

# Fiber Scalability Center (FSC)

## Installation Manual

192 FSC

288 FSC



5480 Nathan Lane  
Plymouth, MN 55442

Part #: MYA20029  
Rev: D  
Updated: 4.2007  
ECN: 6669

Direct: 763.476.6866  
National: 800.422.2537  
[www.apacn.com](http://www.apacn.com)  
[techsupport@apacn.com](mailto:techsupport@apacn.com)

**Table of Contents**

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<b>Introduction</b> .....	1
Proprietary notice.....	1
<b>Technical Support</b> .....	2
<b>Overview</b> .....	3
Enclosure - front view.....	3
Enclosure - rear view.....	4
<b>Installation</b> .....	5
PenCell base.....	5
6 inch riser.....	7
Locate & prepare the enclosure base.....	9
Mount the enclosure on the base.....	10
Grounding the enclosure.....	11
Fiber splitter module (FSM).....	12
FSM pigtail routing (front input for FSM).....	13
Cable deployment (rear input for FSM).....	14
Cable installation (patch & splice).....	15
Feeder cable splicing.....	19
Distribution cable splicing.....	22
<b>Part Number Reference</b> .....	24
<b>Notes</b> .....	25

## **Introduction**

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### ***Proprietary Notice***

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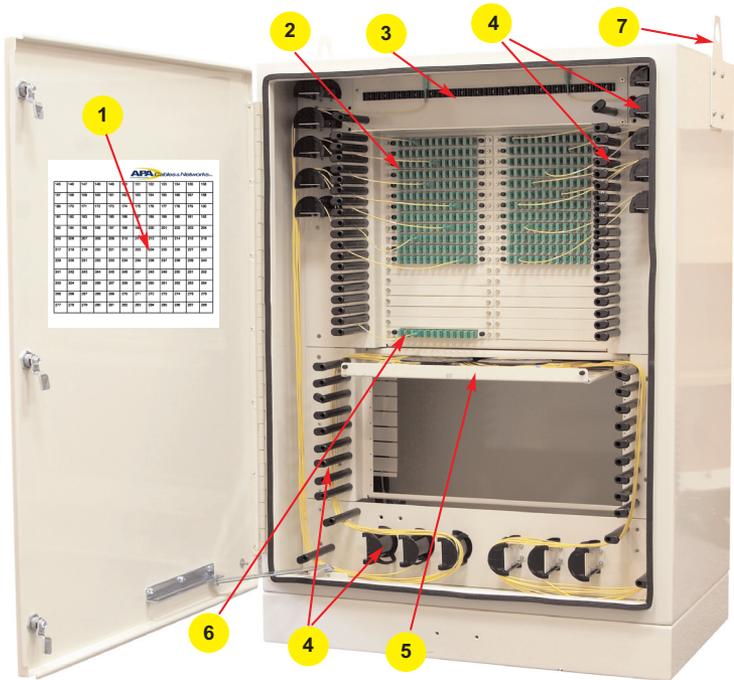
Toll Free: 800.422.2537  
Phone: 763.476.6866  
Fax: 763.475.8457

Customer  
Support: [sales@apacn.com](mailto:sales@apacn.com)

Technical  
Support: [techsupport@apacn.com](mailto:techsupport@apacn.com)

## Overview

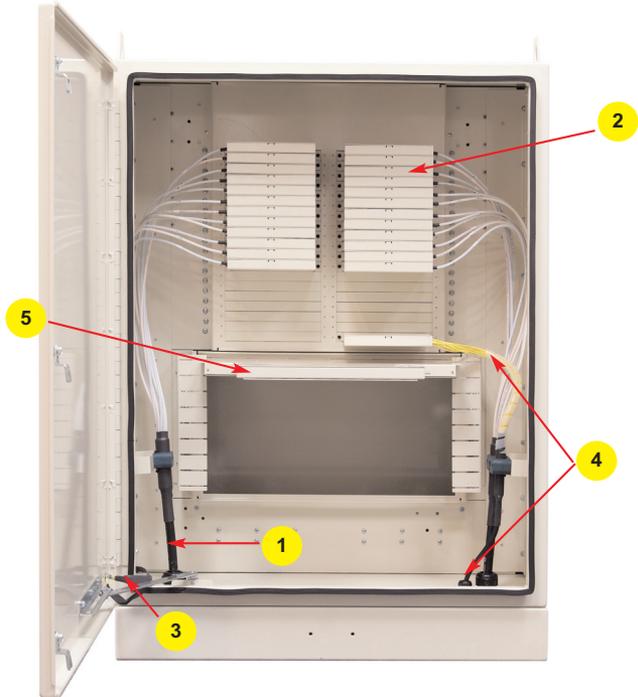
Enclosure - Front View (pigtail outputs)



