

Fiber Splice Box (FSB-D) Installation Instructions



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Ribbon Optimized



Tray Splicing

1.0 General Product Information

Description

All Systems Broadband offers a Fiber Splice Box designed for splice-only applications. Two configurations are available - Ribbon Optimized Splicing and Tray Splicing.

These aluminum enclosures are designed for high-density splice storage, with emphasis on proper fiber management, versatility of cable port seals, and cable tie-down features. The FSB-D enclosure can be configured at the time of order for either ribbon optimized splicing, tray fiber splicing or a combination of each.

The enclosure includes four cable ports with various sealing options using four rubber grommets, compression seals with cable plate or conduit plate. The cable tie-down features may include single cable brackets, dual cable brackets or strength member brackets.

2.0 Safety Precautions



Danger: Direct eye exposure to laser light will cause serious eye damage. Avoid looking directly into an optical fiber, optical connector or optical adapter that is connected to an active light source.



Warning: Wear safety glasses to prevent accidental eye injury. Wear protective gloves and clothing to prevent accidental injury.



Warning: Observe company policies and procedures regarding personal safety.



Warning: Follow local and national safety and construction codes.



Caution: Handle fiber optic cable per manufacturer's recommendation for minimum bend radius, maximum tensile loading, and maximum crush resistance.

3.0 Tools Required

- 216 Tool
- #2 Phillips Screwdriver
- Fiber Optic Cleaning Supplies
- Cable Preparation Tools

4.0 Package Contents

- Fiber Splice Box
 - ◇ Fiber Splice Box Standard Sub-Assembly Kit
 - ◇ Four (4) Rubber Grommets
 - ◇ Combination of other seals and cable retention items
 - ◇ Tie-wraps
 - ◇ Mounting screws
 - ◇ Installation Instructions
- Additional component kits per ordered configuration

Components and accessory kits may be selected at time of order using the ordering guide section of the product datasheet.

Additional product information is available at www.allsystemsbroadband.com.

Installing the Product

5.0 Unpacking

Ensure all components are available per the configuration ordered.

6.0 Mounting

1. Locate an acceptable mounting location for the box.
2. Place the box against the wall. While making sure it is level, mark the four [4] mounting locations at the keyholes.
3. Drill four 1/8" pilot holes at the marks.
4. Install screws into wall at the four [4] locations, keeping head of screws ~ 1/8" from wall.
5. Install box into position and tighten screws (Figs. 1 & 2).

Note: There are two basic configurations for the FSB product line:

- Tray Splicing (Fig. 1)
- Ribbon Optimized Splicing (Fig. 2)

7.0 Port Choice & Routing Considerations

Refer to Figure 3 & 4 for port and tie-down identification. Consider the destination desired for the fiber tubes or core tube when choosing a cable port.

Tips:

- Cables terminated at port 1 or 3 will be stored in a counter-clockwise direction, which provides easy routing to either Tray position T1 or T3 for Tray Splicing (Fig. 3) or Ribbon position R2 or R4 for Ribbon Optimized Splicing (Fig. 4).
- Cables terminated at port 2 or 4 will be stored in a clock-wise direction, which provides easy routing to either Tray position T4 or T2 for Tray Splicing or Ribbon position R3 or R1 for Ribbon Optimized Splicing.
- When routing to the tray for splicing, always route fiber tubes behind the tray support bracket before attaching to the tray.

Note: For Ribbon Optimized Splicing, cables requiring strength Member Brackets can only be used in the lower two cable ports.



