Instructions for Preparing AlumaCore, ADSS, Loose Tube, HexaCore, CentraCore and MiniCore Fiber Optic Cables in the SB01 Splice Enclosure

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Instructions for Preparing

ALUMACORE OPTICAL GROUND WIRE

IN THE SB01 SPLICE ENCLOSURE

ATTENTION:

The SB01 Splice Enclosure now includes a lid gasket that does not require RTV application. Do not apply RTV to the gasket when sealing the SB01 Splice Enclosure. See Section 10 (page 14) for updated instructions.

NOTE:

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THE SB01 SPLICE ENCLOSURE NOW INCLUDES A LID GASKET THAT DOES NOT REQUIRE RTV APPLICATION.

DO NOT APPLY RTV TO THE GASKET WHEN SEALING THE SB01 SPLICE ENCLOSURE.

SEE SECTION 10 (PAGE 14)
FOR UPDATED INSTRUCTIONS.

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List of Materials

ITEM	DESCRIPTION	QTY
1	Splice Box (consisting of the following):	
	Splice Box Body	1
	CSM Termination Eye Bolt	2 or 4
	Center Shaft	1
	Cover Gasket	1
	Connector Assemblies (consisting of the following items for 1 connector):	2 or 4
	Connector Body	1
	Cable Retainer	1
	Nut Retainer	1
	Entry Bushing	1
	Set Screw – 5/16 – 18 UNC	2
	O-Ring	1
2	Organizer Tray Assembly (consisting of the following items for 1 tray):	2 to 8
	Tray	1
	Cover	1
	Splice Protector Holders (6 Splices / Holder)	2
	Manifold (MCI Tray Only)	1
3	Splice Box Cover	1
4	RTV – 108 Adhesive	1
5	Spanner Nut or Hex Nut	1
6	O-Ring or Self-Sealing Washer	1
7	Retaining Rings	2
8	Tension Screw	0 to 4
9	Tension Nut	0 to 4
10	Humi – Sorb	1
11	Range-Taking Flanged Sleeve (used with FRP strength member)	0 to 4
12	Mounting Plate	1
13	Slotted Sleeve (used with OPT/GW FRP strength member)	0 to 4
14	Spacer	1
15	Splice Protector Sleeves	10 to 56

Remove all loose parts, top retaining ring, spacer, mounting plate with tray assemblies from the box. Confirm all parts are present (see List of Materials above), then place in a convenient location.

Please see supplemental instruction sheet for ST1-72 Tray installation instructions.

Items Supplied by Customer:
- Lag screws and washers (1/2 in. dia.) or hardware for attachment of assembly to pole or tower
- Silicone sealant for splice protection
- Splicer equipment

1.0 Purpose of Installation

The purpose of installing an Optical Ground Wire (OPGW) into a splice box is to connect one OPGW to another, and protect the connection in a sealed enclosure.

2.0 Scope

This document describes and illustrates the installation of Optical Ground Wire into the AFL SB01 splice box. This Splice Box has the following advantages:

1. Capable of storing 25 to 40 feet of optical units per cable inside of the splice box for immediate or future splicing.
2. The SB01 splice box can be pre-mounted because of its internal unit storage capacity. Typically the Splice Box is mounted to the pole or tower 15 to 25 ft. (4.5 to 7.6 meters) from the ground.
3. Creates a neater installation of the routing of the OPGW cables into the SB01 splice box. This eliminates the necessity of coiling extra OPGW cable onto the pole or tower.

3.0 Precautions

3.1 Health

Optical fibers are very thin, fragile and sharp. Therefore, careful handling is required to avoid either damage to the delicate glass fibers, or more importantly, injury to the technician or bystander. Small fiber scraps should be deposited on strips of adhesive tape, placed in a bottle or vinyl bag and properly disposed. Do not eat, or drink when working with optical fibers as small pieces of glass may inadvertently be ingested. Never look directly at the end of a fiber unless certain that no Laser Light is being transmitted through the fiber.

3.2 Work Environment

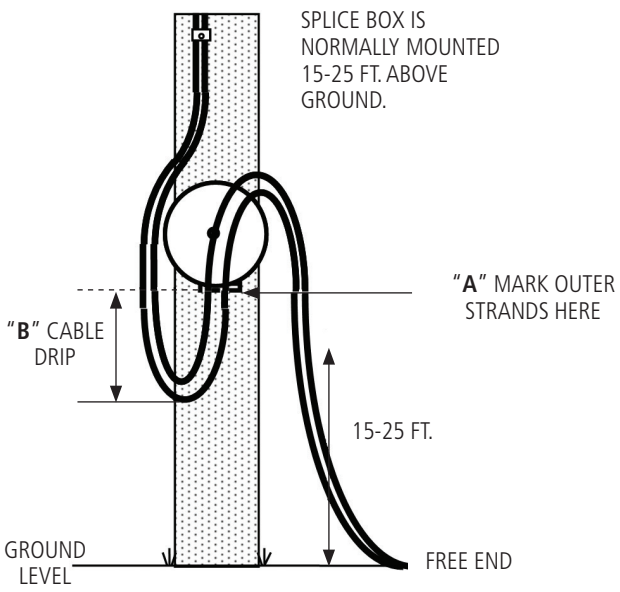
Handle optical fiber and fiber cable carefully, taking care to impose no damage by physical shock or sharp bends. During the actual splicing, care must be taken to keep hands and work area clean in order that the fibers may be kept clean. Dirty fibers mean poor splices! Keep all tools and equipment in their proper cases or storage pouches when not in use. Consideration should be given to the work area in which the Isolator will be organized. A clean, snag free horizontal surface is necessary.

4.0 Cable Preparation

4.1 After the stringing procedure, the ends of the optical unit(s) must be located. It is recommended that this occur prior to the cable being cut free from the payoff to ensure proper length remains for splicing. In some OPGW designs there could be some pull back of the optical unit(s) during the stringing installation. "Pullback" is a term used when the optical unit(s) or core appears to migrate inside the pipe due to elongation of the metallic components during the stringing procedure. When this happens, the core must be located so that the proper amount of optical unit(s) is available for the installation. Cut back 3-5 feet at a time until the optical unit(s) is found.

4.2 Form the OPGW cables into drip loops where they will enter the splice box. Mark the individual cables at these points. These Marks will be referenced as mark "A". Mark "A" is eventually where the outer strands of the OPGW cables will enter the splice box. The diameter of the drip loops should be 30 x the Diameter of the OPGW or not less than 15 inches for a cable that is less than or equal to 0.5 inches in diameter (See Fig. 1).

Fig. 1

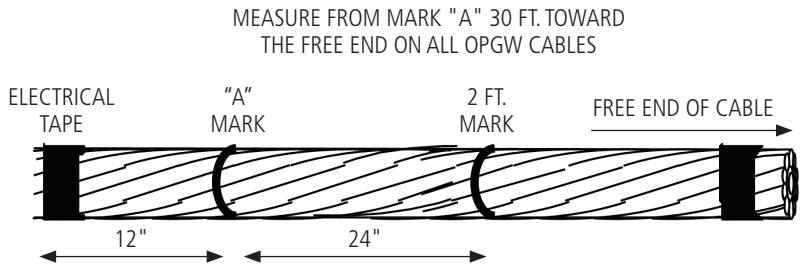


4.3 Measure 30 feet from each individual OPGW cable mark "A" toward the Free End. Mark and cut the cables at this point. This will give 30 feet of optical units for splicing. Unlay the wire strands from the free end about 1 foot back. Score the pipe with a tubing cutter. Do not cut completely through the pipe. Gently flex the pipe until it breaks. Cut the optical units between the sections of pipe that have been separated. This step is necessary so that the optical unit(s) will be able to move freely within the pipe when the pipe is removed.

NOTE: These measurements are based on the splice box being mounted 20 feet on the structure.

4.4 Apply electrical tape 12 inches behind mark "A" (See Fig. 2), THEN PREPARE THE OPGW CABLES ONE AT A TIME. Starting at steps 4.1 to 4.3. Cut the outer strands at the 2-foot mark, which is 24 inches from the "A" mark. Be careful not to damage or cut the pipe.

Fig. 2



NOTE: A tie-wrap can be used in place of electrical tape.

4.5 Once all of the marks have been established, insert a screwdriver in between the outer strands at the two-foot mark on one of the OPGW cables being careful not dent the pipe with screwdriver. Pry up one strand at a time and cut it. Then unlay the strand back to the electrical tape. Cut each strand at the Mark "A" (See Fig. 3a and 3b).

Fig. 3a

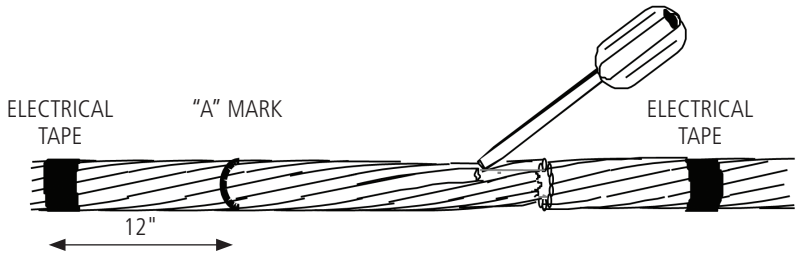
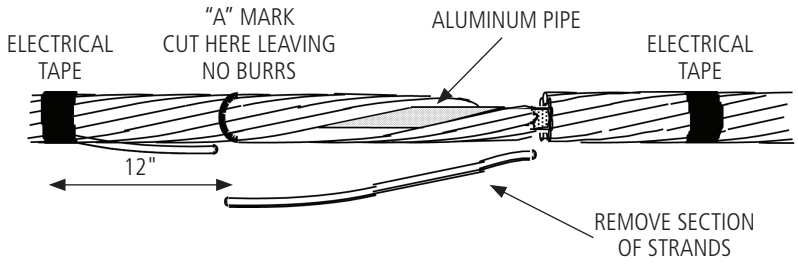
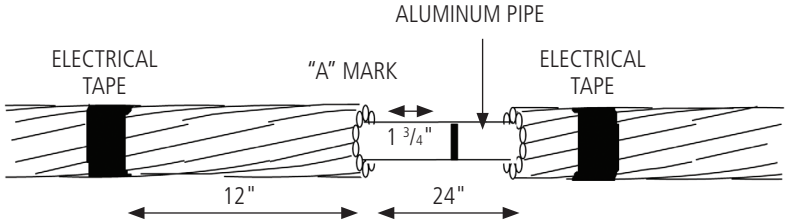


Fig. 3b



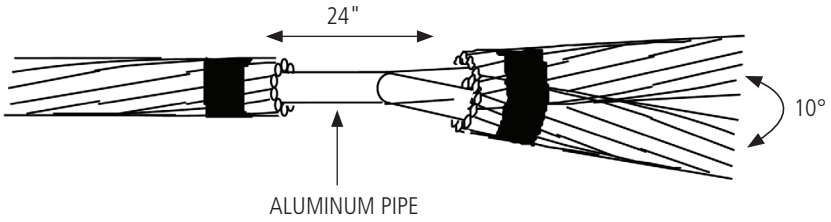
4.6 Measure 1 $^{3}/_{4}$ inches from the "A" mark. Using a felt marker pen, make a mark on the aluminum pipe. Then score the aluminum pipe with small pipe cutter. Try 2 or 3 rotational passes around the pipe first. Then try to bend the pipe back and forth. If the pipe does not move easily, try a few more passes. Do not score too deeply or completely through the pipe. If unsure, cut a small piece of pipe, 2 feet from the free end of the cable and practice cutting the pipe. The number of rotational passes can vary depending on the pipe size and design of the cable (See Fig. 4).

Fig. 4



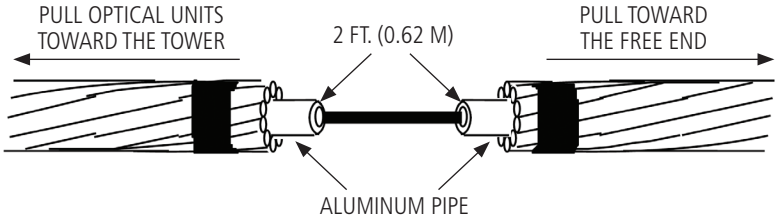
4.7 The pipe may now be broken by bending it back and forth gently and by not more than 10 degrees (See Fig. 5).

Fig. 5



4.8 Slide the outer strands with pipe intact about 2 feet toward the free end of the cable. While holding the cable pull the optical units completely out of the pipe by pulling toward the tower. Be careful not to kink the optical unit(s) (See Fig. 6).

Fig. 6



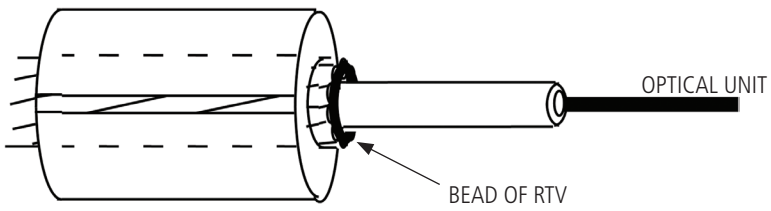
4.9 Immediately tape the end of the optical units when the end clears the aluminum pipe. This will hold the core intact for ease in performing the next steps.

5.0 Cable to Splice Box Preparation

The section will explain how to install the cable into the splice box. This should be performed when the individual OPGW cable has been properly prepared.

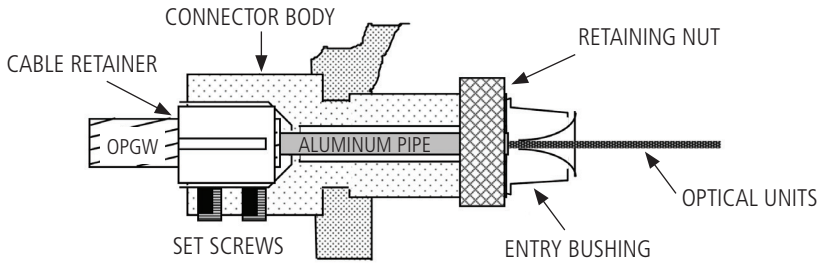
5.1 After the individual OPGW end has been prepared slide the cable retainer over the optical unit(s) and over all outer-strands of wires. Then place a bead of RTV silicone on the wire tips and around the pipe (See Fig. 7).

Fig. 7



5.2 Below (See Fig. 8) is a cross-section of the cable connection inside the splice box plus a three-step procedure for securing the cable to the splice box. Do not unwrap the binder tape and expose the yarn and unit(s) at this time. (**NOTE:** Use the ports on the right side of the splice box first, when two cables are being spliced.)

Fig. 8



5.3 Feed the optical units from the OPGW cable through the connector body and entry bushing. Route the optical unit(s) so that they lay on the center shaft of the splice box during the feeding process. This will keep the optical unit(s) from kinking.

5.4 After all of the unit(s) have been fed into the enclosure, insert the OPGW cable with the cable retainer into the connector body of the splice box. Make sure that the cable retainer is aligned properly and inserted completely. Tighten setscrews.

5.5 Each of the fiber unit(s) should be supported and attached with tape to the outer diameter of the splice enclosure (See Fig. 9) as soon as the OPGW cable has been secured into the connector body. This will secure the optical unit(s) to the splice box and prevent them from kinking.

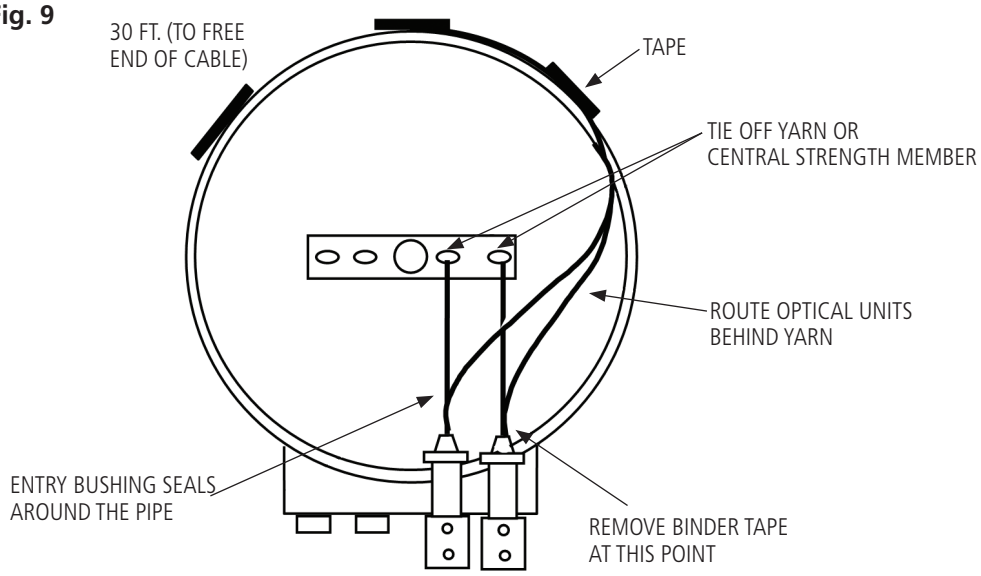
5.6 If a Dielectric Cable is being spliced, the connector body may have a conduit fitting attached to it. To verify that the cable retainer on the dielectric cable has been aligned properly, remove the top Allen (hex socket head) screw and visually align and tighten setscrews. This type of Splice Box configuration (OPGW spliced to a dielectric cable) should be located on the TAKE-OFF structures or designated splice locations where this type of splice box applies.

