



# ASM-MCP03

MCP03  
Master Caution Panel



## INSTALLATION AND OPERATION MANUAL

REV 1.10 July 12, 2017

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## MCP03 Master Caution Panel Installation and Operation Manual

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# MCP03 Master Caution Panel Installation and Operation Manual

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|---|--|--|
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|---|--|--|

The status of this installation and operation manual is controlled by the revision shown on the title page. The status of each section is controlled by revision shown in the footer of each page. All revisions affecting sections of this manual have been incorporated.

| <b>AEM MANUAL REVISIONS</b> |                 |  |               |
|-----------------------------|-----------------|--|---------------|
| Section                     | Revision Number | Revision Description   | Date          |
| 1 and 2                     | Rev: 1.10       | ECO1065:<br>- Changed Legend positions 2 and 8 to SPARE in section 1.5.<br>- Updated revision of Interconnect Drawing listed in section 2.6. | July 12, 2017 |
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## Section 1.0 Description

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### 1.1 Introduction

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Information in this section consists of product description, design features and specifications for the MCP03 Master Caution Panel. All derivative product information will be contained in the applicable manual supplement, which may be obtained from AEM as required.

Review all notes, warnings, and cautions.

### 1.2 Product Description

---

The AEM MCP03 is intended as an enhanced replacement for the OEM Master Caution Panel and Dimming Control Box currently used in the Twin Otter DHC-6 aircraft, 100, 200, and 300 Series.

The MCP03 consists of a single Master Caution Panel; it functions by presenting a lighted, LED-based annunciator legend to the pilot/co-pilot when a caution or advisory signal is detected by the MCP03. These signals originate from sources found throughout the aircraft.

The MCP03 also interfaces to the aircraft Master Warning Light and Reset Switches, and the aircraft Dim/Bright/Test Switch.

### 1.3 Design Features

---

The MCP03 provides users with 27 LED-based caution and advisory annunciators; it incorporates the 18 annunciators displayed by the OEM Caution Panel, and allows 9 additional annunciators for use in custom applications.

The MCP03 utilizes modern electronics for annunciator indication, completely replacing the OEM indicator box and dimming box, thereby greatly increasing the reliability and service life of the system while reducing equipment weight.

### 1.4 Specifications

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#### 1.4.1 Electrical Specifications

---

##### Input Pins

##### 1.4.1.1 Input Operating Voltage

*Normal Operating Conditions:*

|            |          |
|------------|----------|
| Normal:    | +28.0Vdc |
| Maximum:   | +30.3Vdc |
| Minimum:   | +22.0Vdc |
| Emergency: | +18.0Vdc |



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### Abnormal Operating Conditions:

|          |          |
|----------|----------|
| Normal:  | +28.0Vdc |
| Maximum: | +32.2Vdc |
| Minimum: | +20.5Vdc |

### 1.4.1.2 Input Power Requirements

2A maximum @ 28Vdc (Internally fused @ 2A)

### 1.4.1.3 Caution / Advisory Input Signals

*Quantity:* 31

*Circuit Type:* Single-ended

*Input Types:*

|             |  |
|-------------|--|
| <u>GND</u>  | Active Low (Active when external connection to ground is applied)  |
| <u>POS</u>  | Active High (Active when external connection to +28Vdc is applied) |
| <u>NULL</u> | Open Circuit (Active when 26Vac 400Hz is absent)                   |

*Maximum Rated Input Voltage:* 32.2Vdc

### Input Voltage Activation Levels:

| Input Type: | Min Input Voltage for Activation | Max Input Voltage for Activation |
|-------------|----------------------------------|----------------------------------|
| GND         | 0 Vdc                            | 29% of Supply Voltage            |
| POS         | 44% of Supply Voltage            | 32.2Vdc                          |
| NULL        | 0 Vdc                            | 35% of 26Vac 400Hz Signal        |

### Input Signal Hysteresis:

| Input Type: | Activation Voltage              | De-Activation Voltage           |
|-------------|---------------------------------|---------------------------------|
| GND         | 29% of Supply Voltage (Max)     | 39% of Supply Voltage (Min)     |
| POS         | 44% of Supply Voltage (Min)     | 33% of Supply Voltage (Max)     |
| NULL        | 35% of 26Vac 400Hz Signal (Max) | 50% of 26Vac 400Hz Signal (Min) |

*Maximum Current per Input Type:*

|       |  |
|-------|--|
| GND:  | 3.5mA (at 0Vdc, MCP03 sources current)     |
| POS:  | 3.5mA (at 28Vdc, MCP03 sinks current)      |
| NULL: | 25mA (at 26Vac 400Hz, MCP03 sinks current) |



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### 1.4.1.4 TEST IN LOW Input

Quantity: 1

Circuit Type: Single-ended – Active Low

Maximum Rated Input Voltage: 32.2Vdc

Activation Voltage: <10Vdc (nominal)

Maximum Current:  
(at  $V_{IN\_NORMAL}$ ) 400mA

### 1.4.1.5 DIM LOW Input

Quantity: 1

Circuit Type: Bright Mode: Open Circuit  
Dim Mode: Single-ended - Active Low

Maximum Rated Input Voltage: 32.2Vdc

Activation Voltage: <10Vdc (nominal)

Maximum Current:  
(at  $V_{IN\_NORMAL}$ ) 1mA

### 1.4.1.6 AF ARM IN & AF SEL IN Inputs

Quantity: 2

Circuit Type: Single-ended – Active High

Maximum Rated Input Voltage: 32.2Vdc

*Input Voltage Activation Levels:*

| Input Type: | Min Input Voltage for Activation | Max Input Voltage for Activation |
|-------------|----------------------------------|----------------------------------|
| POS         | 44% of Supply Voltage            | 32.2Vdc                          |

*Input Signal Hysteresis:*

| Input Type: | Activation Voltage          | De-Activation Voltage       |
|-------------|-----------------------------|-----------------------------|
| POS         | 44% of Supply Voltage (Min) | 32% of Supply Voltage (Max) |

Maximum Current:  
(at  $V_{IN\_NORMAL}$ ) 3.5mA



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### 1.4.1.7 MASTER CAUTION CANCEL Input

|   |                           |
|---|---------------------------|
| <i>Quantity:</i>                                  | 1                         |
| <i>Circuit Type:</i>                              | Single-ended – Active Low |
| <i>Maximum Rated Input Voltage:</i>               | 32.2Vdc                   |
| <i>Activation Voltage:</i>                        | <10Vdc (nominal)          |
| <i>Maximum Current:</i><br>(at $V_{IN\_NORMAL}$ ) | 1mA                       |

### 1.4.1.8 Position 21 GND EN & Position 25 GND EN Inputs

|   |                           |
|---|---------------------------|
| <i>Quantity:</i>                                  | 2                         |
| <i>Circuit Type:</i>                              | Single-ended – Active Low |
| <i>Maximum Rated Input Voltage:</i>               | 32.2Vdc                   |
| <i>Activation Voltage:</i>                        | <10Vdc (nominal)          |
| <i>Maximum Current:</i><br>(at $V_{IN\_NORMAL}$ ) | 1mA                       |

## **Output Pins**

### 1.4.1.9 MASTER CAUTION OUT Output

|   |  |
|---|--|
| <i>Quantity:</i>  | 1  |
| <i>Circuit Type:</i>  | Single-ended – Alternates between Active Low and Open Circuit (Flashing) |
| <i>Flash Rate:</i>  | 1.5Hz $\pm$ 0.5Hz  |
| <i>Maximum Output Voltage:</i><br>(at $V_{OUT\_MAX\_LOW}$ ) | 2Vdc (During Active Low)   |
| <i>Maximum Current:</i><br>(at $V_{OUT\_MAX\_LOW}$ )        | 400mA  |





