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SERVICE BULLETIN: JSB 017-4

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Subject: Digital Instrument (EFIS and EMS) Maintenance

Issue	Reason for Issue	Revision Status
1	Original Issue	CANCELLED
2	New release firmware	CANCELLED
3	New release firmware	CANCELLED
4	New release firmware	CURRENT

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2 Applicability

All Jabiru factory built Jabiru Aircraft which are equipped with the Dynon EFIS (Electronic Flight Information System) and/or EMS (Engine Monitoring System) instruments.

Note: for LSA category aircraft, this bulletin is equivalent to a Manufacturer's Safety Direction.

3 Background

The EFIS and EMS systems are programmed with the aircraft's limitations by the factory during assembly. If these settings are changed, the aircraft no longer complies with the standards to which it was designed. In addition, the EMS is designed able use a variety of different sensors: for example, several different types of oil pressure sender units are able to be connected to the unit. This means that to give accurate oil pressure readings the EMS must be set to use a "Type 3" sensor.

As it is possible to modify the settings for both units relatively easily, this bulletin is being introduced to add a check of the Digital Instrument (DI) settings during normal scheduled maintenance. This check will confirm that the units are still displaying the correct limitations and are correctly configured.

Night-VFR aircraft also require that the EFIS display be able to run on internal power for a minimum of 1 hour (fully dimmed). Table 1 below gives details of test requirements.

Finally, the software used by the EMS and the EFIS (known as "firmware") is periodically updated by the instrument manufacturer to include new features or to enhance performance and reliability. Before owners are able to use new versions, Jabiru Aircraft must check and approve each firmware release. Accordingly, this bulletin also lists the latest currently approved version of the firmware.

4 Recommendations:

4.1 General

The inspections detailed herein are mandatory for factory-built Jabiru Aircraft models equipped with either (of both) digital instruments.

5 Inspection Details

5.1 General

While basic details for operating the menus etc for the instruments have been included below, the "Pilot User's Guide" for each instrument should be consulted for additional information. These are available from the Dynon Avionics website – www.dynonavionics.com – under the "support" menu.

5.2 EMS Timers

The EMS gives two indications of aircraft time in service – "Hobbs" time and "Tach" time. Hobbs is a simple timer which operates whenever the engine is running whereas the Tach timer is scaled and generally gives a lower reading than the Hobbs meter. Differences between these timers can be significant (differences above 25% have been recorded).

Jabiru Aircraft require that all maintenance be carried out based on Hobbs time.

5.3 Digital Instrument Inspection Table

The following Table shows the frequency and extent of checking required for the digital instruments. For the EMS, the other settings which affect the units readings and accuracy are included and must be confirmed at the intervals noted.

Table 1 – Maintenance Schedule

		Annual Inspection		
		Each 200 Hours		
		Each 100 Hours		
EMS				
1	Limits as detailed in the Aircraft Flight Manual or Pilot's Operating Handbook		*	
	Units¹: Pressure = Bar			
	Volume = Litres			
2	Temperature = °C		*	
	Distance =nm			
	Speed =Knots			
	Altitude = Feet			
3	Alarms: Power on Alarm = OFF		*	
	LGT after ACK = SOLID			
4	Info Item: Item #1 = Volts		*	
	Item #5 = Fuel Timer			
	Other Items = "NONE"			
5	Install Setup: CHTs = 2		*	
	Fuel Tanks = 2			
	Sensors: Tacho Displayed			
	Tacho 6 pulses/rev			
	Tacho Cruise 2800 RPM			
	MAP Not Displayed			
	Oil Press Displayed			
	Oil Press Self-clear alarm			
	Oil Press Sensor type 3			
6	Oil Temp Displayed		*	
	Oil Temp Latching alarm			
	Oil Temp Sensor type 5			
	EGT Not displayed			
	CHT Displayed			
	CHT Latching alarm			
	Fuel Level Displayed			
	Fuel Level No alarm			
	Fuel Level Sensor type 1			
	Fuel Press Not displayed			

¹ Note: **Bold** text here indicates the name of the menu used the adjust the settings detailed

