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FM-10S PS bay Conversion, 220V 1P – 220V 3P Upgrade

Application Guide

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Rev. C

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Application Guide

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1 FM-10S PS Bay Conversion, 220V 1P - 220V 3P

1.1 Overview of Installing the Upgrade Kit.

The upgrade path to convert the FM10s and FMi703, from a single phase power supply to a 3-phase power supply involves populating the power supply sub chassis with the necessary parts for the additional phases. In addition, the power supply wire harness will have to be replaced with the 3-phase wire harness.

2 Installation Preparation

2.1 Requirements

Review the parts list to verify the additional parts received.

2.2 Overview / Estimated Completion Time for the Upgrade

The FM 10s 3-phase Field Upgrade will take about a day to complete.

2.3 Items / Tools required for the Upgrade Process

- ☐ #2 Philips Screw driver
- ☐ #2 Philips stubby Screw driver
- ☐ 3/16" blade flat blade screw driver
- ☐ 1/4" nut driver or wrench
- ☐ 3/8" nut driver or wrench
- ☐ 7/16" nut driver or wrench
- ☐ 1/2" nut driver or wrench
- ☐ wire cutter
- ☐ 6mm allen wrench
- ☐ 5/32" allen wrench
- ☐ 3/16" allen wrench
- ☐ 979-0507-123 KIT (FM10s or FMi703 only)

3 Remove single phase parts

 WARNING: ENSURE ALL PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING

1. The first step will be to remove the un-needed single phase parts. Retain the hardware in an organized fashion. Some parts will remain on the chassis and the hardware will be reused to install the new components.

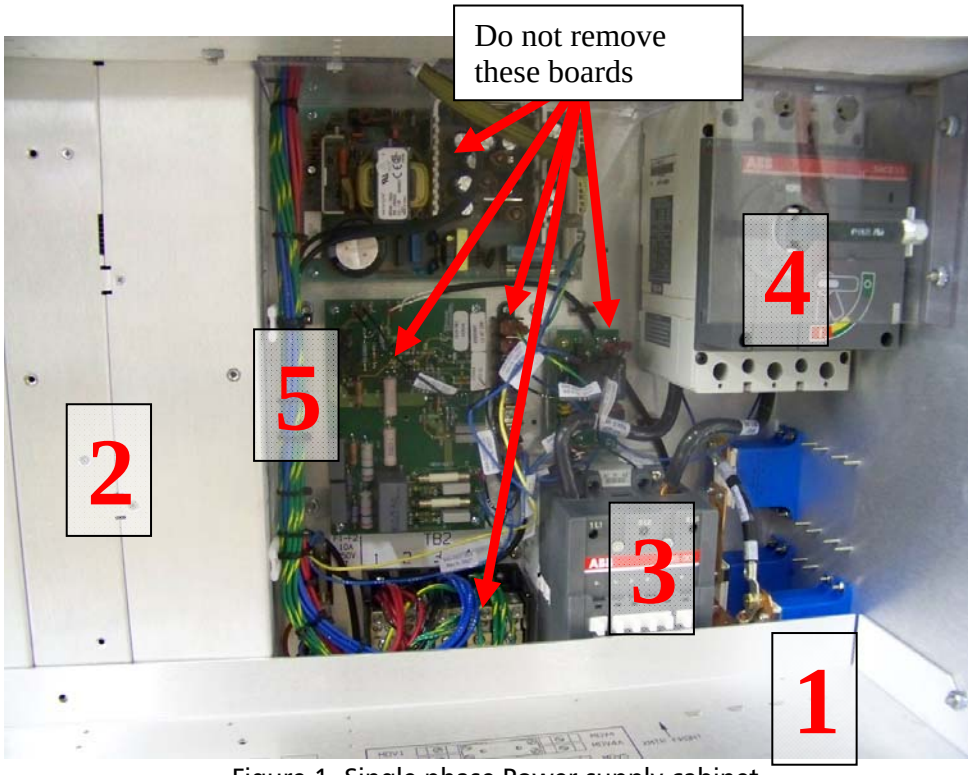


Figure 1. Single phase Power supply cabinet

2. To make things easier to remove, remove components in the above order.

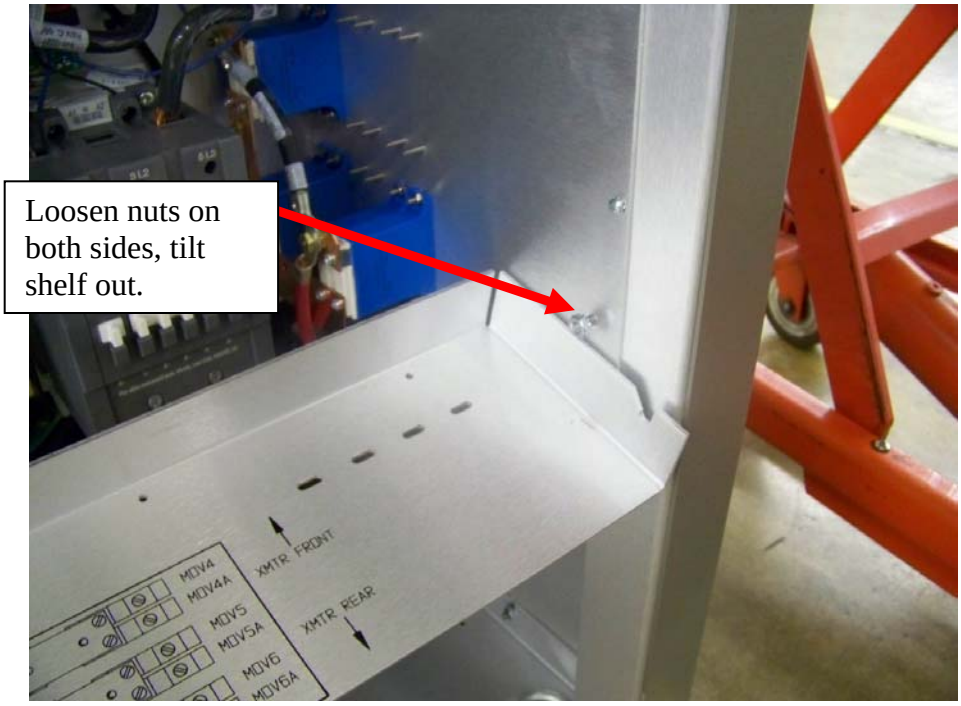


Figure 2. Remove shelf.

3. Remove lower shelf after you loosen two nuts using a 3/8" wrench and remove the Philips screws at each power supply.

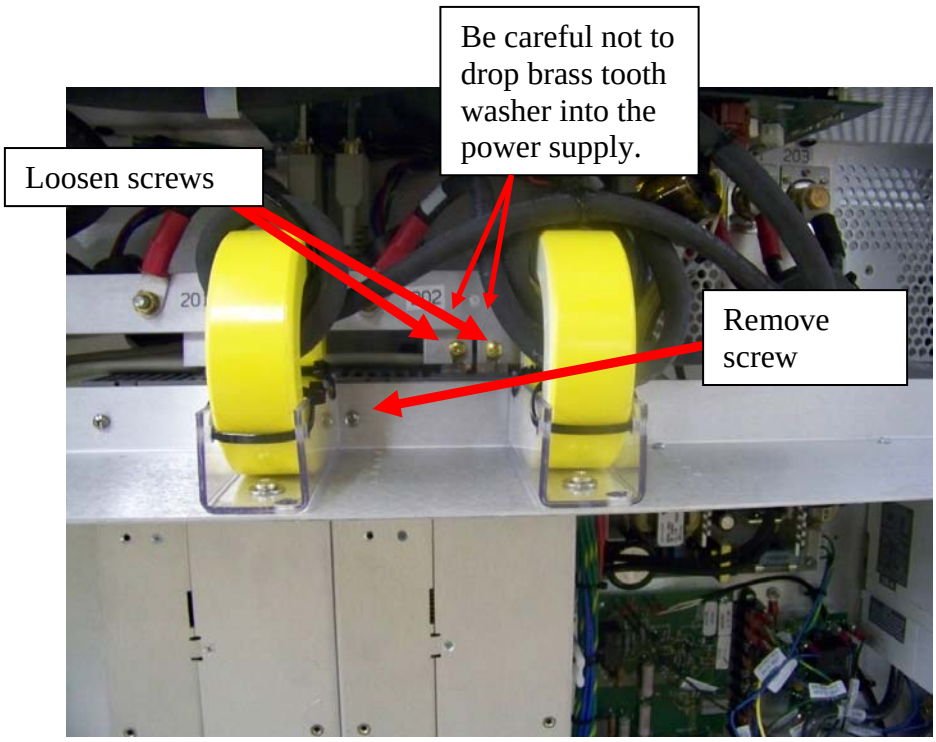


Figure 3. Remove Power Supply #5.

4. Remove power supply #5 to allow more work area. Using a Philips screw driver, loosen the two brass 10-32 screws and remove the steel screw. Disconnect the cables from the top and pull the bottom of the power supply slightly towards you allowing it to be lowered and moved out.

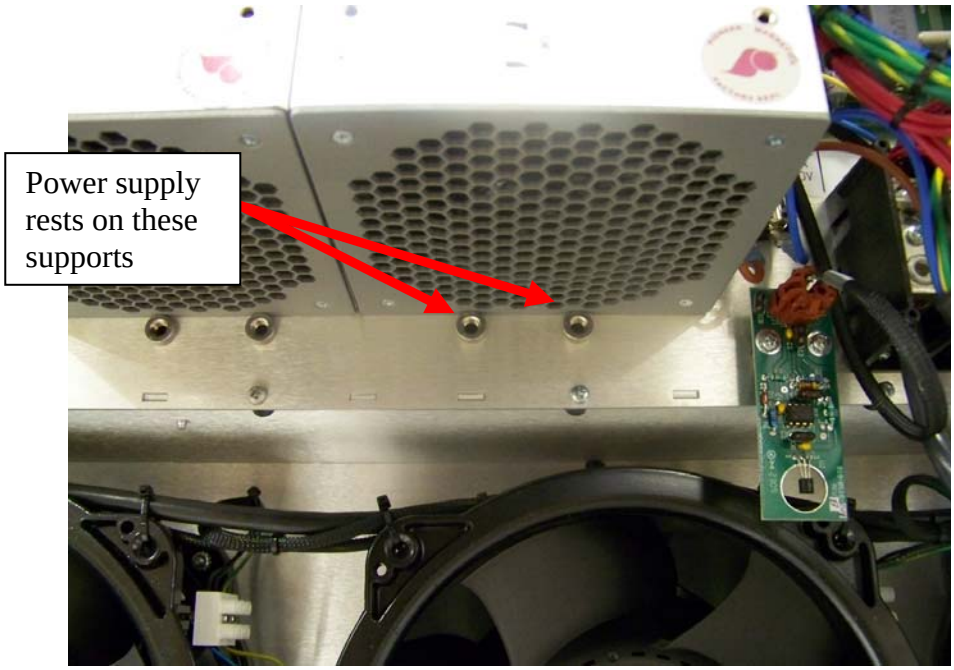


Figure 4. Power Supply supports.

5. Remove the ABB contactor – K2 (#3 in Figure 1)
   5.1. Remove the heavy cables using a 5/32" allen wrench; two top, two bottom.

