



User Guide
For

MD23-342

Digital
Attitude Indicator

powered by



Rev	Date	Detail	Approved
1	10/11/22	Initial release.	BAW

This manual provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install this equipment. It is a supplement to the MD23 Installation Manual and Operating Instructions, p/n 9019161.

If further information is required, please contact Mid-Continent Instruments and Avionics.

Mid-Continent Instruments and Avionics

User Guide UG342
Revision 1

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1.1 INTRODUCTION

The model MD23-342 digital attitude Indicator is a standard 2-inch (2-1/4”) panel-mounted instrument that displays aircraft attitude related functions. Based on Mid-Continent Instruments and Avionics patented FLEX™ Custom Function Display, this FAA and EASA TSO-approved instrument brings a highly capable and modern addition to the cockpit to display required information and provide useful supplementary functions.

This User Guide is a supplement to the Installation Manual and Operating Instructions (IM), MCIA part number 9019161. The IM contains all information associated with the standard product, including installation procedures, product specifications, operating instructions, certification data, and maintenance requirements. This User Guide provides additional information associated with the specific features of the multifunction digital attitude Indicator. It addresses product identification, electrical pinout, initial configuration setup, and in-flight user operation.

1.2 PRODUCT IDENTIFICATION

Each MD23 is comprised of certified hardware and certified software. Within the context of the certified software is a set of data items that can configure and customize the behavior of the unit. This set of data is referred to as a Custom Instrument Definition, or a CID file. The CID file for this instrument is pre-loaded and may be available for future updates via a standard USB flash drive through the programming port on the rear of the unit.

A unique CID number has been assigned specifically to this application. The CID is identified by its two-digit number and an alphabetic character representing the CID version, starting with “A”.

The identification of the hardware, software, and CID configurations are listed below. Both the software version and the CID can be viewed on the Introduction Screen during the first few seconds of applying power to the unit. This information can also be accessed on the Info page of the Options Menu during Flight Mode.

Unit Versions		
Hardware Part Number	Software Version	CID
6420023-3 or -23	1.1.0, or later	42A, or later

1.3 PRODUCT FUNCTION

The Multifunction Digital Attitude Indicator provides an artificial horizon display of the aircraft pitch and roll attitude. It also displays aircraft slip and turn rate and, optionally, heading (if connected to an external source of heading data via ARINC labels 320 or 014).

The unit can be configured by the installer to account for panel tilt, roll offset, roll scale, aircraft symbol and heading display options.

2.1 CONNECTOR PINOUT

For standard pre-installation and installation instructions, including location, cable harness assembly, pneumatic inputs (if applicable), mounting, and others, please refer to the IM.

Pinout identification specific to this CID is listed in the table below. A brief description is provided. Further definition of the inputs and outputs should be documented in the technical requirements and/or statement of work and are not provided within this User Guide.

Connector Pinout		
Pin	Description	Function
1	Ground	Power return; connect to a/c ground
2	ARINC Out (A)	Labels 325, 324, and 320
3	ARINC Out (B)	(paired with pin 2)
4	Dimmer Input	5, 14, or 28VDC input (if used)
5	ARINC In (A)	Label 0320 or 014 (if used)
6	Reserved	
7	Reserved	
8	Reserved	
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	ARINC In (B)	(paired with pin 5)
15	Reserved	
16	Reserved	
17	Reserved	
18	Reserved	
19	Power Input	+10-32VDC
20	Reserved	
21	Reserved	
22	Reserved	
23	Reserved	
24	Reserved	
25	Reserved	
26	Reserved	

Table 1 Unit Connector Pin Identification

The Multifunction Digital Attitude Indicator also provides ARINC outputs of the following data:

Label	Parameter	Units	LSB	MSB	Resolution	Min	Max	Xmit period
0325 (213d)	Roll	deg	15	29	0.010986328	-180.0	180.0	0.02 sec
0324 (212d)	Pitch	deg	16	29	0.021972656	-180.0	180.0	0.02 sec
0320 (208d)	Heading	deg	17	29	0.043945312	-180.0	180.0	0.05 sec

3.1 CONFIGURATION AND SETUP

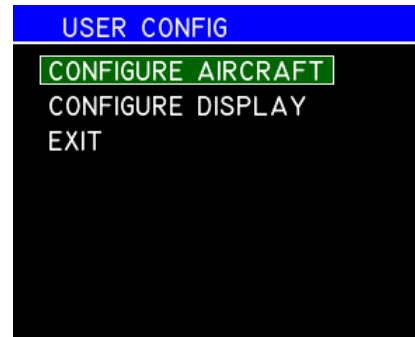
Enter Configuration Mode by pressing and holding the Control Knob while applying power to the unit. For configuration and setup of standard unit functions, including dimming control options and dimming curve definition, please refer to the IM.

