replacement Drive Wheel onto hub. **See Fig. 43.**

**Figure 43**
Install Upper Drive Wheel onto Hub

13.5.2.9 Manually rotate hub / plastic gear and continue seating Drive Wheel. Proper wheel fit and fiber bundle groove alignment is obtained when raised ridge on inside of wheel is fully seated in hub groove.

***Note:*** *Both Bearing Hangers are identical and interchangeable. However, if not installed correctly, bolt hole alignment will be off between Bearing Hangers and Upper Brass Plate.*

13.5.2.10 Slide Drive Wheel-side Bearing Hanger back onto hub shaft with raised Bearing pointing inward toward Drive Wheel. **See Fig. 44.**

13.5.2.11 Side Plastic Gear-side Bearing Hanger back onto hub shaft with raised Bearing pointing inward toward Gear. **See Fig. 45.**

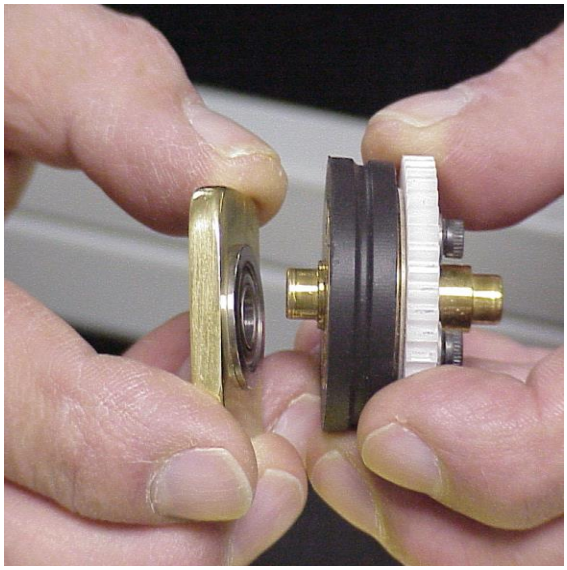

**Figure 44**
Install Bearing Hanger with Raised Bearing Inward Toward Drive Wheel

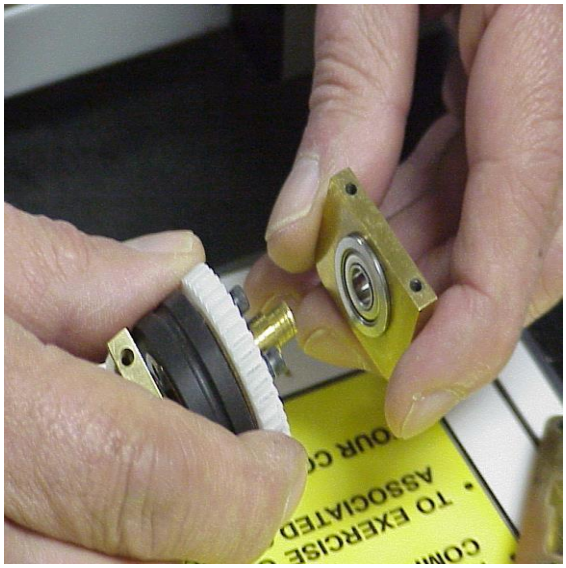

**Figure 45**
Install Bearing Hanger with Raised Bearing Inward Toward Plastic Gear

13.5.2.12 Replace four (4) short machine screws to secure the Bearing Hanger Assembly to Upper Brass Plate and lightly tighten. When properly assembled, the heads of the four (4) short machine screws will be flush with the Upper Brass Plate. **See Fig. 46.**

***CAUTION:*** *Use care when installing machine screws. Do not cross-thread. Do not over tighten / over torque. Lightly tighten to a "snug" fit only.*

