Soneplex

USER MANUAL

Soneplex Fiber Hub Cabinet
Product Catalog: SPX-CABFIN01, SPX-CABFIN04

Revision History of This Manual

To order copies of this document, use document catalog number LTPS-UM-8007-01.

Issue	Release Date	Revisions Made
1	November 9, 2001	Initial release.

USING THIS MANUAL

The following conventions are used in this manual:

- `Monospace type` indicates screen text.
- Keys you press are indicated by small icons such as Y or ENTER. Key combinations to be pressed simultaneously are indicated with a plus sign as follows: CTRL + ESC.
- Items you select are in **bold**.
- Three types of messages, identified by icons, appear in text.

Notes contain information about special circumstances.

Cautions indicate the possibility of personal injury or equipment damage.

The Electrostatic Discharge (ESD) symbol indicates that a device or assembly is susceptible to damage from electrostatic discharge.

INSPECTING SHIPMENT

Upon receipt of the equipment:

- Unpack each container and inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC DSL Systems, Inc. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact ADC DSL Systems, Inc. as described in "Returns" on page 68. If you must store the equipment for a prolonged period, store the equipment in its original container.

UNPACKING AND INSPECTION

For safety and protection during shipment and storage, the cabinet is shipped on a wooden pallet, with plastic covering and an exterior corrugated carton covering all sides.

Always ship and store the cabinet on the pallet and in an upright position to avoid possible damage to internal equipment.

Do not open any doors on the cabinet unless the cabinet is secured to the pallet or foundation pad. An unsecured cabinet is unstable and may tip over.

Do not remove the pallet, corrugated cardboard, and plastic covering until the cabinet has been transported to the installation site.

If the shipping materials appear damaged, do not accept the unit from the shipper; interior damage may not be apparent.

Until the cabinet is turned up for service, any desiccant shipped with the cabinet must remain in the cabinet to retard moisture condensation.

1 Before removing any packing material, inspect for shipping damage. If damage is discovered, immediately report the extent of damage to the transportation company and to ADC. See "Appendix B - Product Support" on page 68.

Do not remove the cabinet from its pallet at this time.

2 Carefully remove all crating material from around the cabinet and pallet.

3 To open a cabinet main or end door, refer to "Opening or Securing a Main or End Chamber Door" on page 14.

4 Inspect the inside of the cabinet; check the packing slip to make sure all components are received such as rectifiers, or batteries. In case of shortage, notify the freight carrier, insurance company, or ADC (see "Appendix B - Product Support" on page 68).

5 Inspect moving parts, mounting hardware, connectors, and electronic equipment. In case of damage, notify the freight carrier, insurance company, or ADC.

Do not install any equipment unless the cabinet is secured to the pallet or the foundation pad.

CAUTIONS AND WARNINGS

The information contained in this practice may not be suitable for all applications, and is subject to change without notice. Refer to 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 practice. Refer also to the following documents:

- Handling Static-Sensitive Materials (local practices)
- Splicing Optical Fiber Cable (local practices)

For further assistance, contact your technical support group.

To avoid eye injury, never look directly into a bare or connectorized fiber end or into optical equipment ports. When not in use, cover connectors with protection caps.

Dispose of loose fiber ends properly, to prevent cut fiber ends from being accidentally ingested or embedded in skin or eyes by humans or animals.

To avoid electrical shock, exercise caution when working around power connections and be careful when working around high electrical potential.

Follow the proper grounding and bonding practices or guidelines.

When handling fiber cables, maintain the recommended minimum bending radius (typically 5 inches).

Plug-in circuit packs contain semiconductor devices that can be damaged by Electrostatic Discharge (ESD). Follow to local practices for the handling of static-sensitive materials.

Ensure that all fiber optic cables are cleaned in accordance with local practices prior to making a connection. Cap any loose fiber to prevent contamination. Refer to local practices for the splicing of optical fiber cable.

When installing equipment to the equipment rails, use only the 12-24 x 1/2 thread displacement screws provided in the loose parts package. (Do not use self-tapping screws.)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

PRODUCT OVERVIEW

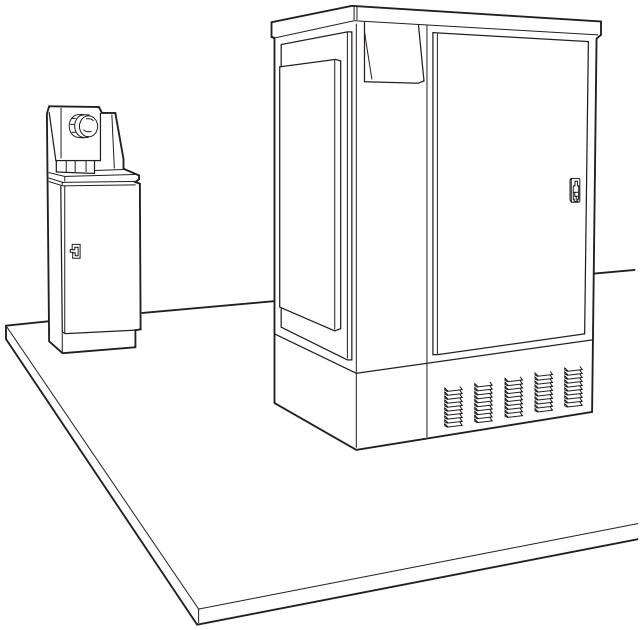


Figure 1. *SPX-Fiber Hub Cabinet with Pedestal-Type Power Transfer Switch P252-889*

The Soneplex® Fiber Hub Cabinet (SPX-CABFIN) shown in Figure 1 is designed to house a variety of electronic equipment for the telecommunications industry. The cabinet provides a sealed internal environment with a heat exchanger cooling system; outside cooling air and humidity are totally isolated from the electronic equipment.

FEATURES

The SPX-CABFIN cabinet features:

- an aluminum cabinet measuring 45 inches (1.14m) wide, 46 inches (1.17m) deep, and 71.25 inches (1.82m) high.
- a main electronics chamber with a heat exchanger cooling system.
- a bulk power system and a side entrance splicing-end or power-end chamber.
- a slide-out battery drawer at the cabinet base.

  The drawer is factory-equipped with a heater that is turned on automatically when the ambient temperature decreases to 40°F (4°C), and remains on until the temperature increases to 60°F (16°C).
- a splicing and power end chamber with a 60 ampere-rated power load center for 120/240 Vac, 60 Hz, single-phase power, and 325-type protection blocks for copper distribution pairs.
- accommodations for up to four 3-inch O.D. outside plant cables.
- one grommeted opening for grounding, and one 2-inch inside diameter conduit opening for connection to local AC power in the splicing/power end chamber.
- secured access doors and intrusion alarm switches.

  Self-locking wind latches hold the doors securely open during maintenance.

AC POWER

Each SPX-CABFIN cabinet requires a separately protected circuit, 120/240 Vac, 60 Hz, single phase, 60 amperes. The AC power may be installed to an AC load center in the splicing/power end chamber through a separate pedestal- or pole-mounted power transfer cabinet. When operating the SPX-CABFIN cabinet under emergency power, the recommended minimum generator capacity is 7.5 kW with 220 Vac, 3-wire output.

BULK POWER SYSTEM

DC power for the SPX-CABFIN cabinet is furnished by a modular power supply shelf (rectifier shelf) and a DC distribution panel. The rectifier shelf provides filtered and regulated DC voltage for powering the cabinet while maintaining the batteries in a fully charged condition. Rectifier output voltage varies according to battery temperature, for example, 54.5 Vdc at 77°F (25°C). Three systems are available: the Marconi® Vortex 25, Lucent® CPS 4000, and Alpha® 4810.

The power supply shelf (Figure 2) consists of an equipment shelf, two A25B50 25-ampere rectifier modules, and an alarm and control assembly for remote alarms. Separately either rectifier module can provide the required DC power; two rectifiers provide for reliability and load sharing.

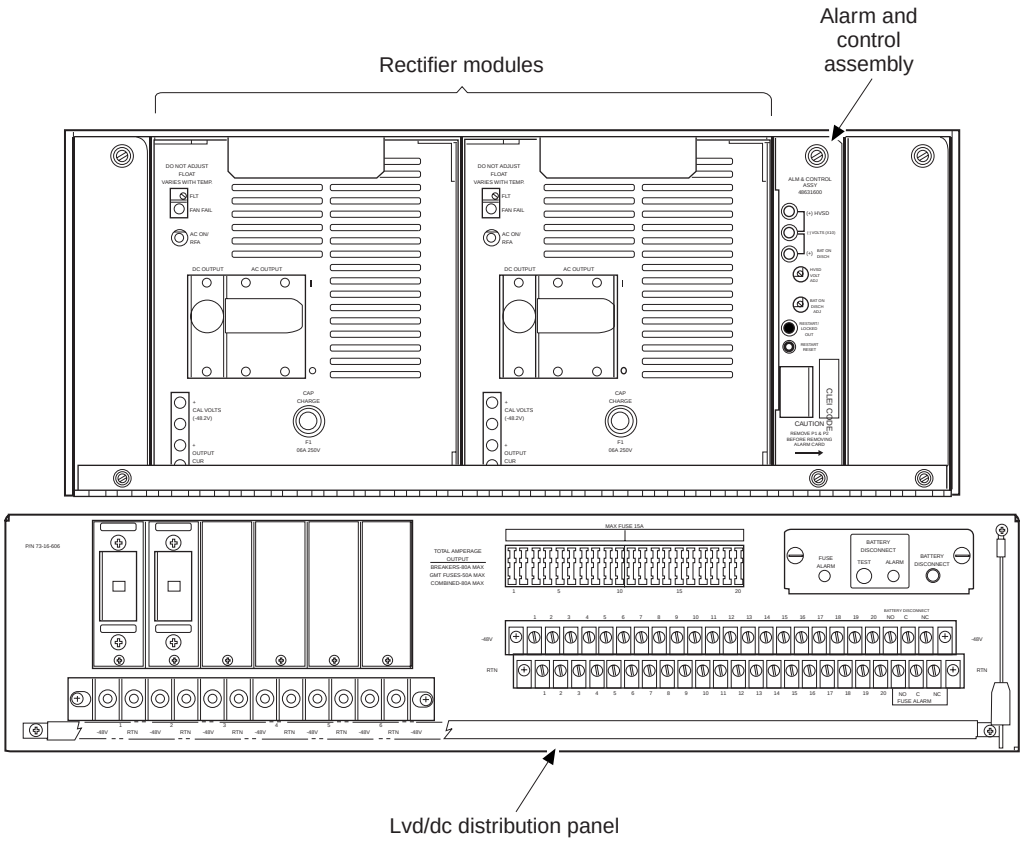


Figure 2. *Modular Power Supply Shelf*

The power supply shelf requires nominal 208/240 Vac, 60 Hz input power; maximum power consumption is 3,101 watts. Input power is protected by an internal circuit breaker. Rectifier output power is current limited.

The power supply shelf with the Alarm and Control Assembly, and the DC Distribution Panel are factory installed, but he rectifier modules are ordered separately and must be field installed.

Rectifier Modules

Rectifier output current remains equal to load current as long as load current does not exceed the rectifier output capacity (nominally 25 amperes per rectifier; 50 amperes total). This mode of operation is known as float charging. During normal operation, the battery does not furnish load current and remains fully charged. During battery recharge following an AC power outage, or in the event of DC overload, the output current limiting circuit prevents the increase of output current above the nominal 25 amperes per rectifier.

A fan assembly, at the rear of each rectifier module, supplies forced air ventilation. If a fan fails, local (faceplate) and remote alarms are activated.

A Lorain® Battery Temperature Compensation Module (which must be secured in the field to battery No. 1 in the battery drawer) automatically adjusts the output (float) voltage of each rectifier module, to maintain battery float current as battery (ambient) temperature fluctuates. The temperature compensation module limits the rectifier output voltage to 56.0 Vdc, and decreases rectifier output voltage with increasing temperature.

Alarm and Control Assembly

The Alarm and Control Assembly (ACA), at the far right of the rectifier shelf, continuously monitors rectifier module DC output voltage.

High Voltage Shutdown

Each rectifier module has two High Voltage Shut-Down (HVSD) features that can disconnect the rectifier modules if the output voltage rises above the limit (strapped at 56.0 Vdc) set by the temperature compensation module.

- Selective HVSD and Restart—The selective HVSD is measured at the ACA front-panel (+) HVSD and (-) VOLTS (X10) test points, and can be adjusted at the HVSD VOLT ADJ control. If the DC output voltage exceeds the HVSD set point (normally 57.5 Vdc), the rectifier module which caused the high-voltage condition shuts down immediately, provided that the rectifier module was delivering greater than 10% of its full load. After approximately 4 seconds, the module automatically restarts. If the rectifier module output voltage again exceeds the high voltage shutdown value within 5 minutes, the module shuts down and locks out; the module must be manually reset. If there is not a high voltage condition within the 5-minute interval, the restart circuit is reset and normal operation resumes.
- Non-Selective HVSD—If the rectifier module output voltage exceeds 59.5 Vdc (preset nonadjustable value), the rectifier module shuts down immediately, regardless of the amount of load current being delivered before the HVSD occurred.

DC Distribution Panel

The cabinet is equipped with a low voltage DC distribution panel having up to five circuit breakers. These circuit breakers and the auxiliary fuses control DC power to the other cabinet equipment (described on the cabinet circuit breaker decal).

BATTERIES

The SPX-CABFIN contains eight batteries which can be installed in a slide-out battery drawer at the cabinet base. In the event of commercial power failure, batteries can supply up to 8 ampere-hours (Ah) of reserve power (depending on the batteries installed).

The cabinet may be equipped with two series 12V strings of four batteries each, or one series 6V string of eight batteries. Battery strings are connected by a connector bus on the drawer front wall; there are eight connectors per

drawer. (The connector bus must be reconfigured for use with 6V batteries.) The drawer is equipped with a set of eight connectorized battery cables.

A battery heater tray is factory installed in the floor of the battery drawer. It is turned on automatically when the drawer temperature decreases to 40°F (4°C), and remains on until the temperature increases to 60°F (16°C).

The battery drawers slide out for access to all batteries. The drawer has heavy gauge steel in load-bearing areas, and is equipped with heavy-duty slides.

The SPX-CABFIN cabinet may be equipped with a Lorain Battery Thermal Management (BTRM) System. This system is made up of an Alarm and Control Unit (ACU) mounted in the main equipment chamber, and Thermal Sensing Units (TSUs) attached to each battery negative terminal and wired to the ACU. The TSUs open at the temperature marked on the unit, typically 140°F (60°C); if this occurs, the ACU reduces the rectifier output to -48 Vdc and generates a latched alarm.

PRIOR TO INSTALLING THE SPX-CABFIN

Before installing the SPX-CABFIN, consider the following:

- "Site Selection" (below)
- "Site Preparation" on page 5
- "Preparing the Form" on page 7
- "Pouring the Pad" on page 9.

SITE SELECTION

Consider the following when deciding on the SPX-CABFIN cabinet location:

Right-of-Way

It should be the practice of any installing company to acquire, in advance of construction, rights-of-way from landowners, and permits or other approvals from public authorities. It is recommended that SPX-CABFIN cabinets be placed in servitudes, on dedicated (recorded) easements, or on property owned by the company; avoid unrecorded easements.

Public safety road and street rights-of-way should be used only when there is adequate space to place the closure and provide safe working conditions. The cabinet should be easily accessible with adequate parking to ensure safety for personnel and vehicles. Also, place the cabinet where it will not create a visual or physical obstruction to vehicular or pedestrian traffic.

Vulnerability

Select locations that will minimize accidental damage or vandalism. Consider the use of protective posts when the cabinet is located where vehicles may run into it. Do not place the cabinet in a ditch or an area subject to flooding. The cabinet should always be located on a site above the 100-year floodplain, and should not be subject to water run-off or flash flooding during heavy rains. Do not place the cabinet in an area where the pad is subject to vehicle loads. In regions subject to frost, the site chosen must be free of heaving.

Accessibility

The closure should be placed not less than 42 inches (1.1m) from any obstruction, such as a fence or hedgerow. Include adequate foundation pad footing area for craft personnel to perform maintenance procedures.

SITE PREPARATION

The cabinet is installed on a concrete pad that is cast-in-place. The foundation pad should be made of concrete only; substitute materials, such as reinforced plastics, lack the rigidity required by the cabinet and are not recommended.

A separate power transfer cabinet can be pedestal-mounted to the same pad or a separate pad, or pole-mounted near the SPX-CABFIN cabinet. For the general positions of the SPX-CABFIN cabinet and power transfer cabinet on the concrete pad, see Figure 3 (for reference only; for detailed information, refer to the template label and the work prints for your installation).

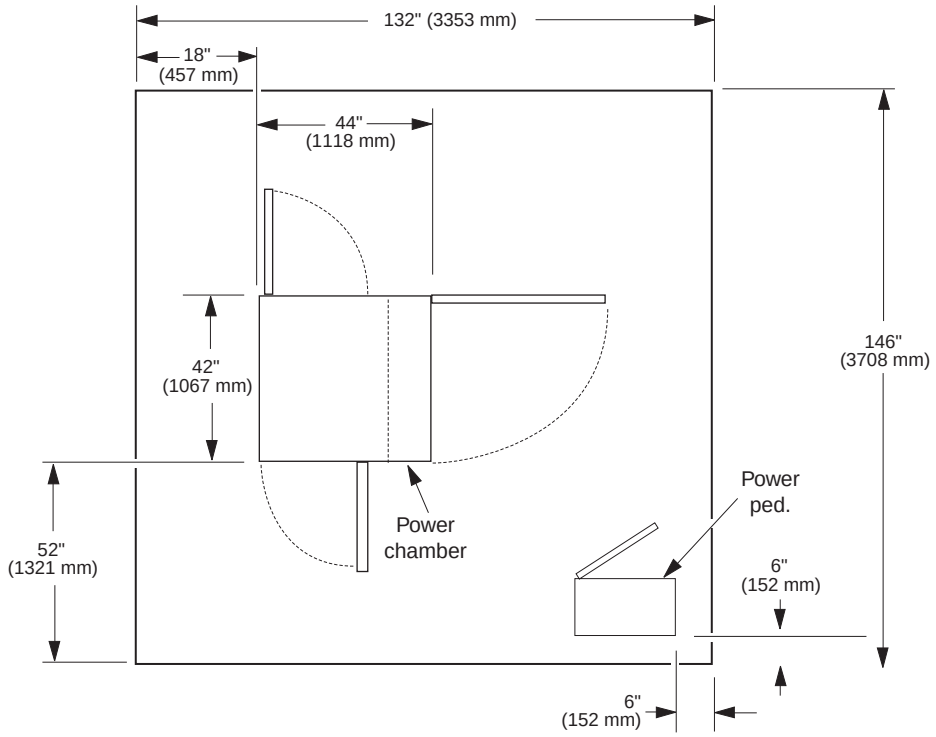


Figure 3. *Foundation Pad Dimensions*

A cabinet mounting template (galvanized metal mounting plates with anchor bolts and support rails) is required to locate the mounting bolts and access conduits in the foundation pad and is installed when the foundation pad is constructed.

The SPX-CABFIN template must be ordered separately from ADC. Please contact your ADC representative.

When a separate power transfer cabinet is used, a second pad may be constructed, using the template and pad recommendations provided by the power transfer cabinet manufacturer. If a power transfer cabinet is to be installed on the main pad, a separate mounting template must be installed with the SPX-CABFIN cabinet mounting template particular to the housing.

6 Ensure that the area chosen for the pad is firm and level. If soil in the area chosen is not firm, compact the soil. Construct a level base for the pad, using a minimum of 6 inches (152 mm) of sand or gravel.

7 For excavated pad applications, excavate a hole for the pad and cable conduits in accordance with the engineering work prints, generally to a depth of 30 inches (760 mm) for standard applications, and 60 inches (1.5 meters) for areas where there is heavy frost.

8 Dig a trench to the area where the cable conduit will rise into the SPX-CABFIN cabinet.

The cable, conduit, ground rod, and ground wire should be placed before the pad is constructed (cast-in-place); refer to DLP-103.

