

MountainScope User Guide

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Printed in the United States of America

Revision 8, up-to-date with software version 1.38.

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Prologue

Thanks for choosing *MountainScope*! We hope that you will not only enjoy its use in and out of the cockpit, but also help us make it better by giving us your feedback about your experience. The product began as a simple terrain awareness tool. We decided to put it on the market when we realized that 17% of general aviation fatalities are caused by *Controlled Flight Into Terrain* (CFIT). With today's technology, that number should be zero, and that is part of *MountainScope*'s goal.

Situational awareness is essential to aviation.

MountainScope strives to improve the picture of your surroundings to help with that awareness--but there are a few things to keep in mind as you use this or any other GPS-based moving map.

GPS Altitude vs. Barometric Altitude: The altitude reading on any GPS receiver has inherent errors--sometimes it matches your altimeter, other times it may read 1000-feet *too high*. Use your airman training to cross check *MountainScope* as you would any other instrument, to insure that you know how accurate it is. This is why the yellow terrain areas include the terrain within 2000 feet of the GPS altitude: hopefully, it ensures that if you stay out of the yellow, you will have at least a 1000-foot clearance above terrain even when the GPS altitude is way off. GPS receivers with WAAS capability will significantly improve the altitude accuracy, but this is no guarantee, and no substitute for your altimeter.

Data Imperfections: The terrain, airports, nav aids, airspaces, etc. rendered in a moving map are no better than the original data and processing. What this means is that there are inherent errors with any data gathering operation that arise from the measurement, recording, and processing

stages of compiling such databases. The data we use comes from U.S. government sources that yield the best data currently available, but it still has its limitations. For example, the high-resolution terrain data currently comes from the *U.S. Geological Survey*, and is basically a combination of actual surveyed data, satellite images, and measurements from known contour lines. Some of this data may be off by as much as 30 meters (~92 feet) in elevation, so while it's useful for informational purposes, one shouldn't use a product like this to navigate canyons, etc. in close proximity to the ground. Details may even be missing from the high-resolution maps, since the points are spaced by approximately 300 feet--any outcropping landscape feature smaller than that may not show up at all.

One last note before you begin with the main part of the guide. As a software product, *MountainScope* has existed in some form for personal use for four years, flying in a cockpit for the last two. It fulfills the vision of just a few pilots, but we realize that everybody does things differently. Some users may notice that certain settings aren't remembered when the program is restarted. For safety's sake, this is intentional: it prevents, for example, forgetting that the terrain warning was turned off during an earlier session.

Remember that we want your feedback as we continue to improve *MountainScope*; but also please consider the safety implications of your suggestions, as safety is paramount.

Happy landings!

Todd Sprague
President
PCAvionics

Introduction

Welcome to MountainScope!

The PCAvionics *MountainScope* software for Windows PCs and Pocket PCs shows you the true shape of your world with a real-time GPS-oriented moving map. High-resolution topographic rendering makes mountainous terrain and bodies of water easy to recognize. Aviation data overlays such as airports, airspaces, airways, and nav aids are derived from official sources, and correspond closely to those found on your sectional charts (see the chapter *Map Display: Aviation Data* for references). Aviation data is also updated every 28 days to ensure that you have the most current information.

Product Features

1. 20 elevation points per nautical mile
2. Uses common aviation charting symbols
3. Permanent water features
4. 3-D topographic terrain with shaded warning areas
5. Flight planning and track logging capabilities
6. Simulator modes, including one where *MountainScope* cooperates with *Microsoft Flight Simulator 2002!*
7. 28-day aviation data updates

Hardware and Software Requirements

MountainScope runs on the Pocket PC running the Windows CE operating system, and on the PC, laptop, or TabletPC running Windows 2000, Windows XP, or Windows 98/Me operating systems. A PC is required to install *MountainScope* on the Pocket PC, as well as to update terrain and aviation data files.

Installation Instructions

MountainScope uses a step-by-step installation wizard, complete with instructions that appear at each step. On most systems, the wizard automatically runs whenever the *MountainScope* CDROM is inserted into the drive. If the wizard fails to run automatically, or if you have specific questions about any phase of the installation, please see the detailed instructions in *Appendix C: Installation*.

Appendix C also contains instructions for modifying the installed terrain files and instructions for program removal.

Register to Obtain Updates

Before you can obtain updates, you must register your copy of *MountainScope*, either by returning the registration card inside the front cover, or by calling our toll-free customer support number at: (877) 444-4PCA. For the registration process, you will need your product serial number located on the inside cover of the user guide, and the place and date of purchase. If you purchased directly from PCAvionics, you were registered when the package was shipped.

Where to Find More Information

This section provides a roadmap to the following information:

- Software License and Limited Warranty
- The User Guide
- General OEM Information
- Online Documentation, Website, and Upgrades
- Customer Support and Contact Information

Software License and Limited Warranty

The *Software License and Limited Warranty* are located in the file: *MtnScopeLicense.rtf*, on the *MountainScope CDROM*, and also appears during the PC installation.

The User Guide

The *MountainScope User Guide* is available both as a ring-bound printed manual and as an *Adobe Acrobat Reader PDF* file. The printed manual may be carried in the cockpit, to provide easy-to-find relevant information while the aircraft is in flight, without requiring online documentation that might otherwise interfere with the use of *MountainScope* itself.

After you have installed *MountainScope* (see *Appendix C*), study the key binding legend in *Appendix A, Key Bindings*, and then continue reading with the next chapter: *Concepts*.

Following *Concepts*, the remaining chapters cover:

- Additional user interface instructions
- Aviation and terrain databases and overlays

-
- Flight planning features
 - GPS and simulator operating modesAlert messages are covered in *Appendix B: Alerts*.

Finally, there is an *Index* at the end of the *User Guide*.

General OEM Information

For general information about the Pocket PC, PC, Windows, and your GPS receiver, please refer to the Original Equipment Manufacturer (OEM) documentation supplied with your device and operating system.

Online Documentation and Website

For more information about *MountainScope*, refer to the following online resources, available on both the *MountainScope CDROM*, and at <http://www.pcavionics.com/>

- FAQ (Frequently Asked Questions)
- Known Issues and Update Notifications
- Release Notes
- Specifications for Terrain, Hydrology, and Aviation Databases

Toll-Free Customer Support

If you need customer support, you may call the toll-free number (9 AM – 5 PM PST) for PCAvionics Customer Support: (877) 444-4PCA. Outside the United States, please call 530-503-9035. Please have your serial number handy.

Concepts

Interface Overview

After activation is completed (see Activation in the Installation section, in Appendix C), when you launch *MountainScope* by clicking on the shortcut, the *Waiver* dialog shown in *Figure 1* appears:

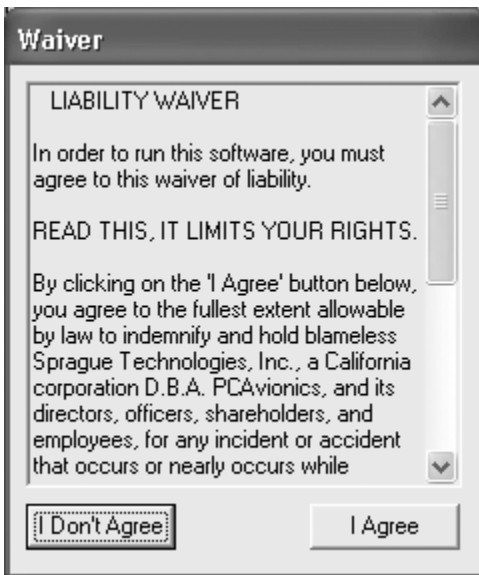


Figure 1: The MountainScope Liability Waiver dialog displayed during startup on the PC. The Pocket PC version presents a similar dialog with the same liability waiver.

Please read the short agreement and press *I Agree* to start *MountainScope*.

If you are using the Pocket PC, you may see a *Warning* dialog about power settings that are set to automatically turn the Pocket PC off. If you choose not to change the Pocket PC settings, and want it to

stay on, simply select the dialog option *Yes*, and *MountainScope* will prevent power from turning off.

If you are using a PC, a dialog similar to that shown in Figure 2 appears, allowing you to choose between different interfaces. If your screen resolution is high enough, you will see additional choices for the interface size (for example: 1024x768). Note that the (240x320) interface on the PC is almost identical to the interface on the Pocket PC.

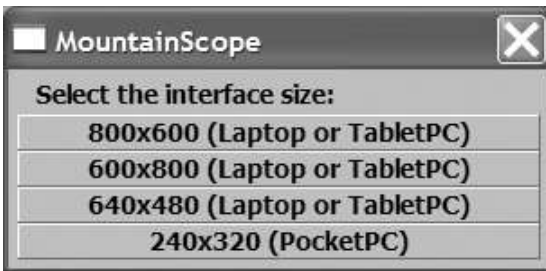


Figure 2: Interface size selector for the PC version.

The next three sections concentrate on the 640x480 and 240x320 interfaces – larger ones will have the same items as 640x480 in slightly rearranged positions. Keep in mind that all of the interfaces are similar, so these sections apply in general:

- *The 640 x 480 Interface*
- *The 240 x 320 Interface*
- *Summary of Differences Between the 640 x 480 and 240 x 320 Interfaces*

Following the interface introductions, the section: *Time, Distance, and Velocity Specifications* covers some fundamental concepts that are required to properly understand how *MountainScope* works, and how to use it. Finally, there are several sections that describe the basic user interface buttons and menus.

The 640 x 480 Interface

On the 640 x 480 interface, the Zulu (UTC) time, the elapsed time, and the map zoom radius (nautical miles) are located just beneath the map display.

