Cabling Methods
Installation Planning and Safeguards

Contents

(continued)

Contents, continued

1. General

1.1 Purpose

This practice provides central office switchboard and power cable information on:

0 Preliminary planning.

- Safeguards.
- Tools and materials.
- Process.

1.2 Filing Instructions and Supersedures

Discard all previous issues and associated addenda of this practice and file this issue numerically in your GTE Telephone Operations practices set.

This practice supersedes and cancels:

- All policies, procedures, general instructions, letters, and memoranda which address this subject.
- Any document which provides information contrary to the information contained in this practice.

1.3 Reason for Reissuing

This practice has been reissued to:

- Add Section 3.19 covering bare wire installation requirements.
- Add Section 3.20 covering cable tags/labels.
- Correct references to GTE Telephone Operations practices.

1.4 Responsibility

This practice was published by the GTE Telephone Operations Administrative Services Department. For more information about this practice, contact the Headquarters COE Construction Department.

1.5 Disclaimer

This practice was prepared solely for the use of GTE Telephone Operations. It must be used only by its employees, contractors, customers, and end users when installing, operating, maintaining, and repairing GTE Telephone Operations' equipment, facilities and services. Any other use of this practice is forbidden. The information contained in this practice may not be applicable in all circumstances and is subject to change without notice. By using this practice the user agrees that GTE Telephone Operations will have no liability (to the extent permitted by applicable law) for any consequential, incidental, special, or punitive damages that may result.

2. Overview

2.1 Introduction

Careful planning of the central office cable process is required to determine and/or ensure:

- Employee safety.
- Adequate floor protection.
- Tools and materials required for safeguard measures.
- Availability of tools and materials.
- Equipment protection.
- Manpower planning.
- When, where, and how the cables are to be run.
- The specific order in which the cables are to be run.
- Cable separation and zoning requirements.
- Paired cable, minimum/maximum cable length requirements.
- Cable zoning and separation requirements.
- Paired cable, minimum/maximum cable length requirements.

Since site-specific equipment floor plan arrangements and building construction differ due to building shape/size, materials, equipment provided, etc., it is impossible to provide information in this practice that would cover specific instructions for all possible installations. Consequently, individual job requirements may alter the general instructions given within this practice. Good judgment must be used, and approval from responsible supervision must be obtained before varying from the accepted standards recommended in this practice and other 256-050 series cabling practices.

2.2 Preliminary Planning

Before beginning the cabling process, the installer must review the following documents for the site-specific installation:

- Site cable running specifications.
- Installer notes specification.
- Equipment power, distribution, and grounding job drawings.
- Floor plan and cable rack job drawings.
- GTE Telephone Operations Practices 256-050-204 and 256-050-205, regarding switchboard cable.
- GTE Telephone Operations Practices 256-050-206 and 256-050-208, regarding power cabling.

2.2 Preliminary Planning, continued

Site-specific floor plan arrangements may differ because of factors such as:

- Building size.
- Type of building construction.
- Type and quantities of equipment provided.

Since each installation is different from other sites, it is impossible to provide specific instructions for all possible installations. Individual job requirements may alter the general instructions given in this practice. Before varying from the standards provided in this practice, the installer must obtain the responsible supervisor's approval.

2.3 References

The following chart provides sources of supplementary information relating to this practice. The documents could be required for performing certain tasks.

See...	For Information About...
Practice 117-200-005	Safety Hats – Description and Use
Practice 117-400-004	Eye Protection -Description and Use
Practice 200-001-000	Safety Precautions
Practice 256-050-204	Cabling Methods Central Office Switchboard Cables – Running and Securing
Practice 256-050-205	Cabling Methods Central Office Switchboard Cables – Butting, Stripping, Fanning
Practice 256-050-206	Cabling Methods – Central Office Running and Securing Power Cable
Practice 256-050-207	Terminating Power Cable Using Compression Connectors and Lugs
Practice 256-050-208	Cabling Methods Central Office Switchboard Cables – Connecting -Wrap and Solder Methods
Practice 256-050-209	Cable Buzzing
Practice 256-050-211	Cabling Methods Connecting Wires – Solderless Wrap Method
Practice 256-050-216	Cabling Methods – Shielded and Coaxial
Practice 256-224-216*	Cabling Methods – GTD-5 EAX
Practice 742-200-070	Sealing Cable Openings

* Published by AG Communication Systems.

2.4 Tools and Materials

Installation tools and materials listed in this section and in the COE Installation Standard Tools and Test Equipment Handbook are required to perform switchboard and power cabling functions:

- Cable Reel Dispenser ("Mexican Hat" type), ID 589295.
- Roll-A-Reel Cable Dispenser.
- Cable Reel Holder Dispenser ("A" frame type).
- Cable Guide (roller type), ID 883585.
- Pulleys (obtained locally).
- Bag, Cable Sheathing Bag, ID 580268.
- Bag, Wire Clipping, ID 580267.
- Bender, Cable, ID 580273.
- Cutter, Cable, ID 572552.
- Cutter, Cable, 300 pr hand-powered, ID 574284.
- Cutter, Cable, 1" hand-powered, ID 572613.
- Slitter, Cable Sheath, ID 587285.
- Stripper, Cable (power), ID 578411.
- Stripper, Coax Cable RG58, ID 834444.
- Stripper, Coax Cable .24", ID 577660.
- Stripper, Coax Cable .26", ID 577661.
- Stripper, Coax Cable .48", ID 577662.
- Tape, Rubber Linerless 3/4" ID 528233.
- Tape, Measure Fiberglass 100', ID 578588.
- Tape, Barricade Caution, ID 571234.
- Twine, Lacing Waxed, ID 761383.
- C-Clamps, 1" deep (4" ID 580836, 6" ID 580837, 8" ID 580838).
- Needle, Chicago, Short, ID 584878.
- Tool, 287 (Evans Needle), ID 588803.
- End Cap, 2 Bar Channel (2 X 9/16"), ID 885099.
- End Cap, Auxiliary Frame (2 X 3/8"), ID 881380.
- End Cap, Cable Rack (3/8 X 1l/2"), ID 881381.
- End Cap, Grid Channel (1 X 2 X 1"), ID 881382.
- End Cap, Threaded Rod (1/2"), ID 881378.
- End Cap, Threaded Rod (3/8"), ID 881379.
- End Cap, Threaded Rod (5/8"), ID 881377.
- Protector Cover, Threaded Rod (1/2"), ID 883978.
- Protector Cover, Threaded Rod (5/8"), ID 883979.
- End Cap, Goalpost, ID 887437.
- End Cap, Cable Separation Bracket, ID 881376.
- Glove, Fingerless, ID 582182 (Large), ID 582181 (Medium), ID 582180 (Small).
- Gloves, Rubber, ID 881229.
- Hacksaw, ID 573951.
- Hacksaw Blades 12"/18, ID 573952.
- Puller, Wire, Insulated, ID 577181.