9 Dig a separate trench for the electrical conduit between the SPX-CABFIN cabinet and the power transfer cabinet.

10 If a pole-mounted AC source is used, dig a trench for the electrical conduit from the pole to the SPX-CABFIN cabinet.

Refer to local practices for specific information on grounding.

PREPARING THE FORM

1 Place the conduits, cables, ground rod(s), and ground wire(s) as indicated in the engineering work prints. Position the conduits horizontally to accommodate four 4-inch conduits. If fewer than four conduits are used, install those closest to the center of the template first.

2 Place a ring ground system around the proposed foundation pad location according to local practices and building safety codes.

3 Lay the SPX-CABFIN cabinet template on the ground over the conduits, and slip the conduits (or cables) into the hole(s) for the cable entry box(es) to locate their positions.

4 Construct the concrete form as shown in Figure 4

Refer to the template label for dimensions.

5 Lay the power transfer cabinet template (if used) over the conduits, in one corner of the pad, to locate the corner as shown in Figure 5 on page 8.

Refer to the template label.

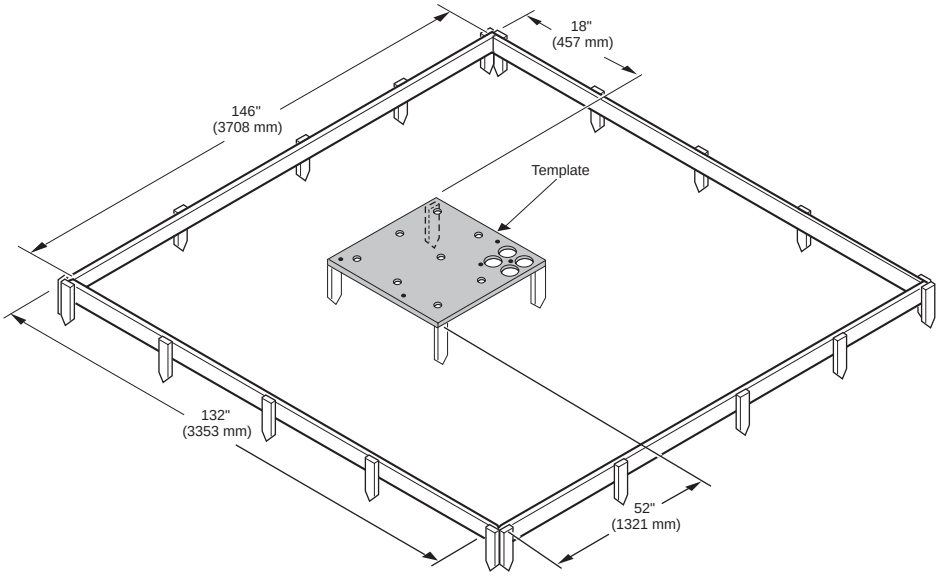


Figure 4. *Foundation Pad Preparation*

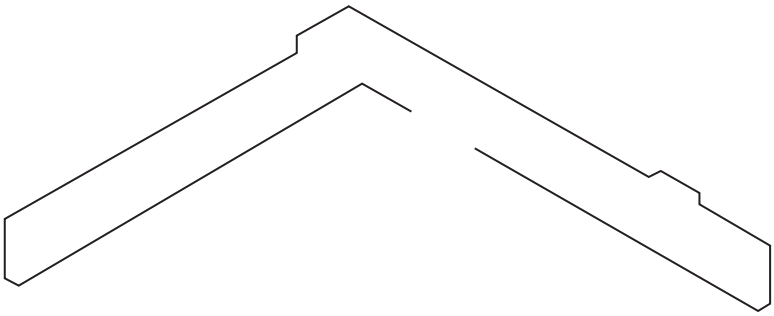


Figure 5. *Power Cabinet Template*

6 Backfill and tamp the trench to hold the conduits or cables firmly in place.

7 Construct and place the leveling stakes (refer to the template label for locations).

8 Remove the template(s), and level the pad form.

The pad top surface should be approximately 6 inches (152 mm) above the gravel base, and 2 inches (51 mm) above the final grade.

9 Place wire mesh (6 x 6, 4 gauge) in the form; ensure that the mesh is vertically centered in the form as shown in Figure 6 on page 9.

No. 3 (3/8-inch) or larger reinforcing rod, with high chairs placed on 15-inch (380 mm) centers, may be used in place of wire mesh.

10 Place the template(s) in the form, and fasten the template(s) to wooden stakes.

11 Position the conduit and cable as required in the cable entry box(es) or appropriate template openings.

Ensure that the conduit ends extending through the template are perpendicular to the template surface and centered in the cables boxes.

12 Level the template(s) on the stakes so that the tops of the templates are flush with, to 1/4 inch (6 mm) above the top of the form.

13 Ensure that the conduits extend approximately 2 inches (51 mm) above the template(s).

Cover the conduit openings to keep concrete from entering during the pour.

14 Treat the area below the pad, and for two feet around the perimeter, for insects (refer to local practices).

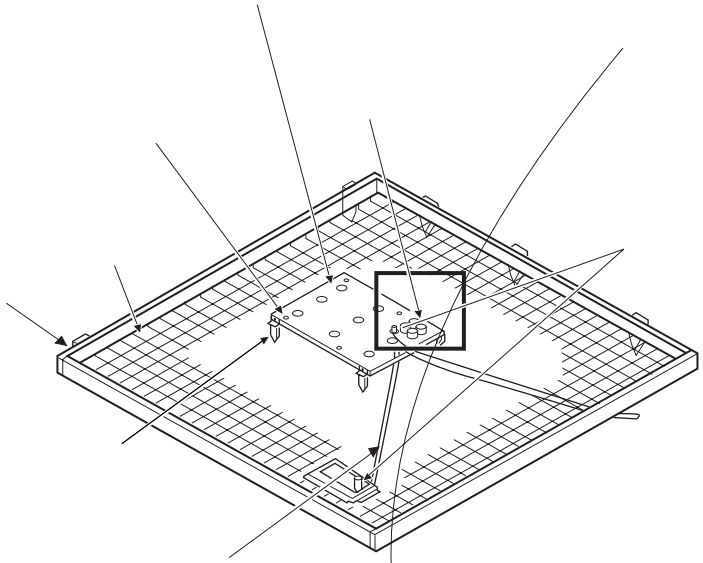


Figure 6. *Foundation Pad Design*

POURING THE PAD

The concrete compression strength must be a minimum of 4,000 psi, as determined by ASTM C39, Test of Compression Strength of Concrete Cylinders. The slump of the concrete must be 2 to 4 inches, as determined by ASTM C143.

Coarse aggregate used in the concrete shall be graded from 3/4 inch to No. 4 only.

1 Before pouring concrete, be sure that all four 1/2-13 anchor bolts are threaded all the way down in the template anchor nuts.

2 Ensure that the wire mesh is set approximately 2 inches (51 mm) off the bottom of the form.

To keep concrete from entering during the pour, cover the duct openings.

3 Pour the concrete. Puddle the concrete along all edges of the form.

4 Finish the concrete so that it is flush with, to 1/4 inch (6 mm) below, the top of the template mounting plates. The pad should be level to within 1/2 inch (13 mm) over the entire length and width.

The pad must cure for a minimum of seven days before supporting any significant load, or before the cabinet is installed. After the second day, the forms may be removed.

INSTALLATION

BEFORE YOU BEGIN

Before beginning these procedures, obtain the following special tools and equipment:

- One hoist (crane) capable of lifting 2,000 lb (900 kg)
- Two wire rope slings, 8-foot (2-m) minimum length, each with 2,000 lb. (900 kg) capacity. (If slings of sufficient length are not available, a spreader bar is required to ensure that the cables pull on the lifting eyebolts in a vertical direction.)
- Two connecting links (to attach wire rope slings to the cabinet lifting eyebolts)
- Rope, for use as tagline; 5/8-inch (40 mm) diameter, approximately 75 feet (19m) long

PLACING THE CABINET ON THE PAD

For this procedure the following equipment is required:

- One hoist (crane) capable of lifting 2,000 lb (900 kg)
- Two wire rope slings, 8-foot (2-m) minimum length, each with 2,000 lb (900 kg) capacity. (If slings of sufficient length are not available, a spreader bar is required to ensure that the cables pull on the lifting eyebolts in a vertical direction.)
- Two connecting links (to attach wire rope slings to the cabinet lifting eyebolts)
- Rope, 5/8-inch (40 mm) diameter, approximately 75 feet (19m) long (for use as tagline)

Observe the following safety measures when placing the cabinet:

- **Before lifting the cabinet, block off the area. Vehicles should not be parked within 25 feet (6.4m) of the lifting circumference.**
- **Keep bystanders away from work operations at all times.**
- **All personnel working with crane equipment should have the proper safety attire as required by company or local safety standards, including standard safety headgear, eye protection, and, when required, insulating gloves.**
- **Do not operate the crane until all stabilizers are extended and firmly supported. Do not attempt to retract or extend the stabilizers while a load is suspended.**
- **Operators should not suspend loads over people, nor should any person be permitted to work, stand, or pass under a suspended load.**
- **Do not stand on the load or under the load; do not place any part of your body under the load.**
- **When raising the crane from the stowed position and while operating the crane, be alert for overhead obstructions or power lines.**
- **Do not exceed the crane capacity.**
- **If the cabinet is to be moved while attached to the pallet (such as in a turnkey staging area or temporary storage location), it may be lifted by a forklift vehicle, provided that the forklift is rated at 2,000 lb (900 kg) and has a minimum fork length of 30 inches (0.76m).**
- **Do not lift the pallet and cabinet from the ends when using a forklift; lift from the sides of the pallet only.**

1 Remove the base cover plates below bay No. 1 and bay No. 2 (battery drawer covers) for access to the cabinet base mounting holes.

The cabinet base mounting holes are located near the battery drawer two front corners, as shown in Figure 7 on page 12, and two rear corners.

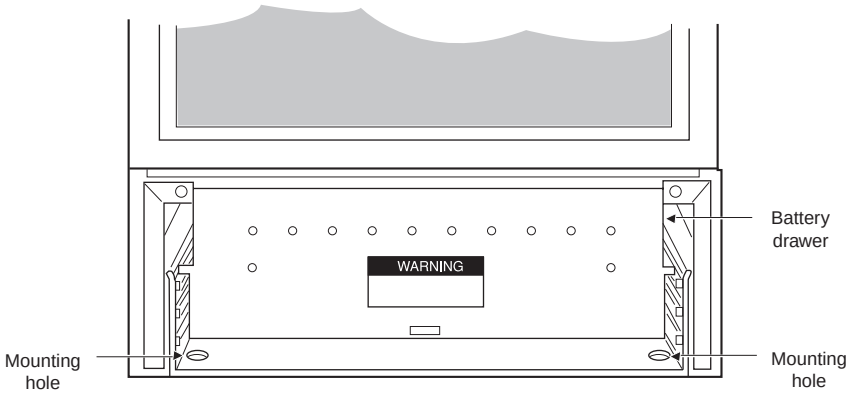


Figure 7. *Cabinet Base Mounting Hole Locations*

2 Insert the cable sling securely through both eyebolts, as shown in Figure 8 on page 13; take up the cable slack with the crane.

3 Attach a length of 5/8-inch diameter rope to a lifting eyebolt as a tagline.

4 Remove the four pallet mounting bolts securing the cabinet to the pallet.

5 Close and latch the cabinet doors.

6 Clean all debris from the cabinet foundation pad.

7 Dress the cables toward the end of the pad in preparation for placing the cabinet.

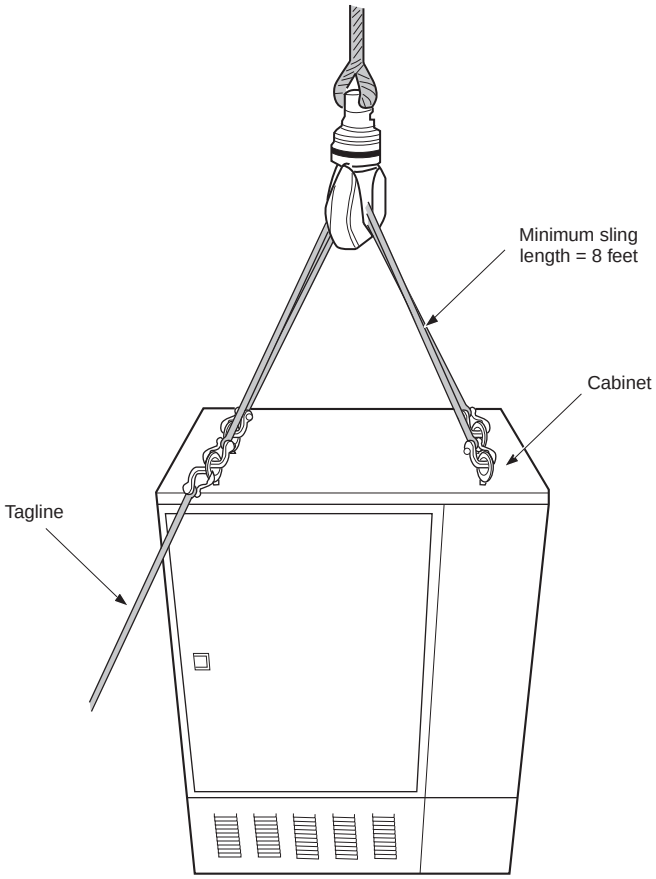


Figure 8. *Sling Inserted in Eyebolts*

8 Remove the anchor bolts and washers from the foundation pad.

The cabinet must be lowered onto the foundation pad parallel with the pad surface, in alignment with the anchor bolts, and clear of the conduits in the foundation pad.

9 Lift the cabinet, and lower it into position over the anchor bolts. The cabinet should rest evenly on the foundation pad and be supported at each corner.

10 Set the cabinet and slacken the slings so that the full weight of the cabinet is on the base.

11 Install the four anchor bolts, flat washers, and lock washers. Tighten all bolts.

12 Remove the slings and tagline. Remove the lifting eyebolts, and insert the nylon hex-head bolts and washers provided in the cabinet loose parts package.

OPENING OR SECURING A MAIN OR END CHAMBER DOOR

Do not open any doors on the cabinet until the cabinet is secured to the concrete foundation pad. An unsecured cabinet is unstable and may tip over.

To open a cabinet door,

1 Release the lock by inserting the security tool (216-Type wrench) into the latch; and turn it counter-clockwise as shown in Figure 9.

The latch is spring-loaded, and will rise from the latch bed.

2 Raise the latch to the fully open position, and open the door as shown in Figure 10 on page 15.

3 To secure the wind latch as shown in Figure 11 on page 15, open the door until the shoulder engages the hole at the end of the slot.

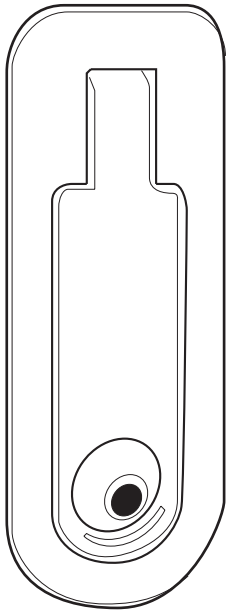


Figure 9. *Latch in Closed Position*

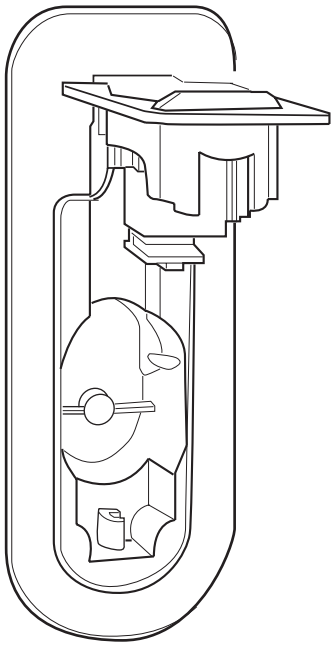


Figure 10. *Latch in Open Position*

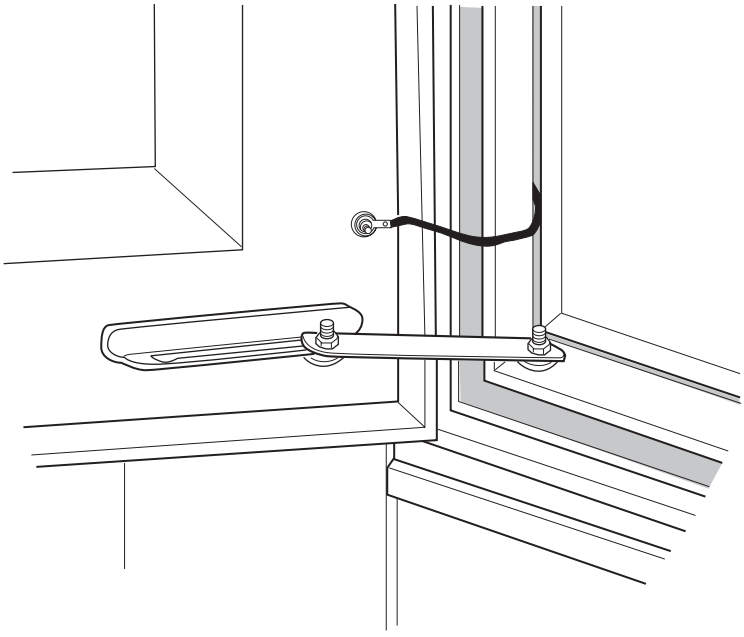


Figure 11. *Wind Latch*

INSTALLING CABLES

When handling fiber cables, maintain the recommended minimum bending radius (typically 5 inches).

Maximum outside plant cable O.D. is 3 in. (76 mm).

1 Open the end chamber door.

2 Remove the skirt below the end chamber by removing one bolt at each end of the battery tray, and one bolt beneath the front center of the end chamber floor as shown in Figure 12 and Figure 13 on page 17.

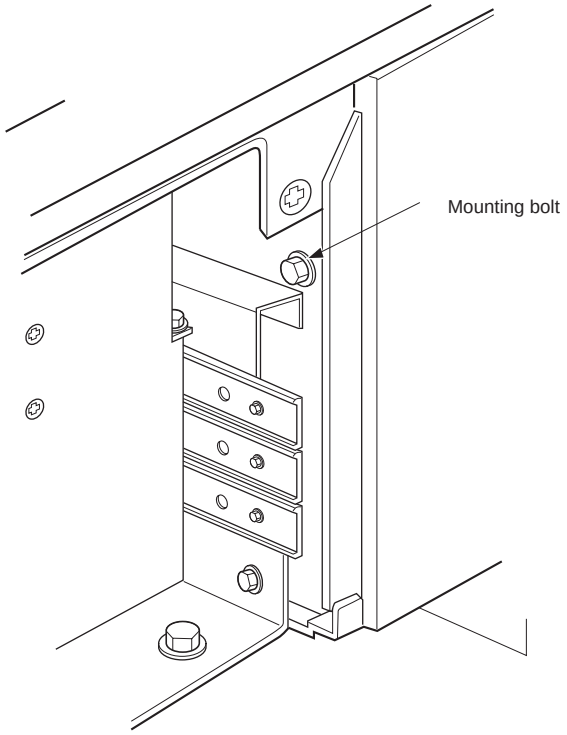


Figure 12. *Skirt Mounting Bolt in Battery Compartment*

Figure 13. *Skirt Mounting Bolt, Ground Bar, and Ground Wire Locations in End Chamber*

3

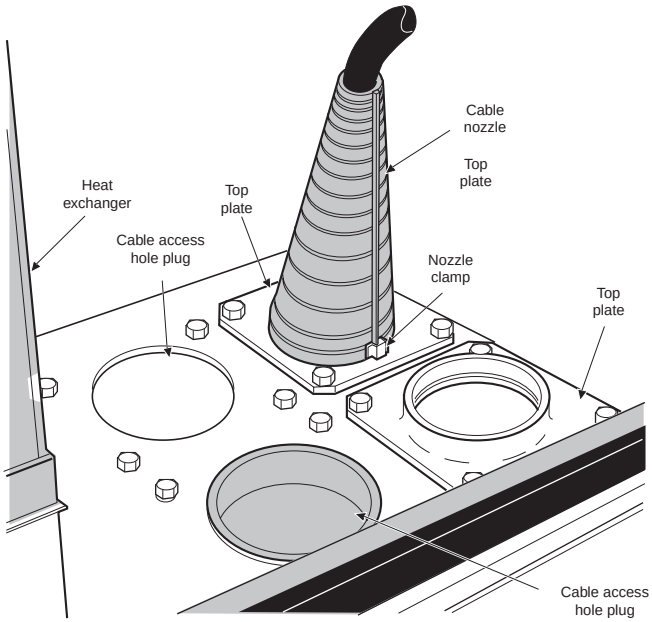


Figure 14. *Removing Cable Nozzles*

4 Install all cables through the conduits and into the cabinet. Pull all cables at least 15 feet (4.6m) beyond the end of the conduit.

