User Guide
For

MD23-215

Multifunction Digital
Counter Drum Altimeter

powered by

Rev	Date	Detail	Approved
1	12/09/2021	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 UG215
Revision 1

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1.1 INTRODUCTION

The model MD23-215 multifunction digital counter drum altimeter is a standard 2-inch (2-¼") panel-mounted instrument that displays and offers several altitude 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 counter drum altimeter. 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**
6420023-2	1.0.2, or later	15A, or later

1.3 PRODUCT FUNCTION

The Multifunction Digital Counter Drum Altimeter primarily provides pressure altitude above sea level up to 55,000 feet. Altitude is numerically presented as a scrolling value in a central window (the 'counter drum') with 20-foot resolution. A single pointer also provides visual analog representation with each rotation representing 1000 feet indication and 20-foot resolution. Altitude can be adjusted with the barometric pressure manually or using an externally synchronized source. Units are configurable for feet or meters and inches of mercury, millibars or hectopascals.

Other features include a vertical speed indicator, a vertical speed trend line, a Standard baro setting, a Target Altitude bug, and a minimum altitude alert setting. The altimeter can provide an encoding feature, with outputs in ARINC 429 and Gillham (or 'gray') code.

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 203, 204, 212, 217, 234, 235
3	ARINC Out (B)	(paired with pin 2)
4	Dimmer Input	5, 14, or 28VDC input (if used)
5	ARINC In (A)	Labels 234, 235
6	Reserved	
7	Reserved	
8	Reserved	
9	Reserved	
10	Reserved	
11	C4	Gillham code, bit 0
12	C1	Gillham code, bit 2
13	B2	Gillham code, bit 4
14	ARINC In (B)	(paired with pin 5)
15	A2	Gillham code, bit 7
16	Reserved	
17	Reserved	
18	Reserved	
19	Power Input	+10-32VDC
20	C2	Gillham code, bit 1
21	B4	Gillham code, bit 3
22	B1	Gillham code, bit 5
23	A4	Gillham code, bit 6
24	A1	Gillham code, bit 8
25	D4	Gillham code, bit 9
26	Reserved	

Table 1 Unit Connector Pin Identification

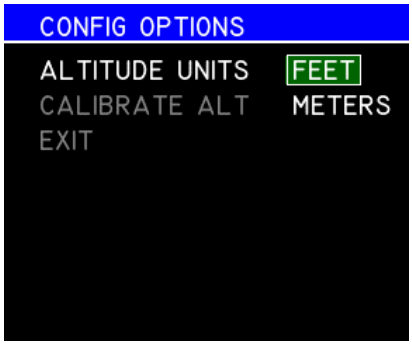
Pneumatic Ports		
Port	**Description**	**Function**
S	Static / Absolute	External Static Pressure
P	Pitot / Differential	Not used

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:

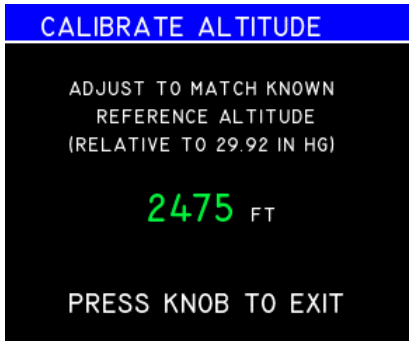
3.1.1. ALTITUDE UNITS



Within the User Configuration Menu, the Altitude Units can be set without leaving the page. With the Altitude Units option highlighted, the current selection is shown to the right in gray. By selecting the Altitude Units option, the units to the right become active and additional options are displayed. The MD23 can be set to display altitude in either Feet or Meters.

Turn the Control Knob to highlight the preferred units and press to select it. The cursor will return to the Altitude Units option in the menu list and the selected option will be shown in gray to the right.

3.1.2. CALIBRATE ALTITUDE



Use the Calibrate Altitude process if the displayed altitude does not match a known altitude reference. When selected, the Calibrate Altitude option opens a new page. Allow the unit five to ten (5-10) seconds to settle and display the currently reported altitude. The altitude will be shown in the units that are currently configured. The calibration page provides instructions to compare the known reference at standard barometric pressure. The message regarding the standard barometric pressure reference will change depending on the currently configured Baro units (either 29.92 In Hg or 1013 mBar) .

Turn the Control Knob until the altitude value matches the known external reference. Pressing the Control Knob will confirm the calibration and exit the page back to the User Configuration Menu.

3.1.3. EXIT

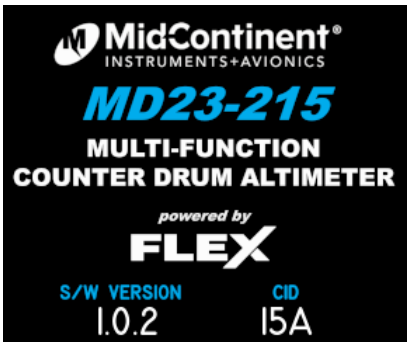
Highlighting and selecting the Exit menu item will close the User Configuration Menu and return to the Configuration Menu.

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:

- Dial: Numbers from 0 to 9, clockwise with major grads that represent 100 units (feet or meters) and minor grads that represent 20 units.
- Pointer: Rotates clockwise with increasing altitude, counter-clockwise with decreasing altitude. If the altitude is below zero, the pointer will remain at zero and both the pointer and altitude value will turn amber. The pointer will not appear with invalid altitude (out of range or unit failure).
- Counter Drum window: Displays the altitude as a numeric value. The tens value is displayed in an expanded window with rolling numbers representing every 20 units. The hundreds, thousands, and ten-thousands digits will change with a similar rolling action at each increment. Invalid altitude will be represented with red dashes (- - - - -). Negative altitude will be represented with amber numbers and a negative sign (-) in the ten-thousands digit location.

