



Starfighter LC (Low Count)

Product Description

Starfighter LC (Low Count)
Non-Captive Splice Closure

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General

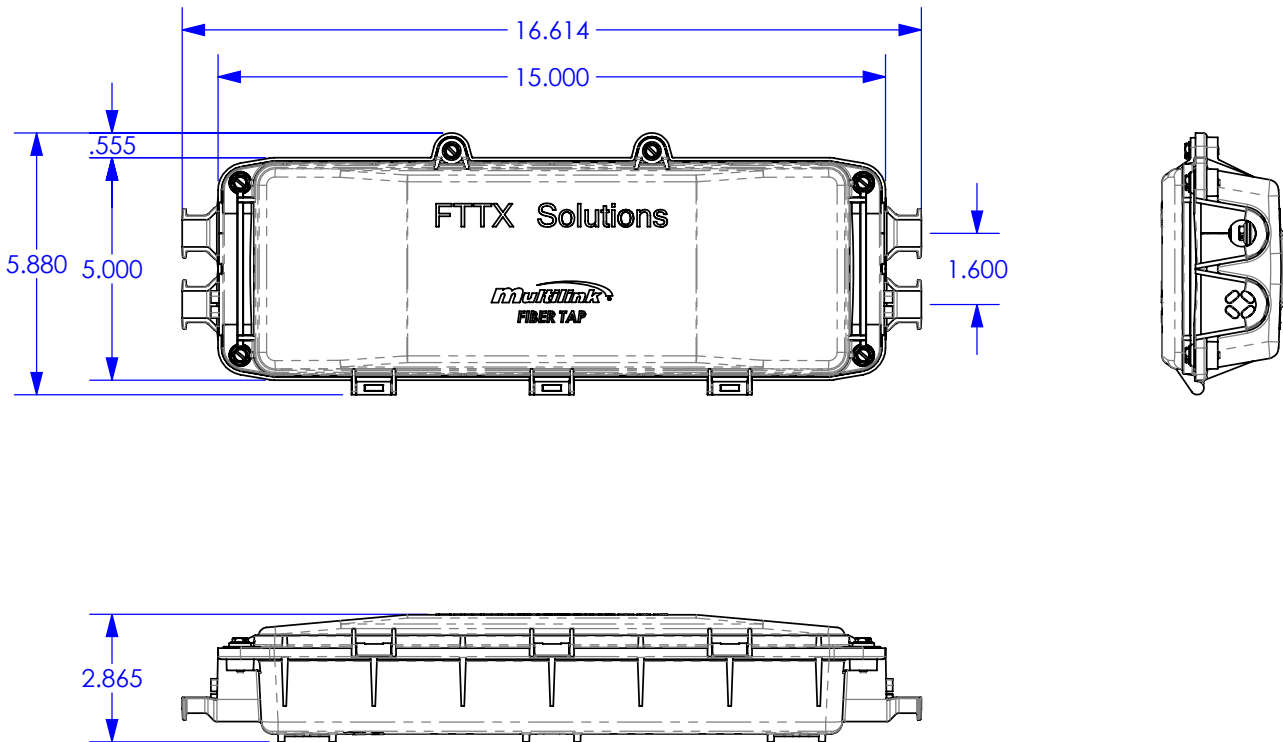
This installation guide provides guidelines for preparation and installation of Multilink's Starfighter LC (Low Count). This product provides a solution for in-line access to the fiber optic trunk line and quick connection to subscribers single drop cable or to low count drop, feeder or lateral cable to be connected to single drop cable at another location. This guide is for installers who are familiar with fiber optic cable systems and their applications.

1. Introduction

1.1 Product Description & FTTX Network Planning

Multilink's Starfighter LC Non-Captive Splice Closure allows a FTTX provider to access the fiber optic trunk line (that is deployed from the central office, headend, or remote hub) and branch connections off to individual subscribers (such as home, apartment, or individual business). Connections can also be branched off to low count drop cables to feed another terminal point. Contact Multilink at (440) 366-6966 for assistance for FTTX network planning and FTTX deployment products.

