

Flytec 5020 GPS Flight Instrument

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Abstract - This paper provides a review of the Flytec model 5020 GPS Vario flight instrument. Also included is a review of Flychart, a Windows software application used to configure, upload, and analyze flight information from the 5020. An overview of key features of the instrument is provided along with personal experiences using it.

In the 1996 movie, Independence Day, Will Smith shouts, "OH, I GOT TO GET ME ONE OF THESE" after taking off in an alien spacecraft. I had a similar response after trying the new Flytec 5020 Vario. With built-in GPS and a list of features long enough to satisfy both the competitive and recreational pilot, the 5020 has got it all.

The 5020 fills the void between the 4020XL and the high end 5030 GPS. The 4020 is perfect for the recreational pilot who doesn't need GPS position information. At the high end of Flytec's product line is the 5030 GPS; a unit packed with features and a large high-resolution display. However, its size, price, and features are targeted to a select group of pilots. The 5020 hits the sweet spot with built-in GPS support, compact size, reasonable price, and many of the functions of the 5030.

THE FACTS

When the 5020 arrived for review, I was naïve enough to think I could master the instrument without reading the manual ... a "guy thing". After stumbling around for a while and having mediocre success, it became obvious that if I wanted to take advantage of the 5020's advanced features, I'd better read the manual.

Here's a partial list of features.

- Flight instrument with integrated 16 channel GPS receiver w/internal antenna
- High resolution, high contrast, graphic LCD display (160 x 240 pixels) with automatic or manual contrast adjustment
- High precision pressure sensor for a very sensitive variometer
- Two event driven soft keys allow access to important functions performed without navigating through different menus
- Up to 200 user definable waypoints
- Store up to 20 routes, each with 30 waypoints
- Automatic pilot notification when a competition cylinder is passed (entry or exit)
- Automatic indication to the last best lift
- Automatic indication of wind direction and velocity
- Automatic start and stop of data logging
- Variable record interval (1-30 sec) for up to 120 hours of FAI/IGC data logging
- Scan rate increasing automatically near FAI-sector/turn point with acoustic and visual notification
- Each track log point records: time, GPS position, GPS altitude, pressure altitude, true airspeed
- Input for optional external vane type airspeed sensor
- Includes FlyChart software for setup, configuration and flight analysis
- All user settings can be set using the keypad or FlyChart

- The integrated final glide computer allows a guided flight to waypoints, including the expected height over target and height above best glide
- Simulation mode where all features can be tested and simulated
- Powered by 2 separate battery banks with automatic switch over
- User selectable fields include: Wind speed, Time of day, Flight time, Speed over ground, Wind component on course line, Altitude over destination, Distance to destination, Bearing, Track, Distance to best climb in vicinity, Ambient temperature (F or C), Altimeter 2 (relative), Altimeter 3 (accumulated altitude), Barometric pressure (HPa/in Hg), Glide ratio through air, Glide ratio over ground, Glide ratio to waypoint

SETUP

The 5020 provides a plethora of settings and personal options including audio volume, LCD display contrast, Record Interval, Recording Mode, Battery Type, Audio Threshold, and more. However, if you're anxious to test drive the 5020, setting the battery type and date should be enough to get you going.

There are two separate banks of batteries. The secondary bank of batteries is a backup to the primary; a nice feature to have during a competition, but also economical since it helps insure all battery energy is used. The instrument accepts either NiMH (Nickel Metal Hydride) or Alkaline batteries. The former is a rechargeable battery with lower output voltage (1.2. versus 1.5 volts). The latter has a longer life but can't be recharged.

The 5020 uses the GPS constellation of satellites to ascertain time with extreme accuracy, but it has no concept of the local time or date. For this reason, the user should set the local date and number of hours ahead or behind UTC (Universal Coordinated Time), which is referenced to Greenwich, England. For my location in San Diego, CA, I am either 7 or 8 hours behind UTC depending on the time of the year (Standard or Daylight Savings Time).

