Aerial Distribution Products

Aerial Ultracab Cross-Connect Enclosures

Description and Installation Manual (631-201-009), Revision F
Part Number: P71350

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ADMONISHMENTS USED IN THIS DOCUMENT

DANGER! Warns of a hazard the reader ***will*** be exposed to that will ***likely*** result in death or serious injury if not avoided. (ANSI, OSHA)

WARNING! Warns of a potential hazard the reader ***may*** be exposed to that ***could*** result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)

CAUTION! Warns of a potential hazard the reader ***may*** be exposed to that ***could*** result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)

ALERT! Alerts the reader to an action that ***must be avoided*** in order to protect equipment, software, data, or service. (ISO)

ALERT! Alerts the reader to an action that ***must be performed*** in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)

FIRE SAFETY! Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)

SAFETY! Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

IMPORTANT SAFETY INSTRUCTIONS

Safety Precautions Definition

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page 4.

General Safety Precautions

The following precautions shall be observed at all time when handling and installing the enclosure:

- Observe the general safety precautions against personal injury and equipment damage.
- The procedures outlined in this manual are only recommended guidelines. Ensure that all NEC (National Electric Code) and local codes for safety and wiring are followed.
  - Use listed two-hole compression connectors (lugs) to terminate all ground connections. Selected lug shall match wire and type, and crimped applied as specified by the lug manufacturer.
  - Apply NO-OX-ID-A to all ground connections.
  - Insulation of field-wire conductors should be rated no less than 105 °C, and gauge in a manner that is consistent with the NEC and local codes.
- Always use a non-contact voltage detector, when approaching an enclosure, to verify no leaks or shorts are presents on the external body.
- Read Enclosure Placement in its entirety prior to attempting to handle or secure the enclosure.
- A minimum of two persons are required to safely install the enclosure.
- Hard hats and steel-toed boots should be worn while maneuvering the enclosure.
- Safety glasses should always be on while on-site.
- Safety gloves should be on when working in temperature extremes, with batteries, or with sharp objects.
- All electricians, operators, and technicians have been trained for the task at hand.
- Keep bystanders away.
- Ensure that all personnel on site are familiar with the first-aid kit location and emergency procedures in the event of an injury.
- Never leave the enclosure unattended. If leaving the site, close and secure the enclosure.

You Must Follow Approved Safety Procedures

DANGER! Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

a) The tasks should be performed in the order indicated.

b) Remove watches, rings, and other metal objects.

c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.

d) Wear eye protection.

e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

Voltages

AC Input Voltages

DANGER! This system operates from AC input voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any AC electrical connections are made. Follow local lockout/tagout procedures to ensure upstream branch circuit breakers remain de-energized during installation. DO NOT apply AC input power to the system until all electrical connections have been completed and checked.

DC Output and Battery Voltages

DANGER! This system produces DC power and may have a battery source connected to it. Although the DC voltage is not hazardously high, the rectifiers and/or battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact an output terminal or battery terminal or exposed wire connected to an output terminal or battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination or battery terminal at a time, or to simultaneously contact a termination or battery terminal and a grounded object. Even a momentary short circuit can cause sparking, explosion, and injury.

Specific Safety Precautions

DANGER! RISK OF ELECTRICAL SHOCK, GENERAL
All ground connections must be installed and verified prior to connecting any power cables (AC or DC) and turning-up of enclosure.

When connecting any discrete power connection, make the connection first with the ground/return and break last with ground/return.

Do not install equipment showing any physical damage.

DANGER! RISK OF ELECTRICAL SHOCK, AC
Proper actions, include, but not limited to:

a) Verify before contacting the enclosure that no current leakage or ground fault condition is present.

b) Verify a proper ground is in place.

c) Verify for AC hook-up, all enclosure circuit breakers are OFF and the utility incoming feed is OFF.

Use a trained licensed electrician.

DANGER! RISK OF ELECTRIC SHOCK
The DC bus is powered by DUAL power sources – Rectifiers and DC Batteries.

To properly work on the system, de-energize by disconnecting BOTH power sources. Even with the batteries turned off by using a local battery (circuit breaker) disconnect, batteries are still "LIVE" and hazardous, including a voltage >50 VDC, and a source of high short circuit current.

Use extreme caution around the batteries and terminals.