1. Designation card
2. Distribution cassettes (FAC's)
3. Parking lot
4. Fiber management rods and spools
5. Fiber Splitter Modules (FSM's)
6. Cassette loaded feeder
7. Hoist plate

## Overview (cont.)

Enclosure - Rear View (patch only)



1. Distribution cable
2. Distribution cassettes (FAC's)
3. Grounding
4. Feeder cable
5. Fiber Splitter Modules (FSM's)

## Installation

### ***Installation of PenCell Base (grass, dirt or gravel)\****

**NOTE:** For installation in grass, dirt, or gravel (all PenCell units)

**NOTE:** Boxes larger than 2 feet x 2 feet should be installed with an additional 8 inches to 10 inches of room in length, depth and width allowed.

**NOTE:** Refer to Figure 1.

**NOTE:** If using a 6 inch riser, excavation will need to be 6 inches deeper than standard installation (see page 7).

**NOTE:** **Install with cover and support beams in place.**

- Prepare the excavation approximately 6 inches deeper than the overall height of the enclosure. The length and width of the excavation should be determined by adding 4 inches to 6 inches to the overall length and width of the handhole or pull box.
- Place approximately 3 inches to 6 inches of compacted material such as sand or gravel in the bottom of the hole. Gravel is the recommended material because of its drainage characteristics. The compacted material should be leveled so the top of the handhole or pull box is flush to the grade.
- Place selected backfill into the excavations at 1foot lift and compact either by manual compacting or flooding the excavation to achieve the desired relative compaction. Install with cover and support beams in place.

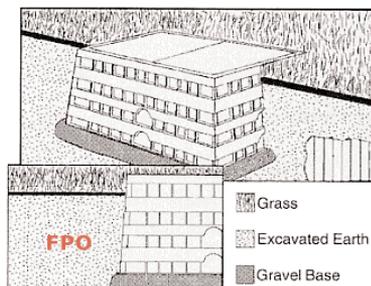


Fig. 1

\* Document adapted from original found at <http://www.pencell.com/installation.shtml>

## Installation (cont.)

### ***Installation of PenCell Base (concrete and pavement)\****

**NOTE:** For installation in concrete and pavement  
(PenCell units with stell or polymer concrete lids)

**NOTE:** Plastic lids are NOT recommended in sidewalk applications.

**NOTE:** Boxes larger than 2 feet x 2 feet should be installed with an additional  
8 inches to 10 inches of room in length, depth and width allowed.

**NOTE:** Refer to Figure 2.

**NOTE:** If using a 6 inch riser, excavation will need to be 6 inches deeper than  
standard installation (see page 7).

**NOTE:** **Install with cover and support beams in place.**

- Prepare the excavation approximately 6 inch deeper than the overall height of the enclosure. The length and width of the excavation should be determined by adding 4 inches to 6 inches to the overall length and width of the handhole or pull box.
- Place approximately 3 inches to 6 inches of compacted material such as sand or gravel in the bottom of the hole. Gravel is the recommended material because of its drainage characteristics. The compacted material should be leveled so the top of the handhole or pull box is flush to the grade. Install with cover in place with shims on all sides and ends to prevent deflection.
- Place selected backfill into the excavation at 1 foot lifts and compact either by manual compaction or by flooding the excavation. The backfill should be discontinued approximately 8 inches below the finished grade. The final 8 inches of the excavation should be finished with concrete. This should be accomplished by providing a form around the enclosure that would produce a 6 inch wide collar. Small shims should be placed between the cover and wall until concrete is set.

