RC T3000

Vario and navigation system

Manual version: 1.2

Contents

Introduction

The unit's main function is a telemetry receiver for the RC Multi 2 system with the RC TRX30 and RC GPS modules. With this system the user can view several parameters of the plane (vario, altitude, GPS position and battery). The Software is designed for many competition tasks or free flying. The user can fly predefined or manually created tasks. The unit will give an acoustic vario tone with user defined beeps and voice announcements. For RF communication the 433 ISM band is used.

Key features

- Extremely small outline: 40 x 62 x 22 mm

- Completely new design approach

- Sunshine readable color display as a central part of the system

- Simple manipulation with one multifunction navigation switch

- Internal battery allows up to 7 hours of run time

- Built-in battery charger (5V via USB cable)

- Micro SD card as a data transfer medium

- GPS triangle competition scoring code, XC soaring, F3F, F3B distance, F3B speed supported

- 69 RF channels (LPD channel table) with 25KHz spacing

Power supply

The unit's battery (accumulator) capacity is up to 7 hours.

The battery can be recharged via PC with a USB to USB Mini B cable. Charging time is typically 3 hours when completely discharged. When the battery is charging a "**plug**" symbol is visible at the top right corner of the main page, as depicted on the figure at right.

Controls

A **navigation switch,** which moves in five independent directions, is used to control the unit. The switch utilizes five motions:

- move up or down – moves the curser up and down the page
- move left or right – displays a different page, think of turning the page of a book
- push/press – selects the highlighted item or navigates to a menu behind the current page

USB Connector

A USB Mini B type plug is positioned on the bottom side of the unit and is used for battery charging.

Note!
There is no data carried on the USB port – no direct communication between the RC T3000 and PC via USB. Only power can be supplied (5V max) via the USB connector.

SD card reader

The RC T3000 has a micro SD card slot positioned on the left side of the unit. The SD card is used for:

- Uploading a TASK from the RC\TSK folder
- Saving a TASK file to the RC\TSK folder
- Updating system firmware (BIN format)
- Audio files for voice announcements are stored in the RC\AUDIO folder (WAV files)

Note!
If the SD card has no wav files in the RC/AUDIO folder or it is not inserted during flight, no voice announcements are possible.

3.5 audio jack

3.5 audio jack is positioned on the left side of the unit. **Mono** earphone is supported.

Main page

The main page consists of basic flight parameters.

In the upper section the **ground speed** information, **GPS signal** status with green bars, (1 bar represents 3 satellites and 5 bars more than 6 satellites) and the **battery indicator** are displayed.

The main part of this page is the **vario indicator** with a yellow needle and a numeric value (current vario or average) in the middle. The maximum analog needle deflection is ±4m/s (±8knots), but the numerical indication is not limited.

The plane **battery indicator** displays battery voltage and is positioned on the middle left side of the display.

The bottom of the page is reserved for **altitude** indication (calculated from air pressure) and the **vario volume** indicator.
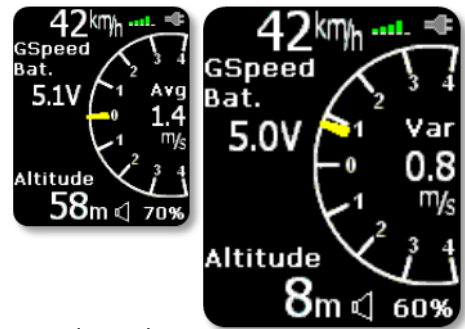
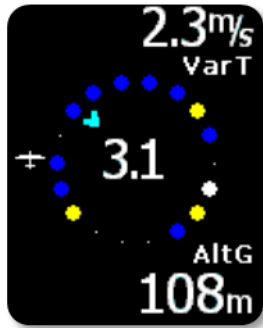| **Note!** |
| --- |
| Pressure altitude readings will always be 0 on the ground. It will change when take-off is detected! |

Navigation switch actions:

- left -> Setup page
- right -> Text page
- up and down -> vario volume adustment
- press -> Thermal assistant page

Thermal assistant

Pressing the navigation switch while on the main vario page will activate the thermal assistant. An automatic switch from the main page is also possible by selecting the Thermal assistant item in the setup/vario menu. The Thermal assistant page shows the thermal profile in colors as a percent of the maximum climb rate in the last circle. Red dots represent 70% or more, yellow 50-70% and blue less than 50% of the maximum. No dot means negative vario and the white dot shows the maximum. The top right corner of the page shows the overall thermal average which is the average climb rate from the start of the thermal to the present time (total average). In the bottom right corner the altitude gain for the thermal is shown. The number displayed inside the circle shows the average vario and the arrow shows wind direction.

Navigation switch actions:

- left -> Setup page
- right -> Text page
- up and down -> not used
- press -> Main vario page

Text page

During flight, some text data can be found here for later review:

- maximum detected altitude
- current ground speed
- distance from the pilot to the plane
- distance flown in flight (trip)
- last known latitude and longitude

If the RC T3000 is powered OFF all this data (except last known latitude and longitude) will be reset. Last known latitude and longitude will be stored until "init memory" is done in Setup.

Navigation switch actions:

- left -> Main vario page/Thermal assistant
- right -> Task navigation page
- up and down -> scroll up and down on the Text page
- press -> not used

GPS triangle navigation page

The GPS triangle task is a complex navigation procedure which guides the pilot from the start point around 3 turn points until the finish line. The task can be created manually or imported from the SD card. On this page the pilot can find basic information on how to approach the next TP on the task.

In the top left corner the remaining task time is displayed. TP name is under the remaining time. The distance to the next turn point is shown in the top right corner. Across the bottom of the display you can find 3D speed and GPS altitude above ground. Navigation is always oriented track up. Above the speed box the numeric vario is displayed.

The TP zone is shown in yellow. The green lines show the course.

Navigation switch actions:

- left -> Text page
- right -> Logbook/Statistic page
- up and down -> changes display zoom (0.6 shown)
- press -> Task menu

Task

Pressing Enter on the Task navigation page displays the task options. The pilot can manually generate a new task by selecting "NEW", load a pre-generated task from the SD card with the "LOAD" option, or "SAVE" a created/imported task to the SD card. Task options can be set under "SETUP". To start/restart the task select "START" option.

New

To manually generate a task on the field, move your plane to the start position and make sure you have a good GPS position. When you select "NEW" the current coordinates are remembered as the start coordinates. To select the direction to the first turn point, walk with the glider in that direction. You will be able to see the course heading on the page. When you are satisfied with the course heading, press the navigation switch to generate the task. It is recommended to walk at least 30m in the direction you wish the task to be oriented. All other points of the course will be calculated and a triangle will be generated.

Load

To load a pre-generated task you should upload the task file (.afg file) into the RC/TSK folder on the SD card. After selecting the "LOAD" option, all .afg task files in that folder will be shown. Select the required task file from the list and it will be uploaded.

Save

The currently active task will be saved into the RC\TSK folder on the SD card after pressing "SAVE". You should edit the name of the task file. Moving the navigation switch left or right selects which letter to edit. Moving the navigation switch up or down changes the underlined letter. Pressing the navigation switch confirms the name and generates an *.AFG file on the SD card.

Note!
To use a saved file from the Skynavigator SW, you will have to rename the task file extension from *.AFG to lower case letters *.afg . This is must be done on a PC.

Setup

This menu allows you to change the task start altitude and task distance. Press Enter on the value you wish to change and move the navigation switch up/down to change it. The task will be recalculated when you leave this menu.
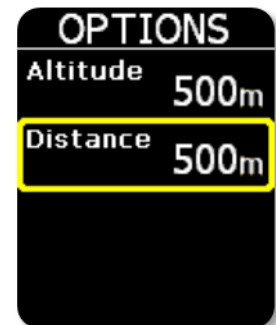
Start

To start/restart the task, select the "START" option. On the Task navigation page "ARMED" text will be displayed when start is triggered. The task time will automatically begin the count down when the plane crosses the start line. A voice announcement will alert you when you select start/restart task.

