

# CONTRACTOR REPORT

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## Telecommunications Administration Standard

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# **Telecommunications Administration Standard**

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## **Abstract**

The purpose of this standard is to establish a uniform administration procedure for a manageable communication system throughout Sandia. The more manageable the system, the more reliably and efficiently it will operate. Sandia is committed to offering a dependable and quality service to its customers. With this standard, Sandia is able to provide the service customers require to maintain and operate the communication system.

# Acknowledgments

Putting together and writing a standard document can be a difficult task. This difficulty comes into play when you are the only player with the experience and input. Thankfully, I was not the only player. The input I received over the past year and the experienced players involved made this document possible. The team effort was a comfort and made my job easy. I would like to give credit to the following players for their continuing input and experience: Roger Adams; Brian Amberg<sup>2</sup>; Paul Baca<sup>2</sup>; Dennis Bateman; Todd Blake<sup>2</sup>; Dave Braggs<sup>2</sup>; Lawrence Chavez<sup>2</sup>; Jon Eberhart<sup>3</sup>; Tim Francis<sup>3</sup>; Scott Harford<sup>2</sup>; Bill Hill<sup>2</sup>; Fred Jones; Tobin Lyon<sup>2</sup>; Frank Martin; Robbi Martinez<sup>2</sup>; Kenny Montano; Paul Montavon<sup>2</sup>; Dennis Montoya<sup>2</sup>; Ron Moody; Jay Peterson<sup>3</sup>; George Rivera; Phillip Salazar<sup>1</sup>; Ray Sanchez<sup>2</sup>; Bob Silva; Richard Skinner; Stephen Sleeper<sup>2</sup>; Ray Tafoya<sup>2</sup>; Ron Wells<sup>2</sup>; Ted Wheaton<sup>3</sup>.

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# Acronyms

IDR	Intermediate Distribution Room
ISDN	Integrated Services Digital Network
LIU	Lightguide Interface Unit
TCC	Technical Control Center

# Telecommunications Administration Standard

## Introduction

The administration of telecommunications is critical to proper maintenance and operation. The intent is to be able to properly support telecommunications for the distribution of all information within a building/campus. This standard will provide a uniform administration scheme that is independent of applications, and will establish guidelines for owners, installers, designers and contractors.

This standard will accommodate existing building wiring, new building wiring and outside plant wiring. Existing buildings may not readily adapt to all applications of this standard, but the requirement for telecommunications administration is applicable to all buildings.

Administration of the telecommunications infrastructure includes documentation (labels, records, drawings, reports, and work orders) of cables, termination hardware, patching and cross-connect facilities, telecommunications rooms, and other telecommunications spaces (conduits, grounding, and cable pathways are documented by Facilities Engineering).

The investment in properly documenting telecommunications is a worthwhile effort. It is necessary to adhere to these standards to ensure quality and efficiency for the operation and maintenance of the telecommunications infrastructure for Sandia National Laboratories.

## Cables

### Cable Names

It is imperative to keep records of each cable installed at Sandia National Laboratory facility. The Department of Energy (DOE) requires Sandia to manage each telecommunication cable installed. With this requirement it is necessary to name each cable within our facility. Each cable

shall have a unique identifier assigned to it to serve as a link to the cable record. The cable shall be labeled at both ends; cables that are spliced together shall be administered as separate cables.

A portable labeling system printer shall be used to identify cables. All cables shall be marked with a non-shrink wire marker sleeve. The electrical contractor shall label all cables. A Sandia communications representative shall provide information to the electrical contractors on the numeric sequence.

### Copper Cables

A copper cable is defined as an assembly of electrical conductors insulated from each other and usually twisted around a common core. These conductors are the pathways for electrical signal transmission.

Each copper cable installed shall have a name associated with it regardless of the number of pairs it contains (Figure 1). The information needed for a copper cable name includes the following:

- building name (Note: Intrabuilding cable names shall include this information. Interbuilding cable names shall not have building numbers associated with them; the physical label on the cable(s) shall not have the building number.)
- unshielded twisted pair
- red (classified) or black (unclassified)
- building floor number
- conductor type
- a sequential number from 0001 to 9999

If any of the characters change, with the exception of the last four, then the numeric sequence shall start at 0001.

