# M803
# Digital Clock Replica

USER GUIDE

RHSimTech Ltd · rhsimtech.co.uk · Firmware v15

# Contents


1 Overview — Features & specifications

2 Getting Started — Connection & driver

3 Front Panel Controls — Buttons & display zones

4 Top Display — Volts & OAT — Bus voltage, outside air temperature (°C / °F)

5 Bottom Display — Clocks & Timers — UT, LT, flight time, elapsed timer

6 Setting the Time — UTC & local time set mode

7 Timers in Detail — Flight time alarm, elapsed timer & countdown

8 Display Themes — Seven backlight colour themes

9 Simulator Integration — SimLink (MSFS) & X-Plane plugin

10 Troubleshooting

A Dimension Sheet

# 1 Overview

The RHSimTech M803 is a panel-mounted replica of the Davtron M803 digital clock, outside air temperature gauge, and bus voltmeter, designed for flight-simulator cockpit builders. The unit replicates the front-panel appearance and operating logic of the original Davtron instrument and is driven live from your simulator via the RHSimTech plugin for your platform.

The display is divided into two independently controlled zones. The top zone shows bus voltage or outside air temperature (°C or °F, selectable). The bottom zone shows one of four time sources — UTC, local time, flight time, or an elapsed / countdown timer — selected by the pilot.

### Key Features

- High-contrast colour LCD display with seven selectable backlight themes
- Top display: bus voltage (28 V nominal) with tenths, or OAT in °C or °F
- Bottom display: UTC clock, local time, flight time stopwatch, elapsed / countdown timer
- UTC and local time set from the unit — changes propagate to the simulator
- Flight time alarm: set an HH:MM alert; display flashes and PC sounds a buzzer tone when reached
- Elapsed timer: count-up stopwatch or count-down with programmable MM:SS set-time
- Countdown expiry continues counting up; buzzer tone sent to the PC
- Automatic power-off when bus voltage drops below 8 V (avionics bus awareness)
- Panel backlight brightness follows the simulator's instrument lighting bus
- Test mode: all display segments on simultaneously

# 2 Getting Started

## 2.1 Connection

The unit has a single USB-C port on the rear panel. Connect this to your PC using a USB-C cable — it carries both data and power. You may connect directly to a USB port on your PC, or preferably through a powered USB hub.

## 2.2 Driver Installation

The unit presents as a standard USB serial device and requires the CH341 driver on Windows. Download `CH341.zip` from rhsimtech.co.uk/downloads.php, extract the archive into its own folder, and run the installer inside. Once installed, the unit will appear as a COM port under Ports (COM & LPT) in Windows Device Manager.

# 3 Front Panel Controls

## 3.1 Buttons

| Button | Primary Action |
|---|---|
| **OAT** | Cycles the top display: Volts → °F → °C → Volts. |
| **SELECT** | Cycles the bottom display: UT → LT → FT → ET → UT. Hold 3 seconds to enter test mode. |
| **CONTROL** | Context-sensitive: increments values in SET mode; controls the elapsed timer; held with OAT to cycle backlight theme. |

## 3.2 Button Combinations

| Combination | Action |
|---|---|
| **SELECT** then **CONTROL** (released together) | Enters SET mode for the currently displayed time source (UT, LT, FT alarm, or ET countdown). |
| **CONTROL** held + **OAT** | Advances to the next backlight theme. Reports the new theme to the simulator so it can be stored. |
| **CONTROL** held 3 s (FT mode) | Resets flight time. Display shows 99:59 while held; zeroes on release. |
| **SELECT** or **CONTROL** (FT alarm flashing) | Silences the flight time alarm and cancels it. |

## 3.3 Display Layout

The colour LCD is divided into two zones separated by a horizontal rule:

- **Top zone** — bus voltage or outside air temperature. Three digits plus a decimal, a unit indicator (E / V / °C / °F), and a minus sign for sub-zero OAT.
- **Bottom zone** — the selected time source in HH:MM or MM:SS format, with mode annunciators (UT / LT / FT / ET) shown as small triangular indicators.

# 4 Top Display — Volts & OAT

Press **OAT** to cycle the top display through three views in order:

### 4.1 Bus Voltage

Displays the aircraft electrical bus voltage as received from the simulator. The reading is shown in the format XX.X followed by the unit indicator. The nominal bus voltage for a 28 V system reads approximately 28.X; 14 V systems read in the 13–15 V range.