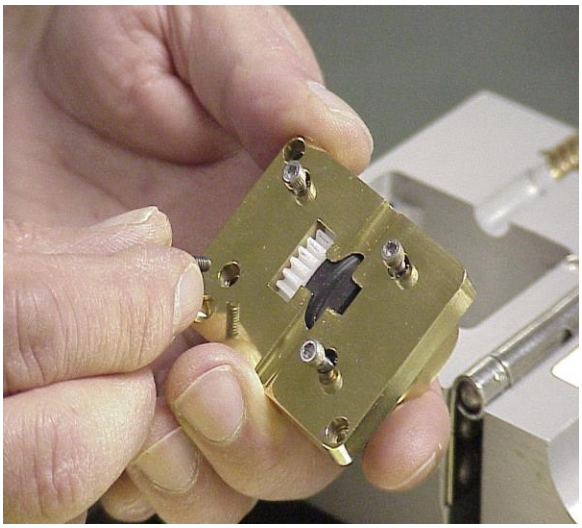

**Figure 46**
Install 4 *Short* Machine Screws
DO NOT OVERTIGHTEN

13.5.2.13 Replace two (2) long machine screws to secure Upper Brass Plate and lightly tighten. When properly assembled, the heads of the two (2) long screws will be flush with the Upper Brass Plate. **See Fig. 47.**

***CAUTION:*** *Use care when installing machine screws. Do not cross-thread. Do not over tighten / over torque. Lightly tighten to a "snug" fit only.*

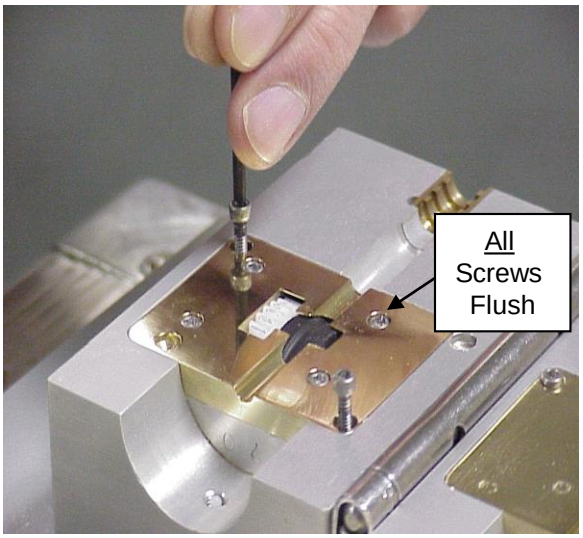


**Figure 47**
Install 2 *Long* Machine Screws
DO NOT OVERTIGHTEN

**13.6** Replace Plastic Drive Gear
If the teeth on the Plastic Drive Gear in the upper Blowing Head section become worn, field replacement of the gear is authorized. Contact SEL to obtain replacement part.

13.6.1 Remove Upper Brass Plate & Drive Assembly and both Bearing Hangers.

13.6.2 Use small 3/32" Allen wrench to remove three (3) machine screws securing Plastic Gear to hub. (Be careful with small washers.)

13.6.3 Install replacement Plastic Gear and re-install three (3) machine screws.

13.6.4 Re-install Bearing Hangers and Upper Brass Plate & Drive Assembly.

**13.7** Adjust Fiber Guide Tension Set Screw
The Fiber Guide Tension Set Screw consists of a spring-loaded plunger that applies tension on the installed Fiber Guides. The head of the Tension Set Screw is located on top of upper Blowing Head section. The spring-loaded plunger is located so it comes in contact with the installed Fiber Guides. The screw's tension is adjusted at the factory. However, field adjustment is authorized if required.

***Note:*** *Set screw tension is too loose if Fiber Guide dies fall out when air pressure is applied to tube span / Blowing Head. Set screw tension is too tight if Blowing Head latches are difficult to close and a gap exists between upper and lower Blowing Head sections.*

13.7.1 To adjust, use a 1/16**"** Allen wrench (Installer provided) and turn set screw clockwise (CW) to increase or counter-clockwise (CCW) to decrease plunger tension on Fiber Guide dies. **See Fig. 48.**

