



CENTERLINE[®] 2100 Motor Control Centers Joining and Splicing Vertical Sections

Application

The following instructions illustrate the recommended procedures that should be used when joining and splicing CENTERLINE[®] 2100 Motor Control Centers (MCCs).

For more splicing information related to specific MCCs, refer to the bus splicing drawing included in the documentation shipped with the MCC.

ATTENTION

De-energize all power sources to the motor control center before joining and splicing vertical sections. Failure to de-energize all power sources can result in severe injury or death.

IMPORTANT

Note for NO-OX-ID - If using corrosion inhibitor on bus bars do not get any on the bus splicing hardware. It will not allow the hardware to be properly torqued. Damage may occur.

Recommended Tools

Assorted screwdrivers, sockets (including 9/16" deep well and 5/16" sockets), and torque wrench

Joining MCCs

NEMA 1, 1G, and 12

Physical restrictions at your installation may not allow the following sequence to be followed exactly as stated.

1. The splice kit(s), if required, are located within a horizontal wireway or blank unit space. On six space factor frame-mounted units, the splice kit is within the unit. A fluorescent pink, removable label (on the outside of the compartment) designates the location. Locate splice kit(s) and set aside for later use.

2. Remove top and bottom horizontal wireway covers as shown in Figure 2 and Figure 3. Remove the wood shim used in transportation from the side of the MCC.
3. Remove top, bottom and center end closing plates, if present, exposing joining holes (referred to as **A** and **B** in Figure 2 and Figure 3) of the MCC. Joining holes not covered by end closing plates may contain 1/4-20 hex head thread-forming screws on the left side and removable plastic plugs on the right side. These screws and plugs are accessible both from within the vertical wireway and from the outside surface of the vertical side plate and must be removed from the side plates to be joined. See Figure 2 and Figure 3.
4. Remove the vertical wireway cover and horizontal bus splice access cover from the sections to be joined. See Figure 1 and Figure 7.
5. Pull all “bottom entry” cables, if any are present, through the conduits to a point where they will be accessible when the center is positioned.
6. **NOTE:** For NEMA 12 MCCs refer to publication 2100-IN037x-EN-P, *NEMA 12 Sealing Instructions*. This publication was shipped with the splice kit.
7. Slide sections together making sure cabinets are level and holes in side sheets line-up with adjacent holes. See Figure 2.
NOTE: Make sure cabinets are level and pushed together, tightly. Do not use hardware to draw cabinets together.
8. Join the two MCCs using the hardware furnished with the splice kit.
 - Pass the 1/4-20 hex head thread forming screw from inside the left MCC through joining holes (A in Figure 2 and Figure 3) and engage the screws with the holes located in the right center. Refer to Torque Requirements on page 15
 - Pass the 1/4-20 x 5/8 hex screw from inside the left center through joining hole (B in Figure 2 and Figure 3) and secure with the 1/4-20 steel nut. Refer to Torque Requirements on page 15
9. Secure the MCC to the floor as required by local code.
10. Inspect the interior for dust and dirt; vacuum cleaning is recommended.
Do not clean using compressed air—it contains moisture and may blow debris into the control equipment.