The opening in each nozzle should be small enough to allow the nozzles to fit securely on the cables. If more than one cable enters the same split sleeve, cut the nozzle to accommodate all cables. Use sealing tape and B sealant to fill the gaps between the cables and to fit the nozzle opening.

5 Cut the small end of a nozzle to permit it to be slipped onto a cable.

6 Slide a nozzle onto a cable (large end first), and move it down the cable into position on the bottom plate. Secure the nozzle to the cable, using one layer of sealing tape and the clamp provided.

7 Repeat Step 5 and Step 6 for the remaining cable(s).

8 Secure any remaining (unused) nozzle in position on the bottom plate.

9 Pull the ground wire(s) through the grommet, and route it in a smooth curve to the ground bar as shown in Figure 13 on page 17.

10 Apply No-Ox (or equivalent), and connect the wire(s) to the wire clamp(s) provided on the ground bar.

11 Reinstall the skirt beneath the end chamber.

INSTALLING AC WIRING

Observe all safety precautions as specified by local building codes and the National Electrical Code® (NEC). If local building codes specify procedures different from those in this section, follow local codes.

Before installation, the AC grounding electrode system must be bonded to an AC main service power neutral/ground bus. Contact your local power company or refer to local practices for information about codes or restrictions for your installation.

These procedures are to be performed by a licensed electrician.

AC equipment from the service drop to the pad is provided locally. The cabinet requires a separately protected 120/240 Vac, 60 Hz, single-phase, 60 ampere circuit. Install the AC power to the AC load center as outlined in the following paragraphs. A surge protector (mounted on the AC inlet box) is provided.

To accommodate local conditions, power can be supplied from an external cabinet containing the local service drop and (when required) power meter. The transfer switch and emergency power inlet may be mounted on the power cabinet when not included with the SPX-CABFIN cabinet. Utility boxes and any exposed switches should be equipped with locks.

1 Make arrangements with the local power company to furnish a single-phase power drop. Determine whether the power company requires the installation of a watt-hour meter.

2 Open the end chamber door. Route the power and ground wires from the external commercial power source through the conduit in the chamber base. Pull the wire at least 10 feet (3m) beyond the foundation pad.

Wire size depends on distance to the source; consult the NEC and local codes. The minimum recommended wire size is 6 AWG (type XHHW or equivalent).

3 At the AC load box, punch out a conveniently located knockout to accommodate the conduit (or strain relief) and wires.

4 Place 2-inch electrical conduit from below the false floor to the bottom of the AC load box. Position the conduit to fit in the knockout at the center-rear of the false floor.

5 Seal the space between the conduit and the conduit opening in the false floor.

6 Open the load box cover, and connect the AC power line to the load center in accordance with the NEC and local codes for branch circuit installation. Route the wires into the load box through the conduit or strain relief. Install the wires to lugs L1 (Line 1) and L2 (Line 2). Install the ground wire to the ground bar, and neutral to the neutral bar.

7 Attach and secure the load box cover.

If the cabinet will not be powered up for an extended period, place a 300W heat source (two 150W light bulbs) inside the cabinet to prevent condensation.

PREPARING CABLE SHEATHS

If joint buried plant is used, check the cable sheath for voltage in accordance with local standards. If voltage is detected, do not proceed with the installation. Contact your supervisor and do not proceed until the voltage hazard is eliminated.

If these recommendations are not in accordance with local practices, follow local practices in place of these steps.

1 Ring cut the cable outer sheath 9 inches (229 mm) above the end chamber false floor.

2 Remove the sheath above the ring cut.

3 Cut the cable grounding shield 9 inches (229 mm) above the false floor (the same place as the outer sheath).

4 Remove the grounding shield to expose the plastic core wrap.

5 Cut the cable core wrap 9-1/2 inches (241 mm) above the false floor (1/2 inch higher than the sheath and shield marks). Pull off the plastic wrap to expose the wire pairs.

6 Check the cable to make sure no pairs were nicked. If filled cable is used, wipe any excess filling compound from the conductor bundle.

7 Install an appropriately-sized bond clamp on the cable. Connect a solid 6 AWG ground wire between the clamp and the cabinet ground bar. Place the ground wire under the containment bracket at the front of the end chamber floor.

8 Install binder group identification ties, then remove the unit binders and prepare to splice the cable.

SPLICING METALLIC CABLE

1 The 325-type protector stubs are already connectorized and arranged on the splicing support bars. An identifying tag shows the pair count of each splicing module as shown in Figure 15 on page 21.

Do not remove the identification tags from the splicing modules.

2 Using the splicing pair-count information provided on the engineering drawings, arrange the appropriate cable pairs with their corresponding protector stub cable pairs on the splicing support bars.

3 Splice, following approved local practices.

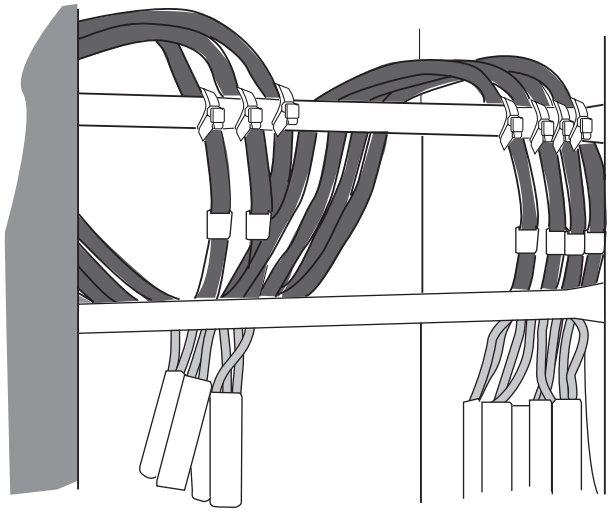


Figure 15. *Protector Stubs Laced to Support Bars*

SPLICING AND TERMINATING FIBER-OPTIC CABLE

Do not directly view the end of any energized fiber. Wear laser safety glasses during this procedure. Follow all local safety precautions before proceeding with splicing.

When handling fiber cables, maintain the recommended minimum bending radius (typically 5 inches).

Refer to local practices for bonding and grounding details.

1 Route the fiber cable from the splice chamber to the fiber termination shelf.

2 The fiber termination shelves come from the manufacturer with a bag of loose parts placed inside the shelf. One 12A1 clamp and grounding kit are included. Use these parts to properly terminate and arrange the fibers; refer to the instructions inside the bag.

Additional 12A1 clamp and grounding kits may be ordered separately as needed (one per outside plant cable).

3 Open the termination shelf cover.

Refer to the appropriate local practice for cable preparation procedures.

4 Remove the outer sheath to allow approximately 60 in. (1524 mm) of fiber to extend beyond the entrance to the termination shelf.

5 Secure the outside plant cable(s) to the frame, using the cable clamp bracket provided with the 12A1 cable clamps as shown in Figure 16. Mount the 12A1 clamp on the left vertical support, about 3 inches (76 mm) below the bottom of the termination shelf.

6 Bond the metallic cable members to the frame, using a 6 AWG ground strap.

Use a nonconducting fishtape to aid in running the fiber cables.

7 Following local practices, route the fiber cables into the shelves for buffering, connectorization, and termination to build-out blocks as indicated on the engineering drawings.

8 Splice, following approved local practices.

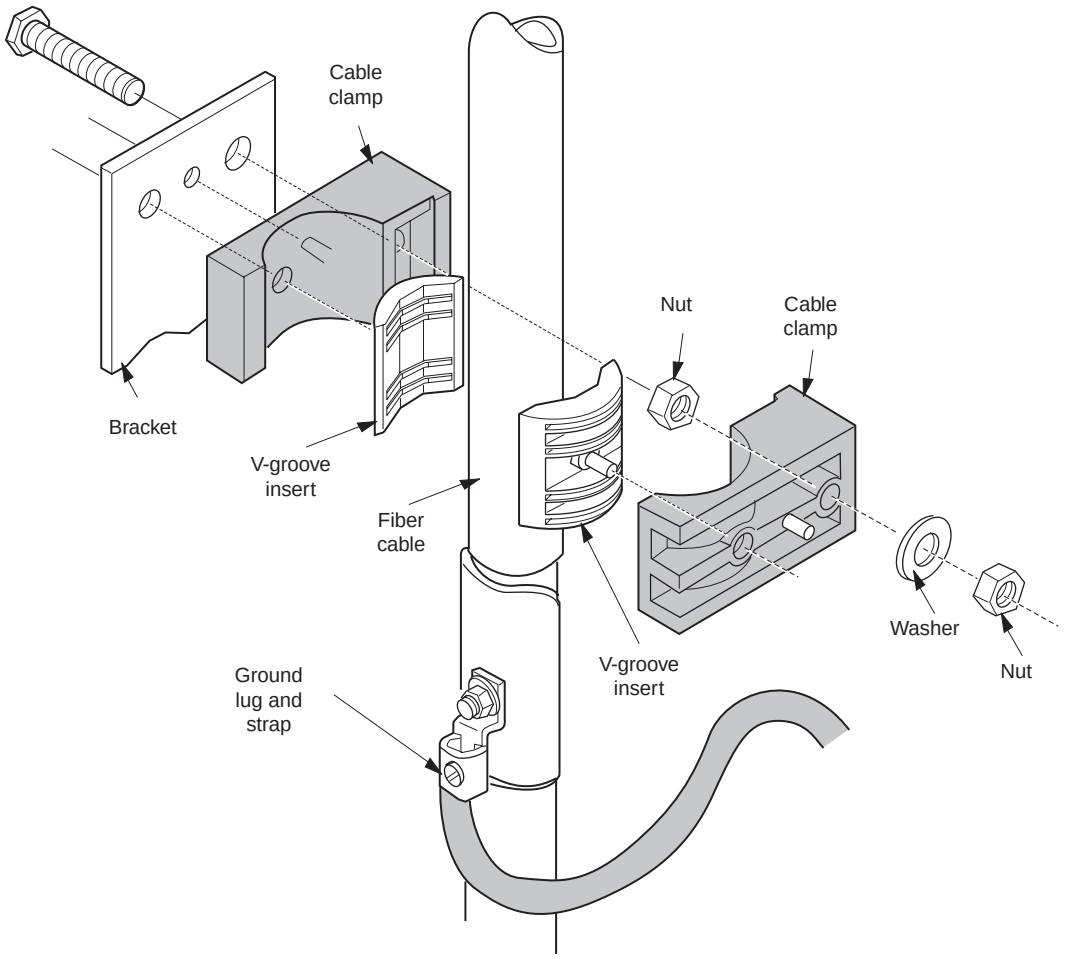


Figure 16. *Fiber Cable Secured with 12A1 Clamps*

CONNECTING AC POWER

Ensure that all AC circuit breakers are set to OFF (open) before starting this procedure. Failure to do so could result in serious injury and equipment damage.

Before applying commercial AC power to the cabinet, ensure that no AC power plugs have been connected to the auxiliary AC receptacles.

Do not proceed with turnup if any voltage in the following steps is not correct; turn down all power and contact the applicable maintenance authority. Do not continue with turnup until the problem has been corrected.

A Fluke 79 Digital Multimeter (DMM) and TL20 Industrial Test Lead Set (or equivalent) are needed to complete this procedure.

1 Before applying commercial AC power to the cabinet, ensure that no AC power plugs are connected to the auxiliary AC receptacles.

The AC power wiring is shown on T-drawing furnished in the cabinet. For a typical AC power wiring diagram, see the cabinet door label or Figure 17 on page 24.

Table 1. *AC Circuit Breaker Assignments*

Breaker Number	Assigned to
1	Main (60A)
2	Left Rectifier (30A)
3	Right Rectifier (30A)
4	Auxiliary outlets
5	Battery heater
6	(not used)

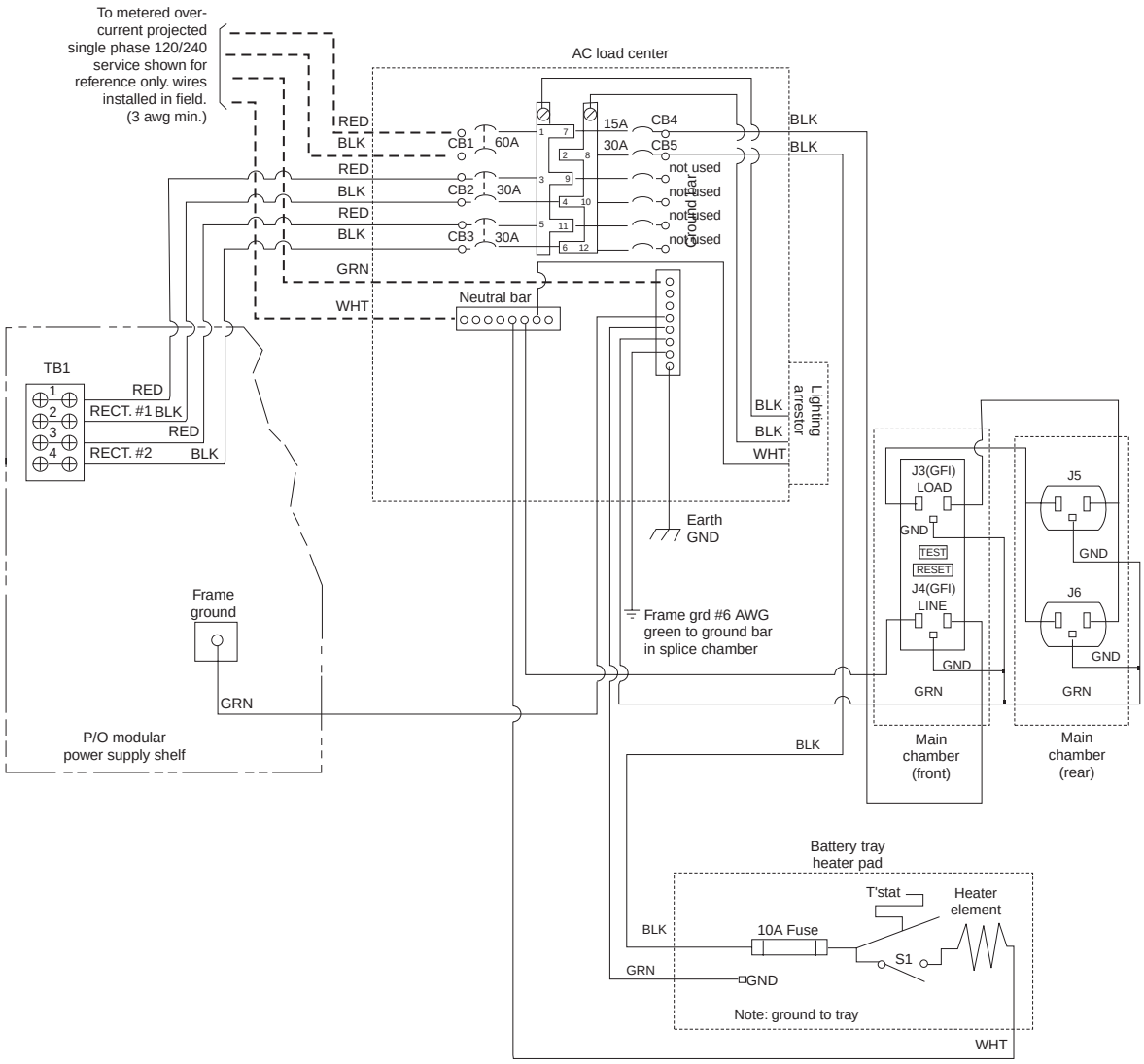


Figure 17. *Typical SPX-CABFIN AC Power Wiring Diagram*

2 At the power cabinet, open the external door and the load center (breaker box cover); set the main AC breaker to ON to apply commercial power to the SPX-CABFIN cabinet.

Exercise care when performing the following steps to avoid electrical shock; hazardous voltages are present.

3 The cabinet can now be powered up. Open the end chamber door. Open the SPX-CABFIN cabinet load center cover.

4 Set main AC circuit breaker CB1 (60A) to ON.

5 Using a DMM, verify the following (nominal) voltages:

- L1 bar to L2 bar 230 Vac
- L1 bar to N bar 115 Vac

- L2 bar to N bar 115 Vac

6 Secure the load center cover panel.

7 Set circuit breakers CB2 and CB3 to OFF.

8 Set circuit breakers CB4 to ON.

9 Using a DMM, measure the voltage at the AC auxiliary outlets. Verify that the voltage is within the range of 110 to 125 Vac.

10 Set circuit breaker CB5 to ON. (This breaker provides power to the battery tray heater.)

To access the battery tray, remove the louvered battery drawer cover beneath bay 1.

11 To confirm heater operation, hold the thermostat by-pass switch (at the rear of the battery drawer) in the by-pass (spring-loaded) position; place the palm of your other hand against the tray heater in the bottom of the battery tray. A properly connected heater will feel warm within one minute.

To secure the battery tray, install the louvered panel(s) beneath the bay door(s).

CONVERTING THE BATTERY TRAY (12V TO 6V)

Before starting this procedure, ensure that there is no DC power in the cabinet (no batteries installed or connected, and no rectifier modules powered up).

1 If necessary, remove the battery drawer cover below bay 1.

2 Slide out the battery drawer; remove any loose parts packages.

3 While facing the front of the battery drawer as shown in Figure 18 on page 26, locate the two center bus connectors (BATT 4 and BATT 5).

4 Note the red cable (BATT 4) and black cable (BATT 5) at the center of the bus; these cables must be removed.

5 Using a small tool (awl or small screwdriver) to depress the locking spring at each connector as shown in Figure 19 on page 26, pull the cable from the connector.

While removing the cable lugs from the connector, carefully note the lug position in the connector; the battery jumper lugs must be installed the same way (Step 7).

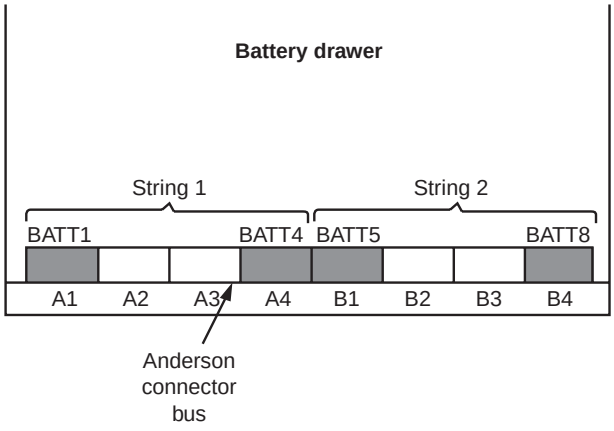


Figure 18. *Battery Drawer Connector Locations*

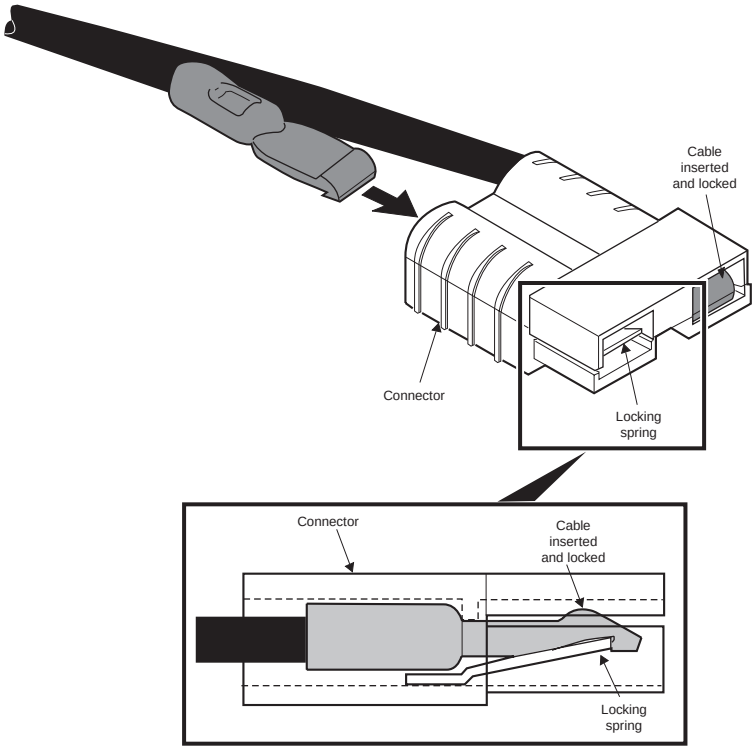


Figure 19. *Connector Locking Spring*

The cable ends must be cut and thoroughly insulated from each other and from the cabinet, if the cables are not completely removed. These cables are terminated at the battery termination panel.

