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Installation Manual and Operating Instructions

TA102 Series
Dual USB Charging Port

True Blue Power® a division of
Mid-Continent Instrument Co., Inc.

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Revision J, January 4, 2017

FOREWORD

This manual provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install this equipment. If further information is required, please contact:

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We welcome your comments concerning this manual. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph/figure/table reference and the page number. Send your comments to:

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REVISION HISTORY

Rev.	Date	Approved	Detail
A	04/19/13	BAW	Initial release.
B	05/30/13	BMC	Updates driven by internal review.
C	08/22/13	TKV	Added Circular Rear Mount option and kit details, added configurations -2, -3, and -4.
D	11/1/13	TKV	Added two additional pins to installation kit and information regarding a recommended crimp tool.
E	11/14/13	TKV	Added information about adhesive for Front Mount Kit. Added information about ETSO certification.
F	06/10/14	TKV	Changed information about mounting screws. (PT+0.285" was PT+0.312")
G	02/26/15	TKV	Added Modification Information, Added Mod 1
H	09/12/16	CAS	Changed the weight in '1.2.2 Physical Attributes' to 0.13 pounds.
J	01/04/17	BAW	Updated to include new mounting option. Added 1.2.4.

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SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The TA102 Series Dual USB Charging Port is a certified accessory that converts 10 to 32 volts of DC electrical input from the aircraft to standard 5V power for any electronic product that charges using a USB connector. The TA102 provides two Universal Serial Bus-A (USB-A) ports and can be rear mounted or front mounted in a variety of locations throughout the aircraft. The unit is certified to FAA TSO C71 and qualified to multiple RTCA DO-160 requirements, providing confidence and convenience to be mounted in either the cabin or cockpit.

This Dual USB Charging Port is designed as a DCP (Dedicated Charging Port) to industry-standard protocol per the *USB Battery Charging 1.2 Compliance Plan*. Early-generation or smaller consumer electronics typically accept one (1.0) amp of power during charging. However, newer electronics, such as the Apple iPad®, other tablets and larger devices can accept and, in some cases, require up to 2.1 amps of power to charge and operate. As a high power DCP, the TA102 can provide up to 2.1 amps of power to charge any USB device, including the higher demand products. Unlike most dual USB chargers which provide one (1.0) amp on one port and 2.1 amps on the second port, the TA102 can provide 2.1 amps of power to both ports simultaneously. With features like short circuit protection, over-current protection, low voltage shut-down and temperature monitoring, it can handle unforeseen conditions safely.

Small, compact and powerful, with plenty of installation flexibility, the TA102 is an ideal choice when selecting a highly useful and effective addition for any aircraft.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 Electrical Attributes

Input Voltage:	10-32 VDC
Input Power:	24 watts max; 1.7 amps @ 14 VDC / 0.85 amps @ 28 VDC
Output Voltage:	5 VDC ±0.25 per port
Output Power:	2.1 amps max per port
Efficiency:	~85% nominal

Table 1.1

1.2.2 Physical Attributes

Weight:	0.13 pounds
Dimensions: (not including connector)	1.50 inches wide X 1.50 inches high X 0.96 inches deep
Charging Ports Type:	USB Standard-A
Mounting:	Panel mount; rear or front

Table 1.2

1.2.3 Qualifications

Certification:	FAA TSO-C71
	EASA ETSO-C71
Environmental Qualification: (see section 5.2)	RTCA DO-160G Environmental Category F1S2BB[(RCC1)(UG)]XXXXXXY[B(XX)]BRXXMXXXAX

Table 1.3

1.2.4 Configurations

Part Number	Power Input	USB Connector
6430102-1	Rear	Sealed
6430102-2	Bottom	Sealed
6430102-3	Rear	Lighted
6430102-4	Bottom	Lighted

Table 1.4

SECTION 2 PRE-INSTALLATION CONSIDERATIONS

2.1 COOLING

No external cooling is required. The unit will become warm when in use. This is normal and within operational parameters. No special mounting considerations are required; however, mounting to a metal surface can help dissipate any heat generated and extend the life of the product.