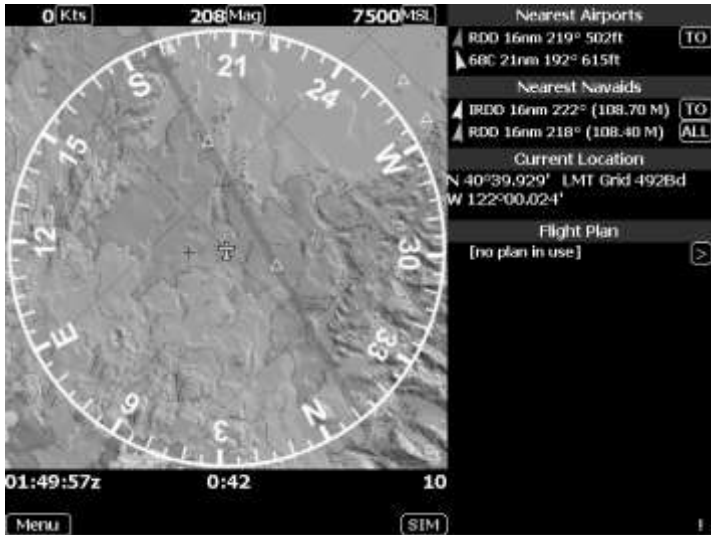


Figure 3: The 640 x 480 MountainScope interface.

Four main information panels appear on the right side:

- Nearest Airports
- Nearest Nav aids
- Current Location
- Flight Plan

Other information panels may appear as described later.

The 240 x 320 Interface

On the 240 x 320 interface, the Zulu (UTC) time, elapsed time, and the map zoom radius are located near the upper right corner, under the altitude read-out.

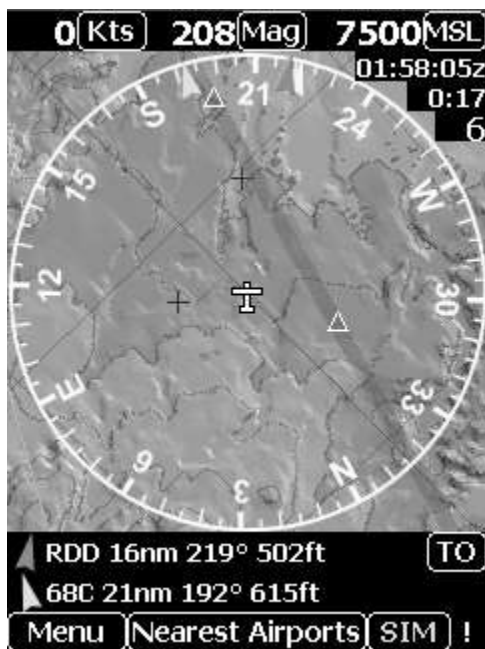


Figure 4: The 240 x 320 MountainScope interface.

Selecting Information Panels

The area for information panels appears below the map display. Unlike the 640 x 480 display, the 240 x 320 interface only displays one information panel at a time. In *Figure 4* above, note that there is a button labeled *Nearest Airports* at the bottom of the screen, which indicates that the panel is currently displaying information for the nearest airports.

Clicking on this button opens a selection menu for the different information panels: *Nearest Airports*, *Nearest Nav aids*, *Current Location*, and *Flight Plan*. If you

choose *Nearest Nav aids*, as shown in *Figure 5*, then the Nearest Nav aids information panel is displayed, as shown in *Figure 6*.

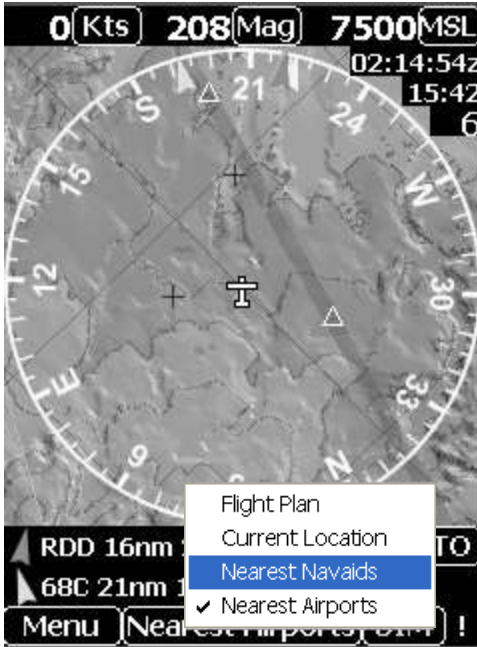


Figure 5: Information Panel selection menu on the 240 x 320 interface. The information panel, currently set to *Nearest Airports* is about to be switched to the *Nearest Nav aids* information panel. Note that because of the positioning of this menu and *Nearest Airports* on it, one can just double-click in the area of the button to bring up this information quickly.

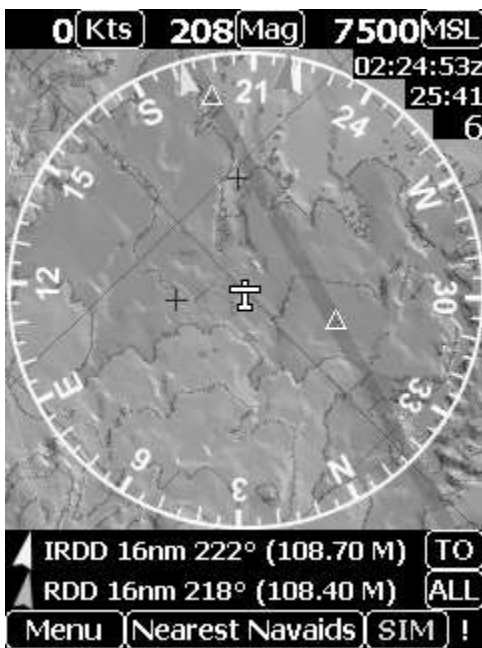


Figure 6: The information display now shows the nearest nav aids.

Summary of Differences Between the 640 x 480 and 240 x 320 Interfaces

The major differences between the two interfaces are:

- **Location of Zulu Time, Elapsed Time, and Display Zoom Radius:** on upper-right corner of 240 x 320, and at bottom just beneath the map display of 640 x 480.
- **Location of Information Panels:** on right side of 640 x 480, and near bottom of 240 x 320.
- **Information Panel Selector Button:** 240 x 320 has a button, and 640 x 480 does not, since all panels are displayed at once.

Time, Distance, and Velocity Specifications

This section discusses time, distance, and velocity values common to either interface. Please see *Figure 3* and *Figure 4* for the graphical placement of these values.

Current Time

The current time is displayed as UTC or “Zulu” time. On the 640 x 480 interface, the current time is located in the lower-left corner, and on the 240 x 320 interface, the current time is located in the upper-right corner, under the current altitude.

Elapsed Time

The elapsed time (hours:minutes:seconds) is located to the right of the current time on the 640 x 480 interface, and directly beneath the current time on the 240 x 320 interface.

The elapsed time is initialized to zero each time *MountainScope* is started, and begins counting immediately. To reset the elapsed time to zero, make sure that the *SimKey* feature is off (from the *Main* menu; see section: *Main Menu Button*), and press the *spacebar* or *Enter* key on the PC, or the *Action* button on the Pocket PC.

Display Radius and Zoom Feature

The display radius (nautical miles) is located to the right of the elapsed time on the 640 x 480 interface, and directly below the elapsed time on the 240 x 320 interface.

The display radius may be increased or decreased by using the zoom feature, available through the zoom keys (see *Appendix A: Key Bindings*), or by clicking on the map display and selecting *Zoom In* or *Zoom Out*

from the pop-up menu. You can also click on the display radius indicator itself to see a list of available zoom levels and switch directly to the one you want.

Note: If the display is at the minimum or maximum display radius, the respective zoom feature (Zoom In or Zoom Out) does not appear on the menu. On the 640 x 480 interface, the minimum and maximum zoom radii are: 0.42 nm and 320 nm, and on the 240 x 320 interface, they are: 0.25 nm and 192 nm.

Velocity: Ground Speed and Ground Track

Velocity is a vector that represents both speed and direction of travel. In *MountainScope*, velocity is reported with a set of two scalar values: *ground speed* and *ground track*.

Ground speed is located in the upper-left of either interface, and is reported in *Knots (Kts)*, *Miles per Hour (MPH)*, or *Kilometers per Hour (KPH)*. Ground speed measurement is computed from GPS values. (See the section *Graphic Multi-Purpose Buttons, Ground Speed Button*.)

Ground track is located to the right of ground speed on either interface (centered over the map display), and is relative to either *Magnetic North* or *True North*. Ground track measurement is computed from GPS values. (See section *Graphic Multi-Purpose Buttons, Ground Track Button*.)

Note: You must be moving to have an accurate ground track reading. The ground track is not the same as a magnetic compass heading reading—it is an indication of direction of travel over the ground. Also note that ground track may not be the same as your heading, due to wind.

The CDI Indicator

As listed in the *Airman's Information Manual (AIM)*, the *Course Deviation Indicator (CDI)* simulates a localizer display. Localizer displays have needles that move horizontally, and 11 dots spaced out evenly from left to right. The target is the center dot, usually larger and hollow. The space between dots is 0.5 degrees off-course, and the line indicates where the course is from present position as if you're facing the station. Localizer emitters are made so the full 5 degrees course width is 700 feet wide at the runway threshold, so *MountainScope* simulates a localizer by matching these specifications. See *Figure 7*. Invoke the localizer by clicking on an airport and selecting a SimLOC for one of its runways, or by clicking on the tip of a localizer arrow and selecting "Set CDI to KSAC LOC." *Note: The CDI heading is always relative to Magnetic North.*



Figure 7: Using the Course Deviation Indicator (CDI) for the runway approach RW18. Note that the white needle is lined up with the center point of the indicator, and that the OBS is 178 degrees. If the needle is red on either side of the indicator, then that means that the airplane is more than 3° off the center of the course.

More Buttons and Menus

In addition to the physical hardware buttons and keys built into the PC keyboard and the Pocket PC device (see *Appendix A: MountainScope Key Bindings*), *MountainScope* uses graphical user interface (GUI) buttons. On the Pocket PC, these buttons may be tapped with the stylus, and on the PC, these buttons may be clicked with the left mouse button while the mouse pointer is over the GUI button.

Main Menu Button



The *Main Menu* button is located on the lower-left corner of either interface.

This button brings up the following menu:



Main Menu

The *Main Menu* contains options for quitting or hiding the program, turning the *SimKeys* on or off, and operating the *Track*, *Display*, and *Lookup* features of *MountainScope*.

