Destination
Minden
Distance
0.3
Alt. Diff
3960
MC
2.0
Dayton
Carson
Marked Point 2
Sunrise
Finish
Point 1
10mi
Double Spring
SIMULATING
Alt. AGL
5036
MSL Altitude
9718
Tot.Cl.
0.0
Avg.Cl.
0.0
0

ClearNav

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Steve McLaughlin in his Nimbus 3, photo by Paul Remde

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1 Introduction

Thank you for purchasing the NK ClearNav. The ClearNav is a soaring flight computer system with many innovative features. The key features are:

- Moving map display of:
  - Airports
  - Airspace
  - Terrain
  - Rivers, lakes, cities, etc.
  - Final Glide Calculator
  - 2 Glide Range Amoebae
  - MSL Glide Range Ring
  - Altitude (MSL or AGL)
  - Glide and Climb Measurements
    - Climb/Glide Netto
    - Average Climb
    - Average Glide Netto
- IGC Approved (pending) GPS Flight Recorder with built-in GPS engine and remote antenna
- Final Glide Calculator
- Powerful task optimization features
- Easy transfer of flight logs, waypoint and airspace file using a USB Flash Drive

The hardware and software that make up the ClearNav were designed to be:

- Simple and intuitive
- Easy to use in flight
- Easy to view in bright sunlight
- Innovative
- Reliable

We hope you find the ClearNav useful and that it increases your enjoyment of the wonderful sport of soaring. Please let us know if you have any suggestions for improving the product or the manual.

1.1 Contributors

This manual was written by Paul Remde of Cumulus Soaring, Inc. (www.cumulus-soaring.com) with help from many NK employees and ClearNav users.

1.2 Updates

The latest version of this manual is available on the NK web site at http://www.nkhome.com/support/pdfs.html.

1.3 Step-by-Step Directions Format

This manual will use a basic "shorthand" method of presenting step-by-step instructions. This is done to keep the number of pages of the manual to a minimum so it is easy to print. Certainly, the detailed instructions below are very clear and easy to follow, but they use much more space than the Basic directions. Below are examples of Basic and Detailed step-by-step instructions. As you can see, the Basic version is much shorter, yet very clear. The Detailed version is shown here to clarify how to use the Basic version. The example below shows how to enable or disable the display of *Bearing* information in the *Distance* window.

To toggle the display of bearing information on or off:

Basic Instructions:

Step through the instructions from left to right. Use the Up, Down, Left or Right buttons as necessary to select each item. The "/" character is used to clearly separate each step.

> *Menu* button / *Setup Menu Icon* / *Personal Preferences Tab* / *Map Display Options* / *Wind & Bearing* / *Bearing Checkbox*

To return to the moving map display – press the *Menu* or *Focus* button. This last step is not usually included in the basic instructions.

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How to Interpret the Basic Instructions	
Basic Instructions	**Detailed Instructions**
Menu button	Press the *Menu* button to access the Ribbon Menu
Setup Menu Icon	Use the *Left* or *Right* button to select the *Setup Menu Icon* and press the *Select* button
Personal Preferences Tab	Use the *Left* or *Right* button to select the *Personal Preferences Tab*
Map Display Options	Use the *Up* or *Down* button to select *Map Display Options* and press the *Select* button
Map Items	Use the *Up* or *Down* button to select *Map Items* and press the *Select* button
Terrain Checkbox	Use the *Up* or *Down* button to select the *Terrain Checkbox* and use the *Select* button to toggle it on or off.
	Press the *Menu* or *Focus* button to exit the menu and return to the moving map screen

1.4 Macintosh Computer Users

This manual has been written for users of Windows PC computers. However, using a Macintosh to transfer waypoint, airspace, firmware upgrade and other files to the ClearNav is fine. File transfers are done using a USB Flash Drive which will work equally well in a Macintosh computer. Some "How To" sections in the manual give specific instructions with PC users in mind, but Mac users will find it easy to accomplish the tasks using their Macs. This manual does not attempt to give specific instructions for Mac users.

1.5 Important Notices

1.5.1 Before You Fly

- **Read the Manual**
  Before you fly with the ClearNav, please read this manual while "playing with" a ClearNav unit on the ground. You will find the unit much easier to use and more enjoyable after you have taken the time to learn how to use it well. The manual includes many detailed overview

sections but also incorporates several real world tutorials which should help you get the most out of your ClearNav. Please don't be intimidated by the large size of the manual. The manual includes many icons and graphics which help clarify things, but they take a lot of space – making the manual appear extra long. It is really a pretty quick and easy read.

- **Play with the ClearNav in Simulator Mode**
  The ClearNav Simulator is a great way to play with the ClearNav on the ground. It allows you to fly the little glider on the screen around your local gliderport. You can turn, adjust the speed and even bump the altitude up and down using the remote control. We recommend taking it for a spin all the way around several tasks in the simulator before using the ClearNav in the glider.

1.5.2 Fly Safely

It is very important to keep your eyes focused outside the cockpit as much as possible. Do not "play with" or configure the ClearNav while in flight. Learn to use the unit and configure it to meet your needs while safely on the ground. There have been several instances of very near misses (one glider nearly hitting another glider in flight) which were attributed to one or both pilots "playing" with their soaring flight computers or soaring flight software when they should have been keeping their eyes out of the cockpit looking for traffic.

1.5.3 Not a Certified Instrument

The ClearNav is designed to enhance your soaring flight. It is not intended to replace your certified primary flight instruments. It is not a replacement for good judgment – which remains the responsibility of the pilot. All calculations are only as good as the data used in the calculation. If incorrect data is entered then incorrect information will be provided by the device. For example: If the glider polar data is not entered correctly the unit cannot calculate accurate final glide information. Also, the unit makes no attempt to warn you to avoid impact with the terrain – it assumes that you will see and avoid terrain and other aircraft. Waypoint and airspace data is the responsibility of the pilot. The ClearNav has no way of knowing whether the data in use is inaccurate or out of date. The maps displayed by the ClearNav are designed to supplement (not replace) the use of aviation maps such as sectional charts, etc.

1.5.4 Warranty

This product is guaranteed to be free of defects in materials and workmanship for a period of two years from the date of their first consumer purchase. NK will repair or replace any defective product or part when notified within the warranty period, and will return the product via domestic ground shipping at no charge. The following shall be excluded from warranty coverage: damage due to improper use or neglect (including corrosion); damage caused by severe or excessive impact, crushing or mechanical harm; modifications or attempted repairs by someone other than an authorized NK repair agent; normal usage wear and failed batteries. If no warranty registration or proof of purchase is provided, the warranty period will be measured from our date of manufacture. Except as otherwise

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provided herein, no other warranties, expressed or implied, are made with respect to these products, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose. NK assumes no liability for any damages, losses, or expenses resulting directly or indirectly from product use.

1.5.5 Repairs

Repairs will be processed at the NK office in Boothwyn, Pennsylvania, USA. Contact information is below.

Nielsen-Kellerman
21 Creek Circle
Boothwyn, PA 19061

610-447-1555
Fax: 610.447.1577
e-mail: info@nkhome.com
Web Site: www.nkhome.com

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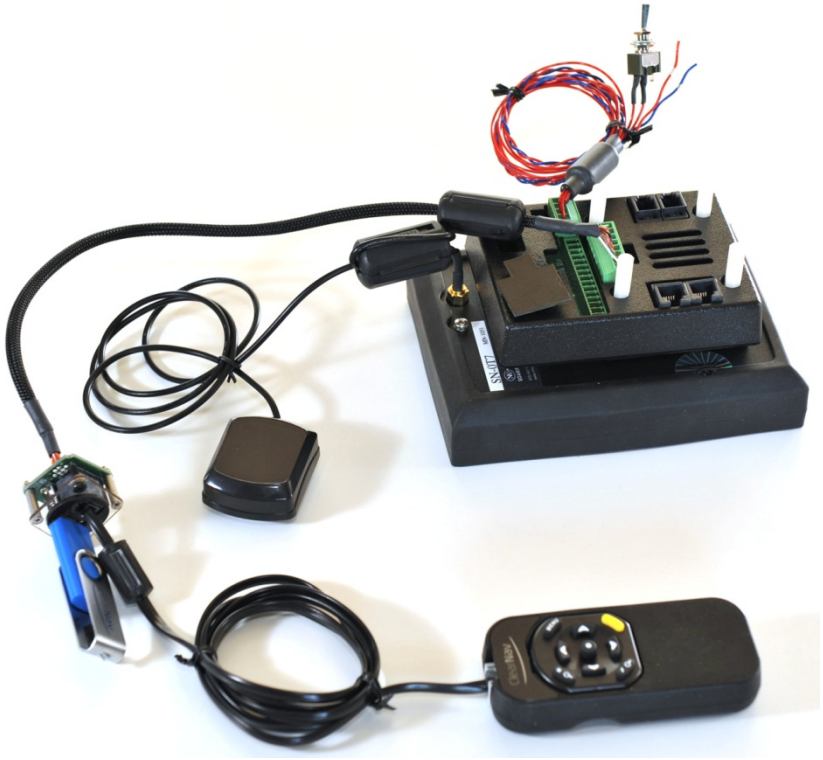
2 System Overview

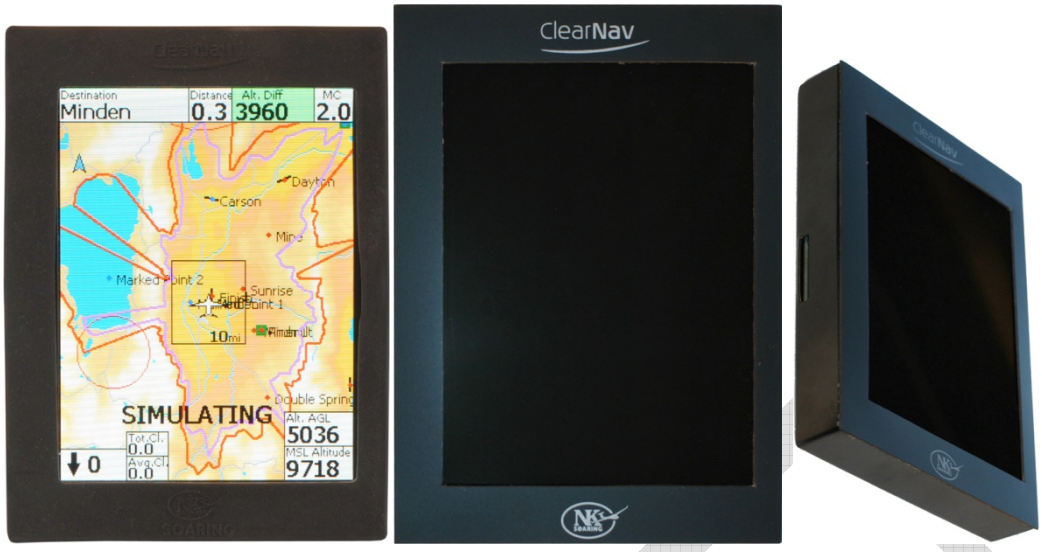
The complete ClearNav system consists of several components – including hardware, software and data files.

2.1 Hardware

The ClearNav system is delivered complete with everything you need to install it on the instrument panel.



2.1.1 ClearNav Display



The ClearNav "Display" is much more than a display. It includes:

- Large and bright LCD display
- Computer running the Windows CE.NET operating system. This operating system is similar to, but different from the Windows Mobile operating system used in Pocket PCs such as HP iPAQs. CE.NET can be thought of as the "industrial" version of the Windows Mobile operating system.
- ClearNavigator soaring flight software
- GPS engine (calculating position and altitude 4 times each second) and connector for external GPS antenna
- Pressure sensor for altitude measurements
- GPS Flight Recorder Recording at 1 second intervals – Approved by the FAI-IGC (Fédération Aéronautique International – International Gliding Commission) for gliders and motorgliders for all flights at all levels
  The IGC Approval Document is available from the FAI-IGC at the link below:
  http://www.fai.org/gliding/gnss
- Built-in SD memory card reader (in the side of the unit)
- 2 RS-232 serial ports for exchanging data with variometers, FLARM units, etc.
  The connections to the RS-232 ports are on the Nexus Junction Box
- 2 CAN bus ports for connection to remote controls and 2nd seat displays, etc.
  The connections to the CAN bus ports are on the Nexus Junction Box.
- USB Port for reading and writing to USB Flash Drive memory sticks
  There is a USB port on the back of the display and a remote USB port on the panel mounted CAN/USB Extension port – for easy access.
- Size: 4.25"w x 5.83"h x 1.22"d (108mm x 148mm x 31mm)
- Display Size: 3.39"w x 4.53"h (86mm x 115mm)

- Screen Resolution: 240 x 320 pixels
- Backlight: CCFL (Cold Cathode Fluorescent Lamp) backlight. Nominal luminance is 700 Candelas/m^2 (nits), achieved with a single lamp that goes around 3 sides of the LCD. NK provides lamp overdrive capability up to 1100 nits for severe ambient conditions such as flying into a hazy late afternoon sun. This increases battery drain, so the display is normally operated at its nominal luminance.
- Weight: ~1 lb (450 g)
- Memory: 2 GB of internal memory for turnpoint, terrain, map and airspace information
- Power Input: 9 to 16 VDC
- Power Consumption: 600 mA at full brightness, 300 mA at min. brightness, In power-save mode the backlight goes to full brightness when any key is pressed on the remote keypad. It backs down to min. brightness about 25 seconds after the last key press.

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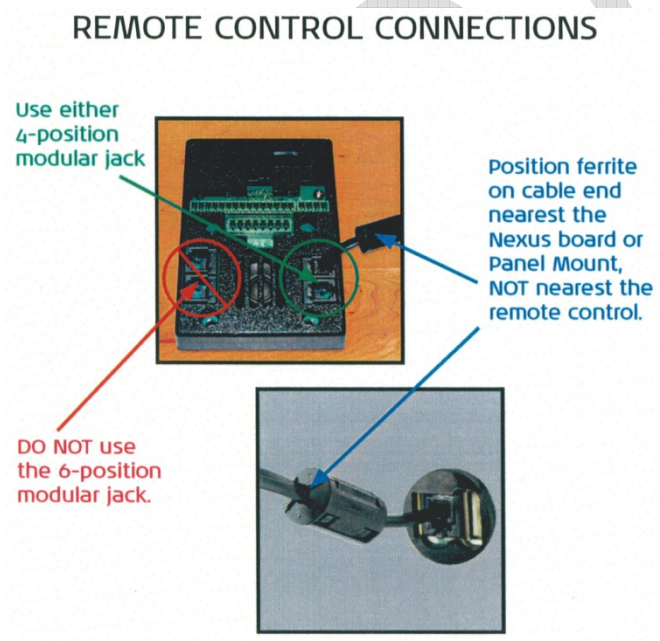
2.1.2 ClearNav Handheld Remote

The *Handheld Remote* is designed to be easy-to-use in flight – even when bumping along in ridge lift and wearing gloves. It offers 9 intuitive buttons that make it easy to quickly access any software feature.

The *Handheld Remote* connects to the *ClearNav Display* through the panel-mounted connector on the *CAN/USB Extension*. It can also be connected directly to either of the 2 small RJ-22 connectors on the *Nexus Junction Box* – but most customers will connect it to the connector on the panel mounted *CAN/USB Extension*.

Dimensions: 100 mm (3.9 inches) long x 44 mm (1.7 inches) wide x 24 mm (0.94 inches) deep



2.1.3 ClearNav Stick Mounted Remote

The Stick Mounted Remote is made from precision carved mahogany with a durable two-part epoxy finish. A 10-button remote control panel is mounted in top of the handle for comfortable, ergonomic control of ClearNav with flying hand. It includes all the same buttons in the same locations as on the standard handheld remote. It includes a PTT (push-to-talk) button and wiring. The hole for the stick is customized to the stick diameter. Please specify the stick diameter when ordering.

2.1.4 Remote Control, Stick Module Only

For the do-it-yourselfer who prefers to fashion their own stick mount, or to be combined with a stick handle manufactured by a third-party. Includes a 10-button remote control panel including PTT button and wiring.

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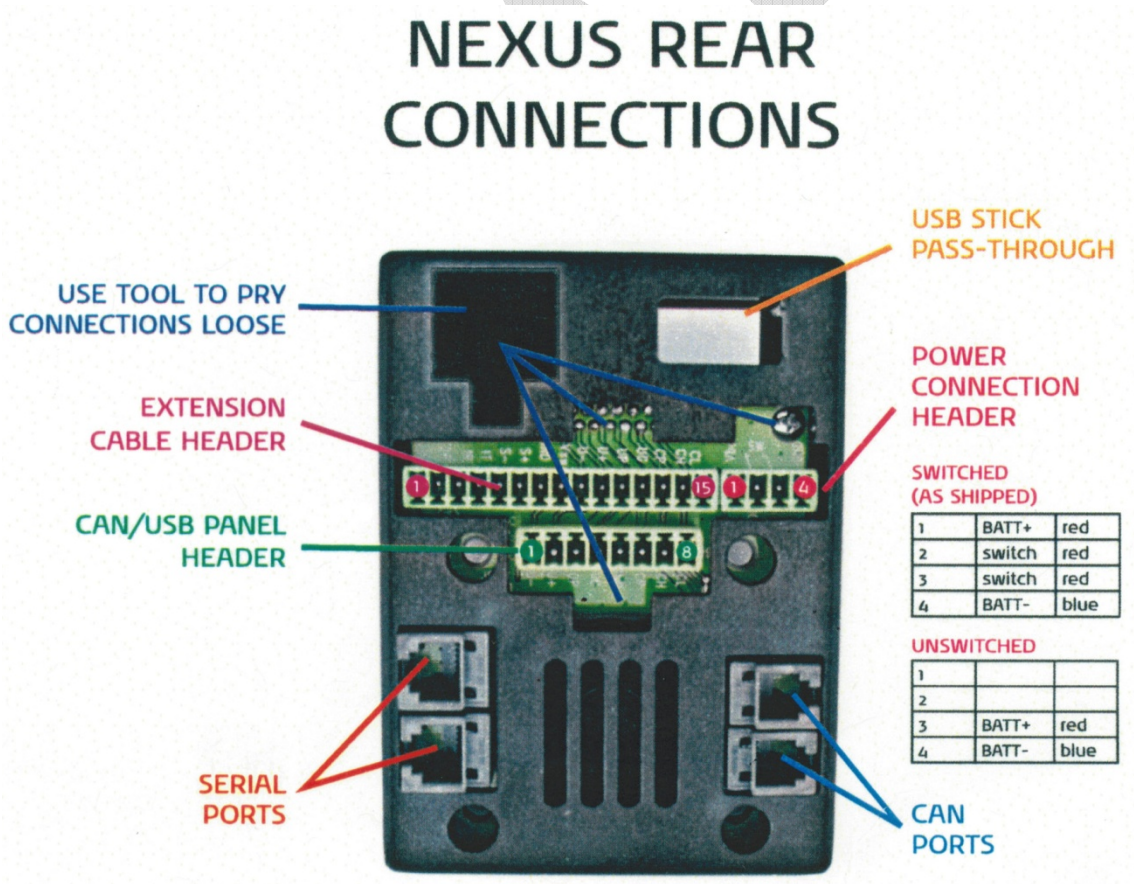
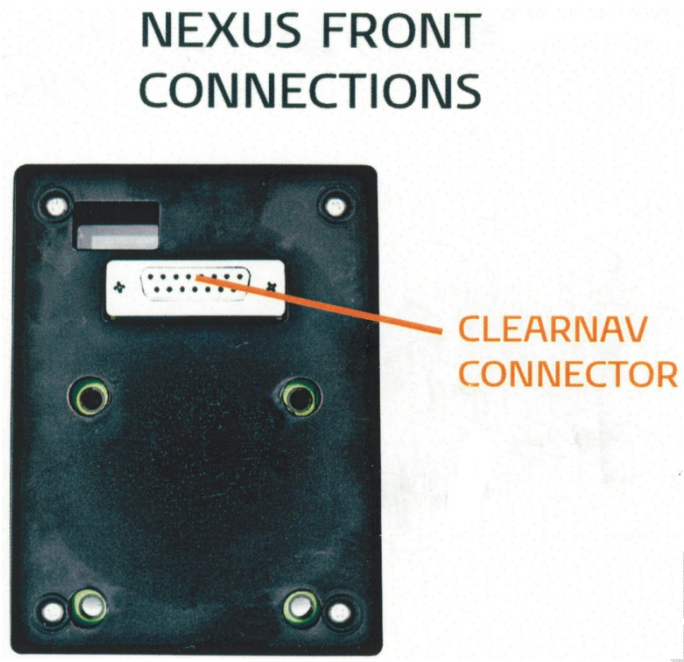
2.1.5 Nexus Junction Box

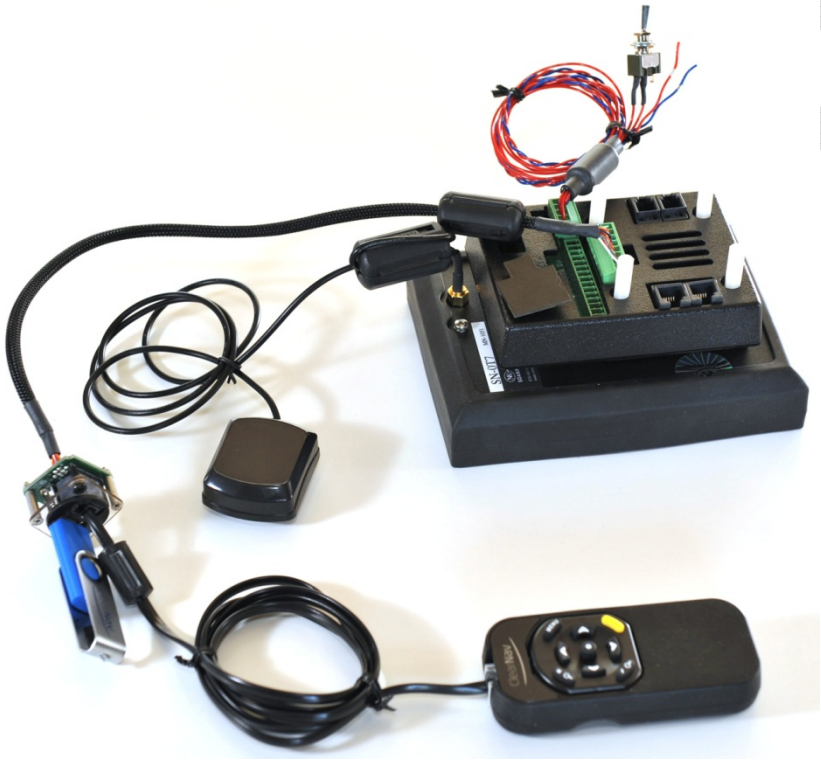
The *Nexus Junction Box* is used to connect a variety of accessories to the ClearNav system. It connects to the *ClearNav Display* through a 15-pin D-Sub connector that is located on the back of the *ClearNav Display*. When using a RAM mounting arm the *Nexus Junction Box* is mounted behind the instrument panel and connected to the *ClearNav Display* using a *DB15 Extension* cable. The *Nexus Junction Box* includes a built-in speaker and includes the 7 connectors shown in the photograph below.



The "business side" of the *Nexus Junction Box* includes a speaker, 12V power connections and a variety of data connectors.



The back side of the *Nexus Junction Box* includes the DB-15 connector that is used to connect to the ClearNav Display.



When mounting the *ClearNav* Display on the front of the instrument panel, or recessed into the panel, the *Nexus Junction Box* is mounted directly to the back of the *ClearNav Display* as shown above.

When the ClearNav is mounted on a RAM mounting arm the *Nexus Junction Box* is mounted behind the instrument panel and connected to the *ClearNav Display* using the *DB15 Extension* cable as shown above.

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2.1.6 Mounting Options

There are several very nice mounting options for the ClearNav.

2.1.6.1 On Panel Mount

The ClearNav ships with the items required to mount it on the front (pilot side) of the instrument panel. That makes for a clean and simple installation. A template is included for use when drilling the mounting holes in the panel. The *Nexus Junction Box* mounts on the back of the ClearNav on the back (glider nose) side of the panel.

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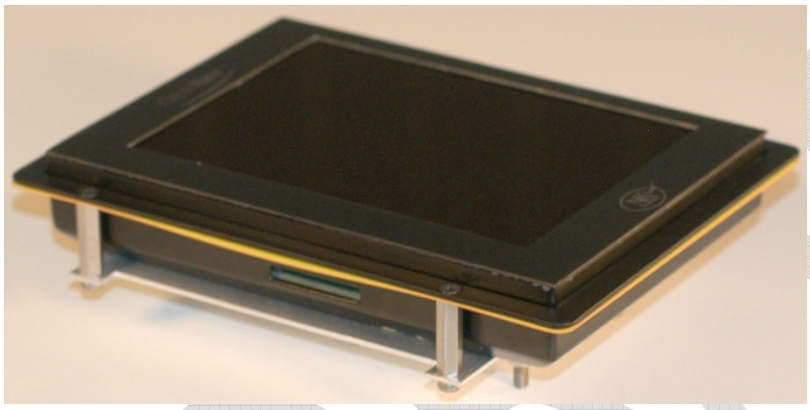
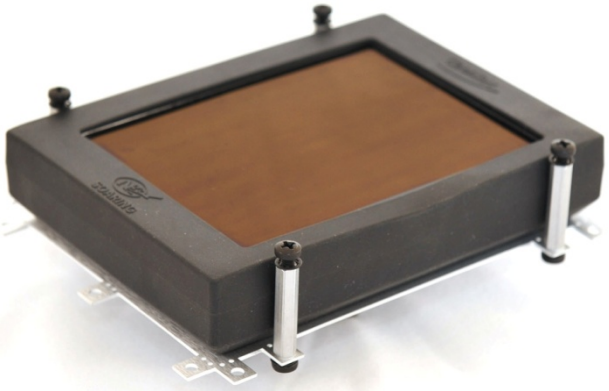
2.1.6.2 ClearNav Through-Panel Mounting Kit

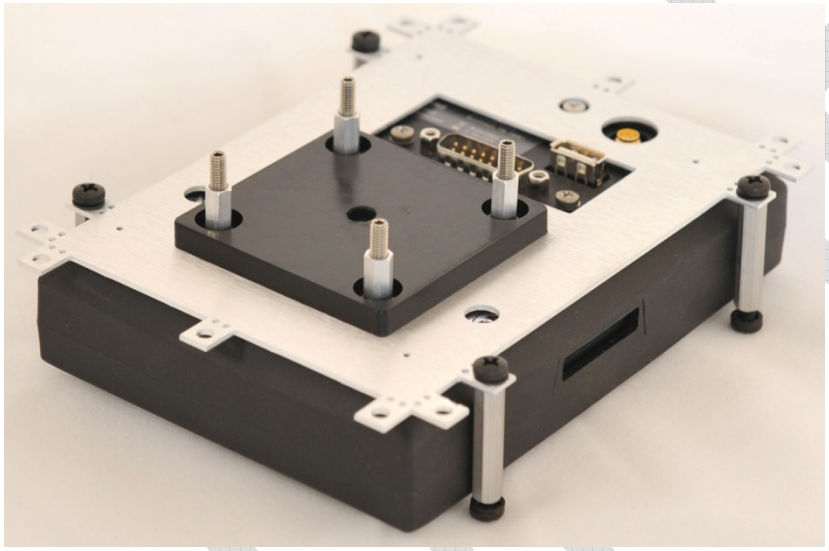


The optional *Through-Panel Mounting Kit* can be used to mount the ClearNav so it is recessed through the instrument panel. This option works fine, but it takes up a lot of panel real-estate, so it will likely fade away in favor of the *Behind Panel Mount* and *Tunnel Mount* mounting options. Only 9 mm (0.35 in) of the unit stands out on the pilot side of the panel.

In the photos above the yellow template is used as a stand-in for the instrument panel - to clarify which parts are on each side of the panel.

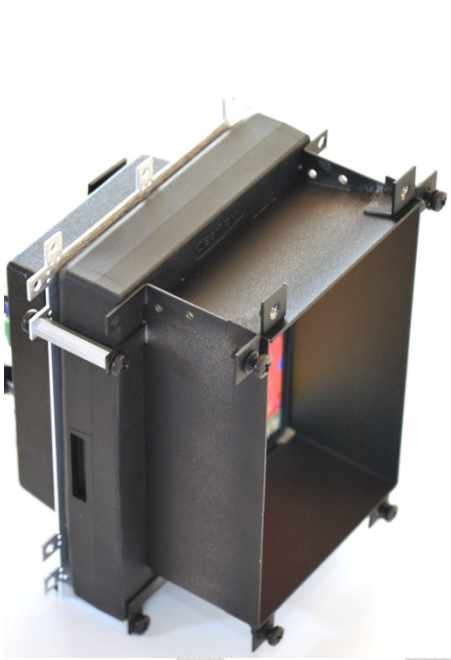
2.1.6.3 Behind Panel Mount Kit





This optional mounting kit is designed to allow you to mount the ClearNav to the back of the instrument panel - while making the smallest hole in the panel possible. The hole in the panel is the same size as the LCD screen. That is much smaller than the hole that would be needed for the entire body of the ClearNav. The body of the ClearNav is concealed behind the panel.

2.1.6.4 Tunnel Mount Kit



This is a popular mounting option for the ClearNav. A Powder-coated aluminum "tunnel" attaches to the rear of the panel to set the ClearNav unit 1.75" back from the panel surface. The cutout for this mount follows the perimeter of the ClearNav display window, and the recess allows installation of other instruments next to the panel cutout. The additional shading provided by the recess also allows the use of a lower brightness setting, reducing power consumption. The mounting kit includes all the required mounting hardware and even a template for marking the panel.

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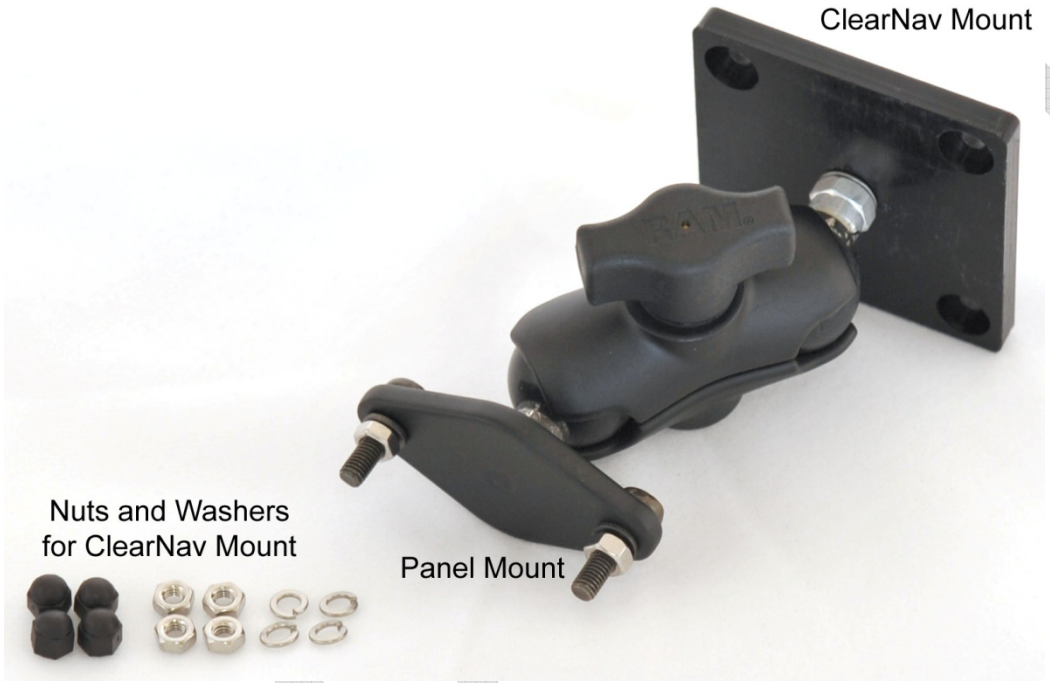
2.1.6.5 RAM Mount Kit

RAM Mount Kit used to mount a ClearNav to the instrument panel



Items included in the RAM Mount Kit

In some gliders it is preferable to mount the display on a mounting arm that is attached to the instrument panel. This is the case when there is not enough room in the panel to mount the unit on the panel. When mounted on a mounting arm, the unit takes-up less panel real estate. It is sometimes acceptable to partially block some instruments. Most customers will find that mounting the ClearNav behind the instrument panel makes for a cleaner and classier installation than the RAM arm option, but those that prefer the RAM arm option will find that it is a rugged and reliable option. The 2 foot *DB15 Extension* cable is required for a neat installation. The *Nexus Junction Box* is normally mounted behind the instrument panel with the *DB15 Extension* cable running from the *ClearNav Display* to the *Nexus Junction Box.*

The kit includes:

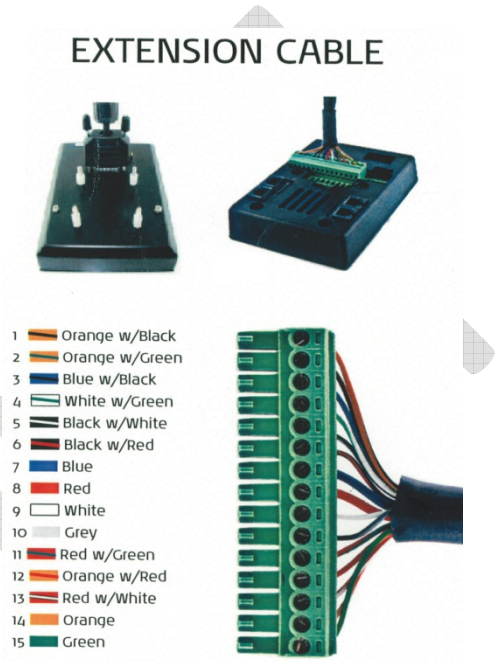
- Short RAM "B" size arm
- RAM-B-238 metal diamond base with 1” ball for use on instrument panel
- RAM “B” size ball mounted to a square mounting base for use on back of the ClearNav
- Mounting screws and nuts

The standard 1.75“ (44 mm) long arm plus the bases on both ends gives a total length of about 4 inches (102 mm) from base to base. If the standard short RAM arm is not long enough, contact your dealer about the optional 3 inch (76 mm) and 5.25 inch (133 mm) arms.

RAM Mount Kit Assembled on the back of the ClearNav Display. Also shown is the 0645 DB15 Extension cable and its’ connection to the Nexus Junction Box.

2.1.7 ClearNav DB15 Extension

The *ClearNav DB15 Extension* cable is designed to connect a *ClearNav display* on a RAM mount to the *Nexus Junction Box* that is installed behind the panel. The cable is a custom 14-conductor 2' cable with low-profile DB15 female connector. The cable is extremely flexible and has an abrasion resistant jacket. The cable is run through a rubber grommet which fits into a 7/16” (11 mm) hole in the panel. One end is connected to the DB-15 connector on the back of the *ClearNav display* and the other end connects to screw-terminals on the *Nexus Junction Box.* The conductors are pre-stripped and tinned. A rubber grommet is included on the cable for use in the panel hole. A wiring diagram is included.



2.1.8 GPS Antenna

The ClearNav has a built-in GPS engine but an external antenna is required. It is included in the standard ClearNav kit. It consists of an amplified external GPS antenna and Dual-Lock mounting strips. The connector attaches directly to the back of the ClearNav.

2.1.9 Panel Mounted CAN/USB Extension

The *Panel Mounted CAN/USB Extension* brings USB and RJ-22 connectors out to a convenient panel mounted connector. It fits into a 1" (25 mm) round hole in the panel. The USB connector is used as a receptacle for a USB Flash Drive for transferring flight logs from the ClearNav and uploading waypoint and airspace files and software updates to the ClearNav. The RJ-22 connector is used by the *Handheld Remote*. A template is included for making the required holes in the panel. This item is included in the standard ClearNav system kit.

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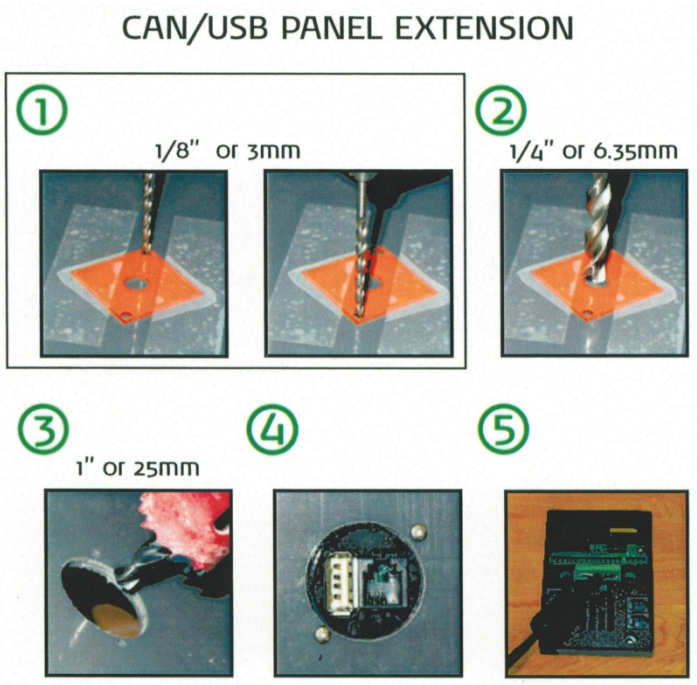

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2.1.10 ClearNav Portable Power Adapter

The Portable Power Adapter makes it easy to play with your ClearNav at home. Just bring the ClearNav main display unit home along with the Handheld Remote and the Portable Power Adapter can be used to connect and power them. It includes a 120VAC to 12VDC/1.25A wall charger. It also includes an RJ cable that plugs into the ClearNav handheld remote and a DB-15 connector that plugs into the back of the ClearNav.

ClearNav Portable Power Adapter

ClearNav Portable Power Adapter shown connected to a ClearNav and Handheld Remote

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2.1.11 External Devices

2.1.12 USB Flash Drive

A USB Flash Drive is used to:

- Transfer waypoint, airspace and other data files to the ClearNav
- Download flight logs from the ClearNav
- Upload firmware upgrades to the ClearNav

USB Flash Drives are wonderful because they are simple to use and make it easy to transfer large amounts of data. When you plug one into your home computer it looks like a hard drive that you can transfer files to and from using the Windows Explorer (My Computer) program that is included with Windows.

The ClearNav ships with a USB Flash Drive in the box with folders and files installed at the factory. If you prefer to buy an additional USB Flash Drive you can find one at any local computer store or Target, Best Buy, Radio Shack, etc. A 1 GB memory stick with was supplied with the first batch of ClearNav units and it seems to have plenty of memory. A 2 GB Flash Drive would hold all the maps, airspace, elevation data, etc. for the entire world. At the time of this writing $20 would get you a 4 GB Flash Drive on Amazon.com. It doesn't hurt to get one that is larger than 1 GB. We recommend getting one in the 2 to 4 GB range, but larger is fine.

2.1.12.1.1 Transferring Flight Logs from the ClearNav to the USB Flash Drive

At the end of the flying day you simply plug the USB Flash Drive into the ClearNav's panel mounted USB connector and use the ClearNav's *Personal Preferences / Flight Recorder* menu to select and transfer the desired flight logs from the ClearNav's memory to the USB Flash Drive.

2.1.12.1.2 Transferring Files from the USB Flash Drive to the ClearNav

When you want to transfer waypoint, airspace, map data, or software or firmware upgrade files to the ClearNav you simply power-down the ClearNav, plug the USB Flash Drive into the ClearNav's panel mounted USB connector, and power-up the ClearNav. When the ClearNav is powered-up with the USB

Flash Drive connected it will ask, “Are you sure you want to run the Updater program?”. If you do nothing it will **not** transfer the files. If you select “YES” it will transfer all the files on the USB Flash Drive to the ClearNav.

2.1.13 Cambridge Aero Instruments 302

The Cambridge 302 is a great companion to the ClearNav. The following data can be received from the 302:

- Vector Wind (speed and direction)
- Real Time Headwind
- True Airspeed from the 302

The Vector Wind (speed and direction) and Real Time Headwind can be displayed on the map screen. The Vector Wind is used for final glide (as the auto wind) if it is available. The wind information supplied by the 302 is a little more accurate and can be calculated when cruising as well as when circling by comparing the True Airspeed to the GPS measured speed and direction. Without the 302 the ClearNav calculates wind using wind drift while circling. To display the Real Time Headwind received from the 302 simply enable that option under *Personal Preferences / Map Display / Wind and Bearing / Head wind Component*. The 302 supplied *True Airspeed* data is used for the total energy final glide computation. When not connected to a 302, the airspeed is calculated using the measured wind and ground speed.

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2.1.14 FLARM

FLARM is a collision alert system that is popular in many countries outside the USA. It has a built-in GPS, pressure sensor and radio transmitter and receiver. It broadcasts its position and altitude so that other FLARM units in the area will be alerted to its presence. It gives alerts if a collision is predicted using data received from other FLARM devices in the area.

The ClearNav displays other FLARM equipped aircraft on the map and displays relative altitude and climb rate for each. The FLARM data is only visible when zoomed-in to certain zoom levels. It hides the data when zoomed-out since FLARM's range is only about 3 km. This feature is sometimes referred to as "FLARM Radar". It is extremely powerful information to have in the cockpit. You can use other gliders to determine which thermal up ahead is the best one! However, it is very, very important that pilots avoid staring at the display when they should be looking out the window. Not all aircraft carry FLARM.

