PulseTech™

Pro-HD Model – E Troubleshooting Guide

ProHD chargers with a serial number that begins with an E are model E systems.

Example: S/N: E25099

WARNING:

During these troubleshooting tests the system can be plugged in and voltage / amperage will be present.

Test should be performed by qualified technicians ONLY.

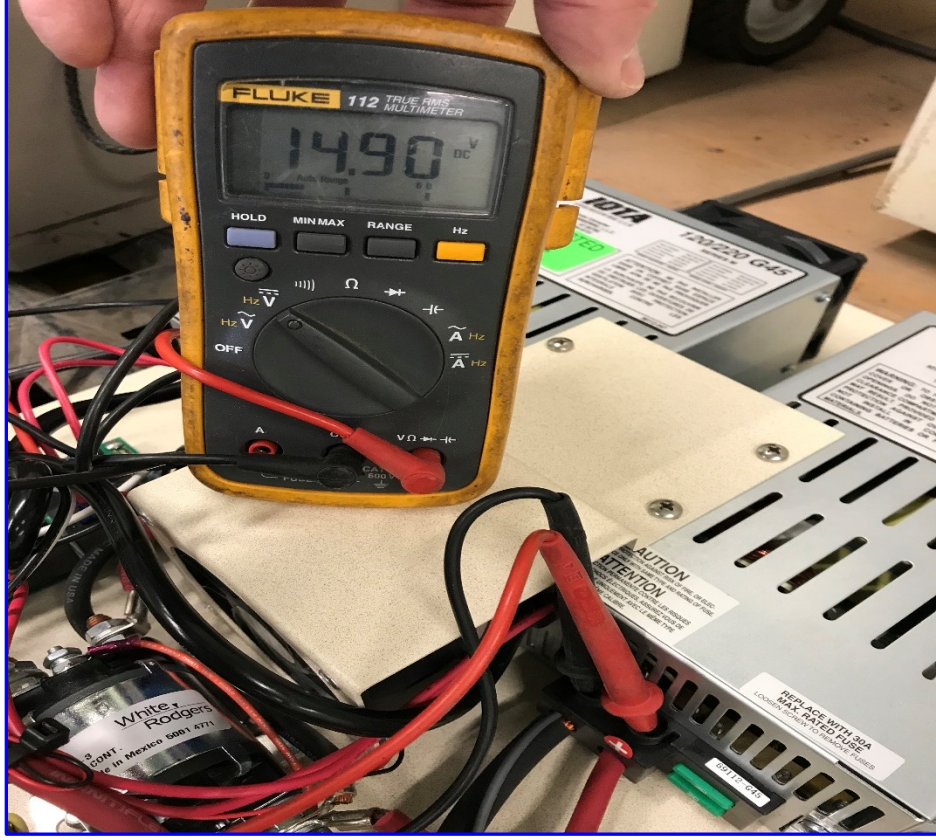
Always ensure that proper precautions are taken when conducting any of these tests.

Table of Contents:

The troubleshooting guide for the model E ProHD is designed to start at page 1 and work your way through the system to determine malfunctions. The below table of contents is for reference within the troubleshooting steps with the ProHD insert removed. To remove, take out the 2 allen head bolts, grab the Anderson connector / cables, then slowly pull upward and out. Place the insert on a workbench.

Once on workbench check all wires, boards and plugs for obvious damage, looseness, etc. After verifying no obvious faults plug in system and validate failure to charge again. If the system is still not functioning use below TS steps. If it is now functioning there are 2 possible issues. First is the rivets on the charging cables might be corroded or not making good contact. Second is the contactor solenoid may be malfunctioning. Verify good rivets / no corrosion, repair as required. 24V solenoid testing is covered under test#12.

Testing Left side power supply.



Testing Right side power supply.

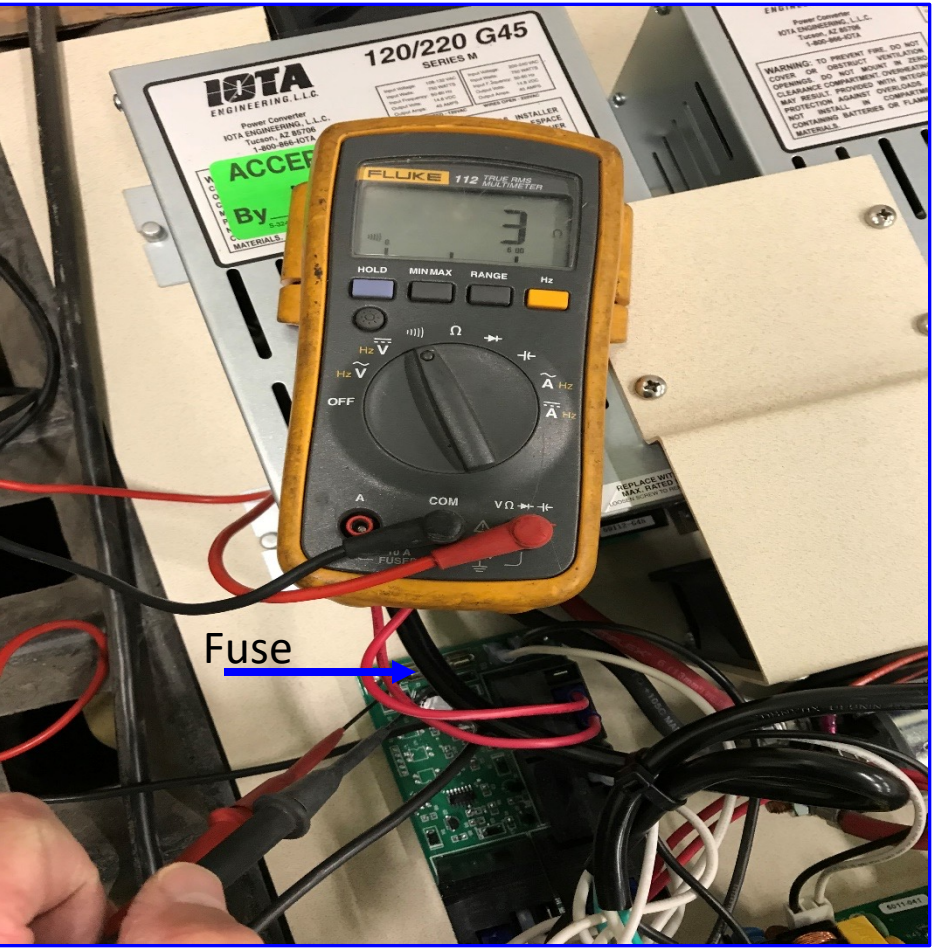
Test #1: Test DC Power supplies. Turn off system. Disconnect AC power.

Position multimeter to Test for 14.8 VDC (+/- .2 VDC) on both power supplies. See above.

Plug in AC power and Turn on system.

If there is NO DC output, go to Test #2.

If there IS adequate DC output, go to Test #6.



Test 2A: Sniffer Board Fuse Test.