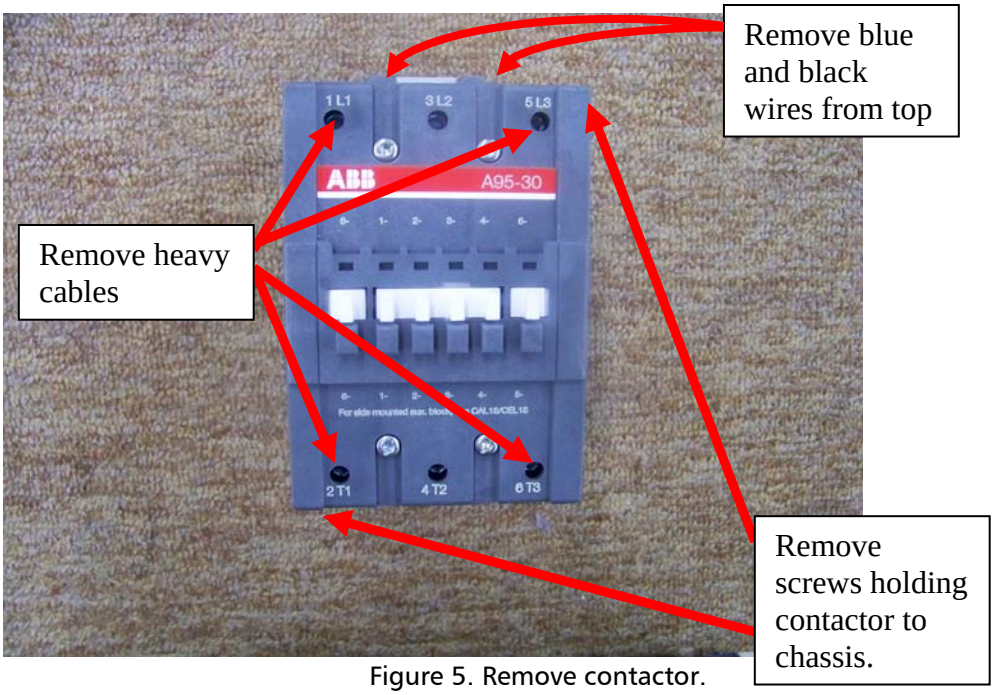


Figure 5. Remove contactor.

   5.2. Remove the black and blue status wires from top using a Philips screw driver. Also see figure 6.
   5.3. Remove contactor using a Philips screw driver, two screws hold the contactor to chassis.
6. Disconnect TB2.
   6.1. Using a 3/16" allen wrench, remove the heavy wires from TB2.

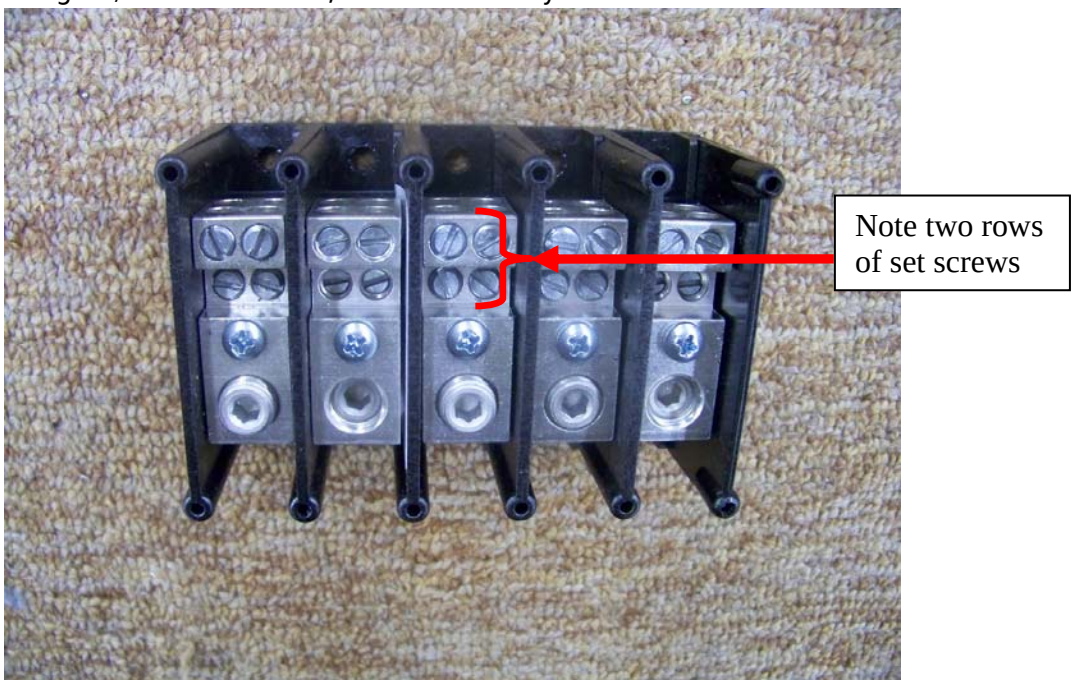


Figure 6. TB2 detail, DO NOT REMOVE TB2
(shown out of chassis for clarity).

6.2. Use a flat blade screw driver to remove the wire harness from the top of TB2.
6.3. Do not remove TB2 from the chassis, it will be reused.

7. Removed the MOV cabling.
   7.1. Remove the 7/16" brass nut off the bottom of the copper strap on the chassis and remove the ground wire attached to it.
   7.2. Remove the 3/8" nuts holding the heavy wires to the MOVs.
   7.3. Remove 2 philips screws from the copper cap on the lower MOV pair.

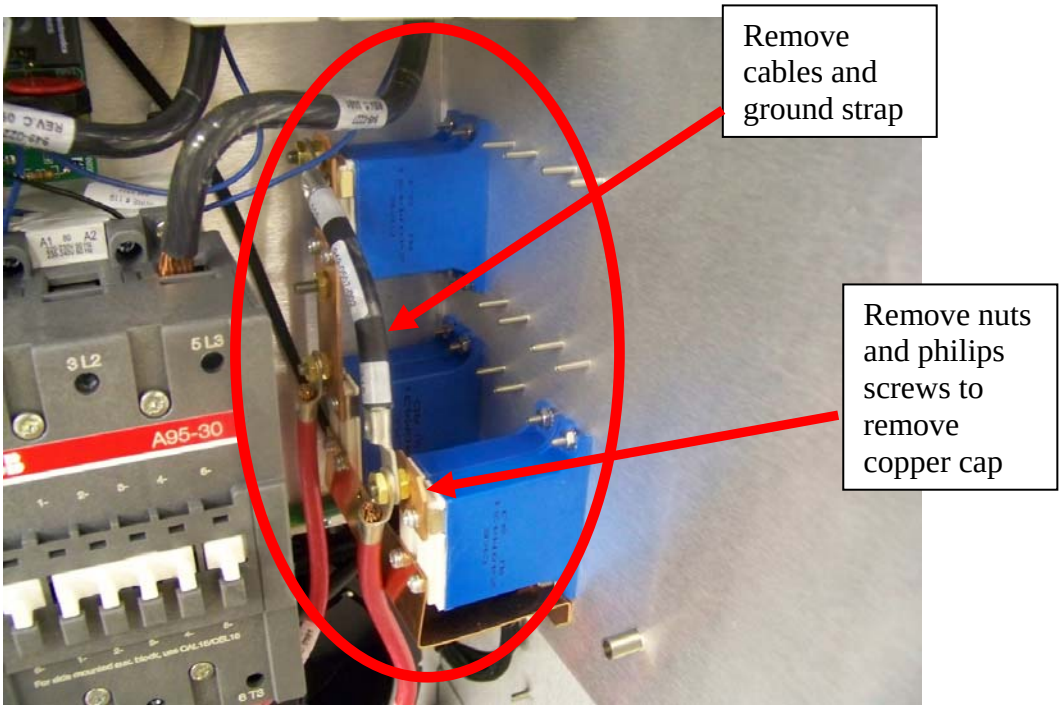


Figure 7. Retain MOV's, remove ground strap and copper cap.

8. Remove CB1.
   8.1. To remove CB1, first the safety shield closest to you must be removed. Start by removing 2 - 3/8" nuts attaching it to the side of the chassis.
   8.2. Using a 6mm allen wrench, remove the heavy cables from the bottom side of CB1.

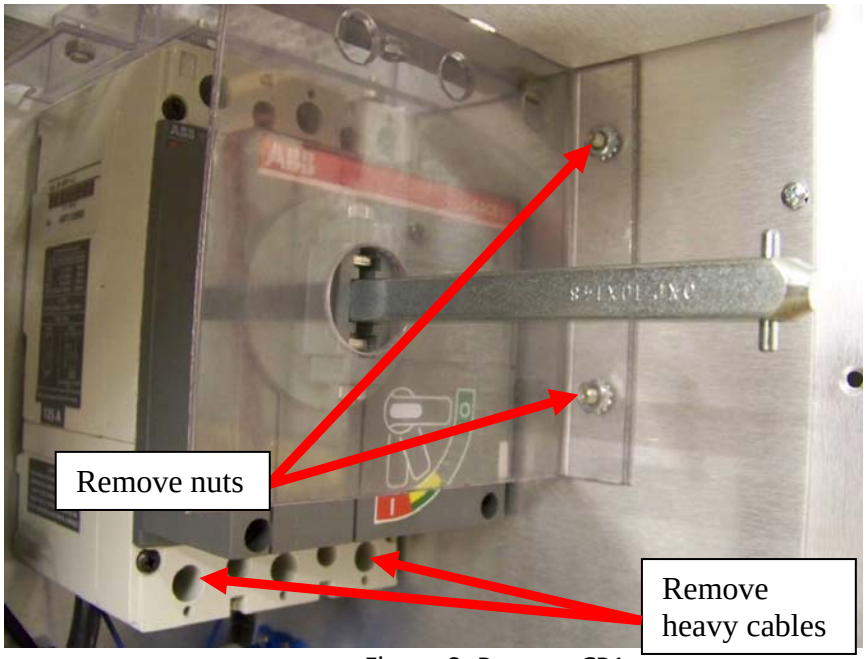


Figure 8. Remove CB1

   8.3. Loosen the two nuts from the shelf above CB1, similar to the lower shelf removed previously. Do not remove this shelf. With moderate force, lift the shelf far enough out and tilted to allow the safety shield to be removed. Leaving the metal shelf in position.
   8.4. To remove CB1 from the chassis, remove 4 philips screws (inset deep into the circuit breaker). Two top, two bottom. NOTE: these are NOT the four easily seen screws, but they are the four that are in between the three cable terminal lugs.

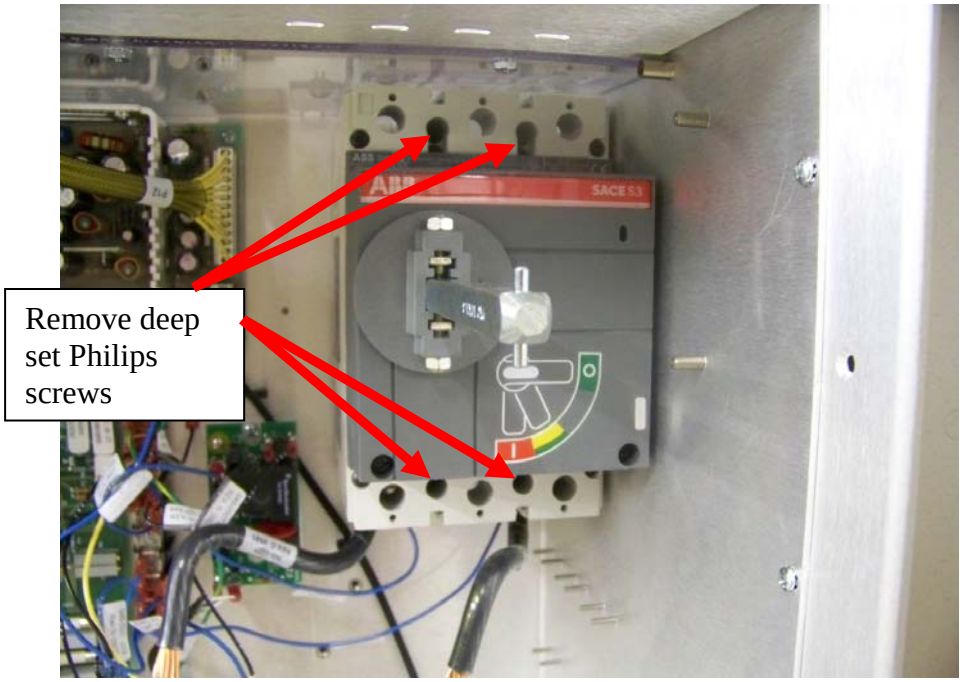


Figure 9. Remove CB1.

