COSMIC® DISTRIBUTING FRAME SYSTEMS

Planning, Engineering, Installation, and Operation

AT&T 201-222-050

System Reference Guide

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ABOUT THIS DOCUMENT

Purpose

This reference guide provides information for planning, engineering, ordering, installing, operating, and maintaining *COSMIC*® Distributing Frame Systems. The *COSMIC* Distributing Frame Systems are modular frameworks designed to terminate, protect, and cross-connect subscriber, trunk, toll, and tie pair circuits in both Central Office and large customer premises applications.

This guide is intended to provide planners with the information needed to properly plan and engineer *COSMIC* Distributing Frame Systems. The guide is also intended for craft personnel responsible for installation, operation, and maintenance.

Reason for Reissue

Although this is the first issue of this manual, it replaces specification J 90610 and Practice 801-005-164, "*COSMIC* Distributing Frame Systems, Equipment Design Specifications."

Scope

This document describes the *COSMIC* family of distributing frames and the apparatus and accessories used with these frames. All phases of frame planning and engineering are addressed, including frame growth methods. Frame installation, cabling, operation, maintenance, and administration are also covered to support the *COSMIC* frame system.

Organization

Section 1 — System Overview

- Provides a general overview of distributing frame systems, network hierarchy, and the *COSMIC* family of distributing frames. The types of *COSMIC* frame systems, features, benefits, configurations, arrangements, engineering, administration, and growth methods are outlined.

Section 2 — Applications

- Describes the wide variety of applications for the *COSMIC* distributing frame systems, including Central Office, Customer Premises, and remote applications.

Section 3 — Frameworks and Equipment

- Describes the *COSMIC* frameworks, and associated frame systems and frame equipment.

Section 4 — Apparatus and Accessories

- Describes the supporting apparatus and accessories available, such as connecting blocks, connectors, protector units, tools, test equipment, and splicing connectors.

Section 5 — *COSMIC* DF Selection

- Describes the factors that must be considered when selecting a *COSMIC* Distributing Frame.

Section 6 — System Planning

- Provides detailed information for planning a *COSMIC* distributing frame system, including objectives, planning guidelines, floor space planning, growth planning and methods, and administration planning.

Section 7 — Engineering

- Describes engineering services to provide the optimal frame and circuit layouts. Emphasizes the engineering process and information on cabling, racking, termination layouts, material specification, and installation. Includes information for the use of the Mechanized Engineering and Layout for Distributing Frames (MELD) System.

Section 8 — Installation and Cabling

- Provides initial installation and cabling information, including procedures and the tools and supplies required.

Section 9 — Administration

- Provides termination assignment methods, such as mechanized assignments using Computerized Frame Administration System (CFAS) and manual record keeping.

Section 10 — Operation and Maintenance

- Describes day-to-day operations and maintenance, such as jumper running, testing, tracing, use of tools, and repair procedures.

Section 11 — Ordering Information

- Provides a summary of ordering information for the frameworks, equipment, apparatus, and accessories used in the *COSMIC* distributing frame systems.

Section 12 — Specifications

- Provides technical specifications such as electrical characteristics and protection technologies.

The last three tabs contain **References**, a **Glossary and Acronyms**, and an **Index**.

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To receive additional information or to send comments, please complete and return the Reference Guide Information Form to the Distributing Frame Systems (DFS) Field Support Group in Norcross, Georgia.

SECTION 1

SYSTEM OVERVIEW

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SYSTEM OVERVIEW

This section begins with a brief description of the various classes of cross-connect frame systems found in a typical central office. After a brief discussion of how these systems fit into the evolving network, the remainder of this section then concentrates on an introduction to the *COSMIC* Distributing Frame System.

1.1 Cross-Connect Frame Systems

Cross-connect frame systems provide for cross-connection and test access to telephone circuits. Several types of systems have been developed to meet the specific needs of voice frequency, digital, and fiber-based circuits.

1.1.1 System Hierachy

Four major types of cross-connect frame systems are now used for modern central office cabling and circuit interconnection:

1. Distributing Frame Systems (DFS)

The Main Distributing Frame (MDF) provides the means for cross-connecting outside plant copper cable pairs to Central Office (CO) equipment. Examples of circuits that are cross-connected at the MDF include voice frequency loop cable pairs to a switching system's Line Equipment (LE) for basic phone service, and interoffice cable pairs to a switching system's Trunk Equipment (TE) for interoffice message trunks. Most of the circuits cross-connected at the MDF are analog voice frequency circuits, although there may be digital circuits ranging from low-speed carrier (9.6 Kb/s) to T1 carrier (1.544 Mb/s).

The MDF may provide electrical protection from hazardous voltages and/or currents that may enter the central office via the copper Outside Plant (OSP) cable. Electrical protection is usually provided with plug-in protector units as part of the Main Distributing Frame (MDF). These protector units are inserted into connectors mounted on the Protector Frame (PF) or MDF. The protectors also provide means for test-access and, by partial removal, temporary service disconnection.

2. Digital Signal Cross-Connect-1/1C (DSX-1/1C)

The Digital Signal Cross-Connect 1/1C (DSX-1/1C) frame is used for interconnecting electrical circuits conforming to DS1 (1.544 Mb/s) or DS1C (3.152 Mb/s) transmission standards. DSX frames provide maintenance patching and monitoring capabilities. DSX-1/1C frame hardware may also be used to cross-connect CEPT-1 level circuits (2.048 Mb/s).

3. Digital Signal Cross-Connect-3/4 (DSX-3/4)

Higher bit rate systems operating at DS3 (44.736 Mb/s) and DS4 (274.176 Mb/s) require coaxial cable for the transmission media. Since coaxial cable requires its own unique connecting technology, the DSX-3/4 frame has been developed to provide dedicated cross-connection, maintenance patching, and monitoring for such systems. DS3 and DS4 are the highest North American industry-standard rate for copper-based systems. DSX-3/4 frame hardware may also be used to cross-connect circuits conforming to CEPT-3 (34.368 Mb/s) or STS-1 (50.84 Mb/s) standards.

4. Fiber Distributing Frame (FDF)

Termination and cross-connect fiber media are provided by the FDF. A FDF is comprised of fiber connectors, connector assemblies, shelves, and bays with provisions for cross-connecting and interconnecting fibers. The accelerating growth of interoffice fiber optic facilities and fiber-in-the-loop applications have prompted the growing use of complete fiber frame systems.

1.1.2 DFS Functions

Cross-Connection

A cross-connection is the physical and electrical connection of a circuit to provide services to customers (POTS, Trunks, and Special Service). Cross-connections are usually completed by connecting outside plant terminations to equipment terminations with solid conducting wires called "jumpers" (Figure 1-1).

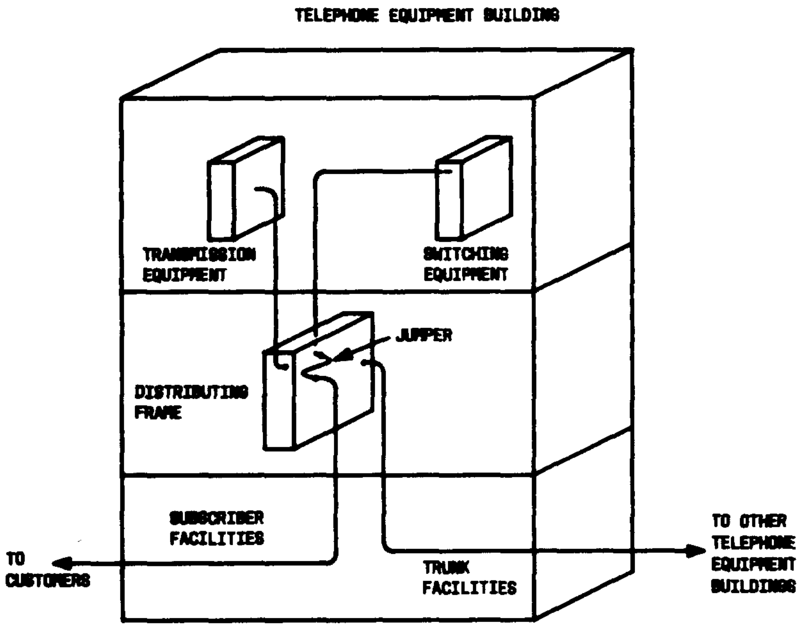

Figure 1-1. Distributing Frame Role in the Telecommunications Network

Electrical Protection

Protection against hazardous voltages and currents can be provided at distributing frames. Voltage and current protection are available in protector units which plug into outside plant connecting apparatus.

Test Access

Distributing frames provide an access point where circuits can be physically opened and tested. Virtually all DF terminations have bridged test access points for a terminated cable. The DF test-access function is commonly provided by a test field or test points on protected connectors.

Temporary Disconnection

Certain DF apparatus permit a circuit to be opened without removing cross-connections. Temporary disconnection is usually accomplished by pulling a protector unit to a "detent position." Temporary disconnection is commonly used for short-term service suspensions.

1.2 *COSMIC* Distributing Frames

The *COSMIC* Distributing Frame System is a family of modular distributing frames that meets the needs of a wide variety of applications from the largest metropolitan central offices with over 2 million lines to the smallest community dial office or point of presence office. The *COSMIC* series of modular distributing frame systems are compatible with both AT&T and other vendors electronic/digital switches.

The *COSMIC* Distributing Frames are modular frameworks designed for equipment and outside plant cable terminations that are generally placed in alternating modules of a frame lineup (Figure 1-2). This arrangement facilitates short jumpers for circuits that are preferentially assigned. Historically, modular DFs have been engineered with equal numbers of facility modules and equipment modules. However, *COSMIC* DF Systems now provide much more flexibility, allowing "growable" and "custom" frame systems with variable ratios of facility and equipment terminations.

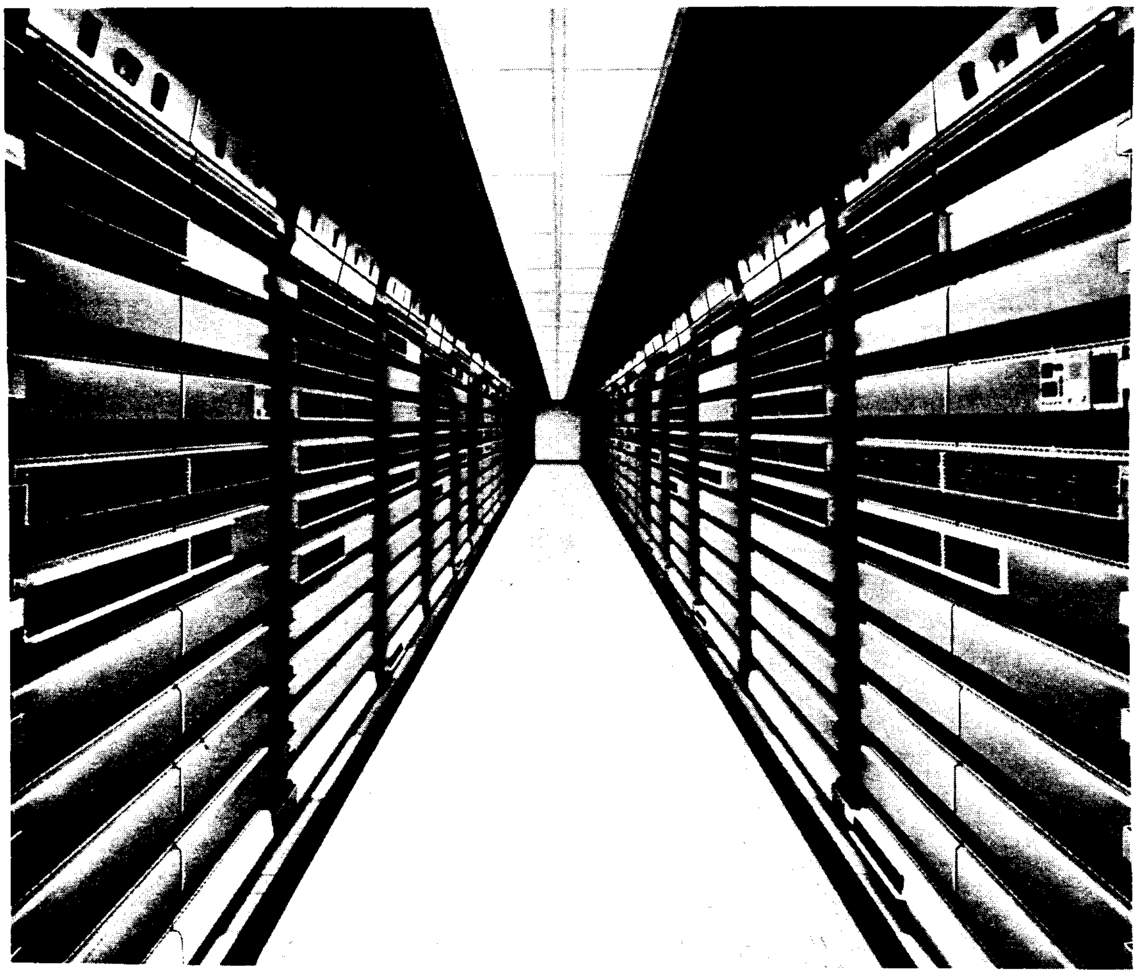

Figure 1-2. *COSMIC* Distributing Frame System

The *COSMIC* DF Systems feature single-sided jumper operations for increased craft efficiency compared to the traditional double-sided arrangement used with conventional distributing frames. *COSMIC* DF frames are low height, allowing easy craft access to jumper wireways. Frame installations conform to Bell Communications Research (Bellcore) Network Equipment Building Systems (NEBS) standards.

COSMIC DFs are fully compatible with the majority of the electromechanical, electronic, and digital switching systems in use, including AT&T *5ESS*® , 1, 1A, 2, 2B, and 3 *ESS*™ switching systems, Northern Telecom's *DMS** -10 and DMS-100, and GTE's *GTD*† -5 EAX switch. Support for these systems includes dedicated connecting blocks with circuit identification information stamped on the connecting block fanning strip as well as mechanized engineering layout with the AT&T MELD System. Other switching systems, such as the Ericsson *AXE*‡ -10, NEC NEAX61E§ and Plessey *SYSTEM X*¶, are also supported.

COSMIC DFs are more compact than the conventional distributing frames. *COSMIC* IA or IIA DFs are typically 2 feet 3 inches (686 mm) deep versus the larger Low Profile Conventional DF which is typically 4 feet 3 inches (1295 mm) deep. Modular framework assemblies and snap-in, preconnectorized apparatus make installation fast and easy. Circuit identification labels printed by mechanized systems and factory-stenciled connecting blocks eliminate the need to hand stencil most circuit identifications in the field, reducing installation time and cost. Single-sided jumper operations and low height improve daily operations. All *COSMIC* DF Systems use the 112-type connecting blocks with labor-saving, punch-on, quick-clip terminals. Wire-wrap versions are also available.

1.2.1 *COSMIC* Framework Types

The *COSMIC* DF lineups are constructed of modules that consist of either one or two adjacent bays. Two basic types of bays are used: cross-connect (formerly called equipment) bays and cross-connect/protection (formerly called facility) bays. The cross-connect bays mount 112- or 78-type connecting blocks which provide for cross-connection but no electrical protection or test access. The cross-connect/protection bays mount either connecting blocks or 307-type protected connectors. The 307-type connectors provide for cross-connection as well as electrical protection (when equipped with 3C- or 4C-type protector units) and test access through the protector units. The cross-connect/protection bays also mount the 407-type non-protected connectors, which are typically used for terminating derived voice-frequency circuits of Digital Loop Carrier (DLC) Central Office Terminals (COTs).

Separating each module in the lineup is a vertical cable and wiring trough. The vertical trough is used to route jumpers on the front of the frame between shelves of adjacent modules or to the express troughs. Combinations of cross-connect/protection and/or cross-connect bays are put together to form modules. A *COSMIC* DF lineup can begin or end with a cross-connect/protection or a cross-connect bay.

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* Trademark of Northern Telecom LTD.
† Trademark of GTE.
‡ Trademark of Ericsson.
§ Trademark of Nippon Electric Co.
¶ Manufactured by Plessey Co.

AT&T offers four types of modular frameworks:

- *COSMIC* **IIA Distributing Frame — The** *COSMIC* IIA DF consists of cross-connect bays and cross-connect/protection bays. The bays are 2 feet 9 inches wide (838 mm) by 2 feet 3 inches deep (686 mm) by 8 feet 2 inches tall (2489 mm). The cross-connect/protection bays mount connectors on the rear for protection of outside plant pairs and connecting blocks on the front for cross-connects. A connector (307 type) consist of a 100-pair protector panel connected to a factory-wired connecting block (112 type). The 112-type connecting blocks are used to terminate all types of circuits (line equipment, tie pairs, trunk, and toll equipment). Cross-connect/protection bays can terminate up to 5,500 protected outside plant pairs and 2,000 tie pairs with high-density 112-type connecting blocks. Cross-connect bays which are designed to mount only 112-type connecting blocks on the front can terminate up to 6,960 switching equipment and tie pairs. The *COSMIC* IIA DF can be used in virtually any application.

- *COSMIC* **IA Distributing Frame** — The dimensions of the *COSMIC* IA DF bays are identical to those of the *COSMIC* IIA DF frame bays. All circuits are terminated on 112-type connecting blocks. *COSMIC* IA DF frameworks use only the cross-connect type framework bays for all terminations. A separate high-density protector frame provides protection and test access for outside plant cable pairs. Outside plant cables terminate on the protector frame and are cabled to connecting blocks on the *COSMIC* cross-connect bays. Modules, consisting of two side-by-side cross-connect bays, can terminate up to 13,200 outside plant pairs using high-density 112-type connecting blocks. Modules consisting of one or two cross-connect bays can terminate up to 13,920 switching equipment and tie pairs. *COSMIC* IA DF frameworks are ideal for wire centers with existing protector frames that can be reused. The *COSMIC* IA DF frames are also used for tie cable networks between multiple frame lineups or as miscellaneous equipment frames.

- *COSMIC* **I Distributing Frame** — The *COSMIC* I DF has a narrower footprint with smaller wiring shelves than the *COSMIC* IA DF. *COSMIC* I frames are typically used as a Subscriber Main Distributing Frame or a Tie-Pair Distributing Frame. It consists of only cross-connect bays. The circuits are terminated on 78- or 112-type connecting blocks. The *COSMIC* I DF requires a separate protector frame to provide protection and test access for outside plant cable pairs. Modules consisting of two cross-connect bays can terminate up to 10,000 outside plant pairs or 10,240 switching equipment and tie pairs. High-density 112-type connecting blocks may be used on the *COSMIC* I DF with the use of a mounting adapter.

- *COSMIC* **Mini Distributing Frame** — The *COSMIC* Mini DF is a single-sided, modular frame system that can terminate and cross-connect both outside plant cables (using 307-type connectors) and equipment cables (using 112-type connecting blocks). On the cross-connect/protection bays, both the outside plant connector and cross-connect field are on the front side of the frame. Cross-connect bays also contain 112-type connecting blocks on the front, thus allowing the frame to be installed against a wall. The *COSMIC* Mini frame is intended for smaller frame applications up to 50,000 total terminations with mechanized engineering and preferential assignment. It is ideally suited for applications where space is tight, such as in small Community Dial Offices, Controlled Environment Vaults, and Equipment Huts.

1.2.2 Protector Frames

Separate stand-alone protector frames are commonly used with *COSMIC* I and IA DF systems to provide protection and test access for outside plant cable pairs. Two of the stand-alone protector frames most commonly used are: (1) the High-Density Modular Protector Frame which uses 308-type connectors, and (2) the lower density Modular Protector Frame which uses 302-type connectors. These connectors, provide protection and test access for outside plant pairs, but have no provisions for cross-connections. Outside plant cable pairs are terminated on protected connectors and tie cabled to connecting blocks on the *COSMIC* DF. Other special purpose protector frames are also available.

1.3 Distributing Frame Configurations

COSMIC frameworks can be engineered with or without separate protector frames for virtually any network configuration. The following paragraphs briefly describe typical configurations.

1.3.1 Subscriber Main Distributing Frame (SMDF)

The SMDF is the most common application for the *COSMIC* DF and provides terminations of line equipment, subscriber outside plant cable pairs, and tie pairs to other DFs in the office. SMDF's can range in size from several hundred lines to several hundred thousand lines in multiple lineup configurations.

1.3.2 Tie Pair Distributing Frame (TPDF)

The TPDF terminates only tie pairs from other distributing frames. A typical application of a TPDF is to provide interconnections between lineups of an SMDF.

1.3.3 Trunk Main Distributing Frame (TMDF)

The TMDF provides terminations of trunk, toll, and miscellaneous equipment and facilities. The TMDF may be in the same lineup as the SMDF or in a separate lineup but is always operated as a separate frame. The TMDF is typically sized for six modules to avoid excessive pileup of long jumpers in the express trough.

1.3.4 Combined Main Distributing Frame (CMDF)

The CMDF combines the SMDF and TMDF functions into one frame. When used as a CMDF, the framework length is usually limited to seven modules. Frame size guidelines are based on the capacity of the express troughs to carry long jumpers and are made on the premise that cross-connects are not always preferentially assigned.

1.3.5 *Subscriber Digital Distributing Frame (SDDF)*

The SDDF terminates outside plant cables dedicated to T-carrier circuits, T-carrier equipment (such as Office Repeater Bays or Digital Loop Carrier Systems), and tie cables to other DFs. The SDDF reduces the need for long shielded jumpers on the SMDF. The *COSMIC* IA and IIA frames also terminate and cross-connect loop T-carrier circuits.

1.4 Frame Arrangements

The framework bays and vertical wiring troughs can be engineered into a variety of frame arrangements. The following paragraphs briefly describe some of the arrangements.

1.4.1 Modular Frames

In modular frame systems, the cross-connect and/or cross-connect/protection framework bays are arranged into functional entities called modules that are dedicated to the termination of a particular family of circuits. A module consists of one or more contiguous bays. The placement of vertical troughs defines the boundaries between modules.

As an example of a modular frame configuration, a typical SMDF terminates circuits that are classified into the following categories:

- **Facilities**, consisting of outside plant cable pairs and derived voice-frequency circuits of loop carrier systems.
- **Equipment**, consisting of switching equipment and other transmission equipment (for example bridge lifters).
- **Tie Circuits**, which are cables interconnecting two distributing frame lineups to allow cross-connects between them.

SMDF cable termination arrangements consist of two types of administrative modules, called facility modules and equipment modules. The Outside Plant cables are typically located in facility modules, the switch line equipment terminations are all located in equipment modules, and the tie circuits may be located in either the facility or equipment modules. Other termination arrangements are possible by dedicating shelves to facility or equipment in the same bay.

1.4.2 Traditional Arrangement

A traditional *COSMIC* frame arrangement consists of equal-sized facility and equipment modules that alternate along the length of the lineup. Each module consists of two bays placed side-by-side. A vertical wiring trough is placed between the modules. The first and last module in the lineup is a single bay.

1.4.3 Custom Arrangement

The newer *COSMIC* "Custom" frame arrangement uses single bays for some of the equipment modules, as opposed to the double bays of the "traditional" arrangement. This helps cut down on floor space requirements, since in many offices more outside plant pairs are terminated on the distributing frame than switching equipment pairs. Stated another way, a *COSMIC* Custom frame lineup can terminate more outside plant pairs (and fewer equipment pairs) than a "traditional" frame of equal length.

1.4.4 Two-Stage Arrangement

Two-stage distributing frames usually consist of frame lineups consisting of facilities interconnected by tie pairs to a separate Equipment Distributing Frame lineup. In this arrangement, one distributing frame stage terminates loop exchange and trunk cable pairs while the second stage terminates switching, line equipment, and toll equipment. Each stage may consist of several distributing frame lineups interconnected through a distributed tie cable network.

1.4.5 Flex-Frame Arrangement

COSMIC flex-frame arrangements combine facility and equipment terminations in the same frame bay. Outside plant cables and equipment cables are terminated in alternating shelves of the same frame bay. Alternating equipment and facilities between shelves permit shorter cross-connect arrangements. Flex-frame arrangements are ideal for small or large wire centers where floor space is limited and the ratio of equipment to facilities is uncertain.

1.5 Engineering and Administration

COSMIC DFs are supported by mechanized engineering and administrative systems, which are designed to optimize the layout of terminations and assignment of short jumpers. These systems are an integral part of the *COSMIC* frame systems.

MELD. The Mechanized Engineering and Layout for Distributing Frames (MELD) system is an engineering aid that determines the termination location of facility cables, line equipment cables, and tie pair cables on modular frames. MELD spreads the facilities and equipment terminations over the length of the frame, ensuring that equal numbers of facility terminations are placed in each facility module, and equal numbers of equipment terminations are placed in each equipment module. One of MELD's outputs is a frame termination record on magnetic tape which is used to initialize and/or update the database of a mechanized administration system (such as CFAS OR COSMOS — see below). Other MELD outputs include a frame record drawing, termination directories sorted by termination type and frame location, and circuit identification labels that mount to the framework. See Section 7 for more information.

Administration Using CFAS or COSMOS. AT&T's Computerized Frame Administration System (CFAS), Bellcore's Computer System for Main Frame Operations (COSMOS) or another similar system is recommended to administer cross-connect assignments on modular frame systems. These operations support systems assign line equipment to outside plant facilities that minimize the length of jumpers while maintaining proper load balance in the switch. The systems are usually successful at finding a suitable piece of equipment in the adjacent equipment module. In searching for equipment, the system considers the class of service and feature requirements of the customer (for example, touch tone vs. rotary dial, loop start vs. ground start, residential vs. business), and the traffic load of other circuits already assigned to the switch concentrators. Preferential assignment procedures reduce jumper pileup, labor, and material for cross-connects. See Section 9 for more information.

1.6 Growth Methods

AT&T planning and engineering supports incremental growth of *COSMIC* frames with little or no retermination of facilities and equipment. Growable *COSMIC* frames reduce initial capital expense. *COSMIC* DF growth options provide a hedge against the uncertainty of a long-range forecast and result in significant savings. New frames can be planned for future growth, further reducing first cost. Growth methods are described in Section 6 of this manual.

COSMIC DF growth options include:

- Adding modules to the ends of one or more *COSMIC* frame lineups.
- Adding additional lineups to expand the frame system capacity.
- Use of newer high-density apparatus.
- Terminating facility terminations in spare termination space in equipment modules.

1.7 Value Added Benefits

Replacing a conventional distributing frame with a *COSMIC* frame can result in significant operating and maintenance savings. The following example shows savings for installing a new *COSMIC* frame as opposed to growing an existing 95-vertical conventional frame.

1. **Mechanized versus Manual Engineering**. Typical MELD engineering costs are half the manual expense.

   Typical savings = $5000/Year

2. **Administration**. Using the MELD tape to initialize the location database of the CFAS or COSMOS administration system, saves the need to manually load this information.

   Typical savings = $5000/Year

3. **Operations**. The number of frame attendants required for *COSMIC* frames with mechanized administration is typically one third the number needed for conventional frames with manual administration. Assuming the conventional frame required six attendants, typical savings are:

   4 Attendants @ $50,000/year Loaded Rate = $200,000/Year

4. **Maintenance Savings**. Maintenance costs vary with the condition of the frame, and accuracy of records. *COSMIC* frames with mechanized administration offer improvements in service averaging 20% fewer troubles compared with manually-administered frames.

   20% Fewer Service Problems = $25,000/Year

5. **Material Savings**. The reduced jumper lengths can represent a significant savings compared to the average jumper length on a conventional frame. Assuming jumper activity of 80 jumpers added per day, or 24,000 jumpers per year, the annual savings in cross-connect wire is:

   60 feet/jumper x $0.035/foot x 24,000 jumpers/year = $50,400/Year

6. **Building Space**. When comparing the options of growing an existing conventional frame against converting over to a new *COSMIC* frame, significant amounts of floor space can be recovered. Assuming $\$100/ft^2$ building cost, or $\$15/ft^2$ annual rental value, the savings in converting to the high-density *COSMIC* frame is:

   $100 x 65 feet x 4 feet = $26,000 Building Value or
   $15 x 65 feet x 4 feet = $3,900 Annual Rental Value.

7. **Recovered Equipment**. In converting from manual to mechanized administration systems, it is quite common to "recover" switching and transmission equipment that had been "lost" due to inaccurate records. Typical savings: $300/line recovered.

8. **Capitalization Advantages.** Another item to consider when comparing the installation of a new frame versus rehabilitation of an old frame is the tax and tariff benefits of depreciating the new frame.

9. **Intangible Benefits**. Other benefits of converting to a *COSMIC* frame which are hard to quantify include the appearance of the frame, rehabilitation of the cable vault, workable cable pathways, and improved documentation.

For this example, the total benefits and savings is $285,400/year, excluding the value of floor space, recovered equipment, and depreciation. The five year savings for this frame would be $1,427,000.

SECTION 2

APPLICATIONS

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APPLICATIONS

2.1 Scope of Applications

COSMIC Distributing Frames offer a system solution to basic and complex cross-connect problems. The *COSMIC* frame family can serve a variety of applications to meet existing and future terminating needs. A typical communications network of *COSMIC* frame applications is illustrated in Figure 2-1. The more popular applications include:

1. Central Offices (A) and Remote Switching Sites (B).
2. Customer Premises, Campus (C) and Building Distribution (D).
3. Community Dial and Point of Presence Offices (E).
4. Mini and Maxi Huts (F) and Controlled Environmental Vaults (G).
5. Disaster Recovery Trailer (H) or Portable Communications Containers (I).

COSMIC frames can be configured and arranged to meet space and cable termination requirements for the largest metropolitan central offices - 2 million terminations, or the smallest Portable Communications Container with up to 2,760 terminations in 1.43 square feet (0.13 square meter).

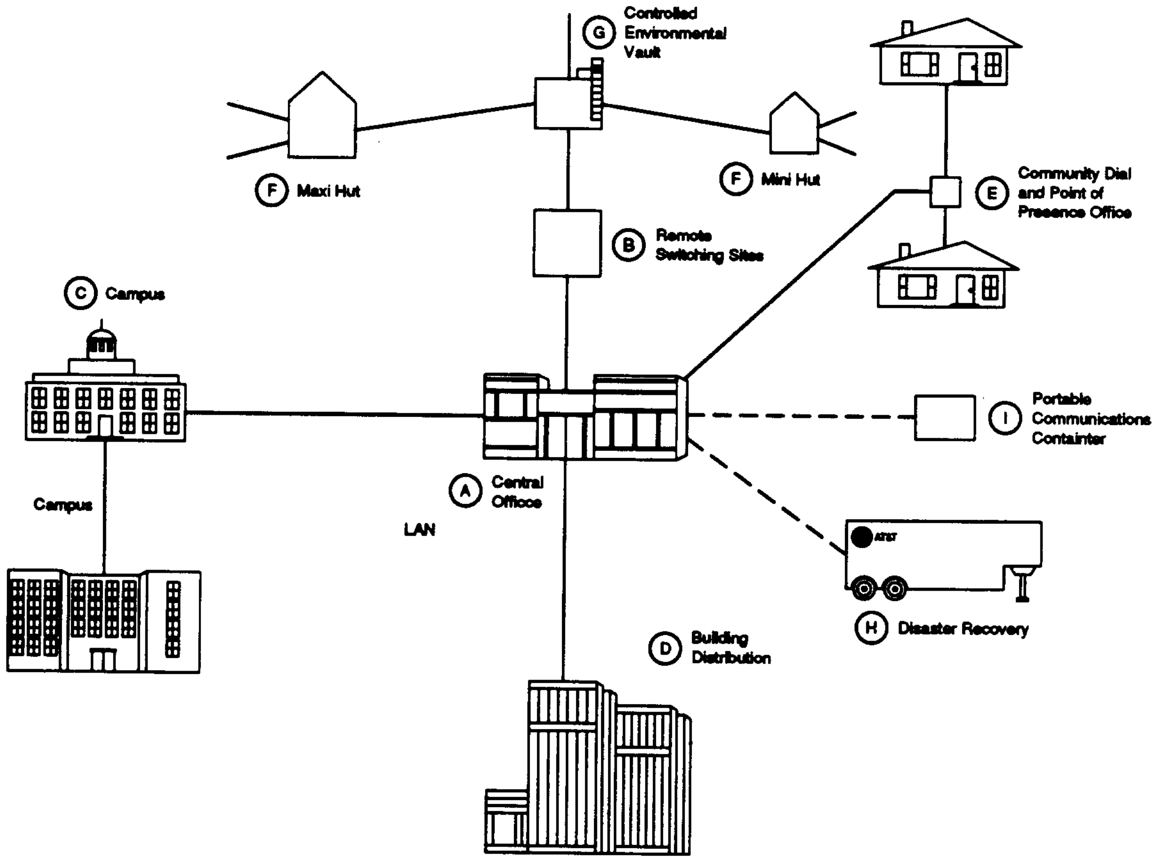


Figure 2-1. Applications for *COSMIC* DFS

2.2 Central Office and Remote Switching Sites

Central Offices and Remote Switching Sites are the most common applications for *COSMIC* modular frames. *COSMIC* frames are planned and engineered as a complete system, beginning at the feeder cable entrance and extending to the switch, including all interconnecting distributing frames.

In central office applications, *COSMIC* frames can be used to terminate and cross-connect virtually any kind of transmission equipment. These modular frame systems support both traditional cross-connect functions and the latest digital technology.

A typical *COSMIC* IIA frame installation is illustrated in Figure 2-2. Cable Rearrangement Facilities provide a compact and flexible splice interface for large outside plant feeder or riser cables. CRF's are equipped with primary and secondary (shield continuity) grounding hardware for vaultless buildings as well as buildings with a cable vault.

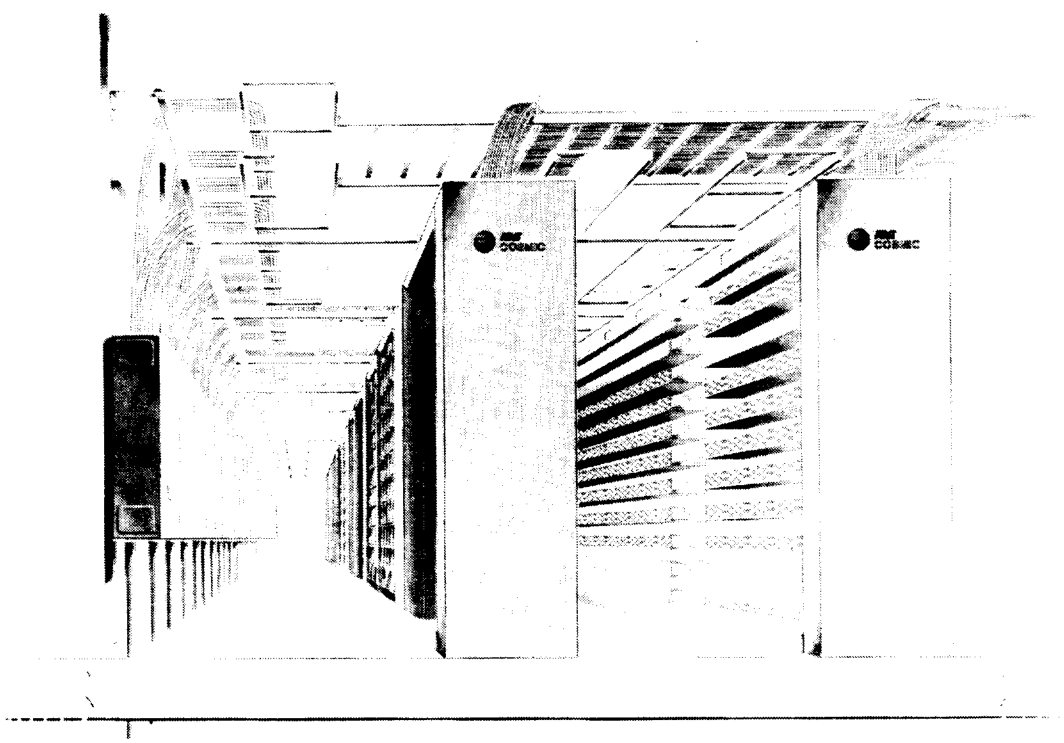


Figure 2-2. COSMIC IIA DF

COSMIC IIA frames can also be installed in buildings designed for bottom cable feeds as illustrated in Figure 2-3. Bottom outside plant cable feeds are practical for first floor installations in new buildings.

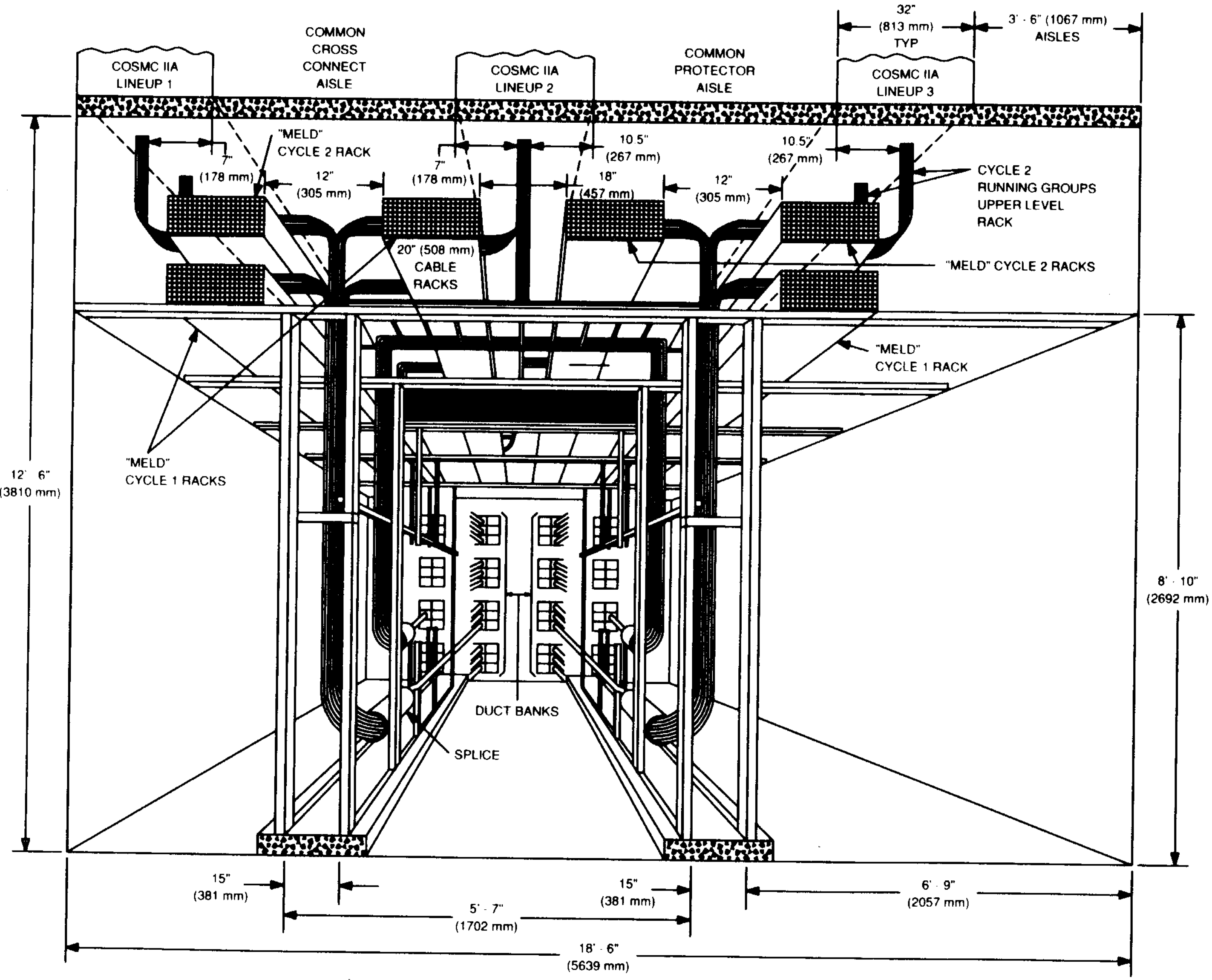


Figure 2-3. COSMIC IIA Bottom Access Cabling Applications

Customized *COSMIC* frame arrangements provide an optimal match of facility and equipment terminations with significant savings in floor space and frame operations. Hybrid framework arrangements are available for maximizing cable termination density as shown in Figure 2-4. Three *COSMIC* IA frame lineups can be served by two levels of AT-9049 wall mounted protector frames with an outside plant termination capacity of 2000 pairs per linear foot (6562 pairs per meter). The *COSMIC* framework bays can be equipped with high density connecting blocks for a maximum termination density of 12,000 pairs per frame bay.

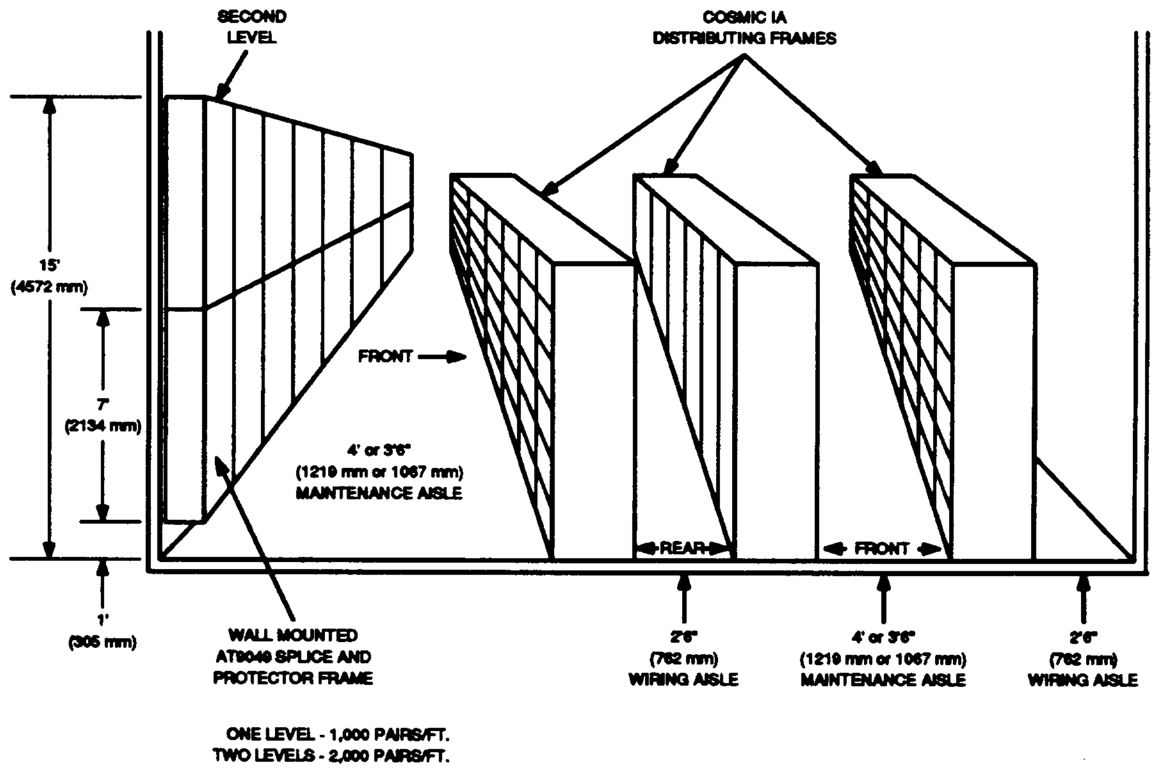
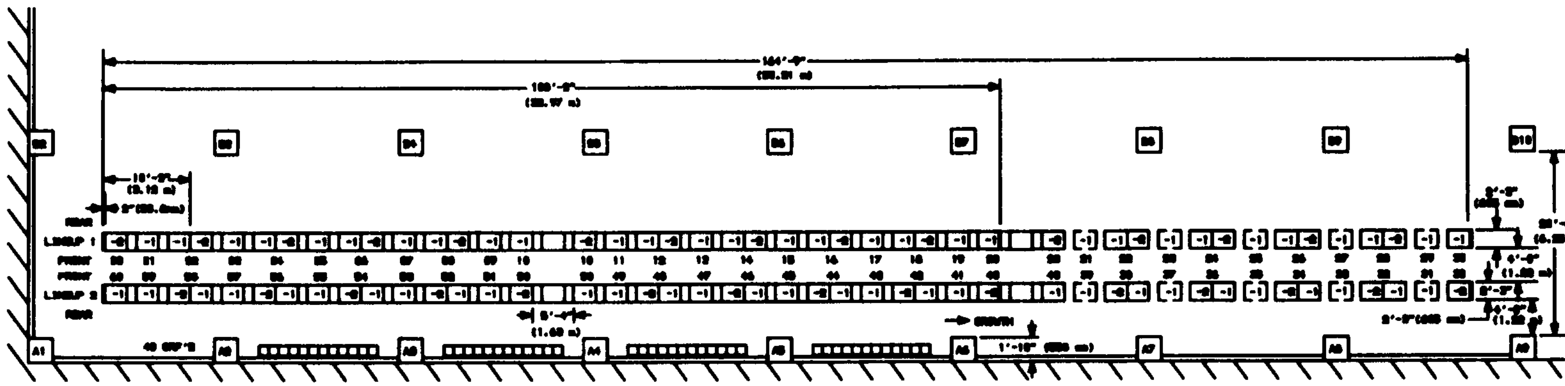


Figure 2-4. Hybrid Framework Applications

Flex frame termination arrangements with alternating shelves of equipment and outside plant cable provide an alternative solution to dedicating a framework bay to outside plant or equipment terminations. *COSMIC* flex frame arrangements allow one 33 inch (838 mm) wide frame bay to be used for both outside plant and equipment terminations when a separate protector frame is provided.

New *COSMIC* Frame Growth methods offer a solution to limited building space with the advantages of reduced frame and installation cost. A three-phase growable *COSMIC* frame plan is shown in Figure 2-5. *COSMIC* frame growth allows planning and sizing adjustments based on predictable service demand forecasts.



COSMIC IIA MDF "CUSTOM-FRAME" GROWTH PLAN

MINIMUM FRAMEWORK-
TWO 20 MODULE LINEUPS

INITIAL FRAME CAPACITY - 2 LINEUPS		
MODULE TYPE	QUANTITY INITIAL	TERMINATION CAPACITY
EQUIPMENT	20	115,200
FACILITY/TIE	20	204,000/72,000

GROWTH FRAME CAPACITY - 2 LINEUPS		
MODULE TYPE	QUANTITY GROWTH	TERMINATION CAPACITY
EQUIPMENT	30	172,800
FACILITY/TIE	30	306,000/54,000

ULTIMATE FRAME CAPACITY - 3 LINEUPS		
MODULE TYPE	QUANTITY	TERMINATION CAPACITY
EQUIPMENT	45	259,200
FACILITY/TIE	45	459,000/81,000

Figure 2-5. Growth Application

2.3 Customer Premises

Customer Premises, Campus and Building Distribution (PBX & PDS) applications for *COSMIC* frames are typically selected based on available space. These installations usually range in size from 1,000 to 80,000 paired terminations. *COSMIC* I, IA, and IIA frameworks are ideal for applications requiring more than 50,000 paired terminations. *COSMIC* Mini frames can be used for all installations with less than 50,000 paired terminations.

2.4 CDO and POP Offices

Community Dial and Point Of Presence Offices (CDO & POP) are ideal applications for a *COSMIC* IA/IIA flex frame or a *COSMIC* Mini. A typical floor plan is shown in Figure 2-6 with wall mounted *COSMIC* Mini and AT9049 Protector frames. These wall mounted frames save valuable space and are under 7 feet (2.1 meter) in height.

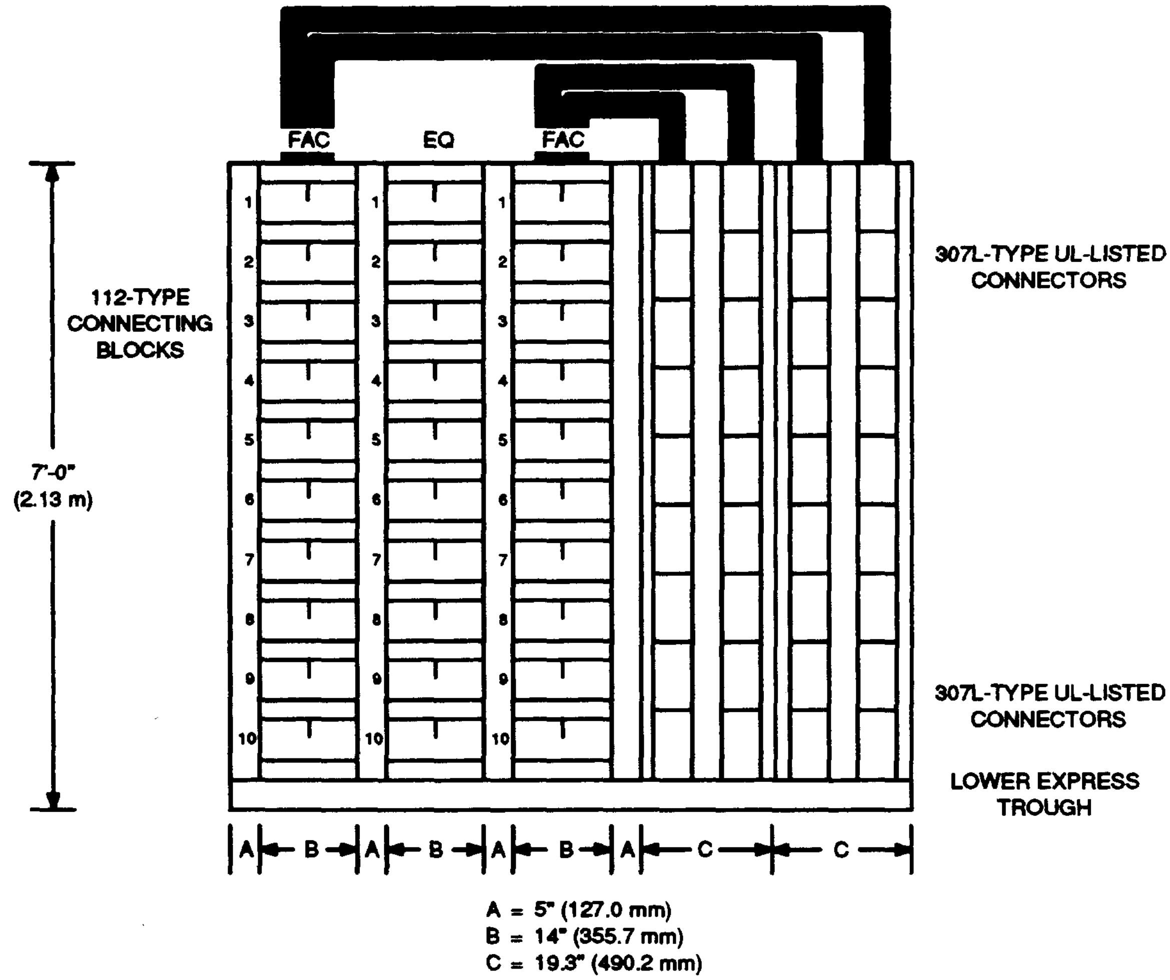


Figure 2-6. COSMIC Mini with AT9049B PF

2.5 Huts and CEVs

Mini and Maxi Huts and Controlled Environmental Vaults are typically small buildings where space is a premium. The *COSMIC* Mini with a CRF installed, is shown in both applications in Figures 2-7 and 2-8 with fiber and copper Subscriber Loop Carrier equipment. These frame arrangements are flexible and can be customized to meet a variety of cable termination applications. Note that CRF is used in both applications.

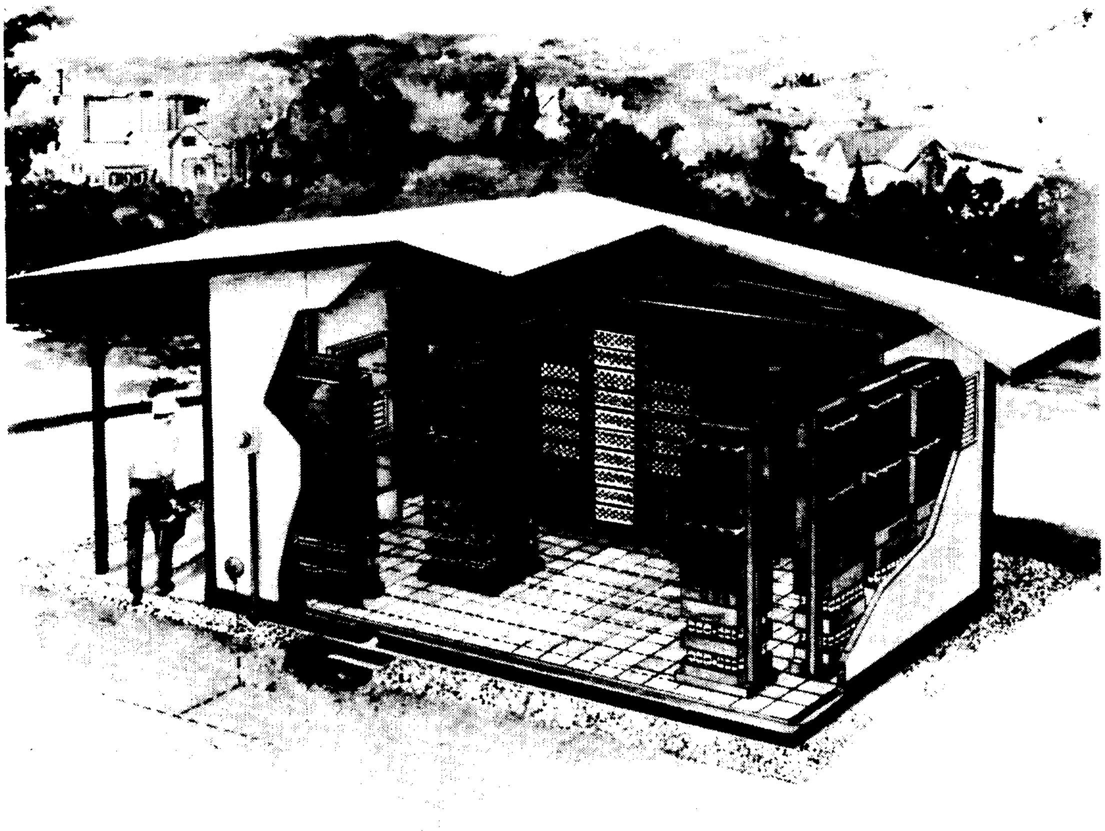


Figure 2-7. COSMIC Mini DF - Hut Application

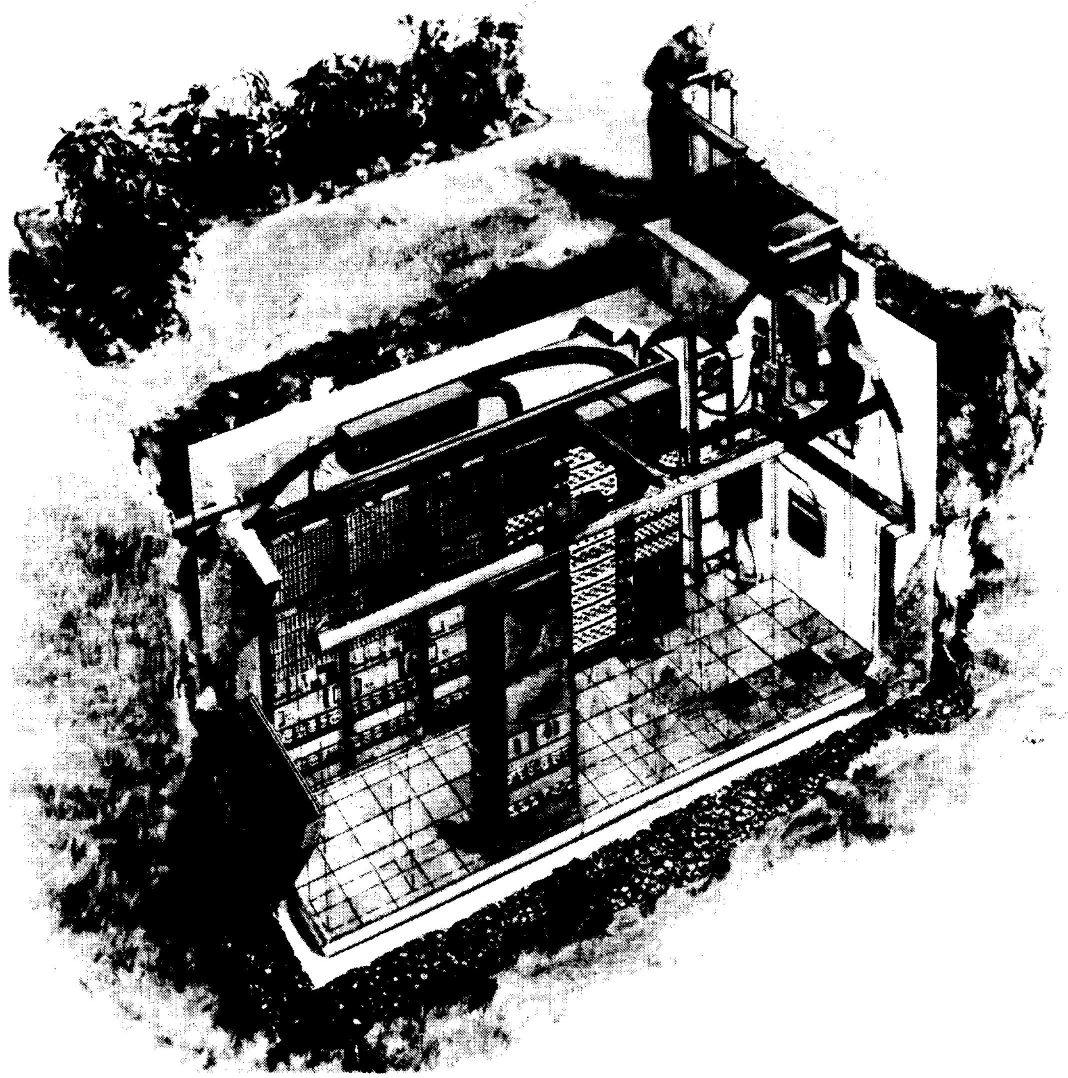


Figure 2-8. COSMIC Mini DF - CEV Application

2.6 Mobile Trailers and Containers

Disaster Recovery Trailer and Portable Communications Containers are prepackaged wire centers in compact, space efficient, mobile trailers. The *COSMIC* Mini DF fits in the allocated space with sufficient cable termination capacity as shown in Figure 2-9. These emergency facilities are designed for dependable telephone service over rugged terrain and extreme thermal conditions.

Figure 2-9. COSMIC Mini DF - Mobile Application

2.7 Special Applications

COSMIC frames can also be configured in a variety of flexible arrangements and customized to meet the ever changing needs of the communications network. These arrangements include:

1. Equipment and outside plant bays with combined protection,
2. Equipment bays only, for use with a separate protector frame or
3. Switching equipment and outside plant cable in the same framework or
4. Miscellaneous equipment frame for special signaling and test lead terminations.

COSMIC frame systems are available with customized apparatus, cabling, and framework to meet special terminating, sizing, and frame configuration requirements. These frameworks are aesthetically designed for the modern office with emphasis on efficient operations, durability and minimal cost.

SECTION 3

FRAMEWORK AND EQUIPMENT

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SECTION 3

FRAMEWORK AND EQUIPMENT

This section describes the *COSMIC* DF (Figure 3-1) and associated equipment that make up *COSMIC* I, IA, IIA, and Mini DF Systems. Framework comparisons, associated equipment, and optional equipment are described. See Section 11 for complete ordering information.

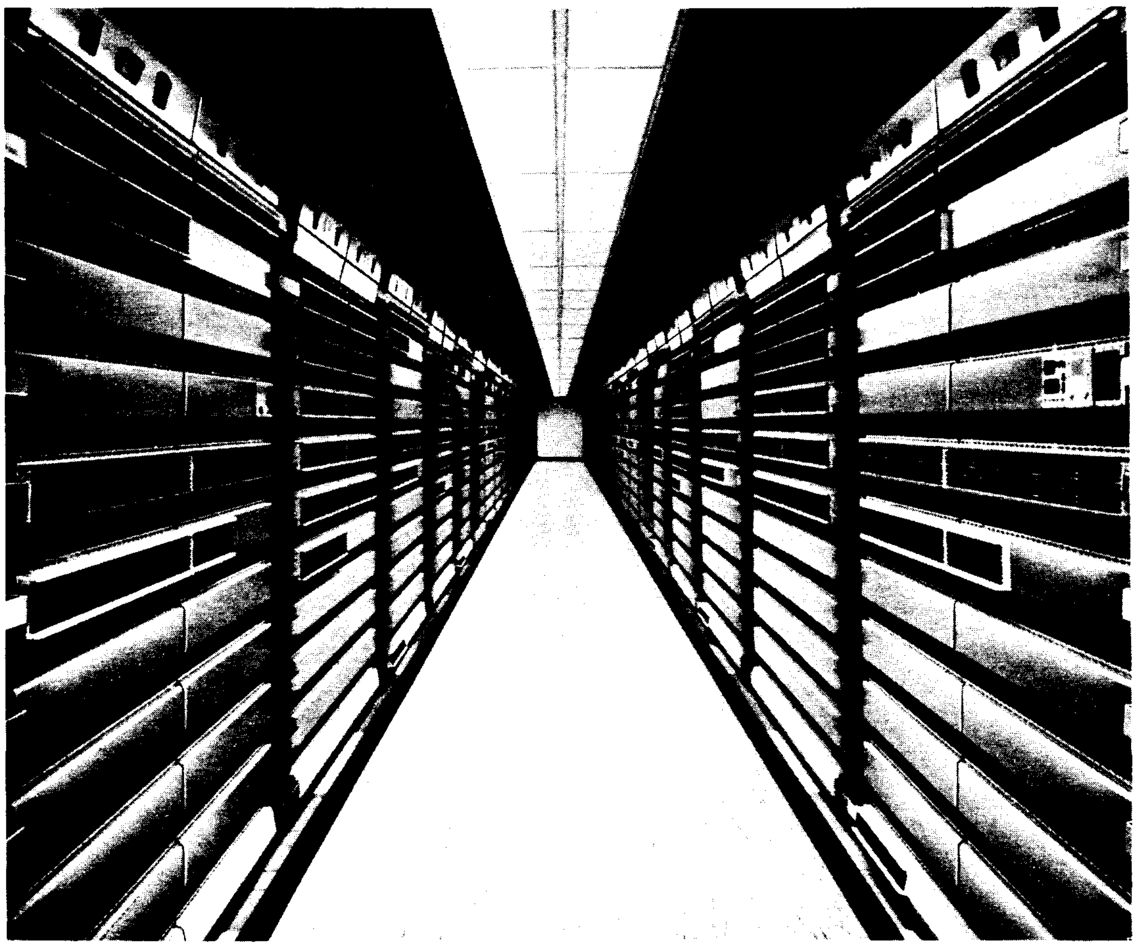

Figure 3-1. *COSMIC* Distributing Frame System

3.1 *COSMIC* Framework Description

3.1.1 Framework Comparison

Selecting the type of *COSMIC* DF System depends on the type and number of terminations required and the available floor space. The Frame Selection, Planning, and Engineering sections of this manual provide detailed planning procedures to determine the type and size of *COSMIC* DFs. Table 3-A is a framework comparison of the *COSMIC* DFs.

Table 3-A. *COSMIC* FRAMEWORK COMPARISON

Frame Type	Framework Description	Dimensions			Capacity	Ordering Code
		Height	Width	Depth		
COSMIC I	Cross-Connect Bay, Mounts 78- or 112-type blocks	8′-0″ (2438 mm)	2′-9″ (838 mm)	1′-6″ (457 mm)	5,000 facility pairs (on 100-pair blocks), or 6,400 equipment pairs (on 128-pair blocks)	ED-6C001-30, G5
	Vertical Wiring Trough	8′-0″ (2438 mm)	1′-0″ (305 mm)	1′-6″ (457 mm)	N/A	ED-6C001-30, G6
COSMIC IA/IIA	Cross-Connect Bay, Mounts 78- or 112-type blocks	8′-2″ (2489 mm)	2′-9″ (838 mm)	2′-3″ (686 mm)	6,000 facility pairs (on 100-pair blocks), or 6,400 equipment pairs (on 128-pair blocks)	ED-6C141-30, G4
	Cross-Connect/ Protection Bay, Mounts 307- and 407-type connectors, and 78- and 112-type blocks. Used only with *COSMIC* IIA frames	8′-2″ (2489 mm)	2′-9″ (838 mm)	2′-3″ (686 mm)	5,100 facility pairs (protected)	ED-6C141-30, G8
	Vertical Wiring Trough	8′-2″ (2489 mm)	1′-0″ (305 mm)	2′-3″ (686 mm)	N/A	ED-6C141-30, G9
COSMIC MINI	Cross-Connect Bay, Mounts 112-type blocks	7′0″ (2134 mm)	14″ (356 mm)	14 3/4″ (375 mm)	2,000 equipment pairs (on 100-pair blocks), or 2,560 equipment pairs (on 128-pair blocks)	ED-6C311-30, G5
	Cross-Connect/ Protection Bay, Mounts 307- and 407-type connectors, and 112-type blocks	7′0″ (2134 mm)	14″ (356 mm)	14 3/4″ (375 mm)	1,000 facility pairs	ED-6C311-30, G4
	Vertical Wiring Troughs	7′0″ (2134 mm)	5″ (127 mm)	9″ (229 mm)	N/A	ED-6C311-30, G3
		7′0″ (2134 mm)	9″ (229 mm)	9″ (229 mm)	N/A	ED-6C311-30, G6
	Upper Express Wiring Trough	5″ (127 mm)	14″ (356 mm)	9″ (229 mm)	N/A	ED-6C314-70, G10
	Upper Express Wiring Trough Vertical Spanner	5″ (127 mm)	5″ (127 mm)	9″ (229 mm)	N/A	ED-6C314-70, G11
		5″ (127 mm)	9″ (229 mm)	9″ (229 mm)	N/A	ED-6C314-70, G13

Basic Framework Components

The basic *COSMIC* DF hardware consists of framework bays and vertical wiring troughs that are placed side-by-side to form a lineup. The basic physical units are:

— **Cross-connect framework bays** mount connecting blocks only (112-type, or the older 78-type blocks). This type of framework is called a **cross-connect bay** (formerly called equipment bay), to highlight its capability of providing cross-connection only — it cannot provide protection. Each framework bay is equipped with horizontal shelves and wire retainers for containing jumpers.

— **Cross-connect/protection framework bays** mount both connecting blocks and 307- and 407-type connectors. This type of bay is called a **cross-connect/protection bay** (formerly called a facility bay). The cross-connect/protection framework bays have horizontal shelves on the front for mounting 112-type connecting blocks. The protector panels of the 307- or 407-type connectors mount on the rear of the *COSMIC* II or IIA DF and on the front of the *COSMIC* Mini DF.

—**Vertical Wiring Troughs,** are used to route jumper wires from the horizontal shelves of the cross-connect and cross-connect/protection framework bays to shelves on adjacent bays, or to the upper or lower express trough.

Earlier *COSMIC* I, IA, and IIA DF ordering groups were pre-engineered combinations of bays and vertical troughs. Typical ordering groups included 6-foot 6-inch (1981 mm) modules, 10-foot 3-inch (3124 mm) "Custom" ordering groups and 13-foot (3962 mm) "traditional" arrangements. As shown in Table 3-A, these ordering groups have been eliminated to give more flexibility in the engineering of both frame additions and new frame systems. *COSMIC* DF Systems are specified by selecting the appropriate combination of framework bays and vertical wiring troughs.

3.1.2 *COSMIC* IA/IIA Distributing Frame Bays

The *COSMIC* IA/IIA DF bays are 8 feet 2 inches (2489 mm) high, 2 feet 9 inches (838 mm) wide, and 2 feet 3 inches (686 mm) deep. The 12-inch (305 mm) wide vertical wiring trough separates the bays. The bays and wiring troughs are placed side-by-side in single or multiple lineups to obtain the desired cable termination capacity. Figure 3-2 shows a cross-connect bay. Figure 3-3 shows a cross-connect/protection bay and Figure 3-4 shows a vertical wiring trough.

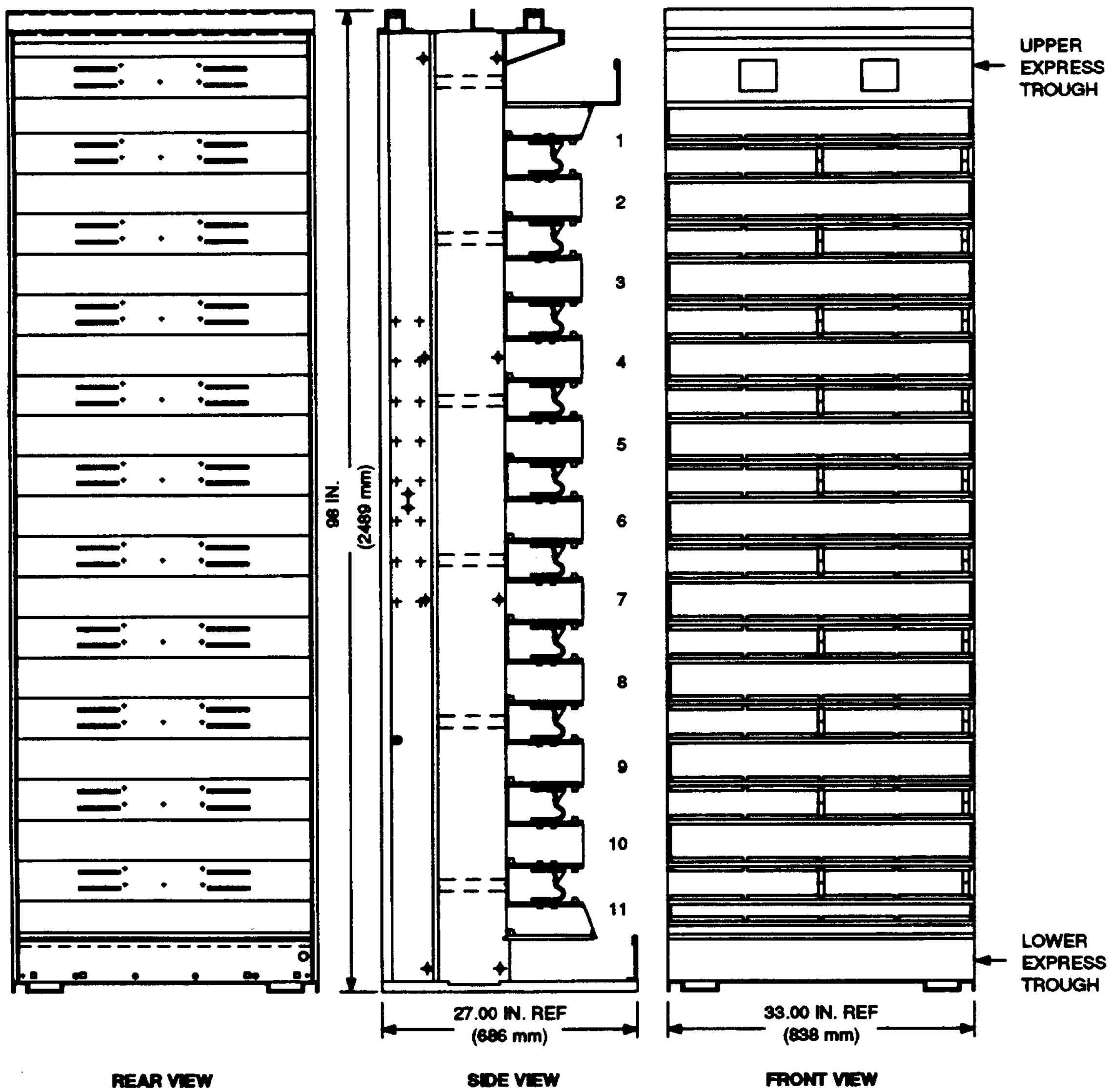

Figure 3-2. *COSMIC* IA/IIA DF Cross-Connect Bay (Front, Rear, and Side View)

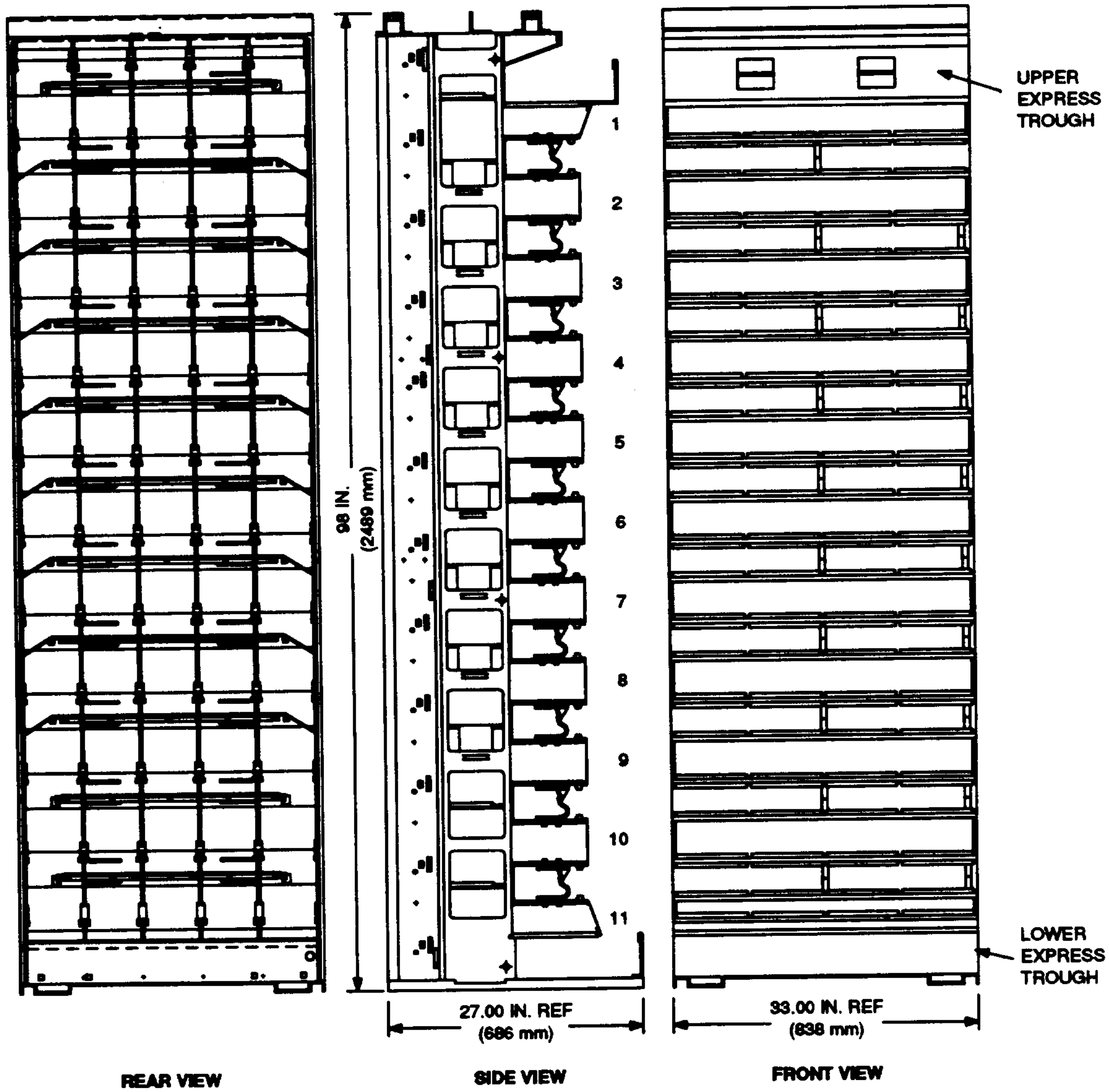

Figure 3-3. *COSMIC* IA/IIA DF Cross-Connect/Protection Bay (Front, Rear, and Side View)

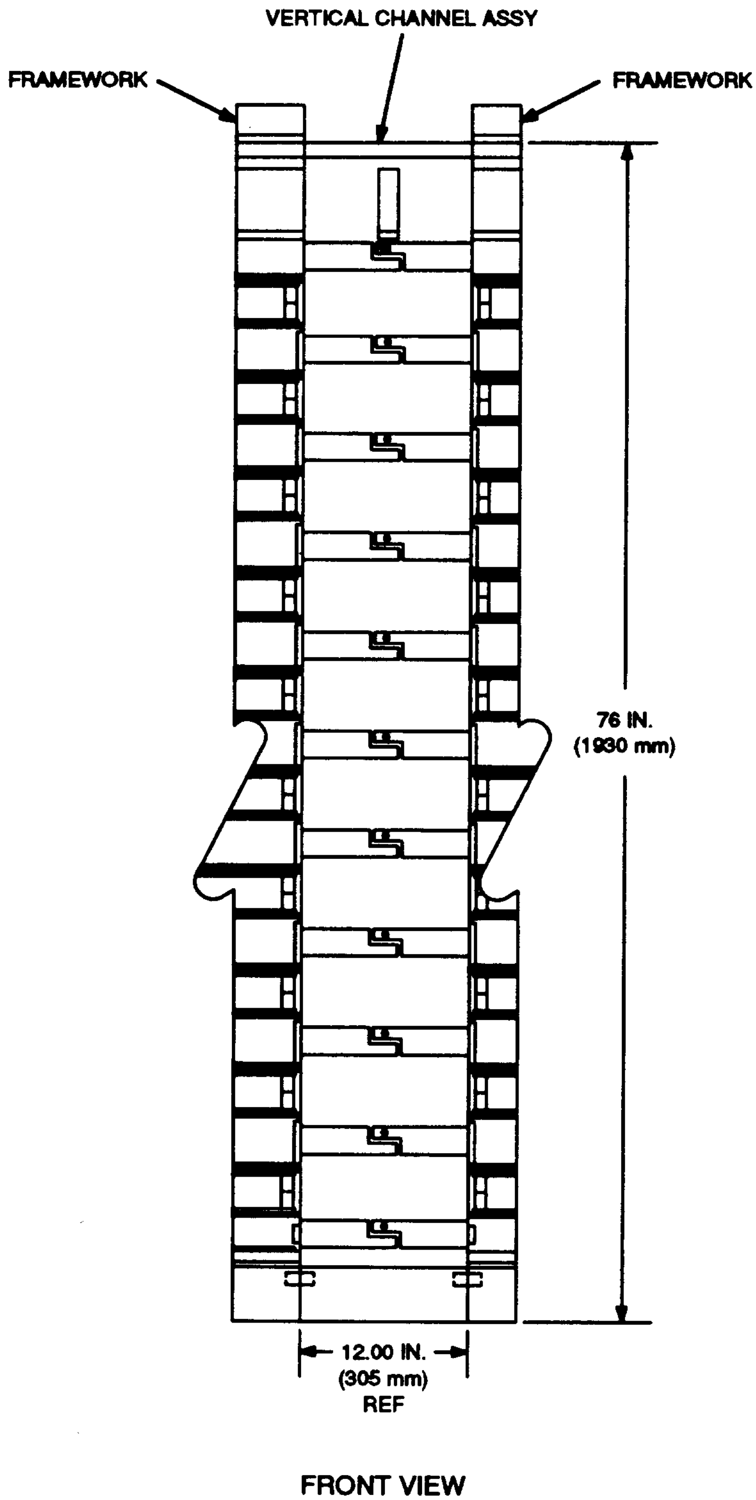

Figure 3-4. *COSMIC* IA/IIA DF Vertical Trough

The top and bottom shelves (numbers 1 and 11) are designed for "half-size" connecting blocks. These shelves can mount up to five 50-pair or 64-pair blocks, or six high density 50-pair or 100-pair blocks. The other shelves (numbers 2 through 10) can mount up to five 100- or 128-pair blocks or six high-density 112H series 100-pair or 200-pair blocks. Figure 3-5 shows the front of the *COSMIC* IA/IIA DF.

Figure 3-5. *COSMIC* IIA DF (Front View)

The *COSMIC* IA DF consists of all cross-connect framework bays. Cables on the *COSMIC* IA DF are terminated on 112-type connecting blocks. The *COSMIC* IA DF System requires a separate protector frame to provide protection and test access for outside plant cable pairs; a single-sided modular high-density protector frame with 308-type connectors is normally used. Outside plant cables are terminated on the protector frame and strap (tie) cables are used to connect the protector frame to 112-type blocks on the cross-connect bays.

The *COSMIC* IIA DF provides integrated protection with the use of the 307-type connector. The cross-connect bays are used as "equipment" modules to terminate switchboard type cables that are cabled to switches or other equipment. The cross-connect/protection bays are used as "facility" modules to terminate outside plant cables or tie cables. The cross-connect/protection bays can mount either 112-type connecting blocks, 307-type protected connectors, or 407-type nonprotected connectors. The 307-type connectors consist of a protector panel that is factory-wired to a 112-type connecting block. The protector panel mounts on the rear of the cross-connect/protection bay while the associated 112-type connecting block mounts on the front.

The rear of the bay is divided into five vertical compartments for mounting connectors (Figure 3-6). Each bay contains 55, 307/407 mounting positions. Connectors on shelves 1 and 11 (every other position only) can be factory wired to two 50-pair connecting blocks (one stenciled 1-50, and the other 51-00). Special 100-pair 307 and 112 block assemblies are available for higher density on shelves 1 and 11. The 307-type connectors on shelves 2 through 10 are factory-wired to one 100-pair connecting block (stenciled 1-100).

Figure 3-6. *COSMIC* IIA DF (Rear View)

3.1.3 *COSMIC* I Distributing Frame Bays

The *COSMIC* I DF bays are 8 feet (2438 mm) high, 2 feet 9 inches (838 mm) wide and 1 foot 6 inches (457 mm) deep. The 12-inch (305 mm) wide vertical wiring trough separates the bays. The bays and wiring troughs are placed side-by-side in single or multiple lineups to obtain the desired cable termination capacity. Figure 3-7 shows the front and side view of a bay.

The *COSMIC* I DF is 1 foot 6 inches (457 mm) deep and contains smaller wiring shelves than the *COSMIC* IIA or IA DFs. Cables are terminated on 112-type connecting blocks (or the older 78-type). The high-density 112H series connecting blocks can be mounted on the *COSMIC* I DFs with the use of 112H series connecting block mounting adapters that fit into existing shelves. The *COSMIC* I DF System requires a separate protector frame to provide protection and test access for outside plant cable pairs. Outside plant cables are terminated on a separate protector frame, and strap (tie) cables are used to connect the protector frame to connecting blocks on the cross-connect bays. *COSMIC* I frames are often used as Tie Pair Distributing frames for *COSMIC* IA and IIA Subscriber Main Distributing Frames (SMDFs).

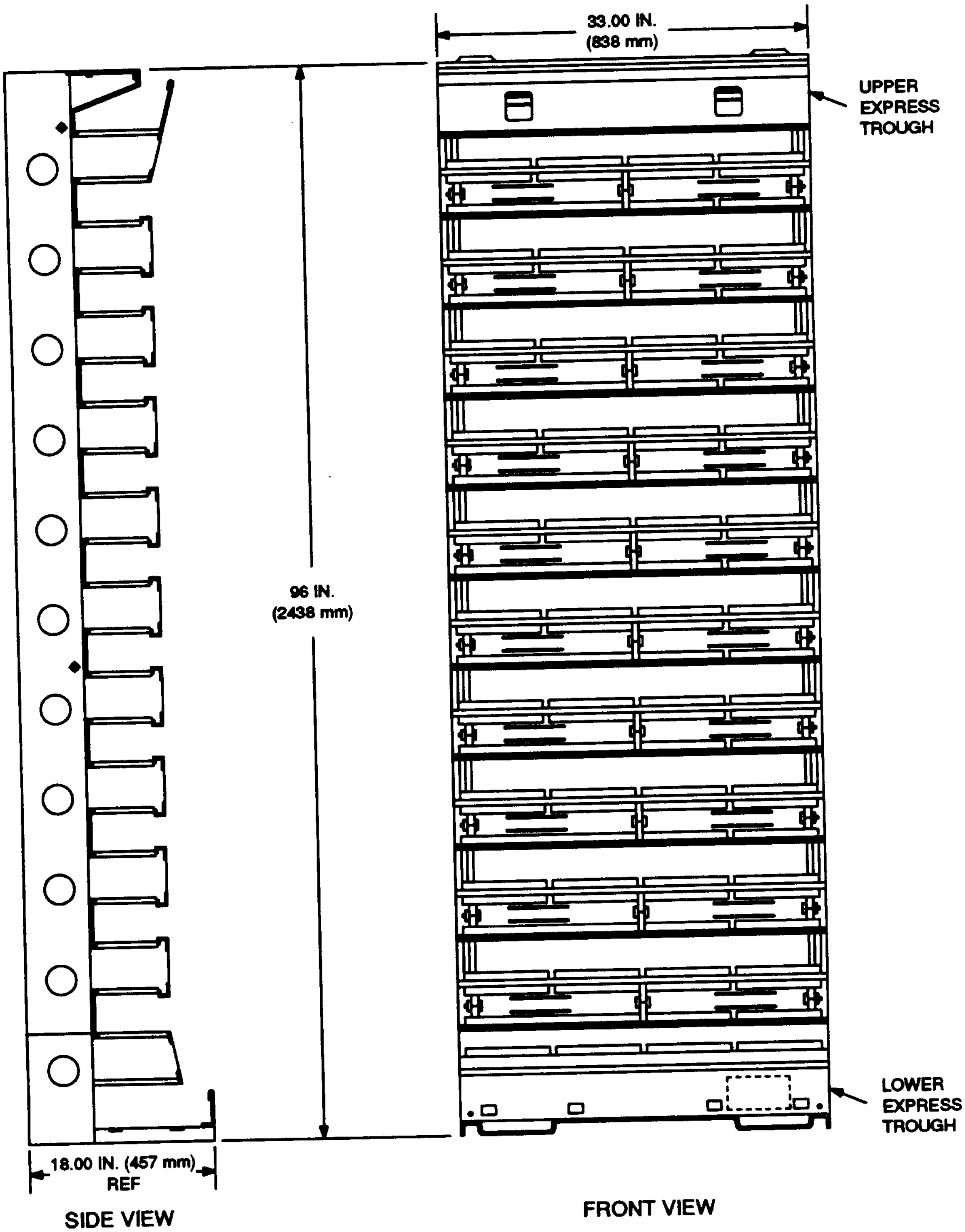

Figure 3-7. *COSMIC* I DF Bay (Front and Side View)

3.1.4 *COSMIC* Mini Distributing Frames

The *COSMIC* Mini DF (Figure 3-8) consists of cross-connect/protection bays, cross-connect bays, and vertical wiring troughs. Vertical troughs are available in 5- or 9-inch (128 or 229 mm) widths. A lower express trough is provided with all frameworks. An optional upper express trough is available for large installations. An end guard is available to cover the jumper express trough and provide an end finish. In the typical application, one, two, or three cross-connect/protection bays can be placed side-by-side to form a facility module, and one or two cross-connect bays are placed side-by-side to form an equipment module. A vertical wiring trough is used to separate the equipment and facility bay. *COSMIC* Mini DFs can be configured in a variety of flexible arrangements of cross-connect/protection and cross-connect bays for combined terminations, or all cross-connect bays for use with separate protector frames or as an Intermediate Distributing Frame (IDF).

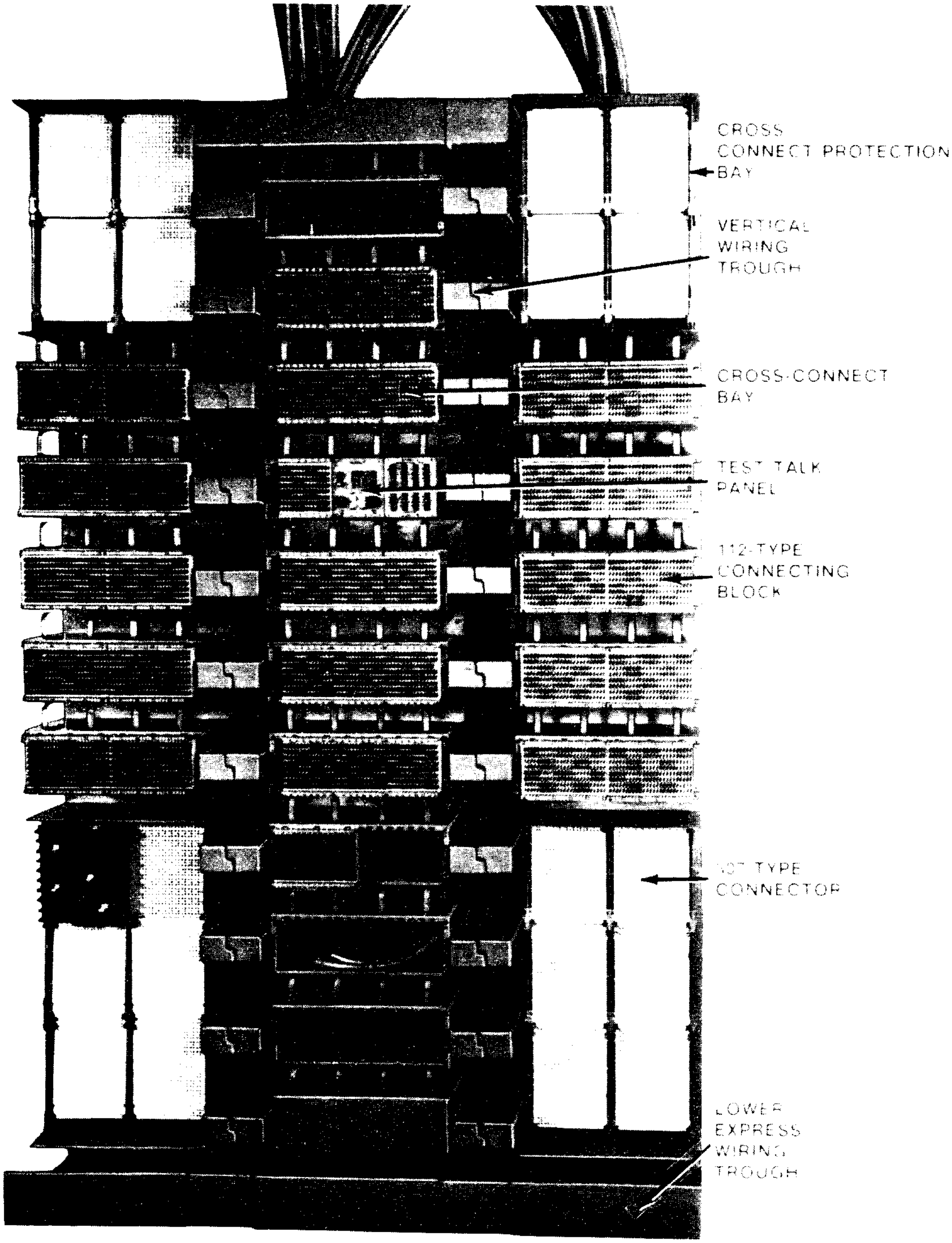

Figure 3-8. *COSMIC* Mini DF (3 Bays), 2 Cross-Connect/Protection (OSP), and 1 Cross-Connect (CO) (Upper Express Trough Not Shown)

Cross-Connect/Protection Bay

The cross-connect/protection bay (Figure 3-9) is 7 feet (2134 mm) tall, 14 inches (356 mm) wide, and 14-3/4 inches (375 mm) deep and can be used to terminate outside plant, T-carrier, and special service lines. If the optional upper express trough is used, add 5 inches (128 mm) to the height and check cabling clearances. The frame bays have 10 shelves. Five shelves can mount 10 of the 307-type connectors (two per shelf) with attached factory prewired 100-pair, 112-type connecting blocks which are mounted on the other five shelves (two per shelf). This results in a maximum capacity of 1,000 protected pairs. The 307-type connectors (with 4C-type protector units inserted) provide voltage and current protection to the lines terminated on them.

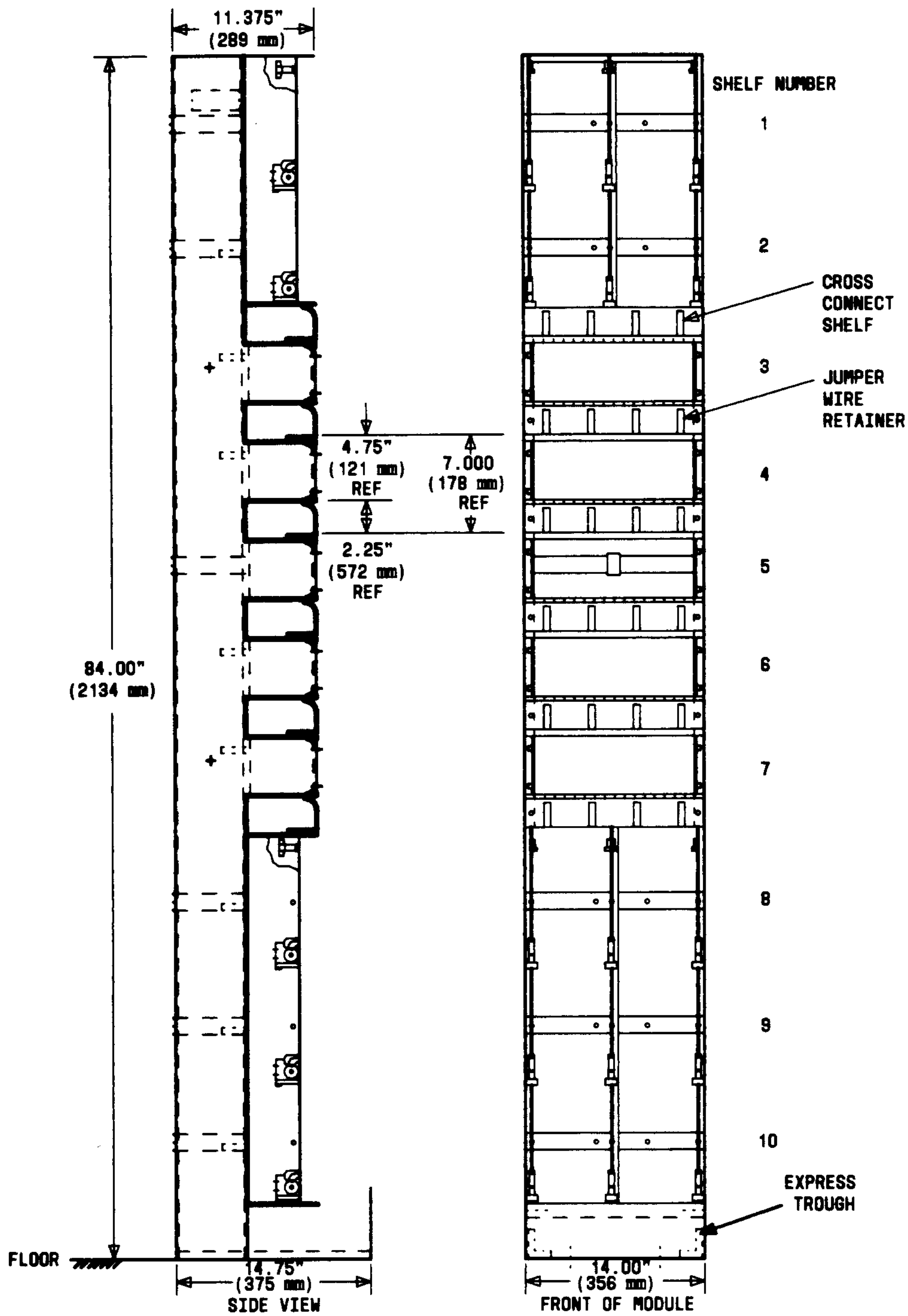

Figure 3-9. *COSMIC* Mini DF — Cross-Connect/Protection Bay (Upper Express Trough Not Shown)

Vertical Trough

The vertical trough (Figure 3-10) is provided between cross-connect/protection and cross-connect bays. It is used to run jumper wires between horizontal wiring shelves of adjacent bays and to route jumpers vertically to the express trough. Two vertical cabling troughs are available: 5 inches (128 mm) wide by 9 inches (229 mm) deep and 9 inches (229 mm) wide by 9 inches (229 mm) deep. The larger is used for arrangements with larger numbers of combined framework bays. These frame arrangements accept standard Mechanized Engineering and Layout for Distributing Frames (MELD) frame labels.

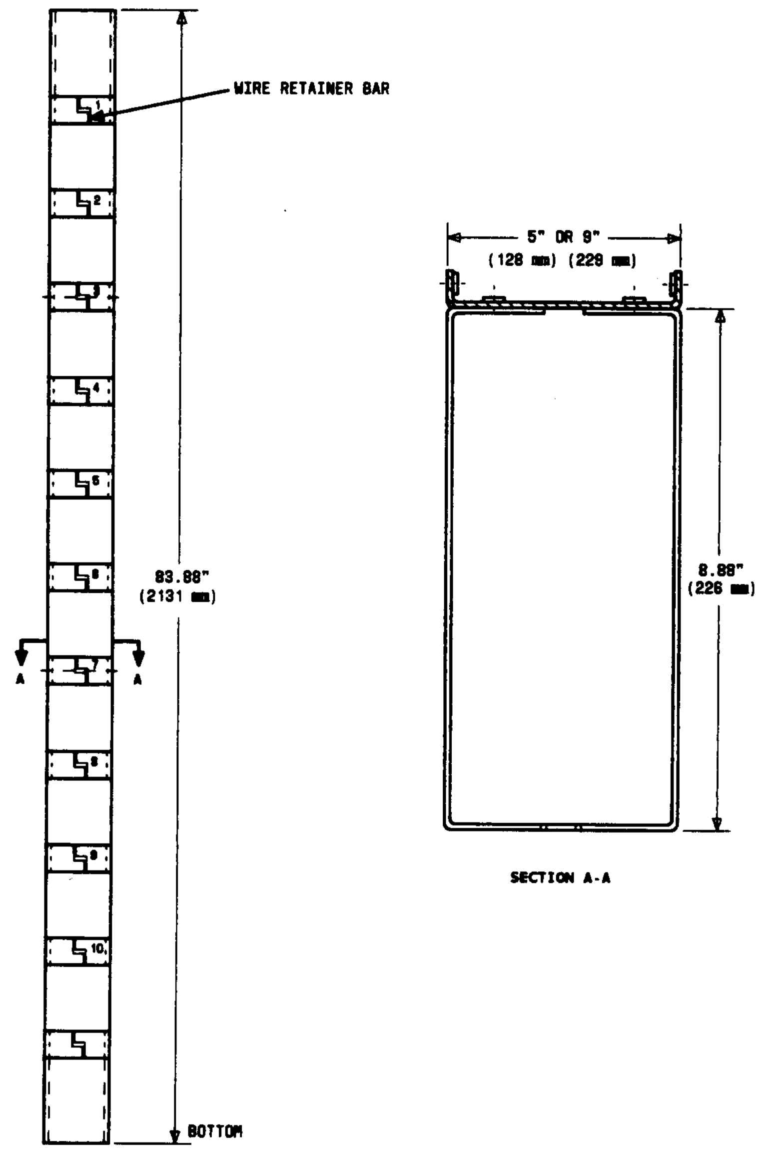

Figure 3-10. *COSMIC* Mini DF — Vertical Trough

Cross-Connect Bay

The cross-connect bay (Figure 3-11) has the same dimensions as the cross-connect/protection bay and is used to terminate line, trunk, and toll equipment on 112-type connecting blocks. The cross-connect bays have 10 shelves and can mount 20 of the 100- or 128-pair 112-type connecting blocks (two per shelf) for a maximum capacity of 2560 equipment pairs.

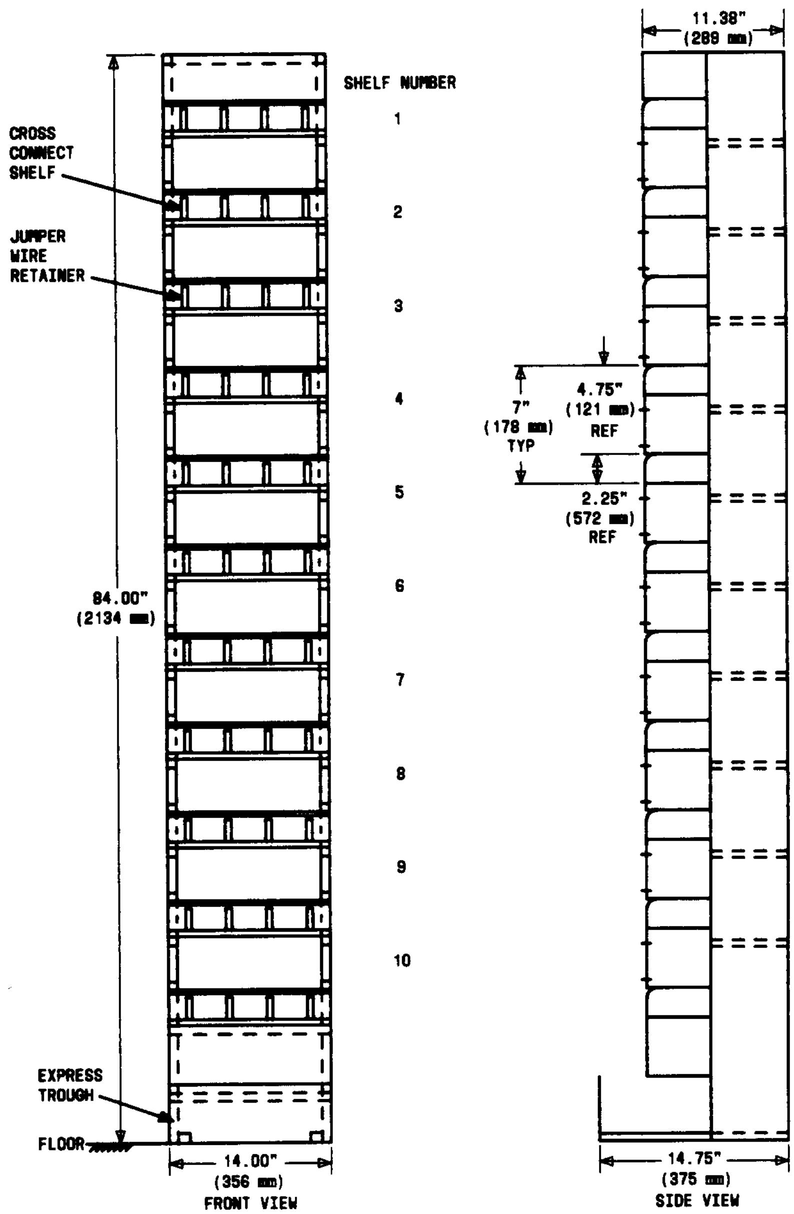

Figure 3-11. ***COSMIC*** **Mini DF — Cross-Connect Bay (Upper Express Trough Not Shown)**

3.1.5 Walk-Through Framework

Walk-through framework modules (Figure 3-12) are available for *COSMIC* I, IA, and IIA DFs to provide an opening in long frame lineups to allow passage for frame attendants. The Walk-Through framework provides a continuous extension of the express troughs at the top and bottom (the bottom beneath hinged cover). These assemblies are 5 feet 4 inches (1626 mm) wide (including adjacent vertical troughs) and provide passage space of 6 feet 8 inches (2032 mm) high by 3 feet (914 mm) wide.

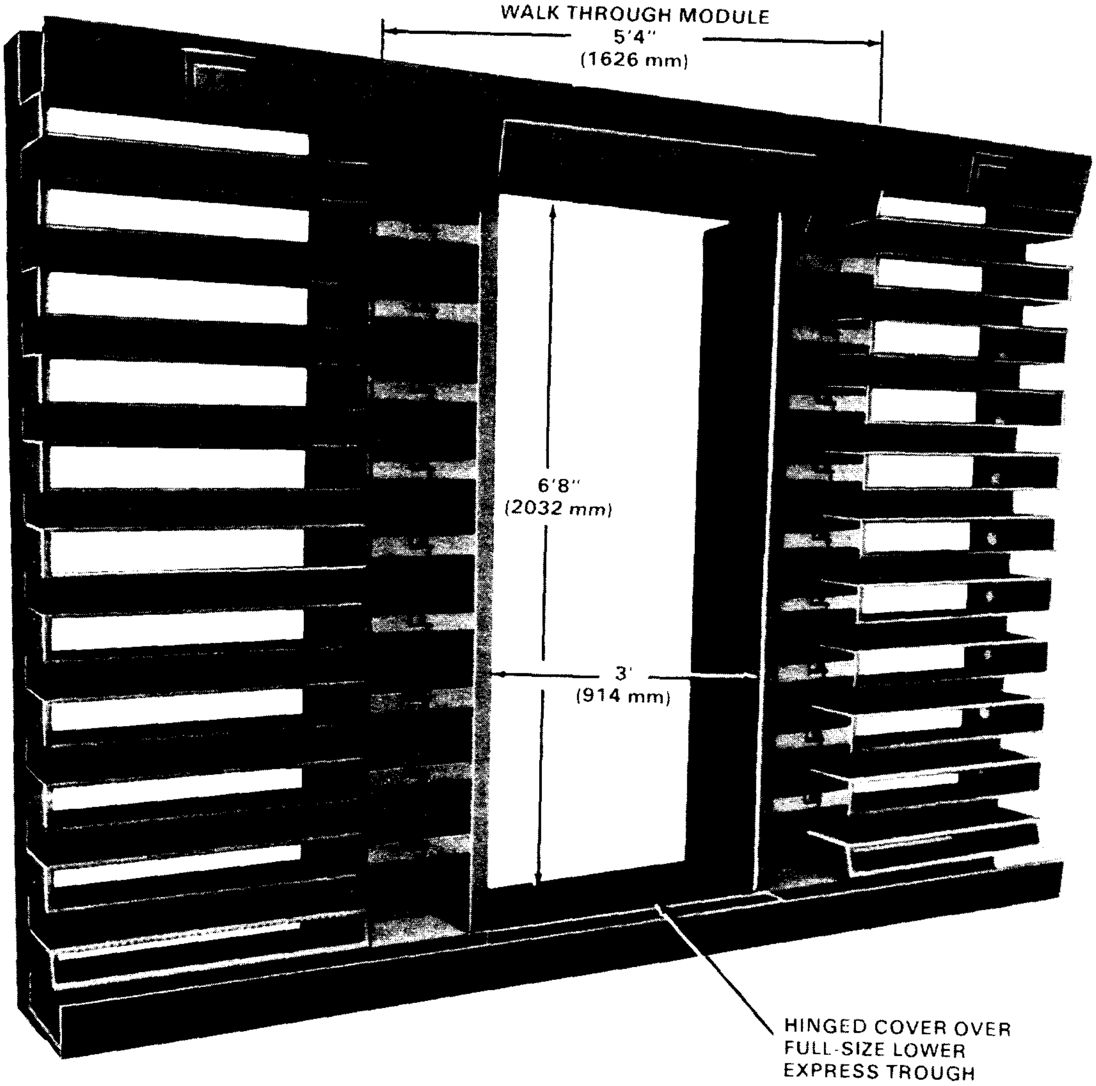

Figure 3-12. *COSMIC* Frame System — Walk-Through Framework

Generally, walk through frameworks should be placed at 50-foot intervals between bays in a frame lineup. The upper and lower express troughs extend through the walk-throughs. An auxiliary express trough is located just below the upper express trough on a walk-through for routing short jumpers over the passageway and between adjacent bays. Table 3-B lists walk-through framework specifications and ordering information.

Table 3-B. WALK-THROUGH FRAMEWORK SPECIFICATIONS AND ORDERING INFORMATION

WALK-THROUGH FRAMEWORK	DIMENSIONS			ORDERING CODE
	HEIGHT	WIDTH	DEPTH	
COSMIC IA, IIA	8′2″ (2489 mm)	5′4″ (1626 mm)	2′3″ (686 mm)	ED-6C142-30, G1
COSMIC I	8′0″ (2438 mm)	5′4″ (1626 mm)	1′6″ (457 mm)	ED-6C107-70, G1

3.1.6 End Guards

End guards are available for protecting each end of a *COSMIC* DF lineup. Table 3-C lists the end guard specifications and ordering information.

Table 3-C. END GUARDS SPECIFICATIONS AND ORDERING INFORMATION

END GUARD FRAMEWORK	DIMENSIONS			ORDERING CODE
	HEIGHT	WIDTH	DEPTH	
COSMIC IA, IIA	8′2″ (2489 mm)	2″ (51 mm)	2′3″ (686 mm)	ED-6C142-30, G2
COSMIC I	8′0″ (2438 mm)	4″ (102 mm)	1′6″ (457 mm)	ED-6C004-70, G3
COSMIC Mini	7′0″ (2434 mm)	14½″ (368 mm)	⅛″ (3 mm)	ED-6C314-70, G4

3.2 Associated Frame Systems

3.2.1 Cable Rearrangement Facility (CRF)

The CRF is a sheet metal splicing cabinet that provides a fire-resistant termination capacity of up to 5,000 pairs using 710-type connectors. Support brackets and wire retainers result in splice density and organizational efficiencies unique to this product.

Vertical splicing of tip cables to riser cables in a CRF is the most efficient and cost effective splice transition. The CRF can be located between the structural columns of an outside wall in a frame room. This arrangement is the most economical for the total system (materials, placement, testing, splicing, and the cost of floor penetrations and vault construction). In addition, it minimizes vault congestion, cable sheath maintenance, and fire stopping problems while (in existing buildings) optimizing the use of riser ducts. Spreading the ultimate number of outside plant pairs equally along the length of the frame lineup minimizes cable pileup in the racks. Up to four parallel lineups of *COSMIC* IIA DF framework can be cabled and fed overhead from a CRF (Figure 3-13). See Practice 636-211-101 for additional information.

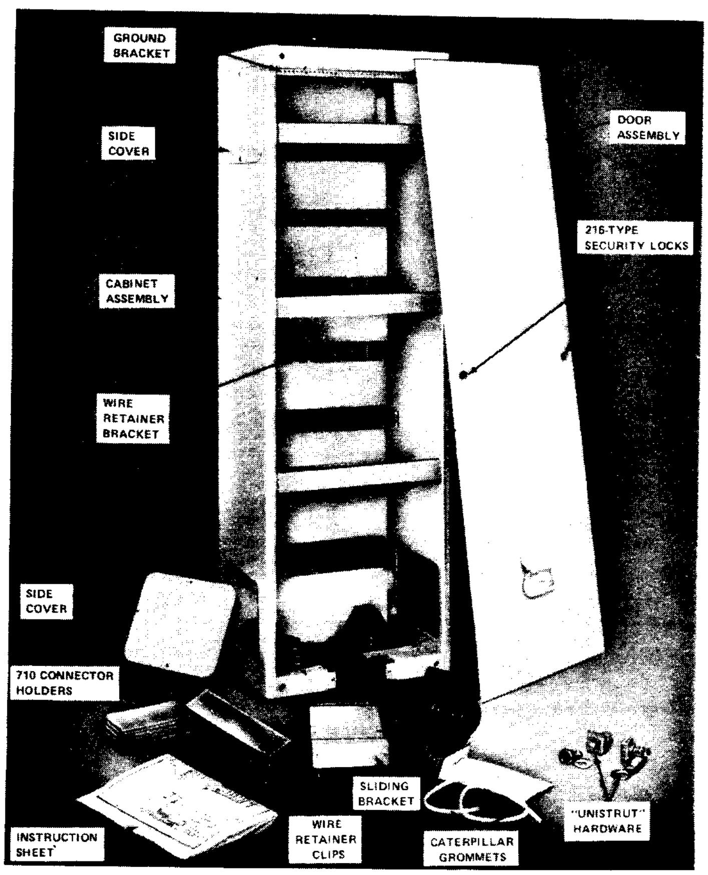

Figure -13. Cable Rearrangement Facility (CRF)

3.2.2 Protector Frames

Modular Protector Frames

Protector frames are required for *COSMIC* I and IA DF Systems to provide protection and test access for outside plant cable pairs. Two types of modular protector frames are available:

- ED-97893-31, High-Density Modular for 308-type connectors.
- ED-1A220-31, Modular for 303-type connectors.

Both types are 6 feet 6 inches (1981 mm) wide, 8 feet (2438 mm) high, 1 foot (305 mm) deep, and have 12 verticals. Each frame is equipped with a KS-20100 protector test set and appliance outlets. Other test/talk system hardware such as jack panels and communication panels are ordered separately. End guards are available for finishing each end of a lineup. End guards have storage space for storing cords and protector units. Cable pair identification labels can be provided by MELD for each connector.

Stub cables may be installed from the connectors on the protector frames to the cable vault through the floor or overhead to cable racks. Cable from the protector frame to the distributing frame is typically 100-pair 26-gauge (.4 mm) shielded or unshielded switchboard cable, installed on overhead cable racks. Wiring operations are performed from the rear of the frame.

The **ED-97898-31** high-density modular protector frame (Figure 3-14) mounts only 308-type connectors. Each vertical terminates eight 308-type connectors for a total of 800 pairs per vertical or 9600 pairs per module. The frame uses 3-, 4-, or 5-type protector units that are inserted in the 308-type connectors. The protector units and connectors are ordered separately.

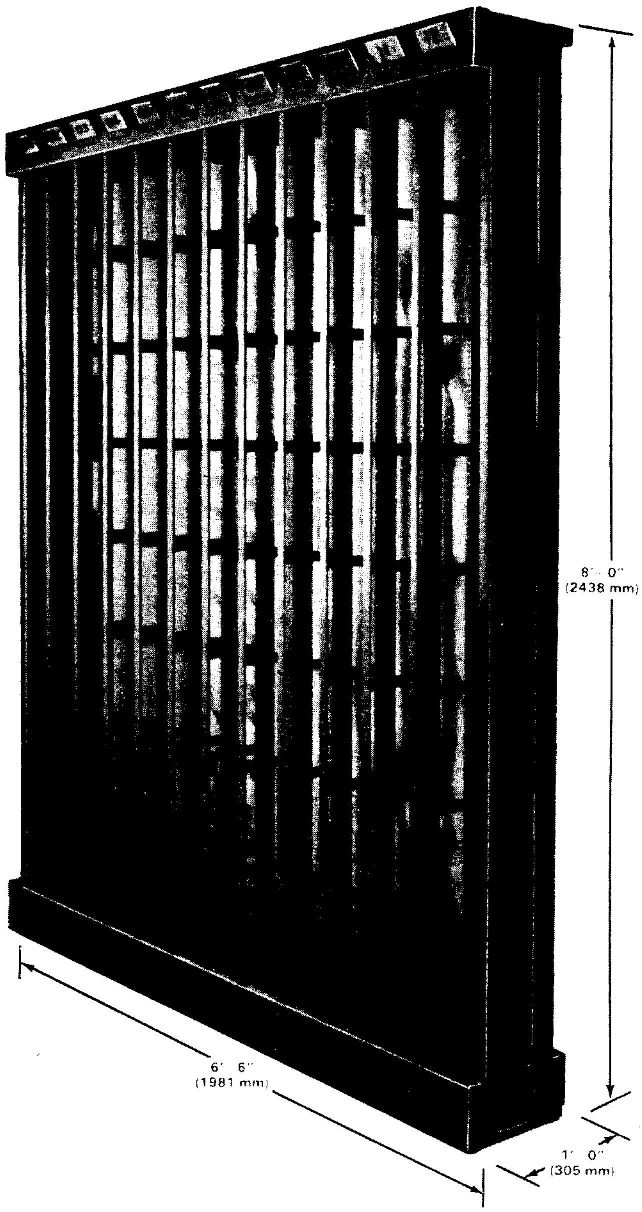

Figure 3-14. High-Density Protector Frame for 308-Type Connectors — Front View (12 Verticals)

The **ED-1A220-31, Group** 7 modular protector frame (Figure 3-15) mounts only 302-type connectors. Each vertical terminates five 302-type connectors with a capacity of 100 pairs per connector, for a total of 500 pairs per vertical or 6000 pairs per module. The frame uses 3-, 4-, or 5-type protector units that are inserted in the 302-type connectors. The protector units and connectors are ordered separately.

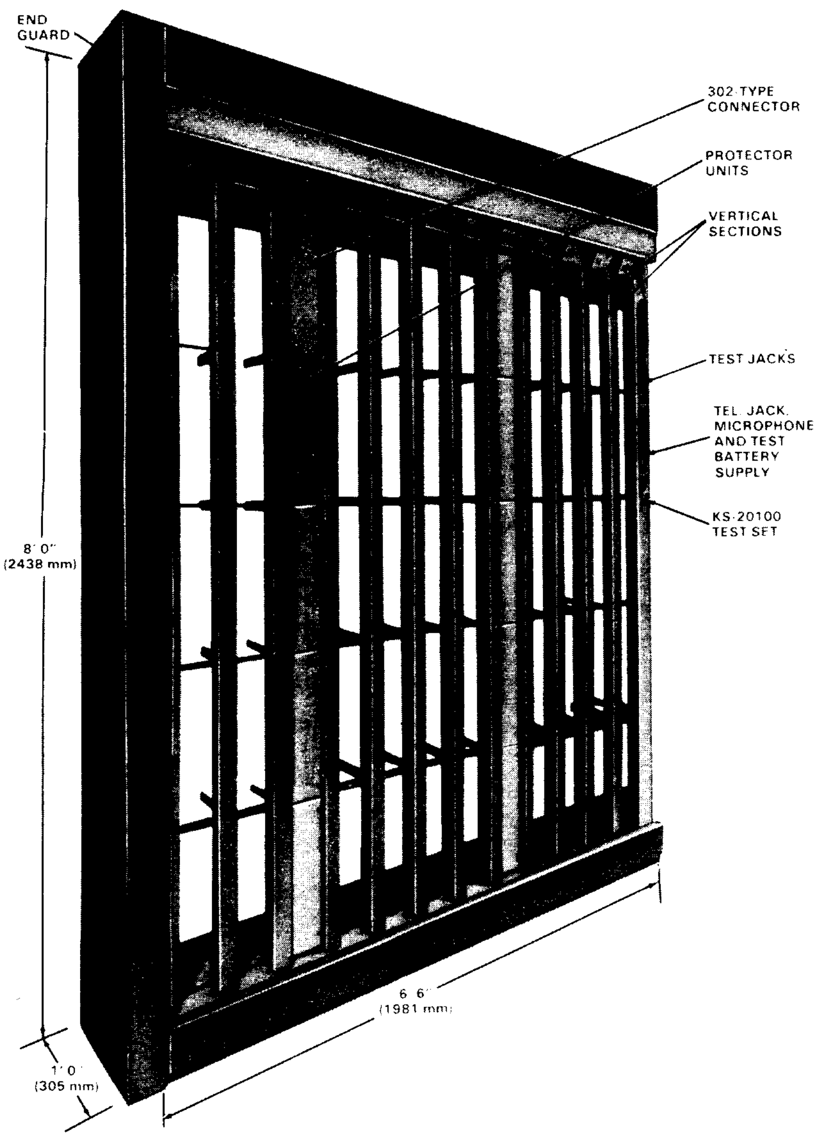

Figure 3-15. Modular Protector Frame for 302-Type Connectors — Front View (12 Verticals)

Low Profile Double-Side Protector Frame (LPDPF)

The LPDPF may be used with *COSMIC* I and IA DF Systems to terminate outside plant pairs on 302-, 308-, or 309-type connectors. The LPDPF conforms to NEBS 8-foot height requirements. The LPDPF is 8 feet (2438 mm) high by 2 feet 5 inches (737 mm) deep at the guardrails. The frame has six verticals with 8-inch (203 mm) spacing. The ED-97755-72 LPDPF front and rear verticals are arranged for mounting 302-, 308-, and 309-type connectors. Connector terminations are tie cabled from both sides to a separate distributing frame. End guards are available but ordered separately.

Special Purpose Protector Frames

Special purpose protector frames can be used in enclosures, such as controlled environmental vaults, or in central offices that have limited space for protector frames.

AT-9049B, C, or D Protector and Cable Enclosure for 307-Type Connectors

The high termination density of the AT-9049B, C, or D is well suited for structures with limited floor space such as remote sites. The AT-9049 also serves as a separate protector frame for large *COSMIC* Mini DF applications. The modularity permits a wide variety of configurations.

The AT-9049B (Figure 3-16) and AT-9049C frames each terminate and protect 900 outside plant pairs. The B unit is designed for lineup growth from left to right, and the C unit for growth from right to left.

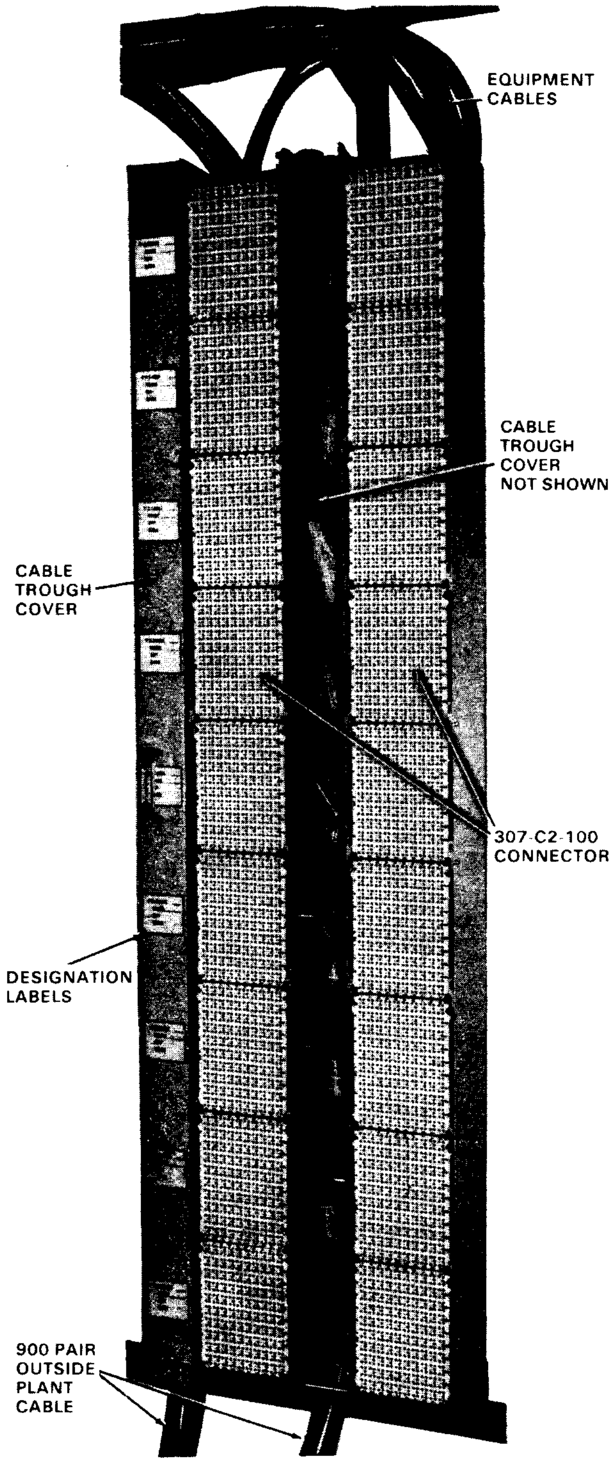

Figure 3-16. AT-9049B Protector and Cable Enclosure (Left-to-Right Growth) Two B Units Shown (Total Capacity 1800 Pairs)

Slide Drawer Assembly (SDA) Protector Frame for 309-Type Connectors

The SDA (Figure 3-17) provides high-density bulk protection for voice and data lines using 3- or 4-type protector units. When pulled open, the drawer telescopes out about 15 inches (381 mm) and latches. The connectors are mounted laterally in the frame vertical. After servicing, the drawer is manually unlatched and pushed back into its stored position.

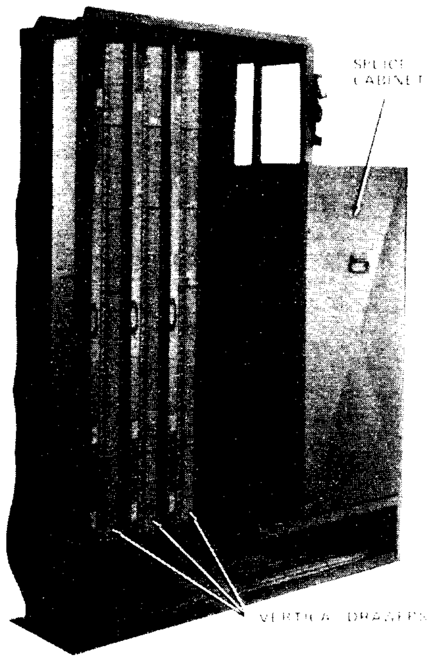

Figure 3-17. SDA with Splice Cabinet — Cover Installed

The SDA consists of a steel frame with one to six vertical drawers. Each vertical drawer mounts six 309-type bivertical (200-pair) connectors with 26-gauge switchboard stub cables to provide protection for 1200 lines. A fully equipped (six-drawer) SDA provides 7200 lines of protection in a relatively small space compared to conventional methods. End guards are not provided but can be custom fabricated.

The optional splice cabinet is a sheet metal splicing facility providing up to 5000 terminations in the mini cabinet and up to 7200 in the maxi cabinet. Vinyl boots on top of the cabinet organize the cable entering the cabinet; the bottom of the cabinet is open.

XLBET Protector Frame for 195-Type UL Listed Protector

The AT&T Extra Large Building Entrance Terminal (XLBET) framework equipped with 195-type protectors provides a high-density single- or double-sided protector frame for many applications in a minimum amount of space (Figure 3-18). The XLBET can be cabled from the top or bottom.

The XLBET consists of a steel frame with one mounting bracket for a single-sided frame or two brackets for a double-sided frame. The bracket mounts from 1 to 27 of the 195-type protectors in a three-column by nine-row arrangement.

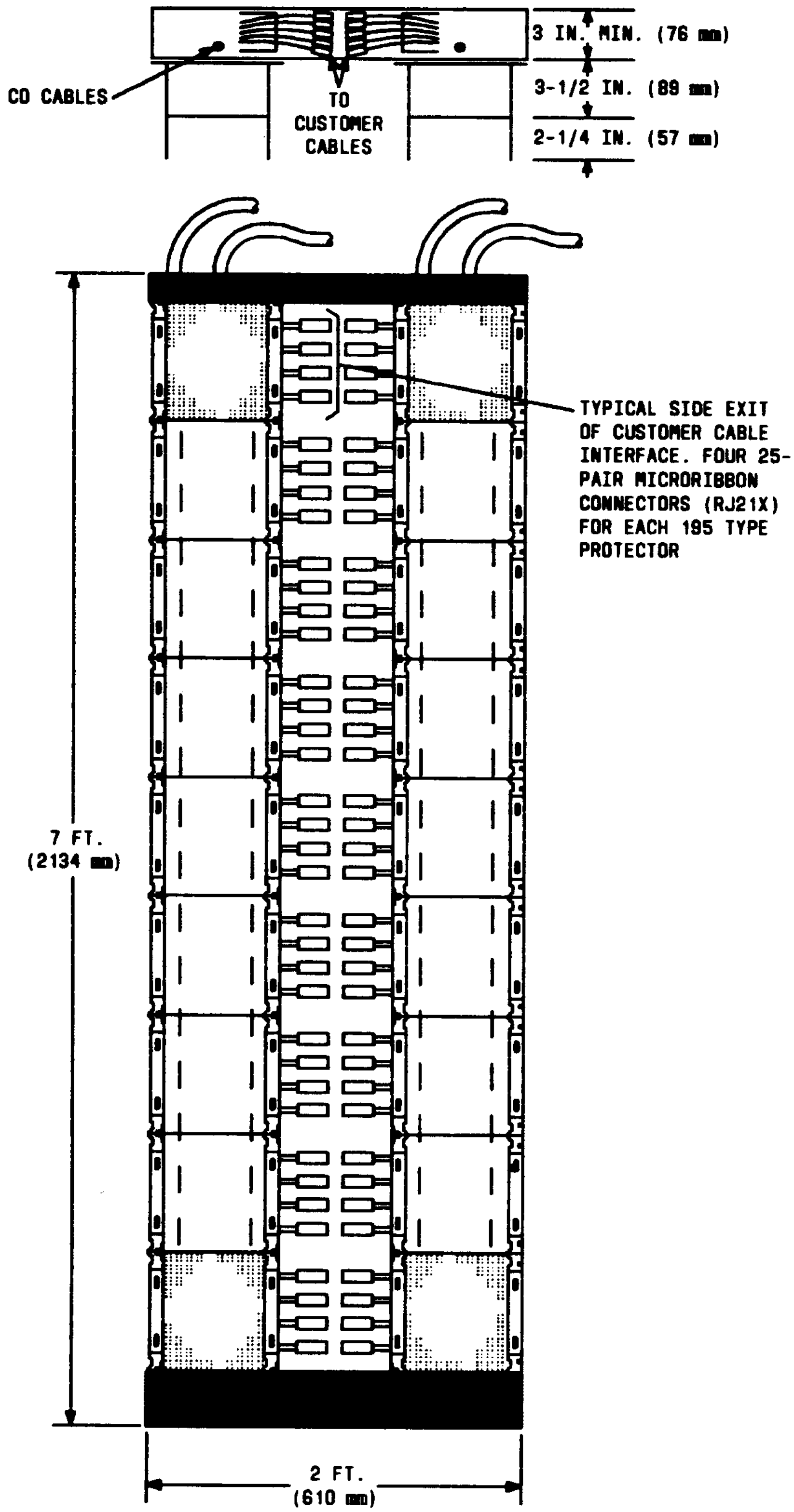

Figure 3-18. XLBET Protector Frame

3.2.3 Cable Racking and Lighting

COSMIC DF Systems include a modular cable rack system designed to organize cables for spreading, minimize cable length and routes, reduce cable congestion and pile-up, and ensure the frame can be cabled to maximum capacity. Patented cabling methods allow the frame to be equipped and cabled, starting at the most convenient shelf height to facilitate cross-connect operations (Figure 3-19).

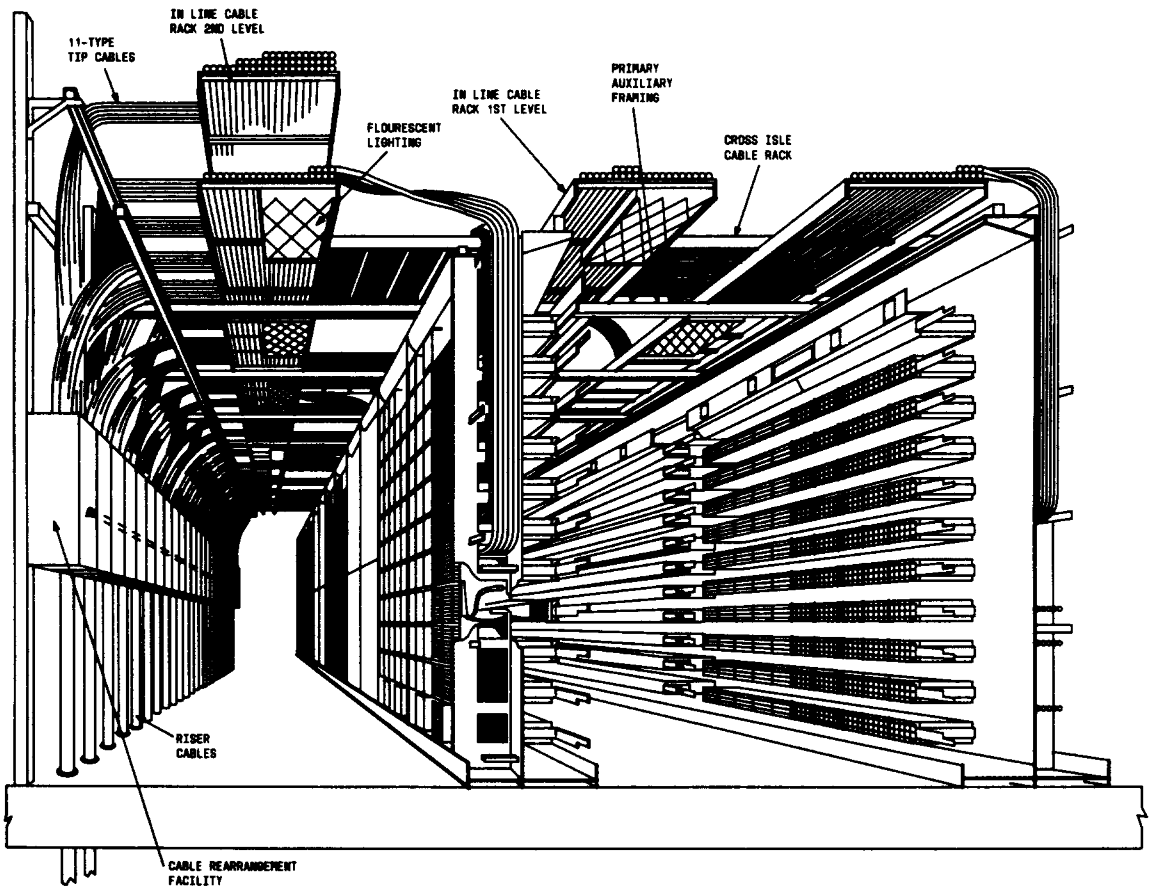

Figure 3-19. *COSMIC* IIA DF System (Cutaway View Showing Cabling Details with Overhead Racking and Lighting)

Lighting and AC power distribution systems are available for *COSMIC* DFs. The lighting system utilizes energy efficient fluorescent fixtures designed to Bellcore illumination standards. The AC power outlets are customized to local and national electric codes.

The termination of the tip cables on the rear of the *COSMIC* IIA DF facility modules requires specific racking arrangements to achieve a uniform tip cable spread to the 307-type connectors. Modular rack and lighting groups have been developed for all cabling conditions and frame lineup configurations. The overhead racking and lighting arrangements are frame supported and comply with the Network Equipment Building Standards (NEBS).

Modular racking arrangements include all necessary hardware to erect a cable pathway system over a 13-foot (3962 mm) or 10-foot 3-inch (3124 mm) *COSMIC* IIA DF arrangement. The structure has a foundation of auxiliary framing bars on 39-inch (991 mm) centers that cross the frame modules and bolt onto the framework (Figure 3-20). The KS-21559 fluorescent fixtures are supported by, and centered between the framing bars. Standard ladder-type cable racks are located over the lighting fixtures and parallel to the framework. Usually a second level of racks distributes tip and equipment cables. Rack widths [15, 20, 25, and 30 inches (381, 508, 635, 762 mm)] are available to optimize use of the available overhead cabling space. The 15-inch (381 mm) racks carry prespread equipment cables across aisles. Most other cabling requirements are satisfied with 20-inch (508 mm) racks. A 20-inch (508 mm) rack supports four cable groups (20 cables) per cable level.

The preconfigured modular racking and lighting arrangements will fit most applications. Custom-engineered arrangements may be used where adequate space may not be available (for example, when air-conditioning ducts or building columns are in the way). Underfloor arrangements are also possible.

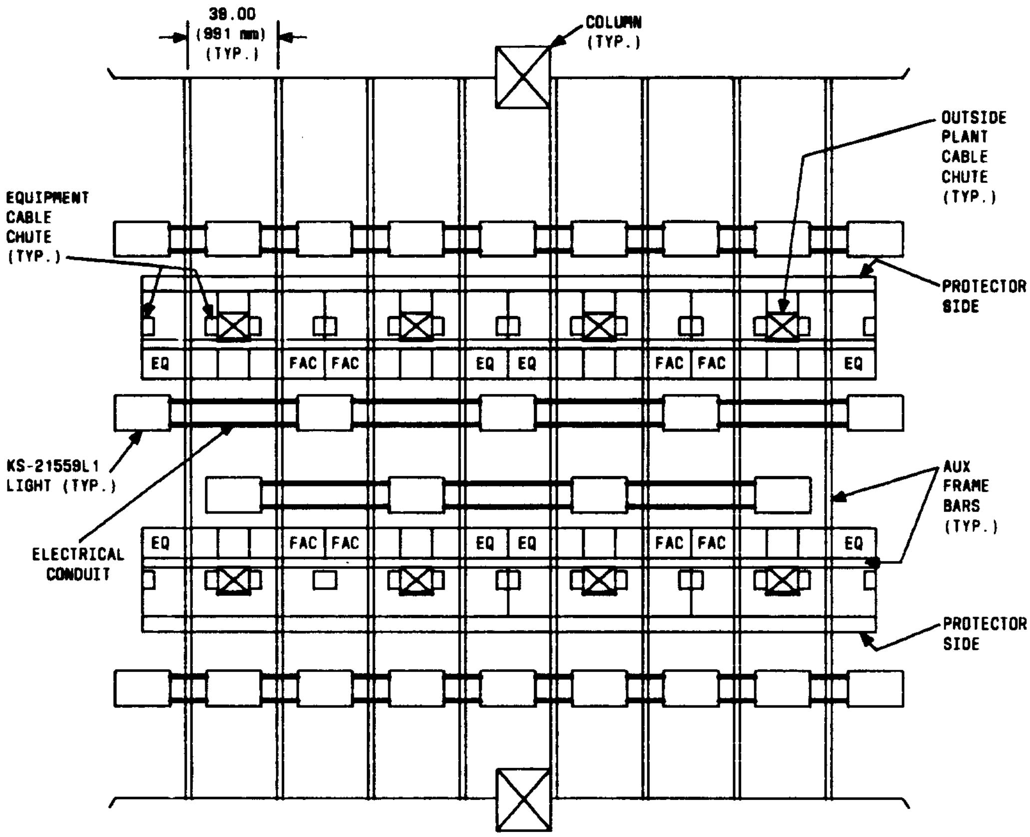

Figure 3-20. Auxiliary Framing and Lighting

3.2.4 Test/Talk Systems

A wide variety of Test/Talk Systems are supported by the *COSMIC* DF Systems. These systems provide two essential functions:

- Access for test systems such as AT&T's Mechanized Loop Testing (MLT) System to individual circuits (outside plant cable pairs and/or switching equipment) that are terminated at the DF. The MLT System is part of the Automated Repair Service Bureau (ARSB), which is located in a centralized Maintenance Center. The controlling system is an on-line, interactive computer system called Loop Maintenance Operations System (LMOS). The Maintenance Center and ARSB have replaced the old Repair Service Bureaus and Local Test Desks. A single ARSB can handle as many as 7 million lines.
- Communication between people located at the DF and elsewhere, such as the Maintenance Center.

The following paragraphs describe:

- The jack modules are orderable with options, including the jack configurations, indicator lamps, and switches. The jack modules are mounted into test/talk panels on the frame.
- The test/talk panels that mount on the DF can be equipped with various combinations of jack modules, transmitters, and battery test supplies.
- The loudspeakers that are typically fastened to the cable rack area above the maintenance aisles.
- The test cords and headset used with the test/talk system.

3.2.4.1 Jack Modules and Associated Apparatus

Jack modules are used to mount the various jacks, indicator lamps, and switches that are needed to interface to the test and talk circuits. The jack modules in turn mount into the test/talk panels.

Three types of jack modules are available:

- Three-position modules, which can mount up to three jacks, indicator lamps, and/or switches. Figure 3-21 shows the standard 3-position module (ED-6C110-10, Group 108) which is provided with test/talk panels equipped with a transmitter unit.

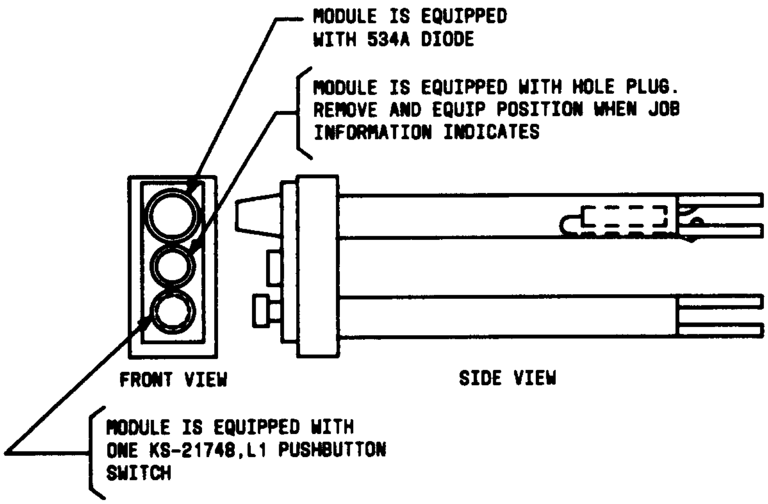

Figure 3-21. 3-Position Jack Module (ED-6C110-10, Group 108)

- Nine-position modules, which can mount up to nine jacks, and/or indicator lamps, Figure 3-22 shows the ED-6C110-10 Group 101 module.

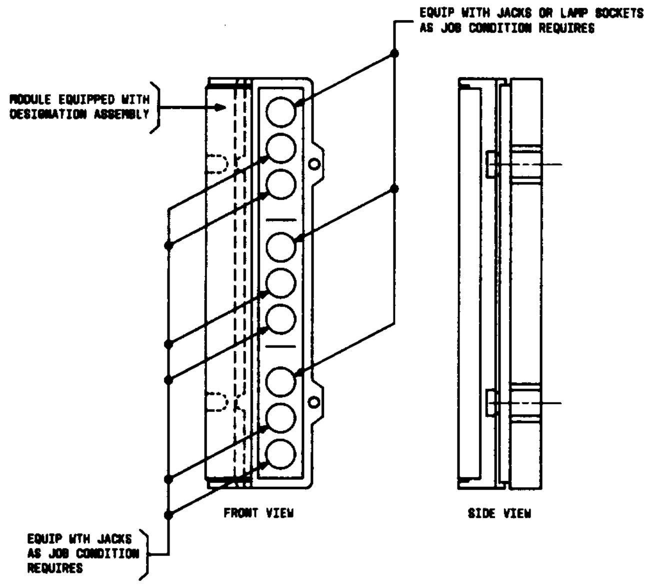

Figure 3-22. 9-Position Jack Module (ED-6C110-10, Group 101)

- Ten-position modules, which can mount up to ten jacks, switches, and/or indicator lamps. Figure 3-23 shows the ED-6C110-10 Group 104 module.

The nine and ten-position modules have the same overall dimensions, and can be installed as needed in the test/talk panels.

The basic components that mount into the jack modules are jacks, switches, and indicator lamps.

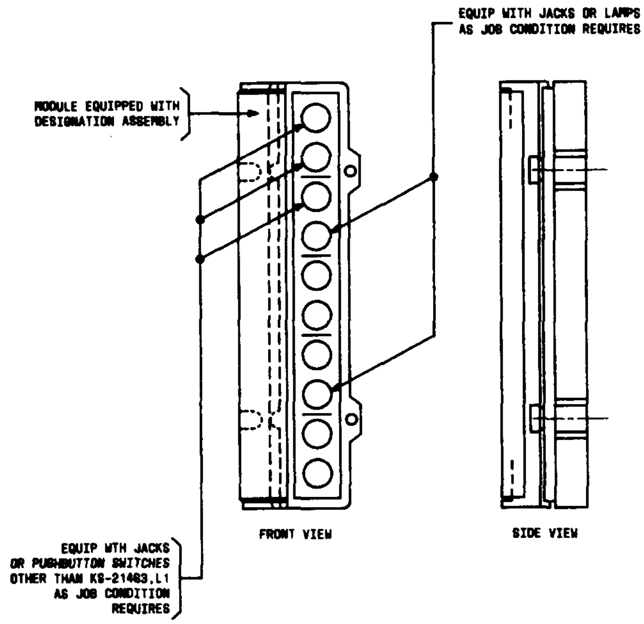

Figure 3-23. 10-Position Jack Module (ED-6C110-10, Group 104)

Jacks. Table 3-D lists the jacks that are used in the test/talk system.

Table 3-D. JACK APPARATUS

Ordering Code	Description
KS-21463, List 1	2-conductor
KS-21463, List 3	2-conductor with a make contact (normally open)
KS-21463, List 5	2-conductor with two make contacts (normally open)
KS-21001, List 1	3-conductor

These jacks allow the use of a telephone headset to access the talk circuits and the patch cords to access the test circuits.

Indicator Lamp. The indicator lamp is provided by the KS-20761, List 4 lamp mounting socket equipped with a 534A Light-Emitting Diode (LED). This LED is designed to be powered by −48 volt office battery. The lamp is used to indicate occupied channels for those circuits that have multiple appearances on the frame.

Pushbutton Switch. The KS-21748, List 1 switch is a momentary two-contact switch. It is used to activate the transmitter for voice communication from the DF to the Maintenance Center.

Hole Plug. A P-250 plastic Hole Plug is available to fill unused jack positions in the jack modules.

Jack Modules. Jack modules are available either empty, to be equipped in the field with components as needed, or factory-equipped with combinations of jacks, lamps, and switches for the more common test and talk circuits. Most of the jack modules may be ordered either as ordering groups from ED-6C110-10 or by the KS-specification. Table 3-E lists the various jack modules.

Table 3-E. JACK MODULES

Jack Module Type	Ordering Code ED-6C110-10	Equivalent to KS-21745	Equipped With	Application
3-Position	N/A*	List 7	Unequipped - may be equipped with 3 jacks, indicator lamps, and/or pushbutton switches.	Intended for use with test or talk circuits where none of the other 3-position modules is appropriate.
	Group 108	List 8	1 KS-21748, L1 switch, 1 KS-20761, L4 socket with 534A LED, 1 P-250 Hole Plug	Used with the AC1 transmitter, for Remote Testing Ldspkr & Talk Line or MDF Ldspkr & Transmitter Circuits.
	N/A*	List 9	2 KS-21463, L1 jacks, 1 KS-21001, L1 jack	Terminates one Telephone and Spare Jack Circuit.
9-Position	Group 101	List 1	Unequipped - six unequipped holes are for jacks and three are for jacks or lamp sockets.	Intended for use with test or talk circuits where none of the other 9-position modules is appropriate.
	Group 102	List 2	6 KS-21463, L1 jacks, 3 KS-20761, L4 sockets with 534A LEDs	Used for one to three appearances of Local Frame Talk Line, Interframe Loudspeaker and Talk Line, or Local Test Desk Talk Line, requiring indicator lamps.
	Group 103	List 3	6 KS-21463, L1 jacks, 3 KS-21001, L1 jacks	Terminates one to three telephone and spare jack positions.
	Group 115	List 15	6 KS-21463, L1 jacks, 1 KS-21001, L1 jack, 2 KS-20761, L4 sockets with 534A LEDs	Terminates one telephone and spare jack appearance plus two test or talk circuits with indicator lamps.
	Group 116	List 16	2 KS-21463, L1 jacks, 4 KS-21463, L3 jacks, 2 KS-21001, L1 jacks, 1 KS-20761, L4 socket with 534A LED	Used with 3 ESS™ switching systems, for telephone jacks compatible with SD-3H520-01, equipped with isolated contacts.

* These items are available only by the KS number.

Table 3-E. JACK MODULES (Contd)

Jack Module Type	Ordering Code ED-6C110-10	Equivalent to KS-21745	Equipped With	Application
10-Position	Group 104	List 4	Unequipped - may be equipped with up to eight jacks or pushbutton switches and two jacks or LEDs.	Intended for use with test or talk circuits where none of the other 10-position modules is appropriate.
	Group 105	List 5	10 KS-21463, L1 jacks	Talk Lines without indicator lamps, In/out test trunks, or Manual Varley 3 tests.
	Group 106	List 6	4 KS-21463, L1 jacks, 2 KS-21748, L1 switches, 2 KS-20761, L4 sockets with 534A LEDs, 2 P-250 hole plugs	Terminates one or two frame maintenance telephone lines.
	Group 110	List 10	10 KS-21463, L1 jacks	Terminates up to ten service observing circuits on COSMIC II or IIA frames.

* These items are available only by the KS number.

An ED-6C110-10 Group 111 jack module kit (KS-21745, List 11) is available consisting of ten sets of Group 110 jack modules. This kit provides jacks for up to 100 service observing circuits.

Panel Insert for Unused Jack-Module Positions. Panel Inserts are available to cover unused jack module positions in the test/talk panels. ED-6C110-10 Group 112 (KS-21745, List 12) is an insert for a 9- or 10-position jack module location. ED-6C110-10 Group 113 (KS-21745, List 13) is an insert for a 3-position module location.

Designation Card. ED-6C110-10, Group 114 (KS-21745, List 14) is a designation strip, card, and cover for use with either a 9- or 10-position jack module. These items are supplied with ED-6C110-10 Groups 101 through 106, and Groups 115 and 116.

3.2.4.2 Test/Talk Panels

The test/talk panels are mounted either on the *COSMIC* Distributing Frame or the associated Protector Frame.

The test/talk panels are equipped to provide the following equipment:

- An AC1 **Transmitter**, which is mounted at a convenient height on the frame to allow the frame attendant to speak with others. All panels equipped with a transmitter are also equipped with an ED-6C110-10 Group 108 jack module to control the operation of the transmitter.
- A **Test Battery Supply**, consisting of –48 and +24 volt battery, ground, and high-resistance to ground test facilities. These test points are provided with pin jacks mounted in the test/talk panels, and are protected with 70A fuses, rated at 1-1/3 amperes. The KS-21348, List 1 pin jack adapter may be used to access the pin jacks points with patch cords equipped with alligator clips.
- Mounting space for the **Jack Modules**, described in paragraph 2.2.4.1, which in turn are equipped with jacks, indictor lamps, and/or switches as needed to terminate the various test and talk circuits at the MDF.

Table 3-F provides an overview of the various panels. Detailed descriptions follow.

Table 3-F. TEST/TALK PANELS

Panel Code	Description	Used on Frame Type	Typical Placement
KS-21316, L8	Transmitter and Battery Supply Panel	All COSMIC DFs (Cross-Connect Side)	Every Second Eq Mod
ED-6C110-10, Group 23	Jack Panel		
ED-6C110-10, Group 25	Transmitter, Battery Supply and Jack Panel	COSMIC II or IIA DF (Protector Side)	Every Eq Mod
ED-6C110-10, Group 26	Jack Panel		As Needed
KS-21316, List 9	Mounting Bracket		One per Group 25 or 26
ED-6C111-11, Group 2	Jack Panel for Service Observing	COSMIC IA, II, or IIA DF (rear)	Every Eq Mod (as needed)
KS-21330, List 2	Jack Panel for Service Observing	COSMIC I DF (rear)	Every Eq Mod (as needed)
ED-6C110-10, Group 8	Transmitter, Battery Supply and Jack Panel	Modular Protector Frame	Even-numbered PF Mods
ED-6C110-10, Group 9	Battery Supply and Jack Panel		Odd-numbered PF Mods
ED-6C110-10, Group 10	Jack Panel		As Needed
ED-6C110-10, Group 44	Transmitter, Battery Supply and Jack Panel	Double-Sided Protector Frame	Every 14 verticals
ED-6C110-10, Group 43	Jack Panel		Every 14 Verticals (if needed)

Panels for the Cross-Connect Side of the Frame (*COSMIC* I, IA, II, IIA, or Mini). Panels that mount on the front of the COSMIC frames are 4 inches (101 mm) wide, occupying the same space as a standard 64-pair 78-type, or 112-type connecting block. Figure 3-24 shows the two types of panels used on the cross-connect side of the *COSMIC*-type frames: the KS-21316 List 8 Transmitter and Battery Supply Panel and the ED-6C110-10 Group 23 Jack Panel.

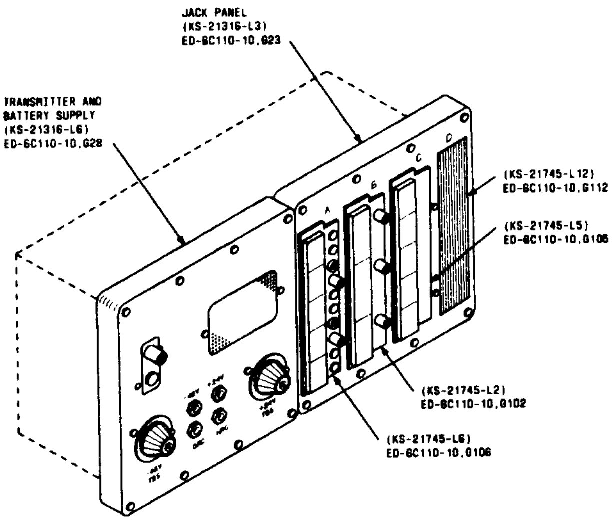

Figure 3-24. KS-21316, List 8 and ED-6C110-10, Group 23 Panels

Transmitter and Battery Supply Panel. The KS-21316, List 8 panel provides a transmitter, +24 and −48 volt battery, ground and high resistance to ground test facilities. It is equipped with an ED-6C110-10 Group 108 (KS-21745, List 8) 3-position jack module to control the operation of the transmitter.

Jack Panel. The ED-6C110-10 Group 23 panel provides space for mounting up to four 9- or 10-position jack modules.

Panels for the Protection Side of a *COSMIC* II, IIA, or Mini Frame.

Transmitter, Battery Supply, and Jack Panel. The ED-6C110-10, Group 25 panel provides a transmitter, associated lamp and key assembly, +24 and −48 volt battery, ground and high resistance to ground test facilities, and space for four 9- or 10- module jack modules. Figure 3-25 shows this panel, which is equipped with an ED-6C110-10 Group 108 (KS-21745, List 8) 3-position jack module. The KS-21316, List 9 mounting bracket is required for mounting the panel to the framework.

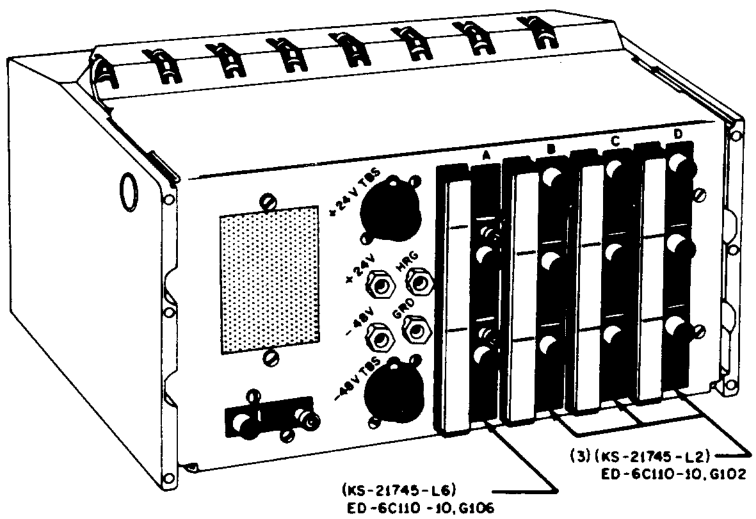

Figure 3-25. ED-6C110-10, Group 25 Transmitter, Battery Supply, and Jack Panel

Jack Panel. The ED-6C110-10, Group 26 panel provides space for an additional eight 9- or 10-position jack modules. See Figure 3-26. A KS-21316, List 9 mounting bracket is required for mounting the panel to the framework.

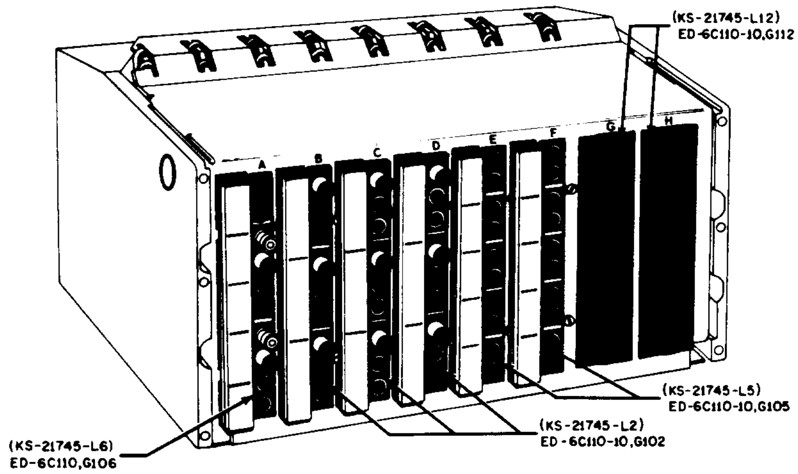

Figure 3-26. ED-6C110-10, Group 26 Jack Panel

This panel is supplied in addition to the Group 25 panel if more space for jack modules is needed.

