



OVT - Manuale d'uso del GPS-NAV

In questo documento riportiamo il manuale d'uso del GPS-NAV (usato negli alianti Orio Virtual Team) in versione inglese originale.

Il GPS-NAV è un sistema computerizzato che funziona in modo completamente integrato con L-NAV ed un variometro compensato. Il sistema viene attualmente impiegato nelle competizioni di alianti.

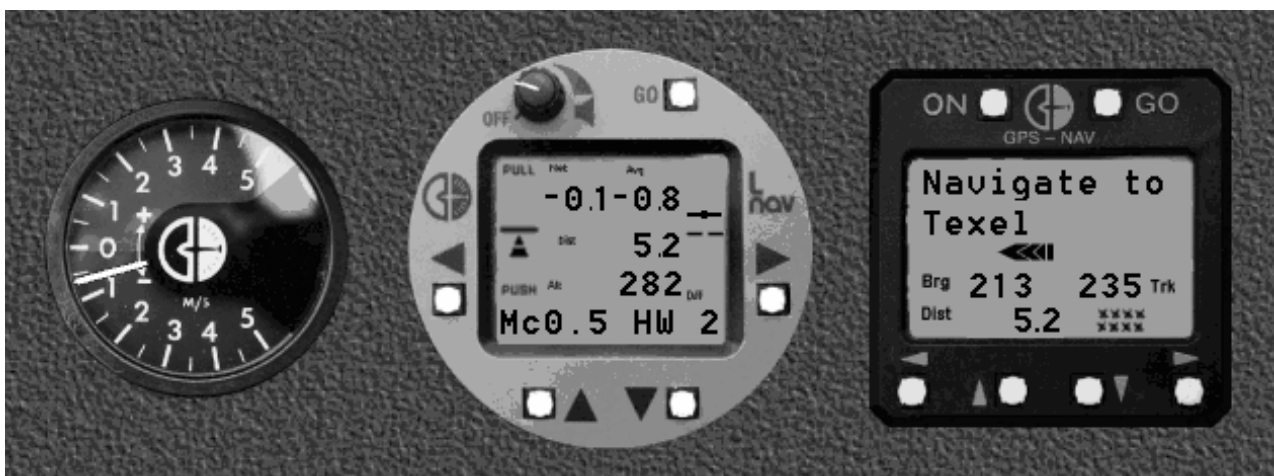
Per maggiori dettagli vedi il sito del produttore:

<http://www.cambridge-aero.com/gpsNAV.htm>

Orio Virtual Team

Cambridge Set User's Guide for FS.

by Max Roodveldt with assistance of Roland Stuck





This set of sailplane gauges for FS is based on the set of Cambridge instruments as used in many real sailplanes and is the result of a joined effort between Roland and me. He did the flying - I did the programming. Roland has a set himself in his real ASW-20 BL. So the action of the FS gauges are as real as it could get - we had access to all the manuals too .

It consists of the following instruments:

- **GPS-NAV.**

The real GPS-NAV is a navigation computer as well as a flight recorder based on the well known Global Positioning System(GPS). In this FS version, only the navigator function has been reproduced and the gauge allows to navigate to any of the 250 waypoints of the internal database. Like the original instrument the virtual GPS-NAV works with a database in the Cambridge . dat format. Such files are available on the internet - there are several sites to download from. The GPS-NAV can also be used to fly a sequence of turnpoints which is called a task in real gliding. Tasks can be composed using the original CAI pc-program. Details on this later. It maybe worth to be noticed that Cambridge was a pioneer of the use of GPS recorder and their "loggers" were selected for the first Worldchampionships where flight were controlled with GPS recorders.

- **L-NAV.**

The L-NAV is a glide computer allowing to calculate the optimal speed to fly between two thermals as a function of glider performance (Speed polar of the glider) and the expected lift (The so called Mac Cready setting). It also allows to calculate the altitude required to reach any point from the GPS-NAV database (both instruments are coupled) as a function of glider performance, wind component and Mac Cready setting.

