

Flytec 6030GPS

Revision Date:08•12•14
Through firmware v3.38a

© Flytec USA 2007 - 2014. All rights reserved.

No part of this manual may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without permission in writing from Flytec USA. This manual is protected under US and International Copyright Laws.

Warning! Read before you proceed! Warning

This instrument is not a safety device and should not be used as an indicator of safe flying parameters. This instrument should only be used for information purposes. Aviation can be a hazardous and possibly fatal activity. As a pilot, you are entirely responsible for your own safety and the safety of others around you. Pilots should abide by applicable aviation authority regulations and use best judgment for safe flying at all times, irrespective of instrument readings. Flytec is not responsible for loss or injury caused by the use of this instrument. You assume all risks associated with flying and the use of this instrument. Individuals who ignore this warning do so at their own risk and may suffer serious personal injury, property damage, or death.

If you are unwilling to assume all of the risks associated with the use of this instrument, do not use the instrument. Return it immediately, unused with all of its' included items, within 30 days of the date of purchase, for a full refund. Please note that instruments showing signs of wear or those that have been damaged or modified in any way cannot be accepted for return.

Table of Contents

| | |
|--|----|
| WARNING! READ BEFORE YOU PROCEED! WARNING! | 3 |
| 1 INSTRUMENT LAYOUT | 6 |
| 2 OVERVIEW | 7 |
| 2.1 Turning the 6030 On/Off | 7 |
| 2.2 Main Display Page | 8 |
| 2.3 Keypad | 9 |
| 2.3.1 Function Keys F1 and F2 | 9 |
| 2.3.2 Entering Text | 9 |
| 2.4 Units for Numerical Values | 9 |
| 2.5 Real-Time Map Page | 10 |
| 2.6 Batteries and Charging | 11 |
| 2.7 User-Fields | 11 |
| 2.8 Main Setup Menu | 12 |
| 3 FLIGHT FUNCTIONS | 13 |
| 3.1 Variometer | 13 |
| 3.1.1 Analog vario | 13 |
| 3.1.2 Digital Vario and Netto Vario | 13 |
| 3.1.3 Average Thermal Climb Indicator | 14 |
| 3.2 Altimeters and Air Pressure | 14 |
| 3.3 Setting Altimeter 1 | 14 |
| 3.4 Speed | 15 |
| 3.4.1 Airspeed | 15 |
| 3.4.2 Stall Alarm | 16 |
| 3.4.3 Ground Speed | 16 |
| 3.4.4 Wind Direction and Speed | 16 |
| 3.4.5 Total Energy Compensation (TEC) | 16 |
| 3.5 Speed-to-Fly | 17 |
| 3.5.1 Best Glide Speed | 17 |
| 3.5.2 McCready Indicator | 17 |
| 3.5.3 Polars | 18 |
| 3.6 Audio | 18 |
| 3.7 Temperature | 20 |
| 3.8 Time and Date | 20 |
| 3.9 Flight Time | 20 |
| 3.10 Distance Measurements | 20 |
| 3.10.1 Distance to Waypoint | 20 |
| 3.10.2 Distance to Last Thermal | 20 |
| 3.10.3 Distance to Goal | 20 |
| 3.10.4 Distance to Restricted Airspace | 20 |
| 3.10.5 Distance to Take-Off | 21 |
| 3.10.6 Distance to Cylinder / Distance to Start Cylinder | 21 |
| 3.11 Glide Ratio (L/D Ratio) | 21 |
| 3.12 Altitudes Above Targets | 21 |
| 3.12.1 Altitude above Best Glide Line (<i>A BG WP</i>) | 21 |
| 3.12.2 Altitude above Waypoint (<i>Alt a WP</i>) | 21 |
| 3.12.3 Altitude above Goal (<i>A BG Goal</i>) | 21 |
| 4 NAVIGATION | 22 |
| 4.1 Assessment of Reception Quality | 22 |
| 4.2 Compass and Flight Direction | 22 |
| 4.3 Real-Time Map Page | 22 |
| 4.4 Relocating Thermals | 23 |
| 4.5 Waypoints and Coordinates | 23 |
| 4.5.1 Current Coordinate Display | 23 |
| 4.5.2 Saving the Current Position | 24 |
| 4.5.3 Waypoints | 24 |
| 5 NAVIGATING WAYPOINTS AND ROUTES | 25 |
| 5.1 Goto Function | 25 |
| 5.2 Track, Bearing and Cross Track Error | 25 |
| 5.2.1 Goto a Waypoint | 26 |
| 5.2.2 Correct Bearing in a Cross Wind | 26 |

| | | |
|-----------|--|-------------------------------------|
| 5.2.3 | Wind Component | 26 |
| 5.3 | Route Function | 27 |
| 5.3.1 | Direction arrow to second turnpoint | 27 |
| 5.3.2 | Enter/Edit Route | 27 |
| 5.3.3 | Direction arrow to second turnpoint | 28 |
| 5.4 | Competition Route | 28 |
| 5.4.1 | Setting up a Competition Route | 28 |
| 5.4.1.1 | Flying a Competition Route | 30 |
| 5.4.2 | Optimized Competition Route | 30 |
| 5.4.2.1 | Flying an Optimized Competition Route | 31 |
| 5.4.3 | The Start | 32 |
| 5.4.3.1 | Exit Start | 33 |
| 5.4.3.2 | Entry Start | 34 |
| 5.4.4 | Final Glide | 34 |
| 5.4.4.1 | Final climb | 35 |
| 5.4.4.2 | Gliding to Goal | 35 |
| 6 | FLIGHT MEMORY AND FLIGHT ANALYSIS | 37 |
| 6.1 | Flight Memory | 37 |
| 6.1.1 | Graphic Display of Flights - Map page | 39 |
| 6.2 | Flight Verification for Competition, OLC and World Records | 39 |
| 7 | RESTRICTED AIRSPACE (CTRS) | 40 |
| 7.1 | Airspace Alerts and Info | 41 |
| 7.1.1 | Recalling Detailed Airspace Information | 42 |
| 7.1.2 | Deselect or select individual airspace | 43 |
| 7.2 | Airspace on an SD card | 43 |
| 7.2.1 | Using Airspace loaded on the SD card | 44 |
| 7.2.2 | Create .faf file from OpenAir file and load to SD card | 44 |
| 7.3 | Entering Flight Airspace Manually | 46 |
| 8 | CONNECTION TO A COMPUTER | 48 |
| 8.1 | Downloading Flights | 48 |
| 8.2 | Instrument Settings | 48 |
| 8.3 | Upload/Download Waypoints and Routes | 48 |
| 8.4 | Uploading Airspace with FlyChart | 49 |
| 8.4.1 | Creating an Airspace File with FlyChart | 52 |
| 8.5 | Transferring New Firmware to the 6030 | 52 |
| 8.6 | Optional Software | 53 |
| 8.7 | Viewing the Contents of an IGC File | 53 |
| 9 | MAIN DEVICE SETTINGS MENU | 55 |
| 9.1 | Flight Memory | 56 |
| 9.2 | Waypoints | 56 |
| 9.3 | Routes | 56 |
| 9.4 | Airspaces (CTRs) | 56 |
| 9.5 | Pilot settings | Error! Bookmark not defined. |
| 9.6 | Clear/Initialize Memory | 58 |
| 9.7 | Simulation Mode | 58 |
| 9.8 | Device settings | Error! Bookmark not defined. |
| 9.9 | SD Card | 59 |
| 10 | MAINTENANCE, WARRANTY AND SERVICE | 61 |
| 10.1 | Resetting and Reinitializing | 61 |
| 10.2 | Water Damage | 61 |
| 10.3 | Warranty | 61 |
| 11 | SPECIFICATIONS AND APPROVALS | 62 |
| 12 | APPENDIX | 63 |
| 12.1 | Stall Alarm | 63 |
| 12.2 | Netto Vario | 63 |
| 12.3 | True or Indicated Air speed | 63 |
| 12.4 | Polars and Best Glide Speed | 64 |
| 12.5 | McCready Theory – Optimized Speed to Fly | 65 |
| 12.6 | Enter & Exit Competition Start Examples | 67 |

1 Instrument Layout



| | | | |
|----|---------------------------------|----|--------------------------------------|
| 1 | Speaker | 14 | Volume |
| 2 | GPS status | 15 | Charging status LEDs |
| 3 | Digital air speed | 16 | Power on/off |
| 4 | Altimeter 1 (MSL) | 17 | F1 Key |
| 5 | Charger cable jack (under flap) | 18 | F1 function identifier |
| 6 | Best Glide speed indicator | 19 | User-field |
| 7 | SD card slot (under flap) | 20 | Compass rose |
| 8 | USB Port (under flap) | 21 | Analog variometer |
| 9 | Analog air speed indicator | 22 | External air speed jack (under flap) |
| 10 | Stall speed indicator | 23 | Thermal Average indicator |
| 11 | F2 function identifier | 24 | Active McCready indicator |
| 12 | F2 Key | 25 | Battery status bank 1 and 2 |
| 13 | OK (accept)/Menu key | 26 | Pitot tube |

2 Overview

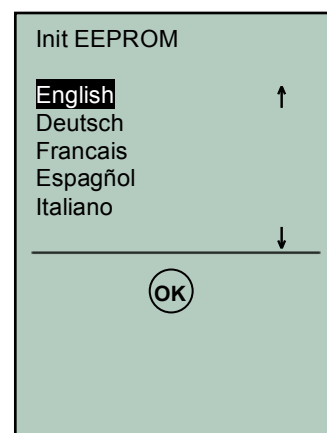
While it is possible to turn on the 6030 and immediately go flying, we recommend that you study these operating instructions and make yourself familiar with the various functions. We have kept the operating instructions as brief as possible. Users who would like to freshen up on the basics, or those who want to learn more about the individual functions and their uses, we have included in-depth explanations in the Appendix. These appendices are referred to in the basic instructions. Please first review the diagrams of the 6030 display and keypad and their descriptions so that after scanning the index briefly you will have an basic understanding of the 6030's functions.

The firmware of the 6030 is stored in "flash" memory. Upgrading your unit's firmware to the most recent version can be done with the help of a PC, and does not necessitate sending the unit to us for service. The cable required to connect the unit to your PC is included. To update your 6030, all you need to do is download the update from our web site and transfer it to your 6030 using the supplied installation software.

The 6030 has a **Simulation mode** that helps you better understand the numerous functions of the instrument, and to practice using the 6030 by simulating an actual flight. With this feature you can simulate almost any situation encountered during flight. You can change several flight parameters such as: altitude, climb rate, air speed, ground speed, wind speed, and flight direction. You can also observe the effects of these on best glide speed, the McCready indicator, arrival altitude at destination, distance from the destination, etc. All accompanying sounds are simulated, as well.

2.1 Turning the 6030 On/Off

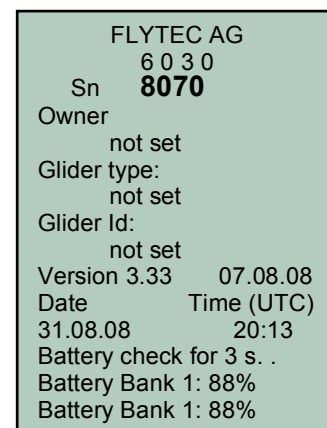
To switch the 6030 **on**, short-press the *On/Off* key. The instrument will beep once, and the display will show a list of possible languages. Select the desired language with the ▲ ▼ keys and press the OK key to continue. The selected language will now be in effect and will become the default; in subsequent start-ups you will only need to press the OK key to confirm start-up. If after pressing the OK key, the 6030 powers down without advancing to the next screen, it is most likely an indication that the batteries are critically low. In this case the 6030 should be charged or the rechargeable batteries should be temporarily replaced with alkaline cells before attempting to start the instrument. Repeatedly attempting to power-up the instrument with weak batteries can cause corruption of the EEPROM and/or loss of factory settings. **Please see Section 2.6.**



After you press the OK key, the display will show the Start-Up screen for 15 seconds with the following information shown:

- Instrument Manufacturer
- Instrument model and serial number
- Pilots Name (if set)
- Glider type (if set)
- Glider ID – Call sign/Pilot license/etc. (if set)
- Firmware version and date
- Time and date
- Battery status for Banks 1 and 2

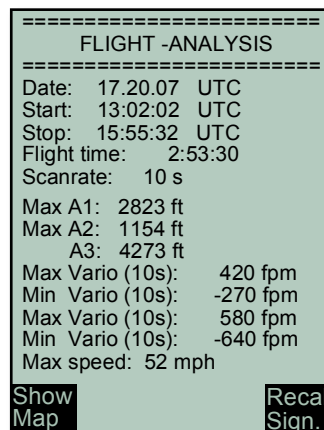
When the battery test is complete the 6030 will enter run-mode and the display will appear as shown in section 2.2.



To switch the 6030 **off**, press and hold the *On/Off* key for 3 seconds. To prevent unintentional switch-off, the display will show *"really switch off?? Press OK to confirm."* Confirm by pressing the *OK* key. If the instrument has not registered a flight, the display will show the Shutdown screen. The remaining battery status will be shown, as well as the comment *"Wait 10 seconds before next power on."* **Important: failure to observe this instruction can cause malfunction.**

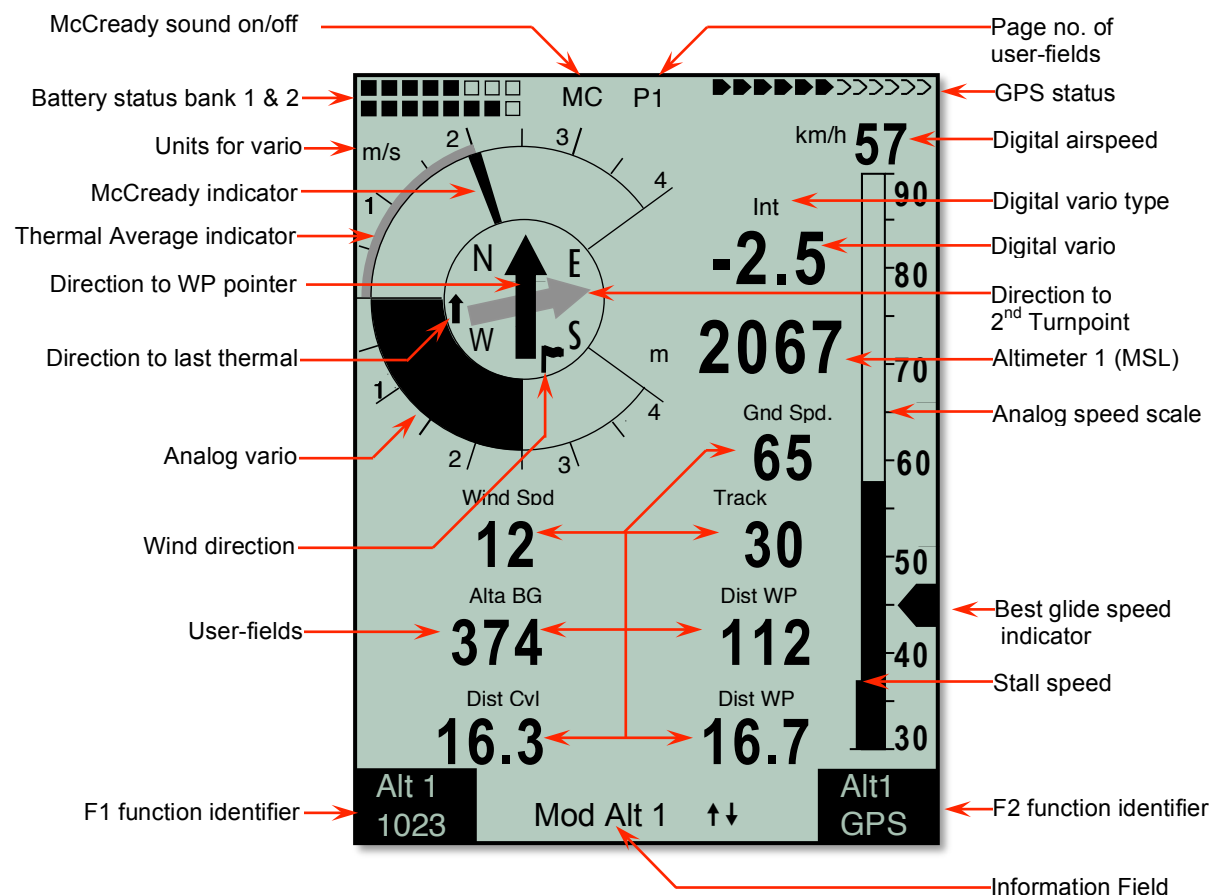
Alternatively, if a flight recording has occurred, the display will show the **Flight Analysis Page** where the particulars of the recorded flight are shown. A short press of the *OK* key or the *On/Off* key will complete the shutdown process.

The 6030 has an **automatic shut-off** function that will power down the unit after 30 minutes without GPS reception or 30 minutes after it determines a flight has concluded.



2.2 Main Display Page

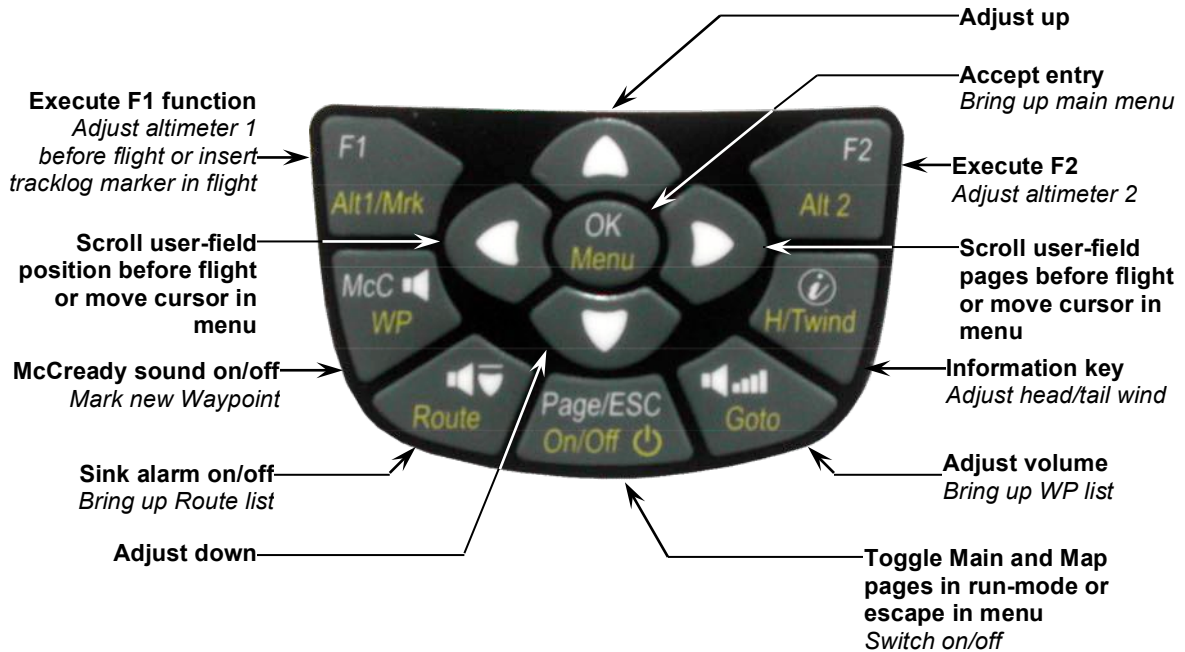
Each time the 6030 is turned on, the display defaults to the main display page. The upper portion of the display provides altitude, vertical speed (vario), air speed (ground speed if pitot sensor is turned off), directional information, as well as battery and GPS status. The lower half of the main display has seven data fields that show relevant flight data. The information shown in each of these fields can be selected from a list by the user. Consequently, they are referred to as **user-fields**. The 6030 has three independent pages of user-fields that can be scrolled through with the **►** key. **The assignment of user-fields is discussed in Section 2.7**



The **Information Field** is the region between the two function key identifiers in the lower portion of the normal operation pages that can show up to two lines of situation dependent text. For example, when you first turn on the instrument the Information Field will show *"Mod Alt1 ↑↓"* to prompt you to set altimeter with the **▲ ▼** keys before you fly. The Information Field is used when the 6030 needs to convey text information when the instrument is in normal run-mod

2.3 Keypad

White lettering on the keypad indicates actions/functions executed with a short-press of that key. Yellow lettering indicates actions/functions executed with a long press (3 seconds) of the key and are associated with making a selection or adjusting a setting.



2.3.1 Function Keys F1 and F2

The 6030 has two **Function Keys** (*F1* and *F2*), and their functions are context-dependent. For example, when operating in Route mode, *F1* means “previous waypoint” and *F2* “next waypoint.” However, when creating a route, *F1* stands for “Insert WP” and *F2* “Delete WP.” In each case the meaning of the keys appears in the dark shaded fields just above the respective keys.

2.3.2 Entering Text

While it is considerably easier to enter alphanumeric data such as pilot name, glider type or waypoint name using FlyChart (**as discussed in section 8.3**), this can also be accomplished with the 6030 keypad even though it does not have letter/number keys. To serve as an example, the following is the process for entering the pilot's name into the 6030:

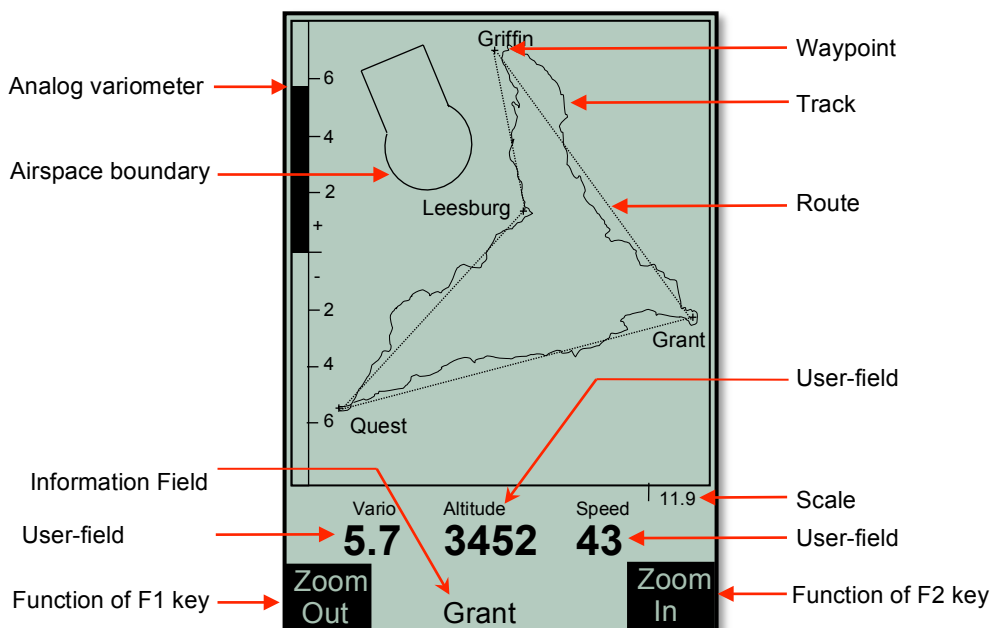
Long-press the Menu key, scroll down to Pilot settings with the ▼ key and press OK, then scroll down to Pilot name with the ▼ key and press OK. Note that there is a blinking cursor in the Pilot Name field (“not set” is there as a place holder). Use the ▲ and ▼ keys to scroll through the available upper case letters and symbols, or short-press the F1 key to cause the ▲ and ▼ keys to scroll through lower case letters and numbers. Press OK to accept the selection and advance to the next character. Continue this process through all the characters of your name. The cursor can be moved with the ◀ and ▶ keys, and characters can be deleted with a short press of the F2 key. **Important:** the characters \$ * ! \ ^ ~ are not available since they are reserved for use in the .igc file.

2.4 Units for Numerical Values

The numerical values shown on the 6030 display can be set to display in either U.S. Standard units or metric units. Altitude values can be in feet or meters; vertical speed (rate of ascent/descent) in ft/min or m/sec; distance in miles or kilometers; speed in mph, km/h or knots; and temperature in °F or °C. Each measurement type can be individually set. For example, altitude can be shown in meters, vertical speed in ft/min and speed in knots. To set the measurement units, highlight the Units sub-menu in *Menu>Device settings* and press OK; the cursor will start blinking on the first unit to be set. Select the desired unit by choosing 0 for metric or 1 for US standard units (2 is used to select knots for speed) with the ▲ ▼ keys, and then press OK to accept the setting and advance to the next field. Proceed in the same way with all five measurement unit selections.

2.5 Real-Time Map Page

A short press of the *Page/ESC* key will bring up the Real-Time Map page where your track, waypoints, the active route, and any restricted airspace you have defined will be visible. If a Competition Route is active, start/turnpoint/goal cylinders will be shown as well. There are three user-fields just below the map (default is Digital vario, altitude and air speed). There is also an analog vario scale along the left edge of the map. Your current position will appear on the track as a direction arrow.



When viewing a stored flight, the ◀ ▶ ▲ ▼ keys can be used to pan the map in each respective direction. However, this function is not enabled during flight.

| Short press | Action on Map Page |
|--|--|
| F1 Zoom out | The map scale is incrementally increased until the complete track is shown. |
| F2 Zoom in | The map scale is incrementally decreased to show greater detail. |
| OK | Jumps back to complete flight view. |
| i | Calls up information related to the three closest airspace avoidances. |
| Page | Returns to the Main Page. |
| ▶ | During flight, all waypoints not used in the active route are hidden/revealed. |
| All other keys cause the displayed track to be redrawn | |

Note: Tracks are drawn backwards from the current position. It will take a few moments to draw the map/track, depending on the number of track points in the flight track (*"Wait"* and *"Ready"* will correspondingly appear in the Information Field). If a zoom or pan key is pressed while the map is being drawn, the original draw will be suspended and will start over again with new pan/zoom selection. This allows you to quickly view the desired section of the map.

2.6 Batteries and Charging

The 6030 operates on two banks of two AA batteries and comes equipped with four 2100 mAh NiMH batteries installed, for a total run time of approximately 30 hours. The instrument always starts on Bank 1 and will automatically switch to Bank 2 when Bank 1 is exhausted. However, if you attempt to start-up the 6030 when battery Bank 1 is too weak for proper operation, the 6030 will be unable to auto-switch to battery bank 2 and will automatically shut down. If this occurs, do not attempt to turn it on again until the batteries have been charged or replaced with fresh batteries. **Important: failure to observe this precaution can result in malfunction.**

When the 6030 is turned on, it performs a battery test during the start-up sequence and shows the approximate charge level of the two battery banks on the start-up screen. When the 6030 is on, the battery status of each bank is shown in the upper left corner of the display on the Main Pages (Bank 1 on the top line and Bank 2 on the bottom line). When the 6030 is shut down, the display will show the battery status of both banks on the shutdown screen. It is recommended that the rechargeable batteries in Bank 1 be swapped with Bank 2 once a year so that they age equally.



The 6030 has a built-in dual charging system that will simultaneously and independently charge Banks 1 and 2. When either the wall adapter or the vehicle charging cable is plugged in (under the right side port cover) the charging status LEDs on the bottom of the instrument will illuminate. The LEDs may blink for a few minutes when the charging cable is first plugged in while the charger assesses the condition of both battery banks. Each LED will turn off when its respective battery bank has been fully charged (4-6 hours if the batteries were nearly fully depleted). When the LEDs turn off, the batteries will continue to trickle charge and can be left this way to top-off the batteries. However, for safety reasons, it is recommended that the charger cable be disconnected after a few hours of trickle charging. **Note: If the charging is terminated before the LEDs turn off, the battery status will falsely show that the batteries are full.** The ambient temperature should be between 50° and 86°F (10°–30°C) during charging. It may happen in warm ambient temperatures that the charging process will be discontinued – indicated by flashing LED(s) – because the batteries have gotten too hot. In this case the charging cable should be removed and replaced after the batteries have been allowed to cool down. **Important: The 6030 should not be switched on during charging, as this will interfere with proper charging of the batteries.**



If you forget to charge the batteries and discover at the takeoff site that they are too weak to use, or if you are in a situation where recharging is not feasible, you can replace the rechargeable batteries with alkaline batteries. It is not necessary – but it is recommended – that Bank 2 have batteries installed. However, Bank 1 **must** have batteries installed. If alkaline batteries are used, the battery type should be changed to alkaline in *Menu>Device settings>Battery type*. It is important that the correct battery type be set, to prevent the 6030 from inadvertently switching off when it attempts to auto-switch from Bank 1 to 2.

Please recycle spent batteries.

