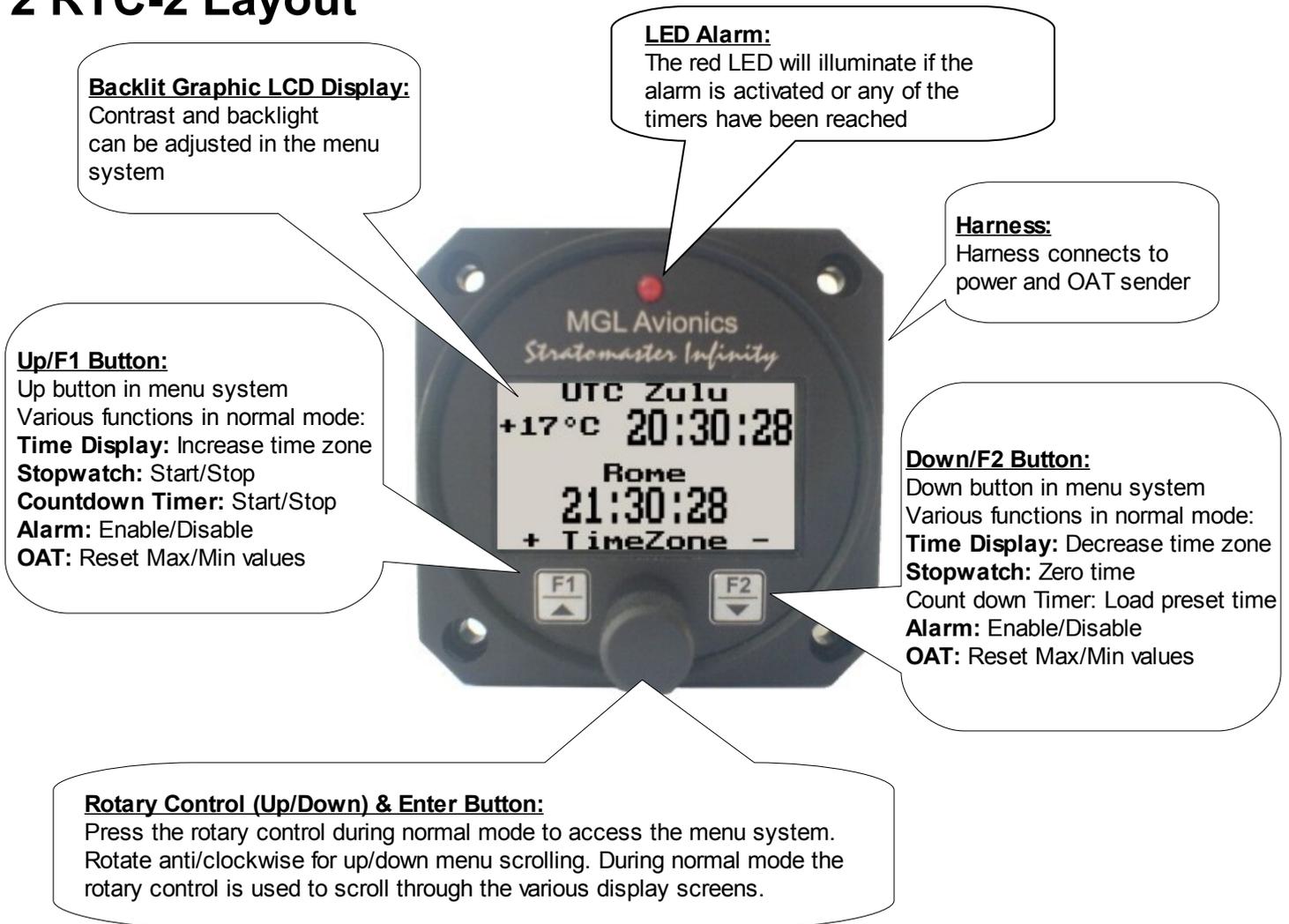# Introduction

The RTC-2 is a 2 1/4" aviation Real Time Clock featuring a two time zone system, stopwatch, countdown timer, alarm and OAT (Outside Air Temperature) 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-2 particularly suitable for sport flying competitions. OAT can be shown in either degrees Celsius or degrees Fahrenheit. 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 and OAT (outside air temperature) 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 shown in degrees Celsius or degrees Fahrenheit**
- **Records maximum and minimum OAT in permanent memory**
- **Replaceable lithium battery**
- **Standard 2 1/4" 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-2 Layout

