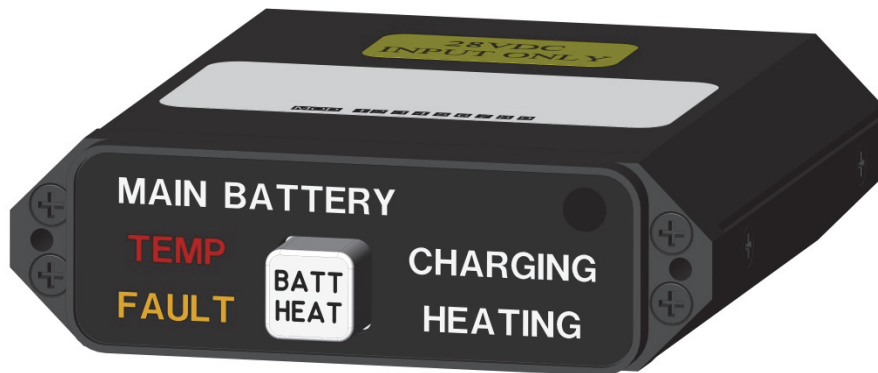




## **INSTALLATION MANUAL AND OPERATING INSTRUCTIONS**

### **MD41-1817 Annunciation Control Unit For Lithium Ion Battery Systems**

MD41-1817      28vdc      Horizontal Mount



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**Manual Number 9018252  
Rev. D January 27, 2020**

## **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 number, and the page number. Send your comments to:

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## REVISION DETAIL

<b>Rev.</b>	<b>Date</b>	<b>Detail</b>
A	09/29/14	Initial Release.
B	07/29/15	Added Environmental Qualification Form.
C	04/25/16	Revised graphics and text to change annunciation text from STANDBY to CHARGING and FAIL to TEMP. Minor modifications to Sections 3 and 4. Added DO-160 section 22 qualification test.
D	01/24/20	Added wiring diagrams for 6430017-2 battery connections.

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## SECTION 1 GENERAL DESCRIPTION

### 1.1 INTRODUCTION

The MD41-1817 products are compact, self-contained Annunciation and Control Units (ACUs). The fully integrated control unit provides annunciation for Mid-Continent Instruments and Avionics TB17 battery systems. It combines the necessary functions and annunciations required to interface with an approved system.

Highlighted features include long-life LEDs used for all lighting, internally backlit selection switch, dead-front inactive annunciations, and the installation option for manual or automatic dimming. An external annunciation dimming adjustment is provided for balancing low-level light conditions.

### 1.2 TECHNICAL SPECIFICATIONS

#### 1.2.1 MODEL

	<b>MD41-1817</b>
Orientation	Horizontal
Power Input	28VDC
Lighting Input	28VDC

**TABLE 1  
MODEL**

#### 1.2.2 PHYSICAL ATTRIBUTES

<b>Characteristics:</b>	
Weight:	0.26 pounds
Dimensions: (not including connector or mate)	3.2 inches long 2.75 inches wide 0.8 inches high
Mating Connector:	Positronic RD25F10JVL0 or equivalent (MCI P/N 7014517)
Instrument Panel Mounting:	Rear mount

**TABLE 2  
PHYSICAL ATTRIBUTES**

#### 1.2.3 PERFORMANCE

<b>Specifications:</b>	
Power Requirement:	0.20 A max

**TABLE 3  
PERFORMANCE**

## SECTION 2 PRE-INSTALLATION CONSIDERATIONS

### 2.1 COOLING

No direct cooling is required. As with any electronic equipment, overall reliability may be increased if the unit is not located near a high heat source or crowded next to other equipment. Means of providing some airflow is considered beneficial.

### 2.2 EQUIPMENT LOCATION

The MD41-1817 ACU must be mounted as close to the pilot's field of view as possible. The unit depth, with connector attached, must also be taken into consideration when selecting an appropriate location. Allow at least 3 inches of space behind the unit for connector attachment and removal.

### 2.3 ROUTING OF CABLES

Care must be taken not to bundle the MD41 series ACU logic and low level signal lines with any high energy sources. Examples of these sources include 400 Hz AC, Comm, DME, HF and transponder transmitter coaxial cables. Always use shielded wire when shown on the installation print.