- **CAF.**

A compensated electrical variometer controlled by the settings of the L-NAV. It can either be displayed as a 80 mm. or a 60 mm. gauge - space permitting...

Because the real instruments are rather complicated - especially the L-NAV - only those functions that are useful within FS are implemented. If by popular demand more functions should be added, updates will be issued later on.



1. Startup.

After starting the flight - and while waiting 'till the plane is stable - press the **[ON]** button on both the GPS-NAV and the L-NAV and the gauges will wake up.

The L-NAV will display the altitude screen - it needs a push on the **[GO]** button to start.

Important: The set has the capability to work in 'british units' and metric modes. The selection is automatic and follows the settings of FS. The setting of FS can be changed by: **Options | Settings | International | Units of measure.**

There are three options with the following results:

	distance	altitude	speed (hor & ver)	pressure
US System	nm	ft	kts	hg
Metric (Altimeter feet)	km	ft	km/h - m/s	mb
Metric (Altimeter meters)	km	m	km/h - m/s	mb

The CAF variometer will change its scale when you switch between US system and Metric (Altimeter meters) mode.

2. Definition of used terms:

First of all the user interface – the buttons on the gauges faces.

[ON] clickin' with the mouse turns the instrument on/off.

[GO] activates a function as explained within this user's guide.

[LEFT] shift left one screen.



[RIGHT] shift right one screen.

[UP] shift up one screen.

[DOWN] shift down one screen.

Navpoint an entry in the database noted in the following format:

Example:

1,46:34.950N,009:50.250E,2312M,S,Albula 1,Passhoehe

ID #: 1...250

comma: separator – MUST only be used between different fields !!!

Latitude: dd:mm.mmmN or S

Longitude: ddd:mm.mmmE or W

Altitude: 2312M or 7585F

Attributes: A - Airport

L - Landable Point

S - Start Point

F - Finish Point

M - Markpoint

T - Turnpoint

H - Home Point

R - Restricted Point

W – Waypoint

A point can have multiple attributes - up to 9 (all).

Name: Albula (24 characters - only first 12 visible)

Text: Passhoehe (24 characters - only first 12 visible)

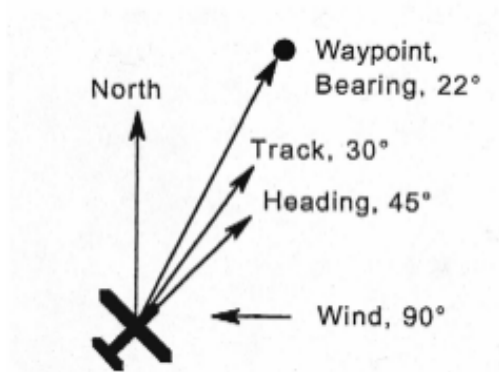
Bearing: is the direction to the navpoint;

Track: is the path the glider is following as computed from the GPS readings;

Distance : is the distance (in km) to the selected navpoint;



Turn Indicator : displays difference between Bearing and Track and points in



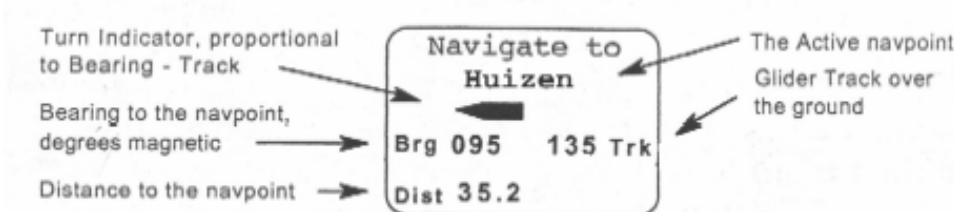
the direction you should fly to reach the navpoint.

Note: attributes control the organization of navpoints into LCD screen lists. Points with T, S, F or R attributes are listed in **TP: Alphabet** and **TP: Distance** screens. Points with A, L, M and W attributes are listed in the **Landpoints** screen.