2.2 Software

The ClearNav runs ClearNavigator software that is specifically designed to work with the ClearNav's unique remote control and other hardware. No other soaring software will work on the ClearNav system.

The ClearNavigator software is designed to be easy-to-use in flight and intuitive. Yet it is very powerful software with many innovative features – such as the glide amoebae and the way it handles turn area tasks.

2.3 Data Files

The ClearNav uses several types of data files for displaying map information, terrain elevation, airports and other waypoints, Special Use Airspace, etc. Fortunately, the ClearNav includes a large amount of memory so that it can hold map and terrain data for much of the world at once. It is important to make sure that the right data files are installed in the ClearNav so that you will have the best data available for your area.

The good news is that the ClearNav supports several types of waypoint and airspace data files – to make it easy to find data for your area. However, there are some recommended file types. Using the

recommended file types will allow the software to work at its best and display the largest amount of information.

Any experienced pilot will tell you that sometimes it is best to limit the amount of information on the moving map. Just because it is possible to display vast amounts of data on the map at once does not mean that displaying everything will be a good thing. Sometimes it is good to hide certain types to data to limit the amount of screen clutter. Fortunately, the ClearNav makes it easy to enable and disable certain types of data when desired.

2.3.1 Waypoint Files

Waypoint files consist of a list of navigation points to display on the map. There are several types of waypoints. They include airports, contest turnpoints, landing points (fields known to be good places to land when necessary), etc. The ClearNav supports waypoint files in the formats listed below. Links are provided to detailed data and example files for each file type. There is no set limit on the size of the waypoint files. We have tested with waypoint files as large as 5000 waypoints – that covered a radius of just over 1000 km from Stanton, MN. The large waypoint file worked fine – however, when the ClearNav opens a list of waypoints (such as when selecting a waypoint to fly to or setting up a task) there is a long pause (up to 1 minute or more) while the unit reads the long waypoint database. The other disadvantage to using large waypoint files is that it takes longer to find the desired waypoint in the long list. Most pilots will probably use waypoint files with 100 to 500 waypoints, but it is nice to know that the ClearNav works well with large waypoint files.

2.3.1.1 Transferring Waypoint Files to the ClearNav

When transferring waypoint files to the ClearNav, put the desired waypoint files into the “Map Data” / “Waypoints” directory on the USB Flash Drive. When the ClearNav is powered-up with the USB Flash Drive connected it will ask “Are you sure you want to run the Updater program?”. If you do nothing it will **not** transfer the files. If you select “YES” it will transfer all the files on the USB Flash Drive to the ClearNav.

2.3.1.2 Worldwide Soaring Turnpoint Exchange (.stx) files

The best type of waypoint file to use in the ClearNav is the *Worldwide Soaring Turnpoint Exchange* format – also referred to as the “NK ClearNav” format. **It is highly recommended that you use this type of waypoint file whenever possible.** If you use this format airports will display on the map with the runway shown with the correct orientation. We’ll call them .stx files. This waypoint file format is preferred over other compatible types because it can be extended easily to include types of data not supported in other waypoint file types. The great news is that .stx files are already available on the Worldwide Soaring Turnpoint Exchange for every soaring site listed there. Since the file is a simple tab separated text file, it is also easy to edit existing files manually, or create new files. The only downside to this file format is that it is not supported by SeeYou and StrePla. SeeYou and StrePla can be used to created waypoint files in the Cambridge (.dat) format and the SeeYou (.cup) format.

Description: http://soaringweb.org/TP/stx.html or http://soaringweb.org/TP/nk_clearnav.html
Example File: http://soaringweb.org/TP/Albert_lea/albert7c.stx

2.3.1.2.1 Supported Waypoint Attributes

- A = Airport, runway shown on map in correct orientation if data is available
- F = Finish Point, available for tasks, red dot on map
- H = Home, The ClearNav navigates to this point at start-up
- L = Landable, green square around waypoint
- X = Approved landing field (extra points) (US Contests Only)
- S = Starting Point, available for tasks, red dot on map
- T = Turning Point, available for tasks, red dot on map (blue dot if not "T", "S", or "F")
- P = Private Airport or Area
- R = Restricted Area
- D = Glider Airfield (green runway on map)
- B = Pub or Bar Nearby

2.3.1.2.2 Supported Airport Surface Types

- A = Asphalt, black runway on map
- C = Concrete runway on map (not sure of color on map)
- D = Dirt runway on map (not sure of color on map)
- G = Grass, green runway on map
- Unknown or gravel, grey runway on map

2.3.1.3 Cambridge (.dat) files

This format is OK, but it does not include as much information about each waypoint. For example, runway orientation data is included in the comment field of Cambridge (.dat) files on the Worldwide Soaring Turnpoint exchange, but it is not in a format that can be used to display the airport on the map in the proper orientation.

The good news is that it is easy to create waypoint files in this format using SeeYou or StrePla. Files are available on the Worldwide Soaring Turnpoint Exchange (http://soaringweb.org/TP/FAA) which include all public and private airports in the USA. You can open the appropriate file in SeeYou or StrePla and export waypoints for your region to a Cambridge waypoint file. Since SeeYou and StrePla don't currently support the Worldwide Soaring Turnpoint Exchange (.stx) format, the Cambridge format is recommended when using this method to generate waypoint files for areas not available in the .stx format on the Worldwide Soaring Turnpoint Exchange.

Description: http://soaringweb.org/TP/cai.html
Example File: http://soaringweb.org/TP/Albert_lea/albert7c.dat

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2.3.1.4 SeeYou (.cup) files

This format is OK, but it does not include as much information about each waypoint and it supports only one attribute (Turnpoint, Airport, Landable, etc.) for each waypoint. The 2 file formats above support multiple attributes for each waypoint.

Description: http://data.naviter.si/docs/cup_format.pdf
Example File: http://soaringweb.org/TP/Albert_lea/albert7c.cup

2.3.2 Airspace Files

The ClearNav supports special use airspace files in the OpenAir format. This format has become the world standard for airspace files. Files in this format usually have the ".txt" extension. The size of the airspace file is not limited – however, large airspace files (such as the entire USA) take a long time to open (up to 1 minute or more). Therefore we recommend using airspace files that cover only the region you plan to fly in.

The ClearNav can also use airspace files in the Tim Newport-Peace format. That is the format used by Glide Navigator II. Files in this format usually have the ".sua" extension. It is nice that files that worked in Glide Navigator II will also work in the ClearNav. However, the ClearNav team recommends using OpenAir files whenever possible.

2.3.2.1 Transferring Airspace Files to the ClearNav

When transferring airspace files to the ClearNav, put the desired airspace files into the "Map Data" / "SUAs" directory on the USB Flash Drive. When the ClearNav is powered-up with the USB Flash Drive connected it will ask "Are you sure you want to run the Updater program?". If you do nothing it will **not** transfer the files. If you select "YES" it will transfer all the files on the USB Flash Drive to the ClearNav.

2.3.2.2 OpenAir (.txt) files

Description: http://www.winpilot.com/UsersGuide/UserAirspace.asp
Example File: http://soaringweb.org/TP/Albert_lea/albert7d.txt

2.3.2.3 Tim Newport-Peace (.sua) files

Description: http://soaringweb.org/TP/sua.html
Example File: http://soaringweb.org/TP/Albert_lea/albert7d.sua

2.3.2.4 Just Soar – U.S. Airspace File Generation Resource

Just Soar is a fantastic airspace generation tool that makes it easy to generate airspace files for user selected regions of the United States. The service is available at http://www.justsoar.com. It is not a free service but the cost very reasonable at $20/year. The data is updated regularly. Files generated using the JustSoar.com service have been tested with the ClearNav and work great. This resource is

especially useful for generating files that cover large regions or soaring sites that are not included on the Worldwide Soaring Turnpoint Exchange.

2.3.2.5 Airspace Files from the Worldwide Soaring Turnpoint Exchange

Pilots flying from gliderports or soaring contest sites will probably find it easiest to use the existing airspace files available on the Worldwide Soaring Turnpoint Exchange. To access the airspace files you first select the desired soaring site and then download the airspace file type you prefer. Downloading airspace files from the Worldwide Soaring Turnpoint Exchange is described here.

2.3.2.6 Worldwide Soaring Turnpoint Exchange

The Worldwide Soaring Turnpoint Exchange is a fantastic site that was created by and is maintained by John Leibacher. It is so important to soaring pilots around the world that it is hosted on 3 different web servers – which are all identical copies of each other. If one site doesn't work for you, try one of the others. They can be accessed here:

- http://soaringweb.org/
- http://soaring.xinqu.net/JL/
- http://soaring.gahsys.com/

2.3.2.7 Downloading .stx Waypoint Files from the Worldwide Soaring Turnpoint Exchange

To download .stx waypoint files for your soaring site, or an upcoming soaring contest site, follow the directions below.

1. Go to the Worldwide Soaring Turnpoint Exchange using one of the 3 links above. http://soaringweb.org is the main site. Note that there is no "www" in the link.
2. Click on the "Turnpoint Exchange" link found under the "Worldwide" heading.
3. Click on the desired continent link near the top of the page – such as North America.
4. Scroll down to the desired country and state or region and click on the link to the desired soaring site.
   For sites in the USA you can dig down to the particular site in several steps. First click on the small down arrow ▼ near the top of the screen to go "down to US table of contents". Then click on the desired state. Then click on the desired soaring site link – such as Albert Lea, MN.
5. Scroll down near the bottom of the page and left-click on the link on the left side of the screen for "Files formatted for downloading and importing into your programs".
6. You should now be on a page that contains files formatted for a wide variety of soaring instruments. The page is sorted alphabetically. The .stx waypoint file is listed in the "N" section as an "NK ClearNav" file. The process for downloading the file varies a bit depending on the web browser you are using. The directions given here apply to Internet Explorer. To download the file right-click on the left-most icon for the desired link. A pop-up menu should appear. Left-click on the "Save Target As…" option. A window will appear and allow you to

select the desired folder to save the file into. We recommend saving it into the "My Documents / Waypoints" directory. That way you and other soaring pilots will know where to find it.

2.3.2.8 Downloading Airspace Files from the Worldwide Soaring Turnpoint Exchange

To download Tim Newport-peace (.sua) or OpenAir (.txt) airspace files (either file format works fine with the ClearNav) for your soaring site, or an upcoming soaring contest site, follow the directions below.

1. Go to the Worldwide Soaring Turnpoint Exchange using one of the 3 links above. http://soaringweb.org is the main site. Note that there is no "www" in the link.
2. Click on the "Turnpoint Exchange" link found under the "Worldwide" heading.
3. Click on the desired continent link near the top of the page – such as North America.
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   For sites in the USA you can dig down to the particular site in several steps. First click on the small down arrow near the top of the screen to go "down to US table of contents". Then click on the desired state. Then click on the desired soaring site link – such as Albert Lea, MN.
5. Scroll down near the bottom of the page and left-click on the link on the left side of the screen for "Files formatted for downloading and importing into your programs".
6. You should now be on a page that contains files formatted for a wide variety of soaring instruments. The page is sorted alphabetically. The airspace files are found in the "S" section under "Special Use Airspace". The process for downloading the file varies a bit depending on the web browser you are using. The directions given here apply to Internet Explorer. To download the file right-click on the left-most icon for the desired link. A pop-up menu should appear. Left-click on the "Save Target As…" option. A window will appear and allow you to select the desired folder to save the file into. We recommend saving it into the "My Documents / Waypoints" directory. That way you and other soaring pilots will know where to find it.

2.3.3 Elevation Data

Elevation data is used to display terrain elevation maps on the map screen and is also used to display the AGL (above ground level) altitude. The data is available in large regions such as USA, Europe, or the entire world. ClearNav units will ship with elevation data for the entire world pre-loaded. If elevation data for your region was not loaded onto your ClearNav for some reason, you can download the elevation data free of charge from the NK web site at http://www.nkhome.com/support/pdfs.html#Soaring. It can be transferred to the ClearNav using the USB Flash Drive. The elevation data should be stored in the "Globe" directory on the USB Flash Drive.

2.3.4 Shape Data (Cities, Rivers, Lakes and Roads, etc.)

Shape data is used to display cities and roads ("culture"), and rivers and lakes ("water") on the map. The data is available in large regions such as USA, Europe, or the entire world. ClearNav units will ship with shape data for the entire world pre-loaded. If shape data for your region was not loaded onto your ClearNav for some reason, you can download the shape data free of charge from the NK web site at http://www.nkhome.com/support/pdfs.html#Soaring. It can be transferred to the ClearNav using the USB Flash Drive. The shape data should be stored in the "Shape" directory on the USB Flash Drive.

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2.4 Putting it All Together

2.4.1 How it Works

The *ClearNav* is a powerful flight computer with a fantastic large and bright display. The CPU (central processing unit) receives input from the sources listed below and uses the data to calculate and display navigation and final glide information on a moving map on the LCD display screen. Data Input Sources

- GPS antenna GPS engine
- Pressure sensor (altimeter data)
- Airspeed, Wind and vario data from an external variometer (optional)
- Operator commands from the Remote Control
- FLARM traffic information (optional)
- NK Supplied Maps of the world
- Customer supplied waypoint and airspace files

Please refer to the Functional Diagram below.

Flight Recorder

While the CPU and LCD screen are busy supplying useful information for the pilot, the built-in flight recorder is also busy logging the GPS data and pressure altitude data every second. The flight recorder gets its data from the GPS antenna and GPS engine, and the built-in pressure sensor. Pilot, glider and task information is provided to the flight recorder before takeoff by the ClearNavigator software for use in the official task declaration, but otherwise the flight recorder runs completely independently from the ClearNavigator software.

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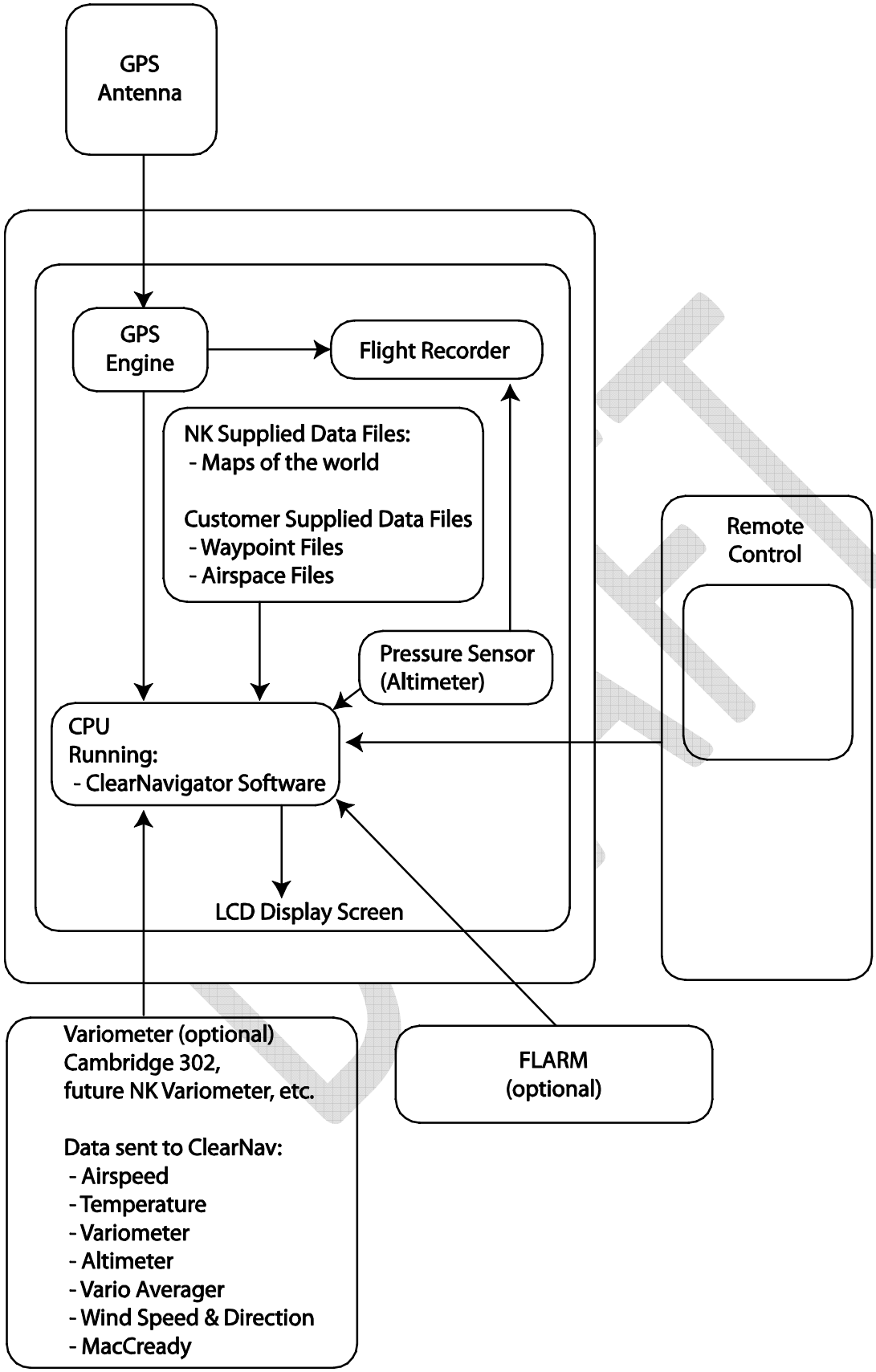

Functional Diagram

2.4.1.1 Advantages of Connecting the ClearNav to an External Variometer

A common question is: "What are the advantages of connecting an external variometer to the ClearNav?"

What the *ClearNav* Can Do – Without Input from an External Variometer

The *ClearNav* will work very nicely without connecting it to an external variometer. The *ClearNav* can calculate the wind speed and direction by measuring wind drift while circling. Experience shows this wind information to be quite accurate. The *ClearNav* does have a built-in pressure transducer so it knows altitude precisely. (Don't forget to set the altimeter before takeoff.) The *ClearNav* can calculate and display accurate final glide information and use the GPS information to help you navigate around a task.

What the *ClearNav* Can't Do – Without Input from an External Variometer

Since the *ClearNav* does not have pitot and static ports or a temperature probe, it cannot calculate airspeed. Airspeed information from an external variometer is handy because it makes it possible to compare the airspeed with the GPS groundspeed to get accurate wind information – even while cruising. It is not necessary to do a complete circle to calculate the wind speed and direction using GPS and airspeed data. All that is needed is airspeed and GPS data taken while flying on 2 different headings. The ability to accurately measure the wind without circling is especially important when flying in ridge and wave lift. Also, the *ClearNav* does not use its built-in altimeter for rate of climb (variometer) functions, so an external speed-to-fly variometer is highly recommended. Also, the *ClearNav* does not have a TE (Total Energy) input – which is another function that makes a nice speed-to-fly variometer an excellent accessory to the *ClearNav*.

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3 Installation

Installing the ClearNav is straight-forward – but experience shows that most aircraft instrument installations take at least twice as long to complete as you would anticipate – so plan accordingly. There are several main steps to the installation as documented below.

3.1 Power Considerations

3.1.1 Fuse Considerations

3.1.1.1 Fuse for the *ClearNav*

A 2 Amp fuse is recommended for the *ClearNav*. Either a "slow blow" or "fast-acting" fuse may be used. The purpose of the fuse is to protect the *ClearNav* in the case of an internal short and to protect the wiring between the battery and the *ClearNav*.

3.1.1.2 Fuse at the Battery

It is always very important to mount a fuse as close as possible to the battery terminals. The battery fuse is designed to prevent any short circuit from causing a fire in the wiring between the battery and the instruments. The fuse can be connected to either the battery plus or common terminal. It really doesn't matter which terminal it is connected to – just that it prevents current flow.

3.1.2 Power Switch

A "ClearNav ON/OFF" power switch mounted in an easily accessible location (such as on the instrument panel) may be desirable. It is not necessary, but would make it easy to power-down the *ClearNav* in the event that the glider battery is getting low and the pilot wants to reserve battery capacity for other instruments. It should never be necessary to re-boot the *ClearNav* in flight, but some pilots may want the ability to do so if necessary. Of course, if the *ClearNav* is powered-down, the internal flight recorder will not function.

The great news is that momentary power interruptions will not cause any problems with the flight log or flight parameters. The *ClearNav* is designed to resume the flight and continue the flight log as soon as the unit powers back up. Only a single flight log will be generated – even if power is interrupted momentarily during the flight.

3.1.3 How to Power Down

We recommend waiting at least 2 minutes after the flight ends before powering down the *ClearNav.* That will allow the flight log to show a solid ground reference line in the altitude log. It is not necessary to do a software shutdown (as done with PCs) prior to powering down the *ClearNav*. At the end of the day you can switch the unit off using a panel mounted *ClearNav* ON/OFF switch or main power switch, or by removing the glider battery.

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3.2 Mounting the ClearNav Display and Nexus Junction Box

3.2.1 On Panel Mount

The ClearNav ships with the items required to mount it on the front (pilot side) of the instrument panel. That makes for a clean and simple installation. A template is included for use when drilling the mounting holes in the panel. The *Nexus Junction Box* mounts on the back of the ClearNav on the back (glider nose) side of the panel.

Note: The 4 mounting studs are positioned to match the 4 screw holes that surround a standard 57 mm (2 ¼") instrument hole.

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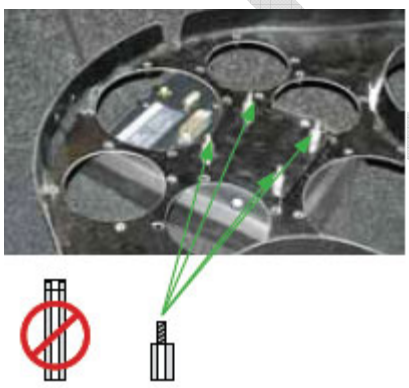
To Mount the ClearNav on the front of the instrument panel:

1. Position Nexus box template on to panel and tape securely.

2. With a pencil, trace Nexus box template on to panel and cut holes.

3. Insert four studs on back of unit through panel.

4. Sandwich panel between ClearNav and mounting plate with the counterbore for studs facing away from the panel. Hand tighten the four stud extension standoffs onto the four studs.



5. Slide Nexus box onto four studs while connecting 15-pin connector.

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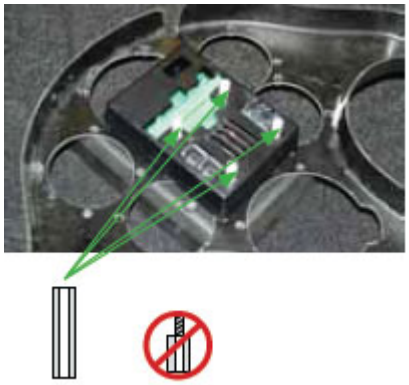
6. Hand tighten the four long standoffs onto the four stud extensions



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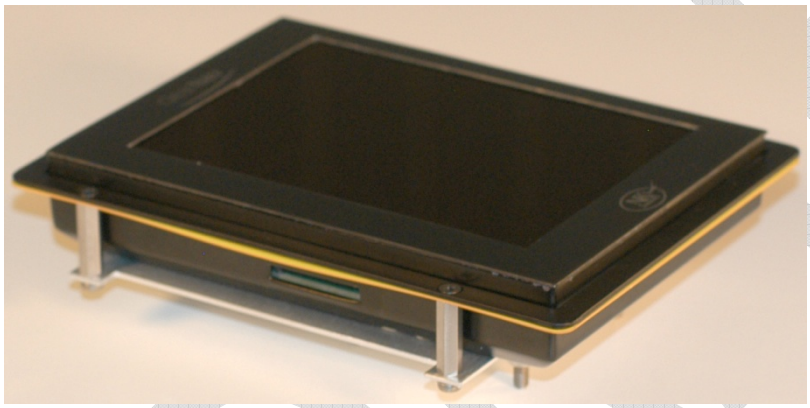
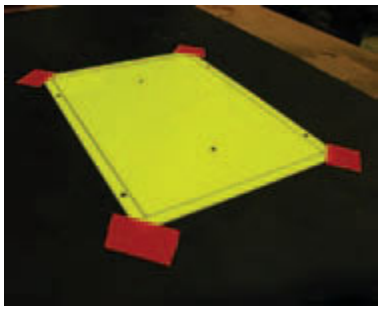
3.2.2 Through Panel Mount



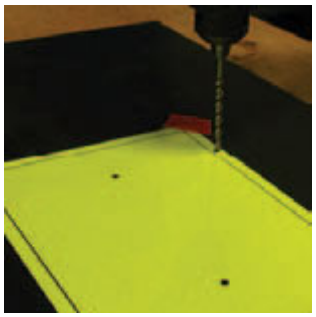
The optional *Through-Panel Mounting Kit* can be used to mount the ClearNav so it is recessed into the instrument panel. This option works fine, but it takes up a lot of panel real-estate, so it will likely fade away in favor of the Behind Panel and Tunnel mounting options. Only 9 mm (0.35 in) of the unit stands out on the pilot side of the panel.

Installation Instructions for Through Panel Mount

1. PREPARE: Position template and hold in place with tape.

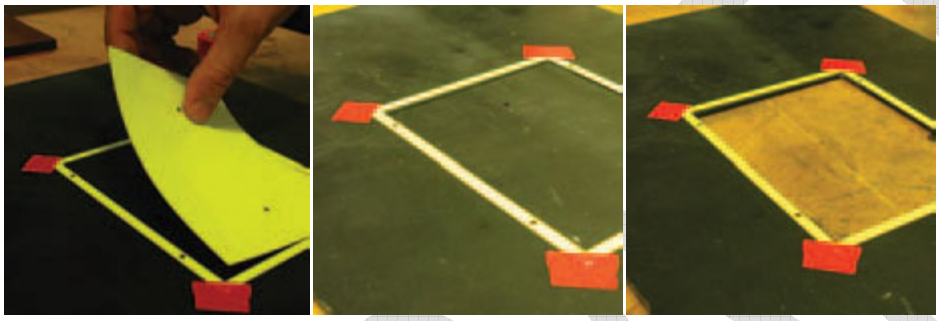


2. DRILL: Position template and hold in place with tape.

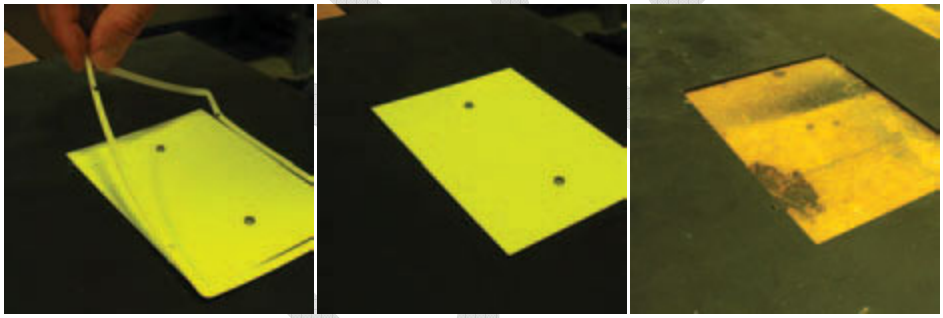


3. CUT: Using Outer Template OR Using Inner Template

Using Outer Template

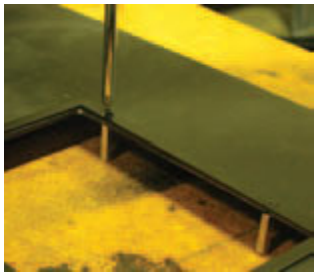


Using Inner Template



4. INSTALL:

Place escutcheon on panel with beveled holes facing out. Attach with 4 flat head screws and standoffs.



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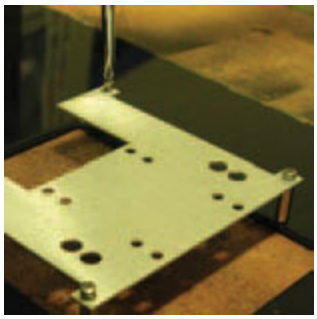
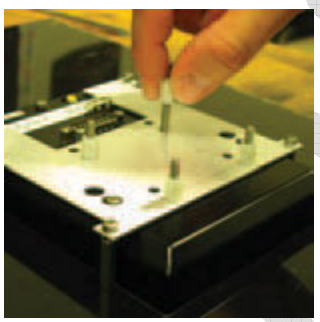
Place escutcheon on panel with beveled holes facing out. Attach with 4 flat head screws and standoffs.



Insert ClearNav through panel.

Use nylon standoffs to tighten ClearNav to mounting plate.



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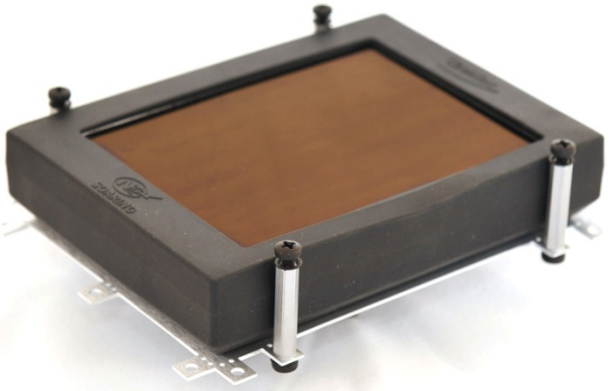
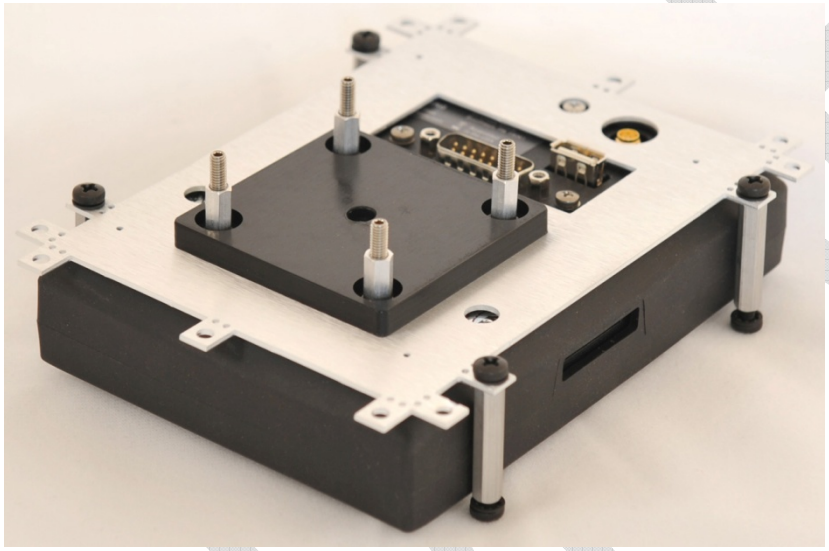
3.2.3 Behind Panel Mount Kit





This optional mounting kit is designed to allow you to mount the ClearNav to the back of the instrument panel - while making the smallest hole in the panel possible. The hole in the panel is the same size as the LCD screen. That is much smaller than the hole that would be needed for the entire body of the ClearNav. The body of the ClearNav is concealed behind the panel.

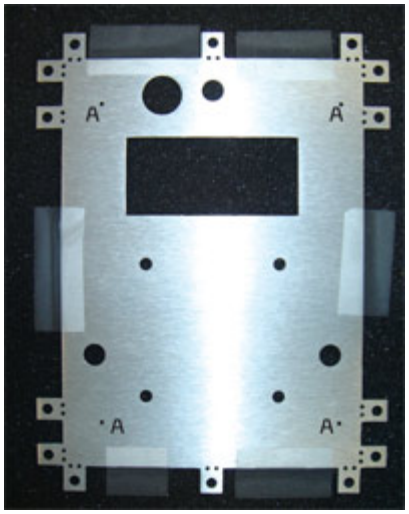
Installation Instructions for Behind Panel Mount

Parts

(1) Rear Mount Plate
(4) Standoffs
(8) M4 Screws
(8) M4 Washers

1. Prepare Panel

a. Use the rear mount plate as template. Tape template securely as shown (1a). (There are 14 breakaway tabs around the edge of this plate. Only 2 on the top half and two on the bottom half that suit the layout of your panel are necessary for secure attachment of assembly.) Unused tabs can be removed.



b. Mark the window cut-out corners using the 4 holes labeled A. Mark the top 2 and bottom 2 panel mount locations holes you plan to use.

c. Remove template and connect the 4 dots (A) (window cutout).

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d. Cut window out and drill panel mount holes (5/32”).

1. Prepare Rear Mount Plate

a. Attach 4 standoffs using 4 screws and 4 washers as sown.

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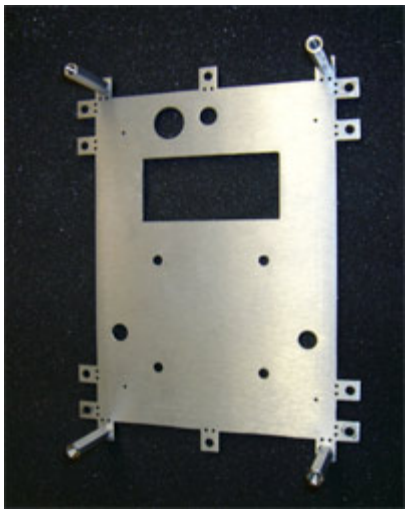

b. Place ClearNav in mount as shown.

c. View from behind.

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d. Attach back plastic plate and standoffs. These items were supplied with the ClearNav.

3. Mounting Assembly

a. Mount assembly to Panel using 4 screws and 4 washers.

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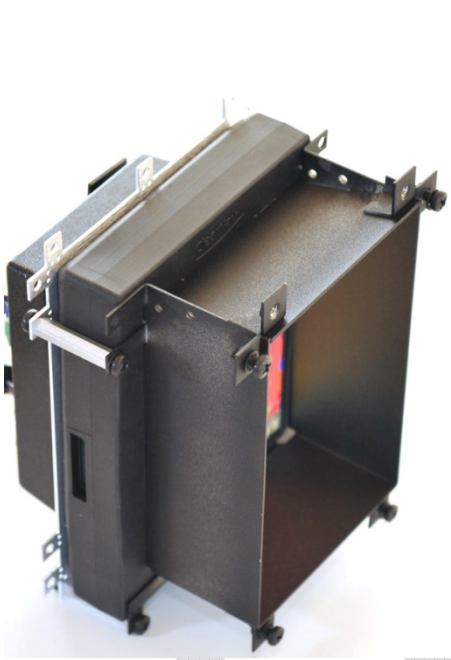
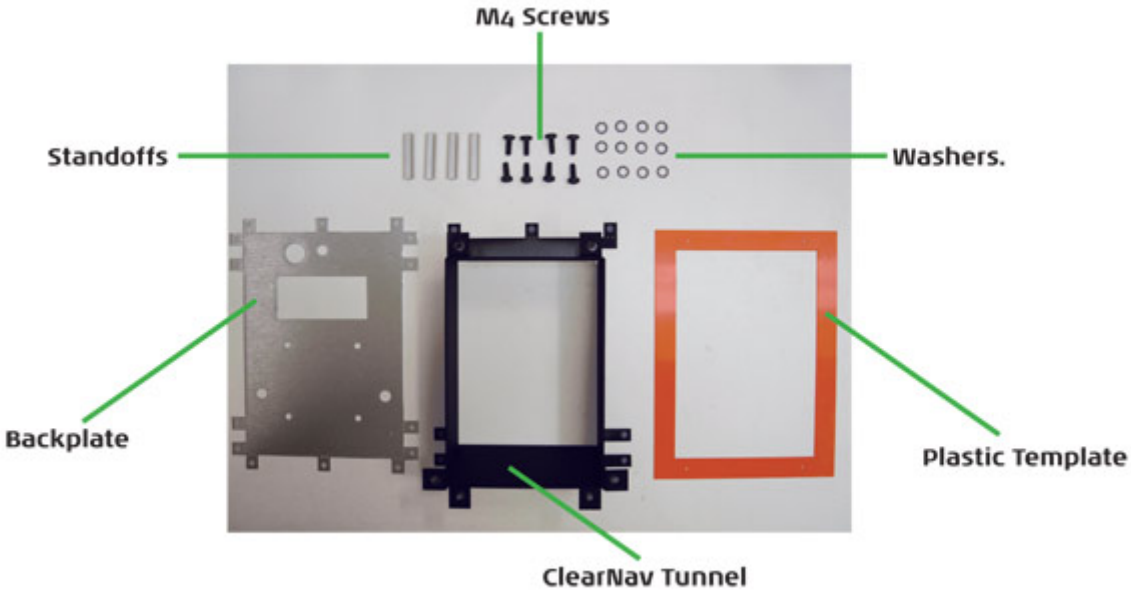
3.2.4 Tunnel Mount



This is a popular mounting option for the ClearNav. A Powder-coated aluminum "tunnel" attaches to the rear of the panel to set the ClearNav unit 1.75" back from the panel surface. The cutout for this mount follows the perimeter of the ClearNav display window, and the recess allows installation of other instruments next to the panel cutout. The additional shading provided by the recess also allows the use of a lower brightness setting, reducing power consumption. The mounting kit includes all the required mounting hardware and even a template for marking the panel.

Installation Instructions for Tunnel Mount

Parts



Panel Preparation

1. Tape plastic template to panel. (note: there are 4 holes on the top and 2 on the bottom)

2. Using the template as a guide, mark the mounting holes and scribe the Tunnel display opening.

3. Cut the Tunnel opening (minimum dimensions - 3.62” x 5.28”) and drill mounting holes (5/32”). Only the top 2 holes are used in this example. The side 2 are unused.

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Assembly Preparation

4. Attach 4 standoffs using 4 screws and washers as shown. Note: Any 2 of the top 4 tabs can be used. Any 2 of the bottom 3 tabs can be used. Bevel is on the top.

5. Place the ClearNav in the mount assembly as shown. Then secure with rear mounting plate using 4 screws and 4 washers.

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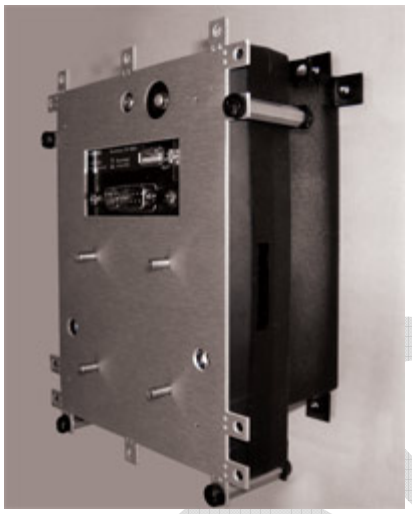

6. Mount assembly to panel.

7. Attach backing plate, nexus box and antenna.

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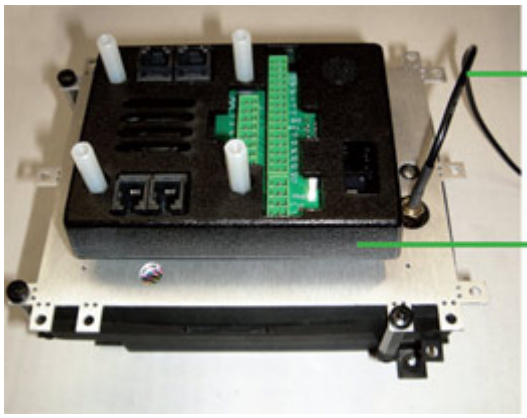

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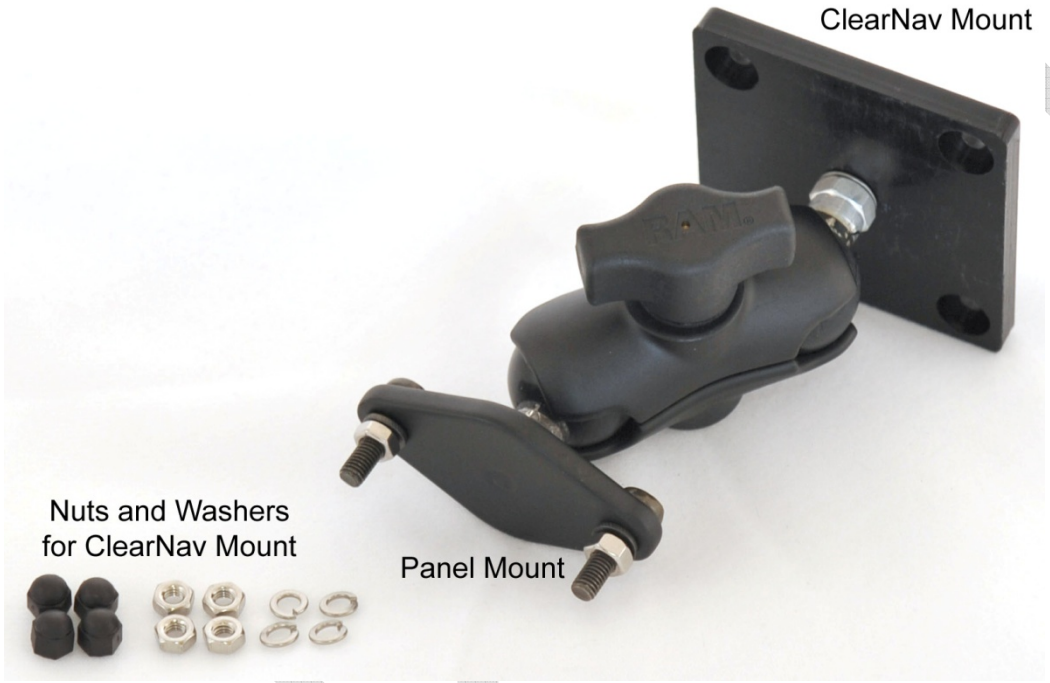
3.2.5 On a RAM Mounting Arm

RAM Mount Kit used to mount a ClearNav to the instrument panel



Items included in the RAM Mount Kit

In some gliders it is preferable to mount the display on a mounting arm that is attached to the instrument panel. This is the case when there is not enough room in the panel to mount the unit on the panel. When mounted on a mounting arm, the unit takes-up less panel real estate. It is sometimes acceptable to partially block some instruments. Most customers will find that mounting the ClearNav directly on the instrument panel makes for a cleaner and classier installation than the RAM arm option, but those that prefer the RAM arm option will find that it is a rugged and reliable option. The 2 foot *DB15 Extension* cable is required for a neat installation. The *Nexus Junction Box* is normally mounted behind the instrument panel with the *DB15 Extension* cable running from the *ClearNav Display* to the *Nexus Junction Box.*

The kit includes:

- Short RAM "B" size arm
- RAM-B-238 metal diamond base with 1” ball for use on instrument panel
- RAM “B” size ball mounted to a square mounting base for use on back of the ClearNav
- Mounting screws and nuts

The standard 1.75“ (44 mm) long arm plus the bases on both ends gives a total length of about 4 inches (102 mm) from base to base. If the standard short RAM arm is not long enough, contact your dealer about the optional 3 inch (76 mm) and 5.25 inch (133 mm) arms.