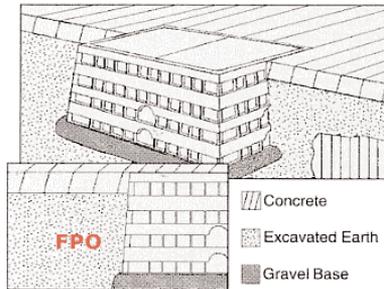


Fig. 2

\* Document adapted from original found at <http://www.pencell.com/installation.shtml>

## Installation (cont.)

### *Installation of 6 inch Riser*

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**NOTE:** Excavation will need to be 6 inches deeper than standard installation.

- Remove the bolts securing the lid to the handhole enclosure and remove both sides of the lid (Fig. 3 and Fig. 4). Retain the bolts for re-installation of the lid.
- Place the riser on top of the enclosure where the lid previously was positioned (Fig. 5).



Fig. 3

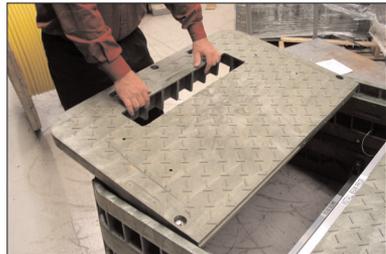


Fig. 4



Fig. 5

## Installation (cont.)

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### Installation of 6 inch Riser (cont.)

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- Using the pre-existing holes in the spacer as a guide, drill clearance holes through the handhole enclosure to accept the mounting bolts (included with the riser) (Fig. 6).
- Insert bolts with the flat washer into the mounting holes. Add remaining flat washer, split ring lock washer and nut. Tighten until secure (Fig. 7).
- Replace the lid and fasten with original bolts and washers
- Bury handhole using appropriate method described on pages 5-6.



Fig. 6



Fig. 7

## Installation (cont).

### ***Locate and Prepare the Enclosure Base for Installation***

- Locate the enclosure base and remove any packaging materials

- If the base is installed on the enclosure, remove the base by removing the (4) bolts from the bottom of the inside of the cabinet.

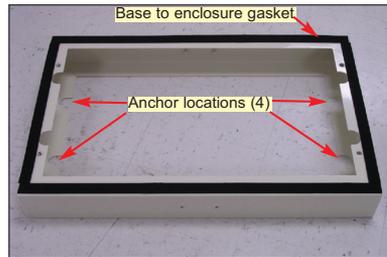


Fig. 8

- Position the enclosure base onto the pad (typically concrete). Assume that the (4) anchor locations in the enclosure base align with the anchor locations in the pad. After verification of the anchor alignment, remove the enclosure base from the pad (Fig. 8).

- Apply continuous beads of caulk / sealant (such as a polycarbonate based product) to the bottom outer periphery of the enclosure base and around the anchor locations.

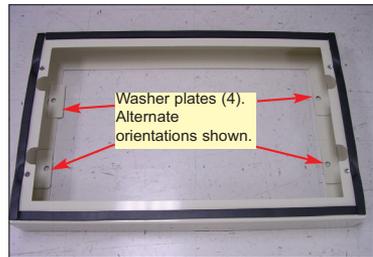


Fig. 9

- Return the enclosure base to the previously determined position on the concrete pad before the caulk "skims" over
- Place the rectangular washer plates (found in the hardware package) onto the enclosure base aligning the holes with the anchor locations in the pad (or placing over cast-in-studs) (Fig. 9).
- Orient the plates to provide the most contact with the base flange.
- Install the chosen fasteners and tighten firmly.