Figure 1 Typical 15" Deep MCC Construction

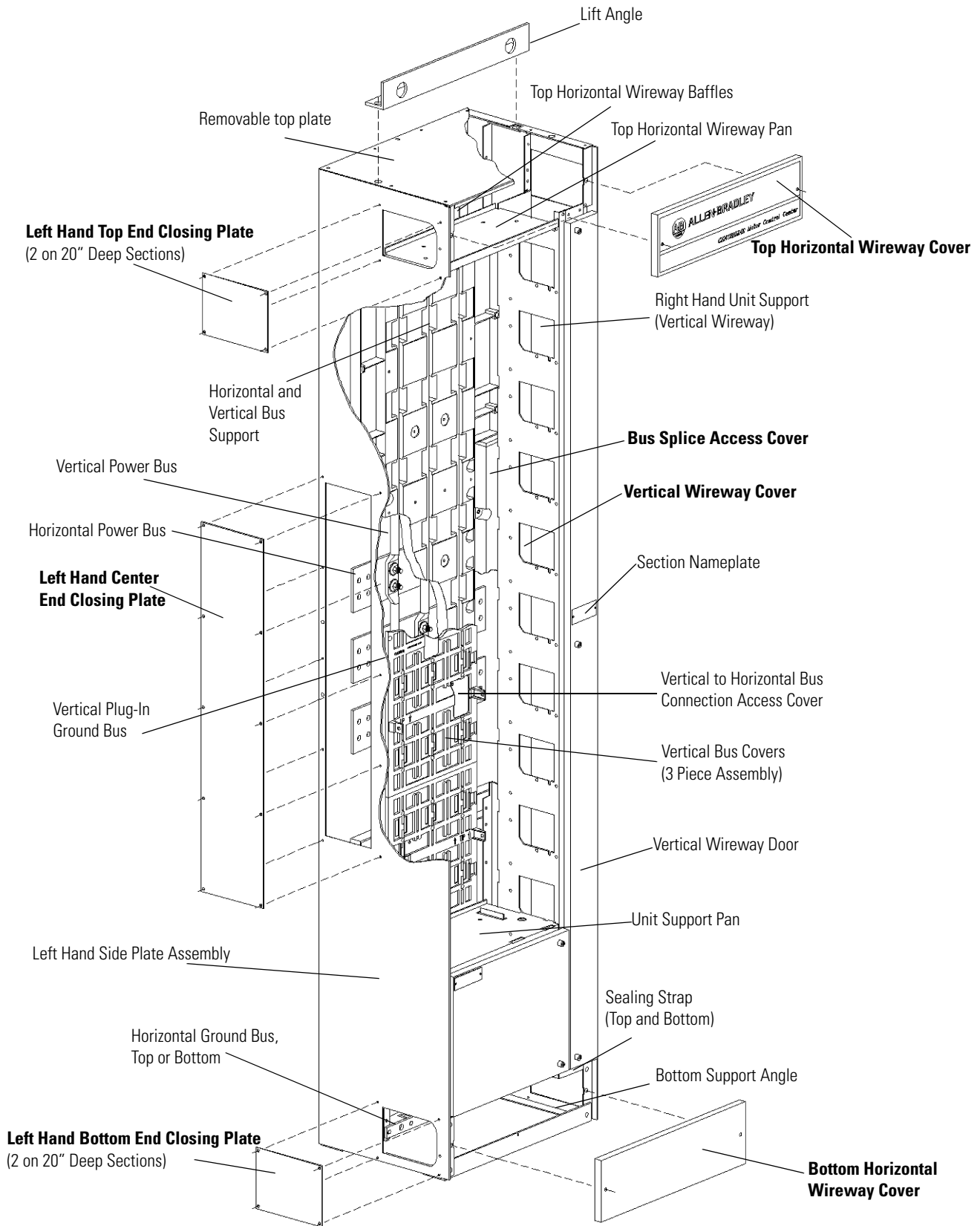