2.2 EQUIPMENT LOCATION

The TA102 Dual USB Charging Port is designed for mounting flexibility, allowing for installation in the cockpit or in the cabin. It is designed for panel mounting and can be installed in a rectangular or circular rear mount configuration or, with an available installation kit, can be front mounted with a cosmetic cover plate. An instrument mounting adapter bracket is also available to easily mount the unit in a standard 2-inch round instrument opening that may already exist in the cockpit panel. There are two versions to choose from which allow the input connector to be located either on the rear of the unit or from the bottom.

The unit can be mounted in any orientation. Clearance should be provided for the mating connector which may require an additional inch beyond the rear of the unit.

2.3 ROUTING OF CABLES

Avoid sharp bends in cabling and routing near aircraft control cables. Avoid close proximity and contact with aircraft structures, avionics equipment or other obstructions that could chafe wires during flight and cause undesirable effects.

2.4 LIMITATIONS

Environmental qualifications were verified per RTCA DO-160, Revision G in lieu of those identified within the minimum performance standards (MPS) of the TSO.

The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards, specification of the article and deviations as listed above. TSO articles must have separate approval for installation in an aircraft. The article may be installed only according to 14 CFR part 43 or the applicable airworthiness requirements.

2.5 MODIFICATIONS

Each model TA102 (part number 6430102-( )) has a nameplate that identifies the manufacturer, part number, description, certifications and technical specifications of the unit. It also includes the “MOD” or modification number representing notable changes in the hardware design of the unit. The following are descriptions of the current modification releases of the TA102 Dual USB Charging Port.

MOD 0

Modification (MOD) 0 is identified on the nameplate by the lack of marking on the MOD numbers 1 through 9 (i.e. 1-9 are visible).

Mod 0 is the initial release of the TA102 Dual USB Charging Port.

MOD 1

Modification (MOD) 1 is identified on the nameplate by the marking/blacking out of MOD number 1 (i.e. 1 is not visible and 2-9 are visible see Figure 2.2 below for example).

Mod 1 of the TA102 Dual USB Charging Port contains the following changes from MOD 0:

- Main PC Board Thickness Changed to 0.062” (was 0.031”)

MOD 0 **MOD 1**

FIGURE 2.2
Modification Nameplate Examples

SECTION 3 INSTALLATION PROCEDURES

3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the TA102 Dual USB Charging Port. After installation of cabling and before installation of the equipment, ensure that power and ground are applied to the proper pins specified in Section 3.3.2, Pin Assignment Information.

3.2 UNPACKING AND INSPECTING EQUIPMENT

When unpacking this equipment, make a visual inspection for evidence of any damage that may have occurred during shipment. The following parts should be included:

a.	Dual USB Charging Port	MCIA P/N 6430102-( )
b.	Installation Manual	MCIA P/N 9017942
c.	Connector Kit	MCIA P/N 9017960
	i. Mating Connector, 2-pin	
	ii. Pins (4) (2 required, 2 spares)	
	iii. Screws, #4-40 x 1/4 flat-head (2)	
	iv. Screws, #4-40 x 5/16 flat-head (2)	

Optional Equipment Available:

a.	Circular Rear Mount Installation Kit	MCIA P/N 9017945
b.	Front Mount Installation Kit	MCIA P/N 9017946
c.	Instrument Mount Adapter Kit	MCIA P/N 9017947
d.	Rear Mount Installation Kit	MCIA P/N 9017957

Equipment Not Provided:

a.	Cable Harness Wire	See Section 3.3.1 for specifications
b.	Circuit Breaker Recommendation (as needed per system requirements)	2 amp (1 amp may be sufficient for 28V aircraft)

3.3 CABLE HARNESS

Construct the cable harness following the instructions outlined below and per Figure 3.1.
Refer to Section 2: Pre-Installation Considerations, for routing precautions.

3.3.1 Wire Gauge Selection

Use of PTFE, ETFE, TFE, Teflon or Tefzel insulated wire is recommended for aircraft use. The wire harness should utilize 20-24 AWG stranded wire. Refer to table 3.1 below.