XC soaring navigation page

Course tracking - The XC soaring navigation page shows the course as a solid green line connecting the turn points. Current bearing to the next turn point is shown as a solid white line. The turn points are shown as yellow circles which depict the turn cylinders. The radius of the cylinder is set by the user. A small icon of an aircraft is in the bottom center of the page and the course moves underneath it. At the top of the page is a < or > icon with a number beside it. This gives the steering correction needed for the glider to fly directly to the turn point.
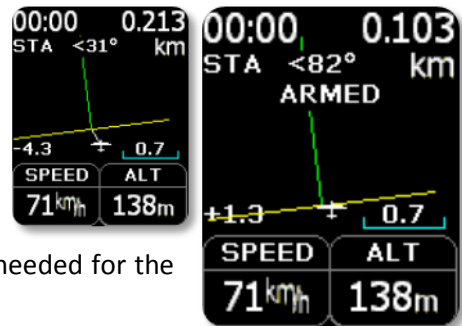
Turn point tracking - Once near the turn point, the navigation page can be zoomed in to see precisely when the turn cylinder is penetrated. "INSIDE" message is announced at this time. This can save a lot of time at the turn point. It also allows one to accurately fly the longest distance through the cylinder if conditions are favorable for that tactic.
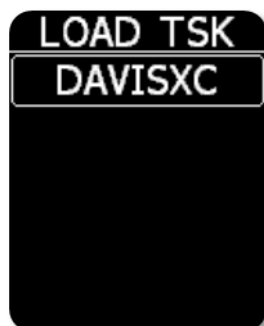
Navigation switch actions:

- left -> Text page
- right -> Logbook/Statistic page
- up and down -> changes zoom
- press -> Task menu

Task

Pressing Enter on the Task navigation page displays the task options. Select the "LOAD" option to load a pre-generated task from the SD card. Task options can be set under "SETUP". To start/restart task, select "START" option.

Load

To load a pre-generated task you should upload the task file (.xcs file) into the RC/TSK folder on the SD card first. After selecting the "LOAD" option all .xcs task files in that folder will be shown. Select the required task file from the list and that task will be uploaded.

Setup

This menu allows you to change the turn cylinder radius. Press Enter and use the up/down functions of the navigation switch to change it. The task will be recalculated when you leave this menu.

Start

To start/restart the task, select the "START" option. On the Task navigation page "ARMED" text will be displayed when the start is triggered. The Task time will start to count up when the plane crosses the start line. A voice announcement will alert you when you select start/restart task.

F3F navigation page

The F3F navigation page shows the course as a solid green line connecting the turn points. The two turn points are shown as yellow lines. These yellow lines define an infinite plane that is the turn point. The course and turn point lines are perpendicular.

The goal is to fly 5 laps/10 legs between turn points (100 m) as fast as possible. An F3F result is valid only if you climb to your launch height (or higher) within 5 seconds after crossing the finish line (to prevent any massive dive while flying the task).
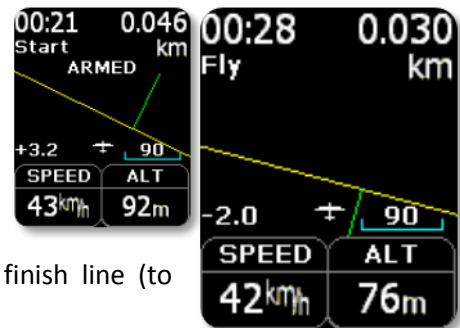
Navigation switch actions:

- left -> Text page
- right -> Logbook/Statistic page
- up and down -> changes zoom
- press -> Task menu

Task

Pressing Enter on the Task navigation page displays the task options. The pilot can manually generate a new task by selecting "NEW", load a pre-generated task from the SD card with "LOAD" option, or "SAVE" a created/imported task to the SD card. Task options can be set under "SETUP". To start/restart the task, select "START" option.