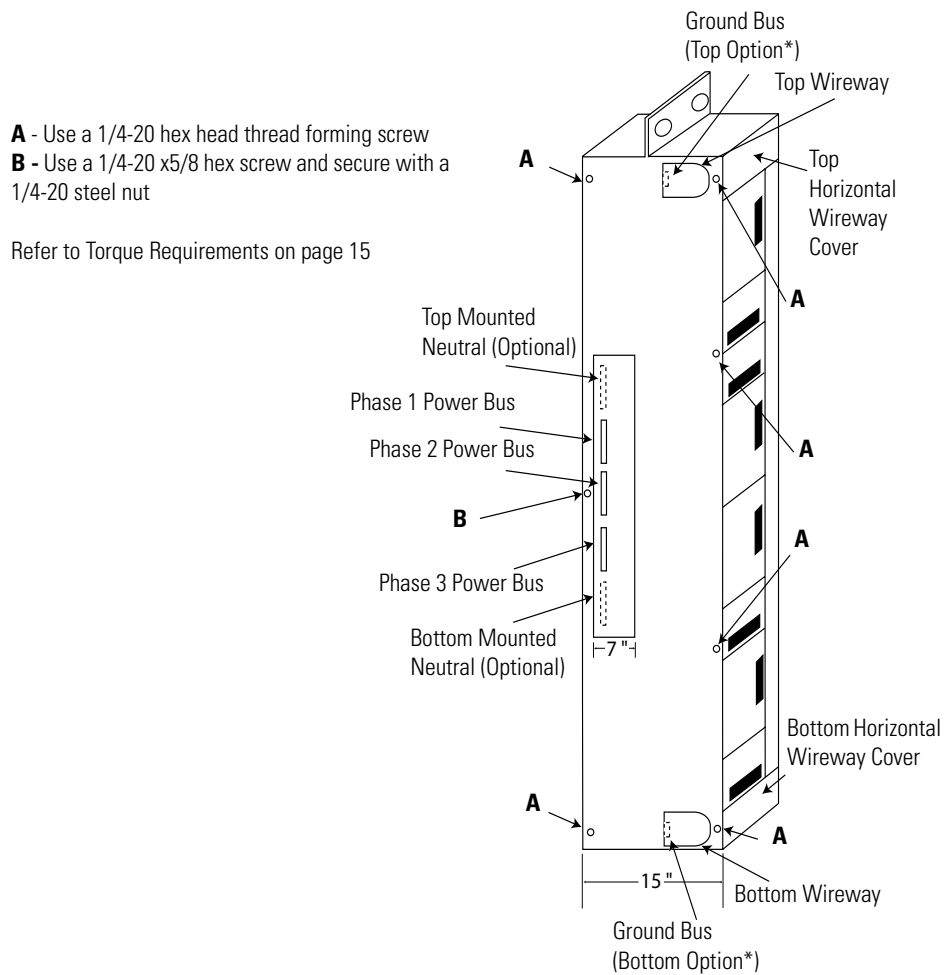
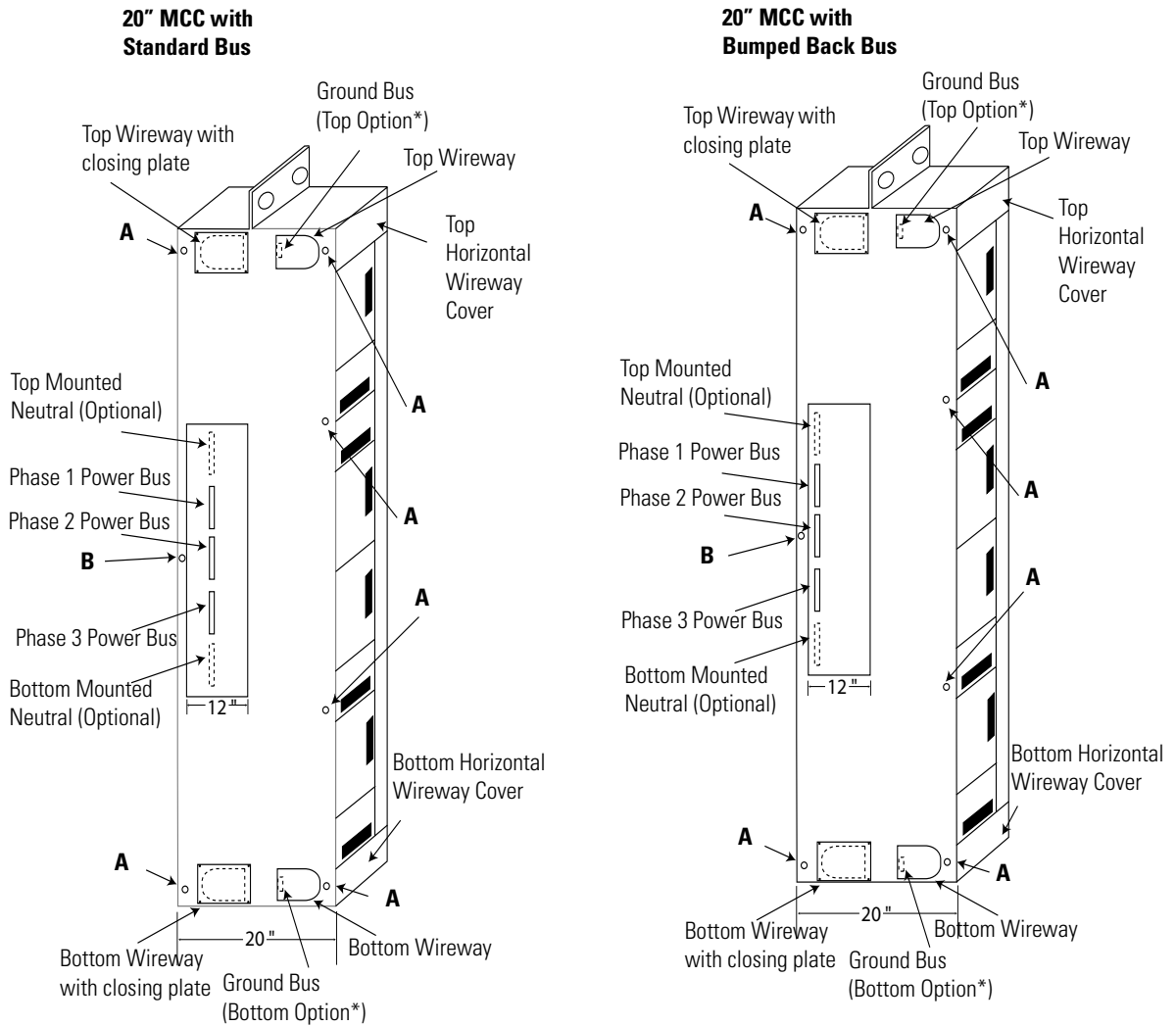