### 4.2 OAT — Degrees Fahrenheit (°F)

Outside air temperature converted to Fahrenheit. The reading is shown with a tenths digit and a leading minus sign for negative values. Three-digit values (e.g. 101.2°F) use all four digit positions; the hundreds digit is blank when not needed. Temperature is derived from the Celsius value received from the simulator.

### 4.3 OAT — Degrees Celsius (°C)

Outside air temperature in Celsius as reported directly by the simulator. Shown as two digits plus a tenths digit (e.g. −12.5°C). A minus sign appears to the left of the reading for negative temperatures.

## 5 Bottom Display — Clocks & Timers

Press **SELECT** to cycle through the four bottom-display modes. The active mode is indicated by a filled triangle next to its annunciator label (UT / LT / FT / ET).

### 5.1 UT — UTC Time

Displays the current Coordinated Universal Time (Zulu time) received from the simulator in `HH:MM` format. The colon flashes at 1 Hz. UTC can be set manually — see Section 6.

### 5.2 LT — Local Time

Displays local time in `HH:MM` format, also received from the simulator. Minutes follow UTC; only the hour offset is settable manually (see Section 6).

### 5.3 FT — Flight Time

A stopwatch that counts the elapsed time since the unit last powered up (avionics bus live). Flight time is always displayed as `HH:MM` (hours and minutes). At 2 minutes of flight time the display shows `00:02`; at 2 hours 40 minutes it shows `02:40`. The counter runs up to 99:59 (hours:minutes).

To reset flight time, hold **CONTROL** for 3 seconds while FT is selected. The display shows 99:59 while the button is held; releasing it zeros the counter.

A flight time alarm can be set (see Section 7.1). When the alarm triggers, the display flashes and the simulator sounds a buzzer tone. Press **SELECT** or **CONTROL** to silence.

### 5.4 ET — Elapsed Timer

The ET mode supports two sub-modes, toggled by entering SET (SELECT + CONTROL):

- **Count up** — a free-running stopwatch. CONTROL cycles: reset → run → stop → reset.
- **Count down** — a countdown from a programmable MM:SS value. See Section 7.2.

## 6 Setting the Time

UTC and local time can be set directly from the unit. Changes are sent to the simulator, which adjusts the sim's Zulu (and local) time accordingly.

**To enter SET mode:**

1. Select the time source to set (UT or LT) using **SELECT**.
2. Press **SELECT** then immediately press **CONTROL** (before releasing SELECT). Release both buttons together. The display enters SET mode with the first digit flashing.
3. Press **CONTROL** to increment the flashing digit.
4. Press **SELECT** to advance to the next digit.
5. After the last digit, pressing **SELECT** exits SET mode and applies the new time.

> **UT set** — sets hours and minutes (4 digits: HH MM). The unit enforces valid 24-hour values.
> **LT set** — sets the hour offset only (2 digits: HH). Minutes always follow UTC minutes and cannot be set independently, matching the behaviour of the original Davtron instrument.

## 7 Timers in Detail

### 7.1 Flight Time Alarm

A programmable alarm that triggers when flight time (FT) reaches a set value. The alarm time is entered in **hours and minutes** — exactly as shown on the FT display. For example, entering `02:40` sets the alarm for 2 hours 40 minutes of flight time.

**Setting the FT alarm:**

1. Select **FT** mode using **SELECT**.
2. Enter SET mode (SELECT then CONTROL, release together). The display enters 4-digit HH:MM entry (hours then minutes).
3. Set the alarm time using CONTROL (increment) and SELECT (next digit).
4. After the fourth digit, SELECT commits the alarm. Setting `00:00` disables it.

When flight time reaches the set value, the FT display flashes and a buzzer tone is sent to the PC (the simulator software sounds the audio). Press **SELECT** or **CONTROL** to silence the alarm; silencing also cancels the alarm time, so it must be re-set to use again.

> **HH:MM — not MM:SS**
> Flight time is always shown in hours and minutes. At 2 minutes of flight time the display reads `00:02`. An alarm set to `02:40` fires after 2 hours 40 minutes of flight time — not 2 minutes 40 seconds.

## 7.2 Elapsed Timer (ET)

### Count-Up Mode

The default ET mode. With ET selected, press **CONTROL** to cycle through: reset → run → stop → reset. The display counts in MM:SS until one hour is reached, then HH:MM.

