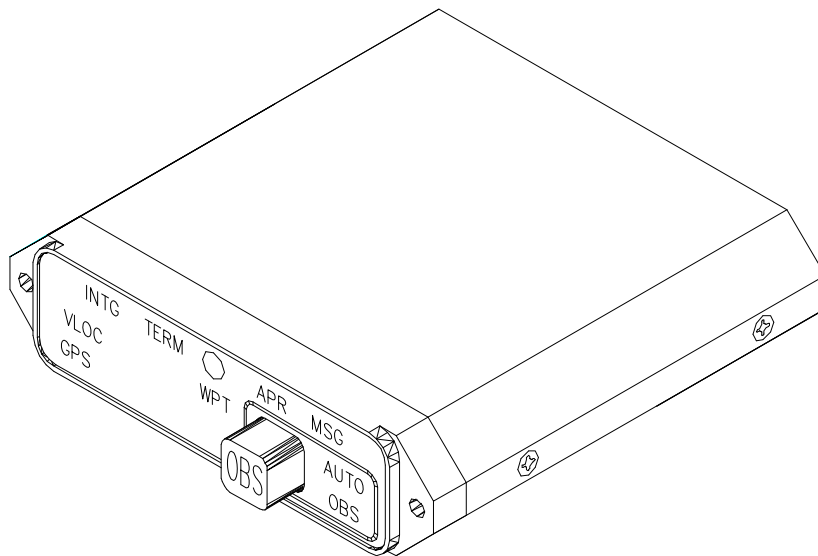




## INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

### MD41-( ) Series GPS Annunciation Control Unit for Garmin GNS/GTN Systems.

MD41-1470    28vdc    Horizontal Mount



Mid-Continent Instruments and Avionics  
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Manual Number 9014952  
REV. C January 5, 2017

## MANUAL REVISION AND HISTORY

MANUAL: MD41-1470

<b>ECO</b>	<b>Rev</b>	<b>Date</b>	<b>Approved</b>	<b>Detail</b>
	1	04/09/2002	CS	Added provisions for controlling annunciation externally. This includes assignments for pins 6 and 23.
6051	A	10/28/2013	BAW	Updated Technical Specifications to include compatible Garmin GTN Systems.
6495	B	11/30/2015	MKN	Corrected TSO number, MD41 series number, and GPS header in section 1.2.
6707	C	01/05/2017	KJW	Changed all Garmin System references to be inclusive of both GTN and GNS systems.

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## SECTION 1 GENERAL DESCRIPTION

### 1.1 INTRODUCTION

The MD41-( ) is a compact, self-contained GPS Annunciation and Control unit. It meets all requirements for external (remote) mode selection and status annunciation for the Garmin GNS 430/530 and GTN 650/750 VHF Communications and Navigation Management Systems.

Features include dual 20,000 hour lamps used for all annunciations, internally lighted selection switches and automatic photocell dimming. An external annunciation dimming adjustment is provided for balancing low level light conditions.

### 1.2 SPECIFICATIONS, TECHNICAL

Mid-Continent Instruments Co., Inc. certifies that the model MD41-( ) series, Annunciation Control Unit has been tested to and meets or exceeds the functional and environmental requirements of the following FAA Technical Standard Order (TSO):

- FAA/TSO-C129: AIRBORNE SUPPLEMENTAL NAVIGATION EQUIPMENT USING THE GLOBAL POSITIONING SYSTEM (GPS)

We also certify we meet the requirements of Part 21, Subpart 0 of the Code of Federal Regulations.

The MD41-( ) series, Annunciation Control Unit conforms to all pertinent documented design and internal manufacturing standards. This includes, but is not limited to: component drawings, specifications, testing criteria, inspection requirements, quality processes, manufacturing instructions, and handling procedures. It shall be manufactured in accordance with Mid-Continent Instruments and Avionics FAA-approved Production Approval Holder-Quality System Manual, Revision M, dated April 14, 2011 or later.

The MD41-14XX series 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 GPS Receiver System:</b>
MD41-1470	Manufacturer: Garmin International  Models: GNS 430/530 GTN 650/750

### 1.2.1 PHYSICAL CHARACTERISTICS

Mounting:	Panel
Width:	3.25 Inches
Height:	.80 Inches
Depth:	3.20 Inches
Weight:	0.50 lbs.