Service-Observing/Service-Evaluation System Panels. The KS-21330 Service Observing Panels mount in the rear of the *COSMIC* frames. The KS-21330, List 2 panel is a 100-position jack panel for monitoring the usage of switching equipment on *COSMIC* I DFs. The ED-6C111-11 Group 2 panel is a 50-position panel for *COSMIC* IA, II, and IIA DFs. These panels are used in offices needing service observing jacks — most modern offices do not need this panel. ED-6C111-11 Group 6 provides a set of 12 cord-hanging brackets to help organize the service observing cords on *COSMIC* I frames.

Panels for the Modular Protector Frame.

Transmitter, Battery Supply, and Jack Panel. Figure 3-27 shows the ED-6C110-10, Group 8 panel. It provides a transmitter, +24 and –48 volt battery, ground, and high resistance to ground test facilities, and space for three 9- or 10-position jack modules. It is equipped with an ED-6C110-10 Group 108 (KS-21745, List 8), 3-position jack module.

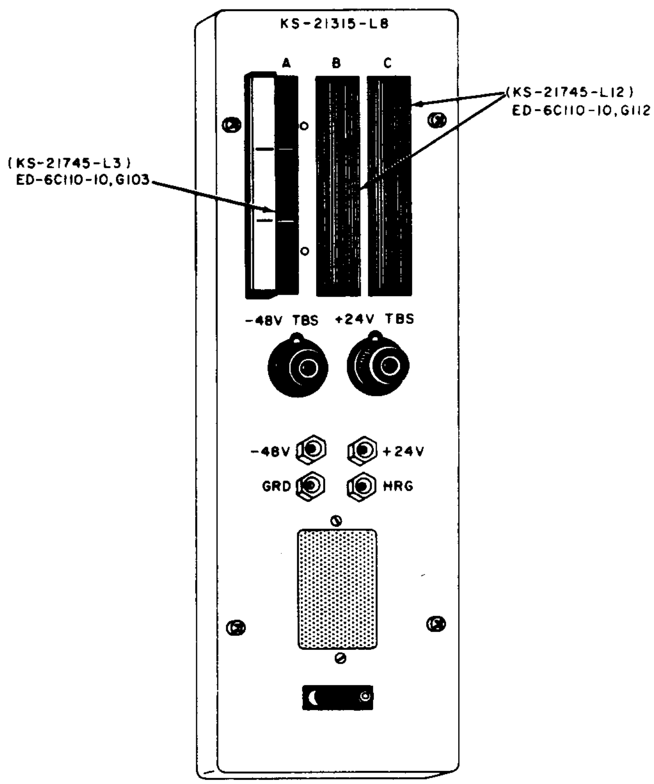

Figure 3-27. ED-6C110-10, Group 8 Transmitter, Battery Supply, and Jack Panel

Battery Supply and Jack Panel. The ED-6C110-10, Group 9 Panel is similar to Group 8, but is supplied without the transmitter (although one may be wired in).

Jack Panel. The ED-6C110-10 Group 10 jack panel, shown in Figure 3-28, provides space for up to fifteen 9- or 10-position jack modules. This panel is used in addition to Groups 8 and 9 as needed.

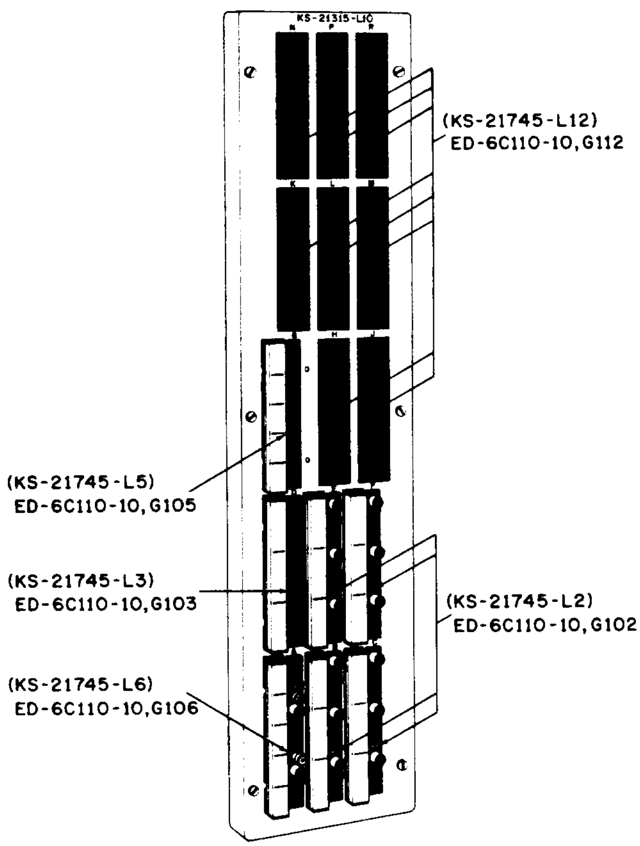

Figure 3-28. ED-6C110-10, Group 10 Jack Panel

Panels for a Double-Sided Protector Frame.

Transmitter, Battery Supply, and Jack Panel. ED-6C110-10 Group 44 provides a transmitter, +24 and –48 volt battery supply, ground and high-resistance to ground test facilities, and space for mounting up to nine 9- or 10-position jack modules. Figure 3-29 shows this panel, which is equipped with an ED-6C110-10 Group 108, 3-position jack module.

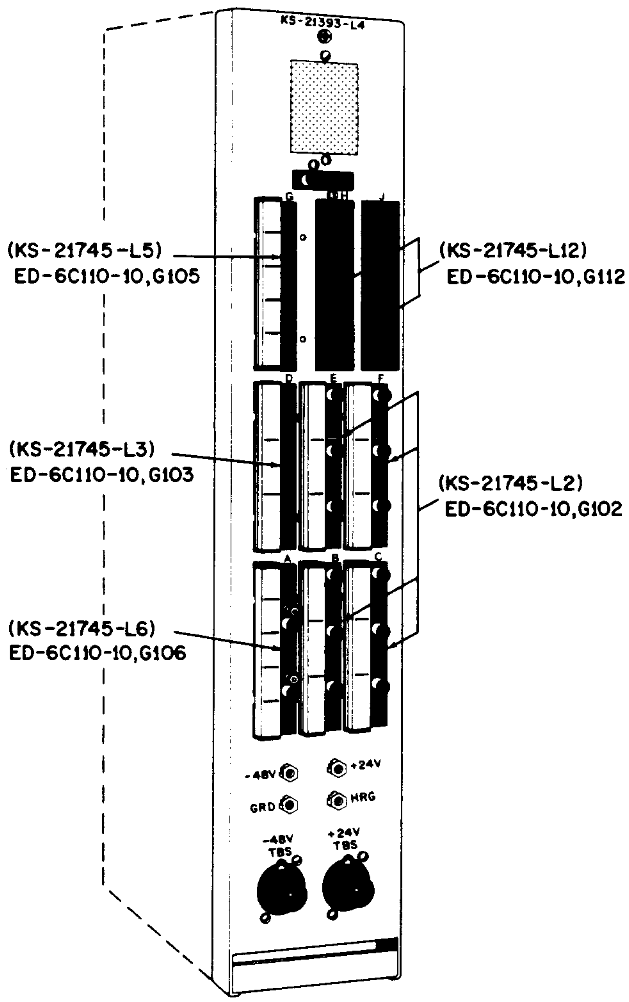

Figure 3-29. ED-6C110-10, Group 44 Transmitter, Battery Supply and Test Panel

Jack Panel. ED-6C110-10 Group 43 provides space for mounting up to fifteen 9- or 10-position jack modules. See Figure 3-30.

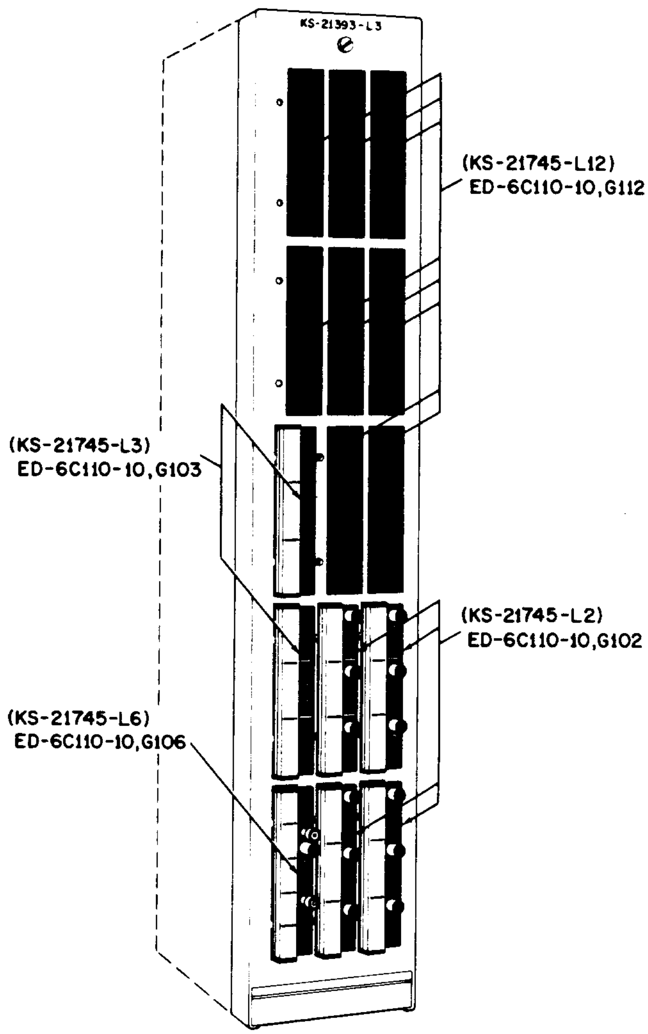

Figure 3-30. ED-6C110-10, Group 43 Jack Panel

3.2.4.3 Loudspeakers

Loudspeakers are mounted in the cable rack area over the maintenance aisles. ED-6C111-11 Group 4 is used for paging at the frame area from the Repair Service Bureau or Local Test Desk. It uses a KS-21347 loudspeaker, and is usually located every 13 feet (3962 mm) in the maintenance aisles.

ED-6C111-11 Group 3 is similar to Group 4, but has a volume control, and is intended for use in the frame administration area.

ED-6C111-11 Group 7, is a WP-91812 loudspeaker, used for inter-frame paging. Two are typically located in each aisle.

Groups 3, 4, and 7 include mounting hardware to support the loudspeakers from the auxiliary cable rack supports above the maintenance aisles.

3.2.4.4 Headset and Cords

The KS-22990, List 3 Headset is equipped with bantam plugs, volume control, and push-to-talk switch.

The KS-21348, List 1 Test Pin Jack Adapter allows alligator clips to access the pin jacks of the battery supply circuit for –48 volt, +24 volt, ground, and high-resistance to ground.

The ED-6C111-11, Group 6 Cord Retaining Brackets are used to hold the service-observing cords on the rear of a COSMIC I frame. Twelve brackets are supplied.

A full line of test cords are available for use with the test/talk system. See Section 3.5.6 for details.

3.3 Other Frame Equipment

3.3.1 Frame Operations Decals

Frame operations decals (Figure 3-31) show pictorial information for the operations on the cross-connect and protector sides of the frame. These decals are normally mounted in the field on the frame lineup end guards, or the inside of walk-through framework. Installation of the decals is per the instructions printed on the back of the decals.

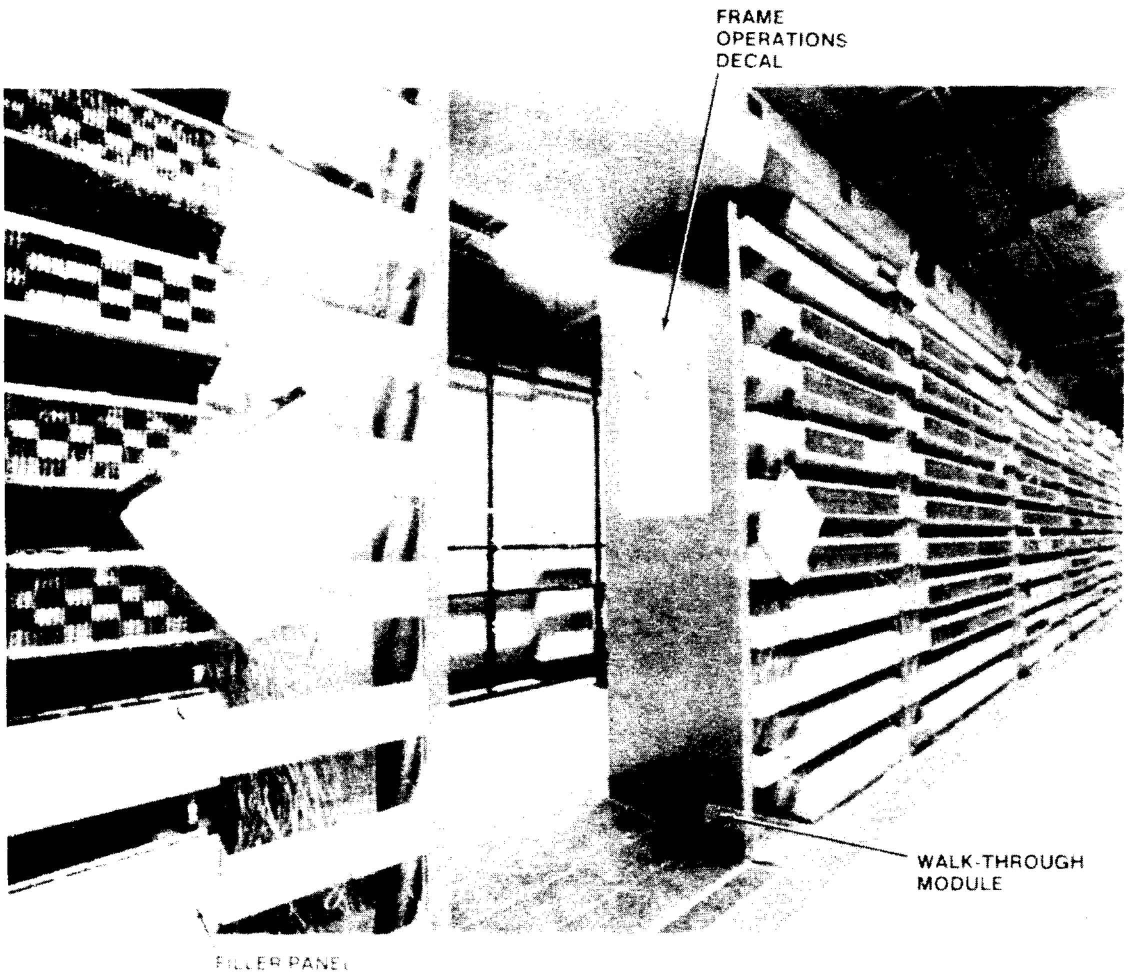

Figure 3-31. *COSMIC* Distributing Frame Associated Equipment

The **Cross-Connect Side Decal** (Figures 3-32) for *COSMIC* IIA, IA, and I DFs describes the tools and procedures used for placing, removing, and tracing cross-connections.

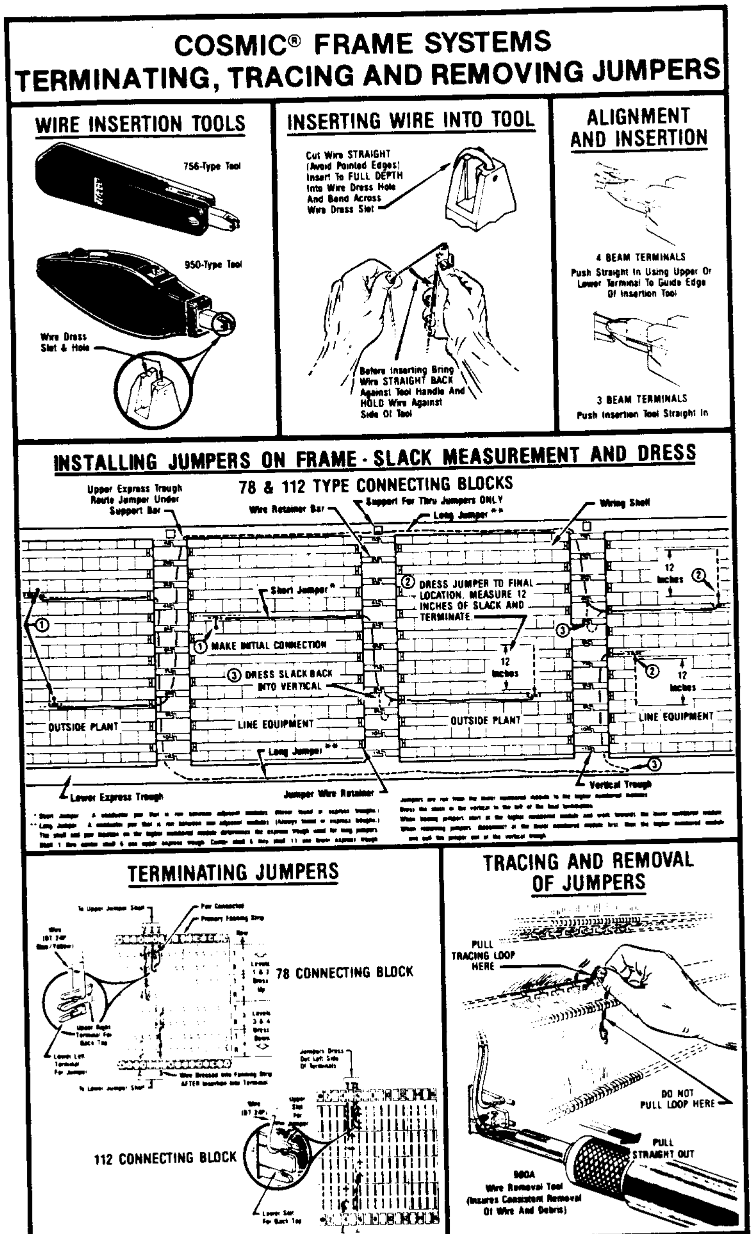

Figure 3-32. Frame Operations Decal (ED-6C129-50, G4) — Cross-Connect Side (78 and 112 Blocks)

The **Protector Side Decal** (Figure 3-33) for *COSMIC* IIA DFs depicts the test cords and equipment arrangement and includes a cable directory.

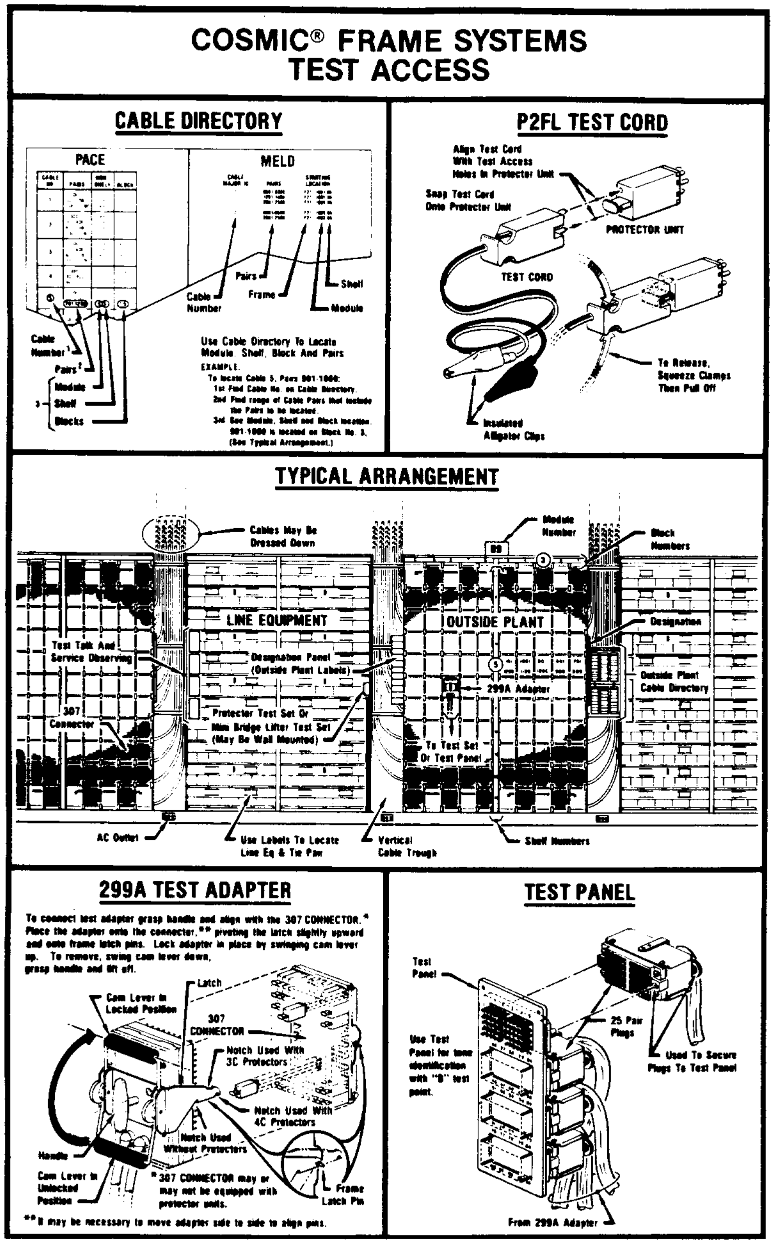

Figure 3-33. Frame Operations Decal (ED-6C129-50, G5) — Protector Side

3.3.2 Filler Panels

Filler (Cover) Panels for Unused Block Positions

The KS-21341 framework filler panel (Figure 3-5) is used to cover openings in the DFs where connecting blocks are to be installed at a later date or to fill unused openings in the frame. Two sizes are available: a wide size [4.86 inches (123 mm)] for shelves 2 through 10 and a narrower one [3.5 inches (89 mm)] for shelves 1 and 11. All the filler panels are approximately 32 inches (813 mm) long and are made of thin plastic with channels for snap-in installation. Both sizes may be cut to the desired length. See Table 3-G for specifications.

Table 3-G. FILLER (COVER) PANELS FOR UNUSED BLOCK POSITIONS — SPECIFICATIONS AND ORDERING INFORMATION

FRAME APPLICATION	APPLICATION NOTES	COLOR	ORDERING CODE
COSMIC I/IA/IIA	4.86 in. (123 mm) wide for switching equipment modules (Shelves 2-10)	Ochre Yellow	KS-21341, L1
	4.86 in. (123 mm) wide for loop cable modules (Shelves 2-10)	Blue	KS-21341, L2
	3.5 in. (89 mm) wide for all modules (Shelves 1 and 11)	White	KS-21341, L5

Filler (Cover) Panels for Unused 307-Type Connector Positions

A framework filler panel (Comcode 105583116) is available to cover openings where 307/407-type connectors are to be installed at a later date on *COSMIC* II/IIA DF facility modules or *COSMIC* II Mini DF facility bays. The panel is 7-7/8 inches (200 mm) high and 6-3/8 inches (162 mm) wide and snaps into the framework, therefore requiring no mounting hardware.

3.3.3 Bay Shelf Designation Strips

Bay Shelf Designation Strips (Flip Gates)

Designation Strips (also called "Flip Gates") provide mounting space for designation labels (ED-6C144-12) that identify the circuits terminated on each terminal of a connecting block.

Designation strips (Table 3-H and Figures 3-34, 3-35, and 3-36) are usually used only on those shelves that are equipped with connecting blocks terminating trunk and toll equipment. Shelves terminating other circuits (outside plant, line equipment or tie pairs) are usually equipped with connecting blocks that are prestamped with circuit identification.

Table 3-H. BAY SHELF DESIGNATION STRIPS

FRAME APPLICATION	APPLICATION NOTES	ORDERING CODE
COSMIC I/IA/IIA	Mounts on shelves 2 through 10 of a bay.	ED-6C142-30 Group 8
	Mounts on any shelf with test/talk panel	ED-6C142-30 Group 9
	Mounts on shelf 1 of a bay	ED-6C142-30 Group 10
	Mounts on shelf 11 of a bay	ED-6C142-30 Group 11
COSMIC Mini	Mounts on any shelf of a bay	ED-6C314-70 Group 7

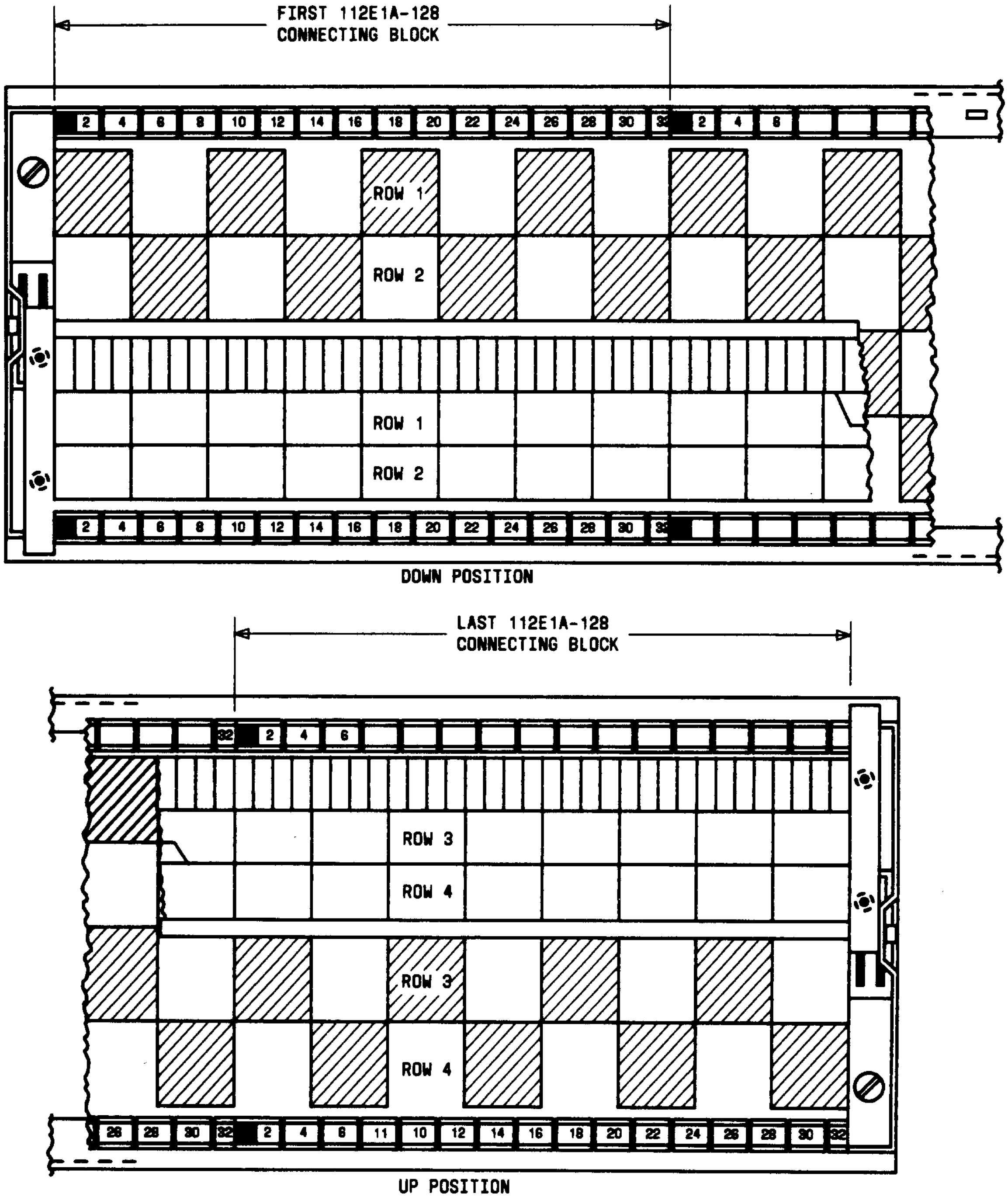

Figure 3-34. ED-6C142-30, Group 8 Bay Shelf Designation Strip for *COSMIC* DFs

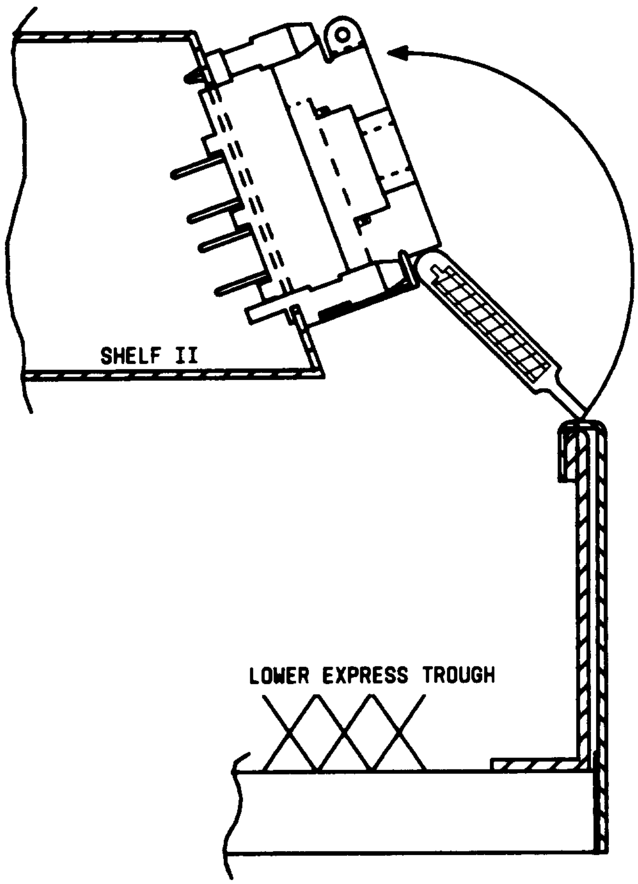

Figure 3-35. ED-6C142-30, Group 11 Bay Shelf Designation Strip for *COSMIC* DFs

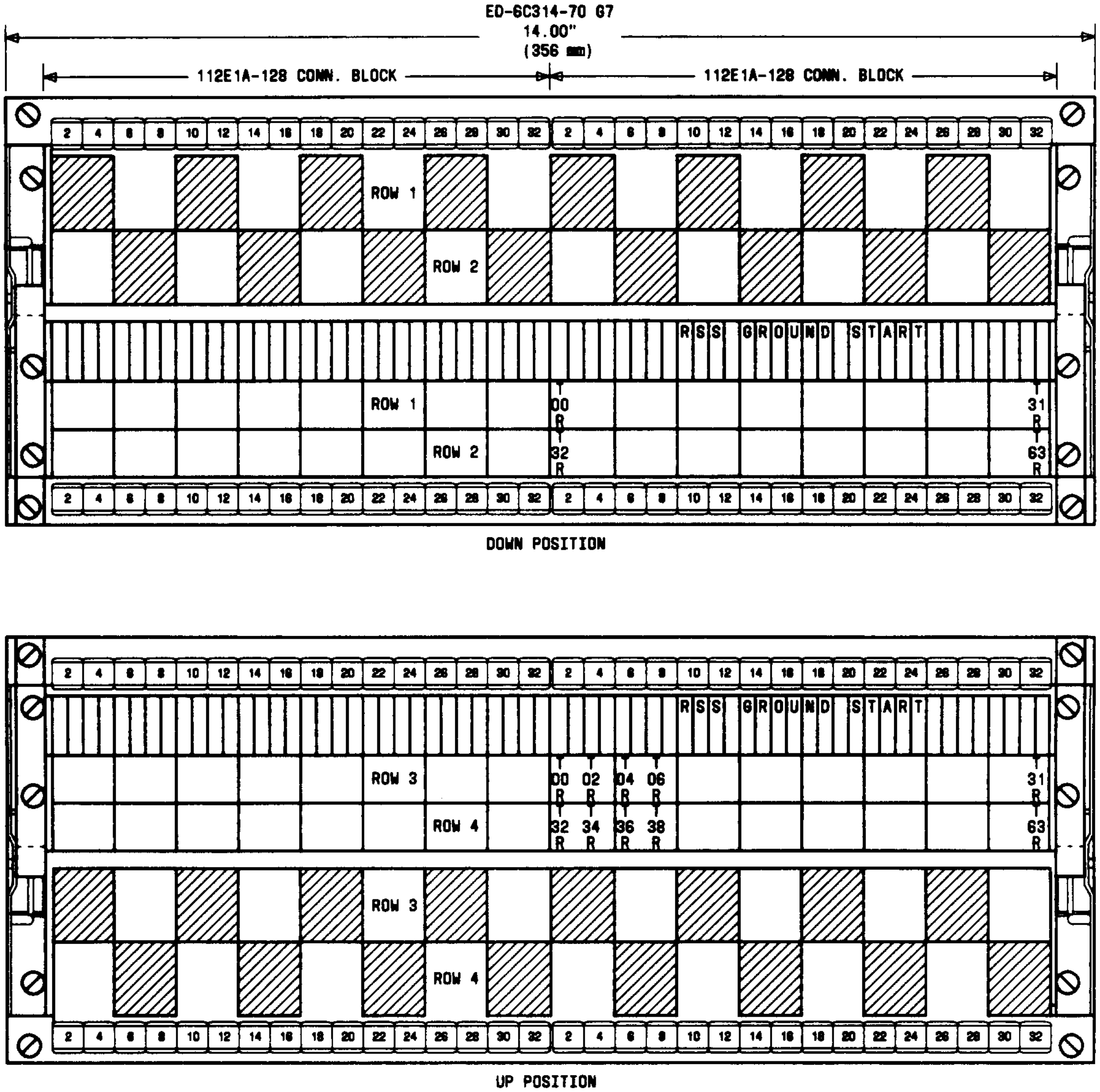

Figure 3-36. ED-6C314-70, Group 7 Bay Shelf Designation Strip for *COSMIC* Mini DFs

Designation Strip Labels (For Bay Shelf Designation Strips)

Sets of labels (Table 3-I) are available for field stenciling. The labels mount on the bay shelf designation strip and provide room for high-level identification (relay rack, bay, shelf, and mounting plate number).

Table 3-I. ED-6C144-12 LABELS

APPLICATION	ED-6C144-12	COMCODE
64-Pair Blocks (16 per shelf) Shelves 2-10	Group 1	104437710
96-Pair Blocks (10 per shelf) Shelves 2-10	Group 2	104437728
100-Pair High Density 112H-Blocks (12 per shelf) Shelves 2-10	Group 3	104400379
50-Pair High Density 112H-Blocks (12 per shelf) Shelves 1 and 11		
100-Pair Regular Density Blocks (10 per shelf) Shelves 2-10	Group 4	104211065
50-Pair Regular Density Blocks (10 per shelf) Shelves 1 and 11		
128-Pair Blocks (10 per shelf) Shelves 2-10	Group 5	104366653
64-Pair Blocks (10 per shelf) Shelves 1 and 11		
Note: Each label set provides upper and lower labels for 3 blocks.		

Designation Fanning Strips (For Terminal Row Identification)

Designation fanning strips provide vertical terminal designations and an end finish to the connecting block fanning strip for containing jumpers. Designation Fanning Strips are used with connecting blocks if the half-shelf designation strip is not provided or a half-shelf is partially filled with connecting blocks. Each ordering group provides a left and right fanning strip (see Table 3-J and Figures 3-37, 3-38, and 3-39). One group should be provided for each shelf that has connecting blocks mounted on it (unless the shelf is equipped with the bay shelf designation strip).

Table 3-J. DESIGNATION FANNING STRIPS

APPLICATION	USED ON SHELVES	ORDERING CODE
General use with 50-pair connecting block, stenciled T, R (Not for use with H-blocks)	1 and 11	ED-6C142-30 Group 23
General use with 100-pair connecting block, stenciled T, R	2 thru 10	ED-6C142-30 Group 24
Use with SMAS 5A or 5B connecting block, stenciled TA, RA, TB, RB	2 thru 10	ED-6C142-30 Group 25
Blank fanning strip, stamp as required	2 thru 10	ED-6C142-30 Group 26
Use with shelves associated with *5ESS* ®, stenciled T, R, SG0, SG1	2 thru 10	ED-6C142-30 Group 27

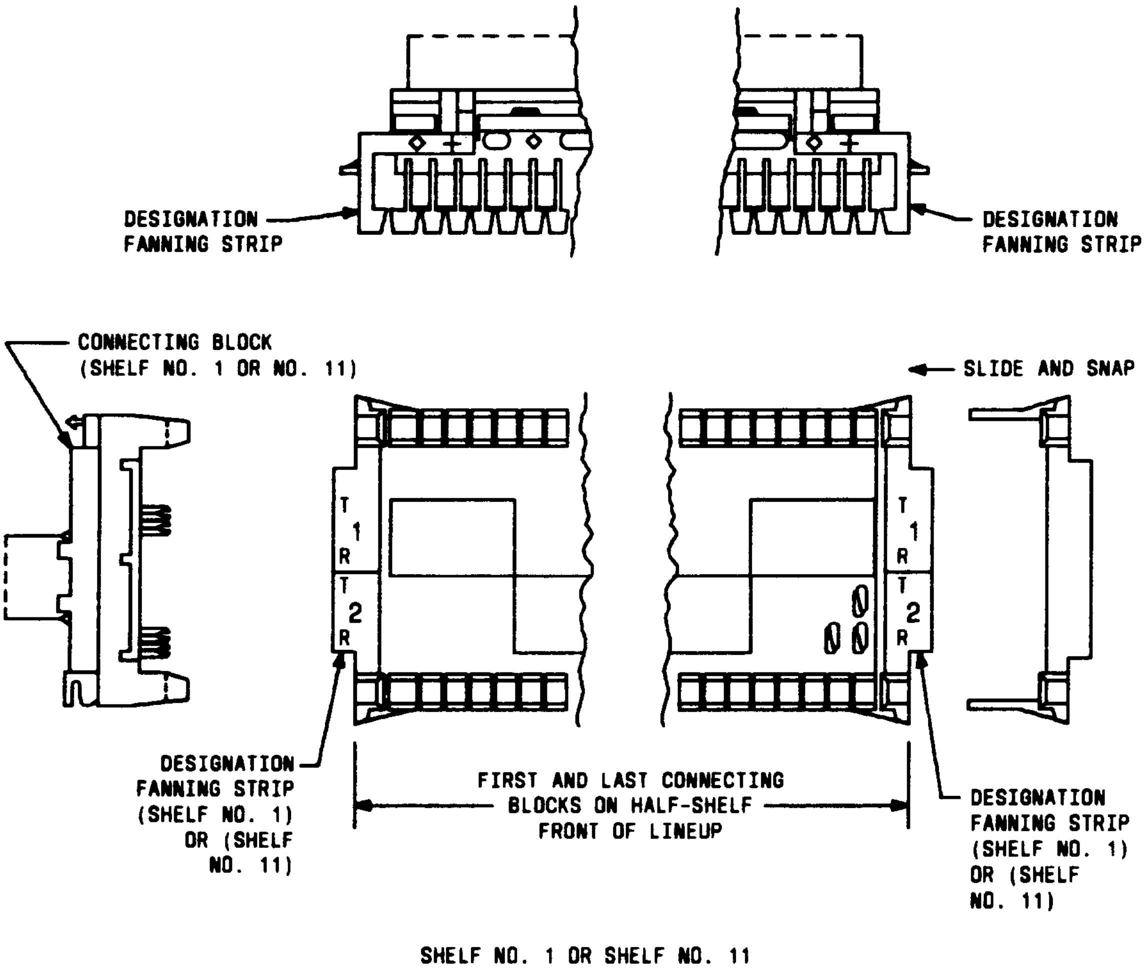

Figure 3-37. ED-6C142-30 Designation Fanning Strips for Shelf 1 or Shelf 11

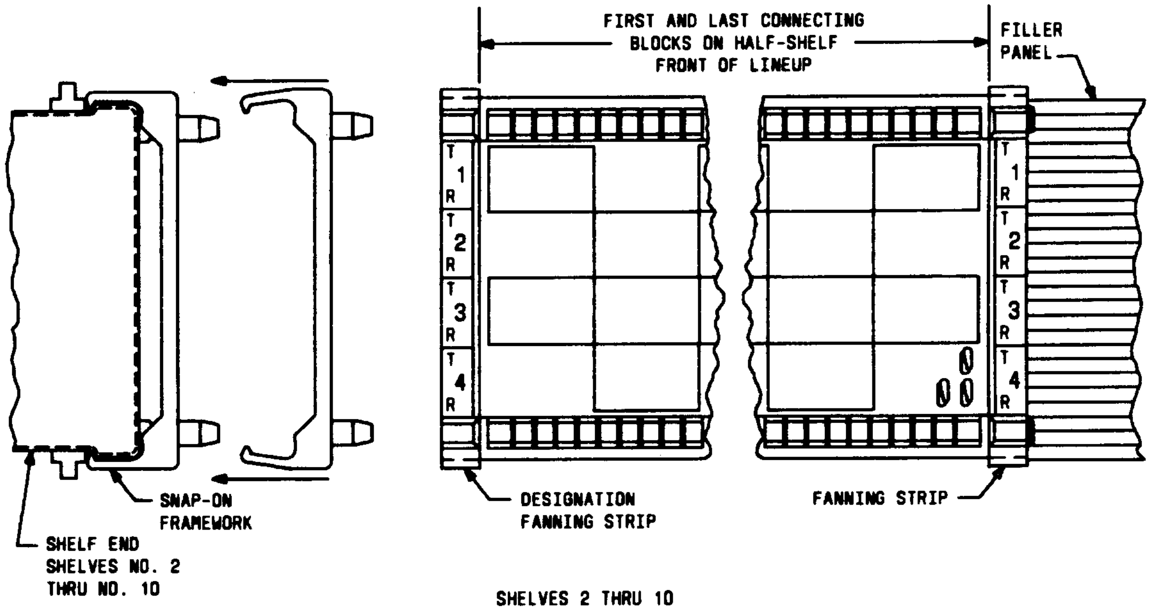

Figure 3-38. ED-6C142-30 Designation Fanning Strips for Shelves 2 Through 10

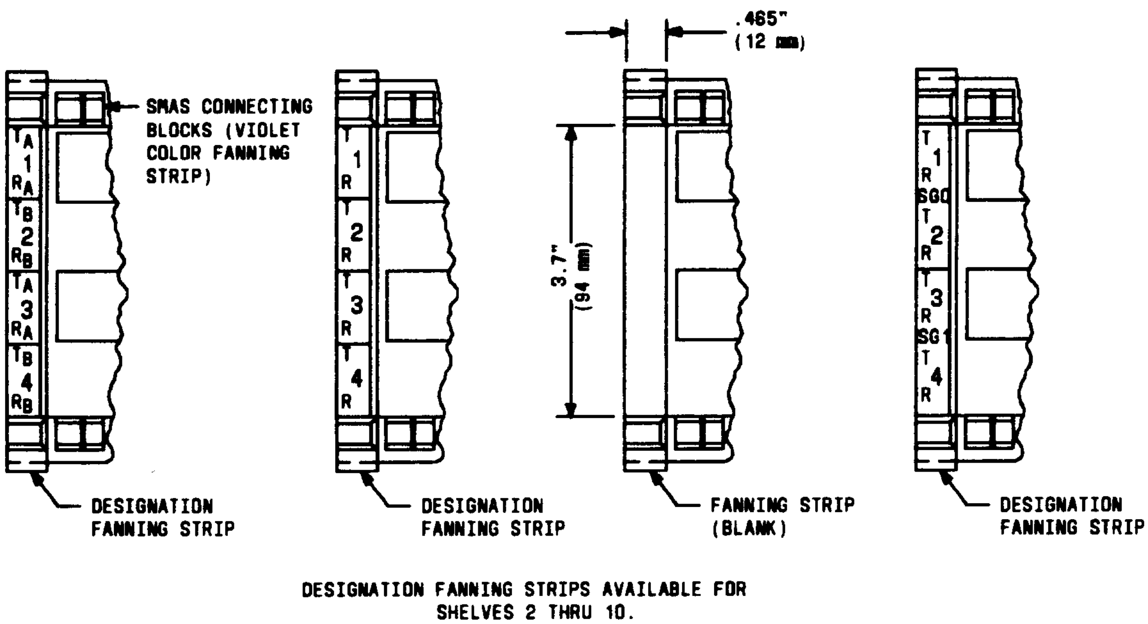

Figure 3-39. ED-6C142-30 Designation Fanning Strips for Shelves 2 Through 10

3.3.4 Cable Location Directory Holder

The cable location directory holder (Table 3-K) is used for mounting four 8½ x 11 inch (216 x 279 mm) cable location directory pages (an output of MELD) on the rear of *COSMIC* IIA DFs. The directory pages show the starting module and shelf location for each group of consecutive cable pairs, and make finding pairs on the 307-type connectors easier. The holder can be located in the rear of the vertical cable trough on either side of a cross-connect/protection module. It is recommended that one cable location directory holder be placed in the first and every other vertical cable trough.

Table 3-K. CABLE LOCATION DIRECTORY HOLDER

FRAME APPLICATION	APPLICATION NOTES	ORDERING CODE
COSMIC IIA	Mounts 4 frame cable directories (an output of MELD) in the rear of the vertical cable trough	ED-6C142-30 Group 14

3.3.5 112H-Type Connecting Block Mounting Adapters

High-density 112H series blocks (100-pair OSP or tie pairs) can be mounted on earlier *COSMIC* I DF using these adapters. A maximum six connecting blocks, 100 or 200 pairs may be mounted. Each adapter spans 33 inches (838 mm). Two are needed for an entire shelf of a module (two bays). Group 3 is used for shelves 2 through 10, and Group 4 is used for top and bottom shelves 1 and 11. Installation of these adapters is normally done with unoccupied shelves. Mounting fasteners are included with each adapter ordered (see Table 3-L and Figure 3-40). See Section 3 for a full description of all 112-type connecting blocks.

Table 3-L. 112H-SERIES CONNECTING BLOCK MOUNTING ADAPTERS

FRAMEWORK	SHELVES	DIMENSIONS			ORDERING CODE
		HEIGHT	WIDTH	DEPTH	
COSMIC I	2 thru 10	4″ (102 mm)	33″ (838 mm)	¾″ (19 mm)	ED-6C142-30, G3
	1 and 11	4″ (102 mm)	33″ (838 mm)	¾″ (19 mm)	ED-6C142-30, G4

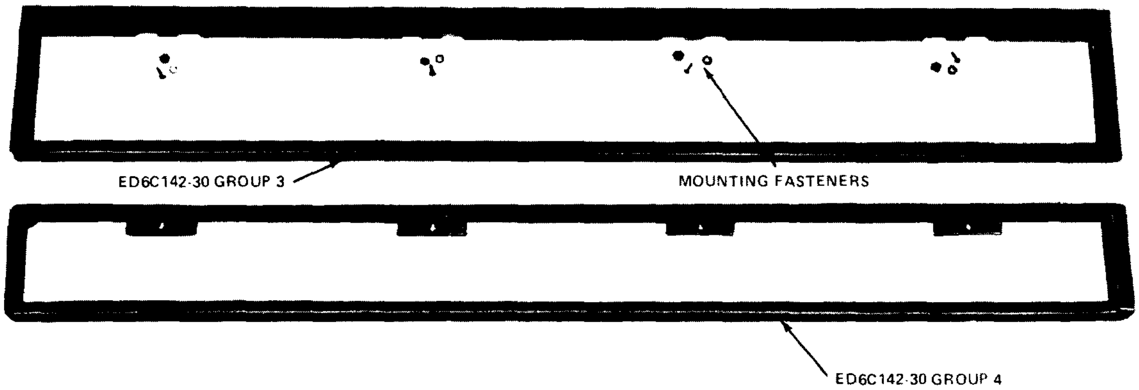

Figure 3-40. 112H-Series Connecting Block Mounting Adapters

3.3.6 711 Mounting Bracket

The ED-6C142-30, Group 13, 711-Mounting Bracket (Figure 3-41) is an enclosure for storing and protecting 711-connectors on the rear of a *COSMIC* I, IA, or IIA DF cross-connect bay. One 711-mounting bracket is ordered for each 33-inch (838 mm) wide shelf that is connectorized with 711-connectors. The Bracket/Enclosure is mounted on the rear of the shelf. Each Bracket/Enclosure has 5 holders (brackets) custom designed to mount up to four 711-connectors per holder for a total of up to twenty, 25-pair or 32-pair, connectors. Once the connectors are mounted on the bracket, a cover encloses the top and rear thus protecting the connectors during service activities.

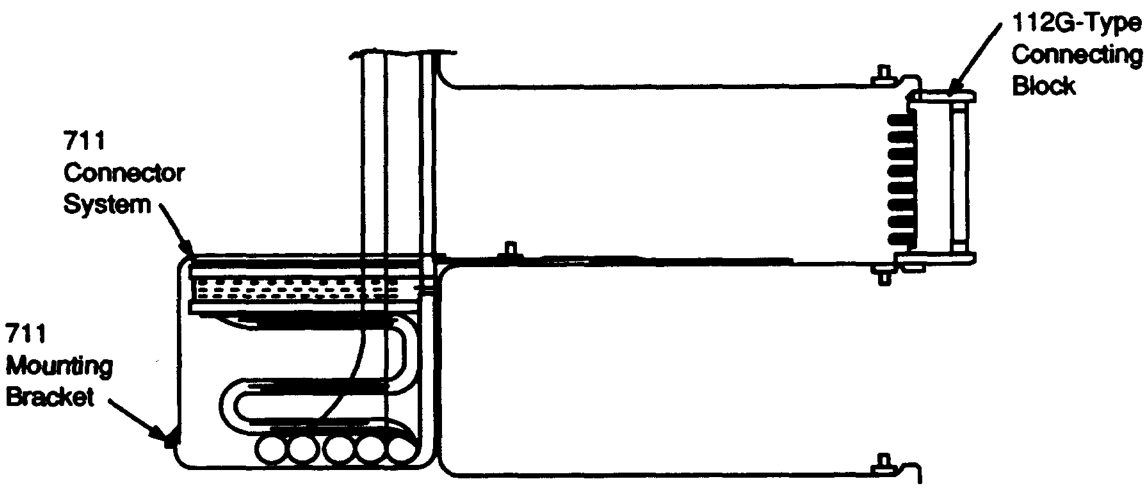

Figure 3-41. 711-Mounting Bracket

The 711-Mounting Bracket is used in conjunction with 112-type connectorized blocks (112G-type) that are equipped with a wiring harness and 711-connectors. The wiring harness allows the 711-connectors to be positioned at the rear of the *COSMIC* DF shelf and joined to cables also equipped with 711-connectors. The 711-mounting bracket can also accomodate a second cable equipped with 711-connectors. This capability is often used in switch cutover methods where older switches are terminated on existing *COSMIC* DFs. The 711-mounting bracket is installed on the rear of the shelf and a 711-connector bridge module is mounted onto switchboard cables. New switch cables can then be tapped on at this new position and old cables removed.

SECTION 4

APPARATUS AND ACCESSORIES

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SECTION 4

APPARATUS AND ACCESSORIES

AT&T provides a full line of apparatus and accessories to support the *COSMIC* DF Systems. *COSMIC* DF apparatus are items such as protector units, connectors, and connecting blocks. See Section 11 for ordering information.

4.1 Connecting Blocks

Connecting blocks are used on *COSMIC* DFs for terminations and cross-connections. All *COSMIC* DFs use the 112-type connecting blocks. The 78-type connecting blocks are used on earlier *COSMIC* I DFs that were installed prior to the availability of the 112-type connecting block. The *COSMIC* I DFs can mount the high density 112H-type connecting blocks only if the ED-6C142-30,G3 (shelves 2 through 10) or G4 (shelves 1 and 11) shelf mounting adapters are used. Except for the type of terminal used and the difference in the color of the checkerboard pattern on the front of the block, the 78- and 112-type connecting blocks are identical. All standard 112- and 78-type connecting blocks are listed by Underwriters Laboratories as communication circuit accessories for use only with *COSMIC* DFs.

4.1.1 112-Type Connecting Blocks

The 112-type connecting blocks (Figure 4-1) are designed for use with all AT&T *COSMIC* DF Systems. These connecting blocks are a molded plastic design with bifurcated insulation displacement-type quick-clip or wire-wrap (both bifurcated and single) terminals. The front of the block is used for jumper cross-connections. Wire wrap terminals for direct or connectorized cable terminations are located at the rear of the block. The terminals are solder plated.

The blue and white checkerboard patterns on the front face of the 112-type connecting blocks delineate rows of paired terminals to facilitate identification of terminals. Color-coded fanning strips clearly denote the connecting block function for quick, easy identification. Prelabeled fanning strips eliminate the need for costly stenciling in the field. Snap-in mountings make installation easy, and locking snap-through fanning strips provide strain relief protection against jumper wire breakage. The fanning strips are color coded: blue for loop cable, white for tie pairs, yellow for *ESS* and other digital switching equipment, green for crossbar, beige for miscellaneous and trunk applications, violet for SMAS, and orange for carrier equipment.

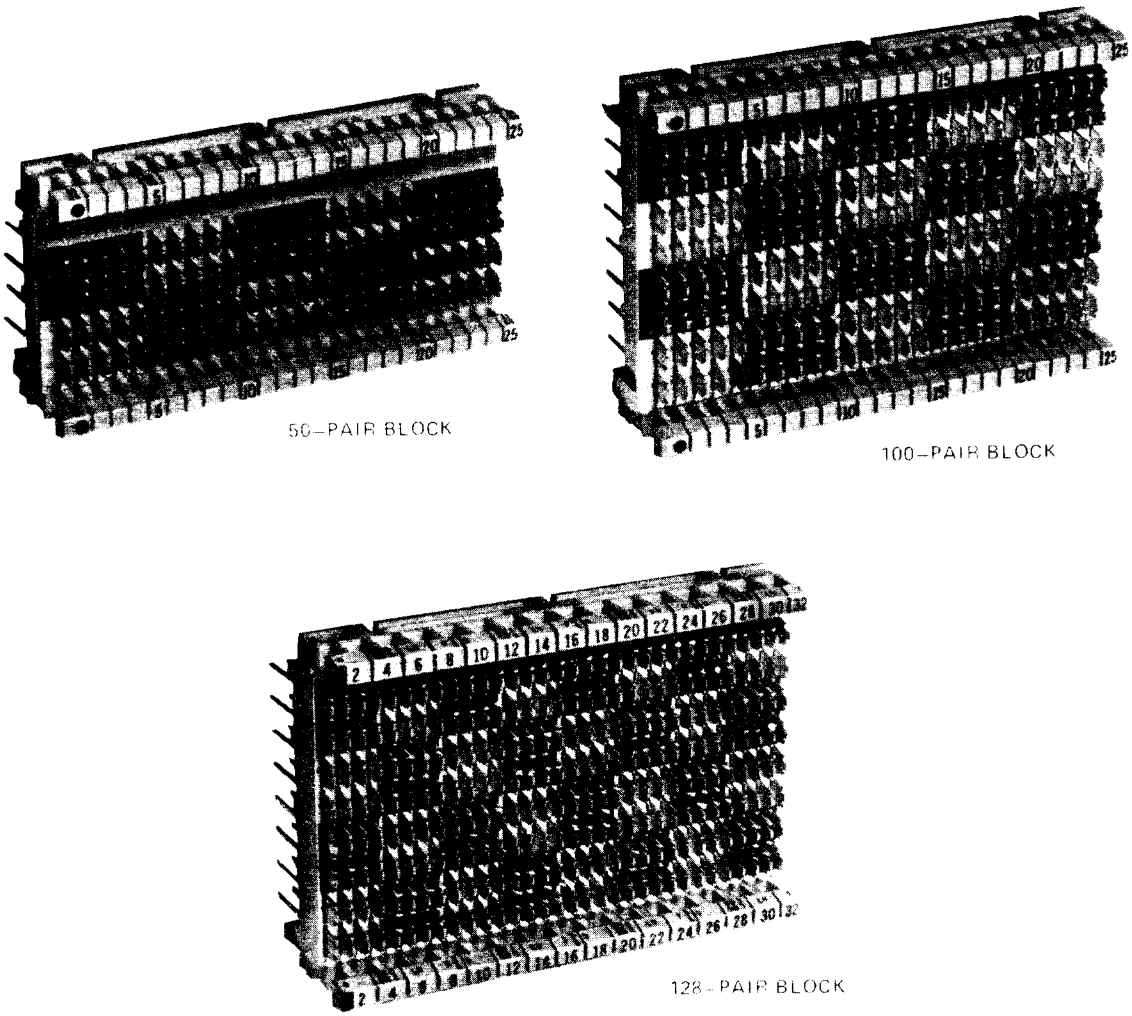

Figure 4-1. 112-Type Connecting Blocks — 50-, 100-, and 128-Pair Terminal Arrangement

Column numbers on all 112-type connecting blocks are compatible with the Location Oriented Identification System (LOIS) as it is printed on service orders by Bellcore's Computer System for Main Frame Operations (COSMOS) or AT&T's Computerized Frame Administration System (CFAS) computer program. This helps increase the efficiency of cross-connect activities while reducing errors.

Codes of the AT&T 112-type connecting blocks are available for virtually all central office switching applications, including AT&T's 1, 1A, 2, 2B, 3, and *5ESS*™ Switching Systems, Northern Telecom *DMS** -100 System, and GTE *GTD*† -5 EAX Switches, Ericsson *AXE*-10‡, NEC NEAX61E § and Plessey *SYSTEM X*¶.

High-density 112H-type connecting blocks are available for OSP and tie-pair terminations on *COSMIC* DFs (*COSMIC* IA, IIA, and *COSMIC* DF Custom IA/IIA bays). They provide 6,000 pair density in each bay while maintaining 100-pair complement numbers. These blocks also permit termination of 6,000 OSP pairs in each *COSMIC* IA DF facility bay.

COSMIC IIA DFs use prewired 307-type connector assemblies, where the 112-type connecting block is supplied as part of the 307-type connector. The high-density (112-type) blocks provide 5,100 outside plant terminations (100-pair blocks) and permit an additional 1,800 tie pairs on derived carrier terminations in each *COSMIC* IIA DF cross-connect/protection bay.

New codes of high-density 112-type connecting blocks are available that offer significantly higher termination density. These blocks are equipped with either an insulation-displacing terminal ("2-Beam" quick clip) or single (non-bifurcated) wire-wrap posts. These new blocks are intended for applications where bifurcated terminals are not needed, such as tie pair circuits. The available codes include a 100-pair version for shelves 1 and 11 of the *COSMIC* DF (compared to the standard 50-pair blocks), and 150-pair and 200-pair versions for shelves 2 through 10 (compared to standard-density 100-pair tie blocks). Like the other 112H-type blocks, each block is 5.3 inches (134 mm) wide, and up to six of these blocks can be mounted on the shelf of a bay.

Preprinted block labels for some of the more common circuits are available to make circuit identification simpler and more accurate.

The capacities of the 112-type connecting blocks are 50, 64, 96, 100, 128, 150, or 200 pairs as indicated by the last numbers in the product code. For example, 112C1A-50 is a 50-pair connecting block.

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* Trademark of Northern Telecom Ltd.
† Trademark of GTE.
‡ Trademark of Ericsson.
§ Trademark of Nippon Electric Co.
¶ Trademark of Plessey.

The width and height of the 112-type connecting blocks are:

- All 50-pair blocks are 6.4 inches (163 mm) by 3.1 inches (79 mm), except the H-type 50-pair blocks which are 5.3 inches (135 mm) by 3.1 inches (79 mm).
- All 64-pair blocks are 4.0 inches (102 mm) by 4.4 inches (112 mm), except the 112E1A-64 which is 6.4 inches (163 mm) by 3.1 inches (79 mm).
- All 96-, 100-, and 128-pair blocks are 6.4 inches (163 mm) by 4.4 inches (112 mm), except the H-type 100-, 150- and 200-pair blocks which are 5.3 inches (135 mm) by 4.4 inches (112 mm).

Figure 4-2 shows the features of the 112-type connecting blocks.

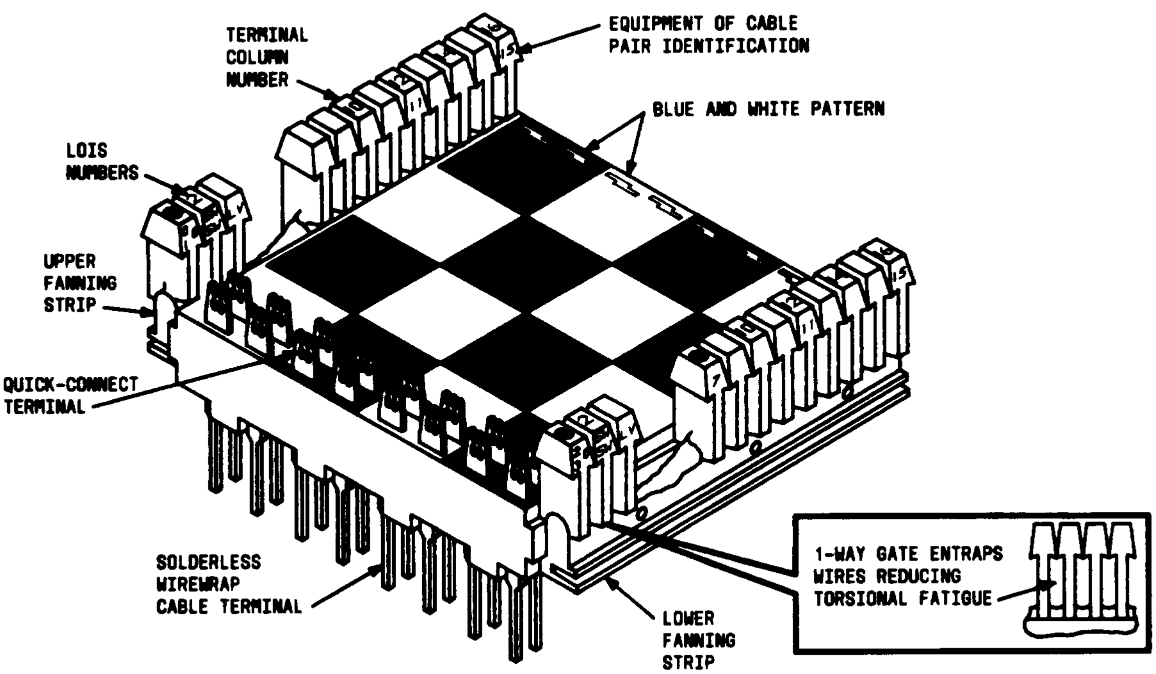


Figure 4-2. 112-Type Connecting Block Features

4.1.2 78-Type Connecting Blocks

The 78-type connecting block (Figure 4-3,) is the predecessor to the 112-type block. It is made of molded plastic and utilizes bifurcated, insulation displacement-type, quick-clip terminals for cross-connections on the front of the block. Wire-wrap terminals are located at the rear for cable terminations. The terminals are solder plated.

In general, all new *COSMIC* DF installations should use 112-type blocks. AT&T has previously recommended that frames already equipped with 78-type blocks continue to use 78-type blocks for future additions, rather than switch to the 112-type blocks. This was because differences between the insulation-displacement clips required the use of different tools for the two block types. However, the new tool bits used with the 756C5 and 950C tools work with either type of clip. Hence, the 112-type blocks may be used alongside the older 78-type blocks without having to change tools.

> ***Note:*** Before substituting the 112-type block (blue and white checkerboard) for the 78-type block (red and white checkerboard), the differences should be fully discussed.

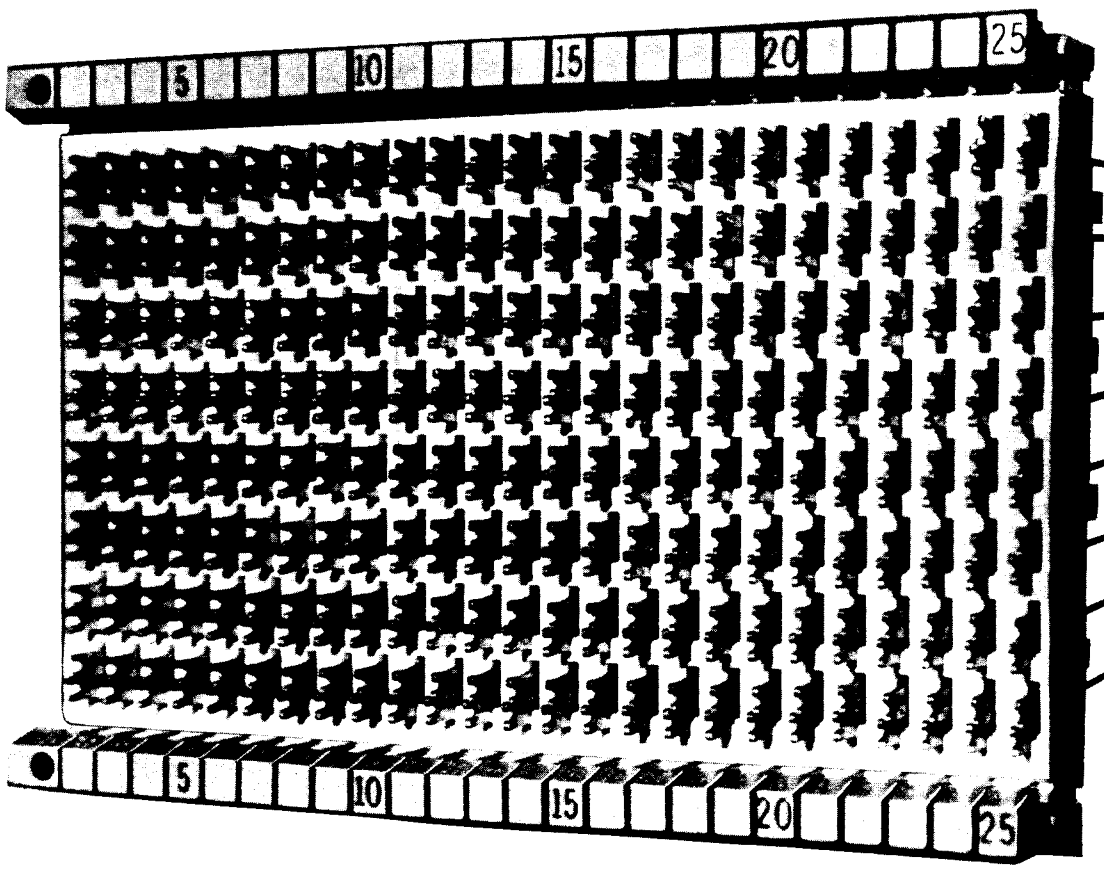


Figure 4-3. 78-Type Connecting Block — 100-Pair Terminal Arrangement

4.1.3 Frame Mounted Bridge Lifter Blocks

Bridge lifter blocks can be used on *COSMIC* and conventional distributing frames to open (lift) idle bridge-tapped cable pairs from a telephone circuit. The bridge lifter assembly used on *COSMIC* DFs is a 112-type connecting block equipped with a 1574D bridge lifter (Figure 4-4). The bridge lifter assembly used on conventional distributing frames is an 89-type connecting block equipped with a 1574D bridge lifter.

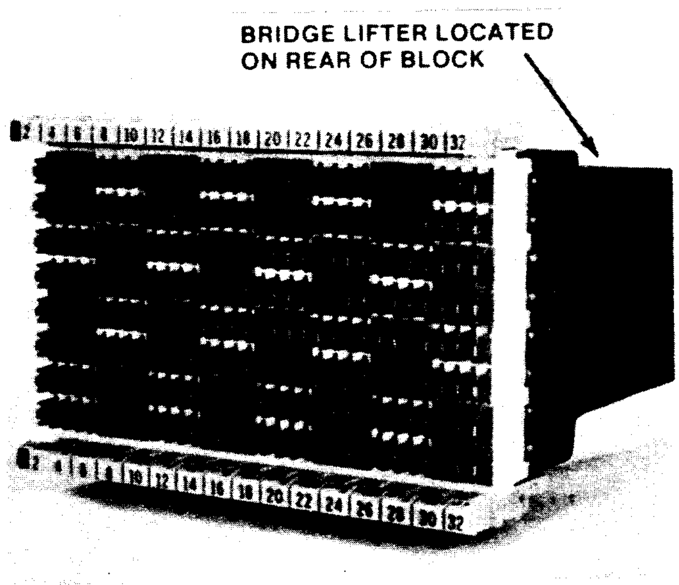


Figure 4-4. Bridge Lifter Block Connector — 112-Type

4.2 Connectors and Stub Cables

Central office connectors are used for terminating and protecting outside plant cables. They are used on *COSMIC* IIA and Mini DFs and on some protector frames associated with *COSMIC* IA and I DFs. Most of the connectors use 4-, 4-, or 5-type protector units that are ordered separately to provide electrical protection. The 5-type protector units provide continuity only. Table 4-A is a quick overall connector selection guide. For specifications and ordering information, see the individual connector descriptions that follow.

Table 4-A. CONNECTOR — FRAME SELECTION GUIDE

CONNECTOR CODES	*COSMIC* IIA, *COSMIC* MINI FRAMES	PROTECTOR FRAMES			SPECIAL PURPOSE PROTECTOR FRAMES		
		MODULAR HIGH DENSITY	MODULAR	LOW-PROFILE DOUBLE-SIDED	AT-9049	SDA	XLBET
307/407	X				X		
308		X		X			
309						X	
302			X	X			
195 Protector*							X

* The 195 protector unit is mounted on the Extra Large Building Entrance Terminal (XLBET) or on walls and backboards.

Most connectors (except 307-type) are equipped with a factory-terminated stub cable with color coded 22- or 24-gauge (.64 or .51 mm) conductors. The gauge of the connector stub is determined by the gauge of the feeder or riser cable to be terminated. The connector stub should be at least two gauge sizes larger than the cable to be terminated, such as a 24-gauge (.51 mm) feeder should use a 22-gauge (.64 mm) stub.

4.2.1 307-Type Connectors

The 307-type connectors are used on the *COSMIC* IIA and *COSMIC* Mini DF Systems. The two main components of the 307-type connector used on the *COSMIC* IIA and *COSMIC* Mini DFs are the protector panel and the connecting block, which are interconnected with a 100-pair wiring harness shown in Figure 4-5. This harness consists of 200 individual conductor leads of 26-gauge (.40 mm) wire or four 25-pair, 24-gauge (.51 mm) twisted-pair cables. The twisted-pair cables are equipped with either wire-wrap or quick-clip connecting blocks.

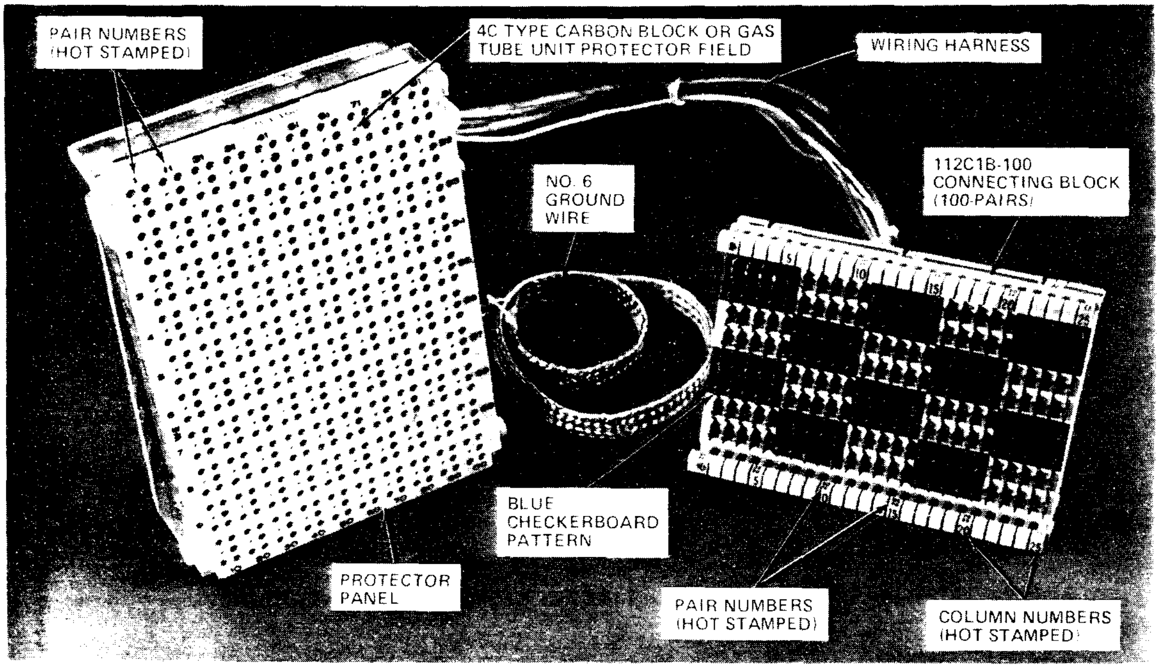


Figure 4-5. 307D1-100 Connector-Front View

The 307-type connectors are available with standard 78-type blocks (four-beam terminals) and 112-type blocks equipped with either three-beam terminals (bifurcated quick clips) or wire-wrap terminals. Connecting blocks are described in paragraph 4.1. The 307-type connectors are also available with eight 710 connectors.

High density 307H-type connectors can be used on *COSMIC* IIA frames to provide 5,100 protected pairs and 1,800 unprotected pairs per bay. Ten 307H-type connectors can be installed on a shelf with space for two additional 112H-100-type connecting blocks. The 307H-type connectors can be used on *COSMIC* II frames with shelf adapters per ED-6C142-30 G3 and G4.

Other codes available include the 307C1-100, which is used for T-Carrier terminations for which cross-connect capability is not required. Special 307C2 through C7-100 connectors are used with *SLC** Carrier Systems in 80-type cabinets.

The 307-type connectors use 4-type protector units (see AT&T 201-208-100). The 307-type connectors with protector units provide for voltage protection, current protection, testing, identification of special circuits, and disconnection of the outside cable pair from the central office equipment.

The 307-type connectors have additional backplane wiring that interconnects the protector panel to four 710-SD-25 connectors (Figure 4-6). These connectors provide for rapid connection to 100-pair cable stubs (11C or 11D type) equipped with mating 710-BD-25 connectors.

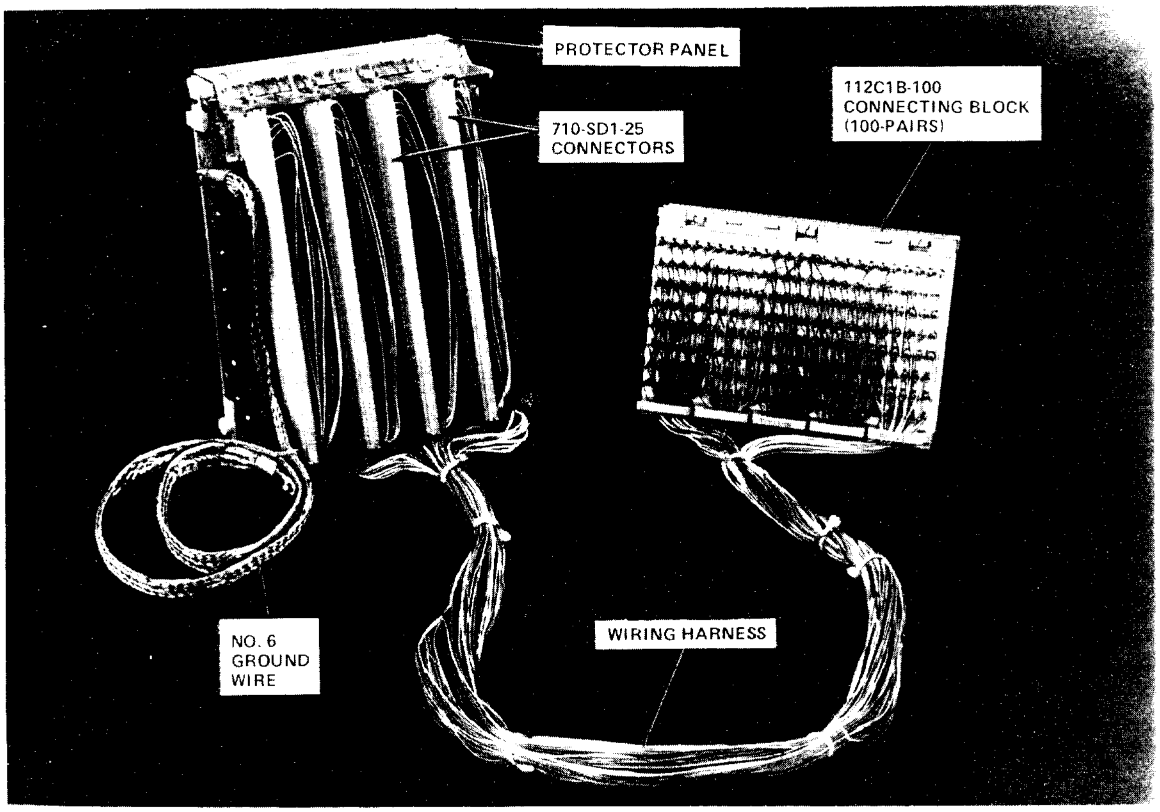


Figure 4-6. 307D1-100 Connector — Back View

A new UL-Listed 307LD2-100 connector (Figure 4-7) offers the features of the standard 307D2-100 connector, but with the added benefit of being listed by UL. This connector is factory-equipped with a 26-gauge (.4 mm), 100-pair stub cable.

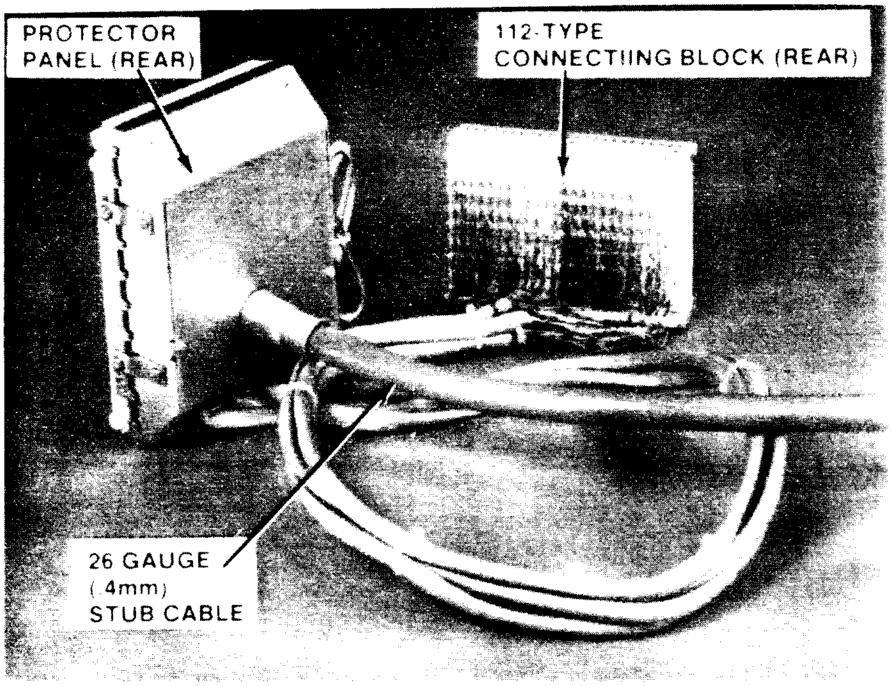


Figure 4-7. 307LD2-100 Connector (UL Listed)

4.2.2 11-Type Connectorized Stub Cables

Stub cables (Figures 4-8 and 4-9) are used with 307-type connectors to interconnect to outside plant cables and must be ordered separately (with the exception of the 307L2D-100 UL connector, which is factory-wired with a 26-gauge (.4 mm) stub cable). These stubs have 22- or 24-gauge (.64 or .51 mm) copper conductors and are insulated with color-coded polyvinyl chloride (PVC). One end of the stub is terminated with 25-pair 710-BD1-25 bridging modules. The cable contains a mylar tape wrap, a corrugated aluminum shield, an outer PVC sheath, and an aluminum-covered moisture plug at the connectorized end of the stub cable. This cable is UL-Listed type "CMR," suitable for riser applications. Both the 22- and 24-gauge (.64 and .51 mm) stub cables have a nonflammable light olive-gray sheath. The 22-gauge (.64 mm) stub cable can be identified by a red binder around the core wrapper; the 24-gauge (.51 mm) cable has a white binder.

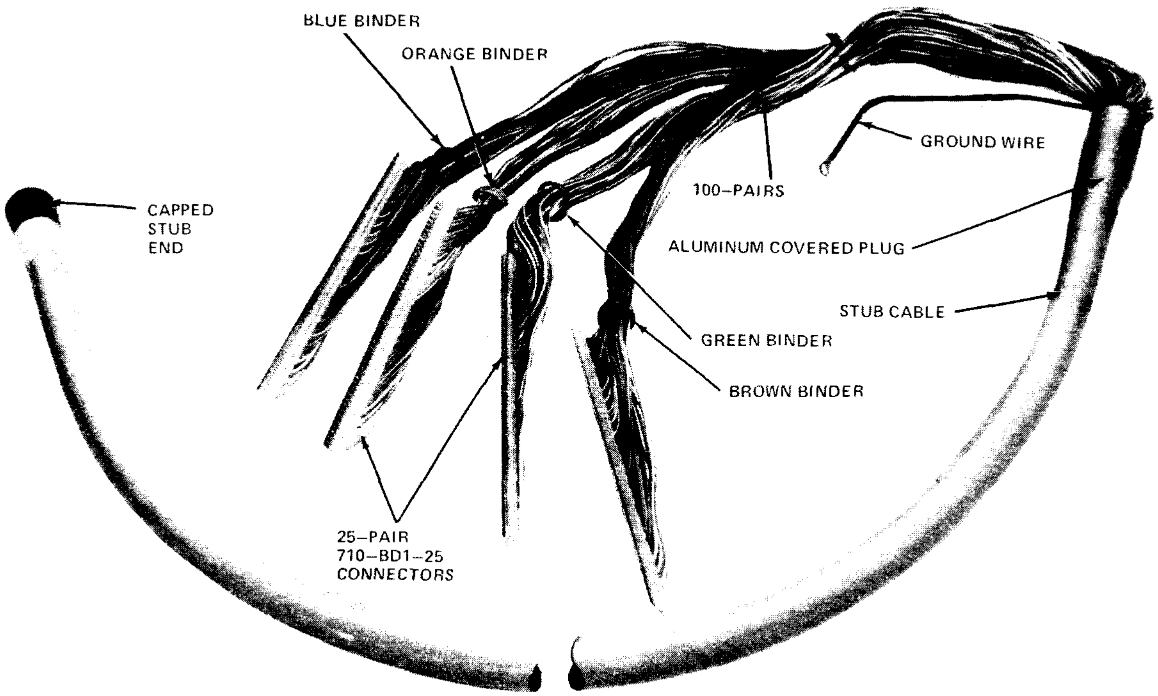


Figure 4-8. 11-Type Connectorized Stub Cable

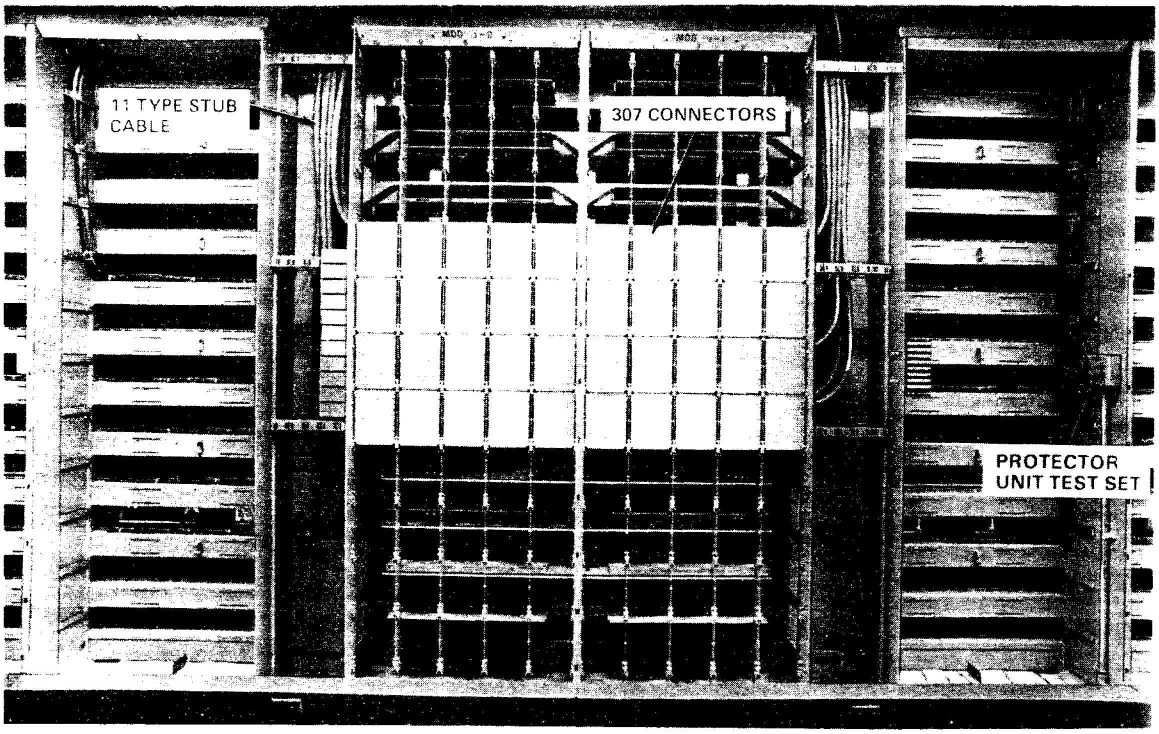


Figure 4-9. *COSMIC* IIA Distributing Frame (Back View)

4.2.3 407-Type Connectors

The 407-type non-protected connector (Figure 4-10) is used on *COSMIC* IIA and *COSMIC* Mini DF Systems. Like the 307-type connector, it mounts in the cross-connect/protection bays of these frames. The connector is equipped with a 100-pair, 112-type connecting block, and four 710-type splicing connectors (Figure 4-11). It does not have a ground system. Continuity between cabling and the cross-connect block can be made using either 5-type continuity plugs or 4C12C continuity only protectors, which provide test access.

The 407-type connector is intended for applications where protection is not required, such as to terminate the derived-pair circuits of loop carrier systems. Many telephone companies have been using standard 307-type protected connectors for these circuits. This allows the craft to perform cross-connect and service-denial operations for these circuits. Connectors used in this manner are often referred to as "pseudo-connectors".

The 407-type non-protected connector, equipped with continuity-only plugs, is a lower cost alternative to the 307-type "pseudo-connector".

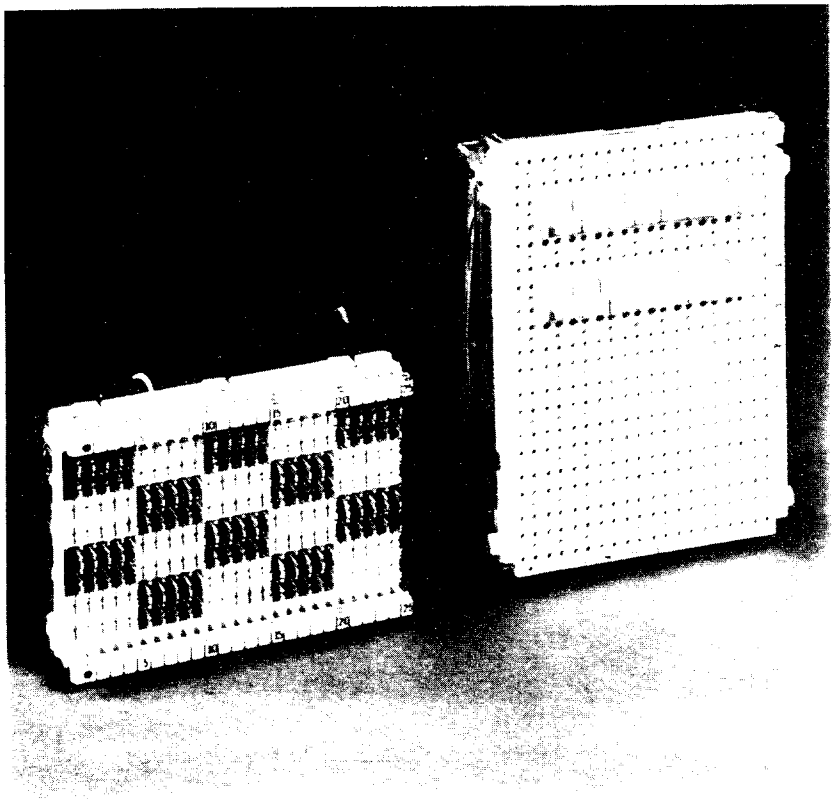


Figure 4-10. 407-Type Connector — Front View

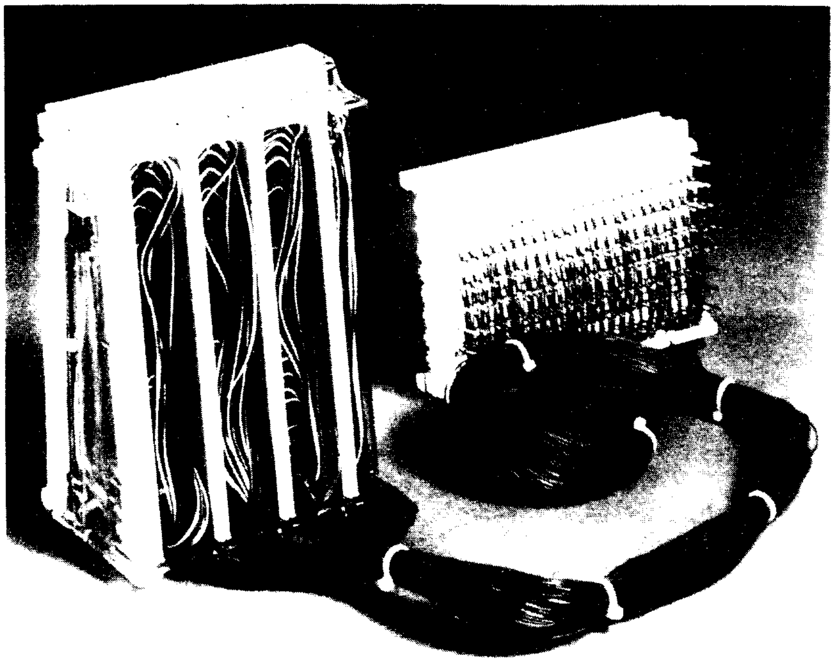


Figure 4-11. 407-Type Connector — Back View

4.2.4 308-Type Connectors

The 308A1, B1, or E1 connector is used to terminate outside plant cables on the high-density modular protector frame (ED-97898-31). These connectors are tie cabled to connecting blocks on the MDF. The 308A3, B3, or E2 connector is used to terminate outside plant cables and provide facilities for tie pairs to the MDF on the low profile double-sided conventional protector frame or a modified ED-97755-70 frame. These connectors, used for double-sided protector frames, have a hinged mounting bracket that allows the connector panel to swing out for access to the backplane cable. The 308-type connectors, with protector units, provide features for voltage protection, current protection, testing, identification of special circuits, and disconnection of the outside cable pair from the central office equipment.

The 308-type connectors are available in two options: Type 1 and Type 2, Hinged

The 308-type 1 connector (Figure 4-12) is a high-density connector used to terminate outside plant cables on the High-Density Modular Protector Frame, ED-97898-31. It provides electrical protection for 100 cable pairs when equipped with 4-, 4-, or 5-type protector units. The connectors are available with 22- or 24-gauge (.64 or .51 mm) reversible cable stubs in 30-(9 m), 50-(15 m), 80-(24 m), 100-(30 m), 150-(46 m), and 200-foot (61 m) lengths. A 100-pair test terminal field is provided. The P or R test connectors mate with the test field for automatic or pair-at-a-time testing.

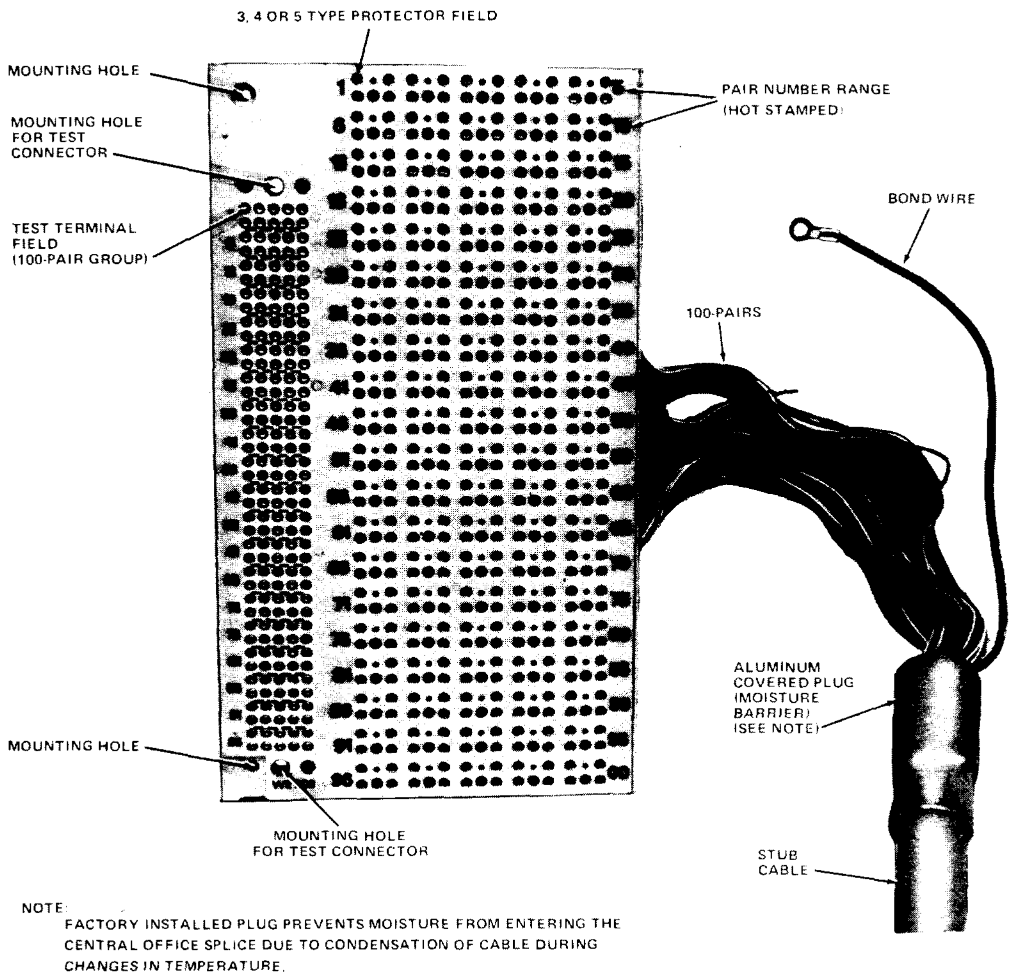


Figure 4-12. 308-Type Connector for Use on High-Density Modular Protector Frame

The 308-type 2 connector (Figures 4-13) is a high-density connector used to terminate outside plant cables on the ED-97755-71 or modified ED-97755-70 Low-Profile Double-Sided Protector Frames (LPDPF). This type is basically the same as the 308-type 1 connector except for its mounting arrangement on the protector frame. The 308-type 2 connector has a hinged mounting bracket which attaches to the vertical bar of the LPDPF. The connectors are available with 22- or 24-gauge (.64 or .51 mm) reversible stubs in 30- (9 m), 50- (15 m) , 80- (24 m) , 100- (30 m), 150- (46 m), and 200-foot (61 m) lengths.

Common features of the 308-type 1 and 2 connectors are:

- Both have the same molded plastic panel that measures 10-5/8 inches (270 mm) high by 6 inches (152 mm) wide.
- Both contain a 100-pair test terminal field that can be accessed with either the multipair P test connector (AT-8906) or the single pair-at-a-time R test connector (AT-8916).
- Both use the same auxiliary devices, such as reversing plugs, minibridge lifters, test cords and plugs, warning markers and guards, etc.

Eight 308-type connectors can be mounted on one protector frame vertical to terminate 800 pairs.

The front panel contains gold-plated terminals for a 5 by 20 array of 3-, 4-, and 5-type protector units (ordered separately).

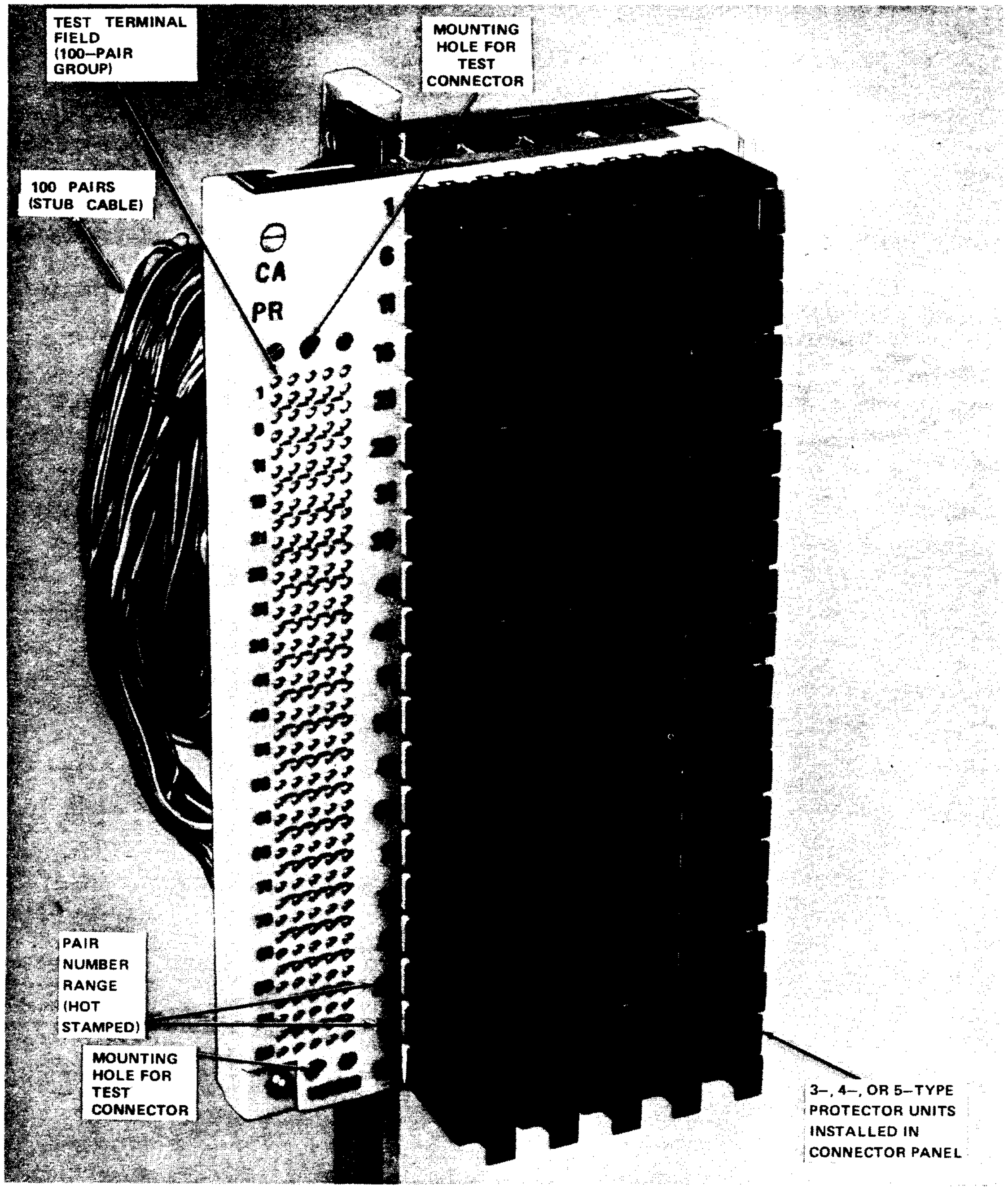


Figure 4-13. 308-Type Connector for Use on Low-Profile Double-Sided Conventional Protector Frame

4.2.5 302-Type Connectors

The 302A1, B1, and E1 connectors are used to terminate outside plant cables on the ED-1A220-31 modular protector frame for use with SMDFs. When the high-density modular protector frame (ED-97898-31) is utilized, the high-density 308-type connector should be used. For new applications the 308-type connector is recommended over the 302-type, due to its higher termination density.

The 302A4, B4, and E3 connectors are used to terminate outside plant cables and provide facilities for tie pairs to the MDF on the low profile and tall double-sided conventional protector frame. These connectors, used for double-sided protector frames, have a hinged mounting bracket that allows the connector panel to swing out for access to the backplane cable.

The 302-type connectors (Figure 4-14) with protector units provide features for voltage protection, current protection, testing, identification of special circuits, and disconnection of the outside cable pair from the central office equipment.

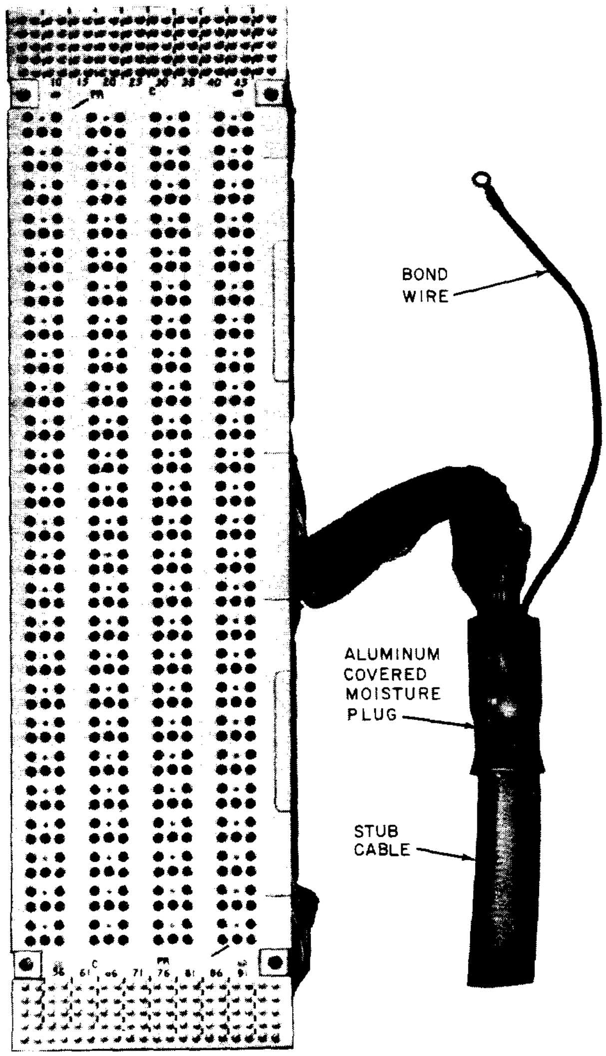


Figure 4-14. 302-Type Connector

4.2.6 309-Type Connectors

The 309-type connectors are used on the ED-97755-72 low-profile double-sided protector frame for use with SMDFs. The 309-type connector may also be used on the ED-97754-74 low-profile conventional distributing frame, the ED-6C331-70 single-sided low-profile distributing frame, and the Sliding Drawer Assembly protector frame.

The 309-type connectors with protector units, provide features for voltage protection, current protection, testing, identification of special circuits, and disconnection of the outside cable pair from the central office equipment. The 200-pair, 309-type connector measures 11-1/8 inches (283 mm) wide, 11 inches (279 mm) high, and extends 4-7/8 inches (98 mm) outward from the frame vertical. This front facing connector consists of two separate 100-pair units, each mounted on adjacent frame verticals abutted in mirror image. Each 100-pair front panel contains gold plated terminals for a 5 by 20 array of 4C protector units. Nine 200-pair connectors can be mounted on one bivertical bay of an 8-foot 10-inch (2692 mm) high ED-97754-74 LPCDF. This is equivalent to 900 pairs per vertical on a conventional arrangement.

4.2.7 195-Type Protector for Extra Large Building Entrance Terminal (XLBET) Protector Frames

The 195-type protector (Figure 4-15) mounts on the XLBET or on walls and backboards. The 195-type protector is used as station protectors in buildings served by exposed cable.

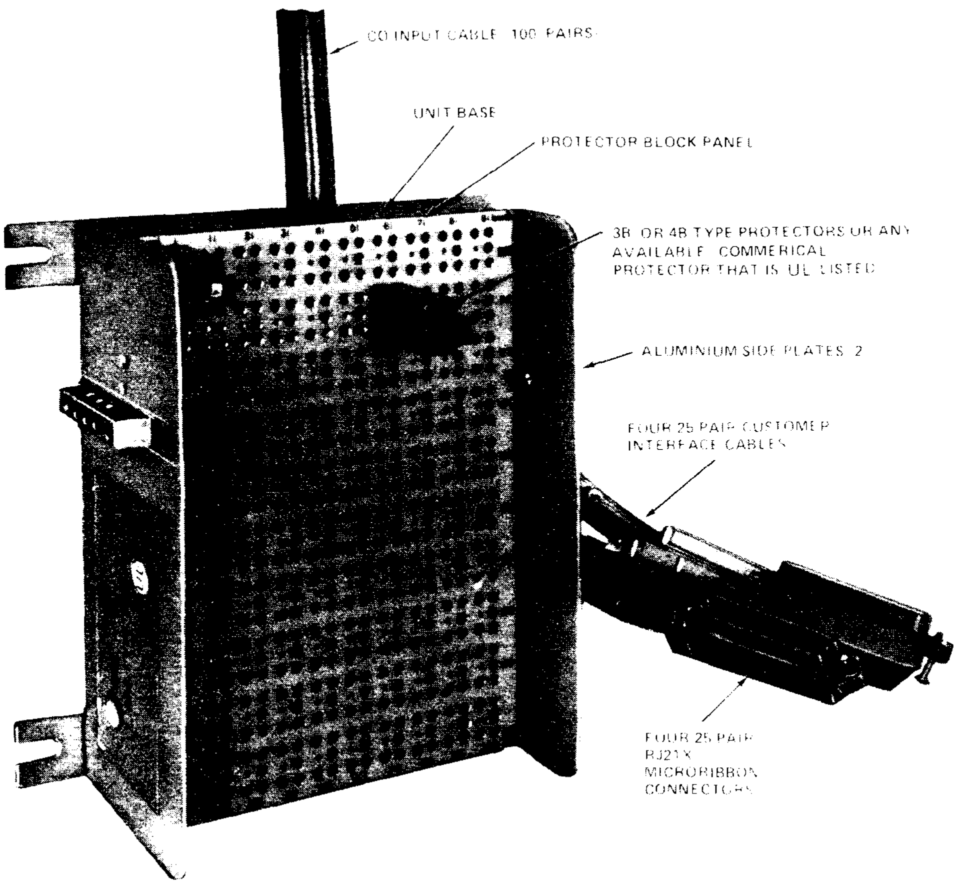


Figure 4-15. 195-Type Protector

The 195 protector family is specifically designed for large pair size installations where space limitations prevent the use of conventional building entrance protectors. The 195 family is UL Listed for indoor use and is available in wall-mounted or frame-mountable configurations.

4.3 Protector Units and Protector Unit Test Sets

AT&T plug-in protector units are inserted into connectors used on *COSMIC* DFs and protector frames to safeguard personnel, equipment, and the networks from hazards such as electrical shock, equipment damage, and fire caused by lightning and AC power faults. Each protector unit provides protection for one tip-ring subscriber pair. The plug-in protector units are not included with the various connectors and must be ordered separately.

All standard plug-in protector units are equipped with four gold-plated tip and ring pins and a solder-plated ground pin.

The plug-in protector units (Figure 4-16) are categorized by three types:

- **4-Type** — For voltage protection only.
- **4-Type** — Includes heat coils for sneak current protection and devices for over-voltage protection.
- **5-Type** — Dummy plug-in units that provide continuity only; used only where protection is not required.

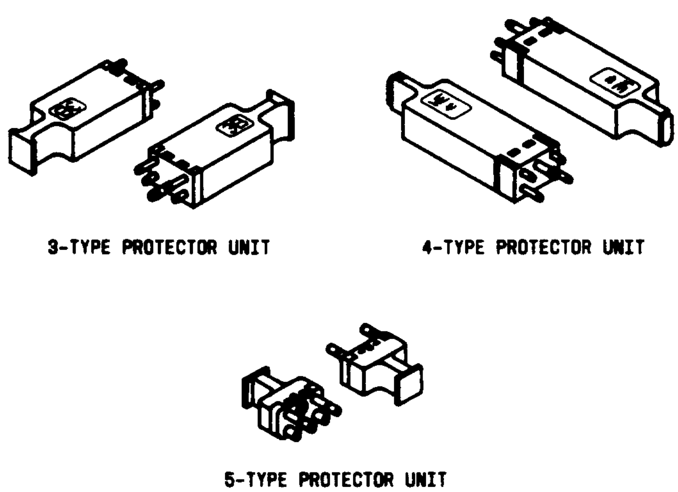


Figure 4-16. Typical 4-, 4-, and 5-Type Protector Units

PROTECTOR UNIT CODING SCHEME

EXAMPLE:

3 B 1 A

Denotes — Voltage Limiter Type (A)

A — Carbon blocks

C — Carbon blocks

E — General purpose gas tubes

E-R — REA approved gas tubes

E-W — General purpose gas tubes (wide gap)

F — *5ESS*® switch gas tubes

S — Solid-state device

SC — Solid-state device with test access holes

Denotes — Application and Housing Color (1)

1 — Black — Standard service

2 — Green — Service denial

3 — Red — Special service

4 — Yellow — PBX battery feed

9 — White — Tip/ring reversal

11 — Orange — Minibridge lifter

12 — Gray — Continuity only — no protection

Denotes — Housing Type (B)

A, B — Without test access (For use with 302- and 308-type connectors)

C — With test access (Intended for use with 307- and 309-type connectors)

Denotes — Type (3)

3-Type — Voltage protection only

4-Type — Voltage and sneak current

5-Type — Continuity only — no protection

4.3.1 3-Type Protector Units — Voltage Protection Only

The 3-type plug-in protector units (Figure 4-17) provide voltage protection only using carbon blocks, gas tubes, or solid-state devices for voltage limiting. (If sneak current protection is a concern, the 4-type protector units with heat coils should be considered.)

The 3B-A protector units are 1-11/16 inches (43 mm) high and utilize carbon blocks for voltage protection.

The 3BE-W protector units are also 1-11/16 inches (43 mm) high and utilize wide-gap 331-RL gas tubes for voltage protection. Note that the 3BE-W series has replaced the 3B-E series which has been discontinued.

The 3C-E and 3C-E-W protector units include test access through the protector and are intended primarily for use with 307-type connectors for *SLC*® 96 and *SLC* Series 5 carrier protection requirements.

The 3B1E-R and 3B3E-R protector units have 332-RL Rural Electrification Administration (REA) PE-80 approved gas tubes and are accepted for use by REA for central office and customer premises applications.

The 3C1S, 3C1SC, 3C3S, and 3C3SC protector units have electronic solid-state voltage limiting devices that provide superior protection for all applications and are compatible with all AT&T central office connectors and building entrance protectors. The "SC" types have test access holes.

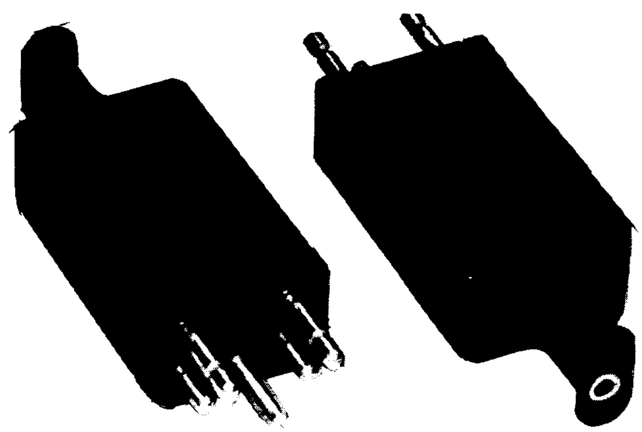


Figure 4-17. Typical 4-Type Protector Unit

4.3.2 4-Type Protector Units — Voltage and Sneak Current Protection

The 4-type plug-in protector units (Figure 4-18) provide both over-voltage and sneak current protection. Heat coils are utilized to protect against sneak current (abnormal over-current conditions too low to cause firing of the voltage limiting devices). The 4-type protector unit options for over-voltage protection include protector units with carbon blocks, gas tubes, or solid-state devices.

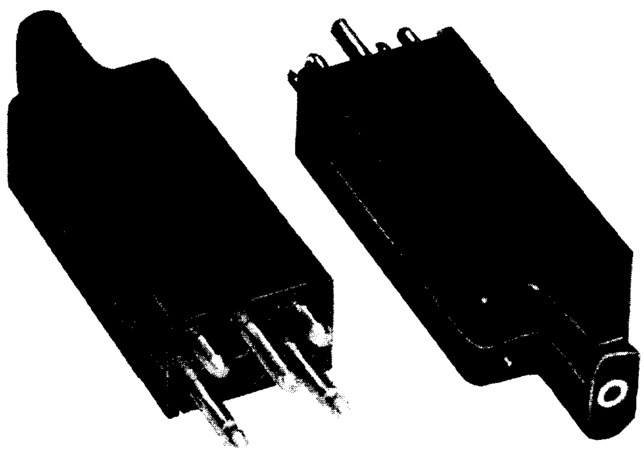


Figure 4-18. Typical 4-Type Protector Unit

The 4C-type protector units include test access through the protector housing and are designed for use with connectors that do not have a separate test field, such as 307- and 309-type central office (CO) connectors.

The 4B-type protector units are 2 inches (51 mm) high, and the 4C-types are 2-1/2 inches (64 mm) high.

The 4B-C and 4C-C protector units utilize carbon blocks for overvoltage protection.

The 4BE-W and 4CE-W protector units have two 331-RL wide-gap gas tubes for general purpose overvoltage protection applications. Note that the 4BE-Ws and 4CE-Ws have replaced the 4B-E and 4C-E series, respectively, and the E series has been discontinued.

The 4B-F and 4C-F protector units utilize two 205A gas tubes and are intended primarily for *5ESS* switch primary protection applications.

The 4B9F and 4C9F protector units contain a polarity reversing circuit board in addition to the gas tube protection and are utilized for tip/ring reversal applications at the central office. Note that the 4B9C, 4B9E, 4C9C, and 4C9E codes have been discontinued and replaced by the F codes.

The 4B12C and 4C12C protector units do not provide any protection and are intended for use with 310-/311-, and 407-/309-type connectors, respectively, to provide continuity only.

The 4C1S solid-state protector (SSP) is an alternative to plug-in protectors with carbon blocks or gas tubes for central office, building entrance, and other applications where superior protection and improved reliability are desirable. Fast clamping at low voltages as well as stable, quiet, and truly balanced SSP performance can significantly reduce failure rates for both protector units and protected surge sensitive equipment. Where improved protector reliability is important for applications such as critical service lines, precise breakover voltage, operation and lower power dissipation due to the low on-state voltage and high surge-current capability, the SSP is ideal.

The 4C3S-75 solid-state protector unit provides the same benefits as the 4C1S solid-state protector unit but is intended only for building entrance and central office applications on circuits not subject to normal ringing voltages, such as those serving digital terminals.

4.3.3 5-Type Protector Units — Continuity and/or Ground Only

The 5-type plug-in unit (Figure 4-19) provides no electrical protection and contains no carbon blocks, gas tubes, or heat coils. It is used to maintain circuit continuity between outside plant and central office equipment.

The 5A2D plug-in unit, used to deny service, does not provide continuity to the central office equipment.

The 5A9D plug-in units contains a polarity reversing circuit board. Tip and ring out is reversed from tip and ring in.

The 5AGND plug-in unit is a grounding device used to ground unused feeder pairs for customer premises applications.

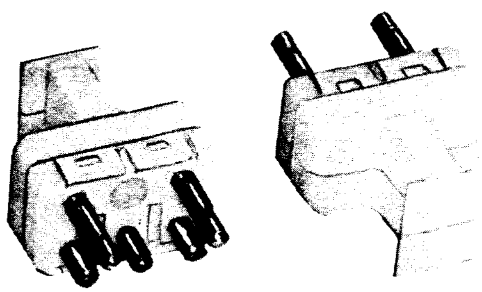


Figure 4-19. Typical 5-Type Protector Unit

4.3.4 Test Sets for Protector Units

KS-20100 Test Set for 4-Type and 4-Type Protector Units

The KS-20100 test set (Figures 4-20 and 4-21) is used for testing 4- and 4-type protector units. The protector units may be tested without disassembly for tip and ring continuity and shorted or grounded protector blocks. The test set also provides a burnout feature to clear carbon-type protector blocks that become shorted by carbon or dust particles. Two mounting arrangements are available: List 1 as an integral part of the modular protector frame, List 2 and List 5 as conduit-type mountings.

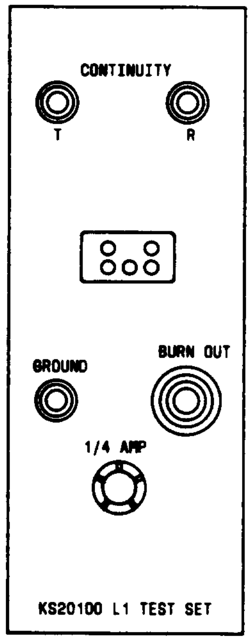


Figure 4-20. KS-20100, L1 Test Set

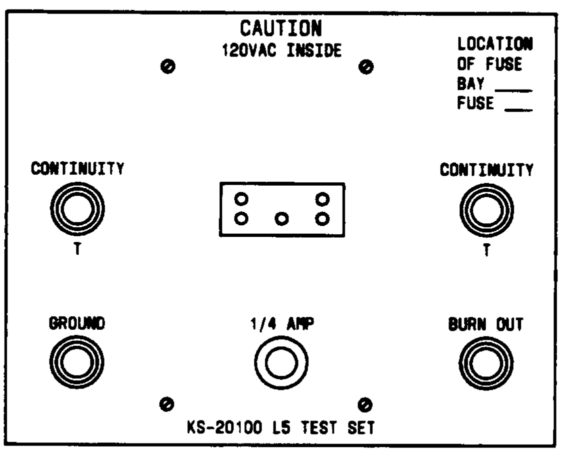


Figure 4-21. KS-20100, L5 Test Set

182A Test Set for Minibridge Lifters

The 182A test set (103016549) (Figure 4-22) is used to test the minibridge lifter protector units for tip and ring continuity and for shorted protector blocks. It also tests the function of the 410A switch contained in the protector unit. The 182A test set is housed in a conduit box for wall mounting, or mounting on the inside wall of a *COSMIC* DF cross-connect bay. For short-term testing or service denial, protector units may be partially withdrawn to the detent position. When the protector unit is pulled out to the detent position, the **central office of customer premises equipment** is disconnected to isolate outside plant cable pairs for testing purposes. In this position, voltage protection is still provided on the outside plant cable pair. Removing the protector unit from the connector opens the circuit and removes all protection.

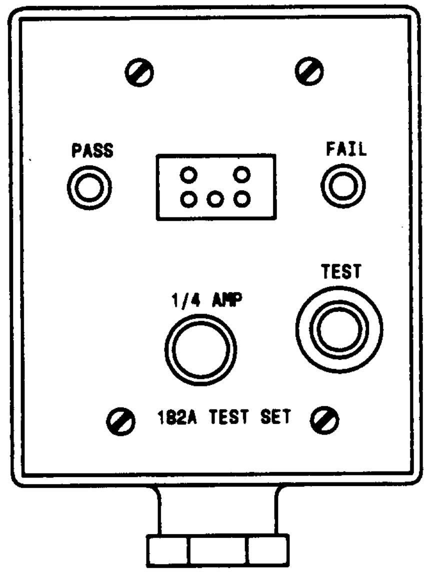


Figure 4-22. 182A Test Set

A4H402, L1 Protector Breakdown Test Set

The protector breakdown test set (Figure 4-23) is an accurate, direct reading digital tester for measuring breakdown voltage of both gas tube and carbon surge arresters. This test set has been approved by Bell Laboratories and is modified to include testing capabilities for 4CF-type and 3D1F-type protectors used with *5ESS* switch offices.

Figure 4-23. A4H402, L1 Protector Breakdown Test Set

The testing procedure using the A4H402 test set is directed at verifying the voltage limiting capability of each protector. It is important that all protectors are checked to ensure the safety of telephone plant personnel and to reduce the possibility and extent of equipment damage in the event that foreign potentials come in contact with outside plant. The A4H402, L1 protector breakdown test set provides a reading that is a true representation of cold tube breakdown voltage compared to repetitive firing testers that read only average breakdown value. Accuracy is unaffected by physical abuse, unlike testers using moving coil meters, since the A4H401, L1 has no delicate moving parts. The case is lightweight and rugged.

4.4 Wire Connection Tools

4.4.1 Wire Insertion Tools

756C- and 950C-Type Quick-Clip Wire Insertion Tools

New 756C- and 950-type wire insertion tools are available with a new wire-insertion bit that works with both 78- and 112-type connecting blocks. The same tool can be used to insert 24- or 22-gauge (.51 or .64 mm) cross-connect wire into 112-type "4-beam" terminals, the new "2-beam" terminals, or the older 78-type "4-beam" terminals. This allows additional terminating capacity to be added to frames equipped with 78-type blocks by simply switching to the newer high-density 112-type blocks, without sacrificing efficient jumper cross-connect operations.

The new wire-insertion tool bits are available in either high-impact nylon plastic or stainless steel. The plastic bits are low cost and disposable; they wear out after several thousand insertion operations. Replacement bits are available in bags of five or fifty.

New 756C- and 950-type tools are available with either plastic or metal bits, as listed in Table 4-B. The 950-type tool (Figures 4-24 and 4-25) is a multipurpose tool that is equipped with a wire-insertion tool, wire cutter, and a wire-removal tool. The 756-type tools (Figures 4-26 and 4-27) are wire-insertion tools only. The new tools replace the older 950A, 950B, 756C3, and 756C4 tools.

Table 4-B. WIRE INSERTION TOOLS AND BITS

Apparatus Code	Ordering Comcode	Description
950C Tool	105 564 835	Multipurpose tool equipped with a plastic bit and 5 replacement bits
950C-1 Tool Spare Parts	105 611 537	Replacement plastic bits (Qty 5)
950C-1 Tool Spare Parts	106 435 365	Replacement plastic bits (Qty 50)
950C1 Tool	106 230 543	Multipurpose tool equipped with a metal bit
950C1-1 Tool Spare Parts	106 230 568	Replacement metal bit (Qty 1)
756C5 Tool	105 564 827	Tool equipped with a plastic bit and 5 replacement bits
756C5-1 Tool Spare Parts	105 611 545	Replacement plastic bits (Qty 5)
756C5-1 Tool Spare Parts	106 435 182	Replacement plastic bits (Qty 50)
756C6 Tool	106 230 527	Tool equipped with a metal bit
756C6-1 Tool Spare Parts	106 230 535	Replacement metal bit (Qty 1)

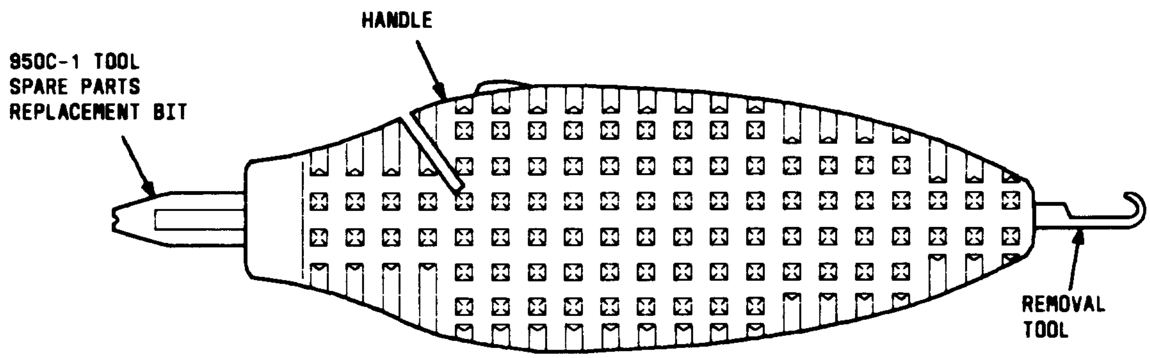


Figure 4-24. 950C Wire Insertion/Removal/Cutter Tool

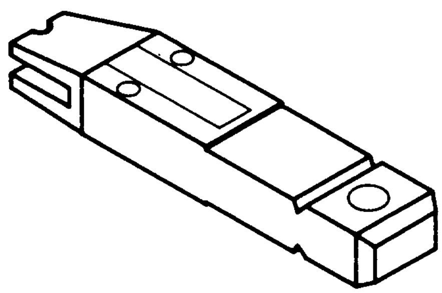


Figure 4-25. Insertion Bit for 950C Tool

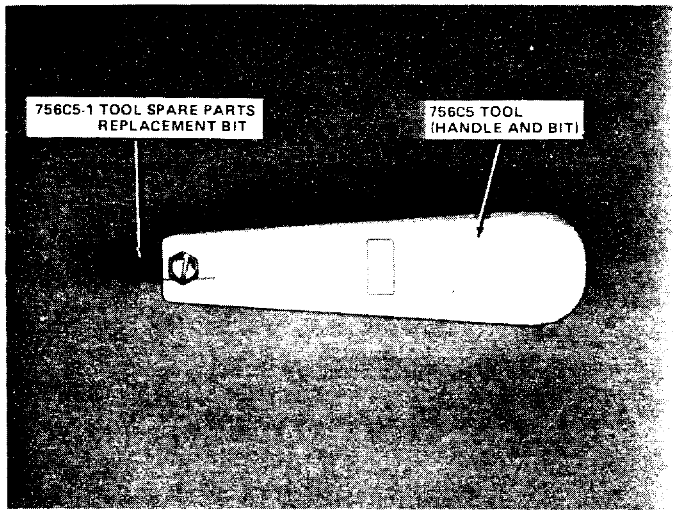


Figure 4-26. 756C Wire Insertion Tool

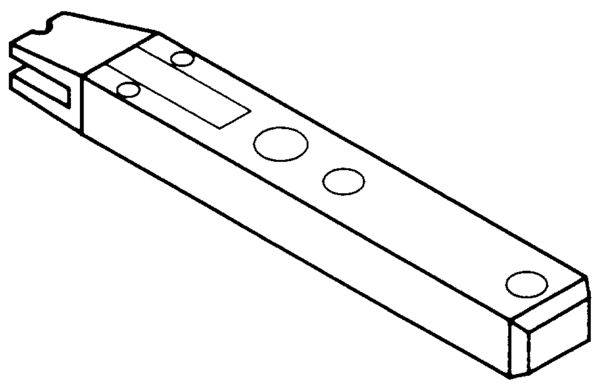


Figure 4-27. Insertion Bit for 756C Tool

4.4.2 Wire Removal Tools

980A Wire Removal Tool

The 980A wire removal tool (Comcode 103809125, Figure 4-28) is designed to remove terminated conductors without leaving debris in the clip. It consists of a two-prong fork with an insulated handle. The prongs of the fork are sized to fit around the clip beneath the seated conductor. Use of the tool reduces the possibility of disturbing or degrading adjacent wire connections during the removal of wire.

Figure 4-28. 980A Wire Removal Tool

KS-20827, L1 Wire Unwrapping Tool

The KS-20827, L1 wire unwrapping tool (Comcode 400751376, Figure 4-29) is a manually operated tool used for unwrapping and removing 22-, 24-, and 26-gauge (.64, .51, and .40 mm) wire from terminals having solderless wrapped connections.

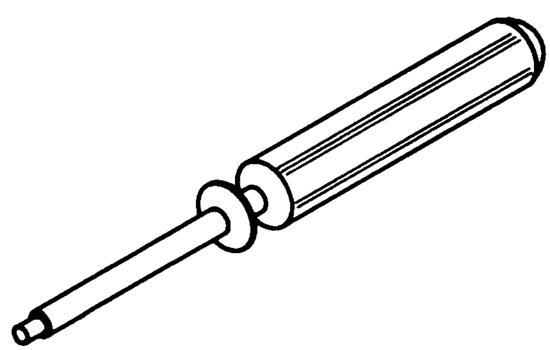


Figure 4-29. KS-20827, L1 Wire Unwrapping Tool

KS-22035, L2 Spudger

The KS-22035, L2 plastic spudger (Comcode 405423260, Figure 4-30) is a narrow 6-21/32 inch (169 mm) long nylon hand tool. One end is tapered to a 1/16-inch (1.6 mm) diameter point with an L-shaped wire hook extension, while the other end tapers to a flat, 3/16-inch (4.8 mm) wide and 1/16-inch (1.6 mm) thick, notched extension. The spudger is used in a variety of wiring operations such as testing solder connections, dressing wires, and removing pieces of wire and insulation from terminals.

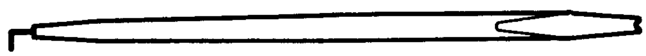


Figure 4-30. KS-22035, L2 Spudger

4.4.3 Wire Stripping Tools

KS-16902, L1 Wire Stripper

The KS-16902, L1 stripper (Comcode 996780607, Figure 4-31) is a pistol-grip tool used for cutting and stripping 22- and 24-gauge (.64 and .51 mm) PVC-, IPVC-, BU-, or U-type wire for wire-wrap operations.

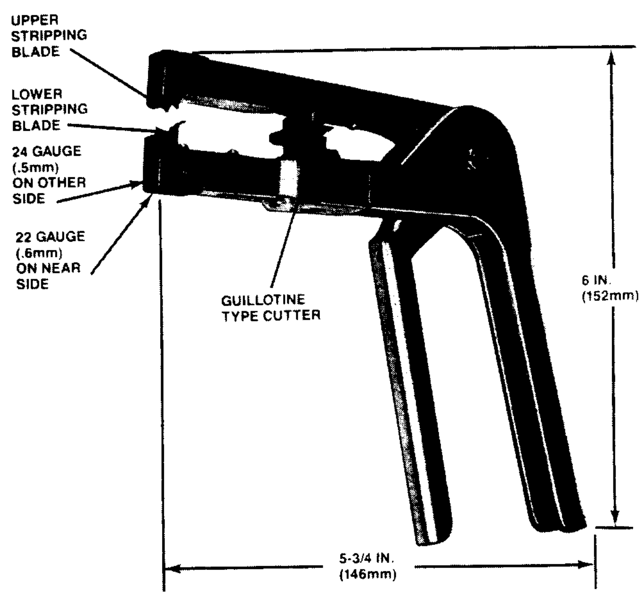


Figure 4-31. KS-16902, L1 Wire Stripper

KS-20620 Wire Strippers

The KS-20620 strippers (Figures 4-32 and 4-33) are convenient, small, lightweight tools with sharp-edged grooves for removing insulation from distributing frame wire. List 1 is the basic insulation removal tool. Lists 2 and 3 have a thumb-operated shear, mounted on the stripper handle, that provides a stripped length of 1-5/8 inches (41 mm). List 4 has two (paired) strippers mounted back to back. Lists 5 and 6 provide stripping slots for two wire gauges plus a thumb-operated shear for 1-5/8 inch (41 mm) stripped length. List 7 is used for stripping and cutoff of DT22P wire (Table 4-C).

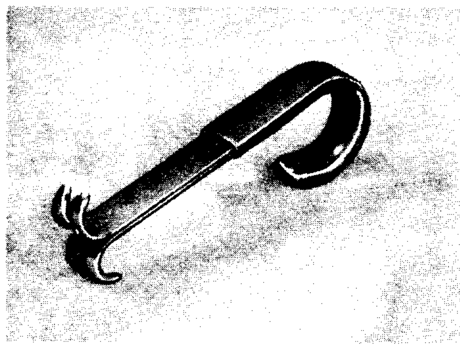


Figure 4-32. KS-20620, L4 Wire Stripper

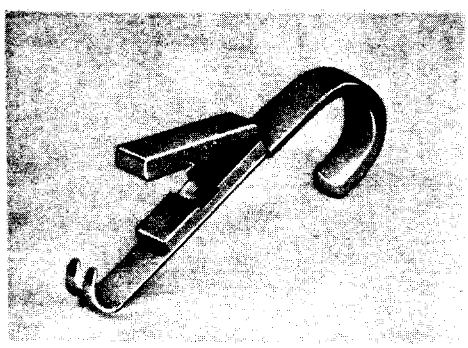


Figure 4-33. KS-20620, L7 Wire Stripper

Table 4-C. KS-20620 WIRE STRIPPER SPECIFICATIONS

FUNCTION	WIRE GAUGE	COLOR OF PLASTIC HANDLE	CODE	COMCODE
Stripper Only	22 (.64 mm)	Red	KS-20620, L1	400890596
Stripper and Cutoff	22 (.64 mm)	Red	KS-20620, L2	400890604
Stripper and Cutoff	24 (.51 mm)	Black	KS-20620, L3	400890612
Dual Stripper and Cutoff	20 & 22 (.81 & .64 mm)	Red	KS-20620, L4	400893111
Dual Stripper and Cutoff	22 & 24 (.64 & .51 mm)	Red	KS-20620, L5	400890547
Dual Stripper and Cutoff	24 & 26 (.51 & .40 mm)	Black	KS-20620, L6	400893129
DT-22P Stripper and Cutoff	22 (.64 mm)	Red	KS-20620, L7	401346291

4.4.4 Wire Wrapping Tools

KS-16363, L3 Wire-Wrapping Tool

The KS-16363, L3 wire-wrapping tool (Comcode 402168090, Figure 4-34) is manually operated by a hand grip and is used for 22-, 24-, and 26-gauge (.64, .51, and .40 mm) solderless wire-wrapped connections. A finger operated chuck is compatible with KS-20963 sleeves. Wrapping bits (KS-16734 and KS-16903) and sleeves (KS-20963) are ordered separately. The KS-16363, L3 replaces the KS-16363, L1 and L2 wire-wrapping tools rated Discontinued Availability (DA).

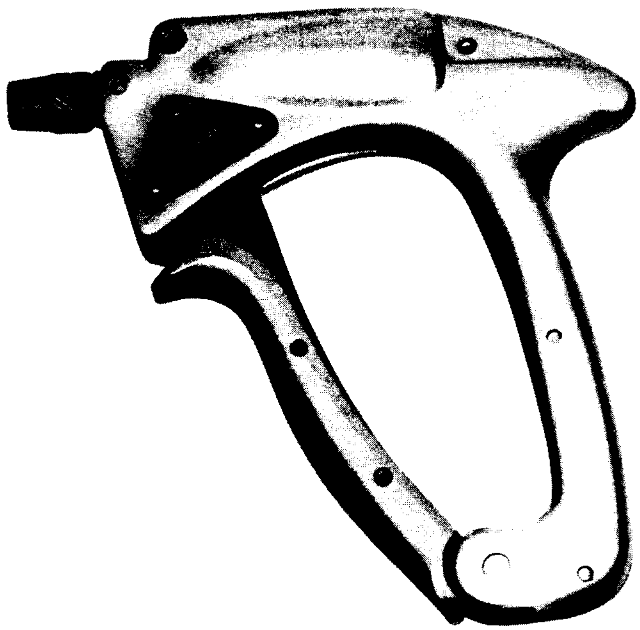


Figure 4-34. KS-16363, L3 Wire-Wrapping Tool

KS-21232, L1 Electric Wire-Wrapping Gun

The KS-21232, L1 wire-wrapping gun (Comcode 401849609, Figure 4-35) is a pistol-shaped, double-insulated electric powered tool used for 22-, 24-, and 26-gauge (.64, .51, and .40 mm) solderless wire-wrapped connections. Wrapping bits (KS-16734 and KS-16903) and sleeves (KS-20963) are ordered separately.

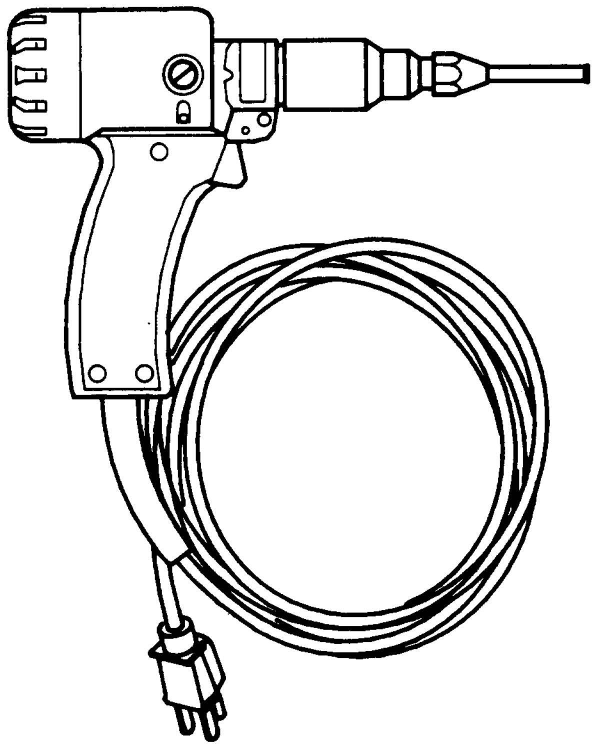


Figure 4-35. KS-21232, L1 Electric Wire-Wrapping Gun

Wire-Wrapping Bits and Sleeves

The KS-16734, L1 wrapping bit is intended for use with the KS-20963, L2 wire-wrapping sleeve and driver tools such as the KS-16363, L3 wire-wrapping tool and KS-21232 wire-wrapping gun. The KS-16903, L1 wrapping bit is intended for use with the KS-20963, L3 wire-wrapping sleeve and driver tools such as the KS-16363, L3 wire-wrapping tool and KS-21232 wire-wrapping gun (Figures 4-36, 4-37 and Table 4-D).

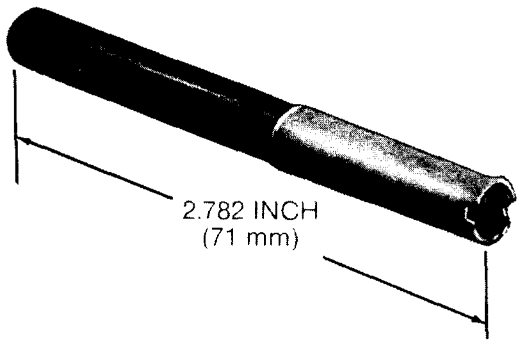


Figure 4-36. KS-20963 Sleeve

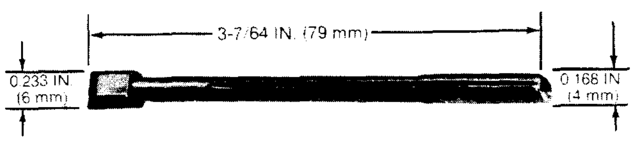


Figure 4-37. KS-16734 and KS-16903 Wrapping Bit

Table 4-D. WIRE-WRAPPING TOOL SLEEVES AND BITS SPECIFICATIONS

WIRE GAUGE	SLEEVE			BIT		
	COLOR	ID	COMCODE	COLOR	ID	COMCODE
22, 24 (.64 & .51 mm)	Red	KS-20963, L2	400897781	Red Band	KS-16734, L1	996811378
24, 26 (.51 & .40 mm)	Yellow	KS-20963, L3	400897799	Green or Yellow Band	KS-16903, L1	400011334

4.4.5 Wire Pliers

KS-21257 Pliers

The KS-21257 pliers (Figure 4-38 and Table 4-E) are used for cutting wire and for crushing and stripping insulation on 22-gauge IPVC insulated wire. They are primarily intended for preparing the ends of jumper wire prior to wire wrapping or soldering. The tips are knurled to facilitate wire handling. An etched mark 1-5/8 inches (41 mm) from the end indicates the correct stripping length for 22-gauge (.6 mm) wrapped connections. Handles are covered with yellow plastic cushion grips. Pliers are available with short or long jaws and aluminum oxide coating for insulation purposes.

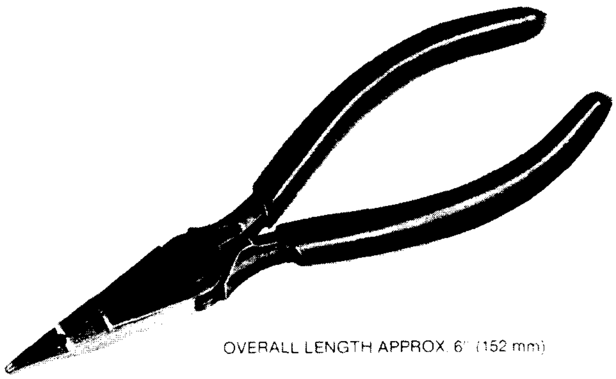


Figure 4-38. KS-21257 Pliers

Table 4-E. KS-21257 PLIER SPECIFICATIONS

DESCRIPTION	LENGTH	CODE	COMCODE
Plain jaws	6-5/8" (168 mm)	KS-21257, L1	401229448
Aluminum oxide coated jaws	6-5/8" (168 mm)	KS-21257, L2	401229455
Plain jaws	5-3/4" (146 mm)	KS-21257, L3	402048870
Aluminum oxide coated jaws	5-3/4" (146 mm)	KS-21257, L4	402048888

4.4.6 Ladders and Reels

KS-21415 Rolling Platform Ladders

The KS-21415 personnel ladder provides access to upper levels of *COSMIC* DFs and protector frames. The ladder is available in a basic configuration or equipped with wire reel and wire guide. It has a fold down upper step to provide a convenient work surface on higher elevations and retractable swivel casters to provide a secure work surface.

KS-21415, L1: The rolling platform ladder (Comcode 401384300, Figure 4-39) provides a three-step ladder, equipped with retractable swivel casters that allow the unoccupied ladder to be moved horizontally in any direction. Rubber shoes attached to legs secure the ladder in position when occupied by personnel. The platform ladder is approximately 1 foot 9 inches wide (533 mm), 4 feet 3 inches (1295 mm) long, and 4 feet 4 inches (1321 mm) high.

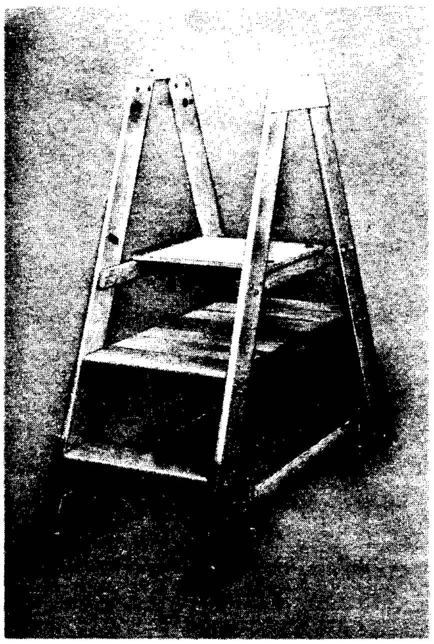


Figure 4-39. KS-21415, L1 Ladder

KS-21415, L2: In addition to the basic ladder configuration, List 2 is equipped with a wire reel, wire guide, and a jumper running tool (Comcode 401384318, Figure 4-40). The modified KS-21955, L9 wire reel, mounted on a sliding shelf, has an automatic brake assembly that is released by pulling tension on wire. A flexible spring wire guide located at the top of the side rail allows the ladder to remain stationary during remote jumper running operations. A jumper running stick, stored on the ladder with a magnetic latch, facilitates placement of wire jumpers in frame shelves or express troughs as wire is dispensed.

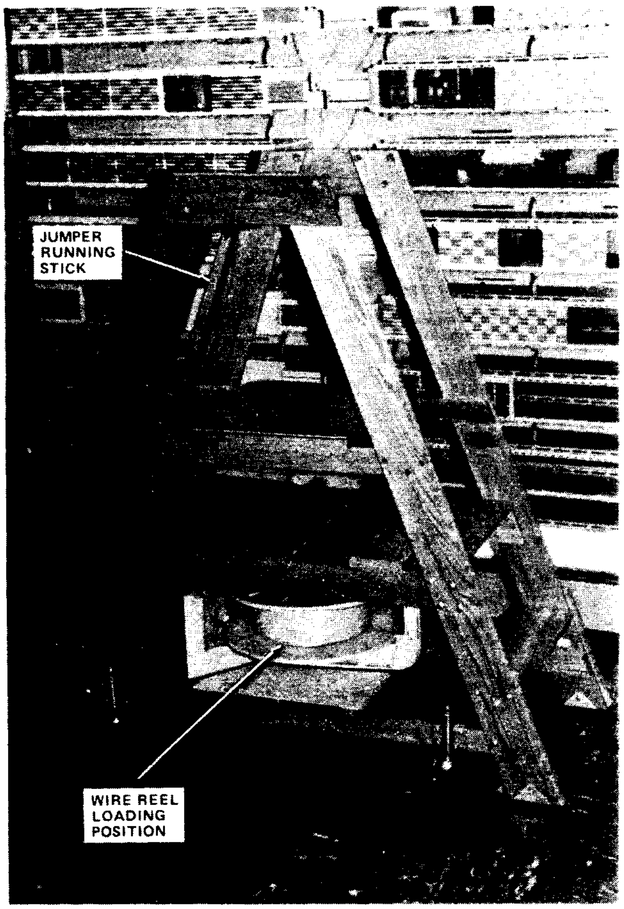


Figure 4-40. KS-21415, L2 Ladder

KS-21955, L1 Wire Reel

The KS-21955, L1 wire reel is used to dispense distributing frame wire in telephone central offices.

The KS-21955, L1 wire reel (Comcode 401977335, Figure 4-41) is a lightweight molded polycarbonate reel and support arm. The 4-3/8 by 16 inch (86 by 406 mm) diameter reel has an inner and outer flange that adjusts to the wire coil width. This reel makes wire dispensing easy and tangle free. Automatic braking prevents wire overrun. A support arm and U-shaped base allows either portable or distributing frame-mounted usages.

The KS-21955, L9 (Comcode 402714687) provides the wire reel without a base and brake assembly for use on the KS-21415, L1 rolling platform ladder.

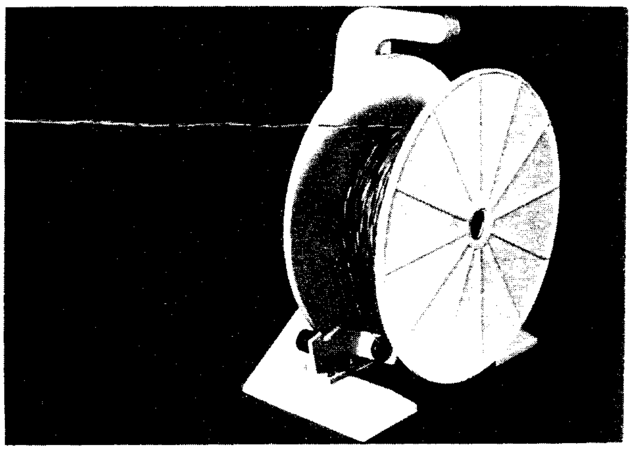


Figure 4-41. KS-21955, L1 Wire Reel

4.4.7 Jumper Running Tool

KS-21415, L3 Jumper Running Tool

The KS-21415, L3 jumper running tool (Comcode 401445077) is used to place jumper wire into frame shelves and the upper express trough. The jumper running tool (Figure 4-42) is made of hardwood with a clear protective finish. The tool is 44-3/4 inches (1137 mm) long with V notches on each end to guide the wire. One jumper running tool is supplied as part of the KS-21415, L2 ladder.

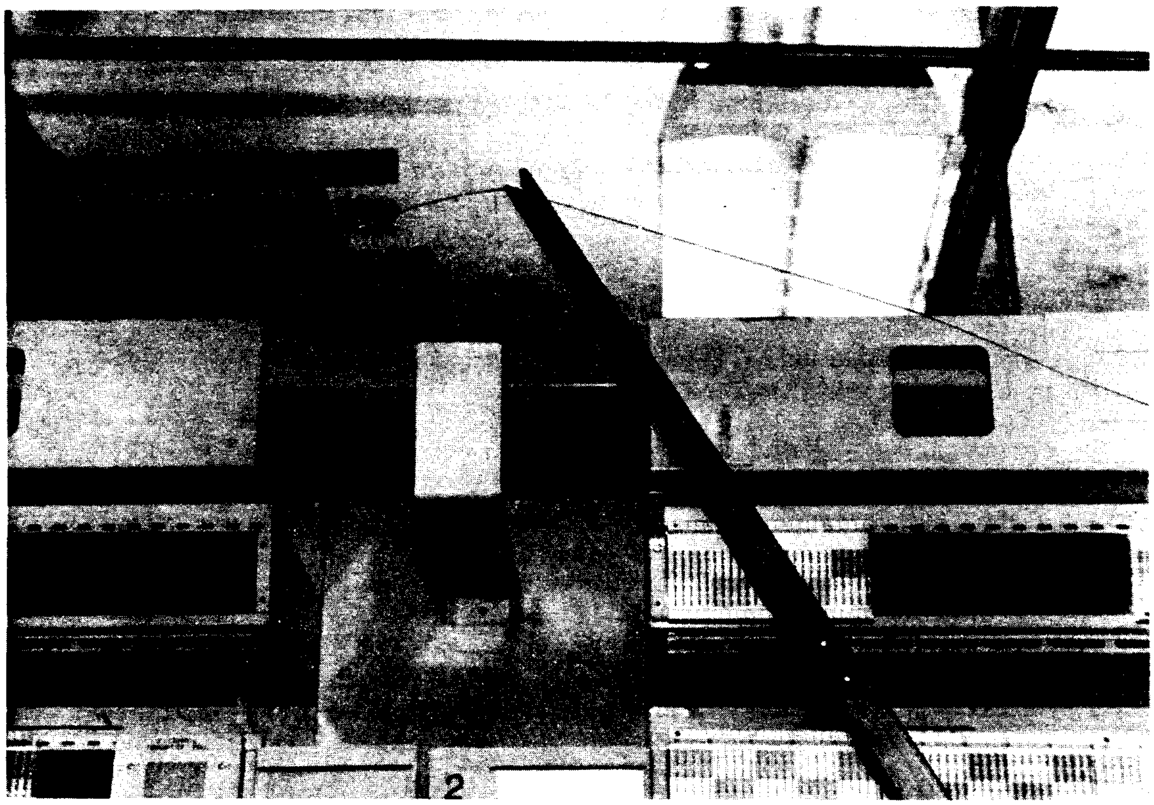


Figure 4-42. Placing Jumper Wire in Trough Using Jumper Running Tool

KS-20962, L2 Bag (Wire Clippings)

The KS-20962, L2 bag (Comcode 401716006) is a 10-1/4 inch (260 mm) high by 16-1/2 inch (419 mm) wide canvas bag used during wiring operations for collecting wire clippings and solder. The bag is constructed with a stiffened flap and plastic hook. List 2 replaces List 1 originally supplied with a weighted flap and two straps.

4.4.8 Cross-Connect Wire

Cross-connect wire is used to cross-connect facilities and equipment on the *COSMIC* DF Systems. Cross-connect wire may be used with solder, solderless wrap, or insulation displacement terminals.

DT-Type Tinned Copper (Irradiated PVC)

DT-type wire is unshielded and has a tinned copper conductor and irradiated polyvinyl chloride (IPVC) insulation, and its overall diameter is 0.036 inch (.9 mm). It is recommended for all *COSMIC* distributing frames.

DU-Type Tinned Copper (Semirigid PVC)

DU-type wire is unshielded and has tinned copper conductors with a single layer of semirigid PVC insulation. It is a lower cost alternative to DT-type wire.

P6-Type (Braid Shield) and P7-Type (Foil Shield)

P6- and P7-type wire is shielded. Shielded wire is used for carrier system connections.

P6-type wire has dual insulation of irradiated PVC over semirigid PVC, a braided shield, and a PVC jacket. Its outside diameter is 0.18 inch (4.5 mm).

P7-type wire is similar to P6-type wire but has a longitudinal polyester-aluminum foil overshield and a 24-gauge (.5 mm) drain wire. The P7-type wire is recommended because of its smaller [0.16 inch (4 mm)] outside diameter.

4.5 Maintenance Tools and Accessories

The *COSMIC* DF accessories are available to increase productivity, aid in installation and testing, and support everyday maintenance of the *COSMIC* DF Systems.

4.5.1 Test Connector Comparison

Test connectors are portable test devices that are used to aid in testing of outside plant pairs. They connect the test terminal fields of an outside plant protected connector to a portable test set, such as an automatic pair identifier. Multiple pair testing or one-at-a-time testing is provided. Table 4-F is a test connector selection guide.

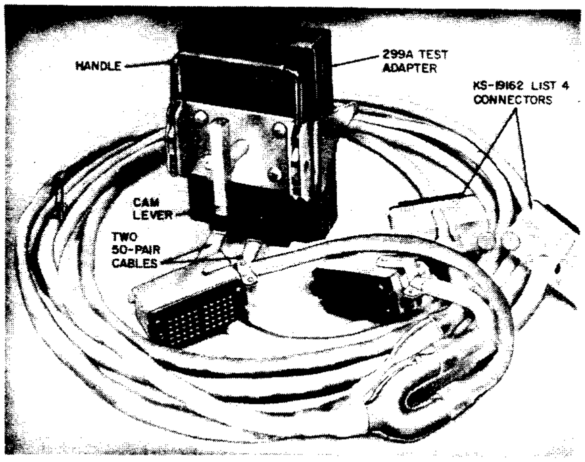
Table 4-F. TEST CONNECTORS

PROTECTED CONNECTOR	CABLE PAIR TESTING	QTY PAIRS IN TEST FIELD	TEST CONNECTOR CODE	AT SPEC	TEST CONNECTOR COMCODE
307	Multiple Pair or Single Pair Using Pick Test Panel. Can Be Used With or Without Protector Units.	100	299A Test Adapter	None	103065819
	Multiple Pair or Single Pair Using Pick Test Panel. Used With Protector Units Fully Inserted or in Detent Position.	100	299B Test Adapter	None	105053862
308	Multiple Pair	100	P Test	AT-8906	402222715
	Single Pair	100	R Test	AT-8916	402352579
309	Multiple Pair or Single Pair Using Pick Test Panel. Can Be Used With or Without Protector Units.	100	U Test	AT-9007	403031784
302, A1,B1,B3,E1	Single Pair	50	D Test	AT-8265	400129359
	Multiple Pair	50	C-4930	None	401489133
302, A4,B4,E3	Single Pair	50	G Test	AT-8353	400318689
	Multiple Pair	50	C-4920	None	401887252

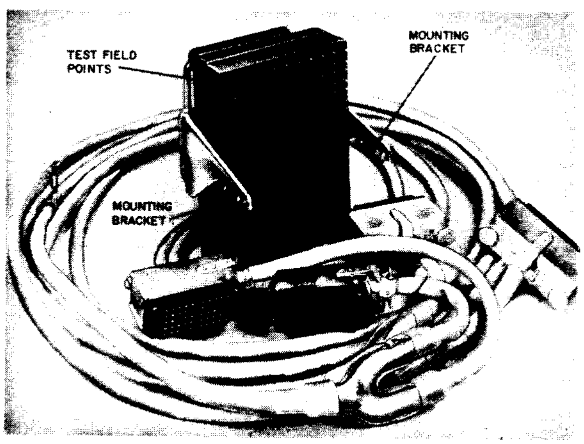
4.5.2 Test Adapters for 307-Type Connectors

299A Test Adapter

The 299A test adapter (Figure 4-43) is used to connect the 100-pair protector panel of the 307-type connector to a test set. The test adapter makes contact with the outside plant T and R conductors through the test points in the top of the 4C-type protector units. If the 307-type connector is not equipped with the protector units, the contacts in the test adapter make contact with the outside plant T and R conductors through their respective sockets in the protector panel. The test adapter contains 200 (100 pairs) spring-loaded contacts that are internally connected to two 50-pair, 15-foot (4572 mm) long cables. Each cable terminates on two 25-pair KS-19162, L4 (or equivalent) connectors for attachment to the test set or the pick test panel. The four connectors are numbered 1-25, 26-50, 51-75, and 76-100 to identify the respective cable pair count. A separate pick test panel is furnished with the 299A test adapter for single or pair-at-a-time testing. The test adapter is also furnished with a KS-22396, L1 carrying case.