Fig. 1 FSB-D Tray Splicing



Fig. 2 FSB-D Ribbon Optimized Splicing

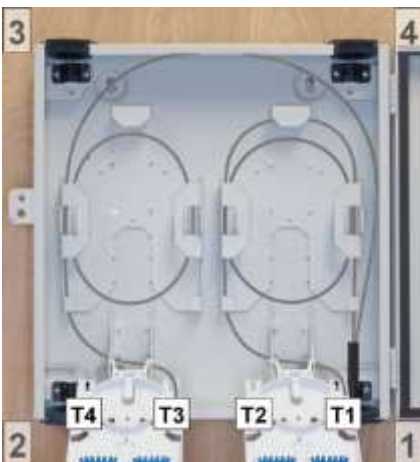


Fig. 3 Tray Splicing

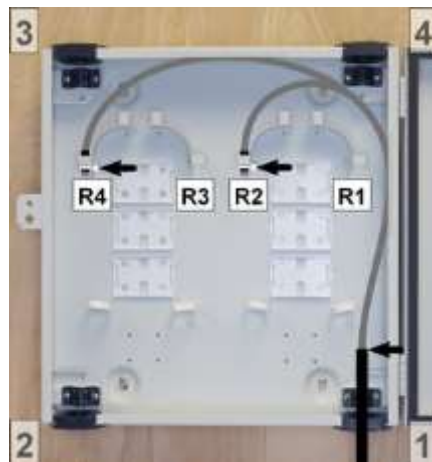


Fig. 4 Ribbon Optimized Splicing

8.0 Chassis Grounding

All grounding should follow local codes and practices.

Grounding components are available for grounding the box and/or non-dielectric cable(s). Refer to the Ordering Guide section of the product datasheet for details.

1. Locate and remove the small metal knock-out that is closest to the non-dielectric cable or external ground wire you are connecting (Fig. 4).

Note: Ensure that the circular masking around the inside of the ground feed-thru knock-out hole is removed before installing the ground feed-thru lug.

2. Attach Ground Feed-thru lug by placing the longer threaded section (or threaded section) into the hole from the outside of the enclosure. Sufficiently tighten the box retaining nut to >40 in-lbs. (Fig. 5 & 6).

Warning: Company practices may apply to torquing of various ground components.



3. If included in the kit, attach the external ground wire, then the star washer, and torque external nut per company-approved practices (Fig. 7).
4. If included in the kit, install the braided ground wire to the internal side of the Ground Feed-Thru (GFT) and torque. Orient the eyelet for routing to the port that will contain the non-dielectric cable.



Fig. 4



Fig. 5



Fig. 6



Fig. 7

9.0 Cable Routing & Sheath Strip Lengths

Ring cuts should be located on the cable so they be positioned about 1 inch inboard of the corner bracket of the chosen port (Fig. 10). Use below instructions and charts to determine port choice, routing and cable cut lengths. Ports are designated (1, 2, 3 & 4) and tube tie-down locations are designated below:

- T1, T2, T3 & T4 tray splicing tube tie-down points (Fig. 8)
- R1, R2, R3 & R4 Ribbon Optimized tube tie-down points (Fig. 9)

Following the recommended routing tips provided in section 7.0, strip the cable sheath. Use the photos and charts below to determine cable strip lengths.

