



BMAA TECHNICAL INFORMATION LEAFLET (TIL)
STANDARD MINOR MODIFICATION
SMM 122 – MINI BACKUP EFIS INSTALLATION
 (INCL. REMOVABLE TYPES)
ISSUE – 1
MAR 2021

Introduction

This leaflet contains the required information to permit straightforward fitment of a miniature back up EFIS in a BMAA aircraft. It covers the fitment of both removable and fixed mini backup EFIS units, as well as the fitment of both removable and fixed mountings if applicable.

This leaflet permits only certain ways of installing a mini backup EFIS instrument. 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 unit, 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.

Eligibility

This TIL has a very specific set of criteria for mini backup EFIS and their installation:

- Device must not weigh more than 300g & the total install should be less than 500g.
- Generally designed to fit directly into the instrument panel (max dia. 100mm) or via a dedicated mount.
- Can only integrate with the aircraft in order to derive electrical power and no other systems (such as pitot static system or engine sensors/wiring).
- The mini EFIS must be in addition and not used instead of the required instruments (as per HADS/TADS).
- The mini EFIS cannot be used as a primary instrument.

Current list of mini EFIS units eligible to use this TIL are:

Manufacturer	Model	Size	Weight	Picture
Dynon	D Series	89 x 83 x 25mm	227g	
RSS Ltd	Aircrew Flight Instrument	85 x 85 x 41mm	200g	

Please email technical.office@bmaa.org if you think another instrument might be eligible.



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Permitted Mini EFIS Units

Only instruments as listed in the section above and installed in the manner described above may be installed.

Please note: the following are **not** eligible for this TIL: MGL, Kanardia, Garmin, uAvionix, Flybox & AvMap. This is because they must be connected to other aircraft systems such as the Pitot Static & engine sensors. Currently these have to be applied for as individual modifications via the BMAA Technical Office.

Essential Safety Checks

1 EFIS

- 1.1 When installing an EFIS, on no account should primary structure be cut, drilled or altered in any way. If in doubt, ask.
- 1.2 The EFIS (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, starboard and towards the pilot, must be carried out.
- 1.4 If the EFIS is removable and is **not** positively restrained by a **fixed** mount, there must also be a retaining lanyard attached to both the aircraft and the EFIS, to stop it becoming a hazard if it comes loose. This must be short enough to prevent it snagging the pilots as they enter or leave the cockpit.
- 1.5 When panel-mounting an EFIS, new cut-outs are only acceptable if the panel is not a primary load-bearing structure. If unsure, contact the manufacturer or the BMAA Tech Office; it is critical to 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. A thick metal panel allows the EFIS to be closer to other instruments than a thick GRP panel. For example (instruments with backing plates screwed into the panel are unlikely to cause significant weakening). Test the panel in the area of the EFIS with 9 times the combined weight of the EFIS and its adjacent instruments forward (spread the load over an area when performing this test). If panel integrity is questionable, repeat the test with 9 times the instruments' combined weight¹.
- 1.6 Such devices usually have their own on/off switch (as part of the unit), if not an additional dedicated switch or ultimately the Master or Master Avionics would suffice.

2 Cabling

- 2.1 If powered or charged 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 EFIS 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 EFIS, 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 'EFIS') and its sense (on/off), which must be down for off. Cables between the EFIS 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.

¹ Further information on load testing may be found in the document TIL 027.



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- 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.

3 Antenna

- 3.1 Any additional separate antenna is to be attached to the aircraft using Velcro, cable ties or similar. Cables must be fixed securely so as not to impede free movement in/out of the aircraft, and must conform to the safety checks in section 2.
- 3.2 The antenna must be mounted out of the airflow.

4 Aircraft Weight and Balance

- 4.1 The last weight report must be checked to ensure that the additional weight of the installation won't put the aircraft overweight.
- 4.2 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).
- 4.3 The inspector must make an amended weight and balance entry in the aircraft logbook.