FRONT VIEW



BACK VIEW

Figure 4-43. 299A Test Adapter for 307-Type Connectors

Pick Test Panel Assembly

The pick test panel assembly (Figure 4-44) is furnished with the 299A and 299B test adapters and U test connectors to access the 100-pair field of the test connectors and adapters for single or pair-at-at-time testing. In typical applications the four KS-19162, L4 connectors on the test connectors or adapters are attached to the pick test panel, tone is applied, and a B test point tester is used to identify individual pairs. The 299A and 299B test adapters are used with the 307-type connector. The U test connector is used also with the 309-type connector. The pick test panel assembly is packed in the test connector and adapter carrying cases.

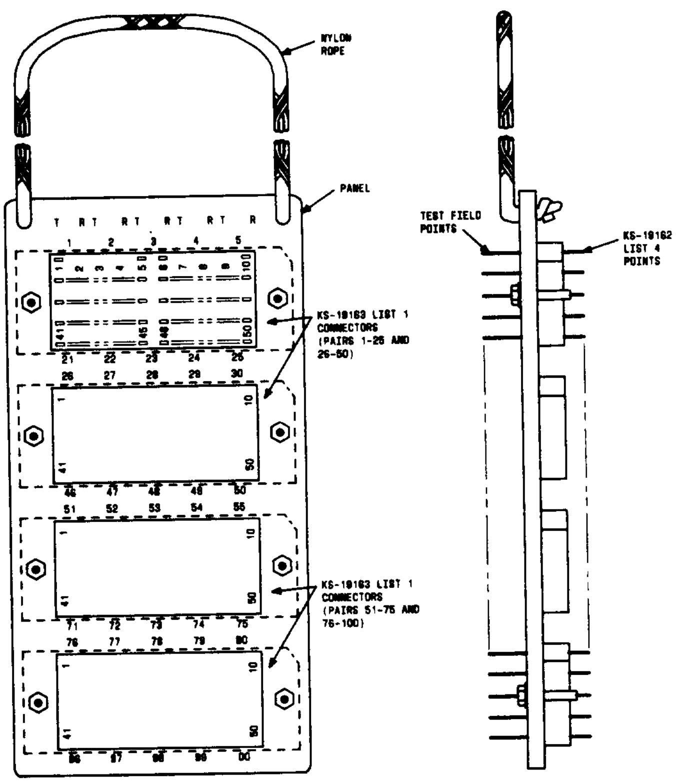


Figure 4-44. Pick Test Panel — Used with 299A and 299B Test Adapters and U Test Connectors — for 307- and 309-Type Connectors

299B Test Adapter

The 299B test adapter (Figure 4-45) is similar to the 299A test adapter in that it is used to connect the 100-pair protector panel of the 307-type connector to a test set, such as an automatic pair identifier. The test adapter can be mounted onto a full complement of protector units without disturbing those protector units that are in a detent position. The protector units may be fully inserted or in the detent position. It also provides the capability (using the tool shown with the 299B test adapter in Figure 4-45) of manually placing any protector unit in the fully inserted or detent position while the test adapter is mounted in place on the 307-type connector. The test adapter makes contact with the outside plant T and R conductors through the test points in the top of the 4C-type protector units. The test adapter contains 200 (100 pairs) spring-loaded contacts that are internally connected to two 50-pair, 15-foot (4.5 m) long cables. Each cable terminates on two 25-pair KS-19162, L4 (or equivalent) connectors for attachment to automatic pair identification equipment. The four connectors are numbered 1-25, 26-50, 51-75, and 76-100 to identify the respective cable pair count. A separate pick test panel is furnished with the 299B test adapter for single or pair-at-a-time testing. The test adapter is also furnished with a KS-22396, L1 carrying case.

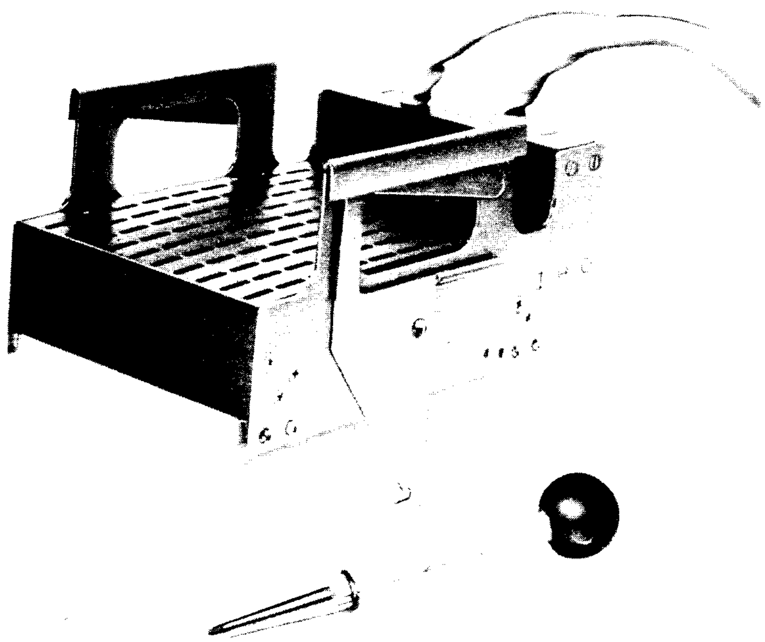


Figure 4-45. 299B Test Adapter for 307-Type Connectors

4.5.3 Test Connectors for 308-Type Connectors

P Test Connector (AT-8906)

The P test connector (Figure 4-46) is used to connect the 100-pair test terminal field of the 308-type connector to test equipment. The test connector contains 200 (100 pairs) spring-loaded contacts that are internally connected to two 50-pair, 15-foot (4572 mm) long cables. Each cable terminates on two 25-pair KS-19162, L4 (or equivalent) connectors for attachment to automatic pair identification equipment. The four connectors are numbered 1-25, 26-50, 51-75, and 76-100 to identify the respective cable pair count. The test connector is furnished with an F (AT-8854) carrying case.

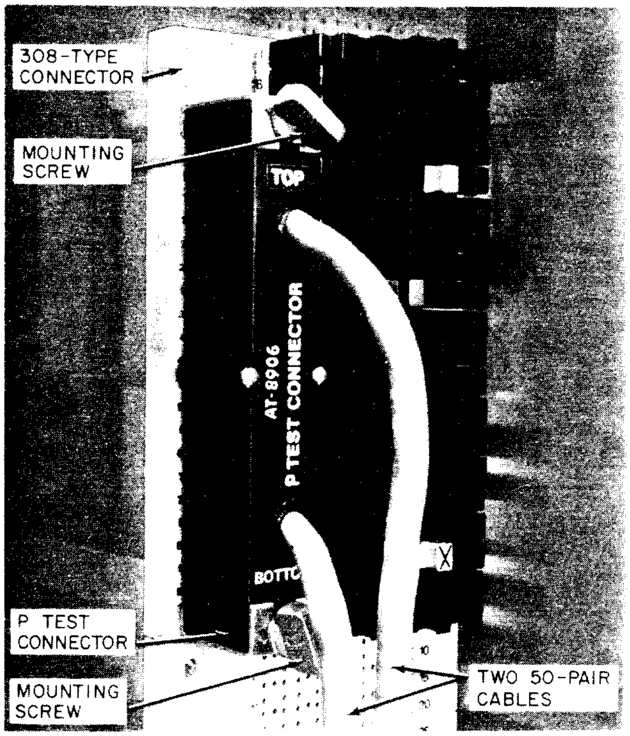


Figure 4-46. P Test Connector (AT-8906) Mounted on a 308-Type Connector

R Test Connector (AT-8916)

The R test connector (Figure 4-47) is used to make test contacts with the 100-pair test terminal field of the 308-type connector. The test connector contains 200 (100 pairs) spring-loaded contacts that are internally connected to 200 (100 pairs) exposed test field spikes (contacts). The test field spikes are located on the front of the test connector. The test spikes permit the attachment of test cords to equipment and provide a means of testing one cable pair at a time.

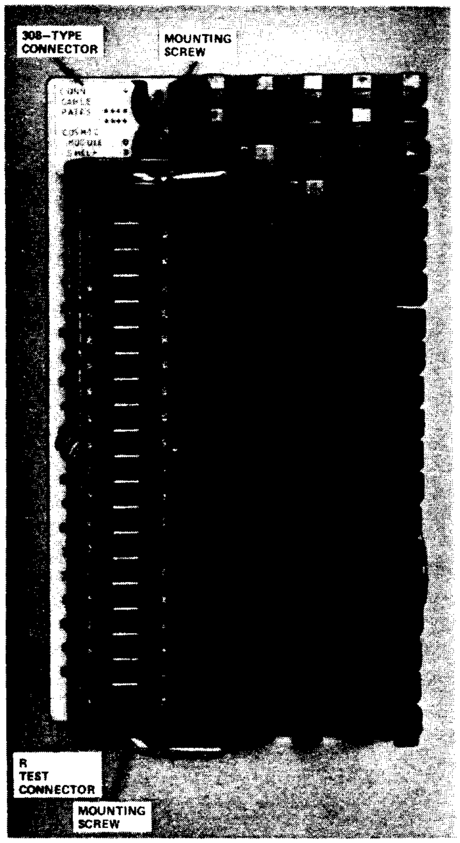


Figure 4-47. R Test Connector (AT-8916) Mounted on a 308-Type Connector

4.5.4 Test Connectors for 302-Type Connectors

D Test Connector (AT-8265)

The D test connector (Figure 4-48) is used to make test contacts with the 50 pairs of recessed, gold-plated test terminals on either of the two test terminal fields of the 302A1, 302B1, or 302E1 connector used on the modular protector frames. This test connector is used for one pair-at-a-time testing.

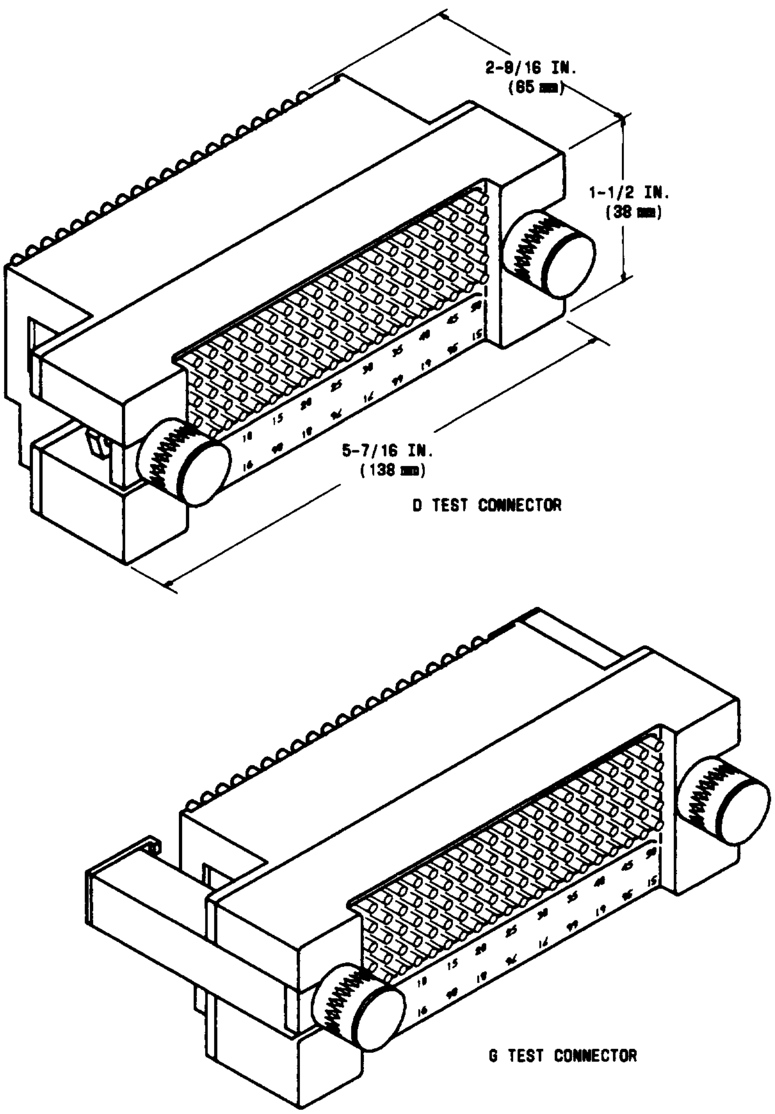


Figure 4-48. D and G Test Connectors — Mounting Arrangements — for 302-Type Connectors

G Test Connector (AT-8353)

The G test connector (Figure 4-48) is used to make test contacts with the 50 pairs or recessed, gold-plated test terminals on either of the two test terminal fields of the 302A4, 302B4, or 302E3 connector used on the double-sided protector frames. The test connector contains 100 (50 pairs) spring-loaded contacts. It has two sets of pair numbering, one inverted from the other for use on either test field of the connector.

C-4920 and C-4930 Multiple Pair Test Connector

The C-4920 multiple pair test connector is used on the 302A4, B4, or E3 connectors used on the double-sided protector frames.

The C-4930 multiple pair test connector is used on the 302A1, B1, or E1 connector used on the modular protector frames.

The multiple pair test connectors (Figure 4-49) contain 100 (50 pairs) spring-loaded contacts that are internally connected to a 50-pair, 15-foot (4572 mm) long cable. The cable terminates on two 25-pair KS-19162, L4 (or equivalent) connectors for attachment to automatic pair identification equipment. One of the KS-19162, L4 connectors is numbered 1-25 and 51-75 and the other is numbered 26-50 and 76-100 for use on either test field of the 302-type connectors to identify the respective cable pair count.

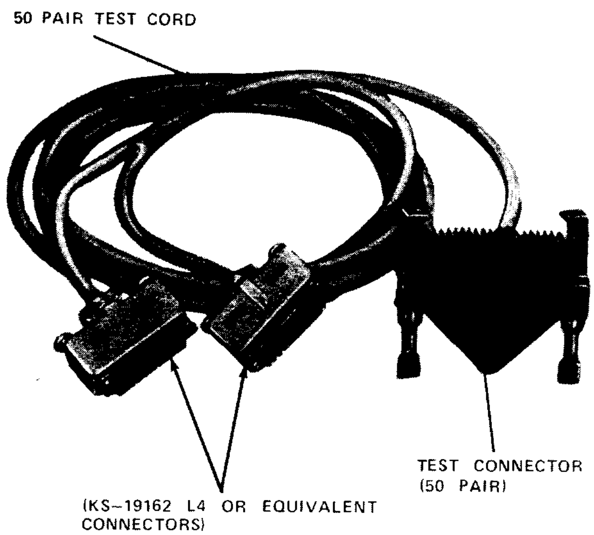


Figure 4-49. C-4920 or C-4930 Multiple Pair Test Connectors — for 302-Type Connectors

4.5.5 Extension Cords for Test Connectors

Extension Cords P100A and P100B are used to increase the cable length all AT&T test connector cords except the D, G, H, N, and R. The cords are not supplied with the test connectors which must be ordered separately.

The P100A cord, which is 30 feet (9 m) long, connects test equipment to test connectors. The plugs on the Y end of the cord are designed to engage with mating connectors on test equipment. Plugs and connectors with similar numbers on the hoods of the cord plugs and on the test equipment should be mated. The jack screws are engaged and turned simultaneously so the plugs and connectors mate squarely. The P100A cord is removed from the test equipment by reversing the jack screws simultaneously. The cord is equipped with female plugs on both ends (Figure 4-50).

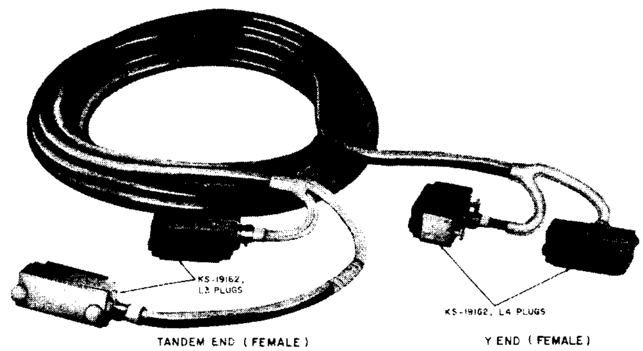


Figure 4-50. P100A Cord

The P100B cord is a 50-foot (15 m) extension cord. One or more P100B cords and a P100A cord are required to bridge between the test equipment and test connectors. Jack screws of the plugs on the Y end of the P100A cord mate with the connectors on the Y end of the P100B cord. Plugs on the tandem end of the P100B cord connect to a test connector or to connectors on the Y end of another P100B cord or test equipment. The cord is equipped with male plugs on one end and female plugs on the other end (Figure 4-51).

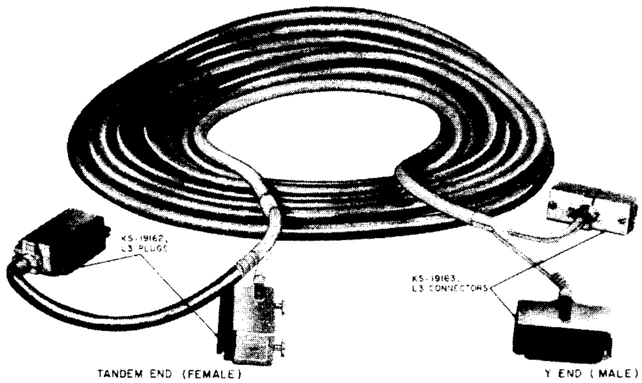


Figure 4-51. P100B Cord

4.5.6 Test Cords and Plugs Used with 307-, 308-, 309-, and 302-Type Connectors

Test cords and plugs are used with connectors/protectors and their associated test connectors for testing purposes. Table 4-G provides usage information, illustrations, and schematics of the test cords and plugs.

The cords listed in these tables are equipped with miniature plugs. Older cords with standard-size plugs and adapter cords are also available — see the Distributing Frame Systems Product Manual, 201-200-050.

Different cords are used with the 302- and 308-type connectors as opposed to the 307- and 309-type connectors because of the orientation of the tip and ring leads in the protector field. Figures 4-52 and 4-53 show the wiring of the protector unit fields.

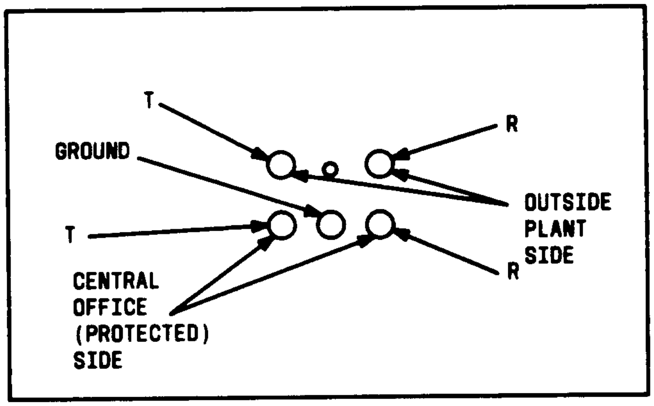


Figure 4-52. Orientation of Sockets in Protector Field for 302- and 308-Type Connectors

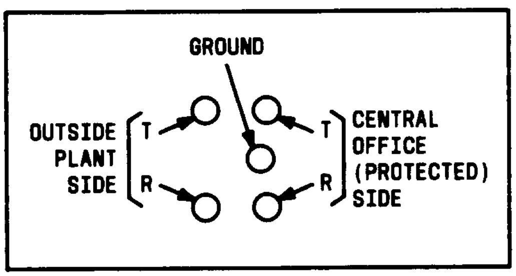


Figure 4-53. Orientation of Sockets in Protector Field for 307- and 309-Type Connectors

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS

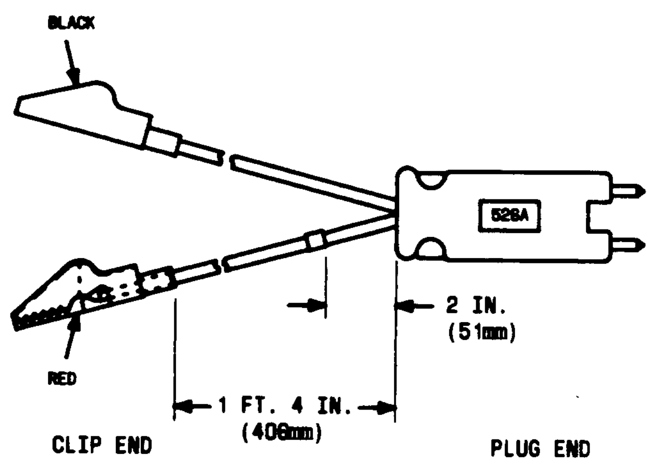
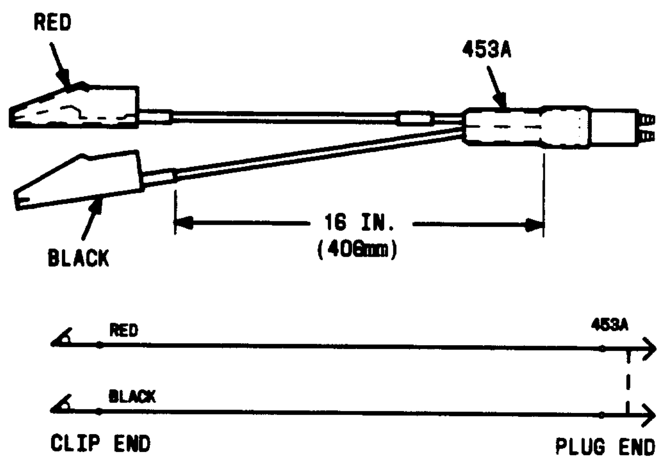
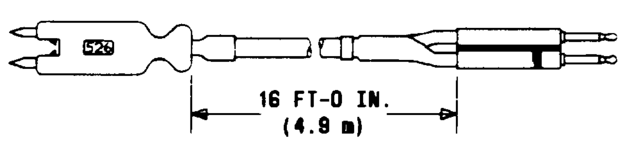
CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
P2FL	307, 309	Used to short the tip and ring or to ground the tip and/or ring, of an individual cable pair by inserting the plug end into the test points of a 3C- or 4C-type protector unit.	
P2EF	308, 302	Used to short the tip and ring, or to ground the tip and/or ring, of an individual cable pair by inserting the plug end into a pair of recessed test terminals on the connector. **This cord should not be used as an adapter for connecting longer cords.**	
W2HN	307, 309	Used to test an individual pair via test points of 3C- or 4C-type protector units.	

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS (Contd)

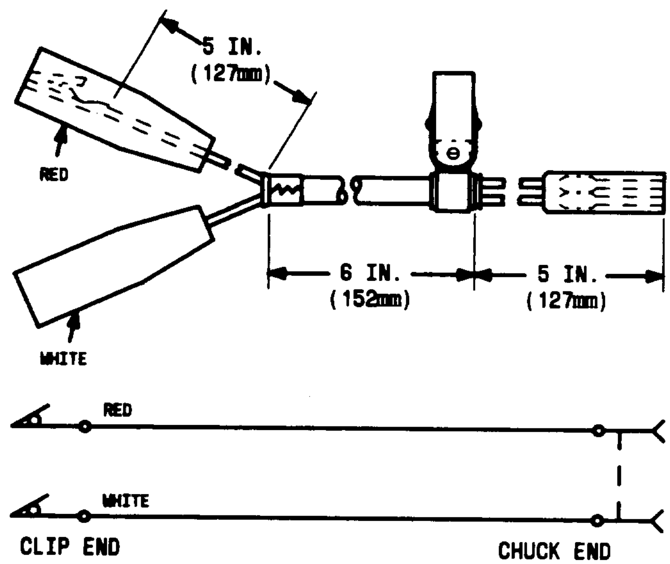
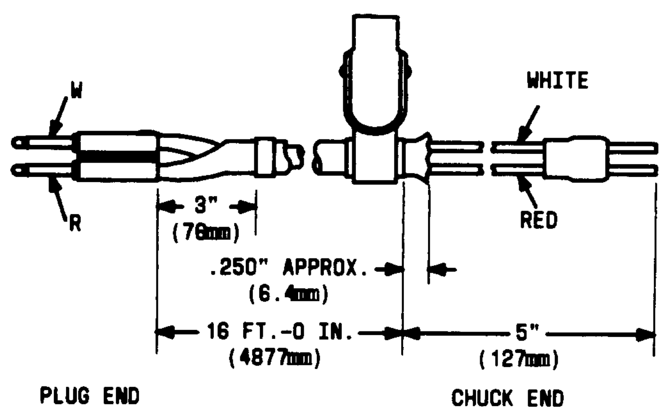
CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
W2FH	302, 307, 308, 309	Used to connect an outside plant test set to a cable pair on the connectors (via the spiked terminals of the D, G, or R test connector), or the pick panel associated with a 299A or U test connector.	
W2HA	302, 307, 308, 309	Used to bridge a cable pair from a connector (via the spiked terminals of the D, G, or R test connector) to a test desk trunk through a frame mounted jack box.	

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS (Contd)

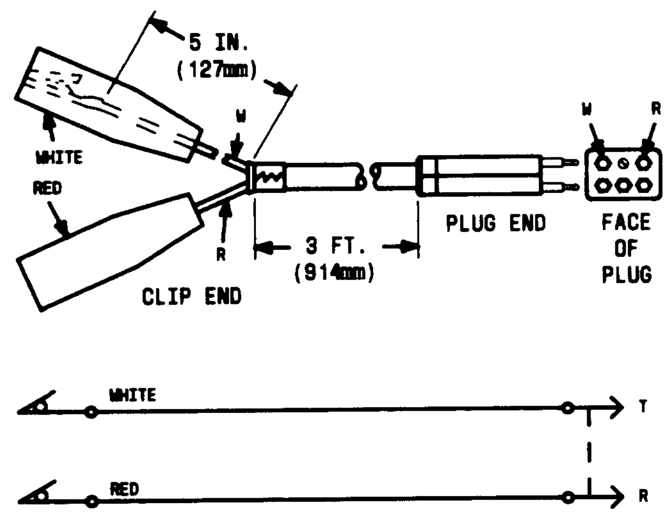
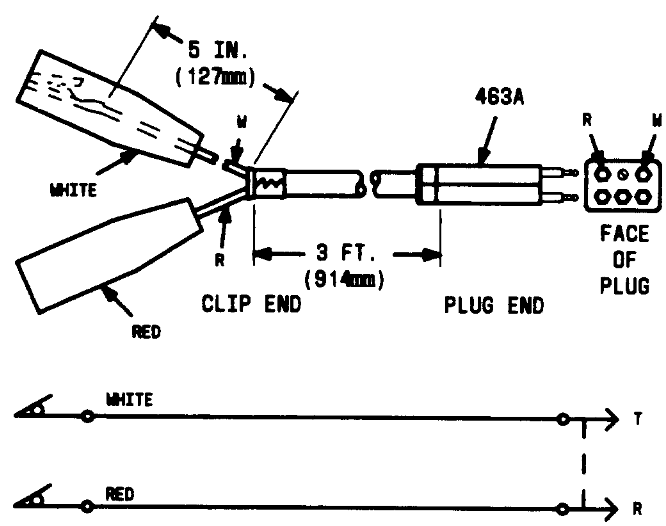
CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
W2GL	307, 309	Used to make a connection with a cable pair at a vacant protector unit socket.	
W2GC	308, 302	Used to make a connection with a cable pair at a vacant protector unit socket on a connector.	

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS (Contd)

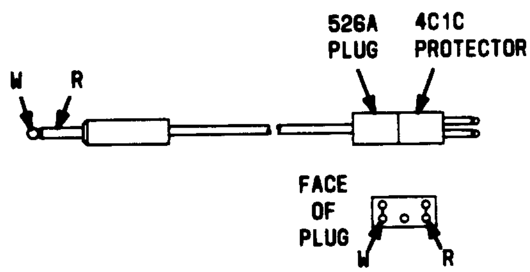
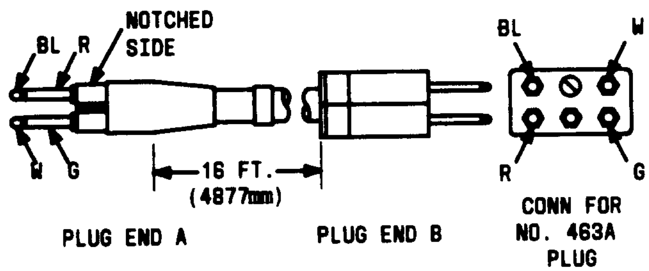
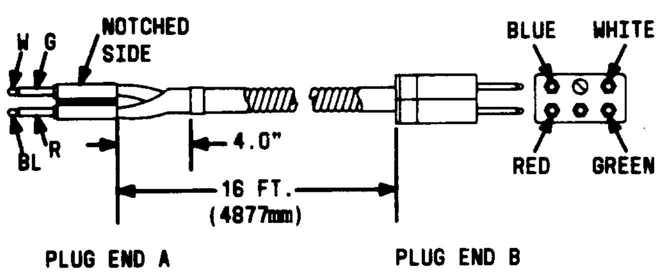
CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
W2HJ	302, 307, 308, 309	Used for Conductor ID Tone tests	
W4CT	307, 309	Used for making IN and OUT tests on connectors	
W4CP	308, 302	Used for making IN and OUT tests on connectors.	

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS (Contd)

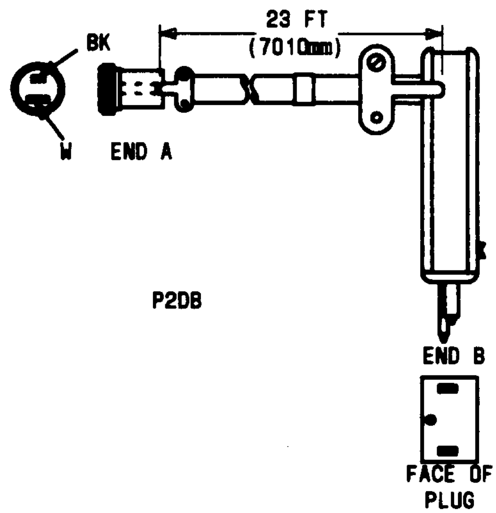
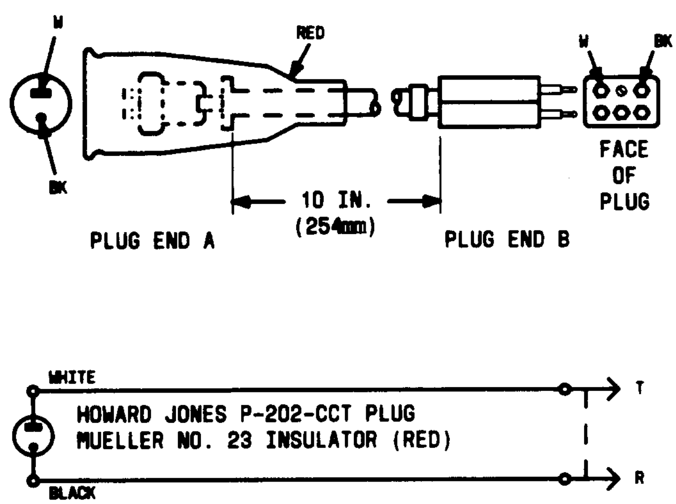
CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
P2DB	307, 309, 302, 308	Used in series with a W2GM or W2GD cord to connect a KS-14103 breakdown test set to a cable pair at a protector unit socket on a connector.	
W2GM	307, 309	Used in series with a P2DB cord to connect a KS-14103 breakdown test set to a cable pair at a vacant protector unit socket on a connector	

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS (Contd)

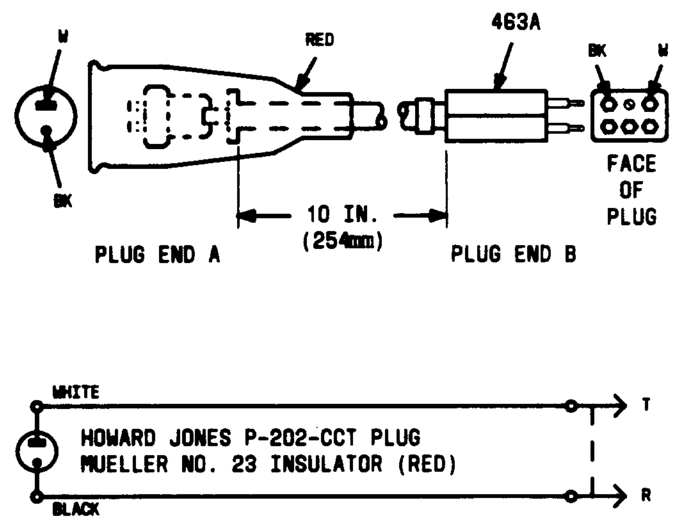
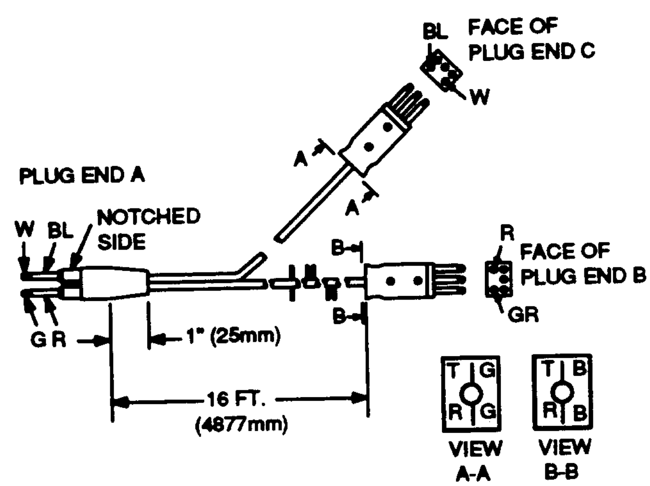
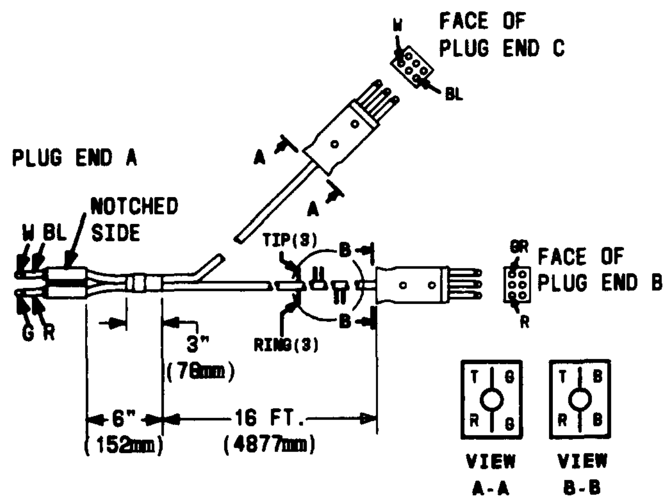
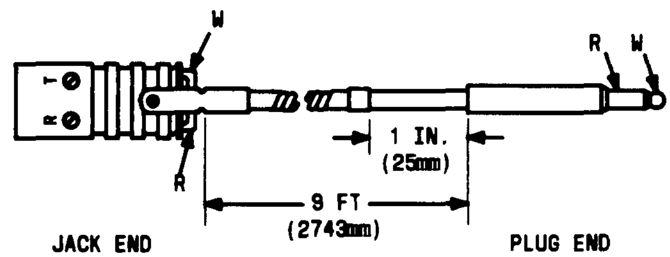
CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
W2GD	308, 302	Used in series with a P2DB cord to connect a KS-14103 breakdown test set to a cable pair at a vacant protector unit socket on a connector.	
W4CU	307, 309	Used in making manual and automatic Varley measurements on a connector	

Table 4-G. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS (Contd)

CODE	ASSOCIATED CONNECTORS	USE	ILLUSTRATION AND SCHEMATIC
W4CR	308, 302	Used in making manual and automatic Varley measurements on connectors.	
W2GY	78- and 112-Type Connecting Blocks	Used for service observing on 78- or 112-type connecting blocks	

4.5.7 Warning Marker, Guard, Indicators, and Insulators for Connectors and Connecting Blocks

Warning markers are used on outside plant protected connectors as personnel safety devices. Their use indicates that abnormally high voltages are present on terminated pairs, such as during breakdown tests.

Guards are used on the test access field of an outside plant protected connector to prevent service interruptions, equipment damage, and personal injury. Guards with associated indicators and insulators also serve to designate circuits assigned to special services and special safeguard measures.

Indicators and **insulators** provide additional visibility and protection for circuits assigned to special services. Indicators are used on cross-connecting wires, and insulators are placed on apparatus terminations for additional protection. (Table 4-H).

Table 4-H. SELECTION GUIDE — WARNING, MARKER, GUARD, INDICATORS, AND INSULATORS

ITEM	ASSOCIATED CONNECTORS				ASSOCIATED CONNECTING BLOCKS		COMCODE
	307	308	309	302	112	78	
Warning Marker							
E Warning Sign	X	X	X	X			400359196
Guard							
KS-19478, L1		X		X			997161617
Indicators							
KS-16847, L1	X		X				997 726 088
Insulators							
KS-16604, L2*			X		X		400809042
D Clip (AT-8301)†						X	400152013
J Clip (AT-8993)†					X		402946313

* For Wire-Wrap Terminals
† For Quick-Clip Terminals

E Warning Sign (AT-8325)

The E warning sign (Figure 4-54) provides a visible warning for the connector being tested.

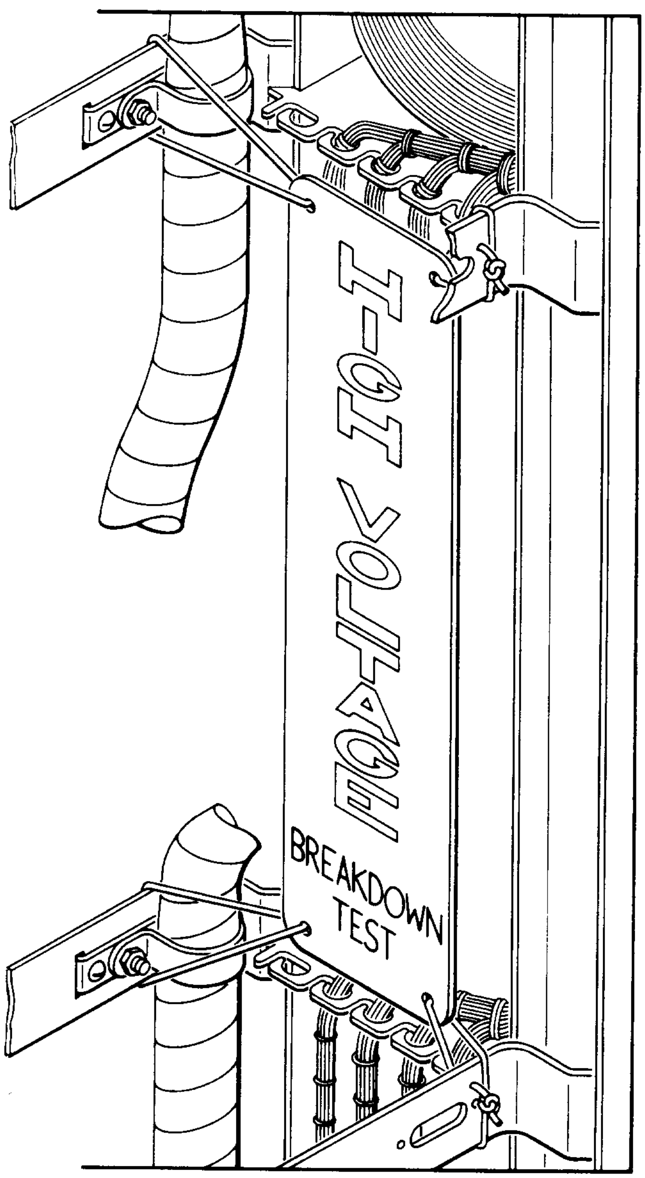


Figure 4-54. E Warning Sign

KS-19478, L1 Guard

The KS-19478, L1 guard (Figure 4-55) is a red molded plastic insert and is used to cover two recessed tip and ring terminals associated with the special service circuits on the test terminal fields of the connectors. The guard prevents accidental contact with the test terminals and acts as an obstruction to circuit interference from the contacts of a test terminal.

Figure 4-55. KS-19478, L1 Guard

KS-16847, L1 Indicator

The KS-16847, L1 indicator (Figure 4-56) is a red cellulose-acetate spiral ring 3/8-inch (9.5 mm) in diameter. The split ring feature permits placing or removing the indicator on terminated cross-connection wires to connectors and connecting blocks.

KS-16847

Figure 4-56. KS-16847, L1 Indicator

KS-16604, L2 Insulator

The KS-16604, L2 insulator (Figure 4-57) is 7/64-inches (2.8 mm) in diameter and 5/8-inches (15.9 mm) long and is designed to insulate and protect circuits with wire-wrapped terminals. The insulator is made of fire-retardant red plastic, slotted to allow clearance for bridged terminations.

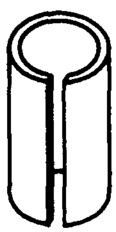
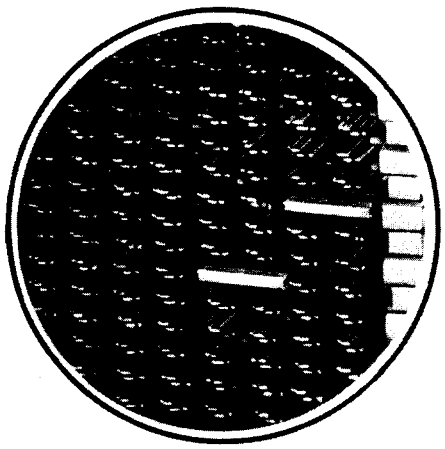


Figure 4-57. KS-16604, L2 Insulator

Terminal Insulators (Special Services Protection)

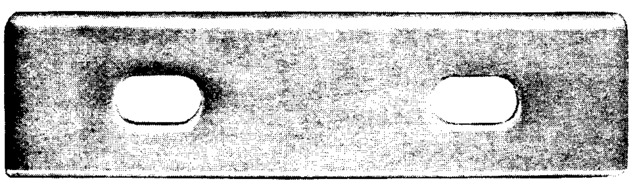
Terminal insulators, made of red plastic with a U-shaped channel that fits over the tip and ring terminals, are used to protect and designate connecting block terminals assigned to special services. Two types are used:

- D Clip Terminal Insulator (Figure 4-58) for bifurcated quick-clip or wire-wrap terminals.
- J Clip Terminal Insulator (Figure 4-59) for three-beam quick-clip terminals.



D CLIP

Figure 4-58. D Clip Terminal Insulator



J CLIP

Figure 4-59. J Clip Terminal Insulator

4.5.8 Block Removal Tools

KS-21345, L2 Connecting Block Removal Tool

The KS-21345, L2 connecting block removal tool is a hand tool used to unseat the 78- and 112-type connecting blocks from *COSMIC* I, IA, and IIA DFs. They are not used with *COSMIC* Mini DFs. Two tools per frame system are recommended (Figure 4-60).

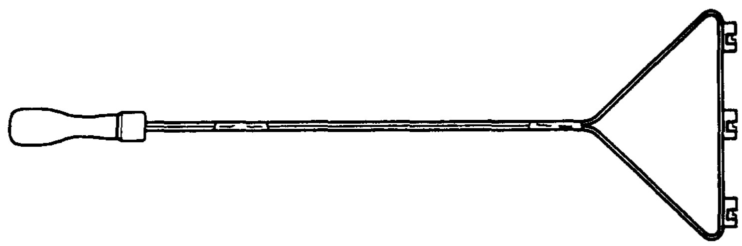


Figure 4-60. KS-21345, L2 Connecting Block Removal Tool

KS-22616, L1 Connecting Block Removal Tool

The KS-22616, L1 connecting block removal tool is a hand tool used to unseat the 112-type connecting blocks from the *COSMIC* Mini DFs or from the *COSMIC* I DF with shelf adapters (Figure 4-61).

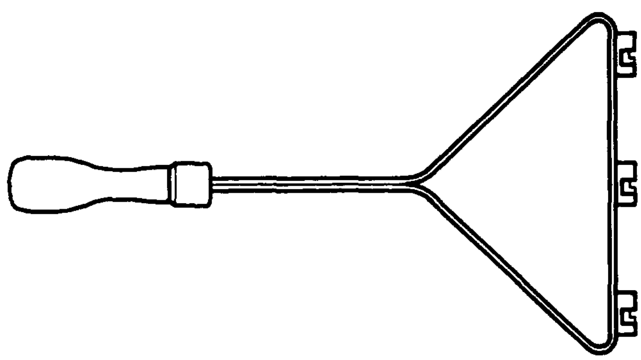


Figure 4-61. KS-22616, L1 Connecting Block Removal Tool

4.5.9 Connector Panel Removal Tool and Service Bracket

KS-22271, L1 307-Type Connector Panel Removal Tool

The KS-22271, L1 connector removal tool is used to unseat the protector panel of the 307-type connector from the *COSMIC* IIA or *COSMIC* Mini DFs or AT-9049 protector frames. It is not used with *COSMIC* I or IA DFs. Two tools per frame system are recommended (Figure 4-62).

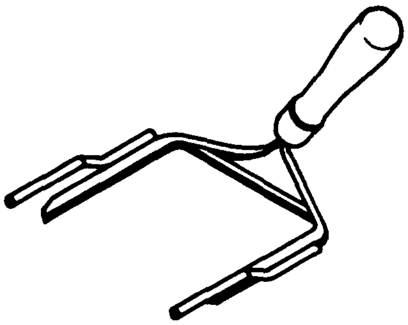


Figure 4-62. KS-22271, L1 307-Type Connector Panel Removal Tool

KS-22325, L1 Service Bracket for 307-Type Connectors

The KS-22325, L1 service bracket is used to temporarily hold the protector panel of the 307-type connector away from the framework for installation and maintenance procedures. It is used with *COSMIC* IIA or *COSMIC* Mini DFs or AT-9049 protector frames. It is not used with *COSMIC* I or IA DFs. Two brackets per frame system are recommended (Figure 4-63).

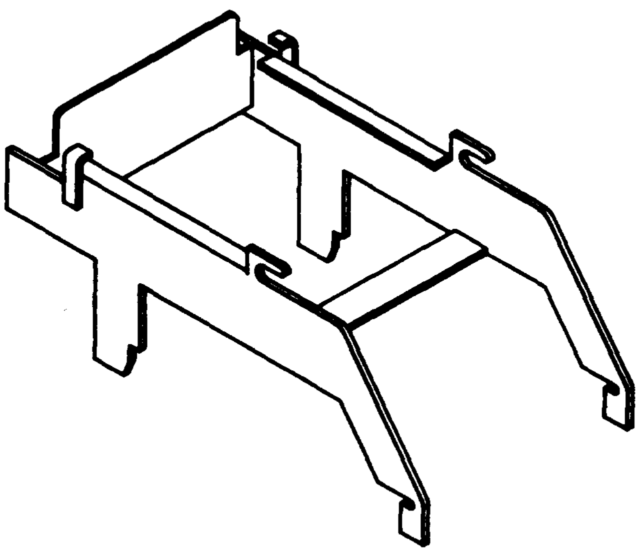


Figure 4-63. KS-22325, L1 Service Bracket for 307-Type Connectors

4.5.10 Connector Presser Tool

AT-8948L Connector Presser Tool and AT-8927C Bridge Module Removal Tool

The AT-8948L connector presser tool is used to connect the 710-type connector bridge module (supplied as part of the 11-type stub cable) to the 710-type connector splice module on the 307-type connector (Figure 4-64).

The AT-8927C bridge module remover tool is used to disconnect the 710-type connector bridge module from the splice module (Figure 4-64).

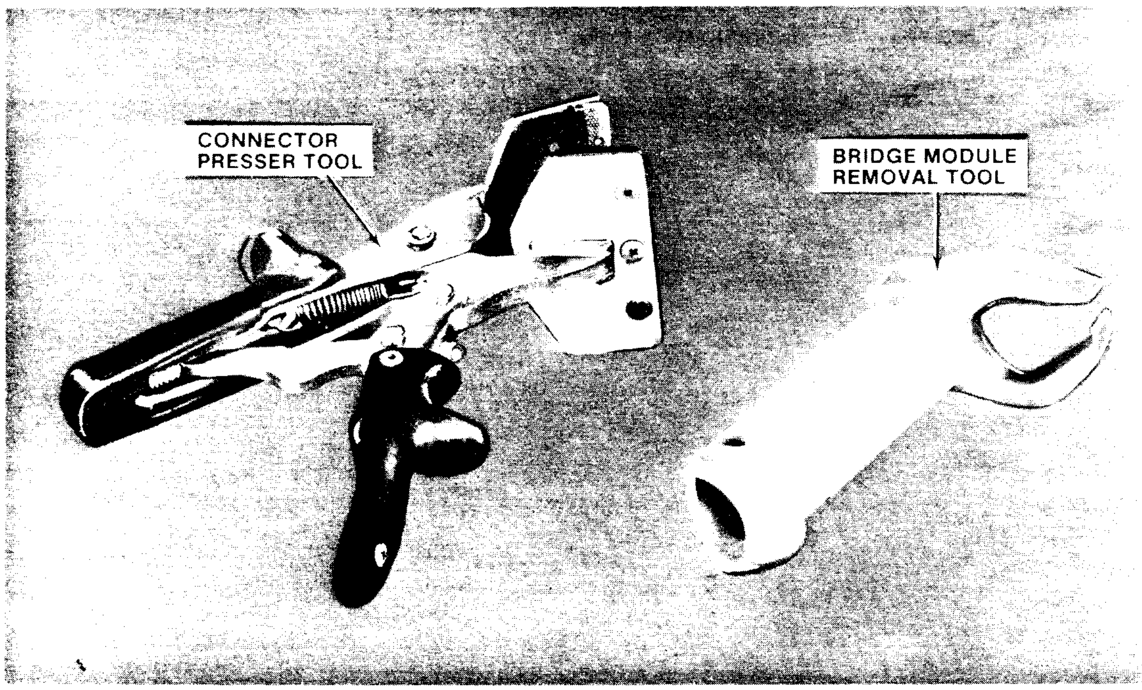


Figure 4-64. AT-8948L Connector Presser and AT-8927C Bridge Module Removal Tool

4.6 Splicing Connectors

4.6.1 710-Type Connector

The 710-type connector (Figures 4-65 and 4-66) is designed for joining air core or waterproof, PIC and pulp, or paper-insulated conductors in underground, buried, or aerial applications. There is also a fire-retardant series of 710 connectors to be used in buildings and cable entrance facilities for splicing purposes.

There are three types of 710 connectors: splicing, bridge, and half-tap. Each type is available in 25-pair and 5-pair sizes. The splicing connectors consist of an index strip, a splicing module, and a cap. The bridge connectors consist of a bridge module and a cap. The half-tap connectors consist of an index strip, a half-tap module, and a cap.

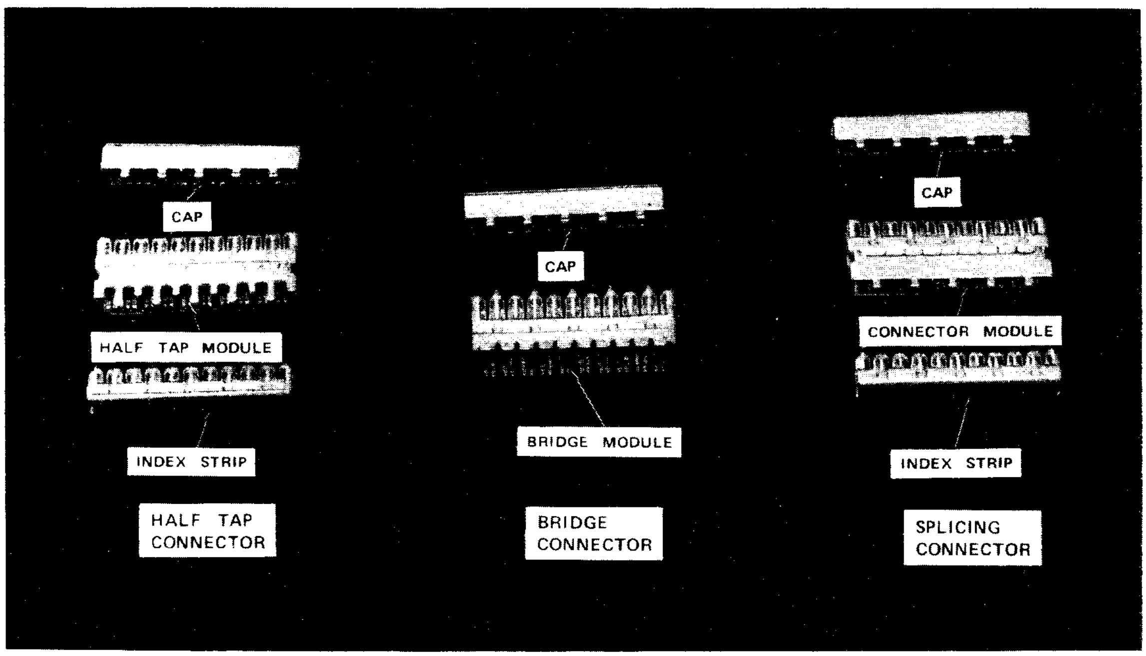
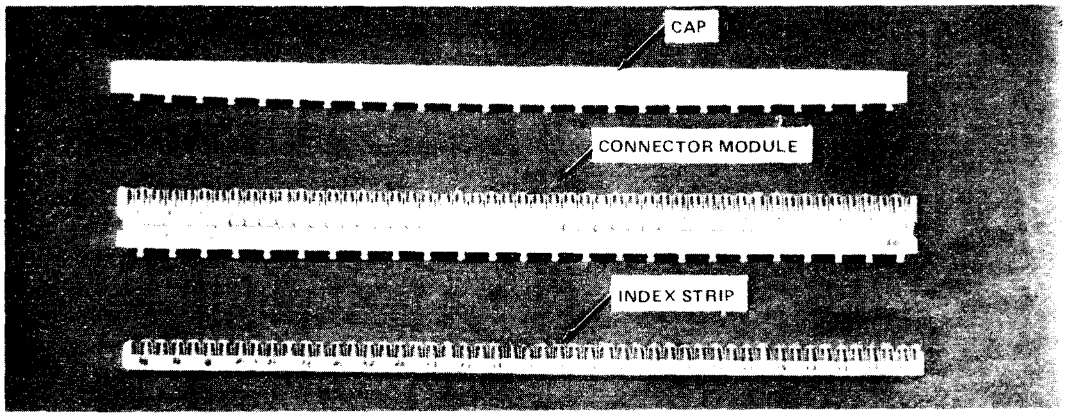
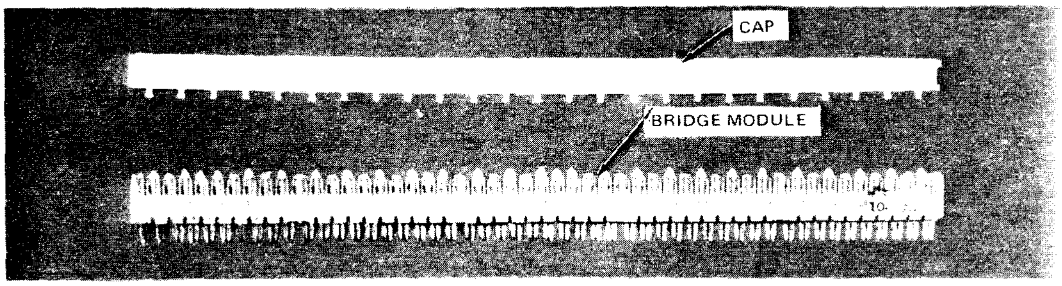


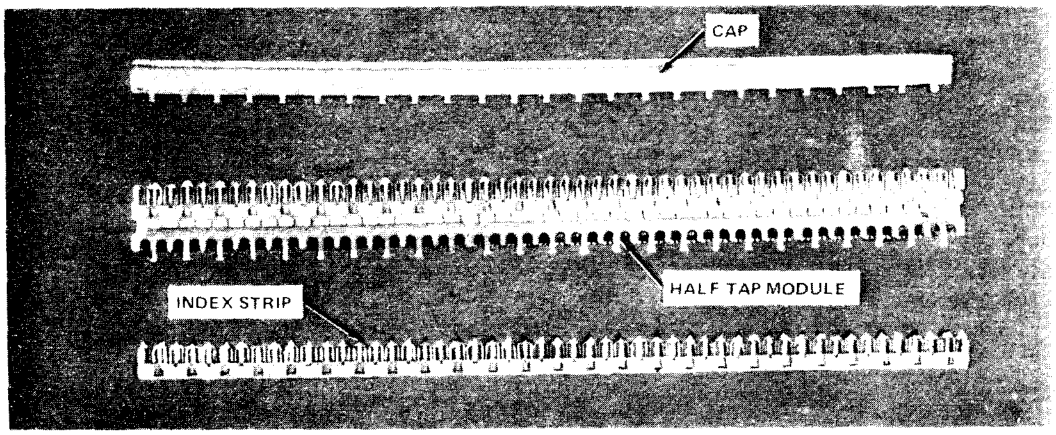
Figure 4-65. 710 Connector — 5 Pair



SPLICING CONNECTOR



BRIDGE CONNECTOR



HALF TAP CONNECTOR

Figure 4-66. 710 Connector — 25 Pair

4.6.2 711 Connector System

The 711-type connector may be used in the central office for mass termination of cable-to-cable and equipment-to-cable wiring. The 711 connector system is a family of unique modular fire-retardant splicing connectors for use in the central office or other non-outside plant environments. By virtue of its design, the system permits general splicing, in-service half-tapping, dual half-tapping, and bridging without the aid of special materials. The two basic components, i.e., the receptacle assembly and the connector module (Figure 4-67), are the only components required for all applications.

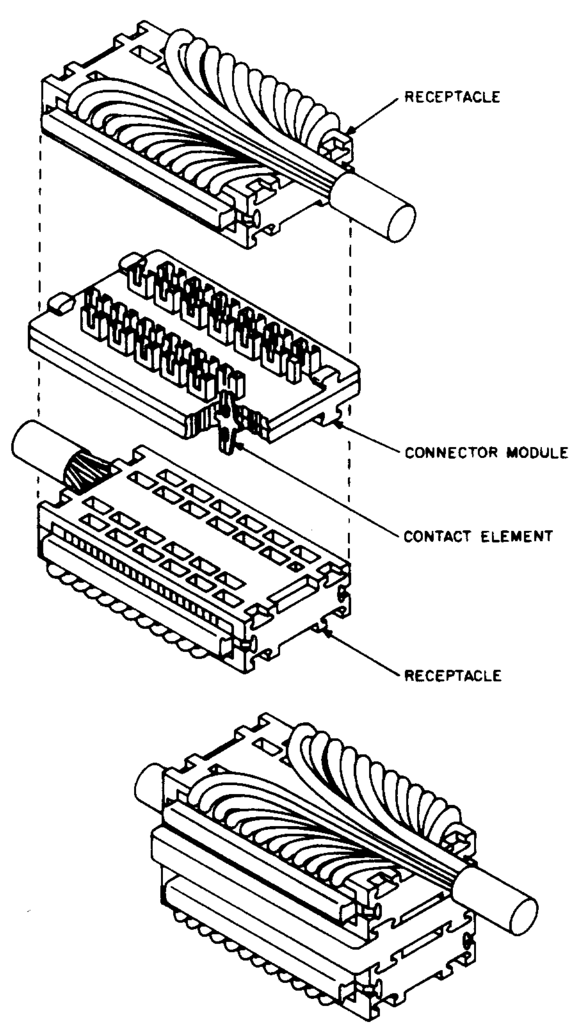


Figure 4-67. 711 Connector Assembly

SECTION 5

COSMIC DF SELECTION

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SECTION 5

COSMIC DF SELECTION

This section describes in detail the factors concerning modular distributing frames that must be considered when specifying a *COSMIC* DF. When planning a *COSMIC* DF in Section 6, it will be necessary to select the appropriate functional configuration, physical framework type, bay/shelf density, and frame layout arrangement. The user may choose to generate alternatives from the available options.

5.1 Modular Distributing Frame

5.1.1 *COSMIC* DF Modules

The *COSMIC* DF is modular by design, and is usually arranged in lineups of alternating facility and equipment modules. A module consists of one or more side-by-side bays. The module boundaries are defined by the center of one vertical trough to the center of the next vertical trough in the lineup. The modular structure provides for the placement of facility terminations in a module immediately adjacent to a module with equipment terminations. This should result in short jumper assignments and an efficiently operated frame.

5.1.2 *COSMIC* DF Selection

As shown in Figure 5-1, four steps are involved in selecting the modular distributing frame:

1. Select the functional configuration - SMDF/TPDF, TMDF, CMDF, SDDF.
2. Select the physical framework type - *COSMIC* I DF, *COSMIC* IA DF, *COSMIC* IIA DF, *COSMIC* Mini DF, or Protector Frame.
3. Select the bay/shelf density by specifying standard or high density connecting blocks.
4. Select the frame layout arrangement - Traditional, Custom, Flex, Two-Stage.

FRAME SELECTION

FUNCTIONAL CONFIGURATION	PHYSICAL FRAMEWORK TYPE	BAY/SHELF DENSITY	LAYOUT ARRANGEMENT
• SMDF/TMDF • TMDF • CMDF • SDDF	• COSMIC I • COSMIC IA • COSMIC IIA • COSMIC MINI • PROTECTOR FAME	• STANDARD DENSITY • HIGH DENSITY	• TRADITIONAL • CUSTOM • FLEX • TWO-STAGE

Figure 5-1. *COSMIC* DF Selection

5.2 DF Functional Configurations

The *COSMIC* DF can be used in a variety of functional configurations. Some of the more common ones are the SMDF/TPDF, TMDF, CMDF, and the SDDF.

5.2.1 SMDF/TPDF

The standard Subscriber Main Distributing Frame (SMDF) is used to terminate and cross-connect outside plant subscriber cable pairs (CP), switch line equipment (LE), subscriber digital loop carrier (DLC), and tie pairs (TP) to other frames. Other test access (TA) lines and miscellaneous equipment (ME) may also be terminated at the SMDF (Figure 5-2).

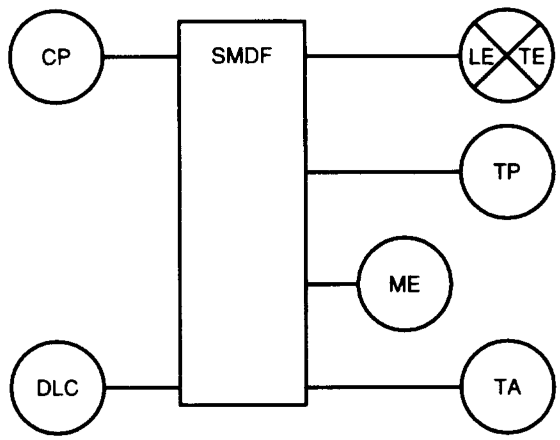


Figure 5-2. SMDF Functional Configuration

The maximum size of the SMDF depends on several factors including cable access and choice of administration system. *COSMIC* SMDF lineups are designed for up to 20-modules, although longer lineups are possible. Three or four lineups of *COSMIC* frames are not uncommon in large offices. Larger frame installations are also possible but are usually more effective in a two-stage arrangement (See paragraph 5.5.4).

The SMDF is generally engineered with the use of the MELD program. MELD is used to spread the outside plant cables and central office equipment cables over the length of the frame. This produces an optimum layout for preferential assignment of short jumpers. An example of a typical SMDF layout is shown in Figure 5-3. The use of MELD is described in more detail in Section 7. Non-POTS circuits such as subscriber loop carrier and test lines may also be terminated at an SMDF but are engineered manually.

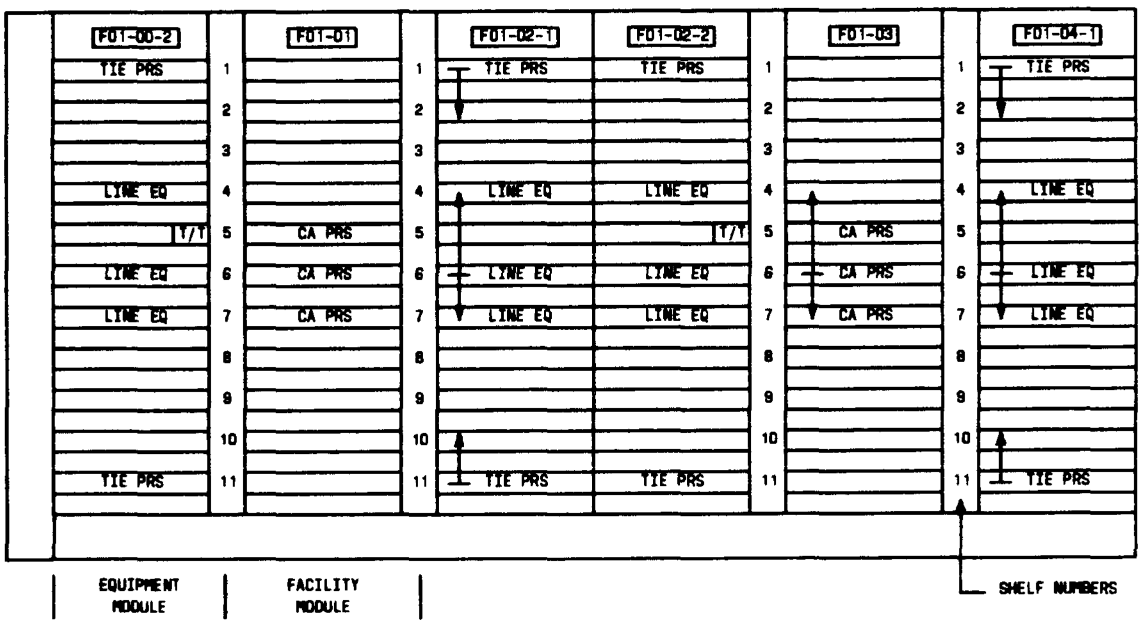


Figure 5-3. SMDF Typical Layout

The SMDF is generally administered through use of an operations support system such as *COSMOS* or AT&T's CFAS. These systems provide an automated means of assigning short cross-connects.

Tie pairs are used to interconnect multiple lineups of the SMDF. Two methods of providing a tie-pair network are supported by MELD - direct ties and ties to a Tie Pair Distributing Frame (TPDF) (see Figure 5-4). Direct Ties are cabled directly between lineups to provide cross-connect access for up to three lineups. The use of direct ties between lineups provides the most economical and efficient arrangement for two DF lineups. Alternatively, if there is a heavy tie pair requirement between three large lineups, a separate TPDF may be more desirable. A separate TPDF is generally recommended over direct ties for SMDF applications of three or more lineups.

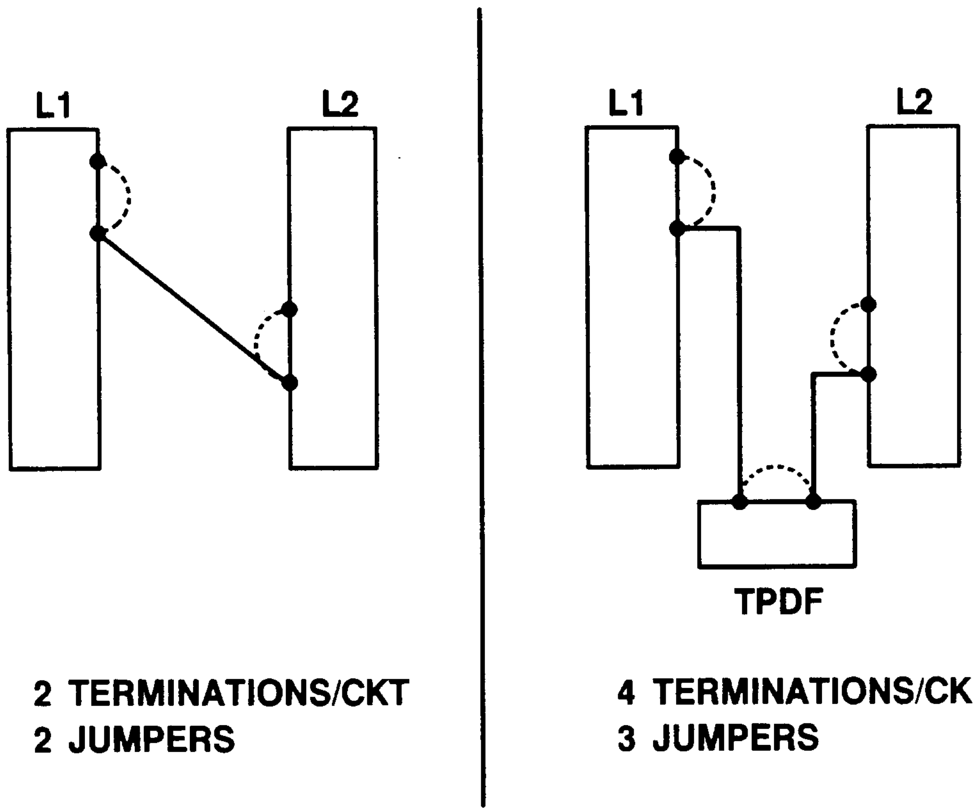


Figure 5-4. Direct Ties vs. Separate TPDF

The TPDF is a small single lineup of *COSMIC* framework modules (Figure 5-5). It may be arranged either as a separate lineup from the other SMDF lineup(s), or in the same physical lineup as one of the SMDF lineups. Tie pairs are distributed between the TPDF and each equipment module of the SMDF. A typical cross-connect using a tie-pair requires three jumpers: one from the facility module to an SMDF-TPDF tie pair, one from an equipment module to another SMDF-TPDF tie pair, and one on the TPDF connecting the two tie pairs. The TPDF engineering layout is also accomplished through use of the MELD program. Each of the three jumpers can be preferentially assigned with a software program such as CFAS. Thus, the TPDF provides a flexible method of interconnecting lineups while minimizing the number of long jumpers.

The number of TPDF bays required for an SMDF depends on the specific installation. Small single lineups will not generally require a TPDF. Direct ties are suggested for two lineup arrangements and can also be used with three lineups. A TPDF should be used for three lineups when a significant number of special services are terminated. Four or more frame lineups always require a TPDF. The TPDF can grow by adding cross-connect frame bays. The number of bays in the TPDF should ideally be a multiple of the number of SMDF lineups. Thus for a 2-lineup SMDF, the TPDF will typically consist of 2 or 4 bays. Figure 5-5 shows a 4-bay TPDF. For a 3-lineup SMDF, the TPDF will typically consist of 6 bays.

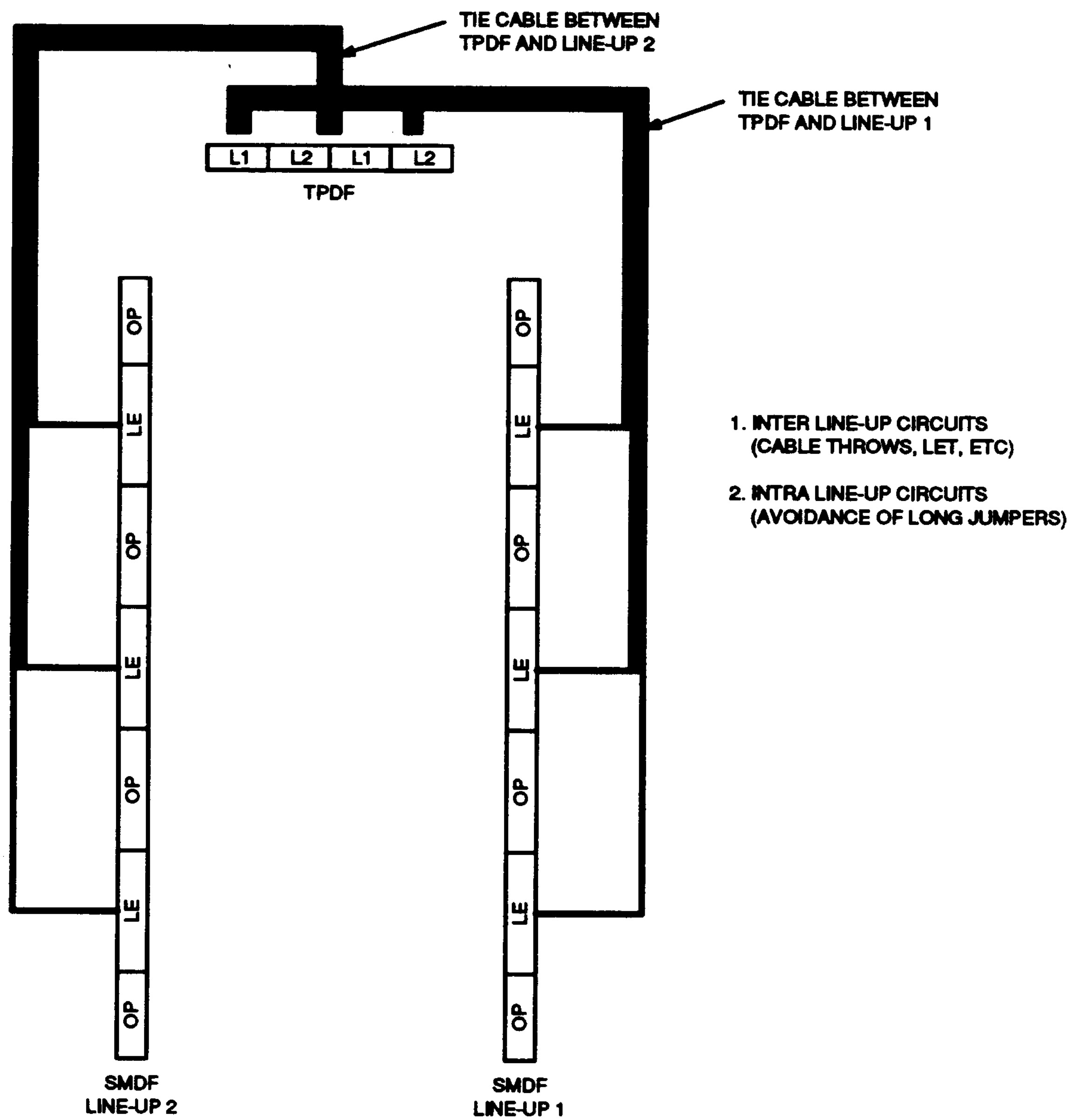


Figure 5-5. SMDF—TPDF Relationship

5.2.2 TMDF

The Trunk Main Distributing Frame (TMDF) is used to terminate and cross-connect trunk, toll, and transmission facilities with associated equipment. The TMDF is primarily used to terminate trunk and toll carrier (CXR) and voice frequency trunk cable pairs (TCP). Trunk equipment (TE), test access (TA) lines, and miscellaneous equipment (ME) are also terminated at the TMDF in addition to tie pairs (TP) to other frames. In most cases, the TMDF is a single lineup frame that is used in conjunction with a SMDF (Figure 5-6).

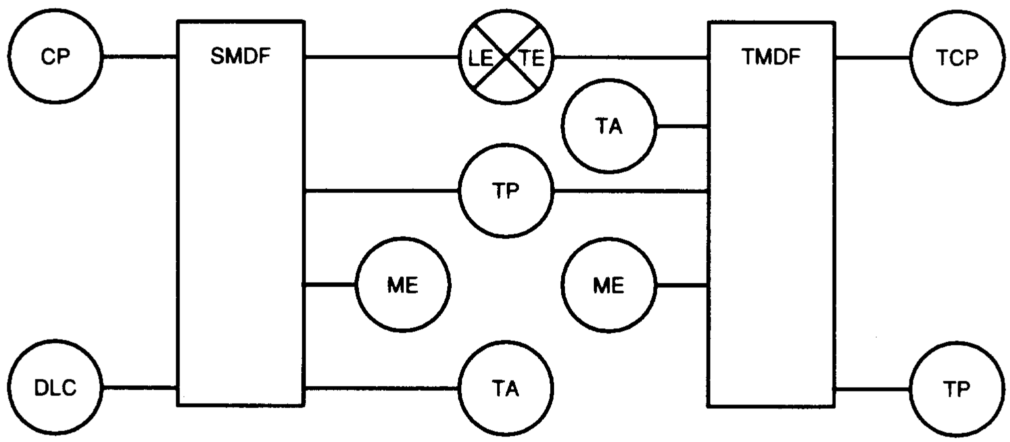


Figure 5-6. TMDF Functional Configuration - Shown with SMDF

As a rough guide to sizing, a six module *COSMIC* TMDF has capacity for 36,000 equipment termination pairs, while a four-module frame has capacity for 24,000 equipment pairs. Most terminations categories will be assigned in shelf increments on a Frame bay. Transmission facilities are typically terminated in Facility (FAC) bays. Trunk, toll, special service circuits, and all other terminations not classified as transmission facilities are generally terminated in Equipment (EQ) modules. Engineering layout of terminations is usually a manual procedure as described in Section 7.

Jumpers on the TMDF are randomly assigned due to the large variety of special terminations. The size of the TMDF is therefore limited to the random jumper capacity of the frame, which is six modules. If the ultimate TMDF termination requirements exceed 36,000 equipment pairs, other frame systems such as the conventional DF should be considered. An example of a typical TMDF layout is shown in Figure 5-7.

00-2		01-1	01-2	02-1	02-2	03-1	03-2		04-1
TIE PRS	1	TIE PRS		TIE PRS		TIE PRS		1	TIE PRS
MISC.	2	N3 CH BK	A6 CH BK	MISC	RT	D4 CH BK		2	MISC.
RT	3	D4 CH BK		RA		D4 CH BK		3	RT
G-SIG	4	D4 CH BK		UT	G-SIG	D4 CH BK		4	G-SIG
MT T/T	5	TRK CA PRS		MT T/T		TRK CA PRS		5	MT T/T
TIE PRS	6	TRK CA PRS		TIE PRS		TRK CA PRS		6	TIE PRS
FUT. ASSIGN	7	TRK CA PRS		FUT.ASSIGN	REG	TRK CA PRS	FUT.ASSIGN	7	FUT. ASSIGN
MFT	8	D4 CH BK		MFT		D4 CH BK		8	MFT
MFT	9	D4 CH BK		MFT		D4 CH BK		9	MFT
MFT	10	N3 CH BK		MFT		N3 CH BK		10	MFT
TIE PRS	11	TIE PRS		TIE PRS		TIE PRS		11	TIE PRS

Figure 5-7. TMDF Typical Layout

5.2.3 CMDF

The Combined Main Distributing Frame (CMDF) combines the SMDF and TMDF functions into one frame (Figure 5-8).

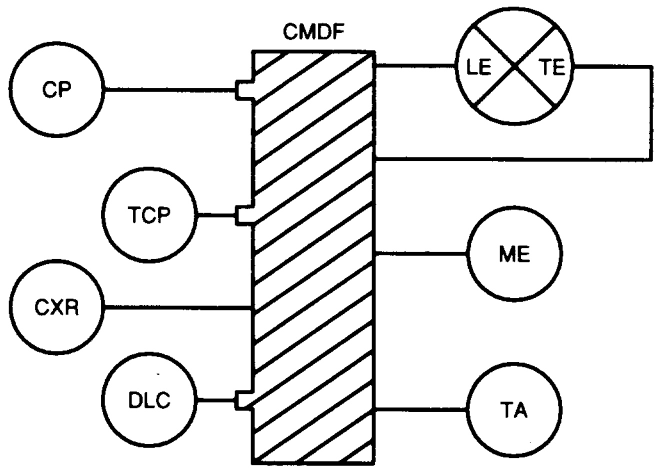


Figure 5-8. CMDF Functional Configuration

The CMDF is typically a single lineup that is used to terminated all circuits within an office. It is ideally suited for small *5ESS* Switches and DMS-10 applications. It terminates outside plant subscriber line equipment, and trunk facilities and equipment. MELD will layout the subscriber line equipment and all the OSP cable pair terminations. CFAS can administer the subscriber OSP and line equipment, for short jumpers. There is no mechanized layout or administration system for the preferential assignment of short jumpers for the trunk facilities and equipment.

The CMDF uses *COSMIC* IA DF or *COSMIC* IIA DF framework. The random assignment jumper capacity of the framework troughs is limited to 14 bays. The 14 bay frame would typically consist of 6 facility bays and 8 equipment bays. A typical *COSMIC* CMDF lineup layout arrangement is shown in Figure 5-9.

The *COSMIC* Mini DF framework is generally used in the CMDF or Combined Main Distributing Frame arrangement. In these applications, both subscriber and trunk terminations are placed on the frame. The length of the *COSMIC* Mini DF is also limited by the trough capacity that is filled by nonpreferential (long) jumpers.

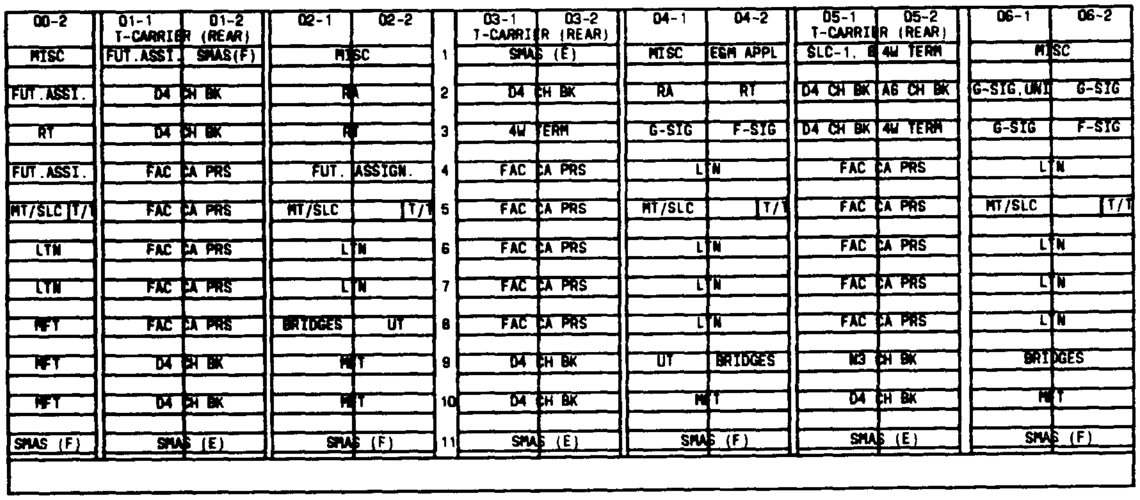


Figure 5-9. Typical CMDF Bay Layout

5.2.4 SDDF

The Subscriber Digital Distributing Frame (SDDF) terminates outside plant cables dedicated to T-carrier circuits, T-carrier equipment (such as Office Repeater Bay or Subscriber Carrier Systems), and tie cables to other DF's. The SDDF reduces the need for long shielded jumpers on the SMDF. The *COSMIC* IA and IIA frames also have applications as a SDDF where the frame terminates and cross-connects loop T-carrier circuits. Figure 5-10 shows a SDDF functional configuration and Figure 5-11 shows a SDDF bay layout. In each of these applications, the frame hardware can be customized to allow an optimal balance of facility and equipment bays that matches the mix of equipment and facility terminations for the wire center.

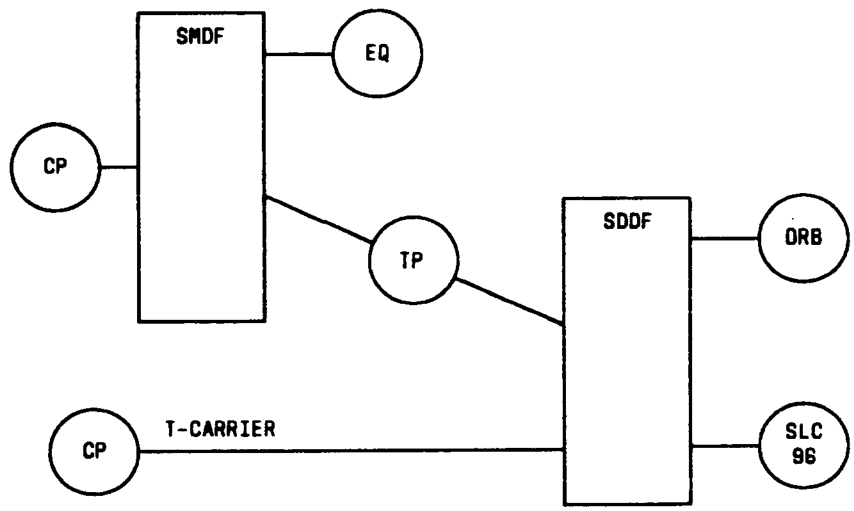


Figure 5-10. SDDF Functional Configuration

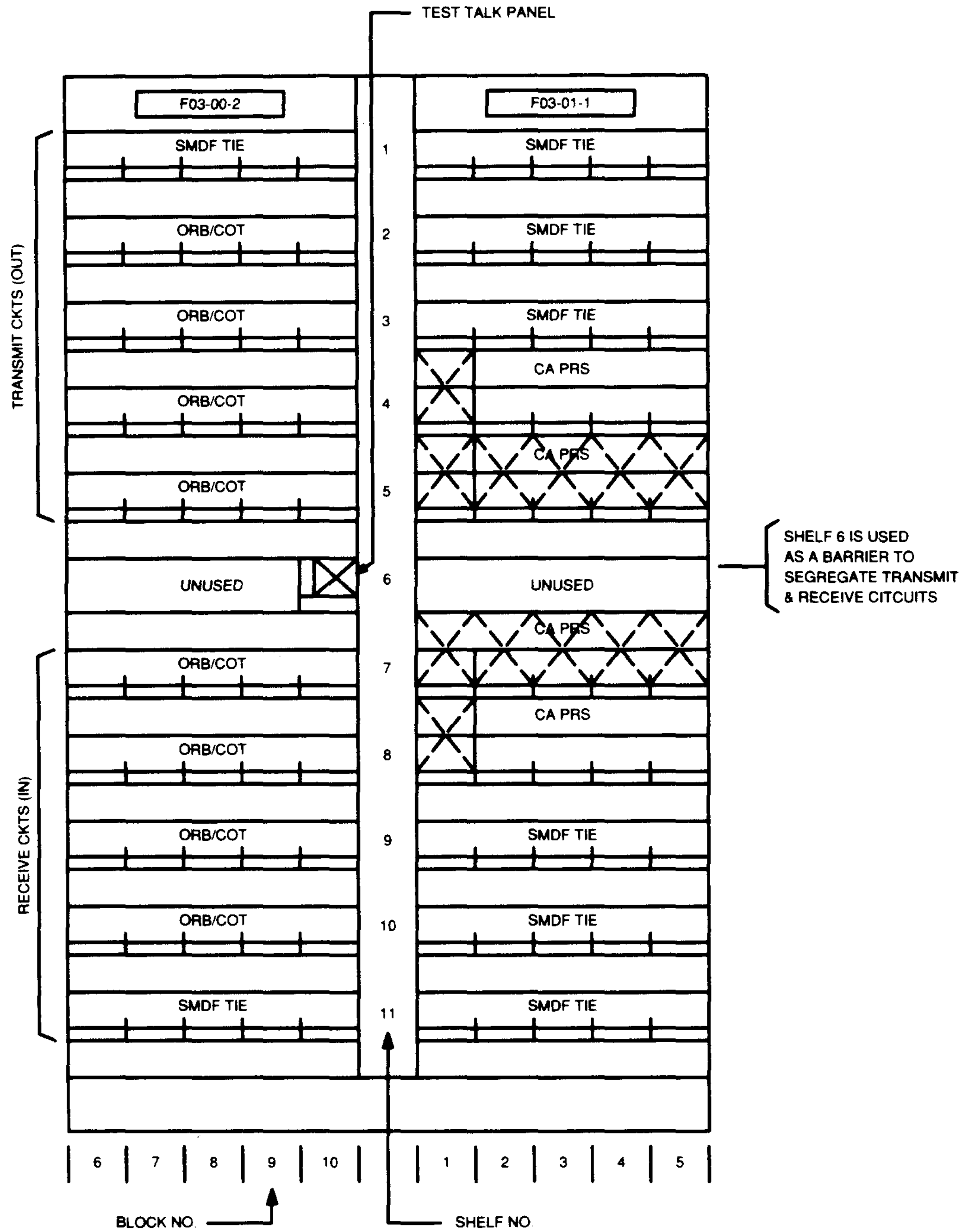


Figure 5-11. SDDF Bay Layout

5.3 Physical Framework Type

The *COSMIC* DF physical framework types are described in detail in Section 3. The following paragraphs summarize the capabilities of the physical framework types.

5.3.1 *COSMIC* I DF

The *COSMIC* I DF is constructed of only cross-connect framework bays, and is used to terminate switchboard cables on 112-type (or 78-type) connecting blocks over 11-shelves. The footprint of the frame is 1 foot 6 inches (457 mm) deep. Outside plant cables needing protection are first terminated on protected connectors mounted on a separate protector frame. Then, OSP strap cables are routed from the protector frame to connecting blocks on the *COSMIC* I DF facility modules. Switch equipment cables are routed directly from the switch to the *COSMIC* I DF equipment modules. *COSMIC* I DF frameworks are typically used as an SMDF to terminate subscriber OSP cables and switch line equipment. *COSMIC* I frames are often used for the Tie Pair Distributing Frames as well, to interconnect multiple lineup Subscriber Main Distributing Frames. The *COSMIC* I DF can mount the latest high-density connecting blocks (112H-Type) only if equipped with the shelf adapter brackets.

5.3.2 *COSMIC* IA DF

The *COSMIC* IA framework is similar to the *COSMIC* I frame in that it is constructed of only cross-connect bays. The *COSMIC* IA DF framework does not provide protection and so is used in conjunction with separate protector frames for the termination of outside plant cables. The foot-print of the frame is 2 feet 3 inches (686 mm) deep to accommodate larger wiring shelves and express troughs than the *COSMIC* I DF framework. The *COSMIC* IA DF framework also has a higher termination capacity since it can mount the newer 112H-type high density connecting blocks. The *COSMIC* IA frame is recommended over the *COSMIC* I frame for new installations. Principally, the *COSMIC* IA DF is used in Subscriber Main Distributing Frame configurations or Tie Pair Distributing Frame configurations. But since the *COSMIC* IA DF has the larger wiring troughs, it can also be used in functional configurations typically not having preferential short jumper assignment. Thus, the *COSMIC* IA DF can function in small Combined Main Distributing Frame or Trunk Main Distributing Frame configurations which typically generate more jumpers in the express troughs.

5.3.3 *COSMIC* IIA DF

The *COSMIC* IIA DF provides integrated protection with the use of the 307-type connector. It uses both the cross-connect and cross-connect/protection framework bays. The foot-print of the frame is 2 feet 3 inches (686 mm) to accommodate larger wring shelves and express troughs; the same size as the *COSMIC* IA frame. The *COSMIC* IIA DF also has a higher termination capacity since it can fully use the newer 112H-type high density blocks. The *COSMIC* IIA DF can be used in large SMDF configurations, or in smaller TMDF or CMDF configurations. When used in large SMDF configurations, the *COSMIC* IIA frame is usually installed with either a *COSMIC* IA TPDF in the same lineup, or optionally a *COSMIC* I TPDF in a separate lineup.

5.3.4 *COSMIC* Mini DF

The *COSMIC* Mini DF is a single-sided modular frame that can terminate and cross-connect both outside plant cables and equipment cables. Both the outside plant protector field and cross-connect field are on the front side of the frame. The *COSMIC* Mini DF framework consists of facility bays, equipment bays, and vertical wiring troughs. Equipment bays have ten shelves and can mount twenty 100- or 128-pair, 112-type connecting blocks. The facility bays can mount ten 307-type connectors with attached 100-pair 112-type connecting blocks. The *COSMIC* Mini DF is typically used in small offices as a CMDF. The MELD system can be used to engineer terminations for the *COSMIC* Mini DF.

5.3.5 Separate Protector Frame

Protector frames are utilized as stand alone protection of outside plant cable pairs. These frames have no provisions for cross-connects, and are used in conjunction with a separate *COSMIC* I, IA, or IIA DF. Outside plant cable pairs are terminated on protected connectors on the protector frame and tie-cabled to connector blocks on the facility side of the *COSMIC* DF. The use of separate Protector Frames generally facilitates higher density DF configurations since more blocks can be mounted on the DF than connectors. A variety of Protector Frames are available in different densities so that the appropriate one can be selected for the required application.

5.4 Bay/Shelf Density

The 112-type connecting blocks are designed for use with all AT&T *COSMIC* DFs and the size of the frame is heavily influenced by the block selection. Primarily, the selection comes down to choosing the standard density that has been widely used in the past or the newer high density blocks.

New codes of high density 112-type connecting blocks are available that offer significantly higher termination density. These blocks are equipped with either a new insulation-displacement terminal (2-Beam quick clip) or single (non-bifurcated) wire wrap posts. These new blocks are intended for applications where bifurcated terminals are not needed, such as tie pair circuits. The available codes include a 100-pair version for shelves 1 and 11 of the *COSMIC* frame (compared to the standard 50-pair blocks), and 150-pair and 200-pair versions for shelves 2 through 10 (compared to standard-density 100-pair tie blocks). Like the other 112H-type blocks, each is 5.3 inches (134 mm) wide, and up to six of these blocks can be mounted on a bay shelf.

Tables 5-A and 5-B summarize the capacities of the various *COSMIC* framework types for both standard and high density.

Table 5-A. SHELF DENSITY

CIRCUIT TYPE	SHELVES	PAIRS PER BLOCK	BLOCKS PER SHELF	PAIRS PER BAY-SHELF
OSP	1 & 11	50	5	250
			6	300
	2-10	100	5	500
			6	600
EQ	2-10	64	8	512
		128	5	640
TIES	1 & 11	50	5	250
			6	300
		64	5	320
		100	6	600
	2-10	100	5	500
			6	600
		200	6	1,200

Table 5-B. FRAMEWORK TERMINATION CAPACITIES

FRAME TYPE	APPLICATION	SHELVES 2-10		SHELVES 1 & 11		TOTAL BAY CAPACITY
		BLOCK CAPACITY (PAIRS)	QTY PER BAY SHELF	BLOCK CAPACITY (PAIRS)	QTY PER BAY SHELF	
COSMIC I	Facilities and/or Ties	100	5	50	5	5,000
		100	6*	50	6*	6,000
	Equipment and Ties	128	5	50	5	6,260
		128	5	50	6*	6,360
COSMIC IA or IIA	Facilities and/or Ties	100	6	50	6	6,000
		100	6	100	6	6,600
	Equipment and Ties	128	5	50	6	6,360
		128	5	100	6	6,960
COSMIC Mini	Facilities Equipment	100	2	—	—	1,000
		128†	2	—	—	2,560

Notes:
* Requires Shelf Adapters
† Terminated on Shelves 1-10

5.5 *COSMIC* I, IA, and IIA Layout Arrangements

5.5.1 Traditional

A "traditional" *COSMIC* frame arrangement consists of equal-sized facility and equipment modules that alternate along the length of the lineup as shown in Figure 5-12. Each module consists of two bays placed side-by-side. A vertical wiring trough is placed between the modules. The first and last module in the lineup is a half-module, consisting of a single bay. This arrangement results in equal numbers of bays for outside plant and equipment terminations. Modules are numbered left-to-right with the left half-module designated -1, and the right half-module designated -2. This particular arrangement results in a pattern that repeats every fouth bay or every 13 feet (3962 mm).

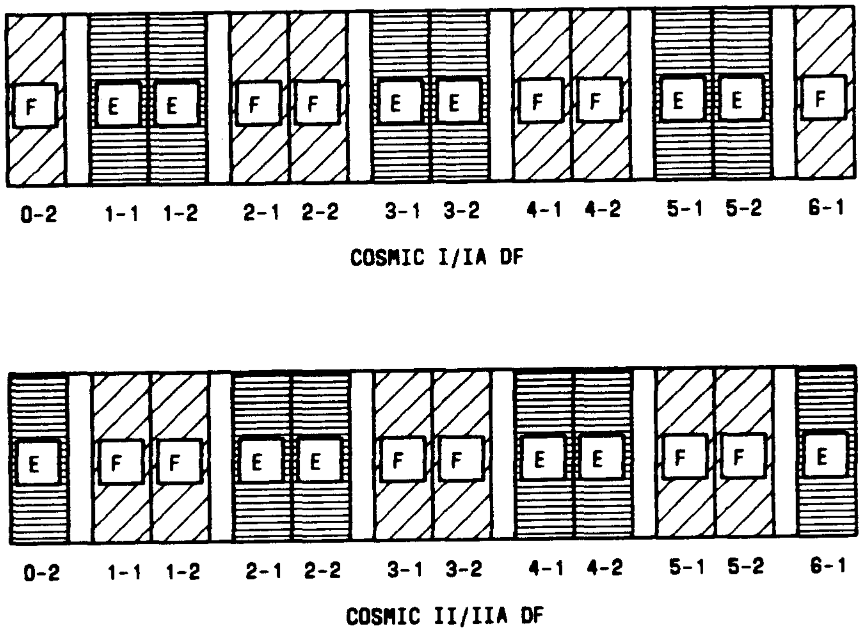
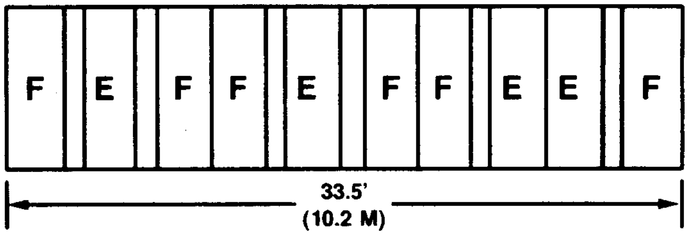


Figure 5-12. Traditional Frame Layout

In *COSMIC* I and IA DFs, the first and last half modules in the lineup are for facility terminations. Thus, the even numbered modules are for facilities (0,2,4 etc.) and the odd numbered modules are for equipment. In *COSMIC* IIA DFs, this convention is reversed, so that the first and last half-modules are for equipment terminations. Thus for COSMIC IIA frames, the even-numbered modules are for equipment, and the odd-numbered modules are for facilities.

5.5.2 Custom

The *COSMIC* "custom" frame arrangement, shown in Figure 5-13, uses single bays for some of the equipment modules, as opposed to the double bays of the "traditional" arrangement. The use of single bays will help reduce floor space requirements, because many offices require more terminations for outside plant than equipment (typically more outside plant pairs are terminated on the distributing frame than switching equipment pairs). This enables the "custom" frame the ability to terminate more outside plant pairs (and fewer equipment pairs) than a "traditional" frame of equal length. The custom layout typically produces a repeating pattern after three bays or every 10 feet 3 inches (3124 mm). For custom frames, the lineup uses the convention of starting and ending with a half facility module.



- **TYPICAL LINEUP CAPACITY - 6 FAC BAYS, 4 EQUIP BAYS**
  COSMIC 1A - 36,000 FAC, 23,040 EQUIP, 4,800 TIES & MISC. EQUIP
  COSMIC 11A - 33,000 FAC, 23,040 EQUIP, 16,800 TIES & MISC.EQUIP
- **COMBINATIONS OF ONE OR TWO FACILITY AND EQUIPMENT BAYS CAN BE USED TO MATCH WIRE CENTER TERMINATION REQUIREMENTS**

Figure 5-13. Custom Frame Layout

5.5.3 Flex-Frame

COSMIC "Flex-Frame" arrangements combine facility and equipment terminations in the same bay. See Figure 5-14. Outside plant cables and equipment cables are terminated in alternating shelves of the same bay. Alternating equipment and facilities between shelves permit shorter cross-connect arrangements. Flex-frame arrangements are ideal for small or large wire centers where floor space is limited. The main advantage of the flex-frame layout is that it allows many cross-connects to be done with intra-bay jumpers for the shortest possible connection. Also, the flex-frame layout allows the most flexibility for balancing facilities and equipment, and hence, it's name.

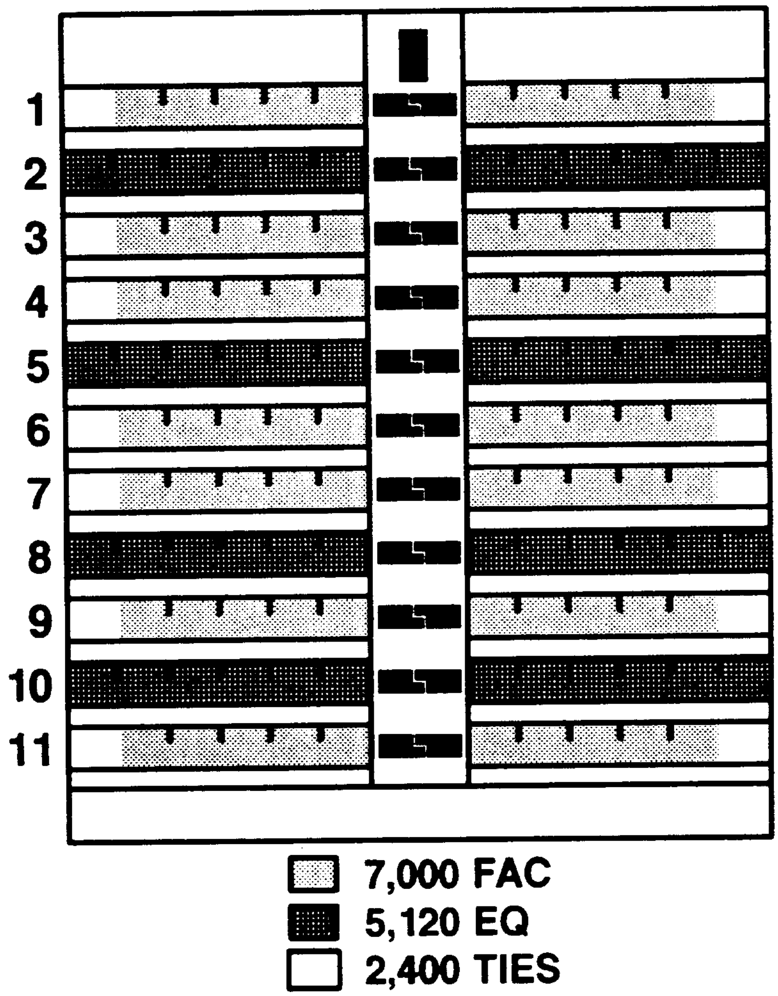


Figure 5-14. Flex-Frame Layout

5.5.4 Two-Stage

Two-Stage arrangements are generally used in very large central offices, typically exceeding 200,000 lines. Two-stage arrangements consist of two frame entities - one entity is dedicated to facility terminations and the other to equipment terminations, and the tie cables are used to directly interconnect the two (there is no tie pair distributing frame). Proper spreading of tie cables provides short-jumper access to any facility and equipment. Two-stage frame arrangements allow almost unlimited growth, assuming a well-planned tie cable network. One disadvantage of two-stage arrangements is that every cross-connect requires a tie and two jumpers. This makes it most attractive for very large offices with a relatively high percentage of special service circuits where the alternative configuration of a multi-lineup SMDF and TPDF would require a high percentage of the cross-connects to use two ties and three jumpers. Figure 5-15 provides characteristics for one and two-stage arrangements.

The following is a list of the primary complexes that are used in two-stage arrangements:

- SFDF - Subscriber Facilities DF
- TFDF - Trunk Facilities DF
- CFDF - Combined Facilities DF (Subscriber and Trunk)
- SEDF - Subscriber Equipment DF
- TEDF - Trunk Equipment DF
- CEDF - Combined Equipment DF (Subscriber and Trunk).

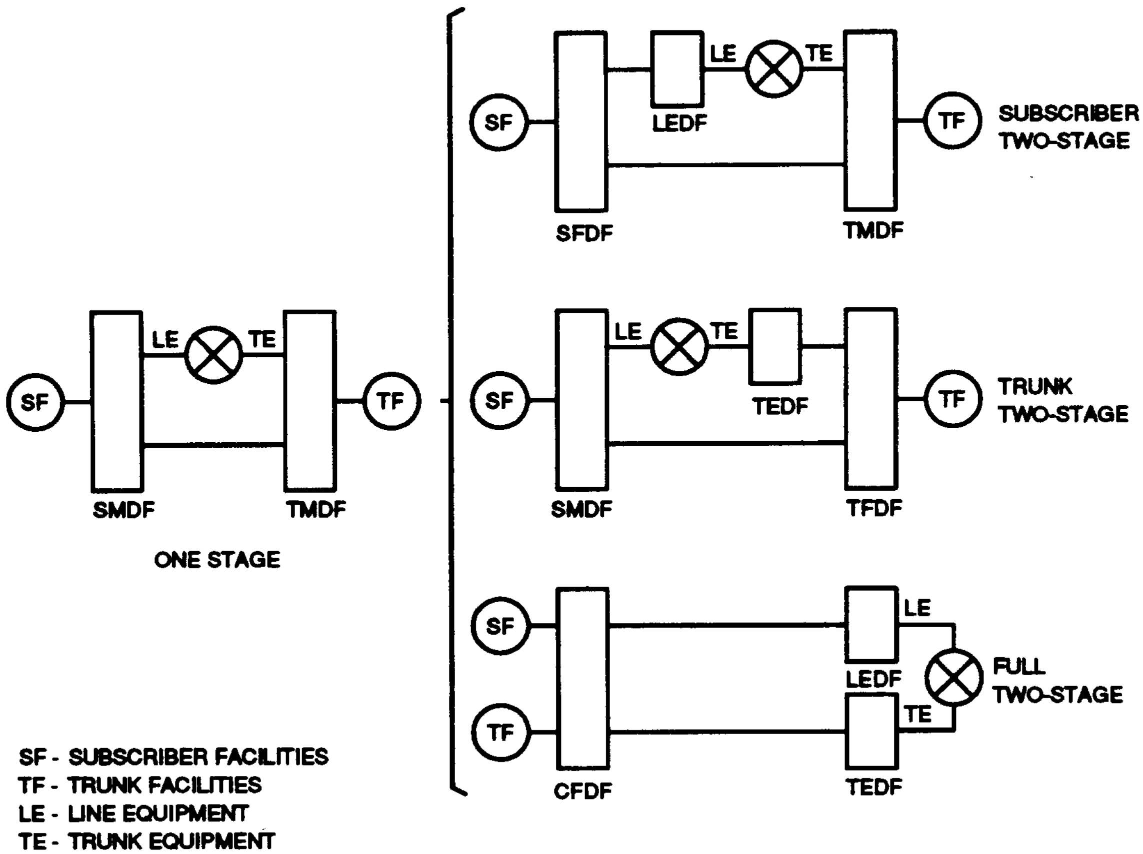


Figure 5-15. Two-stage Schematic

5.6 *COSMIC* Mini DF Layout Arrangement

A *COSMIC* Mini DF frame arrangement is typically one, two, or three cross-connect/protection bays placed side-by-side to form a facility module, and one or two cross-connect bays placed side-by-side to form an equipment module. A vertical wiring trough is placed between the equipment and facility module. Figure 5-16 shows a typical *COSMIC* Mini DF layout.

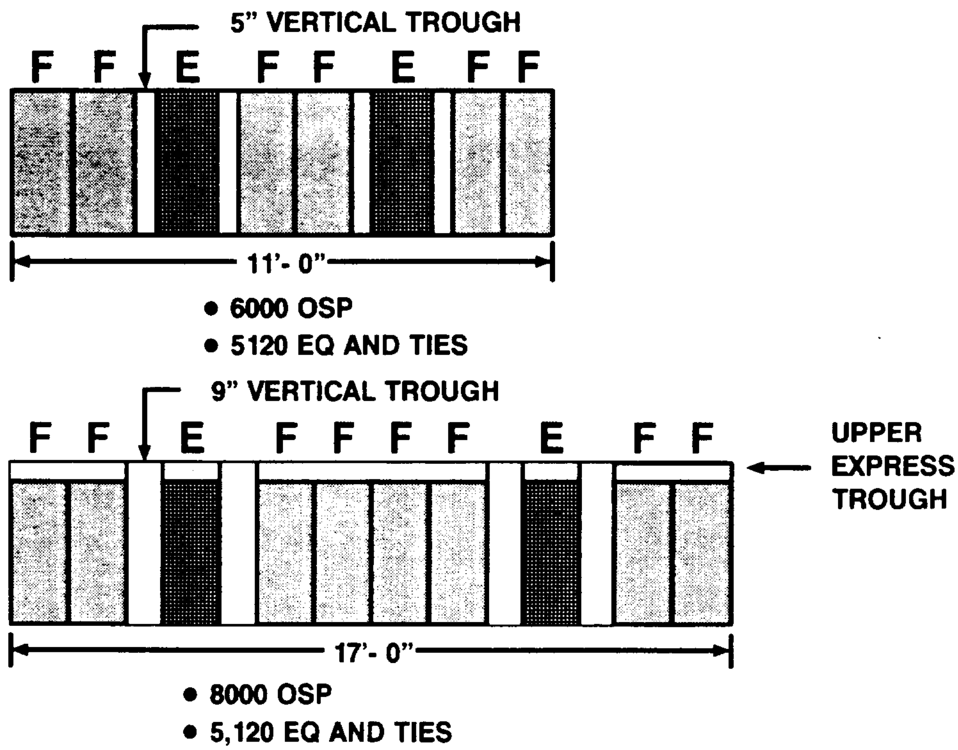


Figure 5-16. *COSMIC* Mini DF Frame Layout

SECTION 6

SYSTEM PLANNING

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SECTION 6

SYSTEM PLANNING

This section provides planning objectives and a recommended planning process for *COSMIC* Distributing Frames. The primary concerns in the planning phase are to identify termination requirements and physical space constraints. Also key to planning is selecting the appropriate frame, sizing the frame, and evaluating alternatives.

6.1 Distributing Frame Planning

6.1.1 Fundamental Planning

Proper planning and engineering of the *COSMIC* DF System can assure that it will be usable for many years without congestion. A *COSMIC* DF plan is usually developed with the following key elements:

- Fundamental Planning - The fundamental planning process results in a long range plan for providing service connections at the distributing frame. The fundamental plan involves projecting termination requirements, typically 20 years or the planned life of the frame, and then developing a floor plan to accommodate these requirements. This plan should be reviewed whenever a major addition is considered or a minimum of once every 5 years.
- Monitoring - A periodic (every 2 years) check on the fundamental plan to ensure viability for 5 more years. The monitoring process reviews forecasts, other area plans, and implementation to assure that the fundamental plan remains valid.

These aspects of planning are consistent with the general planning philosophy promoted by the Common System Planning and Engineering Centers (CSPEC) in many telephone companies. Figure 6-1 shows many of the factors that impact on fundamental planning of distributing frames.

The fundamental plan is the master plan from which all organizations should work, guiding the implementation of circuit additions, assignments, or rearrangements that may come later. The basis of the fundamental plan is the development of long-range forecasts of the number of terminations needed on the DF System. Although there will be some uncertainty in the forecast, it is important that a realistic plan be developed. Without a fundamental plan to allocate space for DF growth, engineering a DF System is certain to lead to expensive rearrangements in the future.

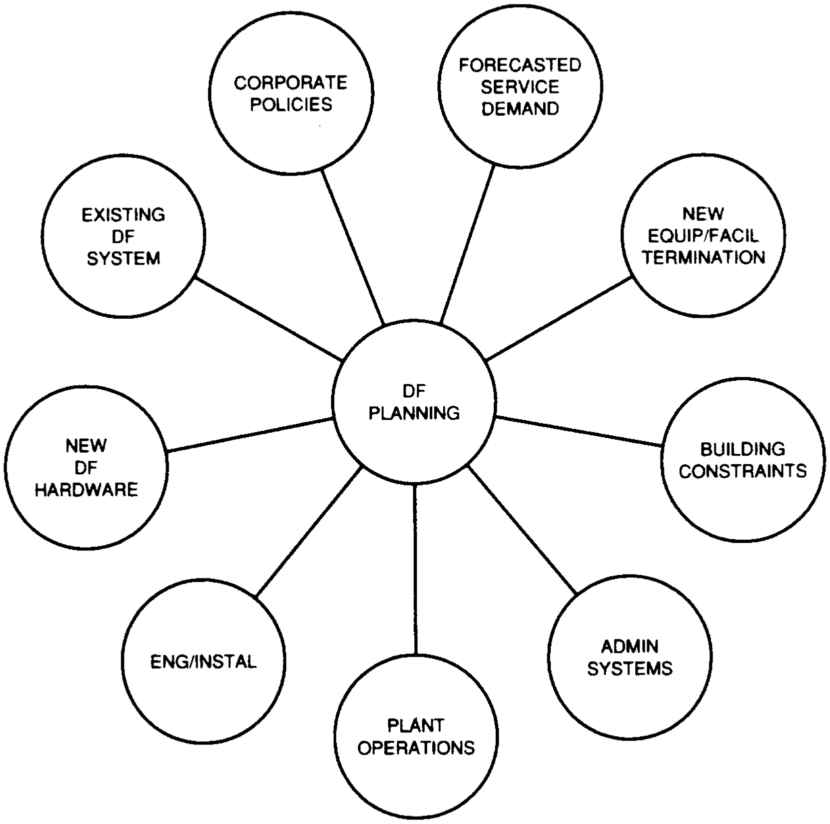

Figure 6-1. DF Planning Environment

6.1.2 Planning Process

The flowchart in Figure 6-2 depicts the sequence of events involved in planning a DF. The typical steps in the process are:

1. Review planning objectives.
2. Determine termination requirements: initial, growth, ultimate.
3. Identify constraints: primarily floor space, cable access, budget, schedule.
4. Select the appropriate *COSMIC* DF (Section 5).
5. Determine the frame size: initial, growth, ultimate.
6. Develop a transition strategy: cable splicing, switch cutover.
7. Evaluate alternatives; if appropriate, generate other options.
8. Develop documentation for the plan suitable for engineering use.

Each of these steps is described in detail in the following paragraphs. Note that when planning an addition or growth to an existing *COSMIC* DF, similar steps can be followed. Growth methods and planning for growth are presented in paragraphs 6.4 and 6.5.

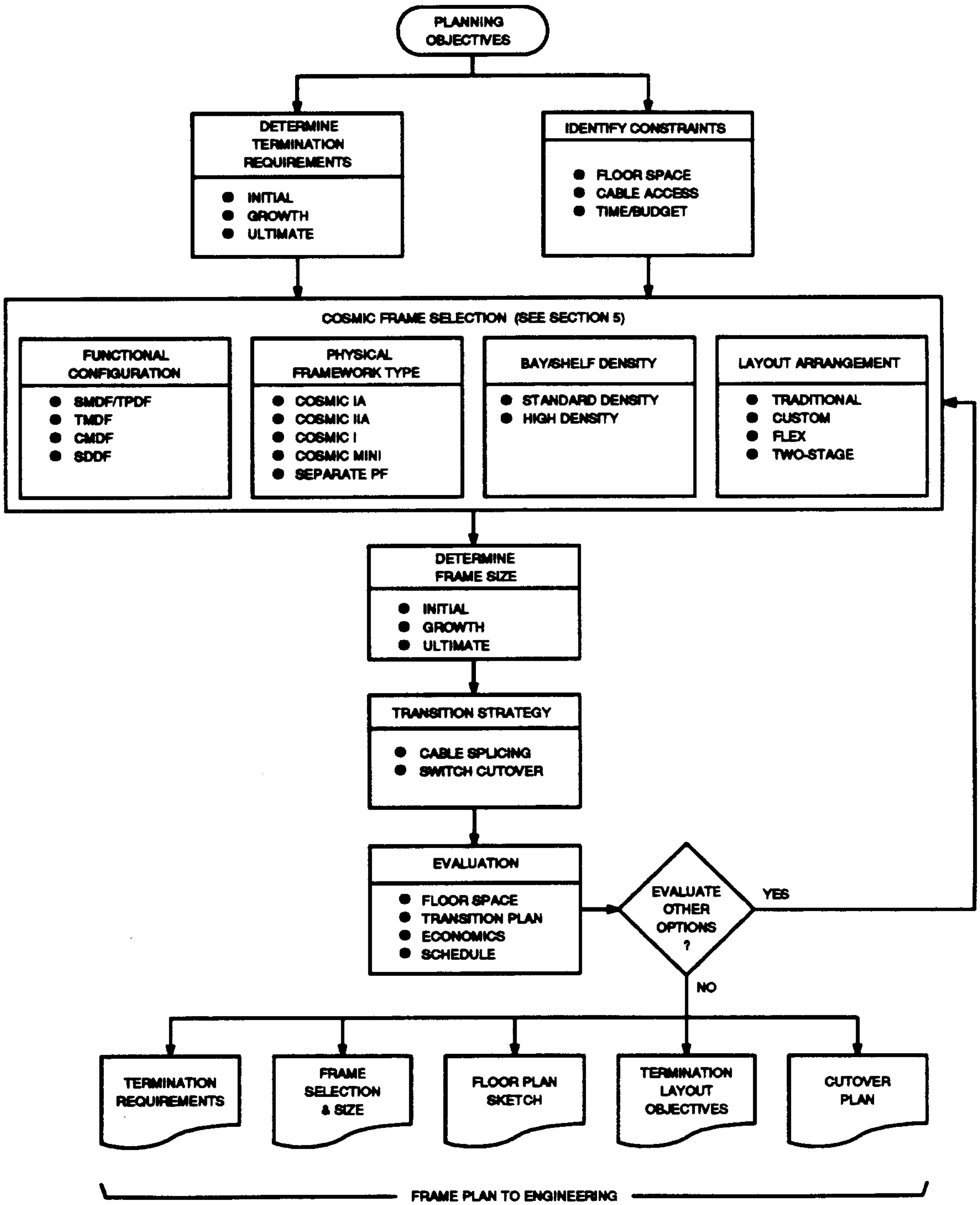

Figure 6-2. Planning Process

6.2 Planning Guidelines for *COSMIC* Frames

6.2.1 Planning Objectives

The process of planning a DF involves identification and evaluation of alternatives and selection of the most appropriate and economic alternative. The specific objectives may differ for each office, but the following general objectives should be considered when planning a DF:

- The DF plan should be in accordance with the fundamental long range plan. The long range plan should be based on the 10-to-20 year projection of the "ultimate" termination requirements. Keep in mind that the *COSMIC* DF can be installed with less than the ultimate framework initially. However, it is still recommended to review the ultimate requirements to evaluate floor space needs.
- To grow a *COSMIC* DF, it is necessary to develop projections for initial and growth service demand. The initial requirements will be the termination needs at the time of cutover to the new frame. Growth service requirements will determine the size of the frame subsequent to the initial installation.
- It is usually preferable to install *COSMIC* DFs in contiguous lineups to facilitate service connections with short jumpers. Where more than one lineup is installed, the number of additional lineups should be minimized to avoid excessive tie-pair interconnection.
- Floor space recommendations should be followed closely to allow adequate space for installation of frames, cabling, and maintenance activities.
- Planning of *COSMIC* DF Systems should include provisions for use of AT&T's engineering support program (MELD) and operational support program (CFAS) or equivalent.

6.2.2 Determine Termination Requirements

Much of the effort in planning a *COSMIC* DF should be in determining an accurate forecast of the termination requirements. Information should be gathered on the expected growth of facilities and equipment over the life of the frame. Key data includes the number of terminations required initially at cutover, the annual growth rate for each year of operation, and the ultimate number of terminations required. The "Services and Termination Profile" sheet shown in Figure 6-3 should be completed early in the planning stage. This data will be used later to calculate the expected jumper pileup and tie pair needs, and to determine whether any circuit reterminations are needed.

The Services and Termination Profile provides the planner with a profile of outside plant, switch equipment, miscellaneous equipment, and tie-pairs for interconnection to other frames. First, the total number of OSP cable pairs should be determined as well as the percent working or percent fill. The number of special services including both switched and non-switched should be recorded. Interoffice trunk cable pairs, channel banks, and pair gain systems should be recorded. Note that the number of interoffice trunk cable pairs will only be important for sizing a *COSMIC* TMDF or CMDF. For sizing an SMDF, the number of Digital Loop Carrier (DLC) pair gain systems to be terminated on the frame is important.

The number of switch equipment terminations should be determined along with the percent utilization or percent working. Switch lines should also be recorded as to each entity; shown as switches A, B, C in Figure 6-3. Note that in sizing a TMDF or CMDF, the number of voice frequency switch trunk line equipment should also be determined.

Miscellaneous equipment termination requirements must also be determined. Miscellaneous equipment termination requirements will typically be heavy on TMDFs and CMDFs and light on SMDFs. These include equipment such as range extenders (CREGS), metallic facilities terminals (MFTs), bridge lifters and central office digital equipment such as Central Office Terminals/Office Repeater Bays (COTS/ORBS).

Finally, it is very important to consider tie-pair termination requirements for interconnecting to other frames. These include trunk ties, PBX ties, and other miscellaneous equipment ties. Note that inter-lineup ties, which typically are needed with multiple lineup SMDFs, are computed separately and are not included in the Services and Termination Profile.

TERMINATION TYPE	ANNUAL GROWTH RATE (%)	TERMINATION QUANTITIES	
		INITIAL	ULTIMATE
Total Facilities			
Working Circuits:			
A. POTS			
B. Switched Specials			
C. Non-Switched Specials			
D. Inter-Office Metallic Trunks			
E. T-Carrier			
F. Loop Carrier Derived Pairs			
Total Equipment			
A. Switch A Circuits Terminated			
Percent Working Fill			
B. Switch B Circuits Terminated			
Percent Working Fill			
C. Switch C Circuits Terminated			
Percent Working Fill			
Miscellaneous Equipment			
A. Range Extenders			
B. MFT			
C. Bridge Lifters			
D. Other (Identify)			
Inter-Lineup Ties			
A. TPDF Ties			
B. Direct Ties			
C. Misc. Ties			
Ties to Other Frame Systems			
A. Trunk Ties			
B. PBX Ties			
C. Misc. Equip.			
D. Other			

Figure 6-3. Services and Termination Profile

6.2.3 Indentify Constraints

Most distributing frame plans must work around constraints for space, time, and cost.

Of primary importance is identifying the floor-space available for the new DF. Sometimes the floor-space may be allocated in the fundamental plan for the entire wire center. Other times, the floor space must be located by the planner in the early planning stage. It is always recommended that a site survey be conducted by the planner and if possible by others who have experience in developing transition plans for DFs. The site survey will consist of an evaluation of wire center conditions and a comparison of existing floor plan drawings to actual equipment installations. Any descrepancies between the floor plan drawings and actual floor space usage should be noted and drawings should be brought up to date.

Floor space can often be found in the upper floors of wire centers that may have recently removed electromechanical switches or other older generation equipment. Remember that the distributing frame will possibly be the single largest piece of equipment in the office and therefore it is important for the planner to reserve as much contiguous space as possible for the new frame. Adding on to existing wire centers is always a possibility, but occurs less frequently than in the past due to the availability of space created by retired equipment. New high density apparatus also requires less space for installing a new *COSMIC* DF.

Often overlooked in the early planning stage is access space for bringing the cables to a new *COSMIC* DF. If outside plant cables are cutover from an existing frame, a splice location must be identified and space reserved for cable transition. Wall space may be needed to perform vertical splicing or cable routing. Overhead clearance for cable and racks must be carefully examined. Special note should be made of any utility pipes or ducts that may block the cable access area.

A schedule for implementing a *COSMIC* DF plan can range from several weeks for the installation of a small *COSMIC* Mini DF to several months or more for a large *COSMIC* IA/IIA DF. AT&T's product support organizations and systems equipment engineering can usually provide a close estimate on each phase implementation including engineering, ordering, and installing a *COSMIC* DF.

AT&T can also provide budgetary and firm price quotes for *COSMIC* DFs. Often these price quotes can be used in determining early the feasibility of a new efficient *COSMIC* DF which will be a cost savings to the user in the long run.

6.2.4 Frame Selection

COSMIC DF selection criteria are described in detail in Section 5. Selection involves identifying the functional configuration, the physical framework type, the bay/shelf density, and the frame layout arrangement. These criteria specify the frame that then must be sized and evaluated against available floor space.

6.2.5 Frame Sizing

The *COSMIC* frame sizing guidelines described in this section take advantage of the ability to grow the frame to reduce the first cost. While long-term forecasting is recommended, the actual frame installed for the initial installation can be substantially less than the "ultimate" (20 - 40 year) installation. Frame sizing is based on the accurate Service and Termination Profile developed in Paragraph 6.2.2. The following steps should be followed to size a *COSMIC* DF:

1. Determine a target value for the percent of frame fill for the initial installation. Frame fill is defined as the ratio of block positions used to the total capacity of the frame. It is desirable to keep the frame fill as low as practical to facilitate operations and provide flexibility for future growth options.

   In offices with limited floor space, there may be no choice but to have a high frame fill. The objective is that the frame should reach 80% fill after ten years of service life. at which time growth of the frame will have to be seriously considered. For most new frames, this is equivalent to an initial frame fill of about 50%, assuming typical growth rates of copper feeder cable of 3% per year.

2. Estimate the number of facility bays (B_{Fac}) needed for both the initial and ultimate sized frames — see Section 5 for bay capacities for high and low density apparatus. Frame sizing is typically a function of outside plant termination requirements:

$$B_{Fac} = \frac{Fac_{Total}}{\text{Frame Fill} \times \text{Bay Capacity}} \tag{3}$$

3. Estimate the number of equipment bays (B_{Eq}) needed for both the initial and ultimate sized frames. Again, refer to Section 5 for bay capacities for high and low density apparatus.

$$B_{Eq} = \frac{Eq_{Total}}{\text{Frame Fill} \times \text{Bay Capacity}} \tag{4}$$

4. Determine the frame layout arrangement (such as traditional, custom, flex, and two-stage) in accordance with Section 5. Flex layouts and two-stage layouts are typically only used in special cases. The layout will usually be traditional or custom and is determined as follows:

   A. If B_{Eq} is approximately equal to B_{Fac}, use the "traditional" arrangement of equal-sized, double-bay facility and equipment modules.

   B. For the case where B_{Eq} is less than half B_{Fac}, use the *COSMIC* Custom framework arrangement (equipment modules are a single bay, facility modules are double-bay)

   C. For the case where B_{Eq} is less than B_{Fac}, but greater than half of B_{Fac} (that is, $1/2\ B_{Fac} \leq B_{Eq} \leq B_{Fac}$, use a mixture of the "traditional" and custom arrangement.

5. Develop a preliminary frame arrangement that will fit into the available floor space. It is generally recommended that lineups not exceed twenty modules in length, although longer lineups are possible.

6. Calculate the number of tie pairs needed using equations (A-16) and (A-17) in Appendix 6A. If the frame is equipped with a TPDF, determine the number of TPDF modules needed:

$$B_{TPDF} = 2 \times \frac{\text{Ties}}{\text{Frame Fill} \times \text{Bay Capacity}}$$

   with B_{TPDF} rounded up to a multiple of two times the number of lineups.

7. Determine if there will be adequate space in the equipment bays to terminate the tie pairs. If not, some of the "custom" framework arrangements will have to be upgraded to the "traditional" arrangements to provide additional capacity.

8. For offices with a high percentage of special service or Centrex circuits, check that the expected peak jumper pileup (JPU) will not exceed the capacity of the express jumper troughs. Use equation (A-5) or (A-6) in Appendix 6A. If the calculation for JPU exceeds 10,000 for a *COSMIC* IA or IIA frame, or 5,000 for a *COSMIC* I frame, additional tie circuits will be needed to allow some of the cross-connects that would otherwise create long jumpers to be replaced by short jumpers and tie circuits through the TPDF. For *COSMIC* IA or IIA frames, the additional number of tie circuits needed to be terminated on each lineup is:

$$\text{Additional Ties} = \text{JPU} - 10{,}000$$

   For *COSMIC* I frames, the additional number of tie circuits needed to be terminated on each lineup is:

$$\text{Additional Ties} = \text{JPU} - 5{,}000$$

9. Reserve floor space for the ultimate frame forecast (see paragraph 6.4 for more details on floor space). When *COSMIC* frames are planned for growth, reserve space at the ends of lineups or parallel to existing frame lineups. The floor space reserved for frame growth may be temporarily used as an administrative area.

6.2.6 Transition Strategy

A transition strategy must be developed to support the change from an existing conventional DF to a new *COSMIC* DF. An important aspect of the strategy is selecting a method for terminating cables and equipment on the frame.

Often a new *COSMIC* DF will be installed to replace an older frame. The OSP cables must be transitioned from the old frame to the new frame. OSP cables are typically half-tapped at an intermediate position between the cable entrance and the older distributing frame. New stub cables, typically 100-pair, are run from the splice location to the new *COSMIC* DF. In cases where the new frame is located beyond one floor from the splice point, it may be desirable to run fire resistant riser cables between the cable entrance facility and a position adjacent to the *COSMIC* DF. From a position adjacent to the *COSMIC* DF, say on a convenient wall, the riser cables can be spliced to 100-pair stub cables.

6.2.7 Evaluation of Alternatives

After the sizing has been completed for different alternatives, each alternative must be evaluated in order to determine the optimal frame system for the wire center. The evaluation must consider both economics, building space factors, and intangible factors. An economic analysis is the major determinate in the alternative selection process. Specific hardware costs may be obtained to help in the evaluation. The installation and retermination costs should be provided and should include cost of building preparation, equipment, removals, and other cost factors. The final task is to select the best frame plan. This task involves weighing the economic comparisons, qualitative judgements of the intangibles, and capital and frame constraints.

6.2.8 Frame Plan Documentation

The DF plan should be documented so that the organizations involved with implementation can clearly follow directions. The documentation recommended includes a detailed breakdown of termination requirements, the selection of the appropriate *COSMIC* DF, a sketch of the floor plan, equipment termination layout objectives and sketches, and a transition plan for cutting over to the new frame.

6.3 Floor Space Planning

The plan for a *COSMIC* DF should include a detailed evaluation of floor space constraints and should result in layout drawings that show the placement of the frame with appropriate aisle spacings. The Floor Plan Data Sheets are a key tool in assisting the planner with this activity.

6.3.1 Floor Plan Data Sheets

The floor plan data sheets provide an aid to planning the frame system placement and floor space utilization in an office. Necessary information such as aisle spacing, floor loading, cabling requirements and other items are illustrated.

Guidelines in Floor Plan Data Sheets, FPD 801-005-164 should be followed in the floor plan layout in order to conform to NEBS building standards for floor loading, minimum aisle spacing, and cabling pathways. Recommended frame arrangements also permit use of standard racking and cabling which results in reduced installation costs. Aisle spacing and floor loading shown on standard *COSMIC* DF Floor Plan Data Sheets apply to custom configurations. Some of the variations between *COSMIC* IA and IIA DF layouts are described below. The layout requirements are contained in the FPD 801-005-164 series Floor Plan Data Sheets.

- *COSMIC* IIA SMDF/TMDF Frame System
- *COSMIC* IA /IIA DF End Guard
- *COSMIC* IA/IIA DF TPDF

- *COSMIC* IA/IIA DF Walk through
- *COSMIC* IIA DF Typical Office Floor Plan
- *COSMIC* IIA CMDF Frame System
- *COSMIC* IIA SDDF Frame System
- *COSMIC* IIA CMDF/SDDF Facility-Equipment Modules
- *COSMIC* IIA DF Equipment Module
- Cable Rearrangement Facility
- *COSMIC* IA SMDF Frame System
- *COSMIC* IA DF Typical Office Floor Plan

Guidelines in Floor Plan Data Sheet FPD 801-005-165 are needed if a *COSMIC* MINI DF system is used. The same type of information for floor loading, minimum aisle spacing, and cabling pathways is given for the *COSMIC* Mini DF system.

6.3.2 Frame Placement

Aisle spacing guidelines should be followed to provide the maximum operating efficiency over the life of the *COSMIC* DF. The following examples illustrate an acceptable layout arrangement.

COSMIC IA DF Layouts

Since *COSMIC* IA type frameworks do not have protector mountings on the DF, they are typically used with either a modular or double-sided protector frame. Figure 6-4 shows dual SMDF lineups with each PF type. In general it is desirable to maintain 3-foot 6-inch (1067 mm) maintenance aisles.

In a single DF lineup, a recommended 3-foot 6-inch (1067 mm) maintenance aisle or a 2-foot 6-inch minimum (762 mm) wiring aisle is used between the wall and the modular PF. A recommended 4-foot (1219 mm) maintenance aisle [3-foot minimum (914 mm)] is used between the PF and the cross-connect side of the DF. Refer to the floor plan data sheets for three lineup arrangements.

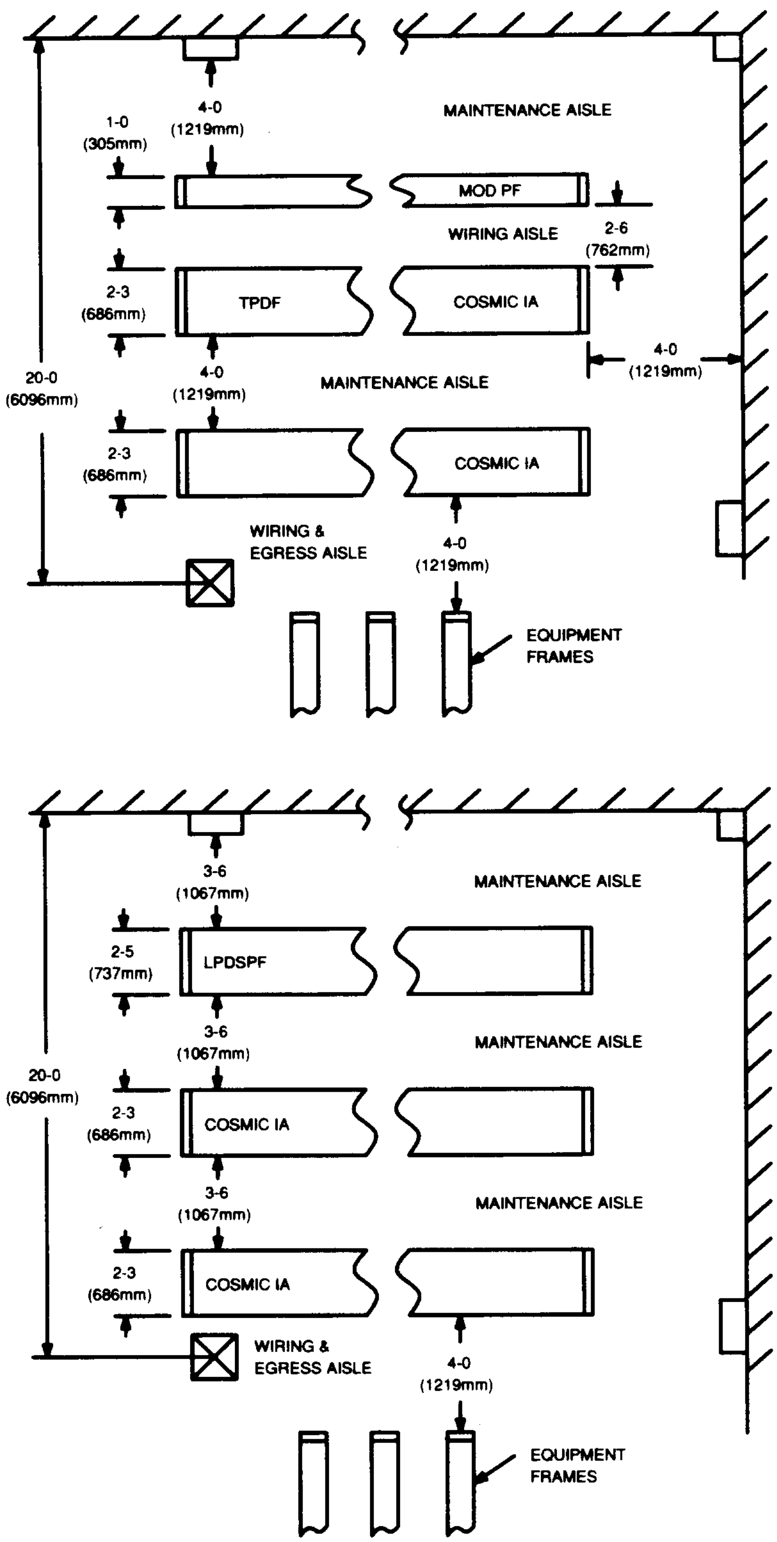

Figure 6-4. Typical *COSMIC* IA SMDF Layout

COSMIC IIA DF Layout

Figure 6-5 shows a typical layout for a dual lineup *COSMIC* IIA SMDF with an auxiliary cable entrance facility consisting of cable rearrangement facilities (CRFs). Standard 4-foot (1219 mm) maintenance aisles are used at the CRF and between frames in up to three lineups. Where space is critical, guidelines permit 3-foot 6-inch (1067 mm) wide maintenance aisles. Walk-throughs should be used as spacers to maintain contiguous frameworks where building columns infringe on minimum aisle space. See floor plan data sheets for additional requirements.

Direct ties are recommended between two lineups. However, a TPDF can be placed at the end of the last lineup, in line with another frame, or perpendicular to lineups. A 4-foot (1219 mm) maintenance aisle is used between a perpendicular TPDF and end of lineups.

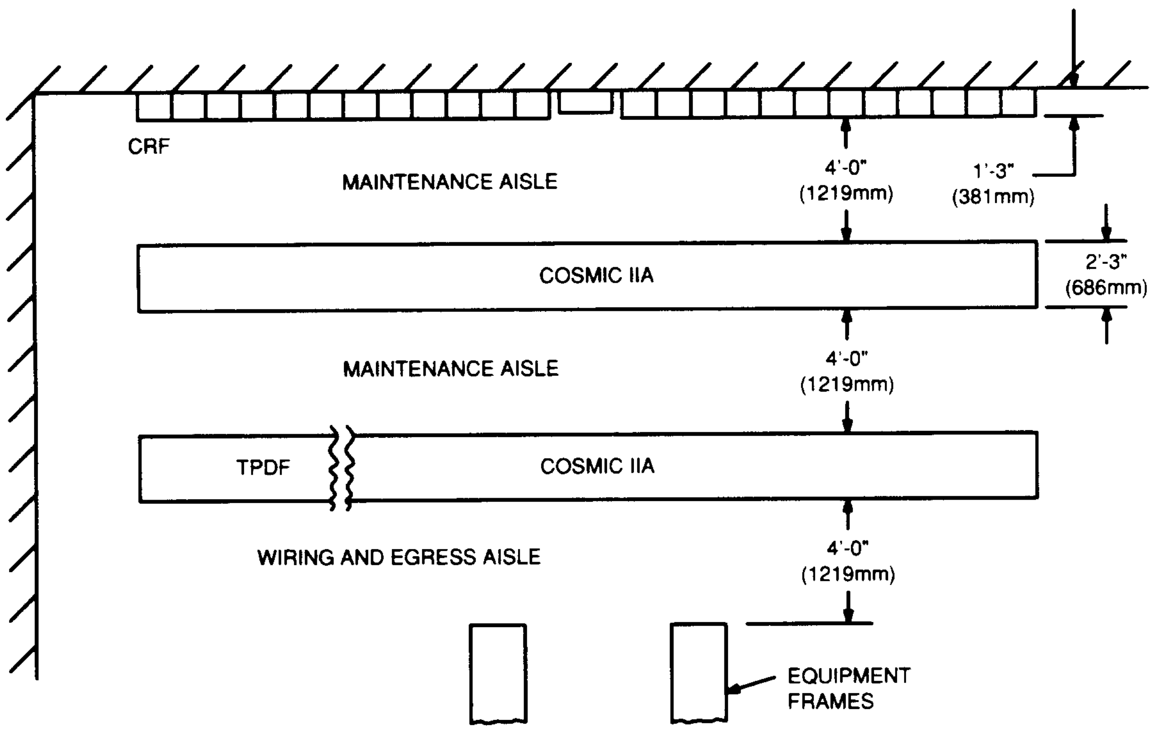

Figure 6-5. Typical *COSMIC* IIA SMDF with CRF

6.3.3 Cable Rack Planning

Although the standard racking arrangement is usually from overhead, cable racking arrangements can be designed to allow cable entry from overhead or underfloor. Standard cable racking arrangements are available for *COSMIC* frameworks in either the traditional 13-foot (3962 mm) or custom 10-foot 3-inch (3124 mm) arrangements. Cable racking groups in drawing ED 6C143-30 are designed in modular widths corresponding to the two basic frameworks. Therefore, racking can be installed to match any arrangement of half and whole equipment modules in a lineup. Different cable rack groups are fabricated to serve from one to three lineups. All lineups must have the same framework arrangements. This symmetrical arrangement is important so that the racking corresponds to the framework. Note that these racking arrangements were designed to bring large diameter OSP stub cables from an Auxiliary Cable Entrance Facility into the rear of a *COSMIC* IIA frame.

Racks are furnished in one or two levels to meet the cable capacity of the frame lineup. A one level racking scheme as shown in Figure 6-6 is provided for single lineups of 10 modules or less. Two level racks as shown in Figures 6-7 and 6-8 are furnished for single lineups of 12 to 20 modules, or two lineups of 14 modules or less, respectively. Cable rack configurations for other frame arrangements are also available — see ED-6C143-30.

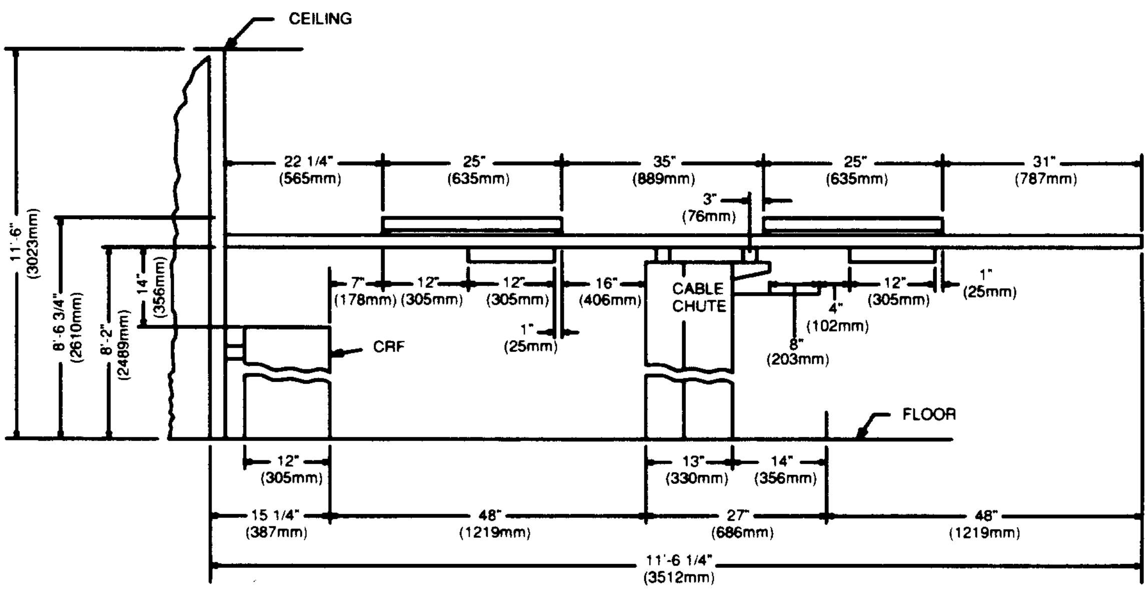

Figure 6-6. Single *COSMIC* IIA DF Lineup Racking - Single Level

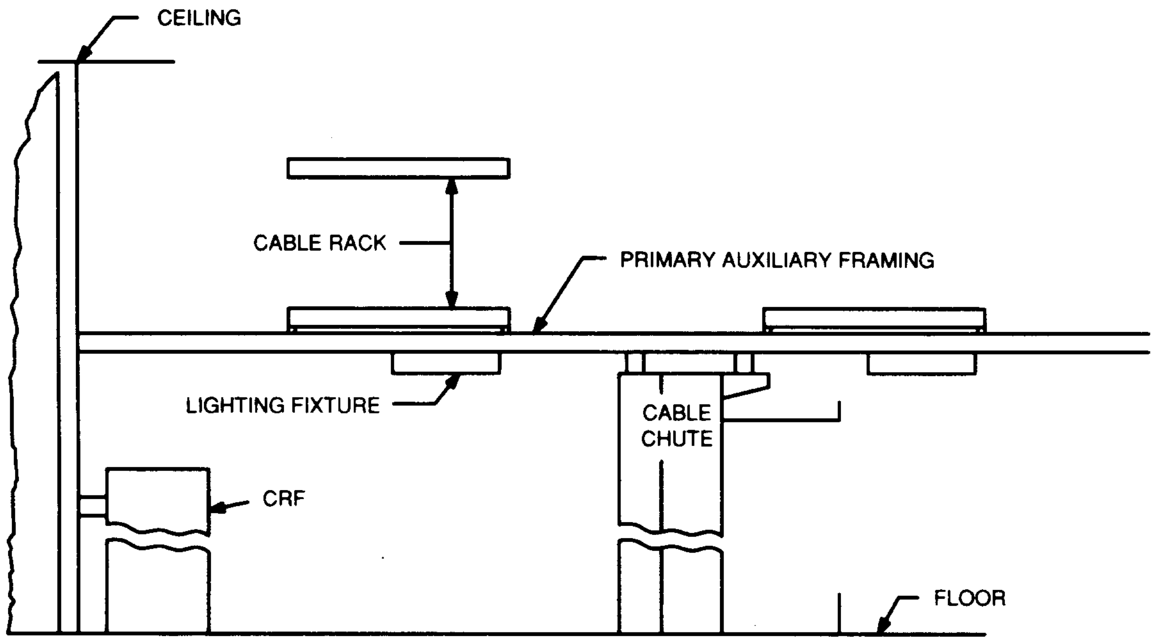

Figure 6-7. Single Lineup *COSMIC* IIA DF - Double Level Racking

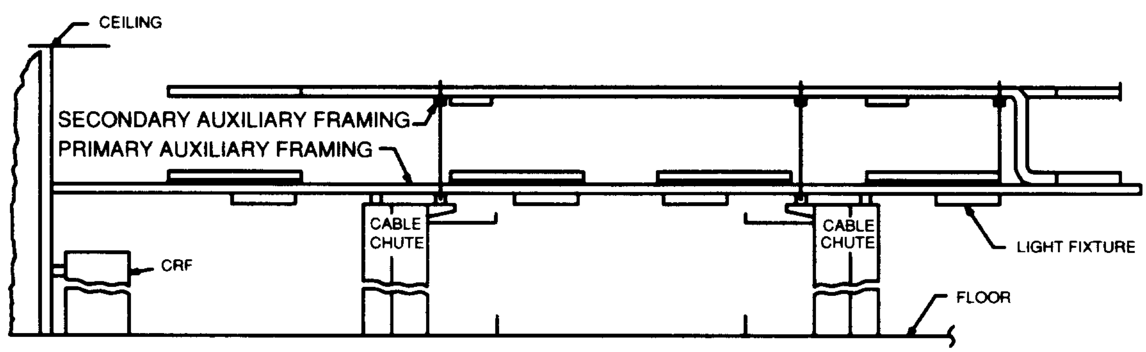

Figure 6-8. Double Lineup *COSMIC* IIA DF - Double Level Racking

To ensure cabling of all configurations, an 11-foot 6-inch (3505 mm) clearance between floor and ceiling is required over the distributing frame area whenever possible.

Lighting for the DF area is supplied by flourescent fixtures that mount under in-line cable channels. Lighting arrangements for 10-foot 3-inch (3124 mm) frameworks are combined with standard 13-foot (3962 mm) groups to match lineup frameworks and cable racking. In-line fixtures are furnished on both sides of a single lineup or as alternating patterns between lineups. Standard lighting fixtures are available for 120 or 277 volt operation.

6.3.4 Floor Loading

Floor loading is another area that must be considered. Most of the information needed is located on the Floor Plan Data Sheets. The load of the DF configurations to be used should not exceed the maximum floor load allowed by the building constraints.

Table 6-A provides planning values of floor loading for fully assembled and cabled frames.

Table 6-A. Floor Loading for *COSMIC* Distributing Frame

Frame Type	Floor Load
COSMIC I Frame	97 Lbs/Ft^2 (474 Kg/m^2)
COSMIC IA Frame	82 Lbs/Ft^2 (400 Kg/m^2)
COSMIC IIA Frame	122 Lbs/Ft^2) (596 Kg/m^2)
COSMIC Mini Frame	75 Lbs/Ft^2 (366 Kg/m^2)

6.4 Growth Methods

Growth methods are available for *COSMIC* DFs that usually require no retermination or special layout arrangements. Some of the older methods for growing *COSMIC* DFs which require retermination are therefore no longer required. The growth methods now recommended include:

1. Using High-Density 112H-Type Connecting Blocks for greater utilization of existing framework shelf space.
2. Utilizing existing framework shelf space for terminations irrespective of bay type; that is, outside plant terminations may be terminated in equipment bays and vice versa.
3. Framework can be added to existing lineups.
4. A new lineup can be added by carefully specifying ties between old and new lineups.

6.4.1 Using High-Density 112H-Type Connecting Blocks

This first and simplest method for increasing the capacity of an existing *COSMIC*-type frame is to begin using newer, high-density 112-type connecting blocks that were not available at the time the frame was first engineered. The *COSMIC* IA and IIA frames can terminate up to six of these blocks on each bay shelf. These connecting blocks are 5.3 inches (134 mm) wide. The older *COSMIC* I and II frames can use these blocks if the mounting shelves are equipped with ED-6C142-30, G3 or G4 adapter brackets — see Figure 6-9. This bracket can be installed on any vacant bay shelf, allowing six of the 112H-type blocks to be mounted on a shelf, as opposed to five of the "standard-size" 112C- or 112E-type blocks. This can result in a 20% increase in the number of cable pairs that can be terminated on a shelf.

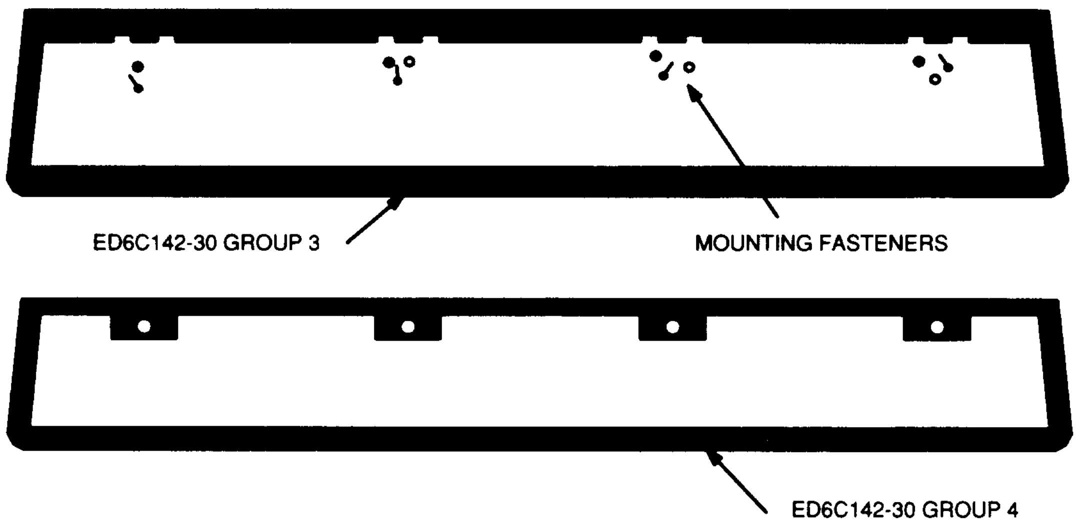

Figure 6-9. Adapter Bracket

The ED-6C142-30 Group 3 adapter bracket is for mounting on shelves 2 through 10 ("full-size" shelves), and Group 4 is for shelves 1 or 11 ("half-size" shelves).

6.4.2 Mixing Equipment and Facility Terminations

Another growth method is to use space that may be available in the equipment modules to terminate growth facility pairs. As described earlier, modular distributing frames were arranged in alternating modules dedicated to terminating either equipment only (and tie pairs) or facilities only (and tie pairs). For frames that are arranged in the "traditional" manner of equal-sized equipment and facility modules, it is not unusual to have the facility modules run out of available space while there is still room in the equipment modules. If facility terminations are placed in the equipment bays as shown in Figure 6-10, the overall life of the frame can be extended significantly.

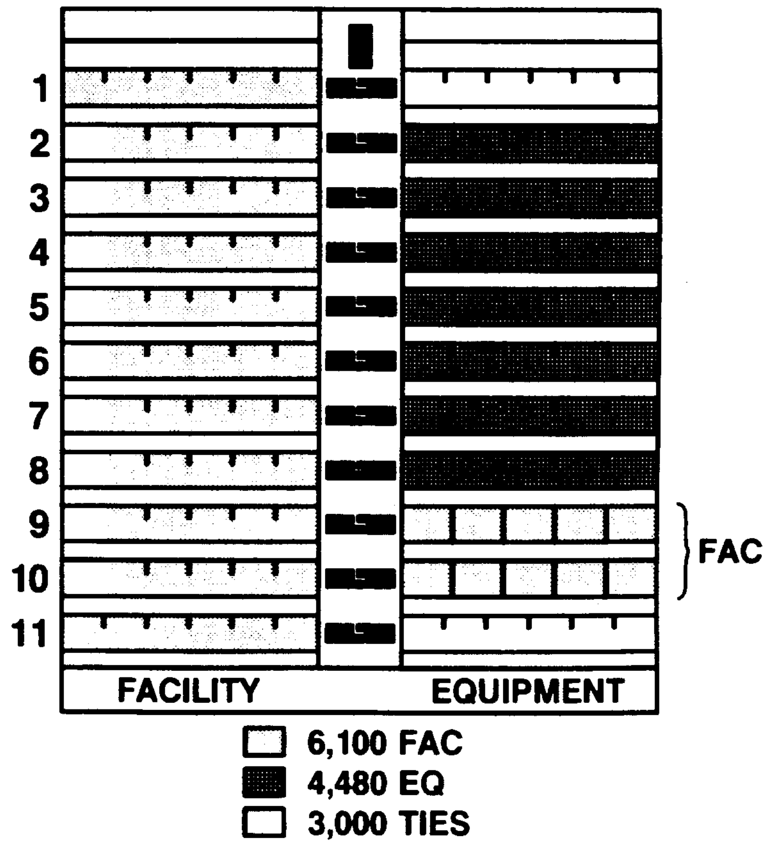

Figure 6-10. Mixing Outside Plant Terminations in Line Equipment Modules

To allow placement of outside plant cables in the equipment modules, the AT&T Regional Engineer uses the "relocate" feature of the MELD system to custom engineer the layout of the frame. A special COSMOS release is compatible with this type of arrangement, and the CFAS system is fully compatible with this mixed arrangement.

Because of the flexibility of this arrangement, the layouts are referred to as "Flex" Frame. Flex arrangements are ideal for frame systems using a separate protector frame (that is *COSMIC* I and IA frames). For *COSMIC* II and IIA frames, pair gain systems can be terminated in the equipment bays on 112-type connecting blocks, but there is no convenient method for mounting the 307-type connectors needed for outside plant cable terminations. One solution is to use a separate protector frame to terminate new cable growth, and then route cables between the protector frame and 112-type connecting blocks mounted on the equipment modules. A wall mounted AT9049 Protector Frame is ideal for terminating OSP cables.

6.4.3 Adding Framework to a Lineup

The next growth option is to add new framework to the end of one or more existing lineups, as depicted in Figure 6-11. New framework bays and vertical troughs could be arranged in either the "traditional" or "custom" configurations, depending on the particular needs of the central office.