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### 1.4.1.10 AF ARM OUT & AF SEL OUT Outputs

|   |   |
|---|---|
| <i>Quantity:</i>                          | 2   |
| <i>Circuit Type:</i>                      | Single-ended – Active High                    |
| <i>Maximum Rated Output Voltage:</i>      |   |
| Bright Mode:                              | System Power Input Voltage – 3.0Vdc (minimum) |
| Dim Mode:                                 | 14.0Vdc ± 0.5Vdc                              |
| <i>Maximum Current:<br/>(Bright Mode)</i> | 200mA (per output)                            |

### 1.4.1.11 TEST OUT LOW Output

|  |                            |
|--|----------------------------|
| <i>Quantity:</i>   | 1                          |
| <i>Circuit Type:</i>                                     | Single-ended – Active Low  |
| <i>Maximum Output Voltage:<br/>(V<sub>OUT_MAX</sub>)</i> | TEST IN LOW Voltage + 2Vdc |
| <i>Maximum Current:<br/>(at V<sub>OUT_MAX</sub>)</i>     | 400mA                      |

## **1.4.2 Physical Specifications**

---

### 1.4.2.1 Dimensions

|                           |   |
|---------------------------|---|
| <i>Height:</i>            | 1.7" max  |
| <i>Depth:</i>             | 2.3" max  |
| <i>Width:</i>             | 13.0" max   |
| <i>Weight:</i>            | 1.25 lb [0.57 kg] MAX   |
| <i>Mounting:</i>          | Standard Dzus Mounting (four fasteners)   |
| <i>Connectors:</i>        | 1 x 62-Pin High Density D-Sub Male  |
| <i>Legends:</i>           | Acrylic MIL-P-5425 with polycarbonate diffuser material   |
| <i>Material / Finish:</i> | Enclosure is aluminum with Clear MIL-DTL-5541 Type II Class 3 coating followed by Black Epoxy Paint |



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### 1.4.2.2 Product Labeling

Product label contains the following information:

**Model Number**  
**Serial Number**  
**Product Weight**  
**Date Manufactured**

*Note: A configuration number is used to denote where the legend layout differs from the MCP03-100. Refer to document RMA-E1085-MCP03 for the latest Legend Configuration Identifier Table. Also refer to Section 1.5.*

### 1.4.3 Environmental Specifications

---

|                         |  |
|-------------------------|--|
| <i>Temperature:</i>     | -45 to +70°C (operating)<br>-55 to +85°C (survival)  |
| <i>Altitude:</i>        | 25,000 feet max  |
| <i>Humidity:</i>        | 95% at 50°C for 48 Hours   |
| <i>Shock:</i>           | Operational Shock, Standard; 6 g for 11 ms in all axes<br>Crash Safety, Impulse; 20 g for 11 ms in all axes<br>Crash Safety, Sustained; Up 3 g, Forward 18 g, Side 4.5 g |
| <i>Vibration:</i>       | Conforms to DO-160G Category 'S', Profile 'L'  |
| <i>Magnetic Effect:</i> | 1 degree deflection less than or equal to 0.21m <sup>[1]</sup>   |

See Environmental Qualification Form MCP03-100-521-0 (Section 2.6) for a full list of the DO-160G test sections and categories to which the MCP03-100 is certified to.

### 1.4.4 Product Approval/Certification

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Transport Canada: Supplemental Type Certificate (STC) Approval  
Federal Aviation Administration: Supplemental Type Certificate Approval

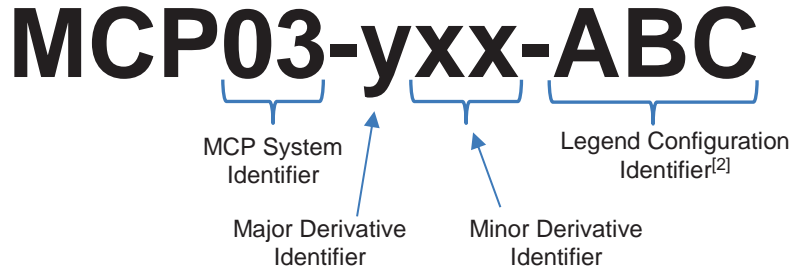
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[<sup>1</sup>] Customer defined specification.



## MCP03 Master Caution Panel Installation and Operation Manual

### 1.5 Unit Nomenclature



| Default MCP03-100 with -000 Legend Configuration |                           |                                       |
|--|---------------------------|---------------------------------------|
| Position(s)                                      | Legend Text               | Legend Text Colour (Not Configurable) |
| 1, 9, 13, 15, 21, 25                             | SPARE                     | Amber                                 |
| 3  | PNEUMATIC<br>LOW PRESS    | Amber                                 |
| 2, 4, 6, 8                                       | SPARE                     | Blue                                  |
| 5  | HYD PRESS<br>CB           | Amber                                 |
| 7  | RESET PROPS               | Amber                                 |
| 10   | L GENERATOR               | Amber                                 |
| 11   | BOOST PUMP 1<br>AFT PRESS | Amber                                 |
| 12   | BOOST PUMP 2<br>AFT PRESS | Amber                                 |
| 14   | DOOR<br>UNLOCKED          | Amber                                 |
| 16   | BOOST PUMP 2<br>FWD PRESS | Amber                                 |
| 17   | BOOST PUMP 1<br>FWD PRESS | Amber                                 |
| 18   | R GENERATOR               | Amber                                 |
| 19   | L ENGINE<br>OIL PRESSURE  | Amber                                 |
| 20   | AFT FUEL<br>LOW LEVEL     | Amber                                 |
| 22   | L PITOT<br>HEAT FAIL      | Amber                                 |
| 23   | DUCT<br>OVERHEAT          | Amber                                 |
| 24   | R PITOT<br>HEAT FAIL      | Amber                                 |
| 26   | FWD FUEL<br>LOW LEVEL     | Amber                                 |
| 27   | R ENGINE<br>OIL PRESSURE  | Amber                                 |

Default Legend Configuration

<sup>[2]</sup> Legend configuration to be specified on purchase order.



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| A |   |   |   |   |   | B |   |   |   |   |   | C |   |   | Option                  | Position | Legend Text            |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------------------------|----------|------------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 |                         |          |                        |
|   | X |   |   | X |   |   |   |   |   |   |   |   |   |   | CHIP DETECTORS          | 1        | L CHIP                 |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                         | 9        | R CHIP                 |
|   |   | X |   |   | X |   |   |   |   |   |   |   |   |   | GENERATOR OVERHEAT      | 1        | L GENERATOR OVERHEAT   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                         | 9        | R GENERATOR OVERHEAT   |
|   |   |   | X | X | X |   |   |   |   |   |   |   |   |   | WING TIP TANKS          | 13       | L WING FUEL PUMP PRESS |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                         | 15       | R WING FUEL PUMP PRESS |
|   |   |   |   |   |   |   | X |   |   | X |   |   |   |   | INTAKE DEFLECTORS       | 2        | L DEFL EXT             |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                         | 8        | R DEFL EXT             |
|   |   |   |   |   |   |   |   | X |   |   | X |   |   |   | RESERVED                | -        | -                      |
|   |   |   |   |   |   |   |   |   | X | X | X |   |   |   | AIRFRAME DE-ICE         | 4        | L STAB DEICE           |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                         | 6        | R STAB DEICE           |
|   |   |   |   |   |   |   |   |   |   |   |   |   | X |   | AC INVERTER             | 25       | 400 CYCLE              |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   | X | AC INVERTER - SPLIT BUS | 21       | L 400 CYCLE            |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                         | 25       | R 400 CYCLE            |

Legend Configuration Identifier Table<sup>[3]</sup>

|        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| POS 1  | POS 2  | POS 3  | POS 4  | POS 5  | POS 6  | POS 7  | POS 8  | POS 9  |
| POS 10 | POS 11 | POS 12 | POS 13 | POS 14 | POS 15 | POS 16 | POS 17 | POS 18 |
| POS 19 | POS 20 | POS 21 | POS 22 | POS 23 | POS 24 | POS 25 | POS 26 | POS 27 |

Legend Position Locations

### 1.6 Product Limitations

Anodyne Electronic Manufacturing or Rocky Mountain Aircraft may replace the SPARE legend positions upon customer request.