5.7 Repeat all of the previous steps for the remaining OPGW cables that are to be installed into this particular splice location. Remember to prep only one cable at a time.

6.0 Anchoring the Optical Units

6.1 Place a piece of electrical tape on the individual optical units, 14 to 18 inches from the entry bushing of the splice box. Working with one optical unit at a time, cut the binder tape at this mark, on the entry bushing side. Unwrap the binder tape back to the entry bushing and cut the binder tape. Cut the yarn at the electrical tape and use the yarn to anchor the optical unit by threading the yarn through the eyebolt and tying in a series of half hitches. Make sure that the yarn is tied off in line and to the eyebolt in the proper position from where the individual OPGW cable enters the splice box. If the cable does not contain yarn, the central strength member should be anchored into the box. Repeat the previous steps for the remaining OPGW cable(s). Tape the optical units together after they have been secured to the eye-bolts (See Fig. 9).

Fig. 9



NOTE: There should be 30 ft. of optical unit(s) prepped for each individual OPGW cable that is to be inserted into the Splice Box. The 30 ft. of optical unit(s) is divided into two sections:

1. 20 ft. from box to ground, and
2. 10 ft. for storing and splicing.

Should the Splice Box be mounted at a different height, then adjust the amount of OPGW cable to be prepped, stored and spliced.

6.2 Temporarily tape the units to the top outside radius of the box (See Fig. 9). This will help support the units and prevent damage of the units at the bushing. Also explained in section 5.5.

6.3 Tighten the retaining nut so that the bushing is sealed around the pipe.

6.4 Tape all of the optical units together every 2 feet. Stop taping the optical units 6 feet from the free end. Tape each individual group of optical unit(s) up to 4 feet 10 inches from the free end. Remove the yarn and binder tape from the optical unit(s) along the 4 foot 10 inch section toward the free end.

7.0 Optical Unit Preparation

7.1 Starting at the free end of one of the OPGW cables, separate the individual colored units one at a time by unlaying them back to the 4 foot 10 inch tape mark. (This only applies to the multiple unit configurations). Now proceed to the other OPGW units and repeat the same step

7.2 Mark the individual colored unit(s) 4 feet from the free end with a permanent marker. In case of multiple units, pair the like colored buffer tubes together. (For example, take the blue units from each of the OPGW cables and match them up. Continue with orange to orange, green to green, etc.).

For Tight Structure Type Alumacore, follow steps **7.3 to 7.4**.
For Loose Tube Type Alumacore, follow steps **7.5 to 7.6**.

7.3 Place the AFL sheath stripper on one of the blue units at the 4-foot mark with the arrow on the sheath stripper pointing toward the free end. Grip down tightly and pull the sheath stripper in one continuous motion toward the free end. Remove the colored sheath.

7.4 Carefully remove the clear epoxy coating from the entire 4 feet by starting at the free end and peeling back. Slowly remove the fibers from the fiberglass reinforced plastic central member (FRP). Count the fibers to make sure that all the fibers are identified before proceeding. Continue separating the fibers for the remainder of the 4 feet. Cut the FRP as close as possible to the core of the optical unit without damaging any fibers. Clean and remove the silicone from all the fibers. Proceed to step **7.7**.

7.5 For loose tube units, using a buffer tube cutter, carefully score and snap the buffer tubes at the 4-foot mark, then gently pull the tube straight away from the fibers.

7.6 If the buffer tubes contain 12 fibers or less, gently wipe them with a clean towel to remove the excess gel. Then clean them with an approved gel-removing solvent. The fibers are ready to be loaded into the splice tray(s). Proceed to Step **7.7**.

If the buffer tubes contain more than 12 fibers each, follow the below instructions pertaining to the colored thread binders.

7.6.1 Starting at the end closest to the stainless steel tube, separate the fibers until you identify one of the colored string binders (See Fig. 10).

7.6.2 Lightly pull on the binder until the bundle starts to separate from the other fibers.

7.6.3 Once a single bundle has been identified, inspect the bundle for the matching color prior to separating the fibers from the other bundles. Once you have identified that both binders are around the same fiber group, separate the unit from the other fibers (See Fig. 11).

Fig. 10

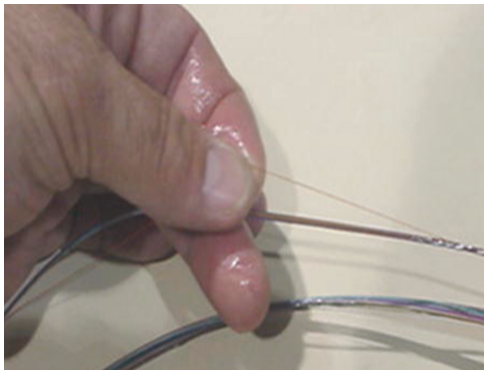
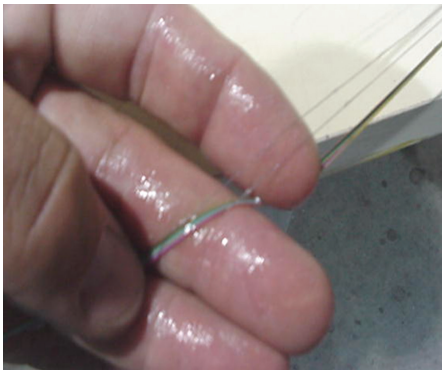


Fig. 11



7.6.4 Repeat steps 7.6.1 through 7.6.2 on each of the fiber bundles. Separate each group of bundled fibers to assure easy identification (See Fig. 12).

7.6.5 On each of the fiber bundles, confirm that the fibers meet the proper color code and specified fiber amount (See Fig. 13).

Fig. 12

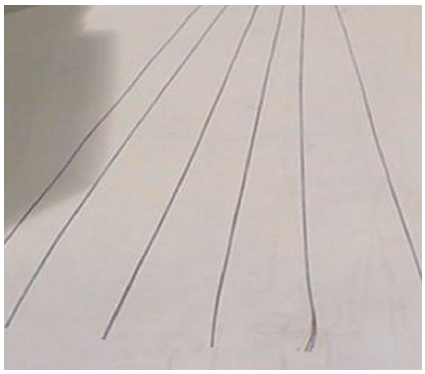
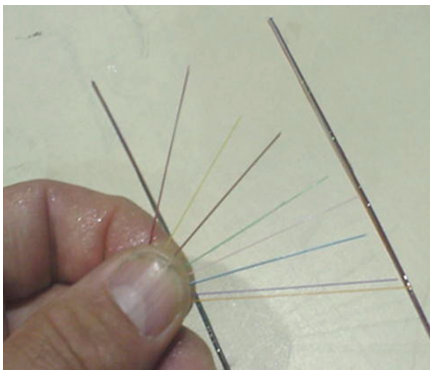


Fig. 13



7.6.6 After all of the fiber bundles have been checked, return to the fiber end closest to the buffer tube. Separate and cut both string binders approximately 12 inches from the buffer tube. Remove and dispose of the excess binder from the optical fibers (See Fig. 14). Take both remaining binders and loosely loop it through itself to form a small slipknot around the bundle they mark. Repeat this process 4 to 5 times. Cut the excess binder, approximately 1.5 inches above the knot (See Fig. 15).

Fig. 14

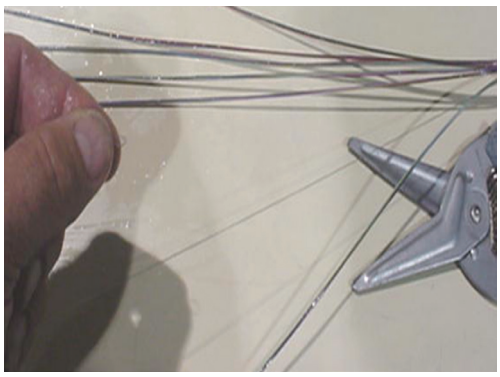
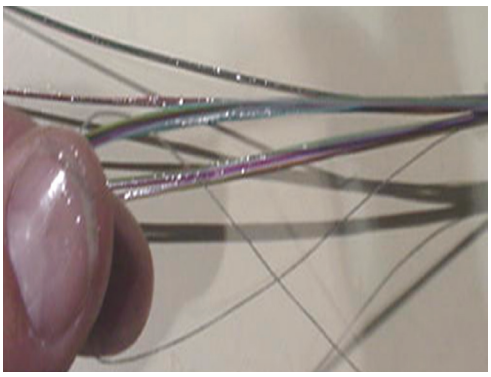


Fig. 15



7.6.7 Assure that each bundle is identifiable before continuing on to the to the next.

7.6.8 After all fiber bundles have been identified, clean each individual fiber group with a standard gel removal cleaner (See Figs. 16 and 17).

Fig. 16

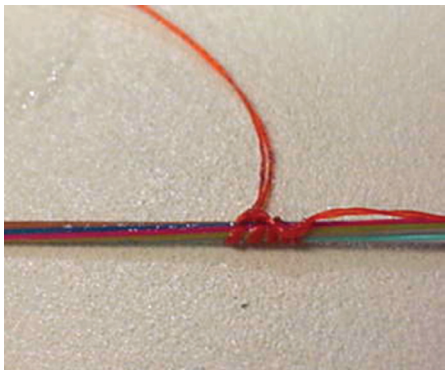
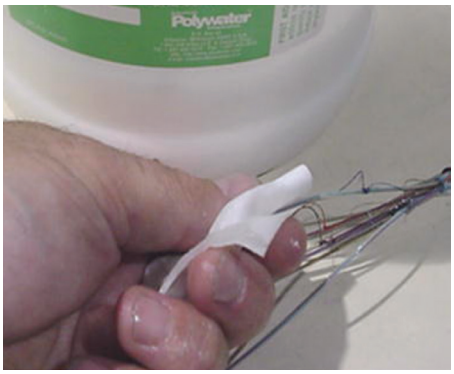
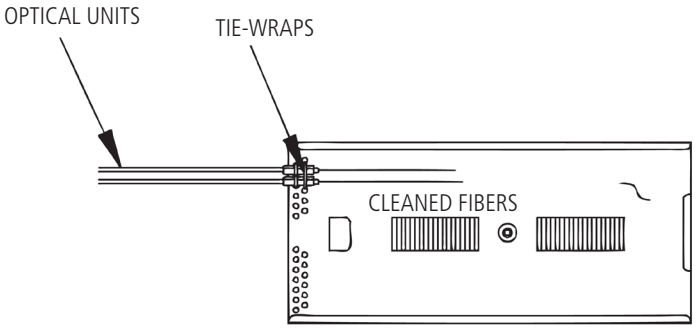


Fig. 17



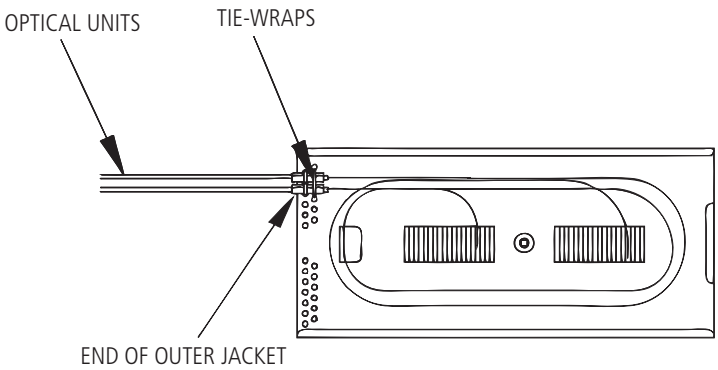
7.7 After same color optical units have been stripped, cleaned, and separated, tape the like units together by placing a piece of double-back tape ¼ inch from the end of the outer jacket material of the optical units. Place the double-back tape units onto the splice tray and secure them to the tray with tie wraps (see Fig. 18).

Fig. 18



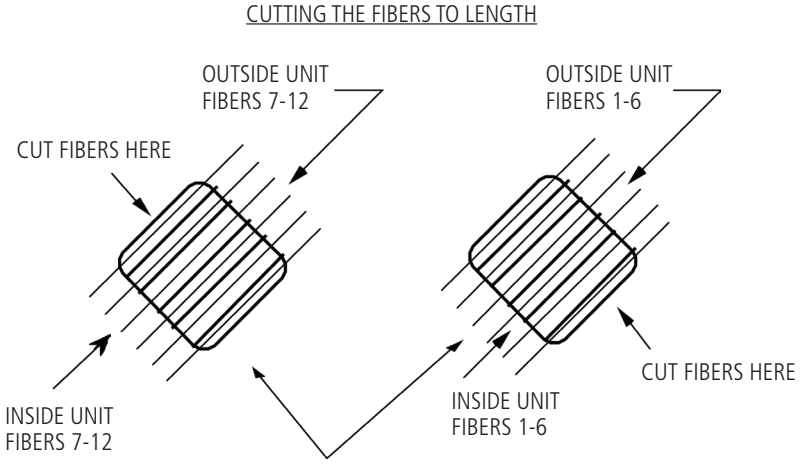
7.8 When cutting fibers to length, wrap the 4 feet of fibers of the inside units around the tray in a clockwise direction. Cut the fibers so that the spliced section will fit into the splice protector sleeve holders. Be sure that the fibers are cut and positioned in color code order. Prepare the outside unit in the same manner. The first six fibers will be shorter than the last six fibers in the outside unit. In the inside unit, the first six fibers will be longer than the last six fibers, based on a 12-fiber unit design. Place the cover onto the splice tray making sure that all of the fibers are wrapped inside the tray (see Fig. 19).

Fig. 19



7.9 Prep all trays in the same manner as in detailed in Fig. 20 before any splicing is performed. (**NOTE:** The exact arrangement may vary due to fiber count configurations.)

Fig. 20



Lay the fibers across their appropriate Splice Protector Holder and cut the fibers at the mid-point of the Splice Protector Holder.

8.0 Splicing Fibers

When splicing, follow these steps:

8.1 Splicing will be easier if the splice tray is level with the top of the splicer.

8.2 Lay out only enough fiber to cleave and place into the splicer.

8.3 Slide one splice protector sleeve over each of the fibers before making splices.

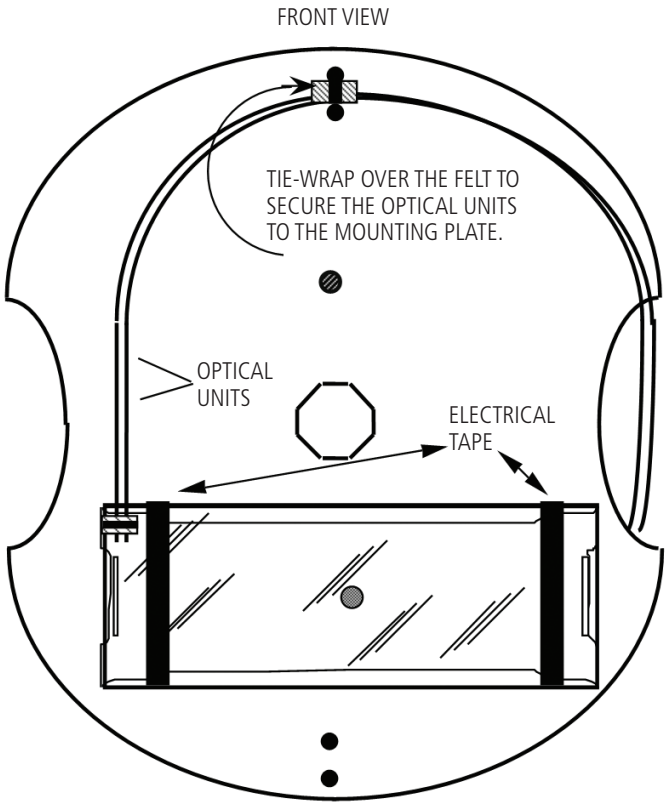
8.4 After splicing is completed and the splicing technician has accepted the splice, slide the splice protector over the spliced area and place in the tube heater. Once the splice protector has cooled and has become rigid, place and center it into splice protector holder in the tray.

8.5 After all of the fibers have been spliced, protected and positioned, make sure that all fibers are stored on the inside of the splice tray. Place the splice tray cover onto the splice tray. Secure the splice tray cover to the splice tray by wrapping both ends of the splice tray with electrical tape (See Fig. 20a).

8.6 If multiple splice trays are required, work only with one splice tray at a time.

8.7 Place the splice tray(s) on the mounting plate bolt. If multiple splice trays are present, be sure to stack all splice tray(s) on the same side of the mounting plate. Place the tension nut on the bolt and tighten it down snug. This will keep the splice tray(s) secured to the mounting plate.