### 1.2.2 ENVIRONMENTAL CHARACTERISTICS

TSO Compliance:	TSO C129
Applicable Documents:	RTCA DO-160C, DO-208
Operating Temperature Range:	-55°C to +70°C
Humidity:	95% Non-Condensing
Altitude Range:	0 to 55,000 ft.
Vibration:	Cat. M and N
Operational Shock:	Rigid Mounting, 6 G Operational 15 G Crash Safety

### 1.2.3 SPECIFICATIONS, ELECTRICAL

Design	All Solid State
MD41-1470 (28VDC)	0.30 Amps

## 1.2.4 FRONT PANEL CONTROLS AND ANNUNCIATIONS

### 1.2.4.1 CONTROLS

**OBS** Momentary action switch, when pressed, will select between automatic waypoint sequencing (AUTO) mode and OBS mode.  
In OBS mode, this will enable OBS selection input from a remote HSI/CDI indicator.

### 1.2.4.2 ANNUNCIATIONS

**VLOC** NAV or ILS information presented on the HSI or CDI.  
**GPS** GPS information presented on the HSI or CDI.  
**MSG** On indicates message(s) active.  
**WPT** On indicates reaching the arrival waypoint.  
**AUTO** Automatic sequencing of waypoints is active.  
**OBS** On indicates GPS OBS mode of operation.  
**INTG** Illuminates when GPS receiver detects a position error or is unable to calculate the integrity of the position.  
**TERM** On indicates aircraft is within 30 miles of departure or arrival airport.  
**APR** On indicates the approach is active.

### 1.2.5 INTERFACE

<b>VLOC annunciation</b> J1 Pin 2	Receives ground from GNS/GTN Systems when in VOR/ILS mode
<b>GPS annunciation</b> J1 Pin 1	Receives ground from GNS/GTN Systems when in GPS mode.
<b>OBS (select)</b> J1 Pin 12	Provides a momentary logic low to the GNS/GTN Systems when OBS is selected. Selects between AUTO and OBS.
<b>OBS annunciation</b> J1 Pin 24	Requires a logic low to annunciate

### 1.2.5 INTERFACE (cont.)

INTG annunciation J1 Pin 20	Requires a logic low to annunciate
TERM annunciation J1 Pin 3	Requires a logic low to annunciate
APR annunciation J1 Pin 9	Requires a logic low to annunciate
WPT annunciation J1 Pin 8	Requires a logic low to annunciate
MSG annunciation J1 Pin 10	Requires a logic low to annunciate
Lamp Test J1 Pin 7	Receives ground from remote test switch to light all annunciations. (Optional connection)

### 1.2.6 EQUIPMENT LIMITATIONS

The MD41-( ) series control units contain specific dash numbers to be used with various GPS receivers or Navigation Management Systems. The installer must match the correct controller part number with the system being installed.

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator.

The MD41-1470 is TSO'D and certified for use with the Garmin GNS/GTN systems.

**NOTE:** If the MD41-( ) is disconnected or removed from the aircraft, there will be no effect in the operation of the GNS/GTN systems.

### 1.2.7 MAJOR COMPONENTS

This system is comprised of one major component, the MD41-1470 GPS Annunciation Control Unit.

## SECTION 2 INSTALLATION CONSIDERATIONS

### 2.1 COOLING

No direct cooling is required. As with any electronic equipment, overall reliability may be increased if the MD41-( ) is not located near any high heat source or crowded next to other equipment. Means of providing a gentle air flow will be a plus.

### 2.2 EQUIPMENT LOCATION

The MD41-( ) must be mounted as close to the pilot's field of view as possible. The preferable location is near the HSI/CDI that will be displaying the GPS/VLOC information. The unit depth, with connector attached, must also be taken into consideration. Note: Unlike previous versions of the MD41 Annunciation Control Units (ACU), the transfer relays are not required as all switching between GPS, VOR and ILS is handled by the GNS/GTN systems. This has allowed a for a smaller size ACU which now provides more options for panel mounting.

### 2.3 ROUTING OF CABLES

Care must be taken not to bundle the MD41-( ) 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 coax. Always use shielded wire when shown on the installation print. Avoid sharp bends in cabling and routing near aircraft control cables.