As stated, a copper cable name includes the building floor designation. If the cable is a horizontal cable, then the floor designation shall be the same as the desktop outlet location. If the cable is a backbone cable, then the

floor number shall be the point of origin for that cable. For instance, if a backbone cable went from the TCC/basement to the Intermediate Distribution Room (IDR)/second floor, then the floor designation would be the basement. If the horizontal cable went from the IDR/1st floor to the desktop/2nd floor, then the floor designation would be the 2nd floor.

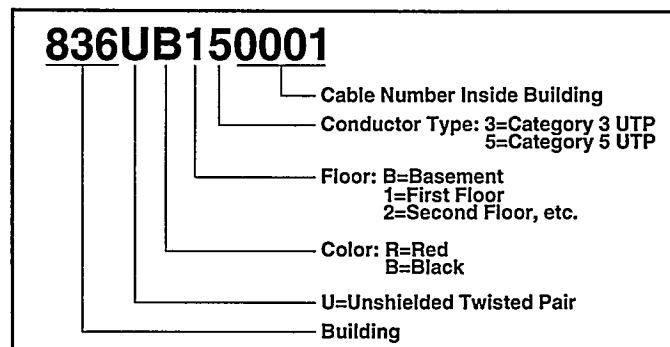


Figure 1. A Typical Copper Cable Name.

The standard copper cable installed at Sandia National Laboratories is defined in SAND93-0002 Revised *Intra-Building Telecommunications Cabling Standard for Sandia National Laboratories*.

## Optical Fiber Cables

An optical fiber is a flexible, optically transparent fiber, as of glass or plastic, through which light can be transmitted by successive internal reflections. Optical fiber cable requires a naming scheme similar to that of the copper cable (Figure 2).

Each optical fiber cable installed shall have a name associated with it regardless of the number of fibers it contains. The information needed on an optical fiber cable includes the following:

- building name (Note: Intrabuilding cable names shall include this information. Interbuilding cable names shall not have building numbers associated with them; the physical label on the cable(s) shall not have the building number.)
- fiber optic
- red (classified) or black (unclassified)
- building floor number
- conductor type
- a sequential number from 0001 to 9999

If any of the characters change, with the exception of the last four, then the numeric sequence shall start at 0001.

As stated, an optical fiber cable name includes the building floor designation. If the cable is a horizontal cable, then the floor designation shall be the same as the desktop outlet location. If the cable is a backbone cable, then the floor number shall be the point of origin for that cable. For instance, if a backbone cable went from the TCC/basement to the IDR/second floor, then the floor designation would be the basement. If the horizontal cable went from the IDR/1st floor to the desktop/2nd floor, then the floor designation would be the 2nd floor.

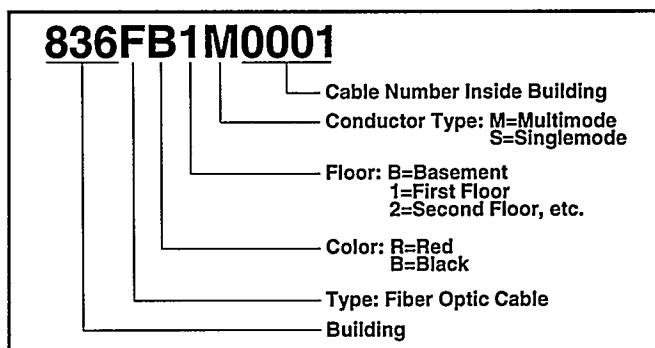


Figure 2. A Typical Optical Fiber Name.

The standard optical fiber cable installed at Sandia National Laboratories is defined in SAND93-0002 Revised *Intra-Building Telecommunications Cabling Standard for Sandia National Laboratories*.

## Intermediate Distribution Room (IDR) Equipment

### Intermediate Distribution Room (IDR)

The IDR is a room dedicated for communication equipment and is the central location for cable distribution within a building. This room can serve red and black networks, optical fiber cable and copper cables. All IDRs are numbered. When there are IDRs on multiple floors; then the lowest IDR location will be the lowest IDR number. Some IDRs will have building room numbers associated with them. IDRs are not numbered according to the floor.