RAM Mount Kit Assembled on the back of the ClearNav Display. Also shown is the 0645 DB15 Extension cable and its’ connection to the Nexus Junction Box.

RAM Mount Installation Instructions

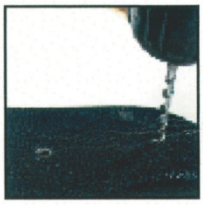
RAM Mount Installation

1

Use ball mount as drilling template. Mark hole locations with a pen.

2

Drill holes using 13/64" or 5mm drill bit.



3

Use pan head screws, split washers, and nuts to secure ball mount to panel.

4

Attach mounting plate with ball mount to ClearNav using split lock washers, nuts, and acorn nuts.

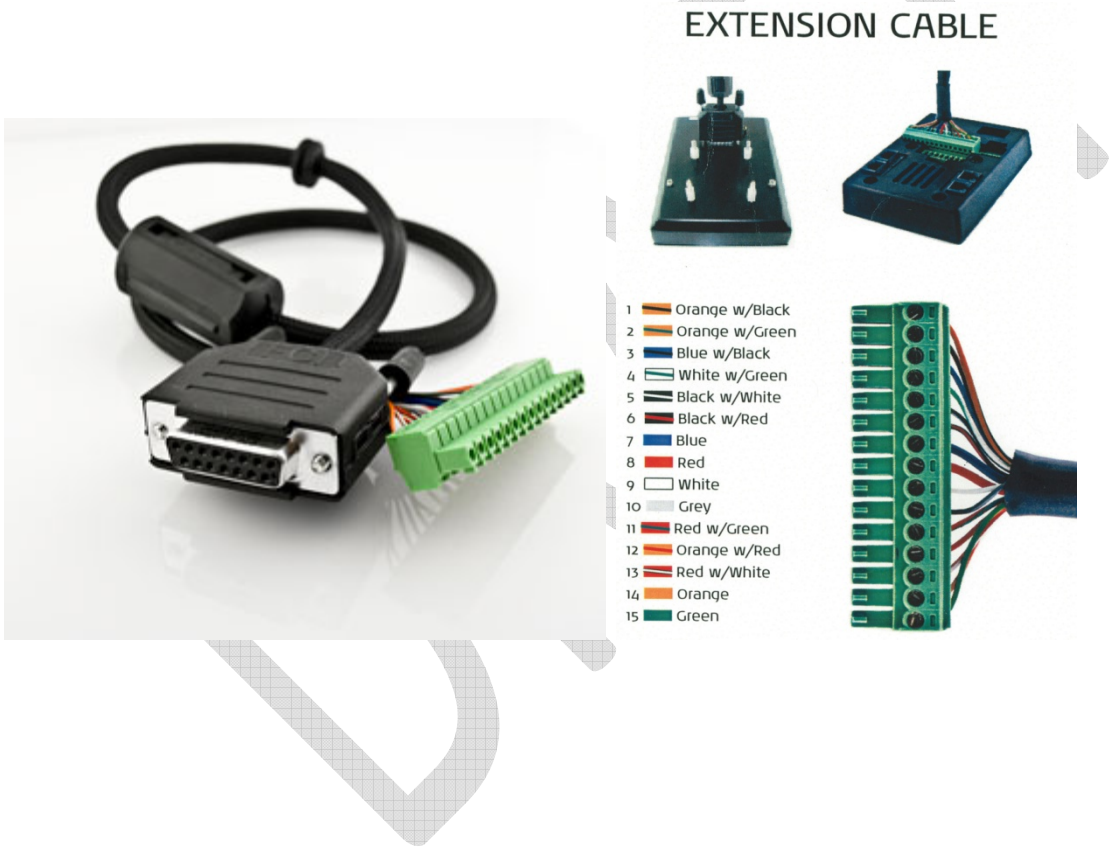
5

Tighten RAM arm to both ball mounts.

3.3 DB15 Extension Cable

The *ClearNav DB15 Extension* cable is designed to connect a *ClearNav display* on a RAM mount to the *Nexus Junction Box* that is installed behind the panel. The cable is a custom 14-conductor 2' cable with low-profile DB15 female connector. The cable is extremely flexible and has an abrasion resistant jacket. The cable is run through a rubber grommet which fits into a 7/16” (11 mm) hole in the panel. One end is connected to the DB-15 connector on the back of the *ClearNav display* and the other end connects to screw-terminals on the *Nexus Junction Box.* The conductors are pre-stripped and tinned. A rubber grommet is included on the cable for use in the panel hole. A wiring diagram is included.

Note: One of the wires in the wiring harness is not used. The DB15 connector has 15 pins but the screw terminal on the *Nexus Junction Box* has only 14 connections. Cut off the tip of the unused wire and use electrical tape to isolate the conductor.



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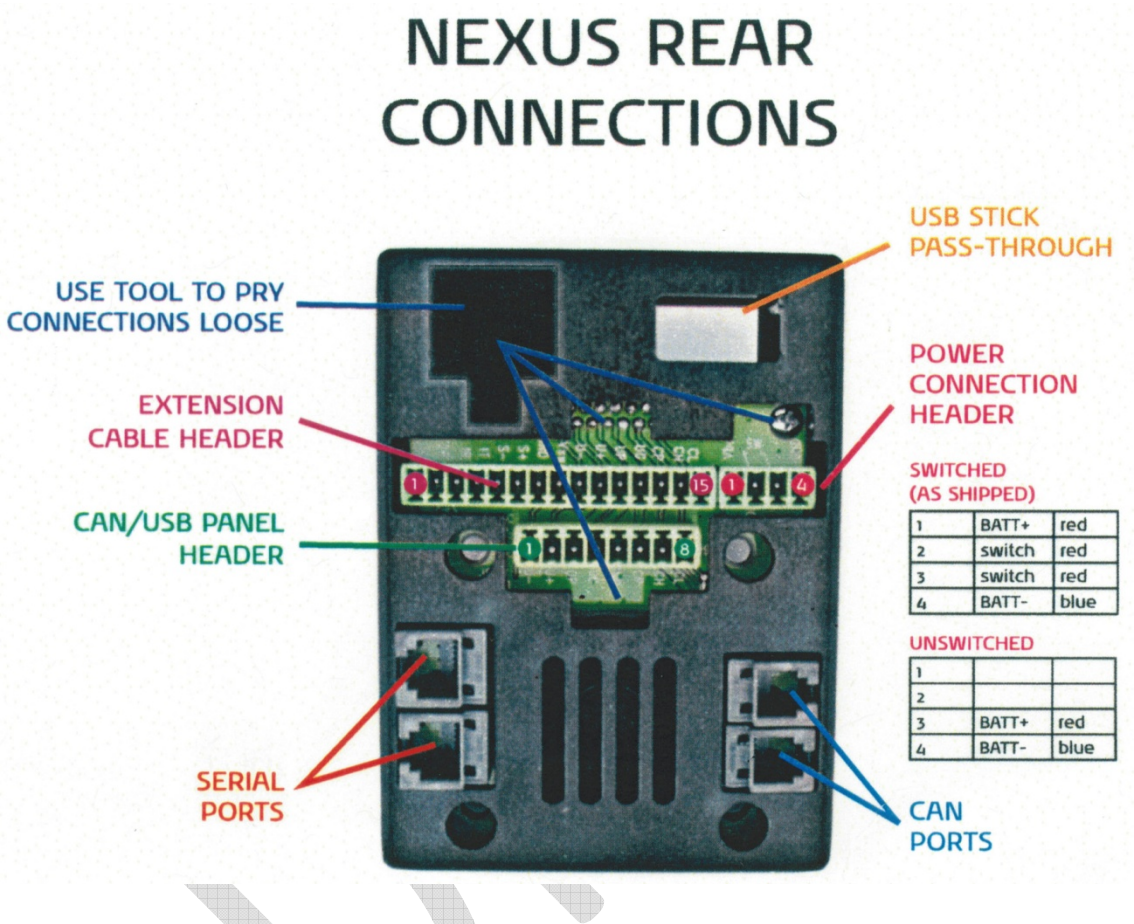
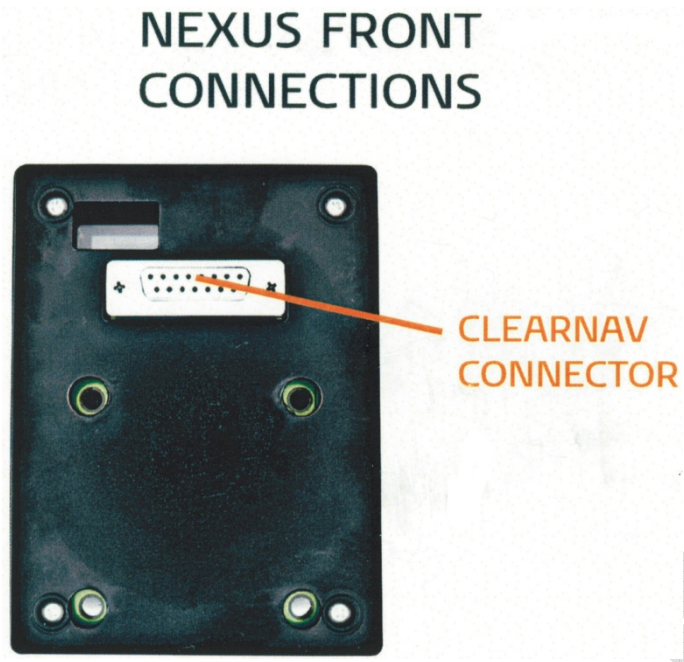
3.4 Nexus Junction Box Installation

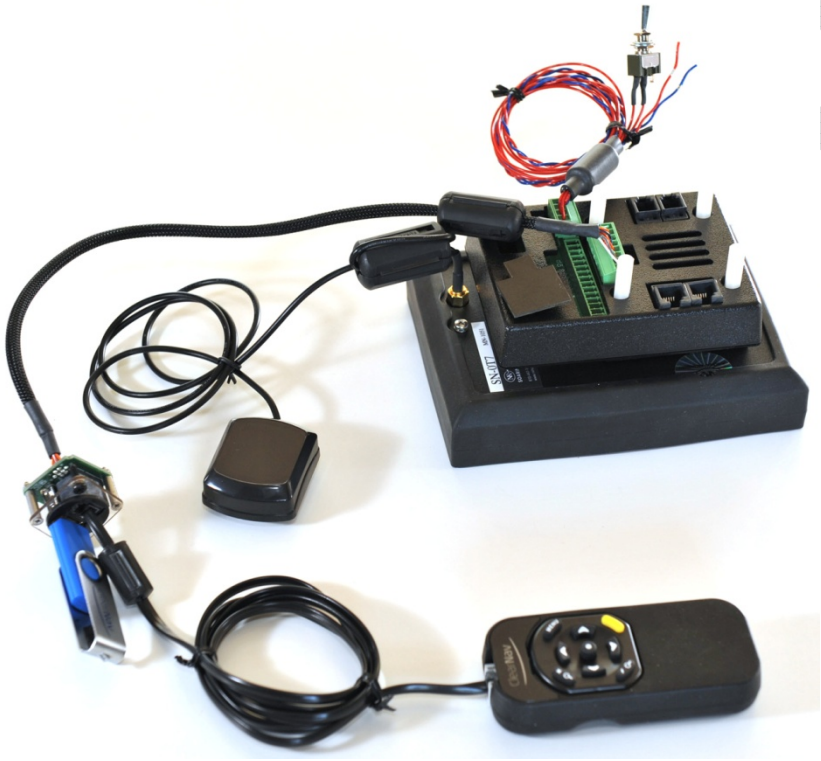
The *Nexus Junction Box* is used to connect a variety of accessories to the ClearNav system. It connects to the *ClearNav Display* through a 15-pin D-Sub connector that is located on the back of the *ClearNav Display*. When using a RAM mounting arm the *Nexus Junction Box* is mounted behind the instrument panel and connected to the *ClearNav Display* using a *DB15 Extension* cable. The *Nexus Junction Box* includes a built-in speaker and includes the 7 connectors shown in the photograph below.



The "business side" of the *Nexus Junction Box* includes a speaker, 12V power connections and a variety of data connectors. The serial ports are used to connect to external soaring devices such as the Cambridge 302 and/or FLARM. The CANbus ports are used to connect to other ClearNav compatible products such as a remote control or another ClearNav.



The back side of the *Nexus Junction Box* includes the DB-15 connector used to connect to the ClearNav Display.



When mounting the *ClearNav Display* on the front of the instrument panel, or recessed into the panel, the *Nexus Junction Box* is mounted directly to the back of the *ClearNav Display* as shown above.

When the ClearNav is mounted on a RAM mounting arm the *Nexus Junction Box* is mounted behind the instrument panel and connected to the *ClearNav Display* using the *DB15 Extension* cable as shown above.

DB15 Extension Cable

3.5 Mounting the GPS Antenna

The ClearNav has a built-in GPS engine but an external antenna is required. It is included in the standard ClearNav kit. It consists of an amplified external GPS antenna and Dual-Lock mounting strips. The connector attaches directly to the back of the ClearNav.

The antenna must be mounted in a location with the top (rounded side) so it has a good view of the sky. It should be mounted with the top pointing straight up. GPS signals go through wood and fiberglass just fine so it is OK to mount the antenna under the instrument panel cover as long as it is made out of fiberglass or wood. GPS signals cannot pass through metal or carbon fiber so the antenna must not be mounted in a location where its' view of the sky is blocked by metal or carbon fiber.

Some experts indicate that it is not good practice to mount 2 GPS antennas immediately next to each other. It may seem silly since the antenna is a receiver and not a transmitter. However, the antenna is an "amplified" antenna so it may be that the amplifier electronics from one antenna could interfere with another nearby antenna. Therefore we recommend mounting the all GPS antennas at least 6 inches away from one another.

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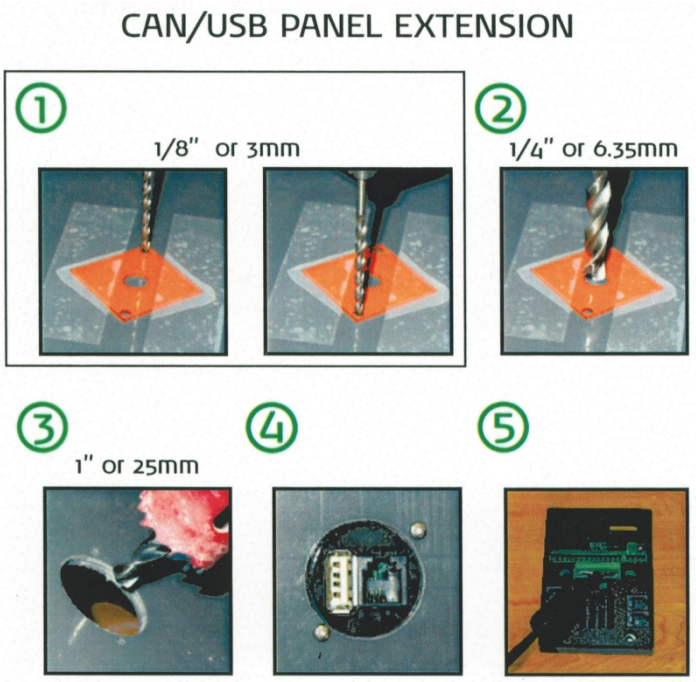
3.6 Installing the Panel Mounted CAN/USB Extension

The *Panel Mounted CAN/USB Extension* brings USB and RJ-22 connectors out to a convenient panel mounted connector. It fits into a 1" (25 mm) round hole in the panel. The USB connector is used as a receptacle for a USB Flash Drive for transferring flight logs from the ClearNav and uploading waypoint and airspace files and software updates to the ClearNav. The RJ-22 connector is used by the *Handheld Remote*. This item is included in the standard ClearNav system kit. A template is included for making the required holes in the panel.

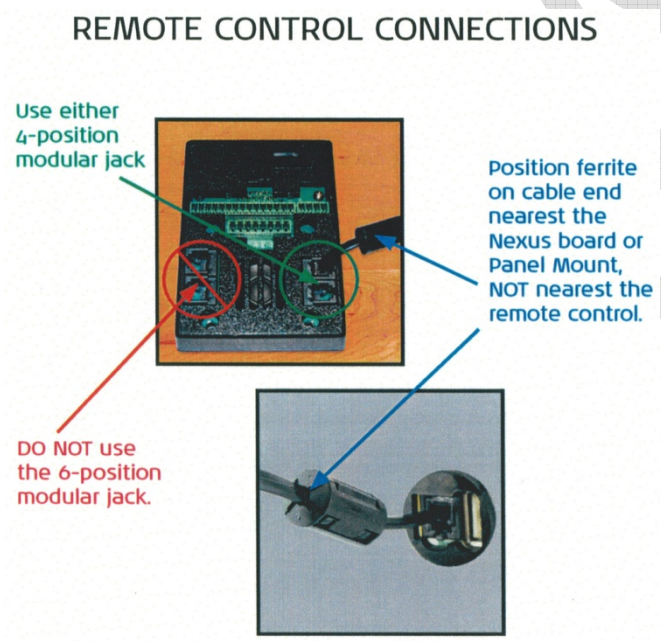


3.7 Connecting the Handheld Remote Control

The *Handheld Remote Control* is normally connected to the panel mounted connector of the *Panel Mounted CAN/USB Extension*. It can also be connected to either of the small RJ-22 connector on the top of the *Nexus Junction Box.*

The ferrite tube on the cable should be positioned so that it is located at the end opposite the remote – close to the panel mounted connector or the *Nexus Junction Box*.

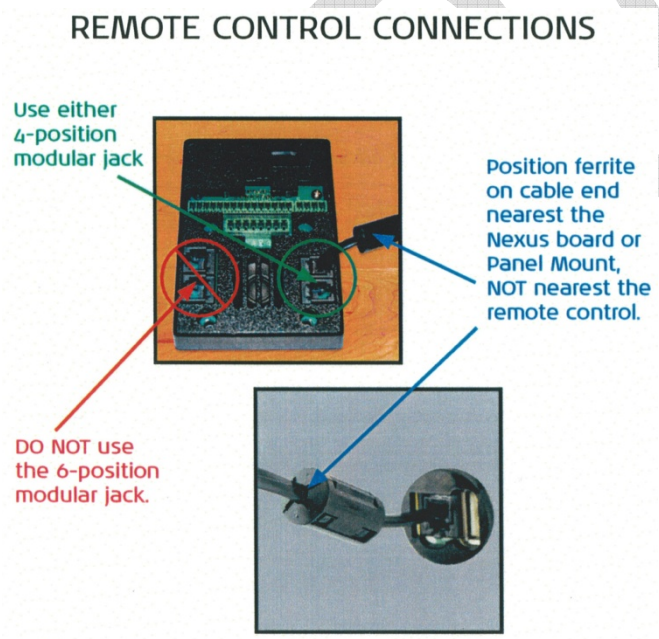
Note: Do **not** plug the 4-conductor RJ-22 connector used for the remote into the larger RJ-11 connectors found on the lower part of the *Nexus Junction Box*. Doing so can damage the contacts in the RJ sockets on the *Nexus Junction Box.*



3.8 Installing the Optional Stick Mounted Remote Control

The optional *Stick Mounted Remote* includes a keypad that is identical to the one on the handheld remote. It also includes a Push-to-Talk button for use with the radio.

Note: Do **not** plug the 4-conductor RJ-22 connector used for the remote into the larger RJ-11 connectors found on the lower part of the *Nexus Junction Box*. Doing so can damage the contacts in the RJ sockets on the *Nexus Junction Box.*



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3.9 Connecting to a Cambridge 302

The Cambridge 302 is a great companion to the ClearNav. The following data can be received from the 302:

- Vector Wind (speed and direction)
- Real Time Headwind
- True Airspeed from the 302

The Vector Wind (speed and direction) and Real Time Headwind can be displayed on the map screen. The Vector Wind is used for final glide (as the auto wind) if it is available. The wind information supplied by the 302 is a little more accurate and can be calculated when cruising as well as when circling by comparing the True Airspeed to the GPS measured speed and direction. Without the 302 the ClearNav calculates wind using wind drift while circling. To display the Real Time Headwind received from the 302 simply enable that option under *Personal Preferences / Map Display / Wind and Bearing / Head wind Component*. The 302 supplied *True Airspeed* data is used for the total energy final glide computation. When not connected to a 302, the airspeed is calculated using the measured wind and ground speed.

The Cambridge 302 can be connected to either of the RS-232 serial port connectors on the *Nexus Junction Box*. The *Cambridge 302 to Nexus Junction Box Cable* can be used for the connection. It is shown below.

Note: Although the NK 0646 302 to ClearNav cable look nearly identical to the Cambridge CAA-098 cable that is used to connect a 302 to a panel mounted RJ adapter for the Cambridge PDA mount system, it is not wired the same. Do not use a Cambridge CAA-098 cable to connect the 302 to the ClearNav.

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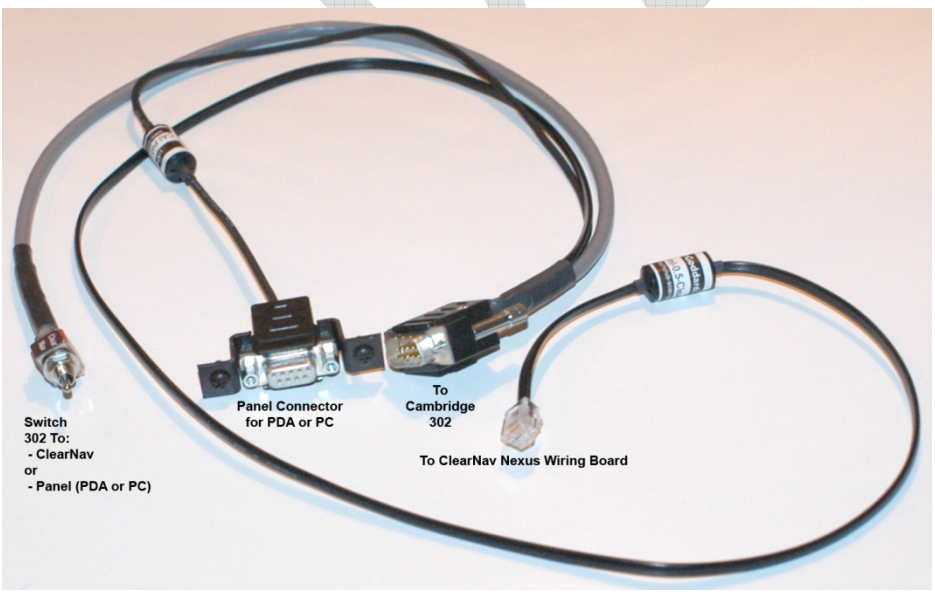
NK 0646 302 to ClearNav Cable

The Goddard CAI-Pnl-0.5-ClearNav-1 Y-cable is available from Cumulus Soaring, Inc. It makes it easy to send Cambridge 302 data to either the NK ClearNav or a panel mounted connector for a PC or PDA. It is used for downloading flight logs from the 302 or uploading waypoint files to the 302. Includes 1 m cable from Cambridge 302 to NK ClearNav Nexus Junction Box, and 0.5 m cable from 302 to DB-9f panel mounted connector for PDA or PC. It has a DB-9m connector at the 302 end and an RJ22 connector at NK ClearNav end. It includes a panel mounted "PDA / ClearNav" switch for selecting whether the 302's data receive line is connected to the panel connector (for PDA or PC) or the NK ClearNav. The 302's transmit line is always connected to both the panel connector and the NK ClearNav. 5 v power from the 302 is made available at the panel connector at all times for powering a PC.



Goddard CAI-Pnl-0.5-ClearNav-1 cable

3.10 Connecting to a FLARM Unit

FLARM is a collision alert system that is popular in many countries outside the USA. It has a built-in GPS, pressure sensor and radio transmitter and receiver. It broadcasts its position and altitude so that other FLARM units in the area will be alerted to its presence. It gives alerts if a collision is predicted using data received from other FLARM devices in the area.

The ClearNav displays other FLARM equipped aircraft on the map and displays relative altitude and climb rate for each. The FLARM data is only visible when zoomed-in to certain zoom levels. It hides the data when zoomed-out since FLARM's range is only about 3 km. This feature is sometimes referred to as "FLARM Radar". It is extremely powerful information to have in the cockpit. You can use other gliders to determine which thermal up ahead is the best one! However, it is very, very important that pilots avoid staring at the display when they should be looking out the window. Not all aircraft carry FLARM.

The FLARM unit can be connected to either of the RS-232 serial port connectors on the *Nexus Junction Box*. The *FLARM to Nexus Junction Box Cable* can be used for the connection. It is shown below. Wiring details are included at the end of this manual.

0647 *FLARM to Nexus Junction Box Cable*

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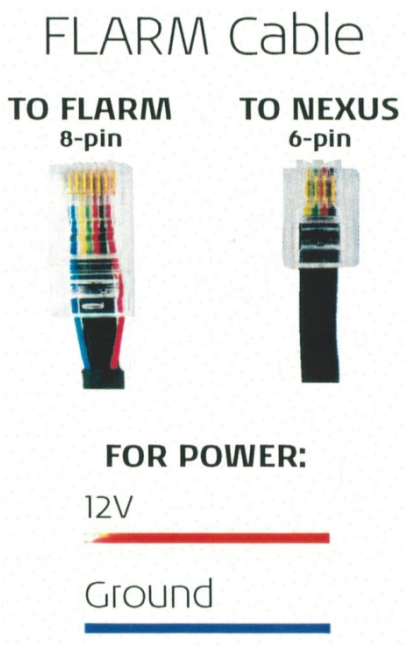

0647 FLARM Cable Connection Details

3.11 Connecting to a 2nd Seat ClearNav Installation

The same mounting options and components are used when installing the ClearNav in the second seat of a two-seat glider. Two ClearNav systems installed in one glider will operate completely independently as they each contain a GPS and full functionality. If one ClearNav is connected to a Cambridge 302 for airspeed data or a FLARM for traffic data, a CANbus extension cable may be used to connect the two Nexus Boards to enable sharing of the data. Additional data and function sharing may be available in the future. The cable connects to CANbus connectors on the Nexus Junction Box connected to both ClearNav units.

2nd Seat CAN-Bus Extension Cable

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4 User Interface

4.1 Remote Control

The handheld remote control is designed to fit comfortably into your hand and be simple and intuitive to use in flight. The 9 buttons on the remote are large and easy to press – even while flying in turbulent air, and while wearing gloves. They have a very positive click feel and sound which make it clear when a button has been pressed and released. They also stand out from the remote which makes them easy to find with your thumb without looking.

The stick mounted remote control features the exact same pushbuttons as the handheld remote - making it easy to switch between the 2 remote control types.

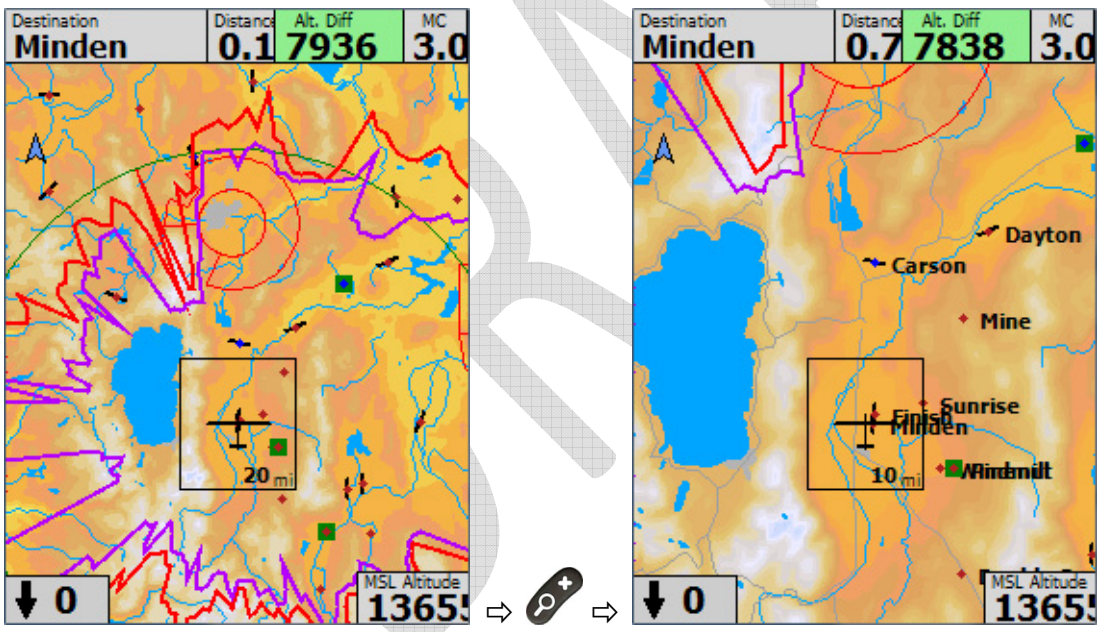
Below is a quick overview of the operation and use of the 9 buttons on the remote.

4.1.1 Zoom In (+) Button

The *Zoom In (+)* button is used to increase the zoom level of the moving map display. After zooming in you will see less of the moving map but will see it in more detail. To keep straight which zoom button to use - think of the *Zoom In (+)* button as pushing the glider's control stick forward to dive down closer to the earth. Since the *Zoom In (+)* button is located on the forward/top side of the remote – it makes sense – just push the forward button as if you were pushing the stick forward to get closer to the earth.

The rectangular *Map Cursor* in the middle of the moving map display shows the current zoom level. The scale number shown is the width of the rectangle. In the screen capture below (left) the scale rectangle in the middle of the map is 20 miles wide. If you were to press the *Zoom In (+)* button once you would zoom in on the map and the number in the rectangle would be 10 miles.

Tip: When incrementing or decrementing numbers with the *Up* and *Down* buttons, the *Zoom In (+)* and *Zoom Out (-)* buttons can be used to increment or decrement the value in larger steps.

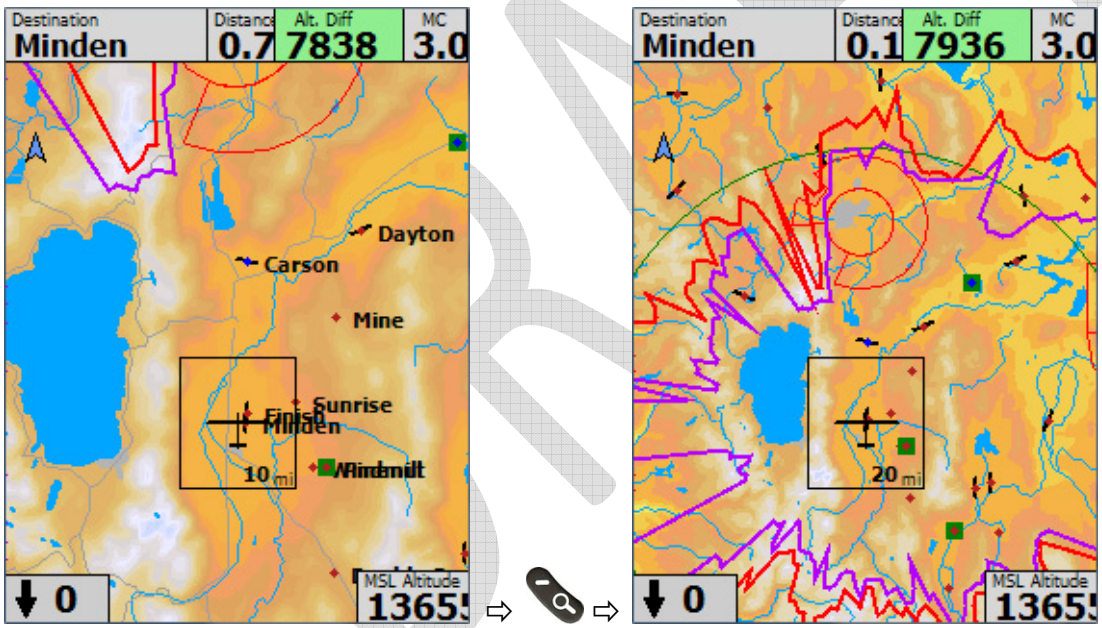


4.1.2 Zoom Out (-) Button

The *Zoom Out (-)* button is used to decrease the zoom level of the moving map display. After zooming out you will see more of the moving map but will see it in less detail. To keep straight which zoom button to use - think of the *Zoom Out (-)* button as pulling the glider's control stick back to climb up away from the earth. Since the *Zoom Out (-)* button is located on the back/bottom side of the remote – it makes sense – just push the back button as if you were pulling the stick back to climb away from the earth.

The rectangular *Map Cursor* in the middle of the moving map display displays the current zoom level. The scale number shown is the width of the rectangle. In the screen capture below (left) the scale rectangle in the middle of the map is 10 miles wide. If you were to press the *Zoom Out (-)* button once you would zoom out and the number in the rectangle would be 20 miles.

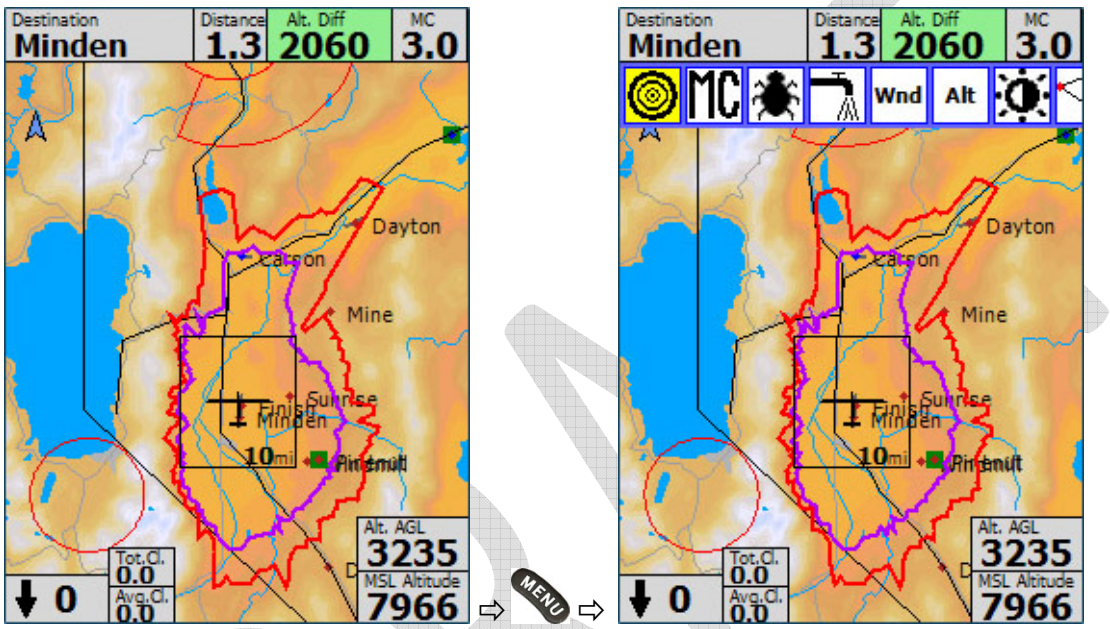
Tip: When incrementing or decrementing numbers with the *Up* and *Down* buttons, the *Zoom In (+)* and *Zoom Out (-)* buttons can be used to increment or decrement the value in larger steps.



4.1.3 Menu Button

The *Menu* button is used to toggle the *Ribbon Menu* on and off. The *Ribbon Menu* appears near the top of the moving map screen and is shown below. Press the *Menu* button once to make the *Ribbon Menu* appear. Press the *Menu* button a 2nd time to hide the *Ribbon Menu*.

The *Ribbon Menu*



The *Ribbon Menu* as it appears near the top of the moving map display when the *Menu* button is pressed.

The *Menu* button also serves another important function. It can be used to exit the setup menus and return to the moving map display. The *Focus* button can also be used to exit any menu and return to the moving map display.

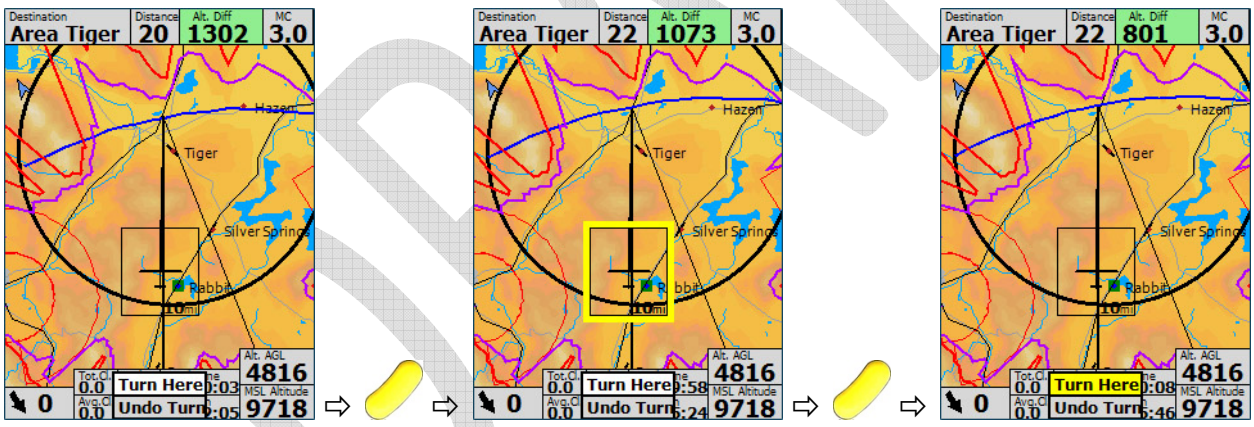
4.1.4 Focus Button

The *Focus* button is used to highlight various items on the moving map. The term focus is used by software programmers to refer to the item on the screen that is currently active. The item with the focus is the active item. It can be used to highlight the yellow *Map Cursor* on the moving map, or when flying an area task it can be used to highlight the "Turn Here" or "Undo Turn" buttons which appear when inside a turn area. The *Focus* button can be used to highlight the desired button. The *Select* button can then be used to activate it. When the *Map Cursor* has the focus you can move it around on the screen using the *Arrow* buttons. The use of the *Focus* button is intuitive because the yellow color of the button matches the yellow color of the item on the screen that has the focus.

For pilots flying with yellow tinted "blue blocker" sunglasses, the yellow highlighting can be changed to pink. This manual assumes that the highlight color is set to the default yellow color.

The *Focus* button also serves another important function. It can be used to exit the *Ribbon Menu* or the setup menus and return to the moving map display. The *Menu* button can also be used to exit any menu and return to the moving map display.

Shifting focus to any item on the screen is temporary. The *Map Cursor* will lose focus about 7 seconds after your last key press.



Press the Focus button to activate various screen items – such as the *Map Cursor* and the *Turn Here* button. The "Turn Here" button is only visible when inside a turn area. The "Undo Turn" button is only available if you have already pressed the "Turn Here" button within the turn area.

4.1.5 Select Button

The *Select* button is used to "select", or "enter", or "OK", or "acknowledge", or "confirm" the current selection. It is located at the center of the keypad and is extended out further than the other buttons to make it easy to find and activate without looking at the remote. The round shape is different from all the other buttons – which also makes it easy to find and activate with your thumb.

4.1.6 Arrow Buttons

The *Arrow* buttons are used to navigate up, down, and across menus and to move the *Map Cursor* to go to or view data on nearby airports or airspace.

The 4 *Arrow* buttons include:

- *Up* button
- *Down* button
- *Left* button
- *Right* button

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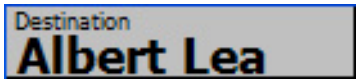
4.2 Navigation Display (moving map, etc.)

Overview of the data on the map

4.2.1 Data at the Top of the Screen

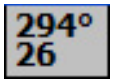
There are 4 data windows on the top of the moving map display. They include the *Destination* window, *Distance* window, *Altitude Differential* window and the *MacCready* window. There is also an optional *Track/Bearing* window which can be displayed near the top left of the display – just below the *Destination* window.

4.2.1.1 Destination Window



The *Destination Window* is located in the top left corner of the moving map screen and shows the name of the current destination.