6 Remove the red cable (BATT 4) and black cable (BATT 5) from the cabinet.

7 Locate the battery jumper in the cabinet loose parts package. Install the battery jumper in the connectors at the locations where the cables have been removed; push the jumper terminals into the connectors so that they lock in place. The installed battery jumper is shown in Figure 20 and Figure 21.

Ensure that the jumper terminal detents are seated against the connector locking springs.

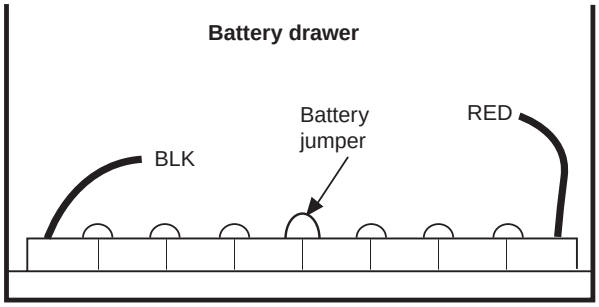


Figure 20. *Battery Jumper Installed in Connector Bus*

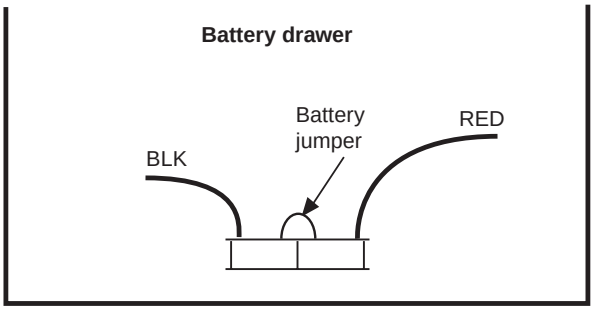


Figure 21. *Battery Jumper Installed in Connectors*

INSTALLING BATTERIES

Observe the following safety measures when handling the batteries:

- **Batteries are electrically live at all times, and must be handled carefully. Even if the case suffers damage, the product is capable of supplying high short-circuit current.**
- **Remove rings, watches, and other jewelry. Although the voltages encountered are not hazardous, the batteries can deliver large amounts of current.**
- **Do not smoke, permit open flames, or cause sparks near a battery.**
- **Do not allow metallic objects to rest on the batteries or fall across the terminals.**
- **Do not lift a battery by the terminals.**
- **Exercise care when handling the batteries and connecting them to the string. Two people are recommended for lifting and placing batteries in the tray(s).**
- **Keep batteries upright.**
- **To avoid injury, wear heavy gloves and safety glasses during all procedures involving the batteries.**
- **Do not connect the battery string to the system until instructed to do so in the following procedure.**

Before installing batteries, ensure that both rectifier module AC INPUT and DC OUTPUT circuit breakers are set to OFF.

A Fluke 79 Digital Multimeter (DMM) and TL20 Industrial Test Lead Set (or equivalent) are needed to complete this procedure.

1 Unpack the batteries.

2 If furnished, lift off the protective plastic cover from each battery; set the covers safely aside for use later (Step 25).

3 Using a DMM, measure the battery voltages to verify the condition of all batteries.

Refer to the battery manufacturer's specifications; replace any battery indicating less than nominal voltage.

4 If necessary, remove the battery drawer cover below bay No. 1.

5 Slide out the battery drawer; remove any loose parts packages.

6 If the cabinet is equipped with a Battery Thermal Runaway Management (BTRM) System, locate the pair of plug-ended leads in the battery drawer used to connect the string of Thermal Switch Units (TSUs). Lay the leads over the front of the battery drawer to clear the battery space.

The pair of single-wire connectors is at the center-front of the drawer; these leads will be connected in Step 30.

7 Set the first battery in the battery drawer.

Install the first battery in the battery drawer near the battery temperature compensation module leads as shown in Figure 22.

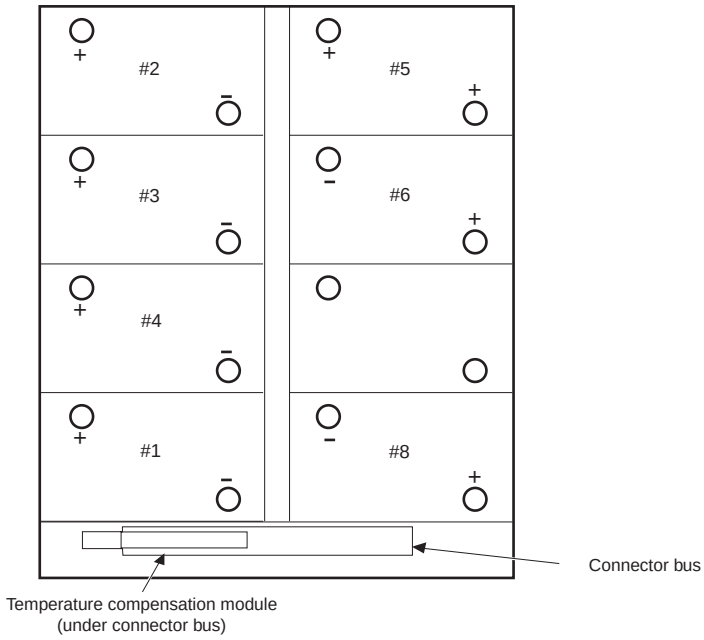


Figure 22. *Battery Installation Sequence*

8 Locate the temperature compensation module; make a note of the calibration voltage written on the module.

Label location is shown in Figure 23 on page 30. This data is needed for the procedure of DLP-405.

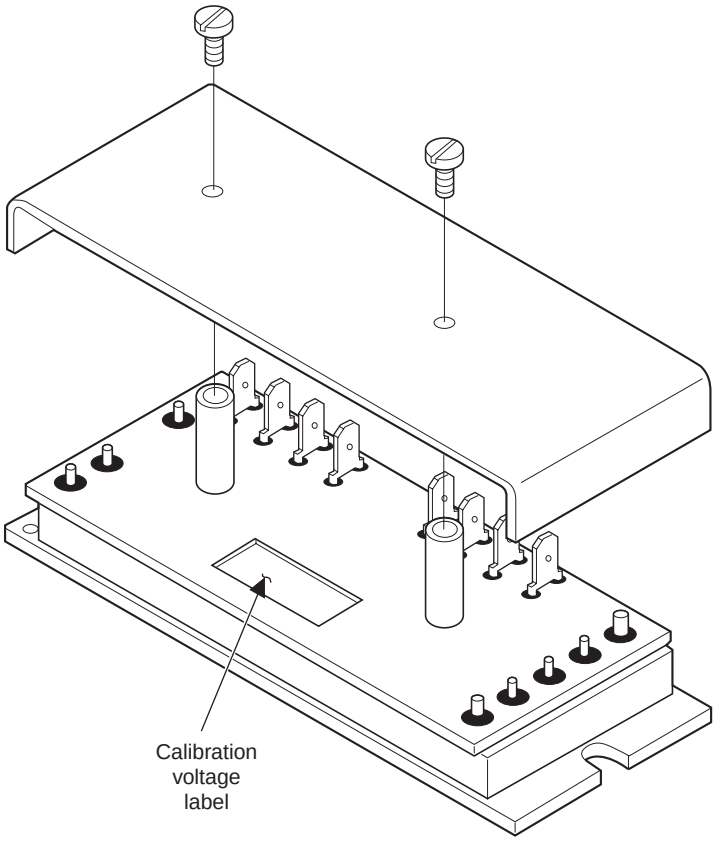


Figure 23. *Calibration Voltage Label Location*

9 Attach the temperature compensation module to the battery, using the long cable ties supplied as shown in Figure 24 on page 31. Place the module low on the front of the battery, so that it will fit under the battery connector bus. Tighten the cable ties securely, and verify that the module is held firmly in place. Trim any excess cable tie.

10 Push the battery with the temperature compensation module into its installed position Figure 24 on page 31. Connect the plug-ended leads from the module to the mating plug on the sense leads in the battery drawer.

11 Locate the plug-ended battery cable kit (furnished in a loose parts package).

Each cable assembly has a battery bus connector and positive and negative leads; the positive (+) lead is marked on each cable.

Battery drawers are shipped with battery cables cut to four different lengths. Select the longest cables for the batteries at the back of the drawer (positions 2 and 5).

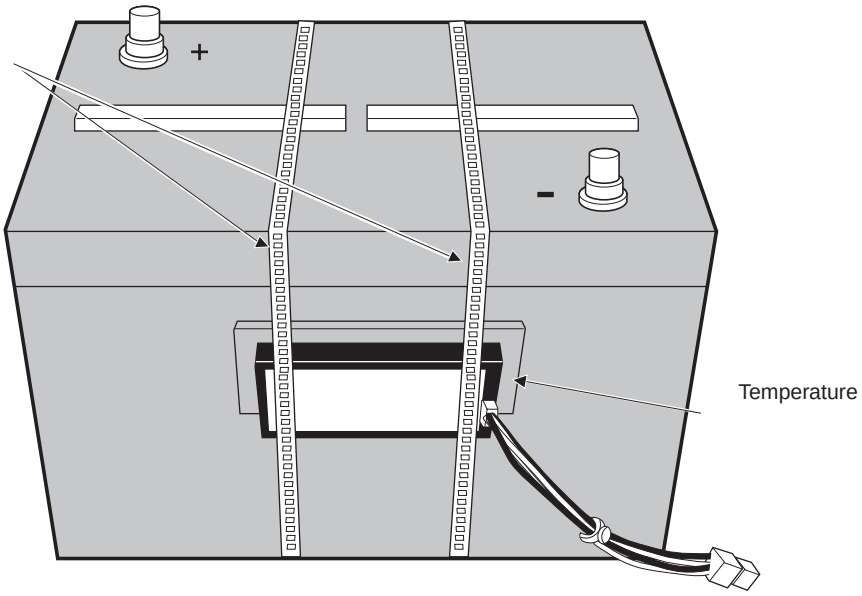


Figure 24. *Temperature Compensation Module Installed*

Do not loosen the large hex nut at the base of the terminal stud. Do not remove the factory-fitted pole connectors (large metallic straps between cells).

12 At the (+) and (-) end terminals of each battery, remove one nut, one lock washer, and one flat washer.

13 Before connecting the battery cables, coat each terminal stud with a small amount of No-Ox or petroleum jelly.

Do not connect the battery string to the system until instructed to do so in the following steps.

Before connecting the batteries, verify that both rectifier AC INPUT and DC OUTPUT circuit breakers are set to OFF.

Do not plug the battery cable connectors into the battery connector bus until all battery cables have been securely connected to their batteries.

14 At battery No. 1, place the lead from battery cable No. 1 marked positive (+) on the battery positive (+) terminal. Install the flat washer and lock washer, and install (but do not tighten) the terminal nut.

This is a -48 Vdc system; (+) is ground.

15 At the negative (-) battery terminal, attach the other lead from battery cable.

Chloride PowerSafe batteries have a red disc below the positive (+) terminal and a blue disc below the negative (-) terminal.

16 If the cabinet:

- Is not equipped with a BTRM System, proceed to Step 19.
- Is equipped with a BTRM System, continue with Step 17.

17 Locate the bag of eight TSUs in the loose parts kit.

The TSUs (about 3/4 in. diameter) are labeled 428804800 60°C.

18 Install a TSU on the negative terminal.

One TSU is to be installed at each battery negative post.

For details, refer to Lorain Products Installation Instructions.

19 Install the flat washer and lock washer, and install (but do not tighten) the terminal fastener (screw or nut).

20 Position the battery cable ends as shown in Figure 25 or Figure 26 on page 33. Tighten both battery terminals to a torque of 65-70 in-lb (735-790 [N-cm]) maximum.

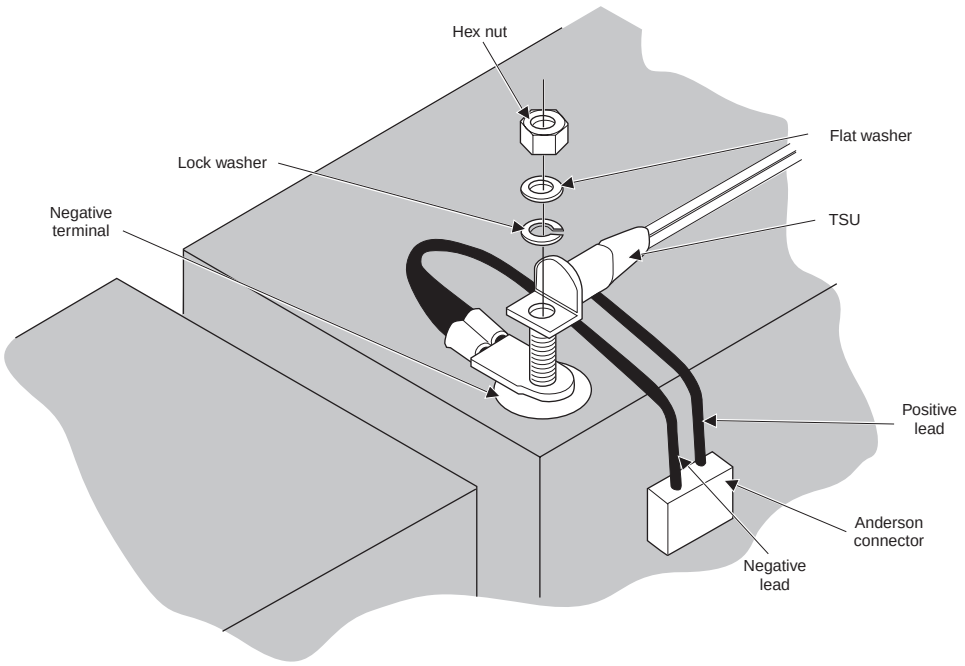


Figure 25. *Battery Cable Installation of Stud Terminal*

21 Connect the cables to the remaining batteries (Step 14 through Step 20), and install the batteries in the sequence of Figure 27 on page 34.

For ease in connecting the battery cables (and TSUs) later, place all batteries in the same position as the first battery (negative terminals nearest the center of the battery drawer).

22 Route the battery cable to the cable aisle (space between battery rows), starting from the midpoint of the short side of each battery.

Loop the cable from the negative terminal (nearest the cable aisle) against the connector bus as shown in Figure 27 on page 34. Route the cable from the positive terminal straight across the battery.

For each battery position, use the corresponding cable number and battery bus connector number.

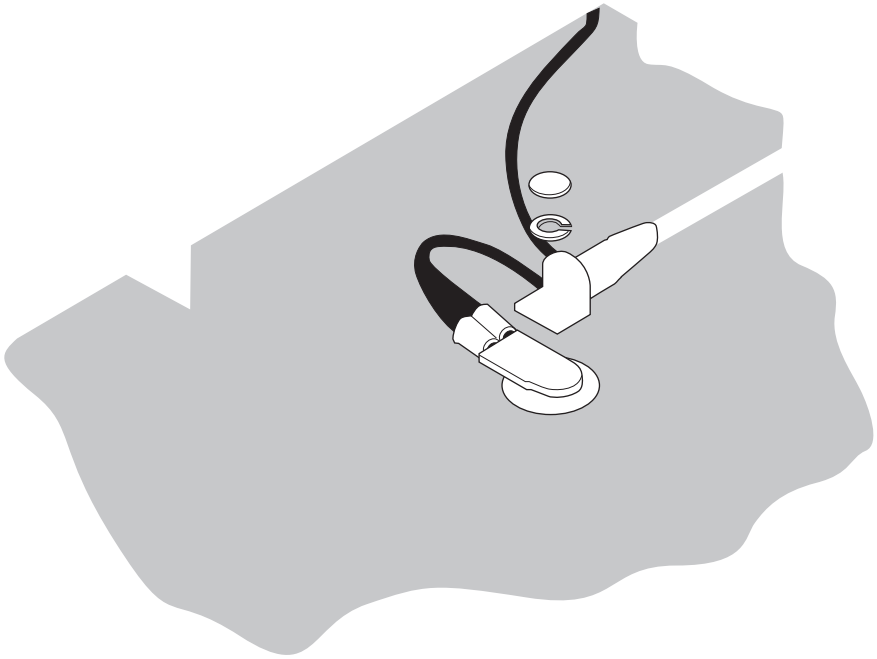


Figure 26. *Battery Cable Installation of Screw Terminal*

23 Plug the connector into the battery connector bus at the front of the drawer at the numbered positions shown in Figure 27 on page 34 or Figure 28 on page 34.

For 12V batteries, connect the first and last batteries in string 1 to connectors 1 and 4, respectively. Connect the first and last batteries in string 2 to connectors 5 and 8, respectively.

For 6V batteries, connect the first and last batteries to connectors 1 and 8, respectively. (The other connector positions are not important.)

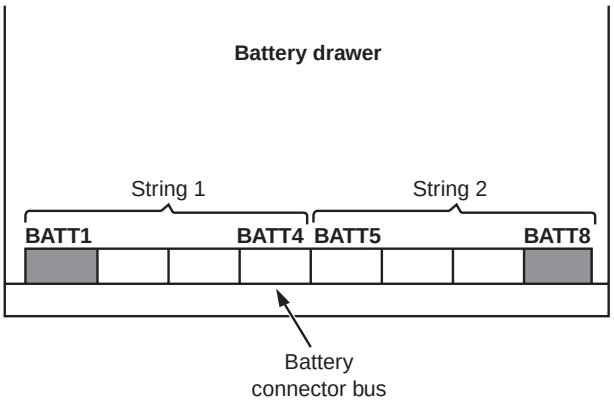


Figure 27. *Battery Bus Connector Locations - 12V Batteries*

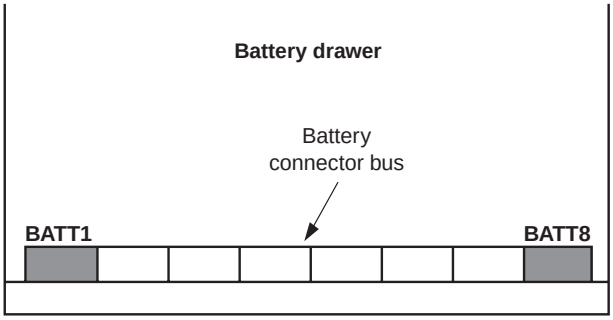


Figure 28. *Battery Bus Connector Locations - 6V Batteries*

24 Dress the cables close to the tops of the batteries, and secure with cable ties. Store any cable slack in the cable aisle.

25 If the batteries were equipped with protective plastic covers (Step 2), locate and remove the thin-walled panel at the center of the short side of the cover as shown in Figure 29 on page 35. Using pliers, flex the panel until it snaps off.

The battery cables (and TSU leads, if equipped) will be brought out from under the cover, through the removed panel, to the cable aisle.

