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C3800

****This Standard Supercedes BECo CS2.11-3.14****

**INSTALLATION OF S&C FUSED, PAD MOUNTED, VISIBLE
BREAK, AIR SWITCH RATED 15 & 25kV, 600 AMP,
MANUAL OR MOTOR-OPERATED SOURCE TRANSFER SWITCH (INCLUDING
RADSEC) WITH FAULT INDICATORS OR CURRENT TRANSFORMERS (PME-9)**

1.0 Bill of Materials

Quantity	15kV Equipment	Catalog ID
1	15kV Rated, 600A Fused, Pad mounted, Visible Break Air Switch with six (6) fuse holders for 12C thru 100C current limiting fuses	"EnergyLine 5802" RTU, Motor-Operated – 15451 Manual - 2680
1	15kV Rated, 600A Fused, Pad mounted, Manual, Visible Break Air Switch with six (6) fuse holders for Type "E" SM4 Power fuses (Existing switch used by NSTAR South)	Direct Charge
1	Fiberglass Box pad for 15KV switches manufactured after January 2001	14024
6	Type "E" 15kV Power Fuses, SM4 10E 20E 40E 65E 80E 125E 150E 200E	9795 9796 9797 9798 9799 9800 9801 9802
6	15kV, 100 Amp Current Limiting Fuse	0727
As needed	15kV Fuse holder for 100 Amp Current Limiting Fuses (Six are supplied with new switches)	2619
As needed	Current Sensors with Black finish (Six are supplied with new switches)	Supplied with switch
As needed	Fault indicators – to be used with earlier motor operated PME-9 switches (CAT. ID #2681)	15290

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2.0 Procedure, cont'd

Quantity	25KV Equipment	Catalog ID
1	25kV Rated, 600A Fused, Pad mounted, Visible Break Air Switch with Base Adapter and six (6) Fuse Holders for Type "E", SMU-20 Power fuses	"RTU Ready" Motor-Operated – 15671 Manual – 14554
6	Type "E" 25kV Power Fuses, SMU-20 15E 25E 40E 65E 80E 125E	14255 14256 14257 14258 14259 14260
1	Fiberglass box pad for use with Catalog ID# 14554 (Nordic GS 86-84-36)	14556
1	Fiberglass base cover for use with Catalog ID#14556 (Nordic GSC 86-84)	14557

Quantity	Miscellaneous Equipment	Catalog ID
1	Base fiberglass cover for use with Catalog ID #14024	14078
1	Fiberglass pad adapter plate (15 kV only)	14025
1	Fiberglass box pad for use with older 15kV switches manufactured prior to January 2001	1621
1	Base fiberglass cover for use with Catalog ID# 1621	1350
6	4kV, 100 Amp Current Limiting Fuse	0719
2	Ground Rod with Connector	9229
6	Fault Indicator with Normally Closed Contacts for 15kV Switches Installed with no RTU (Yellow Leads)-If not available use Catalog ID 2622	2621
6	Fault Indicator with Normally Closed Contacts for 15kV Switches Installed with an RTU (Red Leads)	2622
5 (Maximum)	3C-Padlock or other standard distribution equipment padlock	6143 (North) 11066 (Plymouth & New Bedford) 11068 (Yarmouth)
As Needed	4/0 AWG Bond Wire	103
As Needed	4/0 AWG Copper Ground Connector	597
As Needed	1/0 AWG Bond Wire	100

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2.0 Procedure, cont'd

As Needed	Fairleader or End Bell Duct Shield	1371
1	7/16" Nut Driver or 7/16" socket w/ ratchet handle for applications with current sensors.	N/A

Fault Fiter Fuses and accessories may be required in certain locations and would replace the above listed fuses and holders.

Quantity	Equipment	Catalog ID
6	15kV Fuse holder for Fault Fiter Fuses	2620
6	15kV Fault Fiter Interrupter Module	2618
6	15kV Fuse, BD, Fault Fiter, COMPOUND CURVE type electronic control module, for use with Fault Fiter interrupter on S&C PME-9 switches	2606
6	15kV fuse, BD, Fault Fiter, Inverse Curve type, electronic control module, for use with Fault Fiter interrupter on S&C PME-9 switches	14022

Procedure

- 2.1 Install the fiberglass pad and the pad mounted switch as depicted in Figure 1, Figure 2, or Figure 3. Reference Table I, "15kV PME-9 Switch Material Selection Guide" on Page 4, for assistance in determining required materials for different applications.
- 2.2 Use equal length slings, 6-foot minimum, when lifting the switch.
- 2.3 Maintain adequate clearance around the switch to provide safe passage at all times. Maintain minimum clearances of 10 feet in front of the elbow compartments for elbow or fuse removal. Maintain minimum clearances of six (6) feet around closed switch control compartments or three (3) feet around open control compartment doors, whichever requirement is greater.
- 2.4 Connect the ground bus to all of the ground rods in the fiberglass pad. See Figure 2.
- 2.5 Connect overhead sections to the unfused (main) side of the switch. Do Not connect the "fused" side of 15kV PME-9 switches to overhead load With "K" OR "T" fuse protection.