4.2.1.2 Distance Window

or


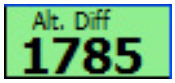
The *Distance Window* is located in the top row of the moving map screen, between the *Destination* and *Final Glide* windows. It always displays the distance to the destination and can optionally display both the distance and bearing to the destination. However, when the display of bearing is enabled, the numbers in the window get much smaller (making it more difficult to read in flight), and the "Distance" label is no longer shown (making it more difficult to remember what the numbers mean after not flying for a while).

To enable or disable the display of bearing information:

> *Menu* button / *Setup Menu Icon* / *Personal Preferences Tab* / *On Screen Options* / *Track and Bearing* / *Bearing/Distance* checkbox

4.2.1.3 Final Glide "Altitude Differential" Window

The *Final Glide Window* is located in the top right corner of the moving map display. The label "Alt. Diff." (Altitude Differential) indicates that the number displayed is the difference between the altitude required to make it to the destination (taking into account wind, airspeed, glider polar, MacCready setting, etc.) and your current altitude. When you are above glideslope the number will be greater than zero and the box will be colored green. When you are below glideslope the number will be less than zero and the box will be grey in color.



1785 feet or meters (depending on units setup) above glideslope

390 feet or meters (depending on units setup) below glideslope

4.2.1.4 MacCready Window

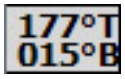
The *MacCready* ("MC") window displays the current *MacCready* setting.

MacCready set to 3 knots or meters/second (depending on the units setup)

To edit the *MacCready* setting, select the *MacCready* "MC" icon from the Ribbon Menu.

4.2.1.5 Track/Bearing Window

The *Track/Bearing* window is an optional display window. It shows the sailplane's current track and bearing.



Track of 177° and bearing of 015°

To enable or disable the display of the *Track/Bearing* window:

> *Menu* button / *Setup Menu Icon* / *Personal Preferences Tab* / *On Screen Options* / *Track and Bearing* / *Track/Bearing* checkbox

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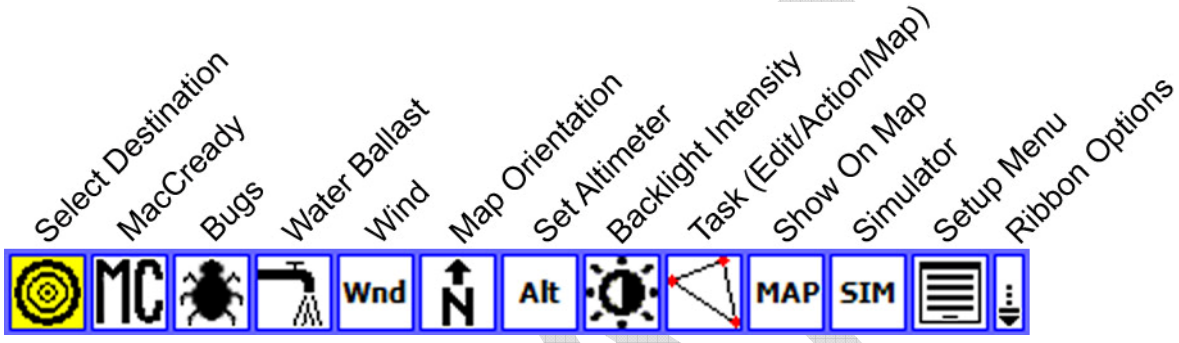
4.2.2 Ribbon Menu

The *Ribbon Menu* is accessed by pressing the *Menu* button on the remote control. The *Left* and *Right* buttons are used to move across the ribbon menu. The *Select* button is used to select the desired menu. To hide the *Ribbon Menu* press the *Menu* button or the *Focus* button . It is possible to wrap around from one side of the *Ribbon Menu* to the other side. For example, if you press the *Left* button while the *Select Destination Icon* is highlighted, the *Ribbon Options Icon* will be highlighted. Not all of the icons shown below will be visible in the *Ribbon Menu* at all times. For example, the *Simulator Icon* is only displayed when in simulator mode. Also, the *Ribbon Options Menu* can be used to disable icons that you don't use often.

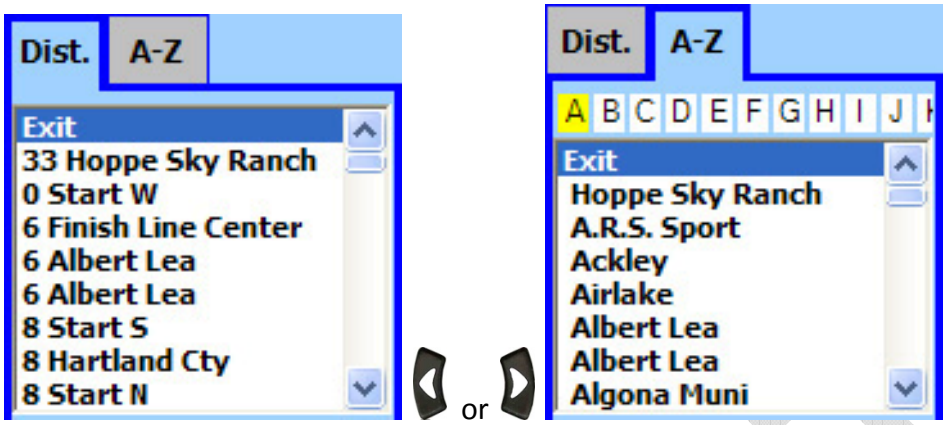


4.2.2.1 Select Destination Icon

The *Select Destination Icon* is used to change the waypoint to which the software is navigating. This is used mostly for "free flying" between waypoints – not when navigating through the waypoints in a pre-declared task. It is also often used when flying a task, but low and in need of a nearby airport at which to land.

> Note: When flying a predefined task, it is not necessary to manually select each waypoint in the task using the *Select Destination* icon. Instead, it is easy to navigate to each task turnpoint in order using the *Task* screens. For example, after rounding a task turnpoint, to start navigating to the next turnpoint, use the *Task* icon in the *Ribbon Menu* to access the *Task* screens. Once there, go to the *Action* tab and select the *Next Leg* button.

The *Select Destination Window* has 2 tabs. The *Distance List Tab* lists the waypoints sorted by distance from your current location. The *Alphabetical List Tab* lists the waypoints alphabetically.



The *Left* and *Right* buttons are used to switch between the *Distance List Tab* and the *Alphabetical List Tab* – and to jump to the desired waypoint using the first letter of the waypoint. When you fist enter the Select Destination window pressing the *Left* button repeatedly will toggle between the 2 tabs. Pressing the *Right* button once will move you from the *Distance List Tab* to the *Alphabetical List Tab*. Pressing it additional times will move the cursor (the highlighted character) through the alphabet list near the top of the window. Once the highlighted character has moved into the alphabet it is a little less intuitive how to get back to the *Distance List Tab*. You need to move the highlighted cursor past either end of the alphabet (past "A" or "Z") – the *Distance List Tab* will then be selected – as if it was the 27th letter in the alphabet.

The *Up* and *Down* buttons are used to move through the lists.

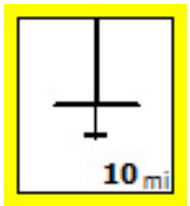
The *Zoom In (+)* button can be used to jump up through the list one screen at a time.

The *Zoom Out (-)* button can be used to jump down through the list one screen at a time.

Press the *Select* button to select the highlighted waypoint and start navigating to it.

Selecting the Destination using the *Map Cursor*

For nearby airports it is much easier and faster to use the *Map Cursor* to select them as the destination. Using the *Map Cursor* is described in section 4.2.4.



4.2.2.2 MacCready Icon

The *MacCready* icon is used to change the *MacCready* setting. The *MacCready* setting is used to estimate the strength of the thermals you expect to use during your soaring flight. The current *MacCready* setting

is displayed in the *MacCready* window in the top-right corning of the moving map display.

Changes to the MacCready setting will lead to changes in the final glide altitude differential number. Increasing the MacCready number will indicate that you should be flying faster and have higher sink rates and therefore require more altitude to make it to the destination. Please refer to your favorite cross-country soaring textbook for more information on setting this number. Briefly - It is used to select the speed-to-fly between thermals. It is often set to the best estimate of the average climb rate in the next thermal. In the last thermal of the day it is set to the achieved climb rate in that thermal.

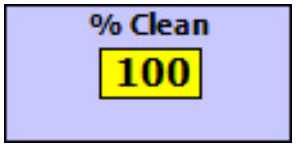
Generally, new cross-country pilots tend to bump the MacCready value down to zero when trying to decide whether they can make it home. Their reasoning is that if they fly more slowly they may be able to make it home. At first thought this seems like a conservative approach because they are optimizing their glide angle. However, many more experienced glider pilots consider it to be less safe than leaving the MacCready number at a setting that matches the actual soaring lift conditions. The reason is that at a MacCready setting of zero you are at the ragged edge of making it home. You have no margin for error (or sink). You can't slow down any additional amount to stretch your glide or speed up to get through sink. With the MacCready set to match the day's soaring conditions the flight computer will recommend that you have more altitude before starting your final glide which will allow you to slow down to stretch your glide in the future if necessary or speed up in sink and still have enough extra altitude to make it home. In addition, you will arrive home more quickly.

Total Energy Final Glide

The ClearNav uses a feature called *Total Energy Final Glide* to take airspeed into account when calculating glide altitudes. *Total Energy Final Glide* takes into account not only the glider's altitude, but also its airspeed. A glider flying at high speed can pull up and gain a significant amount of altitude – however, at the end of the pull-up, the *Total Energy* is the same. Because the ClearNav takes both the glider's altitude and airspeed into account, the number in the *Altitude Differential* window will not change after a pull-up or a dive.

4.2.2.3 Bugs Icon

The *Bugs* icon is used to access the bugs setting adjustment screen.



If your glider's wings are clean you would probably leave it set to the default of 100% clean. If you feel

that you have picked-up a significant amount of performance degrading bugs or water droplets, etc., you can lower the number to degrade the polar used for final glide calculations. The range of the *% Clean* setting is 60 to 120 percent and the default is 100%.

When the *Bugs* icon is highlighted you can begin editing of the number by pressing either the *Select*, *Up* or *Down* button. You would think that you would need to press the Select button to view or change the setting, but the *Up* and *Down* buttons can also be used to bring up the adjustment screen.

Press the *Up* button to increase the setting by 1. Hold the *Up* button to scroll the number up.

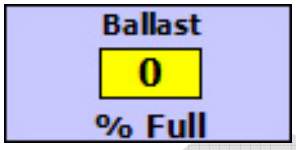
Press the *Down* button to decrease the setting by 1. Hold the *Down* button to scroll the number down.

Press the *Zoom In (+)* button to increase the setting in steps of 5%. Hold the *Zoom In (+)* button to scroll the number up rapidly.

Press the *Zoom Out (-)* button to decrease the setting in steps of 5%. Hold the *Zoom Out (-)* button to scroll the number down rapidly.

4.2.2.4 Water Ballast Icon

The *Water Ballast* icon is used to adjust the percent of water ballast on board.



The range is 0 to 100% and the default is 0%. It is adjustable in steps of 10%. Enter 0% if you are not carrying water ballast and enter 100% if you are at the maximum water capacity specified in the polar settings screen.

When the *Water Ballast* icon is highlighted you can begin editing of the number by pressing either the *Select*, *Up* or *Down* button. You would think that you would need to press the *Select* button to view or change the setting, but the *Up* and *Down* buttons can also be used to bring up the adjustment screen.

Press the *Up* button to increase the setting by 10%. Hold the *Up* button to scroll the number up.

Press the *Down* button to decrease the setting by 10%. Hold the *Down* button to scroll the number down.

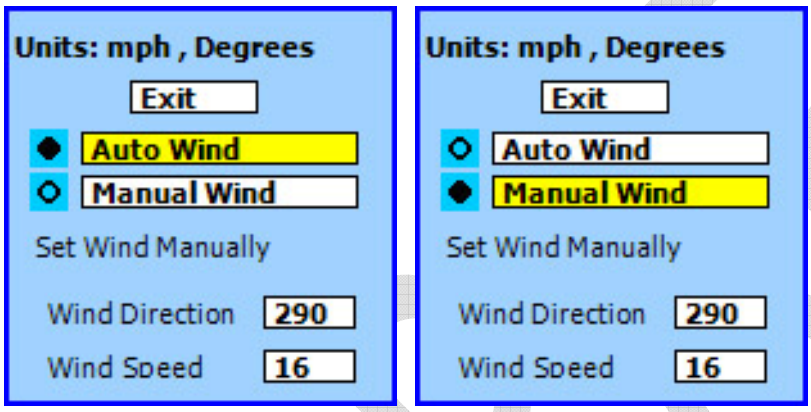
Press the *Zoom In (+)* button to increase the setting in steps of 20%. Hold the *Zoom In (+)* button to scroll the number up rapidly.

Press the *Zoom Out (-)* button to decrease the setting in steps of 20%. Hold the *Zoom Out (-)* button to scroll the number down rapidly.

4.2.2.5 Wind Icon

The *Wind* Wnd icon is used to access the *Wind Edit* window. This window is used to toggle between the automatic and manual entry of wind data, and to manually enter the wind speed and direction when desired. Most pilots will fly with *Auto Wind* most of the time. However, it may become necessary to manually enter the wind when you know that you are flying into a new airmass or know that the winds will be different up ahead.

Wind information is always displayed in the lower left corner of the moving map screen. When *Manual Wind* is entered, the *Calculated Wind* is displayed as a reference immediately over the manually entered wind data. That makes it easy to verify that the manually entered wind makes sense.



To toggle between *Auto Wind* and *Manual Wind*, press the *Up* or *Down* button to highlight either the *Auto Wind* or *Manual Wind* button. Then press the *Select* button to select the highlighted setting. The round "radio buttons" indicate the active setting.

To adjust *Wind Direction* and *Wind Speed*, press the *Up* or *Down* button to highlight the desired parameter and press the *Select* button pop up the edit window for that parameter.

Press the *Up* or *Down* button to adjust the parameter in small steps.

Press the *Zoom Out (-)* button or *Zoom Out (-)* button to adjust the parameter in larger steps.

Press the *Select* button when done editing the parameter.

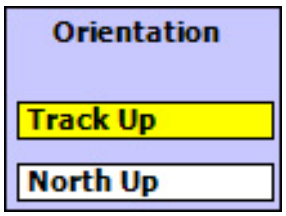
> Note: If you are currently in *Auto Wind* mode and you edit the *Wind Direction* or *Wind Speed*, the wind mode will automatically change to *Manual Wind.*

Press the Exit, *Menu* or *Focus* button to exit the *Wind Edit* window.

4.2.2.6 Map Orientation Icons

The *Map Orientation* (or) icons are used to toggle the moving map between the *Track Up* and *North Up* modes. *Track Up* is commonly used when cruising in a straight line so the map will be oriented to match the view out the window. *North Up* is commonly used when thermalling to keep the map from spinning around as the glider turns.

When the *Track Up* or *North Up* icon is highlighted you can view the *Map Orientation Window*



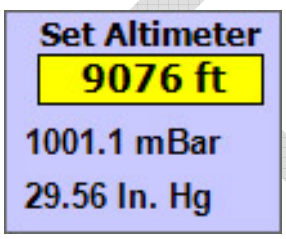
by pressing either the *Select*, *Up* or *Down* button. You would think that you would need to press the *Select* button to view or change the setting, but the *Up* and *Down* buttons can also be used to bring up the adjustment screen. That way only a single button press is need to make the change.

Press the *Up* or *Down* button to toggle between *Track Up* and *North Up* modes. The highlighted text (yellow background) indicates the selected mode.

Press the *Select*, *Menu* or *Focus* button to accept the highlighted selection and return to the moving map screen.

4.2.2.7 Altimeter Set Icon

The *Altimeter Set* icon is used to adjust the ClearNav's altimeter.



> **Important Note: The ClearNav's altimeter should be set immediately preceding takeoff ever time you fly. This number is the one used for the final glide calculations.** The *Altitude AGL* is based on the *MSL Altitude* so it will only display accurately if the *MSL Altitude* is set accurately. You can easily use a local automated weather transmitter (AWOS) pressure setting to adjust the *MSL Altitude* in flight.

To adjust the ClearNav's altimeter, press the Menu button and select the Altimeter Set icon.

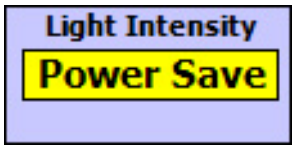
Press the *Up* or *Down* button to adjust the altimeter setting in small steps.

Press the *Zoom Out (-)* button or *Zoom Out (-)* button to adjust the altimeter setting in larger steps.

Press the *Select*, *Menu* or *Focus* button to exit the *Altimeter Set* window.

4.2.2.8 Backlight Intensity Icon

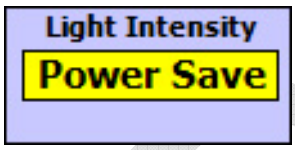
The *Backlight Intensity Icon* is used to access the *Light Intensity Window*.



There are 4 light intensity settings to select from:

- *High* – Full brightness, Great in sunlight, but draws about 600 mA of current from the glider battery.
- *Medium* – Medium brightness, A good compromise setting – pretty good in sunlight but with a bit less current draw (~500 mA?).
- *Low* – Low brightness, Less visible in bright sunlight, but much less current used (~400 mA?)
- *PowerSave* – In this mode the screen goes to the *High* setting when you are using the remote and backs down to the *Low* setting after 25 seconds of non-use. It goes back up to *High* immediately when you press any button on the remote.

When the *Backlight Intensity Icon* is highlighted you can access the *Light Intensity*



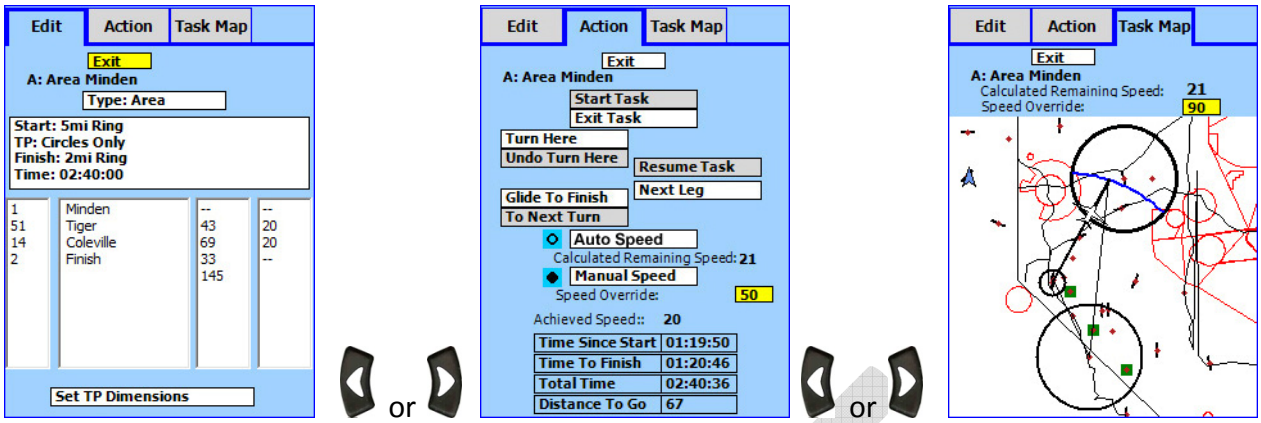
window by pressing either the *Select*, *Up* or *Down* button. You would think that you would need to press the *Select* button to view or change the setting, but the *Up* and *Down* buttons can also be used to bring up the adjustment screen.

Press the *Up* or *Down* button to select the desired *Light Intensity* setting.

Press the *Select*, *Menu* or *Focus* button to accept the highlighted selection and return to the moving map screen.

4.2.2.9 Task Icon

The *Task* icon is used to access the *Task Edit*, *Task Action*, and *Task Map* tabs. These screens are designed for easy use in flight. They can be used to edit tasks, activate the next waypoint in a task, view a map of the task, etc.



To access the *Task Edit*, *Task Action*, and *Task Map* tabs:

Menu button / *Task* icon

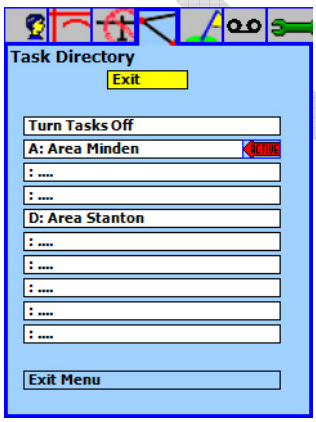
Use the *Left* and *Right* buttons to move between the *Task Edit*, *Task Action* and *Task Map* tabs.

Use the *Up* or *Down* buttons to highlight the desired item to edit.

Press the *Select* button to edit the selected item.

Press the Exit, *Menu* or *Focus* button to exit the *Task Edit*, *Task Action* and *Task Map* tabs and return to the moving map screen.

Additional task information is available in the *Task Directory* tab which is found in the *Setup Menu* screens. The *Task Directory* tab is used to select and activate a task from a list of tasks. The use of the *Task Directory* tab will be described in detail in section 7.4.



To access the *Task Directory* tab, select the *Setup Menus* icon and then press the *Right* button 3 times.

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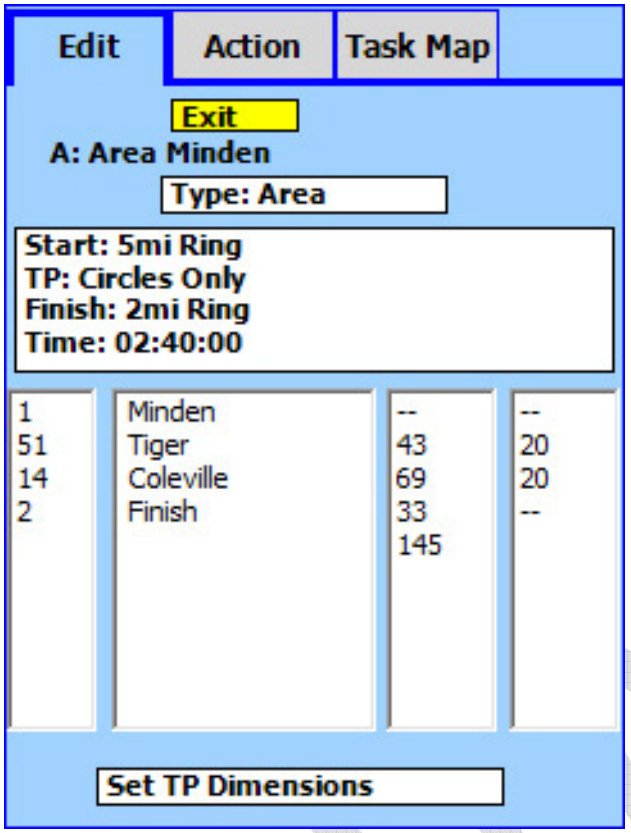
4.2.2.9.1 Task Edit Tab

The *Task Edit* tab is used to edit task settings and task turnpoints.



Use the *Up* or *Down* buttons to highlight the desired item to edit.

Press the *Select* button to edit the selected item.

Use the *Left* and *Right* buttons to move between the *Task Edit*, *Task Action* and *Task Map* tabs.

Press the Exit, *Menu* or *Focus* button to exit the *Task Edit*, tab and return to the moving map screen.

Task Type

The *Task Type* button is used to select the desired task type. The text displayed on the button indicates the type of task currently selected. In the screen capture above it reads “Type: Area” because the task type is set to “Area”.

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Use the *Up* or *Down* buttons to highlight the desired task type.

Press the *Select* button to select the highlighted item.

Press the Exit button to return to the *Task Edit* tab.

Press the *Menu* or *Focus* button to return to the moving map screen.

Task Types

- **Racing** – Racing tasks are pre-defined tasks around specific turnpoints. They include start and finish lines or rings. There is no minimum task time since all pilots must fly the exact same task.
- **Area** – Area tasks have one or more turn areas which give pilots flexibility in determining where to turn within the turn area. A minimum task time is set. Any pilot that finishes under the minimum task time gets their task time set to the minimum. On strong (or under tasked) days pilots fly farther into each turn area (thereby covering more distance) to assure that they don't arrive home early. On weak (or over tasked) days pilots will not fly far into each turn area to assure that they will make it around the task in just over the minimum task time.
- **MAT** – Modified Assigned Tasks are a combination of assigned tasks and "pilot option" tasks. One or more turnpoints are assigned in a specific sequence. A minimum task time is also set. After the pilot completes the assigned turnpoints, he/she may fly to as many other contest turnpoints as desired – the goal being to arrive home in just over the minimum task time.
- **FAI** – FAI tasks are used for badge and record and "FAI-OLC" (Online Contest) flights. They include start and finish sectors or lines. Turnpoints can be displayed as either "FAI Sectors" or a combination of FAI Sectors and circles.

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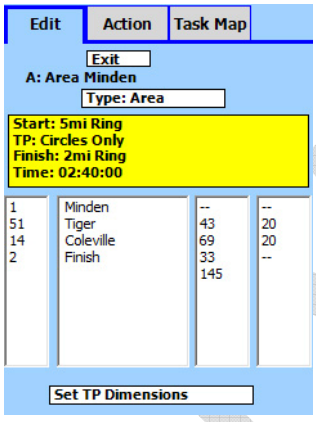
- **Recreational** – *Recreational* tasks are for pilots that want to set out fly to a series of turnpoints – without the complexities of contest tasks. Start and finishes can be rings or lines. Turnpoints are points with a 0.5 km radius. This task type can be used to setup a loose plan for the day when free flying or flying free "recreational" tasks or tasks to be used in the OLC (Online Contest). It is not necessary enter any task in advance. The selected *Home Point* is used by default as both the start and finish points. The *Map Cursor* is used to add turnpoints to the task between the start and finish points. When a turnpoint is selected with the *Map Cursor* a window appears asking, "Do you want to add [airport name here] to the current task?" If you select "Yes" then the turnpoint will be added to the task after all other turnpoints - immediately before the finish point. You can also remove turnpoints from the task using the *Map Cursor*. When a turnpoint that is already in the task is selected with the *Map Cursor* a window appears asking, "Do you want to remove [airport name here] from this task?" If you select "Yes" then the turnpoint will be deleted from the task.

Task Settings

The *Task Settings* button displays the current task settings and is used to access the *Task Settings* edit window.



To edit the task settings, highlight the *Task Settings* button using the *Up* or *Down* buttons and press the *Select* button. The data displayed in the *Task Settings* edit window will vary with the type of task selected.

Below are screen captures of the *Task Settings* windows for all 5 task types.

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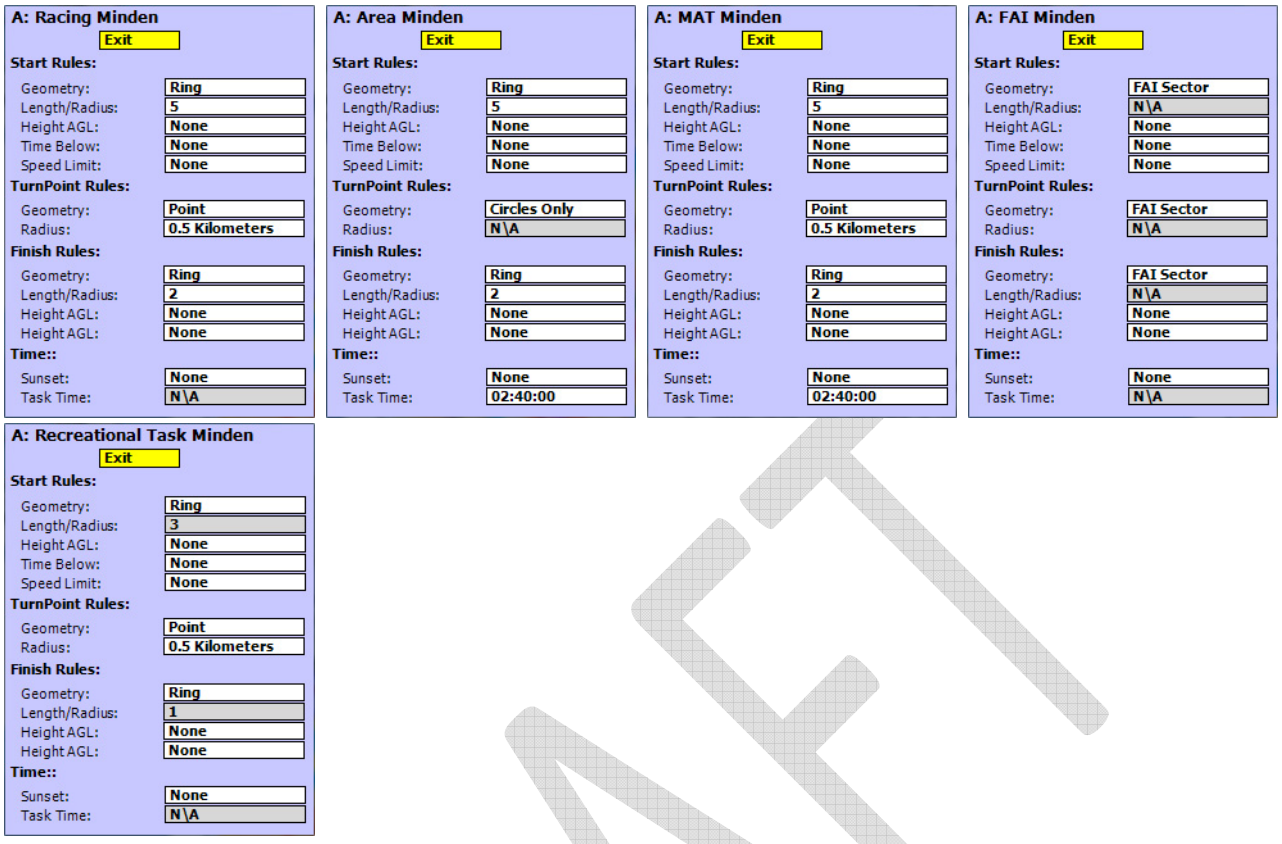

Use the *Up* or *Down* buttons to highlight the desired task parameter.

Press the *Select* button to edit the selected item.

Press the **Exit** button to return to the *Task Edit* tab.

Press the *Menu* or *Focus* button to return to the moving map screen.

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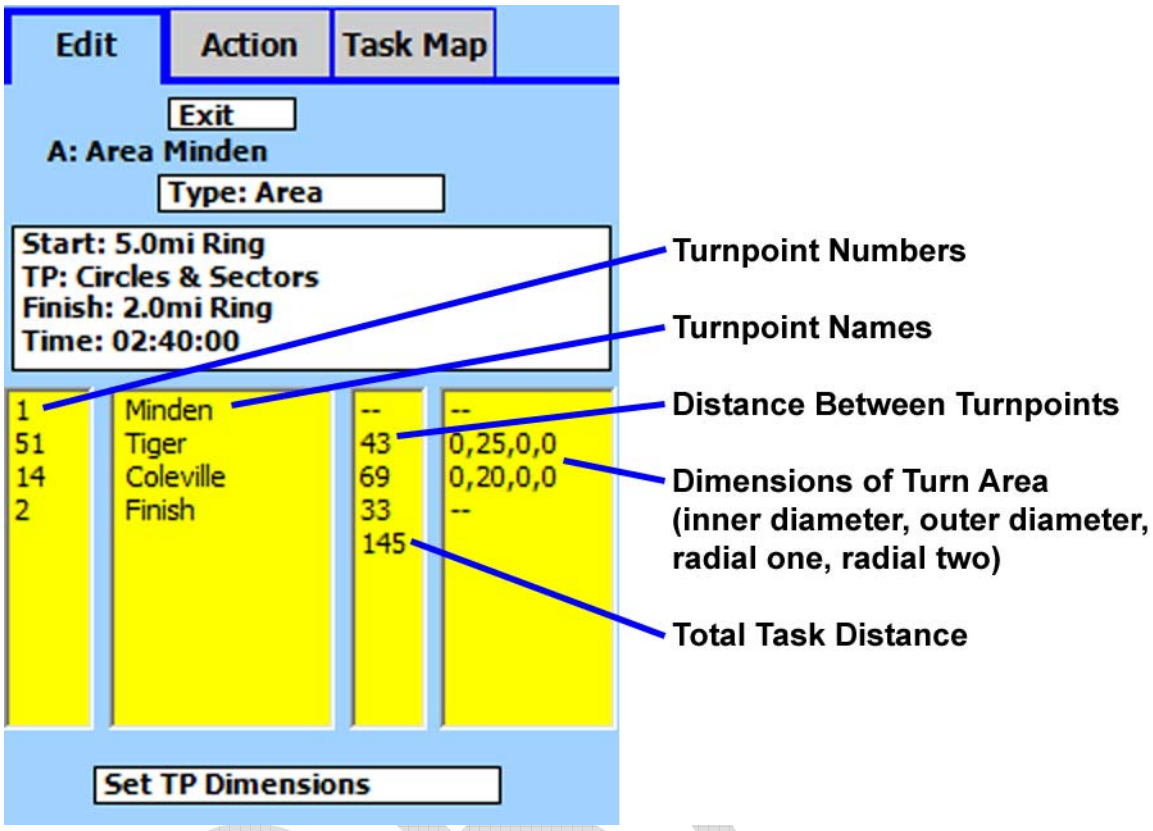
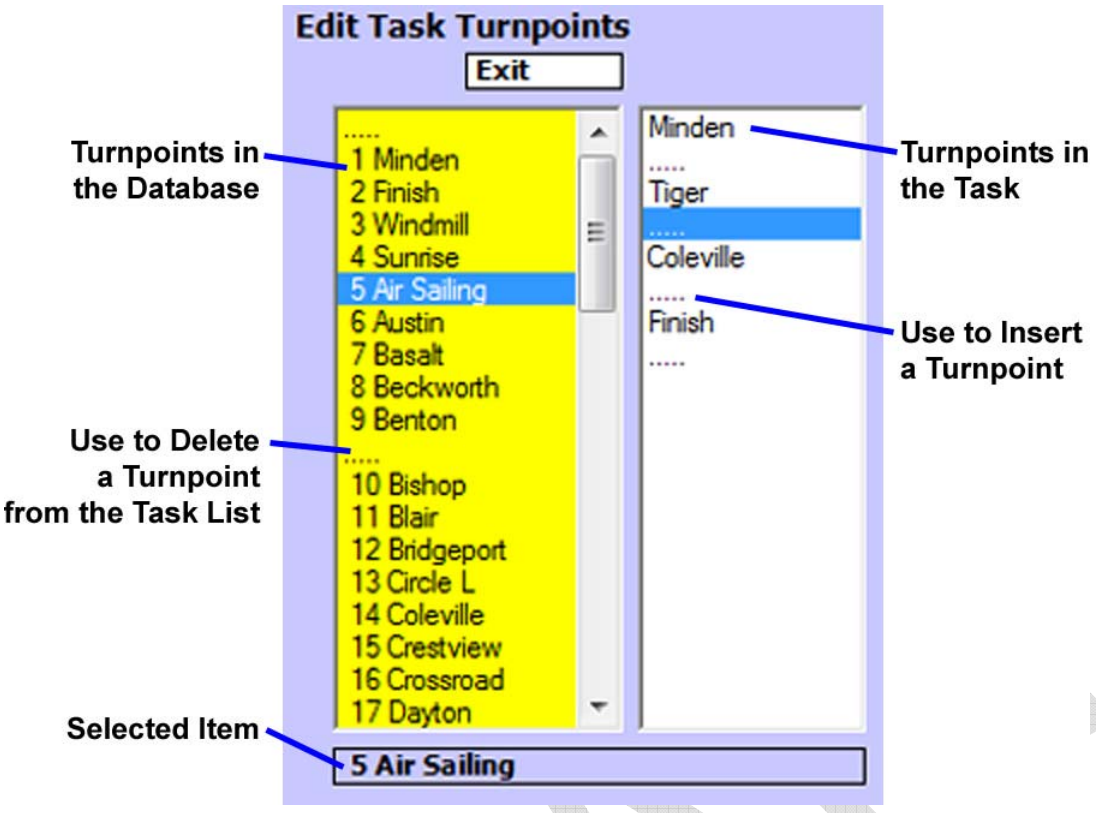
Task Turnpoints List

The *Task Turnpoints List* (highlighted in yellow in the image below) has 2 functions. It displays the list of task turnpoints, and acts as a button to allow access to the *Edit Task Turnpoints* window. The data in each column of the list is documented in the image below.



To edit the turnpoint list, highlight the list using the *Up* or *Down* buttons (as shown in the image above) and press the *Select* button. That will take open the *Edit Task Turnpoints* window – shown below.



Edit Task Turnpoints window

The left window is a list of all the turnpoints in the database. The right window is the list of turnpoints in the task. The "....." lines are blank lines.

The first turnpoint in the list is the *Start Point*, the last turnpoint in the list is the *Finish Point*. Start line and finish line settings apply to those points.

Use the *Up*, *Down*, *Left*, and *Right* buttons to highlight the desired items in both lists.

Press the *Select* button to move the selected item from the left window into the selected item in the right window. **It is important to remember that the *Select* button always moves items from the left to the right.**

- Moving a turnpoint from the left window onto a blank line in the right window will insert it into the task at that location.
- Moving a turnpoint from the left window onto an existing turnpoint in the right window will replace the existing turnpoint with the new turnpoint from the left window.
- Moving a blank line from the left window onto a turnpoint in the right window will remove it from the task.

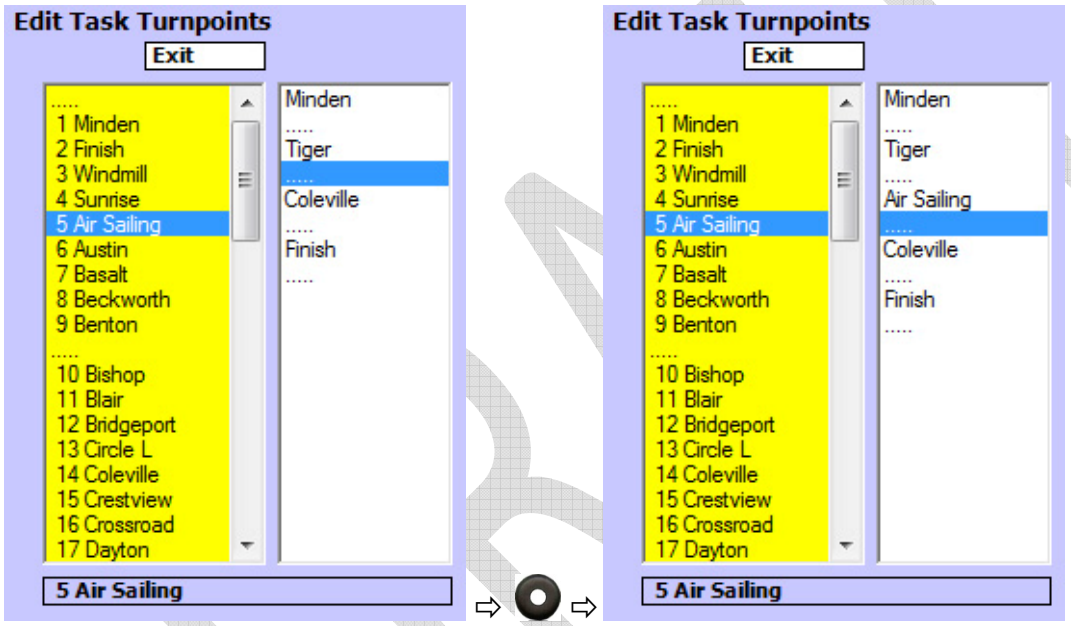
Press the Exit button to return to the *Task Edit* tab.

Press the *Menu* or *Focus* button to return to the moving map screen.

Insert a Turnpoint

To insert a turnpoint into the task list:

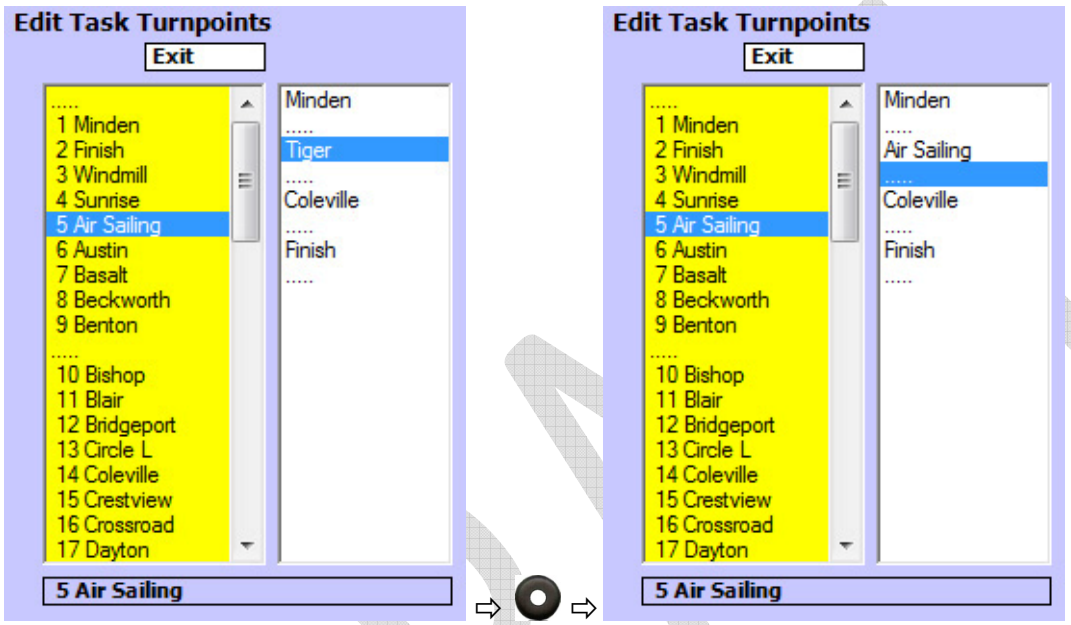
- Select the "….." (blank line) at the desired location in the *Task List* in the right window. In the example below, we want to insert a turnpoint in between the "Tiger" and "Coleville" turnpoints.
- Select the desired turnpoint to be added from the turnpoint database in the left window. In the screen capture below, "Air Sailing" is the turnpoint we want to insert into the task.
- Press the *Select* button. In this example, "Air Sailing" will be inserted in between the "Tiger" and "Coleville" turnpoints in the task list.



