

## INTRODUCTION

Electronics are an ever-increasing feature of LAA aircraft and can be useful to the pilot in many ways. Unfortunately, without costly approval processes, the reliability of electronic products is very difficult to determine. In general, the reliability of electronic equipment on LAA aircraft isn't critical, except where they're used as Electronic Flight Information Systems (EFIS). As always within the LAA system, we take a proportionate approach with the requirements: slow, light aircraft have lighter requirements than fast, heavy aircraft.

EFIS fitted to aircraft intending to operate at night or under IFR will be assessed as part of the overall assessment of the aircraft's instrumentation and electrical systems, see guidance in Technical Leaflets [2.27](#) and [2.28](#).

Some EFIS systems incorporate advanced functionality that can include control of systems such as autopilots, flaps and trim. Where such features are incorporated, reference should be made to section 3.5 of Technical Leaflet [3.26](#).

## GENERAL REQUIREMENTS

If an electronic display is used to display some of the required flight and engine parameters (ASI, altimeter, compass, tacho, Ts and Ps, fuel quantity, manifold pressure, etc) it is acceptable for the display to be able to be selectable in flight to show other parameters instead (for example GPS map) providing that:

- a. ASI, altimeter and compass are visible at all times (either on the primary display or on the back-up instruments), and;
- b. The multi-instrument has an alerting feature (warning light or tone, etc) to warn the pilot if engine rpm, temperatures, pressures or fuel quantity go outside of the normal range, which will function whether or not the parameter concerned is amongst those currently displayed on the screen, and;
- c. The multi-instrument can be easily selected in flight to a standard configuration which does provide a display of all the required parameters simultaneously.

If an electronic display is used to display some of the required flight and engine parameters, providing the unit works satisfactorily in ground and flight testing, then the only back-up instruments required to be fitted are ASI, altimeter and compass.

The Air Navigation Order requires that an aircraft be "equipped with a means of measuring and displaying the magnetic heading". The primary heading display must therefore be derived from magnetic data. The backup heading information may be derived data (e.g. GPS) provided that the GPS receiver and display are independent of the primary EFIS/device, displays the heading at all times and has its own independent backup power supply.

## MICROLIGHT AIRCRAFT

If an electronic display is used on a microlight aircraft, it would be acceptable to avoid having a backup ASI, altimeter and compass, but only if:

- a. The reliability of the instrument can be shown to be at least as good as that of conventional instruments. How this could be done in practise remains to be seen.
- b. Failure of any one sensor does not affect the display of other parameters
- c. The display will continue to work for at least 20 minutes following failure of its normal electrical power supply.
- d. If LAA requires a stall warner, it is independent of the electronic display (it may share the same pitot-static system).

- e. The multi-display either displays cautionary ranges and limits for each critical parameter using conventional coloured arcs and radial lines on the virtual instrument faces, or an agreed equivalent method is used.
- f. The evaluating pilot is fully satisfied with the visibility of the displayed parameters under different ambient light conditions, update rate, ease of interpretation and operation of the system.


## BACKUP INSTRUMENTS





Where a backup ASI, altimeter and compass are required, these must be mechanical instruments except as described here.


Electronic backup instruments may be used where a common failure mode (except an air system failure) is unlikely to affect both the primary and backup instruments at the same time, and where the backup instruments are simple devices. Backup instruments must be available to display the necessary information instantly in the event of a primary instrument failure and be easy to use. Backup units which incorporate multiple pages of functionality are therefore not permitted. Backup instruments must be located where they can be readily checked in flight, particularly on approach (i.e. not far from the usual pilot's instrument scan path).

Aside from software or hardware failure of the primary instruments, the main cause of failure is likely to be lack of electrical power. Backup instruments must therefore incorporate their own backup power supply capable of sustaining the instruments for at least 30 minutes (either internally or externally) and be sufficiently robust that an external overvoltage or other such event that knocks out the primary instruments is unlikely to also affect the backup instruments. Backup power sources for these instruments must be automatically available without intervention from the pilot.

The units below may be used without further reference to LAA Engineering, although your LAA inspector will need to make a Permit Maintenance Release (PMR) entry in the airframe logbook quoting this Technical Leaflet reference. The use of other electronic backup instruments must be approved by LAA Engineering, e.g. by means of a modification approval or indication of the approved configuration in the type's TADS. Note that as additional models are investigated as part of modification approvals, these will be listed here if appropriate.

<i>Make</i>	<i>Model</i>	<i>Instrument type</i>	<i>Notes</i>	
Funkwerk	BF157	ASI, altimeter, VSI	Built-in backup battery	

Garmin	G5	ASI, altimeter, VSI, compass (with external magnetometer)	Optional internal backup battery or external backup battery must be fitted. HSI page must be disabled.	
LX Navigation	BU57	ASI, altimeter, VSI	Built-in backup battery	
LX Navigation	Salus	ASI, altimeter, VSI	Built-in backup battery. Must be set up so that only the 'main page' is available in flight.	
MGL	ASX-1	ASI, altimeter	Requires a separate back-up battery.	

MGL	ASV-1	ASI, altimeter, VSI	Requires a separate back-up battery.	
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