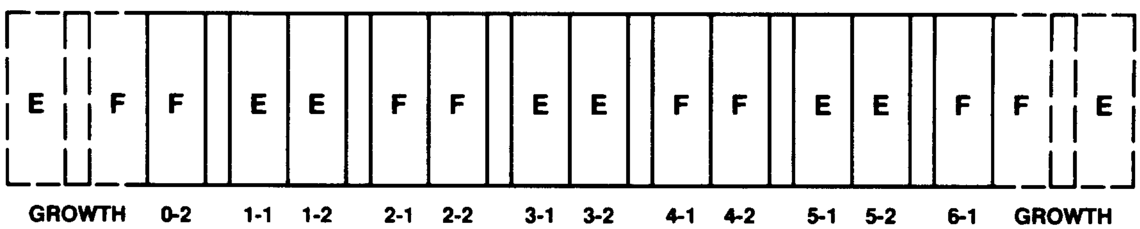

Figure 6-11. Adding Modules to a Lineup

Since frame growth jobs are usually spurred by the need to add space for cable pair terminations, the growth portion of the lineups may be initially "unbalanced," in that there will not be adequate numbers of equipment terminated in short jumper range of the new facilities. In the example shown in Figure 6-12, four bays (two facility and two equipment) have been added to a four module frame lineup. Outside plant cables have been added to the new facility modules, and they are all being served from the existing switch entity "A" with temporary long jumpers. In this example the frame can easily sustain the long jumpers in the express troughs, because the working cable pairs in the new modules are less than the 10,000 pair jumper capacity.

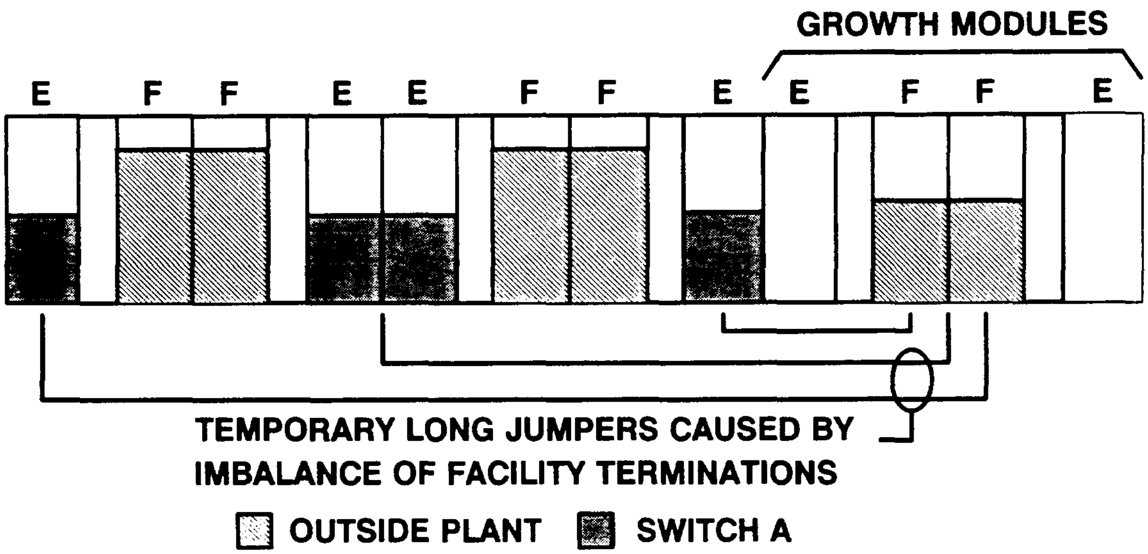

Figure 6-12. Growth Example — Facilities Only

Sometime after the new facility pairs have been added to the growth framework, the office plan may call for the addition of a new digital switch, either to augment or replace an existing switch. Once the new switching equipment is added, as shown in Figure 6-13, the new equipment modules will become populated and the peak jumper pileup will be reduced.

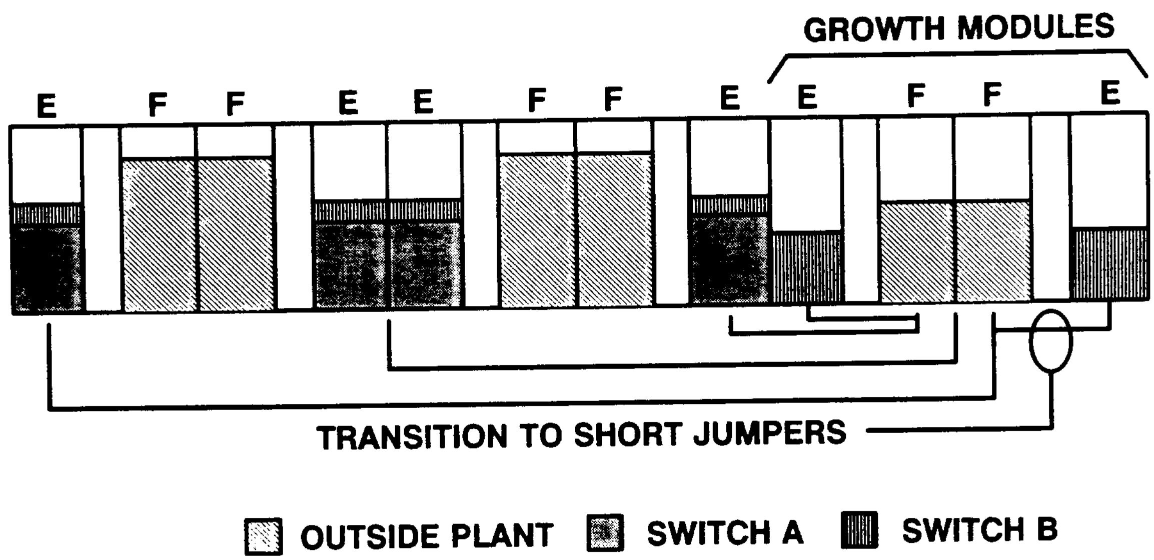

Figure 6-13. Growth Example Continued — Adding Equipment

Eventually switch "A" will be retired and future subscribers will be served from the digital switch "B" as depicted in Figure 6-14. Paragraph 6.5 gives detailed planning guidelines, and discusses frame balance and the affect that unbalanced terminations have on jumper pileup. Appendix 6A provides calculations that ensure the express troughs are adequate for the number of long jumpers that will result.

The general procedure for planning the addition of framework is:

1. Collect data on the number and types of terminations that are to be added to the frame.
2. Determine the number of framework bays needed.
3. Develop a floor plan arrangement
4. Determine whether the expected jumper pileup will cause a problem with the express troughs. In most cases the framework troughs are more than adequate to handle the number of long jumpers.
5. Determine how many tie pairs (if any) are needed and whether the frame plan is adequate to accommodate the tie blocks.

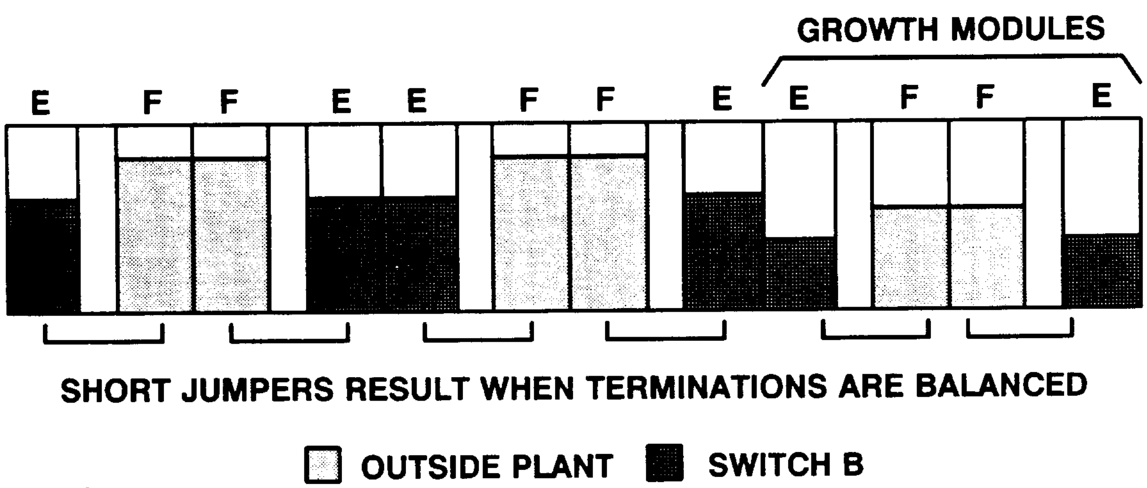

Figure 6-14. Growth Example Continued — Equipment and Facilities Balanced

6.4.4 Adding a New Lineup

The final growth method is to add a new lineup to an existing frame system. Ties will be needed between the new and old lineup(s) to accommodate the frame imbalance as well as the randomly-assigned cross-connects. Also, if a new switching entity is to be terminated on the growth frame, additional ties are usually needed to provide access to the new switch from facilities in the old lineup(s). Conversely, some of the facilities terminated in the new lineup(s) may need to access switching equipment terminated in the old lineup(s). When adding this new switch entity, try to maintain frame balance by continuing to place some of the new switch terminations into the old part of the frame. Paragraph 6.5 and Appendix 6A provides the formulas that are used for these calculations.

6.5 Planning for Growth of *COSMIC* Frames

The first two growth methods described in Paragraph 6.4 — using high-density blocks instead of the lower density 78-type blocks and placing some facility terminations in equipment modules — cause relatively little imbalance in the frame, and hence do not require any special planning techniques to verify that the jumper express troughs and tie pair networks are adequate. But when adding new framework, either to the end(s) of one or more lineups or in completely new lineups, the planning process should include a check of the expected jumper pileup and tie pair usage. This section provides the step-by-step process for planning framework additions. The objective is to determine whether the resulting frame imbalance will cause too many long jumpers, and to calculate the number of tie pairs needed to interconnect the new framework to the old.

6.5.1 Determining Framework Requirements

As long as there is sufficient space for balanced terminations on the *COSMIC* frame, growth is usually possible without retermination. The following guidelines provide general information on planning a frame addition.

1. Gather available data on the expected growth of facilities and equipment over the life of the frame. Use the "Termination Profile" sheet (Figure 6-3). This data will be used to calculate expected jumper pileups and tie pair needs, and determine whether any circuit reterminations are needed.

2. Plan to add framework groups if:

   A. The next cable addition will result in an equipment or facility fill of 80% or greater, or

   B. The 5-year termination forecast exceeds 80% of the frame capacity.

   It is advisable to add framework as early as possible to simplify balancing of terminations.

3. Determine a target value for the percent of frame fill for the initial installation. Frame fill is defined as the ratio of block positions used to the total capacity of the frame. It is desirable to keep the frame fill as low as practical to facilitate operations, delay future growth, and provide flexibility for future growth options. Add enough framework to cause the estimated frame fill five years hence to be 80% or less.

4. Estimate the number of facility bays needed for both the new growth job (New B_{Fac}) and the ultimate sized frames (Total B_{Fac}) — see Table 5A in Section 5 for bay capacities.

$$\text{Total } B_{Fac} = \frac{Fac_{Total}}{\text{Frame Fill} \times \text{Bay Capacity}} \tag{1}$$

$$\text{New } B_{Fac} = \text{Total } B_{Fac} - \text{Existing } B_{Fac}$$

5. Estimate the number of equipment bays needed for both the new growth job (New B_{Eq}) and ultimate sized frames (Total B_{Eq}). Again, refer to Table 5A in Section 5 for bay capacities.

$$\text{Total } B_{Eq} = \frac{Eq_{Total}}{\text{Frame Fill} \times \text{Bay Capacity}} \tag{2}$$

$$\text{New } B_{Eq} = \text{Total } B_{Eq} - \text{Existing } B_{Eq}$$

6. Determine how the bays should be arranged:

   A. If New B_{Eq} is approximately equal to New B_{Fac}, use the "traditional" arrangement of equal-sized equipment and facility modules (2 bays per module).

   B. For the case where New B_{Eq} is less than half New B_{Fac}, use the *COSMIC* Custom framework arrangement where the facility modules are two bays each and the equipment modules are one bay each.

   C. For the case where New B_{Eq} is less than New B_{Fac}, but greater than half of New B_{Fac} (that is, half New $B_{Fac} \leq$ New $B_{Eq} \leq$ New B_{Fac}), use a mixture of the "traditional" and custom arrangement.

7. Develop a preliminary frame arrangement that will fit into the available floor space. It is generally recommended that lineups not exceed twenty modules in length, although longer lineups are possible. Extremely long lineups can lead to operational inefficiencies due to the long walking distances around the lineups, and intra-lineup tie circuits may be needed to reduce the possibility of express trough congestion.

8. If adding modules to an existing lineup, determine the maximum expected jumper pileup (JPU_{Max}), as outlined in equations (A-13), (A-14), and (A-15) in Appendix 6A.

9. Calculate the number of ties needed. If adding modules to existing lineup(s), use equations (A-16) and (A-17) in Appendix 6A. If adding complete new lineups, use equation (A-18) in Appendix 6B.

10. If the frame is equipped with a TPDF, determine how many additional TPDF modules are needed:

$$B_{TPDF} = 2 \times \frac{\text{Ties}}{\text{Frame Fill} \times \text{Bay Capacity}}$$

with B_{TPDF} rounded up to a multiple of two times the number of lineups.

11. Determine if there will be adequate space in the equipment bays to terminate the tie pairs. If not, some of the single-bay equipment modules in a "custom" arrangement have to be upgraded to the double-bay "traditional" arrangement to provide additional capacity.
12. Distributing frames should be monitored on 2-to-5 year intervals to verify that there is still adequate capacity to handle the expected circuit growth.

6.5.2 Renumbering Modules

When growing *COSMIC* frames it is often necessary to renumber the existing modules to maintain a consistent module numbering scheme. For example, if adding four modules to the ends of each lineup of a two-lineup frame where the existing modules are numbered 0-2 to 10-1 in lineup 1 and 10-2 to 20-1 in lineup 2, the new numbering scheme may be to number the modules 0-2 through 14-1 in lineup 1 and 20-2 through 34-1 in lineup 2. This renumbering can be easily accomplished in the MELD database, so that new termination directories, frame designation labels, and operations support system tape can be produced. The renumbering of modules within the existing CFAS or COSMOS database requires the system administrator to edit the existing database of cross-connect records to be consistent. The renumbering of modules should be closely coordinated between the CFAS or COSMOS system administrator, frame planners, and frame operators.

6.5.3 Balancing Terminations

It is advisable to spread some of the terminations of new facilities and equipment into the old part of the frame as well as the new — this allows existing cable pairs to have access to some of the new switching equipment, and new cable pairs to have access to some of the old switching equipment, with minimal numbers of long jumpers and tie pairs. Since the growth equipment modules usually have much more spare capacity than the old modules, MELD in its default spreading routines will allocate most of the new equipment to the growth modules. Once the growth modules reach the same frame fill as the old modules, the standard spreading routines will again start allocating new equipment evenly across all modules. The problem with this default routine is that for a period of time no new equipment is spread to the old part of the frame. Consequently, any facilities in the old part that need to be cross-connected to the new switch (perhaps because of new services offered only by the new equipment) will require the use of tie pairs.

A better approach is to use the MELD relocate feature to terminate some of the new switch into the old equipment modules. The number of equipment pairs that should be relocated is determined by the amount of available space in the old modules — the less room there is, the less equipment should be terminated there. The recommended procedure is to try to have both the new and old parts have terminations added over time so that they both reach 80% termination fill at the same time. Clearly this works best if the frame addition is done as early as possible; once the termination fill in the equipment modules reaches 80%, frame balancing becomes more difficult.

6.6 Administration Planning

There are different types of administration tools needed for the *COSMIC* DF system. The most versatile and widely used is the Computerized Frame Administration System (CFAS). There are many advantages for planning to use this support system as described in more detail below.

CFAS

CFAS provides inventory control of exchange facilities that terminate on the distributing frame, automates the assignment of switching equipment, eliminates the need to keep numerous manual records and enhances the efficiency of managing the central office frame system.

CFAS is compatible with the following switching equipment:

- *5ESS*
- AXE -10
- NEAX 61E (NEC)

and is continually being enhanced to work with other switches.

CFAS can support several conventional or modular frames with multiple lineups per exchange, including TPDF's. CFAS administers the following facility types:

- Directory numbers
- Switching Equipment
- Cable Pairs
- Tie Pairs
- Miscellaneous Equipment
- Multi-line Hunt Group (MLHG)
- PBX lines

There are many benefits provided by using CFAS. Some of these are listed below:

- Automatic inventory control of exchange facilities replacing manual record keeping.
- Preferential assignment of facilities to eliminate long jumpers that congest frames.
- Proper load balance on the exchange switch that improves subscriber service.
- Fast, reliable information to administer main distributing frames that speed service order processing

- Data conversion and inventory management recovers equipment lost in inaccurate paper records.
- Provide regular reports on "Out of Zone" jumpers
- Indicate areas of potential trough congestion
- Provide regular reports on available equipment
- Make more of the existing line equipment available for assignment

If CFAS is not going to be used, there are other systems that can be used such as Computer System For Main Frame Operations (COSMOS). COSMOS is also a mechanized record and assignment system that maintains accurate records of facilities and equipment terminations, and efficiently administers preferrential assignment of cross-connects for short jumpers. At the present time, COSMOS is maintained by Bellcore and is more limited in inputs than CFAS.

If no mechanized system is planned to be used, the *COSMIC* frame should ultimately not exceed approximately 25,000 pairs to avoid long jumper congestion.

APPENDIX 6-A

JUMPER PILEUP AND TIE PAIR CALCULATIONS

Appendix A presents the concept of frame growth, followed by the development of some useful formulas for calculating the expected peak pileup of long jumpers and tie pair usage as a function of the circuit types and spread. These expressions help frame planners verify that the express troughs are adequate to handle any increase in long jumpers caused by the growth of the frame.

The following terminology is used in this document:

- Eqi=Equipment terminations in module i
- Eq_{Total}=Total equipment terminations on the frame
- Fac_j= Facility terminations in module j
- Fac_{Total}=Total facility terminations on the frame
- N = Number of frame lineups
- RDX=Randomly distributed cross-connects
- JPU=Jumper pileup
- TP=Tie pair circuits

6-A.1 JUMPER ASSIGNMENTS ON A WELL-BALANCED FRAME

6-A.1.1 Long Jumper Calculations

Theoretically, in a well-balanced frame system all preferentially assigned circuits could have short jumpers, since there is an equipment pair available for every switched facility pair. But in practice, the typical short jumper success rates for POTS circuits is on the order of 90-95%. Approximately 5-10% of the jumpers associated with POTS circuits are long, usually because of minor imbalances in the number of working facilities in the various modules—if the average working fill is 65%, it is typical to have some outside plant cables operating at close to 80% fill, while others may be working at only 50% fill. The facility modules that have outside plant cables terminated in them with higher than average working fill will tend to be associated with more long jumpers, since the administrative system will have to look further down the frame lineup to find adequate numbers of switching equipment.

One of the prime contributors to long jumpers are special service circuits. These are circuits whose cross-connects can not be preferentially assigned. For example, circuits such as off-premises extensions, foreign exchange lines, and alarms typically require cross-connects between two facility pairs. Because the locations of these facility pairs are predetermined, these circuits can not be preferentially assigned, and so have cross-connects that are essentially randomly distributed.

Another significant contributor to jumper pileup is switched special circuits. These are circuits such as coin pay stations, PBX trunks, and Centrex lines, which generate high traffic loads on the switch. To better balance the load across the switch, the assignment systems are more likely to generate cross-connects using long jumpers for these circuits than for POTS lines. Centrex lines are usually unevenly distributed throughout the outside plant facilities. Therefore, some facility modules may have more Centrex facilities than others, and this uneven distribution also contributes to long jumpers.

For randomly distributed cross-connects, the peak jumper pileup (JPU) will occur at the center of the frame lineup, and will be equal to:

$$JPU = \frac{RDX}{2N^2} \tag{A-1}$$

where

N = The number of ***COSMIC*** frame lineups
RDX = Number of Randomly Distributed Cross-Connects

Equation (A-1) assumes that cross-connects between lineups use tie circuits, which are assumed to generate short jumpers on each frame lineup.

To determine the value for RDX, one needs to consider the numbers and types of circuits cross-connected on the frame—Circuits are usually classified as Specials, POTS, and Centrex. For our purposes, specials are those circuits that can not be preferentially assigned, and so almost always generate long jumpers. This type of circuit includes facility (off-premises extensions, alarm services, etc.), and any other circuits that are not preferentially assigned. POTS circuits are considered to be all circuits that will have a high percentage of short jumpers—typically in the range of 90% short or better. The Centrex circuits category for our purposes includes all circuits that because of their high traffic load often generate long jumpers.

Special Service Circuits. Special Service circuits can not be preferentially assigned. All special service cross-connects are modeled as randomly distributed, so:

$$RDX_{Specials} = Specials \tag{A-2}$$

POTS Circuits. For preferentially assigned circuits, the mechanized assignment system keeps jumper lengths as short as possible. Thus, even if a jumper is long, it is generally not randomly long. To help model the long jumpers due to these circuits, we generally assume that an equation of the form of (A-2) can be used if half of the long POTS jumpers are included. Approximately 5-10% of the preferentially assigned POTS circuits end up with long jumpers, so the term RDX for POTS circuits is considered to be:

$$RDX_{POTS} = 0.05 \text{ x POTS circuits.} \tag{A-3}$$

Centrex Circuits. The last category of circuits to consider is switched circuits that generate higher traffic loads than typical POTS lines. These circuits include PBX trunks, coin pay stations, and Centrex. In metropolitan areas, Centrex lines may comprise 30% or more of all switched lines in the office, and almost always greatly outnumber PBX trunks and pay stations. Consequently, we will lump all these circuits together under the category of "Centrex."

While Centrex lines are preferentially assigned, they require different treatment than POTS lines. All the lines of a single Centrex system must be cross-connected to the same switch. In a central office with multiple switches, this means that only a subset of concentrators are suitable for assignment to any particular Centrex facility. The high load that Centrex lines place on the switch requires that the Centrex facilities be distributed over many concentrators. Yet all the Centrex lines from a single customer location, such as an office building, will often come into the central office on a single feeder cable, which may be spread by MELD into only one or two facility modules. All of these factors lead to a lower probability of a short jumper assignment for Centrex than for POTS circuits.

For modeling purposes, we assume that a fraction h of the Centrex lines are randomly distributed:

$$RDX_{Centrex} = h \times \text{Centrex Circuits} \qquad \text{(A-4)}$$

The value of h depends on the granularity of the spread of outside plant cables—the finer the spread, the smaller h will be. Table A provides the values to use for h:

TABLE A. h Values

Frame Type	Value for h
COSMIC I,IA	0.25
COSMIC II,IIA	0.50

It should be noted that it may be possible to reduce the number of long jumpers due to Centrex circuits by manually forcing the assignment of these circuits to specific concentrators.

6-A.1.2 Jumper Pileup on *COSMIC* II and IIA Frames.

Adding together equations (A-2), (A-3), and (A-4), the total number of randomly-distributed cross-connects on *COSMIC* II and IIA frames is:

$$RDX = \text{Special Circuits} + (0.05 \times \text{POTS Circuits}) + (0.50 \times \text{Centrex Circuits})$$

And the total pileup is:

$$JPU = \frac{RDX}{2N^2} = \frac{\text{Special Circuits} + (0.05 \times \text{POTS Circuits}) + (0.50 \times \text{Centrex Circuits})}{2N^2} \qquad \text{(A-5)}$$

6-A.1.3 Jumper Pileup on *COSMIC* I and IA Frames.

For *COSMIC* I or IA frames, we get

$$RDX = \text{Special Circuits} + (0.05 \times \text{POTS Circuits}) + (0.25 \times \text{Centrex Circuits})$$

And the total pileup is:

$$JPU = \frac{RDX}{2N^2} = \frac{\text{Special Circuits} + (0.05 \times \text{POTS Circuits}) + (0.25 \times \text{Centrex Circuits})}{2N^2} \qquad \text{(A-6)}$$

6-A.1.4 Tie Cable Calculations

Tie cables are required in multiple-lineup frames to allow cross-connections between circuits located on the different lineups. Two types of tie cable networks are considered here. Multiple-lineup *COSMIC* DFs have traditionally been equipped with a Tie Pair Distributing Frame (TPDF), which terminates tie cables to the SMDF lineups. An alternative arrangement uses direct ties between the lineups. The advantage of direct ties is lower cost due to having fewer tie cables to install and running two jumpers per cross-connect rather than three.

For POTS circuits terminated on a well-balanced frame, the number of cross-connects needing ties is generally assumed to be zero. For special service circuits, the number of circuits needing cross-aisle connections is:

$$TP = \frac{(N\text{-}1)}{N} [RDX_{Specials} + RDX_{Centrex}] \qquad \text{(A-7)}$$

Ties on *COSMIC* IIA Frames. For *COSMIC* IIA frames, the number of circuits needing cross-aisle connections is:

$$TP = \frac{(N\text{-}1)}{N} [\text{Specials} + 0.50 \times \text{Centrex Circuits}] \qquad \text{(A-8)}$$

For frame systems using direct ties, equation (A-8) is the number of tie circuits needed.

For frames using a TPDF, the total number of tie pairs needed is equal to two times equation (A-8), since each cross-connect between circuits located on different frame lineups requires two tie pairs to the TPDF (one tie pair from each lineup to the TPDF):

$$\text{TPDF Ties} = 2\ \frac{(N\text{-}1)}{N} [\text{Specials} + 0.50 \times \text{Centrex Circuits}] \qquad \text{(A-9)}$$

Ties on *COSMIC* I and IA Frames. For Centrex lines terminated on *COSMIC* I and IA frames, the number of circuits needing cross-aisle tie pairs is:

$$TP = \frac{(N\text{-}1)}{N} [\text{Specials} + 0.25 \times \text{Centrex Circuits}] \qquad \text{(A-10)}$$

For frames equipped with direct ties, equation (A-10) is the number of tie circuits needed.

For frames using a TPDF, equation (A-10) must be multiplied by 2:

$$\text{TPDF Ties} = 2\ \frac{(N\text{-}1)}{N} [\text{Specials} + 0.25 \times \text{Centrex Circuits}] \qquad \text{(A-11)}$$

Ties to Other Frames. The number of ties needed to other frames (for example, the Trunk Main Distributing Frame) can be estimated from the number of facilities requiring cross-connection to miscellaneous equipment on the other frames:

$$\text{Ties To Other Frames} = \text{Misc. Equip} \tag{A-12}$$

6-A.2 JUMPER PILEUP CALCULATIONS FOR FRAME GROWTH

Equations (A-5) and (A-6) are for frames whose facility and equipment terminations are well spread (that is, the frame is balanced). For frames that have been grown, there will be additional long jumpers and jumper pileup caused by the imbalance in the facility and equipment spread. The remainder of Appendix A provides methods for determining the number of ties needed to keep the jumper pileup manageable.

The variables that impact on the jumper pileup calculations are:

- The number of working switched and non-switched facilities terminated on the new part of the frame (Switched Fac_{New} and Non-Switched Fac_{New}, respectively). These two quantities add up to the total number of new working facilities (Working Fac_{New}).
- The amount of switching equipment terminated on the new part of the frame (Eq_{New}).
- The number of frame lineups (N).

6-A.2.1 Adding Modules to the Ends of Lineup(s)

Calculating Jumper Pileup. Since most growth jobs are spurred by the need to add room for facility terminations, one usually only needs to check that the frame imbalance this causes will not exhaust the express troughs. If it appears that the express troughs will fill up, either more intra-lineup ties must be added, new equipment terminated in the growth part of the frame, or existing equipment reterminated. Hence, the first step is to calculate an expected maximum jumper pileup (JPU_{Max}). This requires checking the pileup at two key points: the junction point between the new framework and the old (where the pileup of jumpers assigned to the new facilities are at a maximum), and the midpoint of the old frame (where the jumper pileup for existing facilities is at a peak).

A. The pileup at the junction point is the sum of the long jumpers caused by the frame imbalance and the randomly-distributed jumpers due to special service circuits:

$$\text{JPU}_{\text{Junction}} = \text{Switched Fac}_{\text{New}} - \text{Eq}_{\text{New}} + \frac{\text{Non-Switched Fac}_{\text{New}}}{N} \tag{A-13}$$

B. The pileup at the midpoint of the frame can be roughly estimated by adding half of the new jumpers to the existing jumper pileup at the midpoint ($\text{JPU}_{\text{Existing}}$).* This is a good

* It is recommended that before any frame is grown, an on-site survey of the frame be conducted, to include an estimation of the peak jumper pileup ($\text{JPU}_{\text{Existing}}$) in the express troughs.

assumption only for the special services circuits; POTS circuits on the growth facilities will be preferentially assigned and so in general will not reach the mid-point. Hence this is a conservative calculation:

$$JPU_{Midpoint} = JPU_{Existing} + \frac{\text{Switched Fac}_{\text{New-Eq New}}}{2} + \frac{\text{Non—Switched Fac}_{\text{New}}}{2N} \qquad \text{(A-14)}$$

C. The maximum pileup is the greater of equation (A-13) and (A-14):

$$JPU_{Max} = \text{Maximum}\ (JPU_{Junction}, JPU_{Midpoint}) \qquad \text{(A-15)}$$

Determine the Number of Tie Pairs Needed. If JPU_{Max} exceeds the capacity of the express troughs (10,000 for *COSMIC* IA, II, and IIA frames, 5,000 for *COSMIC* I frames), the number of equipment and/or tie circuits that should be added to the growth part of the frame is:

$$\text{Intra-Lineup Ties or Equipment Needed} = JPU_{Max} - \text{Express Trough Capacity} \qquad \text{(A-16)}$$

For multiple-lineup frames, additional tie circuits are needed in addition to the quantity in equation (A-16) to allow cross-connections to other lineups. This quantity is:

$$\text{Additional Inter-Lineup Ties Needed} = \frac{N-1}{N}\ (\text{Non-Switched Fac}_{New}) \qquad \text{(A-17)}$$

Example. As an example, consider a single-lineup *COSMIC* IIA DF with 10 modules, growing to 16. Suppose that the facility modules of the existing frame are 80% filled, and the frame has an estimated existing maximum jumper pileup of 2,000 jumpers. Suppose further that the growth job is being spurred by the need to terminate another 10,000 outside plant pairs, of which 5,000 will be switched (that is, cross-connected to the switching system), 2,000 will be non-switched (that is, special services), and the remaining 3,000 will be non-working. For this frame:

$JPU_{Existing} = 2{,}000$
$\text{Switched Fac}_{New} = 5{,}000$
$\text{Non-Switched Fac}_{New} = 2{,}000$
$Eq_{New} = 0$
$N = 1$

From equation (A-13) the pileup at the junction between the new and old parts of the frame will be:

$$JPU_{Junction} = \text{Switched Fac}_{New} - Eq_{New} + \frac{\text{Non—Switched Fac}_{New}}{N}$$
$$= 5{,}000 - 0 + \frac{2{,}000}{1} = 7{,}000.$$

From equation (A-14), the pileup at the midpoint of the frame is estimated to be:

$$JPU_{Midpoint} = JPU_{Existing} + \frac{\text{Switched Fac}_{New}\text{-Eq}_{New}}{2} + \frac{\text{Non—Switched Fac}_{New}}{2N}$$

$$= 2{,}000 + \frac{5{,}000\text{-}0}{2} + \frac{2{,}000}{2} = 5{,}500$$

Comparing $JPU_{Junction}$ with $JPU_{Midpoint}$, we see that JPU_{Max} is 7,000. The 10,000 pair capacity of the express troughs is more than adequate to handle all the long jumpers, so no tie circuits or retermination of existing line equipment is needed. However, if this had been a *COSMIC* I frame, which has an express trough design limit of 5,000 jumpers peak pileup, the express troughs may become congested unless some circuits are reterminated or more tie circuits added. The number of tie circuits to add to allow short jumpers between the new and old parts of the frame from equation (A-16) is:

$$\text{Intra-Lineup Ties or Equipment Needed} = JPU_{Max} \text{ - } 5{,}000 = 7{,}000\text{-}5{,}000 = 2{,}000$$

If the office is using direct ties, this number of ties will have to be spread between the new framework and the old. If a TPDF is being used, then this number of ties need to be added between the new framework and the TPDF, and at least this number of ties need to be available between the old framework and the TPDF.

6-A.2.2 Ties Needed for New Frame Lineups

$$\text{Ties Needed in the New Lineup} = \text{Switched Fac}_{New} \text{ - } \text{Eq}_{New} + \text{Non-Switched Fac} \times \frac{N\text{-}1}{N} \qquad \text{(A-18)}$$

6-A.2.3 The Concept of Frame Balance

To achieve a high percentage of short jumpers, there must be adequate numbers of spare line equipment of each type in each equipment module to satisfy the needs of the working facilities terminated in the adjacent module(s). For example, if one assumes that all outside plant cables have the same percentage of working cable pairs that need to be cross-connected to the switch (say, 65%), then the number of line equipment terminations in an equipment module should be at least 65% of the number of facility terminations in the adjacent module(s). For frames that are installed initially with the planned ultimate number of modules, the spreading algorithms in MELD ensure that this happens by uniformly distributing all the facilities and equipment along the length of the lineup.

In the case of frame additions, the uniform spread assumption no longer holds, since the growth facility modules will almost always have a different number of facility terminations than the old facility modules. Further, for those cases where the growth of the frame is being undertaken to provide room for facility terminations only, the growth equipment modules will initially be empty. Thus, we can expect a lower short jumper success rate for the circuits in the growth part of the frame. In this section, we will show how to calculate the jumper pileup and tie pair needs caused by this frame imbalance. If the jumper pileup becomes excessive, one can either reterminate some of the existing line equipment into the growth part of the frame, or purchase new line equipment sooner than otherwise planned to increase the short jumper success rates.

To assure a high percentage of short jumpers, the amount of switched equipment in a module should be at least equal to the number of facility pairs in the adjacent modules that need to be connected to switched pairs:

$$Eq_i = \text{Switched Facilities in Adjacent Modules}$$

Note that the number of facilities in a module is the sum of the spare and working facilities, and that the number of working facilities is the sum of the working switched plus non-switched specials:

$$Fac_{Total} = Fac_{Spare} + Fac_{Switched} + Fac_{Special}$$

If one assumes a uniform distribution of spare, switched, and non-switched specials in all modules, then:

$$\left(\frac{Fac_{Switched}}{Fac}\right)_i = \left(\frac{Fac_{Switched}}{Fac}\right) \text{Total}$$

Since each of the $Fac_{Switched}$ lines needs to be cross-connected to equipment, the ideal number of equipment terminations in any module i ideally is:

$$\begin{aligned} Eq_i &= \text{Switched Facilities in the Adjacent Module(s)} \\ &= \text{Facilities in Adjacent Module(s)} \times \frac{Eq_{Total}}{Fac_{Total}} \end{aligned} \quad \text{(A-19)}$$

Stated another way, a *COSMIC* frame is defined to be in balance when for each facility module j the ratio of facility pairs terminated in that module to the total number of facilities terminated on the frame equals the ratio of equipment pairs terminated in the adjacent half-module(s) to the total number of equipment pairs terminated on the frame.

It is often convenient to use half the number of equipment pairs in both of the adjacent full equipment modules, rather than just counting the equipment in the adjacent half-modules:

$$\frac{Fac_j}{Fac_{Total}} = 1/2 \frac{(Eq_{j-1} + Eq_{j+1})}{Eq_{Total}} \quad \text{(A-20)}$$

For example, if 10,000 facility pairs are terminated in module 3, and there are 60,000 total facility pairs on the frame, then the facility termination ratio for module 3 is:

$$\frac{Fac_3}{Fac_{Total}} = \frac{10{,}000}{60{,}000} = 0.17$$

Ideally, the switched equipment termination ratio in the adjacent equipment modules 2 and 4 should also be 0.17. If there are 40,000 total switch pairs on the frame, the number that should be terminated in the adjacent half-modules 2-2 and 4-1 is:

$$Eq_{2\text{-}2} + Eq_{4\text{-}1} = Eq_{Total} \times 0.17 = 40{,}000 \times 0.17 = 6{,}800$$

In this example each of the bays $Eq_{2\text{-}2}$ and $Eq_{4\text{-}1}$ should terminate 3,400 equipment pairs.

If the equipment is comprised of more than one switch entity, each entity should be properly represented in each equipment module. Suppose in this example that there are two switching systems in the office, with switch type A comprising 60% of the total and switch type B representing the other 40%. Then 60% of the 3,400 equipment terminations in modules 2-2 or 4-1 should be switch type A and 40% should be switch type B. In this example, there should be 2,040 terminations of type A and 1,360 terminations of type B.

SECTION 7

ENGINEERING

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SECTION 7

ENGINEERING

New *COSMIC* DF installations and additions to existing frames should be planned in accordance with the recommendations established in Section 6. A detailed engineering plan should then be developed in accordance with guidelines in this section. Additional engineering guidelines are provided in extensive engineering drawing (ED-,H-,T-) documentation for the *COSMIC* DF System.

7.1 Engineering References

There are several different types of drawings that are used in the engineering process of a *COSMIC* frame. Drawings are provided for the engineering, ordering, installation and maintenance of the *COSMIC* frames and apparatus. The drawings can be categorized into equipment specification, framework assembly, and non-standard development type drawings. Equipment specification and framework drawings are usually ED- or H- drawings (for example, ED-6C140-10 or H-400-499). Wiring diagrams are given a T- prefix (T-513843) and schematic drawings an SD- (SD-97773-01). Wiring diagrams provide specific information on circuitry and any alarm reporting capabilities, while the schematic drawings are used more by the technicians to help trouble-shoot problems with a specific circuit or a series of circuits. The drawings contents are specified by the dash number at the end. A -10 drawing provides equipment specifications and engineering information and the -30 provides ordering information. Most of these drawings have a sheet index at the beginning of the drawing providing contents of the drawing.

Engineering drawings specify descriptions and orderable material in different ways. The ED and H drawings order by a "Group" (for example, ED6C143-30 Group-3). Not all ED and H drawings are used to order material; they may also be framework assembly drawings, drawings showing typical use, or installation drawings.

The list of the key drawings usually required in the engineering process are found in the references section in the rear of this manual.

7.2 Process of Engineering a *COSMIC* Frame

Input Requirements - The flowchart in Figure 7-1 illustrates the process used to engineer a *COSMIC* DF. Data needed for the engineering process is developed in the planning phase (see Section 6). This data includes termination requirements, frame selection, floor layout sketches, termination objectives, and a cutover plan. From this data, the various phases of the engineering process can be completed.

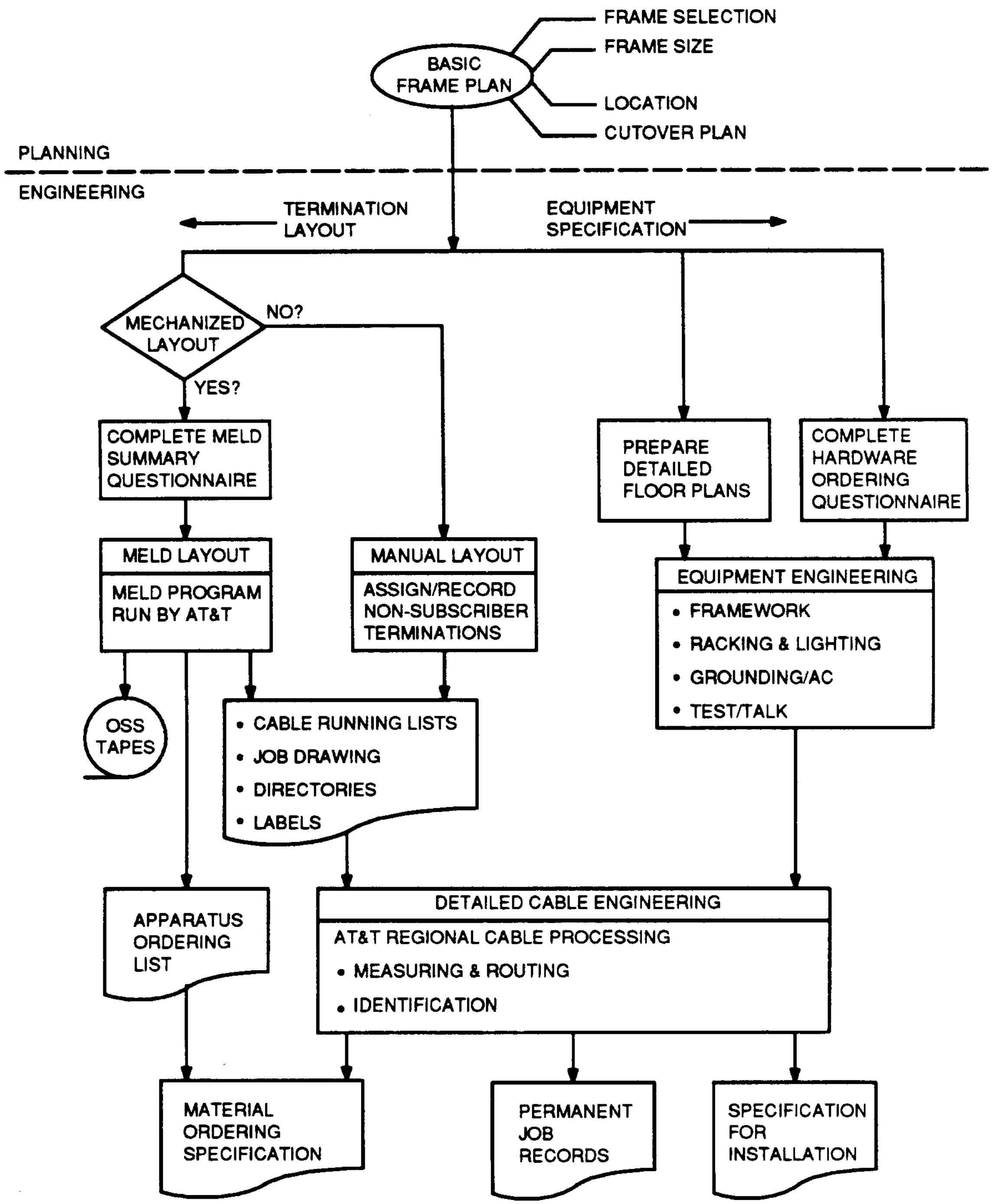

Figure 7-1. Process for Engineering a *COSMIC* DFS

Mechanized "MELD" Termination Layout - Engineering the termination layout is the process of assigning a permanant location for each cable on the DF. The key to this process is the MELD program which assists in achieving a balanced termination layout for a *COSMIC* DF. This program is primarily used to handle the layout of subscriber OSP, switch line equipment, and tie pairs. The program itself is processed at an AT&T regional engineering center. The customer initializes the process by completing the MELD Engineering Summary (see Appendix 7A) Questionnaire. Major benefits of the MELD program in addition to the mechanized layout are the mechanized outputs including termination layout masks, directories, cable running lists, labels, and a magnetic tape used to initialize the software administration data base. MELD also provides hardware ordering lists that are used in preparing the detailed material order.

Manual Termination Layout for TMDFs, CMDFs, and SDDFs - The engineering process may also involve manual layout of terminations not handled by the MELD spread algorithm. These include trunk, toll, and other special types of terminations typically found on TMDFs, CMDFs, and SDDFs. Special planning rules are followed for these types of terminations and special engineering guidelines are followed for assigning and recording terminations. The Layout Mask, cable running lists, and associated documentation are prepared manually.

Engineering of Associated Equipment - A floor plan of the Central Office and a sketch of the planned frame location are used to provide detailed floor plan layouts. Once the detailed frame layout arrangement has been specified, the engineer can develop plans and specifications for the cable rack system, frame lighting system, grounding system, auxiliary AC power, and the test/talk system.

Detailed Cable Specification - Detailed cable engineering is required to provide complete interconnection of the *COSMIC* DF. AT&T provides support for detailed cable engineering with the Regional Cable Processing System (RCPS). RCPS is a complete engineering system that fully specifies all cable routing information for all cables associated with the DF. Among other things, it determines the appropriate cable route, measures lengths, and produces cable routing lists. These functions are important to ensure that the OSP cables are correctly routed in the racks between the splice location and the frame location. Lengths are also calculated, thus minimizing excess cable.

Material Ordering Specification - Information on material needed for an installation is derived from four sources, and it is the engineer's responsibility to verify that the material ordering lists are verified and orders placed on the appropriate manufacturing locations at Material Planning and Procurement Centers (MPPCs):

1. The hardware ordering list produced by MELD covers those items that are specified during the mechanized layout process - connecting blocks, protected connectors, and framework ordering groups.
2. RCPS specifies all of the cables needed including stub cables, switchboard cables, and tie pair cables.

3. The customer specifies other apparatus that may be needed such as tools, jumper wire, protector units, and test cords, by submitting a completed Hardware Ordering Questionnaire to the regional engineer.
4. The regional engineer determines types and quantities of other items based on the manual engineering process. These items include cable racking, lighting, test/talk system components, and grounding systems.

Outputs - Outputs of the detailed engineering process include cable running lists, frame record drawings, directories, labels, material ordering lists, instructions for the installation forces, and input for the frame administration system.

7.3 Mechanized Termination Layout

7.3.1 Mechanized Layout Process

For the successful long term operation of a *COSMIC* frame, the OSP and equipment cable terminations should be balanced across the entire frame. This is especially important for a long frame lineup where the balance of subscriber OSP cables and office equipment cables greatly impacts the long term efficiency of the frame. Thus, the mechanized layout is primarily aimed at the SMDFs or the subscriber portion of a CMDF. A balanced termination layout on any frame will allow the successful preferential assignment of short jumpers, and thus, minimize jumper congestion and simplify administration procedures over the life of the frame.

To begin the layout process, the planner provides information on termination requirements, frame selection, and any preferences pertaining to the frame layout. Data must then be gathered as to the size, type, and identification of OSP and equipment cables. The MELD Questionnaire is usually completed by the customer to transmit all the pertinent information required by the MELD engineer as input to the software program. Since MELD is designed as a flexible engineering tool, AT&T's regional engineers can customize most any frame layout.

The MELD engineering process results in a permanent record drawing for each shelf and bay of the *COSMIC* DF. Directories and frame labels are automatically generated to provide quick location of any physical cable termination on the frame. The MELD program also provides cable running lists to aid the installer, and apparatus ordering lists to aid the engineer. Another important MELD output is the magnetic tape used for initializing the data base of the software administration system (such as, CFAS or COSMOS).

The mechanized layout process is always recommended when engineering the termination layout of the *COSMIC* DF. The process is easily accomplished at an AT&T regional engineering center with the use of the MELD system.

7.3.2 MELD System Description

MELD is the software system specifically designed for use when engineering *COSMIC* DFs. The current version supports all *COSMIC* DF applications, including *COSMIC* Mini DF installations. MELD is used to spread outside plant cable, tie pairs, and line equipment for mechanical, electronic and digital switches. MELD produces the frame layout drawings, directories, frame labels, and Operation Support System (OSS) tape (COSMOS and CFAS compatible). MELD also maintains an ongoing history of all the frames engineered in a wire center. A summary of inputs and outputs is illustrated in Figure 7-2.

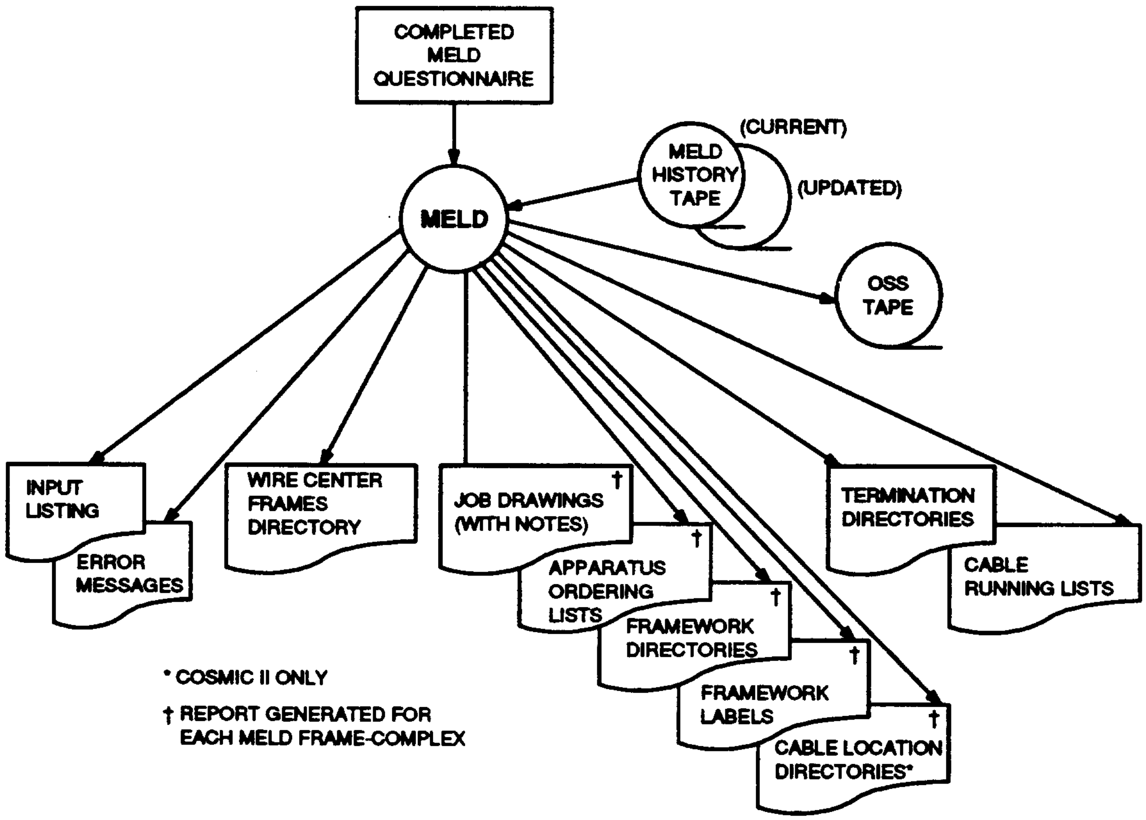

Figure 7-2. Summary of MELD Inputs and Outputs

Program for Arrangement of Cables and Equipment (PACE) was MELD's predecessor, and in some cases, is still being used for earlier installations. However, PACE does not support digital switches or the latest *COSMIC* apparatus, such as 128-pair line equipment or high density OSP or tie pair blocks. It should also be noted that PACE is no longer being enhanced. PACE-to-MELD conversions are recommended and are easily and quickly accomplished at a low cost. The conversion can be a stand-alone order or can be done in conjunction with an addition or frame growth order.

MELD provides engineering support for the following:

- *COSMIC* framework (I,IA,II,IIA) in virtually all configurations including *COSMIC* custom half size equipment modules, and one- or two-stage arrangements.
- *COSMIC* Mini frame special configurations with multibay modules and a separate PF.
- Modular PF's.

MELD's engineering capabilities are listed as follows:

- Standard spread algorithms provide even distributions of circuits across the frame lineups which ensures short jumpers.
- "RESERVE" command for miscellaneous equipment layout
- "RELOCATE" command for specifying Mod, shelf, and block locations which allows outside plant cable to be terminated in equipment modules.
- Common language identification.
- Module renumbering that provides sequential numbering of modules in a lineup after growth.
- Supports mixed block densities
- Supports direct tie cable networks, which require only two jumpers versus three with TPDF.
- Supports incremental growth with little or no retermination.

The following terminations are supported by MELD:

- Subscriber OSP cable pairs
- PGS cable
- Tie cable pairs
- Line equipment pairs

The following line switches are supported:

- 1/1A *ESS*™ Switch
- 2/2B *ESS* switch

- *5ESS*® switch, including ISDN
- Crossbar number 5
- Crossbar number 1
- Step-by-step
- DMS* -100
- AXE†-10
- SYSTEM-X‡
- NEAX61E§

Other switch types are added as demand requires.

7.3.3 MELD Questionnaire

The MELD Engineering Summary Questionnaire (See Appendix 7-A) is the mechanism for the telephone company engineer to inform the AT&T engineer of the principal information needed to layout *COSMIC* installations and subsequent additions. The questionnaire covers the following items:

A. General Data

B. Framework Data

C. Outside Plant Facilities Data

D. Tie Pairs Data

E. Line Equipment Data

F. Reserved Space Data.

The questionnaire may also be used to convert an existing PACE-engineered office history to a MELD engineering office. Following the conversion, MELD can be used for all future engineering updates. Once the forms are completed, they should be sent to the appropriate regional engineering center along with any additional ordering information.

7.3.4 Mechanized Outputs

Once the MELD questionnaire forms are completed, they are used to formulate input into the MELD system. The engineering system then generates several types of outputs as follows. A description of the MELD output formats is provided in Appendix 7B.

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* Trademark of Northern Telecom LTD.
† Trademark of Ericsson
‡ Trademark of Plessey Co.
§ Trademark of Nippon Electric Company

7.3.4.1 Wire Center Frame Directory - The wire center directory lists key engineering data for the *COSMIC* DF and related frames in a given wire center, such as, Central Office. It shows the floor location, frame complex numbering, starting and ending lineup numbers, date and issue of the last MELD run, and whether the frame is under full MELD control. An example of the wire center frame directory is shown in Figure 7-3.

WIRE CENTER FRAMES DIRECTORY

** THE FOLLOWING FRAMES DIRECTORY INCLUDES ALL FRAMES ENGINEERED OR REFERENCED BY MELD **

DATE : 04/02/1991--14:22

BASE NUMBER : ABO1
OFFICE NAME : LIBERTY CORNER (LBCRNJO1)
STREET ADDRESS : PO BOX 4908
CITY,STATE : WARREN . NJ

FUNCTIONAL FRAME(COMPLEX)								FRAME LINEUPS			
CMPLX NAME	CMPLX NO	ENG MODE	CRMS CODE	DRAWING NO	ISSUE	LAST RUN DATE	MELD CTL	CLLI	FLOOR	START	END
PFLOWDEN	NNNN	-	COSPF	-	-	04/02/1991--14:22	N	FNN	01	000	099
PFLOWDEN	0000	PF	COSPF	TAB01-CO-140	001	04/02/1991--14:22	Y	F22 F21	01 01	001 025	024 036
SMDFCOS	0101	SMDF	COS	TAB02-CO-140	001	04/02/1991--14:22	Y	F11 F12	01 01	000-2 005-2	005-1 010-1
SMDFCOS2	0102	SMDF	COS2	TAB02-CO-140	001	04/02/1991--14:22	Y	F21 F22	01 01	000-2 008-2	004-1 012-1
TPDFCOS	0103	TPDF	COS	TAB03-CO-141	001	04/02/1991--14:22	Y	F33	01	000-2	004-1
TPDFCOS	0104	-	COS	-	-	04/02/1991--14:22	N	F44	01	000	099

Figure 7-3. Wire Center Frame Directory

7.3.4.2 Framework Job Drawing - The job drawing provides general notes pertaining to the reference documentation and specification references for AT&T frames. A running history of work that has been done on the frames is included in issue notes. Engineering notes briefly describe the special changes that have taken place on a particular MELD run. The T-140 frame drawing is a pictorial view of the frame, showing the exact location on the frame of all the terminations. It also indicates the location of the "other end" of the termination. Typical pages from a job drawing are shown in Figures 7-4 and 7-5 for *COSMIC* IA/IIA DFs and Figures 7-6 and 7-7 for *COSMIC* Mini DFs.

	06>>>>>>>>>>>>>>>>>>>>>	07>>>>>>>>>>>>>>>>>>>>>	08>>>>>>>>>>>>>>>>>>>>>	09>>>>>>>>>>>>>>>>>>>>>	10>>>>>>>>>>>>>>>>>>>>>
SHELF 1	LC CABLEB PRS 0601-0700 FNNV(000,)07		LC CABLEB PRS 1601-1700 FNNV(001,)07		
SHELF 2	LC CABLEB PRS 2601-2700 FNNV(002,)07	LC CABLEB PRS 3001-3100 FNNV(003,)01	LC CABLEB PRS 4001-4100 FNNV(004,)01	LC CABLEB PRS 5001-5100 FNNV(005,)01	LC CABLEB PRS 6001-6100 FNNV(006,)01
SHELF 3	LC CABLEB PRS 7001-7100 FNNV(007,)01	LC CABLEB PRS 7601-7700 FNNV(007,)07			
SHELF 4					
SHELF 5					
SHELF 6					
SHELF 7					
SHELF 8	LC CABLE9 PRS 3601-3700 F22 (010,)04	LC CABLE9 PRS 4601-4700 F22 (012,)04	LC CABLE9 PRS 5601-5700 F22 (015,)02	LC CABLE9 PRS 6601-6700 F22 (017,)05	LC CABLE9 PRS 7601-7700 F22 (020,)04
SHELF 9	LC CABLEA PRS 6601-6700 F21 (034,)07	LC CABLEA PRS 7601-7700 F21 (035,)01	LC CABLE9 PRS 0601-0700 F22 (002,)05	LC CABLE9 PRS 1601-1700 F22 (005,)01	LC CABLE9 PRS 2601-2700 F22 (007,)05
SHELF 10	LC CABLEA PRS 2001-2100 F21 (027,)02	LC CABLEA PRS 2601-2700 F21 (028,)08	LC CABLEA PRS 3601-3700 F21 (030,)02	LC CABLEA PRS 4601-4700 F21 (031,)05	LC CABLEA PRS 5601-5700 F21 (033,)01
SHELF 11	LC CABLEA PRS 0001-0100 F21 (025,)02		LC CABLEA PRS 1001-1100 F21 (026,)06		

OFFICE
LIBERTY CORNER (LBCRNJ01)
PO BOX 4908
WARREN , NJ

SMDFCDS 0101
FRAME:F11
MODULE:000 SIDE/PART: 2 ED:ED-6C001-30G01
FRAMEWORK JOB DRAWING

ISSUE: 001
DATE: 04/02/91-14:22
DRAWING NO: TAB02-CO-140
SHEET: 1 OF 20

Figure 7-4. Loop Cable Job Drawing

Shelf	Slot(s)	Equipment
SHELF 1	01–02	TP 1121A PRS 0301-0400 F21 (002, 02)01
SHELF 1	03–04	TP 1122A PRS 0001-0100 F22 (008, 02)06
SHELF 1	05	TP 1122A PRS 0301-0400 F22 (010, 02)01
SHELF 2	01	LE DXD1CON000 04EN0768-0959
SHELF 2	02	LE DXD1CON002 01EN0192-0255 LE DXD1CON002 01EN0256-0319
SHELF 2	03	LE DXD1CON002 04EN0768-0831 LE DXD1CON002 04EN0832-0895
SHELF 2	04	LE DXD1CON003 01EN0192-0255 LE DXD1CON003 01EN0256-0319
SHELF 2	05	LE DXD1CON004 01EN0192-0255 LE DXD1CON004 01EN0256-0319
SHELF 3	01	LE X1MOTOLLF002 C13CLLC0102
SHELF 3	02	LE X1M1T1LLF003 C14DLLC0609
SHELF 3	03	LE XSIDF992 LF001L000-099
SHELF 3	04	LE ENNOLME00 BOLD 00-03
SHELF 3	05	LE ENNOLCE01 MOLSG00-03
SHELF 4	01	LE E2E1LTN00 CG1CON0-1
SHELF 4	02	LE E2E1LTN01 CG0CON0-1
SHELF 4	03	LE E2E1LTN01 CG1CON4-5
SHELF 4	04	LE E2E1LTN01 CG2CON4-5
SHELF 4	05	LE E2E1LTN00 CG2CON0-3
SHELF 4	06	LE E2E0LTN01 CG7CON0-3
SHELF 5	01–02	LE E1C1LLN01 LSC0CON00-01
SHELF 5	03–04	LE E1C1LLN01 LSC1CON04-05
SHELF 5	05	LE E1COLLN00 LSF5B0CON0-3
SHELF 5	06	LE E1COLLN00 LSF7B1CON0-3
SHELF 6	01	LE E1COLLN00 LSF0B0CON0-1
SHELF 6	02	LE E1COLLN00 LSF1B0CON4-5
SHELF 6	03	LE E1COLLN00 LSF2B1CON0-1
SHELF 6	04	LE E1COLLN00 LSF3B1CON4-5
SHELF 6	05–06	LE E1COLLN01 LSF1B0CON0-1
SHELF 6	07	LE E1C1LLN00 LSC0CON04-05
SHELF 6	08	LE E1C1LLN00 LSC1CON10-11
SHELF 7	01	LE E1COLLN01 LSF6B0CON0-1
SHELF 7	02	LE E1COLLN01 LSF7B0CON4-5
SHELF 7	03	LE E1C1LLN01 LSC2CON20-21
SHELF 7	04	LE E1C1LLN01 LSC3CON24-25
SHELF 7	05	LE E2E0LTN00 CG1CON4-5
SHELF 8	01	LE X5MOLLF03 VG02-03
SHELF 8	02	LE X5MOLLF05 VG02-03
SHELF 8	03	LE X5MOLLF06 VG02-03
SHELF 8	04	LE X5MOLLF08 VG04-05
SHELF 8	05	LE X5MOLLF10 VG04-05
SHELF 9	01	LE EAA1EMG001 LSM06L000-127
SHELF 9	02	LE EAA2EMG002 LSM02L000-127
SHELF 9	03	LE EAA2EMG002 LSM08L000-127
SHELF 9	04	LE EAA2EMG002 LSM12L000-127
SHELF 9	05	LE EAA2EMG003 LSM06L000-127
SHELF 10	01	LE SES1DLU0001 SH6MOD00-07
SHELF 10	02	LE NEN1SPC00 H0S0PCM00-01
SHELF 10	03	LE NEN1SPC00 H0S1PCM04-05
SHELF 10	04	LE NEN1SPC00 H1S0PCM04-05
SHELF 10	05	LE NEN1SPC01 H0S0PCM00-01
SHELF 10	06	LE NEN1SPC01 H0S1PCM00-01
SHELF 10	07	LE NEN1SPC01 H1S0PCM04-05
SHELF 11	01–02	TP 2111A PRS 0101-0200 F21 (004, 02)02
SHELF 11	03–04	TP 2111A PRS 0301-0400 F21 (002, 02)07
SHELF 11	05	TP 2211A PRS 0101-0200 F22 (012, 02)02

OFFICE
LIBERTY CORNER (LBCRNJO1)
PO BOX 4908
WARREN , NJ

SMDFCOS 0101
FRAME:F11
MODULE:001 SIDE/PART: 1 ED:ED-6C001-30G01
FRAMEWORK JOB DRAWING

ISSUE: 001
DATE: 04/02/91-14:22
DRAWING NO: TAB02-CO-140
SHEET: 2 OF 20

Figure 7-5. Line Equipment Job Drawing

	03	04
SHELF 1	LC CABLE5 PRS 0801-0900 FO1 (000, 03)03	LC CABLE6 PRS 0901-1000 FO1 (000, 03)04
SHELF 2	LC CABLE4 PRS 0601-0700 FO1 (000, 04)03	LC CABLE4 PRS 2201-2300 FO1 (000, 04)04
SHELF 3	LC CABLE5 PRS 0801-0900 FO1 (000, 01)03	LC CABLE6 PRS 0901-1000 FO1 (000, 01)04
SHELF 4	LC CABLE4 PRS 0601-0700 FO1 (000, 02)03	LC CABLE4 PRS 2201-2300 FO1 (000, 02)04
SHELF 5	LC CABLE3 PRS 0401-0500 FO1 (000, 08)03	LC CABLE3 PRS 2001-2100 FO1 (000, 08)04
SHELF 6	LC CABLE2 PRS 0201-0300 FO1 (000, 09)03	LC CABLE2 PRS 1801-1900 FO1 (000, 09)04
SHELF 7	LC CABLE1 PRS 0001-0100 FO1 (000, 10)03	LC CABLE1 PRS 1601-1700 FO1 (000, 10)04
SHELF 8	LC CABLE3 PRS 0401-0500 FO1 (000, 05)03	LC CABLE3 PRS 2001-2100 FO1 (000, 05)04
SHELF 9	LC CABLE2 PRS 0201-0300 FO1 (000, 06)03	LC CABLE2 PRS 1801-1900 FO1 (000, 06)04
SHELF 10	LC CABLE1 PRS 0001-0100 FO1 (000, 07)03	LC CABLE1 PRS 1601-1700 FO1 (000, 07)04

OFFICE	SMDFCOS2 0101	ISSUE: 001
LIBERTY CORNER (LBCRNJO1)	FRAME:FO1	DATE: 04/02/91-14:34
PO BOX 4908	MODULE:000 SIDE/PART: 2 ED:ED-6C311-30G04	DRAWING NO: TAB02-CO-140
WARREN , NJ	FRAMEWORK JOB DRAWING	SHEET: 2 OF 30

Figure 7-6. *COSMIC* Mini DF Loop Cable Job Drawing

	01	02
SHELF 1		
SHELF 2		
SHELF 3	LE ENNOLME19 B1LD 04-07	
SHELF 4	LE ENNOLME16 B1LD 12-15	LE ENNOLME18 BOLD 08-11
SHELF 5	LE ENNOLME14 BOLD 00-03	LE ENNOLME15 BOLD 16-19
SHELF 6	LE ENNOLME11 BOLD 08-11	LE ENNOLME12 B1LD 04-07
SHELF 7	LE ENNOLME08 BOLD 16-19	LE ENNOLME09 B1LD 12-15
SHELF 8	LE ENNOLME05 B1LD 04-07	LE ENNOLME07 BOLD 00-03
SHELF 9	LE ENNOLME02 B1LD 12-15	LE ENNOLME04 BOLD 08-11
SHELF 10	LE ENNOLME00 BOLD 00-03	LE ENNOLME01 BOLD 16-19

OFFICE
LIBERTY CORNER (LBCRNJ01)
PO BOX 4908
WARREN , NJ

SMOFCOS2 0101
FRAME:F01
MODULE:001 SIDE/PART: 1 ED:ED-6C311-30G05
FRAMEWORK JOB DRAWING

ISSUE: 001
DATE: 04/02/91-14:34
DRAWING NO: TAB02-CO-140
SHEET: 3 OF 30

Figure 7-7. *COSMIC* Mini DF Line Equipment Job Drawing

7.3.4.3 Framework Directory - The framework directory is organized by frame locations and shows the terminations on the frame in a chart format. An example of a framework directory is shown in Figure 7-8.

FRAME ADDRESS (VERTICAL.APP)	ACTUAL ID				ALTERNATE ID			
	CAT	MAJOR ID	MINOR ID	ADDRESS	*CATEGORY	MAJOR ID	MINOR ID	ADDRESS
025.001	RESERVED -- SEE DRAWING							
025.002	LC	CABLEA	PRS 0001-0100	F11 (000, 11)06				
025.003	LC	CABLEA	PRS 0101-0200	F12 (005, 11)06				
025.004	LC	CABLEA	PRS 0201-0300	F11 (004, 11)05				
025.005	LC	CABLEA	PRS 0301-0400	F12 (009, 11)05				
025.006	LC	CABLEA	PRS 0401-0500	F11 (002, 11)05				
025.007	LC	CABLEA	PRS 0501-0600	F12 (007, 11)05				
025.008	LC	CABLEA	PRS 0601-0700	F11 (004, 11)01				
026.001	LC	CABLEA	PRS 1301-1400	F12 (009, 11)07				
026.002	RESERVED -- SEE DRAWING							
026.003	LC	CABLEA	PRS 0701-0800	F12 (009, 11)01				
026.004	LC	CABLEA	PRS 0801-0900	F11 (002, 11)01				
026.005	LC	CABLEA	PRS 0901-1000	F12 (007, 11)01				
026.006	LC	CABLEA	PRS 1001-1100	F11 (000, 11)08				
026.007	LC	CABLEA	PRS 1101-1200	F12 (005, 11)08				
026.008	LC	CABLEA	PRS 1201-1300	F11 (004, 11)07				
027.001	LC	CABLEA	PRS 1801-1900	F11 (002, 11)03				
027.002	LC	CABLEA	PRS 2001-2100	F11 (000, 10)06				
027.003	RESERVED -- SEE DRAWING							
027.004	LC	CABLEA	PRS 1401-1500	F11 (002, 11)07				
027.005	LC	CABLEA	PRS 1501-1600	F12 (007, 11)07				
027.006	LC	CABLEA	PRS 1601-1700	F11 (004, 11)03				
027.007	LC	CABLEA	PRS 1701-1800	F12 (009, 11)03				
027.008	LC	CABLEA	PRS 1901-2000	F12 (007, 11)03				
028.001	LC	CABLEA	PRS 2101-2200	F12 (005, 10)06				
028.002	LC	CABLEA	PRS 2201-2300	F11 (004, 11)09				
028 003	LC	CABLEA	PRS 2301-2400	F12 (009, 11)09				
028.004	LC	CABLEA	PRS 2501-2600	F12 (007, 11)09				
028.005	LC	CABLEA	PRS 2701-2800	F12 (005, 10)07				
028.006	RESERVED -- SEE DRAWING							
028.007	LC	CABLEA	PRS 2401-2500	F11 (002, 11)09				
028.008	LC	CABLEA	PRS 2601-2700	F11 (000, 10)07				
029.001	LC	CABLEA	PRS 2801-2900	F11 (004, 10)06				
029.002	LC	CABLEA	PRS 2901-3000	F12 (009, 10)06				
029.003	LC	CABLEA	PRS 3001-3100	F11 (002, 10)06				
029.004	LC	CABLEA	PPS 3101-3200	F12 (007, 10)06				
029.005	LC	CABLEA	PRS 3201-3300	F11 (004, 10)01				
029.006	LC	CABLEA	PPS 3401-3500	F11 (002, 10)01				
029.007	RESERVED -- SEE DRAWING							
029.008	LC	CABLEA	PRS 3301-3400	F12 (009, 10)01				
030.001	LC	CABLEA	PRS 3501-3600	F12 (007, 10)01				
030.002	LC	CABLEA	PRS 3601-3700	F11 (000, 10)08				
030.003	LC	CABLEA	PRS 3701-3800	F12 (005, 10)08				
030.004	LC	CABLEA	PRS 3801-3900	F11 (004, 10)07				
030.005	LC	CABLEA	PRS 3901-4000	F12 (009, 10)07				
030.006	LC	CABLEA	PRS 4001-4100	F11 (002, 10)07				
030.007	LC	CABLEA	PRS 4101-4200	F12 (007, 10)07				
030.008	RESERVED -- SEE DRAWING							

OFFICE
LIBERTY CORNER (LBCRNJO1)
PO BOX 4908
WARREN , NJ

PFLOWDEN 0000
FRAME: F21
VERTICALS: 025-030 SIDE: ED: ED-97898-31G01
F R A M E W O R K D I R E C T O R Y

ISSUE: 001
DATE: 04/02/91-14:22
DRAWING NO: TAB01-CO-140
SHEET: 1 OF 1

Figure 7-8. Framework Directory

7.3.4.4 Termination Directory - The termination directory is organized by specific termination type and circuit IDs, and shows the location of the terminations on the frame in a chart format. An example of a page from a termination directory is shown in Figure 7-9.

OFFICE
LIBERTY CORNER (LBCRNJO1)
PO BOX 4908
WARREN , NJ

DATE : 04/02/91-14:22
PAGE : 1

T E R M I N A T I O N D I R E C T O R Y
LC 1

MINOR ID	'FROM' LOCATION	'TO' LOCATION	CATEGORY & MAJOR ID	MINOR ID	'FROM' LOCATION	'TO' LOCATION
PRS 0001-0100	F21 (001, 11)01	F21B(001,002)11				
PRS 0101-0200	F21 (001, 11)03	F21B(001,004)11				
PRS 0201-0300	F21 (001, 11)05	F21B(001,006)11				
PRS 0301-0400	F22 (009, 11)01	F22B(009,002)11				
PRS 0401-0500	F22 (009, 11)03	F22B(009,004)11				
PRS 0501-0600	F22 (009, 11)05	F22B(009,006)11				
PRS 0601-0700	F21 (003, 11)01	F21B(003,002)11				
PRS 0701-0800	F21 (003, 11)03	F21B(003,004)11				
PRS 0801-0900	F21 (003, 11)05	F21B(003,006)11				
PRS 0901-1000	F22 (011, 11)01	F22B(011,002)11				
PRS 1001-1100	F22 (011, 11)03	F22B(011,004)11				
PRS 1101-1200	F22 (011, 11)05	F22B(011,006)11				
PRS 1201-1300	F21 (001, 11)07	F21B(001,008)11				
PRS 1301-1400	F21 (001, 11)09	F21B(001,010)11				
PRS 1401-1500	F22 (009, 11)07	F22B(009,008)11				
PRS 1501-1600	F22 (009, 11)09	F22B(009,010)11				
PRS 1601-1700	F21 (003, 11)07	F21B(003,008)11				
PRS 1701-1800	F21 (003, 11)09	F21B(003,010)11				
PRS 1801-1900	F22 (011, 11)07	F22B(011,008)11				
PRS 1901-2000	F22 (011, 11)09	F22B(011,010)11				
PRS 2001-2100	F21 (001, 10)01	F21B(001,001)10				
PRS 2101-2200	F21 (001, 10)02	F21B(001,002)10				
PRS 2201-2300	F21 (001, 10)03	F21B(001,003)10				
PRS 2301-2400	F21 (001, 10)04	F21B(001,004)10				
PRS 2401-2500	F21 (001, 10)05	F21B(001,005)10				
PRS 2501-2600	F22 (009, 10)01	F22B(009,001)10				
PRS 2601-2700	F22 (009, 10)02	F22B(009,002)10				
PRS 2701-2800	F22 (009, 10)03	F22B(009,003)10				
PRS 2801-2900	F22 (009, 10)04	F22B(009,004)10				
PRS 2901-3000	F22 (009, 10)05	F22B(009,005)10				
PRS 3001-3100	F21 (003, 10)01	F21B(003,001)10				
PRS 3101-3200	F21 (003, 10)02	F21B(003,002)10				
PRS 3201-3300	F21 (003, 10)03	F21B(003,003)10				
PRS 3301-3400	F21 (003, 10)04	F21B(003,004)10				
PRS 3401-3500	F21 (003, 10)05	F21B(003,005)10				
PRS 3501-3600	F22 (011, 10)01	F22B(011,001)10				
PRS 3601-3700	F22 (011, 10)02	F22B(011,002)10				
PRS 3701-3800	F22 (011, 10)03	F22B(011,003)10				
PRS 3801-3900	F22 (011, 10)04	F22B(011,004)10				
PRS 3901-4000	F22 (011, 10)05	F22B(011,005)10				

Figure 7-9. Termination Directory

7.3.4.5 Cable Location Directory - The cable location directory shows the starting location for each group of consecutive pairs, for each loop cable and each loop carrier terminated on the SMDF frame. The cable location directory example shown in Figure 7-10 is produced for *COSMIC* IIA-type frames only.

```
OFFICE                            C A B L E   L O C A T I O N   D I R E C T O R Y                  ISSUE: 001
LIBERTY CORNER    (LBCRNJO1)                          LOOP CABLE    (LC)                       DATE:04/02/91-14:22
PO BOX 4908                                                                        DIRECTORY NO:   TAB02-CO-140
WARREN               NJ                                                                            PAGE:    1OF   1

  CABLE        PAIRS         STARTING        PAIRS         STARTING        PAIRS         STARTING        PAIRS         STARTING
 MAJOR ID                    LOCATION                      LOCATION                      LOCATION                      LOCATION
-------------------------------------------------------------------------------------------------------------------------------
            1 0001-0300 F21 (001, 11) 0301-0600 F22 (009, 11) 0601-0900 F21 (003, 11) 0901-1200 F22 (011, 11)
              1201-1400 F21 (001, 11) 1401-1600 F22 (009, 11) 1601-1800 F21 (003, 11) 1801-2000 F22 (011, 11)
              2001-2500 F21 (001, 10) 2501-3000 F22 (009, 10) 3001-3500 F21 (003, 10) 3501-4000 F22 (011, 10)

            2 0001-0500 F21 (001, 10) 0501-1000 F22 (009, 10) 1001-1500 F21 (003, 10) 1501-2000 F22 (011, 10)
              2001-2500 F21 (001, 09) 2501-3000 F22 (009, 09) 3001-3500 F21 (003, 09) 3501-4000 F22 (011, 09)
```

Figure 7-10. Cable Location Directory

7.3.4.6 Cable Running List - The cable running list provides a detailed breakdown of all cable routing information with to-and-from identification. The cable running list greatly improves the efficiency of the engineer and the installer. This list is actually a partial cable running list that is fed into the RCPS to receive the actual details of where to run, how to run, and the length needed for each jumper. An example of a partial cable running list is shown in Figure 7-11.

```
T-513843-FIG-34 OSP CABLE PAIRS

 1 11DA    PR 0001 COS2           SHELF 11SPL POS XXX     OSP CA      CGNO00001
             -0100 0102           BLOCK 01FL     66
           RGN  01 001-1                  .02                1
           CA  001 FL 01          /CONN
                   F21

 1 11DA    PR 0101 COS2           SHELF 11SPL POS XXX     OSP CA      CGNO00001
             -0200 0102           BLOCK 03FL     66
           RGN  01 001-1                  .04                1
           CA  002 FL 01          /CONN
                   F21

 1 11DA    PR 0201 COS2           SHELF 11SPL POS XXX     OSP CA      CGNO00001
             -0300 0102           BLOCK 05FL     66
           RGN  01 001-1,2                .06                1
           CA  003 FL 01          /CONN
                   F21

 1 11DA    PR 0301 COS2           SHELF 11SPL POS XXX     OSP CA      CGNO00002
             -0400 0102           BLOCK 01FL     66
           RGN  02 009-1                  .02                1
           CA  004 FL 01          /CONN
                   F22

 1 11DA    PR 0401 COS2           SHELF 11SPL POS XXX     OSP CA      CGNO00002
             -0500 0102           BLOCK 03FL     66
           RGN  02 009-1                  .04                1
           CA  005 FL 01          /CONN
                   F22


LIBERTY CORNER                 PO BOX 4908     , WARREN                NJ

CESAMANICH          246690                LC     04/02/91-14:22

12345WE
```

Figure 7-11. Cable Running List

7.3.4.7 Frame Labels - Frame labels are supplied by MELD for each *COSMIC* DF shelf containing terminations. The label shows the apparatus number and the cable or equipment name for each termination indicating the "other end" location for loop cable, tie pair, and loop carrier. Labels are also produced for modular protector frames. Mounting information is included with each label. Examples are shown in Figures 7-12, 7-13 and 7-14. Examples of PACE-style labels are provided in Figures 7-15 through 7-17.

	APP 04
PFLOWDEN 0000	LC
FRAME F22	CABLE9
	PRS
VERTICAL 003	0801-0900
APPARATUS 04	F11
	(004, 09)07

	APP 05
PFLOWDEN 0000	LC
FRAME F22	CABLE9
	PRS
VERTICAL 003	1001-1100
APPARATUS 05	F11
	(002, 09)07

	APP 01
PFLOWDEN 0000	LC
FRAME F22	CABLE9
	PRS
VERTICAL 004	1301-1400
APPARATUS 01	F12
	(009, 09)02

	APP 02
PFLOWDEN 0000	LC
FRAME F22	CABLE9
	PRS
VERTICAL 004	1501-1600
APPARATUS 02	F12
	(007, 09)02

	APP 04
PFLOWDEN 0000	LC
FRAME F22	CABLE9
	PRS
VERTICAL 004	1201-1300
APPARATUS 04	F11
	(004, 09)02

	APP 05
PFLOWDEN 0000	LC
FRAME F22	CABLE9
	PRS
VERTICAL 004	1401-1500

Figure 7-12. Sample MELD Labels for Protector Frame Application

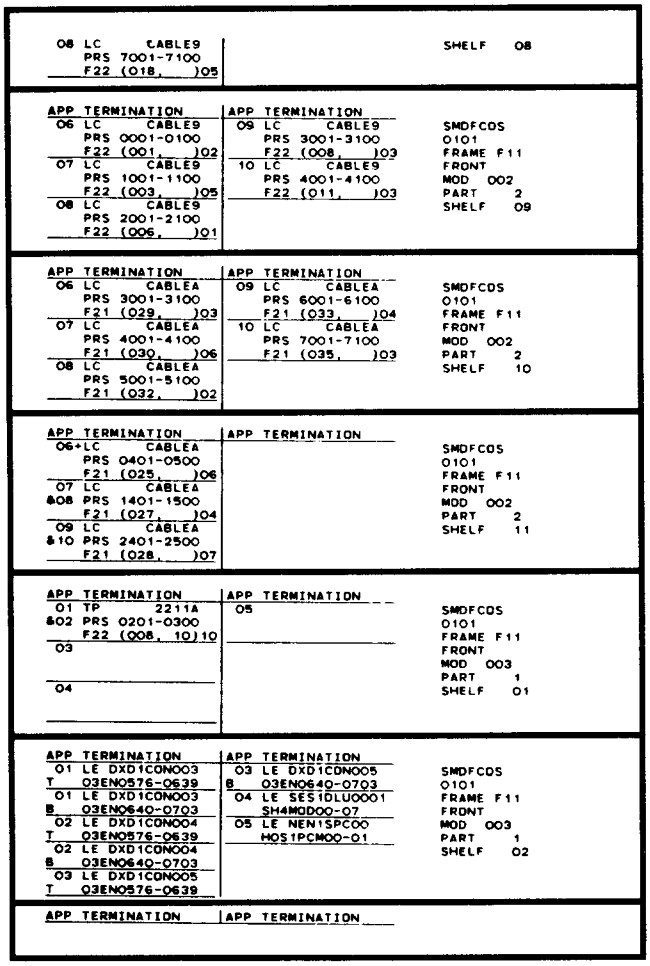
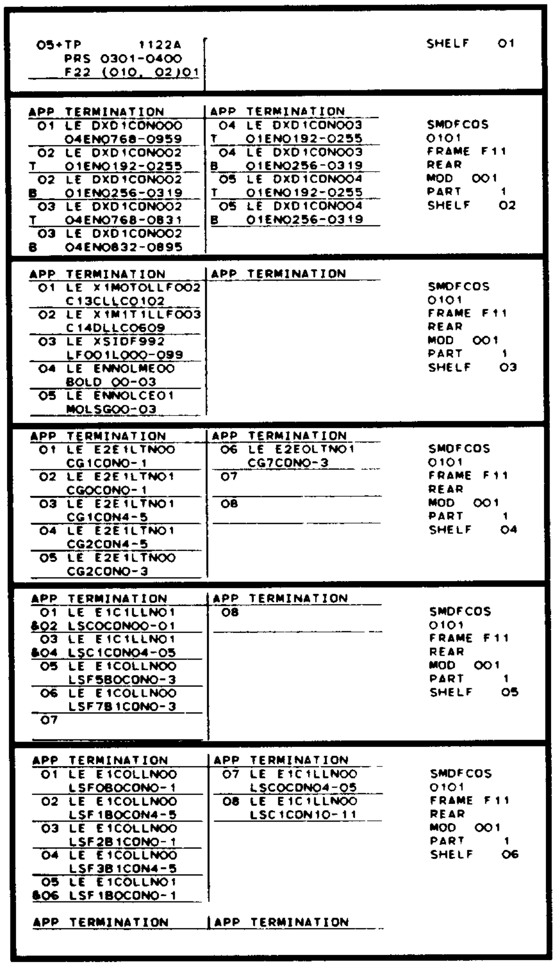


Figure 7-13. Sample MELD Labels (SMDF)



05+TP 1122A
PRS 0301-0400
F22 (010, 02)01
SHELF 01

APP TERMINATION	APP TERMINATION	
01 LE DXD1CON000 04EN0768-0959	04 LE DXD1CON003 T 01EN0192-0255	SMDFCOS
02 LE DXD1CON002 T 01EN0192-0255	04 LE DXD1CON003 B 01EN0256-0319	0101 FRAME F11
02 LE DXD1CON002 B 01EN0256-0319	05 LE DXD1CON004 T 01EN0192-0255	REAR MOD 001
03 LE DXD1CON002 T 04EN0768-0831	05 LE DXD1CON004 B 01EN0256-0319	PART 1 SHELF 02
03 LE DXD1CON002 B 04EN0832-0895		

APP TERMINATION	APP TERMINATION	
01 LE X1MOTOLLF002 C13CLLC0102		SMDFCOS 0101
02 LE X1M1T1LLF003 C14DLLC0609		FRAME F11 REAR
03 LE XSIDF992 LF001L000-099		MOD 001 PART 1
04 LE ENNOLME00 BOLD 00-03		SHELF 03
05 LE ENNOLCE01 MOLSG00-03		

APP TERMINATION	APP TERMINATION	
01 LE E2E1LTN00 CG1CON0-1	06 LE E2E0LTN01 CG7CON0-3	SMDFCOS 0101
02 LE E2E1LTN01 CG0CON0-1	07	FRAME F11 REAR
03 LE E2E1LTN01 CG1CON4-5	08	MOD 001 PART 1
04 LE E2E1LTN01 CG2CON4-5		SHELF 04
05 LE E2E1LTN00 CG2CON0-3		

APP TERMINATION	APP TERMINATION	
01 LE E1C1LLN01 &02 LSC0CON00-01	08	SMDFCOS 0101
03 LE E1C1LLN01 &04 LSC1CON04-05		FRAME F11 REAR
05 LE E1COLLN00 LSF5B0CON0-3		MOD 001 PART 1
06 LE E1COLLN00 LSF7B1CON0-3		SHELF 05
07		

APP TERMINATION	APP TERMINATION	
01 LE E1COLLN00 LSF0B0CON0-1	07 LE E1C1LLN00 LSC0CON04-05	SMDFCOS 0101
02 LE E1COLLN00 LSF1B0CON4-5	08 LE E1C1LLN00 LSC1CON10-11	FRAME F11 REAR
03 LE E1COLLN00 LSF2B1CON0-1		MOD 001 PART 1
04 LE E1COLLN00 LSF3B1CON4-5		SHELF 06
05 LE E1COLLN01 &06 LSF1B0CON0-1		

APP TERMINATION	APP TERMINATION

Figure 7-14. Sample MELD Labels (Equipment Label)

VERTICAL 000 APPARATUS 02	FROM 0101 MOD 007 SHLF 09 APP 07
PFLOWDEN 0000 FRAME F22 VERTICAL 003 APPARATUS 03	APP 03 CAB ##### PRS ## T FROM #### MOD ### SHLF APP 7
PFLOWDEN 0000 FRAME F22 VERTICAL 003 APPARATUS 04	APP 04 CAB ABLE9 PRS 0801 0900 FROM 0101 MOD 004 SHLF 09 APP 07
PFLOWDEN 0000 FRAME F22 VERTICAL 003 APPARATUS 05	APP 05 CAB ABLE9 PRS 1001 1100 FROM 0101 MOD 002 SHLF 09 APP 07
PFLOWDEN 0000 FRAME F22 VERTICAL 004 APPARATUS 01	APP 01 CAB ABLE9 PRS 1301 1400 FROM 0101 MOD 009 SHLF 09 APP 02
PFLOWDEN 0000 FRAME F22 VERTICAL 004 APPARATUS 02	APP 02 CAB ABLE9 PRS 1501 1600 FROM 0101 MOD 007 SHLF 09 APP 02

Figure 7-15. Sample PACE-Style Label for Protector Frame Application

```
FROM NNNN  NNNN  NNNN  NNNN  NNNN              PART     2
MOD/                                           SHELF   02
VERT 002V  003V  004V  005V  006V
SHLF
BLK    05    05    05    05    05
-------------------------------------------------------------
BLK    06    07    08    09    10
                                               SMDFCOS
CAB  ABLE9 ABLE9 ABLE9                         0101
PRS   5001  6001  7001                         FRAME  F11
      5100  6100  7100                         FRONT
                                               MOD    002
FROM 0000  0000  0000                          PART     2
MOD/                                           SHELF   08
VERT 013   016   018
SHLF
BLK    05    03    05
-------------------------------------------------------------
BLK    06    07    08    09    10
                                               SMDFCOS
CAB  ABLE9 ABLE9 ABLE9 ABLE9 ABLE9             0101
PRS   0001  1001  2001  3001  4001             FRAME  F11
      0100  1100  2100  3100  4100             FRONT
                                               MOD    002
FROM 0000  0000  0000  0000  0000              PART     2
MOD/                                           SHELF   09
VERT 001   003   006   008   011
SHLF
BLK    02    05    01    03    03
-------------------------------------------------------------
BLK    06    07    08    09    10
                                               SMDFCOS
CAB  ABLEA ABLEA ABLEA ABLEA ABLEA             0101
PRS   3001  4001  5001  6001  7001             FRAME  F11
      3100  4100  5100  6100  7100             FRONT
                                               MOD    002
FROM 0000  0000  0000  0000  0000              PART     2
MOD/                                           SHELF   10
VERT 029   030   032   033   035
SHLF
BLK    03    06    02    04    03
-------------------------------------------------------------
BLK    06    07    08    09    10
                                               SMDFCOS
CAB  ABLEA ABLEA ABLEA ABLEA ABLEA             0101
PRS   0451  1401  1451  2401  2451             FRAME  F11
      0500  1450  1500  2450  2500             FRONT
                                               MOD    002
FROM 0000  0000  0000  0000  0000              PART     2
MOD/                                           SHELF   11
VERT 025   027   027   028   028
SHLF
BLK    06    04    04    07    07
-------------------------------------------------------------
BLK    01    02    03    04    05
                                               SMDFCOS
CAB  2211A 2211A                               0101
PRS   0201  0251                               FRAME  F11
      0250  0300                               FRONT
                                               MOD    003
FROM 0102  0102                                PART     1
MOD/ 008   008                                 SHELF   01
VERT
SHLF   10    10
BLK    10    10
```

Figure 7-16. Sample PACE-Style Labels (SMDF)

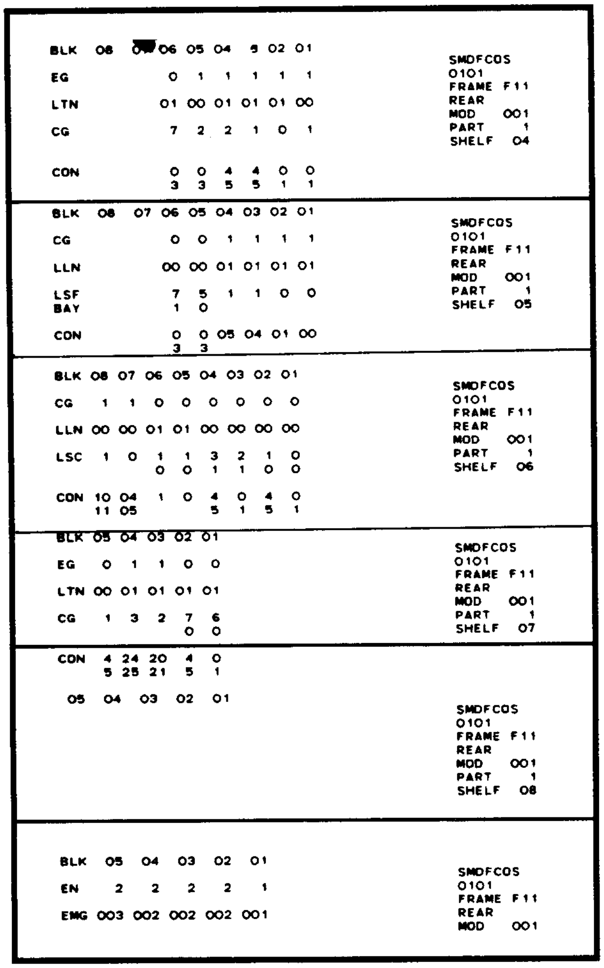


Figure 7-17. Sample PACE-Style Labels (Line Equipment)

7.3.4.8 OSS Tape - The OSS tape is an interface between the MELD and CFAS System, or MELD and the COSMOS System. The tape contains formatted records with office and frame identification data, all OSP cable, ties, and line equipment terminations, and their respective apparatus locations on all frames engineered with MELD. Termination information for all frames is provided on a single MELD OSS tape - regardless of the number of *COSMIC* DFs. All tape data is formatted with ASCII characters for OSS processing, and can also be readily interpreted by direct tape printout.

A detailed specification on the format of the OSS tape is available upon request.

7.3.4.9 Apparatus Ordering List - *COSMIC* DF engineering specifications can be prepared with the aid of ordering information generated by the MELD program. MELD generates an apparatus ordering list which indicates the types and quantities of connecting blocks to be used on the *COSMIC* DF. An example of the apparatus ordering list is shown in Figure 7-18.

OFFICE
LIBERTY CORNER (LBCRNJO1)
PO BOX 4908
WARREN ,NJ

FRAME APPARATUS ORDERING LIST
SMDFCOS 0101

ISSUE: 001
DATE: 04/02/91-14:22
DRAWING NO: TAB02-CO-140

TERMINATING APPARATUS

CODE	COMCODE	QTY
78C1B-50	102463486	48
78C2B-50	102995206	48
78C1B-100	102371804	192
112C1A-50	103288197	28
112C2A-50	103288254	28
112E3F-128	104401302	98
78C3A-100	102730462	20
78C1C-100	102371812	8
112E2F-128	104017348	26
112C2A-64	103288262	128
112E1B-128	103288296	48
112C1A-64	103288205	64
112E2B-128	103758140	32
78C2A-100	102415882	50
112A1A-128	106005812	8
112C1A-100	103288189	28

MODULE NO. CARDS

CODE	QTY
841160-047	26
841160-054	8
841160-062	6
841160-070	2
841160-088	2
841160-096	4
841160-104	2
841160-112	2
841160-120	2
841160-138	2
841160-146	8
841160-153	80

QTY FRAME LABELS TO BE INSTALLED

FRONT	168
REAR	168
TOTAL	336

Figure 7-18. Apparatus Ordering List

7.4 Non-Mechanized Termination Layout

7.4.1 Manual Layout Process for the TMDF, CMDF, and SDDF

Cable terminations other than subscriber OSP and switching line equipment require special rules and generally are not handled by the MELD spread algorithm. Therefore, the layout of non-Subscriber cable terminations such as trunk, toll, and special service circuits is done manually. Note that MELD can be used to mechanize the layout of subscriber cable pairs, line equipment pairs, and tie pairs on a CMDF. Complete procedures for engineering these terminations have been developed and are available on ED-6C160-11, ED-6C160-12, ED 6C140-10 and ED-6C140-11. The general process for engineering these types of terminations is provided in the paragraphs below and is designed to generate as even a spread as possible. Each of the non-Subscriber functional frames requires special consideration as to layout planning, assigning terminations, and recording terminations.

Layout Planning - The ultimate layout of the frame is usually developed for a TMDF, CMDF, or SDDF prior to any pair assignments. Layouts are planned to meet the ultimate termination forecasts for the functional frame. Space is reserved on the frame in single bay increments with each bay designated as a facility or equipment bay depending on the type terminations. Shelves not needed to meet the initial termination forecast are reserved for future assignment. The ultimate layout can later be revised, either by dedicating those shelves marked for future assignment or by changing a shelf allocation from one category to another. Appendix 7-C provides further guidelines for developing the frame layout for the *COSMIC* TMDF, CMDF, and SDDF. The ultimate layout is recorded on the frame mask, which serves as the primary engineering documentation.

Assigning Terminations - Terminations are allocated space only in appropriately designated shelves as given on the ultimate mask and in accordance with rules given in the ED drawings. Shelves are filled with cable terminations from left to right (viewed from the front of the frame). Terminations which do not fall into one of the categories specified on the ultimate mask are terminated in the shelves reserved for "Miscellaneous". Equipment cables cannot be split over separate shelves because of physical restrictions on the frame. All assignments should be made to minimize unused space on shelves.

Facility and equipment terminations are sequentially spread on the TMDF and CMDF. The spreading sequences used are similar to those used in MELD for the SMDF. Spreading sequences and termination arrangements for specific trunk and toll equipment are described in ED-6C160-11 or -12 and ED-6C140-10 and -11.

Recording Terminations - Job drawings are developed for recording terminations on a TMDF, CMDF, or SDDF. These drawings provide a record of the ultimate layout, and a method for monitoring the half-module shelf fill over the life of the frame. In addition, they provide a record detailing all terminations, and termination directories for circuit provisioning reference.

Complete records required to support a TMDF, CMDF, or SDDF include:

1. The ultimate layout mask of the frame.
2. Half-module (bay) views. Front and rear views of facility modules. Front views only of equipment modules.
3. Individual block sketches, which are used only when enough information cannot be provided on the half-module front views.
4. A termination index listing all terminations by drawing number and frame location.
5. Termination directories.

7.4.2 TMDF Sample

A sample of a TMDF layout mask is shown in Figure 7-19. Note that the facility and equipment terminations have been spread in a uniform approach across the frame. Terminations are usually placed in center shelves first, with shelves near the top and bottom reserved for future growth.

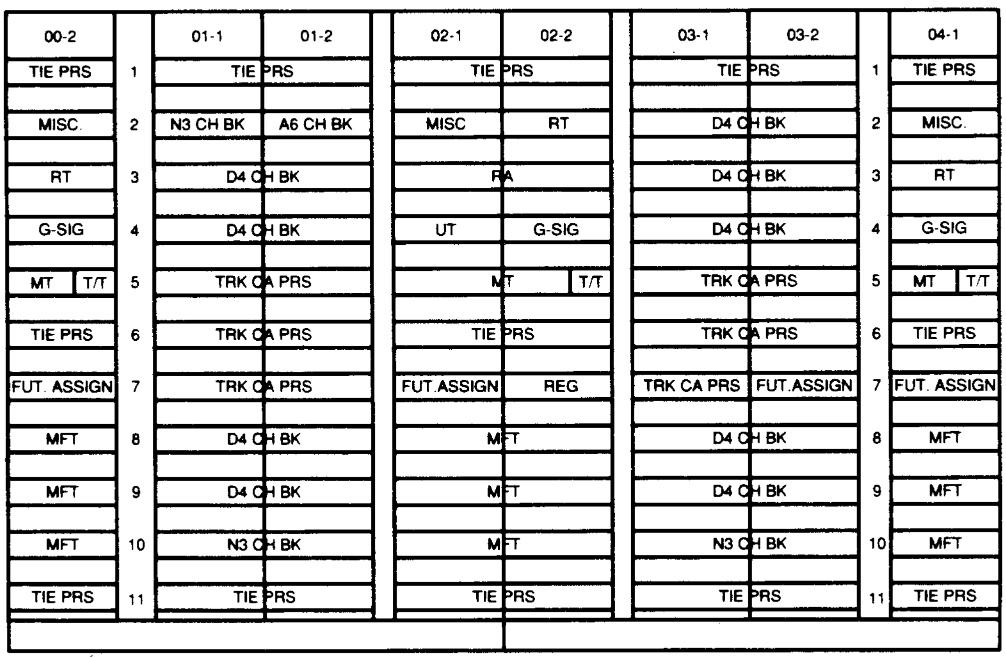


Figure 7-19. Typical Result of Engineering TMDF

7.4.3 CMDF Sample Layout

A sample of a CMDF layout mask is shown in Figure 7-20. Note that the subscriber portion including Subscriber cable pairs, switch line equipment, and tie pairs can be engineered by using the MELD program. Shelf positions are reserved in the MELD engineering for trunk, toll, and special service terminations. These other terminations must then be assigned and recorded manually.

00-2	01-1 01-2 T-CARRIER (REAR)	02-1 02-2		03-1 03-2 T-CARRIER (REAR)	04-1 04-2	05-1 05-2 T-CARRIER (REAR)	06-1 06-2
MISC	FUT.ASSI. SMAS(F)	MISC	1	SMAS (E)	MISC E&M APPL	SLC-1, 8 4W TERM	MISC
FUT.ASSI.	D4 CH BK	RA	2	D4 CH BK	RA RT	D4 CH BK A6 CH BK	G-SIG,UNI G-SIG
RT	D4 CH BK	RT	3	4W TERM	G-SIG F-SIG	D4 CH BK 4W TERM	G-SIG F-SIG
FUT.ASSI.	FAC CA PRS	FUT. ASSIGN.	4	FAC CA PRS	LTN	FAC CA PRS	LTN
MT/SLC T/T	FAC CA PRS	MT/SLC T/T	5	FAC CA PRS	MT/SLC T/T	FAC CA PRS	MT/SLC T/T
LTN	FAC CA PRS	LTN	6	FAC CA PRS	LTN	FAC CA PRS	LTN
LTN	FAC CA PRS	LTN	7	FAC CA PRS	LTN	FAC CA PRS	LTN
MFT	FAC CA PRS	BRIDGES UT	8	FAC CA PRS	LTN	FAC CA PRS	LTN
MFT	D4 CH BK	MFT	9	D4 CH BK	UT BRIDGES	N3 CH BK	BRIDGES
MFT	D4 CH BK	MFT	10	D4 CH BK	MFT	D4 CH BK	MFT
SMAS (F)	SMAS (E)	SMAS (F)	11	SMAS (E)	SMAS (F)	SMAS (E)	SMAS (F)

Figure 7-20. Typical CMDF Layout Mask

7.4.4 SDDF Sample Layout

A sample SDDF layout mask is shown in Figure 7-21.

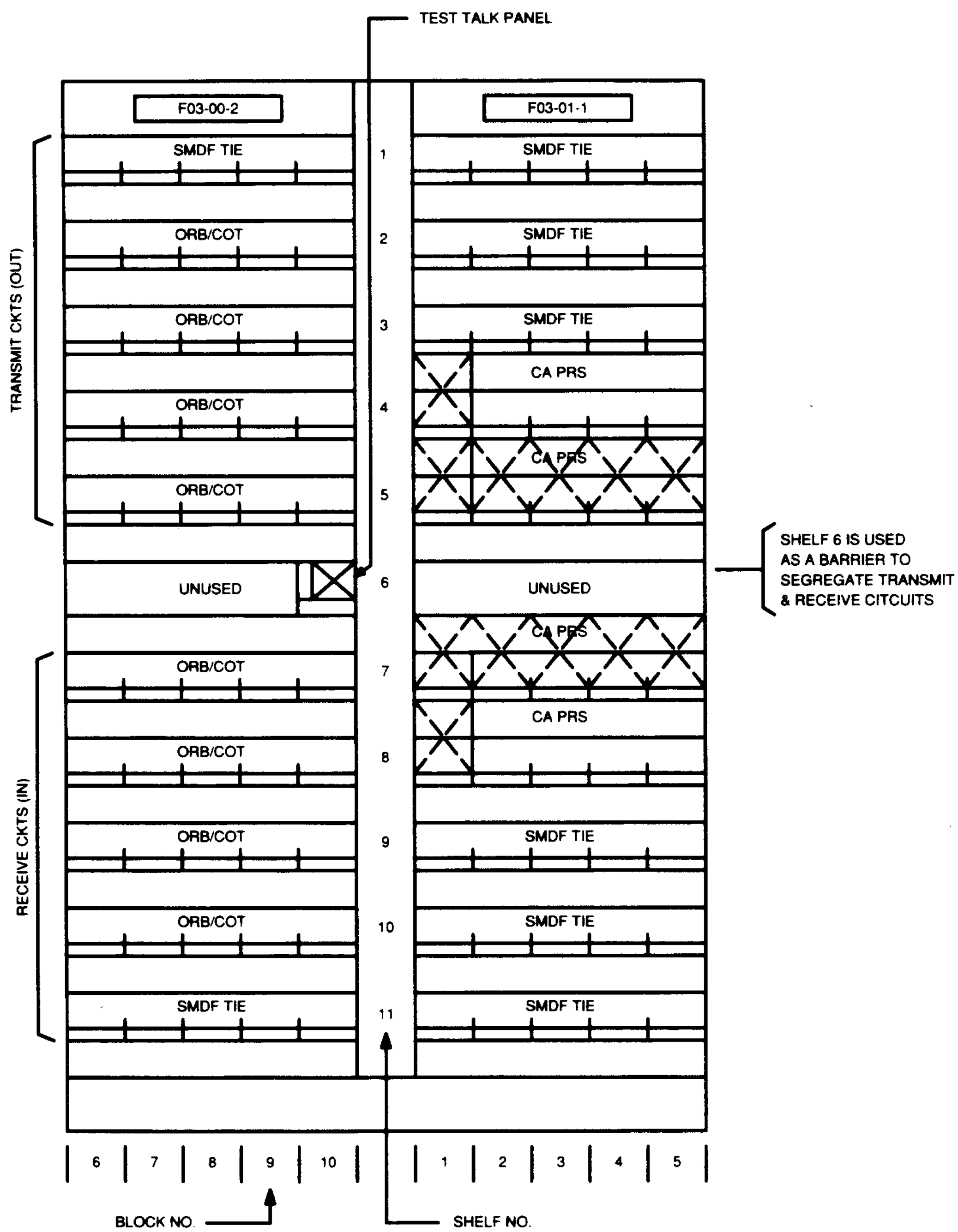


Figure 7-21. Typical SDDF Layout Mask

7.5 Detailed Cable Engineering

7.5.1 Cabling *COSMIC* Frames

Cabling procedures for *COSMIC* frames are designed for efficient routing and placing of cables. Planning and specification of cable access pathways provide the ability to spread cable across the frame and allow for future cable growth without premature exhaustion of the cable racks. Cable engineering results in an organized installation that will efficiently serve the user over the planned life of the frame. Standard cable rack arrangements are available that allow installation of the ultimate pile-up of cable while staying within Bellcore's NEBS ceiling height requirements. The MELD program plays an important engineering role by determining cable end locations. Cable directories and cable running lists are outputs of the MELD engineering process. The AT&T Cable Routing and Measuring System (CRMS) is also an important engineering tool used to determine the shortest route while maintaining proper spread in the racks to minimize cable pile-up. The four components for cabling a *COSMIC* DF include:

1. **Cable Access Planning** considers the amount and type of cable that is to be terminated. Also the cutover plan, top-or-bottom cable access, and the location for splicing cables must be determined. If an Auxiliary Cable Entrance Facility (ACEF) is used, careful planning of the riser-tip cable interface is required to be sure that there will be adequate cabling space throughout the life of the frame.
2. **Cable Racking System Design** involves cable rack identification and specification. Modular arrangements are selected to fit the appropriate applications.
3. **Cable Routing and Measuring** involves optimizing cable routes and length determinations of cables to the frame.
4. **Method of Cabling** includes procedures for placing cables that minimize cable pileup in the racks and that are consistent with the MELD cable spreading algorithms.

7.5.2 Cable Access Planning

7.5.2.1 Cable Types - A variety of cable sizes and conductor pair counts are used with the *COSMIC* DF. The nominal diameter of AT&T's 800A-type equipment cable ranges from 0.65 inches (16.5 mm) for 128-pair cable to .37 inches (9.4 mm) for 32-pair cable. Twenty-six gauge (.4 mm) cable is adequate for most installations on the *COSMIC* DF. Twenty-four gauge (.5 mm) cable can be accommodated if needed. Outside plant cables from separate PFs or decimal-count switching systems use 100-pair (806A) switchboard cable. Octal-count switching systems use either 64-pair (809A) or 128-pair (810A) switchboard cable. For cases requiring 50-pair terminations, use 50-pair 813A cable.

Shielded tip cables are used when routing an unprotected outside plant cable from a splice location to the rear of a *COSMIC* IIA frame. The tip cables (11-type stubs) typically are used in 100-pair complements with either 22- or 24-gauge (.6 mm or .5 mm) conductors. The 11-type stub cables are 0.91 inches (23 mm) in diameter and have a nonflammable sheath allowing these cables to be routed between floors. They are listed by UL as "CMR" type cables. Figure 7-22 shows a typical overhead cable arrangement.

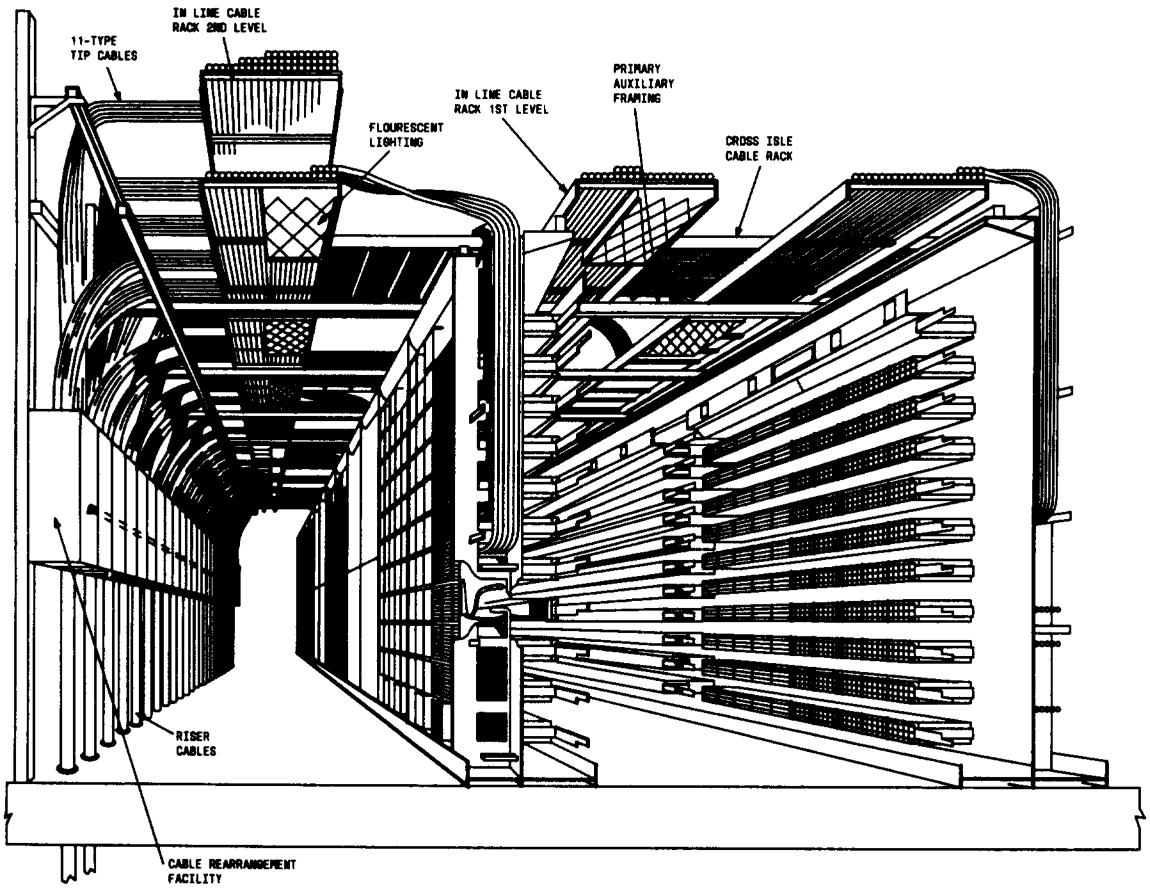


Figure 7-22. Overhead Cabling for *COSMIC* IIA DF

7.5.2.2 Auxiliary Cable Entrance Facility (ACEF) (*COSMIC* IIA Frames) - An ACEF is an area within a wire center used for splicing riser cables. It is an extension of the cable entrance and is common when distributing frames are located on upper floors of the wire center. A vertical splice is recommended for connecting vertical OSP cable risers to tip cables at the ACEF. The tip cables are then routed overhead and spread over the *COSMIC* IIA DF. The ACEF can usually be located in the floor space between the structural columns on an outside wall of the frame room. This arrangement minimizes vault congestion, cable sheath maintenance, and fire stopping problems while optimizing the use of riser ducts. Using available riser cables, splice locations, and splicing techniques, up to four parallel lineups of *COSMIC* IIA frames can be cabled and fed overhead from an ACEF.

Whenever possible, the ACEF should be located parallel to the *COSMIC* IIA frame lineups on an outside wall above the CEF. A UNISTRUT* arrangment is used to support vertical splice enclosures and cables on the wall. Once the frame size has been established, the zone density cable can be determined for the ACEF. Cable density is determined by dividing the ultimate number of cable pairs terminated on the frame by the available splicing space on the wall adjacent to the lineup. Ideally, each zone will occupy about 13 feet (3962 mm) of ACEF wall space The zone size is the ultimate number of facility pairs divided by the number of zones. For equal length lineups, this will be about 10,000 pairs times the number of lineups.

Riser cables should be spliced at the ACEF sequentially such that the new splice is adjacent to the last. All splice locations should be placed within one zone before proceeding to fill the next zone. This ensures that riser cables not divisible into 500-pair complements can be combined with any combination of 100-to-400 pairs of an adjacent riser cable to form groups of five tip cables. Cable identification numbers do not have to be in any particular sequence.

7.5.2.3 CRF (*COSMIC* IIA Frames) - The Cable Rearrangement Facility (CRF) is a high density, completely front facing splicing interface that is capable of terminating up to 5,000 spliced pairs while using less space than conventional cylindrical enclosures. The CRF was designed for use with the *COSMIC* IIA framework installations utilizing an ACEF. Its modular design greatly improves cable pair identification, organization, and workability. It offers easy access to all spliced pairs without the loss of valuable space.

The CRF is a 15 inch wide (301 mm), 12 inch deep (305 mm), and 48 inch high (1219 mm) sheet metal structure providing a fire resistant termination cabinet. The sides of the splice cabinet have cutouts that are covered by filler plates. These plates are removed whenever two closures are mounted side by side to permit transfer of cable pairs between units. Up to fifty 100-pair tip cables enter from the top and up to four feeder or riser cables enter from the bottom of the cabinet. The CRF is designed to be used with the AT&T 710-type modular splice connectors.

* Registered trademark of UNISTRUT International, Corp.

The CRF is installed vertically on a wall or free standing rack arrangment. ED-6C136-30 provides more details on the CRF and includes the various ordering groups available. The CRF can be ordered for the application of the 710 connectors (ED-6C136-30 G1) or for the application of the 3M MS^2 modules (ED-6C136-30 G3). Groups 2, 4, and 5 are specified to order grounding kits, splicing tools, and an upgrade kit, respectively. The method of installing and splicing the CRF is provided in ED-6C146-50, Section C.

7.5.2.4 Tip Cable MELD Input for *COSMIC* IIA Frames - Once the riser or tip cable drop position is established, the MELD questionnaire can be completed and a cable directory generated. The MELD cable directory provides the location of every tip cable pair in the order of the feeder cable number. The MELD algorithm for spreading tip cables on the *COSMIC* IIA frame assigns 500 sequential cable pairs from a riser or feeder cable to alternating subscriber modules. Five hundred pairs correspond to the complete cable complement for a half shelf and will be cabled by a group of five 100-pair tip cables.

7.5.2.5 Bottom Cable Access to *COSMIC* IIA Frame - ***The methods for running floor-fed tip cables are similar to those for overhead cabling, except that the process required inverted transitions, and the slotted fire penetration. In addition, cable groups must be threaded through the floor a single cable at a time instead of as a group.***

The method of spreading cable in the CEF for single lineups is identical to that of overhead racking arrangement with a two level rack. Figure 7-23 shows a bottom cable feed from a 3-lineup frame system. The racking arrangement consists of symmetrical two-level racks for each lineup and is cabled in the same manner as a single lineup. All the cable groups are installed from the outside of the racks and dropped through the center of a double UNISTRUT frame to the splice cases. The centralized drop allows routing of tip cables to associated splice cases on either side of the UNISTRUT without using laterals. This arrangement requires an enlarged CEF design.

For *COSMIC* frames located on raised floors, bottom access with cables routed under the floor requires special engineering.

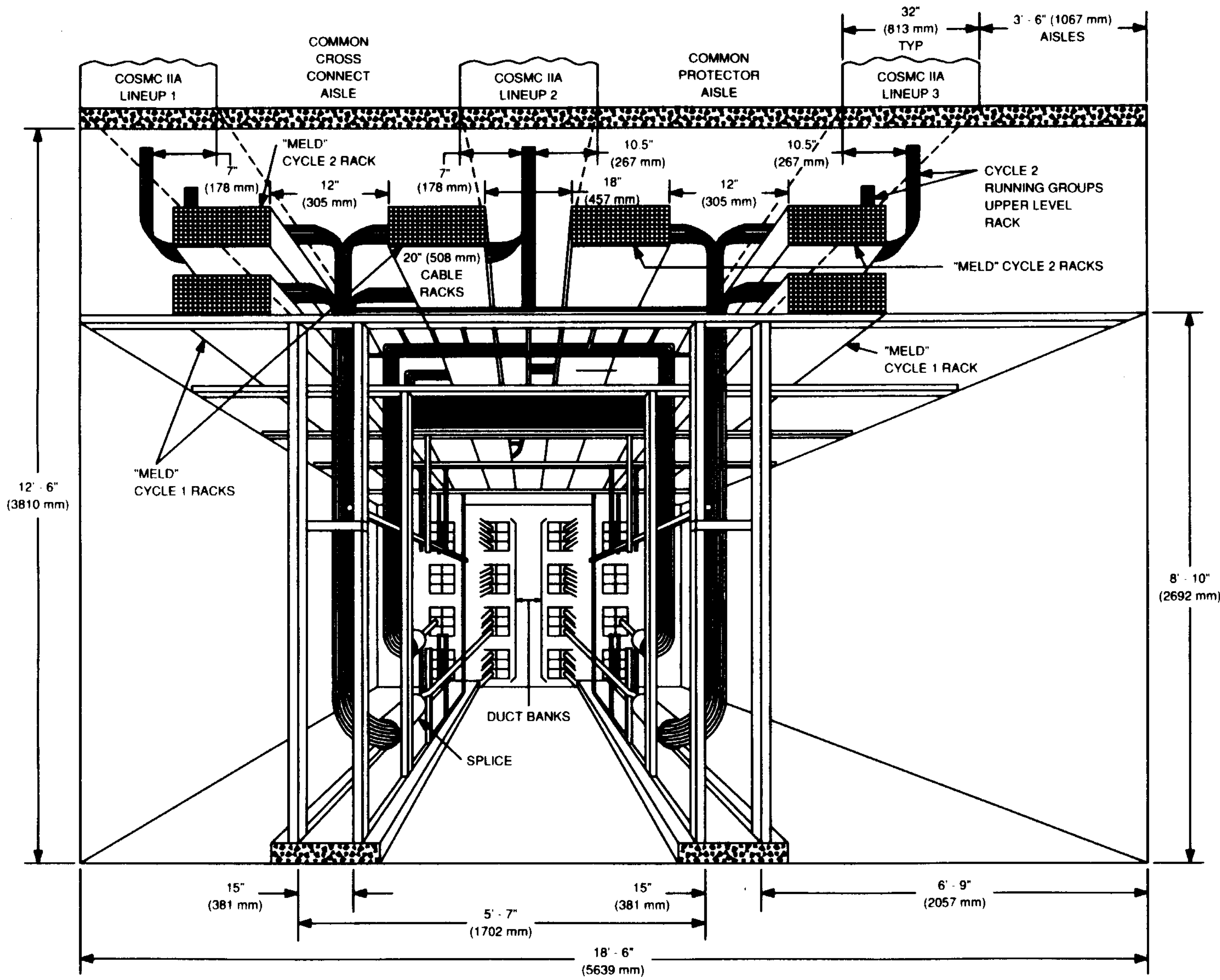


Figure 7-23. Typical Bottom Access Cabling to *COSMIC* IIA Frame

7.5.3 Cable Racking System Design

The modular nature of the *COSMIC* DF allows modular design of the cable rack arrangements. This results in consistent cable routing and measurement of tip cables terminating on framework lineups. *COSMIC* I DFs and *COSMIC* IA DFs involve only switchboard cable and therefore require relatively simple racking arrangements. *COSMIC* Mini DF applications tend to be smaller and therefore also require less effort in cable pathway design. However, the termination of tip cables on the rear of facility modules in *COSMIC* IIA DF applications requires very specific racking arrangments to support uniform spread and high cable loads. To understand these racking arrangments, it is important to define the terminology used to identify these racks.

7.5.3.1 Cable Rack Identification - In-line, lateral, and distribution racks are the three classifications of overhead cable racks associated with the outside plant and equipment cables that usually come in at opposites ends of the rack. To keep them separate and to help eliminate pileups, each has a different rack system for its specific application. The *COSMIC* IIA frame is depicted in Figure 7-24 and described as follows:

1. **OSP In-line Spreading Racks -** In a single lineup, an in-line spreading rack is used to distribute OSP cable groups from the splice location to the facility modules. For multiple lineup arrangements, there are two in-line spreading racks for each frame lineup. Cables transit from the lateral racks and run lengthwise along the frame on the in-line spreading rack until the cable group reaches the module for terminations. At that point, the cable group transits from the in-line spreading rack into the appropriate vertical cable channel.
2. **OSP Distribution Rack -** The OSP distribution rack is used with two or more lineups and is located directly over the first in-line spreading rack (that is, nearest to ACEF splice position). The distribution rack supports transition of tip cables from the ACEF to the OSP lateral racks.
3. **OSP Lateral Racks -** The OSP lateral racks are used with multiple lineup arrangments and are used to carry tip cables from the distribution rack to the in-line spreading racks. The OSP lateral racks run perpendicular to the frame and the in-line racks at the upper level. The number of tip cable lateral racks is equal to the number of facility modules in the longest lineup.
4. **Equipment In-line Spreading Racks -** The equipment switchboard cables are distributed from the switching equipment to the modules via the equipment spreading rack in a single lineup arrangement. In a multiple lineup arrangement, the equipment in-line spreading rack is located close to the equipment and is used to distribute cables to the cross-aisle lateral racks.
5. **Equipment Cross-aisle Lateral Racks -** The cross-aisle racks are used in multiple lineups with a double level equipment spreading rack. Lateral racks are numbered consecutively 1,2,3,4 etc.

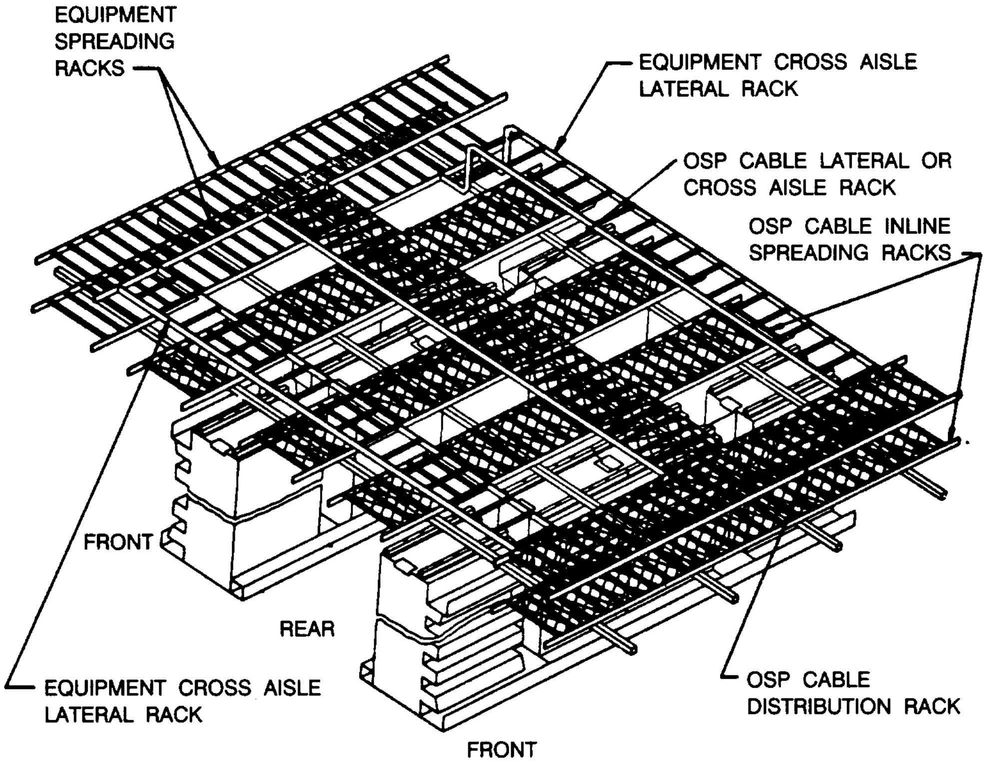


Figure 7-24. Typical Cable Rack Arrangement

7.5.3.2 Modular Racking and Lighting Arrangements - The termination of the tip cables on the rear of the facility modules requires specific racking arrangements to achieve a uniform tip cable spread to the 307-type connectors and to support the bulk and weight of the tip cables. Standard modular rack and lighting groups have been developed for all cabling conditions and frame lineup configurations (see ED 6C143-30) that are suitable for most applications. The overhead racking and lighting arrangements are frame supported and comply with Network Equipment Building Standards (NEBS).

Modular racking arrangements include all necessary hardware to erect a cable pathway system over the *COSMIC* frameworks. The structure has a foundation of auxiliary framing bars on 39-inch (991 mm) centers that cross the frame modules and bolt onto the framework. Fluorescent lighting fixtures are supported by and centered between the framing bars as shown in Figure 7-25. Standard ladder-type cable racks are installed over the lighting fixtures and parallel to the framework as illustrated in Figure 7-26. Usually a second level rack supports tip and equipment cables. Rack widths [15 inches (381 mm), 20 inches (508 mm), 25 inches (635 mm) and 30 inches (762 mm)] have been selected to optimize use of the available overhead cabling space. The 15-inch (381 mm) racks carry pre-spread equipment cables across aisles. Most other cabling requirements are satisfied with 20-inch (508 mm) or 25-inch (635 mm) racks. A 20-inch (508 mm) rack supports four tip cable groups (20 cables) per cable level.

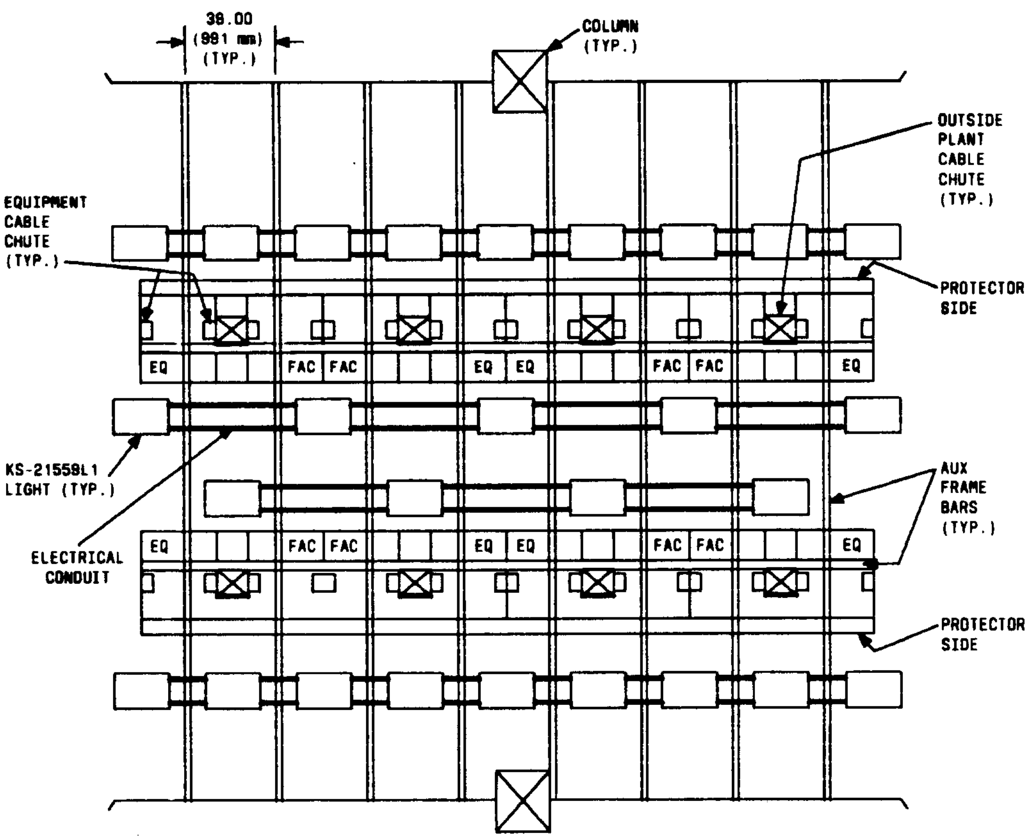


Figure 7-25. Typical Auxiliary Framing and Lighting

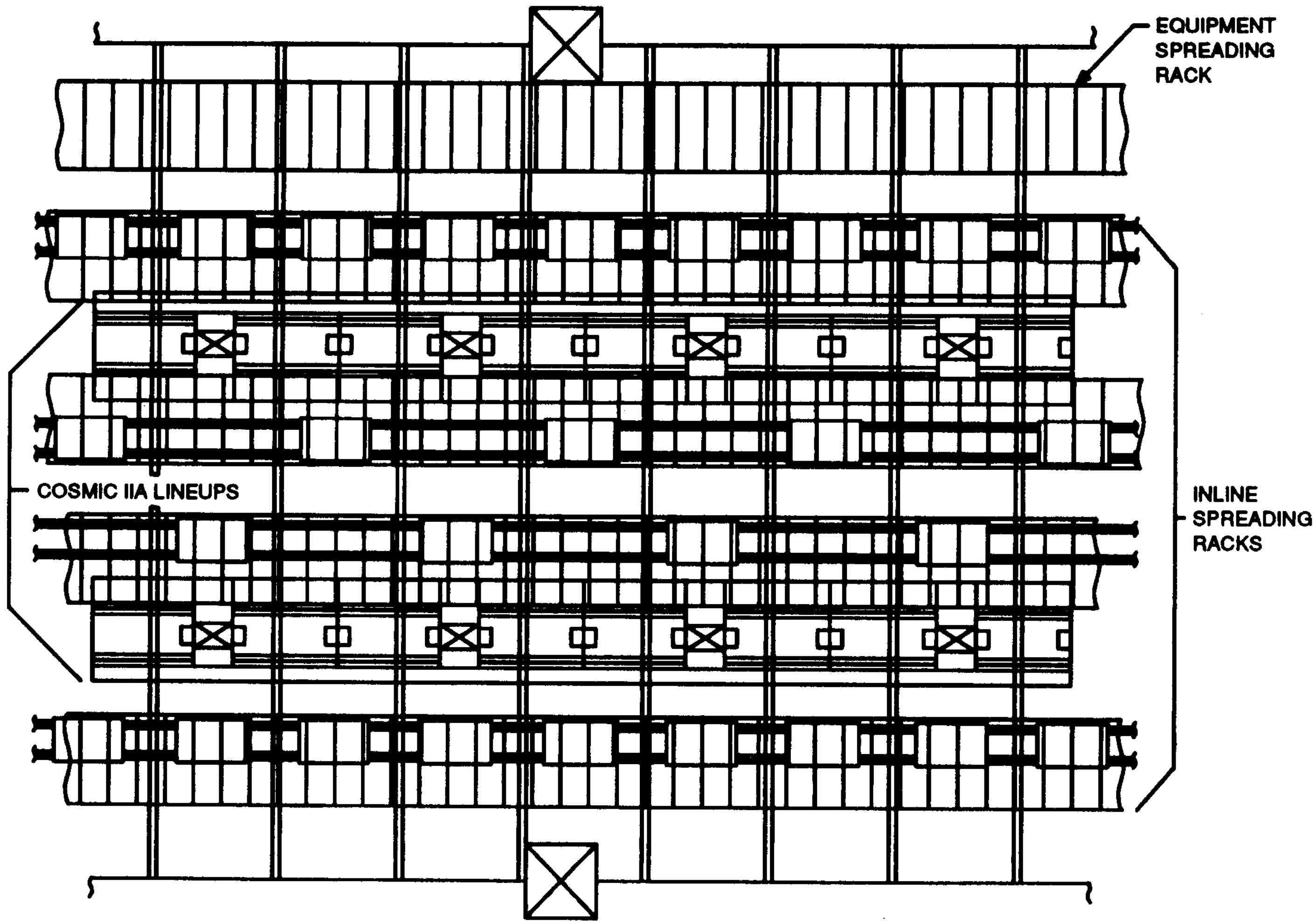


Figure 7-26. Typical First Level Racking Arrangments

7.5.3.3 Specification of the Racking Arrangement - Most *COSMIC* DFs can be engineered using the standard racking groups. Cable rack arrangements have been developed for overhead cabling of single, double, triple, and quadruple lineups. Lighting arrangements are specified in ED-6C118-30, by groups that correspond to a particular rack arrangement. Rack arrangements for single and double lineups are shown in the ED-6C143-30 series drawings and in Figures 7-27 and 7-28, respectively. Auxiliary framing for low level and high level supports must be engineered and ordered separately.

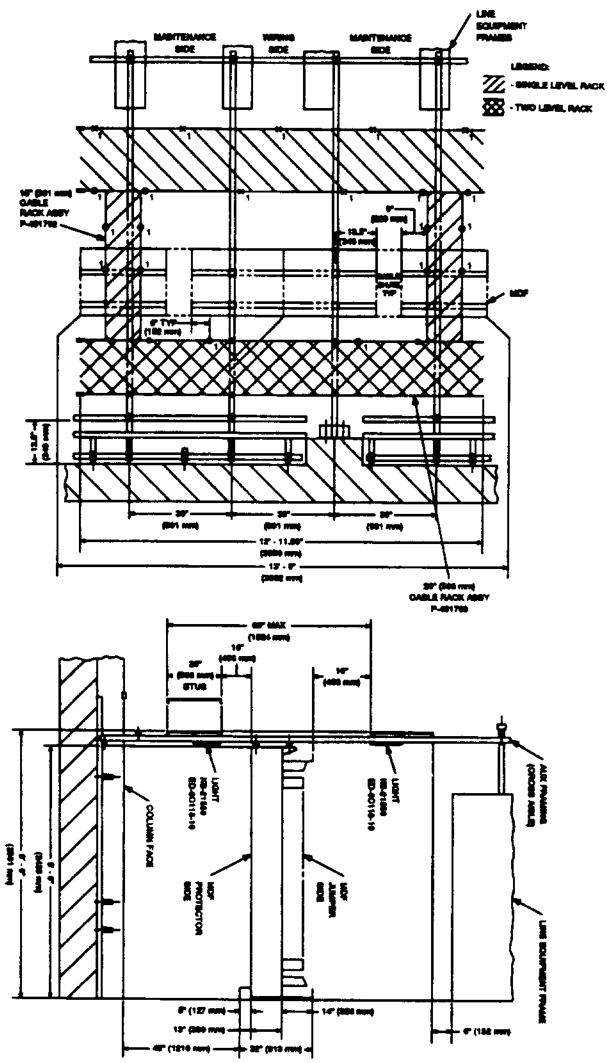


Figure 7-27. Typical Cable Rack Arrangement, Single Lineup

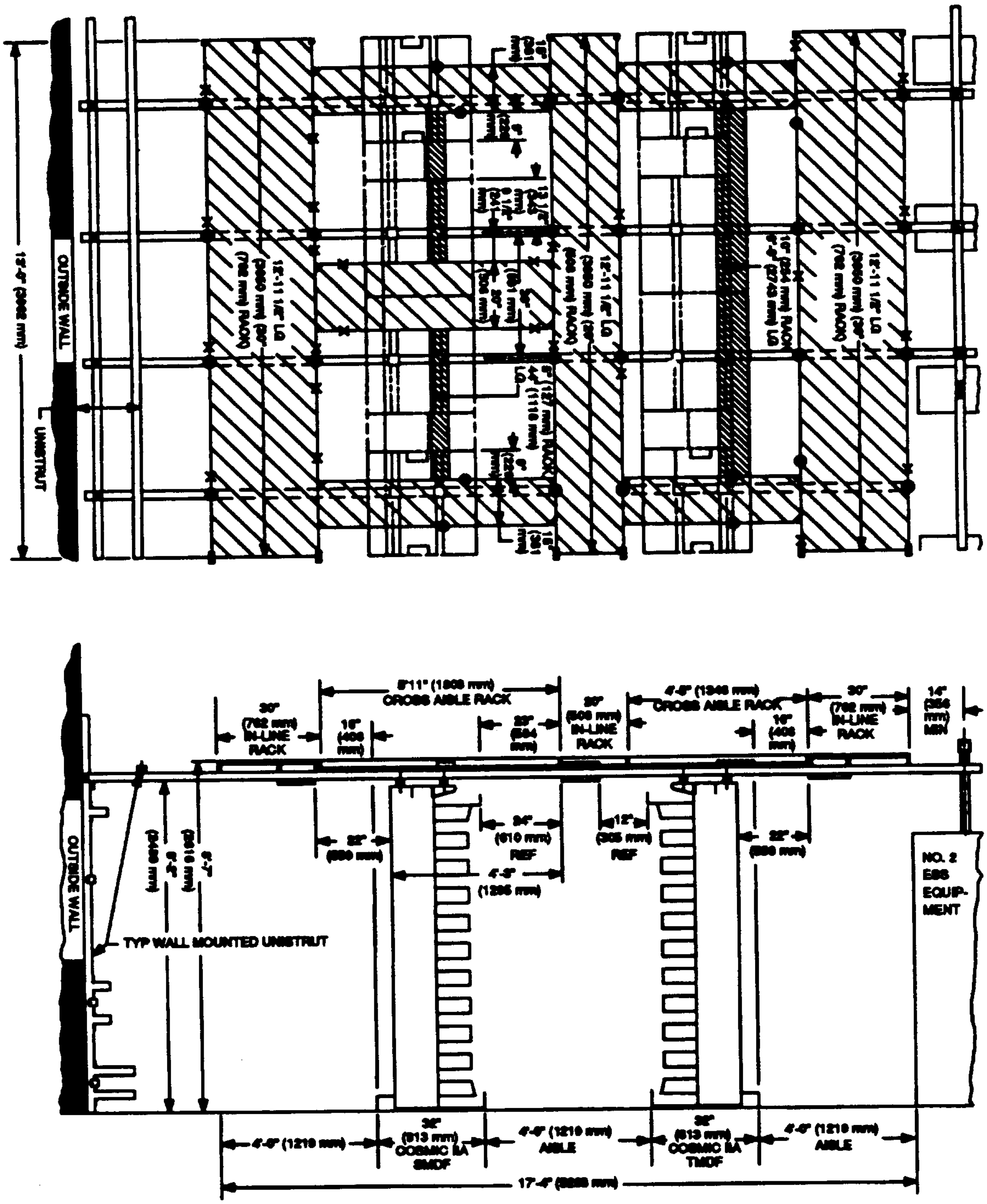


Figure 7-28. Typical Cable Rack Arrangement, Double Lineup

The rack arrangements differ depending on the configuration of the framework. The SMDF/TMDF configuration uses wider racks than the SMDF-only configuration, to provide increased capacity for facility and equipment cables as shown in Figure 7-29. A CMDF cable rack arrangement comprises two racks, facility and equipment, running parallel to the frame (See Figure 7-30). The relatively small size of the CMDF lineup allows for minimum racking to satisfy the cabling requirements.

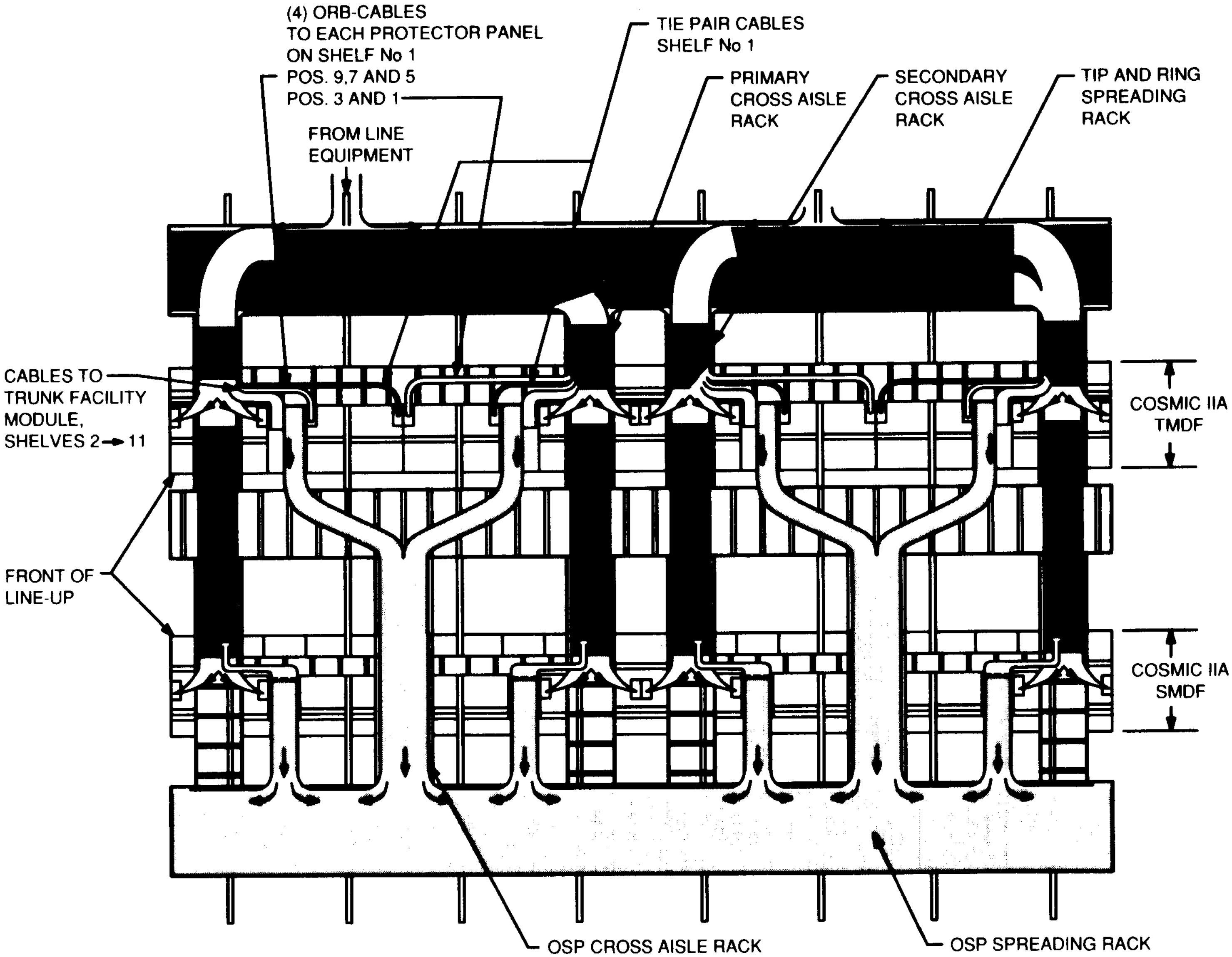


Figure 7-29. SMDF-TMDF Cable Rack Arrangement

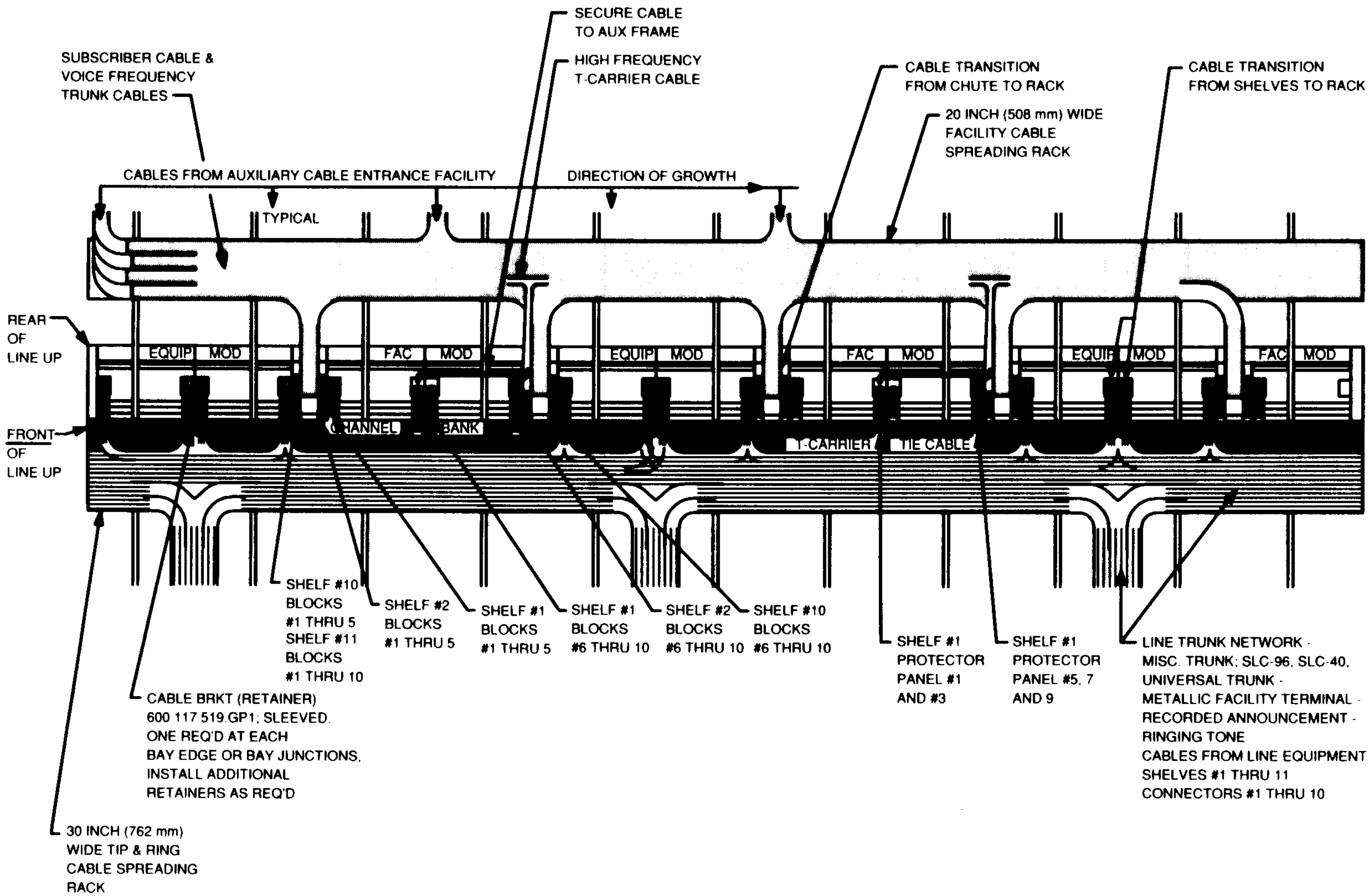


Figure 7-30. Typical CMDF Cable Rack Arrangement

Ordering information is given in the table 7-A below.

TABLE 7-A
***COSMIC* CABLE RACKING**
(*COSMIC* IA/IIA)

ORDERING INFORMATION ED & GROUP NO.	DESCRIPTION
ED-6C143-30, G1	Single lineup of cable rack materials for SMDF/TMDF and CMDF — provides one level of outside plant and equipment racks with associated mounting materials for a 13 ft. (3962 mm) framework arrangement in 1 lineup of 5 framework arrangements (20 bays) or less.
ED-6C143-30, G2	Single lineup of cable rack materials for SMDF/TMDF and CMDF — provides two levels of outside plant racks and one level of equipment racks with associated mounting materials for a 13 ft. (3962 mm) framework arrangement in 1 lineup of 6 framework arrangements (24 bays) or more. Maximum of 40 bays per lineup.
ED-6C143-30, G3	Single lineup of walk-thru cable rack materials — required in addition to Group 2. Extends cable rack between bays when walk-thru is provided.
ED-6C143-30, G4	Double lineup of cable rack materials — provides two levels of outside plant and equipment racks with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 2 lineups. Maximum of 40 bays per lineup.
ED-6C143-30, G5	Double lineup of walk-thru cable rack materials — required in addition to Group 4. Extends the cable rack between bays when walk-thru is provided.
ED-6C143-30, G6	Triple lineup of cable rack materials — provides two levels of outside plant and equipment racks with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 3 lineups. Maximum of 28 bays per lineup.
ED-6C143-30, G7	Triple lineup of walk-thru cable rack materials — required in addition to Group 6. Extends cable rack between bays when walk-thru is provided.
ED-6C143-30, G8	Quadruple lineup of cable rack materials — provides two levels of outside plant and equipment racks with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 4 lineups. Maximum of 20 bays per lineup.
ED-6C143-30, G9	Quadruple lineup of walk-thru cable rack materials — required in addition to Group 8. Extends cable rack between bays when walk-thru is provided.

TABLE 7-A
***COSMIC* CABLE RACKING**
(*COSMIC* IA/IIA) (Contd)

ORDERING INFORMATION / ED & GROUP NO.	DESCRIPTION
ED-6C143-30, G10	Triple lineup 32 bays or more per lineup of cable rack materials — provides two levels of outside plant racks and two levels of equipment racks (two 25 in. (635 mm) racks side-by-side on each level) with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 3 lineups. Maximum of 40 bays per lineup.
ED-6C143-30, G11	Triple lineup of walk-thru cable rack materials (32 bays or more) — required in addition to Group 10. Extends cable rack between bays when walk-thru is provided.
ED-6C143-30, G12	Quadruple lineup of 24 bays or more per lineup of cable rack materials — provides two levels of outside plant racks and two levels of equipment racks (two 25 in. (635 mm) racks side-by-side on each level) with associated mounting materials for each 13 ft. (3962 mm) framework arrangement in 4 lineups. Maximum 40 bays per lineup.
ED-6C143-30, G13	Quadruple lineup of walk-thru cable rack materials (24 bays or more) — required in addition to Group 12. Extends the cable rack between bays when walk-thru is provided.
ED-6C143-30, G14	Double lineup — unit 10 ft. 3 in. (3124 mm) cable rack materials — provides two levels of outside plant and equipment racks with associated mounting material for each 10 ft. 3 in. (3124 mm) framework arrangement in 2 lineups. Maximum of 10 framework arrangements per lineup (40 bays).
ED-6C143-30, G15	Triple lineup — unit 10 ft. 3 in. (3124 mm) cable rack materials — provides two levels of outside plant and equipment racks with associated mounting material for each 10 ft. 3 in. framework arrangement in 3 lineups.
ED-6C143-30, G16	Auxiliary framing stanchion support
ED-6C143-30, G17	Triple lineup SMDF, 40 bays per lineup (*COSMIC* II) less than 4 ft. (1219 mm) aisles.
ED-6C143-30, G18	Quadruple lineup SMDF, 40 bays per lineup (*COSMIC* II) less than 4 ft. (1219 mm) aisles.

7.5.4 Cable Routing and Measuring

Methods of routing both tip and equipment cables have been developed so that they are consistent with modular racking arrangements and ACEF design. These methods ensure a logical consistent installation of all cables throughout the life of the frame, and they minimize cable pileup and rack congestion.

AT&T's Regional Engineering centers have a series of programs that assist the engineer in specifying cables. The cable processing system includes complete cable running lists and cable tags to provide unique identification for each cable. The Cable Routing and Measurement System (CRMS) is a module of RCPS that is used to determine the route that each cable will take through the cable pathway system. CRMS automatically calculates the length of each cable. Thus, standard procedures are used to optimize the cable layout in the racks, and minimize excess cable with associated installation costs.

CRMS works for SMDFs, TMDFs, and CMDFs using standard *COSMIC* DF racking arrangements. For non-standard arrangements, the routing and measuring functions must be completed by manual engineering techniques.

7.5.5 Cable Installation Methods

In order to provide a complete cable engineering specification, it is important to understand the pertinent aspects of cable installation.

7.5.5.1 Tip Cable Methods - Placing tip cable in *COSMIC* IIA frame modules requires careful planning and engineering. The appropriate cabling plan must be specified by the engineer to insure a proper installation. Engineering must provide the job record drawing showing placement of cables on the frame. Engineering must also provide the cable running list and cable tags containing complete cable identification, length, and routing information. An example of typical cable distribution is shown in Figure 7-31.

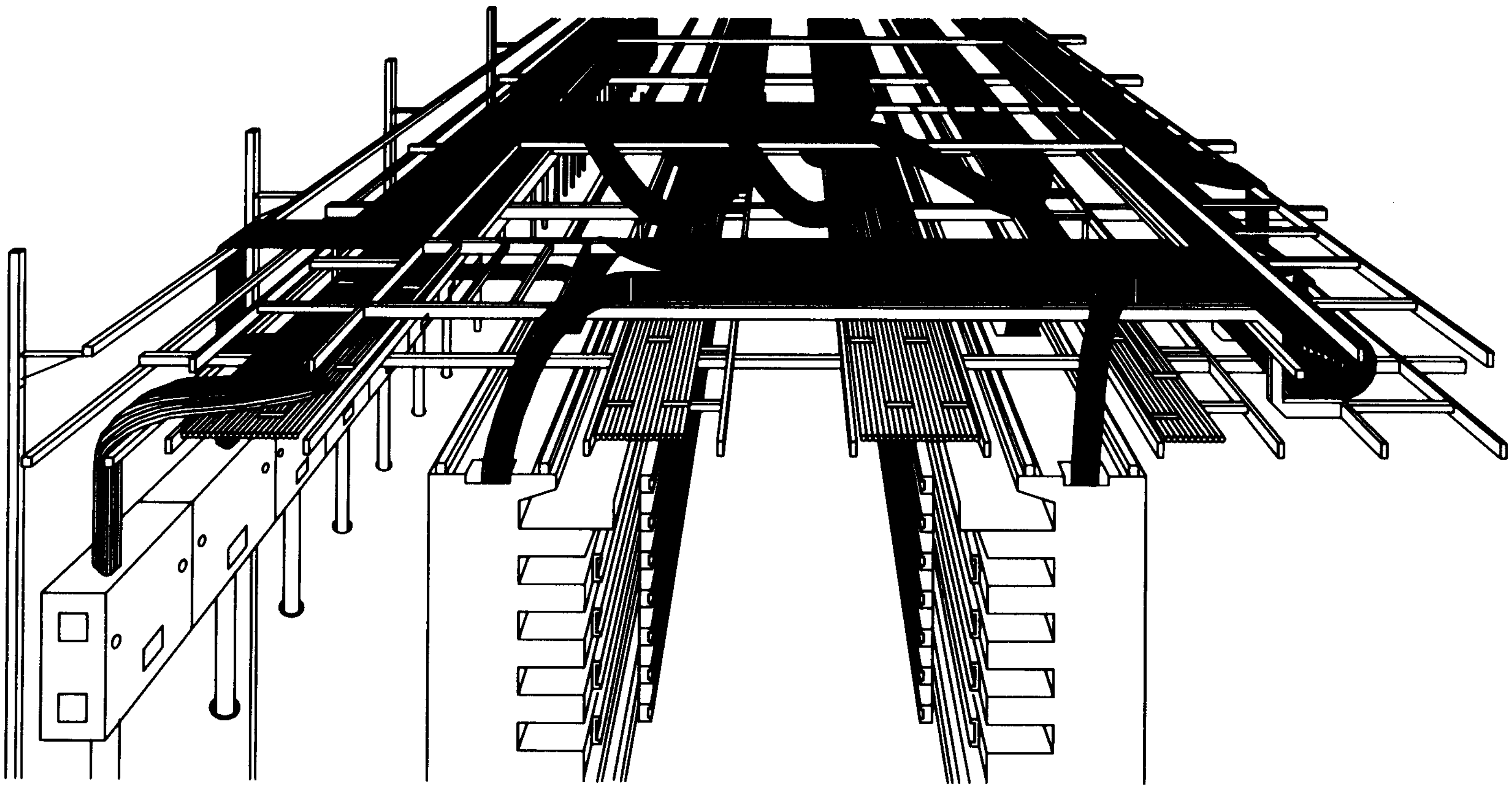


Figure 7-31. Typical Cable Distribution

AT&T strongly recommends that the tip cable engineering be completed at the AT&T regional engineering center to ensure proper methods are used. This ensures that tip cables are precisely spread, routed, and measured, and that all labels, tags, directories, and records (including splice locations and frame locations of all OSP pairs) are generated or updated. Engineering should take care to interface with other organizations involved with the installation. Often the OSP cable splicing organization will be responsible for OSP cable and riser cable splicing. In choosing to run the tip cables, the frame user should select an installer who will adhere to the standard drawings and methods and coordinate their efforts with the frame planners and engineers. Additional detailed information on the method of cabling and installation is available in Section 8 and in ED-6C143-30.

7.5.5.2 **Equipment Cable Methods** - Equipment cables are routed from the switch to the equipment modules. After the routing paths have been established, the transitions into the equipment modules are established. Figure 7-32 illustrates the typical dress into the bays, depending on the direction of cable feed, to prevent blocking the cable holes. Cable shelves 5 to 1 on one side and 6 to 11 on the other.

