



RTC-1

Aviation UTC Real Time Clock, OAT and Voltage display

Operating Manual – English 1.00



Introduction

The RTC-1 is a 3 1/8" aviation Real Time Clock featuring a two time zone system, stopwatch, countdown timer, alarm, OAT (Outside Air Temperature) and Voltage display. It is primarily intended to show UTC time (also known as Greenwich Mean Time, GMT or Zulu time) together with a local time to facilitate ordinary ATC time reporting.

Each time zone may be programmed with an additional hour offset to allow for summer time or similar variances. Local offsets may be added or subtracted. Stopwatch and timers can be operated simultaneously to a programmable alarm, making the RTC-1 particularly suitable for sport flying competitions.

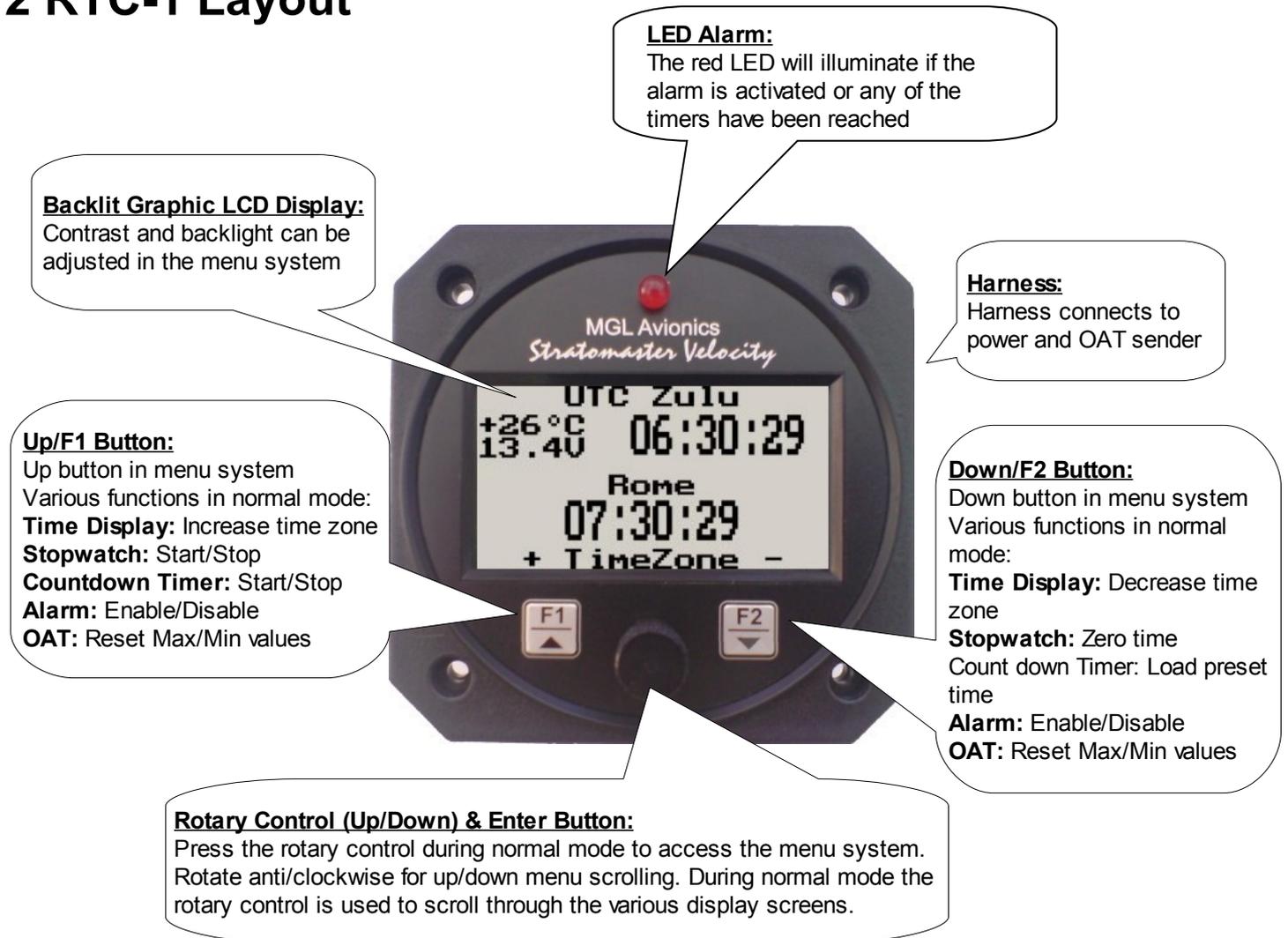
The RTC-1 can also display OAT in either degrees Celsius or degrees Fahrenheit, as well as can measure voltages up to 30V DC with a programmable low and high voltage alarm.