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

### 2.4 LIMITATIONS

Note that this product is part of an incomplete system. It is designed to be installed with other applicable equipment to provide functionality for main battery systems.

### 2.5 TECHNICAL SPECIFICATIONS

The MD41-1817 complies with the manufacturers' specifications and has been verified and approved for use with the following systems:

<b>Mid-Continent Instruments and Avionics Model Number(s):</b>	<b>Designed for use with Battery System:</b>
MD41-1817	Manufacturer: Mid-Continent Instruments and Avionics  Model(s): TB17

## SECTION 3 INSTALLATION PROCEDURES

### 3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the MD41 series ACU. After installation of cabling and before installation of the equipment, ensure that power is applied only to the pins specified in the interconnect diagram.

### 3.2 UNPACKING AND INSPECTING EQUIPMENT

When unpacking this equipment, make a visual inspection for evidence of any damage that may have incurred during shipment.

#### 3.2.1 INCLUDED PARTS

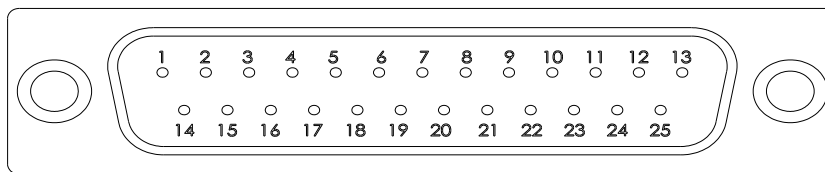
- |                          |                           |
|--------------------------|---------------------------|
| A. Main Battery ACU –    | MCIA P/N MD41-1817 series |
| B. Installation Manual – | MCIA P/N 9018252          |

#### 3.2.2 AVAILABLE PARTS

- |  |                    |
|--|--------------------|
| A. J1 Connector Kit (25 pin) –               | MCIA P/N 7014517   |
| B. 7-pin Cylindrical TB17 Signal Connector – | MCIA P/N 9017889-1 |
| C. Annunciator Cutout Template –             | MCIA P/N 8014474   |

### 3.3 CABLE HARNESS

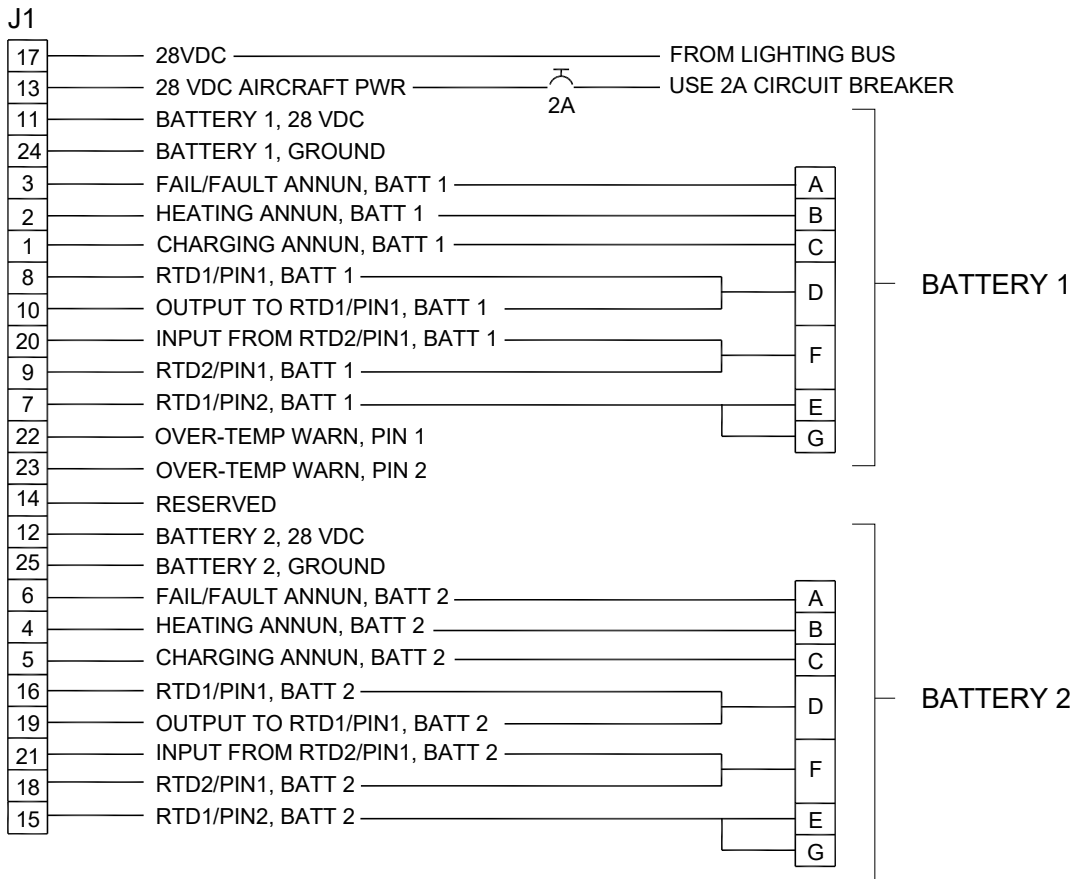
The MD41 cable harness should be made using 24 AWG wire or larger for all connections. Construct the cable harness with regards to the instructions below and using the Connector Pinout of Figure 1, Schematic Pinout of Table 4, and Wiring Diagram of Figures 2 and 3.