9. Disconnect the vertical terminal strip.
   9.1. Disconnect the wires attached to the vertical terminal strip.
   9.2. Do not remove the terminal strip, it will be reconfigured and reused.

10. Remove wire harness.
    10.1. Cut the two wire ties holding the power supply harness (#5 in figure 1) to the wire guides.
    10.2. Use a stubby Philips screw driver to remove the harness holder from the chassis above power supply #4.

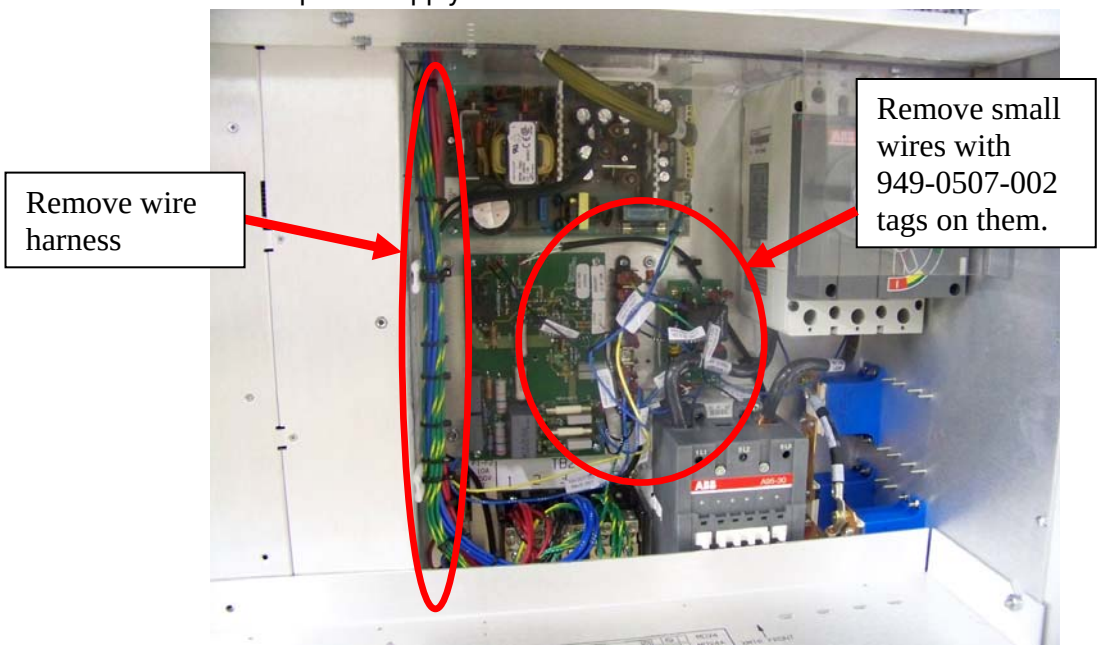


Figure 10. Remove wire harness

10.3. Cut 3 wire ties holding the harness to the chassis. These are located over power supplies #2, #3 and #4.

10.4. Pull the harness out of the chassis.

11. Remove miscellaneous wires.

11.1. Remove all small wires with 949-0507-002 tags on them including wires 240, 241 that go down to the fan area.

11.2. Remove lower right fan using 5/16" socket or nut driver, swing fan away with wires still attached to the fan. Pull wires 240 & 241 out of the slot in the panel; disconnect the wires from the LED board. Retain the grommet for the replacement wire harness.

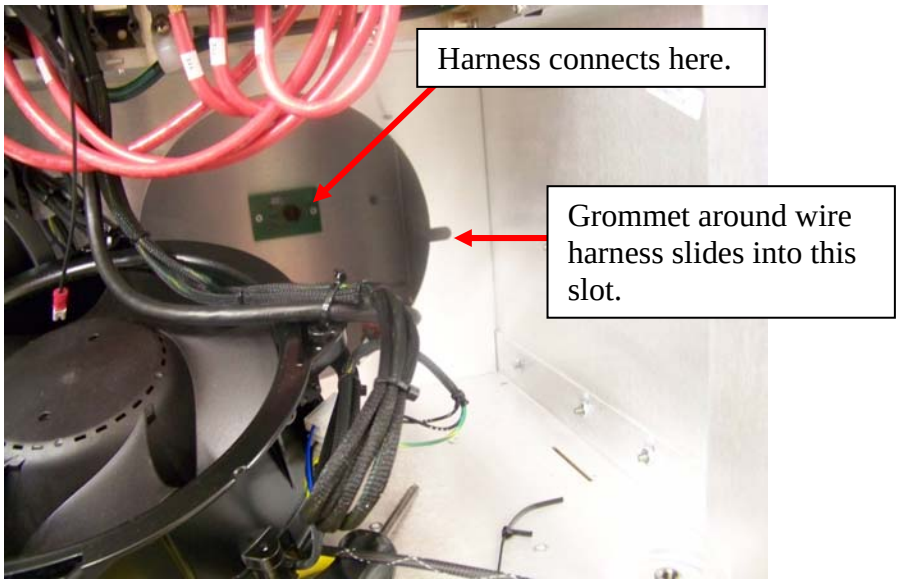


Figure 11. Fan removal for wire harness replacement

12. End of disassembly process. Set removed components aside, they will not be reused. Sort and retain hardware, it will be reused.

4 Reassembly

1. Reinstall fan.

1.1. Reuse the grommet from the removed wire harness, install on to new wire harness and slip it in the slot next to the fan opening.

1.2. After the new wire harness containing wires 240 & 241 (among others) has been attached to the LED board, reinstall the fan using the hardware removed in the previous step.

2. Install additional MOV's

2.1. Install the supplied MOV's on the remaining studs on the side wall of the chassis keeping the MOV's straight and aligned with the existing MOV's.

2.2. Install wide copper ground strap to the lower MOV's in the same fashion as it was removed using screws and lock washers only. Do not use flat washers in addition to the lock washers.

2.3. Install the ground nut & lock washer on to stud a few turns. It will be removed again later to install the ground cable.

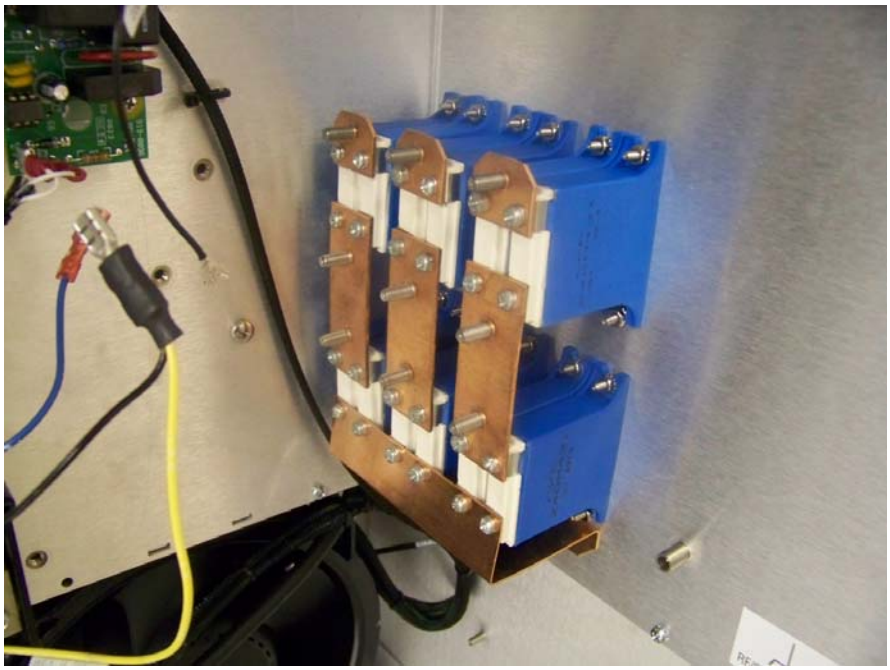


Figure 12. MOV assembly with ground strap.

2.4. Install copper caps and straps between MOV's as shown.
2.5. All strap studs should have a star lock washer and #10 brass nut installed prior to attaching any cables.
2.6. Locate the short heavy cables; 114, 115 and 116. Using a needle nose pliers bend the lugs to approximately 45°.
2.7. Install the heavy red wire pairs; 111/105, 112/106 and 113/107 to the MOV straps as shown below.

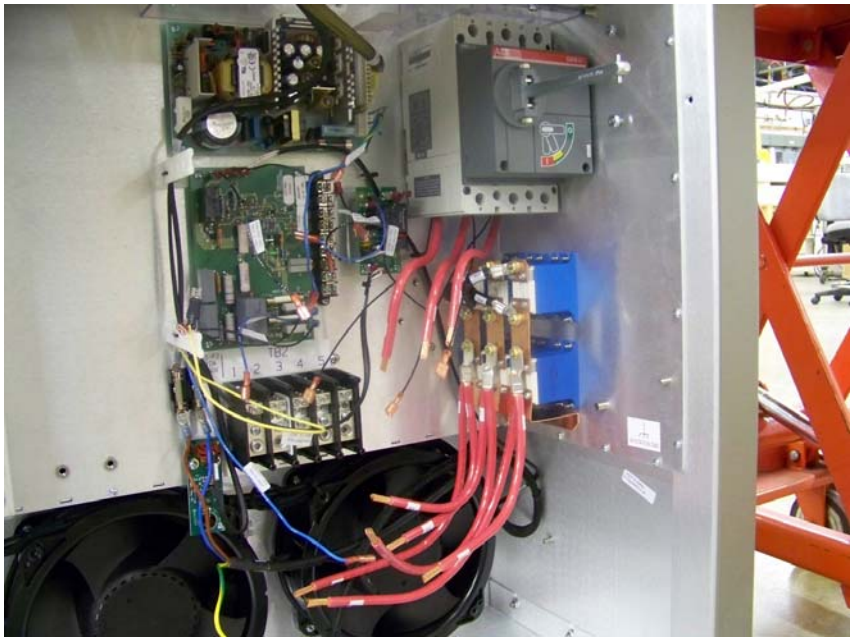


Figure 13. Wire MOV's

2.8. Wire the MOV's as shown below.

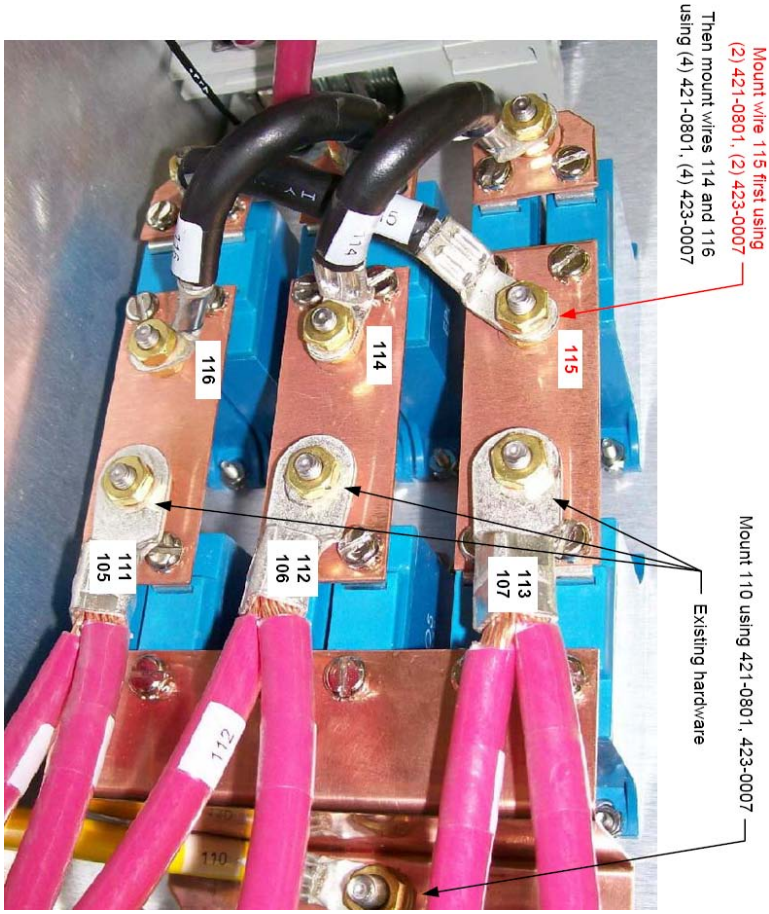


Figure 14. Wire MOV's

3. Reconfigure the Vertical terminal strip.
   3.1. Remove one jumper from the vertical terminal strip as shown in the photo. This is the second jumper up from the bottom. This can be done with the terminal strip in the transmitter chassis.

