CHAPTER 3: ELECTRICAL INSTALLATION

This chapter covers the installation of all cables and wiring required to operate the powerplant.
This is the ONLY aproved wiring for all engines and earler models should be updated to this dual battery system.
If you are not comfortable performing wiring related tasks, you must seek assistance from someone who is. You will need a rock-solid electrical system, so this is not the place to take risks.

Engine Sensors

Various sensors are located on the engine for monitoring temperature and pressures. If you ordered your powerplant along with an engine monitor, then your sensors will be pre-installed. You are required to connect the engine monitor wiring harness to these sensors following the instructions provided by the vendor.

If you did not order an engine monitor, you will need to obtain and install your own set of sensors for at least, the following items.

- Oil Temperature
- Oil Pressure
- Coolant Temperature
- Gearbox Temperature
- Fuel Pressure
- Battery Voltage (2)

A pictorial guide to the engine sensor locations is provided on the Viking web site

General Electrical Strategy & Requirements

Your powerplant is a technically advanced design which depends on a computer and a variety of electronic sensors to control operation of its ignition and fuel injection system. This is fundamentally different from traditional aircraft engines which generate spark from mechanical magnetos. One can argue the merits of mechanical versus electronic controls endlessly; however, the type of electronic system your powerplant uses has evolved over decades of use in millions of vehicles. The Viking use a redundant ECU in its operation.

The use of modern electronics provides a very precise control over fuel mixture and ignition timing, responding instantly to changing conditions.

The Achilles heel of any electronic engine control system is its fundamental requirement for a rock-solid electrical supply. A battery alone meets this requirement perfectly. However, batteries live only so long before they need to be recharged.

Introducing an Alternator and voltage regulator into the picture creates a far more complex and somewhat electrically noisy environment and also the need to monitor for, and respond to, additional failure modes. Monitoring failure modes requires instrumentation and responding to failure modes requires switches. Our once- simple battery has grown into quite an assortment of devices, each contributing to the overall failure rate.

When flying an airplane, a pilot gets accustomed to the sound of the engine. When this sound falls silent, most pilots would agree that their ability to quickly and clearly perform failure analysis and formulate a response is somewhat limited by their interest in the soil passing below their seat.

So why not just plug in a fresh battery and leave everything else turned off? Brilliant!

1. **Requirement** – The electrical system must have dual batteries, each capable of operating the powerplant for at least 30 minutes of flight at cruise power, with only the essential equipment required to operate the engine.

2. **Requirement** – A means of selecting one, the other, or both batteries.

3. **Requirement** – A means of turning off all but the essential equipment required to keep the engine running.

4. **Requirement** – A means of monitoring the charge state of each battery.

Hot Standby Battery; Switched on demand.

This strategy simply keeps a spare battery standing by until it is needed. It is then switched into service to replace the primary battery. The charging requirement can simply be met by flying different legs on a different battery, thereby constantly keeping them charged and ready. This is the system used by Viking.

IMPORTANT NOTE: Lithium Ion batteries are superior to the lead acid type in many ways. However, they act differently. As with your modern power drill, it will continue to operate at full capacity, until suddenly empty. This is good, since we want max output when needed. However, keep in mind that your alternator charge should be 13.8 to 14.2V. If you read lower, chances are you are running on battery power alone, and no charging is taking place. You will not see a gradual reduction in Voltage. Also, the alternator warning circuit lamp should be wired:

Wire the warning light so that it has 12V to one side when the ignition switch is on.
Wire the other end to the alternator, as shown.
The alternator provide the grounding and will shine the light any time it is not charging.
The grounding is removed with the alternator running / providing a charge.