



# Technical Support

Subject
Testing Multifunction AC and DC Circuits

## SYSTEM OR PARTS AFFECTED

- Multifunction Power Systems (MF) with AC-DC Generator, equipped with either:
  - 120V AC GFCI and 240V AC receptacles
  - Terminal strip connections

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When generator output is reported as a problem, refer to the following diagnostic procedures.

## Before you start

When contacting VMAC Technical Support, the following information is required:

Customer name	
Contact information – phone number	
Contact information – email address	
System ID number	
Service Ticket number (if issued)	
Engine Hours	
Compressor Hours	

## TEST PROCEDURES

The AC Voltage test must be performed before the DC test. Without proper AC output from the generator, there will be no DC output.

### 240V AC CIRCUIT TESTING – RECEPTACLE-TYPE MULTIFUNCTION

1. Start the Multifunction engine and allow it to warm up for 1 minute. The engine should rev up and then idle down.
2. Turn the Generator on at the control panel. The engine should rev up and stay at high rpm.
3. Using a multimeter set to the AC voltage scale, measure the voltage at the 240V AC receptacles (Figure 1). Record the results in Table 1 below and compare to the specifications.

Circuit	Specification	Measured Voltage
X to Y	Min. 216 ACV, Max 263 ACV	
X to Z	Min. 216 ACV, Max 263 ACV	
Y to Z	Min. 216 ACV, Max 263 ACV	

Table 1

Version	Document	Department	Revision Details	Revised by	Tech	Engineering	Implemented
B	EXT-MF-005	Tech	Add Terminal Strip Test	BDJ	DB	N/A	24 Oct 2019

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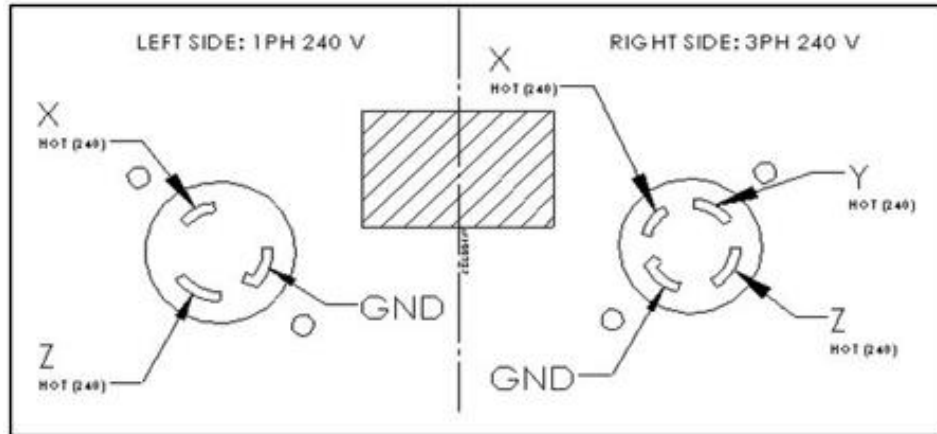


Figure 1

### 120V AC CIRCUIT TESTING – RECEPTACLE-TYPE MULTIFUNCTION

4. Ensure that the machine is running, the main breaker is in ON position, and neither of the 20A pop breakers is tripped.
5. Locate the two 120V receptacles, above the 240V outlets and LED Voltage display (Figure 2). Use a multimeter set to its AC voltage setting to measure between the small slot and large slot in each of the 4 120V AC outlets. Record the results in Table 2 below and compare them to the specifications.

Circuit	Specification	Large slot – Small slot
Left Outlet, Left side	Min. 110V, Max. 130V	
Left Outlet, Right side	Min. 110V, Max. 130V	
Right Outlet, Left side	Min. 110V, Max. 130V	
Right Outlet, Right side	Min. 110V, Max. 130V	

Table 2

**NOTE** *If output from the 240ACV outlets was good but 0V is measured in any of the 120ACV circuits above, check to see if the GCFI has tripped. If the GCFI is tripped, try to reset it. If the GCFI will not reset, replace the outlet.*

6. Press the “test” button on the GFCI and it should trip. Press reset button to re-enable receptacle. **GFCIs will not reset if the generator is not making voltage**