Contact Anodyne Electronic Manufacturing or Rocky Mountain Aircraft for further information.

End of Section 1.0

<sup>[3]</sup> Contact Rocky Mountain Aircraft for the most recent Legend Configuration Identifier Table.



## MCP03 Master Caution Panel Installation and Operation Manual

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### Section 2.0 Installation

---

#### 2.1 Introduction

---

Information in this section consists of: unpacking and inspection procedures, installation procedures, post-installation checks, and installation drawings.

#### 2.2 Unpacking and Inspection

---

Unpack the equipment carefully. Inspect the unit visually for damage due to shipping and report all such claims immediately to the carrier involved. Note that each unit should have the following:

- MCP03-XXX
- Certificate of Conformity or Release certification

Verify that all items are present before proceeding and report any shortages immediately to your supplier.

##### 2.2.1 Warranty

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All Anodyne Electronics Manufacturing Corp. (AEM) products are warranted for 2 years. See the website [www.aem-corp.com/warranty](http://www.aem-corp.com/warranty) for complete details.

#### 2.3 Installation Procedures

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##### 2.3.1 Warnings

---

None.

##### 2.3.2 Cautions

---

**CONNECTOR:**

When removing the wiring harness from the 62-pin connector, ensure even pressure is applied on each side of the connector as it is pulled straight out. Failure to do so may result in bent or broken pins within the connector.

**FUSE RATING:**

The +28VDC A and +28VDC B supply pins are each internally fused at 2A. Any current demands exceeding 2A on each pin may damage the associated fuse.



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### 2.3.3 Cabling and Wiring

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All wires should be 22 AWG unless otherwise specified. All unshielded wire shall be selected in accordance with AC43.13-1B change 1, paragraphs 11-76 through 11-78. Wire types should be to MIL-W22759 as specified in AC43.13-1B change I, paragraphs 11-85, 11-86 and listed in Table 11-11. All shielded wire/cable should be in accordance with MIL-C-27500.

A #4-40 bonding stud is located at the rear of the MCP03 for bonding to the airframe.

### 2.3.4 Pre-Installation Checks

---

**Do not connect the MCP03 to the wiring harness until the conditions listed below are met.**

Check the following:

- a) Check P1, [GROUND] (pin #3) for continuity to ground.
- b) Check P1, [GROUND] (pin #22) for continuity to ground.
- c) Check P1, [28VDC A] (pin #1) for +28 Vdc relative to ground.
- d) Check P1, [28VDC B] (pin #2) for +28 Vdc relative to ground.

Ensure all connectors are tight and the mechanical installation is sound.

### 2.3.5 Post-Installation Checks

---

Power up the aircraft's systems and confirm the normal operation of the MCP03 using the following steps:

- a) Set the TEST-BRIGHT-DIM switch located within the DHC-6 cockpit to the DIM position. Legend positions that are currently indicated should be illuminated.
- b) Move the TEST-BRIGHT-DIM switch to the BRIGHT position. The legend positions from step a) should illuminate brighter.
- c) Push and hold the TEST-BRIGHT-DIM switch to the TEST position. All legend positions should illuminate with the same intensity as the legends from step b). Release the TEST-BRIGHT-DIM switch.

### 2.3.6 Installation Kit

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Installation of the MCP03 requires a Rocky Mountain Aircraft STC installation kit. Contact AEM or Rocky Mountain Aircraft for further information.

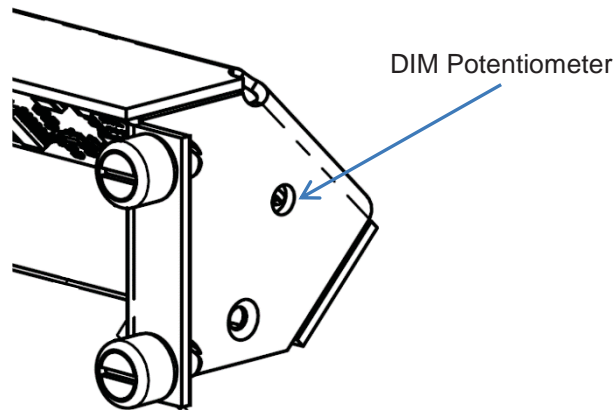


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### 2.4 Adjustments and Connections

#### 2.4.1 Legend Position DIM Level Adjustment

The MCP03 is shipped from the factory with all DIM level brightness adjustments set to the normal test levels. Once installed in the aircraft, it may be desirable to modify this level to match other brightness levels within the cockpit. To increase or decrease the brightness level in DIM mode, adjust DIM potentiometer clockwise or counter-clockwise, respectively, until the desired brightness level is obtained.



MCP03 Dim Level Adjustment

#### 2.4.2 Legend Positions 21 and 25 Trigger Selection

Legend positions 21 and 25 can be optionally configured to activate by either a GND or NULL signal, depending on the presence of ground connections at [POSITION 21 GND EN] (pin #5) or [POSITION 25 GND EN] (pin #17).

While a ground connection is **absent** at [POSITION 21 GND EN] (pin #5), legend position 21 will be activated by a NULL-type signal at [POSITION 21 AC] (pin #4). While a ground connection is **present** at [POSITION 21 GND EN] (pin #5), legend position 21 will be activated by a GND-type signal at [POSITION 21 GND] (pin #27).

While a ground connection is **absent** at [POSITION 25 GND EN] (pin #17), legend position 25 will be activated by a NULL-type signal at [POSITION 25 AC] (pin #15). While a ground connection is **present** at [POSITION 25 GND EN] (pin #17), legend position 25 will be activated by a GND-type signal at [POSITION 25 GND] (pin #16).



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### 2.5 Continued Airworthiness

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Maintenance of the MCP03 Master Caution Panel is 'on condition' only. Periodic maintenance of this product is not required.

### 2.6 Installation Drawings

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Use of the "#" symbol in the REV. column indicates that the document is listed elsewhere in the manual. Refer to the applicable AEM Part No. to locate the referenced document.

| DOCUMENT        | REV  | DESCRIPTION                  | TYPE                    | SERIAL NO. |
|-----------------|------|------------------------------|-------------------------|------------|
| MCP03-100-403-0 | 1.10 | Master Caution Panel MCP03   | Interconnect            | 66330+     |
| MCP03-100-405-0 | 1.00 | Master Caution Panel MCP03   | Connector Map           | 66330+     |
| MCP03-100-922-0 | 1.00 | Master Caution Panel MCP03   | Mechanical Installation | 66330+     |
| MCP03-100-521-0 | 1.00 | Master Caution Panel (DHC-6) | Environmental Qual Form | 66330+     |

Section 2.0 ends following above documents


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| REVISIONS |                                      |           |     |
|-----------|--------------------------------------|-----------|-----|
| REV       | DESCRIPTION                          | DATE      | BY  |
| 1.10      | ECO#1065 - CORRECTION TO LEGEND TEXT | 12-Jul-17 | AJV |




MCP03-100 INSTALLATION NOTES

NOTES:

1. THE MCP03 IS INTENDED TO BE INSTALLED IN THE TWIN OTTER DHC-6 AIRCRAFT AS A REPLACEMENT FOR THE ORIGINAL GRIMES MASTER CAUTION PANEL AND DIMMING CONTROL BOX. THE MCP03 IS NOT INTENDED TO BE CONNECTED TO THE EXISTING MCP WIRING HARNESS OR CONNECTOR. MODIFIED WIRING HARNESS AND DSUB CONNECTOR ARE REQUIRED BEFORE CONNECTION TO THE MCP03 CAN BE MADE.
  