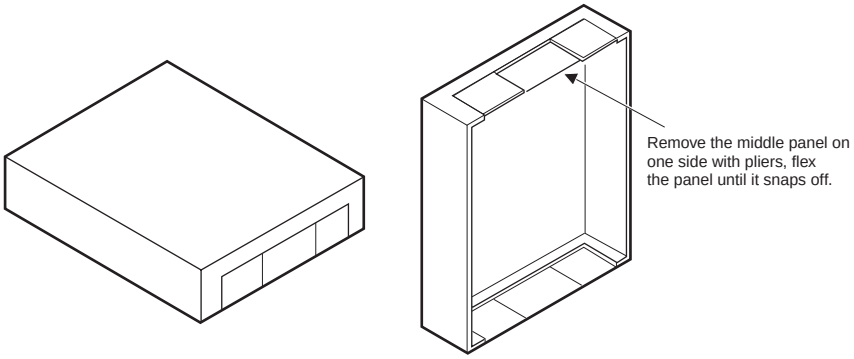


Figure 29. *Removing Battery Cover Knockout Panel*

26 Place the protective plastic covers on the battery.

27 Ensure that all battery cables are dressed to clear the opening as the drawer is closed.

Do not install the battery drawer cover at the front of the battery drawer at this time.

TURNING UP BATTERIES

Before starting this procedure, verify that the rectifier modules have not been installed, or are turned off. If the rectifier modules are powered up, DMM indications will show rectifier output instead of battery voltage.

A Fluke 79 Digital Multimeter (DMM) and TL20 Industrial Test Lead Set (or equivalent) are needed to complete this procedure.

1 Verify that all batteries are properly installed.

2 If the batteries:

- are in one 6V string, proceed to Step 4.
- are in two 12V strings, continue with Step 3.

3 Isolate the first and second battery strings:

- At the DC distribution panel, operate the battery disconnect (by inserting the pin provided at the right-hand side into the BATTERY DISCONNECT jack shown in Figure 30 on page 36), or:
- Disconnect any one connector from the battery connector bus for the second string of batteries.

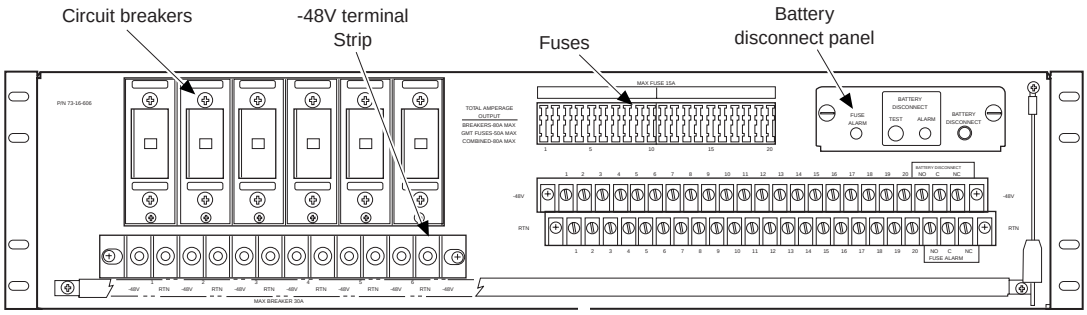


Figure 30. *Distribution Panel Controls and Indicators*

4 Using a DMM, measure the battery string voltage at the connector bus in the battery drawer. Connect the DMM probes at the top of the open connectors for each end of the string as shown in Figure 31 or Figure 32.

If the probes are too short, remove any protective covers from the batteries, and connect the DMM probes to the battery terminals at the ends of the string.

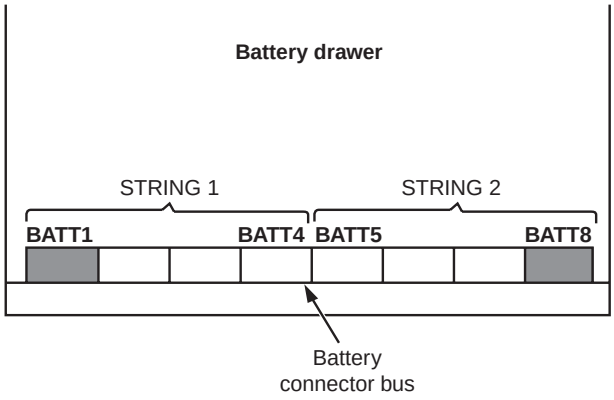


Figure 31. *Battery Bus Connector Locations - 12V Batteries*

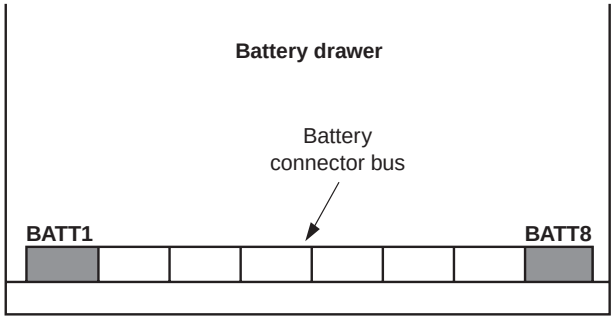


Figure 32. *Battery Bus Connector Locations - 6V Batteries*

5 Verify that the battery string voltage is within the range of -50.0 to -56.0 Vdc.

- If the battery string voltage does not fall within the acceptable range, ensure that batteries are properly connected.
- If no problems are found and the battery string still falls below the acceptable limit, contact your technical support group.

DO NOT PROCEED until the problem is corrected.

6 If the batteries:

- are in one 6V string, proceed to Step 10.
- are in two 12V strings, continue with Step 7.

7 If two 12V battery strings are used, reconnect all battery bus connectors for the second string (under test), and isolate the second string:

- At the DC distribution panel, ensure that the battery disconnect is operated (the pin provided at the right-hand side is inserted into the BATTERY DISCONNECT jack as shown in Figure 30 on page 36, or
- Disconnect any one connector from the battery connector bus for the first string of batteries.

8 Repeat Step 4 and Step 5 for the battery string under test.

9 Remove the pin from the BATTERY DISCONNECT jack.

10 Ensure that all battery bus connectors are reconnected.

INSTALLING RECTIFIER MODULES

Before starting this procedure, ensure that AC load center circuit breakers CB2 and CB3 are set to OFF (open). Failure to do so could result in serious injury and equipment damage.

Use an ESD wrist strap to prevent static discharge. An ESD ground connection is provided on the multiplexer shelf.

A Fluke 79 Digital Multimeter (DMM) and TL20 Industrial Test Lead Set (or equivalent) are needed to complete this procedure.

Modular Power Supply Shelf

The modular power supply shelf (rectifier shelf) and DC Distribution Panel (below the rectifier shelf) are shown in Figure 33. For the rectifier module controls and indicators, see Figure 34 on page 39 and Table 2 on page 39. For the Alarm and Control Assembly (ACA) controls and indicators, see Figure 35 on page 41 and Table 4 on page 41.

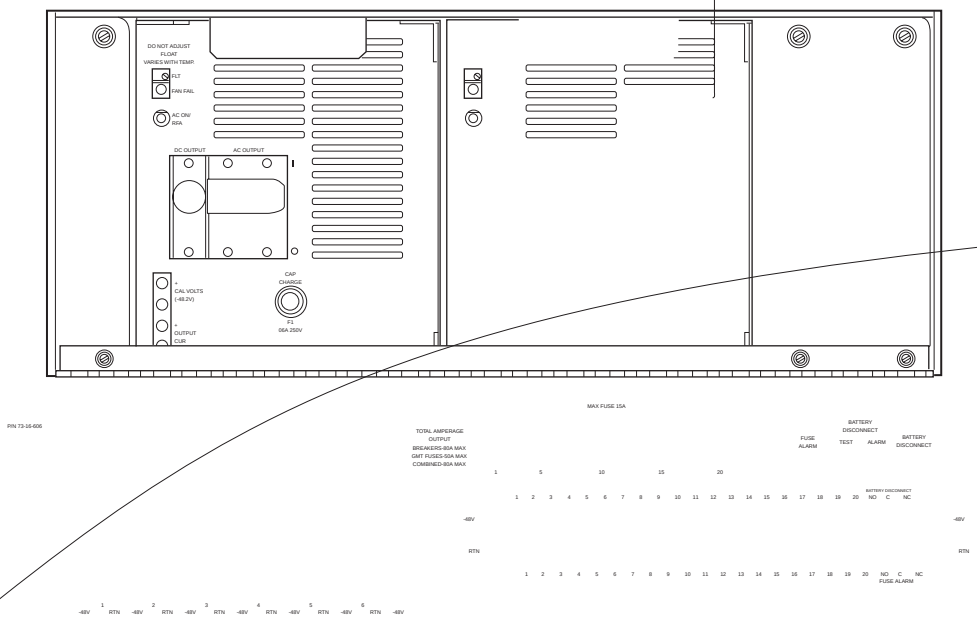


Figure 33. *Modular Power Supply and DC Distribution Panel*

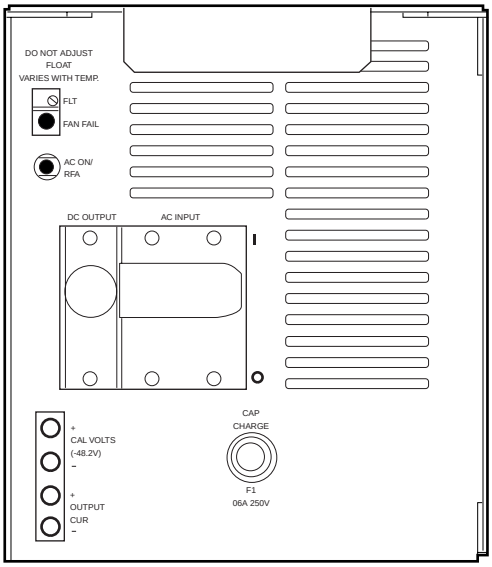


Figure 34. *Rectifier Module Controls and Indicators*

Table 2. *Rectifier Module Controls and Indicators*

Item	Function
DC OUTPUT	(Circuit breaker) Controls DC output from the rectifier module. If set to OFF (manually or automatically), the rectifier module shuts down and locks out, and rectifier fail (RFA) local and remote alarms are extended.
AC INPUT	(Circuit breaker) Controls AC power to the rectifier module.
FLT	(Potentiometer) Sets the rectifier output float voltage.
FAN FAIL	(Red LED) Lighted if the rectifier module internal fan fails.
AC ON/RFA	(Red/green LED) Lighted green when power is applied through the AC INPUT circuit breaker. Lighted red if a failure disables the rectifier. A failure condition also activates the alarm relay connected to the cabinet Power Minor (PMN) alarm input. Failure conditions include: • Complete failure of AC input voltage • AC input voltage above or below preset levels • Open AC INPUT or DC OUTPUT circuit breaker (manual or automatic) • High voltage shutdown • Rectifier module internal temperature exceeds a preset value • Any condition where the rectifier cannot deliver power
CAL VOLTS (48.2V)[(a)]	(Test jacks) Used to measure rectifier sense voltage from the Battery Temperature Compensation Module.
OUTPUT CUR	(Test jacks) Used to measure rectifier DC output current.

(a) Each millivolt indicated on a DMM corresponds to a charging current of 0.5 ampere.

Table 3. *DC Circuit Breaker and Fuse Assignments*

Items	Label	Assignment
Circuit Breakers (30A)	CB-1	Soneplex Shelf 1 A BATT
	CB-2	Soneplex Shelf 1 B BATT
	CB-3	Soneplex Shelf 2 A
	CB-4	Soneplex Shelf 2 B
	CB-5	Soneplex Shelf 3 A
	CB-6	Soneplex Shelf 3 B
Fuses (GMT Type, 15A max)	FUSE 1	MUX A
	FUSE 2	MUX B
	FUSE 3	FAN TRAY A
	FUSE 4	FAN TRAY B
	FUSE 5	not used
	FUSE 6	MASTER FAN H.E. FANS
	FUSE 7	not used
	FUSE 8	not used
	FUSE 9	not used
	FUSE 10	not used
	FUSE 11	RMU A
	FUSE 12	not used
	FUSE 13	RING GEN B
	FUSE 14	not used
	FUSE 15	not used
	FUSE 16	not used
	FUSE 17	DSX PANELS
	FUSE 18	RTU
	FUSE 19	TEMP COMP
	FUSE 20	RMU B

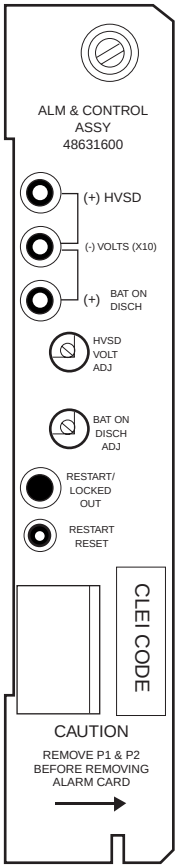


Figure 35. *Alarm and Control Assembly Controls and Indicators*

Table 4. *Alarm and Control Assembly Controls and Indicators*

Item	Function
(+)HVSD	(Test jack) Used with the (-)VOLTS (X10) jack to measure the rectifier shelf high voltage shutdown DC voltage trip point. A DC voltmeter connected to these jacks indicate 1/10 actual voltage.
(+)BAT ON DISCH	(Test jack) Used with the (-)VOLTS (X10) jack to measure the battery voltage on discharge trip point. A DC voltmeter connected to these jacks indicate 1/10 actual voltage.
HVSD VOLT ADJ	(Potentiometer) Used to adjust the voltage at which a rectifier module shuts down (if the module is delivering more than 10% of rated load).
BAT ON DISCH ADJ[(a)]	(Potentiometer) Used to adjust the voltage at which a Battery On Discharge alarm occurs.
RESTART/LOCKED OUT	(Red LED) Lighted 4 seconds after a high voltage condition occurs.
RESTART RESET	(Push-button switch) When pressed, resets the internal timer on the HVSD circuit.

(a) The battery disconnect panel pin must not be in the BATTERY DISCONNECT jack during this procedure.

Installing the DC Distribution Panel

The DC Distribution Panel (Figure 36 and Table 5) distributes the DC power used, and:

- provides voltage and load-sensing circuitry to detect power-related problems.
- disconnects the batteries if the battery string voltage drops below 42 Vdc, to prevent battery damage (and reconnects at 49 Vdc).
- provides external alarm contacts (2A max).

Removal of the Battery Disconnect Panel will not affect operation of the fuse panel.

For DC circuit breaker and fuse assignments, and a DC power wiring diagram, refer to Table 5 on page 42 and Figure 45 on page 52.

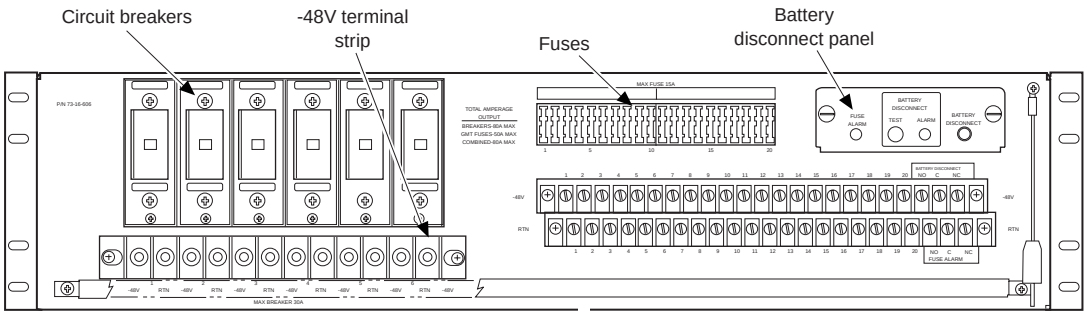


Figure 36. *DC Distribution Panel Controls and Indicators*

Table 5. *DC Distribution Panel Controls and Indicators*

Item	Function
CB1, CB2	(Circuit breakers: 30A max) Controls application of DC power (rectifier or battery) to the remote digital terminal (RDT). If either circuit breaker is set to OFF (or operated automatically), local and remote alarms are extended.
FUSE PANEL	(Fuses: 15A max) Refer to Table 6 on page 52.
FUSE ALARM	(Red LED) Lighted when any fuse has failed, or when either circuit breaker is set to OFF or tripped.
BATTERY DISCONNECT TEST	(Pushbutton switch) When pressed, manually tests the BATTERY DISCONNECT ALARM circuit (without operating the low-voltage disconnect (LVD) relay).
BATTERY DISCONNECT ALARM	(Red LED) Lighted when the low-voltage disconnect relay has disconnected the batteries (from the load and the rectifiers.
BATTERY DISCONNECT	(Jack) When a pin (provided at right-hand side) is inserted into the jack, manually operates the low-voltage disconnect relay, and disconnects the batteries from the rectifiers and load.

1. At the DC Distribution Panel, ensure that all circuit breakers are set to OFF. The panel is located in bay No. 2, below the rectifier shelf as shown in Figure 36 on page 42.
2. At the bottom front of the rectifier shelf, loosen the captive fasteners, and pivot the module retainer downward. Remove the blank cover plates (if present).
3. Unpack the rectifier modules. On each rectifier module, ensure that the AC INPUT and DC OUTPUT circuit breakers are set to OFF.
4. Insert a rectifier module in the left (No. 2) slot of the modular power supply chassis as shown in Figure 37.

Do not turn on the rectifier modules at this time.

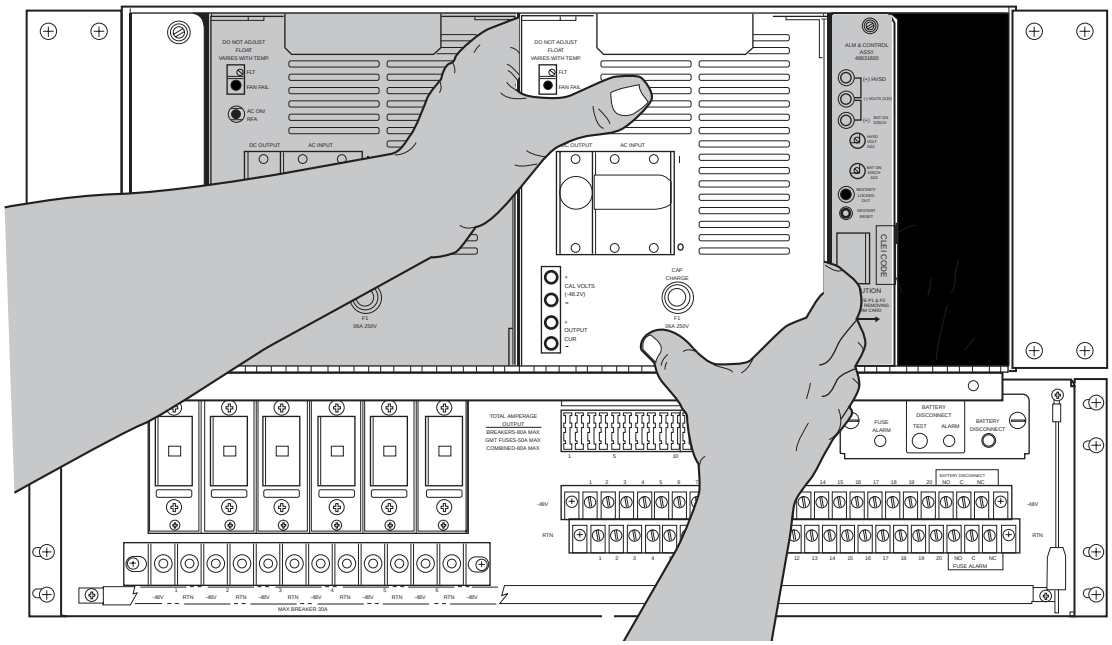


Figure 37. *Installing a Rectifier Module*

5. Confirm that the AC ON/RFA LED is lighted red. With the battery string installed and the rectifier module not powered up, the normal indication is a red LED.
6. Install the other rectifier module in the second (No. 1) slot of the modular power supply chassis (at the right of rectifier module No. 2). Confirm that the AC ON/RFA LED is lighted red.
7. Unpack the Alarm and Control Assembly (ACA).
8. Install the ACA plug-in in the third slot of the rectifier shelf; tighten the top captive fastener as shown in Figure 38 on page 44.
9. Locate remote alarm connector P1; connect P1 to ACA connector J1 (the side connector nearest the front of the ACA). Access to J1 is through the shelf side opening.
10. Reinstall the blank faceplate over the fourth (right-hand) slot on the shelf as shown in Figure 38 on page 44.
11. To secure all modules in the rectifier shelf, ensure that all modules are fully seated (pushed all the way in). Pivot the module retainer upward and tighten three captive fasteners.