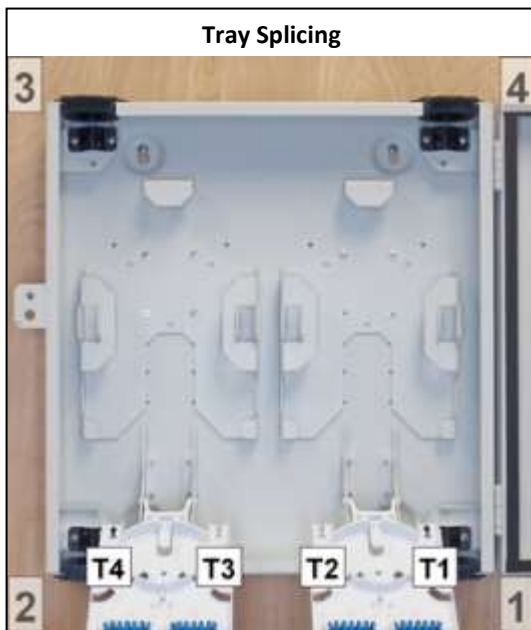


Fig. 8

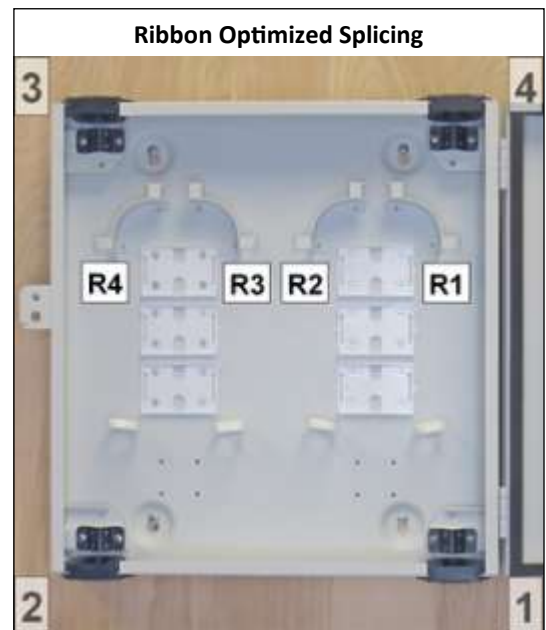


Fig. 9

Loose Buffer Tube Routing & Sheath Strip Lengths	
Incoming Cable End Port to Tie-down	Loose Buffer Tube Exposed Length, plus slack storage (optional)
1 to T1 or 2 to T4	64", 84" (+1 loop on tray),
1 to T3 or 2 to T2	76", 96" (+1 loop on tray), 116" (+2 loops on tray)
3 to T3 or 4 to T2 3 to T1 or 4 to T4	62", 82" (+1 loop on tray), 102" (+2 loops on tray)
Midspan Cable	Loose Tube Exposed Length
One Way / Two Way	64" min / 128" min (+20"/loop)

Ribbon Cable Routing & Sheath Strip Lengths	
Incoming Cable End	Core Tube Exposed Length
1 to R2 or 1 to R4	75"
3 to R4 or 4 to R1	52"
3 to R2 or 4 to R3	90"
Midspan Cable	Core Tube Exposed Length
Ports 1 & 2 or 3 & 4	94"

Note: Ideally, cables terminated in ports 1 & 3 are typically routed in a counter-clockwise direction and cables terminated in ports 2 & 4 will typically be routed in a clockwise direction. If cross-over routing is needed to reach the desired tie-down point, add 3" to the total exposed lengths designated above.

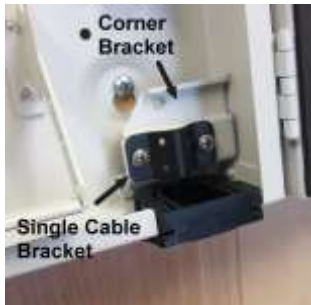


Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14a



Fig. 14b

10.0 Cable Preparation & Assembly

The cable ring cut should be positioned about an inch or so inboard the selected port corner bracket (Fig. 10).

Follow the below cable preparation sequence as needed for cable hardware installation.

1. Cable Compression Seal and Cable Plate, see Fig. 11, 12, 13
2. B-bond (Fig. 15a - 15d)
3. Strength Member Bracket, bottom ports only for Ribbon Optimized (Fig. 16 - 19).

Cable Seal, Retention and Grounding Preparations - Based on your application, follow steps in order below.

1. Cable Compression Seal & Cable Plate

Install the two short screws into the cable plate loosely as shown (Fig. 12). Next, install the cable compression seal to the plate as shown and tighten.

Note: Often times the small rubber inner seal will need to be removed for larger cable diameters (Fig. 12).

Make sure that both the orientation of the screws, plate and seal are correct for port installation (Fig. 12). Next, slide the assembly (seal first) over the fibers, fiber tube(s) and past the ring cut by about 3"; do **not** tighten the seal onto the cable yet (Fig. 13). Proceed to step 3 for armor cable and/or step 4 for Strength Member Bracket (SMB) installations.

2. Rubber Grommet Seal

This is the standard port seal (Fig. 14a). Remove and modify grommet as needed by lifting the winged sections and sliding it out (Fig. 14b). It can be installed over the end of the cable(s) by cutting a hole or slitting it along the centerline and installing it around cable(s) either before or after cable(s) are installed in the port.