Figure 15. Vertical terminal strip
(shown out of chassis for clarity).

3.2. Remove the adjacent screws and slide out the spade lugs and jumper.

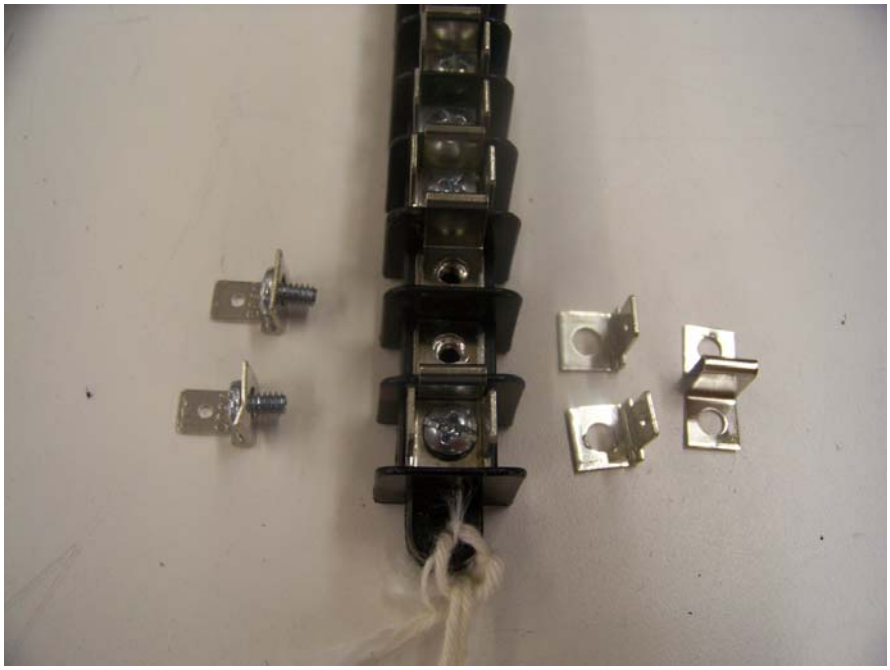


Figure 16. Disassemble to remove jumper as shown
(shown out of chassis for clarity).

4. Configure Main circuit breaker CB1
   4.1. On the circuit breaker previously removed, transfer the shaft and cover to the new breaker.
   4.2. Pry the red nameplate from the front cover to expose 2 screws. Remove these two and two on the bottom to remove the entire front cover and shaft.
   4.3. Remove the front cover from the new breaker in a similar fashion.
   4.4. Transfer the shaft and cover to the new breaker. NOTE: orientation of arrow corresponds to the breaker lever being in the OFF / down position.

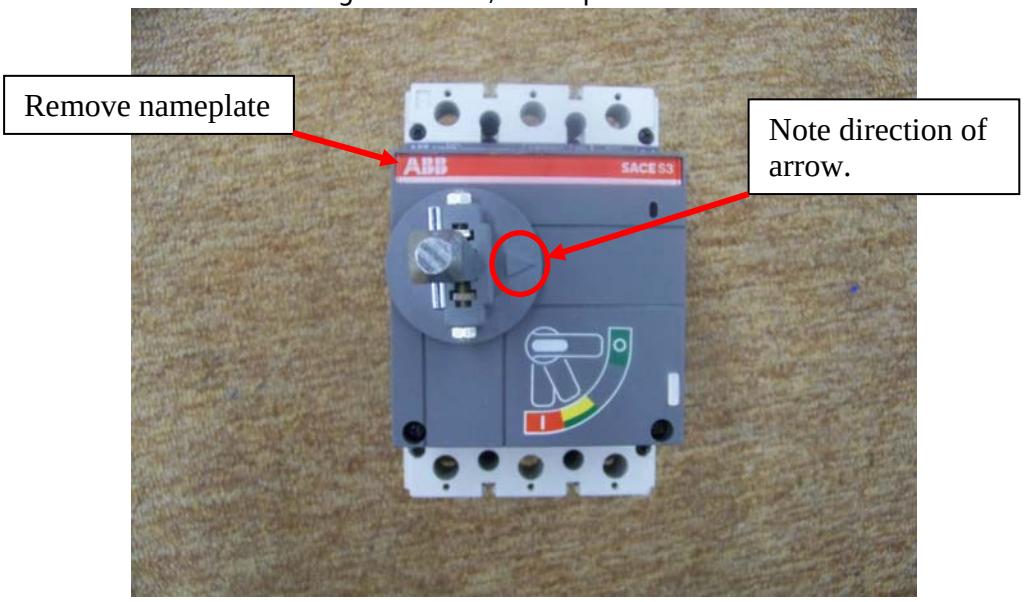


Figure 17. CB1 cover and shaft.

5. Install Main circuit breaker CB1.
   5.1. Install the wire pairs prior to installing CB1 into the chassis. Install wire pairs: 101/119, 102/118 and 103/117 to the bottom of the breaker using a ¼" allen wrench.

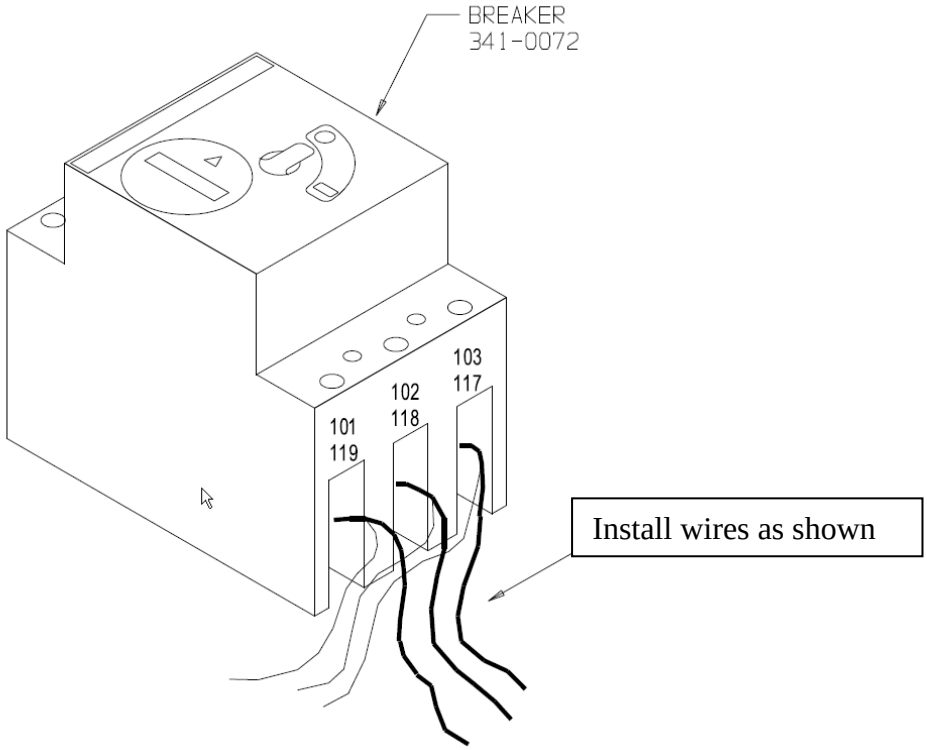


Figure 18. CB1 wire orientation.

   5.2. Form the wires in an "S" toward the location where the contactor K2 will be.
   5.3. Install CB1 in the chassis using the long Philips screws removed earlier.
   5.4. Torque the wires to 50 inch pounds.
   5.5. Install the clear safety shield by first positioning it over the shaft, then the studs, last the tabs. Loosen the shelf hardware above the breaker. Tilt the shelf out and up in the rear with moderate force to allow the tabs to engage the shield.

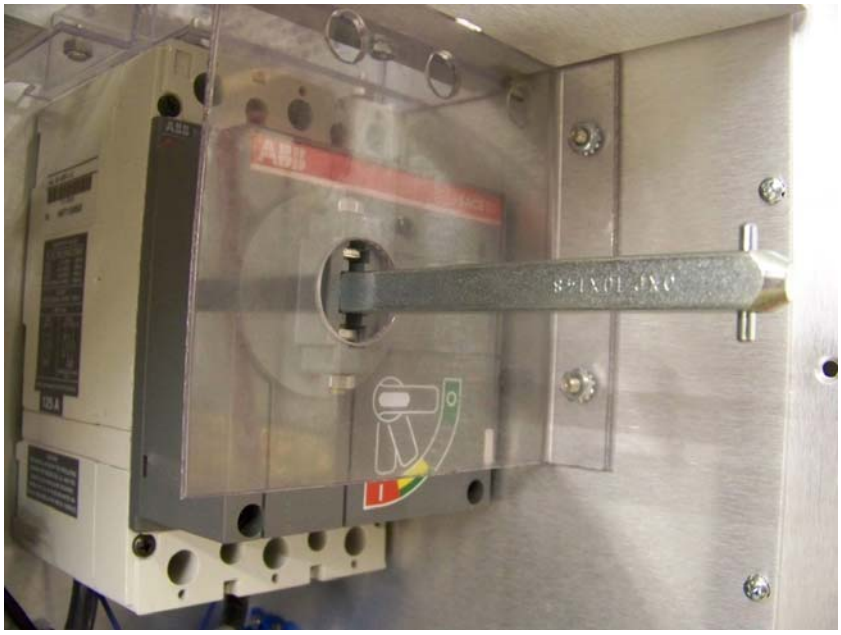


Figure 19. CB1 shield installed.

6. Install Contactor K2.
   6.1. Install K2 into the chassis using the hardware from the original one. Note the lower left corner will have a cable clamp and flat washer on the screw.
   6.2. Connect wire 101 to 1L1.
   6.3. Connect wire 102 to 3L2.
   6.4. Connect wire 103 to 5L3.
   6.5. Torque to 35 inch pounds.