### Termination Hardware

Each termination hardware unit shall be labeled with a unique identifier to serve as a link to its record. The ter



mination position for cable pairs shall be recorded. Recording the termination position allows a traceable circuit from end to end.

## Copper Cable 110 Wiring Units

The 110 wiring units allow cables to be cross-connected from one termination point to another. Two types of wiring units are floor standing frames or wall-mounted 110 wiring block(s) for minimum building wiring.

There are 12 300-pair 110 wiring blocks on a copper cable frame; a wall-mounted wiring block can be 100 or 300 pair. Each block can have its own function. There are groups of blocks for the following:

- trunk cables (cable between buildings) and/or main cables (cables within the building),
- power cables (cables that supply -48 volt for ISDN phones),
- LAN cables (cables from a frame to a network hub), and
- user cables (cables from a frame or block to the desktop).

Each 300-pair block has 12 25-pair wiring strips. These strips can contain 6 4-pair cables. See Figure 3 for cable configuration for 4-pair cables.

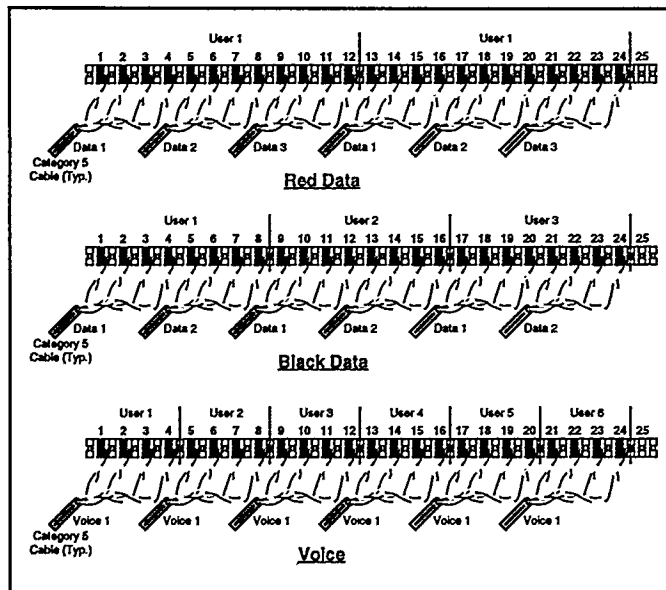


Figure 3. 25-Pair Strips.

All cables shall be labeled on the 110 wiring blocks as individual pairs (Figure 4). There can be many individual cables in each group of blocks. The numbering of

pairs for a group of blocks shall be begin with 1 and go to the end of the group. For example, 3 300-pair cables for the trunk cable are numbered from 1 to 900.

The Sandia communication database shall include an acronym for the data and voice wiring block designation. These acronyms will vary depending on whether it is a data frame or a voice frame. This is the only label on the frame that will separate data from voice (see Figure 5).

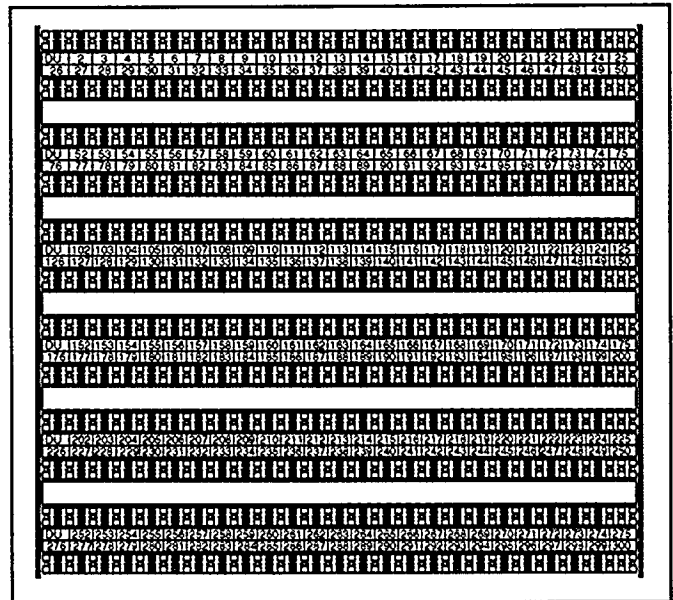


Figure 4. 110 Punchdown Block.