2.4 Tools and Materials, continued

- Mallet, Rubber, ID 584640.
- Mat, Rubber 27"x36", ID 571031.
- Mat, Canvas 2'x4', ID 576033.
- Tarpaulin, Canvas 10'x15', ID 578663.
- Sheeting, Protective Antistatic 20x100, ID 321015.
- Tie Wraps, ID 528328, ID 762957, or other approved tie wraps.
- Terminal, Block Wiring Jig for Sylvania Modular Frames, ID 881586.
- Tool, Cable Tie, Installing, ID 578937.
- Wire Wrap, Gun, Electric, ID 579002.
- Unwrapped Wire, hand 26-32GA, ID 588908.
- Unwrapped Wire, hand 20-26GA, ID 588791.

2.5 Switchboard Cable Information

All individual switchboard cable conductors consist of a solid-tinned copper wire, except for possibly connectorized (both ends) cables. Use solid-tinned copper wire cable for all cabling activity where wire wrap or solder termination of the leads is required. Only cables purchased that are connectorized on both ends may consist of either tinned or untinned wire.

All individual conductors are insulated with a semirigid polyvinyl chloride (PVC) sheath. The insulation of each conductor is color-coded by means of spiral stripes or circular bands of either one, two, or three colors.

The primary color code (blue, orange, green, brown, and slate) is used for the binders of the polyethylene ribbons incorporated in the cable to identify individual groups. The group of the first priority is encircled by blue and white ribbon, the second with orange and white, the third with green and white, etc.

Each wire of the cable has the separate and distinguishable color. The primary color code listed above applies to wires and binders and is used for keeping the proper running order for connections. A secondary color code (white, red, black, and yellow) is also applied to wires to allow a larger quantity of connectors to be encased in one cable.

EXAMPLE: **Using the primary color code in association with the secondary color code, the first wires, in order, will be a blue-white lead mated with a white-blue lead, an orange white lead mated with a white-orange lead, etc.**

When the white series has been exhausted, the second series will be a blue-red lead mated with a red-blue lead, an orange-red lead mated with a red-orange lead, etc.

2.5 Switchboard Cable Information, continued

The following table provides cable color codes.

CABLE COLOR CODE			
PAIR NUMBER	**PAIRS MATE**	**PAIRS COLOR**	**SINGLES** COLOR
1	WHT-BLU	BLU-WHT	BLU
2	WHT-ORN	ORN-WHT	ORN
3	WHT-GRN	GRN-WHT	GRN
4	WHT-BRN	BRN-WHT	**BRN**
5	**WHT-SL**	**SL-WHT**	**SL**
6	**RED-BLU**	**BLU-RED**	**BLU-RED-WHT**
7	RED-ORN	ORN-RED	ORN-RED-WHT
8	RED-GRN	GRN-RED	GRN-RED-WHT
9	RED-BRN	BRN-RED	BRN-RED-WHT
10	RED-SL	SL-RED	SL-RED-WHT
11	BLK-BLU	BLU-BLK	BLU-BLK-WHT
12	BLK-ORN	ORN-BLK	ORN-BLK-WHT
13	BLK-GRN	GRN-BLK	GRN-BLK-WHT
14	BLK-BRN	BRN-BLK	BRN-BLK-WHT
15	BLK-SL	SL-BLK	SL-BLK-WHT
16	YEL-BLU	BLU-YEL	BLU-YEL-WHT
17	YEL-ORN	ORN-YEL	ORN-YEL-WHT
18	YEL-GRN	GRN-YEL	GRN-YEL-WHT
19	YRL-BRN	BRN-YEL	BRN-YEL-WHT
20	YEL-SL	SL-YEL	SL-YEL-WHT

2.5 Switchboard Cable Information, continued

The following table provides cable binder colors.

CABLE BINDER COLORS	
NUMBERS	**COLOR**
1	BLU-WHT
2	ORN-WHT
3	GRN-WHT
4	BRN-WHT
5	SL-WHT
6	BLU-RED
7	ORN-RED
8	GRN-RED
9	BRN-RED
10	SL-RED

3. Safeguards and Precautions

3.1 Safety Precautions

Applicable safety precautions not outlined herein are contained in GTE Telephone Operations Practice 200-001-000 and should be reviewed and used whenever installers are running cables.

The construction supervisor should review, with the respective installers, the proper methods of using special tools or devices, such as power cable benders, cable pulleys, and cable rings.

3.2 Fatigue

To avoid fatigue, positions on cable rack and floor should be rotated a minimum of every two hours to coincide with breaks and lunch periods. Take care to ensure that in locations which require above average physical strength, the installer is capable of performing the task. When running cable over extended periods of time (days), rotate the entire crew when possible.

3.3 Heavy Gauge Cable

When running heavy-gauge cable, such as 750 or 500 MCM power cable, utilize a pull cord. It should be run to the cable destination as if it were a smaller gauge cable. This will help reduce excess strain on the cable runner. Because of the excessive weight involved, use additional installers at all locations when possible (see Sections 5.3 and 5.4).

3.4 **Connectorized Cable**

When running connectorized cables, plug-ends should be bundled and wrapped with a protective covering to prevent any damage.

3.5 Sew/Stitch Cable

When it is required to sew/stitch cable in cable racks, splice "lacing twine" per GTE Telephone Operations Practice 256-050-204, place the splice close to the last stitch, and cut the excess twine after the knot has been secured under a stitch. This will prevent hand injuries caused by slipping of lacing twine knots.

3.6 Tie Wrapping Cable

Make sure that:

- The cable tie or lace is not pulled so tightly that it cuts the cable sheath or conductors.
- The cable tie secures the cable/wires so that when firmed up, the tie wrap "eye" can be rotated to the rear of the bundle.
- Loose wires are secured in a manner that prevents an indentation in the wire form.
- A sharp portion of the trough rack or slat does not cut into the cable sheath.