Do not smoke.

DANGER! RISK OF ELECTRICAL SHOCK, OSP CABLES
If joint buried cables are used, check the cable sheath for voltage in accordance with local standards. If voltage is detected, do not proceed with the installation. Contact the supervisor and do not proceed until the voltage hazard is eliminated.

DANGER! RISK OF CHEMICAL EXPOSURE
A battery can present harmful chemicals. Refer to the Battery Installation Manuals and MSDS supplied with the batteries. Work in a ventilated area and follow all safety procedures.

At a minimum, wear safety glasses and gloves when working with batteries.

WARNING! PREVENT INJURIES, FROM LIFTING THE ENCLOSURE
Follow all local safety practices while lifting the enclosure. Wear all locally approved safety gear. All persons working with lifting equipment must wear standard safety headgear, eye protection, and (when required) gloves.

Keep bystanders away from work operations at all times.

Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.

Use all four points (eyebolts) to lift the enclosure.

Do not move or lift the enclosure with the front door open.

Never lift or move the enclosure with batteries or rectifiers installed.

Do not allow the lifting equipment or enclosure to touch any electrical wiring or equipment.

Operate all lifting equipment within safety constraints, as defined by the manufacturer and local practices; for example, do not exceed the capacity of reach.

Do not use slings, clevises or shackles of insufficient capacity.

Crane Operation:

Only properly trained operators shall operate the crane.

Do not operate the crane until all stabilizers are extended. The stabilizers must be in firm contact with the ground or other adequate support structure. Do not retract or extend the stabilizers when the enclosure is suspended from the crane.

Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.

Only the crane rigging crew should set up the crane and rigging.

Do not exceed the lifting capacity of the crane.

Forklift Operation:

The forklift must be rated for a lifting capacity of 4,000 lbs (1814 kg), or greater.

Required Equipment:

One hoist, crane, or forklift capable of lifting 4,000 lbs (1814 kg).

Four wire-rope slings, 8-ft. (2.44 m) long (minimum). Each sling should have 1,500 lb. (700 kg) capacity.

Four connecting links (clevises) (rated for a minimum of 1500 lb), to attach the wire-rope slings to the enclosure lifting eyes.

A 75-ft (20 m) rope, 5/8" (1.5 cm) in diameter, to use as a tagline. A tagline is used to guide the enclosure into position while it is lifted and lowered.

CAUTION! PREVENT EQUIPMENT DAMAGE, PROPER HANDLING
Do not stack nor lay the enclosure on its side.

Similarly, do not stack batteries or lay them on their side. Do not tip batteries -- keep in upright position at all times.

To avoid possible personnel injury or damage to the enclosure, do not remove it from the pallet until at the installation site, at the point of transfer onto the pad.

DANGER! PREVENT EQUIPMENT DAMAGE, MAINTAIN VENTILATION
To optimize the service life of this equipment, make sure there are no obstructions in front of the ventilation openings.

WARNING! RISK OF INJURY, FROM UNSECURED ENCLOSURE
Do not push or lean against an unsecured (unbolted) enclosure as it may tip over causing bodily injury.

Do not pull cables, terminate cables, install or place any batteries or rectifiers until enclosure has been secured onto a pad.

Use caution when opening and closing doors to an enclosure not secured onto a pad.

WARNING! RISK OF INJURY TO EYES AND SKIN, FROM OPTIC DEVICES
Do not look into a fiber cable or device, nor hold such cable or device against body, fabric or other material.

WARNING! RISK OF HAZARDOUS SUBSTANCES
After handling of the enclosure or any such component, such as batteries, cables, busbars, etc., always wash hands immediately after.

WARNING! RISK OF EXPLOSION
For safety reasons, never restrict or block the airflow through the door or entry panel ventilation openings.

CAUTION! PREVENT EQUIPMENT DAMAGE, FROM CONDENSATION
Until the enclosure is turned up for service, the bags of desiccant shipped with the enclosure must remain in the enclosure to prevent condensation.

Once service is in-place, remove the desiccant.

CAUTION! PREVENT EQUIPMENT DAMAGE, BUILD A GOOD PAD
The pad should be level to within 1/4 in (6.4 mm) over the entire length and width, with a crown in the middle to prevent any pooling of water and twist to the enclosure frame.