As you can see in the figure at the left, the *SimKeys* feature is turned on, as indicated by the checkmark. To turn *SimKeys* off, you would select the *SimKeys* option again, removing the checkmark. All of the options on the *Main Menu* are discussed further under the sections that describe these features.

Hiding the program will minimize or put the *MountainScope* window to the back, so that it will reappear if you click on it in the task bar or try to start it from the Start Menu again. This can be handy to get to other program or settings without quitting *MountainScope*.

Alert Button



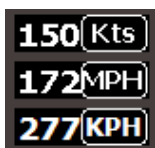
The *Alert* button is located in the lower-right corner of either interface. If there is an active alert, the button flashes

between the two images shown. If there are no alerts, the button is displayed only as the first image. If you see the *Alert* button flashing, click on it, and an *Alert* box opens, listing the current alerts. Refer to *Appendix B, Alerts* for instructions about alerts.

Graphic Multi-Purpose Buttons

Graphic Buttons are screen shapes that depict a labeled button. Certain buttons called *multi-purpose buttons*, or simply *multi-buttons*, change the mode of operation, or state, when clicked or tapped, and the label changes to identify the new mode.

Ground Speed Button



The images shown here show the two states for one button (the ground speed button): clicking the button changes between units for knots (Kts), miles-per-hour (MPH), or kilometers-per-hour (KPH). Just to the left of the buttons are the current indicator values for those buttons. Try clicking this button now to see the label change. (The ground speed button is located in the upper-left corner of either interface.) Note that this setting globally sets the distance and speed units displayed by *MountainScope*.

Ground Track Button



The ground track button is located to the right of the ground speed button on either interface. It is centered directly over the main map display. The ground track button may be toggled between units for *True* North or *Magnetic* North. Note that changes in this setting apply consistently to the heading for the compass rose, all headings displayed in the information panels, and all headings for each checkpoint in the flight plan listing view. The only exception is for the *CDI* display (see *The CDI Indicator*), which is always *Magnetic* North.

Altitude Button



The altitude button is located to the right of the ground track button, just above the upper-right corner of the main map display on either interface, and the reading of the altitude is located just to the left of the button. The readings from the buttons in this image were taken from the same location: flying at 7500 feet above Mean Sea Level, we're 916 feet Above Ground Level of 6584 feet — if you're not in the pattern, you'd better be looking out the window. The altitude button may be toggled between the following three unit settings:

- **MSL:** altitude *above Mean Sea Level*
- **AGL:** altitude *Above Ground Level*
- **GND:** altitude of the *Ground Level*

Note: The Altitude button may indicate UNK for MSL or AGL if the GPS receiver is not reporting altitude, but you can always get GND elevation.

To-From Button



The *To-From* button is included in the information panels for *Nearest Airports* and *Nearest Nav aids*. Toggling the *To-From* button changes the bearing for a location displayed in the information panels. If the button is set to *To*, then the bearing is given directly to the location. If the button is set to *From*, then the bearing is given directly away from the location.

VOR-NDB-LOC-ALL Button



The *VOR-NDB-LOC-ALL* button is included on the right side of the *Nearest Nav aids* information panel. This button filters the information display to show the two nearest nav aids having the specified type:

- **VOR:** VHF Omni Range
- **LOC:** Localizer
- **NDB:** Non-Directional Beacon

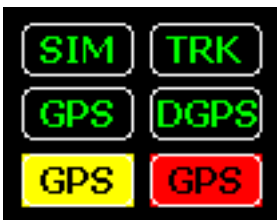
If the button is set to *ALL*, then the information panel shows the two nearest nav aids, regardless of type.

Information Panel Selector Button



(Specific to the 240 x 320 interface)

On the 240 x 320 interface, the button to the right of the *Main Menu* button indicates the current context of the *Information Panel*, and clicking this button selects the *Information Panel* mode through a pop-up menu, as described earlier in the section *Selecting Information Panels*. Note that this button does not appear on the 640 x 480 interface.



SIM-GPS Button

The SIM-GPS button indicates whether *MountainScope* is operating in *Simulator*, *Track/Replay*, or *GPS* mode. If the button is flashing yellow, the GPS is not sending valid data (e.g., it hasn't locked onto the satellites yet). If the button is flashing red, action may be required on your part because you may

have the selected the wrong protocol for your GPS receiver, or the GPS may have become disconnected. If WAAS or another differential GPS mode is in use, it will indicate DGPS in green. Clicking on the button brings up a pop-up menu for specifying aspects of the operating mode. Please refer to the section *Operating Modes: Simulator and GPS* for more information about this button and the pop-up menu.

Tutorial 1: Using Classified Directories

Many of the features in *MountainScope* use a special type of hierarchical classified directory for looking up items. For example, if you wanted to lookup the navaid called *ZILOM*, you could follow the process illustrated in *Figure 8*:

Menu

- Quit
- SimKeys
- Track ▶
- Display ▶
- Lookup**

1. Select the *Lookup* option from the *Main Menu*, then select *Navaid* from the next pop-up menu.

- Airport
- Navaid**
- Waypoint
- User Waypoint
- SAR Grid

2. The *Navaid* classified directory appears. Select the letter **Z**, to see the next level of classified entries. Since there is only one entry beginning in **ZI**, **ZILOM**, it is spelled out completely, and you can now select it.

Navaid		
A	J	S
B	K	T
C	L	U
D	M	V
E	N	W
F	O	X
G	P	Y
H	QEEZY	Z
I	R	

Navaid	
ZE	ZU
ZILOM	ZZV
ZO	

Figure 8: Looking up a Navaid from the classified directory menus.

Map Display: Basics

The most prominent feature of *MountainScope* is the scope image, or *Map Display*. The *Map Display* provides a graphic representation of:

- Ground terrain beneath the aircraft
- Heading and bearing information
- Aviation data overlays

This chapter covers *Map Display* basics, including basic overlays and terrain rendering. The next chapter, *Map Display: Aviation Data*, covers the features for aviation data overlays in more detail.

The *Map Display* also responds when the user clicks on specific elements of the display by showing a context-sensitive pop-up menu at the location of the user input (see the section *Selectable Symbolic Items*).

Compass Rose and Position Marker

The *Map Display* shows a terrain map with both navigation and aviation data overlays.

The most prominent element of the *Map Display* is the *Compass Rose*, as shown in *Figure 9*. The *Compass Rose* rotates around the *Position Marker*, an airplane-shaped icon. The *Position Marker* is always centered on the screen and pointing forward to the top. From the *Display* menu, you can turn on a forward path line that makes it easy to see what you'll be flying over.

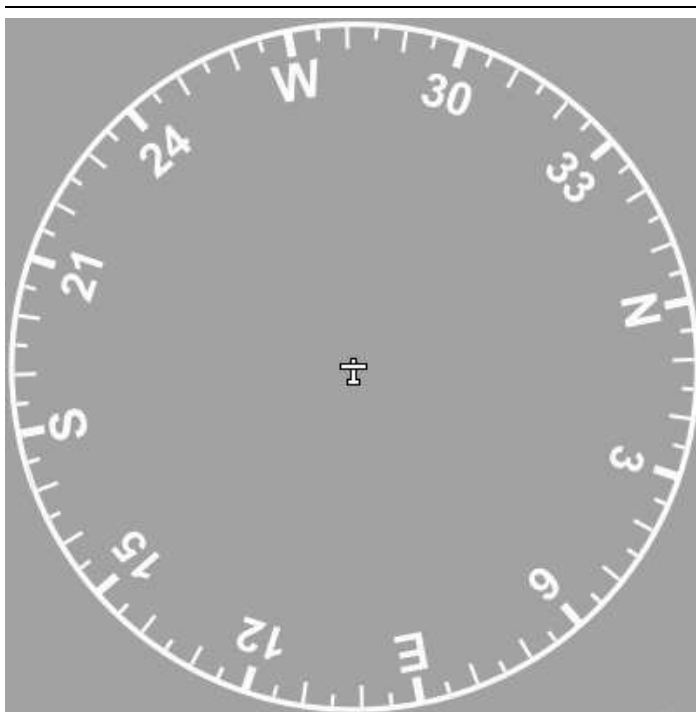


Figure 9: A Map Display showing only the Compass Rose and Position Marker.

Bugs



Bugs are screen shapes appearing on both the main map display and on the information panels, and they represent headings to specific objects, such as: checkpoints, nav aids, and airports. Bugs always point to the object. Bugs on the *Map Display* always radiate away from the *Position Marker* at the center of the Compass Rose, towards the object, unless the *Position Marker* is centered on the object, in which case, the bug points to the *Position Marker*. See *Figure 10* and *Figure 11* for some examples of bugs.

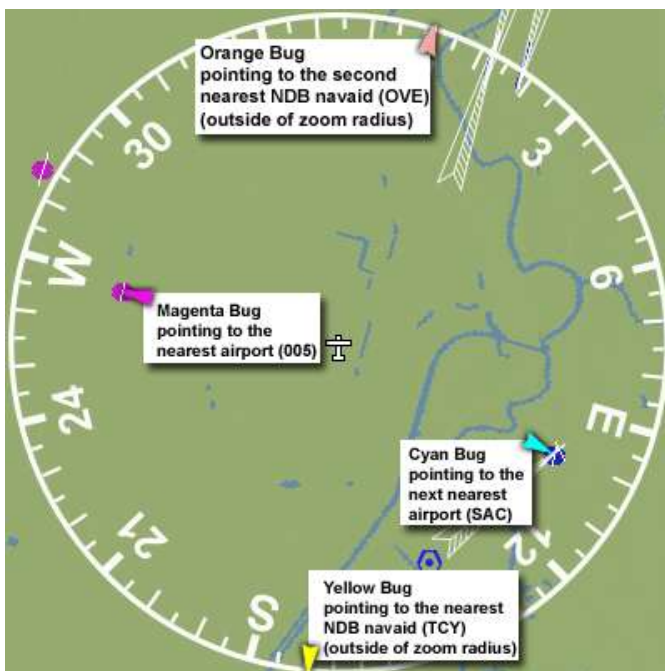


Figure 10: Some bugs pointing to nearby airports and NDB nav aids. Note that these bugs match the bugs in Figure 11.


