Trouble Shooting Pancake Generators

The Marathon PANCAKE is a 4 lead, brushless, AVR regulated generator. They are small, dedicated, single phase generators between 8kW – 20kW. Normal output voltage is either 240Vac or 120Vac. A complete listing of models and specifications is included at the end of this trouble shooting guide.

An PANCAKE generator is simple to trouble shoot with 6 main components: **the exciter stator and exciter rotor windings, a voltage regulator, a rectifier assembly, and the main stator and main rotor windings.** For tools you will need a good multi-meter – a Fluke works very well – a ratchet set, and a set of screwdrivers. You can make an analog style meter work as well.

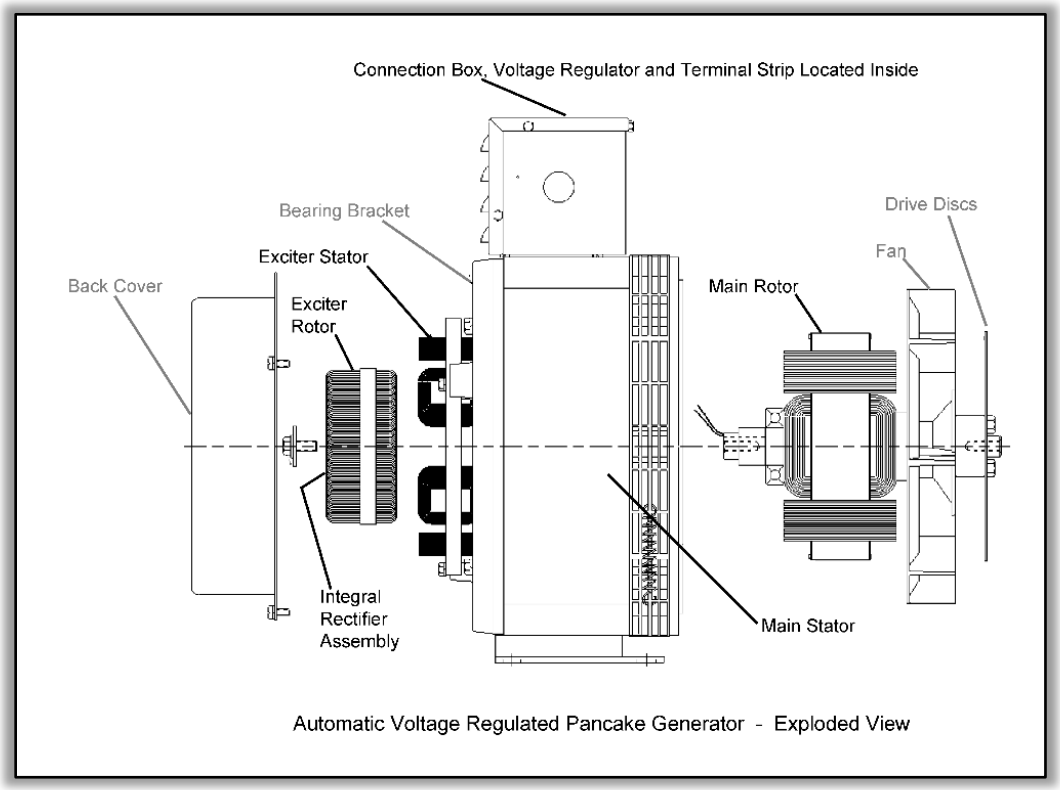


Figure 1

This trouble shooting guide is intended to address the most common causes of low or no output voltage, usually 5V – 25V either Line-to-Line or Line-to-Neutral as measured at the generator output terminal strip located in the connection box mounted on top of the generator.

If the generator has been sitting, unused, for 3 – 6 months, or longer it may have lost its residual magnetic field required to build voltage. If you suspect this is the case, refer to the section on **Restoring Residual Magnetism** near the end of this trouble shooting guide.

Start trouble shooting in the connection box mounted on the top of the generator. It gives easy access to the exciter stator leads (F+ & F-) especially when the generator is mounted in a gen-set.