Time is maintained by an internal lithium battery which can be replaced by the user.

1 Features

- Features a 2 time zone system, stopwatch, countdown timer, alarm, OAT (outside air temperature) and voltage display
- Stopwatch and timers can operate simultaneously to a programmable alarm
- Local time offsets can be added or subtracted e.g. summer time or similar variances
- OAT can be displayed in degrees Celsius or degrees Fahrenheit
- Can measure voltages up to 30V (compatible with both 12V and 24V aircraft supplies)
- Contains a programmable low/high voltage alarm to automatically alternator failures , bad batteries, etc.
- Records maximum and minimum OAT and maximum Voltage reached in permanent memory
- Replaceable lithium battery
- Standard 3 1/8" aircraft enclosure (can be front or rear mounted)
- Rotary control plus 2 independent buttons for easy menu navigation and user input
- Alarm output as well as a red LED that illuminates when the alarm has been activated
- Large backlit graphic LCD with adjustable contrast
- Wide input supply voltage range of 8 to 30V DC with built in voltage reversal and over voltage protection for harsh electrical environments
- Light weight design
- 1 year limited warranty

2 RTC-1 Layout



3 Main Display

There are 5 main displays that can be setup to be displayed on the RTC-1: UTC time, stopwatch, countdown timer, alarm and OAT display.

3.1 UTC Time

UTC display showing two independent time zones. The top display is normally used to display UTC time but this can be changed using the "Main Time Zone" selection



3.2 Stopwatch

This screen shows the stopwatch. The stopwatch can be started and stopped at any time and reset to zero.



3.3 Countdown Timer

This screen shows the countdown timer. The timer is loaded from a preset value that can be adjusted in the menu. Once loaded, the timer can be started and counts down. It can be stopped and restarted at any time.



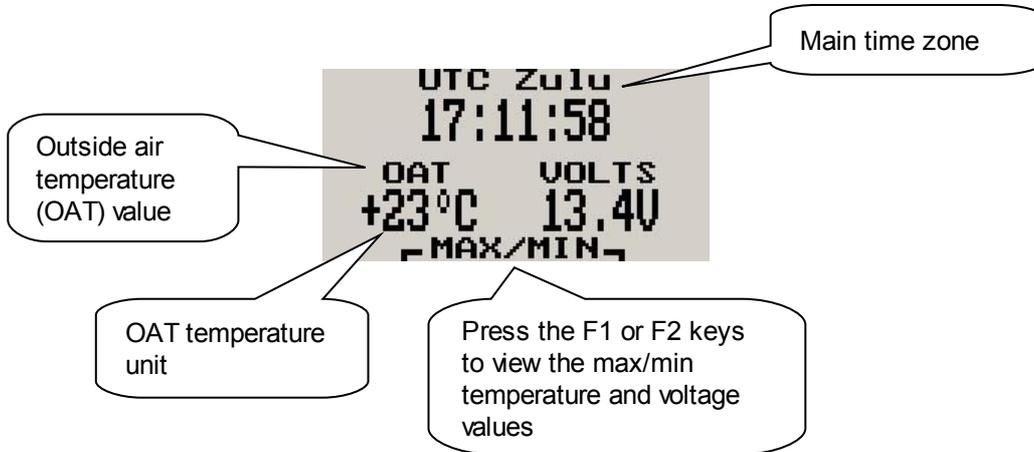
3.4 Alarm

This screen shows the alarm time. The alarm time is set in the menu.