2. THE EXISTING INTERCONNECT INFORMATION FOR P1 SHOWN ON PAGE 2 AND 3 ARE FOR REFERENCE ONLY, AND PROVIDE INFORMATION TO ASSOCIATE THE SPECIFIC PLUG AND PIN NUMBER TO ITS ASSOCIATED MCP03 LEGEND POSITION. PLEASE REFER TO THE APPLICABLE DHC-6 WIRING DIAGRAM FOR COMPLETE INFORMATION.
  
3. ALL WIRES SHOULD BE 22 AWG UNLESS OTHERWISE SPECIFIED. ALL UNSHIELDED WIRE SHALL BE SELECTED IN ACCORDANCE WITH AC43.13-1B CHANGE 1, PARAGRAPHS 11-76 THROUGH 11-78. WIRE TYPES SHOULD BE TO MIL-W-22759 AS SPECIFIED IN AC43.13-1B CHANGE 1, PARAGRAPHS 11-85, 11-86 AND LISTED IN TABLE 11-11. ALL SHIELDED WIRE/CABLE SHOULD BE IN ACCORDANCE WITH MIL-C-27500.
  
4.  CABLE LENGTH NOT TO EXCEED 3.3 FT [1.0 M].
  
5. CABLE LENGTH FROM GROUND STUD TO AIRFRAME CHASSIS NOT TO EXCEED 3.3 FT [1.0 M].

DEFINITIONS:

- N/C: NO CONNECTION. THE PIN IS NOT CONNECTED TO ANYTHING INTERNALLY, AND THEREFORE SHALL HAVE NO CONNECTION EXTERNALLY.
- N/C SPARE: NO CONNECTION INTERNALLY, BUT A SPARE WIRE SHALL BE INSTALLED IN THE WIRE HARNESS.
- RESERVED: MAY BE CONNECTED AND USED IN THE FUTURE. THE CIRCUITRY MAY BE PRESENT OR ADDED TO ACTIVATE THE FUNCTION. THE PIN MAY BE USED FOR TEST PURPOSES. THERE IS NO EXTERNAL CONNECTION.
- RESERVED SPARE: (RSV SP) RESERVED, BUT INSTRUCTIONS SHALL BE FOLLOWED TO ACTIVATE THE CIRCUITRY. A SPARE WIRE SHALL BE INSTALLED IN THE WIRE HARNESS.

|   |   |           |  |   |                         |
|---|---|-----------|--|---|-------------------------|
|   | NAME  | DATE      | UNLESS OTHERWISE SPECIFIED:  |  <b>ANODYNE ELECTRONICS MANUFACTURING CORP.</b><br>KELOWNA BC CANADA<br>(250)-763-1088<br>WWW.AEM-CORP.COM |                         |
| DRAWN   | NB/LAC  | 23-MAR-17 | DIMENSIONS ARE IN INCHES [MM]<br>TOLERANCES:<br>FRACTIONAL _____ ±0.0625"<br>ANGULAR _____ ±0.5°<br>TWO DECIMAL PLACE _____ ±0.010"<br>THREE DECIMAL PLACE _____ ±0.005" |   |                         |
| CHECKED   |  | 13-JUL-17 |  | TITLE: <b>MASTER CAUTION PANEL MCP03 INTERCONNECT</b>   |                         |
| APPROVED  |  | Jul 17/17 |  |   |                         |
| CONFIDENTIAL AND PROPRIETARY THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ANODYNE ELECTRONICS MANUFACTURING. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ANODYNE ELECTRONICS MANUFACTURING IS PROHIBITED. |   |           | MATERIAL: N/A  | PAPER SIZE: <b>A</b>  | CAGE CODE: <b>L9015</b> |
|   |   |           | FINISH: N/A  | PART No.: <b>MCP03-100</b>  |                         |
|   |   |           |  | SCALE:1:1   | DO NOT SCALE DRAWING    |
|   |   |           |  | DRAWING No.: 403-0  | REVISION <b>1.10</b>    |
|   |   |           |  |   | SHEET:1 of 3            |

MCP03-100  
J1

P1  
62 PIN FEMALE DSUB  
MATING CONNECTOR

|                          |               |    |
|--------------------------|---------------|----|
| (SPARE)                  | POS 1         | 24 |
| (SPARE)                  | POS 2         | 7  |
| (PNEUMATIC LOW PRESS)    | POS 3         | 43 |
| (SPARE)                  | POS 4         | 23 |
| (HYD PRESS CB)           | POS 5         | 9  |
| (SPARE)                  | POS 6         | 13 |
| (RESET PROPS)            | POS 7         | 60 |
| (SPARE)                  | POS 8         | 10 |
| (SPARE)                  | POS 9         | 14 |
| (L GENERATOR)            | POS 10        | 44 |
| (BOOST PUMP 1 AFT PRESS) | POS 11        | 25 |
| (BOOST PUMP 2 AFT PRESS) | POS 12        | 51 |
| (SPARE)                  | POS 13 HI     | 48 |
| (SPARE)                  | POS 13 LO     | 50 |
| (DOOR UNLOCKED)          | POS 14        | 12 |
| (SPARE)                  | POS 15 HI     | 20 |
| (SPARE)                  | POS 15 LO     | 55 |
| (BOOST PUMP 2 FWD PRESS) | POS 16        | 59 |
| (BOOST PUMP 1 FWD PRESS) | POS 17        | 42 |
| (R GENERATOR)            | POS 18        | 58 |
| (L ENGINE OIL PRESSURE)  | POS 19        | 47 |
| (AFT FUEL LOW LEVEL)     | POS 20        | 26 |
| (SPARE)                  | POS 21 AC     | 4  |
| (SPARE)                  | POS 21 GND EN | 5  |
| (SPARE)                  | POS 21 GND    | 27 |
| (L PITOT HEAT FAIL)      | POS 22        | 6  |
| (DUCT OVERHEAT)          | POS 23        | 49 |
| (R PITOT HEAT FAIL)      | POS 24        | 61 |
| (SPARE)                  | POS 25 AC     | 15 |
| (SPARE)                  | POS 25 GND EN | 17 |
| (SPARE)                  | POS 25 GND    | 16 |
| (FWD FUEL LOW LEVEL)     | POS 26        | 56 |
| (R ENGINE OIL PRESSURE)  | POS 27        | 57 |
|                          | AF ARM IN     | 45 |
|                          | AF SEL IN     | 19 |
|                          | AF ARM OUT    | 46 |
|                          | AF SEL OUT    | 18 |