Replace a Turnpoint

To replace a task turnpoint with a different turnpoint:

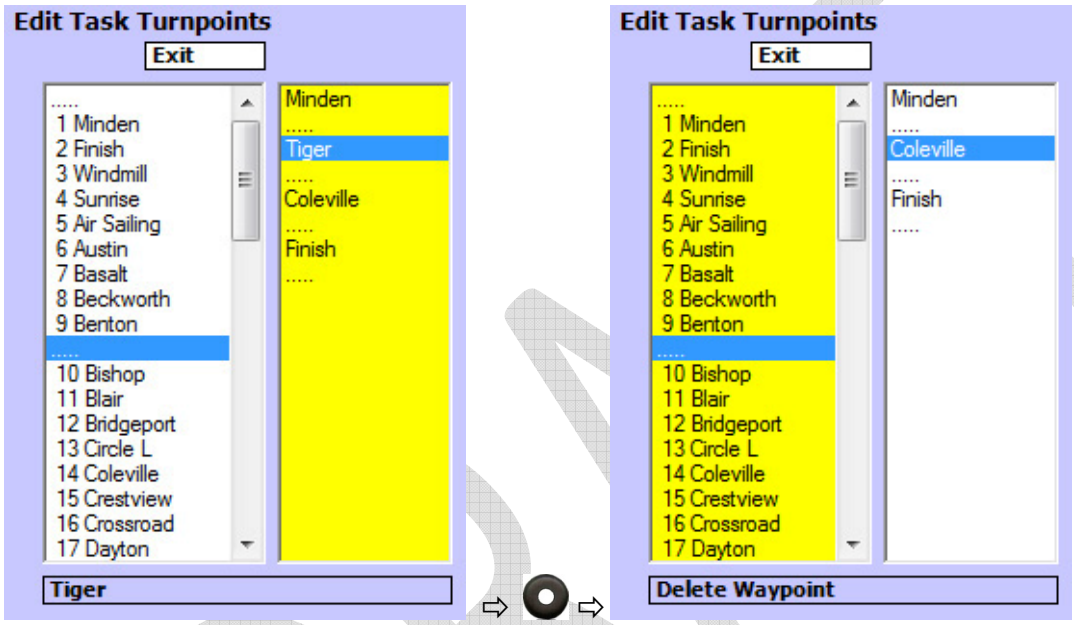
- Select the task turnpoint that you wish to replace in the *Task List* in the right window. In the screen capture below, "Tiger" is the turnpoint we want to replace.
- Select the new turnpoint from the turnpoint database in the left window. In the example below, "Air Sailing" is selected as the waypoint that will replace "Tiger".
- Press the *Select* button. In this example, "Air Sailing" will replace "Tiger" in the task list.



Delete a Turnpoint

To remove a turnpoint from the task list:

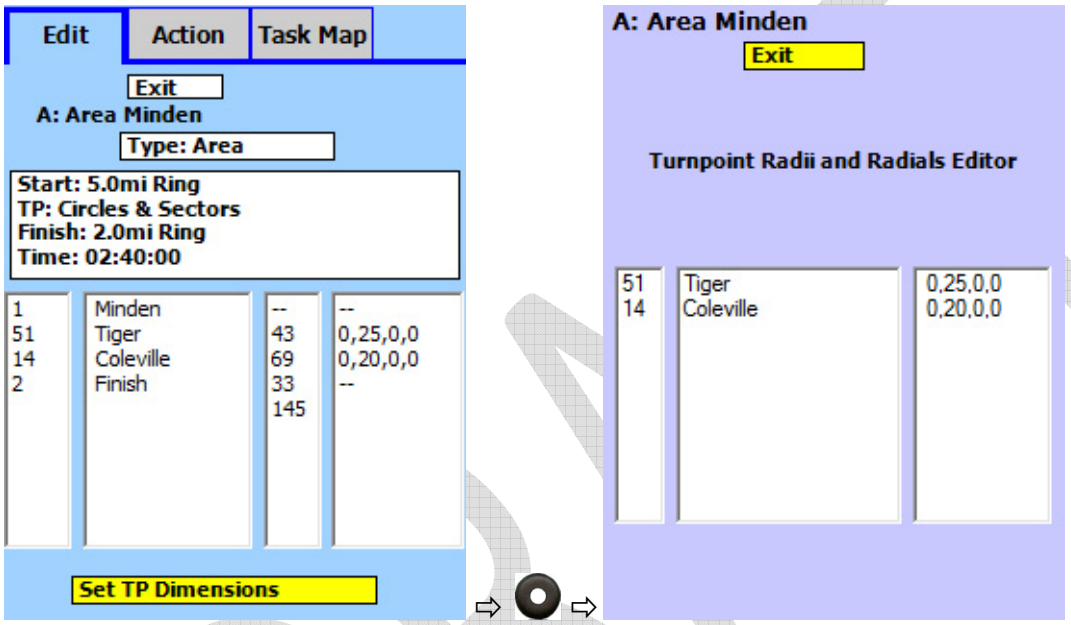
- Select any "….." (blank line) line in the left (*Turnpoint Database*) window. In the screen capture below, a blank line is selected between the "Benton" and "Bishop" turnpoints. Any blank line will work fine.
- Select the turnpoint you want to replace in the *Task List* in the right window. In the example below we want to remove "Tiger" from the task.
- Press the *Select* ⊙ button. In this example, "Tiger" will be removed from the task.



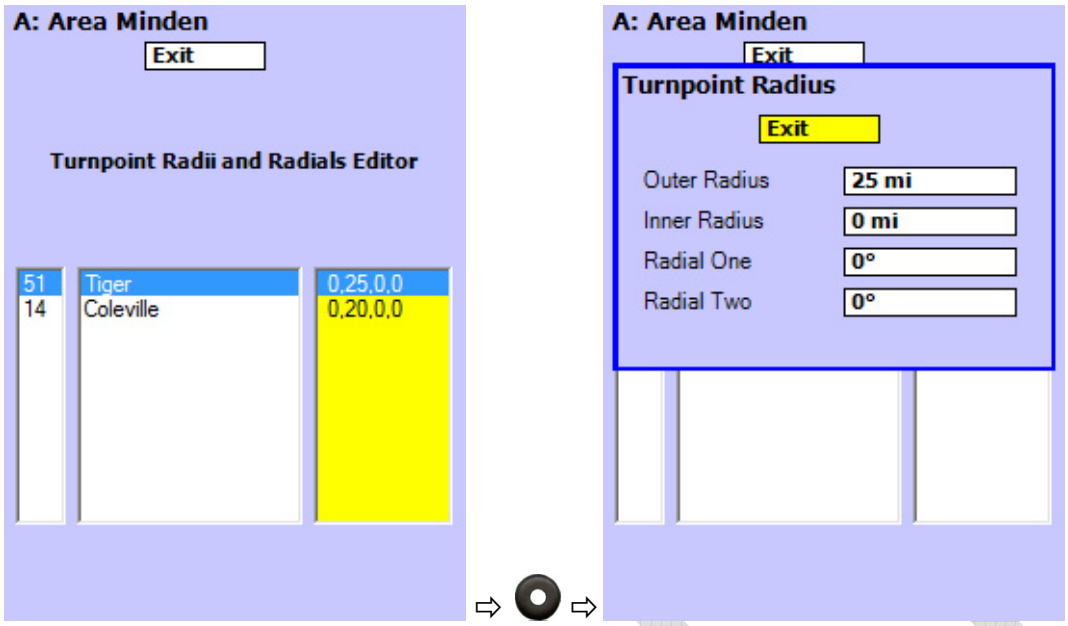
Set Turnpoint Dimensions

The *Set TP Dimensions* button is used to edit the parameters which define the turn areas for each turnpoint in an area task. They apply only to area tasks. The number of parameters that define the shape of the area depends on whether the area is defined only by circles (U.S. contests) or by radii and radials (pie wedges, contests outside the U.S.). In the examples below we will enable the more complex area shapes so those features can be seen. U.S. pilots don't need to worry about the inner radius or radial angles.

To edit the turnpoint dimensions, select the *Set TP Dimensions* button and press the *Select* button.



To edit turnpoint dimensions for a particular turnpoint, select the desired turnpoint in the list using the *Up* and *Down* buttons, Then press the *Select* button. An edit window for that turnpoint will appear.



To adjust the turnpoint dimensions, press the *Up* or *Down* button to highlight the desired parameter and press the *Select* button pop up the edit window for that parameter.

Press the *Up* or *Down* button to adjust the parameter in small steps.

Press the *Zoom Out (-)* button or *Zoom Out (-)* button to adjust the parameter in larger steps.

Press the *Select* button when done editing the parameter.

Press the **Exit** button to return to the list of turnpoints.

Press the *Menu* or *Focus* button to return to the moving map screen.

Edit the dimensions for each turnpoint in the same way.

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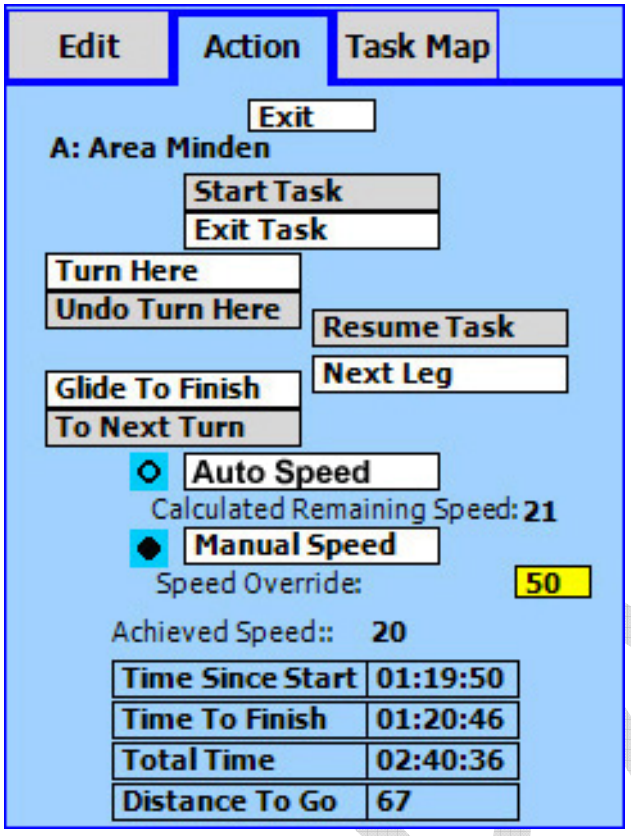
4.2.2.9.2 Task Action Tab

The *Task Action Tab* is used when flying a task. It can be used to start a task, exit a task, resume a task, move on to the next leg of a task, etc. Some very useful task statistics are also available in this tab.



To edit parameters in this screen, press the *Up* or *Down* button to highlight the desired parameter and press the *Select* button activate a feature or pop up the edit window for a parameter.

Press the Exit, *Menu* or *Focus* button to return to the moving map screen.

Note: Items that are grayed-out cannot be selected or edited.

- ***Start Task* Button**
  This button is used to start the task setup in the *Task Edit* tab. The task will start automatically when you exit the start cylinder or cross the start line – so you should never really need to press the *Start Task* button. The only reason use the *Start Now* button would be if you wanted to start without going through the start gate or across the start line, or if you had started but for some reason (GPS issue..?) the ClearNav did not think you had started.
- ***Exit Task* Button**
  The *Exit Task* button is used to exit the task if you decide to re-start or abandon the task.

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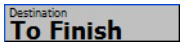
- ***Turn Here* Button**
  When you select the *Turn Here* button the task is redrawn with that point as the turnpoint and the active waypoint is changed to the next waypoint in the task.
- ***Undo Turn Here* Button**
  Select the *Undo Turn Here* button to resume navigation to the calculated ideal turnpoint within the current turn area.
- ***Resume Task* Button**
  The *Resume Task* button is used to resume the task after it has been suspended. The task is suspended any time you start navigating to a non-task turnpoint. For example, if you are getting low and use the *Map Cursor* to "Go To" a nearby airport, the task will be suspended. When the *Resume Task* button is pressed the ClearNav will resume navigating to the waypoint that it was navigating to when the task was suspended.
- ***Next Leg* Button**
  The *Next Leg b*utton is used to move on to the next leg of the task. For example, if you are currently navigating to the first turnpoint and have just rounded the turnpoint you would press the *Next Leg* button to tell the ClearNav to start navigating to the next turnpoint in the task. The ClearNav will automatically switch to the next leg when you enter the turn cylinder of an assigned task, but it will not automatically switch when flying an area task – because you will probably want to continue flying into the turn area rather than moving on as soon as you enter the turn area.
- ***Glide To Finish***
  The *Glide To Finish* button makes it possible to display final glide information around multiple turnpoints to the finish. The ClearNav will continue navigating to the current task turnpoint, but the *Final Glide Window*

will no longer display the differential final glide to the next turnpoint. It will display the final glide around the remaining task turnpoints to the finish. Also, the *Distance Window*

will show the distance around the remainder of the task. The Destination Window changes to "To Finish" 

to indicate that the final glide calculation is to the finish point. The other indicator that you are displaying the *Glide To Finish* number in the *Final Glide Window* is that the *Glide To Finish* button will be grayed-out and the *To Next Turn* button will be available.
- ***To Next Turn* Button**
  The *To Next* Turn button is paired with the *Glide To Finish* button. Only one of them is available at a time. The *To Next Turn* button is only available when "Gliding to Finish". Press the *Glide To Next Turn* button to resume displaying the final glide and distance to the active task waypoint.
- ***Achieved Speed***
  The *Achieved Speed* is the speed achieved from the start to your current position. It is a good reference for helping to calculate the *Calculated Remaining Speed* for the remainder of the task, but it is important to remember that the *Achieved Speed* will probably be quite a bit

slower than the speed you attain during the remainder of the task. That is because you will not be stopping to thermal when on final glide which will make your average speed go up significantly during the last part of the task.

- ***Calculated Remaining Speed***
  The *Calculated Remaining Speed* automatically takes the final glide into account making it unnecessary to try to use the *Achieved Speed* to manually calculate the speed for the remainder of the task.
- ***Speed Override***
  The *Speed Override* is a manually entered number representing the estimated average speed you will obtain during the remainder of the task (including final glide). It would be used if you believe that the *Calculated Remaining Speed* will not be accurate for one reason or another. If you edit this parameter, the ClearNav will automatically switch to *Manual Speed* mode.
- ***Auto Speed* Button**
  The *Auto Speed* button is used to allow the ClearNav to use the automatically calculated *Calculated Remaining Speed* – which is the default. Most pilots will probably use this most of the time. The ClearNav always automatically calculates *Calculated Remaining Speed* using your climb and glide performance to this point and taking into account the final glide portion of the flight during which the average speed will increase because you won't be stopping to thermal. The *Calculated Remaining Speed* is always displayed on this screen as a reference.
- ***Manual Speed* Button**
  When in *Manual Speed* mode the *Calculated Remaining Speed* can be used as a reference and you can manually set the *Speed Override*. Most pilots will probably use the *Auto Speed* mode most of the time. A good example of when it makes sense to manually enter the predicted speed is when you know that you will be flying much faster or slower for the remainder of the task due to changes in the weather or type of soaring flight – such as a cloud street or isolated storm up ahead or a transition to ridge running or wave flight. When in *Auto Speed* mode, manually editing the *Speed Override* will change the mode to *Manual Speed* mode.

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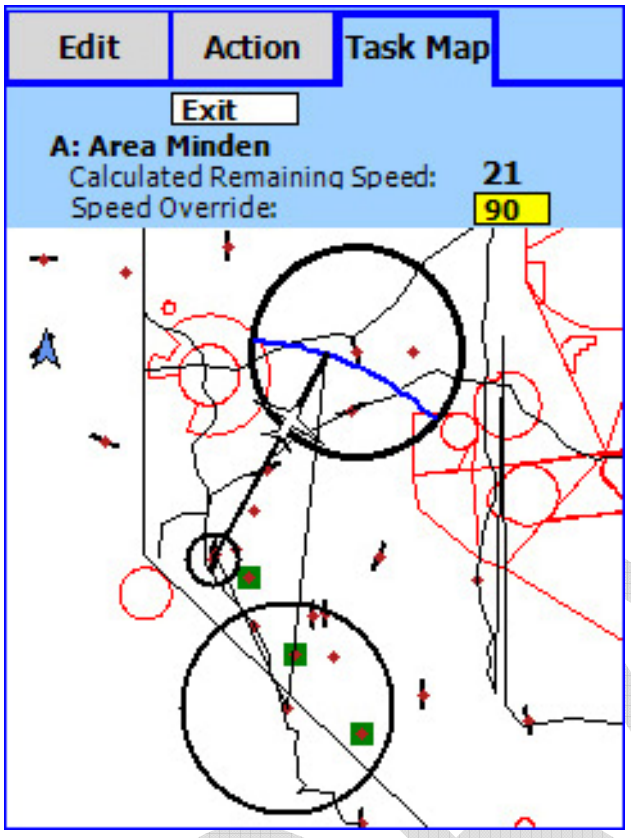
4.2.2.9.3 Task Map Tab

The *Task Map* tab gives a great overview of the entire task. You can see the turn areas and verify that they look as they should. You can see the blue recommended turn arc and even adjust the *Speed Override* to see how the blue arc moves with different estimated speeds.



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4.2.2.10 Map Icon

The *Map Icon* MAP is use to access the *Show On Map* window. The data in the *Show on Map* window is also available in the *Map Items* screen which is available through the *Setup Menus* icon / *Personal Preferences* tab / *Map Display Items* **Map Display Options** button / *Map Items* **Map Items** button.

/ MAP ⇨

or

/ / / **Map Display Options** / **Map Items** ⇨

Note that the *Show On Map* and *Map Items* screens are similar but slightly different. In the *Show On Map* screen you can enable, disable and erase the *Tracks* (small dots on the map showing where you have been). Also, the *Show On Map* screen has a *Culture* checkbox which is replaced by *Roads* and *City Areas* checkboxes on the *Map Items* screen. (Culture = Roads + City Areas)

The *Show on Map w*indow can be used to quickly and easily select the type of data to display on the moving map. The *Map Items* screen can be used to fine tune the display of map data. Experienced contest and cross-country soaring pilots would probably recommend keeping the information on the map to a minimum to reduce screen clutter and reduce the amount of time spent staring at the map – when your eyes should be looking out the window for traffic and analyzing nearby clouds. However, there are times when the colorful data on the map is extremely useful and important. The best part is

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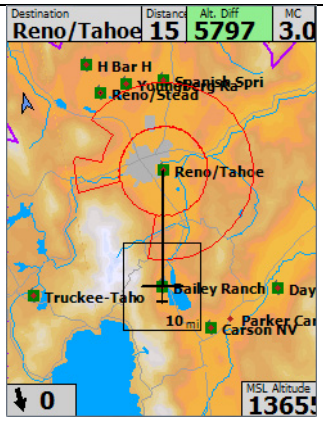
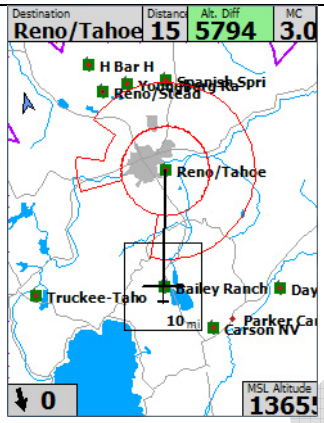
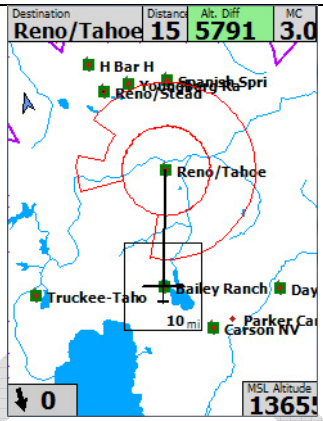
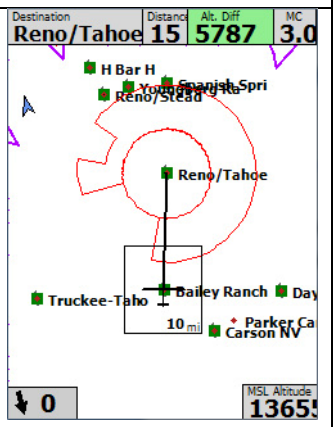
that it is easy to change the data to display in a few seconds while flying – so you don't need to be too worried about how you set it up. Below are 4 examples of various map display options.

Map Data Display Examples

			
• Airports • Airspace • Water Bodies • Roads • City Areas • Terrain	• Airports • Airspace • Water Bodies • Roads • City Areas	• Airports • Airspace • Water Bodies	• Airports • Airspace

- ***Terrain Data***
  Terrain Data is colorful ground elevation data which shows mountains, valleys, etc. In mountainous areas it is nice to be able to compare the terrain seen out the window with the terrain on the map. However, the colorful data can increase screen "clutter" and make it more difficult to see the data you need to see to fly the task – such as airports and airspace. Therefore, some pilots will opt to turn off the display of terrain data (especially when flying in flat regions) to improve the contrast of the display and to reduce screen clutter.
- ***Roads***
  Roads are displayed on the map in shades of grey. As with *Terrain* data, some pilots will want to view the *Roads* data to help them confirm that the cities viewed out the window match the data displayed on the map. Others will prefer to turn off the *Roads* data to reduce screen clutter.

  Note: The *Show on Map* window that is accessed using the *Map* Icon MAP does not have a checkbox for *Roads*. However, it does have a checkbox for *Culture*. *Culture* includes both *Roads* and *City Areas*.

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- ***Water Bodies***
  Water Bodies data includes rivers and lakes and other bodies of water. As with the *Roads, City Areas* and *Terrain* data, some pilots will want to view the data to help them confirm that the rivers and lakes viewed out the window match the data displayed on the map. Others will prefer to turn off the *Water Bodies* data to reduce screen clutter.
- ***City Areas***
  City Areas are displayed on the map in shades of grey. As with *Terrain* data, some pilots will want to view the *City Areas* data to help them confirm that the cities viewed out the window match the data displayed on the map. Others will prefer to turn off the *City Areas* data to reduce screen clutter.

  Note: The *Show on Map* window that is accessed using the *Map* Icon MAP does not have a checkbox for *City Areas*. However, it does have a checkbox for *Culture*. *Culture* includes both *Roads* and *City Areas*.

- ***Landable Only***
  The Landable Only checkbox is used to hide any waypoints that are not setup in the waypoint database as "Landable". It could be used when low to make it easy to view only airports or fields which can be used for landing. The default setting is unchecked – so that all waypoints will be displayed on the map, whether you can land there or not.

  Important Note: This feature is only as good as the data in the waypoint file. If the waypoint file has the "Landable" attribute assigned to airports that are not wide enough or long enough for your glider, you may have an "interesting" landing. It is your job to assure that the data in the waypoint file is correct.
- ***Tracks***
  The Tracks checkbox is used the enable or disable the display of glider tracks ("bread crumbs") on the map. The tracks can be extremely helpful for re-connecting with a lift source that was used minutes our hours earlier in the flight. The display of tracks is enabled by default.
- ***Erase Tracks***
  The Erase Tracks button can be used to erase all the flight track data displayed on the map. It does not affect the flight log data in the flight recorder. One situation in which you may want to erase the tracks is when the wind direction has changed significantly – making the circle tracks on the map from thermals earlier in the day useless.

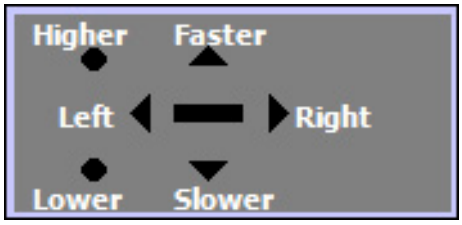
The *Up* and *Down* buttons are used to move through the options and the *Select* button is used to toggle the checkboxes on and off or to activate the Erase Tracks button.

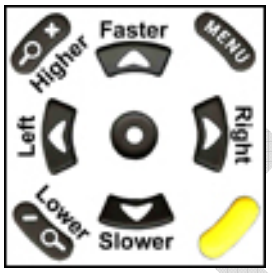
To exit the *Show On Map Window* press the *Menu* or *Focus* button, or use the *Up* and *Down* buttons to highlight the *Exit* button Exit and then press the *Select* button.

4.2.2.11 Simulator Icon

The ClearNav Simulator is a great way to play with the ClearNav on the ground. It allows you to fly the little glider on the screen around your local gliderport. You can turn, adjust the speed and even bump the altitude up and down using the remote control. We recommend taking it for a spin all the way around several tasks in the simulator before using the ClearNav in the glider.

The *Simulator Icon* is used to view the *Simulator Controller*. The *Simulator Controller* is used to make the glider in the simulator fly faster, slower, turn left or right, or to bump the altitude up or down. The image below shows the remote control features available in *Simulator* mode.

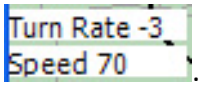




The image on the left is shown on the map screen when editing the simulator settings. The image on the right was created to make it very clear what each button on the remote does while the *Simulator Controller* is displayed.

The *Simulator Icon* is only visible when in Simulator mode.

Simulator mode can be entered upon startup, or using the *Menu* button / *Setup Menu Icon* / *Tools Tab* / *Simulator* button.

When the *Simulator Controller* is visible on the screen you can adjust the glider's speed, turn rate or altitude using the buttons on the remote control. When you adjust the turn rate or speed the current turn rate and speed will be displayed on the screen for a few seconds 

. A turn rate of zero will make the glider fly straight ahead. A turn rate that is greater than zero will turn the glider to the right and a turn rate that is less than zero will turn the glider to the left. The turn rate is in degrees/second. Note that the simulator uses turn rates that remain in effect until you change the rate back to zero. That way you can set the glider up in turn and it will continue to circle indefinitely.

Press the *Zoom In (+)* button to bump the glider's altitude up by 100 m (328 feet).

Press the *Zoom Out (-)* button to bump the glider's altitude down by 100 m (328 feet).

To hide the simulator controller, press the *Select*, *Menu* or *Focus* button.

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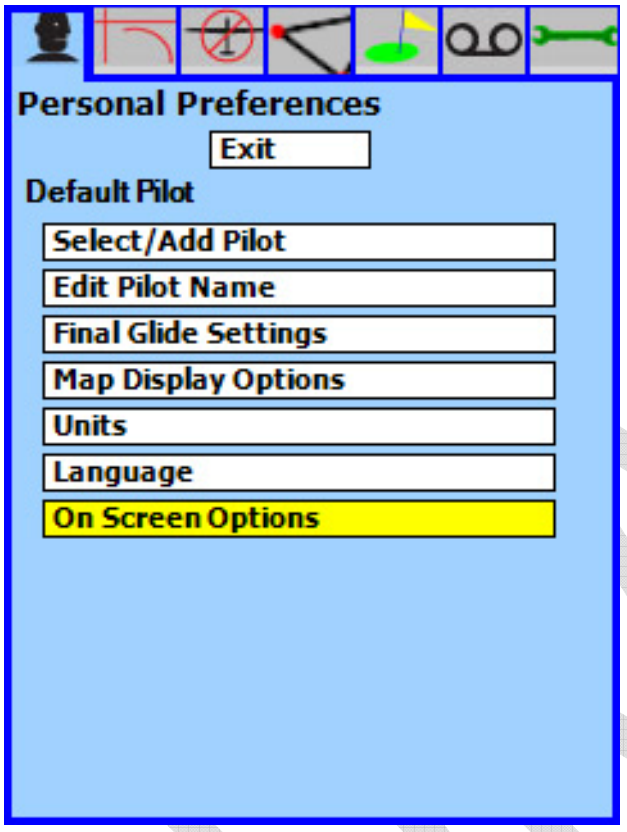
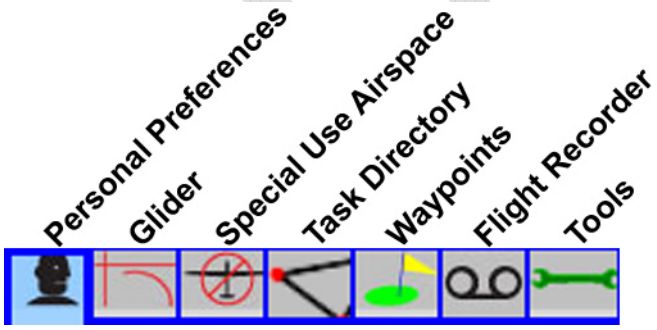
4.2.2.12 Setup Menus (Brief Introduction)

The *Setup Menu Icon* takes you to the *Setup Menus*. The *Setup Menus* are for setup items that are not generally changed in flight. It is highly recommended that you spend time going through the settings in every *Setup Menu* tab while on the ground to make sure that everything is set to match your preferences.

Details on the parameters in every *Setup Menu* are available in section 7.



The *Setup Menus* are arranged into 7 tabs:



The *Left* and *Right* buttons are used to select the desired tab.

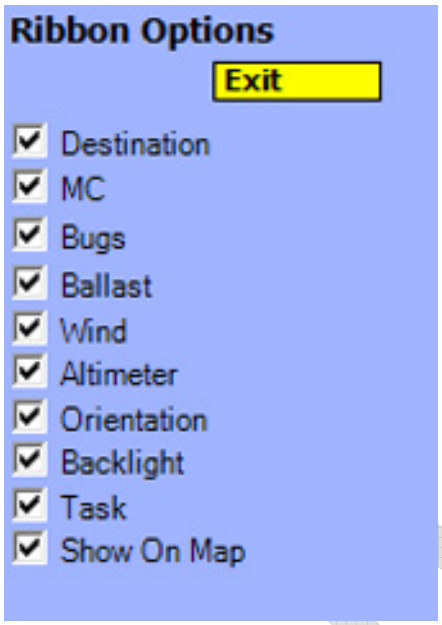
The *Up* and *Down* buttons are used to select the desired menu item within the tab you are viewing.

Press the *Select* button to select a menu item.

To exit the *Setup Menu* and return to the moving map screen press the *Menu* or *Focus* button, or use the *Up* and *Down* buttons to highlight the *Exit* button Exit and then press the *Select* button.

4.2.2.13 Ribbon Options Icon

The *Ribbon Options Icon* is used to select which icons to display in the *Ribbon Menu*.



The *Ribbon Options Menu*

The *Up* and *Down* buttons are used to move through the options and the *Select* button is used to toggle the checkboxes on and off.

To exit the *Ribbon Options Menu* press the *Menu* or *Focus* button, or use the *Up* and *Down* buttons to highlight the *Exit* button Exit and then press the *Select* button.

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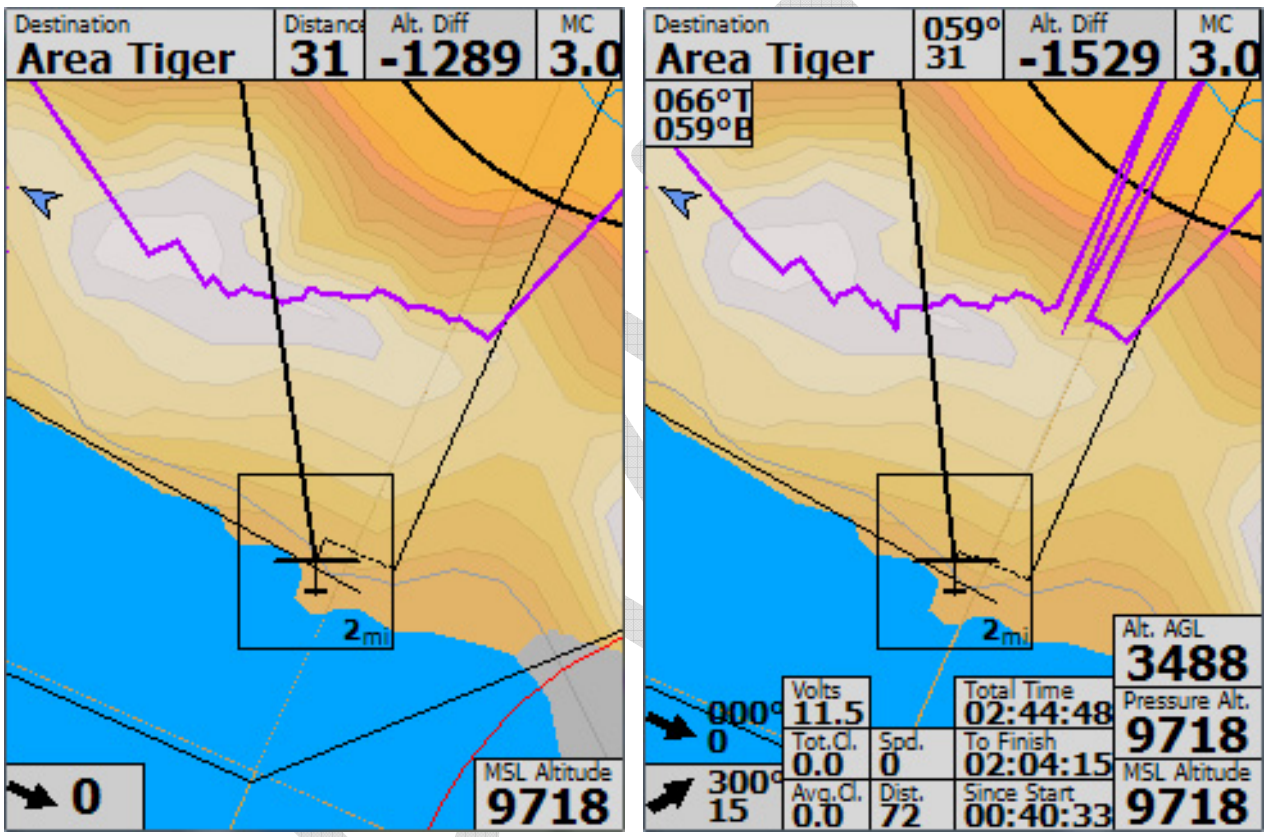
4.2.3 Numeric Data Display Options

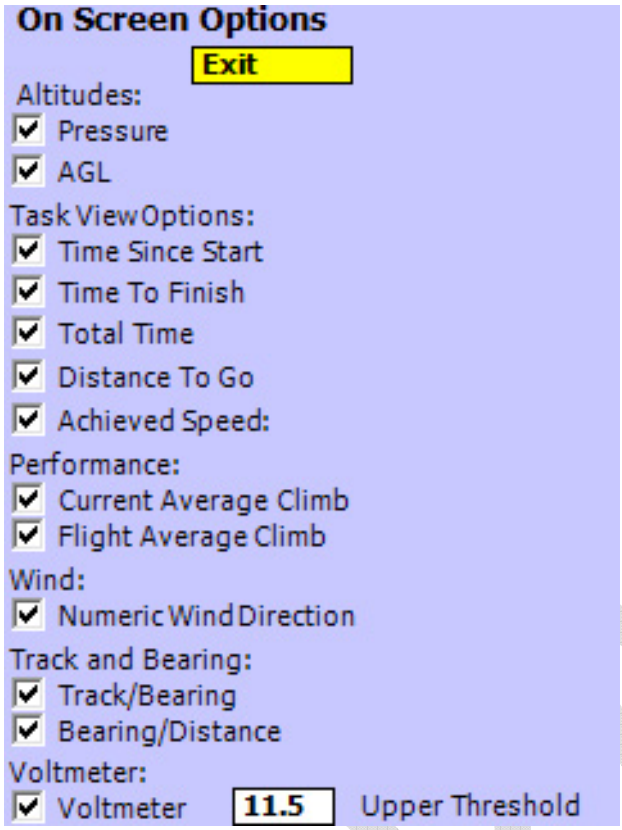
Several numeric data display windows can be displayed on the screen if desired. Experienced soaring pilots strongly recommend displaying only the minimum amount of information on the screen. That way you will not be tempted to stare at the numbers when you should be looking out for traffic and analyzing nearby clouds, etc. However, the ClearNav can display some very useful information which helps you make the most of your time in the air. Most pilots will display several, but not all of the optional data display windows.

Below are screen captures showing the 2 extremes. In the left image all the optional display windows were disabled. In the right image, all the available display windows were enabled.



To enable the desired data display windows, go to:

Menu button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options*



Use the *Up* or *Down* buttons to highlight the desired numeric data display option.

Press the *Select* button to enable or disable the checkbox for the highlighted item.

Press the Exit button to return to the *Personal Preferences* tab.

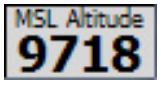
Press the *Menu* or *Focus* button to return to the moving map screen.

Below is a description of each available data window.

4.2.3.1 Altitudes

4.2.3.1.1 Altitude MSL

The *Altitude MSL* (mean sea level) window is always displayed in the lower right corner of the moving map screen.



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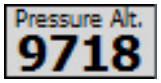
The *Altitude MSL* is the altitude that has been adjusted to compensate for changes from the standard atmosphere. You should edit the *Altitude MSL* before takeoff every time you fly by setting it to match the known airport elevation. For details on setting the altimeter, see section 4.2.2.7.

4.2.3.1.2 Pressure Altitude

When enabled, the *Pressure Altitude* window is displayed immediately above the *Altitude MSL* window in the lower right corner of the moving map screen.



The *Pressure Altitude* is the raw altitude from the pressure transducer and shows the altitude in a standard atmosphere. Since the local barometric pressure is not likely to match the standard atmosphere this number will be different than the MSL Altitude. This number is used when near special use airspace such as when near 18,000 feet in the USA.

To enable or disable the display of *Pressure Altitude:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / Altitudes / Pressure checkbox

4.2.3.1.3 Altitude AGL

The *Altitude AGL* is the approximate altitude above ground level. This is a very powerful feature because it makes it easy to know your approximate altitude above the terrain at a glance. You will find the Altitude AGL especially useful when flying in mountainous areas. Of course, the elevation model is not perfect, so don't count on this number to warn you about local objects that stand up above the general terrain elevation. The *Altitude MSL* is used to calculate the Altitude AGL so it is important to set the *Altitude MSL* before takeoff. For details on setting the altimeter, see section 4.2.2.7. The *Altitude AGL* is calculated by subtracting the ground elevation (from the built-in ground elevation model) from the *Altitude MSL*.

To enable or disable the display of *Altitude AGL:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / Altitudes / AGL checkbox

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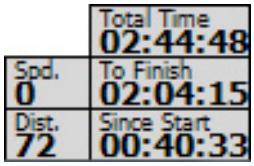
4.2.3.2 Task View Options

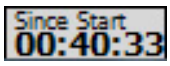


The task view data windows display several parameters which are useful when flying tasks – especially contest tasks with assigned minimum task times. All the parameters in this group of data windows are also available in the *Task Action* tab. Therefore, if you want to limit screen clutter by disabling the display of one of these numbers, you can still access them somewhat quickly in flight.

To access the *Task Action* tab:

> *Menu* button / *Task* icon / *Left* and *Right* buttons to select the *Task Actions* tab

4.2.3.2.1 Time Since Start

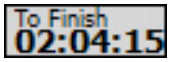


The *Time Since Start* is the time in hours, minutes and seconds (hh:mm:ss) since the task was started.

To enable or disable the display of *Time Since Start:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / *Task View Options*: / *Time Since Start* checkbox

4.2.3.2.2 Time To Finish



The *Time To Finish* is the estimated time in hours, minutes and seconds (hh:mm:ss) remaining until the task is finished. The time *To Finish* is estimated by dividing the *Distance To Go* by the *Predicted Speed*.