**FIGURE 1**  
**REAR VIEW OF 25-PIN D-SUB CONNECTOR (J1)**

Connector Pinout			
Pin #	Description	Pin #	Description
1	CHARGING, Battery 1	14	Reserved
2	HEATING, Battery 1	15	Pin 2 of RTD 1, Battery 2
3	FAIL/FAULT, Battery 1	16	Pin 1 of RTD 1, Battery 2
4	HEATING, Battery 2	17	Panel Lighting Input, 28VDC
5	CHARGING, Battery 2	18	Pin 1 of RTD2, Battery 2
6	FAIL/FAULT, Battery 2	19	Output to Pin 1 of RTD 1, Battery 2
7	Pin 2 of RTD 1, Battery 1	20	Input from Pin 1 of RTD 2, Battery 1
8	Pin 1 of RTD 1, Battery 1	21	Input from Pin 1 of RTD 2, Battery 2
9	Pin 1 of RTD 2, Battery 1	22	Pin 1 of Over Temperature Warning
10	Output to Pin 1 of RTD 1, Battery 1	23	Pin 2 of Over Temperature Warning
11	28 VDC, Battery 1	24	GROUND
12	28 VDC, Battery 2	25	GROUND
13	28 VDC, Aircraft Power		

**TABLE 4  
SCHEMATIC PINOUT**

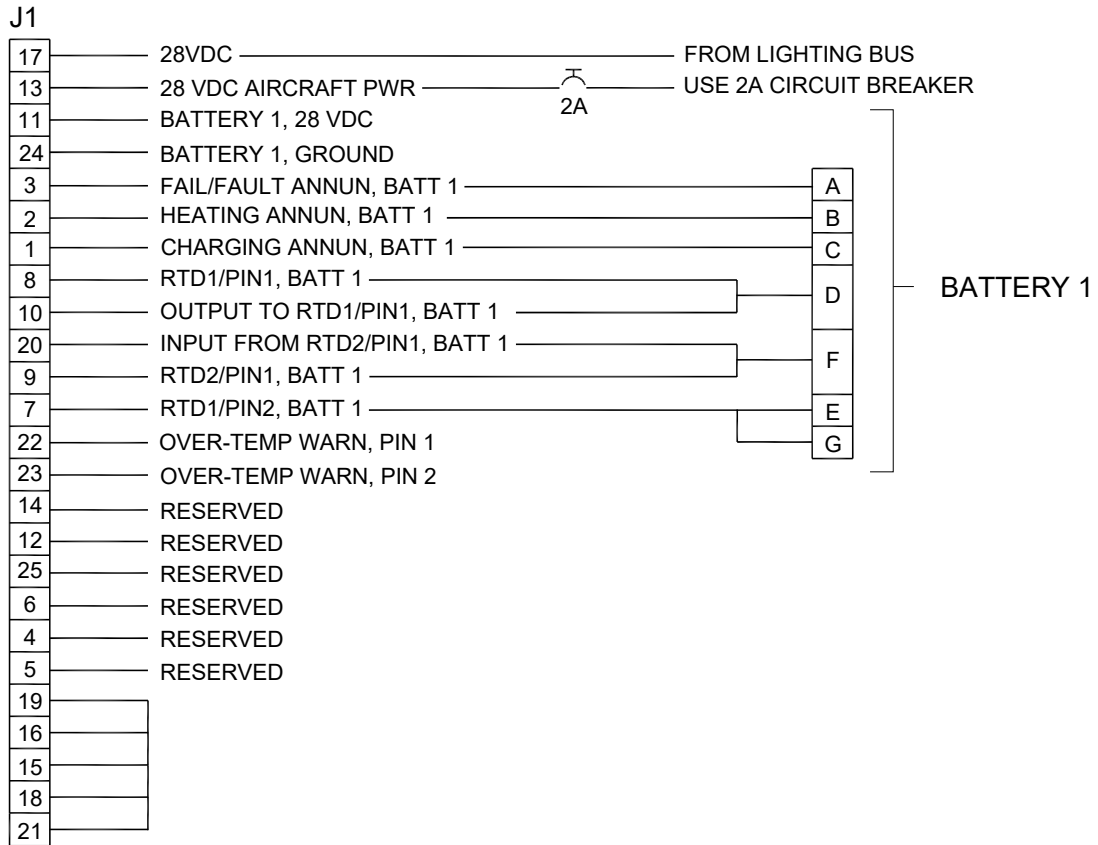


**NOTES:**

1) ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.