Attributes also controls other behavior. For example, when the GPS-NAV is first turned on, the **Navigate to** screen shows the Home Point (H). If there is no Home Point, the GPS-NAV displays the navpoint with the lowest ID #.

3. Navigating with the GPS-NAV

To start the instrument use the button **[ON]**. It will come up with the **Main Screen** and the first navpoint in the GPS-NAV.dat file that holds an 'H' (for 'Home') in the attributes – if there isn't an 'H' it will come up with the first navpoint in the file. After 2 seconds (the GPS readout interval) You will get the following screen:



As the words imply, **Main Screen** is just that. That's where most of the flying is done - pressing **[GO]** will always bring you back to this. Watch for the words: **Navigate to:**.

Important: as the timing interval of the GPS reading is set to 2 seconds - just like the real one and maybe even a little too short to read out the FS variables

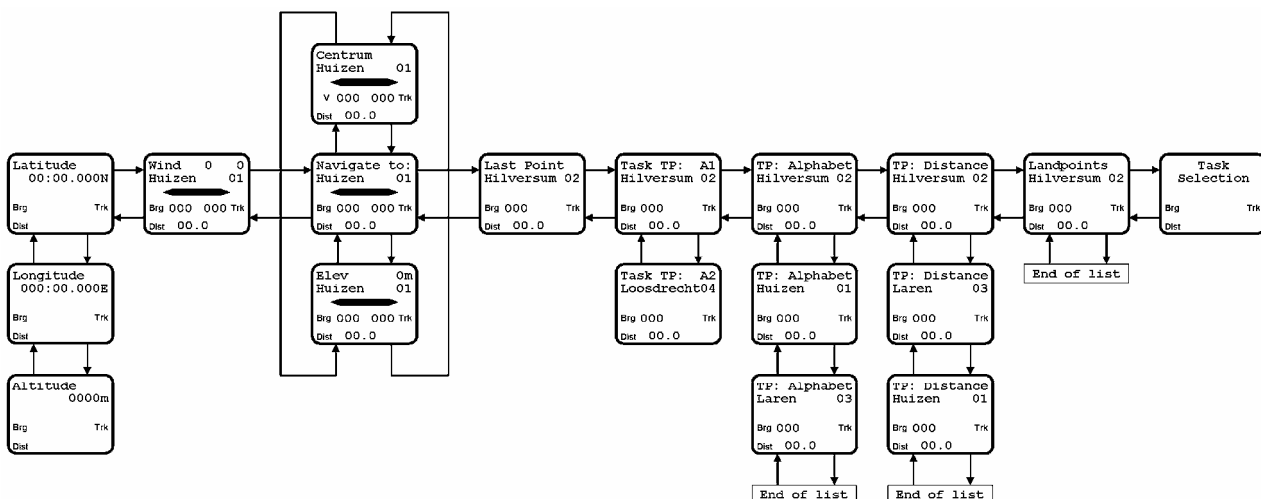


- there will be a small delay in the updating of the displays. Allow for this delay when correcting your flight path – or changing screens. You should take things really easy here; and who’s in a hurry anyway ?

When you get near the navpoint (< 2.0 km) the message **Navigate to:** will change to **Close to:** and if you are really close (< 0.5 km) it will change again: **Arrival!** - and you’re there.

Other screens:

The screen map shows how to go to the other screens



Pressing the **[DOWN]** key from the **Main Screen** will bring the **Elevation** of the navpoint, pressing it again will give the **Comment** line of the navpoint - both as stored in the database.

Pressing the **[UP]** key from the **Main Screen** will bring the **Comment** line of the navpoint, pressing it again will give the **Elevation** of the navpoint. See the chart above.

Last Point screen:

The previous active navpoint is stored on the **Last Point** screen. Go **[RIGHT]** from the **Main Screen** to reach it. Pressing **[LEFT]** will return the **Main**



Screen again, but pressing **[GO]** will exchange the navpoints - the **Last Point** will become the active point and the active point will become the **Last Point**.