2.7 User-Fields

On the Main Display Page, the 6030 can display either five or seven user-fields that can be selected from the list below. There are three pages of user-fields that can be scrolled with a short press of the ► key. The page number (i.e., P1, P2 or P3) of the sub-page is shown left of the GPS status indicator. On the Map Page there are three User-fields. To assign a user-field, press the ◀ key to scroll to the desired user-field position. The name of the corresponding user-field will be highlighted in black above the selected field and will appear in the Information Field. To change the user-field shown in the selected position, use the ▲ ▼ keys to scroll through the list of possible values. If the user-field is not changed within 10 seconds, the highlighting will cancel and the original data field will remain. During flight you may page among the three pages of user-fields using the ► arrow key; however assignment of the user-fields is blocked. The Selection of 5 or 7 user-fields for each of the three user pages is set in *Menu>Device settings>Userfields*. Set each page to “Yes” for 7 user-fields per page or “No” for 5 user-fields per page. When five user-fields per page is selected, the four user-fields in the lower portion of the display are considerably larger than when seven per page is selected.

| User-Field | Description | Reference |
|--------------------------|--|-----------|
| Alt 1 | MSL altitude | 3.2 |
| Alt 1 (ft) | Altimeter 1 shown in feet (used if main altimeter is in meters) | 3.2 |
| Alt 2 | Reference height (if desired can be set to 0 at launch) | 3.2 |
| Alt 3 | Total height gained during the flight | 3.2 |
| Alt GPS | Altitude From internal GPS module* | 3.2 |
| FL (ft) | Flight level | 3.2 |
| QNH (hPa) | Air pressure in hecto-Pascals (millibars) | 3.2 |
| QNH (inHg) | Air pressure in inHg | 3.2 |
| Alt a WP | Arrival height above the next waypoint/goal* | 3.12.2 |
| Alt Allowed | Shows the floor of overhead airspace (if present) | 7 |
| Vario | Vertical speed | 3.1.2 |
| A BG WP | Altitude above the best glide path to the next waypoint* | 3.12.1 |
| A BG Goal | Altitude above (or below) best glide to goal around the course | 3.12.3 |
| Alt Cone | Vertical distance up to CESS | 5.4.4.1 |
| Start Race | Minutes and seconds before/after the start of Competition Route | 5.4.3 |
| CylArrival | Minutes and seconds before/after the race start from current position | 5.4.3 |
| Spd StCyl | Groundspeed required to arrive at the start cylinder boundary for optimal start* | 5.4.3 |
| Flt time | Flight time since takeoff | 3.9 |
| Time | Time of day according to GPS with UTC offset applied | 3.8 |
| Temp | Internal temperature | 3.7 |
| Track | Flight direction (course)* | 5.2 |
| Bearing | Direction to chosen destination* | 5.2 |
| Dist WP | Distance to chosen destination (waypoint)* | 3.10.1 |
| Dist therm | Distance to last climb* | 3.10.2 |
| Dist goal | Distance to goal (end of route) around the balance of the route * | 3.10.3 |
| Dist CTR | Distance to restricted areas* | 3.10.4 |
| Dist Toff | Distance to takeoff* | 3.10.5 |
| Dist Cyl | Distance to cylinder* | 3.10.6 |
| Dist StCyl | Distance to start cylinder* | 3.10.6 |
| Dist opt WP | Distance to the optimized turnpoint cylinder intercept (optimized route active)* | 5.4.2 |
| XT Error | Cross track error (the perpendicular distance to the active leg of a route)* | 5.2 |
| Wind Comp | Wind component (ground speed minus true air speed) along the glider's track* | 5.2 |
| Gnd spd | Speed over the ground (GS)* | 3.4.3 |
| Air spd | Air speed | 3.4.1 |
| Wind Spd | Wind speed* | 3.4.4 |
| L/D req. | L/D required to reach a WP* | 3.11 |
| L/D air | Actual L/D through air (= TAS/Sink) | 3.11 |
| L/D gnd | Actual L/D over ground (= Ground Speed/Sink)* | 3.11 |
| L/D goal | L/D required to reach goal around the remaining turnpoints to goal* | 3.11 |
| SMS p/t | Number of pending and transmitted positions (via SMS) | |
| FLARM | No. of FLARM enabled aircraft in close proximity (optional hardware required) | |
| [blank] | No data shown | |
| * GPS reception required | | |

2.8 Main Setup Menu

Press and hold the *Menu* key until the **Main Setup Menu** appears. In this menu you can customize the 6030 to your preferences, view recorded flights, manage routes/waypoints, manage restricted airspace definitions, manage the instrument memory, and access the 6030 Simulation mode. Use the ▲ ▼ keys to highlight the desired selection, and press OK to open that sub-menu. **Please see Section 9 Main Setup Menu for a complete discussion of the Main Setup Menu.**

3 Flight Functions

3.1 Variometer

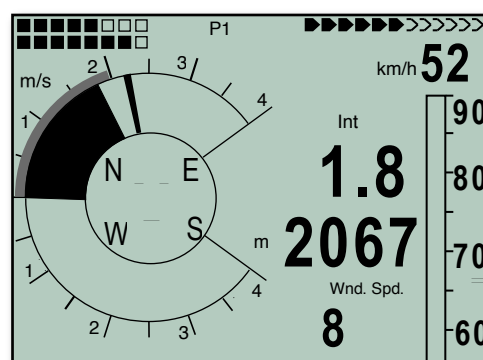
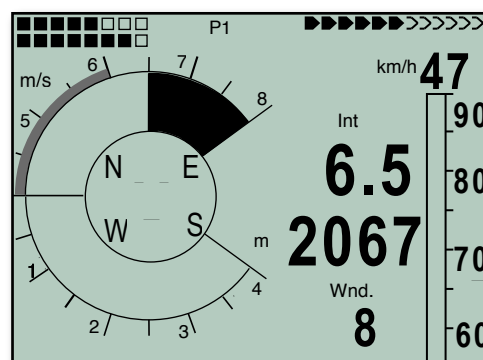
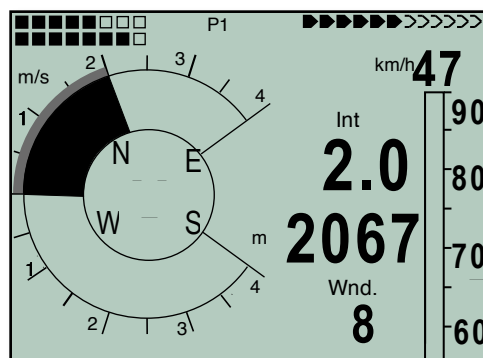
3.1.1 Analog vario

The most important instrument function for any kind of glider flying is the **variometer**. The 6030 displays vertical speed in ft/min or m/sec and tells whether the pilot is climbing or descending. By using the vario and its accompanying sounds, the pilot can search for the most efficient climb or recognize when he or she is in rapidly descending air.

The first scale range on the analog variometer display is ± 4 m/sec (shown as ± 4 m/sec in the figure on the right). If the vertical speed exceeds these limits, the scale automatically switches to a second range from 800 to 1600 ft/min (shown as ± 4 to 8 m/sec in the top figure next page).

The 6030 features a new state-of-the-art pressure sensor and smart filter technology. This allows the variometer to dramatically reduce false lift indication caused by turbulence surrounding lift. This filtering can be controlled in *Menu>Pilot settings>Vario>Vario response delay*. The setting range is 0 (dampened and subdued) to 4 (fast and reactive). A setting of 4 will yield a very fast and reactive vario that will respond almost instantly with vertical ascent and will offer little dampening of ascent and descent swings associated with turbulence. This setting is recommended for very smooth light conditions or for pilots who want to be able to “hear” the texture of the air and do their own filtering. A setting of 0 will minimize false indications of lift, however, the vario response will seem dampened and sluggish. This setting is useful in strong and turbulent conditions or for pilots that prefer not to be distracted by a very active variometer. If you are unsure of your preference, a setting of 2 or 3 is recommend (with a *Vario lift threshold* of 4 ft/min or 2cm/s). The effects of this setting can be seen and heard in the simulation mode, or in test flights, and the vario response delay can then be adjusted up or down as desired.

If you are flying too fast while thermaling, thus compromising your climb rate, the 6030 will provide a visual indication on the dial display. A radial line will appear above the indicated climb rate (lower right figure). If this example is compared to the figure on the bottom of the preceding page, you can see that a 52 km/h thermaling speed is too fast for the 2 m/sec thermal, and the pilot's climb rate is compromised by 0.2 m/sec. To maximize the climb rate, the pilot should reduce air speed until the radial line converges with the indicated climb rate on the dial (unless, of course, the turbulence of the thermal dictates a higher thermaling speed).



3.1.2 Digital Vario and Netto Vario

The **digital vario** appears to the right of the analog vario dial just above Altimeter 1, and has a resolution of 10 ft/min (0.1 m/sec). The digital variometer has a very wide measuring range of $\pm 14,000$ ft/min (± 70 m/sec). Therefore, it is capable of displaying extreme vertical speeds such as those found in skydiving and base-jumping. If desired, the digital vario display can function as an **averaged vario** (also called an **integrated vario**) by setting *Digital vario mode* to 0 in *Menu>Pilot settings>Vario>Digital vario mode* and then setting the desired

average period between 1 and 30 seconds in the *Average time* field. This is very useful in determining the actual strength of a rough thermal.

Alternatively, the digital vario can be set as a **Netto** (air-mass) vario, which shows the vertical motion of the surrounding air, by setting *Digital vario mode* to 1. It is possible to set the digital vario to serve as an averaged vario while climbing and as a netto vario (air mass vario) while gliding, by setting the *Digital vario mode* field to 2. **For more information, see Section 12.2.** In order to receive accurate netto vario information from the 6030, you must first install an accurate polar for your flight configuration (i.e., your particular glider, wing loading, harness, air speed sensor, etc.). **Please see Section 12.4 for more information.**

3.1.3 Average Thermal Climb Indicator

Soaring pilots know that thermal strength can vary considerably from day to day and throughout any given day. The 6030 has an Average Thermal Climb indicator that shows the strength of a thermal averaged over a predetermined period (up to 10 minutes). The Average Thermal Climb rate is shown in the shaded outer ring (this ring is black when McCready sound is turned on) of the analog vario dial. In the example below the averaged strength of the last thermal is 2 m/sec. You are gliding optimally when you control your air speed so that the McCready indicator points to the value of the average thermal climb indicator. Also **see Section 12.5, McCready Theory.** The period over which the thermal strength is averaged can be set between 1 and 20 in *Menu>Pilot settings>Vario>Thermal Averager*, where the values represents units of 0.5 minutes. The default is 20, which is 10 minutes (20*0.5 min).

3.2 Altimeters and Air Pressure

The 6030 tracks and can display five different altitudes as well as the **QNH** in hPa and InHg, as shown in the table below. The MSL altitude is shown in Altimeter 1 (Alt 1) and appears to the right of the analog variometer. All of the other altitudes and the QNH can be displayed in the user-fields. **See Section 2.7, User-Fields.**

| | |
|-----------------|--|
| Alt 1 | Altitude above sea level (QNH). Can be manually set with ▲ ▼, F1, F2 keys or auto-set from GPS (see below). |
| Alt 2 | Altitude with respect to a reference height. This can be adjusted at any time by calling up "Mod A2 ↑↓" with a 3-second press of the F1 key and then setting the desire value using the ▲ ▼ keys – or press the F2 key to set A2 to 0. |
| Alt 3 | The total height gained during a flight. If several pilots complete the same flight task, then the one who climbed the least overall would have flown most efficiently. |
| FL (ft) | Flight-Level is based on an air pressure of 29.92 inHg (1013 hPa) at mean sea level and cannot be adjusted by the user. |
| Alt GPS | Altitude from the internal GPS module. May be useful in competition where there is a ceiling and the scorekeeper will be checking compliance with scoring programs that use GPS altitudes. In this case, the pilot should monitor Alt GPS to be sure a declared ceiling is not broken. |
| QNH hPa | The barometric pressure at sea level in hecto-Pascals (millibars) |
| QNH inHg | The barometric pressure at sea level in inches of mercury |

With the exception of GPS altitude, all of the altimeters in the 6030 measure altitude from atmospheric pressure. When you turn on the 6030 it has no way of knowing to what extent the current barometric pressure is having on the measured air pressure. For this reason, Alt 1 should be adjusted to display the actual height above sea level prior to each flight.

3.3 Setting Altimeter 1

When the 6030 enters the run mode after switch-on, Alt 1 will be blinking to indicate that the altitude has not yet been set and the Information Field will show "Mod Alt1 ↑↓" to prompt that the ▲ ▼ keys can be used to set Alt 1. If the user does not set Alt 1 with the ▲ ▼ keys the 6030 will auto-set Alt 1 to GPS altitude as soon as the GPS gets a 3D fix. After Alt 1 is auto-set, it will continue to blink to show that the altitude was not manually set by the user, however, it will stop blinking when the 6030 recognizes that a flight has begun. Alt 1 can be manually set to a value that corresponds to the default QNH pressure of 29.92 inHg (1013.25 hPa) with a short press of the F1 key. Alt 1 can be manually set to GPS altitude by pressing the F2 key (provided the internal

GPS has acquired). If other pages or functions have been accessed prior to setting the altitude, “Mod Alt1 ↑↓” may not be present in the Information Field but can be called up with a long press of the Alt1 key.

When you adjust Alt 1, the sea level air pressure also changes and can be seen in the **QNH hPa** or **QNH inHg** user-fields. To set the altitude of your current location based on the QNH pressure, follow the steps to set Alt 1 – but rather than setting the Alt 1 value to a specific altitude, use the ▲ ▼ keys to set the QNH user-field to the value reported by a weather radio or flight service. If Alt 1 is set to zero for any planned landing area, then the height above this location will always be indicated after starting. The associated air pressure (**QFE**) will be the actual air pressure in hPa at that altitude, which deviates from QNH, the pressure at sea level.

The user-field **Alt GPS** displays your altitude as determined by the internal GPS module, whereas, all of the other altimeters in the 6030 use **pressure altitude**. Due to the different calculation methods for pressure altitude and GPS altitude, Alt GPS will, more than likely, differ from Alt 1, even if you correctly set your reference altitude prior to launch. On warm days pressure altitude will generally read lower than GPS altitude and can differ a few hundred feet. It should be noted that the worldwide standard for aviation is pressure altitude. Therefore, GPS altitude should not be used with respect to aviation regulations. Alt GPS may be useful in competitions that set altitude limits with respect to GPS altitude.

As the pressure sensor in the 6030 ages, the pressure shown in the QNH user-field, when setting the altimeter, may not coincide with the QNH provided by flight service, local weather station, etc. It is possible to correct this by entering a pressure sensor correction value, however, this should only be attempted by experienced users. If you find that the 6030 QNH does not agree with the QNH provided by reliable sources, contact Flytec for assistance in entering a correction.

3.4 Speed

3.4.1 Airspeed

After vertical speed and altitude, air speed is the next most significant piece of flight information. Air speed information increases safety and can be used to increase performance during racing and distance flights. The best glide speed, the McCready speed to fly, and the netto vario can only function when the air speed is known. The 6030 displays your air speed in the analog speed scale on the right side of the normal run-mode display, and digitally at the top of the analog scale. You can choose to display air speed as **true** or **indicated**, and can choose between two possible speed ranges for the analog speed display (12–37 mph) or (19–56 mph) in *Menu>Pilot settings>Speed>Speed mode*.

The 6030 has two independent speed sensor options:

- A built-in **pitot pressure sensor** that measures **indicated air speed (IAS)** and is capable of showing speeds of up to 180 mph (300 km/h) on the digital display and 12–56 mph on the analog speed scale. If necessary, the pitot tube can be extended with a flexible tube to a turbulence-free spot on the glider or removed (pulled out) for replacement. **IMPORTANT: if the pitot tube is removed, the opening in the fitting should NEVER be plugged airtight as this can over-pressurize and damage the internal sensor.**
- An optional **vane wheel sensor** (can be used with HG and PG versions of the 6030), which measures **true air speed (TAS)** and is capable of showing speeds 1–94 mph (150 km/h) on the digital display and 12–56 mph on the analog speed scale. It is also well suited for determining the wind speed at takeoff. If this sensor is plugged into a 6030, the pitot sensor will be disabled and the air speed from the vane sensor will be displayed.

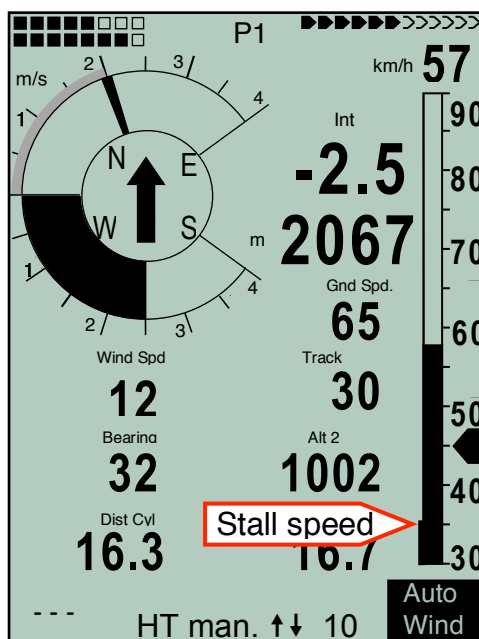
Regardless of which air speed sensor is used, the 6030 internally calculates both TAS and IAS. Should you be unfamiliar with the difference between these two air speeds, please refer to Section 12.3, True or Indicated Air speed in the Appendix.

The measured air speed from either speed sensor (pitot and vane wheel) can be corrected by applying a correction factor in *Menu>Pilot settings>Speed>Vane wheel correction* or *Menu>Pilot settings>Speed>Pitot correction*. The factory setting is 100% for both sensor options. When a value other than 100% is used, the 6030 will display that percentage of the measured value. It is also possible to set a constant **offset** onto the pitot air speed value to compensate for the slower airflow underneath the wing; this is set in *Menu>Pilot settings>Speed>Pitot correction*. This offset will be added or subtracted (depending on the sign) to the measured air speed value. It is recommended that pitot correction be set to 100% if an offset value is to be

used. The pitot sensor can be turned off in *Menu>Pilot settings>Speed>Pitot correction* by setting *use sensor* to *off*.

3.4.2 Stall Alarm

It is possible to enter the stall speed of your glider into the 6030, in which case, the altitude-adjusted stall speed will appear on the left edge of the analog speed scale (shown in figure left 36km/h). If the measured air speed falls below that threshold an alarm will be given. Since the 6030 cannot directly determine if a glider is about to stall, it is important to correctly enter the glider's stall speed (or preferably a speed just a little bit faster). The stall alarm threshold can be entered in *Menu>Pilot settings>Speed>Stall speed*. To prevent the stall alarm from sounding during slow flight (thermaling), an altitude threshold above which the stall alarm feature will be inactive can also be set using this same menu. To disable the stall alarm, set the stall speed value to 0. The trigger point for the stall alarm is always linked to the indicated air speed. Therefore the alarm will sound at a faster flying speed at higher altitudes than at sea level. For information, refer to Section 12.1 Stall Alarm.



3.4.3 Ground Speed

The GPS receiver determines its position once each second. Ground speed is derived from the distance between these positions and can be displayed in the user-field *Gnd speed*. Only from the difference between air speed and ground speed can one make conclusions about the wind's influence. If the pitot sensor is turned off in *Menu>Pilot settings>Speed>Pitot correction* and there is no vane wheel sensor plugged in, the 6030 automatically shows the GPS-derived ground speed in the analog speed scale and in the digital speed field.

3.4.4 Wind Direction and Speed

The wind speed can be displayed in the user-field *Wind Spd*. Wind direction appears in the compass rose as a small windsock. It is necessary to fly at least two complete 360s as steadily as possible before the 6030 can register and display wind speed and direction. During the final landing approach, this symbol should always be at the top of the compass rose (to the extent the landing field will allow).

3.4.5 Total Energy Compensation (TEC)

It is evident that a cyclist who coasts up a small hill without pedaling has gained the elevation from his own momentum. Similarly, a hang glider can gain altitude by pushing out the control bar while flying at speeds above minimum sink. It would be a mistake for that pilot to interpret this altitude gain as lift. **Total Energy Compensation (TEC)** is an attempt to eliminate a climb indication (audible and visual) caused by trading air speed for altitude. This is an indispensable feature for sailplanes because of their performance. However, if an obvious gain in altitude can be achieved by speed reduction when hang gliding and paragliding, then the use of TEC makes sense for them as well. The 6030 can suppress these vario swings caused by speed changes, and will indicate climb or sink caused by the surrounding air, and not by the conversion of speed to altitude. When you are flying according to McCready speed to fly, where speed adjustments are continuously necessary, the TEC is also of great help. TEC also steadies the vario, and its related audio, when you are centering in a turbulent thermal. The effect of the TEC can be adjusted in *Menu>Pilot settings>Speed>TEC*. The factory compensation setting is 65%, and it is recommended that the compensation be kept between 60% and 80%. A TEC setting of 100% has not proved useful because then even horizontal wind turbulences can influence the TEC and make the vario a bit jumpy.

3.5 Speed-to-Fly

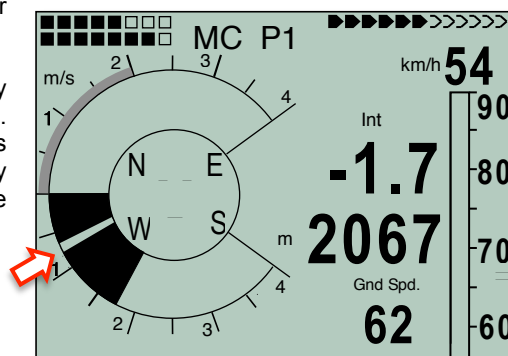
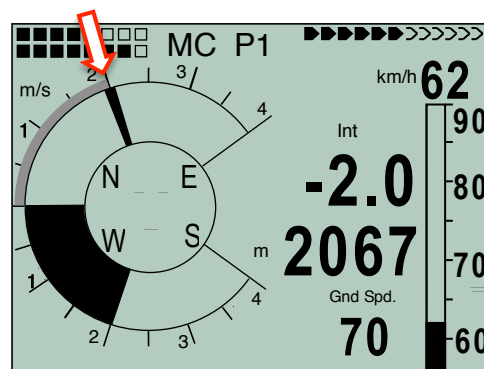
3.5.1 Best Glide Speed

On the right side of the analog speed scale there is a black arrow that indicates the air speed for best glide, which is dependent on the polar of the glider, the wind strength and direction, and the sink rate of the surrounding air. When racing (flying to cover the most distance in the least amount of time), a pilot will generally fly faster than the best glide speed this indicator is recommending – unless every foot of height is essential (survival mode). The true value of the best glide speed will increase with increased altitude; however, it does not matter if you have chosen to display true or indicated air speed, since the 6030 compensates for this on the various displays. For more information **please see Appendix Sections 12.3, True or Indicated Air Speed, and 12.4, Polars and Best Glide Speed.**

3.5.2 McCready Indicator

To assist in controlling your glide speed for McCready-optimized flight, the 6030 has a McCready indicator that shows the **speed ring setting** being flown, based on your current flight speed, the polar of the glider, the wind, and the vertical speed of the air mass in which you are currently flying. On the 6030 the McCready pointer appears as a radial line in the analog dial. To fly optimally, you should control glide speed so that the McCready indicator points to your next expected climb rate on the analog vario dial. In the example (above right), the pilot is flying with a speed ring setting of 2 m/sec (400 ft/min). To complete a competition task in the shortest time possible, the pilot may consider keeping the McCready pointer as close as possible to the average climb rates achieved in previous thermals (indicated by the Average Thermal Climb indicator). **Please refer to Section 12.5, McCready Theory** for further explanation.

If you glide too slowly for the given conditions, the McCready pointer will appear in the sink sector of the analog vario display. In the example (below right), the pilot is flying 50 km/h, which is too slow for the current conditions; therefore the McCready pointer is seen in the sink sector of the dial display. If the McCready sounds are on, the pilot will hear The Negative McCready alarm (rapid low-frequency beep) telling the pilot to speed up. The pilot should immediately speed up until the negative McCready alarm stops and the McCready pointer at least progresses to 0 (best glide).



Using the 6030's McCready audio feature, you can control glide speed acoustically. The default for McCready sound is turned off each time the 6030 is turned on. To activate the McCready sound, press the *McC* key once. When the McCready sound is turned on, "MC" will appear at the top of display (between the battery status and the page number). The Average Thermal Climb indicator will appear as a solid black outer ring (as opposed to shaded when the McCready sound is off). The frequency of the McCready tone is proportional to the speed ring setting that you are flying (i.e., the higher the speed ring setting, the higher the frequency of the McCready tone). If the tone lowers while you are gliding and attempting to hold a fixed speed ring setting, then you need to speed up; conversely, if the tone increases then you should slow down.

It is possible to set a **dead band** for the McCready sound (in *Menu>Pilot settings>McCready>tonegap*) so that there will no McCready sound when flying at or near the desired speed ring setting. Each time the McCready sound is turned on, the dead band will be centered on the speed ring setting you were flying when you pressed the *McC* key. If a deadband has been set in the McCready settings, the deadband will appear shaded in the Average Thermal Climb indicator (assuming the Average Thermal Climb indicator is filled in to the point where you set the dead band). To move the dead band to a different speed ring setting, adjust your speed so that the McCready indicator lines up with the new desired speed ring setting and then press the *McC* key twice (the first press turns the sound off and the second press turns it back on with the new setting). The width of the dead band in ft/min (m/sec) and time delay (in seconds) for the starting of the McCready sound after leaving a thermal can be set in *Menu>Pilot settings>McCready*.

3.5.3 Polars

In order to receive accurate speed to fly, netto vario and glide ratio information from the 6030, you must enter an accurate **polar** for your flight configuration (i.e., your particular glider, wing loading, harness, air speed sensor, etc.). You can obtain the polar for your glider from your glider's manufacturer and then, by trial and error, adjust those values to match your actual performance. A more accurate method is to use the 6030 to record the data to build your polar by flying **data recording flights** in smooth air. During the flight, each air speed between V_{stall} and V_{ne} should be maintained for several seconds. With the aid of **FlyChart** 4.52.21 or later, the data attained can be used to generate your own actual polar curve.

Once the polar has been developed, only two polar curve points need to be entered into the 6030: the speed (mph or km/h) and corresponding sink rate (ft/min or m/sec) for (1) minimum sink and (2) a speed in the upper range of your glider (best maneuvering speed). These two air speed/sink rate pairs are entered manually into the 6030 in *Menu>Pilot settings>Polar data*. You may notice that the polar values you enter are rounded- this is normal and is no cause for concern. In addition to the two sink-rate/air-speed pairs, you must also enter the average altitude at which you flew when conducting the testing, using the *altitude* field of the Polar data menu. All of the documented polar curve points will be converted and saved as "Indicated," and the polar curve will now be valid for all altitudes.

The 6030 can store the polar data for two different gliders so that you do not need to re-enter the polar data pairs when flying your second glider. To enter and use a second polar data set, change the *use set* field in *Menu>Pilot settings>Polar data* to either 1 or 2.

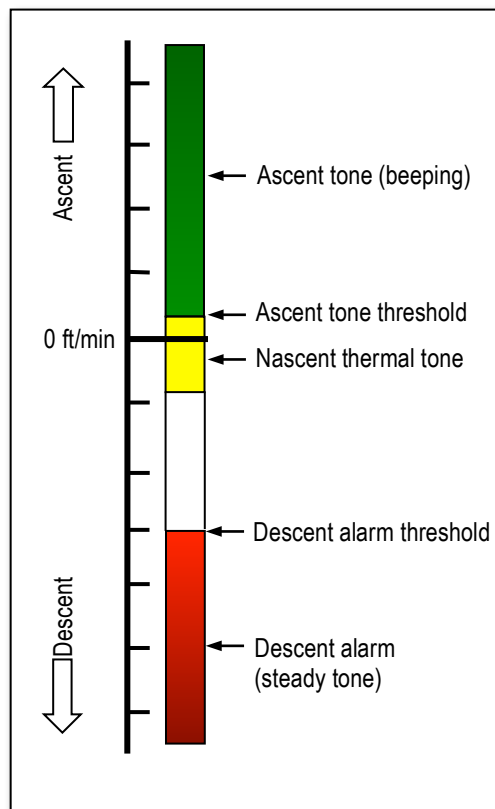
3.6 Audio

The volume for the 6030 audio is adjusted with the \blacktriangleleft key. Short press the \blacktriangleleft key to scroll through the volume settings. The sound levels are: 0% – 25% – 50% – 75% – 100% and are momentarily displayed in the Information Field when a change in volume is made. All of the sounds described in this section can be heard in Simulation mode.

Automatic Volume Control: The basic sound levels of 25%, 50%, and 75% will slowly increase automatically when the air speed exceeds 25 mph (40 km/h), but never to greater than 100%.

Ascent Tone: The ascent tone starts when the climb rate exceeds a predetermined threshold. The **ascent tone threshold** is the lift value that must be exceeded to start the ascent tone (beeping). If the vario units have been set to ft/min, the default threshold is approximately 4 ft/min and can be altered to between 0 and 39 ft/min. If the vario units have been set to m/sec the default is .02 m/sec and can be set between 0 and 0.2 m/sec. The value can be changed in *Menu>Pilot settings>Acoustic vario>Lift audio threshold*. The greater the threshold value, the greater the ascent rate needed to initiate the ascent tone. As stronger lift is encountered, the frequency (tone) and tempo of the ascent tone will increase at a predetermined rate (see **Modulation** and **Pitch below**). It is possible to set the start frequency of the ascent tone between 600 and 1400 Hz in the *ascentF* field in *Menu>Pilot settings>Acoustic vario>Customize sound*.

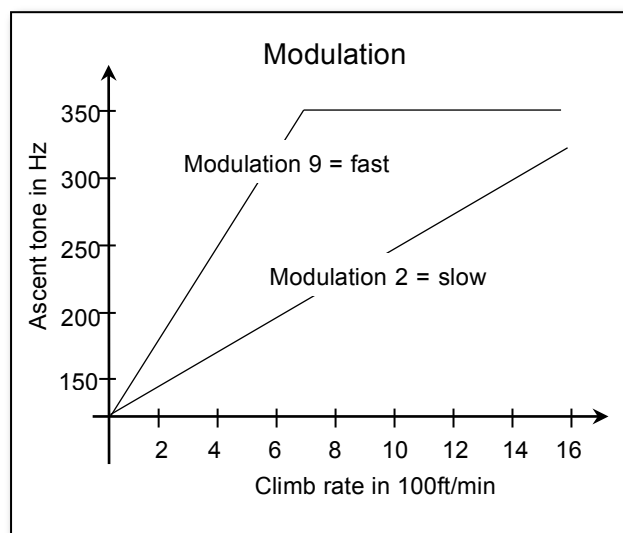
Nascent (Near) Thermal Tone: This is a beep tone similar to the ascent audio that indicates lift that is not quite strong enough to trigger the ascent tone but may deserve investigation when finding a source of lift is critical. The nascent thermal tone is only active in flight to prevent unnecessary and distracting beeping while standing at launch waiting to takeoff or after landing. The upper threshold of this tone is the same as ascent tone threshold and the lower limit can be set between 0 and -200ft/min in *Menu>Pilot settings>Acoustic vario>Near thermal tone*. In this same menu the cycle rate (beep/pause ratio) of the nascent thermal tone can be set from 10% to 100%. At 10% the nascent thermal tone will have a short beep and a long pause, at 50% the



beep/pause will be equal, and at 100% the tone will be steady. The nascent thermal tone can be disabled *Menu>Pilot settings>Acoustic vario>Near thermal tone*.

Acoustic Integrator: Also known as dampening, this is used to dampen the irregular ascent/descent sounds that would result when flying in turbulent air. The amount of dampening can be set to between 1 and 35 in the *damp* field in *Menu>Pilot settings>Acoustic vario>Customize sound*. The lower the value, the more responsive the frequency change in the ascent tone will be, as vertical speed values change. However, this will result in an erratic beep frequency in rough air (piano effect). The higher the value, the smoother the ascent/descent frequency changes will be with changes in vertical speed – however, the frequency change will be somewhat delayed. The factory setting is 8, which is a good compromise.

Modulation: The rate at which the frequency of the ascent tone increases as increased lift is encountered is called modulation. The modulation of the ascent tone can be adjusted to values from 2 to 9 in *Menu>Pilot settings>Acoustic vario>Customize sound*. The higher the value, the faster the frequency will increase as the lift values increase. A modulation setting of 9 will yield more audible change at lower climb rates, making it best suited for use in mild lift. Conversely, a modulation of 2 will spread the audible change over a greater range of climb rates, and will be better suited for flying in stronger conditions (see graph facing page). The factory setting is 5.



Pitch: The ascent tone has a beep-pause ratio of 1:1 that cannot be changed; however, the tempo (pitch) of the beeping becomes more rapid with increasing lift. The rate at which the tempo increases as increased lift is encountered can be changed by altering the pitch value between 1 and 7 in *Menu>Pilot settings>Acoustic vario>Customize sound*. A pitch setting of 7 will yield maximum beep tempo at a climb rate of 1,000 ft/min (5 m/sec), while a setting 1 will yield maximum beep tempo at 5,000 ft/min (25 m/sec).

Sink Alarm: The sink alarm is a continuous tone, triggered when the descent rate exceeds a predetermined threshold. The sink tone decreases in frequency as the descent rate increases. The sink alarm can be toggled on and off by briefly pressing the \blacktriangleleft key. When the sink alarm is turned on, the 6030 will sound a sample tone and the analog vario display will momentarily show the sink alarm threshold. The sink tone threshold can be set between 10 and 2000 ft/min in *Menu>Pilot settings>Acoustic vario>Sink tone threshold*. The start frequency of the sink tone can be set in the *sinktoneF* field in *Menu>Pilot settings>Acoustic vario>Customize sound*.

Stall Alarm: This is a tone of medium frequency with a very fast beep interval rate; it is always at full volume (100%) and is not adjustable. The threshold speed and altitude for the stall alarm can be set in *Menu>Pilot settings>Speed>Stall speed*. To turn off the stall alarm, set the threshold speed to 0. **For more details read Section 12.1, Stall Alarm**, in the Appendix.

McCready Sound: When gliding with the McCready Sound activated, the 6030 will provide a beep that corresponds to the **McCready speed value (speed to fly)**. This sound is not adjustable and has been chosen so that it should not be confused with the normal ascent beeping. It has a beep-pause ratio of 1:4. It is possible to set a dead band for the McCready sound in the *tonegap* field of *Menu>Pilot settings>McCready*, so that there will be no McCready sound when flying at or near the desired speed ring setting. Each time the McCready sound is turned on, the deadband will be centered on the speed ring setting you were flying when you pressed the *McC* \blacktriangleleft key. When the McCready sound is turned on, "MC" will appear at the top of display (between the battery status and the page number). A time delay (in seconds) for the starting of the McCready sound after leaving a thermal can be set to between 0 and 30 seconds in the *delay* field in *Menu>Pilot settings>McCready*. For more detail, **read Sections 3.5.2**

Negative McCready Alarm: This is a deeper (lower frequency) beep with a rapid beep interval rate, which indicates that you are flying slower than best glide speed and should fly faster immediately. This sound is not adjustable.