Figure 2 Example of 15" Deep MCC



* Ground bus is required. The ground bus can be in the bottom, top or bottom and top.

Figure 3 Example of 20" Deep MCCs



- A** - Use a 1/4-20 hex head thread forming screw
- B** - Use a 1/4-20 x5/8 hex screw and secure with a 1/4-20 steel nut

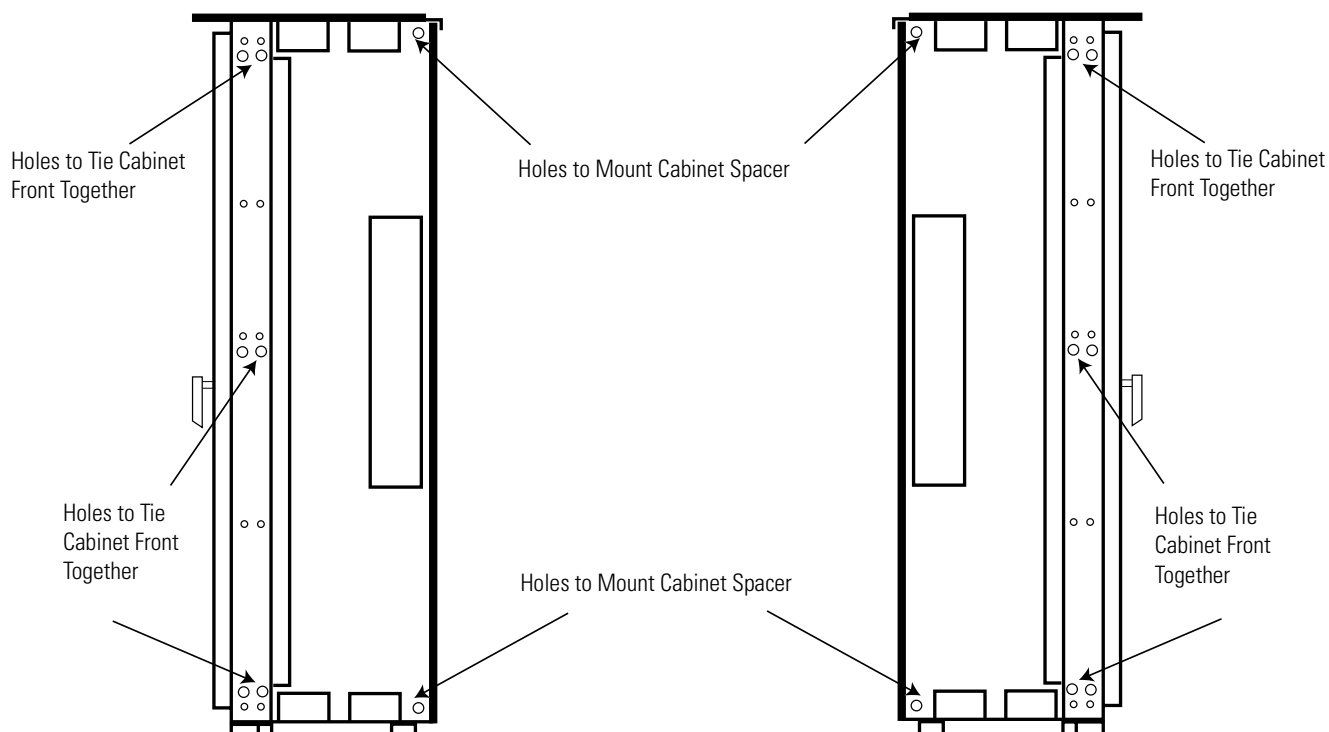
Refer to Torque Requirements on page 15

* Ground bus is required. The ground bus can be in the bottom, top or bottom and top.

NEMA 3R and 4

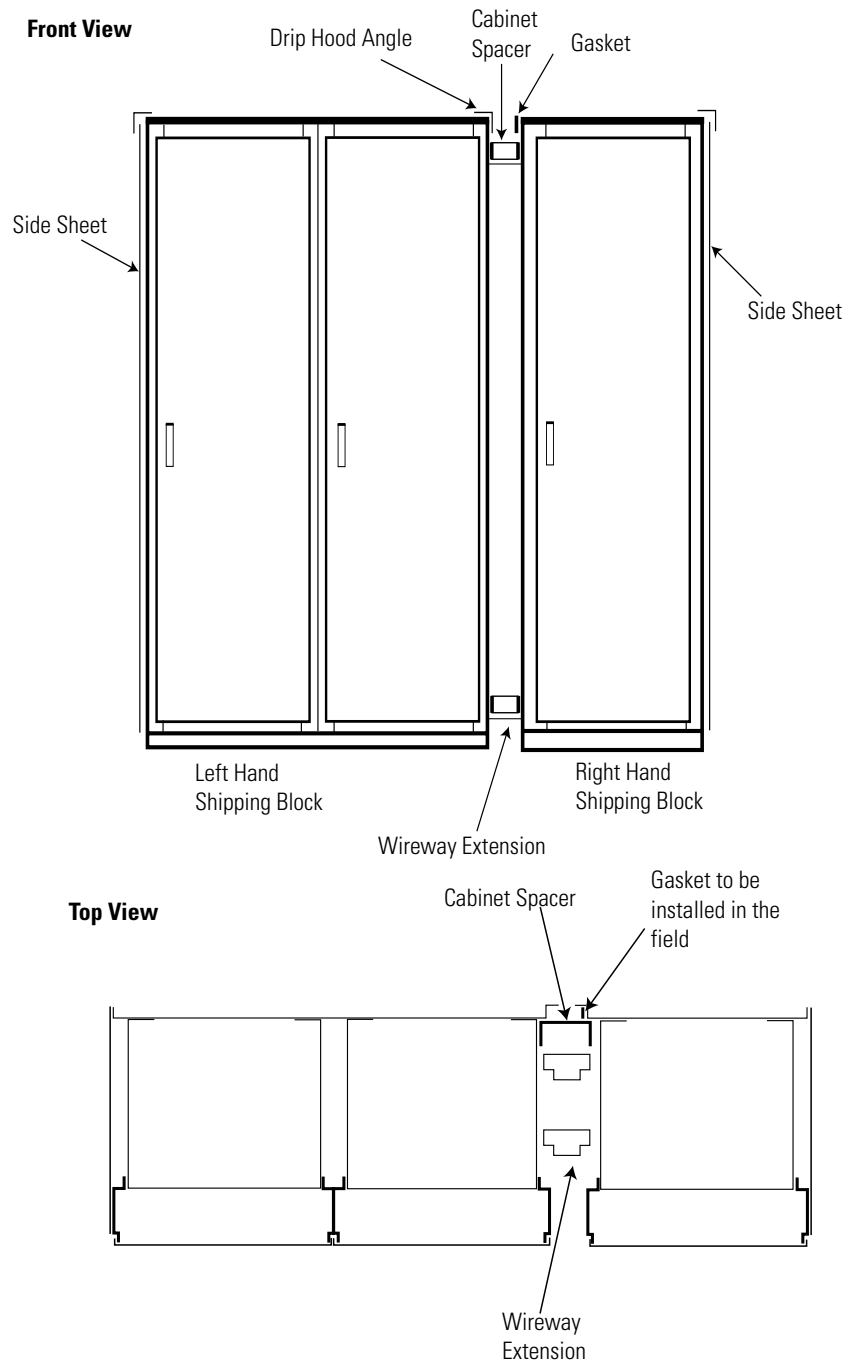
1. Remove 3R/4 side sheet from end of section, being spliced, if present (3R End Closing Plate). See Figure 5.

Figure 4 NEMA 3R/4 Without Side Sheet.



2. Mount cabinet spacer (supplied with Splice Kit) to right hand shipping block, using 1/4 - 20 X 3/4" thread-forming screws. (Pass thread-forming screws through large hole in cabinet spacer and bolt to cabinet.) See Figure 4 and Figure 5. Refer to Torque Requirements on page 15.

Figure 5 NEMA 3R/4



3. Remove drip hood angle from shipping block being spliced. See Figure 5.
4. Install gasket (supplied with splice kit) on back plate and top plate (If not present on cabinet.). See Figure 5.

5. Slide sections together making sure cabinets are level and cabinet spacers and holes in front flange lines-up with adjacent holes. See Figure 5.
6. Install 1/4-20 X 3/4" thread-forming screws through left hand shipping block side plate into cabinet spacer. These can be accessed through the top and bottom horizontal wireways. Refer to Torque Requirements on page 15.