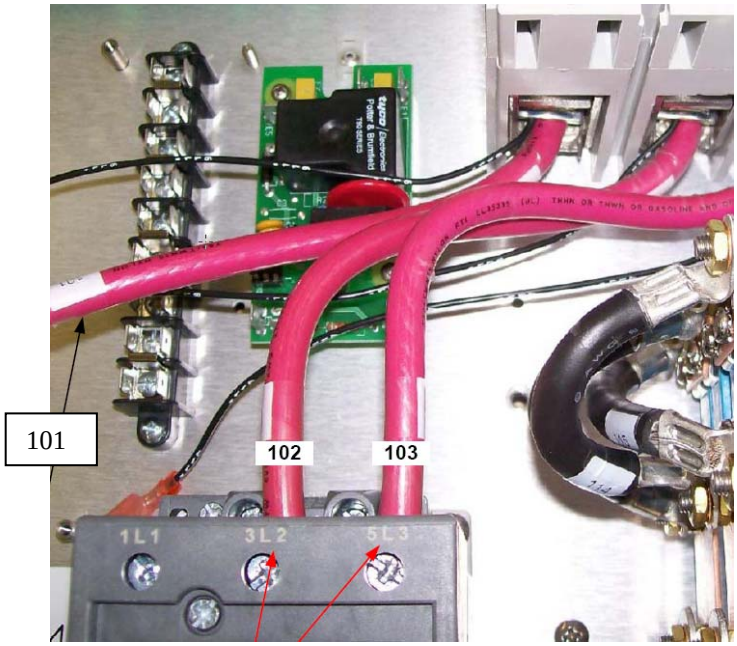


Figure 20. Top of K2

7. Connect the MOV wires to the bottom of the contactor;

7.1. Wire 111 to 2T1.
7.2. Wire 112 to 4T2.
7.3. Wire 113 to 6T3.
7.4. Torque to 35 inch pounds.

8. Connect the other red wires from the MOV's to TB2.
   8.1. Connect wire 105 to TB2-1.
   8.2. Connect wire 106 to TB2-2.
   8.3. Connect wire 107 to TB2-3.
   8.4. Connect green ground cable removed earlier to the stud below the MOV's to TB2-4. Pass it through the cable loop attached to the bottom screw of K2.
   8.5. Tighten the nut with a 7/16" wrench. Tighten TB2 using a 3/16" allen wrench.

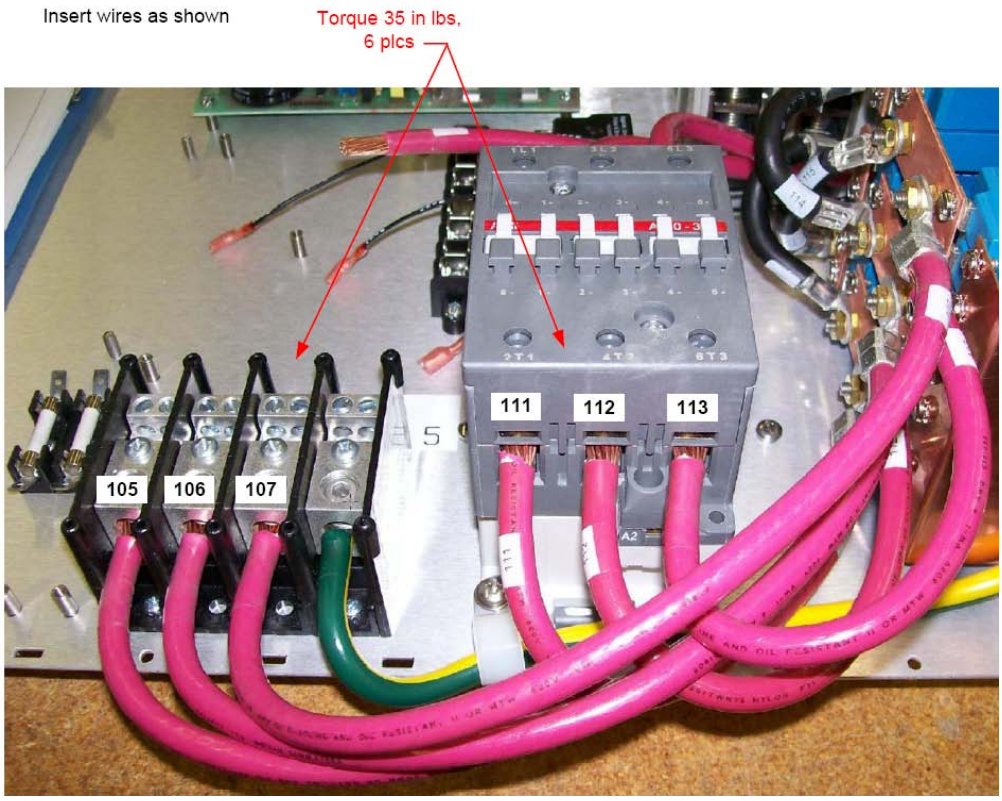


Figure 21. Wires to K2 and TB2.

9. Connect wires to vertical terminal strip
   9.1. Attach a new heavier wire 190 to the chassis stud at the top of the terminal strip.
   9.2. Attach wires to the terminal strip as listed in the table.

Color	Wire number to left	Terminal number	Wire number to right	Color
Green	142	1	136	Green
Black	160	2	190	Black
Yellow/Black	135/201	3	119	Black
Black	138	4	150	Black
Yellow	200	5	140	Black
Black	134	6	118	Black
Black	156	7	139	Black
Black	133	8	117	Black
	-	9	-	Black

10. Attach wires to K1as shown below.

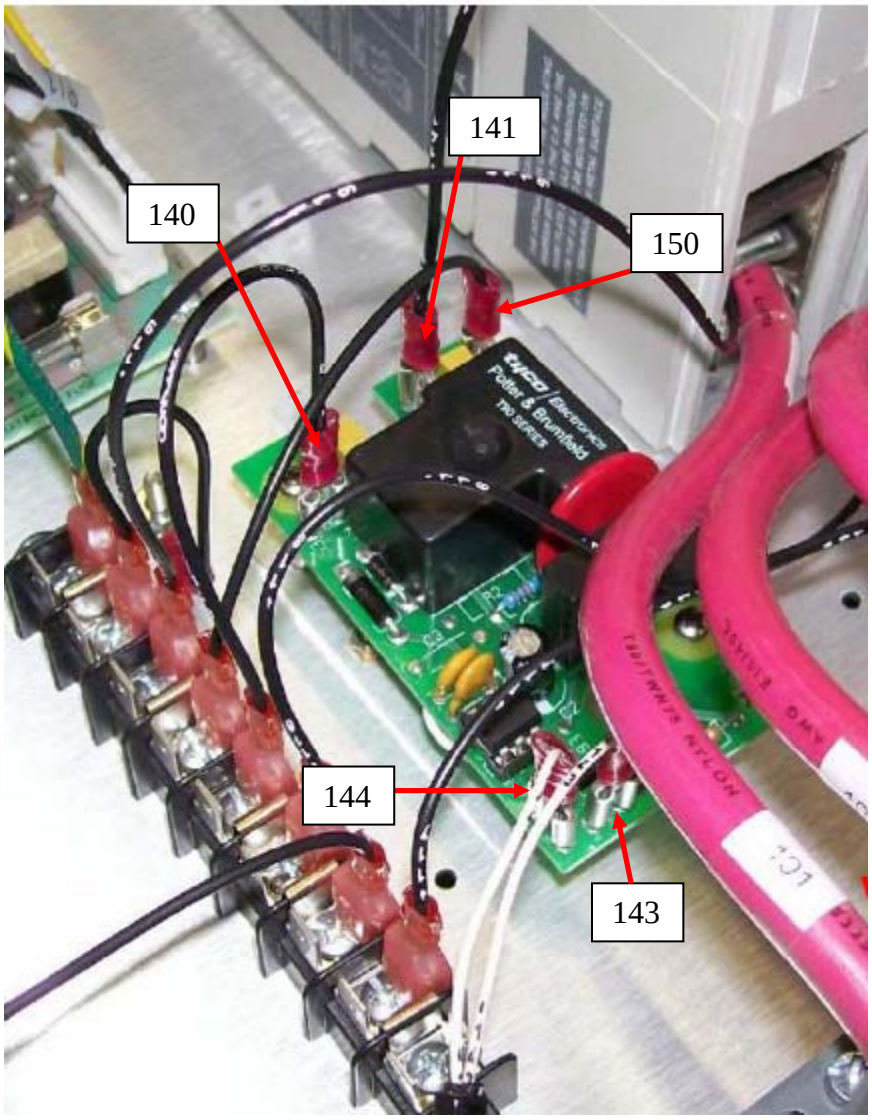


Figure 22. Wires to K1.

11. Attach wires to K2.
    11.1. Two wires have unfinished ends, pull the insulation off the ends of wires 139 and 141. It has already been cut, pull off the insulation with fingers.
    11.2. Insert them into the top of K2, 139 at A1 and 141 at A2.

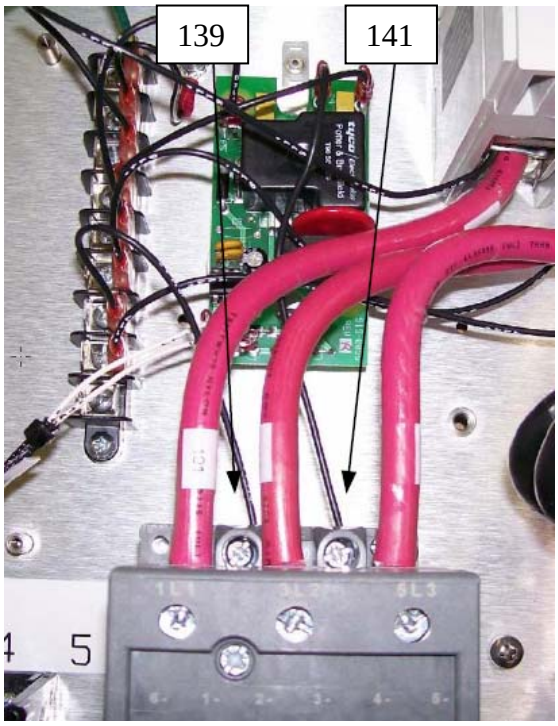


Figure 23. Control to top of K2.

12. Install new wire to LVPS.
    12.1. Wire #778 which contains wires 136, 137, 138. Wire 136 faces up.

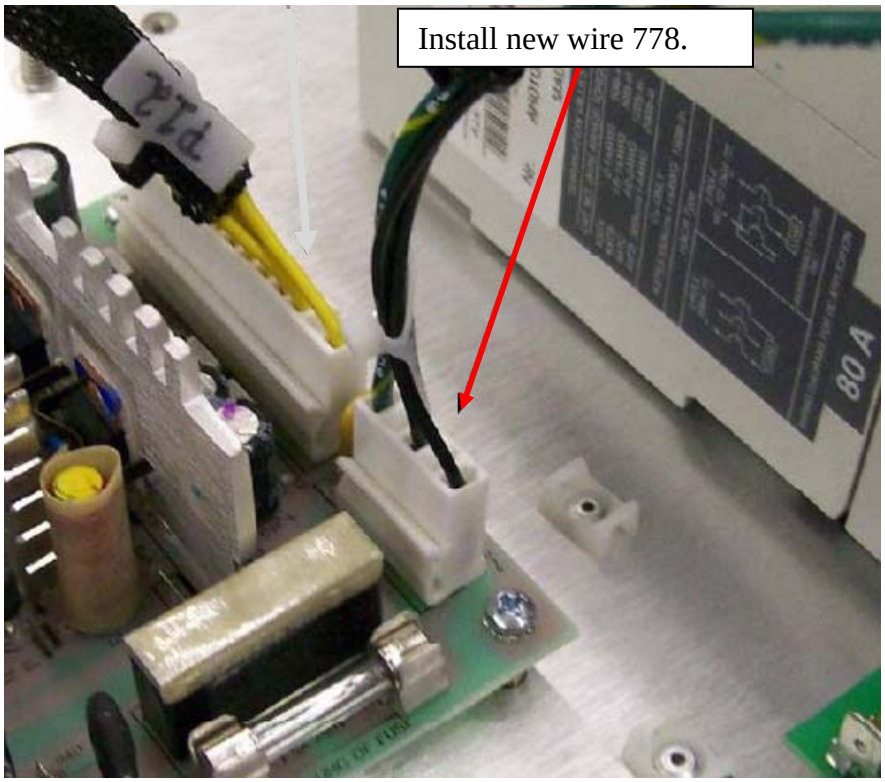


Figure 24. LVPS wire harness.

