

INSTALLATION INSTRUCTIONS

Voltage Surge Withstand Kits: Accessories 38-A and 38-B
For Automatic Transfer Switch Applications



WARNING

Accidental starting.
Can cause severe injury or death.
Disconnect battery cables before working on generator set (negative lead first and reconnect it last).

Accidental starting can cause severe injury or death. Turn generator master switch to OFF position, disconnect power to battery charger, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator. The generator set can be started by automatic transfer switch or remote start/stop switch unless these precautions are followed.

⚠ WARNING
Hazardous voltage. Can cause severe injury or death. Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

(under 600 Volt)

Hazardous voltage can cause severe injury or death. De-energize both normal and emergency power sources before proceeding. Move generator master switch on controller to OFF position and disconnect battery negative (–) before working on transfer switch! Turn the transfer switch selector switch to the OFF position.

600 Volt and Above Only

⚠ DANGER
Hazardous voltage. Will cause severe injury or death. Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

(600 Volt and above)

STANDARDS

- ANSI C62.41-1980 Class C, B, and A: IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits.
- ANSI C62.2: Guide for Application of Valve-Type Lightning Arrestors for Alternating Current Systems.
- ANSI C37.90A: Guide for Surge Withstand Capability Tests.
- ANSI/IEEE Standard 28-1974: Standard for Surge Arrestors for AC Power Circuits.
- UL 1449: Standard for Transient Voltage Surge Suppressors, in repeated limiting of transient voltage surges on 50 and 60 Hz power circuits, indoor use, on load side of service disconnect, not exceeding 600 Volts RMS.

NOTE

No protection device will withstand a direct lightning strike. Each of these accessories is intended to provide protection within designed limits.

SPECIFICATIONS

KA-38-A

Voltage surge withstand protection incorporating Metal Oxide Varistor (MOV) design. Designed to provide Class C protection as defined in ANSI C62.41-1980 for voltage surges produced by lightning and other induced causes.

- Maximum RMS Voltage: 650 volts.
- Initial Clamp Voltage: 1100 volts.
- Suppression Power: 2.6 kilojoules.
- Response Time: less than 50 nanoseconds.
- Failure Indication: darkening and/or distortion of case end, pressure plug.
- Standard 3/4-inch conduit nipple for mounting.
- Water-tight housing.
- Solid-state, bipolar nonlinear voltage-dependent resistors.
- Waveshape: 8 kA (magnitude) x 20 ms (duration).
- Surge
Current: 1500-A 5000-A 10,000-A 20,000-A
- Crest kVA: 2.2 2.6 2.9 3.5
- Response Time: 1,000 times faster than fastest lightning surges.

KA-38-B

Voltage surge withstand protection incorporating Metal Oxide Varistor (MOV) design plus solid-state silicon junction design (silicon avalanche). Designed to provide the same degree of protection as accessory 38-A, plus protection against shorter pulse durations.

Transformer Secondary Protection:

- Frequency: 0-100 kHz.
- Initial Clamp Voltage: 66.
- Maximum Clamp Voltage: 86.
- Clamp Symmetry: bi-polar, symmetrical.
- Response Time: less than 5 nanoseconds.
- Joule Rating: 5 joules.
- Maximum Surge Current (Amps): 58.

APPLICATIONS

Kit No.	Application
PA-294530 (KA-38-AA)	70-104 amp, MOV module, without silicon-avalanche suppressor
PA-294531 (KA-38-AB)	150 amp, MOV module without silicon-avalanche suppressor
PA-294532 (KA-38-AC)	250-4000 amp, MOV module without silicon-avalanche suppressor
PA-294538 (KA-38-AD)	30 amp, MOV module, without silicon-avalanche suppressor
PA-294539 (KA-38-BD)	30 amp, MOV module, with silicon-avalanche suppressor
PA-294556 (KA-38-BA)	70-104 amp, MOV module, with silicon-avalanche suppressor
PA-294557 (KA-38-BB)	150 amp, MOV module, with silicon-avalanche suppressor
PA-294558 (KA-38-BC)	225-4000 amp, MOV module, with silicon-avalanche suppressor

Figure 1. Kit Applications

INSTALLATION

1. Move generator master switch to OFF position. Remove generator set battery cables, negative lead first.
2. Install kit parts as shown in Figures 3, 6, 8, 10, and 12.

Steps 3 through 7 refer to kits PA-294530, PA-294531, PA-294538, PA-294539, PA-294556, and PA-294557 only.

3. Drill two 0.219-in. (5.5-mm) diameter holes in the transfer switch enclosure at the location indicated in Figures 3, 6, 8, 10, and 12. Use center punch points for precise locations. These holes are used to attach the MOV mounting bracket to the enclosure.

NOTE

You may want to mount the Metal Oxide Varistor (MOV) module to the exterior of the transfer switch enclosure to allow convenient inspection for failure indications. Wiring leads provided on the MOV module are long enough to allow mounting of the MOV module outside the transfer switch enclosure.

NOTE

Visual inspection is required to determine whether the MOV module has failed. Failure is indicated by darkening and/or distortion of the case end and/or pressure plug.

4. Use a 7/8-in. (22.2-mm) diameter knockout punch or hole saw to cut a hole in the side of the transfer switch enclosure 3 1/2 inches below the mounting bracket holes.
5. Mount the MOV module directly to the transfer switch enclosure using two washers (320318) and locknut provided with the MOV module.
6. Cut the MOV module leads to length needed to connect them to the MOV terminal block.
7. Install remaining kit parts as shown in Figures 3, 6, 8, 10, and 12.
8. Reconnect generator set battery cables, negative lead last.
9. Move generator set master switch to normal operating position.