3.5 OAT/Voltage Display

This screen shows the OAT (Outside Air Temperature) and Voltage values. The OAT can be setup in the menu to be displayed in either degrees Fahrenheit (°F) or in degrees Celcius (°C).



3.6 Maximum/Minimum values display

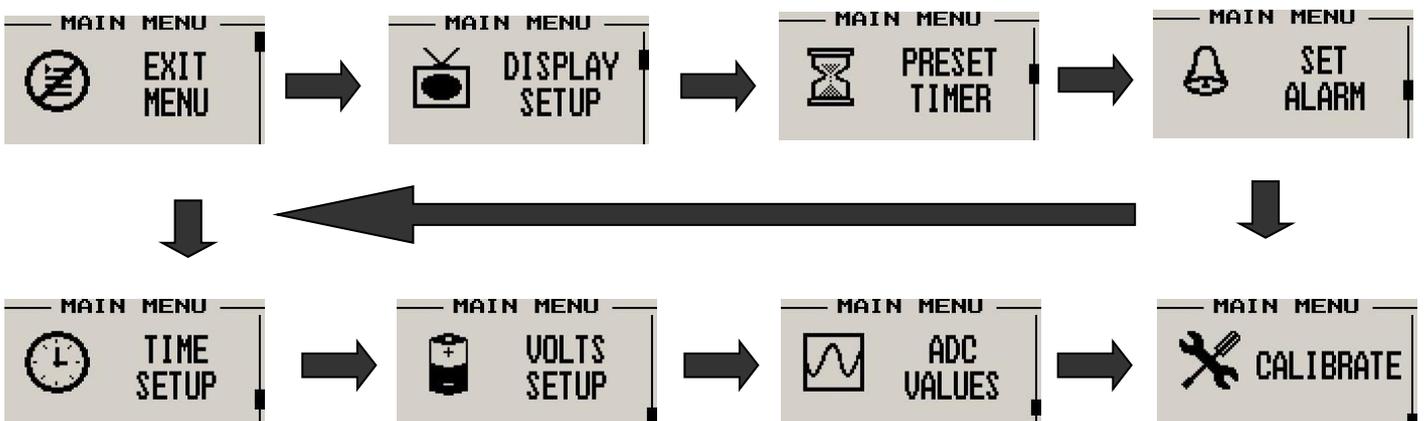


Press the F1 or F2 keys during the OAT/Voltage display to display the maximum/minimum values. Press the F1 key to reset the max/min values to the current values. To avoid false recordings, the maximum/minimum OAT function is only activated 10 seconds after the instrument has powered up.

Note: The permanent maximum values are stored in non-volatile memory and are recalled on power-up.

4 Menu System

Pressing the rotary control button during the normal display mode will cause the RTC-1 to enter the menu system. Use the up/down keys or the rotary control to navigate through the menu system.



Note: (ADC Values and Calibrate Menus are only visible when powering up the unit and pressing the Rotary Control). The text "CALIBRATE" will appear on the intro screen when entering this mode.

Warning: The Calibrate Menu is for technical personnel only. Changing any values in this menu may cause the instrument to display incorrect information, and may require the instrument to be returned to the factory for recalibration.

4.1 Exit Menu



Pressing the rotary control on this menu item will cause the RTC-1 to exit the menu system. All changes made during navigation of the menu system will be saved in non-volatile memory on exiting the menu system. If you remove power before exiting the menu the instrument will not save any changes.

4.2 Display Setup



Move the highlight over the "DONE" menu item and press the rotary button to return to the main menu



Select this menu option to adjust the display contrast



Select this menu option to turn the backlight on or off



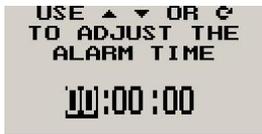
Select whether you want the OAT to be displayed in degrees Fahrenheit (°F) or in degrees Celcius (°C)

4.3 Preset Timer



Enter the timer preset value. This is the value that is loaded into the timer when you perform a timer load. The timer counts down to zero when started, starting from this value. When zero is reached the alarm is activated.

