BRITISH MICROLIGHT AIRCRAFT ASSOCIATION

TECHNICAL INFORMATION LEAFLET

NO: 109a **ISSUE 3** **FEB 2011**

STANDARD MINOR MODIFICATION – AWARE GPS INSTALLATION

Introduction

This leaflet contains the required information to permit straightforward fitment of an "Aware" GPS device in a microlight aeroplane. It covers both fixed and removable installations.

The normal fee of £10 is waived, until further notice, to encourage fitment of this useful safety device.

This leaflet permits only certain ways of installing the device. This is because these ways are known to be straightforward, risk and hassle free. This doesn't mean that there aren't other ways of fitting a GPS, but if you wish to do it in another way, this must be done through a more conventional mod application (at greater cost) and more information than is required here may be requested by the BMAA technical office.

Notwithstanding the simple approach taken by this TIL, it is the aircraft owner's responsibility to ensure that all materials used in a modification are of adequate quality, that proper aircraft engineering standards are applied, that this modification does not create any safety problem when combined with any other modification to the aircraft, and that no relevant information has been withheld from the BMAA or inspector.

Permitted Options

1 GPS type
- 1.1 The GPS may be fixed, or removable from the aircraft.

2 Antenna type
- 2.1 The GPS has an integral antenna.

3 Power Supply
- 3.1 The GPS may operate on its internal battery, or…
- 3.2 The GPS may be powered by an external battery and/or a regulator attached to an auxiliary power supply socket, or a dedicated fused supply of 5v.

4 GPS Location
- 4.1 The GPS is to be located in the cockpit, out of the airflow, and, in particular…
- 4.2 The GPS is to be mounted on the instrument panel, or...
- 4.3 The GPS is to be mounted on the windscreen using the supplied sucker mount, or…
- 4.4 For 3-axis microlight aircraft, the GPS is to be mounted on a bracket, without drilling, to an overhead tube, or…
- 4.5 For flex-wing (weight-shift control) microlight aircraft, the GPS is to be mounted on a bracket attached, without drilling, to the trike keel tube, in front of the pilot.

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Essential Safety Checks

1 GPS

1.1 When installing a GPS, on no account should primary structure be cut, drilled or altered in any way. If in doubt, ask.

1.2 The GPS (including any mounting brackets and integral batteries) must be weighed.

1.3 A load test, using scales or a spring balance to 9 times the instrument weight forwards, 4.5 times the instrument weight up and down, 3 times the instrument weight to port and starboard must be carried out.

1.4 If the GPS is removable, and not positively restrained, or if it is mounted on a windscreen sucker mount, there must also be a retaining lanyard attached to both the aircraft and the GPS, to stop it becoming a hazard if it comes loose[1]. This must be short enough to prevent it snagging the pilots as they enter or leave the cockpit.

1.5 When panel-mounting the GPS, if a new cutout is required, this is only acceptable if the panel is not load bearing primary structure. If unsure, make certain first and cut later. There must be enough space around the instruments so that there is adequate mechanical strength left in the panel to carry the additional weight. Obviously this means that with a thick metal panel the GPS can be far closer to other instruments than with a thick GRP panel for example (instruments with backing plates that are screwed into the panel are unlikely to have a significant weakening effect). In addition to the load test of check 1.3, test the panel in the area of the GPS with 9 times the combined weight of the GPS and its adjacent instruments forward (spread the load over an area when performing this test). If there is any question as to whether the whole panel can cope with the additional weight, repeat the test with 9 times the combined weight of all the instruments[2].

2 Cabling

2.1 If powered via the auxiliary power supply socket it is the pilot's responsibility to secure the cable and ensure that it cannot pose a danger to the control of the aircraft, since any such cable is not considered part of the modification.

2.2 If wired directly into the aircraft's electrical system, the GPS must be connected to its power supply via an in-line fuse and a switch (such that it is easy for the pilot to turn off the power supply to the installed instrument in flight). The fuse rating must be between 1.5 and 2 times the maximum current draw of the GPS, and placarded on, or adjacent to, the fuse holder. The switch can be a separate switch or the supply can be routed via the master switch. In the case of a separate switch, it must be clearly placarded with its function (for example 'GPS') and its sense (on/off), which must be down for off. Cables between the GPS and the power supply must be firmly secured

2.3 Any cables bridging de-riggable parts of the aircraft must have quick release fasteners at the join.

2.4 No holes must be drilled in any metal or primary structure for cables to pass through.

2.5 No holes must be cut in the sail for cables to pass through.

2.6 Cables, if passing through the wing, must be routed so that they cannot snag any flying controls.

[1] Some removable GPS models – such as the Garmin 196 – have a mounting cradle that allows the GPS to be positively locked in place. If such a device is used, a retaining lanyard is not mandatory.

