

# Ekko 12v Battery System Update- Gen 1 & 2

## Tools required-

**NOTE: Access to a vehicle lift will greatly expedite this repair remedy.**

1. Torque wrench capable of Ft/Lbs. and In/Lbs.
2. Sockets – 3/8", 1/2, 9/16, 5/8, 3/4, 11/16, 10mm, 13mm, 17mm & 17mm deep well.
3. 3/8 ratchet and misc. extensions.
4. 1/2", 9/16" and thin 17mm wrench. Ratchet wrenches are preferred due to the tight spaces.
5. Wire stripper and crimper.
6. Scraper/Putty knife.
7. Serpentine belt tensioner release tool with 14mm socket.
8. Screw gun with #2 Philips.
9. Flashlight.
10. Drill with 1/4" drill bit and 2" hole saw.
11. Jig Saw with wood blade.
12. Wire Brush.
13. Scissors.
14. Cell phone with Lithionics App.
15. 120V outlet checker.



# Ekko 12v Battery System Update- Gen 1 & 2

## Parts required- Recall Kit #RC7908-23-774

1. Battery cap kit (2)
2. Inverter Panel Asm
3. Buss Bar Panel Asm
4. 2.5" Clamp
5. 2" cap (2)
6. cable tie (15)
7. Battery Cables 2/0 Red (2)
8. Battery Cables 2/0 Black (2)
9. Inverter Cable 3/0 Red,
10. Inverter Cable 3/0 black
11. Balmar 1070 Alternator Harness
12. Cable Asm 1/0 Red
13. Large P clamps (4)
14. Loctite 243
15. Orange torque paint
16. Sealant, Manus (3)
17. Terminal cover (2, reusable)
18. Breaker Cover – Generation 1 only
19. 2" Grommets (2)
20. 3" Grommet
21. Edge cover (2')
22. Convolute tubing (two 2' pieces)
23. Screws – G11-08-10B (10), G39-08-12T (6), and G39-08-20T (12)
24. Winnebago Breaker control harness
25. Sealing Tape 36" length – Generation 1 only
26. Balmar 1061 Battery Temp Harness
27. Balmar replacement alternator w/temp sensor.



1



2



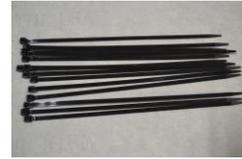
3



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# Step 1 – Disconnect all Power Sources from the Coach.

1. Make sure the lithium batteries are not fully charged. If they are, drain the battery/batteries to under 90%. This will allow you to properly test the system after this work is completed.
2. Disconnect the 110v power cord from the coach – See Image 1.
3. Turn off the house disconnect switch – See Image 2.
4. Turn off the 12v battery 250-Amp main breaker/breakers – See Image 3.
5. Turn off the inverter disconnect – See Image 4.
6. Unplug the solar panels from the roof connection port – See Image 5.
7. Turn off the 12v house battery/batteries by holding down the power button on the top of the battery/batteries for 3 seconds. Make sure the blue LED lights are off - See Image 6.
8. Under the hood of the chassis, disconnect the “Purple” coded Winnebago chassis power cable from the Ford jump post left of the fuse box –See Image 7.

Image 7



Image 1



Image 2



Image 3



Image 4



Image 5

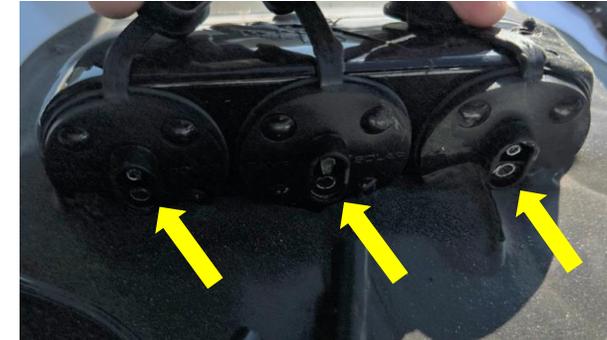


Image 6



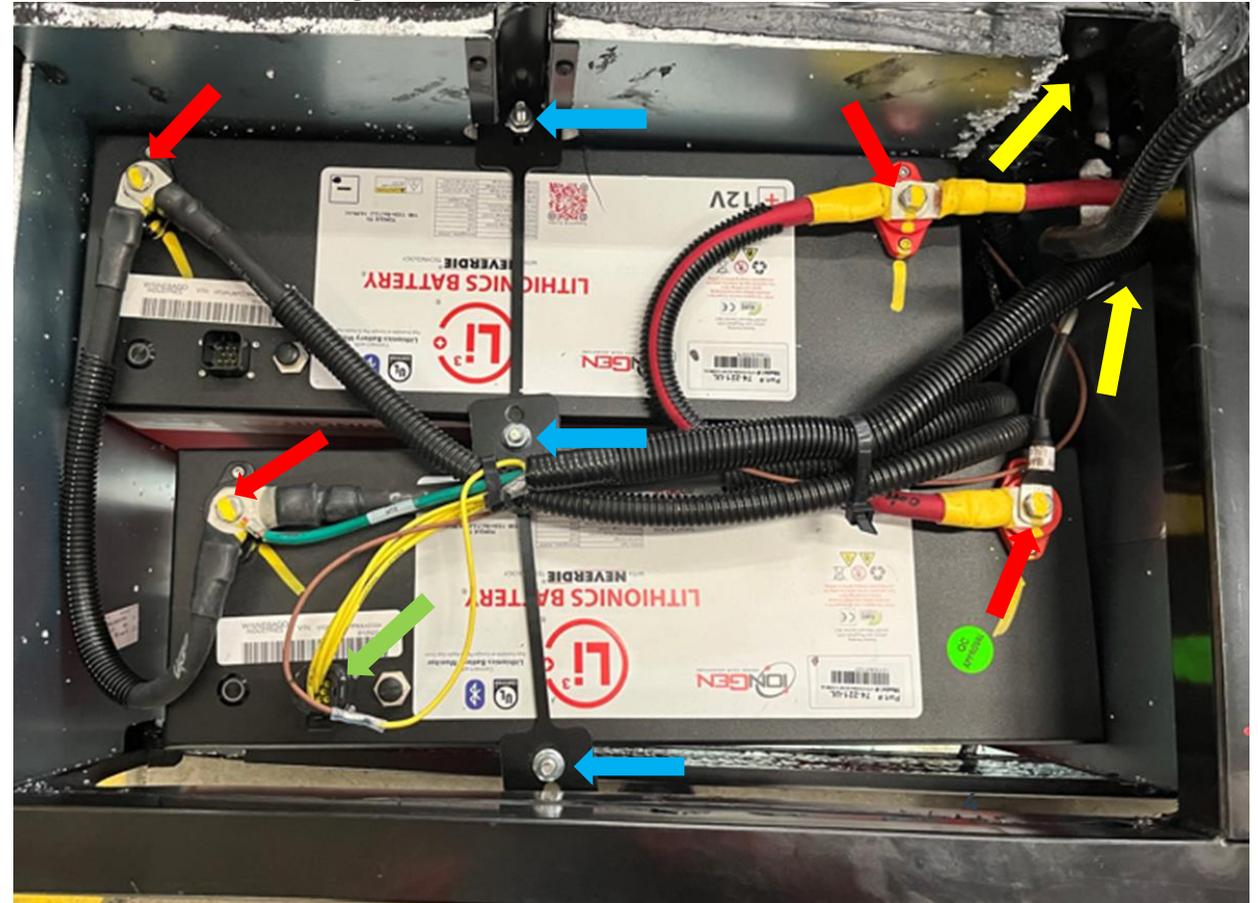
# Step 2 – Battery Removal.

1. Remove the closeout panel from the lower section of the compartment by removing (6) screws with the drill and #2 Philips bit – See Image 1, Yellow arrows.
2. Remove the 8-pin control connector from the top of the main battery. See Image 2, Green arrow for location. Note: some units with (2) batteries may have an 8-Pin connector in each battery.
3. Using a ½” wrench, remove the battery hold-down fastener on the first battery, see Image 2, Blue arrows and pull the bolt down through the compartment.
4. Using a 13mm Socket and ratchet (Some coaches may require 13mm gear wrench with pivot head) remove the battery cables from the battery posts – See Image 2, Red arrows.
5. Slide the battery out of the battery compartment and set aside.
6. If equipped, Repeat this step for the second battery.
7. Remove all battery cables and harnesses from the battery compartment by pulling them through the existing rubber grommets in the right rear corner. See Image 2, Yellow arrows. When completed, the battery compartment should be empty.

Image 1



Image 2 – Shown with floor removed for clarity



# Step 3 – Inverter and Component Removal.

1. Gain access to the Inverter. If applicable, remove the steel panel supporting the Inverter disconnect and 250-Amp main battery breaker by removing the (4) screws that mount it. See Image 1, Red arrows.
2. Remove the Inverter wiring access cover. Mark all 4 cables/harnesses entering the inverter with a permanent black marker as listed below. See Image 2, Red arrows.
  1. Inverter 110v in
  2. Inverter 110v out
  3. Inverter 12v+ (positive)
  4. Inverter 12v- (negative)
3. Remove 110v, 12v, and case ground connections from inverter. For disconnecting 110v cables, push out the indent clips on the black plastic holder that retain the cable in the inverter case, these will be reused.
4. Remove the (4) mounting screws and slide the Inverter out of the compartment and set aside for later use.
5. Remove the (3) position buss bar from the rear of the compartment and set aside for later use – See Image 3. The plastic cover pulls off to expose mounting screws.

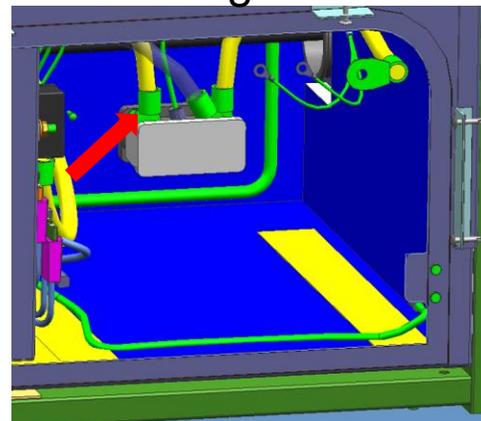
Image 1



Image 2



Image 3



# Step 4 – Remove 3-Point Seat.

1. To remove the rear passenger seats, start by grabbing onto the front of the bottom seat cushions, carefully pull up ensuring you do not damage the retaining clips. The seat will pop out of the retainer clip and then lift out – See Image 1. Repeat process for the second seating position.
2. Using a white paint marker, make alignment marks on the seat frame for reinstallation of the seats – See Image 2.
3. Remove the front cabinet face to access the seat attachment bolts.
  - a) Remove the (6) screws that attach it to the base cabinet.
  - b) Pull the cabinet face away from the base cabinet to disconnect the heat register and set the cabinet face aside.
4. Using a  $\frac{3}{4}$ " socket, remove the 8 nuts and washers holding the 4 U-bolts - See Image 3. Set the seat hardware aside for reinstallation – See Image 4.

