Document Version	V1.0
Design	Harkwood Services Ltd.
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Title	Installation of USB v3 USB-PD chargers.
Classification	Minor
Aircraft Type	This design change is designed for: • Aeroplanes that are not complex motor-powered aircraft. • Rotorcraft that are not complex motor-powered aircraft. • Any ELA2 aircraft.

Document Affected		
	Weight and Balance	No, negligible
	Electrical Load Analysis	Yes
	Compass Swing	No
	Maintenance Manual	No
	Wiring Diagram	Yes
	Flight Manual	Yes
	Logbook	Yes
	Radio Licence	No

Reason for Change	Installation of a safe and low RF signature USB supply for charging portable electronic devices and any device requiring a USB-C PD supply
Description of Change	Installation of USB supply.
Scope of the change	The change consists of a mechanical and electrical installation. The installation will re-use existing wiring provisions wherever possible. A new circuit breaker will be installed, as well as an ON/OFF switch when necessary. This design change does not include structural changes.
Environment	The equipment has been designed to be installed in the cabin of a general aviation aircraft, where it is protected from direct sustained fluid ingress.
Aircraft power supplies	Equipment may be connected to 14 Volt DC or 28 Volt DC.
Circuit protection	A dedicated circuit protection device shall be used. This can either be a pullable style circuit breaker or a switch-type circuit breaker. The circuit protection device is to be identified according to the system being protected.

Electrical Load Analysis	The Electrical Load Analysis should be updated. For aircraft that don't have an Electrical Load Analysis, a complete analysis shall be made. Installation is only allowed when the electrical system load analysis shows that the aircraft electrical system has sufficient energy for this system. Upgrades of the electrical power system are not part of this modification and would require further approval. If there is insufficient power available, the maximum power output can be reduced to limit the load on the electrical system.
Cooling requirements	None
Weight and balance requirements	Not applicable. Change in weight is negligible.
Placards	Circuit breakers and switches shall be identified.
Applicability	This design change is designed for: • Aeroplanes that are not complex motor-powered aircraft. • Rotorcraft that are not complex motor-powered aircraft. • and any ELA2 aircraft.
Installers	This design change is to be installed by appropriately rated personnel depending on the regulatory route of the installation.
Continued Airworthiness:	There are no mandatory continued airworthiness instructions applicable to this installation. We recommend inspecting the wiring, using the same interval as recommended by the aircraft manufacturer.

Installation / Post installation Instructions

Installation

- ✓ There are no mandatory continued airworthiness instructions applicable.

- ✓ Perform ELA update to ensure the electrical system is sufficiently rated for this installation. Upgrades of the electrical system are out of scope.

  Configure the charger for a lower maximum power output as required to meet the available power from the ELA, or regulatory power limit.

- ✓ Determine if a switch, or circuit breaker switch is required.

- ✓ Locate a suitable mounting location. Keep at least 15 cm as a compass's safe distance. Make sure the mounting location doesn't interfere with the aircraft's primary structure. The mounting location should be sure that ingress of fluid is prevented and also minimise the possibility that (conductive) objects could be inserted into the USB sockets.

- ✓ If directly mounting, the unit has 4 M3 threaded screw holes. The length of the bolt must be such that 4 to 5 mm of thread is in the charger. A typical formula would be panel thickness + 4 mm.

  When using an adapter plate, use the provided fixings. A Torx T10 driver is required.

  Where pre thread locked fasters are not available, a medium-strength locking compound should be used, such as Loctite 243.

- ✓ Make the aircraft safe for maintenance according to standard practices.

- ✓ Observe health and safety instructions where applicable.

- ✓ Carry out any modifications needed to the instrument panel, avionics rack or pedestal to facilitate installation. Use FAA AC-43.13-1B and the aircraft maintenance manual for standard practices.

✓ Install new wiring. Use either the supplied power cable or self-supplied MIL-W-22759/16-20 or equivalent 20 AWG wiring. The cable length from breaker to charger should not be longer than 2m.

Connect the positive wire to an unused or new, suitably rated circuit breaker based on the aircraft electrical system voltage. This circuit breaker shall be connected to an avionics bus. When multiple busses are available, connect to non-essential buss. An on-off switch can be installed in series between the circuit breaker and the device if needed. As an alternative, a circuit breaker / switch can be used.

Recommended circuit breakers:

- Klixon 7277-1-5 / 7277-1-10
- Klixon 7277-2-5 / 7277-2-5
- Tyco W23X1A1G5 / W23X1A1G10

Recommended circuit breaker / switch:

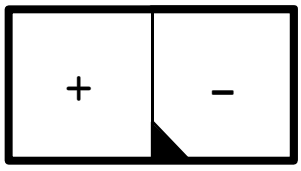
- Tyco W31X2M1G5 / W31X2M1G10

Install the wiring using standard practices as described in the aircraft maintenance manual, or FAA AC-43.13B.

When self-supplied wiring is used, the following connector is required:

Molex bare connector P/N 43645-0200 (QTY 1)
Molex crimp pin P/N 43030-0002 (QTY 2)

These pins should be crimped with Molex crimp tool P/N 63819-0000. Pin should be inserted, per the illustration below.



✓ Test wiring for continuity and isolation.

✓ Apply USB charger or PSS PED decal near the circuit breaker and near the switch, if applicable.

Post Installation

✓ Power up the aircraft and switch on the charger. Check that the self-test is being performed, on which the ports lights will pulse in sequence.

✓ Connect a device to be charged. Ensure the green LED at that port lights up. Check all ports for proper operation.

- ✓ While charging a device, perform a full aircraft EMI test in accordance with FAA AC 43.13-1B, Chapter 11.
- ✓ If required, fill out EASA Form 123 for this modification. Record ELA results on Form 123.