FIRMWARE

Because the 5020 software program is stored in flash memory, it is field upgradeable. When program improvements or fixes are available, the 5020 can be reprogrammed without returning it to the factory. The review unit I received came with version 1.12a. A check of the Flytec web site (<http://flytec.com>) showed version 1.13 was available, which gave me an opportunity to verify the upgrade process.

Upgrading was straightforward. From the Flytec web site I downloaded and installed `installFlasherc.exe`, a utility used to upload firmware to flash memory. Next I downloaded the new firmware `5020v113.zip` file and uncompressed it.

With the 5020 off (yes, the 5020 must be off), insert the serial cable that comes with the instrument. Open the flasher utility, select the new firmware file (`5020v113.moc`) and upload it. The upload process takes about three minutes. Disconnect the cable and you essentially have a new 5020. A major enhancement in 1.13 was the addition of a Wind Speed display screen, well worth the upgrade.

DISPLAYS

There are three displays. The Main Screen shown in Figure 2 displays the health of the battery banks, the number of currently visible GPS satellites, flight speed, flight direction, flight time, and other key information.

The Map Screen shown in Figure 3 displays the flight path. This display is particularly useful to competitive and cross-country pilots, which shows the view from above. In the example, the pilot is shown making a few full turns, hitting WP1 (Waypoint 1), and continuing to fly to the next waypoint.

The Wind Speed Screen (not shown) is a new screen provided in version 1.13. It provides graphical final glide information. A crosshair gives the wind corrected best glide path to the active waypoint. The symbol of a paraglider at the center of the crosshair directs the pilot to fly left or right to help in hitting a goal. The vertical position of the symbol is determined by the required L/D to goal.

GPS SUPPORT

Most, if not all, paragliding competitions these days require a GPS enabled Vario to allow race officials a means to verify flights. It is also an invaluable tool for the pilot to set waypoints and verify goals during a flight. However, the recreational pilot can also make good use of the built-in GPS to do post flight analysis.

The 5020 has a 16 channel GPS receiver, which means it can receive up to 16 satellites simultaneous. The number of satellites being received is constantly changing as one satellite dips below the horizon and another rises. The number of satellites being received is displayed by a highlighted "greater than" (>) character in the upper right hand corner of the display as shown in Figure 2. As long as four satellites are visible, the position information provided by the 5020 is accurate.

Like all GPS receivers, the 5020 must have a clear view of the sky. As long as the Vario is no greater than 45 degrees from the horizontal position, the instrument will be able to receive enough satellites to provide position information.

I found the GPS receiver to be very sensitive; I often had 8 satellites in view. Near a window in my home, I could receive one or two satellites and was surprised to find I could even receive satellites sitting in the middle of my living room. Normally the 5020 will lock onto satellites within a few seconds, but can take longer if it is being used for the first time in a new location. If the current location is not significantly different from the location where the 5020 was last used, the location saved in the Satellite Almanac will aid the GPS receiver in finding satellites, so the locking on to satellites can be quick. You can help the 5020 find its current position by giving it your approximate location; a nice feature but I prefer to wait a few extra minutes and let the 5020 find me.

SHOWTIME

OK, let's put down the manual and see what this puppy can do.

The instrument comes with a Velcro strap used to fasten to your leg. If you want to monitor the flight path, the 5020 must point upward to view GPS satellites. With a leg mount, and sitting in your harness, the 5020 has good sky visibility. One can use a flight deck, but I found the leg mount satisfactory.

One of the features I wanted to test was to compare actual flight paths and durations with those measured by the 5020. The manual states the flight recording mode is automatically started when the ground or airspeed reaches at least 10 km/h. Since the instrument may incorrectly sense launch, 20 data points are stored prior to meeting the launch criterion.

The data recorded during a flight includes: altitude, speed, latitude, longitude and other key flight parameters. The rate at which the data is sampled is user programmable. For testing, sampling flight parameters at 1 second intervals is reasonable. However, during long flights, you may wish to decrease the sampling rate to 10 seconds.

