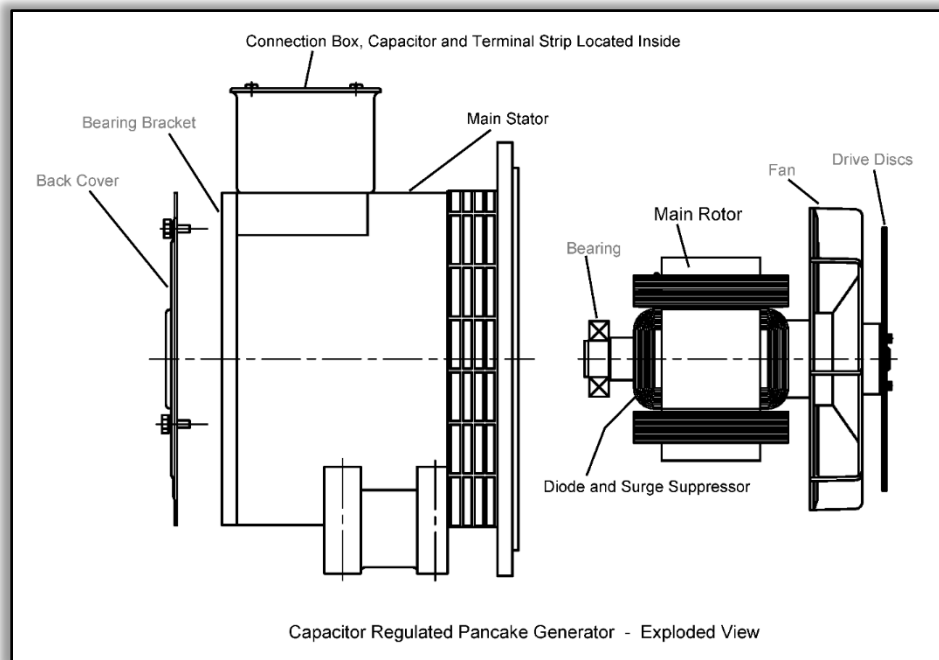


Trouble Shooting Capacitor Regulated Pancake Light Tower Generators

These are small, capacitor regulated generators. The most common model numbers include 201CSA5411 which is a 6kW unit and the 201CSA5420 which is an 8 kW unit. A more complete listing of models is included at the end of the trouble shooting guide.

A capacitor regulated, light tower generator is simple to trouble shoot with just 6 main components: **the main stator winding, the main rotor winding, the excitation winding, a capacitor, diode and surge suppressor.** For tools you will need a good multi-meter – a Fluke works very well – a ratchet set, a set of screwdrivers and a soldering iron. You can make an analog style meter work as well.



This trouble shooting guide is intended to address the most common causes of very low or no output voltage, usually 3V – 10V 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's easily accessible – especially when the generator is mounted in a light tower – and contains most of the wiring and components that you need to check.

SAFETY NOTE – All trouble shooting must be done with the gen-set shut down.

Step 1 : Check the Capacitor

SAFETY NOTE – Discharge capacitor by shorting terminals with insulated jumper wire or screwdriver with insulated handle.

Digital Multimeter: Disconnect leads from capacitor – Blue Leads in Figure 1. Switch multimeter to the capacitor setting, and directly check the capacitance reading. **If capacitance measured is significantly less than capacitance rating specified, you have a failed capacitor that must be replaced.**

OR

Analog meter: Disconnect leads from capacitor – Blue Leads in Figure 1. Switch meter to Ohms x 1000 scale. Touch leads to the capacitor terminals – you should see the resistance start very low, near zero, gradually increase towards infinity and then return back to zero. Discharge capacitor, reverse leads and repeat. **If you do not see the charge / discharge pattern, you have a failed capacitor that must be replaced.**



Figure 1

Step 2 : 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 T4 – top and bottom Yellow Leads in Figure 1. You must have good continuity and should have a resistance reading between .3 to .7 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 3 ohms you have a failed main stator winding.