Nearest Airports	
 005 6.6nm 267° 68ft	<input type="checkbox"/> TO
 SAC 7.2nm 101° 24ft	
Nearest Nav aids	
 TCY 52nm 169° (203 k)	<input type="checkbox"/> TO
 OVE 58nm 001° (212 k)	<input type="checkbox"/> NDB

Figure 11: Bugs on information panels that match the Bugs shown in Figure 10.

As discussed in section *VOR-NDB-LOC-ALL Button*, chapter *Concepts*, you can switch the type of navaid that is reported in the *Nearest Nav aids* information panel by toggling the button (which appears as *NDB* in Figure 11). As the type is toggled, both the information panel and the map display reflect the change. Note that flight plan bugs are always *dark blue*.

7.5-minute (7.5') Grid Overlay

A 7.5-minute (7.5') grid overlay is available. The grid overlay is toggled on or off from the *Display, Overlays, 7.5' grid* item on the Menu.

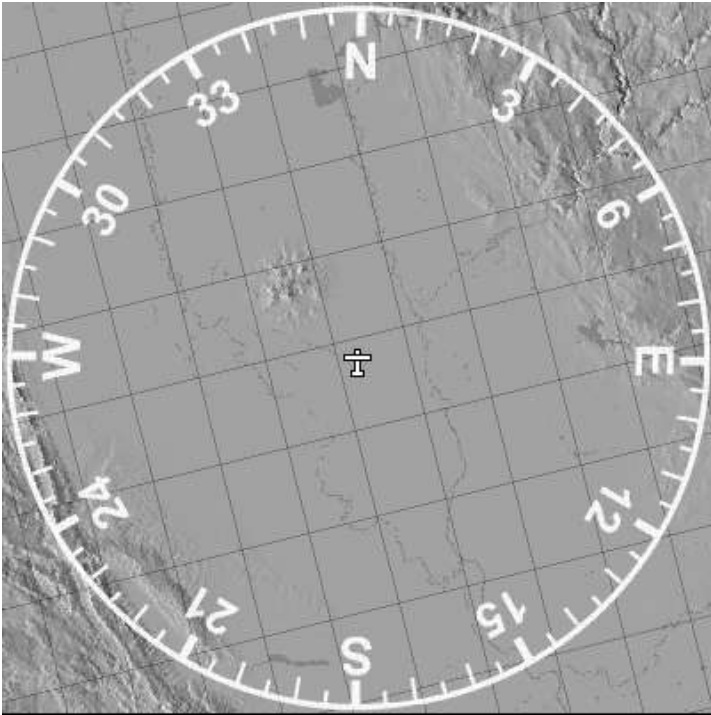


Figure 12: 7.5' Grid overlay, display zoom at 30-mile radius.

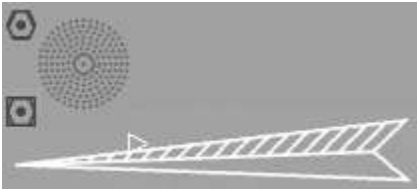
Selectable Symbolic Items

Certain symbolic items may be clicked or tapped on the map, and then selected by choosing the proper name from some pop-up menus that are described below in the section *Pop-up Menus for Selectable Symbolic Items*.

The following symbols may be selected from the map display:



Airports are denoted by typical runway layout symbols, appearing in different shapes and colors. The runway layout approximates the aviation data that specifies length, width, position, class, and status of the runways.



Nav aids: VOR, NDB, LOC, and variants of these types of nav aids appear in different shapes and colors. The localizer symbol will fade away at higher levels of zoom, as is the case with standard waypoints.



User and Standard Waypoints: *User Waypoints* are denoted by a black cross, and *Standard Waypoints* by a white triangle.

Waypoints give the specific location of a point on the map. *User Waypoints* are created, modified, and deleted by the user, and may be triangulated. *Standard Waypoints* are included as part of the aviation data, and are not modifiable by the user, nor can they be triangulated.



Obstacles: *Obstacles* are denoted by blue “carats” and will have a red circle around them if the tip is above you. By selecting them, you can find out what they are, exact height, lighting, markings, and frequency if applicable.



Airspace: Airspace sectors can be selected to find out their class, altitudes, controlling agency and frequency.

Invisible Selectable Items and Display Zoom Scale

In certain areas, the concentration of selectable items (such as standard waypoints) may be so great at large display radii (map or zoom scale) that it would be impractical to discern between different items, and the density of such items might obscure other aviation data overlays. For this reason, waypoints are not visible at the larger scales of zoom. Please note that you won't be able to select waypoints from the map display if they are not visible, even if you know that such a waypoint exists at a specific location. You may, however, always select a waypoint by *ID* from the *Main Menu's Lookup* option.

Pop-up Menus for Selectable Symbolic Items

This section describes the pop-up menu which may appear when you are selecting a symbolic item from the *Map Display*. Regardless of whether you click on a selectable symbol, you will get options for *Zoom In/Out*, *Make New User Waypoint*, and measurement information telling you the distance & heading to the point where you clicked, plus the ground elevation at that point. If your system is capable, you will get a "Windshield View" option that when selected will split the display to give you a forward-looking 3D display as in *Figure 20*.

Primary Map Display Menu



Without nearby items: if you click somewhere on the map in an area that does not contain any *visible* selectable items

(see *Invisible Selectable Items and Display Zoom Scale*), then the *Primary Map Display Menu* appears, and there are no aviation items to select.



With nearby items: If, however, you click on or near one or more selectable items, the *Primary Map Display Menu* appears with the selectable items

included at the top of the menu. If you choose one of these items, then one of the *Selection Command* menus, described in the next section, appears.

Selection Command Menus

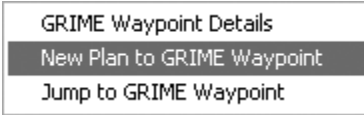
After choosing a selectable item from the *Primary Map Display Menu*, one of five possible types of *Selection Command Menus* will appear.

Each of these menu types offers a *Details* option as the first choice, and a *Jump to* option as the last choice. The *Details* option opens the *Details Window*, in which details about the item are displayed (see section *The Details Window*). The *Jump to* option only works in Simulator mode, and sets the *Current Location* to the selected item as well as centering the *Map Display* to the new location (see section *Jumping to a Selected Item*).

The type of menu, and other options offered besides *Details*, depends upon: the state of the current flight plan, and on whether the item is a *User Waypoint* or not. The five *Selection Command Menu* item types are:

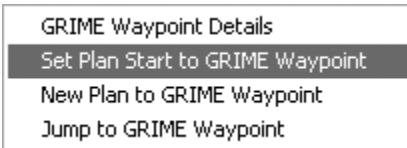
- New Plan Initiator
- Plan Start Locator
- Checkpoint Includer
- Checkpoint Remover
- User-Waypoint Modifier

Note: If the item is a User Waypoint, one of the first four menu types will be combined with the last menu type.



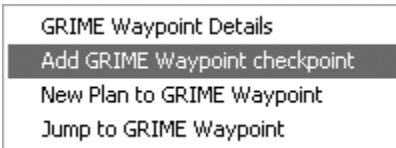
New Plan Initiator: the menu offers the chance to create a *New Plan* to the selected item. If you

choose this option, the item becomes the *Destination* for a new plan, and the item information appears in the flight plan information panel, and the next step would be to pick another item to be the *Start* of the plan.



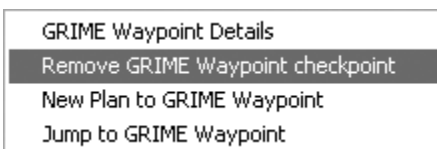
Plan Start Locator: if a flight plan exists, but a starting point has not yet been set,

the menu offers the chance to make the selected item become the *Plan Start* of the existing flight plan. Note that after you have set an item to be the *Plan Start*, you may begin adding other items as plan checkpoints.



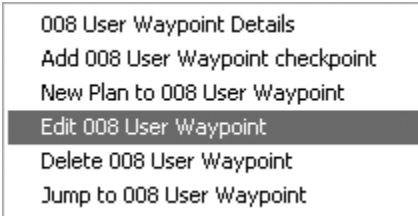
Checkpoint Includer: if a flight plan exists, and the plan already contains a *Plan Start*,

then the menu offers the option to *Add* the selected item as a *Checkpoint* within the plan. Note that you cannot add an item as a *Checkpoint* if it already exists in the plan as either: a *Checkpoint*, the *Plan Start*, or the *Destination*: the *Checkpoint Includer* menu won't appear for the item if this is the case.



Checkpoint Remover: if a flight plan exists and the selected item is

already included as a *Checkpoint* on that plan (but not as the *Start* or *Destination*), then the menu offers the option to *Remove* the checkpoint from the plan.



User-Waypoint Modifier: if the selected item is a *User Waypoint*, then options to *Edit* or *Delete* it are

offered in addition to the flight plan options just described. See the section *Managing User Waypoints*, in the *Flight Plans* chapter for more information about editing and deleting *User Waypoints*.

Alternative Lookup Feature: Selecting Items from the Classified Directory

As an alternative to selecting symbols directly from the display, you can use the main *Menu Lookup/<Symbol>* option to find information about a particular symbol by *Lookup*. (See the section *Tutorial 1: Using Classified Directories* for more information about making selections from a classified directory.)

The Details Window

After *Lookup*, the information is displayed in a *Details* window, along with buttons for: *New Plan*, *Checkpoint*, and *Jump*, as shown in *Figure 13*:

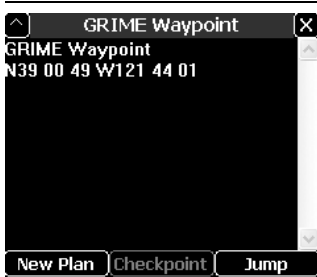


Figure 13: *Details* window for a Selectable Item, in this case, the GRIME Waypoint. The information display includes buttons for: New Plan, Checkpoint, and Jump. If you select the New Plan button, you will begin a new flight plan, with the destination set to this waypoint. Note that the Checkpoint button is currently disabled, indicating that there is no flight plan to add to. See the section *Flight Plans* for more details about using New Plan and Checkpoint. If Simulator mode is *on*, and you select the Jump button, *MountainScope* sets the Current Location to the location of this waypoint, and the Map Display centers on the waypoint.