*Data Frame: 8361FADT*

DT=Data Trunk Cable

DM=Data Main Cable

DL=Data LAN Cable

DU=Data User Cable

*Voice Frame: 8361FAVT*

VT=Voice Trunk Cable

VM=Voice Main Cable

VP=Voice Power Cable

VU=Voice User Cable

Figure 5. Data and Voice Frame Acronyms.

The blocks shall be labeled with the pair count using a spreadsheet template (see Figure 4). The electrical contractor shall label the blocks.

110 wiring blocks for the trunk, main, and user cables shall be labeled starting from pair one to the end of

that group of cable count, with the exception of the labeled acronym (DT, DM, etc.).

The blocks for the concentrators shall be labeled with the concentrator number, slot, and port numbers (see Figure 6). Sandia communication personnel shall label these 110 wiring blocks.

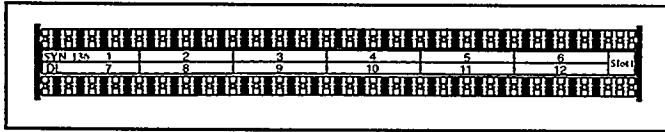


Figure 6. Concentrator Block Labels

The frame name does not distinguish between red and black or voice and data, and each frame shall have a designated label. The electrical contractor shall label all frames with an engraved label attached to the frame (Figure 7).

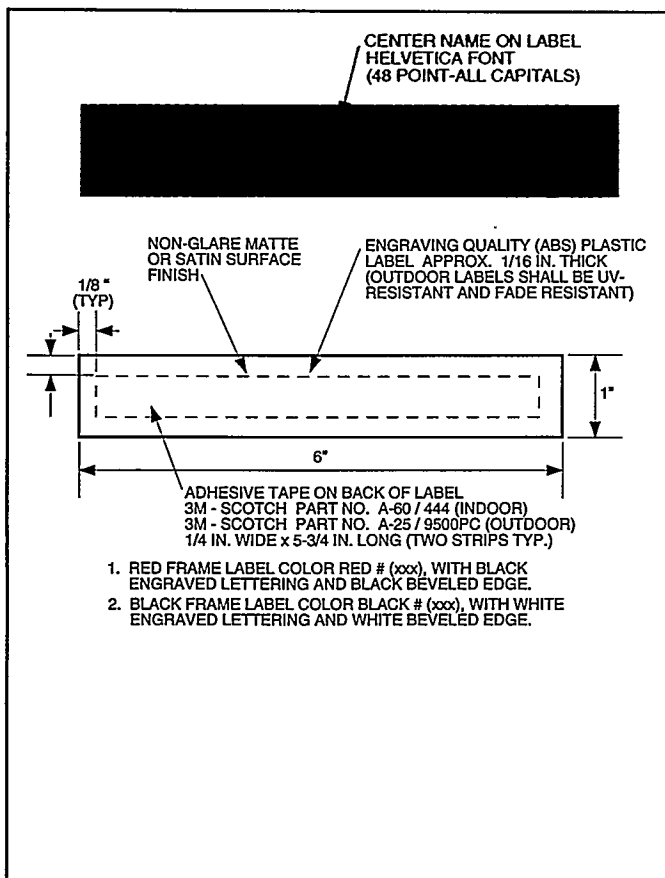


Figure 7. 110 Frame. (The sequential character shall start over when any of the other characters change.)