To enable or disable the display of *Time To Finish:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / *Task View Options*: / *Time To Finish* checkbox

4.2.3.2.3 Total Time

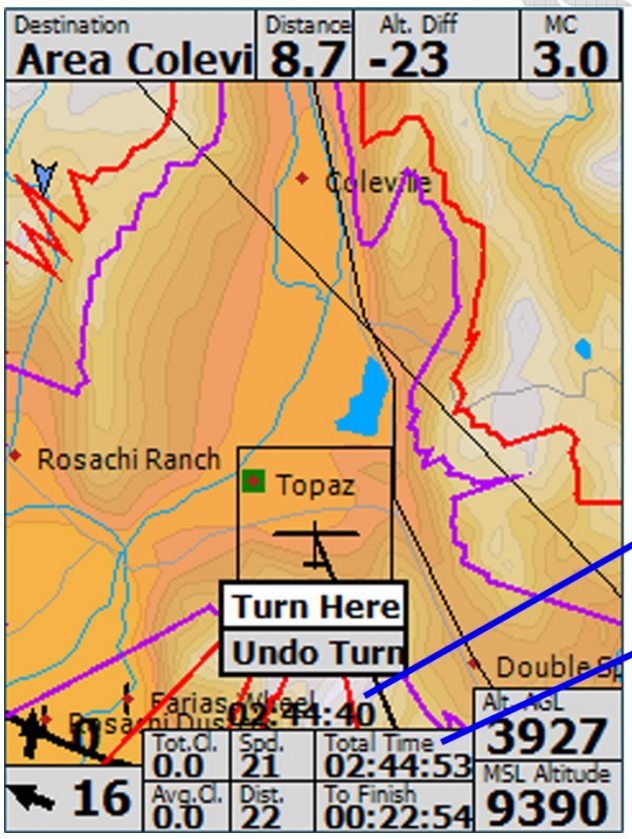
The *Total Time* is the estimated time from start to finish to complete the task. It is calculated by adding the *Time Since Start* to the *Time To Finish*. This number is extremely useful when flying tasks that have a minimum task time. You may want to display this number when flying contest tasks. As long as the *Total Time* is longer than the minimum task time assigned by the contest managers, you are doing fine. If the *Total Time* is less than the minimum task time then you may need to fly farther into turn areas or add turnpoints to free tasks.

To enable or disable the display of *Total Time:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / *Task View Options*: / *Total Time* checkbox

4.2.3.2.4 Total Task Time If You Turn Here

There is an additional number displayed above the *Total Time* window (see image below) when you are in the final turn area of the task. It is the *Total Task Time If You Turn Here*. It is shown regardless of which of the parameters you select for display on the moving map screen. This is a fantastic feature! If you are displaying the *Total Time* on the moving map it will show the total task time if you fly to the turnpoint shown on the map. The *Total Task Time If You Turn Here* is the total task time if you turn for home now. By comparing those 2 numbers to the minimum task time you will know exactly when to turn for home. We recommend waiting until the *Total Task Time If You Turn Here* is 3 to 5 minutes over the minimum task time – to make sure you make sure you don't get home early. The screen image below should help clarify the 2 numbers. The image below was made using the PC simulator so the numbers don't look right. Normally, the *Total Task Time If You Turn Here* would be quite a bit less than the *Total Time*.



In Last Turn Area:

Total Task Time if you turn for home now

Total Task Time if you go to the turnpoint shown on the map

4.2.3.2.5 Distance To Go

The *Distance To Go* is the distance from your current location around all remaining task turnpoints to the finish point. The units are the distance units selected in the setup screens – such as miles or kilometers.

To enable or disable the display of *Distance To Go:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / *Task View Options*: / *Distance To Go* checkbox

4.2.3.2.6 Achieved Speed

The *Achieved Speed* is the average speed since the start of the task.

To enable or disable the display of *Achieved Speed:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / *Task View Options*: / *Achieved Speed* checkbox

4.2.3.3 Performance

4.2.3.3.1 Current Average Climb (Climb Rate Average for Current Thermal)

This is the average climb rate in the current thermal. It is a very handy number.

To enable or disable the display of *Current Average Climb:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / Performance: / *Current Average Climb* checkbox

4.2.3.3.2 Flight Average Climb (Climb Rate Average Since Start

This is the average climb rate since take-off – or since the start of the task. The number is automatically reset when the task is started because the data measured before the start of the task is likely to be very different from the data measured after the start of the task. Many pilots will find that this number is much lower than their best guess at their average climb rate. This number is theoretically a great number to use as a recommended *MacCready* setting.

To enable or disable the display of *Flight Average Climb:*

> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / Performance: / *Flight Average Climb* checkbox

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4.2.3.4 Wind

Wind speed and direction information is always displayed in the lower left corner of the moving map screen. The wind speed and direction is calculated automatically by the ClearNav using GPS position data to analyze wind drift while circling. If a Cambridge 302 or other supported device is connected the ClearNav receives wind speed and direction data from that device. The wind measured by the 302 is calculated using both GPS data and airspeed data, so it can be calculated while cruising – which is a huge advantage when flying in ridge or wave lift.

Default Wind Speed and Direction Window

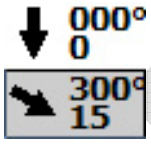
When *Manual Wind* is entered, the *Calculated Wind* is displayed as a reference immediately over the manually entered wind data. That makes it easy to verify that the manually entered wind makes sense.

To enter manual wind speed and direction:

> *Menu* button / *Wind* icon

For details on entering manual wind data see section 4.2.2.5.

4.2.3.4.1 Numeric Wind Direction



Some pilots like to see a numeric depiction of the wind direction in addition to the wind arrow. That is possible by enabling the display of *Numeric Wind Direction.* The downside to enabling the *Numeric Wind Direction* is that the numbers are smaller – making it more difficult to read in fight.

To enable or disable the display of *Numeric Wind Direction:*

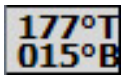
> *Menu* button / *Setup Menu* icon / *Personal Preferences* tab / *On Screen Options* / Wind: / *Numeric Wind Direction* checkbox

4.2.3.5 Track and Bearing

4.2.3.5.1 Track/Bearing

The *Track/Bearing* window displays the sailplane's current track and bearing. The track is the direction the sailplane is moving. The bearing is the direction to the active turnpoint. This option is likely to be

especially popular with power pilots – who seem to be accustomed to viewing the track and bearing. However, we recommend turning this feature off and simply turning the sailplane until the line on the map from the glider to the turnpoint is pointing straight up. This graphical approach is easier to read and understand at a glance.



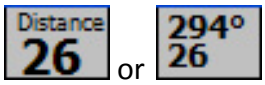
Track of 177° and bearing of 015°

To enable or disable the display of the *Track/Bearing* window:

> *Menu* button / *Setup Menu Icon* / *Personal Preferences* tab / *On Screen Options* / *Track and Bearing* / *Track/Bearing* checkbox

4.2.3.5.2 Bearing/Distance

This option does not enable a new window. Instead it adds the *Bearing* to the *Distance* window at the top center of the moving map. The bearing is the direction to the active turnpoint.



or

The *Distance Window* is located in the top row of the moving map screen, between the *Destination* and *Final Glide* windows. It always displays the distance to the destination and can optionally display both the distance and bearing to the destination. However, when the display of bearing is enabled, the numbers in the window get much smaller (making it more difficult to read in flight), and the "Distance" label is no longer shown (making it more difficult to remember what the numbers mean after not flying for a while).

To enable or disable the display of bearing information:

> *Menu* button / *Setup Menu Icon* / *Personal Preferences Tab* / *On Screen Options* / *Track and Bearing* / *Bearing/Distance* checkbox

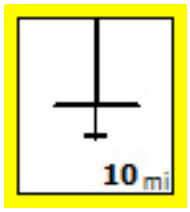
4.2.3.6 Voltmeter

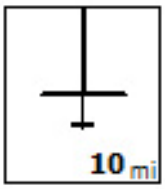
The *Voltmeter* window displays the battery voltage. The *Voltmeter Upper Threshold* parameter is used to determine the voltage below which the voltmeter will be displayed. For example, if the *Voltmeter Upper Threshold* is set to 11 volts, the *Voltmeter* window will appear when the battery voltage drops below 11 volts.

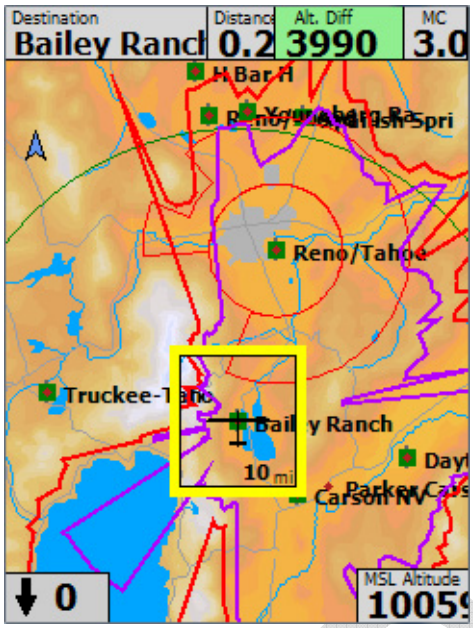
To enable or disable the Voltmeter window:

> *Menu* button / *Setup Menu Icon* / *Personal Preferences Tab* / *On Screen Options* / *Voltmeter* / *Voltmeter* checkbox

4.2.4 The Map Cursor



or




The *Map Cursor* is displayed in the center of the map display. It is used to:

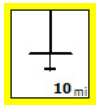
- Pan the moving map display with the *Up*, *Down*, *Left* and *Right* buttons
- Select a turnpoint so that you can view details on it or start navigating to it (Go to) or add it to the active task
- Select an airspace and view details on it or turn it off for 12 hours
- The distance number in the bottom right corner of the box indicates the width of the moving map window. For example, if the number is 10 the distance across the entire map from side to side is 10 miles or kilometers (depending on the unit's settings).

Activating the *Map Cursor* (making it yellow)
The *Map Cursor* is highlighted with a yellow border when it is active. To activate it press the *Focus* button once or twice. To minimize clutter, the yellow highlight times-out after about 5 seconds.

4.2.4.1 Pan the Moving Map Display

To Pan the map screen is to move it around (as if sliding a map across the top of a table) so you can see regions of the map that were not previously in view.

To Pan the moving map screen:

Press the *Focus* button once or twice until the yellow box is displayed around the *Map Cursor* 

Note: The *Map Cursor* does not necessarily need to be highlighted to pan the map, it is OK if the highlight has timed out. But panning will not work if some other item (such as the *Turn Here* button) is highlighted.

Use the *Up*, *Down*, *Left* and *Right* buttons to pan the map

To cancel panning and reset the map to the current location:

Press the *Focus* button or *Menu* button

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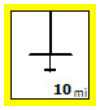
4.2.4.2 To View Data on a Nearby Turnpoint and Start Navigating to it

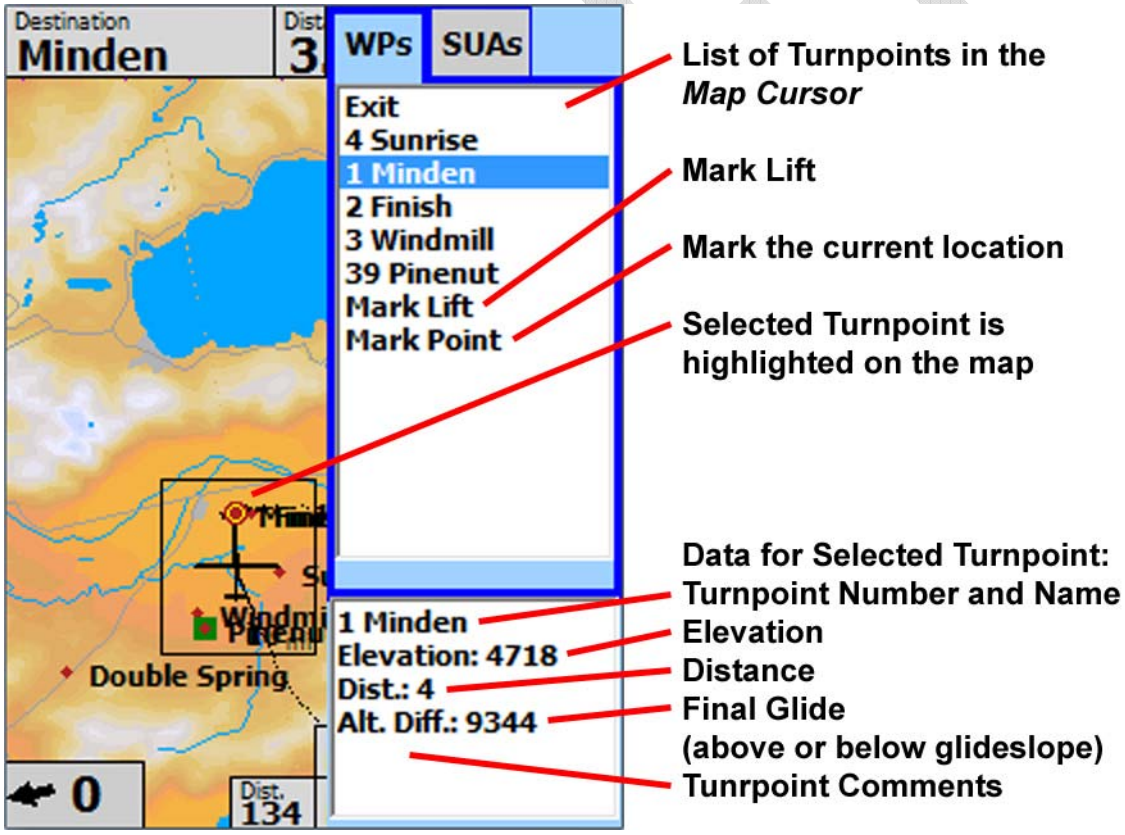
The *Map Cursor* makes it easy to select a nearby airport and start navigating to it. To do so:

Press the *Focus* button once or twice until the yellow box is displayed around the *Map Cursor* 

Use the *Up*, *Down*, *Left* and *Right* buttons to move the *Map Cursor* around the desired turnpoint. It is OK to have multiple turnpoints in the box as you will get the opportunity to select the desired turnpoint from a list of the turnpoints that are in the box. You can pan the map in any direction by moving the *Map Cursor* off the edge of the map.

Press the *Select* button. A list of the turnpoints in the box will be displayed.

If desired, use the *Left* and *Right* buttons to switch between the *WPs* and *SUAs* tabs.



Use the *Up*, *Down* buttons to move through the list of turnpoints and select the desired turnpoint. Note that data for the selected airport is shown at the bottom of the screen.

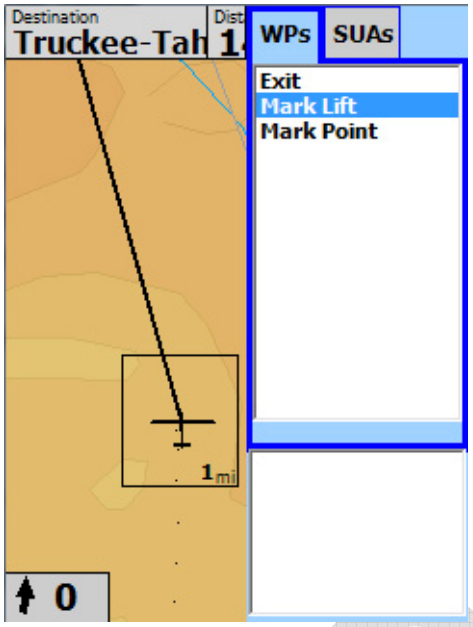
Press the *Select* button to start navigating to the selected turnpoint.

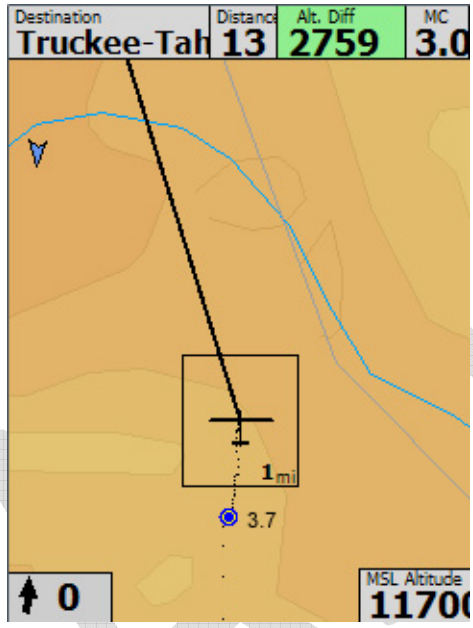
Press the *Focus* or Exit button to return to the moving map.

4.2.4.3 Mark Lift

The *Mark Lift* feature is a powerful new tool for the soaring pilot. The glider's current climb rate is "stamped" onto the map in the current location for future reference. It can be used to mark strong wave lift or thermal lift so that you can come back and use it again later in the flight.

Mark Lift points are deleted when the ClearNav is shut down.





To mark the current lift on the map:

Press the *Focus* button once or twice until the yellow box is displayed around the *Map Cursor*

Press the *Select* button. A list of the turnpoints in the box and the *Mark Lift* and *Mark Point* options will be displayed.

Use the *Down* button to select the *Mark Lift* option.

Press the *Select* button.

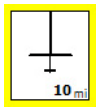
Note: It is not possible to select a previously marked *Mark Lift* point. However, you can navigate to a *Mark Lift* point by viewing it on the map and turning the glider until the *Mark Lift* point is directly in front of the glider.

4.2.4.4 Create a *Mark Point*

A *Mark Point* is a waypoint that is created using the *Map Cursor*. If you have not moved the *Map Cursor* the *Mark* Point will be created at the current location of the glider. If you have moved the *Map Cursor* it is created at the location of the cross-hair ("+") at the center of the *Map Cursor*. It can be used in flight to mark the location of some reference point on the ground, or some event that you want to mark in the flight. It can also be used to create points before flight. However, *Mark Points* do not appear in the list of waypoints used for creating tasks – so it is not possible to create a task using *Mark Points*.

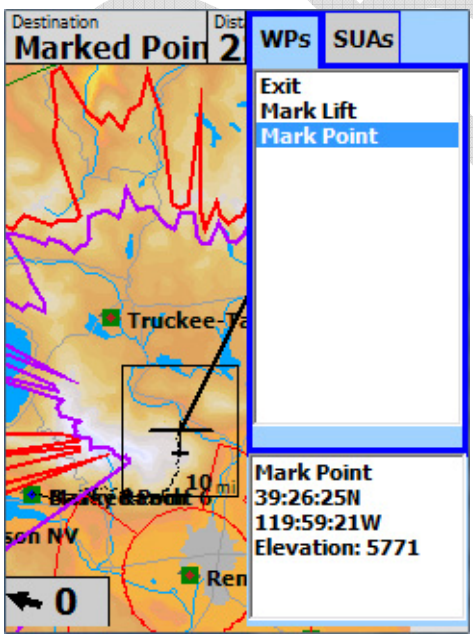
Every time you add a new *Mark Point* it is saved into a waypoint file called "MarkedWaypoints.stx" so that it will appear the next time you fly. Each new *Mark Point* is given a new name – such as "Marked Point 1", "Marked Point 2", etc.

To create a *Mark Point*:

Press the *Focus* button once or twice until the yellow box is displayed around the *Map Cursor* 

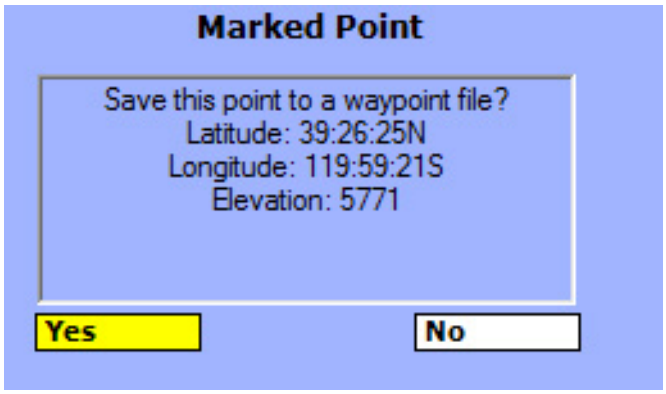
Use the *Up*, *Down*, *Left* and *Right* buttons to put the *Map Cursor* at the location of the desired turnpoint.

Press the *Select* button. A list of the turnpoints in the box will be displayed, along with the *Mark Point* option.

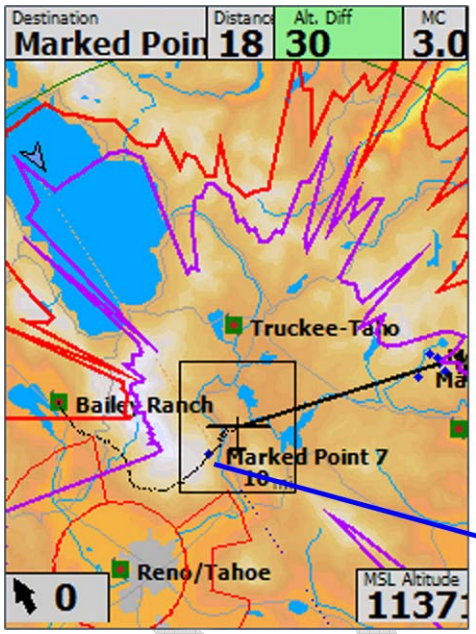


Use the *Up*, *Down* buttons to select *Mark Point* at the bottom of the list of turnpoints.

Press the *Select* button to mark the point.



Use the *Left* and *Right* buttons to select "Yes" to save the new *Mark Point* or "No" to cancel.



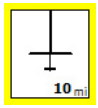
The image above shows how a *Mark Point* looks on the map.

To delete a *Mark Point* from the waypoint file:

Setup Menu / *Waypoints* Tab / *Edit Waypoints* button / select the desired *Mark Point* / *Edit Waypoint* button / *Delete Waypoint* button.vnn

4.2.4.5 To View or Disable Nearby Airspace

The *Map Cursor* can be used to view details on local airspace or disable or re-enable airspace. To do so:

Press the *Focus* button once or twice until the yellow box is displayed around the *Map Cursor* 

Use the *Up*, *Down*, *Left* and *Right* buttons to move the *Map Cursor* over the desired airspace section. It is OK to have multiple airspace sections in the box as you will get the opportunity to select the desired airspace from a list of the airspace sections that are in the box. The airspace you are interested in does not need to be completely enclosed by the *Map Cursor*. You can pan the map in any direction by moving the *Map Cursor* off the edge of the map.

Press the *Select* button. A list of the airspace sections touched or inside the box will be displayed.

Use the *Right* button to switch to the *SUAs* tab.

Use the *Up*, *Down* buttons to move through the list of airspace sections. Note that data for the selected airspace section is shown at the bottom of the screen.

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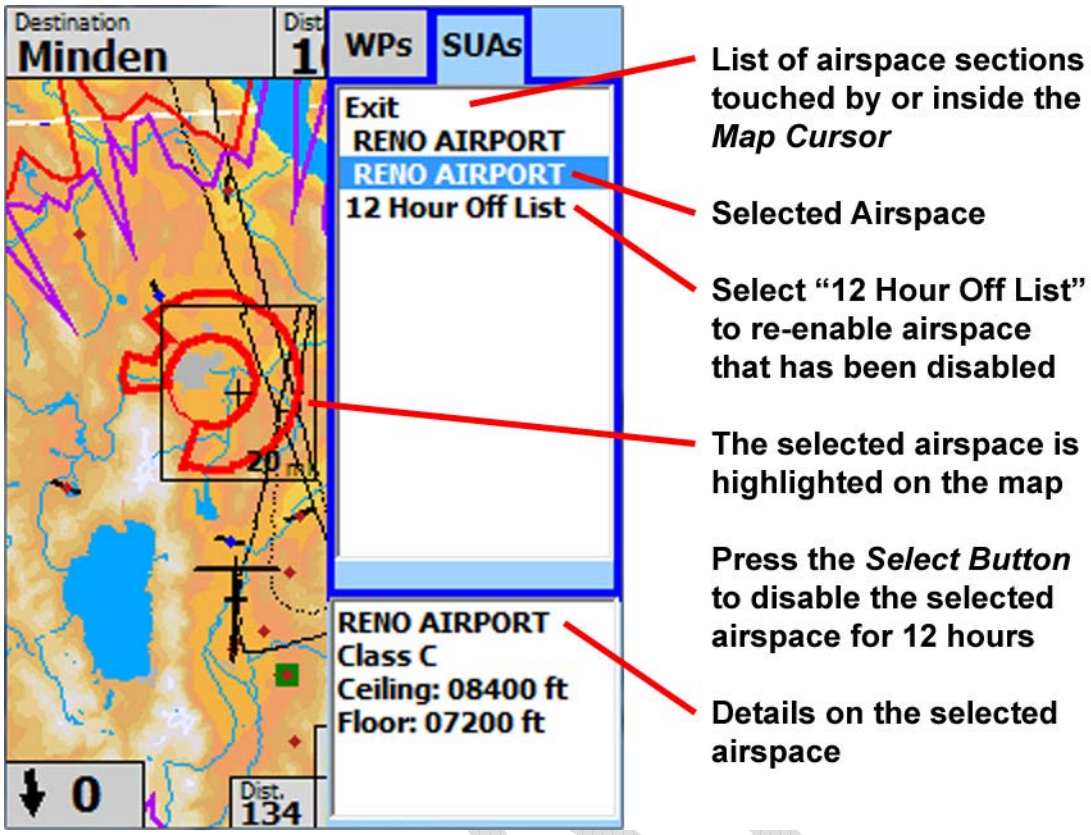
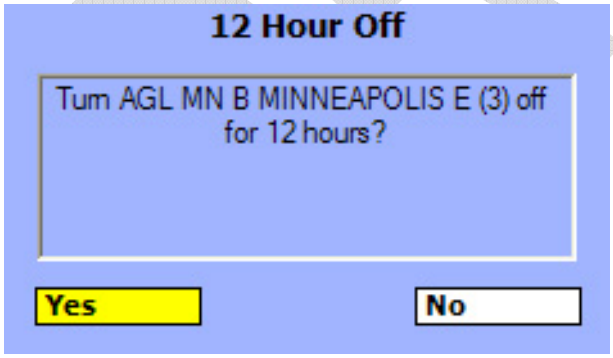
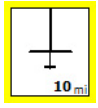


Press the *Select* button to disable the selected airspace for 12 hours. A confirmation dialog will give you the option to continue or cancel (see below). Press "Yes" to disable it or "No" to cancel. It will not be deleted from the airspace data file – it will only be disabled for 12 hours. It will automatically appear the next time you power-up the ClearNav.



4.2.4.6 To Re-Enable Airspace that has been Disabled:

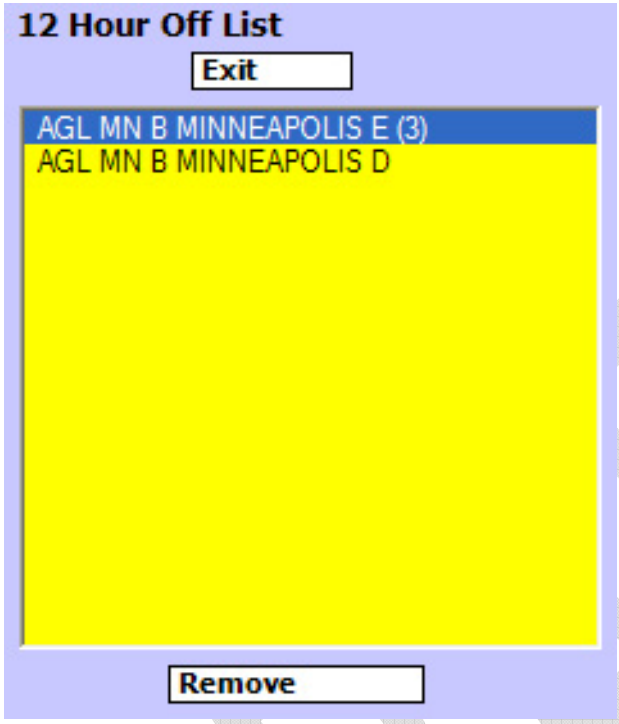
Press the *Focus* button once or twice until the yellow box is displayed around the *Map Cursor* 

Press the *Select* button.

Use the *Right* button to switch to the *SUAs* tab.

Use the *Down* button to move down to the "12 Hour Off List" item.

Press the *Select* button. The *12 Hour Off List* will be displayed.



Use the *Up*, *Down* buttons to select the airspace you want to re-enable.

Press the *Select* button to select it. The *Remove* button will be highlighted.

Press the *Remove* button to remove it from the *12 Hour Off List* – which re-enables it.

If desired, select and remove other airspace sections in the same fashion.

Press the *Focus* or Exit button to return to the moving map.

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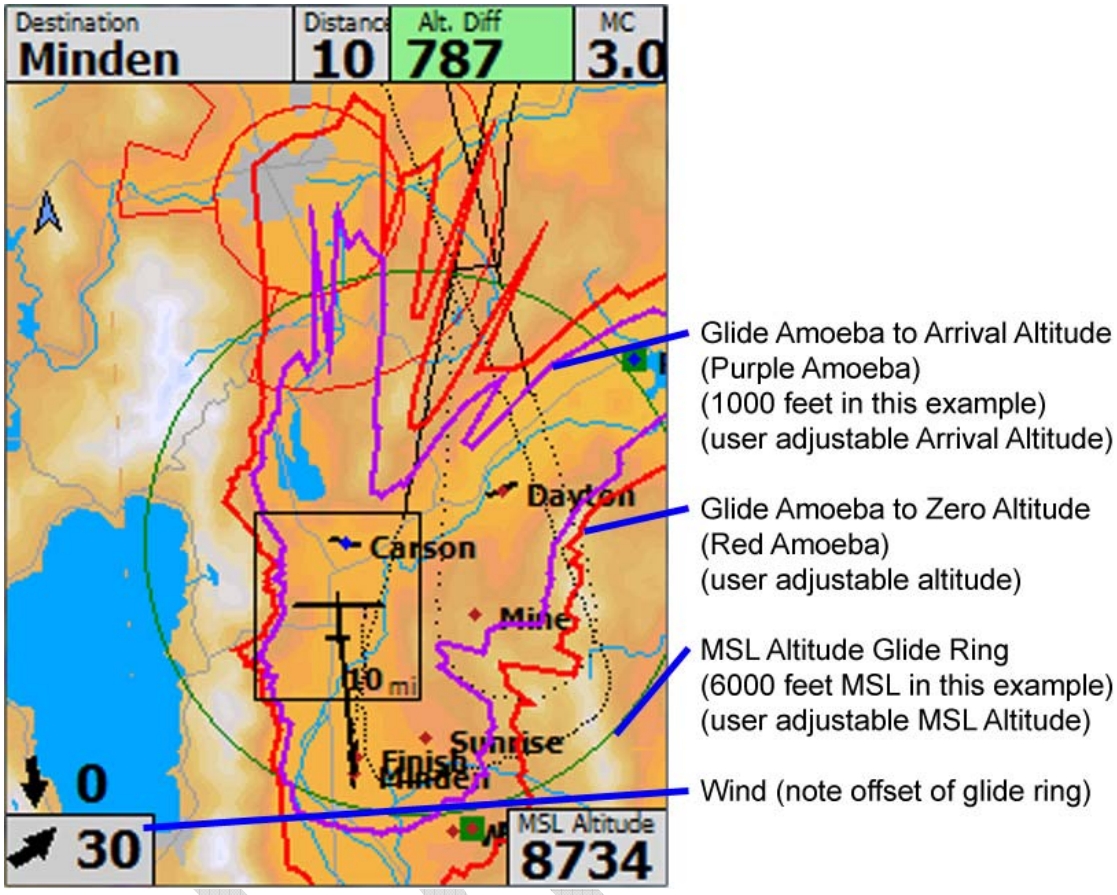
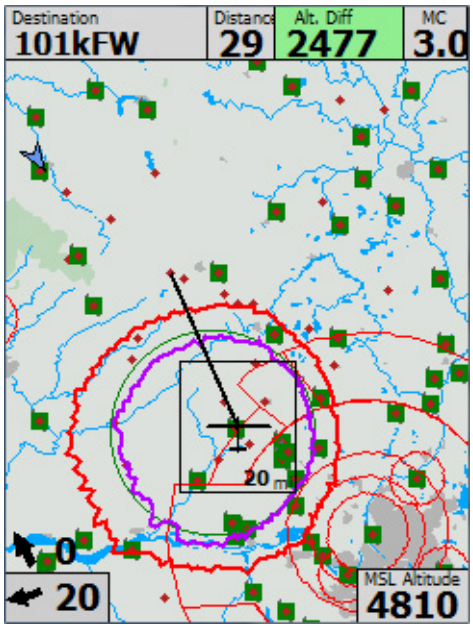
4.2.5 Glide Amoebae

The *Glide Amoebae* (plural form of Glide Amoeba) are powerful graphical display items which make it obvious at a glance how far you can glide in any direction. Any airport or field that is inside the *Glide* Amoebae is within glide range. There are 2 *Glide Amoebae* displayed on the map. The arrival altitudes for each *Glide Amoeba* are adjustable. There is also an optional *MSL Altitude Glide Ring* which is described in the next section.



Example showing the *Glide Amoebae* in mountainous terrain

As you can see in the image above the *Glide Amoebae* can take on strange "amoeba-like" shapes when flying in mountainous terrain. The purple *Glide Amoeba* has a flat spot on the top left side where a mountain ridge is located. The points where the *Glide Amoeba* shoots out (such as at the left side) is where there is a mountain pass that can be glided through and on into the valley beyond.



Example showing the Glide Amoebae in flat terrain

In flat terrain the *Glide Amoebae* are simple circles that are offset by the wind.

The *Glide Amoebae*'s location is calculated using:

- The glider's polar
- The wind speed and direction
- The glider's *MSL Altitude*
- The elevation of the surrounding terrain
- The glider's airspeed – The final glide calculations are based on total energy final glide. As you fly faster your glider has more energy and could pull up to gain altitude and range. For example, if 2 identical gliders were at the same location and altitude but different airspeeds, the one at high airspeed would have more energy and could pull up to gain more altitude. Therefore the *Glide Amoebae* for the glider at high speed would be displayed farther away from the glider than the *Glide Amoebae* of the glider at lower airspeed.

To access the settings for the *Glide Amoebae* go to:

Menu button / *Setup Menu Icon* / *Personal Preferences Tab* / *Final Glide Settings*

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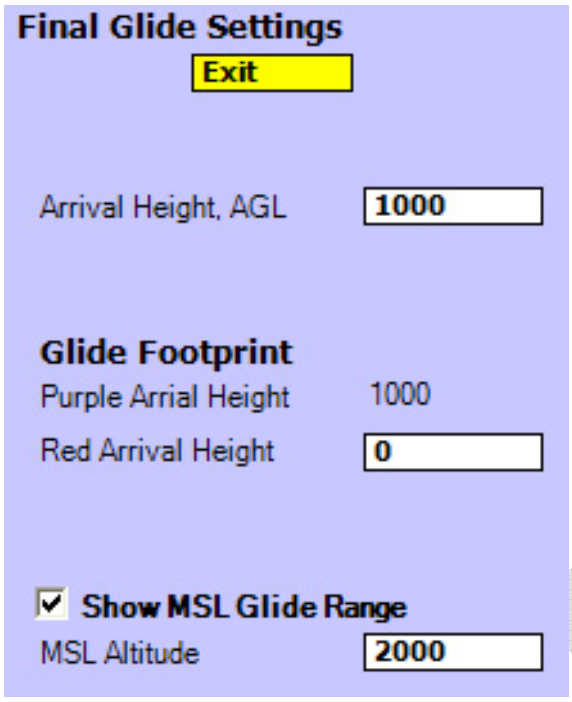
Final Glide Settings
Exit
Arrival Height, AGL
1000
Glide Footprint
Purple Arrial Height
1000
Red Arrival Height
0
Show MSL Glide Range
MSL Altitude
2000

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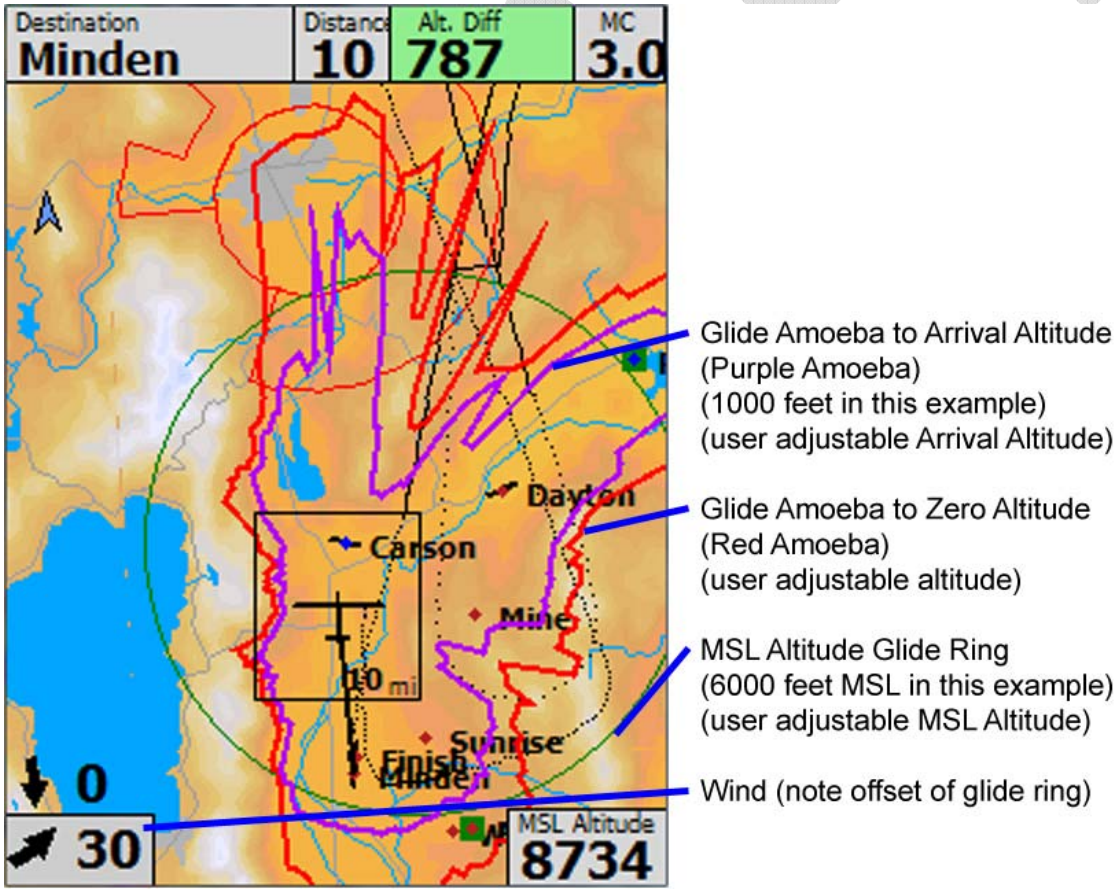
4.2.6 MSL Altitude Glide Ring

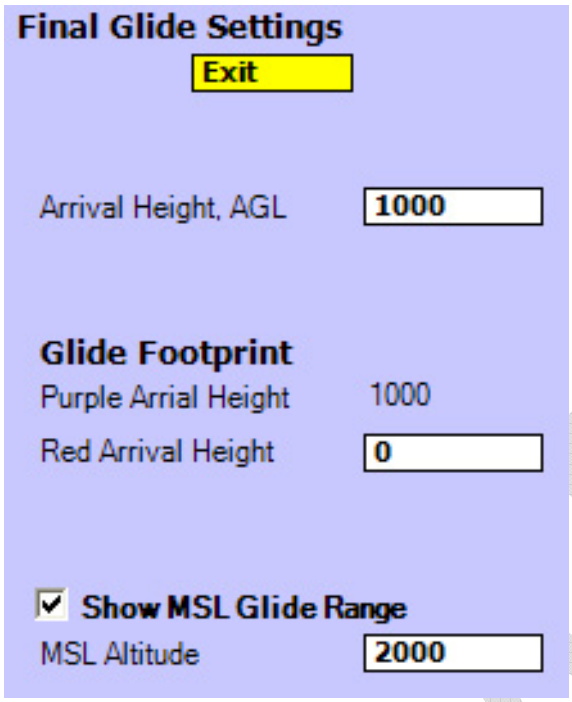
The *MSL Altitude Glide Ring* can be displayed on the map to show how far you can glide descending down to the user selected MSL Altitude. This option is a neat idea, but we aren't sure yet how useful it will be. If you don't use it we recommend turning it off to limit the amount of information on the map. In still air you can glide from your current location all the way to the *MSL Altitude Glide Ring*. You will arrive at the ring at the user selected MSL Altitude. The ring will only display when the glider is at an altitude that is higher than the user selected *MSL Altitude* entered for the *MSL Altitude Glide Ring.* As you increase the number entered in the *MSL Altitude* the ring will get closer to the glider because the difference in altitude will get smaller.

The *MSL Altitude Glide Ring* may be useful is when trying to overfly an airspace region. For example, if there is airspace nearby that has a ceiling of 3000 feet MSL, you could set the *MSL Altitude Glide Ring* to 3000 feet (or 3200 feet to be conservative). If the airspace you want to fly over is completely inside the *MSL Altitude Glide Ring* then you know that you can glide over it. If the airspace region extends beyond the *MSL Altitude Glide Ring* then you know that you can't make it all the way across the airspace region without descending down into it.