Fig. 20a



8.8 Place felt around the mylar tape on both units and tie-wrap as shown in Fig. 20a above.

9.0 Installing Mounting Plate to Splice Box

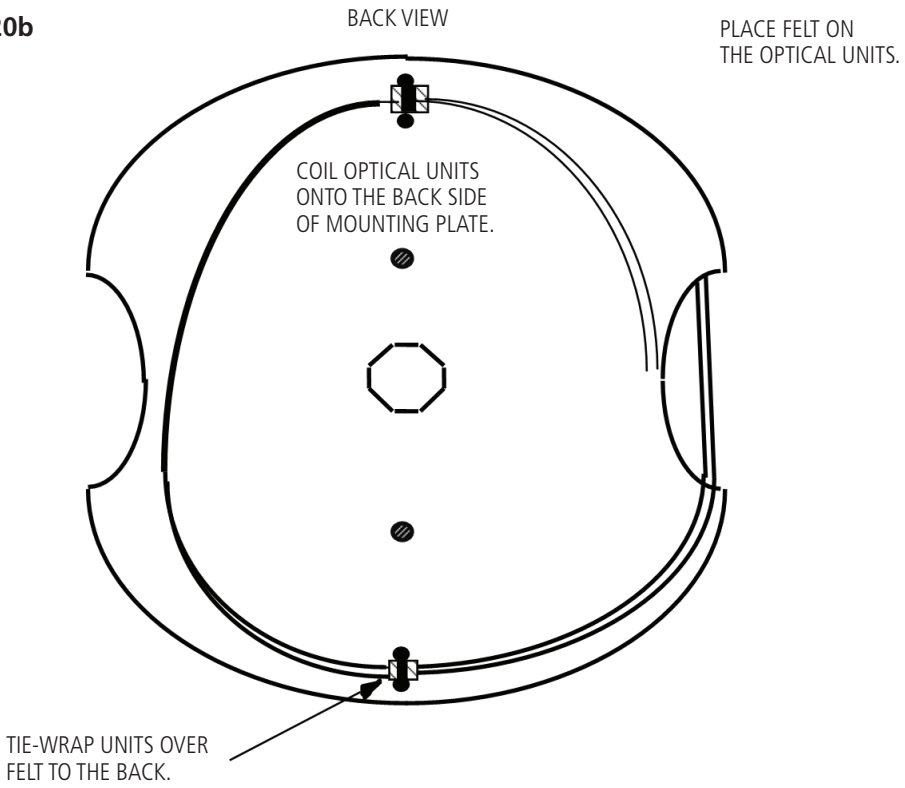
9.1 Using felt around the mylar tape, secure the optical units to the back side of the mounting plate. Tie-wrap the optical units (snug) as shown in Fig. 20b.

9.2 Coil the optical units in a counter-clockwise direction on to the back side of the mounting plate. Coil just enough of the optical units so that the mounting plate would lie on the ground. (The reason for this is to prevent a tremendous mechanical shock to the optical units in the event that the technician drops the mounting plate while coiling the optical units as he climbs the tower.)

9.3 After coiling as much of the optical units (while on the ground tie-wrap the units snug, but not too tight), continue to coil the optical units around the back side of the mounting plate about 1 inch from the edge until the splice box has been reached. Remove the temporary tape from the top front rim of the splice box. Proceed to coil the small section of optical units in a counter-clockwise direction and by aligning and positioning the mounting plate to the center shaft.

NOTE: Coiling the optical units should be done by rotating the mounting plate. This avoids twisting and stressing the fiber units (See Back View, below).

Fig. 20b



9.4 When all of the slack is coiled and stored behind the mounting plate, align the mounting plate and secure it to the center shaft by placing the spacer on the center shaft, and installing the outside retaining "clip" ring. (See Fig. 21a on following page.)

Fig. 21a

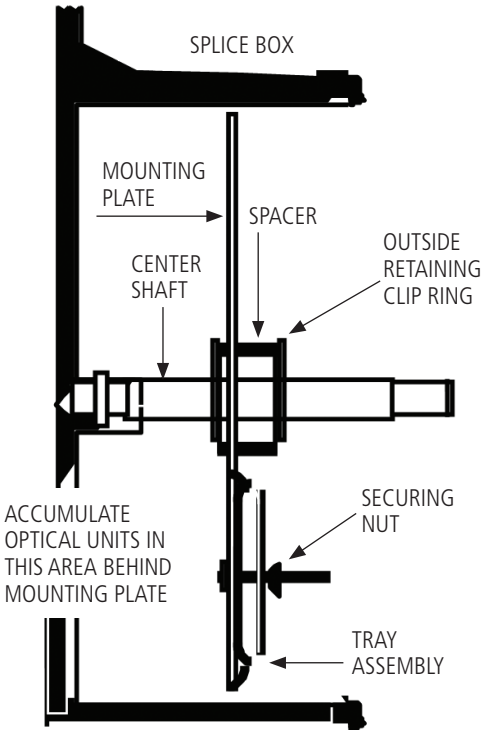
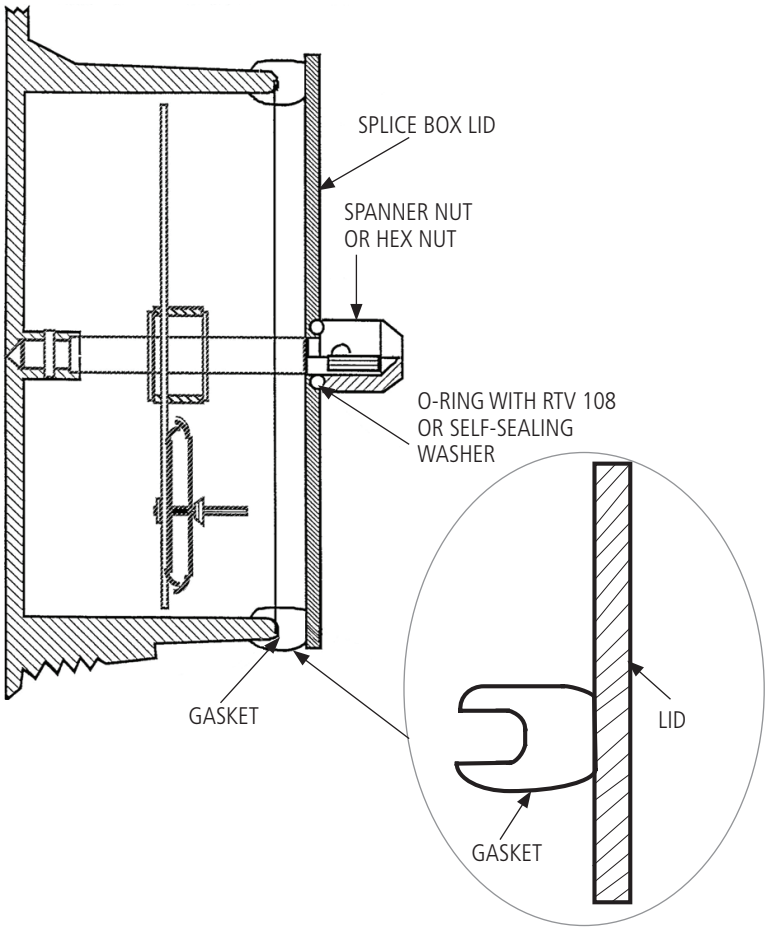


Fig. 21b



10.0 Sealing the Splice Box

10.1 Using alcohol ≥91% and a clean cloth, wipe down the inside groove (both sides) of the gasket and the inside of the splice box lid.

10.2 Place the gasket on the splice box with the beveled side on the lip of the splice box.

10.3 Place the splice box lid on the splice box.

WITH SPANNER NUT

10.5 Place the O-Ring over shaft. Cover the O-Ring with RTV. Screw the spanner nut on the shaft.

10.6 Tighten the spanner nut on the center shaft until the lid bottoms out (typically 45 ft-lbs).

WITH JAM NUT

10.5 Place the self-sealing washer over the shaft. Screw the nut on the shaft.

10.6 Tighten the spanner nut on the center shaft until the lid bottoms out (typically 45 ft-lbs).

Fig. 22

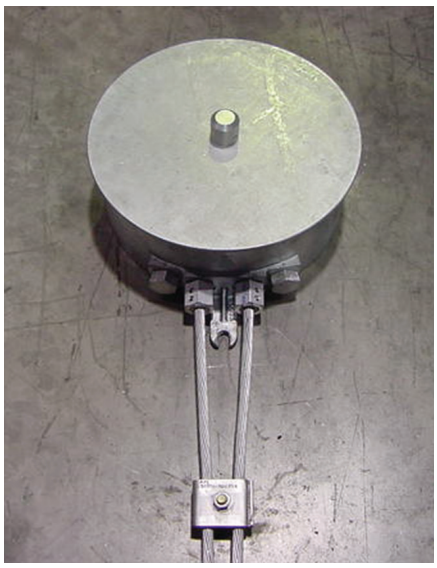
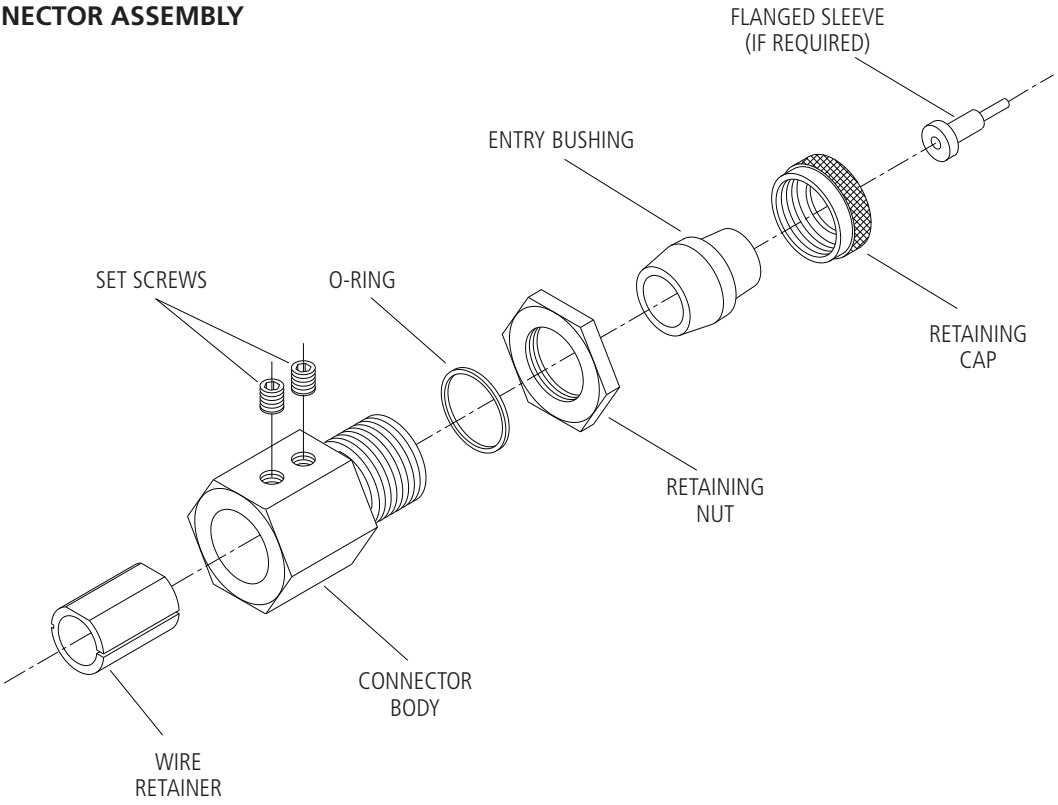


Fig. 23 CONNECTOR ASSEMBLY



Instructions for Preparing

ADSS AND UNARMORED LOOSE TUBE CABLE

IN THE SB01 SPLICE ENCLOSURE

ATTENTION:

The SB01 Splice Enclosure now includes a lid gasket that does not require RTV application. Do not apply RTV to the gasket when sealing the SB01 Splice Enclosure. See Section 10 (page 27) for updated instructions.

NOTE:

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THE SB01 SPLICE ENCLOSURE NOW INCLUDES A LID GASKET THAT DOES NOT REQUIRE RTV APPLICATION.

DO NOT APPLY RTV TO THE GASKET WHEN SEALING THE SB01 SPLICE ENCLOSURE.

SEE SEALING THE SPLICE BOX SECTION (PAGE 27)

FOR UPDATED INSTRUCTIONS.

TABLE OF CONTENTS

List of Materials

ITEM	DESCRIPTION	QTY
1	Splice Box (consisting of the following):	
	Splice Box Body	1
	CSM Termination Eye Bolt	2 or 4
	Center Shaft	1
	Cover Gasket	1
	Connector Assemblies (consisting of the following items for 1 connector):	2 or 4
	Connector Body	1
	Cable Retainer	1
	Nut Retainer	1
	Entry Bushing	1
	Set Screw – 5/16 – 18 UNC	2
	O-Ring	1
2	Organizer Tray Assembly (consisting of the following items for 1 tray):	2 to 8
	Tray	1
	Cover	1
	Splice Protector Holders (6 Splices / Holder)	2
	Manifold (MCI Tray Only)	1
3	Splice Box Cover	1
4	Spanner Nut or Hex Nut	1
5	O-Ring or Self-Sealing Washer	1
6	Retaining Rings	2
7	Tension Screw	0 to 4
8	Tension Nut	0 to 4
9	Humi – Sorb	1
10	Range-Taking Flanged Sleeve (used with FRP strength member)	0 to 4
11	Mounting Plate	1
12	Slotted Sleeve (used with OPT/GW FRP strength member)	0 to 4
13	Spacer	1
14	Splice Protector Sleeves	10 to 56

Remove all loose parts, top retaining ring, spacer, mounting plate with tray assemblies from the box. Confirm all parts are present (see List of Materials above), then place in a convenient location.

Please see supplemental instruction sheet for ST1-72 Tray installation instructions.

Items Supplied by Customer:
- Lag screws and washers (1/2 in. dia.) or hardware for attachment of assembly to pole or tower
- Silicone sealant for splice protection
- Splicer equipment

1.0 Purpose of Installation

This document describes and illustrates the installation of ADSS and/or Unarmored Loose Tube Cable into the AFL (B8424) Premounted Splice Box.

2.0 Scope

This Splice Box has the following advantages:

1. Capable of storing a minimum of 30 ft. of optical unit per ADSS and/or Unarmored Loose Tube cable inside of the (B8424) Splice Box for immediate or future splicing.

2. The (B8424) Splice Box can be premounted because of its internal unit storage capacity. Typically the Splice Box is mounted to the pole or tower 15-25 ft. (6.1 meters) from the ground.

3. Creates a neater installation of the routing of cables into the (B8424) Splice Box. This eliminates the necessity of coiling of extra cable onto the pole or tower.

3.0 Precautions

3.1 Health

Optical fibers are very thin, fragile, and sharp. Therefore, careful handling is required to avoid either damage to the delicate glass fibers or, more importantly, injury to the technician or bystander. Small fiber scraps should be deposited on strips of adhesive tape, placed in a bottle or vinyl bag, properly disposed. Do not eat or drink when working with optical fibers as small pieces of glass may inadvertently be ingested. Never look directly at the end of a fiber unless certain that no Laser Light is being transmitted through the fiber.

3.2 Work Environment

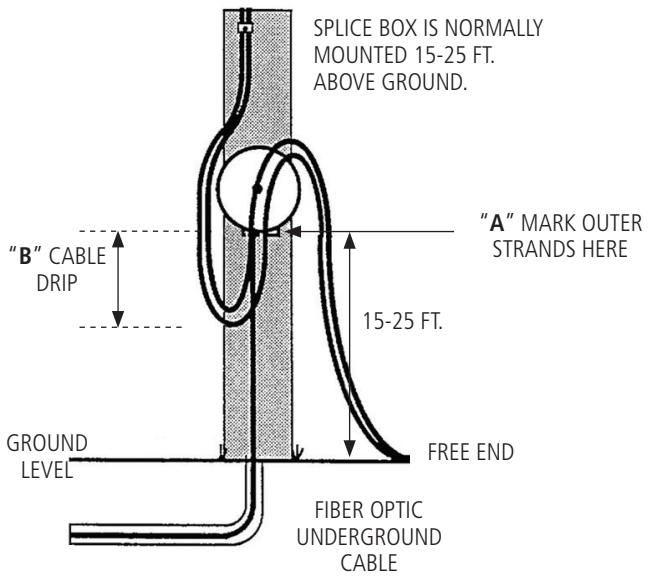
Handle optical fiber and fiber cable carefully, taking care to impose no damage by physical shock or sharp bends. During the actual splicing, care must be taken to keep hands and work area clean in order that the fibers may be kept clean. Dirty fibers mean poor splices! Keep all tools and equipment in their proper cases or storage pouches when not in use. Consideration should be given to the work area in which the splice box will be organized. A clean, snag free horizontal surface (protected from wind) is necessary.

4.0 Cable Preparation

4.1 After the stringing or pulling procedure there should be a minimum of a 100 ft. of ADSS and/or Unarmored Loose Tube cable from each pulling direction at the tower. The 100 ft. of ADSS and/or Unarmored Loose Tube cable is measured from the base of the tower.

4.2 When marking the ADSS and/or Unarmored Loose Tube cable use yellow or contrasting color tape to ad in visibility. Form the ADSS and/or Unarmored Loose Tube cable into drip loops where they will enter the connector body at the splice box. Mark the individual cables at these points. These Marks will be referenced to as Mark "A". (See Fig. 1.)

Fig. 1



4.3 Measure 30 feet from each individual ADSS and/or Unarmored Loose Tube cable from mark "A" toward the Free End. This will give 30 feet of optical units for storage and splicing.

NOTE: These measurements are based on the splice box being mounted 20 feet on the structure.

4.4 From point "A" measure 2 3/4 inches toward the loose end of the cable and carefully ring cut the cable. The ring cut will point "B" (see Figs. 2 and 3). From the ring cut to the loose end of the cable remove the outside jacket/coating. Therefore, from the loose end, expose 4-6 inches of the rip cord. Then, grip the rip cord and pull to point "B". Remove the jacket/coating.