SEE APPLICABLE  
AIRCRAFT WIRING  
DIAGRAM

|  |        |           |  |
|--|--------|-----------|--|
|  | NAME   | DATE      | UNLESS OTHERWISE SPECIFIED:  |
| DRAWN  | NB/LAC | 23-MAR-17 | DIMENSIONS ARE IN INCHES [MM]<br>TOLERANCES:                         |
| CHECKED  |        | 13-JUL-17 | FRACTIONAL _____ ±0.0625"<br>ANGULAR _____ ±0.5°                     |
| APPROVED   |        | Jul 17/17 | TWO DECIMAL PLACE _____ ±0.010"<br>THREE DECIMAL PLACE _____ ±0.005" |
| CONFIDENTIAL AND PROPRIETARY<br>THE INFORMATION CONTAINED IN THIS<br>DRAWING IS THE SOLE PROPERTY OF<br>ANODYNE ELECTRONICS MANUFACTURING.<br>ANY REPRODUCTION IN PART OR AS A WHOLE<br>WITHOUT THE WRITTEN PERMISSION OF<br>ANODYNE ELECTRONICS MANUFACTURING IS<br>PROHIBITED. |        |           | MATERIAL:<br>N/A   |
|  |        |           | FINISH:<br>N/A   |



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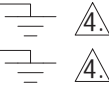
TITLE: **MASTER CAUTION PANEL MCP03  
INTERCONNECT**

|                         |                            |                               |                          |
|-------------------------|----------------------------|-------------------------------|--------------------------|
| PAPER SIZE:<br><b>A</b> | CAGE CODE:<br><b>L9015</b> | PART No.:<br><b>MCP03-100</b> | REVISION:<br><b>1.10</b> |
| SCALE:1:1               | DO NOT SCALE DRAWING       | DRAWING No.: 403-0            | SHEET:2 of 3             |




MCP03-100  
J1 (CON'T)

P1  
62 PIN FEMALE DSUB  
MATING CONNECTOR

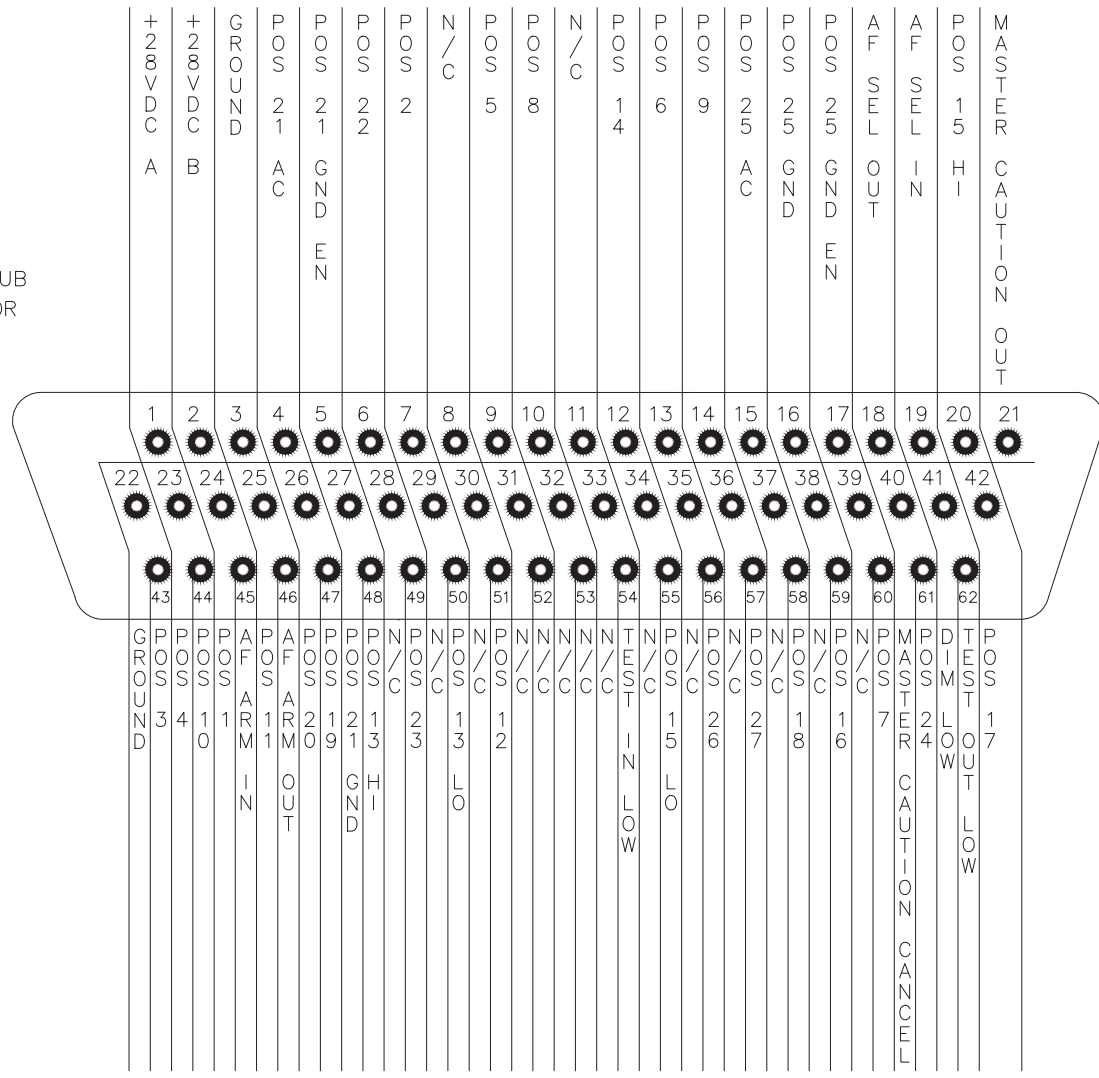
|                       |    |
|-----------------------|----|
| +28VDC A              | 1  |
| +28VDC B              | 2  |
| GROUND                | 3  |
| GROUND                | 22 |
| MASTER CAUTION OUT    | 21 |
| MASTER CAUTION CANCEL | 40 |
| DIM LOW               | 41 |
| TEST OUT LOW          | 62 |
| TEST IN LOW           | 54 |
| N/C                   | 8  |
| N/C                   | 11 |
| N/C                   | 28 |
| N/C                   | 29 |
| N/C                   | 30 |
| N/C                   | 31 |
| N/C                   | 32 |
| N/C                   | 33 |
| N/C                   | 34 |
| N/C                   | 35 |
| N/C                   | 36 |
| N/C                   | 37 |
| N/C                   | 38 |
| N/C                   | 39 |
| N/C                   | 52 |
| N/C                   | 53 |






