PIVOT	Technical Standards Document	DOCUMENT ID	PP-GNS-B7N7 – S/T/GT-220
	Department: Technical Services	REVISION A	DATE 06/10/2019

Title:

PIVOT Technology Overview

Key Words / Acronyms:

Alternating Current (AC)
Commercial Off the Shelf (COTS)
Company (Military Pilot Supply of Texas Inc., dba Fly Boys)
Direct Current (DC)
Electromagnetic Interference (EMI)
Electronic Flight Bag (EFB)
European Aviation Safety Agency (EASA)
Federal Aviation Agency (FAA)
Derived unit of frequency in the International System of Units defined as one cycle per second (HZ)
International Organization for Standardization (ISO)
National Electrical Manufacturers Association (NEMA)
Portable Electronic Device (PED)
Radio Technical Commission for Aeronautics (RTCA)
Technical Standards Document (TSD)
Transient Voltage Suppression (TVS)
Test conditions for the design of avionics electronic hardware in airborne systems (DO-160G)
Universal Serial Bus (USB)
Volts AC power (VAC)
Volts DC power (VDC)

SUMMARY:

This TSD provides an abbreviated but comprehensive technical overview of PIVOT technology and its use in both commercial and military aviation aircrafts operating under FAA, EASA or other authority's regulatory guidance derived from the aforementioned.

REVISIONS RECORD

Rev.	*Action*	*Date*	*Prepared*	*Checked*	*Approved*
A	BASELINE APPROVAL	06-10-2019	Ken Crowhurst	Nate Stoffregen	Nate Stoffregen

Background

Increased deployment of COTS PED tablets as EFB or tactical cockpit platforms in portable mounts is driving the need for connectivity to aircraft power for charging the tablet. For cockpit situations where there is no permanent or dedicated source for providing power via USB, operators must utilize available power sources. Power receptacles that provide 115VAC 400 Hz are inappropriate for use as the 400 Hz power will destroy conventional 115 VAC-to-USB power converters and render them useless. The alternative solution is to utilize available 28 VDC cockpit maintenance outlets. These power ports, while not provisioned with an EMI protection filter or isolation transformers, can be made applicable for use by utilizing an appropriate 28VDC converter power plug.

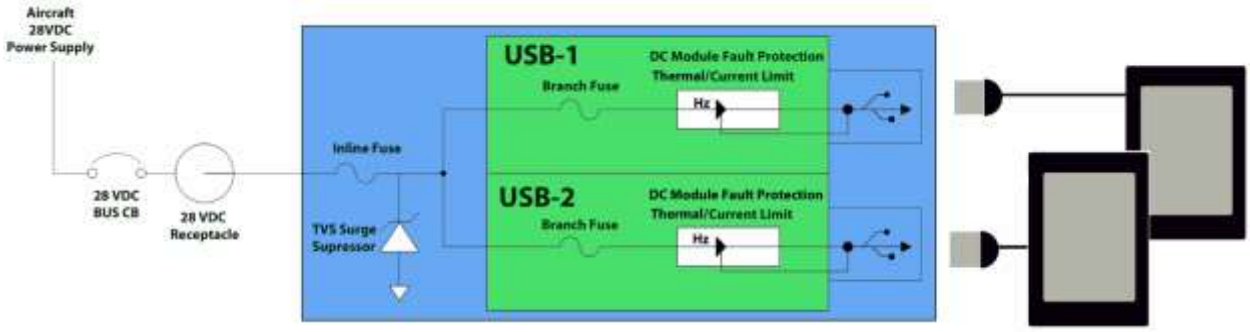
PIVOT Power

PIVOT 28VDC Converter Power Plug with dual USB power ports is a highly reliable RTCA DO-160G tested device for providing USB power to cockpit tablet devices during flight. Certified for cockpit use, the plug provides conditioned power from the 28V DC bus to two USB 2.0 ports which delivers power suitable for tablet device charging while providing surge protection.

It is important to know that a portable electronic charging device (converter power plug) is not part of the aircraft's systems. These products are designed to be a protective interface between the aircraft and the iPad. Their function is to provide charging power while restricting potential faults in a cable, connection, or a defective tablet from harming the aircraft while at the same time protecting the iPad from incoming aircraft bus power surges.

