FIBER DISTRIBUTION FRAMES
Common Systems

1. GENERAL

  1.01   This Bell Services Practice (BSP) provides the requirements, objectives, and physical design of the Fiber Distribution Frames (FDF): front load, rear load, and the 7-Inch frames.

  1.02   All FDFs are designed to provide a central assembly for termination, storage, and splicing of fiber optic cables. The assembly normally consists of the basic "equipment rack" plus optional items that are mounted on the rack corresponding to the planned use of the frame. For example, dedicated Outside Plant (OSP) bays and Fiber Optic Termination (FOT) bays. OSP bays will either use pre-terminated fiber cable stubs, which will run to the cable vault for splicing, or cable will be brought from the cable vault to the rear of the OSP shelf. FOT bays are cabled from the network element to the rear of the FOT shelf. Cross-

connects between the OSP shelves and the FOT Shelves are made across the front of the bays.

2. FDF FAMILY OF PRODUCTS

2.01 An FDF is comprised of modular fiber cable management products. The modular design provides add-on capability, and allows these products to be configured to meet the termination, storage, and distribution requirements of almost any fiber optic cable system.

2.02 The FDF family of products includes the following product groups:

Fiber Distribution Frames - are available in three basic styles: front load, rear load, and 7-inch FDS style. Frames may be ordered empty or loaded at the factory per the engineer's requirements.

Frame Modules - are of four main types: connector modules, splice modules, storage modules, and value added modules (VAM) chassis. Depending on the engineer's need, these modules are mounted on frames in various configurations.

Value Added Modules (VAMs) - are plug-in modules that fit within a VAM chassis. VAMs provide enhanced optical functions. Included are splitters, wavelength division multiplexers, variable attenuators and optical switches.

Related Frame Products - include Interbay Fiber Management Panels, which are typically placed between frames to provide guides for storing excess slack in cross-connect patch cords; End Guards, which may be placed at the end of a lineup to provide protection and a finished appearance; and Rear Fiber Storage Panels, which hold service loops for pre-terminated Fiber Optic Terminal patch cords.

Fiber Protection System - consists of overhead raceways or ducts for routing fibers between equipment frames. This system is engineered to provide physical protection for installed fiber patch cords.

Cables and Connectors - include OSP and Intrafacility Cables (IFCs), patch cords, pigtails, and industry standard connectors, such as ST and SC.

Fiber Management Software - provides the ability to build a computer model of the fiber network for use in network management and troubleshooting. Using interactive, pictorial workspaces, the user can record and query the network infrastructure of equipment, cables, and related items.

3. ADMONISHMENTS

The following admonishments must be adhered to whenever working with fiber optic products.

U Danger*: Infrared radiation is invisible and can seriously damage the retina of the eye. Do not look into the optical bulkhead of an operational transmitter or into the receiver end of an active fiber. A protective cap or hood MUST be immediately placed over any radiating bulkhead receptacle or*

optical fiber connector to avoid the potential of dangerous amounts of radiation exposure. This practice also prevents dirt particles from entering the connector.

U   Danger: *Do not look into the ends of any optic fiber. Exposure to invisible laser radiation may result. Do not assume laser power is turned off or the fiber is disconnected at the other end.*

4. PRODUCT OVERVIEW

4.0.1   The Fiber Distribution Frame, shown in Figure 4-1, is a modular frame assembly that provides a central location for terminating, splicing, and connecting optical fibers. The FDF may also hold VAMs to enhance optical function using wave division multiplexers, splitters, variable attenuators, and optical switches.
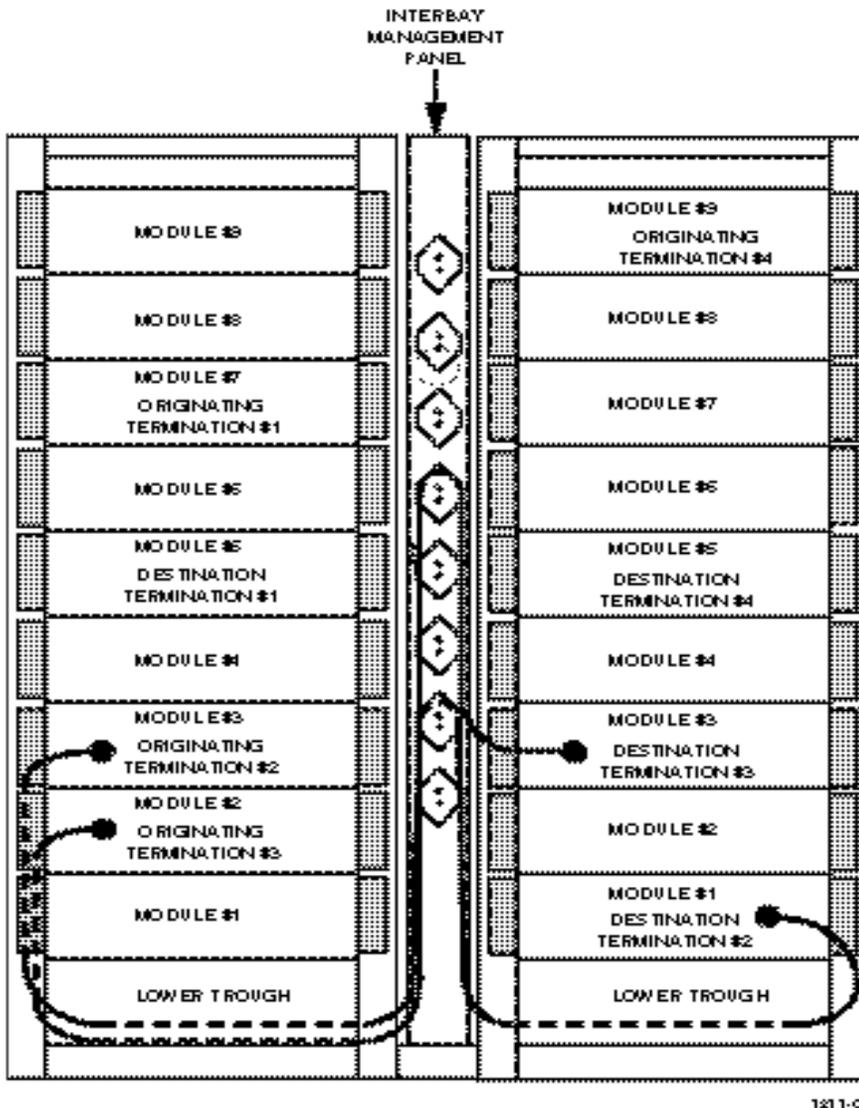
Figure 4-1. Sample Lineup with Fiber Distribution Frames

4.1 MAIN COMPONENTS

4.1.1 As shown in Figure 4-2, the network equipment rack provides the basic structure of the frame. It supports the fiber protection system and frame modules. The fiber protection system consists of fiber guides, radius limiters, clamps, and similar items used to secure and guide fibers and patch cords on the frame. The frame modules are function-specific chassis that mount on the frame in any of the nine predetermined locations utilizing 7-inch FDS modules. Based on function, frame modules can be divided into three types: splice, connector, and VAM chassis. A typical FDF lineup also includes related frame products used in some applications.
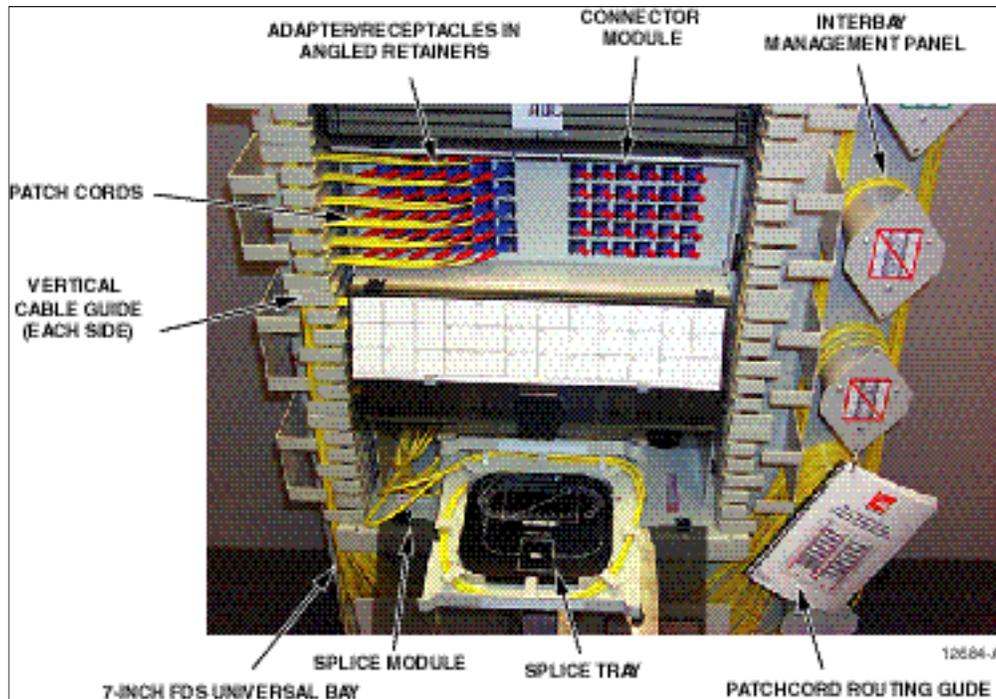
Figure 4-2. FDF Main Components

4.2 AVAILABLE STYLES

4.2.1 The **Generation I** is a low density Cable Management Tray (CMT) using a bay arrangement. This arrangement has 24 to 48 fiber optic ports per panel and up to 11 panels per 7-foot bay. **This FDF layout is considered grand fathered and shall be capped with existing panels.** All new bays will use the **Generation II FDF** equipment outlined in this practice and Product Approval Notice 19995259, FDF and Fiber Optic Apparatus dated December 1999 using 72 ports per panel[1].

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[1] SNET uses 96 ports.
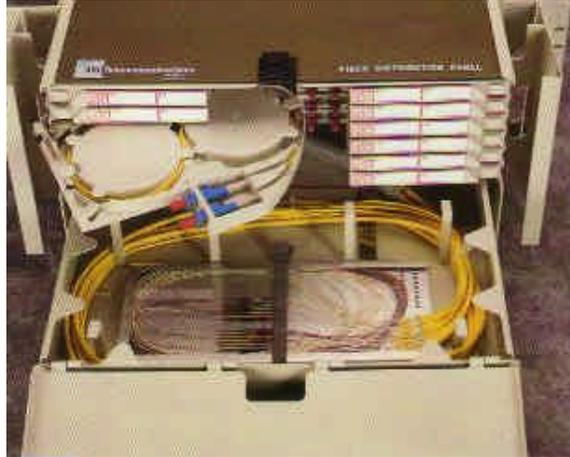
Figure 4-3. CMT (Cable Management Tray) 24 Fiber Shelf

4.2.2   The **Generation II** is a medium density FDF using a bay arrangement. This is the SBC Local Exchange Carrier **STANDARD FOR USE**. This FDF has 72 fiber optic ports per panel and up to 9 panels per 7-foot high bay[2]. All new bays will use the **Generation II FDF** equipment outlined in this BSP and PAN 19995259, FDF and Fiber Optic Apparatus dated December 1999 using 72 ports per panel. The standard frame relay rack is a Network bay having a 23-inch interior and 26-inch exterior width and a 15-inch depth. 12-inch bays may be utilized to complete existing lineups if no more than 2 bays. Any more than 2 bays will require using the 15-inch depth.
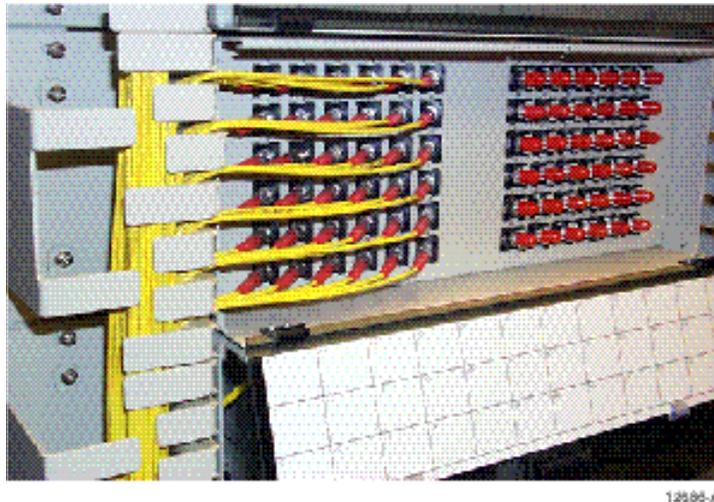
Figure 4-3. Generation II Fiber Distribution Shelf

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[2] SNET uses 96 ports

4.2.3   The **Generation III FDF** is a high density FDF that utilizes a new frame arrangement instead of a bay. This new philosophy for fiber will emulate the deployment strategy that has been used for years with copper. The strategy is to deploy an MDF structure for fiber, as opposed to the equipment rack strategies that have been used in the past. The product line is being evaluated for potential use by the Common Systems-Cross Functional Sourcing Team (CS-CFST) in 2000. As of the issue date of this document, this product is not approved for use.[3]
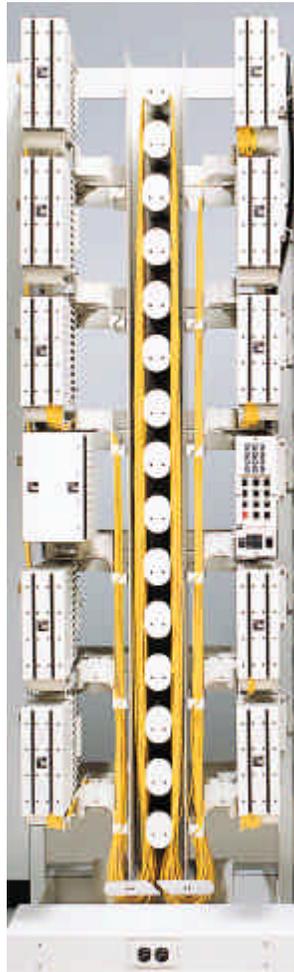
Figure 4-4. Generation III or Next Generation Frame (NGF)

4.3 CUSTOMIZATION

4.3.1   The FDF is available both as a pre-assembled bay with all the major frame components mounted on the equipment rack and in kit form with the major components shipped separately. Each assembled frame conforms to the standard 15-inch bay lineup typically found in a central office.

