



User Guide
For

MD23-190

Multifunction Clock
with GPS Synchronization

powered by



Rev	Date	Detail	Approved
1	12/09/2021	Initial release.	BAW
2	01/04/2022	Editorial updates.	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 UG190
Revision 2

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1.1 INTRODUCTION

The model MD23-190 multifunction clock is a standard 2-inch (2-¼”) panel-mounted instrument that displays time, with or without an ARINC input for GPS synchronization, and offers several timers and related time 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
6420023-1	1.0.2, or later	90A, or later

1.3 PRODUCT FUNCTION

The CID identified within this User Guide is designed as a multi-function clock. It displays UTC time and Local time and contains multiple timers such as count up, count down, and Elapsed Flight time. It can receive ARINC 429 inputs to provide time synchronization with a GPS source and Estimated Time to Waypoint. The highly accurate internal clock maintains time to ±2 minutes per year when not sync'd, including a 10-year internal battery to keep time when the unit is powered off. Additional Hobbs and Run timers track usage over the life of the product with the Flight and Hobbs timers capable of being triggered via an external signal. The clock can also output currently displayed time via ARINC to external equipment.

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)	ARINC label 150
3	ARINC Out (B)	(paired with pin 2)
4	Dimmer Input	5, 14, or 28VDC input (if used)
5	ARINC In 1(A)	ARINC labels 150, 252
6	ARINC In 2(A)	Reserved
7	Reserved	
8	Reserved	
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	ARINC In 1(B)	(paired with pin 5)
15	Reserved	
16	ARINC In 2(B)	Reserved
17	Reserved	
18	Reserved	
19	Power Input	+10-32VDC
20	Reserved	
21	Reserved	
22	Discrete Input	Flight Timer Start/Stop Signal
23	Discrete Input	Hobbs Timer Start/Stop Signal
24	Reserved	
25	Reserved	
26	Reserved	

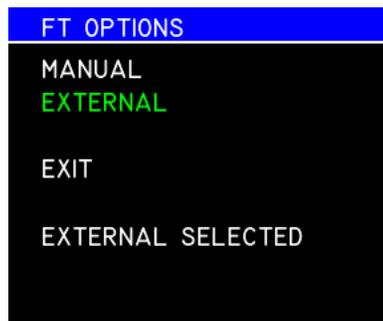
Table 1 Unit Connector Pin Identification

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 CID are found within the User Configuration menu option. The User Configuration items include two functions:

- Flight Timer (FT) Options:
 - select MANUAL to start and stop the Flight Timer manually
 - select EXTERNAL to start the timer on an open signal. Timer stops when grounded
- Hobbs Timer Pre-Set: (to coincide with the existing aircraft/engine time basis)
 - enter password 1238. This is constant for all units with this CID. Anyone with this password can reset or change the Hobbs timer
 - enter the desired pre-set value for the Hobbs timer



Flight Timer Configuration Options



Hobbs Timer Set Page

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 DISPLAY PRESENTATION

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



Power on screen



Normal Operation
(example)

The main display is divided into three segmented areas – the upper, middle, and lower panes. Operation of each function and examples images are shown below.

Turning the Control Knob right or left rotates between functions or indexes digits and highlights that element **GREEN** when selected. Pressing the Control Knob selects or toggles a highlighted function or sets a selected digital value and sequences to the next.

UPPER PANE

The Upper Pane always shows the time, time zone (UTC or LOCAL) and date. It also shows the status of the GPS time synchronization signal. See TIME under the Functions section for more details.

MIDDLE PANE

The Middle Pane provides control and an expanded view of one of the functions selected from the Lower Pane. When the unit is initially powered on, the Middle Pane is blank.

LOWER PANE

The Lower Pane shows the current active value of all four timer functions and allows any of them to be selected for an expanded view and control in the Middle Pane. The Middle Pane can be manually turned off by re-selecting the currently active function in the Lower Pane.

4.1.2 CLOCK FUNCTIONS

TIME

When highlighting and selecting the current time zone in the Upper Pane (either UTC or LOCAL), three options become available to scroll and select between UTC, LOCAL, or LOCAL SET.

In LOCAL SET mode, the hour and minutes can be changed to the desired values.

A satellite icon is shown in either gray (off) or white (on) depending on whether the unit is currently receiving and synchronized with the GPS time from the incoming ARINC 429 signal. When no incoming signal is received or the unit is off, the unit maintains accurate time based on its internal clock and will re-synchronize when the signal is available.



Normal View
(UTC mode shown)



Time Zone Options
(Local Set mode shown)

Flight Timer (FLT)

When the Flight Timer is selected from the Lower Pane, the Lower Pane will show MM:SS and the Middle Pane will show the HH:MM:SS for the first minute. After the first minute, the Lower and Middle Pane will show HH:MM, with the Middle Pane also showing :SS, if that feature is set to ON in the Seconds Option menu (see 4.1.3).