4.4 Set Alarm

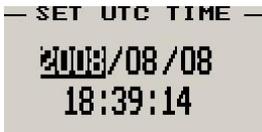
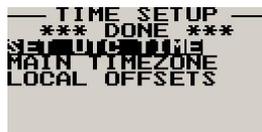


Enter the local time that will activate the alarm
Note: Alarms are based on the time of your selected local time zone

4.5 Time Setup



Move the highlight over the “DONE” menu item and press the rotary button to return to the main menu



This function is used to set the internal real time clock. The time to be entered must be UTC in order for the system to operate correctly. Do not enter local time (unless it is the same as UTC). UTC is the same as Greenwich Mean Time (GMT) or Zulu time.



Select the main time zone that is to be displayed on the top section of the display. Normally this would be set to UTC.

Each of the time zones can be individually modified by adding or subtracting one or more hours from its ordinary time. Offsets can range from -12 to +12 hours. For normal operation of the time zone this value should be set to zero. Use the F1 and F2 keys to select the time zone to change. Use the rotary control to edit the menu items hour and minute of the offset.

4.6 Voltage Setup



Move the highlight over this menu item and press the rotary button to return to the main menu.



Select whether you want the voltage alarm to be turned on or off.



Enter the low voltage set-point for when the alarm must be activated. Any voltage below this value will activate the alarm.



Enter the high voltage set-point for when the alarm must be activated. Any voltage above this value will activate the alarm.

4.7 ADC Values



Note: This menu item is for technical personnel only, and is not displayed during the normal operation of the instrument. Please see section 4 above on how to access this menu item.



This menu displays the ADC value that has been read from the temperature sensor and voltage circuitry.

4.8 Calibrate



Note: This menu item is for technical personnel only, and is not displayed during the normal operation of the instrument. Please see section 4 above on how to access this menu item. Consult your local dealer or factory before entering this menu.



Move the highlight over this menu item and press the rotary button to return to the main menu



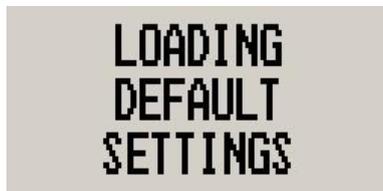
The RTC-1 is calibrated in degrees Celcius. The RTC-1 is calibrated at the factory using a precision laboratory thermometer. If recalibration is required then adjust the value using the up/down keys or the rotary control until the temperature matches the reference ambient temperature. The RTC-1 is now calibrated.



Adjust the voltage calibration constant until the reading matches your supply voltage measurement device (e.g. multimeter).

5 Loading Factory default settings

Pressing and holding the F1 and F2 keys simultaneously on power up will cause the RTC-1 to load preprogrammed factory default settings. The following screen will be displayed:



6 Operating the alarms

If the alarm is activated, the corresponding item on the display will flash. At the same time the externally available alarm switch will close. The switch will remain closed until any button is pressed to acknowledge the alarm or until the condition(s) that activated the alarm no longer exist. The alarm output can be used to switch an external alarm indicator. The external alarm switch is an open collector transistor switch to ground with a maximum rating of 0.5A DC. It is possible to wire the alarm contacts of several Stratomaster instruments in parallel should this be desired. To avoid false activation of the alarms, the alarm function is only active 10 seconds after the instrument has powered up.

7 Cleaning

The unit should not be cleaned with any abrasive substances. The screen is very sensitive to certain cleaning materials and should only be cleaned using a clean, damp cloth.

Warning: The RTC-1 is not waterproof. Serious damage could occur if the unit is exposed to water and/or spray jets.