Wire Gauge	Wire Length
20 AWG stranded wire	35 ft
22 AWG stranded wire	22 ft
24 AWG stranded wire	14 ft

Table 3.1
Wire Gauge and Length

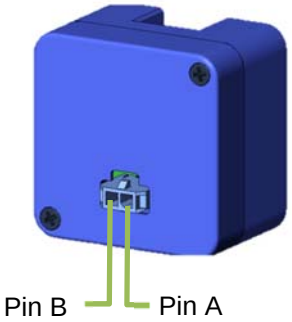
Note: Pins should be crimped using Molex Hand Crimp Tool 63819-0000 (Preferred), 63811-2800 (obsolete) or 11-01-0200 (obsolete). See the Molex Hand Crimp Tool User Manual for crimp procedures.

3.3.2 Pin Assignment Information

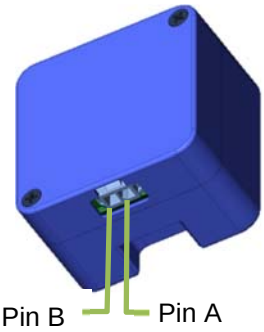
INPUT POWER:

Pin A (keyed) – Positive DC input +10 to 32 VDC power

Pin B – Negative DC input / ground



(6430102-1, -3)



(6430102-2, -4)

Figure 3.1
Power Input

3.3.3 Harness Verification

WARNING:
Failure to install aircraft power and ground wires in the proper mating connector locations will permanently damage the unit.

Once the cable harness is prepared, prior to connecting the TA102, activate the aircraft power bus and use a multimeter to verify that aircraft power and ground is supplied with appropriate voltage on the proper pins within the mating harness.

3.4 MOUNTING

The TA102 can be installed in one of four ways:

- rear mount, rectangular
- rear mount, circular *
- instrument mount *
- front mount, decorative bezel *
- rear mount, decorative bezel *

* installation kit required. See Section 3.2, Optional Equipment Available for part number reference

Prepare the panel cutout as shown in Figures 3.3, 3.4, 3.5 or 3.6 per the selected mounting option.

- For Rectangular Rear Mount, Circular Rear Mount and Instrument Mount Installations countersinks in the panel for flat head screws are optional. However, flat head screws are provided for flush appearance. For Front and Rear Decorative Bezel Installations, countersinks in the panel are required.
- For Rear Mount Installations:
  Mounting screws length MUST be between (PT + 0.150”) and (PT +0.260”). [PT = panel thickness]
  Mounting screws provided with the unit are 0.24” and 0.31” (accommodates 0.020” to 0.160” PT).
  For PT greater than 0.125, the USB connector will be below the surface of the panel (below flush).
- For Circular Rear Mount Installations:
  Mounting screws length MUST be between (PT + 0.200”) and (PT + 0.375”). [PT = panel thickness]
  Mounting screws provided with the Circular Rear Mount Install Kit are 0.438”.
- For Front Mount Installation: Maximum panel thickness is 0.25”.
- For Rear Mount Installation with Decorative Bezel: Panel thickness greater than 0.065 will cause the USB connector to be below the surface of the bezel (below flush).