When mounting the enclosure on a pad, the compression strength of the concrete pad used must be a minimum of 4000 psi as determined by ASTM C39 test of compression strength of concrete cylinders.

Always use a barrier pad between the concrete and the pad to prevent corrosion.

CAUTION! PREVENT EQUIPMENT DAMAGE, OPERATING TEMPERATURE
The enclosure is approved for operation in an environment with an expected temperature range of -40°F to +115°F (–40° C to +46°C) and 5% to 95% relative humidity range, condensing. Do not use at temperatures or humidity exceeding these ranges.

The enclosure is not for indoor use.

CAUTION! PREVENT DAMAGES CAUSED BY ELECTROSTATIC DISCHARGES (ESD)
When handling the ECU unit, wear an appropriate antistatic device (a wrist strap for example) that is properly connected to a designated antistatic grounding point (on a framework, on an anti-static floor mat, etc.). ESD-protective packaging material shall also be used when carrying/shipping the ECU unit.

Personal Protective Equipment (PPE)

DANGER! ARC FLASH AND SHOCK HAZARD.
Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done determine the "hazard/risk" category, and to select proper PPE.

Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E "Standard for Electrical Safety in the Workplace".

Hazardous Voltage

DANGER! HAZARD OF ELECTRICAL SHOCK.
More than one disconnect may be required to de-energize the system before servicing.

Handling Equipment Containing Static Sensitive Components

ALERT! Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions contained on the Static Warning Page.

Maintenance and Replacement Procedures

CAUTION! When performing any step in procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the unit; otherwise service interruption or equipment damage may occur.

NOTE! *When performing any step in procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps, unless otherwise directed.*

STATIC WARNING

This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on conductive or anti-static material such as conductive foam, conductive plastic, or aluminum foil. Do not use ordinary Styrofoam™ or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

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ABOUT THIS DOCUMENT

Purpose

This practice provides instruction for installing the Aerial Ultracab Cross-Connect Enclosures.

Reason for Reissue

Whenever this practice is reissued, the reason for reissue will be stated in this paragraph.

- Update the installation instructions and illustrations.

Information Not Provided in This Practice

Refer to other local practices or building codes as applicable for the correct methods, tools and materials to be used in performing procedures not specifically described in this document.

If your enclosure is equipped with RLS terminal blocks, then refer to the following documents for specific information on wire termination on RLS50 blocks:

- 641-202-002, RLS50 Self-Strip Block Description and Installation and
- 641-202-009, RLS50 Self-Strip Block Feed-Thru Half-Tap Activator Kit Description and Installation

NOTE! *The information contained in this practice is subject to change without notice and may not be suitable for all applications.*

DESCRIPTION

Application

The Aerial Ultracab Cross-Connect Enclosures (**Figure 1** and **Figure 2**) are pole-mounted, center-feed cross-connect/interface system equipped with quiet front CFQ terminal blocks or RLS self-strip terminal blocks.

Figure 1: *400 Pair Aerial Ultracab Cross-Connect Enclosure*

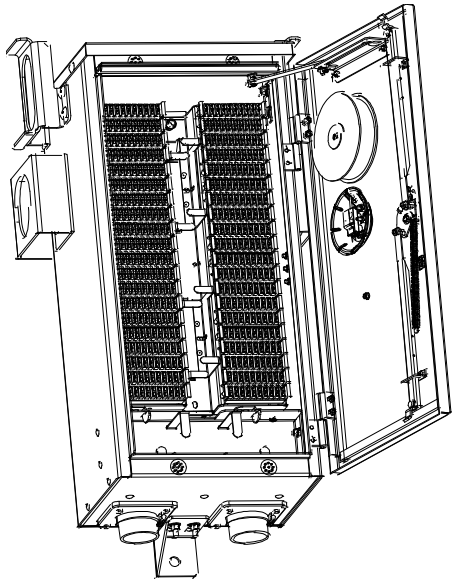
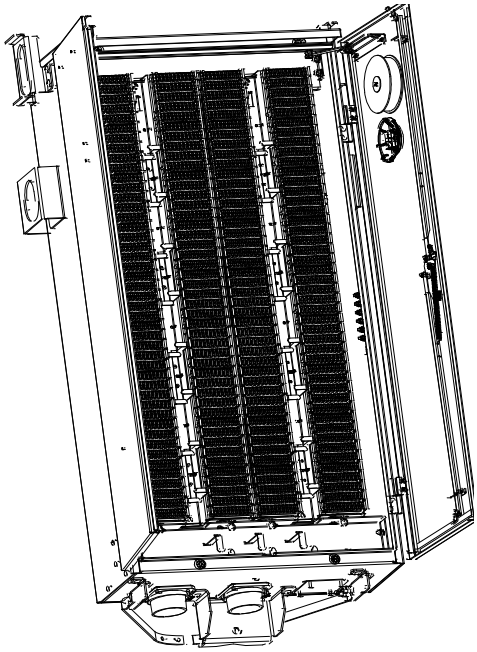