3.7 Temperature

The 6030 uses a temperature sensor, not only for compensation of the pressure sensors but also for automatically regulating the contrast of the display. The temperature can be displayed in the user-field *Temp* and can be set to Fahrenheit or Celsius in *Menu>Device settings>Units*. It should be noted the sensor measures the circuit board temperature. The inside temperature of the casing can be higher than the ambient air temperature, especially when in direct sunlight.

3.8 Time and Date

The 6030 contains a real-time clock that is periodically set to your local time by the GPS signal and can be displayed in the user-field *Time*. The time does not need to be set since it is automatically set by the GPS receiver. The UTC time will be automatically set when the 6030 acquires GPS coverage for the first time (or after the instrument has been re-initialized) and will be confirmed with a short beep. However, to set the unit to local time, you must enter the difference from UTC. A positive value corresponds to time zones east of Greenwich and negative values to those west. It is also possible to enter half-hour time zones by adding a 0.5h shift to the set time zone. The UTC offset and date can be set under *Menu>Device settings>UTC offset*.

3.9 Flight Time

The takeoff time is automatically recorded and the flight time starts when the 6030 detects horizontal movement or a change of altitude. This is referred to as **Flight Acceptance**. Flight acceptance will occur when either the GPS speed exceeds 10km/h or there is 20m change in altitude (within 60 seconds). These default values can be changed in *Menu>Pilot settings>Recording>Recording mode*.

The flight time can be displayed in the user-field *Flt Time*. The 6030 will also automatically recognize the end of the flight when horizontal movement is less than 10km/h and the vario is less than 20 ft/min for 60 sec. In *Menu>Pilot settings>Recording>Recording Mode* you can choose between automatic, semi automatic and full-time recording. **For more information on recording, see Section 6.1.**

3.10 Distance Measurements

3.10.1 Distance to Waypoint

The horizontal distance to a waypoint can be displayed in the user-field *Dist WP*. This distance will appear, either if the instrument has switched to the waypoint automatically as part of the *Route* function, or if the destination has been chosen manually with the *Goto* function. For distances under 10 km the resolution is 10 meters; if the distance is greater than 10 km the resolution is 0.1 km. Please **read Section 5.1, Goto Function**. The distance to a waypoint is always measured to the actual waypoint and not to the cylinder that may be around the waypoint in the case of a Competition Route.

3.10.2 Distance to Last Thermal

This function can assist the pilot in relocating thermals that are lost when searching for better lift. The user-field *Dist Therm* will show the distance to your last thermal with a climb rate over a predetermined limit. The threshold for the last thermal can be set in *Menu>Pilot settings>Vario>Last Thermal threshold*. A small up-arrow in the compass rose shows the direction to the last thermal. If this arrow is displayed at the top in the ring, then you are flying towards the thermal; conversely, if the arrow is in the bottom of the compass rose, you are going away from the thermal.

3.10.3 Distance to Goal

The remaining distance to goal, or to the end of a route around the balance of that route, can be displayed in the user-field *Dist goal*. This value is used when calculating L/D to goal (**see Section 4.6 below**).

3.10.4 Distance to Restricted Airspace

It is possible to enter restricted airspace (referred to as **CTRs**) in the 6030. CTRs will appear on the real-time map and can be polygons, circles or polygons with arc sections. The distance to the nearest CTR can be displayed with the user-field *Dist CTR*. For information on entering restricted airspace **please see Sections 7 and 8.4**

3.10.5 Distance to Take-Off

The distance to the “takeoff” point can be shown in the user-field *Dist Toff*. The takeoff point is defined as the position where the instrument declared the beginning of the flight (more than 10km/h TAS or GPS speed for 5 seconds).

3.10.6 Distance to Cylinder / Distance to Start Cylinder

In a competition it is usually not necessary to fly to the actual start point, turnpoint or goal. It is only necessary to fly through the boundary of a cylinder surrounding the start/waypoint/goal, defined when you set up the Competition Route. The 6030 has two user-fields for displaying the distance to these competition cylinders. *Dist StCyl* will show your distance to the boundary of the start cylinder and *Dist Cyl* will show your distance to the boundary of the cylinder around the next waypoint in an active Competition Route. *Dist StCyl* is very useful when trying to position yourself for an optimal start. *Dist Cyl* is also useful when flying the task, so that you do not need to remember the size of the turnpoint/goal cylinder and subtract that from the distance to waypoint. For a discussion of how to use the distance to cylinder information in competition please refer to section 5.4.3

3.11 Glide Ratio (L/D Ratio)

By definition, the glide ratio is calculated by taking the horizontal distance traveled and dividing it by the height lost. The following types of glide ratios can be selected as user-fields:

| | |
|-----------------|---|
| L/D air | Glide ratio through the air = true air speed divided by descent rate |
| L/D gnd | Glide ratio over the ground = ground speed divided by descent rate |
| L/D req | Required glide to destination = distance to the next waypoint divided by the altitude difference to the waypoint. This is the ratio needed to reach your chosen destination from your present position. |
| L/D goal | Required glide to goal = distance to goal divided by the altitude difference to goal around any remaining turnpoints. On the last leg of a route <i>L/D goal</i> = <i>L/D req</i> . This field will only show a value if there is an active route. The calculation does not take into account the elevations of the turnpoints (for example, a turnpoint elevation might be higher than your current altitude). |

3.12 Altitudes Above Targets

3.12.1 Altitude above Best Glide Line (*A BG WP*)

The user-field *A BG WP* displays your current altitude above (or below) the best glide to the next waypoint or goal if you are on the final leg of a route. This value takes the calculated or the manually entered wind into account. When the altitude over best glide becomes positive (meaning you could just make goal at best glide speed) the *A BG WP* user-field will invert (white numbers on a black background). The altitude above best glide is also the altitude that you could lose during final glide and still make it to goal. For more information **please see Section 5.2.1**.

3.12.2 Altitude above Waypoint (*Alt a WP*)

The user-field *Alt a WP* displays your current altitude above (or below) the McCready glide path to the next waypoint – or to goal if you are on final glide. When the value of *Alt a WP* becomes positive, the user-field will invert (white numbers on a black background), indicating that you have gained sufficient altitude to fly to goal at the optimum McCready speed ring setting. For more information **please see Section 5.2.1 and 5.4.4**.

3.12.3 Altitude above Goal (*A BG Goal*)

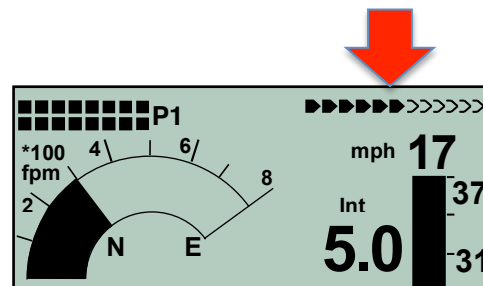
The user-field *A BG Goal* displays your altitude above (or below) best glide path to goal around the remaining active route. This value takes the calculated or the manually entered wind into account for each leg of the course. This feature is particularly useful when you have gained sufficient altitude to make it around the last turnpoint (or the last few turnpoints in a tight course) and make goal. However, it is not possible for the 6030 to anticipate changes in the wind speed or wind direction along the course and these will affect the accuracy of this value. For more information **please see Section 5.2.1**.

4 Navigation

In Earth's orbit there is a network of navigation satellites. Using the signals from these **global positioning satellites (GPS)**, it is possible to very precisely determine your position anywhere in the world. Therefore, the use of GPS receivers has become indispensable for flight navigation and competition.

4.1 Assessment of Reception Quality

The 6030 can receive 20 satellites at the same time, however due to satellite constellation, on average, only 9 satellites are visible (receivable) at any given time. When the 6030 is turned on, the internal GPS receiver is automatically turned on. It is necessary to receive at least four satellites in order to fix your position initially, but once the current position is **acquired**, three satellites are sufficient for further 2D navigation. However, if you want to record GPS altitude in a flight record, then four satellites are necessary. The arrowhead bar-scale in the top right corner of the normal run-mode display shows the number of satellites being received. Each filled-in arrow represents one satellite with good reception. The greater the number of filled in arrowheads, the better the overall GPS reception. The compass cardinals (N, S, E & W) are only shown when the GPS has acquired sufficiently to navigate.



A **Satellite Almanac** table in the GPS receiver keeps track of the path, location, and time of all satellites with reference to the receiver. The Almanac is continuously updated during signal reception. However, if the signal to the Almanac memory is disrupted completely, or if the 6030 is taken 125 miles or more from the last reception point, then the Almanac must be re-established. In this case it can take ten minutes or more to determine your new position. When the 6030 is turned off, power is still supplied to the almanac's memory.

If the receiver is turned off for only a short period of time (less than 2 hours), it should take less than a minute to acquire the location. Buildings, mountains or thick forest affect reception quality. Therefore, you should always look for the clearest view of the sky. The antenna is located under the 6030 label and should face upwards, at least until it has locked onto several satellites. Because the received strength of the satellite signal is only 1/1000 that of mobile radios, these radio receivers and other disruptive factors (like notebook computers) should be kept as far away as possible from the 6030.

4.2 Compass and Flight Direction

In contrast to a normal magnetic compass that is oriented to magnetic north, the GPS compass can show direction only when the user is moving. However, it has the advantage that it is not subject to any grid deviation and does not show any deviation as a result of ferrous or magnetic material. Its zero point always corresponds with true geographic north (0 or 360 degrees).

The **compass rose** appears in the inner circle of the analog vario dial. If you have selected a Goto point, then a direction-to-destination pointer will appear inside the compass rose. However, if you are stationary the compass and pointer are inoperative. Your exact course (i.e., the direction you travel over ground) is always at the top of the compass, but can also be displayed in the *Track* user-field. When you are circling in a thermal the compass rose appears to turn. In reality the pointer does not move; the instrument, along with the aircraft, moves around the rose.

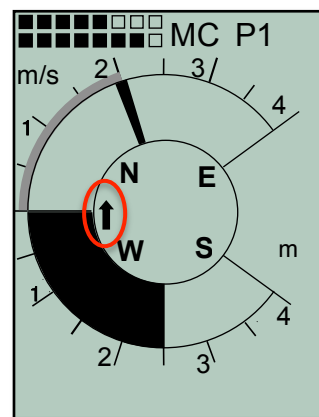
4.3 Real-Time Map Page

A short press of the *Page/ESC* key when the 6030 is in the run mode will bring up the real-time Map page where your track, waypoints, the active route, and any restricted airspace you have defined will be visible. If a Competition Route is active, start/turnpoint/goal cylinders will also be shown. There are three user-fields shown just below the map, and an analog vario scale is along the left edge of the map. Your current position will appear on the track as a direction arrow. The track is drawn backwards from the current position to the beginning of the flight. This way you will not have to wait for the entire track to be drawn to see your current section of the track. The view may be zoomed in and out with the *F1* and *F2* keys. When the zoom in/out keys are pressed, it will take a few moments to redraw the map ("*Wait*" and "*Ready*" will correspondingly appear in the Information Field). If a zoom key is pressed while a map is being redrawn, the original redraw will be suspended and will start over again with new zoom selection. This allows you to quickly view the desired section

of the map. The default orientation of the map is *north up* but can be changed to *course up* in *Menu>Pilot settings> Map orientation*. When course up is selected the orientation of the map is accurate to 1° at the moment the map is refreshed. The map will be refreshed every 30 seconds, when your position is about to run off the map or when zoom in/out is invoked. A refresh of the map can be forced at any time with a press of the **►** key.

4.4 Relocating Thermals

A small up-arrow in the compass rose shows the direction to the last thermal with a climb rate greater than the preset threshold. If this arrow appears at the top in the ring, then you are flying towards the thermal. Conversely, if the arrow is in the bottom of the compass rose you are going away from the thermal. In the example, the last thermal is NW of your current position. The default threshold for the last thermal indicator is 197 ft/min, and it can be set between 100–600 ft/min in *Menu>Pilot settings>Vario>Last Thermal threshold*. If you want to take full advantage of this function, *Dist Therm* should be set as a user-field so that you can also see the distance to the last thermal.



4.5 Waypoints and Coordinates

A waypoint is any single point on the earth's surface to which you would like to go. The 6030 can save up to 200 different waypoints. Each waypoint can include a user-assigned name up to seventeen characters, the waypoint's coordinates and waypoint altitude.

The 6030 GPS utilizes the **World Geodetic System 1984 (WGS84)**. This reference system assumes that latitude is measured from the equator (0 degrees) to the North Pole (90 degrees north) and to the South Pole (90 degrees south). Longitude is measured from the Greenwich meridian (London, 0 degrees). East is positive (up to 180 degrees), and west is negative (up to -180 degrees).

In addition to the international Geodetic System WGS84, many countries use their own map references wherein the coordinates for the same point may differ slightly. Since the FAI Sporting Code General Section 2006 (7.3.1.1) states that the only valid GPS system for calculating distances is WGS84, the 6030 does not allow different geodetic systems.

The following position formats (for input and display) can be selected in *Menu>Device settings>Coordinate format*:

- Degrees, Minutes, Decimal places of minutes: dd°mm.mmm
- Degrees, Minutes, Seconds: dd°mm'ss"
- Degrees, Decimal places of degrees: dd.ddddd
- UTM (a grid with a 1 km raster in both E/W and N/S directions)
- Swiss grid

To achieve the greatest position accuracy the format dd°mm.mmm (factory default) should be used because this is the format used by GPS receivers. With the other formats, rounding errors could add up to 15 meters in the worst case.

The 6030 can also understand waypoints entered according to the convention of using the first three letters of the waypoint name followed by three numbers for the altitude in tens of meters. For example: **LAB167** indicates a waypoint with the name LABxxx and an altitude of 1670 meters MSL. This altitude is stored in the waypoint's altitude field.

4.5.1 Current Coordinate Display

Provided the 6030 is receiving a GPS signal, the actual position can be displayed in the Information Field by pressing the *information* key **ⓘ**. After twenty seconds, the current position will be replaced by the information previously displayed in the Information Field. This function is useful after landing to relay your location to a person coming to retrieve you.

4.5.2 Saving the Current Position

If you wish to save your current position as a waypoint, with the GPS acquired, press and hold the *WP* key for three seconds, “Add Wayp” will appear for *F1*, press *F1* key to confirm. The current coordinates will be stored in the memory as a waypoint, and the 6030 will give a double beep as confirmation. The 6030 uses the letter M (for mark) for the first character of the waypoint name along with the date and time. Example: *M.22.04 11:16:49* for 22 April 11 hrs. 16 minutes 49 seconds (UTC). Of course this waypoint name can be changed to a more meaningful name in the Waypoint menu. For more information on this **please refer to Section 4.5.3, Editing/Entering Waypoints.**

4.5.3 Waypoints

It is considerably easier to add waypoints to your 6030 using a PC and software that manages waypoints – such as FlyChart, SeeYou or GPSDump – or by downloading them from a meet director/scorekeeper. However, you can add waypoints to your list or edit existing ones using the 6030 keypad. To show the list of waypoints stored in the 6030, highlight *Waypoints* in the Main Setup Menu and press the *OK* key. To add a waypoint, **see Section 5.7.5, Inserting Waypoints, below.** All waypoints are arranged in alphabetical order.

If the 6030 waypoint list contains more than eight waypoints, there will be a down arrow at the lower right edge of the list to show that additional pages of waypoints follow. To scroll down one page at a time, press the *▶* arrow; waypoints 9 to 16 will now appear, and so on.

To edit a waypoint: select it with *▼ ▲* keys from the waypoint list and press the *OK* key. After pressing the *OK* key, the first letter of the waypoint name will blink; you can now change the first letter of the name of the waypoint by using the *▲ ▼* keys. There are numbers and letters, as well as a set of special symbols, to choose from. With the *F1* key you can switch between capital and lower case letters, and numbers. By pressing the *▶* key you acknowledge the character and move forward to the next character. A waypoint name can be up to seventeen characters long. Once the waypoint name has been changed (or left as is), confirm the name by pressing *OK*. The blinking cursor will now advance to the waypoint’s altitude field and the value can be altered in the same manner as above. Confirm any changes that you have made, or accept the existing value by pressing the *OK* key. **Important:** the characters \$ * ! \ ^ ~ are not available since they are reserved for use in the .igc file.

| Waypoints | |
|---------------------|---------------|
| Colman | |
| Cheryl | |
| Ocala | |
| I27-474 | |
| DS - 33 | |
| Fantasy of Flight | |
| Astatula | |
| ----- | |
| Used Waypoint 7/200 | |
| Astatula | |
| Alti | 245 ft |
| Lati | N 47° 55.116 |
| Longi | W 011° 16.813 |
| Ins. | Del. |
| Wayp. | Wayp. |

The blinking cursor will now advance to the degrees/minutes portion of the waypoint latitude. The value can be changed with the *▼ ▲* keys. Holding the *▼ ▲* keys down will change the values rapidly. Once the desired degrees/minutes appear, confirm by pressing the *OK* key. The cursor will now advance to the decimal minutes field and can be similarly set. Change the value as necessary and confirm, once again, with the *OK* key. The blinking cursor advances to the waypoint longitude, which can be altered and confirmed in the same manner as the latitude. **Note:** Cylinder radius for any waypoint can only be set in the Competition Route.

To delete a waypoint: select it with *▼ ▲* keys from the waypoint list and press the *F2 (Del Wayp)* key. To be on the safe side, the 6030 will ask for confirmation by showing, “Delete Waypoint?”. Use the *▼ ▲* keys to switch from *No* to *Yes*, and press the *OK* key. The deletion process can be stopped by pressing *ESC* key. The entire waypoint list can be deleted using *Menu>Clear/Initialize memory>Delete all WP & Routes*.

To add a waypoint: press the *F1 (Ins Wayp)* key when the 6030 is displaying the waypoint list. Enter the waypoint name, altitude, and position as described above. After confirming all field entries with the *OK* key, the new waypoint is added to the waypoint list. A total of 200 waypoints (displayed in alphabetical order) can be stored in the 6030.

Import/export waypoint lists: The 6030 waypoint list can be saved to the SD card in *Menu>SD-Card*. Similarly, a waypoint lists can loaded into the 6030 from the SD card also in the *SD-Card* menu. With this feature, waypoint lists can be easily shared between 6030 pilots and a waypoint list in a 6030 can be saved to the SD card prior to loading a new list so that it can be retrieved for later use. Waypoint lists can be saved to the SD card via a PC in GPS eXchange format (.gpx) and then imported into the 6030. Note: the SD card must be formatted FAT or FAT16.

Note: Any newly entered waypoints can only be used after you have switched back to the normal run-mode by short-pressing the *ESC* key. In addition, you cannot enter new waypoints into an existing route if it is active. If the route is active, first enter **Route mode** by pressing and holding the *Route* key, then press the *F2 (Cancel Route)* key to deactivate the route.

5 Navigating Waypoints and Routes

5.1 Goto Function

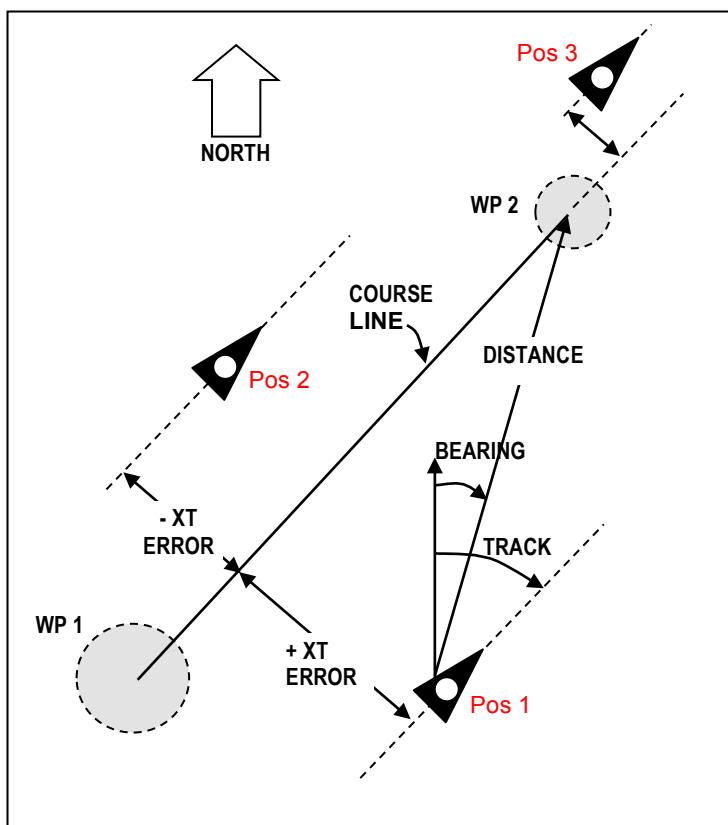
Pressing and holding the *Goto* key switches the lower half of the display into **Goto mode**. This function allows you to search for a waypoint stored in memory and select it as the next waypoint or goal. The closest five waypoints are displayed, with the nearest waypoint on top. The numbers after each waypoint name indicate the distance in miles. You can search for a waypoint using the \blacktriangle \blacktriangledown keys, and select it by pressing the *OK* key. The *Goto* function can be deactivated from the Goto mode with a short press of the *F2 (Cancel Goto)* key. If there is an active Goto but the GPS has not acquired yet the bearing pointer will straight up (12 o'clock).

5.2 Track, Bearing and Cross Track Error

Track is defined as the route of the glider over the ground and can be displayed in the user-field *Track*.

Bearing is the heading in degrees to a desired point and can be displayed in the user-field *Bearing*. Geographic true north is always 0 or 360 degrees (east 90, south 180, west 270 degrees). The bearing is the direction to a specific destination or waypoint from the glider.

Cross track error is the perpendicular distance to the active leg of a **route** and can be seen in the user-field *XT Error*. Positive *XT Error* indicates that you are to the right of course line (Pos 1 in figure). Conversely, a negative value shows that you are left of course line (Pos 2). If you fly past the next waypoint in a route (not Competition Route) a virtual line is extended past the WP and the *XT Error* is given in relation to the virtual line (Pos 3). If you do not have an active route and you choose a waypoint with either the *Goto* or the *Route* key, then a virtual line is drawn from the position where you invoked the *Goto* or *Route* function to the waypoint. The cross track error is your perpendicular distance to that virtual line. The same applies if you are in an active route and you change the active leg with the *Prev/Next WP* function.



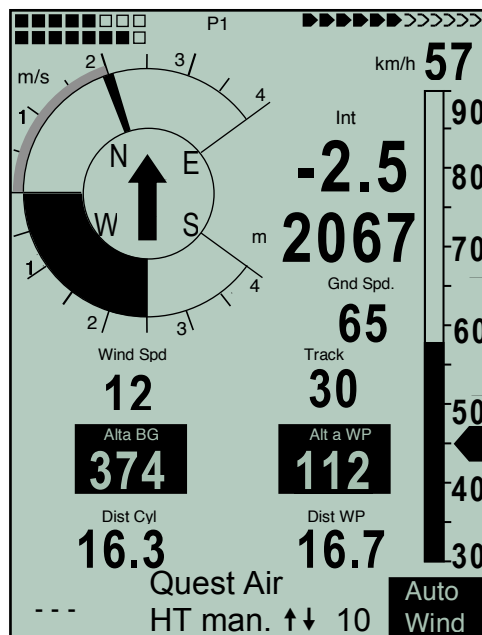
The precision of the *XT Error* depends on the length of the active leg of the route, with the greatest error occurring when you are centered between two waypoints of a route. For example, if the leg is 50km the error can be as much as 400 meters. This error is due to the very flat angles that result from being off-track a relatively small amount proportional to a long leg.

5.2.1 Goto a Waypoint

In the example, the direction to the waypoint is northeast, ground speed, the distance to the waypoint and the calculated arrival height over the waypoint (*Alt a WP*) are displayed in the user-fields. The user-field *Alt a WP* is the height above the optimum glide slope to the waypoint. The data field will invert (white numbers on a black background) when *Alt a WP* becomes positive. The calculated arrival height assumes that there is neither lift nor sink along the flight path and that the wind remains constant. For more information **please refer to Section 5.4.4, Final Glide.**

You can also see *A BG WP* in the example, which is the pilot's altitude above or below the best glide line to the next waypoint (or goal if on final glide). When *A BG WP* displays 0, the pilot has sufficient altitude to just be able to reach the waypoint/goal by flying at the best glide speed. The data field will invert (white numbers on a black background) when *A BG WP* becomes positive.

When thermaling you should climb until *Alt a WP* shows zero, which means you can go on glide at McCready optimum speed to fly. *A BG WP* then shows how much height you will have above the best glide slope to use while gliding to goal. Generally you should not proceed to goal if the *A BG WP* shows zero or negative numbers – reaching goal would be impossible without encountering lift on the way.



The user-field *A BG Goal* displays your altitude above (or below) best glide path to goal around the remaining turnpoints. This value takes the calculated or the manually entered wind into account for each leg of the course. This feature is particularly useful when you have gained sufficient altitude to make it around the last turnpoint (or last few turnpoints in a tight course) and make goal. However, it is not possible for the 6030 to anticipate a change in the wind speed or direction along the course that will affect the accuracy of this value.

5.2.2 Correct Bearing in a Cross Wind

If you encounter a strong cross wind on the way to a waypoint/goal, you can find the optimal angle between your destination and the wind by gradually changing your direction of flight against the wind until the directional pointer in the center of the compass rose points directly upwards, as shown in the example above. By doing this you can be sure that your flight path over ground is a straight line to goal (i.e., track=bearing) and consequently the shortest one – and you will avoid the well-known “pursuit curve.”

5.2.3 Wind Component

When flying to a waypoint – and, even more importantly, to a goal – the wind component (the difference between ground speed and air speed over the track) is very important. In most cases the wind does not blow directly from the front or from behind, but from the side. If the wind component displayed in the user-field *Wind Comp* is positive, then you will fly with a tail wind, and the glide ratio over the ground will improve. If it is negative, the glide ratio will worsen. To find the correct angle between the destination and the wind when a strong cross wind is present, **please refer to Section 5.2.2.**

The 6030 takes the wind component into consideration when calculating the optimum speed to fly, and with final glide calculations. The wind component can be either automatically entered or manually entered by the pilot. Manual entry of the wind component may be preferable to automatic in some circumstances. Some examples are:

- There is a significant velocity and/or directional wind shear
- The calculated wind speed is underestimated due to “blocking” when climbing in a strong thermal. The true wind in this case can be stronger than the automatic calculation.
- On glide, small wind fluctuations can cause differences of the calculated arrival altitude (these can also be caused by yawing). A manual wind component will keep the result more stable.
- When a more conservative approach to goal in a headwind is desired.

When you are flying to a destination, the 6030 defaults to automatic head/tailwind. If a manual head/tailwind is desired, press and hold the *H/T wind* key for 3 seconds; the Information Field will read “*HT wind auto*”. Press the *F2* key until the Information Field reads “*HT man. ↑↓*”, then use the *▲ ▼* keys to set the desired head/tailwind in the Information Field (e.g., “*HT man. ↑↓ -12*” for a 12 mph headwind). When entering a manual headwind component, you must rely on experience to enter a reasonable value based on the circumstances. To revert to automatic head/tailwind, press the *F2 (Auto Wind)* key.

5.3 Route Function

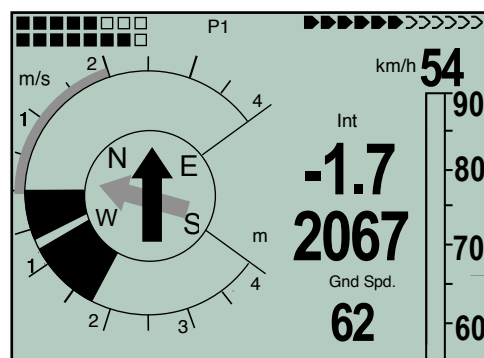
A **route** is a sequence of waypoints that must be flown in order. The 6030 can store up to twenty routes; the waypoints used on a route must first have been entered into the 6030’s waypoint list. Each route can also be assigned a route name, for example, *Quest Air Triangle*. The same waypoint can be used more than once along a route, and the same waypoint may occur on other routes as well. If a waypoint is used in a route, it cannot be deleted from the waypoint list until the route is deleted. You can view the stored routes by highlighting *Routes* in the Main Setup Menu and pressing the *OK* key. Up to eight are displayed on the screen at one time; use the *►* arrow to display the next set of eight routes. While flying a route you have the option of looking up other, possibly closer, waypoints without leaving the current active route; use a long press of the *GoTo* key in normal run-mode to do this.

To activate a route, press the *Route* key for a few seconds and a list of your existing routes will be displayed in the lower half of the display. Highlight the desired route with the *▲ ▼* keys, then press *OK*, and the name of the active route will appear in the Information Field. When you are flying with an active route, the next waypoint will be shown in the top line of the Information Field and “*next ↑ pr ↓ wp*” will appear in the bottom line. You can move forward to the next waypoint or move back to the previous waypoint using the *▲ ▼* keys.

It is possible to designate any previously entered route as a **Competition Route** which, in contrast to the routes described above, can have waypoints or cylinders around waypoints that are mandatory (such as turnpoints in a competition task or in FAI record/badge flights). For more information on Competition Routes **see Section 5.4, Competition Route**.

5.3.1 Direction arrow to second turnpoint

In the middle of the compass rose, a solid black arrow points to the next waypoint. If there is more than one waypoint remaining in an active route there will be a second arrow (shaded) under the black arrow that points in the direction to the second waypoint. This second arrow makes it easier for pilots flying a competition task to know in advance which direction to turn after reaching the waypoint cylinder. In the example, the direction to the second waypoint is northwest of the current position.



5.3.2 Enter/Edit Route

The easiest way to create a route is to use software like FlyChart or SeeYou on your computer and then upload the routes to the 6030. Routes also can be created from the waypoints stored in the 6030 using the keypad as described below.

To create a new route, select *Routes* from the Main Setup Menu, and press the *F1 (Ins. Route)* key. A new route with the default name “Xxxxx” will appear in the lower half of the display. The blinking cursor will be on the first character of the default name, which can be changed using the *▲ ▼* keys. Use the *►* key to advance the cursor to the next letter, and accept the previous one. Repeat this process for each character of the name. Press the *OK* key to conclude the entry of the route name.

Next, the desired waypoints must be added to the route. Press the *F1 (Ins. Wayp)* key and the list of the available waypoints, in alphabetical order, will be displayed in the bottom half of the screen. The prompt “*Select Waypoint No1*” is displayed. Use the *▼ ▲ ►* keys to scroll until the desired waypoint is highlighted. Add it to the route by pressing the *OK* key. The waypoint is then added to the list of waypoints in the route displayed in the upper half of the screen.

To add the next waypoint, press the *F1 (Ins.Wayp)* key again. Once more, the waypoint list appears, and you can select the second waypoint. After selecting the waypoint, press the *OK* key to add this waypoint to the

route, and so on. The black-highlighted waypoint in the upper half of the screen is always the last one entered. The *F1 (Ins. Wayp.)* key will insert the next waypoint after the one highlighted in black. To delete a waypoint, highlight it with the *▲ ▼* keys and press *F2 (Del. Wayp.)*.