Failed main stator windings cannot be repaired. Replace generator.

Step 3 : Check the Excitation Winding

SAFETY NOTE – Discharge capacitor by shorting terminals with insulated jumper wire or screwdriver with insulated handle.

Disconnect leads from capacitor – Blue Leads in Figure 1. These are the excitation winding leads, typically labeled E1 and E4. Set meter to the lowest ohm scale available. Connect one side to E1 and the other side to E4. You should have good continuity and somewhere between 1.0 to 2.5 ohms. Refer to Specifications Table for resistance by model.

If you have NO continuity or a significantly higher ohm reading – anything higher than 5 ohms **you have a failed excitation winding.**

Failed excitation windings cannot be repaired. Replace generator.

Step 4 : Check for Grounded or Shorted Main Stator Windings

Set meter to the highest possible Ohms scale.

Check for continuity between the excitation winding leads E1 & E4 – Blue Leads in Figure 2 and main stator leads T1, T2, T3 & T4 – Yellow Leads in Figure 1. You should have no continuity between E1 & E4 and T1, T2, T3 & T4. Readings should be greater than 1 megohm or infinite.

If you have continuity or < 1 megohm resistance between the excitation the main stator windings, **you have a failed excitation and main stator windings.**

Check for continuity between the excitation winding leads E1 & E4 – Blue Leads in Figure 2, and the ground terminal; then check for continuity between the main stator leads T1, T2, T3 & T4 – Yellow Leads in Figure 1 and the ground terminal. You should have no continuity between any of the leads and the ground terminal. Readings should be greater than 1 megohm or infinite.

If you have continuity between the windings and the ground terminal, **you have failed excitation and main stator windings.**

A final note on the excitation windings. The excitation winding is a high voltage winding. It is not unusual for the excitation winding to test good at rest when the generator is not operating and to fail in operation at high voltage by faulting to the main stator winding.

If your light tower generator windings and components check out good at rest, but the generator fails to build voltage, **you have a defect between the excitation winding and the main stator windings.**

Failed excitation windings cannot be repaired. Replace generator.

If testing STEPS 1 - 4 have not found any faults or defects, move to the opposite drive end of the generator to check the diode and surge suppressor. Depending on accessibility, you may be able to test the diode and surge suppressor without removing the bearing bracket.

Step 5 : Check the Surge Suppressor, Only if Output is Zero Volts

The suppressor is located on the shaft end, near the diode. It may be covered in epoxy potting material. One lead is screwed to the rotor core; the other is soldered to the top of the diode.

Lift the lead fastened to the rotor core. Connect test leads to each side of the suppressor. **Continuity or very low resistance indicates a failed suppressor that must be replaced or removed from the circuit.**

An alternate test is to cut it out of the circuit, insulate and secure the remaining leads, and then run the generator. Do not cut the main rotor lead which is also connected to the diode.

If the suppressor was bad and there are no other component failures, it will now build voltage.

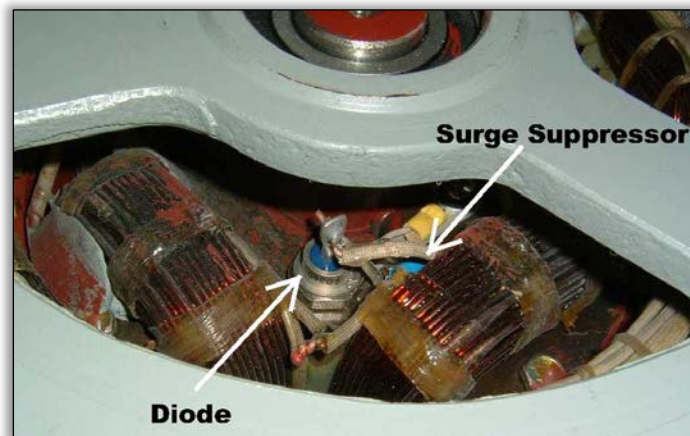


Figure 2

Step 6 : Checking and Replacing the Diode

Unsolder all leads connected to the top of the diode.