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[3] This product is currently the **Standard** in Ameritech.

4.3.2   Depending on the central office environment, the frame may be 7', 9' or 11' 6" in height. However, for convenience in access, modules should only be mounted to the 7' height regardless of the height of the frame.

4.3.3   The frame is available empty (without modules) or with modules already installed per the engineer's specification. Modules may also be ordered individually as either empty or factory-loaded with IFC. Figure 3-4 shows a connector module loaded with IFC cable.

4.3.4   Other options include protective covers for the horizontal trough and interbay fiber management panel and raised floor accessories.
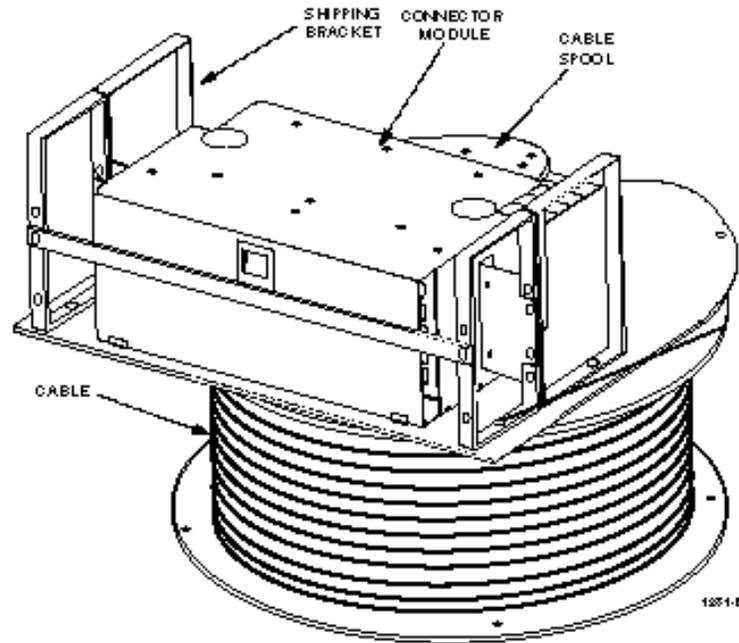
Figure 4-4. Factory-Loaded Connector Module with IFC Cable

5. APPLICATION OVERVIEW

5.0.1   This subsection contains an overview of FDF application. Topics presented here include: floor plan layouts, cross-connect application, cable routing summary and the use of Value-added Modules.

5.1 FLOOR PLAN LAYOUT

5.1.1   It is crucial that the FDF be properly planned for growth. The standard floor plan layout of the FDF should be placed in an alternating pattern of FOT and OSP bays providing for a logical growth pattern, e.g., OSP-FOT-OSP-FOT-OSP-FOT-OSP-FOT…… If possible, the growth pattern should remain in a single lineup.

5.1.2 In extremely small Central Offices, the first FDF bay can be used in a combination mode with the FOT panels on the bottom and the OSP panels on the top. Any growth beyond the first bay will require the existing pattern be carried out through out the lineup. If in doubt as to the growth of the office, then care should be used to place the frames in the normal arrangement of OSP-FOT-OSP-FOT….

5.1.3 In exceptionally large central offices that are fiber hubs for a large metropolitan area, the following pattern may be employed…..OSP-OSP-FOT-OSP-OSP-FOT-OSP………

5.2 CROSS-CONNECT APPLICATION

5.2.1 ***The full cross-connect architecture will be used in the SBC Local Exchange Carriers.*** Fire-retardant (Plenum rated) ribbon fiber optic cables are pre-terminated on one OSP shelf in a FDF bay and spliced to optical outside plant facilities in the cable vault. Fiber Optic interconnect cables from optical transmission and switching equipment are terminated on the rear of a Fiber Optic Termination shelf in an adjacent FDF bay. The FOT and OSP terminations will be connected via cross-connect fiber optic jumpers at the time a service request is initiated. Network Element terminations will be placed on the rear of FOT panels. OSP Fiber terminations will be placed on the rear of OSP Panels. In most applications, an alternating bay terminating arrangement is recommended. The alternating bay arrangement segregates outside plant (OSP) terminations and Fiber Optic Transmission (FOT) equipment terminations into alternate bays and ensures a most cost effective deployment arrangement. **The FDF shall always utilize the cross-connect methodology**. The interconnection of Fiber termination equipment to another within the Central Office will be through the full interconnect design of the Fiber Distribution Frame. (Example: An OC48 with subtending OC3C will be cabled to the FDF and not directly between the two multiplexers). *Under no circumstances will CO fiber equipment be directly terminated on the front access ports of the OSP panels but will be terminated on the rear of the FOT panels and will be subsequently cross-connected to another FDF panel.*

5.3 ON-FRAME VS OFF-FRAME SPLICING

5.3.1 Splicing may be done on the frame itself or at some off-frame location.

5.3.2 On-frame splicing is typically used in situations where the OSP cable vault is close enough to the FDF to be within the OSP indoor maximum distance or in locations where fusion splicing is not permitted in the cable vault of the central office. The fiber cable may be spliced on a new integrated OSP/Splice Panel of the FDF*.*

5.3.3 By comparison, off-frame splicing is used when there is an additional link, provided by the pre-terminated IFC cables between the FDF and the cable splicing vault or the first manhole outside of the central office. This method employs fusion splicing in the vault. Fusion Splicing in the vault may be prohibited in certain SBC LECs. Pre-terminated, fire-retardant, plenum rated,

ribbon fiber cable is the current standard for the IFC cable. The standard cable sizes are 24, 72, and 216.[4]

5.4 CABLE ROUTING SUMMARY

5.4.1   The FDF is designed to enforce a consistent manner of routing cables so as to facilitate rerouting, testing, and network growth. The following topics summarize FDF cable routing.

5.5 OUTSIDE PLANT CABLES

5.5.1   In all applications, Outside Plant (OSP) cables are routed to the rear side of the frame. Typically, the OSP cables are routed to integrated splice modules for splicing to pigtails. In some cases, OSP cables are broken out, installed with field connectors, and connected directly to connector modules.

5.5.2   Up to 32 separate OSP cables may be secured to the rear side of each frame, 16 on each side. A cable clamp kit is available for securing each cable end to the frame and for grounding metallic support members or metallic cable sheathes. The frame is equipped with tie bars for securing the cables to the side of the equipment rack. Various types of OSP cables may be terminated at the frame.

5.5.3   OSP cables may be routed to the FDF from either the top or the bottom of the frame. Cable routing and clamping position for top vs. bottom routing are mirror images of one another.

5.6 Intrafacility CABLES (IFC)

5.6.1   Intrafacility cables (IFCs) or Pre-Terminated Cable Stubs (PCSs) are used with FDFs to provide a link between OSP cables and connector modules. One end of the IFC cable is spliced to the OSP. The other end of the IFC is connected at a connector module or pre-connectorized at the factory.

5.6.2   All IFC routing and clamping is on the rear side of the frame. IFC cables are mounted using the same clamping positions as OSP cables. However, unlike OSP cables, IFC cables do not need to be grounded. The clamp kit used for OSP cables can also be used for IFC cables.

5.7 PIGTAILS

5.7.1   Pigtails, typically in 12-fiber bundles, are used with FDFs in the same manner as IFC, to provide a link between OSP cables and connector modules. Due to the limited length of pigtails, the splice and connector module are integrated into the same shelf.

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[4] SNET uses 96 fiber cable.

5.8 FIBER OPTIC TERMINAL PATCH CORDS/JUMPERS

5.8.1   In a cross-connect application, FOT equipment patch cards are terminated at the rear side of the frame. A rear fiber storage panel shall be used to guide service loops. Additional patch cord length is chased to the network element where it is stored. No more than 10 feet of slack will be allowed on any patch cord.

5.8.2   Fiber optic cross-connect jumpers shall be ordered in the near correct lengths in order to properly place the connection from the two fiber panels (OSP-FOT), (FOT-FOT), or (OSP-OSP) on Generation I FDF systems. On Generation II and beyond FDF systems, the fiber jumpers should be provided in 5-foot increments, but should not be less than 2 meters for any one-jumper cross-connect. Sufficient storage is available on 72-96 panel fiber systems. In any case, the fiber optic jumpers shall be ordered from a Procurement approved manufacturer.

5.8.3   ADCP 95-007 Issue 2, September 1999 shows the proper method of routing cross-connect jumpers and slack management on the ADC 7" Fiber Distribution Frame.

5.9 FIBER PROTECTION SYSTEM

5.9.1   The Fiber Protection System (FPS) is a cable raceway system used only for fiber optic patch cords between network elements and the FDF.

5.9.2   The office FPS shall provide diverse route capability between network elements and the FDF. The FPS shall extend from the horizontal raceway to within six inches of the FDF by means of a vertical trough. The horizontal portion of the FPS shall be located above the 7' level. Fiber Optic OSP or IFC Cables will not be placed in the raceway/duct work of the Fiber Protection System.

5.9.3   Route diversity shall be accomplished by the use of multiple cable paths rather than the separation of cable within a single run of raceway. It is preferred that FPS be engineered using the multiple cross aisle cable path concept used for copper cable management.

Figure 5-1. Diverse Patch Cord Routing

Note: Fiber Optic Cable placements within the Central Office will adhere to merged practice standards as outlined in BSP 800-003-150MP.

> 5.9.4   In some offices, it may be advisable to label FPS routes as "Working" and "Protection". This is not mandatory, but, may assist the installer in selecting the diverse routing.

> 5.9.5   When placing or extending a FPS, place markers on the entire horizontal run at 5' increments beginning at the FDF. This will aid the technicians, installers, and engineers in determining the proper length of fiber patch cord and provide relief from dealing with excessive slack. On all new installation projects that require a patch cord to be placed in existing FPS, the 5' increments markers will be placed at this time.

5.10 SATELLITE FDF AND TIE CABLES

> 5.10.1   When the equipment placement is located on another floor or a non-contiguous equipment area, a Fiber Optic Tie Cable will be placed from the FDF to that remote area and terminated on a satellite FDF.

> 5.10.2   There are three methods for placing this tie cable.

> Method 1

> > The preferred method is to place an OSP fiber shelf with a pre-terminated and pre-connectorized cable stub in the existing FDF. An FOT shelf should be placed in the satellite frame and the pre-connectorized end should be terminated on the rear of the FOT shelf. . The stub should be measured to the nearest exact length between the two shelves.

NOTE: In most cases, it is well advised to dedicate an entire bay for tie cables between the existing and the satellite FDF.

Method 2

The preferred alternative to the above is to place an OSP fiber shelf with a pre-terminated and raw ended stub in the existing FDF. An FOT shelf should be placed in the satellite frame and the raw ended stub should be field mounted with the appropriate connectors and then terminated on the rear of the FOT shelf. The stub should be measured to the closest available length between the two frames.