## Installation (cont).

### ***Mount the Enclosure on the Base***

- If the enclosure is fastened to a pallet: Open the enclosure and remove the (4) shipping lag screws located in the corners of the enclosure (Fig. 10)
- Lift the enclosure from the pallet (a hoist is recommended).
- Hoist plates are provided at the top of the enclosure. If the cabinet has been received with the large hole of the plates downward, flip the plates for use. Be sure to fully tighten the plate attachment screws before lifting the enclosure.



Fig. 10

- If using a hoist, attach the cable or strap hooks to both hoist plates. Place the enclosure onto the previously mounted base. When adjusting the enclosure into position avoid damaging the enclosure to base gasket.
- A less desirable method of lifting is to place a sturdy pipe through both hoist plates and lift from both ends of the pipe. Be careful of the cabinet sliding towards either end of the pipe and pinching the lifter's hands.



Fig. 11

- Locate the hardware package shipped with the enclosure. Locate the (4) bolts with the gasketed-washers. Assure the enclosure is oriented properly to the base and then insert the bolts through holes in the corners of the enclosure. Insert all four bolts before tightening them with a wrench.
- If desired, after the enclosure is mounted to the base, the hoist plates can be returned to the large hole-downward position or removed entirely.
- Check for and remove all tape, cardboard and foam supports used during shipping (Fig. 11).

## Installation (cont).

### ***Grounding the Enclosure***

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- A grounding tail and lug is located in the lower left corner of the rear of the cabinet (Fig. 12).
- The cabinet can be grounded via the large lug attached to the plate using a 6 gauge or larger wire.



## Installation (cont).

### ***FSM (Fiber Splitter Module) Installation***

- Remove the FSM and port designation card from the shipping materials being careful to avoid damaging any of the enclosed components
- The port designation card can be stored in the bag attached to the front door of the cabinet (Fig. 13).
- Install the FSM with labels facing up through the front of the lower bulkhead. The FSM is fastened to the bulkhead with the captive hardware attached to the FSM (Fig. 14a and 14b).
- Typically start with the top position (#1) in the lower bulkhead. Add each FSM (#2, #3, etc.) below the previous as required.
- Record the FSM number and port designations in the space provided on a designation card. Additional designation cards can be ordered from APACN.



Fig. 13

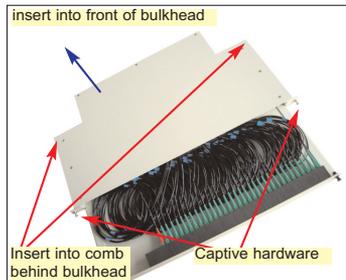


Fig. 14a

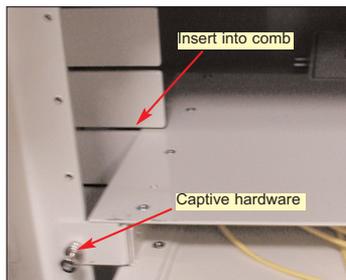


Fig. 14b

## Installation (cont).

### FSM Pigtail Routing (front input for FSM)

**NOTE:** Use the below instructions when the FSC is configured for front input. If using a rear input, see instructions on page 14.

- The input and output pigtails for the FSM are stored and accessed in the front portion of the FSM. In order to access the pigtails, pull the push-pull fasteners and slide the drawer out (Fig. 15).
- Route the input pigtail to the feeder port (Fig. 16 - red line). The input pigtail is identified by the red booted connector.
- Route the output pigtails to the distribution ports (Fig. 16 - blue line).
- After routing both input and output pigtails, close the FSM drawer and push in the locking push-pull fasteners.

**NOTE:** The fiber routing spools are different spacing for the vertical and horizontal sets. This allows incremental slack take up.