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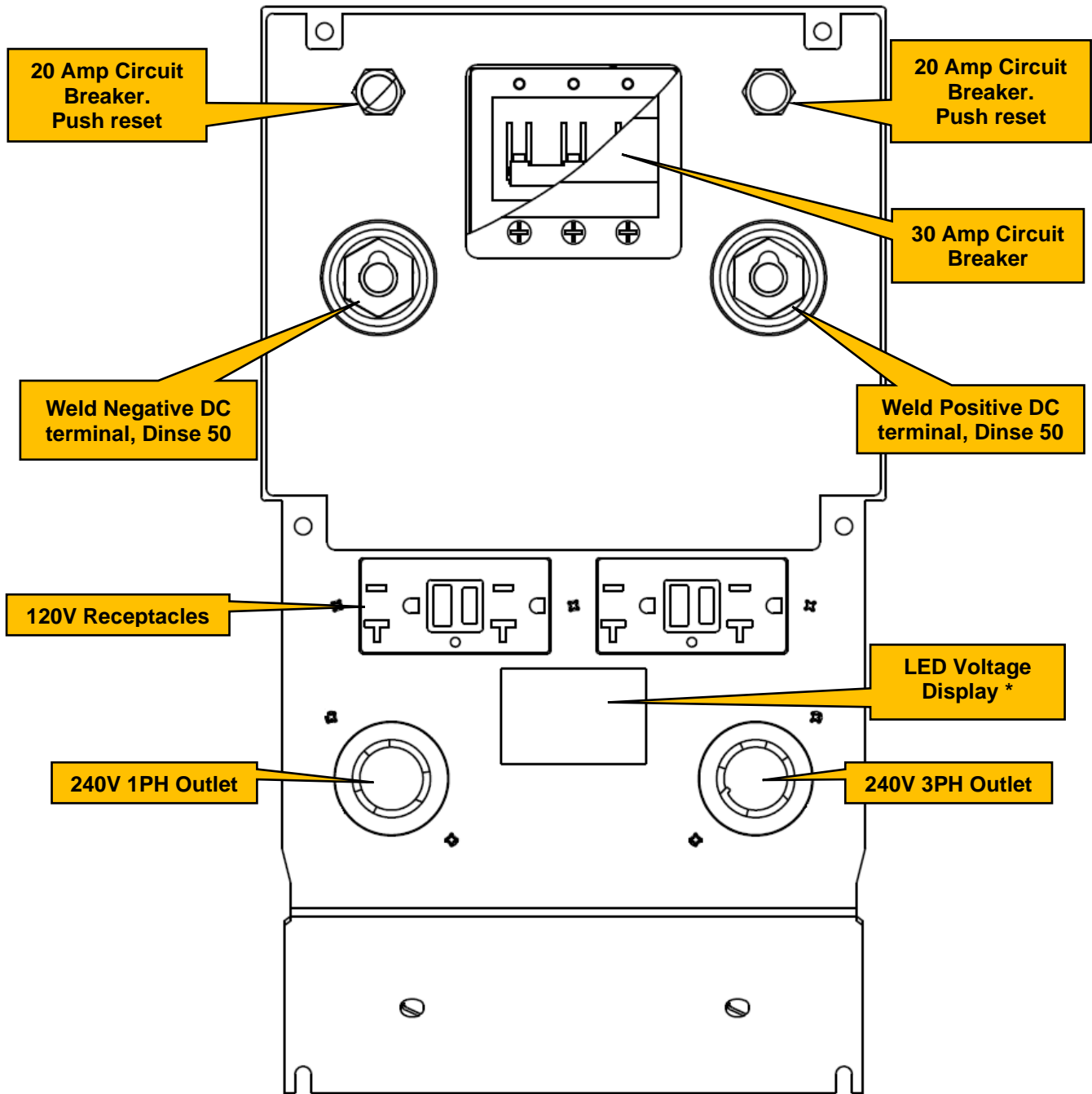


Figure 2



*\* The generator's LED Voltage display (Figure 2) has 5 LEDs. The bottom LED indicates "210V", however it simply means that the generator is producing somewhere between 0V and 210V. If only the lowest LED is lit, the generator is likely not producing 210V but something much lower.*

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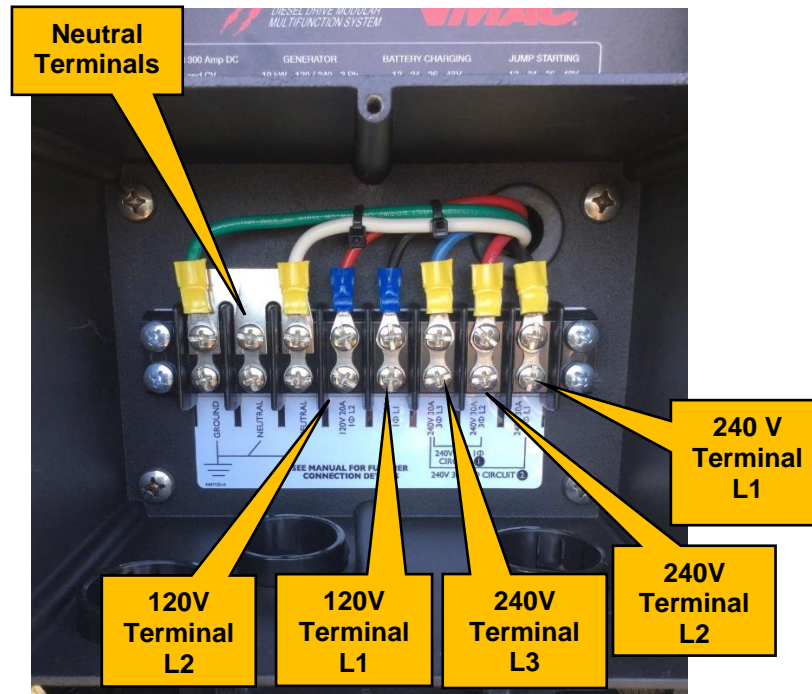
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## TESTING 240V AC CIRCUITS – TERMINAL STRIP MULTIFUNCTION