Method 3

The following should be used only when absolutely necessary. Place an OSP fiber shelf equipped with a FLIP splicing panel in the satellite FDF and a preterminated shelf in the existing FDF. Place the preterminated IFC cable measured to the closest appropriate length between the frames and splice the raw end at the FLIP panel.

5.10.3   From this satellite location, a Fiber Protection System will be placed in a logical layout to support the eligible area for each Network Element. The remote area will be supported through fiber jumper cross-connects to the Network Element allowing for rapid fiber deployments at minimal dedicated long-term costs.

5.10.4   It should be noted that pre-terminated, fire retardant, plenum rated, ribbon fiber cable can be placed through cable holes between floors and does not require conduit. The cable should be placed on a cable rack clearly labeled "For Fiber Use Only".

5.10.5   **It must be emphasized that Fiber Protection Systems and Fiber Optic Jumpers will not traverse firewall partitions and floors. The direct fiber cabling to a Network Element within an established fiber jumper area is not recommended. The dedication of fiber capacity to specific providers or equipment should be mitigated for SBC Local Exchange Carriers equipment and CLEC virtual Collocation equipment and cabling. The direct cabling method is only available for CLEC Physical Collocation Cabling Equipment.**

5.11 OPTICAL PATCH PANELS

5.11.1   The optical patch panel (typically an interconnect panel) was intended to be used where a small number of fibers would be terminated. These panels mounted in standard relay racks, are typically configured as an "interconnect" system in which only the Outside Plant fiber appears at a connector on the panel. A Fiber Optic Terminal "cables" to the OSP connection with a fiber optic jumper, run in a fiber protection system, from the FOT bay to the bay containing the

optical patch panel. The interconnect panel is not specifically designed as a cross-connect point using fiber patch cords. It has limited devices for managing excess jumper slack or to prevent micro bending of the jumpers.

5.11.2   Interconnect panels such as a stand-alone LUC1E panel shall not be installed in the Central Office. Older Interconnect panels should have the fiber cable rolled to the FDF at the first opportunity as described in the Planning Guidelines portion of the Infrastructure Deployment Guidelines dated August, 1999, Tab 3, Page 6. Small applications of fiber services at customer locations may utilize this technology.

5.12 FIBER OPTIC SPLITTERS

5.12.1   The **standard splitter configuration will be the 90/10 unit** which will allow 90% of the transmission to proceed to its destination. The loss to the primary leg is minimized with this unit. **<u>The use of the 50/50 type splitter was requested by some individual groups but it is strongly cautioned against their use.</u>** The 50/50 unit creates the most loss to the original signal and could cause the need for regenerators if not carefully designed into the network. The 50/50 unit should be provided on an exception basis only. The 90/10 splitters and associated connector hardware are used to provide a continuous non-intrusive test/monitor location for fiber optic light based signals.

5.12.2   Single Mode Fiber Optic Splitters may be used as an optical patch panel and will be placed within the Central Office Fiber Distribution Frame or on the customer's premises as the fiber optic demarcation point. Splitters will not be placed at the equipment location. These units may be used as the Demarcation Point for the regulated service, a handoff point for a Certified Local Exchange Company (CLEC), or at the Transport to Switch handoff point within a Central Office. Product Approval Notice (PAN) 19985002, *Fiber Splitters and Associated Housings*, dated September 1998 specifies the approved products for use.

5.12.3   Multi-mode Splitters are not approved or suitable in the SBC Local Exchange Carrier Network.

5.13 OPTICAL TERMINATIONS

5.13.1   Biconic Splices should not be used for any Fiber Optic Services.

5.13.2   The standard termination for Pacific Bell, Nevada Bell and Southern New England Telecommunications is the SC-UPC connector.

5.13.3   The standard termination for Southwestern Bell Telephone is the ST-UPC connector.

5.13.4   These connector uses will be handled as standard within the respective Local Exchange Companies for all Fiber Optic provisioned services (Asynchronous, OC3, OC3C, OC12, OC48, OC192, WDM, DWDM and any other

Fiber Optic speeds not listed). Refer to the Infrastructure Deployment Guidelines, Transport, Tab 10, *Optical Splitter, Optical Amplifiers and Wavelength Division Multiplexing (WDM)*, dated July 1999. Existing fiber cable should be reterminated with the standard connector for their area in the existing LUC1E panel or transition the cable to a FDF panel.

5.14 PLANNING GUIDELINES:

5.14.1   Consideration for use or transition to a FDF shall be when:

1. New fiber cable is to be placed in the Central Office.

2. When Central Office rearrangements or other type activities occur that will effect floor space.

3. Older technology or Manufacture Discontinued FOT equipment must be upgraded, such as the migration off older fiber interconnection arrangements (such as a LUC1U and/or LUC1E panel).

4. Cable activity causes rearrangements, cable throws, or services that require fiber connectors to be changed and upgraded.

5. Collocation Fiber Optic requests initiated in support the Certified Local Exchange Carrier's service requirements.

5.15 ATTENUATORS

5.15.1   Attenuators are placed at the Fiber Distribution Frame (FDF) panel supporting the Network Element. FOT and OSP panels in the FDF normally are ordered with a 0-dB attenuation. The connector may be changed in the FDF and replaced with the proper attenuator in the connector socket to pad the signal in 5-dB increments. These "Bulkhead" attenuators are flush mounted with the panel face and are color coded for proper use. In addition, "In-Line" attenuators may be placed to pad the signal and shall only be placed between the FOT panel and the fiber jumper going to the Network Element. Never place an attenuator between two fiber optic jumpers in the Fiber Protection System (Yellow Raceway) or the FDF troughs, but in the FOT panel itself.   Attenuators should not be placed on the Network Element equipment side of the fiber optic jumper except under unusual circumstances where the fiber connections are secured from incidental hazards and potential service outages.

5.16 OPTICAL AMPLIFIERS

5.16.1   Optical Amplifiers are inline optical devices, which boost the optical signal. The use of amplifiers would reduce or eliminate the need for optical regenerators in long spans. Amplifiers, unlike regenerators, are not bandwidth specific and could be reused even if the optical lightwave equipment is upgraded. These devices can be deployed as transmit power amplifier, receive preamplifier, or as inline amplifiers.

6.0 BASIC FRAME COMPONENTS

6.0.1   This subsection contains a physical, functional, and technical description for each of the main components of the basic FDF frame. Included are the network equipment rack, front side cable management system, and rear side cable management system.

6.1 NETWORK EQUIPMENT RACK

6.1.1   The network equipment rack provides the basic structure for the FDF. It is an industry –standard, 23-inch, unequal flange network equipment rack. Figure 4-3 shows the components and dimensions of the network equipment rack.

6.1.2   As shown, the network equipment rack has pre-drilled mounting holes and front and rear floor guards. The mounting holes are spaced 1-inch (2.54 cm) apart and tapped for #12-24 screws. The floor guards include a front space box cover and 2-inch (5.04cm) rear guard box. The equipment rack may be 7', 9', or 11'6" tall, depending on the option selected.

6.2 FRONT SIDE CABLE MANAGEMENT SYSTEM

6.2.1   The front side cable management system provides a means to secure and route fiber cross connect jumpers on the front side of the frame. Figure 6-1 shows the front side cable management system. It consists of vertical cable guides and a horizontal trough.

6.2.2   The vertical cable guides form a vertical channel for routing cross connect jumpers from the modules to the horizontal trough. They also provide a mounting point for the various modules. The cable guides attach to the vertical rails on each side of the equipment rack. The cable guides are made of cold rolled steel and painted putty white.

6.2.3   The horizontal trough is used to route cross connect jumpers between opposite sides of a single bay frame or between frames in a multi-bay lineup. A warning label is attached to the front of the lower horizontal trough. The label cautions users not to view the light source with optical instruments. The trough is made of aluminum and painted putty white.
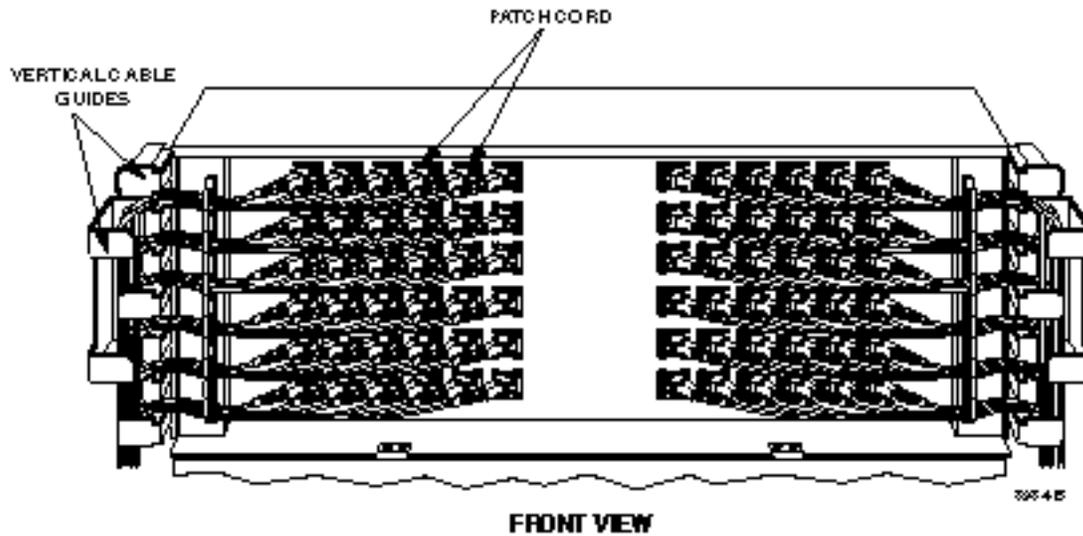
Figure 6-1. Front Side Cable Management System

6.3 REAR SIDE CABLE MANAGEMENT SYSTEM

6.3.1   In cross-connect applications, FOT equipment patch cords are routed to the rear of the bulkhead. Patch cord organization and protection is provided by the rear cable guide (figure 6-2). The rear cable guide is attached to the side of the connector panel using two #12-24 screws. FOT equipment patch cords are routed either up or down the back of the frame, into the cable guide and then into the back of the connector panel.
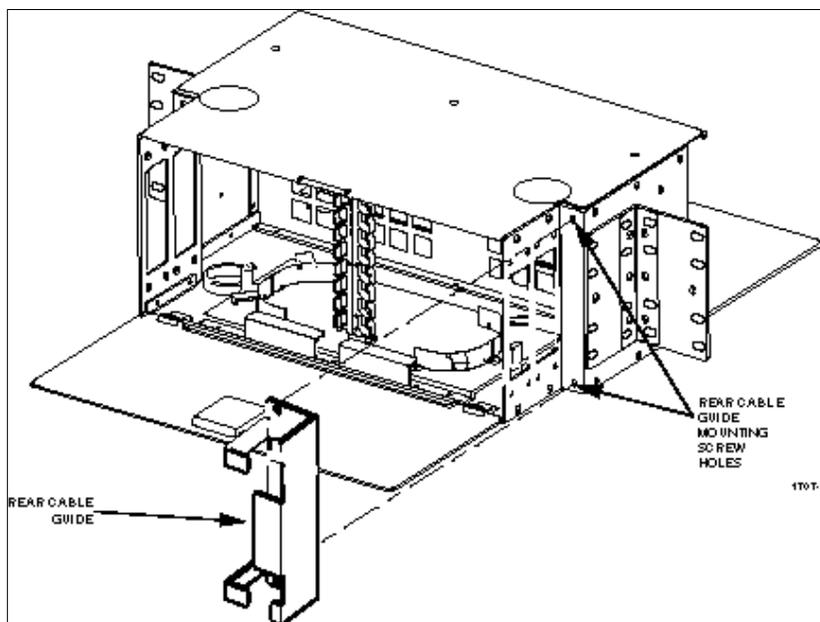
Figure 6-2. Rear Cable Guide