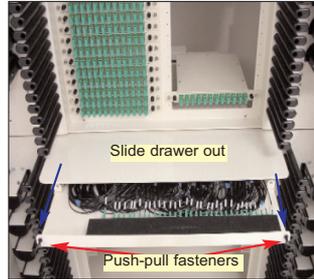


Fig. 15

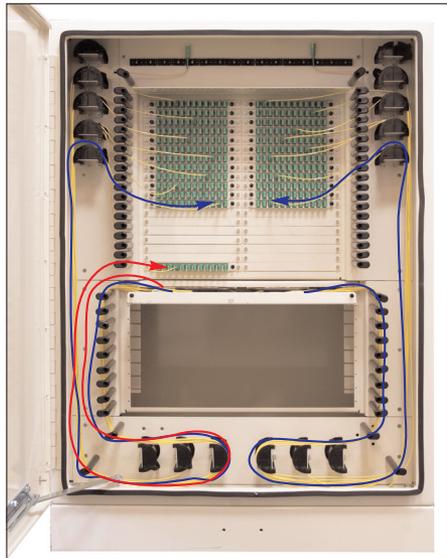


Fig. 16

## Installation (cont).

### **Cable Deployment (rear input for FSM )**

**NOTE:** Use the below instructions when the FSC is configured for rear input. If using a front input, see instructions on page 15.

- Locate the pre-terminated simplex fiber cables on the feeder plate on the right hand side wall in the rear of the cabinet. The simplex fibers are stored in parking lot clips attached to the feeder plates (Fig. 17).



Fig. 17

**NOTE:** Each fiber is numbered to coincide with the fibers of the feeder cable.

- To power up a splitter, choose the appropriate feeder and remove it from the parking lot using an upward motion.
- Extend the connector to the splitter, being sure to leave the fiber in the radius

limiter at the top of the feeder plate (Fig. 18 - blue line).

- Remove the dustcap from both the connector and the adapter and insert the connector until it is fully seated into the adapter (Fig 18).
- The output pigtails for the FSM are stored and accessed in the front portion of the FSM. In order to access the pigtails, pull the push-pull fasteners and slide the drawer out (Fig. 15).
- Route the output pigtails to the distribution ports on the front of the FSC (Fig. 16 - blue line).
- After routing both input and output pigtails, close the FSM drawer and push in the locking push-pull fasteners.

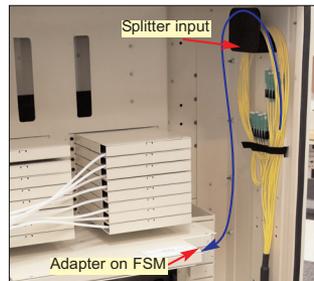


Fig. 18

## Installation (cont).

### ***Cable Installation (patch & splice versions only)***

**NOTE:** If the cabinet is supplied with grommet style seals, see directions on page 16.

- Determine which feed-through hole will be used to install the feeder cable.
- If the corresponding feed-through plate already has a cable installed, you will need to loosen the compression fitting securing the cable to the plate. This will allow the plate to slide along the preinstalled cable (Fig 19).
- Remove the four corner mounting screws that are holding the plate to the floor of the rear of the cabinet, saving the mounting screws.
- Select the compression fitting that most nearly fits the cable to be installed. The fittings are included in the ship-along hardware. Loosen, or if needed remove, the dome nut on the compression fitting to allow the cable to fit through the internal sealing ring (Fig. 20).



Fig. 19

**NOTE:** The sealing rings come in different sizes and colors.

- Locate the end of the cable to be spliced into the cabinet. Feed this end through the locknut, the feed-through plate, the compression fitting and finally the dome nut.
- Thread the locknut onto the fitting being careful to avoid crossing the threads, and tighten firmly against the feed-through plate.

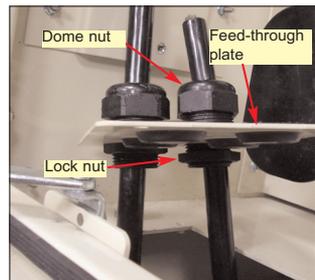


Fig. 20

## Installation (cont).

### Cable Installation (patch & splice versions only) (cont.)

**NOTE:** If the cabinet is supplied with grommet style seals, proceed as follows. If not, see directions on page 15.

- Remove the four screws that are holding the plate to the floor of the rear of the cabinet. Be sure to save the mounting screws.
- Select the entrance hole to be used and remove the rubber grommet. Using a utility knife or other cutting tool, remove the center piece of the grommet (Fig. 21).
- Feed the cable up through the floor of the cabinet.
- Determine the correct amount of outer jacket to remove from the cable by referencing the splicing section of this manual (pg. 18).
- Insert the blunt end of the cable to be spliced into the grommet. Feed the cable so that approximately 12 inches more than the recommended breakout is exposed above the grommet (Fig. 22).
- Insert the cable and grommet through the hole in the feed-through plate until the grommet locks in the outer groove. Pull the cable downward to lock the grommet and complete the seal (Fig 23).
- Replace the feed-through plate and install the mounting screws.