**FIGURE 2  
WIRING DIAGRAM - TWO TB17 (6430017-1) BATTERIES**

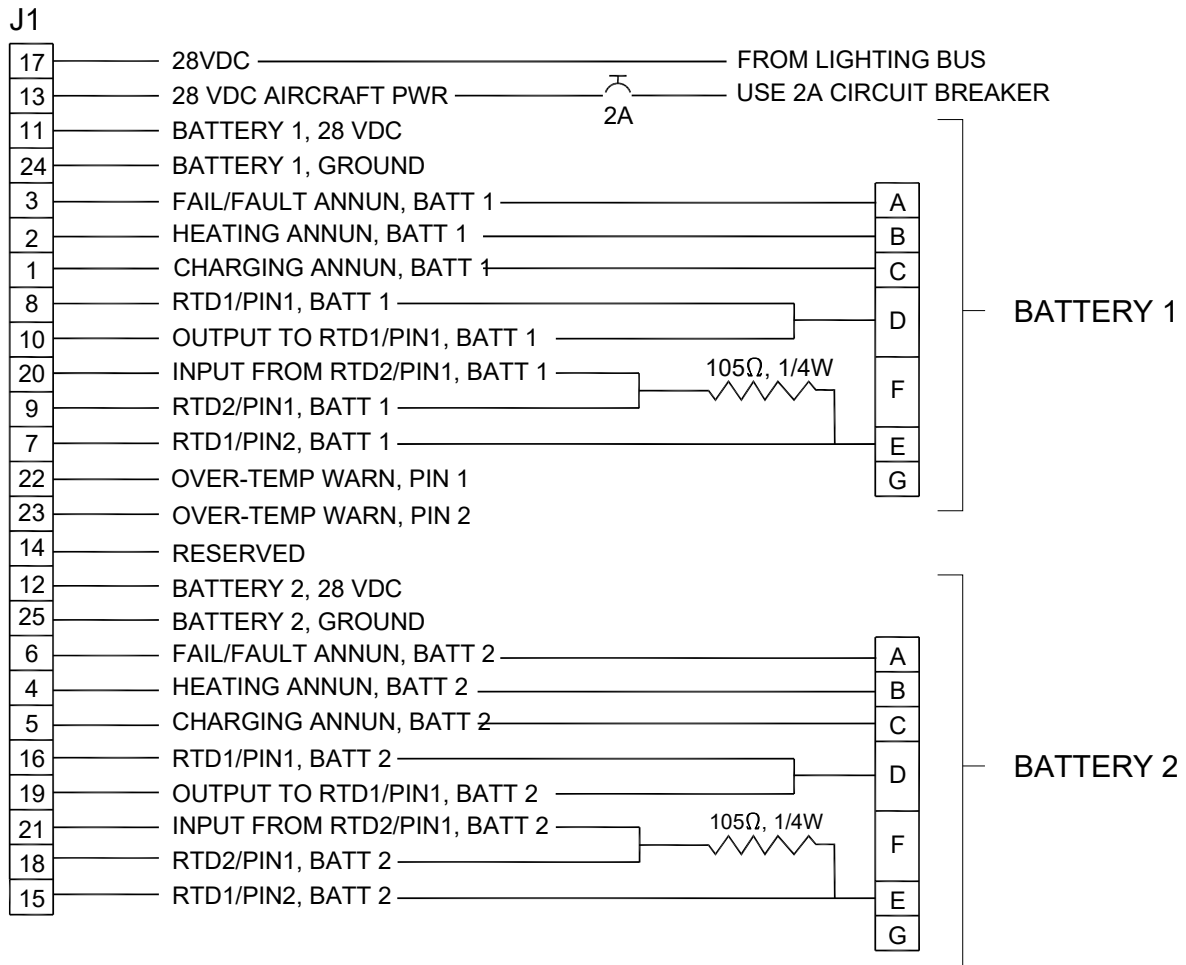




**NOTES:**

- 1) ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.

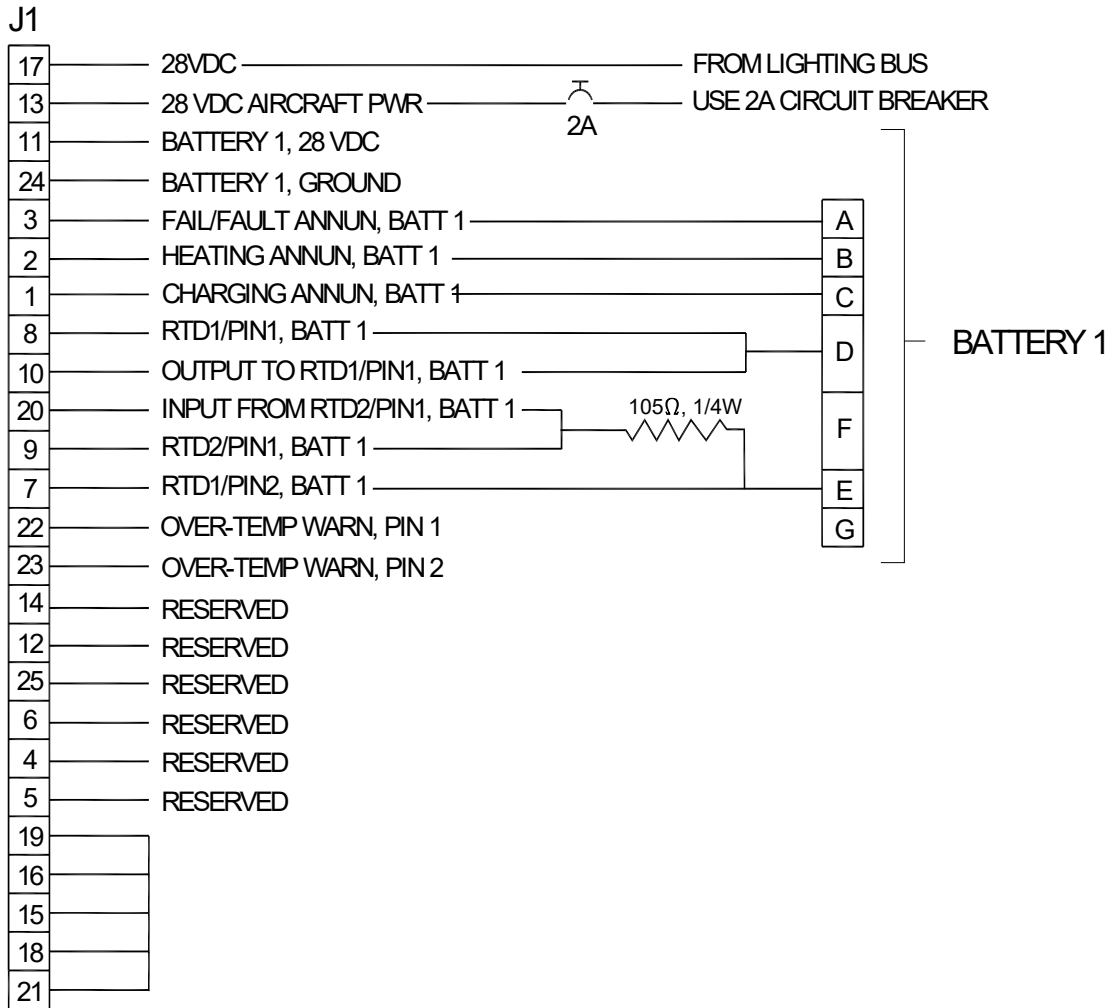
**FIGURE 3**  
**WIRING DIAGRAM - ONE TB17 (6430017-1) BATTERY**