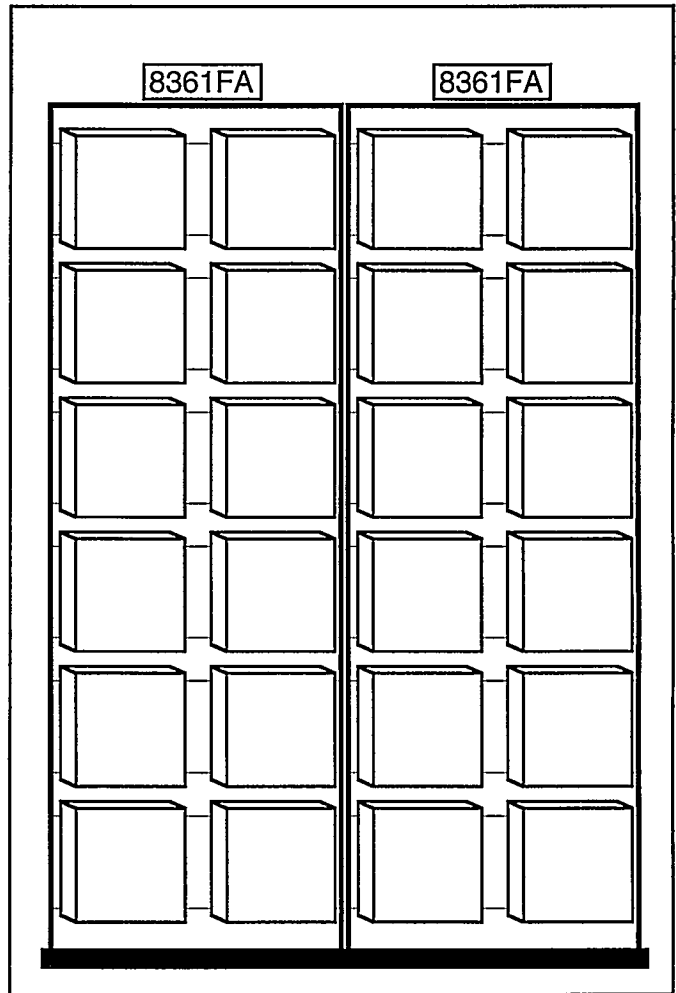


Figure 7. Continued.

## Lightguide Interconnection Unit (LIU)

The LIU is a wall-mounted optical fiber termination unit and is the interconnect between one cable and another or from a cable to a concentrator.

This unit can contain a trunk, main, or user fiber cables.

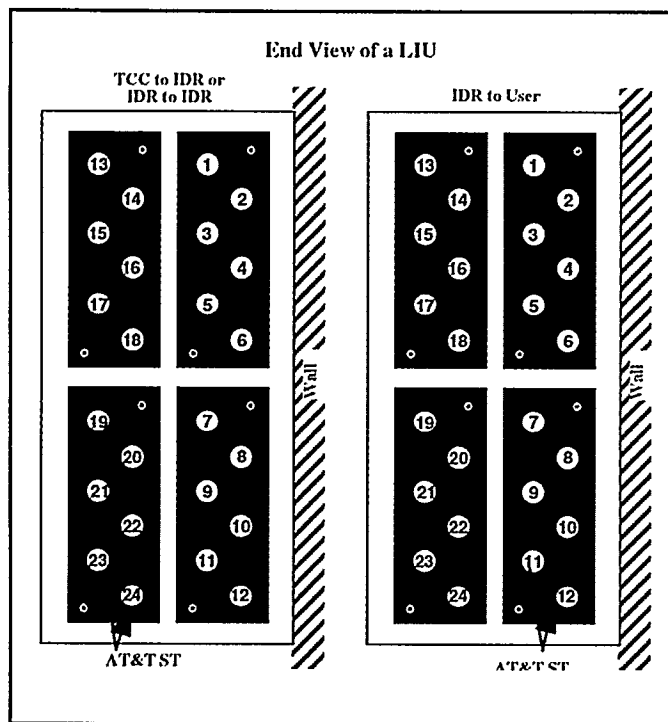


Figure 8. LIU Panel Connector Sequence

The LIUs are labeled like the 110 frames. There is a significant amount of LIUs used in one IDR. The LIU name does not distinguish between red and black or voice and data. LIUs hold 24 strands of optical fiber cable. Numbering the individual fiber strands in a LIU shall always be from 1 through 24 for cables with 24 fiber strands or less. Multiple LIUs shall be used for cables greater than a 24-fiber cable and shall be labeled sequentially according to the number of fiber strands (Figure 8). The LIU label shall have the building number, the IDR number, and the numeric sequence. This shall be an engraved label attached to the door of the LIU (Figures 9 and 10).