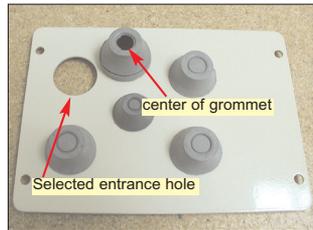


Fig. 21

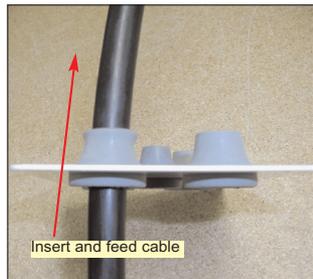


Fig. 22

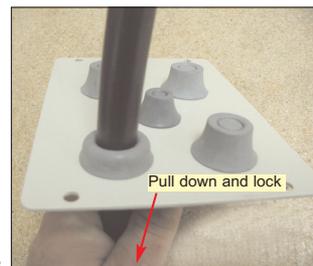


Fig. 23

## Installation (cont).

### ***Cable Installation (patch & splice versions only) (cont.)***

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- Reinstall the feed-through plate by securing it to the floor of the cabinet using the original 4 mounting screws.
- Determine the correct amount of outer jacket to remove from the cable by referencing the splicing section of this manual (pg. 18). Pull enough of the cable through the compression fitting to allow about 12 inches more than the recommended breakout length to extend out of the fitting.
- Remove the appropriate amount of outer jacket.
- Locate the green clamp shells and corresponding mounting screws from the ship-along hardware.
- Determine which clamp best fits the cable to be installed. The clamp shells are used in same size pairs. Avoid using a clamp that is too small and does not easily close around the cable (Fig. 24).
- Adhere a strip of foam tape (included in the ship-along hardware) to at least one side of the clamp (Fig. 25).



Fig. 24

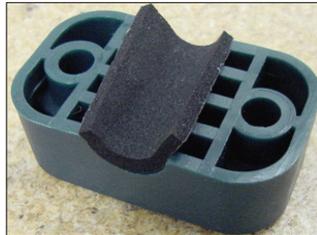


Fig. 25

## Installation (cont).

### ***Cable Installation (patch & splice versions only) (cont.)***

- Use the included mounting screws to fasten the clamp shells and cable to the appropriate cable bracket. The cable should be mounted so that the breakout is slightly above the top of the clamp (Fig. 26).
- If desired, the cable strength member can be secured in the included bracket.
- Manipulate the cable to provide gentle bends between the green clamp shell and the compression fitting (Fig. 27).
- Tighten the fitting dome nut firmly, compressing the sealing ring around the cable. This typically requires 1 full-turn past the point where the ring is fully contacting the cable.