3.7 Securing Hand Tools

Exercise extreme caution when working aloft with any kind of hand tool.

NOTE: The quantity of hand tools taken up into the overhead or up a ladder must be limited to those absolutely necessary to perform the job.

When the tool and work operation permits, use a lanyard of lacing twine to secure the tool to the:

- Superstructure.
- Framework.
- Employee's wrist.

CAUTION: This lanyard should be of sufficient length to prevent the tool from falling onto the equipment or the employees below, yet not be a hindrance to the work operation.

WARNING: Observe these precautionary measures to prevent:

- **Serious injury to a fellow employee.**
- **Severe service outage due to a tool falling into a power dlstrlbution panel or electronic equipment below.**

3.8 Cable Reel Dispensers

Ensure that the cable reel rims or turntables are free of nails or other sharp projections before rolling the reels on tiled/carpeted floors. Roll the reels onto fiberboard or similar material to protect the tile when turning the cable reel around corners.

Use floor protection when storing or moving cable reels.

3.9 **Gloves**

Wear full-fingered gloves at all times when running cable or working with cable reels. Fingerless gloves are only permissible when sewing cables.

3.10 Hats

Wear safety hats with chin straps while running cable because of hazards such as air conditioning ducts, cable racks, or fire alarm detectors obstructing the cable running path. Refer to GTE Telephone Operations Practice 117-200-005 for specific conditions requiring the use of safety hats.

3.11 Ladders

Ladders used to access the cable running area must be blocked or secured to prevent any accidental movement. Place safety cones strategically to alert employees that cables are being run.

3.12 Lighting

Provide adequate lighting in overhead areas that are congested with ironwork and air conditioning ducts.

3.13 Caution Tape

Place caution tape over all sharp-edged objects and at hazardous work areas to highlight hazards, safety, and caution.

3.14 Cable Rack/ Trough/Grid

Exercise caution when entering central office cable rack and grid. Never step, sit, or kneel on cables, as the direct pressure could cause damage to the cable conductors. When there is a need to enter a cable area, use plywood or other supportive materials to distribute any weight. Employees must be aware of the potential that cables may be dislodged or damaged when contact is made with cables.

3.15 Sharp Edges

Ensure that sharp edges of the runway/trough/grid, threaded rods, etc., are protected from accidental wire or cable cutting when running and hoisting the wire and cable. Use end caps, protective threaded rod coverings, and cable guides listed in the tools and materials list as applicable prior to running cable.

3.16 Eye Protection

Refer to GTE Telephone Operations Practice 117-400-004 for specific conditions requiring the use of eye protection.

3.17 Cable Holes

Whenever using cable holes, close them as soon as practical following installation of cable. Do NOT leave cable holes open:

- Beyond working hours.

  OR

- When work has been temporarily suspended.

NOTE: Refer to GTE Telephone Operations Practice 742-200-070 for more detailed information on cable holes.

The closing of cable holes is required to:

- Help contain smoke and/or fire in the specific room/floor.
- Contain the Halon fire extinguishing chemical when activated in the sized area.

3.18 "Live" Power Equipment

The following safeguards apply when working around "live" power equipment or cable:

- Work performed in the vicinity of "live" power equipment must be performed during light traffic periods (normally between 11 p.m. and 6 a.m.).
- When work is performed on "live" power boards or other power equipment, cover exposed grounded metal parts in the immediate area with an insulating material to prevent an accidental short circuit. For electrical protection, use a 27 inch by 36 inch by 1/8 inch rubber insulating blanket equipped with nonconductive eyelets or a piece of masonite.
- When working close to any AC power supply, use rubber insulating gloves and, when necessary, stand on a rubber insulating blanket.
- Do not use metal:
  - Rulers.
  - Tapes.
  - Lamp guards.
  - Strand ropes.
- Remove all jewelry, such as rings, watches, or other metal objects, from hands and arms.

3.19 Wire Connections

Observe the following procedures and GTE Telephone Operations practices when connecting wires:

- Bare wires connected by screw connections must be made using spade/terminal connections. Do not connect bare wire under screw heads. Use either saddle lugs or wire connectors to make the connections.
- Wire wrap connections must be performed in accordance with the requirements found in GTE Telephone Operations Practice 256-050-211.
- Wrap and solder connections are covered in GTE Telephone Operations Practice 256-050-208.

3.20 Cable Tags/ Labels

Remove temporary cable running tags before placing the associated equipment in service.

In situations in which the cable running tags must remain after installation, perform the procedures shown in the following chart.

NOTE: **Because of the added labor and material cost associated with wrapping and fastening cable tags, this activity is not recommended unless the need can be justified.**

Step	Removing and Fastening Cable Running Tags (General)
1	Remove the cable running tags.
2	Wrap the cable running tags around the cable.
3	Fasten the cable running tags with a cable tie.

3.20 Cable Tags/ Labels, continued

For string type and gummed tags, perform the procedures shown in the following chart.

If the Tag Is a...	Then...
String type tag	1. Remove the string and the tag wrapped at the cable butt on the sheath with the non-hole end of the tag: • Placed against the cable. • Rolled around the cable. 2. Insert a small cable tie through the hole and around the cable with the eye of the tie ending at the hole.
Gummed tag	1. Remove the tag. 2. Fold the tag in half with the two gummed surfaces against each other. 3. Wrap the tag around the cable on the sheath at the butt. 4. Attach a small cable tie to the tag.

4. Unpacking and Checking Cables

4.1 Specification Verification

All cable received on a project should be verified against the project cable ordering specifications and/or cable drawings. Check cable reels, cable coils, and plug-ended cables for the correct:

- Length.
- Number of conductors.
- Plug size.

4.2 Visual Inspections

If there is a possibility that the cable tags on reels, coils, and plug-ended cables may be incorrect, count the quantity of conductors within the cable and the termination points on plug-ended cables to ensure that the correct cables are being selected. The quantity of conductors and conductor gauge must correspond to the description of the part number (on the cable tag) that identifies the specific cable. See Section 2.5 for the cable color codes and gauges.