New

To manually generate a task, move your plane to the start position and make sure you have a good GPS position. When you select "NEW" the current coordinates are remembered as the start coordinates. To select the direction to the first turn point, walk with the glider in that direction. You will be able to see the course heading on the page. When you are satisfied with the course heading, press the navigation switch to generate the task. It is recommended to walk at least 30m in the direction you wish the task to be oriented. If you do not know the required heading, simply walk to the other turn point before pressing the navigation switch.

Load

To load a pre-generated task you should upload the task file (.f3x file) into the RC/TSK folder on the SD card. After selecting the "LOAD" option, all .f3x task files in that folder will be shown. Select the required task file from the list and it will be uploaded.

Save

The currently active task will be saved into the RC\TSK folder on the SD card after pressing "SAVE". You should edit the name of the task file. Moving the navigation switch left or right selects which letter to edit. Moving the navigation switch up or down changes the underlined letter. Pressing the navigation switch confirms the name and generates an *.F3X file on the SD card.

Start

To start/restart the task, select the "START" option. In the Task navigation page "ARMED" text will be displayed when the start is triggered. The task time will start to count down when the plane crosses the start line. If the start line is not crossed in 30 seconds, the task time will start to count automatically. A voice announcement will alert you when you select start/restart task.

F3B distance navigation page

The F3B distance navigation page shows the course as a solid green line connecting the turn points. The two turn points are shown as yellow lines. These yellow lines define an infinite plane that is the turn point. The course and turn point lines are perpendicular.

The goal is to fly as many legs as possible between turn points (150 m) in a 4 minutes task time.

You have 7 minutes of "working time" and 4 minutes of "task time". Working time starts when you release from winch tow and task time starts when crossing the turn point line for the first time. If working time expires and task time is still left, the task is finished.

Navigation switch actions:

- left -> Text page
- right -> Logbook/Statistic page
- up and down -> changes zoom
- press -> Task menu

Task

Pressing Enter on the Task navigation page displays the task options. The pilot can manually generate a new task by selecting "NEW". He can load a pre-generated task from the SD card with the "LOAD" option or "SAVE" a created/imported task to the SD card. To start/restart a task, select the "START" option.

New

To manually generate a task, move your plane to the start position and make sure you have a good GPS position. When you select "NEW" the current coordinates are remembered as the start coordinates. To select the direction to the first turn point, walk with the glider in that direction. You will be able to see the course heading on the page. When you are satisfied with the course heading, press the navigation switch to generate the task. It is recommended to walk at least 30m in the direction you wish the task to be oriented. If you do not know the required heading, simply walk to the other turn point before pressing the navigation switch.

Load

To load a pre-generated task you should upload the task file (.f3x file) into the RC/TSK folder on the SD card. After selecting the "LOAD" option, all .f3x task files in that folder will be shown. Select the required task file from the list and it will be uploaded.

Save

The currently active task will be saved into the RC\TSK folder on the SD card after pressing "SAVE". You should edit the name of the task file. Moving the navigation switch left or right selects which letter to edit. Moving the navigation switch up or down changes the underlined letter. Pressing the navigation switch confirms the name and generates an *.F3X file on the SD card.
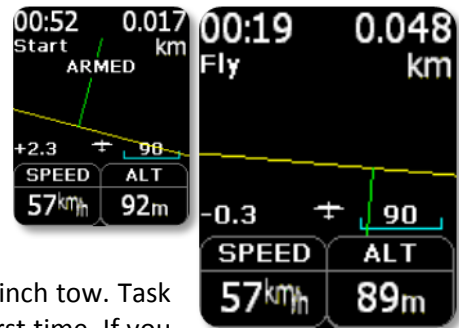
Start

To start/restart the task, select the "START" option. In the Task navigation page "ARMED" text will be displayed when the start is triggered. The task time will start to count down when the plane crosses the start line. After takeoff is detected working time starts to count down. A voice announcement will alert you when you select start/restart task.