## 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-( ). 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 equipment, make a visual inspection for evidence of damage incurred during shipment. The following parts should be included:

1. MD41-1470 (28 volt) Horiz. Mount
2. J1 Connector Kit (25 pin). MCIA PN 7014517
3. Installation Manual. MCIA PN 9014952

### 3.3 MOUNTING THE MD41-( )

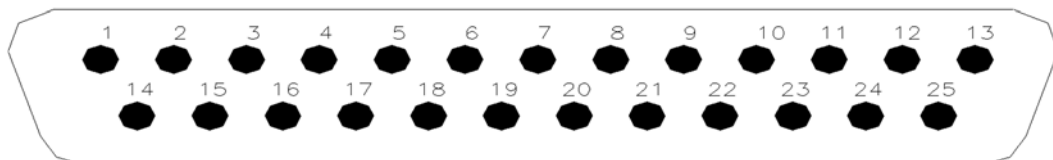
Plan a location in the aircraft for the MD41-( ) to be mounted as close to the pilot's field of view as possible. The preferable location is near the HSI/CDI that will be displaying the GPS information. Avoid mounting close to heater vents or other high heat sources. Allow a clearance of at least 3 inches from back of unit for plug removal.

The indicator is secured in place behind the panel since it is designed for rear mount only. Make a panel cutout as shown in Figure 3-2. Secure the indicator in place with two 4-40 x 3/8 flat head Phillips screws.

### 3.4 INSTALLATION LIMITATIONS

Wire the aircraft harness according to figure 3-3. Use at least 24 AWG wire for all connections. Avoid sharp bends and routing cable near high energy sources. Care must be taken to tie the harness away from aircraft controls and cables. Normal installation techniques should be applied. Also see equipment limitations, section 1.2.6.

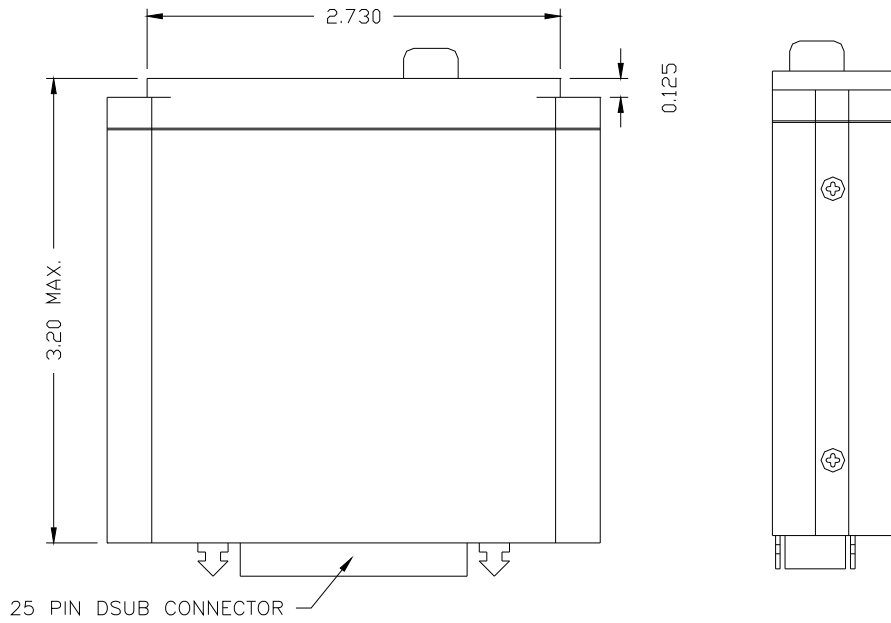
## J1 CONNECTOR



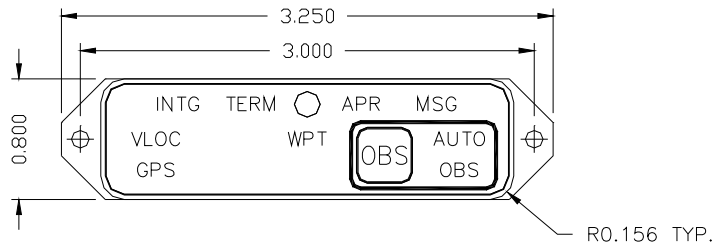
## REAR VIEW OF J1 CONNECTOR

J1 PIN NO.	
1 -----	GPS ANNUNCIATION
2 -----	VLOC ANNUNCIATION
3 -----	TERM ANNUNCIATION
4 -----	SPARE
5 -----	28vDCDIMMER IN (from aircraft dimming bus for push-button lighting)
6 -----	Bright/Dim annunciation lamp power.
7 -----	LAMP TEST (receives ground from remote test switch)(optional conn.)
8 -----	WPT ANNUNCIATION
9 -----	APR ANNUNCIATION
10 -----	MSG ANNUNCIATION
11 -----	SPARE
12 -----	OBS MODE SELECT (momentary logic low sent to the receiver)
13 -----	28VDC UNIT POWER
14 -----	SPARE
15 -----	SPARE
16 -----	SPARE
17 -----	SPARE
18 -----	SPARE
19 -----	SPARE
20 -----	INTG ANNUNCIATION
21 -----	SPARE
22 -----	SPARE
23 -----	Internal photocell dimming output. To use, jumper pin 23 to pin 6.
24 -----	OBS ANNUNCIATION
25 -----	POWER GROUND