1.2 Starfighter LC Dimensional Drawing



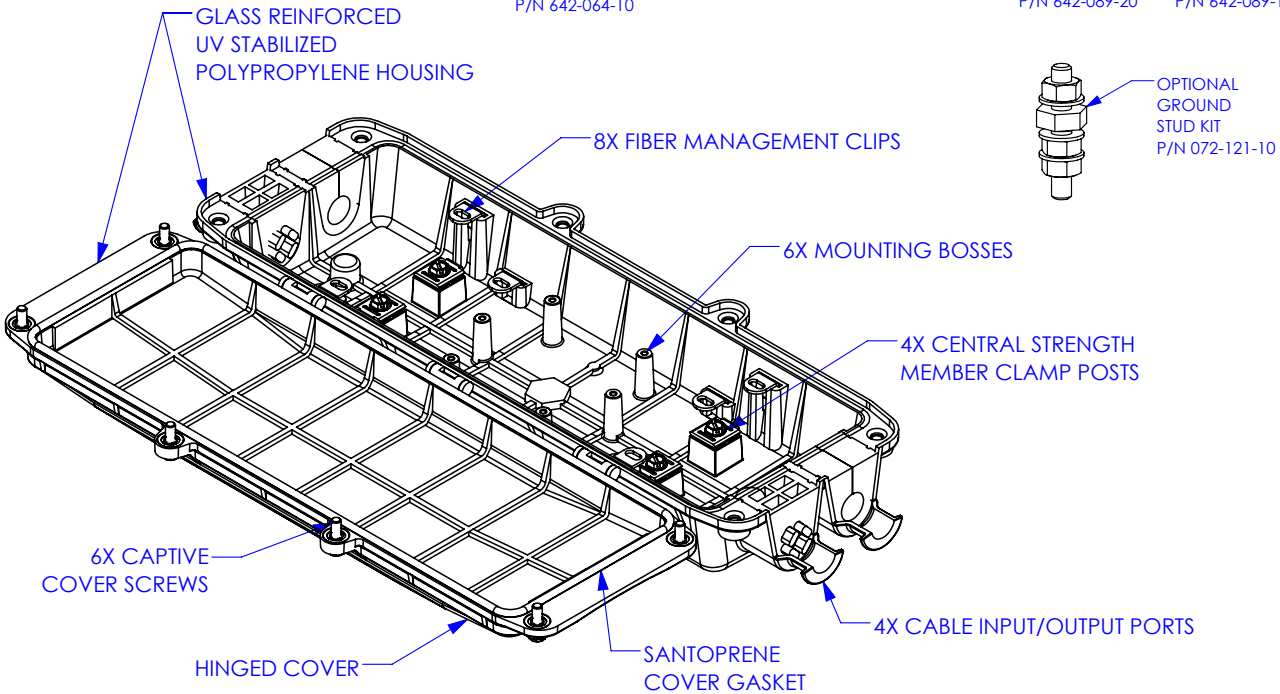
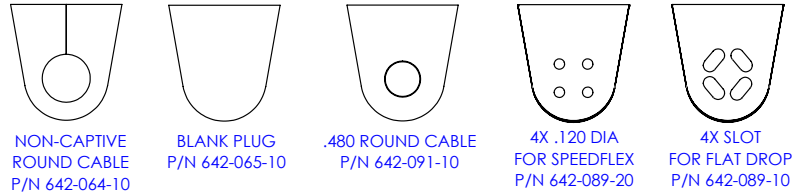
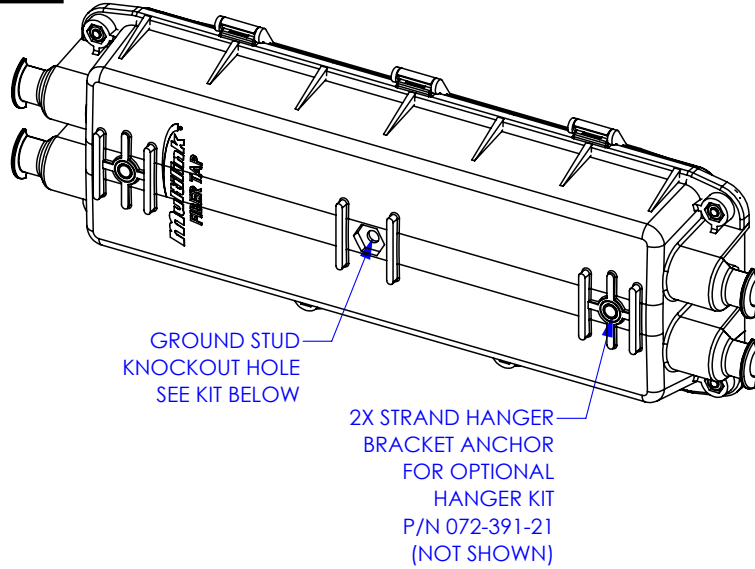
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Introduction (Cont.)

Starfighter LC Dimensional Drawing (Cont.)

Parameter	Specification
*Splice Capacity	Up to 72 Fiber
**Patch Capacity	Up to 24 Fiber
Cable Diameter	Up to 0.58"
Connector Types	SC/APC SC/UPC LC/APC LC/UPC
Cable Types	Unarmored Armored
Various Kits	Ground Stud Kit
*3 QTY Splice Trays ONLY, No Patch **24 Fiber LC Adapters ONLY	



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2. Preparations

2.1 Installation Outline

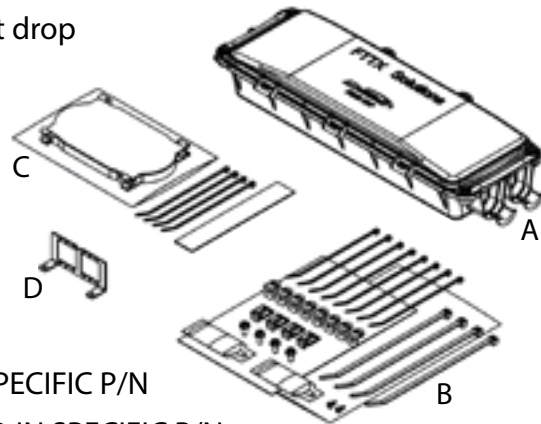
The general procedure of the Starfighter LC installation includes:

- Securing cables to the Starfighter LC mounting bracket(s)
- Configuring grommets for cable entry and exit drop
- Splicing and fiber termination or patching

2.2 Starfighter LC Checklist

Each kit includes the following items:

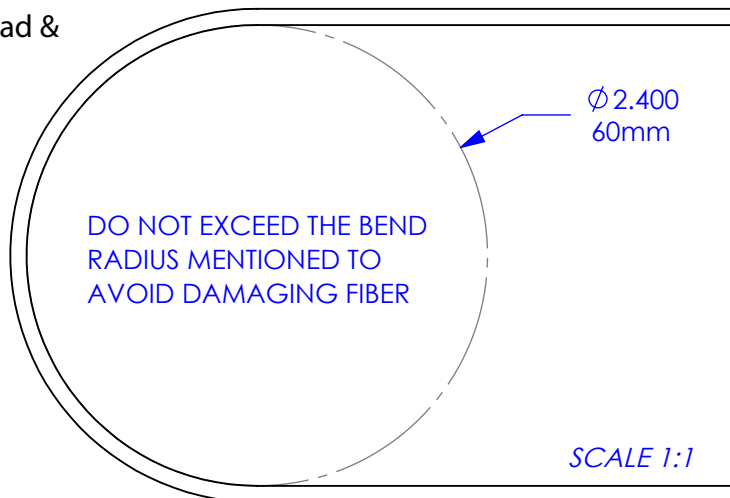
- 1x Starfighter LC Assembly (A)
- 1x Hardware Kit (B)
- 1-3x Splice Tray Kit(s) (C) ONLY INCLUDED IN SPECIFIC P/N
- 1x SF-LC Bulkhead Bracket (D) ONLY INCLUDED IN SPECIFIC P/N



2.3 Recommended Tools and Equipment

The Following list includes tools and equipment that you may need for a successful installation (these tools **ARE NOT INCLUDED** with the product or accessories):

- Safety Glasses
- Cut-Resistant Gloves
- Hex-Head Screw Drivers (1/4" head & 11/32" head)
- 216C Tool (3/8" & 7/16" heads)
- Scissors
- Tape Measure
- Side Cutters/Diagonal Cutters
- Pliers
- Marker
- Ring Cut Tool
- Buffer stripping Tool
- Mastic Tape
- Bend Radius Gauge (See Figure)



BEND RADIUS GAUGE

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3. General Warnings

3.1 Laser Light Warning

Never look directly into the end of a fiber that may be carrying laser light. Laser light can be invisible and may be harmful to your eyes. Viewing it directly may not cause pain; therefore it will not cause blinking or the iris of the eye to close involuntarily as it does when viewing bright light. Consequently, serious damage to the retina of the eye is possible. Should accidental exposure of laser light be suspected, arrange an eye exam immediately.

3.2 Laser Light Magnification Warning

Do not use magnifiers in the presence of laser radiation. Diffused laser light can cause serious eye damage if focused with optical instruments.

3.3 Loose Fiber Warning

Cleaved or broken glass fibers are very sharp and can pierce the skin easily. Keep your work area clear of removed fiber. Do not allow pieces of fiber to stick to your clothing or fall into the work area where they can cause injury later. Use tweezers to pick up broken/cut pieces of fiber and place on a piece of tape that has been set aside for this purpose.

3.4 Sharp Edge Warning

The wearing of cut-resistant safety gloves to protect your hands from sharp cutting tools and the metal armoring of armored cable is strongly recommended. Use extreme care when working with severed armor. There may be sharp edges where the armor is damaged. Always cover the exposed/cut armor end with a wrap of black electrical tape. To minimize the chance of injury from sharp-blade tools, always cut away from yourself and others. Dispose of used blades and armor scrap properly.

3.5 Safety Glasses Warning

Use safety glasses while working is highly recommended to provide eye protection from accidental injury when handling chemicals, cables or working with fiber. Pieces of glass fiber are very sharp and have potential to damage the eye.

3.6 Electrical Shock Warning

Do not install telecommunications equipment or work with telephone wiring during a lightning storm. Telephone lines can carry high voltages from lightning causing electrical shock resulting in severe injury or death.

3.7 Fiber Damage Warning

Fiber Optic cable is highly sensitive to excessive pulling, bending and crushing. Take care when bending the cables. Be sure not to pull too hard on the fibers. Do not crush the cable or allow it to kink. Doing any of these things may cause damage to the fiber and require it to be replaced.