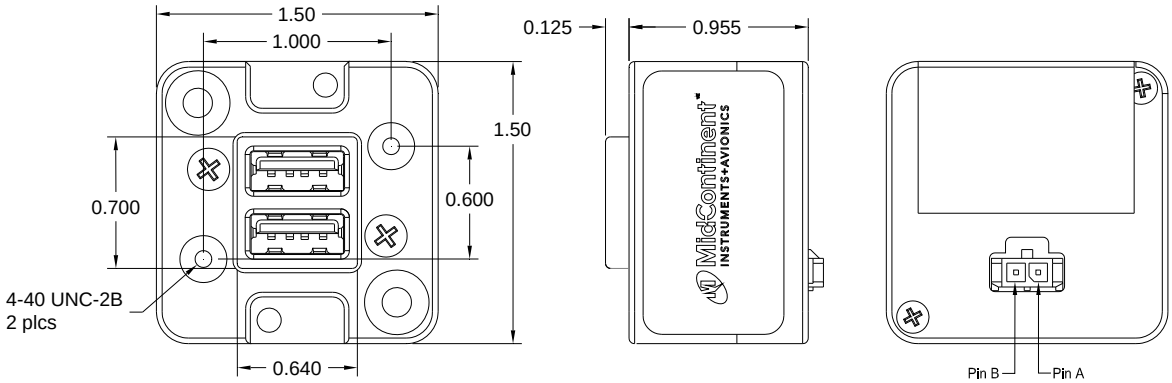
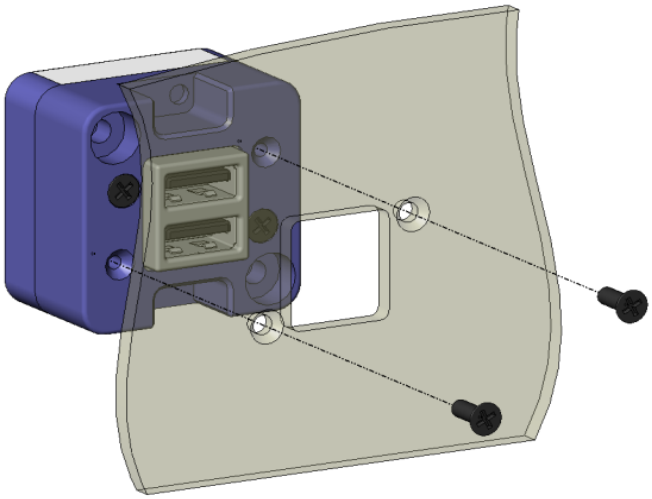
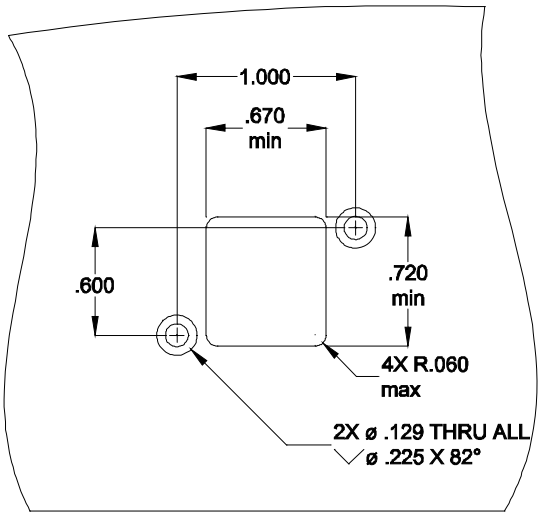


Figure 3.2
TA102 Outline Drawing
(-1 Version Shown)

3.5 INSTALLATION COMPLETION

Prior to operating the unit in the aircraft, it is recommended to verify the output and functionality of the unit. In order to prevent accidental damage to other systems, it is not recommended to attach the output to other equipment prior to verification. Verify the output of the unit at the terminating end of the cable with a multimeter to ensure proper voltage and polarity. Once verified, installation can be completed and functionality should be checked.