4. Unpacking and Checking Cables, continued

4.2 Visual Inspections, continued

Inspect all cable reels, cable coils, and plug-ended/connectorized cables for visible damage that may have been incurred in manufacturing, shipping, and/or handling. Inspect factory-wired/connectorized cables for:

- Condition of cable connectors mating to verify cable is firmly seated; not crimped or loose through connector.
- Wire wraps on factory-wired terminal block connections.
- Acceptable usage of heat shrink materials, not electrical tape, on HF plug-ended cables.
- Clean cable butts where an excessive amount of wire sheathing materials are not left hanging.

After this inspection is completed, store the equipment in a clean, dry area until ready for use.

5. Cable Reel Types

5.1 **General**

Determine which cable reel holder is best suited for the job:

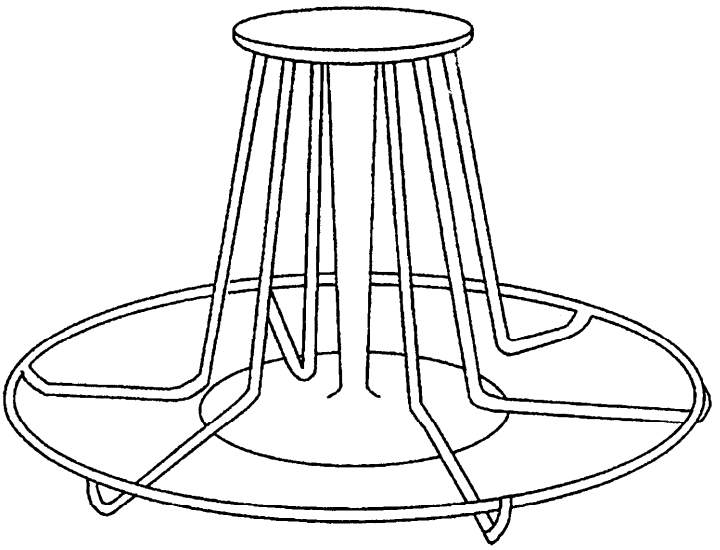
- Cable Reel ("Mexican Hat" type) -use for cable coils and plug-ended cables.
- Roll-A-Reel -when large, heavy cable reels are used, two Roll-A-Reel units should be joined together.
- Cable Reel Holder ("A" frame type) -use for medium-sized cable reels.

Take care when handling and running switchboard cable to ensure that the cable insulation sheath does not become damaged in any way. Protect the insulating sheath of cable from any sharp edges by suitably covering all sharp edges with a protective covering; e.g., use threaded rod protective covers, or use the cable guide. Do not pull the cable around any unprotected sharp edges or corners, over the edges of cable runway, or in any area which would tend to damage, scrape, or crimp the insulation sheath or conductors within the sheath.

Protect the floors to prevent damage from cable reels.

5.2 Cable Reel Method

Use the "Mexican Hat" type cable reel dispensers (illustrated below) for cable bundles and plug-ended cables. Multiple cables can be uncoiled and run in groups utilizing no more than four cable reel dispensers at a time. Conveniently locate the cable reel dispensers based on the floor layout, product line type, and cable rack, trough or grid type being used.

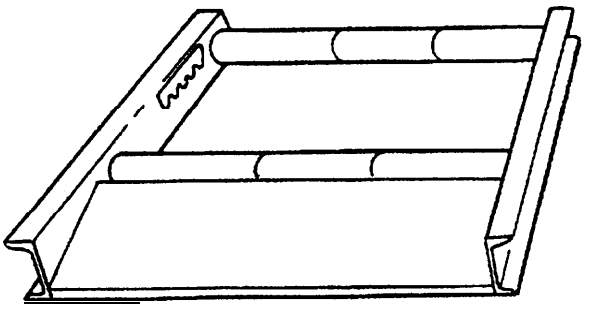


Cable Reel ("Mexican Hat" type)

5.3 Roll-A-Reel Method

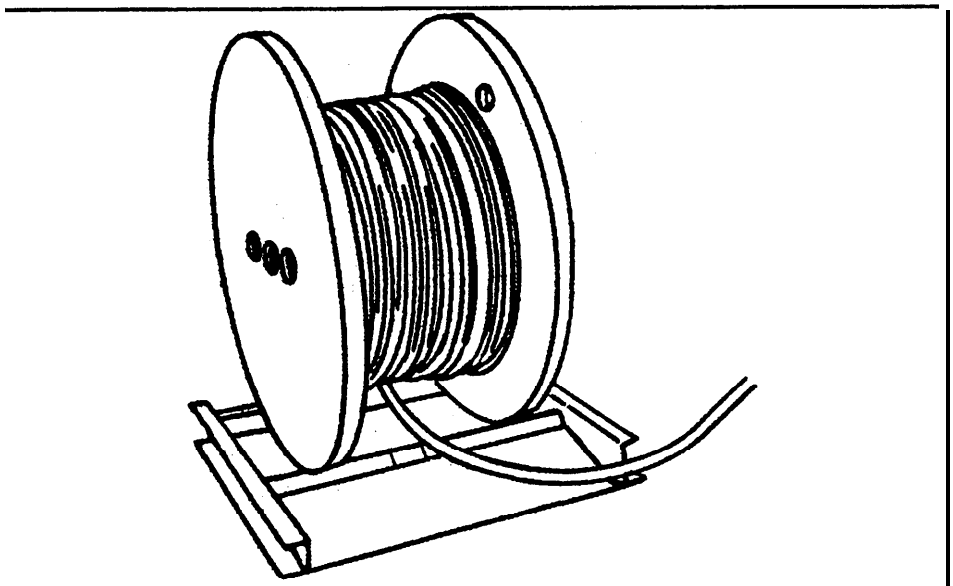
Place a Roll-A-Reel unit (illustrated below) in a location from which the maximum quantity of cables can be run. Roll the cable reel onto the Roll-A-Reel unit (as shown on the following page). Feed the switchboard cable off the reel from the bottom of the cable reel.

Pull the cable off the reel slowly, without jerking or kinking the cable. When feeding the cable off the reel, make certain that the cable does not get caught between the cable reel edge and the Roll-A-Reel unit because this will damage, crimp, or cut the cable.