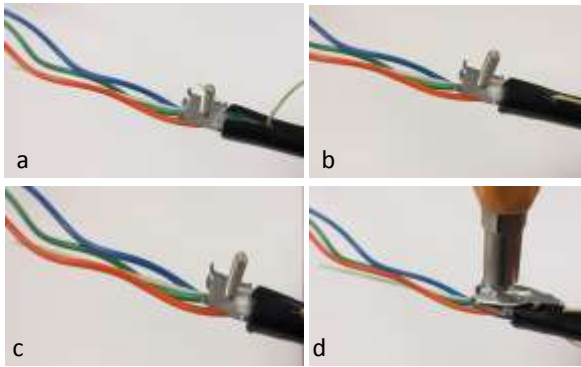


Fig. 15a through 15d



Fig. 16

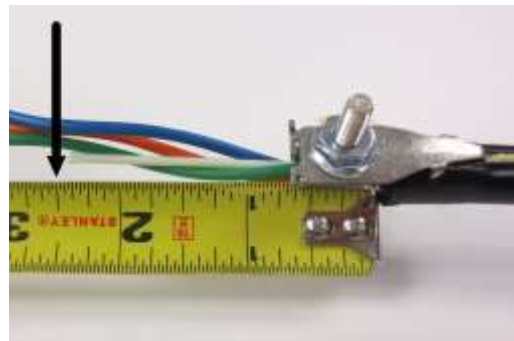


Fig. 17



Fig. 18 With Loose Buffer Tube



Fig. 19 With Central Core Tube Ribbon

3. B-bond (cable clamp)

Install the B-bond onto the cable. Follow company practice to ensure proper connection to the cable armor is made.

Note: Tabbing both sides of the cable, or pulling the rip cords just past the ring cut will make B-bond installation easier and provide two position options for the clamp (Fig. 15a thru 15d). Consider orientation of cable in the port before B-bond installation onto the cable. The ground wire can be attached after the cable is installed in the port.

4. Strength Member Bracket (SMB)

Note: For Ribbon Optimized Splicing, Strength Member Brackets can only be used in the lower two cable ports.

If the cables have rigid strength members and the SMB is used (Fig. 16), trim the strength members to 1 3/4" from the ring cut (Fig. 17). When installing a SMB onto the cable, take note of the SMB tab position and make sure it will align with the corner bracket slot (Fig. 20). Make sure the strength members are pushed in fully against the inside end of the SMB and that no fiber tubes are trapped under the strength members (see circle in Fig. 18 & 19). Install the hose clamp into position as shown. While pulling the SMB back against the protruding strength members, tighten hose clamp into position (Fig. 18 & 19).

10.1 Install Cable Assembly

Remove the single cable bracket of the designated port (Fig. 10).

Follow applicable steps below in order to install cables into cable port; skip non-applicable steps as needed.

Note: If installing the Ribbon Optimized configuration and using the upper ports (3 & 4), it's easier to ring cut and remove excess core tube length prior to terminating cable into the port. Ring cut core tube 1-1/2" from cable jacket, remove, then clean ribbons as needed.



Fig. 20



Fig. 21



Fig. 22



Fig. 23

1. Cable Seal and Plate Assembly (without Strength Member Bracket)

Make sure the cable compression seal is not tight onto the cable jacket. With the attachment screws of the plate backed out, install the **Cable Plate** assembly (Fig. 13).

- Lower the assembly into the port so the screw heads fit through the keyholes from the inside, and slide the plate back so the sealing flange is flush with the box flange. While pushing the plate back, tighten the screws (Fig. 21).
- Re-install the single cable plate and screws. Adjust the cable so the ring cut and/or B-bond extends about an inch past the corner bracket prior to fully tightening down the clamp.
- Tighten the cable compression seal onto the cable jacket (Fig. 23).

2. Strength Member Bracket (SMB)

Install the SMB and cable assembly into the designated port. For Ribbon Optimized Splicing, only ports 1 & 2 can accommodate cables with SMB's.

- **If compression seal is used**, lower the assembly into the port so the screw heads of the plate fit through the keyholes from the inside, and slide the plate back. At the same time, orient the SMB so one of the SMB tabs aligns with the slot into the corner bracket [two tab options (Fig. 20)]. Make sure the SMB sits flush with corner bracket and install the short anchor screw provided (Fig. 22). Tighten the cable compression seal to the cable jacket (Fig. 23).
- **If a rubber grommet is used**, install it onto the cable (modify as needed). Insert the assembly into the designated port. At the same time, orient the SMB so one of the SMB tabs aligns with the slot into the corner bracket [two tab options (Fig. 20)]. Make sure the SMB sits flush with corner bracket and install the short anchor screw provided (Fig. 22). Make sure the grommet is pushed back so the flange is even with the box port flange.