To alter a route, scroll through the *Route* list with the *▼ ▲* keys, and select the route with the *OK* key. The first letter of the route name is highlighted and can be altered (as can subsequent letters) with the *▼ ▲* keys. If you don't wish to change the route name, press the *OK* key to bring up the list of waypoints in the route. Waypoints can be added as described in the previous section. If you wish to change a waypoint in a route, insert the new waypoint and then delete the old waypoint using *F2 (Del. Wayp.)*.

To delete a route, scroll through the *Route* List with the *▼ ▲* keys, and select it with the *OK* key. Then press *F2 (Del.Route)*. The 6030 will ask: "Delete Route?" Use the *▼ ▲* keys to change the *No* to a *Yes*, and then press the *OK* key. **Note:** It is not possible to delete the Competition Route. The entire Route List (with the exception of the Competition Route) can be deleted using *Menu > Clear / Initialize memory > Delete all WP & Routes*.

5.3.3 Direction arrow to second turnpoint

In the middle of the compass rose, a solid black arrow points to the next waypoint. If there is more than one waypoint remaining in an active route there will be a second arrow under the black arrow that appears hollow and points in the direction to the second waypoint. This second arrow makes it easier for pilots flying a competition task to know in advance which direction to turn after reaching the waypoint cylinder.

5.4 Competition Route

Cross-country hang gliding and paragliding competition tasks consist of a circuit (route) of waypoints that are mandatory (i.e. start, turnpoints and goal) where the pilot must fly into cylinders around the mandatory points in the defined sequence. In the 6030, the term **Competition Route** is used to define a route used for a competition task. The Competition Route differs from a standard route in that it allows you to enter the task parameters that are established by the competition (e.g., meet director, task committee, etc.). A competitor's score is totally dependent on a GPS recording of the pilot's flight. The 6030 will automatically record a tracklog of the flight that can be easily downloaded to a scorekeeper's computer. Since it is required that the pilot fly into the cylinders of a competition task, the 6030 will give an unmistakable **Turnpoint Reached** alert (2-seconds of ascending beeps) as soon as the pilot enters the cylinder. This way the pilot knows that the instrument has recognized and recorded the entry and that it is time to proceed to the next turnpoint. When the turnpoint reached alert is given, the 6030 will automatically transition to the next point in the route and navigation will be relative to that point.

In an effort to decrease congestion around waypoints, it is common for competitions to call tasks with large start and turnpoint cylinders. As the size of the cylinder increases, a distinct advantage arises in being able to navigate to the optimal cylinder intercept rather than to the turnpoint center. For this reason the 6030 has the ability to optimize the Competition Route to assist the pilot in flying the shortest possible course. When the optimized route function is active, the 6030 will re-optimize the route as needed in flight in the event you fly off course line due to a cross wind or when seeking a better lift line. Please see section 5.4.2 for more information on the **Optimized Competition Route**.

After you have completed a flight using a Competition Route, the waypoints will be included in the track log (IGC file). SeeYou, CompeGPS, GpsDump or other programs that can read and display IGC files can use your track log to determine whether the assigned task was completed correctly.

5.4.1 Setting up a Competition Route

It is possible to copy any route in the *Route Menu* to the Competition Route by selecting the desired route with the *▲ ▼* keys, and press the *WP* key. The display will ask "Copy to Competition Route?", press the *▲* or *▼* key to change the *No* to *Yes* and press *OK*. Alternatively, the route waypoints can be entered directly in the Competition Route. Regardless of which method is used, once the waypoints are entered the task parameters established by the competition task setter must be set in the Competition Route. Note that all the turnpoints in the route have been given default 400m (0.40km) entry cylinders and the total center-to-center distance of the route is shown in the lower half of the display. Since competition tasks have considerably more parameters than a standard route, it will be more straightforward to build the competition task directly in the Competition Route.

To build the task directly in the competition route, select the Competition Route from the route menu, delete all waypoints from the competition route(if any), and enter the task waypoints in the same manner as a standard route (see section 5.3.2). Once the Waypoints are entered, the additional competition parameters established

by the competition task setter can be set. Waypoints in a competition task fall into three categories: start, turnpoints and goal. Because of the nature of the type of start and finish of a task, a start or goal waypoint may need to be entered in the competition route more than once. The procedure for entering the start, turnpoints and goal, with their respective parameters, are as follows.

The Start: To set the start point for the task, highlight the desired waypoint from the list in the Competition Route and press the *WP* key. The selected waypoint will now have “S” after the cylinder size and the lower half of the display will show the remaining start parameters to be set. Press *OK*, and set the start cylinder size using the $\blacktriangle \blacktriangledown$ keys. Press *OK*, and then set the first start time. Press *OK*, and then set the interval between subsequent start times. Press *OK* and set total number of start times. Press *OK* and set the start to *ENTER* or *EXIT*. In the example, Quest is a 3 km Exit start with 3 start times with the first start at 12:30 (followed by 12:45 and 13:00 start times. Note: In order to mark a waypoint as the start, there must be at least one subsequent waypoint.

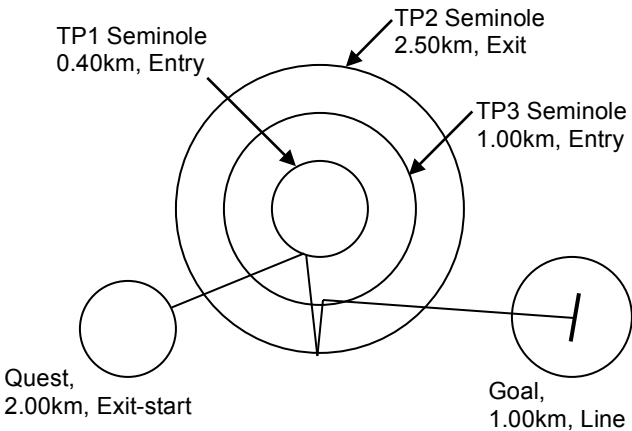
In the case of an entry start, the task normally involves flying into a large cylinder around a waypoint and then continuing into a smaller cylinder around the same waypoint. In this case the first waypoint is listed, first with the large cylinder size and marked as the start, then again with the smaller cylinder size.

Turnpoints: Once the start parameters are set, the cylinder radius and mode for each of the remaining turnpoints in the Competition Route must be individually set if they differ from the 400m-entry that is set by default. To do this, highlight the turnpoint from the list, and press the *OK* key. The blinking cursor will be on the turnpoint radius size, which is always in kilometers regardless of unit setting in the *Device settings* menu. Adjust the radius with the $\blacktriangle \blacktriangledown$ keys and press the *OK* key to confirm.

The blinking cursor will be on the turnpoint mode, the turnpoint mode can be toggled between Entry and Exit with the $\blacktriangle \blacktriangledown$ keys and confirmed by pressing the *OK* key. The turnpoint mode will be indicated in the waypoint list (E for entry and X for exit). Repeat the above process for all of the turnpoints in the Competition Route. **Important:** even if a task turnpoint is the default 400m-entry it is recommended that you confirm the turnpoint radius and mode for each turnpoint of the Competition Route.

In most cases, competition turnpoints (waypoints between the start cylinder and goal) will have an entry cylinder (often 400m). However, it is becoming increasingly popular for competitions to call more complex tasks. The ability to set any turnpoint as enter or exit allows the 6030 to handle tasks like the example shown below.

| COMPETITION-ROUTE | | | | |
|-----------------------|-------|------|-------|------|
| Quest | 3.00 | S | 7.38 | |
| Seminole | 0.40 | E | 12.34 | |
| Fantasy | 0.40 | E | 24.22 | |
| Cleremont | 0.40 | E | 8.78 | |
| Quest | 0.40 | L | 0.00 | |
| Waypoint 1/5 in Route | | | | |
| Quest | | | | |
| Total Distance: | 49 | | | |
| Radius (m) | 3000 | | | |
| Starttime: | 12:30 | +15 | min | |
| Startgates: | 03 | EXIT | | |
| Ins. | | | | Del. |
| Wayp | | | | Wayp |



| COMPETITION-ROUTE | | | | |
|-------------------|------|---|------|------|
| Quest | 2.00 | S | 7.38 | |
| Seminole | 0.40 | E | 0.00 | |
| Seminole | 2.50 | X | 0.00 | |
| Seminole | 1.00 | E | 8.78 | |
| Goal | 1.00 | L | 0.00 | |
| Wp 2/5 in Route | | | | |
| Seminole | | | | |
| Total Dist: | 52 | | | |
| Radius [m]: | 400 | | | |
| Mode: | EXIT | | | |
| Ins. | | | | Del. |
| Wayp | | | | Wayp |

In the case of an exit turnpoint (TP3 above) the pilot is free to exit in any direction. In a task like the one shown above, the instrument will optimize the exit waypoint to the south by default, however, as soon as the pilot flies in one direction, the optimized waypoint will be updated.

Goal: Finally, the goal parameters must be set. The 6030 treats the last waypoint in the list as goal with a 400m cylinder by default. To set the goal parameters, highlight the last waypoint in the list and press the OK key. If goal is a cylinder, set the cylinder radius with the ▲ ▼ keys and press the OK key to confirm. In the case of a goal line, set the radius to the distance from the waypoint center to the goal line endpoint with the ▲ ▼ keys, press the OK key, set the *Line* parameter to yes and press the OK key to accept the parameters. To set up a route with an end-of-speed-section goal, enter the goal turnpoint twice, the first one with a cylinder radius corresponding to the size of the end-of-speed section and the second one with a line length equal to the length of finish line each side of center (as defined by the task-setter). In the example, the end-of-speed section is 1000m radius and the finish line is 200m either side of center (400 meters total).

| COMPETITION-ROUTE | | |
|-------------------|------------|-------|
| Quest | 5.00S | 7.38 |
| Seminole | 0.40E | 12.34 |
| Fantasy | 0.40E | 24.22 |
| Cleremont | 0.40E | 8.78 |
| Goal | 1.00E | 0.00 |
| Goal | 0.20L | 0.00 |
| ----- | | |
| Wp 6/6 in Route | | |
| Goal | | |
| Total Dist: | 53 | |
| Radius [m]: | 200 | |
| Line: | Yes | |
| ----- | | |
| Ins. Wayp | Del. Wayp. | |

5.4.1.1 Flying a Competition Route

The two most technically challenging aspects of flying a competition task are the *start* and *final glide*. The 6030 has been designed to offer valuable assistance for both as discussed in sections 5.4.3 and 5.4.4

To activate a previously defined Competition Route, bring up the route list with a long press of the *Route* key, the lower half of the display will show the route list with the Competition Route highlighted, press the OK key and the 6030 will return to the run mode with the Competition Route active. The Information Field will show the name of the first waypoint (start point) of the route alternating with a countdown timer that shows the hour/minutes/seconds before/after the opening of the start gate. The procedure for defining a Competition Route can be found in section, 5.4.1

If you view the Map page with an active Competition Route, the map will show a dotted line for the complete route and will also display the turnpoint cylinders around the turnpoints. If you access the Map page during a flight, a direction arrow will show your actual position. The track is drawn backwards from your current position towards the beginning of the flight. This way you will not have to wait for the entire track to be drawn to see your current section of the track. During flight, a short press of the ► will hide all waypoints not used in the active route and a subsequent short press the ► key will bring back the hidden waypoints.

Map Auto Zoom: With Auto-zoom enabled, as you approach a turnpoint and fly within a preset user-defined distance (e.g. 100m), the 6030 will automatically switch from the main page to the Map page at a preset zoom (e.g., 0.5 mi scale). This way it will be immediately obvious that you are close to the cylinder and you will be able to clearly see your position relative to the cylinder. Once you fly into the cylinder and the turnpoint reached sound is given and the display will go back to the main page. Auto-zoom will only become active 30 seconds before the start time. Auto-zoom will stay active within a goal cylinder that has a finish line until the finish line is crossed. **Important:** Restricted airspace is not shown when the map is showing the maximum zoom level.

There are three modes of Auto-zoom: off, map only, and full. Full auto-zoom will work as described above. If *Map only* is selected, the 6030 will only transition to the auto-zoom level if the 6030 is on the Map page, that is, it will not automatically switch from the main page to the Map page when you cross the threshold distance. The Auto-zoom mode, auto-zoom scale (0.06 - 0.99 mi. or 0.1 - 1.6km) and threshold distance (30 - 180 m) can be set in *Menu>Pilot settings>Auto Zoom C-Route*. In the *Auto Zoom C-Route* menu it is also possible to set a different set of user-fields to be shown on the Map page when Auto-zoom is active. For example, you can set **Dist StCyl** and **Dist Opt WP** to shown when the map is auto-zoomed to help you decide the best place to tag the turnpoint cylinder.

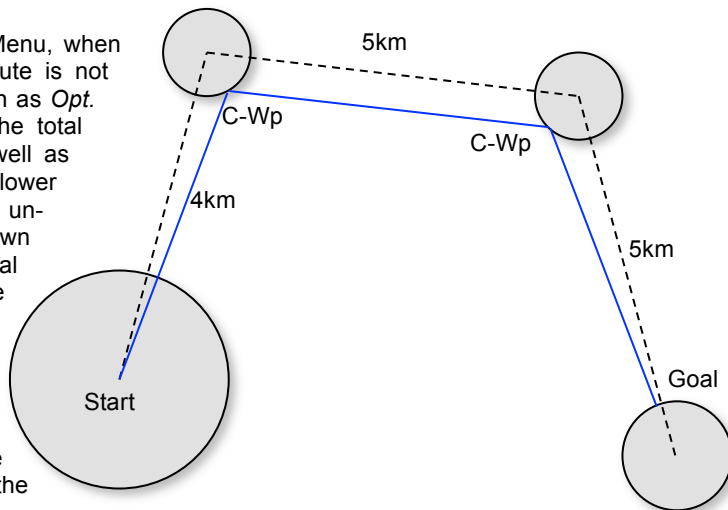
When flying a Competition Route, it is possible to select additional waypoints (perhaps sources of lift) by pressing and holding the *Goto* key. The waypoints are sorted according to their distance from the pilot. The waypoints that are part of the Competition Route are marked with an asterisk in the displayed list. This means they must be achieved. The alarm remains active when entering a waypoint cylinder along the route, even if a waypoint not belonging to the route has been selected. Press the F2 key to toggle back and forth between the waypoints of the Competition Route and another waypoint.

5.4.2 Optimized Competition Route

If a task has large turnpoint cylinders the Optimized Route may be preferred over the Competition Route. To activate a previously defined Competition Route as an optimized Competition Route, bring up the route list with a long press of the *Route* key, the lower half of the display will show the route list with the Competition Route highlighted. Press the F1 (Optim C RTE) key and the *COMPETITION ROUTE* in the list will be changed to *Opt*.

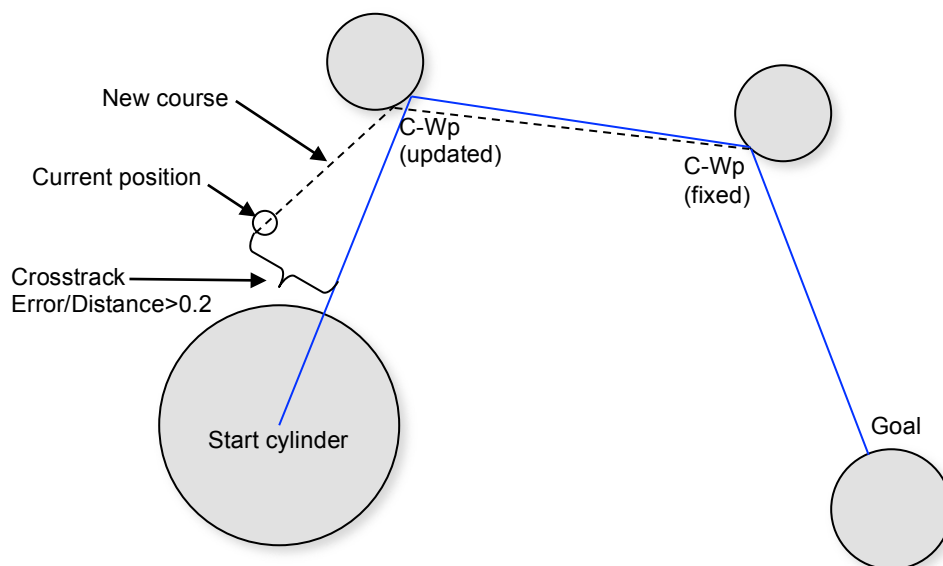
COMPETITION ROUTE. Press the **OK** key and 6030 will return to the run mode with the optimized Competition Route active. Once the optimized route option has been enabled it will stay active until it is disabled. This means that if you copy a new route to the Competition Route the new route will be optimized. To disable route optimization, long press the **Route** key, the lower half of the display will show the *Opt. COMPETITION ROUTE* highlighted, press the **F1** (Optim C RTE) key, *Opt. COMPETITION ROUTE* in the list will be changed to **COMPETITION ROUTE**, press the **OK** key and 6030 will return to the run mode. The optimized route function can be turned off/on in flight, if desired, as described above.

If the Route list is viewed from the Main Menu, when the optimized route is selected but the route is not active, the **COMPETITION-ROUTE** is shown as *Opt. COMPETITION-ROUTE* and, if selected, the total center-to-center distance of the route as well as the optimized route distance is shown in the lower half of the display. The optimized and un-optimized total distance is calculated as shown in the example. C-Wp refers to the optimal intercept calculated by the instrument. The dashed black line represents the normal Competition Route (distance =14km), whereas, the solid blue line represents the optimized route (distance <14km). When an optimized Competition Route is active it will be shown on the Map page and the optimal intercepts (C-Wp) will be shown on the turnpoint cylinders.



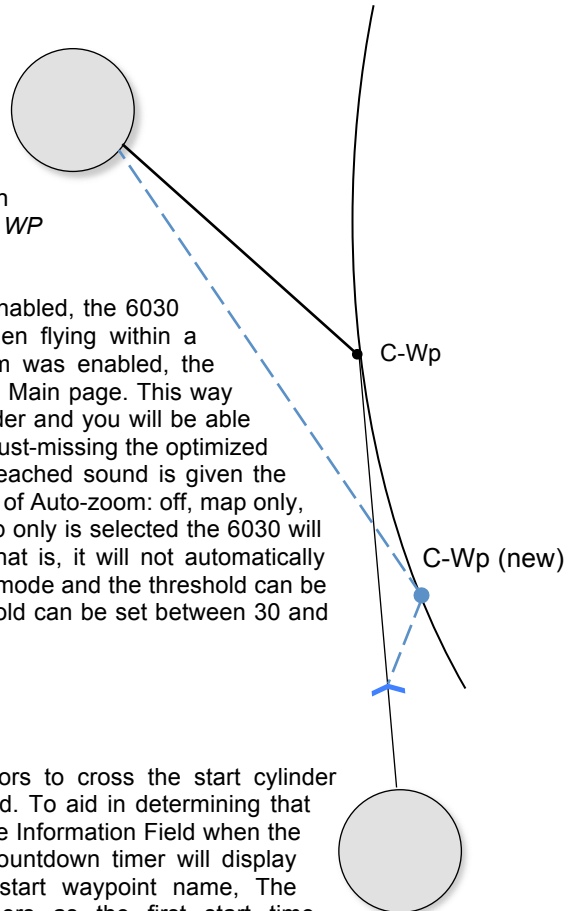
5.4.2.1 Flying an Optimized Competition Route

In flight, if your cross track error divided by the distance to the cylinder is greater than 0.2 ($\sim 11^\circ$) a new optimum intercept is calculated and you will see the map update the current C-Wp and bearing line as shown in the diagram. Of course, all of the related user-fields and compass pointers are updated as well. Note: the C-Wp for subsequent turnpoints remains unchanged.



When approaching a turnpoint cylinder (C-Wp) at near tangent, to be sure that you do not just-miss the cylinder intercept, you should adjust your flight path so that it is just slightly on the turnpoint side of the bearing pointer to the C-Wp. Failure to observe this could result in flying just outside the optimum intercept and missing the turnpoint. One way to avoid this is turn slightly towards the turnpoint center when you are very close to the C-Wp. Use the user-field *Dist Opt WP* to monitor your distance to the intercept.

If the 6030 is on the Map page and Auto Zoom has been enabled, the 6030 will automatically go to maximum zoom (0.1km scale) when flying within a preset user-defined distance (e.g. 100m). If full Auto Zoom was enabled, the display will automatically transition to the Map page from the Main page. This way it will be immediately obvious that you are close to the cylinder and you will be able to clearly see your position relative to the cylinder and avoid just-missing the optimized intercept. Once you fly into the cylinder and the turnpoint reached sound is given the display will go back to the Main page. There are three modes of Auto-zoom: off, map only, and full. Full auto-zoom will work as described above. If Map only is selected the 6030 will only zoom to maximum if the 6030 is on the Map page, that is, it will not automatically switch from the Main page to the Map page. The Auto-zoom mode and the threshold can be set in Menu>Pilot settings>Auto Zoom C-Route. The threshold can be set between 30 and 180 meters.



5.4.3 The Start

To achieve an optimal competition start, the pilot endeavors to cross the start cylinder boundary just a moment after the task start time has passed. To aid in determining that moment, the 6030 has a countdown timer that is shown in the Information Field when the Competition Route (that has a start time) is active. The countdown timer will display hh:mm:ss to the start time and will alternate with the start waypoint name. The countdown timer will display decreasing negative numbers as the first start time approaches. At the actual start time (countdown timer = 00:00:00), the 6030 will give an acoustic alert consisting of three, prolonged, high-pitched, two-tone beeps to serve as a definitive alert that it is possible to start the task (i.e., exit or enter the start cylinder). When the start time has passed, the timer will start to count up to show how much time has passed since the task start. There is also a user-field **Start Race** that functions the same as the countdown timer except it only shows mm:ss. When Start Race becomes positive the user-field will visually invert (white numbers on a black background) to serve as a definitive visual alert that it is possible to start the task (i.e., exit or enter the start cylinder).

The moment the criteria for a valid start are achieved the 6030 gives an unmistakable “turnpoint reached” sound (2-seconds of ascending beeps) and the 6030 will automatically switch to the next turnpoint. The criteria for a valid start are: the start time of an active Competition Route has passed and the pilot either enters an entry cylinder or is within an exit cylinder. Because the GPS receiver in the 6030 confirms its position every second, it will take less than 1 second to alert the pilot of a valid start or of crossing a turnpoint cylinder. At that moment the 6030 will record at least one tracklog point within the cylinder, regardless of the tracklog recording interval you have set in the Recording settings menu.

Quite often the pilot may be waiting for the race to start some distance from the start cylinder. The user-field **CylArrival** displays the countdown to the ideal moment to commence gliding to the start cylinder from the pilot's present position. The characteristics of the CylArrival are similar to the Start Race user-field, described above in this section - decreasing negative numbers during countdown to zero, then the display field visually inverts and counts up. When you are climbing, CylArrival is derived by adding the gliding time to the start cylinder flying at best-glide speed, to the Start Race value. For example, If you are thermaling 2 miles from the start cylinder and your best-glide speed is 30 mph, CylArrival will show 0:00 four minutes prior to the race start (*Start Race* would show -4:00). When you are gliding, CylArrival is derived by adding the time it will take to cover the distance to the start cylinder flying at your current speed, to the Start Race value. This user-field is helpful to determine whether to proceed to the start circle or wait for the next start time. Ideally the pilot heads to the start cylinder when CylArrival becomes 0 (assuming you have the desired altitude) and fluctuates near zero during the glide. Note: wind is not considered in CylArrival.

Another user-field useful in assisting the pilot in arriving at the start cylinder at the designated start time is **Spd StCyl**. This user-field shows the ground speed required to get to the start cylinder boundary just as the start time passes. For example, if you were 1 mile from the start cylinder with a 1pm start, Spd StCyl would show 30 (mph) at 12:58pm indicating that if you flew towards the start cylinder at that moment with a groundspeed of 30mph you would arrive at the start cylinder at 1pm. This user-field is constantly updating so you can see if you should speed up or slow down to get the correct start. Spd StCyl is active up until the start time passes.

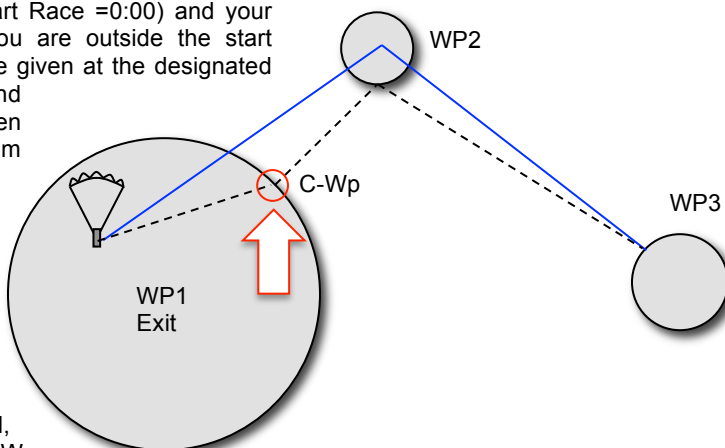
When a Competition Route is active the bottom line of the Information Field will show “*next ↑ pr ↓ wp*”. This serves as a reminder that the next waypoint can be advanced or moved back with the *↑ ↓* keys. This is of particular importance when you wish to go back and take a later start. If *next ↑ pr ↓ wp* is not shown in the Information Field press the *McC* *↔*/WP key for 3-seconds to bring it up. This will enable the *↑ ↓* keys to advance or move back the current active WP. When a valid start occurs, the Competition Route will advance to the first turnpoint in the route, however, if you wish to go back and take a later start, the *↓* key (prev wp) can be pressed and the start waypoint will once again be active with the start time incremented forward one interval. If you change your mind you can advance to the next WP by pressing the *↑* key (next wp). If you wish to increment to the next start time before you have achieved a valid start, press the *↑* key (next wp) followed by the *↓* key (prev wp) and the instrument will increment the start time by the interval set in the Competition Route. If the start time is incremented as described above, the countdown timer will be relative to the newly selected start time. Please also see section 12.6.

The other key piece of information necessary to achieve an optimal start is your position relative to the start cylinder boundary. Ideally you would want to position yourself just outside an Enter start or just inside an Exit start, just before the start time. The user-field Dist StCyl will show your distance to the boundary of the start cylinder. Dist Cyl is also useful when flying the task, so that you do not need to remember the size of the turnpoint cylinder and goal and subtract that from the distance to waypoint. A positive value indicates you are outside the cylinder and a negative value indicates you are inside the cylinder.

Usually, but not necessarily, the start cylinder is the first waypoint of the Competition Route. If a waypoint has been set as the start (marked with an “S” after the cylinder radius), you must also set the start time and the type of start as described in the section above. By setting the start to “ENTER” or “EXIT” you define whether the race begins by flying into or out of the cylinder. You must enter/exit the start cylinder after the set start time to cause the 6030 to automatically transition to the next turnpoint in the route. If no waypoint is set to be the start, you can start whenever you want and the automatic transition to the next turnpoint occurs as soon you are inside the first cylinder. For an Enter start, it makes little sense to choose the takeoff place as the start cylinder because immediately after receiving satellites the 6030 will switch over to the next turnpoint. The criteria for the “turnpoint reached” signal differ for enter and Exit starts as explained below in the following sections.

5.4.3.1 Exit Start

With the Competition Route set for an Exit start, the “turnpoint reached” signal will be given as soon as the start time has passed (Countdown timer or Start Race = 0:00) and your position is inside the start cylinder. If you are outside the start cylinder, the “start time open” signal will be given at the designated start time (i.e., Countdown timer = 0:00) and the “turnpoint reached” signal will be given the moment you cross the start cylinder from outside to inside. In both cases the sound is given to alert you that it is time to go to the next turnpoint; the next turnpoint will then become active (WP2 in the example). All calculations and the direction arrows will now be with respect to WP2.



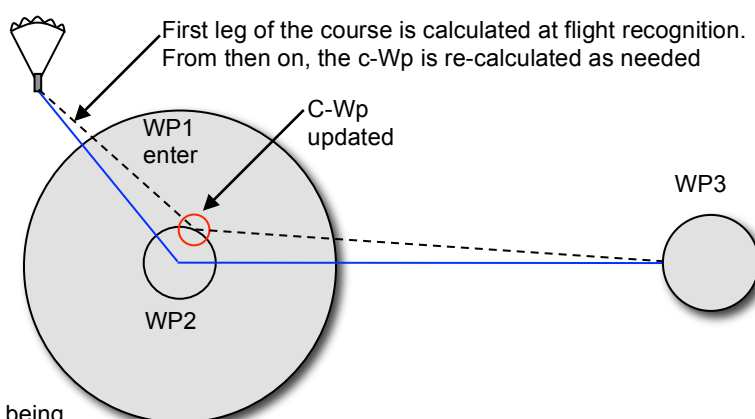
If the Optimized Competition Route is being used, before start time has passed, the bearing arrow will point to the C-Wp calculated at the time the Competition Route was built. On the Map page, the route will show the bearing line from your current position to the C-Wp on the start circle. Assuming you are inside the exit cylinder when start time passes, the “turnpoint reached” signal sounds, the next waypoint becomes active and the directional arrow in the compass points to the next waypoint. Keep in mind that before the start time has passed, the directional arrow in the compass points to the optimal point (C-Wp) and not to the start circle center (as is the case with a normal Competition Route). If you are trying to

position yourself for an optimal start you should monitor *Dist opt WP* to know your distance to the optimal intercept and *Dist to Cyl.* or *Dist StCyl* to see if you are inside or outside the cylinder (positive distance is outside and negative distance is inside). Of course you can also look at the Map page to see your position relative to the course.

If, after achieving a valid start, you wish to take the next start time, press the ▼ key ("*next ↑ pr ↓ wp*" must be displayed in the bottom line in the Information Field). By pressing the ▼ key you set the start (WP1 in the example) as the active waypoint, and the instrument will increment the start time by the interval set in the Competition Route. If you wish to increment to the next start time before you have achieved a valid start, press the ▲ key (next wp) followed by the ▼ key (prev wp) and the instrument will increment the start time by the interval set in the Competition Route. If the last start time has passed and you press the ▼ key, the instrument will not increment the start time. **Note:** It is required that the first turnpoint after the start cylinder be outside the start cylinder. Please see Section 12.6 for a detailed example of a task with an Exit start.

5.4.3.2 Entry Start

When the Competition Route is set for an entry start, the start time open signal will be given at the designated start time (i.e., Countdown timer/Start Race=0:00) and the "turnpoint reached" signal will be given as soon as you subsequently cross the start cylinder from outside to inside. The first turnpoint will become active and all calculations and the direction arrows will be made with respect to the first turnpoint (WP2 in the example).



If the Optimized Competition Route is being used, the entry start cylinder has no optimized entry point, however, the turnpoint inside the entry cylinder has an optimized intercept (C-Wp) that is calculated when the 6030 recognizes that the flight has begun (flight acceptance). The first leg of the route is drawn from your position at flight acceptance to the C-Wp and is updated as needed when the your cross track error divided by the distance to the cylinder is greater than 0.2 (~11°).

If you are trying to position yourself for an optimal start you should monitor *Dist StCyl.* to see if you are inside or outside the cylinder (positive distance is outside and negative distance is inside). Before a valid start has been achieved the direction arrow points to the C-Wp of the first turnpoint and will continue to point to the first turnpoint's C-Wp until the first turnpoint is achieved.

If, after achieving a valid start, you wish to take the next start, press the ▼ key ("*next ↑ pr ↓ wp*" must be displayed in the bottom line in the Information Field). By pressing the ▼ key you set the start (WP1 in the example) as the active waypoint, and the instrument will increment the start time by the interval set in the Competition Route. If you wish to increment to the next start time before you have achieved a valid start, press the ▲ key (next wp) followed by the ▼ key (prev wp) and the instrument will increment the start time by the interval set in the Competition Route. If the last start time has passed and you press the ▼ key, the instrument will not increment the start time. **Please see Section 12.6** for a detailed example of a task with an Exit start.