Panel Cutout Detail

Figure 3.3
Rear Mount Installation

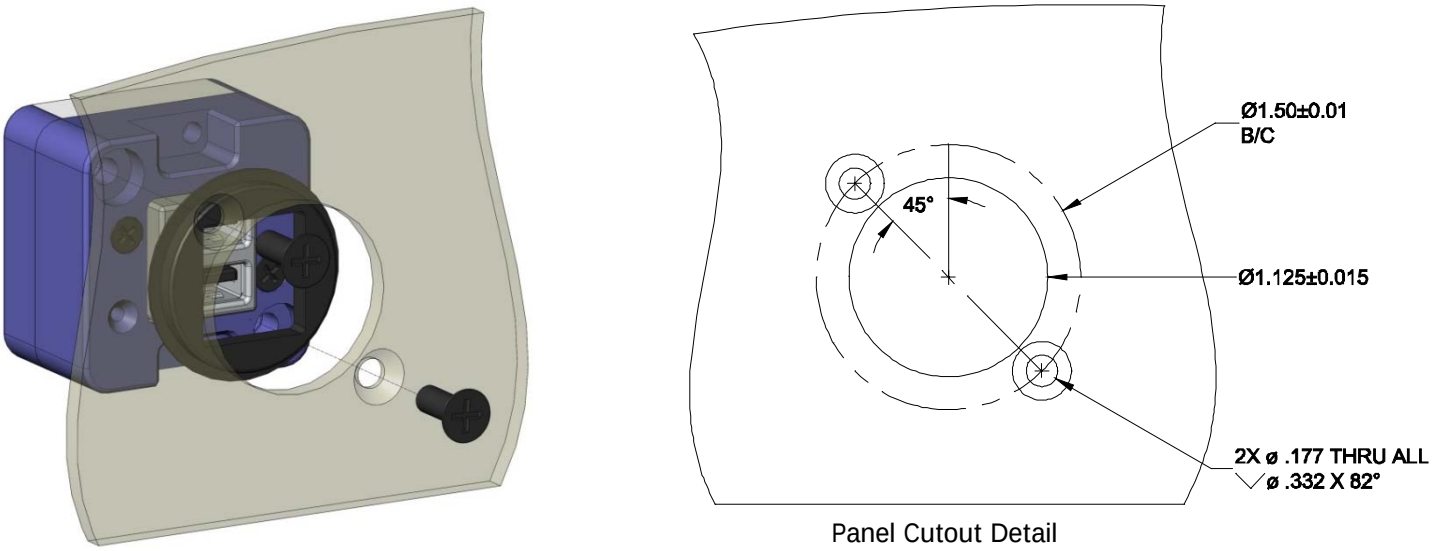


Figure 3.4
Circular Rear Mount Installation

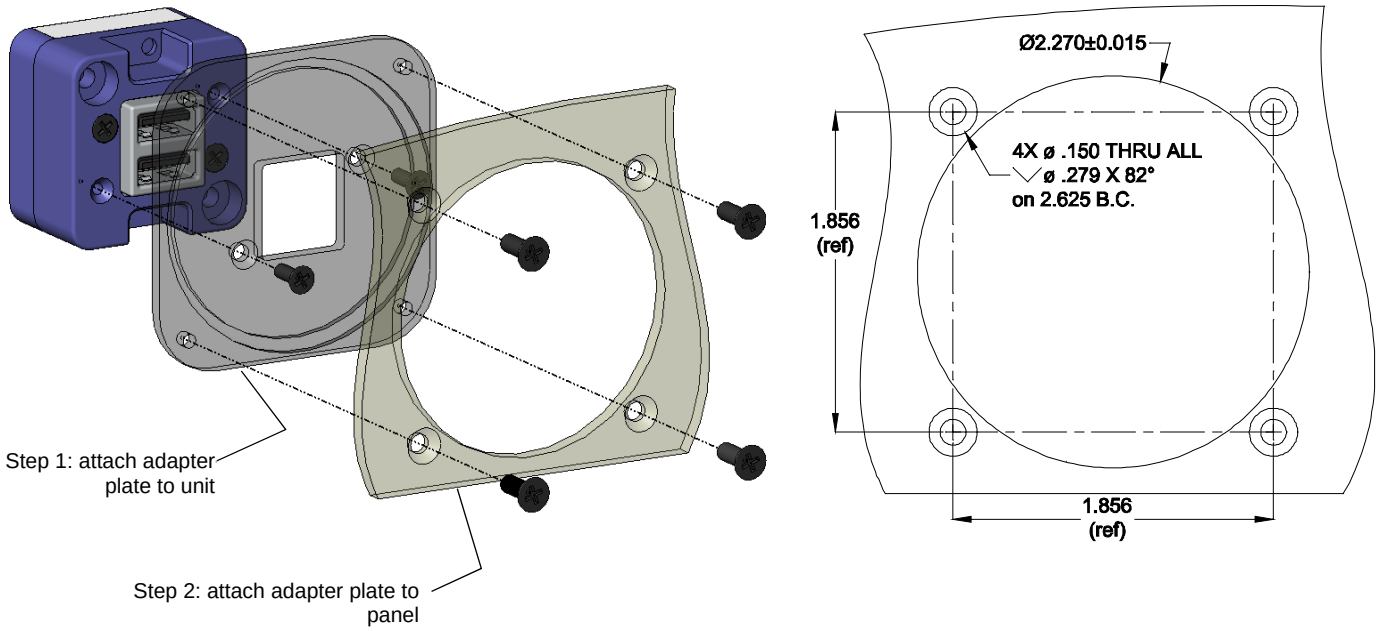


Figure 3.5
Instrument Mount Installation

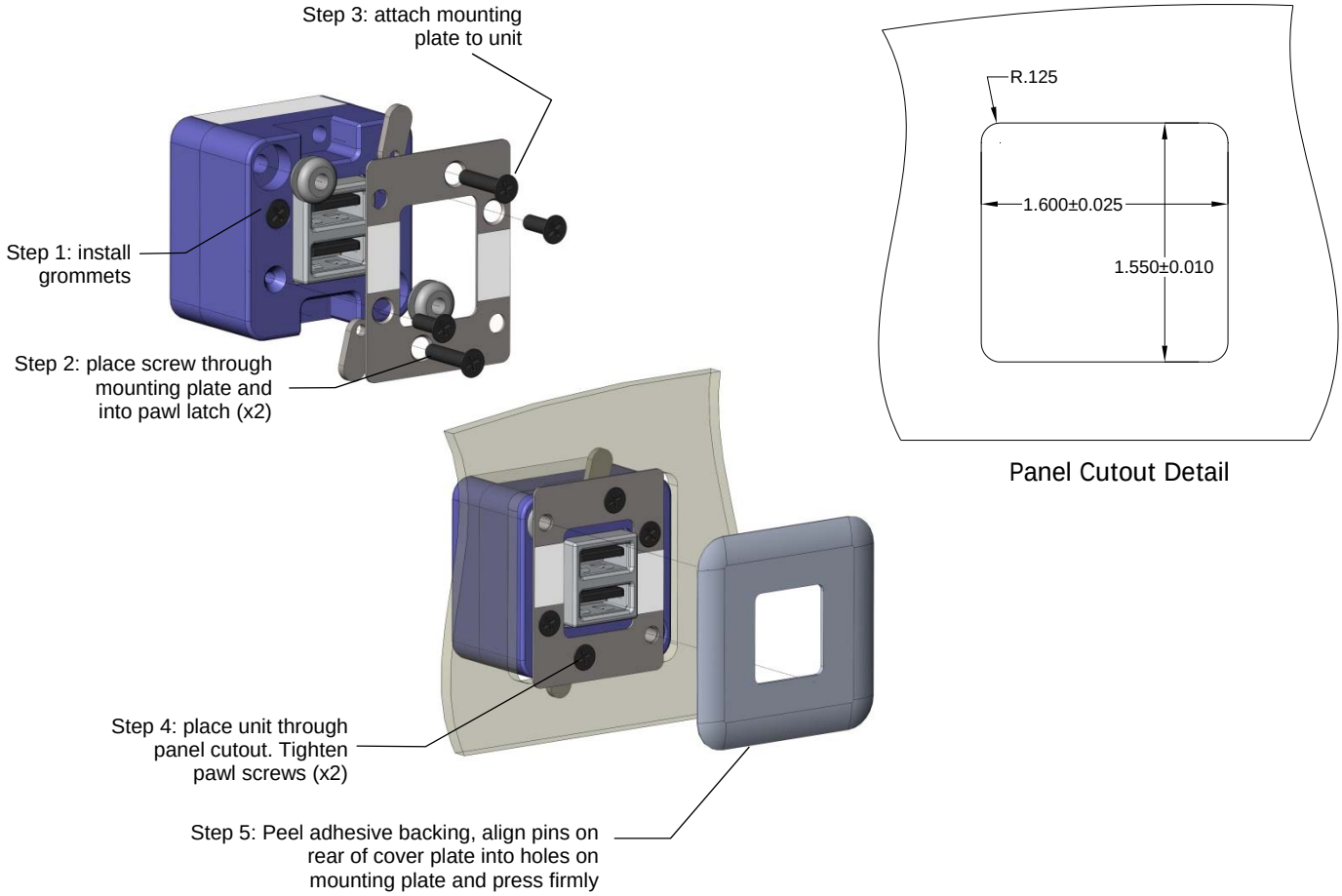


Figure 3.6
Front Mount Installation