SAFETY NOTE – Dangerous Voltage May Be Present During Testing

Step 1 : Check Exciter Stator Continuity and Resistance

SAFETY NOTE –Testing the exciter stator must be done with the gen-set shut down.

Disconnect exciter stator leads F+ & F- from the voltage regulator – white leads in Figure 2. Using digital multimeter or analog meter check continuity between F+ & F-. **If you have NO continuity between F+ & F- , you have a failed exciter stator winding.**

Switch meter to auto-ranging Ohms setting check continuity between F+ and generator ground**.** You should have at least 5-10 megOhms of resistance between the exciter stator and ground. A new unit will have > 100 megOhms or more. **If you HAVE continuity between F+ and generator ground, or < 5 megOhms of resistance, you have a failed exciter stator winding.**

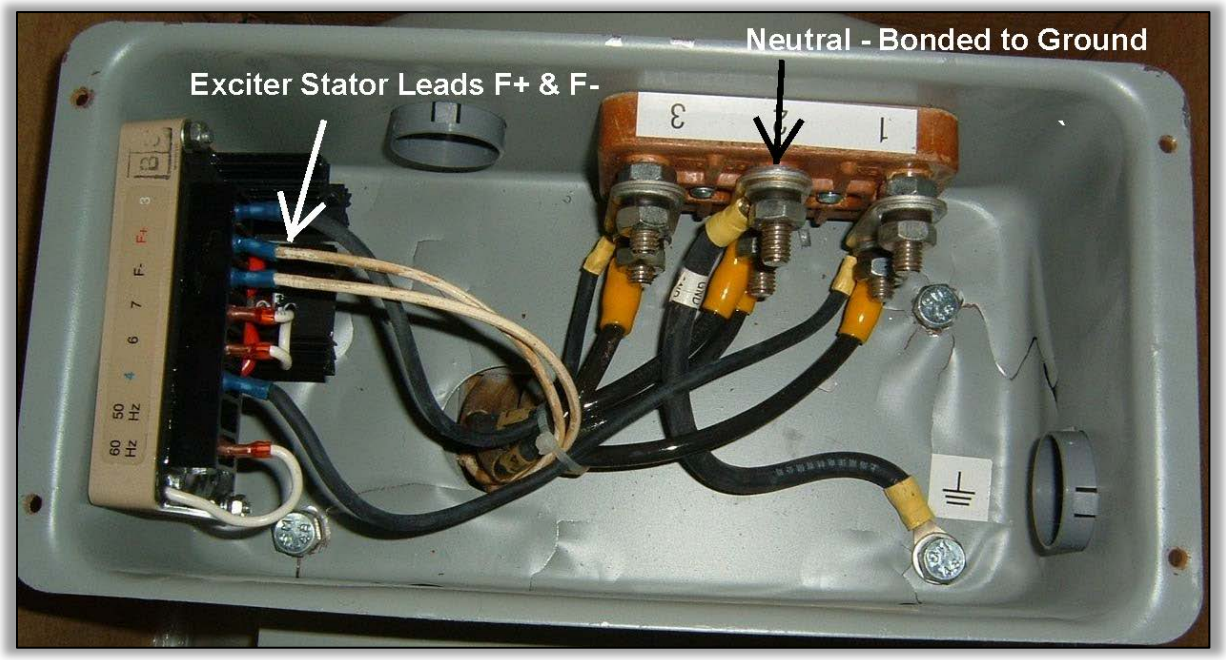


Figure 2

Using digital multimeter or analog meter, switch meter to auto-ranging Ohms setting and check resistance between F+ & F-. Refer to Specifications Table for resistance by model.

If exciter stator resistance does not match table value within ± 5 Ohms, you have a failed exciter stator winding.

Failed exciter stator cannot be repaired. Replace Exciter Stator

Step 2 : Constant Excitation Test

SAFETY NOTE – The Constant Excitation test MUST be done with the gen-set running.

Disconnect exciter stator leads F+ & F- from the voltage regulator – white leads in Figure 1 and observing polarity, connect to a 12V battery. The gen-set starting battery can be used as the source of constant excitation.