**NOTES:**

1) ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.

**FIGURE 4**  
**WIRING DIAGRAM - TWO TB17 (6430017-2) BATTERIES**



**NOTES:**

- 1) ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.

**FIGURE 5  
WIRING DIAGRAM - ONE TB17 (6430017-2) BATTERY**

Refer to Section 2: Pre-Installation Considerations in regards to routing precautions.

**3.3.1 LIGHTING CONTROL**

Button backlighting (pin 17) is powered (28 VDC) from the aircraft's panel lighting bus. All annunciation and button backlight brightness will be automatically controlled by the internal photocell and the dimming circuit.

### **3.3.2 POWER AND SIGNALS**

Wire aircraft power and aircraft ground according to the associated ACU pins in the Pinout Diagram. Annunciation signals should be wired from the appropriate system inputs and outputs to the associated ACU pins in the Pinout Diagram.

If an over temperature condition exists, pins 22 and 23 will be tied together with a 100 $\Omega$  series resistance. This output signal can be utilized as a battery over temperature indicator to other systems in the aircraft. The TEMP annunciation will be lit in this condition.

### **3.3.3 HARNESS VERIFICATION**

With the MD41 ACU disconnected, turn on the avionics master switch and use a volt-meter (multimeter) to verify that aircraft power and panel lighting bus power is on the appropriate pin(s) with appropriate voltage. Also verify that aircraft ground is applied to the appropriate pins.