SEE APPLICABLE  
AIRCRAFT WIRING  
DIAGRAM

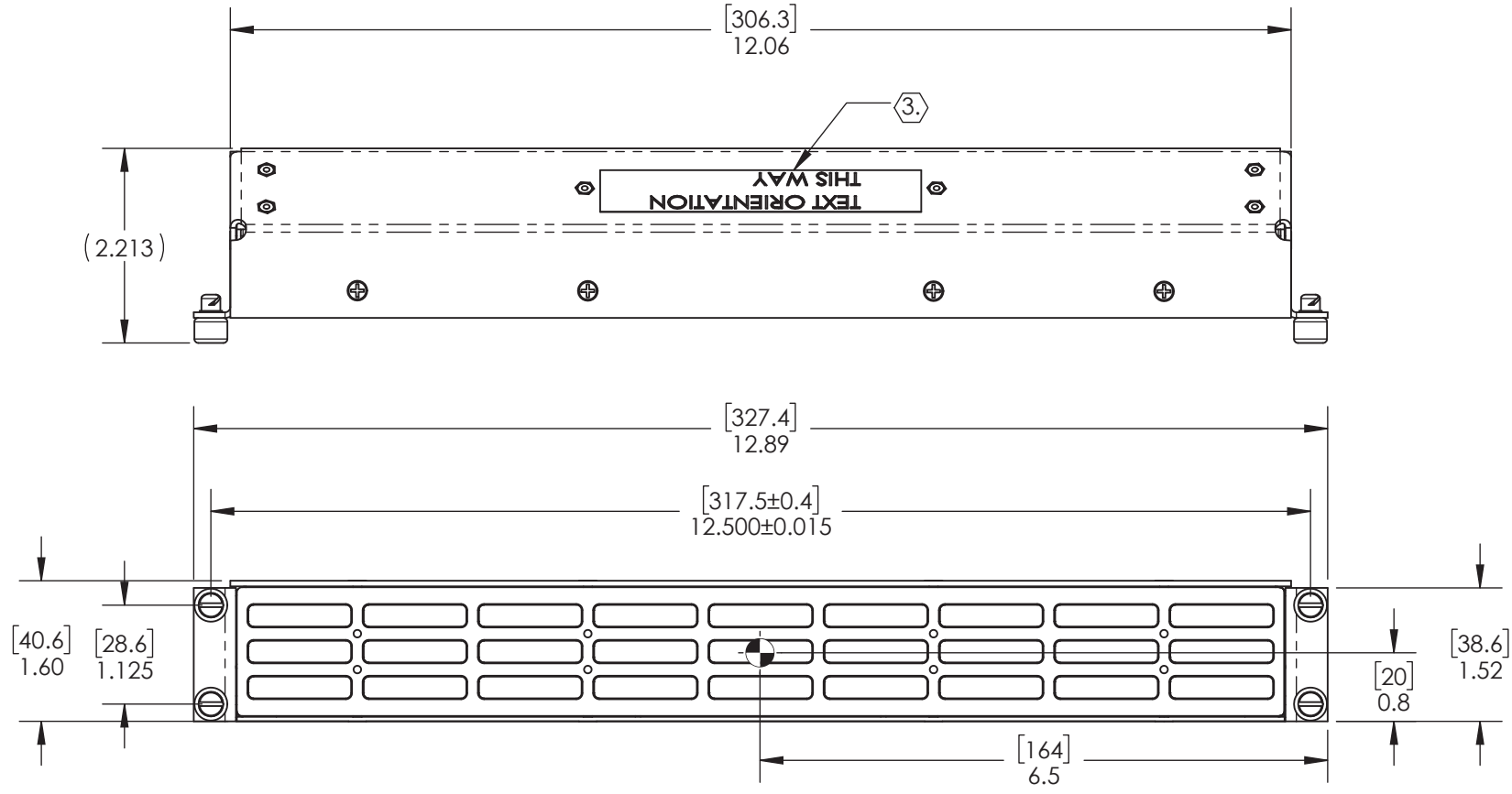
|  |   |           |  |  |                  |  |                    |                     |
|--|---|-----------|--|--|------------------|--|--------------------|---------------------|
|  | NAME  | DATE      | UNLESS OTHERWISE SPECIFIED:  |  <b>ANODYNE ELECTRONICS MANUFACTURING CORP.</b> |                  | KELOWNA BC CANADA<br>(250)-763-1088<br>WWW.AEM-CORP.COM                                |                    |                     |
| DRAWN  | NB/LAC  | 23-MAR-17 | DIMENSIONS ARE IN INCHES [MM]<br>TOLERANCES:<br>FRACTIONAL _____ ±0.0625"<br>ANGULAR _____ ±0.5°<br>TWO DECIMAL PLACE _____ ±0.010"<br>THREE DECIMAL PLACE _____ ±0.005" |  |                  | TITLE:<br><h2 style="text-align: center;">MASTER CAUTION PANEL MCP03 INTERCONNECT</h2> |                    |                     |
| CHECKED  |  | 13-JUL-17 | MATERIAL: N/A  | PAPER SIZE: A  | CAGE CODE: L9015 |  |                    | PART No.: MCP03-100 |
| APPROVED   |  | Jul 17/17 | FINISH: N/A  | SCALE:1:1  |                  | DO NOT SCALE DRAWING   | DRAWING No.: 403-0 | SHEET:3 of 3        |
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J1  
62 PIN FEMALE DSUB  
MATING CONNECTOR

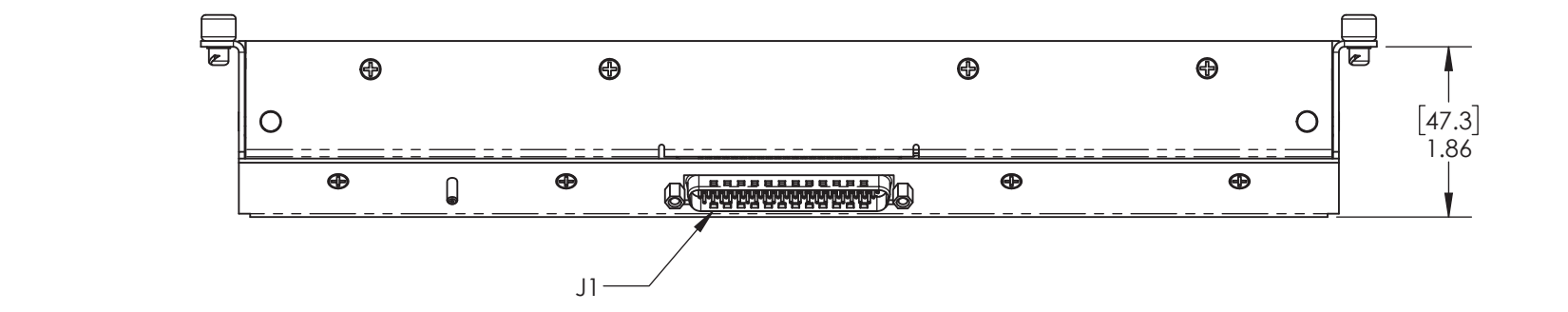


VIEW IS FROM REAR OF AIRFRAME CONNECTOR

|   |   |           |   |   |   |                |                      |                    |
|---|---|-----------|---|---|---|----------------|----------------------|--------------------|
| DRAWN   | NAME  | DATE      | UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES [MM]<br>TOLERANCES:<br>FRACTIONAL _____ ±0.0625"<br>ANGULAR _____ ±0.5°<br>TWO DECIMAL PLACE _____ ±0.010"<br>THREE DECIMAL PLACE _____ ±0.005" |  | KELOWNA BC CANADA<br>(250)-763-1088<br>WWW.AEM-CORP.COM |                |                      |                    |
|   | LAC   | 20-DEC-16 |   |   |   |                |                      |                    |
| CHECKED   |  | 21-DEC-16 | MATERIAL:<br>N/A  | TITLE:<br><b>MASTER CAUTION PANEL MCP03<br/>CONNECTOR MAP</b>                         |   |                |                      |                    |
| APPROVED  |  | Apr 18/17 |   |   |   | FINISH:<br>N/A | PAPER SIZE: A        | CAGE CODE: L9015   |
| CONFIDENTIAL AND PROPRIETARY THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ANODYNE ELECTRONICS MANUFACTURING. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ANODYNE ELECTRONICS MANUFACTURING IS PROHIBITED. |   |           | SCALE:1:1   |   |   |                | DO NOT SCALE DRAWING | DRAWING No.: 405-0 |