Configuration settings specific to this unit are found within the User Configuration menu option. The User Configuration items include two functions:

3.1.1 USER CONFIGURATION

Within the User Configuration Menu, the user can select to either configure aircraft installation related options or instrument display options

Turn the Control Knob to highlight the desired option and press to select it.



3.1.2 CONFIGURE AIRCRAFT

The Configure Aircraft Menu contains aircraft installation related options.

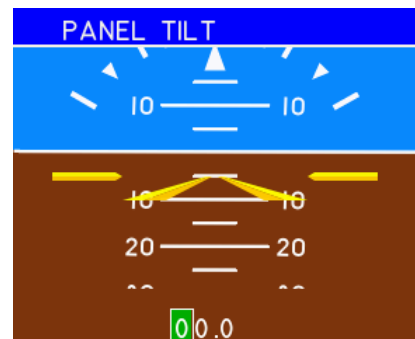
Turn the Control Knob to highlight the desired option and press to select it.



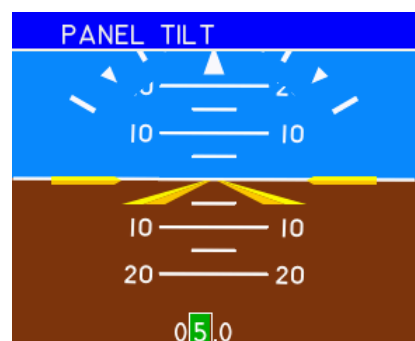
3.1.2.1 PANEL TILT

Use the panel tilt adjustment to compensate for any front-to-back tilt of the instrument as installed in the instrument panel.

This screen will appear (for example) as shown in the first illustration on the right when initially selected, before any adjustment is made. The actual measured pitch angle is displayed by the artificial horizon display.



The current panel tilt setting is shown at the bottom of the screen in degrees. When the Control Knob is turned, the digit that is highlighted in green will be changed and the displayed pitch angle will change accordingly. Press the Control Knob to advance to the next digit. The second illustration on the right shows the panel tilt adjustment display after the adjustment has been made.

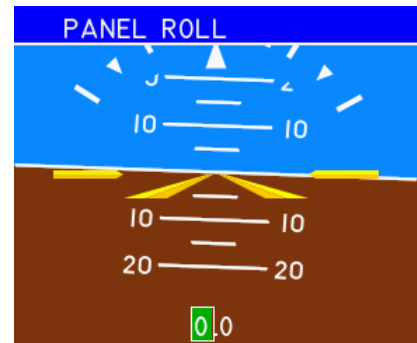


The display will return to the Configure Aircraft menu when the knob is pressed with the last digit highlighted.

3.1.2.2 PANEL ROLL

The panel roll adjustment screen functions basically the same as the panel tilt adjustment screen. An example of this screen before adjusting to compensate for a slight roll misalignment in the instrument installation is shown at the right. Press the Control Knob to select the digits and turn to adjust.

The display will return to the Configure Aircraft menu when the knob is pressed with the last digit highlighted.



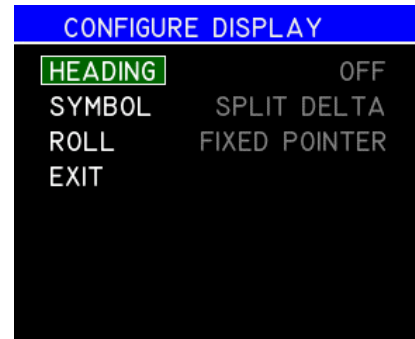
3.1.2.3 EXIT

The last menu item on the Configure Aircraft Menu is EXIT. Highlighting and selecting the Exit menu item will close the Configure Aircraft Menu and return to the User Configuration Menu.

3.1.3 CONFIGURE DISPLAY

The Configure Display menu allows the user to select various options that affect the appearance of the display. It is illustrated on the right. The current setting for each of these options is shown on the right side of the screen in grey text. Each of these options is described in the following subparagraphs.

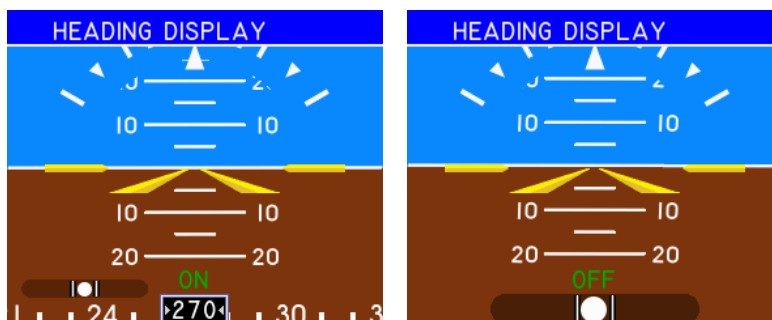
Turn the Control Knob to highlight the option you wish to change and press the knob to select that option.