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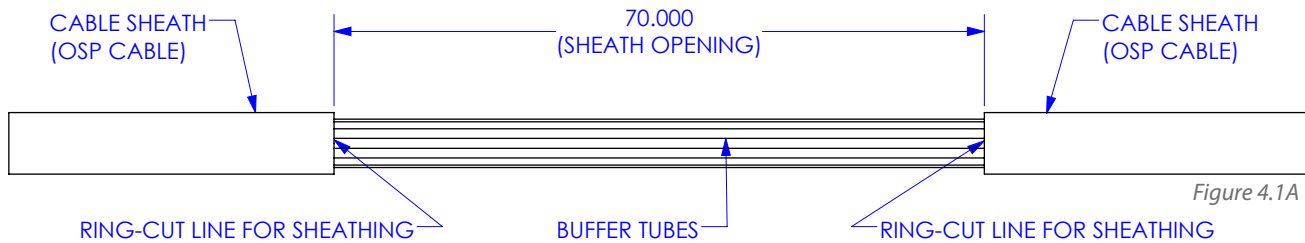
4. Installation

Entry Cable Preparations

Note: Fiber optic cable is sensitive to excessive pulling, bending, and crushing forces. Consult the cable specification sheet of the cable you are installing. **Do not bend the cable more sharply than the minimum recommended bend radius. Do not apply more pulling force to the cable than specified. Do not crush the cable or allow it to kink.** Doing so may cause damage that can alter the transmission characteristics of the cable; the cable may then have to be replaced.

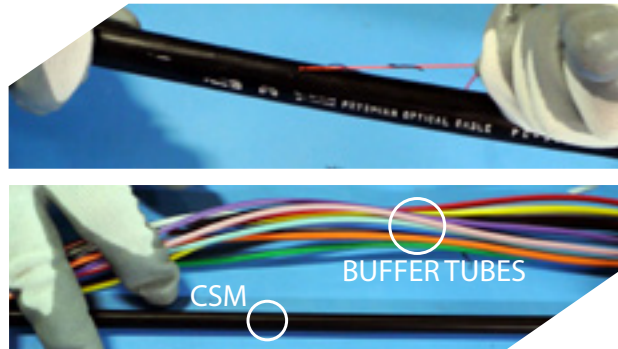
4.1 Entry Cable Prep

Measure 70" inches of cable and mark two spots on each end. Using the appropriate tool, make a ring cut at both locations. Carefully make a horizontal cut from one circle cut to the other. During the cutting process, be sure not to damage the buffer tubes inside the cable.



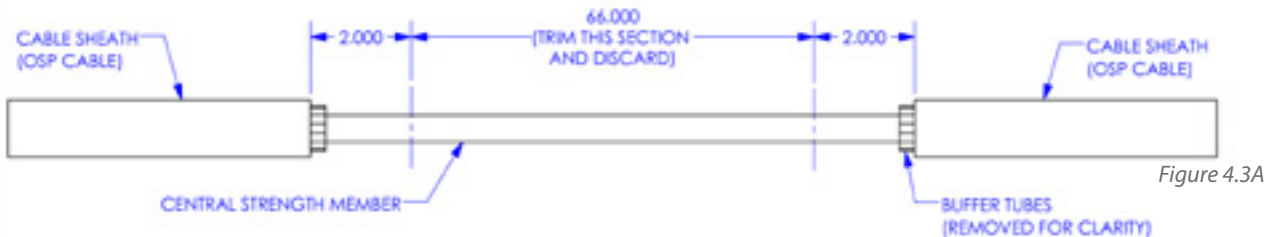
4.2 Cable Jacket Removal

Find the rip cord in the cable and pull to help separate the jacket from the cable. Remove the outer jacket and trim away all the protective layers leaving the Central Strength Member (CSM) and buffer tubes exposed across the length of the ring cut.

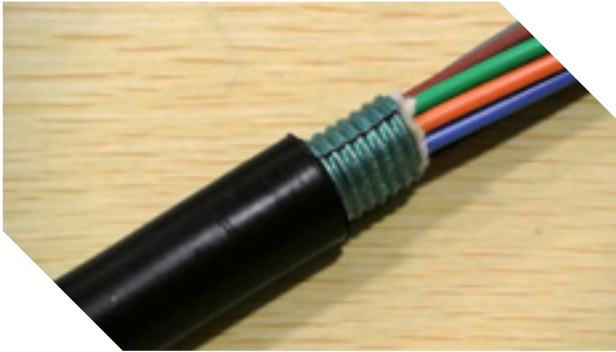


4.3 Cut & Trim CSM

Measure at least 2" inches from each side of the ring cut locations with the exposed buffer tubes and make a mark on each side of the CSM (Figure 4.3A). Cut and trim the CSM discarding the 66" inch section (Figure 4.3B). If using armored cable continue to 4.4, else continue to 4.8.



Installation (Cont.)

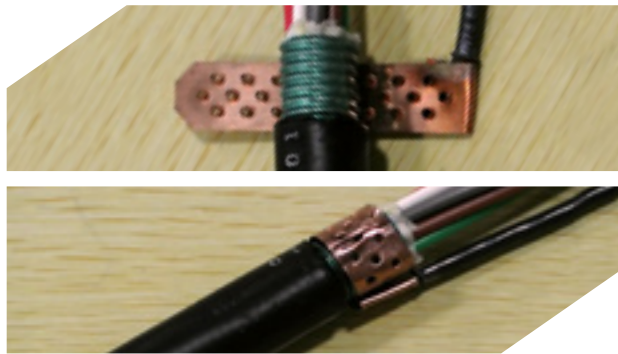


4.4 Armored Cable

Allow at least 1" of the cable's armor to remain from the jacketing. The copper ground clamp (from the grounding kit, ***sold separately**) will wrap around any exposed cable armor. Repeat on opposite side of ring cut and any armored drop cable.