With the 5020 as my copilot, I launched. After getting into my harness and looking for other pilots (safety first), I saw the 5020 had correctly sensed launch and was updating. Even though I had gloves on, I found the buttons fairly easy to select. My direction was shown correctly as was my current flight time. On this maiden voyage I decided to keep the flight short and land. With 1 second sampling period, the 5020 took 40 seconds to sense the flight had ended. This could create a problem for "touch and go" flights, but in that case, the 5020 supports a manual mode to measure flights.

FLYCHART 4.0

Flychart is the Windows application that allows a pilot to evaluate recorded flight data on a computer. It is included free with the instrument. It also allows the user to set instrument parameters (i.e., waypoints). Flychart is a powerful tool that provides a plethora of features and options.

The 5020 sent for review came with a registration number to be used after downloading Flychart from the Flytec web site at <http://www.flytec.com>. The version reviewed here is 4.32.26.

Downloading the 10MB file was simple and installation followed the standard Windows procedure. Double clicking the executable opened an installer and moments later Flychart was installed.

Flytec's web page states the 5020 version of Flychart supports Windows XP, ME, and 98. Because my computer of choice is Windows 2000 I decided to see if it worked ... it didn't: Duplicating the installation process on a Windows XP machine was successful. During installation, I was prompted to specify a language (English). However, upon launching Flychart I was greeted with a German language user interface. I sent an email to Flytec late Saturday night and hoped for a reply within a few days. I was impressed to find a reply the following morning. Apparently it is normal, or a software bug, for Flychart to start in the German mode the first time it is launched. You must change the language to English under System Settings in the Extras menu. Fortunately, even though all other text is in German, the Extras menu was in plain English. After selecting English, I restarted Flychart and was all set.

Although the 5020 allows setting waypoints using the keypad, using Flychart is significantly easier. To set a waypoint, specify a name, latitude, longitude, altitude, and upload.

This review cannot do justice to all of Flychart's features, so I'll limit comments to the graphical analysis window. The chart shown in Figure 4 consists of four windowpanes. The upper left pane of the window shows the altitude graph. Below that the Vario plot and below that the speed graph. The right pane of the window displays the "view from above" of the flight path, which is similar to the Map Screen on the 5020, but the Flychart display provides far more detail.

If you wish to learn more about Flychart, take it for a test drive. A full working version of Flychart is available to download. It works exactly like the registered copy but limits the user to 15 flight downloads. Flychart is a great accessory; I can see that having it on a laptop at a competition can be very useful. Unfortunately, Flychart leaves no room for exaggerating to your peers what you actually did or didn't do during the flight.

NITS

I use the term "nits" to categorize observations that some may say is nit picking. After all, one man's "must have" feature is a another man's "nuisance". For example, the 5020 comes with a bright purple carrying case that some say is ugly. I thought the color was perfect. A day glow purple case stands out and should be less likely to be left behind. However, if purple isn't your color of choice, I understand Flytec is now providing the 5020 case in other colors.

The manual is pretty good and provides most of the information you need to operate the 5020. However, it could be organized better. My copy had several pages duplicated twice. I'd also like to see the manual in PDF format available on the Flytec web site. Version 1.13 of the firmware provided a new Wind Speed screen but I could find no documentation on how to use the new feature.

Battery 1 and 2 were incorrectly labeled according to the manual. I later found the manual is correct, the instrument is wrong. This is a known manufacturing error with some of the early models. The wires can be switched to solve the problem, however, this has been addressed in new versions being shipped.

The computer interface uses a standard RS-232 connection with DB-9 connector. Many desktops and most new laptop computers have replaced the RS-232 interface with USB. A USB interface would be a useful improvement.

After each flight, the 5020 displays the flight duration, maximum altitude, speed, and saves it to memory. You can delete individual flights but I could find no way to delete "all" flights. Deleting individual flights is tedious and time consuming; a "Delete All" option would be useful.

Several of the displays such as Flight Memory and Basic Settings do not take advantage of the entire LCD display. For example, the Flight Memory display shows the last six flights. The display is large enough to easily display more. Displaying only the last six flights means that you have to stroll down if you wish to examine the eighth flight. I'd like to see the information take advantage of all LCD real estate.