Image 1



Image 2

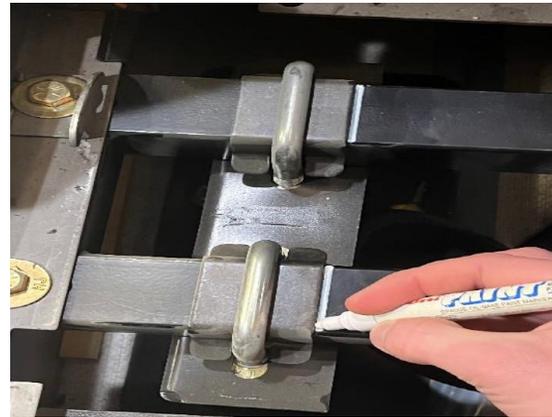


Image 4

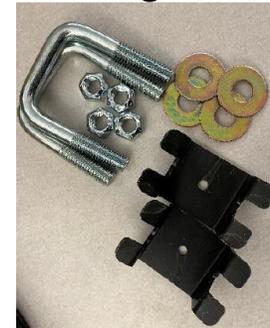


Image 3



# Step 4 – Remove 3-Point Seat (Continued).

1. The seat backs and cross members should now lift off the dinette cabinet – See Image 1. Remove the seat and set aside.
2. Directly under the 3-Point seat, unmount the automatic transfer switch(ATS) by removing the (4) mounting screws along with all the wiring clamps and screws holding it in place- See Image 2 so the ATS can be raised up off the floor.
3. Set the ATS aside without undoing the electrical connections.

Image 1



Image 2



# Step 5 – Add Additional Wire Routing Holes.

1. Add a 2" x 6" pocket, under the 3-Point seat, through the upper floor for the Inverter wires.
  - a) Start by drilling (2) ¼" holes, up through the floor, between the floor tubes, located by the joint of the tubes in the back of the compartment as shown in Image 1. Make sure you drill up through the floor, ensuring that the drill does not damage any electrical components above the floor.
  - b) From inside the coach, in the bench seat cabinet, use the (2) ¼" holes to mark out a 6" x 2" rectangle extending toward the driver's sidewall..
  - c) Use the jig saw to cut out the floor. The hole should look like Image 2 and 3 when completed.
2. Add an additional 2" interior battery compartment wire routing hole.
  - a) On the center dividing panel, measure 3" horizontally outward from the center of the hole shown with the Yellow arrow – See Image 4 - and drill new hole using the 2" hole saw. The new hole is shown with the red arrow – See Image 4. Install 2" Grommet to protect wiring from cut edge.

Image 1

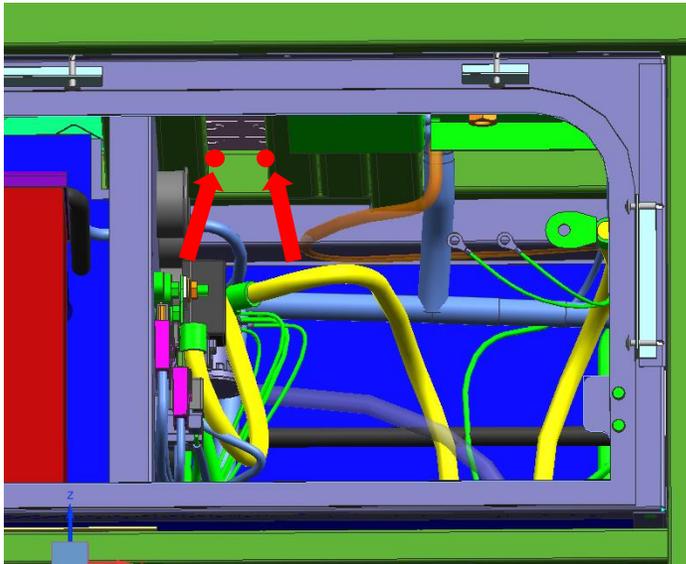


Image 2

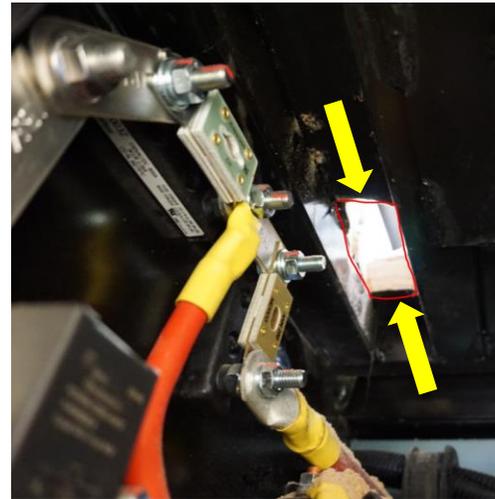
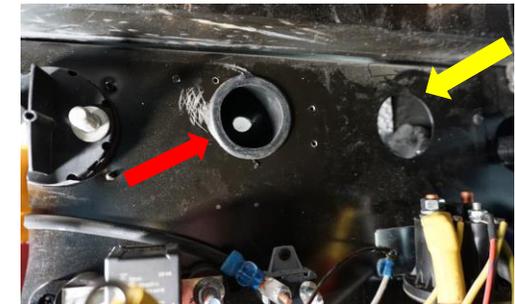


Image 3



Image 4



# Step 6 – Chassis Ground Bar.

1. Locate the chassis ground bar that is welded to the upper floor tube behind the Drivers Side #2 compartment (without generator), or behind the generator. Note: It may be necessary to lower the generator to gain proper access to the ground bar.
2. Remove the Inverter 3/0 ground cable, the 3/0 Alternator ground cable, the 3/0 main battery ground, and the 12 Awg Balmar black ground wire from the ground bar. Untangle the circuits and route all 4 cables into the compartment rearward of the battery compartment removing as much slack as possible.
- 3. Verify that the ground bar isn't painted, and the surface is free of all oxidation. Clean the buss bar with a wire brush as necessary.**
4. Inspect all ring terminals for excessive heat shrink or damage. If the heat shrink is overlapping the ring terminal as shown in Image 1, trim the heat shrink back as shown in Image 2 to insure a proper electrical connection. If the ring terminal is damaged, replace the cable or replace the damaged ring terminal. If replacing ring terminal, pull test connection by hand to ensure proper crimp.
5. Reconnect the main battery ground to an open slot on the ground bar. Make sure it is the only terminal connected at that slot.
6. Using the 1/2" socket and backer wrench, torque all the existing ground bolts to 230 In/Lbs.

Image 1- Bad



Image 2 - Good



**1/16" Ground Bolts are used for all General grounds. Using a 1/2" socket and backer wrench, torque all ground bolts to – 230 In-Lbs.**



# Step 7 – Cable Cleanup.

1. Locate the Balmar regulator mounted under the hood, on the passenger side wheel well – See Image 1. Remove the Balmar regulator, control wiring and pipe insulation from that area and discard. Continue to remove the Balmar control harness all the way back to the battery compartment. This harness is being replaced.
2. Plug the holes in the back corner of the battery compartment with 2” caps – See image 2. You may need to use the scraper to clean up the existing sealant to allow the new plug to snap into place. Cap seal the plugs with sealant.
3. Clean and straighten up the cables in wiring compartment as much as possible as shown in Image 3.

Image 1

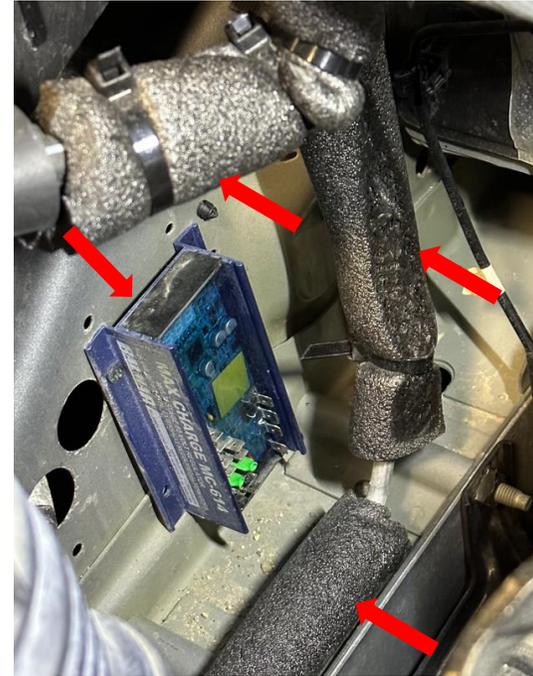
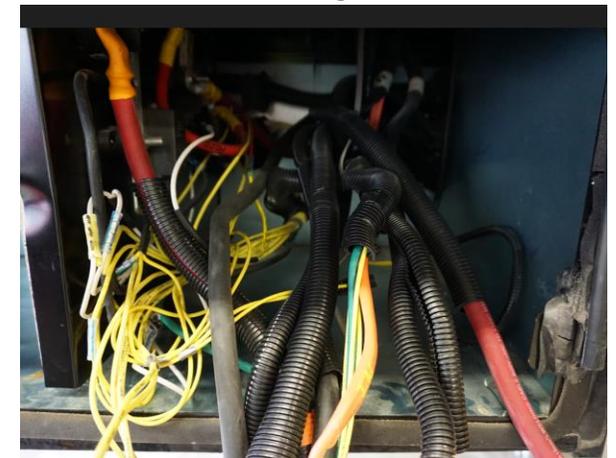


Image 2



Image 3



# Step 8 – Alternator rework.

1. Using the serpentine belt tool, remove the drive belt from the alternator and remove the (2) M10 alternator mounting bolts so the alternator can be lowered for proper access. Remove additional connections in order to remove alternator. The original alternator will be discarded. Note: The Ford splash guard can be removed for better access.
2. Remove all cable ties and clamps attaching the alternator battery cables and control harness from the chassis so they can move freely and remove alternator from the coach.
3. Locate the new alternator and follow the alternator assembly and torque procedure shown on the following page. **Never let the alternator hang by the positive post and always support the alternator throughout this process. Use a thin 17mm backer wrench on the base of the 3/0 12v positive connection to connect the positive cable.**
4. After completing the alternator assembly and torque procedure the cable orientation should resemble Image 1. Note: Image is shown looking from the ground up and the cables are routed horizontally toward the driver's side of the coach.
5. Mark all connections and bolts with orange torque paint. Torque paint should be applied across the entire connection point as shown in Image 2.
6. Securely tie the alternator cables up to the engine harness carrier with two ties as shown in Image 3 – Yellow lines. This will keep the cables away from all ridged chassis components. The red arrows represent the path of the alternator harness and battery cables.