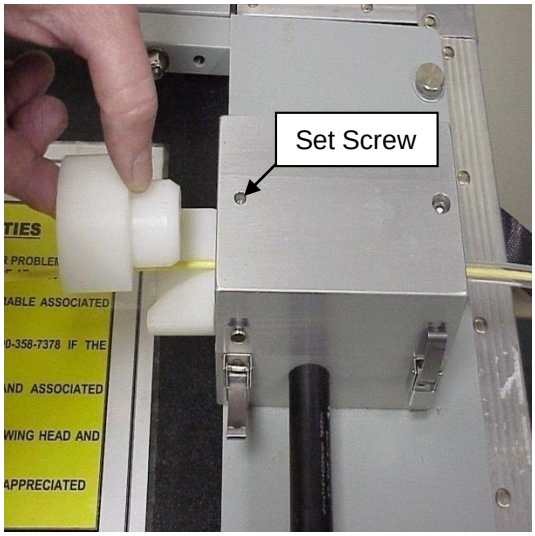


**Figure 48**
Fiber Guide Tension Set Screw

13.7.2 Make set screw adjustments in small increments and test-fit Fiber Guides; it is a trial-and-error adjustment. Repeat until desired tension is obtained.

**13.8** Tighten Metal Gear / Hub Assembly
A Metal Gear / Hub Assembly is attached to the Air Motor output shaft with a Split-Die Clamp. Should the Clamp become loose, the Metal Gear / Hub Assembly will spin on output shaft and Fiber Bundle Drive Wheels will not function properly.

13.8.1 Use small 3/32" Allen wrench to remove two (2) long machine screws that secure Lower Brass Plate to lower Blowing Head section and remove Brass Plate.

13.8.2 Remove Drive Wheel by peeling it from hub.

13.8.3 Use large 7/16" Allen wrench to loosen Split Die Clamp machine screw. **See Fig. 49.**

13.8.4 Slide and hold Metal Gear / Hub Assembly in tight on Air Motor output shaft. This places lower Metal Gear / Hub Assembly in proper alignment with upper drive components (Plastic Gear, Upper Hub, and Upper Drive Wheel).

13.8.5 Use 7/16" Allen wrench to re-tighten Split Die Clamp machine screw; tighten firmly.

13.8.6 Reinstall Drive Wheel and Lower Brass Plate.

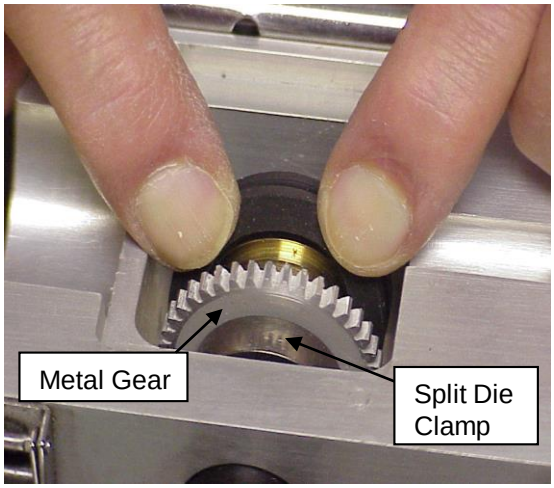


**Figure 49**
Metal Gear / Hub Assembly
and Split Die Clamp

**13.9** Remove Blowing Head from Payoff Stand
The Blowing Head may be removed from the Payoff Stand Shelf for cleaning or to support fiber bundle installation efforts where it is not practical to set up the Transit Case (e.g.: down in Maintenance Holes, up in ceiling areas, and so forth).

13.9.1 Remove two (2) fasteners (knurled-head bolts) that secure front of Payoff Stand Shelf to Inner Case. Lift hinged Shelf to gain access to two (2) bolts (thumb screws) under Blowing Head. **See Fig. 50.**