Note: The Checkpoint button in the Details window, shown in Figure 13 will change modes depending on the current status of the item in the flight plan:

- If the flight plan does not yet have a *Start* point, then the *Set Start* button is shown instead.
- If the item does not yet exist as a checkpoint in the current flight plan, the *Checkpoint* button is shown (disabled if there is no flight plan).
- If the item already exists as a checkpoint in the current flight plan, then the *Remove CP* button is shown instead (for Remove CheckPoint).

Jumping to a Selected Item

If *MountainScope* is in *Simulator* mode and you click on a symbol shown on the map display, and then select the option for *Jump to <name of> <symbol>*, or if you click the *Jump* button displayed at the bottom of an *Details* window, then *MountainScope* sets the current

location (the airplane symbol) to the location of the selected symbol.

Terrain and Water

This section describes features of the map display that pertain to terrain and water rendering, including:

- Contour Lines
- High- and Low-Resolution Terrain Images
- Terrain and Warning Color Shading
- Night Mode Shading

Contour Lines

Contour lines clearly accentuate the changes in terrain elevation at intervals of 500 feet (see *Figure 14*). Contour lines are especially helpful in determining the rate of change in approaching terrain (steeper terrain is indicated by closer contour lines than less steep terrain). The contour lines can also reveal a greater resolution of the change in terrain elevation where the color shading doesn't change noticeably.

While the extra shading offered by closely-spaced contour lines (such as that found in mountainous terrain) may help to accentuate the terrain contour, it may also contribute excessive noise to the actual terrain graphic, especially in areas with overlapping aviation datum. Therefore, the user may want to turn off contour lines in such circumstances. Contour lines are toggled on or off from the *Display/Contours* item on the *Main Menu*.

High- and Low-Resolution Terrain Images

If the required map files are stored on the PC or Pocket PC, then the terrain is rendered using high-resolution methods as shown in *Figure 14*. Otherwise, the terrain is rendered in colored blocks corresponding to the 7.5'

grid, as shown in *Figure 15* and *Figure 16*; an alert also appears in the *Alert* box indicating which high-resolution terrain map files are missing. Terrain warnings (discussed below) are still available for low-resolution rendering, but only with a crude approximation: if one or more warnings applies to terrain anywhere within a grid cell, the entire grid cell is colored with the highest-level warning in that cell.

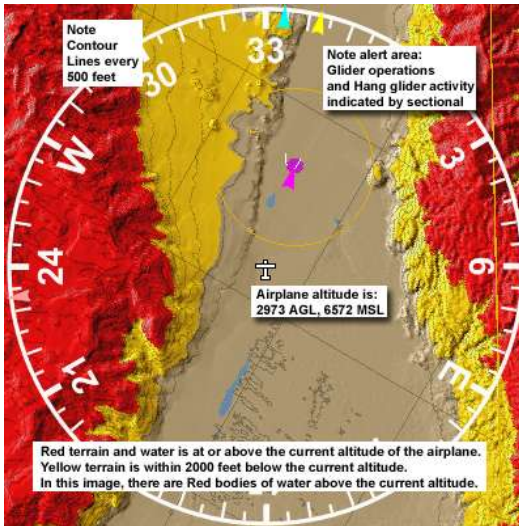


Figure 14: High-resolution terrain image showing terrain contour lines and terrain warnings.

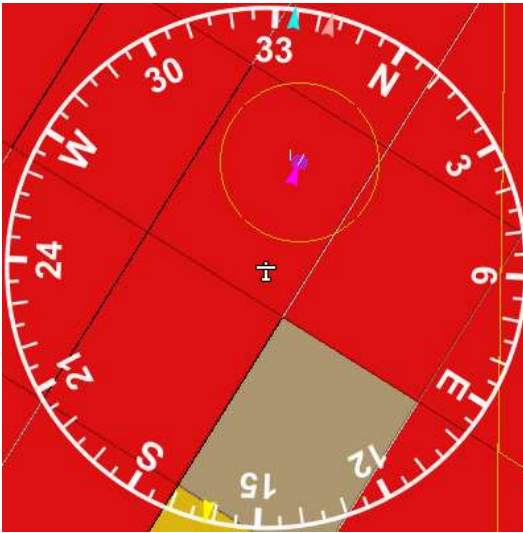


Figure 15: Low-resolution terrain image of the same location and altitude as shown in *Figure 14*.



Figure 16: Another low-resolution terrain image of the same location as shown in *Figure 14* and *Figure 15*, but zoomed out to 80 nautical miles radius.

Terrain and Warning Color Shading

This section describes the color shading of terrain and terrain warning areas on the map display, as shown in *Figure 14* through *Figure 20*.

Terrain that is At Least 2000 feet Below

If the terrain is more than 2000 feet below the current altitude, then the terrain is shaded with a gradient color scheme similar to that used on sectional charts or topographic maps, where the variations in shade indicate different bands of elevation. This 2000 feet distance can be adjusted to 1000 or 500 feet on the *Display/Terrain Warning* menu.

For example, a valley near sea level may appear green, and the foothills rising up from the valley will be shaded with darker green, through tan, and eventually brown. Similarly, mountains may be shaded from light to darker brown as the ground altitude of the terrain increases.



Shading for Water that is At Least 2000 ft Below

Permanent water features such as lakes, reservoirs, and large rivers appear as blue shading. Note that the shading process for water depends upon the availability of hydrography data, which may not be complete for all areas. Also note that if terrain warnings are on, the water will be shaded red or purple if a terrain warning applies to the body of water.

Shading for Terrain Warnings

Two conditions warrant special color shading of the terrain, to indicate that the aircraft is flying below or within 2000 feet of surrounding terrain:

-
- *Red* terrain and water is at or above the current altitude.
 - *Yellow* terrain and *Purple* water are within 2000 feet below the current altitude.

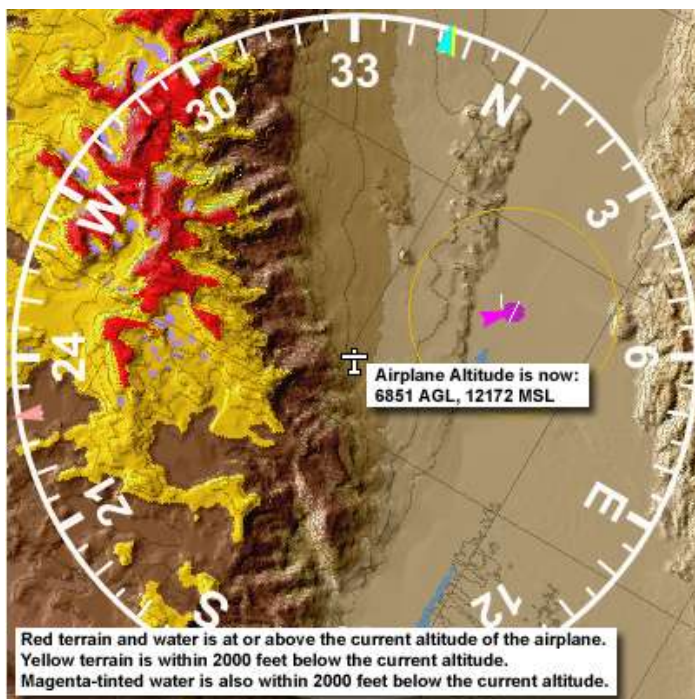


Figure 17: High-resolution terrain image, showing the same terrain as in *Figure 14*, but with the airplane at a higher altitude.

Night Mode

Night Mode reduces the brightness of the map display by dimming the white graphic and text areas to gray, and drastically reducing the brightness of the terrain, so that the display has less impact on night vision adaptation.

Night Mode is also useful when you want to examine aviation data overlays clearly separated from the

terrain information. If you have *Terrain Warnings* turned on, the warning areas are still visible, as shown in *Figure 18*. Otherwise, all of the terrain is rendered with nighttime shading.

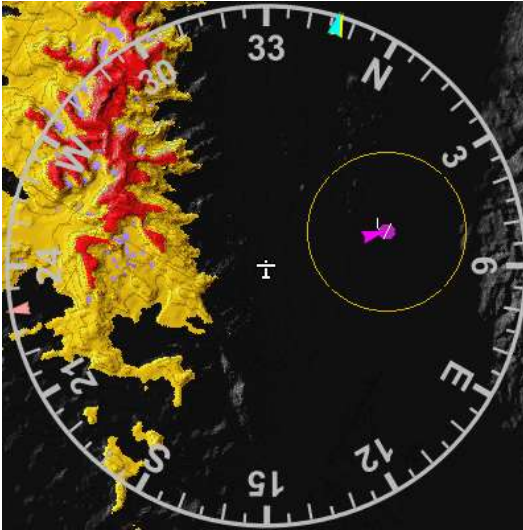
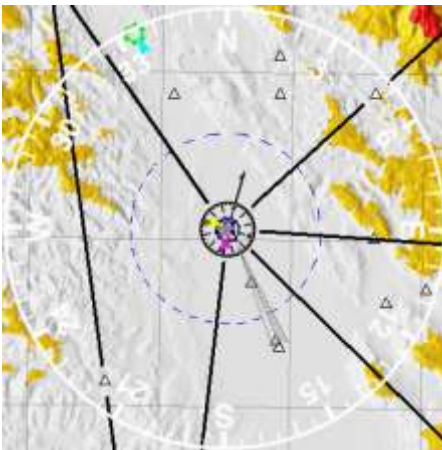


Figure 18: High-Resolution terrain image showing the same terrain as in *Figure 17*, but in *Night Mode*.

IFR Mode



By selecting *Display/IFR* you can get a simulated low-altitude IFR enroute chart display as shown to the left. This mode will still show terrain, but only in areas of concern.

Figure 19 : Low-altitude IFR chart

3D Windshield View

By clicking on the map and selecting *Windshield View*, You can get a split screen including a 3D rendering of what you should see out the windshield in the direction of your ground track, as in *Figure 20* below. Obstacles will also appear as stretched pyramids that are normally blue, but will be red if the obstacle intersects your current altitude.