Multimeter Diode Test : Switch multimeter to diode test mode, place one lead on the top of diode, the other lead in contact with bare metal on the shaft end. Reverse the leads and repeat. A good diode will have no voltage reading in one direction and 0.4 – 0.5Vdc in the other.

No voltage in either direction or voltage in both directions indicates a failed diode that must be replaced.

OR

Analog Meter: Place one lead on top of the diode and the other lead in contact with the shaft end. Reverse 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.

Continuity with little or no resistance in both directions or very high resistance in both directions indicates the diode has failed and must be replaced.

Once unsoldered, turn CCW to remove a failed diode. Install a new diode, **torque to 25 – 30 in-lbs. CRITICAL do not over torque.** An extra ¼ turn can cause excessive torque and fail the diode. Solder leads back in place to the top of the diode.

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. There are several ways to restore residual magnetism to a generator. Only one is required. **The static procedure with the GEN-SET at rest is safest.**

12V Static Field Flash **SAFETY NOTE – Do NOT Run Generator**

Disconnect all incoming leads to the generator.

Connect a lead to the (+) lead of a 12V battery. Connect the other end to the top of the diode.

Connect a lead to the (-) lead of a 12V battery and brush the other end of the lead on the bare metal on the generator shaft end. You may need to repeat several times. A good field flash will show a strong spark as you pull the lead away from the generator shaft end.

120V Field Flash Through Service Receptacle

SAFETY NOTE – DANGEROUS VOLTAGE WILL BE PRESENT

Fabricate a Power Cable with male 120Vac wall plugs on each end, attached to both sides of a switchable 10-15A breaker.

With the generator at rest, plug power cable in to wall outlet and service receptacle on Light Tower trailer. Set meter to VOLTS and connect to generator output leads.

Start and run generator, no-load, with lamps and breaker switched off. Switch breaker on & off several times and observe output voltage.

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

If your light tower generator windings and components check out good at rest, but the generator fails to build voltage, **you have a defect between the excitation winding and the main stator windings** that you are unable to detect this fault with the available equipment.

Failed excitation windings cannot be repaired. Replace generator.



Capacitor Regulated Light Tower Generator Specifications

Current Production Models - 2/17/16

Model No.	kW	Hz	Main Stator		Rotor	Capacitor		Diode P/N	Surge Suppressor P/N
			L-L Res. Ohms	E1-E4 Res. Ohms	Res. Ohms	Rating	P/N		
201CSA5411	6	60	0.724	2.238	1.2	440V, 25uf	92726 97F9632	730825-01	761670-01
201CSA5420	8	60	0.498	1.978	1.272	600V, 25uf	27L1502	730825-01	761670-01
201CSA5422	6	50	0.498	1.978	1.272	440V, 45uf	97F9645	730825-01	761670-01
332CSA5213	6.5	50	0.37	2.41	1.54	450V, 45uf	769804-01	730825-01	761670-01

Diode Specifications :Reverse polarity, 40 amp, 600 PIV, stud type ¼ - 28 UNF - 2A. Torque base stud to 25 In-Lb maximum.

Surge Suppressor Specifications: MOV, 250 Volts cont., 40 Joules.