The cable and room name(s) are also on the LIU for convenience. Cable number 1 shall be the cable terminated at the top of the LIU closest to the wall. The electrical contractor shall label all LIUs.

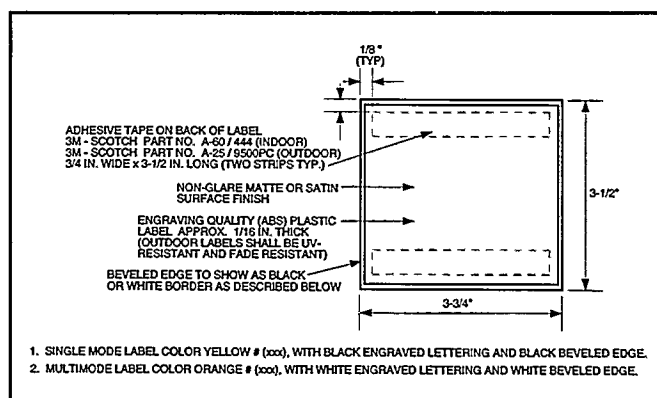


Figure 9. LIU Engraving Template.

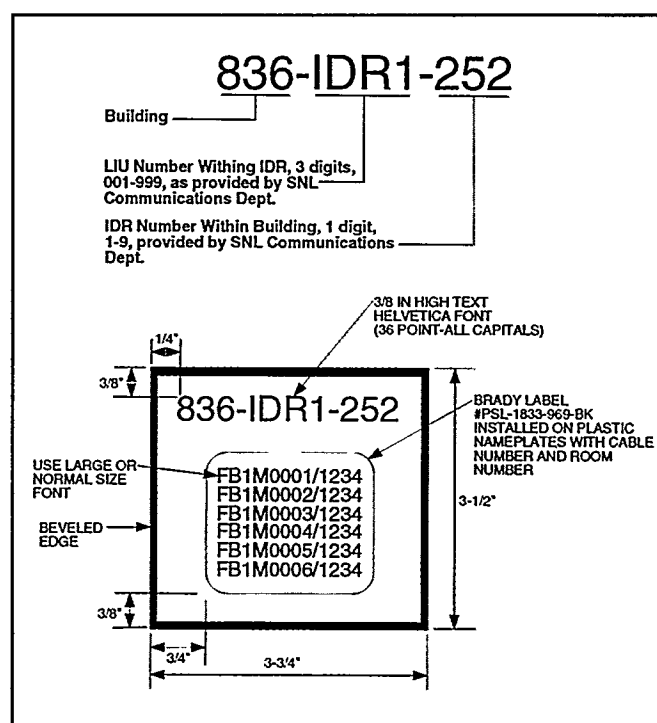


Figure 10. LIU Label. (The sequential character shall start over when any of the other characters change.)

## Communication Cabinet

The floor-standing communication cabinets contain the hub equipment, the lightguide termination shelf unit, and any other appropriate equipment. The cabinet label shall have the building number, "R" if it is a red cabinet, or "B" if the cabinet is black, the IDR number, and a sequential character (Figure 11). The red and the black cabinets shall be labeled as two separate systems. Cabinet label size and color shall be the same as the 110 frame labels.