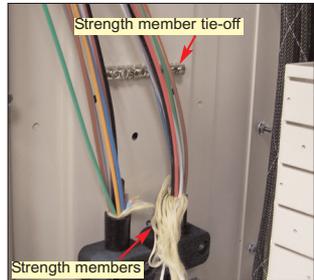


Fig. 26

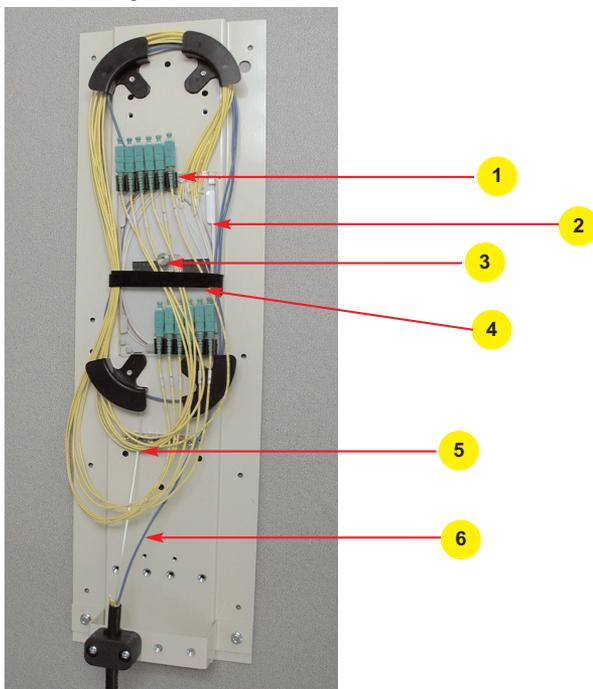


Fig. 27

## Installation (cont).

### Feeder Cable Splicing

#### Feeder Storage Plate



1. Parking lot
2. Splice tray
3. Knurled nut
4. Velcro strap
5. Strength member tie-off
6. Buffer tube from feeder

## Installation (cont).

### Feeder Cable Splicing (cont.)

- Unlatch the velcro strap, then unwrap and remove the simplex pigtails from the feeder plate on the right hand side of the rear of the cabinet (Fig. 28).
- Set these to the side to avoid damage during cable installation.
- Install the feeder cable on the right hand side in the rear of the cabinet as described in the cable installation section on page 15, removing **15 feet** of the outer jacket.
- Each simplex pigtail has a number label applied at the connector boot (Fig. 29 - red circle) and a mark or second label showing the appropriate place to tie the pigtail into the (Fig. 29).
- Remove the cable jacket from the tie off point leaving the label for fiber identification.
- Select the appropriate buffer tube to be spliced into the feeder tray.
- Temporarily route the buffer tube 1 1/2 times around the radius limiters and mark the tube where it will be tied off in the tray (Fig. 30 - red circle).

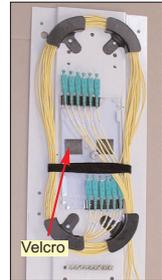


Fig. 28  
Tray

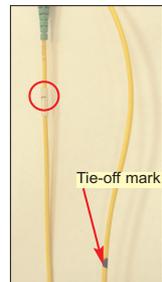


Fig. 29



Fig. 30

## Installation (cont).

### *Feeder Cable Splicing (cont.)*

- Remove the excess buffer tube to expose and clean the 250um fibers.
- Remove the splice tray by removing the knurled nut.
- Tie off the simplex fibers and the buffer tube in the splice tray. The grommet tape included in the installation hardware can be used to cushion the buffer tube (Fig. 31).
- Splice the appropriate fibers to the corresponding simplex fibers, store the slack and replace the cover to the tray.
- Wrap the buffer tube slack around the radius limiters, then return the splice tray to the stud and secure with the knurled nut.
- Wrap the simplex fibers around the radius limiters one at a time in reverse order (12,11,10,9.....) and park (Fig. 32).
- Secure the velcro strap over the buffer tubes, simplex fibers and the splice tray (Fig. 32).