2.0 Procedure, cont'd

15kV Equipment	Catalog ID#	New Installation With		Replacement of Existing PME-9 Switch Manufactured Prior to 1/1/01 With		Replacement of An Existing Oil Switch With A New PME-9 Switch	
		Switch Manufactured Prior To 1/1/01	Switch Manufactured After 1/1/01	Switch Manufactured Prior To 1/1/01	Switch Manufactured After 1/1/01		
15kV Rated, 600A Fused, Pad mounted, Visible Break Air Switch with six (6) fuse holders for 12C thru 100C current limiting fuses	Motor Operated 15451 Manual 2680 Micro-AT 15425	X	X	X	X	X	
15kV Rated, 600A Fused, Pad mounted, Manual, Visible Break Air Switch with six (6) fuse holders for Type "E" SM4 Power Fuses (Existing Switch NSTAR South)	Direct Charge	See Note #1	See Note #1	See Note #1	See Note #1	See Note #1	
Fiberglass box pad for 15kV switches manufactured after 1/1/01	14024		X				
Base fiberglass cover for use with Catalog ID #14024	14078		See Note #2				
Fiberglass box pad for use with older 15kV switches manufactured prior to 1/1/01	1621	X				X	
Base fiberglass cover for use with Catalog ID#1621	1350	See Note #2					
Fiberglass pad adaptor plate	14025				X	X	

Table 1 - PME-9 Installation Material Selection Guide

Note 1: This PME-9 switch is applicable for NSTAR South applications only.
 Note 2: The base fiberglass cover is used as a temporary measure for applications where the PME-9 switch is not installed at the same time as the base pad. Return cover to stock after the PME-9 switch has been installed.

2.0 Procedure, cont'd

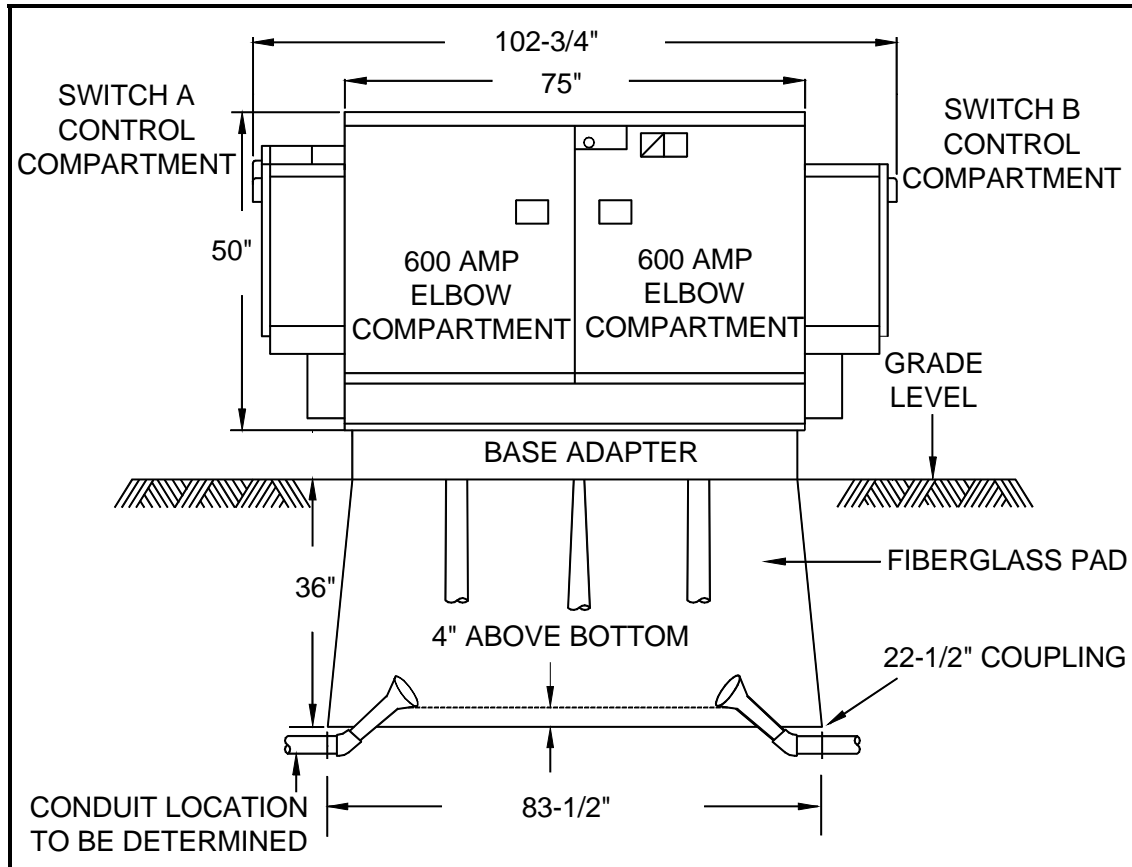


Figure 1 - Typical 15kV, S&C Switch Mounted on Pad (600 Amp Elbow Side) - Front View (Motor Operated Switch Shown with base adapter)