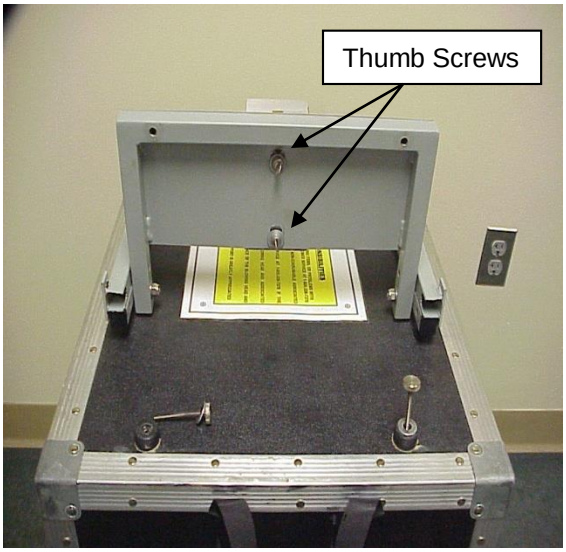


**Figure 50**
Payoff Stand Shelf Lifted for Access
to Blowing Head Fasteners

13.9.2 Use pliers or similar tool (Installer provided) to remove bolts and separate Blowing Head from Shelf. **See Fig. 51.**

13.9.3 Reassemble in reverse order.

***Note:*** *When re-installing Blowing Head, ensure it aligns with fiber reel so fiber bundle feeds straight into back of Blowing Head.*

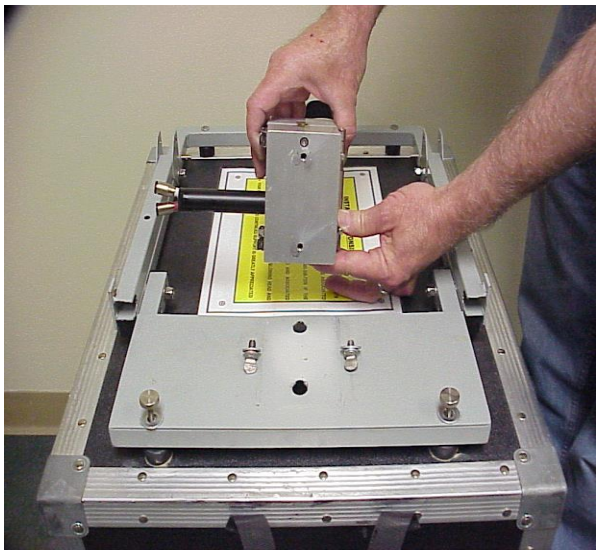

**Figure 51**
Blowing Head Removed from
Payoff Stand Shelf

**13.10** Replace Blowing Head Air Motor
If Blowing Head Air Motor operation becomes erratic or metal Drive Gear cannot be rotated, the Air Motor may have become defective (frozen / seized).

13.10.1 Field replacement of the individual Air Motor is not authorized.

13.10.2 Contact SEL to obtain a replacement Blowing Head / Air Motor Assembly.

***Note:*** *The defective Blowing Head Serial Number (metal-stamped number located inside Fiber Guide areas) must be provided to SEL.*

## ADDENDUM A

## OLDER TRANSIT CASE DESIGN

14.1 Equipment can be received in an older transit case design. The older transit case preparation is slightly different from the newer design, but the blowing head setup and procedures remain the same.

**Figure 52**
Older Transit Case Design


**Figure 53**
Top Transit Case Lid Open


**Figure 54**
Inner Case Removed

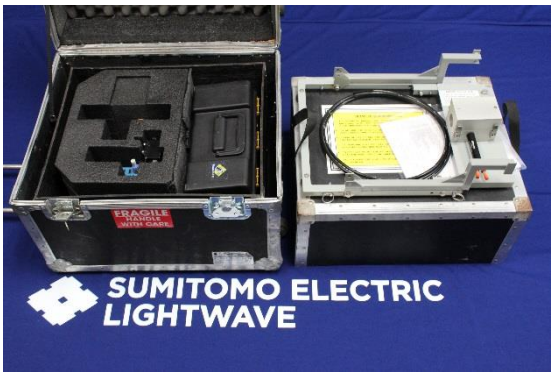


**Figure 55**
Top Of Transit Case Removed

14.2. Instead of 4 pegs used to mount the payoff stand, the payoff stand has it's own platform that rests on top of case transit case Set Inner Case (Payoff Stand and Blowing Head Assembly) onto rubber guides located on top of Transit Case to create a convenient work area..