The PIVOT power plug is manufactured by Global Navigation Sciences (GNS) for which PIVOT is the exclusive distributor. The PIVOT power plug has been specifically designed for aircraft use with unprotected 28VDC power supplies and has been subjected to all DO-160G Section 21 Category H radiated and conductive EMI emission lab tests. The results document that the EMI levels from the PIVOT power plug are well within the standards necessary for flight deck use. An isolation transformer is not applicable to low voltage DC circuits and pertains only to the 28VDC references in Airbus "Electrical Power – Electrical Outlets – PED Connection on vacuum cleaner, sockets, maintenance & medical outlets" document reference #25.67.00003 last published 12-DEC-2012.

The PIVOT power plug provides both aircraft DC bus protection and load fault protection on each isolated USB receptacle. The power module for each USB output has a series thermal fuse and a DC current control module that senses connection and/or battery faults to limit output current.



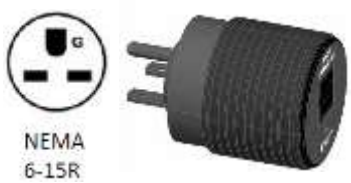
Bus Supply Surge: The converter power plug motherboard provides conditioned power for two isolated USB daughter-board DC power modules. Transient protection is provided to the DC power modules by a TVS surge suppressor that is preceded by an inline fuse that will interrupt power in the event that the energy exceeds the surge suppressor. These components concurrently protect the iPad and charger from bus surges while providing additional fault protection to the aircraft from connection or internal faults.

Current Limit: Within each USB receptacle, a DC power module with fault sensing reacts to low resistance/short cable connections or battery fault condition by retarding the power output to eliminate over-current conditions. This current monitoring circuit also restricts the maximum output current at 2.1 amps during normal operation.

DC Module Fuse(s): Inside each power module, branch fuses protect the aircraft 28VDC bus from an internal fault in either power module. The fuses also protect the DC power modules from overvoltage or dangerous power source incompatibility. In the event of a fault, the fuse will blow and permanently disable the power available to one or both USB receptacles. These fuses are designed for severe fault conditions where normal operational parameters have been exceeded and corrective action must be taken before the charging circuit can be re-energized.

PIVOT power plugs are available in the following configurations:

B7N7-S-220
Straight engage plug
for NEMA 6-15R receptacles



B7N7-GT-220
Twist-lock polar plug with center key for ML-3R receptacles.

B7N7-T-220
Twist-lock polar plug with no center key for ML-1R receptacles.

Best Practices

- Use only in approved 12-36VDC power receptacle
- Ensure charger USB ports are clear of dust/dirt/contamination before connecting USB cable
- Plug charger into 12-36VDC power receptacle *before* connecting USB cable
- Make sure all connectors are free of dust/dirt/contamination
- Remove USB power cable from module when switching from ground power to engine/APU power
- Keep USB power cable free of seat track to avoid damage
- Store charger in moisture free and dust free environment

Cautionary Notes

- **Always** unplug USB cable(s) when switching between ground and aircraft/APU power
- **Never** plug charger into any AC power receptacle
- **Never** use charger if previously submerged in any liquid
- **Never** force charger into 12-36VDC power receptacle if electrodes (prongs) are bent or damaged
- **Never** remove USB power cable from charger by pulling on the cable (pull from base)
- **Never** use when the ambient temperature is below -40˚C or above +55˚C.

Comments

The DO-160G EMI emission testing was performed by Qualtest, Inc. Laboratories which operates under the relevant quality system requirements of ISO 9001:2008 for providing testing services as recognized by TRC Registration Certificate #00018. Complete test results are available upon request.

Every PIVOT GNS-B7N7-S/T/GT-220 power plug has a warranty up to one year if the product fails due to manufacturing defect. Replacement does not cover for damage due to abuse or improper use.

Note that the fuse on the PIVOT charging module is the best possible method to protect the aircraft and the tablet being charged from a potentially unsafe or overvoltage condition. If the fuse on the module blows, it is the result of a potentially unsafe or overvolt condition that the module is designed to protect you from. A blown fuse is not considered a defect and is not necessarily a warrantable condition. Non-operational modules should be returned to PIVOT for inspection and service. These units are not user-serviceable and should not be disassembled.

Additional Information

To learn more, please visit pivotcase.com for instructional videos, product support and additional information. You'll find valuable online resources to enhance your user experience and see the complete line of PIVOT products.

If you have questions, please contact PIVOT Support.

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www.youtube.com/c/pivotcasevideo

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