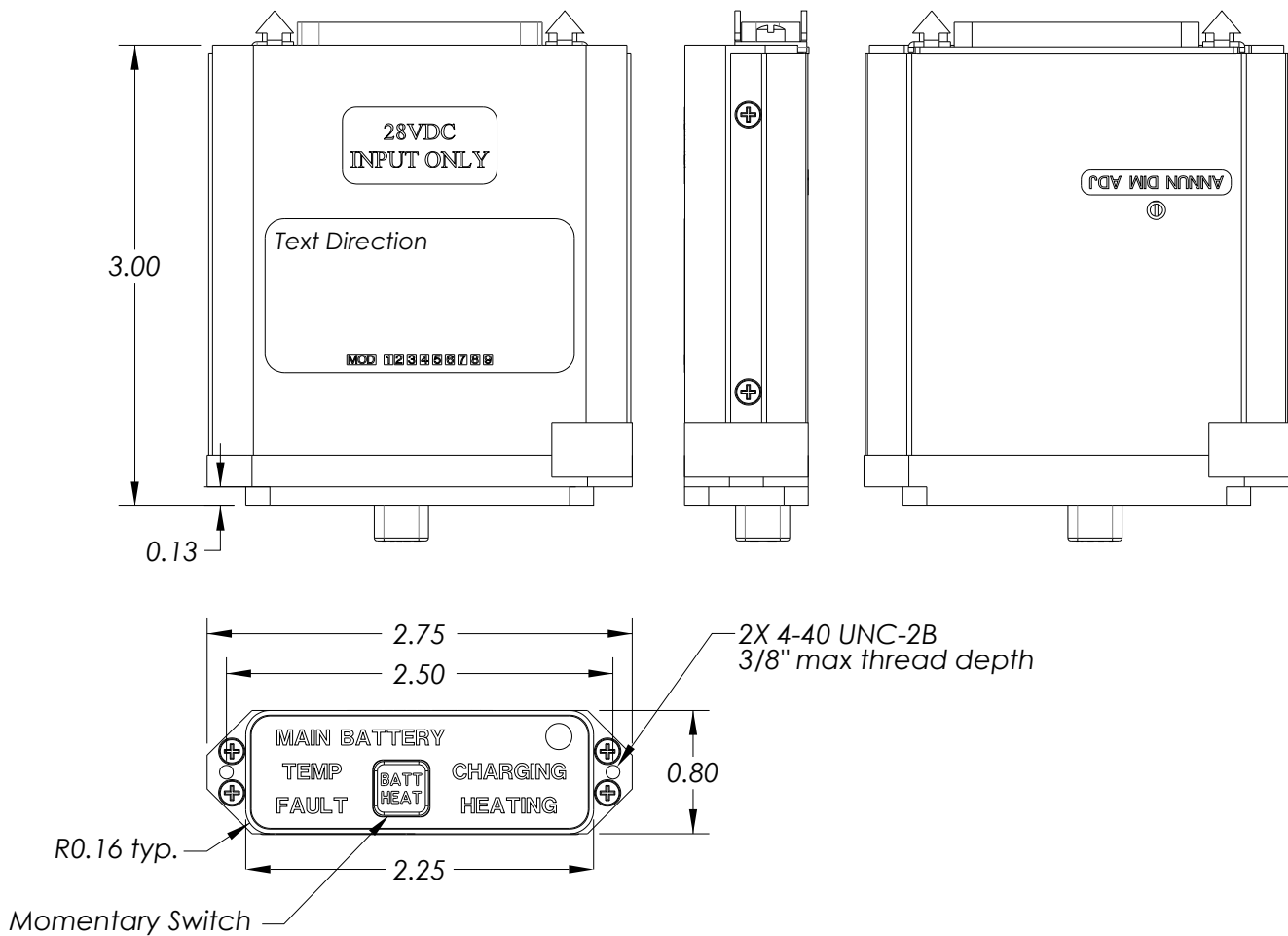
### 3.4 MOUNTING

Refer to Section 2: Pre-Installation Considerations in regards to equipment location.

The MD41 ACU is designed for rear panel mounting only. A cutout should be made in the panel in accordance with Figure 4 for the unit bezel and two mounting holes. A cutout template is available from Mid-Continent Instruments and Avionics (reference p/n 8014474) upon request.

Prior to completing the mounting of the unit in the aircraft, make sure to set the Annunciator Dim Adjustment if automatic dimming is configured for the annunciators. Ideally this procedure is best performed in a dark cockpit to simulate low-light/night time conditions. Connect the unit to the cable harness and turn on master power to the instrument panel and lighting bus. Use a small flat-bladed screwdriver to access the adjustment screw inside the hole on the bottom of the unit (see Figure 4). Adjust the screw to increase or decrease the annunciator lighting brightness to a level appropriate with the rest of the panel instrument lighting.

Secure the indicator to the panel with two #4-40 x 3/8 flat head phillips screws.



**FIGURE 6**  
**OUTLINE DRAWING MD41-1817**

## SECTION 4 OPERATION

### 4.1 FRONT PANEL CONTROLS AND ANNUNCIATIONS

#### 4.1.1 CONTROLS

- BATT/HEAT There are 2 different TB17 battery modes of operation that will determine actions when the BATT/HEAT momentary switch is depressed (see Manual Number 9018047, section 4.3 that describes Sleep and Active mode of TB17):
- When the TB17 battery is in *sleep mode*, pressing the BATT/HEAT momentary switch lights all annunciators as depicted in Figure 5, which includes MAIN BATTERY, TEMP, FAULT, BATT/HEAT button, CHARGING and HEATING for at least 3 seconds or until the button is released
  - When the TB17 battery is in *active mode*, pressing the BATT/HEAT momentary switch lights all annunciators as depicted in Figure 5, which includes MAIN BATTERY, TEMP, FAULT, BATT/HEAT button, CHARGING and HEATING until the button is released

BATT/HEAT button is white backlit. Refer to the installation manual and operating instructions of the TB17 for additional operational and functional interface details.