NOTE: Make sure cabinets are level and pushed tight together. Do not use hardware to draw sections together.

7. Install (6) 1/4-20 X 3/4" thread-forming screws in the front flange to secure sections together. (Screws must be installed from the left shipping block through into the right block.) This area can be accessed by opening the NEMA 3R/4 doors. See Figure 4. Refer to Torque Requirements on page 15.
8. Replace the drip hood angle removed in Step 3. Make sure hardware is placed through the drip angle and clearance hole in top plate before threading into adjacent top plate. Refer to Torque Requirements on page 15.
9. Install Wireway extensions. From top and bottom wireway in right hand shipping block, insert extension through wireway opening and hook lip on wireway opening of left hand section. Install 1/4-20 X 1/2" thread-forming screw in wireway extension to secure to wireway opening in right hand section. (This does not bolt into the cabinet, but is clamped onto the wireway opening.) See Figure 5.

Splicing MCCs

A main horizontal bus splice kit must be added between the horizontal bus work of the MCCs. In addition, the neutral bus splice kit, if required, and the ground bus splice kit must be installed to complete the splicing operation. Refer to Splicing Procedures for instructions.

To gain access to the horizontal bus, remove the plug-in units in front of the horizontal bus in the first vertical section of the right center.

Plug-In Unit Removal

To complete plug-in unit removal refer to publication, 2100-IN007x-EN-P, Installing Units with Horizontal Operating Handles and publication 2100-IN014x-EN-P, Installing Units with Vertical Operating Handles.

The following is an overview of the removal process for a plug-in unit:

1. Open unit door by turning door latch a quarter turn. Door removal is not necessary when removing a unit; however, if door removal is desired, follow steps a-d below. Step b may be required even if the door is not removed.
 - a. Open the door completely.
 - b. If present, remove control station housing by loosening the two (2) captive screws located at the top and bottom of the control station housing on the front of the unit door.
 - c. Remove hinge pins by sliding up with screwdriver.
 - d. Swing door to near closed position and lift off.
2. Loosen the screw type latches located at the front of the unit. Most units have one (1) at the top and one (1) at the bottom, but units two space factors and larger have two (2) at the top.
3. Detach necessary wiring from unit.
4. Place wire/terminal block in line with wiring clearance tunnel at lower right of unit. Pull unit forward to unplug from bus, using the upper right latch assembly and the lower left tab handle.
5. Remove the unit support pan. Refer to Figure 6.
 - a. Using a screwdriver, pry the plastic retaining clip from the right side of the support pan. It is visible in the vertical wireway.
 - b. Lift right side of pan approximately four (4) inches.
 - c. Pull right side of pan forward to release from left rear slot.
 - d. Push back on left side of pan until it is free.