7.0 RELATED FRAME PRODUCTS

7.1 INTERBAY FIBER MANAGEMENT PANEL

7.1.1   The Interbay fiber Management Panel (IMP), shown in Figure 7-1, provides storage between bays for cross-connect jumpers. In a multiple bay lineup, IMPs are normally located on each side of the lineup and between bays. To provide space for these panels, all bays must be spaced 5" (12.7cm) apart.
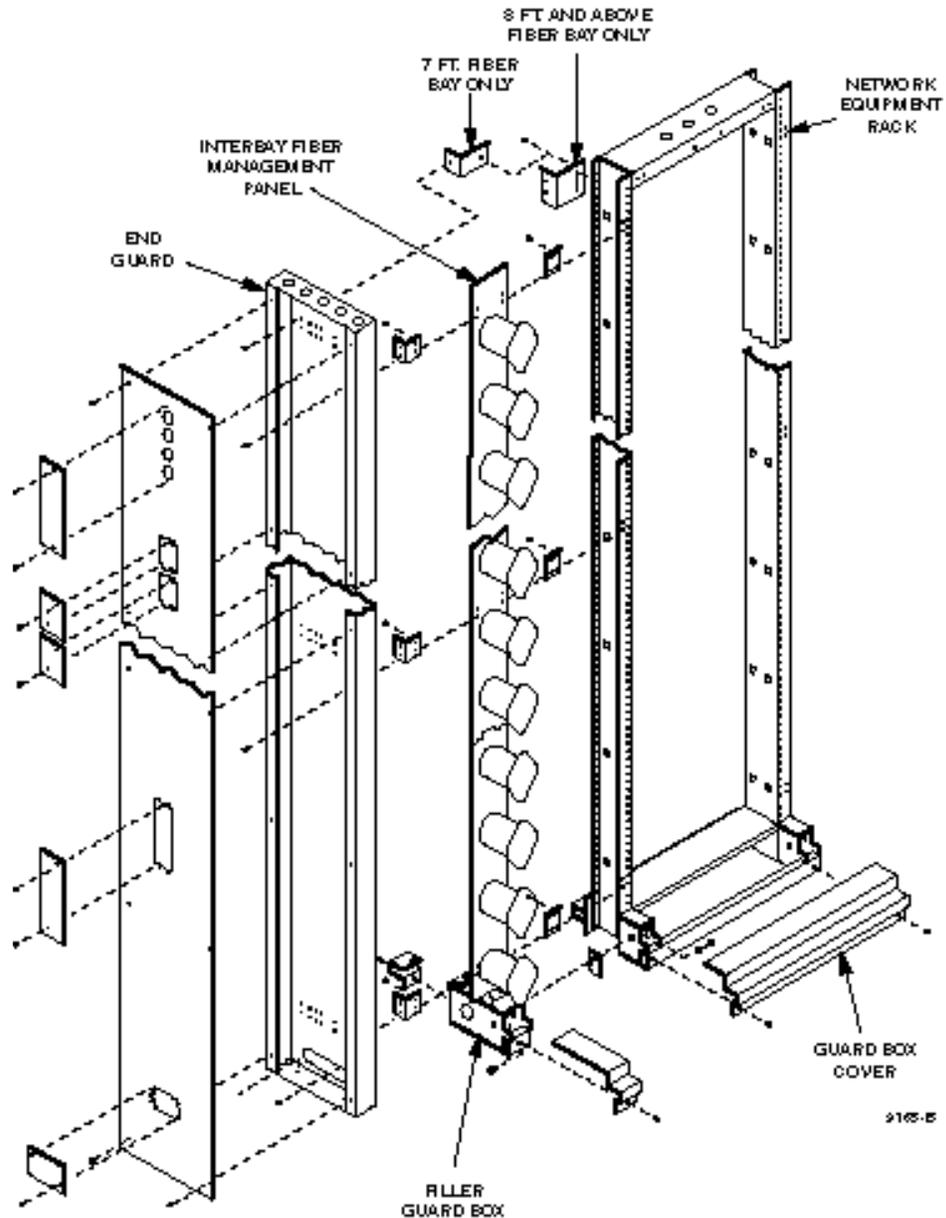

Figure 7-1. Interbay Fiber Management Panel and End Guard (7' Frame)

The IMP includes a lower guard box, AC raceway, and trough filler kit when shipped.

7.2 END GUARD

7.2.1   The end guard, also shown in figure 7-1, mounts on either side of a lineup. It gives the lineup a finished appearance, provides a channel for routing cables, and services as a mounting place for outlets and switches. The end guard is available for 12" and 15" footprints and may be attached to either end of the bay or IMP.

7.3 REAR FIBER STORAGE PANEL

7.3.1   The rear fiber storage panel provides cable management and service loop storage for fibers directed from the rear of the FDF to fiber optic terminal (FOT) equipment. Additional patch cord slack, if any, should be stored at the FOT.

8.0 INSTALLATION

8.0.1   Refer to the vendor's documentation for installation instructions.

9.0 TRANSITION GUIDELINES AND PROCEDURES

9.1 PROCEDURES TO ADD ADC FDF AND EQUIPMENT IN EXISTING LUCENT LGX LINE-UPS.

9.1.1 GENERAL

9.1.2   ADC Fiber Distribution Frames can be junctioned to existing Lucent frame line-ups following the procedures described herein.

9.1.3   ADC pre-terminated Outside Plant (OSP) Shelves will fit into existing Lucent frame line-ups with no modifications.

9.1.4   ADC Fiber Optic Terminal (FOT) Shelves will fit into existing Lucent frame line-ups with no modifications.

9.2 GENERAL NOTES

9.2.1   When populating existing Lucent line-ups, it is recommended to add ADC's 7" Lucent compatible connector module. 7" Lucent compatible connector modules have an identical footprint yet offers the benefits of ADC's angled retainers and vertical cable guides. ADC 7" compatible shelves are available with both adapters only (FOT) and with pre-connectorized intrafacility fiber cable (OSP).

9.2.2   ADC frames feature upper and lower horizontal cable troughs which makes transitioning easier between the existing (Lucent) and new (ADC) platforms-12" (See Figure 9-1).

9.2.3   An ADC Transition Kit is needed when transitioning between a Lucent frame (old) and an ADC (new) 15" FP Fiber Distribution Frame (See Figure 9-2).
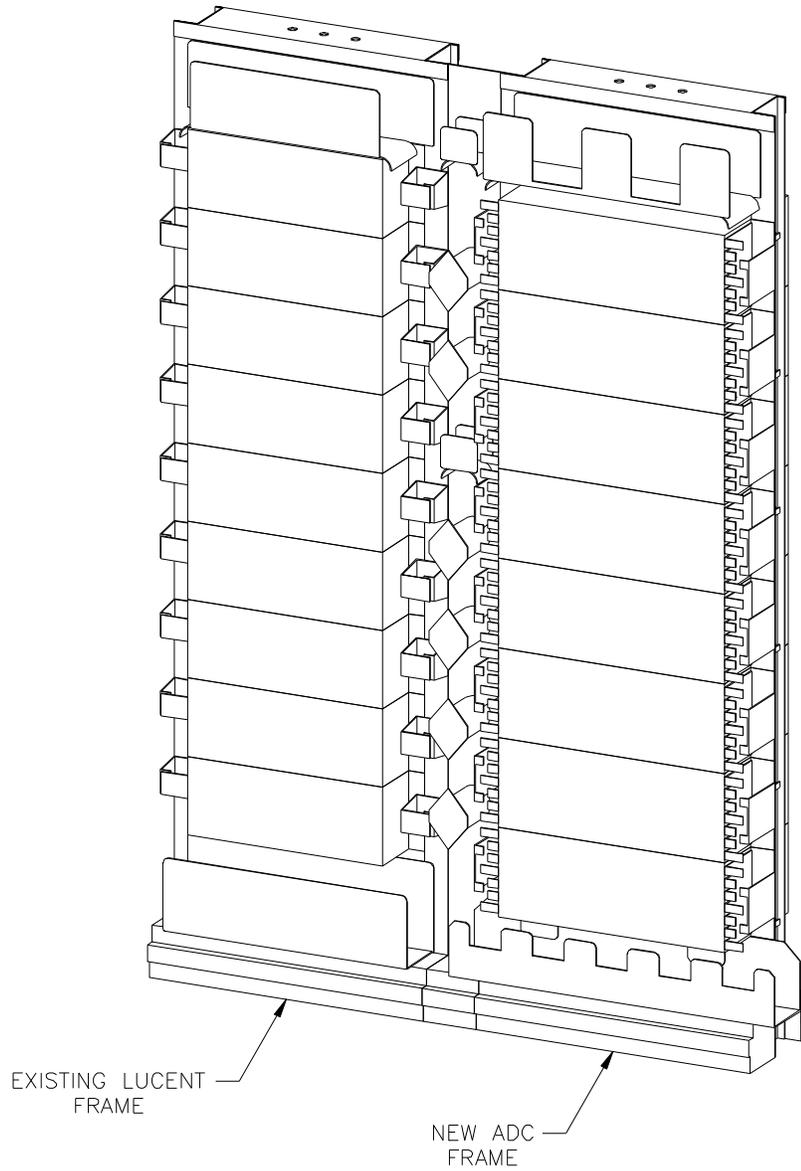

EXISTING LUCENT
FRAME

NEW ADC
FRAME

Figure 9-1. Transition from Lucent LGX to ADC 12" FDF.

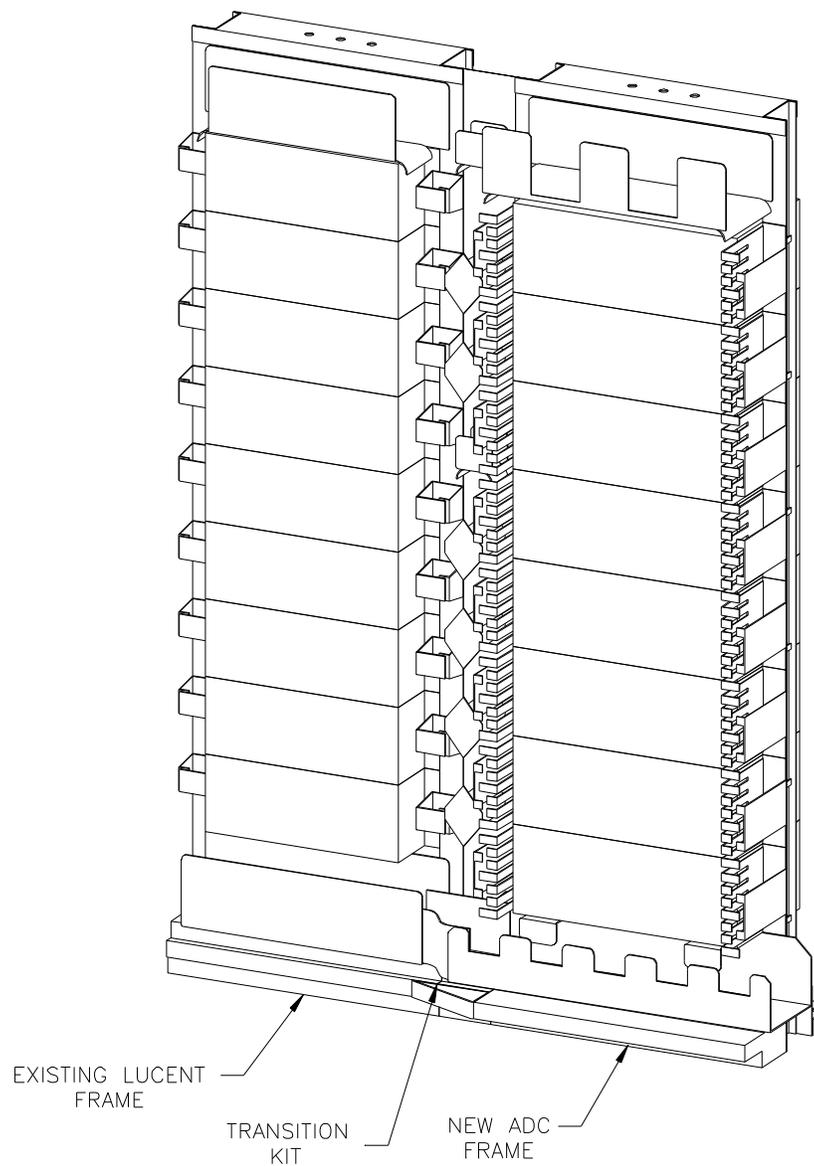EXISTING LUCENT
FRAME

TRANSITION
KIT

NEW ADC
FRAME

Figure 9-2. Transition from Lucent LGX to ADC 15" FDF

9.3 ENGINEERING GUIDELINES

9.3.1   Framework and Cable Management Requirements (When Transitioning between Lucent and ADC Frames)

9.3.2   When adding an ADC Frame next to an existing Lucent Frame, the first step is to remove the existing end guard, which may be in place at the end of the Lucent line-up.

9.3.3   The next step is to install a new ADC Interbay Management Panel (IMP), ADC Transition Kit (15" FP only) and then an ADC Fiber Distribution Frame (FDF). Ordering information is as follows:

Interbay Management Panels (IMPs)
7' Environment, 12" FP – E-501-L565-A-12 7' IMP for SBC Applications
11.5' Environment, 12" FP – E-501-L567-A-12 11.5' IMP for SBC Applications
7' Environment, 15" FP – E-501-L565-A 7' IMP for SBC Applications
11.5' Environment, 15" FP – E-501-L567-A 11.5' IMP for SBC Applications

          Each FDF should have an IMP on either side of each FDF.