Selection of another navpoint:

This is where the real fun starts. From the **Main Screen** press the **[RIGHT]** button three times and you will get to the **TP: Alphabet** screen. Now use the **[DOWN]** and **[UP]** buttons to display all the navpoints in the database that contains any of the characters 'TSFR' in the attributes. (See the original 'CAI' manual to see how attributes work.) Holding down the mousebutton will make the list scroll in either direction. The **Bearing** and **Distance** displays are relative to the glider's current position. Pressing the **[GO]** button will make the selected navpoint the active one and brings the **Main Screen** back on. Also will the previous active navpoint shift to the **Last Point** screen. Easy does it... If you don't want to change your selection return with three times **[LEFT]**.

The second way to get a new navpoint is to shift **[RIGHT]** from the **TP: Alphabet** screen to use the **TP: Distance** screen. There you'll find all the navpoints that contains any of the characters 'TSFR' in the attributes sorted by the distance from the current flying position. **[DOWN]** and **[UP]** will get you through the list. **[GO]** will make the selection the active one and return you to the **Main Screen**, or else return by way of the shift **[LEFT]** button.

Further right from the **TP: Distance** screen is the **Landpoints** screen. The list there holds all the navpoints with the any of the characters 'ALMW' in the attributes. Those navpoints are sorted by their distance from the flying position. Use **[DOWN]** and **[UP]** to scroll. **[GO]** will make the selection the active navpoint and return you to the **Main Screen**.

Note 1: the navpoint distances are computed from the current flying position on entering the **TP: Distance** and the **Landpoints** screens, so if you take too long to make a selection the distances will have changed, 'cause the plane keeps flying on... (or at least is should).

You can refresh the list by shifting **[LEFT]** and then **[RIGHT]** again. This was done because continuously refreshing the distance data slows down the FS frame rate too much – even with a V550 card.

Note 2: pressing **[GO]** from the **Last Point**, **TP: Alphabet**, **TP: Distance** and **Landpoints** screens will make the selected navpoint the active navpoint so please be careful there.



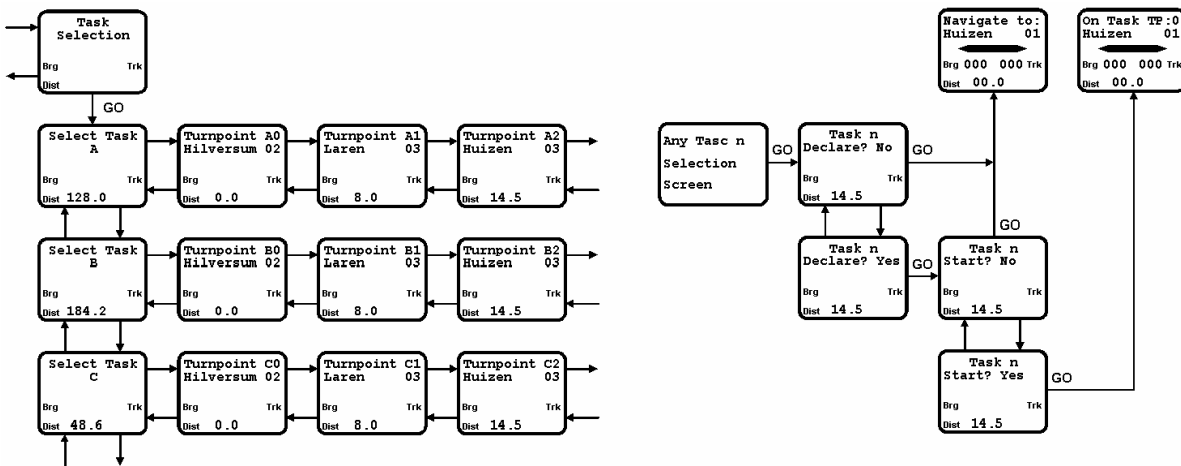
It's better to use the shift **[LEFT]** button from those screens or you will suddenly be flying to a totally different navpoint - it happens to me all the time... (and you can always bring the original navpoint back on by using **Last Point** - good thinking, guys).