5.4.4 Final Glide

Here, GPS data and the McCready theory go hand in hand (**please also read the Section 12.5, McCready Theory**). The objective of final glide calculations is to reach goal as quickly as possible, by determining the optimal altitude for leaving your last thermal and the best speed to fly while on final glide. To this end the 6030 will indicate when to leave the last thermal, and will assist you in determining the correct speed ring setting to fly to goal. Because there is no way for the 6030 to know the nature of the air mass in route to goal, final glide recommendations are just that and should not be interpreted as absolutes. However, the 6030 will provide highly useful data to help you access your progress and make beneficial adjustments.

In order to provide final glide data, the 6030 needs to know the distance to goal, the climb rate of your last thermal, the altitude of goal, your present altitude, and your glider's polar. There are two other variables that will affect your final glide: the horizontal (wind) and vertical (lift/sink) components of the air mass on final glide.

Predictions of the wind can be made based on your previous glides; however, making predictions about the amount of lift or sink on course is far less reliable. For this reason the lift and sink on final glide is assumed to be net zero. Final glide consists of two phases, (1) Last Thermal and (2) Glide to Goal discussed in the following two sections.

5.4.4.1 Final climb

Just as the 6030 knows the McCready optimized speed to fly for a next expected climb rate based your gliders polar (as entered into the instrument), it similarly knows the correct speed to fly to goal based on your final climb rate. For each speed to fly there is an associated glide ratio. Using this glide ratio, the distance and altitude of goal, the 6030 can determine the necessary altitude you must attain in your last climb to arrive at goal by flying the optimal speed. If there is a wind component, the 6030 can calculate your resulting glide ratio and adjust the departure altitude.

The wind encountered on final glide can have a significant effect on your progress to goal, and in the worst case can cause you to come up short. The 6030 automatically calculates the wind component and adjusts the final glide departure altitude. However, the experienced pilot knows that there are circumstances where a manually entered wind component would be preferable. If a manual head/tailwind is desired, press and hold the *H/T wind* key for 3 seconds; the Information Field will now show "*HT wind auto*". Press the *F2* key, and the Information Field will show "*HT man. ↑↓*"; use the *▲ ▼* keys to set the desired head/tailwind in the Information Field (e.g., "*HT man. ↑↓ -12*" for a 12-mph headwind). When entering a manual headwind component, you must rely on experience and expertise to determine a reasonable value based on the circumstances. To revert to automatic head/tailwind press the *F2 (Auto Wind)* key.

As you climb in your final thermal, the 6030 compares the optimum (automatic or manual wind-adjusted) departure altitude with your current altitude and displays this value in the user-field *Alt a WP*. The displayed value will become increasing less negative as you approach the optimal departure altitude (*Alt a WP = 0*). When this occurs the user-field visually inverts (white numbers on a black background) and it is now possible to leave the thermal and fly at the optimum speed to goal. This assumes that lift and sink on final glide net zero. Because there is no way for the 6030 to know otherwise – or to know if the wind component will change – you must decide, based on an assessment of conditions, whether to leave immediately when *Alt a WP = 0*, or if it is prudent to continue to climb for some reserve altitude.

In a strong thermal, when you climb to *Alt a WP = 0*, it means that you have climbed appreciably higher than the altitude required to make goal at best glide speed. This extra height allows you to glide to goal at a higher speed. However, if the last thermal is weak, the optimal glide speed is just a little more than best glide, and the resulting calculated departure altitude will only be a little higher than that required to make goal at best glide speed. Therefore you would have only minimal extra altitude, and a small area of sink could prevent you from reaching goal without another thermal. For this reason you should climb to an altitude higher than *Alt a WP = 0* if the last thermal is weak.

If goal is a line with an end-of-speed-section (ESS), calculating the optimum departure moment is slightly more complicated. Scoring this type of finish, your elapsed course time is only until you enter the ESS, however, it is still necessary to cross the goal line at the center of the ESS. To achieve the fastest possible final glide for this type of finish you would need to climb high enough in your last thermal to fly McCready speed to the ESS and then best glide to the goal line. As discussed above, when the optimized competition route is used, *Alt a WP* is relative to the optimized cylinder intercept. If you leave the last climb when *Alt a WP = 0* you should have sufficient altitude to make the ESS but likely not enough to make the goal-line, therefore, it is clear that you must climb higher than *Alt a WP = 0* in that last thermal. Since *A BG WP* is relative to the next point in the route and *A BG Goal* is relative to the very end of the route, the difference between these two values (on the last leg of a route) is the amount of altitude required to fly best glide speed from the second to last point in the route (ESS intercept in this case) to goal. This means that if you climb the difference between *A BG Goal* and *A BG WP* above *Alt a WP = 0* you should have sufficient altitude to make the ESS at best McCready speed and then the goal line at best glide speed.

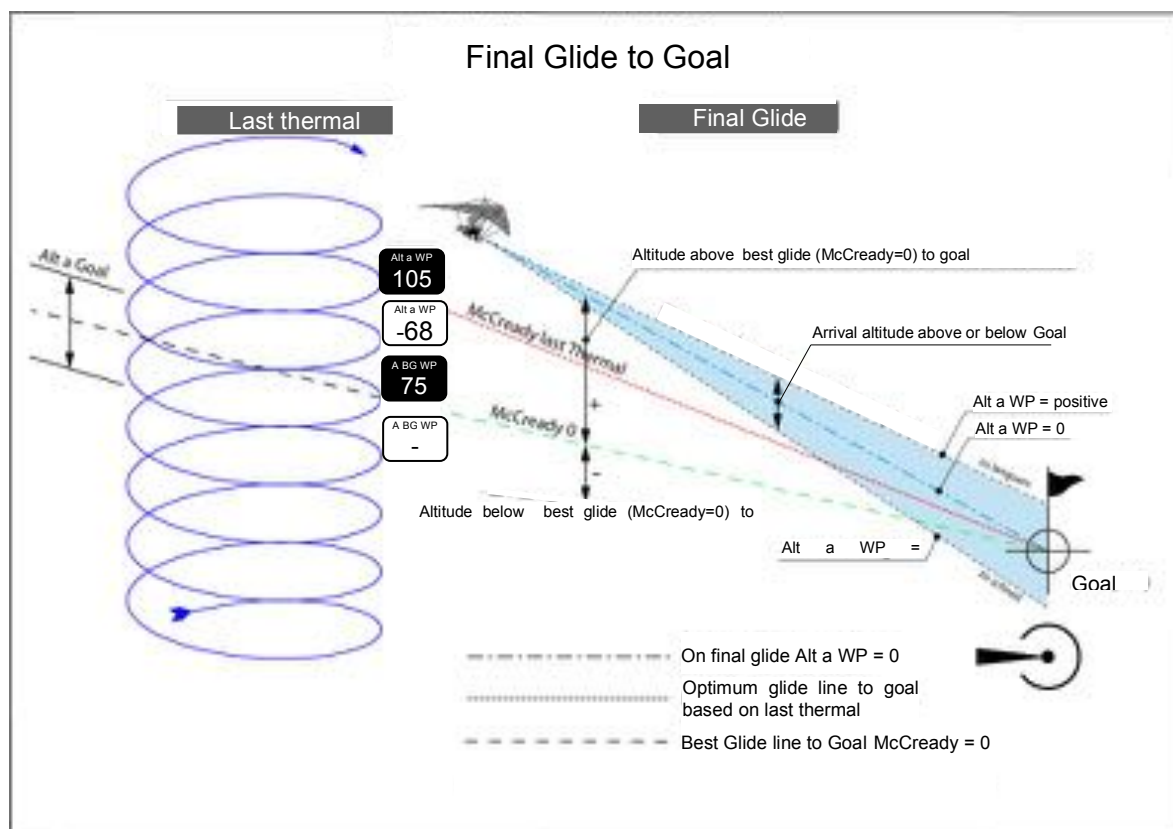
If goal has a conical-end-of-speed section (CESS), in certain situations, it may be faster to climb up to the CESS than to intersect it on glide. You can monitor the height up to the CESS in the user-field *Alt Cone*.

5.4.4.2 Gliding to Goal

Since the height needed to attain optimum final glide speed is based on the strength of the last thermal, you should control your speed on final glide so that the McCready indicator lines up with the Average Thermal Climb indicator. However, if your climb rate increases substantially in the last few minutes of your last thermal, the Thermal Averager may not correctly reflect the overall strength of your last thermal due to the relatively long

average period of the Thermal Averager. In other words, you will likely reach the optimum departure altitude before the Thermal Averager has a chance to catch up to the higher climb rate. In this case, you could glide with a speed ring setting (McCready indicator) closer to the value that was shown on the digital vario (ideally with a 20 to 30 second average) just before you left to go on final glide.

You can monitor your progress in the user-fields *Alt a WP* and *A BG WP* (see figure next page). Ideally *A BG WP* should slowly decrease to zero as you arrive at goal, while *Alt a WP* should stay around zero all the way to goal. Obviously these values will fluctuate due to the nature of the air mass on final glide. Consequently you should check these values periodically during final glide and take note of the trend. If *Alt a WP* increases steadily, then you are generally in a favorable air mass and can likely fly a faster speed ring setting. Conversely if *Alt a WP* becomes increasingly negative, then the air mass has more sink than expected and may require a less aggressive speed ring setting – but never slower than best glide speed (McCready indicator = 0). If you encounter a large area of sink on final glide, you will likely have to fly slower with a lower McCready indicator value (of course after you clear the sink). If *A BG WP* becomes negative, reaching goal without gaining some altitude is no longer possible.



If you fly through a good thermal on final glide it may be advantageous to stop and climb. This will likely be the case if your last climb was relatively weak. If, when you enter this new thermal, *Alt a WP* is negative, then there is a time benefit to be gained by climbing. However, that benefit can only be realized if you fly at a faster speed ring setting once you leave this thermal at *Alt a WP* = 0. The appropriate speed ring setting will be the climb rate that you have been achieving on this climb. If *Alt a WP* is positive when you fly into a thermal on final glide, then it would be a waste of time to circle there – unless there is some other reason to gain altitude, such as pilots reporting bad sink ahead of you, there is a ridge you need to clear, you are generally pessimistic about the air mass ahead, etc.

Another way to monitor your progress on final glide is to compare your glide ratio required (*L/D req*) and your glide ratio over the ground (*L/D gnd*). If your *L/D gnd* is greater than *L/D req* then you are currently progressing favorably and should make goal (provided *L/D gnd* remains greater than *L/D req*). Conversely, if *L/D gnd* is less than *L/D req* then you are progressing below the minimum necessary glide slope and will not be able to make goal unless you encounter a more favorable air mass and/or gain some additional altitude. If you control your speed so *L/D gnd* = *L/D req* then you are flying the correct speed to arrive at goal at 0' AGL and the McCready pointer (radial line in the vario dial) will be indicating the corresponding speed ring setting. The McCready

pointer reflects the best speed ring setting from your current position to goal, at least until the situation changes again. Some caution here, flying the speed where $L/D_{gnd} = L/D_{reg}$ is generally not advisable unless it is abundantly clear that conditions on course line are becoming more favorable. It is prudent to back off of the speed ring setting determined by $L/D_{gnd} = L/D_{reg}$. By how much depends on what conditions look like on the way to goal, feedback from pilots in front of you, or your intuition. It is also important to note that reassessing your final glide speed ring setting should not be done actively or you will end up flying reverse speed-to-fly (slowing down in sink). Remember, speed-to-fly assumes lift and sink will net zero, not that there will be no sink on your glide. Reassessing should be done only after a significant period of excessive sink (or lift).

In some competition tasks the last turnpoint is relatively close to goal and thermal height and/or a favorable tailwind will allow you to achieve sufficient altitude before the last turnpoint so that you can go on final glide before achieving the last turnpoint. In this case the user-field *A BG Goal* should be monitored. *A BG Goal* shows your altitude above your best glide line around the remaining portion of the course (accounting for the wind). Since this value is relative to your best glide line, it is good idea to climb above *A BG Goal* = 0 and gain some reserve altitude before going on final glide. If you wish to fly above best glide speed (usually the case if the last thermal is good) then you should climb even higher than your reserve margin. The user-field *L/D Goal* is the glide ratio required to make it around the remainder of the course and can also be monitored in this situation to help evaluate your progress.

6 Flight Memory and Flight Analysis

6.1 Flight Memory

The 6030 has a sophisticated flight data recording function that records complete flight data in accordance with IGC (International Gliding Convention) rules. This recording includes a digital signature to secure the recording against tampering. This means that flights recorded on the 6030 can be transferred directly to an online contest, scorekeeper, certifying body for record homologation, etc. without the need to "process" the recording through a computer program. The following data is recorded at a preset recording interval: time stamp, latitude/longitude (in the WGS84 coordinate system), indication of fix quality, pressure altitude, GPS altitude and air speed (or groundspeed if no airspeed sensor is used).

There are three **recording modes** available, fulltime, automatic and semi-automatic. **Automatic recording** is the default recording mode, meaning that the instrument will automatically detect the beginning and end of the flight. The 6030 determines when a flight has begun by monitoring GPS speed and altitude change and when either of these values exceed a preset threshold, the flight is deemed to have begun; this moment is referred to as **Flight Acceptance**. Using this mode the instrument will only record from just before takeoff to 1 minute after landing. To ensure that the flight recording includes the very beginning of a flight, the 6030 will include up to 27 recording points prior to flight acceptance. For example, with the recording interval set to 10 seconds, the flight recording will include the 4-1/2 minutes (27 x 10s) before flight acceptance. If the recording mode is set to **Fulltime**, recording will start recording 2 minutes after the instrument is turned on (to allow any necessary settings to be made before the recording starts) until the instrument is switched off. **Semi-automatic** will record from Flight Acceptance until the instrument is switched off. The recording mode and parameters for Flight Acceptance can be set in *Menu>Pilot settings>Recording>Recording mode*. The default mode is Automatic (Full auto) and the default parameters for flight acceptance are 10km/h and 20m of altitude change.

With the recording mode set to automatic, a flight will be determined to have ended when the horizontal speed is lower than 6mph (10 km/h) and the vario is less than 20 ft/min (0.1 m/sec) for 60 seconds. When this occurs the 6030 will show an overview of the flight called the **Flight Analysis** page (shown right). The digital signature (a checksum used to verify that the flight record has not been tampered with) is calculated at this moment. Do not press any keys until the process is completed. After the digital signature is generated the instrument will save the flight to the instrument flight memory and as an **IGC** file to the SD card, if one is installed. A message at the bottom of the Flight Analysis page will confirm the progress and indicate the name of the IGC file when complete. You can then return to the run mode with a short press of the OK key. A flight must be at least three minutes long to be logged into memory.

| FLIGHT ANALYSIS | |
|------------------|--------------|
| Date: | 17.20.07 UTC |
| Start: | 13:02:02 UTC |
| Stop: | 15:55:32 UTC |
| Flight time: | 2:53:30 |
| Scanrate: | 10 s |
| Max A1: | 2823 m |
| Max A2: | 1154 m |
| Max A3: | 4273 m |
| Max Vario (1s): | 8.9 m/s |
| Min Vario (1s): | 6.6 m/s |
| Max Vario (10s): | 6.2 m/s |
| Min Vario (10s): | 4.4 m/s |
| Max Air speed: | 73 km/h |
| Show Map | Recal Sign. |

The frequency at which the 6030 records data is the **Record Interval** and can be set in *Menu>Pilot settings>Recording>Recording Interval*. The default recording interval is ten seconds, which is appropriate for most types of flying. The record interval can be set to a value between 1 and 60 seconds. A recording interval of 1 second is useful for performance testing or aerobatic flights, whereas, a record interval greater than the default 10 seconds may be useful for extraordinarily long recordings. Because the 6030 records a tracklog point at the moment the pilot crosses a cylinder boundary it is not necessary to use a short record interval as is the case with consumer GPS units.

When the record interval is set to 1-second, at the conclusion of a flight, the 6030 will save the flight to the flight memory with a 5-second record interval and will also save two IGC files (one at 5-sec. and one at 1-sec.) to the SD card. Obviously an SD card must be installed for these two flights to be recorded. When selecting the 1-second record interval in *Menu>Pilot settings>Recording>Recording Interval* the instrument will remind you that the SD card must be installed. When saving a flight recorded at 1-sec. to the SD card, it will take about 85-seconds to process each hour of record time. Please wait for IGC file name to be shown at the bottom of the Flight Analysis page before pressing any keys.

If fulltime recording is selected, recording will continue until the *On/Off* key is pressed for three seconds. When this is done the display will show “*really switch off?*”, press the *OK* key to confirm the end of the recording and begin the generation of the digital signature. After the digital signature is generated the instrument will save the flight to the instrument flight memory and the SD card. Do not press any keys until the process is completed. Note: manual recording will not start if the 6030 is in the menu-mode.

To view your stored flight records, highlight *Flight Memory and Tracks* in the Main Setup Menu and press the *OK* key. The records are stored according to date of the flight, shown in the left column, with the most recent flight on top. The duration of the flight is also shown, in the right column. On this page, individual flights can be deleted from the list by pressing the *F2 (Del. Flight)* key. Individual flights in this list can be manually saved to an SD card (assuming one has been loaded into the SD card slot) by pressing the *F1 (Copy to SD)* key. Note: the SD card must be formatted with FAT or FAT16. For more information regarding saving to the SD card see section 9.9.

| Flight Memory and Tracks | |
|--|---------|
| 01.03.02 | 0:43:12 |
| 13.02.02 | 1:37:34 |
| 28.01.02 | 0:24:05 |
| 23.01.02 | 1:02:24 |
| 12.01.02 | 2:11:45 |
| 15.12.01 | 0:34:55 |
| 24.11.01 | 1:07:32 |
| <div>Copy to SD</div> <div>Del. Flight</div> | |

To view the details of a flight, use the *▼ ▲* keys to move through the list and choose the desired flight with the *OK* key. The flight, with its benchmark figures is then displayed on the Flight Analysis page. If necessary, the Digital Signature of the flight can be recalculated by pressing the *F2* key (see section **Error! Reference source not found.**). Pressing the *F1* key will display the tracklog of the flight.

Important: The 6030 will store up to 100 flights in the Flight Memory menu. When the memory is full (more than 100 flights or the recording time has been exceeded) the 6030 will write a new flight recording over the oldest flight in memory. To prevent the loss of data and possible firmware issues it is recommended that you routinely save your flights to your computer (with FlyChart, GPSDump, etc.) and/or to an SD card. Once the flights have been properly saved, the flight memory should be cleared in *Menu>Clear/Initialize memory>Delete all flights*. This procedure ensures that your recorded flights are remotely saved and allows the 6030 to record new flights with refreshed memory.

It is possible that the max values shown on the Flight Analysis page will not agree with the max values shown in your flight evaluation software (e.g., FlyChart, SeeYou, CompeGPS, etc.). This is because the 6030 updates its max values each second, whereas flight evaluation programs analyze the data contained in the *.igc file*, and it is quite possible that the maximum value occurred between recording points. For example, if the 6030 recording interval is set to 10 sec, and within a 10-second period an altitude change of 20 meters occurs, a climb rate of 2.0 m/sec is calculated by a flight evaluation program. However, within this 10-second period it is quite possible that a momentary climb rate greater than 2 m/sec occurred. Due to the 6030's 1-second update rate, the Flight Analysis page would show the higher value. Flight Analysis page data is not transferred when flights are downloaded to a PC.

Flights stored in the 6030 can be downloaded to flight verification programs to score a competition, prove a record flight or participate in the OLC (On-Line Contest). The takeoff and landing points are contained in the IGC file. The takeoff position is the GPS location where flight acceptance (as discussed above) occurred. The landing position is the position where the instrument recognized the end of the flight according to the conditions

discussed above (the point where the 6030 switches to the Flight Analysis page). With this feature, the instrument is in compliance for world records as stated in FAI Sporting Code Section 7 part D.

It is possible to set a marker in the track log of a flight by pressing the *Mrk* key for 3 seconds. Of course the GPS must be acquired and flight acceptance must have occurred. The marker will be set in the E record in the IGC file.

Important: Since the proof of a completed flight depends entirely on the GPS recording, it is important to ensure that the GPS receiver has good reception (at least 4 satellites) before takeoff. Therefore the 6030 should be turned on several minutes before takeoff to help ensure that the GPS is fully acquired.

6.1.1 Graphic Display of Flights - Map page

The track log of saved flights can be viewed on the 6030 display. Go to the Flight Analysis page (see steps above) and then press *F1 (Show Map)*. The track log appears on the display. North is located at the top, and waypoints are displayed with a + sign and the name. The map scale is displayed in the lower right corner of the map. The view can be changed as follows:

F2: Zoom In: The scale of the map is halved each time the *Zoom In* key is pressed, to a maximum of 0.2 mi. Thus individual circles during a climbing period will be clearly recognizable (depending on the recording interval setting).

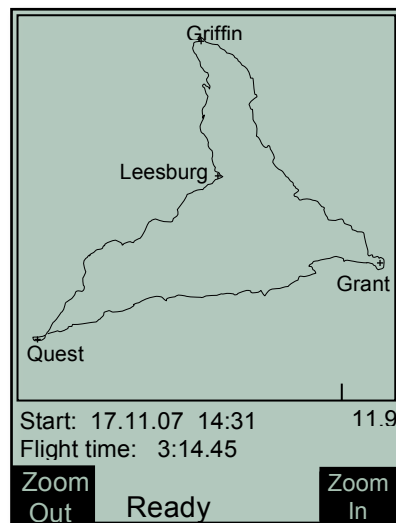
F1: Zoom Out: The map scale is doubled each time the *Zoom Out* key is pressed, to a maximum scale of 29.5 mi. Thus the complete flight can be seen on the display (except for particularly long flights).

◀ ▶ ▲ ▼ : Pan: With these the plotted area can be shifted up, down, left and right.

OK: From any view, jump back to display the complete flight.

ESC: Back to the Main Setup Menu. Any other key will cause the track in the current flight to be redrawn.

Note: When the pan and zoom functions are used it will take a few moments to redraw the map/track ("*Wait*" and "*Ready*" will correspondingly appear in the Information Field). If a zoom or pan key is pressed while a map is being redrawn, the original redraw will be suspended and will start over again with new pan/zoom selection. This allows you to quickly view the desired section of the map.



6.2 Flight Verification for Competition, OLC and World Records

Flights stored in the 6030 are saved in a secure IGC (International Gliding Committee) format and can be downloaded to flight verification programs to score a competition flight, participate in on-line contest, or prove a record flight. Flight data including time/date, GPS coordinates, GPS and pressure altitude, and speed are recorded at a preset interval. This interval can be set in *Menu>Pilot settings>Recording>Record interval*. Also contained in the IGC file are the takeoff and landing points, the declared route (Competition Route), the user-set pilot and aircraft information and instrument information. **Important:** The Competition Route must be activated prior to takeoff to be included in the IGC file (C-record).

At the completion of a flight, the 6030 automatically generates a tamper resistant **Digital Signature** and saves it within the IGC file (G-Record). During this process the 6030 will display "*Generating Digital Signature*" in the Information Field. If only one character of the flight data contained in the IGC file were altered, this signature would no longer be valid and the judging committee would be aware of the manipulation.

This calculation to create the digital signature is very complicated and can take up to several minutes to complete for a long flight with a frequent record interval. Due to this complexity it is possible that an error is made when generating the signature. In this case a scoring program may reject the flight. However, in most cases, this can be remedied by going to the Flight Analysis page of the flight and pressing *F2 (Recal Sign.)* to recalculate the Digital Signature. After the Digital Signature is recreated re-download the flight to the scoring program.

With these features, the instrument is in compliance with Section 7 part D of the FAI Sporting Code. **Important:** the characters \$, *, !, \, ^, ~ should not be used in the pilot's name, waypoint's name, glider type, glider ID, etc. since they are reserved for use in the .igc file: Failure to observe this can prevent the track log from being read by scoring and flight software. More detailed information in regard to IGC file format is available on the FAI website: http://www.fai.org/gliding/gnss/tech_spec_gnss.asp.

Once a flight has been download to a PC it is possible to view the raw data contained in the IGC file by opening it with a text editor. It is also possible to import the data into a spreadsheet program like Excel for advanced data analysis. **For more on viewing IGC data, please see Section 8.7.**

As of 2007, twenty-five countries have joined the Online Contest (OLC). Flights are submitted to the OLC via the Internet and must follow the IGC format and include a digital signature. GPS receivers like Garmin or Magellan do not create digital signatures for their track logs. Flight records from these devices must be downloaded to flight evaluation programs like CompeGPS and SeeYou that create a digital signature when the recording is downloaded from the GPS to the PC. However, a digital signature created by a PC does not provide very good security against manipulation of the flight. In the future, it is likely that the regulations will be changed and the signature will have to be generated by the recording device. To correctly classify and score your flight on the OLC, the pilot's name, glider type and glider ID must be submitted with the flight recording. This data can be entered into the 6030's memory, and thus be transmitted with the flight record, in *Menu>Pilot settings>Pilot name/Glider type/Glider Id*.

7 Restricted Airspace (CTRs)

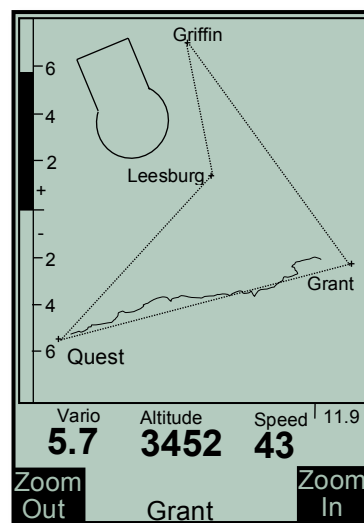
While flying, there are areas pilots must avoid such as regulated airspace, danger areas, cables, wildlife protection areas or fields prohibited by a competition organizer. The 6030 refers to these avoidances as **Airspaces** (or CTRs) and it is possible to enter up to 300 airspaces into the active memory of the 6030 and virtually unlimited CTRs can be stored and accessed using an SD card. Airspaces loaded into the 6030s active memory will be shown on the Map page when you are flying in their vicinity. The instrument will also provide proximity alerts and display the airspace details when entering the warning distance and when entering the actual airspace. The distance to the nearest airspace can be seen in the user-field **Dist CTR**. If you fly under an airspace floor the user-field **Alt Allowed** will show the maximum allowable altitude. **Alt Allowed** will show - if there is no airspace floor present or if you enter an airspace. Airspace can be entered into the 6030 in three ways:

Direct upload via PC: up to 300 airspaces can be loaded into the instrument memory using a PC and flight software like FlyChart, GPS Dump, etc. This method is common at competitions where the meet staff compiles an airspace file and uploads it via the USB connection. No SD card is required. Instructions for this method are in section 8.4.

Pre-load CTR file on to an SD card: Airspace files are compiled on a PC and saved to an SD card. The SD card is loaded into the 6030, the desired airspace file is selected in the SD-Card menu and the 100 closest airspaces of that file are automatically loaded into the airspace list (after the instrument gets a GPS fix). With this method it is possible to build airspace files for entire states, countries, continents or even the world and always have the correct airspace loaded when you move from one flying site to another. Instructions for this method are in section 7.2

Manual entry: CTRs can be entered/edited via the 6030 keypad. This method is very tedious and would likely only be used to edit an existing airspace or to add 1 or 2 airspaces to an existing list. Manual entry is discussed in section 7.2.2.

Important: The Airspace function is only a tool. The pilot is solely responsible for staying out of airspace and avoiding obstacles. Due to the fact that the 6030 calculates distance (point-to-point) there can be considerable error when calculating the distance to a CTR if the shortest distance is to a straight leg of the airspace rather than to one of the actual points that define the CTR. Consequently, if your approach to the airspace is along one of its straight legs it is recommended that you monitor your proximity to the airspace using the Map page.



7.1 Airspace Alerts and Info

There are different types of airspace and it is possible to select which types will be warned according to the three options below. This can be done in the Main Setup Menu >Pilot settings> CTR Alarm (select 0, 1 or 2). The list of airspace types is later in this section.

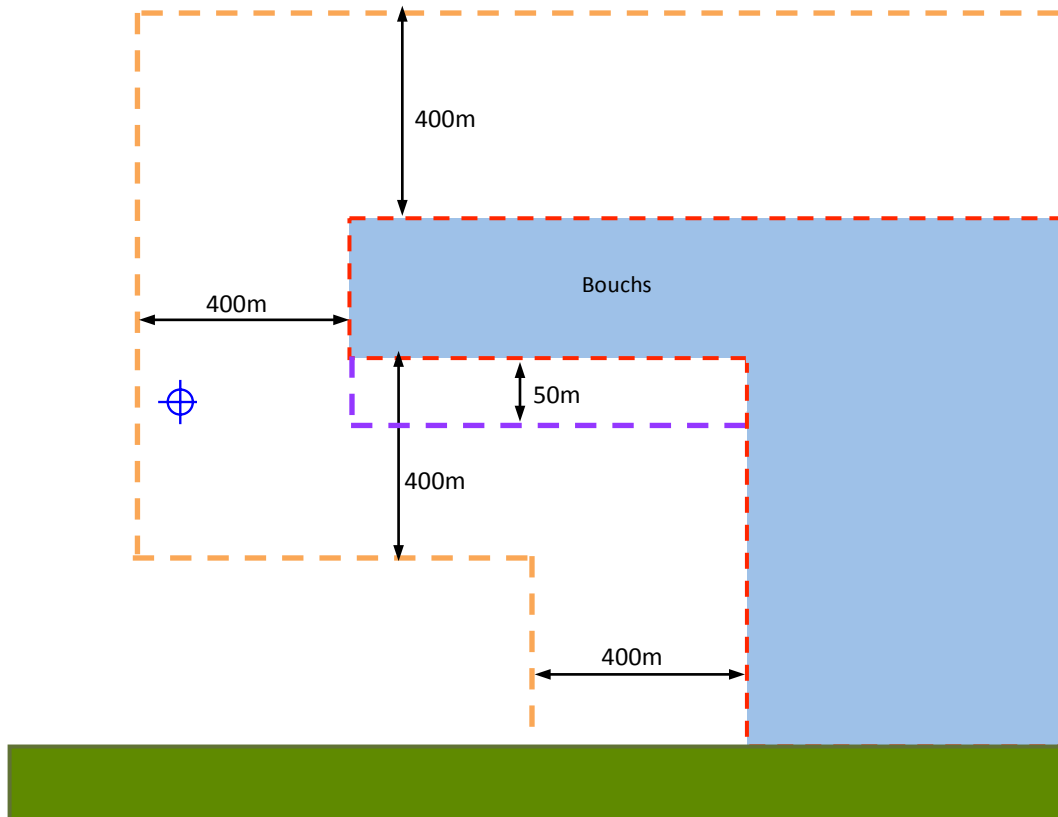
CTR Alarm = 0: No acoustic warning and no automatic display of the CTR info page. The CTR info page can always be called up with a short press of the information key.

CTR Alarm = 1: Single acoustic warning when entering the warning distance and Single acoustic warning when entering the airspace. The CTR info page is automatically shown for 10s with broken threshold highlighted.

CTR Alarm = 2: Single acoustic warning when entering the warning distance and a double acoustic (high pitch-low pitch) when entering the airspace. The CTR info page is automatically shown for 10s with broken threshold highlighted.

The warning distance of an individual airspace is usually set in the airspace file but can be modified on the instrument (see section 7.2.2) and applies to the horizontal and vertical distance to the airspace. However, since approaching the floor of an airspace from below is usually relatively slow (climbing in a thermal as opposed to gliding), an additional alert is given at 50m below the airspace floor (purple line in the diagram below) regardless of the warning distance set for the airspace. See following diagram.