13. Connect Power supply wires.
    13.1. Lace the new wire harness into the chassis from left to right.
    13.2. Start with the unfinished ends, feed them into the chassis above PS1, running them to the right toward PS5, then down towards TB2.
    13.3. Connect to the tops of the power supplies. If the redundant power supply is not installed in position 3. Tie that connector back out of the way.
    13.4. Wire-tie them to the provisions above PS2, 3 and 4.
    13.5. The unfinished ends will connect to TB2. Insert the green wires in the back row of the top of TB2-4. The set screw for this is the lower set screw.
    13.6. Loosely wire-tie the harness to the plastic guides to the side away from the power supplies.

13.7. Insert the red wires into the back row of TB2 per the table and picture below.
NOTE: TB2-5 WILL NOT BE USED

TB2-1	TB2-2	TB2-3	TB2-4
162, 172, 191	151, 181, 192	152, 161, 171, 182	154, 164, 174, 184, 194, 142

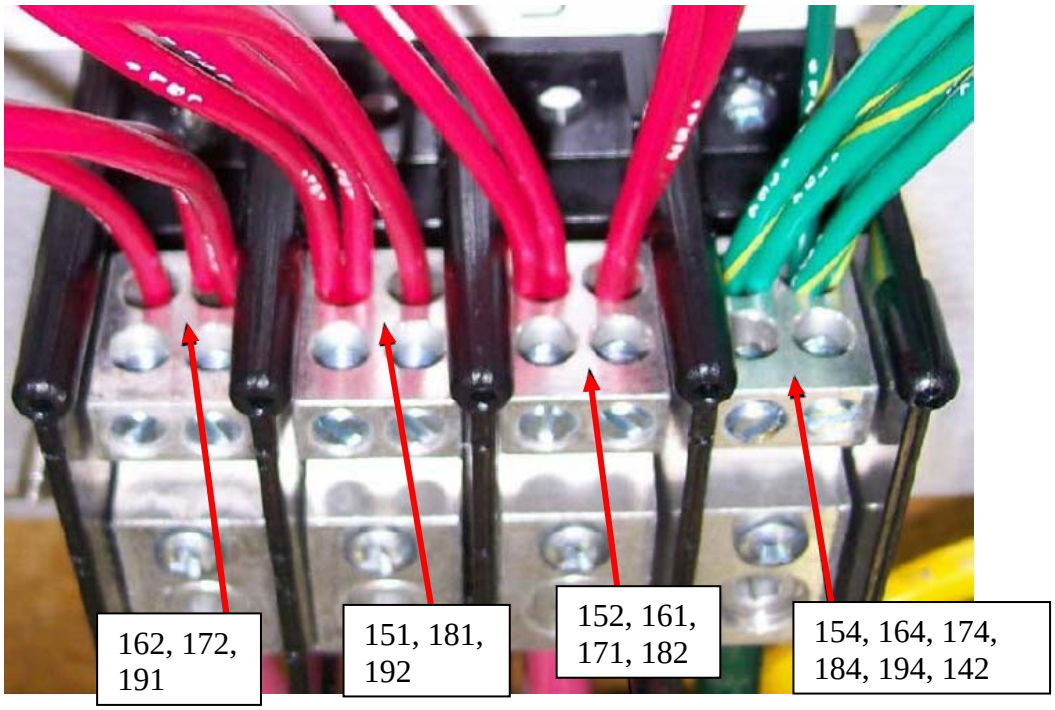


Figure 25. TB2 power supply connections

13.8. Connect the fan wires to the front row of TB2.

TB2-1	TB2-2	TB2-3	TB2-4
221, 224, 227, 230	222, 225, 228, 231	N/C	223, 226, 229, 232, 238

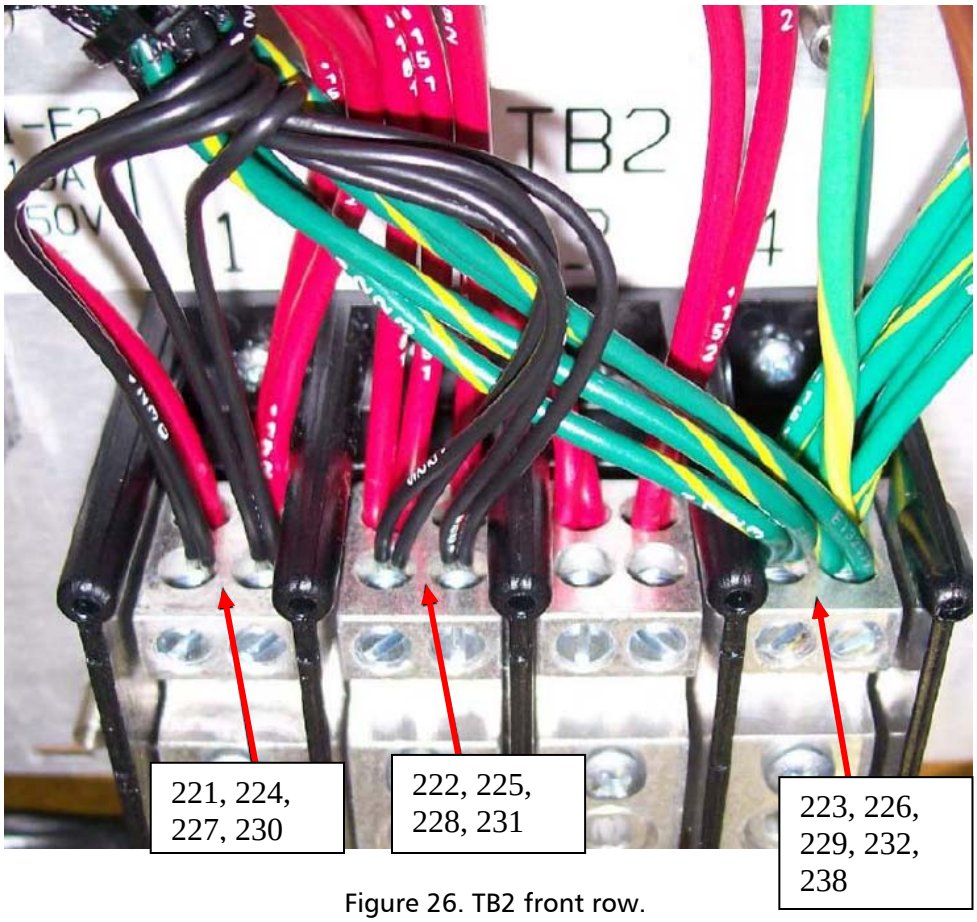


Figure 26. TB2 front row.

14. Attach wires to fuse block.
    14.1. Attach the wires from wire #238 to the bottom of the fuse block; blue wire to the left fuse block, the brown wire to the right fuse block.
    14.2. On the top of the fuse block, attach wire 200 (left), and 201 (right).

Figure 27, fuse block.

15. Install High Low Sensor boards.
    15.1. On the High Low Sensor board that is in the chassis, one at a time, remove the Philips screw and replace with a threaded stand-off and lock washer. Retain the screws removed for later use.
    15.2. Install a fifth stand-off in the center of the board (there was not a screw in that location).
    15.3. Install wires as shown below.

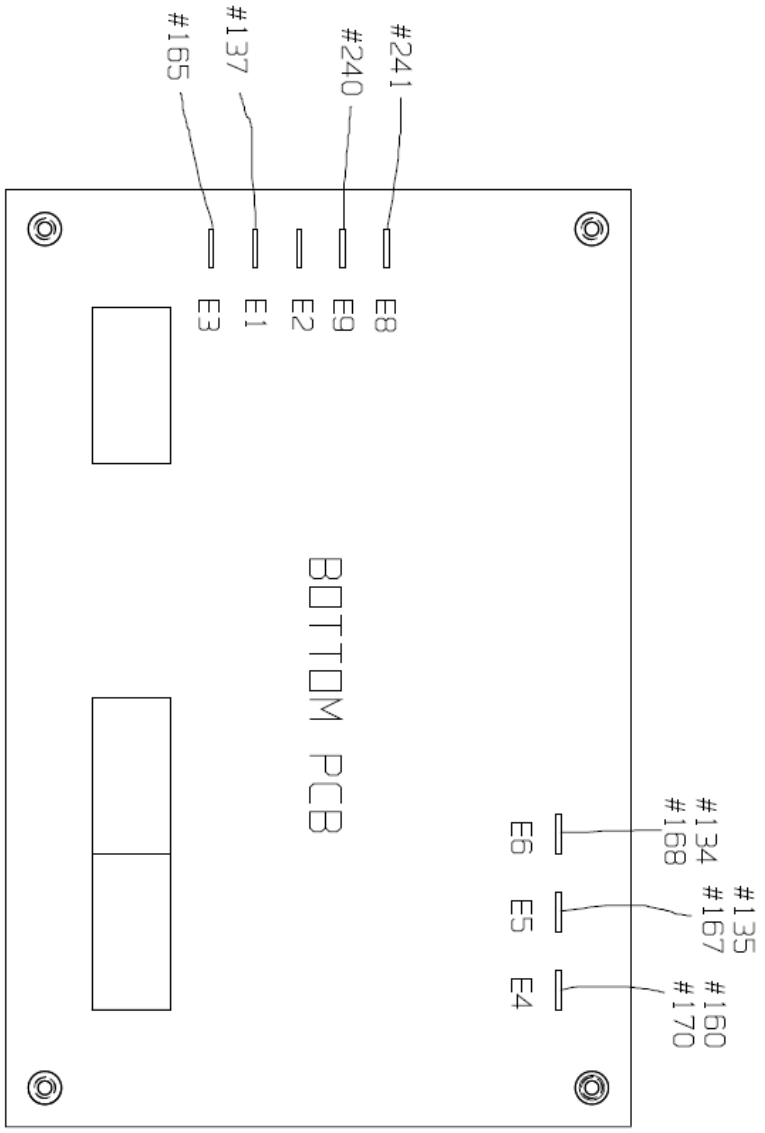


Figure 28. Bottom High Low Sensor

15.4. Install the middle High Lower Sensor board on the stand-offs using additional stand-offs and lock washers. Wire as shown.

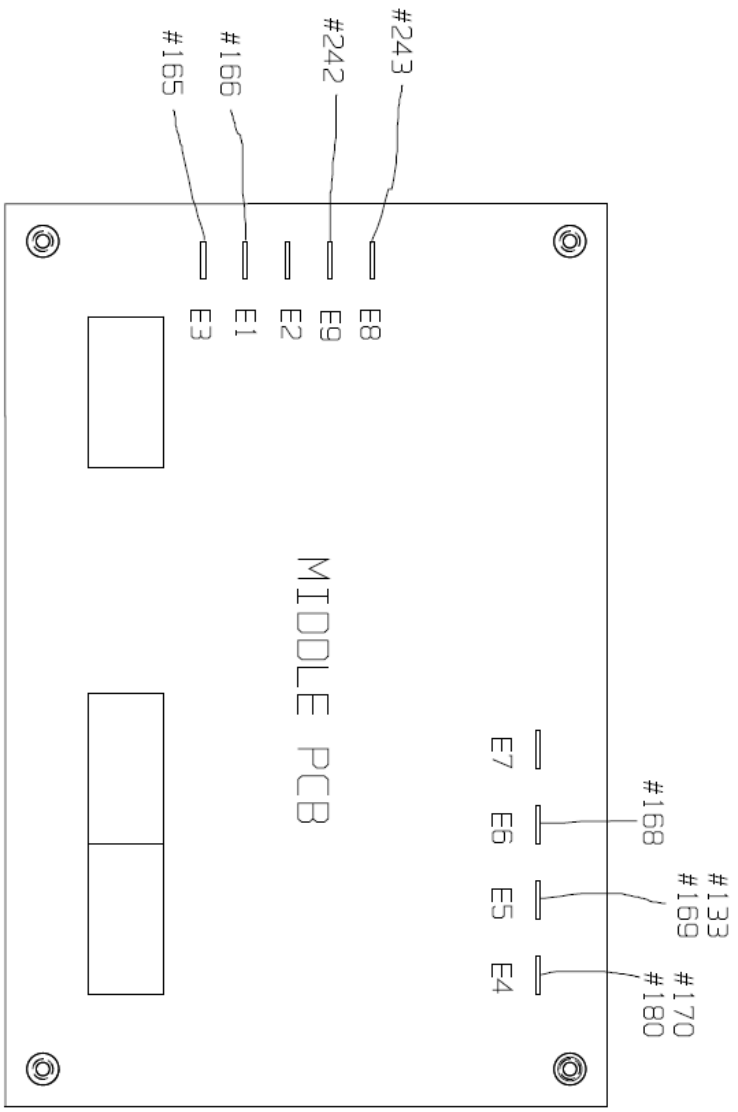


Figure 297. Middle High Low Sensor

15.5. Repeat for the top High Low Sensor. Use 4 screws removed previously to secure the Top board to the stack. There will not be a screw in the center location.