More screens.

Starting at the **Main Screen** and going **[LEFT]** you'll find the **Wind Screen**. This screen displays the wind direction and speed (in km/h) on the current altitude as available from within FS. Make sure the weather generation option in FS is activated to see it work. That's **Options | Preferences | Weather generation** and each time you start FS a different kind of weather will be created - within limits, that is...

A second **[LEFT]** brings up the **Latitude Screen** – that's where you are at the moment. A **[DOWN]** shows your Longitude, a second **[DOWN]** your Altitude. As always, a **[GO]** will return you to the **Main Screen**.

Tasks:



Pressing **[GO]** at the **Task Selection Screen** gives you the choice between a maximum of 10 previously prepared tasks. **[DOWN]** and **[UP]** scrolls them. You'll see the Task's total distance on the bottom of the screen. **[RIGHT]** and **[LEFT]** shows the Task's turnpoints.

[GO] from any Task point will bring the **Declare ? Screen** – and use **[DOWN]** and **[UP]** to change between No or Yes. After selecting Yes **[GO]** will bring the **Start ? Screen**.



Again use **[DOWN]** and **[UP]** to change between No and Yes. Confirming Yes with **[GO]** will bring the **Main Screen** back on, but with **On Task TP:** in the first line.

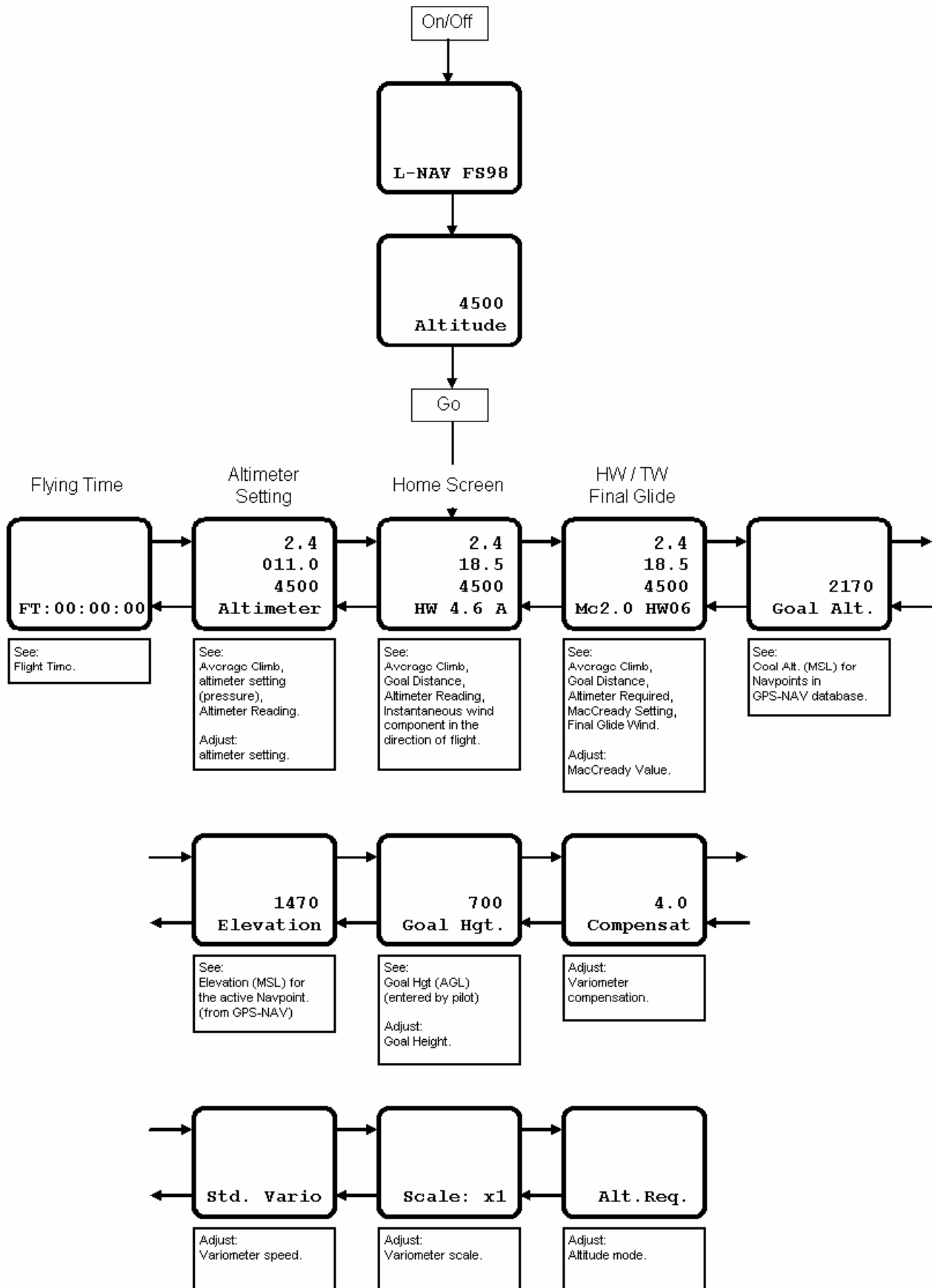
Confirming No on both screens brings the unchanged **Main Screen** back on.