Image 1

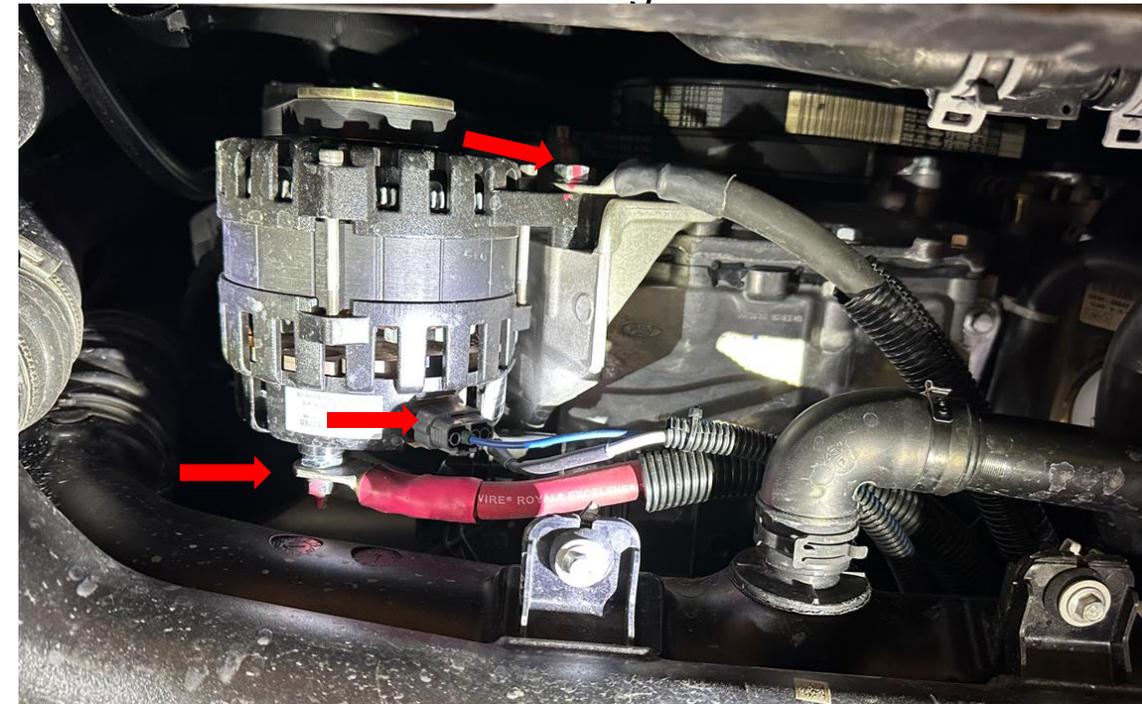


Image 2



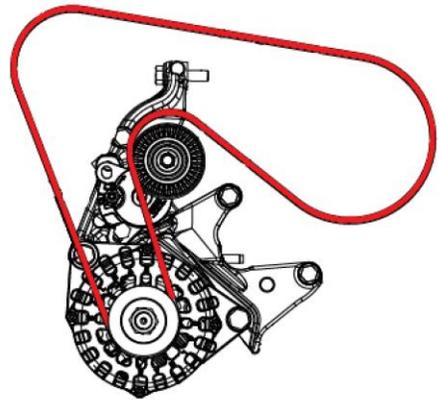
Image 3



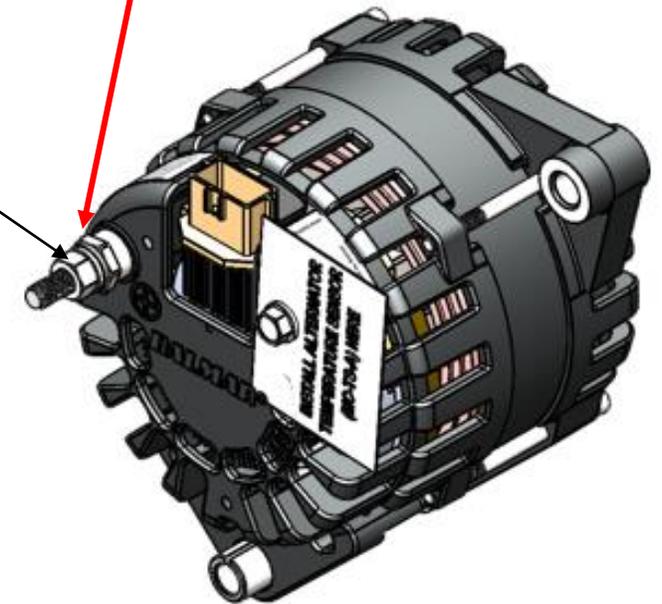
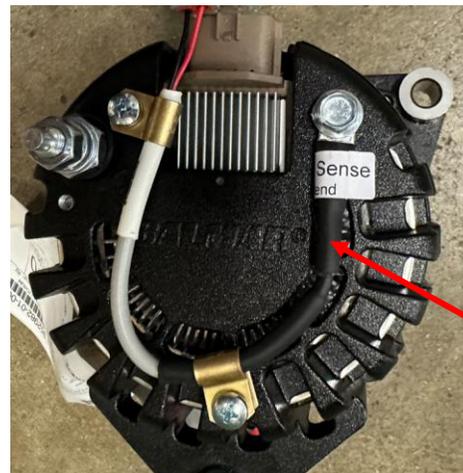
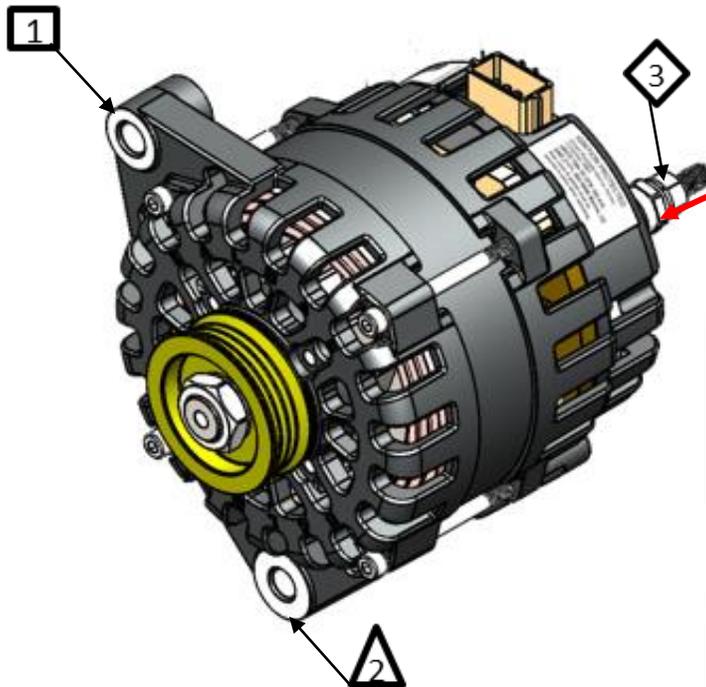
# Black Alternator Assembly and Torque Procedure

**Note: To avoid damaging the alternator, never hang the alternator by the cables and always use a thin 17mm backer wrench to remove or torque the positive 3/0 cable. Damage to the rectifier will occur if this process is not followed**

- 1 Install ground cable to front of alternator. Torque M10-1.5x45, 17mm head bolt to 45 ft-lb. Apply thread locker.
  - 2 Install M10-1.5x140, 17mm head bolt, torque to 35 ft-lb. Apply thread locker.
  - 3 Install B+ cable and torque M8-1.25, 13mm head nut to 14 ft-lb. Apply thread locker. Stack - Terminal, washer, lock washer, Nut.
- Terminal/cable orientation shown below with red arrows. Cables need to be attached and be aligned with the 4-pin connector. Rotate all 3 cables 20 Deg toward the 4-pin connector so that all 4 cables can be bundled together approximately 6-12" down stream. Ensure terminals and or cables does not interfere with other components that would affect proper torquing.



Belt Routing



**Use thin 17mm backer wrench on the base of this stud.**

Alternator temp sensor harness is pre attached to alternator.

# Step 9 – Cable Support and Routing.

1. Remove the Ford supplied 10mm bolt directly above the driver's side drive axle, on the inside of the frame rail, shown in image 1.
2. Group the 3 cables from the alternator and the 2 Winnebago chassis power cables together and route them all through the 2.5" clamp at the point the 10mm fastener was removed in Image 1.
3. See image 2 - Using the original 10mm fastener (shown with the red arrow), attach the 2.5" clamp above the drive axle into the original threaded position. All 5 cables should be captured by the clamp and be safely mounted away from all moving objects.
4. Just rearward of the new 2.5" clamp and right after the engine harness carrier, bundle all 3 alternator cables together and tie them up using the Ford factory engine harness carrier and cable tie from the Recall Kit- See Image 3.

Image 1



Image 2

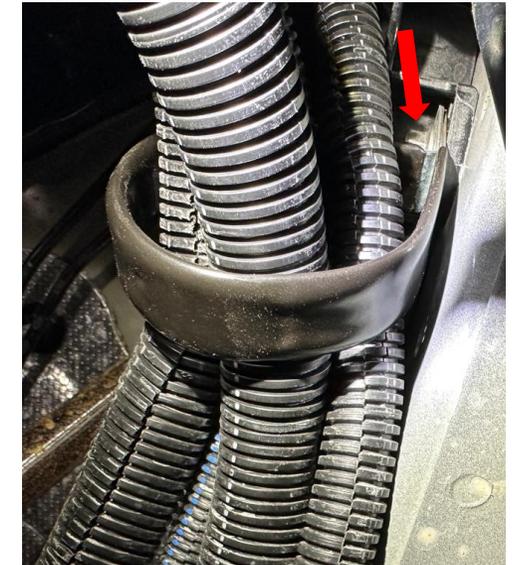


Image 3



# Step 10 - Cable Support and Routing (Continued).

1. From the alternator rearward, use cable ties to bundle all Winnebago cables together every 12" away from all heat producing and moving objects. Be sure to add ties in the following areas:
  - a) Away from the exhaust heat shield just behind the front right drive axle – See Image 1. Blue arrow is showing the heat shield and the red arrow is showing the harness tied up and away from the heat shield.
  - b) Through body mount holes in front of the fuel fill. See Image 2 – Yellow arrow is the same location in both images.
  - c) At each support tube behind the battery box. See Image 2 – red arrows.