Figure 6 Removal of Support Pan



Splicing Procedures

1. Remove the horizontal bus splice access cover to expose the horizontal bus splicing. See Figure 7.

Figure 7 Bus Splice Access Cover



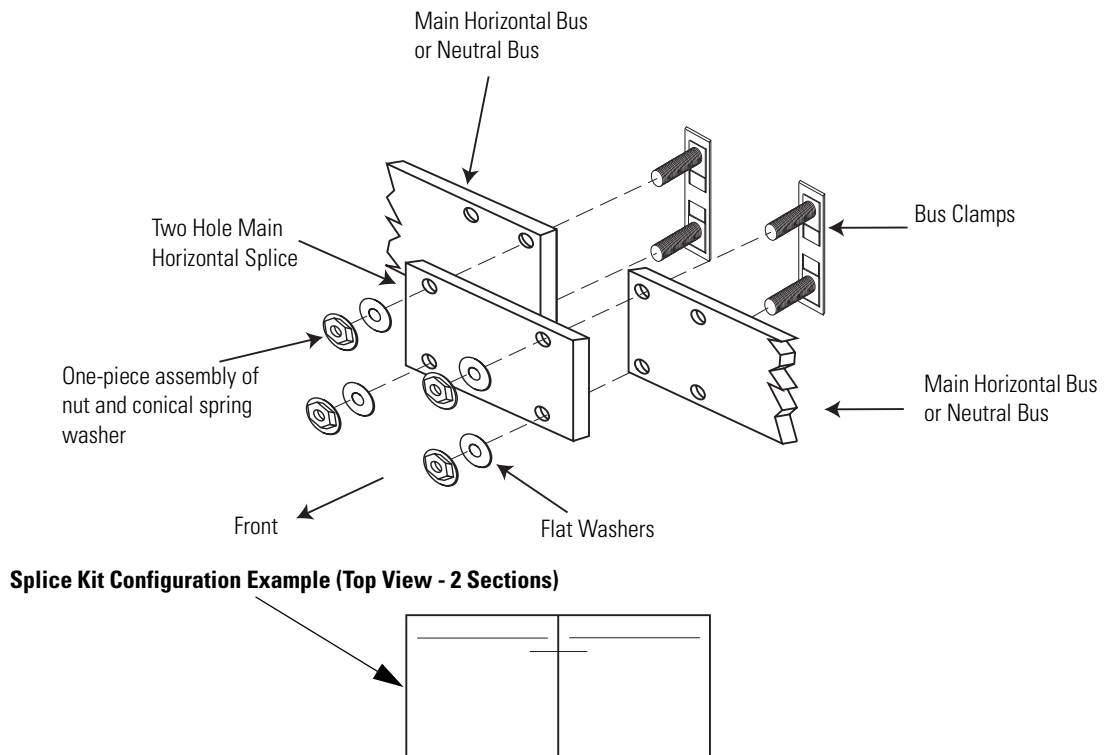
Bus Splice Access Cover In Place



Bus Splice Access Cover Removed

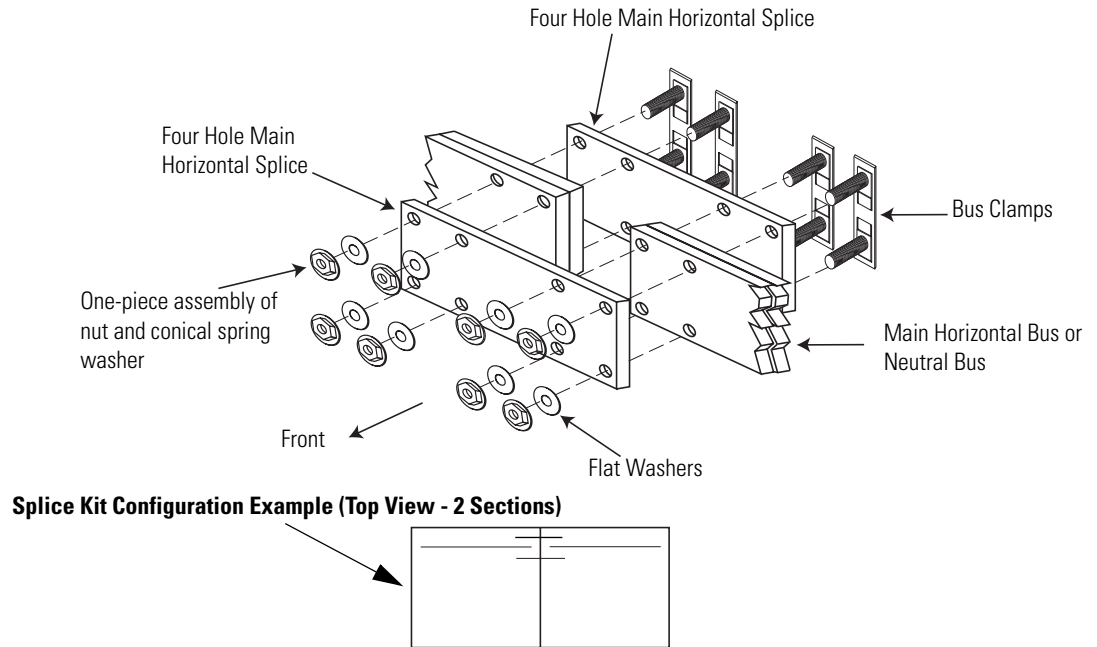
2. Assemble splice bars to the bus work of the vertical sections as shown in figure 8 - 13. If additional access to the splice is desired, loosen the fastening screws and remove the bus access plate located in the vertical wireway of the center (to the left of the splice). The horizontal bus now is exposed to the left and right of the splice for added convenience. The splicing kit will contain either two or four sets of hardware per splice bar, depending on the current rating of the horizontal bus.
3. See Table A on page -14 for bus dimensions and mounting holes.
4. Tighten to torque specifications as listed in the Torque Requirements on page -15 or tighten until the conical spring washer is flattened on the one-piece nut and washer assembly. **Do not grease or lubricate the hardware.**
5. Replace covers and plates and check all bolts and nuts for tightness. Replace units in their respective stations.

Figure 8 600 - 1200 Amp Main Horizontal (and Neutral) Bus Splicing Detail and Configuration Example



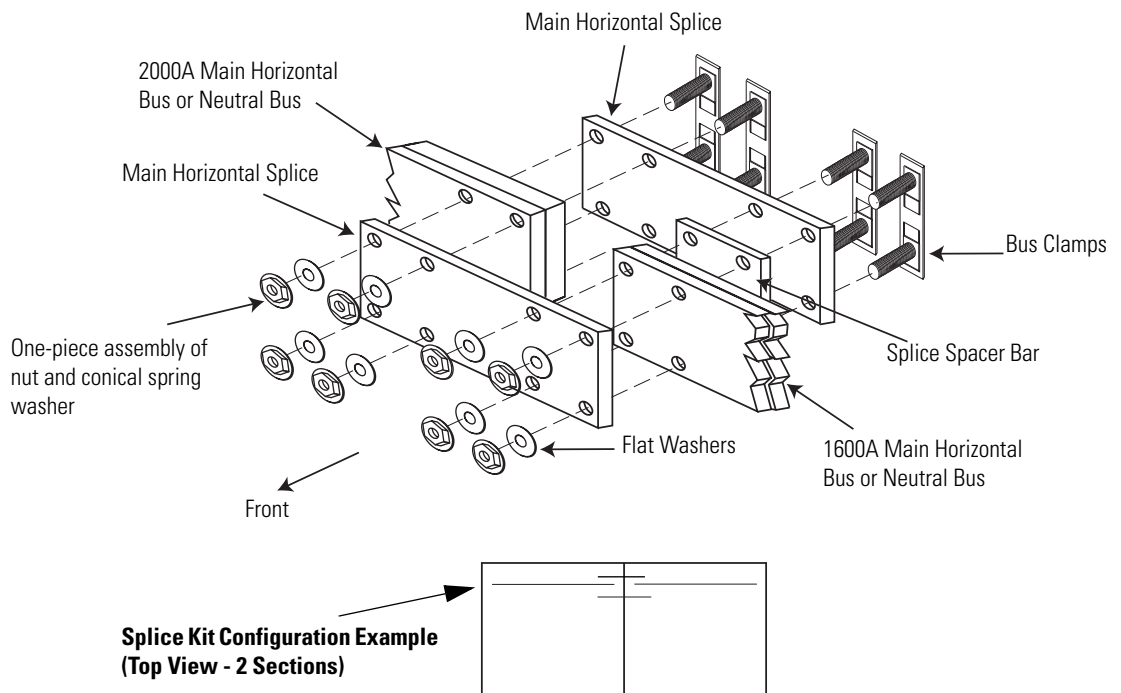
Refer to Table A for bus size and thickness.