Figure 2: *1800 Pair Aerial Ultracab Cross-Connect Enclosure*



Construction

Enclosures are manufactured of aluminum and mill-galvanized steel. All enclosures are powder coat painted with green or off-white finish. Enclosure dimensions are given in **Table 1.** All enclosures are equipped with filtered vents for proper ventilation. Enclosure doors are secured by a three-point locking system and have closed-cell and bulb seal neoprene gasketing.

Table 1: *Enclosure Dimensions*

Pair Count	Enclosure Dimensions (inches)		
	Height	Width	Depth
100-400	33	16	14
500-900	45	24	14
1000-1200	45	32	14
1300-1800	62	33	14
1900-2700	62	46	14

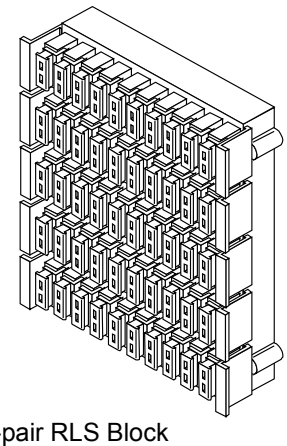
Terminal Blocks

The terminal block field is drop-down style and secured with hex head bolts. All blocks are hard-wired to a cable stub or harness behind the block face and are encapsulated for moisture resistance.

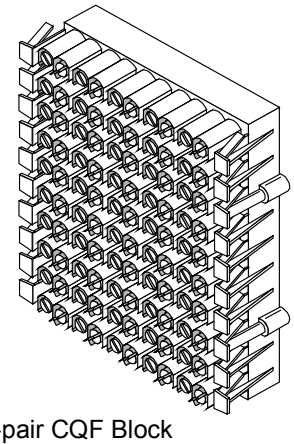
Enclosures are equipped either with 50-pair CQF quiet-front screw-type binding post terminal blocks or with 50-pair RLS self-strip terminal blocks both shown in **Figure 3**. The CQF terminal lugs are tin-plated for corrosion resistance and are captivated in the block to eliminate accidental detachment from the block housing.

For information on RLS terminal blocks, see document 641-202-002, *RLS50 Self-Strip Block Description and Installation*.