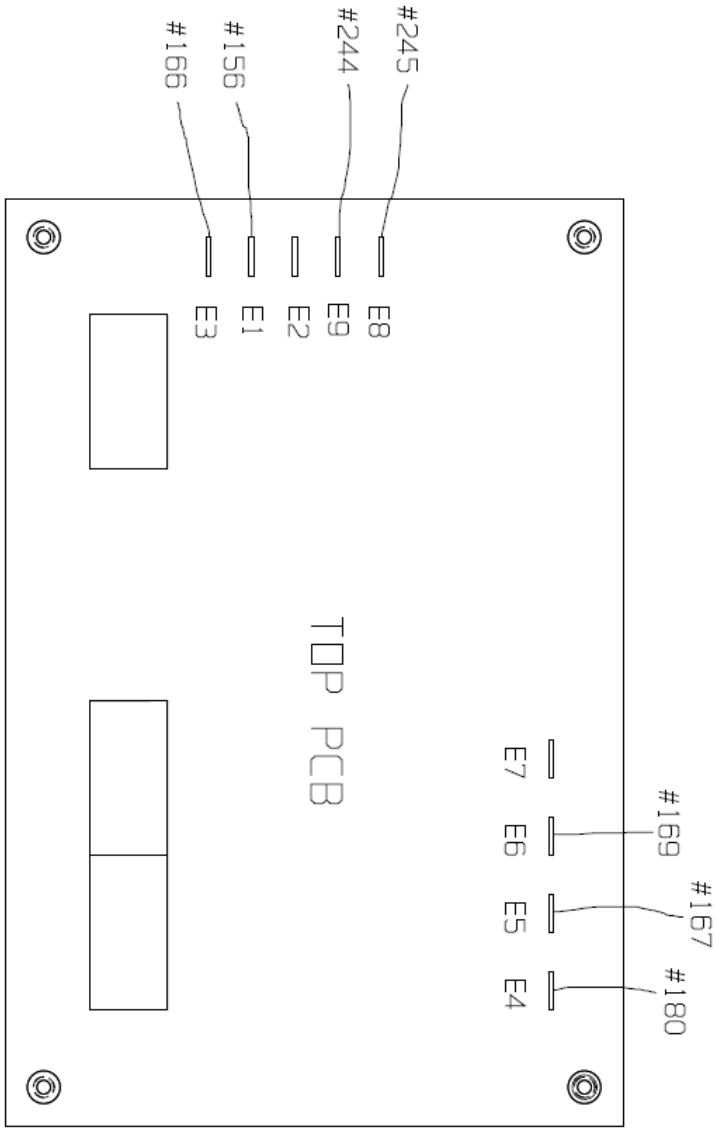


Figure 30. Top High Low Sensor

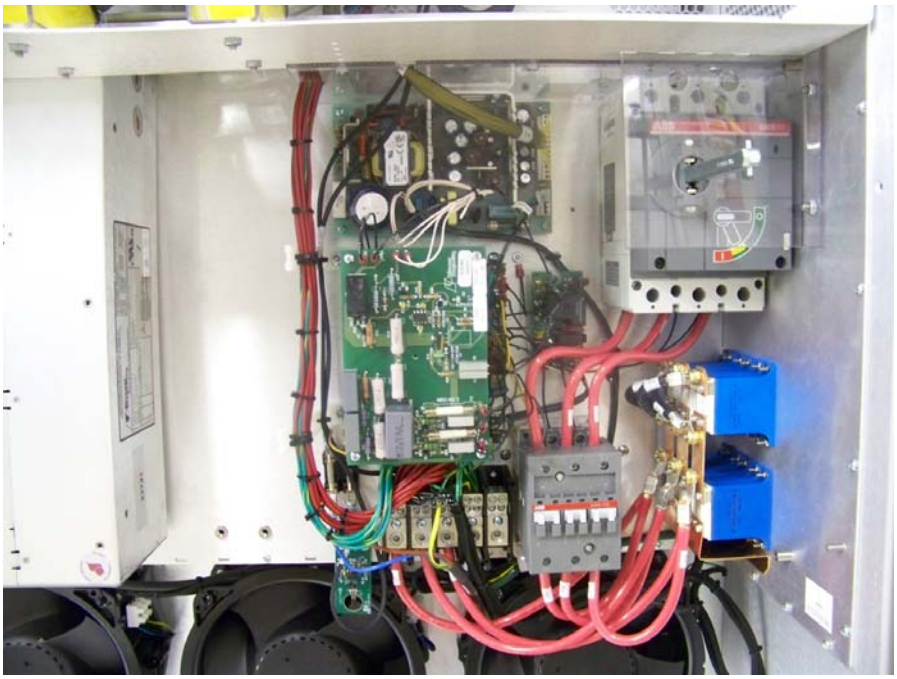
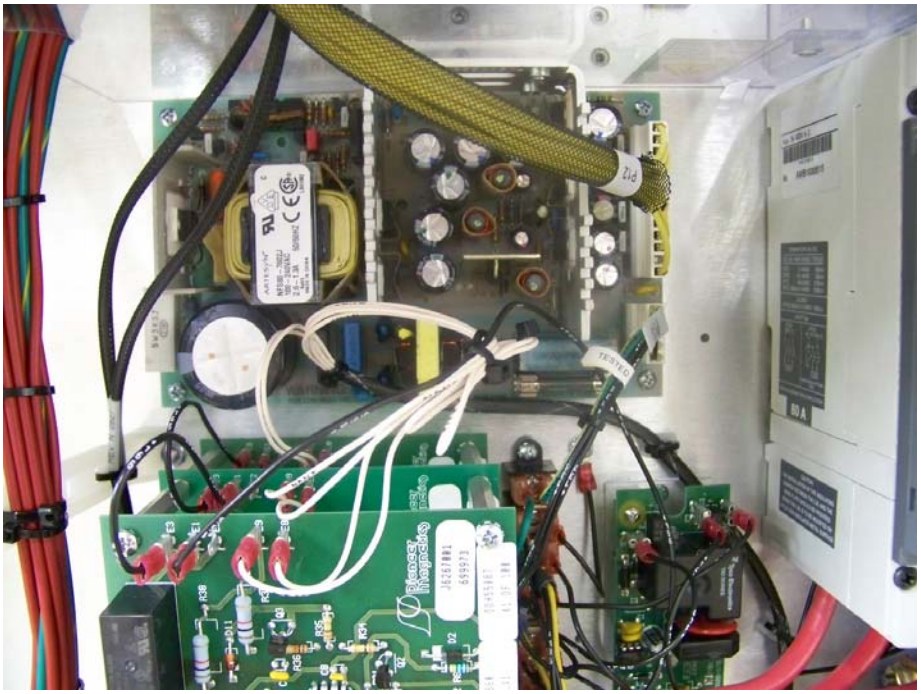
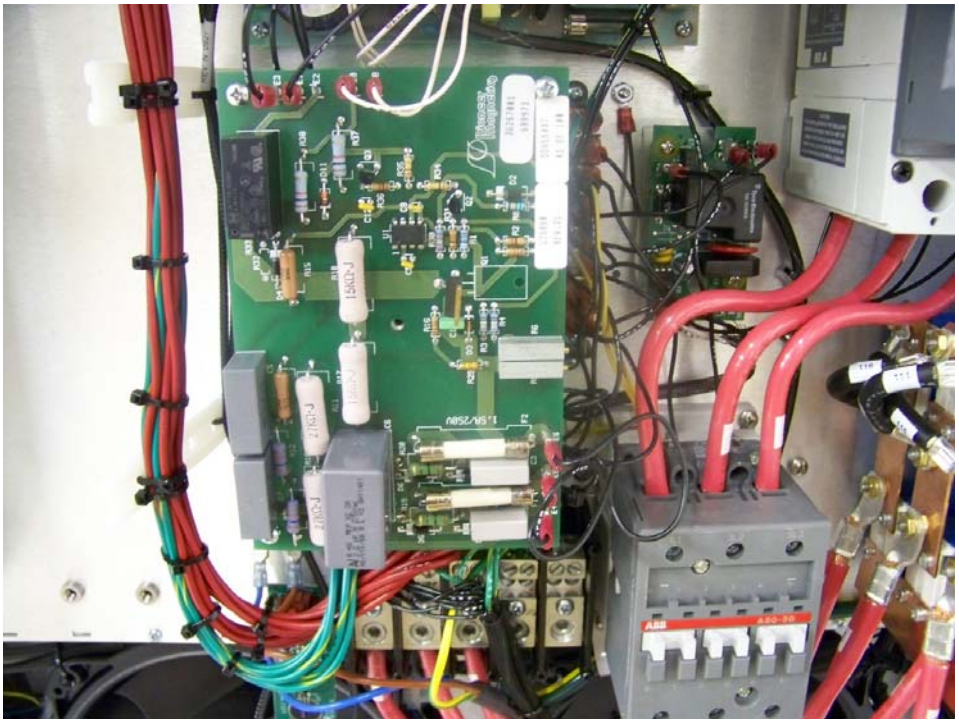
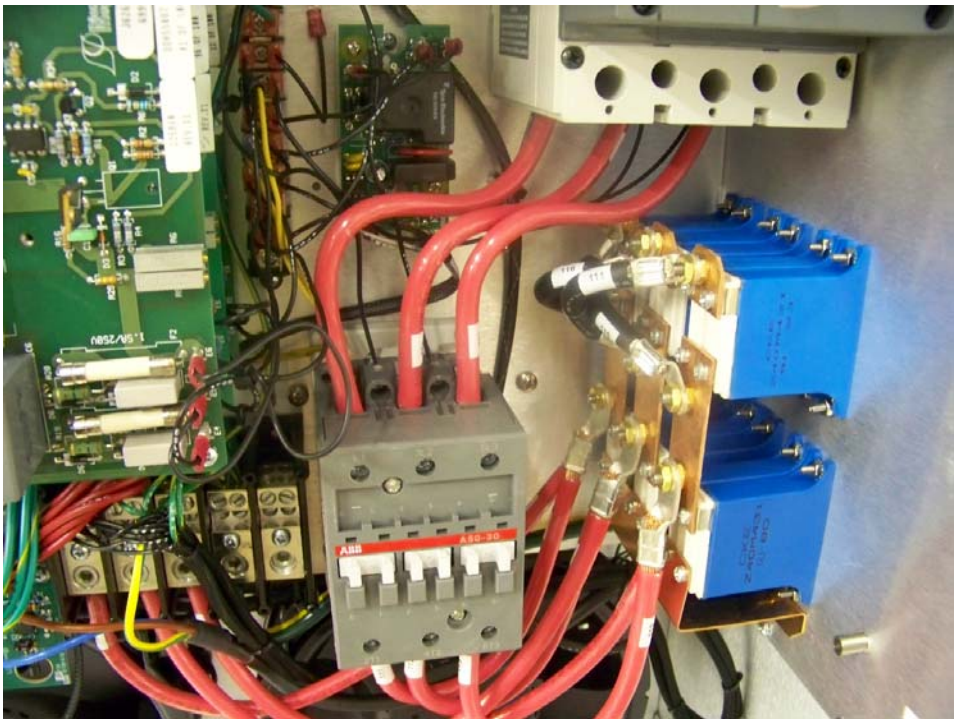