Fig. 2

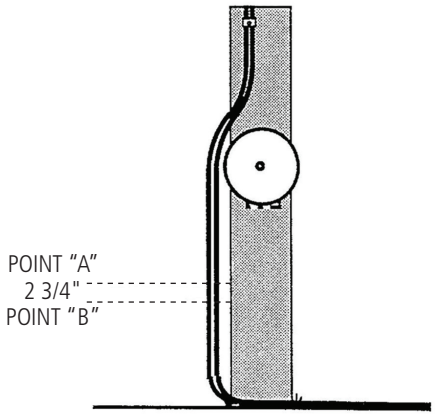
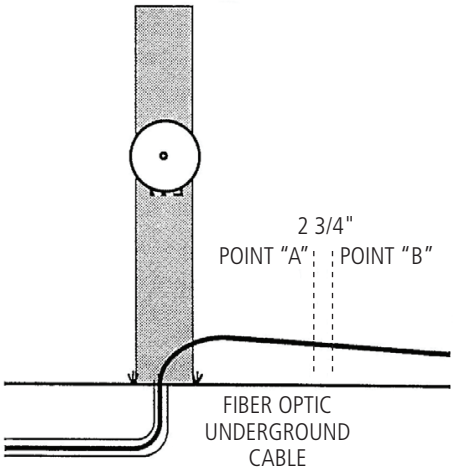
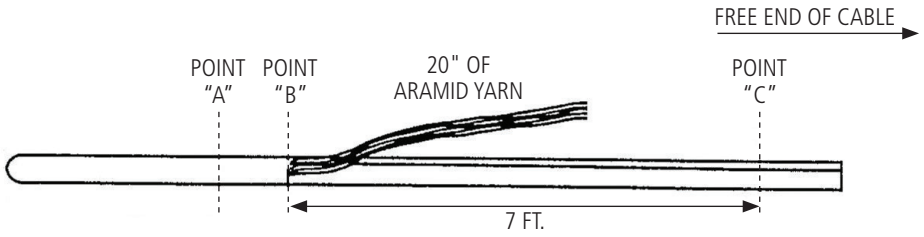


Fig. 3



4.5 If Kevlar is present leave 20 inches from point "B" toward the loose end of the cable. Cut the Kevlar at this 20 inch mark and remove from that point to the end of the cable. Should the ADSS or Loose Tube cable have a inside jacket measure from point "B" out 7 ft. toward the loose end of the cable and mark with a contrasting tape (black may be poor choice). (See Fig. 4.) Call this new point, point "C". Carefully ring cut at point "C". **DO NOT CUT** the rip cord or nick the fibers bearing tubes.

Fig. 4

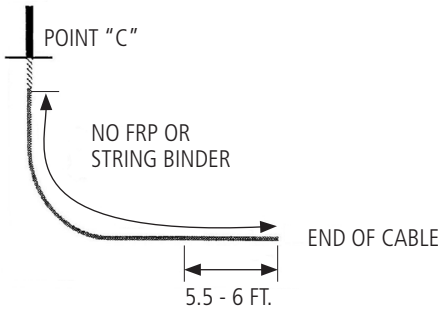


This is for the removal of the inner jacket to the loose end of the cable. Therefore at the loose end of the cable, expose 4-6 inches of the rip cord, pull this cord to Point "C" and remove this jacket.

4.6 Now remove the mylar tape and string binders. Remove short sections of the string binders from the loose end (a mono carbon cleaner works well).

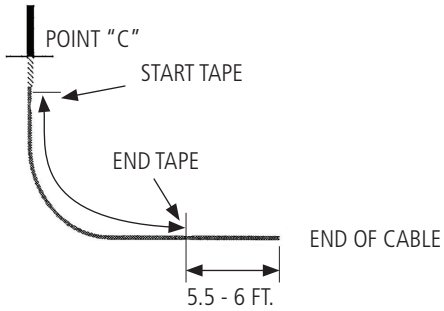
4.7 After all of the binders are removed, carefully roll out the FRP Central Member. Be very careful not to collapse the fiber bearing tubes. Remove the RFP about 1/2" (± 1/8") or 1/2" (± 5/8") from point "C". Clean and dry the area around point "C". (See Fig. 5.)

Fig. 5



4.8 With the FRP member removed and point "C" dry, retape this area in a spiral manner with a 2 ½" to 3" vinyl tape i.e., from point "C" to about 5.5 to 6 feet from the cable end. (See Fig. 6.)

Fig. 6



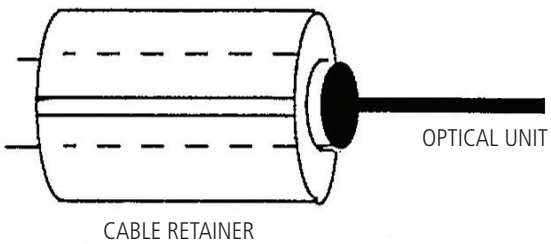
5.0 Cable to Splice Box Preparation

The section will explain how to install the cable into the splice box. This should be performed when the individual ADSS and/or Unarmored Loose Tube cable has been properly prepared.

5.1 Position the proper size cable retainer against the tape at point "A" and put a wrap or two of tape at both ends of the cable retainer on the cable only.

5.2 Install this cable into the splice enclosure until the cable retainer is properly positioned and locked in the connector body. Always be careful to support the cable while inserting it into the splice enclosure so that the tubes are not damaged in any way. (See Fig. 7).

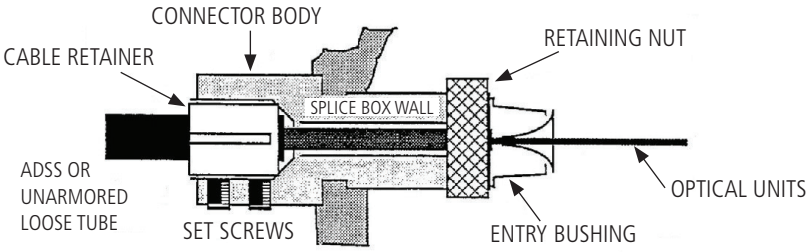
Fig. 7



5.3 This procedure must be done to each of the type of cable installed in the enclosure.

5.4 Fig. 8 below is a cross section of the cable connection inside the splice box plus a three step procedure for securing the cable to the splice box.

Fig. 8



5.5 Feed the optical units from the cable, through the connector body and entry bushing. Route the optical unit(s) so that they lay on the center shaft of the splice box during the feeding process. This will keep the optical unit(s) from kinking.

5.6 After all of the unit(s) have been fed into the enclosure insert the cable with the cable retainer into the connector body of the splice box. Make sure that the cable retainer is aligned properly and inserted completely. Tighten set screws.

5.7 Each fiber unit(s) should be supported and attached with duct tape to the outer diameter of the splice enclosure (see fig. 9) as soon as the cable has been secured into the connector body. This will secure the optical unit(s) to the splice box and prevent them from kinking.

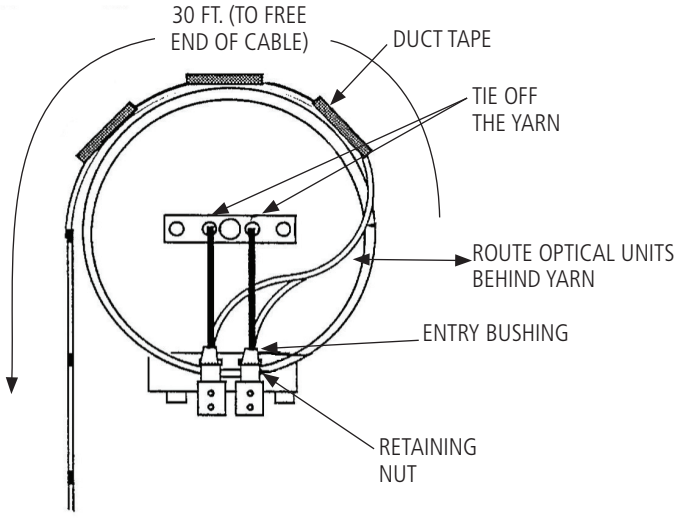
5.8 If Dielectric Cables are being used, the connector body may have a conduit fitting attached to it. To verify the cable retainer on the Dielectric cable has been aligned properly, remove the top allen screw and visually align and tighten set screws.

5.9 **Repeat all of these steps for the remaining cables that are to be installed into this particular splice location. Remember to prep only one cable at a time.**

6.0 Anchoring the Optical Units

6.1 To anchor the optical thread the yarn through the eye-bolt and tying in a series of half-hitches. Make sure that the yarn is tied off in line and to the eye bolt in the proper position from where the individual cable enters the splice box. Repeat the following steps for the remaining cable(s). Tape the optical units together after they have been secured to the eye-bolts. (See Fig. 9.)

Fig. 9



NOTE: There should be 50 ft. of optical unit(s) prepped for each individual cable that is to be inserted into the Splice Box. The 50 ft. of optical unit(s) is broken down into two sections:

1. 20 ft. from splice box to ground, and
2. 30 ft. for storing and splicing.

Should the Splice Box be mounted at a different height, then adjust the amount of cable to be prepped, stored and spliced to fit.

6.2 Tape (duct tape is recommended) the units to the top outside radius of the box. (See Fig. 9.) This will help support the units and prevent damage of the units at the bushing. Also explained in Section 5.6.

6.3 Tighten the retaining nut so that the bushing is sealed around the units.

6.4 Tape the optical units together every 2 feet. Stop taping the optical units 6 feet from the free end. Tape each individual optical unit(s) 4 ft. 10 inches from the free end. Remove the yarn and tape from the optical unit(s) from the 4 ft. 10 inch section from the free end.

7.0 Optical Unit Preparation

7.1 Starting at the Free End of one of the units, separate the individual colored units one at a time by unlaying them back to the 4 ft. 10 inch tape mark (This only applies to the multiple unit configurations). Now proceed to the other cable units and repeat the same steps.

7.2 Mark the individual colored unit(s) 4 ft. from the free end with a permanent marker. In case of multiple units pair the like colored buffers together. (For example: Match the blue units from each of the cable units. Orange to orange, green to green, etc.)

7.3 With a buffer tube cutter, ring cut the tube at the 4 ft. mark. One or two revolutions will score the tube enough. Remove the buffer tube cutter. Grip the buffer tube on either side of the scored area and bend tube back and forth until it breaks. Remove the buffer tube slowly exposing the fibers.

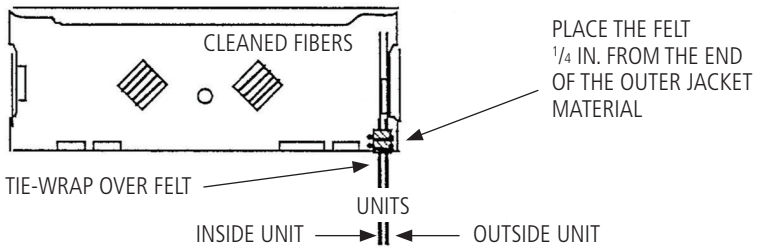
7.4 Remove the gel from the fibers.

7.5 Then verify that all fibers are identified.

7.6 After the like cable optical units (blue to blue) have been prepared, cleaned and separated, tape the blue units together by placing a piece of double-back tape 1/4 inch back from the end of the outer jacket material of the optical units. Place the double-backed section of the blue units onto the splice tray and secure them to the splice tray with tie-wraps. (See Fig. 10.) If multiple units exist, follow the same steps for the remainder of the like-colored units.

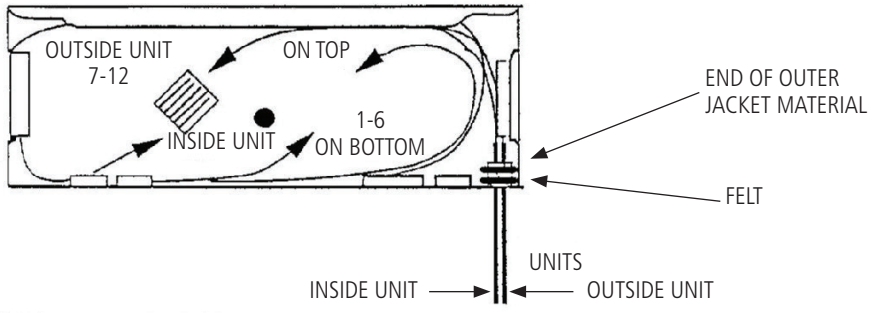
NOTE: The felt serves to cushion the optical units from the tie-wraps to be applied.

Fig. 10



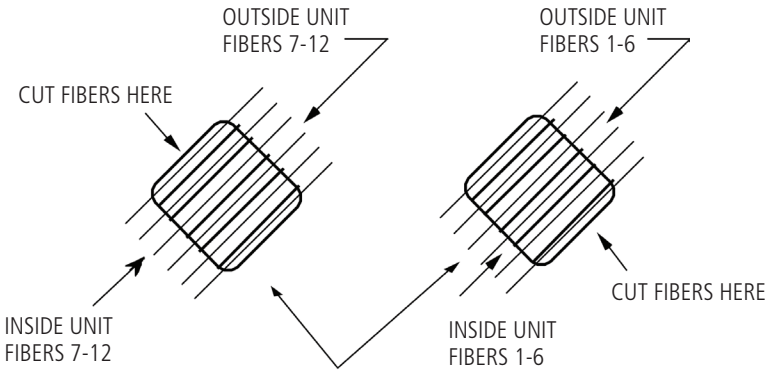
7.7 When cutting fibers to length wrap the four feet of fibers of the inside unit around the tray in a counterclockwise direction. Cut the fibers so that the splice section will fit into the splice-protector-holders. Be sure that the fibers are cut and positioned in COLOR CODE ORDER. Prepare the outside unit in the same manner. The first six fibers will be shorter than the last six fibers in the outside unit (See figure 11). The inside unit, the first six fibers will be longer than the last six fibers (this figure is based on a 12-fiber unit design). **Place the splice tray cover onto the splice tray making sure that all of the fibers are wrapped inside of the splice tray.**

Fig. 11



7.8 Prep all trays in the same manner as in (Fig. 12) before any splicing is performed. This may vary due to fiber count configurations. Lay the fibers across their appropriate Splice Protector Holder and then cut the fibers at the mid-point of the Splice Protector Holder.

Fig. 12 CUTTING THE FIBERS TO LENGTH



8.0 Splicing Fibers

When splicing, follow these steps:

8.1 Splicing will be easier if the splice tray is level with the top of the splicer.

8.2 Lay out only enough fiber to cleave and place into the splicer.

8.3 Slide splice protector sleeve over one of the fibers BEFORE STRIPPING, CLEANING, CLEAVING AND LOADING INTO SPLICER.

8.4 After splicing is completed and the splice has been accepted by the splicing technician, slide the splice protector over the spliced area and place in the tube heater. Once the splice protector has cooled and has become rigid, place and center it into splice protector holder in the tray.

8.5 After all of the fibers have been spliced, protected and positioned, make sure that all fibers are stored on the inside of the splice tray. Place the splice tray cover onto the splice tray. Secure the splice tray cover to the splice tray by wrapping both ends of the splice tray with electrical tape. (See Front View, Fig. 12a, on following page).

8.6 If multiple splice trays are present, work only with one splice tray at a time. Make sure that Step 8.5 is completed before continuing to the remaining trays.

8.7 Place the splice tray(s) on the mounting plate bolt. If multiple splice trays are present, be sure to stack all splice tray(s) on the same side of the mounting plate. Place the tension nut on the bolt and tighten it down snug. This will keep the splice tray(s) secured to the mounting plate.

Fig. 12a FRONT VIEW

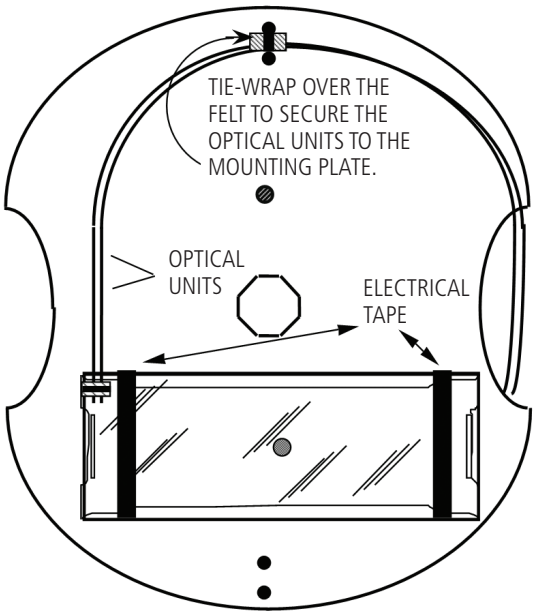
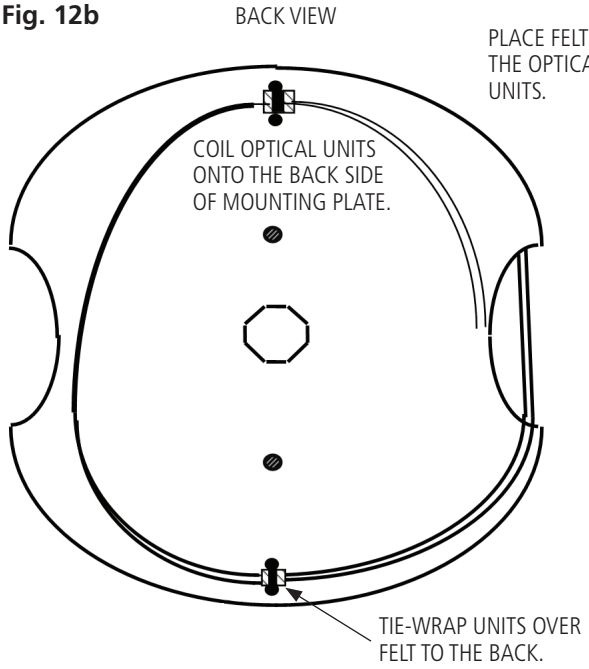


Fig. 12b BACK VIEW



8.8 Place felt around the mylar tape on both units and tie-wrap as shown on the Front View in Fig. 12a above.

9.0 Installing Mounting Plate to Splice Box

9.1 Using double-back tape, secure the optical units to the back side of the mounting plate. Tie-wrap the optical units (snug) as shown in Fig. 12b above.