Legacy Models - 2/17/16

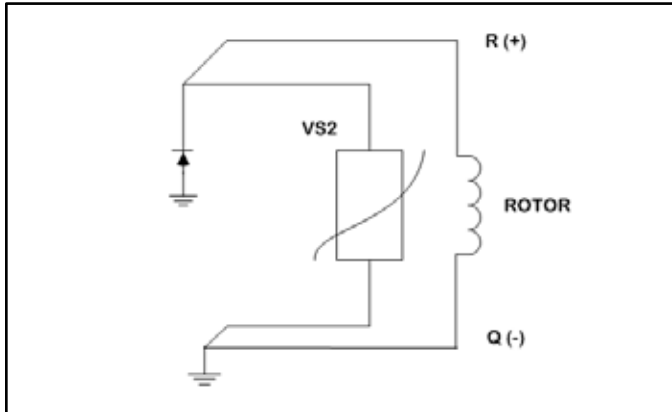
Model No.	kW	Hz	Main Stator		Rotor	Capacitor		Diode P/N	Surge Suppressor P/N
			L-L Res. Ohms	E1-E4 Res. Ohms	Res. Ohms	Rating	P/N		
201CSA5412	8	60	0.564	1.986	1.729	600V,25uf	27L1502	730825-01	761670-01
332CSA5201	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332CSA5202	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332CSA5203	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332CSA5210	8	60	0.28	1.52	1.49	450V, 45uf	769804-01	730825-01	761670-01
332CSA5211	8	60	0.28	1.52	1.49	450V, 45uf	769804-01	730825-01	761670-01
332CSA5212	6.5	50	0.37	2.41	1.54	450V, 45uf	769804-01	730825-01	761670-01
332CSA5214	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332CSA5215	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332CSA5216	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332CSA5218	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01
332RSA/B1020	6	60	0.69	1.86	1.38	440V, 60uf	769806-04	730825-01	761670-01
332RSA/B1021	6	60	0.69	1.86	1.38	440V, 60uf	769806-04	730825-01	761670-01
332RSA/B1022	8	60	0.44	1.64	1.5	440V, 50uf	769806-03	730825-01	761670-01
332RSA1023	8	60	0.44	1.64	1.5	440V, 50uf	769806-03	730825-01	761670-01
332RSA1024	6.5	60	0.6	2.12	1.5	440V, 50uf	769806-03	730825-01	761670-01
332RSA1025	6.5	60	0.6	2.12	1.5	440V, 50uf	769806-03	730825-01	761670-01
332RSA5021	7.5	60	0.64	1	1.5	370V, 45uf	789806-06	9253-26R	761670-01
334RSA1006	10	60	0.331	1.38	1.72	440V, 35uf	769806-05	9253-26R	761670-01
201CSA5412	8	60	0.564	1.986	1.729	600V, 25uf	27L1502	730825-01	761670-01
332CSA5201	6	60	0.43	2.16	1.38	450V, 45uf	769804-01	730825-01	761670-01

Diode p/n: 730825-01 : Reverse polarity, 40 amp, 600 PIV, stud type ¼ - 28 UNF - 2A. Torque base stud to 25 In-Lb maximum.

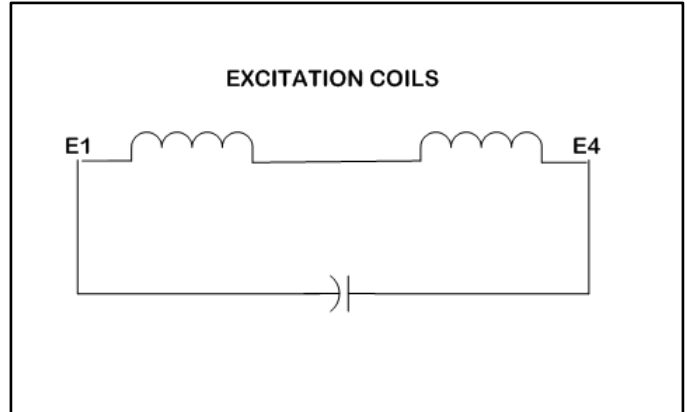
Diode p/n: 9253-26R : Reverse polarity, 12 amp, 600 PIV, stud type 10 - 32 UNF - 2A. Torque base stud to 30 In-Lb maximum.

Surge Suppressor Specifications: MOV, 250 Volts cont., 40 Joules.