Figure 3: *Terminal Blocks*



50-pair RLS Block



50-pair CQF Block

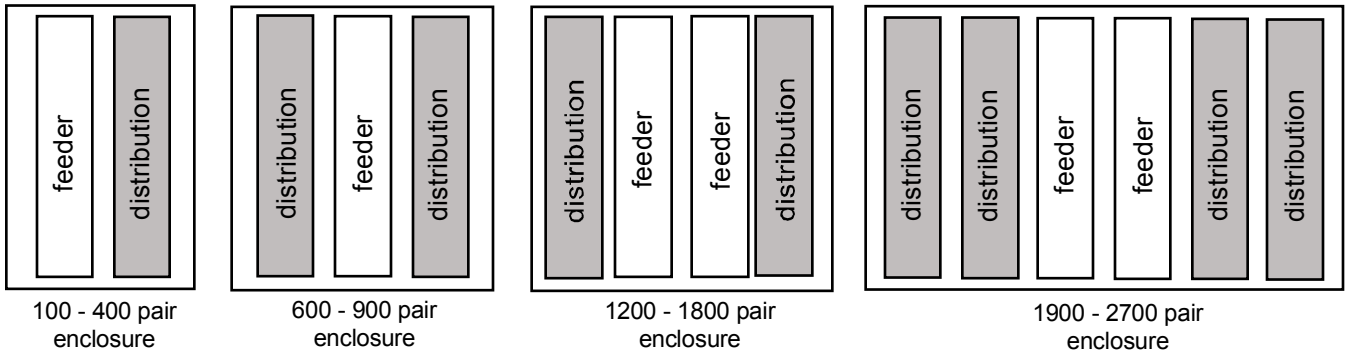
Wire Pair Identification

The feeder (in) and distribution (out) pairs are identified separately on the face of the enclosure blocks by color code. The binding posts or IDC clips are given terminal pair identification, starting with one and proceeding to the last pair number for that particular type of pair. Therefore, each has a feeder (in-green) pair number one and a distribution (out-blue) pair number one, etc. Terminal blocks are numbered horizontally (EXAMPLE: Row 1, pairs 1-5; row 2, pairs 6-10; on RLS: Row 1, pairs 1-10; etc.).

Feeder Pairs

All standard pole-mounted cross-connect enclosures of 600 pairs and larger are configured for a feeder to distribution ratio of 1 to 2. Engineering design may dictate different counts. Feeder pairs are located in the left column for 100-pair to 400-pair enclosures; in the center column for 600-pair to 900-pair enclosures and in the two center columns for 1200-pair to 2700-pair enclosures. Refer to **Figure 4**.

Figure 4: *Layout of Terminal Blocks*



INSTALLATION

Choosing and Preparing a Location for the Enclosure

The pole-mounted cross-connect enclosures can be installed at any height. For ease of access, install the enclosure at working level per local practices.

SAFETY! In areas where damage could occur to enclosures mounted at ground level, such as alleys, mount the enclosure below aerial cables, with adequate clearance for bending the stub at a 90o angle to prepare the splice. A balcony may be installed for ease of access and to provide a safe working position for field technicians.

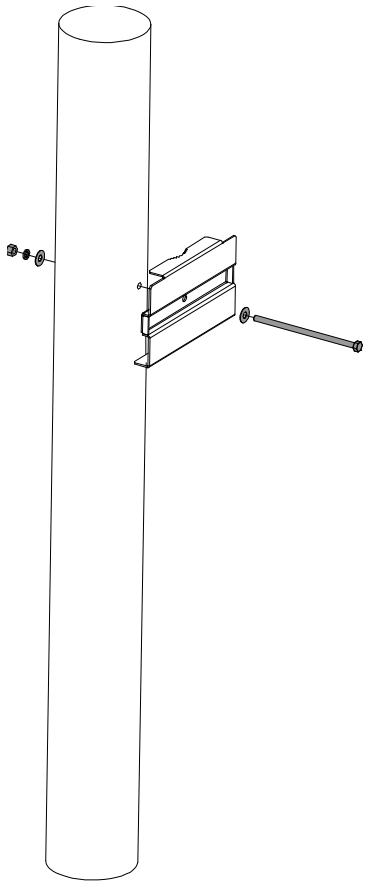
Installing the Enclosure

DANGER! Be sure the area above the hoisting operation is clear of power lines or obstructions. Also, be sure to follow all local and company safety practices during lifting.

Perform the following steps to install an Aerial Ultracab Cross-Connect Enclosure:

1. Drill a $^{11}/_{16}$-inch hole through the pole for the top bracket (see **Figure 5**).

Figure 5: *Top Pole-Mounting Bracket*



2. Secure the top bracket to the pole with a $^{5}/_{8}$-inch through bolt. Level the bracket before tightening the bolt.
3. Raise the unit using a block and tackle or winch line passed through a snatch block attached to the top of the sling. Guide the unit during the hoisting operation with a hand line fastened to the bottom pole-mounting bracket.
4. Place the enclosure on top of the pole-mounted bracket and verify that both brackets on the enclosure are properly engaged and sitting levelled on the pole bracket (see **Figure 6**).
5. Secure the bottom pole mounting by drilling a $^{11}/_{16}$-inch hole through the pole and using a $^{5}/_{8}$-inch through bolt (see **Figure 7**).
6. Attach the supplied stabilizer bars to the bottom of the enclosure using the supplied "U" clamps, do not tighten (see **Figure 7**).