Test 2B: Sniffer Board AC input power test.

Test #2: Test adequate AC input to sniffer board. Turn off system. Disconnect AC power.

Test 2A: Test the fuse on the sniffer board (small board on left side as looking at system). Replace if blown.

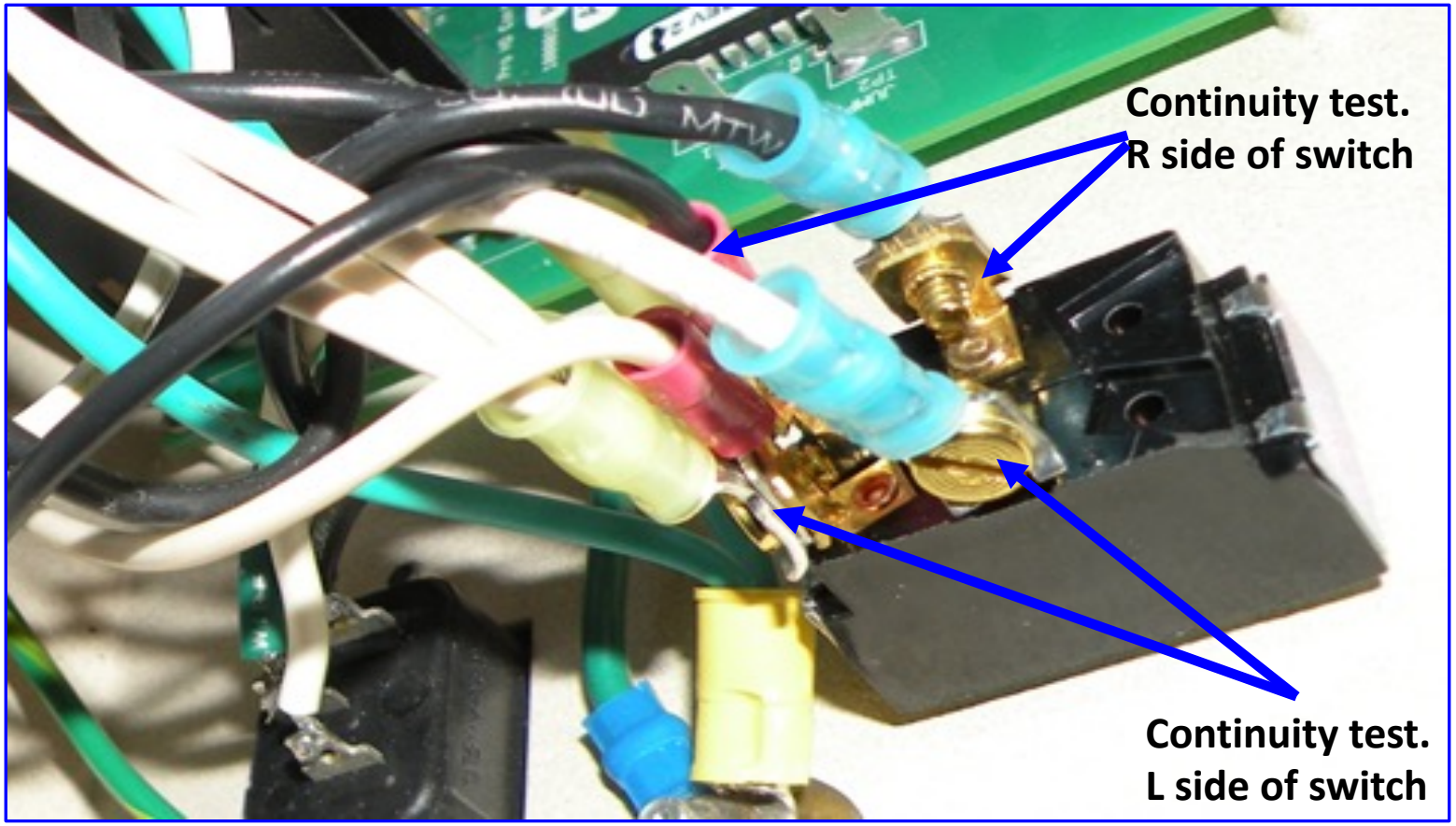
Test 2B: Disconnect the black and white AC power wires from sniffer board. These will be the ones right next to the fuse and closet to the power supplies. A needle nose pliers can help, as these can be difficult to pull loose.

Position multimeter to Test for 120 VAC going into the sniffer board from power switch (see above example).

Plug in AC power, turn on system. You should have AC power (100 – 240 VAC) coming from the main on/off switch.

If there is no power going into the Sniffer Board, the On/Off switch or connection wires are bad. See next page Test 2C for testing switch.

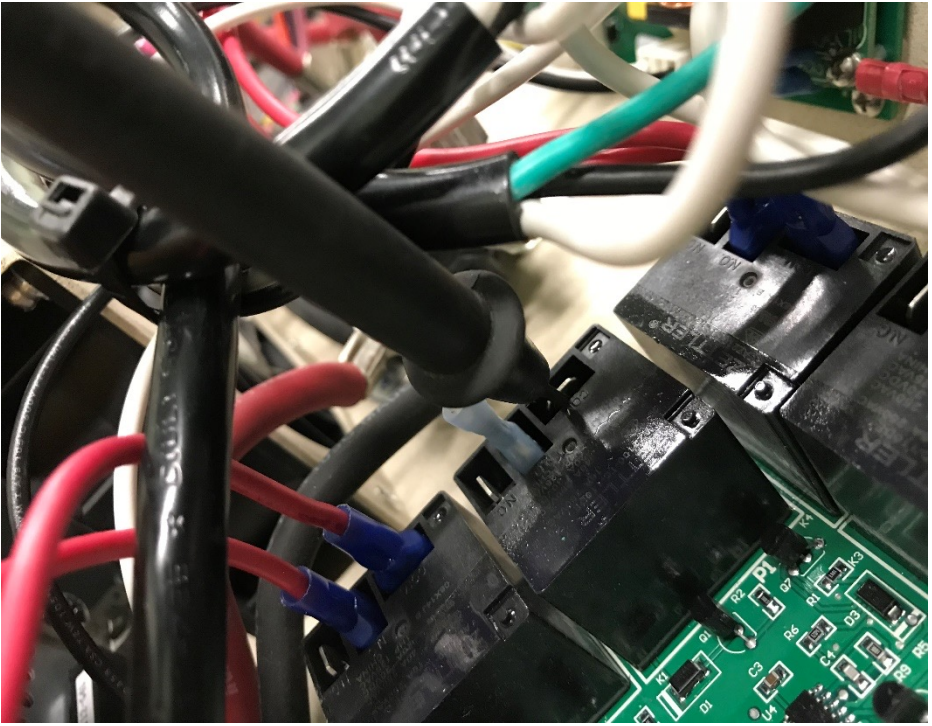
If there is AC voltage present, go to Test #3.