Another user interface nit is the lack of user feedback. For example, if you have no recorded flights when you select Flight Memory, there is no indication why flights are not displayed. The 5020 should display "No Recorded Flights Available" message so you're not wondering why nothing is happening. I would also suggest an audible response to invalid selections. For example, three beeps in rapid succession to emphasize the item being selected by the user is not supported.

CONCLUSION

The 5020 is a great addition for any paraglider. Whether your interests are recreational or more serious, it has what you need.

The number of features and space limitations limit the scope of this review. For those wishing additional information, I recommend the review by Jerome Daoust of the Brauniger Competino, which is identical to the Flytec 5020. That review is available at http://www.expandingknowledge.com/Jerome/PG/Article/Accessory/Archive/2004_11_15_JeromeDaoust_Brauniger_Cometino/Main.htm. Peter Loeskow also provides useful information at http://www.expandingknowledge.com/Jerome/PG/Article/Accessory/Archive/2004_11_15_JeromeDaoust_Brauniger_Cometino/Peter_Loeskow.htm. The Paragliding Forum at <http://www.paraglidingforum.com/> is yet another good source of information and discussion.

Thanks to Kyoung Ki Hong, Torrey Pines Gliderport flight instructor, for a lesson on the use of flight decks in competition. Also to my wife, a fellow pilot, best friend, and proof reader; you will always be the wind beneath my wing.



Figure 1. Flytec model 5020 with built-in 16 channel GPS receiver.

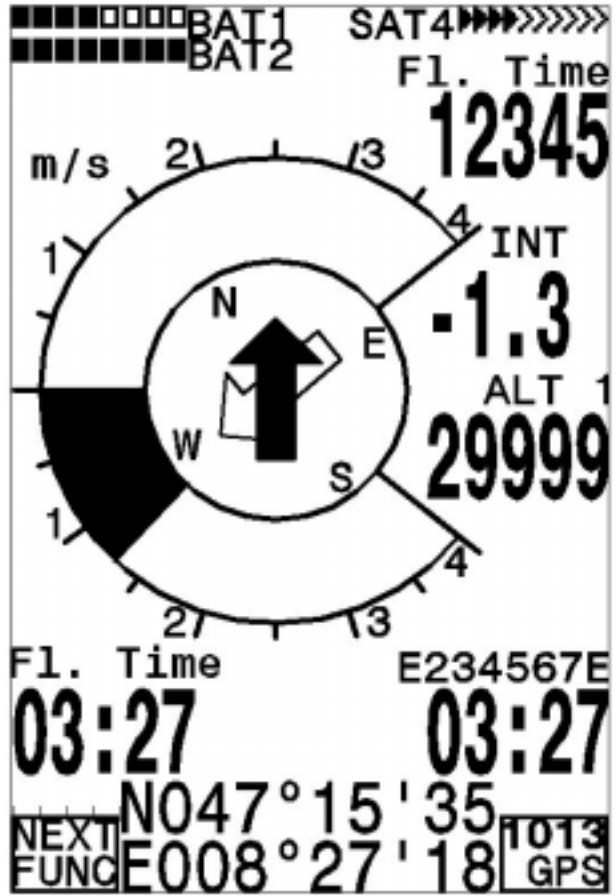


Figure 2. Main Screen shows key flight metrics, battery status, visible GPS satellites, altitude, heading, flight time, and more.