Run the get-set, no-load with all breakers switched off. Measure output voltage at terminals 1 & 3 shown in Figure 1. A well-charged battery should give full output voltage – 240Vac or 120Vac depending on generator connection – or possibly a bit more. Voltage should be equally balanced L1 - N and L2 – N.

Possible Constant Excitation Test Results

Test Voltage	Possible Corrective Action
216 – 252 Or 108 – 126	Output voltage is within expected range. Exciter stator appears good. **Voltage Regulator has failed and must be replaced.**
≤ 200 Or ≤ 100	Output voltage is below expected range. Exciter stator appears good. **One or more diodes have failed. Replace Exciter Rotor and Integral Rectifier Assembly.**
≤ 50	**Multiple component failures. Replace generator.**
Unbalanced Voltage	**Main stator has failed. Replace generator.**

Step 3 : Check the Main Stator Winding

The main stator windings are very low resistance which makes them difficult to test. Set meter to the lowest possible Ohms scale. Connect one side to T1 and the other side to T3 – Black Leads in Figure 1. You must have good continuity and should have a resistance reading between .1 to .5 Ohms. Refer to Specifications Table for resistance by model.

If you have NO continuity or you have a significantly higher ohm reading – anything higher than about 2 ohms **you have a failed main stator winding.**

Set meter to the highest possible Ohms scale. Check for continuity between T1 & T3 and the ground terminal. Resistance should be greater than 2 megohms or infinite. If you have continuity or < 2 megOhms resistance between the main stator leads and the ground terminal **the main stator is faulted to ground.**

Failed main stator windings cannot be repaired. Replace generator.

If testing STEPS 1 - 3 have not found any faults or defects, move to the opposite drive end of the generator to check the diodes on the rectifier assembly. You will need to remove the back cover to gain access to the rectifier assembly which is integral with the exciter rotor. It is not necessary to remove the exciter rotor.

Step 4 : Checking Diodes / Rectifier Assembly

The diodes may be tested in place. The White leads connect to three FORWARD stud type diodes, and the Black leads connect to three REVERSE stud type diodes.

Remove each of the exciter rotor leads from the quick-connect diode terminals and remove the mail rotor leads from the main rotor terminals – note location of each for proper reassembly.

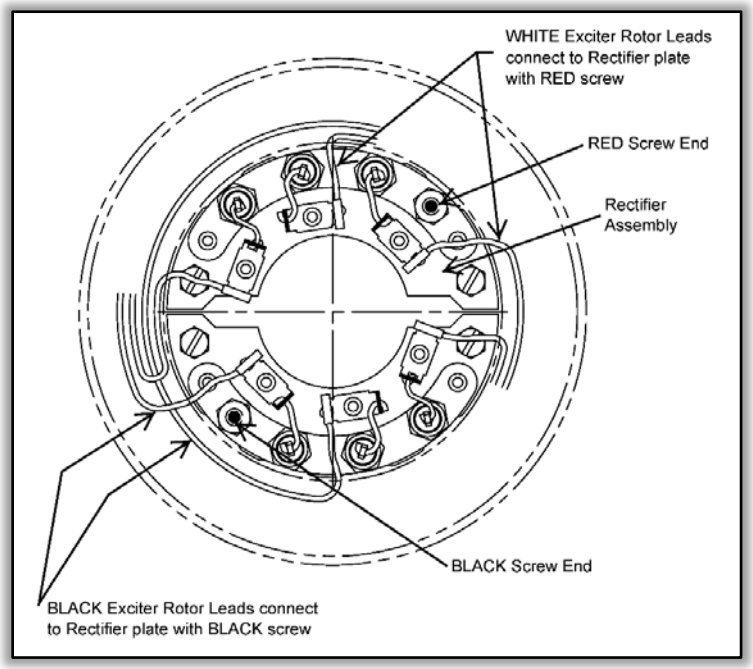


Figure 3

Multimeter Diode Test : Switch multimeter to diode test mode, place one lead on the top of a diode, the other lead in contact with corresponding main terminal post. Test each of the three FORWARD diodes in turn. Reverse test leads and repeat. A good diode will have no voltage reading in one direction and 0.4 – 0.5Vdc in the other.