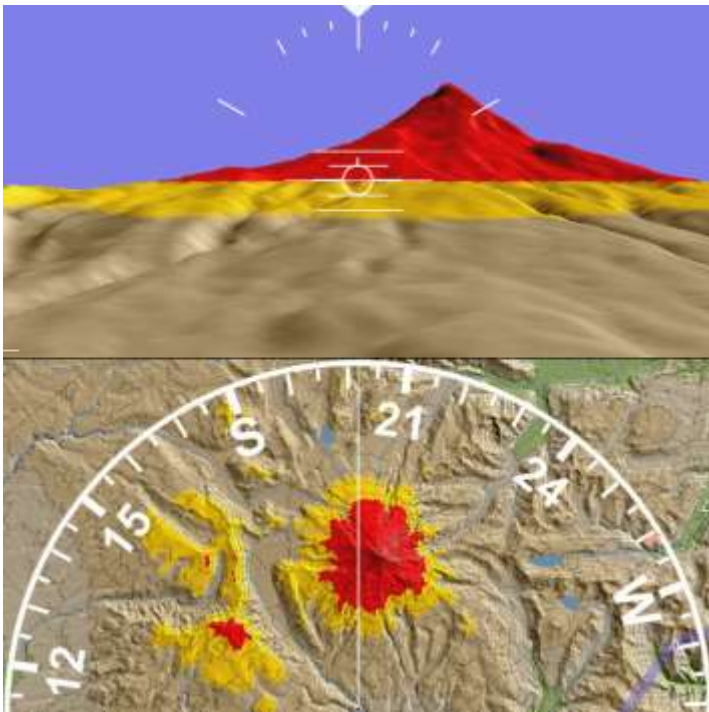
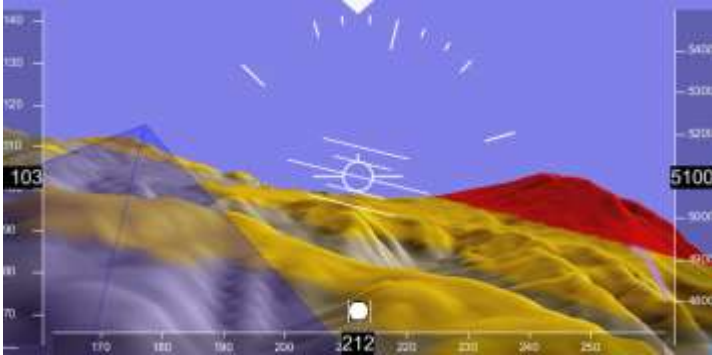


Figure 20: Mount Rainier. The Windshield view shows in the top half of the map display if selected from the *Primary Map Display Menu*. This feature may not be available on PocketPC systems or if you do not have DirectX 8.1 installed. The altitude marks will only appear if you have a gyro connected and working.

3D Windshield View with EFIS Information

If you have an electronic gyro and/or airdata sensors, this display will become very much like an EFIS, including tapes for airspeed, altitude, and heading, and trend lines for turn and climb rates.



Map Display: Aviation Data

Aviation data is displayed as graphic overlays on the main map display. The aviation data may be updated at routine intervals from the PCAvionics website, <http://www.pcavionics.com/>.

Missing or Out-of-Date Data

MountainScope alerts you if your databases are missing or expired by flashing the **Alert** box. The **Alert** box is labeled with an exclamation mark and is located in the lower right corner of the interface.

Tapping (or clicking) the **Alert** box, opens a *Details* window containing all alerts. If any databases are expired, or expire within the next 7 days, these databases appear in the list.

If a newer database is already installed at the time an older database expires, an *Alert* message may request that you quit and restart *MountainScope* to reload the new database.

For more information about resolving missing or out-of-date aviation data, please see *Appendix B, Alerts*.

Summary of Aviation Data Overlays

Table 1 lists the types of aviation data currently supported by *MountainScope*.

	<i>ID</i>	<i>Name</i>	<i>Loc</i>	<i>Elev</i>	<i>Type</i>	<i>Freq</i>
Airports₁	✓	✓	✓	✓	✓	✓
Nav aids₂	✓	✓	✓	✓	✓	✓
Obstacles			✓	✓ ₃	✓	✓ ₄
Waypoints	✓		✓			
Airspace₅		✓	✓	✓	✓	✓
Airways		✓	✓	✓	✓	

Notes

1. Airport info may also include info about fuel and lighting, and also the following runway info: ID, true heading, width and length of each runway, position of both ends of the runway, status about whether the runway is open or closed, and whether or not the runway is soft.
2. Navaid info contains slaved variation, and may also contain LOC and GS angles, where applicable.
3. Obstacle elevation is reported as the tip of the obstacle. The tips within 2000 feet of the current altitude are displayed as blue carats as a warning, and the tips at or above are displayed as blue carats with a red ring, as dangerous. Obstacles that are not within 2000 feet from the current altitude are not shown. If the altitude is not known, or if altitude warnings are off, then the obstacles are always blue. If you see an obstacle on the map display, treat it as a warning, and try to identify it visually.
4. Obstacle info may include frequency, verification status, painting, or lighting where applicable.
5. Information for Class B, C, D, and Special Use airspace boundaries is available.

Table 1: Supported aviation data.

Appearance of Aviation Data Overlays

This section illustrates airports, airspaces, airways, navaids, and obstacles as they appear on the *Map Display* (see *Figure 21* through *Figure 24*). See also *Selectable Symbolic Items*.

- **Airports:** airports are selectable items that are drawn with a close approximation to the actual airport layout, as drawn and color-coded on a sectional chart. The airport overlay may include relative length and orientation of runways, if that information is available in the aviation database. Airports may be enclosed by an associated airspace. As a selectable item, you may add airports to flight plans as checkpoints or final destinations, jump to airports on the map display, and display detailed information in a detail window. In addition to the figures indicated above, refer to the legend on a standard sectional chart.
- **Airspaces:** airspaces are selectable items – you can click on them to get altitude and frequency information. *Always* refer to your sectional chart for complete information about an airspace. *MountainScope* uses: thick solid blue lines for Class B airspaces, thick solid magenta lines for Class C airspaces, thin dashed blue lines for Class D airspaces, thin dashed magenta lines for surface Class E sectors, thick solid orange-yellow-colored lines for Military Operations Areas (MOA), Warnings & Alerts, and thicker solid red-colored lines for Restricted and Prohibited .
- **Airways:** airways currently are not selectable items. You can click on them to get additional information. *Always* refer to your sectional chart for specific information about an airway.

MountainScope uses thick light-blue, somewhat transparent lines to depict airways.

- **Nav aids:** nav aids are selectable items that are drawn with a close approximation to the actual nav aid depiction on a sectional chart, with a few exceptions (localizers are depicted as on the plan view for an IFR approach plate). As a selectable item, you may add nav aids to flight plans as checkpoints or final destinations, jump to nav aids on the map display, and display detailed information in a detail window (including the morse code IDs). In addition to the figures indicated above, refer to the legend on a standard sectional chart.
- **Obstacles:** obstacles are selectable items – you can click on them to get their type, altitude, lighting, painting, verification status, and frequency. Obstacle elevation is stated as the MSL altitude of the highest part of the obstacle. If terrain warnings are *off*, obstacles are always depicted as blue carats. If terrain warnings are on, then obstacles more than 2000 feet below the airplane are not shown, obstacles within 2000 feet are shown as blue carats, and obstacles that are at or above the aircraft’s altitude are shown as red-circled blue carats (see *Figure 24*).

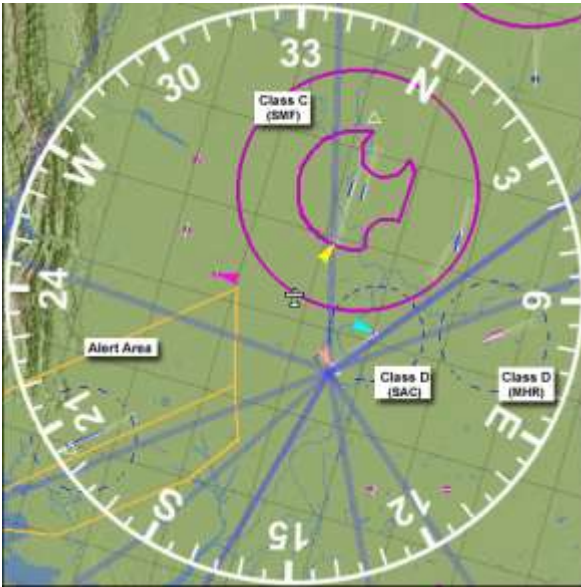


Figure 21: Airports, Airspaces, Airways (blue lines), and NavAids. Note the Alert area.

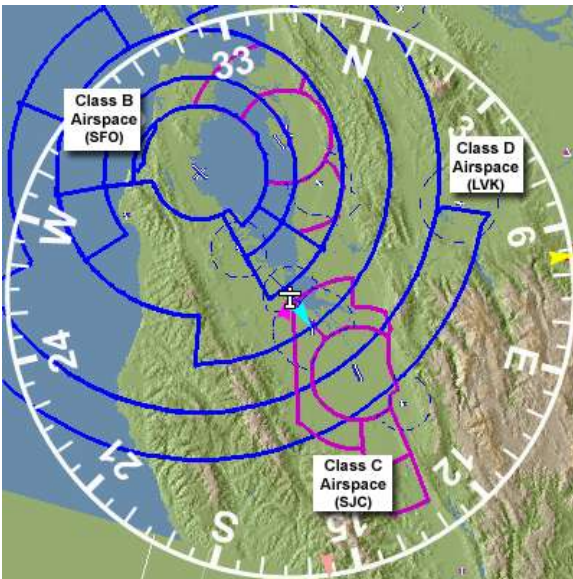


Figure 22: Busy airspaces near San Francisco. This figure illustrates Class B, C, and D airspaces.