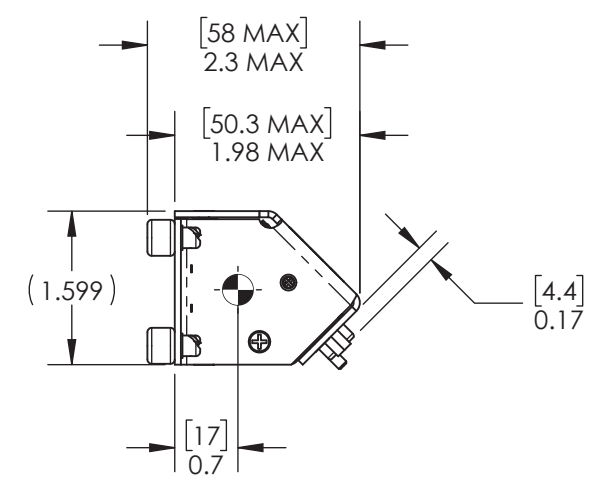


FRONT VIEW



NOTES:

1. WEIGHT: 1.25 lb MAX [0.57 kg MAX]
2. APPROXIMATE CENTER OF GRAVITY.
3. PRODUCT LABEL.



|   |      |           |                               |
|---|------|-----------|-------------------------------|
|   | NAME | DATE      | UNLESS OTHERWISE SPECIFIED:   |
| DRAWN   | LAC  | 13-Apr-17 | DIMENSIONS ARE IN INCHES [MM] |
| CHECKED   |      | 13-Apr-17 | TOLERANCES:                   |
| APPROVED  |      | Apr 18/17 | ANGULAR: ±0.5°                |
| <b>CONFIDENTIAL AND PROPRIETARY</b><br>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ANODYNE ELECTRONICS MANUFACTURING. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ANODYNE ELECTRONICS MANUFACTURING IS PROHIBITED. |      |           | FRACTIONAL: ±0.0625"          |
|   |      |           | MATERIAL:                     |
|   |      |           | FINISH:                       |
|   |      |           |                               |

|   |                      |                      |   |  |
|---|----------------------|----------------------|---|--|
|   |                      |                      | 15-1925 KIRSCHNER RD.<br>KELOWNA BC V1Y 4N7<br>(250)-763-1088<br>WWW.AEM-CORP.COM |  |
| TITLE: MASTER CAUTION PANEL MECHANICAL INSTALLATION |                      |                      |   |  |
| PAPER SIZE: B                                       | CAGE CODE: L9015     | PART No. : MCP03-100 | REVISION: 1.00  |  |
| SCALE: 1:2  | DO NOT SCALE DRAWING | DRAWING No. : 922-0  | SHEET: 1 OF 1   |  |



# ENVIRONMENTAL QUALIFICATION FORM

Description: **Master Caution Panel (DHC-6)** Document: **MCP03-100-521-0100**

Part #: **MCP03-100** TSO #: **N/A**

Manufacturer's Specification and/or Other Applicable Specification: \_\_\_\_\_

Manufacturer: **Anodyne Electronics Manufacturing Corp.**

Address: **#15 - 1925 Kirschner Rd., Kelowna, BC, Canada. V1Y 4N7**

DO-160 Rev: **G**

Prepared By:



Kris Erickson  
Designer  
June 16,  
2017

Checked By:



Nathanael  
Bergmann  
Designer  
June 16, 2017

Approved By:



Todd  
Blackstock  
R&D Manager  
Jun 20/17

| Conditions                                 | Section    | Description of Conducted Tests           |
|--|------------|--|
| <b>Temperature and Altitude</b>            | <b>4.0</b> | <b>Equipment tested to Categories B2</b> |
| Ground Survival Low Temp.                  | 4.5.1      | -55 °C                                   |
| Short-Time Operating Low Temp.             | 4.5.1      | -45 °C                                   |
| Operating Low Temp.                        | 4.5.2      | -45 °C                                   |
| Ground Survival High Temp.                 | 4.5.3      | +85 °C                                   |
| Short-Time Operating High Temp.            | 4.5.3      | +70 °C                                   |
| Operating High Temp.                       | 4.5.4      | +70 °C                                   |
| In-Flight Loss of Cooling                  | 4.5.5      | N/A                                      |
| Altitude                                   | 4.6.1      | +25,000 ft (+7,620 m)                    |
| Decompression                              | 4.6.2      | N/A                                      |
| Overpressure                               | 4.6.3      | N/A                                      |
| <b>Temperature Variation</b>               | <b>5.0</b> | <b>Equipment tested to Category B</b>    |
|  |            | ± 5 °C/min                               |
| <b>Humidity</b>                            | <b>6.0</b> | <b>Equipment tested to Category A</b>    |
|  |            | 95% RH for 48 hrs.                       |
| <b>Operational Shocks and Crash Safety</b> | <b>7.0</b> | <b>Equipment tested to Category B</b>    |
| Operational Shocks                         | 7.2.2      | 6 g for 11 ms in all axes                |
| Crash Safety Impulse                       | 7.3.2      | 20 g for 11 ms in all axes               |
| Crash Safety Sustained                     | 7.3.3      | Up 3 g, Forward 18 g, Side 4.5 g         |

Rev: 1.00

Jun 16, 2017

Page 1 of 4

ENG-FORM: 521-0100.DOTX

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| Conditions                            | Section     | Description of Conducted Tests   |
|---------------------------------------|-------------|--|
| <b>Vibration</b>                      | <b>8.0</b>  | <b>Equipment tested to Category S</b><br>Profile: L  |
| Explosion Atmosphere                  | 9.0         | Category X, no test performed  |
| Waterproofness                        | 10.0        | Category X, no test performed  |
| Fluids Susceptibility                 | 11.0        | Category X, no test performed  |
| Sand and Dust                         | 12.0        | Category X, no test performed  |
| Fungus                                | 13.0        | Category X, no test performed  |
| Salt Spray                            | 14.0        | Category X, no test performed  |
| <b>Magnetic Effect</b>                | <b>15.0</b> | <b>Equipment tested to Category Z</b><br>Deflection of 1°: ≤ 0.21m<br><br>(This specification has been defined by the customer)                          |
| <b>Power Input</b>                    | <b>16.0</b> | <b>Equipment tested to Category BXX</b>  |
| Voltage (Average Value DC)            | 16.6.1.1    | Maximum Operating Voltage: +32.2 Vdc<br>Nominal Operating Voltage: +28 Vdc<br>Minimum Operating Voltage: +18 Vdc<br>Emergency Operating Voltage: +18 Vdc |
| Momentary Power Interruptions (DC)    | 16.6.1.3    | 50 ms Max (tested to b, c, d)  |
| Normal Surge Voltage (DC)             | 16.6.1.4    | As per DO-160G   |
| Engine Starting Undervoltage (DC)     | 16.6.1.5    | As per DO-160G   |
| Low Voltage Conditions (DC)           | 16.6.2.2    | As per DO-160G   |
| Momentary Undervoltage Operation (DC) | 16.6.2.3    | +12 Vdc for 7s   |
| Abnormal Surge Voltage (DC)           | 16.6.2.4    | +60 Vdc for 100ms, +40 Vdc for 1s  |