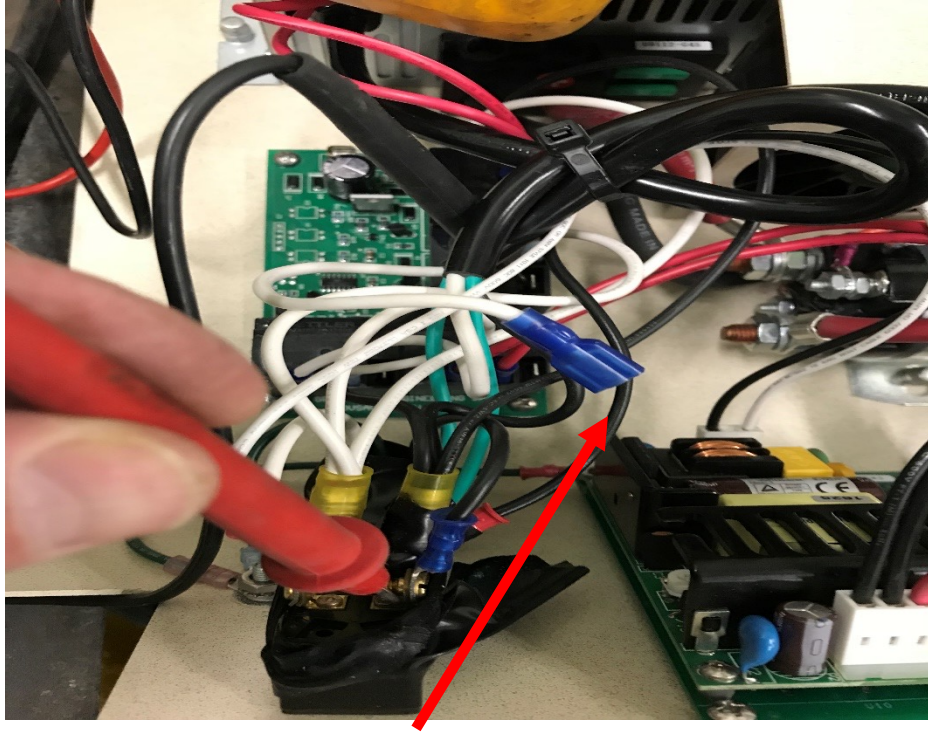
Test 2C: Testing the On / Off switch: **System off, AC power disconnected.**

Remove protective tape around on/off switch. Check all wires and connections from the AC power plug and the switch. Repair any deficiencies.

Switch Test: Using your multimeter test for continuity between the top lugs where the AC power wires are connected to the on/off switch and the corresponding lug below. With the switch in the off position there should be no continuity, and with the switch turned on there should be continuity.



White wire disconnected. Multimeter lead on Sniffer board output lug to DC power supply white wire.



White wire disconnected. Multimeter lead on black AC power lug of on/off switch. It may be easier to place a multimeter lead on the top lug or down into the wire cluster. Either is fine, as long as good contact is made before testing.

Test #3: Testing for AC power out of Sniffer Board going to DC Power supplies. Turn off system. Disconnect AC power.

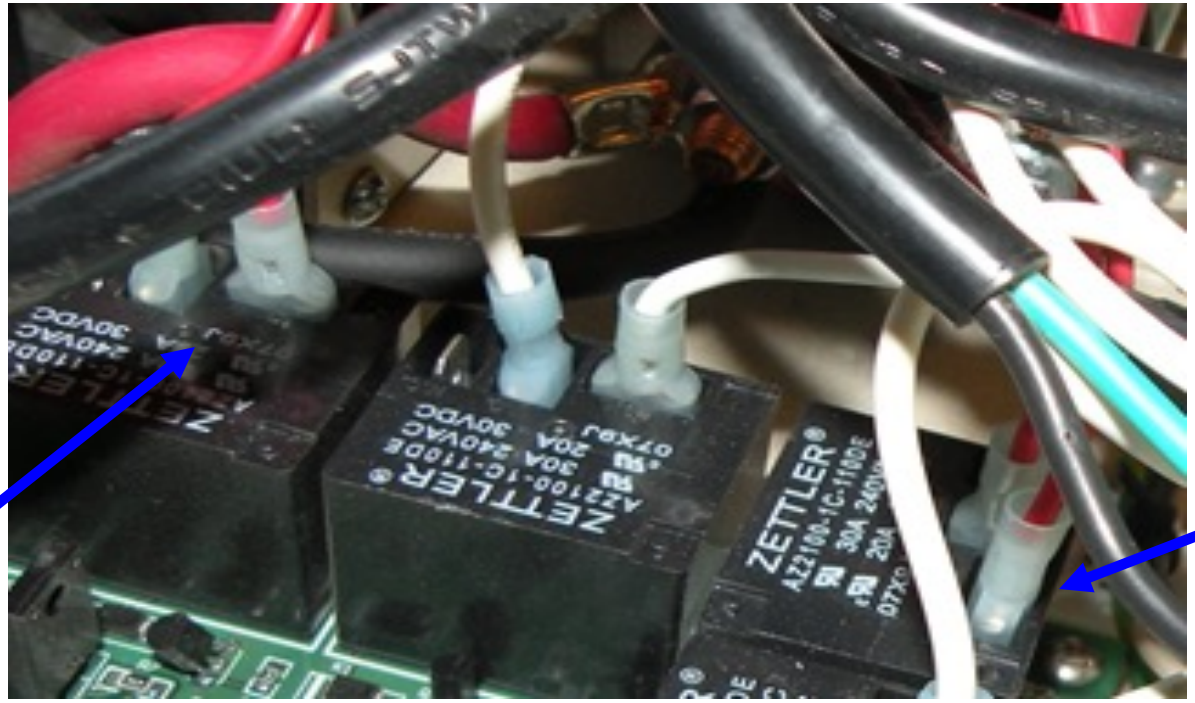
Find the white wires that go from the sniffer board to the power supplies. There will be 1 white wire per power supply. Note where they are connected and then disconnect the 2 white wires from sniffer board.

Set multimeter for AC Test (100 – 250 VAC). See above pics. Plug in and turn on system.
Test for adequate AC power coming out of the sniffer board going to each power supply.

Good AC Power output: Go to Test 4 next page.

No AC Output: The Sniffer Board is bad. Replace.

Connect / short
2 Red wires.



Connect / short
2 Red wires.