Roll-A-Reel Unit

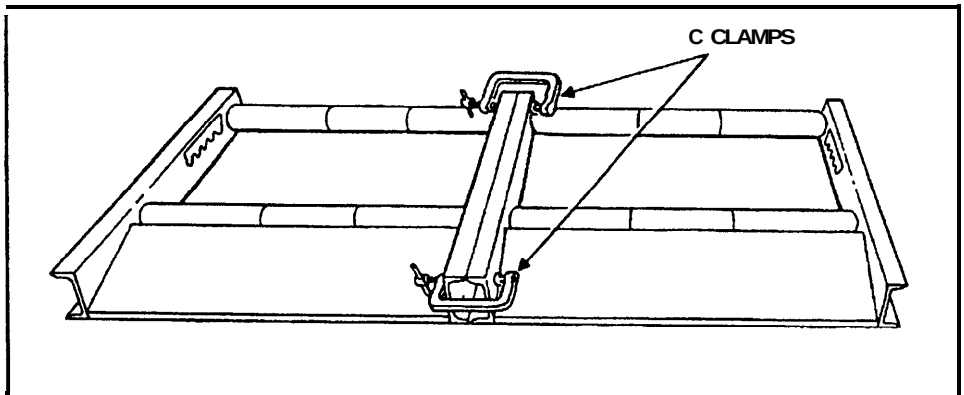
5.3 Roll-A-Reel Method, continued



Roll-A-Reel Unit with Cable Reel

NOTE: Do not feed switchboard cable off the top side of the cable reel. Doing so may tend to pull the entire cable reel off of the Roll-A-Reel unit If the cable should catch or bind on the reel.

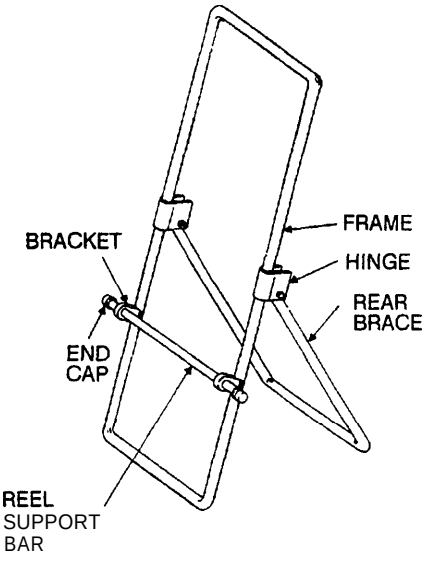
If a cable reel is too large to be used on a single Roll-A-Reel unit, place two Roll-A-Reel units side by side and secure them together with C clamps (as illustrated below). Ensure that the C clamps are positioned so that they do not rub on the cable.



Roll-A-Reel Units Joined with C Clamps

5.4 Cable Reel Holder ("A Frame Type) Method

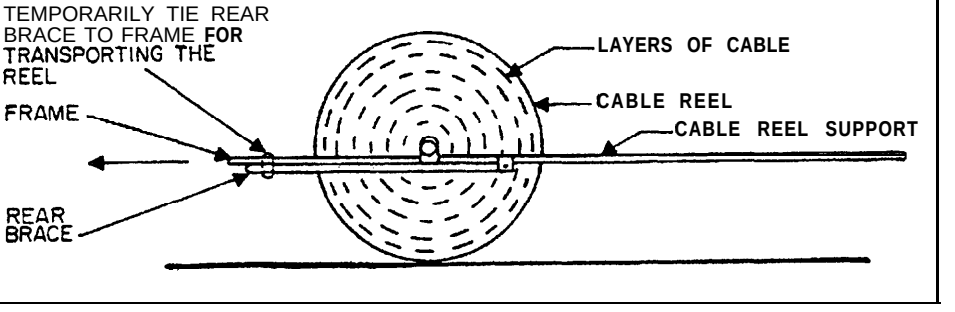
Assemble the cable reel holder (illustrated below) according to the following instructions.



Cable Reel Holder

Step	Assembling the Cable Reel Holder
1	Unscrew one end cap of the reel support bar.
2	Remove the bar from the holder.
3	Position the holder so that the bar support brackets are approximately at the center hole of the cable reel.
4	Insert the reel support bar through the bracket at one side of the holder, then through the center hole of the cable reel, and then through the bar support bracket on the other side of the holder A-frame jack.
5	Screw the end cap of the reel support bar onto the end of the bar.

Roll the reel to the location desired as the most convenient area to run in the cable. Leave the holder in place while the reel is moved (see illustration below).



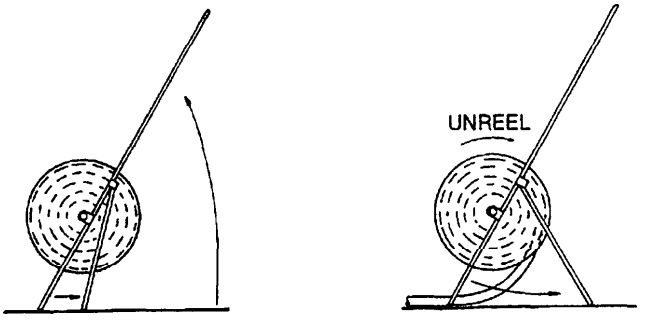
5. Cable Reel Types, continued

5.4 Cable Reel Holder ("A" Frame Type) Method, continued

Feed the cable off the reel according to the following instructions.

CAUTION: The cable reel holder accommodates cable reels up to 38 inches in diameter and 21 inches in width. Do not handle exceptionally heavy cable reels with this type of device; the reel may bend the support bar and frame when lifting the reel off the floor. Use a Roll-A-Reel unit when handling exceptionally heavy cable reels.

Step	Feeding the Cable Off the Reel
1	Stand the cable reel up on the holder by lifting the long portion of the holder A-frame jack.
2	When the cable reel clears the floor (illustrated below), the rear brace of the holder A-frame jack automatically swings into the proper position for supporting the frame.



NOTE: THE CABLE REEL HOLDER WILL ACCOMMODATE CABLE REELS UP TO 38 INCHES IN DIAMETER AND 21 INCHES WIDE. (WITHIN ACCEPTABLE WEIGHT LIMITATIONS)

6. Cable on Reels

6.1 Cable Reel Footage

As shown in the illustration at the bottom of Page 18, some cables are marked with a footage measurement and cable size every two feet on the insulating cable sheath. The cable size identification (051A) is the same as the last four characters of the cable part number, D-91 0051 -A. In some instances, the footage marking numbers increase in value as the cable is unreeled (see illustration at the bottom of Page 18). In other instances, the footage marking numbers decrease in value as the cable is unreeled (see illustration on Page 19).