4.5 Grounding Kit **sold separately*

Apply the copper ground clamp (from the grounding kit, ***sold separately**) to the exposed cable armor. Be sure that the teeth clamp into the armor to prevent from coming off. Repeat on opposite side of ring cut and any armored drop cable.



4.6 Attaching Hose Clamp

Attach the hose clamp over top of the copper ground clamp. Tighten the bolt of the hose clamp to compress the teeth of the copper ground clamp into the armor cable. The teeth must penetrate the film of the armor cable or grounding will not be successful. Repeat on opposite side of ring cut and any armored drop cable.

4.7 Secured Grounding

Loosen the ground nut on the base of the Starfighter LC and attach the grounding connector by using the grounding bolt as a guide. Repeat on opposite side of ring cut and any armored drop cable. Tighten down the ground nut securing the grounded connection. Perform step after successful splicing or patching.



Installation (Cont.)

4.8 Cable Anchoring

Attach the CSM clamp to the base of the Starfighter LC using the supplied hardware in 4 places as shown. DO NOT tighten the CSM clamps fully down to the base before sliding the cable's CSM under the lip of the clamp. Tighten the screw of the clamp to secure the CSM in place. Make sure to follow this process for both entry and exit of cable.

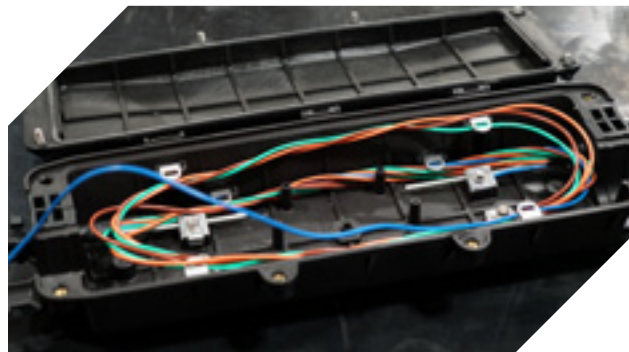


4.9 Buffer Tube Anchoring

Insert the supplied cable management clips into each of the fiber management inserts on the perimeter of the Starfighter LC. Each clip will serve as cable management system holding the buffer tubes securely later on.

4.10 Buffer Tube Branching

Determine the number of buffer tubes that will need to be branched off to be spliced or patched to subscriber drop off cables. Cut these selected buffer tubes on the exit side (full length of the ring cut) and separate these from the remainder buffer tubes that will pass through.

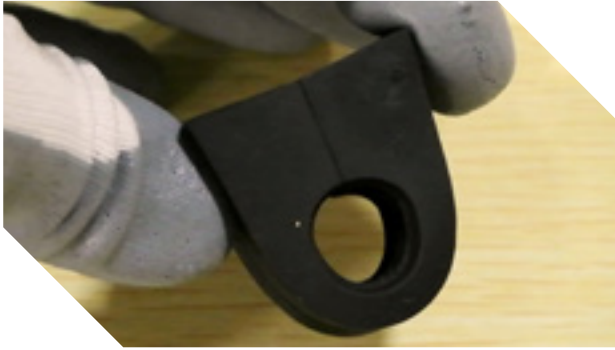


4.11 Buffer Tube Prep

Route the remainder of the pass through buffer tubes around the inside perimeter on the bottom of the Starfighter LC using the fiber management clips previously attached. Two full loops will be formed when securing the buffer tubes within the designated area. Be sure to follow the bend radius gauge to prevent snapping the fiber. Use the supplied smaller tie wraps on each of the fiber management clips. DO NOT tighten the tie wraps too tight to prevent fiber damage or disruption of light.

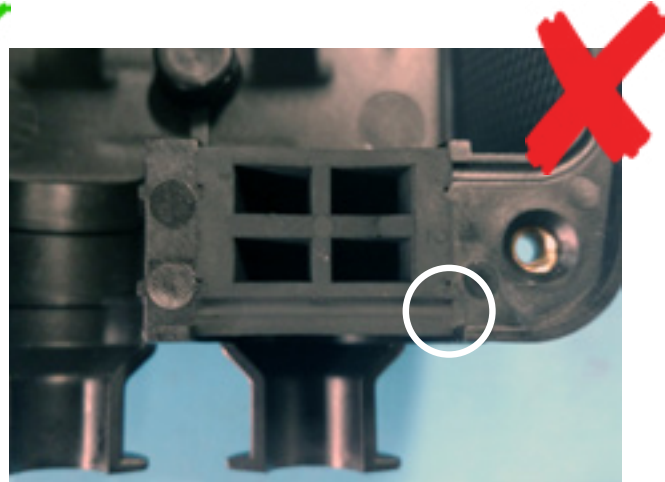


Installation (Cont.)