Repeat testing procedure for the three REVERSE diodes.

No voltage in either direction or voltage in both directions indicates a failed diode.

OR

Analog Meter: Place one lead on top of a diode, the other lead in contact with corresponding main terminal post. Test each of the three FORWARD diodes in turn. Reverse test leads and repeat. A good diode will have much greater resistance in one direction. Typical forward resistance is under 100 Ohms. Typical resistance in the reverse direction is over 30,000 ohms.

Repeat testing procedure for the three REVERSE diodes.

Continuity with little or no resistance in both directions or very high resistance in both directions indicates a failed diode.

Failed diodes must be replaced. Replace Integral Rectifier Assembly.

Field Flashing / Restoring Residual Magnetism

If the generator has been sitting, unused, for 3 – 6 months, or longer it may have lost its residual magnetic field required to build voltage.

12V Dynamic Field Flash

SAFETY NOTE – The Dynamic Field Flash MUST be done with the gen-set running.

Disconnect sensing & power leads 3 & 4 from the voltage regulator – black leads in Figure 4. Insulate and isolate leads for safety.

Disconnect exciter stator leads F+ & F- from the voltage regulator – white leads in Figure 4 and observing polarity, connect to a 12V battery. The gen-set starting battery can be used.

Run the get-set, no-load with all breakers switched off. Measure output voltage at terminals 1 & 3 shown in Figure 4. A well-charged battery should give full output voltage – 240Vac or 120Vac depending on generator connection – or possibly a bit more.

If output voltage comes up to normal range, run generator for 15 minutes to build residual magnetism.

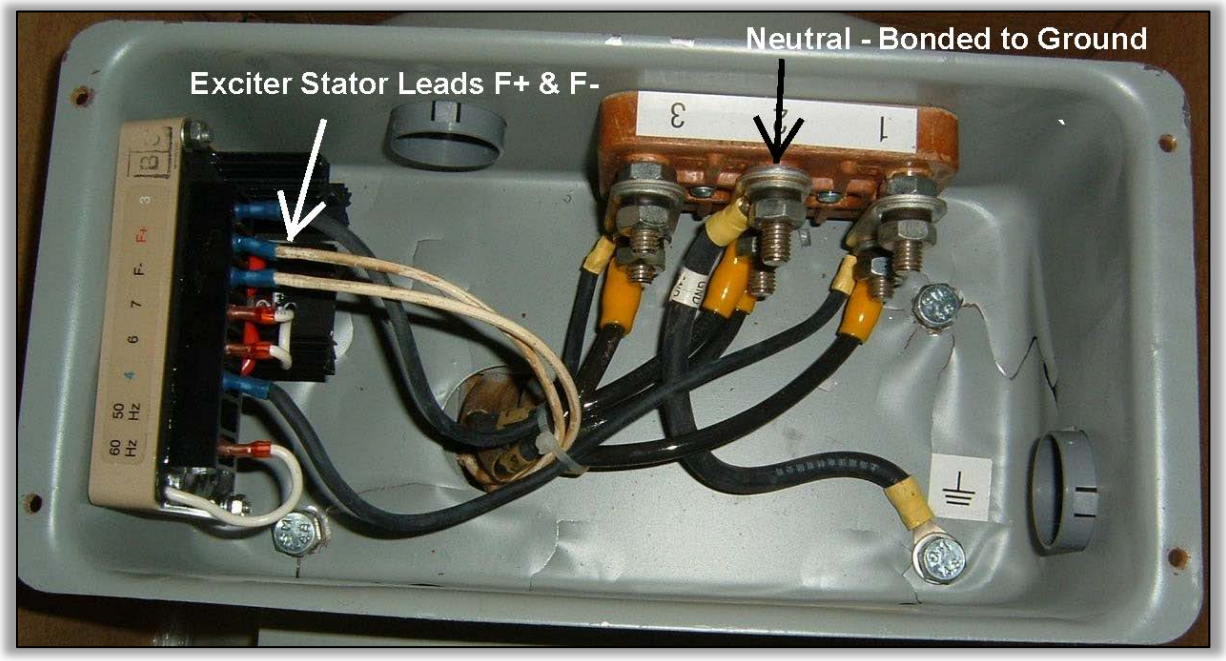
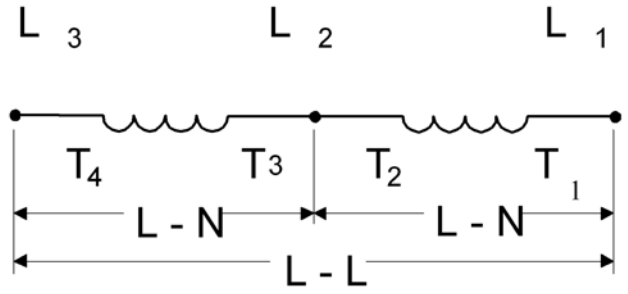
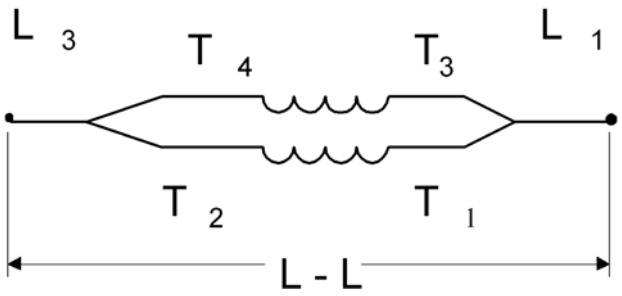