2.0 Procedure, cont'd

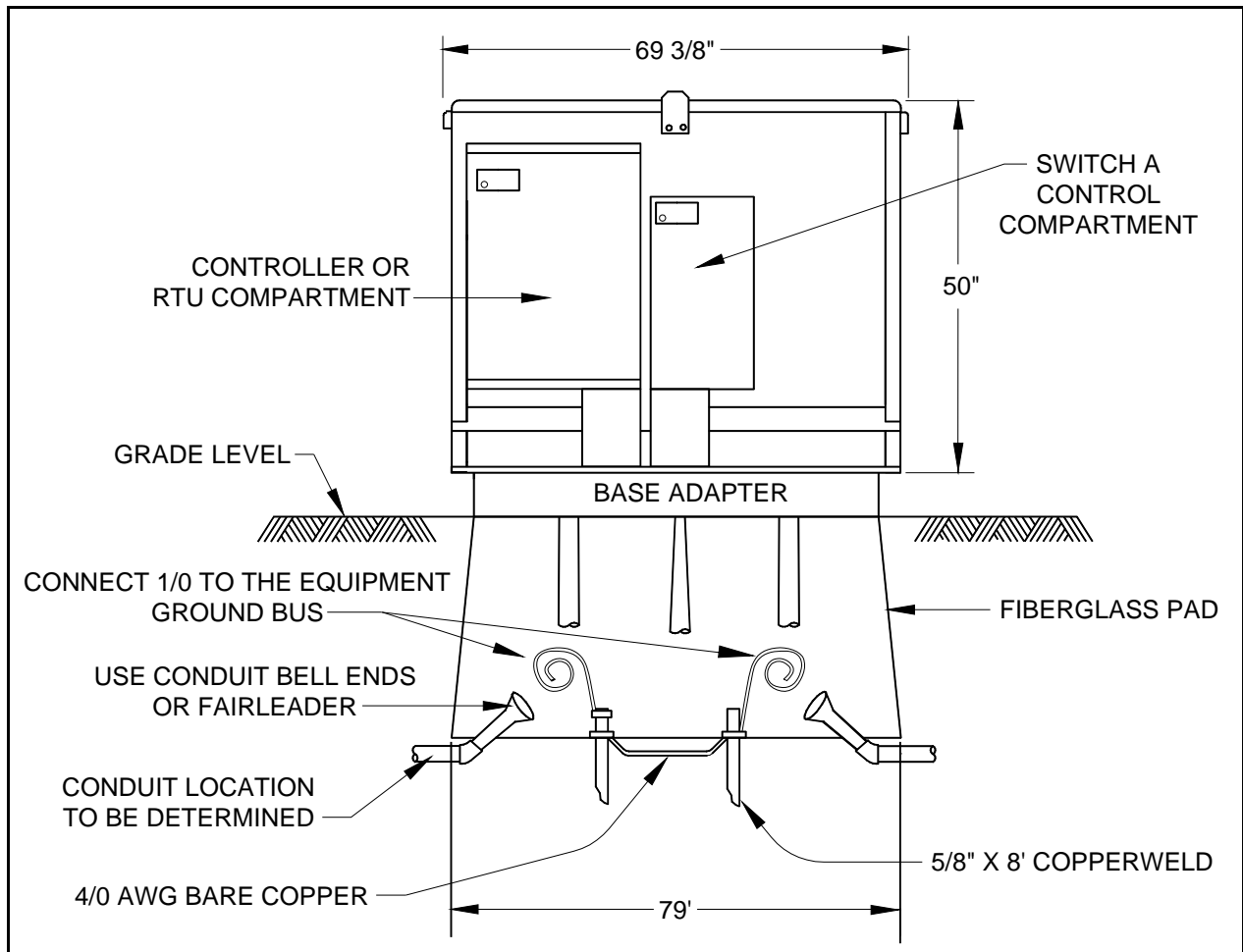


Figure 2 - Typical 15kV, S&C Switch Mounted on Pad (RTU Compartment Side) - Side View (Motor-Operated Switch with Base Adapter)

Note 1: There are no RTU or switch control compartments on manual switches.

Note 2: The opposite side of the switch has only a switch control compartment. See Figure 5.