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		Annual Inspection		
		Each 200 Hours		
		Each 100 Hours		
	Fuel Flow	Displayed		
	Fuel Flow	K-Value ² - Check		
	Voltage	Display		
	Voltage	Self-clear alarm		
	Voltage	Displayed Info #1.		
7	Check firmware version		*	
8	Main page display to look like Figure 1. Items given in Section 5.5 shown.		*	
EFIS				
9	Limits as detailed in the Aircraft Flight Manual or Pilot's Operating Handbook		*	
10	Items listed in Section 5.4 shown.		*	
11	Check firmware version		*	
12	Run EFIS on internal battery for 15min and check internal battery voltage. Voltage must be no lower than ##. Lower readings require the EFIS's internal battery to be replaced. (Night VFR only)		*	
13	Run EFIS on internal battery until flat and record time elapsed (screened fully dimmed) (Night VFR only).			*

² K-value is a calibration setting for the individual flow meter. The K-value is noted in the aircraft's airframe logbook. It should not be changed from the original factory setting unless a new sensor is fitted.



Figure 1 - EMS Main Page Display

5.4 Required EFIS limitation displays:

- Never exceed speed, V_{NE} (Red line speed, top of yellow arc)
- Maximum structural cruising speed, V_C (Top of green arc, bottom of yellow arc)
- Maximum Flap Extension speed, V_{FE} (Top of white arc)
- Stall speed with full flap, V_{S0} (Bottom of white arc)
- Stall speed clean, V_{S1} (bottom of green arc)

5.5 Required EMS Displays:

- RPM Red line
- Maximum continuous CHT (Top of CHT green arc, bottom of yellow arc)
- Maximum Take-Off CHT (Red line for CHT, top of yellow arc – no more than 5 minutes)
- Maximum continuous Oil Temperature (Top of oil temp green arc, bottom of yellow arc)
- Maximum Take-Off Oil Temperature (Red line for oil temp, top of yellow arc)
- Minimum Fuel Pressure (start of green arc)
- Maximum Fuel Pressure (end of green arc)
- Minimum Idle Oil Pressure (Redline & start of yellow arc)
- Minimum Flight Oil Pressure (end of yellow arc, start of green arc)
- Maximum Oil Pressure (End of green arc)
- Figure 1 shows what the display should look like on the main page.
- Minimum System Voltage (Bottom of green arc)
- Maximum System Voltage (top of green arc)

5.6 EFIS / EMS Firmware

The latest approved versions of firmware are:

EFIS-D10A Firmware: EFIS-D10A version 5.00.00 released 11/13/08 (month/day/year)
 EFIS-D100 Firmware: EFIS-D100 version 5.00.00 released 11/13/08 (month/day/year)
 EMS-D10 Firmware: EMS-D10 version 5.00.00 released 11/13/08 (month/day/year)

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Future revisions of the firmware must be approved by Jabiru Aircraft (and this Service Bulletin re-issued accordingly) before it may be loaded. Firmware upgrades are available from Jabiru Aircraft.

When loading new versions of the firmware, on to the EMS, it is prudent to record the Engine hours (Tacho and Hobbs) and the fuel flow calibration (should be recorded in the airframe logbook).

Older revisions of the firmware may continue to be used.

6 Compliance – Implementation Schedule:

The inspections detailed herein are to be carried out at the aircraft's next scheduled 100-hourly inspection, then at the intervals detailed in Section 5.3.

Settings, firmware and instructions are to be obtained from Jabiru Aircraft.

7 Airworthiness Note:

Where required, maintenance work called for by this Bulletin must be carried out by authorised personnel. For the aircraft detailed herein this means the owner, an RA-Aus Level 2 holder or a Licensed Aircraft Maintenance Engineer (LAME) – as appropriate to the aircraft's registration and use (Private or Air Work operations).

On completion of the work, the authorised person must note the completion of the actions required by this bulletin in the aircraft's maintenance logbook. This note should refer to the completion of maintenance requirements of this Service Bulletin, indicate if anything significant was found during the course of the work, indicate the date of the work and the identity (including licence number where appropriate) of the person carrying out the work.