Figure 4

Pancake Generator Connections

SINGLE PHASE CONNECTION - DUAL VOLTAGE SERIES			
	VOLTAGE		
		L-L	L-N
	60 HZ	240	120

SINGLE PHASE CONNECTION - SINGLE VOLTAGE PARALLEL		
	VOLTAGE	
		L-L
	60 HZ	120

marathon™ Generators

Pancake Generator Specifications

Current Production Models - 3/2/16

Model No	Standard AVR	kW	Hz	Exciter Stator Ω	Exciter Rotor Ω	Main Stator L-L Res. Ω (Series)	Main Rotor Ω
331CSA / CSB3018	SE350EL	8	60	23.7	0.49	0.50	1.48
332CSA / CSB3020	SE350EL	10	60	24.5	0.49	0.395	1.58
333CSA / CSB3024	SE350EL	15	60	28	0.55	0.20	1.88
334CSA / CSB3027	SE350EL	17.5	60	27	0.55	0.162	2.08
334CSA / CSB3028	SE350EL	20	60	27	0.55	0.162	2.08
334CDA3028	SE350EL	20	60	27	0.55	0.162	2.08

Legacy Models - 3/2/16

Model No	Standard AVR	kW	Hz	Exciter Stator Ω	Exciter Rotor Ω	Main Stator L-L Res. Ω (Series)	Main Rotor Ω
331RSA / RSB3002	VR63-4A	8	60	23.7	0.49	0.50	1.48
332RSA / RSB3004	VR63-4A	10	60	24.5	0.49	0.395	1.58
333RSA / RSB3008	VR63-4A	15	60	28	0.55	0.20	1.88
334RSA / RSB3010	VR63-4A	17.5	60	31.7	0.55	0.162	2.08
334RDA3028	VR63-4A	20	60	31.7	0.55	0.162	2.08
332CSA5204	VR63-4A	10	60	24.1	0.47	0.39	1.61
333CSA / CSB5205	VR63-4A	15	60	28	0.55	0.202	1.94
334CSA / CSB5207	VR63-4A	17.5	60	28	0.54	0.169	2.08
337CSB5209	VR63-4A	20	60	28.6	0.56	0.143	2.36
332RSA5017	VR63-4A	10	60	24.1	0.47	0.39	1.61
333RSA / RSB5048	VR63-4A	15	60	28	0.55	0.202	1.94
334RSA5003	VR63-4A	17.5	60	28	0.54	0.169	2.08
337RSB5012	VR63-4A	20	60	28.6	0.56	0.143	2.36