Image 1

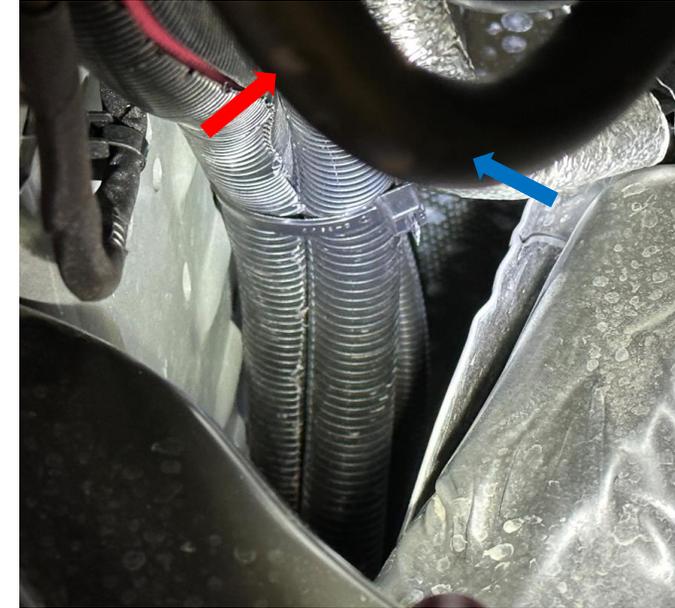


Image 2

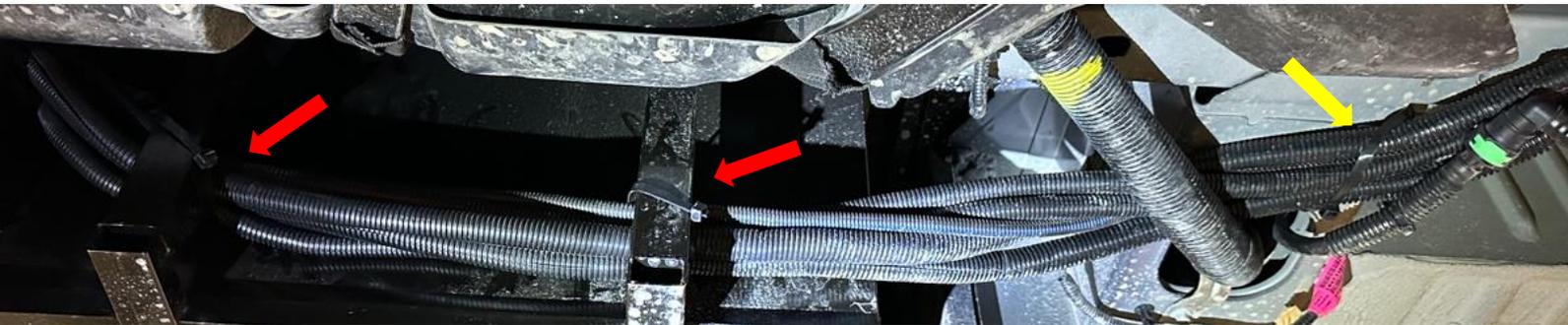
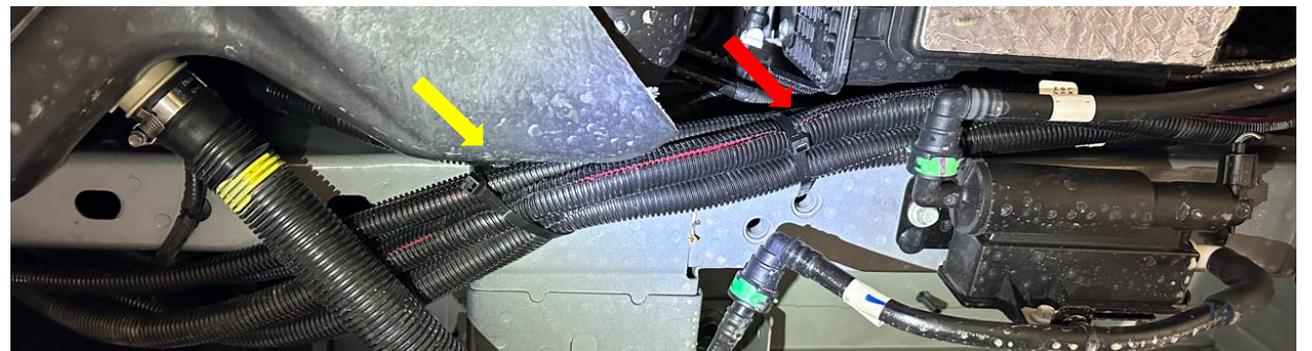


Image 2 Continued

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# Step 11 – Prep the Batteries.

- 1. Locate the Battery cap kit in the Recall Kit - See Image 1. One kit for option 22N (Single Battery) and two with option 22A (Dual Battery)
- 2. Apply Loctite to the M8 x 14mm fasteners – See Image 2.
- 3. Attach 3' battery cables 2/0 “Red” and 2/0 “Black” to the matching color battery posts. Orientate the cables as shown in Image 3.
- 4. Make sure the cables and fasteners are stacked as shown in Image 4.
- 5. Note: Only one battery (main) requires a temperature sensor. Attach the temperature sensor to the main battery positive post. Position the temp sensor between the lock washer and main battery cable and rotate it 90 deg from the battery ring terminal as shown in Image 5.
- 6. Torque each battery terminal to 132 In/Lbs. and mark each terminal with orange torque paint as shown in Image 5.

Image 1



Image 2



Image 3



Option 22N or 22A – Main battery includes temp sensor

Option 22A – Aux battery. No temp sensor

Image 4

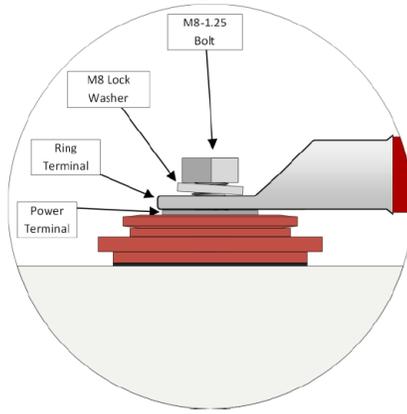


Image 5



# Step 11 – Prep the Batteries (Continued).

1. Note: Protect all exposed battery terminals not mounted to the battery using terminal covers. See Image 4. This will protect the battery during installation and cable routing.
2. You need to notch the main battery positive boot to clear the temp sensor. Mark a  $\frac{1}{2}$ " x  $\frac{5}{8}$ " rectangle on the side of the battery boot as shown in Image 1. Use a scissors and cut out the rectangle and slide it over the positive battery cable.
3. Slide the protective boots over the battery posts and snap them into place as shown in Image 2.
4. The notched protective boot should cover all the exposed terminals as shown in Image 3.

Image 1



Image 2



Image 3



Image 4



# Step 12 – Battery Installation.

1. Reinstall battery(batteries if equipped) back into battery compartment. Note: The batteries will not fit into the compartment when vertical, therefore follow the procedure listed below. With a two-battery unit – Option 22A, insert the Aux battery, or the battery without the temperature sensor first. When two batteries are present, stagger them so both buttons can be accessed. Note: it may be easiest to bring in the 8-Pin battery control connector back through the grommet before the battery cables are pulled through.
  - a) Elevate the battery, center it in the opening and rest it against the compartment approximately 2”- 4” lower. See Image 1.
  - b) Tip the battery into the compartment and lift it straight up, so the terminal boots clear the inside flange of the compartment door. See Image 2.
  - c) Rotate the bottom of the battery into the compartment and push the battery into place. See Image 3.
  - d) Route the battery cables through the 3” grommet and secure the batteries to the units with the original hardware.

Image 1



Image 2



Image 3



# Step 13 – Buss Bar Installation.

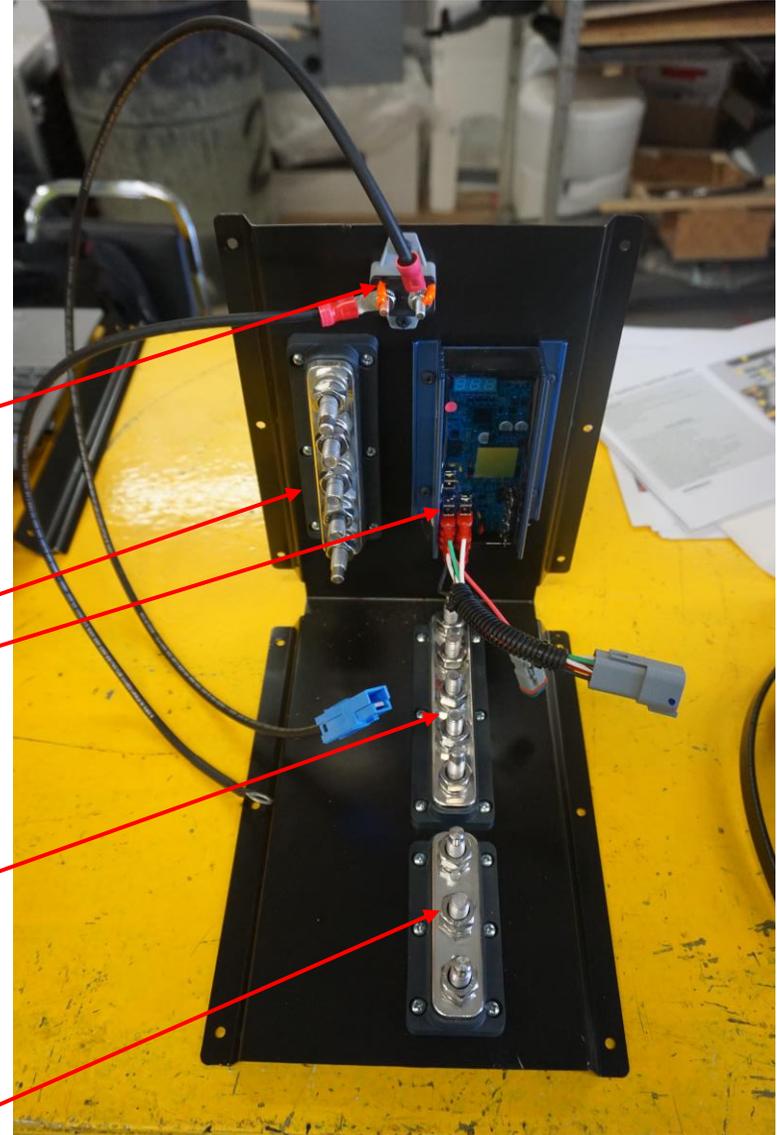
Image 1

1. Locate the Buss Bar Panel Asm in the Parts Kit – See Image 1 .
2. Install the original 3 post Buss Bar into the pilot holes on the panel, using #8-18 ½" mounting screw (6).
3. Install the panel in the coach using #8 – 18x1 ¼" mounting screws (12), on the rearward wall of the wiring compartment and compartment floor. The panel should be positioned in the corner approximately 5" from the compartment door - Image 2.

Image 2



5 inches



Solar Panel  
40A Breaker

Ground Bus-  
5-Position buss bar

Alternator  
Regulator

Power Bus-  
5-Position buss bar

Battery Bus-  
3-Position bar  
Not include – Use buss  
bar that was removed

# Step 13 – Buss Bar Installation (Continued).

1. Remove the protective boots from the battery cables and connect the battery cables as shown in Image 1. Torque each terminal to 190 In/Lbs. and mark with orange torque paint as shown. Replace bus bar cover. Stack ring terminals with the largest on bottom and smaller going up on the post.