LED Alarm:
The red LED will illuminate if the alarm is activated or any of the timers have been reached

Backlit Graphic LCD Display:
Contrast and backlight can be adjusted in the menu system

Harness:
Harness connects to power and OAT sender

Up/F1 Button:
Up button in menu system
Various functions in normal mode:
Time Display: Increase time zone
Stopwatch: Start/Stop
Countdown Timer: Start/Stop
Alarm: Enable/Disable
OAT: Reset Max/Min values

Down/F2 Button:
Down button in menu system
Various functions in normal mode:
Time Display: Decrease time zone
Stopwatch: Zero time
Count down Timer: Load preset time
Alarm: Enable/Disable
OAT: Reset Max/Min values

MGL Avionics
Stratomaster Infinity

UTC Zulu
+17°C 20:30:28
Rome
21:30:28
+ TimeZone –

Rotary Control (Up/Down) & Enter Button:
Press the rotary control during normal mode to access the menu system. Rotate anti/clockwise for up/down menu scrolling. During normal mode the rotary control is used to scroll through the various display screens.

3 Main Display

There are 5 main displays that can be setup to be displayed on the RTC-2: UTC time, stopwatch, countdown timer, alarm and OAT display.
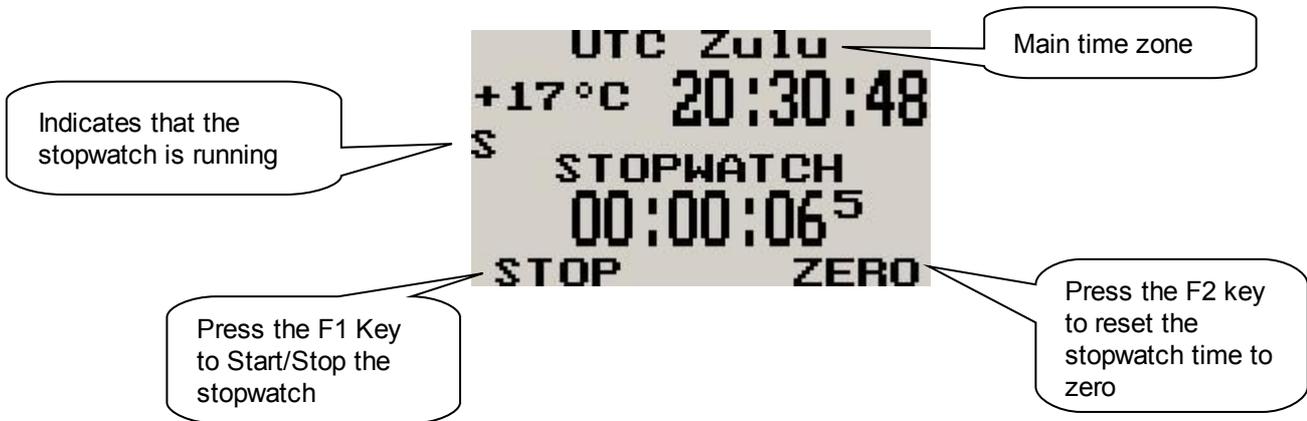
3.1 UTC Time

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

Main time zone

Local time zone

UTC Zulu
+17°C 20:30:28
Rome
21:30:28
+ TimeZone –

Press the F1 key to change the local time zone

Press the F2 key to change the local time zone

3.2 Stopwatch

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

Main time zone

Indicates that the stopwatch is running

UTC Zulu
+17°C 20:30:48
S
STOPWATCH
00:00:06^5
STOP   ZERO

Press the F1 Key to Start/Stop the stopwatch

Press the F2 key to reset the stopwatch time 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.

Main time zone

Indicates that the countdown timer is running

UTC Zulu
+17°C 20:31:27
T
TIMER
00:59:56^5
STOP   LOAD

Press the F1 Key to Start/Stop the timer

Press the F2 key to load the preset time

3.4 Alarm

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

Main time zone

Indicates that the alarm is enabled

UTC Zulu
+17°C 20:31:52
ALARM
A 22:00:00
Alarm Enabled

Press the F1 or F2 key to enable/disable the alarm

3.5 OAT Display

This screen shows the OAT (Outside Air Temperature) value. The OAT can be setup in the menu to be displayed in either degrees Fahrenheit (ºF) or in degrees Celcius (ºC).