3. Rubber Grommet

Modify the grommet as needed to install it onto the cable. It can either be slit along the centerline or a hole can be cut and the cable threaded through it. Install the grommet and cable; make sure the grommet is fully seated into the port and even with the sealing flange of the box.

- **Single Cable Bracket:** While holding cable in place, install single cable bracket and screws, making sure to position the cable ring cut about an inch inboard of the corner bracket. Tighten both screws sufficiently to hold cable in place.



Fig. 24



Fig. 25



Fig. 26



Fig. 27

4. Dual Cable Bracket (DCB)

Install the DCP into the port selected using the supplied hardware. The flat head screw goes into the center top hole (Fig. 24) and two short screws are provided for the other two locations.

- Cables can be installed with the rubber grommet in place (if slit) or with smaller cables the grommet can be installed after cables are secured to the bracket.
- Position the first cable in the lower section of the DCB and secure it with either a hose clamp or large tie-wrap (Fig. 24 & 25). Make sure cable ring cut extends past the end of the bracket. Position the second cable in the upper section and secure the same way.

Note: Orient the hose clamp away from fibers that may be routed nearby.

- If grommet is not already installed, modify and install now.

5. Ground Wire

Route and connect the ground wire from the Ground Feed-through (GFT) to the B-bond stud and torque per company approved practice. The star washer should go between the top stranded ground wire eyelet and the top retaining nut.

6. Conduit Plate

Install the short screws into the conduit cable plate leaving them loose (Fig. 27). Next, route and position the 1-1/4" corrugated conduit into the back of the enclosure port. While holding the conduit against the back of the port, install the conduit cable plate by dropping it down so the screws protrude through the keyholes and sliding it to the rear firmly against the corrugated conduit and tighten the screws.

Next: Proceed to section 11.0 for Tray Splicing (Fig. 28) and/or section 12.0 for Ribbon Optimized Splicing (Fig. 29).



Fig. 28



Fig. 29

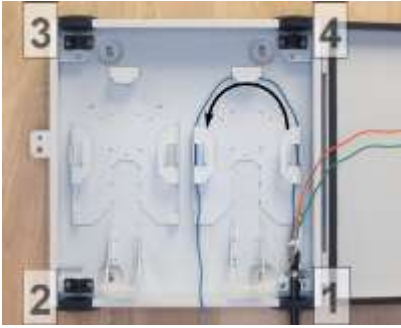


Fig. 31

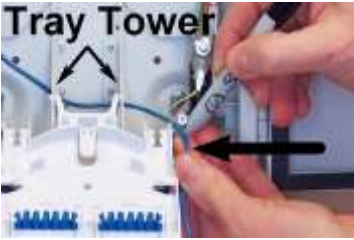


Fig. 31



Fig. 32

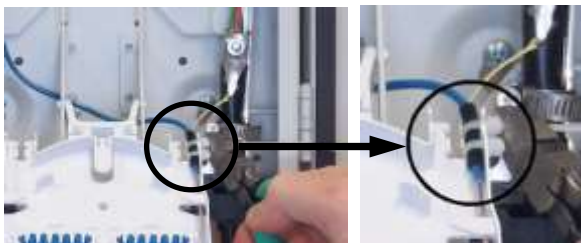


Fig. 33



Fig. 34



Fig. 35



Fig. 36



Fig. 37



Fig. 38

11.0 Tray Splicing - Routing & Storage

1. Separate the designated buffer tubes or 900 micron fibers to be spliced and store the slack length desired in the slack basket.

Note: For Midspan Applications

- If fibers to be spliced will be cut dead to the field, cut the designated tubes downstream, close to the exiting side sheath ring cut.
- If splicing both directions (upstream and downstream), cut the designated groups of fibers at the midpoint.

2. Install the trays as needed starting closest to the basket. Route the designated buffer tubes or 900 micron fibers as desired for storage.

