INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

MD41-104X/MD41-105X Series
Helicopter Terrain Awareness Warning System
Annunciation Control Unit
For Garmin 4XXW/5XXW Systems

MD41-1048	28vdc	Horizontal Mount
MD41-1048(5V)	28vdc	Horizontal Mount, 5vdc lighting
MD41-1058	28vdc	Vertical Mount
MD41-1058(5V)	28vdc	Vertical Mount, 5vdc lighting

REV. C March 1, 2011 **Manual Number 9017035**

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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

Rev.	Date	Detail
A	02/15/10	Initial release.
B	06/18/10	Updated TSO references.
C	03/01/11	Added UG to Section 8 part of Environmental Qualifications.

TABLE OF CONTENTS

SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The MD41-1048, -1058, -1048(5V), and -1058(5V) are compact, self-contained Annunciation and Control Units (ACUs). The fully integrated control unit provides annunciation and mode selection for Terrain Awareness Warning Systems (TAWS or HTAWS). It is specifically designed to work with Garmin 4XXW/5XXW series systems and derivatives with equivalent functionality. It combines the necessary functions and annunciations required to interface with an approved system and provide regulatory compliance with (H)TAWS minimum performance specifications.

Highlighted features include long-life LEDs used for all lighting, internally back lighted selection switches, 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 MODELS

Unit Configurations				
	MD41-1048	**MD41-1048(5V)**	**MD41-1058**	**MD41-1058(5V)**
Orientation	Horizontal	Horizontal	Vertical	Vertical
Power Input	28 VDC	28VDC	28VDC	28VDC
Lighting Input	28 VDC	5 VDC	28VDC	5 VDC

Table 1.1

1.2.2 PHYSICAL ATTRIBUTES

Characteristics:	
Weight:	0.26 pounds
Dimensions: (not including connector or mate)	3.2 inches long 3.25 inches wide 0.8 inches high
Mating Connector:	Positronic RD25F10JVL0 or equivalent (MCI P/N 7014517)
Instrument Panel Mounting:	Rear mount

Table 1.2

1.2.3 PERFORMANCE

Specifications:	
Qualification:	FAA TSO-C151
Environmental Qualification:	RTCA DO-160D Environmental Category F2CAB(SM/UG)XXXXXXZBABA(TT)M[A3C3]XXA* * Sections 16, 20, 21, and 22 comply with DO-160C, Section 8 (UG) complies with DO-160F
Power Requirement:	0.15 A max

Table 1.3

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 would be considered beneficial.

2.2 EQUIPMENT LOCATION

The MD41-104X/-105X series ACU must be mounted as close to the pilot's field of view as possible. Please reference the HTAWS installation manual for approved locations. 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

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. 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.

Note that this product is part of an incomplete system. It is designed to be installed with other applicable equipment to provide functionality for (helicopter) terrain awareness warning systems.

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. The following parts should be included:

a. HTAWS ACU – MCI P/N MD41-104X or MD41-105X series
b. J1 Connector Kit (25 pin) – MCI P/N 7014517
c. Installation Manual – MCI P/N 9017035

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 3.3 and Wiring Diagram of Table 3.3.

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

3.3.1 LIGHTING CONTROL

Button backlighting is powered (5vdc or 28vdc) from the aircraft's panel lighting bus. This will allow manual dimming control of the button brightness using the aircraft's panel lighting control dimmer.

Annunciation brightness can be controlled as two groups. One group includes the TAWS WARN annunciation and the other group includes all other annunciations together. Each group can be set to be full bright when activated or to dim using the internal photocell of the unit as it corresponds to the ambient light of the cockpit.

To set either group, connect the BRT/DIM control pin (pin 3 for TAWS WARN and pin 7 for all others) to either an Annun Full Bright pin or an Internal Dimming pin depending on desired function. There are two pins each for the full bright or internal dimming option; each pin is identical in its function.

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.

3.3.3 HARNESS VERIFICATION

With the MD41 ACU disconnected, turn on the avionics master switch and use an ohm-meter 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 3.4 for the unit bezel and two mounting holes. If needed, a cutout template is available from Mid-Continent Instruments and Avionics (reference p/n 8014458).

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 any of the annunciations. 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. 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 in place with two #4-40 x 3/8 flat head phillips screws.