7. The terminal strip is located on the front of the generator in the same location as the receptacles and LED voltage display would be located in Figure 2. Remove the lid that is held in place by 6 screws to access the terminal strip.
8. Start the Multifunction engine and allow it to warm up for 1 minute. The engine should rev up and then idle down.
9. Turn the generator on at the control panel. The engine should rev up and stay at high rpm.
10. Using a multimeter set to the AC voltage scale, measure the voltage at the following points on the terminal strip (Figure 3). Record the results and compare to the specifications in Table 3.

Circuit	Specification	Measured Voltage
240V Terminal L1 to L3	Min. 216 ACV, Max 263 ACV	
240V Terminal L2 to L3	Min. 216 ACV, Max 263 ACV	

**Table 3**



**Figure 3**

## TESTING 120V AC CIRCUITS – TERMINAL STRIP MULTIFUNCTION

11. Ensure the machine is running, the generator is turned on, the main breaker is in the ON position and neither of the 20A pop breakers is tripped.
12. Locate the 120V AC terminals and Neutral terminals (Figure 3). Use a multimeter set to its AC voltage setting to measure between the terminals as described in Table 4. Record the results in the same table and compare to the specifications.

Circuit	Specification	Measured Voltage
120V Terminal L1 to Neutral	Min. 110 ACV, Max 130 ACV	
120V Terminal L2 to Neutral	Min. 110 ACV, Max 130 ACV	

**Table 4**

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## TESTING DC CIRCUITS – TERMINAL STRIP AND RECEPTACLE TYPES.

13. Select the DC voltage setting on the multimeter. Measure the open circuit voltage between the positive and negative Weld DC terminals in each of the weld settings-12V/24V/36V/48V. Record the measurements in Table 5 and compare with the specifications.

Weld Setting	Specification	Measured Voltage
12V	13-17 Volts DC	
24V	26-30 Volts DC	
36V	39-48 Volts DC	
48V	52-62 Volts DC	

**Table 5**

14. If the values recorded in Table 5 are all correct but the unit will not weld or charge properly, generator replacement is required due to faulty non-serviceable internal generator components.
- If the AC voltage test results do not meet specification, then go to Step 15.
  - If the DC voltage test results do not meet specification, replacement of the generator PC board is required. Contact VMAC Technical Support for information on the A500199 PC Board installation.

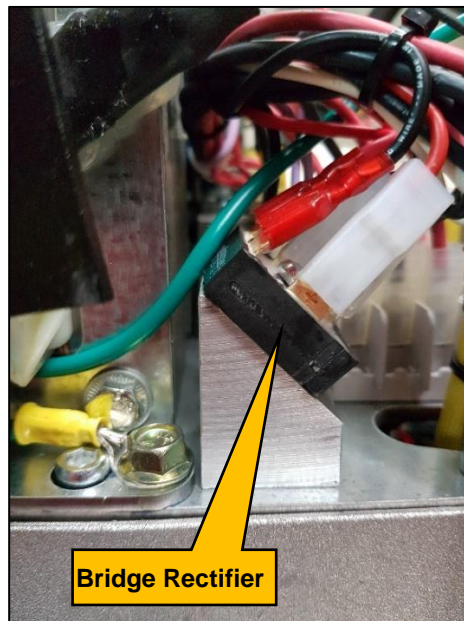


*It is possible for a faulty PC board to damage the welder control box. It is not possible to test the welder control box without first ensuring a good PC board is in place.*

When the generator repair is complete go to step 17.

## IF UNIT FAILS AC VOLTAGE TEST

15. Turn the Multifunction off and disconnect the battery.  
 16. With the generator cover off, locate the bridge rectifier (Figure 4).