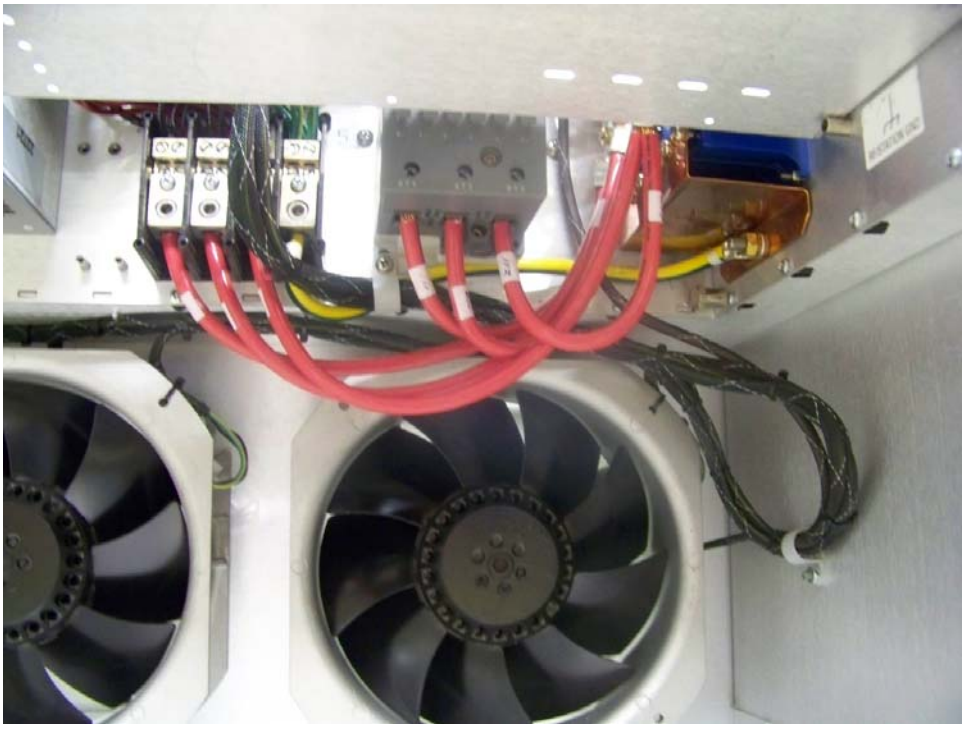
Figure 31. 3 phase Conversion

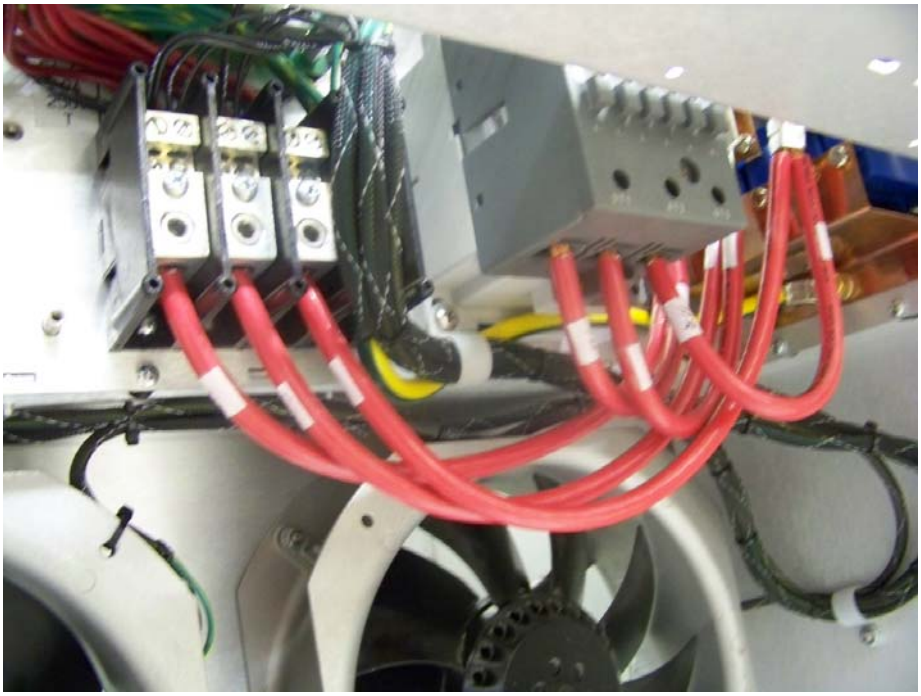
16. Complete installation.
    - 16.1. Dress wires with wire ties in to a neat route.
    - 16.2. Reinstall Power supply #5 being careful not to drop hardware into power supply.
    - 16.3. Install lower shelf removed earlier.
17. Reference photos.

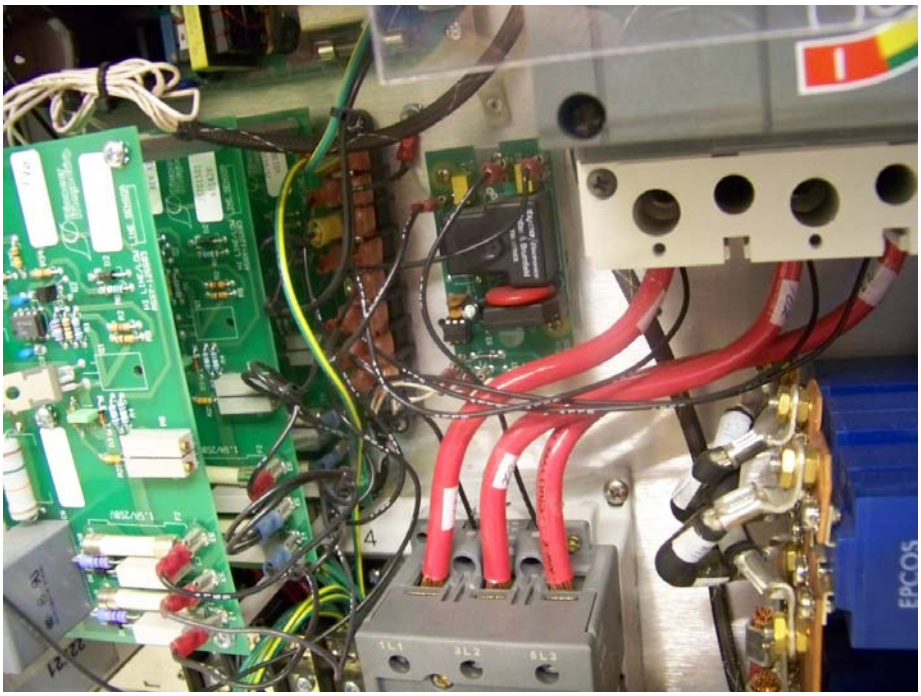


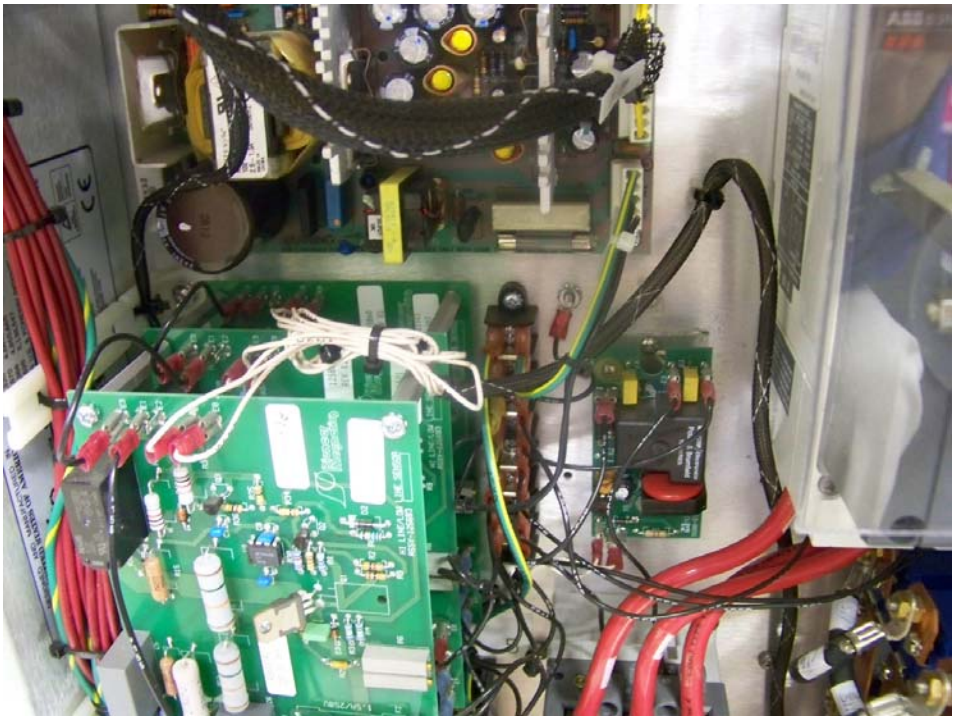


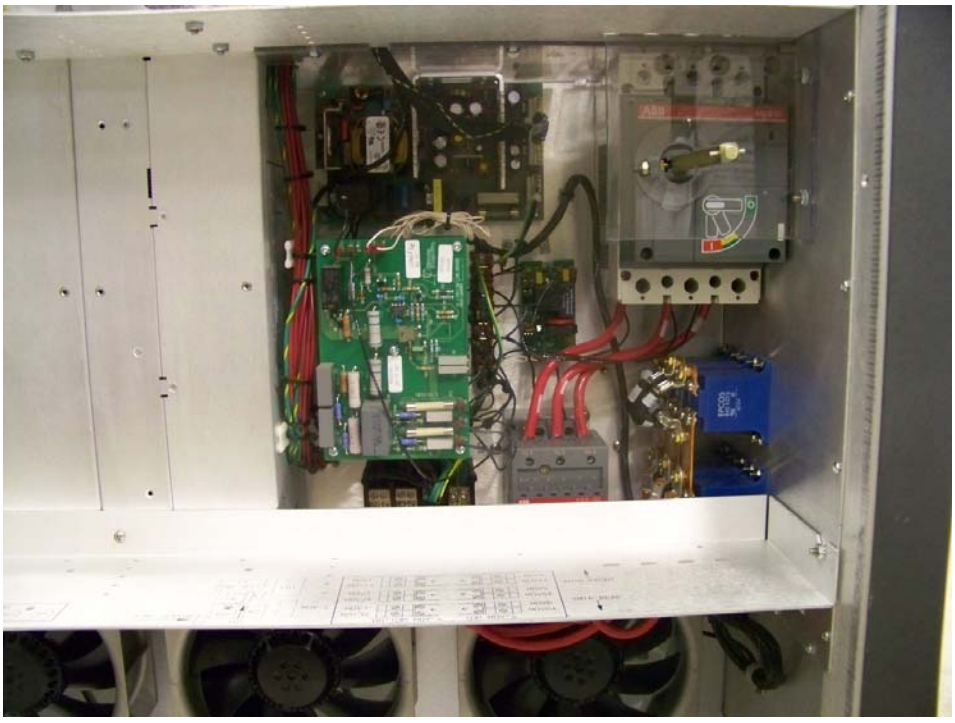












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