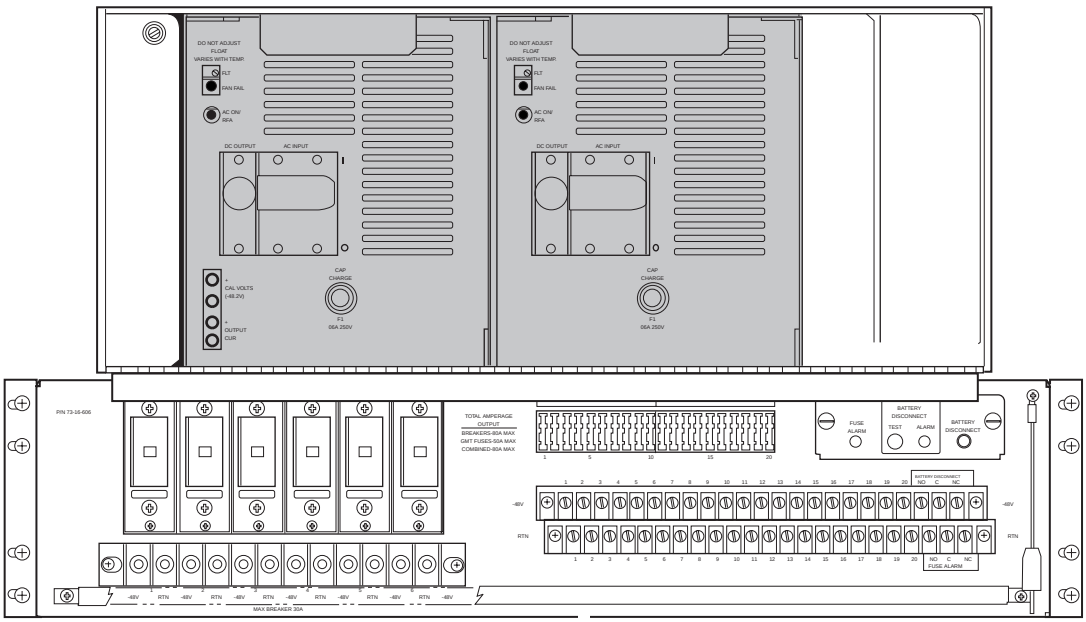


Figure 38. *Installing Alarm and Control Assembly*

12 At the load center (in the end chamber), set AC circuit breakers CB2 and CB3 to ON. These circuit breakers provide AC power to the left and right rectifier modules, respectively.

13 At rectifier module No. 1, set the DC OUTPUT and AC INPUT circuit breakers to ON. Verify that (only) the rectifier module No. 1 AC ON/RFA LED is lighted green.

14 Allow the rectifier module to operate for 10 minutes (minimum) to ensure that the rectifier has stabilized.

15 Using a DMM, measure the rectifier output voltage. At the terminal strip at the left side of the DC Distribution Panel, connect the DMM (-) lead to a -48 Vdc terminal point and (+) lead to the RTN terminal below an installed circuit breaker as shown in Figure 39.

Figure 39. *Battery Voltage Test Points*

Measure the air temperature in the area of the battery temperature compensation module. Using the chart in Figure 40 on page 45, find the correct float voltage, for example, -54.5 Vdc at 77°F (25°C).

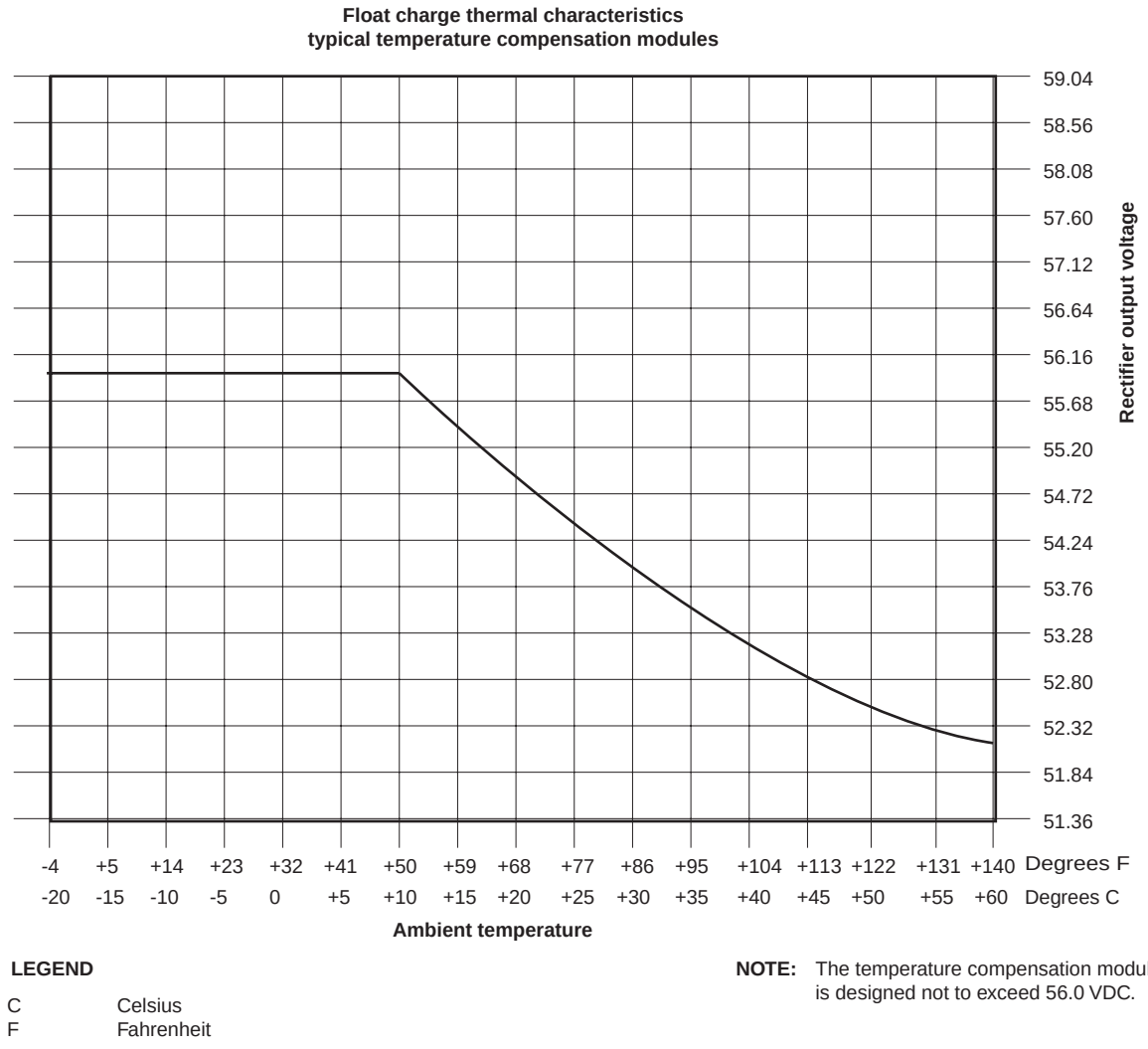


Figure 40. *Float Voltage Chart*

16 Verify that the rectifier output voltage is within ±0.1 Vdc of the value found on the chart in Step 15. If the rectifier output voltage is correct, proceed to Step 19.

17 If the DMM indication is not correct, measure the rectifier module output current at the rectifier module OUTPUT CUR (+) and (-) jacks.

Each millivolt indicated on the DMM corresponds to a charging current of 0.5 ampere. For example, 50 millivolts indicates a charging current of 25 amperes.

18 If the DMM indicates 50 millivolts, the battery string is charging and the rectifier module is current limited; proceed to the next step only after the DMM indication has decreased to 25 millivolts or less.

19 Obtain the calibration voltage marked on the battery temperature compensation module. (The module marking was noted in DLP-403.)

20 Using a DMM, measure the calibration voltage at rectifier module No. 1 CAL VOLTS (+) and (-) jacks. Leave the DMM connected for the next step.

21 If necessary, adjust rectifier module No. 1 FLT potentiometer for a DMM indication within ±0.1 Vdc of the value marked on the battery temperature compensation module. To increase, adjust the FLT potentiometer clockwise.

Make adjustments slowly to allow battery voltage to stabilize.

22 Recheck the rectifier output voltage. (Use the same DMM connections as in Step 14.) If the voltage is not within ±0.1 Vdc of the value found on the chart in Step 15, check for a defective temperature compensation module or wiring.

23 At rectifier module No. 2, set the DC OUTPUT circuit breaker to ON; set the AC INPUT circuit breaker to ON. Verify that the rectifier module No. 2 AC ON/RFA LED is lighted green.

24 At rectifier module No. 1, set the AC INPUT circuit breaker to OFF; set the DC OUTPUT circuit breaker to OFF. The rectifier module No. 1 AC ON LED will be lighted red.

25 Allow rectifier module No. 2 to operate for 10 minutes (minimum), to ensure that the rectifier has stabilized.

26 Measure the rectifier output voltage. Use the same DMM connections as in Step 14. The DMM indicates rectifier No. 2 output.

27 Verify that the rectifier output voltage is within ±0.1 Vdc of the value found on the chart in Step 15.

28 Use the DMM to measure the calibration voltage at rectifier module No. 1 CAL VOLTS (+) and (–) jacks.

29 If necessary, adjust the rectifier module No. 2 FLT potentiometer for a DMM indication within ±0.1 Vdc of the value marked on the battery temperature compensation module.

30 Recheck the rectifier output voltage (Step 14). Verify that the voltage is within ±0.1 Vdc of the value found in Step 15.

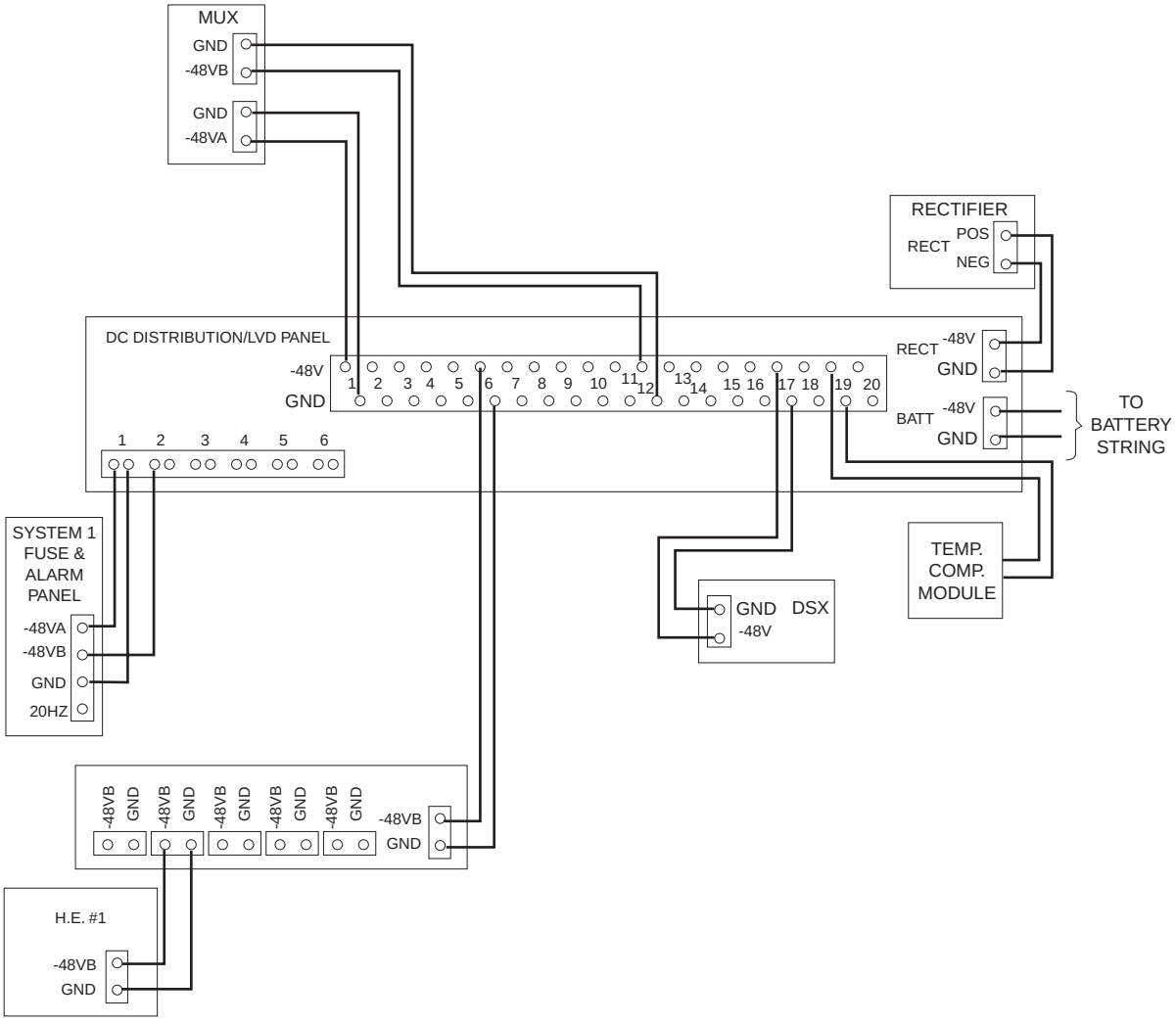
31 At rectifier module No. 1, set the DC OUTPUT circuit breaker to ON. Set the AC INPUT circuit breaker to ON. Verify that both rectifier module AC ON/RFA LEDs are lighted green.

32 Verify that the calibration voltage of both rectifiers is within ±0.1 Vdc of the value shown on the temperature compensation module.

33 Repeat Step 20 through Step 32 until both rectifier module output voltages are identical and the calibration voltage is within ±0.1 Vdc of the calibration value.

When output voltage adjustments are complete, the rectifier output currents may be unequal: this is not an abnormal condition.

34 At the AC load center, set circuit breakers CB2 and CB3 to OFF.



LEGEND

BTRM	Battery Thermal Runaway Management
H.E.	Heat Exchanger
RMU	Remote Maintenance Unit
RTU	Remote Test Unit

Figure 41. *Typical DC Power Wiring Diagram*

TURNING UP BULK POWER PLANT

1 Verify that the rectifier module installation procedure (as described in "Installing Rectifier Modules" on page 38) has been completed.

2 At the DC Distribution Panel, verify that all circuit breakers are set to ON.

If it is necessary to adjust the intrusion alarm switches, refer to "Adjusting the Intrusion Alarm Switch" on page 52.

CONNECTING EMERGENCY POWER

To operate the cabinet under emergency power, the recommended minimum generator capacity is 7.5 kW with 220 Vac, 3-wire output.

1 Connect an AC generator fitted with an approved 30-ampere Hubble connector.

2 Start the generator and let it run for a few minutes to stabilize engine speed.

At Step 3, the system will be temporarily running on batteries.

3 At the power transfer cabinet (JuiceBox ® or equivalent), set the power control switch to the middle position, disconnecting both the commercial power and the generator.

4 At the power transfer cabinet, remove the cover from the female receptacle located on the outside of the power transfer cabinet as shown in Figure 42 on page 49.

5 Remove the protector from the receptacle.

Ensure that Step 3 has been performed. High voltage is present in the cabinet.

6 Rotate the collar behind the protector as necessary; then, pull the protector off the receptacle as shown in Figure 43 on page 50

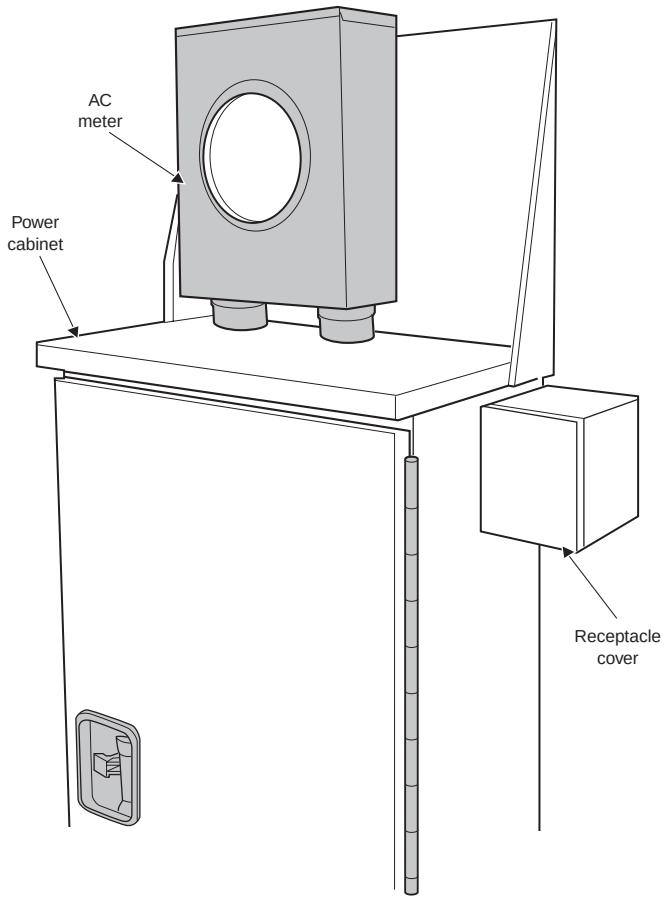


Figure 42. *AC Meter Socket Installed*

7 Connect the plug from the AC generator to the power transfer cabinet receptacle.

8 Set the power control switch to the GENERATOR (down) position to transfer to the generator.

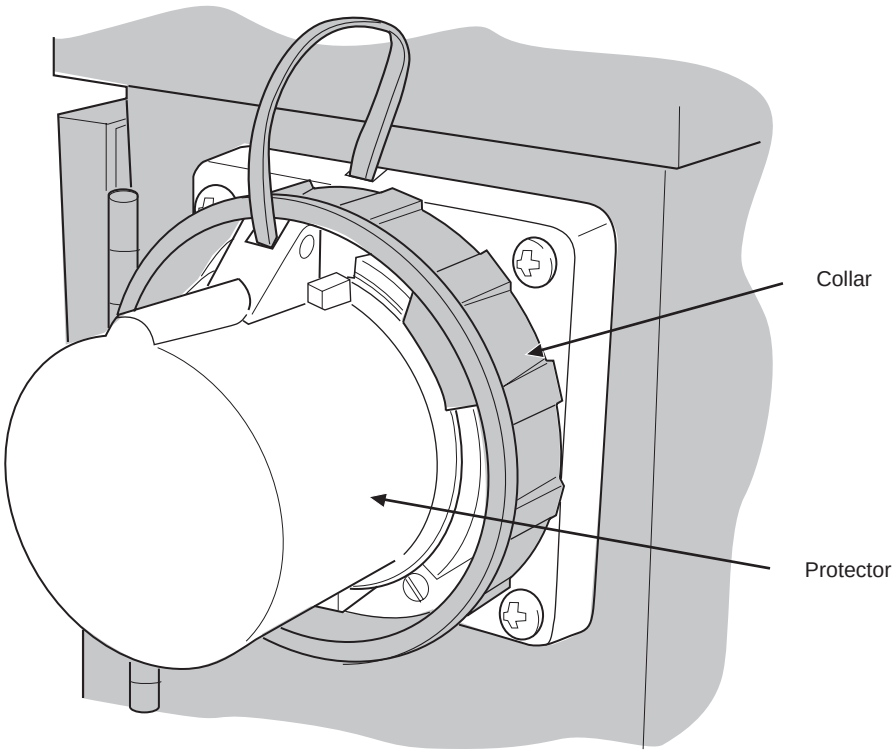


Figure 43. *Receptacle Protector*

TURNING UP THE HEAT EXCHANGER

The heat exchanger keeps the temperature within the cabinet below 149°F (65°C). The heat exchanger has dual air passages; outside air is never mixed with the air in the electronics chamber as shown in Figure 44. A fan at the top of the unit draws in outside air at the bottom of the cabinet and exhausts it at the vent at the cabinet top. A fan at the bottom of the unit draws air from the top of the electronics chamber and exhausts it into the bottom of the chamber.