2.0 Procedure, cont'd

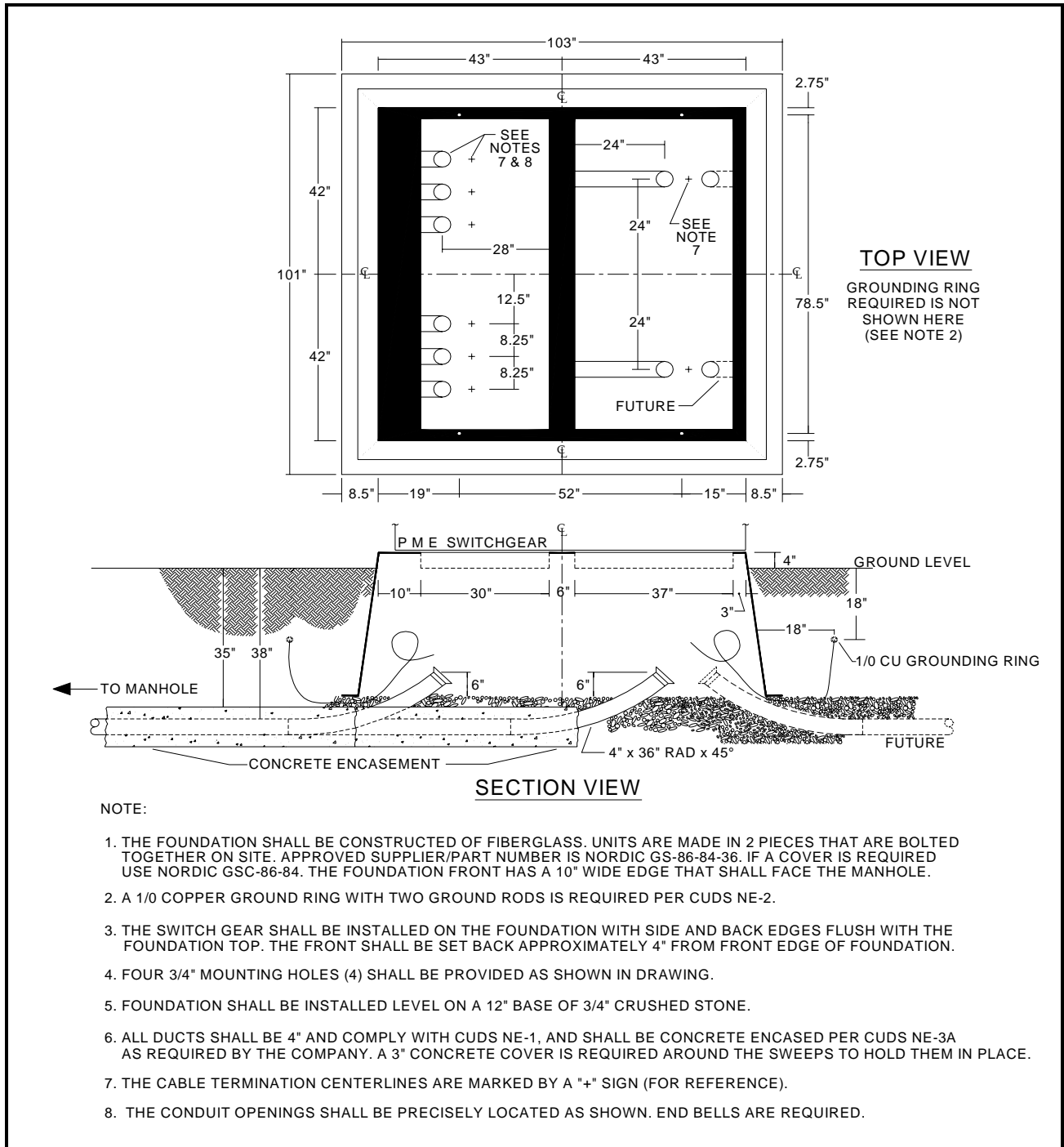


Figure 3 – Typical 25kV Pad mounted Switchgear Foundation (Fiberglass) Installation

2.0 Procedure, cont'd

- 2.6 Allow as much slack cable as possible in the fiberglass pad to facilitate placement and removal of elbows as shown in Figure 4.

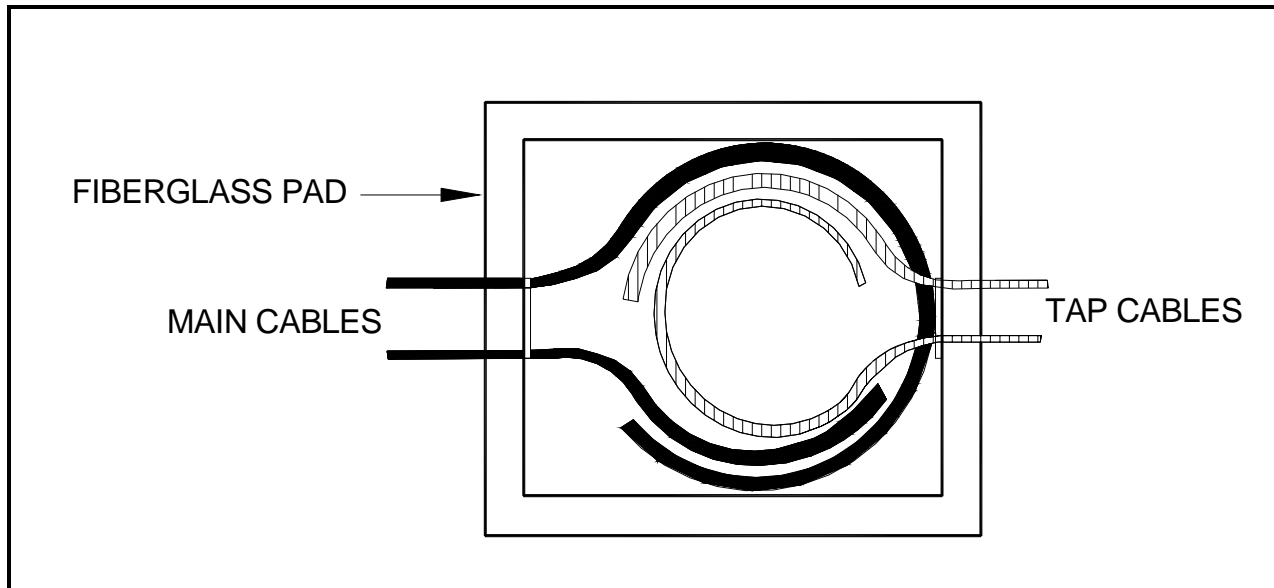


Figure 4 - Typical Cable Racking Within Pad

- 2.7 Rack cables in the elbow compartments within factory installed channels.
- 2.8 Connect all concentric wires and drain wires to equipment ground bus, maintaining clearance for rotating fuse assembly.
- 2.9 Refer to Figures 5 and 6 for phase configurations and equipment locations for RTU, switch controls and manual operating handles.