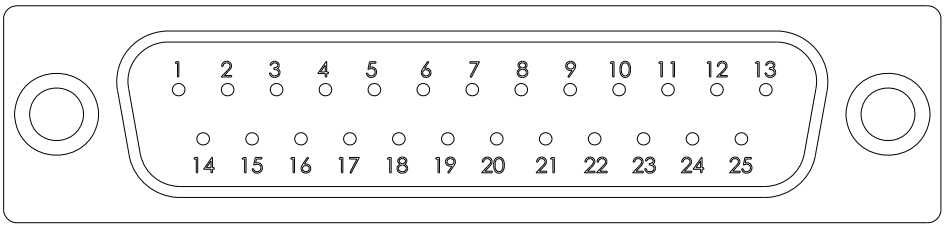
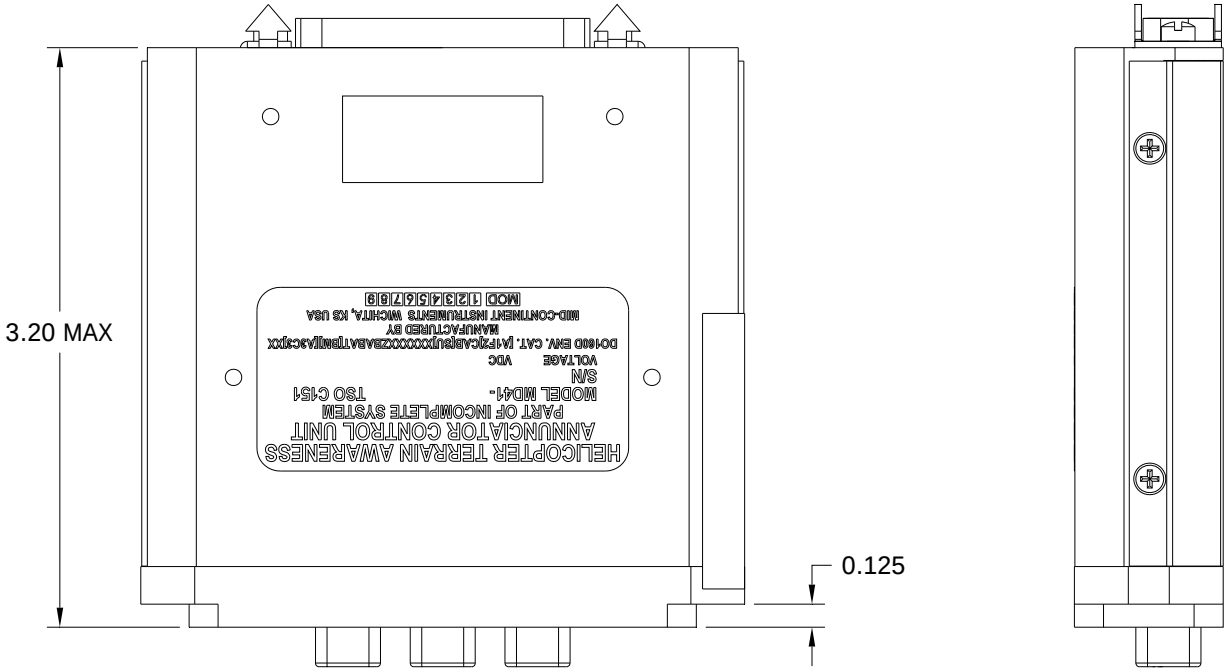
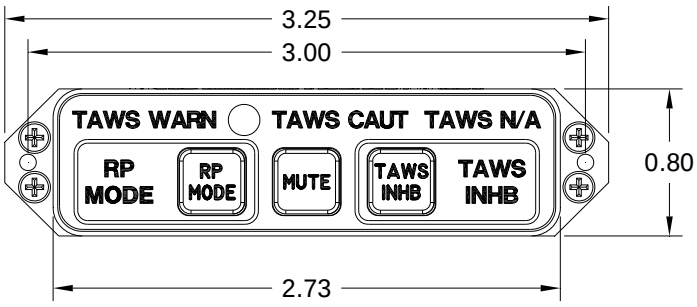


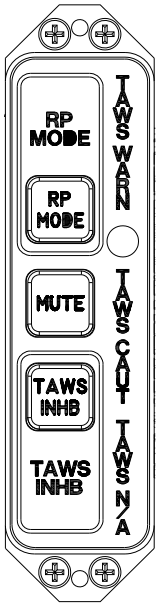
FIGURE 3.3
REAR VIEW OF 25-PIN D-SUB CONNECTOR (J1)

Connector Pinout				
Pin #			Pin #	
1	Annun. Full Bright #1		14	Reduced Protection Mode* IN
2	Annun. Full Bright #2		15	Reduced Protection Mode* OUT
3	TAWS Warning BRT/DIM IN		16	Mute Caution* OUT
4	Internal Dimming Program #1		17	Reserved
5	TAWS Caution Annun.* IN		18	Reserved
6	TAWS Test* IN		19	TAWS Annun. Inhibit* IN
7	Annun. BRT/DIM IN		20	TAWS Inhibit* OUT
8	Panel Lighting Bus HI**		21	Aircraft Ground
9	Panel Lighting Bus LO		22	Aircraft Ground
10	TAWS Not Available Annun. IN		23	Aircraft Ground
11	TAWS Warning Annun.* IN		24	Aircraft Ground
12	Internal Dimming Program #2		25	Aircraft Ground
13	Aircraft Power**			
*	Designates an active low signal			
**	See Specifications for voltage input.			