Important Routing Tips

- Counter-clockwise routing from ports 1 & 3 presents fibers to the right side of the tray (Fig. 31); clock-wise routing from ports 2 & 4 presents fiber to the left side of tray.
 - If needed, an "S" bend can be formed with the designated fibers or tubes inside the slack basket to change the stored direction to reach the side of the tray needed. This is sometimes done when the desired cable ports are already occupied.
 - Dual Cable Brackets can be used to double port cable capacity when: cables are 7/16" diameter or smaller, no SMB is used and a rubber grommet seal is used.
 - **Always route fibers or tubes behind the tray support tower and to the opposite side of the tray (Fig. 31 & 33).**
 - Smaller cables can be secured to the single cable bracket using tie-wraps as shown in Fig.'s 35 & 36.
3. Following the above tips, mark the fibers/tubes just past the tie-down location at the tray tie-down point (Fig. 33). Always ensure enough length is provided to prevent pulling or binding of the fibers when the tray is hinged.
 4. Ring cut the fiber tube or jacket at the mark and remove. Clean fibers as needed.

Note: In cases where bare 900 micron fibers are routed to the tray, wrap bundles of fibers for protection at tie-down location. Also wrap them anywhere they could be damaged or could rub other hard components (i.e. Strength Member Bracket or B-bond).

5. Wrap fibers or tube along the tie-wrap area for protection as needed, with 1-1/2 wraps of felt wrap (Fig. 32).
6. Position and secure the fiber tubes to the corner of the tray with the tie-wraps provided (Fig. 33).
7. Store the unused or midspan fibers inside the basket (Fig. 34).
8. Prior to splicing, fibers can be temporarily stored around the perimeter of the tray for protection.

Splicing: Follow instructions provided with trays.

9. A label is provided for the tray cover; attach and identify splices as needed.
10. Secure trays tightly to the slack basket (Fig. 38) with the strap provided after splicing is complete.

12.0 Ribbon on Tray Splicing

Routing

1. Ensure the cable jacket is positioned about 1" inboard of the bottom corner brackets. Route the core tube from **port 1** up the side of the box and over to the opposite side of the slack basket, using a generous bend to avoid kinking the tube (Fig. 39 black arrow).
2. Mark the core tube as shown, at the top/left of the right slack basket (Fig. 40).
3. Ring cut and remove excess core tube length, and wrap core tube with felt wrap about 1/8" from the end of the tube. Attach the core tube to the **top/left** slack basket section, using the provided tie-wraps (Fig. 41 black circle).
4. Install ribbons into the provided transportation tubes. **Allow a 1-2" window for ribbons to transition from core tube to the transportation tubes. (Fig. 45 black arrow).** Secure **port 1** transportation tubes to the **bottom/left** of the right slack basket using the provided tie-wraps (Fig. 42 black circle).
5. Route the core tube from **port 2** to the left side of the left slack basket (Fig. 43 black arrow). **Note: The core tube coming in on port 2 does not need to be secured to the slack basket**
6. Secure **port 2** transportation tubes at **top/left** of left slack basket (Fig. 44 black circle) and route as shown in Figure 44.
7. Install trays as needed and route transportation tubes first **behind** the tray tower, then up to the right side tray attachment point. Ring cut and remove the excess transportation tube. Secure the transportation tube to the corner of the tray with the tie-wraps provided (Fig. 46).
8. Route jumpers (from microtube manifolds if used), into **top** ports and over to the opposite side of the slack basket, using a generous bend (Fig. 47 black arrows).
9. Route jumpers first **behind** the tray tower, then up to the tray attachment point. Ring cut jumpers to expose fiber.
10. Mark the jumpers just past the tie-wrap location. Wrap jumper group with a 1 to 1-1/2 loop of the provided felt wrap. Secure jumpers to the corner of the tray with the tie wraps provided (Fig. 48). **A maximum of 6 jumpers should be secured at each attachment point on the tray.**
11. Completed routing is shown in Figure 49. Close and secure the housing.

Deribbonizing

1. Grip between thumb and index finger near the end of desired ribbon. Brush with the index finger across the top of the ribbon until matrix is released from fiber (Fig. 50).
2. Peel back matrix to desired length (Fig. 51).
3. Clean and prep fibers for splicing (Fig. 52).