2.0 Procedure, cont'd

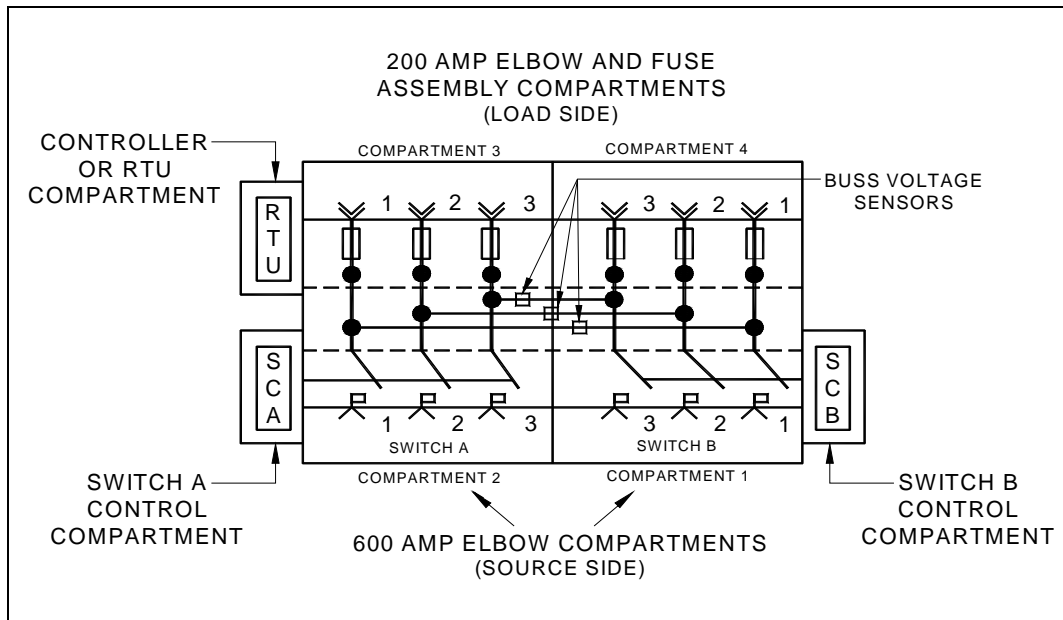


Figure 5 – Typical Motor-Operated S&C Switch Electrical Configuration Diagram

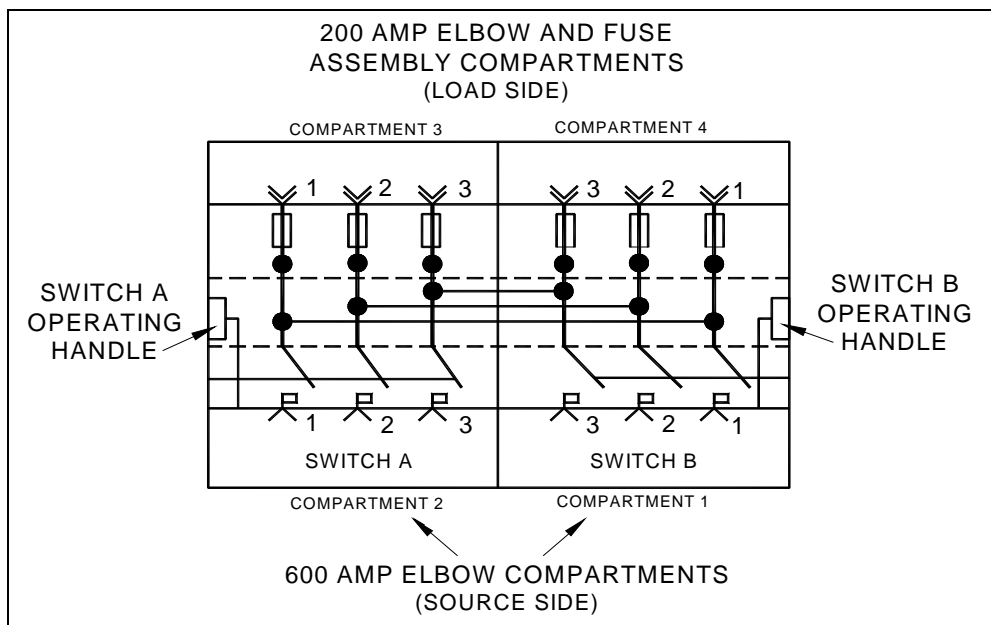


Figure 6 – Location of Switch A and Switch B Operating Handles on Manually Operated Switches

2.0 Procedure, cont'd

- 2.10 Determine what type of source transfer control the switchgear is equipped with:
- 2.10.1 Manual control – See electrical configuration in figure 6.
 - 2.10.2 Motor operated control utilizing fault indicators. See section 2.13 for installation guidelines of fault indicators.
 - 2.10.3 Motor operated control utilizing current sensors. See sections 2.11 and 2.12 for installation guidelines of current sensors.
 - 2.10.4 Micro-AT control (Cat. ID #15425 or #15426). Uses two current sensors per phase. See construction standard C3809.
- 2.11 For motor operated switches with current sensors, connect the leads from each current sensor (black finish) as shown in figure 7.
- 2.11.1 Pay particular attention to the polarity markings on the sensors and that all markings face the same direction.
 - 2.11.2 Observe the wires are numbered and the terminal connections are phase dependant.
 - 2.11.3 Using hardware furnished, connect the sensor to the wiring harness as shown in figure 7.
 - 2.11.4 Install protective rubber boots on the threaded terminals of the current sensor before the current sensor is mounted on the high voltage cables.
 - 2.11.5 The current sensors will have a black finish for switches with RADSEC and auto transfer capability. Refer to the Bill of Materials.