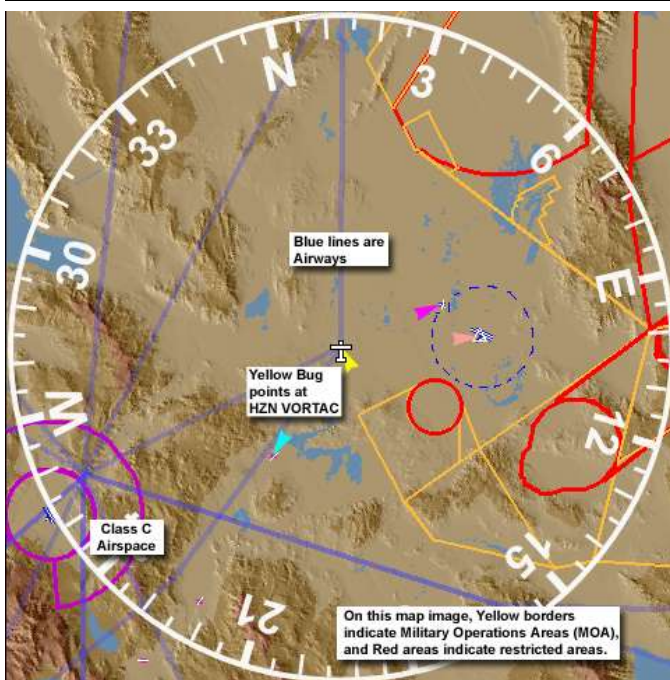


Figure 23: Class C, MOA and Restricted airspaces near the Hazen VORTAC (HZN), and blue lines indicating airways.



Figure 24: Blow-up of Map Display showing terrain and obstacle warnings. The Yellow terrain and the tips of the blue obstacles are within 2000 feet of the aircraft's altitude. The red-circled obstacles are at or above the aircraft's altitude.

Flight Plans

You can create a flight plan to your destination, complete with checkpoints along the way. At any time, you can add or remove checkpoints from the flight plan, or change your destination by creating a new flight plan. You can also record a flight track, and play it back later.

Flight Plan Overlay

The flight plan is drawn as a blue line between the starting and destination points. A blue bug indicates the bearing to the next checkpoint (See *Figure 25*). The overlay corresponds to the flight plan displayed by the *Flight Plan* information panel. Note that the flight plan bug is always colored blue. The overlays may be turned on or off from the *Main* menu *Overlays* option.

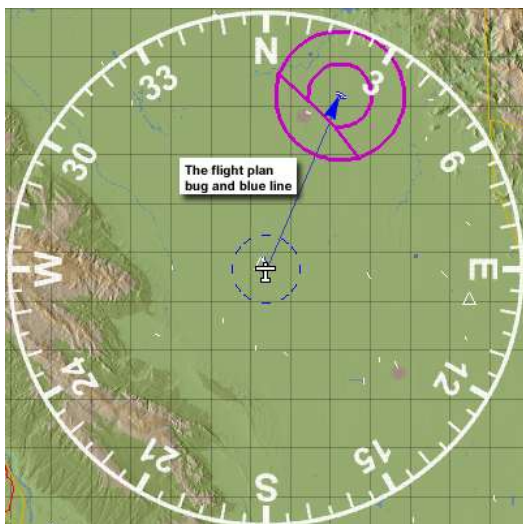


Figure 25: Simple flight plan overlay for a flight plan between two airports.

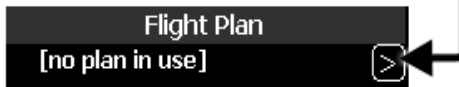
Checkpoints

Checkpoints mark destination intervals along a flight plan. A checkpoint may be one of the following items:

- Standard Waypoint
- User Waypoint
- Navaid
- Airport
- SAR Grid

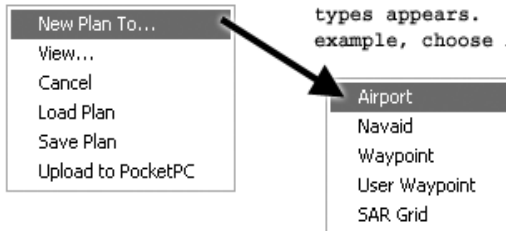
Tutorial 2: Flight Plan with Checkpoints

1. To work with flight plans, locate the flight plan information panel, and press the button on the right side:



Step 1: Start with the *Flight Plan* button.

2. A menu of flight planning options appears. To create a new flight plan, select *New Plan To...* The menu of valid item types appears. For this example, choose *Airport*:



Step 2: Create a new flight plan to an airport.

3. The *Airport Directory* opens. You may select the identifier letters for the airport by clicking the mouse, tapping with the stylus, or simply typing the letters from the keyboard. As each letter is selected, the *Airport Directory* shows the next level in the hierarchy. The ID for *Bishop Airport (BIH)* is selected in the following example steps: 4, 5, and 6.

Step 3: Use the *Airport* directory lookup in steps 4-6.

4. Pick or type B.

Airport		
0	C	O
1	D	P
2	E	Q
3	F	R
4	G	S
5	H	T
6	I	U
7	J	V
8	K	W
9	L	X
A	M	Y
B	N	Z

5. Pick BI, or type I.

Airport		
B08	BH	BR
B1	BI	BS
B2	BJ	BT
BA	BK	BU
BB	BL	BV
BC	BM	BW
BD	BN	BX
BE	BO	BY
BF	BP	BZN
BG	BQK	

6. Pick BIH, or type H.

Airport		
B1C	BIH	BIV
BIF	BIL	BIX
BIG	BIS	

Step 4, Step 5, Step 6: Pick BIH.

7. The *Flight Plan* information panel now shows *Bishop Airport* as the destination. Since we are not moving, the *Estimated Time Enroute (ETE)* does not apply.

Flight Plan	
BIH 27nm 124° [no ETE]	>
BISHOP Airport	

Also note that the information indicates that *BIH* is 27nm away with a bearing of 124 degrees--this example assumes that we are currently located at the nearby *Mammoth Yosemite Airport (MMH)*. (Use the *Lookup item/Airport* feature from the main menu to locate *MMH*, similar to the steps in 4, 5, 6, then from the details window, jump to *MMH*).

Step 7: The destination appears in the flight plan.

8. Next we need to add the *Start* checkpoint for this flight plan. Note that there are several ways to do this: you can use the *Lookup* feature on the main menu to open the item's information window, which will contain a button to set the plan start, or you can click on an item on the map display or one of the information panels and the *Set Plan Start* option will be listed on the pop-up menu.

Since we are at *MMH*, *MMH* appears in the *Nearest Airports* panel so just click here:

Nearest Airports	
MMH 0.0nm 360° 7128ft	TO
B24 24nm 327° 6802ft	

Step 8: *Set Plan Start*, the initial location of the flight plan.

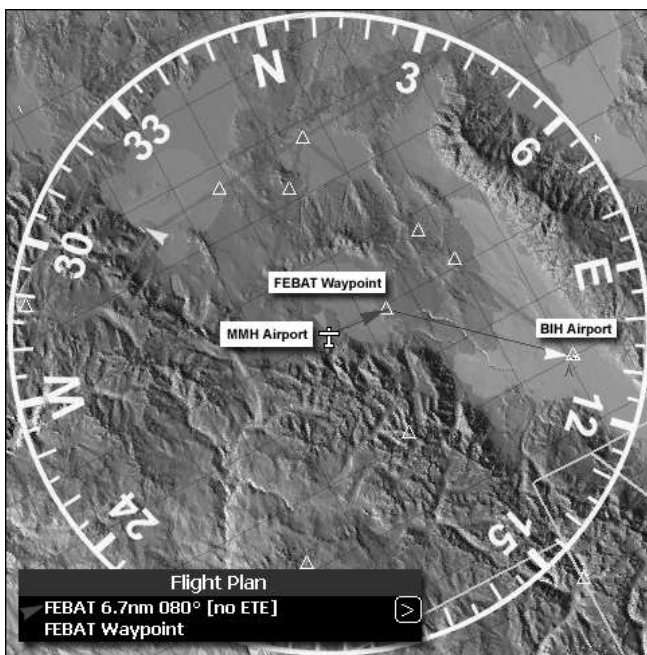


Step 9: *Set Plan Start* from a selectable item pop-up menu.

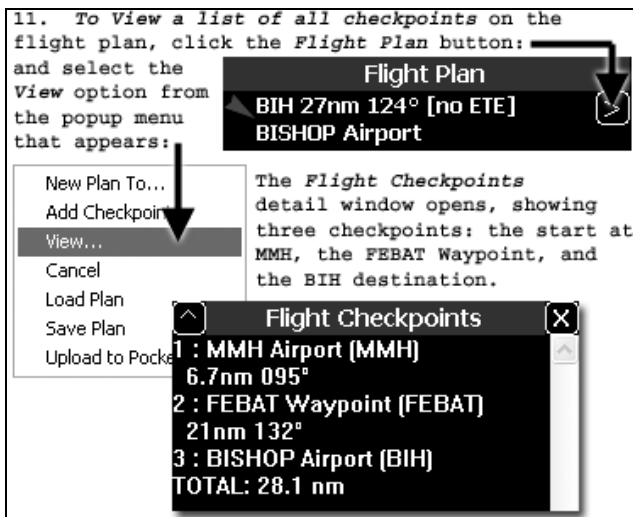
Methods for Adding a Checkpoint to a Flight Plan

To *Add* another *Checkpoint* to a flight plan, do one of the following:

- A.** Click the **Flight Plan** button (located on the right side of the Flight Plan information panel), and select the *Add Checkpoint...* option from the pop-up menu, pick one of the valid item types (*Airport*, *Navaid*, *Waypoint*, *User Waypoint*, *SAR Grid*), and then enter the *ID* for the item as shown in steps 3, 4, 5, and 6.
- B.** **Lookup** the information for the item (*Airport*, *Navaid*, *Waypoint*, *User Waypoint*, *SAR Grid*) using the main menu's *Lookup* feature so that the item information is displayed in a *Detail* window and then press the *Checkpoint* button.
- C.** Click on the item from an **Information panel** (*Nearest Airports*, *Nearest Navaids*, *Current Location*), and select the *Add <item> Checkpoint* option.
- D.** Click on the item from the **Map Display**, if the item appears on the *Map* display, click on the item, select the item's name from the first pop-up menu, and then *Add <item> Checkpoint* from the second menu.