NOTE! *Does not apply for 400 pair size units.*

7. Attach the other end of the stabilizer bars to the pole using two $^{3}/_{8}$-inch bolts per bar (see **Figure 7**).

NOTE! *Does not apply for 400 pair size units.*

8. Tighten all mounting hardware.

Figure 6: *Lifting Brackets and Stabilizer Bars*

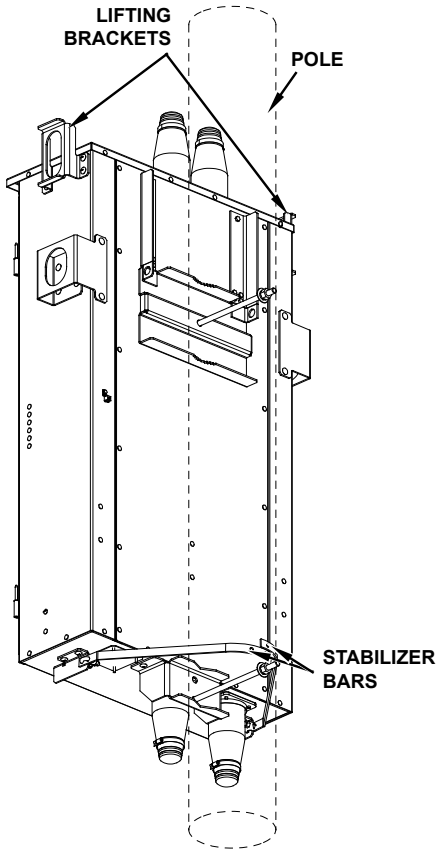
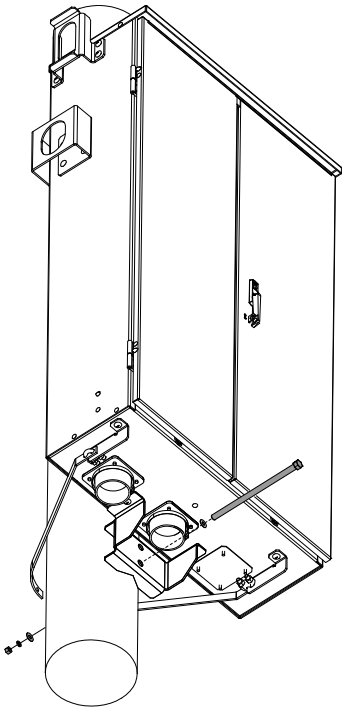


Figure 7: *Bottom Pole-Mounting Bracket*



JUMPER WIRING

Before You Begin

Before running cross-connect jumper wire, craft personnel should become familiar with the numbering sequence used in the terminal as described in Wire Pair Identification and Feeder Pairs.

Feeder and distribution fields are color-coded. Feeder cables are terminated in the green field and distribution cables are terminated in the blue field.

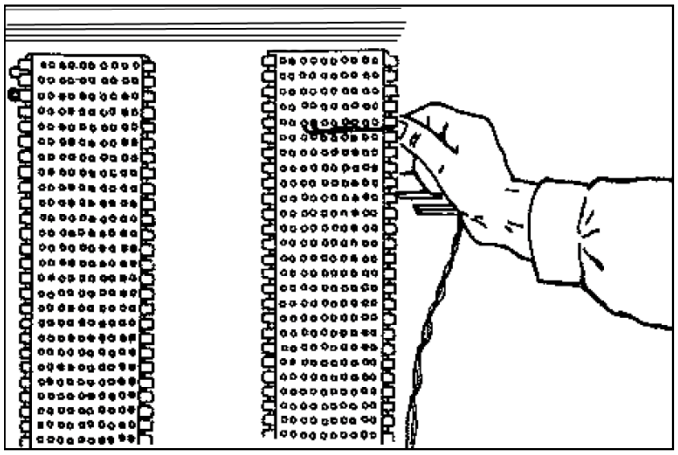
Begin by terminating each 22 AWG "G" or 24 AWG "F" cross-connecting jumper wire pair as described in Terminating Jumper Wires on CQF Blocks or Terminating Jumper Wires on RLS Blocks.

Terminating Jumper Wires on CQF Blocks

Perform the following steps to terminate a jumper wire pair on a CQF terminal block in the feeder field:

1. Pull enough jumper wire from the spool mounted on the housing door to reach the assigned feeder cable terminal binding post (see **Figure 8**).