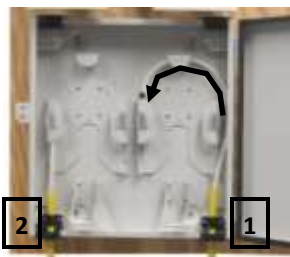


Fig. 39



Fig. 40



Fig. 41



Fig. 42

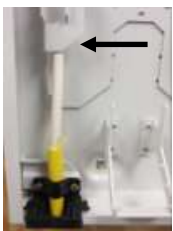


Fig. 43



Fig. 44



Fig. 45



Fig. 46



Fig. 47



Fig. 48



Fig. 49



Fig. 50



Fig. 51



Fig. 52

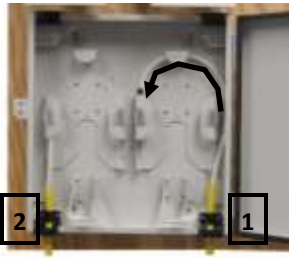


Fig. 39



Fig. 40

Deribbonizing

1. Grip between thumb and index finger near the end of desired ribbon. Brush with the index finger across the top of the ribbon until matrix is released from fiber (Fig. 50).
2. Peel back matrix to desired length (Fig. 51).
3. Clean and prep fibers for splicing (Fig. 52).



Fig. 41



Fig. 42



Fig. 43

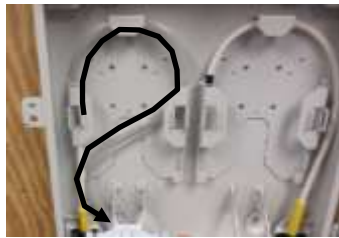


Fig. 44



Fig. 45

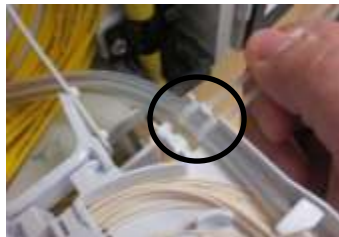


Fig. 46

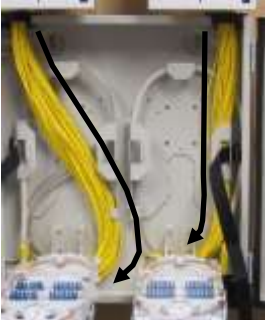


Fig. 47



Fig. 48



Fig. 49



Fig. 50



Fig. 51



Fig. 52

13.0 Ribbon Optimized - Routing & Splicing

Routing

Core Tube Routing Tips:

- It is preferred to use the lower ports 1 & 2 (Fig. 53).
- Dual Cable Brackets can be used to double cable capacity when: cables are 7/16" diameter or smaller, no SMB is used and a rubber grommet seal is used.
- Ports 3 & 4 cannot accept cables requiring Strength Member Brackets (SMB's).
- **Counter-clockwise routing from ports 1 & 3 presents fibers to the left bend control on each side, R2 & R4 (Fig. 55 & 58); clockwise routing from ports 2 & 4 presents fibers to the right side bend control (Fig. 58).**

For cables entering the lower ports (1 & 2)

1. Ensure the cable jacket is positioned about 1" inboard of the corner bracket (Fig. 54).
2. For ports 1 & 2, route the core tube up the side of the box and over to the opposite side bend control, using a generous bend to avoid kinking the tube (Fig. 58). Mark the core tube as shown in Fig. 55, just past the metal bend control.
3. Ring cut and remove excess core tube length, and clean the ribbons as needed.
4. Wrap core tube with felt wrap 1/8" from the end of the tube.
5. Attach the core tube to the **lower/back** bend control section, using the provided tie-wraps (Fig. 57). Once cables tubes are routed, wrapped and secured, ribbons are now ready to be spliced (Fig. 58 & 59).

For cables entering the upper ports (3 & 4)

1. Mark the core tube 1-1/2" past the cable jacket.
2. Ring cut and remove the excess core tube and clean ribbons as needed (adjust cable as needed for access).
3. Position the cable so the core tube extends just past the bend control bracket (Fig. 59). **Do not attach the core tubes from the upper ports to the bend controls; let them run along the side.**
4. Prepare for splicing, trim all ribbons to be spliced 48" from the end of the core tube, see end of core tube in Figure 59.