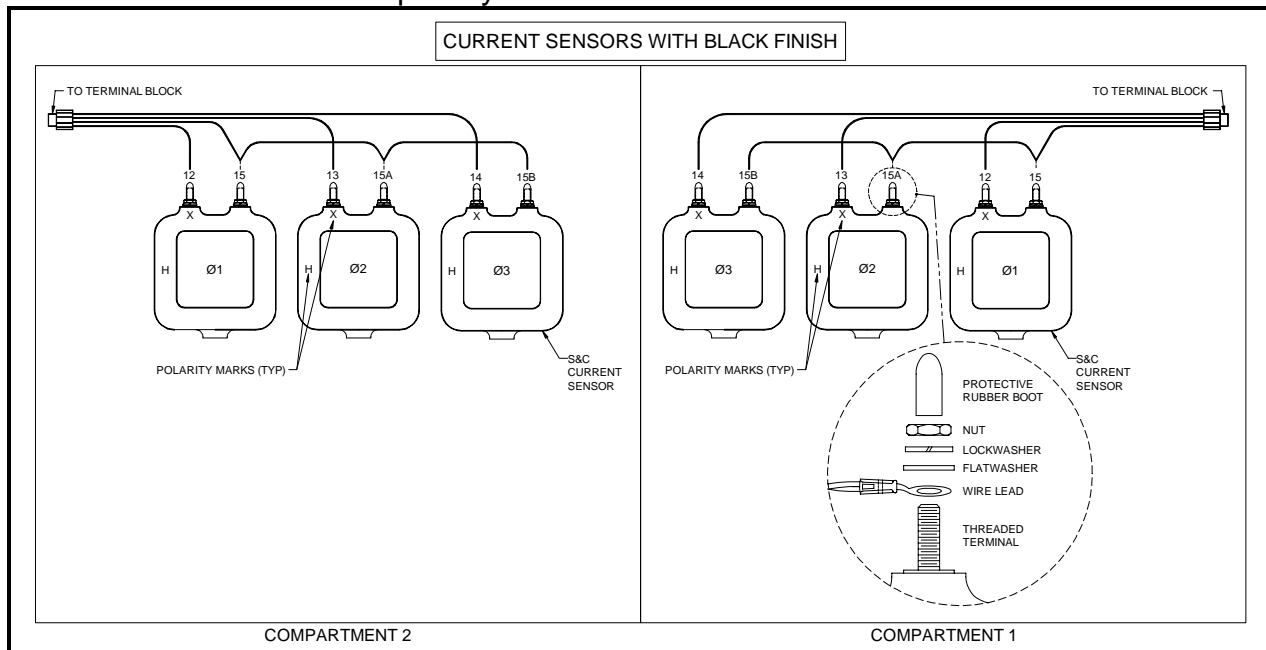


Figure 7 – Current Sensor (Black Finish) Connections – Motor operated switch

2.0 Procedure, cont'd

- 2.12 When current sensors are to be used, install current sensors on each of the 600 Amp main cables where the cable jacket and metallic shielding have been removed below the elbow, as shown in Figure 8.

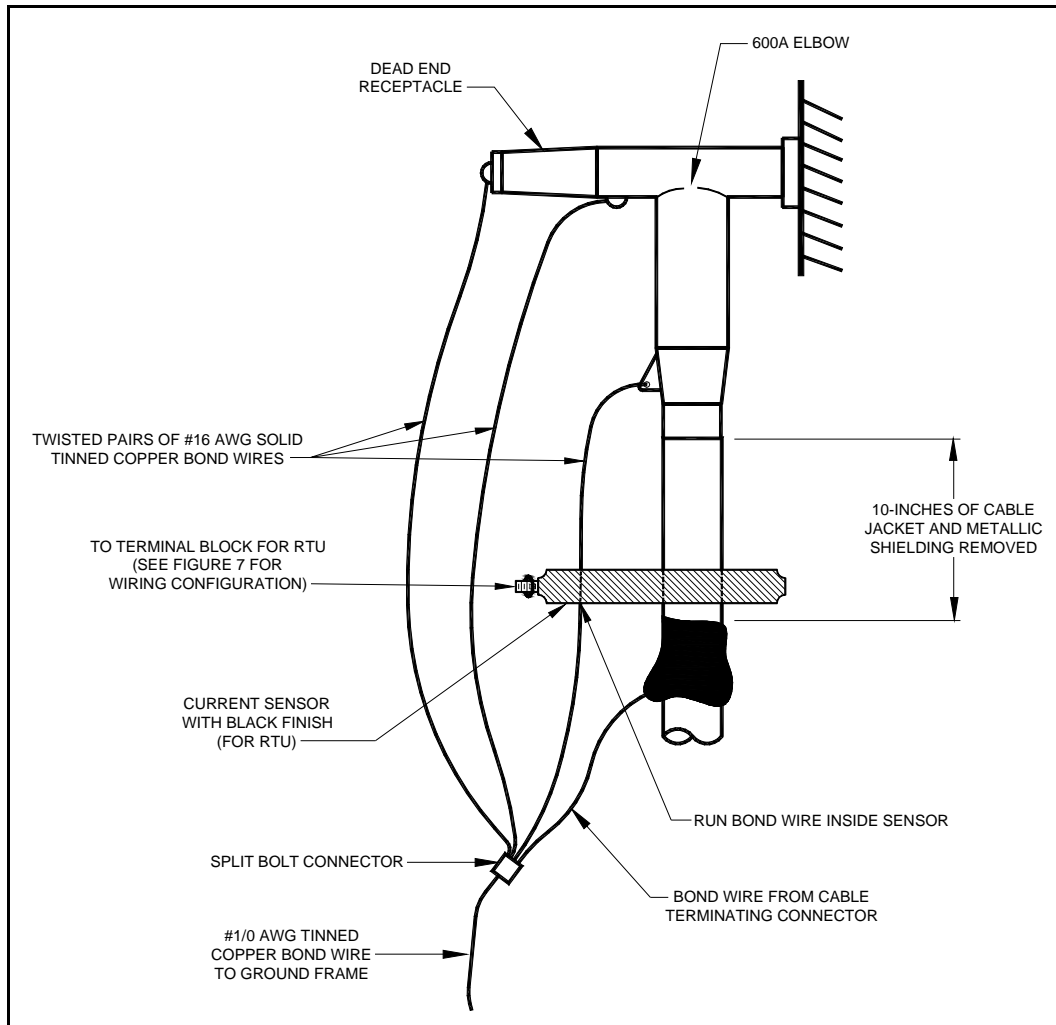


Figure 8 – 15kV Current Sensor Installation for motor operated PME-9 with RTU

- 2.12.1 Remove the $\frac{1}{4}$ " – 20 gap nut on the sensor. See figure 9.
- 2.12.2 With the polarity marks on top, open the current sensor and place it around the appropriate phase wire.
- 2.12.3 The terminator drain wire must be brought through the current sensor.