Transition Kit
All Environments – FDF-ACC267 Lucent to ADC Fiber Distribution Frame Transition Kit (15" FP Only)

12" Footprint Fiber Distribution Frames (FDFs)
7' Environment – E-501-10786 7' FDF with 6" Upper & 6" Lower Troughs, Front VCGs, and 12" FP
11.5' Environment – E-501-10788 11.5' FDF with 6" Upper & 6" Lower Troughs, Front VCGs and 12" FP

15" Footprint Fiber Distribution Frames (FDFs)
7' Environment – E-501-10835 7' FDF with 6" Upper & 6" Lower Troughs, Front VCGs, and 15" FP
11.5' Environment – E-501-10791 11.5' FDF with 6" Upper & 6" Lower Troughs, Front VCGs and 15" FP

          Note: The above FDF frames may be designated as OSP or FOT type frames. Each FOT type frame should have (2) Rear Fiber Storage Panels on the rear side (See Figure 9-3). Ordering Information for the kit is as follows:

Rear Fiber Distribution Frame Storage Kit
All Environments – FDF-RFSP Rear Fiber Frame Storage Kit

9.3.4   The last step is to specify a putty white end guard at the end of the line-up (See Figure 9-3). Ordering Information for the end guard is as follows:

End Guards

7' Environment, 12" FP – UEGP-7PW 7' Universal Style End Guard, 2.5"W
11.5' Environment, 12" FP – UEGP-115PW 11.5' Universal Style End Guard, 2.5"W
7' Environment, 15" FP – RAC-7B0162 7' Universal Style End Guard, 2.5"W
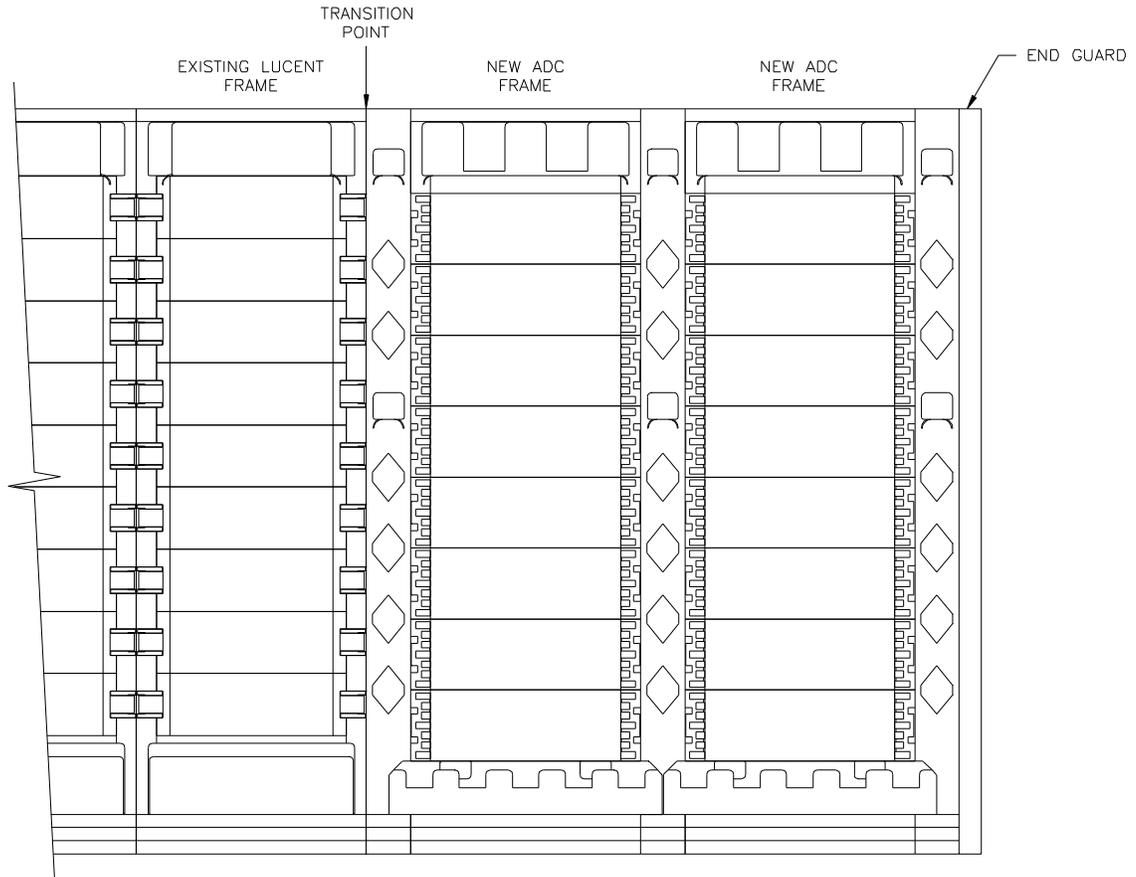11.5' Environment, 15" FP – RAC-1B0210 11.5' Universal Style End Guard, 2.5"W

Figure 9-3. Typical Completed Transition

9.4 INSTALLATION INSTRUCTIONS:

9.4.1   Adding new ADC Frame adjacent to existing Lucent Frame

9.4.2   Step 1) Remove existing Lucent end guard and install Interbay
Management Panel (IMP) guard box to Lucent frame.

9.4.2.1   The filler guard box is included in the kits for network rack spacers, filler
panels, and interbay fiber management panels. It can only be used with racks
mounted on a concrete floor.

1. Remove the guard box cover from the adjacent rack; set aside the screws for re-
use.

2. Place the filler guard box against the base of the rack; align the side mounting holes in the filler guard box and spacer with the side mounting hole in the rack.

3. Loosely secure the filler guard box and spacer to the base of the adjacent frame using the 3/8-16 × 3/4-inch cap screw, 3/8-inch lock washer, and 3/8-16 hex nut provided.

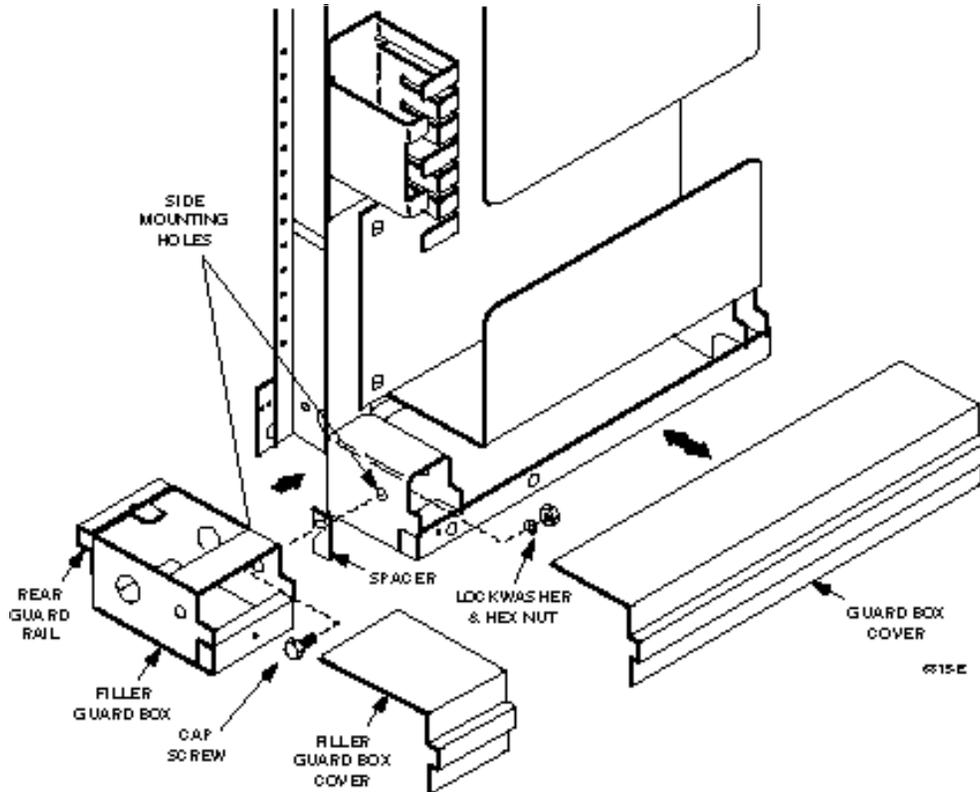▶ **Note**: Figure 1 shows the 4-inch guard box. The 6-inch guard box looks different but mounts in the same way using the same mounting location and hardware.

Figure 9-4. Filler Guard Box Installation

4. Insert the 1/8-inch spacer provided between the frame base filler and the frame base. When the spacer is in place, tighten the 3/8-16 cap screw and nut.

5. Replace the guard box cover that was removed in step 2; secure it to bottom of frame with original mounting screws.

6. Secure the rear guard rail to the rear of the frame base filler.

7. Secure the filler guard box cover to the top and front of the frame base filler.

9.4.2.2   Follow same procedure for attaching to ADC FDF.

9.4.3   Step 2) Install ADC IMP to Lucent frame.

9.4.3.1   The interbay fiber management panel (IMP) is used in a fiber application only. It may be installed between two racks, or between a rack and an end guard. The kit includes a filler guard box, which should be already installed (if not, refer to Section 9.4.21 above). Different heights are accommodated using various combinations of panel sections (Figure 9-5).
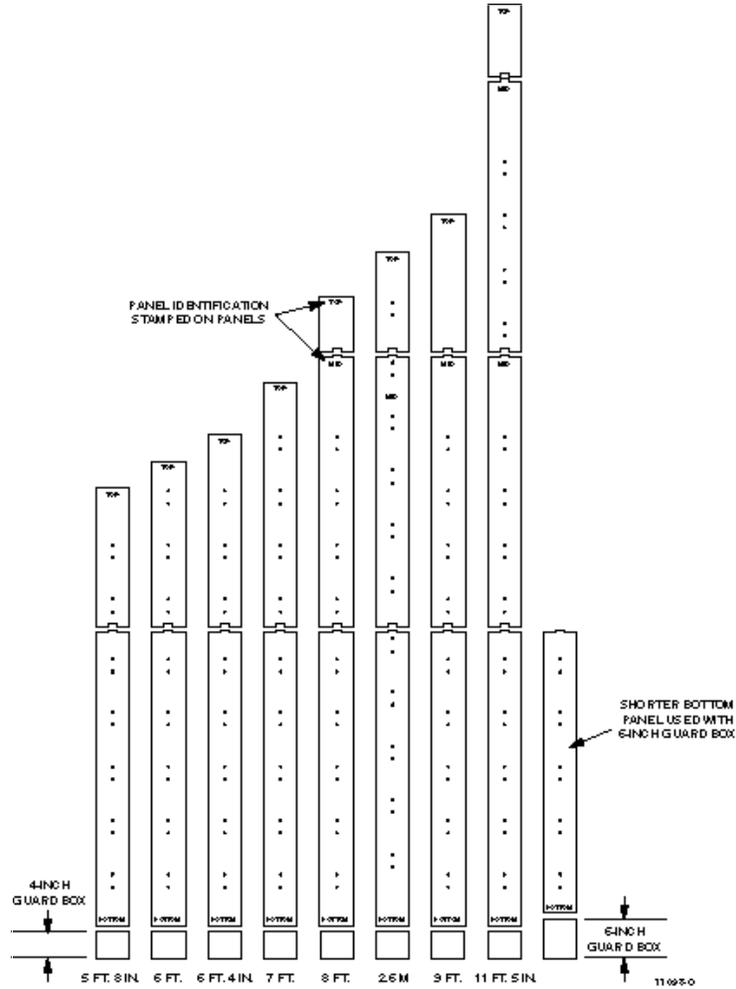