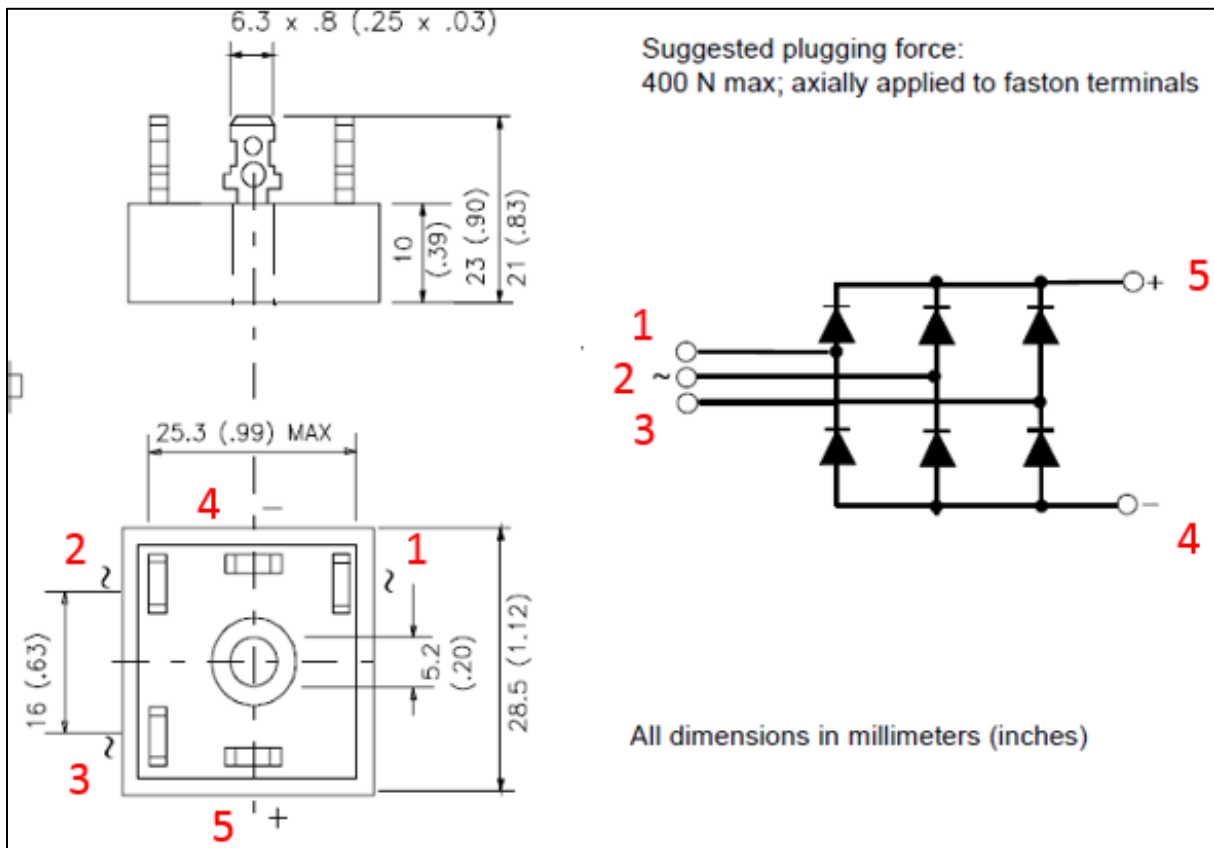


**Figure 4**

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17. Note the wire positions on the bridge rectifier for reassembly and disconnect them from the bridge rectifier.
18. Set the multimeter to "diode check" with the leads connected for voltage measurement. Use Figure 5 as a guide for pin location.
19. Connect the ground lead of the multimeter to pin 5 and the positive lead to the pins below. Resulting voltage should be:
  - a. Probe pin 1: 0.4-0.5V
  - b. Probe pin 2: 0.4-0.5V
  - c. Probe pin 3: 0.4-0.5V
 If any pin produces a short or open circuit, the bridge rectifier is failed.
20. Connect the positive lead of multimeter to pin 4 and the negative lead to the pins below. Resulting voltage should be:
  - a. Probe pin 1: 0.4-0.5V
  - b. Probe pin 2: 0.4-0.5V
  - c. Probe pin 3: 0.4-0.5V
 If any pin produces a short or open circuit the bridge rectifier is failed



**Figure 5**

21. If the bridge rectifier has failed, replace the bridge rectifier, reassemble the generator, and re-test.
22. If the bridge rectifier passes the test, generator replacement is required due to faulty non-serviceable internal generator components.

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## IF UNIT FAILS DC TEST

- 23. When the generator repair is complete, if the DC test results still do not meet specifications as shown in step 14, turn the generator off.
- 24. Replace the welder control box unit.
- 25. Start the MF engine and allow it to warm up for 1 minute.
- 26. Turn the generator on and verify that output values are now correct.

If you have any questions, please call VMAC Tech Support 1-888-241-2289

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