F3B speed navigation page

The F3B speed navigation page shows the course as a solid green line connecting the turn points. The two turn points are shown as yellow lines. These yellow lines define an infinite plane that is the turn point. The course and turn point lines are perpendicular.

The goal is to fly 2 laps/4 legs between turn points (150 m) as fast as possible.

You have 1 minute to start the task after you release from the winch tow. Task time starts counting when the turn point line is crossed for the first time. If you fail to start in 1 minute you must land and re-launch.

Navigation switch actions:

- left ->Text page
- right -> Logbook/Statistic page
- up and down -> changes zoom
- press -> Task menu

Task

Pressing Enter on the Task navigation page displays the task options. The pilot can manually generate a new task by selecting "NEW". He can load a pre-generated task from the SD card with the "LOAD" option or "SAVE" a created/imported task to the SD card. To start/restart a task, select the "START" option.

New

To manually generate a task, move your plane to the start position and make sure you have a good GPS position. When you select "NEW" the current coordinates are remembered as the start coordinates. To select the direction to the first turn point, walk with the glider in that direction. You will be able to see the course heading on the page. When you are satisfied with the course heading, press the navigation switch to generate the task. It is recommended to walk at least 30m in the direction you wish the task to be oriented. If you do not know the required heading, simply walk to the other turn point before pressing the navigation switch.

Load

To load a pre-generated task you should upload the task file (.f3x file) into the RC/TSK folder on the SD card. After selecting the "LOAD" option, all .f3x task files in that folder will be shown. Select the required task file from the list and it will be uploaded.

Save

The currently active task will be saved into the RC\TSK folder on the SD card after pressing "SAVE". You should edit the name of the task file. Moving the navigation switch left or right selects which letter to edit. Moving the navigation switch up or down changes the underlined letter. Pressing the navigation switch confirms the name and generates an *.F3X file on the SD card.

Start

To start/restart the task, select the "START" option. In the Task navigation page "ARMED" text will be displayed when the start is triggered. The task time will start to count down when the plane crosses the start line. If the start line is not crossed in 1 min, you must land and re-launch. A voice announcement will alert you when you select start/restart task.

Thermal task navigation page

Thermal task does not have a Task navigation page although the statistic page is working normally. It is the only task where a GPS signal is not needed.

Navigation switch actions:

- left -> Text page
- right -> Logbook/Statistic page
- up and down -> not used
- press -> not used

Logbook/statistic page

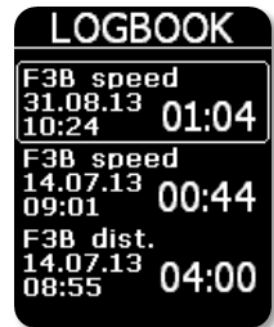During flight this page provides **statistic information** of the current flight.

Navigation switch actions:
- left -> Task navigation page
- right -> Setup page
- up and down -> scroll on statistic page
- press -> not used

After flight the statistic information will be replaced with the **logbook** showing:

- type of task
- date of flight
- take-off time
- flight time

The logbook is stored in the RC T3000 internal flash memory. Pressing Enter on any flight in the logbook displays **flight info** – statistics of completed task.

Navigation switch actions:

left -> Task navigation page
right -> Setup page
up and down -> scroll on logbook page
press -> Flight info

GPS triangle statistic

- start time
- start altitude and speed
- number of laps
- average task speed
- penalty points
- flight time
- scoring code

XC soaring statistic

- start time
- flight time
- distance flown
- average task speed

F3F statistic

- flight time
- average task speed (if valid)
- legs flown

F3B distance statistic

- start time
- flight time
- average task speed
- legs flown

F3B speed statistic

- start time
- flight time
- average task speed
- legs flown

Setup page

The Setup page offers a wide range of options. Select an option to set up by pressing the navigation switch.