To select the next Task Point go to the **Task TP: Screen** - two shifts **[RIGHT]** and press **[GO]**. The new Task point becomes the actual one, and the previous one goes to the **Last Point Screen**.

Watch Out: pressing **[GO]** on any other screen than **Task TP: Screen** disables the current task and you'll have to select that task again.



4. Flying with the L-NAV.





To start the **L-NAV** press **[ON]** and after a few seconds the **Altitude Screen** will appear and show you your current altitude (MSL). Press **[GO]** to reach the **Home Screen**.

Home Screen.

Displayed are:

The Speed-to-Fly "Push / Pull" indicator.

The netto vario. (vertical speed of the air mass)

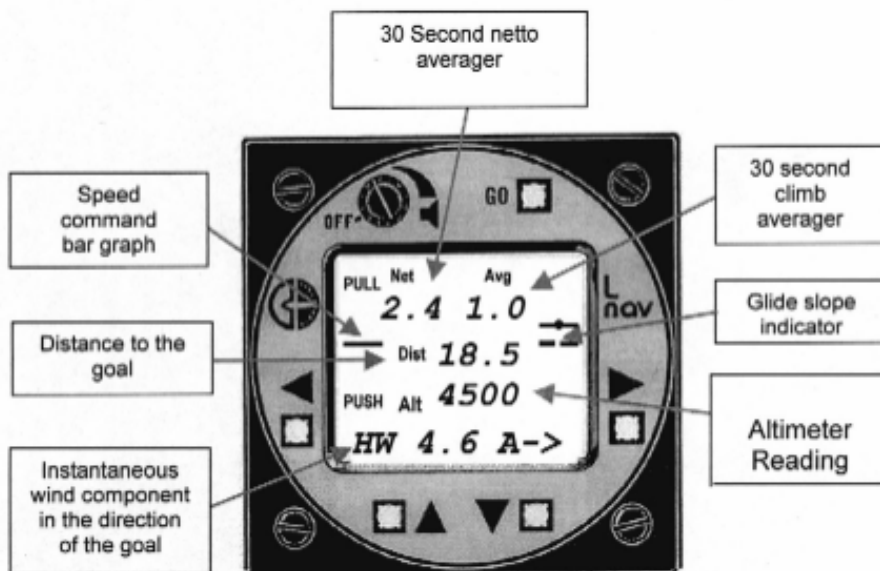
The vario averager.

The distance to fly to the active waypoint on the GPS-NAV

The altitude (MSL).