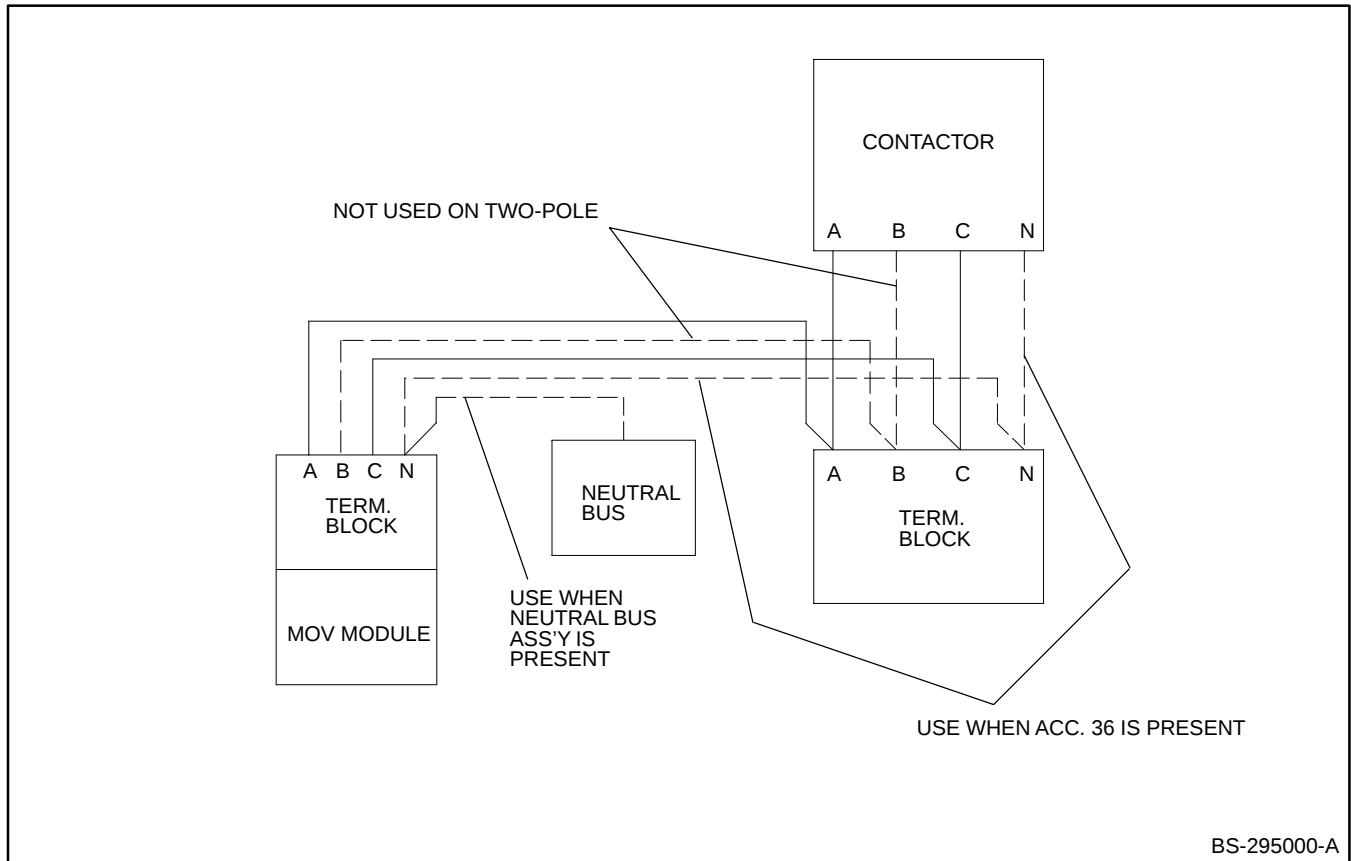


Figure 2. Wiring Diagram—30-150 Amp

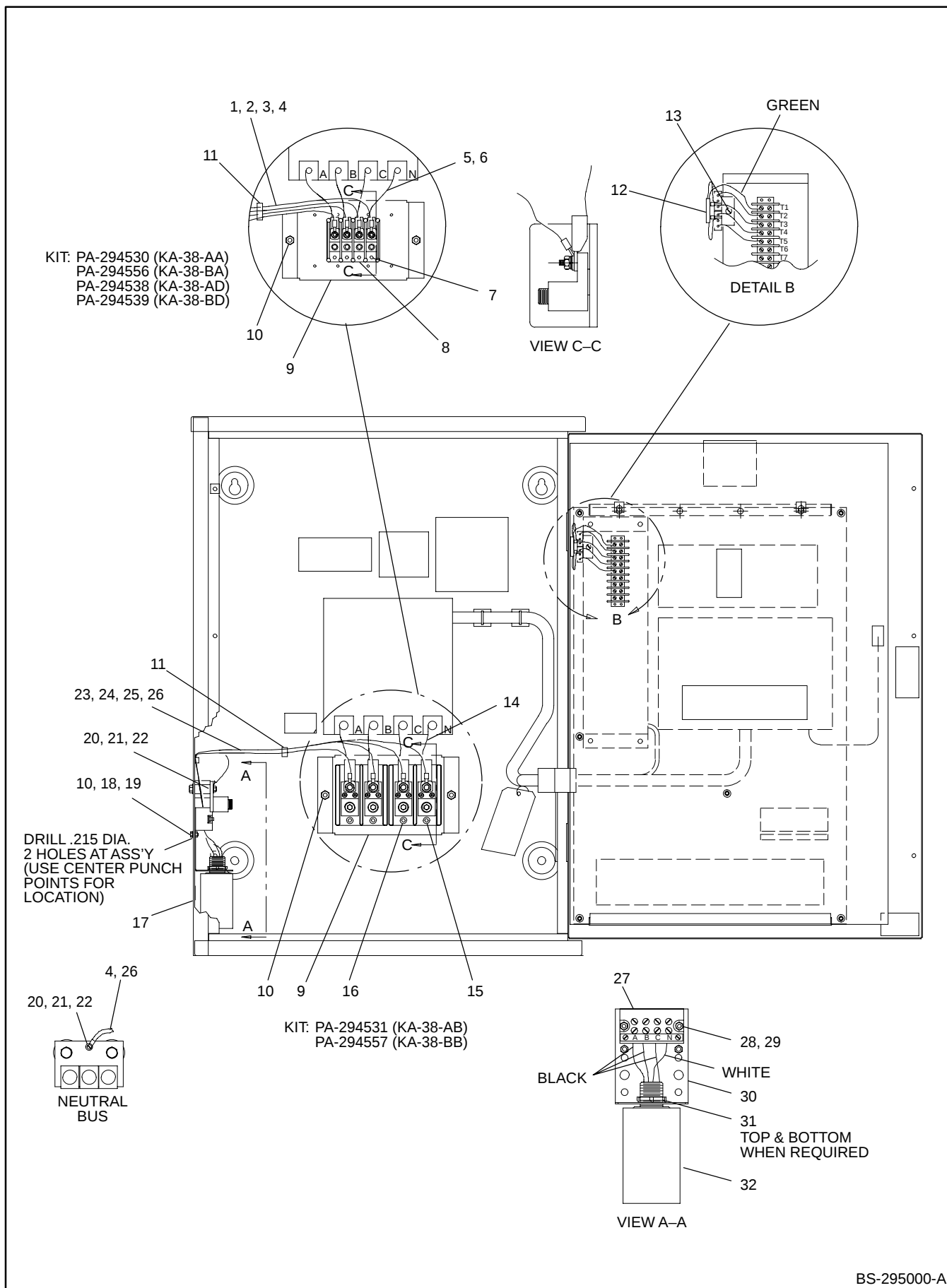


Figure 3. Assembly—30-104, 150 Amp

LEGEND—Figure 3. Assembly—30-104, 150 Amp

- | | |
|--|-----------------------------------|
| 1. Lead (SWOA-1410-1506) | 17. Decal (294512) |
| 2. Lead (SWOB-1410-1506) | 18. Lock Washer (X-22-22) qty. 2 |
| 3. Lead (SWOC-1410-1506) | 19. Carriage Bolt (295008) qty. 2 |
| 4. Lead (SWON-1415-1514) | 20. Lock Washer (X-22-9) |
| 5. Lead (294535) | 21. Plain Washer (X-25-79) |
| 6. Lead (294542) | 22. Screw (X-97-13) qty. 2 |
| 7. Screw (X-67-77) qty. 4 | 23. Lead (SWOA-1410-1706) |
| 8. Distribution Block (294528) | 24. Lead (SWOB-1410-1706) |
| 9. Mounting Bracket (294527) | 25. Lead (SWOC-1410-1706) |
| 10. Hex Jam Nut (X-6210-1) qty. 3 | 26. Lead (SWON-1415-1714) |
| 11. Cable Clip (299096) qty. 2 | 27. Mounting Bracket (294510) |
| 12. Suppressor Assembly (294560) | 28. Lock Washer (X-22-20) qty. 2 |
| 13. Hex Washer Head Screw (X-67-64) | 29. Hex Nut (X-72-4) qty. 2 |
| 14. Lead (294536) qty. 4 | 30. Mounting Bracket (294509) |
| 15. Screw (X-67-124) qty. 8 | 31. Plain Washer (320318) qty. 2 |
| 16. Distribution Block (294529) qty. 1 | 32. MOV Module (294511) |