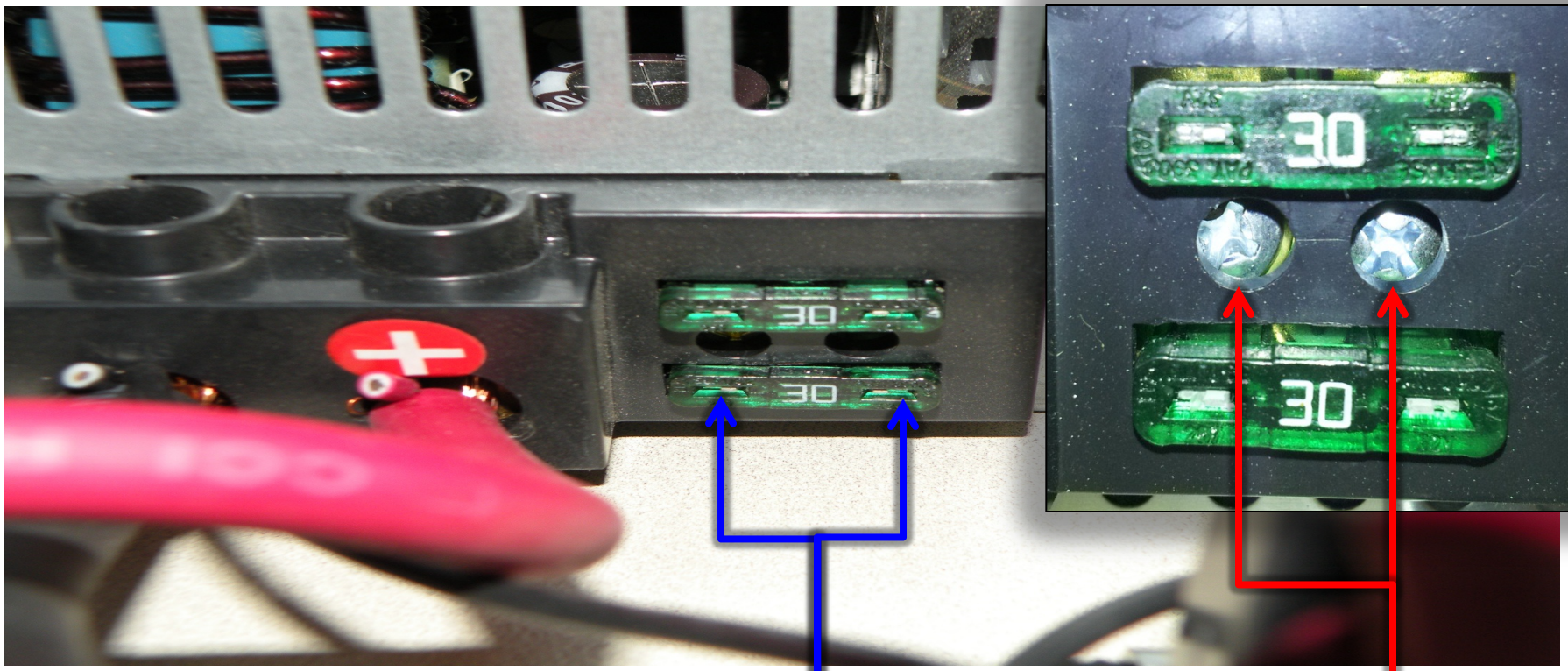
Test #4: Sniffer Board short test: Note: This test can only be done with 120V AC. Do not run test if using 220V AC power.
Turn off system. Disconnect AC power.

Find the red wires that go from the sniffer board to the power supplies that are not working. Connect / short the 2 wires together that are next to each other on the sniffer board. You can use a paperclip, a small bladed fuse, etc. There is not Voltage on these wires, you are connecting them to manually place the power supply into a 120V AC input configuration.

Plug in AC power and turn the system on.

Retest Power Supplies (Test#1):
If you now have 14.8 VDC (+/- .2V) output from the power supplies the sniffer board is bad. Replace sniffer board.

If still no output from power supplies go to **Test #5 on next page**.



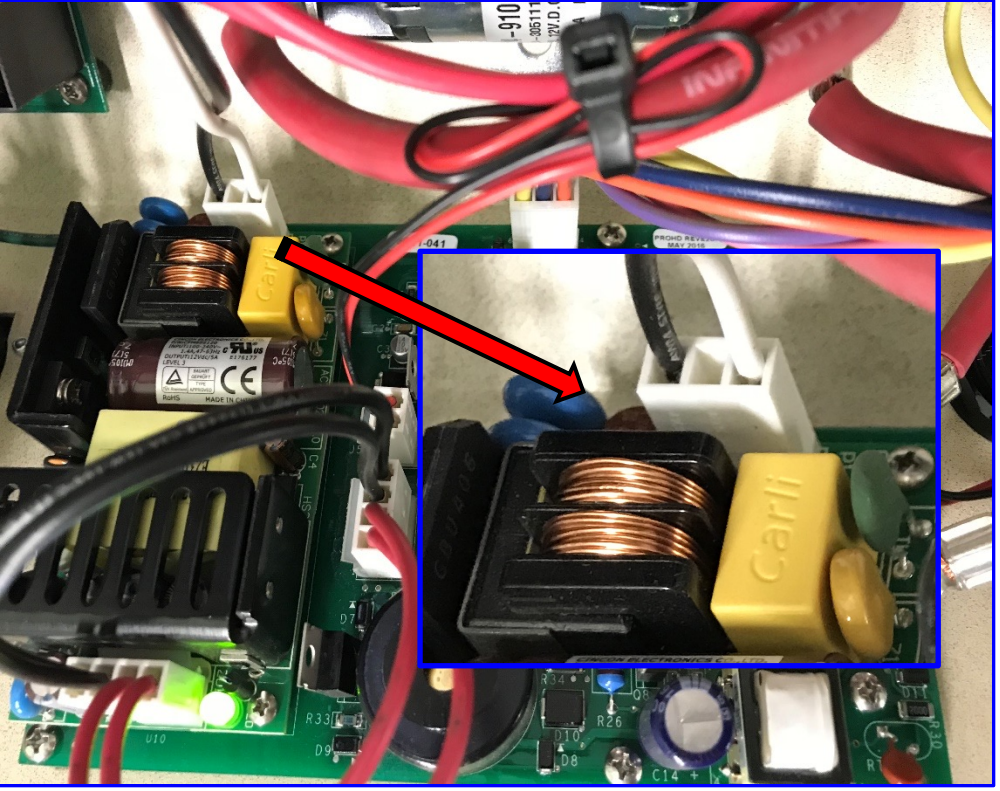
Test #5: Test Fuse on Power Supplies. Turn off system. Disconnect AC power.

These fuses rarely blow, but it is worth a check before you replace a power supply.