#### 4.1.2 ANNUNCIATIONS

MAIN BATTERY	(WHITE)	Lit when any of the annunciators are ON.
TEMP	(RED)	Lit when over temperature sensed on battery. Land as soon as practical and present the battery for maintenance evaluation.
FAULT	(AMBER)	Blinking - when battery has experienced a recoverable fault. Steady - when battery has experienced a non-recoverable fault. For steady light, present battery for maintenance evaluation upon landing.
CHARGING	(WHITE)	Lit when battery is charging. If battery is used as an emergency power source, it is recommended flight not be initiated until CHARGING is no longer displayed, indicating a state of charge greater than 95%.
BATT/HEAT	(WHITE)	Lit when panel lighting input is high (pin 17) and unit is connected to Battery 1 (pin 11), Battery 2 (pin 12), and/or aircraft power (pin 13).
HEATING	(WHITE)	Lit when battery heater is activated due to unit temperature below 10°C and battery is in active state. It is recommended that an engine start not occur until the HEATING annunciation turns off.

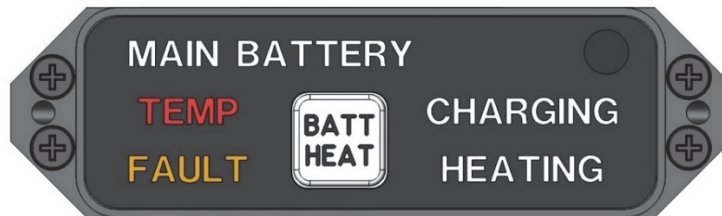


FIGURE 7  
FRONT PANEL

## **SECTION 5 CONFORMANCE**

### **5.1 CONTINUED AIRWORTHINESS STATEMENT**

No periodic scheduled maintenance or calibration is necessary for continued airworthiness of the MD41 series ACU. 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.

## Appendix 1

### DO-160 Environmental Qualification Form

**MODEL NUMBER:** MD41-() **PART NUMBER:** MD41-1817  
**NOMENCLATURE:** MD41-() Battery Annunciation Control Unit  
**TSO APPROVALS:** N/A  
**MANUFACTURER:** Mid-Continent Instrument Co., Inc.  
**ADDRESS:** 9400 E. 34<sup>th</sup> St. North, Wichita, KS 67226, USA.  
**MANUFACTURERS SPECIFICATIONS:**  
 Minimum Performance Specifications: TS360, TDS360  
 Qualification Test Reports: QTR2104 – QTR2108; QTR2115 – QTR 2118  
**RTCA DO-160:** Rev G, dtd 12/08/10 **DATES TESTED:** 4/2015-5/2015

CONDITIONS	SECTION	DESCRIPTION OF TEST
Temperature and Altitude	4	Category F2
Low Temperature	4.5.1	Survival and Short Operating Low Temp = -55C
	4.5.2	Normal Operating Low Temp = -55C
High Temperature	4.5.3	Survival High Temp = +85C
	4.5.4	Short and Normal Operating High Temp = +70C
Altitude	4.6.1	Altitude = 55,000 ft
Temperature Variation	5	Category S2
Humidity	6	Category B
Operational Shock and Crash Safety	7	Category B
Vibration	8	Category R Curves B&B1, Category U Curve G
Explosion	9	Category X
Waterproofness	10	Category X
Fluids	11	Category X
Sand and Dust	12	Category X
Fungus	13	Category X
Salt Fog	14	Category X
Magnetic Effect	15	Category Y
Power Input	16	Category Z(XX)
Voltage Spike	17	Category A
Audio Freq Conducted Susceptibility	18	Category Z
Induced Signal Susceptibility	19	Category ZC(X)
Radio Frequency Susceptibility	20	Category T (conducted) Category T (radiated) [TT]
Emission of Radio Freq Energy	21	Category M
Lightning Induced Transient Susceptibility	22	Category A3 (pin injection) Category G3L3 (cable bundle) [A3G3L3]
Lightning Direct Effects	23	Category X
Icing	24	Category X
ESD	25	Category A
Fire, Flammability	26	Category X