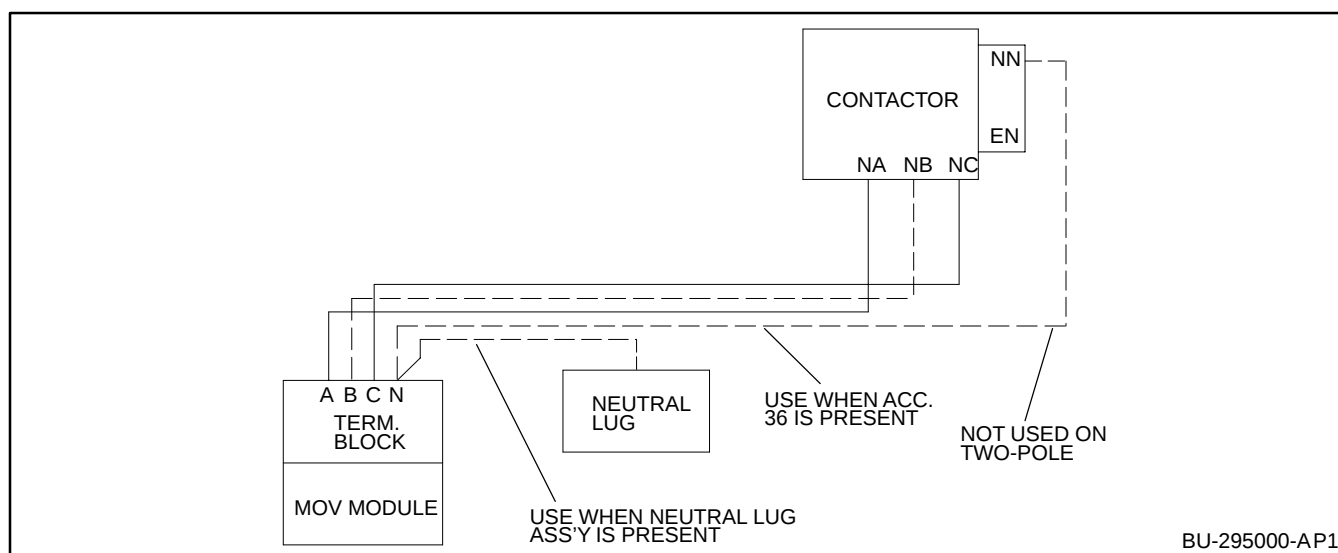


Figure 4. Wiring Diagram—225-400 Amp

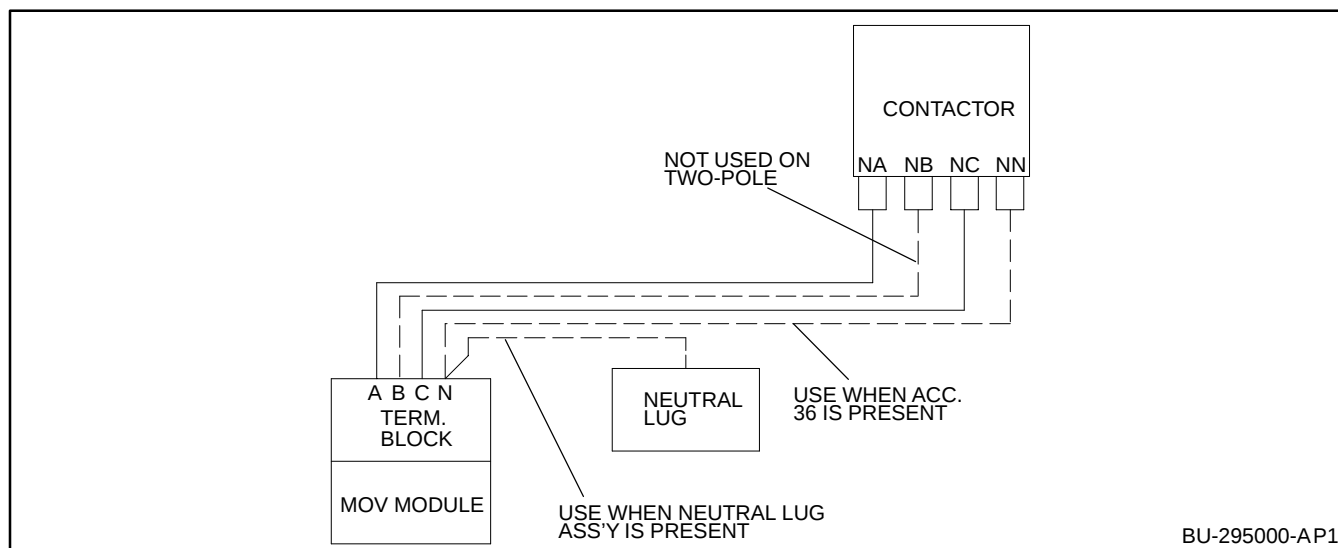


Figure 5. Wiring Diagram—600-800 Amp

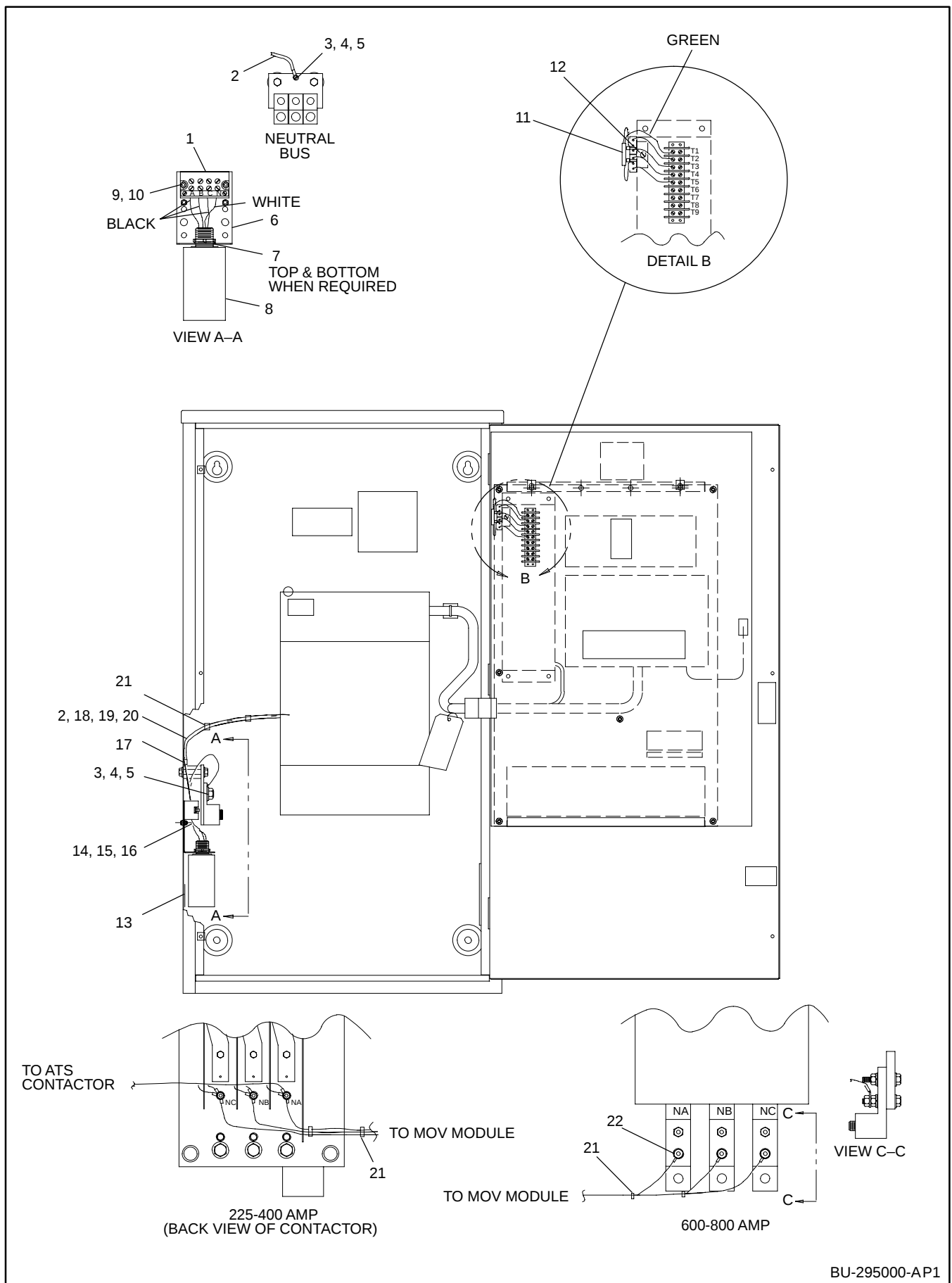


Figure 6. Assembly—225-800 Amp

LEGEND—Figure 6. Assembly—225-800 Amp

- | | |
|----------------------------------|-----------------------------------|
| 1. Terminal Block (294510) | 12. Screw (X-67-64) |
| 2. Lead (SWON-1440-1714) | 13. Decal (294512) |
| 3. Screw (X-97-11) | 14. Screw (X-97-13) qty. 2 |
| 4. Lock Washer (X-22-9) | 15. Lock Washer (X-22-22) qty. 2 |
| 5. Plain Washer (X-25-79) | 16. Hex Jam Nut (X-6210-1) qty. 2 |
| 6. Mounting Bracket (294509) | 17. Cable Clip (299096) qty. 8 |
| 7. Plain Washer (320318) qty. 2 | 18. Lead (SWOA-1430-3417) |
| 8. MOV Module (294511) | 19. Lead (SWOB-1430-3417) |
| 9. Hex Nut (X-72-4) qty. 2 | 20. Lead (SWOC-1430-3417) |
| 10. Lock Washer (X-22-20) qty. 2 | 21. Cable Tie (X-468-2) qty. 8 |
| 11. Suppressor Assembly (294560) | 22. Hex Jam Nut (X-83-6) qty. 4 |