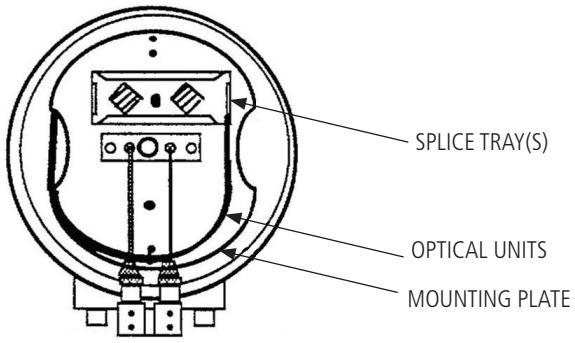
9.2 Coil the optical units in a counter-clockwise direction on to the back side of the mounting plate. Coil just enough of the optical units so that the mounting plate would lie on the ground. (The reason for this is to prevent a tremendous mechanical shock to the optical units in the event that the technician drops the mounting plate while coiling the optical units as he climbs the tower.)

9.3 After coiling as much of the optical units (while on the ground, tie-wrap the units snug, but not too tight), continue to coil the optical units around the back side of the mounting plate about 1 inch from the edge until the splice box has been reached. Remove the duct tape from the top front rim of the splice box. Proceed to coil the small section of optical units in a counter-clockwise direction and by aligning and positioning the mounting plate to the center shaft.

NOTE: Coiling the optical units should be done by rotating the mounting plate. This avoids twisting and stressing the fiber units. (See Back View, Fig. 12b, above).

9.4 When all of the slack is coiled and stored behind the mounting plate, align the mounting plate and secure it to the center shaft by placing the spacer on the center shaft and installing the outside retaining clip ring (See Fig. 13).

Fig. 13



9.5 When all of the slack is coiled and stored behind the mounting plate, align the mounting plate and secure it to the center shaft by placing the spacer on the center shaft, and installing the outside retaining "clip" ring. (See Fig. 14 below left.)

Fig. 14

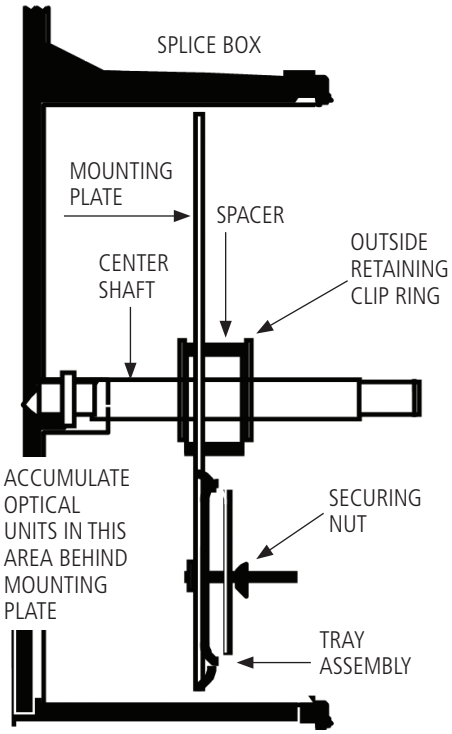
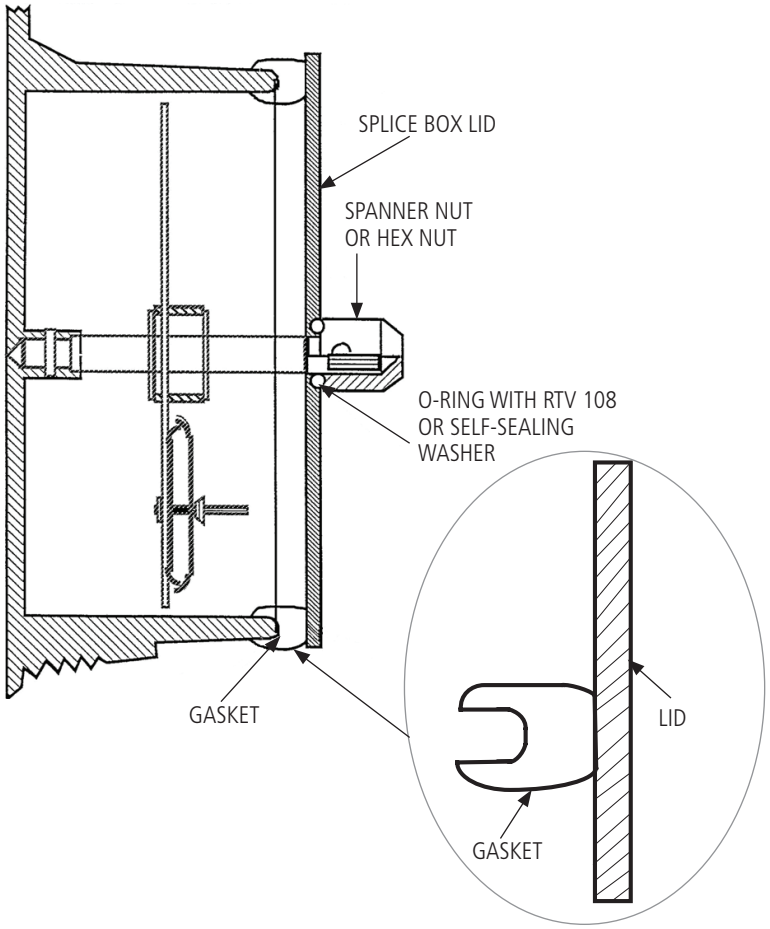


Fig. 15



10.0 Sealing Splice Box

10.1 Using alcohol ≥91% and a clean cloth, wipe down the inside groove (both sides) of the gasket and the inside of the splice box lid.

10.2 Place the gasket on the splice box with the beveled side on the lip of the splice box.

10.3 Place the splice box lid on the splice box.

WITH SPANNER NUT

10.4 Place the O-ring over shaft. Cover the O-ring with RTV. Screw the spanner nut on the shaft.

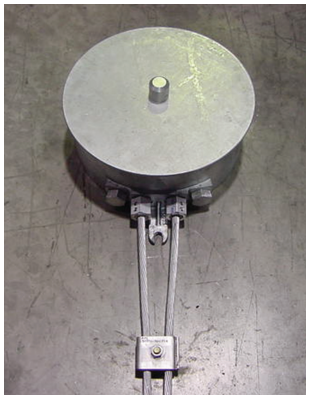
10.5 Tighten the spanner nut on the center shaft until the lid bottoms out (45 ft-lbs).

WITH JAM NUT

10.4 Place the self-sealing washer over the shaft. Screw the nut on the shaft.

10.5 Tighten the spanner nut on the center shaft until the lid bottoms out (45 ft-lbs).

Fig. 16



Instructions for Preparing

AFL HEXACORE, CENTRACORE AND MINICORE

OPTICAL GROUND WIRE

IN THE SB01 SPLICE ENCLOSURE

(STAINLESS STEEL TUBE CABLE DESIGNS)

ATTENTION:

The SB01 Splice Enclosure now includes a lid gasket that does not require RTV application. Do not apply RTV to the gasket when sealing the SB01 Splice Enclosure. See Section 18 (page 44) for updated instructions.

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THE SB01 SPLICE ENCLOSURE NOW INCLUDES A LID GASKET THAT DOES NOT REQUIRE RTV APPLICATION.

DO NOT APPLY RTV TO THE GASKET WHEN SEALING THE SB01 SPLICE ENCLOSURE.

SEE SEALING THE SPLICE BOX SECTION (PAGE 44) FOR UPDATED INSTRUCTIONS.

TABLE OF CONTENTS

List of Materials

ITEM	DESCRIPTION	QTY
1	Splice Box (consisting of the following):	
	Splice Box Body	1
	CSM Termination Eye Bolt	2 or 4
	Center Shaft	1
	Cover Gasket	1
	Connector Assemblies (consisting of the following items for 1 connector):	2 or 4
	Connector Body	1
	Cable Retainer	1
	Nut Retainer	1
	Entry Bushing	1
	Set Screw – 5/16 – 18 UNC	2
	O-Ring	1
2	Organizer Tray Assembly (consisting of the following items for 1 tray):	2 to 8
	Tray	1
	Cover	1
	Splice Protector Holders (6 Splices / Holder)	2
	Manifold (MCI Tray Only)	1
3	Splice Box Cover	1
4	RTV – 108 Adhesive	1
5	Spanner Nut or Hex Nut	1
6	O-Ring or Self-Sealing Washer	1
7	Retaining Rings	2
8	Tension Screw	0 to 4
9	Tension Nut	0 to 4
10	Humi – Sorb	1
11	Range-Taking Flanged Sleeve (used with FRP strength member)	0 to 4
12	Mounting Plate	1
13	Slotted Sleeve (used with OPT/GW FRP strength member)	0 to 4
14	Spacer	1
15	Splice Protector Sleeves	10 to 56

Remove all loose parts, top retaining ring, spacer, mounting plate with tray assemblies from the box. Confirm all parts are present (see List of Materials above), then place in a convenient location.

Please see supplemental instruction sheet for ST1-72 Tray installation instructions.

Items Supplied by Customer:

- Lag screws and washers (1/2 in. dia.) or hardware for attachment of assembly to pole or tower
- Silicone sealant for splice protection
- Splicer equipment

Please see supplemental instruction sheet for ST1-72 Tray installation instructions.

1.0 Purpose of Installation

The purpose of installing optical cables into a splice enclosure is to connect the individual fibers of the cables providing a continuous light path while protecting the connection in a sealed enclosure.

2.0 Scope

This document describes and illustrates the installation of the HFC stainless steel tube Optical Ground Wire (OPGW) into the AFL SBO1 splice enclosure.

3.0 Precautions

3.1 Health

Optical fibers are very thin, fragile and sharp. Therefore, careful handling is required to avoid either damage to the delicate glass fibers, or more importantly, injury to the technician or bystander. Small fiber scraps should be deposited on strips of adhesive tape, placed in a bottle or vinyl bag and properly disposed. Do not eat or drink when working with optical fibers as small pieces of glass may inadvertently be ingested. Never look directly at the end of a fiber unless certain that no laser light is being transmitted through the fiber.

3.2 Work Environment

Handle optical fiber and cable carefully, taking care to impose no damage by physical shock or sharp bends. During the actual splicing, care must be taken to keep hands and work area clean in order that the fibers may be kept clean. Keep all tools and equipment in their proper cases or storage pouches when not in use. Consideration should be given to the work area in which the enclosure will be organized. A clean, snag-free horizontal surface protected from the wind is necessary.

4.0 Cable Preparation at Towers

4.1 After the stringing procedure, a minimum of 75 feet (per 7.0 install) of OPGW should remain at the base of the structure for prepping and splicing purposes. If a service loop is required, calculate the excess cable that will be needed for this procedure prior to the time of installation.

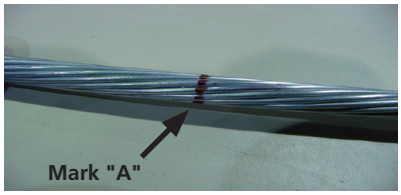
Note: If the cable at the structure was located on the pulling end, remove the first 10 feet due to potential damage.

4.2 Prior to installing the OPGW into the AFL splice enclosure, the mounting location of the splice enclosure needs to be determined. This will determine the amount of cable that will be needed to reach the prepping and splicing area.

4.3 Determine which of the two cables will be permanently mounted closest to the outside of the tower. Mark this cable with tape for identification purposes.

4.4 Measure both cables back 10.5 feet on the SB01 enclosure and the ST1-72 Tray.. This length allows for the furcation of the tubes and 6.5 feet of fiber in the splice trays. At this point, place a mark on the cable that will be permanently mounted closest to the inside of the tower. After marking the cable, measure approximately 6 to 8 inches toward the free end of the cable and mark the remaining cable. The outside cable will always need to be the longer of the two cables in order to provide proper routing of the cables onto the tower. Each cable mark should be a straight and continuous circle around the cable strands (see Fig. 1). These Marks will be referenced as Mark "A". Mark "A" is eventually where the outer strands of the OPGW cables will enter the splice enclosure.

Fig. 1



Note: Mark "A" is the actual measured length of the cable to the bottom of the connector body as if the enclosure were mounted at the final structure location.

5.0 Preparation of the Splice Enclosure

This section will explain the necessary adjustments and accessories that need to be performed prior to the actual installation of the optical units into the enclosure.

5.1 With the use of a wrench, turn the termination eyebolts by 90 degrees in a counter clockwise direction as shown in Fig. 2. After this procedure, the eyebolts should be oriented as shown in Fig. 3.

Fig. 2

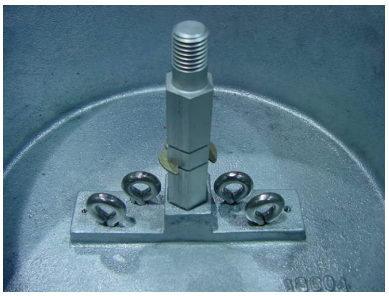
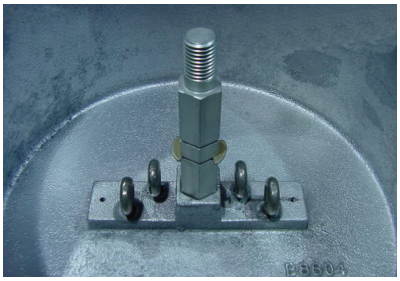
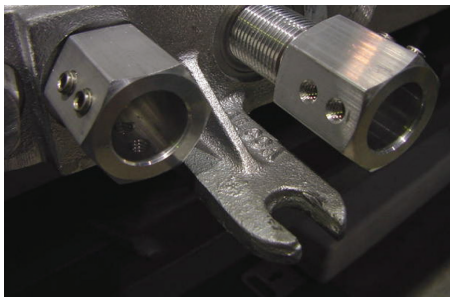


Fig. 3



5.2

Fig. 4



1. Remove the cable retainers (wire retainer) from each connector body.
2. Check the side of each cable reatiner to compare the cable range to the actual diameter of the cable.
3. Remove the set screws from the connector body.
4. Be sure that the Red O-ring is clean and is properly in position prior to tightening the connector Body.
5. Place and tighten the connector bodies into the two center splice enclosure ports (see Fig. 4)
6. Re-enter the set screws into the connector bodies

6.0 Securing the Optical Ground Wire Samples

6.1 Place a hose clamp or tie wrap around the cable approximately 2 feet behind Mark A (see Fig. 5). This secures the outer strands from unlaying during subsequent handling of the cable. Secure both cables to a workbench or table so that they are held rigidly in place (see Fig. 6). The use of a range taking tower guide clamp attached to a workbench is an adequate means of stabilizing the cable.

NOTE: The remaining cable preparation instructions will be as follows:
HexaCore–Stranded Stainless Steel Design: section 7.0 - 7.4
CentraCore–Stainless Steel Tube in Pipe Design: section 8.0 - 8.5

Fig. 5

Fig. 6

7.0 HexaCore: Removal of Outer / Inner Strands – Stranded Stainless Steel Tube Design

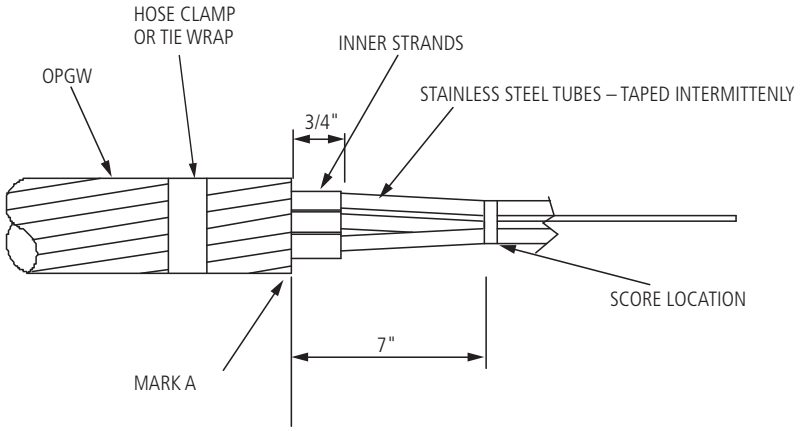
7.1 Unlay the outer strands from the free end past the Mark "A." Evenly cut each individual wire strand at Mark "A" (see Figs. 7 and 8). Be careful not to nick, cut or pry against the stainless steel tubes when unlaying and cutting the outer strands. After all outer wires have been cut at Mark A, fan the remaining length of outer wires back to the hose clamp or tie wrap located 2 feet behind Mark A. This will allow access to the inner layer of strands and stainless steel tubes. Approximately 10 inches back from Mark A, temporarily wrap electrical tape around the inner layer of strands. Replace outer strands to their original lay around the inner strands.