6.2 Cable Reel Tags

A cable reel tag (see illustration below) attached to each cable reel indicates the cable size (part number) and the number of feet of cable on that reel. The first (or initial) footage number on the cable sheath will not correspond with the amount of feet marked on the tag because the cable is factory marked in succession from 2 to 99,999 feet and cut at various lengths to supply individual orders.

PT NO.	D910051 -A		12/C/04
COLOR	GREY		Fr 0500
MPC	584-7029960		
JKT	S/A NO. 934-4900668		
TEST	S/A NO. 934-5300660		
SPOOL	S/A NO. 934-5500665		
CLOCK NO. _____		REEL NO.	
DATE _____			
TEST NO. GCC	GS-006-G 034 _____		

6.3 Cable Usage

The person initially removing cable from a new reel is to mark on the reel tag, preferably in red ink, the first footage number shown on the cable sheath. With this first footage number recorded on the reel tag, and if the following methods are exercised, the amount of cable remaining on the reel can be accurately determined:

- If the footage marking numbers on the cable sheath increase in value as the cable is unrolled (see illustration below), subtract the first footage number (as recorded on the reel tag) from the footage number now appearing on the cable sheath. The remainder subtracted from the "total feet on reel" as shown on the cable reel tag determines the length of the remaining cable.

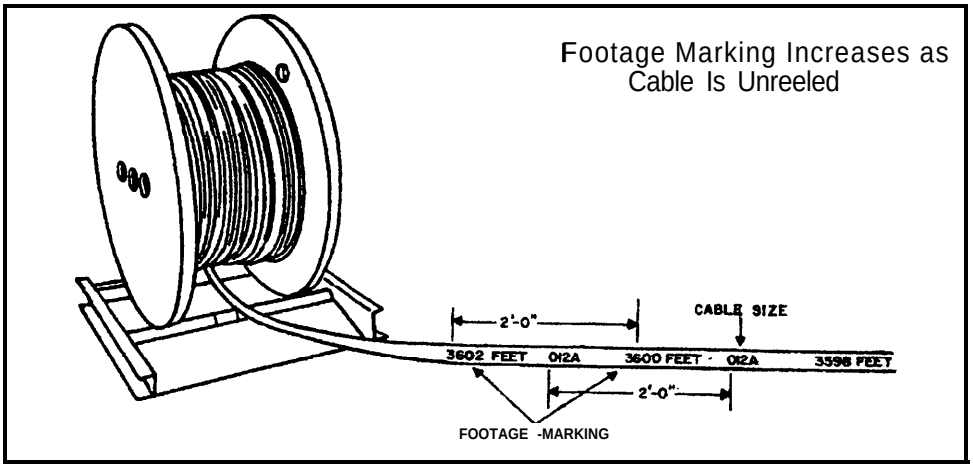
  Example:

  2842 (footage number now appearing on sheath)
  -2630 (first footage number as recorded on tag by installer)

  212 (amount of cable used)

  350 (length of total feet on reel)
  -212 (amount of cable used)

  138 (remaining feet of cable on reel)



Footage Marking Increases as Cable Is Unreeled

6.3 Cable Usage, continued

- If the footage marking numbers on the cable sheath decrease as the cable is unrolled (see illustration below), subtract the footage number now appearing on the sheath from the first footage number recorded on the tag by the installer making the initial cable removal. The remainder subtracted from the total number of feet as listed on the cable tag determines the length of the remaining cable.

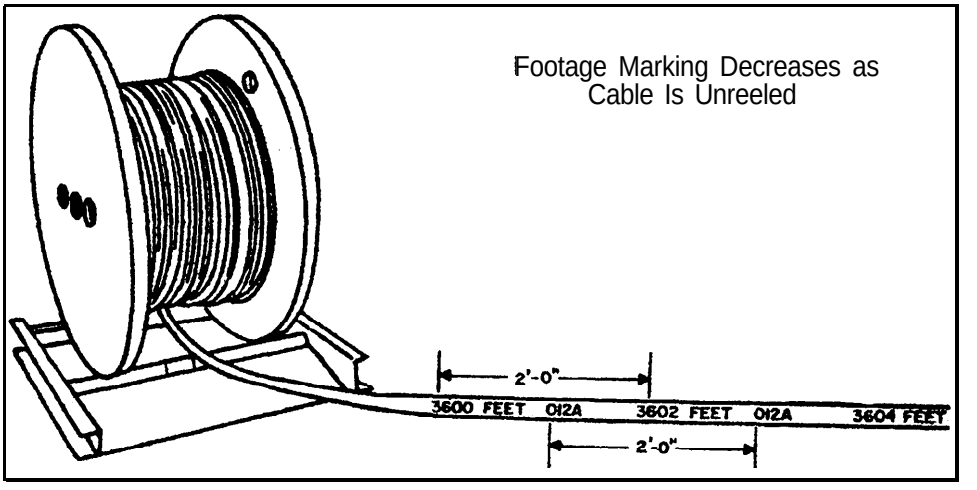
  Example:

  2630 (first footage number as recorded on tag by installer)
  -2524 (footage number now appearing on sheath)

  106 (amount of cable used)

  350 (length of total feet on reel)
  -106 (amount of cable used)

  244 (remaining feet of cable on reel)



Footage Marking Decreases as Cable Is Unreeled

7. Precutting Cables

7.1 General

In some instances, it will be more advantageous to precut the cables to the proper lengths before placing the cables on the runways, troughs, or cable grid. This can be accomplished easily by making a measuring run of each specific cable, using a cloth tape. Mark the tape after the measuring run is made. Add or subtract the distances between other shelves, terminal blocks, or units; note these varying measurements to obtain the lengths of the individually numbered cables in the same basic run. Then lay the tape on the office floor and roll off the cable to the length of the tape measurement. Finally, precut the cable. The tape is generally easier to handle in the measuring stage than the actual cable.

