Load Testing
a
Pulsed Flyback Generator

Load testing is considered to be essential over and above other practical tests in confirming the proposed harvesting function of a generator of this type. Due to the fact that some factors and variables cannot be fully accounted for or even estimated until a live load is added to the system, and also in this case battery swapping enabled, then accurate measurements of the amount of load that can be sustained can only be done with all the elements of the generator in operation.

Testing the available power output for this type of device can be done using a variation on the so called ‘loop’ testing procedure. Here, the generator output is fed back into the input such that, if there is more output than is required to run the generator, with its losses, then extra energy is being drawn into the system. In this event the device will continue to run beyond the expectations of its nominal power supply and presents with a CoP>1.

In the Pulsed Flyback Generator, this process in effect occurs every 15mins or so due to the essential battery-swapping mechanism that is integral to its successful operation. Battery swapping is fundamental to the device’s operation since there are no known appliances that can run directly off inductive flyback pulses and so storage in a battery or capacitor is an important part of the energy flow.

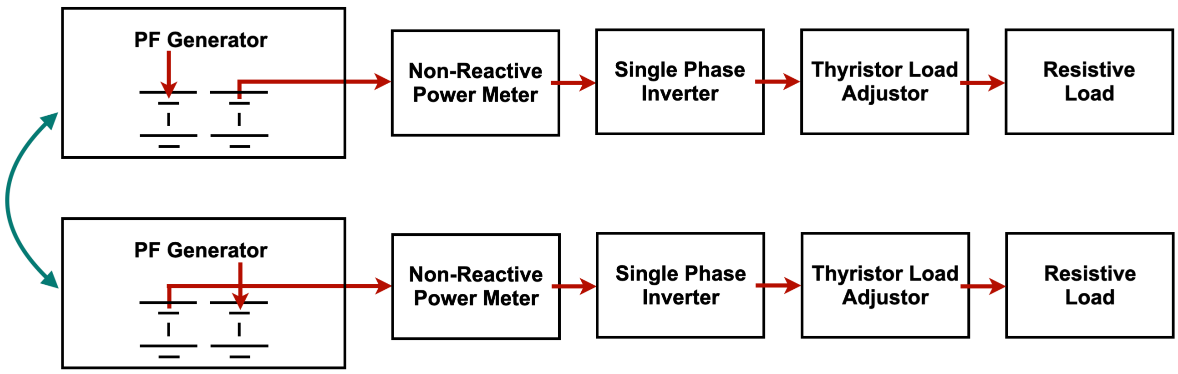
With the two batteries, at any moment one of them will be the supply or ‘run’ battery and the other will be the ‘receiving’ battery. The run battery supplies all the energy for the circuit to operate and also any external load attached to the system, while the receiving battery is being pulsed charged. Then at an interval of typically 15-30mins, the batteries swap over their roles and the now charged ‘receiving’ battery becomes the ‘run’ battery.

Given that the energy used by the run battery to charge up the receiving battery is much less than the amount arriving in the receiving battery, for example 1/6, then there is theoretically 5/6th of the energy of the run battery available for an external load and which would equate to a CoP of 5.

Any energy hypothetically drawn in from the vacuum is first stored in the receiving battery before being used in the next swap cycle for the circuit and load. So in effect, this ongoing process is equivalent to looping the output back into the input but instead of happening in real time, it occurs with a delay of 15 mins. The energy is from output to storage, then storage to input with resulting output to storage etc. and with the receiving battery acting like a giant energy sink or sponge for the harvested energy and charge.

The CoP measurements are then a sort of hybrid situation in that they involve this looping process. But there are also factors and losses that are not easy to quantify and which will affect the real live measurements of the power available from the run battery after a cycle of being charged as the receiving battery.

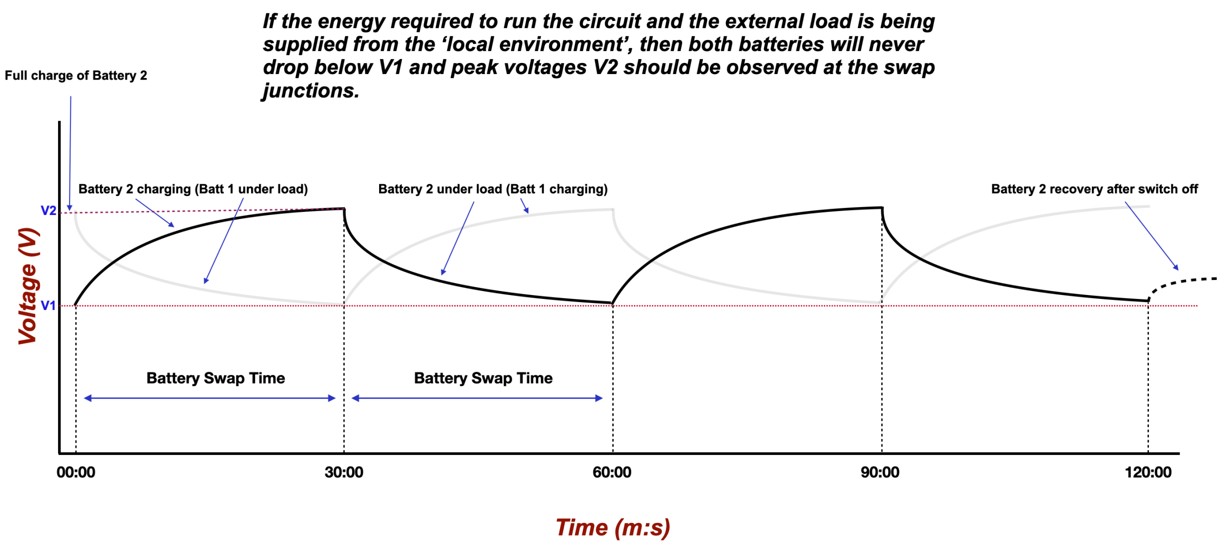
The proposed setup shown below consists of a non-reactive power meter connected directly to the generator output so that a reading is taken before any losses resulting from



Load testing Setup using AC

the inverter. The power meter is connected to a single phase inverter whose 50Hz output is then adjusted using a Thyristor unit to feed a series of incandescent lamps. These provide a purely resistive load ranging from 10W to 300W.

Given this, in order to undertake the power measurements, repeated swap cycles are undertaken as shown in the graphic below. At the start of the graph, battery 2 is the receiving battery (black line) and is being pulse charged while battery 1 (the other greyed



Battery Swapping during Load Testing

line) is under load as the ‘run’ battery while it provides power to both the circuit and the external load.

After 30mins battery 2 is now at a much higher state of energy and charge and, after the swap, becomes the run battery and battery 1 starts to receive the pulse charging.
If, for example, this swapping cycle continued for 24 hours, there would be 24 complete cycles and 48 swap events. If at the end both batteries have not dropped below V1, indicated by the horizontal red dotted line, and equally are still able to reach their peak starting voltages of V2, then that is clear evidence that energy has been drawn into the system and that the load is not drawing down more energy than can be replenished during each cycle.

Testing will involve incremental increases to the load to find the point at which a voltage drop is recorded following the recovery phase after a series of cycles. From that value the maximum power output that can be sustained is derived.

At that point, despite the known external load and the dissipation of a measurable amount of energy, the net energy state of the batteries has been maintained through an as yet unspecified process of energy influx.

Julian Perry
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