Note: The older transit case, like the newer one, provides the option to mount larger reels of fiber, such as a full 3000m reel of 72-fiber bundle.

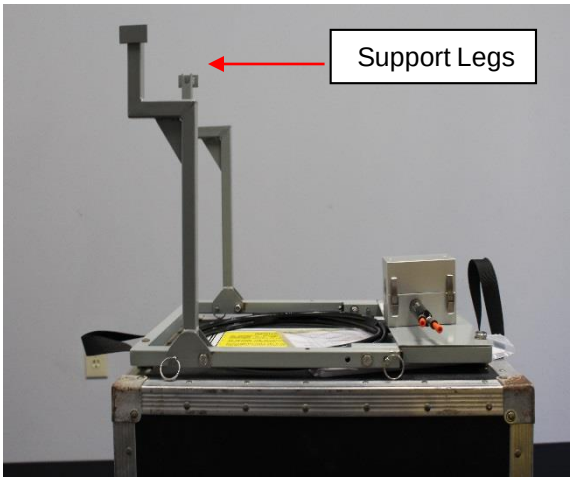


**Figure 56**
Raised Support Legs For The
Older Case

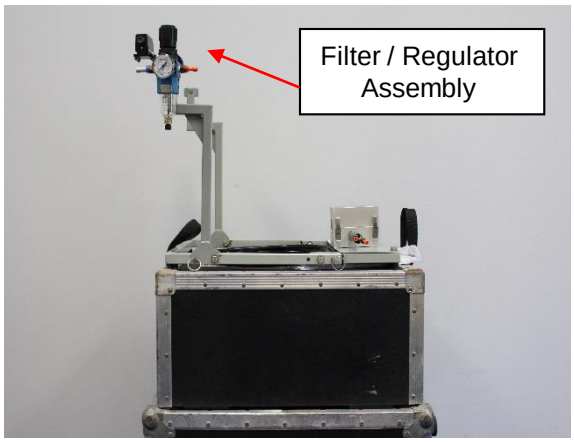


**Figure 57**
Installed Filer / Regulator on a
Older Case

14.3 After following the SP-F04-001 procedure to arrange the older transit case, it should look comparable to the standard blowing head equipment assembly. See Fig 59.

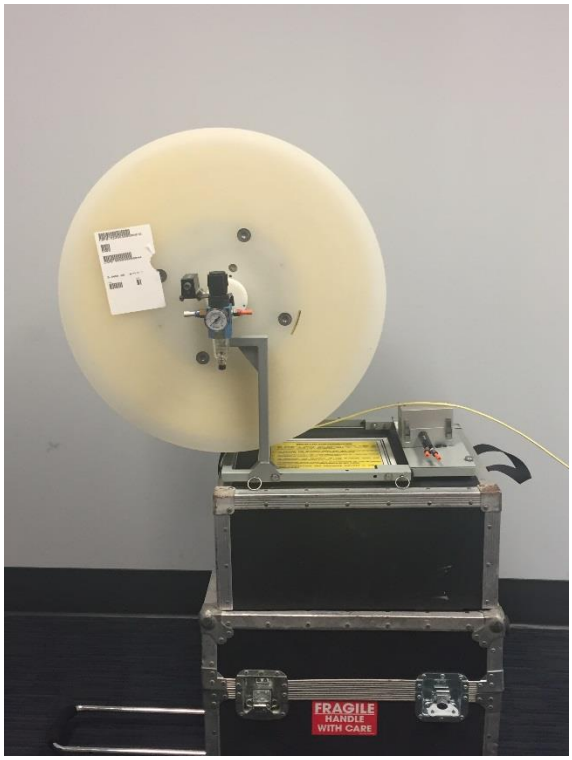


**Figure 58**
Properly Mounted 72-Fiber Reel
on a the older transit case

**Figure 59**
Standard Blowing Head
Equipment Set-up complete using
older case.

**5.0 Equipment Layout**

5.1 **See Fig. 60** for Older Transit Case Blowing Head Equipment layout.