Use of the tape serves to forewarn the installer of the obstacles and problems that will be encountered when actually running the cable. This allows the installer to prepare the cable properly and avoid trouble later when running the cable. This method also prevents possible damage to the cable from sharp edges, corners, etc. Such danger areas can be adequately protected prior to actually running the cable by installing threaded rod protective coverings listed in Section 2.4.

7.2 Typical Drop Length Gauge Method

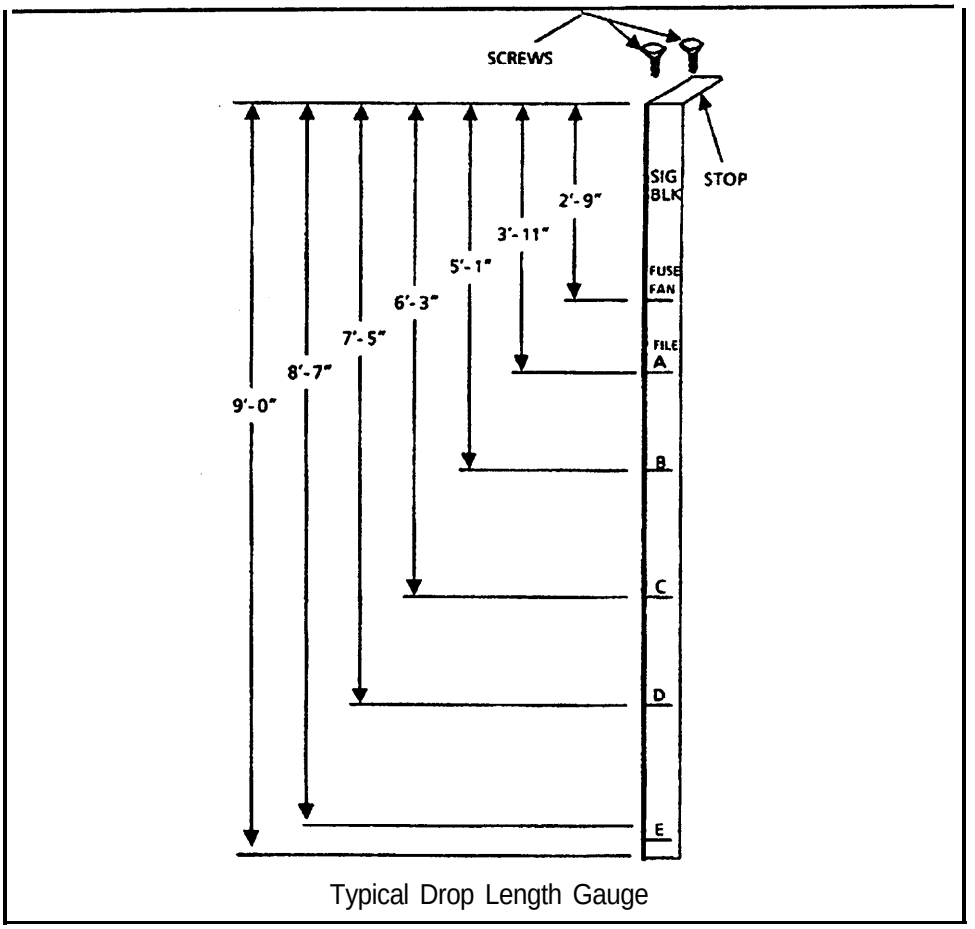
The purpose of a drop length gauge (see illustration below) is to accurately and efficiently control the cutting length of the cable. The installer can make the drop length gauge on site, using a nine-foot board of concave molding approximately two inches wide. The stop board is also made by the installer. It is attached to the gauge with two screws and is used to stop the cable. If the installer has another method of measuring the drop length and can ensure control of the cutting length, the drop length gauge is not mandatory.

NOTE: **The illustration below is a typical example. When on site, frames may differ as to file and fuse panel location. Because of this, the drop length gauge must be marked accordingly.**

The drop length gauge has markings for the fuse panel and files T, A-E. The markings are distances from the bottom of the cable bracket, located at the top of the frame, to the bottom of the fuse panel or respective file, plus 18 inches. The amount of cable required (past the last termination) for fanning and terminating is 18 inches.

The drop length gauge is to be located near the cable reel or close to the person responsible for running cable. The individual pulls a short length of cable from the cable reel and lays the cable on the drop length gauge until the end of the cable touches the stop.

The person responsible for running the cable marks the cable with a VU mark 7900 marker, or equivalent, at the fuse panel or respective file locations per the cable specification.



Typical Drop Length Gauge

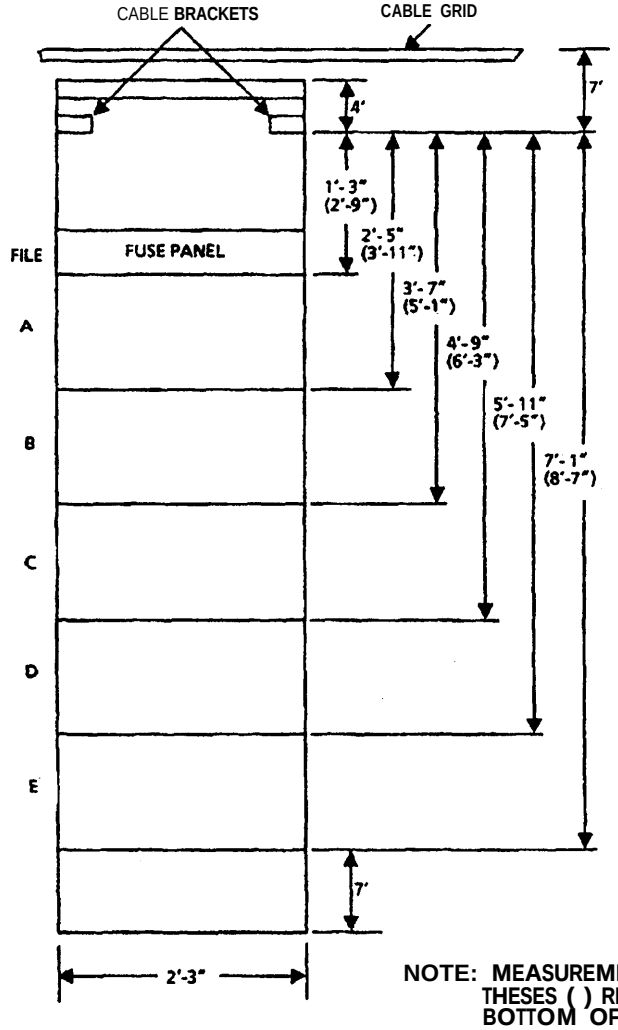
7.2 Typical Drop Length Gauge Method, continued

The cable is then passed to an individual on the cable grid. He, in turn, enters the grid area to the frame (see illustration below) on which the cable terminates, and drops the cable through the grid until the mark on the cable is even with the bottom of the cable bracket located at the top of the frame.