  The altitude units, as selected in the Configuration Mode, is displayed above the window.

- Barometric Pressure window: Current and correct altitude can only be displayed when adjusted in accordance with the existing barometric pressure conditions. To do this, simply turn the Control Knob to enter the current barometric pressure. The range is from 27.50 to 31.50 In Hg or 930 to 1070 millibar (mbar)/hectopascals (hPa), depending on the selected units as displayed in blue below the Baro window.

4.1.2. SECONDARY DISPLAY PRESENTATION

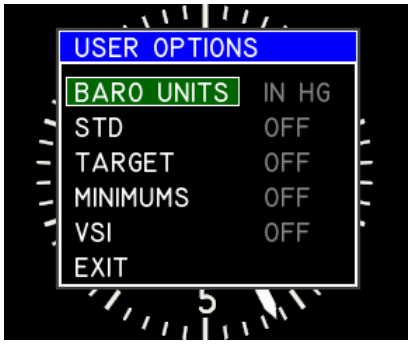
Secondary Function elements are defined as follows. Further details about each secondary function can be found in 4.1.4.

Display of All Secondary Functions

- Standard Baro reset function (STD). Status is displayed in the upper left corner.
- Altitude Target. The Target status and value are displayed in the upper right corner.
- Minimum threshold. The MINS status and value are displayed in the lower right corner.
- Vertical Speed. The vertical speed scale and indicator are found along the left edge of the display. The numeric value and units of vertical speed are in the lower left corner.
- Vertical Speed Trend Indicator. The VS trend indicator is shown in magenta along the circumference of the dial, emanating clockwise or counter-clockwise from the current altitude position of the pointer.

4.1.3. USER OPTIONS

Pressing and holding the Control Knob for three (3) seconds will activate the Options Menu. The manual brightness adjustment and info page are described in the IM. The Options Menu or User Options items will close and return to the active display after ten (10) seconds if no knob activity is recorded.



When highlighted and selected, the User Options item will open a new page and display the options available to the user during Flight Mode. The User Options menu is where the Secondary Functions can be turned on, off, or set to their desired mode. The list of features are provided in 4.1.2 and shown in the image.

Highlight and select Exit to return to the Options Menu or simply wait five (5) seconds and the unit will return to the active Flight Mode display.

4.1.4. ALTIMETER FUNCTIONS

BARO SYNC

The barometric pressure setting can be synchronized with an external system (such as the primary avionics) via ARINC 429. When available, two small gray triangles will appear next to the Baro window. The baro value will follow and match the external input and turn green while changing, and back to white when stable. The baro setting can be manually changed at any time by simply turning the Control Knob. The gray arrows will be removed. If the external sync signal is still valid and available, it will revert back to sync mode when the external input value changes.

STANDARD BARO

The user can change the barometric pressure value directly to standard baro (29.92 inHg or 1013 mBar/hPa) using the Standard feature. By pressing the Control Knob once, the STD annunciation will be highlighted from gray to magenta. By turning the Control Knob left or right and pressing when ON is displayed, the baro will change to standard value.

This feature can be turned off in the User Options Menu or be set to Auto. In Auto mode, the baro will automatically revert to standard baro and the STD label will change from white to green when the altitude ascends past 18,000 feet (FL 180; or equivalent meters). In auto mode, the STD label will turn yellow when the aircraft descends below 18,000 feet, to indicate the need to adjust the baro pressure to the applicable value. Manually adjusting the baro with the Control Knob, or through the external sync will immediately take the unit out of Standard Baro mode.

ALTITUDE TARGET

The user can use the Altitude Target feature to set a point of interest as a reminder or altitude acquisition value. The Target feature can be turned on or off in the User Options Menu. When on, the Target Value can be set by pressing the Control Knob until the TRGT annunciator turns magenta.

Once the TRGT feature is active, turning the Control Knob left or right will change the target value and rotate the magenta Target Bug around the dial to its corresponding position. The Target value has a resolution of 100 units. Once active, the bug is only visible on the dial when the current altitude is within 800 units of the target. The bug is cyan until the current altitude is within 200 units, then the bug and the target value will turn amber. When within 50 units, the bug and target value will turn green.

MINIMUMS

A Minimum Altitude Alert can be set for approaches or related reminders. The Minimums (MINS) Alert feature can be turned on or off in the User Options Menu. When on, the Minimum Value can be set by pressing the Control Knob until the MINS annunciator turns magenta.

Once the MINS feature is active, turning the Control Knob left or right will change the minimum value. Once set, the MINS alert will activate when the aircraft descends past the set value after being above it. When activated, the border around the main altitude value (the 'counter drum window') will turn amber, along with the MINS numeric value. The alert will stay active until ascending 50 units above the minimum value or until the unit is power cycled.

VERTICAL SPEED

Vertical Speed can be displayed in two ways. As an analog and digital vertical speed indicator (VSI) or as a dynamic vertical trend line. Both the VSI and the Trend features can be turned on or off independently under the VSI option in the User Options Menu (VSI/TREND/BOTH/OFF). When on, neither feature has any further user options.

The VSI feature provides an analog scale from -2000 to +4000 feet per minute (or -10 to +20 meters per second) and a digital readout of the vertical speed up to ±9000 feet per minute (or equivalent meters per second). The VSI units are determined by the configured altitude units (feet or meters).

The vertical trend line is representative of a 6-second trend. The end of the magenta arc predicts the aircraft's altitude in six seconds given the current rate of climb or descent.

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 accept and display data associated with a static pressure source. 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.