4.12 Cable Entry Grommet Inserts

Make sure the cable is **neither too big (allows up to 0.58 diameter MAXIMUM) nor too small** compared to the designated diameter. Use Mastic tape around the cable to build up the diameter to the appropriate size. Insert the fiber jacketing into the cable entry grommet with the gasket seam aligned internally to the closure. Any grommet entry not being used **MUST** have a solid blank grommet inserted to ensure a water-tight seal.

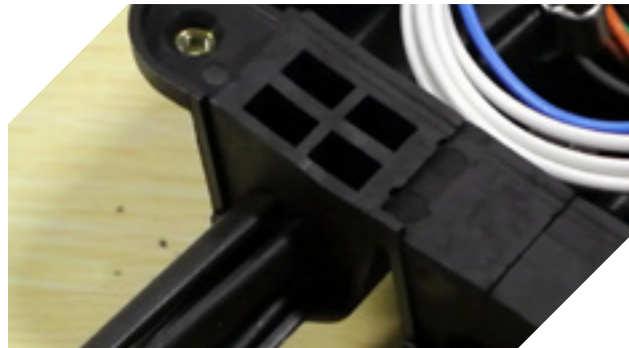


If splicing continue to 4.13, otherwise for patching continue to 4.18.

Splicing Network Planning

4.13 Insert Exit Drop Grommet

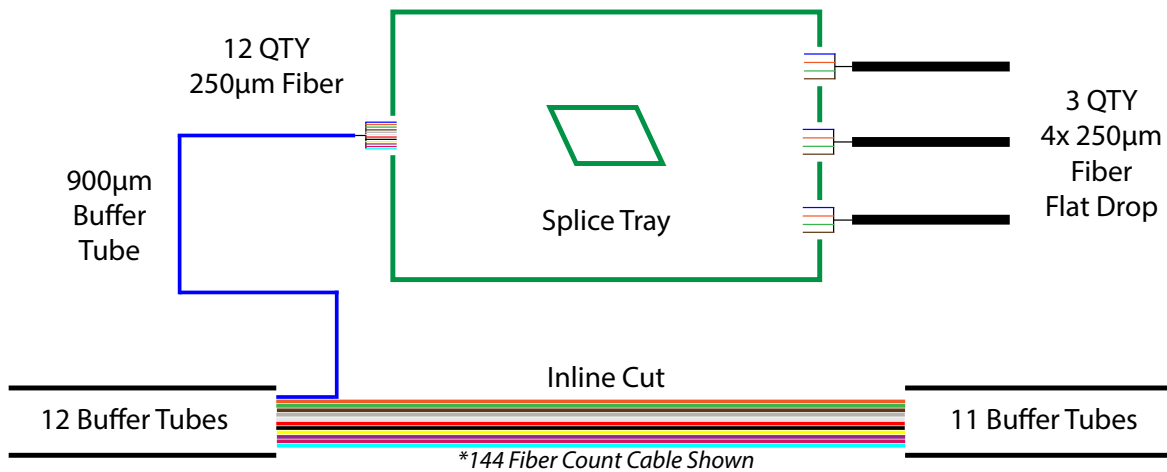
Using the appropriate drop grommet feed each fiber jacketing, spliced flat drop in this case, into the appropriate hole sliding the grommet onto the drops. Gauge how far the grommet needs to be moved by placing the drops into the base. Each flat drop grommet allows 4 flat drops to be installed per grommet. Any grommet exit not being used **MUST** have a solid blank grommet inserted to ensure a water-tight seal.



Installation (Cont.)

4.14 Splice Tray Kit

Carefully remove the supplied splice tray and each of the components. Then proceed to splice accordingly following your splicer's manual and operating procedures. Once finished with a successful termination insert the splice tray into the center of the bracket inside the Starfighter LC. Use the network planning guide below.

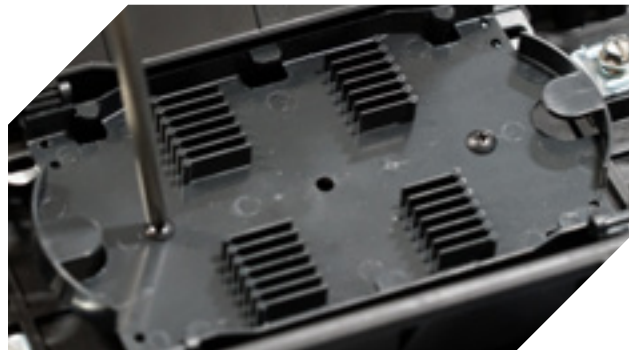


4.15 Proper Fiber Management

Route each of the fiber buffer tubes using the fiber management clips located on the upper section of the Starfighter LC. Make sure all fibers are tucked away neatly using a tie wrap in each of the 4 locations so as to not allow them to get pinched in the hinge of the closure. Insert the grommet securely into the grooves of the Starfighter LC base.