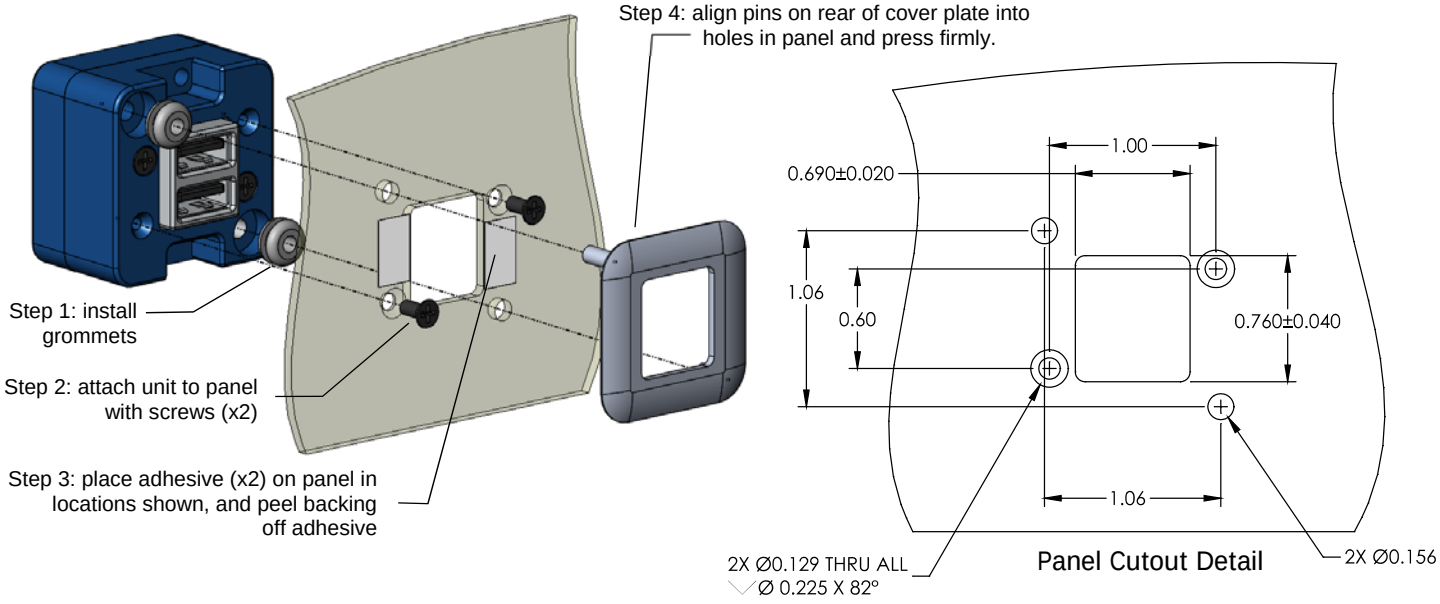


Figure 3.7
Rear Mount Installation with Cover

SECTION 4 OPERATION

4.1 ELECTRICAL PERFORMANCE

The TA102 Series Dual USB Charging Port converts an aircraft (DC) input voltage within the range specified to a 5V (DC) output. This output power is applied to a dual USB-A connector in accordance with the *USB Implementers Forum.*

The USB D+ and D- data lines communicate with the USB portable device to tell the device it is a dedicated charging port (DCP), capable of a higher current than a standard USB port. This allows the USB portable device to draw up to 2.1 Amps.