A yellow colored frame indicates you are in *edit mode*. You can change settings with up and down movements of the navigation switch. Press the navigation switch to save. The frame will become inactive (white colored frame).

To leave the menu, use left or right movements of the navigation switch.
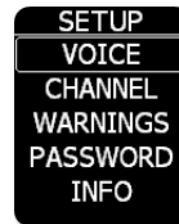
Profile

The user has an option to save or load a personal profile on the RC T3000. The personal profile contains all of the user's changed settings: vario settings, units, beeps and voice settings.

Save

Select a position to create a profile by pressing the navigation switch. Move the switch up or down to change the characters and left or right to navigate across the name. Press the navigation switch to save.
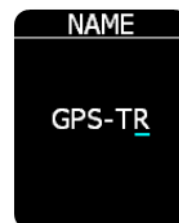
Load

Press the navigation switch while on the profile name to activate it.

Vario

Value:
- Vario – the unit will display the normal (instantaneous) vario value.
- Average – the unit will display an average vario value over the user defined (Avg. time) timeframe.

Negative mute: when enabled, only a positive vario beep will be generated. When negative vario is detected (plane sinking), there will be no tone.

Thermal assistance: if checked, an automatic switch to the Thermal assistant page from the Main vario page will occur while circling and vice versa. (Circling detected by GPS track)

Avg. time: define time in seconds (10 – 40) for the average vario.

Task

Type: select between F3B distance, F3B speed, F3F, XC soaring, GPS triangle, and Thermal tasks.

Servo start: this option allows the user to start the task via an RC servo channel on the receiver. The Multi2 must be plugged into this channel.

Trigger: servo pulse trigger is high if the pulse is longer than 1600 us. Low servo pulse trigger is detected when the servo pulse is less than 1400 us. The task will be started or restarted when a servo pulse change is detected (from high to low or low to high, depending on the trigger setting).
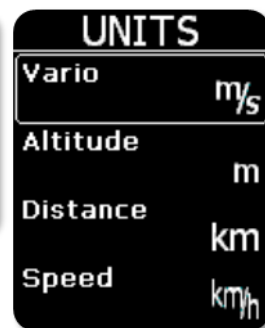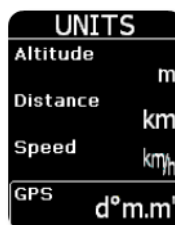
Units

In the Units options the user can select the different units which the RC T3000 can display.

Values:

- Vario: m/s or kts
- Altitude: m or ft
- Distance: km, nm or mi
- Speed: km/h, mph or kts
- GPS: d°m's'' or d m.m'

Beeps

The user has the option to set a user defined beep for entering inside the turn point zone, when penalty points are calculated on crossing start line, and alerts on the distance to the turn point (beep will be generated 100m, 50m and 20m before turn point).
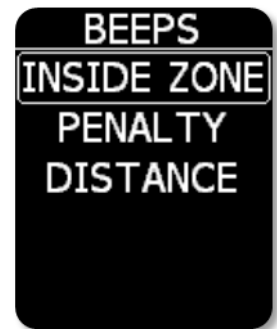
Beep settings

The user can enable/disable the beeps. F1 and F2 set the frequency of the beep. P1 and P2 define length of the F1 and F2 beeps. With "Cnt" the user can set how many times the beep will be repeated. All set options can be tested with the "Test BEEP" option.
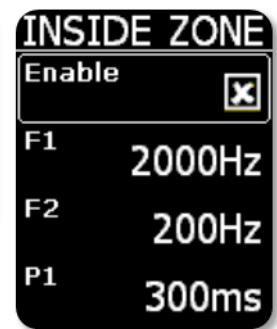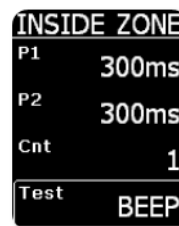
Voice

Different voice announcements can be set.