Figure 9 1600 - 3000 Amp Horizontal (and Neutral) Bus Splicing Detail and Configuration Example



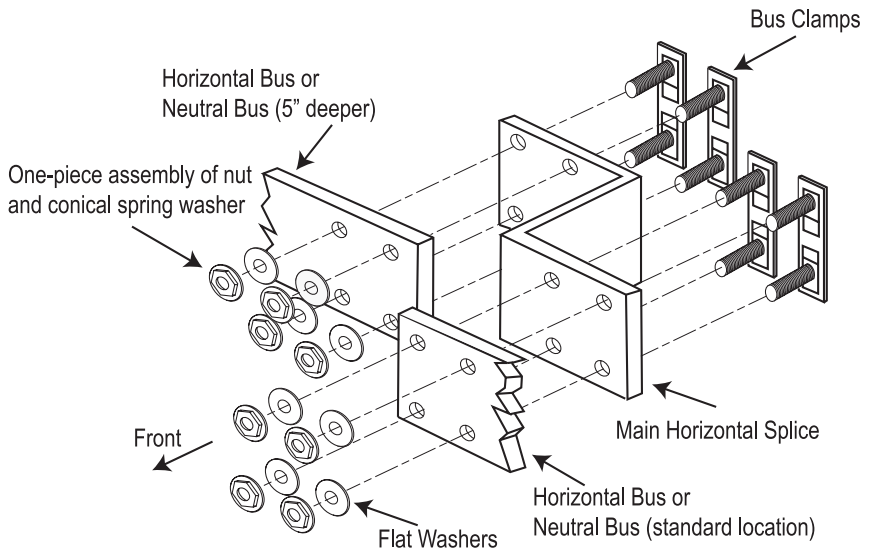
Refer to Table A for bus size and thickness.

Figure 10 2000 Amp Main Breaker and 1600 Amp Horizontal Bus Splicing Detail and Configuration Example

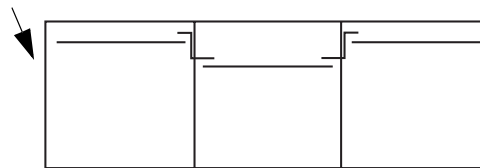


Refer to Table A for bus size and thickness.

Figure 11 Offset "Z" 600 - 1200 Amp Bus Splicing Detail and Configuration Example

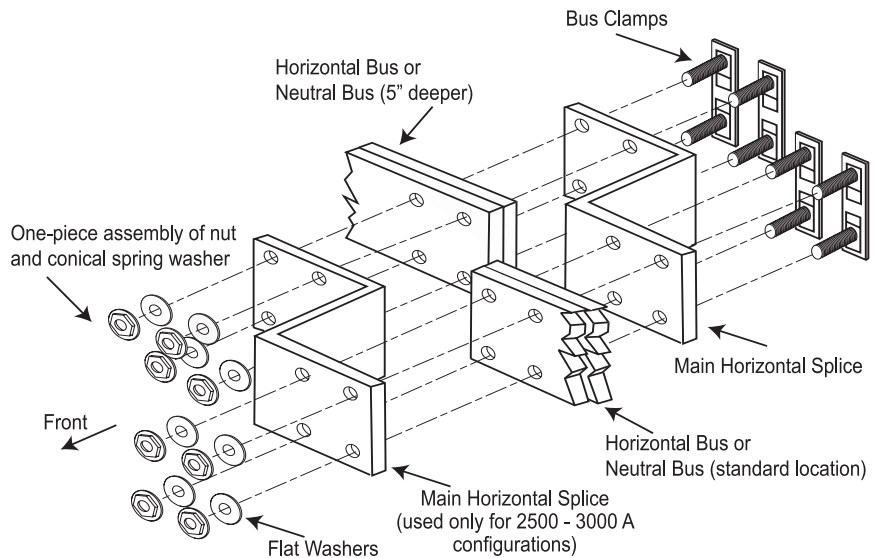


Splice Kit Configuration Example (Top View - 3 Sections)

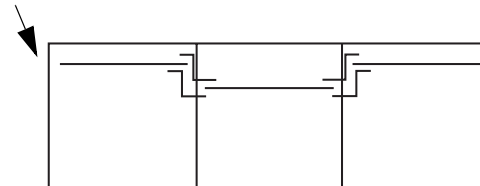


Refer to Table A for bus size and thickness.

Figure 12 Offset "Z" 1600 - 3000 Amp Bus Splicing Detail and Configuration Example



Splice Kit Configuration Example (Top View - 3 Sections)



Refer to Table A for bus size and thickness.