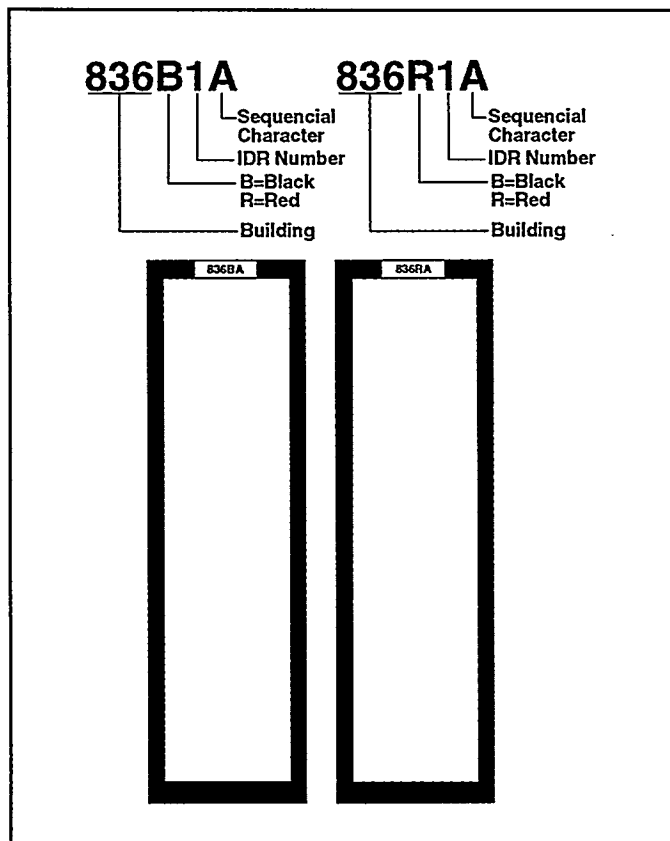


Figure 11. Communication Cabinet.

## Lightguide Termination Shelf

The lightguide termination shelf is an optical fiber termination shelf that is rack mounted in a communication cabinet. This shelf is the interconnect between one fiber cable to another. Multiple shelves shall be used for cables greater than a 72-fiber cable and shall be labeled sequentially according to the number of fiber strands. A single shelf may hold more than one trunk, main, or user cable. The numbering sequence starts at 1 for each trunk and main cable within the shelf and continues to the last fiber strand within that cable. The 4-fiber cable for users shall

be numbered according to the number of couplers in the shelf. Each individual coupler shall be labeled with the appropriate number (Figure 12).

Each shelf shall contain either singlemode or multimode, not both. The cable(s) terminated within the shelf shall be labeled on the outside door of the shelf. This shall be labeled by the electrical contractor with a Brady Label or equivalent.