Main time zone

Min OAT temperature

Outside air temperature (OAT) value

Max OAT temperature

OAT temperature unit

Press the F1 or F2 keys to reset the max/min temperature values
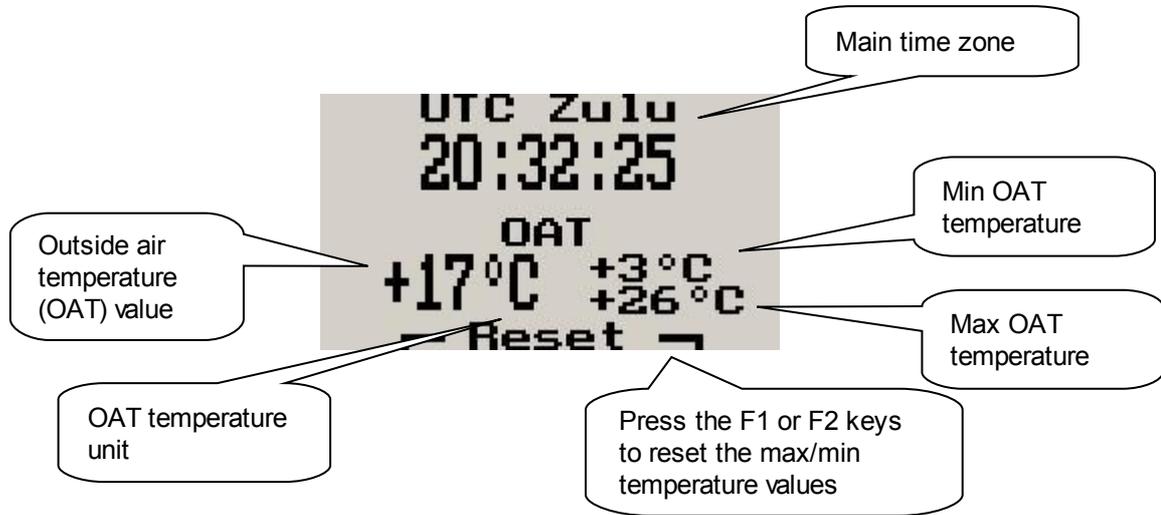
OAT Maximum/Minimum reset

Press the F1 or F2 keys during the OAT display to reset the maximum/minimum temperature values to the current OAT temperature. 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-2 to enter the menu system. Use the up/down keys or the rotary control to navigate through the menu system.
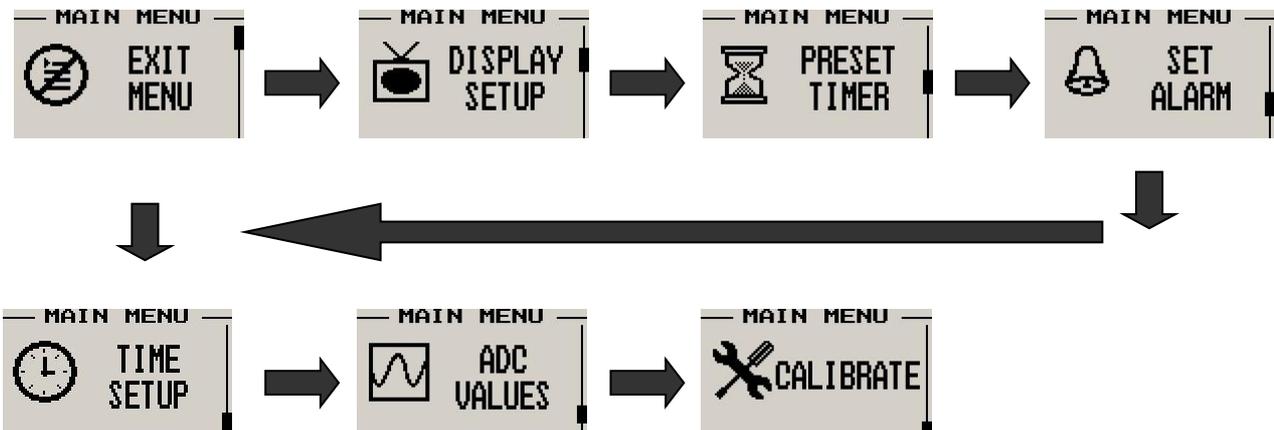
Note: (ADC Values and Calibrate Menus are only visible when powering up the unit and pressing the Rotary Control). The text "CALIBRATE" will appear on the intro screen when entering this mode.

