

ELECTRICAL LOAD ANALYSIS – A REMINDER TO OWNERS

Has your aircraft’s electrical system been changed since manufacture? If so, it needs an electrical load analysis to, among other things, reassure you the battery can support the aircraft should the electrical systems fail during flight.

An ELA is both a procedure and a document. It’s specific to your aircraft and is a crucial part of its records.

An ELA details:

- the complete aircraft electrical system, listing the primary generation systems
- the electrical storage systems
- the electrical loads

and, if applicable

- any alternate electrical generation and storage systems.

The ‘procedure’ part of an ELA tests the loading on the electrical system at various phases of flight during normal operation.

The ELA ‘document’ is evidence that in an emergency, there’s sufficient energy reserve to power critical systems to allow for a safe landing within a specified timeframe – and that the emergency procedures can be complied with during that time.

It also tests the endurance of the aircraft’s main battery, should the electrical generation systems fail in a ‘worst case’ scenario, eg, night IFR.

So, should your aircraft have a current ELA? Yes, it should.

Are you now thinking, ‘if my aircraft should have a current ELA, why doesn’t it have one?’

That could be because your aircraft doesn’t have an electrical system to analyse. Or it could be that your aircraft is in the same configuration as when it was



// Skyline Aviation in Hawkes Bay carried out an electrical load analysis when it upgraded its King Air B200 with a Garmin G600 TXI Avionics suite.

delivered from the manufacturer, and its certification requirements at the time of manufacture are still being met.

But if your aircraft's electrical system has changed in *any* way since manufacture, or you're bringing an aircraft into New Zealand, an electrical load analysis has to be performed.

In December 2019, the CAA updated Advisory Circular AC21-11 & AC91-23 *Electrical Load Analysis* (Revision 1) to provide greater clarity and guidance on what's expected.

Despite this, the CAA's product certification team is still seeing lots of ELAs not meeting requirements.

// The ELA document is a fundamental part of the aircraft's records so keep in mind that you should be given a copy. //

Expect your maintainer to ask

As noted in the July/August 2016 *Vector* article, "Electrical Load Analysis – Does Your Aircraft Need One?" the CAA isn't demanding retrospective ELAs – that is, to aircraft already in the country.

But, as the AC advises, the CAA does expect an ELA to be updated or created whenever the aircraft is electrically altered.

So when you take your aircraft in for a modification that puts a load on the electrical system, alters the electrical generation system or the electrical storage system, expect your maintenance provider to ask whether you have an ELA.

The ELA document is a fundamental part of the aircraft's records so keep in mind that you should be given a copy.

Some are generated using custom software or spreadsheets. While you may not be given a copy of that software, you should be given a suitable and compliant document for your records. ➤

// SOME QUICK QUESTIONS AND ANSWERS

Q. Why do I need a separate ELA when the maintenance manual has an electrical load chart?

A. It's true that many aircraft manufacturers do include an electrical load chart in the maintenance manual for all possible OEM configuration options.

The problem is that some of this equipment may not be installed, and more importantly, the charts don't perform a load analysis of the data.

The charts are valuable in creating an ELA specific to your aircraft, but are not an ELA in their own right.

Q. Why do I need an ELA for a new radio that draws less power, when I've been flying around for years with no issues?

A. Any design change or alteration to an aircraft requires evidence that the applicable certification requirements are still being met.

An ELA provides that evidence, even though the change has improved the performance of the electrical system.

Q. Do I still need an ELA if, as a test, I power up my aircraft while it's on the ground and it's using only the battery and the battery lasts 30 minutes?

A. A test regime may be used but the test method must be meaningful, and the results must be analysed and documented.

Remember that the electrical loads on the ground may not be the same as in the air because the systems might not be in their normal operating condition.

Q. Why does my ELA have to meet much broader requirements than those I need, for how I fly my aircraft – such as for night VFR, when I fly my aircraft only day VFR?

A. Even though you may operate the aircraft only day VFR, you need to provide evidence that the applicable certification requirements are still being met for all scenarios that the aircraft was designed for. That includes the worst-case scenario for most GA aircraft – night IFR in inadvertent icing conditions.

For more information, read the December 2019 revision of Advisory Circular AC21-11 & AC91-23 *Electrical Load Analysis* to understand better what is expected regarding an ELA and for guidance on creating one.