## Coach Power, 5 Position buss bar- (Post-250 Amp breaker) (left to right)

1. 3/0 Positive to Inverter
2. 3 stacked ring terminals - 3/0 Positive to Alternator and (2) 12 AWG red from Balmar harness
3. 2/0 Positive to 250A Breaker
4. 3 stacked ring terminals - 1/0 Positive to Batt Disconnect, 14 AWG yellow from Breaker control harness and 8 AWG HS from solar control.
5. 1/0 Positive to Boost Solenoid

**Note: Confirm all wire connections by following the diagram that is included on the last page of this guide.**

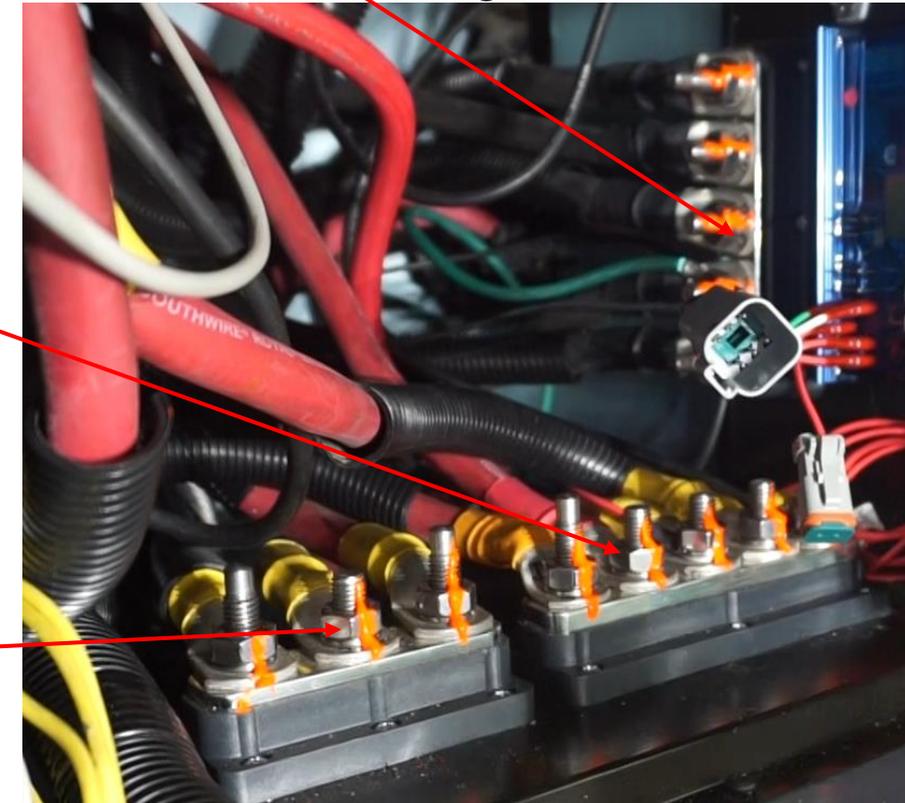
## Coach battery, 3 Position buss bar- (Pre-250 Amp breaker) (left to right)

1. 2/0 Positive from Inside Battery
2. 2/0 Positive to 250A Breaker
3. 2/0 Positive from outside Battery – Option 22A only

## Interior Grounds - 5 Position Bus bar (top to bottom)

1. 2/0 Negative from Inside Battery
2. 3/0 Negative from Alternator
3. 3/0 Negative from Inverter
4. 4 stacked ring terminals - 2/0 Negative from Chassis Ground bar, 12 AWG Blk from Balmar harness, 14 AWG wht from Breaker control harness and 8 AWG (Circuit HT) from solar control.
5. 2/0 Negative from outside Battery – Option 22A only

Image 1



# Step 13 – Buss Bar Installation (Continued). (Solar Panel Breaker Wiring)

1. Run the blue connector from the 40-Amp solar panel breaker through the floor with the inverter wiring - Image 1.
2. Under the 3-point seat, find the blue, 10 Awg yellow wire and 8 Awg black connection. This is the solar feed circuit “HS” to the coach batteries. Note: “HS” will be printed on the yellow 10 Awg wire – See Image 2.
3. Unplug the connector in Image 3 and replace the 10 Awg connector with the new one routed from below.
4. Remove all 10 Awg, yellow “HS” wiring, from the coach. It will include a 40-amp fuse holder and ring terminal in the compartment below and discard – See Image 4.

Image 1

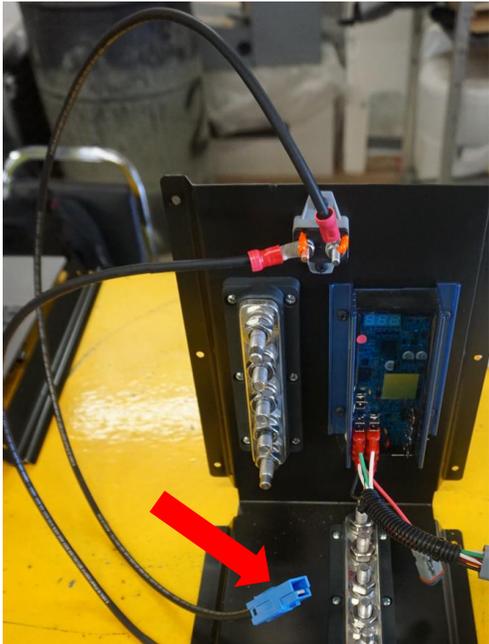


Image 2



Image 3

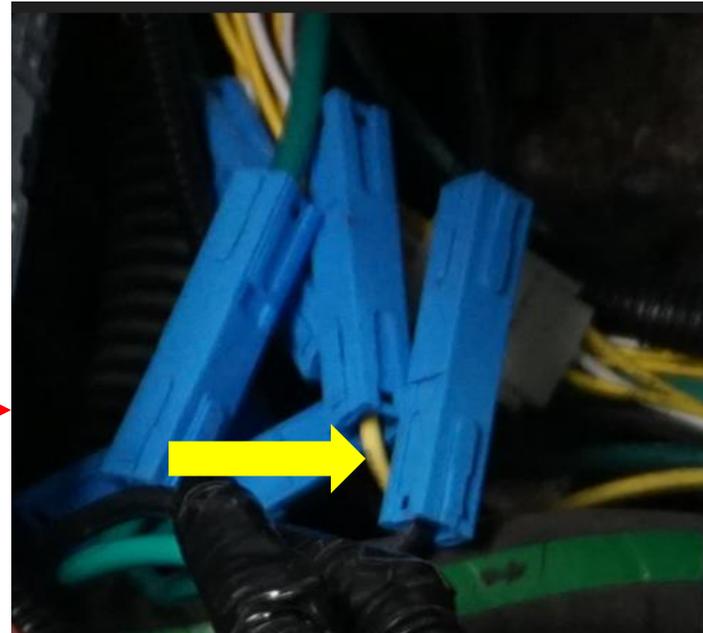
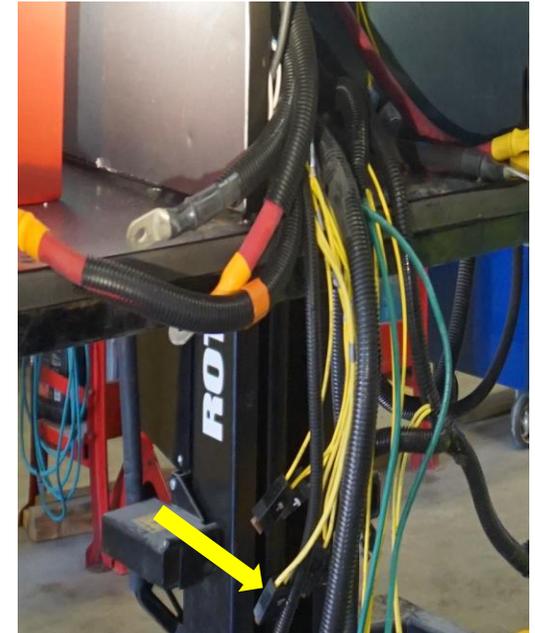


Image 4



# Step 13 – (Continued) Adding Breaker Control harness.

1. Locate the 8-Pin Lithionics battery connector. Pull back the convoluted tubing 24" and cut all 4 circuits – BCA, BCB, KE5 and KE10. KE5 (Run only trigger) is the only circuit you will be using. – Remove and discard circuits BCA, BCB and KE10 from the original Winnebago harness – see Image 1.
2. Take circuit KE5 that was previously connected to the 8-Pin battery connector and splice it to the new circuit “KE” on the Breaker control harness with the provided butt splice. Next, locate the brown wire on the new Balmar regulator harness, and the “BRN” circuit on the Breaker control harness. Connect these circuits together with the provided butt splice - See image 2
3. Locate the 250 A breaker and remove circuits BCA and BCB from the back of the breaker and remove these circuits from the original Winnebago harness - They are being replaced by new BCA and BCB circuits from the Breaker control harness – See Image 3. Connect the new BCA and BCB circuits to the breaker and torque the terminals to 12 In/Lbs.
4. Locate new circuit “LOC” on the Breaker control harness. Connect this circuit to pin 16 on the Balmar regulator - See image 4

Image 1



**WINNEBAGO**  
INDUSTRIES

Image 2



Image 3

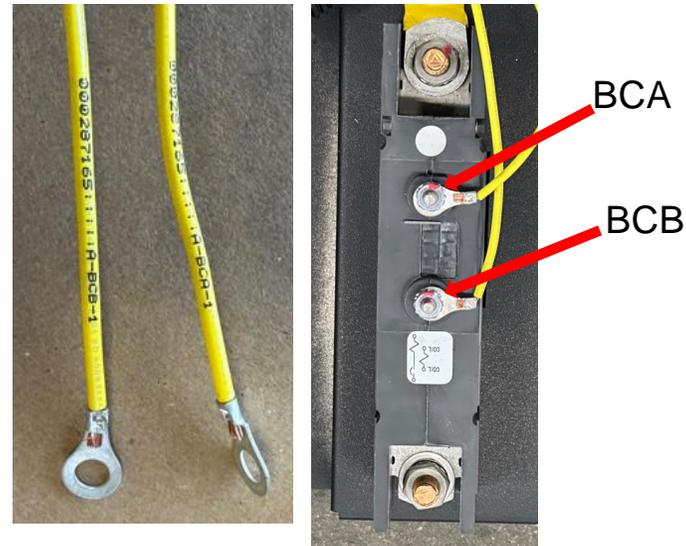
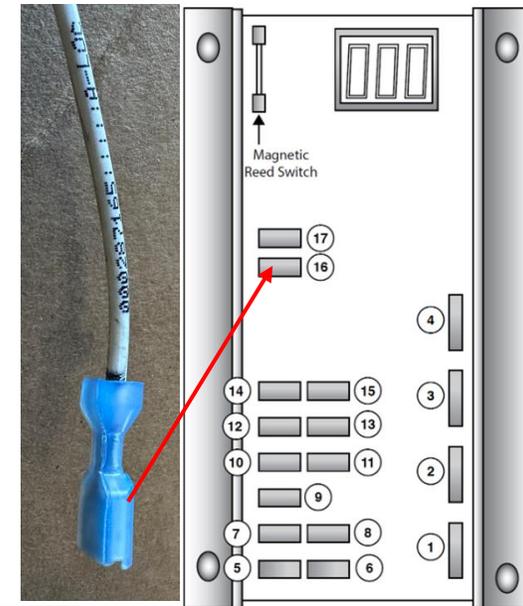


Image 4



Note: the 3/8" ground ring terminal connects to the 5-position ground bar and the 3/8" positive ring terminal connects to the 5-position positive buss bar. See initial step 13 page for connection points.