5 Radio Interference

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

6 Placards

- 6.1 If the EFIS displays Air Speed and/or Altitude/Height, ensure placards installed stating:

“GROUND SPEED ONLY” | “GPS ALT/HEIGHT ONLY”

What to do once you have fitted your EFIS

In conjunction with your inspector, fill in the form on pages 4, 5 and 6 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 122

Reg: G- _ _ _ _	Aircraft type:	Serial No:
Owners name ¹ :		Owners BMAA No:
<i>¹ BMAA Aircraft Ownership Trustee Grid required for syndicate/group/company owned aircraft</i>		

Installation Details

Backup EFIS Unit Make and Model		Backup EFIS Unit Weight	g
Backup EFIS Unit Mount Make and Model <i>(If supplied separately to EFIS)</i>		Backup EFIS Mount Weight <i>(If supplied separately to EFIS)</i>	g
		Total Installation Weight <i>(Including Additional Wiring Required)</i>	g

Tick all that apply

1. Backup EFIS Unit Fitment	Removable	<input type="checkbox"/>	2. EFIS Location	Overhead	<input type="checkbox"/>
	Fixed	<input type="checkbox"/>		In Instrument Panel	<input type="checkbox"/>
			On Instrument Panel	<input type="checkbox"/>	
			Keel Tube	<input type="checkbox"/>	
			Windscreen	<input type="checkbox"/>	
3. Power Supply	Integral Battery	<input type="checkbox"/>	4. Antenna (if applicable)	Integral	<input type="checkbox"/>
	Aircraft Power Supply	<input type="checkbox"/>		Separate	<input type="checkbox"/>
	Power via a TIL107 (already approved)	<input type="checkbox"/>			
	Integral Battery with A.P.S Charging	<input type="checkbox"/>			
5. EFIS Mount	Non-Existent	<input type="checkbox"/>	6. EFIS Mount Fitment	Removable	<input type="checkbox"/>
	Integrated with EFIS	<input type="checkbox"/>		Fixed	<input type="checkbox"/>
	Separate	<input type="checkbox"/>			



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Mini EFIS Eligibility

No.	ACTION	COMMENTS	INSPECTOR INITIALS
A	Mini EFIS On BMAA Approval List? <i>(If EFIS not listed check with BMAA Technical Office before approval)</i>	YES / NO	
B	Manufactures Instructions Available and Followed		
C	Manufactures Instructions Appended to aircraft POH		
D	Confirm this instrument is fitted in addition to all mandated instruments, as per the applicable HADS/TADS		
E	Provide photo/s of the newly installed EFIS		

Safety Checks

No.	ACTION	COMMENTS	INSPECTOR INITIALS
1 All EFIS types			
1.1	No primary structure drilled or altered		
1.2	EFIS 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 EFIS Unit & Mount			
2.1	Lanyard fitted – if applicable.		
2.2	Primary flight instruments not hidden		
2.3	Aircraft controls not restricted		
2.4	Entry and exit of aircraft not impeded		
3 Fixed EFIS Unit			
3.1	Mounted in instrument panel - not primary structure		
3.2	Instrument panel strength (see section 1.5 of Essential Safety Checks)		
3.3	Has the new EFIS unit directly replaced an existing instrument? If Yes state which: _____	YES / NO	
3.4	If yes to 3.3, confirm that the instrument replaced was <u>not</u> one mandated by the HADS/TADS		



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No.	ACTION	COMMENTS	INSPECTOR INITIALS
4 EFIS powered or charged by aircraft power supply			
4.1	Circuit protected by appropriate fuse		
4.2	Fuse rating placarded		
4.3	Power to EFIS 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		
5.6	If the EFIS displays Air Speed and/or Altitude, ensure placards installed stating: "GROUND SPEED ONLY" "GPS ALT/HEIGHT ONLY"		
6 Antenna installation (if applicable)			
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:	BMAA Inspector Name:	Date:
	BMAA Inspector #:	
	BMAA Member #:	

This form must be sent with payment as per BMAA Online Shop (www.bmaa.org), and BMAA Aircraft Ownership Trustee Grid (if applicable) to*: technical.office@bmaa.org

BMAA Office Approval:	(signed)	(Name)
Mod No.: G-____ / TIL122 / 20 __ / _____		(Date)

**Whilst waiting for this form to be returned by the BMAA the aircraft may be flown for up to 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.*