NOTE: **The illustration below is a typical network frame; frames will differ from office to office and must be marked accordingly.**

The bottom of the cable bracket is located seven inches below the top of the cable grid; therefore, the individual on the cable grid has the ability to see and properly judge the distance.

Upon completion of this task, the cable can be measured at the originating frame, then cut.



NOTE: MEASUREMENTS WITHIN PARENTHESES ( ) REPRESENT INCHES FROM BOTTOM OF CABLE BRACKET TO BOTTOM OF LAST TERMINAL BLOCK ON FUSE PANEL OR RESPECTIVE FILE PLUS 1 FOOT, 6 INCHES FOR FANNING, AND TERMINATING.

Typical Network Frame

7. Precutting Cables, continued

7.3 Cable Placing

After the switchboard cables are placed in the trough, grid, or runway, verify that the cables are of sufficient length to accomplish the termination of each cable. Allowance must be made for break-offs, bends, vertical drops, butting, stripping, appropriate maintenance loops, and fanning prior to the cutting of the cable ends. On vertical drops or runs, it is recommended that the drops be tied temporarily until the final termination length of the cables is determined prior to cutting.

8. Manpower Considerations

8.1 Responsibilities

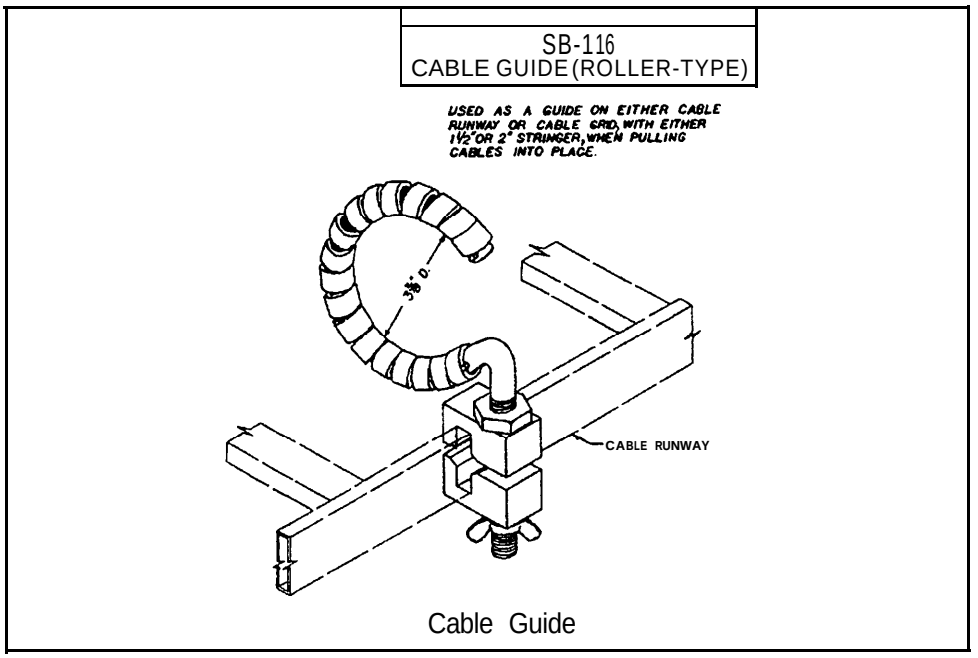
It is the Construction Supervisor's responsibility to ensure that adequate manpower is provided whenever running switchboard cable. The intent is to promote a safe work environment by minimizing fatigue. The result will be increased efficiency and reduced job-related injuries.

As a general rule on large jobs, the minimum number of installers should be three. They should be located in the following manner:

- Installer #1 will be located on the floor to unroll cables, place cable tags, pass cable to the installer located in the equipment rack, and receive cables at the run destination.
- Installer #2 will be seated in the equipment rack (grid) at the point where cables enter. Cables should be pulled between legs and passed to Installer #3, the cable runner.
- Installer #3 will receive cable from Installer #2 and run cable to the destination (not to exceed 50 feet; see Section 8.2).

8.2 Long Cable Runs

When cable runs are in excess of 50 feet and/or runs are not straight, additional installers should be stationed at each 50-foot increment, and/or at each bend for pulling slack if cable guides (see illustration below) will not suffice.



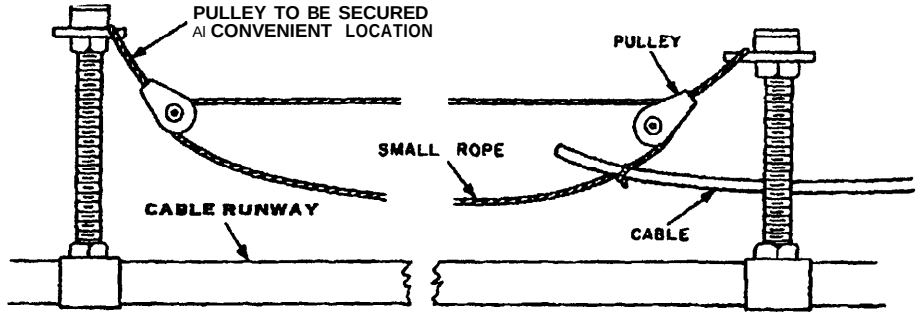
Cable Guide

8.2 Long Cable Runs, continued

When long cable runs are straight, and if the working space in the rack area is limited, it will be difficult to make the long cable runs, especially when short-handed. In this case, the pulley method (see illustration below) may be used. This will also reduce the need for employees to crawl or walk on cable racks/grid (see Section 3.14).

To facilitate running long, multiple cables, use cable guides in convenient locations such as:

- Where cable is fed onto the rack/trough/grid.
- Around sharp bends, obstructions and/or sharp edges.



Typical Method of Using Pulley Set Up on Long Distance Cable Runs