Figure 9-5. Panel Section Combinations for Different Frame Heights

9.4.32   Follow same procedure for attaching to ADC FDF.

9.4.4   Step 3) Install rear fiber storage panels.

9.4.4.1   The Rear Fiber Storage Panel (RFSD) mounts flush on the rear side of an interbay fiber management panel using the same mounting hardware. The RFSD is shipped with an extra spool that is positioned differently depending on whether the RFSD is mounted on the left or right side of the frame. Use the following procedure to install the RFSD:
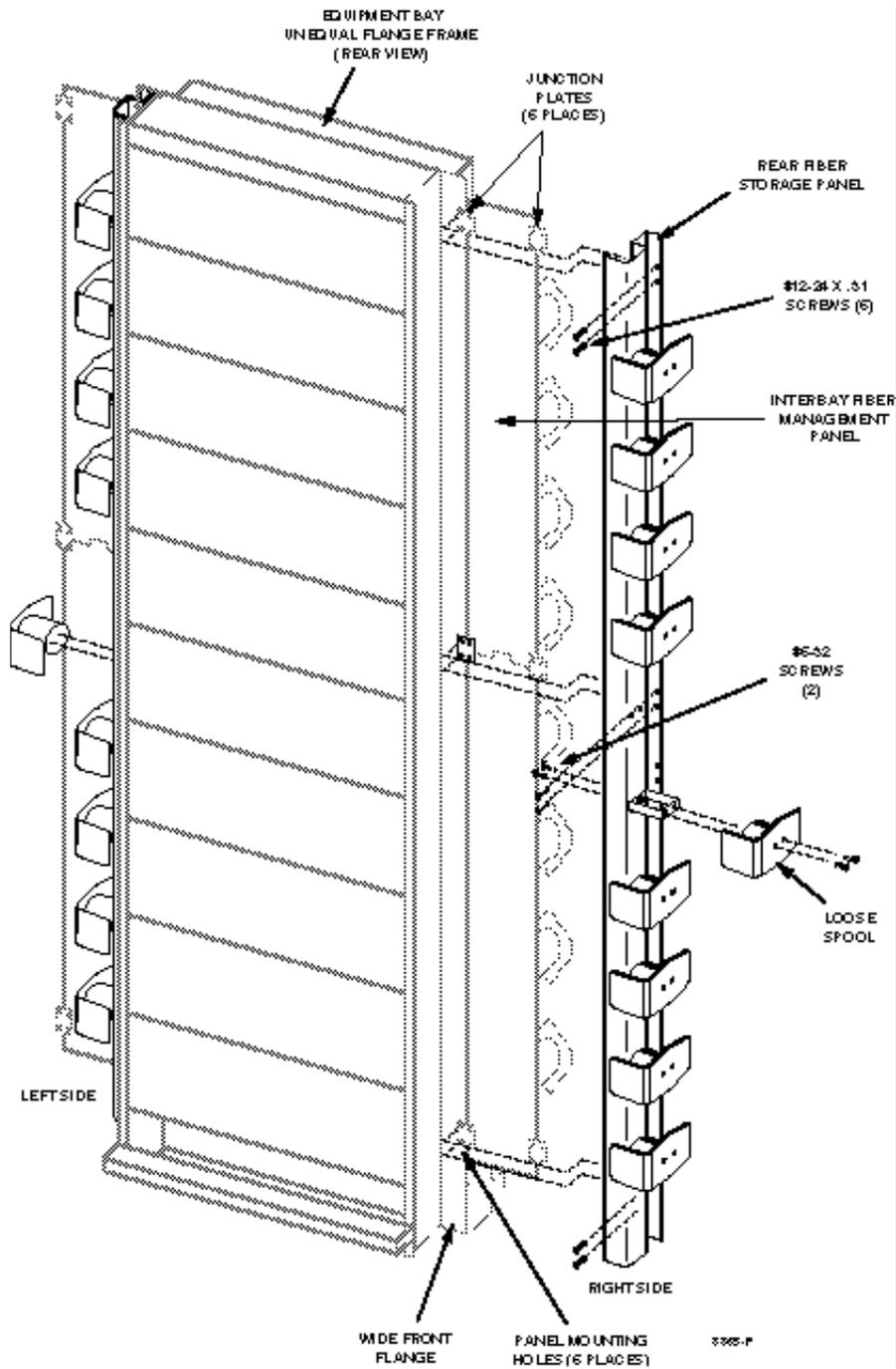
Figure 9-6. Installing a Rear Fiber Storage Panel

1. Position yourself at the rear of the interbay fiber management panel with the RFSP in hand.

2. Stand up the RFSP in its correct location on either the left side or right side of the frame with the RFSP spools facing away from the frame.

3. Note that the RFSP has four upper spools and four lower spools with two spool-mounting positions between. Install the extra spool in the lowest mounting position using the two #6-32 screws provided in the kit.

▶ **Note**: If the RFSP is facing in the wrong left or right direction, the mounting positions will be reversed. Be sure to install the extra spool in the correct position before installing the junction plates.

4. Observe that the interbay fiber management panel is fastened to the wide front flange of the rack with six junction plates, each secured with four 12-24 × 0.316 Phillips-head screws, as shown in Figure 33.

5. Remove the two inmost Phillips-head screws from the three junction plates (top to bottom) You will be using this same hardware to mount the RFSP and interbay fiber management panel together.

6. Align the rear fiber storage panel as shown, and secure it to the rear of the interbay fiber management panel using the six screws just removed above.

9.4.5   Step 4) Install end guard to ADC IMP.

9.4.5.1   An end guard panel can be used with any ADC unequal flange rack of either type, network or non-network. It can be attached directly to a rack or to a filler panel or interbay fiber management panel. Three heights are available corresponding to the three heights of racks. Use the following procedure to install an end guard panel (Figure 9-7).
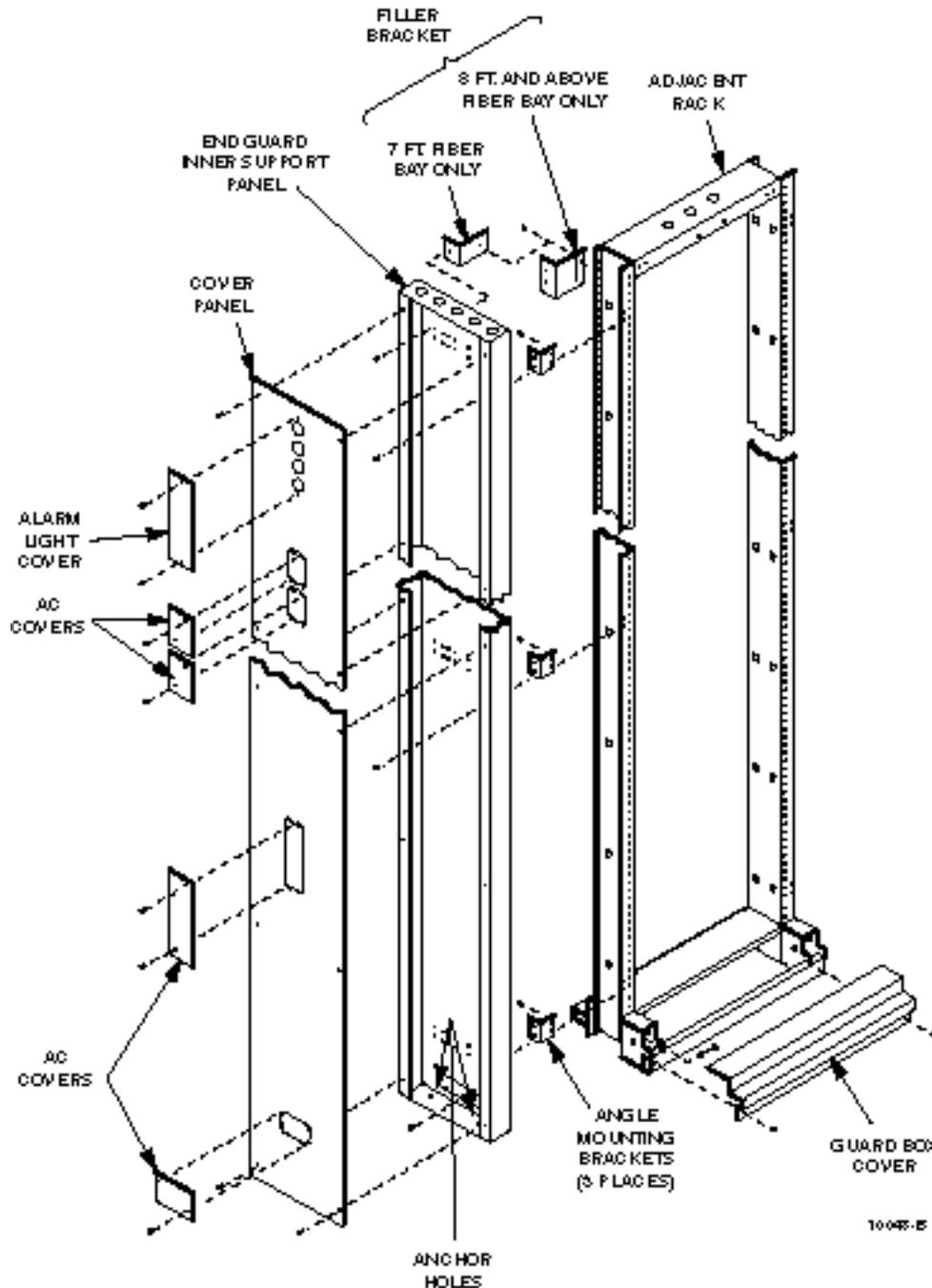
Figure 9-7. Installing an End Guard Panel Directly To Network Rack

1. If the rack or filler panel to which the end guard panel will be joined does not have angle mounting brackets already installed in the positions shown in Figure 36, fasten the angle mounting brackets to the rear side of the rack or filler panel using the four 12-24 × 0.25 inch Phillips-head mounting screws provided in the kit.

2. Place the end guard inner support panel in its approximate position, and temporarily support it by loosely securing it to the angle mounting brackets using the 12-24 × 0.25 inch Phillips-head screws provided in the kit.

3. For additional temporary support, temporarily install the filler bracket shown in Figure 34. Loosely attach the filler bracket using two 12-24 × 0.50 inch Phillips-head screws.

4. Align the end guard inner support panel and mark the anchors holes on the floor.

5. Unfasten the end guard inner support panel from the brackets and set it aside.

6. Drill anchor holes and install the floor anchors.

7. Set the end guard inner support panel in position again, and loosely attach it to the floor anchors.

8. Re-attach the inner support panel to the angle mounting brackets and filler brackets using the same screws as used above. Note that the longer screws are used for the filler bracket.

9. Tighten the floor anchors, then tighten the screws in the brackets.

10. Mount the cover panel to the end guard inner support panel using 12-24 × 0.5 inch self- tapping screws.

11. Mount the blank alarm light cover using 8-32 × 0.31 inch Phillips-head screws.

12. Mount the four blank AC covers to the cover panels using 8-32 × 0.31 inch screws.

9.5   PROCEDURES TO ADD ADC FIBER DISTRIBUTION FRAMES IN EXISTING GENERATION ONE FIBER FRAME LINEUPS

9.5.1 GENERAL

9.5.1.1   ADC Fiber Distributing Frames (FDF) can be junctioned to existing ADC generation one fiber frame line-ups following the procedures described herein.

9.5.2 GENERAL NOTES

9.5.2.1   ADC frames feature upper and lower horizontal cable troughs which makes transitioning easier between the existing generation one and new ADC platform (See Figure 9-8.)