Fig. 7

Fig. 8

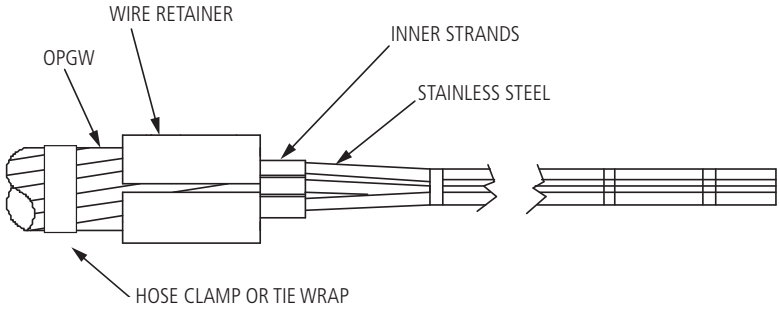
7.2 Measuring from the ends of the outer strands toward the free end, mark the inner wires at 3/4 inch, then mark each of the stainless steel tubes at 7 inches. After marking the cut location, uncoil both the outer and inner wire strands several inches past the 3/4 inch mark. Cut the inner layer of the wire strand at the 3/4 inch mark. Remove the black electrical tape that was placed on the cable in section 7.1. Reform both layers of wire strands back together and move the hose clamp or tie wrap closer to the end s of the wire strands as shown in Fig.9. If using an AFL tube straightener, refer to Appendix A.

Fig. 9



7.3 Slide the proper size wire retainer over the outer strands. Position flush with the cut ends of the outer layer (see Fig. 10).

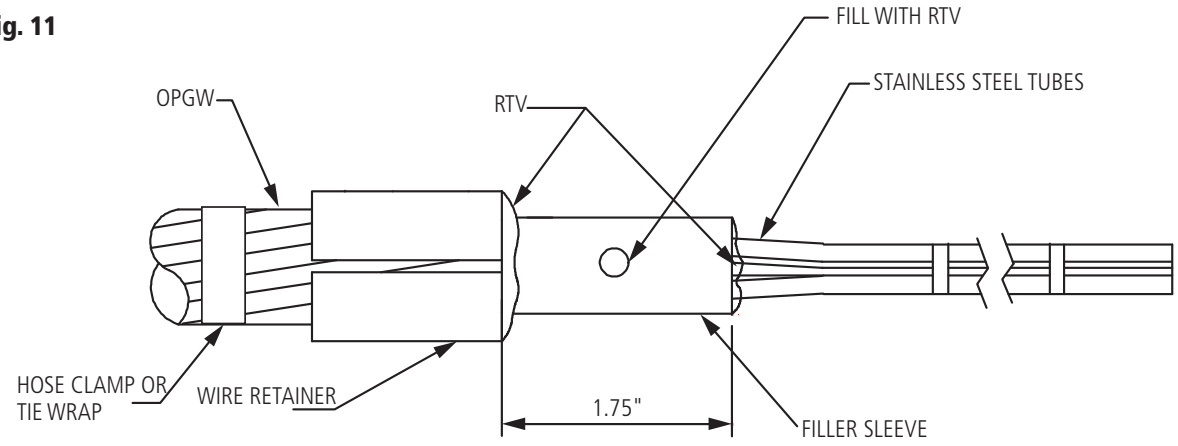
Fig. 10



Note: The hose clamp or tie wrap can be removed after the wire retainer has been applied

7.4 Place a bead of silicone on the outer layer wire tips and around the inner strands to fill all voids. Slide the filler sleeve over the stainless steel tubes and inner strands. While holding sleeve in place, insert silicone into the filler sleeve hole until silicone comes out of the end of the sleeve (see Fig. 11). Rotate the sleeve 180° and again insert silicone until it extrudes out end of sleeve. This will ensure more complete filling of the space within the sleeve.

Fig. 11



8.0 CentraCore: Removal of Outer Strands / Aluminum Pipe – Stainless Steel Tube in Aluminum Pipe Design

8.1 Unlay the outer strands from the free end back to Mark "A" and cut (see Figs. 12 and 13).

Fig. 12

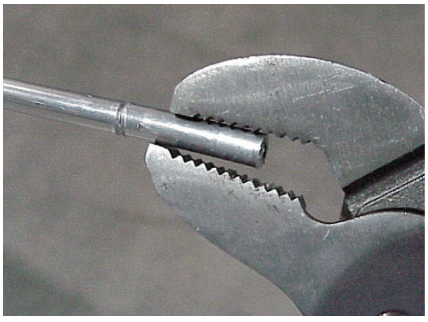
Fig. 13

8.2 After all outer wires have been cut at Mark A; slide the proper wire retainer over the aluminum pipe and onto the outer wire strands. Position the retainer flush with the cut ends of the outer layer.

8.3 With the use of tubing cutter, score and remove approximately 1 3/4 inches of aluminum pipe from around the stainless steel tube. This procedure will provide a clean cut for the movement of the remaining aluminum tube (see Figs. 14 and 15).

Fig. 14

Fig. 15



8.4 Two procedures can be used to perform this process:
1. Using a tubing cutter, score the aluminum pipe in 6 to 10 inch sections. Lightly flex the aluminum pipe back and forth until the bond between the two sections is broken. slide or remove the aluminum pipe down or off.

2. Using a tubing cutter, score the aluminum pipe at 6 to 10 inch sections. Using two pairs of plyers, place one on each side of the scored area. Move the plyers slightly in opposite directions several times until the bond between the two sections is broken. Slide or remove the aluminijm pipe down or off.

Fig. 16A

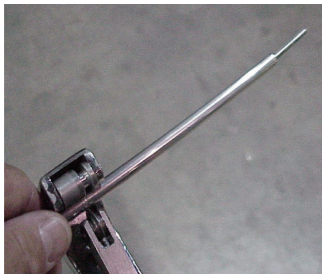
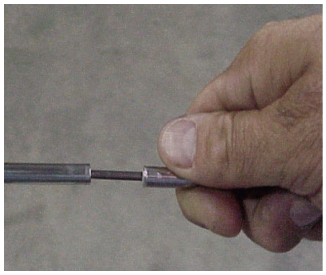


Fig. 16B

Fig. 16C



8.5 All remaining aluminum pipe sections except for a 2" portion shall be ring cut and slid to the end/or removed from the stainless steel tube in 6 to 10 inch sections (see Figs. 17and 18). Always maintain control of the sample to prevent kinking of the stainless steel tube.

Fig. 17

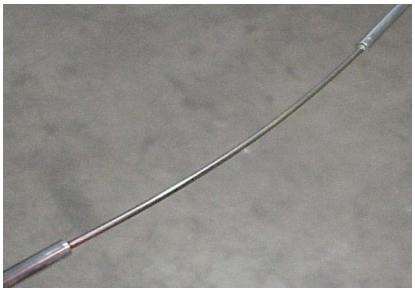
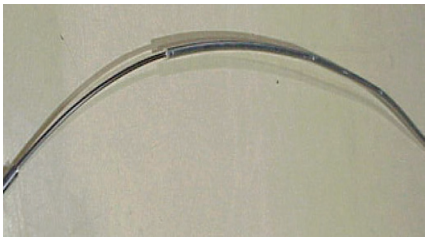


Fig. 18



8.6 Place a mark on the stainless steel tube that represents the removal location.

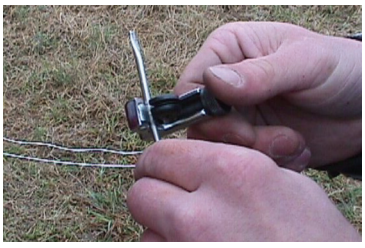
9.0 Removal of Stainless Steel Tube(s)

NOTE: Certain required components listed in these instructions, such as transition tubing and labels, are available and sold separately in AFL part number OGF01 Furcation Kit.

9.1 This step involves scoring the stainless steel tube(s). Practice scoring, flexing, and snapping the stainless steel tube on a scrap piece of cable. Practicing this procedure helps ensure that the optical fibers are not damaged during tube removal (see Fig. 20).

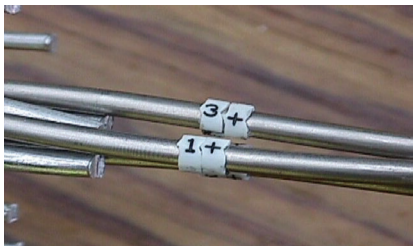
9.2 From the scored location (7") on the stainless steel tube(s), mark each tube at approximately 4-foot increments. Always label each tube with some form of identification (i.e., wire markers, colored pen marks, etc). Before removing see Fig. 21.

Fig. 20 CentraCore:



Final scoring location:

Fig. 21 HexaCore:



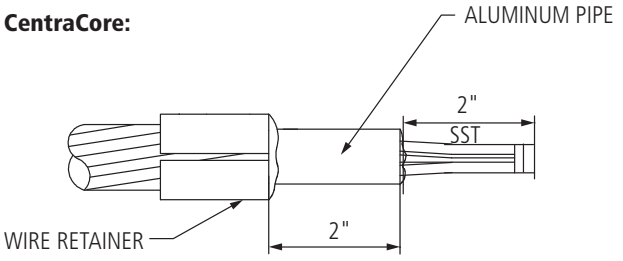
Note: AFL sells number stickers and not snap on numbers.

9.3 Choose a stainless steel tube and carefully score it at the mark closest to the free end. Flex the tube at the scored location in order to snap and separate the tube. Continue to score and remove each 4-foot piece of tube until the tube is removed.

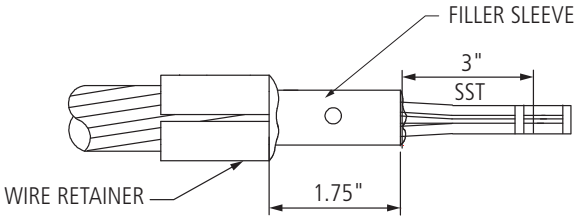
NOTE: Special care should be taken to ensure that the fibers do not scrape against the ends of the tubes during the removal process.

9.4 Cut a 2" length of the heat shrink tubing for each stainless steel tube. Slide the heat shrink tubing over the fibers and 1" of the stainless steel tube (see Fig. 22). If the pipe can be completely removed, slide the heat shrink tubing over the stainless steel tube prior to being removed.

CentraCore:

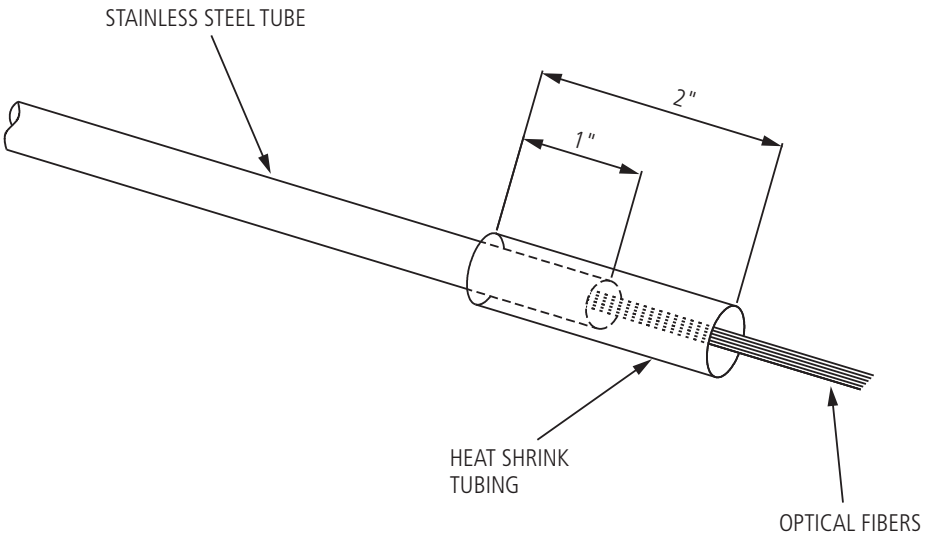


HexaCore:



9.5 Using a heat gun, evenly shrink the tubing around the stainless steel tube and fibers. The heat shrink tube will not shrink onto the fibers. Special care should be taken to ensure that the hot air blast does not remain on the optical fibers for an extended period. Allow the tubing to cool for approximately 5 minutes.

Fig. 22



10.0 Placement of the Transition Tubing

In order to protect the fiber as it is routed from the end of the stainless steel tube to a splice or transition tray, an approximate 6.5-foot (ST01-72 Tray) length of primary transition tubing should be used. Cut and slide this primary transition tubing over the fibers, fitting it snugly around the heat shrink tubing at the mouth of the stainless steel tube (see the FRP/transition tubing procedure).

11.0 Identifying Fiber Groups

11.1 Lightly run a clean wipe over the surface of the fibers to remove the excess gel (see Fig. 23). Do not use a cleaner.

11.2 Starting at the end closest to the stainless steel tube, separate the fibers until you can identify the colored string binders (see Fig. 24).

NOTE: AFL optical ground wires use two colored thread binders to identify each group of twelve fibers in each stainless steel tube. This built-in redundancy makes for a fail-safe method to identify fiber groups in the unlikely event that any binders should break.

Fig. 23

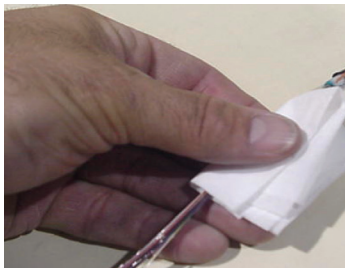
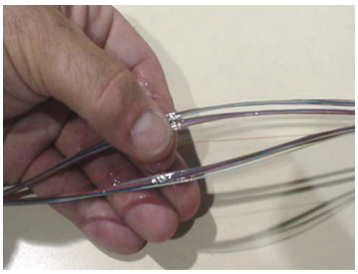


Fig. 24



11.3 Locate one of the colored string binders then lightly pull it until the bundle starts to separate from the other fibers (see Fig. 25 and 26).

11.4 Once a single bundle has been identified, inspect the bundle for the matching color prior to separating the fibers from the other bundles. Once you have identified that both binders are around the same fiber group, count and identify the number of fibers and confirm that they meet the standard color code (see Fig. 27). Separate the unit from the other fibers (see Fig. 28).

Fig. 25

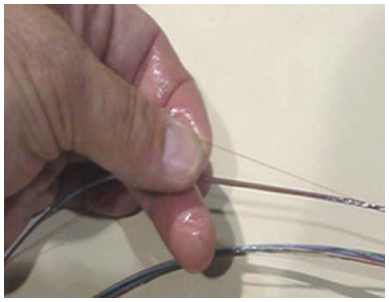
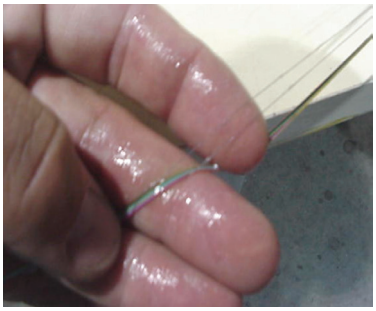


Fig. 26



11.5 Repeat steps 10.3 through 10.4 on each of the fiber bundles. Separate each group of bundled fibers to assure easy identification (see Fig. 27).

Fig. 27

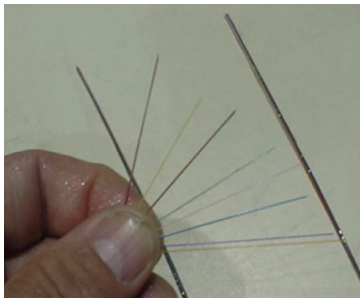
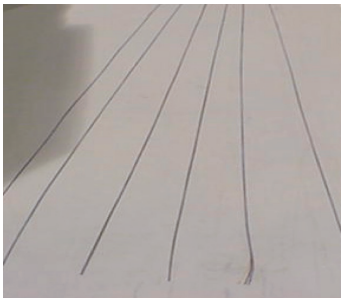


Fig. 28



11.6 The knot is used to identify the indivual units after cleaning. Once the fiber groups have been identified, cut the binders at approximately 4 inches from the stainless steel tub (1 group at a time). Place several half hitch knots around the fiber group for identification. Remove the remaining binders from the group (see Fig. 34 and 35).

12.0 Cleaning the Optical Units

Clean each fiber group with a qualified fiber cleaner.

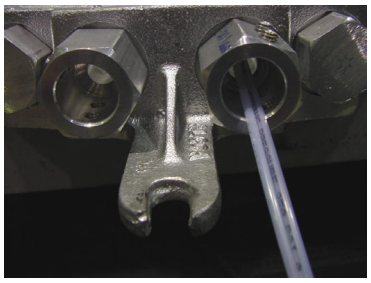
13.0 Placement of the Transition Tubing

13.1 Place a bead of RTV silicone on the wire tips located at the cable retainer (CentraCore Designer).

13.2 Verify which side of the enclosure the transition tubing will be placed in.

13.3 Feed the fiber, transition tubing and stainless steel tube through the connector body (see Fig. 29). Route the transition tubing so that the optical fibers don't get damaged during the feeding process.

Fig. 29



13.4 After all of the unit(s) have been fed into the enclosure, insert the OPGW cable and cable retainer into the connector body of the splice box. Make sure that the cable retainer is aligned properly with the flat portion being inline with the set screws. Be sure the cable retainer is inserted completely. Firmly tighten each setscrew during the unit installation and again after the completion of the splicing (see Figs. 30A and 30B).

Fig. 30A

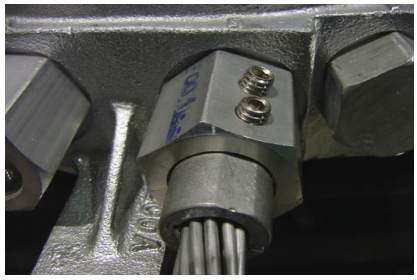
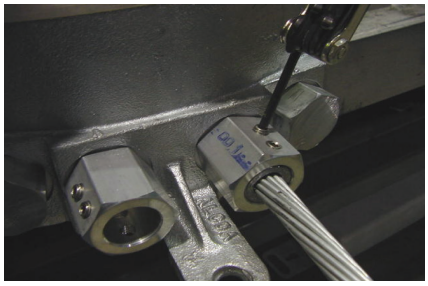
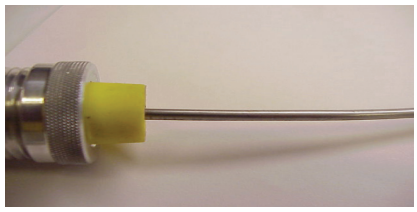


Fig. 30B



13.5 Slide the bushing and retaining nut over the fibers and transition tubing. Tighten the retaining nut so that the bushing is sealed around the pipe and or tube(s) (see Fig. 31).