# Step 14 – Install the Inverter Under the 3-Point Seat.

1. Place ATS box centered between the seat supports with the edge close to pump tray. Dry fit Alternator mounting bracket asm to confirm ATS box placement is within bracket opening to allow access. Secure ATS box using mounting tabs and original hardware. Ensure cable P-clamps are reinstalled - See Image 1.
2. Install inverter mounting bracket asm. The feet of the bracket should fit between the base of the seat supports. Orientate bracket so that the mounting holes for the inverter are towards the front of the coach. Bracket must be placed to allow installation of 3-Point bench seat front panel, see Image 2. Install bracket using #8-18 x ½" screws.
3. Pull the AC 110V and DC 12V cable connections along with the case ground wire back around behind the inverter to the connecting side. Make the AC connections using the clip style connections inside the inverter, ensuring the wires make full contact inside the connector. Additionally ensure the black plastic clip fully seats into inverter to prevent the cables from backing out. Make the DC connections to a torque of 88 in-lb. Attach the green inverter case ground as shown in Image 3, shown with Red arrow.

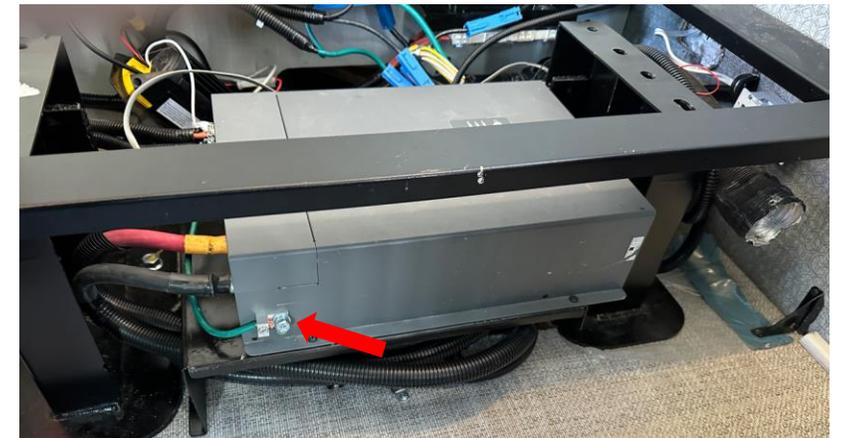
Image 1



Image 2



Image 3



# Step 15 – Connect Remaining Electrical Components.

1. Connect the Inverter Disconnect - 9/16" Socket, Torque - 120 In-Lbs. x2 – See Image 1.
2. Coach Battery Breaker- 5/8" Socket, Torque - 24 In-Lbs. x 2 – See Image 2, yellow arrow.
3. Coach Battery disconnect - 9/16" Socket, Torque - 120 In-Lbs. x2 – See Image 2, red arrows.
4. Battery Boost Solenoid – 1/2" Socket, Torque - 190 In-Lbs. x2 - 3/8" socket, Torque - 15 In-Lbs. See Image 2, orange arrow.
5. Visually check all other battery cables/connections and correct, as necessary - See Image 3.
6. Mark all torqued points with orange paint.

Image 1



Rear View



Image 2

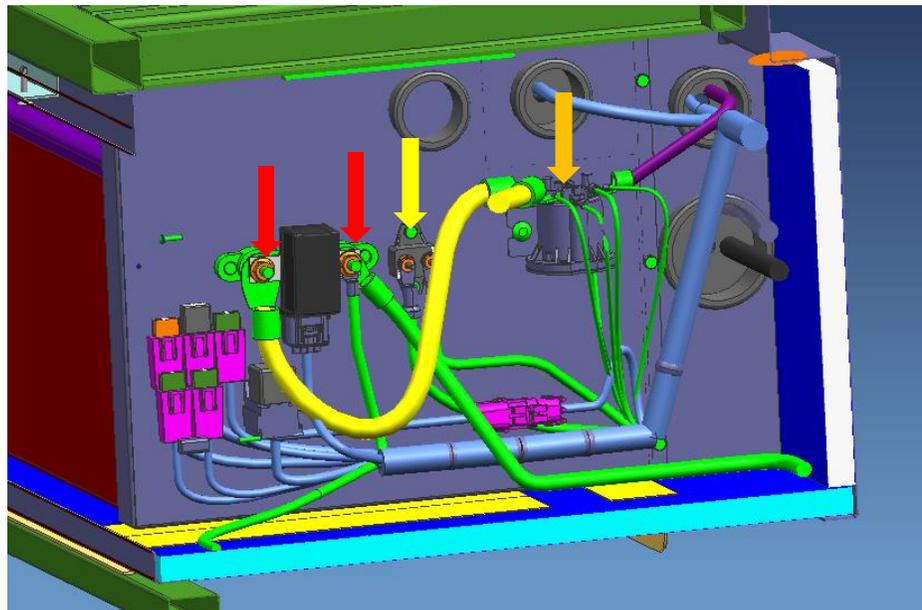
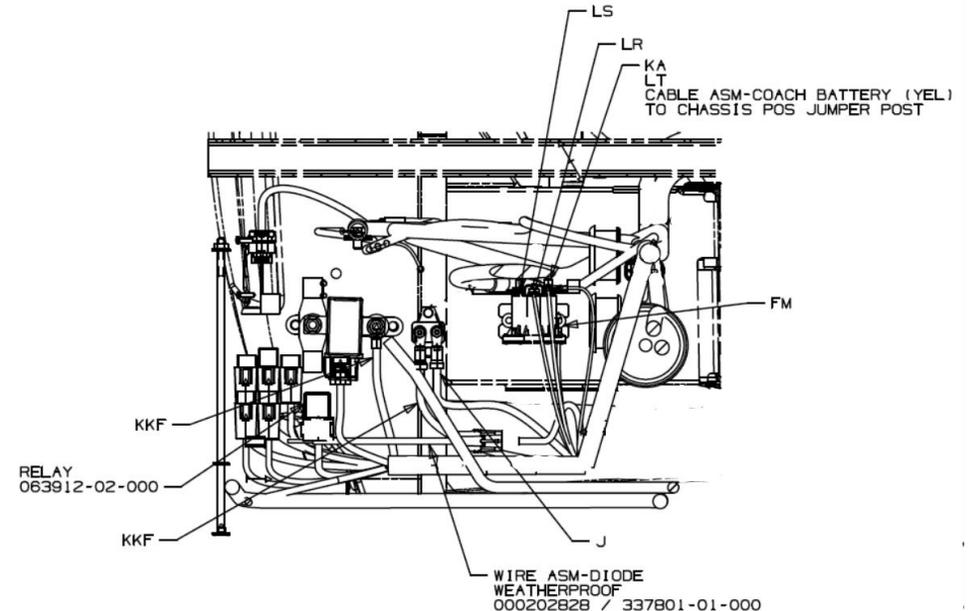


Image 3



# Step 16 – Wrapping Up the Work.

1. Reattach the closeout panel from the lower section of the compartment with the (6) screws previously removed and the drill with #2 Philips bit. See Image 1.
2. Make the three connections to Balmar regulator.
3. Seal up all cable grommets with sealant.
4. Reconnect the 8-Pin battery control connector back into the Main battery or the battery with the temp sensor – See Image 2.

Image 1



Image 2



# Step – 17 Wire Connection Validation – Breaker Control.

1. With the 8-Pin battery control connector now connected to the Main battery, hold down the power button on the top of the battery/batteries. Make sure the blue LED is lit and turn on the 250 A Breaker – See Image 1.
2. From your mobile device, download "Lithionics Battery Monitor" from Google play or Apple app store and Open the Lithionics Battery Monitor application. Connect to the main battery through the App – Note: The battery serial number is on the side of the battery, select the correct serial number listed on the app – See Image 2.
3. Select the "Settings" gear icon in the upper right corner of the application – See Image 3.
4. Select "Terminal Console" - See Image 4
5. With the terminal console open, type "BT" in the command line and hit "done" - See Image 5.
6. Once you hit the "done", the 250-amp breaker should open. "BT" is the command for breaker test. If the breaker opened, proceed to step 7. If not, verify all wiring connections with the diagram included on the last page of this document.
7. Turn on the inverter disconnect but leave the 250-amp breaker off.

Image 1



Image 2



Image 3



Image 4



Image 5



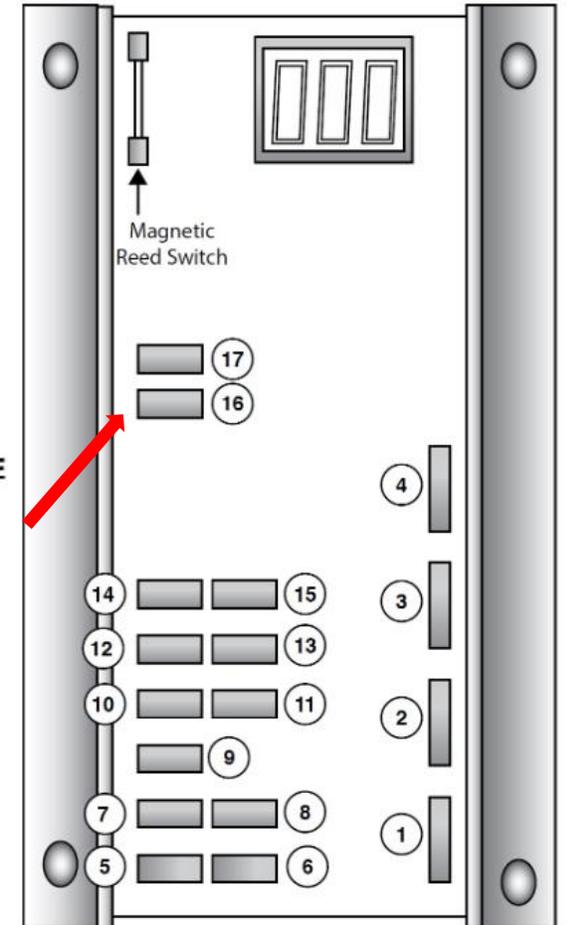
# Step 18 – System Validation and Testing - Alternator.

**Initial test and startup procedure.** Make sure coach battery is on (Blue LED is lit), Engine is off, and the 250-Amp breaker is off/open. Check the voltages at the following regulator terminals to ensure the wiring is correct. Use a hand-held multi-meter and test the following terminals for voltage: See Image 1 for terminal location.

