

Commissioning a Constant Frequency Generator as the Power Supply for the Blue Parrot Radar

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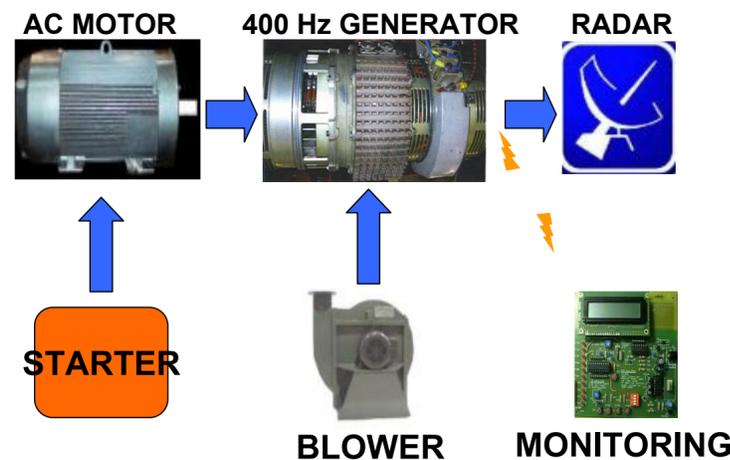
Executive Summary

A 400 Hz Generator and Control Unit salvaged from a decommissioned Mirage F1 aircraft was donated to the Radar Remote Sensing Group. The generator makes up the 200 V line-line three phase power supply to operate the radar due to its 400 Hz requirements. The 15 kW generator is a convenient self-contained unit to supply the radar's power requirements with control unit, provided it is mechanically coupled to a prime mover. The prime mover is chosen based on the generators mechanical characteristics and due to its nature has large start up currents. The large start-up currents cause unwanted inertial fatigue which is solved by a reduced voltage starter.

Cooled by bled compressed air from the aircrafts jet engine turbine a suitable sized ventilation system is designed to meet the thermal requirements of the generator. The ventilation system consists of a blower fan, diffuser, tubes and shroud together supplying forced cooling at 130 g/sec at 3 kPa. During commissioning the ventilation system provides acceptable rates of cooling with and without a load connected to the generator.

The generator is protected against fault conditions with circuit breaker protection on the load side, set at 45 A. The generator was tested on a 4.8 kW resistive load during a 20 minute duration which produced acceptable heat conditions, voltage and frequency deviations.

Fig. 1: Schematic of setup



During start-up the prime mover is subjected to increased thermal stress (see Fig.2 below).

Fig. 2: Motor Phase Current vs Slip

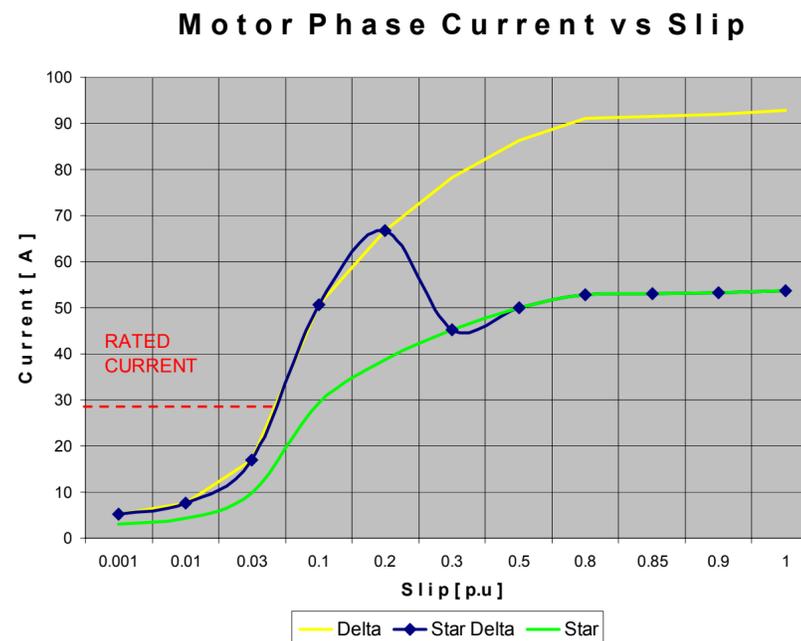
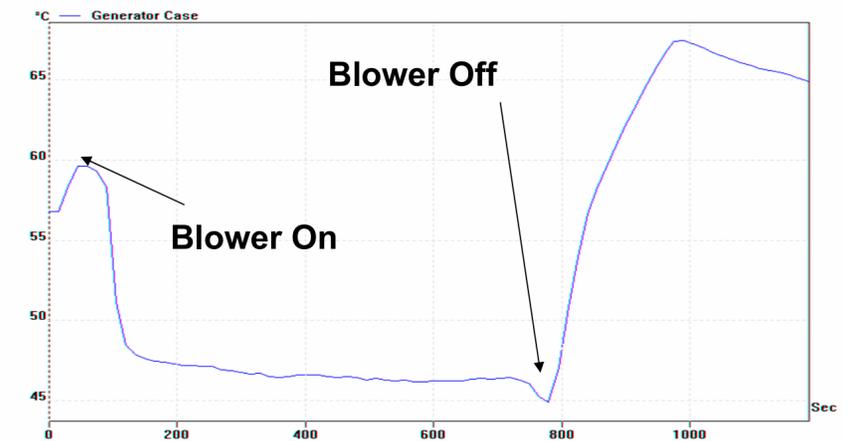


Fig. 3 below shows the effects of cooling during a 4.8 kW load test.

Fig. 3: Effects of Cooling



Conclusion

The generator was tested on a 4.8 kW resistive load during a 20 minute interval which produced acceptable heat conditions, voltage and frequency deviations. During long periods of standstill it was evident that oil was the root cause of previous frequency faults. The status of the project is suspended until such time that the oil leak can be remedied.