Sample airspace: Warning distance 400m (CTR alarm set to 2)



In the example above, crossing the orange or purple line yields single tone alarm and brings up CTR Info Page. Crossing red line yields double tone alarm and brings up CTR Info Page. A pilot at the blue target is inside the 400m horizontal warning distance and therefore would have received the single tone alarm and CTR info page would be automatically displayed. Note: since the horizontal distance is the threshold that was broken, the warning distance is highlighted (figure at right). On the other hand, if the warning distance in the vertical direction was broken the Low/Up parameter would have been highlighted. The distance to the nearest Airspace can also be seen in the user-field *Dist CTR*. The display is limited to distances of 50 km. If you enter a airspace, the *Dist CTR* will display 0.00

In the example above, the airspace type is CTR, the following are the available airspace designations:

| | |
|-----|----------------------------|
| D | Danger Areas |
| AWY | Airways |
| FIZ | Flight information zone |
| CTR | Controlled airspace |
| TMA | TMA |
| R | Restricted Areas |
| TSA | Temporary segregated areas |
| VZ | Forbidden zones |
| FLF | Airways |
| HPO | Heliport |
| GG | Danger Areas |
| HI | Obstacles (e.g., cables) |
| SZ | Wildlife protection area |
| BB | Cable car |

```

-----
          CTR Info Page
-----
CTR BUOCHS (MIL C
Low:0m Up:3950m
Distance: 374m

0 Ctr cancelled

Canc1 N47'00.842 React
CTR E008'18.464 CTR

```

7.1.1 Recalling Detailed Airspace Information

The CTR info page can be called up anytime with a short press of the *i* key and the five closest airspaces are shown. To see the details of one of the displayed airspaces, highlight the desired airspace with ▲▼ keys and short press the OK key. The details will be shown as in the example at right.

Typically OpenAir files will only contain the name, perimeter and floor/ceiling limits of the airspace. However the instrument is capable of displaying all of the info shown in the example at right. You can add this additional information into an OpenAir file with a text editor using the following tags. After doing this, make sure you process the file with the OpenAir2faf program so it can check your entries and give a warning if typos or mistakes are found (see section 7.2).

| Label in the instrument | Tag in OpenAir |
|-------------------------|--|
| Name: | AN (max 16 characters) |
| Class: | AC |
| Type: | AT |
| Designator: | AD (ICAO Designator) |
| Radio 1: | AR1 (max 16 characters) |
| Radio 2: | AR2 (max 16 characters) |
| Radio 3: | AR3 (max 16 characters) |
| LowerLevel: | AL (in meter without units) |
| UpperLevel: | AH (in meter without units) |
| Warning Distance: | WD (in meter without units) |
| Actual Distance: | 374m (nearest distance from the actual position) |
| Status: | AS (0 = Off, 1 = On) |
| Comment: | CO (max 16 characters) |

```

-----
          CTR BUOCHS (MIL C
-----
Class: D
Type: CTR
Designator: LSZC
Radio 1: TWR:119.625
Radio 2:
Radio 3:
LowerLevel: 0m
UpperLevel: 3950m
Warning Distance:400m
ActualDistance: 374m
Status: On
Comment:

```

If the airspace name in the OpenAir file has more than 16 characters, the last character is truncated and a serial number in the order of occurrence in the OpenAir file will be added. The airspace above will appear in the faf file as follows;

```

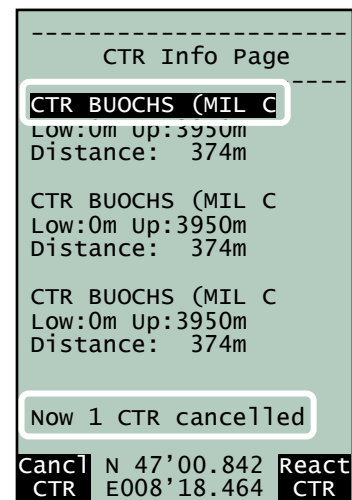
AC D
AT CTR
AD LSZC
AR1 TWR:119.625
AR2
AR3
AN CTR BUOCHS (MIL C
AS 1
WD 400
CO
AL 0
AH 3950
DP 47:01.817 N 008:20.300 E
DP 47:00.617 N 008:18.550 E
DP 46:57.033 N 008:19.950 E
DP 46:57.550 N 008:20.283 E
DP 46:57.683 N 008:21.867 E
DP 46:57.417 N 008:22.067 E
DP 46:57.350 N 008:22.500 E
DP 46:57.417 N 008:23.433 E
DP 46:56.383 N 008:23.633 E
DP 46:56.767 N 008:25.567 E
DP 46:57.217 N 008:27.867 E
DP 46:58.467 N 008:27.933 E
DP 46:57.917 N 008:28.667 E
DP 46:57.767 N 008:30.683 E
DP 46:58.917 N 008:30.350 E
DP 47:02.233 N 008:28.717 E
DP 47:01.567 N 008:27.967 E
DP 47:02.250 N 008:26.833 E
DP 47:02.350 N 008:25.900 E
DP 47:02.650 N 008:25.967 E
DP 47:02.417 N 008:24.317 E
DP 47:01.817 N 008:20.300 E
*
```

7.1.2 Deselect or select individual airspace

If you start your flight under an airspace whose lower limit is higher than you could possibly reach that reach day, you can cancel this airspace to prevent unnecessary warnings. It is possible to deselect up to 3 airspaces. Any deactivated airspaces are reactivated on restart of the instrument.

To deactivate an airspace, short press the *i* key to bring up the CTR info page, select the desired airspace with the ▲▼ keys and press the F1 key (Cancel CTR). The airspace is deleted from the CTR Info page and the next closest airspaces move up the list. The number of canceled airspaces is shown at the bottom of the page (just above the GPS coordinates). Canceled airspaces are shown on the map page with dotted boundary.

To reactivate the canceled airspaces press the F2 key (React CTR) on the CTR info page. Any canceled airspaces are also re-activated if they fall out of the 100 nearest airspace list. Therefore, if you fly back towards the start, the previously canceled airspaces will once again be active as they are reloaded into the active airspace memory.



7.2 Airspace on an SD card

Using an SD card it is possible to load unlimited airspaces into the 6030. Individual airspaces are assembled into airspace files (region, state, Province, country, continent, etc.). Airspace files can be generated on a PC from **OpenAir** files found on the Internet using the Flytec airspace utility. The airspace file is then loaded onto an SD card. With the SD card loaded into the 6030, the instrument will search for the SD card for the 100 closest airspaces and load them into the 6030 Airspace menu. As you fly from one location to another the 6030 will update its list of 100 airspaces from the SD card. Airspaces are shown on the map page and alerts will be given when flying near (or within) an airspace according to the CTR alarm type set (see section 7.1). Pressing the *i* key at anytime will bring up the info page which will show info for the 3 closest CTRs.

The most common air space file is **OpenAir**, which should have a .txt extension. Unfortunately the internal format of these files is not standardized over the various sources. Consequently the air space file must first be processed by a small Flytec program **OpenAir2faf** available on the Flytec website. This small program checks to see if the format is correct and, if necessary, corrects any errors. In order for this file to be read by the 6030, the file name must be 8 characters or less with the extension .faf and must be contained in a folder named CTR in the root directory of the SD card. The .faf file created by the OpenAir2faf program is a standard text file and can be viewed and edited using any text editor, however, care should be exercised when editing an airspace file to avoid making an incorrect change to a airspace boundary. The 6030 will accept airspaces to a maximum of 100 vertices, the OpenAir2faf program checks the OpenAir file and will give a warning if any of the airspaces exceed the 100-vertex limit.

Properly constructed .faf files may be available from fellow pilots, the local flying community, competition staff, etc. In which case you can simply copy the file into a folder named CTR on an SD card and insert the card into the 6030. The instructions for creating an .faf file and saving to an SD card are in the section 7.2.2.

7.2.1 Using Airspace loaded on the SD card

Since there can be multiple .faf files in the CTR folder. The selection as to which file is used must be made in *Menu>Main Setup Menu>SD-Card>Select CTR file*. Highlight the desired airspace with the ▲▼ keys and press OK. The display will confirm the file you chose as “selected” in the lower portion of the display. This selection can also be made during the flight. This is useful if you cross a border for example and the file needs to be changed.

If the selected file is valid, the instrument examines all the air spaces and loads the closest 100 CTR's into the instrument memory. This can take up to 10 minutes depending on the size of the .faf file. Once the 100 closest airspaces have been loaded into the instrument memory the instrument finds the 3 closest airspaces and their respective data can be displayed by pressing the info key. This information is recalculated every second. The 6030/6030 periodically checks the distances to the unloaded airspaces in the active .faf file on the SD card and if you have moved closer to any of these, the instrument updates the airspaces accordingly. Consequently, when the 6030/6030 is in use, the instrument memory will always contain the 100 nearest airspaces.



If you add or change air spaces on the instrument the instrument will ask, when exiting the Airspace menu, if the change is to be written to the SD card. If accepted, the updating of the file on the SD card can take several minutes. The same also applies if you add new CTR's or make changes to the airspaces in the instrument memory with FlyChart. If you read the airspaces from the 6030/6030 with FlyChart the 100 CTR's in the memory will be transferred not the contents of the SD card.

Important! To avoid data loss or other malfunction, SD cards should only be inserted/removed when the instrument is switched off or in the Main Menu. It is recommended that you save your .faf files to a PC since SD cards are not infallible.

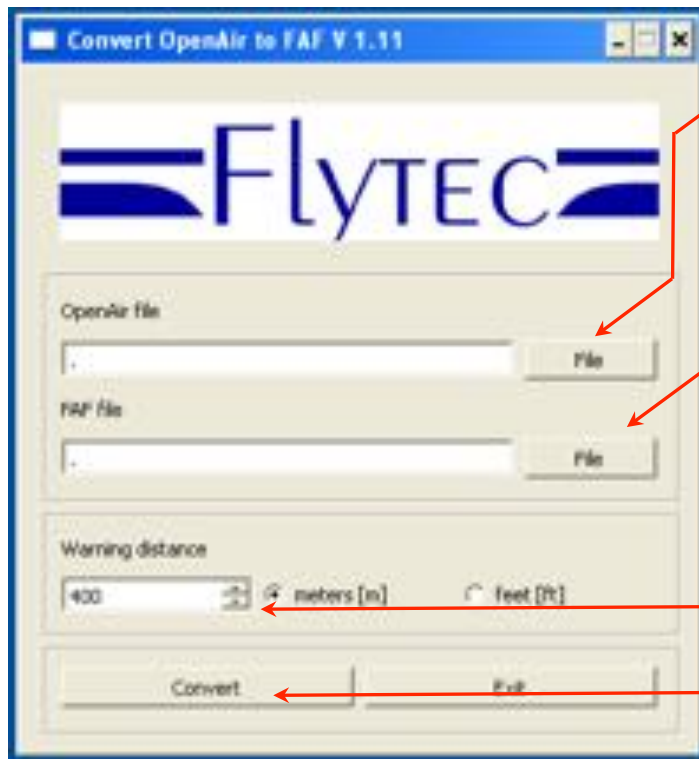
7.2.2 Create .faf file from OpenAir file and load to SD card

1. Locate and download an OpenAir text file for the region you want. Save the .txt file in a place where you can find it again (e.g. Desktop, folder named Airspace, etc.). If the file is zipped, unzip the file to the folder above. Some good resource are:

Worldwide: <http://soaringweb.org/Airspace/>
 Germany: <http://www.daec.de/fachbereiche/luftraum-flugbetrieb/luftraumdaten/>
 Switzerland: <http://www.flyland.ch/> (SHV members only)

2. Download the airspace utility **OpenAir2faf.exe** from www.flytec.com. Double click the file and the install wizard will guide you through the installation. After the installation is complete, three shortcuts (English, French, German) to the program will be added to your desktop (of course the other shortcuts can be deleted).

3. Double click the icon for the language you want to start the program.



Click button and browse to OpenAir file you downloaded in Step 1 and select the file.

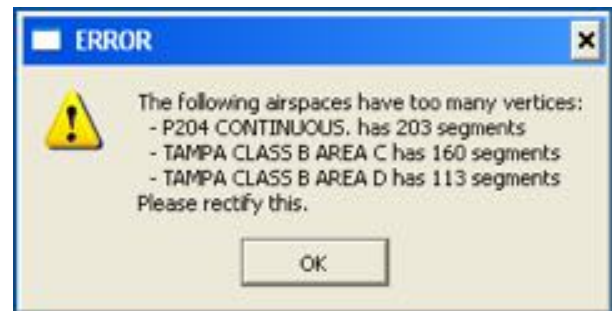
Click button and browse to the location where the converted file to be saved to. The name of the converted file can be entered in the *File Name* field. Skip this step and the converted file will be saved to the same location as the source file with the same name but with a .faf extension. Note: In order for the converted file to be recognized by the instrument, the file name (preceding the .faf file extension) must be 8 letters or less.

Select feet or meters and set airspace warning distance

Click to process file and save to the location above

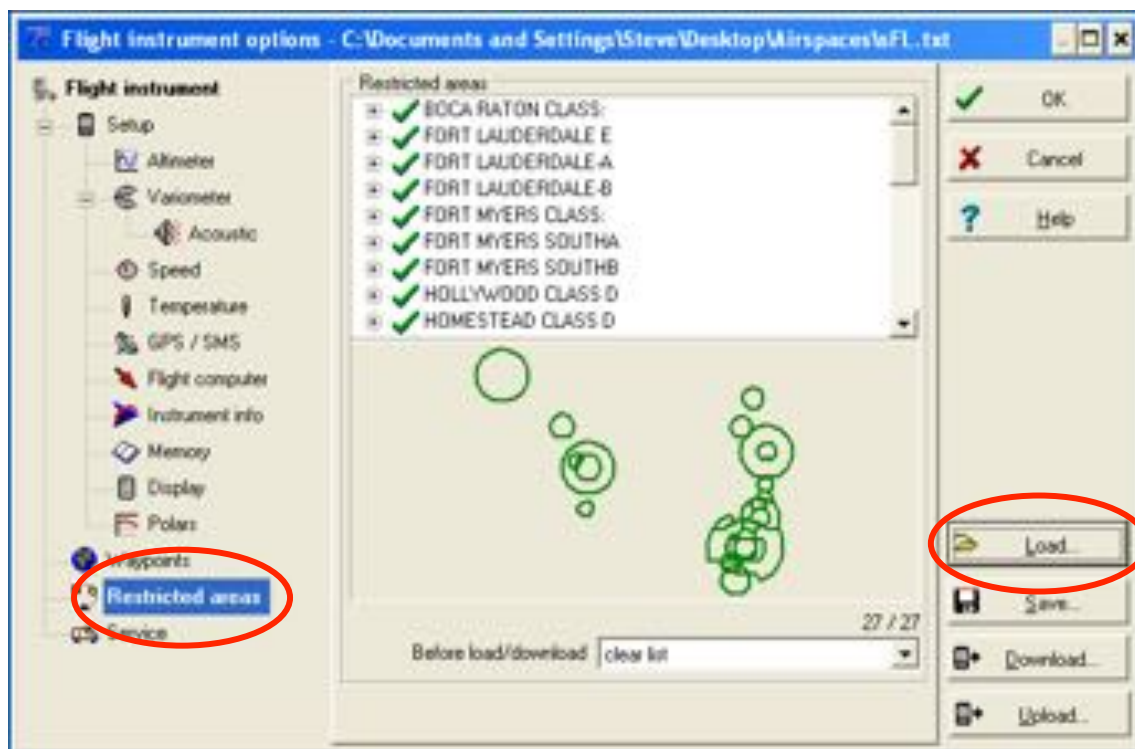
Upon clicking *Convert* the program will check to see if a file with the same name already exists. If the file exists, the program will ask if the file should be overwritten, or if the airspace in this conversion should be added to the existing file. If the conversion program finds errors in the OpenAir file it will display the problems found during the conversion in a list.

4. Create a folder named CTR in the root directory of the SD card (formatted Fat or Fat16)
5. Copy the .faf file created above into the CTR folder in the root directory of the SD card
6. Insert the SD card into the instrument and it will recognize the airspace the next time the instrument is turned on. The instrument will clear the internal airspace memory, search for the closest 100 CTR's in the specified file and load it into the internal airspace memory (the GPS must be acquired).



You can view the airspace file in FlyChart if you change the file extension from .faf to .txt

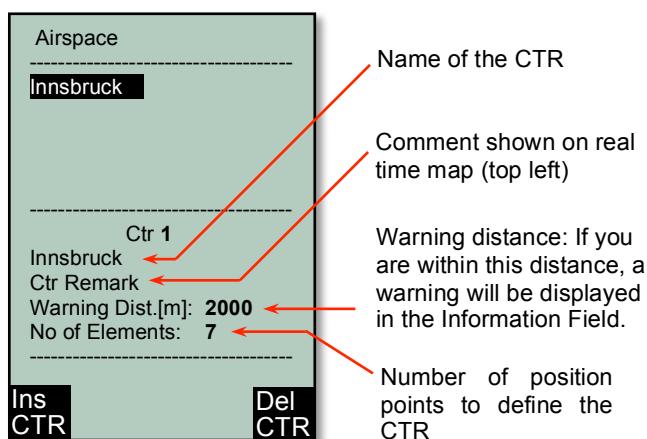
- In FlyChart open *Flight instrument Options*, in the *Extras* menu
- Click *Restricted areas* in left pane
- Click *Load* and browse to the file created above (with the .txt extension). The individual airspaces contained in the file are shown in a scrollable list and graphically in the center of the window.



7.3 Entering Flight Airspace Manually

While it is possible to enter airspaces into the instrument manually using *Menu>Airspaces*, it is far easier using FlyChart or similar flight software (e.g., GPS dump). The procedure for editing/entering/deleting an airspace with the 6030 keypad is given below; the procedure for using FlyChart can be found in Section 8.4.

Stored airspaces can be viewed in the Airspaces menu within the Main menu. The 6030 comes with the Innsbruck airspace loaded, as shown at right. The names of any loaded airspaces are shown in the upper half of the display and the details (name, 17-character comment, warning distance and the number of elements to define the shape of the area) for the highlighted airspace are shown in the lower half. The preloaded Innsbruck airspace can be edited to define a airspace in your flying area.



To enter an airspace, bring up the Airspace list from the Main Menu, press the F1 key (Ins. CTR) and then follow the instructions below for editing an airspace. To edit an airspace, highlight the desired airspace as described above and press the OK key. The cursor will now blink on the first character of the airspace name and it can be changed with the \uparrow \downarrow keys. With the F1 key you can switch between capital letters and symbols, and lower case letters and numbers. Pressing the \rightarrow arrow key acknowledges a character and moves the cursor

forward to the next character. Once the Airspace name has been edited (or left as is), confirm the name by pressing the OK key.

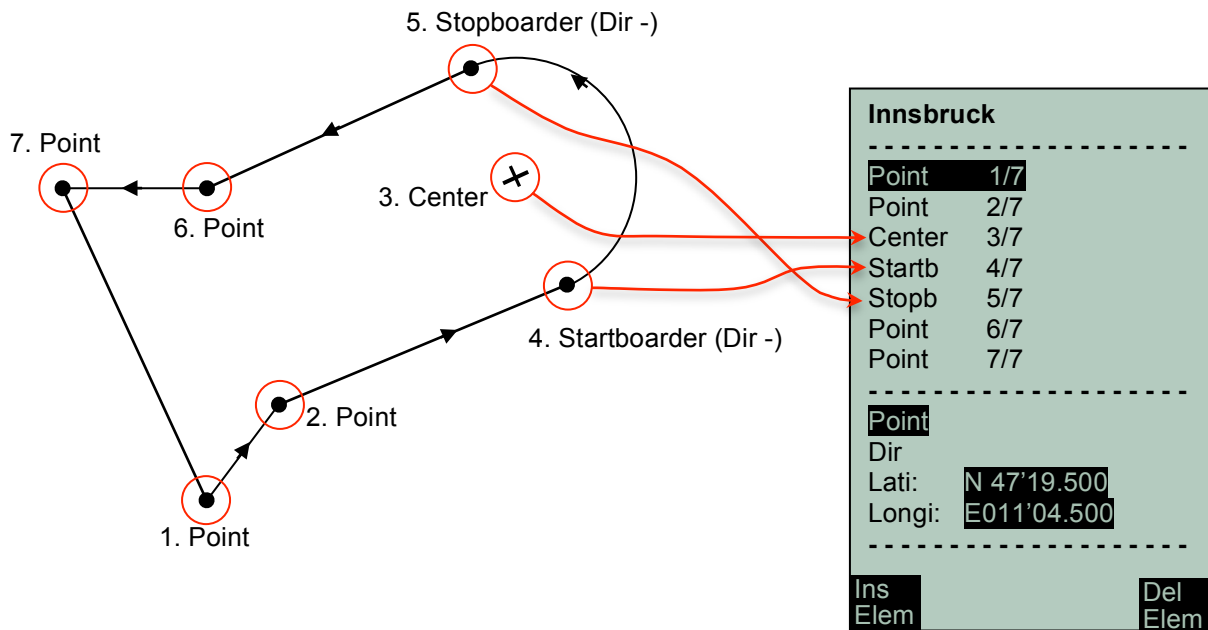
The cursor will now blink on the first character of the airspace Remark line. Edit the comment (if desired) in the manner described above, and then press the OK key to acknowledge the comment and advance the cursor to the Warning Distance field. Change the Warning Distance (if desired) in the same manner. Press the OK key to acknowledge the value and bring up the airspace element list. To select an element, scroll through the element types using the ▲ ▼ keys and press the OK key when the desired element is shown. The details of the element will appear in the lower half of the display and can be edited in the usual manner.

An airspace is defined by a series of **elements** consisting of end points of lines and arc segments, or by the center and radius of a circle. Each element must have its GPS coordinates and must be entered exactly in sequential order (clockwise or counter-clockwise). The instrument will automatically connect the last point entered to the first point, so it is unnecessary to repeat the first point at the end of the string. For mathematical reasons the distance between two points in an airspace should not be too far apart. The accuracy of the distance calculation will be increased if an intermediate point is inserted between two distant end points. The types of elements are:

| | |
|--------------|--|
| Point: | End point of a line or arc |
| Center: | Center of an arc |
| Startborder: | Start point of an arc (+ clockwise/ - counter-clockwise) |
| Stopborder: | End point of an arc (+ clockwise/ - counter-clockwise) |
| Circle: | Center of the circle with radius in meters |

When entering arc segments, observe the following parameters: Lat/Long of the arc center, Lat/Long of the start point of the arc segment, Lat/Long of the end point of arc segment, and rotational direction (+ for clockwise and - for counter-clockwise). When entering circles, the Lat/Long of the center and the radius in kilometers are sufficient.

**Example:
Counter-Clockwise**



8 Connection to a Computer

Using FlyChart, it is possible to download the waypoints, routes, Airspaces, recorded flights and user-settings from 6030 to a PC. It is also possible to upload waypoints, routes, Airspaces and user-settings from the PC to the 6030. You can view your recorded flights over real-world terrain in Google Earth directly from FlyChart. And with a simple flasher program you can upgrade the 6030 firmware when new releases become available.

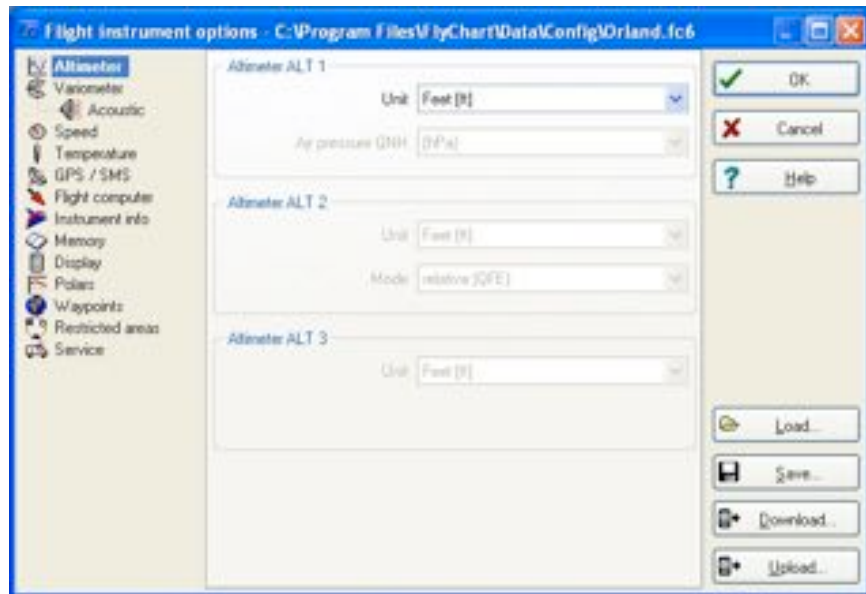
The 6030's basic equipment includes a USB data cable. In order for the 6030 to communicate with a PC, the appropriate USB driver must be installed on the PC. The driver name is PL-2303 and it is available at <http://flytec.com/Products/Software.htm>. If you install FlyChart 4.52.36 or later, the PL-2303 driver will be installed automatically.

8.1 Downloading Flights

To download a flight recording to a PC, go to the Flight Analysis Page for the desired flight (under Flight memory in the Main Menu) and then follow the downloading instructions for the PC flight program. In FlyChart simply click the download icon on the task bar.

8.2 Instrument Settings

Using FlyChart it is possible to easily configure the 6030 from your PC. To do this, turn on the 6030 and enter the Main Menu, connect the USB cable to the 6030 and your PC, then launch FlyChart. In the FlyChart Extras menu select Flight Instrument Options and the window shown at right will open. Click the Download button, and the current 6030 settings will be downloaded. Click each of the headings on the left to see their associated parameter settings and make any desired changes. When all of the changes have been made, click the Upload button. After the status bar shows the

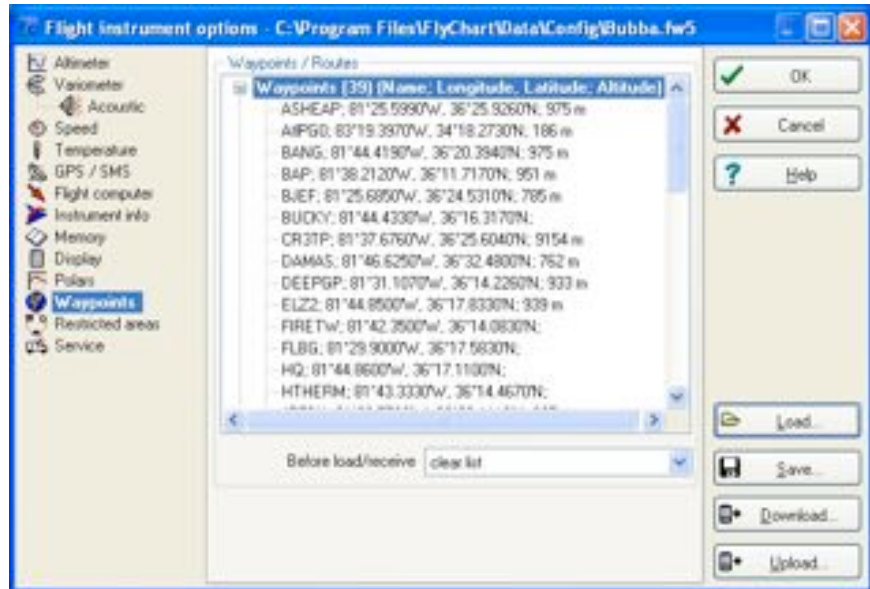


upload is complete, you have the option to save this configuration in FlyChart as the default 6030 configuration, or to save it under a different name when you click the Close box. In this way it is possible to save multiple configurations that can be quickly loaded into the 6030. To load a specific configuration click the Load button in this window, browse to the desired configuration and then click Upload .

8.3 Upload/Download Waypoints and Routes

To exchange waypoints and routes between a PC and compatible flight software (e.g., FlyChart, SeeYou, CompeGPS) enter the 6030 Main Menu and follow the instructions on the PC for the flight software. When uploading waypoints and routes, the 6030 checks whether their names already exist, and if so the old names are overwritten. This search can take a little while so there may be pause between the time you click the Upload button and the beginning of the waypoint transfer. If the names do not already exist in the list, the new waypoints/routes are added to the existing list. **Note: You should make sure that transferred waypoints show up in the 6030 waypoint list before you transfer a route from your computer that uses these waypoints.**

To transfer waypoints and routes with FlyChart, open the Flight Instrument Options window (as described in the previous section) and click the Waypoints heading on the left side of the window. Click the Download button to pull the waypoints and routes from the 6030 into FlyChart. To load waypoints into the 6030, click the Load button in this window, browse to select the desired waypoint file and then click the Upload button. FlyChart can handle FlyChart .fw5 files, SeeYou .cup files, CompeGPS .wpt and .rte files, GPS eXchange .gpx files, SwissMap 50 .smo files and Garmin files.



8.4 Uploading Airspace with FlyChart

Airspace to be avoided can be entered/edited/deleted in the 6030 manually as described in Section 7.3, or far more easily with FlyChart, as discussed below. Generally airspaces are assembled into a file will likely consist primarily of aviation authority airspaces (e.g., airports, MOAs, etc.) but may also include high-tension lines, government lands, unfriendly landowners, etc. Due to the processing power required for the 6030 to continually refresh the map and calculate distances, it is recommended that airspace files only contain individual airspaces that you could possibly reach during a flight. For this reason it is preferable to load the airspace file onto an SD card and let the 6030 automatically load, and update as needed, the 100 closest airspaces. For more information on this refer to section 7.2

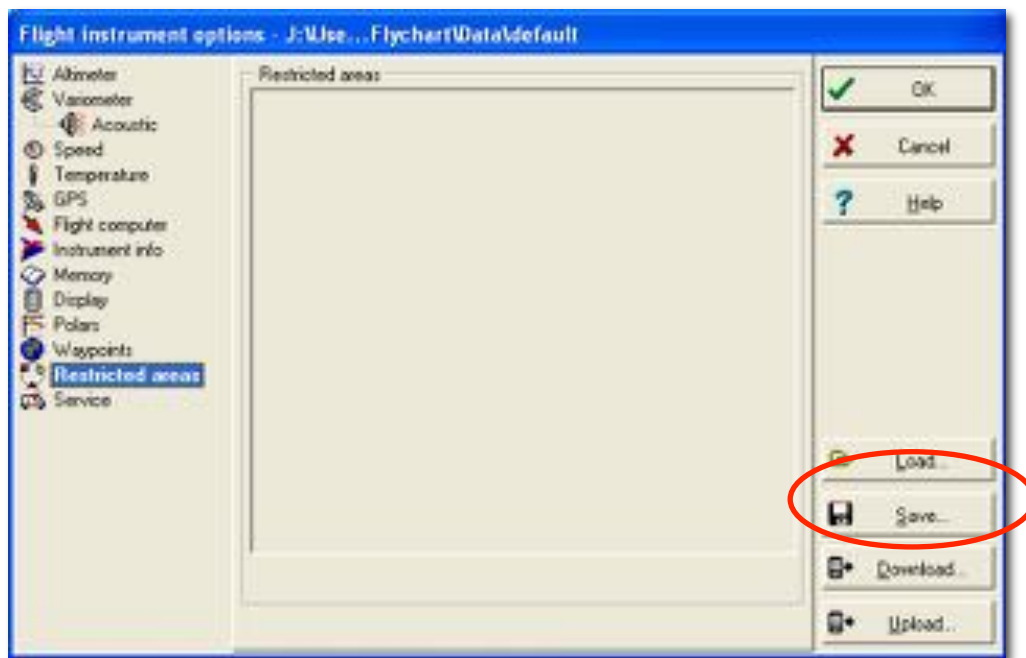
Airspace files can be obtained from the Internet, fellow pilots, competition staff, etc. or can be built in FlyChart (see section 8.4.1). FlyChart is able to open airspace files in OpenAir format (*.txt files) available from resources like <http://soaringweb.org/Airspace/>. These files are normally derived from an open database called DAFIF (see the disclaimer at the beginning of the *.txt file). At right is an example of a airspace taken from a DAFIF file. The relevant airspaces within your flying area can be selected and saved to a file in FlyChart. You can create and save different airspace files for use when flying different flying sites. Other avoidances like power lines, wildlife refuges, etc. can be added to these files as needed. Airspace files saved with FlyChart will have the suffix *.fa5 and can be quickly loaded to the 603. Please see section 8.4.1 for more information on creating an airspace file.

```
### (CLASS B) ORLANDO (C1)
###
AC B
SB 0,150,255
AN MCO: 124.8 MHz
AL 1600AMSL
AH 10000ALT
DP 28:44:00 N 081:25:30 W
DP 28:45:45 N 081:25:00 W
DP 28:47:20 N 081:25:00 W
DP 28:48:40 N 081:25:20 W
DP 28:50:00 N 081:24:30 W
DP 28:50:00 N 081:02:30 W
DP 28:44:00 N 081:02:30 W
```

Note: the starting point and the ending point do not have to be identical.