When the Flight Timer is configured for Manual mode, the user can START, STOP, and RESET the timer manually by scrolling to and selecting the desired action. If RESET is selected without first selecting STOP, the timer will reset to zero and continue counting.

When the Flight Timer is configured for External mode, no control options are available. The start and stop functions are determined by the input signal and reset upon power cycle.



Flight Timer
(Manual Mode)



Flight Timer
(External Mode)

Estimated Time to Waypoint (WP)

When the WP Timer is selected from the Lower Pane, the Lower Pane and Middle Pane will show HH:MM. There are no control options in WP mode. The Estimate Time to Waypoint is supplied via external input source (ARINC Label 252, also known as “Time To Go”).



WP Timer
(if available)

Count-up Timer (T↑)

When the Count-up Timer (also referred to as elapsed timer, stopwatch, or chronograph) is selected from the Lower Pane, the Lower Pane and Middle Pane will show HH:MM:SS. The user can START, STOP, and RESET the timer manually by scrolling to and selecting the desired action. If RESET is selected without first selecting STOP, the timer will reset to zero and continue counting.



Count-up Timer
(running)

Count-down Timer (T↓)

When the Count-down Timer is selected from the Lower Pane, the Lower Pane and Middle Pane will show HH:MM:SS. The user can SET, START, STOP, and RESET the timer manually by scrolling to and selecting the desired action. When SET is selected, turning the Control Knob changes the digits and pushing it sequences from hours to minutes to seconds. Once activated, when the timer reaches zero, it will begin counting up, show a plus (+) in front of the timer, and turn the digits yellow. If RESET is selected without first selecting STOP, the timer will reset to its original setting and continue counting.



Count-down Timer
(during Setting)



Count-down Timer
(count-up after timer reaches zero)

Summary of Display and Functions:

- Upper Pane
 - Time/Date: Select and display UTC or Local Time; Displays date
 - Set: Allows user to set Local Time
 - Sync Icon: Displays Sync status; white = on, gray = off
- Middle Pane
 - Current Timer: Enlarged view and control of the currently selected timer
Timers have specific functions that may include stop/start/reset/set
- Lower Pane
 - Timer Options: Displays available timers with current activity
 - FLT (Flight): Manually start/stop/reset or controlled via input signal (weight-on-wheels, engine start relay, etc)
 - WP: Available only if provided via external ARINC input
 - T ↑ (Count-up): Stopwatch function with manual start/stop/reset
 - T ↓ (Count-down): Count-down timer from user set value with manual start/stop/reset; counts up after reaching zero

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 five (5) seconds if no activity is recorded.

When highlighted and selected, the User Options item will open a new page and display the available options available to the user during Flight Mode. The User Options and their descriptions are listed below.

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.



Options Menu



User Options Menu

Time Format

The Time Format menu can set the Local Time to 12-HR or 24-HR mode. UTC time will always be shown in 24-HR model. This page will also identify which mode is currently active.



Time Formal Menu

Time Set

The Time Set menu allows the user to set UTC time or Local Time. GPS time is shown if currently available.

The UTC time can be set to a different time than the GPS time, even when GPS time is available. In this case, the time basis will continue to be synchronized, but the manual UTC time will be stored and remembered as an offset to the GPS time. The SYNC UTC function can be used to reset a manually modified UTC time back to GPS time (if GPS time is currently available).

Seconds can only be set/reset to zero. UTC seconds cannot be set if a current GPS time is available; it will always be synchronized with GPS seconds. Local seconds cannot be set; it will always be synchronized with UTC seconds.



Time Set Menu
(GPS time not available)



Time Set Menu
(GPS time available)

Date Set

The Date Set menu allows the user to set the date. The internal calendar will keep an accurate date through the year 2099.



Date Set Menu

Seconds Option

The Seconds Option menu allows the user to choose whether the seconds (HH:MM:SS) are shown (ON) or not shown (OFF) on the main display for both the time (UTC and LOCAL) and the Flight Timer. This feature is to reduce clutter or distraction per user preference.



Seconds Option Menu

Timers

The Timers menu displays two informational timers. The Run Timer shows hours that the unit has been powered on since inception. The Hobbs Timer shows hours of aircraft operation based on an external start and stop signal provided by the aircraft.



Timers Menu

Summary of User Option Menu items and their function:

- Time Format Set 12 or 24-hour time display; applies to Local Time only
- Time Set Set UTC and Local Time
UTC can be set as an offset to GPS time or independently when Sync is not on/available
SYNC UTC resets UTC to GPS time (if available)
- Date Set Set date
- Display Seconds Enable display of seconds (on/off) for Clock and Flight Timer
- GPS Sync Sets GPS Sync to on or off; if available
- Timers Displays Run timer (total power-on time of the unit)
Displays Hobbs timer (if enabled via external signal)

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

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

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 or CID version updates, there are no repairable parts or processes available to be performed in the field.