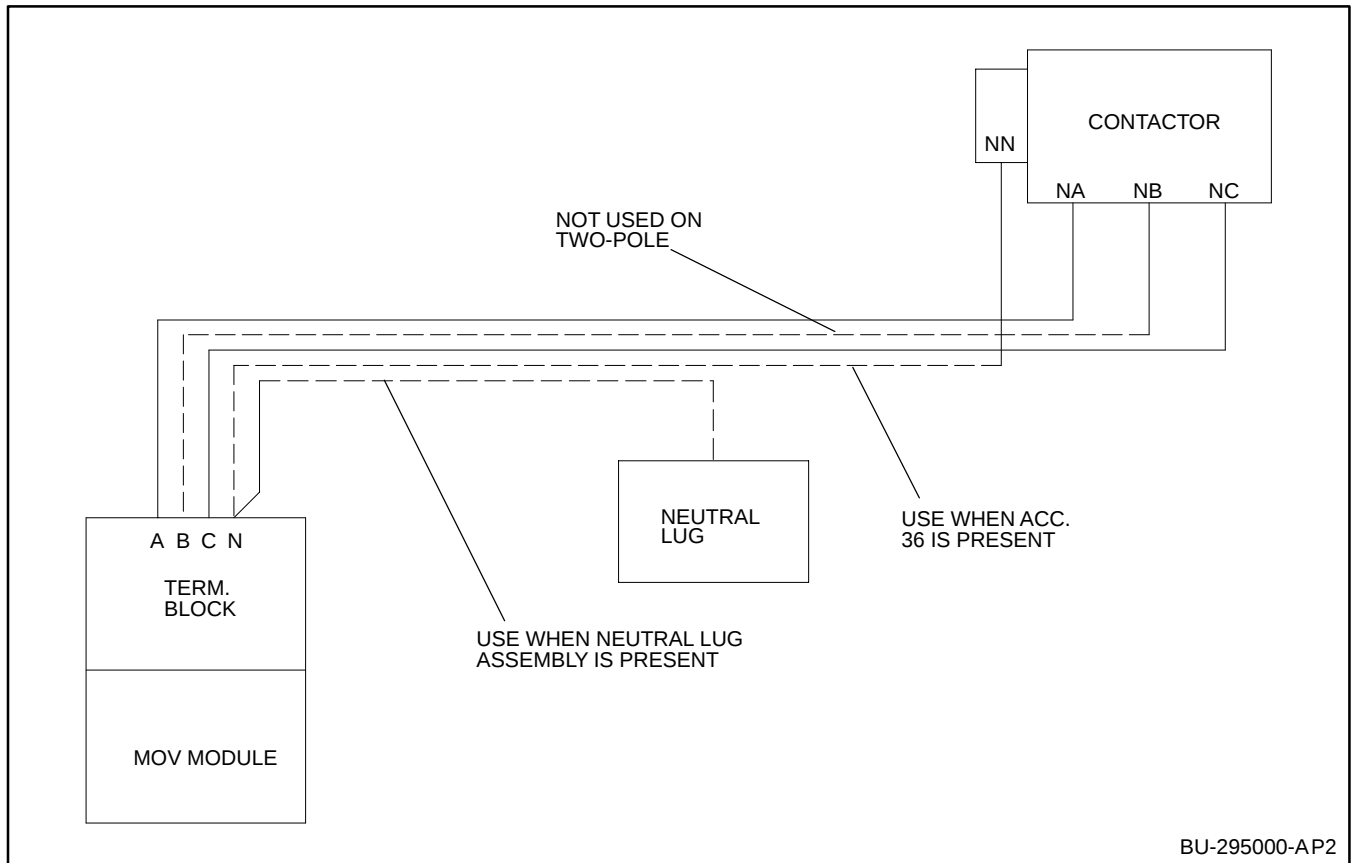


Figure 7. Wiring Diagram—1000-1200 Amp

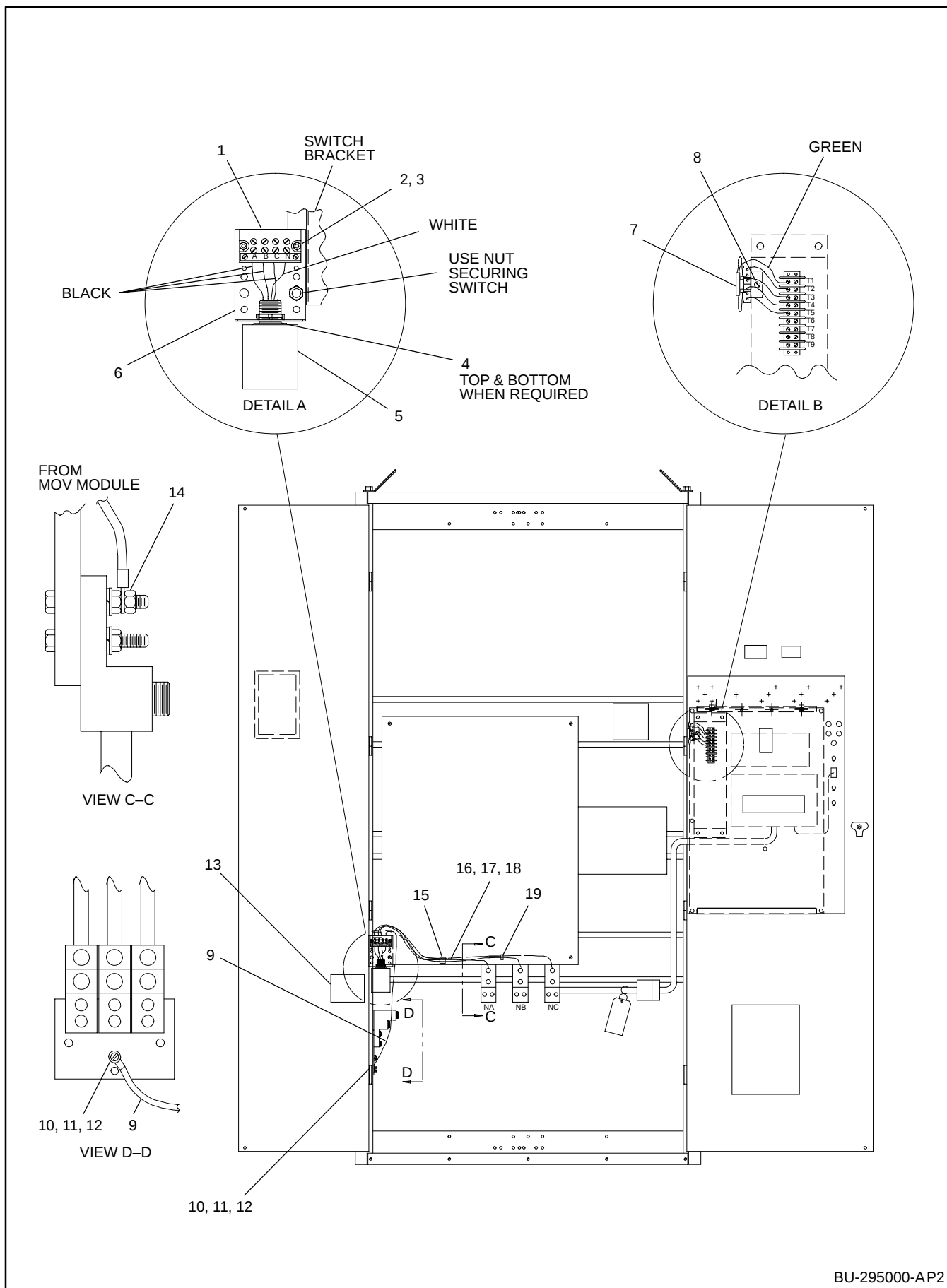


Figure 8. Assembly—1000-1200 Amp

LEGEND—Figure 8. Assembly—1000-1200 Amp

1. Terminal Block (294510)
2. Lock Washer (X-22-20) qty. 2
3. Hex Nut (X-72-4) qty. 2
4. Plain Washer (320318) qty. 2
5. MOV Module (294511)
6. Mounting Bracket (294509)
7. Suppressor Assembly (294560)
8. Screw (X-67-64)
9. Lead (SWON-1440-1714)
10. Screw (X-97-11)
11. Lock Washer (X-22-9)
12. Plain Washer (X-25-79)
13. Decal (294512)
14. Hex Jam Nut (X-83-6) qty. 4
15. Cable Clip (299096) qty. 8
16. Lead (SWOA-1430-3417)
17. Lead (SWOB-1430-3417)
18. Lead (SWOC-1430-3417)
19. Cable Tie (X-468-2) qty. 8