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-2 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 degress Fahrenheit (ºF) or in degrees Celcius (ºC)

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.
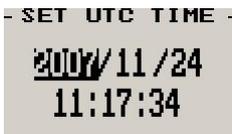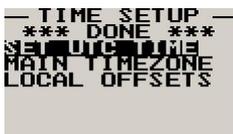
4.4 Set Alarm

— MAIN MENU —

🔔 SET
ALARM

USE ▲ ▼ OR ↻
TO ADJUST THE
ALARM TIME

⑩:00:00

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

— MAIN MENU —

🕐 TIME
SETUP

— TIME SETUP —
*** DONE ***
SET UTC TIME
MAIN TIMEZONE
LOCAL OFFSETS

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

— TIME SETUP —
*** DONE ***
SET UTC TIME
MAIN TIMEZONE
LOCAL OFFSETS

- SET UTC TIME -

2007/11/24

11:17:34

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.

— TIME SETUP —
*** DONE ***
SET UTC TIME
MAIN TIMEZONE
LOCAL OFFSETS

-MAIN TIMEZONE
UTC Zulu
UTC+0:00
USE ▲ ▼ OR ↻
TO CHANGE,MENU
TO SELECT

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

— TIME SETUP —
*** DONE ***
SET UTC TIME
MAIN TIMEZONE
LOCAL OFFSETS

- LOCAL OFFSET -
*** DONE ***
HOUR: +0
MINUTE: +0
UTC Zulu
UTC+0:00
PREV   NEXT

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 ADC Values

— MAIN MENU —

📈 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.

— ADC VALUES —
*** DONE ***
OAT: 2393

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

4.7 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-2 is calibrated in degrees Celcius. The RTC-2 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-2 is now calibrated.

5 Loading Factory default settings

Pressing and holding the F1 and F2 keys simultaneously on power up will cause the RTC-2 to load preprogrammed factory default settings. The following screen will be displayed:
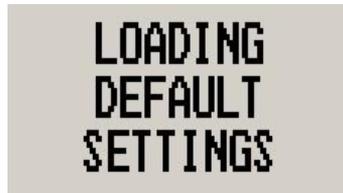
6 Operating the alarms

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-2 is not waterproof. Serious damage could occur if the unit is exposed to water and/or spray jets.

8 RTC-2 Specifications

|	
Operating Temperature Range	-10ºC to 50ºC (14ºF to 122ºF)
Storage Temperature Range	-20ºC to 80ºC (-4ºF to 176ºF)
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. 40mA @ 13.8V (backlight on) 10mA @13.8V (backlight off)
Display	114x64 graphic LCD display. Contrast and backlight is user configurable, green/yellow backlight
ADC	12bit over sampled successive approximation
Dimensions	see Infinity series dimensional drawing
Enclosure	2 1/4" ABS, black in color, front or rear mounting
Weight	Approx. 134 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