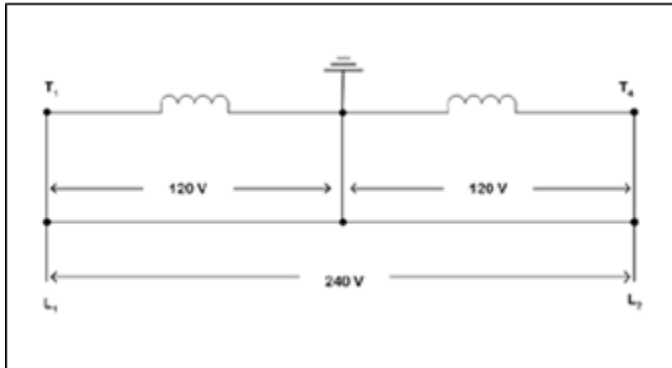
Capacitor Regulated Generator Connection Diagrams



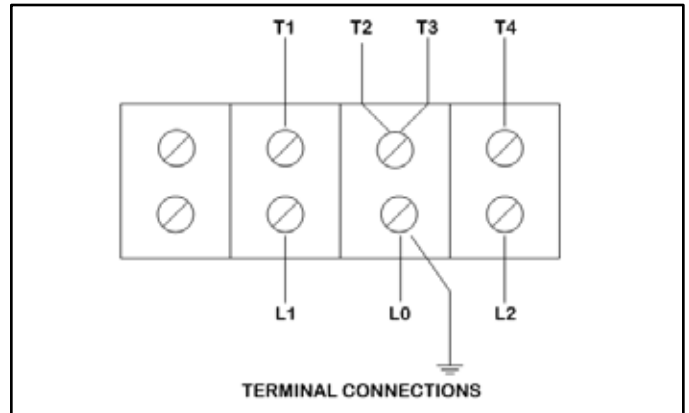
Diode and Suppressor



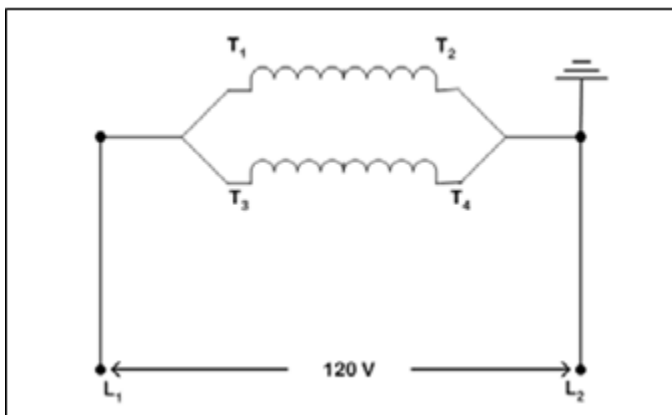
Excitation Windings



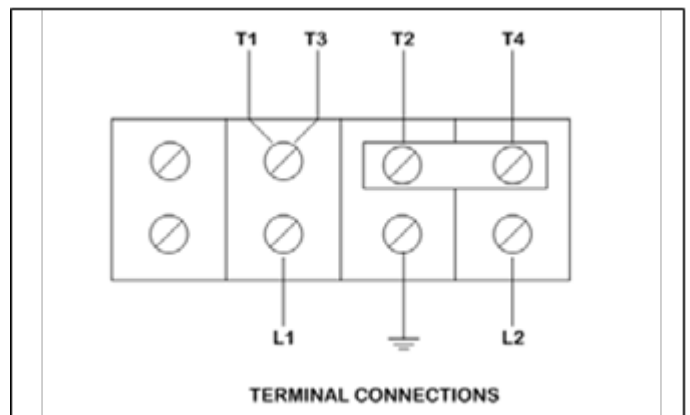
240 Volt Connections



TERMINAL CONNECTIONS



120 Volt Connections



TERMINAL CONNECTIONS