2.0 Procedure, cont'd



(a)



(b)



(c)

Figure 9 – Placing current sensors around the high voltage cables

(a) 1/4" – 20 gap nut on the sensor

(b) Using a 7/16" socket, remove the 1/4" – 20 gap nut

(c) Sensor will split allowing placement around the source side main cables

2.12.4 Replace and securely tighten the gap nut.

2.12.5 Secure the current sensor to the phase wire using plastic wire ties as shown in figures 10 and 11.

2.0 Procedure, cont'd

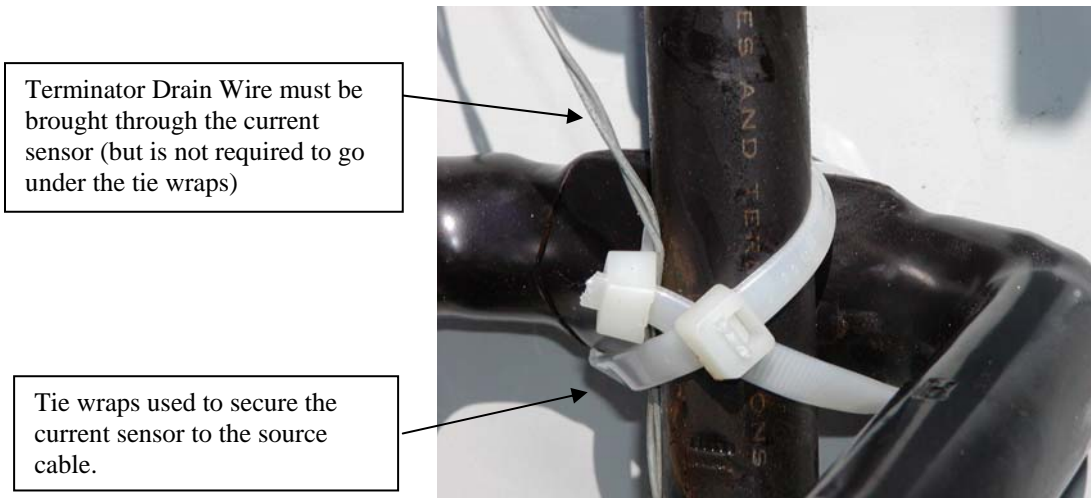


Figure 10 – Securing the CT to the source side main cables

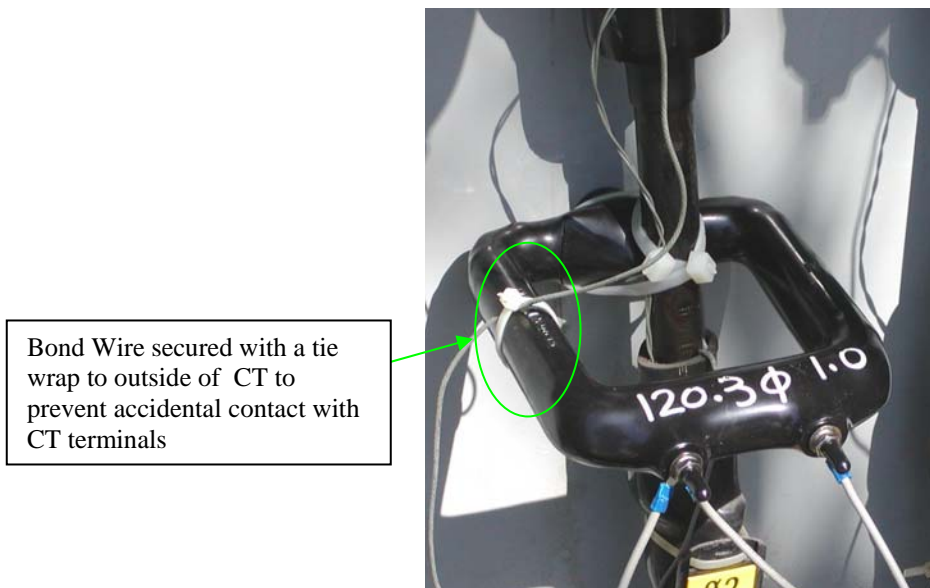


Figure 11 – Typical current sensor installation for PME-9

2.12.6 After current sensors are properly installed, plug the remaining end of the sensor leads into the terminal block connector near the outside wall of the 600 amp compartment (one terminal block connector for each 600 amp compartment).

2.0 Procedure, cont'd

- 2.13 When fault indicators are to be used, install fault indicators on each of the 600 Amp main cables where the cable jacket and metallic shielding have been removed below the elbow, as shown in Figure 12.