### Count-Down Mode

To switch ET to count-down, enter SET mode from ET (SELECT then CONTROL). This simultaneously toggles to count-down and opens the MM:SS time-entry screen:

1. Enter the countdown time (MM:SS, up to 59:59) using CONTROL and SELECT.
2. SELECT after the last digit starts the countdown immediately.

Press **CONTROL** to pause or resume. When the countdown reaches zero, the display begins counting up from the moment of expiry, and a buzzer tone is sent to the PC. Press **CONTROL** to silence the buzzer; a further press of CONTROL resets to the programmed time.

To switch back to count-up, enter SET mode from ET again.

> **Buzzer audio**
> The M803 replica does not produce audio itself. Buzzer tones (countdown alarm, flight time alarm) are reported to the simulator via the plugin, which plays the audio through your PC speakers or simulator audio output.

# 8 Display Themes

The M803 replica offers seven display colour themes, replicating the various Davtron panel colour options. The theme is stored by the simulator plugin and restored automatically on the next connection.

| # | Theme name | Appearance |
|---|---|---|
| 0 | Green | Green background, black digits — classic avionics green |
| 1 | Orange | Orange background, black digits |

| | | |
|---|---|---|
| 2 | Amber | Amber background, black digits |
| 3 | Night Green | Black background, green digits — low-glare night mode |
| 4 | Ice Blue | Ice-blue background, black digits |
| 5 | Night Red | Black background, red digits — red-light night mode |
| 6 | Night Amber | Black background, amber digits |

**Changing the theme:**

Hold **CONTROL** and press **OAT**. Each press advances to the next theme in the list above, wrapping from theme 6 back to theme 0. The change takes effect immediately and is reported to the plugin so it can be stored for the next session.

# 9 Simulator Integration

The M803 replica connects to your simulator via the RHSimTech plugin for your platform. All communication between the unit and the simulator is handled automatically by the plugin — no manual configuration of ports or protocols is required.

## 9.1 Microsoft Flight Simulator (MSFS 2020 / 2024)

1. Download **SimLink** from rhsimtech.co.uk/downloads.php. SimLink is a standalone application — no installer is required. Create a dedicated folder somewhere easy to find (for example `C:\RHSimTech\SimLink\`) and place the downloaded `.exe` there. The filename includes the version number (e.g. `SimLink v1.23.exe`) and will change with each release — the file in the folder is always the one to run.
2. Connect the USB-C port on the rear of the unit to your PC — directly or through a powered USB hub.
3. Run the SimLink `.exe`. The M803 is detected automatically.
4. Start MSFS and load a flight. SimLink forwards bus voltage, OAT, and time data to the unit in real time. The backlight brightness tracks the simulator's instrument lighting bus.