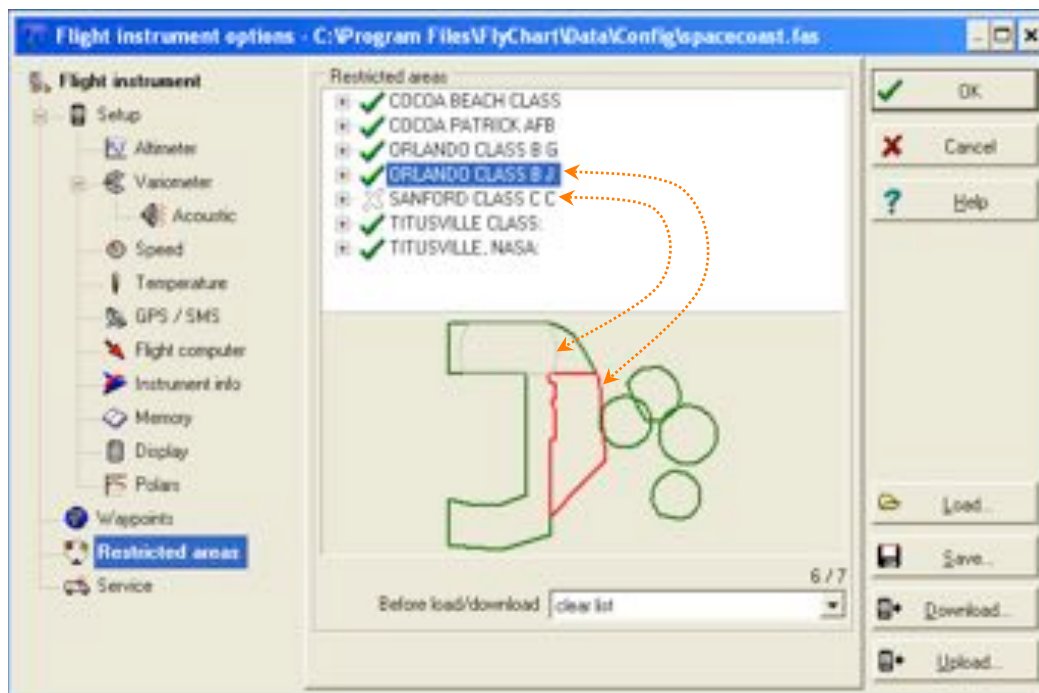
Once an airspace list has been built and saved with FlyChart (*.fa5 file) it can be uploaded to the 6030 as follows. The following assumes that you have installed and set up FlyChart on your PC and have connected the 6030 with the USB cable.

1. In FlyChart select Extras>Flight instrument options.
2. In the Flight Instrument Options window select Restricted Areas, and an empty frame will open.



3. Click the Load button, browse to the location of your airspace file, select the desired restricted area file (*.fas, *.fa5, *.txt or *.smo) and click Open.

4. The boundaries of the airspaces will appear in the preview area below the airspace list. Airspaces marked with a green checkmark are "selected" and areas marked with an X are "deselected". Selected airspaces are shown with a solid green boundary line and deselected airspaces are shown with a dotted green boundary. Click on any airspace in the list and its boundary is shown in red.



Only selected areas will be uploaded to the 6030 when the Upload button is clicked. Right-click on an airspace (in the list) to perform the following actions:

Select>Toggle: Status of selected area is reversed (green check changes to an X and vice versa).

Select>All: All restricted areas will be selected and marked with a green check mark.

Select>None: All restricted areas will be deselected and marked with an X.

To select a range of airspaces: left-click the first one and shift-left-click on the last one. To select multiple individual airspaces: Ctrl-left-click the desired areas. When selected, the group will be highlighted in blue and can be toggled on/off with a right-click. The desired areas will now be marked with a green checkmark and will be drawn in the graphic area. Clicking on any active (green checked) restricted area will cause that one to be outlined in red in the graphic area.

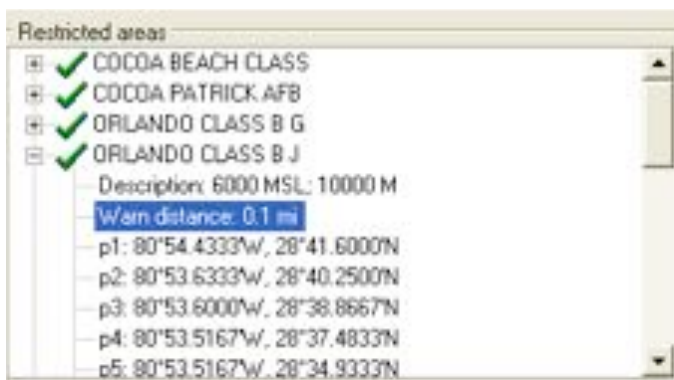
Since the 6030 needs considerable calculation power to refresh the map display and generate distance calculations, when selecting which airspaces to include in a airspace file, only select the ones you can realistically fly near.

5. After the desired Airspaces are selected and edited if necessary (see the section below on editing an Airspace), click the Upload button to send them to the 6030. Of course the instrument must be connected to the PC with the USB cable and turned on, and in the Airspaces menu. If the speaker is turned on, the 6030 will beep as the airspaces are loaded. If a problem occurs during transfer, a lower-pitched beep will sound. After uploading is complete you can confirm that the airspaces have been transferred by clicking the Download button in FlyChart and viewing, in the Restricted Areas frame, which restricted areas are actually stored in the 6030.

6. To save the airspace list you just made as a file on you computer (for later use or to share with fellow pilots), click the Save button, assign a file name, browse to the location you want the file saved (e.g., folder named Airspaces) and click Save.

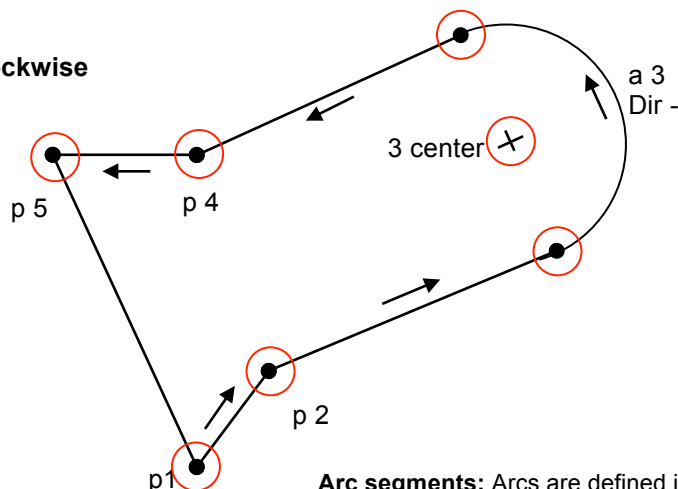
Editing Airspaces

It is possible to edit the name, description, warning distance and boundary coordinates of an airspace. When an airspace file is opened, the included airspaces are listed alphabetically. Click the + symbol next to the airspace name to show the details for the airspace. Below the airspace name is the description, which is used for the lower and upper altitude limits; below the description is the warning distance. Any attribute of the airspace can be edited by right-clicking the item to be changed and selecting Edit from the dropdown menu. A name can only be used once, and the name and comment are limited to 17 characters each. Below the warning distance, the coordinates of the points that define the airspace boundary are listed sequentially. An airspace boundary is defined either by a sequence of points (p) and/or arcs (a) or as a circle (c).

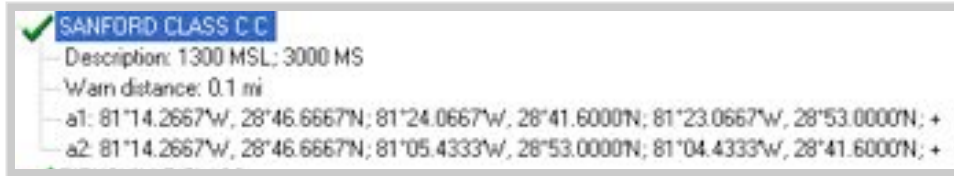


Example:

Counter-Clockwise



Arc segments: Arcs are defined in the following format: Lat/Long of the arc center; Lat/Long of the start point of the arc; Lat/Long of the end point of the arc; rotational direction (+ clockwise, - counter-clockwise).



Circles: Circle are defined in the following format: Lat/Long of the arc center; radius in km



8.4.1 Creating an Airspace File with FlyChart

1. Obtain an appropriate regional airspace file in *.fas, *.fa5 or *.txt format
2. In *FlyChart*>*Extras*>*Flight instrument options*>*Airspaces* click Load, select the above file, and click *Open*. All of the airspaces contained in the file will be shown.
3. Select the airspaces that are relevant to you and/or deselect the ones that are not relevant (as described in item 4 of Section 8.4).
4. Alter individual airspace names, descriptions and warning distances to your preference.
5. If necessary, simplify complex airspaces by deleting points used to define parts that are not approachable.
6. If necessary, combine airspaces that are nested into each other.
7. Click the Save button, assign an appropriate new name and click OK to store this airspace file in *FlyChart* for future use.
8. Click the Upload button to send the airspaces to the 6030. If the speaker is turned on, the 6030 will beep while the airspaces are being loaded. If a problem occurs during transfer, a lower-pitched beep will sound.

8.5 Transferring New Firmware to the 6030

Flytec is continually improving, adding features and enhancements to the 6030 firmware. Periodically Flytec AG and Flytec USA will post firmware at www.flytec.ch and www.flytec.com. To update the 6030 firmware, it is necessary that the 6030 USB driver is installed on your PC. If you have installed *FlyChart* 4.52.38 or later the driver should already be installed. If necessary, you can download the stand-alone driver from <http://flytec.com>.



To update the firmware, make certain the 6030 is turned **off** and connect the 6030 to your PC with the provided USB cable. The 6030 may start a high pitched beeping when the USB cable is connected, if this occurs, the cable must be unplugged and the 6030 turned off (if it turned on) before attempting to flash the firmware.. Double click on the appropriate firmware file on the website and the dialog above right will open. Click *Run*, and the Firmware Update window shown right will open. The Flasher should automatically find the port that your 6030 is plugged into. Click the *Update* button; the firmware upload begins and a status bar shows the progress. Leave the 6030 undisturbed until the "*Firmware update is complete*" message appears.



Important: Due to memory reorganization that may occur during firmware updates, it is recommended that the 6030 be reinitialized after loading new firmware. This can be done with the *Clear/Initialize memory* in the Main Setup Menu. Flights, waypoints/routes, loaded airspace and user settings can be downloaded and saved to FlyChart (or similar) before installing new firmware.

Important: Never leave the PC cable hooked up to the unit when it is turned off. If this is done energy will be consumed, and the battery can be drained.

8.6 Optional Software

With the help of a release code obtainable from the Flytec AG or Flytec USA, additional special functions can be activated. To enter a release code:

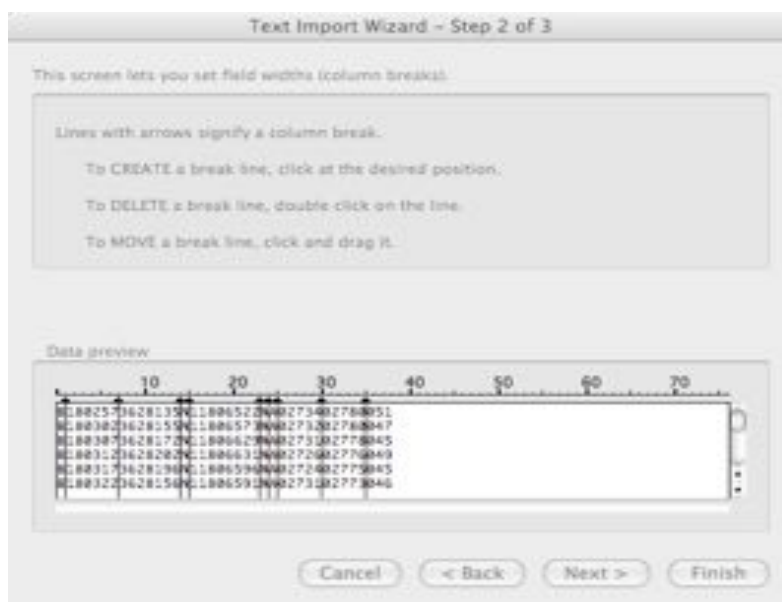
- Select *Optional SW-Packages* from *Device settings* in the Main Menu and press *OK*.
- Highlight the appropriate software package from the Optional Software Packages list.
- Press *OK* and the code 30000 will start blinking.
- Press the ▼ key; the code will jump to 30000.
- Use the ▲ ▼ keys to set the code obtained from Flytec and press *OK*.
- The 6030 display will display “*Package released*”.

Note: If you enter a wrong code, the instrument will be blocked for 5 minutes or longer!

8.7 Viewing the Contents of an IGC File

To view the raw data contained in the IGC file, download the instrument with a flight evaluation program such as FlyChart or SeeYou, save the flight as an IGC file and then open the desired flight file with a text editor. Or if technical analysis of data is desired, the IGC file can be imported into a spreadsheet program such as Excel. It should be noted that **any** changes made to an IGC file will void the Digital Signature contained in that file and created by the instrument to insure against manipulation. Consequently an IGC file that has been altered will not be accepted by scoring software. The steps for importing an IGC file to Excel are:

1. Select the Import command from *File>Menu* in Excel.
2. Select the Text file radio button in the dialog box.
3. Browse to the desired file, make sure *All Files* is enabled and click Open.
4. Select *Fixed Width* as the data type and click Next.
5. Set column breaks at 1, 7, 14, 15, 23, 24, 25, 30 and 35, and click Next. (see figure at right).



6. Select the General radio button and click Finish.
7. Select the New sheet radio button and click OK.
8. The data will now be visible in the spreadsheet. Several of the first lines of the IGC file are non-flight data and the column breaks set above will not appropriate. The text in these lines can be reformatted or deleted. Alternatively, these lines can be excluded from the import in Step 4 above.
9. The headings shown in the figure can be added and the column widths can be adjusted:

| | | Time UTC hh:mm:ss | Latitude dd mm.mmm | N/S | Longitude ddd mm.mmm | E/W | Fix A=3D V=2D | Altitude Ref. 1013hP | Altitude GPS | Speed kph |
|----|---|----------------------|-----------------------|-----|-------------------------|-----|---------------------|----------------------------|-----------------|--------------|
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | B | 180150 | 3628350 | N | 11806875 | W | A | 2736 | 2773 | 55 |
| 4 | B | 180156 | 3628335 | N | 11806835 | W | A | 2737 | 2775 | 44 |
| 5 | B | 180201 | 3628322 | N | 11806801 | W | A | 2731 | 2776 | 44 |
| 6 | B | 180206 | 3628302 | N | 11806771 | W | A | 2741 | 2777 | 40 |
| 7 | B | 180211 | 3628273 | N | 11806747 | W | A | 2737 | 2777 | 44 |
| 8 | B | 180216 | 3628243 | N | 11806722 | W | A | 2735 | 2778 | 42 |
| 9 | B | 180221 | 3628217 | N | 11806693 | W | A | 2733 | 2778 | 43 |
| 10 | B | 180226 | 3628188 | N | 11806667 | W | A | 2734 | 2779 | 45 |

10. The latitude and longitude values are in the XX°XX.XXX' format. For space reasons, the degree and decimal symbols are omitted from the IGC file. For example, the latitude value 3628350 above should be read as 36° 28.350'. Using the number format code ##"°" ##"."### in Excel for the latitude and longitude columns, the coordinate data can be expressed in the XX°XX.XXX' format.

| | A | B | C | D | E | F | G | H | I | J |
|----|---|----------------------|-----------------------|-----|-------------------------|-----|---------------------|----------------------------|-----------------|--------------|
| | | Time UTC hh:mm:ss | Latitude dd mm.mmm | N/S | Longitude ddd mm.mmm | E/W | Fix A=3D V=2D | Altitude Ref. 1013hP | Altitude GPS | Speed kph |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | B | 180150 | 36° 28.350 | N | 118° 06.875 | W | A | 2736 | 2773 | 55 |
| 4 | B | 180156 | 36° 28.335 | N | 118° 06.835 | W | A | 2737 | 2775 | 44 |
| 5 | B | 180201 | 36° 28.322 | N | 118° 06.801 | W | A | 2731 | 2776 | 44 |
| 6 | B | 180206 | 36° 28.302 | N | 118° 06.771 | W | A | 2741 | 2777 | 40 |
| 7 | B | 180211 | 36° 28.273 | N | 118° 06.747 | W | A | 2737 | 2777 | 44 |
| 8 | B | 180216 | 36° 28.243 | N | 118° 06.722 | W | A | 2735 | 2778 | 42 |
| 9 | B | 180221 | 36° 28.217 | N | 118° 06.693 | W | A | 2733 | 2778 | 43 |
| 10 | B | 180226 | 36° 28.188 | N | 118° 06.667 | W | A | 2734 | 2779 | 45 |

9 Main Setup Menu

To access the 6030's Main Setup Menu, long press the *Menu* key. To select one of the sub-menus, highlight the desired item with the \blacktriangle \blacktriangledown keys and press the *OK* key. If the sub-menu has more than one page you can scroll through them with the \blacktriangleleft \blacktriangleright keys. If a menu item has further sub-menus its name is preceded with a \blacktriangleright character.

Main Setup Menu

Flight Memory and Tracks \Rightarrow Stored flights

Waypoints \Rightarrow Waypoint list

Routes \Rightarrow Route list

Airspaces \Rightarrow CTR list

>Settings

>Vario

Vario response delay
Digital vario mode
Last thermal threshold
Thermal averager

>Acoustic vario

Customize sound
Lift audio threshold
Near thermal tone
Sink tone threshold

>Speed

Speed mode
Pitot correction
Vane wheel correction
Stall speed
TEC Total energy comp.

>Recording

Recording mode
Recording interval

McCready

CTR Alarm

Polar Data

Map orientation

Auto Zoom C-Route

Pilot Name

Glider type

Glider Id

>Clear/Initialize memory

Delete all flights
Delete all WP & routes
Initialize EEPROM
Init CTRs

Simulation mode

>Device settings

Display contrast
Language \Rightarrow Set language for display text
Battery type \Rightarrow Choose NiMH or Alkaline
UTC offset \Rightarrow Set time offset
Units \Rightarrow Select units
Coordinate format \Rightarrow Choose coordinate format
Userfields \Rightarrow Choose 5 or seven user-fields for 3 user pages
Press. Sensor offset \Rightarrow Enter pressure sensor correction for QNH
Bluetooth \Rightarrow Bluetooth pairing – requires optional BT module and unlock code.
SMS \Rightarrow Setup for sending GPS position via SMS. Requires installation of opt. BT module & unlock code.
FlyLink \Rightarrow Set parameters for wireless communication to peripheral devices
Flarm \Rightarrow Requires installation of FLARM module – contact Flytec
>Optional SW-Packages \Rightarrow Enter release codes for packages 01-15
>Factory Settings \Rightarrow Enter security code (for technician use only)

>SD-Card

Generate IGC File \Rightarrow Use Flight Memory menu to save tracks to SD card
Export WP & routes \Rightarrow Save WPs and routes from 6030 to SD card
Import WP & routes \Rightarrow Load WPs and routes from SD card to 6030 card
Activate CTR file on SD card. Name of active CTR file is shown
Save Settings
Restore settings

9.1 Flight Memory

This menu contains all the flight recordings stored the 6030. To view the list, highlight *Flight Memory and Tracks* using the $\blacktriangle \blacktriangledown$ keys and press the *OK* key. The records are stored according to date of the flight, shown in the left column, with the most recent flight on top. The length of the flight is also shown, in the right column. On this page, individual flights can be deleted from the list by pressing *F2 (Del. Flight)*. To view a flight, use the $\blacktriangledown \blacktriangle$ keys to move through the list and choose the desired flight with the *OK* key. The flight, with its benchmark figures, is then displayed on the Flight Analysis page. Press *F1 (Show Map)* to view the map of the flight or *F2 (Recal Sign.)* to recalculate the digital signature (if you have trouble sending this flight to the OLC). For more information **see section 6.2 and Error! Reference source not found.** Flights can be saved as IGC files to an SD card (**see section 9.9**).

Important: Although the 6030 will store up to 100 flights, it is recommended that the flight memory be downloaded routinely to FlyChart, SeeYou, etc. and then cleared in *Menu>Clear/Initialize memory>Delete all flights*. This procedure provides security to your recorded flights and allows the 6030 to record new flights with "refreshed" memory. If a PC is not immediately available and you have an SD card installed, you can save flights to the SD card for later transfer to a PC (**see section 9.9**).

9.2 Waypoints

This menu contains all the waypoints loaded into the 6030. To view the list, highlight *Waypoints* in the Main Setup Menu using the $\blacktriangle \blacktriangledown$ keys and press *OK*. If there are more waypoints than can be displayed on one page, you can scroll through the pages with the $\blacktriangleleft \blacktriangleright$ keys. To select a waypoint, highlight the desired waypoint with the $\blacktriangle \blacktriangledown$ keys and then press *OK*. The waypoint can now be edited or deleted (**see Section 4.5.3**). Waypoints can be added from the keypad in this sub-menu or more easily using FlyChart. The waypoint list can be saved to, and read from, an SD card (**see section 9.9**).

9.3 Routes

This menu contains all the routes loaded into the 6030. To view the list, highlight *Routes* in the Main Setup Menu with the $\blacktriangle \blacktriangledown$ keys and press *OK*. If there are more routes than can be displayed on one page, you can scroll through the pages with the $\blacktriangleleft \blacktriangleright$ keys. To select a route, highlight the desired route with the $\blacktriangle \blacktriangledown$ keys and then press *OK*. The route can now be edited or deleted (**see Section 5.3.2**). Routes can be added from the keypad in this sub-menu, or more easily using FlyChart or other flight software like SeeYou or CompeGPS (**See section 8.3**). The route list can be saved to, and read from, an SD card (**see section 9.9**).

9.4 Airspaces (CTRs)

This menu contains restricted areas (CTRs) that have been loaded into the 6030. It is possible to enter/load up to 300 CTRs depending on the complexity of the CTRs. To view the CTR list, highlight *Airspaces* with the $\blacktriangle \blacktriangledown$ keys and press *OK*. To select a CTR, highlight it with the $\blacktriangle \blacktriangledown$ keys and then press *OK*. The CTR can now be edited or deleted (**see Section 7.2.2**). CTRs can be added/edited with the keypad in this sub-menu, or more easily using FlyChart (**see section 8.4**). Airspace can be loaded even more conveniently via the SD Card FlyChart (**see section 7.2**).

9.5 Pilot settings

This menu contains a series of settings that permit the 6030 to be programmed according to your preferences. To view the list of settings, highlight *Pilot settings* in the Main Setup Menu with the $\blacktriangle \blacktriangledown$ keys and press *OK*. Navigate to a desired setting with the $\blacktriangle \blacktriangledown$ keys and press *OK*; the parameters with their current setting(s) are displayed. To change a value, press *OK*. The value to be changed will blink and can be modified using the $\blacktriangle \blacktriangledown$ keys. Pressing the *OK* key installs the new value; a confirmation tone is given and the cursor will advance to the next parameter in the sub-menu (if there is one). Pressing the *ESC* key recalls the previous setting. The following Pilot settings sub-menu table shows the parameters that can be set and the default values as well as section references to explanations within this manual.

| Setting | Description | Reference | Factory Default |
|------------------------|--|-----------|---|
| Vario | | | |
| Vario response delay | Vario responsiveness - range 0 (slow) to 4 (fast) | 3.1.2 | 2 |
| Digital vario mode | Averager (INT) or netto vario; averager period (1–30 sec) | 3.1.2 | INT; 1 sec |
| Last thermal threshold | Minimum strength of thermal to be tracked by last thermal feature (100–600 ft/min) | 4.4 | 197 ft/min |
| Thermal averager | Time interval over which climb rate is averaged in the previous thermal (0.5–10 min) | 3.1.3 | 20 = 10 min |
| Acoustic vario | | | |
| Customize sound | Frequency of ascent tone, modulation, frequency of sink tone, acoustic integrator, pitch | 3.6 | 1200 Hz; Mod = 5; 700 Hz Damp = 8; Pitch = 3: |
| Lift audio threshold | Threshold for ascent tone (0–80 ft/min/ 0–0.4 m/sec) | 3.6 | 4 = 0.04 m/sec (8 ft/min) |
| Near thermal tone | Set lower threshold for nascent thermal tone; enable/disable tone; set beep/pause ratio for tone | | -90ft/min, no, 20% |
| Sink tone threshold | Descent rate required to sound sink alarm (10–2000 ft/min) | 3.6 | 160 ft/min (0.8 m/sec) |
| Speed | | | |
| Speed mode | True or Indicated air speed; Speed range upper 19–54 mph; lower 12–37 mph | 3.4.1 | True air speed; upper speed range |
| Pitot correction | Sensor on/off; Pitot sensor 90 to 150 % | 3.4.1 | True air speed; upper speed range |
| Vane Wheel correction | Vane wheel 70 to 150 % | 3.4.1 | True air speed; upper speed range |
| Stall speed | Speed threshold and altitude limit | 3.4.1 | 0 mph, 0 ft |
| TEC | Total energy compensation range 0–99% | 3.4.5 | 65% |
| Recording | | | |
| Recording mode | Always, full auto, semi-auto start/end of flight recording Ground speed & altitude change for Flight Acceptance | 6.1 | Full auto 10kn/h; 20m |
| Recording interval | Time interval per track log point (1–60 sec) | 6.1 | 10 sec = 48 hrs |
| McCready | Delay for McCready audio after leaving lift, acoustic dead band in ft/min (m/sec) | 3.5 | 7 sec; ±100 ft/min |
| CTR Alarm | Acoustic alarm when within warning distance to loaded airspace | 7 | No |
| Polar data | Use polar set 1 or 2, sink rate/air speed pair, altitude of data | 12.4 | 25 mph @ 197 ft/min; 47 mph @ 630 ft/min; @ 1000' |
| Map Orientation | North up or course up | 4.3 | 0= Course up |
| Auto Zoom C-Route | Set proximity to cylinder and mode for auto zoom | 5.4.1.1 | 0=auto zoom off: 150m |
| Pilot Name | Enter pilot name | 2.3.2 | Not set |
| Glider type | Glider class for OLC (HG Rigid Wing or HG Flexible Wing or Paraglider) | 2.3.2 | Not set |
| Glider Id | Your ham radio call sign for OLC | 2.3.2 | Not set |

It is always possible to reset all of the user settings back to the factory settings using *Menu>Clear/Initialize memory>Initialize EEPROM*. **Important!** All flight records, waypoints and routes will be deleted if you reset the unit.

9.6 Clear/Initialize Memory

In this menu the 6030 memory can be cleared and re-formatted. To view the options, highlight *Clear/Initialize Memory* in the Main Setup Menu with the \blacktriangle \blacktriangledown keys and press *OK*. The various clearing/reformatting options can be executed by highlighting the desired action with the \blacktriangle \blacktriangledown keys, pressing *OK*, changing the *No* to *Yes* with the \blacktriangle or \blacktriangledown key, and pressing *OK*.

| Clear/Initialize Memory | Description | Procedure |
|--------------------------|---|--|
| Delete all flights | Deletes all flight recordings, re-formats flight memory | Change <i>no</i> to <i>yes</i> , press <i>OK</i> . Information Field will show the progress; wait for all sectors to clear before pressing any keys. |
| Delete all WP and routes | Deletes all WP and routes, re-formats WP/route memory | |
| Init CTRs | Initializes CTR memory and erases all loaded CTRs | |
| Initialize EEPROM | Re-formats memory, deletes all WP, routes and user settings | |

9.7 Simulation Mode

To enter Simulation mode, highlight *Simulation* in the Main Setup Menu using the \blacktriangle \blacktriangledown keys and press the *OK* key. Use the \blacktriangle \blacktriangledown keys to change *No* to *Yes*, then press the *OK* key; the display will return to the normal run-mode and the simulation will start at the last known GPS position. The GPS receiver is turned off during the simulation, and “*Simulation*” appears in lieu of its status bar. A simulated flight is stored in the memory of the 6030, but the digital signature is not valid.

In Simulation mode you can alter your altitude, air speed, vertical speed (vario), head/tailwind component, and track using the \blacktriangleright \blacktriangleleft \blacktriangle \blacktriangledown keys. To access these variables press the *F1 (Next Func.)* key. As you scroll through the variables, the Information Field will show each variable and which of the arrow keys to use to alter it. Simulation mode allows you to explore the relationships between best glide speed, McCready indicator and the sounds produced by the 6030. Toggle the *F1 (Next Func.)* key to access the different variables and alter them as shown:

| | |
|--|---|
| var $\uparrow\downarrow$ Spd \blacktriangleright \blacktriangleleft | Change climb/sink rate and change air/ground speed |
| wind $\uparrow\downarrow$ Trk \blacktriangleright \blacktriangleleft | Change wind speed and flight direction |
| blank or other info | Press \blacktriangleright to change user-field pages (1, 2, or 3) |
| Mod Alt1 $\uparrow\downarrow$ | Use \blacktriangle \blacktriangledown keys to modify Alt1 |
| Mod Alt2 $\uparrow\downarrow$ | Use \blacktriangle \blacktriangledown keys modify Alt2 |

If you initiate a climb with the \blacktriangle key, the 6030 simulates circling up in a thermal. The compass rose turns and the distance to goal continuously changes between somewhat closer and somewhat farther away. After thermaling up you can change back to gliding flight (descending) using the \blacktriangledown key.

The *Gofo* function can be called up to select a waypoint; the distance to the waypoint will appear. If the direction arrow in the middle of the compass points upward, the pilot is moving towards the waypoint, and the distance will become smaller. In Simulation mode a Competition Route can be set. If you navigate into a turnpoint cylinder or you enter/exit a start cylinder with a positive start time, you will hear the “waypoint achieved” sound and you will also see the automatic switchover to the next waypoint. By pressing the *ESC* key you can switch to the map display and observe the approach to the waypoint cylinder.