4.16 Attach Splice Tray to Base

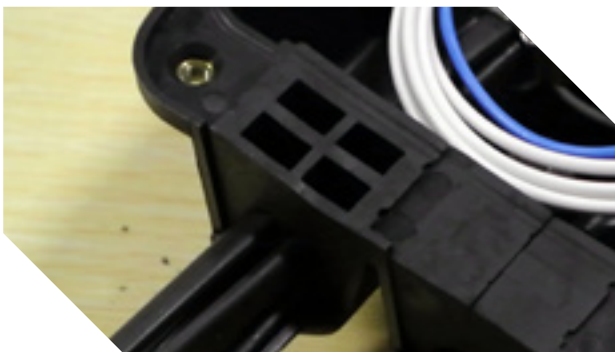
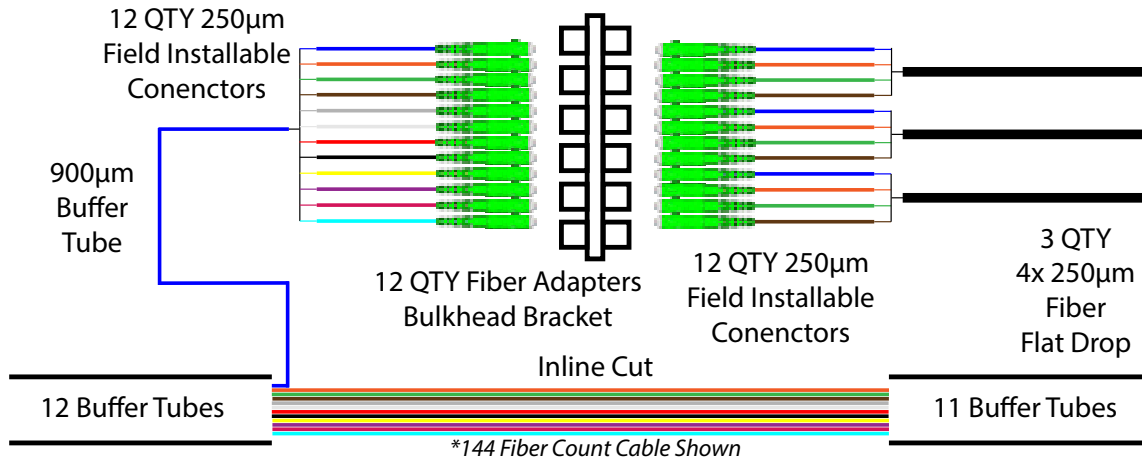
Attach the splice tray to the base by lining up the hole on the base with the mounting holes on the splice tray. If using armored cable with a grounding kit (***sold separately**) insert the eye of the ground strap over the ground bolt, located below the splice tray when installed, before tightening. Proceed to step 4.23.



Installation (Cont.)

Patching Network Planning

Use the network planning guide below for a successful Starfighter LC installation. Various configurations are available but this guide follows the configuration shown below.



4.17 Insert Exit Drop Grommet

Using the appropriate drop grommet feed each fiber jacketing, spliced flat drop in this case, into the appropriate hole sliding the grommet onto the drops. Gauge how far the grommet needs to be moved by placing the drops into the base. Each flat drop grommet allows 4 flat drops to be installed per grommet. Any grommet exit not being used **MUST** have a solid blank grommet inserted to ensure a water-tight seal.

4.18 Install Field Installable Connectors

On each of the 250µm from the buffer tubes separated from the main line install a field installable connector on the preferred number of fibers to be inserted into the bulkhead bracket. Repeat this process on each of the drop cables being installed.



4.19 Attach Bulkhead Bracket to Base

Attach the bulkhead bracket to the base by lining up the hole on the base with the mounting holes on the bulkhead bracket. If using armored cable with a grounding kit (***sold separately**) insert the eye of the ground strap over the ground bolt, located below the bulkhead bracket when installed, before tightening.



Installation (Cont.)



4.20 Insert Feeder Connectors

Remove the adapter dust cap from the bulkhead bracket then the dust cap from the Field Installable Connector and plug in. **DO NOT** remove either the dust cap or adapter dust cap prior to direct installation in this step. Doing so can compromise the integrity of the polished fiber with the potential to collect dust in the adapter preventing an optimal connection.

4.21 Insert Distribution Connectors

Take each pigtail or field installable connector to be installed and remove the dust cap and remove the adapter dust cap before plugging into the bulkhead bracket. **DO NOT** remove either the pigtail dust cap or adapter dust cap prior to direct installation in this step. Doing so can compromise the integrity of the polished jumper and potential to collect dust in the adapter preventing an optimal connection.



4.22 Proper Fiber Management

Route each of the fiber buffer tubes using the fiber management clips located on the upper section of the Starfighter LC. Make sure all fibers are tucked away neatly using a tie wrap in each of the 4 locations so as to not allow them to get pinched in the hinge of the closure.