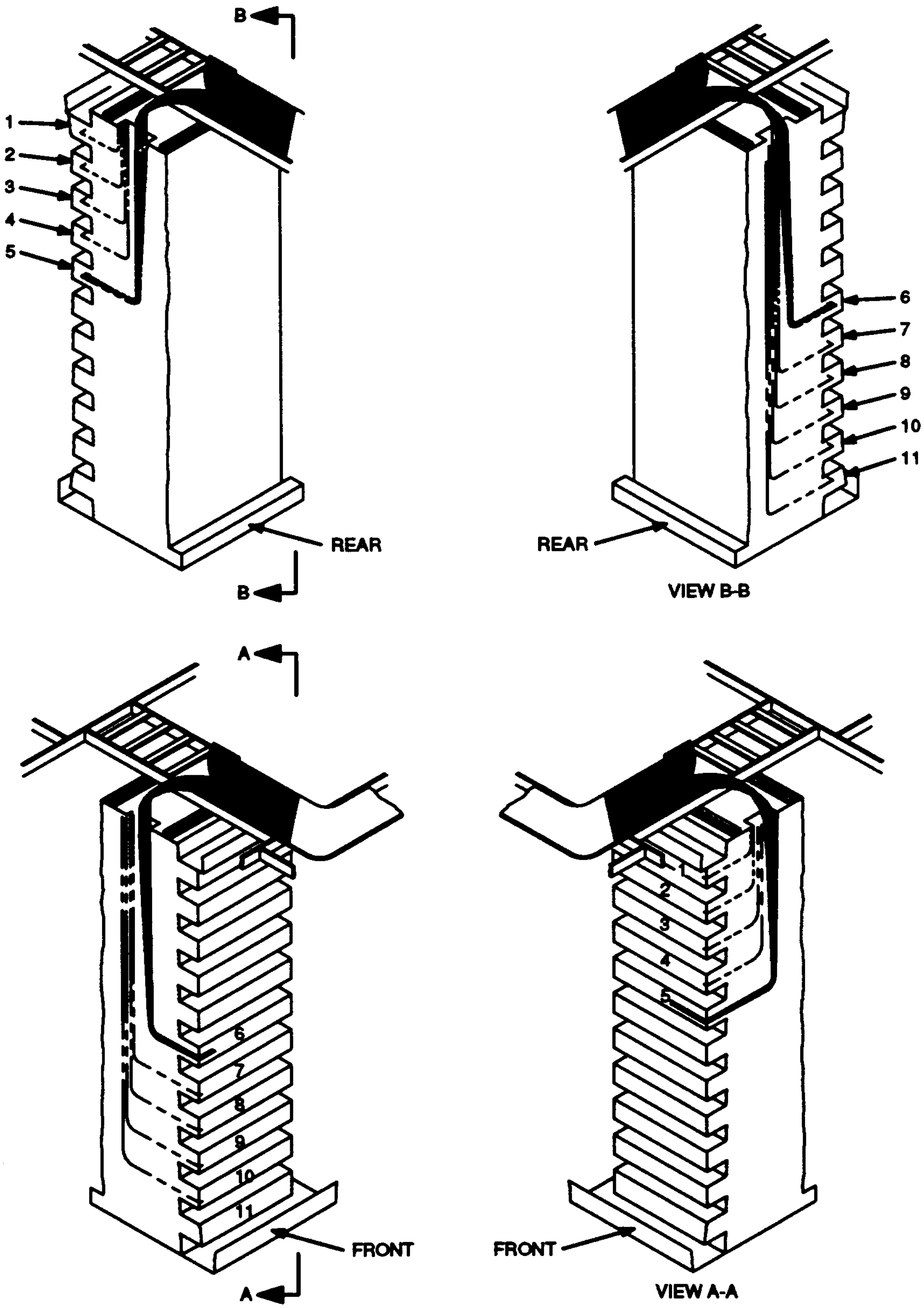


Figure 7-32. Equipment Cable Transition in Modules

7.6 Engineering of Associated Equipment

7.6.1 Grounding

Frame grounding is necessary to protect the personnel that work on the frame from harmful voltages and currents caused by lighting, or AC power induction in outside plant cables. The equipment that is wired to the frame is also protected. The *COSMIC* frame is equipped with a ground bar furnished as part of the framework for the primary purpose of providing a direct path to ground. This ground bar is located at the top of the frame and functions as a protector ground (*COSMIC* IIA or *COSMIC* Mini) and as a framework ground.

An in-line ground conductor should run the length of the lineup and is usually mounted on the top of the framework. The conductor serves principally to interconnect a ground path for each bay as shown in Figure 7-33. A ground point is established by crimping a parallel tap connector to the in-line ground conductor bus on the top of the frame. When applicable, run a conductor as short as practical to the Central Office ground (CO GRD), cable vault or protector frame, and the ground window of the switch (it is recommended that the distributing frame not be part of the switch isolated ground plane).

The ground conductor that is usually used in this arrangement, unless otherwise specified, is a power wire, KS5482, List 28 (Comcode 901174961). This is a 1/0 AWG (8.3 mm) diameter, fire retardant stranded copper cable with a textile insulation. It is rated "CMR" by Underwriters Laboratories. Additional details and material ordering information for grounding a *COSMIC* Frame may be found in ED-6C145-30.

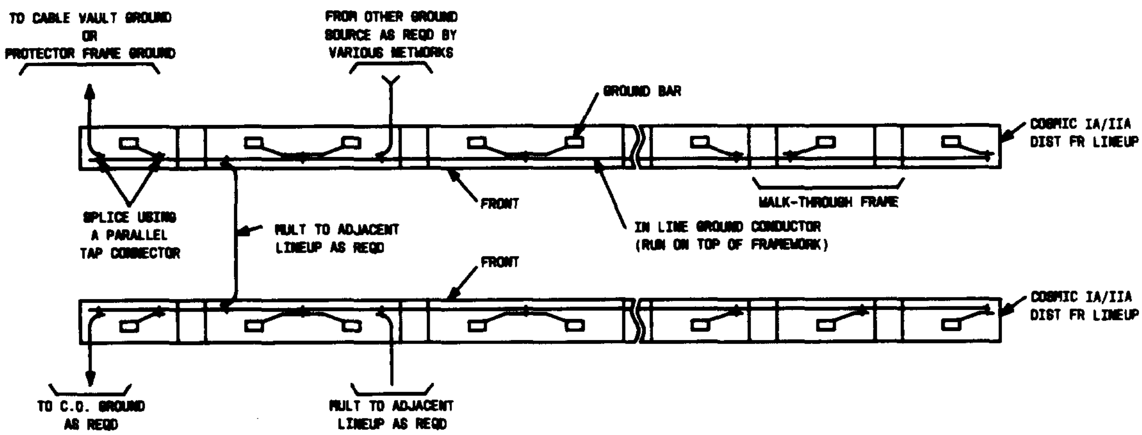


Figure 7-33. Termination of Cable Ground Bar

7.6.2 Lighting

Standard lighting groups have been designed for the *COSMIC* DF to correspond with the modular cable rack arrangements. A standard light fixture is part of the system. The light fixture houses a single 40-watt U-shaped fluorescent lamp. The fixture opening is provided with a hinged louver assembly to improve light distribution on equipment surfaces and to minimize glare. It is available in either 120 V or 270 V power requirements. Some typical lighting arrangements are shown in Figure 7-25 (these lineups are shown without the overhead lateral racks so that the lighting fixtures can be seen). The lighting should be adequate for any work that would be necessary on the frame. Additional details for lighting layout and material ordering may be found in ED-6C145-30.

7.6.3 AC Power

Convenient appliance outlets can be placed throughout the distributing frame area to make 120 V single phase grounded AC service available to operate cord connected appliances. The outlets are located in the rear base trim panel at each vertical cable chute. One vertical outlet channel assembly should be ordered for each outlet desired. The blank outlet cover and bracket furnished with the framework will have to be removed when installing an outlet. AC outlets are an optional feature that should be spaced at the proper intervals to assure a safe working environment for any test equipment or apparatus requiring AC power.

The AC circuits are extended to the distributing frame area by means of a metallic conduit that is run inside the base trim panel along the length of the framework. The conduit and wiring, and outlets must be engineered and installed in compliance with the National Electrical Code and local ordinances. Figure 7-34 shows a typical arrangement for the AC pathway used for appliance outlets and test set power. Additional details and material ordering specifications may be found in ED-6C145-30.

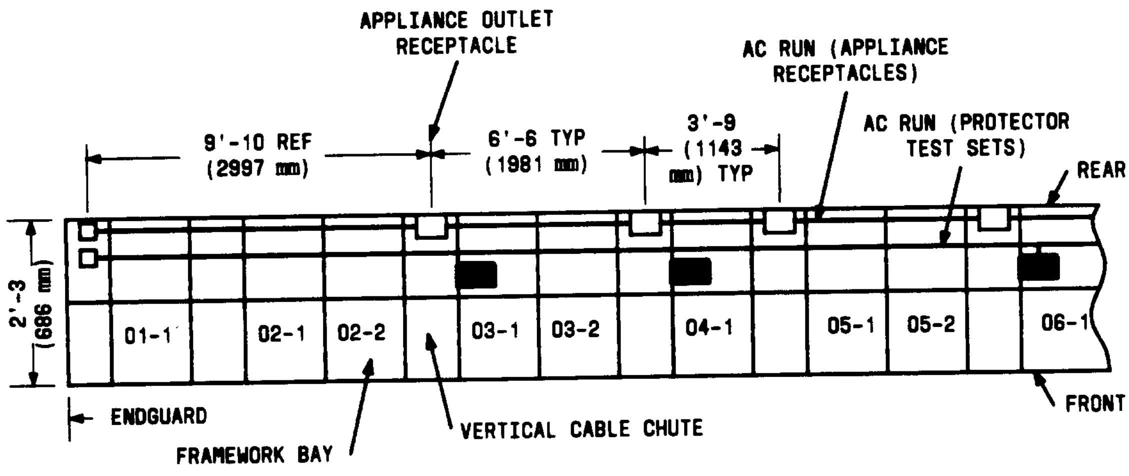


Figure 7-34. Appliance Outlets

7.6.4 Test/Talk System

Because of the Distributing Frame's role as the interface between outside plant cable pairs and central office equipment, it is a convenient test location and a center of maintenance activity. The *COSMIC* DF Systems support a wide variety of test and talk systems that are used in this activity. These systems provide two essential functions:

— Communication between people located at the DF and elsewhere, such as the Maintenance Center.

— Access for test systems such as AT&T's Mechanized Loop Testing (MLT) System to individual circuits (outside plant cable pairs and/or switching equipment) that are terminated at the DF.

Because of the variety of test and talk circuits that can be wired to the DF, and the interdependency of these systems on test systems and procedures used by the telephone company, test/talk arrangements vary widely from office to office. The *COSMIC Distributing Frame Systems Hardware Ordering Questionnaire,* Form E-8203, can be used by the telephone company to specify to AT&T Regional Engineering which test and talk circuits and test cords are to be provided.

Test/Talk circuits fall into two broad categories:

- Talk Circuits, which provide for communication between crafts people located in different areas of the central office, or between the frame area and a remote test desk.
- Test Circuits, which allow test equipment at the Repair Service Bureau or Local Test Desk to gain access to circuits terminated or cross-connected on the MDF.

Description of the various circuits and engineering recommendations are contained in Appendix 7-D.

APPENDIX 7-A

Meld Engineering Summary Questionnaire

MELD

MECHANIZED ENGINEERING AND LAYOUT FOR DISTRIBUTING FRAMES

E-8196A

ENGINEERING
SUMMARY
QUESTIONNAIRE

FOR MELD LAYOUT

OR

PACE-TO-MELD CONVERSION

OF COSMIC® - TYPE

DISTRIBUTING FRAMES

DECEMBER 7, 1990

AT&T

E-8196A AT&T
Issue Date: 12/7/90
Sheet 1

MECHANIZED ENGINEERING AND LAYOUT FOR DISTRIBUTING FRAMES
(MELD)
Engineering Summary Questionnaire

Contents

Part

General Data

Framework Data

Outside Plant Facilities Data

Tie Pairs Data

Line Equipment Data

* Trademark of Northern Telecom, Ltd.
\+ Trademark of Ericsson
** Trademark of Plessey
\++ Trademark of Siemens
*** Trademark of Nippon Electric Company

Part

Reserved Space Data

About This Questionnaire

a. Completed forms from this E8196A questionnaire provide AT&T-NS Region Engineers with the principal information needed to layout initial (new) COSMIC-type SMDF installations and subsequent additions using the MELD engineering system.

b. This questionnaire may also be used to provide selected data (not maintained by PACE) for converting existing PACE-engineered office history to MELD engineering history. Following conversion, MELD can be used for future engineering updates - including 5 ESS and DMS-100 switch line equipment. (The E8113 questionnaire series should be used for existing PACE-engineered frames that are to be updated with PACE.)

c. Completed forms are to be forwarded to the appropriate AT&T-NS Regional Engineering Center along with additional ordering information if any. The responsible AT&T-NS Systems Equipment Engineer will contact the ordering engineer directly for additional information if necessary.

d. This questionnaire is maintained by the AT&T-NS MELD Software Engineering organization in the Operation Systems Technical Center (OSTC) located at Liberty Corner, Warren, NJ.

e. Additional Copies may be obtained from:

AT&T Network Systems
Customer Information Center
P. O. Box 19901
Indianapolis, Indiana 46219
1-800-432-6600

f. Suggestions for improvement of this questionnaire should be forwarded to:

AT&T Network Systems
Operations Systems Technical Center
Department NFLC246690
184 Liberty Corner Road
P.O. Box 4908
Warren, N.J. 07059-0908

Instructions

This questionnaire is intended to be reasonably self-explanatory to Central Office Equipment Engineers familiar with COSMIC-type frame systems. Instructions that follow cover selected form entry items; a reference glossary of special terms and abbreviations used on all forms follows. The forms provided here are <u>not</u> used for direct computer input; thus preparers can freely add additional notes and attachments as desired for clarity and completeness. If preparers encounter any special problems, the responsible AT&T-NS Systems Equipment Engineering organization should be contacted for assistance.

Questionnaire Use For Regular MELD Engineering

Use only the parts needed for a particular order, including additional copies when necessary. For update orders that include modifications (e.g. additions, removals, or identification changes), use applicable form entry fields and special instructions lines provided at the bottom of each form. Right-justify all entries to avoid possible misinterpretation of trailing (on the right) blanks. Note that all frames and terminations identified must be unique.

For specific details about the many different kinds of apparatus available, refer to the AT&T Distributing Frame Systems Products Manual (DFSPM) - Document Number 201-200-050.

Questionnaire Use For PACE-To-MELD Conversion

Use parts 1A, 2A, and 2B (and 3B for COSMIC-[II] type DFs) for office frames in their <u>current PACE-engineered</u> configuration. If regular MELD update engineering is to be done following conversion, provide a separate copy of this questionnaire for the update work.

1. General Data

Enter applicable data on Part 1A. The OTC Engineer identified in the Order Data section will be the contact for AT&T-NS Region Engineering follow-up information. In the synopsis section, check one of four order types given, applicable engineering data items being affected (for initial or update orders), and desired output options - 1600 bpi; COSMOS tape density is most common, but some COSMOS sites still use 800 bpi; only changed frame labels are normally provided, but all new labels can be requested if needed. Note that Regeneration Orders are used to obtain additional outputs only (i.e. include no engineering work); thus, only Part 1A is needed for a Regeneration order.

2. Framework Data

These data cover raw framework (less terminations) configuration and identification information for new or modified frameworks; they need not be supplied for routine additions to existing frameworks previously engineered with MELD. Use Part 2A for COSMIC-type SMDFs and TPDF, and Part 2B for Modular PF (if any) and Other-Frames (i.e., conventional PFs or DFs) that are 'tied' with tie pairs to the COSMIC-type SMDF. Refer to Glossary for special terms; especially 'Frame Complex' and 'Frame Lineup'.

3. Outside Plant Facilities Data

These data cover Loop Cable (LC) and Loop Carrier (LX - pair gain system derived pairs) termination information. For optimum cabling arrangements, use of the optional shelf sequence override is not recommended. Leading zeros in Cable IDs will be regarded as significant; for example, cables 004, 04 and 4 would be regarded as three different cables. use Part 3A for COSMIC [I]-type SMDFs with integrated protection.

The Precable Data section in Part 3A may be used to request a quantity of unshielded 26-gauge PF-to-DF tie cables to be laid out and installed in addition to tie cables for LC and LX cables entered in the Cable Data section below. If requested, the intended use/allocation of the precable ties must be differentiated as LC or LX. Use Special Instructions if any shielded PF-to-DF tie cables are wanted for either precable or named cable entries.

For the Cable ID section in Part 3B (COSMIC II-type SMDF), be sure to enter cables in the order that they will be arranged along the ACEF. This order will often be different from the sorted low-to-high order of the cable IDs!

For COSMIC [II] Mini-type SMDFs use Part 3C. This section has combined sections from Part 3A and Part 3B to meet the diverse uses of the COSMIC [II] Mini-type SMDFs.

4. Tie Pair Data

Use Part 4A for ties joining the COSMIC-type SMDF and TPDF, and Part 4B for ties joining the SMDF and 'Other' frames. For apparatus entries, see Glossary; note that 128-pair blocks are not recommended on COSMIC framework ED6C001-30G03. The SMDF Spread Mode is the same on both forms: Even-numbered Modules (0,2,4...) are customarily Facility modules on COSMIC [I]-type frames and Equipment modules on COSMIC [II]-type frames. Conversely, Odd-Numbered modules are Equipment and Facility modules respectively on COSMIC [I]- and [II]-type frames. Tie pairs are typically placed on Equipment modules of all COSMIC-type frames.

For Cable Data sections, cable size stipulates one of four possible unshielded cable sizes: 50, 64, 100, or 128 pairs. Within the specified apparatus series given at the top of the form, MELD will use a block size exactly equal to the specified cable size for shelves 2-10. On half-shelves 1 and 11, MELD will use two adjacent 50-pair or 64-pair blocks for 100-pair and 128-pair cables respectively. If shielded cable and/or block capacities larger than the designated cable size are wanted (e.g. 50-pair cable on 100-pair blocks, or 100-pair cable on 128-pair blocks), explain in the Special Instructions section at the form bottom.

'From' SMDF Frame Lineup CLLI must be entered (MELD does not automatically layout ties over all SMDF lineups). Automatic Cable ID override may be used to specify desired cable and pair IDs. MELD's automatic ID convention is of the form: xxyyz where xx is the SMDF frame lineup CLLI (less the F), yy is the TPDF lineup CLLI (less the F), and z ranges over: [0-9 and A-Z less I and O] as needed.

5. Line Equipment Data

Use Part 5A for 5 ESS switching systems, Part 5B for ESS Nos. 1/1A and 2/2B systems, Part 5C for Crossbar Nos. 5 and 1 systems, Part 5D for Step-By-Step systems, Part 5E for DMS-100 systems, Part 5F for AXE-10 systems, Part 5G for SYSTEM-X systems, Part 5H for EWSD systems, Part 5I for NEAX61E (International) systems and Part 5J for NEAX61E (Domestic) systems.

In all cases, note that hi-density 128-pair blocks are not recommended for use on COSMIC framework ED6C001-30G03 and ED6C001-30G05 because of potential for excessive jumper pileup.

For 5 ESS, if complete Switching Module and Line Unit identification is not known, enter total quantity of Line Units. For regular Line Units, J-code 'AB' designates original J5D004AB design, type 'AC' designates J5D004AC design and type 'AD' designates newer J5D004AD design. For ISDN Line Units, 'AK' designates J-code J5D004AK, the only code currently available. Note that with the 2W cabling option, only 2W Line Cards may be used; whereas with the 4W cabling option, either 2W or 4W Line Cards may be used.

For No. 1/1A ESS and No. 2/2B ESS Line Equipment (Part 5B), enter applicable equipment identifiers and concentration ratios (see Glossary). Type 'F' designates original ferreed networks, whereas type 'R' designates newer remreed networks. If special concentrator features are used (i.e., CREGs), identify applicable concentrators in the special instructions section at the form bottom.

For No. 5 and No. 1 Crossbar Line Equipment (Part 5C), enter applicable equipment identifiers. If special features are used (i.e., essential-service or touch-tone) identify applicable vertical groups in the special instructions section at the bottom of form. The same instructions apply to the Line Link Column (LLC) for special features.

For Step-By-Step Line Equipment (Part 5D), enter applicable equipment identifiers.

For DMS-100 (Part 5E), type 'LME' designates original version with Line Drawers, whereas the 'LCE' designates newer version with Line Sub Groups. Types 'LCEI' and 'LCME' both designate Line Sub Groups with ISDN. If partial LME/LCE/LCEI/LCME is to be laid out, enter applicable BAY/LCM/LCMI and low-high LD/LSG identifiers.

For AXE-10 Line Equipment (Part 5F), enter applicable equipment identifiers.

For SYSTEM-X Line Equipment (Part 5G), enter applicable equipment identifiers.

For EWSD Line Equipment (Part 5H), enter applicable equipment identifiers.

For NEAX61E (International) Line Equipment (Part 5I), enter applicable equipment identifiers.

For NEAX61E (Domestic) Line Equipment (Part 5J), enter applicable equipment identifiers.

6. Reserved Space Data

Use Part 6A to reserve space for test/talk and jack panels, and Part 6B for miscellaneous terminations. In both cases note that comment text will appear on applicable COSMIC-type framework job T-drawings, but will not appear on directories, labels, or the COSMOS Tape.

Test/Talk & Jack Panels are the size of small 64-pair line equipment blocks (16/shelf) and thus may be placed in any of small block locations 1-8 on a left half-module (side-1), or small block locations 9-16 on a right half-module (side-2). Panel description comment examples for the two panels now in use are:

ED-6C110-10	and	ED-6C110-10
G28		G23
KS-21316-L8		KS-21316-L3
XMTR PANEL		COMM PANEL

Space reservation for miscellaneous terminations (Part 6B) may be made for any of three block sizes whose standard location ranges are given at the bottom of the form. Note that comment text lines for small (64-pair LE) blocks are limited to 13 characters each, whereas comment lines for Hi-Six (12/shelf) and all other blocks (10/shelf) may be up to 18 characters long.

Multiple space reservations at regular intervals with the same comment text can be specified within one entry by indicating a series or range of applicable frame location parameters (e.g., Modules: 2,4,6,8,10,14; or block locations 6-10). For irregular or otherwise ambiguous cases, use a separate entry for each block location to be reserved.

Glossary	
A	Designates a specific side of a DSPF (cf. "B")
AB	Designates 5ESS J-Code J5D004AB - regular Line Units
AC	Designates 5ESS J-Code J4D004AC - regular Line Units
ACEF	Auxiliary Cable Entrance Facility - Location of COSMIC[III]-type loop cable splice cases
AK	Designates 5ESS J-Code J5D004AK - ISDN Line Units
AT&T-NS	AT&T Network Systems
AXE-10	Ericsson Digital Switch
B	Designates a specific side of a DSPF (cf. "A")
BPI	Bits per inch (computer magnetic tape density)
C	BSCL Control Group designator for No. 1/1A ESS
CEF	Cable Entrance Facility - Location of COSMIC[III]-type loop cable splice cases
CG	Concentrator Group, No. 2/2B ESS
CIC	AT&T-T Customer Information Center
CIRCUIT	Circuit, NEAX61E (International)
CLLI	Common Language Location Identification - of the form "Fxx" for each DF and PF frame lineup
CONC	Concentrator, highest level equipment on SYSTEM-X (not to be confused with CONC for Nos 1/1A, 2/2B ESS)
COSMIC®	Common Systems Main Interconnecting Frame
COSMIC-type	Generic term for COSMIC frame system product line
- COSMIC	ED-6C001-30, 18"-deep framework (6'6" ordering groups without protected connector mounting provisions)
- COSMIC IA	ED-6C141-30, 27"-deep framework (6'6" ordering groups without protected connector mounting provisions)
- COSMIC II	ED-6C113-30, 32"-deep framework (being replaced by IA and IIA ordering groups)
- COSMIC IIA	ED-6C141-30, 27"-deep framework (13' ordering groups with protected connector mounting provisions)
- COSMIC II Mini	ED-6C311-30, 14 3/4"-deep framework (14" ordering groups with or without protected connector mounting provisions)
COSMIC[I]-type	Combining term for COSMIC or COSMIC IA

Glossary

COSMIC[II]-type	Combining term for COSMIC II or COSMIC IIA
COSMOS	Computer System for Mainframe Operations
CR	Concentration Ratio for No. 2/2B ESS (2:1 or 4:1)
CREG	Concentrated Range Extender with Gain (Nos 1/1A,2/2B ESS)
D	Common Language Digital entity designator for 5ESS
DF	Distributing Frame; has cross-connect provisions (cf. "PF")
DLU	Digital Line Unit, EWSD
DSPF	Double Sided Protector Frame
EMG	Equipment Module Group, AXE-10
EN	Equipment Number, SYSTEM-X
EWSD	Electronische Wahler System Digital, Siemens Switch
EWSD MOD	EWSD Module
EWSD SHELF	EWSD Shelf
F	Designates Ferreed network type for No. 1/1A or 2/2B ESS (cf. "R")
Frame Complex	Common group of one or more PF or DF frame lineups engineered and administered as one system; identified by name and number (e.g. SMDF-0102)
Frame Lineup	A contiguous physical assembly of PF or DF framework units (verticals or modules) uniquely designated with a BSCL CLLI (e.g. F04); is always a member of a frame complex
H	Designates Horizontal side of conventional DFs (cf. "V")
HW	Highway, NEAX61E (Domestic)
Hi-Den-112	COSMIC-type Framework apparatus with 128-pair capacity (10/shelf)
Hi-Six-112	High density COSMIC apparatus with 100-pair capacity; may be used for tie pairs and loop facilities (12/shelf, 6/half-mod shelf)
Hi-Six-200	Newest high density COSMIC apparatus with 200-pair capacity; may be used for tie pairs (12/shelf, 6/half-mod shelf)
IDF	Intermediate Distributing Frame
ISDN	Integrated Services Digital Network
ISLU	Integrated Services Line Unit, 5ESS Equipment

Glossary

LC	Loop Cable; Subscriber/Distribution Outside Plant Cable
LCE	Line Concentrating Equipment, DMS-100 (has LDs)
LCEI	Line Concentrating Equipment ISDN, DMS-100
LCM	Line Concentrating Module, DMS-100
LCME	ISDN Enhanced Line Concentrating Module, DMS-100
LCMI	Line Concentrating Module ISDN, DMS-100
LCR	Line Concentration Ratio for No. 1/1A ESS (2:1 or 4:1)
LD	Line Drawers, Used in DMS-100 LMEs (cf. "LSG")
LE	Line Equipment, generic term for
LFG	Line Finder Group
LIC	Line Interface Circuit, AXE-10
LLC	Line Link Column, No. 1 Xbar equipment
LLF	Line Link Frame, No. 5 Xbar equipment
LJR	Line Junctor Ratio for No. 1/1A ESS (with 2:1 LCR - 2:1, 5:2, 3:1, 7:2, 4:1), with 4:1 LCR - 4:1, 5:1, 6:1, 7:1, 8:1)
LLN	Line Link Network, No. 1/1A ESS equipment
LM	Line Module, NEAX61E (International)
LME	Line Module Equipment, DMS-100 (has LSGs)
LNI	Line Network Interface, point of 5 ESS protection
LOC	Location
LSC	Line Switch Circuit, No. 1/1A ESS (Remreed)
LSF	Line Switch Frames No. 1/1A ESS (Ferreed)
LSG	Line Sub Group, used in DMS-100 LCEs (cf LD)
LSM	Line Switch Module, AXE-10
LTF	Line Trunk Frame, NEAX61E (International)
LTN	Line Trunk Network, No. 2/2B ESS equipment
LU	Line Unit (regular), 5ESS equipment
LX	Loop Carrier derived cable pairs, generic term for
MELD	Mechanized Engineering and Layout for Distributing Frames

Glossary

MOD	COSMIC Framework Module; a basic bay-like unit of COSMIC Frame engineering and administration installed as continuous horizontal shelves for mounting apparatus, bounded on both ends by vertical troughs.
MOD	Module, EWSD
N	BSCL switch entity designation for DMS-100
NEAX61E	Digital Switch, Nippon Electric Company
NNX	Number Number Digit, Step-By-Step equipment
OTC	Operating Telephone Company
PACE	Program for Arrangement of Cables and Equipment
PCM	Pulse Code Modulator, NEAX61E (Domestic)
PF	Protector Frame (provides protected termination for facilities, but generally has no cross-connect provisions)
R	Designates Remreed network type for No. 1/1A or 2/2B ESS
SEE	Systems Equipment Engineer (AT&T-NS)
Series-78	Family code for original COSMIC-type four-beam terminal blocks
Series-112	Family code for COSMIC-type three-beam terminal blocks
SHELF	COSMIC Frame horizontal apparatus mounting levels within a COSMIC module.
SHW	Subhighway, NEAX61E (Domestic)
SHELF	EWSD
SM	Switching Module, No. 5ESS
SMDF	Subscriber Main Distributing Frame (terminates subscriber facilities and equipment, but not interoffice facilities or equipment)
SPC	Speech Path Controller, NEAX61E (Domestic)
SSPF	Single Sided Protector Frame
SYSTEM-X	Plessey Digital Switch
TP	Tie Pairs, generic term for
TPDF	Tie Pair Distributing Frame (generally terminates only tie pairs for inter-frame or intra-frame connections)
V	Designates Vertical side of conventional DFs (cf. "H")
VG	Vertical Group used with No. 5 Xbar
WSG	Wire Shelf Group, SYSTEM-X

Page ___ of ___

Date Prepared _________

Mechanized Engineering and Layout for Distributing Frames
(MELD)
Engineering Summary Questionnaire

Part 1A - General Data

Order Data

Company Name ____________	OTC Engineer ____________
AT&T-NS Order ID ____________	Street ____________
Customer Order ID ____________	City ________ State ______ Zip ______
Project Number ____________	Phone (___) ____________

COSMOS Tape Shipping Instructions (if other than OTC Engineer above)

Company Name ____________		
Attention ____________		Phone (___) ________
Street ____________		
City ____________	State ____________	Zip ________

Office Data

Office Name ____________

CLLI: (Place _ _ _ _ State _ _ Building _ _)

Street ____________

City ________ State ________ Zip ________

Base Number: _ _ _ _

Synopsis (Check applicable items)

Order Type (check one)	Engineering Work	Output Options
___ Initial Engineering	___ Office ID Data	COSMOS Tape Density
___ Update Engineering	___ Framework(s)	[800 bpi__,1600 bpi__]
___ Output Regeneration	___ OSP Facilities	Frame Labels
___ PACE/MELD Conversion	___ Tie Pairs	[changed ___, all ___]
	___ Line Equipment	
	___ Test/Talk Panels	
	___ Reserved Space	

Special Instructions (if any): ____________________________

____

____

Part 2A - COSMIC-Type SMDF & TPDF Framework Data

SMDF

Frame Complex ID:
Name ___________ Number _____

Framework Type (check one):
COSMIC __ COSMIC IA __ COSMIC II __ COSMIC IIA __ COSMIC II Mini __

Frame Lineup*	Frame CLLI	Number of Modules	Module Numbers Low ID	Module Numbers High ID	Floor	Walk-Through Locations Module ID
1st	F__	__	___	___	__	___
2nd	F__	__	___	___	__	___
3rd	F__	__	___	___	__	___
4th	F__	__	___	___	__	___

* Enter closest lineup to CEF/ACEF first, next closest second, etc.

Special Instructions (if any): ______________________

____

____

TPDF

Frame Complex ID:
Name ___________ Number _____

Framework type (check one):
COSMIC __ COSMIC IA __ COSMIC II __

Frame Lineup	Frame CLLI	Number of Modules	Module Numbers Low ID	Module Numbers High ID	Floor
1st	F__	__	___	___	__

Special Instructions (if any): ______________________

____

____

Part 2B - Modular PF & Other-Frames Framework Data

Modular PF (COSMIC [I]-type Installations only)

Frame Complex ID:
Name _ _ _ _ _ _ _ _ _ _ _ _ Number _ _ _ _

Numbering Direction (check one):
Left-to-Right ___ Right-to-Left ___

Density (check one):
Low (5 302-Conn's/Vertical) ___ High (8 308-Conn's/Vertical) ___

Layout Spread:
Vertical ___ Horizontal ___

Frame CLLI	Number of Modules	Vertical Numbers Low ID	Vertical Numbers High ID	Floor
F _ _	_ _	_ _ _	_ _ _	_ _
F _ _	_ _	_ _ _	_ _ _	_ _
F _ _	_ _	_ _ _	_ _ _	_ _
F _ _	_ _	_ _ _	_ _ _	_ _

Special Instructions (if any): ___

Other-Frames (Non-MELD Controlled Conventional DFs and PFs)

Type (circle)	Complex Name	Complex Number	Frame CLLI	Vertical Numbers Low ID	Vertical Numbers High ID	Floor
DF or PF	_ _ _ _ _ _ _ _ _ _	_ _ _ _	F _ _	_ _ _	_ _ _	_ _
DF or PF	_ _ _ _ _ _ _ _ _ _	_ _ _ _	F _ _	_ _ _	_ _ _	_ _
DF or PF	_ _ _ _ _ _ _ _ _ _	_ _ _ _	F _ _	_ _ _	_ _ _	_ _
DF or PF	_ _ _ _ _ _ _ _ _ _	_ _ _ _	F _ _	_ _ _	_ _ _	_ _

Special Instructions (if any): ___

Part 3A - Outside Plant Facilities Data For COSMIC [I]-Type DF

SMDF Apparatus and Layout Data

Apparatus (check one):
Series-78 ___ Series-112 ___ Hi-Six-112 ___

Optional shelf sequence override* (enter shelf numbers):

__	__	__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

*Default sequence is: 6,5,7,4,8,3,9,2,10,1,11.

Precable Data (PF-to-SMDF Ties)

Loop Cable (LC) Precable Data:
Number of Pairs _ _ _ _ _ From PF Frame CLLI F _ _

Loop Carrier (LX) Precable Data:
Number of Pairs _ _ _ _ _ From PF Frame CLLI F _ _

Cable Data

	LC	Pair Range		PF	Location on PF (Non-Modular PFs Only)		
Cable ID	or LX	Low Pair	High Pair	Frame CLLI	Vert-ical	* Side	Conn-ector
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _
_ _ _ _ _ _ _ _ _ _	_ _	_ _ _ _	_ _ _ _	F _ _	_ _ _	_	_ _

*Enter 'A' or 'B' for DSPF; blank for SSPF; 'V' for conventional DF.

Special Instructions (if any): ______________________________

Part 3B - Outside Plant Facilities Data For COSMIC [II] - Type SMDF

SMDF Apparatus and Layout Data

307 Assembly/Apparatus (check one):
Series-78 ___ Series-112 ___

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (enter shelf numbers):

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
__	__	__	__	__	__	__	__	__	__	__

*Default sequence is: 6,5,7,4,8,3,9,2,10,1,11.

Cable Data (See Note below)

		Pair Range		Cable Code* (check one)			Splice Location Data (LC only)	
				LC		LX		
Cable ID	LC or LX	Low Pair	High Pair	11CA	11DA	806A	Position Number	Floor
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--
----------	--	----	----	—	—	—	---	--

* Cable gauges for these codes are: 11CA=22; 11DA=24; 806A=26.

NOTE: Enter in the order that cables will be arranged along the Auxiliary Cable Entrance Facility (ACEF) — left-to-right or right-to-left.

Special Instructions (if any): ______________________________

____

____

Part 3C - Outside Plant Facilities Data For COSMIC [II] Mini-Type SMDF

SMDF Apparatus and Layout Data

Apparatus (check one):
Series-78 ___ Series-112 ___ Hi-Six-112 ___

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (enter shelf numbers):

__	__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th

*Default sequence is: 10,9,8,7,6,5,4,3,2,1.

Precable Data (PF-to-SMDF Ties)

Number of Pairs _____ From PF Frame CLLI F __ Type (circle one) LC or LX

Cable Data

Cable ID	LC or LX	Pair Range: Low Pair	Pair Range: High Pair	Cable Code*	PF Frame CLLI	Location on PF (Non-Modular PFs Only): Vert-ical	Location on PF (Non-Modular PFs Only): ** Side	Location on PF (Non-Modular PFs Only): Conn-ector	Splice Location Data (LC only): Position Number	Splice Location Data (LC only): Floor
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__
__________	__	____	____	____	F__	___	_	__	___	__

* Cable gauges for these codes are: 11CA=22; 11DA=24; 806A=26.
**Enter 'A' or 'B' for DSPF; blank for SSPF; 'V' for conventional DF.

Special Instructions (if any): ____________________

____

____

Part 4A - Tie Pair Data (SMDF-to-TPDF)

Apparatus and Layout Data

Apparatus (check one):

50/100/200 Pairs				64/128 Pairs
Series-78 ___	Series-112 ___	Hi-Six-200 ___	Hi-Six-112 ___	Hi-Den-112 ___

SMDF Spread Mode (check one):
Even-numbered Modules ___ Odd-numbered Modules ___

SMDF optional shelf sequence override* (enter shelf numbers):

__	__	__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

* Default sequence is: 2,10,1,11,3,9,4,8,5,7,6.

TPDF optional shelf sequence override+ (enter shelf numbers):

__	__	__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

+Default sequence is: 6,5,7,4,8,3,9,2,10,1,11.

Cable Data

Cable Size*	Number of Pairs	'From' SMDF CLLI	'To' TPDF CLLI	Automatic Cable ID Override: Cable ID	Pair Range: Low Pair	Pair Range: High Pair
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----
---	----	F__	F__	-----	----	----

* 50, 64, 100 or 128; cable codes are 813A, 809A, 806A and 810A respectively; 50-, 64- and 100-pair cables will be placed on shelves 1 and 11 only.

Special Instructions (if any): ____________________

____

____

Part 4B - Tie Pair Data (SMDF-to-Other DFs)

SMDF Apparatus and Layout Data

Apparatus (check one):

50/100/200 Pairs				64/128 Pairs
Series-78 ___	Series-112 ___	Hi-Six-200 ___	Hi-Six-112 ___	Hi-Den-112 ___

Spread Mode (check one):
Even-numbered Modules ___ Odd-numbered Modules ___

Optional shelf sequence override* (enter shelf numbers):

__	__	__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

* Default sequence is: 2,10,1,11,3,9,4,8,5,7,6.

Cable Data

		'From'	'To' Other -DF Location(s)						Automatic Cable ID Override		
Cable*	No. of	SMDF	Frame	Side	Vertical No(s)		Shelf ID(s)			Pair Range	
Size	Pairs	CLLI	CLLI	(V/H)	From	To	From	To	Cable ID	Low Pair	High Pair
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----
---	----	F__	F__	_	---	---	--	--	-----	----	----

* 50, 64, 100 or 128; cable codes are 813A, 809A, 806A and 810A respectively; 50-, 64- and 100-pair cables will be placed on SMDF shelves 1 and 11 only.

Special Instructions (if any): ______________________________

____

____

Part 5A - Line Equipment Data (5 ESS™)

Apparatus and Layout Data

Apparatus (check one):

64-Pairs		128-Pairs
Series-78 ___	Series-112 ___	Hi-Den-112 ___

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

* Default sequence is: 6,5,7,4,8,3,9,2,10

DF - Connectorized Cable (check one): Yes ___ No ___

5 ESS Data (Regular Line Units)

Protection Location (check one):
Separate PF/DF ___ Separate LNI ___ SMDF-Mounted LNI ___

Entity	Switching Modules			Type	Line Units			
ID	Low	High	CR	(circle)	Qty	Low	High	Floor
D_	___	___	_:1	AB or AC or AD	___	_	_	__
D_	___	___	_:1	AB or AC or AD	___	_	_	__
D_	___	___	_:1	AB or AC or AD	___	_	_	__

5 ESS Data (ISDN Line Units - ISLU)

Entity	Switching Modules		Cabling Option*	J-Code	ISDN Line Units (ISLUs)		Line Groups		
ID	Low	High	(circle one)	(circle)	Low	High	Low	High	Floor
D_	___	___	2W or 4W	AK	_	_	__	__	__
D_	___	___	2W or 4W	AK	_	_	__	__	__
D_	___	___	2W or 4W	AK	_	_	__	__	__

Special Instructions (if any): ____________________

____

____

Part 5B - Line Equipment Data (No. 1/1A ESS and No. 2/2B ESS)

Apparatus and Layout Data

Apparatus (check one):

64-Pairs		128-Pairs
Series-78 ___	Series-112 ___	Hi-Den-112 ___

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

No. 1/1A ESS Data

Control Group	LLNs Low	LLNs High	Type (F or R)	If Partial LLN LSF/LSC Range Low	If Partial LLN LSF/LSC Range High	LCR	LJR	Floor
C__	__ __	__ __	__	__	__	__:1	__.__:1	__ __
C__	__ __	__ __	__	__	__	__:1	__.__:1	__ __
C__	__ __	__ __	__	__	__	__:1	__.__:1	__ __

Special Instructions (if any): ____________________

____

____

No 2/2B ESS Data

Entity ID	LTNs Low	LTNs High	Type (F or R)	If Partial LTN CG Range Low	If Partial LTN CG Range High	CR	Floor
E__	__ __	__ __	__	__	__	__:1	__ __
E__	__ __	__ __	__	__	__	__:1	__ __
E__	__ __	__ __	__	__	__	__:1	__ __

Special Instructions (if any): ____________________

____

____

Part 5C - Line Equipment Data (No. 5 and No. 1 Crossbar)

Apparatus and Layout Data

Apparatus (only 100-Pair Series-78 blocks are used).

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

--	--	--	--	--	--	--	--	--
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

No. 5 Crossbar Data

Marker	LLFs		VGs		Frame*	
Group	Low	High	Low	High	Type	Floor
M__	--	--	-	-	---	--
M__	--	--	-	-	---	--
M__	--	--	-	-	---	--

* Frame Type - Possible No. 5 crossbar frame (bay) entries are:

190 - Basic 190 Line Frame
290 - Basic 290 Line Frame
50 - Supplementary Split-50 Line Frame
100 - Supplementary Split-100 Line
200 - Supplementary 200 Line Frame

No. 1 Crossbar Data

Originating Marker ID	Terminating Marker Group ID	Line Link Frame	Choice	Quarter Choice	LLCs Low	LLCs High	LLC(s) Suffix (optional)	Floor
M__	T_	---	--	-	---	---	-	--
M__	T_	---	--	-	---	---	-	--
M__	T_	---	--	-	---	---	-	--

Special Instructions (if any): ________________________________

____

____

Part 5D - Line Equipment Data (Step By Step)

Apparatus and Layout Data

Apparatus (only 100-Pair Series-78 blocks are used).

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

Step By Step Data

IDF or NNX ID	LFGs Low	LFGs High	Number Of Lines In LFG(s) (100 or 200)	Number Of Line Finders In LFG(s)	If Low Line ≠ 0 Low Line #	Floor
___	__	__	_	___	___	__
___	__	__	_	___	___	__
___	__	__	_	___	___	__
___	__	__	_	___	___	__
___	__	__	_	___	___	__

Special Instructions (if any): ______________________________

____

____

Part 5E - Line Equipment Data (DMS*-100)

* Trademark of Northern Telecom, Ltd.

Apparatus and Layout Data

Apparatus (check one):

64-Pairs: Series-78 ___ Series-112 ___

128-Pairs: Hi-Den-112 ___

Spread Mode+ (check one):

Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

--	--	--	--	--	--	--	--	--
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

DMS-100 Data

Switch ID	LME(s)/ LCE(s)/ LCEI(s)/ LCME(s) Low	LME(s)/ LCE(s)/ LCEI(s)/ LCME(s) High	Type (circle)	If Partial LME/LCE/LCEI/LCME: Bay/ LCM/ LCMI	LD(s)/LSG(s)/ Range Low	LD(s)/LSG(s)/ Range High	Floor
N__	--	--	LME - LCE - LCEI - LCME	-	--	--	--
N__	--	--	LME - LCE - LCEI - LCME	-	--	--	--
N__	--	--	LME - LCE - LCEI - LCME	-	--	--	--
N__	--	--	LME - LCE - LCEI - LCME	-	--	--	--
N__	--	--	LME - LCE - LCEI - LCME	-	--	--	--

Special Instructions (if any): ______

Part 5F - Line Equipment Data (AXE+-10)

+ Trademark of Ericsson

Apparatus and Layout Data

Apparatus (only 128-Pair Series-112 blocks are used):

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

AXE-10 Data

Entity	Equipment Module Group		Line Switch Module		Line Interface Circuit		
ID	Low	High	Low	High	Low	High	Floor
--	---	---	--	--	---	---	--
--	---	---	--	--	---	---	--
--	---	---	--	--	---	---	--
--	---	---	--	--	---	---	--
--	---	---	--	--	---	---	--

Special Instructions (if any): ___

Part 5G - Line Equipment Data (SYSTEM-X**)

** Trademark of Plessey

Apparatus and Layout Data (Analog Line Unit Shelf (ALUS))

Apparatus (check one):

64-Pairs: Series-78 ___ Series-112 ___

128-Pairs: Hi-Den-112 ___

Spread Mode+ (check one):

Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

__	__	__	__	__	__	__	__	__
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

SYSTEM-X Data

Entity ID	Feature (circle)	Concentrator Id	Wire Shelf Group Low	Wire Shelf Group High	Equipment Number Low	Equipment Number High	Floor
--	M3 or M2	---	--	--	---	---	--
--	M3 or M2	---	--	--	---	---	--
--	M3 or M2	---	--	--	---	---	--
--	M3 or M2	---	--	--	---	---	--
--	M3 or M2	---	--	--	---	---	--

Special Instructions (if any): ____________________

____

____

Part 5H - Line Equipment Data (EWSD++)

++ Trademark of Siemens

Apparatus and Layout Data

Apparatus (check one):

64-Pairs		128-Pairs
Series-78 ___	Series-112 ___	Hi-Den-112 ___

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

--	--	--	--	--	--	--	--	--
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

EWSD Data

Entity ID	Digital Line Unit Low	Digital Line Unit High	EWSD Shelf Low	EWSD Shelf High	EWSD Mod Low	EWSD Mod High	Floor
--	----	----	-	-	--	--	--
--	----	----	-	-	--	--	--
--	----	----	-	-	--	--	--
--	----	----	-	-	--	--	--
--	----	----	-	-	--	--	--

Special Instructions (if any): ________________________________

Part 51 - Line Equipment Data (NEAX61E***)

*** Trademark of Nippon Electric Company

Apparatus and Layout Data

Apparatus (check one):

64-Pairs: Series-78 ___ Series-112 ___

128-Pairs: Hi-Den-112 ___

Spread Mode+ (check one):

Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

--	--	--	--	--	--	--	--	--
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

NEAX61E Data

Entity	Line Trunk Frame		Line Module			Circuit		
ID	Low	High	Low	High	Loc	Low	High	Floor
--	--	--	---	---	-	---	---	--
--	--	--	---	---	-	---	---	--
--	--	--	---	---	-	---	---	--
--	--	--	---	---	-	---	---	--
--	--	--	---	---	-	---	---	--

***** This Form Recommended For International Use Only *****

Special Instructions (if any): ________________________________

____

____

Part 5J - Line Equipment Data (NEAX61E***)

*** Trademark of Nippon Electric Company

Apparatus and Layout Data

Apparatus (check one):

64-Pairs: Series-78 ___ Series-112 ___

128-Pairs: Hi-Den-112 ___

Spread Mode+ (check one):
Even-numbered Modules ___ Odd-numbered Modules ___ All Modules ___

+Spread Mode is only applicable for COSMIC II Mini SMDF's and Flex Framework Groups

Optional shelf sequence override* (shelves 2-10 only):

--	--	--	--	--	--	--	--	--
1st	2nd	3rd	4th	5th	6th	7th	8th	9th

*Default sequence is: 6,5,7,4,8,3,9,2,10

NEAX61E Data

Entity	Speech Path Controller		Highway		Subhighway		Pulse Code Modulator		
ID	Low	High	Low	High	Low	High	Low	High	Floor
--	--	--	-	-	-	-	--	--	--
--	--	--	-	-	-	-	--	--	--
--	--	--	-	-	-	-	--	--	--
--	--	--	-	-	-	-	--	--	--
--	--	--	-	-	-	-	--	--	--

Special Instructions (if any): ___

Part 6A - Reserved Space Data (Test/Talk & Jack Panels)

Panel Description Text	Frame Location(s)			
(KS or ED Number) 13 characters/line maximum	CLLI	Module(s)	Shelf	Block* Loc(s)
_____________ _____________ _____________ _____________	F__	___,___ ___,___ ___,___ ___,___	__	__-__
_____________ _____________ _____________ _____________	F__	___,___ ___,___ ___,___ ___,___	__	__-__
_____________ _____________ _____________ _____________	F__	___,___ ___,___ ___,___ ___,___	__	__-__
_____________ _____________ _____________ _____________	F__	___,___ ___,___ ___,___ ___,___	__	__-__
_____________ _____________ _____________ _____________	F__	___,___ ___,___ ___,___ ___,___	__	__-__
_____________ _____________ _____________ _____________	F__	___,___ ___,___ ___,___ ___,___	__	__-__

*Enter any small block (16/shelf) location(s) from 1 to 16.
Locations 1-8 are on side 1, and locations 9-16 on side 2.

Special Instructions (if any): ____

____

____

APPENDIX 7-B

Meld Output Formats

MELD FRAMEWORK ADDRESS FORMATS
FOR JOB DRAWINGS AND DIRECTORIES
aaab(ccc,ddd)ee

FRAMEWORK	aaa LINEUP CLLI	b LINEUP SIDE	ccc UNIT ID	ddd SHELF	ee APPARATUS	EXAMPLE
COSMIC®-TYPE DF	FRAME-LINEUP CLLI (Fxx)	(ƀ) = FRONT SIDE	MODULE ID (nnn)	SHELF ID (đnn)	BLOCK ID (nn)	F01 (013, 03)05
		(B) = BACK SIDE		CHANNEL ID (đnn)	CONNECTOR ID (nn)	F01B(024, 02)07
ESS MODULAR DF	CLLI (Fxx)	UNUSED (ƀ)	VERTICAL ID (nnn)	UNUSED (đƀƀ)	CONNECTOR ID (nn)	F02 (036,)02
CONVENTIONAL SINGLE-SIDED DF	CLLI (Fxx)	(V)= VERT SIDE	VERTICAL ID (nnn)	UNUSED (đƀƀ)	APPARATUS ID (nn)	F03V(109,)11
		(H)= HORIZ SIDE		SHELF ID (đaƀ)	UNUSED (ƀƀ)	F03H(109, C)ƀƀ
CONVENTIONAL DOUBLE-SIDED DF	CLLI (Fxx)	(V)= VERT SIDE	VERTICAL ID (nnn)	UNUSED (đƀƀ)	APPARATUS ID (nn)	F04V(127,)06
		(H)= HORIZ SIDE		SHELF ID (đaƀ)	UNUSED (ƀƀ)	F05H(102, D)ƀƀ
		(R)= REVERSE*		SHELF ID (đaƀ)	UNUSED (ƀƀ)	F05R(D ,102)ƀƀ
INTER-CONNECTION BAYS (e.g.,QCX,CCB)	CLLI (Fxx)	UNUSED (ƀ)	BAY ID (nnn)	PANEL ID (đxx)	BLOCK ID (nn)	F06 (017, 02)04
ESS MODULAR PF	CLLI (Fxx)	UNUSED (ƀ)	VERTICAL ID	UNUSED (đƀƀ)	CONNECTOR ID (nn)	F07 (016,)05
CONVENTIONAL SINGLE-SIDED PF	CLLI (Fxx)	UNUSED (ƀ)	VERTICAL ID (nnn)	UNUSED (đƀƀ)	CONNECTOR ID (nn)	F08 (025,)11
CONVENTIONAL DOUBLE-SIDED PF	CLLI (Fxx)	(A)=SIDE A (B)=SIDE B	VERTICAL ID (nnn)	UNUSED (đƀƀ)	CONNECTOR ID (nn)	F09A(053,)04

Printed formats are shown for proper user input as prescribed in MELD Questionnaire Instructions.

( ) denotes intended field value entries where:

n = numeric {0-9};
a = alphabetic {A-Z}
x = alphanumeric {0-9:A-Z};
ƀ = blank;
đ = non-enterable character position (always blank on output)
UPPER CASE = literal constant

- Value of "R" for "b" causes ccc and ddd to be interchanged on printed output.

TERMINATION	FORMAT[1]	IDENTIFICATION DATA
LOOP CABLE	LC aaaaaaaaaa PRS bbbb-cccc zzzzzzzzzzzzzz	a = Cable ID b = Complement Low-Pair c = Complement High-Pair
LOOP CARRIER (PGS Derived Pairs)	LX aaaaaaaaaa PRS bbbb-cccc zzzzzzzzzzzzzz	a = Cable ID b = Complement Low-Pair c = Complement High-Pair
PF-DF Pre-Cable	As above for LC or LX	Note 2
AXE-10+ Line Equipment	LE EAaaEMGbbb LSMccLddd-eee	a = Entity Id b = Equipment Module Group Id c = Line Switch Module Number d = Low Line Interface Circuit Number e = High Line Interface Circuit Number
Crossbar 1 Line Equipment	LE X1MaTbLLFccc CddeLLCffffg	a = Originating Marker Group ID b = Terminating Marker Group ID c = Line Link Frame ID d = Choice ID e = Quarter Choice ID f = Line Link Column ID g = Line Link Column ID suffix
Crossbar 5 Line Equipment	LE X5MaLLFbb VGcc-dd	a = Marker Group ID b = Line Link Frame ID c = Low Vertical Group ID d = High Vertical Group ID
DMS*-100 Line Equipment (Line Concentrators)	LE ENNaLCEbb McLSGdd-ee	a = Switching Entity ID b = Line Concentrator Bay ID c = Line Concentrator Module ID d = Low Line Sub-Group ID e = High Line Sub-Group ID
DMS-100 Line Equipment (ISDN Line Concentrators)	LE ENNaLCIbb IcLSGdd-ee	a = Switching Entity ID b = Line Concentrator ISDN Module Id c = Line Concentrator Module Part Id d = Low Line Sub-Group ID e = High Line Sub-Group ID
DMS-100 Line Equipment (ISDN Enhanced Line Concentrators)	LE ENNaLCMbb McLSGdd-ee	a = Switching Entity ID b = Line Concentrating Module, Enchanced ID c = Line Concentrating Module Part Id d = Low Line Sub-Group ID e = High Line Sub-Group ID

MELD TERMINATION IDENTIFICATION FORMAT CONVENTIONS
FOR JOB DRAWINGS, DIRECTORIES AND FRAME LABELS

(continued on next page)

DMS-100 **Line Equipment** **(Line Modules)**	LE ENNaLMEbb BcLD dd-ee	a = Switching Entity ID b = Line Module ID c = Line Module Bay ID d = Low Line Drawer ID e = High Line Drawer ID
ESS 1/1A Line Equipment (Ferreed)	LE E1CaLLNbb LSFcBdCONe-f	a = Control Group ID b = Line Link Network Number c = Line Switch Frame Number d = Bay Number e = Low-Concentrator Number f = High-Concentrator Number
ESS 1/1A Line Equipment (Remreed)	LE E1CaLLNbb LSCcCONdd-ee	a = Control Group ID b = Line Link Network Number c = Line Switch Circuit Number d = Low-Concentrator Number e = High-Concentrator Number
ESS 2/2B Line Equipment	LE E2EaLTNbb CGcCONd-e	a = Entity ID b = Line Trunk Network Number c = Concentrator Group Number d = Low-Concentrator Number e = High-Concentrator Number
5 ESS™ Line Equipment (Regular Line Units)	LE E5DaSMbbb LUcCONd-e	a = Digital Entity ID b = Switching Module Number c = Line Unit Number d = Low-Concentrator Number e = High-Concentrator Number
5 ESS™ Line Equipment (ISLU Line Units)	LE E5DaSMbbb ISLUcLGdd-ee	a = Digital Entity ID b = Switching Module Number c = Integrated Services Line Unit Number d = Low Line-Group Number e = High Line-Group Number
EWSD++ Line Equipment	LE SEaaDLUbbbb SHcMODdd-ee	a = Entity ID b = Digital Line Unit Number c = EWSD Shelf Number d = Low EWSD Module Number e = High EWSD Module Number
NEAX61E*** Line Equipment	LE Z1aaLTFbb LMcccCddd-eee	a = Entity ID b = Line Trunk Frame Number c = Line Module Number d = Low Circuit Number e = High Circuit Number

MELD TERMINATION IDENTIFICATION FORMAT CONVENTIONS
FOR JOB DRAWINGS, DIRECTORIES AND FRAME LABELS
(continued on next page)

Step-by-Step Line Equipment	LE XS IDFaaa LFbbbLccc-dd	a = Intermediate DF or NNX ID b = Line Finder Group ID c = Low Line Number ID d = High Line Number ID
SYSTEM-X** Line Equipment	LE DXaaCONbbb ccENdddd-eeee	a = Entity ID b = Concentrator Number c = Wire Shelf Group Number d = Low Equipment Number e = High Equipment Number
TIE PAIRS	TP aaaaa[3] PRS bbbb-cccc zzzzzzzzzzzzzz	a = Cable ID b = Complement Low-Pair c = Complement High-Pair

'zzzzzzzzzzzzzz' = Termination's Frame Location Frame Address (per Figure 1A).

1 - As used on Job Drawings.
2 - Cable ID will be @Pssttttnn where:
 @P = Designates MELD-Created, temporary PF-DF pre-cable name.
 s = Source Protector Frame-Lineup CLLI ID (Less the "F" Character).
 t = Target SMDF Frame-Complex Number
 n = Additional Identifiers [A0, A1...A9...Z9] as needed.
3 - When Automatic MELD Tie Cable Naming is used, Cable ID will be 'ssttn', where:
 s = Source DF Frame-Lineup CLLI (Less the "F" character)
 t = Target DF Frame-Lineup CLLI (Less the "F" character)
 n = Additional Identifier [0-9; A-Z] as needed.

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* Trademark of Northern Telecom, Ltd.
+ Trademark of Ericsson
** Trademark of Plessy
++ Trademark of Siemens
*** Trademark of Nippon Electric Company

MELD TERMINATION IDENTIFICATION FORMAT CONVENTIONS
FOR JOB DRAWINGS, DIRECTORIES AND FRAME LABELS

APPENDIX 7-C

MANUAL LAYOUT OF TMDF, CMDF, AND SDDF

Overview

This appendix describes the process for engineering those terminations on *COSMIC* Frame Systems that cannot be handled by the MELD system. These terminations include trunk, toll, and special service circuits, plus certain shielded tie cable arrangements. Typical frame configurations that require manual layout are the TMDF, CMDF, and SDDF. The SMDF requires manual layout only if there are special circuits involved (for example, bridge lifters).

With the evolution of the telephone network to digital transmission and switching systems, many of the concerns about the layout of voice-frequency based trunk and toll circuits are becoming less significant. The overwhelming majority of inter-office facilities are digital - hence, the use of voice frequency trunk and toll equipment is disappearing. Equipment such as Metallic Facilities Terminals (MFTs), Signaling Units and Voice Frequency trunk switch circuits are becoming obsolete. Even the use of D Channel Banks is becoming less common in the central office, and as Digital Cross-Connect Systems such as AT&T's DACS become more prevalent, may disappear entirely.

The impact on Main Distributing Frame Systems is that the planning and engineering processes are becoming much simpler. Modular distributing frames may be used to cover a greater percentage of all frame applications as concerns about manual engineering and administration become less significant.

The following section provides a description of how the manually- engineered circuit arrangements should be planned, the development of the layout mask, how terminatiion space should be allocated, and how those terminations are ultimately documented in a manually-produced job record drawing. Finally, some specifics on the layout of TMDFs, CMDFs, nad SDDFs is provided.

The Layout Mask

It is strongly recommended that a layout mask be developed for all TMDF, CMDF, and SDDF applications. The purpose of the layout mask is to aid in the spreading of termination assignments along the length of the frame throughout its intended service life. It also helps the transmission, switching, and outside plant facility planners in the telephone company to communicate information about frame termination requirements with each other and with the distributing frame engineer.

An example of a layout mask for a TMDF is shown in Figure 7-12. Note that space has been allocated uniformly across the frame for the various circuit types that are planned to be terminated on the frame.

The facility bays terminate voice frequency trunk cables, the derived channels of toll carrier systems, tie pairs to other frames, and the equipment side of universally wired Switched Maintenance Access Systems (SMAS). Note that most SMAS applications are "unitized" with other transmission equipment, and hence, do not require terminations on the DF. Space for each category of terminations should be uniformly distributed over all of the facility bays. Specific recommendations for allocating space on the layout mask for these circuits are as follows:

- Tie Pairs - shelves 1 and 11 are used for tie pairs to other frames.
- VF Trunk Cable Pairs (OSP) - space is allocated for cable pairs starting on shelf 6 and extending outward to shelves 5, 7, 4, 8, etc.
- T-Carrier Cables - terminate at the TMDF for protection only on 307C1-100 Connectors. Shelf 1 connector positions 1, 3, 5, 7, and 9 of the facility bays are always reserved for T-carrier connections. These circuits are hard-wired to the Office Repeater Bays.
- Toll Facilities/Trunk Carrier Derived Channels - space is allocated for trunk carrier channels starting on shelves 2 and 10 and extending towards the shelves reserved for trunk cable pairs.
- SMAS Equipment Side - The equipment side of SMAS will always terminate in the facility bays on the TMDF. Shelves reserved for SMAS are intermixed with those for trunk carrier channels.

The equipment bays are used for the termination of Tie Pairs, Trunk Circuits, miscellaneous ESS equipment and toll equipment. The different terminations and a brief description is provided below:

- Tie Pairs - shelves 1 and 11 are used for Tie Pairs.
- No. 2/2B ESS
  - Trunks Circuits - Miscellaneous Trunk (MT) and Universal Trunk (UT) circuits are split terminated between the SMDF and TMDF. Shelf 5 of SMDF equipment bays is reserved for the line and/or trunk switching side of all trunk circuits.
  - Recorded Announcement (RA) - a bay shelf can terminate 320 RA circuits (2 pairs per circuit)
- No. 1/1A ESS
  - Trunk Circuits - MT, UT, and Combined Miscellaneous Trunk (CMT) Circuits have reserved space. The MT and CMT circuits can be terminated on the same shelves, therefore the space required for each can be totaled on the ultimate layout and designated as MT. There is also Miniaturized Universal Trunk (MUT) circuits that can be terminated on the same shelves as the UT circuits.
  - Recorded Announcement (RA)
- No. *5ESS*® - The various types of terminations are Trunk Units (TU), Metallic Service Units (MSU), 13A Recorded Announcement, Resistor Panel, Directly Connected Test Unit (DCTU).
- DMS-100 Trunk Modules

- Common *ESS* Circuit
  - Ringing and Tone Circuits - up to 640 circuits will terminate on a bay shelf
  - Bridge Lifters (BL) - 320 relay rack mounted BL terminate on a bay shelf
  - Miscellaneous *ESS* - Maintenance frame circuits and other miscellaneous *ESS* circuits are terminated on shelves reserved for "*ESS* MISC". A minimum of one shelf in every two bays should be reserved for "*ESS* MISC".
- Toll Equipment
  - Metallic Facility Terminals (MFT) - The space to be reserved for MFT is found by totaling the ultimate termination space required for each of the different MFT wiring arrangements that will be used in the office. Space should be allocated, whenever possible, in increments of two adjacent shelves (that is, 9 and 11, 7 and 8) on each bay to facilitate the splitting of cables between the shelves. Allocate shelves for MFT beginning on shelf 10 and proceed upward.
  - Analog Facility Terminals: F- & G-signaling Circuits - A bay will terminate a maximum of 80 F- or G-signaling circuits
  - SMAS Facility (Line) Side - The facility side of SMAS 5A/5B maintenance connectors and 4A/4B connector group are terminated in TMDF Equipment bays when SMAS is not split-terminated between the SMDF and TMDF. When split terminated, the facility side of maintenance connectors or connector groups will be terminated in SMDF Equipment bays. The equipment side of SMAS always terminates on the TMDF. The facility side of maintenance connectors and connector groups can be allocated space in the same shelf.
  - Other Toll Equipment Terminations - A category is established when at least one shelf of termination space will be ultimately required. If a complete shelf is not required the termination can be classified as a miscellaneous toll termination which should have a minimum of one shelf reserved for every two bays and labeled "TOLL MISC".

Assigning Terminations

Once the layout mask has been completed, the assignment of specific terminations can begin.

An outline of the assignment procedure is given below:

1. Locate the shelves on the ultimate layout dedicated to the category of terminations under consideration on the ultimate framework.
2. Assign terminations as uniformly as possible. Try to terminate equal numbers of terminations of each type into all bays. Shelves are filled from left to right (as viewed from the front of the frame).
3. Each 112-type connecting block has two jumper fanning strips (one on the top and one on the bottom). For operational efficiency, all the jumper wires that are needed for any one circuit should be routed either through the top or the bottom fanning strip. It is desirable that any one trunk, toll, or special service circuit be terminated completely either in the top half of the block (on the top four terminals) or the bottom half of the block (bottom four terminals). For example, an 8-wire circuit should be terminated on

two adjacent columns of four terminals each, either on the top half of the block or the bottom half. The convention that is recommended to be followed is that odd-numbered circuits are terminated on the top half of the block and even numbered circuits are terminated on the bottom half.

4. For those categories of terminations that do not have shelves defined on the ultimate layout, or where termination space is exhausted, the ultimate layout should be revised before assignments can be made on the shelves dedicated for other categories of terminations or on shelves reserved for "Future Assignment".

Job Record Drawing

There are three principal types of job record drawings that are produced for manually-engineered terminations:

1. Frame Record Drawing - Each sheet of the frame record drawing shows the termination assignments of one bay of the *COSMIC* frame. This drawing carries sufficient informaiton for most types of trunk and toll circuits. Examples are shown in Figure 7-4 and 7-5.
2. Block Sketches - Drawings of the layout of circuits terminated on individual connecting blocks are required for miscellaneous circuits that share a connecting block with other circuit types. The block shows all terminations down to the individual terminal.
3. Terminations Directories - Termination directories list equipment terminated on the frame by equipment type. They are convenient for quickly looking up termination locations, particularly for assigning cross-connects. An example of a termination directory is shown in Figure 7-9.

Frame Labels

Two types of frame labels are typically needed for trunk, toll, and special service circuits:

1. The shelf label, which mounts on the wire retainer of the vertical wiring trough adjacent to the shelf, provides a high-level identification of the circuits terminated on the shelf.
2. The half-shelf designation strip mounts over the shelf and provides space for detailed circuit identification of each terminal. As described in Section 4, the designation strip "flips" up to reveal the bottom half of each block, or down to reveal the top half.

Specific Application

1. TMDF

   Because it is generally not practical to perform preferential (short jumper) assignment of cross-connects on TMDFs, the overall size of the TMDF should be limited to the number of circuits that can be randomly cross-connected without exhausting the express troughs. The recommended upper limit for the TMDF is six full-size modules in a single lineup.

2. CMDF

   Since the CMDF terminates preferentially assignable subscriber circuits, some percentage of the cross-connects will be short; and hence, the CMDF may be grown larger than a

TMDF before exhaustion of the express troughs becomes a concern. CMDFs can typically be as large as 7 or 8 modules.

The engineering layout process for the CMDF requires a combination of both mechanized engineering using MELD (for the subscriber circuits) and manual engineering (for the trunk, toll and special service circuits). Since the default MELD spreading algorithms start with terminations on shelf 6, growing outward to shelves 5, 7, 4, 8, etc., the manually engineered terminations should start on shelves 2 and 10 and grow inward toward shelves 3, 9, etc.

3. SDDF

The overall layout plan for the SDDF is developed by reserving the bay shelves of the ultimately required framework for the various categories of terminations that will be required in the office. The quantities of terminations is obtained through the planning section and any of the questionnaires completed prior to the engineering process.

The Facility bays terminate Outside Plant Cables that are dedicated to T-Carrier use (that is, MAT and ICOT screened cables) and tie pairs to the SMDF or CMDF. Space for both termination categories should be distributed uniformly over all facility bays. The following list provides the terminations and a brief description of the categories terminated on facility bays:

- Outside Plant Cables - Each 100 pair OSP stub cable terminated on the SDDF must be designated as either a transmit (out) or receive (in). The number of shelves to be allocated for OSP cable pairs for each direction is the number of cable pairs divided by 500.
- Reserving Space for Cable Pairs - for cable pairs designated as receive, start on shelf 7 and extend downward to shelves 8, 9, and 10 (shelf 11 is reserved for tie pairs). For cable pairs designated as transmit, start on shelf 5 and extend upward to shelves 4, 3, and 2 (shelf 1 is reserved for tie pairs).
- Tie Cable - Each tie cable terminated on the SDDF must be designated as either transmit or receive. The same formula is used as calculating OSP cable pairs.
- Reserving Space for Tie Cable Pairs - For tie cables designated as transmit, reserve shelf 1 in every bay. If more shelves are required, start on shelf 2 and extend downward to shelves 3, 4, and 5. If these have already been reserved, see "Allocating Space for Spares" below.
- For tie cables designated as receive, reserve shelf 11 in every bay. If more shelves are required, start on shelf 10 and extend upward to shelves 9, 8 and 7. If these shelves have already been reserved for cable pairs, see "Allocating Space for Spares" below.

The Equipment bays are used for the termination of T-Carrier equipment and the Tie Pairs to the SMDF or CMDF. Space for any particular category of terminations should be uniformly distributed over all of the bays. The list below provides the terminations and brief description of each.

- Office Repeater Bay (ORB) Shelves - The ORBs are cabled to the SDDF in complements of two ORB shelves at a time, corresponding to 25 T1 lines. Each pair of ORB shelves requires two 25-pair cables, one for transmit circuits and one for receive.

- Digital Loop Carrier System Central Office Terminals - are cabled in complements of one bank each, corresponding to five T1 lines (five transmit pairs in one cable and five receive cables in another).

- Reserve Space for T-Carrier Equipment - Allocate ORB and/or SLC-96 space as follows:

  For ORB (out), start on shelf 5 and extend upward to shelves 4, 3, and 2 (shelf 1 is reserved for tie pairs)

  For DLC Systems (out), start on the shelf immediately above the uppermost shelf used for ORB (out) in the step above, and extend upwards towards shelf 2.

  For ORB (in), start on shelf 7 and extend downward to shelves 8, 9, and 10 (shelf 11 is reserved for tie pairs).

  For DLC Systems (in), start on the shelf immediately below the lower most shelf used for ORB in the step above, and extend downwards towards shelf 10.

  ORB and SLC-96 should not be terminated on the same shelf.

- Allocating Space for Tie Pairs - Reserve shelf 1 for tie pairs (out) and shelf 11 for tie pairs (in). If additional tie pairs are required, reserve space as follows:

  For tie cables (out), start on shelf 2 and extend downward to shelves 2, 3, and 4.

  For tie cables (in), start on shelf 10 and extend upward to shelves 9, 8, and 7.

APPENDIX 7-D

DETAILED ENGINEERING OF TEST/TALK SYSTEMS

Test/Talk System

Because of the distributing frame's role as the interface between outside plant cable pairs and central office equipment, it is a convenient test location and a center of maintenance activity. The *COSMIC* DF Systems support a wide variety of test and talk systems that are used in this activity. These systems provide two essential functions:

— Communication between people located at the DF and elsewhere, such as the Repair Service Bureau (RSB) or Local Test Desk (LTD).

— Access for test systems such as AT&T's Mechanized Loop Testing (MLT) System to individual circuits (outside plant cable pairs and/or switching equipment) that are terminated at the DF.

Because of the variety of test and talk circuits that can be wired to the DF, and the interdependency of these systems on test systems and procedures used by the telephone company, test/talk arrangements vary widely from office to office. The *COSMIC Distributing Frame Systems Hardware Ordering Questionnaire,* ***Form E-8203, can be used by the telephone company to specify to AT&T Regional Engineering which test and talk circuits and test cords are to be provided.***

Circuit Functions

Test/Talk circuits fall into two broad categories:

- **Talk Circuits,** which provide for communication between crafts people located in different areas of the central office, or between the frame area and a remote test desk.
- **Test Circuits,** which allow test equipment at the RSB or LTD to gain access to circuits terminated or cross-connected on the MDF.

Descriptions of the various circuits follow.

Talk Circuits

There are several different talk circuits that can be wired to the *COSMIC* test/talk panels to provide either private talk channels (using headsets) or communication using frame-mounted transmitters and public address loudspeakers.

Local Frame Talk Line (SD-2P011-01). The Local Frame Talk Line, illustrated in Figure 7-D-1, is a private communication link using headsets between two areas of the *COSMIC* frame system. The jack sets can be equipped with optional lamps to indicate occupied channels.

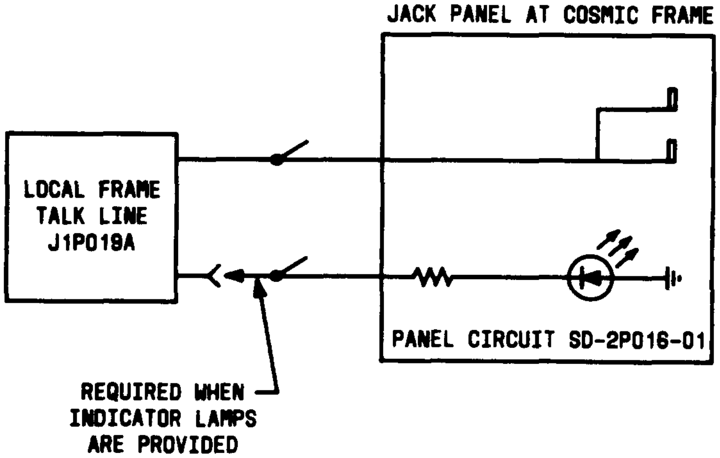


Figure 7-D-1. Local Frame Talk Line (SD-2P011-01)

Either one, two, or three circuits can be provided. At least one circuit is recommended in all frame systems. For frames consisting of two or more lineups, a second channel is recommended, and a third channel is optional.

Interframe Loudspeaker and Talk Line (SD-2P012-01). The Interframe Loudspeaker and Talk Line, shown in Figure 7-D-2, is used for communication between personnel located at two frames spaced far apart, where access to a paging loudspeaker is desired. Typical applications are for communication between a *COSMIC* MDF and a conventional MDF, between a *COSMIC* I or IA frame and the associated protector frame, or between two *COSMIC* lineups on different floors. A crafts person plugs a headset into a jack on a test/talk panel to activate the loudspeakers. When the responding crafts person plugs into the appropriate jack at his or her location, the loudspeaker is disconnected and a private talking path is established between the two jack positions. Optional lamps indicate occupied channels.

This circuit is arranged for one loudspeaker channel and up to three headset channels. In small *COSMIC* II or IIA offices, or in *COSMIC* I or IA frames where the working aisle is directly facing a single-sided protector frame, this circuit may not be necessary. Otherwise, a minimum of one channel, up to a maximum of three channels, is recommended.

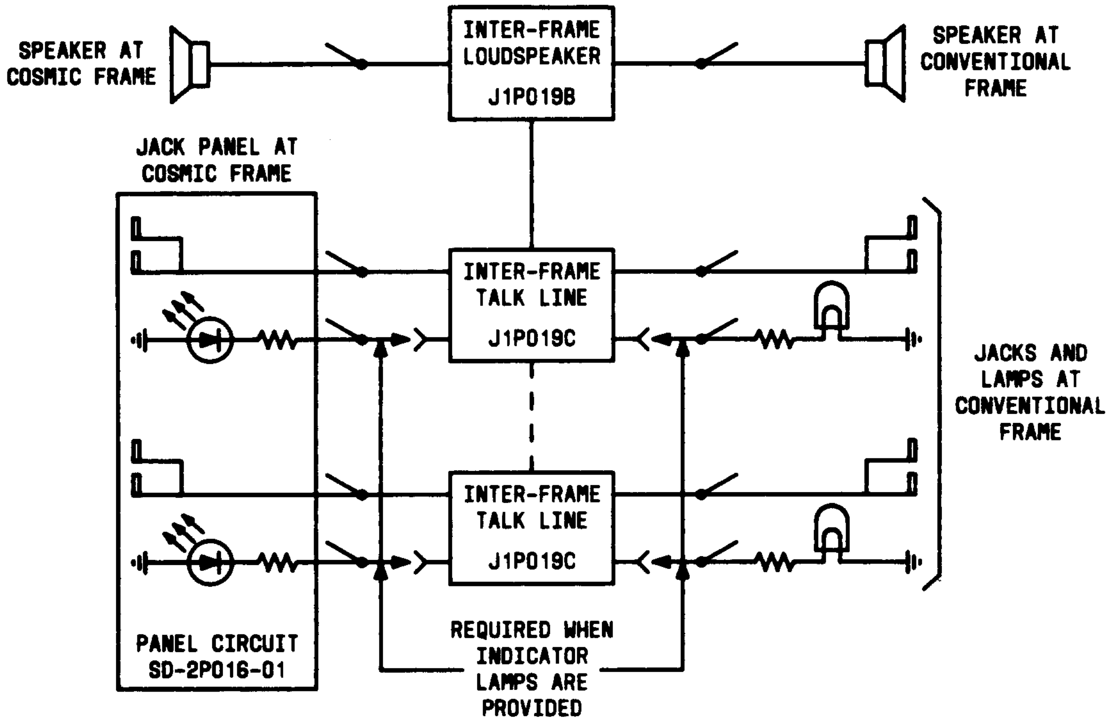


Figure 7-D-2. Inter-Frame Loudspeaker and Talk Line (SD-2P012-01)

Local Test Desk to Frame Talk Line (SD-2P013-01). The Local Test Desk to Frame Talk Line, Figure 7-D-3, is a communication link using headsets between jacks located on the frame and the local test desk. Optional indicator lamps at the frame can be used to signal the craft from the LTD. The lamp goes out once a headset is patched into the circuit at the MDF.

This circuit can be arranged for as many circuits as are needed. However, different electronics are required depending on whether the LTD is in the same building as the DF (that is, are interconnected via a "short" loop, less than 50 ohms) or in a different building (interconnected to the DF via a "long" loop, between 50 and 1,600 ohms).

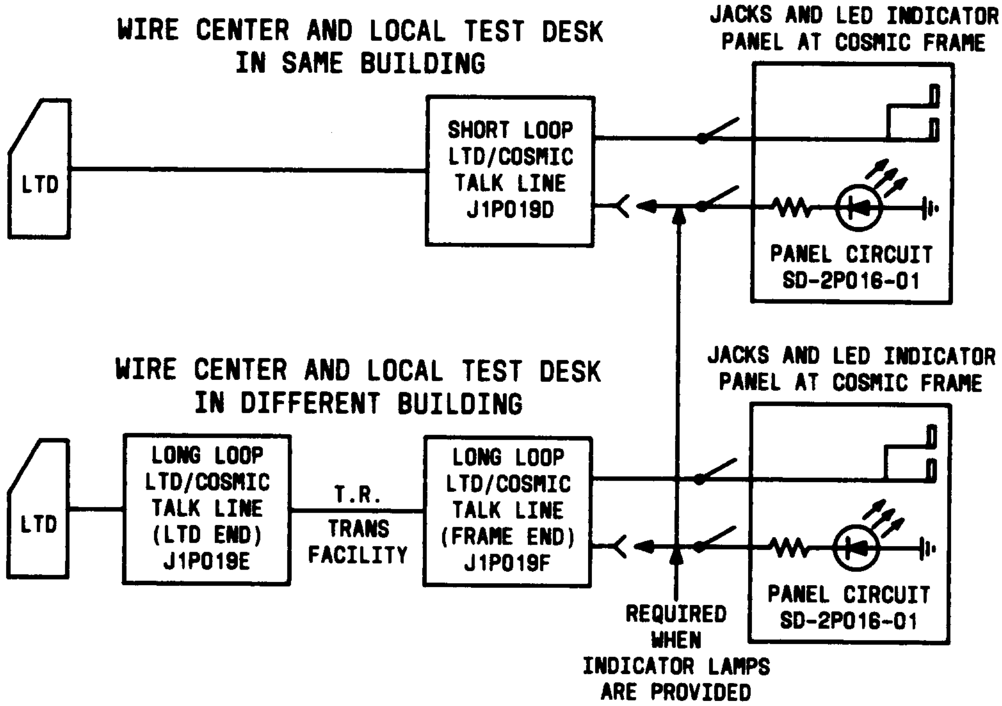


Figure 7-D-3. Local Test Desk to Frame Talk Line (SD-2P013-01)

Frame Maintenance Telephone Line (SD-2P014-01). The Frame Maintenance Telephone Line provides access to a key telephone system via headset jacks at the DF. This circuit, shown in Figure 7-D-4, provides a private talking path between frame attendants and people outside the central office. An outside person reaches this line by dialing an official number that has appearances in jacks on the distributing frame. It is equipped with a hold switch and an indicator lamp that flashes to signal an incoming call.

Generally, two circuits are recommended. More than two circuits may be appropriate if there will be frequent loop plant rearrangement activity requiring coordination between outside plant and central office personnel.

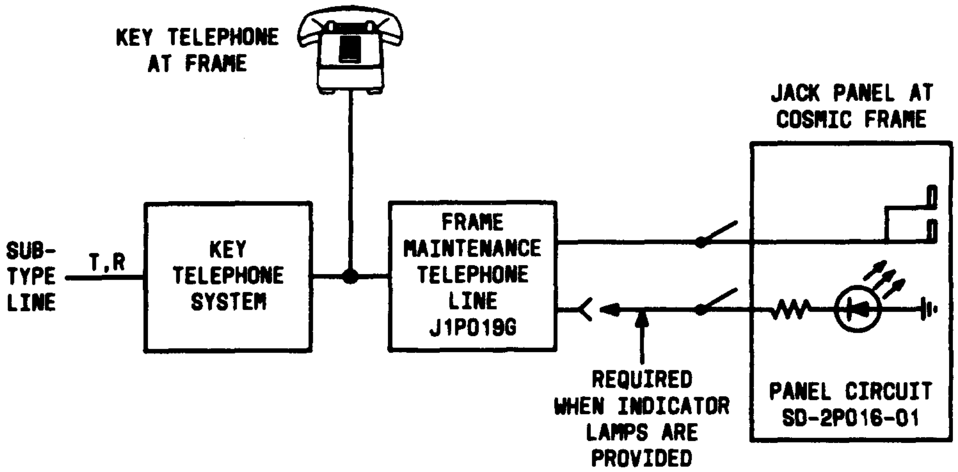


Figure 7-D-4. Frame Maintenance Telephone Line (SD-2P014-01)

Remote Testing Loudspeaker and Talk Line (SD-97559-01). Figure 7-D-5 shows the Remote Testing Loudspeaker and Talk Line, which is a communication system between a remote LTD and the frame area. It uses the overhead loudspeakers for the LTD to talk to the craft at the frame, and transmitters with push-to-talk buttons in frame-mounted panels for the frame craft to talk back to the LTD. The circuit can also be provided with frame-mounted jacks for private channel communications using a headset. A communication link is established between the remote LTD and the central office via either a dedicated facility or a dial-up telephone line.

One channel is suggested.

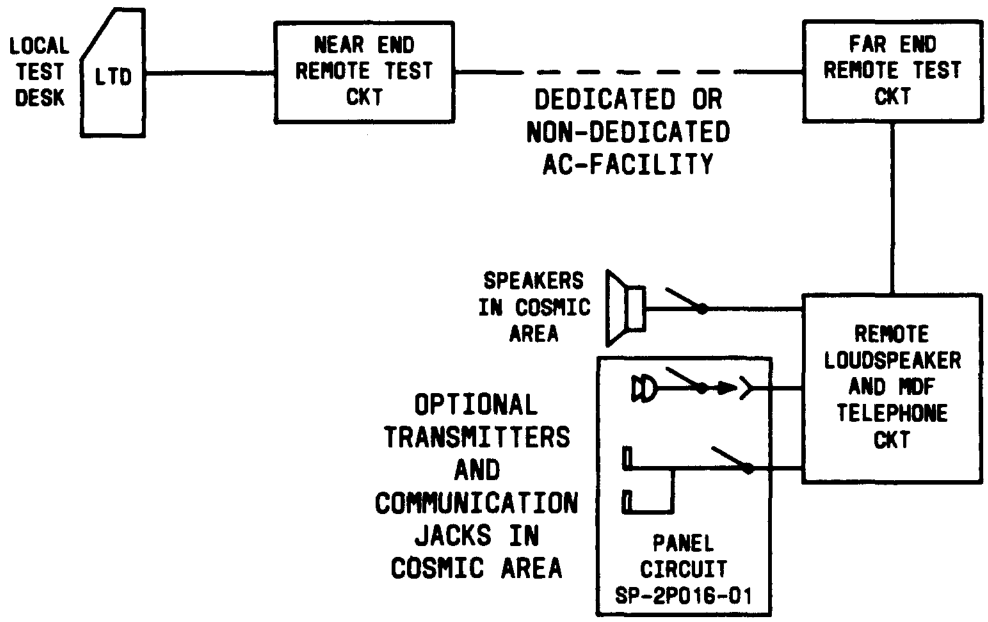


Figure 7-D-5. Remote Testing Loudspeaker and Talk Line (SD-97559-01).

MDF Loudspeaker and Transmitter Circuit (SD-96471-01). The Local Test Desk Loudspeaker and Transmitter Circuit provides communications between a local LTD and the frame area via loudspeaker and transmitter. This circuit is similar to the Local Test Desk Loudspeaker and Transmitter circuit described above, except is used when the LTD is located in the same building as the DF. See Figure 7-D-6.

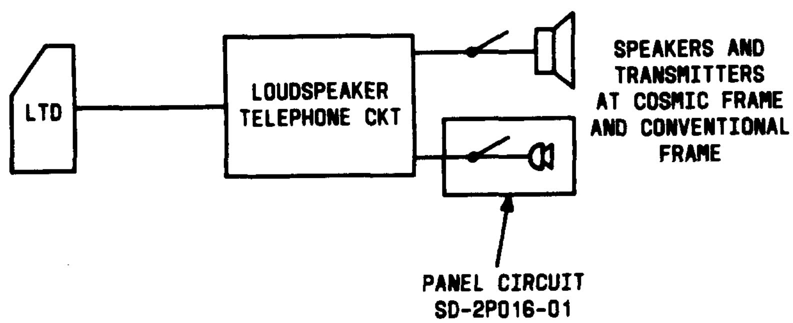


Figure 7-D-6. MDF Loudspeaker and Transmitter Circuit (SD-96471-01).

Telephone and Spare Jack Circuit. The telephone and spare jack circuit uses a frame miscellaneous circuit of the switching system to provide a headset communication link between the MDF and the maintenance area of the switch. Typically, one channel is provided for each switch entity.

Test Circuits

The test circuits described here are used with the various test cords during maintenance activities, for example to help locate faults in the outside plant. Most offices should be equipped with the Battery Supply, In-and-Out Test Trunks, and Conductor Identification Tone circuits described here. The other test circuits that are described are generally for older switching systems, such as No. 1 or No. 5 Crossbar switches, and are usually not needed in modern central offices.

Battery Supply. Provides +24 and -48 volt battery supply, plus ground and a high-resistance to ground (through a 12K ohm resistor), via pin jacks on the test/talk panels. It is typically used to provide ground and/or battery to the leads of an outside plant pair using the P2FL Test Cord (which bridges onto the pair through the test-access points of a 4C-type protector unit plugged into a 307-type connector) or a P2EF test Cords (used with 302- and/or 308-type connectors). Battery supply is provided at convenient points along the frame — typically in every equipment module.

The KS-21348 **Test Pin Jack Adapter** provides access to these pin jacks by test cords equipped with alligator clips.

In-and-Out Test Trunk (SD-90070-01). The In-and-Out Test Trunk provides access for a loop testing system such as AT&T's Mechanized Loop Testing (MLT) System to jacks at the MDF. A test patch cord such as the W4CT cord (for 307-type connectors) or W4CP cord (for 302- or 308-type connectors) can then be patched from the jacks to the protector unit position of the circuit under test.

In-and-Out Test Trunks are recommended for all offices. Most offices are equipped with two trunks, although the number of circuits depends on the capacity of the loop test system.

Conductor Identification Tone Circuit (SD-95689-01) The Conductor ID Tone Circuit is a relay-rack mounted unit that is cabled to jacks on the protector side of the DF to provide tone for outside plant maintenance and testing. Having this circuit multipled along the frame eliminates the need to use a portable tone generator. The circuit provides a 577 Hz tone, warbled between 2 and 7 Hz, with two jack appearances: one is a high-level tone at +6 dBm, and the other is a low-level tone at 0 dBm (1 mW). The frame attendant uses a W2HJ patch cord between the circuit's jack appearance on the DF and the protector unit position of the outside plant pair under test. One circuit is recommended, to be multipled along the protector side of the frame.

Older Test Circuits. Several older test circuits that had appearances at the MDF are described here. These circuits are generally needed only for additions to existing frames.

Automated RSB to MDF Test Circuit (SD-2P033-01). The ARSB to MDF test circuit is wired like an in-and-out test trunk to provide access of the ARSB to outside plant pairs under test. This circuit was used with MLT-1 system to access outside plant pairs terminated on the frame via two subscriber line appearances, which were multipled to jack appearances along the frame. Modern MLT-2 systems use the standard In-and-Out Test Trunk described previously.

Service-Observing/Service-Evaluation Circuits. Service-Observing and Service-Evaluation Circuits monitor switching equipment, typically for traffic studies. The W2GY test cord is used to connect service observing jacks on the rear of the DF to the wire-wrap posts on the rear of the 78- or 112-type connecting block terminating the switching equipment.

Service observing circuits are usually provided in increments of 50 or 100 jacks. However, modern switching systems generally have a built-in service evaluation system, and so do not need to have these circuits terminated on the frame.

Varley Tests. Varley tests allow location of resistance faults in the outside plant cable. A wheatstone bridge in the Local Test Desk in the central office is used to measure resistance imbalances between the tip and ring of a suspected bad pair. A known good pair is used to provide access for the wheatstone bridge to the far side of the bad pair. The good and bad pair are patched to the jack appearances of the wheatstone bridge at the DF using the W4CU cord (for 307-type connectors) or the W4CR cord (for 302- or 308-type connectors).

Varley tests have generally been made obsolete by modern testing systems such as the MLT System.

Plugging Up Line Circuit. The plugging-up line circuit provides a communication and test link between the Master Test Frame of a No. 1 or No. 5 Crossbar switch and the DF.

Engineering

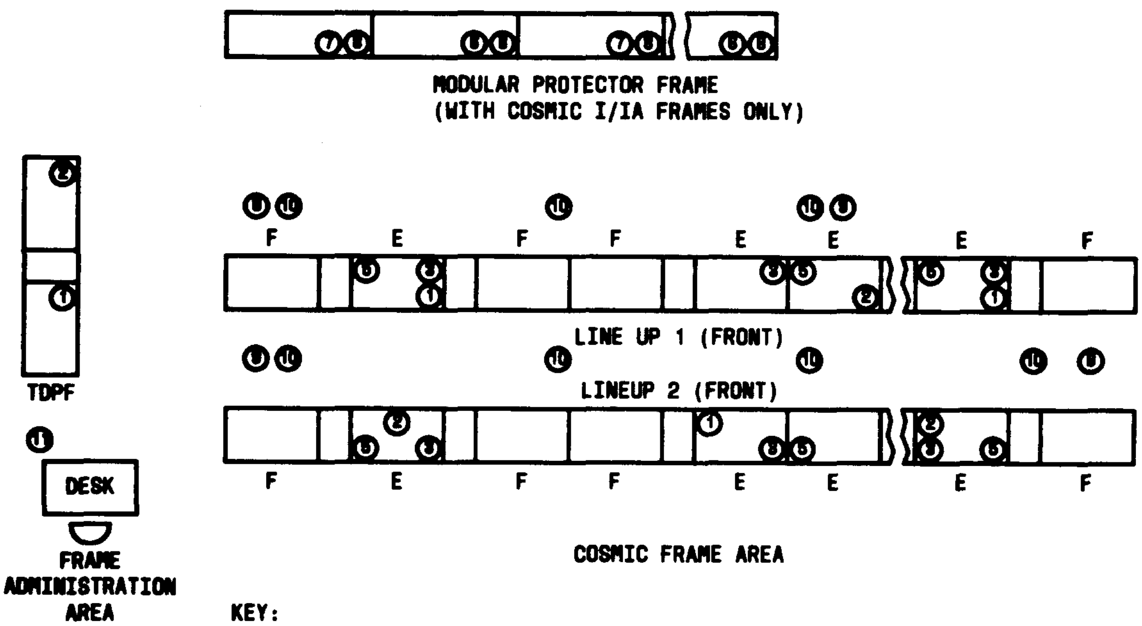
Because of the wide variety of test and talk circuits that can be wired to the DF, and the interdependency of these systems on test systems and procedures used by the telephone company, the specific test/talk arrangement will vary from office to office. The *COSMIC* Distributing Frame Systems Hardware Ordering Questionnaire, ***Form E-8203, can be used by the telephone company to specify to AT&T Regional Engineering which test and talk circuits and test cords are to be provided.***

Once the test and talk circuit requirements have been identified, the engineering process consist of:

- Determining the types of panels needed and their locations on the distributing frame and protector frame.
- Determining which jack modules and individually-ordered components are needed.

Arrangements of Test/Talk Panels and Loudspeakers

Figure 7-D-7 summarizes the panel and loudspeaker arrangements for typical *COSMIC* frames.



KEY:

1. TRANSMITTER & BATTERY SUPPLY PANEL - KS-21316,L8
2. JACK PANEL - ED-6C110-10,G23
3. TRANSMITTER, BATTERY SUPPLY & JACK PANEL - COSMIC IIA FRAMES ONLY - ED-6C110-10,G25 & MOUNTING BRACKET KS-21316,L9
4. JACK PANEL - COSMIC IIA FRAMES ONLY (IF NEEDED) - ED-6C110-10, G26 & MOUNTING BRACKET KS-21316,L9
5. SERVICE OBSERVING PANEL - IF NEEDED:
   - COSMIC I FRAMES - KS-21330,L2 PANEL & ED-6C111-11 G6 CORD-HANGING BRACKETS
   - COSMIC IA AND IIA FRAMES - ED-6C111-11,G2
6. TRANSMITTER, BATTERY SUPPLY & JACK PANEL - MODULAR PROTECTOR FRAME ONLY - ED-6C110-10,G8
7. BATTERY SUPPLY AND JACK PANEL - MODULAR PROTECTOR FRAME ONLY - ED-6C1101-10,G9
8. JACK PANEL (IF NEEDED) - MODULAR PROTECTOR FRAME - ED-6C110-10,G10
9. PAGING LOUDSPEAKER - ED-6C111-11,G7
10. PAGING LOUDSPEAKER - ED-6C111-11,G4
11. PAGING LOUDSPEAKER WITH VOLUME CONTROL - ED-6C111-11,G3

E EQUIPMENT BAY

F FACILITY BAY

Figure 7-D-7. Typical Arrangement of Test/Talk Panels and Loudspeakers

Cross-Connect Side of *COSMIC* I, IA, II, IIA, and Mini DFs

KS-21316, List 8 Transmitter and Battery Supply. It is recommended that one KS-21316, List 8 panel be placed on the right end of shelf 5 of every other equipment module, starting with the first equipment module in the lineup (that is, spaced about every 26 feet (8 m) along the frame).

On the TPDF, one panel should also be placed on the right end of shelf 5 of every other module.

ED-6C110-10, Group 23 Jack Panel. One jack panel should be placed on the right end of shelf 5 of every other equipment module, starting with the second equipment module in the lineup (spaced about every 26 feet (8 m) along the frame). A panel should also be placed in every other module of the TPDF.

Protection Side of *COSMIC* II or IIA DFs

ED-6C110-10, Group 25 Transmitter, Battery Supply and Jack Panel. One ED-6C110-10 Group 25 panel is recommended in every equipment module.

A KS-21316, List 9 mounting bracket is required for mounting the panel to the framework.

ED-6C110-10, Group 26 Jack Panel. The ED-6C110-10 Group 26 panel is used in addition to the Group 25 panel if more space for jack modules is needed.

A KS-21316, List 9 mounting bracket is required for mounting the panel to the framework.

Service Observing Panels

For offices needing service-observing/service-evaluation system panels, one panel should be placed in the back of each equipment module. Use the KS-21330, List 2 panel for *COSMIC* I frames, and the ED-6C111-11, Group 2 panel for *COSMIC* IA, II, and IIA frames.

Also for *COSMIC* I frames, place one set of ED-6C111-11, Group 6 cord-hanging brackets in the rear of each equipment module.

Modular Protector Frames

ED-6C110-10, Group 8 Transmitter, Battery Supply, and Jack Panel. One panel should be placed in every even-numbered protector frame module.

ED-6C110-10, Group 9 Battery Supply and Jack Panel. One panel should be placed in every odd-numbered PF module.

ED-6C110-10, Group 10 Jack Panel. This panel is used in addition to Groups 8 and 9 as needed.

Double-Sided Protector Frames

ED-6C110-10, Group 44 Transmitter, Battery Supply, and Test Panel. The ED-6C110-10 Group 44 panel is typically located in vertical 8 of the frame, and then in every fourteenth vertical from there.

ED-6C110-10, Group 43 Jack Panel. The ED-6C110-10 Group 43 panel is typically located in vertical 9 of the frame, and then in every fourteenth vertical from there.

Loudspeakers

Two ED-6C111-11 Group 7 loudspeakers should be located in each maintenance aisle. These speakers are wired from an Interframe Loudspeaker Paging Circuit located on a miscellaneous relay rack.

ED-6C111-11 Group 4 speakers should be located every thirteen feet in the maintenance aisles. An ED-6C111-11 Group 3 speaker should also be located in the frame administration area. Both of these speakers are wired from a Local Test Desk Loudspeaker Circuit located on a miscellaneous relay rack.

Selection of Jack Modules

The Jack and Test Panel Circuit (SD-2P016-01) controls all wiring of test/talk circuitry on the MDF. For circuits that are multipled at the MDF (such as most of the talk circuits) a miscellaneous connecting block on the MDF is needed for the interconnection of cabling from the test/talk equipment to the frame wiring. This block may be located in the TPDF, or any convenient location on the MDF.

Table 7-D-A shows which jack sets are used for the various talk circuit, and Table 7-D-B provides information on the test circuits.

All jacks are wired from cabling buses routed along the top of the frame. Either 710- or 711-type splicing connectors are used to bridge onto the cabling busses above each module as needed.

Figure 7-D-8 shows a typical arrangement of jack modules in the jack panels used in a *COSMIC* IIA frame installation.

Table 7-D-A. Apparatus for Talk Circuits

Circuit Type	Components Required Per Frame Appearance	Jack Module Used: ED-6C110-10
Circuits with optional lamp: Local Frame Talk Line (SD-2P011-11) Interframe Ldspkr and Talk Line (SD-2P012-01) LTD to Frame Talk Line (SD-2P013-11)	2 KS-21463, L1 jacks and 1 KS-20761, L4 socket with 534A LED	Part of Group 102 or 115
Circuits without optional lamp: Local Frame Line (SD-2P011-01) Interframe Ldspkr and Talk Line (SD-2P012-01) LTD Frame Talk Line (SD-2P013-01)	2 KS-21463, L1 jacks	Part of Group 105
Frame Maintenance Telephone Line (SD-2P014-11)	2 KS-21463, L1 jacks, 1 KS-20761, L4 socket with 534A LED, 1 KS-21748, L1 switch	Part of Group 106
Subscriber Line Circuits T-2P033-)	2 KS-21463, L1 Jacks	Part of Group 102 or 115
Remote Test Loudspeaker and Talk Line (SD-97559-01), or MDF Loudspeaker and Transmitter (SD-96471-01)	1 KS-20761 socket with 534A LED, 1 KS-21748, L1 switch	Group 108 (provided as part of the various transmitter panels)
Remote Test Loudspeaker and Talk Line (T-97559-11) arranged for headset access	1 KS-21463 L1 jack and 1 KS-21463 L3 jack	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
Telephone and Spare Jack Circuits: Frame Misc. Ckts Frame Line Ckt Line or Trunk Ckt	2 KS-21463, L1 jacks and 1 KS-21001, L1 jack	Part of Group 103 or 115, or KS-21745, L9
Telephone and Spare Jack Circuits with auxiliary contacts: Frame Misc. Ckt: Crossbar No. 5 (T-25204-1) Crossbar No. 5 (T-25574) Frame Talk Line (T-96379-) Line or Trunk Ckt. (T-99434-)	2 KS-21463, L3 jacks and 1 KS-21001, L1 jack	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components

Table 7-D-B. Apparatus for Test Circuits

Circuit Type	Components Required Per Frame Appearance	Jack Module Used: ED-6C110-10
In-and-Out Test Trunk Ckt (T-90070-11) Test Trunk for Manual Varley 3 Tests (T-90403-01)	2 KS-21463, L1 jacks	Part of Group 105
Conductor Identification Tone Circuit (T-95689-)	2 KS-21463, L3 jacks 1 KS-20761, L4 socket with 534A LED	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
ARSB Loop Testing Circuit (T-2P033-), In-and-Out type with indicator lamp	1 KS-21463, L1, jack 1 KS-21463, L3 jack 1 KS-20761, L4 socket with 534A LED	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
Test Trunk Circuit (Bridging) (T-90071-)	2 KS-21463 L1 jacks	Part of Group 105
Plugging-Up Line Circuit, with or without automatic cut-through (T-95597 or T-25471)	2 KS-21463, L3 jacks	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
Test Trunk arranged for Wheatstone Bridge Test with Manual Varley 3 Test (T-90403-11) arranged for tandem connection to succeeding office	2 KS-21463, L3	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
Test Trunk for Automatic Varley 3 Test (T-95545)	1 KS-21463 L3 jacks, 1 KS-21463, L5 jack, 1 KS-20761, L4 socket and 574A LED	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
Test Trunk for Intermittent Trouble Crossbar No. 5 (T-26113-)	1 KS-21463, L1 jack and 1 KS-21463, L3 jack	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components
Test Trunk for Intermittent Trouble Crossbar No. 1 (T-25505-)	2 KS-21463, L1 jack and 1 KS-21463, L3 jack	Part of Group 101 or 104, or KS-21745 L7, equipped with individually-ordered components

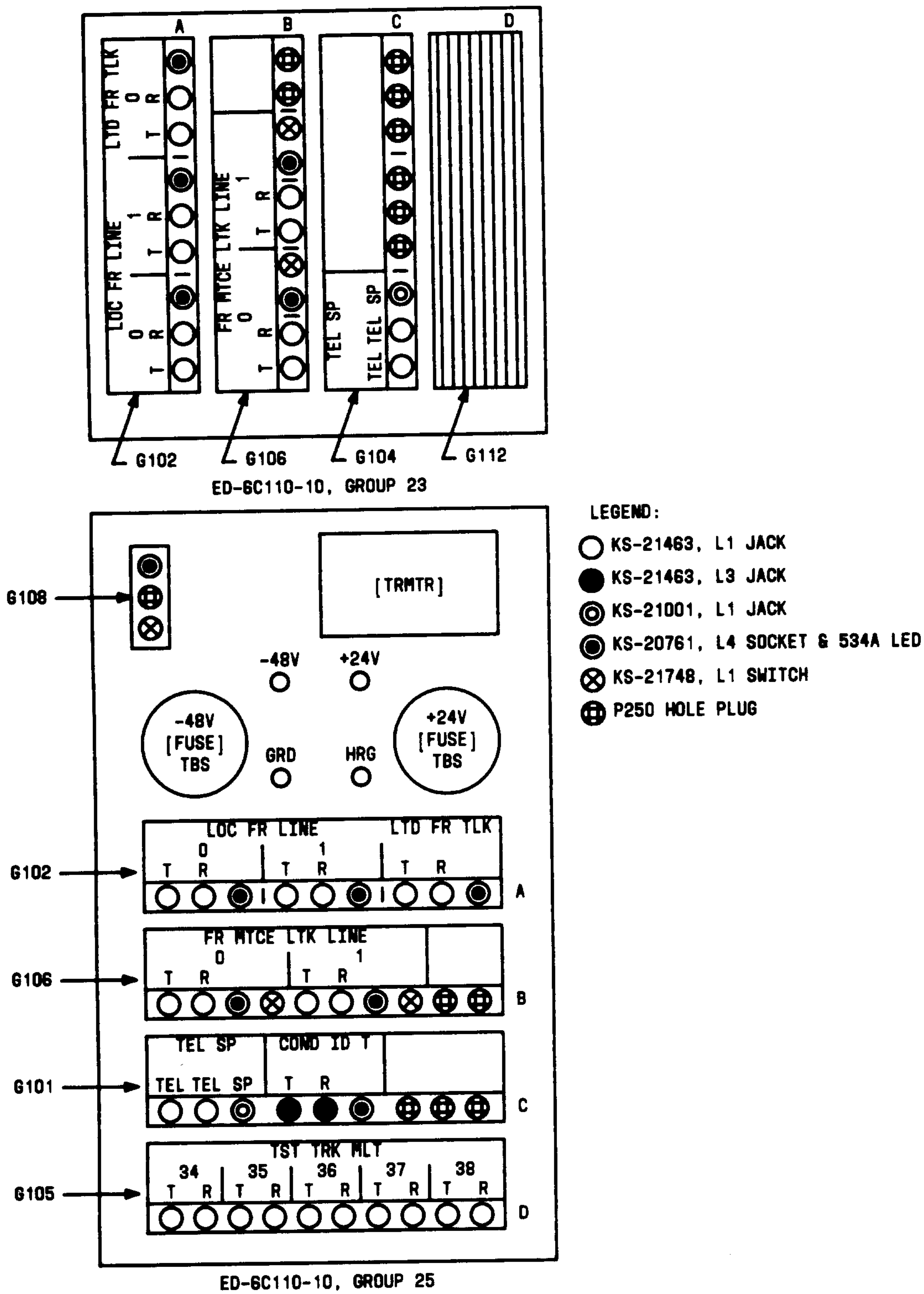


Figure 7-D-8. Typical Jack Arrangements

References

Practices

- 824-102-103, "Protector and Distributing Frame, Test/Talk Systems, Equipment Design Requirements, Plant Service Systems," J1P019.
- 201-216-101, "Miniature Test/Talk System, Description, Distributing and Protector Frames."
- 201-216-102, "Cords and Plugs, Description, Miniature Test/Talk System."
- 216-732-501, "Plugging-Up Line Circuit, Tests, No. 1 Crossbar Offices."
- 218-708-501, "Plugging-Up Line Circuits SD-25741-01, Tests, No. 5 Crossbar Offices."

Drawings

- ED-6C111-10, "Miniature Test/Talk System, Typical Equipment Layout, Method of Installation, and Cabling."

Schematic Information

Table 7-D-C provides schematic information for Test/Talk systems.

Table 7-D-C. Schematic Information

Circuit	Schematic Drawings		Equipment
Jack and Test Panel Circuits	SD-2P016-01	T-2P016-12	ED-6C110-10, ED-6C111-11
Local Frame Talk Line	SD-2P011-01	T2P011-11	J1P019A-( )
Interframe Loudspeaker and Talk Circuit	SD-2P012-01	T-2P012-11	J1P019B-( ), J1P019C-( )
LTD Frame Talk Line	SD-2P013-01	T-2P013-11	J1P019D-( ), J1P019E-( ), J1P019F-( )
Frame Maintenance Telephone Line	SD-2P014-01	T-2P014-11	J1P019G-( )
In-and-Out Test Trunk Circuit	SD-90070-01	T-90070-16	J93016C4-( )
ARSB Loop Testing Circuit	SD-2P033-01	T-2P033-	J1P023K-( )
Conductor ID Tone Circuit	SD-95689-01	T-95689-12	J93016AP-( )
Universal Line or Trunk	SD-99434-01	T-99434-31	J99235CW-( )
No. 5 Crossbar Test Trunk Ckt for Detecting Intermittent Trouble	SD-26113-01	T-26113-	
Plugging Up Line with/without automatic cut-through	SD-95597-01	T-95597-	
No. 5 Plugging Up Line Ckt with Automatic Cut-Thru	SD-25741-01	T-25741	
Remote Testing - MDF Loudspeaker (far end) Remote Testing — MDF Loudspeaker (CO end)	SD-97559-01 SD-96471-01	T-97559-12 T-96471-11	J93016D J95001H-( ) J95001J-( )
Test Trunk arranged for Wheatstone Bridge Tests with Manual Varley 3 Tests		T-90403-11	
Auto Varley Test Trunk	SD-95545-01	T-95545-	

SECTION 8

INSTALLATION AND CABLING

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SECTION 8

INSTALLATION AND CABLING

This section provides initial installation and cabling information, including requirements and methods to be followed and the tools and supplies to be used. Refer to ED-6C146-10 for framework information, and ED-6C146-50 for cabling methods.

8.1 *COSMIC* Framework Installation

8.1.1 Preparation

Supplies and Tools

Prior to starting work operations covered by any section, an analysis should be made to determine the tools and supplies required. These should be obtained before going to the work location and then arranged at the work location in the most convenient manner.

Electrical appliances and tools shall be plugged into the building outlets, not the frame base outlets of live frames, to eliminate any grounding problems. The only exception to this is that electrical tools and test sets to be used *on* live frames should be plugged into the frame base outlet.

Precautions

The specific precautions to be taken against personal injury, equipment damage, and service interruptions are covered in each procedure as they apply. General precautions are to be observed at all times.

Live wiring, such as power feeder cable lugs, that is exposed during installing operations shall be covered with a suitable insulating material, such as R-3154 Protective Sheeting or equivalent.

Sprays and cleaners can damage plastic parts. Do not apply any sprays or cleaners to products that have not been approved. Be especially careful not to expose any plastic parts to chemicals containing trichloroethane, such as certain cleaning fluids and lubricant sprays.

Specifications and Drawings

In general, the primary source of requirements for installations are the Standard Drawings, such as ED, H, J, and T Drawings which will be supplied through AT&T Regional Engineering Centers or through AT&T field support.

The Standard Drawings may be modified by job specifications and/or drawings per local conditions. In such cases, the information shown on the job specifications and drawings supersedes the standard information.

The information in this section is to supplement and/or explain the standard drawings and job specifications, and to outline the most efficient installation sequence.

Tools and Supplies

In addition to the tools normally available on the job, the following AT&T supplies or equivalent are required for framework installation.

Tool Kit 33	Vacuum Cleaner
Tool Kit 66A	Masonry Drilling
Tool Kit 69	Floor Supported Hoisting Center (may be required if building conditions do not allow for construction of a ceiling supported hoisting center)
Tool Kit 102	General Tool
R-1313*	Line, Fish
R-1314*	Plumb Bob, Steel
R-1545	Wrench, Socket, Hex 11/16 inch Special
R-2792	General Use Wrench Set
R-2795*	Wrench, Socket, 1/2 inch Square and 5/8 inch Hex. Combination
R-2806*	Handle, Reversible Rachet for 1/2 inch Square Drive Wrench Sockets
R-2819	Wrench, Sockets, Details 5 and 6
R-3057	Wrench, Socket, Hex. Pivoted
R-3470	Dolly Wheels (TS-808)
R-3626	(2) Electric Hoist
R-3662	Steel Strapping Cutter
R-3671	Clamp, "e" 8
R-3681	Eye Bolt, 5/8
R-4223	Hoisting Fixture (bottom of frame)
TS-829	Vise Grip Pliers (R-4479)
Comcode 841 629 488	Shim, Leveling, .064 inch (1.6 mm) thick
Comcode 841 629 496	Shim, Leveling, .125 inch (3.2 mm) thick
Comcode 841 629 504	Shim, Leveling, .250 inch (6.4 mm) thick

* These tools are contained in Tool Kits 43 and 48.

8.1.2 Laying Out Floors

The "Floor Plan Data Sheets" and installation drawings provided by Engineering should be used to lay out the frame system and mark the floor for drilling. For additional floor layout information, see ED-6C146-10.

8.1.3 Drilling Floors

To drill holes into concrete floors, a drill and masonry drill bit is required. Smooth holes are required for drop-in anchors.

If during the drilling operation a reinforcement rod is hit, locate a new hole, 1 inch (25 mm) away on a 45° angle.

8.1.4 Installing Anchors in Non-Earthquake Areas

Each bay receives two anchors. The anchors and attaching hardware are furnished with the ED-6C142-30 groups.

8.1.5 Installing Anchors in Earthquake Areas

Each bay receives four anchors. The special anchors and attaching hardware may be ordered with the ED-6C142-30 groups.

8.1.6 Transporting *COSMIC* Frames to Lineups

Attaching Dolly Wheels

The R-3470 (set 808) dolly wheels are used to transport the modules into position.

Attach one dolly wheel to each corner of the module. Move the lever to the "latched" position.

Raise the module off the floor approximately 1/4 inch (6 mm) using the dolly wheel handle.

Disengage the hoist hook and remove the eye bolt.

Transporting the Frames

Moving frames with the R-3470 dolly wheel should be done cautiously.

Transport the bay to lineup position.

Do not remove dolly wheels until alignment and leveling procedures have begun.

8.1.7 Assembling the Frames

Refer to the engineering and ED drawings for the proper bay to start with.

If possible, start at center of line up and work towards both ends. Such procedure will eliminate dimensional error accumulations.

Start by bolting the right and left outside plant bay together using the R-4479 vise grip pliers at the bottom of the front of the adjoining bays, and 8-inch (203 mm) C clamps R-3671.

Bolt the vertical channel assembly to the outside plant bay.

Bolt the next equipment bay to the vertical channel assembly.

Shim as required, but ***do not*** anchor to the floor.

Bolt the next bay together using the vise grips and the C clamp to hold it in place. Figure 8-1 shows a typical frame arrangement.

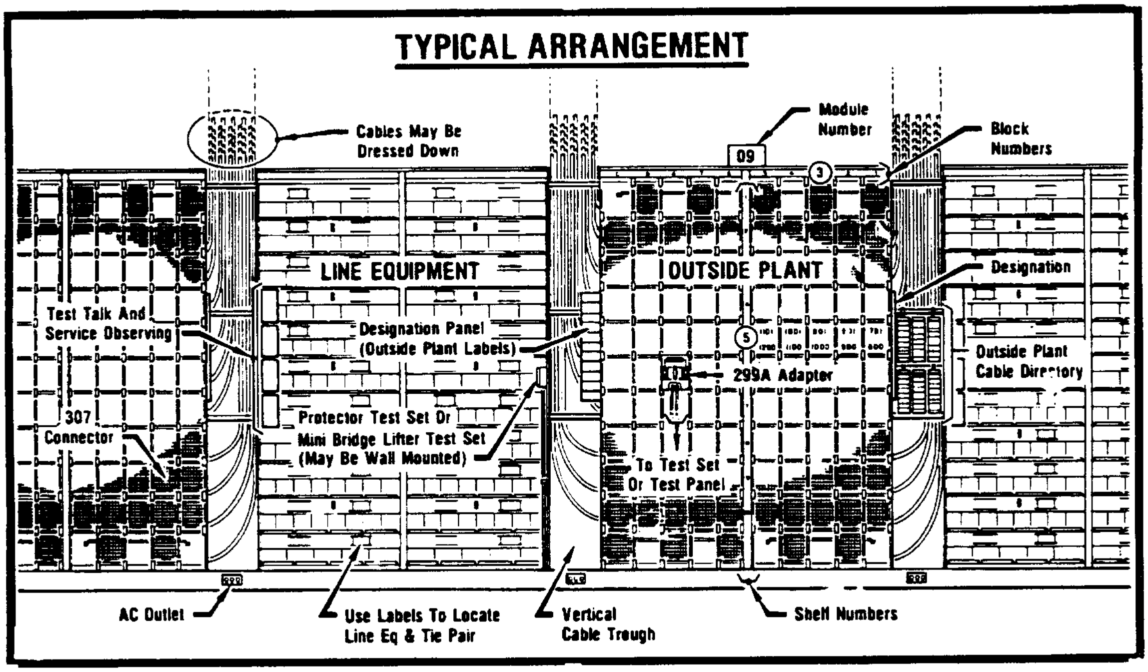


Figure 8-1. Typical *COSMIC* Frame Arrangement

8.1.8 Aligning the Frames

The following aligning procedures should be performed.

Locate the base with the front edge on the floor line.

The top should then be aligned vertically within a variation of 1/4 inch (6 mm) in both directions. Use a R-1314 Plumb Bob and shims.

Distributing frames may follow the general contour of the floor. However, for appearance reasons, the shelves of distributing frames should not be more than 1/4 inch (6 mm) above or below a straight reference line extending the full length of the indicated ultimate lineup.

This reference line may slope with the floor. In checking this requirement, use the R-1313 Fish Line drawn tightly under the transverse arms from the ends of the frame lineup.

Insert short pieces of 3/8 inch (10 mm) bar under the frame to facilitate moving the frame when aligning it horizontally.

Use shims, strips of wood, auxiliary framing bars, or conduit to help maintain the alignment of each bay until the frame can be bolted in place.

Plumb the frame using the R-1314 Plumb Bob. The frame base should rest on the floor except where it is necessary to raise the frame slightly in order to level and align the frame.

The vertical parts of the framework should be plumb to within a deviation of 1/4 inch (6 mm).

After aligning and locating the base of the frame, remove the short pieces of 3/8 inch (10 mm) bar.

8.1.9 Leveling the Frames

Shims of the proper thickness should be used under the base of the frames, when required.

The leveling shims are made of steel 9.25 inches (235 mm) long by 4 inches (102 mm) wide.

Shim, .064 inch thick (1.6 mm) (Comcode 841 629 488)
Shim, .125 inch thick (3.2 mm) (Comcode 841 629 496)
Shim, .250 inch thick (6.4 mm) (Comcode 841 629 504)

Any combination of the three leveling shims on top of each other can be used under each corner of the left and right framework.

If shims are required under framework corners receiving anchors, place one set of shims on each side of the anchor.

8.1.10 Fastening Frames

To Floors

Use the R-2806 Reversible Handle and the R-2795 combination 1/2 inch square and 5/8 inch hexagon wrench socket for tightening floor bolts (Figure 8-2).

Each bay will receive two anchors (Figure 8-3).

In earthquake areas, each bay will receive four anchors (Figure 8-4).

COSMIC DFs are to be fastened in accordance with:

- ED-6C146-10 (*COSMIC* IA/IIA DF)
- ED-6C313-10 (*COSMIC* Mini DF)

These drawings also contain earthquake fastening requirements.

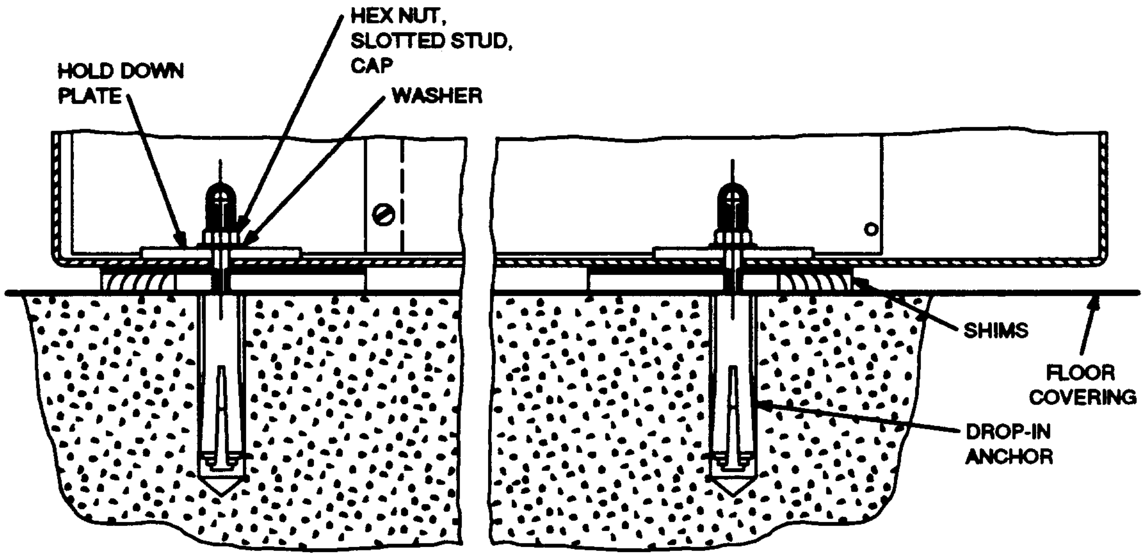


Figure 8-2. Method of Bolting Frames to Floor

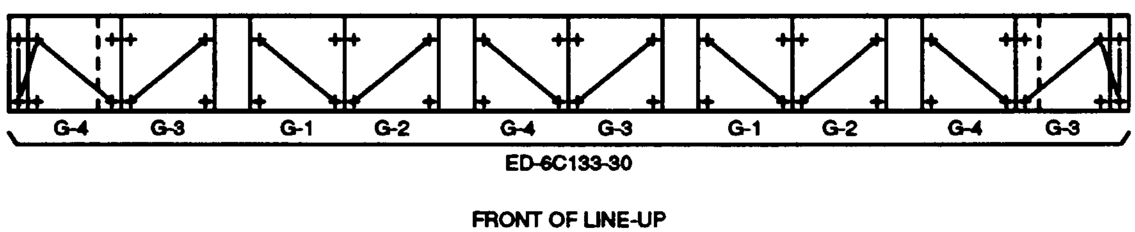


Figure 8-3. Bolt Pattern in Non-Earthquake Areas (2 Per Bay)

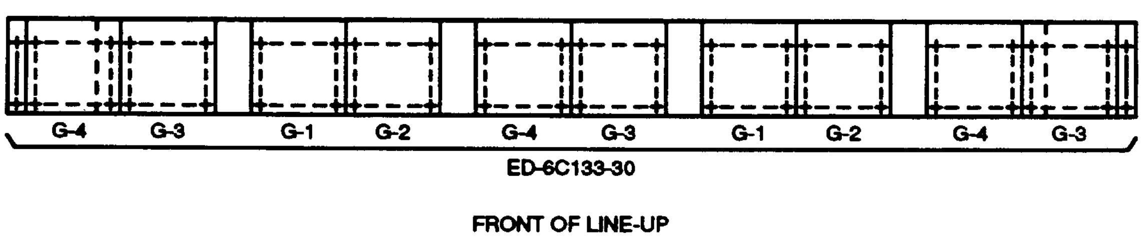


Figure 8-4. Bolt Pattern in Earthquake Areas (4 Per Bay)

To Superstructure

Use the R-3057 Double Ended 5/8 inch — 7/8 inch socket wrench for tightening the nuts on the bolts securing the top to auxiliary framing.

Bolt the top support and the retaining bracket to top of frame at specified locations.

Ground frame per ED-6C145-30.

Install trim panels prior to the installation of cable racks over the maintenance aisles.

8.2 Identification on Vertical Channel Assembly

Stamp the rear of the vertical channel assembly with 3/8 inch (9.5 mm) black characters or labels (Figure 8-5). The stamping identifies the 11-type stub cables or switchboard cables associated with the shelves for 307 connectors or 78 or 112 connecting blocks. The stamping may go on the cable brackets or on the channel plate behind the cable brackets. See ED-6C146-10 for further details.

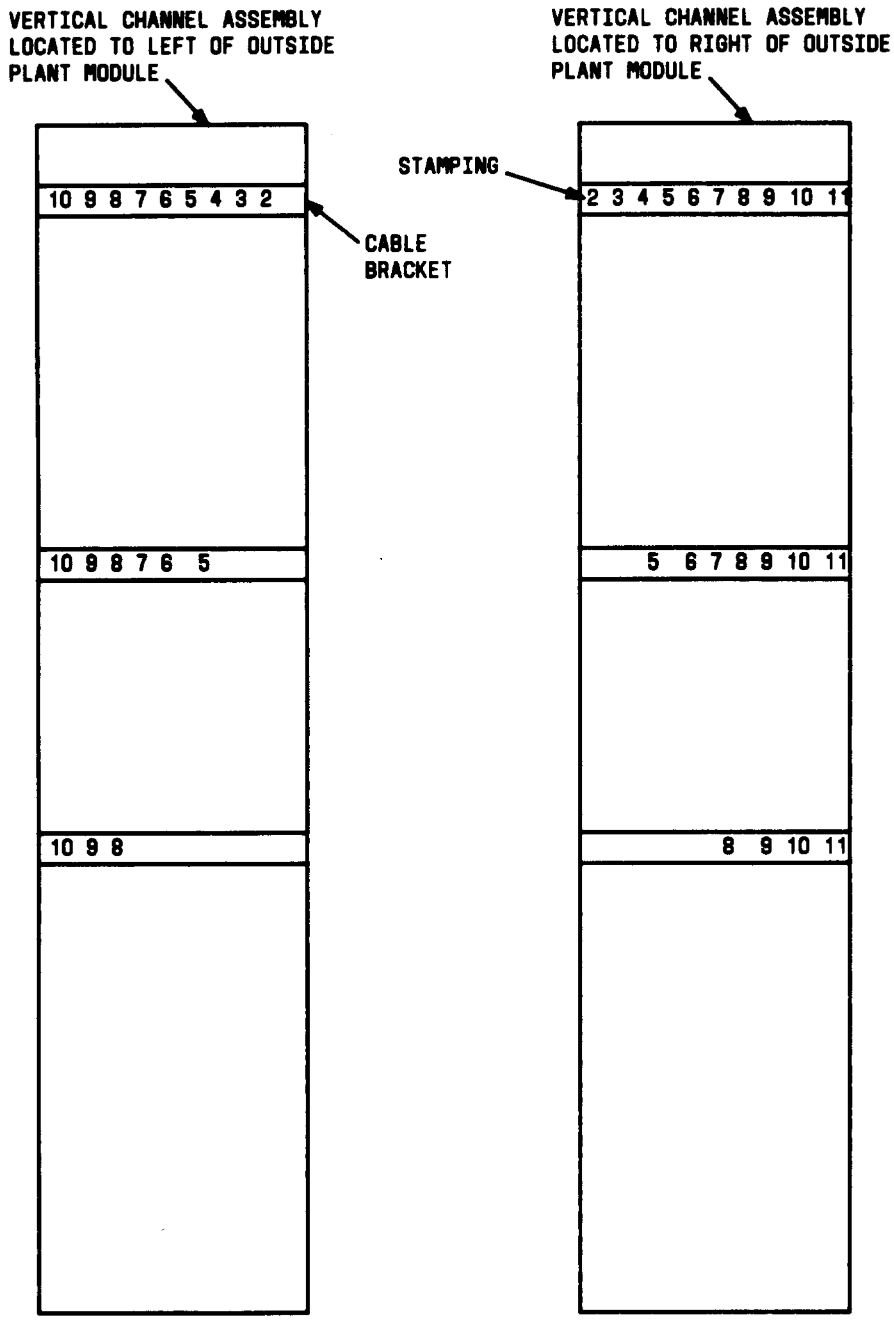


Figure 8-5. Identification on the Rear of the Vertical Channel Assembly Identify Outside Plant Cables Entering from an Overhead Cable Rack

8.3 Identification on Horizontal Identification Strips

On the rear and at the top of the outside plant (facility) module, identify the module number with 1-inch (25 mm) black characters on the horizontal identification strips 842 389 066 and 842 389 074 (Figure 8-6).

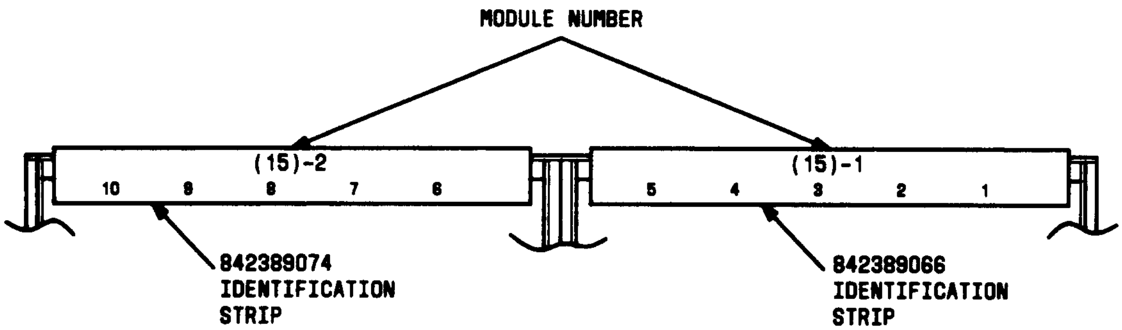


Figure 8-6. Module Number on Identification Strips

8.4 Identification Equipment Module

On the rear and at the top of the equipment module, identify the module number and side number with 1-inch (25 mm) black characters on framework (Figure 8-7).

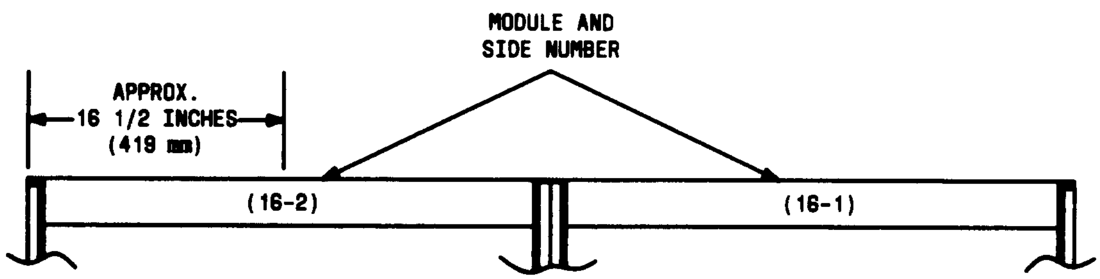


Figure 8-7. Module and Side Number on Equipment Module Framework

8.5 Installing Designation Card Holders and Designation Cards

On the front and at the top of the modules, install the designation card holders (Figure 8-8) and install the designation cards in the holders (Figures 8-9 and 8-10). See ED-6C146-10 for further information.

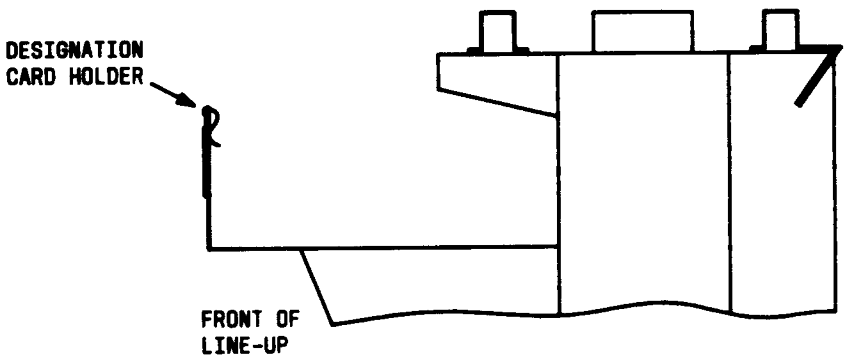


Figure 8-8. Installing Designation Card Holder

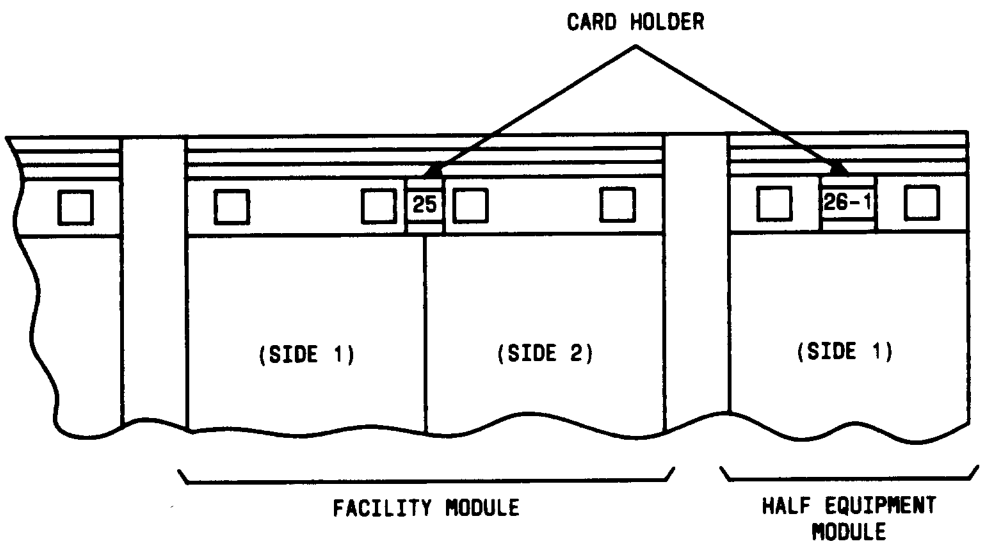


Figure 8-9. Typical Location of Designation Card Holders

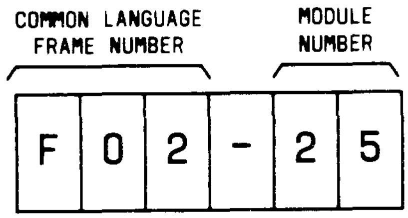


Figure 8-10. Typical Designation Cards in Card Holder

8.6 Installing the KS-20100 and 182A Protector Unit Test Sets

The KS-20100 and 182A protector unit test sets should be located on a nearby wall or on the rear of the framework as specified by the end user. An example is shown in Figure 8-11.

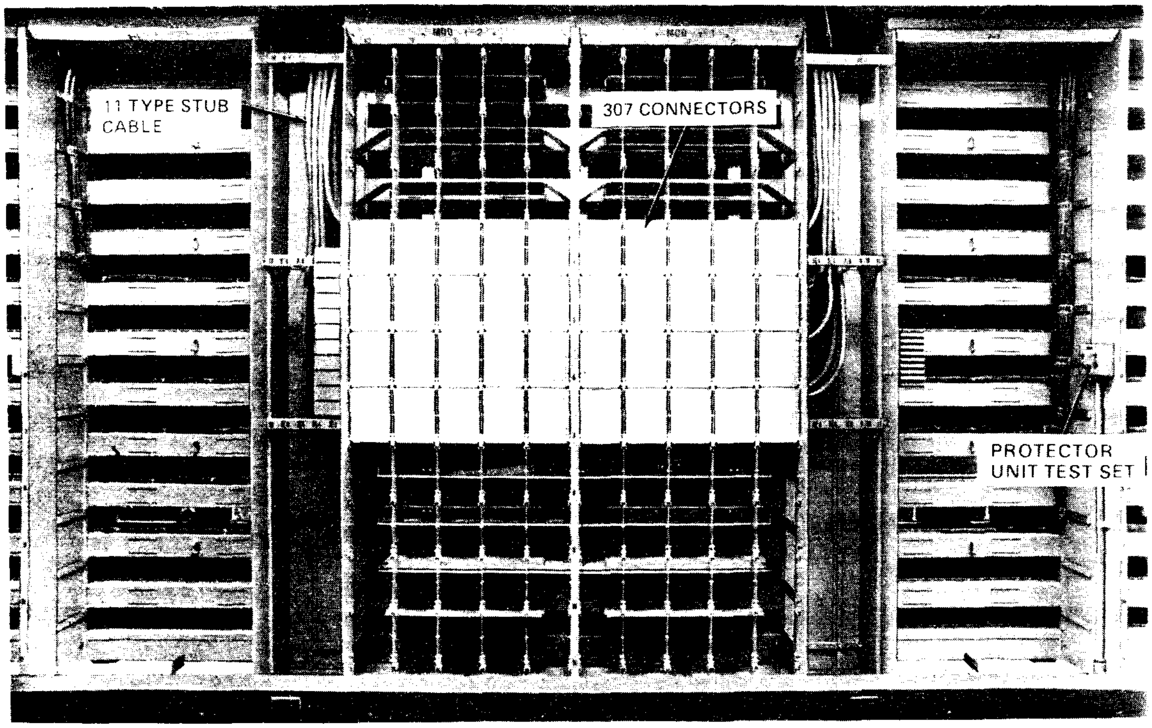


Figure 8-11. Typical Location of KS-20100 or 182A Protector Unit Test Set on Framework

8.7 Installing the Base Channel, Base Trim Panel, and Molding

The optional base channel assembly, molding, and base channel cover are installed on the rear of the framework. This is only required for *COSMIC* IA or IIA frames installed adjacent to older *COSMIC* II frames. The base trim panel and molding is installed on the lower express wiring trough on the front of the framework (Figure 8-12). See ED-6C146-10 for installation information.

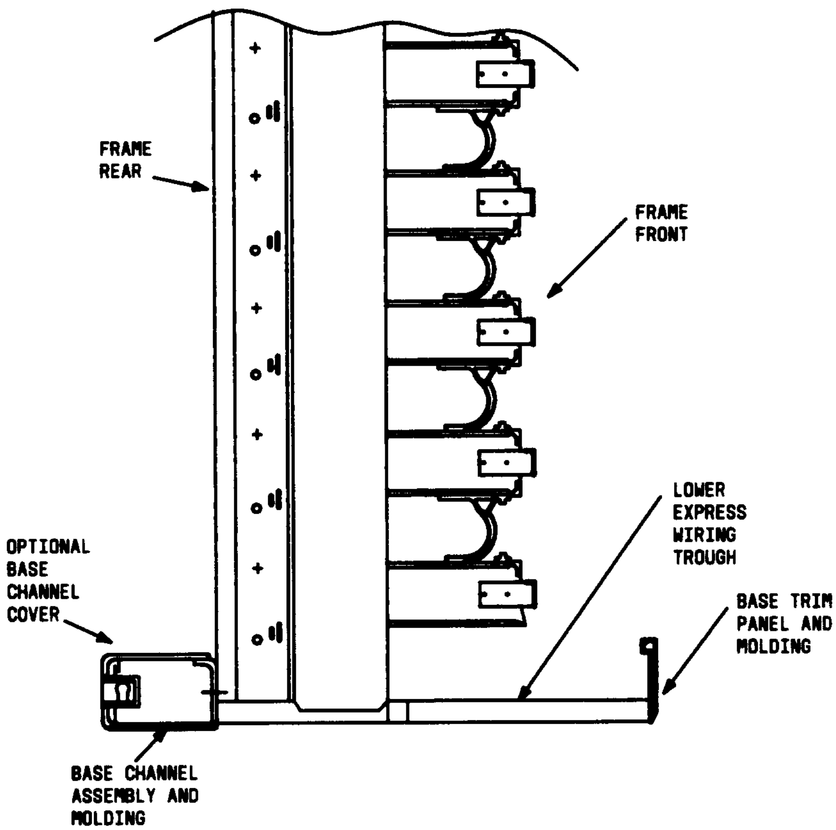


Figure 8-12. Base Channel, Base Trim Panel, and Molding

8.8 Installing Ground Cable at Top of Frame

Each frame is equipped with a ground bar welded to the top of the frame and functions as a protector ground and a framework ground (Figure 8-13).

An inline ground conductor is run the entire length of the lineup and is mounted on top of the framework. The conductor provides a ground path from each bay. The ground is extended to adjacent lineups.

A ground point is established by crimping a parallel tap connector to the inline ground conductor bus on top of the frame. The conductor shall be run as short as practical and to: CO ground, cable vault ground, protector frame ground, and/or the ground window of the switch. The distributing frame should not be part of the switch isolated ground plain. See ED-6C145-30 for further information.

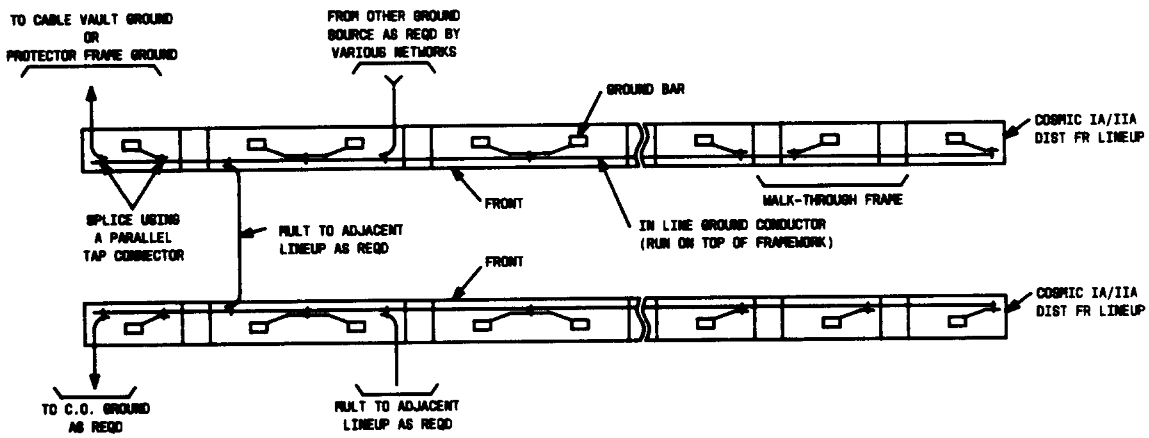


Figure 8-13. Typical Grounding Network

8.9 Installing Test/Talk System and Service Observing Jack Panels

Test/Talk System

The talk circuits consist of:

- Jack and Test/Talk Panel Circuit
- Local Frame Talk Line
- Inter-Frame Loudspeaker and Talk Line
- Local Test Desk Frame Talk Line
- Frame Maintenance Telephone Line.

The test circuits consists of:

- MDF Loudspeaker Circuits (local and remote)
- MDF Test (shoe) Circuits
- Wheatstone Bridge Test Circuit.

The test/talk panels are interconnected by a cable(s) that is spliced (710 connector) into a common bus cable and installed on the overhead frame rack. These individual cables will vary in size according to the number of talk stations furnished on the panel. Each of these cables should be connected according to the ED-6C111-10 drawing. Figure 8-14 shows a typical test/talk overhead cable arrangement.

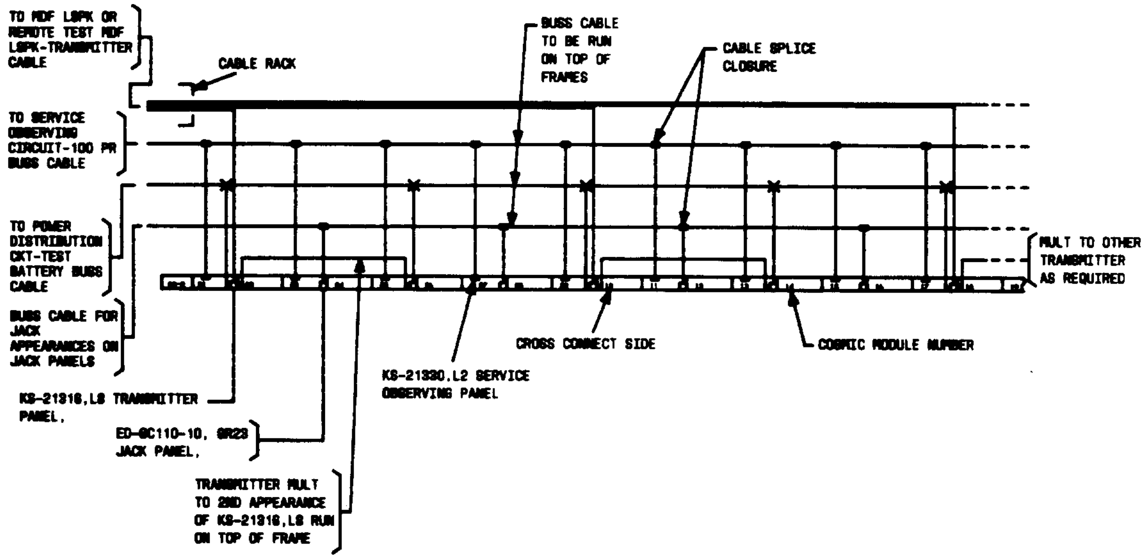


Figure 8-14. Typical Test/Talk Overhead Cable Arrangement

The test/talk panels are approximately 4 inches (102 mm) wide (replaces a 64-pair connector block) and should be located on shelf 5. Refer to the front equipment layout for the exact locations. The individual module test/talk panel cables are spliced into the common bus cables above the frame and enter the module in the same manner as the connecting block cables. Figure 8-15 shows the location of test/talk panels on the cross-connect side of the frame.

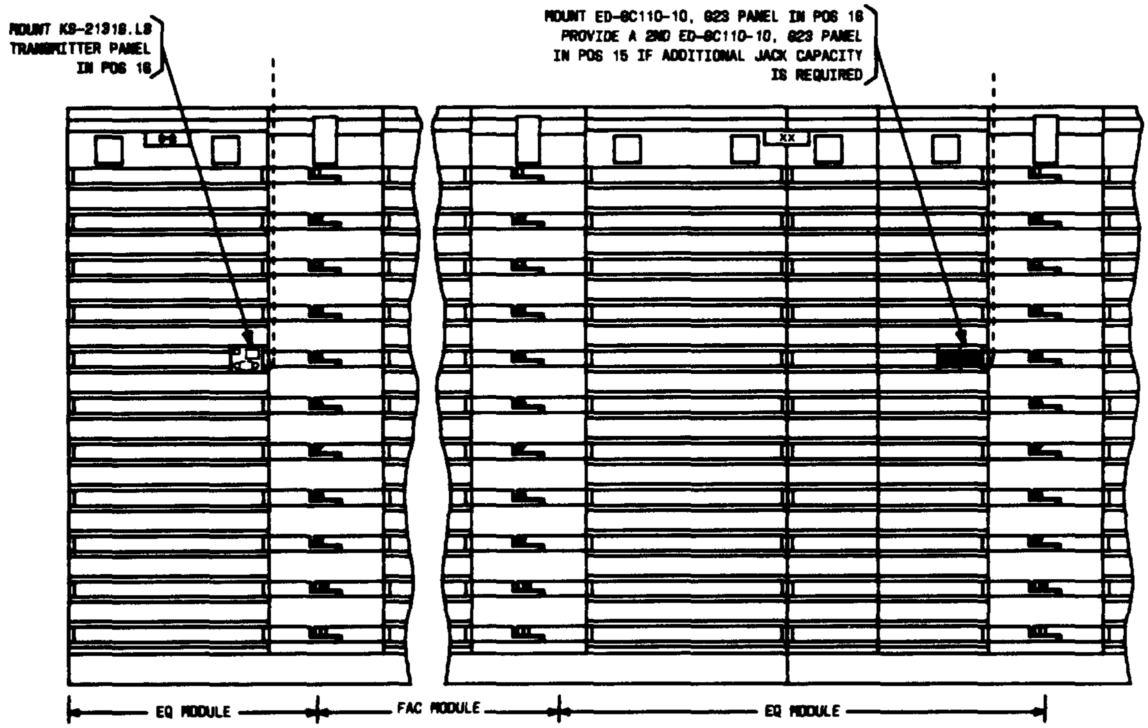


Figure 8-15. Location of Test/Talk Panels on the Cross-Connect Side of Frame

The leads for these panels should be connected from the front side using the R-4452 Wiring Fixture. Mount the R-4452 fixture, slide the panel to be wired in place and connect leads (Figure 8-16). When the panel is properly positioned in the fixture, remember that it will be in an upside down position so exercise caution when connecting, especially the solderless wrapped connections.

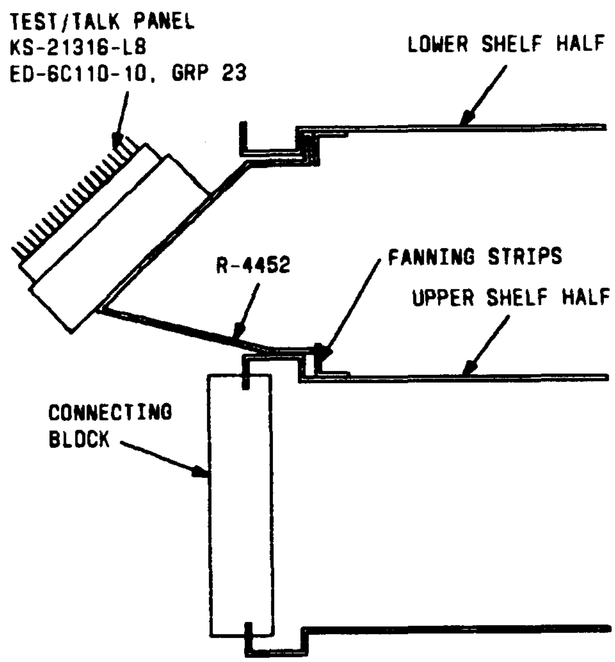


Figure 8-16. Temporary Mounting of Test/Talk Panel for Wiring

Service Observing Jack Panels

The types of facilities available on the panels are:

- Communications Jacks
- Telephone and Spare Jacks
- Battery and Ground Test Pins
- Local Test Desk Loudspeaker Transmitters.

The service observing jack cable is fed into the individual panel by a cable spliced (710 connectors) into a common bus cable installed on the overhead rack (Figure 8-14). These cables must be connected at the panels according to the ED-6C111-10 drawing.

The jack panels should be mounted on the rear or protector side of the frame (Figure 8-17).

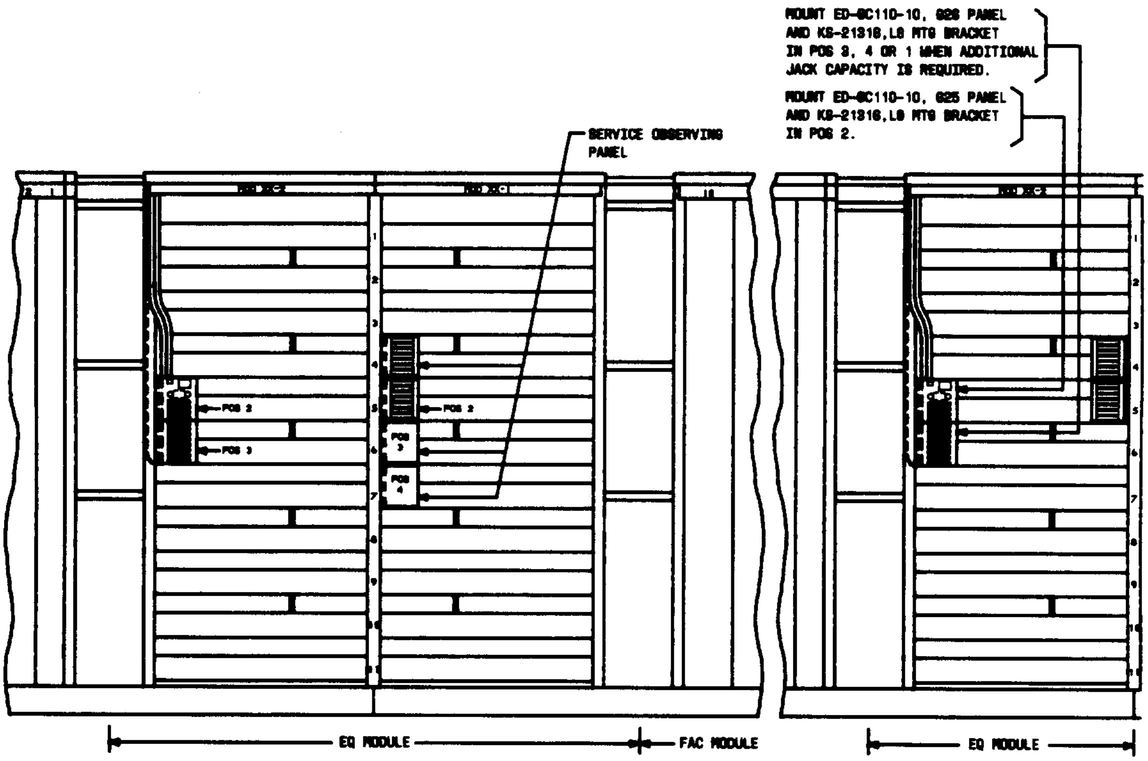


Figure 8-17. Location of Service Observing Panels and Test/Talk Panels on the Rear or Protector Side of the Frame

8.10 Installing Overhead Cable Racking

Modular racking arrangements include all necessary hardware to erect a cable pathway system over the framework. The structure has a foundation of auxiliary framing bars on 39-inch (991 mm) centers that cross the frame modules and bolt onto the framework (Figures 8-18 and 8-19).

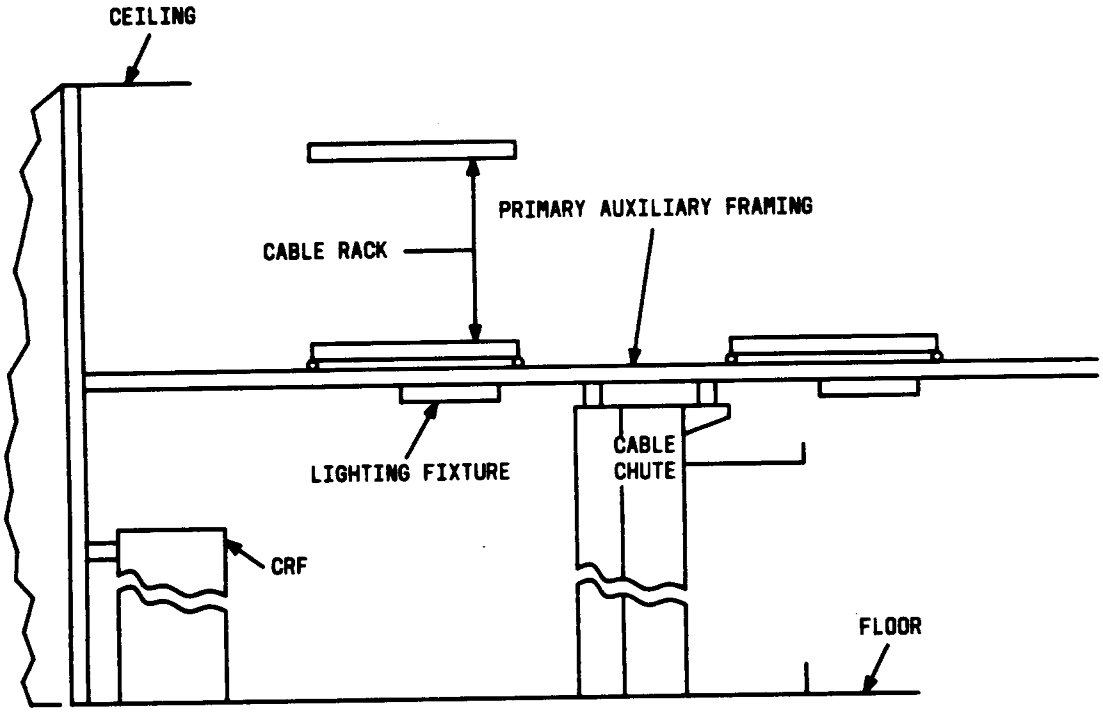


Figure 8-18. Single Lineup Framing

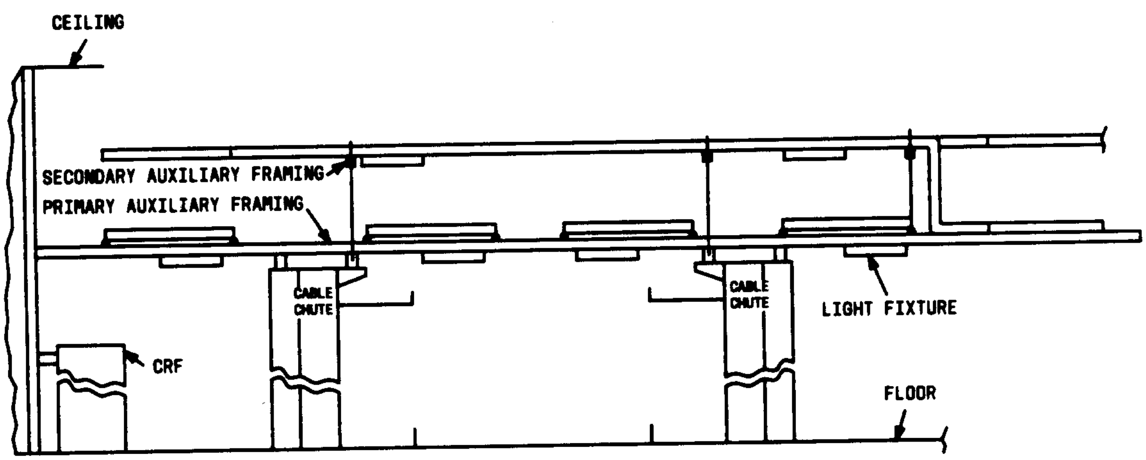


Figure 8-19. Double Lineup Framing

The auxiliary framing channels placed perpendicular to the frame lineups are designated primary framing, and the channels running parallel to the frame lineups are designated secondary framing.