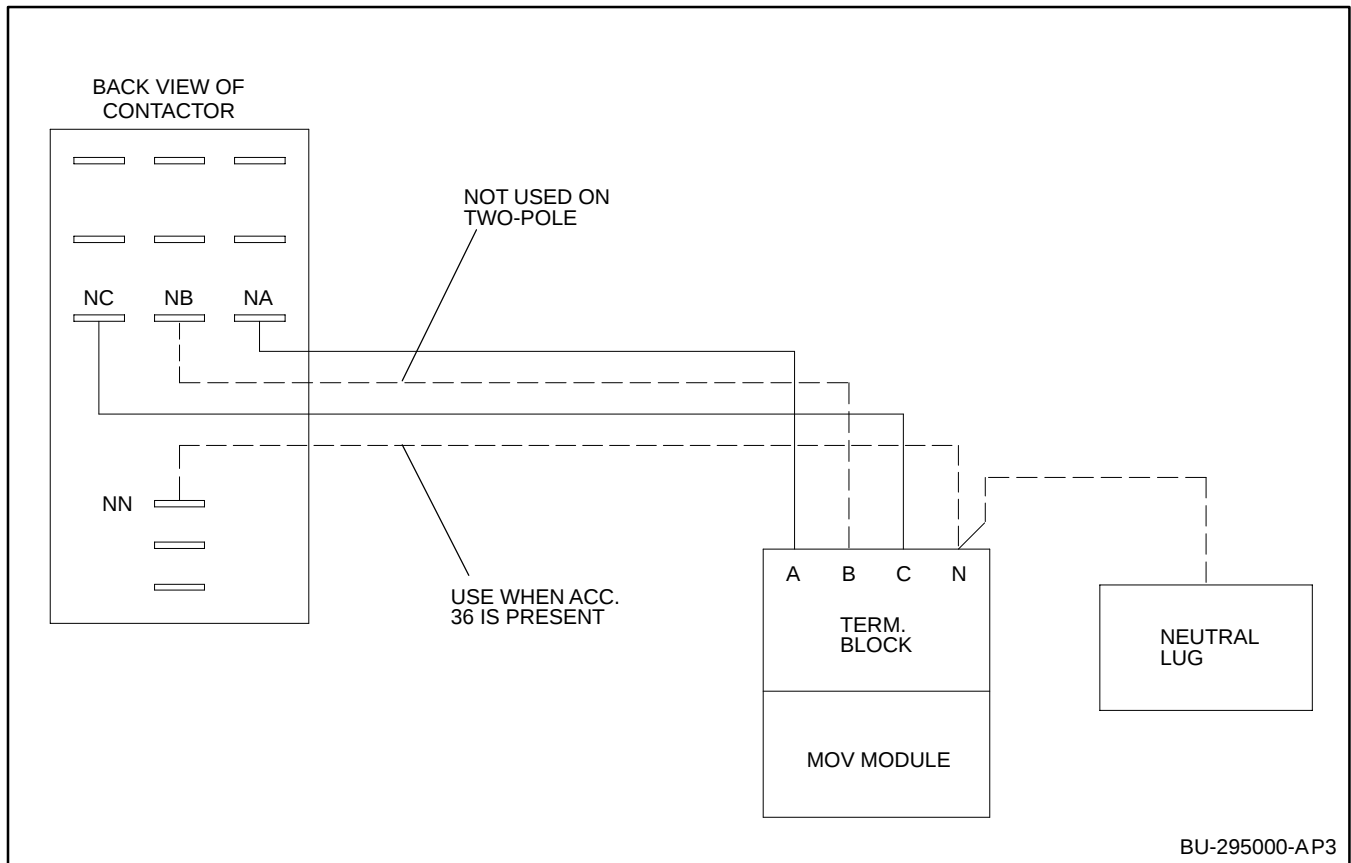


Figure 9. Wiring Diagram—1600-4000 Amp

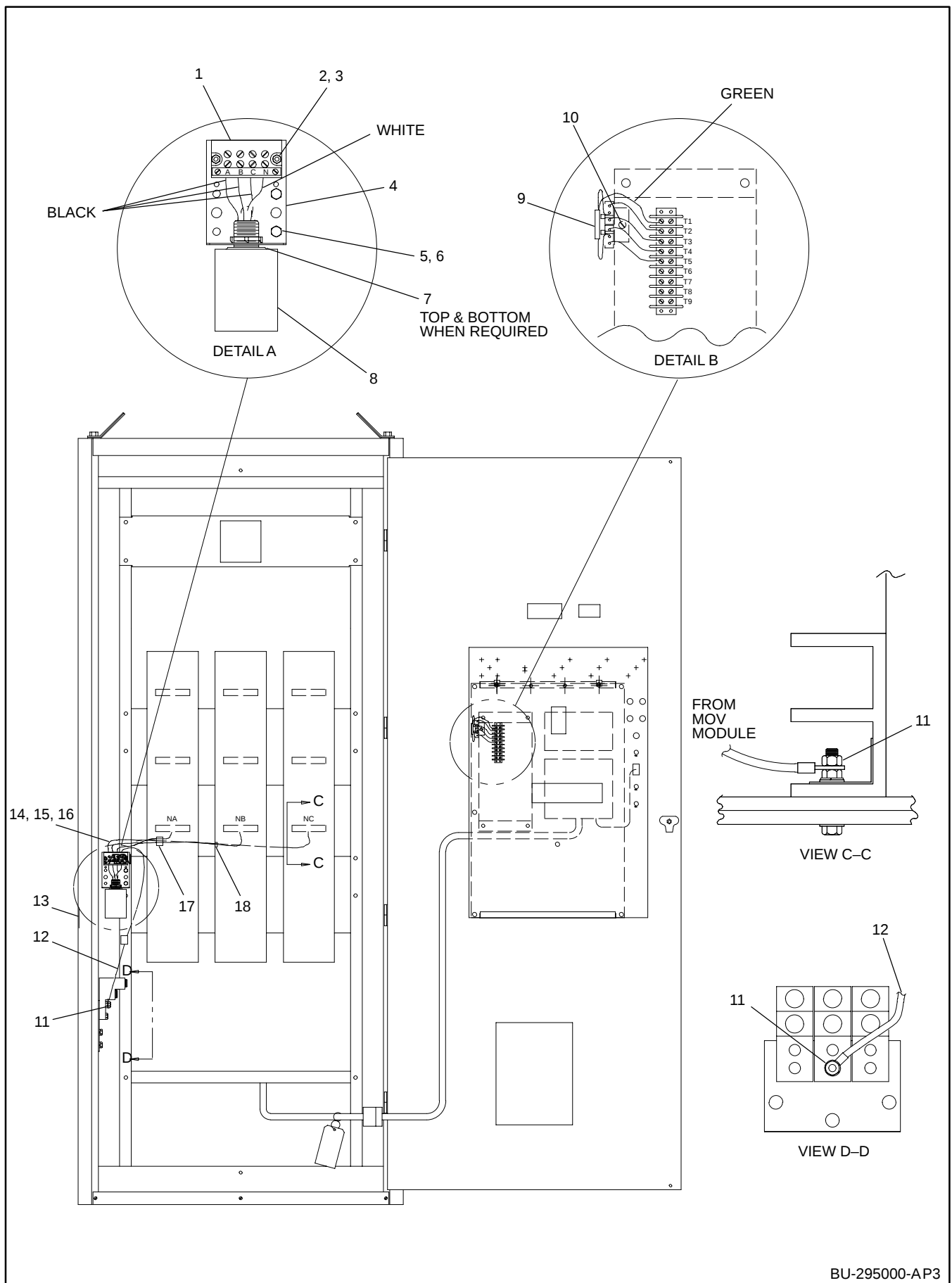


Figure 10. Assembly—1600-2000 Amp

LEGEND—Figure 10. Assembly—1600-2000 Amp

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|---------------------------------|---------------------------------|
| 1. Terminal Block (294510) | 10. Screw (X-67-64) |
| 2. Lock Washer (X-22-20) qty. 2 | 11. Hex Jam Nut (X-83-6) qty. 4 |
| 3. Hex Nut (X-72-4) qty. 2 | 12. Lead (SWON-1440-1714) |
| 4. Mounting Bracket (294509) | 13. Decal (294512) |
| 5. Screw (X-791-2) qty. 2 | 14. Lead (SWOA-1430-3417) |
| 6. Whiz Nut (X-6210-2) qty. 2 | 15. Lead (SWOB-1430-3417) |
| 7. Plain Washer (320318) qty. 2 | 16. Lead (SWOC-1430-3417) |
| 8. MOV Module (294511) | 17. Cable Clip (299096) |
| 9. Suppressor Assembly (294560) | 18. Cable Tie (X-468-2) qty. 8 |