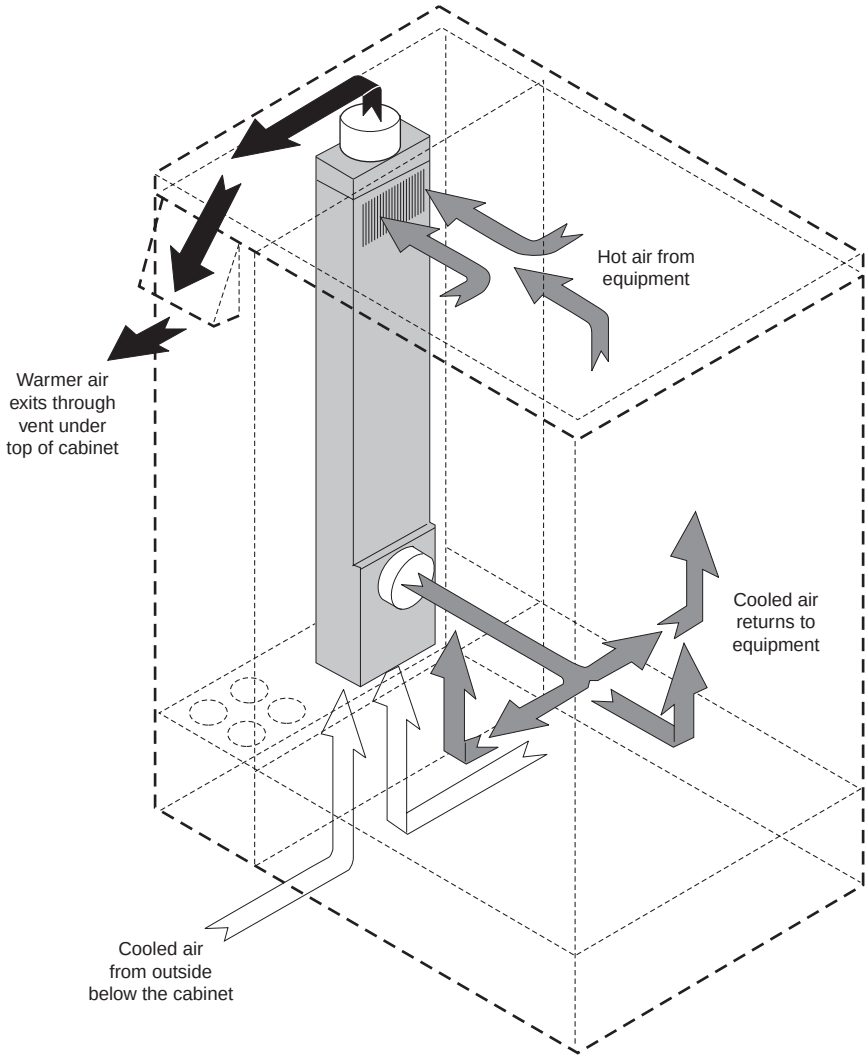


Figure 44. *Heat Exchanger Air Flow*

To verify heat exchanger fan operation,

1 Locate the heat exchanger fan control switch as shown in Figure 45 on page 52.

2 To start the fans, push up on the switch.

Operation of the top fans can be confirmed by sound and air movement at the vent at the top of the cabinet. Operation of the bottom fans on the side of the heat exchanger can be confirmed by observation from the bottom of the bays.

3 Set the master fan shelf ON/OFF/MOM switch to ON.

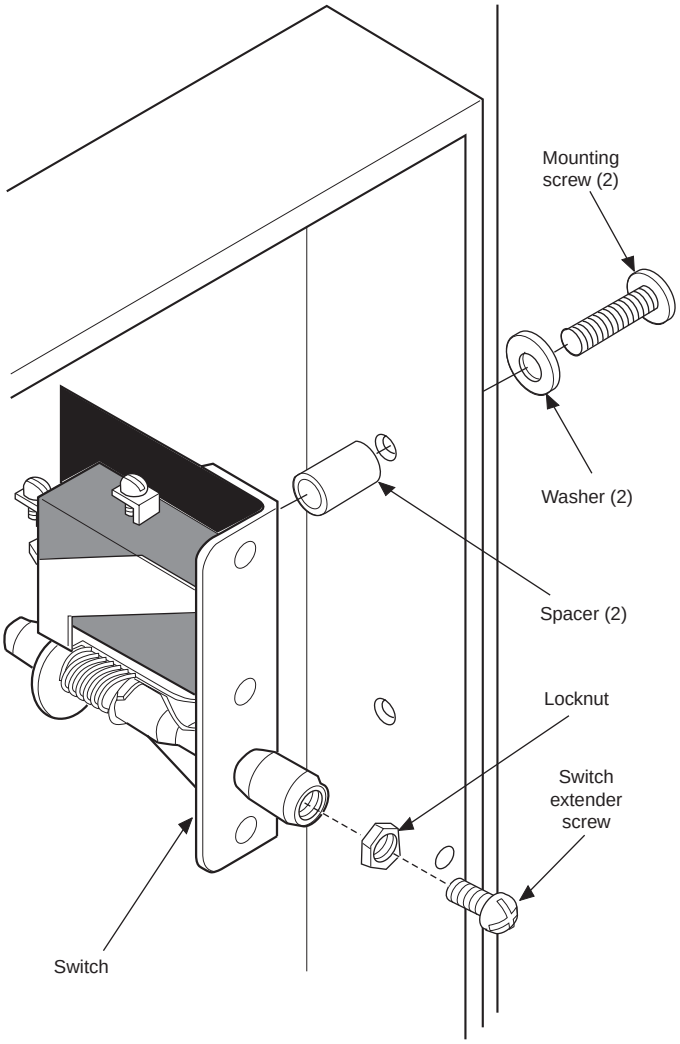


Figure 46. *Typical Intrusion Alarm Switch*

4 When the switch extender screw is properly adjusted, tighten the extender screw locknut.

5 Repeat Step 1 through Step 4 for each intrusion alarm switch.

To disarm the alarm switch and reset the alarm card when the door is open, pull the switch extender screw all the way out (past the normal position).

CONFIGURING ALARMS

Alarms are wired to a wire-wrap cross-connect panel. Refer to cabinet drawing T-CS405-30 (furnished with cabinet) for a summary of all cabinet alarms and their physical terminations.

For a summary of the more important cabinet and power alarms and their activators, refer to Table 7 on page 54.

Table 7. *Alarm Summary*

Alarm Designation	Alarm Activator
RFA	Activated by the absence of rectifier DC output. Could be caused by: AC input failure, AC INPUT circuit breaker operation, or high voltage shutdown (over -59.5 Vdc). (To reduce the possibility of a false RFA, there is a self-test interval of 20 to 40 seconds between detection and the issuance of local and remote RFAs.)
CB CR	Activated by one or both of the following conditions: • Manual or automatic operation of the DC OUTPUT circuit breaker on either rectifier. • Manual or automatic opening of two or more DC load circuit breakers (on the DC distribution panel).
AC FAIL	Indicates the absence of 240 Vac power to the rectifiers and battery heaters.
LVD	(Low Voltage Disconnect) Activated when the battery string voltage drops to -42.5 Vdc, signaling the imminent disconnection of that battery string (and system failure if the cabinet is on backup power).
AUX FA	Indicates failure of one or more fuses in the Auxiliary Fuse and Alarm Panel. These fuses control critical equipment in the cabinet (heat exchanger fans, intrusion alarms, and auxiliary fan shelves).
INTRUSION	Indicates that a door is open (or closed improperly) and the available 30-minute delay has expired or was not initiated.
HI TEMP	Indicates that the temperature inside the main chamber has exceeded 150°F (66°C). Reset when the temperature decreases to 130°F (54°C).

APPENDIX A - MAINTENANCE

BATTERY MAINTENANCE

Perform battery maintenance at the intervals prescribed by local practices.

1 Ensure that the batteries and drawers are clean and dry.

2 Ensure that threaded connections are tight. In high discharge rate applications or areas subject to high vibration, periodically check tightness for a torque value of 65-70 in-lb (735-790 [N-cm]) maximum.

3 Remove each battery protective cover and inspect the battery terminals.

Do not scrape or wire-brush the battery connectors.

4 Ensure that the terminals are clean and the connections are tight.

5 If necessary, clean and tighten the terminals in accordance with local practices, using approved cleaning solutions.

6 Reapply No-Ox compound, and replace each battery protective cover.

7 The cells do not contain any free electrolyte and never require topping up. However, written records must be kept of battery and cell voltages, so that long-term changes in battery condition may be monitored.

Records must be kept to ensure warranty protection.

(Refer to the Battery Installation and Maintenance Record supplied with the batteries.)

REPLACING THE BATTERY

Observe the following safety measures when handling the batteries:

- **Batteries are electrically live at all times, and must be handled carefully. Even if the case suffers damage, the product is capable of supplying high short-circuit current.**
- **Remove rings, watches, and other jewelry. Although the voltages encountered are not hazardous, the batteries can deliver large amounts of current.**
- **Do not smoke, permit open flames, or cause sparks near a battery.**
- **Do not allow metallic objects to rest on the batteries or fall across the terminals.**
- **Do not lift a battery by the terminals.**
- **Exercise care when handling the batteries and connecting them to the string. Two people are recommended for lifting and placing batteries in the tray(s).**
- **Keep batteries upright.**
- **To avoid injury, wear heavy gloves and safety glasses during all procedures involving the batteries.**
- **Do not connect the battery string to the system until instructed to do so in the following procedure.**

If the complete battery string is to be replaced, refer to "Installing Batteries" on page 28.

A Fluke 79 Digital Multimeter (DMM) and TL20 Industrial Test Lead Set (or equivalent) are needed to complete this procedure.

1 Verify that the cabinet is on commercial power by confirming that one or both rectifier module AC ON/RFA LEDs are lighted green.

If commercial power has failed, have a generator (7.5 kW minimum) powering the cabinet during battery replacement.

2 Remove the battery drawer cover below bay No. 1; open the battery drawer.

3 Remove any protective covers from all batteries in the drawer.

The battery string under test will be out of service from the next step until the completion of Step 24.

4 In the battery drawer, disconnect (any) one battery bus connector from the connector bus (to isolate the battery string under test from the bulk power supply).

5 Using a DMM, measure the voltage at each battery to verify the condition of all batteries in the string.

Refer to the battery manufacturer's specifications; replace any battery indicating less than nominal voltage.

6 For each defective battery, carefully trace out the battery cable to identify the position of its battery bus connector; disconnect the battery bus connector.

7 Disconnect the battery cable from the defective battery, and remove the cable from the battery drawer.

8 If the cabinet is equipped with a Battery Thermal Runaway Management (BTRM) system, locate and disconnect the leads to the Thermal Switch Unit (TSU) at the defective battery.

9 Lift the defective battery straight up and out of the drawer.

10 Using a DMM, verify the replacement battery condition by measuring the battery voltage.

Refer to the battery manufacturer's specifications; replace any battery indicating less than nominal voltage.

11 If battery No. 1 at the front of the drawer is being replaced, attach the temperature compensation module, using long cable ties as shown in Figure 47 on page 58. Place the module low on the front of the battery, so that it will fit under the battery connector bus. Tighten the cable ties securely, and verify that the module is held firmly in place. Trim any excess cable tie.

12 Place the new battery in the vacated position.

13 If battery No. 1 at the front of the drawer is being replaced, connect the plug-ended leads from the module to the mating plug on the sense leads in the battery drawer.

Do not loosen the large hex nut at the base of the terminal stud. Do not remove the factory-fitted pole connectors (metal straps between cells).

14 On the replacement battery, remove the nut, lock washer, and flat washer from each terminal where connections will be made. Coat both terminal studs with a small amount of No-Ox or petroleum jelly.

15 Place the battery cable lead which is marked positive (+) on the battery positive (+) terminal. Install the flat washer and lock washer, and install (but do not tighten) the terminal nut.

16 Place the other battery cable lead on the negative (-) battery terminal.

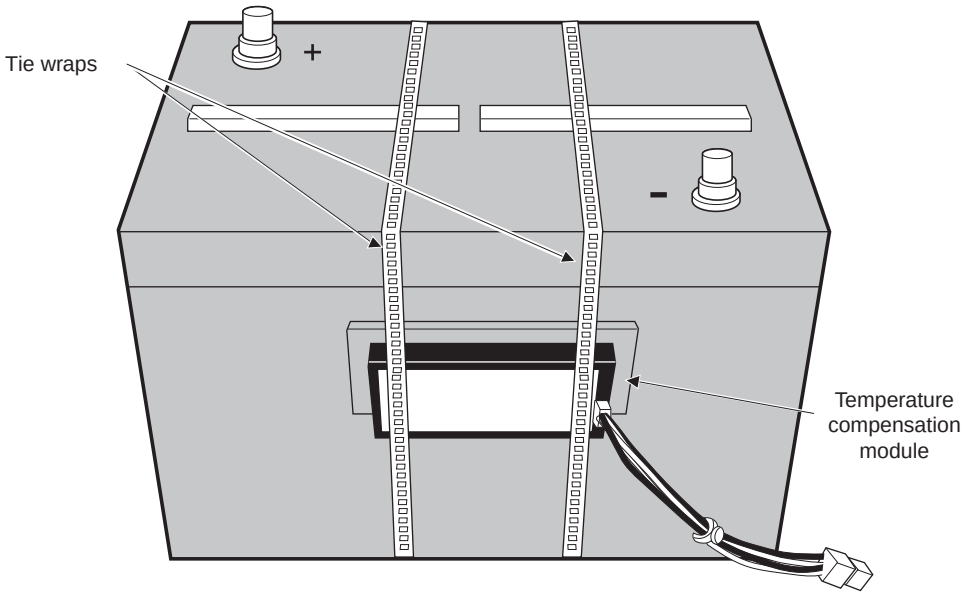


Figure 47. *Temperature Compensation Module Installed*

17 If the cabinet:

a Is not equipped with a BTRM system, proceed to Step 20.

b Is equipped with a BTRM system, continue with Step 18.

18 Install a TSU on the negative terminal.

One TSU is to be installed at each battery negative post.

For details, refer to Lorain Products Installation Instructions.

19 Install the flat washer and lock washer, and install (but do not tighten) the terminal fastener (screw or nut).

20 Route the battery cables (and TSU leads) into the cable aisle between the battery rows.

21 Tighten both battery terminal nuts to a torque of 65-70 in-lb (735-790 [N-cm]) maximum.

22 Repeat Step 6 through Step 21 for each defective battery in the string.

23 Repeat Step 4 through Step 22 for the second battery string.

24 Plug the battery bus connector into the connector bus at the front of the drawer.

25 Using a DMM, measure the battery string voltage at the battery bus connector bus in the battery drawer. Connect the DMM probes at the top of the open connectors at each end of the bus. If the probes are too short, remove any protective covers from the batteries, and connect the DMM probes to the battery terminals at the ends of the string.

26 Verify that the battery string voltage is within the range of -50.0 to -56.0 Vdc.

27 Ensure that all cables are stored so that they clear the drawer opening as the drawer is closed.

28 Reinstall the old battery cover(s) with the cutout panel already removed.

29 Close the battery drawer, and replace the battery drawer cover.

BATTERY THERMAL RUNAWAY MANAGEMENT (BTRM) SYSTEM MAINTENANCE

Fuses have exposed live parts. To avoid possible electrical shock, ensure that all alarm-type fuses have protective caps installed.

The BTRM System Alarm and Control Unit (ACU) requires no routine maintenance. To replace an ACU fuse and protective cap, refer to cap locations as detailed in Figure 48.

1 Protective fuse caps (Lorain Part No. 248898700) are available for alarm-type fuses F1 through F4. If fuse replacement becomes necessary, remove the fuse cap from the old fuse and place it on the new fuse before installing the new fuse.

2 Replace a failed fuse with a 1-1/3-ampere fuse (Lorain Part No. 2486080000).

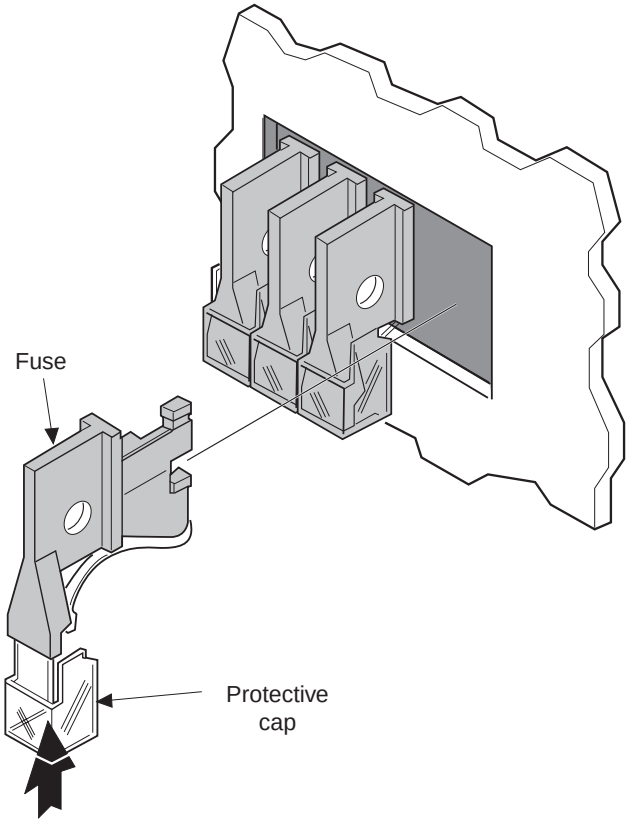


Figure 48. *ACU Fuse and Protective Cap Installation*

MODULAR POWER SUPPLY SHELF MAINTENANCE

The modular power supply requires no routine maintenance. To replace a rectifier module, perform Step 1 through Step 9. To replace the Alarm and Control Assembly (ACA) or fuse F1, perform Step 10 through Step 17.

Replacing the Rectifier Module

1. At the defective rectifier module, set the AC INPUT and DC OUTPUT circuit breakers to OFF.
2. On the modular power supply shelf (rectifier shelf), loosen the two captive fasteners, and pivot the module retainer downward.

The rectifier module is very heavy and may be warm. Support the module with one hand during removal.

3. Grasp the rectifier module by the handle (at top) and pull the module out of the rectifier shelf.
4. Insert the replacement rectifier module in the shelf. Push firmly so that the connector is fully seated. Verify that the AC ON LED is lighted red.
5. To secure all modules in the rectifier shelf, pivot the module retainer upward and tighten the captive fasteners.
6. Power up the replacement module: first set the DC OUTPUT circuit breaker to ON; then, set the AC INPUT circuit breaker to ON. Verify that the AC ON LED changes from red to green.
7. If there are no rectifier alarms, turn the other rectifier module off by first setting the AC INPUT circuit breaker to OFF, then setting the DC OUTPUT circuit breaker to OFF.
8. Adjust the float voltage on the new rectifier as shown in Figure 40 on page 45.
9. At the other rectifier module, first set the DC OUTPUT circuit breaker to ON; then, set the AC INPUT circuit breaker to ON.

Replacing the Alarm and Control Assembly

1. If fuse F1 has failed, replace it with a Bussmann GMT-1/2 fuse.
2. On the rectifier shelf, loosen the captive fasteners, and pivot the module retainer downward. Remove the blank cover plate(s) (if present).
3. At the right side of the rectifier shelf, locate remote alarm connector P1; disconnect it from ACA connector J1. Access to J1 is through the shelf side opening; J1 is the connector nearest the front of the ACA.
4. Loosen the captive fastener on the ACA, and remove the ACA.
5. Install the replacement ACA in the rectifier shelf; tighten the captive fastener.
6. Locate remote alarm connector P1, and connect it to ACA connector J1.
7. Replace the blank cover plate(s).
8. Pivot the module retainer upward, and tighten the captive fasteners.

HEAT EXCHANGER MAINTENANCE

The heat exchanger air intakes, at the louvers at the cabinet base, are protected by screens.

It is recommended that the screens be inspected and cleaned semi-annually or at the intervals prescribed by local practices.