| Conditions   | Section   | Description of Conducted Tests   |
|--|---|--|
| <b>Voltage Spike</b>   | <b>17.0</b>   | <b>Equipment tested to Category A</b><br>600 Vpk for 10us<br>Positive and Negative spikes  |
| <b>Audio Frequency Susceptibility</b>  | <b>18.0</b>   | <b>Equipment tested to Category B</b><br>1.6 Vpp 0.2 to 1kHz<br>4.0 Vpp 1 to 15 kHz  |
| <b>Induced Signal Susceptibility</b><br>Magnetic Fields Into Equipment<br>Electric Fields Into Equipment<br>Magnetic Fields Into Cables<br>Electric Fields Into Cables<br>Spikes Induced Into Cables | <b>19.0</b><br>19.3.1<br>19.3.2<br>19.3.3<br>19.3.4<br>19.3.5 | <b>Equipment tested to Category ZC</b><br>20 Arms @ 400 Hz<br>170 Vrms @ 400 Hz<br>30 A•m @ 400 Hz to 0.8 A•m @ 15 kHz<br>1800 V•m from 380 to 420 Hz<br>Positive and Negative spikes as per DO-160G |
| <b>Radio Frequency Susceptibility</b><br>Conducted Susceptibility<br>Radiated Susceptibility   | <b>20.0</b><br>20.4<br>20.5                                   | <b>Equipment tested to Category TT</b><br>0.01 to 400 MHz<br>SW/CW: 5 V/m from 0.10 to 8 GHz   |
| <b>Radio Frequency Emission</b><br>Conducted RF Emission<br>Radiated RF Emission   | <b>21.0</b><br>21.4<br>21.5                                   | <b>Equipment tested to Category M</b><br>Power Lines: 150 kHz to 152 MHz<br>Interconnecting Cables: 150 kHz to 152 MHz<br>100 MHz to 6 GHz   |
| Lightning Induced Transient Susceptibility   | 22.0  | Category X, no test performed  |
| Lightning Direct Effects test  | 23.0  | Category X, no test performed  |
| Icing  | 24.0  | Category X, no test performed  |
| <b>Electrostatic Discharge</b>   | <b>25.0</b>   | <b>Equipment tested to Category A</b><br>15,000 Vp, 10 Positive and Negative spikes.   |





| Conditions                | Section     | Description of Conducted Tests   |
|---------------------------|-------------|--|
| <b>Fire, Flammability</b> | <b>26.0</b> | <b>Category C</b><br>The MCP03-100 is constructed of metal on all sides with pockets on the front surface for exposure of the illuminated legends with no vent holes. The combined volume of all legends is less than the volume defined within the small parts exemption definition of DO-160G. |

**REMARKS**

- Sections 4 through 8, 15 through 19 and 25 tests were conducted at Anodyne Electronics Manufacturing Corp. (AEM) in Kelowna BC.
- Section 20 and 21 were tested at Electronics Test Centre, Airdrie, AB.
- In the power input test, equipment was tested to subparagraph 16.6.1.3.b. (Requirement for Digital Circuits)

End of Environmental Qualification Form



# MCP03 Master Caution Panel Installation and Operation Manual

## Section 3.0 Operation

### 3.1 Introduction

Information in this section consists of functional and operational procedures for the MCP03 Master Caution Panel.

### 3.2 General

#### 3.2.1 Annunciator Lighting

When illuminated, Caution legend positions are amber text on a black background and Advisory legend positions are blue text on a black background.

All annunciator legends can operate at two brightness levels, BRIGHT and DIM.

Refer to Section 2.4 for user accessible adjustments.

#### 3.2.2 Caution / Advisory Signal Detection

The MCP03 monitors the status of 27 Caution / Advisory input signals. Upon detection of a Caution or Advisory signal, the MCP03 activates and illuminates the corresponding legend position.

Depending on legend position location, the detection circuitry can trigger on three types of input signals.

Advisory legends illuminate blue and are located at legend positions 2, 4, 6, and 8. Caution legends illuminate amber and are located at all other legend positions.

The three trigger types are:

POS – Activates when a 28Vdc signal is present.

GND – Activates when a connection to ground is present.

NULL – Activates when open circuit – 26Vac is absent. Does **not** illuminate when a 26Vac signal is present.

The legend position locations and their corresponding trigger types are detailed in the following table:

|                 |     |     |             |           |     |           |             |     |     |
|-----------------|-----|-----|-------------|-----------|-----|-----------|-------------|-----|-----|
| Legend Position | 1   | 2   | 3           | 4         | 5   | 6         | 7           | 8   | 9   |
| Trigger Type    | GND | POS | GND         | GND       | POS | GND       | GND         | POS | GND |
| Legend Position | 10  | 11  | 12          | 13        | 14  | 15        | 16          | 17  | 18  |
| Trigger Type    | GND | GND | GND         | POS & GND | GND | POS & GND | GND         | GND | GND |
| Legend Position | 19  | 20  | 21          | 22        | 23  | 24        | 25          | 26  | 27  |
| Trigger Type    | GND | GND | GND or NULL | GND       | GND | GND       | GND or NULL | GND | GND |

Legend Position Trigger Type Table

The annunciator legend is extinguished once the advisory or caution signal is removed.



## MCP03 Master Caution Panel Installation and Operation Manual

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### **3.2.3 Dual HI/LO Legend Positions**

Legend positions 13 and 15 require the presence of both a POS and a GND signal to illuminate the corresponding legend.

A POS signal must be present at [POSITION 13 HI] (pin #48) and a GND signal must be present at [POSITION 13 LO] (pin #50) for legend position 13 to illuminate.

A POS signal must be present at [POSITION 15 HI] (pin #20) and a GND signal must be present at [POSITION 15 LO] (pin #55) for legend position 15 to illuminate.

### **3.2.4 Legend Positions 21 & 25**

Legend positions 21 and 25 can be configured as either GND input type or NULL input type. For more information on configuring these inputs, see Section 2.4.2.

### **3.2.5 External MASTER CAUTION Annunciator Operation**

If both legend position 10 [L GENERATOR] (pin #44) and legend position 18 [R GENERATOR] (pin #58) detect a Caution signal at the same time, they will illuminate each respective position and flash the external MASTER CAUTION annunciator at a rate of 1.5Hz until one or both signals are removed, or a ground connection occurs at [MASTER CAUTION CANCEL] (pin #40). The MASTER CAUTION CANCEL signal is typically supplied by a switch in the cockpit. If the MASTER CAUTION CANCEL switch is pressed while both signals are still present, only the external MASTER CAUTION annunciator will be extinguished.

### **3.2.6 BRIGHT / DIM Input Operation**

The MCP03 illuminates the legend positions in either BRIGHT or DIM mode. A connection to ground at [DIM LOW] (pin #41) will set the MCP03 to DIM mode. If [DIM LOW] is left floating, the MCP03 will be set to BRIGHT mode. The BRIGHT and DIM modes are typically controlled via the external TEST-BRIGHT-DIM switch mounted in the cockpit.

### **3.2.7 TEST Operation**

When [TEST IN LOW] (pin #54) is connected to ground via the external TEST-BRIGHT-DIM switch, all annunciator legends will illuminate and the AF ARM OUT and AF SEL OUT active high outputs will activate. The external MASTER CAUTION OUT flashing output will activate because legend positions 21 & 25 have both been activated.

[TEST OUT LOW] (pin #62) is tied to [TEST IN LOW] (pin #54) with a diode. Therefore, [TEST OUT LOW] will pull low through the ground connection at [TEST IN LOW].



## MCP03 Master Caution Panel Installation and Operation Manual

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### **3.2.8 AF SEL & AF ARM Input / Output Operation**

If the MCP03 is in BRIGHT mode, and a POS signal is present at [AF ARM IN] (pin #45), the MCP03 will apply the power supply voltage (28VDC nominal minus a maximum of 3.0Vdc) at [AF ARM OUT] (pin #46).

If the MCP03 is in BRIGHT mode, and a POS signal is present at [AF SEL IN] (pin #19), the MCP03 will apply the power supply voltage (28VDC nominal minus a maximum of 3.0Vdc) at [AF SEL OUT] (pin #18).

If the MCP03 is in DIM mode, the above voltages applied at the AF ARM OUT and AF SEL OUT pins will be 14Vdc.

End of Section 3.0

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