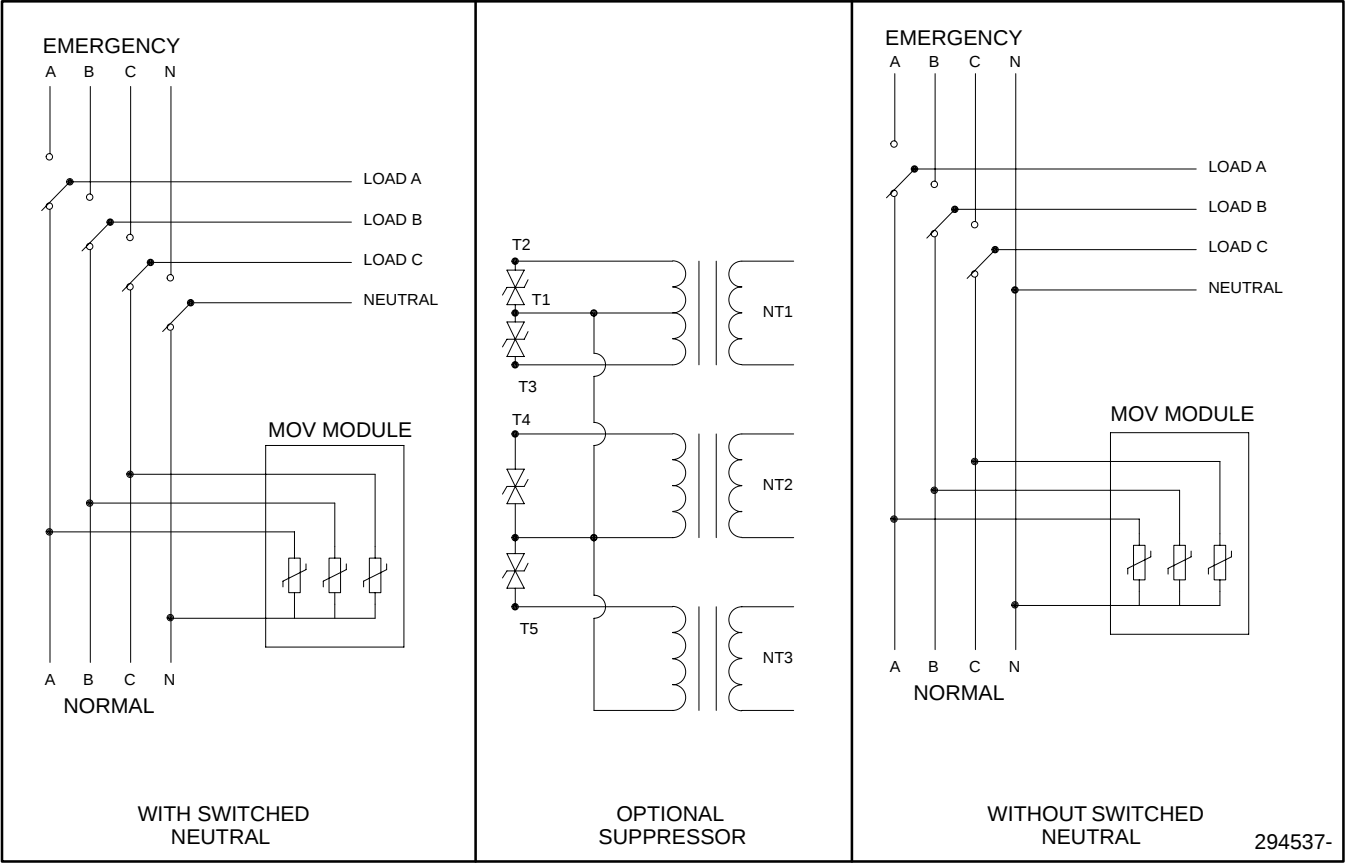


Figure 11. Schematic Diagram

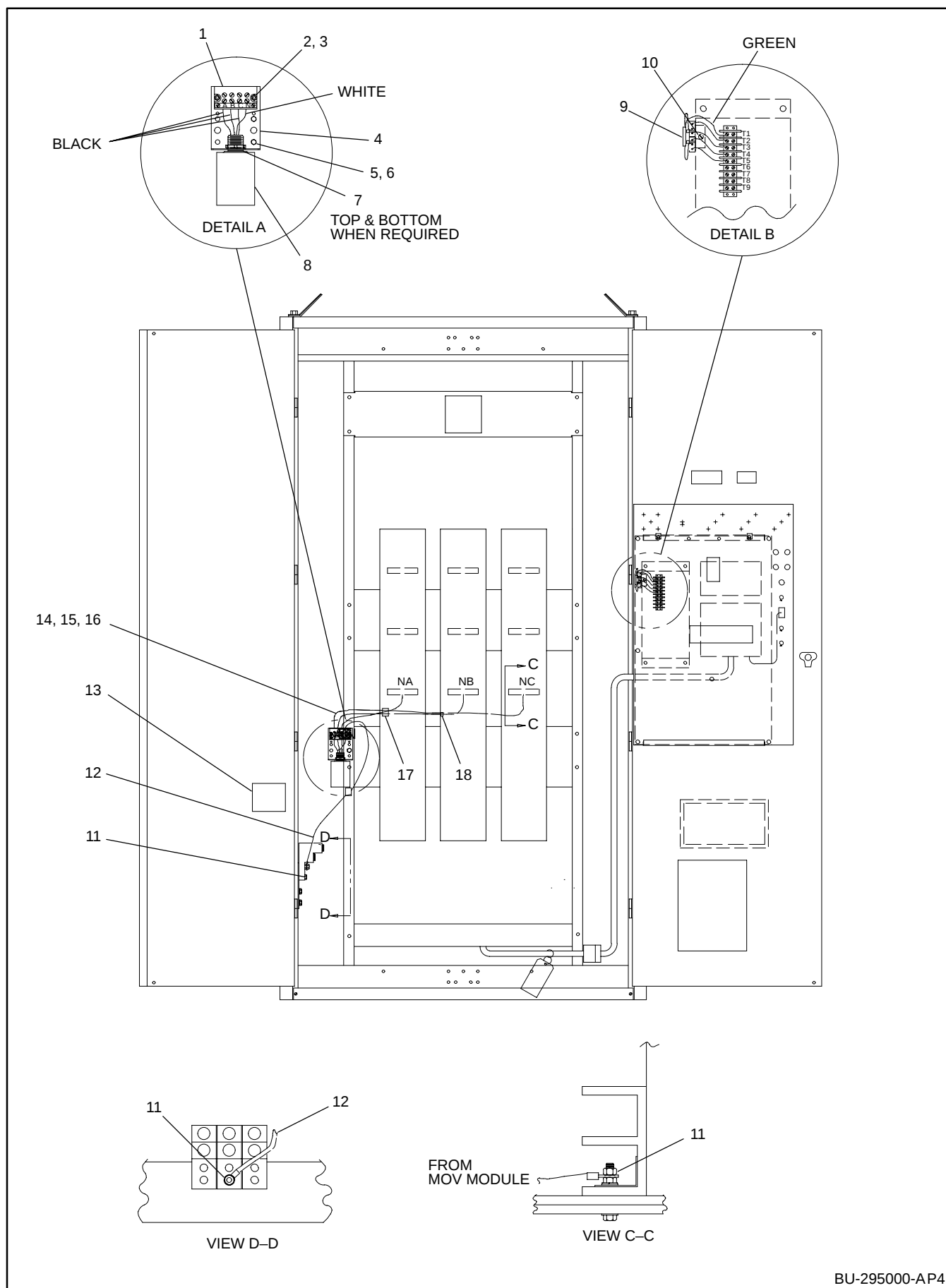


Figure 12. Assembly—3000-4000 Amp

LEGEND—Figure 12. Assembly—3000-4000 Amp

- | | |
|---------------------------------|---------------------------------|
| 1. Terminal Block (294510) | 10. Screw (X-67-64) |
| 2. Lock Washer (X-22-20) | 11. Hex Jam Nut (X-83-6) qty. 4 |
| 3. Hex Nut (X-72-4) qty. 2 | 12. Lead (SWON-1440-1714) |
| 4. Mounting Bracket (294509) | 13. Decal (294512) |
| 5. Screw (X-791-2) qty. 2 | 14. Lead (SWOA-1430-3417) |
| 6. Whiz Nut (X-6210-2) qty. 2 | 15. Lead (SWOB-1430-3417) |
| 7. Plain Washer (320318) qty. 2 | 16. Lead (SWOC-1430-3417) |
| 8. MOV Module (294511) | 17. Cable Clip (299096) |
| 9. Suppressor Assembly (294560) | 18. Cable Tie (X-468-2) qty. 8 |

Parts List—30 Amp		
Kits: PA-294538 (KA-38-AD) without Suppressor PA-294539 (KA-38-BD) with Suppressor		
Description	Qty.	Part No.
Lead	1	SWOA-1410-1506
Lead	1	SWOB-1410-1506
Lead	1	SWOC-1410-1506
Lead	1	SWON-1415-1514
Washer, #10 internal tooth lock	1	X-22-9
Washer, #8 external tooth lock	2	X-22-20
Washer, #10 external tooth lock	2	X-22-22
Washer, 0.208 x 0.344 x 0.031 in. plain	1	X-25-79
Nut, 1/4-20 hex jam	2	X-6210-1
Nut, 1/4-20 whiz	2	X-6210-2
Screw, 10-32 x 0.438 hex washer head (Kit PA-294539)	1	X-67-64
Screw, 8-32 x 0.312 in. slotted pan head	4	X-67-77
Nut, 8-32 hex	2	X-72-4
Screw, 10-32 x 0.375 in. slotted hex	1	X-97-11
Screw, 10-32 x 0.438 in. slotted hex washer head	2	X-97-13
Bracket, mounting	1	294509
Block, terminal	1	294510
MOV Module	1	294511
Decal	1	294512
Bracket, mounting	1	294527
Block, distribution	1	294528
Lead	4	294542
Suppressor Assembly (Kit PA-294539)	1	294560
Bolt, carriage	2	295008
Clip, cable	2	299096
Washer	2	320318

Parts List—70-104 Amp		
Kits: PA-294530 (KA-38-AA) without Suppressor PA-294556 (KA-38-BA) with Suppressor		
Description	Qty.	Part No.
Lead	1	SWOA-1410-1506
Lead	1	SWOB-1410-1506
Lead	1	SWOC-1410-1506
Lead	1	SWON-1415-1514
Washer, #10 internal tooth lock	1	X-22-9
Washer, #8 external tooth lock	2	X-22-20
Washer, #10 external tooth lock	2	X-22-22
Washer, 0.208 x 0.344 x 0.031 in. plain	1	X-25-79
Nut, 1/4-20 hex jam	2	X-6210-1
Nut, 1/4-20 whiz	2	X-6210-2
Screw, 10-32 x 0.438 hex washer head (Kit PA-294556)	1	X-67-64
Screw, 8-32 x 0.312 in. slotted pan head	4	X-67-77
Nut, 8-32 hex	2	X-72-4