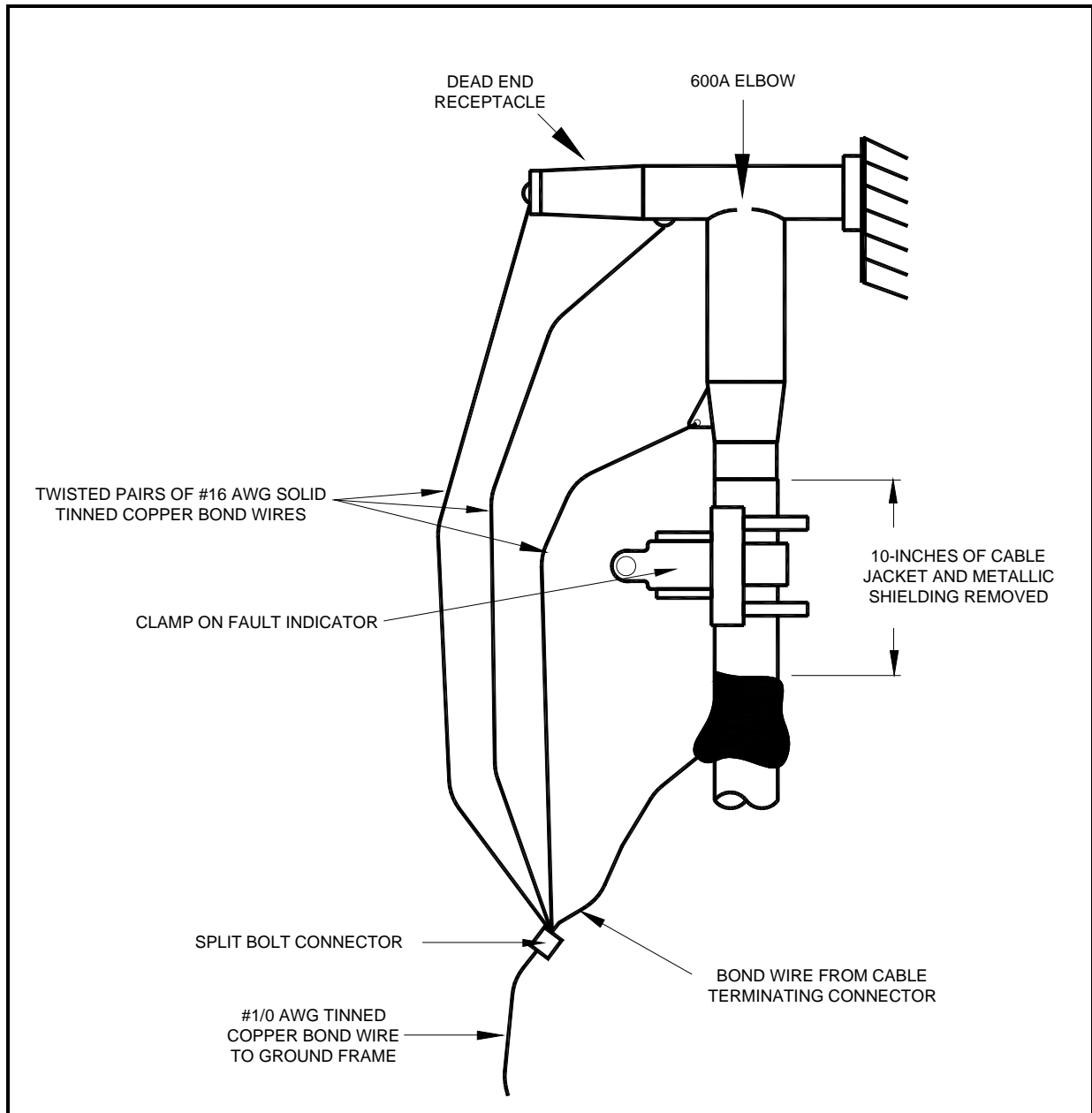


Figure 12 – 15kV Fault Indicator Installation

2.0 Procedure, cont'd

- 2.14 For motor-operated switches with fault indicators, connect the leads from each fault indicator in series, attaching two of the leads from the series loop to wires 14 and 15, as shown in Figure 13. The fault indicator leads must be red for switches having a RTU installed for RadSec control. Refer to the Bill of Materials.

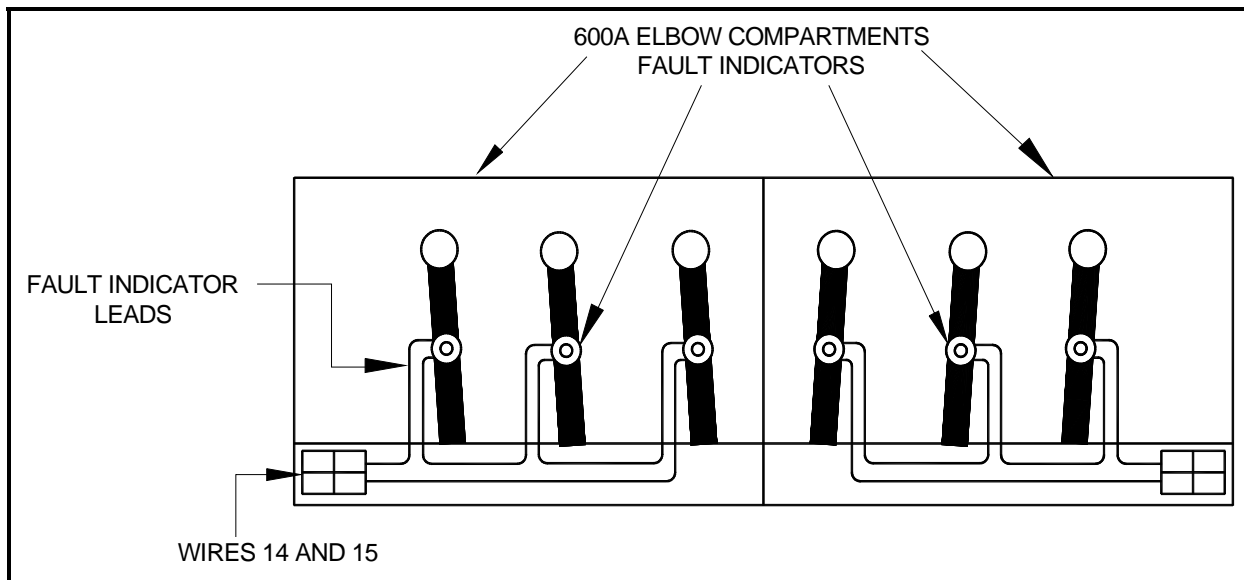


Figure 13 - Fault Indicator Connections

Note: Current sensors or fault indicators must be installed and properly connected in order for RADSEC to be functional.

- 2.15 If the switch is to operate at 4kV, a 120VAC source shall be installed for the battery charger. The 120VAC source should be connected to the two gray wires labeled 700 and 701 in the “switch A” compartment (compartment 2). Terminate the hot side of the 120VAC to the wire labeled 701 and terminate the neutral of the 120VAC to the wire labeled 700. If the wires are not there, the switch should not be energized until this work is complete.

Note: If the switch is energized before the 700 and 701 connections above are completed, the switch primary cables must be de-energized and elbows removed to complete the connections later.

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2.0 Procedure, cont'd

- 2.16 Put the battery charger input selector switch to the “voltage-sensor source” position for pad mount switches operating at 15kV or 25kV or to “external source” position for pad mount switches operating at 4kV. If the selector switch is **yellow**, there will be a selector switch in each switch control compartment. If the selector switch is **silver**, there will be only one selector switch, located in the switch control compartment next to the RTU compartment.
- 2.17 Put the main power switch, located in the switch control compartment next to the RTU compartment, in the “on” position.

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