1. TEST # 1: Engine/Ignition Off - Regulator is unpowered - LED display should be dark or off)
  - a) Terminal 2 - RED Power Wire – under 1Vdc.
  - b) Terminal 9 - Positive Voltage Sense Wire - under 1Vdc.
  - c) Terminal 3 - BROWN Ignition Wire - 0 Vdc.
  - d) Terminal 4 - BLUE Field Wire - 0 Vdc.
2. TEST # 2: Engine/Ignition Off, turn on the 250-amp breaker. Regulator is powered - LED display should be dark or off)
  - a) Terminal 2 - Primary RED Power Wire - 12 -14.5 Vdc.
  - b) Terminal 9 - Positive Voltage Sense Wire - 12 -14.5 Vdc.
  - c) Terminal 3 - BROWN Ignition Wire - 0 Vdc.
  - d) Terminal 4 - Primary BLUE Field Wire - 0 Vdc.
3. TEST # 3: Engine Off, chassis in accessory mode (If equipped push the Start button without pressing the brake pedal). Regulator is powered - LED display should be dark or off)
  - a) Terminal 2 - Primary RED Power Wire - 12 -14.5 Vdc.
  - b) Terminal 9 - Positive Voltage Sense Wire - 12 -14.5 Vdc.
  - c) Terminal 3 - BROWN Ignition Wire - 0 Vdc.
  - d) Terminal 4 - Primary BLUE Field Wire - 0 Vdc.

Image 1

1. GROUND INPUT
2. POWER INPUT
3. IGNITION INPUT
4. FIELD OUTPUT
5. ALT. TEMP. (-)
6. ALT. TEMP. (+)
7. BAT. TEMP. #1 (-)
8. BAT. TEMP. #1 (+)
9. POSITIVE VOLTAGE SENSE
10. SmartLink™ TX
11. SmartLink™ RX
12. STATOR IN
13. TACHOMETER OUT
14. BAT. #2 TEMP. (-)
15. BAT. #2 TEMP. (+)
16. AUX. #1 LAMP
17. DASH LAMP



Pin 16 is the alternator fault lockout trigger circuit

# Step 18 – System Validation & Testing - Alternator cont.

## Image 1

4. TEST # 4: Start the engine - Engine on - Regulator is powered – Data showing on LED display.
  - a) Terminal 2 - RED Power Wire - 12 -14.5 Vdc.
  - b) Terminal 9 - Positive Voltage Sense Wire - 12 -14.5 Vdc.
  - c) Terminal 3 - BROWN Ignition Wire - 12 -14.5 Vdc.
  - d) Terminal 4 - BLUE Field Wire – 4- 14.5 Vdc.
  - e) LED Display will be rolling through the following information in sequential order. "See Image 1" for additional info.
    - 1) BAL
    - 2) 618
    - 3) CFP
    - 4) -b-
    - 5) bv – Then it will display the actual battery voltage.
    - 6) Cv - Then it will display calculated target battery voltage.
    - 7) b1 - Then it will display the battery temperature.
    - 8) AL - Then it will display the alternator temperature. If the temp is not displayed correctly, it will display N/C and the temp sensor on the alternator will need to be replaced with P/N 356896-01-000. Contact Technical Assistance at 1-866-653-4329.
    - 9) b2 - Then it will display NC since only one battery temp sensor is used.

	<b>BAL</b> Indicates Balmar
	<b>618</b> Indicates MaxCharge model, such as MC-618
	<b>CFP</b> Indicates Regulators Custom factory Program– The Winnebago program
	<b>F-0</b> Indicates the Regulator's Max Field Percentage (Belt Load Manager) . Ranges from F-0 to F-9
	<b>-b-</b> Indicates stage of charge. "-b-" indicates bulk. "-A-" indicates absorption. "-F-" indicates float. "-r-" indicates ramp.
	<b>bv</b> Indicates system battery voltage. Followed by actual voltage reading.
	<b>Cv</b> Indicates Calculated Voltage (Target voltage based on preset program levels). Followed by voltage reading.
	<b>b1</b> Indicates Battery #1 Temperature. Followed by NC (not connected), or temperature in Celsius.
	<b>AL</b> Indicates Alternator #1 Temperature. Followed by NC (not connected), or temperature in Celsius.
	<b>b2</b> Indicates Battery #2 Temperature. Followed by NC (not connected), or temperature in Celsius.

6. Open the Lithionics Battery Monitor application again.
  - a) Connect to the main battery through the App – Note: The battery serial number is on the side of the battery, select the correct serial number listed on the app.
  - b) On the main screen. Locate the Cell "C." – Current.
  - c) With the engine running at 2000RPM, the display in cell "C." should be green and displaying a reading of 160-170A. If two batteries are connected to the coach, the current is distributed equally to each battery. In this case, you need to log into each battery and add the cell "C." values together and the total should be 160-170A.
7. Testing is now complete.

# Step 19 – System Validation and Testing Inverter

1. Turn on the Inverter disconnect – See Image 1.
2. Turn on the inverter with the remote display panel – See Image 2.
3. Verify that the inverter is fully operational by performing the following steps.
  - a) Use one of the 110v receptacles in the coach to power up a device.
  - b) Turn on and operate the roof A/C.
  - c) Start the Microwave. (Roof A/C and microwave cannot be run at the same time)
4. Turn off the Inverter disconnect.

Image 1

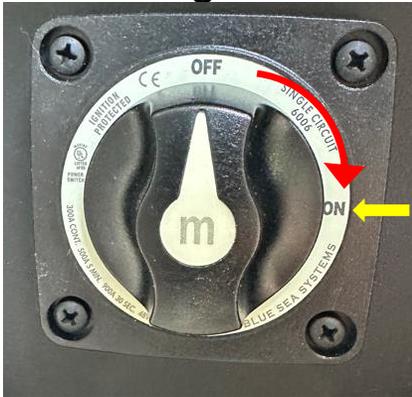


Image 2



Image 3



# Step 20 – System Validation and Testing Power Cord and Solar.

1. Connect the power cord to the unit– See Image 1 and plug the power cord into 30-amp receptacle.
2. Check that the power cord is supplying power by performing the following steps.
  - a) Use one of the 110v receptacles in the coach to power up a device.
  - b) Turn on and operate the roof A/C.
  - c) Start the Microwave.
3. Unplug the power cord and disconnect it from the coach.
4. Reconnect the solar panels to the solar connection port - See Image 2.
5. Drive the unit outside and verify that the solar panels are charging the batteries– See Image 3.

Image 1



Image 2

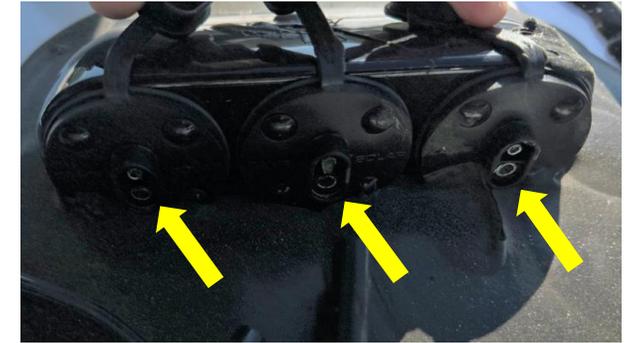


Image 3



# Step 21 – Reinstall the 3-Point Seat.

1. If everything has tested ok - Set the seat backs and cross members on the dinette frame – See Image 1.
2. Align the seat so previously made marks are realigned – See yellow arrows in Image 2.
3. Using a  $\frac{3}{4}$  inch socket, reinstall the seat hardware. Using a torque wrench, torque the nuts to 57 +/-3.5 NM (42 +/- 3 Ft-lbs.) shown with the red arrow (8-Places) in Image 3.
4. Reinstall the seat cushions by aligning the slots/pins and pushing down on the front edge and reinstall the seat base front panel.
5. The rework is now completed.

Image 1



Image 2

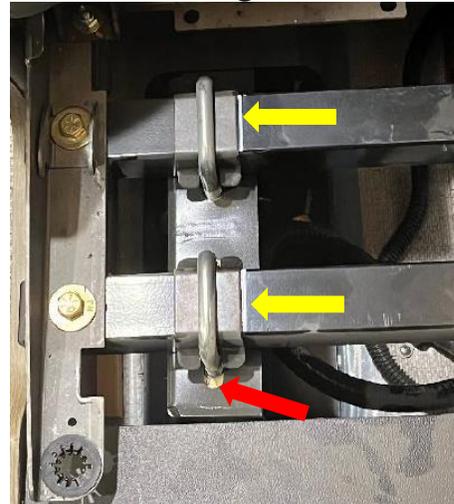


Image 3

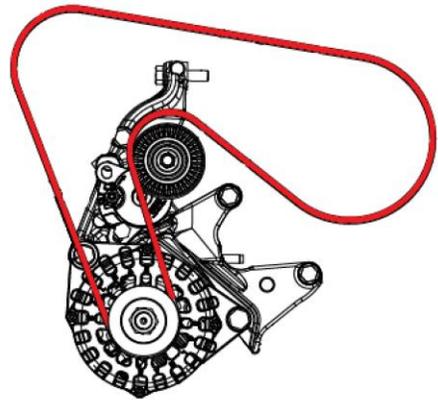


# Blank Slide-

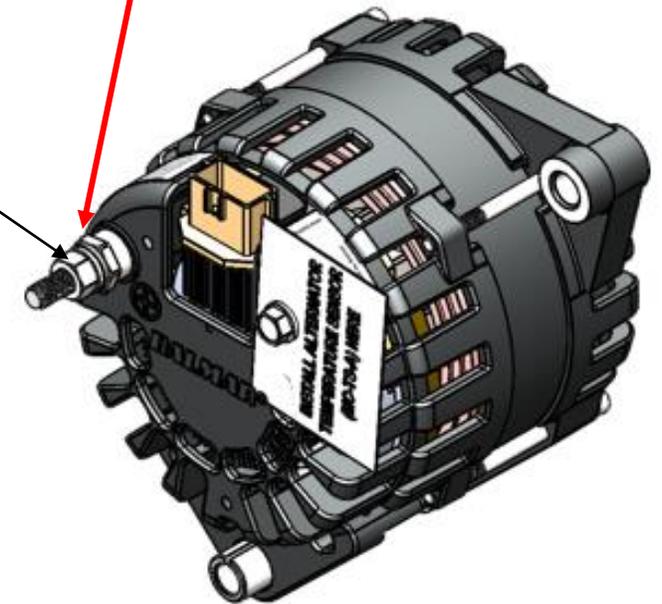
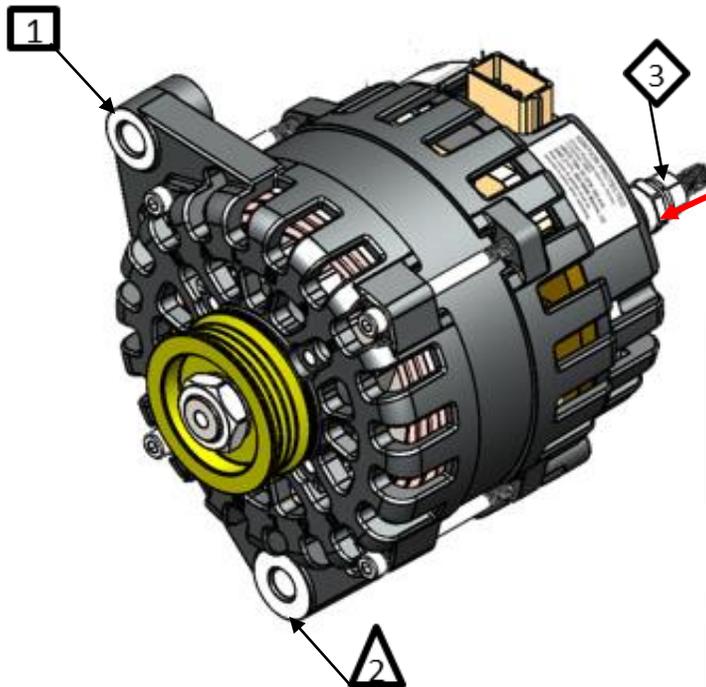
# Black Alternator Assembly and Torque Procedure