9.8 Device settings

| Device settings | Description | Reference | Factory Default |
|----------------------|--|----------------|-------------------------|
| Display contrast | Contrast setting 0–100% | 3.7 | 50% |
| Language | Text language (English, German, French, Spanish, Italian) | | English |
| Battery type | Alkaline or NiMH | 2.6 | NiMH |
| UTC Offset | Offset from UTC ± 13 hours, add 0.5 Hr | 3.8 | 2; no |
| Units | m or ft; m/s or ft/min; km/h or mph or kn; °C or °F; km or miles | | m; m/s; km/h; °C; km |
| Coordinate format | dd°mm.mmm; dd.ddddd; dd°mm:ss.ss; UTM; Swiss Grid | 4.5 | dd°mm.mmm |
| ef6ss. Sensor offset | Correct pressure sensor to correct QNH | 3.2 | Factory set |
| Userfields | Set number of user-fields for each of 3 user pages | 2.7 | yes: yes: yes |
| Bluetooth | Not yet available | n/a | n/a |
| SMS | Not yet available | n/a | n/a |
| FlyLink | Requires installation of FlyLink module | Contact Flytec | |
| Flarm | Requires installation of FLARM module | Contact Flytec | |
| Optional SW Packages | Enter additional feature package release codes | 8.6 | n/a |
| Factory settings | For technician use only | n/a | n/a |

9.9 SD Card

It is recommended that the 6030 be used with an SD card installed since the instrument will keep a system log file on the SD card, which can be beneficial when troubleshooting. The following files can be stored on and read from an SD/SDHC card loaded into the 6030 SD card slot:

- Any number of flights (saved as secure IGC Files)
- Any number of waypoint and route files (file type .GPX only)
- An unlimited number of air spaces (file type .FAF only)
- Instrument configuration (file type .CFG only)

Important! The SD card must be formatted FAT or FAT16 (which can be accomplished on a PC) and all folders (directories/subdirectories) and file names must be 8 characters or less. To avoid data loss or other malfunction, SD cards should only be inserted/removed when the instrument is switched off or in the Main Menu. It is recommended that you periodically backup the contents of the SD card they are not infallible.

Saving Flights to SD card:

At the conclusion of the flight (after the Digital Signature is generated), the flight will be saved to the SD card as an IGC file with a file name according to the IGC file naming convention. After a moment, the saving of the IGC file to the SD card is confirmed in the lower portion of the display with the IGC file name. To manually save a flight recording from the 6030 flights list to the SD card go to *Menu>Flight memory & tracks*, press the OK key, select the desired flight from the list and press the *F1 (Copy to SD)* key. IGC files saved to the SD card can be read by a PC with a SD card reader.

Remote transfer of flight recording

If you have a smart phone with a Micro-SD card slot, you can transfer your flight to a online competition or a competition scorekeeper directly from your mobile phone. Using a SD card adapter, insert your phone's micro SD card into the instrument, save the flight as described above, then insert the micro SD card back into the phone and transfer the flight via an online contest server or as an email attachment.

Save/Retrieve waypoints and routes on the SD card

Waypoints and routes that are saved in the 6030 memory can be saved to the SD card. Conversely, waypoints and routes lists can be saved to the SD card via a PC in GPS eXchange format (.gpx) and then imported into the 6030. The waypoint list in a 6030 can be saved to the SD card prior to loading a new list so that the original list can be reloaded at a later time. Additionally, waypoint lists can be easily shared between 6030 pilots using an SD card.

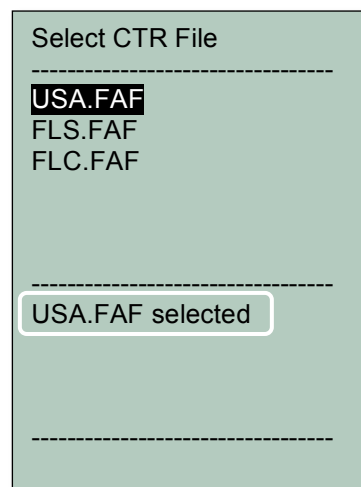
To save the 6030 waypoint/route list to the SD card go to *Menu>SD Card>Export WP & Routes*, press the *OK* key, change *No* to *Yes* and press the *OK* key. The contents of the waypoint and route list will be saved to a file 6030_1.GPX on the SD card. A subsequent export will have the file name 6030_2.GPX, and so on. With this feature you can save essentially limitless waypoint/route lists.

To load a waypoint/route list from the SD card into the 6030, go to *Menu>SD Card>Import WP & Routes*, press the *OK* key, select the desired file from the list and press the *OK* key. The contents of the file will be added to the waypoints and routes already contained in the respective lists. If your intent is to only have the waypoint/routes contained in the SD card file in the respective waypoint/route lists then these lists should be cleared prior to importing. This can be done in *Menu>Clear/Initialize memory>Delete all WP & routes*

Load Airspace file from SD Card

Airspace saved to the SD card with a PC (in .faf format) can be loaded into the 6030 Airspace menu. Any number of airspace files can be saved to the SD card, each containing any number of individual airspaces. The selection as to which file is used is made in *Menu>Main Setup Menu>SD-Card>Select CTR file*. Highlight the desired airspace with the **▲▼** keys and press *OK*. The display will confirm the file you chose as “selected” in the lower portion of the display. This selection can also be made during the flight. This is useful if you cross a border for example and the file needs to be changed.

If the selected file is valid, the instrument examines all the air spaces and loads the closest 100 CTR's into the instrument memory. This can take up to 10 minutes depending on the size of the .faf file. The 6030 periodically checks the distances to the unloaded airspaces in the active .faf file on the SD card and if you have moved closer to any of these, the instrument updates the airspaces accordingly. Consequently, when the 6030 is in use, the instrument memory will always contain the 100 nearest airspaces.



For more information about loading airspace on the SD card, editing airspace files and using the airspace function please see section 7.

Save/restore instrument configuration

The current instrument configuration (user-settings) can be saved to and restored from the SD card. To save the instrument settings: *Menu>Main Setup Menu>SD-Card>Save settings>change No to Yes>press OK*. A file xxxx.cfg (where xxxx= serial number of 6030) will be created in a folder named CFG in the root of the SD card. To restore instrument settings: *Menu>Main Setup Menu>SD-Card>restore settings*.

This function is very useful if it becomes necessary to reinitialize the instrument. By saving the 6030 configuration to an SD card, you can easily restore the configuration, thereby avoiding the need to manually reestablish all your settings/preferences after reinitializing. Additionally, 6030 users can easily share configurations by saving their configuration onto an SD card and another 6030 user restoring the the settings from the card. It should be noted that for obvious reasons, the following items are not resored to a 6030 with a diferent serial number: Pilot name, Glider type, Glider Id, LCD contrast and GPS module type, device serial number, firmware version, unlocked software packages, device manufactuer Flytec or Brauniger), calibration data (absolute pressure, differential pressure, LCD voltages and temperature correction).

10 Maintenance, Warranty and Service

10.1 Resetting and Reinitializing

In the rare case where the 6030 becomes completely stuck (static display and no response to the keypad) you will have to reset the instrument. To do this, remove all four batteries for 1 hour.

Reinitializing the instrument returns the 6030 memory to the state in which it left the factory (i.e., all user settings, flight records, waypoints and routes are cleared). Occasionally the need may arise to completely clear the EEPROM memory, such as after a firmware upgrade or if the 6030 starts to behave unusually. To reinitialize the 6030 go to *Menu>Clear/Initialize memory>Initialize EEPROM*, press the *OK* key, change the *No* to *Yes*, press *OK*. The Information Field will show the progress; wait for all sectors to clear before pressing any keys.

10.2 Water Damage

If water enters the 6030, damage is likely and the warranty is void. To minimize the extent of the damage the batteries should be removed immediately to prevent destructive short-circuit. The following steps should be performed as soon as reasonably possible.

1. Carefully open the housing being careful to not pull on any of battery leads or ribbon cables.
2. Remove the keypad ribbon cables from the connectors on the circuit board.
3. If salt water entered the housing, rinse all affected areas with clean, fresh water.
4. Dry the instrument carefully with warm air (hair dryer 140°F max).
5. Return the instrument to Flytec USA or Flytec AG for service

**Never place the instrument into a microwave oven!
Microwaves will destroy the instrument immediately!**

10.3 Warranty

The 6030 is warranted against material and manufacturing defects for two years. Physical damage such as a broken housing or display window, as well as damage resulting from abuse, battery leakage, improper care, exposure to excessive heat or opening the housing are excluded from this warranty. In the event a defect is encountered during the two-year warranty period, please contact FLYTEC for service instructions. Please carefully read this operation manual before you contact FLYTEC for operation or service issues.

WARNING: In rare cases the 6030 may not provide any data at all, or the data provided may be incorrect. Flytec will not be held responsible for any claims resulting from missing or incorrect data. Flytec will not be held responsible for any damage claims arising from a malfunctioning unit. **Responsibility for ensuring the safe execution of flights lies with the pilot alone.**

11 Specifications and Approvals

| | |
|-------------------------|---|
| Altimeter: | Maximum 26,000' (8,000 m) in 3 ft (1 m) increments |
| Analog variometer: | +/-2,000 ft/min (+/-10 m/sec); in 20 ft/min (0.1m/sec) increments |
| Digital variometer: | +/-14,000 ft/min (+/-70m/sec); in 10 ft/min (0.1m/sec) increments |
| Speed (pitot pressure): | Analog: 12–54 mph (20–90 km/h) in 1 mph increments Digital: 19–180 mph (30–300 km/h) in 1 mph increments |
| Speed (vane wheel): | Analog: 19–54 mph (30–90 km/h) in 1 mph increments Digital: 0–180 mph (0–300 km/h) in 1 mph increments |
| Waypoints: | 200 WP |
| Routes: | 20 routes with max. 30 WPs in each |
| Maximum recording time: | 145 hr @ 30 sec recording intervals, 97hr @ 20 sec, 48hr @ 10 sec |
| Track log points: | 21,000 |
| Number of Flights: | 100 |
| Screen resolution: | 320 x 240 pixel (1/4 VGA) |
| Operating temperature: | 5 to 114°F (-15 to 45°C) |
| Flight recording: | According to the IGC format |
| Measurements: | 6-3/4" x 3-3/8" x 1" (170 x 88 x 26 mm) |
| Weight: | 12 oz (340 grams) without bracket |
| Electrical supply: | 2 x 2AA NiMH batteries |
| Battery life: | ±40 hrs |

The technical details may be altered without notification.

Approvals

CE ETSI EN 301 489-1 V1.6.1/ETSI EN 301 489-3 V1.4.1
IEC/EN 60950-1:2006: Safety Europa.

FCC according to 47CFR15, ICES-003, Issue 4

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1- This device may not cause harmful interference
- 2- This device must accept any interference received, including interference that may cause undesired operation

12 Appendix

12.1 Stall Alarm

If a pilot gradually slows down his or her glider, a stall will eventually result. This situation becomes dangerous if the airflow suddenly separates from the wing when close to the ground. For this reason wings have washout (twist) so that the wing tips have a lower angle of attack than the root section of the wing. If the airflow stalls in the root because of a too high an angle of attack, then lift may remain on the swept wing tips, rotating the nose down and reducing the angle of attack. It is ill-advised to fly at a high angle of attack near the ground, since the glider may stall when encountering turbulence.

Anyone who has ever watched a hang glider on approach can observe the following: when a good headwind prevails, less experienced pilots may flare early and the glider may climb, making for a difficult or hard landing. With no wind, or with a light tail wind, less experienced pilots may wait too long to flare. The result may be only a belly landing, but it also could result in a whack, or in a ground loop with broken down tubes. Our experience indicates that about half of the otherwise not-so-well-executed landings could have been saved by flaring when an appropriately set stall alarm went off.

Stall speeds vary with wing loading/pilot weights. If you wish to set a stall alarm speed value, you will need to perform a few tests to determine your own stall speed. It is worth noting that close to the ground the stall occurs at approximately 1 mph (2 km/h) slower than in free air. The stall speed also depends on the specific weight of the air at different altitudes. In the 6030, the threshold for the stall alarm is automatically raised with increasing flight altitude, corresponding precisely to the indicated air speed. It makes no difference if the pilot has chosen true or indicated air speed for the speed display.

The stall alarm is a loud, concise, acoustic signal that tells you that your air speed has fallen below a predetermined threshold. The difference between stall alarm threshold and the speed for minimum sink can be very small. Several pilots have noticed that while circling up in weak thermals at minimum sink speed, the stall alarm sometimes sounds. For this reason there is an altitude limit, adjustable in *Menu>Pilot settings>Speed>Stall speed*, above which the stall alarm will be disabled. Your landing areas should then, of course, be below this limit.

12.2 Netto Vario

In contrast to the normal vario, which displays the vertical speed of the glider, a netto vario displays the vertical speed of rising or sinking of the surrounding air mass. The prerequisite for this is a correctly entered polar curve for the glider and, of course, an air speed sensor. Let's assume that a pilot is flying at 31 mph (50 km/h) through the air. The 6030 determines from the glider's polar curve that at this speed there would be a sink rate of 220 ft/min. Let's say the normal vario shows a sink rate of 100 ft/min. Consequently, the surrounding air must be rising at about 120 ft/min. If, in our example, the normal vario indicates a sink rate of 400 ft/min, then the corresponding air would have to be sinking at about 180 ft/min. With the correct polar curve and vertically stable air, the netto vario should show a value of zero at all speeds. The netto vario, therefore, can be used to check our polar curve when we are absolutely certain that the air mass is not rising or descending. If the netto vario in this example indicates that the air is continuously rising by 60–100 ft/min when the pilot is on a fast glide, then we know that his wing is better than the stored polar curve and sinks approximately 80 ft/min less than the polar curve states. In this case the polar data should be adjusted in *Menu>Pilot settings>Polar data*.

Another example of when the netto vario is advantageous: A pilot is crossing a valley at a fast glide speed. Suddenly he notices a sharp decrease in sink rate, and turns instinctively. As it turns out this was a mistake because what was thought to be a thermal turns out to be nothing more than zero sink. A quick glance at the netto vario would have kept the pilot from wasting time and altitude. The netto vario display only makes sense during descending glides. While climbing, an averaged (integrated) vario, which indicates the average climb over a chosen time period, is more advantageous. It is possible to set the digital vario to serve as an averaged vario while climbing, and as an air mass (netto) vario during glide in *Menu>Pilot settings>Vario>Digital vario mode*. The integration time for the netto vario is always 1 second.

12.3 True or Indicated Air speed

In general aviation, it is customary to measure air speed with the help of a pitot tube as dynamic pressure speed – also called indicated air speed (IAS) – and also to display it as such. The advantage of this method is that at

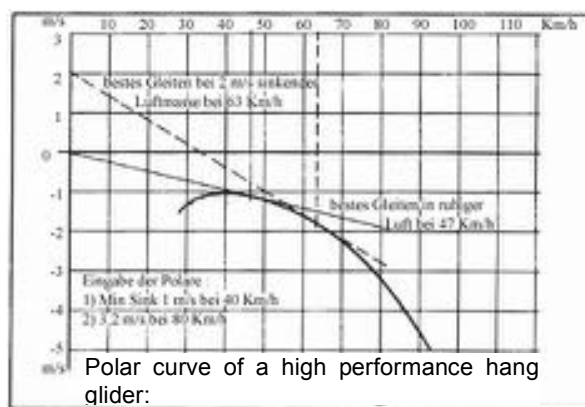
any altitude the maximum allowable speed of the aircraft and its stall speed will be displayed at fixed positions on the instrument's scale. This is also the case for best glide speed, which will have a fixed position on the speed scale. However, the disadvantage of this system is that the indicated speed will be correct *only* at a certain altitude (usually at sea level). The glider will fly faster the higher one flies, due to the fact that the atmosphere gets thinner with altitude. At approximately 21,000 ft (6,500 meters) the air weighs only half of that at sea level, and one's air speed will therefore increase 1.41 times (the square root of 2).

To calculate wind speed, arrival altitudes or arrival times, true air speed is needed. The vane wheel sensor (propeller type) shows the true air speed (TAS) because it runs virtually without friction. Thanks to modern processor technology, the 6030 can calculate both true and indicated air speed, regardless of which air speed input device (propeller or pitot tube) is used. The pilot can set the type of speed he/she would like to see in the display without affecting airspeed related calculations. Therefore, if the pilot elects to display IAS, it should be no surprise that at high altitudes with no wind, the ground speed displayed by the GPS will be much higher than the indicated air speed, even though in reality ground speed and air speed would be the same.

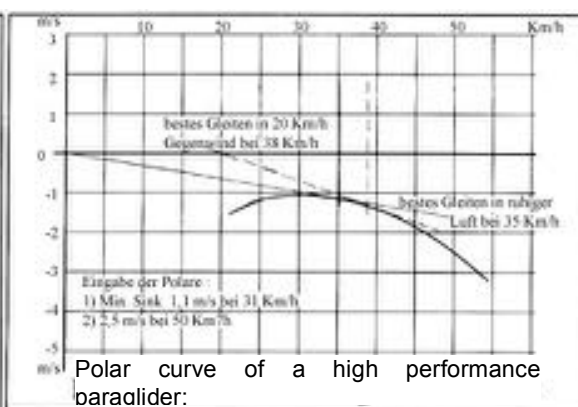
12.4 Polars and Best Glide Speed

The polar performance curve of a glider shows the relationship between air speed and the associated sink rate. The highest point on the polar curve is the minimum sink rate. If one plots a line starting at zero sink rate, tangent to the polar curve, it touches the polar curve at the best glide speed. If one divides this speed by the associated sink rate, the result yields the best glide ratio.

From the polar data entered in *Menu>Pilot settings>Polar data* the 6030 knows the glider sink rate for each flight speed. If the current sink rate measured by the vario is more than the value found in this table, the glider is in sinking air. If, for example, using the polar curves shown below, the vario displays a sink rate of 100 ft/min (0.5 m/sec) when flying at 22 mph (35 km/h), the pilot must be in air rising at 160 ft/min ($1.3 - 0.5 = 0.8$ m/sec). This is also shown by the netto vario (**please also see Section 12.2, Netto Vario**). Because the 6030 knows the lift and sink rate of the surrounding air mass (if you have entered correct polar data for your glider and pilot combination), it can continually plot new tangent lines to the polar curve to indicate the speed of the best glide in any situation.



Polar curve of a high performance hang glider:

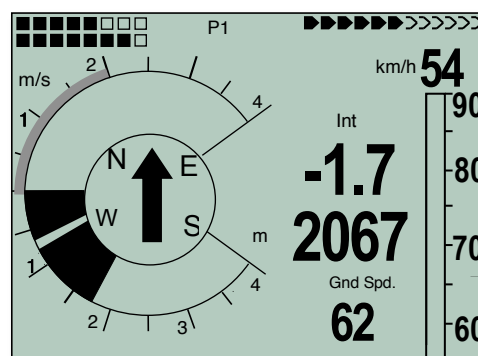


Polar curve of a high performance paraglider:

In the hang glider example (above left), the tangent line is drawn assuming a sink rate of the air mass of 2 m/sec (400 ft/min). The best glide speed in this air mass is therefore 63 km/h (39 mph). The best glide speed is the speed that allows the pilot to fly at the best glide ratio through the air.

In the 6030 display for the hang gliding example (shown at right), the pilot is flying too slowly. Note that the McCready indicator is in the negative range of the dial. At this speed the pilot dawdles in the sinking air, and will therefore waste both altitude and time. Conversely, if the pilot flies faster than the 6030's recommended speed of 63 km/h (39 mph), the pilot would arrive lower than a pilot flying at the optimal speed of 39 mph.

In the paraglider polar curve above, the tangent line is drawn for a head wind of 20 km/h (12 mph) and the resulting best glide is 38 km/h (24 mph). If the pilot flies with an activated GPS so that



the unit can consider the head wind, this increase in the best air speed will automatically be taken into consideration. The best glide speed arrow will indicate the best glide speed over the ground.

In contrast to sailplanes, for which the manufacturers' measured polar curves have long-term validity, a hang glider (and, even more so, a paraglider) has a polar curve that is dependent on the age of the surface, the condition of the sailcloth, the weight of the pilot, the aerodynamics of the pilot's harness and other factors. In order to realize the best possible speed during a flight, it is necessary to have entered the most accurate polar curve data possible – which means this should be determined by the pilot and not rely on overly-optimistic manufacturer's data. An overly-optimistic polar curve will cause the 6030 to indicate a speed ring setting that is too high.

In order to receive accurate speed to fly, netto vario and glide ratio information from the 6030, you must install an accurate polar for your flight configuration (i.e., your particular glider, wing loading, harness, air speed sensor, etc.). You can use the 6030 to record the data to build your polar by flying data-recording flights in smooth air. During the flight, each air speed between V_{stall} and V_{ne} should be maintained for several seconds. With the aid of FlyChart 4.52.21 or later, the data attained can be analyzed and the polar curve can be determined.

Once the polar has been developed, only two polar curve points need to be entered into the 6030: the speed (mph or km/h) and corresponding sink rate (ft/min or m/sec) for (1) minimum sink and (2) a speed in the upper range of your glider (best maneuvering speed). These two air speed/sink rate pairs are entered manually into the 6030 in *Menu>Pilot settings>Polar data*. In addition to the two sink-rate/air-speed pairs, you must also enter the average altitude at which you flew when conducting the testing, using the *altitude* field of the Polar data menu. The polar curve points will be converted and saved as IAS pairs and the polar curve will now be valid for all altitudes.

12.5 McCready Theory – Optimized Speed to Fly

In contrast to flying at best glide speed, which allows us to reach a goal with the least possible loss of altitude, we can get to a goal in the shortest possible time using McCready theory and calculations. A pilot thermaling up in an attempt to reach a goal must decide whether to leave the thermal at an altitude that will allow him or her to reach goal at best glide, or whether it might be faster to continue climbing and then glide with a higher speed to goal.

McCready found that with a given polar curve, there is only one departure altitude that enables one to reach the goal in the shortest time, assuming no net lift or sink on the way to goal. This departure altitude is dependent on the pilot's climb rate in the thermal and the prevailing wind component. The speed for the final glide is primarily dependent on the average climb in the last thermal.

Because the 6030 measures and calculates the relevant parameters during thermaling, it can signal when to leave the thermal to reach the goal as quickly as possible. The calculations assume that on the glide path to goal, rising and sinking air neutralize each other, and that the wind direction and speed measured while thermaling are the actual wind direction and speed while gliding to goal. Because these conditions do not always exist, experienced pilots may climb above the McCready glide path to goal before leaving the thermal. This additional altitude can be monitored in the *Alt a WP* user-field. The height above best glide path to goal is continuously recalculated, and can be displayed in the *A BG WP* user-field. To better indicate the point when the pilot can make goal at best glide speed and at McCready glide speed, the *A BG WP* and *Alt a WP* user-fields will invert (white numbers on a black background) when their respective values become positive.

When attempting to determine at what speed to fly between thermals (and not to a goal), the pilot makes a guess as to the value of the average climb in the next thermal. This value is known for historical reasons as the **McCready speed ring value**. The 6030 calculates the average climb rate, over a user-selected time period, in the last thermal and displays this value on the outer ring on the dial display. The time interval for the thermal averager can be adjusted in *Menu>Pilot settings>Vario>Thermal averager*.

In addition to the 6030's display of the last thermal's strength, the 6030 also displays the speed ring setting (next expected climb rate) that coincides with the pilot's current air speed. This pointer is known as the **active McCready indicator**, and is displayed as a radial line on the analog vario scale (dial). This indicator goes up when the pilot speeds up, or has less sink. The indicator goes down when the pilot meets stronger sink, or flies slower. How much the value changes depends predominantly on the polar curve.

To fly at McCready speed, adjust your speed so that the radial line points to your best guess of the strength of the next thermal, most likely the value of the thermal averager. If you have turned on the McCready sounds, the

frequency of the McCready tone is proportional to the speed ring setting that you are flying (i.e., the higher the speed ring setting that you fly, the higher the frequency of the McCready tone). If the tone lowers while you are gliding, then you need to speed up and vice versa. With the McCready sounds on, you do not need to watch the indicator continuously, but can react to vario changes by adjusting your speed to the changing McCready tone. A dead band can be set so that there is no McCready sound when you are gliding within a certain range of the desired speed ring setting. **For more information about McCready sounds see Section 3.5.**

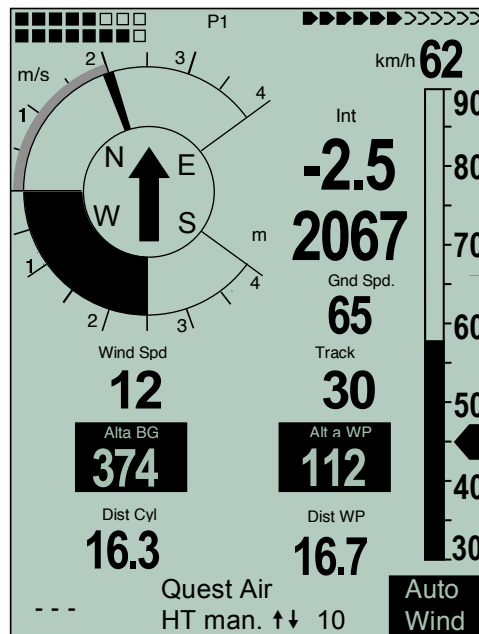
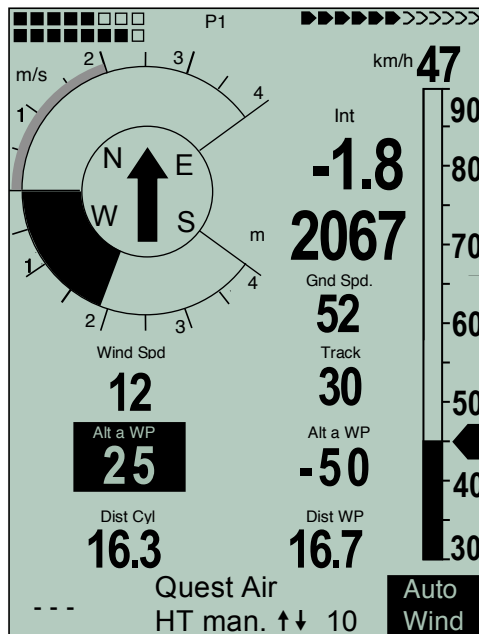
A possible scenario: A pilot is crossing a valley at a relatively high speed. Due to more-than-anticipated sink encountered on course line, there is a risk that the pilot may not be able to clear the ridge on the other side of the valley. So that the least amount of altitude is lost from this point forward, the pilot should reduce speed until the McCready indicator is on zero (i.e., best glide speed). With a speed ring setting of 0 the best glide indicator on the right side of the analog speed scale will correspond with the actual present speed (see top figure). In this example, the pilot is flying at the best glide speed for this air mass. The flight speed of 47 km/h corresponds to the best glide indicator and the McCready indicator is on 0. The average climb in the last thermal was 2.0 m/sec.

If the pilot were to further reduce speed, the McCready indicator would run into the negative range of the dial. This must be avoided, because in this case the pilot will waste unnecessarily both time and altitude. The 6030 will sound a rapid low beep tone if the pilot flies slower than best glide speed. This will most likely happen when a pilot flies right at best glide speed and then encounters sinking air. In that case the pilot should speed up to remain at best glide speed.

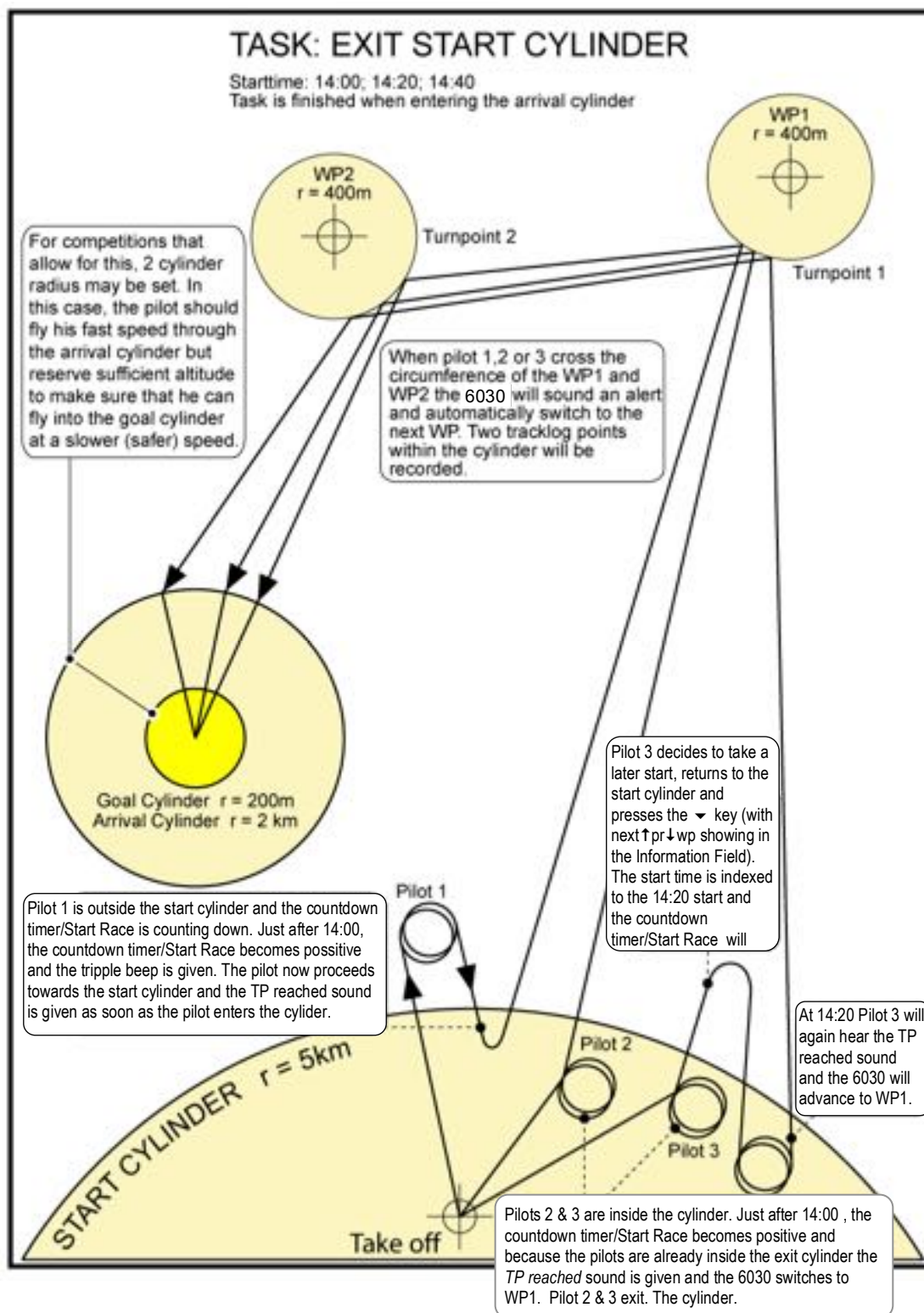
To fly at the McCready optimum speed, assuming that the climb rate expected in the next thermal is equal to the Average Thermal Climb indicator, the pilot should adjust air speed until the McCready indicator points to the value to which the Average Thermal Climb indicator has filled on the dial scale (see figure bottom right). In this example the pilot is flying the correct speed for an anticipated next climb of 2 m/sec, corresponding to a flight speed of 62 km/h. Note that the McCready indicator (radial line) points to 2 m/sec, which was the average climb rate for the last thermal.

Of course, the next climb may be different than the previous one, so the pilot may elect to fly with the McCready indicator above or below the Average Thermal Climb indicator. A conservative pilot might prefer to fly with the McCready indicator between zero (best glide) and the value of the Average Thermal Climb indicator.

All the functions described here can be sampled in Simulation mode. The measured values such as speed, sink or climb, flight direction and ground speed can be varied by the user. Their effects can be observed on the display and the resulting tones can be heard.



12.6 Enter & Exit Competition Start Examples



TASK: ENTER START CYLINDER

Starttime: 14:00; 14:20; 14:40

Task is finished when entering the arrival cylinder