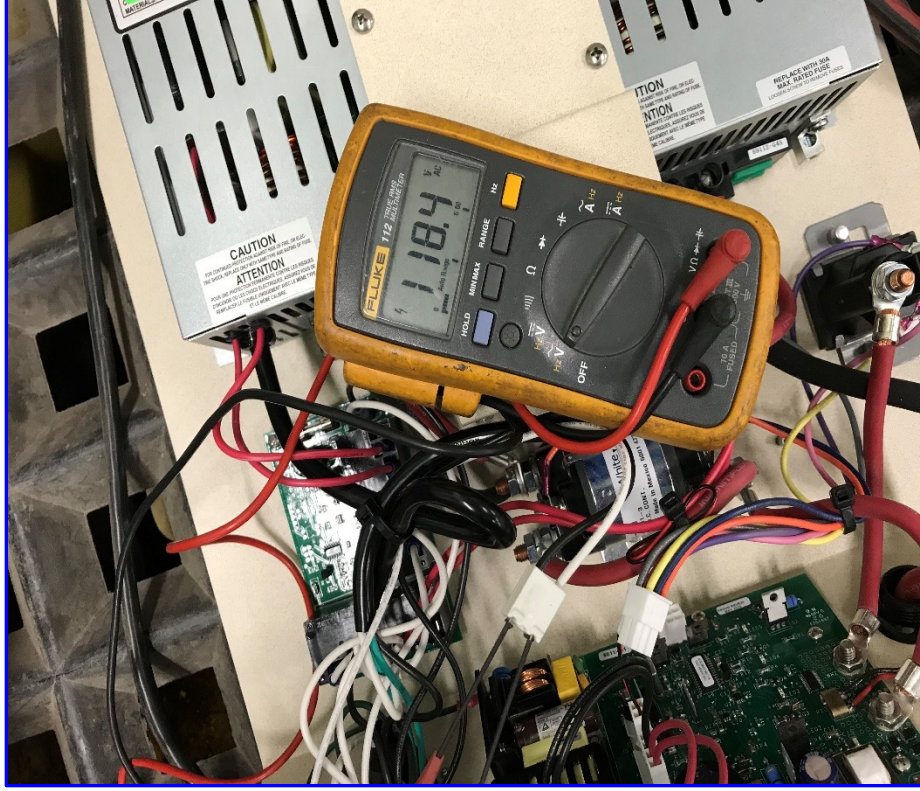
Using your multimeter check for continuity across the metal tabs of the two fuses. If you cannot make good contact remove the fuses to test. NOTE, there are screws that hold the fuses in place, See breakout pic at right. These MUST be loosened before attempting to remove. Replace any unserviceable / blown fuses.

Plug in AC power and turn on system. If you still do not have 14.8 VDC (+/- .2V) output from a power supply it is unserviceable. You need 2 proper functioning power supplies for 24V charging. Replace malfunctioning power supplies.

If bad:
Loosen the two small Phillips head screws and replace the 30A fuses.
If good:
The power supplies are bad.



AC power plug for Controller board power supply.



Testing AC power to Controller board power supply.

Test #6: Test for adequate AC power input to controller board / fan power supply.

The small power supply on the controller board has a green LED indicator. When this is light it should indicate adequate AC power is being received. If this is illuminated when power is on go to Step #7 on next page.

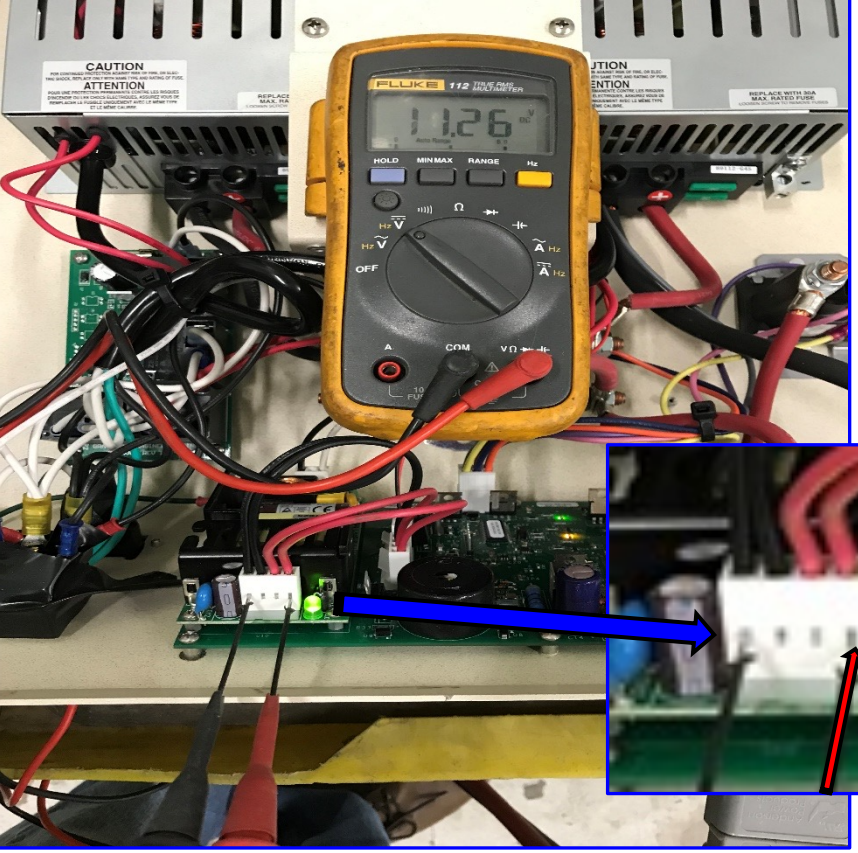
LED Not illuminated. Turn off system. Disconnect AC power.

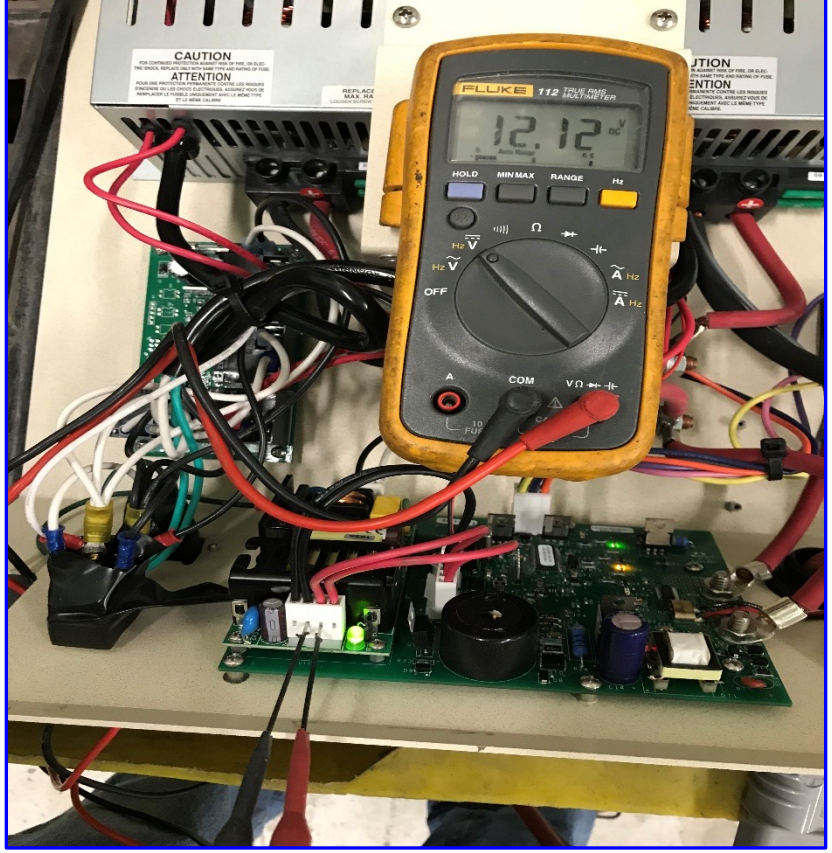
Find and disconnect the AC power plug for the Controller Board / Fan Power Supply. A small flathead screwdriver may help with the plastic tab holding the connector in place. Set multimeter to AC, and test for input AC voltage.