The unit is designed as a DC-to-DC converter with a series switch on each output to regulate current applied to that output. Each series switch independently reduces the output current to a safe level if the USB portable device draws excess current, is shorted or has a fault.

If the temperature of the TA102 becomes elevated due to a fault or excessive load, the device will seamlessly communicate with the USB portable device to lower the charge current. This allows the device to continue charging while the unit returns to a temperature within designed limits. When the temperature returns to a safe level the TA102 will automatically reestablish the higher charge current level with the device and continue charging.

4.2 PROTECTIVE FEATURES

4.2.1 Short Circuit Protection

The TA102 is capable of surviving a short circuit event without permanent damage. The unit goes into an over-current condition so that the average current is significantly reduced and the device is protected.

4.2.2 Over-Current Protection

The TA102 monitors the current draw individually on each port. During an over-current condition the voltage is reduced. If the voltage falls below 3.8 VDC the output is turned off for a period of 12 seconds. The output is then checked for continued over-current conditions every 16 milliseconds. This condition is referred to as a hiccup mode. The device stays in this mode until the over-current condition is removed, then returns to normal operation.

4.2.3 Low Input Voltage Shutdown

If the input voltage applied to the TA102 drops below 10 VDC the unit will shut down until the applied voltage returns to a level within range.

4.2.4 Over-Temperature

When the temperature of the TA102 becomes elevated, the unit communicates with the USB portable device to reduce the charge current output (1 amp limit). When the temperature returns to an acceptable level the unit automatically returns to a higher charge current as required (up to 2.1 amps).

SECTION 5 CONFORMANCE

5.1 CONTINUED AIRWORTHINESS STATEMENT

No periodic scheduled maintenance or calibration is necessary for continued airworthiness of the TA102 series Dual USB Charging Port. If the unit fails to perform to specifications, the unit must be removed and serviced by Mid-Continent Instruments and Avionics or their authorized designee.

5.2 ENVIRONMENTAL QUALIFICATION STATEMENT

MODEL NUMBER: TA102 Series **PART NUMBER:** 6430102-( )
NOMENCLATURE: Dual USB Charging Port
CERTIFICATION: FAA TSO-C71
MANUFACTURER: True Blue Power, a division of Mid-Continent Instrument Co., Inc.
ADDRESS: 9400 E. 34th St. North, Wichita, KS 67226, USA.

MANUFACTURERS SPECIFICATIONS:
Minimum Performance Specifications: TS102 (03/2013), TDS102 (03/2013)
Qualification Test Reports: QTR1401-1402, QTR1404-1408, QTR1415-1416
RTCA DO-160: Rev G, dtd 12/08/10 **DATES TESTED:** 03/2013-04/2013

CONDITIONS	SECTION	DESCRIPTION OF TEST
Temperature and Altitude	4	Category F1
Low Temperature	4.5.1	Operating Low Temp = -40°C
High Temperature	4.5.3	Short Time Operating High Temp = +70°C
High Temperature	4.5.4	Normal Operating High Temp = +55°C
Altitude	4.6.1	Altitude = 55K feet
Temperature Variation	5	Category S2
Humidity	6	Category B
Operational Shock and Crash Safety	7	Category B
Vibration	8	Fixed Wing: Category R, Curves C, C1 Helicopter: Category U, Curve G [(RCC1)(UG)]
Explosion	9	Category X
Waterproofness	10	Category X
Fluids	11	Category X
Sand and Dust	12	Category X
Fungus	13	Category X
Salt Spray	14	Category X
Magnetic Effect	15	Category Y
Power Input	16	Category B(XX)
Voltage Spike	17	Category B
Audio Freq Conducted Susceptibility	18	Category R
Induced Signal Susceptibility	19	Category X
Radio Frequency Susceptibility	20	Category X
Emission of Radio Frequency Energy	21	Category M
Lightning Induced Transient Susceptibility	22	Category X
Lightning Direct Effects	23	Category X
Icing	24	Category X
ESD	25	Category A
Fire, Flammability	26	Category C

REMARKS:
Sections 4: Category F1 Continuous Operating Low Temperature (-20°C) performed at Short-time Low temperature (-40°C).