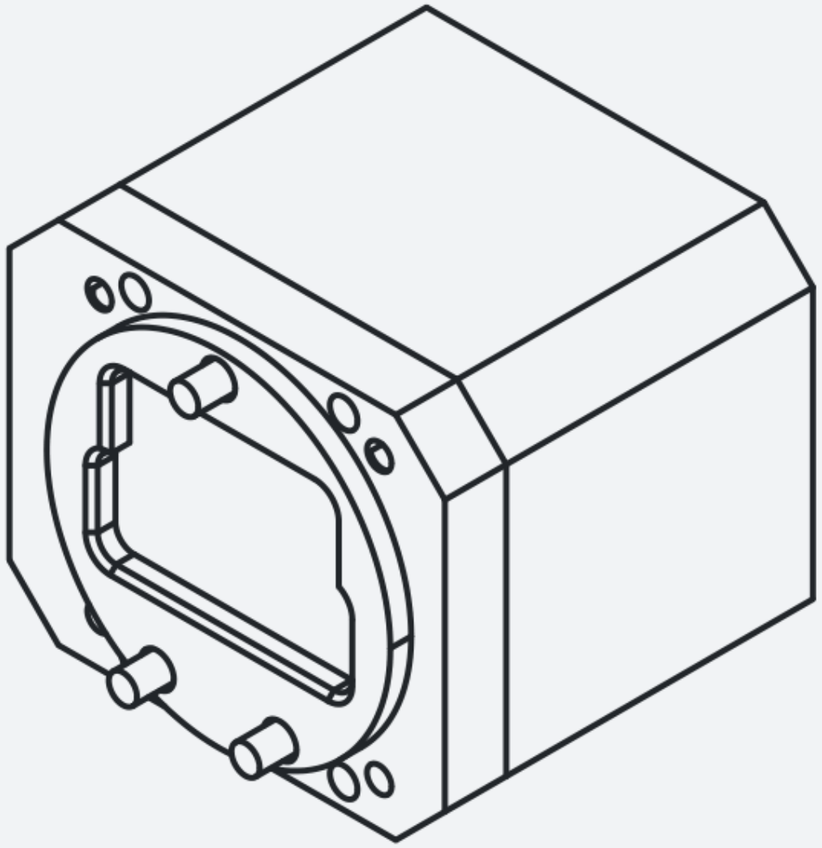
## 9.2 X-Plane 11 / 12

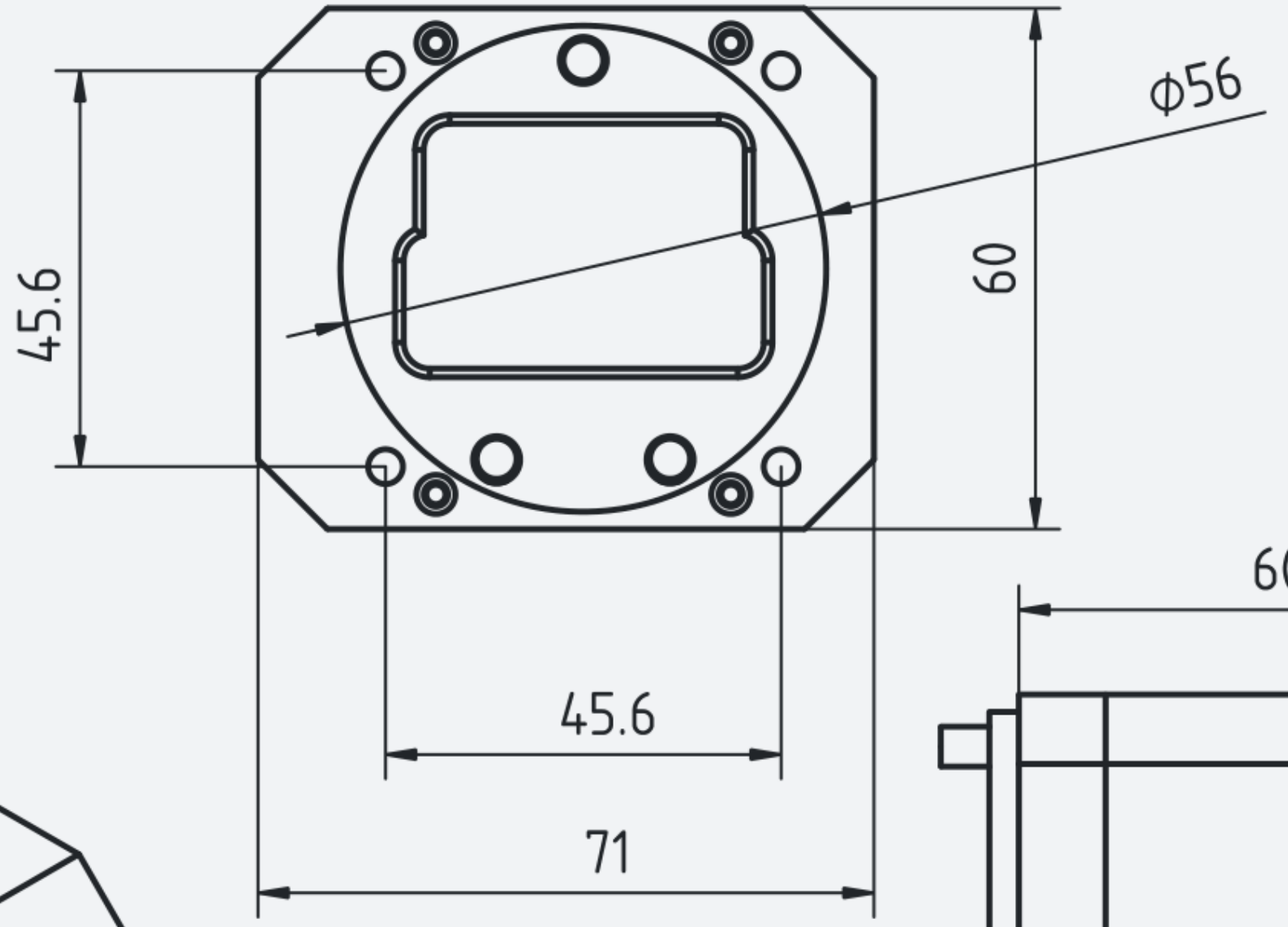
1. Download the **RHSimTech X-Plane Plugin** installer from rhsimtech.co.uk/downloads.php and run it. The installer places the plugin into your X-Plane plugins folder automatically.
2. Connect the USB-C port on the rear of the unit to your PC — directly or through a powered USB hub.
3. Launch X-Plane. The plugin detects the M803 automatically and begins forwarding data.