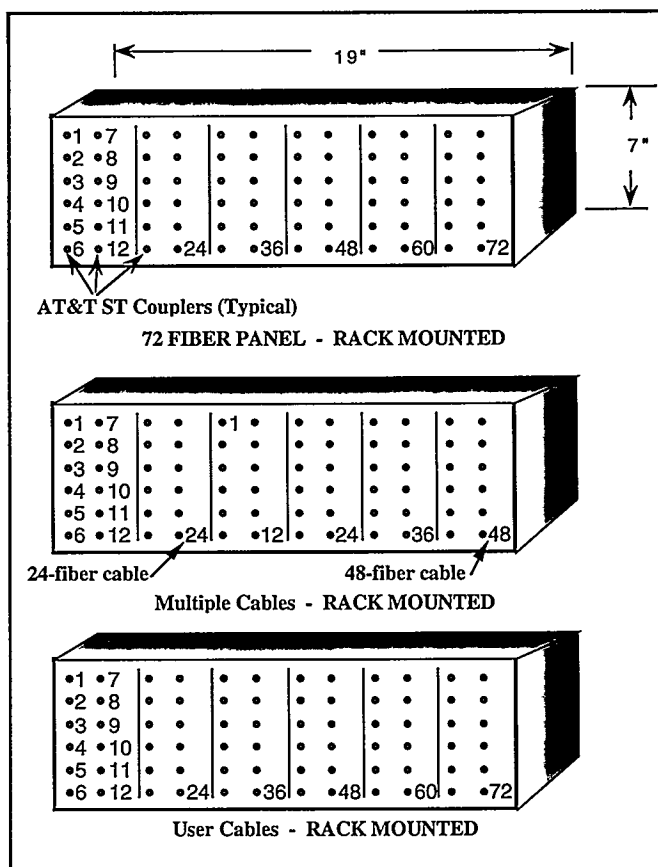


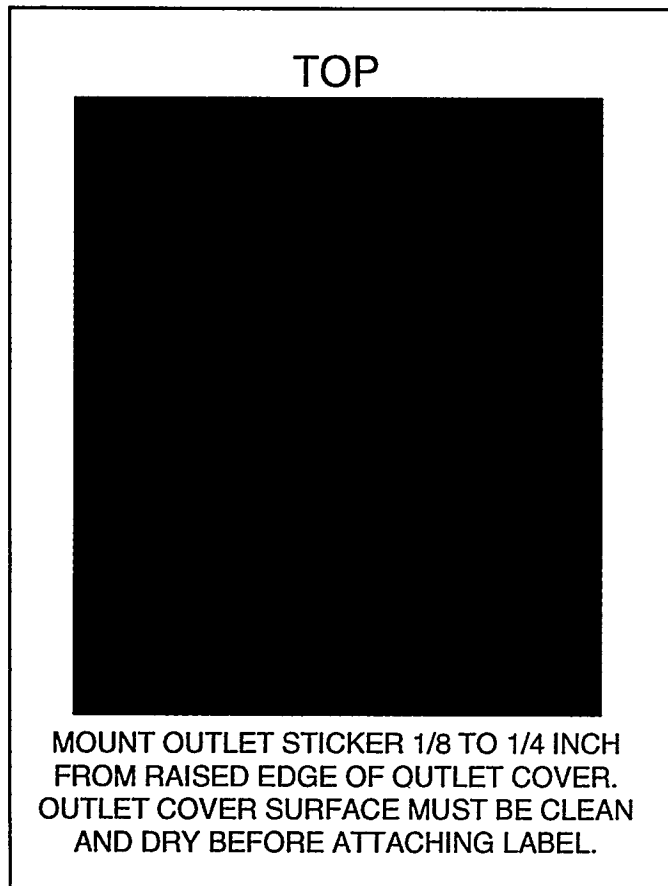
Figure 12. Lightguide Termination Shelf.

## Communication Outlet

### Red and Black Outlets

The outlets installed are colored, multimedia outlets. The red outlet indicates a classified network, and the black outlet indicates an unclassified network. Each of these outlets is labeled with a sticker provided by the Sandia Communications Department. These stickers have a preassigned numeric value and are colored red or black for the appropriate outlet. The electrical contractor shall

label the outlet unless then directed by the Sandia Communication Representative, then Sandia shall label the outlet (Figure 13).



**Figure 13.** Communication Outlet.

A user identifier number shall also be used as a label on the outlet. This number is generated by the Sandia Communications Department for each outlet. This adhesive label shall be attached to the inside of the outlet box. (Labels shall be attached where possible on older types of outlets.) Circuit information shall also be recorded on this label as well as the building number, room number, and outlet number (Figure 14).

CKT. ID # _____
BLDG/RM _____
SYN/SL/PO _____
DROP BOX _____
TECH CONTOL _____

**Figure 14.** Sticker for Red and Black Outlets.

## Communication Database and Maps

### Communication Database

The Communication Database is a database maintained by Sandia. This database allows communication circuits to be documented, trouble calls generated, and work orders generated by Sandia personnel. The field labeling shall be input into this database by Sandia Communication personnel. Any information pertaining to cables, pathways, cross-connect/patch panels, cabinets, equipment, and telecommunication rooms shall be documented in this database. See "Documentation Cables Procedures" in the *Communication Operations Manual* for detailed information on maintaining this folder.

It is critical to keep this database up to date. Any change in a circuit must be documented. The amount of time inputting information into the database is insignificant compared to the time it takes to physically trace out an incorrectly documented circuit.

## Communication Maps

The Communication Maps are drawings and documentation within the Sandia Communication Department. These documents and drawings contain information for red and black, copper and optical fiber, cable names, cabling charts, and IDR layouts. See "Documentation Cables Procedures" in the *Communication Operations Manual* for detailed information on maintaining this folder.

It is also critical to keep this folder up to date. Any change in a circuit must be documented. The amount of time inputting information into the maps is insignificant compared to the time it takes to physically trace out an incorrectly documented circuit.

## Definitions

Intrabuilding cable	wiring within a building.
Interbuilding cable	wiring entering a building
Horizontal cable	telecommunications wiring system that extends from the work area telecommunications outlet to the intermediate distribution room or Tech Control Center.
Backbone cable	interconnections between intermediate distribution rooms, entrance facilities, equipment rooms, and tech control centers.
Desktop	work area.
LAN cable	a copper or optical fiber cable interconnect between the termination point and the network equipment (typically the hubs).

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