Fig. 31



14.0 Placement of Optical Fibers in Transition Tubing / Trays (12F Tray Application)

14.1 Route the primary transition-tubing counter clockwise in the box to a splice / transition tray (see Figs. 32 and 33). Secure the tubing to the tray. In the case of two high fiber count optical ground wire cables being spliced together it is advisable to use the same transition tray for the two stainless steel tubes being spliced. Ensure that all tubing is clearly marked for ease of identification.

Fig. 32

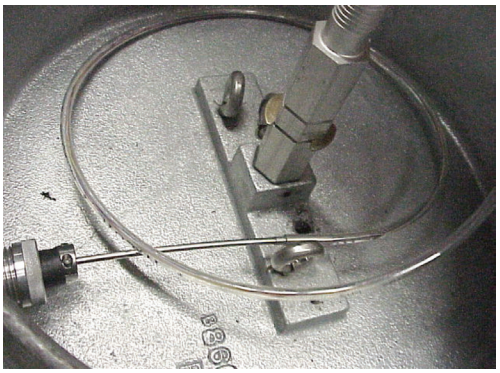
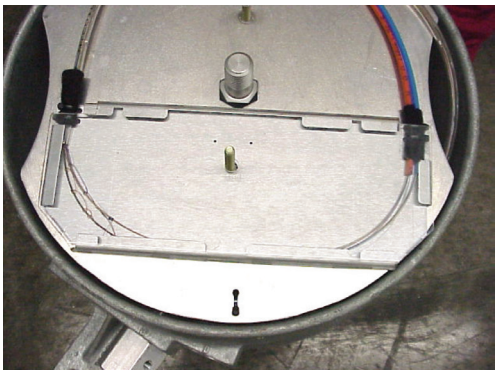


Fig. 33



14.2 If furcation (subdividing a large group of fibers into smaller groups) is required, use the transition tray to segregate the fibers into smaller bundles (see Fig. 33). A length of secondary transition tubing approximately 21 inches long is sufficient to route the fiber from the transition tray, into the actual splice tray. One tray will be needed for each sub-group of fibers.

14.3 If furcation is required, the following method is used to segregate the fibers into individual bundles.

1. Remove the individual fiber group from within the transition tray.

2. Separate each bundle and cut both string binders approximately 4 inches from the stainless steel tube.

3. Remove and dispose of the excess binder from the optical fibers.

4. Take both remaining binders and loosely loop it through itself to form a small half hitch knot around the bundle they mark (see Figs. 34 and 35).

5. Cut the excess binder off approximately 1.0" above the new half hitch knot.

6. Repeat this method for each high fiber count stainless steel tube.

7. If further cleaning of the fibers is necessary, use a standard gel remover cleaner.

Fig. 34

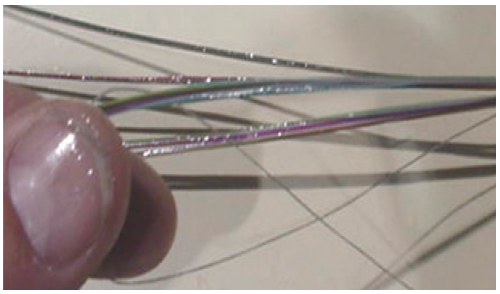
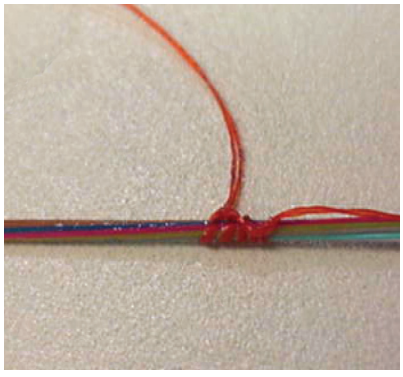


Fig. 35

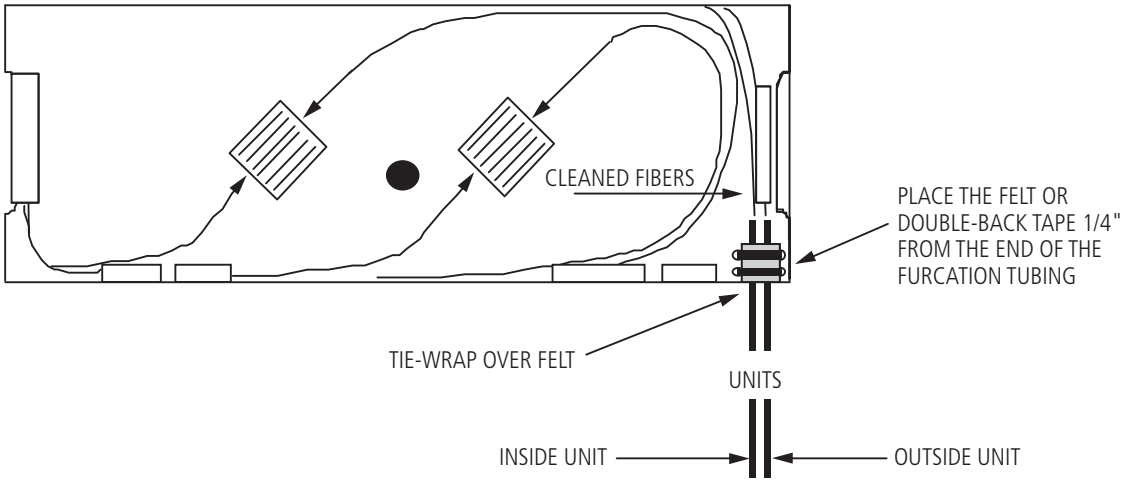


14.4 Slide the secondary transition tubing (approx. 21") over each sub-group of fibers. Identify each unit color and secure the tubing to the transition tray (see Fig. 33).

15.0 Optical Unit Preparation

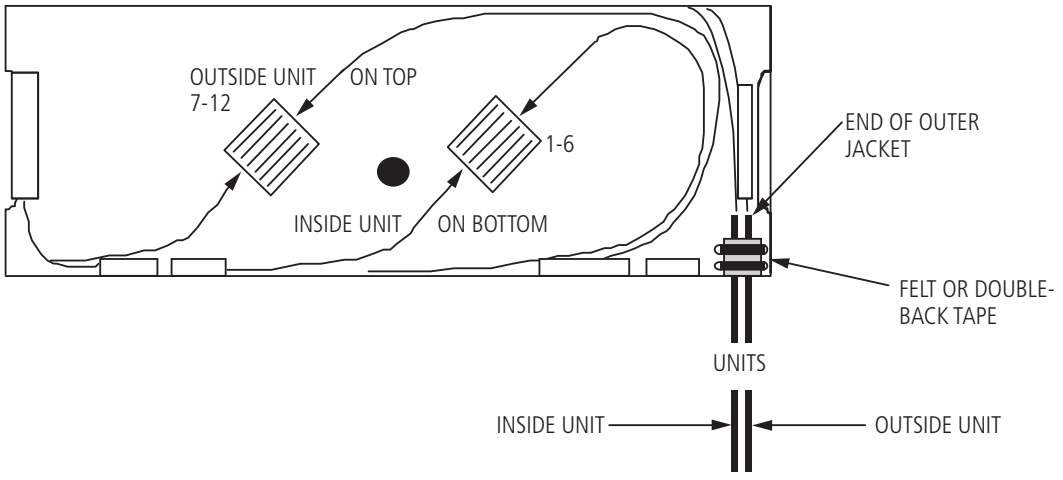
15.1 Tape the tubes marked "Blue" together by placing a piece of double-back tape or felt 1/4 inch back from the end of the furcation tubing. Place the bound section of the Blue units onto the splice tray and secure them to the splice tray with tie wraps (see Fig. 36). If multiple units exist, follow the same steps for the remainder of the like colored tubes. (Note: The double-back tape or felt serves to cushion the optical units from the tie-wraps to be applied).

Fig. 36



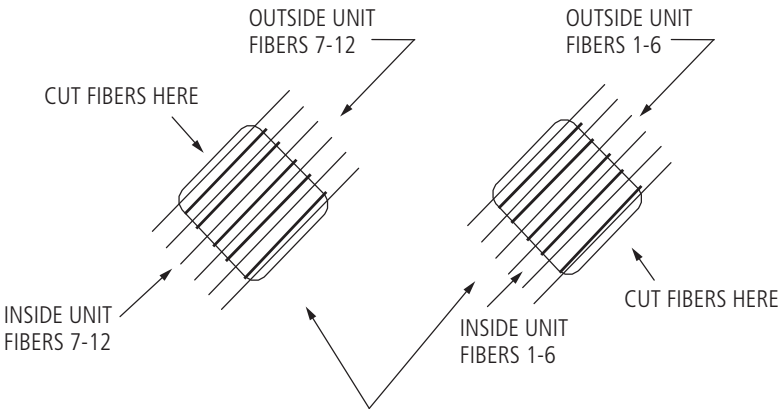
15.2 When cutting fibers to length, wrap the four plus feet of fibers of the inside unit around the tray in a counterclockwise direction. Cut the fibers so that the splice section will fit into the splice-protector-holders. Be sure that the fibers are cut and positioned in COLOR CODE ORDER. Prepare the outside unit in the same manner. The first six fibers will be shorter than the last six fibers in the outside unit (see Figs. 37 and 38). For the inside unit, the first six fibers will be longer than the last 6 fibers. (This figure is based on a 12-fiber unit design.) Place the splice tray cover onto the splice tray making sure that all of the fibers are wrapped inside of the splice tray.

Fig. 37



15.3 Prep all trays in the same manner as detailed in Fig. 37 before any splicing is performed. (NOTE: The exact arrangement may vary due to fiber count configurations).

Fig. 38 CUTTING THE FIBERS TO LENGTH



16.0 Splicing Fibers

16.1 Splicing will be easier if the splice tray is level with the top of the splicer.

16.2 Lay out only enough fiber to cleave and place into the splicer.

16.3 Slide splice protector sleeve over one of the fibers BEFORE STRIPPING, CLEANING, CLEAVING AND LOADING INTO SPLICER.

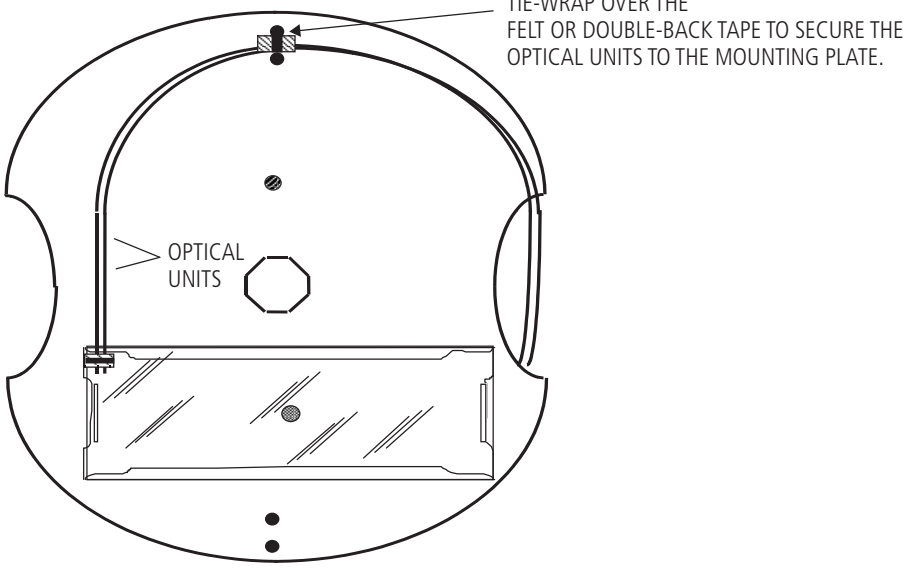
16.4 After the splicing is completed and the splicing technician has accepted the splice, slide the splice protector over the spliced area and place in the tube heater. Once the splice protector has cooled and has become rigid, place and center it into splice protector holder in the tray.

16.5 After all of the fibers have been spliced, protected and positioned, make sure that all fibers are stored on the inside of the splice tray. Place the splice tray cover onto the splice tray.

16.6 If multiple splice trays are required, work only with one splice tray at a time.

16.7 Place the splice tray(s) on the mounting plate bolt. If multiple splice trays are present, sure to stack all splice tray(s) on the same side of the mounting plate. Place the securing nut on the bolt and securely tighten it down snug. This will keep the splice tray(s) secured to the mounting plate (see Fig. 39).

Fig. 39 FRONT VIEW

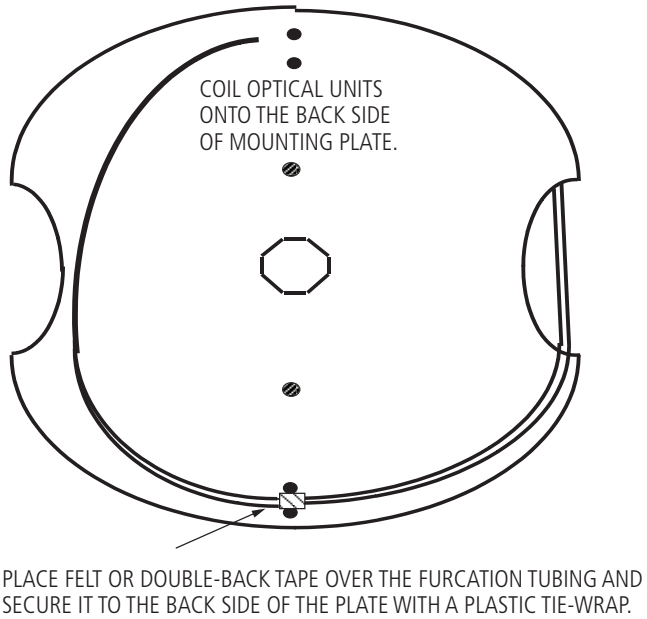


16.8 Place felt or double-back tape around all of the furcation units and tie wrap them together as shown in the above Fig. 39.

17.0 Installing Mounting Plate within the Splice Box

17.1 Using felt or double-back tape, secure and tie wrap the furcation tubes to the backside of the mounting plate (snug) as shown in Fig. 40.

Fig. 40 BACK VIEW



17.2 Proceed to coil the small section of furcated fibers in a counter-clockwise direction. Align and position the units within the enclosure.

NOTE: Coiling the furcated units should be done by rotating the mounting plate. This procedure will assist in preventing twist or stress to the optical fibers (see Fig. 39 and 40 on previous page).

17.3 When all of the slack is coiled and stored behind the mounting plate, align the mounting plate and secure it to the center shaft by placing the spacer on the center shaft, and installing the outside retaining "clip" ring. (See Fig. 41a below left.)

Fig. 41a

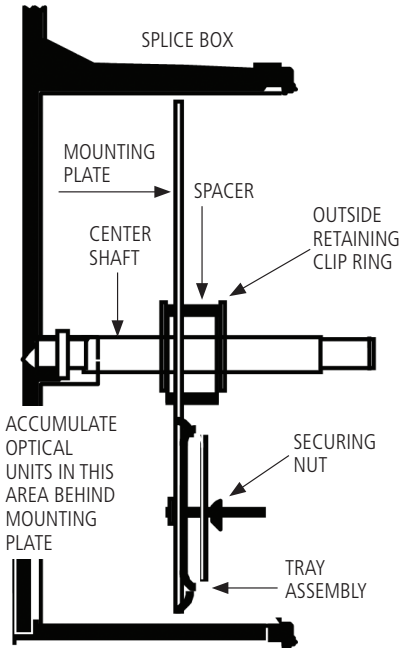
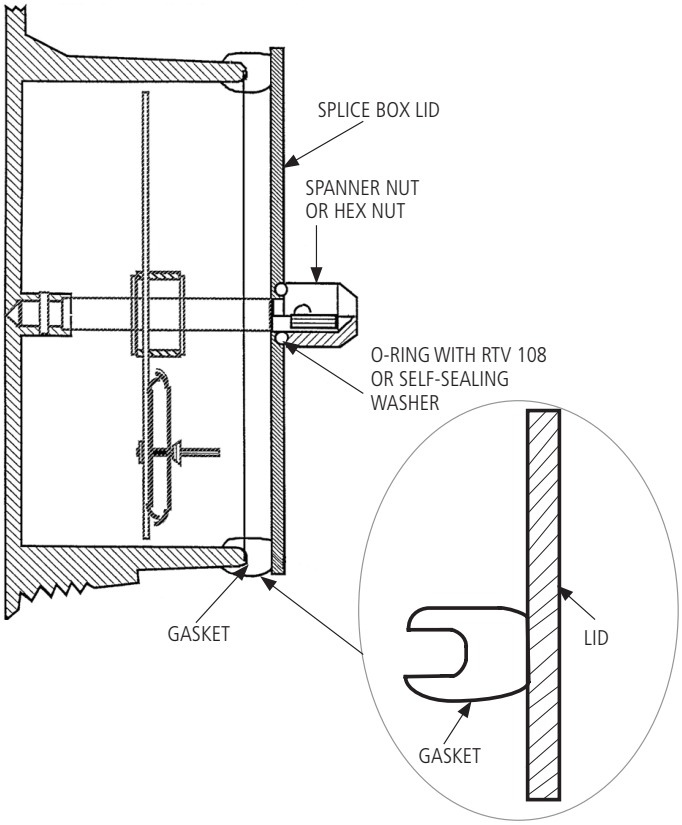


Fig. 41b



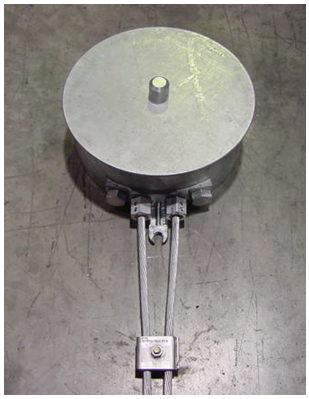
18.0 Sealing the Splice Box

18.1 Using alcohol ≥91% and a clean cloth, wipe down the inside groove (both sides) of the gasket and the inside of the splice box lid.