Figure 13 Insulated “Z” 600 - 1200 Amp Bus Splicing Detail and Configuration Example

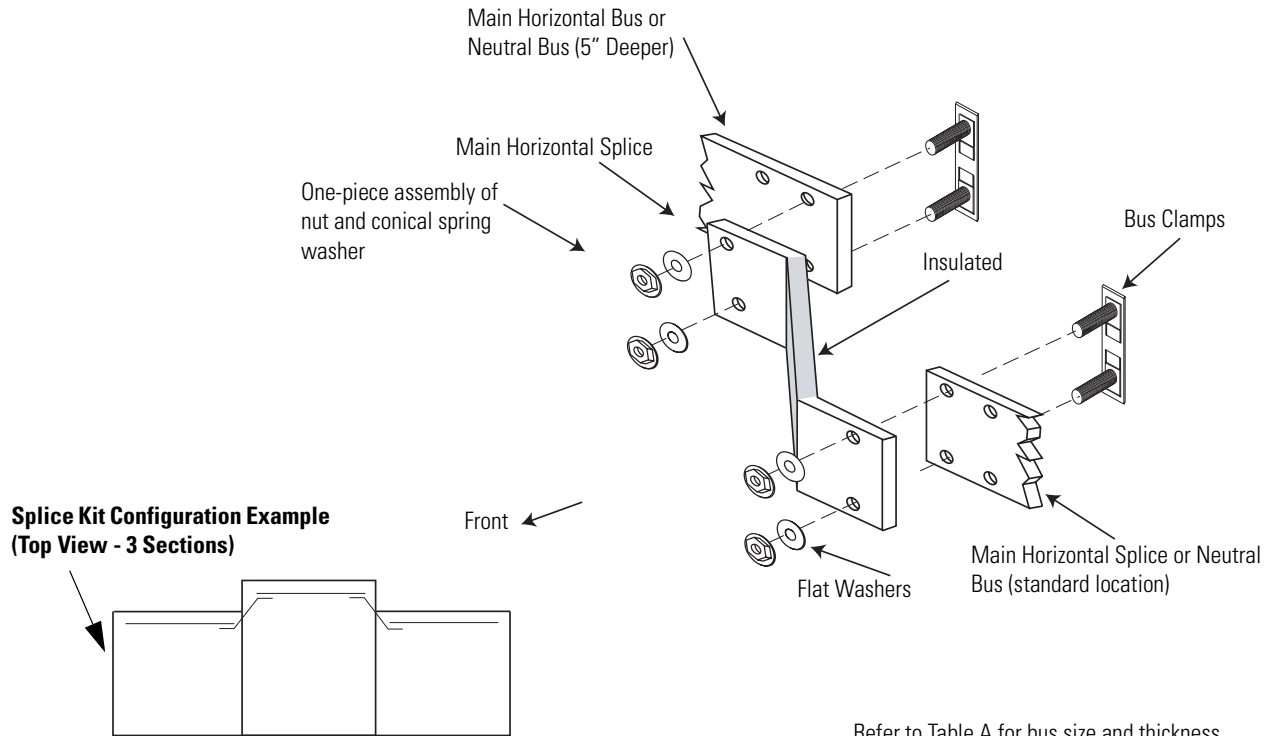


Table A Bus and Splice Bar Dimensions

STANDARD NEMA 1, 1G, 12 & 3R SPLICE BAR INFORMATION					
AMP	MATERIAL	QTY	THICKNESS	WIDTH	SPLICE MTG. HOLES
600	Copper/Tin	1	.125"	3"	2
	Copper/Silver	1	.125"		
	Aluminum/Tin	1	.125"	4"	
800	Copper/Tin	1	.125"	4"	2
	Copper/Silver	1	.125"		
	Aluminum/Tin	1	.1875"		
1200	Copper/Tin	1	.250"	4"	2
	Copper/Silver	1	.250"		
1600	Copper/Tin	2	.250"	4"	4
	Copper/Silver	2	.250"		
2000	Copper/Tin	1	.250"	4"	4
		1	.375"		
	Copper/Silver	1	.250"	4"	
		1	.375"		
2500/ 3000	Copper/Tin	2	.375"	4"	4
	Copper/Silver	2	.375"		

"Z" SPLICE BAR					
(Used to Splice Standard Depth Bus to Bus 5" Deeper)					
Note: 600-1200 AMP Bus is the same thickness as a standard Splice Bar					
AMP	MATERIAL	QTY	THICKNESS	WIDTH	SPLICE MTG. HOLES
1600	Copper/Tin	1	.500"	4"	4
	Copper/Silver	1	.500"		
2000	Copper/Tin	1	.625"	4"	4
	Copper/Silver	1	.625"		

Table B Conversions

DECIMAL	FRACTION	MILLIMETER	DECIMAL	FRACTION	MILLIMETER
.125"	1/8"	3.175	.375"	3/8"	9.525
.250	1/4"	6.350	.625"	5/8"	15.875
.500"	1/2"	12.700	3"	3"	76.200
.1875"	3/16"	4.763	4"	4"	101.600

Torque Specifications and Table

Tighten all bus connections with a torque wrench and socket according to intervals established by your maintenance policy. If a torque wrench is not available, tighten until conical spring washer is flat. Do not grease or lubricate the hardware.

Table C Torque Requirements

Description	Torque in Ft./Lb.
Lug attachment bolts 1/2-13 Hardware	45 lb.-ft. ± 5 lb.-ft. 61 N-m ± 6 N-m
Horizontal to vertical bus connection 3/8-16 Hardware	28 lb.-ft. ± 4 lb.-ft. 38 N-m ± 5 N-m
Horizontal splice connection 3/8-16 Hardware	28 lb.-ft. ± 4lb.-ft. 38 N-m ± 5 N-m
Connecting Hardware 1/4-20 Hardware	55 lb.-in. ± 3lb.-in. 6.2 N-m ± 0.6 N-m
10-32 Hardware	32 lb.-in. ± 3lb.-in. 3.6 N-m ± 0.4 N-m

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