Plug in AC power and turn on power switch:

AC Power Good: Go to Step #7 on next page

AC Power not good: Check wires, and power switch. Fix any deficiencies.





Testing controller board DC power supply outputs.

Test #7: Test for adequate DC power output from controller board power supply to controller board and cooling fan.

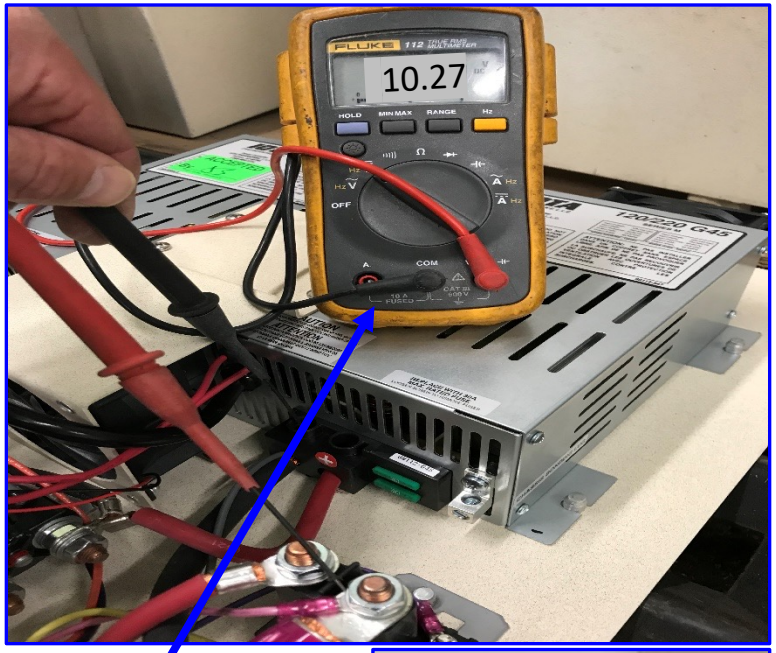
AC Power plugged in, System power switch on.

Note: There are test ports on the plug, so there is no need to disconnect. See above right side pic.

Set multimeter to DC voltage and test output. There should be between 11 and 13 volts between any of the 2 ground (black wires) and 2 power (red wires).

DC Output Power Good: Go to Step #8

DC Power Output not good: Conduct Test#6 again. If AC input good with no DC output replace Rev E controller Board.



Testing battery VDC at Relay and power supply. Should match VDC of the battery the system is connected to via clamps prior to turning on system.

Testing charging output VDC at same locations as pervious test on upright relay and power supply. VDC should now indicate charge VDC of 14.8VDC (+/- .2 VDC).

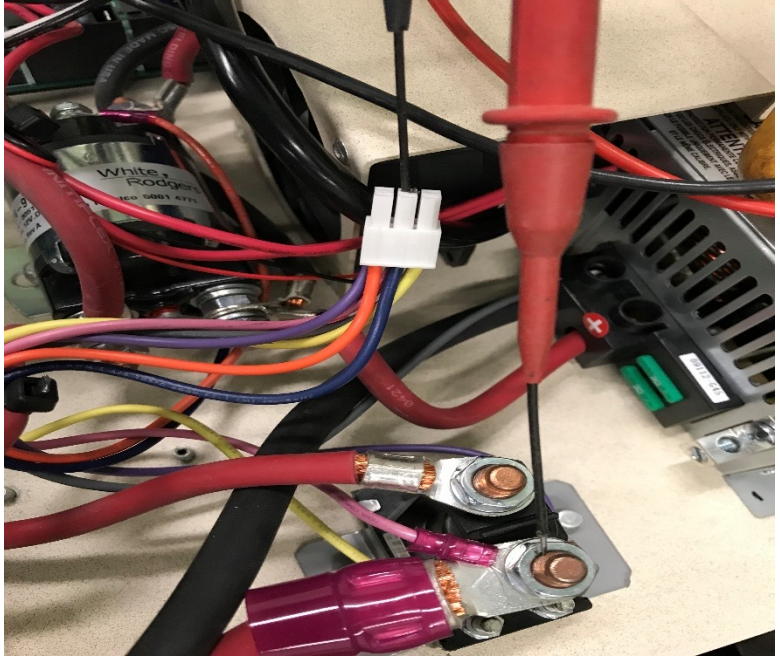
Test #8: Test 12V Charge system (hooked up to a single 12V battery or 12V system). Turn off system. Disconnect AC power.

Hook clamps to a single 12V battery. Ensure battery has at least 6 VDC (10 or more VDC is better for testing) when tested.
> Test for battery voltage coming into charger. See above left pic. Lightly wiggle battery clamps while testing to ensure rivets on clamps are tight. If VDC drops when wiggled repair rivets.

AC Power plugged in, System power switch on. Charger should engage battery after a few seconds, and stay engaged.

Measure 12V charge: Using Multimeter test for 14.8 VDC (+/- .2 VDC) output to battery. (See above right side pic)
> Does system engage single 12V battery and stay engaged? You may have to test several batteries to verify fault or serviceability.
Yes: 12V side of ProHD charger is functioning properly. Go to test 10 for 24V side test.
No: Check all cables, clamps, and charger clamp rivets. Repair any deficiencies and retest. If still not ok go to step 9.

Testing activation VDC on upright solenoid switch.



Checking continuity between upright solenoid switch battery VDC (upper post purple wire) and corresponding controller board plug.

Test #9: Test Upright Relay (12V Charging). Turn off system. Disconnect AC power.

Hook charger clamps to a 12V system.
12V can be a battery or 12V system. Ensure battery VDC is at least 6 VDC (10 or more VDC is better for testing).

See above left side pic. Locate upright solenoid switch and set Multimeter to VDC.
AC Power plugged in, System power switch turned on.

Charger should engage batteries after a few seconds, and stay engaged. Controller board should provide a constant 11 to 13VDC to the upright relay. If VDC does not remain constant turn off and unplug system. Check all connections, and continuity between the upright relay and corresponding plugs on controller board wire plug (see above right side pic).

Go to next page, Test #9 continued.

Testing activation VDC on upright solenoid switch.

Upright relay failure verification.

Test #9 Continued: Test Upright Relay (12V charging). Turn off system. Disconnect AC power.