18.2 Place the gasket on the splice box with the beveled side on the lip of the splice box.

18.3 Place the splice box lid on the splice box.

Fig. 42



WITH SPANNER NUT

10.4 Place the O-ring over shaft. Cover the O-ring with RTV. Screw the spanner nut on the shaft.

10.5 Tighten the spanner nut on the center shaft until the lid bottoms out (45 ft-lbs).

WITH JAM NUT

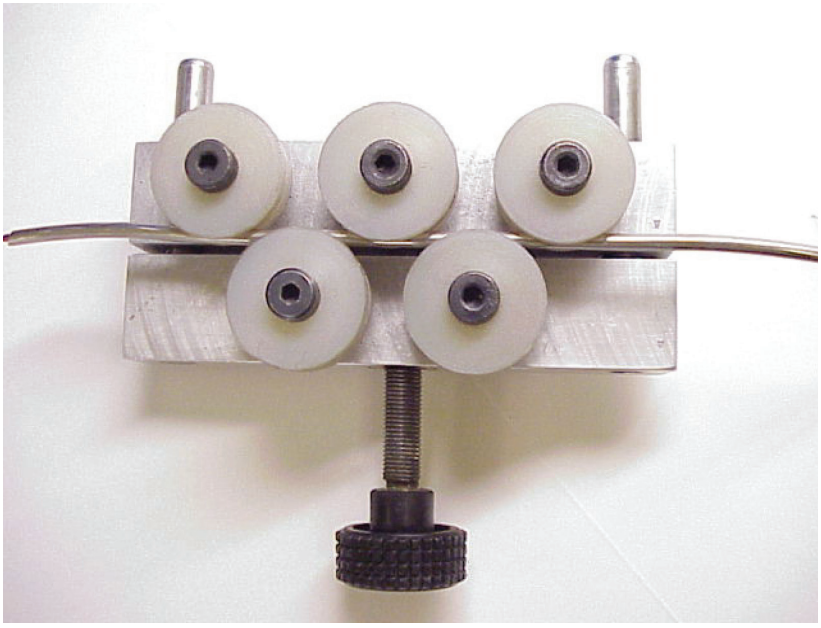
10.4 Place the self-sealing washer over the shaft. Screw the nut on the shaft.

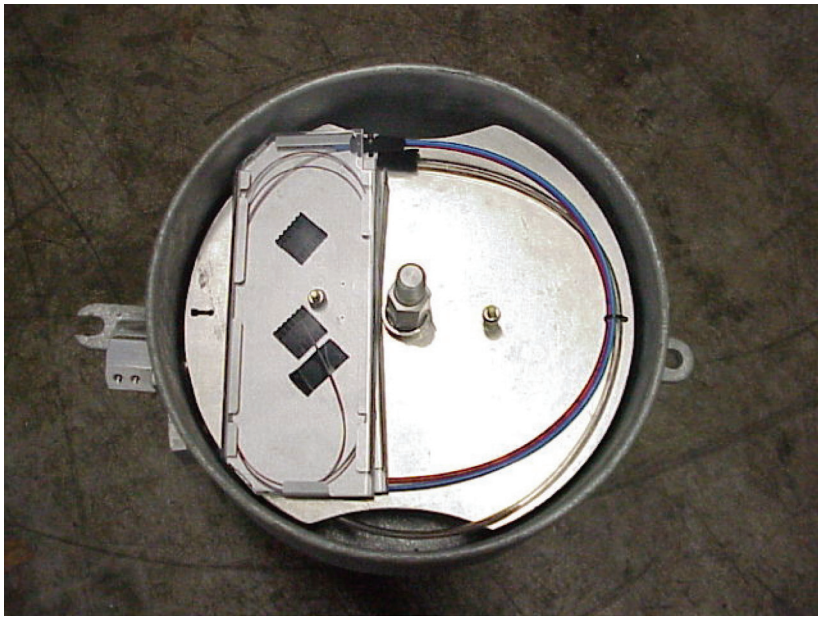
10.5 Tighten the spanner nut on the center shaft until the lid bottoms out (45 ft-lbs).

Appendix A

If using an AFL tube straightener, loosen the rollers to allow the stainless steel tube to pass through easily. Insert the free end of one tube into one end of the tool, between the rollers, and out the other end. Slide the tool along the stainless steel tube back to the 7- inch mark. Tighten the rollers together until all are contacting the tube. The purpose is to tighten the rollers to the point where they straighten the tube when it is pulled through them. You may want to practice this procedure on a scrap length of tubing to get an idea of how tight the rollers should be. Over-tightening may crush the tubes and/or damage the fibers. Once the rollers are tightened, use the handles on both sides of the tool to slide it toward the free end, thereby straightening the tubes for ease of tube removal (see Fig. 43).

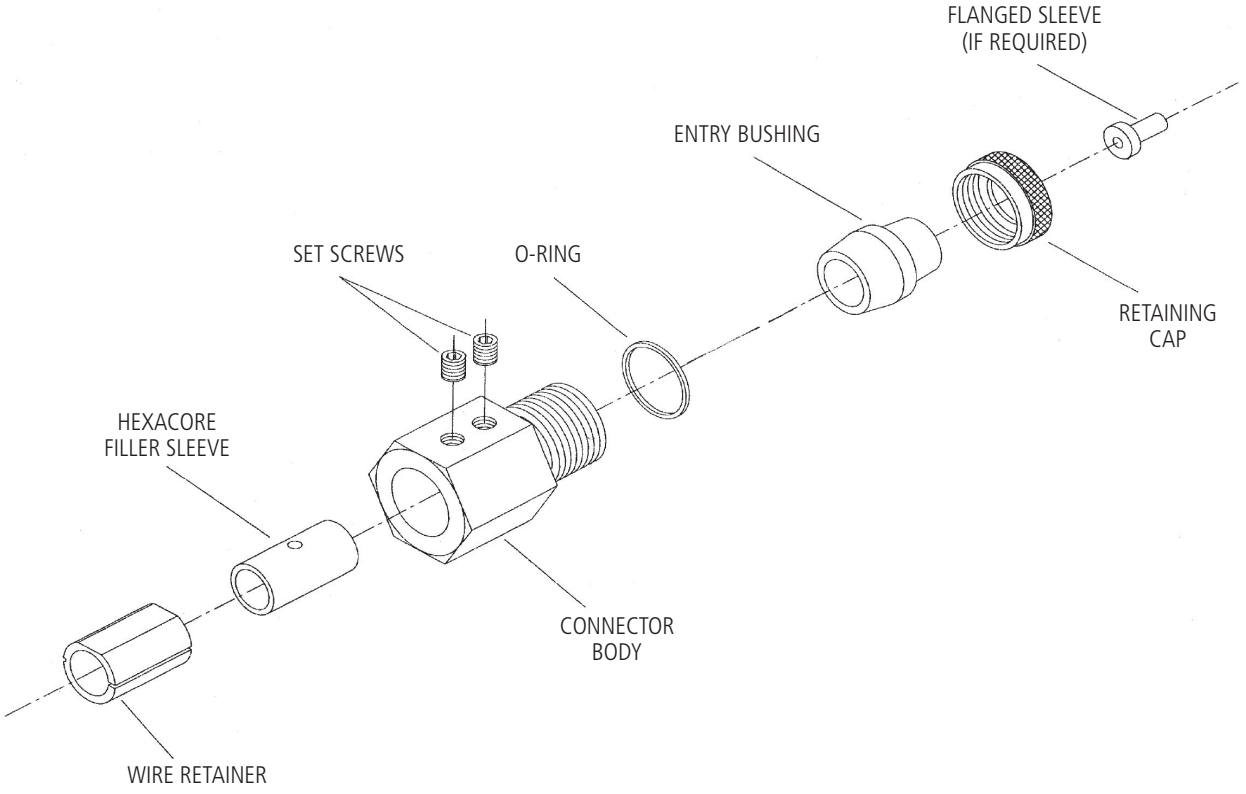
Fig. 43





AFL SB01 SPLICE ENCLOSURE

Connector Assembly



Instructions for Preparing

AFL ST1-72 FIBER SPLICE TRAY

INTO THE AFL SB01 SPLICE ENCLOSURE

NOTE:

TABLE OF CONTENTS

1.0 Tray Description

Fig. 1

1.1 The AFL ST1-72 Splice Tray is capable of holding up to 72 individual splices per tray. The circular tray is constructed of high impact resistant Lexan with a black base and a clear lid. Each tray assembly contains eight, twelve fiber manifolds. Of the eight manifolds, only six are used in the splicing process with the remaining two manifolds being placed in the top positions to help secure the fibers within the tray.

NOTE: All eight manifolds must remain within the tray

2.0 Maximum Fiber Capacity

2.1 A maximum fiber count of 144 splices (two ST1-72 trays) can be stored within the AFL SB01 Splice Enclosure.

NOTE: Prior to installing any cable combination, be sure to verify that the required splice lay out can be contained within each of the two 72 fiber trays without the need to furcate the fibers from one tray to the other. If the customer requires more than the AFL recommended unit storage, confirm that the storage area is adequate prior to splicing the cable.

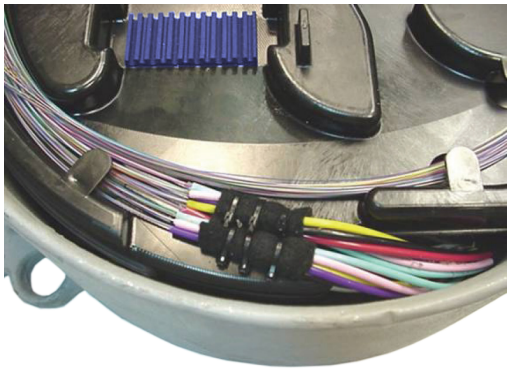
3.0 ADSS or Loose Tube Installation

Fig. 2

3.1 When installing an ADSS or Loose Tube cable into the SB01 enclosure and ST1-72 tray, it requires a minimum of 10.5 feet of optical unit. A minimum of 4 feet (48 inches) of optical unit is stored within the enclosure with an additional 6.5 feet (78 inches) of open fiber being placed within the splice tray. The aramid yarn or central strength member shall be secured within the enclosure with the optical units being routed in a clockwise direction.

NOTE: Fig. 2 above shows an AFL 144 fiber ADSS design. Storage of Loose Tube or ADSS cables can be increased in length (over 4 feet) depending on the customer's required cable design. If the customer requires more than the AFL recommended unit storage, confirm that the storage area is adequate prior to splicing the cable.

Fig. 3

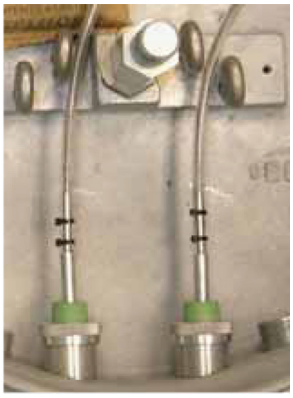


3.2 Each bundle of optical units shall be wrapped with an adhesive backed felt tape and secured within the tray with black UV cable ties. Once the excess has been cut from the cable tie, move the connection point away from the fibers and towards the edge of the enclosure.

4.0 Stainless Steel Tube Installation

Fig. 4a

Fig. 4b



4.1 When installing a Stainless Steel Tube cable design (CentraCore design shown) into the AFL SB01 enclosure and ST1-72 tray, it requires a minimum of 10.5 feet of optical fiber. A minimum of 4 feet (48 inches) of transition tubing (with fiber) is stored within the enclosure with an additional 6.5 feet (78 inches) of open fiber being placed within the splice tray. The transition tubing (with fiber) shall be routed within the enclosure in a clockwise direction.

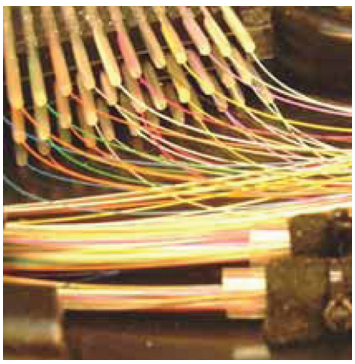
Fig. 5

4.2 Each transition tube containing optical fibers shall be wrapped with an adhesive backed felt and then secured within the tray with black UV cable ties. (**NOTE:** Once the excess has been cut from the cable tie, move the connection point away from the fibers and towards the edge of the enclosure.)

5.0 Routing of Optical Fibers

Fig. 6a

Fig. 6b



5.1 Route all of the fibers into the tray by using the following procedure:
(36F on Left / 36F on Right)

5.1.1 A length of 6.5 feet of fiber is used in order to complete two full wraps within the splice tray.

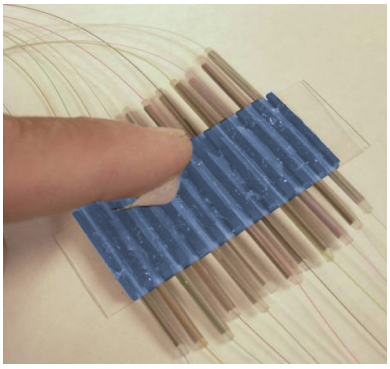
5.1.2 Each set of optical fibers should be separated by unit and individually measured and cut to length.

EXAMPLE: If cutting the fibers to length within the blue units, one of the two units would be measured from the top left side of the manifold facing down with the other unit being measure from the bottom left side facing up. All fibers should be stacked in sequence with the lowest number being placed on the bottom. Fibers 1-36 are to be placed on the left hand side of the tray with fibers 37-72 being placed on the right.

NOTE: Each tray assembly contains eight, twelve fiber manifolds. Of the eight manifolds, only six are used in the splicing process with the remaining two manifolds being placed in the top positions to help secure the fibers within the tray.

6.0 Fiber Splice Sleeves

Fig. 7



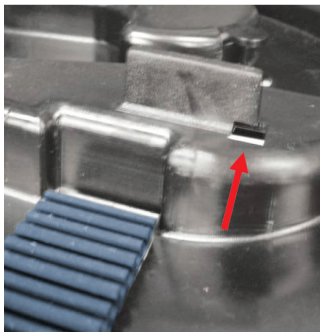
6.1 AFL recommends using the Fujikura 60 mm (#500065) splice sleeves for this application.

6.1 **NOTE:** To ensure that the recommended sleeves are being used, all contractors should check the tightness of their splice sleeves within each of the manifolds used. If necessary, a small bead of RTV can be placed and spread evenly over the splice sleeves to help secure them in place. If this method is used, allow a few minutes for the RTV to begin curing so that the manifolds will not stick together within the tray.

7.0 Closing the ST1-72 Tray

Fig. 8a

Fig. 8b



7.1 After splicing, ensure that all of the fibers are located under the tabs and are free of any pinch points that may be caused from securing the lid. Insert one foam plug on each side of the tray to help secure the fibers in place.

7.2 Apply the lid as follows:

7.2.1 Align the open portion of the lid with the fiber entry location on the tray.

7.2.2 Placed the lid under the locking portion of the tray (above photos).

7.2.3 Secure the lid in place by pressing down on the center of the tray.

Note: Be sure that all 8 manifolds remain within the tray (required).

8.0 Routing and Securing the ST1-72 Tray

Fig. 9a

Fig. 9b

8.1 Route the fiber units back into the SB01 enclosure in a clockwise direction. If longer lengths of fiber unit were required, remove any excess torque by rotating the tray during the routing process. Always install the tray with the lid of the tray facing the lid of the SB01 enclosure.

Fig. 10a

Fig. 10b

8.2 Place the center of the tray over the center shaft of the SB01 enclosure.

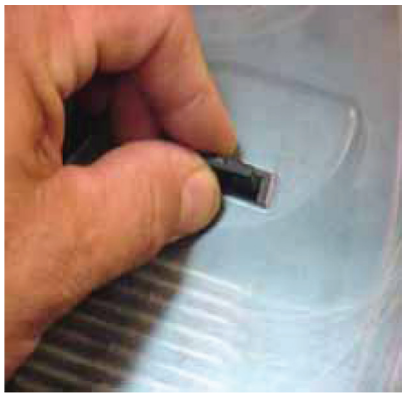
8.3 Place the aluminum spacer ring over the center shaft and onto the tray lid.

8.4 Secure the tray by installing the retainer ring above the spacer and onto the center shaft of the enclosure.

8.5 Seal the SB01 enclosure according to the AFL standard procedure.

9.0 Removing the ST1-72 Tray

Fig. 11



9.1 To remove the tray from within the enclosure, place two fingers on each of the two raised taps and slightly move the tray to the left (against the torque of the tray) and lift upward.