TABLE 3.3
WIRING DIAGRAM







MD41-1048
MD41-1048(5V)

MD41-1058
MD41-1058(5V)

Note: Use two 4-40 X 3/8" Flat Head Phillips Screws for Mounting

FIGURE 3.4
OUTLINE DRAWING

SECTION 4 OPERATION

4.1 FRONT PANEL CONTROLS AND ANNUNCIATIONS

4.1.1 CONTROLS

RP MODE — Momentary Switch, when pressed, will initiate the command to put the HTAWS system into Reduced Protection (RP) Mode.

MUTE — Momentary switch, when pressed, will suppress an aural alert associated with terrain and obstacle *cautions*. This function will not suppress aural alerts associated with terrain and obstacle *warnings*.

TAWS INHB — Momentary switch, when pressed, will inhibit (deactivate) the HTAWS functionality of the system.

All button/switch controls are white backlit. Refer to the operation manual of the HTAWS System equipment manufacturer for additional operational and functional interface details.

4.1.2 ANNUNCIATIONS

TAWS WARN	(RED)	Terrain or obstacle warning alert is present
TAWS CAUT	(AMBER)	Terrain or obstacle caution alert is present
TAWS N/A	(AMBER)	HTAWS functionality is not available
RP MODE	(WHITE)	Reduce Protection Mode has been selected and verified as active
TAWS INHB	(WHITE)	HTAWS functionality is temporarily inhibited via manual selection on the HTAWS system or the TAWS INHB button on the ACU

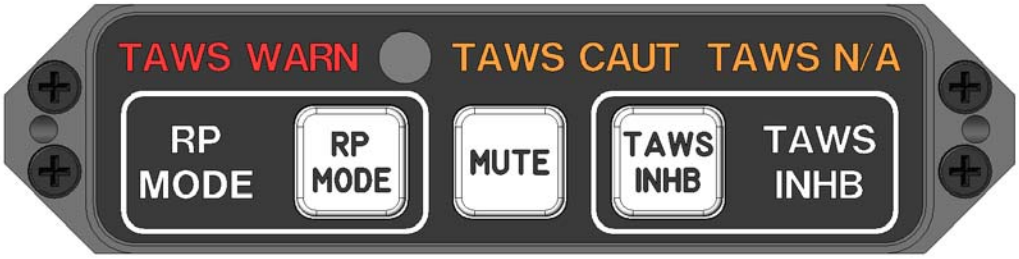


FIGURE 4.1 FRONT PANEL

4.2 LIGHTING BEHAVIOR

Lighting behavior can be controlled in multiple ways. Button lighting is controlled manually using the aircraft's panel lighting bus controller. Annunciator lighting is split into two groups. The TAWS WARN light can be configured to automatically dim using the internal photocell or configured to be on full bright when activated. All other annunciations can be configured the same way as a group; either set to automatically dim or to be on full bright.

If using the dimming feature for any of the annunciations, the Annunciator Dim Adjust on the outside of the unit can be used to set the brightness at their dimmest level for best night-time viewing.

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.

5.2 ENVIRONMENTAL QUALIFICATION STATEMENT

NOMENCLATURE: HTAWS Annunciator Control Unit (ACU)
MODEL NUMBER: MD41-104X/-105X series **TSO NUMBER:** C151
MANUFACTURERS SPECIFICATIONS:
Minimum Performance Specifications: Test Specification (TS) 187, Test Data Sheet (TDS) 444
QUALIFICATION STANDARD: RTCA DO-160D (* denotes qualification to RTCA DO-160C), (** denotes qualification to RTCA DO-160F)

CONDITIONS	SECTION	DESCRIPTION OF TEST
Temperature and Altitude	4	Category F2
Low Temperature	4.5.1	Operating Low Temp = -55C
High Temperature	4.5.2	Operating High Temp = +70C
Decompression	4.6.2	Altitude = 55K
Overpressure	4.6.3	-15,000 ft
Temperature Variation	5	Category C
Humidity	6	Category A
Operational Shock and Crash Safety	7	Category B
Vibration	8	Category S, Curve M Category U, Curve G** (SM/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 Z
Power Input*	16	Category B
Voltage Spike	17	Category A
Audio Frequency Conducted Susceptibility	18	Category B
Induced Signal Susceptibility	19	Category A
Radio Frequency Susceptibility*	20	Category T (conducted) Category T (radiated) [TT]
Emission of Radio Freq Energy*	21	M
Lightning Induced Transient Susceptibility*	22	Category A3 (pin injection) Category C3 (cable bundle) [A3C3]
Lightning Direct Effects	23	Category X
Icing	24	Category X
ESD	25	Category A