3.1.3.1 HEADING

This option controls whether the heading digital display and tape are displayed at the bottom of the screen. If this option is set to OFF, the heading will not be displayed and the slip indicator will be displayed at the bottom of the screen. If this option is set to ON, the slip indicator will be smaller and moved just above the heading tape on the left side of the screen.

Turn the Control Knob to change the heading display option and the display will change accordingly. Press the knob to select the desired heading display option and the screen will return to the Configure Display Menu.

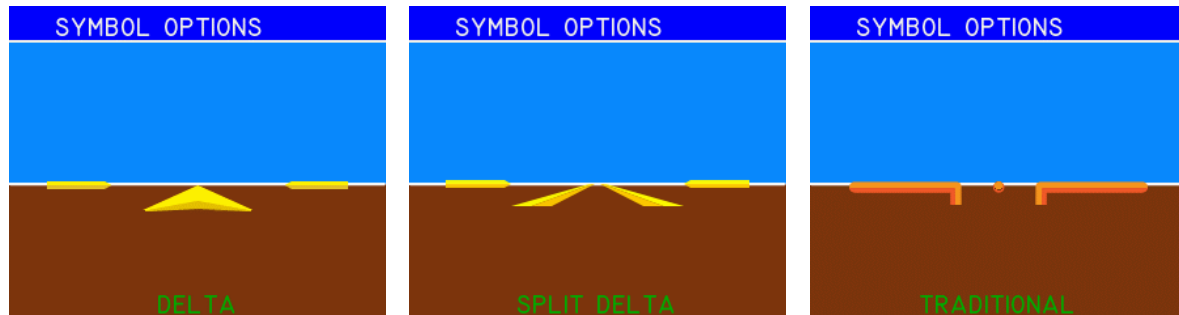


3.1.3.2 SYMBOL

If you select the SYMBOL option from the Configure Display Menu, the screen will show an example of the display appearance using the currently selected aircraft symbol.

The options are Delta, Split Delta, and Traditional as shown in the illustrations below.

Turn the Control Knob to change the aircraft symbol option and the display will change accordingly. Press the knob to select the desired symbol and the screen will return to the Configure Display Menu.

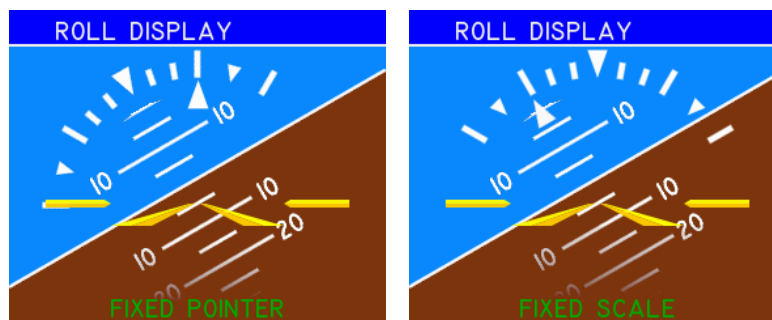


3.1.3.3 ROLL

If you select the ROLL option from the Configure Display Menu, the screen will show an example of the display appearance using the currently selected roll display option.

The options are Fixed Pointer, and Fixed Scale, as shown in the illustrations below.

Turn the Control Knob to change the roll display option and the display will change accordingly. Press the knob to select the desired option and the screen will return to the Configure Display Menu.



3.1.3.4 EXIT

The last menu item on the Configure Display menu is EXIT. Highlighting and selecting the Exit menu item will close the Configure Display Menu and return to the User Configuration Menu

3.1.4 EXIT

The last menu item on the User Configuration menu is EXIT. Highlighting and selecting the Exit menu item will close the User Configuration Menu and return to the Configuration Menu.

4.1 OPERATION

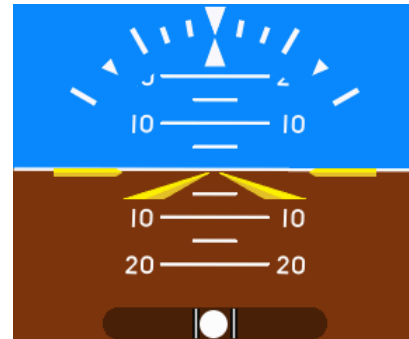
For operation of standard unit functions, including the Options Menu, manual brightness control, Info page, and others, please refer to the IM.