Rack widths [15 inches (381 mm), 20 inches (508 mm), 25 inches (635 mm), and 30 inches (762 mm)] are available to optimize use of available overhead cabling space. The 15 inch (381 mm) racks carry pre-spread equipment cables across aisles. Most other cabling requirements are satisfied with 20-inch (508 mm) racks. A 20-inch (508 mm) rack supports four cable groups (20 cables) per cable level (Figure 8-20).

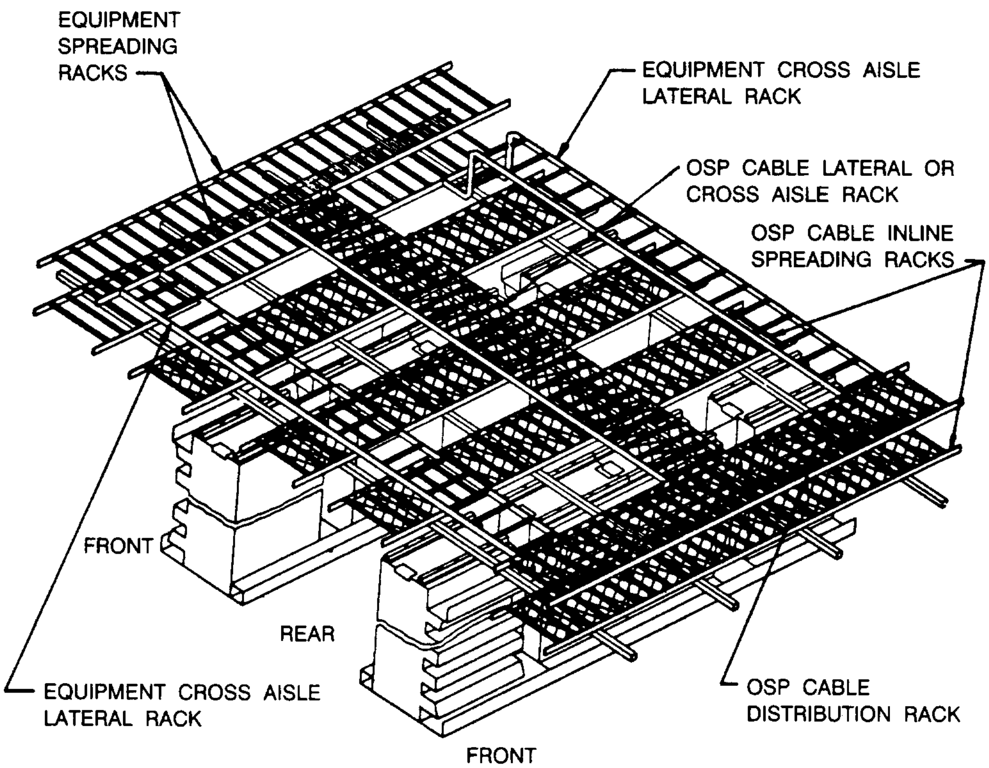


Figure 8-20. Typical Rack Arrangement for Double *COSMIC* Frame Lineup

Lighting fixtures are supported by and centered between the framing bars. Standard ladder type cable racks are installed over the lighting fixtures and parallel to the framework. Usually, a second level of rack distributes tip and equipment cables. Auxiliary framing is used to support second level side by side cable rack (Figure 8-21).

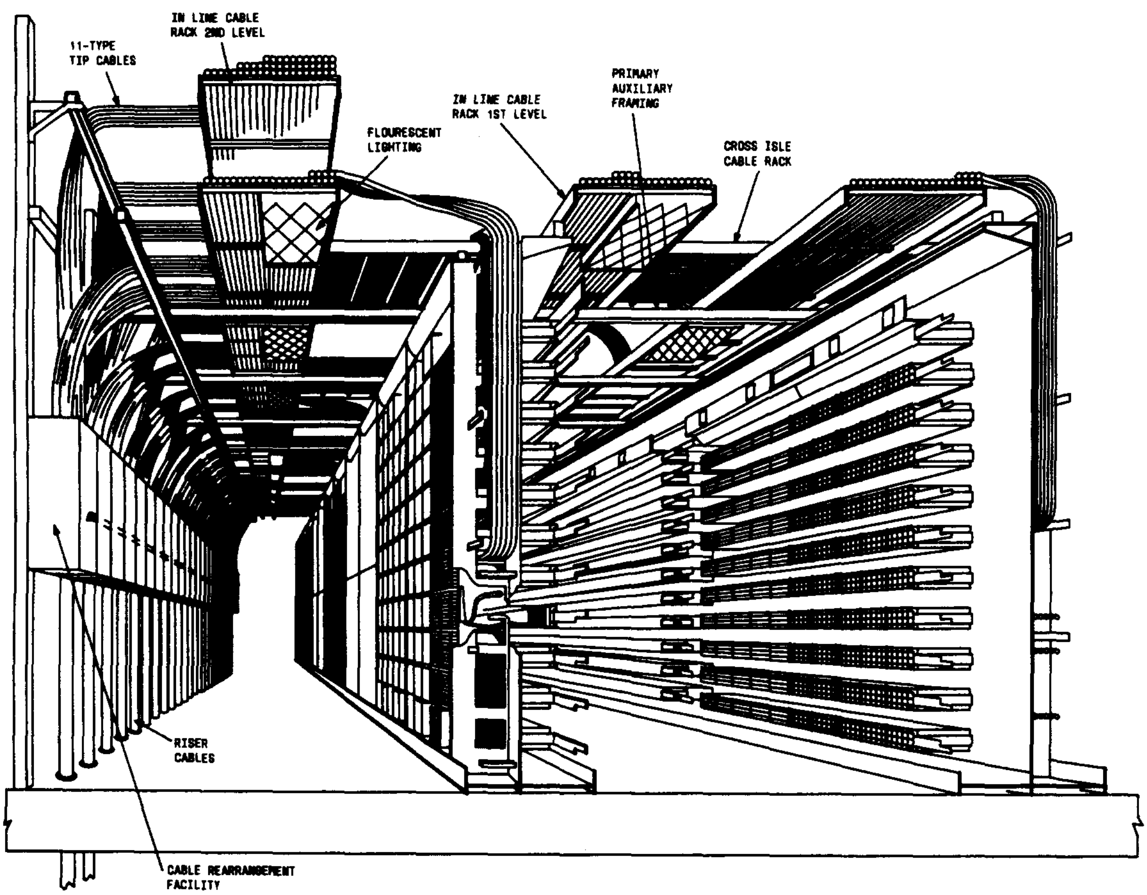


Figure 8-21. Cutaway View of *COSMIC* Frame System

On multiple lineups, it may be beneficial to leave off the second layer of lateral rack at first. Install the first cross aisle or lateral rack. Then install each lateral rack as needed, and fill the lateral racks in sequence. Finally, install the equipment racks. Some jobs require the second level of rack to be installed before the first level rack, if ceiling supported. When ceiling supported, use auxiliary framing and threaded rods on 6-foot (1829 mm) maximum centers.

Standard methods of erecting, aligning, and installing auxiliary framework and racking should be applied as outlined in AT&T 800-614-155 and AT&T 800-614-157 Cable Rack Installation practices. Install the overhead cable racking per the Engineering Racking Plan and ED-6C143-30.

8.11 Installing Light Fixtures

The KS-21559 fluorescent light fixtures are supported by the auxiliary framing bars (Figure 8-21). The light fixtures are installed in an alternating pattern between lineups (Figure 8-22). Additional auxiliary framing must be provided as necessary to support light fixtures at the end of the lineup.

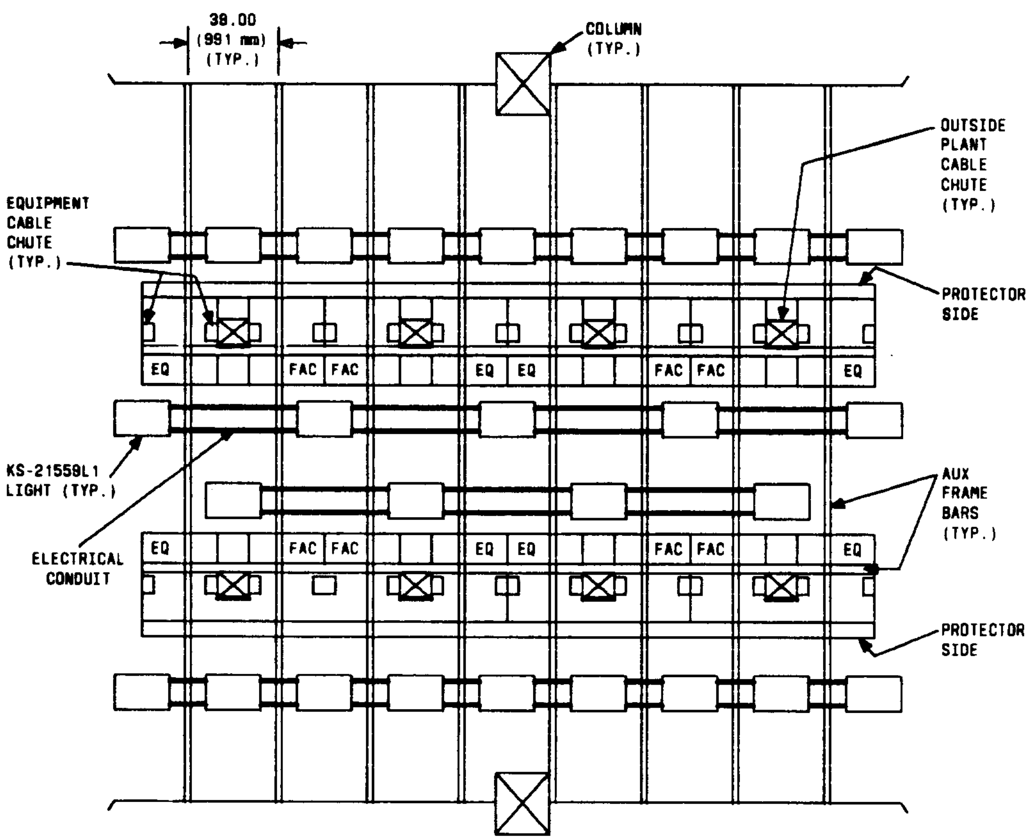


Figure 8-22. Typical Lighting Arrangement for a Double Lineup

The light fixture houses a single 40-watt, U-shaped fluorescent lamp. The fixture opening is provided with a hinged louver assembly of special design to improve light distribution on equipment surfaces and to minimize glare.

The telephone operating company furnishes the lamps for the light fixtures. Use approved wire per T-97766-11, note 64 for wiring light fixtures. Install the light fixtures per the engineering specifications and ED-6C145-30.

8.12 Installing Appliance Outlets

Convenient appliance outlets are optional and can be placed throughout the distributing frame area to make 120-volt single phase grounded AC service available to operate cord connected appliances. They are typically located in the rear base trim panel at each vertical cable chute. The blank outlet cover and bracket furnished with the framework must be removed to install the outlet assembly (Figure 8-23).

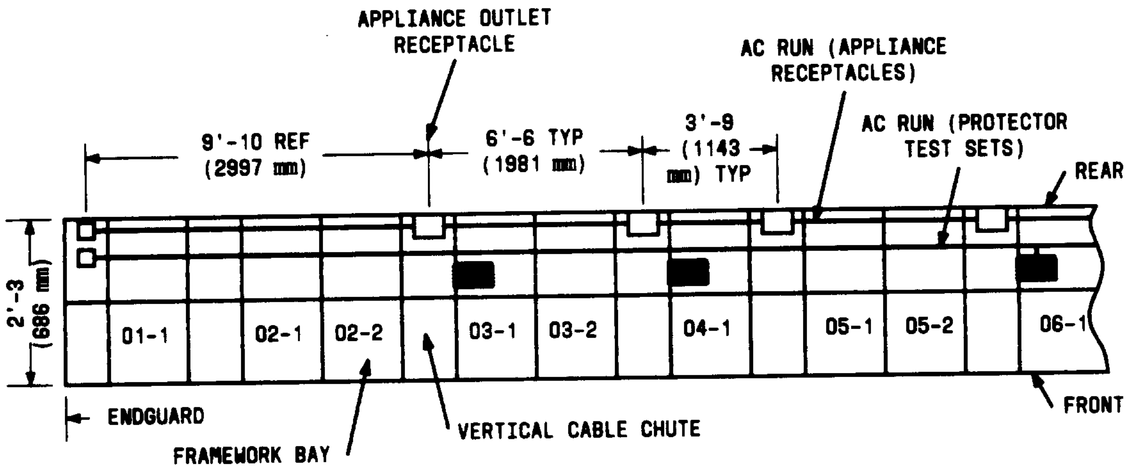


Figure 8-23. Typical Appliance Outlet Receptacles

The AC circuits are extended to the distributing frame area by a metallic raceway that terminates in a conduit hole provided at the top of the endguard mounted at either end of the distributing frame lineup.

At each vertical channel location where an AC outlet is not required, the installer should loop the AC wiring to provide sufficient slack for installation of an outlet at a later time if desired. Install the appliance outlets per the engineering specifications and ED-6C145-30. All AC circuits should be installed according to Bellcore requirements for grounded outlets, and in accordance with the National Electrical Code and local requirements.

8.13 Installing Cabling and Wiring

Tools and Supplies

980A	Wire Removal Tool
AT-8927L	Bridge Module Removal Tool (710 Connector)
AT-8948L	Connector Presser Tool (710 Connector)
KS-14440, L16	Soldering Iron
KS-16363, L3	Wire Wrapping Tool
KS-16902, L1	Wire Stripper (Pistol Grip)
KS-20620, L1-L7	Wire Stripper
KS-20827, L1	Wire Unwrapping Tool
KS-20962, L2	Bag-Wire Clippings
KS-21232, L1	Electric Wire Wrapping Gun
KS-21345, L2	Connecting Block Removal Tool (78 and 112)
KS-21415, L1, L2	Rolling Platform Ladder
KS-22035, L2	Spudger
KS-22271, L1	Connector Removal Tool (307 Connector)
KS-22325, L1	Service Bracket (307 Connector)
KS-22616, L1	Connecting Block Removal Tool (112 Connecting Block) — For *COSMIC* Mini DF
P-32B952	Fiber Insulator
P-68616	Fiber Insulator
R-1514	Shears, Cable
R-2916	Twine
R-3367	Heat Sink
R-4265	Nylon Cable Ties
R-4266	Cable Tie Fastening Tool
R-4366	Butt-Strip Tool (Combination)
R-4370	Cable Tie Holder
R-4451	Wiring Fixture (78 and 112 Blocks)
RM-583101	Gray Sheet Fiber (1/64 inch) (.4 mm)

8.13.1 Cable Installation

Cable routing lists are furnished by the Regional Engineering Organizations; therefore, whenever questions or lack of information arises, they should be contacted.

The majority of cables for ***COSMIC*** Distributing Frames are installed on ladder-type cable racks. Therefore the cables will require clipping or sewing (unless otherwise directed by the operating company). Where clipping is required, the installer should plan to place all anchor clips in position prior to running cables in these racks. Nylon cable ties ***are not*** approved for securing cables to the cable rack for switchboard cable.

All cable racks should be identified with numbers so the routing information provided on the cable tags can be followed. All cable tags should be sorted by route to maintain maximized installation efficiency.

Prior to cable installation, consideration should be given to the use of scaffolding. Where room permits, wood-planks 10 to 12 inches (254 to 305 mm) wide should be placed alongside racks on the top of the auxiliary framing bars to allow the cabling crew a place to stand or sit while pulling cables.

The **Line Equipment** cables are standard switchboard cables which normally connect switch equipment to Line Equipment modules. The line equipment cables are usually installed on **separate racking**.

The **Outside Plant** cable is connected from the Outside Plant modules to a riser/feeder entrance facility. These cables may be placed by AT&T installation or by the Operating Company personnel. The outside plant cables are 11-type connectorized cables equipped with four 25-pair, 710 Bridging Modules assembled to four 710 SD connectors located on the rear side of the 307 connectors. The outside plant cables are placed on dedicated cable racks and **do not intermix** with the line equipment cables.

The outside plant stub cables will have standard cable tags furnished by the engineering organization. The cable tags will show the outside plant module, shelf and block number on the originating end and the splice location on the terminating end. In addition, the cable tag provides cable rack routing information.

There are several basic rules and information that must be known and followed when installing the outside plant cables, they are:

A. Remember the connector protector cables are aligned in a horizontal plane (by the horizontal shelf) and not in a vertical fashion.

B. Each cable group (five cables) must be placed in the sequence shown on the cable routing list.

C. Each group of five cables must enter into the correct compartment (slot) of the vertical cable chute according to the shelf sequence marked. Cables should be aligned in the compartment according to shelf and block location (Figure 8-24).

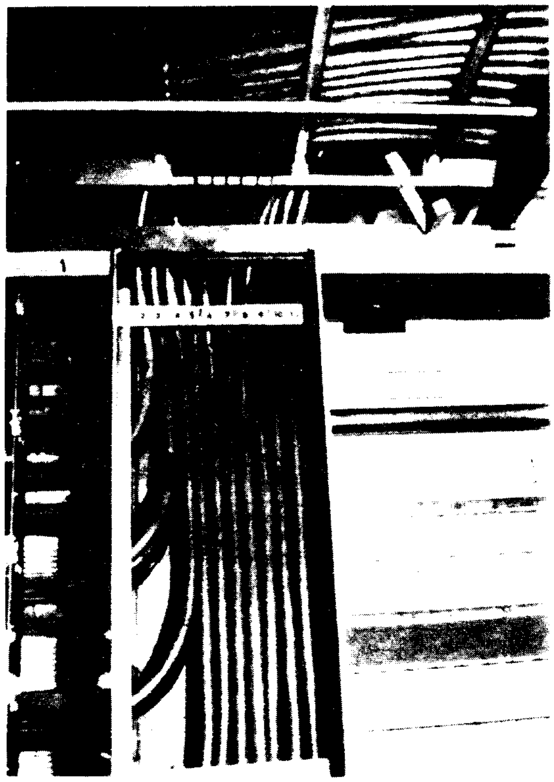


Figure 8-24. Typical Outside Plant Cable Arrangement

D. All outside plant cables should originate in the *COSMIC* outside plant half-module to their splice locations. (Reference cable tags and drawing ED-6C146-10.)

E. Cables are spread over the modules, and should be installed in the sequence provided by the cable routing list

F. The transition of the cables from the vertical cable chute onto the overhead cable racks is designed to prevent blocking. Shelves 6 and 7 of module X, side 1 or shelves 5 and 6 of module X, side 2 form the "A" foundation for future cable groups. These cable groups transition onto the inline spreading rack by folding over the stringer or spiraling a quarter turn. The remaining groups stack over one another following the base foundation in forming the "A" transition. This arrangement is nonblocking and provides adequate space for future cable groups (Figures 8-25 and 8-26).

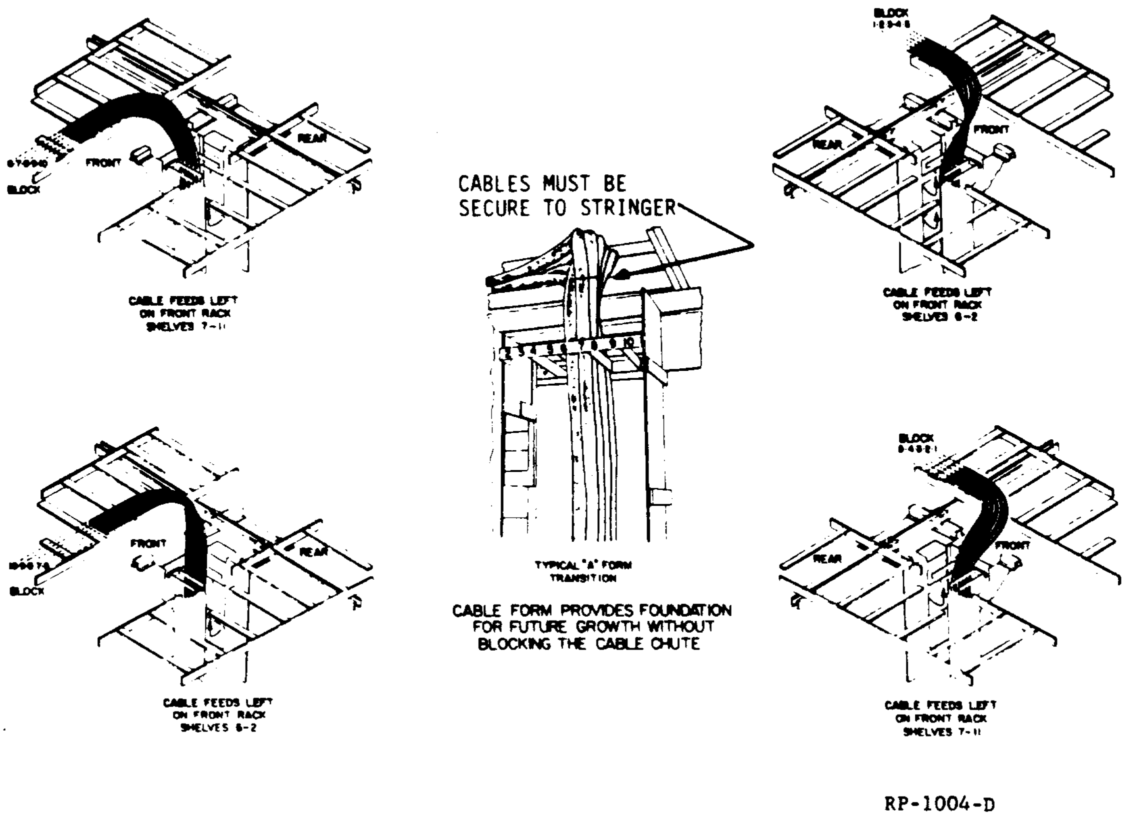


Figure 8-25. Cable Chute Transition to Front Rack

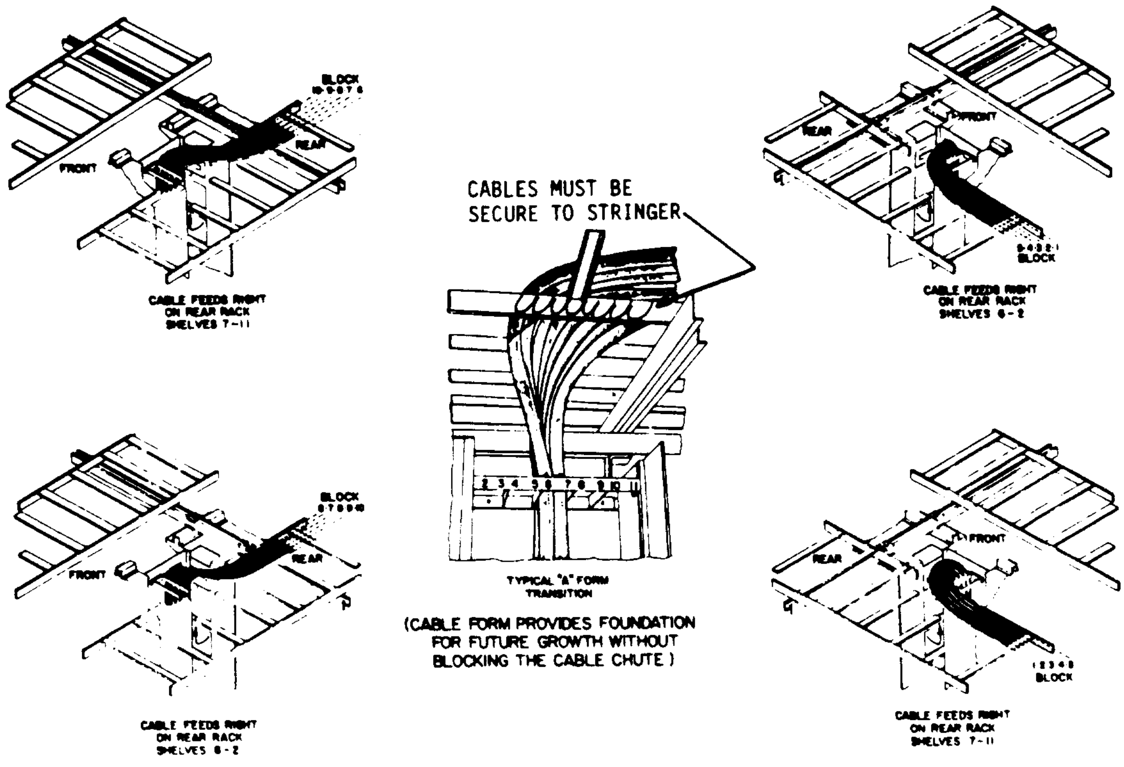


Figure 8-26. Cable Chute Transition to Rear Rack

G. Transition from inline spreading rack to a lateral. This transition is used on multiple frame line-ups to provide a non-blocking drop. The "Gull Wing" cable transition was developed for *COSMIC* distributing frames in order to reduce the number of cross aisle or lateral racks. Typical "Gull Wing" cable transitions are illustrated in Figure 8-27. Any or all of these combinations can be used on the job conditions.

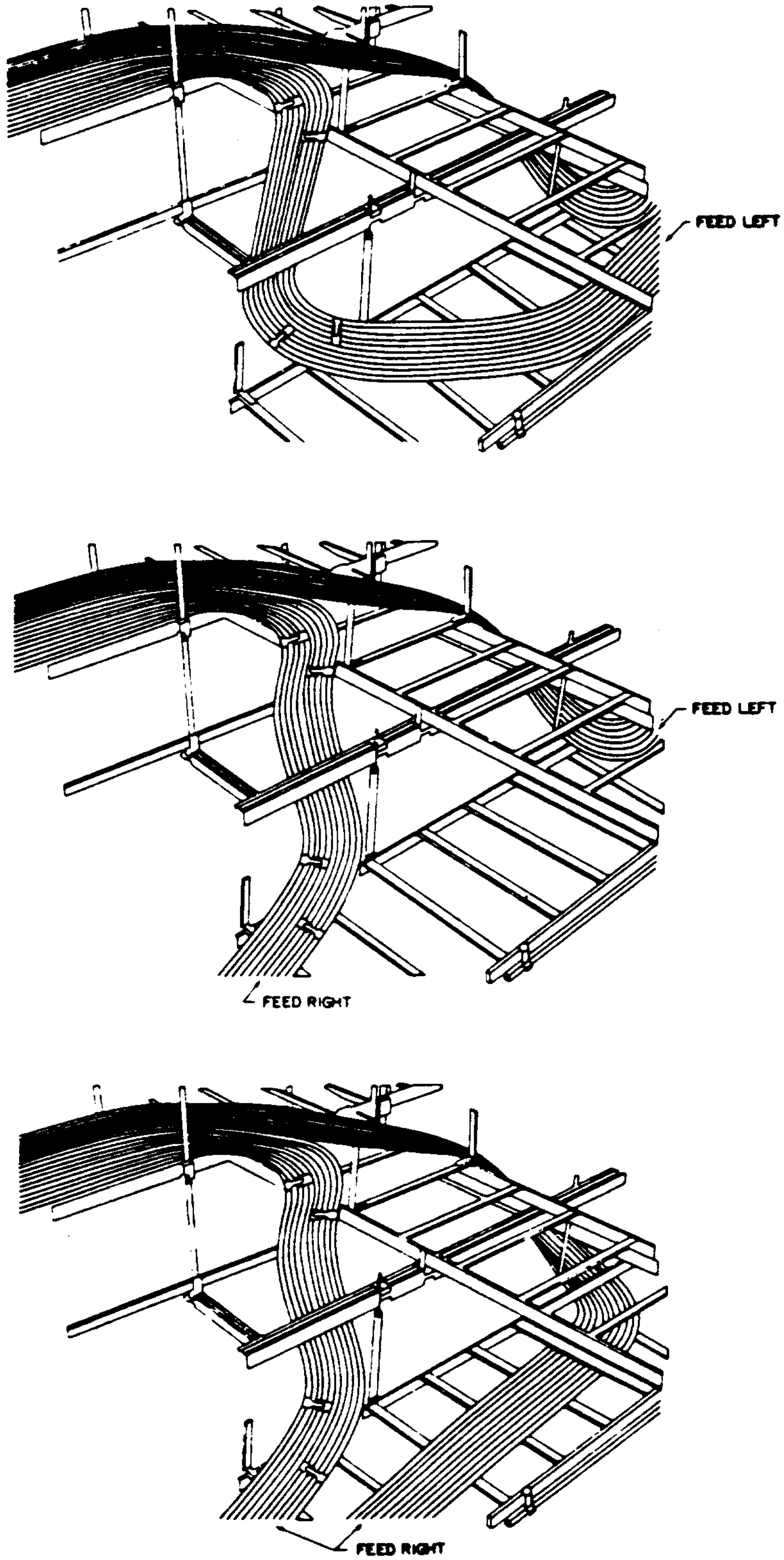


Figure 8-27. Gull Wing Transitions

H. After cables have been placed on the correct overhead racking system, they must be "clipped" together at approximately 3-foot (914 mm) intervals. The KS-22411 Clips are designed to hold the group of five cables together (Figure 8-28).

I. Cable groups can be shifted and inter-changed along the rack to avoid crossing.

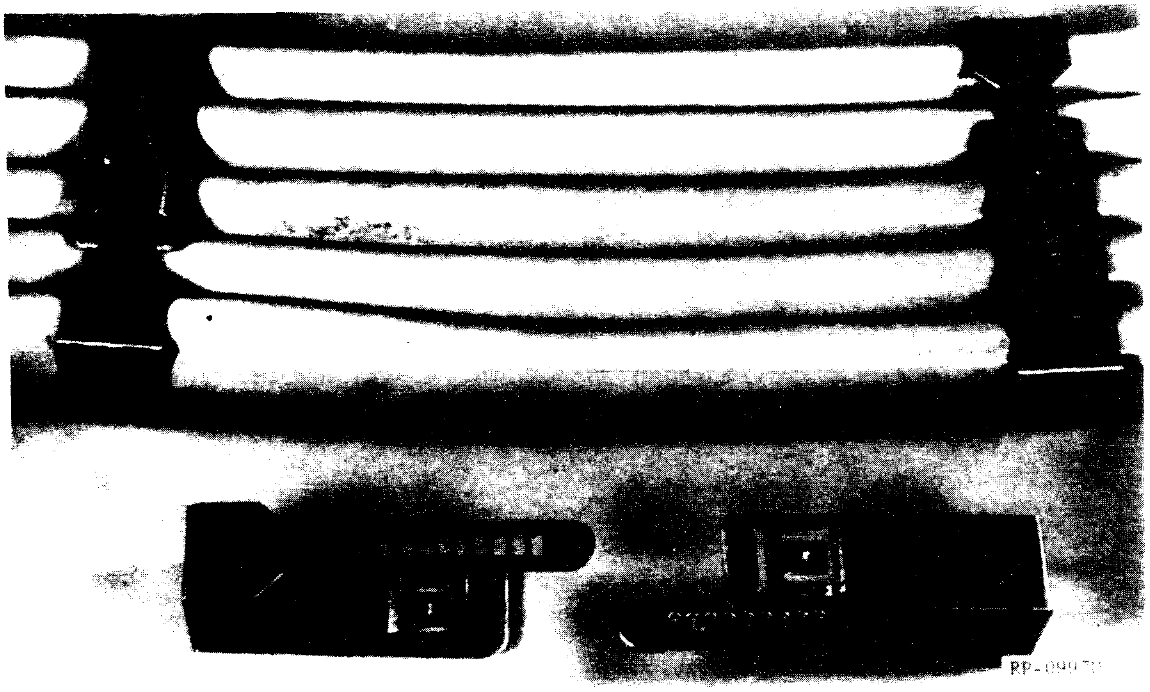


Figure 8-28. KS-22411 Clips for Outside Plant Cable Groups

8.13.2 Pre-Planned Cabling

All outside plant cable racks should be identified by placing temporary signs on the side of the rack stringer bars to make cable routing easier to follow.

One shelf of an outside plant frame bay accommodates five ABAM type cables. All five cables should be installed at one time as a group. The weight of the cable will require several installers. Looping of the cable will reduce the amount of cable pulled at one time.

The outside plant cables are sent to the job site in individually boxed cartons with the lengths stamped on the outside of the carton. Sort by cable lengths required for the first five cables. Open the cartons, and uncoil each of the five cables straight on the floor. Remember the nonconnectorized ends of the cables enter the rack first. Using an R-3409 Dispenser with one of the boxes as a base will simplify rolling out of the cable. The cable must be rolled out to avoid twists.

Outside plant cables are placed and routed in sequence. The following paragraphs explain the cable placing sequence and splice drop points.

A group of five cables terminate on a shelf which is designated as Side 1 or Side 2. For a single line-up with a two level rack: 1 — The first group of (5) cables will be from bay (1-1, shelf-6). The second group of cables is from (5-1, shelf-6), and the third group of (5) from (9-1, shelf-6), etc.

Note: Cables for Modules 1, 5, 9, 13, etc., are placed on the lower rack level while cables for modules 3, 7, 11, 15, etc., are placed on the upper rack. Note that cable groups are assigned in sequence which minimizes crossing.

When there is only one crew placing cable, it would be expedient to continue working on the lower cable rack. Using the same sequence, install the cables for the Side 2 bay, Shelf-6 next, such as 1-2, 5-2, 9-2, etc. This cable routing scheme was designed to start in the middle and then alternate up (Shelf-5) and then down (Shelf-7), again up (Shelf-4), then down (Shelf 8), and continue alternating until the module is completely filled or cable installation is complete.

The shelf installation sequence is 6-5-7-4-8-3--2-10-1-11 for each module starting with 1-1, 5-1, 9-1, 10-1, etc. Then repeat the cycle 1-2, 5-2, 9-2, 13-2, etc. Continue installing the cable groups in this sequence until complete for the lower cable rack.

On the upper level rack, again using the specified shelf and module running sequence, start with Shelf-6, bays 3-1, 7-1, 11-1, etc. Then 3-2, 7-2, 11-2, etc. Alternate to shelves 5-7-4-8-3-9-2-10-1-11 until cable installation is completed.

Note: If two cable crews are available for placing outside plant cables in a single line-up, one crew can install cables on the upper rack (modules 3, 7, 11, etc.) and one crew on the lower rack (modules 1, 5, 9, etc.) without interfering with one another.

When a double frame line-up is being utilized, there are four low level outside plant spreading racks, one on each side of each line-up, designated A1, B1, C1, and D1. There is one upper level outside plant spreading rack, designated A2, and there are lateral (cross aisle) racks, designated 1, 2, 3, etc., which allow the outside plant cable groups to be distributed from the low level racks to the outside plant upper spreading racks and then to the splice locations.

To facilitate installing cables on a double frame line-up, install the cross-aisle racks as needed. The cables are collated by splice position and lateral (cross-aisle) rack. Each lateral will be filled (approximately 150 cables on double line-up, 250 cables on a triple line-up) before moving to the next lateral rack.

The lateral outside plant racks should be added as the cable installation proceeds. Remember to fill the cable rack in layers. This ensures the least amount of cable pile-up.

The "Gull Wing" forms the basic transition from inline spreading rack to lateral rack (Figure 8-24) and is used in multiple frame line-ups.

The cable group position is determined by collating the future groups in the rack, either to the left or to the right of a lateral, which will make up a level of 4 groups. For example, if there are four modules (Figure 8-29) being served by an inline rack to the left of lateral 2, the first and second group in rack B form transitions directly to the lateral. It should be noted that these two cable groups are closest to the auxiliary CEF (splice drop); therefore, groups 3 and 4 on rack C also form transitions directly to the lateral. Cable groups furthermost from the auxiliary CEF (Groups 3 and 4 in rack B, and 1 and 2 in rack C) pass under the lateral and up the opposite side.

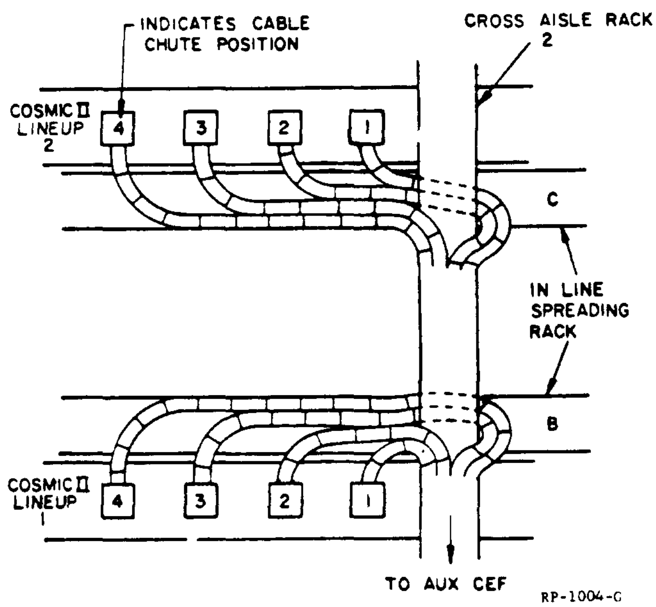


Figure 8-29. Gull Wing Cable Group Position — Four Modules

When two modules appear to the left of lateral 14 (Figure 8-30), the two cable groups from each module are combined and then routed as described in the preceding paragraph. The transition points are marked by two cable brackets spaced 14 inches (356 mm) apart on each rack. These brackets are also used on bends, along the rack to retain cable, and at cable chutes. The first layer of ten cables must be secured to the rack stringer. Future cable groups should be banded to the first layer.

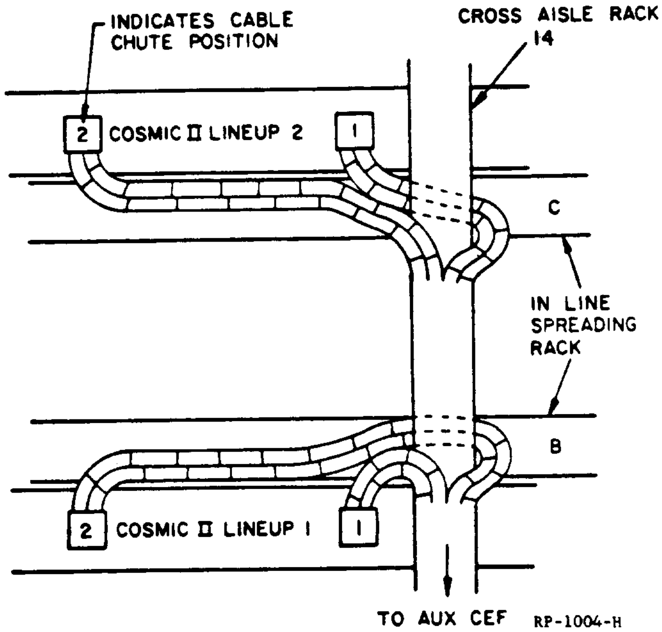


Figure 8-30. Gull Wing Cable Group Position — Two Modules

8.13.3 Drop Point (Location Where Cable Group Leaves the Rack)

The drop location of a cable group will vary with the number of splices, frame line-up lengths, and number of frame lineups. Each cable group should be dropped off the rack at the corresponding splice location. Shifting and interchanging of cable groups between levels should only take place along the rack where the cable level is only partially filled. The crossing of cables should take place after the cables leave the rack heading for a splice location.

8.13.4 Cable Protection

The outside plant cables have an aluminum shield and a heavy PVC jacket. These cables do not need fiber protection applied on the cable rack.

Where the outside plant cables break off the cable rack (drop points) at wall mounted splice locations, it is not necessary to apply protection to the auxiliary bars located above the splice enclosures.

The line equipment cables shall be protected at locations where they bend sharply around or run across edges of metal work. If the metal work cannot be protected, then firmly secure fiber protection around the cables at these points being sure it cannot be dislocated.

Where cables require protection, the P-68616, P-32B952 Fiber Insulators or RM-583101 1/64 inch (.40 mm) Gray Sheet Fiber can be used.

8.13.5 Securing Cables

The line equipment cables originating at the line equipment frames shall be secured to the cable racks by either sewing or clipping.

The outside plant cables do not require securing except for the following:

A. When a group of cables transitions from one level of rack to another level, they must be secured to the cable rack stringer or to a previously secured cable group before they leave the rack and to the stringer entering the next level of rack.

B. Cables shall be secured to the cable rack stringer prior to entering the outside plant half-module cable chute.

C. The cables shall be secured to every cross strap on all vertical cable racks. They can either be clipped or sewed.

8.13.6 Cable Check (From-To)

All cables and wires should be checked to be sure they are in their proper (from-to) locations after cable installation. Verify proper routing prior to any securing, butting, stripping, or connecting operations are performed within the individual framework. This effort will minimize cable errors and omissions. Use the ITE-4137 Continuity Test Set or other standard test set to perform this verification.

A simple buzz test of the aluminum ground shield for the outside plant cables will be sufficient to verify cable and locations.

Note: Be sure the shields and ground leads are not in contact with any common ground, when continuity testing these outside plant cables. The stub ends of the cables are insulated so it would be best to "pick" through the insulation to the ABAM shield and leave the insulated ends intact.

8.13.7 Butting and Stripping

Outside Plant Modules

Cable preparation is not required in the outside plant modules due to the use of connectorized stub cables. The connectorized end of these cables are fed into their proper shelves (the shelf above the connector block they serve) and are secured to the shelf with cable ties placed around the crimped sleeve and then tightened and cut off with the R-4266 or R-4287 Tool. The 710 Connector is formed over the back edge of the shelf, then under the shelf out to connector block position on the rear of the frame.

Line Equipment Modules

The line equipment module cables are fed through openings at the top on both the left and right sides of the bay. Viewing the frame from the rear side, the cables for Shelves 1 through 5 enter from the left side. The cables for Shelves 6 through 11 enter from the right side. The sheathing for these cables will remain intact until they reach the shelf they serve. Therefore, each group of cables serving a given shelf shall be butt and stripped approximately 1-1/2 inches (38 mm) below the last point they are secured to prior to entering the shelf.

Note: Fiber insulators are not required on the frame cable straps as long as the cable jacket protects the leads from metal surfaces. Lacing cord or cable ties may be used for securing purposes. Lacing cord must be used at the top-most cable strap.

8.13.8 Use of Nylon Cable Ties

The R-4265 Cable Ties may be used in place of lacing cord for general banding, for banding cable at breakouts on the shelf, for holding cable to prepare wire forms, and for positioning at cable brackets.

8.13.9 Fan, Form, and Dress

Outside Plant Modules

The 307 Connector Assemblies are factory wired with 710 Splice modules that mate with 710 bridge modules on the outside plant cable (Figures 8-31 and 8-32). The KS-22325 Service Bracket supports the 307 connector for pressing the 710 Connectors together. The slack for these cable forms shall be laid onto the individual shelves in the neatest possible manner. Be sure the form for the connector block above does not interfere with the mounting of the connector block directly below. The two forms (stub cable and assembly forms) will have to be banded together and folded back out of the way of the connector below.

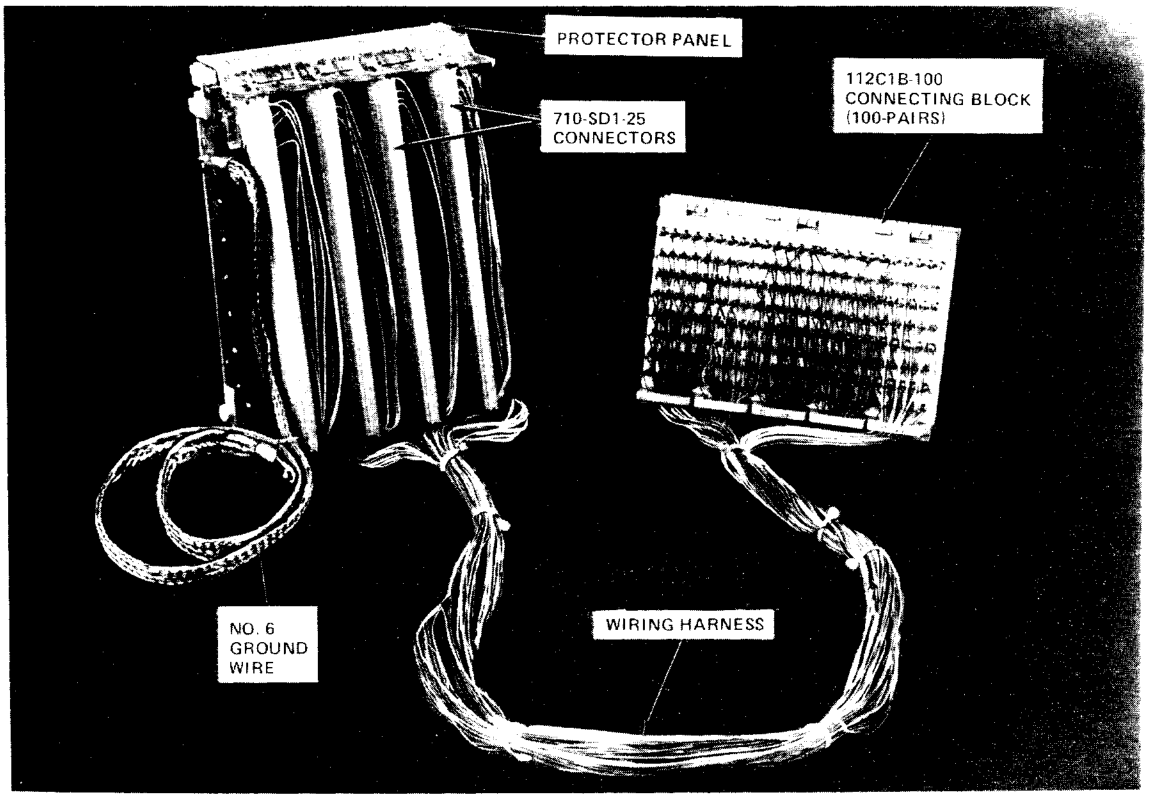


Figure 8-31. 307D1-100 Connector — Back View

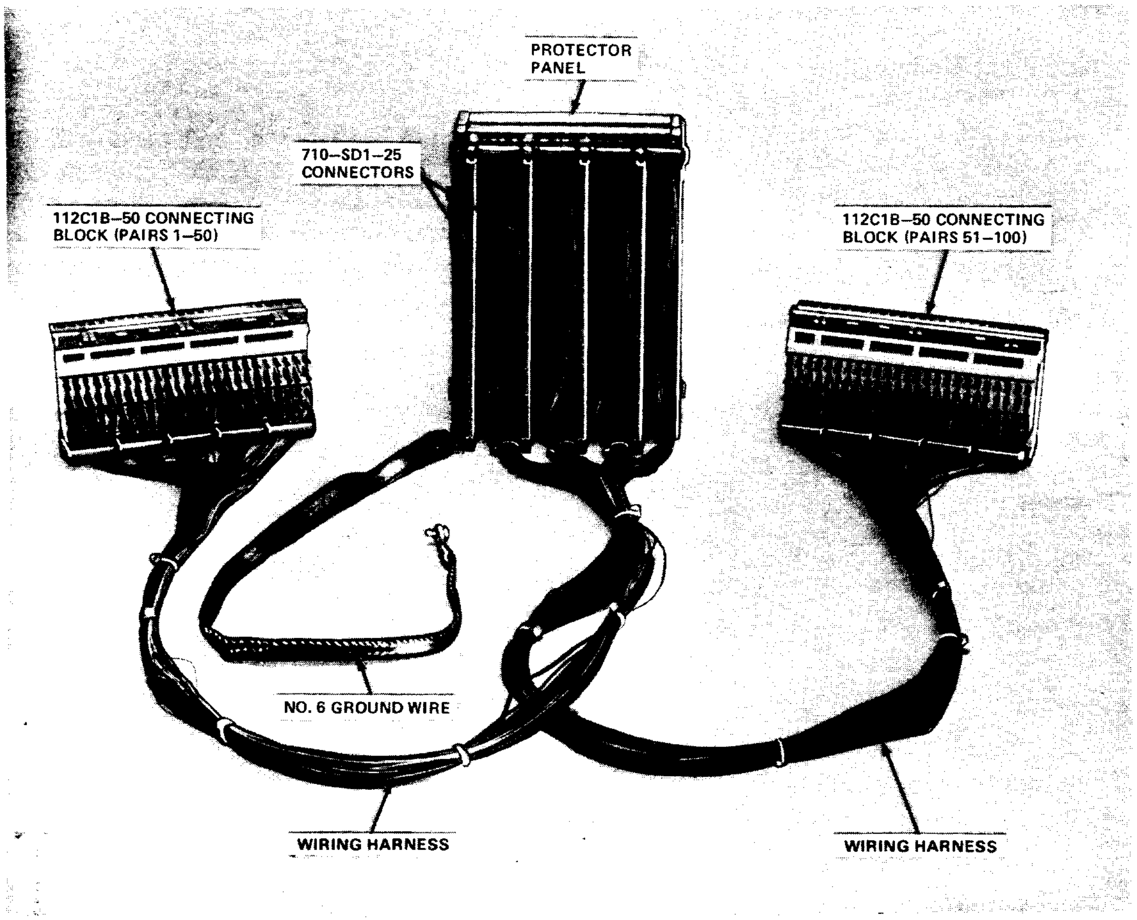


Figure 8-32. 307E1-100 Connector — Back View

Line Equipment Modules

The cable lead fanning strip located at the rear edge of each shelf has "Loop Type" openings spaced every 2 inches (51 mm). Therefore, with a 64-pair connecting block being approximately 4 inches (102 mm) long, the equal distribution of cable leads across the rear of the shelf for the block should be 32 cable pair per fanning loop.

When five 100-pair connecting blocks are serving a given shelf, the following pattern should be used. Start at the cut end of the cable arm and fan 32 pair into each of the first seven fanning loops, fan 24 pair into the eighth fanning loop, then again fan 32 pair into each of the ninth through fifteenth loops, then fan the last 28 pair into the sixteenth loop.

Fifty-pair connecting blocks on shelves 1 and 11 can have one 100-pair cable serving two blocks. However, the odd-numbered block (first or fifth) should be cabled separately. It is not advisable to use a 100-pair cable split over two bays on *COSMIC* I/IA frames. This paragraph does not apply to the first and last bay of a frame lineup. Use of high density blocks, six per shelf, avoids this problem.

Where 50-pair connecting blocks are utilized in either the first or last bay of a frame lineup, the odd numbered connecting block (1, 5, 6, or 10) should be cabled individually with a 50-pair cable.

8.13.10 Protector Frame for *COSMIC* I/IA Distributing Frames

Butting and Stripping

After cable verification and prior to the butting and stripping operations, all cables should be trimmed back to a convenient length for ease of handling using the R-1514 Cable Shears. Extreme caution should be used when trimming back cables to avoid causing possible short cable lengths.

Each 302 or 308 connector cable should be butted approximately 1/2 inch (13 mm) below the weld pin with the combination R-4366 Butt-Strip Tool.

Form, Fan, and Dress

The form at the protector frame end of the cable is a single leg form that runs directly down the center of the 302/308 connector. The following operations will provide for an efficient installation:

a. Trim off the excess cable slack and mark the cable butt location 1/2 inch (13 mm) below the weld pin. (See Figure 8-33.)

b. Butt and strip the cable and then secure it to the weld pin with either twine or a nylon cable tie (be sure not to lose binder identity).

c. Bring the cable along the top of the (5-slot) fanning strip and secure it in the approximate center using twine or a nylon cable tie. (See Figure 8-34.)

d. Bend the cable over at this secured point and bring it down the center of the 302/308 connector.

e. Break the blue binder out of the cable and turn it in toward the connector side. Place a band (cable tie or twine) approximately 4 inches (102 mm) below the 5-slot fanning strip of the connector position.

f. Proceed to break out the orange, green, brown, and slate binders, respectively, in the same manner described in e. Band each binder approximately 2-1/2 inches (64 mm) apart.

   Note: Each band securing a binder breakout point should be located approximately in the center of the five rows served by the binder, i.e., (blue) rows 2-3, (orange) rows 2-8, etc.

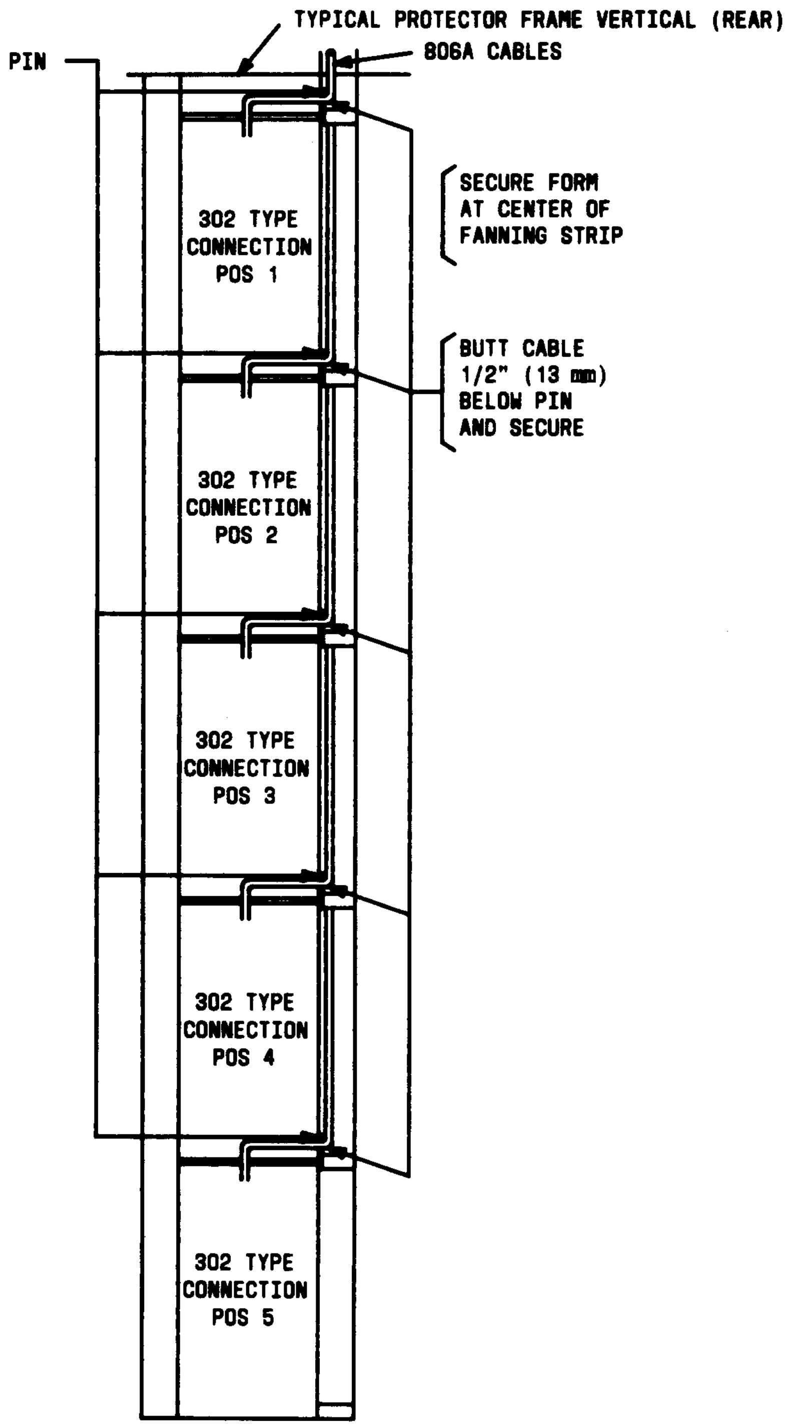


Figure 8-33. Typical Butting and Running of Cable at Each Vertical Connector Position

g. When the binders are secured in the approximate center of the field they serve, trim all the binder leads back leaving at least a minimum of 7 inches (178 mm) from the band point to the wire end.

h. Proceed to skin all the leads so they have a "skinner" lead length (insulated portion of the wire) of 4 inches (102 mm), the "skinner" (bare wire) portion of the wire depends on the gauge of wire being solderless wrapped. (See Figure 8-34.)

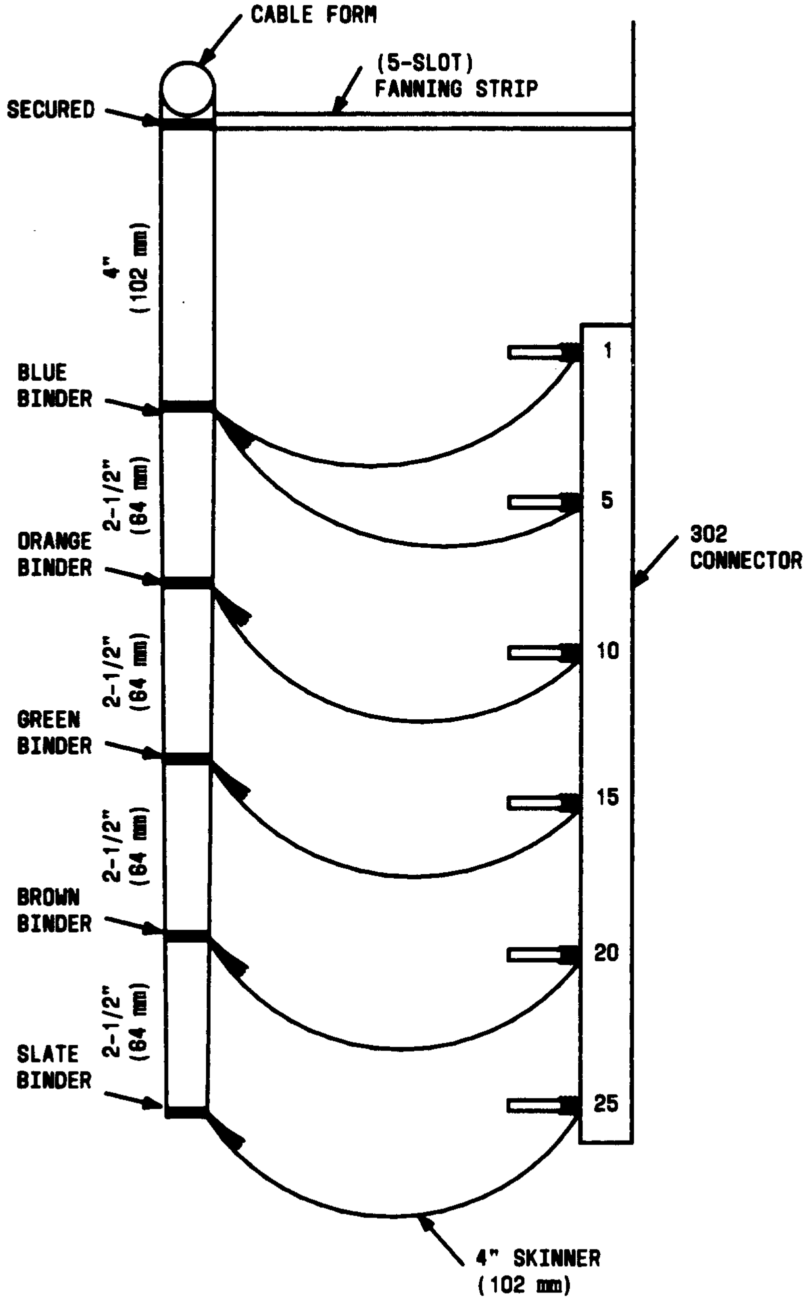


Figure 8-34. 302 Connector Forming

i. Proceed to wire wrap the cable leads. It appears that working top down, and left to right would be the easiest, such as, start with the yellow identifiers (dots and dashes) and work to the right; then the black, red, and white color coded leads.

j. After all the leads have been connected, dress them so they have a neat appearance. (See Figure 8-35.)

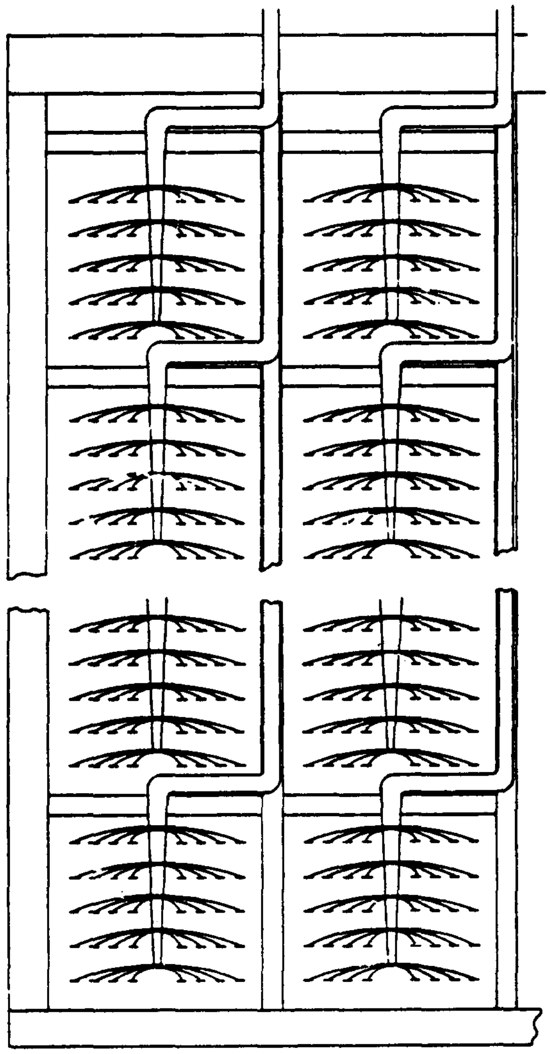


Figure 8-35. Typical Method of Dressing Tie Cable to 302-Type Connectors on Protector Frame

8.13.11 Connecting

The line equipment modules utilize 78C-Type and/or 112-Type Connecting Blocks which have wire wrap terminals on the rear (installer) side and slotted beam quick-connect or solderless wrap terminals on the front (operating company) jumper side.

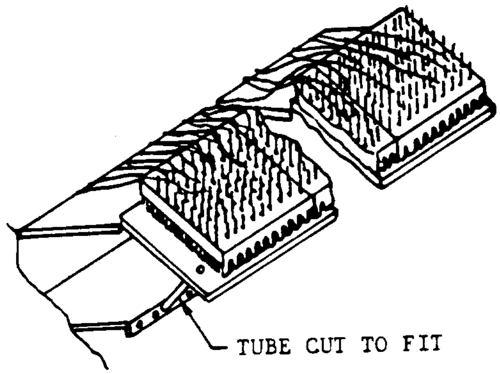
All Solderless Wrapped Connections (SWC) should be made using standard wire wrapping tools. The 78C- or 112-Type Blocks utilized on the line equipment modules are approved for solderless wrapped connections wire gauges 20 (.8 mm) through 26 (.4 mm).

Inspect all wire wrapped connections. Any defective connections should be soldered before being considered as qualified and approved. The R-4121 L-2 Soldering Station with low melting RM-728225 or RM-728226 Solder is recommended.

Line Equipment Modules

The R-4451 Wiring Fixture is designed to hold the 78C-Type or 112-Type Connecting Blocks in place during the wire terminating operation. This fixture is designed to be used on either the front or rear side of the frame. The design of the *COSMIC* IIA frame has eliminated several service observing cord brackets from the rear of each shelf. Therefore, connecting from the rear side cannot be accomplished on the *COSMIC* IIA frame. The 112-type high density blocks are designed with a slot in the fanning strip for mounting to the shelf.

Connecting (front side) — The R-4451 Wiring Fixture has "tab" type brackets located in the upper right and left corners on the rear side. These two brackets allow the fixture of a frame shelf. This fixture also has two 1/4 inch (6 mm) holes located in the lower portion of the fixture to accommodate tilting. If tilting is desired, cut two pieces of rigid PVC tubing to the desired length (tilting angle desired) and secure them to the fixture with twine or nylon cable ties (see Figure 8-36).



NOTES: 1. MOUNT ADAPTER BAR ON BOTTOM EDGE OF SHELF TO BE CONNECTED.

2. TUBES CUT TO FIT AND SECURED IN PLACE TO PROVIDE TILTING ANGLE.

3. TEMPORARILY FASTEN ALL BLOCKS AS THEY WILL FINALLY APPEAR ON SHELF (WIRE WRAP TERMINALS TO THE FRONT).

4. REMEMBER WHEN CONNECTING - THESE BLOCKS ARE IN AN UPSIDE DOWN POSITION.

Figure 8-36. Connecting at Front Side of Frame

After the fixture has been mounted, the following procedures can be used:

A. Fan cable leads through the appropriate loops of the rear shelf fanning strips.

B. Mount all connecting blocks (wire wrap terminals toward front) on the wiring fixture in the position that they will finally appear on the frame shelf.

Note: Remember, with the wire wrap terminals facing outward, the blocks are now mounted in an upside down position (top row at the bottom).

C. Fan leads through the connecting block fanning strips and start terminating the leads. Connect leads starting at the bottom row and work toward the top row. Connect leads left to right. (Remember the above note.)

D. After all leads for the shelf have been terminated, verify the connections and solder all defects.

E. Remove the blocks from the wiring fixture and place them in the shelf channel in their proper mounting positions.

F. After each module has been completed (wired) or near the end of the work day, "snap" the blocks into their correct mounting positions (see Figure 8-37).

G. At the rear of the shelves, secure the cable forms to the rear shelf fanning strips in at least four evenly spaced locations. Use two strands of approved twine or nylon cable ties.

H. After the shelf connecting blocks have been mounted in place, and the cable form secured to the rear shelf fanning strip, dress the cable leads for each block into a flat "S" shaped curve. This dress is required to allow service observing cords to be connected on the rear (cable side) of the connecting block terminals.

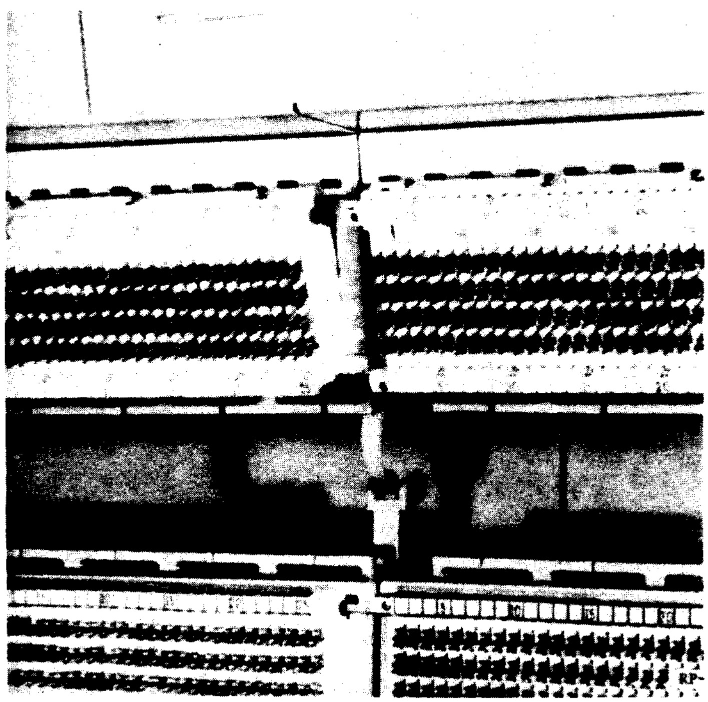
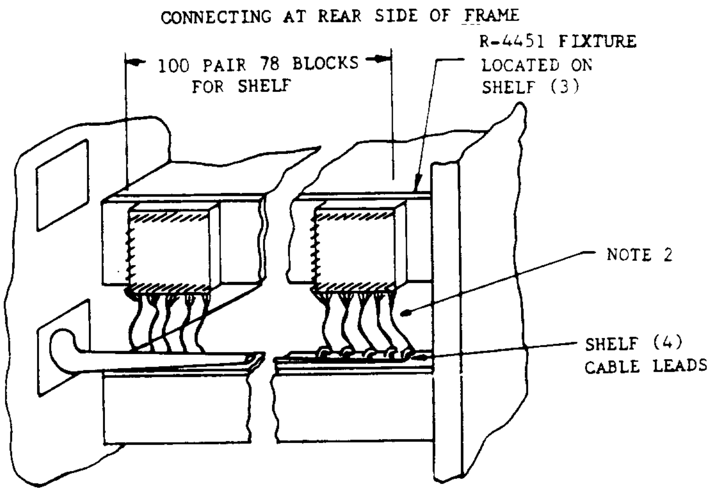


Figure 8-37. Snapping Connecting Blocks into Position

Connecting (Rear Side) for *COSMIC* I/IA Distributing Frames

Terminating the cable leads to the 78C-Type connecting blocks from the rear side of the frame is considered as an alternate method to front side connecting. For the method of temporarily mounting the connecting blocks on the R-4451 Wiring Fixture, refer to Figure 8-38. The procedures listed below should be followed for rear side connecting:

a. Fasten the R-4451 Wire Fixture to the service observing cord brackets located on the shelf immediately above the shelf being connected. That is, if the blocks for shelf 6 are being connected, mount the wiring fixture to the rear brackets of shelf 5.



NOTES:

1. INSTALLER TO DETERMINE WHICH LOOPS OF THE FANNING STRIP TO USE. R-3412 MARKERS MAY BE RE-QUIRED FOR LEAD IDENTIFICATION.
2. DRESS LEADS AGAINST TERMINAL STRIP AS CLOSE AS POSSIBLE. REFER TO SECTION A-A OF DRAWING ED-6C011-10.
3. LEADS TO LAY AS FLAT AS POSSIBLE IN THE HORIZONTAL SHELF CHANNEL.
4. SPARE LEADS LEFT LONG ENOUGH TO REACH ULTIMATE TERMINALS. DRESS LEADS AROUND REAR FANNING STRIP AND SECURE IN PLACE.

Figure 8-38. Connecting at Rear Side of Frame

b. The following difficulty will be encountered when connecting from the rear side of the frame. Even though all blocks can be mounted on the R4451 Wiring Fixture, the last five rows at each end cannot be connected due to the frame upright flanges; therefore, it would be expedient to completely connect the block farthest from the main form first, remove it from the wiring fixture, and place it on the shelf. Then, set up the rest of the blocks clear of the flange and finish connecting them.

c. After the cable leads have been fanned through the rear fanning strip, start bringing the leads into the connecting blocks.

d. Refer to connecting sheets and then form, fan, and connect the leads accordingly. It appears that starting at the bottom row and working left to right is the easiest method. Remember that the block is mounted in an upside down position.

e. After all leads for the shelf have been connected, verify the connections and solder all defects prior to permanent mounting.

f. After the blocks have been mounted, dress all the cable leads into a flat "S" type curve and press them down flat against the bottom of the shelf to allow for service observing cord connections to the rear (cable side) of the terminals.

Outside Plant Modules

The outside plant cables contain four 25-pair 710BD Connectors on each cable stub (11CA- or 11DA-) end that presses into the four 25-pair 710SD Connectors on the 307 Connector. The method for connection is as follows:

A. Mount the KS-22325 Service Bracket (Figures 8-39, 8-40, and 8-41) on the protector vertical uprights one shelf below the location you intend to apply the 710 Connectors to the 307 Connector Block (Figure 8-42). The use of this bracket holds the block while the 710 Connectors are being applied and keeps it within the confines of the guard rail to eliminate possible damage from ladders, etc.

Note: When adding Shelf 11 (bottom row), you must also set the bracket in Shelf 11 location the same as you did for Shelf 10 or you can lay the block on the AC trough. Be careful not to damage these Shelf 11 blocks.

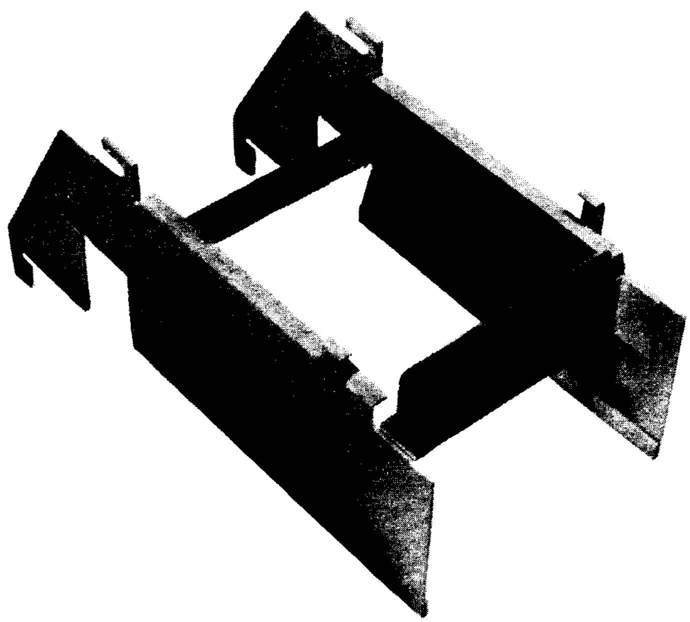
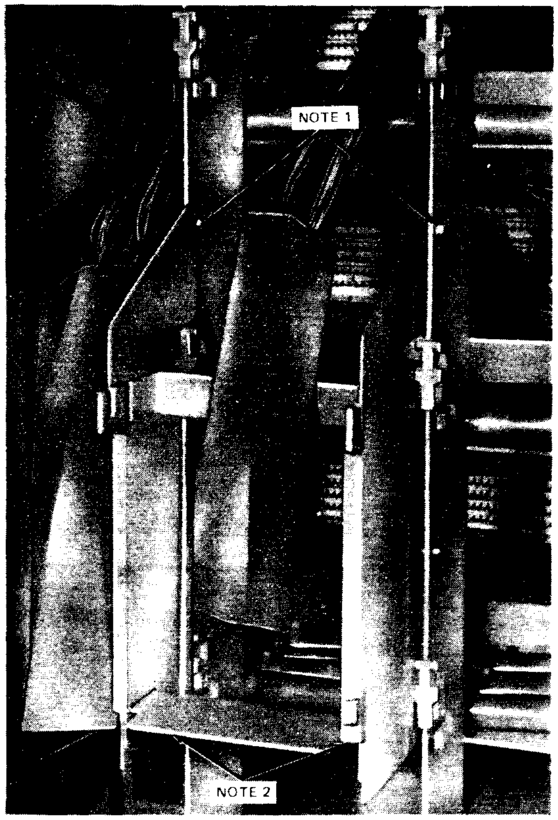


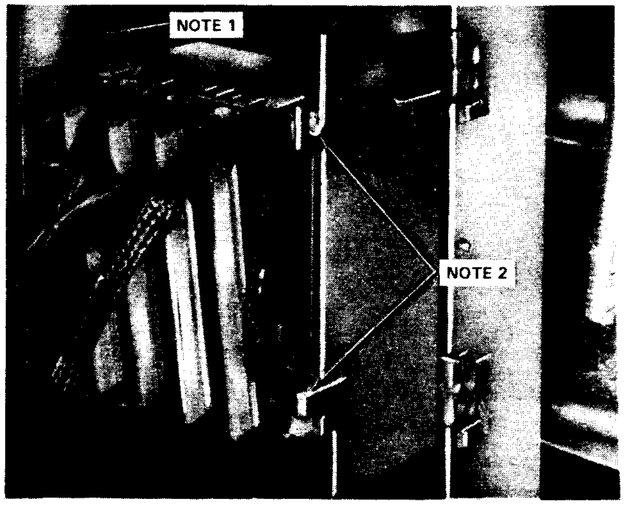
Figure 8-39. Service Bracket (KS-22325, L1)



NOTES:

1. WITH BOTTOM OF SERVICE BRACKET TILTED TOWARD THE AISLE, ALIGN AND ENGAGE FRAME PINS AND SERVICE BRACKET SLOTS.
2. PIVOT BOTTOM OF SERVICE BRACKET TOWARD FRAME UNTIL IT RESTS AGAINST FRAME AND SNAP IN LOCKS.

Figure 8-40. Installing KS-22325, L1 Service Bracket



NOTES:

1. MOVE CONNECTORIZED END OF STUB CABLE TO SIDE OF SERVICE BRACKET.
2. MOUNT 307 CONNECTOR PIN INTO UPPER SLOT OF SERVICING SHELF, BOTTOM AND SIDES OF CONNECTOR RESTS AGAINST SERVICE BRACKET.

Figure 8-41. Installing 307 Connector on KS-22325, L1 Service Bracket

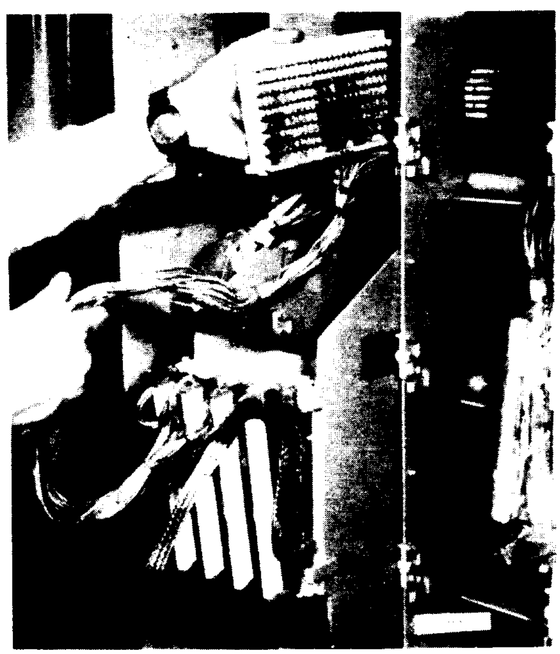


Figure 8-42. Placing 307 Connector Block for 710 Connections

B. The 78C- or 112-Type Connecting Blocks should be set into their respective positions on the shelf and "snapped" into place (Figures 8-43 and 8-44).

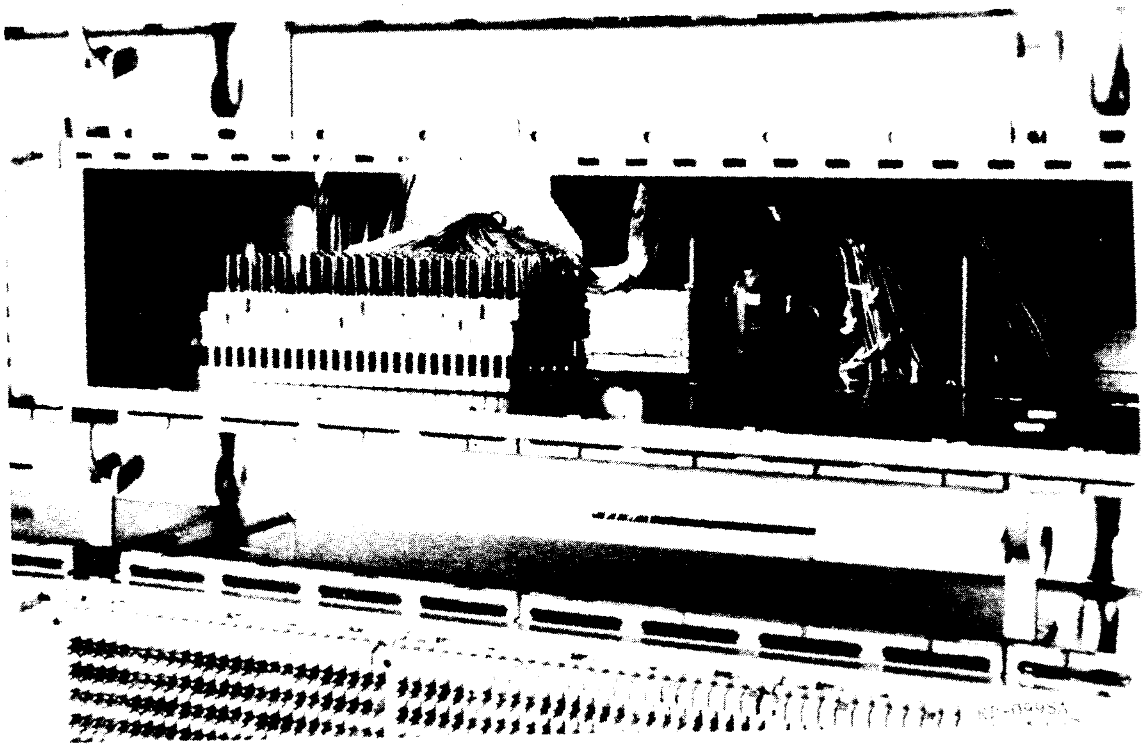


Figure 8-43. Placing 78- or 112-Type Connecting Block Upon Shelf

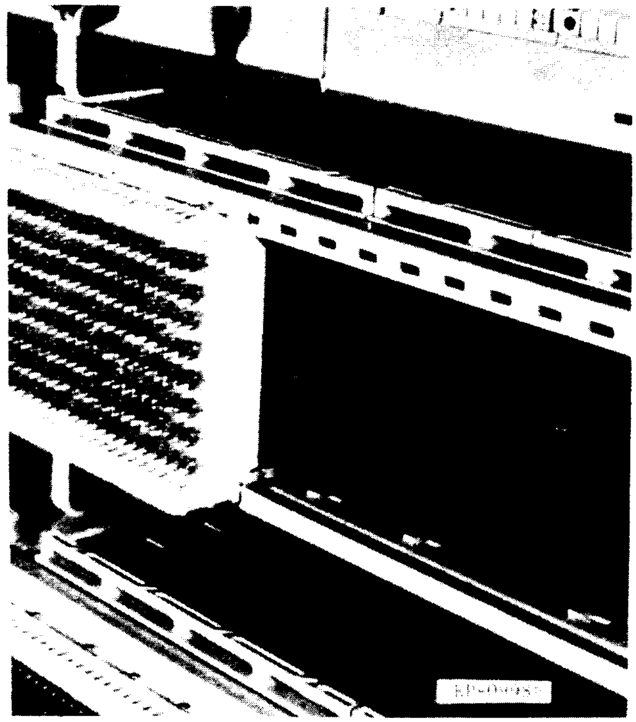


Figure 8-44. 78- or 112-Type Connecting Block in Final Position

C. After the connector block part of the assembly has been positioned on the service bracket, bring the 710BD connectors of the cable stub into position and prepare to press them into the four 710SD Connectors on the connector/protector block (see Figure 8-45).

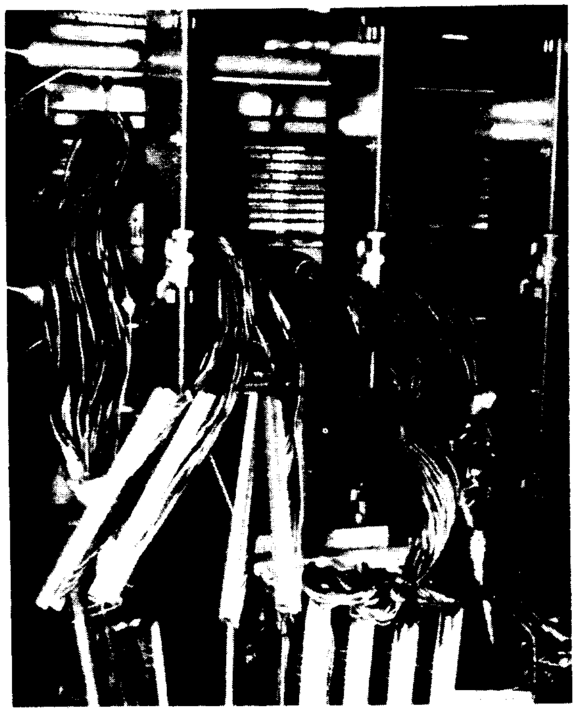


Figure 8-45. Preparing to Press 710 Connectors Together

D. The outside plant cable stub form is protected with a corrugated paper that has been taped in place. Cut the tape bands and remove the protection. Note the clear plastic caps that are protecting the 710 slotted beam terminals. Leave these plastic caps in place until you are ready to seat each of the connectors.

E. Each of the four formed arms of the cable stub have plastic ring color coded identifiers on them. Match these identifiers with the ones on the rear of the 307 Connector. The forms as they are shipped from the shop makes it somewhat difficult to insert the connectors together. Therefore, a slight bending of these formed arms will ease connector insertion.

F. Remove the clear plastic terminal guard for the first connector located in the left side and align the 710BD (Bridging Module) with the slots in the 710SD Connector Module. Be very careful not to damage, bend, or distort these bridging terminals. This is a "blind" type operation that requires a sense of "feel." A step in the plastic bracket can be used to index the bottom of the bridge module into the side of the splicing module. When the terminals have been aligned properly, begin at the bottom and press together with thumb pressure to hold then together (see Figure 8-46). If excessive pressure is encountered, remove the bridging module using the AT-8927C Tool. Check and realign terminals if necessary and begin to reinsert.

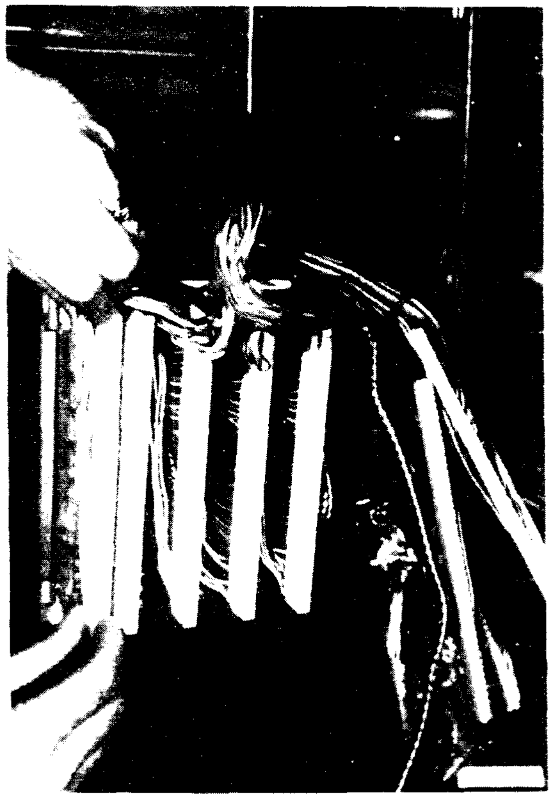


Figure 8-46. Aligning First 710 Connector by Hand

G. Remove the 710 Connector from the 307 Block to align the 710 bridge module. The 710 Connector can be released by pushing out the plastic tab holding the connector in place. Remove only one connector at a time, so as not to mix the locations of the connectors. Insert the corresponding color coded bridge terminal and form the leads back.

H. Using the AT-8948 Connector Presser Tool, begin at the bottom and start pressing them together. Working up, it will take about three or four operations of the tool (squeezes) to properly seat the two parts together (see Figure 8-47).

Figure 8-47. Pressing First 710 Connector with AT-8948L Connector Presser Tool

I. Working from left to right, continue to press the connectors together being sure that the connector parts are fully seated in the two jaw flanges of the AT-8948 Connector Pressing Tool. When you start pressing the last connector parts together, you will have to dress the ground strap conductor out of the way to allow room for the pressing tool. After the four connectors are pressed together, apply a cable tie or a double strand of twine around both the tie leads and stub cable leads at the top of the 710 Connector Assembly. Apply the tie or band just above the assembly as shown in Figures 8-48 and 8-49.

Figure 8-48. Four 710 Connectors Pressed into Position

Figure 8-49. Securing the Forms with Cable Ties

J. If cable ties were used, cut off the ends with the R-4266 or R-4827 Fastening Tool.

K. Take the ground lead from the cable stub and the braided ground lead from the protector block assembly and secure them to the hole provided in the shelf directly behind the protector block. Place the barrel side of the lug of the protector panel ground lead in toward the shelf and the barrel side of the lug of the cable stub ground lead outward (away from the shelf) so the two even surfaces are flat against each other. Insert the hex headed thread forming screw through the holes in the two lugs and through an internal tooth lock washer, and screw them into the hole in the shelf. Be sure the washer is between the lugs and the framework. This washer and screw will cut through the painted surface and provide a bonded ground. Be sure the screw is tightly secured to the shelf, but do not over tighten (see Figure 8-50).

Figure 8-50. Securing Cable Stubs and Connector Ground Leads

L. Remove the 307 connector assembly from the service bracket, rotate upward and snap into the vertical uprights (see Figure 8-51).

Note: Shelf one and eleven mount 307 Connectors in positions 1, 3, 5, 6, 8, and 9. When using high density 50-pair blocks, all 307 connector positions on shelves 1 and 11 can be occupied with 100-pair high density blocks.

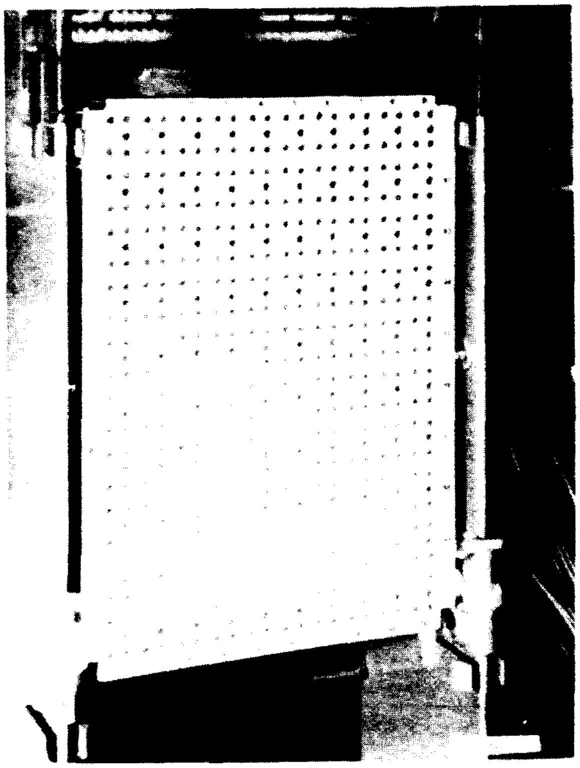


Figure 8-51. 307 Block Connectorized and in Final Position

Storing Spare and Unused Leads

The spare and unused leads serving a particular connecting block, test, or jack panel should be left long enough to reach the ultimate terminating point. The leads for the test and jack panels should be cut off and folded back along the cable form.

The leads serving the 78C- or 112-Type Connecting Blocks should reach the last rear fanning strip loop serving the last block the cable serves. Measure the leads to be sure they are long enough, cut off excess lead length, and double them back on the rear fanning strip form. Additional bands or cable ties may be required to hold these leads in place.

8.13.12 Block Removal Procedure

78C- or 112-Type Connecting Blocks

After a 78C-Type Block has been positioned and "snapped" into place from the front side of the frame, it may have to be removed. This block removal may be necessary to locate a short, open, or cross in the cable leads of the line equipment or possibly in the shop form of the connector block assembly.

To release a 78C- or 112-Type Connecting Block from a position on a line equipment module go around to the rear side of the frame and locate the block to be removed. Then using the KS-21345 Removal Tool reach into the wiring shelf and insert the tool over the locking tabs of the block as shown in Figure 8-52. A firm steady forward pressure on the tool will compress the locking tabs and release the block.

To remove a 78C- or 112-Type Connecting Block from a position on an outside plant module, the same method of releasing the locking tabs should be used as stated above. However, the 307 Connector Block directly behind the block being removed must be taken out first to gain access to the wiring shelf.

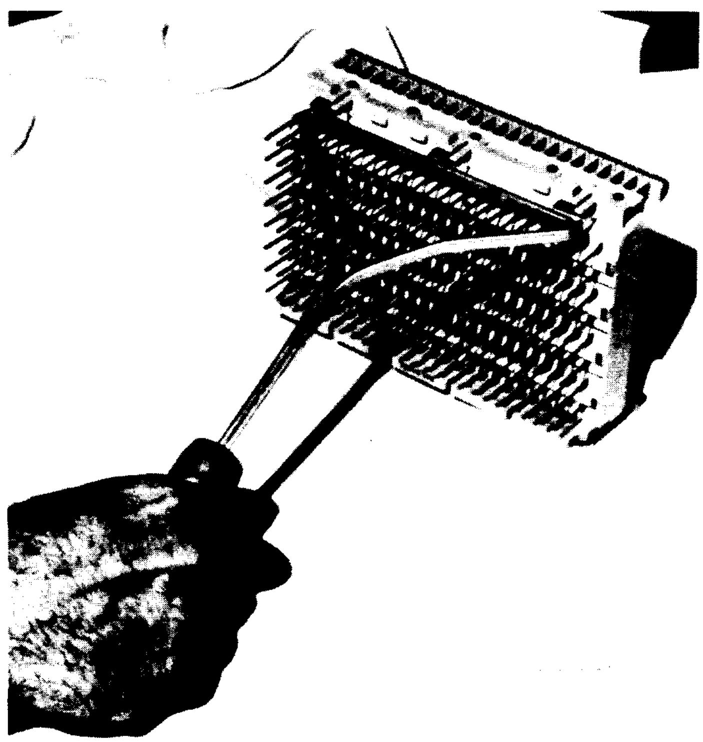
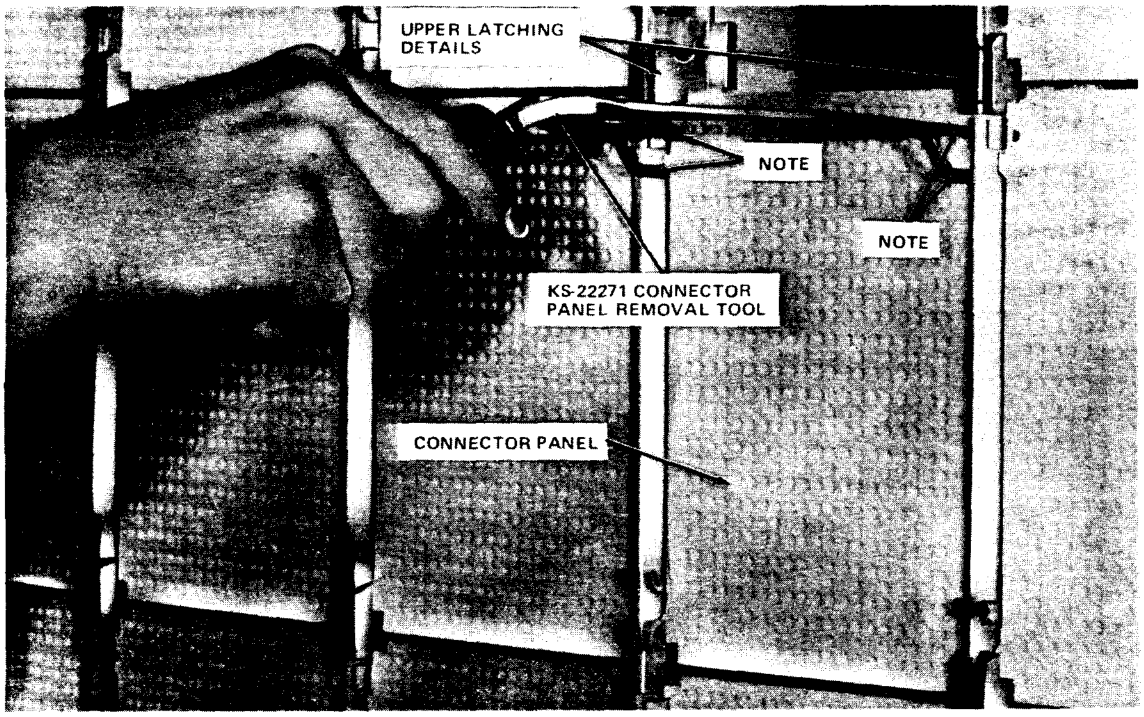


Figure 8-52. Removing 78- or 112-Type Connecting Block from Position with KS-21345, L2 Tool

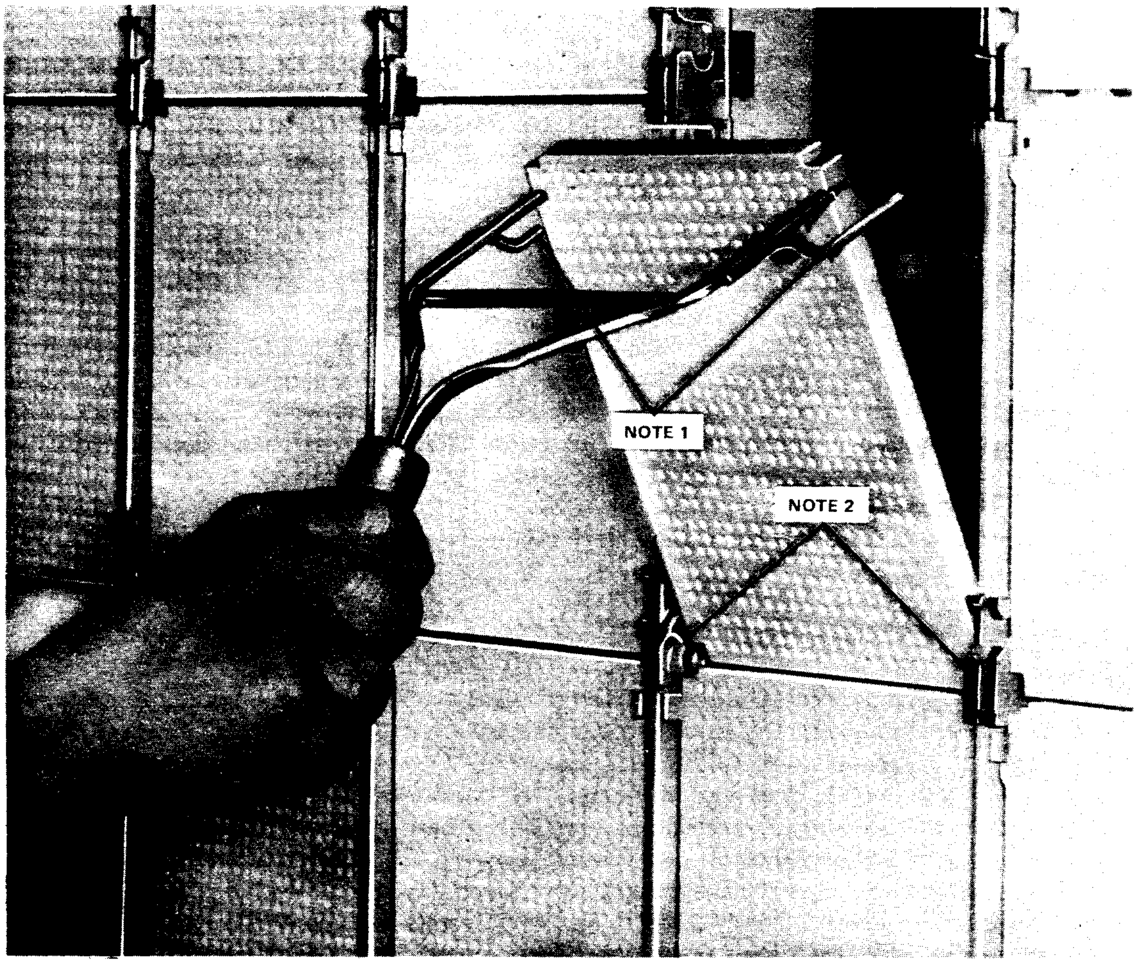
307-Type Connector Blocks

To remove a 307 Connector Block from its locked in position on the frame, insert the KS-22271 Tool into the top of the block as shown in Figure 8-53. The pressure from the top set of prongs will release the locking mechanism of the mounting details. The bottom set of prongs actually grasps the block; therefore, pull back and outwards on the tool (as shown in Figure 8-54) and the block will be released from its locked in position.



NOTE
INSERT UPPER PRONGS OF 307 PANEL REMOVAL TOOL INTO SLOTS IN 307-TYPE PANEL. LOWER PRONGS WILL BE PROPERLY ENGAGED AT THE SAME TIME.

Figure 8-53. Releasing 307 Block from Position with KS-22271, L1 Tool



NOTES
1. PUSH TOOL IN TO DISENGAGE UPPER LATCHING DETAILS AND TILT 307-TYPE PANEL WITH TOOL DOWN AND OUTWARD.
2. MANUALLY RELEASE LOWER PIVOT PINS AND REMOVE 307-TYPE PANEL.

Figure 8-54. Removing 307 Block from Position

8.13.13 Cross-Connections

The 78-type connecting blocks have twin clip quick-connect terminals for terminating the jumper wires. The 112-type connecting blocks have three-beam, quick-connect terminals for terminating the jumper wires. The 950C or 756C5 quick-clip wire insertion tools should be used for terminating the jumper wires on these terminals. The inadvertent use of other tools may cause poor connections, opens, nicked wires, or other wire damage.

Standard DT-24P distributing frame wire is the recommended cross-connection wire to be used on *COSMIC* distributing frames.

A cross-connection is considered short if it runs between any two points of adjacent modules. Short cross-connections do not enter the upper or lower express trough. The service order indicates to the craftperson the coordinate information of module, shelf, upper or lower half of the block, block number, column number, and (paired) row in the block for a cross-connection. When cross-connecting to a 78-type connecting block, the bottom slot of the terminal should be used first. When cross-connecting to a 112-type connecting block, the top slot of the terminal should be used first. The unused position of the connecting block terminal is used when a second cross-connection is required.

Cross-Connection Assignment

Preferential assignment provides for the shortest possible jumper between modules. If this type of connection cannot be made for a particular assignment, the computer system (COSMOS or CFAS) performs a full sequential search (alternating direction) of the modules for line equipment. The search starts first to the left, then goes to the right and continues in this alternating manner, such that eventually more distant terminals are searched. When a suitable terminal is found, the cross-connection will be the shortest one possible between the equipment and facility terminations. The size of the short jumper assignment universe, coupled with the high percentage of short jumper assignments generated by COSMOS or CFAS, results in limited usage of the upper and lower express troughs. This allows these troughs to be used for handling cable throws and line equipment transfers for load balancing.

Complete procedures for running jumpers, installing connections, and testing circuits are provided in Section 10 — Operations and Maintenance.

8.13.14 Verification Items

The following is a brief checklist to verify some of the important procedures.

- Outside plant cables and line equipment cables are installed on separate dedicated racks and are not mixed together.
- Yellow conductor of jumper wire pair is designated as the "tip" conductor.

- Outside plant cable routing followed precisely.
- Outside plant cables enter the cable trough in the correct compartments.
- Transition of the cables from the vertical cable chute onto the overhead rack is correct.
- Transition from inline spreading rack to a lateral "Gull Wing" is non-blocking.
- Outside plant cable groups are clipped together at approximately 3-foot (914 mm) non-adjacent intervals.
- Cable code on reel agrees with reel tag.
- Line equipment cables are protected where they bend sharply around or across metal work.
- Line equipment cables are secured on rack — no cable ties.
- Outside plant cables are secured where they:
  - Make a transition from one level rack to another
  - Enter into the half-module
  - Run on vertical cable rack.
- Cable stubs are secured to shelves at crimped sleeve locations.
- Line equipment cables are butted approximately 1-1/2 inches (38 mm) below last strap prior to entering shelf they serve.
- Soldered wire connections were made according to practice 800-612-154.
- Cable form secured to rear shelf fanning strips in a least four evenly spaced locations.
- Cable leads dressed into flat "S" shaped form at bottom of shelf.
- Stub and protector forms banded together.
- Stub shield connector ground leads fastened to shelf.
- Spare and unused leads left long enough to reach furthest terminating point.
- Correct tool used for terminating cross-connections.

8.13.15 Installing Filler Panels

Unused Connecting Block Positions

The KS-21341 framework filler panel is used to cover openings in the distributing frames where connecting blocks are to be installed at a later date or to fill unused openings in the frame. Two sizes are available: 4.86 inches (123 mm) for shelves 2 through 10, and 3.5 inches (89 mm) for shelves 1 and 11. The wide panel comes in two colors: yellow for switching equipment modules and blue for loop cable modules. The narrow size is white for all modules. All filler panels are approximately 32 inches (813 mm) long and are made of thin plastic with top and bottom lips for snap in installation. Both sizes may be cut to the desired length with scissors.

Unused 307-Type Connector Positions

The framework filler panel (Comcode 105 583 116) is used to cover openings where 307-type connectors are to be installed at a later date. The panel is 7-7/8 inches (200 mm) high and 6-3/8 inches (162 mm) wide and snaps into the framework, therefore, requiring no mounting hardware.

8.14 *COSMIC* Mini DF System

The *COSMIC* Mini DF is single-sided, and both the outside plant protector field and cross-connect field are on the front side of the frame, allowing the frame to be installed against a wall.

The framework consists of cross-connect/protection bays, cross-connect bays, and vertical wiring troughs arranged to provide the required frame capacity. A lower express wiring trough is provided with all framework. An optional upper express wiring trough may be provided.

The cross-connect/protection bays mount 307-type connectors and attached prewired 112-type connecting blocks. The cross-connect bays mount 112-type connecting blocks (Figure 8-55).

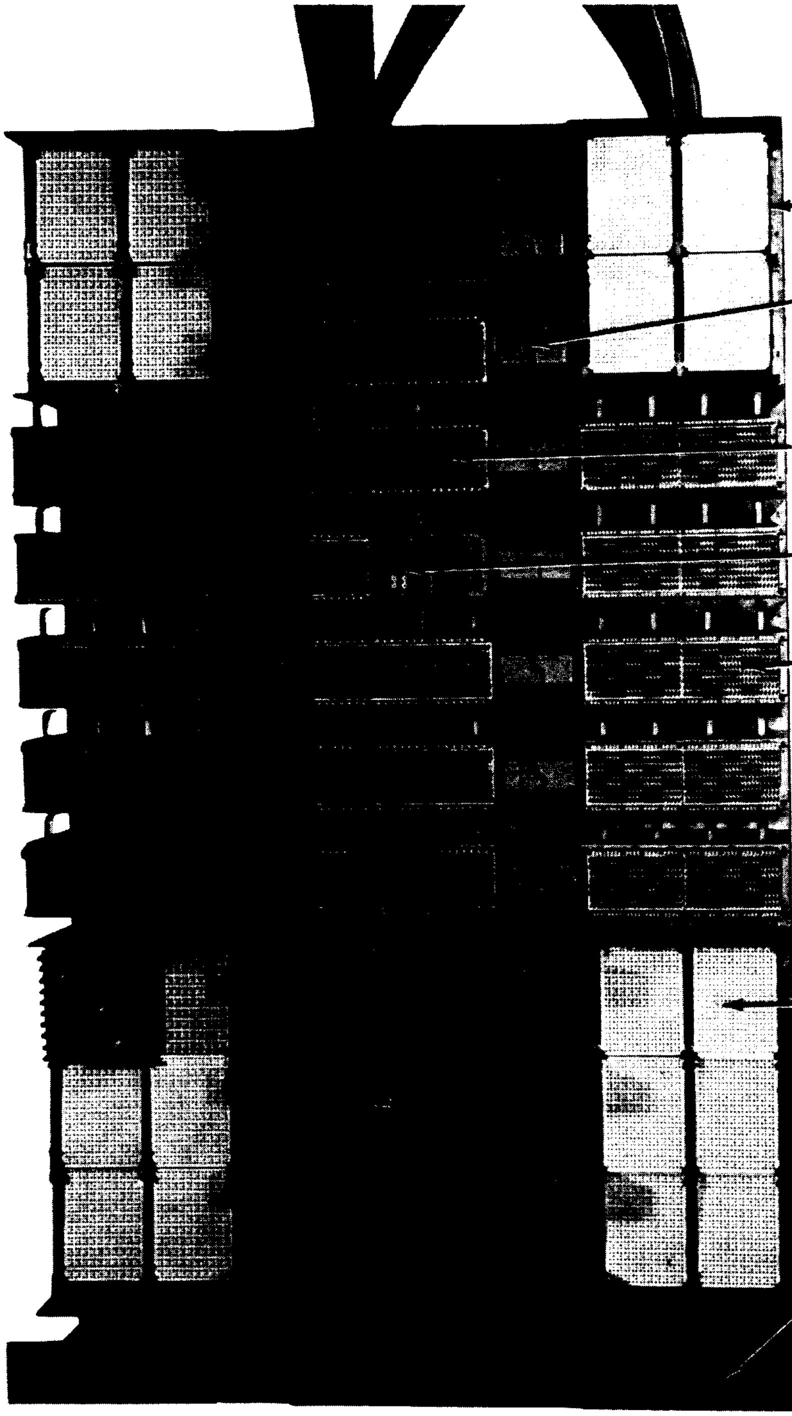


Figure 8-55. *COSMIC* Mini DF (3 Bays) 2 Cross-Connect/Protection (OSP) and 1 Cross-Connect (CO) (Upper Express Trough Not Shown)

Each bay is anchored to the floor with two bolts and the vertical cable trough is bolted to the bays. An endguard is available to cover the jumper express trough and provide an end finish.

The "Floor Plan Data Sheets" and installation drawings provided by Engineering should be used to layout the frame system and mark the floor for drilling. For additional floor layout information, see ED-6C312-10.

For framework installation see paragraph 8.1 of this section and ED-6C313-10.

8.14.1 Installing Ground Cable at Top of Frame

Install an inline ground conductor (bus) on the top of the frames. The ground is extended to adjacent frames. The conductor provides a ground path to each bay (Figure 8-56).

The ground bracket is furnished as part of the framework, and functions as a protector ground and a framework ground. Cut the ground lead to required length, attach terminal to lead and screw terminal to ground bracket.

A ground point is established by crimping a parallel tap connector to the inline ground conductor bus on the top of the frame. If desired, two bays may be grounded with one combined ground and parallel connector. Install per ED-6C316-10.

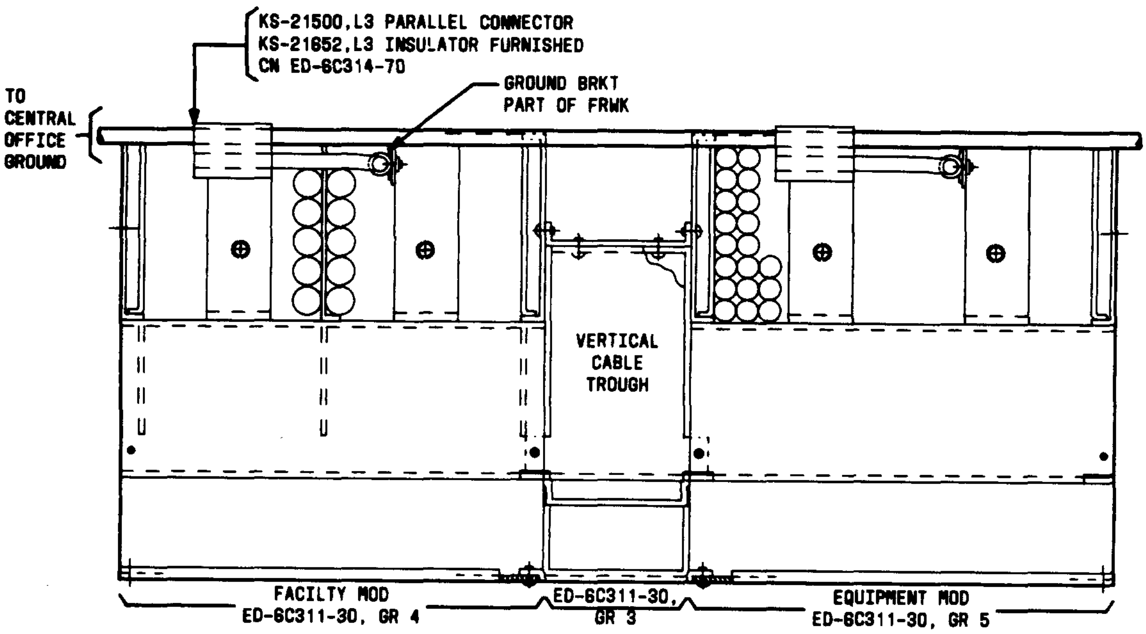


Figure 8-56. Ground Bus and Ground Lug on Top of Frame

8.14.2 Installing Overhead Cable Racking

The *COSMIC* Mini DF is a single lineup and the cable rack arrangement is installed overhead in front of the lineup (Figure 8-57).

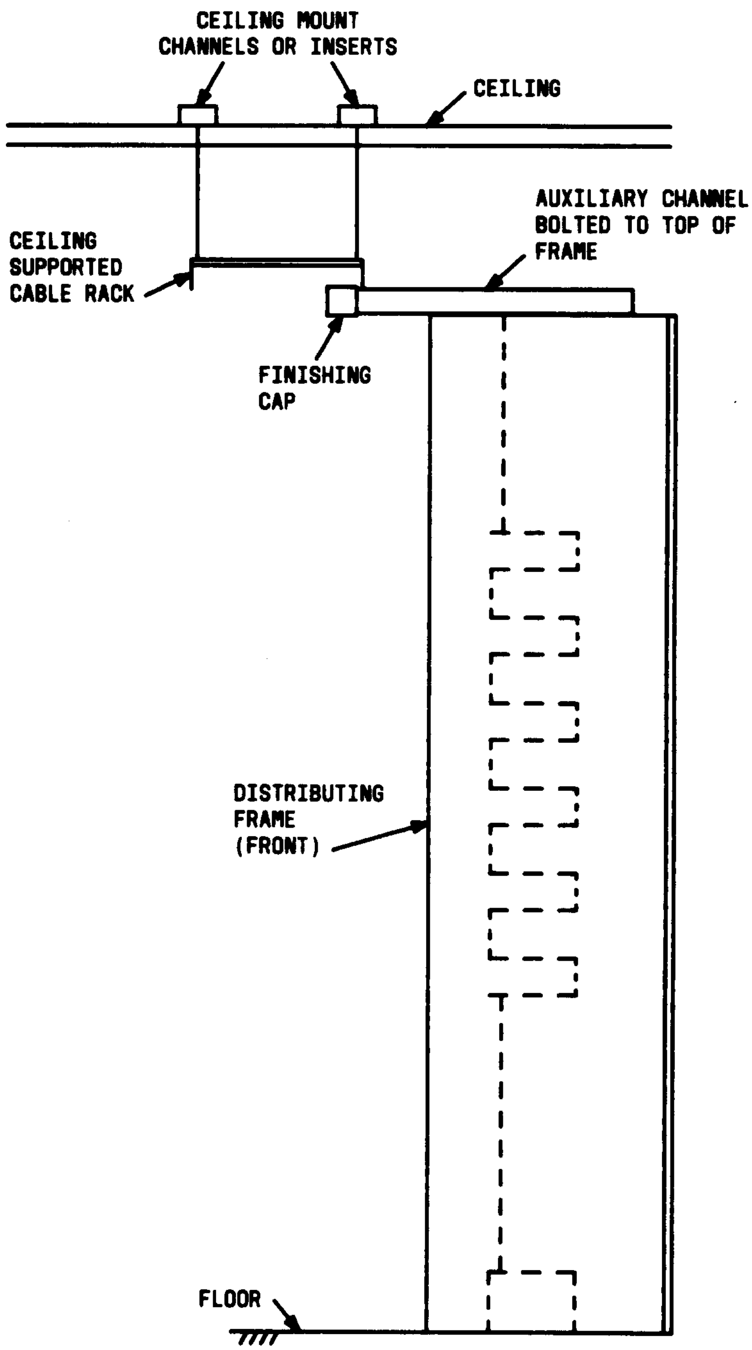


Figure 8-57. Cable Rack Arrangement

All cables are routed through the overhead cable rack arrangement and fed down through the top of the frame.

The auxiliary framing channels are fastened to the underside of the ladder type cable racking and to the top of the facility module framework. The cable rack is ceiling supported.

Standard methods of erecting, aligning, and installing auxiliary framework and racking should be applied as outlined in AT&T 800-614-155 and AT&T 800-164-157 Cable Rack Installation practices. Install the overhead cable racking per the Engineering Racking Plan and ED-6C317-10.

8.14.3 Installing Cabling and Wiring

Cable routing sheets are furnished by the Engineering group.

The line equipment cables are standard switchboard cables connecting switchboard equipment frames to the equipment modules (Figure 8-58).

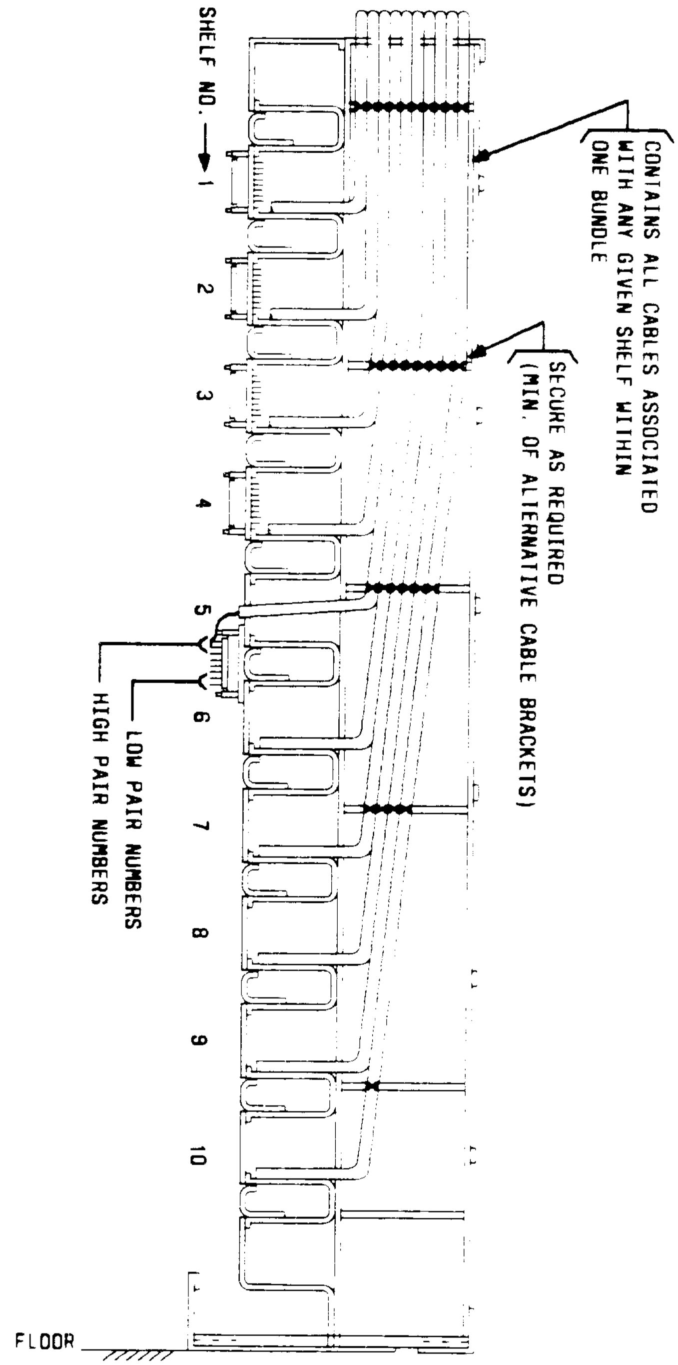


Figure 8-58. Running and Dressing Cable in Equipment Module

The outside plant cable stubs connect the facility modules to an auxiliary cable entrance facility. The outside plant cables are 11-type connectorized cables equipped with four 25-pair 710 Bridging Modules which insert into the four 710 SD connectors on the 307 connectors (Figure 8-59).

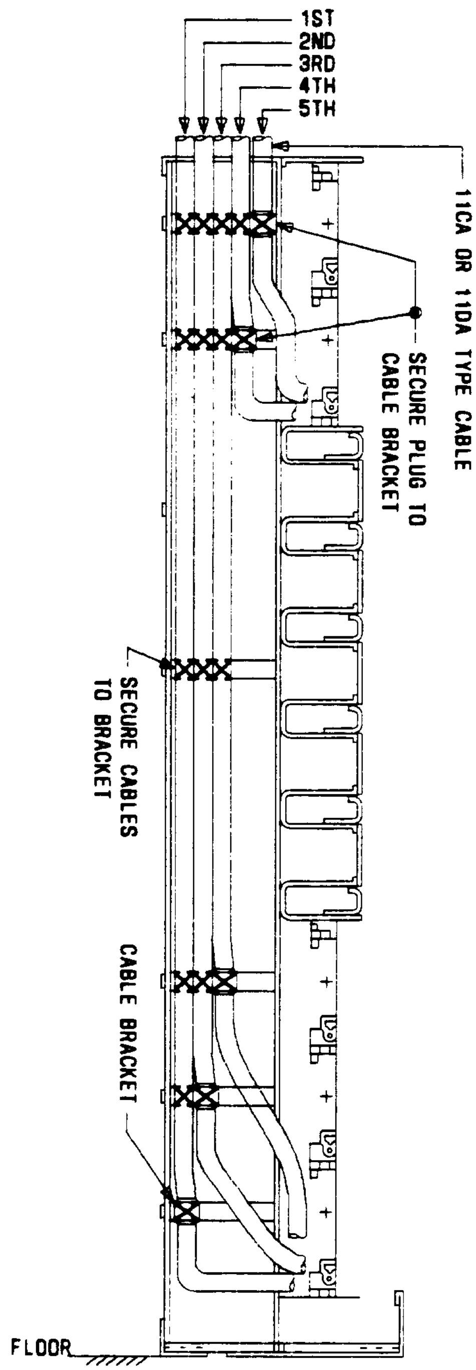


Figure 8-59. Running and Securing Cables in Facility Module

Cable and wiring information for *COSMIC* DFs is provided in paragraph 8.13 of this section. Install the *COSMIC* Mini DF cabling and wiring per the Engineering Cable Routing Sheets and ED-6C316-10.

8.14.4 Connecting

Connecting and installation information for the 112-type connecting blocks and the 307-type connectors is provided in paragraph 8.13.11 of this section and ED-6C316-10. Block removal procedures are shown in paragraph 8.13.12.

8.14.5 Cross-Connections

Complete procedures for running jumpers, installing connections, and testing circuits are provided in Section 10 — Operation and Maintenance.

8.14.6 Filler Panels

Filler panel information for unused block positions on frames is provided in paragraph 8.13.15 of this section.

SECTION 9

ADMINISTRATION

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ADMINISTRATION

This section provides a brief description of the administration guidelines for a *COSMIC* DF System.

9.1 Administration of a COSMIC Frame

Cross-connect frame systems require continuous support in record keeping and frame operations. The selection of an assignment system depends on a number of factors evaluated at a local level. Frame planners should become familiar with local administrative procedures since the success of an application can depend on the ability of the administration system to maintain an efficiently run frame.

COSMIC DFs are modular frameworks designed for equipment and facility terminations that are generally placed in alternating modules of a frame lineup. *COSMIC* DFs are designed to take advantage of "Preferential assignment" of cross-connects. Preferential assignment reduces jumper lengths and jumper pile-up in the express troughs by connecting jumpers between adjacent modules. This is accomplished by attempting to assign the nearest available line equipment to a given cable pair while complying with traffic loading constraints. Whenever preferential assignment can not be used, random assignment will usually result. In this procedure, the assignments are based primarily on traffic load or other parameters with no considerations for the relative locations for short jumpers. This may result in long jumpers and jumper pileup in the troughs.

Past experience has shown that the administration of a DF is extremely important. AT&T recommends a software support system be used to assist with the administration of a *COSMIC* DF, particularly when the outside plant pairs exceed 25,000.

9.2 Software Support Systems

COSMIC DF administration involves inventory and cross-connect assignment among facility, equipmment, and tie pair terminations. With the use of a software support system, a highly accurate data base can be maintained and more cross-connects can be assigned as short "Preferential" jumpers. There are two main computer based systems that are used in the *COSMIC* frame systems: COSMOS and CFAS.

9.2.1 COSMOS

Computer System for Main Frame Operations (COSMOS) is a minicomputer based system providing a central data base which is easily accessible locally to frame craft or remotely accessible at service provisioning center. COSMOS is supported by Bellcore and is used by the Bellcore client companies. COSMOS is used to inventory all subscriber cable pairs, switch equipment, and tie pairs on the DF. Although the major objective of COSMOS is termination inventory and assignment, it has broad capabilities and performs many functions for Dial Administration, Plant Assignment, Repair Service, etc.

Remote terminals may also communicate with COSMOS. The user addresses COSMOS with transaction codes to obtain various services, to request assignments, to inquire about data base items, to change data base entries, and to request off-line reports. COSMOS manipulates data and immediately returns information to the user or schedules report compilation at the computer location. It also provides hard copy instructions for connects and disconnects that the craft personnel complete at the frame. Once the personnel complete the work, the COSMOS data base is updated.

9.2.2 CFAS

Computerized Frame Administration System (CFAS) is supported by AT&T and is similar in functionality to COSMOS. CFAS is designed to run locally on a microcomputer, providing inventory control of exchange facilities that terminate on the DF. It also automates the assignment of switching equipment, eliminates the need to keep numerous manual records and manages all other record keeping associated with the frame and equipment. Figure 9-1 shows the relationship that CFAS plays in the DF environment.

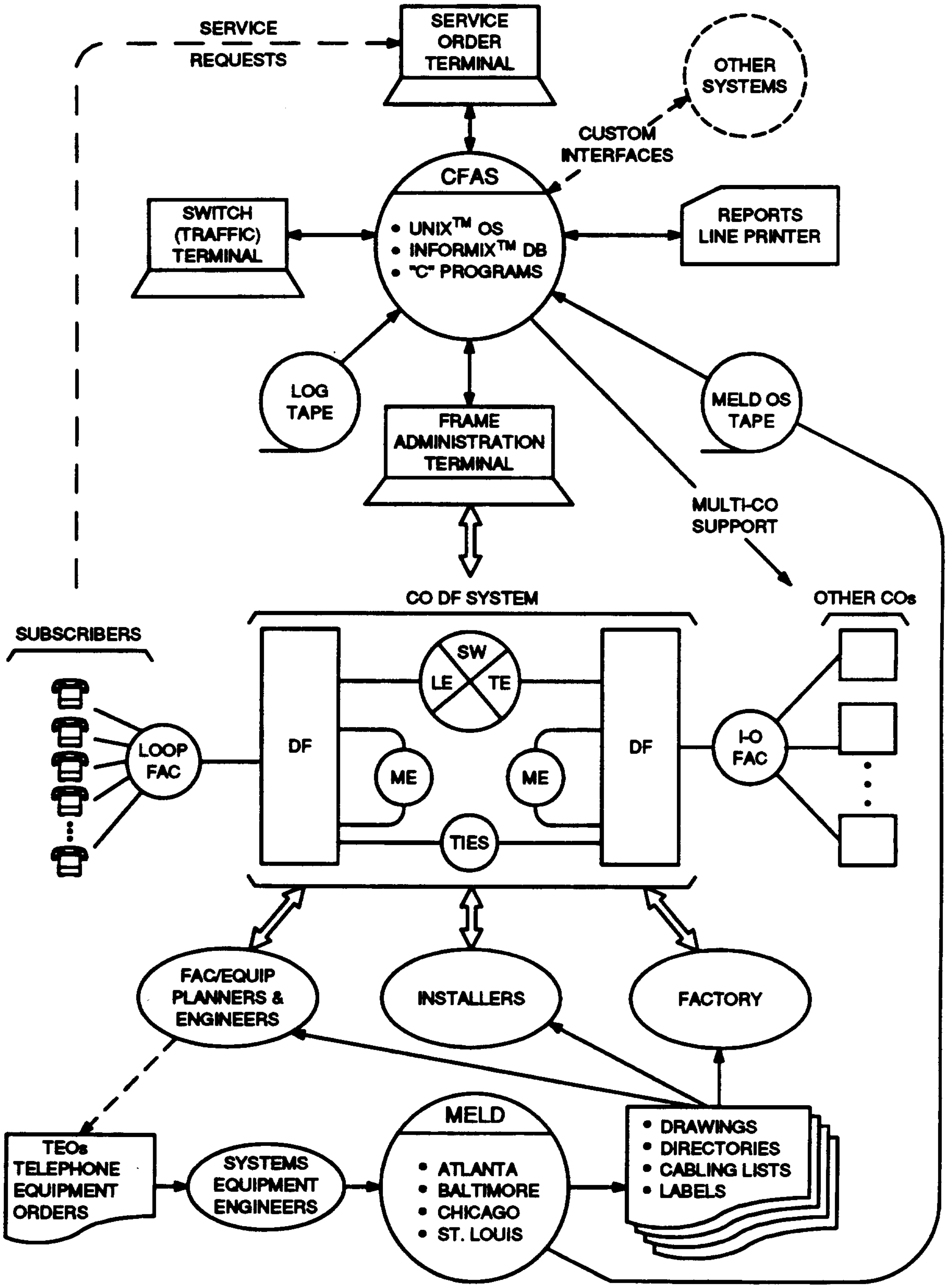

Figure 9-1. CFAS Operations Environment

9.3 CFAS Functions and Features

CFAS provides inventory control of exchange facilities terminated on the DF, automates the assignment of switching equipment, eliminates the need to keep numerous manual records, and enhances the efficiency of all organizations involved in the management of central office facilities.

The CFAS application programs are based on a modern relational data base mangement system that runs on AT&T computers using the UNIX* Operating System.

CFAS selects the best available switching equipment in a process that balances switch load considerations with frame jumper length. For the selected cable pair location, the nearest equipment zones are searched for equipment that can provide the required service. If no equipment is found, then CFAS progressively searches more distant equipment zones in a similar fashion. The search process continues extending outward in zones until an assignment is made.

Some of the benefits provided by CFAS are listed below:

- Automatic inventory control of exchange facilities replacing manual record keeping
- Preferential assignment of facilities to eliminate long jumpers that congest frames
- Proper load balance on the exchange switch that improves subscriber service
- Fast, reliable information to administer main distributing frames that speed service order processing
- Data conversion and inventory management recovers equipment lost in inaccurate paper records.
- Provides regular reports on "Out of Zone" jumpers
- Indicates areas of potential trough congestion
- Can be used to track the effects of jumper "Churn"
- Provides regular reports on available equipment
- Makes more of the existing line equipment available for assignment
- Reduces the percentage of "Dedicated Inside Plan (DIP)"
- Relaxes load balance rules without forfeiting service integrity

9.3.1 System Capability

CFAS has the versatility to be compatible with many different switches, some of which are listed below:

- *5ESS*®
- AXE-10 (Ericsson)
- NEAX-61E (NEC)
- *1A ESS*™

---

* Registered trademark of UNIX System Laboratories

CFAS can support several conventional or modular frames with multiple line-ups per exchange, including TPDFs, and administers seven facility types:

- Directory numbers
- Switching Equipment
- Cable Pairs
- Tie Pairs
- Miscellaneous Equipment
- Multi-Line Hunt Group (MLHG) Terminals
- PBX lines

9.3.2 Frame Connect Order

When an order involves frame cross-connect work, CFAS generates a connect order for the frame technician. The frame order shows all facilities in the circuit that are maintained in the CFAS data base and identifies the facilities being added to, removed from, and reused in the circuit.

The CFAS frame order also includes the following items:

- Service order number and type
- Frame work due date
- Frame location of all frame-terminated facilities, identified by the Location Oriented Identification System (LOIS) conventions
- Remarks

After an order is completed at the frame, service order information is entered in the system for a period of time set by the CFAS system administrator. This information includes the work completion date, facilities involved, and the frame technicians initials.

9.3.3 Traffic Administration

While minimizing jumper length, CFAS assignments maintain proper switching equipment load balance. A Current Estimate Usage (CEU) is maintained for each load group and assignments are directed to equipment in the less heavily loaded groups. CFAS also has the capability to age directory numbers, and reuse them after a specified time.

Several lists and statistical event reports are available dealing with load groups, switching equipment, directory numbers, PBX lines, and MLHG terminals.

9.3.4 Switch Cutover

CFAS can also be used to aid in switch conversions. The switch conversion module uses mechanized input including directory number, cable pair, class of service, features, etc., to make assignments into a new switch. The CFAS assignment algorithm produces the frame jumper running list that can be printed by frame, zone, cable pair range, switching equipment range, etc. Also, a file of circuit information that can be use by other computer systems is produced.

9.3.5 Documentation

The following documents are available for CFAS information:

- CFAS Installation Guide
- CFAS Database Creation and Growth Guide
- CFAS Users Guide
- CFAS System Administration Guide
- CFAS Special Projects Guide

9.3.6 CFAS Screen Form Examples

Figures 9-2, 9-3, 9-4, and 9-5 are examples of some of the CFAS screen forms.

```
EXCHANGE: MAIN     **ESTABLISH NEW SERVICE**
  ORDER NUMBER  111112                      DUE DATE: 16-03-87
  ORDER TYPE  CON
  CLASS OF SERVICE  RES                 FEATURES  ML     ENTITY ID  E0
  DN  722-1001             CP  OA-1001            SE  ?
                        ENTER OTHER FACILITIES
            FAC TYPE -- FAC ID ------------------ FR LOC ------
            FAC TYPE -- FAC ID ------------------ FR LOC ------
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```

Figure 9-2. CFAS New Service Input Screen

```
   EXCHANGE: MAIN                               DATE: 16-03-87
                                                TIME: 08:16
                    **FRAME OUTPUT REPORT**