**FIGURE 3-1 SCHEMATIC PINOUT, 25 PIN DSUB**



HORIZONTAL MOUNT  
MD1470

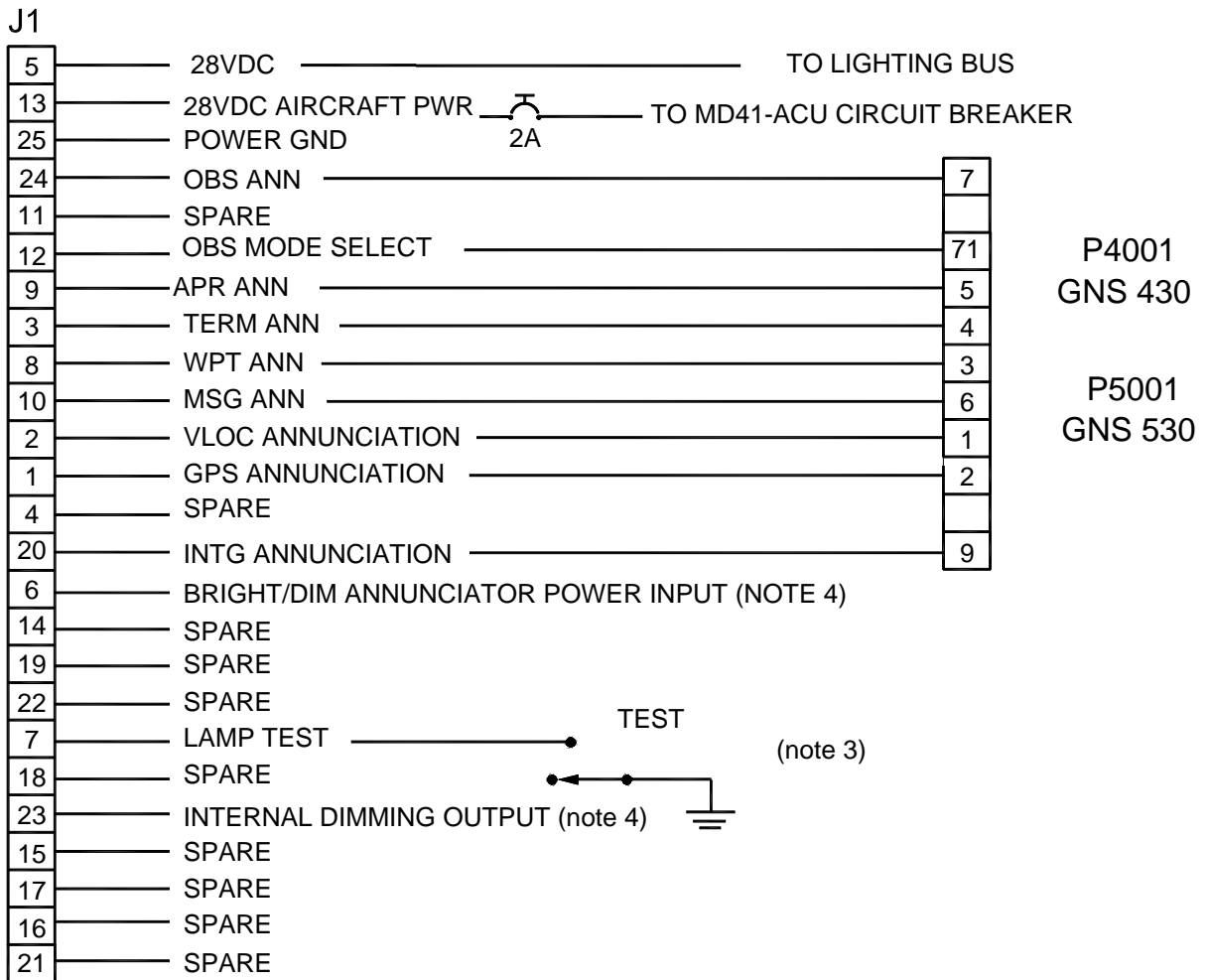


ANNUNCIATOR COLOR CHART:

- 1) VLOC: White
- 2) GPS: Green
- 3) MSG: Amber
- 4) TERM: Green
- 5) APR: Green
- 6) WPT: Amber
- 7) OBS: Green
- 8) AUTO: White
- 9) INTG: Amber

Note 1: Use two 4-40 X 3/8" Flat Head Phillips Screws for Mounting

**FIGURE 3-2 OUTLINE DRAWING**



**NOTES:**

- 1) REFER TO GARMIN GNS 430/530 INSTALLATION MANUAL FOR ACTUAL INSTALLATION.
- 2) ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.
- 3) MOMENTARY SWITCH FOR TEST. (optional connection)
- 4) INSTALL JUMPER BETWEEN PIN 6 AND 23 TO USE INTERNAL DIMMING

**FIGURE 3-3 WIRING DIAGRAM, MD41-1470  
GARMIN GNS system.**

(GTN System not shown. Refer to the Garmin GTN Installation Manual for actual installation.)

## SECTION 4 POST INSTALLATION CHECKOUT

### 4.1 PRE INSTALLATION TESTS

With the MD41-( ) disconnected, turn on the avionics master switch and verify that aircraft power is on pin 13 for. Using an ohm meter, verify pin 25 is aircraft ground.

### 4.2 OPERATING INSTRUCTIONS

Turn off the avionics master switch and connect the mating connector to the MD41-( ). Turn on the avionics master switch and the MD41-( ) should come on with the following annunciations.

1. VLOC or GPS
2. AUTO
3. MSG may be flashing depending on the status of the GPS receiver.

Press the lamp test button (if installed), all annunciations should light. Continue pressing the lamp test button and cover the photocell window located in the center of the front panel. All annunciations should dim.

Annunciation brightness at the minimum dimming level may be adjusted by rotation of the dimmer control located on the bottom of the MD41-( ) case. CW rotation lowers the dimming level.

Refer to section 5.2.7 of the Garmin GNS/GTN systems installation manual for testing of external mode select switches and annunciations.

No periodic maintenance or calibration is necessary for continued airworthiness of the MD41-( ).

**APPENDIX**

**ENVIRONMENTAL QUALIFICATION FORM**

**RTCA / DO160C**

NOMENCLATURE: MD41-( ) GPS ANNUNCIATION CONTROL UNIT

MODEL NO: MD41-( )

TSO NO: C129

CLASS A1

MANUFACTURER TEST SPECIFICATION:

MPS 7015613

MANUFACTURER: Mid-Continent Instruments and Avionics  
9400 E. 34<sup>th</sup> Street N.  
Wichita, KS 67226  
Phone (316) 630-0101

Conditions	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Categories A1 & F2 except as noted  Cooling air not required  Not Tested
Low Temperature	4.5.1	
High Temperature	4.5.2 & 4.5.3	
In-Flight Loss of Cooling	4.5.4	
Altitude	4.6.1	
Decompression	4.6.2	
Overpressure	4.6.3	
Temperature Variation	5.0	Equipment tested to Category B
Humidity	6.0	Equipment tested to Category A
Shock	7.0	Equipment tested per DO-160C Par. 7.2.1
Operational	7.2	
Crash Safety	7.3	
Vibration	8.0	Equipment tested without shockmounts to Categories M and N (Table 8-1)
Explosion	9.0	Equipment identified as Category X, no test required
Waterproofness	10.0	Equipment identified as Category X , no test required

**Environmental Qualification (cont.)**

Conditions	Section	Description of Conducted Tests
Sand and Dust	12.0	Equipment identified as Category X, no test required
Fungus	13.0	Equipment identified as Category X, no test required
Salt Spray	14.0	Equipment identified as Category X, no test required
Magnetic Effect	15.0	Equipment tested to Class Z
Power Input	16.0	Equipment tested to Category B
Voltage Spike	17.0	Equipment tested to Category A
Audio Frequency Susceptibility	18.0	Equipment tested to Category B
Induced Signal Susceptibility	19.0	Equipment tested to Category A
Radio Frequency Susceptibility	20.0	Equipment tested to Category T
Radio Frequency Emissions	21.0	Equipment tested to Category Z
Lightning Induced Transient Susceptibility	22.0	Equipment identified as Category X, no tests required
Lightning Direct Effects	23.0	Equipment identified as Category X, no tests required
Icing	24.0	Equipment identified as Category X, no test required