Screw, 10-32 x 0.375 in. slotted hex	1	X-97-11
Screw, 10-32 x 0.438 in. slotted hex washer head	2	X-97-13
Bracket, mounting	1	294509
Block, terminal	1	294510
MOV Module	1	294511
Decal	1	294512
Bracket, mounting	1	294527
Block, distribution	1	294528
Lead	4	294535
Suppressor Assembly (Kit PA-294556)	1	294560
Bolt, carriage	2	295008
Clip, cable	2	299096
Washer	2	320318

Parts List—150 Amp		
Kits: PA-294531 (KA-38-AB) without Suppressor PA-294557 (KA-38-BB) with Suppressor		
Description	Qty.	Part No.
Lead	1	SWOA-1410-1706
Lead	1	SWOB-1410-1706
Lead	1	SWOC-1410-1706
Lead	1	SWON-1415-1714
Washer, #10 internal tooth lock	1	X-22-9
Washer, #8 external tooth lock	2	X-22-20
Washer, #10 external tooth lock	2	X-22-22
Washer, 0.208 x 0.344 x 0.031 in. plain	1	X-25-79
Nut, 1/4-20 hex jam	2	X-6210-1
Nut, 1/4-20 whiz	2	X-6210-2
Screw, 10-32 x 0.438 hex washer head (Kit PA-294557)	1	X-67-64
Screw, 8-32 x 0.312 in. slotted pan head	4	X-67-77
Screw, 8-32 x 0.500 in. slotted pan head	8	X-67-124
Nut, 8-32 hex	2	X-72-4
Screw, 10-32 x 0.375 in. slotted hex	1	X-97-11
Screw, 10-32 x 0.438 in. slotted hex washer head	2	X-97-13
Bracket, mounting	1	294509
Block, terminal	1	294510
MOV Module	1	294511
Decal	1	294512
Bracket, mounting	1	294527
Block, distribution	1	294529
Lead	4	294536
Suppressor Assembly (Kit PA-294557)	1	294560
Bolt, carriage	2	295008
Clip, cable	2	299096
Washer	2	320318

Parts List—225-4000 Amp		
Kits: PA-294532 (KA-38-AC) without Suppressor PA-294558 (KA-38-BC) with Suppressor		
Description	Qty.	Part No.
Lead	1	SWOA-1430-3417
Lead	1	SWOB-1430-3417
Lead	1	SWOC-1430-3417
Lead	1	SWON-1440-1714
Washer, #10 internal tooth lock	1	X-22-9
Washer, #8 external tooth lock	2	X-22-20
Washer, #10 external tooth lock	2	X-22-22
Washer, 0.208 x 0.344 x 0.031 in. plain	1	X-25-79
Tie, cable	8	X-468-2
Nut, 1/4-20 hex jam	2	X-6210-1
Nut, 1/4-20 whiz	2	X-6210-2
Screw, 10-32 x 0.438 hex washer head (Kit PA-294558)	1	X-67-64
Screw, 8-32 x 0.500 in. slotted pan head	8	X-67-124
Nut, 8-32 hex	2	X-72-4
Screw, 1/4-20 x 0.75 in.	2	X-791-2
Nut, 3/8-16 hex jam	4	X-83-6
Screw, 10-32 x 0.375 in. slotted hex	1	X-97-11
Screw, 10-32 x 0.438 in. slotted hex washer head	2	X-97-13
Bracket, mounting	1	294509
Block, terminal	1	294510
MOV Module	1	294511
Decal	1	294512
Block, distribution	1	294529
Lead	4	294536
Suppressor Assembly (Kit PA-294558)	1	294560
Bolt, carriage	2	295008
Clip, cable	2	299096
Washer	2	320318