**Note: To avoid damaging the alternator, never hang the alternator by the cables and always use a thin 17mm backer wrench to remove or torque the positive 3/0 cable. Damage to the rectifier will occur if this process is not followed**

- 1 Install ground cable to front of alternator. Torque M10-1.5x45, 17mm head bolt to 45 ft-lb. Apply thread locker.
  - 2 Install M10-1.5x140, 17mm head bolt, torque to 35 ft-lb. Apply thread locker.
  - 3 Install B+ cable and torque M8-1.25, 13mm head nut to 14 ft-lb. Apply thread locker. Stack - Terminal, washer, lock washer, Nut.
- Terminal/cable orientation shown below with red arrows. Cables need to be attached and be aligned with the 4-pin connector. Rotate all 3 cables 20 Deg toward the 4-pin connector so that all 4 cables can be bundled together approximately 6-12" down stream. Ensure terminals and or cables does not interfere with other components that would affect proper torquing.



Belt Routing



Use thin 17mm backer wrench on the base of this stud.

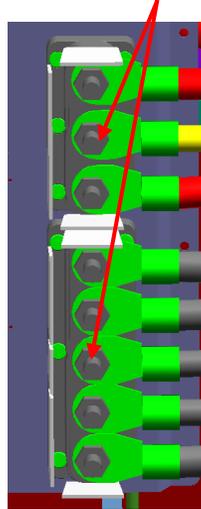
Alternator temp sensor harness is pre attached to alternator.

# Torque values-

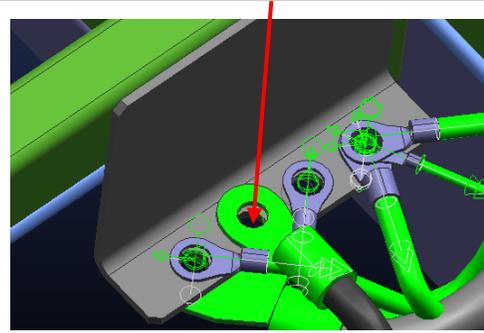
**Lithionics battery-**  
**347028-01-000**  
**13mm Socket**  
**Torque - 132 In-Lbs. x2**



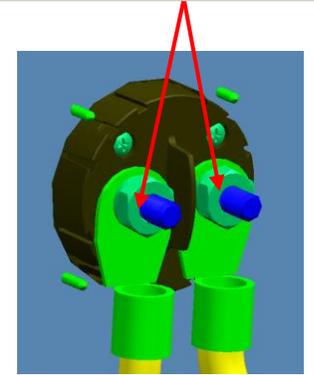
**3 or 5-way buss bar**  
**325348-01-000 3-Way**  
**355972-01-000 5-Way**  
**17mm Deep well Socket**  
**Torque - 190 In-Lbs. x All**



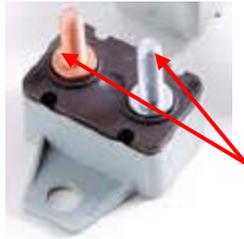
**5/16" Ground Bolt.**  
**All General grounds**  
**1/2" socket and backer wrench.**  
**Torque - 230 In-Lbs. x All**



**Inverter Disconnect-**  
**183904-01-000**  
**9/16" Socket**  
**Torque - 120 In-Lbs. x2**



**Xantrex Inverter-**  
**328076-01-000**  
**13mm Socket**  
**Torque - 88 In-Lbs. x2**

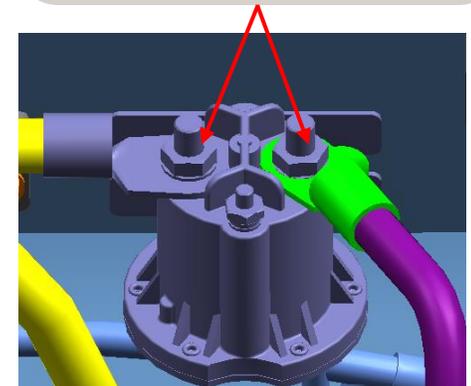
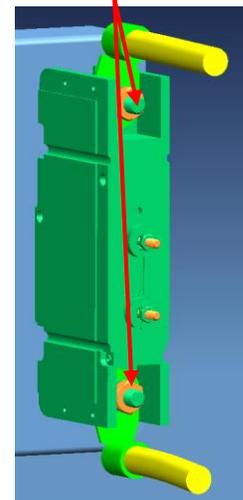
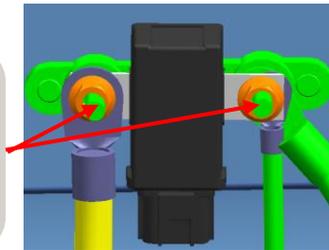


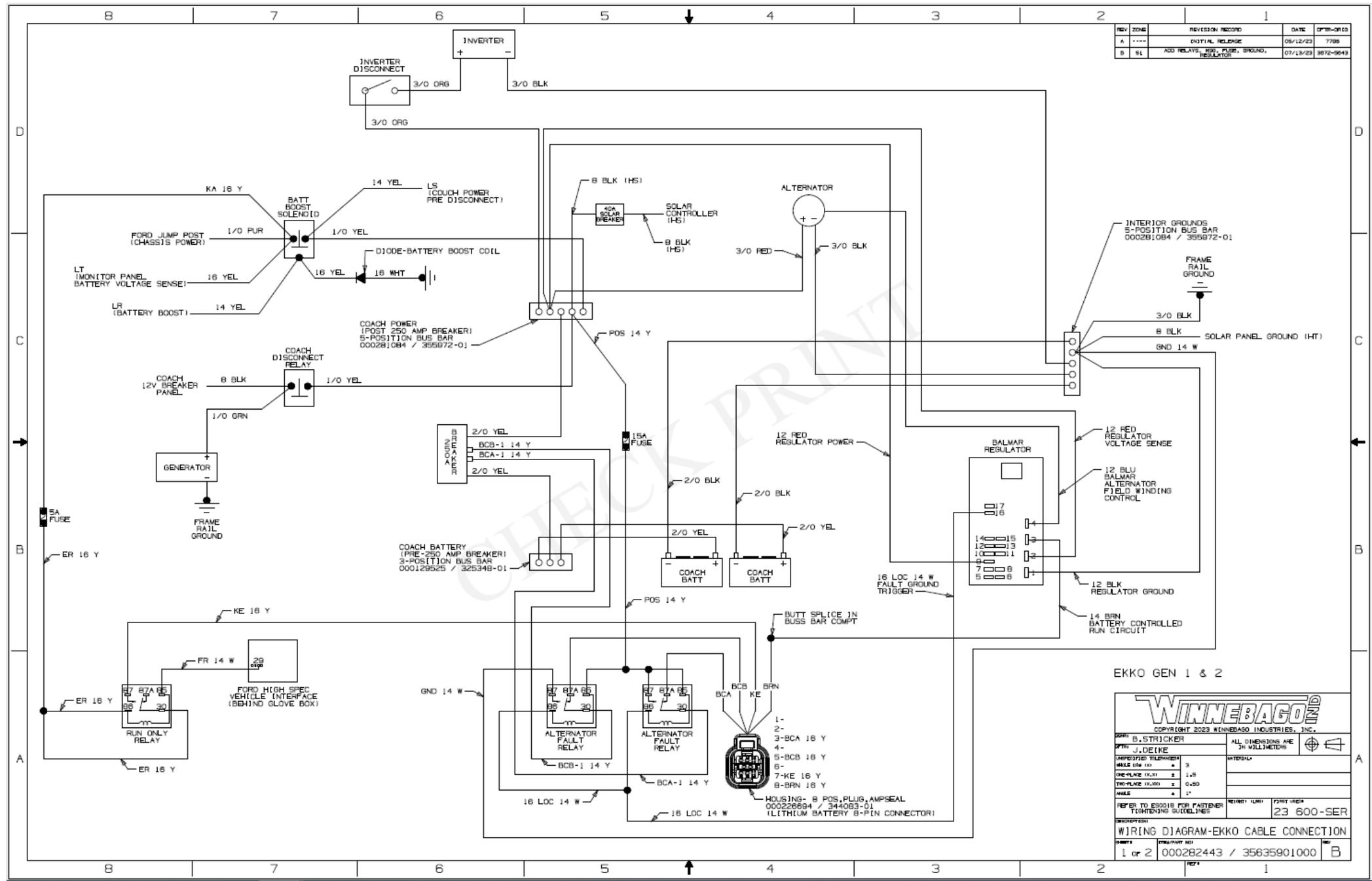
**40A Breaker**  
**333588-01-000**  
**3/8" Socket**  
**Torque - 24 In-Lbs. x2**

**Coach Battery 250-Amp Breaker**  
**347029-01-000**  
**5/8" Socket - Torque - 230 In-Lbs. x2**  
**3/8" socket - Torque - 12 In-Lbs. x2**

**Battery boost solenoid**  
**335753-01-000**  
**1/2" Socket-**  
**Torque - 190 In-Lbs. x2**  
**3/8" socket-**  
**Torque - 15 In-Lbs.**

**Coach Battery Disconnect-**  
**180722-01-000**  
**9/16" Socket**  
**Torque - 130 In-Lbs. x2**





REV	ZONE	REVISION RECORD	DATE	DTM-0163
A	----	INITIAL RELEASE	05/12/23	7788
B	SL	ADD RELAYS, REG, FUSE, GROUND, RELAY/COIL	07/13/23	3672-0643

EKKO GEN 1 & 2

**WINNEBAGO**  
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DRN: B. STRICKER	ALL DIMENSIONS ARE IN MILLIMETERS
DRN: J. DEIKE	
UNFINISHED DIMENSIONS	
SCALE (DWG. NO.)	1:4
SCALE (PLATE 19, 20)	1:4
SCALE (PLATE 19, 20)	1:4
SCALE	1"
REFER TO E20016 FOR FASTENER TIGHTENING GUIDELINES	23 600-SER
WIRING DIAGRAM-EKKO CABLE CONNECTION	
REV: 1 of 2	000282443 / 35635901000