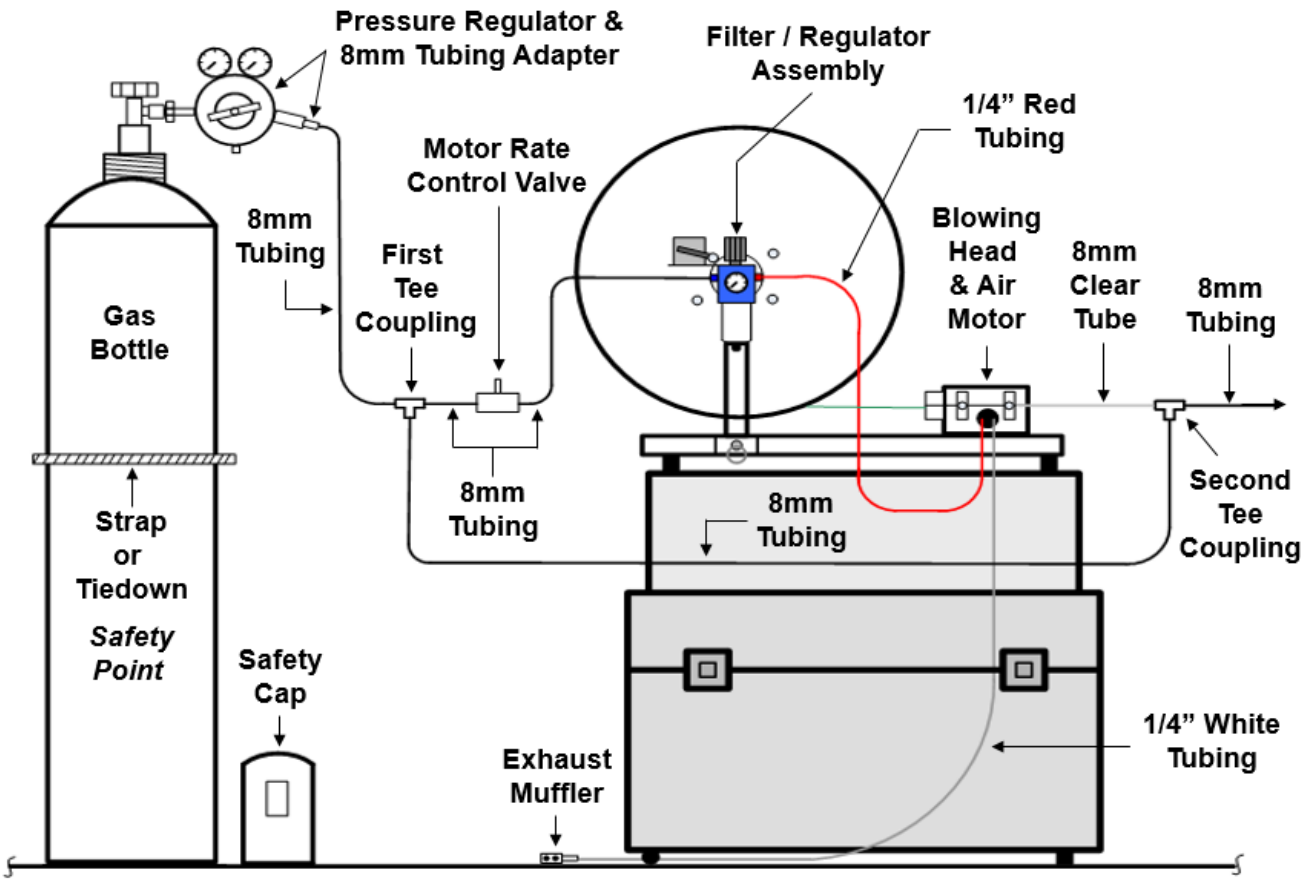


**Figure 60**
All equipment is set up the same with the older transit case design
Keep it neat!