The glide slope indicator showing if the altitude is higher or lower than the altitude required to reach the navpoint (See HW/TW screen)

The wind component (HW= Headwind or TW= Tailwind)



Turning the GPS-NAV on and off will influence the following readouts:

The distance to fly is based on the selected Navpoint. Change the Navpoint in the GPS-NAV to see it working. If the GPS-NAV is off the distance will show 0.



The Wind component. With the GPS-NAV on it will show either TW x.x A or HW x.x A depending on the wind setting in FS and the direction your flying. The first time you turn it on it will take 20 to 30 seconds to become stabilized - that's the buffer getting filled. If the GPS-NAV is off it will show HW 0.0 M.

The Speed-to-Fly indicator and the Glide Slope Indicator are also influenced because when the GPS-NAV is off there's nothing to compute.

Note: moving the plane with the Slew mode while the gauges are on will lead to faulty readouts for at least 30 seconds after you leave it again. You either wait for everything to return to working order or you don't use the Slew mode - try flying there instead...

Other screens: To change to the other screens use the **[RIGHT]** and **[LEFT]** buttons (See the screen map). The **[GO]** button will always get you back to the **Home Screen**.

HW / TW Final Glide Screen.

The first screen on the right is the HW / TW Final Glide Screen. According to Roland it's the standard flying screen. It shows:

The speed-to-fly indicator.

The netto vario.

The vario averager.

The distance to fly.

The altitude difference between the actual altitude and the required altitude

The glide slope indicator.

The MacCready setting and wind component - Mc0.5 HWxx or Mc0.5 TWxx.

The speed to fly is calculated as a function of the performance of the glider (speed polar), the Mac Cready setting and the present vertical motion of the airmass.

The required altitude is calculated taking into account the speed polar of the glider the Mac Cready setting, and the wind component.



NB: Since all calculations are done with the ASW 20 speed polar, the gauge does only work properly for gliders with similar performance.

The **[UP]** and **[DOWN]** buttons let you change the MacCready value. You will see it's effect on the Speed-to-Fly indicator. The preset value is ideal for coming home in any case (even with strong headwind)

Further to the right are the setup screens:

Goal Altitude Screen.

Shows the sum of the goal elevation and the wanted height of arrival.

Elevation Screen.

Shows the elevation of the goal - only with the GPS-NAV on.

Goal Height Screen.

Shows the wanted height of arrival and allows the setting of that height. Use **[UP]** and **[DOWN]** to set your wanted height. All the other settings will be adjusted accordingly.

The relationship between goal altitude, elevation and goal height is best understood from the following scheme:



Compensation Setting Screen.

Allows the compensation setting of the L-NAV and of the connected CAF variometer. The preset value (4.0) is a reasonable compromise - change only when you know exactly what you're doing...



Vario Speed Setting Screen.

Allows the speed setting of the connected CAF variometer. You can select either Fast, Standard or Slow depending on your preferences.

Vario Scale Setting Screen.

Allows the scale setting of the connected CAF variometer. You can switch between x.5, x1 or x2 scales resulting in a 2.5 m/s, 5 m/s or 10 m/s readout. Setting will be visible on the L-NAV screen.

Altitude Mode Setting Screen.

Allows to switch between altitude modes as visible on the HW / TW Final Glide Screen. The standard mode is Diff. and shows the difference between altitude and needed altitude, the alternative mode is Req. and just shows the needed altitude.

To the left of the Home Screen are two more screens:

Altitude Screen.

Shown are the following values:

Averager variometer.

Barometric pressure in Millibars.

Altitude.

Use the **[UP]** and **[DOWN]** buttons to adjust the barometric pressure and watch the altitude change accordingly. Basic value is 1013 mb or use **Keyboard [B]** to reset.

Flying Time Screen.

Displays the flying time since the gauge was turned on. Can be used for timing a pilot on a given task. Switching the gauge off and on again resets the time again.



The CAF variometer.

It's an electrical compensated variometer with adjustable compensation, speed and scales. You can adjust those settings using the L-NAV. With the L-NAV turned off or not available it uses the standard pre-settings.

That's all - I hope...