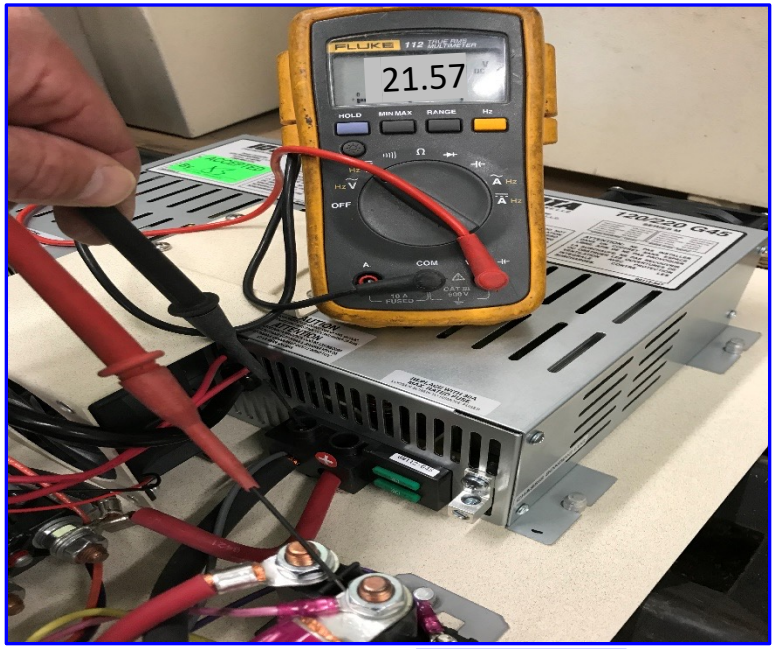
Is there a constant 11 to 13 VDC at the upright relay? Again, this should be done on several batteries or systems with adequate VDC to verify fault.

Yes: Good constant Vdc to upright relay. Does the 12V side of ProHD charger now functioning properly.

Yes: Go to Test 10 to start 24V charging testing.

No: Upright relay failure. To verify fault. Turn system off and position a screw driver across the relay (see above right hand pic) top posts. Turn system back on. If system charges once pulsing light comes on the upright relay is defective. Replace upright relay.

No: VDC comes on and drops off or no VDC at upright relay. Replace controller board.



Testing battery VDC at relay and power supply. Should match VDC of the battery the system is connected to via clamps or Nato plug prior to turning on system.

Testing charging output VDC at same locations as pervious test on upright relay and power supply. VDC should now indicate charge VDC of 29.6 VDC (+/- .4 VDC).

Test #10: Test 24V Charge system (hooked up to a 24V system or 2 - 12V batteries in series). Turn off system. Disconnect AC power.

Hook clamps to a 24V system or 2 - 12V batteries in series. Ensure battery VDC is at least 16 VDC (20 or more VDC is better for testing) when tested. We recommend that you do not use a single 24V battery. Most of these are small very dense batteries and the ProHD can have problems engaging these, as it is designed for 24V systems with multiple batteries.

> Test for battery voltage coming into charger. See above left pic. If using clamps lightly wiggle cable near clamps while testing to ensure rivets on clamps are tight. If VDC drops when wiggled repair rivets.

Go to next page: Test#10 continued.

Testing charging output VDC at same locations as pervious tests: Test between upright relay power side and power supply. VDC should now indicate charge VDC of 29.6 VDC (+/- .4 VDC).

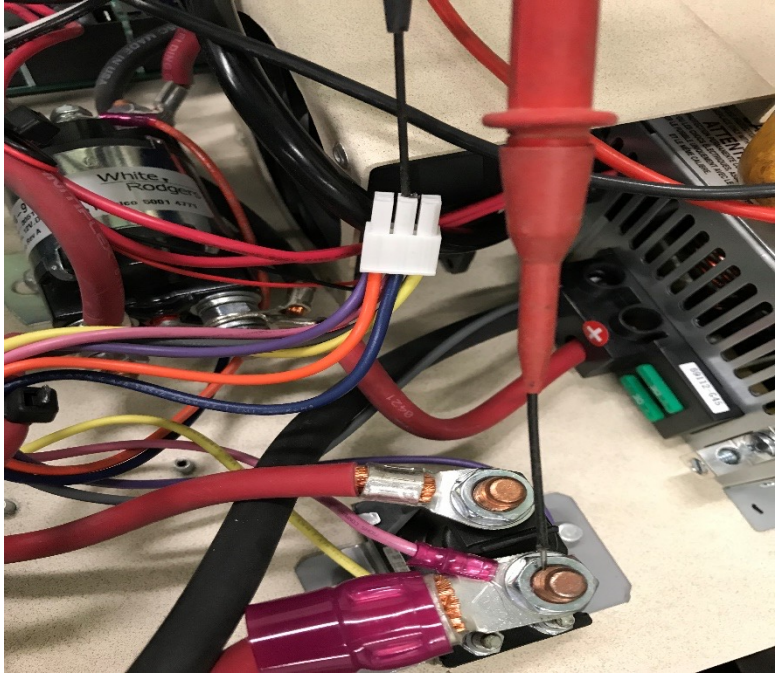
Test #10 continued: Test 24V Charge system (hooked up to a 24V system or 2 - 12V batteries in series).

AC Power plugged in, System power switch turned on. Charger should engage batteries after a few seconds, and stay engaged.

Measure 24V charge: Using Multimeter test for 29.6 VDC (+/- .4 VDC) output to battery. (See above pic)
> Does system engage 24V batteries and stay engaged? You may have to test on several systems to verify fault or serviceability.

Yes: 24V side of ProHD charger is functioning properly.

No: Check all cables, clamps, and charger clamp rivets. Repair any deficiencies and retest.
If still not functioning go to step 11.



Checking activation VDC (left pic) and continuity between upright solenoid switch battery VDC (upper post purple wire) and corresponding controller board plugs (right pic).

Test #11: Test Upright Relay (24V system). Turn off system. Disconnect AC power.

Hook charger clamps or Nato connector to 24V system.
24V can be a system or 2 - 12V batteries in series. Ensure battery VDC is at least 16 VDC (20 or more VDC is better for testing).

See above left side pic. Locate upright solenoid switch and set Multimeter to VDC.
AC Power plugged in, System power switch turned on.

Charger should engage batteries after a few seconds, and stay engaged. Controller board should provide a constant 11 to 13VDC to the upright relay. If VDC does not remain constant turn off and unplug system. If not previously done, check all connections and continuity between the upright relay and corresponding plugs on controller board wire plug (see above right side pic).

Go to next page, Test #11 continued.

Testing activation VDC on upright solenoid switch.

Upright relay failure verification.

Test #11 Continued: Test Upright Relay (24V charging). Turn off system. Disconnect AC power.

Is there a constant 11 to 13 VDC at the upright relay? Again, this should be done on several batteries or systems with adequate VDC to verify fault.

Yes: Good constant Vdc to upright relay. Does the 24V side of ProHD charger now functioning properly.

> Yes: No further testing needed.

> No; with good constant VDC at relay: Go to Test 12 for 24V Solenoid testing.