8 RTC-1 Specifications

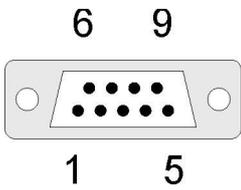
Operating Temperature Range	-10°C to 50°C (14°F to 122°F)
Storage Temperature Range	-20°C to 80°C (-4°F to 176°F)
Humidity	<85% non-condensing
Power Supply	8 to 30Vdc SMPS (switch mode power supply) with built in 33V over voltage and reverse voltage protection
Current Consumption	Approx. 42mA @ 13.8V (backlight on) 12mA @13.8V (backlight off)
Display	128x64 graphic LCD display. Contrast and backlight is user configurable, green/yellow backlight
ADC	12 bit over sampled successive approximation
Dimensions	see Velocity series dimensional drawing
Enclosure	3 1/8" ABS, black in color, front or rear mounting
Weight	Approx. 174 grams
Alarm contact current rating	Open collector transistor switch to ground. Maximum rating 0.5A DC
Non-volatile memory storage	100000 write cycles
Ambient Temperature Sender type	Semiconductor LM335 (National Semiconductor)
Internal battery type	CR2032
Voltage measurement range	8 to 30V DC
Voltage resolution	0.1V

9 Changing the internal battery

The RTC-1 uses an internal Lithium battery to supply power to run the internal clock. If you find the RTC-1 loses time when you switch off main power you should replace the battery. This battery is of type CR2032. It is used in many calculators and similar equipment and is easy to obtain. Remove the 2 securing nuts next to the DB-9 connector and remove the unit from its enclosure. The battery holder is located on the circuit board behind the display. Observe correct polarity when installing a new battery. The side marked "+" will be viewable once the battery is inserted.