9.5.2.2   An ADC Transition Kit is needed when transitioning between a generation one (old) fiber frame and a new ADC 15" FP fiber distribution frame.
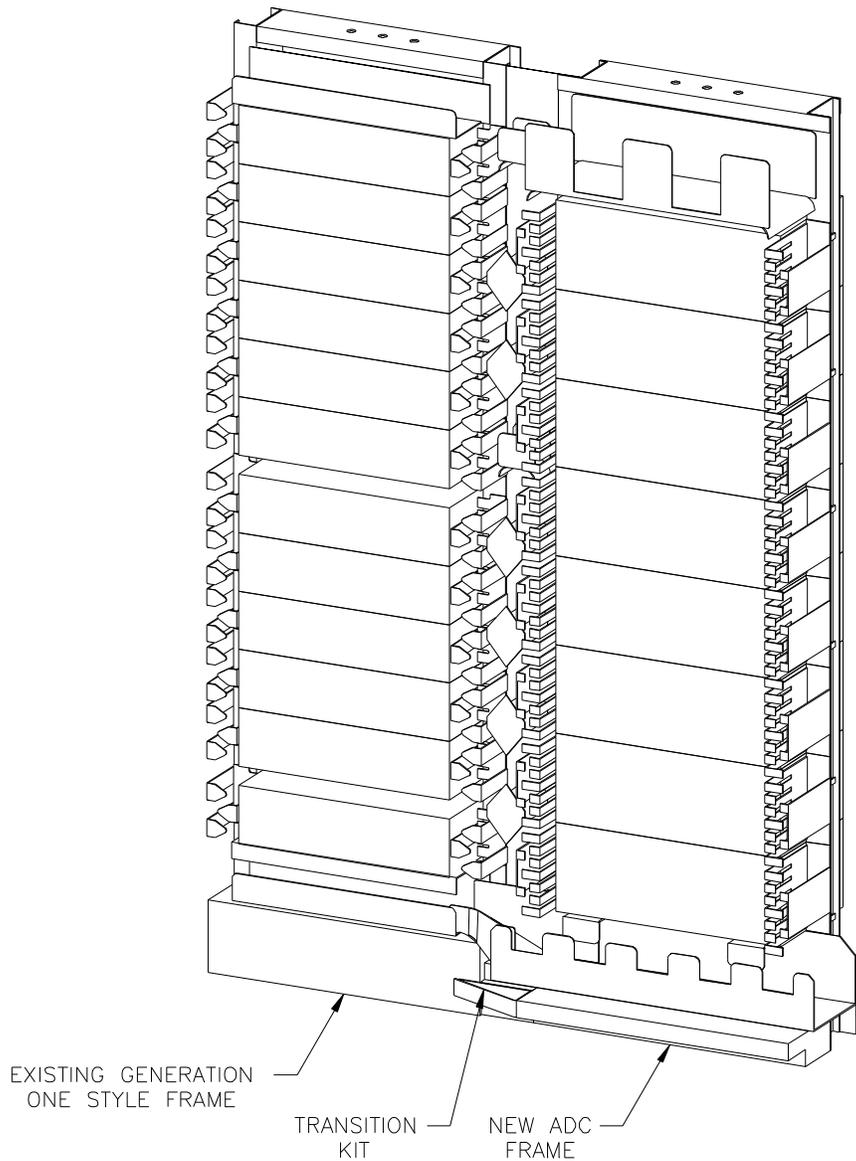
Figure 9-8. ADC Generation One Transition

9.6 ENGINEERING GUIDELINES

9.6.1   Framework and Cable Management Requirements (When Transitioning Between Generation One and ADC Fiber Distribution Frames)

9.6.2   When adding an ADC frame next to an existing Generation One fiber frame, the first step is to remove the existing end guard, which may be in place at the end of the current line-up.

9.6.3   The next step is to install a new ADC Interbay Management Panel (IMP), an ADC Transition Kit (15" FP only) and then an ADC Fiber Distribution Frame (FDF). Ordering information is as follows:

Interbay Management Panels (IMPs)
7' Environment, 12" FP – E-501-L565-A-12 7' IMP for SBC Applications
11.5' Environment, 12" FP – E-501-L567-A-12 11.5' IMP for SBC Applications
7' Environment, 15" FP – E-501-L565-A 7' IMP for SBC Applications
11.5' Environment, 15" FP – E-501-L567-A 11.5' IMP for SBC Applications

Each FDF should have an IMP on either side of each FDF.

Transition Kit
All Environments – FDF-ACC269 Generation One to ADC Fiber Distribution Frame Transition Kit (15" FP Only)

12" Footprint Fiber Distribution Frames (FDFs)
7' Environment – E-501-10786 7' FDF with 6" Upper & 6" Lower Troughs, Front VCGs, and 12" FP
11.5' Environment – E-501-10788 11.5' FDF with 6" Upper & 6" Lower Troughs, Front VCGs and 12" FP

15" Footprint Fiber Distribution Frames (FDFs)
7' Environment – E-501-10835 7' FDF with 6" Upper & 6" Lower Troughs, Front VCGs, and 15" FP
11.5' Environment – E-501-10791 11.5' FDF with 6" Upper & 6" Lower Troughs, Front VCGs and 15" FP

Note: The above FDF frames may be designated as OSP or FOT type frames. Each FOT type frame should have (2) Rear Fiber Storage Panels on the rear side (See Figure 9-5). Ordering Information for the kit is as follows:

Rear Fiber Distribution Frame Storage Kit
All Environments – FDF-RFSP Rear Fiber Frame Storage Kit

9.6.4   The last step is to specify a putty white end guard at the end of the line-up (See Figure 9-5). Ordering Information for the end guard is as follows:

End Guards

    7' Environment, 12" FP – UEGP-7PW 7' Universal Style End Guard, 2.5"W
    11.5' Environment, 12" FP – UEGP-115PW 11.5' Universal Style End Guard, 2.5"W
    7' Environment, 15" FP – RAC-7B0162 7' Universal Style End Guard, 2.5"W
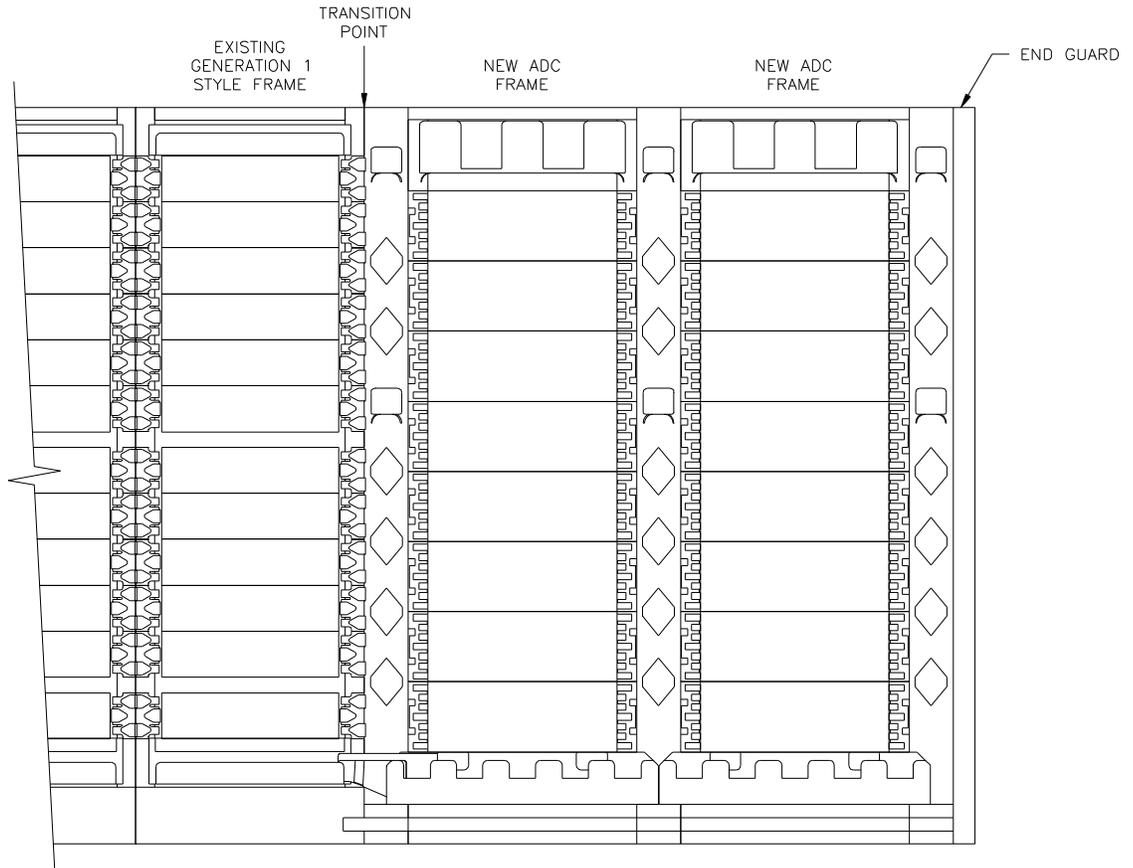   11.5' Environment, 15" FP – RAC-1B0210 11.5' Universal Style End Guard, 2.5"W

Figure 9-9. Typical Completed Transition.

9.7 INSTALLATION INSTRUCTIONS

9.7.1   Adding new ADC Frame adjacent to existing Generation One Fiber Frame.

9.7.2   Step 1) Remove existing Generation One end guard and install Interbay Management Panel (IMP) guard box to ADC fiber distribution frame.

9.7.21 The filler guard box is included in the kits for network rack spacers, filler panels, and interbay fiber management panels. It can only be used with racks mounted on a concrete floor.

1. Remove the guard box cover from the adjacent rack; set aside the screws for re-use.

2. Place the filler guard box against the base of the rack; align the side mounting holes in the filler guard box and spacer with the side mounting hole in the rack.

3. Loosely secure the filler guard box and spacer to the base of the adjacent frame using the 3/8-16 × 3/4-inch cap screw, 3/8-inch lock washer, and 3/8-16 hex nut provided.

▶ **Note**: Figure 1 shows the 4-inch guard box. The 6-inch guard box looks different but mounts in the same way using the same mounting location and hardware.
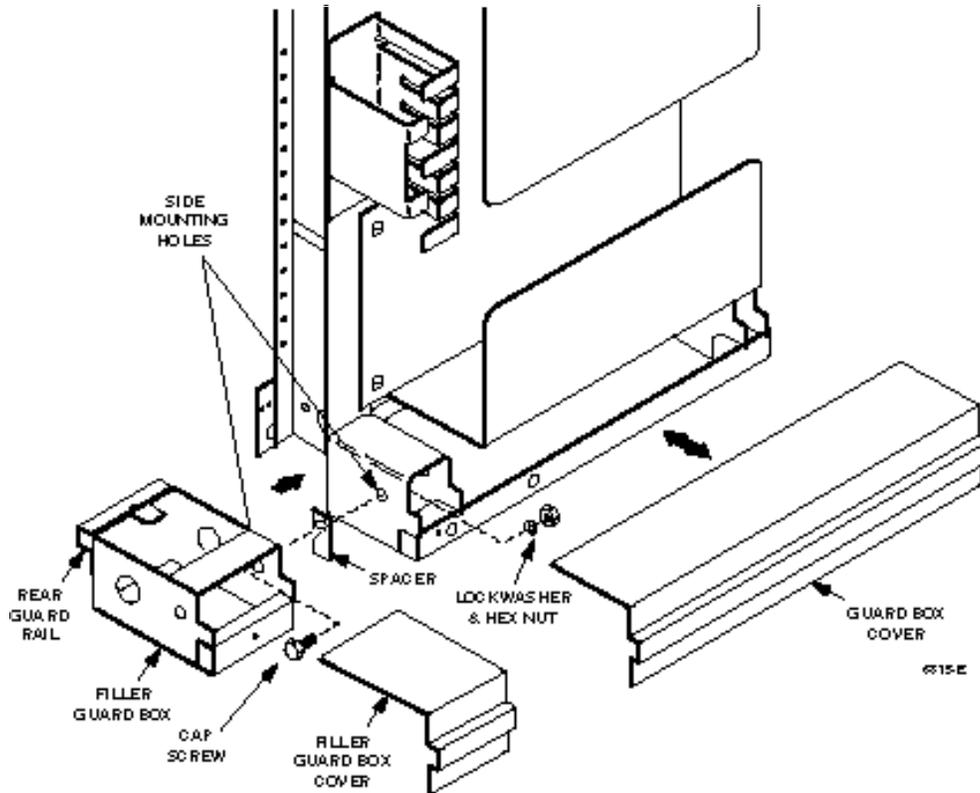

Figure 9-10. Filler Guard Box Installation

4. Insert the 1/8-inch spacer provided between the frame base filler and the frame base. When the spacer is in place, tighten the 3/8-16 cap screw and nut.