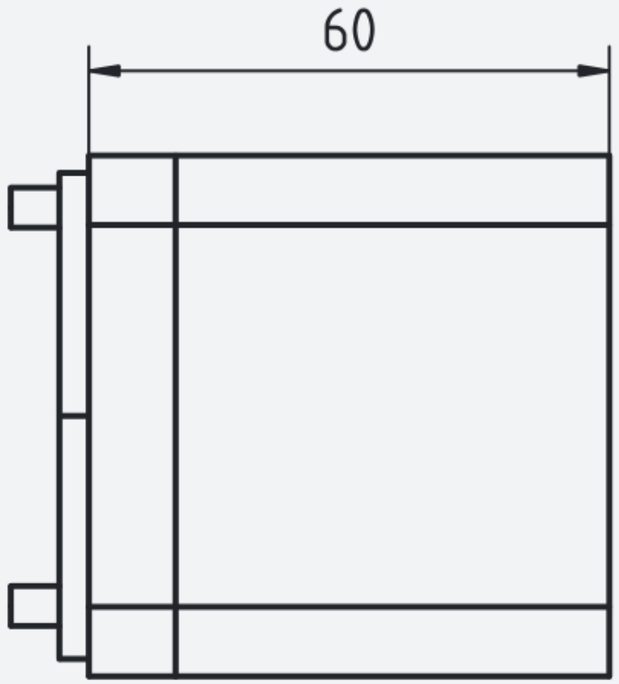
> **Theme storage**
> When you change the backlight theme using the CONTROL + OAT button combination, the new theme number is reported to the plugin. SimLink and the X-Plane plugin store this and send it back to the unit on the next connection, so your preferred theme is restored automatically.

# 10 Troubleshooting

| Symptom | Likely cause | Action |
|---|---|---|
| Display shows splash / connecting screens then stays on connecting | Plugin not running or not connected | Ensure SimLink (MSFS) or the RHSimTech X-Plane plugin is running; check the USB-C connection |
| Voltage reads 00.0 or time shows 00:00 | Plugin connected but no flight loaded | Load a flight in the simulator; data updates once the plugin begins sending |
| Backlight is very dim or off | Simulator instrument lighting at zero | Check the simulator's instrument lighting / rheostat setting |
| OAT reads a fixed value and does not change | Simulator not supplying OAT data | Ensure the aircraft is loaded and airborne; some aircraft models may not export OAT |
| Time set does not update the simulator | Plugin version mismatch | Update SimLink or the X-Plane plugin to the latest version from rhsimtech.co.uk/downloads.php |
| No buzzer sound on alarm | PC audio muted or sim audio not configured | Check PC speaker / headphone volume and the simulator's audio output settings |
| Unit not detected on USB | Cable or port issue | Try a different USB-C cable and a different USB port on the PC; confirm a COM port appears in Windows Device Manager under Ports (COM & LPT) |
| Display goes blank during a flight | Bus voltage below 8 V (avionics off) | The unit powers down when the simulator avionics bus goes offline. It will restore automatically when avionics power returns. |






| RHSimTech<br>HAND-CRAFTED FLIGHT SIMULATOR HARDWARE | TITLE<br>M803 Clock/Timer/OAT/Voltmeter | | |
|---|---|---|---|
| DRAWING No.<br>RHS-803 | SCALE<br>1:1 | SHEET<br>1 / 1 | REV<br>A |
| DRAWN BY<br>R. HULME | DATE<br>28/10/2026 | DIMENSIONS IN mm<br>DO NOT SCALE FROM PRINT | |