ORDER NUMBER: 111112                    ORDER TYPE: CON
ORDER STATUS: A                         FRAME DUE DATE: 16-03-87

IN DN: 722-1001
IN CP: OA-1001        FRAME: 02021      LOIS: 021-03-U-04/1-03
IN SE: 002-01-001     ENTITY: E0        EQUIPMENT NUMBER: 769
                      FRAME: 02021      LOIS: 020-06-U-01/1-02
                      COS: RES          FEA: ML
```

Figure 9-3. CFAS Frame Output Report Output Screen

EXCHANGE: MAIN

DATE: 17-03-87
TIME: 15:51

SWITCHING EQUIPMENT LIST REPORT

SWITCHING EQUIPMENT	EQPT. NUMBER	STAT	CLASS OF SVC	EQPT. CLASS OF SVC	FEA.	EQPT. FEA.	FRAME LOC
000-00-000	0	WK	RES	RES	ML		01001
000-00-001	1	WK	RES	RES	ML		01001
000-00-002	2	WK	RES	RES	ML		01001
000-00-003	3	SP		RES			01001
000-00-004	4	SP		RES			01001
000-00-005	5	SP		RES			01001
000-00-006	6	SP		RES			01001

TOTAL SWITCHING EQUIPMENT: 7

Figure 9-4. CFAS Switching Equipment Report Output Screen

EXCHANGE: CENTRAL

DATE: 30-03-89
TIME: 09:38

MULTI-LINE HUNT GROUP REPORT

LISTED DIRECTORY NUMBER: 766-7030 PC
ENTITY: 50
GROUP: 0001

TERM	ST	CHANGE DATE	SWITCHING EQUIPMENT	ST	CLASS OF SERVICE/ CABLE PAIR	FEA/ ST	DIRECTORY NUMBER
0001	PC	19-02-89	001-000-42	PC	HGS1	M	766-7030
					1-0055	PC	
0002	PC	19-02-89	003-000-43	PC	HGS1	M	766-7031
					1-0056	PC	
0003	PC	23-02-89	004-001-02	PC	HGS1	M	766-7014
					1-0057	PC	

TOTAL LINES: 3

Figure 9-5. CFAS Multi-Line Hunt Group Report Output Screen

SECTION 10

OPERATION AND MAINTENANCE

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SECTION 10

OPERATION AND MAINTENANCE

This section describes the day-to-day frame operation and maintenance procedures, such as jumper running, testing, use of tools, and repair procedures.

10.1 Operation and Maintenance Tools

The tools and aids used to perform the frame operations and maintenance procedures are described in detail, with pictures and tables, in Section 4 — Apparatus and Accessories.

Caution: ***Sprays and cleaners can damage plastic parts. Do not apply any sprays or cleaners to products that have not been approved. Be especially careful not to expose any plastic parts to chemicals containing trichloroethane, such as certain cleaning fluids and lubricant sprays.***

10.2 Frame Operations

10.2.1 Administration System Interface

Bellcore's COSMOS and AT&T's Computerized Frame Administration System (CFAS) provide frame orders for the frame technician specifying the cross-connects to be installed or removed. When an order involves frame terminated facilities, the frame order shows all facilities in the circuit that are maintained in the data base and identifies the facilities being added to, removed from, and reused in the circuit.

The frame order also includes the following items:

- Service order number and type
- Frame work due date
- Frame location of all frame terminated facilities including Location Oriented Identification System (LOIS)
- Remarks.

If necessary, the system will assign tie pairs between any specified frame locations, assigning short jumpers and TPDF ties, if required. A report on the availability of tie pairs between any or all frame zones can also be provided.

After an order is completed, service order information including the completion date, the facilities involved, and the frame technician initials are usually retained in the system for reference for a period of time set by the system administrator.

CFAS is covered in detail in Section 9, Administration.

10.2.2 Running Jumpers

Location Oriented Identification System (LOIS)

The LOIS designation provides the exact frame locations of the terminals and is keyed to the geometry and identification characters provided on the *COSMIC* I, IA, and IIA DF connecting blocks. All work and service orders controlled by COSMOS or CFAS use LOIS to instruct frame personnel on jumper termination locations. The character "U" or "L" is inserted between the module shelf numeric designation and the connecting block numeric designation. The character "U" or "L" indicates the direction from which the connecting block is entered by the jumper wire (that is, from the upper or lower fanning strip). The alpha character "U" is shown when the connecting block terminal row is 1 or 2 or when the module shelf number is 11, and the alpha character "L" is shown when the connecting block terminal row is 3 or 4 or when the module shelf number is 1.

The LOIS format is as follows:

Service Order Example

130-1824 FC2 - 16 - 07 U 09 - 1 - 24

Terminal Column Number
Block Row
Block Number
"U" for Upper or "L" for Lower
Shelf Number
Module Number
Frame Line-Up Identifier
Cable Pair Group

Wire

The DT-type 24-gauge (.5 mm) wire is the recommended jumper wire to be used on the *COSMIC* distributing frames. The DU-type 24-gauge (.5 mm) wire may be used where less rigid wire is desired. For applications requiring shielded jumper wire (such as T-carrier circuits for subscriber loop carrier systems), P6-type (braided shield) or P7-type (foil shield) wire is recommended. Jumper wire is available in various color combinations. Recommended colors for Plain Old Telephone Service (POTS) is yellow/blue and special services is yellow/red.

Amount of Slack

Approximately 12 inches (305 mm) of slack should be left in all jumpers on *COSMIC* I, IA, or IIA DFs, and 10 inches (254 mm) for *COSMIC* Mini DFs. Slack must be dressed back from both terminations (equipment and cable) through the fanning strips, horizontal wiring channels, and into the vertical trough.

A convenient method of determining the proper amount of slack is to measure two and a half shelves above or below the terminal shelf where the terminations are to be made. This slack should then be dressed into the vertical wiring trough.

Short Jumpers

A short jumper is a cross-connection wire between any two locations on the same or adjacent modules. Short jumpers use the vertical troughs between modules, but ***not*** the upper or lower express troughs. Jumpers between adjacent modules should never be routed in the express trough.

Note: Refer to Figure 10-1 for jumper running functions and reference to number designations for running short jumpers.

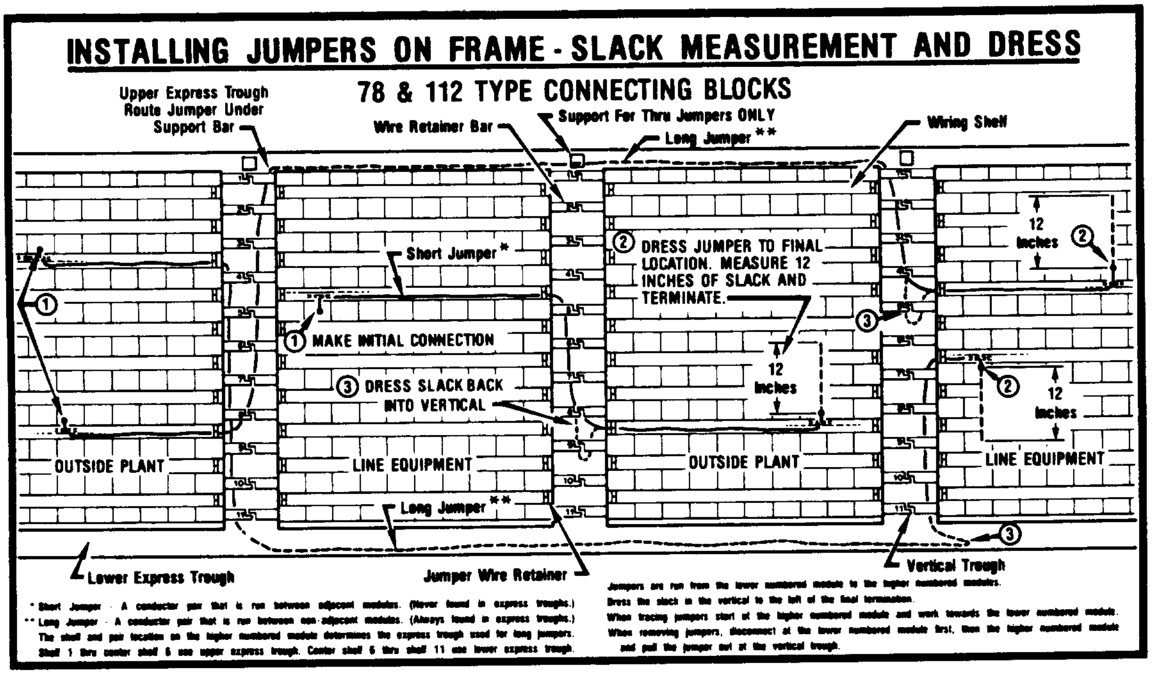


Figure 10-1. Method of Running Jumpers on *COSMIC* I, IA, or IIA Distributing Frames

The procedure used in running short jumpers is as follows:

Step 1 (Figure 10-1)

a. Using the 950C or the 756C5 wire insertion tool, connect the jumper into the designated terminals (Figures 10-2, 10-3, 10-4, and 10-5). Maintain the twist in the jumper wire as close to the terminal as possible.

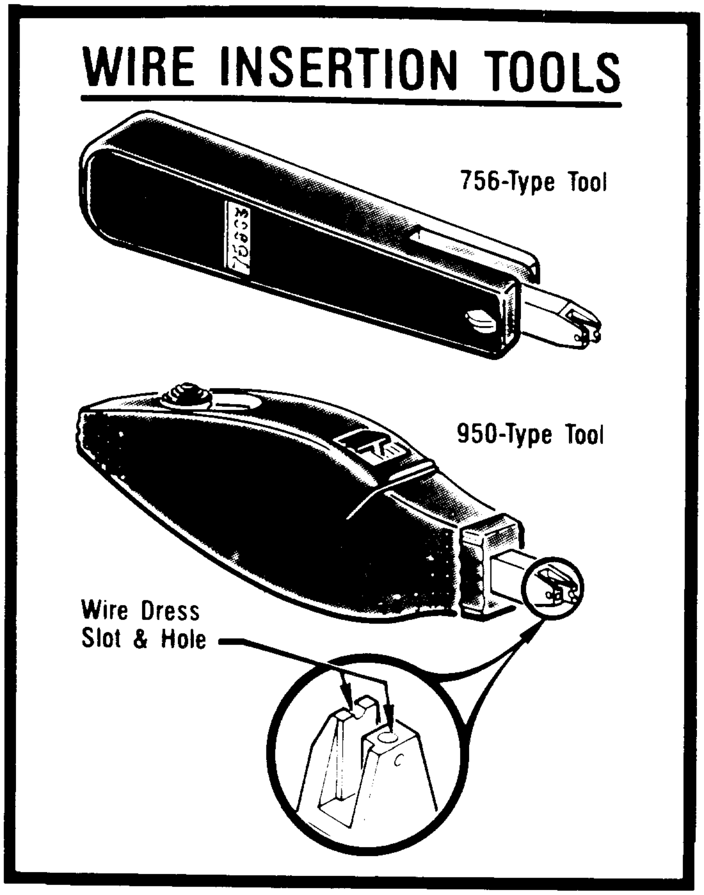


Figure 10-2. 950C and 756C5 Wire Insertion Tools

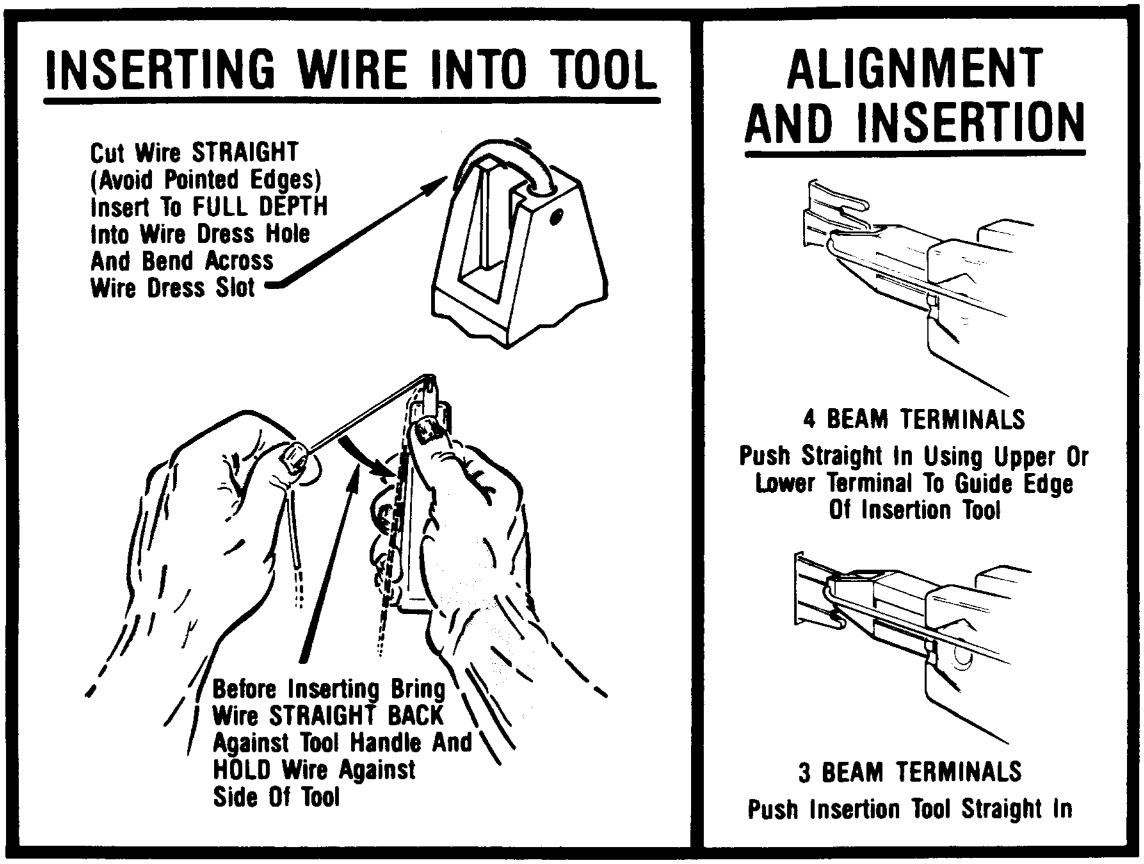


Figure 10-3. Inserting Jumper Wire in Wire Insertion Tool

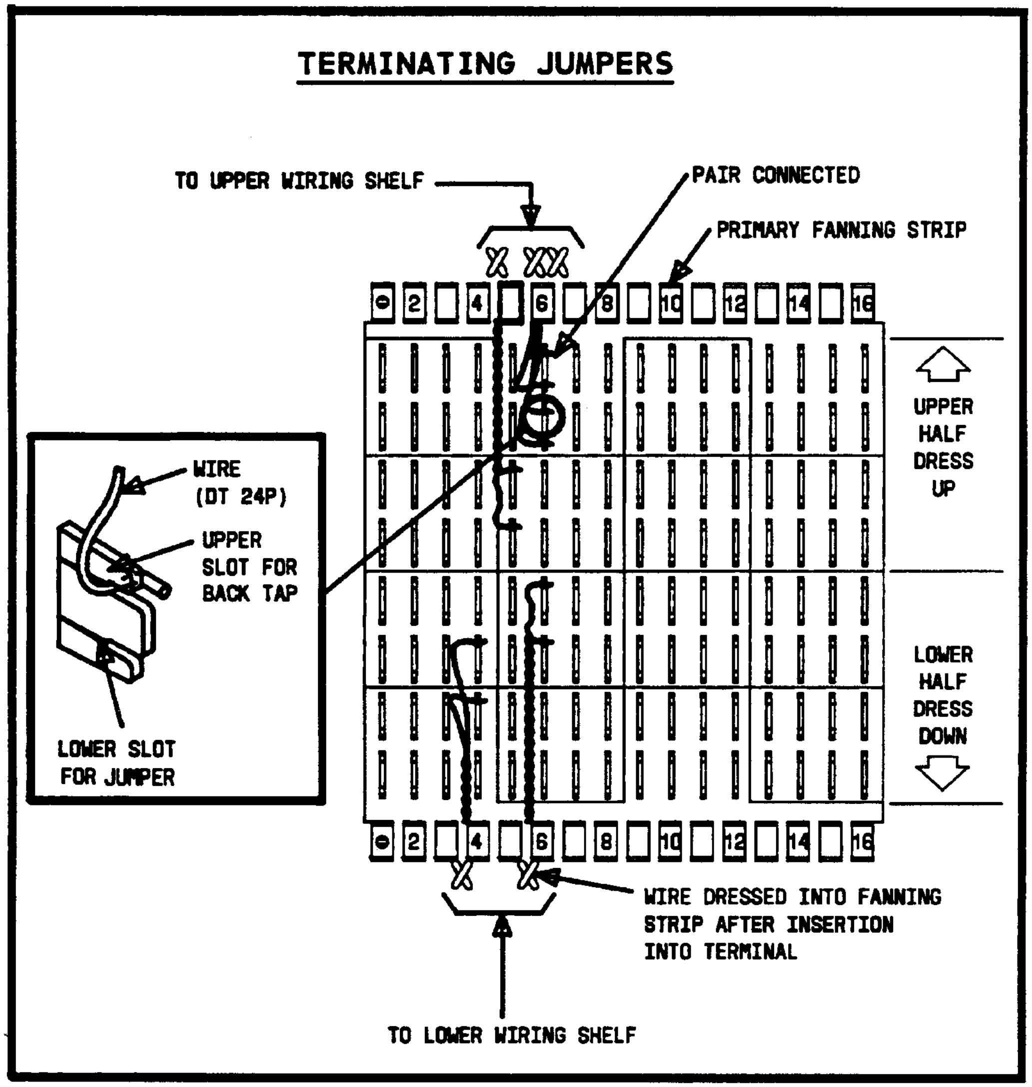


Figure 10-4. Terminating Jumpers on 112-Type Connecting Block

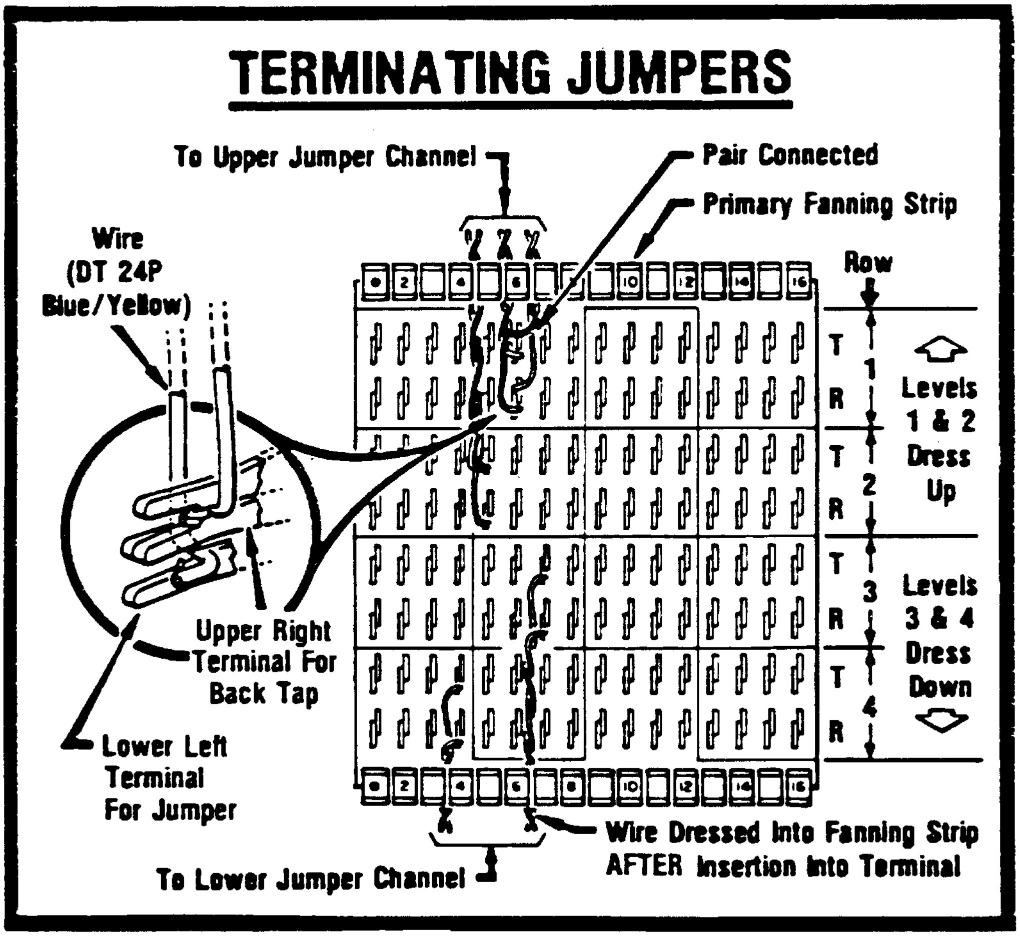


Figure 10-5. Terminating Jumpers on 78-Type Connecting Block

b. Dress the jumper into the block fanning strip that is closest to the terminals (top for rows 1 and 2 and all of shelf 11, bottom for rows 3 and 4 and all of shelf 1).

Step 2 (Figure 10-1)

a. Then dress the jumper into the frame fanning strip and into the vertical trough, working toward the second termination. The jumper must be run behind the jumper wire retainer.

b. Run the jumper up or down (as required) into the vertical trough until reaching the proper horizontal shelf.

c. Place the jumper behind the wire retainer bars.

Note: If LOIS indicates "U" (upper), run the jumper wire on the shelf above the indicated connecting block shelf, and if LOIS indicates "L" (lower), run the jumper wire on the shelf below the indicated connecting block shelf.

d. Run the jumper wire on the horizontal shelf, behind the jumper wire retainer. Leave about 12 inches (305 mm) of slack, and then cut the jumper wire.

e. Using the 950C or the 756C5 wire insertion tool, connect the jumper wire to the tip and ring terminals, then into the block, and then into the frame fanning strip.

Step 3 (Figure 10-1)

a. Dress the slack into the vertical trough.

Long Jumpers

A long jumper is a cross-connection between any two horizontal terminal wiring shelves of nonadjacent modules using both the vertical trough between the modules and the upper or lower horizontal express troughs.

Note: Refer to Figure 10-1 for jumper running functions and references to number designations for running long jumpers.

To run long jumpers, perform the following procedures:

Step 1 (Figure 10-1)

a. Locate the assigned terminal on the lower numbered module.

b. Using the 950C or the 756C5 wire insertion tool, connect the jumper to the designated terminals (Figures 10-2, 10-3, 10-4, and 10-5).

Step 2 (Figure 10-1)

a. Dress the jumper on the shelf, working toward the second termination on the higher numbered module.

b. Place the jumper into the vertical trough behind the jumper wire retainers.

c. Run the jumper to the proper express trough by proceeding as follows:

- If the shelf location of the higher numbered module is in shelves 1 through 6U, run jumper upward in the vertical trough to the upper express trough.
- If the shelf number of the higher numbered module is shelves 6L through 11, run the jumper downward in the vertical trough to the lower express trough.

Note: This method of choosing express troughs should cause both the upper and lower express troughs to be about equally filled.

d. Dress the jumper behind the wire retainer bars.

e. Run the jumper wire in the upper or lower express trough to the vertical trough that is immediately prior to the final terminal location regardless of the terminal location within the module.

f. If the upper express trough is used, place jumper behind the jumper support bar.

g. Run the jumper up or down the vertical trough (as required) until reaching the proper horizontal shelf.

h. Place the jumper behind the jumper wire retainer bars.

If LOIS indicates "U" (upper), run the jumper wire on the shelf above the indicated terminal connector; and if LOIS indicates "L" (lower), run the jumper wire on the shelf below the indicated terminal connector.

To determine whether the upper or lower express trough should be used, it is recommended that the procedure described previously in Step 2c be followed. However, if the initial cross-connections on the frame did not use this procedure but instead used the facility location to determine which express trough to use, this procedure should be continued. Be consistent; use one method or the other to determine which express trough to use.

To complete the routing of the jumper, proceed as follows:

i. Run the jumper wire on the horizontal shelf and through the appropriate frame fanning strip.

j. Before cutting the jumper wire, allow approximately 12 inches (305 mm) of slack. Dress the slack back through the frame fanning strip along the horizontal shelf and into the vertical trough.

k. Place the wire into the block fanning strip.

l. Using the wire insertion tool, connect the jumper wire to the tip and ring terminals.

Note: Once jumper wires are connected and are within the block fanning strip, avoid removing them from the fanning strip for identification or tracing. This could cause the wire to break at the terminal because of torsional stress.

Step 3 (Figure 10-1)

a. Dress the slack into the vertical trough.

A Workcenter Information Package (WIP) 365-WIP-004V is available showing jumper placement procedures.

10.2.3 Installing Connections

Installing Cross-Connect Wires into Connecting Block Terminals

AT&T 800-612-164 covers the procedure for terminating shielded cable. When installing nonshielded cross-connect wire into connecting block terminals, use the following procedure:

Note: Before reconnecting previously connected wires, cut off the broken insulation at the end of the wire.

1. Determine if the terminals to be connected appear in the upper or lower half of the connecting block.

   Note: Use the upper fanning strip for terminals in the upper half of the block, and use the lower fanning strip for terminals in the lower half of the block.

2. Locate the block column number in which the terminal appears.
3. Connect the wire for 78-type connecting blocks or 112-type connecting blocks as follows.

78-Type Connecting Blocks

To connect wires to 78-type connecting block terminals, use the 950C or 756C5 quick-clip wire insertion tool (Figure 10-2) and proceed as follows:

Note: It is recommended that several trial connections be made on unused terminals to gain experience in the use of the wire insertion tool before making actual connections. Do not wiggle or rock the tool as this may cause the wire to break, and excessive pressure or striking the tool may force the terminal through the block.

1. Grasp the wire insertion tool in such a way that pressure will be applied with the palm of the hand while holding the tool loosely with the insertion head in a vertical position.
2. Insert the tip (or ring) conductor to full depth into wire dress hole and bend across face through wire dress lot, and bring wire straight back against tool handle (Figure 10-3).
3. Position the tool directly over the twin clip of the lower left terminal with the wire entry from the left side of the terminal and gently push forward until the tool is in proper alignment with the terminal. Push the tool forward until it bottoms on the terminal. At this point, the wire has been inserted to the proper depth (Figure 10-5).
4. Withdraw the tool straight out from the terminal. If unusual pressure is encountered, inspect the connection. If the connection is bad, remove the wire with the wire removal tool. Clip the end of the poorly connected wire and reconnect it.
5. Perform the same steps (Steps 1 through 4) for the mating wire of the pair, and dress the pair of wires into the proper block and frame fanning strip slot.

112-Type Connecting Blocks

To connect wires to the terminals of 112-type connecting blocks, use the 950C or 756C5 quick-clip wire insertion tool and proceed as follows:

1. Grasp the wire insertion tool in such a way that pressure will be applied with the palm of the hand while holding the tool loosely with the insertion head in a vertical position.
2. Insert the tip (or ring) conductor to full depth into wire dress hole and bend across face through wire dress slot, and bring wire straight back against tool handle (Figure 10-3).
3. Position the tool directly over the lower slot of the terminal and gently push forward until the tool is in proper alignment between the second and third beams on the terminal. Push the tool forward until it bottoms on the terminal. At this point, the wire has been inserted to the proper depth (Figure 10-4).
4. Withdraw the tool straight out from the terminal. If unusual pressure is encountered, inspect the connection. If the connection is bad, remove the wire with the wire removal tool. Clip the end of the poorly connected wire and reconnect it.
5. Perform the same Steps 1 through 4 for the mating wire of the pair, and dress the pair of wires into the proper block and frame fanning strip slot.

Back-Tap Connections

Adding a jumper to a terminal on which another jumper already exists is sometimes called a back tap. It is usually done to add a new facility or equipment. Upon removal of the original jumper, the second jumper provides a new circuit configuration.

To install the second jumper (back-tap) on the connecting block terminals:

1. For 78-type connecting blocks, repeat the previous procedure except insert the second jumper into the upper right terminal, with the wire entry from the right side of the terminal (Figure 10-5).
2. For 112-type connecting blocks, repeat the previous procedure except insert the second jumper into the upper slot of the terminal between the first and second beam (Figure 10-4).

10.2.4 Removing Connections

Caution: ***If tools other than the 980A or 950C are used, connections on adjacent terminals might be disturbed or the reliability of the terminal (to make a good connection) might be reduced thus affecting service.***

To remove wires from the terminal block, proceed as follows:

1. Place the tool hooks around the terminal beam behind the wire.
2. Using the wire removal tool as shown in Figures 10-6 and 10-7, pull the wire from the terminal and away from adjacent terminals.

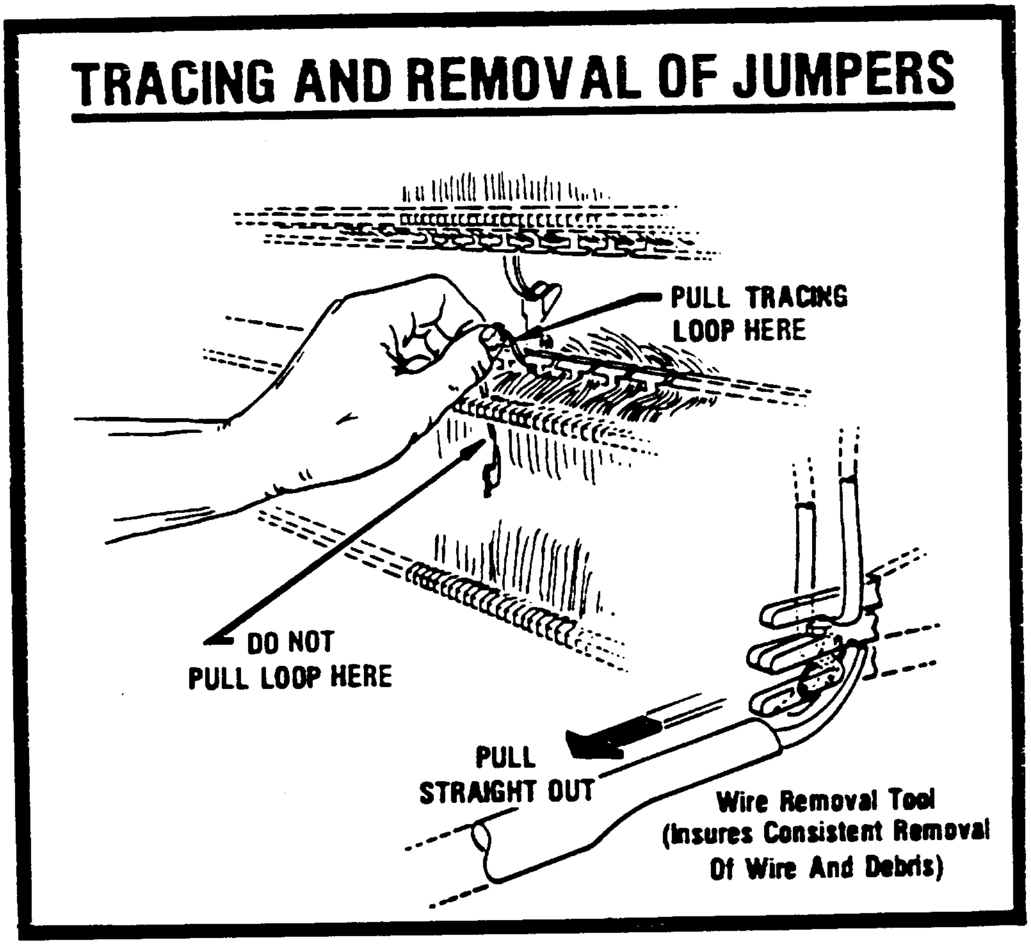


Figure 10-6. Tracing and Removal of Jumpers (78-Type Connecting Block)

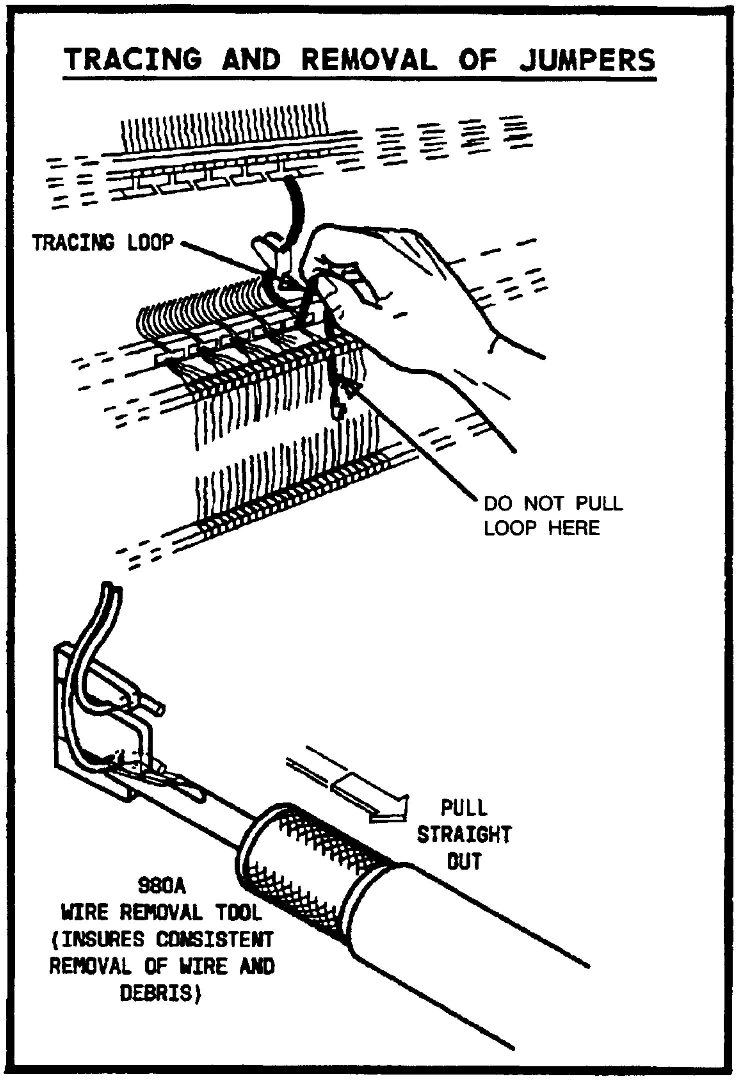


Figure 10-7. Tracing and Removal of Jumpers (112-Type Connecting Block)

10.2.5 Designation of Special Service Lines

Indicators and insulators provide visibility and protection for circuits assigned to special services. Indicators are used on cross-connecting wires, and insulators are placed on apparatus terminations for additional protection. Descriptions, pictures, and applications of indicators and insulators are contained in Section 4.

The following indicators and insulators are available for use on the 78-type connecting blocks:

- KS-16847, L1 Indicator (split ring)
- D Clip Insulator (for bifurcated quick-clip or wire-wrap terminals).

The following indicators and insulators are available for use on the 112-type connecting blocks:

- KS-16847, L1 Indicator (split ring)
- KS-16604, L2 Insulator (for single wire-wrap terminals)
- J Clip Insulator (for three-beam quick-clip terminals).

10.2.6 Testing and Verifying Circuit

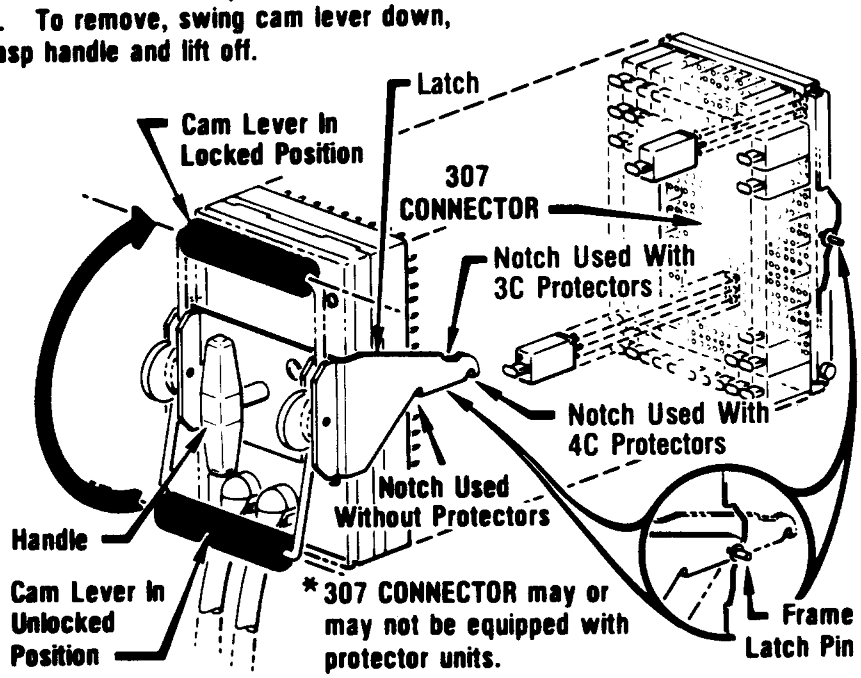
Test connectors, adapters, and test cords are used to connect to the test terminal fields of connectors to test outside plant cable pairs. Multiple testing or one-at-a-time testing is provided.

299A Test Adapter For 307-Type Connectors

The 299A test adapter (Figure 10-8) is used to connect the 100-pair protector panel of the 307-type connector to automatic pair identification equipment. The test adapter makes contact with the outside plant T and R conductors through the test points in the top of the 4C-type protector units. If the 307-type connector is not equipped with the protector units, the contacts in the test adapter make contact with the outside plant T and R conductors through their respective protector sockets in the protector panel. The test adapter contains 200 (100 pairs) spring-loaded contacts that are internally connected to two 50-pair, 15-foot (4572 mm) long cables. Each cable terminates on two 25-pair KS-19162, L4 (or equivalent) connectors for attachment to automatic pair identification equipment. The four connectors are numbered 1-25, 26-50, 51-75, and 76-100 to identify the respective cable pair count. A separate pick test panel is furnished with the 299A test adapter for single or pair-at-a-time testing.

299A TEST ADAPTER

To connect test adapter grasp handle and align with the 307 CONNECTOR.* Place the adapter onto the connector, pivoting the latch slightly upward and onto frame latch pins. Lock adapter in place by swinging cam lever up. To remove, swing cam lever down, grasp handle and lift off.**



**** It may be necessary to move adapter side to side to align pins.**

Figure 10-8. Mounting the 299A Test Adapter

Pick Test Panel Assembly

The pick test panel assembly (Figure 10-9) is furnished with the 299A and 299B test adapters to access the 100-pair field of the adapters for single or pair-at-a-time testing. The four KS-19162, L4 (25-pair) connectors on the adapters are attached to the pick test panel, tone is applied, and a B test point tester is used to identify individual pairs.

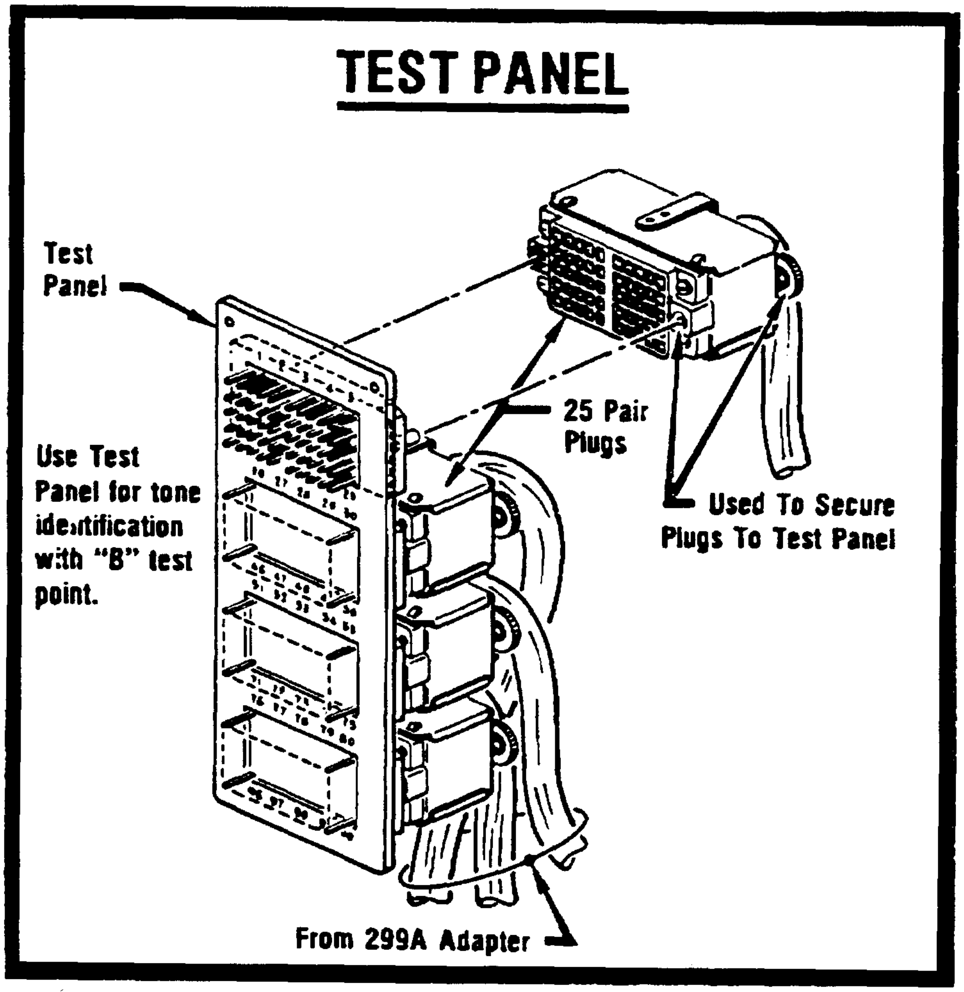


Figure 10-9. Mounting 299A Test Adapter Connectors on Pick Test Panel

P2FL Test Cord

The P2FL test cord (Figure 10-10) is used to short the tip and ring or to ground the tip and/or ring of an individual cable pair by inserting the plug end into the test points of a 4C-type protector unit on the 307-type connector.

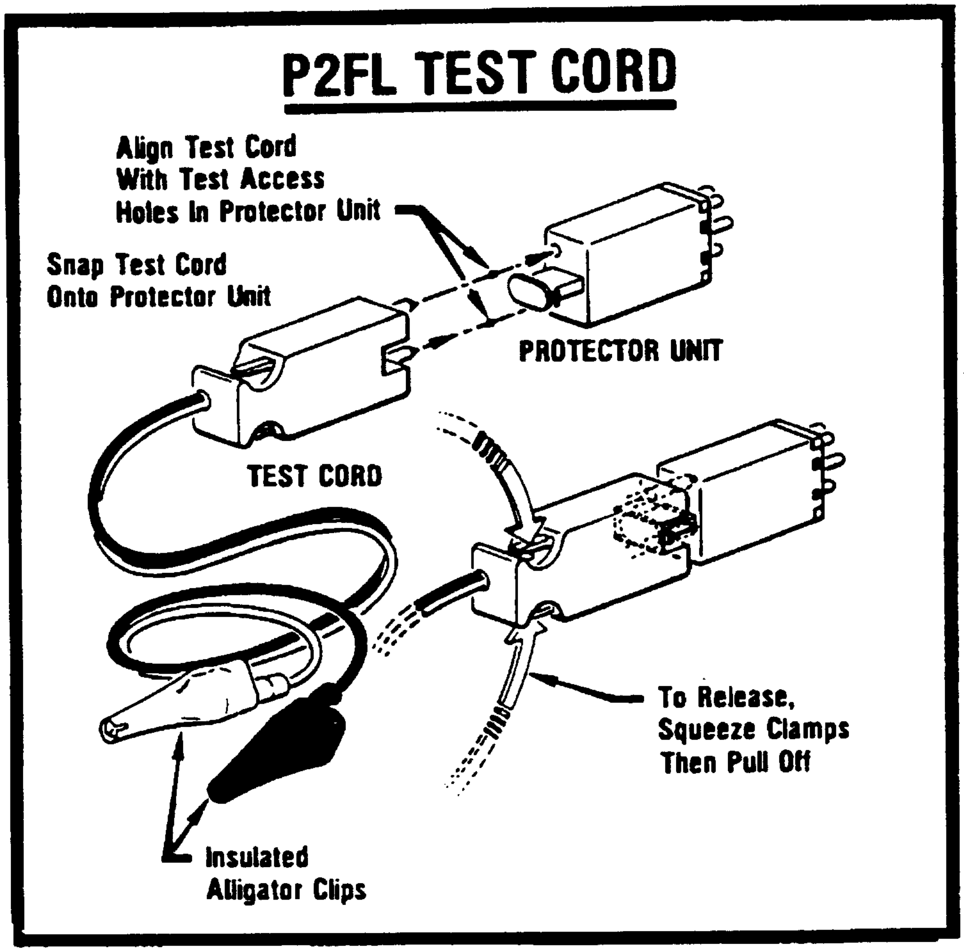


Figure 10-10. Mounting the P2FL Test Cord on Protector Unit

The test connectors and adapters used for testing and verifying circuits are listed in Table 10-A. Complete descriptions of these connectors and adapters, as well as single pair test cords, are given in Section 4.5.

Table 10-A. TEST CONNECTORS AND ADAPTERS

CONNECTOR CODE	ASSOCIATED CONNECTORS	QTY. PAIRS IN TEST FIELD	CABLE PAIR TESTING
299A Test Adapter	307	100	Multiple-pair or single-pair using pick test panel. Can be used with or without protector units.
299B Test Adapter	307	100	Multiple-pair or single-pair using pick test panel. Used with protector units fully inserted or in detent position.
C-4920	302 A4, B4, E3	50	Multiple-pair.
C-4930	302 A1, B1, B3, E1	50	Multiple-pair.
D Test	302 A1, B1, B3, E1	50	Single-pair.
G Test	302 A4, B4, E3	50	Single-pair.
P Test	308	100	Multiple-pair.
R Test	308	100	Single-pair.
U Test	309	100	Multiple-pair or single-pair using pick test panel. Can be used with or without protector units.

10.2.7 Monitoring Jumper Pileup

The pileup of jumpers in the upper and lower express troughs of the frame should be monitored regularly to ensure that jumpers are routed properly and that dead jumpers are removed. This can significantly help to extend the life of the frame. The following operations and administrative guidelines using reports from the administrative system can help avoid jumper congestion and minimize long cross-connections.

Operations Guidelines

1. Verify that jumpers are routed correctly and that the proper amount of slack is in the vertical trough.
2. Remove disconnected jumpers.
3. Monitor jumper fill in the express troughs.
4. If jumper pile-up becomes excessive, one or more of the following should be implemented:

   A. Initiate jeopardy reports to force short jumpers.

   B. Remove Dedicated Inside Plant (DIP) restrictions.

   C. Perform short jumper line equipment transfers.

   D. Alert the Central Office Engineer to start corrective action (additional tie cables or line equipment).

Administrative Guidelines

The following steps can help alert the CO supervisor and/or engineer to situations that may contribute to excessive jumper pileups in the express troughs of the frame, and hence, potentially troublesome operations.

1. Obtain regular reports on Out of Zone (for example, "long") jumpers.
2. Track areas of potential express trough congestion.
3. Tabulate the effects of jumper "churn". An existing frame will eventually balance itself through continuous cable throw and subscriber disconnect activity. This process is often referred to as ***frame churning***; it represents the equivalent retermination of every circuit over a two- to five-year period.
4. Obtain reports on equipment availability. Lack of equipment often forces long jumpers.
5. Consider reducing the percentage of DIPs to increase the availability of switching equipment.
6. Relax switch load balance rules to increase the percentage of short jumpers.
7. Set administrative search parameters (such as the "M" number in COSMOS) equal to the lineup length to reduce intralineup tie pair usage.
8. Use line equipment transfers to convert long jumpers to short.

10.2.8 Inspections of *COSMIC* Frames

Inspections should be performed periodically as a part of good frame operations. The following paragraphs itemize the recommended inspections.

Cross-Connection Wires

1. Cross-connection wires are installed, terminated, and dressed properly. Pay particular attention to the following items:
   - There are 12 inches (305 mm) of slack on each cross-connection wire (10 inches (254 mm) on *COSMIC* Mini DFs).
   - Long jumpers are routed through the correct express trough.
   - Upper support bars, at the top of the vertical jumper troughs, are used to support only those jumpers in the upper express trough that are ***not*** using that vertical trough.
   - The proper wire insertion tool is used and is available at the frame.
   - All jumpers are snapped into the fanning strips on the block.
2. Dead cross-connections have been removed.

Connecting Blocks

1. Connecting blocks are securely fastened to the frame.
2. Stamping on the fanning strips is legible.
3. Terminals are clear of wire clippings or foreign material.
4. Spare connecting block locations are equipped with the properly colored filler panels, if desired.

Designation Strips, Labels, and Stamping

1. Designation labels, mounted on half-shelf designation strips, should fit properly without over-lapping or peeling.
2. Labels are correctly placed, accurate, complete, legible, and none are missing.
3. Designation strips, used on connecting blocks, are securely fastened, legible, and plastic covers are in place.
4. Labels or stamping on wire retainer bars are legible.

Cabling

1. Connecting block cabling is securely fastened to the framework.
2. Cable fasteners (straps, tie cords, etc.) are in place and are not broken.

Connectors and Protector Units

1. Connectors (307-type) are mounted properly and securely on the framework of facility modules.
2. Protector units are placed properly in the connectors, including line network interface connectors (if provided).
3. Correct type of protector unit (equal height) is installed for the type of service.
4. There is an ample supply of the required types of protector units.

Protector Unit Test Sets, KS-20100 and 182A

1. The test set is operational and indicator lights are working.
2. The 1/4-ampere fuse in the AC power supply of both test sets is properly inserted.
3. There is an ample supply of the required 1/4-ampere fuses.

Test/Talk Panels

1. Panels are securely fastened to the framework, front or rear of frame.
2. Talk circuits are properly identified.
3. Transmission and reception are satisfactory, via the audio transmitter.
4. Pushbuttons and lamps function properly.
5. Test battery and ground supply jacks function properly.

Loudspeakers

1. Transmitter panels and speakers are securely fastened to the frame.
2. Circuits are properly identified.
3. Transmission and reception are satisfactory.
4. Pushbuttons and lamps function properly.

Rolling Work Platforms and Wire Reels (Dispensing)

1. Steps, including the hinged folding step, are securely fastened to the platform frame and are not split nor worn thin at the edges.
2. The rubber bumpers and shoe pads are in place.
3. The casters roll freely and retract when the platform is occupied.
4. Platform mounted wire reels are securely mounted on the platform.
5. Reels (both platform-mounted and free-standing) turn freely and the brake mechanism functions properly.

Special Service Devices

1. Special service devices are properly installed on connecting blocks.
2. There is an ample supply of new devices.

Service Observing Jack Panels and Cords

1. Jack panels are fastened securely to the frame.
2. Cords are neatly draped within the framework.
3. Cords are not frayed; plugs are not bent or broken; and contacts are clean.

Electrical Outlets

1. Frame-mounted electrical outlets are in working order.

Outside Plant Cable Directory and Holder

1. Directory holders are mounted in the rear of the vertical cable trough.
2. One set of cable directory sheets is mounted on each holder.
3. Each directory holder is equipped with four plastic directory guards.

Frame Shim

1. The base of each bay is shimmed to within 1/16-inch (1.58 mm) of the adjacent bay.
2. Wire retainer bars are aligned and allow jumper wires to be installed easily.

Frame Operations Decals

1. One set of frame operations decals is mounted on each end guard.

Designation Fanning Strips (Optional)

1. Designation fanning strips are adjacent to the first and last connecting block on a half shelf to identify terminals.

Frame Ground

1. The frame must be grounded in accordance with ED-6C145-30 (*COSMIC* DF) or ED-6C316-10 (*COSMIC* Mini DF) as follows:

- Each half-module is connected to the in-line ground bus at the top of the frame.
- The in-line ground is connected to the central office ground, cable rack ground, and any other ground source as required.
- Each stub cable ground lead and 307 connector ground is securely tightened to the frame, except isolated grounds, when required.

Frame Stamping

1. The rear side of each half-module is stamped with the module and side number.
2. The rear side of the vertical channel assembly is stamped with the appropriate shelf number.
3. Wire retainers on the front (cross-connect) side are stamped with the associated shelf number.

Shelf Wire Retainers

1. Wire retainers are not broken.

Vertical Retainers

1. The vertical retainers are aligned with adequate gap.

Reports

1. A record of this inspection and any repair work should be entered on an appropriate form.

10.3 Maintenance

10.3.1 Protector Unit Testing and Replacement

Any protector units that are defective or suspected or being defective should be discarded, except the minibridge lifters (4B11FG and 4C11F). Return the minibridge lifters to the appropriate AT&T repair facility for repair.

If evidence is found or there is suspicion of abnormally high voltage conditions or contact between CO main frame terminations, observe the following precautions:

- Identify and mark the location.
- Notify the office supervisor and test center.
- Notify other employees who may have occasion to work on the frame.
- Avoid all contact with associated frame terminations until authorized by the test center.
- If the test center requests that the protector units and associated circuits be inspected, wear insulated gloves to remove the protector unit.

> ***Note:*** Insulation gloves shall be mechanically inspected before they are used in accordance with AT&T 075-141-501.

To remove protector units from circuits which **do not** have abnormally high voltages present, grasp the handle of the protector unit and withdraw the unit from the connector jack.

When it is necessary to remove protector units from circuits that are suspected of having abnormally high voltages present, insulated gloves should be worn in **all** cases.

10.3.1.1 Test Procedures

Protector units may be tested without disassembly by using the KS-20100 test set and the 182A test set.

The **KS-20100, L5 test set** (Figures 10-11 and 10-12) is used to test for the presence or absence of tip and ring continuity as well as shorted or grounded protector blocks. The KS-20100 test set also provides a burnout feature to clear protector blocks shorted by carbon or dust particles. For the KS-20100 test set piece part replacement, see AT&T 201-208-803.

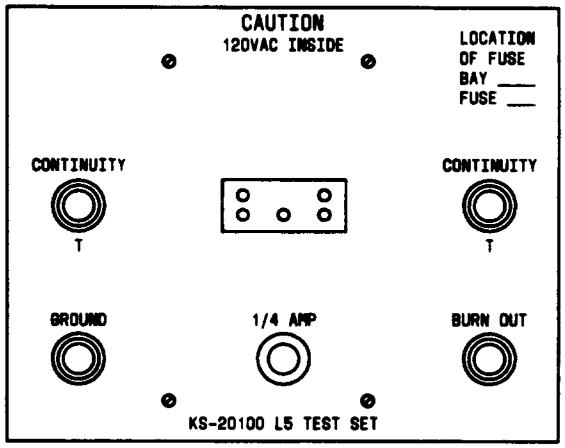


Figure 10-11. KS-20100, L5 Test Set

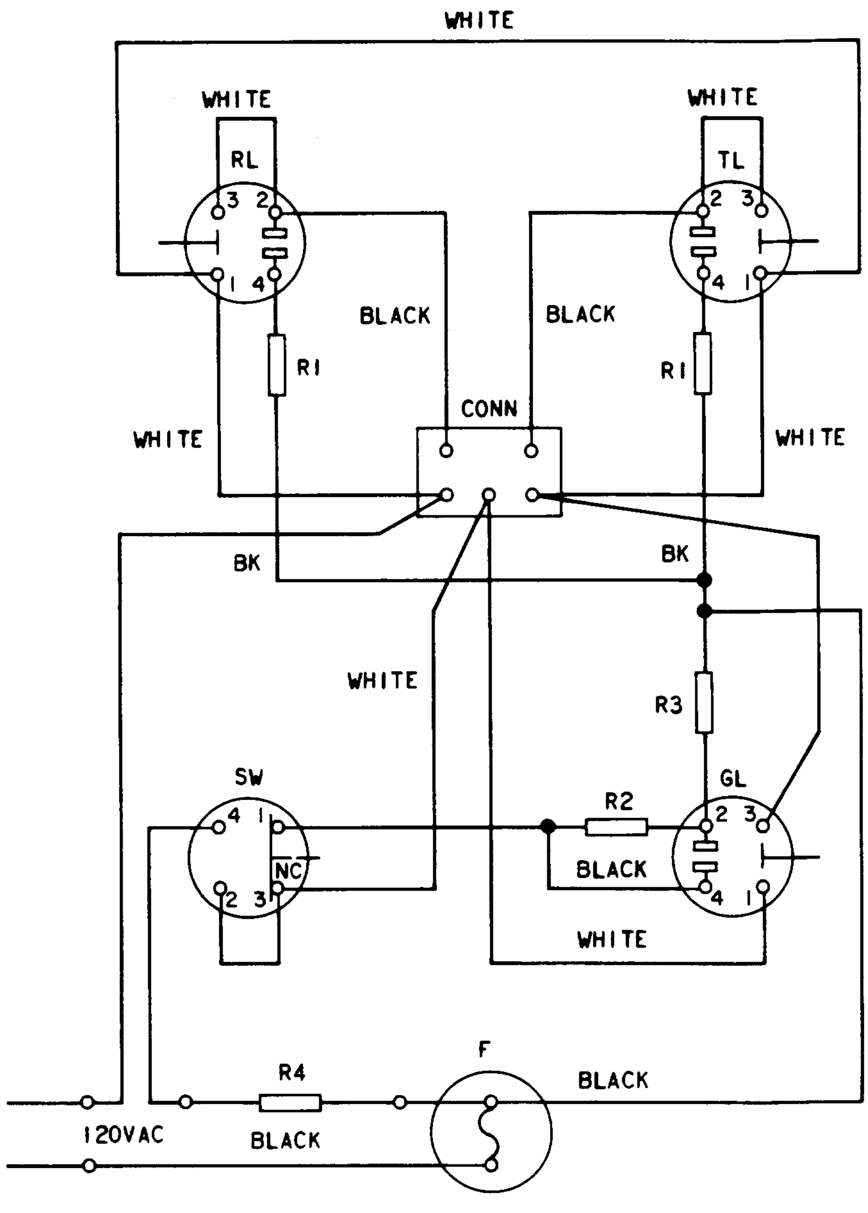


Figure 10-12. KS-20100, L5 Test Set Schematic Diagram

The **182A test set** (Figures 10-13 and 10-14) is used to test the minibridge lifter protector units (4B11F and 4C11F) for tip and ring continuity and for shorted protector blocks. It also tests the function of the 410A switch contained in the protector unit. The 182A test set is housed in a conduit box for wall mounting.

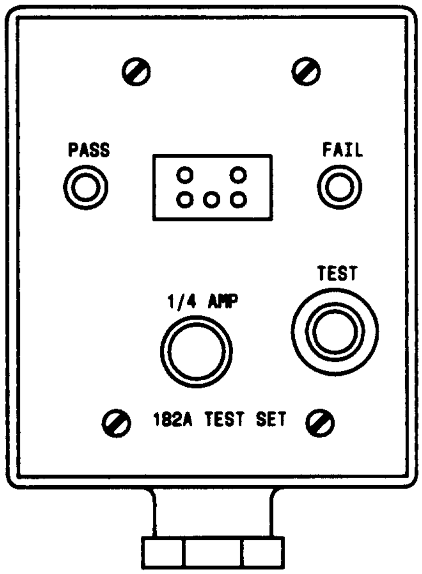


Figure 10-13. 182A Test Set

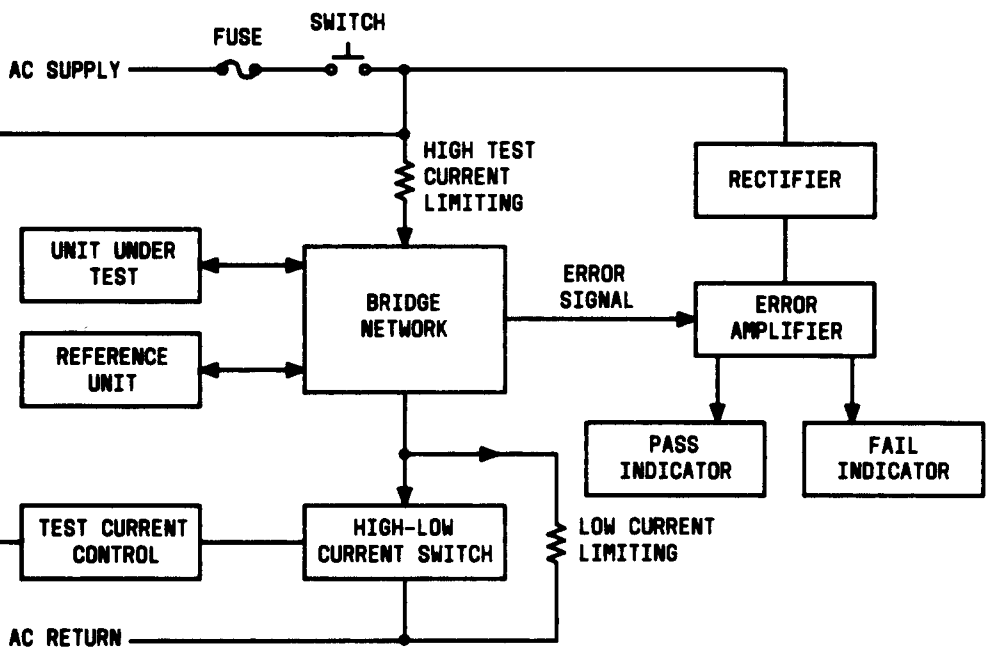


Figure 10-14. 182A Test Set Block Diagram

For short-term testing or service denial, protector units may be partially withdrawn to the detent position. When the protector unit is pulled out to the detent position, the **central office or customer premise equipment** is disconnected to isolate outside plant cable pairs for testing purposes. In this position, voltage protection is still provided on the outside plant cable pair. Removing the protector unit from the connector opens the circuit and removes all protection.

Three tests are provided in the following paragraphs to test all the protector units. The protector units are placed in three categories by color for testing.

DANGER: Testing a protector unit while it is disassembled can expose the tester to hazardous voltages.

10.3.1.2 Test Protector Units with Orange Housing (Minibridge Lifter) (Discontinued Availability — Replaced by Bridge Lifter Block)

Purpose

This test checks for the presence of tip and ring continuity and checks the function of the 410A switch contained in the protector unit.

Protector units that pass the test on the 182A test set may be returned to service without further testing.

Protector units that fail the test on the 182A test set must also be tested with the KS-20100 test set.

Protector units with shorts that burnout successfully when tested on the KS-20100 test set must be retested using the 182A test set.

Test Procedure

At the 182A test set, perform the following steps:

1. Insert the protector unit into the test jack.
2. Press and hold the TEST pushbutton.

   Indication: PASS (green) lamp or FAIL (red) lamp lighted.

   Comment: If neither lamp is lighted, check the 1/4-amp fuse. The FAIL lamp may flash momentarily when the TEST pushbutton is first pressed and should be ignored.
3. Release the TEST pushbutton.

   Indication: PASS or FAIL lamp goes off.
4. If the PASS lamp lighted in Step 2, remove the protector unit from the test set and place it back in service.
5. If the FAIL Lamp lighted in Step 2, remove the protector unit from the test set and perform test using the KS-20100 test set per paragraph 10.3.1.3.

10.3.1.3 Test All Protector Units Except Those with Green Housing

Purpose

This test checks for the presence of tip and ring continuity as well as defective protector blocks. Also, attempts are made to burnout defective carbon blocks.

Test Set Preparation

At the KS-20100 test set, perform the following steps:

1. Press and release the CONTINUITY R pushbutton.

   Indication: The CONTINUITY R pushbutton should light for a moment.

   Comment: If the pushbutton does not light, check the 1/4-amp fuse.

2. Press and release the CONTINUITY T pushbutton.

   Indication: The CONTINUITY T pushbutton should light for a moment.

   Comment: If the pushbutton does not light, check the 1/4-amp fuse.

3. Press and release the GROUND pushbutton.

   Indication: The GROUND pushbutton should light for a moment.

   Comment: If the pushbutton does not light, check the 1/4-amp fuse.

Test Procedure

At the KS-20100 test set perform the following steps:

1. Insert the protector unit into the test jack.

   Indications: CONTINUITY R and CONTINUITY T pushbuttons should light.

   GROUND pushbutton should remain off.

2. If indications of Step 1 are correct, remove the protector unit from the test jack and return it to service.

3. If both CONTINUITY pushbuttons did not light, remove the protector unit from the test jack and dispose.

4. If the GROUND pushbutton lighted, press the BURNOUT pushbutton for 2 or 3 seconds.

   Indication: GROUND pushbutton should go off.

   Comment: If the pushbutton does not remain off, repeat this step several times.

5. If the GROUND pushbutton remained lighted after repeating Step 4 several times, remove the protector unit from the test jack and dispose.

6. If the GROUND pushbutton remains off after performing Step 4 once or several times, remove the protector unit from the test jack, and if the housing is not orange, return the unit to service.

7. If the protector unit housing is orange, the unit must be retested using the 182A test set per paragraph 10.3.1.2. If the unit fails the retest, return it to the appropriate AT&T repair facility.

10.3.1.4 Test Protector Units with Green Housing (Service Denial)

Purpose

This test checks for the absence of tip and ring continuity as well as defective protector blocks. Attempts should be made to burnout defective carbon blocks.

Test Set Preparation

Verify operation of the KS-20100 test set by performing the preparation steps listed in paragraph 10.3.1.3.

Test Procedure

At the KS-20100 test set, perform the following:

1. Insert the protector unit into the test jack.

   Indications: All pushbuttons should remain off.

2. If indications of Step 1 are correct, remove the protector unit from the test set and return it to service.
3. If either or both CONTINUITY pushbuttons lighted, remove the protector unit from the test jack and dispose.
4. If the GROUND pushbutton lighted, press the BURNOUT pushbutton for 2 or 3 seconds.

   Indication: GROUND pushbutton should go off.

   Comment: If the pushbutton does not remain off, repeat this step several times.

5. If the GROUND pushbutton remains off after performing Step 4 once or several times, remove the protector unit from the test jack and return it to service.
6. If the GROUND pushbutton remained lighted after performing Step 4 several times, remove the protector unit from the test jack and dispose.

10.3.2 307-Type Connector Repair Procedures

Precautions

Exercise extreme care when removing and connecting wires or replacing terminals to prevent damage to adjacent connections and to avoid crosses to operating circuits.

The end of a wire previously used for a solderless wrapped connection or soldered connection shall not be reused for subsequent connections. The end of the wire should be cut off and the insulation removed before reconnecting. It will be necessary to splice the wire if there is not enough slack to provide the number of turns required for solderless wrapped connections. (See AT&T 069-132-811.)

10.3.2.1 Replacing Defective Terminals

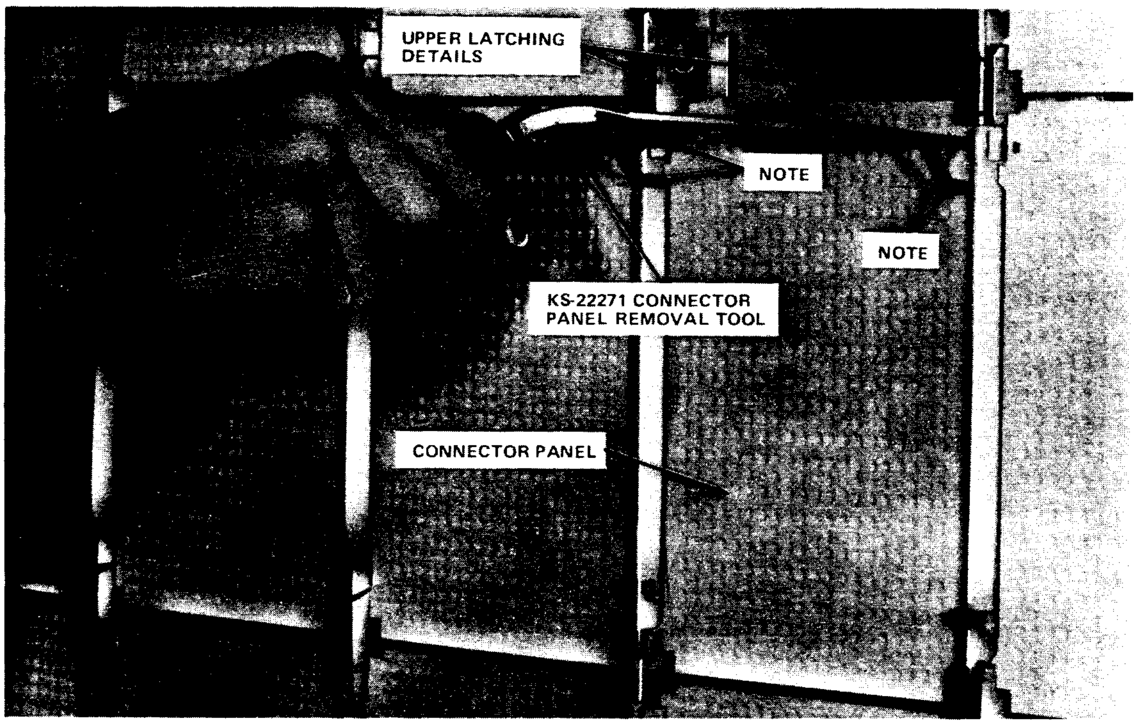
General

To replace a tip, ring, or ground terminal, the connector panel must be removed from the frame and placed in a service bracket to gain access to the wiring side of the terminal. After the new terminal is installed, the connector panel is placed back on the frame.

Removing the Connector Panel From the Frame

To remove the connector panel from the frame, proceed as follows:

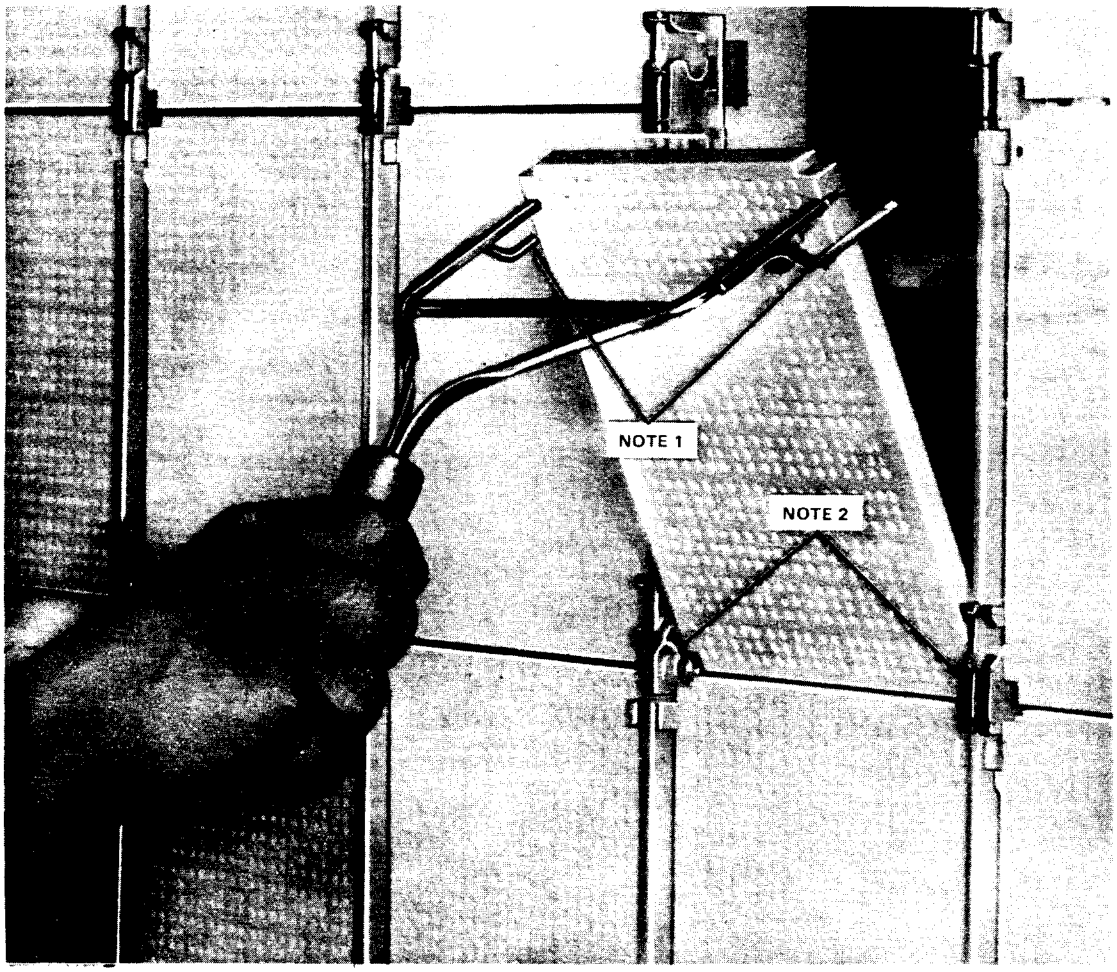
1. Remove the 3C- or 4C-type protector unit from the defective circuit.
2. Insert the connector panel removal tool (Figure 10-15) into the connector panel.



NOTE
INSERT UPPER PRONGS OF 307 PANEL REMOVAL TOOL INTO SLOTS IN 307-TYPE PANEL. LOWER PRONGS WILL BE PROPERLY ENGAGED AT THE SAME TIME

Figure 10-15. Engaging Connector Panel Removal Tool into Panel

3. Apply a slight downward pressure on the handle to release the upper latching details.
4. Tilt the top of the connector panel outward and downward (Figure 10-16).
5. Lift the connector panel off the bottom pivot pins.



NOTES:
1. PUSH TOOL IN TO DISENGAGE UPPER LATCHING DETAILS AND TILT 307-TYPE PANEL WITH TOOL DOWN AND OUTWARD.
2. MANUALLY RELEASE LOWER PIVOT PINS AND REMOVE 307-TYPE PANEL.

Figure 10-16. Removing Connector Panel

6. Hold the connector panel in one hand and use the other hand to place the service bracket (Figure 10-17) on the frame pins. Figure 10-18 shows a service bracket in place on a new frame installation.

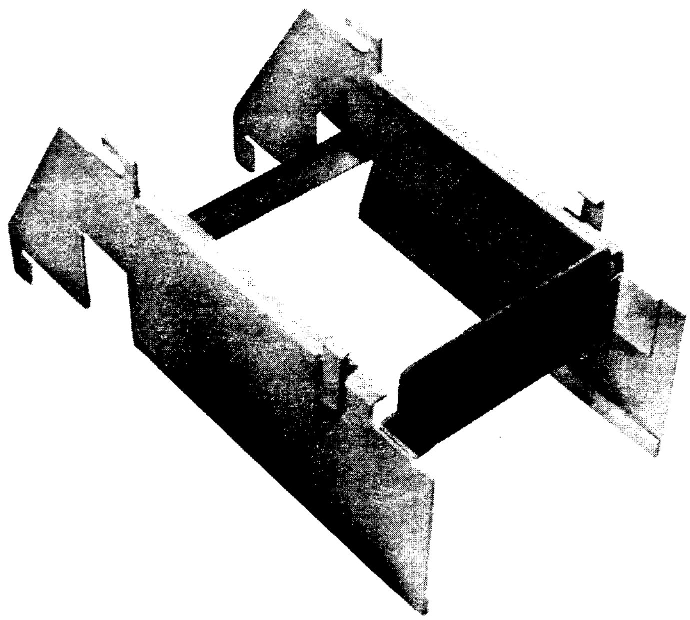
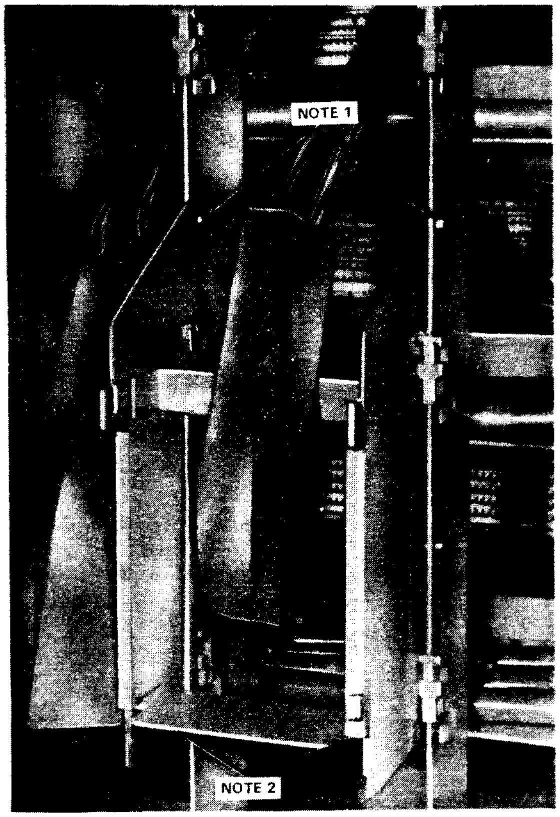


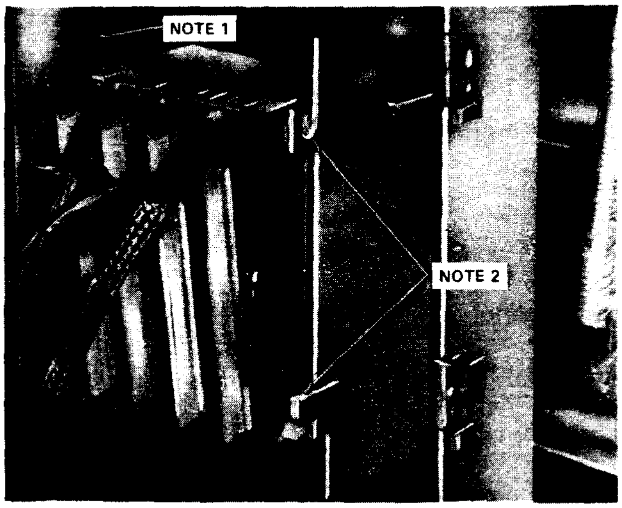
Figure 10-17. Service Bracket (KS-22325, L1)



NOTES:
1. WITH BOTTOM OF SERVICE BRACKET TILTED TOWARD THE AISLE, ALIGN AND ENGAGE FRAME PINS AND SERVICE BRACKET SLOTS.
2. PIVOT BOTTOM OF SERVICE BRACKET TOWARD FRAME UNTIL IT RESTS AGAINST FRAME AND SNAP IN LOCKS.

Figure 10-18. Installing KS-22325, L1 Service Bracket

7. Place the lower connector panel pins into the upper slots of the service bracket.
8. Rotate the connector panel downward so that the top is resting against the bottom of the service bracket and the wiring side of the connector is facing outward (Figure 10-19).



NOTES:
1. MOVE CONNECTORIZED END OF STUB CABLE TO SIDE OF SERVICE BRACKET.
2. MOUNT 307 CONNECTOR PIN INTO UPPER SLOT OF SERVICING SHELF, BOTTOM AND SIDES OF CONNECTOR RESTS AGAINST SERVICE BRACKET.

Figure 10-19. Installing 307 Connector on KS-22325, L1 Service Bracket

9. Remove the plastic mounting bracket which houses the 710 connectors and the ground strap as follows:
   a. Tie each individual group (25 pairs) of connecting block leads or carrier bay leads (307C1-100 connector) using twine or tape.
   b. Identify each group according to the color of the cable tie (blue, orange, green, or brown) presently fastened to the mounting bracket.
   c. Cut and remove the cable ties.
   d. Disengage the two tangs at the top of the plastic bracket and then disengage the two tangs at the bottom.
   e. Remove the bracket with the 710 connectors in place and carefully place it back toward the frame to gain access to the wiring side of the connector panel terminals.

Replacing a Tip or Ring Terminal

To replace a tip or ring terminal (Figure 10-20), proceed as follows:

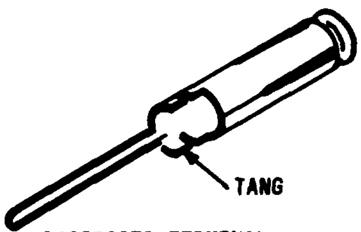


Figure 10-20. Tip or Ring Terminal

1. Remove the wire wrap termination, cut and dispose of the bare wire.
2. Use the wire stripping tool to remove insulation (1-5/8 inches (41 mm) for 22- or 24-gauge (.6 or .5 mm) wires and 1-7/8 inches (46 mm) for 26-gauge (.4 mm) wire) or the remaining wire for the new termination. The wire is now prepared for connection to the new terminal.
3. Use the long-nose pliers to bend the tangs on the defective terminal until they line up with the slots in the connector panel.
4. Use the long-nose pliers and twist the terminal until it breaks.
5. Have the proper replacement terminal handy before proceeding with the next step.
6. Lift the connector panel from the bottom of the service bracket (as though it were hinged at the top) high enough to remove the defective terminal.
7. Use the long-nose pliers to remove the defective terminal and note the position of the tangs as the terminal is removed.

8. Using the position of the tangs as a reference, insert the new terminal into the connector panel.
9. Use the tip of the long-nose pliers to push the terminal until it is fully seated in the connector panel.
10. Lower the connector panel onto the service bracket.
11. Use the long-nose pliers to bend the tangs approximately 45 degrees to hold the terminal in the connector panel.
12. Connect the previously skinned wire to the terminal.

Replacing a Ground Terminal

To replace a ground terminal (Figure 10-21), proceed as follows:

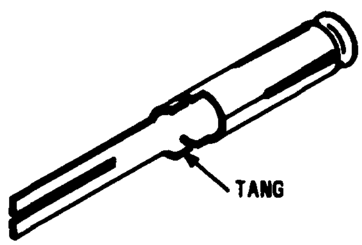


Figure 10-21. Ground Terminal

1. Use the soldering copper to heat the terminal connection to remove as much solder from the terminal as possible. The terminal should move freely once the soldered connection to the ground bar is broken.
2. Use the long-nose pliers to bend the tangs on the defective terminal until they line up with the slots in the connector panel.
3. Use the long-nose pliers and twist the terminal until it breaks.
4. Have the proper replacement terminal handy before proceeding with the next step.
5. Lift the connector panel from the bottom of the service bracket (as though it were hinged at the top) high enough to remove the defective terminal.
6. Use the long-nose pliers to remove the defective terminal and note the position of the tangs as the terminal is removed.
7. Using the position of the tangs as a reference, insert the new terminal into the connector panel.
8. Use the tip of the long-nose pliers to push the terminal until it is fully seated in the connector panel.
9. Lower the connector panel onto the service bracket.

10. Use the long-nose pliers to bend the tangs approximately 45 degrees to hold the terminal in the connector panel.
11. Use the soldering copper to solder the new terminal to the ground bar.

Reinstalling the Connector Panel on the Frame

To reinstall the connector panel on the frame, proceed as follows:

1. Place the plastic mounting bracket containing the 710 connectors onto the connector panel. Be sure the four tangs are properly seated on the connector panel.
2. Fasten the wire groups (removed previously) to the plastic mounting bracket. Use the correct colored cable ties.
3. Remove the twine or tape that had been used to separate the wires into group.
4. Inspect each portion of the plastic mounting bracket housing to be sure the 710 connectors are contained properly in their portion of the housing and the ground strap is placed into the channel provided in the housing.
5. Remove the connector panel from the service bracket.
6. Support the connector panel with one hand and remove the service bracket from the frame with the other hand.
7. Dress the connecting block wiring and stub cabling back onto the frame.
8. Place the connector panel into the lower snap-in locks on the frame.
9. Pivot the connector panel upright and toward the frame until the upper latching details are engaged.
10. Insert the proper 3C- or 4C-type protector unit.

10.3.3 78- and 112-Type Connecting Block Repair and Replacement Procedures

Replacement Parts

The connecting block code is stamped on the rear of the block. Terminals may be ordered for replacement on the 78- and 112-type connecting blocks. Contact the AT&T Regional Field Support Organization for ordering the connecting block terminals or their fanning strips.

Preparation

Before beginning any replacement procedure, refer to local practices for access procedures.

To replace a terminal or the entire connecting block, it is necessary to remove the cross-connections and the cable wiring from the affected terminals. For a single terminal replacement, the wires do not have to be tagged for identification. However, to replace a connecting block, take extreme care to identify and tag each lead or pair of leads as they are removed from the terminals.

Generally, there is enough slack in the cross-connection wires to allow for the replacement of the fanning strip without removing the wires from the terminals. Each lead can be pulled through the fanning strip one-way gate (Figure 10-22 or 10-23) using the long-nose pliers. The wires should remain seated in the quick-connect terminals, and, as an added precaution, tie or tape the wires associated with each column together to aid in placing the wires into the proper gate after the new fanning strip has been installed.

If any special service insulating clips are removed during the replacement procedure, note the circuit(s) involved.

To gain access to the rear of connecting blocks on an FAC (facility) bay, in *COSMIC* IIA DFs only, first remove the associated 307 connector and place it in a service bracket.

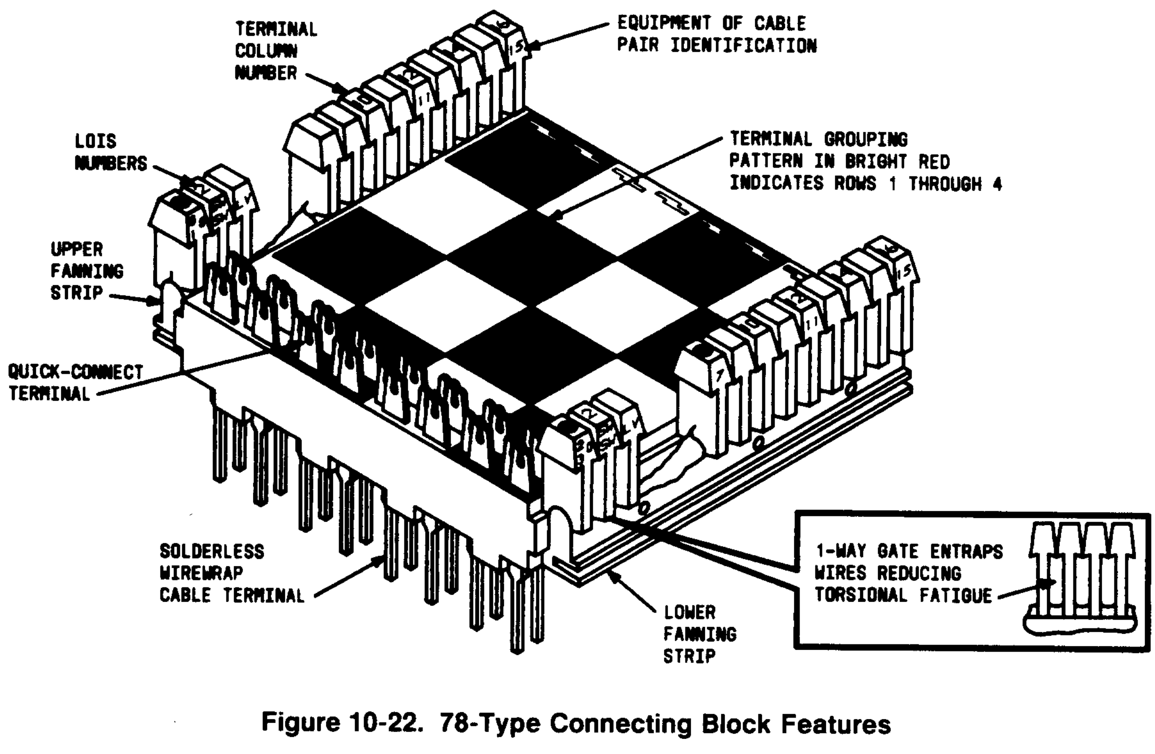


Figure 10-22. 78-Type Connecting Block Features

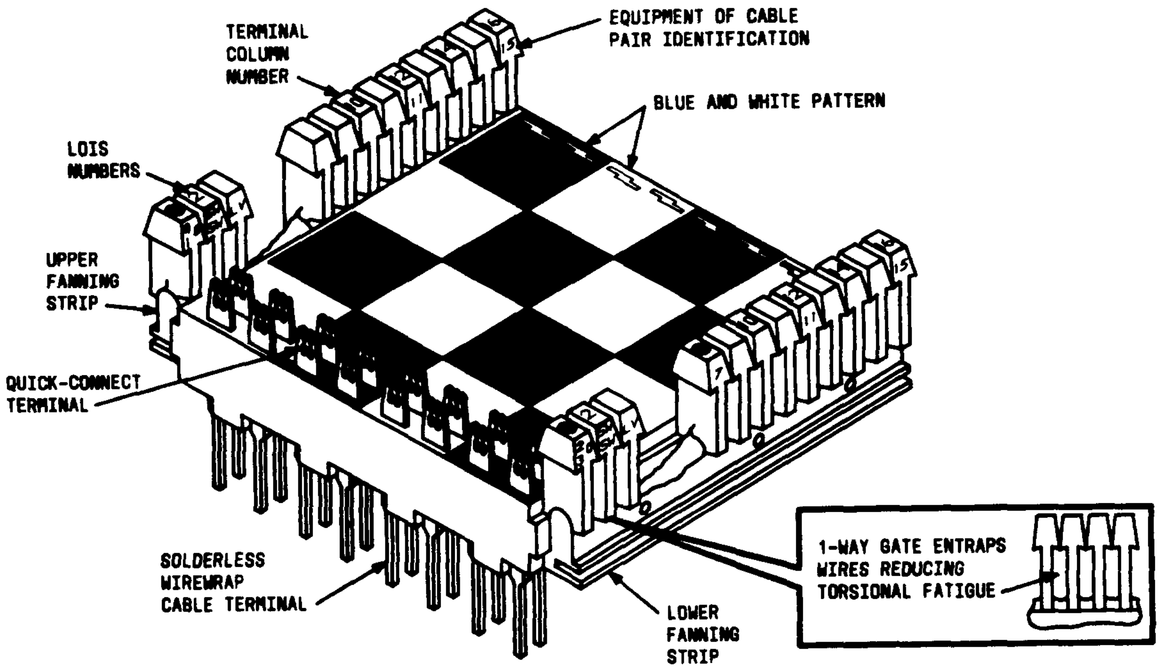


Figure 10-23. 112-Type Connecting Block Features

10.3.3.1 Connecting Block Repair and Replacement Procedures for *COSMIC* I, IA, II, IIA DFs

Terminal

The following steps give the procedure used to remove and replace connecting block terminals.

1. Using the 980A wire removal tool or the 950C wire insertion and remove tool, remove the cross-connection wire from the defective terminal.
2. At the rear of the block, remove the cable wire using the KS-20827 wire-unwrapping tool.
3. After removing the cable wire, use a pair of long-nose pliers to twist the terminal at its base until it breaks. Do not pull the terminal out or the hole will enlarge.
4. Using the long-nose pliers, pull the remainder of the terminal out from the front of the block.
5. Place the new terminal into the block from front with pliers and using a slight pressure, push the terminal into the block until it is seated properly (indicated by a "click").
6. Use pliers at the rear of block to twist terminal slightly either to the left or right to lock terminal in place.
7. Reconnect the wires on the new terminal.
8. Place all wire clippings into the KS-20962 wire clipping bag.
9. Verify that the circuit is working properly.

Fanning Strip

The following procedure describes the method used to replace a defective fanning strip.

1. Pull all the cross-connection wires through the fanning strip gates.
2. To remove the defective fanning strip, follow Step 2a for connecting blocks other than 112H-type blocks, or follow Step 2b for 112H-type connecting blocks.
   a. Holding the fanning strip to the connecting block, remove the fanning strip screws, and then remove the defective fanning strip.
   b. For 112H-type blocks, hold the fanning strip to the block body, use a screwdriver to lift the latch on the end of the fanning strip, slide the fanning strip over to disengage it from the block body, and then lift the defective fanning strip off the block body.
3. To install the new fanning strip, follow Step 3a for connecting blocks other than 112H-type blocks, or follow Step 3b for 112H-type connecting blocks.
   a. Install the new fanning strip using the screws to fasten the fanning strip to the connecting block.
   b. For 112H-type blocks, align the tabs on the connecting block body with the fanning strip, and then snap the fanning strip in place.
4. Reinsert the cross-connection wires into the proper fanning strip gates, and dress the wires back on the frame.
5. Make a visual inspection to be sure that none of the wires have been removed from their quick-connect terminals.
6. Use the KS-22035 plastic spudger to dress the wires along the front of the connecting block.

Connecting Block

The following procedure describes how to remove and replace connecting blocks on the MDF.

1. Using the wire removal tool, remove each cross-connection wire from the connecting block.
2. After removing the cross-connection wires from the fanning strips (both top and bottom), tag each wire for identification and tie or tape together all wires associated with the same connecting block column.
3. Cut back the end of each wire approximately 1/2 inch (13 mm) and deposit the clippings into the wire clipping bag.

   Note: The wires are now prepared for reconnecting to the new connecting block.
4. Lay the wires back on the framework so they will not interfere with the removal of the connecting block.

   Note: The KS-21345 connecting block removal tool is used to remove the connecting block from the shelf.

5. Align the inclined projections on the face of the KS-21345 connecting block removal tool with the snap-in tabs on the top rear of the block.
6. Press the connecting block removal tool toward the front of the frame. This action releases the top of the block allowing it to tip forward.
7. Lift the connecting block off the frame by disengaging the groove in the lower connecting block fanning strip from the edge of the shelf.
8. With the cable wiring side of the connecting block facing upward, place the block against the shelf so that the bottom of the lower fanning strip is flush against the outside surface of the shelf.
9. Using the roll of twine, lash the block to the shelf by making several wraps around the front part of the bottom fanning strip and the shelf. This should hold the block firmly in place.
10. Remove, insulate, and identify (by tagging or other means) each cable wire and place them back out of the way.
11. Cut the twine holding the block to the frame.
12. Place the new block against the shelf (cable side up), and follow the procedure outlined in Steps 8 and 9 to lash it to the shelf.
13. Using the proper wire-wrapping bit, reconnect the cable wires to the connecting block.
14. Dress the cable back on the framework.
15. Replace any cable ties that may have been removed to gain slack when removing the cable wiring.
16. Cut the twine holding the block to the shelf, and place the block on the shelf so that the groove in the bottom fanning strip is seated over the edge of the shelf.
17. With the thumbs placed on the front facets of the top fanning strip, push the block firmly toward the framework until the tabs snap into place on the shelf.
18. Reconnect all the cross-connections, and dress the slack back onto the frame shelf.
19. Following local practices, verify that all circuits are working properly.

10.3.3.2 Connecting Block Repair and Replacement Procedures for *COSMIC* Mini DFs

Terminal

Remove the cross-connection wire(s) from the defective terminal, using the 980A wire removal tool or the 950C wire insertion and removal tool.

The connecting block must be removed from the wiring shelf. Use the KS-22616 tool and proceed as follows:

1. Insert the prongs of the tool into the three slots on the top of the fanning strip. There are three groups of three slots. Use the rightmost slot of each group.
2. Press down until the three prongs of the tool are seated properly in the slots.

3. The tool handle is offset in an upward direction. Rotate the handle downward until the three tangs on the fanning strip disengage fro the wiring shelf.
4. Lift the connecting block up slightly to disengage the bottom fanning strip, which is slotted lengthwise, from the track on the wiring shelf.

Remove the cable wire(s), using the KS-20827 wire-unwrapping tool.

Use a pair of long-nose pliers to twist the terminal at its base until it breaks. The remainder of the terminal can then be easily pulled out from the front of the block using the long-nose pliers.

Place the new terminal into the front of the block with pliers and using a slight pressure, push the terminal into the block until it is seated properly (indicated by a "click").

Use pliers at the rear of block to twist terminal slightly either to the left or right to lock terminal in place.

Reconnect the cable wire(s) on the new terminal.

Reinstall the connecting block on the wiring shelf by first engaging the grooved bottom fanning strip on the wiring shelf track. Next, push the upper fanning strip against the shelf until the three fanning strip tangs snap into place.

Reinsert the cross-connection(s) into the new terminal using the 756C-5 wire-insertion tool, or the 950C wire insertion and removal tool.

Fanning Strip

The cross-connections must be removed from the fanning strip one-way gates.

The connecting block must be removed from the wiring shelf. Use the KS-22616 tool and proceed as follows:

1. Insert the prongs of the tool into the three slots on the top of the fanning strip. There are three groups of three slots. Use the rightmost slot of each group.
2. Press down until the three prongs of the tool are seated properly in the slots.
3. The tool handle is offset in an upward direction. Rotate the handle downward until the three tangs on the fanning strip disengage from the wiring shelf.
4. Lift the connecting block up slightly to disengage the bottom fanning strip, which is slotted lengthwise, from the track on the wiring shelf.

The fanning strip can be removed from the block by removing the three machines screws. Using the same screws, fasten the new fanning strip to the block.

Reinstall the connecting block on the wiring shelf by first engaging the grooved bottom fanning strip on the wiring shelf track. Next, push the upper fanning strip against the shelf until the three fanning strip tangs snap into place.

Reinsert the cross-connection wires into the proper one-way gates on the fanning strip and dress the wires back on the wiring shelf.

Make a visual inspection of the front of the block to be sure that none of the wires have been removed from the quick-connect terminal. Use the plastic spudger to dress the wires along the front of the block.

Connecting Block

Use the wire removal tool to remove the cross-connection wires from the terminals. Cut back each wire past the pierced insulation, approximately 1/4-inch (6 mm). Deposit wire clippings into the wire clipping bag. Tag each wire for identification and tie or tape together all wires associated with the same fanning strip one-way gate. Remove the wires from the one-way gates and place the wires on the wiring shelf so that they will not interfere with the removal of the connecting block.

The connecting block must be removed from the wiring shelf. Use the KS-22616 tool and proceed as follows:

1. Insert the prongs of the tool into the three slots on the top of the fanning strip. There are three groups of three slots. Use the rightmost slot of each group.
2. Press down until the three prongs of the tool are seated properly in the slots.
3. The tool handle is offset in an upward direction. Rotate the handle downward until the three tangs on the fanning strip disengage from the wiring shelf.

With the cable wiring side of the block facing upward, place the block against the shelf so that the bottom of the lower fanning strip is flush against the outside surface of the shelf. Use the roll of twine to lash the block to the shelf by making several wraps around the front part of the bottom fanning strip and the shelf. This should hold the block firmly in place. Remove and cut off skinned portion of the cable wires and identify each cable wire (by tagging or other means). Place wire clippings into distributing frame bag.

Cut the twine holding the defective connecting block to the frame. Place the new block against the shelf and lash it to the shelf.

Reconnect the cable wires, using the proper wire-wrapping bit. Dress the cable back on the shelf.

Cut the twine holding the block to the shelf. Install the new connecting block on the wiring shelf.

Reconnect all the cross-connections and place them in the proper fanning strip one-way gates. Remove the identification tags and the ties. Dress the wires on the front of the block and dress the slack back into the vertical cabling trough.

Following local practices, verify that all circuits affected are working properly.

10.3.4 Framework Maintenance

Shelf Wire Retainer Replacement

The following procedure describes the method used to replace a defective shelf wire retainer. See Section 11 for the ordering codes.

1. Remove existing wire retainer by inserting a screwdriver under the rear tab and prying upward while pushing the retainer towards the rear of the shelf.
2. Install new wire retainer by inserting the rear tab into the slot and pressing the curled front end down until the tab snaps into the front shelf slot. Press down on the front tab of the retainer to seat (Figure 10-24).
3. New retainers can be removed by inserting a screwdriver beneath the recessed surface and prying upward.

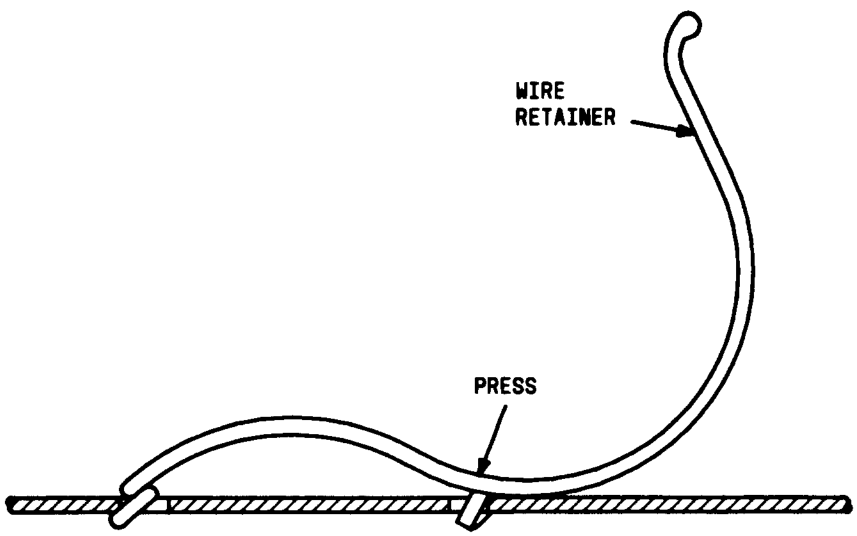


Figure 10-24. Shelf Wire Retainer Replacement

Frame Designation Label Cover Replacement

The clear plastic label covers for frame identification labels snap into the slots provided on the framework (Figure 10-25). See Section 11 for the ordering codes.

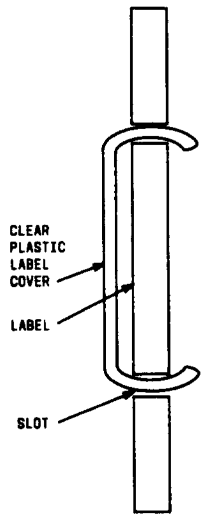


Figure 10-25. Frame Designation Label Cover

Wire Retainer Bar Alignment

The wire retainer bars on the vertical wire trough should be aligned so that the wire gaps are the proper width. To align the bars, loosen the mounting screws, move the bars into proper position and tighten the screws (Figure 10-26).

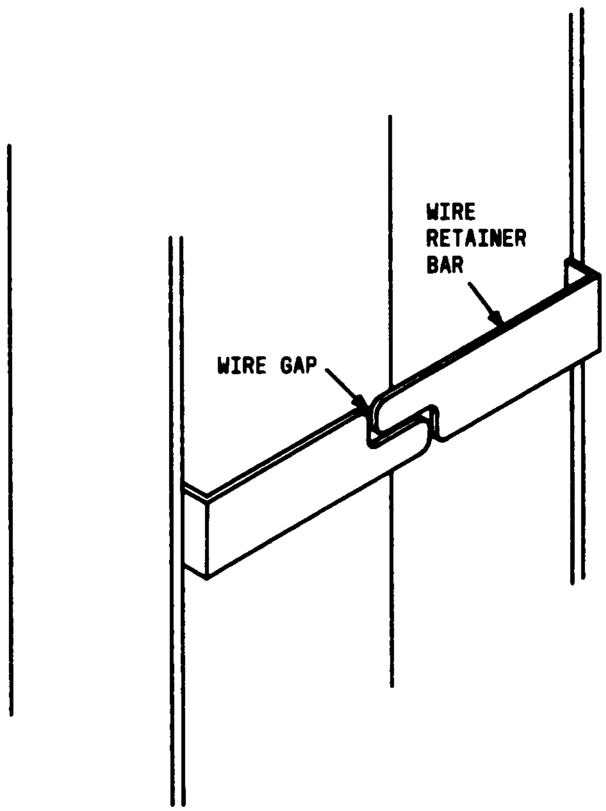


Figure 10-26. Wire Retainer Bar Alignment

SECTION 11

ORDERING INFORMATION

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APPENDIXES

SECTION 11

ORDERING INFORMATION

This section provides a summary of ordering information for the *COSMIC* framework, equipment, apparatus and accessories. The Appendix at the end of this section is a copy of E Form 8203 "Hardware Ordering Questionnaire," to aid in ordering *COSMIC* Distributing Frame Systems. See your AT&T Network Systems Account Representative if you have questions about the availability of these items or for information on items that may have been introduced subsequent to this writing.

11.1 *COSMIC* Framework

11.1.1 Basic *COSMIC* Framework Components

The three basic framework components are the Cross-Connect/Protection Bay, Cross-Connect Bay, and Vertical Wiring Trough (Tables 11-A and 11-B).

Table 11-A. BASIC *COSMIC* IA/IIA FRAMEWORK COMPONENTS

ORDERING CODE	DIMENSIONS			DESCRIPTION
	HEIGHT	WIDTH	DEPTH	
ED-6C141-30, G8	8′2″ (2489 mm)	2′9″ (838 mm)	2′3″ (686 mm)	Cross-Connect/Protection Bay
ED-6C141-30, G4	8′2″ (2489 mm)	2′9″ (838 mm)	2′3″ (686 mm)	Cross-Connect Bay
ED-6C141-30, G9	8′2″ (2489 mm)	1′ (305 mm)	2′3″ (686 mm)	Vertical Wiring Trough

Table 11-B. BASIC *COSMIC* I FRAMEWORK COMPONENTS

ORDERING CODE	DIMENSIONS			DESCRIPTION
	HEIGHT	WIDTH	DEPTH	
ED-6C001-30, G5	8′0″ (2438 mm)	2′9″ (838 mm)	1′6″ (457 mm)	Cross-Connect Bay
ED-6C001-30, G6	8′0″ (2438 mm)	1′0″ (305 mm)	1′6″ (457 mm)	Vertical Wiring Trough

11.1.2 *COSMIC* I, IA, and IIA Walk-Through Framework

Walk-through framework provides openings in long frame lineups (Table 11-C).

Table 11-C. *COSMIC* I, IA, AND IIA WALK-THROUGH FRAMEWORK

ORDERING CODE	*COSMIC* DF	DIMENSIONS		
		HEIGHT	WIDTH	DEPTH
ED-6C142-30, G2	IIA/IA	8′2″ (2489 mm)	5′4″ (1626 mm)	2′3″ (686 mm)
ED-6C107-70, G1	I	8′0″ (2438 mm)	5′4″ (1626 mm)	1′6″ (457 mm)

11.1.3 *COSMIC* I, IA, and IIA End Guards

End guards finish each end of a *COSMIC* distributing frame lineup (Table 11-D).

Table 11-D. *COSMIC* I, IA, AND IIA END GUARDS

ORDERING CODE	*COSMIC* DF	DIMENSIONS		
		HEIGHT	WIDTH	DEPTH
ED-6C142-30, G1	IIA/IA	8′2″ (2489 mm)	2″ (51 mm)	2′3″ (686 mm)
ED-6C004-70, G3	I	8′0″ (2438 mm)	4″ (102 mm)	1′6″ (457 mm)

11.1.4 *COSMIC* I, IA, and IIA Floor Mounting Hardware

Table 11-E provides ordering information for floor anchoring hardware for the bays and walk-through framework.

Table 11-E. *COSMIC* I, IA, and IIA FLOOR MOUNTING HARDWARE

ORDERING CODE	DESCRIPTION
ED-6C142-30,G5	Floor mounting hardware for concrete floors
ED-6C142-30,G36	Floor mounting hardware for concrete floors. To be used in Pacific Bell seismic zones 3 and 4

11.1.5 *COSMIC* Mini Distributing Frame

Table 11-F provides the *COSMIC* Mini DF specifications and ordering information.

Table 11-F. *COSMIC* MINI DISTRIBUTING FRAME

ORDERING CODE	DIMENSIONS			DESCRIPTION
	HEIGHT	WIDTH	DEPTH	
ED-6C311-30, G5	7′ (2134 mm)	14″ (356 mm)	14¾″ (375 mm)	Cross-Connect Bay
ED-6C311-30, G4	7′ (2134 mm)	14″ (356 mm)	14¾″ (375 mm)	Cross-Connect/Protection Bay
ED-6C311-30, G3	7′ (2134 mm)	5″ (127 mm)	9″ (229 mm)	Vertical Wiring Trough
ED-6C311-30, G6	7′ (2134 mm)	9″ (229 mm)	9″ (229 mm)	Vertical Wiring Trough
ED-6C314-70, G10	Upper Express Wiring Trough (adds 5″ (127 mm) to frame height, and is recommended for applications exceeding 15,000 termination pairs).			
ED-6C314-70, G11	Vertical Spanner (wiring trough that goes above each 5″ (127 mm) vertical wiring trough).			
ED-6C314-70, G13	Vertical Spanner (wiring trough that goes above each 9″ (229 mm) vertical wiring trough).			
ED-6C314-70, G4	End Guards (pair), end finish for frame lineup.			
ED-6C314-70, G8	Floor Mounting Hardware for wood floor.			
ED-6C314-70, G9	Floor Mounting Hardware for concrete floor.			
ED-6C314-70,G12	Floor Mounting Hardware for concrete floor. To be used in Pacific Bell seismic zones 3 and 4.			

11.2 Associated Frame Systems

11.2.1 Cable Rearrangement Facility (CRF)

The Cable Rearrangement Facility provides an interface for splicing up to 5,000 tip cable pairs to a riser or feeder cable (Table 11-G).

Table 11-G. CABLE REARRANGEMENT FACILITY (CRF)

PRODUCT CODE	COMCODE	DIMENSIONS			DESCRIPTION
		HEIGHT	WIDTH	DEPTH	
ED-6C136-30, G1	601003304	48″ (1219 mm)	15″ (381 mm)	12″ (305 mm)	Cable Rearrangement Facility
ED-6C136-30, G2	403797186	—	—	—	B Grounding Kit
D-180992	103299426	—	—	—	Optional Key Locks
ED-6C136-30, G3	601248552	48″ (1219 mm)	15″ (381 mm)	12″ (305 mm)	Cable Rearrangement Facility (for 3M Splices)
ED-6C136-30,G4	601324015	—	—	—	Universal modular splicing tool mount for use with G-13
ED-6C136-30,G5	601324023	—	—	—	Kit of parts for upgrading 710A tool mounting kits for CRF applications.

11.2.2 Protector Frames

Protector frames are required for *COSMIC* IA and I DFs to provide protection and test access for outside plant cable pairs. The High-Density Modular Protector Frame (Table 11-H) uses 308-type connectors. The Modular Protector Frame (Table 11-I) uses 302-type connectors. The Low-Profile Double-Sided Protector Frame (Table 11-J) uses 302-, 308-, or 309-type connectors.

Table 11-H. HIGH-DENSITY MODULAR PROTECTOR FRAME

ORDERING CODE	DIMENSIONS			DESCRIPTION
	HEIGHT	WIDTH	DEPTH	
ED-97898-31	8′ (2438 mm)	6′6″ (1981 mm)	1′ (305 mm)	12-Vertical Module
ED-1A198-71	End Guards			

Table 11-I. MODULAR PROTECTOR FRAME

ORDERING CODE	DIMENSIONS			DESCRIPTION
	HEIGHT	WIDTH	DEPTH	
ED-1A220-31, G7	8′ (2438 mm)	6′6″ (1981 mm)	1′ (305 mm)	12-Vertical Module
ED-1A198-71	End Guards			

Table 11-J. LOW-PROFILE DOUBLE-SIDED PROTECTOR FRAME

ORDERING CODE	DIMENSIONS			DESCRIPTION
	HEIGHT	VERTICAL SPACING	DEPTH *(Note)*	
ED-97755-72	8′0″ (2438 mm)	8″ (203 mm)	1′3⅜″ (391 mm)	6 Verticals (for 302-, 308-, 309-Connectors)

Note: Excluding guardrails [with guardrails — 2′ 5″ (737 mm)].

11.2.3 Special Purpose Protector Frames

Special purpose protector frames are used in large enclosures, controlled environmental vaults, or in central offices that have a limited space for protector frames.

11.2.3.1 AT-9049 B, C, or D Protector and Cable Enclosure

The AT-9049 protector and cable enclosure (Table 11-K) uses 307-type connectors.

Table 11-K. AT-9049 PROTECTOR AND CABLE ENCLOSURE

AT SPECIFICATION	COMCODE	DIMENSIONS			DESCRIPTION
		HEIGHT	WIDTH	DEPTH	
AT-9049B	403249170	75″ (1905 mm)	10″ (254 mm)	9.12″ (232 mm)	900-Pair Capacity Left to Right Growth
AT-9049C	403249162	75″ (1905 mm)	10″ (254 mm)	9.12″ (232 mm)	900-Pair Capacity Right to Left Growth
AT-9049D	403249147	75″ (1905 mm)	19.32″ (491 mm)	9.12″ (232 mm)	1800-Pair Capacity No Growth
AT-9050B	403249253	Cable Trough End Guard			
AT-9059B	403652647	Empty 307-Connector Slot Filler Panel			
—	845114040	Label, Digital Line Cable Pair			
—	403037070	Label, Pair-Gain Cable Number			
—	403037088	Label, Miscellaneous Pairs			

11.2.3.2 Slide Drawer Assembly (SDA) Protector Frame

The SDA (Table 11-L) uses 309-type connectors and can be ordered with or without the splice cabinet (Table 11-M).

Table 11-L. SLIDE DRAWER ASSEMBLY (SDA) PROTECTOR FRAME

PRODUCT CODE	COMCODE	DIMENSIONS (IN.)			CAPACITY (PAIRS)	NUMBER OF DRAWERS	NUMBER OF 309-CONNECTORS	SPLICE CABINET
		HEIGHT	WIDTH	DEPTH				
PX6672-30L136	105727648	84.0 (2134 mm)	65.0 (1651 mm)	16.0 (406 mm)	6000	6	30	136 Max
PX6672-30L1	105727754	84.0 (2134 mm)	42.5 (1080 mm)	15.0 (381 mm)				None
PX6672-30L136	105727671	84.0 (2134 mm)	46.5 (1181 mm)	16.0 (406 mm)	3600	3	18	136 Max
PX6672-30L134	105727655	84.0 (2134 mm)	37.5 (953 mm)	15.0 (381 mm)				134 Mini
PX6672-30L1	105727689	84.0 (2134 mm)	22.5 (572 mm)	15.0 (381 mm)				None
PX2624-30L136	105727697	84.0 (2134 mm)	40.5 (1029 mm)	16.0 (406 mm)	2400	2	12	136 Max
PX2624-30L134	104727705	84.0 (2134 mm)	31.5 (800 mm)	15.0 (381 mm)				134 Mini
PX2624-30L1	105727713	84.0 (2134 mm)	16.5 (419 mm)	15.0 (381 mm)				None
PX1612-30L136	104727721	84.0 (2134 mm)	34.3 (871 mm)	16.0 (406 mm)	1200	1	6	136 Max
PX1612-30L134	105727739	84.0 (2134 mm)	25.3 (643 mm)	15.0 (381 mm)				134 Mini
PX1612-30L1	105727747	84.0 (2134 mm)	10.3 (262 mm)	15.0 (381 mm)				None

Table 11-M. SDA SPLICE CABINET

PRODUCT CODE	COMCODE	DIMENSIONS (IN.)			CAPACITY PAIRS	CABINET
		HEIGHT	WIDTH	DEPTH		
PXAM66C136	405427121	65.0 (1651 mm)	24.0 (610 mm)	16.0 (406 mm)	7200	136 Max
PXAM66C134	405427162	60.0 (1524 mm)	15.0 (381 mm)	11.8 (300 mm)	5000	134 Min

11.2.3.3 Extra Large Building Entrance Terminal (XLBET) Protector Frame

The XLBET can be configured single-sided with two or three columns or double-sided with four columns. Table 11-N provides selection guidelines, and Table 11-O provides specifications and ordering information.

Table 11-N. XLBET PROTECTOR FRAME CONFIGURATION SELECTION AND ORDERING GUIDELINES

CAPACITY PAIRS PER BAY	CONFIGURATION	CAPACITY 195 PROTECTORS	QTY. FRAMEWORK ORDERING UNITS		
			3" BAY (76 mm)	6" BAY (152 mm)	MOUNTING BRACKET FOR 195 PROTECTOR
1800	Two-column Single Sided	18	1	—	1
2700	Three column Single Sided	27	—	1	1
3600	Four column (Two Columns Back-to-Back) Double Sided	26	—	1	2

Table 11-O. XLBET PROTECTOR FRAME

PRODUCT CODE	COMCODE	DIMENSIONS			DESCRIPTION
		HEIGHT	WIDTH	DEPTH	
LA2003-139	105158224	7′ (2134 mm)	24″ (610 mm)	3″* (76 mm)	3-Inch Deep Bay
LA2006-139	105158240	7′ (2134 mm)	24″ (610 mm)	6″ (152 mm)	6-Inch Deep Bay
LA2070-139†	105516496	7′ (2134 mm)	23″ (610 mm)	1″ (25 mm)	Mounting Bracket for 195 Protector

* Excluding front and rear base mounting flanges, each 6″ (152 mm) deep, which are included, preassembled to the framework bay.

† Also available in smaller sizes as follows:
Group 3 for three 195 protectors (Comcode 105661805)
Group 6 for six 195 protectors (Comcode 105661797)
Group 12 for twelve 195 protectors (Comcode 105661771).

11.2.4 Test/Talk Systems

Tables 11-P through 11-V provide ordering information for the various apparatus and ordering groups for Test/Talk Systems used on COSMIC DFs.

Table 11-P. COMPONENTS TO BE MOUNTED IN JACK MODULES

CODE	COMCODE	DESCRIPTION
KS-21463, List 1	401 446 794	Jack, 2-conductor
KS-21463, List 3	401 446 810	Jack, 2-conductor with make contact
KS-21463, List 5	401 446 836	Jack, 2-conductor with two make contacts
KS-21001, List 1	401 119 359	Jack, 3-conductor
KS-20761, List 4 534A	401 826 227 102 481 843	Lamp Mounting Socket LED
KS-21748, List 1	401 815 048	Momentary contact switch
P-250	402 032 650	Hole Plug

Table 11-Q. ED-6C110-10 JACK MODULES

ED-6C110-10		EQUIVALENT TO KS-21745	MODULE TYPE	EQUIPPED WITH					
				JACK			SWITCH: KS-21748 L1	LAMP: KS-20761 L4 SOCKET AND 534A LED	HOLE PLUG P-250
GROUP	COMCODE			KS-21463 L1	KS-21463 L3	KS-21001 L1			
Group 101	600 201 271	L1	3-pos'n						
Group 102	600 201 289	L2	9-pos'n	6				3	
Group 103	600 201 297	L3	9-pos'n	6		3			
Group 104	600 201 305	L4	10-pos'n						
Group 105	600 201 313	L5	10-pos'n	10					
Group 106	600 201 321	L6	10-pos'n	4			2	2	2
*	401 822 218	L7	3-pos'n						
Group 108	600 201 339	L8	3-pos'n				1	1	1
*	401 822 234	L9	3-pos'n	2		1			
Group 110	600 201 347	L10	10-pos'n	10					
Group 115	600 201 396	L15	9-pos'n	6		1		2	
Group 116	600 201 404	L16	9-pos'n	2	4	2		1	

* These jack modules are available by the KS-spec order number only. The comcode numbers shown correspond to the KS-spec code.

Table 11-R. OTHER ED-6C110-10 GROUPS

ED-6C110-10		EQUIVALENT TO KS-21745	DESCRIPTION
GROUP	COMCODE		
Group 111	600 201 354	List 11	Package of ten ED-6C110-10, Group 110 Jack Modules
Group 112	600 201 362	List 12	Panel Insert for vacant 9- or 10-position jack module location
Group 113	600 201 370	List 13	Panel Insert for vacant 3-position jack module location
Group 114	600 201 388	List 14	Designation Card for 9- or 10-position module

Table 11-S. TEST/TALK PANELS

CODE	COMCODE	DESCRIPTION	LOCATION
KS-21316, List 8	401 903 646	Transmitter and Battery Supply	COSMIC Frame - Front
KS-21316, List 9	402 534 051	Mounting Bracket for ED-6C110-10 G25 or G26	COSMIC Frame - Rear
KS-21330, List 2	401 932 066	Service Observing Panel	COSMIC Frame - Rear
ED-6C110-10, G8	600 201 164	Transmitter, Battery Supply and Jack Panel	Modular Protector Frame
ED-6C110-10, G9	600 201 172	Battery Supply and Jack Panel	Modular Protector Frame
ED-6C110-10, G10	600 201 180	Jack Panel	Modular Protector Frame
ED-6C110-10, G23	600 201 198	Jack Panel	COSMIC Frame - Front
ED-6C110-10, G25	600 201 206	Transmitter, Battery Supply and Jack	COSMIC II/IIA Frame - Rear
ED-6C110-10, G26	600 201 214	Jack Panel	COSMIC II/IIA Frame - Rear
ED-6C110-10, G43	600 201 222	Jack Panel	Double-Sided Protector Frame
ED-6C110-10, G44	600 201 230	Transmitter, Battery Supply and Jack Panel	Double-Sided Protector Frame

Table 11-T. ED-6C111-11 ORDERING GROUPS

CODE	DESCRIPTION
ED-6C111-11, G2	Service Observing Panel for COSMIC IA/II/IIA Frames
ED-6C111-11, G3	KS-21347 Speaker with Volume Control and Mounting Hardware
ED-6C111-11, G4	KS-21347 Speaker and Mounting Hardware
ED-6C111-11, G6	Set of 12 cord retaining brackets for COSMIC I Frames
ED-6C111-11, G7	WP-91812 Speaker and Mounting Hardware

Table 11-U. PLUG ADAPTERS

CODE	COMCODE	DESCRIPTION
KS-21386, L1	401 272 646	Adapts duplex, 2-conductor standard-size plugs to miniature duplex plug
KS-21387, L1	401 272 794	Adapts single, 3-conductor standard-size plug to miniature plug
KS-21348, L1	401 311 121	Test pin jack adapter - allows access to pin jacks with alligator clips

Table 11-V. HEADSET

CODE	COMCODE	DESCRIPTION
KS-22990, L3	403 350 051	Head Telephone Set equipped with a 10-foot coiled cord and a push-to-talk switch

11.3 Other Frame Equipment

11.3.1 Frame Operation Decals

Frame operation decals (Table 11-W) show pictorial information for the operations on the cross-connect and protector sides of the frame. These decals are normally mounted on the frame lineup end guards or the inside of walk-through modules.

Table 11-W. FRAME OPERATIONS DECALS

ORDERING CODE	PIECEPART COMCODE	*COSMIC* FRAME	DESCRIPTION
ED-6C129-50, Group 4	844691733	IIA, IA, I	Cross-Connect Side (78 & 112 Blocks)
	845376870		Instructions (Back of Decal)
ED-6C129-50, Group 5	843284043	IIA	Protector Side
	845376870		Instructions (Back of Decal)

11.3.2 Filler Panels

Filler (Cover) Panels for Unused Block Positions

Filler (cover) panels (Table 11-X) are used to fill unused block openings in the frames. The panels may be cut to the desired length with scissors.

Table 11-X. FILLER (COVER) PANELS FOR UNUSED BLOCK POSITIONS

ORDERING CODE	PRODUCT CODE	COLOR	APPLICATION
ED-6C142-30, G16	KS-21341, L1	Yellow	4.86 inches (123 mm) wide for shelves 2 through 10 of equipment bay
ED-6C142-30, G17	KS-21341, L2	Blue	4.86 inches (123 mm) wide for shelves 2 through 10 of facility bay
ED-6C142-30, G18	KS-21341, L3	White	3.5 inches (89 mm) wide for shelves 1 and 11 of equipment and facility bays

Filler (Cover) Panels for Unused 307-Type Connector Positions

Filler (cover) panels (Table 11-Y) are used to cover openings where 307-type connectors are to be installed at a later date. The panel snaps into the framework and requires no mounting hardware.

Table 11-Y. FILLER (COVER) PANEL FOR UNUSED 307-TYPE CONNECTOR POSITIONS

COMCODE	DIMENSIONS		APPLICATION
	HEIGHT	WIDTH	
106467806	7⅞″ (200 mm)	6⅜″ (162 mm)	For facility modules

11.3.3 Bay Shelf Designation Strips

Bay Shelf Designation Strips

Designation strips (also called flip gates) provide mounting space for designation labels (ED-6C144-12) that identify the circuits terminated on each terminal of a connecting block (Table 11-Z).

Table 11-Z. BAY SHELF DESIGNATION STRIPS

ORDERING CODE	*COSMIC* FRAME	APPLICATION
ED-6C142-30, G8	IIA, IA, I	For shelves 2 thru 10 of facility or equipment half module
ED-6C142-30, G9		For any shelf with test/talk panel
ED-6C142-30, G10		For shelf 1 of facility or equipment half module
ED-6C142-30, G11		For shelf 11 of facility or equipment half module
ED-6C314-70, G7	Mini	For any shelf of facility or equipment bay

Bay Shelf Designation Strip Labels

The designation strip labels (Table 11-AA) mount on the designation strips (flip gates) and are field stenciled.

Table 11-AA. BAY SHELF DESIGNATION STRIP LABELS

ORDERING CODE	COMCODE	APPLICATION
ED-6C144-12, G1	104437710	64-pair blocks (16 per shelf) shelves 2 through 10
ED-6C144-12, G2	104437728	96-pair blocks (10 per shelf) shelves 2 through 10
ED-6C144-12, G3	104400379	100-pair high-density 112H blocks (12 per shelf) shelves 2 through 10
		50-pair high-density 112H blocks (12 per shelf) shelves 1 and 11
ED-6C144-12, G4	104211065	100-pair regular density blocks (10 per shelf) shelves 2 through 10
		50-pair regular density blocks (10 per shelf) shelves 1 and 11
ED-6C144-12, G5	104366653	128-pair blocks (10 per shelf) shelves 2 through 10
		64-pair blocks (10 per shelf) shelves 1 and 11

Note: Each label set provides upper and lower labels for three blocks.

Designation Fanning Strips (for Terminal Row Identification)

Designation fanning strips (Table 11-AB) provide designation information space and end finish (to secure jumper wire) on the connecting blocks when the half shelf designation strip is not provided, or a half shelf is partially filled with connecting blocks. Each ordering group provides a left and right fanning strip.

Table 11-AB. DESIGNATION FANNING STRIPS (FOR TERMINAL ROW IDENTIFICATION)

ORDERING CODE	USED ON SHELVES	APPLICATION
ED-6C142-30, G23	1 and 11	General use with 50-pair connecting block, stenciled T, R
ED-6C142-30, G24	2 thru 10	General use with 100-pair connecting block, stenciled T, R
ED-6C142-30, G25	2 thru 10	Use with SMAS 5A or 5B connecting block, stenciled TA, RA, TB, RB
ED-6C142-30, G26	2 thru 10	Blank fanning strip, stamp as required
ED-6C142-30, G27	2 thru 10	Use with shelves associated with 5ESS, stenciled T, R, SG0, SG1

11.3.4 Cable Location Directory Holder

The cable location directory holder (Table 11-AC) is used to mount the outside plant cable location directories supplied by MELD on the rear of the *COSMIC* IIA frame.

Table 11-AC. CABLE LOCATION DIRECTORY HOLDER (FOR *COSMIC* IIA DF)

ORDERING CODE	DESCRIPTION
ED-6C142-30, G14	Mounts 4 frame cable directories (an output of MELD) in the rear of the vertical cable trough.

11.3.5 112H Series Connecting Block Mounting Adapters

The adapters (Table 11-AD) allow high-density 112H series connecting blocks to be mounted on *COSMIC* I framework. Mounting fasteners are included with each adapter ordered.

Table 11-AD. 112H-SERIES CONNECTING BLOCK MOUNTING ADAPTERS (FOR *COSMIC* I DF)

ORDERING CODE	DIMENSIONS			APPLICATION
	HEIGHT	WIDTH	DEPTH	
ED-6C142-30, G3	4″ (102 mm)	33″ (838 mm)	¾″ (19 mm)	For shelves 2 through 10
ED-6C142-30, G4	4″ (102 mm)	33″ (838 mm)	¾″ (19 mm)	For shelves 1 and 11

11.3.6 Floor Trim

Plastic floor trim molding (Table 11-AE) is used to dress the bottom of the *COSMIC* I, IA, and IIA frames.

Table 11-AE. FLOOR TRIM (FOR *COSMIC* I, IA, AND IIA DFs)

ORDERING CODE	DESCRIPTION
ED-6C142-30, G15	Floor trim molding to dress bottom of frames

11.3.7 711 Mounting Bracket

The 711-Mounting Bracket (Table 11-AF) is an enclosure for storing and protecting 711-connectors on the rear of a *COSMIC* I, IA, or IIA cross-connect bay. One 711-mounting bracket is ordered for each shelf that is connectorized with 711-connectors.

Table 11-AF. 711 MOUNTING BRACKET

ORDERING CODE	DESCRIPTION
ED-6C142-30,G13	Equipped with cover and 5 connector holders (Brackets). Each holder mounts four 711-connectors for a total of twenty, 25-pair or 32-pair, connectors.

11.3.8 Designation Card Holder and Designation Cards

The designation card holder (Table 11-AG) is mounted on the front of the frame and holds the designation card (Table 11-AH). The card identifies the frame and module number.

Table 11-AG. DESIGNATION CARD HOLDER

ORDERING CODE	DESCRIPTION
ED-6C142-30,G6	Designation Card Holder. Used on the last bay of each functionally different DF.

Table 11-AH. DESIGNATION CARDS

COMCODE	DESCRIPTION
841160047	Framework No. "0"
841160054	Framework No. "1"
841160062	Framework No. "2"
841160070	Framework No. "3"
841160088	Framework No. "4"
841160096	Framework No. "5"
841160104	Framework No. "6"
841160112	Framework No. "7"
841160120	Framework No. "8"
841160138	Framework No. "9"
841160146	Framework No. "-"
841160153	Framework No. " "
843290719	Framework No. "F"
842389900	Framework No. "SUMMARY"
842389918	Framework No. "BLANK"

11.3.9 Cable Racking

Ordering information for cable racking is given in the table 11-AI below.

Table 11-AI. *COSMIC* CABLE RACKING (*COSMIC* IA/IIA DFs)

ORDERING INFORMATION ED & GROUP NO.	DESCRIPTION
ED-6C143-30, G1	Single lineup of cable rack materials for SMDF/TMDF and CMDF — provides one level of outside plant and equipment racks with associated mounting materials for a 13 ft. (3962 mm) framework arrangement in 1 lineup of 5 framework arrangements (20 bays) or less.
ED-6C143-30, G2	Single lineup of cable rack materials for SMDF/TMDF and CMDF — provides two levels of outside plant racks and one level of equipment racks with associated mounting materials for a 13 ft. (3962 mm) framework arrangement in 1 lineup of 6 framework arrangements (24 bays) or more. Maximum of 40 bays per lineup.
ED-6C143-30, G3	Single lineup of walk-thru cable rack materials — required in addition to Group 2. Extends cable rack between bays when walk-thru is provided.
ED-6C143-30, G4	Double lineup of cable rack materials — provides two levels of outside plant and equipment racks with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 2 lineups. Maximum of 40 bays per lineup.
ED-6C143-30, G5	Double lineup of walk-thru cable rack materials — required in addition to Group 4. Extends the cable rack between bays when walk-thru is provided.
ED-6C143-30, G6	Triple lineup of cable rack materials — provides two levels of outside plant and equipment racks with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 3 lineups. Maximum of 28 bays per lineup.
ED-6C143-30, G7	Triple lineup of walk-thru cable rack materials — required in addition to Group 6. Extends cable rack between bays when walk-thru is provided.
ED-6C143-30, G8	Quadruple lineup of cable rack materials — provides two levels of outside plant and equipment racks with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 4 lineups. Maximum of 20 bays per lineup.
ED-6C143-30, G9	Quadruple lineup of walk-thru cable rack materials — required in addition to Group 8. Extends cable rack between bays when walk-thru is provided.

Table 11-AI. *COSMIC* CABLE RACKING (*COSMIC* IA/IIA DFs) (Contd)

ORDERING INFORMATION ED & GROUP NO.	DESCRIPTION
ED-6C143-30, G10	Triple lineup 32 bays or more per lineup of cable rack materials — provides two levels of outside plant racks and two levels of equipment racks (two 25 in. (635 mm) racks side-by-side on each level) with associated mounting materials for one 13 ft. (3962 mm) framework arrangement in 3 lineups. Maximum of 40 bays per lineup.
ED-6C143-30, G11	Triple lineup of walk-thru cable rack materials (32 bays or more) — required in addition to Group 10. Extends cable rack between bays when walk-thru is provided.
ED-6C143-30, G12	Quadruple lineup of 24 bays or more per lineup of cable rack materials — provides two levels of outside plant racks and two levels of equipment racks (two 25 in. (635 mm) racks side-by-side on each level) with associated mounting materials for each 13 ft. (3962 mm) framework arrangement in 4 lineups. Maximum 40 bays per lineup.
ED-6C143-30, G13	Quadruple lineup of walk-thru cable rack materials (24 bays or more) — required in addition to Group 12. Extends the cable rack between bays when walk-thru is provided.
ED-6C143-30, G14	Double lineup — unit 10 ft. 3 in. (3124 mm) cable rack materials — provides two levels of outside plant and equipment racks with associated mounting material for each 10 ft. 3 in. (3124 mm) framework arrangement in 2 lineups. Maximum of 10 framework arrangements per lineup (40 bays).
ED-6C143-30, G15	Triple lineup — unit 10 ft. 3 in. (3124 mm) cable rack materials — provides two levels of outside plant and equipment racks with associated mounting material for each 10 ft. 3 in. framework arrangement in 3 lineups.
ED-6C143-30, G16	Auxiliary framing stanchion support
ED-6C143-30, G17	Triple lineup SMDF, 40 bays per lineup (COSMIC II) less than 4 ft. (1219 mm) aisles.
ED-6C143-30, G18	Quadruple lineup SMDF, 40 bays per lineup (COSMIC II) less than 4 ft. (1219 mm) aisles.

11.3.10 AC, Lighting, and Grounding

Ordering information for AC, Lighting, and Grounding is given in Table 11-AJ.

Table 11-AJ. AC, LIGHTING, AND GROUNDING

ORDERING CODE	DESCRIPTION
ED-6C142-30,G21	Frame Ground Bar — Provides two ground straps per equipment bay. To be used for terminating ground wire from shielded switchboard cable on *COSMIC* IA/IIA DFs.
ED-6C142-30,G22	Shield Grounding Material — Provides ground wire assembly for grounding one shielded cable at both ends. Application — Shielded tie cables between SMDF and SDDF.
ED-6C145-30,G1	Framework Grounding Hardware — Provides a ground lead and associated material for grounding two adjacent bays to the in-line ground bus.
ED-6C145-30,G2	Splicing Hardware — Provides hardware for splicing two 1/0 AWG ground cables together in the distributing frame area. Order #1/0 conductor (KS-5482-01,1/0 AWG type RHW) for in-line frame ground bus. Engineer on job basis.
ED-6C145-30,G20	End Guard Light Switch and Associated Materials — Provides light switch and associated wiring materials.
ED-6C145-30,G21	Lighting Materials for a Single Row of Lights for a 6 ft. 6 in. (1981 mm) Framework Arrangement — Provides mounting material for two lights. See Groups 28 and 29 for correct light fixture.
ED-6C145-30,G22	Lighting Materials for a Double Row of Lights for a 6 ft. 6 in. (1981 mm) Arrangement of Frame Lineup — Lights are mounted in a staggered arrangement. Provides mounting materials for two lights. See Groups 28 and 29 for correct light fixture.
ED-6C145-30,G23	Lighting Materials for a Walk-Through in a single Lineup or Multiple Lineup Arrangement — Provides mounting materials for one light in a single row. See Groups 28 and 29 for correct light fixture.
ED-6C145-30,G24	Lighting Materials for a Walk-Through in a Multiple Lineup — Lights are in two rows in a staggered arrangement. Provides mounting materials for lights in both rows. See Groups 28 and 29 for correct light fixture.

Table 11-AJ. AC, LIGHTING, AND GROUNDING (Contd)

ORDERING CODE	DESCRIPTION
	Wiremold Mounted Relay Box — Equipped with five General Electric Co. RR-7 247 relays. One RA-16 rectifier and two terminal strips.
ED-6C145-30,G25	RT-1 (120 V) Transformer L-25
ED-6C145-30,G26	RT-2 (277 V) Transformer L-26
ED-6C145-30,G27	Without Transformer L-27
	Lighting Fixtures — Required with Groups 21, 22, 23, and 24.
ED-6C145-30,G28	120V L28
ED-6C145-30,G29	277V L29
ED-6C145-30,G30	Lighting Materials for a Single Row of Lights for a 10 ft. 3 in. (3124 mm) Arrangement of Frame Lineup — Provides material for three lights. See Groups 28 and 29 for correct light fixture.
ED-6C145-30,G31	Lighting Materials for a Double Row of Lights for a 10 ft. 3 in. (3124 mm) Arrangement of frame lineup — Lights are mounted in a staggered arrangement. Provides mounting materials for three lights. See Groups 28 and 29 for correct light fixture.
ED-6C145-30,G33	Appliance Outlet Material — Provides outlet channel assembly/outlet box for vertical channels of *COSMIC* IA/IIA DF vertical channels.

11.4 *COSMIC* Apparatus and Accessories

11.4.1 Connecting Blocks

Connecting blocks are used on *COSMIC* DFs for terminations and cross-connections.

11.4.1.1 112-Type Connecting Block

The 112-type connecting blocks (Table 11-AK) are used on all *COSMIC* DFs . *COSMIC* I DFs can mount the high-density 112H-type connecting blocks only if the ED-6C142-30 shelf mounting adapters are used.

Table 11-AK. 112-TYPE CONNECTING BLOCKS

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112A1A-128	106005812	BWW	8 x 32	Yellow	2-10	Miscellaneous equipment	
112A1AB-128	106005820	BWW	8 x 32	Yellow	2-10	Miscellaneous equipment	
112C1A-50	103288197	BQC	4 x 25	White	1, 11	Tie pairs (1-50)	Must be ordered with 112C2A-50 to terminate a 100-pair cable
112C1A-64	103288205	BQC	8 x 16	Yellow	2-10	1/1A ESS (4:1 LCR) line equipment	
112C1A-96	1036344812	BQC	8 x 24	Violet	2-10	SMAS 5A (*facility side*) Quadrant A	
112C1A-100	103288189	BQC	8 x 25	White	2-10	Tie pairs (1-100)	
112C1AB-64	104440870	BWW	8 x 16	Yellow	2-10	1/1A ESS (4:1 LCR) line equipment	
112C1AS-50	104440896	SWW	4 x 25	White	1, 11	Tie pairs (1-50)	Must be ordered with 112C2AS-50 to terminate a 100-pair cable
112C1AS-100	104440888	SWW	8 x 25	White	2-10	Tie pairs (1-100)	
112C1B-50	103288221	BQC	4 x 25	Blue	1, 11	Outside plant pairs (1-50)	Must be ordered with 112C2B-50 to terminate a 100-pair cable. Used on *COSMIC* I or IIA (supplied as part of 307E1-100 connector for *COSMIC* IIA)

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112C1B-100	103288213	BQC	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Used on *COSMIC* I or IA (supplied as part of 307D1S-100 connector for *COSMIC* IIA)
112C1BB-50	104440912	BWW	4 x 25	Blue	1, 11	Outside plant pairs (1-50)	Must be ordered with 112C2BB-50 to terminate a 100-pair cable. Used on *COSMIC* I or IA (supplied as part of 307E1B-10 connector for *COSMIC* IIA)
112C1BB-100	104440904	BWW	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Used on *COSMIC* I or IA (supplied as part of 307D1B-100 connector for *COSMIC* IIA)
112C1BS-50	104447644	SWW	4 x 25	Blue	1, 11	Outside plant pairs (1-50)	Must be ordered with 112C2BS-50 to terminate a 100-pair cable. Used on *COSMIC* I or IA (supplied as part of 307E1S-100 connector for *COSMIC* IIA)
112C1BS-100	104448766	SWW	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Used on *COSMIC* I or IA (supplied as part of 307D1S-100 connector for *COSMIC* IIA)
112C1CS-50	104447651	SWW	4 x 25	Orange	2-10	Carrier pairs with shield ground terminations	Modified blue checkerboard stamping

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112C1F-100	104017322	BQC	8 x 25	Yellow	2-10	GTD* -5 line equipment	Horizontal wiring arrangement. See 112H1E-100 for preferred high-density apparatus. Used on *COSMIC* IA/IIA.†
112C2A-50	103288254	BQC	4 x 25	White	1, 11	Tie pairs (51-100)	Must be ordered with 112C1A-50 to terminate a 100-pair cable.
112C2A-64	103288262	BQC	8 x 16	Yellow	2-10	1/1A ESS (2:1, 4:1 LCR), 5ESS (4:1-10:1 LCR) — line equipment	
112C2A-96	103634820	BQC	8 x 24	Violet	2-10	SMAS 5 (facility side) Quadrant B	
112C2AB-64	104450192	BWW	8 x 16	Yellow	2-10	1/1A ESS (2:1 LCR), 2/2B ESS (2:1, 4:1 LCR), 5ESS (4:1-10:1 LCR) — line equipment	
112C2AS-50	104447669	SWW	4 x 25	White	1, 11	Tie pairs (51-100)	Must be ordered with 112C1AS-50 to terminate a 100-pair cable.

* Trademark of GTE.

† Shelf adapters required for use on *COSMIC* I frames.

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERMINAL TYPE	ROW AND COLUMN FIELD	FANNING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112C2B-50	103288270	BQC	4 x 25	Blue	1, 11	Outside plant pairs (51-100)	Must be ordered with 112C1B-50 to terminate a 100-pair cable. Used on *COSMIC* I or IIA (supplied as part of 307E1-100 connector for *COSMIC* IIA).
112C2BB-50	104447677	BWW	4 x 25	Blue	1, 11	Outside plant pairs (51-100)	Must be ordered with 112C1BB-50 to terminate a 100-pair cable. Used on *COSMIC* I or IA (supplied as part of 307E1B-100 connector for *COSMIC* IIA).
112C2BS-50	104447685	SWW	4 x 25	Blue	1, 11	Outside plant pairs (51-100)	Must be ordered with 112C1BS-50 to terminate a 100-pair cable. Used on *COSMIC* I or IA (supplied as part of 307E1S-100 connector for *COSMIC* IIA).
112C2E-100	103815510	BQC	8 x 25	Beige	2-10	Miscellaneous applications, *SLC* 96 carrier, shielded tie pairs from SDDF	
112C2EB-100	104447693	BWW	8 x 25	Beige	2-10	Miscellaneous applications, *SLC* 96 carrier, shielded tie pairs without shield grounds	

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112C2ES-100	104447701	SWW	8 x 25	Beige	2-10	Miscellaneous applications, *SLC* 96 carrier, shielded tie pairs without shield grounds	
112C2F-64	104017330	BQC	8 x 16	Yellow	2-10	5ESS ISLU or RISLU (2-wire), DMS* -10/100 line equipment	Replaces the F-61746 block
112C2FB-64	104447719	BWW	8 x 16	Yellow	2-10	5ESS ISLU (2-wire), DMS-10/100 line equip-ment	
112C3A-96	103634838	BQC	8 x 24	Violet	2-10	SMAS 5A (facility side) Quadrant C	
112C3F-64	104373204	BQC	8 x 16	Yellow	2-10	5ESS ISLU or RISLU (4-wire) line equipment	
112C3FB-64	104447727	BWW	8 x 16	Yellow	2-10	5ESS ISLU (4-wire) line equipment	
112C4A-96	103634846	BQC	8 x 24	Violet	2-10	SMAS 5A (facility side) Quadrant D	
112C4A-100	103634861	BQC	8 x 25	Violet	2-10	SMAS 5B (facility side) Circuits 00-49	
112C5A-100	103634853	BQC	8 x 25	Violet	2-10	SMAS 5B (facility side) circuits 50-99	
112E1A-64	103317905	BQC	4 x 32	Beige	2-10	Miscellaneous and trunk equipment	

* Trademark of Northern Telecom.

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112E1A-128	103288288	BQC	8 x 32	Beige	2-10	Miscellaneous and trunk equipment on CMDF, TMDF, high-frequency *SLC*, SMAS on SMDF, 5ESS trunk units	
112E1AB-128	104447735	BWW	8 x 32	Beige	2-10		
112E1AS-128	104447743	SWW	8 x 32	Beige	2-10		
112E1B-64	103317913	BQC	4 x 32	White	1, 11	Tie pairs (1-64)*	
112E1B-128	103288296	BQC	8 x 32	Yellow	2-10	1/1A ESS (2:1 LCR), 2/2B ESS, 5ESS (4:1-10:1 LCR) line equipment	
112E1BB-128	104447750	BWW	8 x 32	Yellow	2-10		
112E1C-128	103556247	BQC	8 x 32	Yellow	2-10	5ESS line equipment 10A remote switching system	
112E1D-128	103634879	BQC	8 x 32	White	2-10	Tie pairs (1-128)	
112E2B-128	103758140	BQC	8 x 32	Yellow	2-10	1/1A ESS (4:1 LCR) line equipment	
112E2BB-128	104447768	BWW	8 x 32	Yellow	2-10		
112E2D-128	106005838	BQC	8 x 32	White	2-10	Tie pairs (1-128) inter-connecting equipment	
112E2F-128	104017348	BQC	8 x 32	Yellow	2-10	5ESS ISLU or RISLU (2-wire and 4-wire), DMS-10/100 — line equipment	Replaces the F-61726 block
112E2FB-128	104447776	BWW	8 x 32	Yellow	2-10		

* Shelf adapters required for use on *COSMIC* I frames.

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112E3D-128	106005846	BQC	8 x 32	White	2-10	Tie pairs (129-256) interconnecting equipment	
112E3F-64	104432687	BQC	8 x 16	Yellow	2-10	AXE* -10 line equipment (line interface cards [0-63]), SYSTEM X†	Must be ordered with 112E4F-64 to terminate a 128-pair cable in a switch module. Used on *COSMIC* I.
112E3F-128	104401302	BQC	8 x 32	Yellow	2-10	AXE-10 line equipment, SYSTEM X	
112E4D-128	106005853	BQC	8 x 32	White	2-10	Tie pairs (257-384) interconnecting equipment	
112E4F-64	104432695	BQC	8 x 16	Yellow	2-10	AXE-10 line equipment (line interface cards 64-127), SYSTEM X	Must be ordered with 112E3F-64 to terminate a 128-pair cable in a switch module. Used on *COSMIC* I.
112E5D-128	106005994	BQC	8 x 32	White	2-10	Tie pairs (385-512) interconnecting equipment	
112G1A-128	103665204	BQC	8 x 32	Beige	2-10	Miscellaneous and trunk equipment for 5ESS trunk units	Wired to four 32-pair 711-type connectors
112G1B-50	104016886	BQC	4 x 25	Blue	1, 11	Outside plant pairs (1-50) folded *COSMIC* IIA	Wired to two 25-pair 711-type connectors. Nonstock item.

* Trademark of Ericsson.
† Trademark of Plessey.

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112G1B-100	104016878	BQC	8 x 25	Blue	2-10	Outside plat pairs (1-100) folded *COSMIC* IIA	Wired to four 25-pair 711-type connectors. Nonstock item.
112G1B-128	103665212	BQC	8 x 32	Yellow	2-10	5ESS (4:1-10:1 LCR) line equipment	Wired to four 32-pair 711-type connectors
112G1C-128	103749354	BQC	8 x 32	Beige	2-10	5ESS metallic service unit, resistor, 13A announcement	Wired to four 32-pair 711-type connectors
112G1D-128	104199781	BQC	8 x 32	Yellow	2-10	DMS-10/100 line equipment	Wired to four 32-pair TRW* (or equivalent) connector
112G2B-50	104016894	BQC	4 x 25	Blue	2-10	Outside plant pairs (51-100) folded *COSMIC* IIA	Wired to two 25-pair 711-type connectors. Nonstock item.
112G2B-128	104377429	BQC	8 x 32	Yellow	2-10	5ESS ISLU or RISLU (2-wire) line equipment	Wired to four 32-pair 711-type connectors
112G4B-128	104407879	BQC	8 x 32	Yellow	2-10	5ESS ISLU or RISLU (4-wire) line equipment	Wired to four 32-pair 711-type connectors
112H1B-100	104052063	BQC	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Used on *COSMIC* IA† (supplied as part of 307F1-100 connector for *COSMIC* IIA)
112H1BS-100	105571681	SWW	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Used on *COSMIC* IA/IIA†

* Trademark of TRW.
† Shelf adapters required for use on *COSMIC* I.

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112H1D-50	104052097	BQC	4 x 25	White	1, 11	Tie pairs (1-50)	Used on *COSMIC* IA/IIA†
112H1D-100	104052089	BQC	8 x 25	White	2-10	Tie pairs (1-100)	Used on *COSMIC* IA/IIA†
112H1DS-50	104447792	SWW	4 x 25	White	1, 11	Tie pairs (1-50)	Used on *COSMIC* IA/IIA†
112H1DS-100	104447784	SWW	8 x 25	White	2-10	Tie pairs (1-100)	Used on *COSMIC* IA/IIA†
112H1E-100	104188024	BQC	8 x 25	Yellow	2-10	GTD-5 line equipment	Horizontal wiring arrangement. Used on *COSMIC* IA/IIA
112H1E1-100	104199799	BQC	8 x 25	Yellow	2-10	GTD-5 line equipment	Vertical wiring arrangement. Used on *COSMIC* IA/IIA
112H1G-100	104193925	BQC	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Wired to four 25-pair 711-type connectors. Used on *COSMIC* IA/IIA†.
112H2D-50	104052113	BQC	4 x 25	White	1, 11	Tie pairs (51-100)	Used on *COSMIC* IA/IIA†
112H2DS-50	104447800	SWW	4 x 25	White	1, 11	Tie pairs (51-100)	Used on *COSMIC* IA/IIA†

† Shelf adapters required for use on *COSMIC* I frames.

Table 11-AK. 112-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
112H2G-100	104199807	BQC	8 x 25	Yellow	2-10	GTD-5 line equipment	Horizontal wiring arrangement. Wired to four 25-pair TRW (or equivalent) connectors. Used on ***COSMIC*** IA/IIA
112H3D-100	106070493	QC	8 x 25	White	1, 11	Tie pairs (1-100)	Requires shelf adapter for ***COSMIC*** frames
112H3DS-100	106070527	SWW	8 x 25	White	1, 11	Tie pairs (1-100)	
112H4D-150	106070501	QC	12 x 25	White	2-10	Tie pairs (1-150)	
112H4DS-150	106070535	SWW	12 x 25	White	2-10	Tie pairs (1-150)	
112H4D-200	106070519	QC	16 x 25	White	2-10	Tie pairs (1-200)	
112H4DS-200	106070543	SWW	16 x 25	White	2-10	Tie pairs (1-200)	
112J1B-128	104430459	BQC	8 x 32	Yellow	2-10	5ESS (4:1-10:1 LCR) line equipment	Wired to four 32-pair TRW (or equivalent) connectors

Note: The following abbreviations are used in this table.
BWW — Bifurcated Wire-Wrap
BQC — Bifurcated Quick-Clip
SWW — Single Wire-Wrap
QC — Quick-Clip (2-Beam)
ESS — Electronic Switching System
LCR — Line Concentration Ratio (:)
SMAS — Switched Maintenance Access System
SDDF — Subscriber Digital Distributing Frame
SMDF — Subscriber Main Distributing Frame
CMDF — Combined Main Distributing Frame
TMDF — Trunk Main Distributing Frame
ISLU — Integrated Service Line Unit
RISLU — Remote Integrated Service Line Unit.

11.4.1.2 78-Type Connecting Blocks

The 78-type connecting blocks (Table 11-AL) are used on *COSMIC* I DFs.

Table 11-AL. 78-TYPE CONNECTING BLOCKS

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
78C1A-50	102371770	BQC	4 x 25	White	1, 11	Tie pairs (1-50)	Must be ordered with 78C2A-50 to terminate a 100-pair cable.
78C1A-64	102371788	BQC	8 x 16	Yellow	2-10	1/1A ESS™ (4:1 LCR) line equipment	
78C1A-96	103679551	BQC	8 x 24	Violet	2-10	SMAS 5A (facility side) Quadrant A	
78C1A-100	102371796	BQC	8 x 25	White	2-10	Tie pairs (1-100)	
78C1B-50	102463486	BQC	4 x 25	Blue	1, 11	Outside plant pairs (1-50)	Must be ordered with 78C2B-50 to terminate a 100-pair cable. Used on *COSMIC* I or IA (supplied as part of 307B1-100 connector for *COSMIC* IIA).
78C1B-100	102371804	BQC	8 x 25	Blue	2-10	Outside plant pairs (1-100)	Used on *COSMIC* I or IA (supplied as part of 307A1-100 connector for *COSMIC* IIA).
78C1C-100	102371812	BQC	8 x 25	Orange	2-10	Step-by-step line equip-ment	
78C2A-50	102995198	BQC	4 x 25	White	1, 11	Tie pairs (51-100)	Must be ordered with 78C1A-50 to terminate a 100-pair cable.

Table 11-AL. 78-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
78C2A-64	102371838	BQC	8 x 16	Yellow	2-10	1/1A ESS (2:1, 4:1 LCR), 5ESS (4:1-10:1 LCR) line equipment	
78C2A-96	103679569	BQC	8 x 24	Violet	2-10	SMAS 5A (facility side) Quadrant B	
78C2A-100	102415882	BQC	8 x 25	Green	2-10	No. 5 crossbar line equip-ment	
78C2B-50	102995206	BQC	4 x 25	Blue	1, 11	Outside plant pairs (51-100)	Must be ordered with 78C1B-50 to terminate a 100-pair cable. Used on *COSMIC* I or IA (supplied as part of 307B1-100 connector for *COSMIC* IIA).
78C2E-100	103815528	BQC	8 x 25	Beige	2-10	Miscellaneous applications, *SLC* 96 carrier, shielded tie pairs	
78C2F-64	104017355	BQC	8 x 16	Yellow	2-10	5ESS ISLU or RISLU (2-wire), DMS-10/100 line equip-ment	
78C3A-96	103679577	BQC	8 x 24	Violet	2-10	SMAS 5A (facility side) Quadrant C	
78C3A-100	102730462	BQC	8 x 25	Green	2-10	No. 1 crossbar line equip-ment	
78C3F-64	104404926	BQC	8 x 16	Yellow	2-10	5ESS ISLU or RISLU (4-wire) line equipment	
78C4A-96	103679585	BQC	8 x 24	Violet	2-10	SMAS 5A (facility side) Quadrant D	

Table 11-AL. 78-TYPE CONNECTING BLOCKS (Contd)

ITEM CODE	COMCODE	TERM-INAL TYPE	ROW AND COLUMN FIELD	FAN-NING STRIP COLOR	*COSMIC* SHELF NO.	APPLICATION	APPLICATION NOTES
78C4A-100	103679593	BQC	8 x 25	Violet	2-10	SMAS 5B (facility side) (00-49)	
78C5A-100	103679601	BQC	8 x 25	Violet	2-10	SMAS 5B (facility side) (50-99)	
78E1-64	106005796	BQC	8 x 16	Beige	2-10	Trunk and miscellaneous equipment	Used on *COSMIC* I.
78E1A-64	106005804	BQC	8 x 16	Beige	2-10	Trunk and miscellaneous equipment	Used on *COSMIC* I.
78E3F-64	104432703	BQC	8 x 16	Yellow	2-10	AXE-10 line equipment (line interface cards 0-63)	Must be ordered with 78E4F-64 to terminate a 128-pair cable in a switch module.
78E4F-64	104432711	BQC	8 x 16	Yellow	2-10	AXE-10 line equipment (line interface cards (64-127)	Must be ordered with 78E3F-64 to terminate a 128-pair cable in a switch module.
78G1B-64	104411657	BQC	8 x 16	Yellow	2-10	1/1A ESS (2:1 LCR), 2/2B ESS, 5ESS (4:1-10:1 LCR) — line equipment	

Note: The following abbreviations are used in this table.
BQC — Bifurcated Quick-Clip
ESS — Electronic Switching System
LCR — Line Concentration Ratio (:)
SMAS — Switched Maintenance Access System
ISLU — Integrated Service Line Unit
RISLU — Remote Integrated Service Line Unit.

11.4.1.3 Frame Mounted Bridge Lifter Blocks

The bridge lifer assembly (Table 11-AM) used on *COSMIC* DFs is a 112-type connecting block equipped with a 1574D bridge lifter. The assembly is used to open (lift) idle bridge-tapped cable pairs from a telephone circuit.

Table 11-AM. FRAME MOUNTED BRIDGE LIFTER BLOCKS

COMCODE	ITEM DESCRIPTION	TERMINAL TYPE	QTY. CIRCUITS	QTY. COILS
105148993	112E1A-128 Block Connector, Equipped With 1574D Bridge Lifter	BQC	32	64
105369490	112C1A-100 Block Connector, Equipped With 1574D Bridge Lifter	BQC	24	50
105676167	112E1AB-128 Block Connector, Equipped With 1574D Bridge Lifter	BWW	32	64

Note: The following abbreviations are used in this table.
BWW — Bifurcated Wire-Wrap
BQC — Bifurcated Quick-Clip.

11.4.2 Connectors and Stub Cables

Central office connectors are used for terminating and protecting outside plant cables. They are used on *COSMIC* IIA and Mini distributing frames and on protector frames associated with *COSMIC* IA and I distributing frames.

11.4.2.1 307-Type Connectors

The 307-type connectors (Table 11-AN) are used on the *COSMIC* IIA and *COSMIC* Mini DFs. They are also used in the wall-mounted AT-9049 protector frames.

Table 11-AN. 307-TYPE CONNECTORS

PRODUCT CODE	COMCODE	TERMINAL TYPE (Note)	EQUIPPED WITH CONNECTING BLOCK	FRAME SHELF	*COSMIC* FRAME
307C1-100†	103334009	N/A	None*	—	IIA, Mini
307D1-100	103318309	BQC	112C1B-100	2-10	IIA
307D1B-100	104447818	BWW	112C1BB-100	2-10	IIA
307D1S-100	104447826	SWW	112C1BS-100	2-10	IIA
307D2-100	103554747	BQC	112C1B-100	2-10 1-10	IIA Mini
307D2B-100	105571699	BWW	112C1BB-100	2-10 1-10	IIA Mini
307D2S-100	105571707	SWW	112C1BS-100	2-10 1-10	IIA Mini
307E1-100	103318317	BQC	112C1B-50 112C2B-50	1 or 11	IIA
307E1B-100	104447834	BWW	112C1BB-50 112C2BB-50	1 or 11	IIA
307E1S-100	104447842	SWW	112C1BS-50 112C2BS-50	1 or 11	IIA
307F1-100	104367768	BQC	112H1B-100	2-10	IIA
307G1-100	104367776	BQC	112H1B-50 112H2B-50	1 or 11	IIA
307H1S-100	105571715	SWW	112H1BS-100	2-10	IIA
307LD2-100-30	106060387	BQC	112C1B-100 and 30 foot (9.1 m) stub	2-10 1-10	IIA Mini
307LD2-100-50	106287089	BQC	112C1B-100 and 50 foot (15.2 m) stub	2-10 1-10	IIA Mini
307LD2-100-100	106287121	BQC	112C1B-100 and 100-foot (30.5 m) stub	2-10 1-10	IIA Mini

Note: BQC = Bifurcated quick-clip, SWW = single wire-wrap, BWW = bifurcated wire-wrap

* This code is equipped with 25-pair 710-type connectors instead of a connecting block.

† Outside plant side is 22-gauge (.6 mm) and equipment side is 26-gauge (.4 mm).

11.4.2.2 11-Type Connectorized Stub Cables (For 307-Type Connectors)

The stub cables (Table 11-AO) are used with 307-type connectors to interconnect to outside plant cables and must be ordered separately.

Table 11-AO. 11-TYPE CONNECTORIZED STUB CABLES

ITEM CODE	COMCODE	STUB CABLE WIRE GAUGE	STUB CABLE LENGTH (FEET)	STUB CABLE CAPACITY PAIRS	EQUIPPED WITH BRIDGE MODULE	USED WITH CONNECTOR	APPLICATION
11CA-40	103271334	22 (.6 mm)	40 (12 m)	100	Four 25-Pair 710BD1-25	307 D1, D2, and E1. Also 309G1-200	Tip Cable (cables are generally spiced to feeder/riser cables)
11CA-60	103271342		60 (18 m)				
11CA-80	103226486		80 (24 m)				
11CA-100	103226494		100 (30 m)				
11CA-120	103271359		120 (37 m)				
11CA-150	103226502		150 (46 m)				
11CA-200	103226510		200 (61 m)				
11CB-40	103681474		40 (12 m)	50*	Two 25-pair 710BD1-25	307C1-100	T-Carrier Facility Cables (split 50-pair transmit and receive counts)
11CB-60	103681482		60 (18 m)				
11CB-80	103681490		80 (24 m)				
11CB-100	103681508		100 (30 m)				
11CB-120	103681516		120 (37 m)				
11CB-150	103681524		150 (46 m)				
11CB-200	103681532		200 (61 m)				
11DA-40	103271367	24 (.5 mm)	40 (12 m)	100	Four 25-pair 710BD1-25	307 D1, D2, and E1. Also 309G1-200	Tip Cable (cables are generally spliced to feeder/riser cables)
11DA-60	103271375		60 (18 m)				
11DA-80	103226551		80 (24 m)				
11DA-100	103226569		100 (30 m)				
11DA-120	103271383		120 (37 m)				
11DA-150	103226577		150 (46 m)				
11DA-200	103226528		200 (61 m)				

* Each 307C1-100 requires two 50-pair 11CB stub cables.

Table 11-AO. 11-TYPE CONNECTORIZED STUB CABLES (Contd)

ITEM CODE	COMCODE	STUB CABLE			EQUIPPED WITH BRIDGE MODULE	USED WITH CONNECTOR	APPLICATION
		WIRE GAUGE	LENGTH (FEET)	CAPACITY PAIRS			
11EA-40	103318580	22 (.6 mm)	40 (12 m)	25†	One 25-Pair 710BD1-25	307C1-100	T-Carrier Office Repeater Bay
11EA-60	103318598		60 (18 m)				
11EA-80	103318606		80 (24 m)				
11EA-100	103318549		100 (30 m)				
11EA-120	103318556		120 (37 m)				
11EA-150	103318564		150 (46 m)				
11EA-200	103318572		200 (61 m)				
11EB-40	103681540		40 (12 m)	50‡	Two 25-Pair 710BD1-25		
11EB-60	103681557		60 (18 m)				
11EB-80	103681565		80 (24 m)				
11EB-100	103681573		100 (30 m)				
11EB-120	103681581		120 (37 m)				
11EB-150	103681599		150 (46 m)				
11EB-200	103681607		200 (61 m)				

Note: Different lengths or gauge of stub cable can be provided on a special order basis, such as 26-gauge 300-foot stub cable.

† Each 307C1-100 requires four 11EA stub cables.

‡ Each 307C1-100 requires two 11EB stub cables.

11.4.2.3 407-Type Connectors

The 407-type connectors (Table 11-AP) are used on the *COSMIC* IIA and Mini DFs. Protection is not provided.

Table 11-AP. 407-TYPE CONNECTORS—NON-PROTECTED

PRODUCT CODE	COMCODE	TERMINAL TYPE	EQUIPPED WITH	FRAME SHELF	*COSMIC* FRAME
407D1-100	106055460	Bifurcated Quick-Clip	112C1B-100 and four 710-type 25 pair splicing connectors	2-10	II, IIA
407F1-100	106055486	Bifurcated Quick-Clip	112H1B-100 and four 710-type 25 pair splicing connectors	2-10	II*, IIA

Note: Other 407-type unprotected connector options, such as versions equipped with bifurcated or single wire-wrap terminals, can also be made available on a special basis. Please contact your AT&T Sales Representative for ordering information.

* Frame equipped ED6C142-30 shelf adapters.

11.4.2.4 308-Type Connectors

The 308-type connectors (Table 11-AQ) are used on the high-density modular protector frame and the low-profile double-sided conventional protector frame.

Table 11-AQ. 308-TYPE CONNECTORS

ITEM CODE (*Note*)	COMCODE	STUB CABLE			FRAME APPLICATION
		WIRE GAUGE	LENGTH (FEET)	CABLING DIRECTION	
308A1-100-30	103111829	24 (.5 mm)	30 (9 m)	Up/ Down	High-Density Modular Protector Frame (ED-97898-31 only)
308A1-100-50	103111837		50 (19 m)		
308A1-100-80	103111845		80 (24 m)		
308A1-100-100	103111852		100 (30 m)		
308A1-100-150	103111860		150 (46 m)		
308A1-100-200	103111878		200 (61 m)		
308A3-100-30	103760856		30 (9 m)		Low-Profile Double-Sided Conventional Protector Frame (ED-97755-72)
308A3-100-50	103904827		50 (19 m)		
308A3-100-80	103904835		80 (24 m)		
308A3-100-100	103904843		100 (30 m)		
308A3-100-150	103904850		150 (46 m)		
308A3-100-200	103904868		200 (61 m)		

Note: 308A3-100 replaces 308A2-100 and 308C2-100
308B3-100 replaces 308B2-100 and 308D2-100.

Table 11-AQ. 308-TYPE CONNECTORS (Contd)

ITEM CODE (*Note*)	COMCODE	STUB CABLE WIRE GAUGE	STUB CABLE LENGTH (FEET)	STUB CABLE CABLING DIRECTION	FRAME APPLICATION
308B1-100-30	103111886	22 (.6 mm)	30 (9 m)	Up/ Down	High-Density Modular Protector Frame (ED-97898-31 only)
308B1-100-50	103111894		50 (19 m)		
308B1-100-80	103111902		80 (24 m)		
308B1-100-100	103111910		100 (30 m)		
308B1-100-150	103111928		150 (46 m)		
308B1-100-200	103111936		200 (61 m)		
308B3-100-30	103760864		30 (9 m)		Low-Profile Double-Sided Conventional Protector Frame (ED-97755-72)
308B3-100-50	103904876		50 (19 m)		
308B3-100-80	103904884		80 (24 m)		
308B3-100-100	103904892		100 (30 m)		
308B3-100-150	103904900		150 (46 m)		
308B3-100-200	103904918		200 (61 m)		
308E1-100	103440679	No Stub*			High-Density Modular Protector Frame (ED-97898-31 only)
308E2-100	103289503				Low-Profile Double-Sided Conventional Protector Frame (ED-97755-72)

Note: 308A3-100 replaces 308A2-100 and 308C2-100
308B3-100 replaces 308B2-100 and 308D2-100.

* Typically used for pair-gain system terminals cabled to the connectors with switchboard cable.

11.4.2.5 302-Type Connectors

The 302-type connectors (Table 11-AR) are used on the ED-1A220-31 modular protector frame and the low-profile and tall double-sided protector frames. Table 11-AS lists the accessories available for the 302-type connector.

Table 11-AR. 302-TYPE CONNECTORS

ITEM CODE (*Note*)	COMCODE	STUB CABLE			FRAME APPLICATION
		WIRE GAUGE	LENGTH (FEET)	CABLING DIRECTION	
302A1-100-30*	101642817	24 (.5 mm)	30 (9 m)	Up/ Down	Modular Protector Frame (ED-1A220-31 only)
302A1-100-50*	101642825		50 (19 m)		
302A1-100-80*	101642833		80 (24 m)		
302A1-100-100*	101642841		100 (30 m)		
302A1-100-150*	102759826		150 (46 m)		
302A1-100-200*	102759834		200 (61 m)		
302A4-100-30	103760799		30 (9 m)		Low-Profile and Tall Double-Sided Conventional Protector Frame
302A4-100-50	103904728		50 (19 m)		
302A4-100-80	103904736		80 (24 m)		
302A4-100-100	103904744		100 (30 m)		
302A4-100-150	103904751		150 (46 m)		
302A4-100-200	103904769		200 (61 m)		

Note: 302A4-100 replaces 302A3-100 and 302C3-100.
302B4-100 replaces 302B3-100 and 302D3-100.

* Cannot be modified to provide hinged arrangement.

Table 11-AR. 302-TYPE CONNECTORS (Contd)

ITEM CODE (*Note*)	COMCODE	STUB CABLE			FRAME APPLICATION
		WIRE GAUGE	LENGTH (FEET)	CABLING DIRECTION	
302B1-100-30*	101642858	22	30 (9 m)	Up/ Down	Modular Protector Frame (ED-1A220-31 only)
302B1-100-50*	101642866		50 (19 m)		
302B1-100-80*	101642874		80 (24 m)		
302B1-100-100*	101642882		100 (30 m)		
302B1-100-150*	102759867		150 (46 m)		
302B1-100-200*	102759875		200 (61 m)		
302B4-100-30	103760807		30 (9 m)		Low-Profile and Tall Double-Sided Protector Frame
302B4-100-50	103904777		50 (19 m)		
302B4-100-80	103904785		80 (24 m)		
302B4-100-100	103904793		100 (30 m)		
302B4-100-150	103904801		150 (46 m)		
302B4-100-200	103904819		200 (61 m)		
302E1-100	102861614	No Stub†			Modular Protector Frame (ED-1A220-31 only)
302E3-100	103046074				Low-Profile and Tall Double-Sided Conventional Protector Frame

Note: 302A4-100 replaces 302A3-100 and 302C3-100.
302B4-100 replaces 302B3-100 and 302D3-100.

* Cannot be modified to provide hinged arrangement.
† Typically used for pair-gain system terminals cabled to the connectors with switchboard cable.

Table 11-AS. ACCESSORIES FOR 302-TYPE CONNECTORS

PRODUCT CODE	COMCODE	USED WITH	DESCRIPTION
		Bracket	
86A	101213718	Connectors with hinged mounting brackets	Holds connector panel open
		Adapters	
176A	101213262	14-foot 6-inch (4420 mm) vertical	Three aluminum bars marked A, B, and C
176B	101213270	11-foot (3353 mm) or 12-foot 6-inch (3810 mm) vertical	Two aluminum bars marked A and B
		Number Plates	
P19E127	811951276	5A-Type Protector Unit	Stenciled — 5-6, 30-31, 55-56, 80-81
P19E128	811951284		Stenciled — 10-11, 35-36, 60-61, 85-86
P19E129	811951292		Stenciled — 15-16, 40-41, 65-66, 90-91
P19E130	811951300		Stenciled — 20-21, 45-46, 70-71, 95-96
P19E131	811951318	3B-Type Protector Unit	Stenciled — 5-6, 30-31, 55-56, 80-81
P19E132	811951326		Stenciled — 10-11, 35-36, 60-61, 85-86
P19E133	811951334		Stenciled — 15-16, 40-41, 65-66, 90-91
P19E134	811951342		Stenciled — 20-21, 45-46, 70-71, 95-96
P46L642	824636427	4B-Type Protector Unit	Stenciled — 5-6, 30-31, 55-56, 80-81
P46L643	824636435		Stenciled — 10-11, 35-36, 60-61, 85-86
P46L644	824636443		Stenciled — 15-16, 40-41, 65-66, 90-91
P46L645	824636450		Stenciled — 20-21, 45-46, 70-71, 95-96

11.4.2.6 309-Type Connectors

The 309-type connectors (Table 11-AT) are used on the ED-97755-72 low-profile double-sided protector frame and the sliding drawer assembly protector frame. The 309-type connectors are also available in half-connector units (Table 11-AU) to facilitate incremental additions and permit frame design flexibility.

Table 11-AT. 309-TYPE CONNECTORS

ITEM CODE	COMCODE	CROSS-CONNECT TERMINAL TYPE	STUB CABLE			APPLICATION
			WIRE GAUGE	LENGTH (FEET)	CABLING DIRECTION	
309A1-200-30	103779799	Wire-Wrap	24 (.5 mm)	30 (9 m)	Up/Down (Swivel)	Outside Plant Facility Pairs
309A1-200-50	103779807			50 (19 m)		
309A1-200-80	103779815			80 (24 m)		
309A1-200-100	103779823			100 (30 m)		
309A1-200-150	103779831			150 (46 m)		
309A1-200-200	103779849			200 (61 m)		
309B1-200-30	103779856		22 (.6 mm)	30 (9 m)		
309B1-200-50	103779864			50 (19 m)		
309B1-200-80	103779872			80 (24 m)		
309B1-200-100	103779880			100 (30 m)		
309B1-200-150	103779898			150 (46 m)		
309B1-200-200	103779906			200 (61 m)		
309E1-200	103670865		No Stub			Pair-Gain Systems (Pseudo Connector for Derived Pairs)
309G1-200	104185392		*			

* Connector equipped with four 710-type connectors for connection to 11CA- and 11DA-type stub cables.

Table 11-AU. 309-TYPE CONNECTORS — HALF-CONNECTOR UNITS

ITEM CODE	COMCODE	CROSS-CONNECT TERMINAL TYPE	STUB CABLE WIRE GAUGE	STUB CABLE LENGTH (FEET)	STUB CABLE CABLING DIRECTION	APPLICATION
309A1L-100-30	105755441	Wire-Wrap	24 (.5 mm) Left Half	30 (9 m)	Up/Down (Swivel)	Outside Plant Facility Pairs
309A1L-100-50	105762942			50 (19 m)		
309A1L-100-80	105762983			80 (24 m)		
309A1L-100-100	105763031			100 (30 m)		
309A1L-100-150	105763148			150 (46 m)		
309A1L-100-200	105763163			200 (61 m)		
309A1R-100-30	105755458		24 (.5 mm) Right Half	30 (9 m)		
309A1R-100-50	105764260			50 (19 m)		
309A1R-100-80	105764278			80 (24 m)		
309A1R-100-100	105764286			100 (30 m)		
309A1R-100-150	105764294			150 (46 m)		
309A1R-100-200	105764302			200 (61 m)		
309B1L-100-30	105755466		22 (.6 mm) Left Half	30 (9 m)		
309B1L-100-50	105764310			50 (19 m)		
309B1L-100-80	105764328			80 (24 m)		
309B1L-100-100	105764336			100 (30 m)		
309B1L-100-150	105764344			150 (46 m)		
309B1L-100-200	105764351			200 (61 m)		
309B1R-100-30	105755474		22 (.6 mm) Right Half	30 (9 m)		
309B1R-100-50	105764369			50 (19 m)		
309B1R-100-80	105764377			80 (24 m)		
309B1R-100-100	105764385			100 (30 m)		
309B1R-100-150	105764393			150 (46 m)		
309B1R-100-200	105764401			200 (61 m)		
309E1L-100-LS	105755482		No Stub — Left Half			Pair-Gain Systems (Pseudo Connector for Derived Pairs)
309E1R-100-LS	105755490		No Stub — Right Half			
309G1L-100-710	105755508		No Stub — Left Half*			
309G1R-100-710	105755516		No Stub — Right Half*			

* Connector equipped with two 710-type connectors for connection to 11CA- and 11DA-type stub cables.

11.4.2.7 195-Type Protector [for Extra Large Building Entrance Terminal (XLBET) Protector Frames]

The 195-type protector (Table 11-AV) is used on the XLBET or also on walls and backboards.

Table 11-AV. 195-TYPE PROTECTORS

ITEM CODE	COMCODE	INPUT STUB LENGTH (FEET)	RJ21 OUTPUT CONNECTOR TYPE
Wall Mounted			
195A1-100-25	105404776	25 (7.6 m)	Female
195A1-100-25M	105564025	25 (7.6 m)	Male
195A1-100-50	105564033	50 (15.2 m)	Female
195A1-100-50M	105564041	50 (15.2 m)	Male
Frame Mounted			
195B1-100-25	105501050	25 (7.6 m)	Female
195B1-100-25M	105564058	25 (7.6 m)	Male
195B1-100-50	105564066	50 (15.2 m)	Female
195B1-100-50M	105564074	50 (15.2 m)	Male
195B1-100-100	105564082	100 (30.4 m)	Female
195B1-100-100M	105564090	100 (30.4 m)	Male

11.4.3 Protector Units

The plug-in protector units are inserted into connectors used on *COSMIC* distributing frames and protector frames to provide protection for outside plant cable pairs. The protector units are categorized by three types:

- **3-Type** — For voltage protection only.
- **4-Type** — Includes heat coils for sneak current protection, and devices for over-voltage protection.
- **5-Type** — Dummy protector units that provide continuity only, used only where protection is not required.

Tables 11-AW, 11-AX, 11-AY and 11-AZ list the ordering information for the 3-, 4-, and 5-type protector units.

Table 11-AW. 3-TYPE PROTECTOR UNITS — VOLTAGE PROTECTION

PRODUCT CODE	COMCODE	HOUSING COLOR	CIRCUIT APPLICATION
Carbon Block Protector Units			
3B1A	102381779	Black	Standard
3B2A	102381787	Green	Service denied
3B3A	102381795	Red	Special
3B4A	102381803	Yellow	PBX battery
3B13A	103157228	Green	Check cable fault
Gas Tube Protector Units — REA Approved			
3B1E-R	105494248	Black	Standard
3B3E-R	105449255	Red	Special
Wide Gap Gas Tube Protector Units			
3B1E-W	104410147	Black	Standard
3B2E-W	104410154	Red	Special
3B3E-W	105499255	Red	Special
3B4E-W	104410170	Yellow	PBX battery
3C1E-W	104410188	Black	Standard
3C3E-W	104410196	Red	Special
Solid-State Protector Units			
3C1S	105514756	Black	Standard
3C1SC	106021066	Black	Standard
3C3S	105695969	Red	Special
3C3SC	106021074	Red	Special

Table 11-AX. 4B-TYPE PROTECTOR UNITS — VOLTAGE AND SNEAK CURRENT PROTECTION

PRODUCT CODE	COMCODE	HOUSING COLOR	CIRCUIT APPLICATION
Carbon Block Protector Units			
4B1C	102904893	Black	Standard
4B2C	102904901	Green	Service denied
4B3C	102904919	Red	Special
4B4C	102904927	Yellow	PBX battery
4B12C	103626016	Gray	Continuity only (no carbon blocks)
Wide Gap Gas Tube Protector Units			
4B1E-W	104401856	Black	Standard
4B2E-W	104401864	Green	Service denied
4B3E-W	104401872	Red	Special
4B4E-W	104401880	Yellow	PBX Battery
205A Gas Tube Protector Units			
4B1F	103550992	Black	Standard
4B2F	103551016	Green	Service denied
4B3F	103551024	Red	Special
4B4F	103551032	Yellow	PBX battery
4B9F	103551040	White	Reverse ring and tip
4B11F	103551008	Orange	Minibridge lifter

Table 11-AY. 4C-TYPE PROTECTOR UNITS — VOLTAGE AND SNEAK CURRENT PROTECTION

PRODUCT CODE	COMCODE	HOUSING COLOR	CIRCUIT APPLICATION
Carbon Block Protector Units			
4C1C	103051470	Black	Standard
4C2C	103051488	Green	Service denied
4C3C	103051496	Red	Special
4C3C-2	104271101	Red	Special
4C4C	103051504	Yellow	PBX battery
4C12C	103290755	Gray	Continuity only (no carbon blocks)
Wide Gap Gas Tube Protector Units			
4C1E-W	104401898	Black	Standard
4C2E-W	104401906	Green	Service denied
4C3E-W	104401914	Red	Special
4C3E-2	104271093	Red	Special
4C4E-W	104401930	Yellow	PBX battery
205A Gas Tube Protector Units			
4C1F	103324034	Black	Standard
4C2F	103324059	Green	Service denied
4C3F	103324067	Red	Special
4C3F-2	104152152	Red	Special
4C4F	103324075	Yellow	PBX battery
4C11F	103324042	Orange	Minibridge lifter
Solid-State Protector Units			
4C1S	104386545	Black	Standard
4C1SC	105743124	Black	Standard
4C2S-75	105581086	Red	Special (Operates at 75 V DC)
4C33C	105775001	Red	Special

Table 11-AZ. 5-TYPE PROTECTOR UNITS — CONTINUITY ONLY — NO PROTECTION

PRODUCT CODE	COMCODE	HOUSING COLOR	CIRCUIT APPLICATION
5A1D	100828268	Gray	Standard
5A2D	100828276	Green	Service denied
5A3D	100828284	Red	Special
5A4D	100828292	Yellow	PBX battery
5A9D	102244481	White	Reverse ring and tip

11.4.4 Test Sets for Protector Units

Table 11-BA lists the test sets and their accessories that are used to test protector units.

Table 11-BA. TEST SETS FOR PROTECTOR UNITS

TEST SET CODE	COMCODE	DESCRIPTION
KS-20100 Test Set For 3-Type and 4-Type Protector Units		
KS-20100, L1	997850334	Test set, mounted on frame
KS-20100, L3	402365761	Caution label
KS-20100, L4	402635890	Test adapter used with List 5 to test 1-type protector unit.
KS-20100, L5	402632590	Test set, wall mounted, one per distributing frame or protector frame lineup.
KS-20100, L6	402635908	Conduit box for wall mounting List 5
182A Test Set For Minibridge Lifter Protector Units		
182A	103016549	Test set, housed in a conduit box for wall mounting
A4H402 Protector Breakdown Test Set		
A4H401, L1	104271911	Test set
A4H402, L2	104271929	Unit, Marker
A4H402, L4	105019194	Adapter
A4H402, L5	104292354	Adapter
A4H402, L7	105534788	Test set, -48 volt
A4H402, L8	105534796	Plate, flat wall mounting
A4H402, L9	105534325	Bracket, 90-degree

11.4.5 Wire Connection Tools

11.4.5.1 Wire Insertion Tools

The 950C (Table 11-BB) and the 756C (Table 11-BC) multipurpose wire insertion tools permit mixing high-density 112-type connecting blocks with 78-type connecting blocks on *COSMIC* DFs.

Table 11-BB. 950C QUICK-CLIP WIRE INSERTION/REMOVAL/CUTTER TOOL

TOOL CODE	COMCODE	DESCRIPTION
950C	105564835	Tool (Handle and Plastic Bit) and 5 replacement bits
950C-1	105611537	Replacement Bit, Plastic (Qty. 5)
950C-1	106435365	Replacement Bit, Plastic (Qty. 50)
950C1	106230543	Tool (Handle and Stainless Steel Bit)
950C1-1	106230568	Replacement Bit, Stainless Steel

Table 11-BC. 765C QUICK-CLIP WIRE INSERTION TOOL

TOOL CODE	COMCODE	DESCRIPTION
756C5	105564827	Tool (Handle and Plastic Bit) and 5 replacement bits
756C5-1	105611545	Replacement Bit, Plastic (Qty. 5)
756C5-1	106435182	Replacement Bit, Plastic (Qty. 50)
756C6	106230527	Tool (Handle and Stainless Steel Bit)
756C6-1	106230535	Replacement Bit, Stainless Steel

11.4.5.2 Wire Removal Tools

Table 11-BD lists the wire removal tools.

Table 11-BD. WIRE REMOVAL TOOLS

TOOL CODE	COMCODE	DESCRIPTION
980A	103809125	Wire Removal Tool (Two-Prong Fork)
KS-20827, L1	400751376	Wire Unwrapping Tool
KS-22035, L2	405423260	Spudger, Plastic With L-Shaped Wire Hook

11.4.5.3 Wire Stripping Tools

Table 11-BE lists the wire stripping tools.

Table 11-BE. WIRE STRIPPING TOOLS

TOOL CODE	COMCODE	DESCRIPTION
KS-16902, L1	996780607	Wire Stripper, Pistol Grip (22-, 24-gauge) (.6, .5 mm)
KS-20620, L1	400890596	Wire Stripper, Red (22-gauge) (.6 mm)
KS-20620, L2	400890604	Wire Stripper With Cutoff, Red (22-gauge) (.6 mm)
KS-20620, L3	400890612	Wire Stripper With Cutoff, Black (24-gauge) (.5 mm)
KS-20620, L4	400893111	Dual Wire Stripper With Cutoff, Red (20-, 22-gauge) (.8, .6 mm)
KS-20620, L5	400890547	Dual Wire Stripper With Cutoff, Red (22-, 24-gauge) (.6, .5 mm)
KS-20620, L6	400893129	Dual Wire Stripper With Cutoff, Black (24-, 26-gauge) (.5, .4 mm)
KS-20620, L7	401346291	DT-22P Wire Stripper With Cutoff, Red (22-gauge) (.6 mm)

11.4.5.4 Wire Wrapping Tools

Table 11-BF lists the wire wrapping tools.

Table 11-BF. WIRE WRAPPING TOOLS

TOOL CODE	COMCODE	DESCRIPTION
KS-16363, L3	402168090	Wire-wrapping tool, manual hand grip (22-, 24-, 26-gauge) (.6, .5, .4 mm). Uses KS-20963 sleeves and KS-16734 and KS-16903 bits.
KS-21232, L1	401849609	Electric wire-wrapping gun, pistol shaped (22-, 24-, 26-gauge) (.6, .5, .4 mm). Uses KS-20963 sleeves and KS-16734 and KS-16903 bits.
KS-16734, L1	996811378	Bit, red band (22-, 24-gauge) (.6, .5 mm). Used with KS-20963, L2 sleeve.
KS-16903, L1	400011334	Bit, green or yellow band (24-, 26-gauge) (.5, .4 mm). Used with KS-20963, L3 sleeve.
KS-20963, L2	400897781	Sleeve, Red (22-, 24-gauge) (.6, .5 mm). Used with KS-16734, L1 bit.
KS-20963, L3	400897799	Sleeve, yellow (24-, 26-gauge) (.5, .4 mm). Used with KS-16903, L1 bit.

11.4.5.5 Wire Pliers

The KS-21257 pliers (Table 11-BG) are used for cutting wire and stripping insulation on 22-gauge (.6 mm) IPVC insulated wire. They are primarily intended for preparing the ends of jumper wire prior to wire-wrapping or soldering.

Table 11-BG. KS-21257 WIRE PLIERS

TOOL CODE	COMCODE	LENGTH	DESCRIPTION
KS-21257, L1	401229448	6⅝″ (168 mm)	Plain jaws
KS-21257, L2	401229455	6⅝″ (168 mm)	Aluminum oxide coated jaws
KS-21257, L3	402048870	5¾″ (146 mm)	Plain jaws
KS-21257, L4	402048888	5¾″ (146 mm)	Aluminum oxide coated jaws

11.4.5.6 Ladders and Reels

Ladders and wire reels (Table 11-BH) are used in the daily operations of the *COSMIC* DFs.

Table 11-BH. OPERATING AIDS

ITEM CODE	COMCODE	DESCRIPTION
KS-21415, L1	401384300	Rolling Platform Ladder.
KS-21415, L2	401384318	Rolling Platform Latter — Equipped with wire reel, wire guide, and a jumper running tool.
KS-21955, L1	401977335	Wire Reel — Equipped with support arm, base, and brake assembly.
KS-21955, L9	402714687	Wire Reel — Without base, and brake assembly for use on the KS-21415, L2 rolling platform ladder.

11.4.5.7 Jumper Running Tool and Wire Clipping Bag

The jumper running tool is used to place jumper wire into frame shelves and the upper express trough and the wire clipping bag holds discarded pieces of wire (Table 11-BI).

Table 11-BI. JUMPER RUNNING TOOL AND WIRE CLIPPING BAG

ITEM CODE	COMCODE	DESCRIPTION
KS-21415, L3	401445077	Jumper Running Tool — To place jumper wire into frame shelves or the upper express trough. One is supplied with the KS-21415, L2 rolling platform ladder.
KS-20962, L2	401716006	Bag — Wire Clippings.

11.4.5.8 Cross-Connect Wire

Cross-connect wire is used to cross-connect facilities and equipment on the *COSMIC* DFs. Color code abbreviations used in the ordering tables are as follows:

BK = Black
BL = Blue
G = Green
O = Orange
R = Red
W = White
Y = Yellow.

Example:
Y/BL = Yellow with Blue marks

Recommended colors for Plain Old Telephone Service (POTS) is Y/BL and special services is Y/R.

DT-Type Tin Copper (Irradiated PVC)

The DT-type wire is unshielded and has a tinned copper conductor and irradiated polyvinyl chloride (IPVC) insulation and its overall diameter is 0.036 inches (.9 mm). It is recommended for all *COSMIC* DFs (Table 11-BJ).

Table 11-BJ. DT-TYPE CROSS-CONNECT WIRE (24-GAUGE)(.5 mm)

PRODUCT CODE	COMCODE	CONFIGURATION	INSULATION COLORS	LENGTH (FEET)	COILS PER BOX
DT 1C/24 C5000	103252599	Single	BK	5000/coil (1524 m)	6
DT 2C/24 C5000	102379195	Pair	Y/BL	5000/coil (1524 m)	3
DT 2C/24 C5000	103252573	Pair	Y/G	5000/coil (1524 m)	3
DT 2C/24 C5000	103252565	Pair	Y/O	5000/coil (1524 m)	3
DT 2C/24 C5000	103252581	Pair	Y/R	5000/coil (1524 m)	3
DT 3C/24 C3000	103252607	Triple	Y/BL/R	5000/coil (914 m)	4
DT 2/24 C2500	103252557	2 Pairs	Y/BL/R/G	2500/coil (762 m)	3

DU-Type Tinned Copper (Semirigid PVC)

The DU-type wire is unshielded and has tinned copper conductors with a single layer of semirigid PVC insulation. It is a lower cost alternative to DT-type wire (Table 11-BK).

Table 11-BK. DU-TYPE CROSS-CONNECT WIRE (24-GAUGE)(.5 mm)

PRODUCT CODE	COMCODE	CONFIGURATION	INSULATION COLORS	LENGTH (FEET)	COILS PER BOX
DU 1C/24 C5000	104234257	Single	BK	5000/coil (1524 m)	6
DU 2C/24 C5000	104234166	Pair	Y/BL	5000/coil (1524 m)	3
DU 2C/24 C5000	104234174	Pair	Y/O	5000/coil (1524 m)	3
DU 2C/24 C5000	104234182	Pair	Y/G	5000/coil (1524 m)	3
DU 2C/24 C5000	104234190	Pair	Y/R	5000/coil (1524 m)	3
DU 3C/24 C3000	104234208	Triple	Y/BL/R	3100/coil (945 m)	4
DU 4C/24 C2500	104234356	2 Pairs	Y/BL/R/G	2500/coil (762 m)	3

P6-Type (Braid Shield) and P7-Type (Foil Shield)

The P6-type wire has dual insulation of irradiated PVC over semirigid PVC, a braided shield, and a PVC jacket. Its outside diameter is 0.18 inches (4.6 m).

The P7-type wire is similar to P6-type wire but has a longitudinal polyester-aluminum foil overshield and a 24-gauge (.5 mm) drain wire. The P7-type wire is recommended because of its smaller (0.16 inches) (4 mm) outside diameter (Table 11-BL).

Table 11-BL. P6- AND P7-TYPE CROSS-CONNECT WIRE (24-GAUGE) (.5 mm)

PRODUCT CODE	COMCODE	CONFIGURATION	INSULATION COLORS	LENGTH (FEET)
P6 2C/24 R1735	844512889	Pair	R/R-G	1735/reel (529 m)
P7 2C/24 S1000	105046783	Pair	BL/W-BL	1000/spool (305 m)
P7 2C/24 S1000	105046791	Pair	R/R-G	1000/spool (305 m)
P7 2C/24 S1000	105065486	Pair	R/BK	1000/spool (305 m)

11.4.6 Maintenance Tools and Accessories

11.4.6.1 Test Connectors

Test connectors (Table 11-BM) are portable test devices that connect to the test terminal fields of connectors to test outside plant cable pairs. Test cords are ordered separately.

Table 11-BM. TEST CONNECTORS

CONNECTOR CODE	COMCODE	AT SPEC	ASSOCIATED CONNECTORS	QTY. PAIRS IN TEST FIELD	CABLE PAIR TESTING
299A Test Adapter	103065819	None	307	100	Multiple pair or single-pair using pick test panel. Can be used with or without protector units.
299B Test Adapter	105053862	None	307	100	Multiple pair or single-pair using pick test panel. Used with protector units fully inserted or in detent position.
C-4920	401887252	None	302 A4, B4, E3	50	Multiple pair.
C-4930	401489133	None	302 A1, B1, B3, E1	50	Multiple pair.
D Test	400129359	AT-8265	302 A1, B1, B3, E1	50	Single-pair.
G Test	400318689	AT-8353	302 A4, B4, E3	50	Single-pair.
P Test	402222715	AT-8906	308	100	Multiple pair.
R Test	402352579	AT-8916	308	100	Single-pair.
U Test	403031784	AT-9007	309	100	Multiple pair or single-pair using pick test panel. Can be used with or without protector units.

11.4.6.2 Extension Cords for Test Connectors

Extension cords (Table 11-BN) may be used to extend the test connector cords.

Table 11-BN. EXTENSION CORDS FOR TEST CONNECTORS

CORD NUMBER	COMCODE	FOR USE WITH TEST CONNECTOR	DESCRIPTION
P100A	102268349	299A, 299B, C4920, C4930, P, U	Extension Cord—30-Feet (9 m) Long
P100B	102268356		Extension Cord—50-Feet (15 m) Long

11.4.6.3 Test Cords and Plugs Used with 307-, 308-, 309-, and 302-Type Connectors

Test cords and plugs (Table 11-BO) are used with connectors/protectors and their associated test connectors for testing purposes.

Table 11-BO. TEST CORDS AND PLUGS USED WITH 307-, 308-, 309-, AND 302-TYPE CONNECTORS

TEST CORD	COMCODE	CONNECTOR TYPE	FUNCTION
P2DB	101433852	307, 309	Connect KS-14103 breakdown test set via vacant protector unit socket. Used with W2GD or W2GM.
P2EF	102808581	308, 302	Individual pair bridged access via connector test points. Equipped with alligator clips.
P2FL	103105268	307, 309	Individual pair bridged access via test points of 3C- or 4C-type protector units. Equipped with alligator clips.
W2GC	102959088	308, 302	Access outside plant pair via vacant protector unit socket. Equipped with alligator clips.
W2GD	101636959	308, 302	Connect KS-14103 breakdown test set via vacant protector unit socket. Used with P2DB.
W2GL	101945590	307, 309	Access outside plant pair via vacant protector unit socket. Equipped with alligator clips.
W2GM	102490935	307, 309	Connect KS-14103 breakdown test set via vacant protector unit socket. Used with P2DB.
W2GY	102563988	78- and 112-type connecting blocks	Service Observing. Equipped with miniature single plug.
W2FH	101616399	308, 302	Test outside plant pair via pick test panel. Equipped with alligator clips.
W2HA	102567286	308, 302 307, 309	Bridge on outside plant pair via a "pick panel" to various test equipment via frame-mounted jack. Equipped with miniature duplex plug.
W2HJ	102997822 9 ft. (2743 mm) 102915477 10 ft. (3048 mm) 103002713 12 ft. (3658 mm) 102867165 16 ft. (4877 mm)	302, 307, 308, 309	Individual pair test access via a vacant protector unit socket for conductor ID tone testing. Equipped with miniature single plug.
W2HN	103850913	307, 309	Individual pair test via test points of 3C- or 4C-type protector units. Equipped with miniature plug.
W4CP	102564002	308, 302	Access outside plant/central office pairs via a vacant protector unit socket for in and out test. Equipped with miniature duplex plug.
W4CR	102567302	308, 302	Access outside plant pair via vacant protector unit socket for making Varley measurements. Equipped with miniature duplex plug.
W4CT	102653508	307, 309	Access outside plant/central office pairs via a vacant protector unit socket for in and out test. Equipped with miniature duplex plug.
W4CU	102655305	307, 309	Access outside plant pair via vacant protector unit socket for making Varley measurements. Equipped with miniature duplex plug.

11.4.6.4 Warning Marker, Guard, Indicators, and Insulators

Table 11-BP lists the warning marker, guard, indicators, and insulators and their associated connectors and connecting blocks.

Table 11-BP. WARNING MARKER, GUARD, INDICATORS, AND INSULATORS

ITEM	COMCODE	ASSOCIATED CONNECTORS	ASSOCIATED CONNECTING BLOCKS
Warning Marker			
E Sign	400359196	307, 308, 309, 302	—
Guard			
KS-19478, L1	997161617	308, 302	—
Indicators			
KS-16847, L1	997726088	307, 309	78, 112
Insulators			
KS-16604, L2*	400809042	309	112
D Clip (AT-8301)†	400152013	—	78
J Clip (AT-8993)†	402946313	—	112

* For Wire-Wrap Terminals
† For Quick-Clip Terminals.

11.4.6.5 Block Removal Tools

Block removal tools (Table 11-BQ) are used to remove and service connecting blocks for maintenance purposes.

Table 11-BQ. BLOCK REMOVAL TOOLS

TOOL CODE	COMCODE	DESCRIPTION
KS-21345, L2	403205008	Removal Tool — To unseat the 78- and 112-type connecting blocks from *COSMIC* I, IA, and IIA DFs.
KS-22616, L1	402757173	Removal Tool — To unseat the 112-type connecting blocks from *COSMIC* Mini DFs or from *COSMIC* I DFs with shelf adapters.

11.4.6.6 Connector Panel Removal Tool and Service Bracket

The connector panel removal tool and service bracket (Table 11-BR) are used to remove and service 307-type connectors for maintenance purposes.

Table 11-BR. CONNECTOR PANEL REMOVAL TOOL AND SERVICE BRACKET

TOOL CODE	COMCODE	DESCRIPTION
KS-22271, L1	402470553	Removal Tool — To unseat the protector panel of 307-type connectors from *COSMIC* IIA or *COSMIC* Mini DFs or AT-9049 protector frames.
KS-22325, L1	402446504	Service Bracket — To hold the protector panel of the 307-type connector away from the *COSMIC* IIA, Mini DFs or AT-9049 protector frames for installation or maintenance procedures.

11.4.6.7 Connector Presser and Removal Tools

The connector presser and remover tools (Table 11-BS) connect or remove the 710-type connector bridge module to or from the splice module.

Table 11-BS. CONNECTOR PRESSER AND REMOVAL TOOLS

TOOL CODE	COMCODE	DESCRIPTION
AT-8948L	402490064	Connector Presser Tool — To connect the 710-type connector bridge module to the 710-type connector splice module on the 307-type connector.
AT-8927C	402321590	Bridge Module Remover Tool — To disconnect the 710-type connector bridge module from the splice module.

11.4.7 Splicing Connectors

11.4.7.1 710-Type Connector

The 710-type connector (Table 11-BT) is used to join air core or waterproof, PIC and pulp, or paper-insulated conductors in underground, buried, or aerial applications.

Table 11-BT. 710-TYPE CONNECTOR SPECIFICATIONS AND ORDERING INFORMATION

Product Code	Application	Contact Plating/ Filled	Qty Per Box	Insulation	Connector	No. of Pairs	Color	Comcode
Copper or Aluminum 17-24 AWG (1.1 — .5 mm)								
710-SAL- 5	Splice	Indium Plated	25	PIC*	Encapsulated	5	Green w/blue index strip	103262192
710-TAL- 5	Half-Tap	Indium Plated	25	PIC*	Encapsulated	5	Green w/blue index strip	103262200
710-BAL- 5	Bridge§	Indium Plated	25	PIC*	Encapsulated	5	Green	103262184
Copper 22-26 AWG (.6 — .4 mm)								
710-SC1- 5	Splice	Solder Plated	25	PIC*	Encapsulated	5	Green	103262168
710-TC1- 5	Half-Tap	Solder Plated	25	PIC*	Encapsulated	5	Green	103262176
710-BC1- 5	Bridge§	Solder Plated	25	PIC*	Encapsulated	5	Green	103262150
710-SD1- 5	Splice or Half-Tap	Solder Plated	25	Pulp† PVC‡	Dry	5	Gray	103316972
710-BD1- 5	Bridge§	Solder Plated	25	Pulp† PVC‡	Dry	5	Gray	103316964
710-SB1-10	Splice or Half-Tap	Solder Plated	25	Pulp	Dry	10	Green	104440268
710-BB1-10	Bridge	Solder Plated	25	Pulp	Dry	10	Green	104440227
710-SC1-10	Splice	Solder Plated	25	PIC	Encapsulated	10	Green	104440284
710-BC1-10	Bridge§	Solder Plated	25	PIC	Encapsulated	10	Green	104440235
710-SD1-10	Splice or Half-Tap	Solder Plated	25	Pulp PVC	Dry	10	Gray	104440292
710-BD1-10	Bridge	Solder Plated	25	Pulp PVC	Dry	10	Gray	104440243
710-TC1-10	Half-Tap	Solder Plated	25	PIC	Encapsulated	10	Green	104440318
Copper 19-24 AWG (.9 — .5 mm)								
710-SBL-10	Splice or Half-Tap	Solder Plated	25	Pulp	Dry	10	Green	104440250
710-SCL-10	Splice	Solder Plated	25	PIC	Encapsulated	10	Green	104440276
710-TCL-10	Half-Tap	Solder Plated	25	PIC	Encapsulated	10	Green	104440300
710-SCL-25	Splice	Solder Plated	24	PIC*	Encapsulated	25	Green w/blue index strip	103628418
710-TCL-25	Half-Tap	Solder Plated	24	PIC*	Encapsulated	25	Green w/blue index strip	103628426
710-BC1-25	Bridge§	Solder Plated	24	PIC*	Encapsulated	25	Green	103062709

See footnotes at end of table.

Table 11-BT. 710-TYPE CONNECTOR SPECIFICATIONS AND ORDERING INFORMATION (Contd)

Product Code	Application	Contact Plating/ Filled	Qty Per Box	Insulation	Connector	No. of Pairs	Color	Comcode
Copper 22-26 AWG (.6 — .4 mm)								
710-SC1-25	Splice	Solder Plated	24	PIC*	Encapsulated	25	Green	103062717
710-TC1-25	Half-Tap	Solder Plated	24	PIC*	Encapsulated	25	Green	103062725
710-BC1-25	Bridge§	Solder Plated	24	PIC*	Encapsulated	25	Green	103062709
710-SB1-25	Splice or Half-Tap	Solder Plated	24	Pulp†	Dry	25	Green	103257523
710-BB1-25	Bridge§	Solder Plated	24	Pulp†	Dry	25	Green	103257515
710-SD1-25	Splice or Half-Tap	Solder Plated	24	PVC‡	Dry	25	Gray	103274577
710-BD1-25	Bridge§	Solder Plated	24	PVC‡	Dry	25	Gray	103274569
Copper 22-28 AWG (.6 — .3 mm)								
710-SCF-25	Splice	Solder Plated	24	PIC*	Encapsulated	25	Yellow	104394531
710-SDF-25	Splice or Half-Tap	Solder Plated	24	PVC‡	Dry	25	Yellow	104394549
710-BCF-25	Bridge	Solder Plated	25	PIC	Encapsulated	25	Yellow	104394515
710-BDF-25	Bridge	Solder Plated	25	PVC	Dry	25	Yellow	104394523
710-TCF-25	Half-Tap	Solder Plated	25	PIC	Encapsulated	25	Yellow	104394556

* 19-gauge (.9 mm) water-resistant DEPIC and air-core high-density polyethylene insulated conductors are acceptable with the 710 Connector System.

19-gauge (.9 mm) water-resistant cable with solid polypropylene or high-density polyethylene insulated conductors is not recommended for use with the 710 Connector System.