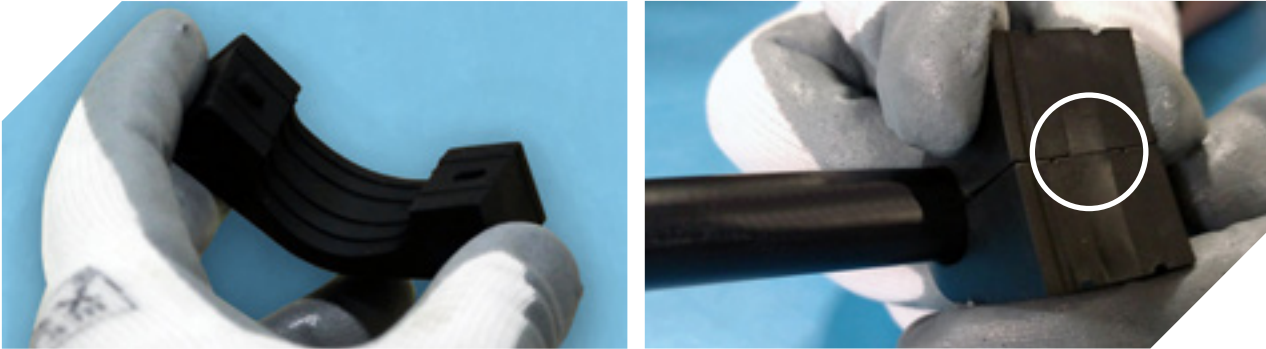


Installation (Cont.)

Closing the Closure

4.23 Proper Grommet Seal

Make sure each fiber jacketing/entry grommet is tight around the jacketing of the fiber. Use mastic tape when necessary to accommodate the diameter being used. Any entry grommets not being used **MUST** have a solid blank grommet inserted to ensure a water-tight seal.



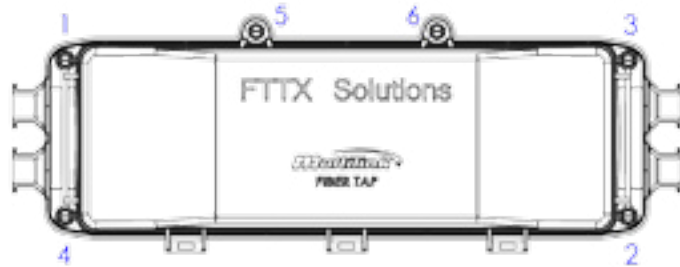
4.24 Applying the Sealant

Take a silicon sealant packet provided with the closure and slowly apply sealant to the inside and outside of the cable entry grommet before inserting into the closure's base with the gasket seal aligned correctly. One sealant packet should be used per grommet inserted. Cover the entire outside face of the cable entry grommet once inserted into the base creating a seal along with the seam of the grommet as circled. **NOTE: Apply new sealant when reopening closure to ensure proper seal.**



4.25 Torque Tighten Hex Bolts

Close the cover to the closure ensuring the cover gasket fits firmly into the base groove. Hand tighten each hex bolt on the closure's cover using 11/32" hex-head screw driver following the pattern as shown. Then use a torque wrench at 15 inch pounds on each of the hex-head screw. Once fully tightened inspect the perimeter of the closure and grommets that they are fully secured.



5. Accessory List

Multilink's Starfighter LC supports various options of grommets accommodating vast cable diameters, additional accessories some of which are included with the Starfighter LC, and patch & splice options including field installable connector kits, and pigtails.





Starfighter LC Pigtails

Product Photo	Description	Stock ID
	SC/APC 12 Fiber SM 3M Pigtail Spiral Wrapped	10-6418
	SC/UPC 12 Fiber SM 3M Pigtail Spiral Wrapped	10-6416
	LC/UPC 12 Fiber SM 3M Pigtail Spiral Wrapped	065-180-10
	SC/APC 12 Fiber SM 3M Pigtail Yellow Jacket	065-395-10
	SC/UPC 12 Fiber SM 3M Pigtail Yellow Jacket	065-371-10
	LC/APC 12 Fiber SM 3M Pigtail Yellow Jacket	065-437-10
	LC/UPC 12 Fiber SM 3M Pigtail Yellow Jacket	065-396-10
	SC/APC 4 Fiber SM 3M Pigtail Yellow Jacket	065-310-10
	SC/UPC 4 Fiber SM 3M Pigtail Yellow Jacket	066-493-10
	LC/APC 4 Fiber SM 3M Pigtail Yellow Jacket	066-494-10
	LC/UPC 4 Fiber SM 3M Pigtail Yellow Jacket	066-495-10
	SC/APC 1 Fiber SM 3M Pigtail Yellow Jacket	066-490-10
	SC/UPC 1 Fiber SM 3M Pigtail Yellow Jacket	065-286-10
	LC/APC 1 Fiber SM 3M Pigtail Yellow Jacket	066-491-10
LC/UPC 1 Fiber SM 3M Pigtail Yellow Jacket	066-492-10	

Starfighter LC Accessories

Product Photo	Description	Stock ID
	Velcro Strap ½ x 8"	651-030-10
	12 Port Splice Tray Kit	072-394-10
	SF-LC Grounding Kit	072-121-10

Starfighter LC Field Installable Kits

Product Photo	Description	Stock ID
	SC/APC SM Field Installable Kit	066-025-10
	SC/UPC SM Field Installable Kit	066-024-10
	LC/APC SM Field Installable Kit	066-131-10
	LC/UPC SM Field Installable Kit	066-029-10

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