4.1.1 PRIMARY DISPLAY PRESENTATION

In Flight Mode, the display is presented as shown in the example figures below.



Power on screen

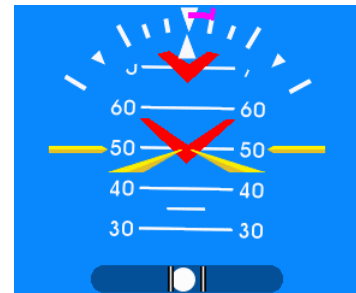


Normal Operation
(example)

Primary Function elements are defined as follows:

- Pitch Display

The pitch scale range is ± 90 degrees with 10 degree major graduations which have numeric labels and 5 degree minor graduations (up to ± 35 degrees) which are unlabeled. At extreme pitch attitudes where the display shows only the ground or the sky, chevrons are displayed which indicate the direction of the horizon (zero pitch).



- Roll Display

The roll display range is ± 180 degrees. The roll scale has minor graduations at ± 10 and ± 20 degrees and major graduations at 0, ± 30 , ± 45 , and ± 60 degrees. The 0 and ± 45 degree graduations are triangles, the others are linear.

- Slip Display

The slip display is a typical “ball in tube” display.

- Turn Rate Display

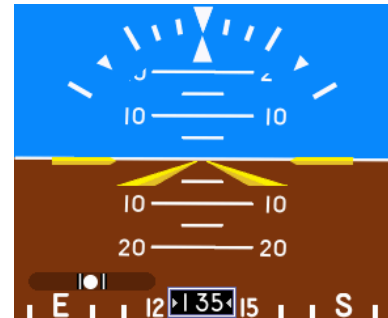
The turn rate is displayed as an arc and uses the roll scale graduations as follows:

- For a two minute turn, the arc extends to the 30 degree roll graduation.
- For a one minute turn, the arc extends to the 60 degree roll graduation.

- Heading Display (optional)

The heading is displayed as a numeric digital readout and a heading tape which scrolls left during right turns and right during left turns.

When ARINC heading data, label 0320 or 014 is being received and is valid, the display will show triangular “sync” indicators on either side of the numeric heading display pointing inwards. The illustration to the right shows an example of this.



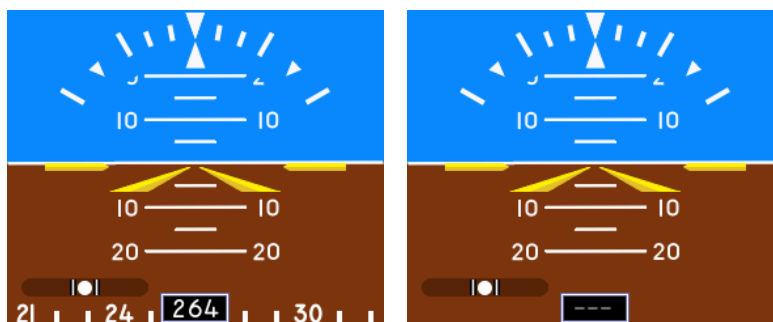
- Error Annunciations

- **Red X** – displayed if sensor input limits are exceeded or internal error limits are exceeded in the attitude calculations. When these limits are no longer exceeded, the unit will transition back to normal attitude display mode. It may take several seconds after the display transitions back to normal attitude display mode for the attitude to completely recover to full accuracy.



- **Loss of Heading Aiding**

If the ARINC heading data is lost, the “sync” indicators will disappear. After several seconds, if the data is not recovered, the heading tape will disappear, and the heading digital display will show three grey dashes. See the illustrations below for examples.



4.1.2 USER OPTIONS

The artificial horizon display instrument does not have any in-flight configurable user options.

5.1 CONFORMANCE

For standard conformance items such as qualification levels and software updates, please refer to the IM.

5.1.1 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

For this application, the MD23 is configured to process and display data associated with a temperature and altitude compensated inertial measurement unit. Some aviation regulations may apply to inspect and test for accuracy on a regular basis. (for example, 14 CFR §91.411 for altimeters) Please identify and/or refer to the appropriate maintenance procedures for your aircraft in the pilot operating handbook or flight manual supplement.

5.1.2 COMPONENT MAINTENANCE AND REPAIR

No periodic scheduled maintenance or calibration is necessary for continued airworthiness of the MD23 Custom Function Display, unless specified in the aircraft maintenance procedures, as referenced above in 5.1.1.

The unit display can be cleaned using a lint-free cloth moistened with water. No chemicals should be used to clean the display.

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. Other than software version updates or in-field calibration, there are no repairable parts or processes available to be performed in the field.