Figure 8: *Pulling Jumper Wire*



2. Terminate the jumper wire on the terminal binding post as shown below (see **Figure 9**).
    - Strip approximately $^{1}/_{2}$-inch of insulation from the end of the jumper wire. Do not nick the conductor.
    - Loosen the screw on the binding post until the first washer rides out in front of the terminal silo.
3. Place the wire between the washers on the terminal binding post. Tighten securely, but do not over tighten (see **Figure 10**).

Figure 9: *Jumper Wire Termination*

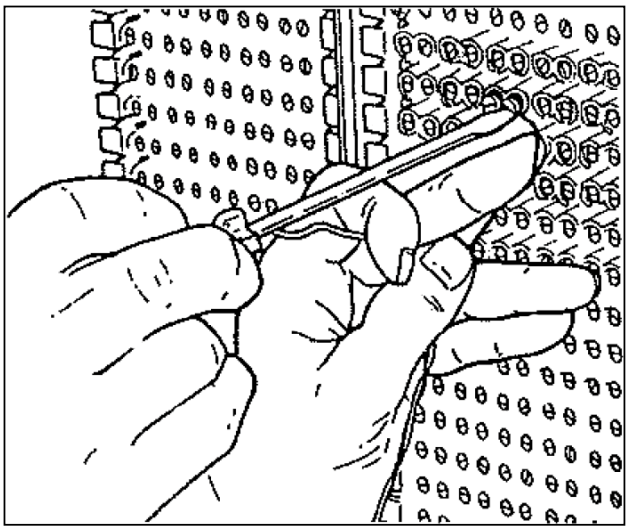
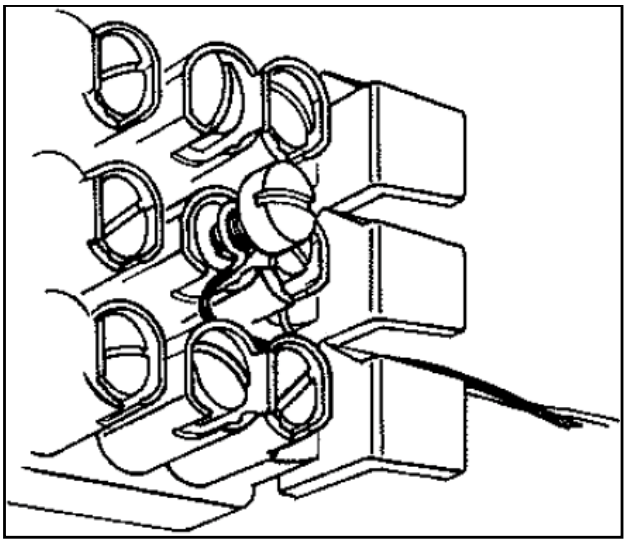


Figure 10: *Placing Wire Between Washers on Binding Post*



4. Continue on to Routing Wire to route the wires.

Terminating Jumper Wires on RLS Blocks

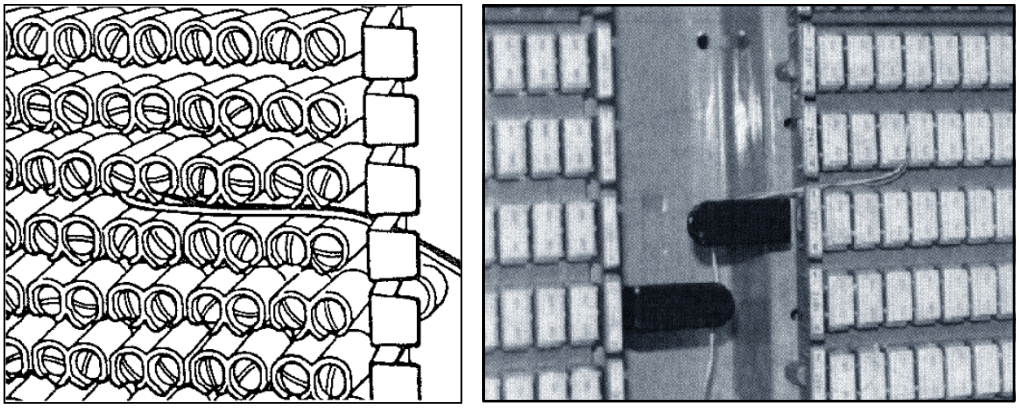
For specific information on terminating wire pairs on RLS blocks, see document 641-202-002, *RLS50 Self-Strip Block Description and Installation*. For information on dual wire termination to a pair, see document 641-202-009, *RLS50 Self-Strip Block Feed-Thru Half-Tap Activator Kit* Description and Installation. Once you have terminated a wire pair, continue on to Routing Wire to route the wires.