> No; with NO constant VDC at relay: Upright relay failure. To verify fault. Turn system off and position a screw driver across the relay (see above right hand pic) top posts. Turn system back on. If system charges once pulsing light comes on the upright relay is defective. Replace upright relay.

No: VDC comes on and drops off or no VDC at upright relay. Replace controller board.

Testing activation VDC on 24V solenoid.

Multimeter probes on activation lugs for 24V solenoid.

Test #12: Test 24V system Solenoid. Turn off system. Disconnect AC power.

When you are engaging a 24V system a constant 11 to 13 VDC at the 24V solenoid must be maintained.

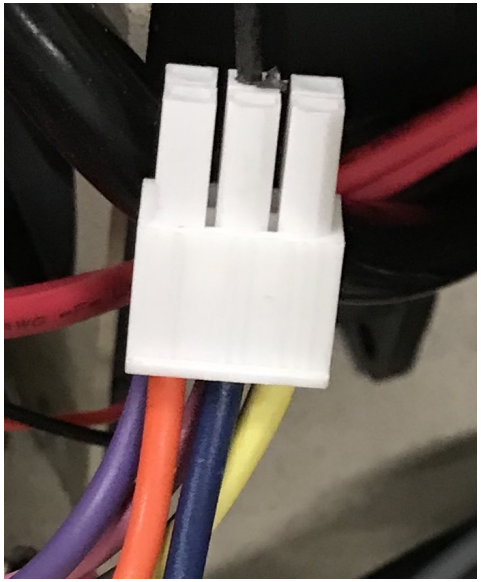
Hook charger clamps or Nato connector to 24V system. 24V can be a system or 2 - 12V batteries in series. Ensure battery VDC is at least 16 VDC (20 or more VDC is better for testing).

Locate 24V solenoid located right in front of cooling fan. The left side of the solenoid has the activation wires coming form the controller board.

Set multimeter to VDC testing, and place probes on activation lugs of 24V solenoid.

Continued on next page:

Testing activation VDC on 24V solenoid.


Controller Board wire plug.

Test #12 (continued): Test 24V system Solenoid. Plug in AC Power, and turn system power switch on.

Charger should engage (or attempt to engage) batteries after a few seconds. If the charger works now while the insert is laying flat you may have a solenoid sticking issue. This can sometimes be difficult to diagnose.

Measure Vdc at 24V solenoid activation lugs. Controller board should provide a constant 11 to 13VDC to the 24V solenoid when charging 24V systems. If VDC does not remain constant turn off and unplug system. Check all connections and continuity between the 24V solenoid and corresponding plugs on controller board wire plug. Repair any defective wires or connections and retest. Again, if the system now works laying down you may have a sticking solenoid.

Do you have constant VDC at the 24V solenoid?

Yes: Constant Vdc to solenoid.

> Yes: 24V side of ProHD charger now functioning properly. No further testing needed.

> Yes, 24V side of ProHD still not engaging 24V systems with insert upright.

> Yes, 24V side of ProHD is now engaging 24V systems with insert flat. Replace contactor solenoid.

No: Replace Controller board. END OF TESTING. If you have further questions please contact your PulseTech FSR. POC I listing on next page.

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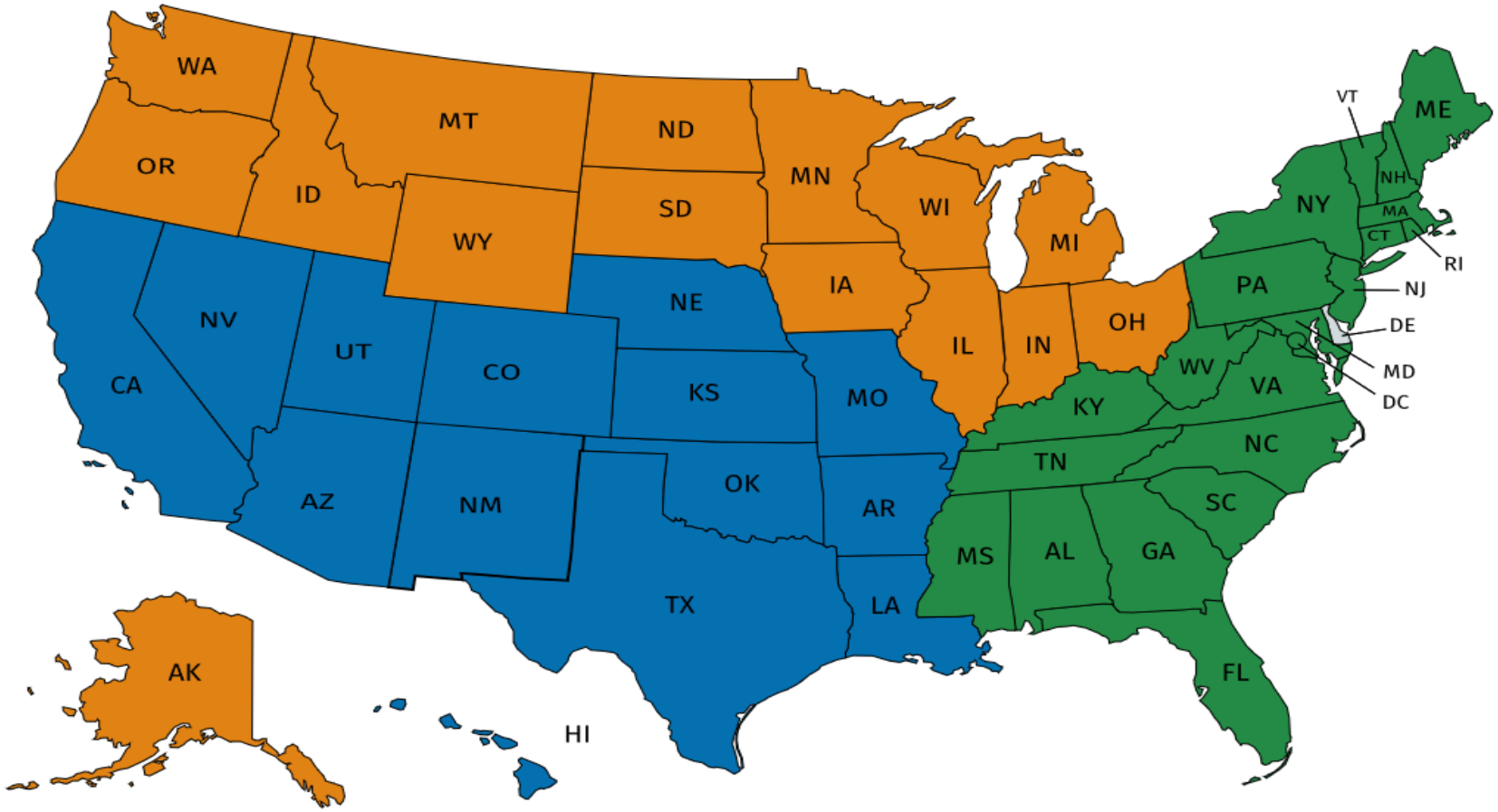
Field Support Representative Map



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