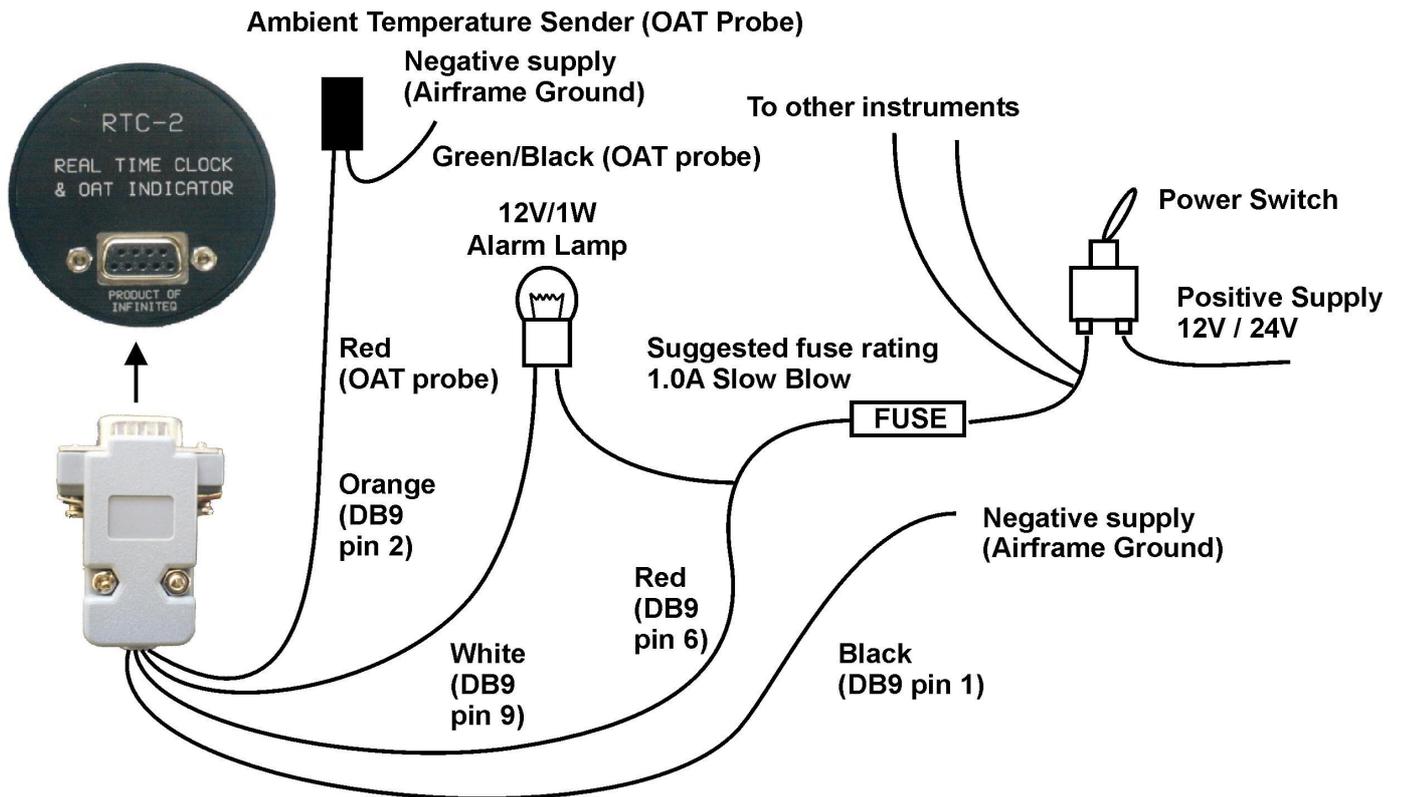
10 Installation

10.1 RTC-1 DB9 Cable connections



DB 9 Pin	Color	Function
1	Black	Ground
2	Orange	OAT Sensor
4	NC	Airtalk communication (Not connected) Used for firmware upgrading
6	Red	8-30Vdc power
9	White	Alarm Output

10.2 Connection Diagram



The use of an external 1A fuse is recommended. Connect the supply terminals to your aircraft's power supply. The RTC-1 can be used on both 12V and 24V without the use of any pre-regulators. Ensure that the supply voltage will not drop below 8V during operation as this may result in incorrect temperature readings.

11 Warranty

This product carries a warranty for a period of one year from date of purchase against faulty workmanship or defective materials, provided there is no evidence that the unit has been misused or manhandled. Warranty is limited to the replacement of faulty components and includes the cost of labour. Shipping costs are for the account of the purchaser.

Note: Product warranty excludes damages caused by unprotected, unsuitable or incorrectly wired electrical supplies and/or sensors, and damage caused by inductive loads.

12 Disclaimer

Operation of this instrument is the sole responsibility of the purchaser of the unit. The user must make themselves familiar with the operation of this instrument and the effect of any possible failure or malfunction.

This instrument is not certified by the FAA. Fitting of this instrument to certified aircraft is subject to the rules and conditions pertaining to such in your country. Please check with your local aviation authorities if in doubt. This instrument is intended for ultralight, microlight, homebuilt and experimental aircraft. Operation of this instrument is the sole responsibility of the pilot in command (PIC) of the aircraft. This person must be proficient and carry a valid and relevant pilot's license. This person has to make themselves familiar with the operation of this instrument and the effect of any possible failure or malfunction. Under no circumstances does the manufacturer condone usage of this instrument for IFR flights.

The manufacturer reserves the right to alter any specification without notice.

Other instruments in the *Stratomaster Velocity* series

ALT-3	Encoding aviation altimeter and Vertical speed indicator (VSI)
ALT-4	Encoding aviation altimeter with Serial RS232 & Parallel Gillham code output
ASI-3	Airspeed indicator (ASI) with automatic flight log
ASX-2	Encoding aviation altimeter and Airspeed indicator (ASI)
AV-2	Artificial horizon and magnetic compass indicator
E-1	Universal engine monitor
FLIGHT-2	Primary Flight instrument
FF-3	Fuel Computer (single or dual fuel tanks)
GF-2	+/-10G tilt compensated dual range G-force meter
MAP-2	Manifold pressure and RPM Indicator
ROTOR-1	Dual Rotor / Engine tachometer
RTC-1	Aviation real time clock (RTC), outside air temperature (OAT) and Voltage display
RV-3	Universal engine / Rotor RPM Indicator
TC-2	4-Channel thermocouple (EGT/CHT) indicator
TC-3	12-Channel thermocouple (EGT/CHT) indicator
TP-2	Universal temperature and pressure gauge