[2] Further advice on instrument panels is contained in TIL 027.

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3 Aircraft Weight and Balance

3.1 The last weight report must be checked to ensure that the additional weight of the installation won't put the aircraft overweight.

3.2 For a 3-axis microlight aircraft, the inspector must calculate, from the known weight and position of the new instrument the empty CG change, and satisfy themselves that this will not in any condition make the aircraft go outside the permitted CG limits. If a W&CG report is not held for the aircraft, one must be prepared or BMAA HQ contacted for the file copy (Note: it is an ANO requirement that whenever an aircraft is weighed, details of the weighing are included in the aircraft logbook).

3.3 The inspector must make an amended weight and balance entry in the aircraft logbook.

4 Radio Interference

4.1 If a radio is fitted, check that the GPS does not cause excessive interference. A small increase in the use of the radio's squelch control to suppress GPS 'noise' is acceptable, but if the squelch cannot completely remove the interference, or the quality of received transmissions is significantly affected by the GPS, remedial action is required.

What to do once you have fitted your GPS

In conjunction with your inspector, fill in the form on pages 4 and 5 of this TIL, and return it to the BMAA. The BMAA will return this form to you, with the full modification approval number shown at the bottom of the page. This mod number must then be entered in the aircraft logbook.

It is acceptable to send in the form with your permit renewal form.

Aircraft must be wholly owned by BMAA members. A BMAA Ownership Trustee Grid should be submitted with this form for syndicate, group and company owned aircraft.

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BMAA – STANDARD MINOR MODIFICATION CHECKLIST: TIL 109a

Reg: G-_ _ _ _	Aircraft type:	Serial No:
Owners name:		Owners BMAA No:
BMAA Aircraft Ownership Trustee Grid required for syndicate/group/company owned aircraft		

Installation Details

Make and Model	Airbox Aware Airspace Warning Device

GPS Weight	170g
Total Installation Weight	g

Tick one box per section

1. GPS	Removable		2. GPS Location	Overhead	
	Panel Mount			Instrument Panel	
				Keel Tube	
				Windscreen	
3. Power Supply	Integral Battery				
	Aircraft Power Supply				

Safety Checks

CHECK	ACTION	COMMENTS	INSPECTOR'S INITIALS
1 All GPS types			
1.1	No primary structure drilled or altered		
1.2	GPS inside cockpit & outside airflow		
1.3	Installation load tested		
1.4	Aircraft within weight & CG limits – amended weight & balance entry in aircraft logbook		
2 Removable GPS			
2.1	Lanyard fitted - Ensure GPS is not a hazard if supported only by the lanyard.		
2.2	Primary flight instruments not hidden		
2.3	Aircraft controls not restricted		
2.4	Entry and exit of aircraft not impeded		
3 Panel-mount GPS			
3.1	Mounted in instrument panel - not primary structure		
3.2	Instrument panel strength (see section 1.5 of Essential Safety Checks)		

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CHECK	ACTION	COMMENTS	INSPECTOR'S INITIALS
4 GPS powered by aircraft power supply			
4.1	Circuit protected by appropriate fuse		
4.2	Fuse rating placarded		
4.3	Power to GPS can be switched off by pilot in flight (master switch acceptable)		
4.4	Switch function clearly placarded		
4.5	Switch down for off and placarded as such		
5 General installation checks			
5.1	Multi-strand cable used - adequate cable flexibility and current capacity		
5.2	All cable terminations properly made - no exposed conductor		
5.3	Cables and other components properly secured		
5.4	Quick-release fasteners used for de-riggable parts of airframe		
5.5	No holes or cuts made in airframe		
6 Antenna installation			
6.1	Secure and clear of propeller & exhaust		
7 Radio interference			
7.1	No excessive interference		

OWNER'S DECLARATION

I declare that the foregoing information is correct to the best of my knowledge and I will not change the installation design once approved.

Signed:	Name.	Date:

INSPECTOR'S DECLARATION

I declare that the foregoing information is correct and the installation is fit to be flown.

Signed:	Name.	Insp No:	Date:

This form must be sent with payment as per current fees in MF or www.bmaa.org, and BMAA Aircraft Ownership Trustee Grid (if applicable) to*:- technical.office@bmaa.org

BMAA Office Approval: **(signed)** **(Name)**

Mod No.: G-_ _ _ _ / TIL109a / 20 _ _ /_ _ _ _ _ **(Date)**

**Whilst waiting for this form to be returned by the BMAA the aircraft may be flown for upto one calendar month from the Inspection date above. Once this form is returned to you signed please enter the full modification approval number above in your aircraft logbook and retain this sheet with your aircraft records.*