5. Replace the guard box cover that was removed in step 2; secure it to bottom of frame with original mounting screws.

6. Secure the rear guard rail to the rear of the frame base filler.

7. Secure the filler guard box cover to the top and front of the frame base filler.

9.7.3   Step 2) Install ADC IMP to Generation One Fiber Frame.

9.7.31 The interbay fiber management panel (IMP) is used in a fiber application only. It may be installed between two racks, or between a rack and an end guard. The kit includes a filler guard box, which should be already installed (if not, refer to Section 9.7.21 above). Different heights are accommodated using various combinations of panel sections (Figure 9-11).
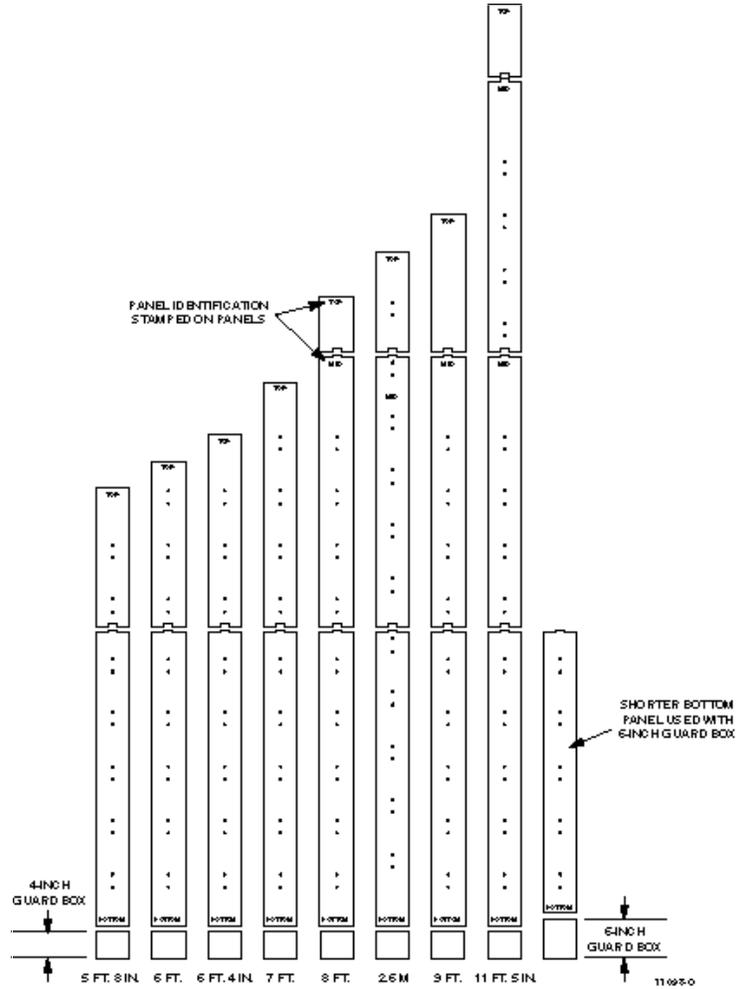

Figure 9-11. Panel Section Combinations for Different Frame Heights

9.7.3.3 Follow same procedure for attaching to ADC FDF.

9.7.4 Step 3) Install rear fiber storage panels.

9.7.4.1 The Rear Fiber Storage Panel (RFSD) mounts flush on the rear side of an interbay fiber management panel using the same mounting hardware. The RFSD is shipped with an extra spool that is positioned differently depending on whether the

RFSD is mounted on the left or right side of the frame (see Figure 9-12). Use the following procedure to install the RFSD:
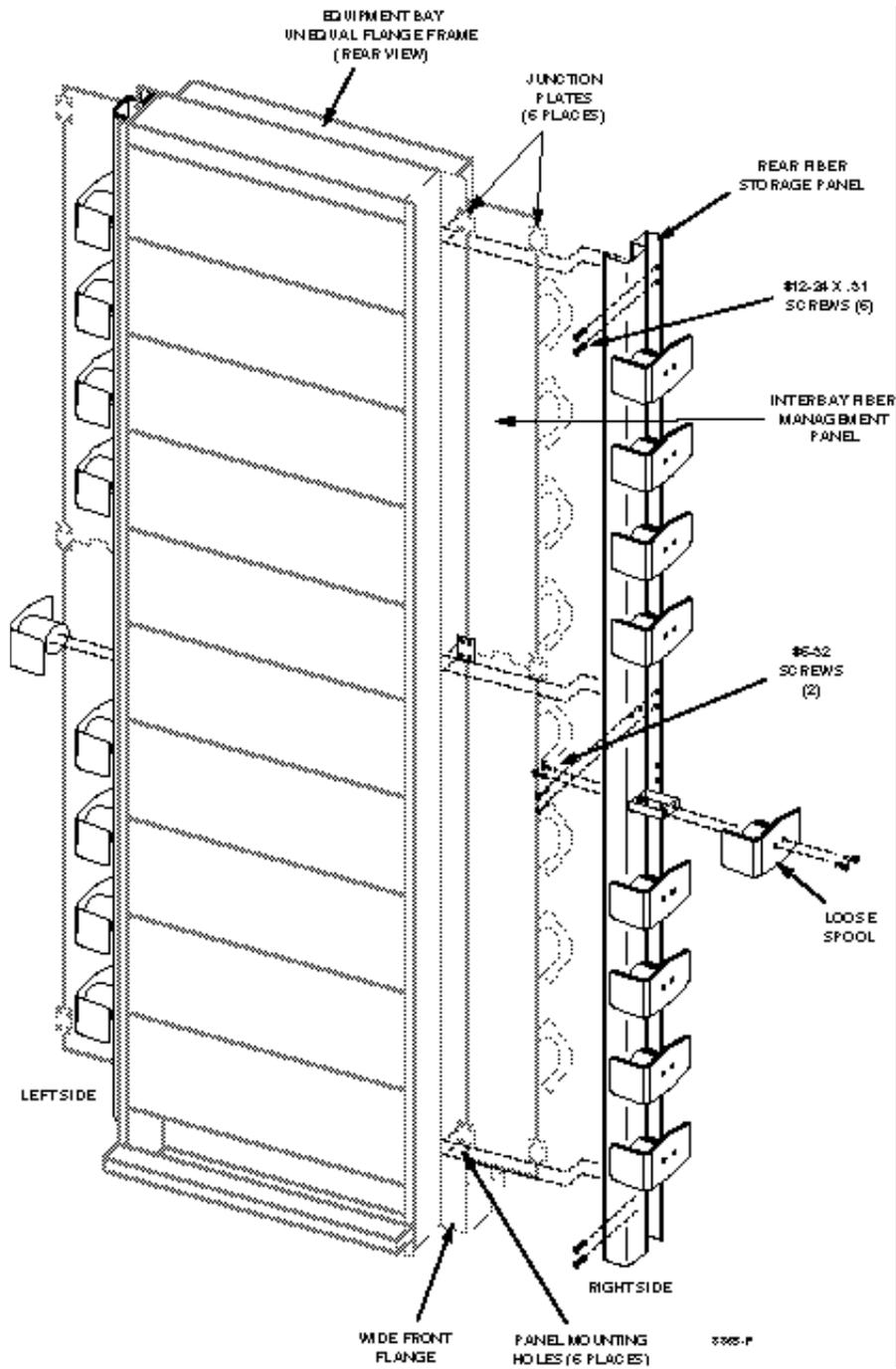

Figure 9-12. Installing a Rear Fiber Storage Panel

1. Position yourself at the rear of the interbay fiber management panel with the RFSP in hand.

2. Stand up the RFSP in its correct location on either the left side or right side of the frame with the RFSP spools facing away from the frame.

3. Note that the RFSP has four upper spools and four lower spools with two spool-mounting positions between. Install the extra spool in the lowest mounting position using the two #6-32 screws provided in the kit.

▶ **Note**: If the RFSP is facing in the wrong left or right direction, the mounting positions will be reversed. Be sure to install the extra spool in the correct position before installing the junctions plates.

4. Observe that the interbay fiber management panel is fastened to the wide front flange of the rack with six junction plates, each secured with four 12-24 × 0.316 Phillips-head screws.

5. Remove the two inmost Phillips-head screws from the three junction plates (top to bottom) You will be using this same hardware to mount the RFSP and interbay fiber management panel together.

6. Align the rear fiber storage panel as shown, and secure it to the rear of the interbay fiber management panel using the six screws just removed above.

9.7.5   Step 4) Install end guard to ADC IMP.

9.7.5.1   An end guard panel can be used with any ADC unequal flange rack of either type, network or non-network. It can be attached directly to a rack or to a filler panel or interbay fiber management panel. Three heights are available corresponding to the three heights of racks. Use the following procedure to install an end guard panel (Figure 9-13).
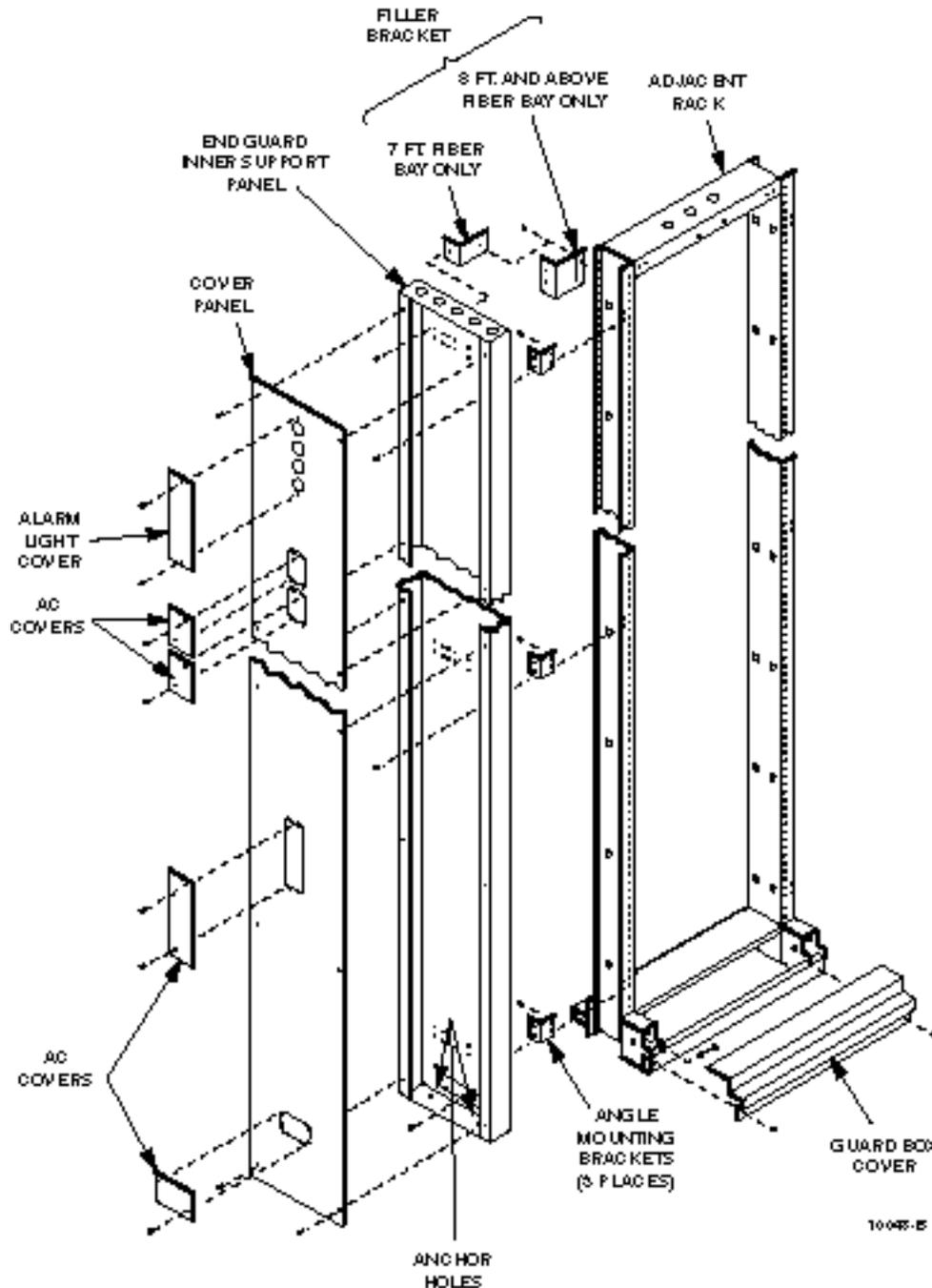
Figure 9-13. Installing an End Guard Panel Directly To Network Rack

1. If the rack or filler panel to which the end guard panel will be joined does not have angle mounting brackets already installed in the positions shown in Figure 36, fasten the angle mounting brackets to the rear side of the rack or filler panel using the four 12-24 × 0.25 inch Phillips-head mounting screws provided in the kit.

2. Place the end guard inner support panel in its approximate position, and temporarily support it by loosely securing it to the angle mounting brackets using the 12-24 × 0.25 inch Phillips-head screws provided in the kit.

3. For additional temporary support, temporarily install the filler bracket shown in Figure 34. Loosely attach the filler bracket using two 12-24 × 0.50 inch Phillips-head screws.

4. Align the end guard inner support panel and mark the anchors holes on the floor.

5. Unfasten the end guard inner support panel from the brackets and set it aside.

6. Drill anchor holes and install the floor anchors.

7. Set the end guard inner support panel in position again, and loosely attach it to the floor anchors.

8. Re-attach the inner support panel to the angle mounting brackets and filler brackets using the same screws as used above. Note that the longer screws are used for the filler bracket.

9. Tighten the floor anchors, then tighten the screws in the brackets.

10. Mount the cover panel to the end guard inner support panel using 12-24 × 0.5 inch self- tapping screws.

11. Mount the blank alarm light cover using 8-32 × 0.31 inch Phillips-head screws.

12. Mount the four blank AC covers to the cover panels using 8-32 × 0.31 inch screws.