The heat exchanger fans are designed to operate for years without routine maintenance. To replace a failed fan unit (top or bottom), first remove the heat exchanger (Step 1 through Step 7). Replace the top fan assembly (Step 1 through Step 8) or bottom fan assembly (Step 1 through Step 6), and reinstall the heat exchanger (Step 1 through Step 7).

Before beginning top or bottom fan replacement, disconnect power at the fuse and alarm panel by removing the auxiliary fuse labeled FAN H.E. on the fuse and alarm panel door.

Removing the Heat Exchanger

1 Locate and disconnect the bottom fan power connector as shown in Figure 49 on page 62.

Be careful to avoid the draw latches; the handles will snap open when released.

2 Release the two draw latches at the top left and right sides of the heat exchanger. The heat exchanger will drop about one-half inch.

3 Release the two draw latches at the bottom left and right sides of the heat exchanger.

4 Release all latches from the top and bottom locking clips. The hanging bracket near the top of the heat exchanger can be used to hang the heat exchanger on the end chamber door.

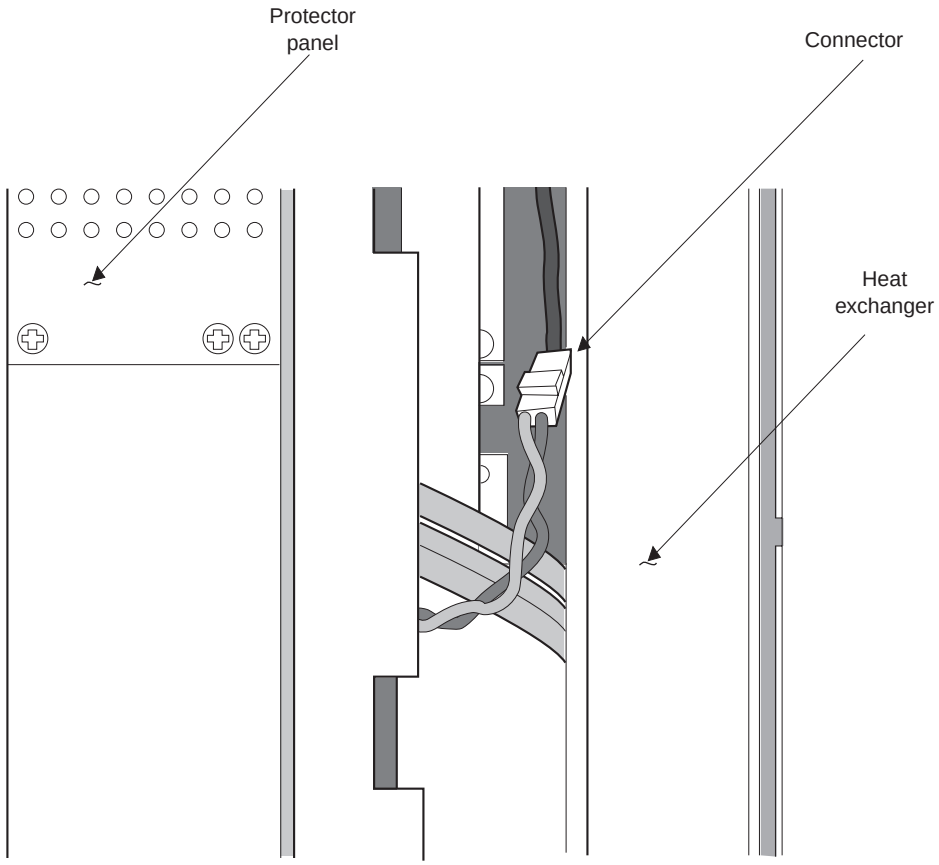


Figure 49. *Heat Exchanger Bottom Fan Connector*

5 Grasp the heat exchanger with both hands. While holding it in its vertical position, bring it out of the cabinet. The top fan assembly will drop so that the shoulder rivet is at the top of the retaining slot.

6 Hang the heat exchanger on the inside of the open end chamber door, between the map pocket and the door rods as shown in Figure 50 on page 63.

7 The top and bottom fans are now accessible for replacement.

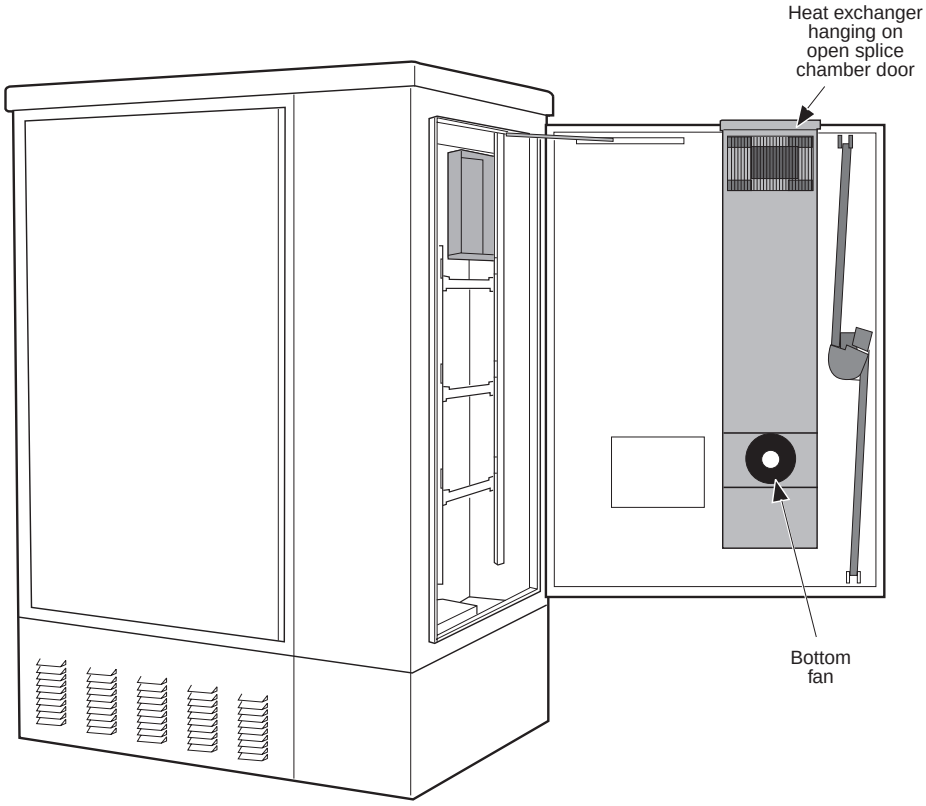


Figure 50. *Heat Exchanger Supported on End Chamber Door*

Replacing the Top Fan Assembly

1. Disconnect the top fan power connector as shown in Figure 51.
2. Lift the fan assembly, and align the large opening in the slot with the front rivet. Pull the fan assembly out about one inch to clear the rear shoulder rivets. The top fan assembly, inside the upper air trough, is held by a shoulder rivet at each back corner and one centered at the front.
3. When the fan assembly has cleared the rear rivets, allow it to drop straight down onto the fan rails.
4. Slide the fan assembly out from the cabinet.
5. Slide the replacement fan assembly onto the fan rails.

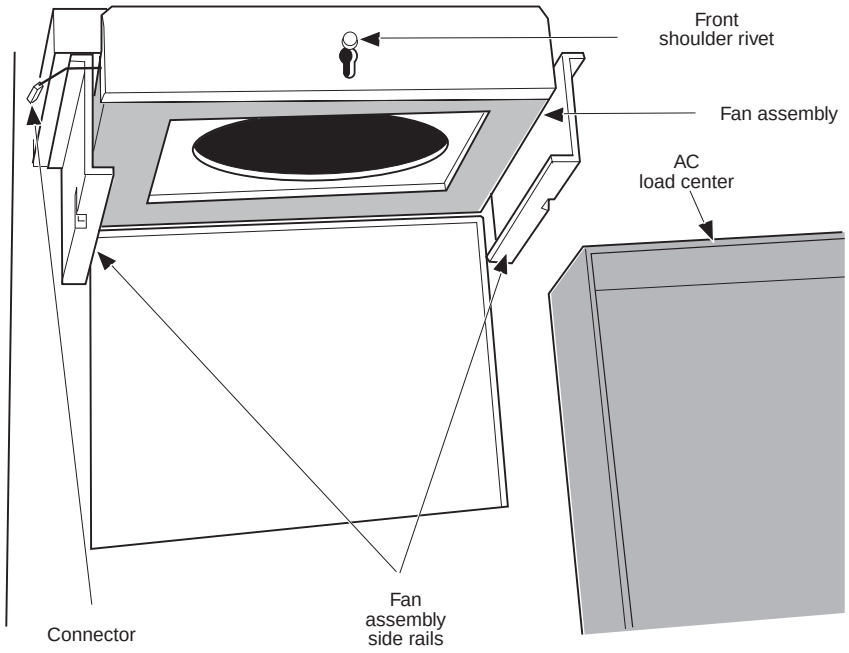


Figure 51. *Top Fan Assembly*

Ensure that the fan plate is above the rear shoulder rivets.

6. Support the fan assembly with one hand and guide it into position, engaging first the rear shoulder rivets, and then the front rivet.
7. Connect the top fan power connector.
8. Install the heat exchanger.

Replacing the Bottom Fan Assembly

1. Remove one fan mounting bolt. The heat exchanger should be removed and hang on the end chamber door as shown in Figure 51 on page 64.
2. Support the fan assembly with one hand, and remove the second fan mounting bolt. The fan drops free for removal.
3. On the replacement fan assembly, note the indicated air flow direction. The correct air flow is out (away from the heat exchanger).
4. Position the replacement fan on the heat exchanger, and secure with two mounting bolts.
5. Insert the power lead and connector into the retaining clip on the side of the heat exchanger.
6. Install the heat exchanger.

Replacing the Heat Exchanger

1. Verify that the top fan assembly is installed and connected.
2. Lift the heat exchanger into place between the lower plenum and the top fan assembly. Keep the heat exchanger aligned vertically.
3. Align the bottom of the heat exchanger over the lower plenum. Pay special attention to the alignment of the draw latches and locking clips.
4. Align the top of the heat exchanger under the top fan assembly.

Be careful to avoid the draw latches; the handles snap closed when secured.

5. Secure the two lower, and then the two upper draw latches. While the upper latches are being closed, verify that the top fan assembly moves up as the heat exchanger is locked into place.
6. Connect the bottom fan power connector as shown in Figure 51 on page 64.
7. Verify that the heat exchanger fans are operating.

DISCONNECTING EMERGENCY POWER

At Step 1, the system is temporarily running on batteries.

1. At the power transfer cabinet (JuiceBox), set the power control switch to the middle position, disconnecting both the generator and the commercial power.
2. Shut down the generator.
3. Disconnect the AC generator plug from the power transfer cabinet receptacle.

Ensure that Step 1 has been performed. High voltage is present in the cabinet.

4 Install the protector on the receptacle.

5 Install the protector on the receptacle. Rotate the collar behind the protector as necessary to secure the protector as shown in Figure 52.

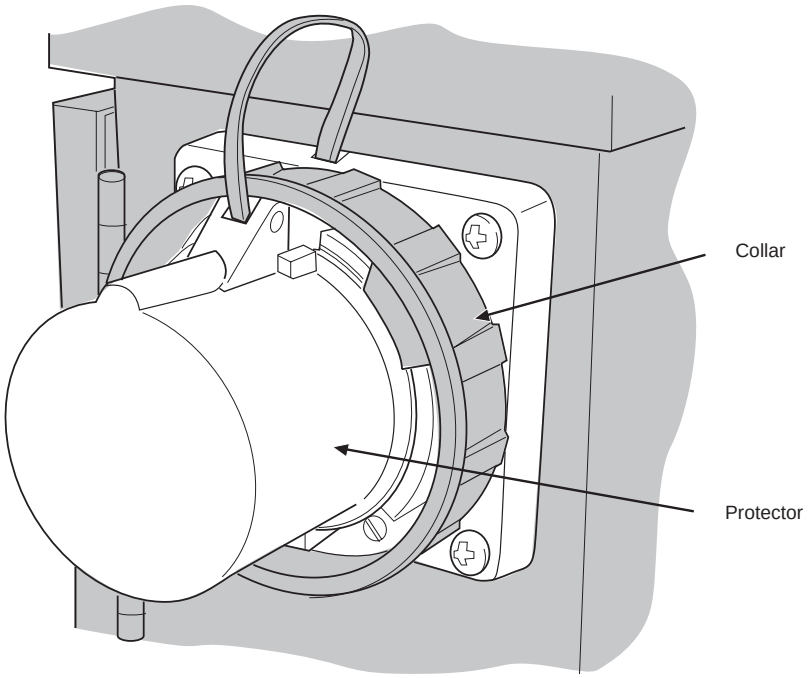


Figure 52. *Receptacle Protector*

6 Set the power control switch to the up position to return to commercial power.

7 Install the cover on the female receptacle located on the outside of the power transfer cabinet as shown in Figure 53 on page 67.

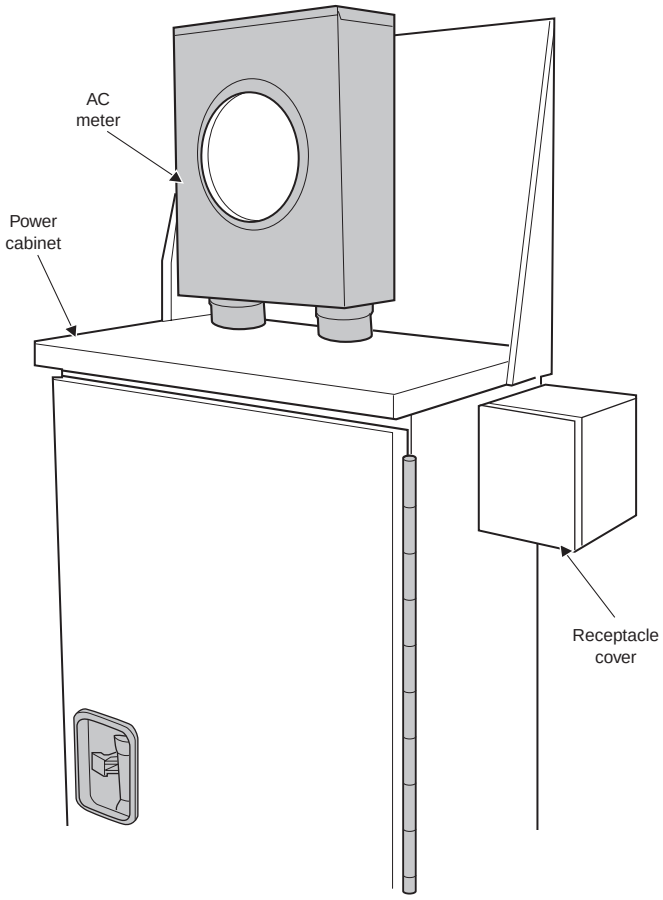


Figure 53. *AC Meter Socket Installed*

APPENDIX B - PRODUCT SUPPORT

For customers wanting information on ADC products or help in using them, ADC offers the services listed below. To obtain any of these services by telephone, first dial the central ADC telephone number, then dial the extension provided below.

The central number for calls originating in the United States or Canada is **800.366.3891**. For calls originating outside the United States and Canada, dial country code "1" then dial **952.917.3000**.

Sales Assistance **Ext. 73000**	• Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration **Ext. 73000**	• Complete Solutions (from concept to installation) • Network Design and Integration Testing • System Turn-Up and Testing • Network Monitoring (upstream or downstream) • Power Monitoring and Remote Surveillance • Service/Maintenance Agreements • Systems Operation
BIA Technical Assistance Center **Ext. 73223** **Email: technical@adc.com**	• Technical Information • System/Network Configuration • Product Specification and Application • Training (product-specific) • Installation and Operation Assistance • Troubleshooting and Repair/Field Assistance
Online Technical Support	• www.adc.com/knowledge_base_frames/
Online Technical Publications	• www.adc.com/library1/
Product Return Department **Ext. 73748** **Email: repair&return@adc.com**	• ADC Return Authorization number and instructions must be obtained before returning products.

Product information may be downloaded from the ADC website at *www.adc.com* or by contacting your sales representative.

This publication may be verified at any time by contacting ADC's Technical Assistance Center at 1.800.366.3891, extension 73223 (in the United States or Canada) or 1.952.917.3223 (outside the United States and Canada) or by writing to ADC Telecommunications, Inc., Attn: Technical Assistance Center, Mail Station #77, P.O. Box 1101, Minneapolis, MN 55440-1101, USA.

RETURNS

To return equipment to ADC:

1 Locate the purchase order number under which the equipment was purchased. You will need to provide this number to ADC Customer Service to obtain a return authorization.

2 Call ADC Customer Service to ask for a Return Material Authorization (RMA) number and instructions before returning products. Use the telephone number, fax number, or email address listed below:

- Telephone: 800.366.3891 ext. 73748 or 952.917.3748

  The 800 line is toll-free in the USA and Canada.

- Fax: 952.917.3237
- Email Address: repair&return@adc.com

3 Be prepared to provide the following information:

- Company name, address, telephone number, and the name of a person Customer Service can contact regarding this equipment.
- A description of the equipment as well as the number of units that you are returning. Be sure to include the model and part number of each unit.
- The shipping address to which Customer Service should return the repaired equipment.
- The reason for the return.

CERTIFICATION AND WARRANTY

FCC CLASS A COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

LIMITED WARRANTY

ADC DSL Systems, Incorporated (“ADC”) warrants that, for a period of sixty (60) months from the date of shipment, the hardware portion of its products will be free of material defects and faulty workmanship under normal use. ADC's obligation, under this warranty, is limited to replacing or repairing, at ADC's option, any such hardware product which is returned during the 60-month warranty period per ADC's instructions and which product is confirmed by ADC not to comply with the foregoing warranty.

ADC warrants that, for a period of 90 days from the date of purchase, the software furnished with its products will operate substantially in accordance with the ADC published specifications and documentation for such software. ADC’s entire liability for software that does not comply with the foregoing warranty and is reported to ADC during the 90-day warranty period is, at ADC’s option, either (a) return of the price paid or (b) repair or replace of the software. ADC also warrants that, for a period of thirty (30) days from the date of purchase, the media on which software is stored will be free from material defects under normal use. ADC will replace defective media at no charge if it is returned to ADC during the 30-day warranty period along with proof of the date of shipment.

The transportation charges for shipment of returned products to ADC will be prepaid by the Buyer. ADC will pay transportation charges for shipment of replacement products to Buyer, unless no trouble is found (NTF), in which case the Buyer will pay transportation charges.

ADC may use reconditioned parts for such repair or replacement. This warranty ***does not*** apply to any product which has been repaired, worked upon, or altered by persons not authorized by ADC or in ADC's sole judgment has been subjected to misuse, accident, fire or other casualty, or operation beyond its design range.

Repaired products have a 90-day warranty, or until the end of the original warranty period—whichever period is greater.

ADC DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ITS PRODUCTS AND ANY ACCOMPANYING WRITTEN MATERIALS. FURTHER, ADC DOES NOT WARRANT THAT SOFTWARE WILL BE FREE FROM BUGS OR THAT ITS USE WILL BE UNINTERRUPTED OR REGARDING THE USE, OR THE RESULTS OF THE USE, OF THE SOFTWARE IN TERMS OF CORRECTNESS, ACCURACY, RELIABILITY OR OTHERWISE.

MODIFICATIONS

Any changes or modifications made to this device that are not expressly approved by ADC DSL Systems, Inc. voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

SAFETY STANDARDS COMPLIANCE

The equipment has been tested and verified to comply with the applicable sections of the following standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-1950/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

For technical assistance, refer to “Appendix B - Product Support” on page 68.

ADC DSL Systems, Inc.
14402 Franklin Avenue
Tustin, CA 92780-7013
Tel: 714.832.9922
Fax: 714.832.9924

Technical Assistance

Tel: 800.366.3891 x73223
Tel: 952.917.3223
Fax: 714.832.9924

ISO 9001
DNV
DNV Certification, Inc.
Certificated Firm

DOCUMENT: LTPS-UM-8007-01, ISSUE 1

1207222