To access the settings for the *MSL Glide Ring* go to:

Menu button / *Setup Menu Icon* / *Personal Preferences Tab* / *Final Glide Settings*



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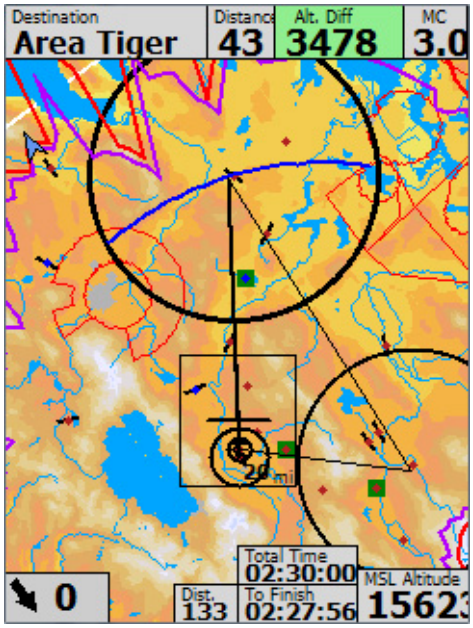
4.2.7 Area Task Turn Arc

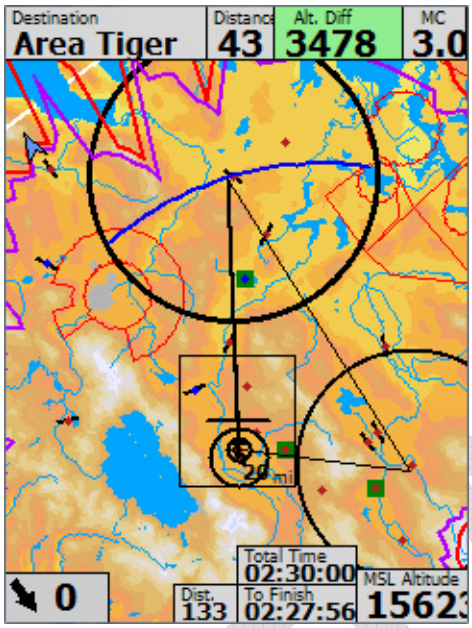
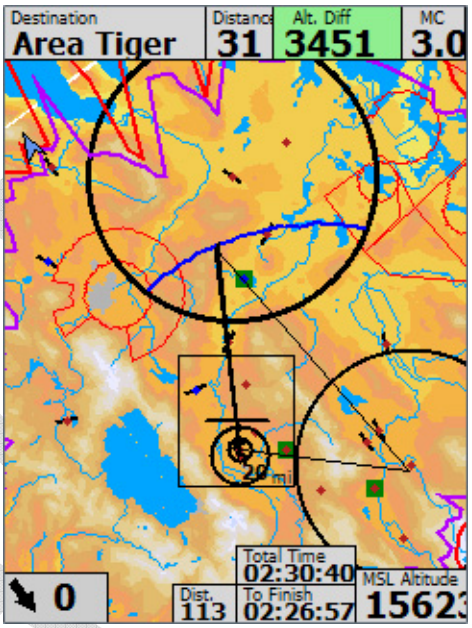


The *ClearNav* features a brilliant new tool designed to help contest pilots fly area tasks – the *Area Task Turn Arc*. The previous generation of soaring flight software required you to manually move the turn point within the turn area on the screen as you were flying. That can be cumbersome and even dangerous to do in flight. The ClearNav is much simpler and more intuitive. There is no need to move or manipulate the turn location in any way. A blue arc is shown inside the turn area. It is a locus of points within the turn area that lie along an ellipse such that making your turn at any point on the line will give you the same distance around the course. The software places the blue arc automatically based on your estimated speed around the course and the specified minimum task time. Task course lines are drawn in fine black lines from the start point, to a point on the blue line and then on to the center of the next turn area. If you are flying fast then blue arc moves to a point on the far edge of the turn area. If you are flying slowly the blue arc moves to a point on the near side of the turn area. When the blue arc reaches the far or near side of the area then the turnpoint in the next turn area moves away from the center of that area to compensate. For example, if you are flying slowly then the blue arc will move to the near side of the turn area you are headed for and the turn point in the following turn area will move closer to the near edge of that area. The method of handling turn areas is revolutionary and brilliant! Congratulations Chip Garner on this innovation! It is brilliant because you never need to move the turn point manually; you just glance at the screen and fly to a point on the blue arc. That makes flying safer because you will keep your eyes out of the cockpit and it also makes you faster because you can focus your efforts on flying fast - not fiddling with the software.

Below are a series of screen captures designed to clarify how the *Area Task Turn Arc* works. The glider is flying a triangular turn area task with circular turn areas. The minimum task time has been set to 2.5 hours and the glider's estimated speed around the task has been manipulated in simulator mode to show the effects of different estimated speeds. As you can see, as the speed increases the *Area Task*

Turn Arc moves farther out to increase the task distance. As the estimated speed decreases the *Area Task Turn Arc* moves closer is to decrease the task distance.

Note: In flight, you wouldn't alter your speed to adjust the location of the *Area Task Turn Arc*. You would fly the task as fast as possible. The screen captures show how the *Area Task Turn Arc* would look if you were flying at the particular speed.

	
The arc is in the center of the turn area when the speed is 54 mph. Notice that the task goes to the center of the 2nd turn area – allowing for maximum flexibility in the future.	If the estimated speed was a bit slower (46 mph) the arc moves in a bit. Notice that the task still goes through the center of the 2nd turn area.

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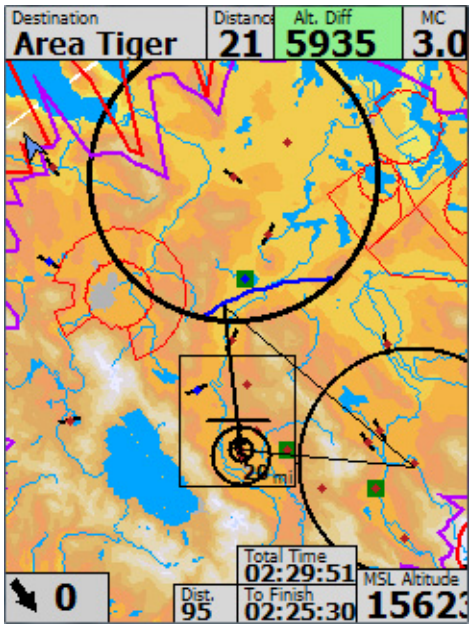
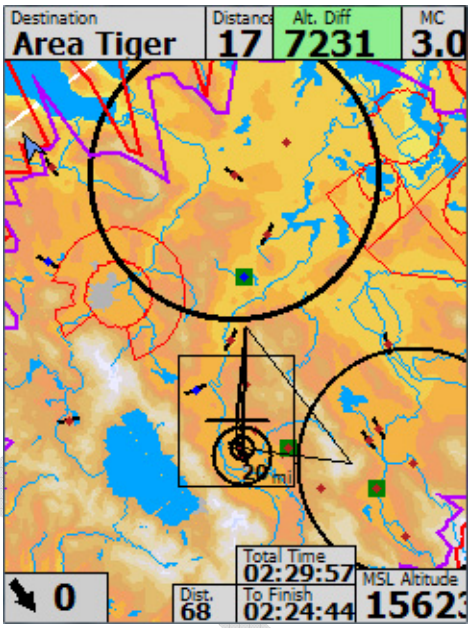
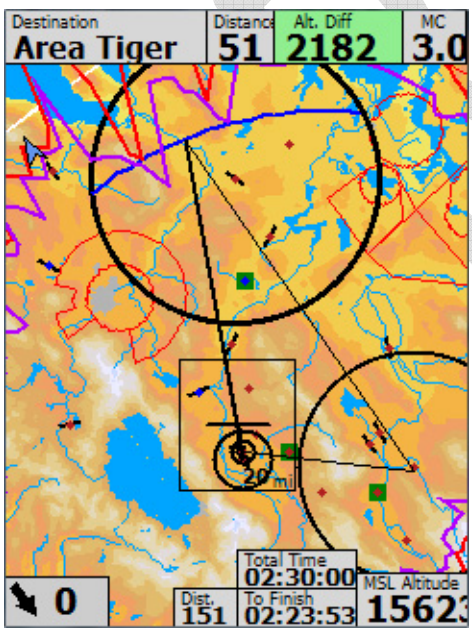


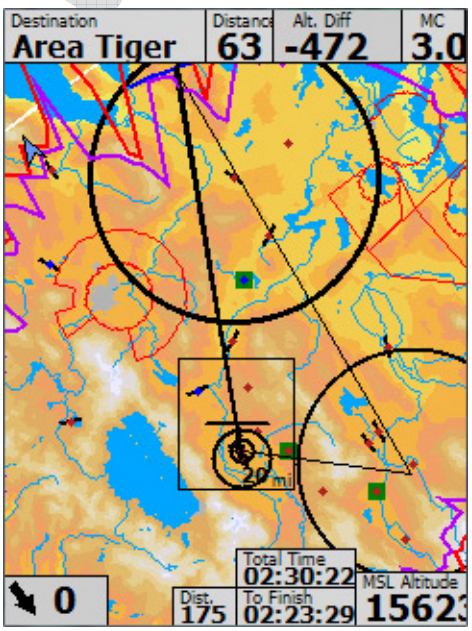
With the estimated speed at 39 mph the arc moves in a bit more, but the task still goes through the center of the 2nd turn area.



With the estimated speed at 28 mph there is no more room to move in the first turn area, so the location of the turnpoint in the 2nd turn area is adjusted in as well.



With the estimated speed at 63 mph the arc moves out a bit, but the turnpoint location in the 2nd turn area remains at the center.



With the estimated speed at 73 mph the arc moves out a bit more, but the turnpoint location in the 2nd turn area remains at the center.

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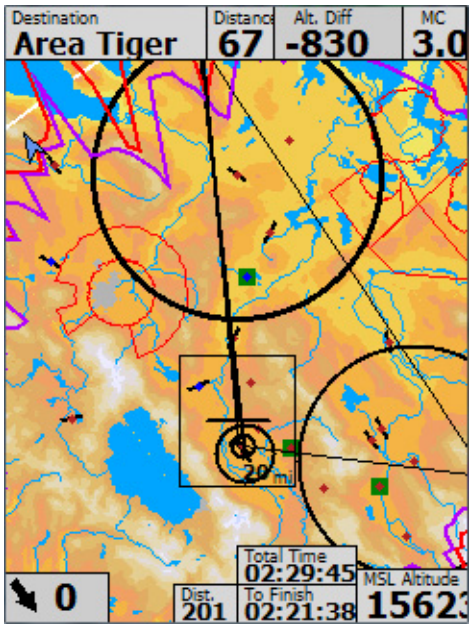	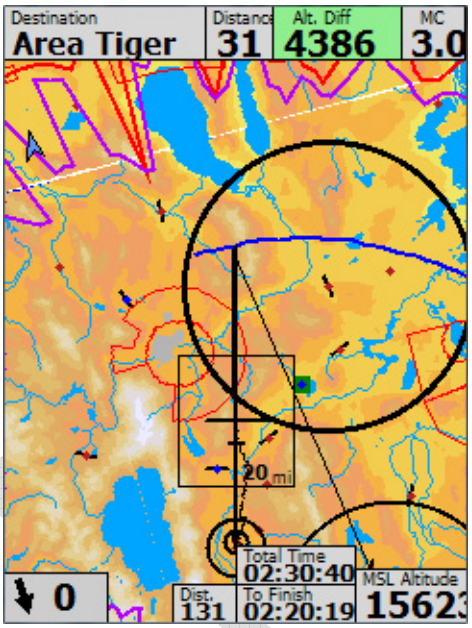
With the estimated speed at 85 mph there is no more room to move the arc out, so the location of the 2nd turnpoint is moved out a bit as well.	In this example the glider has flown off to the left of course in search of lift. Notice that the task course has been altered to go to the left side of the turn arc. The new task line is drawn from the start through the glider's current location.

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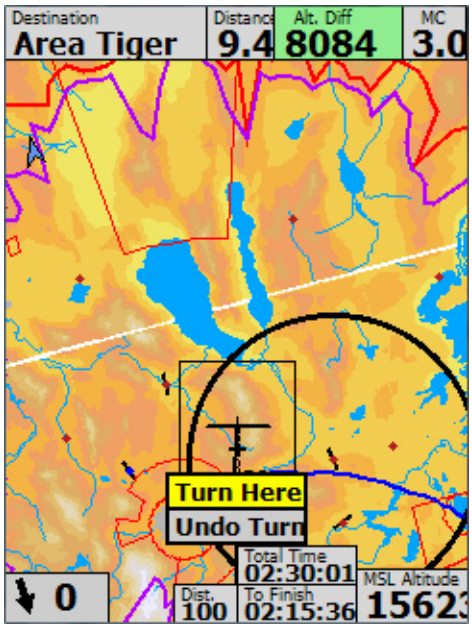
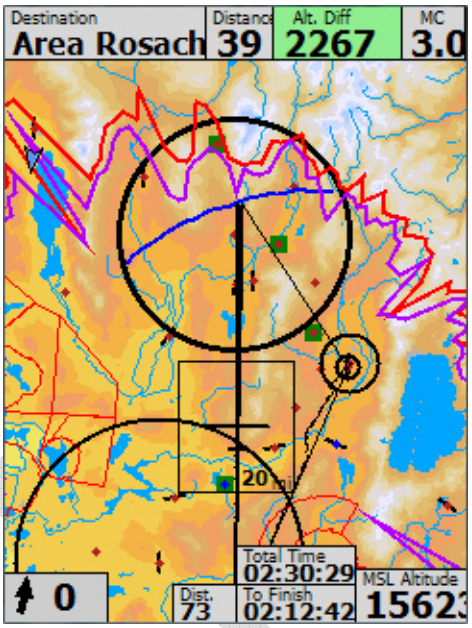


The glider has now reached the *Area Task Turn Arc*. The distance window at the top of the screen stops decreasing and starts increasing as you fly away from the recommended turn location.

It is time to tell the ClearNav that you are turning at your current location.

Use the *Focus* button to highlight *Turn Here* button.

Press the *Select* button



The glider is now on the 2nd leg of the task. The task line is drawn from the point at which the glider turned in the 1st turn area, through the glider's current position, and on to the turn arc.

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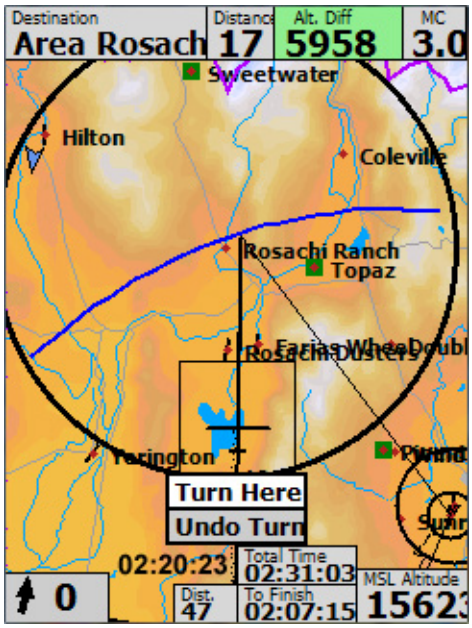	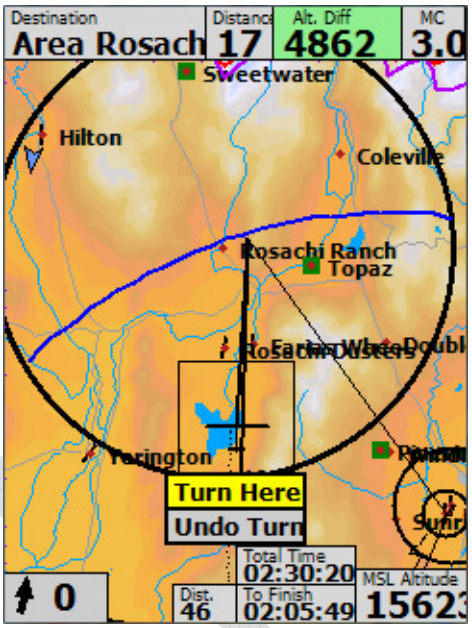
The glider is now inside the last turn area of the task. When in the last turn area a new a powerful number appears immediately above the *Task Window*. It is the *Total Task Time If You Turn Here*. From now on the pilot should use that number to determine when to turn for home. The number shown is 02:20:23. Since the minimum task time is 2.5 hours, it is not yet time to head for home. The number will reach 2.5 hours when the *Area Task Turn Arc* is crossed. If a normal final leg and final glide are anticipated, the pilot would normally turn at the blue arc. However, if there are cloud streets leading home (promising higher speeds) the pilot may want to continue beyond the blue arc.	When the time to turn is reached, be sure to tell the *ClearNav* that you are turning. Use the *Focus* button to highlight *Turn Here* button. Press the *Select* button

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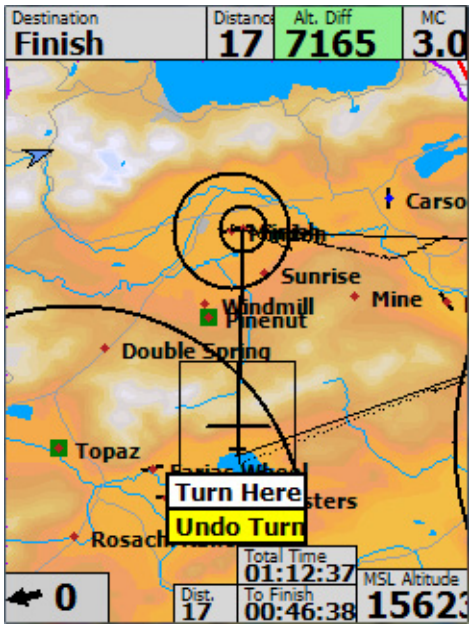

After pressing the *Turn Here* button the active waypoint is changed to the finish.

If you change your mind and decide to turn again and fly further into the current turn area, use the Use the *Focus* button to highlight the *Undo Turn* button and press the *Select* button

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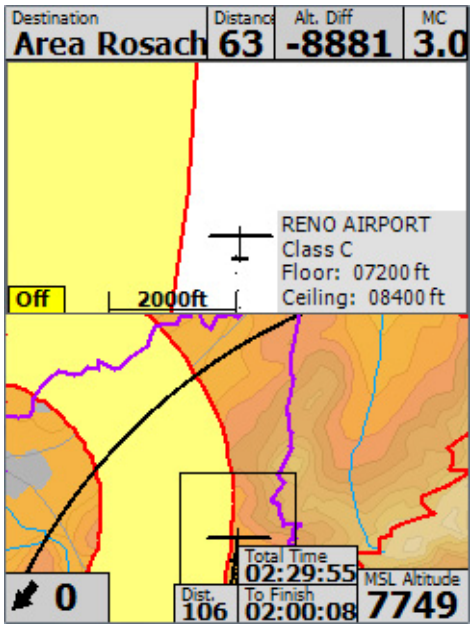
4.2.8 Airspace Warning Window

The *ClearNav* uses audible alerts and graphics to warn the pilot when approaching controlled airspace from the side, or from below.

4.2.8.1 Airspace Warnings When Near the Side of Airspace



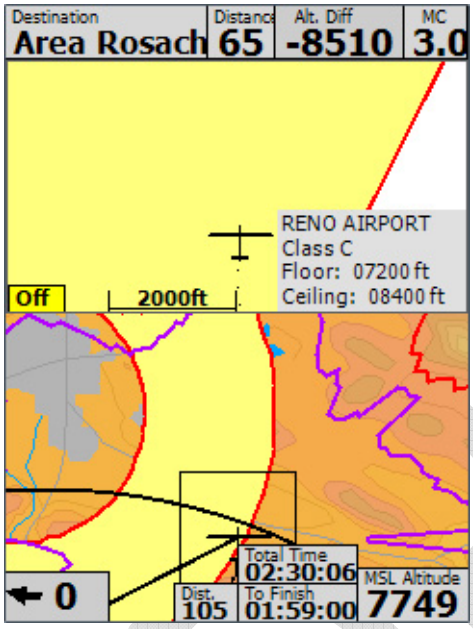
The *Airspace Warning Window* is displayed on the top of the screen. The yellow area is the airspace that the glider is near. The scale bar below the glider shows 2000ft in this example and can be used to estimate your distance from the airspace. The grey text box in the *Airspace Warning Window* lists details about the airspace section in question.

As you approach airspace horizontally the *ClearNav* will warn you about the pending intrusion as soon as you reach a distance from the airspace that is less than the *Horizontal Warning Margin*. The default value for the *Horizontal Warning Margin* is 1640 feet (500 m). As soon as the glider is inside the *Horizontal Warning Margin* the *ClearNav* will beep and pop up the *Airspace Warning Window*. It will also slide the glider and main map view down so that the glider located in the lower section of the area of the screen not taken up by the *Airspace Warning Window*. The *Airspace Warning Window* shows a zoomed-in view that includes the glider, the airspace, and a scale bar to make it clear exactly how close you are to the airspace. That way you can maneuver the glider as necessary to avoid entering the airspace without needing zoom in on the main map view. The yellow *Off* button can be used to turn off the *Airspace Warning Window*. To activate the *Off* button simply press the *Select* button or the *Focus* button or the *Menu* button. It does not turn off the display of the airspace on the map – it only turns off the *Airspace Warning Window*. If you exit the *Horizontal Warning Margin* region, the *Airspace Warning Window* will close automatically. The *Airspace Warning Window* will be displayed again every time you approach the airspace. However, the software has some hysteresis built-in so that circling on the edge of the *Horizontal Warning Margin* should not cause the *Airspace Warning Window* to cycle on and off. While the *Airspace Warning Window* is displayed the *Zoom In (+)* and

Zoom Out (-) buttons can be used to zoom the main map view in and out. That is handy if you want to zoom in for a closer look or zoom out for an overview of the situation.

To change the *Horizontal Warning Margin*:

> *Menu* button / *Setup Menu Icon* / *Special Use Airspace* Tab / *Horizontal Warning Margin* button
>
> The *Up* and *Down* buttons increment and decrement the *Horizontal Warning Margin* in small steps and the *Zoom In (+)* and *Zoom Out (-)* buttons increment and decrement it in large steps.



The image above shows what it looks like when the glider is inside the airspace.

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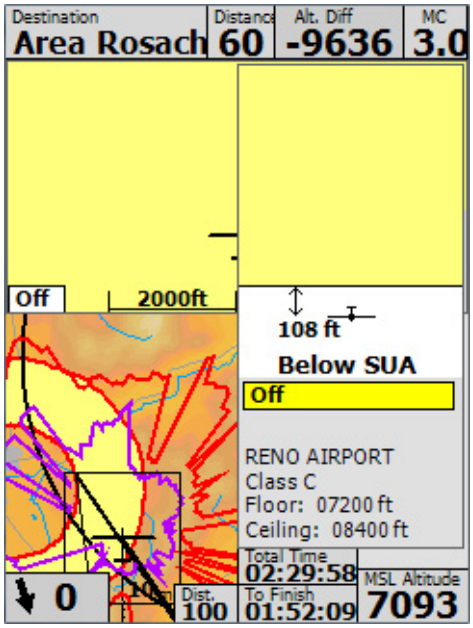
4.2.8.2 Airspace Warnings When Below Airspace



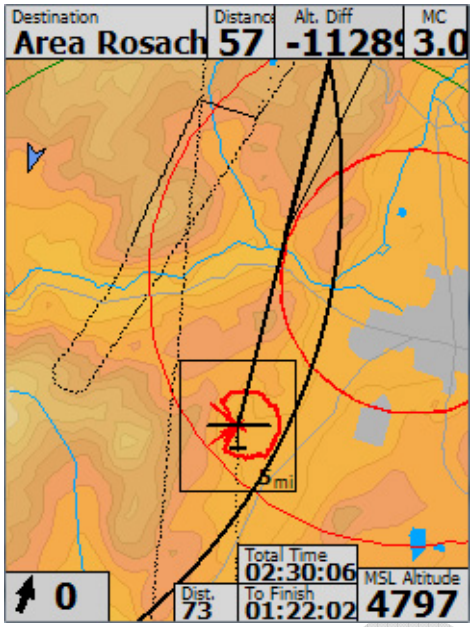
The *Airspace Warning Window* is displayed on the right side of the screen. The yellow area is the airspace that the glider is near. The vertical bar shows that the glider in this example is 108 ft below the airspace. At the bottom of the *Airspace Warning Window* are details about the airspace section in question.

As you approach airspace from below the *ClearNav* will warn you about the pending intrusion as soon as you reach a distance from the airspace that is less than the *Vertical Warning Margin*. The default value for the *Vertical Warning Margin* is 492 feet (150 m). As soon as the glider is inside the *Vertical Warning Margin* the *ClearNav* will beep and pop up the *Airspace Warning Window*. It will also slide the glider and main map view over so that the glider is centered in the area of the screen not taken up by the *Airspace Warning Window*. The *Airspace Warning Window* shows a zoomed-in view that includes the glider, the airspace, and a distance bar that indicates the distance to the airspace. The yellow *Off* button can be used to turn off the *Airspace Warning Window*. To activate the *Off* button simply press the *Select* button or the *Focus* button or the *Menu* button. It does not turn off the display of the airspace on the map – it only turns off the *Airspace Warning Window*. If you exit the *Vertical Warning Margin* region, the *Airspace Warning Window* will close automatically. The *Airspace Warning Window* will be displayed again every time you approach the airspace. However, the software has some hysteresis built-in so that dolphin flying near the edge of the *Vertical Warning Margin* should not cause the *Airspace Warning Window* to cycle on and off. While the *Airspace Warning Window* is displayed the *Zoom In (+)* and *Zoom Out (-)* buttons can be used to zoom the main map view in and out. That is handy if you want to zoom in for a closer look or zoom out for an overview of the situation.

To change the *Vertical Warning Margin*:

Menu button / *Setup Menu Icon* / I Tab / *Vertical Warning Margin* button

The *Up* and *Down* buttons increment and decrement the *Vertical Warning Margin* in small steps and the *Zoom In (+)* and *Zoom Out (-)* buttons increment and decrement it in large steps.



In the image above, the sailplane is flying underneath the airspace. Since it is well below the airspace, no warning is given. If it were to find a good thermal and climb up to the airspace, a warning would be given when it arrived within the *Vertical Warning Margin.*

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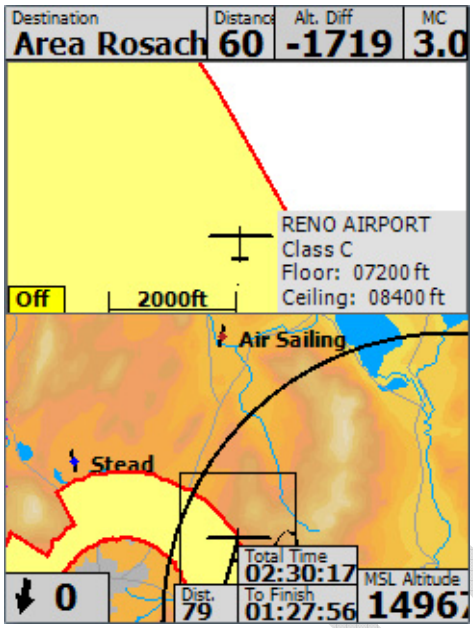
4.2.8.3 Airspace Warnings When Above Airspace

The *ClearNav* will warn you about airspace even if you are flying over the top of it. It acts as if the airspace extends up to very high altitude. For example, you may be at 10,000 feet over airspace with a ceiling of 5,000 feet. The ClearNav would still warn you as if you were in the airspace, even though you are 5,000 feet above it. If you are trying to overfly airspace you may want to enable the *MSL Altitude Glide Ring* feature. If you set the MSL Altitude of the ring to the top of the airspace it would show on the map the distance you could glide before descending into the top of the airspace.



In the image above, the glider is overflying airspace by several thousand feet, yet the ClearNav still displays the *Airspace Warning Window.* That done to make certain the pilot knows that there is airspace directly below.

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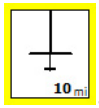
4.3 Using the Map

4.3.1 Change Destination

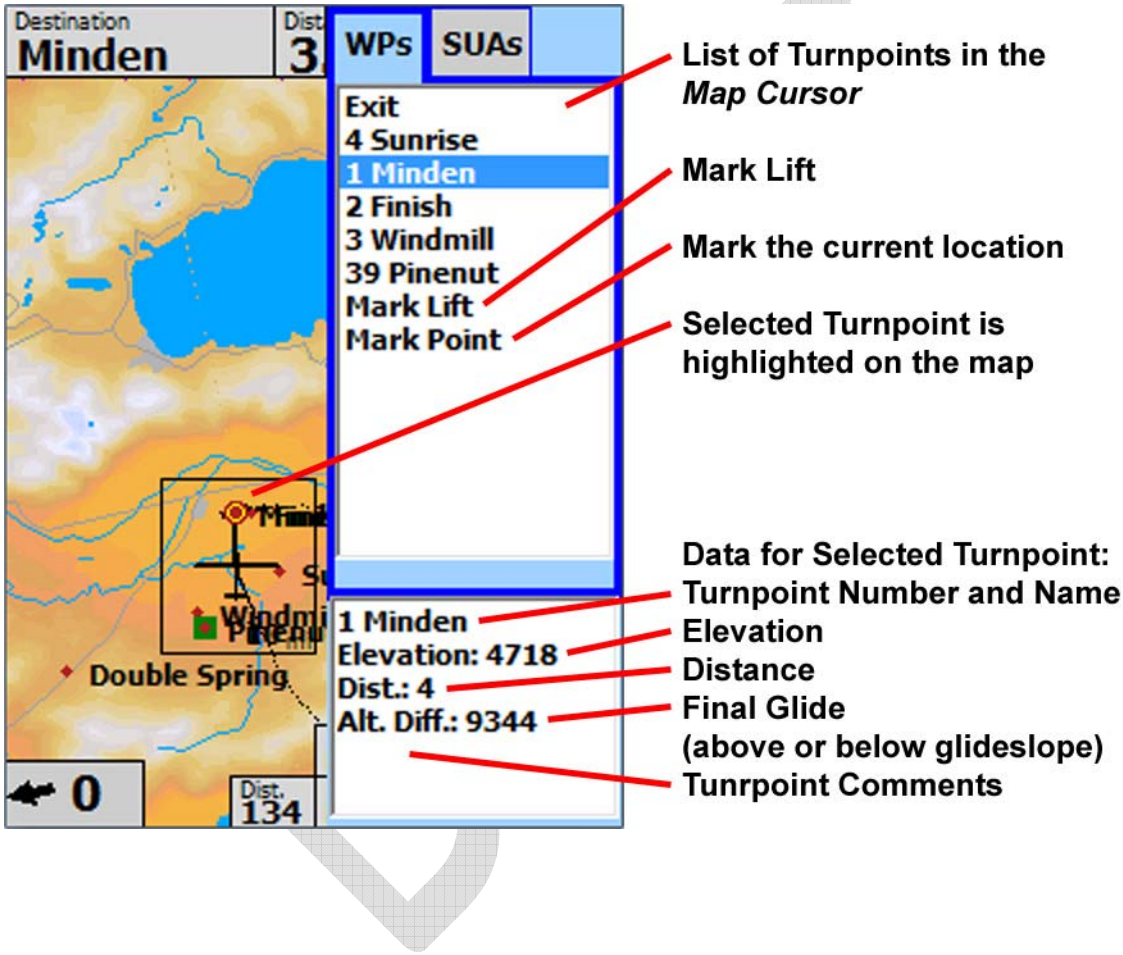
There are several ways to select a waypoint for navigation.

4.3.1.1 Changing the Destination using the Map Cursor

Nearby waypoints can be selected for navigation using the *Map Cursor* 

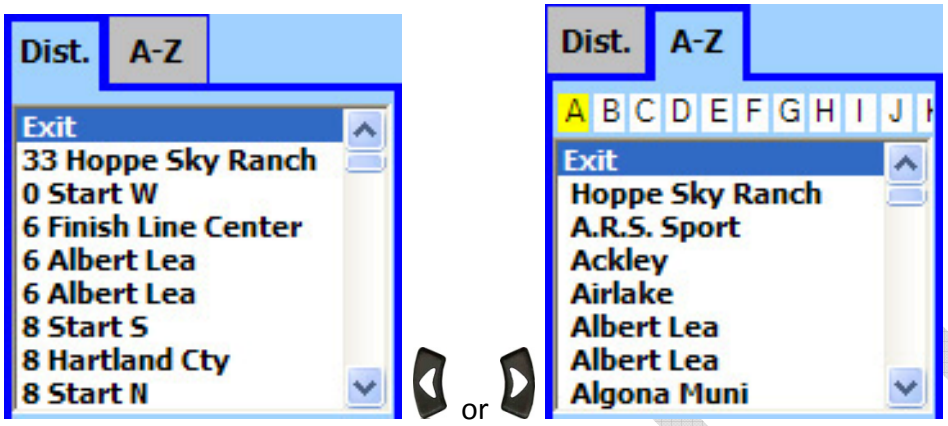
.

Using the *Map Cursor* is described in detail in section 4.2.4.



4.3.1.2 Changing the Destination Using the Select Destination Icon

To start navigating to a waypoint by selecting from a list of waypoints sorted by distance from the current location, or sorted alphabetically, use the *Select Destination Icon* on the *Ribbon Menu*. Using the *Select Destination Icon* is described in section 4.2.2.1.



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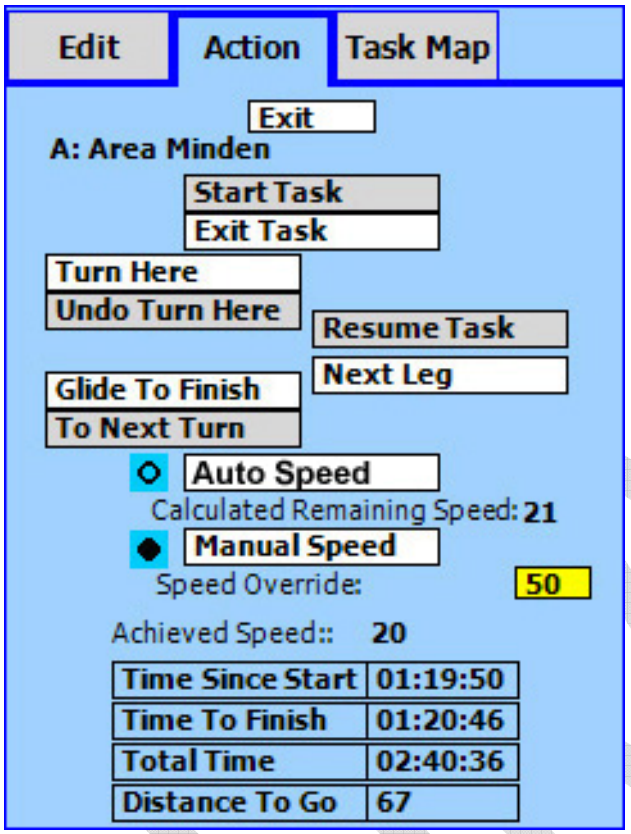
4.3.1.3 Changing Destination By Stepping Through the Waypoints in a Task

When flying in a contest or flying a badge or record flight the task is often entered into the *ClearNav* before takeoff. In that case the pilot will step through the waypoints in the task in order. The task is entered before takeoff using the *Task Edit* tab which is accessed using the *Task* icon on the *Ribbon* Menu. In flight, the *Task Action* tab (shown below) is used to step through the task using the *Next Leg* button.



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5 How To – File Transfers and Upgrades

5.1 Transfer Flight Logs from the ClearNav to the PC

5.1.1 Transferring Flight Logs from the ClearNav to the USB Flash Drive

At the end of the flying day you simply plug the USB Flash Drive into the ClearNav's panel mounted USB connector and use the ClearNav's *Personal Preferences / Flight Recorder* menu to select and transfer the desired flight logs from the ClearNav's memory to the USB Flash Drive.

5.1.2 Transferring Flight Logs from the USB Flash Drive to your PC or Mac

You will probably want to transfer your flight logs to your home or laptop computer to backup the files and view the flight log in 3D using a program like SeeYou or StrePla. When you plug the USB Flash Drive into your computer the computer should recognize the drive in a few seconds and give you the option to view the files. Windows will open the Windows Explorer (My Computer) program and display the files on the USB Flash Drive. You can then copy the files onto your computer's hard drive. We recommend copying the flight logs into a "My Documents/Flights" folder.

5.2 Transferring Waypoint and Airspace Files from the PC to the ClearNav

A USB Flash Drive is used to transfer files from your home or laptop computer to the ClearNav. You will want to transfer waypoint and airspace files for your region to the ClearNav before using it for the first time, and every time you bring it to a new soaring site. The ClearNav can store waypoint and airspace files for many soaring sites in its internal memory. Creating or downloading waypoint files and airspace files is covered in the Waypoint Files and Airspace Files sections.

5.2.1 Transferring Waypoint and Airspace Files from your Computer to the USB Flash Drive

The first step is to transfer the desired files from your computer to the USB Flash Drive. When you plug the USB Flash Drive into your computer the computer should recognize the drive in a few seconds and give you the option to "Open Folder to view files with Windows Explorer". Click OK. Windows will then open the Windows Explorer (My Computer) program and display the files on the USB Flash Drive. You can then copy the files from your computer's hard drive onto the USB Flash Drive. Waypoint files

should be copied into the "Map Data/Waypoints" directory on the USB Flash Drive. Airspace files should be copied into the "Map Data/SUAs" directory on the USB Flash Drive. The files need to be in those directories for the ClearNav to access them.

5.2.2 Transferring Waypoint and Airspace Files from the USB Flash Drive to the ClearNav

Transferring the waypoint and airspace files from the USB Flash Drive to the ClearNav is very easy.

1. Power-down the ClearNav
2. Plug the USB Flash Drive into the ClearNav's panel mounted USB connector
3. Power-up the ClearNav. When the ClearNav is powered-up with the USB Flash Drive connected it will ask, "Are you sure you want to run the Updater program?" If you do nothing it will **not** transfer the files. If you select "YES" it will transfer all the files on the USB Flash Drive to the ClearNav.

5.3 Upgrading the Firmware and Software in the ClearNav

The term *Firmware* is used to describe the software that runs the operating system and hardware drivers in the ClearNav. The term *software* will be used in this manual when referring to the actual ClearNav application. The term firmware was created to clarify that the software is pre-installed by the manufacturer. A decade or 2 ago firmware was usually programmed into a memory chip at the factory. But today firmware and software can often be downloaded from the internet and transferred to a device to give it new functionality. That is an advantage for those of us using the products because we can upgrade them in a few minutes without the need to send the unit back to the factory for an upgrade. You do not need to worry about which files are firmware and which are software. You only need to download new files to the USB Flash Drive and the ClearNav will automatically pull in the files it needs. To upgrade the firmware and/or software in the ClearNav you need only a USB Flash Drive.

5.3.1 Downloading the Firmware and Software Upgrade Files to your Computer

ClearNav firmware and software upgrade files will be available on the NK web site. Download the files to your computer. They will probably be saved in a Zip file. Unzip the files directly into the root directory on the USB Flash Drive. The root directory is the highest level directory.

5.3.2 Transferring Firmware and Software Files from the PC to the USB Flash Drive

Unzip the files directly into the root directory on the USB Flash Drive. The root directory is the highest level directory. To unzip the files click on the zip file. Select all the files in the list and click the "Extract" button. A window will appear for you to select the destination for the extracted files. Select the root directory of the USB Flash Drive as shown below and press the "Extract" button.

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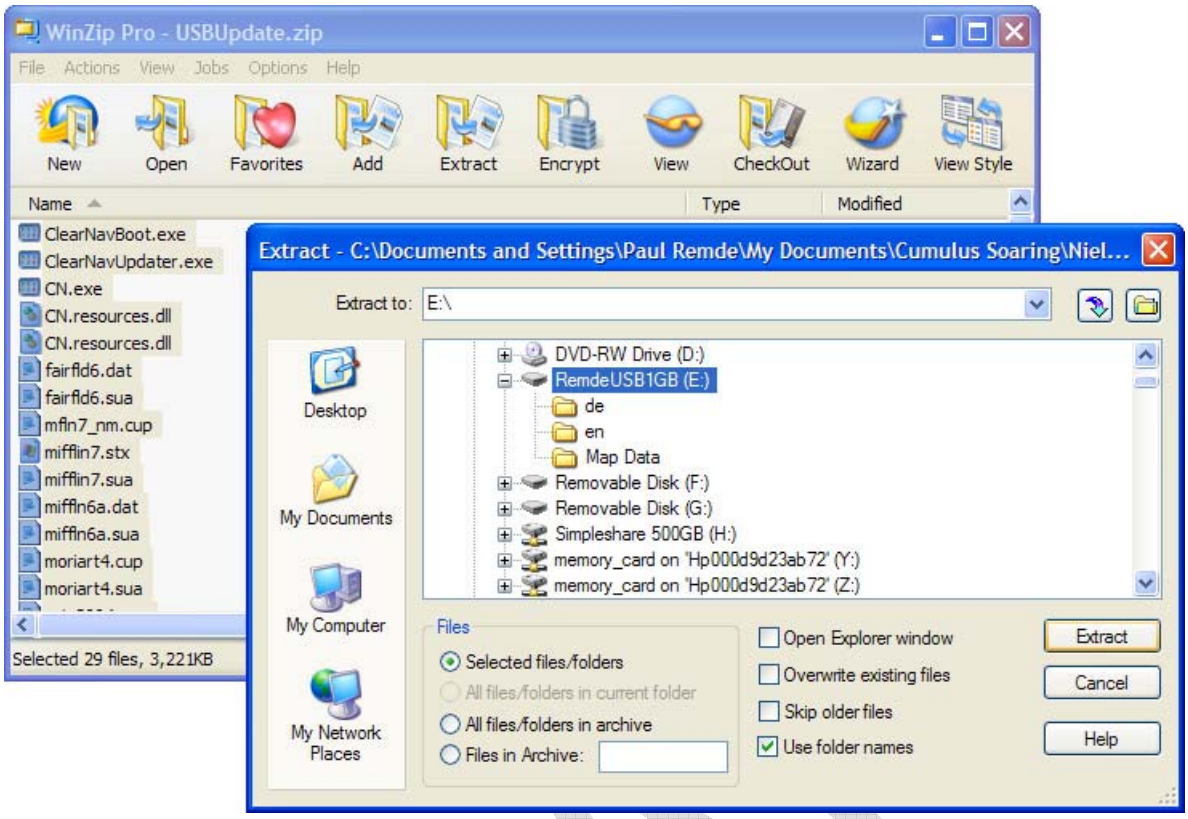

5.3.3 Transferring Software and Firmware Files from the USB Flash Drive to the ClearNav

Transferring the firmware and software files from the USB Flash Drive to the ClearNav is very easy.