9 Installation

9.1 Connection Diagram
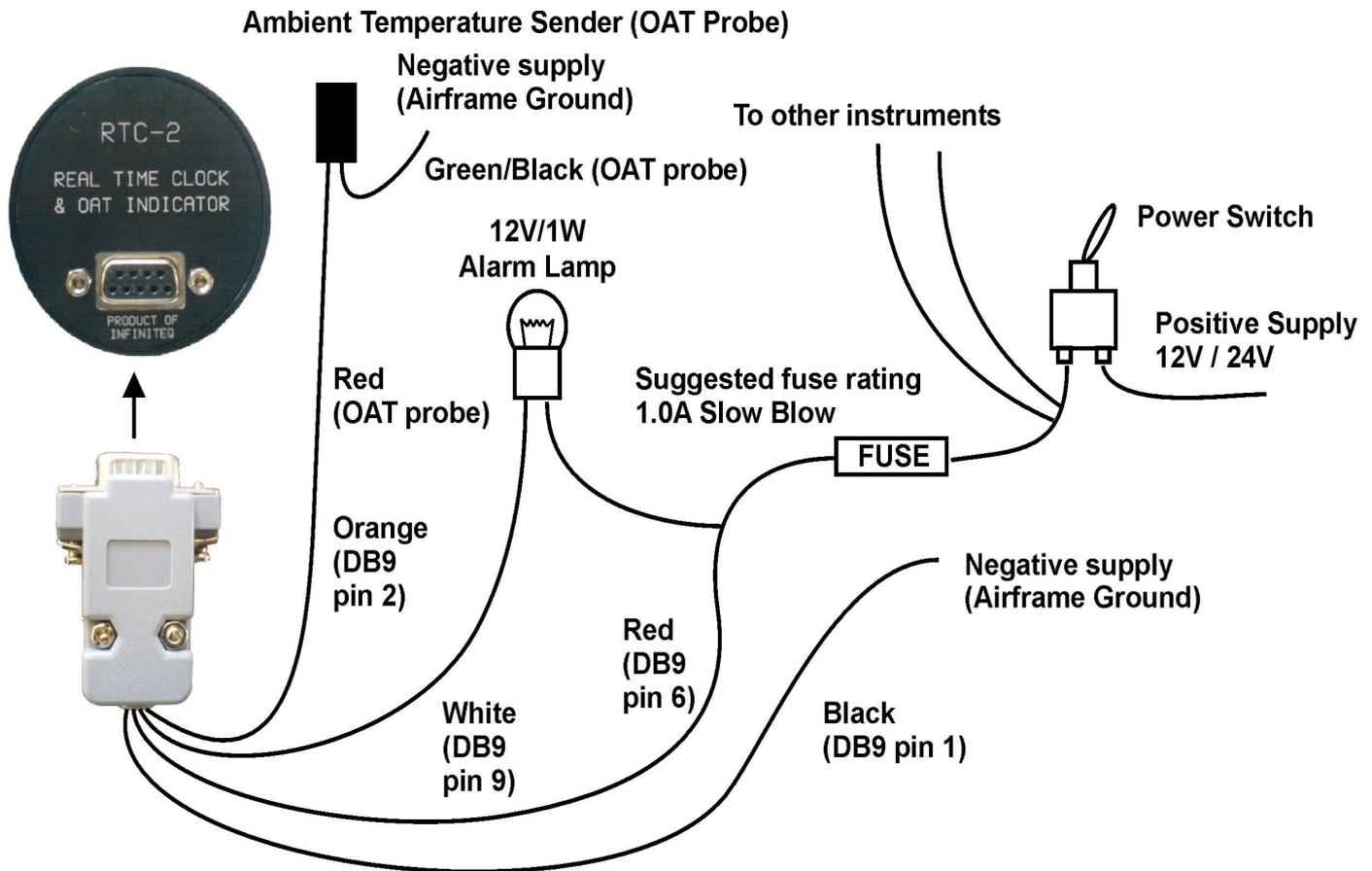
The use of an external 1A fuse is recommended. Connect the supply terminals to your aircrafts power supply. The RTC-2 can be used on both 12V and 24V without the use of any pre-regulators. Ensure that the supply voltage will not drop below 8V during operation as this may result in incorrect temperature readings.

9.2 RTC-2 DB9 Cable connections
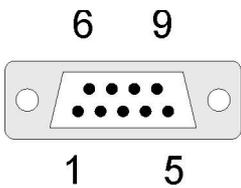
DB 9 Pin	Color	Function
1	Black	Ground
2	Orange	OAT Sensor
4	NC	Airtalk communication (Not connected) Used for firmware upgrading
6	Red	8-30Vdc power
9	White	Alarm Output

10 Changing the internal battery

The RTC-2 uses an internal Lithium battery to supply power to run the internal clock. If you find the RTC-2 looses 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.

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 Infinity* series

ALT-1	Precision encoding altimeter and vertical speed indicator
ALT-2	Precision encoding altimeter and vertical speed indicator with a serial RS232 transponder output
ASI-1	Airspeed indicator (ASI) with automatic flight log
ASX-1	Encoding aviation altimeter with serial output and airspeed indicator (ASI)
AV-1	Artificial horizon and magnetic compass indicator
BAT-1	Battery voltage and current monitor
E-3	Universal engine monitor
FF-1	Fuel Computer (single or dual fuel tanks)
GF-1	+-10G tilt compensated dual range G-force meter
MAP-1	Manifold pressure and RPM Indicator
RV-1	Universal engine RPM and rotor RPM Indicator
RV-2	Universal turbine RPM / RPM factor display
RTC-2	Aviation real time clock (RTC) and outside air temperature (OAT) display
TC-1	4-Channel thermocouple indicator
TP-1	Universal temperature and pressure gauge