† An F Spec code is available on a nonstock basis for 19-gauge (.9 mm) pulp application.

‡ PVC, a flame-retardant insulating material, is used in buildings and central offices.

§ Bridge connectors can accommodate 17- through 24-gauge (1.1—.5 mm) aluminum conductors and 19- through 26-gauge (.9—.4 mm) copper conductors.

11.4.7.2 711-Type Connector

The 711-type connector (Tables 11-BU and 11-BV) may be used in the central office for mass termination of cable-to-cable and equipment-to-cable wiring.

Table 11-BU. 711-TYPE CONNECTOR SPECIFICATIONS AND ORDERING INFORMATION (MAJOR ASSEMBLIES)

Application	Product Code	Description	Comcode
12-Pair Splice Module	711CA1-24	Connector Module	103046231
25-Pair Splice Module	711CA1-50	Connector Module	103046264
32-Pair Splice Module	711CA1-64	Connector Module	103046272
12-Pair Receptacle Assembly (Gray Mandrels) for 22-AWG (.6 mm) BU, BW, DEPIC, 24-AWG (.5 mm) BU, BW and ABMM	711RAB1-24	Receptacle	103043972
12-Pair Receptacle Assembly (White Mandrels) for 26-AWG (.4 mm) BY and D Inside Wire	711RAD1-24	Receptacle	103044079
25-Pair Receptacle Assembly (Yellow Mandrels) for 22-AWG (.6 mm) BU, BW, ABAM and DEPIC	711RAA1-50	Receptacle	103043949
25-Pair Receptacle Assembly (Gray Mandrels) for 24-AWG (.5 mm) BU, BW and ABMM	711RAB1-50	Receptacle	103043998
25-Pair Receptacle Assembly (Pink Mandrels) for 24-AWG (.5 mm) BU and D Inside Wire	711RAC1-50	Receptacle	103044046
25-Pair Receptacle Assembly (White Mandrels) for 26-AWG (.4 mm) BY and D Inside Wire	711RAD1-50	Receptacle	103044095
32-Pair Receptacle Assembly (Yellow Mandrels) for 22-AWG (.6 mm) BU, BW, ABAM and DEPIC	711RAA1-64	Receptacle	103043956
32-Pair Receptacle Assembly (Gray Mandrels) for 24-AWG (.5 mm) BU, BW and ABMM	711RAB1-64	Receptacle	103044004
32-Pair Receptacle Assembly (White Mandrels) for 26-AWG (.4 mm) BY and D Inside Wire	711RAD1-64	Receptacle	103044103
32-Pair Receptacle Assembly (Blue Mandrels) for 1249 Cable	711RAE1-64	Receptacle	104432893

Table 11-BV. 711-TYPE CONNECTOR SPECIFICATIONS AND ORDERING INFORMATION (LOOSE PARTS)

Application	Product Code	Description	Comcode
12-Pair Receptacle Housing (No Mandrel)	711RA1-24	Housing	103043865
25-Pair Receptacle Housing (No Mandrel)	711RA1-50	Housing	103043881
32-Pair Receptacle Housing (No Mandrel)	711RA1-64	Housing	103043899
25-Pair Mandrel for 22-AWG (.6 mm) BU, BW, ABAM and DEPIC (Yellow)	711MA1-50	Mandrel	103043576
32-Pair Mandrel for 22-AWG (.6 mm) BU, BW, ABAM and DEPIC (Yellow)	711MA1-64	Mandrel	103043584
12-Pair Mandrel for 22-AWG (.6 mm) BU, DEPIC, 24-AWG (.5 mm) BU, BW and ABMM (Gray)	711MB1-24	Mandrel	103043626
25-Pair Mandrel for 22-AWG (.6 mm) BU, DEPIC, 24-AWG (.5 mm) BU, BW and ABMM (Gray)	711MB1-50	Mandrel	103043659
32-Pair Mandrel for 22-AWG (.6 mm) BU, DEPIC, 24-AWG (.5 mm) BU, BW and ABMM (Gray)	711MB1-64	Mandrel	103043667
25-Pair Mandrel for 24-AWG (.5 mm) BU, BW, ABMM and D Inside Wire (Pink)	711MC1-50	Mandrel	103043733
12-Pair Mandrel for 26-AWG (.4 mm) BY and D Inside Wire (White)	711MD1-24	Mandrel	103043782
25-Pair Mandrel for 26-AWG (.4 mm) BY and D Inside Wire (White)	711MD1-50	Mandrel	103043816
32-Pair Mandrel for 26-AWG (.4 mm) BY and D Inside Wire (White)	711MD1-64	Mandrel	103043824
32-Pair Mandrel for 26-AWG (.4 mm) 1249 Cable (Blue)	711ME1-64	Mandrel	104432302
12-Pair Panel Mounting Clip	711A1-24	Clip	103222162
25-Pair Panel Mounting Clip	711A1-50	Clip	103222170
32-Pair Panel Mounting Clip	711A1-64	Clip	103222188

11.5 Replacement Parts

11.5.1 Shelf Wire Retainers

Table 11-BW lists the ordering information for Shelf Wire Retainers.

Table 11-BW. SHELF WIRE RETAINERS

COMCODE	SHELF	*COSMIC* FRAME
845980499	Upper	*COSMIC* I DF
845980507	Lower	
842388670	Upper	*COSMIC* IA/IIA DF
846562353	Lower	
824874432	—	*COSMIC* Mini DF

11.5.2 Frame Designation Label Covers

Table 11-BX lists the ordering information for Frame Designation Label Covers.

Table 11-BX. FRAME DESIGNATION LABEL COVERS

CODE	COMCODE	*COSMIC* FRAME
KS-21528,L1	403851595	*COSMIC* I, IA, IIA, Mini DF

11.6 Mechanized Engineering and Layout for Distributing Frames (MELD)

MELD is an AT&T engineering system for laying out *COSMIC* DFs. The outputs from MELD are:

- Wire Center Frames Directories
- Framework Job Drawings
- Framework Directories
- Termination Directories
- Cable Location Directories
- Frame Labels
- Operations Support System (OSS) tape.

Detailed information about the use of MELD outputs and the MELD Engineering Summary Questionnaire E-1896A is provided in Section 7 of this manual. The E-1896A questionnaire can be obtained from:

AT&T Account Executives

or

AT&T Network Systems Region Engineers

or

AT&T Customer Information Center
P.O. Box 19901
Indianapolis, Indiana 46219
Attn: WEPM Stock Maintenance
Telephone (317) 352-8552

The MELD Tape Output Specification, which describes the tape format, can be obtained from:

Mr. S. Cranston
AT&T
Operations Systems Technical Center (OSTC)
184 Liberty Corner Road
P.O. Box 4908
Warren, NJ 07060-0908
Telephone: (201) 580-4949

11.7 Computerized Frame Administration System (CFAS)

The CFAS is an automatic frame management system and provides the following:

- Automatic inventory control of exchange facilities replacing manual record keeping.
- Preferential assignment of facilities to eliminate long jumpers that congest frames.
- Proper load balance on the exchange switch that improves subscriber service.
- Fast, reliable information to administer main distributing frames that speeds service order processing and tracking.
- Data conversion and inventory management recovers equipment "lost" in inaccurate paper records.
- Data base updating from MELD tapes speeds operation.

Detailed information about the use of CFAS outputs is provided in Section 9 of this manual. For further information please contact:

Mr. R. E. Silva
AT&T
184 Liberty Corner Road
P.O. Box 4908
Warren, NJ 07060-0908
Telephone: (201) 580-5342

APPENDIX 11-A

Hardware Ordering Questionnaire — E Form 8203
For *COSMIC* Distributing Frame Systems

COSMIC® Distributing Frame Systems

Hardware Ordering Questionnaire

E Form 8203
Issue 4

TABLE OF CONTENTS

1. ABOUT THIS DOCUMENT

1.1 Purpose

This questionnaire is intended to be submitted to AT&T Network Systems to convey information about the COSMIC Distributing Frame (DF) framework and the associated apparatus, tools, and wire that are to be supplied to the office.

1.2 Reason for Reissue

Improvements made with this issue include:

- Use of terminology and definitions that are consistent with the new system reference guide.[1]
- Updated ordering information for COSMIC framework groups.
- Information on new products, including wire insertion tool bits that are available in quantities of five or fifty, the 407-type non-protected connector, the UL-listed 307-type protected connector, new operations decals, and several new protector unit codes.
- Reorganized and updated information on test cords and test/talk circuit arrangements.

Whenever a new issue of this questionnaire is produced, the entire document will be reissued.

1.3 Scope

This document is used to specify ordering quantities for the following items:

- COSMIC-type frameworks, including:
  - — COSMIC I, COSMIC IA, COSMIC IIA, and COSMIC II Mini Framework Systems.
  - — Modular Protector Frames.
- Associated framework accessories, such as end guards, "walk-through" modules, filler panels, and designation strips.
- Tools, cords, and wire.
- Plug-in protector units.
- Miniature test/talk systems.
- The CFAS System.

It is assumed that the reader is familiar with the COSMIC Distributing Frame systems. See section 11 for a complete list of references.

1.4 Format

Most of the sections in this questionnaire consist of a description portion on the left-hand page and an order entry section on the adjacent right-hand page. Simply fill in the quantity of each item desired, or in some cases circle the appropriate response, and send the completed form to your AT&T Regional Engineering Center. Feel free to write in any special instructions or questions you may have anywhere on the page, and we will contact you.

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1. *COSMIC Distributing Frame Systems — Planning, Engineering, Installation and Operation — System Reference Guide*, AT&T 201-200-150, planned for release in April, 1991.

1.5 Planning and Engineering COSMIC Distributing Frame Systems

The COSMIC DF Systems offer a wide range of alternative configurations and arrangements. Modular frame configurations have traditionally been applied as Subscriber Main Distributing Frames (SMDFs), Tie Pair DFs, Trunk MDFs, and Combined MDFs. More recent developments include:

- Growable frame arrangements.
- "Custom" COSMIC DFs, providing virtually unlimited flexibility to match the particular mix of facilities and equipment in an office.
- Two-stage frame systems.
- "Flexible" frame systems, in which facilities and equipment are terminated in the same modules.
- Multiple-lineup frames using direct tie circuits between lineups in place of the traditional Tie Pair Distributing Frame to minimize the overall cost of the MDF system.

The COSMIC DF arrangements described in this document provide only a glimpse of the many varied arrangements that are possible, and are not meant to preclude other possible arrangements. The modular designs of the COSMIC-type DFs allow virtually unlimited variations of frame arrangements and applications. A recent Customer Information Release describes some of these alternative arrangements.[2]

AT&T offers engineering and consultation services to assist in the preparation of your MDF plan, and to help devise the most efficient, least cost system that will satisfy your office requirements for many years into the future. Contact your account representative or Regional Engineering Center for more information.

1.6 Frame Administration

A frame administration operations support system (OSS) is recommended to administer the assignment of short cross-connect jumpers on modular frame systems. AT&T's CFAS (Computerized Frame Administration System) is a total frame management system for administering your MDF. It provides the following benefits:

- Automatic inventory control of exchange facilities, replacing manual record keeping.
- Preferential (short jumper) assignment of facilities to minimize long jumpers.
- Proper load balancing of the exchange switch.
- Fast, reliable information to administer MDFs and speed service order processing and tracking.
- Data conversion and inventory management that can recover equipment "lost" in inaccurate paper records.
- Database updating from the MELD tape to speed implementation.

For more information contact your AT&T Network Systems Account Representative, or one of the Field Support Groups listed at the end of this section.

1.7 Order Processing

A floor plan for the office showing the layout of the COSMIC-type DF should be submitted to AT&T Network Systems with this order. The floor plan should indicate outside plant splice locations so that proper stub cable lengths can be determined.

A companion document, called the E Form 8196A MELD Engineering Summary Questionnaire, should also be submitted to provide information on the circuits that are to be terminated on the COSMIC MDF.[3] MELD (Mechanized Engineering and Layout for Distributing Frames) is used by AT&T to engineer

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2. *COSMIC Distributing Frame Systems, Enhancements and Growth Methods*, AT&T 201-099-023TD, November, 1990.
3. For MDFs that are to be engineered using the older PACE system, use the E Form 8113B Questionnaire.

termination layouts of COSMIC frame systems. MELD spreads and inventories outside plant cable, tie pairs, and line equipment. It produces the frame record drawings, termination directories, frame labels, and a tape for updating the circuit location database of Operation Support Systems. It also calculates the number and types of the various terminating apparatus needed (78- and/or 112-type connecting blocks, 302-, 307-, or 308-type connectors, and 11-type stub cables). The use of MELD is highly recommended for all COSMIC I, IA, and IIA frame installations.

1.8 How to Order This Document

Copies of this form may be obtained as follows:

AT&T Customer Information Center
Attention: Order Entry Center
P.O. Box 19901
Indianapolis, IN 46219

Toll-free telephone number: 1-800-432-6600.

Specify that you want E Form 8203.

1.9 Additional Product Information

For more information on the COSMIC Distributing Frame Systems, or other AT&T cross-connect frame system products, contact your AT&T Network Systems Sales Representative. Questions may also be directed to one of the following Regional Field Support Organizations:

Atlanta, GA	404-447-3142
Cockeysville, MD	301-584-4365
Omaha, NE	402-691-4840
Phoenix, AZ	602-233-5833

2. OFFICE AND ENGINEER DATA

Please complete all applicable entries. The "Customer Order Number" is the requesting company's order identification, and is requested for tracking purposes. The "Engineer" is the principal customer representative for this job.

Date: ______________________________

Customer Order Number: ______________________________

Office Name: ______________________________

Address: ______________________________

Associated floor plan drawing identifying name and/or number: ______________

Engineer ______________________________

Address: ______________________________

____

Telephone: ______________________________

Please write in any special instructions and/or additional information, such as references to other orders, special equipment to be provided, critical dates, other engineering contacts, etc.:

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3. FRAME HARDWARE

3.1 COSMIC I, IA, and IIA Frameworks

This section is used to convey information to AT&T Network Systems about the types and number of the various MDF lineups to be supplied.

AT&T offers consultation services to help develop an optimal modular DF arrangement. It is suggested that the COSMIC frame arrangement be reviewed with AT&T as early in the planning process as possible, particularly with respect to the placement of walk-through frameworks and half-modules in COSMIC Custom MDFs.

Table 1 lists the various framework bays and vertical troughs that are available. Complete descriptions of this hardware is provided in the *Distributing Frame Systems Products Manual.*

TABLE 1. COSMIC Frame Hardware

Frame Type	Framework Description	Dimensions Height	Width	Depth	Capacity	Ordering Code
COSMIC I	Cross-Connect Bay. Mounts 78- or 112-type blocks	8'-0" (2438 mm)	2'-9" (838 mm)	1'-6" (457 mm)	5,000 facility pairs (on 100-pair blocks), or 6,400 equipment pairs (on 128-pair blocks)	ED-6C001-30, Group 5
	Vertical Wiring Trough	8'-0" (2438 mm)	1'-0" (305 mm)	1'-6" (457 mm)	N/A	ED-6C001-30, Group 6
COSMIC IA/IIA	Cross-Connect Bay. Mounts 78- or 112-type blocks	8'-2" (2489 mm)	2'-9" (838 mm)	2'-3" (686 mm)	6,000 facility pairs (on 100-pair blocks), or 6,400 equipment pairs (on 128-pair blocks)	ED-6C141-30, Group 4
	Cross-Connect/Protection Bay. Mounts 307- and 407-type connectors, and 78- and 112-type blocks. Used only with COSMIC IIA frames	8'-2" (2489 mm)	2'-9" (838 mm)	2'-3" (686 mm)	5,100 facility pairs (protected)	ED-6C141-30, Group 8
	Vertical Wiring Trough	8'-2" (2489) mm	1'-0" (305 mm)	2'-3" (686 mm)	N/A	ED-6C141-30, Group 9

In earlier documentation references were made to a variety of framework groups that were pre-engineered combinations of bays and vertical troughs. Typical ordering groups included 10'-3" long "Custom" and 13'-0" long "traditional" arrangements. Most of these groups have been eliminated in favor of ordering by individual bays and vertical troughs, to give more flexibility in the engineering of both frame additions and new frame systems.

Submit one completed Section 3.1 for each frame complex. For offices with multiple frame complexes (for example, a SMDF, TMDF, and SDDF all in one building), submit as many copies of Section 3.1 as required.

A. Enter the application of the frame complex. Typical applications include:

- **SMDF** (Subscriber Main Distributing Frame) — terminates and cross-connects line equipment, outside plant cable pairs, and tie pairs to other DFs in the office.
- **TMDF** (Trunk Main Distributing Frame) — provides terminations of miscellaneous, trunk, and toll equipment and facilities.
- **CMDF** (Combined Main Distributing Frame) — combines the SMDF and TMDF functions into one frame.
- **SDDF** (Subscriber Digital Distributing Frame) — terminates outside plant cables dedicated to T-carrier circuits, T-carrier equipment (for example, Office Repeater Bays and Digital Loop Carrier systems), and tie cables to other DFs.
- **MEDF** (Miscellaneous Equipment Distributing Frame) — usually used in conjunction with a two-stage frame system, the MEDF is similar to a TMDF.

Also enter the frame complex's name and/or number, as shown on the floor plans.

B. Indicate whether this is a new COSMIC frame complex, or growth of an existing frame.

C. Indicate the framework type, configuration, and number of lineups in the frame complex. Also complete one line of information for each lineup. Possible configurations include:

- A "traditional" modular arrangement of alternating, equal-sized, facility and equipment modules arranged in one or more lineups. Indicate the framework type to be used (COSMIC I, COSMIC IA, or COSMIC IIA frames), the number of lineups, and the number of modules in each lineup. Do not include the TPDF, which is defined below.
- A "custom" arrangement of alternating facility and equipment modules, but where some (or all) of the equipment modules are half size. This arrangement is useful for balancing the frame termination space available with the actual facility and equipment termination needs of the office. Indicate the framework type to be used (COSMIC I, COSMIC IA, or COSMIC IIA frames), the number of lineups, and the number of modules in each lineup. Also indicate which of the equipment modules is to be half-sized. Do not include the TPDF, which is defined below.
- A "two-stage" arrangement, in which facilities are terminated on one (or more) lineups and equipment circuits are terminated on different lineups. Be sure to indicate what the various lineups are called in this arrangement — for example, lineups may be designated as an SFDF (Subscriber Facility DF), as an LEDF (Line Equipment DF), or an MEDF (Miscellaneous Equipment DF). Also indicate the type of framework to be used for each lineup (COSMIC I, COSMIC IA, or COSMIC IIA frames), the number of lineups of each type, and the number of modules in each lineup.

D. Enter the number of Walk-Through Framework Groups needed for the frame complex. This framework group adds 5'-4" to the length of a module, and may be placed in any full-sized equipment module. Indicate each module that will have a Walk-Through module installed in it (use more lines if necessary).

E. Indicate whether end guards shall be provided. COSMIC IA/IIA frames use ED-6C142-30, Group 1, and COSMIC I frames use ED-6C004-70, Group 3.

3.1 COSMIC I, IA, or IIA Distributing Frame Arrangement

3.1A Frame complex application (SMDF, TMDF, etc.) ________________
Name ________________ Number ________________

3.1B This is an (initial, growth of an existing) COSMIC installation.

3.1C Frame Arrangement:
Framework Type (COSMIC I, IA, or IIA): ____________
Configuration ("Traditional," Custom, 2-Stage): ________________
Number of Lineups _______
Complete one line for each frame lineup:

Lineup Number	Number of Modules	Starting Module Number	Ending Module Number	Half-Sized Equipment Module Numbers
1	__________	______________	______________	________________
2	__________	______________	______________	________________
3	__________	______________	______________	________________
4	__________	______________	______________	________________

3.1D Number of Walk-Through Framework Groups: __________
COSMIC IA/IIA frames use ED-6C142-30, Group 2
COSMIC I frames use ED-6C107-70, Group 1

Locate Walk-Through frameworks within the following modules:
Lineup Number: _____ Modules: ________________________
Lineup Number: _____ Modules: ________________________
Lineup Number: _____ Modules: ________________________
Lineup Number: _____ Modules: ________________________

3.1E End Guards (shall, shall not) be supplied.

3.2 Tie Pair Distributing Frame

A. If there will be a Tie Pair Distributing Frame (TPDF) associated with the frame complex, enter the TPDF name and number.

B. Enter the framework type to be used for the TPDF (COSMIC I or COSMIC IA frame), and number of modules.

3.3 Protector Frames

A. For complexes using the COSMIC I or COSMIC IA type frameworks, a separate protector frame is typically required to terminate and protect outside plant cable pairs. Enter the type of protector frame to be used, the number of verticals that are already installed and available, and the number of new verticals to be added. Typical PF types are:

- ED-97898-31 PF: each framework group is 6'-6" (1981 mm) long, and consists of twelve verticals that can terminate up to 9600 pairs on ninety-six 308-type connectors.
- ED-1A220-31 PF: each framework group is 6'-6" (1981 mm) long, and consists of twelve verticals that can terminate up to 6000 pairs on sixty 302-type connectors.
- ED-97755-72 Low Profile Double-Sided Protector Frame (LPDPF): typically used with conventional-type distributing frames, the LPDPF is an open ironwork style of frame that can terminate up to 1,000 pairs per vertical on 302-type connectors, or 1,600 pairs per vertical on 308-type connectors. It is ordered in 6-vertical increments.
- AT-9049 Protector and Cable Enclosure: splices and protects up to 900 cable pairs in a vertical that is 75 inches (1905 mm) high by 10 inches (254 mm) wide by 9.12 (232 mm) inches deep. It is intended for applications in structures with limited floor space such as vaults, huts, and CDOs. It also serves well as a separate protector frame for large applications of COSMIC Mini frames.

B. Indicate whether end guards shall be provided for the protector frame. Modular Protector Frames use ED-1A198-71.

C. Indicate any special instructions regarding outside plant connectors. For example, it may be desired to reuse existing outside plant connectors on an old DF.

3.2 Tie Pair Distributing Frame

3.2A TPDF Name ____________________ Number ____________________

3.2B Type of TPDF framework (COSMIC I or COSMIC IA): ______ Number of TPDF modules: ________

3.3 Protector Frames

3.3A Number of Modular Protector Framework Groups:

ED-97898-31: Verticals available:____ New Verticals needed:_____
ED-1A220-31: Verticals available:____ New Verticals needed:_____
ED-97755-72: Verticals available:____ New Verticals needed:_____
AT-9049: Verticals available:____ New Verticals needed: _____

3.3B End Guards (shall, shall not) be supplied.

3.3C Special instructions:

3.4 COSMIC II Mini DF Framework Groups

A. Enter the COSMIC II Mini DF name and number as it appears on the office floor plans.

B. Enter the number of COSMIC II Mini Framework Bays required for the CMDF. Each bay is 7'-0" (2134 mm) high and 1'-3" (381 mm) deep.

   a. ED-6C311-30 Group 4 — this framework group consists of a cross-connect and protection bay. It is 1'-2" (356 mm) wide, and can mount up to ten 307-type connectors and their associated 112-type connecting blocks. It is usually used as a facility module, for the termination of outside plant cables.

   b. ED-6C311-30 Group 5 — this framework group consists of a cross-connect bay. It is 1'-2" (356 mm) wide, and can mount up to twenty 112-type connecting blocks. It is usually used as an equipment module, for the termination of switching and/otr transmission equipment cables. It may also be used as a facility module in conjunction with a separate protector frame, such as the AT-9049 frame (see Section 3.3).

C. Indicate whether the vertical wiring troughs that are usually placed between facility and equipment modules are to be 5" (127 mm) wide (ED-6C311-30 Group 3) or 9" (229 mm) wide (ED-6C311-30 Group 6).

D. The COSMIC Mini DF framework groups are equipped with a lower express trough for running long jumpers past intermediate bays. An optional upper express trough is available that doubles the long jumper capacity of the frame. Indicate whether the frame shall be equipped with the upper express trough.

E. Indicate whether end guards shall be provided. COSMIC II Mini frames use ED-6C314-70, Group 4.

F. Indicate any special instructions regarding the COSMIC Mini frame.

3.4 COSMIC II Mini DF Framework Groups

3.4A Complex Name ________________ Number ________________

3.4B Number of COSMIC II Mini Framework Groups

a. Facility Bays ED-6C311-30 Group 4: __________

b. Equipment Bays ED-6C311-30 Group 5: __________

3.4C Width of vertical wiring trough to be supplied:

5" (ED-6C311-30, Group 3) _____ or 9" (ED-6C311-30, Group 6) _______.

3.4D Upper express troughs (shall, shall not) be provided.

ED-6C314-70, Group 10 (basic trough)

ED-6C314-70, Group 11 (spans 5" vertical trough)

3.4E End Guards (shall, shall not) be supplied.

3.4F Special instructions:

3.5 Framework Accessories

Indicate whether each of the following accessories shall be supplied.

A. Filler panels (recommended for covering vacant connecting block positions).
ED-6C142-30, Group 16 (yellow, for shelves 2-10 of equipment modules)
ED-6C142-30, Group 17 (blue, for shelves 2-10 of facility modules)
ED-6C142-30, Group 18 (white for shelves 1 and 11 of equipment and facility modules)

B. Designation fanning strips (recommended on each shelf to help retain jumpers and provide lead designations).
ED-6C142-30, Group 23 for shelves 1 and 11 (stamped T and R)
ED-6C142-30, Group 24 for shelves 2-10 (stamped T and R)
ED-6C142-30, Group 25 for SMAS 5A/5B on shelves 2-10 (stamped TA, RA, TB, and RB)
ED-6C142-30, Group 26 for shelves 2-10 (blank)

C. Designation strips (recommended for labeling trunk, toll, and miscellaneous circuits).
For COSMIC IA/IIA frames:
ED-6C142-30, Group 8 for shelves 2-10
ED-6C142-30, Group 9 for shelf 5 equipped with test/talk panel(s)
ED-6C142-30, Group 10 for shelf 1
ED-6C142-30, Group 11 for shelf 11
For COSMIC II Mini frames:
ED-6C314-70, Group 7

D. Cable location directory holders — The ED-6C142-30, Group 14 holder is used to mount the outside plant cable location directories supplied by MELD (or PACE) on the rear of the COSMIC II or COSMIC IIA frame.

E. Enter the number of frame operations decals needed. The ED-6C129-50, Group 4 decal describes the tools and procedures for placing, removing, and tracing cross-connects. The Group 5 decal describes frame operations for the protector side of the COSMIC IIA frame.

These decals should be mounted on the end guards of the frame lineups or on the inside surface of a walk-through module.

F. Floor trim.

G. Cable racking: Shall AT&T supply cable racking for the DF?

H. Lighting: Shall AT&T provide a lighting system for the DF?

I. AC outlets are an option on the back of the COSMIC IA, COSMIC Custom IA, COSMIC IIA, and COSMIC Custom IIA frameworks. They may be placed in 6'6" or 13'-0" intervals or in custom arrangements. For COSMIC I, IA, or IIA DFs, and for the 13'-0" long COSMIC IA/IIA Custom DF framework groups, indicate whether AC outlets will be placed at 6'-6" or 13'-0" increments, or in some other arrangement. For 10'-3" long COSMIC IA/IIA Custom DF framework groups, indicate whether one or two AC outlets will be placed in each framework group.

J. Special Instructions: list other frame accessories to be supplied, or any special instructions with respect to the cabling methods, cable rack arrangements, lighting, or grounding methods to be used.

3.5 Framework Accessories

3.5A Filler panels (shall, shall not) be provided.

3.5B Designation fanning strips (shall, shall not) be provided.

3.5C Designation strips (shall, shall not) be provided.

3.5D Cable location directory holders (shall, shall not) be provided (for COSMIC IIA frames only).

3.5E Number of Operations Decals to be provided:
ED-6C129-50, Group 4: ____________
ED-6C129-50, Group 5: ____________

3.5F Floor Trim (shall, shall not) be provided.
ED-6C142-30, Group 15

3.5G Cable Racking (shall, shall not) be provided.

3.5H Lighting (shall, shall not) be provided.

3.5I AC Outlets (shall, shall not) be provided.
For "traditional" COSMIC-type frames, locate outlets (every 6'-6", every 13'-0").
For COSMIC IA/IIA Custom DFs using 10'-3" long framework groups, locate (one, two) outlet(s) per 10'-3".

3.5J Other Accessories, and any special instructions on cabling, racking, lighting or grounding:

____

____

____

____

4. CONNECTING BLOCKS AND ACCESSORIES

A. Place a check mark next to the appropriate style of connecting block to be provided. The 112-type connecting blocks are available equipped with either Insulation-Displacing Clips (IDCs) or wire-wrap jumper terminals, and have a blue checker-board pattern. The older 78-type connecting blocks are equipped with an earlier IDC design and have a red checker-board pattern. With the availability of the new 756- and 950-type wire insertion tools, which use a common insertion bit for both types of blocks, frames already equipped with the older 78-type blocks may have new 112-type connecting blocks added.

B. Indicate whether the connecting blocks shall be standard density or high density. The standard density blocks are 6.4 inches (163 mm) long, and up to five may be mounted on each bay shelf. The high-density blocks are 5.3 inches long (134 mm), and up to six may be mounted per bay shelf. Special high-density tie blocks are also available with non-bifurcated cross-connect terminals (either IDC or wire-wrap) that can terminate up to 200 pairs per block.

C. Indicate whether the connecting blocks shall be connectorized, and if so whether the blocks shall be equipped with AT&T 711-type connectors or miniature-ribbon connectors.

D. For COSMIC IIA and COSMIC Mini frames, indicate whether the 307-type protected connectors shall be the standard central office version, or a new UL-listed version. The new UL-listed version will be available in the first quarter of 1991. The 307LD2-100 connector will offer the features of the standard 307D2-100 central office connector, but with the added benefit of being listed by UL. It comes factory-wired with a 26-gauge, 100-pair stub, and is intended primarily for applications on customer premises.

E. If the COSMIC frame will be used to terminate voice-frequency derived pair circuits of Digital Loop Carrier systems, indicate whether these circuits are to be terminated on connecting blocks, standard protected 307-type connectors (pseudo-connectors), or the newer 407-type non-protected connectors.

F. Indicate whether AT&T Network Systems will install the initial cross-connect jumpers on the MDF. If AT&T is to do this work, jumper lists will have to be provided to AT&T.

G. Indicate the types an numbers of special service insulators desired.

- The KS-16604, List 2 Insulator is single-lead insulator for use with 112-type connecting blocks equipped with wire-wrap terminals only.
- The D-clip insulator is for use with 78-type connecting blocks. It insulates a pair-at-a-time.
- The J-clip insulator is for use with 112-type connecting blocks equipped with IDCs. It insulates a pair-at-a-time.

H. Special service guards are used on connectors to prevent service interruptions, equipment damage, and personal injury. The KS-19478, List 1 guard covers the recessed tip and ring terminals associated with special service circuits on the test terminal field of a 302- or 308-type connector. It prevents accidental contact with the test terminal.

I. The particular codes quantities of 78- or 112-type connecting blocks that are supplied are dependent on the types of circuits that are to be terminated on the MDF. AT&T will determine these codes from the information that is usually supplied as part of the *MELD Engineering Summary Questionnaire*, E Form 8196A. However, if any particular codes of 78- or 112-type connecting blocks are desired, indicate so here.

4. CONNECTING BLOCKS AND ACCESSORIES

4.A The frame shall be equipped with:
112-type blocks with IDCs ____
112-type blocks with (single, bifurcated) wire-wrap terminals_____
78-type blocks with IDCs ____

4.B Provide (standard density, high-density) connecting blocks.

4.C Connecting blocks (shall, shall not) be connectorized.
Connectorized blocks shall be equipped with (711-type, miniature-ribbon) connectors.

4.D For COSMIC IIA and COSMIC Mini Frames, 307-type protected connectors shall be;
Standard central office version ______
UL-listed version ______

4.E Digital Loop Carrier derived voice-frequency circuits shall be terminated on (check one):
112-type connecting blocks _____
307-type protected connectors _____
407-type non-protected connectors _____

4.F Cross-connect jumpers (shall, shall not) be installed by AT&T Network Systems.

4.G Insulators:
Number of KS-16604, L2 Insulators (400809042) ___________
Number of D Clips, AT-8301 (400152013) __________
Number of J Clips, AT-8993 (402946313) __________

4.H Number of KS-19478 Guards (997161617) ____________

4.I Specific codes of connecting blocks desired:

5. TOOLS, PLATFORMS, CORDS, TEST EQUIPMENT, AND WIRE

5.1 Tools and Platforms

A. Enter the number of 950-type multi-purpose tools needed. These tools are a combination jumper wire insertion tool, wire removal tool, and wire cutter tool. The 950C tool is supplied with a disposable plastic tool bit that can be used with either 112- or 78-type blocks, and a bag of five replacement bits. Additional replacement tool bits are ordered as 950C-1 bits, and are packaged either five or fifty per bag. The 950C1 tool has a stainless steel bit. Replacement steel bits are available as 950C1-1 bits.

B. Enter the number of 756C-type wire insertion tools needed. The 756C5 tool is supplied with a disposable plastic tool bit that can be used with either 112- or 78-type blocks, and a bag of five replacement bits. Additional replacement tool bits are ordered as 756C5-1 bits, and are packaged either five or fifty per bag. The 756C6 tool has a stainless steel bit. Replacement steel bits are available as 756C6-1 bits.

C. Enter the number of 980A jumper wire removal tools needed. This tool is not needed if 950-type multi-purpose tools are used.

D. Enter the number of KS-21345, L2 Connecting Block Removal Tools needed. These tools are used to unseat the connecting blocks from the COSMIC I, COSMIC IA and the COSMIC IIA MDF. They are not used with the COSMIC II Mini DF (see item I below). Two tools per frame system are recommended.

E. Enter the number of KS-22271,L1 Connector Panel Removal Tools needed. These tools are used to unseat the protector panel of the 307-type connector from the COSMIC IIA or COSMIC II Mini DF. They are not used with COSMIC I and IA SMDFs. Two tools per frame system are recommended.

F. Enter the number of KS-22325,L1 Service Brackets required to support the protector panel of the 307-type connectors during installation or maintenance procedures on the COSMIC IIA and COSMIC II Mini DF Systems. They are not used with the COSMIC I and IA SMDFs. Two brackets per frame system are recommended.

G. Enter the number of KS-21415 Rolling Work Platforms needed. Recommended:

   a. One List 1 (basic ladder only) per 10 modules.

   b. One List 2 (ladder equipped with wire reel assembly and jumper running tool) per 10 modules.

H. Enter the number of free-standing KS-21955, L1 Wire Reels needed. One per lineup is recommended.

I. Enter the number of KS-21415, L3 jumper running tools needed. This is an oak tool with V-notches at each end to guide the jumper wire into the upper express trough. One jumper running tool is supplied as part of the KS-21415 List 2 Ladder.

J. Enter the number of KS-22616, L1 connecting block removal tools needed. These tools are used to remove the connecting blocks from the COSMIC II Mini DF or COSMIC I or COSMIC II frames with shelf adapters.

K. Enter the number of AT-8948L Connector-Presser tools needed. These tools are used to connect the 710-type connector bridge module (supplied as part of the 11-type stub cable) to the 710-type connector splice module on the 307-type connector.

L. Enter the number of AT-8927C Bridge Removal Tools needed. These tools are used to disconnect the 710-type connector bridge module from the splice module.

M. Enter the number of 710 Connector System Tools needed. The 890E tool is a manually-operated tool used for assembling 25-pair 710-type connectors. It tool is wired for use with a pair verification test set. The 890B tool is similar to the 890E tool, except that the test feature has been omitted. See Section 8.1 for information on tool support kits used when working with these tools on a Cable Rearrangement Facility (CRF).

5.1 Tools and Platforms

5.1A Number of Multi-purpose Tools:

950C Multipurpose Tool with Plastic Bit (105564835): ____________
950C-1 Tool Spare Parts (Qty 5) (105611537): ____________
950C-1 Tool Spare Parts (Qty 50) (106435365): ____________
950C1 Multipurpose Tool with Metal Bit (106230543): ____________
950C1-1 Replacement Metal Bit (Qty 1) (106230568): ____________

5.1B Number of Wire Insertion Tools:

756C5 Tool with Plastic Bit (105564827): ____________
756C5-1 Tool Spare Parts (Qty 5) (105611545): ____________
756C5-1 Tool Spare Parts (Qty 50) (106435182): ____________
756C6 Tool with Metal Bit (106230527): ____________
756C6-1 Replacement Metal Bit (Qty 1) (106230535): ____________

5.1C Number of Wire Removal Tools

980A (103809125): ____________

5.1D Number of Connecting Block Removal Tools

KS-21345, L2 (403205008): ____________

5.1E Number of Connector Panel Removal Tools

KS-22271, L1 (402470553): ____________

5.1F Number of Service Brackets

KS-22325, L1 (402446504): ____________

5.1G Number of Rolling Work Platforms

KS-21415, L1 (401384300): ____________
KS-21415, L2 (401384318): ____________

5.1H Number of Wire Reels

KS-21955, L1 (401977335): ____________

5.1I Number of Jumper Running Tools

KS-21415, L3 (401445077): ____________

5.1J Number of Connecting Block Removal Tools

KS-22616, L1 (402757173): ____________

5.1K Number of AT-8948L Connector Presser Tools

(402490064): ____________

5.1L Number of AT-8927 Bridge Removal Tools

(402321590): ____________

5.1M Number of 890E Tools (104430319): ____________
Number of 890B Tools (105229777): ____________

5.2 Test Cords

Enter the number of each type of test cord needed. See the "Distributing Frame Systems Products Manual" for complete descriptions of each of these cords.

Test cord used with 302-, 307-, and 308-type connectors.

A. W2HJ — used to patch conductor identification tone to an outside plant pair via a vacant protector unit position. Equipped with a bantam plug.

B. P2DB — used in series with a W2GM or W2GD cord to connect a KS-14103 breakdown test set to a cable pair at a vacant protector unit position.

C. W2FH — used to access an individual pair through a pick test panel (i.e. an R Test Connector). This cord is equipped with alligator clips.

D. W2HA and W2FM — Individual pair test access through a pick test panel. The W2HA is equipped with a miniature bantam plug, and the W2FM is equipped with a full-size plug.

Test Cords for use with 307-type connectors only (COSMIC IIA and/or COSMIC II Mini DFs):

E. P2FL — Used to test a single pair or short tip and/or ring through the 4C-type protector units. Equipped with alligator clips. May be ordered individually or in packages of twenty.

F. W2GL — Used to access an unprotected outside plant pair via a vacant protector unit position. Equipped with alligator clips.

G. W2GM — Used in series with a P2DB cord to connect a KS-14103 breakdown test set to an outside plant cable pair at a vacant protector unit position.

H. W4CT and W4CJ — Used for making in-and-out tests on 307-type connectors via a vacant protector unit position. The W4CT is equipped with a miniature bantam plug, and the W4CJ is equipped with a full-size plug.

I. W4CU and W4CM — Used in making manual and automatic Varley measurements on 307-type Connectors. The W4CU is equipped with a miniature bantam plug, and the W4CM is equipped with a full-size plug.

Test cords for use with 302- and 308-type connectors (modular protector frames):

J. P2EF — used to test a single pair or short tip and/or ring through the test field of a 302- or 308-type connector. Equipped with alligator clips.

K. W2GC — used to access an outside plant pair via a vacant protector unit position on 302- and 308-type Connectors. Equipped with alligator clips.

L. W2GD — used in series with a P2DB cord to connect the KS-14103 Breakdown Test Set to an outside plant cable pair at a vacant protector unit position on 302- or 308-type Connectors.

M. W4CP and W4BR — Used for making in-and-out tests on 302- and 308-type connectors via a vacant protector unit position. The W4CP is equipped with a miniature bantam plug, and the W4BR is equipped with a full-size plug.

N. W4CR and W4CL — Used in making manual and automatic Varley tests on 302- and 308-type connectors. The W4CR is equipped with a miniature bantam plug, and the W4CL is equipped with a full-size plug.

Test cord for Service Observing on the rear of 78- or 112-type connecting blocks:

O. W2GY — used for interconnecting a switching system line equipment appearances to a service observing jack appearance on the rear of the COSMIC I, COSMIC IA and COSMIC IIA DF.

5.2 Test Cords

Test cords used with 302-, 307-, and 308-type connectors.

5.2A Number of W2HJ Test Cords

9' length (102997822): ____________

10' length (102915477): ____________

12' length (103002713): ____________

16' length (103867165): ____________

5.2B Number of P2DB Test Cords (101433852): ____________

5.2C Number of W2FH Test Cords (101616399): ____________

5.2D Number of W2HA Test Cords (102567286): ____________

Number of W2FM Test cords (101616449): ____________

Test Cords for use with 307-type connectors only (COSMIC IIA and/or COSMIC II Mini DFs):

5.2E Number of P2FL Test Cords

Package of one (103105276): ____________

Package of twenty (103105268): ____________

5.2F Number of W2GL Test Cords (101945590): ____________

5.2G Number of W2GM Test Cords (102490935): ____________

5.2H Number of W4CT Test Cords (102653508): ____________

Number of W4CJ Test Cords (101898633): ____________

5.2I Number of W4CU Test Cords (102655305): ____________

Number of W4CM Test Cords (101981603): ____________

Test cords for use with 302- and 308-type connectors (modular protector frames):

5.2J Number of P2EF Test Cords (102808581): ____________

5.2K Number of W2GC Test Cords (102959088): ____________

5.2L Number of W2GD Test Cords (101636959): ____________

5.2M Number of W4CP Test Cords (102564002): ____________

Number of W4BR Test cords (102530821): ____________

5.2N Number of W4CR Test Cords (102567302): ____________

Number of W4CL Test cords (101981611): ____________

Test cord for Service Observing on the rear of 78- or 112-type connecting blocks:

5.2O Number of W2GY Test Cords (102563988): ____________

5.3 Test Equipment

Enter the quantities of test equipment needed.

A. 299A Test Adapter — used to test 100-pairs of outside plant terminations on 307-type connectors. Used on COSMIC IIA, COSMIC Custom IIA, and COSMIC II Mini DFs.

B. 299B Test Adapter — this adapter is similar to the 299A, except that the test shoe may be mounted on a 307-type connector with some or all of the protector units in the detent position. It also allows individual protector units to be moved from the detent position to the in-service position, or vice-versa, while the test adapter is in place. This may be useful during cable throw operations involving special service circuits.

C. P Test Connector — for use with 308-type connectors. Equipped with two 50-pair test cords.

D. R Test Connector — provides pair-at-a-time test access of 308-type connectors.

E. D Test Connector — provides pair-at-a-time test access on the 302-type connector.

F. 182A Mini-Bridge Lifter Test Set — Used for testing 4-type mini-bridge lifter protector units on COSMIC IIA frame systems.

G. KS-20100 Test Set — Used for testing 3- and 4-type protector units. The List 1 test set is mounted directly in a modular protector frame, and List 5 is a conduit-type mounting. List 6 is a conduit box for wall mounting the List 5 set.

H. A4H402, List 1 Protector Test Set — used to verify the voltage limiting capability of carbon block and gas tube protector units. The List 7 set is a –48 volt version that may be wall or rack mounted. List 8 is a bracket for mounting the set against a wall, and List 9 is a bracket for mounting the set 90° from the wall.

I. KS-21387 Patch Cord — adapter cord used to interconnect a cord equipped with standard three conductor plugs to a miniature jack.

J. KS-21386, List 1 Plug Adapter — 4-conductor adapter cord used to interconnect cords equipped with dual standard plugs type) to paired miniature jacks.

K. KS-21348 Jack Adapter — test pin jack adapter permits access to voltage supply pin jacks (-48V, +24V, Ground, and High-Resistance to Ground) by test cords equipped with alligator clips.

5.3 Test Equipment

5.3A Number of 299A Test Adapter (103065819): ____________

5.3B Number of 299B Test Adapter (105053862): ____________

5.3C Number of P Test Connectors AT-8906 (402222715): ____________

5.3D Number of R Test Connectors AT-8916 (402352579): ____________

5.3E Number of D Test Connectors AT-8265 (400129359): ____________

5.3F Number of 182A mini-Bridge Lifter Test Sets (103016549): ____________

5.3G Number of KS-20100 Test Sets
L1 (997850334): ____________
L5 (402632590): ____________
L6 (402635908): ____________

5.3H Number of A4H402 Protector Breakdown Test Sets
L1 (104271911): ____________
L7 (105534788): ____________
L8 (105534796): ____________
L9 (105534325): ____________

5.3I Number of KS-21387 Test Set Patch Cords (401272794): ____________

5.3J Number of KS-21386, L1 Plug Adapter (401272646): ____________

5.3K Number of KS-21348 Jack Adapter (401311121) ____________

5.4 Cross-Connect Wire

Recommended colors: for POTS (Plain Old Telephone Service) use Y/BL, for special services use Y/R.*

A. Enter the number of boxes of 24-gauge, unshielded DT-type wire. DT wire has a tinned-copper conductor and irradiated poly-vinyl chloride (IPVC) insulation, and its overall diameter is 0.036 inches. It is recommended for all COSMIC-type frames.

Product Code	Configuration	Insulation Colors	Length (Feet)	Coils per Box	Comcode
DT 1C/24 C5000	Single	BK	5,000/coil	6	103252599
DT 2C/24 C5000	Pair	Y/BL	5000/coil	3	102379195
DT 2C/24 C5000	Pair	Y/G	5000/coil	3	103252573
DT 2C/24 C5000	Pair	Y/O	5000/coil	3	103252565
DT 2C/24 C5000	Pair	Y/R	5000/coil	3	103252581
DT 3C/24 C3000	Triple	Y/BL/R	3000/coil	4	103252607
DT 2/24 C2500	2 Pairs	Y/BL/R/G	2500/coil	3	103252557

B. Enter the number of boxes of 24-gauge, unshielded DU-type wire. DU-type wire with semirigid PVC insulation is a lower cost alternative to DT-type wire.

Product Code	Configuration	Insulation Colors	Length (Feet)	Coils per Box	Comcode
DU 1C/24 C5000	Single	BK	5000/coil	6	104234257
DU 2C/24 C5000	Pair	Y/BL	5000/coil	3	104234166
DU 2C/24 C5000	Pair	Y/O	5000/coil	3	104234174
DU 2C/24 C5000	Pair	Y/G	5000/coil	3	104234182
DU 2C/24 C5000	Pair	Y/R	5000/coil	3	104234190
DU 3C/24 C3000	Triple	Y/BL/R	3100/coil	4	104234208
DU 4C/24 C2500	Quad	Y/BL/R/G	2500/coil	3	104234356

C. Enter the number of boxes of 24-gauge, shielded P6- or P7-type wire. Shielded wire is used for carrier system connections. P6-type wire has dual insulation of irradiated PVC over semirigid PVC, a braided shield, and a PVC jacket. Its outside diameter is 0.18 inches. P7-type wire is similar but has a longitudinal polyester-aluminum foil overshield and a 24-gauge drain wire. The P7-type wire is recommended because of its smaller outside diameter (0.16 inches).

Product Code	Configuration	Insulation Colors	Length (Feet)	Comcode
P6 2C/24 R1735	Pair	R/R-G	1735/reel	844512889
P7 2C/24 S1000	Pair	BL/W-BL	1000/spool	105046783
P7 2C/24 S1000	Pair	R/R-G	1000/spool	105046791
P7 2C/24 S1000	Pair	R/BK	1000/spool	105065486

* Color code abbreviations are as follows: BK - Black; BL - Blue; G - Green; O - Orange; R - Red; W - White; Y - Yellow.

5.4 Cross-Connect Wire.

5.4A 24-gauge unshielded DT-type jumper wire.

CODE	COMCODE	NUMBER OF BOXES
DT 1C/24 C5000 (BK)	103252599	
DT 2C/24 C5000 (Y/BL)	102379195	
DT 2C/24 C5000 (Y/G)	103252573	
DT 2C/24 C5000 (Y/O)	103252565	
DT 2C/24 C5000 (Y/R)	103252581	
DT 3C/24 C3000 (Y/BL/R)	103252607	
DT 2/24 C2500 (Y/BL/R/G)	103252557	

5.4B 24-gauge unshielded DU-type jumper wire.

CODE	COMCODE	NUMBER OF BOXES
DU 1C/24 C5000 (BK)	104234257	
DU 2C/24 C5000 (Y/BL)	104234166	
DU 2C/24 C5000 (Y/O)	104234174	
DU 2C/24 C5000 (Y/GR)	104234182	
DU 2C/24 C5000 (Y/R)	104234190	
DU 3C/24 C3100 (Y/BL/R)	104234208	
DU 4C/24 C2500 (Y/BL/R/G)	104234356	

5.4C 24-gauge shielded P6- or P7-type jumper wire.

CODE	COMCODE	NUMBER OF BOXES
P6 2C/24 R1735 (R/R-G)	844512889	
P7 2C/24 S1000 (BL/W-BL)	105046783	
P7 2C/24 S1000 (R/R-G)	105046791	
P7 2C/24 S1000 (R/BK)	105065486	

6. PLUG-IN PROTECTOR UNITS

This section is used to order the protector units that can be used with COSMIC-type framework systems. There are three families of plug-in protectors:

- 3-Type — for voltage protection only.
- 4-Type — includes heat coils for sneak current protection, and devices for over-voltage protection. The 4C-type protector units have integral test lands, and are designed to be used specifically with 307-type Connectors.
- 5-Type — "dummy" units that provide continuity only, used where protection is not required.

Over-voltage protection is provided by one of the following technologies:

Carbon Blocks. Over-voltage protection in carbon block protector units (3B-A, 4B-C, and 4C-C types) is provided by a 3-mil air gap. These units typically operate at about 500 volts. If the current flowing across the air gap is large enough or persists for an appreciable time (as in sustained power cross faults) the protector unit's thermal overload mechanism will operate and the unit will become permanently grounded, fail safe.

Gas Tubes. The general purpose gas tube plug-in protector units (3BE-W, 4BE-W, 4CE-W types) offer longer service life, reduced maintenance, and more predictable overvoltage protection performance. These units are equipped with 331A-RL wide-gap technology gas tubes, designed to operate at 350 V DC.

For applications that require tighter DC breakdown voltage protection, such as the 5ESS® switch, the 4B-F or 4C-F plug-in protectors are needed. These units are equipped with narrow-gap 205A gas tubes which typically operate at 240 V DC.

Solid-State Devices. AT&T's new family of SSP (Solid-State Protector) units provide a premium alternative to both carbon block and gas tube protector units. Fast turn-on voltage limiting is independent of rate-of-rise and number of operations. As a result, the failure rates of both protection and the surge-sensitive equipment are significantly reduced.

Two types of solid-state protectors are available. Codes ending in the letter "S" are balanced (that is both tip and ring become grounded simultaneously) while codes ending in the letters "SC" are unbalanced, although the pair is still protected within a narrow voltage range.

Protector Unit Coding Scheme. Protector units are coded "*wxyz*," where:

w denotes the protector type:
3-Type — voltage protection only
4-Type — Voltage and sneak current
5-Type — Continuity only, no protection

x denotes the housing type:
A or B — Without test access
C — With test access

y denotes the color and application:
1 — Black — Standard service
2 — Green — Service denial
3 — Red — Special service
4 — Yellow — PBX Battery feed
9 — White — Tip/ring reversal
11 — Orange — Mini-Bridge lifter
12 — Gray — Continuity only, no protection

z denotes the voltage limiter type:
A or C — Carbon Blocks
E — General purpose gas tubes
E-R — REA approved gas tubes
E-W — General purpose gas tubes (wide gap)
F — Gas tubes for 5ESS® switch applications
S or SC — General purpose solid-state
FS — Solid-state for 5ESS® switch applications

6.1 3-Type — Voltage Protector Units

Used on 302- and 308-type Connectors. All of these codes are UL-listed.

Circuit Application	Housing Color	3B_A Carbon Blocks Code	3B_E-W Wide-Gap Gas Tubes Code	3C_E-W Wide-Gap Gas Tubes Code	3B_E-R REA-Approved Code	3C-S Solid-state Balanced Code	3C-SC Solid-State Code
Standard Circuit	Black	3B1A	3B1E-W	3C1E-W	3B1E-R	3C1S	3C1SC
Service Denied	Green	3B2A	3B2E-W	-	-	-	-
Special Circuit	Red	3B3A	3B3E-W	3C3E-W	3B3E-R	3C3S	3C3SC
PBX Battery	Yellow	3B4A	3B4E-W	-	-	-	-
1A Sensor e/w Resistor	Green	3B13A	-	-	-	-	-

6.1 3-Type — Voltage Protector Units

CODE	COMCODE	NUMBER
3B1A	102381779	____________
3B2A	102381787	____________
3B3A	102381795	____________
3B4A	102381803	____________
3B13A	103157228	____________
3B1E-R	105494248	____________
3B3E-R	105449255	____________
3B1E-W	104410147	____________
3B2E-W	104410154	____________
3B3E-W	105499255	____________
3B4E-W	104410170	____________
3C1E-W	104410188	____________
3C3E-W	104410196	____________
3C1S	105514756	____________
3C1SC	106021066	____________
3C3S	105695969	____________
3C3SC	106021074	____________

6.2 4B-Type — Voltage and Sneak Current Protector Units

These protectors provide both voltage and sneak current protection. They are used on 302- and 308-type Connectors. All of these codes are UL listed.

Circuit Application	Housing Color	4B_C Carbon Blocks Code	4B_E-W Wide Gap Gas Tubes Code	4B_F 205A Gas Tubes Code
Standard Circuit	Black	4B1C	4B1E-W	4B1F
Service Denied	Green	4B2C	4B2E-W	4B2F
Special Circuit	Red	4B3C	4B3E-W	4B3F
PBX Battery	Yellow	4B4C	4B4E-W	4B4F
Tip & Ring Reversal	White	4B9C	-	4B9F
Mini-Bridge Lifter	Orange	4B11C	-	4B11F
Continuity Only	Grey	4B12C	-	-

6.2 4B-Type — Voltage and Sneak Current Protector Units

CODE	COMCODE	NUMBER
4B1C	102904893	
4B2C	102904901	
4B3C	102904919	
4B4C	102904927	
4B12C	103626016	
4B1E-W	104401856	
4B2E-W	104401864	
4B3E-W	104401872	
4B4E-W	104401880	
4B1F	103550992	
4B2F	103551016	
4B3F	103551024	
4B4F	103551032	
4B9F	103551040	
4B11F	103551008	

6.3 4C-Type — Voltage and Sneak Current Protector Units

These protector units provide both voltage and sneak current protection. They have integral test lands, and are designed specifically for use on 307-type Connectors (i.e. on COSMIC IIA, COSMIC Custom IIA, and COSMIC II Mini DFs), although they may also be used with 302- and 308-type connectors. All of these codes are UL listed.

Circuit Application	Housing Color	4C_C Carbon Blocks Code	4C_E-W Wide Gap Gas Tubes Code	4C_F 205A Gas Tubes Code	4C_S Solid-State Balanced Code	4C-SC Solid-State Code
Standard Circuit	Black	4C1C	4C1E-W	4C1F	4C1S 4C1FS	4C1SC
Service Denied	Green	4C2C	4C2E-W	4C2F	-	-
Special Circuit	Red	4C3C	4C3E-W	4C3F	4C3S 4C3FS 4C3S-75*	4C3SC
PBX Battery	Yellow	4C4C	4C4E-W	4C4F	-	-
Tip & Ring Reversal	White	-	-	4C9F	-	-
Mini-Bridge Lifter	Orange	-	-	4C11F	-	-

*The 4C3S-75 unit is designed to operate at 75 V DC and is intended for non-ringing circuits.

The 4C12C unit provides continuity only — between the outside plant and central office terminals of the connector. Like the other 4C-type units, it also has test access holes.

6.3 4C-Type — Voltage and Sneak Current Protector Units

CODE	COMCODE	NUMBER
4C1C	103051470	
4C2C	103051488	
4C3C	103051496	
4C4C	103051504	
4C1E-W	104401898	
4C2E-W	104401906	
4C3E-W	104401914	
4C4E-W	104401930	
4C1F	103324034	
4C2F	103324059	
4C3F	104271101	
4C4F	103324075	
4C9F	103324083	
4C11F	103324042	
4C1S	104386545	
4C1SC	105743124	
4C1FS	105605620	
4C3S	105605596	
4C3S-75	105581086	
4C3SC	105775001	
4C3FS	105605646	
4C12C	103290755	

6.4 5-Type — No Protection — Continuity Only

These protector units provide continuity between the outside plant and central office terminals of the connector. They do not provide any electrical protection. They are used on 302- and 308-type Connectors (the 4C12C is recommended for use with 307-type connectors).

Circuit Application	Housing Color	5A_D Continuity Only Code
Standard Circuit	Grey	5A1D
Service Denied	Green	5A2D
Special Circuit	Red	5A3D
PBX Battery	Yellow	5A4D
Tip & Ring Reversal	White	5A9D

6.4 5-Type — No Protection — Continuity Only

CODE	COMCODE	NUMBER
5A1D	100828268	______________
5A2D	100828276	______________
5A3D	100828284	______________
5A4D	100828292	______________
5A9D	102234481	______________

7. MINIATURE TEST/TALK SYSTEMS AND CIRCUITS

7.1 Miniature Test/Talk System

The COSMIC-type DFs are all arranged for miniature jacks. All new conventional type DFs should be arranged with miniature jacks, whereas older existing conventional DFs may have either miniature or standard jacks. For each other conventional type DF in the building, indicate whether it is equipped with miniature or standard jacks.

7.1 Miniature Test/Talk System

Conventional Distributing Frame(s) on the same floor (will, will not) be arranged for miniature jacks.

Conventional Distributing Frame(s) on other floors (will, will not) be arranged for miniature jacks.

7.2 Talk Circuits

Indicate the number of each type of circuit desired in the "ADD'L" (Additional) column. For additions to existing frames, also indicate the number of existing circuits in the column marked "CURRENT."

A. Local Frame Talk Line — SD-2P011-01

Purpose: Private communication link using headsets between two areas of the COSMIC frame system. Optional lamps indicate occupied channels.

Recommended number of channels (maximum of 3 channels/unit):

- Single lineup frame: one channel recommended.
- Frames with two or more lineups: two channels are recommended, and a third channel is optional.

B. Interframe Loudspeaker and Talk Line Circuit — SD-2P012-01

Purpose: Provides for communication between personnel located at two frames spaced far apart, where access to a paging loudspeaker is desired. Typical applications are for communication between COSMIC MDF and a conventional MDF, between COSMIC I MDF and the associated protector frame, or between two COSMIC MDF lineups on different floors. One frame attendant activates the paging loudspeaker by plugging into a headset into a jack at one frame location. When the responding frame attendant plugs a headset into a jack at the other frame location, the loudspeaker is disconnected and a private talking path is established between the two headsets. Optional lamps indicate occupied channels.

The circuit is arranged for one loudspeaker channel and up to three headset channels. If the COSMIC frame is a single lineup which shares a common working aisle directly facing a single-sided protector frame, no channels may be necessary. Otherwise, a minimum of one channel, up to a maximum of three channels, are recommended.

C. Local Test Desk to Frame Talk Line — SD-2P013-01

Purpose: Provides a communication link using headsets between jacks located on the frame and the local test desk (LTD). Optional indicator lamps at the frame can be used to signal the craft from the LTD. The lamp goes out once a headset is patched into the circuit at the MDF.

The configuration of the electronics that provides this circuit depends on whether the LTD is in the same building as the DF (that is the LTD and MDF are interconnected via a "short" loop of less than 50 ohms) or in a different building (interconnected via a "long" loop, between 50 and 1,600 ohms).

The number of channels required is determined by office testing activity.

With the evolution away from LTDs to Maintenance Centers, this circuit has generally been replaced by circuits using dial-up lines (for example, the Frame Maintenance Telephone Line, described next).

7.2 Talk Circuits

	CURRENT	ADD'L
7.2A Local Frame Talk Line — SD-2P011-01. (With, Without) Indicator Lamps. Number of channels required:		
Frame ______________.	______	______
Frame ______________.	______	______
7.2B Interframe Loudspeaker and Talk Line — SD-2P012-01. (With, Without) Indicator Lamps. Number of channels required.	______	______

List frames assigned to "FRAME AREA A":

____.

List frames assigned to "FRAME AREA B":

____.

	CURRENT	ADD'L
7.2C Local Test Desk Frame Line — SD-2P013-01. (With, Without) Indicator Lamps. Number of channels required:		
• Cross-connect side of Frame.	______	______
• Protector side of Frame.	______	______

Local test desk is located in (same, different) building as frames.

D. Frame Maintenance Telephone Line — SD-2P014-01

Purpose: Provides access to a key telephone system via headset jacks at the MDF, for private communications between frame attendants and people outside the central office (such as installers or splicers). The outside person reaches this line by dialing an official number that has appearances in jacks on the distributing frame. Frame attendants use headsets to communicate on this channel. The circuit is equipped with a hold switch and an indicator lamp that flashes to signal an incoming call.

Generally two circuits are recommended. More than two circuits may be appropriate if there is frequent loop plant rearrangement activity requiring coordination between outside plant and central office personnel.

E. Remote Testing Loudspeaker and Talk Line — SD-97559-01

Purpose: A communication system between a remote Maintenance Center and the frame area. It uses the overhead loudspeakers for the Maintenance Center to talk to the frame attendant, and transmitters with push-to-talk buttons in frame-mounted panels for the frame attendant to talk back to the Maintenance Center. The circuit can also be provided with frame-mounted jacks for private channel communications using a headset. The communication link between the Maintenance Center and the central office can be either a dedicated facility or a dial-up telephone line.

One channel is recommended.

F. MDF Loudspeaker and Transmitter Circuit — SD-96471-01

Purpose: Provides communication between a LTD and the frame area via loudspeaker and transmitter. The circuit is similar to the Remote Testing Loudspeaker and Talk Line described above, except is used when the LTD is located in the same building as the DF. Telephone companies that have Maintenance Centers will typically use the Remote Testing Loudspeaker and Talk Line instead of this circuit.

Number of circuits: One channel is suggested.

7.2 Talk Circuits (continued)

	CURRENT	*ADD'L*
7.2D Frame Maintenance Telephone Line — SD-2P014-01. (With, Without) Hold Key. (With, Without) 48V Indicator Lamp. Number of channels required:		
• Cross-connect side of Frame ______________.	________	______
• Protector side of Frame ______________.	________	______
7.2E Remote Testing Loudspeaker and Talk Line — SD-97559-01. Number of channels required:	________	______
7.2F MDF Transmitter and Loudspeaker Circuit — SD-96471-01. For each circuit, list the frames on that circuit:	________	______

Circuit 1 — Frames

____.

Circuit 2 — Frames

____.

7.3 Test Circuits

A. In-and-Out Test Trunks are recommended for all offices. The number of circuits recommended depends on the size of the office as follows:

Office Size: Number of Lines	Recommended Number of In-and-Out Trunks
<10,000	1
10,000 - 30,000	2
30,000 - 60,000	3
>60,000	4

B. The Conductor Tone Identification Circuit is a relay-rack mounted unit that is cabled to jacks on the MDF to provide tone for outside plant maintenance and testing. It eliminates the need for portable tone generators. The circuit provides a 577 Hz tone, warbled between 2 and 7 Hz, with two jack appearances: one is a high-level tone at +6 dBm, and the other is a low-level tone at 0 dBm (1 mW). The frame attendant uses a W2HJ patch cord to inject the tone onto the outside plant pair under test. One circuit is recommended.

C. **Older Test Circuits:** Several older types of circuits are described here. These circuits are generally only needed for additions to existing frames.

The Loop Testing Frame Circuit (SD-2P033-01) — MDF Test Jacks circuit is wired like an in-and-out test trunk to provide access of the Automated Repair Service Bureau to outside plant pairs under test. This circuit was used with the MLT-1 system to access outside plant pairs via two subscriber line appearances. Modern MLT-2 systems use the In-and-Out Test Trunk described above.

Service Observing/Service Evaluation Circuits monitor switching equipment, typically for traffic studies. The W2GY test cord is used to connect service observing jacks on the rear of the DF to the wire-wrap posts on the rear of the 78- or 112-type connecting blocks terminating the switching equipment cables. Modern switching systems generally have built-in service evaluation systems, eliminating the need for this circuit.

Varley tests allow location of resistance faults in the outside plant. A wheatstone bridge at the LTD is used to measure resistance imbalances between the tip and ring of a suspected bad pair. A known good pair is used to provide access for the wheatstone bridge to the bad pair at a point that is known to be further away from the central office than the fault. The good and bad pair are patched to jack appearances of the wheatstone bridge at the DF using the W4CU cord (for 307-type connectors) or the W4CR cord (for 302- or 308-type connectors).

Plugging-up line circuits provide communication and test links between the Master Test Frame of a No. 1 or No. 5 Crossbar switch and the MDF.

7.3 Test Circuits

	CURRENT	*ADD'L*
7.3A In-and-Out Test Trunk — SD-90070-01.	_______	_____
7.3B Conductor ID Tone Circuit — SD-95689-01.	_______	_____
7.3C Older Circuits:		
Service Observing Circuits — SD-1A142-01.	_______	_____
Wheatstone Bridge Test Trunks: • Manual Varley 3 — SD-90403-01.	_______	_____
• Automatic Varley 3 — SD-95545-01.	_______	_____
Plugging-Up Line (Common Systems) — SD-95597-01.	_______	_____
Plugging-Up Line (Crossbar No. 5) — SD-25741-01.	_______	_____
Intermittent Trouble Test Trunks: • Step by Step — SD-32038-01.	_______	_____
• Crossbar No. 1 — SD-25505-01.	_______	_____
• Crossbar No. 5 — SD-26113-01.	_______	_____

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8. CABLE REARRANGEMENT FACILITY AND TIP CABLE INSTALLATION

This section is used to convey special information about the following:

- **Cable Rearrangement Facility.** The Cable Rearrangement Facility (CRF) provides a flexible interface for splicing up to 5,000 tip cable pairs to a riser or feeder cable. It is designed to be mounted vertically on a Unistrut type framework either in a Cable Entrance Facility (CEF) or Auxiliary Cable Entrance Facility (ACEF). The splice cabinet is a 15-inch wide (381 mm) by 12-inch deep (305 mm) by 48-inch high (1219 mm) sheet metal structure.
- **Tip Cable Installation Instructions (COSMIC IIA and COSMIC Custom IIA Frames Only).** Tip cable planning encompasses the amount and type of cable to be terminated, the location of the splice closure, the cable assignment and cable pathway system.

  The recommended arrangement is *overhead* cabling from an ACEF or primary CEF in vaultless buildings located on the same floor as the COSMIC IIA or COSMIC Custom IIA MDF. Bottom cable feed is also possible with special engineering.

8.1 Cable Rearrangement Facility Ordering and Installation

A. Enter the number of ED-6C136-30 Group 1 CRF cabinets required (for use with AT&T 710-type splices).

B. Enter the number of ED-6C136-30 Group 3 CRF cabinets required (for use with 3M splices).

C. Enter the number of B Grounding Kits needed. Each kit provides material for bonding and grounding up to fifty tip cables and four riser cables.

D. Enter the number of optional key locks needed.

E. Enter the number of 710 Modular Splicing Tool Support Frames required. These support frames are used during splicing operations to position the 710 splicing tool at a convenient work height in front of the CRF cabinet. See Section 5.1 for ordering information on the splicing tools.

F. Enter the number of 710 Tool Support Hardware Kits required. These kits are used in conjunction with a 710A Tool Mounting to form the equivalent of the ED-6C136-30 Group 4 Tool Support Frames.

G. Enter the number of 216-type tools needed. This tool is needed to open the security locks on the front access door of the CRF.

H. Indicate whether AT&T Network Systems will butt, strip and place the tip cables in the CRF. If it is decided that AT&T Network Systems will not install the cables, the cables will be dropped floor length in front of the cabinet.

8.1 Cable Rearrangement Facility Ordering and Installation

8.1A Number of Cable Rearrangement Facility cabinets
ED-6C136-30 Group 1 (601 003 304) __________

8.1B Number of Cable Rearrangement Facility Cabinets for 3M splices
ED-6C136-30 Group 3 (601 248 552) ________

8.1C Number of B Grounding Kits ED-6C136-30 Group 2 (403 797 186) __________

8.1D Number of optional key locks D-180992 (103 299 426) __________

8.1E Number of 710 Modular Splicing Tool Support Frames
ED-6C136-30 Group 4 (601 324 015) ________

8.1F Number of 710 Tool Support Hardware Kits
ED-6C136-30 Group 5 (601 324 023) ________

8.1G Number of 216-type tools (102450574) ________

8.1H Cables (shall, shall not) be placed in the CRF cabinet by AT&T Network Systems.

8.2 Tip Cable Installation Instructions

A. Enter the tip cable code, 11CA (100-pair, 22-gauge) or 11DA (100-pair, 24-gauge) of the tip cables required for this order.

B. Indicate whether AT&T Network Systems will install the tip cables.

8.2 Tip Cable Installation Instructions

8.2A (11CA, 11DA) cables shall be used for this order.

8.2B Tip cables (will, will not) be installed by the AT&T Network Systems Company.

9. COMPUTERIZED FRAME ADMINISTRATION SYSTEM (CFAS)

It is recommended that a mechanized Operations Support System (OSS) be used to administer the preferential assignment of short jumpers on modular distributing frames. AT&T's CFAS is a total frame management system that provides inventory control of exchange facilities, automates the assignment of switching equipment, eliminates the need to keep manual frame jumper records, and enhances the efficiency of all organizations involved in the management of central office and private network facilities.

A single CFAS can support several exchanges by running in multi-user mode on a single processor. It can administer several conventional or modular MDFs per exchange, including TPDFs.

CFAS administers seven classes of DF assignment parameters:

1. Directory numbers,
2. Switching equipment,
3. Cable pairs,
4. Tie pairs,
5. Miscellaneous equipment,
6. Multi-Line Hunt Group terminals,
7. PBX lines.

CFAS assigns the best available switching equipment in a process called "preferential assignment" that considers the load balance of the switch against the jumper length. Given an outside plant cable pair that needs a switching equipment assignment, the equipment zones nearest the outside plant pair location on the frame are searched for the lightest loaded equipment that can provide the required service. If no equipment can be found with a load less than a specified capacity, progressively more distant equipment zones are searched until an assignment is made.

For PBX or MLHG terminals, assignments are made following rules that spread the assignments evenly over the available equipment.

CFAS generates service orders for the frame attendants. These orders use the Location-Oriented Assignment System (LOIS) for COSMIC frames to help the attendants complete their work quickly and without errors.

If you would like more information on CFAS, write your name, address, and telephone number on the facing page, or call 1-800-WE2-CARE (1-800-932-2273).

9. COMPUTERIZED FRAME ADMINISTRATION SYSTEM

Please provide more information about CFAS (yes/no).

Name ______________________________

Address: ______________________________

____

____

Telephone: ______________________________

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10. SPECIAL TERMINATIONS

This section is used to convey termination information about those outside plant cables **not** included in the MELD questionnaire. This may include the following terminations:

- Voice Frequency Trunk Tip Cables, to be terminated on a TMDF or COSMIC II Mini Frame.
- High Frequency Tip Cables to be terminated on a TMDF, CMDF, or SDDF, and COSMIC II Mini Frame.

This section is also used to order the 307-type connectors that are used to terminate these cables.

10.1 Voice Frequency Tip Cables

A. Enter all VF (Voice Frequency) cable pairs to be terminated on the frame for this order that are **not** included on the MELD Questionnaire.

Enter the cable identification. Trunk cables having missing cable pairs must have a separate entry line for each contiguous pair count.

Enter the low pair and high pair of the cable.

To minimize cable racking congestion, VF trunk cables should be entered in the same order as they appear in the splice positions. The splice position number and the floor for the VF trunk cables are entered under the designated columns. Splice position numbers should be numbered left-to-right or right-to-left in ascending order, as appropriate.

Enter the type of cable to be used, per the following table.

Gauge	*Code*
22	11CA (100 pair)
24	11DA (100 pair)

B. Enter the number of 307D1-100, 307D2-100, or 307F1-100 connectors required to terminate the cables identified above (i.e. for cables not included in the MELD (or PACE) Questionnaire). The following codes are available:

- 307D1-100 Connector: equipped with a 112C1B-100 connecting block, for use on COSMIC II and COSMIC IIA frame systems.
- 307F1-100 Connector: high density version equipped with a 112H1B-100 connecting block, compatible only with COSMIC IIA DFs.
- 307D2-100 Connector: equipped with a 112C1B-100 connecting block, and a wiring harness of four twisted-pair cables. For use on COSMIC II, COSMIC IIA, or COSMIC II Mini frames.

10.1 Voice Frequency Tip Cables

10.1A. Enter only those cables not included in the MELD Questionnaire.

			Splice Case		
Cable ID	Low Pair	High Pair	Position No.	Floor	Cable Code

10.1B. 307-type Connectors to terminate the above cables:

Number of 307D1-100 Connectors (103318309) _______

Number of 307F1-100 Connectors (104367768) _______

Number of 307D2-100 Connectors (103554747) _______

10.2 High Frequency Tip Cables

A. Enter all High Frequency (e.g., T-Carrier) cable pairs to be terminated for this order. These cables are normally not included in the MELD Questionnaire.

Enter the cable identification. High Frequency cables having missing cable pairs must have a separate entry line for each contiguous pair count.

Enter low and high pair (transmit or receive) of the cable. Segregate Transmit from Receive leads when entering the low and high pair, because Transmit and Receive leads *cannot* be mixed in a cable because of transmission reasons.

To minimize cable racking congestion, cables must be entered in the same order they appear in the splice case positions. The splice case position number and the floor on which it is located are entered under the appropriate columns. Splice case position numbers should be numbered left-to-right or right-to-left in ascending order, as appropriate.

Enter the type of code to be used, per the following table.

Gauge	*Code*
22	11CA (100 pair)
22	11CB (50 pair)

Enter "T" for Transmit and "R" for receive under "Transmit/Receive" as appropriate for the Cable ID: low pair and high pair.

B. Enter the number of 307C1-100 connectors required to terminate the high frequency cables identified above. This connector is used on the COSMIC IIA, COSMIC Custom IIA, and COSMIC II Mini DF Systems.

10.2 High Frequency Tip Cables

10.2A

			Splice Case			
Cable ID	Low Pair	High Pair	Position No.	Floor	Cable Code	Transmit/ Receive

10.2B Number of 307C1-100 Connectors (103334009) __________

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11. REFERENCES

The following references contain general information for the COSMIC-type frame systems and products:

- COSMIC *Distributing Frame Systems — Planning, Engineering, Installation and Operation — System Reference Guide*, AT&T 201-200-150, planned for release in April, 1991.
- COSMIC *Distributing Frame Systems, Enhancements and Growth Methods*, AT&T 201-099-023TD, November, 1990.
- *Distributing Frame Systems Products Manual*, AT&T 201-200-050, Issue 4.
- Floor Plan Data Sheets FPD-801-005-164-1 through 801-005-164-12, "COSMIC I/IA/IIA Floor Plan Data Sheets."
- FPD-801-005-165-1 through 801-005-165-5 "COSMIC II Mini Floor Plan Data Sheets."

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SECTION 12

SPECIFICATIONS

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SECTION 12

SPECIFICATIONS

This section provides performance Specifications for *COSMIC* Distributing Frame Systems. These specifications are subject to change without notice.

12.1 Frameworks and Frame Systems

A. **Flammability** — all plastic parts have a minimum oxygen index of 28% and meet UL 94V-0 test requirements.

B. **Earthquake Resistance** — frames meet earthquake test requirement of Bellcore TR-EOP-00063, "Network Equipment Building Standards (NEBS) — Generic Equipment Requirements," Issue 3.

C. **Lighting** — standard arrangements provide in excess of 20 footcandles (215 lux) for maintenance aisles and 10 footcandles (108 lux) for wiring aisles.

D. **Dimensions and Capacities** are shown in Tables 12-A through 12-E.

Table 12-A. *COSMIC* I Frame

Item	Height	Width	Depth	Capacity (pairs)	Shipping Weight
Cross-Connect Bay	8′-0″ (2438 mm)	2-9″ (838 mm)	1′-6″ (457 mm)	5,000 pairs (on 100-pair blocks), or 6,400 equipment pairs (on 128-pair blocks)	300 lbs. (136 kg)
Vertical Trough	8′-0″ (2438 mm)	1′-0″ (305 mm)	1′-6″ (457 mm)	-	125 lbs. (57 kg)
End Guard	8′-0″ (2438 mm)	4″ (102 mm)	1′-6″ (457 mm)	-	150 lbs. (68 kg)
Walk Through	8′-0″ (2438 mm)	5′-4″ (1626 mm)	1′-6″ (457 mm)	-	350 lbs. (159 kg)

Table 12-B. *COSMIC* IA/IIA Frame

Item	Height	Width	Depth	Capacity (pairs)	Shipping Weight
Cross-Connect Bay	8′-2″ (2489 mm)	2′-9″ (838 mm)	2′-3″ (686 mm)	6,000 facility pairs (on 100-pair blocks) or 6,400 equipment pairs (on 128-pair blocks)	450 lbs. (204 kg)
Cross-Connect/Protection Bay	8′-2″ (2489 mm)	2′-9″ (838 mm)	2′-3″ (686 mm)	5,100 facility pairs (protected)	650 lbs. (295 kg)
Vertical Trough	8′-2″ (2489 mm)	1′-0″ (305 mm)	2′-3″ (686 mm)	-	100 lbs. (45 kg)
End Guard	8′-2″ (2489 mm)	2″ (51 mm)	2′-3″ (686 mm)	-	150 lbs. (68 kg)
Walk Through	8′-2″ (2489 mm)	5′-4″ (1626 mm)	2′-3″ (686 mm)	-	550 lbs. (249 kg)

Table 12-C. *COSMIC* Mini-Frame

Item	Height	Width	Depth	Capacity (pairs)	Shipping Weight
Cross-Connect Bay	7′-0″ (2134 mm)	1′-3″ (381 mm)	1′-2″ (356 mm)	2,560 pairs (on 128-pair blocks)	125 lbs. (57 kg)
Cross-Connect/Protection Bay	7′-0″ (2134 mm)	1′-3″ (381 mm)	1′-2″ (356 mm)	1,000 pairs (protected)	135 lbs. (61 kg)
Vertical Trough	7′-0″ (2134 mm)	5″ (127 mm)	1′-2″ (356 mm)	-	40 lbs. (18 kg)
End Guard	7′-0″ (2134 mm)	1″ (25 mm)	1′-2″ (356 mm)	-	60 lbs. (27 kg)

Table 12-D. Protector Frame

Item	Height	Width	Depth	Capacity (pairs)
ED-1A220-31,G7	8′-0″ (2438 mm)	6′-6″ (1981 mm)	1′-0″ (305 mm)	6,000
ED-97898-31	8′-0″ (2438 mm)	6′-6″ (1981 mm)	1′-0″ (305 mm)	9,600
AT-9049	6′-0″ (1829 mm)	9″ (229 mm)	10″ (254 mm)	900

Table 12-E. Jumper Trough Dimensions

Frame Type	Horizontal Shelves	Vertical Trough	Express Trough	Lower Express Trough
COSMIC I DF	7.25″ x 3″ (184 mm x 76 mm)	11.75″ x 8.75″ (298 mm x 222 mm)	8.75″ x 4.5″ (222 mm x 114 mm)	11.75″ x 3.75″ (298 mm x 95 mm)
COSMIC IA/IIA DF	8.75″ x 3.5″ (222 mm x 89 mm)	11.75″ x 11″ (298 mm x 279 mm)	13.75″ x 5″ (349 mm x 127 mm)	13.5″ x 4.25″ (343 mm x 108 mm)
COSMIC Mini DF	5.5″ x 2.25″ (140 mm x 57 mm)	4.5″ x 8.6″ (114 mm x 218 mm) or 8.5″ x 8.6″ (216 mm x 218 mm)	8.75″ x 4″ (222 mm x 102 mm)	8.75″ x 4″ (222 mm x 102 mm)

E. Floor Loading is shown in Table 12-F.

Table 12-F. Fully Assembled & Cabled Loads

Frame Type	Floor Load
COSMIC I Frame	97 Lbs/Ft^2 (474 Kg/m^2)
COSMIC IA Frame	82 Lbs/Ft^2 (400 Kg/m^2)
COSMIC IIA Frame	122 Lbs/Ft^2) (596 Kg/m^2)
COSMIC Mini Frame	75 Lbs/Ft^2 (366 Kg/m^2)

12.2 Protected Connectors

A. Meet fusing coordination requirements of Bellcore TA-EOP-000164.

B. Insulation Resistance: 1,000 megohms at 500 volts RMS.

C. Dielectric Strength: 1,000 volts RMS.

D. Protector unit sockets — plated with gold-flashed paladium nickel, tested per Bellcore TA-EOP-000164.

E. Industry-standard 5-pin protector unit configuration.

F. Grounding — ground bar is 6 gauge equivalent (13.29 mm^2) or larger; internal ground bars are 12 gauge equivalent (3.31 mm^2) or larger.

G. UL-listed 307-type connector available, factory-wired with 26-gauge (.4 mm) stub cable.

H. Non-protected 407-type connector: lower-cost alternative for circuits not requiring voltage and/or sneak current protection.

I. Typical shipping weights: 302A1-100-30 = 29 lbs. (13 kg)
307D1-100 = 9 lbs. (4 kg)
309A1-200-30 = 50 lbs. (23 kg)

12.3 Connecting Blocks

A. Listed by Underwriter's Laboratories.

B. Available with insulation-displacement clips ("quick clips") or wire wrap terminals.

- IDCs:
  - For 22- or 24- gauge (.6 or .5 mm) wire.
  - Contact resistance: < 2 milliohms after testing per Bellcore TA-EOP-000164.
  - Rated for 200 insertion-withdrawal cycles.
- Wire-Wrap Terminals: meet Electronic Industries Association Standards EIA-RS-280B,"Solderless Wrapped Connections."

C. Dielectric Strength: 1,000 volts RMS.

D. Insulation Resistance: 1,000 Megohms at 500 volts RMS.

E. Typical shipping weight for 112-type: 29 lbs (13 kg) for box of 12.

12.4 Stub Cables

A. Listed type "CMR" by Underwriters Laboratories.

B. Available with 22- or 24-gauge (.6 mm or .5 mm) wire.

C. Insulation: PVC.

D. Jacket: PVC.

E. Shield: corrugated aluminum.

F. Typical shipping weight for 60 ft. (1524 mm): 46 lbs (21 kg)

12.5 Switchboard Cables (800A-Family)

A. Listed type "CMR" by Underwriters Laboratories.

B. Available from 4-168 pair sizes.

C. Solid tinned copper conductors, 26 gauge (.5 mm).

D. Insulation: Semirigid PVC

E. Jacket: PVC.

12.6 Protector Units Specifications

12.6.1 Identification

All protector units are color coded to key you to a specific circuit application. For example, the red protector units for special service circuits virtually eliminate accidental interruption of service for critical data or alarm circuits. Symbols permanently stamped on the end of housing handles provide additional application and identification information for craft. For example, general purpose gas tube protectors are stamped with an "O" in a color that contrasts with the housing color.

Color	Application
Black	Standard circuit
Green	Service denied
Red	Special circuit
Yellow	PBX battery
White	Tip and ring reversal
Orange	Minibridge lifter
Gray	Dummy — continuity only.

12.6.2 Connection

Full insertion of plug-in protector units into the connector panel interconnects outside plant with central office or customer premises equipment, providing electrical protection.

When the plug-in protector units are properly inserted into a terminal group on the connector panel, they provide contacts for one pair as follows:

a. The **central office application** will provide:

- Tip and ring to outside plant conductors (long pins)

- Tip and ring to central office (short pins)
- Ground which also serves to properly orient the protector unit relative to the connector panel (center pin).

b. The **station application** will provide:

- Tip and ring to outside plant conductors or toward the central office (long pins)
- Tip and ring toward the customer premise (short pins)
- Ground, which also serves to properly orient the protector unit relative to the connector panel (central pin).

For short-term testing or service denial, protector units may be partially withdrawn to the "detent" position. When the protector unit is pulled out to the detent position, the **central office or customer premises equipment** is disconnected to isolate outside plant cable pairs for testing purposes. In this position, voltage protection is still provided on the outside plant cable pair. Removing the protector unit from the connector opens the circuit and removes all protection.

12.6.3 Stamping

The stamping or symbols embossed on the top of the protector housing identify certain characteristics of the protector unit. The symbols are defined as follows:

None (Blank) — carbon blocks or no carbon blocks or gas tubes in the case of continuity only units

⌇ — resistor connected between tip and ring terminals

○ — general purpose gas tubes

Φ — 205A gas tubes for *5ESS*

× — carbon blocks and polarity (tip and ring) reversing circuit board

S — general purpose solid state device and test lands.

R — REA approved 332RL gas tubes

S-75 — 75-volt solid-state devices

△ — grounding device

· · — These are test points (actually holes through the top of the 3C- and 4C-type protector housings) that provide test access via a P2FL test cord.

For many protector unit codes, a combination of the symbols is utilized. Protector codes with combination symbols are noted in the tables for the 3-, 4-, and 5-type protector units.

12.6.4 Over-Voltage Protection

For over-voltage protection, three protection technologies are available:

- Carbon Blocks

- Gas Tubes
- Solid-State Electronics.

Carbon Block Over-Voltage Protection — The carbon block protector units (3B-A, 4B-C, 4C-C types) are intended for use in low lightning risk areas, typically for applications where a technician is available to perform expected routine maintenance, such as manned central offices with electromechanical switches.

Over-voltage protection is accomplished with 3-mil surge-limiting carbon blocks. When voltage on a tip or ring conductor exceeds a predetermined level (typically 500 V), the voltage will be limited by arcing across the 3-mil air gap. If current flow across this gap is large or persists for an appreciable time (substained power cross faults), the protector units thermal overload mechanism will operate and the protector unit will become permanently grounded, fail safe.

Carbon block protector units are discharge-type devices; applications are primarily intended for manned central offices with electromechanical switches. The performance and service life of carbon block protector units are significantly affected by use and operation, and technicians must be available to perform routine maintenance to clear shorted or noisy protector units. Carbon block protector units lack the precision performance and service life of gas tube and new solid-state protector units and are characterized as having high-maintenance characteristics.

Typical electrical characteristics for carbon block protector units are as follows:

DC breakdown @2 kV/s	Nominal 500 volts
Surge breakdown voltage (@ 100 v/μs)	Nominal 700 volts Maximum 1000 volts
Insulation resistance	100 megohms

All AT&T carbon block protector units meet the ***Bellcore*** requirements per Specification TR-TSY-000300, Issue 1, June 1985, Plug-in Carbon Block Protectors for Use in CO Connectors and Building Entrance Terminals.

Gas Tube Over-Voltage Protection — The general purpose gas tube plug-in protector units (3BE-W, 4BE-W, 4CE-W types) are intended for most central office and customer premises applications where longer service life, reduced maintenance, and more predictable over-voltage protection performance is desirable. The newer wide-gap general purpose gas tube protector units are economical alternatives versus carbon block units for protection of central office and customer premises equipment that have an over-voltage threshold greater than 265 volts (typically all applications except the AT&T *5ESS* switch).

For digital central office and PBX equipment that requires tighter DC breakdown voltage protection such as the AT&T *5ESS* switch, the 4B-F and 4C-F plug-in protectors are needed.

For gas tube protector units, over-voltage protection is accomplished with 331-RL wide-gap technology gas tubes (for the general purpose W codes) and narrow-gap 205A gas tubes (for the F *5ESS* switch codes). When the voltage across tip and/or ring conductors exceeds the specified range (typically 350 V DC for the W codes or 240 V DC for the F codes), the voltage will be limited by arcing across the internal gap of the sealed gas tubes. The gas tubes will recover after the potentially damaging energy has been dissipated to ground. If current flow across the gas tubes is large or persists for an appreciable time (sustained power faults), the protector unit thermal overload mechanism will operate and the protector unit will become permanently grounded (fail-safe condition).

Gas tube protector units are recommended as preferred economical alternatives versus carbon block protector units for all customer premises and unmanned applications, such as remote pair-gain systems and unmanned central offices. Gas tubes provide longer service life (typical 10 times longer) and require significantly less maintenance as compared to carbon block protector units.

Electrical and service life characteristics for the general purpose gas tube W codes (3BE-W, 4BE-W, 4CE-W) are as follows:

Electrical Characteristics	
DC breakdown voltage (@ 2 kV/s)	265 to 425 volts
Surge breakdown voltage (@ 100 V/μs)	200 to 800 volts
Insulation resistance (PE-80)	100 megohms typical
DC hold-over voltage (IEEE 465.1)	150 volts typical
Vented breakdown voltage (meets UL reqts.)	< 1000 volts
DC arc voltage	20 volts typical
Glow-to-arc transition current (IEEE 465.1)	0.5 amp typical
Capacitance (PE-80)	< 10 picofarads
AC discharge (PE-80)	> 65 amps (11 cycles @ 60 Hz)
Maximum impulse discharge (PE-80)	20 K amps (8 x 20 μs waveform)
Sneak current @ 68° F (20° C)	< 210 sec. @ 0.54 amps*

* For 4B4E-W and 4C4E-W < 210 sec. @ 1.875 amps

Service Life Characteristics	**No. of Operations**
Short duration 60 Hz AC	
1 amp 60 Hz AC/1 s burst	> 60
10 amps 60 Hz AC/1 s burst	> 60
Continuous 60 Hz AC .5 amp	140 seconds

Surges:

10 amp (10 x 1000 μs waveform)	> 1000
100 amp (10 x 1000 μs waveform)	> 100
300 amp (10 x 1000 μs waveform)	> 50

For the stated number of operations,

VB, VL, and RL values remain within

required ranges as follows:

VB: 265 to 425 volts

VL: < 1000 volts

RL: > 10M ohms

Electrical characteristics for the F codes (4BF, 4CF, 3DF) for *5ESS* switch protection are as follows:

Electrical Characteristics

DC breakdown voltage (@ 2 kV/s)	215 to 265 volts
Surge breakdown voltage (@ 100 V/μs*)	180 to 1000 volts
Insulation resistance @ 100 V dc	100 megohms
Capacitance	< 10 picofarads
Sneak current @ 68° F (20° C)	< 210 s @ 0.54 amps†

* With a *5ESS* switch, peak surge voltages are limited by diodes (secondary protection) incorporated in the input circuits of the line unit.

† For 4B4F and 4C4F < 210 sec. @ 1.875 amps.

Service life characteristics are similar to that for the W codes.

Solid-State Over-voltage Protection — The newer family of solid-state protector (SSP) units provide a premium alternative to both carbon block and gas tube protector units for central office, building entrance, and other applications where superior protection and improved reliability are desirable. Fast clamping at low voltages as well as stable, quiet, and truly balanced electronic SSP performance can significantly reduce failure rates for both protector units and protected surge sensitive equipment. Where improved protector reliability is important for applications such as critical service lines, precise breakover voltage, and lower power dissipation due to the low on-state voltage and high surge-current capability, the SSPs are ideal.

Solid-state over-voltage protection is accomplished with semiconductor devices in a design which ensures excellent balance across tip, ring, and ground. Upon reaching the specified breakdown voltage in either direction between any two conductors (tip, ring, or ground), the SSP switches to a low-voltage, on-state, shorting tip and ring to ground simultaneously. Conduction and power dissipation will continue until the fault current drops below the holding current. The normal off-state condition is a high impedance, low leakage state that prevents loading of the telecommunication line. If the current flow across the SSP device is large or persists for an appreciable time, the heat coil mechanisms will operate and permanently ground tip and ring terminals.

Electrical characteristics for the 3C-S and 4C-S solid-state protector units are as follows:

Electrical Characteristics (@ 20° C)	
DC breakdown voltage (@ 2 kV/s)*	220 to 300 volts
Surge breakdown voltage (@ 100 V/μs)*	220 to 300 volts
Insulation resistance (PE-80)	> 100 megohms
DC holdover current†	260 mA/52 volts
	200 mA/135 volts
	140 mA/150 volts
On-state voltage (@ 100A)	< 10 volts
Response time	< 100 nanoseconds
Rated impulses current‡	200 amps
Capacitance§	< 100 picofarads
Line series resistance	> 4 ohms (4-types only)
Operational temperature range	-40° C to +75° C
Sneak current @ 68° F (20° C)	< 210 sec @ 0.54 amps

* Breakover voltages remain within the specified limits regardless of age, use, or rate-of-rise of applied voltage.

† The DC hold-over test per IEEE (ANSI/IEEE C62.31 1984) is used to establish the level of DC current for a specified open circuit voltage in which a device will extinguish in less than 150 ms.

‡ Impulse discharge test applies 200 amp 10 x 1000 μs current waveform between any two long terminals (T-R, T-G, R-G) or 100 amp 10 x 1000 μs applied simultaneously to T-G and R-G. Below rated impulse current, the number of operations is unlimited.

§ Capacitance as measured between any two terminals at a frequency of 1 kHz at 1 V AC rms with an applied bias of 50 V DC.

12.6.5 Typical Shipping Weight

4C-type protectors: 35 lbs (16 kg) for box of 1000.

REFERENCES

The following practices on the COSMIC Distributing Frame System are available. Contact your document procurement organization or your AT&T Network Systems Account Representative or order from the AT&T Customer Information Center.

Call: AT&T Customer Information Center on 800-432-6600

Write: AT&T Customer Information Center
Attention: Order Entry Section
P.O. Box 19901
Indianapolis, IN 46219

ORGANIZATION OF PRACTICES

069-1 Layer	Distributing Frame Cross-Connectors
069-3 Layer	Reconditioning Central Office Connectors
106-3 Layer	Test Equipment for Main Distributing Frames
201-2 Layer	Distributing Frames
636-3 Layer	Main Frame Terminations and Connectors
802-0 Layer	Protective Grounding Systems
876-1 Layer	Electrical Protection Devices
876-2 Layer	Electrical Protection — Central Offices
876-3 Layer	Electrical Protection — Stations

INDIVIDUAL PRACTICES

PRACTICE	TITLE
065-105-301	Rolling Platform Ladder — KS-21415, L1 and L2 — Operation, Adjustment, Piece-Part Data, and Replacement Procedures
069-120-811	Skinning and Preparing Wire for Cross-Connections on Distributing Frames and Cross-Connection Fields
069-132-811	Punched or Wire Terminals (Not Having Notches or Perforations) — Method of Making and Removing Wrapped Connections

069-140-811	Soldered Connections Using Soldering Coppers — Method of Making and Removing
074-205-104	Bags — Description

PRACTICE	TITLE
074-205-114	Bits — Description
074-241-115	Needles — Description
074-247-128	Pliers II — Description
074-253-114	Reel, Wire — Description
074-256-141	Sleeves, Wire Wrapping — Description
074-257-136	Wire Strippers — Description
074-269-113	Wire Wrapper — Description
074-269-126	Wrench, Protector Unit — Description
075-150-801	Wire Reel KS-21955 — Piece-Part Data
081-860-105	Transfer Stenciling Kits — Description and Use
106-315-119	Multiple Pair Test Connectors for 302- and 303-Type Connectors
201-208-100	3-, 4-, and 5-Type Protector Units — Description, Use, Maintenance, and Test Procedures
201-208-103	Tools and Aids — Distributing and Protector Frames
201-208-106	Test Equipment, Cords, Plugs, Warning Markers, Guards, Insulators, and Indicators — Description and Use
201-208-107	302-Type Connectors — Description, Use, Installation, and Repair Procedures
201-208-110	307-Type Connectors — Description, Use, Installation, and Repair Procedures
201-208-111	308-Type Connectors — Description, Use, Installation, and Repair Procedures
201-208-112	309-Type Connectors — Description, Use, Installation, and Repair Procedures
201-216-101	Miniature Test/Talk System — Description — Distributing and Protector Frames
201-216-102	Cords and Plugs — Description — Miniature Test/Talk System

201-216-801	Miniature Test/Talk System — Piece Parts and Replacement Procedures — Distributing and Protector Frames
201-219-101	Protector Frames — Description

PRACTICE	TITLE
201-222-105	78- and 112-Type Connecting Blocks — Description and Use — *COSMIC* Distributing Frames
201-222-301	78- and 112-Type Connecting Blocks, Method of Making Connections, Repair and Replacement Procedures — *COSMIC* Distributing Frames
460-110-100	Special Safeguard Measures (SSM) and Special Service Protection
631-460-118	195-Type Protector — Description and Installation
632-205-216	709-Type Connectors (*QUICK-SNAP®*) — Description and Use
632-205-217	Product Application Bulletin — *QUICK-SNAP* Connector
632-205-220	Wire Joining, 710 Connector System
632-205-222	711 Connector System
636-200-011	Marking Main Frames — Pair and Cable Numbers
636-210-205	Cable Termination — Installation of Open Cable Forms
636-211-101	Cable Rearrangement Facility (CRF) — Description, Installation, and Splicing
680-122-010	Customer Loop Bridge Lifters — Application and Administration
680-830-012	*COSMIC* Frame — Manual Assignment Procedures
781-800-005	Cable Entrance Facility (CEF) — Common Systems Planning and Design
781-880-005	Cable Entrance Facility (CEF) — Common Systems Planning and Design
800-612-154	Connecting and Soldering Individual Conductors
824-102-103	(J1P109) — Test Talk Systems
919-240-610	Cable Entrance Facility Design

VIDEO CASSETTES (WIPs)

Video cassettes [1/2 inch (13 mm) VHS format], known as Workcenter Information Package (WIPs), are available from the AT&T Customer Information Center.

WIP	TITLE
365-WIP-004V	*COSMIC* Distributing Frame System — Operations
632-WIP-002S	*QUICK-SNAP* Connectors — Installation

WIP	TITLE
632-WIP-003V	710 Modular Splicing System
632-WIP-004V	711 Connector System — 1025B Tool Kit
632-WIP-005V	711 Connector System — 1042A Tool Kit
632-WIP-006V	711 Connector System — 1043A Tool Kit
636-WIP-012V	Cable Rearrangement Facility (CRF) — Installation
636-WIP-013V	*COSMIC*® Distributing Frame Systems — Growing with the Future

MANUALS

The following system reference manuals are available from the AT&T Customer Information Center:

MANUAL	TITLE
201-200-050	Distributing Frame Systems Products Manual (DFSPM)
365-301-120	800 Series and 900 Series DSX-1/1C Systems
365-301-130	System III DSX-3/4
636-299-120	*LGX*® Fiber Distribution System
900-200-318	Outside Plant Engineering Handbook

CATALOGS

The following catalogs are available from:

AT&T Network Systems
P.O. Box 1278
Morristown, NJ 07960

CATALOG SELECT CODE	TITLE
2225B	Electronic Wire and Cable
2268B	Outside Plant Systems
2149C	Distributing Frame Systems

ENGINEERING DRAWINGS

The following ED drawings are available from the AT&T Customer Information Center.

DRAWING	DESCRIPTION
ED-6C140-10	*COSMIC* DF System Engineering & Ordering Guide
ED-6C140-11	Apparatus Ordering Guide
ED-6C141-30	*COSMIC* IA/IIA DF Framework Groups (Ordering)
ED-6C142-30	Framework Accessories (Ordering)
ED-6C143-30	Cable Rack (Ordering & Installation)
ED-6C144-12	Labels (For Flip Gates) (Ordering)
ED-6C145-30	AC, Lighting, Grounding
ED-6C146-10	Frame Installation
ED-6C146-50	Cabling
ED-6C001-30	*COSMIC* I DF Framework Groups (Ordering)
ED-6C004-70	*COSMIC* I DF End Guard (Ordering)
ED-6C107-70	*COSMIC* I DF Walk-Through (Ordering)
ED-6C110-10	Test/Talk Hardware Ordering, Installation, and Cabling
ED-6C111-10	Test/Talk Method of Installing
ED-6C129-50	Operations Decals
ED-6C136-30	CRF Groups (Ordering)
ED-6C311-30	*COSMIC* Mini DF Framework Groups (Ordering)
ED-6C311-70	*COSMIC* Mini DF Facility Framework
ED-6C311-71	*COSMIC* Mini DF Equipment Framework
ED-6C312-10	*COSMIC* Mini DF Typical Equipment Arrangement
ED-6C313-10	*COSMIC* Mini DF Framework Installation
ED-6C314-70	*COSMIC* Mini DF Hardware Groups (Ordering)
ED-6C316-10	*COSMIC* Mini DF Cabling & Grounding
ED-6C317-10	*COSMIC* Mini DF Cable Rack Arrangements

SCHEMATIC DRAWINGS

DRAWING	DESCRIPTION
SD-2P016-01	Jack and Test Panel Circuits
SD-97777-01	Termination Specifications

QUESTIONNAIRES

The following Questionnaires are available from the AT&T Customer Information Center.

QUESTIONNAIRES	TITLE
E Form 8113A	PACE Engineering Questionnaire for Existing *COSMIC* Distributing Frames Maintained by PACE
E Form 8113B	PACE Engineering Questionnaire for Existing *COSMIC* II Distributing Frames Maintained by PACE
E Form 8196A	Engineering Summary Questionnaire for MELD Layout or PACE to MELD Conversion of *COSMIC*-Type Distributing Frames
E Form 8203	Hardware Ordering Questionnaire for *COSMIC* Distributing Frame Systems and Apparatus

FLOOR PLAN DATA SHEETS

DRAWING	DESCRIPTION
801-005-164	*COSMIC* IA/IIA DF
801-005-165	*COSMIC* Mini DF

GLOSSARY AND ACRONYMS

A&M — See LA.

A/D — Analog to Digital Conversion.

AC/ac — Alternating Current.

ACEF (Auxiliary Cable Entrance Facility) — Secondary cable splicing facility between the CEF and a DF.

ADFPW — Advanced Distributing Frame Planning Workshop.

AFT (Analog Facilities Terminal) — An analog carrier terminal that provides transmission and signaling functions by means of plug-in units.

AMA — Automatic Message Announcement.

ANSI — American National Standards Institute.

AT — AT&T Specification for Outside Plant product manufactured by other suppliers.

ATTEN — Attention/Attenuate.

Attenuation — The loss of energy of a signal.

AWG — American Wire Gauge.

AXE™ — Ericsson Family of Switching Systems.

Back-Tap — A DF jumper connected at one end to a termination on which another jumper already exists and at the other end to a new facility or equipment. Upon removal of original jumper, the second jumper provides a new circuit configuration.

Bay — (1) DF apparatus mounting space between adjacent framework elements. A horizontal bay is the space on a shelf between adjacent verticals. (2) A modular framework partially/fully enclosed by sheet metal panels.

Bellcore — Bell Communications Research.

Bifurcated — Quick-clip or wire-wrap terminals with provisions for connecting two conductors.

Blocked-In Layout — A DF termination layout pattern that locates all terminations from a given equipment or facility in close proximity; that is, not "spread".

BNC — Bayonet-Type Connector, used for coaxial cables.

BOC — Bell Operating Company.

BQC (Bifurcated Quick Clip) — Two quick-clip terminals to facilitate back-taps.

Bridge Lifter — A device used in circuits with two or more facilities to reduce signal loss/noise (for example, as for party service).

Bridge-Tap — Splicing into an existing circuit, generally to add additional permanent branch(es). (Compare with Half-Tap.)

Bridged Circuit — A circuit with two or more facilities.

BSP — Bell System Practice.

Building Cable — A cable with a protective fire-retardant sheath that is typically recommended for use in buildings.

BWW (Bifurcated Wire-Wrap) — Two wire-wrap terminals to facilitate back taps.

Cable Duct — A single pipe, tube, or conduit through which cables can be passed.

Cable Mining — Systematic removal of unused cable from building cable distribution system (racks, ducts, risers, etc.).

Cable Riser — Opening or slot in building floor or wall for cable passage.

Cable Throw — Transfer of a circuit from one cable pair to another cable pair.

Cable Transfer — Same as Cable Throw.

Carbon Block — Small block of carbon used in DF protector units. Breakdown provides a path to ground for voltages typically over 350 volts.

Carrier System — Transmission system that electronically provides multiple communication channels over one path.

CCITT — International Telephone and Telegraph Consultative Committee.

CDF (Combination Distributing Frame) — Conventional DF with verticals equipped to mount connectors and blocks.

CDO (Community-Dial Office) — A small dial equipment building that typically has no resident forces.

CEF (Cable Entrance Facility) — Usually a below ground or ground level vault where OSP cables enter the Central Office and are spliced to interior cabling.

CEPT — European Conference of Postal and Telecommunications Administrations.

CEU (Current Estimated Usage) — CFAS Switch Traffic Parameter.

CEV — Controlled Environment Vault.

CFAS — Computerized Frame Administration System.

CH BK (Channel Bank) — Equipment that provides multiplex/demultiplex and analog/digital conversion functions, typically for interoffice circuits.

Churn — The connection, disconnection, and rearrangement activity of cross-connections at a frame.

Circuit Transfer — A change in a working circuit configuration. On DFs, new assignments and jumper changes are usually required.

Circuit — An electrical path between two or more points to provide a service.

Class of Service — A subgrouping of telephone customers based on rate distinctions.

CLEI — Common Language Equipment Identifier.

Closure — A facility used for storing and environmentally sealing copper on fiber cable splices — typically placed in a cable entrance facility or in the outside plant environment.

CMDF (Combined Main Distributing Frame) — Terminates loop and IO facilities and equipment.

CMR — Cable type, UL Listed as riser communications cable, UL 1666 fire tested.

CO (Central Office) — Historically, a Central Office referred to a local switching system. Now it refers to a telephone company building in which a switching system is located and includes other equipment that may be located in such building (also called Wire Center, or Exchange).

Code 5 — Circuit fault attributed to Central Office.

COE (Central Office Equipment) — Electrical, electronic, and mechanical devices located in a Central Office.

COEE — Central Office Equipment Engineer.

Compression — Replacement of low-density DF termination apparatus with new hi-density apparatus to achieve more termination space.

Concentrator — Equipment used to reduce a large number of incoming paths to a smaller number of outgoing paths.

Connecting Apparatus — Same as Termination Apparatus.

Connecting Block — Partially enclosed termination apparatus for cross-connections.

Connector — A DF termination apparatus with electrical protection features.

Control Leads — Leads associated with monitoring and controlling a device or system.

Conventional Distributing Frame — DF framework characterized by open lattice structure of vertical and horizontal members.

COSMIC® — AT&T Modular DF.

COSMOS — An automated assignment and record-keeping system initially designed by Bell Laboratories to assist BOCs in effectively managing MDF subscriber facilities and circuits. Now a *Bellcore* OSS for DF administration.

COT (Central Office Terminal) — Equipment that provides multiplex/demultiplex and analog/digital conversion functions at the Central Office end of a loop T-carrier circuit. The COT may be provisioned to provide line-powering (that is, interface directly with loop T-carrier) or to interface with a DS1 signal at the DSX.

CP — Cable Pair(s).

CREG (Concentrated Range Extender With Gain) — A range extender within electronic switching systems.

CRF (Cable Rearrangement Facility) — CO OSP Cable Splice Cabinet.

CRMS (Cable Routing and Measuring System) — An AT&T mechanized engineering tool.

Cross-Connection — Wired connection (paired, triples, or quads) run between terminal apparatus on a distributing frame, commonly referred to as a "jumper".

Cross-Connect Bay — Framework bay that mounts connecting blocks only (78- or 112-Type blocks). It provides no protection.

Cross-Connect/Protection Bay — Framework bay that mounts both connecting blocks and 307- and 407-type connectors.

Crosstalk — The undesired transference of a signal onto an adjacent signal caused by electromagnetic coupling between physically separated circuits.

CSPEC — Common Systems Planning and Engineering Center.

CTLENS — Cut Through Line Equipment. (Same as DIP — Dedicated Inside Plant.)

Cutover — Deactivation of old equipment and near simultaneous activation of new, replacement equipment.

DA (rating) — Discontinued Availability product rating (previously MD — Manufacture Discontinued).

DACS (Digital Access Cross-Connect System) — An electronic digital cross-connect system manufactured by AT&T Network Systems that has the capability to rearrange the digital signal components of a particular transmission rate. For example, the DACS I and II Systems can rearrange the DS0 components of DS1 signals, and the DACS III can rearrange the DS1 components of a DS3 signal.

DAS — Digital Access Switch.

Data Link — A circuit designed to carry digital information, usually by time division multiplex techniques.

DATS — Digital Access Test Set.

dB (Decibel) — A logarithmic unit of power ratios. If P_1 and P_2 are power levels expressed in the same units (for example, watts), then dB (decibels) = $10 \log_{10} (P_1/P_2)$.

DC/dc — Direct Current.

DCLU — Digital Carrier Line Unit.

DCO — Digital Central Office.

DCS (Digital Cross-Connect System) — A system that terminates digital signal systems at a particular bit rate but allows the direct interchange of component signals at a lower bit rate. A DCS 1/0, for example, terminates DS1 systems and interchanges DS0 bit rate channels. (See DACS.)

DCT (Digital Carrier Trunk Frame) — A T-Carrier message trunk system that merges switching and transmission functions into a three-bay framework that bypasses the switching trunk frame and the required IDF.

DDM-1000 — A digital multiplexer manufactured by AT&T Network Systems that interfaces DS1 signals with either electrical DS3 signals or lightguide FT3 or FT3C signals.

DDS (Digital Data System) — A nationwide private line synchronous data communications network formed by interconnecting digital transmission facilities and providing special maintenance and capabilities.

Dead Jumper — Any DF jumper disconnected at one or both ends.

DF (Distributing Frame) — A frame dedicated for cross-connection functions.

DF Administration — Daily DF operations management, including assignment.

DF Assignment — Selection of specific DF facility/equipment terminations for cross-connection to provide a given service.

DF Configuration — The physical arrangement of a specific DF, typically in terms of its modules or verticals and lineups.

DF Layout — The arrangement of facility/equipment terminations on a DF.

DF Network — A wire center's entire complex of DF's, associated tie pairs, and DF terminations allocation viewed as a total interconnection system.

DFS — Distributing Frame System(s).

DFSPM — Distributing Frame Systems Products Manual.

DFT (Digital Facilities Terminal) — A digital carrier terminal that combines digital carrier transmission and signaling functions into one unit per digital carrier line that includes digital banks.

DFW — Distributing Frame Wire.

Digital Cableway — A type of cable pathway typically utilized with AT&T transmission equipment that may be adapted for use with the *LGX*® distributing frame.

Digital Carrier Transmission Facilities — Facilities used to transmit digital signals in both the loop and interoffice plant. Repeaters, which provide signal equalization and regeneration, are deployed at regular intervals. T-carrier is a popular short-haul digital transmission facility.

Digital Switch — A time division electronic switching system (for example, *ESS*™ No. 4, *5ESS*®).

Digroup — A digitally multiplexed group of 24 voice channels.

DIP (Dedicated Inside Plant) — A jumper left connected after termination of service with intended reuse for future customer on the same cable pair with the same line equipment (same as CTLENS — Cut Through Line Equipment).

Direct Ties — Multiple frame lineup tie linkage cabled directly between lineups; that is, does not use a separate TPDF.

Disconnection — De-energizing or disabling an electrical circuit by the removal of one or more components.

Distributing Ring — Insulated metal ring used to contain and route jumper wires or cable conductors on DFs.

DLC (Digital Loop Carrier) — A T-Carrier System used in loop applications.

DMS™ — Northern Telecom Family of Switching Systems.

DS (Digital Signal) — One of several transmission rates in the time-division multiplex hierarchy. Examples of the North American digital hierarchy include DS-1 (operating at 1.544 megabits/second), DS-1C (3.152 megabits/second), and DS-3 (44.736 megabits/second). The term DS0 generally applies to the 64 Kb component of a DS1 signal that represents the equivalent of a voice channel. Digital signal rates and signal templates are documented by industry standards organizations such as ANSI, CEPT, and the CCITT.

DSX (Digital Signal Cross-Connect) — A centralized termination, interconnection, and test point for digital equipment at a particular digital signal bit rate. A DSX provides: rearrangeable connections between any two equipment terminations or appearances, test access through a monitor port, and patching jacks. These capabilities enable a DSX frame to provide several operational functions, including equipment interconnection, test access, and patching. DSXs are identified by the transmission rate of the signals terminated on them — the DSX-1 is for DS1 signals, the DSX-3 is for DS3 signals, etc. All equipment terminated on a DSX-*n* must conform to the industry standards for the DS*n* transmission rate.

DT — (1) Distant Terminal. (2) Type of AT&T DF Jumper Wire.

DT-Type Wire — New DF jumper wire with slick insulation and smaller diameter.

ED — Equipment Drawing.

EDF — Electronic Distributing Frame.

ER&I — Engineer Furnish and Install.

EIA — Electronic Industries Association.

EIM — Engineering Information Memorandum.

Electromechanical Switching Equipment — Switching system that employs electromechanical devices to perform the base switching functions.

EMS (Equivalent Main Stations) — Non-POTS switched services.

End Guard — Protective finishing member attached to ends of installed framework lineups.

Equipment Frame — A frame primarily for mounting electronic or electromechanical devices.

Equipment — Central Office systems/technology commonly restricted to those providing switching and signaling functions. (Compare with Facilities.)

Equivalent Pairs — The number of physical pairs associated with a certain type of facility or equipment requiring termination outside the system (that is, total leads divided by two).

ESS (Electronic Switching System) — A trademark of AT&T used to describe electronic switching systems that use solid-state switching control.

ESS Modular DF — A single-sided DF characterized by modules of terminal blocks mounted in vertical arrangements.

EWSD — Siemens Family of Digital Electronic Switching Systems.

Exchange Area — The territory within which telephone service is provided without toll charges and covered by a specific rate base.

Exchange Cable — A paired cable principally for connecting customer premises to a Central Office.

Express Trough — A wireway, typically placed near the top or bottom of a bay, that allows long jumpers to be routed past the bay.

Facilities — Any one of the elements of physical telephone plant used to provide means of loop or interoffice transmission. (Compare with Equipment.)

Fanning Strip — A narrow strip with holes or slots through which cross-connecting wires can be run for orderly termination on a termination apparatus.

FDF (Fiber Distributing Frame) — A generic term used to describe a cross-connection/interconnection facility such as the *LGX* distributing frame that can easily accommodate large numbers of optical fibers.

Fill — Ratio of working terminations to total terminated (for example, OSP Fill, LE fill).

Floater — A jumper disconnected at both ends.

FMUX — Fiber Multiplexer.

FPDS — Floor Plant Data Sheets.

Frame Force — Personnel who operate a DF System.

Frame Maps — Frame Monitoring and Planning System.

Frame Zoning — Division of a frame into two or more layout and/or assignment zones.

Frame — Framework together with apparatus and equipment mounted on it.

Framework — A bare frame structure without connecting apparatus.

FT-Series G — A lightguide multiplexer and transmission system that interfaces to CO equipment at the DS3 rate and transmits at up to 1.7 Gb/s.

Functional Frames — DF applications distinguished by types of terminations on the frames (for example, CMDF, SMDF, TMDF, IDF). Also see DF Network.

Fundamental Planning — A systematic long-range planning process characterized by design and objective evaluation of alternative plans.

GA (rating) — General Availability (Replaces AT&T Standard Rating).

Gb — Gigabit (one billion bits).

GRD — Ground.

GTD™ — GTE Family of Switching Systems.

Guard Rails — Protective aisle railings installed on frames.

H (drawing) — Engineering Method of Procedures or Equipment Specifications Produced by AT&T Network Systems Engineering Centers.

Half-Tap — Splicing into existing circuit for in-service relocation; original branch is customarily removed (unbridged) after relocation is completed. (Also see Bridge-Tap.)

HDF/HMDF — Horizontal (Shelf) Side of a conventional DF. (Compare with VDF.)

Heat Coil — A protective device used in series with the OSP line at a main distributing frame, which operates to open and ground the line if excess current flows.

HFCP ***(High-Frequency Cable Pair)*** — A cable pair used in multiplexed portion of a circuit carrying more than one channel.

HFDF ***(High-Frequency Distributing Frame)*** — A functional DF dedicated to termination of high-frequency (on modulated) circuit facilities.

ID — Identification/Identifier.

IDC — Insulation Displacement Clip (Quick-Clip) Terminal Type.

IDF ***(Intermediate Distributing Frame)*** — (1) A distributing frame without OSP cable terminations (terminates ties and/or equipment but not OSP facilities). (2) A conventional DF equipped to mount blocks on both sides.

Incremental Growth — Ability to increase the termination capacity of an installation in an incremental fashion.

Incremental Planning — Recurring short-range planning characterized by frequent small equipment additions without long-range plans.

Integrated Carrier — Switching system equipment that provides the functions of separate carrier terminals.

Interoffice Special Service — Any special service circuit with physical connections in two or more Central Offices.

Interzone Jumpers — Jumpers between two or more short-jumper assignment zones — also called long jumpers.

Interconnect — Direct connection of facilities to equipment without jumpers. (Compare with Cross-Connect.)

Intraframe Tie Pair — Tie pairs joining separate regions of the same frame.

Intra-Office Special Service — Any special service completely connected within one Central Office exchange area.

Intrazone Jumpers — Jumpers connecting two terminations located in the same assignment zone — also called short jumpers.

IO (Interoffice) — Associated facilities/equipment, circuits between COs. (Compare with Loop.)

IPVC — Irradiated Polyvinyl Chloride.

ISDN — Integrated Services Digital Network.

ISLU — ISDN Line Unit (*5ESS* Switch ISDN Line Equipment).

Jumper — Manually placed conductor connection(s) between terminations, usually on some form of distributing frame. The connection may be single or multiconductor. A jumper is also called a cross-connection.

Kb — Kilobit (1000 bits).

KS — AT&T Specification for inside plant product manufactured by other suppliers.

kV (Kilovolt) — 1000 volts.

LA (rating) — Limited Availability (replaces Manufacture Limited).

LAN — Local Area Network.

LATA — Local Access Transport Area.

LCIE — Lightguide Cable Interconnection Equipment.

LCR — Line Concentration Ratio.

LDS (Lightguide Distribution System) — A fiber distribution system utilizing AT&T *LGX* Distributing Frame and/or Distribution Shelf hardware.

LE (Line Equipment) — Switch Equipment associated with loop subscriber lines.

Lead Absorption — Practice of using IDFs to terminate miscellaneous equipment leads and routing a smaller subset to MDFs via tie pairs for reduced MDF termination space requirements.

Lead Groups — The categorization of equipment leads according to their function.

LEC — Local Exchange Carrier/Company.

LED — Light-Emitting Diode.

LET (Line Equipment Transfer) — Transfer of a circuit from one line equipment to another.

LG — Lightguide.

LGX Distributing Frame — AT&T flexible fiber distributing frame used to cross-connect or interconnect fiber circuits.

LGX Distribution System — A cross-connect and/or interconnect system for lightguide media.

LGX — A trademark of AT&T used to describe a fiber distribution system or a fiber distributing frame.

Lightguide — Used to describe AT&T fiber optic media products including cable, connectors, and interconnection devices.

Lightwave — Particles of light known as photons traveling in waves. The length of the waves determines the light's color, speed, and behavior in a lightguide.

Lineup — A contiguous row or line of framework modules or verticals in a building.

LIU — Line Interface Unit.

LMDF — Lightguide Main Distributing Frame.

LNI — Line Network Interface.

Load Balancing — The process of assigning line equipment to customers to maintain a uniform distribution of traffic in a switching system.

Local Switches — End office (class 5) switching systems to which customer loops or lines are connected.

LOIS — Location Oriented Identification System.

Long Jumper — A cross-connect that runs between two separate frame bays, modules, or zones that are not adjacent.

Loop — Facilities domain between a Central Office and its served customers. (Compare with IO.)

LPCDF (Low-Profile Conventional Distributing Frame) — AT&T rugged, low-height, double-sided conventional DF.

LPDPF (Low-Profile Double-Sided Protector Frame) — AT&T double-sided, conventional protector frame.

LPDSPF — Replaced by LPDPF.

LSCIE — Lightguide Stranded Cable Interconnection Equipment.

LST (Line Station Transfer) — Coincident transfer of a circuit facility and equipment.

LTD — Limited.

LX — Integrated Loop Carrier Switch Interface Equipment.

mA (Milliampere) — .001 amperes.

Marker Lead — Equipment lead(s) associated with status or control support.

Mb — Megabit (one million bits).

MD — See DA.

MDF (Main Distributing Frame) — A DF on which both OSP and equipment cables are terminated.

ME (Miscellaneous Equipment) — Combining term for types of signaling and conditioning equipment terminated on DFs (such as bridge lifters, echo suppressors, MFT, etc.).

Mechanized Assignment — Assignment logic provided by computer system(s).

MEDF — Miscellaneous Equipment Distributing Frame.

MELD — Mechanized Engineering and Layout for Distributing Frames; AT&T frame engineering system.

MFT (Metallic Facilities Terminal) — A voice frequency terminal that combines voice frequency transmission and signaling functions in one unit.

ML — Maintenance Line.

MLHG — Multi-Line Hunt Group.

MLSI — Maintenance Line Status Indicator.

MM — Multimode.

MOD — Module.

Modular Distributing Frame — A distributing frame (usually single-sided) whose unit modules are usually sheet metal bays.

MS (Main Station) — Switched POTS services.

MT (Message Trunk) — A circuit connecting two switching entities.

Multiplexing/Demultiplexing — The process of combining/separating a number of channels into/from a single special channel for transmission.

MUX (Digital Multiplexers) — Equipment that provides an interface between different bit rates in the digital network. Multiplexers combine/separate a number of individual channels into/from a common bit stream for transmission.

NEBS (Network Equipment-Building System Standards) — *Bellcore* spatial and environmental specifications for design and installation planning of new equipment systems to be located in wire centers.

Network Bay Frame — An AT&T bay frame with unequal mounting flanges typically used for transmission equipment.

Network — A planned organization of multiple elements that allows one element to be connected to another. (Also see DF Network.)

NNX Code — The first three digits of the telephone number (the Central Office code).

OCRF — Optical Cable Rearrangement Facility.

ODA — Office Data Assembler; *5ESS* Switch Translation Data Assembly.

Optical Fibers — Fibers through which light may be transmitted with small intensity losses.

ORB (Office Repeater Bay) — Equipment that provides the interface between a T-carrier circuit and the DSX. It regenerates the incoming signal to the DS-1 (or DS-1C) level and provides line powering to the outside plant repeaters.

Order Activity — The sum of work orders and service orders generated per unit time.

OS (Operations System) — Mechanized systems that are designed to support administration, operation and maintenance functions. They maintain records, monitor network growth, and assist in planning, engineering, and assignment.

OSHA — Occupational Safety and Health Act.

OSP (Outside Plant) — The part of the telephone system that is located physically outside of telephone company buildings.

OSS — Operations Support System (for example, CFAS); same as OS.

Outside Plant Cable — Combining term for exchange cable and trunk cable.

OW (Order Wire) — Provides talking facilities between frames or between the CO and outside plant locations.

P&CE — AT-9049 PF Protector and Cable Enclosure.

PACE (Program for Arrangement of Cables and Equipment) — AT&T initial mechanized layout system used for spreading loop cable, line equipment, and tie cables on COSMIC frames (predecessor to MELD).

Pair Gain — Reduced exchange cable requirements achieved by use of multiplexing or concentration technologies.

Party Line — Two, four, eight or more customers sharing the same line to a Central Office.

Pathways — A physical means for routing and holding cable or jumper media. The boundaries of the pathway are formed by retaining devices that control the direction and location the cables/jumpers may take.

PBX (Private Branch Exchange) — A private switching system, either manual or dial, usually serving an organization such as a business company or a government agency and usually located on the customer's premises.

PDS — Premises Distribution System.

PEG — Planning and Engineering Guidelines.

PF (Protector Frame) — A frame that solely provides protected termination for outside plant cable (has no cross-connect capabilities).

PGS — Pair Gain System (for example, *SLC*®).

Pileup — The mass of jumpers or cables passing through a specific cross-section of a frame, shelf, or cable rack.

Planning Horizon — The time interval a plan is intended to cover.

POI (Point of Interface) — The interface between a LEC (Local Exchange Carrier) and a long distance carrier.

POTS (Plain Old Telephone Service) — Voice communication public telephone service provided via switched facilities.

Preferential Assignment — The assignment of facilities and equipment with the objective of short jumper length in addition to other considerations (for example, load balance, class of service, etc.).

PROT — Protector/Protection.

PVC — Polyvinyl Chloride.

PWB — Printed Wiring Board.

R — Ring conductor.

Random Assignment — The process of assigning equipment necessary to provide service irrespective of jumper length.

RBOCs — Regional Bell Operating Companies.

REG (Range Extender with Gain) — A solid-state circuit package that will permit the extension of conductor loop signaling and transmission for long loops served from a Central Office.

Rehabilitation — Modernization of an existing DF using retermination, compression, additional ironwork, and mining techniques.

Remote Site — An unattended equipment location outside a CO.

Repeater — Gain device used to correct distortion or loss of volume in a circuit.

Retermination — Transferring terminated conductors to different termination points, for example, to achieve a different DF layout or install a new DF.

Riser Cable — Large-pair, fire-retardant cable for vertical distribution of OSP between CEF and ACEF or CFR. (Also see Stub Cable.)

RISLU — Remote Integrated Services (ISDN) Line Unit.

RSM — Remote Switch Module.

RSS (Remote Switching System) — A remote concentrator-carrier switching system that operates under the control of a host ESS.

RT (Remote Terminal) — Equipment that provides multiplex/demultiplex and analog/digital conversion for loop carrier systems located in the distribution network outside the host CO.

SD — Schematic Drawing.

SDA — Slide Drawer Assembly Protector Frame.

SDDF — Subscriber Digital Distributing Frame, typically for cross-connecting ORBs to OSP.

Sheath — The outer covering of a cable, usually lead or plastic.

Shielded Cable — A cable having an electrostatic shield around the pairs and inside the sheath.

Shoe — Temporary test access to a circuit, typically effected with a plug-ended test cord connected at a CO connector on a DF or PF.

Short Jumper — A cross-connect entirely contained within a single bay/module/zone or run between two adjacent bays. Short jumpers do not require use of an express trough on modular frames.

Signaling — The transmission of address (pulsing), supervision, or other switching information between stations and switching systems, including any information required for billing.

SLC (Subscriber Loop Carrier) — Pair-gain systems for application to subscriber loops.

Sleeve — A third conductor (Tip and Ring) usually used for equipment control.

SMAS (Switched Maintenance Access System) — A Central Office equipment system that provides for remote test access to circuits via a central controller and in-circuit test points.

SMDF (Subscriber Main Distributing Frame) — A distributing frame that terminates loop OSP and associated subscriber line equipment.

SO (Service Order) — An order prepared in the commercial department of an operating company at the request of a customer to establish a service, change an existing service, or discontinue a service.

SONET — Synchronous Optical Network.

Span — A transmission facility between two COs or between a CO and a remote site.

Special Service — Any of a variety of switched services, nonswitched services, or special rate services. Examples are PBX, WATS, Foreign Exchange, Answering Service, Off-Premise Extension, and burglar alarms.

SPL (rating) — Special rating used on some older equipment drawings (no longer in use).

Splice — Direct connection of metallic conductors or lightguide fibers.

Split-Terminated — Termination of separate lead groups from the same equipment to different frames.

SS — Special Service.

SSLPDF (Single-Sided Low-Profile Distributing Frame) — AT&T versatile conventional single-sided DF.

SSM — Special Service Measures.

SSP — (1) Special Service Protection. (2) Solid State Protector.

STD (rating) — Replaced by GA (General Availability).

Strap Cable — Tie pair cable joining a PF with associated distributing frames.

STS — Synchronous Transport Signal.

Stub Cable — Cable between CEF or CRF and DF connectors (sometimes called Tip Cable). (Also see Riser Cable.)

Subscriber Line — A telephone channel from the Central Office to the subscriber's telephone.

Switchboard Cable — Cables for interconnecting Central Office equipment or for terminating equipment on distributing frames.

Switching Entity — A specific switching system with a wire center.

Switching System — An electromechanical or electronic system for connecting lines to lines, lines to trunks, or trunks to trunks.

SWW — Single Wire-Wrap Terminals.

SXS (Step-by-Step) — An electromechanical switching system.

T — Tip conductor.

T-Carrier System — A complete end-to-end digitally multiplexed facility. T1 carrier operates at 1.544 megabits/second; T-1C operates at 3.152 megabits/second.

T-Drawing — Termination Schematics.

T1 Cross-Connect — A cross-connect system for T1-carrier circuits. Unlike a DSX, a T-carrier cross-connect involves circuits with different signal levels that may have line powering.

Tb — Terabit (one trillion bits).

TCAS — T-Carrier Administration System.

TDF (Trunk Distributing Frame) — A switching system IDF used for message trunk load balancing and interoffice signaling compatibility.

TDM — Time Division Multiplexing.

TE (Trunk Equipment) — Switching equipment associated with the connection of trunk circuits.

TELCO — Telephone Company.

TEO — Telephone Equipment Order.

Terminal Strip — A connecting apparatus with many terminals that are not enclosed in a housing.

Terminal — (1) A metallic lug or binding post on apparatus connecting conductors. (2) Equipment at the end of a communication circuit.

Termination Apparatus — Combining term for DF apparatus used to terminate facility/equipment cable on DFs (that is, connectors, terminal strips, and blocks).

Termination — Conductor connection on a termination apparatus.

Test Access Equipment — Equipment such as test jacks and SMAS that provide access to a circuit for testing.

Test Shoe — See Shoe.

Tie Cable — Building cable interconnecting two distributing frames or distributing frame regions.

Tip and Ring — The U.S. Standard names of the two conductors associated with a two-wire cable pair.

Tip Cable — See Stub Cable.

TIRKS (Trunk Integrated Record Keeping System) — An OS program for maintaining data required in the Trunks and Special Services operations dealing primarily with interoffice facility and equipment inventory, assignment, scheduling, and planning.

TLK — Talk.

TMDF (Trunk Main Distributing Frame) — Any distributing frame terminating interoffice trunk cable and equipment but not subscriber cable.

Toll Switches — Switching systems that provide telephone service outside a designated local exchange service area.

TPDF (Tie Pair Distributing Frame) — A distributing frame that only terminates tie pairs from other DFs.

Transmission — The passage of electrical energy from one point to another along a path, or the passage of radio waves through space between transmitting and receiving stations.

Trough — See Express Trough and Vertical Trough.

Trunk Cable — Cable between two Central Offices. (Same as Interoffice Cable.)

Trunk — A communications channel between two switching systems.

TSPS (Traffic Service Position System) — A stored program control system that provides operator assistance for toll calls.

TST — Test.

TX — Integrated Trunk Carrier Switch Interface Equipment.

UFOC — Universal Fiber Optic Closure.

UL — Underwriters Laboratories.

Ultimate Capacity — The maximum terminations/jumpers that a frame system with finite apparatus/jumper space is expected to carry by design plan for layout, assignment, and operation.

Unbridging — The removal of a half-tap.

Uniform Spread — Uniformly distributed layout of terminations across the length of a frame.

Universal Carrier — COTs with frame-terminated channels. (Compare with Integrated Carrier.)

*UNIX** — AT&T General Purpose Computer Operating System.

VCEF — Vaultless Cable Entrance Facility (CO OSP Cable Splice Cabinet).

VDF/VMDF — Vertical (Upright) Side of a DF. (Compare with HDF/HMDF.)

Vent Safe — Assurance of gas tube protector over-voltage protection in the event of gas leakage.

VERT — Vertical.

Vertical Trough — A jumper pathway that is provided between adjacent bays/modules to allow jumpers to run vertically on the frame from one bay/module to another, or from a bay/module to the upper or lower express trough.

VF — Voice Frequency.

Voice-Frequency Trunk Pair — Trunk cable used for a single communication channel (not multiplexed or concentrated).

WIP — Workcenter Information Package.

Wire Center — See CO (Central Office).

Work Order Activity — Quantity of work orders generated per unit time.

Work Order — An internal Telco order to add, remove, or change facilities or equipment.

XBAR (Crossbar System) — A switching system using contact spring switches operated by relay controlled horizontal and vertical bars.

XFS — Cross-Connect Frame Systems (Combining term for DFS, DSX, and FDF).

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* Registered trademark of UNIX System Laboratories, Inc.

XLBET — Extra Large Building Entrance Terminal.

Y-Splice — A direct tap of a pair of wires onto another pair of wires.

Zone Spread — DF layout of outside plant and line equipment terminations into partitioned zones in approximately equal quantities.

Zones — DF regions (modules or range of verticals) defined for termination layout engineering and/or short jumper assignment administration.

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