1. Power-down the ClearNav
2. Plug the USB Flash Drive into the ClearNav's panel mounted USB connector
3. Power-up the ClearNav. When the ClearNav is powered-up with the USB Flash Drive connected it will ask, "Are you sure you want to run the Updater program?" If you do nothing it will **not** transfer the files. If you select "YES" it will transfer all the files on the USB Flash Drive to the ClearNav.

6 How To – Flying with the ClearNav

6.1 First Time Setup

6.1.1 Copy Waypoint and Airspace Files onto ClearNav

6.1.2 Power-up ClearNav

6.1.3 Select desired waypoint file

6.1.4 Select desired airspace file

6.1.5 Set UTC Time offset in the NIA info/Set window

6.1.6 Setup Pilot Preferences in the Pilot Preferences menu

6.1.6.1 Pilot Name

6.1.6.2 Final Glide Settings

6.1.6.3 Map Display Options

6.1.6.4 Units

6.1.6.5 Language

6.1.7 Enter Pilot Name and glider data for logger

6.1.8 Select Task Start, TP and Finish Rules

6.1.9 Select the desired Task Type

6.1.10 Enter a task

6.2 Before Every Flight

6.2.1 Set Altimeter

6.2.2 Do a Task Declaration (if desired)

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6.3 A Typical Day at the Gliderport

6.3.1 Power up

6.3.2 Set Altimeter

6.3.3 Enter a task or two

6.3.4 Fly a task

6.3.5 After landing – transfer the flight log to the USB memory stick

6.4 Local Flying

6.4.1 Navigation to nearby airports

6.5 Setup and Fly a Badge or Record Task

6.6 Setup and Fly a Contest Task

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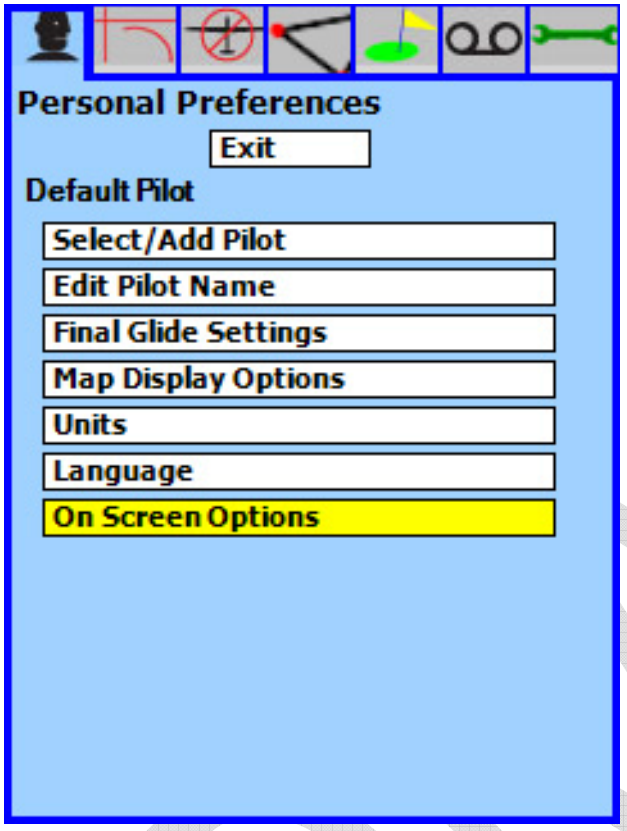
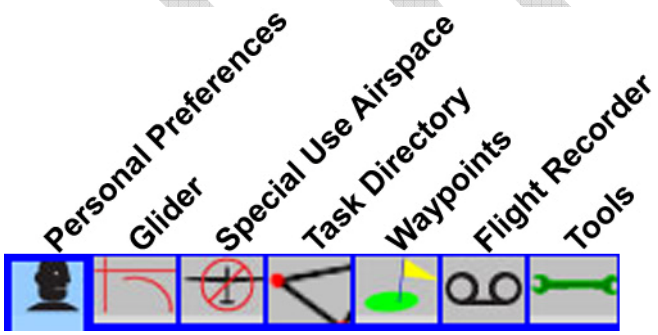
7 Setup Menu (Details)

The *Setup Menus* are used to edit setup parameters that are not normally accessed in flight. There is nothing keeping you from accessing the *Setup Menus* in flight, but we highly recommend avoiding their use in flight. You do not want to be staring at the display screen and fiddling with parameters when you should be flying with your eyes out of the cockpit – looking for traffic and the best sources of lift.



The *Setup Menus* are arranged into 7 tabs:



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To access the *Setup Menus:*

Select the *Setup Menus* icon on the *Ribbon Menu*.

The *Left* and *Right* buttons are used to select the desired tab.

The *Up* and *Down* buttons are used to select the desired menu item within the tab you are viewing.

Press the *Select* button to select a menu item.

To exit the *Setup Menu* and return to the moving map screen press the *Menu* or *Focus* button, or use the *Up* and *Down* buttons to highlight the *Exit* button

and then press the *Select* button.

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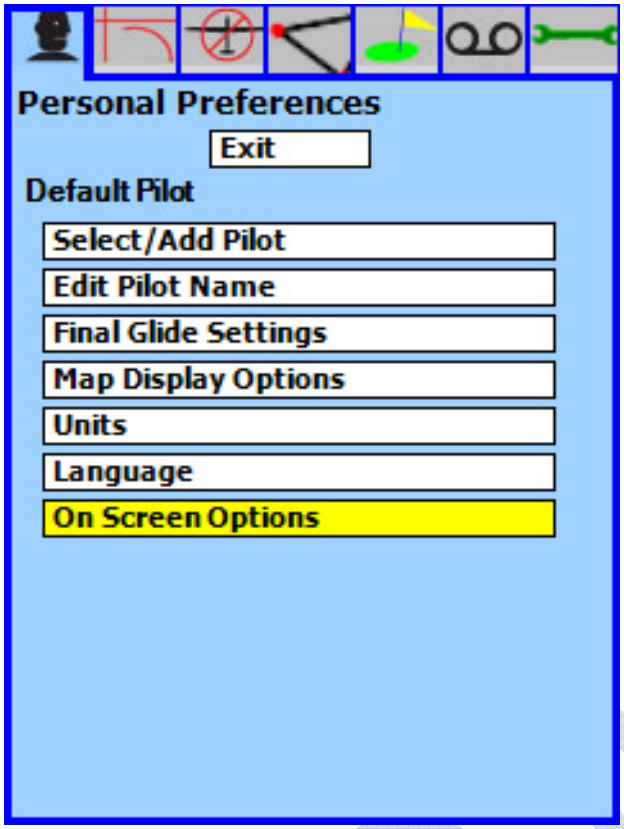
7.1 Personal Preferences Tab



7.1.1 Add Multiple Pilots / Select/Add Pilot

This button appears as the *Add Multiple Pilots* button if only one pilot is setup. It appears as the *Select/Add Pilot* button when multiple pilots have been entered. If only one pilot is using the *ClearNav* there is no need to access this screen because the *Pilot Name* for the active pilot can be edited using the *Edit Pilot Name* button found on the *Personal Preferences* tab. Up to 10 different pilots can be stored in the *ClearNav*. The *Select/Add* Pilot window is used to select existing pilots and add new pilots to the list. When you add a new pilot you are taken directly to the *Edit Pilot Name* window (described below).

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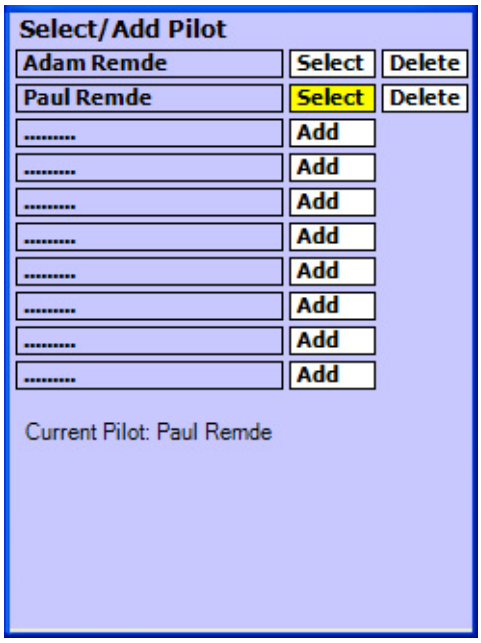
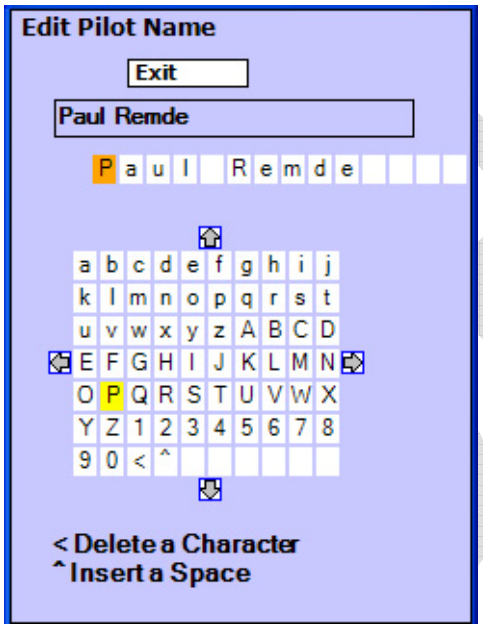


7.1.2 Edit Pilot Name

The *Edit Pilot Name* window is used to edit the name of the current pilot.



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7.1.3 Final Glide Settings

7.1.4 Map Display Options

7.1.4.1 Terrain Color Saturation

7.1.4.2 Tracks

7.1.4.2.1 *Tracks Enable* checkbox

7.1.4.2.2 *Erase Tracks* button

7.1.4.3 Map Items

7.1.4.3.1 *Terrain* checkbox

7.1.4.3.2 *Roads* checkbox

7.1.4.3.3 *Water Bodies* checkbox

7.1.4.3.4 *City Areas* checkbox

7.1.4.4 Waypoint Names & Numbers

7.1.4.4.1 *Control Points – Names* checkbox

7.1.4.4.2 *Control Points – Short Name* checkbox

7.1.4.4.3 *Control Points – Number* checkbox

7.1.4.4.4 *Other Waypoints – Names* checkbox

7.1.4.4.5 *Other Waypoints – Short Name* checkbox

7.1.4.4.6 *Other Waypoints – Number* checkbox.

7.1.4.5 Wind & Bearing

7.1.4.5.1 *Bearing* checkbox

7.1.4.5.2 *Numeric Wind Direction* checkbox

7.1.4.5.3 *Head wind Component* checkbox

7.1.5 Units

7.1.5.1 Speed (Kilometers/Hour, Miles/Hour, Knots)

7.1.5.2 Distance (Kilometers, Miles, Nautical Miles)

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7.1.5.3 Altitude (Meters, Feet)

7.1.5.4 Vertical Speed (Knots, Meters/Second)

7.1.5.5 SUA Altitudes (Meters, Feet)

7.1.6 Language (English, Deutsch)

7.1.7 Flight Recorder

7.1.7.1 Pilot Name

7.1.7.2 Glider Type

7.1.7.3 Glider ID

7.1.7.4 Transfer Flight Logs

7.1.7.5 Pilot Event

7.2 Glider Tab

7.2.1 Add Multiple Gliders / Select/Add Glider

This button appears as the *Add Multiple Gliders* button if only one glider is setup. It appears as the *Select/Add Glider* button when multiple gliders have been entered. If only one glider or wingspan configuration is used there is no need to access this screen because the *Edit Glider ID, Edit Glider Type* and *Polar* buttons on the *Glider* tab can be used to edit the data for the active glider.

7.2.2 Edit Glider ID

7.2.3 Edit Glider Type

7.2.4 Polar

7.2.4.1 Ballast Capacity (liters)

7.2.4.2 Empty Weight (kg)

7.2.4.3 Best Glide

7.2.4.4 Best Glide Speed (kph)

7.2.4.5 2 m/s Sink Speed (kph)

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7.3 Special Use Airspace Tab

7.3.1 Horizontal Warning Margin

7.3.2 Vertical Warning Margin

7.3.3 Ignore SUA's Above

7.3.4 Maximum Permitted Altitude

7.3.5 Load/Unload SUA Files

7.3.6 12 Hour Off List

7.3.7 Audio Alarm

7.4 Task Directory Tab

7.4.1 Choose Task

7.4.2 Type

7.4.2.1 Task Type: None

The *None* task type disables all task functions. Some pilots prefer to fly from point to point without setting up a task. This is a fine option for exploring the area around your airport, but it is not very useful when flying a task in a contest, or for a badge or record. When Task Type *None* is selected it is not possible to enter the *Edit Task* screen. It is also not possible to access the *Task Window* found in the NIA at the bottom of the screen.

7.4.2.2 Task Type: Racing

A racing task is a simple pre-assigned task around a number of turnpoints. A racing task does not have a *Minimum Time* because all contestants must fly the same task. This type of task is commonly used in soaring contests. It is not recommended for badge or record flights because the start, finish and turnpoint rules are different for those types of tasks. If you will be flying a badge or record flight you should select the FAI task type. Pilot flying free distance tasks such as Online Contest Classic tasks will probably want to use the MAT or FAI or Home Based task types.

7.4.2.3 Task Type: Area

Area tasks are very common in soaring contests because they allow a great deal of flexibility in the actual task flown. Pilots often like this task because it allows them to follow the best lift and avoid area of poor weather. When editing an area task you can edit area parameters for each turnpoint. For U.S. soaring contests the only area parameter is the area radius. Contests in other countries have parameters for inner and outer radius as well as 2 radials to be used to specify a "pie wedge" shape – if desired. All those parameters are supported in the *ClearNav*.

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7.4.2.4 Task Type: FAI

FAI tasks are used when flying for badges or records. They utilize either FAI sectors or lines for the start and finish and FAI "photo sectors" for the turnpoints.

7.4.2.5 Task Type: MAT

MAT tasks are "Modified Assigned Tasks" which are commonly used in soaring contests. They include 1 or more assigned turnpoints and a minimum task time. After the assigned turnpoints have been rounded the pilot can fly to several other contest turnpoints of his/her choosing to use up all the time remaining. The *ClearNav* makes it easy to add additional waypoints to the task while in flight using the *Map Cursor*. When a turnpoint is selected with the *Map Cursor* a window appears asking, "Do you want to add [airport name here] to the current task?" If you select "Yes" then the turnpoint will be added to the task after all other turnpoints - immediately before the finish point. You can also remove turnpoints from the task using the *Map Cursor*. When a turnpoint that is already in the task is selected with the *Map Cursor* a window appears asking, "Do you want to remove [airport name here] from this task?" If you select "Yes" then the turnpoint will be deleted from the task.

7.4.2.6 Task Type: Recreational Tasks

Recreational tasks are for pilots that want to set out fly to a series of turnpoints – without the complexities of contest tasks. Start and finishes can be rings or lines. Turnpoints are points with a 0.5 km radius. This task type can be used to setup a loose plan for the day when free flying or flying free "recreational" tasks or tasks to be used in the OLC (Online Contest). It is not necessary enter any task in advance. The selected *Home Point* is used by default as both the start and finish points. The *Map Cursor* is used to add turnpoints to the task between the start and finish points. When a turnpoint is selected with the *Map Cursor* a window appears asking, "Do you want to add [airport name here] to the current task?" If you select "Yes" then the turnpoint will be added to the task after all other turnpoints - immediately before the finish point. You can also remove turnpoints from the task using the *Map Cursor*. When a turnpoint that is already in the task is selected with the *Map Cursor* a window appears asking, "Do you want to remove [airport name here] from this task?" If you select "Yes" then the turnpoint will be deleted from the task.

7.4.3 Edit Task

7.4.4 IGC Declaration

It is very important to perform an IGC Declaration before takeoff for any badge or record flight. The IGC declaration is entered into the beginning of the flight log file and used as the official flight declaration. The declaration does not occur automatically and the *ClearNav* does not remind you to declare the task after you finish editing a task. The task declaration uses the task data entered in the *Edit Task* screen along with pilot data entered in the *Pilot Name* screen and glider ID and Type data entered into the *Glider* tab.

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To make the declaration simply select the *IGC Declaration* button on the *Task Programming* tab. The declaration process is instantaneous and the data is displayed on the *IGC Declaration* screen. Press the *Exit* button when done viewing the declaration data.

7.4.5 Start, TP and Finish Rules

7.4.5.1 Contests Tab

7.4.5.1.1 Start Rule

- Geometry
  - Line
  - Ring
- Length Or Radius
- Maximum Height

7.4.5.1.2 Turn Point Radius

7.4.5.1.3 Area Rule

- Circles Only
- Circles & Sectors

7.4.5.1.4 Finish Rule

- Geometry
  - Line
  - Ring
- Length Or Radius

7.4.5.2 FAI Task Tab

7.4.5.2.1 Start Rule

- Geometry
  - Line
  - FAI Sector

7.4.5.2.2 FAI Turn Point

7.4.5.2.3 Finish Rule

- Geometry
  - Line
  - FAI Sector
- Length Or Radius

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7.5 Waypoints Tab

7.5.1 Home Point Select

7.5.2 Load/Unload Waypoint Files

7.5.3 Edit Waypoints

7.5.3.1 Name

7.5.3.1.1 Latitude

7.5.3.1.2 Longitude

7.5.3.1.3 Elevation

7.5.3.1.4 Attributes

7.5.3.1.5 Radio Freq.

7.5.3.1.6 Description

7.5.3.1.7 Comments

7.5.3.1.8 Runway Information

- Direction
- Length
- Surface
    - Unknown
    - Grass
    - Concrete
    - Asphalt
    - Dirt

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7.5.3.1.9 Delete Waypoint

7.6 Tools Tab

7.6.1 GPS Information

7.6.1.1 Latitude

7.6.1.2 Longitude

7.6.1.3 UTC

7.6.1.4 Track Angle

7.6.1.5 Speed

7.6.1.6 Altitude

7.6.1.7 Pressure Altitude

7.6.1.8 Num Of Satellites

7.6.1.9 GPS Fix Mode

7.6.1.10 Circling Wind

7.6.1.11 Wing Age

7.6.1.12 CAI Information (Available only if connected to a Cambridge instrument)

7.6.1.12.1 Wind Direction

7.6.1.12.2 Wind Speed

7.6.1.12.3 Wind Time

7.6.1.12.4 Component Wind

7.6.1.12.5 Altitude MSL

7.6.1.12.6 QNH Setting

7.6.1.12.7 True Airspeed

7.6.1.12.8 Variometer

7.6.1.12.9 Averager

7.6.1.12.10 Relative Variometer

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7.6.1.12.11 MacCready Setting

7.6.1.12.12 Ballast

7.6.1.12.13 Bugs

7.6.2 Simulator

7.6.2.1 Enable Simulation (Yes / No)

7.6.3 Serial Port Setup

7.6.3.1 COM1 Baud Rate

7.6.3.2 COM2 Baud Rate

7.6.3.3 Use COM1 Serial Port Only (checkbox)

7.6.3.4 COM1 (monitor)

7.6.3.5 COM2 (monitor)

7.6.4 About ClearNavigator

7.6.4.1 Software Version

7.6.4.2 Firmware Version

7.6.4.3 Firmware Build Date

7.6.4.4 Serial Number

7.6.4.5 Seal Status

7.6.5 FLARM Data

7.6.5.1 NumberOfObjects

7.6.5.2 TransmissionStatus

7.6.5.3 GPSStatus

7.6.5.4 PowerOK

7.6.5.5 AlarmLevel

7.6.5.6 RelativeBearing

7.6.5.7 AlarmType

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7.6.5.8 RelativeVertical

7.6.5.9 RelativeDistance

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8 Specifications

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9 Wiring Diagrams and Cable Schematics

9.1 ClearNav Display DB-15m Connector

The ClearNav Display unit has a DB-15m (male) connector on the back of the unit. It is used for all data and power connections to the display except the GPS Antenna. The connections include 12V power, speaker connections, 2 RS-232 serial ports, a CANbus port and a USB (master) port. ClearNav users should never need to connect to this port directly. Most connections are done on the *Nexus Junction Box* which breaks out the connections listed here onto multiple connectors. When the *ClearNav* is mounted on a RAM arm the *DB15 Extension* is used to connect the *Nexus Junction Box* to this connector.

#0600 CLEARNAV DB-15m	
1	COM2 TXD
2	COM2 RXD
3	COM1 RXD
4	COM1 TXD
5	Speaker -
6	Speaker +
7	-VBatt
8	+VBatt (SW)
9	USB N
10	USB P
11	USB PWR
12	USB GND
13	CAN PWR
14	CANH
15	CANL

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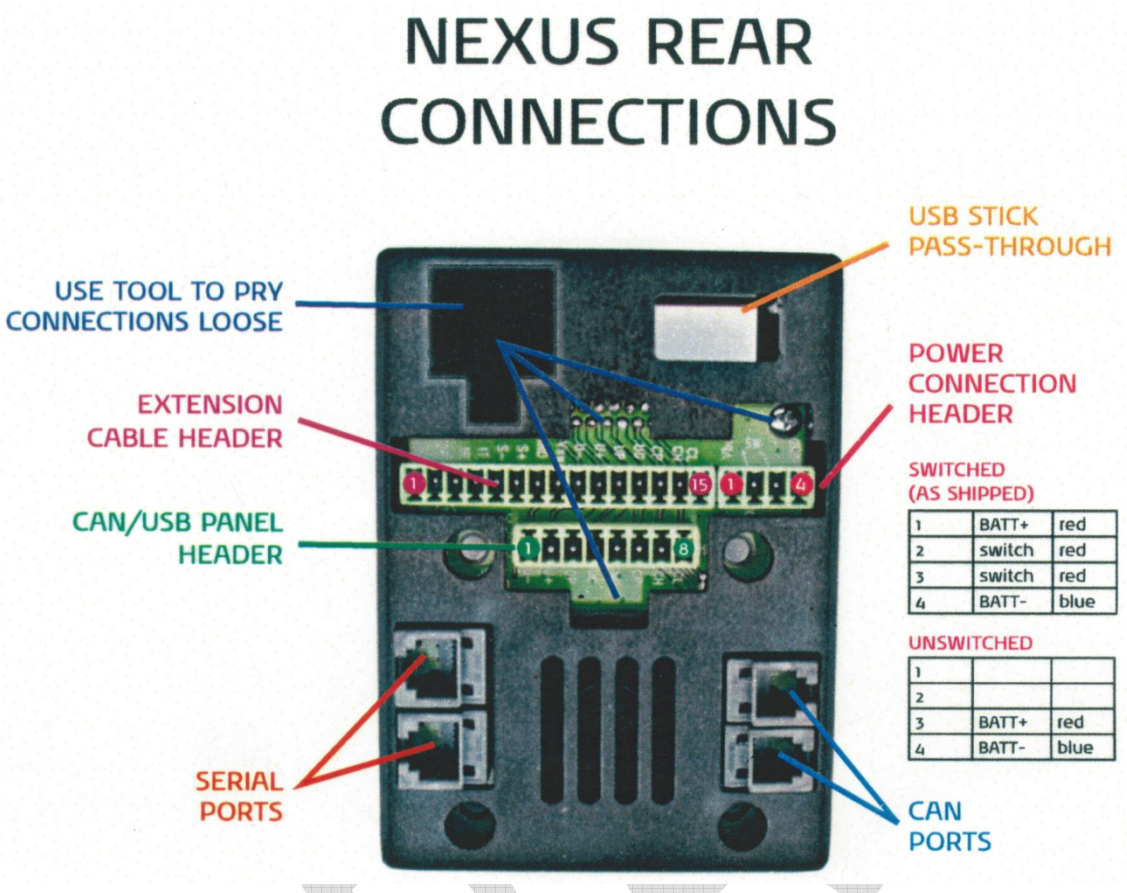
9.2 Nexus Junction Box



The *Nexus Junction Box* is used to connect data cables and power to the *ClearNav*. It also includes a speaker.

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9.2.1 Screw Terminal Connector for DB15 Extension Cable

The 14-pin or 15-pin screw terminal connector is used to connect the *Nexus Junction Box* to the *ClearNav* with the *DB15 Extension* cable when the *ClearNav* is mounted on a RAM arm.

The "First Flight" versions of the *Nexus Junction Box* have 14-pin connectors. Future versions of the *Nexus Junction Box* will probably have a 15-pin connector in place of the current 14-pin connector – to match the 15 connections on the back of the *ClearNav*. The *DB15 Extension* already includes 15 wires. When connecting it to the 14-pin version of the *Nexus Junction Box* the unused wire is the orange wire with the red stripe. Put electrical tape on the end of that wire to protect the wire from accidental connection. Don't remove or cut back the wire as it is likely to be used in the future.

#0641 Nexus Junction Box 14-pin Screw Terminal Connector (First Flight ClearNav Units Only)		
Pin # (from left to right)	**Function**	**DB15 Extension Wire Color**
1	COM2 TXD	Orange/Black
2	COM2 RXD	Orange/Green
3	COM1 RXD	Blue/Black
4	COM1 TXD	White/Green
5	Speaker -	Black/White
6	Speaker +	Black/Red
7	-VBatt	Blue (20AWG)
8	+VBatt (SW)	Red (20AWG)
9	USB N	White
10	USB P	Gray
11	USB PWR	Red/Green
		Orange/Red
13	CAN PWR	Red/White
14	CANH	Orange
15	CANL	Green

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#0641 Nexus Junction Box 15-pin Screw Terminal Connector		
Pin # (from left to right)	**Function**	**DB15 Extension Wire Color**
1	COM2 TXD	Orange/Black
2	COM2 RXD	Orange/Green
3	COM1 RXD	Blue/Black
4	COM1 TXD	White/Green
5	Speaker -	Black/White
6	Speaker +	Black/Red
7	-VBatt	Blue (20AWG)
8	+VBatt (SW)	Red (20AWG)
9	USB N	White
10	USB P	Gray
11	USB PWR	Red/Green
12	USB GND	Orange/Red
13	CAN PWR	Red/White
14	CANH	Orange
15	CANL	Green

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9.2.2 CANbus/USB Remote Connector

The 7 or 8-pin CANbus/USB connector allows easy connection of the Panel Mounted CANbus/USB Extension. The end of the cable that connects to the *Nexus Junction Box* has a pre-wired connector. Simply slide it onto the receptacle on the *Nexus Junction Box*.

The "First Flight" versions of the *Nexus Junction Box* have 7-pin connectors. Future versions of the *Nexus Junction Box* may have an 8-pin connector in place of the current 7-pin connector – for the USB Ground connection. The "First Flight" units have both the –Vbat and USB Ground on a single connection.

#0651 Panel Mounted CANbus/USB Extension Cable 7-pin Connector		
Pin # (from left to right)	**Function**	**Panel Mounted CANbus/USB Extension Wire Color**
1	USB Power	Red/Green
2	USB N	White
3	USB P	Gray
4	-VBat & USB Ground	Blue/Black & Orange/Red
5	CAN Power	Red/White
6	CANH	Orange
7	CANL	Green

#0651 Panel Mounted CANbus/USB Extension Cable 8-pin Connector		
Pin # (from left to right)	**Function**	**Panel Mounted CANbus/USB Extension Wire Color**
1	USB Power	Red/Green
2	USB N	White
3	USB P	Gray
4	USB Ground	Orange/Red
5	-VBatt	Blue/Black
6	CAN Power	Red/White
7	CANH	Orange
8	CANL	Green

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9.2.3 12V Power Input Connector

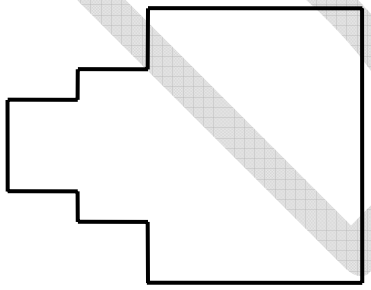
The 4-pin connector on the *Nexus Junction Box* is for connection of 12V power. Four connections are used to make it easy to connect an ON/OFF switch.

#0641 Nexus Junction Box 4-Pin Power Connector			
Pin # (from left to right)	**Function**	**Switched**	**Un-Switched**
1	+V Battery	Battery +	
2	Switch +	Switch	
3	+V Battery or Switch	Switch	Battery +
4	-V Battery	Battery -	Battery -

9.2.4 2 x RJ-11 (6P4C) RS-232 Modular Jacks

The 2 RJ-11 6P4C (6-pin / 4-contact) connectors on the *Nexus Junction Box* allow the *ClearNav* to exchange RS-232 serial data with an external device such as a Cambridge 302 variometer or a FLARM device.

Facing the Nexus Junction Box, contacts on the two 6P4C Modular Jacks have the following functions:



#0641 Nexus Junction Box RJ-11 6P4C Connector for RS-232 Serial Data			
Pin # (Top to Bottom)	**ClearNav Function**	**Wire Color**	**Attached Device Function**
1	No Function		
2	Transmit (TXD)	Yellow	Receive (RXD)
3	Receive (RXD)	Green	Transmit (TXD)
4	Ground	Red	Ground
5	No Function	Black	No Function
6	No Function		

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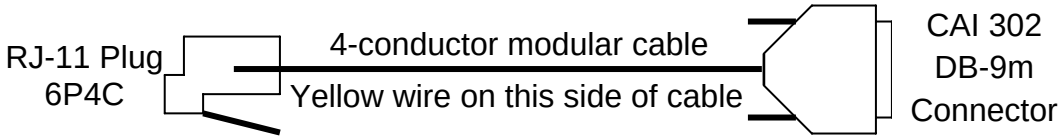
9.2.4.1 Cable for Connection to Cambridge 302

The 0646 data cable is used to connect a Cambridge 302 to the *Nexus Junction Box*. The connections are shown below.



0646 Data Cable Cambridge 302 DB-9m to Nexus Junction Box RJ-11 6P4C Connector for RS-232 Serial Data				
Pin # (Top to Bottom)	**ClearNav Function**	**Wire Color**	**CAI 302 Function**	**CAI 302 DB-9m Connections**
1	No Function			
2	Transmit (TXD)	Yellow	Receive (RXD)	3
3	Receive (RXD)	Green	Transmit (TXD)	2
4	Ground	Red	Ground	5
5	No Function	Black	No Function	
6	No Function			

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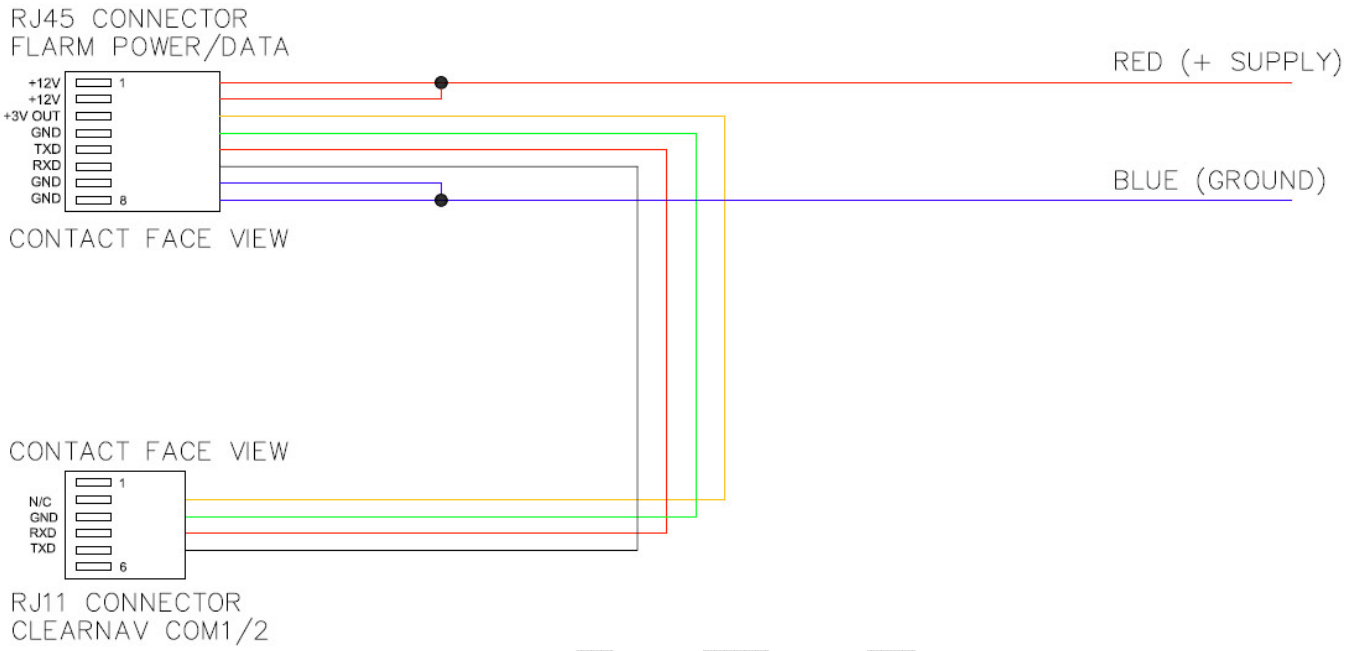
9.2.4.2 FLARM Data Cable

The 0647 data cable is used to connect a FLARM device to the *Nexus Junction Box*. It includes an 8-pin RJ45 connector for the FLARM unit, an RJ-11 6P4C (6 pin, 4 conductor) connector for the ClearNav, and 12V power leads for powering the FLARM. The connections are shown below.



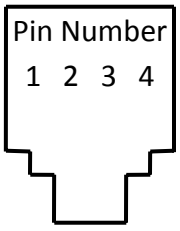
0647 Data Cable FLARM RJ45 to Nexus Junction Box RJ-11 6P4C Connector for RS-232 Serial Data				
FLARM Pin #	**FLARM Function**	**Wire Color**	**ClearNav Function**	**ClearNav Connections**
1	+12 V Input	Red		
2	+12 V Input	Red		
3	+ 3 V Output	Yellow	No Connection	2
4	Ground	Green	Ground	3
5	Transmit (TXD)	Red	Receive (RXD)	4
6	Receive (RXD)	Black	Transmit (TXD)	5
7	Ground	Blue		
8	Ground	Blue		

9.2.5 2 x RJ-22 (4P4C) CANbus Jacks

CANbus communication bus is a high-speed communication bus used for communication between NK *ClearNav* products – and future NK soaring instruments. Multiple devices can be connected to a single CANbus port. CANbus is used for the connection between the *ClearNav Nexus Junction Box* and the handheld and stick mounted remote control units. It is also used in 2-seat gliders to connect two ClearNav units together so they can share data – such as air data from a Cambridge 302 or other air data source. It is also used to connect the *ClearNav* to other NK Soaring instruments.

All NK Soaring CANbus devices (except the remote controls) have 2 CANbus jacks – to allow multiple units to be easily daisy-chained together. The *Nexus Junction Box* therefore has 2 CANbus connectors. Both CANbus jacks have the same function.

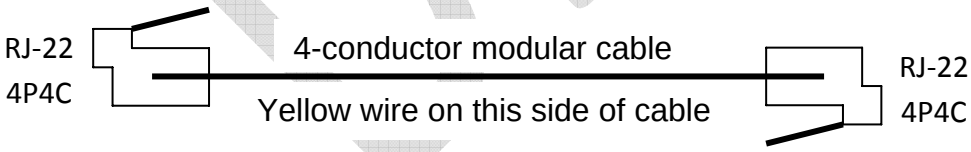
The CANbus connectors are RJ-22 4P4C (4-pin, 4 conductor) connectors. They are the same type connectors used to connect a phone handset to the phone base unit.



CANbus Connector RJ-22 4P4C Modular Connector on ClearNav Nexus Junction Box		
Pin # (Left to Right)	**ClearNav Function**	**Wire Color**
1	- Ground	Black
2	+ Voltage	Red
3	CAN High	Green
4	CAN Low	Yellow

9.2.5.1 CANbus Cable

A simple 4-conductor modular cable can be used to connect NK Soaring CANbus devices together. The cable is configured as shown below.

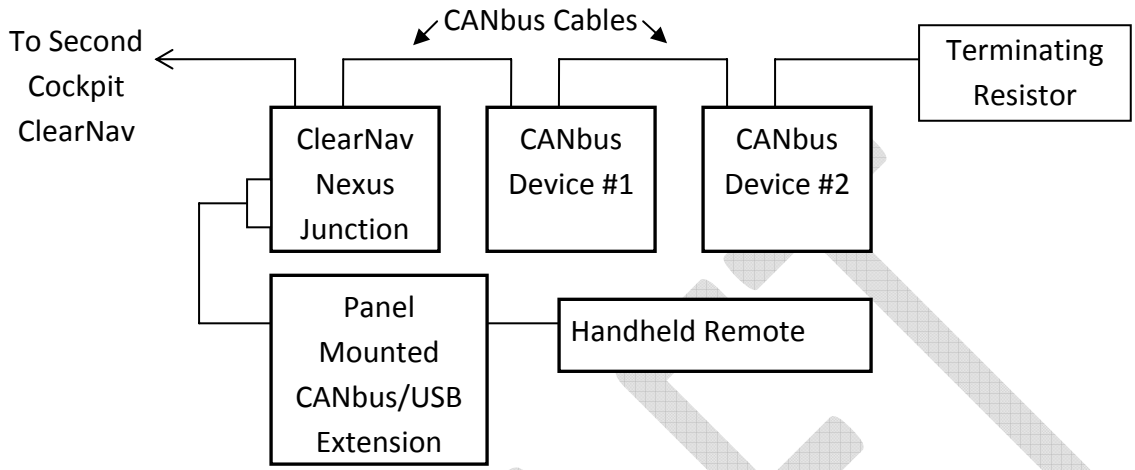


9.3 CANbus System Overview

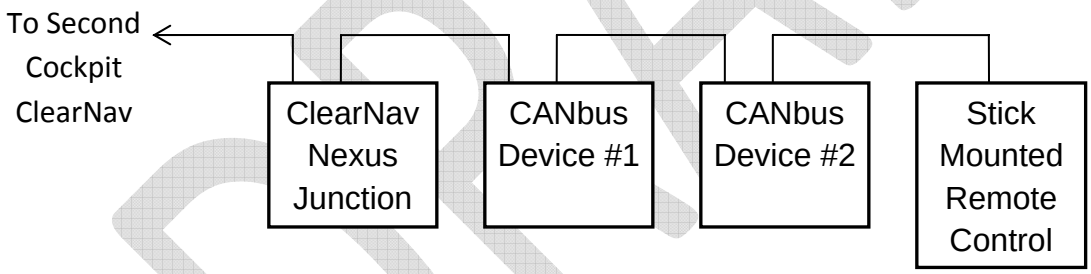
CANbus communication bus is a high-speed communication bus used for communication between NK *ClearNav* products – and future NK soaring instruments. Multiple devices can be connected to a single CANbus port. CANbus is used for the connection between the *ClearNav Nexus Junction Box* and the handheld and stick mounted remote control units. It is also used in 2-seat gliders to connect two ClearNav units together so they can share data – such as air data from a Cambridge 302 or other air data source. It is also used to connect the *ClearNav* to other NK Soaring instruments.

All NK Soaring CANbus devices (except the remote controls) have 2 CANbus jacks – to allow multiple units to be easily daisy-chained together. The *Nexus Junction Box* therefore has 2 CANbus connectors. Both CANbus jacks have the same function.

Below is an example CANbus network which includes a handheld remote control:



Below is an example CANbus network which includes a stick-mounted remote.



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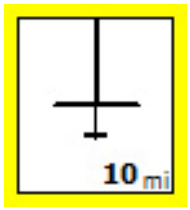
10 Glossary

Map Cursor



The *Map Cursor* is displayed in the center of the map display. It is used to:

- Pan the moving map display with the *Up*, *Down*, *Left* and *Right* buttons
- Select a turnpoint so that you can view details on it or start navigating to it (Go to) or add it to the active task
- Select an airspace and view details on it or turn it off for 12 hours

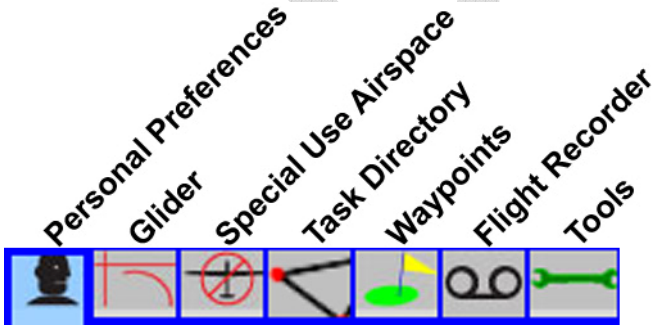
The distance number in the bottom right corner of the box indicates the width of the moving map window. For example, if the number is 10 the distance across the entire map from side to side is 10 miles or kilometers (depending on the unit's settings).

Ribbon Menu

Accessed using the *Menu* button. It is displayed near the top of the screen.

Setup Menu

The *Setup Menu* is used to access setup parameters normally not accessed in flight. It is accessed using the *Menu* button and the *Setup Menu* icon on the *Ribbon Menu*.



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