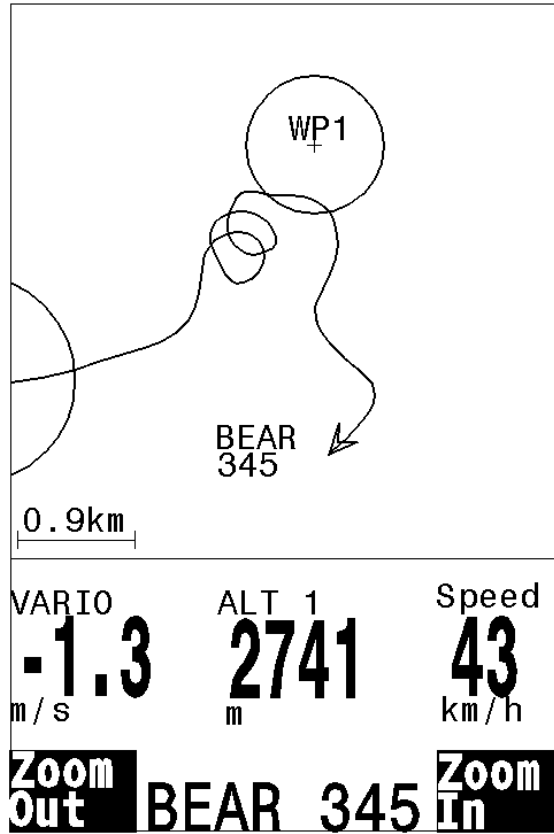


Figure 3. Map Screen shows flight path and waypoints.

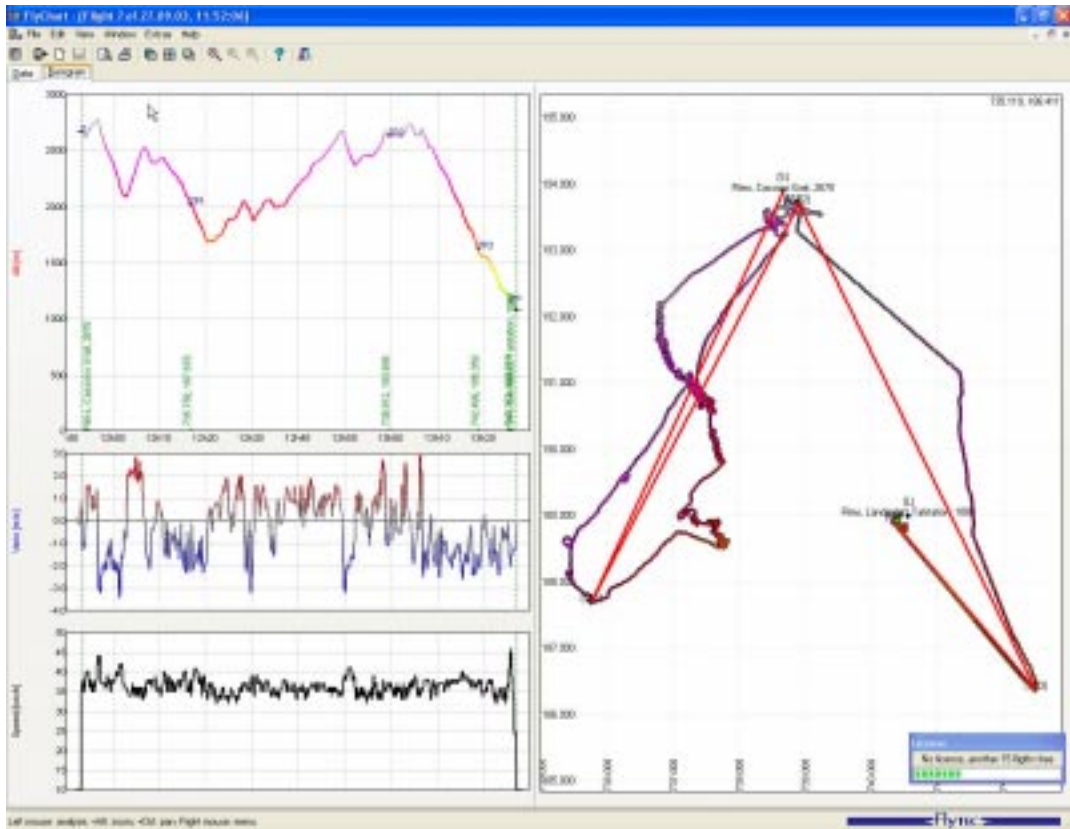


Figure 4. Flychart flight analysis software showing graphical display of altitude, vario pressure, speed, and flight path.