- **Line dist.** – The distance from the ideal line to the TP is set here. This setting will trigger an announcement stating how many meters you are away and if you are "in" or "outside" of the triangle line.
- **Altitude** – A voice message will be generated every 50 or 100 m if this option is enabled.

- **Time** – Set how often the remaining task time will be announced.

- **Inside** – "Inside" word will be generated when you enter a TP sector.

- **Penalty** –Number of penalty points will be announced when crossing the start line if a penalty is detected.
- **Alt gain**– When circling flight is detected, gained or lost altitude is announced every 30 seconds.
- **Vario** – Sets the vario to announce the current or average vario strength every 30 seconds of circling flight.
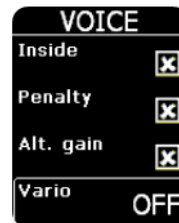
Channel

The channel number on 433MHZ ISM band can be set here. RC Multi 2 must be set on the same channel! Select "Send new ch." to also change the RC Multi 2.

Channel 1 is 433.075MHz and channel spacing is 25kHz.

Warnings

The RC T3000 will warn the user with a voice warning when:

- GPS altitude set here is exceeded
- plane battery voltage is lower than value set here

If these warnings are triggered a warning box will be shown on the page and the user must confirm it by pressing the navigation switch to hide the warning.

Password

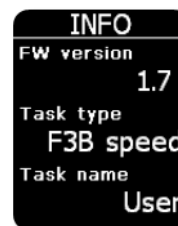To access some special functions of the RC T3000 unit, different passwords can be entered:

- **99999** – Erases all stored flights!
- **46486** – Reset to factory default values
- **76253** – Open the snake game
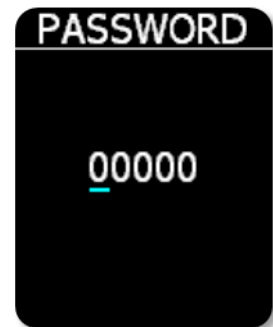
Info

The info page displays information about:

- serial number
- firmware version
- selected task type
- selected task name

Battery information and power management

The RC T3000 is powered with a rechargeable battery. The battery can be charged and discharged hundreds of cycles. Use only the PC USB port to recharge the battery.

Do not leave a fully charged battery connected to a charger for too long a time. Overcharging may shorten its life. If left unused, a fully charged battery will lose its charge over time.

Battery run time is typically up to 7 hours.

Note!
Always charge the device even if it will not be used for a long time. Periodically check the battery status and recharge if needed. This will help to keep the battery healthy.

Note!
The unit has an integrated automatic power OFF function. It will automatically power OFF before the battery is completely empty or if there is no RF link or if the navigation switch is not used for 2 minutes.

How to power ON and OFF

A long press (**approximately 2 seconds**) on the navigation switch will power the unit ON. The first indication that the power has been turned on is the presence of the RC Electronics logo. After you see the logo, release the switch. If the press is too long the unit will switch OFF due to a safety feature to prevent unintended power on.

To switch OFF, simply apply a long press on the navigation switch until the unit turns OFF. If flight is detected, you are asked if you wish to finish the flight.

Firmware update

Download the latest FW from our WEB site (www.rc-electronics.org). Copy the latest firmware file and rename it to fw with extension .bin. (fw.bin)

- Save the update file to the **root** of the SD card (you should see RC folder and the update file).

- Insert the SD card to the RC T3000 unit.

- Power the RC T3000 ON. You will see the "Updating…" page. When update is finished (after 3 seconds), the unit will power OFF automatically. Power it ON again and you are ready to use the new firmware.

Revision history

January 2012	Initial release of owner manual.
May 2012	Added in firmware v1.4 - automatic power off function - task save option - altitude voice messages added in VOICE setup - added VARIO setup
October 2013	Added XC soaring, F3F, F3B distance, F3B speed and thermal task. New options under SETUP menu.