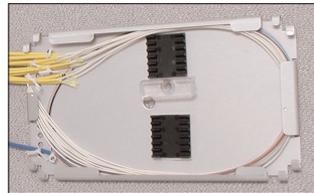


Fig. 31

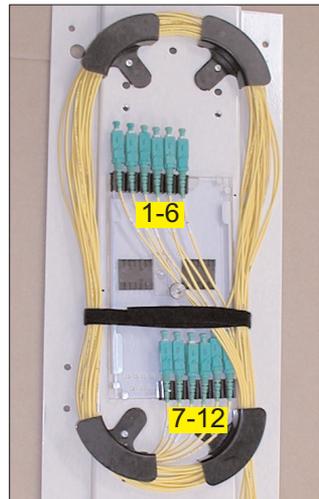


Fig. 32

## Installation (cont).

### Distribution Cable Splicing

- Install the distribution cable on the left hand side in the rear of the cabinet as described in the cable installation section on page 15. Remove 15 feet of the outer jacket.
- Group the first 6 buffer tubes to be spliced and fully insert them into one of the smaller mesh sleeves enclosed in the ship along hardware. This will help to control the bundle while routing and storing (Fig. 33).
- Continue with the next 6 buffer tubes and IFC pigtails and repeat until all of the fibers are banded.
- Route the grouped buffer tubes first over the small radius limiter (with a clip) (Fig. 34 - blue line) and then around the cabinet (Fig. 34- green line).
- The IFC pigtails are grouped in mesh sleeving and routed around the radius limiters. Route the IFC pigtails with the corresponding bundle of buffer tubes around the radius limiters and the splice sleighs (Fig 34 - orange line).
- Mark the buffer tube and distribution pigtails at the point where they will be tied to the tray. Each tray will accommodate 24 splices (two buffer tubes and two distribution pigtails) (Fig. 35.-red circle).

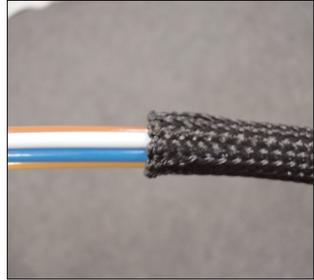


Fig. 33

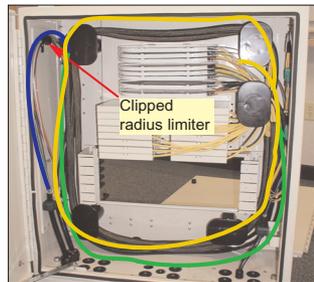


Fig. 34

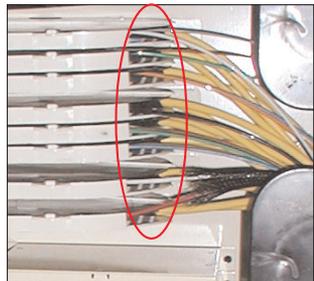


Fig. 35

## Installation (cont).

### ***Distribution Cable Splicing***

- Remove the sleigh. The 3 or 6-tray sleigh can be removed by loosening (don't remove) the knurled nut holding the sleigh assembly to the bulkhead, and sliding the sleigh assembly to the left, clearing the nut and stud on the other end of the entry (Fig. 36).
- Each tray can be removed from the sleigh by pushing the button on the side and pulling and rotating the tray out of the sleigh.
- Strip the jacket from the buffer tube at the point marked for tying to the tray, and clean the 250 um fibers.
- Strip the jacket from the IFC tails at the point marked for tying to the tray.
- Remove the cover and tie two buffer tubes and two IFC tails to the tray.
- Splice the corresponding fibers from the buffer tubes and the IFC tails.
- Secure the splice chip to the tray by removing the paper from the rear exposing the adhesive and placing in the tray (Fig. 37).
- Insert the splices into the splice chips, store the slack and replace the cover.
- Reinsert the tray into the sleigh and repeat until the sleigh is full.
- Wrap the buffer tube and IFC slack as described on page 21 and reattach the sleigh to the bulkhead in the appropriate position making sure it is over both studs. Tighten the knurled nut to the bulkhead.
- Repeat this process with the remaining sleighs until all of the fibers are spliced.

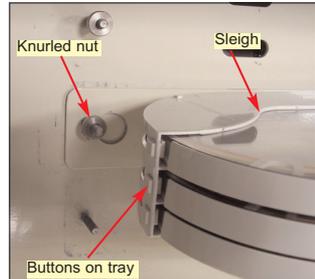


Fig. 36

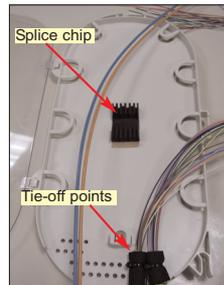


Fig. 37