Routing Wire

Perform the following steps to route a jumper wire pair:

1. Route the wires horizontally between the activator rows to the wiring trough (see **Figure 11**).

Figure 11: *Routing Wire*



2. Place the wire behind the wire retainers at the sides or bottom of the terminal field, and make a finger loop in the wire to provide enough slack to trace the wires when necessary.
3. Route the cross-connecting jumper wire to the assigned distribution post or activator and cut to required length.
4. Terminate the jumper wire pair on the distribution field as you did on the feeder field.

ACCESSORIES

Table 2 lists ordering information for available accessories.

Table 2: *Accessories*

Catalog Number	Description
P29869	spools shaft for cross-connect wire
P33392	one-pair tester - CQF
P69681	one-pair tester - RLS
P38220	special service caps - CQF (package of 80)
P53828	special service caps - RLS (package of 80)
P44195	green (feeder) CQF block numbers 1-1500
P49940	green (feeder) CQF block numbers 1500-2700
P49941	blue (distribution) CQF block numbers 2701-3600
P44196	blue (distribution) CQF block numbers 1-2700
P64541	green (feeder) RLS block numbers 1-2100
P53350	blue (distribution) RLS block numbers 1-3600
P90370E	off-white touch-up paint, 0.6 ounce bottle

Spool Shafts for Cross-Connect Jumper Wire

G cross-connect spool holds 300 feet; F cross-connect spool holds 400 feet. Terminals have a spool shaft and retainer provided on the inside of the door (see **Figure 12**).

One-Pair Tester

Terminals have a one-pair tester secured to a mounting dish on the door of each terminal (see **Figure 13**).

Figure 12: *Jumper Wire Spool Shaft*

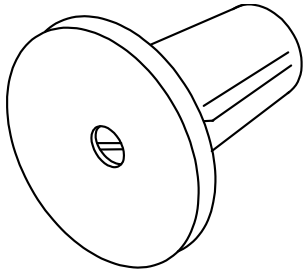


Figure 13: *One-Pair Tester, CQF*

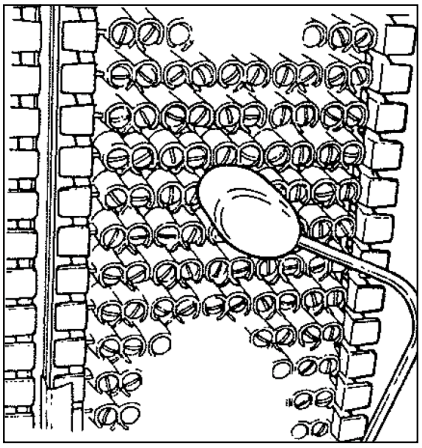
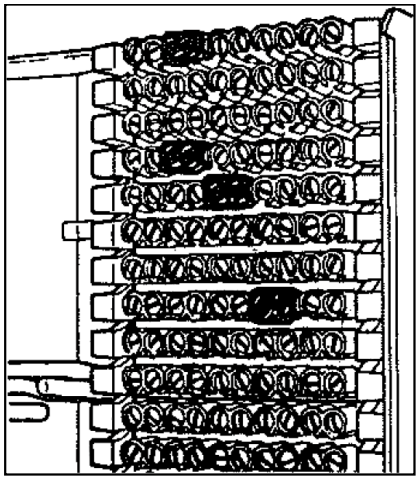


Figure 14: *Special Services Protective Cap*



Special Service Protective Cap

These are red plastic caps that fit over the silos surrounding the binding posts or activators (see **Figure 14**). A package with eighty pairs of caps is furnished with each terminal.

Label Kits for the Terminal Blocks

These are available in green or blue colored labels. The green label kits are used for pair counts in the feeder fields. The blue label kits are for pair counts in the distribution field. Specify numbers required.

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631-201-009 (RF 10/17)