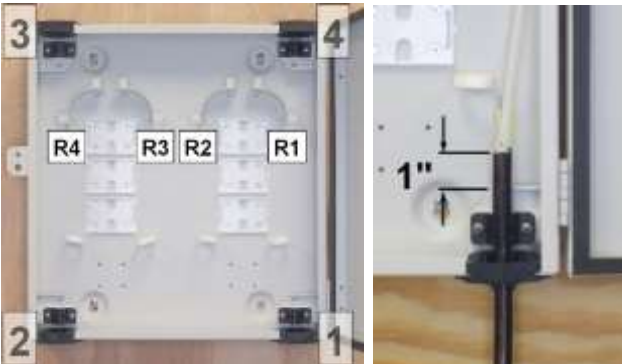


Fig. 53



Fig. 54



Fig. 55



Fig. 56

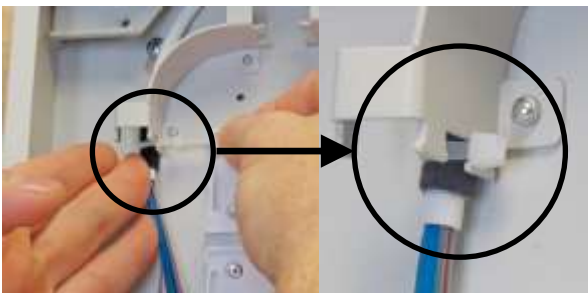


Fig. 57

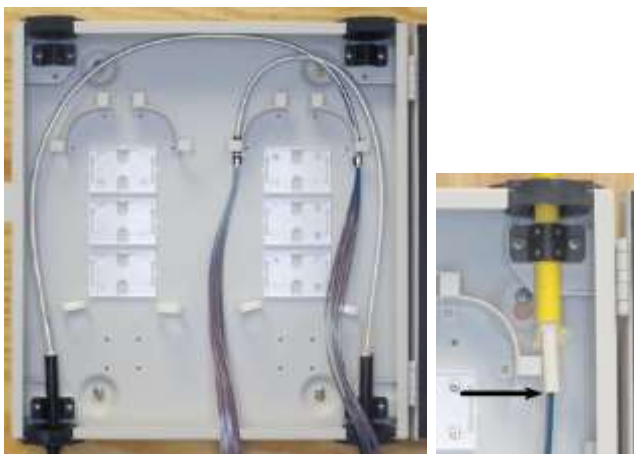


Fig. 58



Fig. 59



Fig. 60



Fig. 61



Fig. 62



Fig. 63



Fig. 64



Fig. 65



Fig. 66



Fig. 67



Fig. 68



Fig. 69

Splicing & Storage

1. Measure the bare ribbon length from the end of each secured core tube, trim ribbons to be spliced to 48" in length.

Important: Trim designated ribbons downstream for midspan.

2. Lay out and organize all ribbons to be spliced. It is **important to remove all twists in the ribbons before splicing.**
3. Splice ribbons and place each completed and cooled splice into the cradle(s), Fig. 60.
4. Once all splices are complete, install cradles one at a time.
 - Flip cradle with splices to the left, creating a cross of the ribbons (Fig. 61).
 - Place cradle bottom edge into the bottom of the cradle adapter (Fig. 62).
 - Tilt top of cradle back against the cradle adapter and snap it in using your finger, as shown. By putting pressure at the tab at the top, the cradle will snap into cradle adapter (Fig. 63).
5. Once all cradles are installed, take the group of ribbon loops and flip them to the right, creating a cross of the ribbons in the opposite direction as the first flip (Fig. 64).
6. Install the group of ribbons over the bend controls (Fig. 65).
7. Organize and install the ribbon groups along each side into the white plastic guide clips.
8. Install four tie-wraps at the **upper/front** bend control tie-down locations, separate from the core tube. Pay particular attention to Fig. 66. **Be careful to contain the ribbons and avoid putting direct pressure on them.** Position the head of the tie-wrap to the inside of bend controls (Fig. 67).
9. Check all ribbons to make sure they are contained and arranged as needed. Wrap any metal with felt wrap as needed for ribbon protection. Storage of ribbons is now complete (Fig. 68).
10. Use door label as needed to identify completed splice (Fig. 69).
11. Close and secure the housing.

14.0 Customer Service

1-877-272-4984

customerservice@allsystemsbbroadband.com

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