Step 10: Use methods A, B, or D to add the *FEBAT* waypoint to the tutorial flight plan. (This waypoint is located close to MMH airport—you should be able to see it on the map.)



Step 11: Viewing checkpoints on a flight plan.

Managing User Waypoints

A *User Waypoint* marks a specific location on the map as indicated by the user. This section shows how to:

- *Make a User Waypoint*
- *Edit a User Waypoint*
- *Delete a User Waypoint*
- *Triangulate with User Waypoints*

To select or jump to an existing *User Waypoint*, see the section: *Jumping to a Selected Item*, located in the chapter *Map Display: Basics*.

Make a User Waypoint

You may make a user waypoint either:

- *At the Current Location:* To make a user waypoint at the current location (the location of the *Position Marker*), click within the *Current Location* information panel, and select *Mark Waypoint*.
- *At an Arbitrary Location on the Map Display:* To make a user waypoint at an arbitrary location on the map display, simply click at the desired map location, and select the *Make User Waypoint* option from the pop-up menu.

In either case, the new user waypoint appears as a black cross. You can then refine the location of the waypoint by editing it, as described in the next section.

Edit a User Waypoint

To edit a user waypoint, click the waypoint on the display, and select its name from the pop-up menu (see the section *Selectable Symbolic Items*). Then select the *Edit <name> User Waypoint* option from the next pop-up menu. An editing window appears as shown in

Figure 26. In addition to changing the name and comments for the waypoint, editing is useful for changing the location, altitude, and heading, so that the waypoint may be used for triangulation (see *Triangulate with User Waypoint*). The coordinates may be entered as +/- for North/South or East/West, and may be typed ddd.ddddd or ddd mm.mmm or ddd mm ss.s (where d=degrees, m=minutes, s=seconds and fractions thereof).

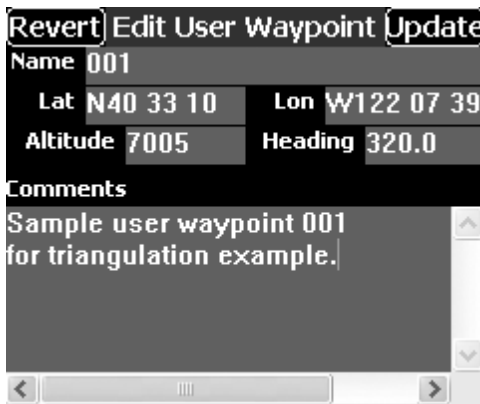


Figure 26: Editing a user waypoint.

Delete a User Waypoint

To delete a user waypoint, simply click on the waypoint, select its name from the pop-up menu that appears, and then select *Delete <name> User Waypoint* from the next pop-up. The user waypoint will be deleted.

Note: Be careful, as there is no confirmation dialog required of the user before the waypoint is deleted.

Triangulate with User Waypoints

If a user waypoint contains heading information, it may be triangulated with another waypoint having

heading information. If the two headings intersect, a new user waypoint is added at the point of intersection.

If a user waypoint does not currently contain a heading, you may edit the waypoint to contain this information (see the section *Edit a User Waypoint*).

Triangulation Example

1. Create an arbitrary user waypoint on the map as shown at *P1* in *Figure 27*, and edit the waypoint to have the name *P1* and a heading of 30° (see the section *Edit a User Waypoint* above).
2. Create another arbitrary user waypoint on the map as shown at *P2* in *Figure 27*, and edit the waypoint to have the name *P2* and a heading of 330° .
3. Click or tap on the user waypoint *P1*, and from the pop-up menu, select *Triangulate P1 User Waypoint with...* Select *P2* from the classified directory that appears (see section *Tutorial 1: Using Classified Directories*). Since the headings in this example intersect, the result is plotted automatically as a new User Waypoint named: *P1xP2*, as shown in *Figure 27*.



Figure 27: Triangulation example, showing triangulated waypoint P1xP2 triangulated from User Waypoints P1 and P2.

Flight Plan Reference

The Flight Plan Panel

The *Flight Plan* panel displays the next checkpoint that appears on the current flight plan. The airport, navaid, or waypoint is considered to be the *next checkpoint*. The information includes:

- Heading bug to the checkpoint
- ID of the checkpoint
- Distance to the checkpoint
- Estimated Time Enroute (ETE) to the checkpoint
- Name of the checkpoint

As the checkpoint is approached, the ETE will decrease. If the checkpoint is reached, or if it is

passed, and if there is another checkpoint on the flight plan closer to the current location and heading, then the closer destination becomes the current destination, replacing the previous destination.

. . .On the 640x480 Interface

On the 640x480 interface, the *Flight Plan* panel is located on the right side of the display, and is always visible (see *Figure 28*).

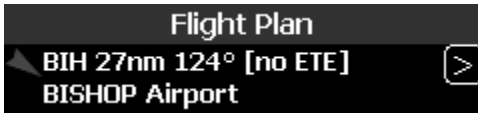


Figure 28: Flight Plan information panel, Note the Pop-up menu button on the right, and the flight plan bug on the left.

. . .On the 240x320 Interface

On the 240x320 interface, access the *Flight Plan* panel through selection buttons at the bottom of the display (see *Selecting Information Panels*). The panel is similar to that shown in *Figure 28*.

The Flight Plan Pop-up Menu



Pop-up Menu Button: the flight plan menu button is located on the right side of the *Flight Plan Panel* (see *Figure 28*)--the button opens the pop-up menu shown in *Figure 29*.

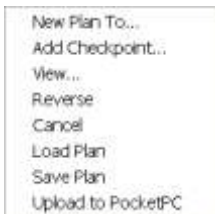


Figure 29: Flight Plan Pop-up Menu.

New Plan To...

Selecting the *New Plan To...* option brings up another pop-up menu showing the destination types you may select (see *Figure 30*).



Figure 30: The *New Plan To* pop-up menu. After you choose a destination type, you may select the specific destination for the flight plan, which appears in the *Flight Plan* information panel. This process is illustrated in

Tutorial: Flight Plan with Checkpoints.

Add Checkpoint...

Selecting the ***Add Checkpoint...*** option allows you to add a checkpoint to an existing flight plan. The selection process is the same as that described in the previous section, *New Plan To....*

To add additional checkpoints to the flight plan, repeat the process.

Reverse

This will reverse all the points in the flight plan. Note this is only visible when the plan has more than one point in it.

Cancel

This will erase the flight plan immediately (careful, it won't ask permission.)

View...

The *View...* option presents a list of all items on the current flight plan, along with leg bearings and distances.

The Load Plan and Save Plan Options

The ***Load Plan*** and ***Save Plan*** options allow you to create plans and save them for later use.

Upload to Pocket PC

Flight plans may be entered into *MountainScope* on the *PC*, and then downloaded to a *Pocket PC*. Simply connect your *Pocket PC* to your *PC* with *ActiveSync*,

select your flight plan, and click the *Upload to Pocket PC* option on the menu. You may also enter flight plans directly into the *Pocket PC*.

Uploading a flight plan to the *Pocket PC* includes a process for transferring required terrain files. You may specify a desired radius for high-resolution terrain around the starting point and destination, and a desired width along the flight path between these two points. Keep in mind that higher radius and width specifications require more terrain data to be uploaded to the *Pocket PC*, reducing the amount of available storage resources. This process is managed through the dialogs shown in *Figure 31*, allowing you to specify the desired area of terrain files around the route, and also around the points of departure and arrival. When you press *OK*, the *Select Data Files to Update* dialog opens, allowing you to modify the set of terrain files to be on the PocketPC. With the defaults, the PocketPC will have only the files required to meet the minimum radii specified in the first dialog. Clear the checkmark

for the *Remove existing unchecked files* option if you don't want any files deleted.

Note: files will only be copied to or deleted from the selected *Data Area* and won't be copied if they exist on the device.

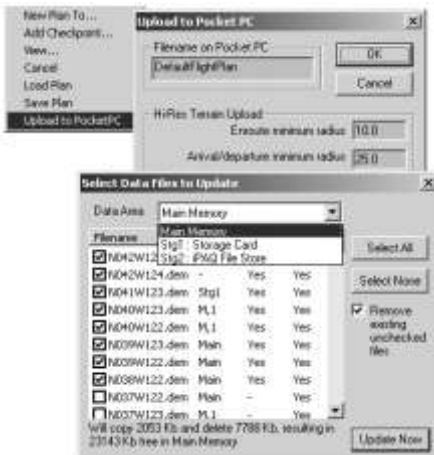


Figure 31: Uploading a flight plan to the *Pocket PC*. From the flight planning menu, select the *Upload to Pocket PC* option. The *Upload to Pocket PC* dialog opens.

Search and Rescue (SAR) Grid

The *Search and Rescue (SAR) Grid* feature shows the current *SAR Grid ID* for the current location, as indicated by the *Current Location* information panel.

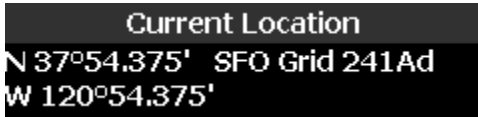


Figure 32: Current Location information panel, showing SAR grid ID as: SFO Grid 241Ad.

SAR Grid Subdivision Basis and General Naming Convention

The SAR grid is based on the standardized Sectional Aeronautical Chart Grid and Identification System for 30-minute interval charts at the scale 1-500,000. The 30-minute interval charts are further subdivided into a grid of 15-minute quadrangles, and numbered in sequence from west to east, starting with the first full quadrangle in the northwest corner of the chart, which is number 1, and continuing across and down the chart to the last full quadrangle in the southeast corner. The total number of 15-minute quadrangles is specific to each chart; for example, the San Francisco chart (SFO), has a grid consisting of 448 15-minute quadrangles, named SFO 1 through SFO 448.

MountainScope displays a grid composed of 7.5-minute quadrangles, which subdivides each 15-minute quadrangle into 4 more parts. These four parts are named by appending the capital letters A, B, C, and D to the name of the 15-minute quadrangle that the parts subdivide. For the 15-minute quadrangle SFO 241, these subdivisions are: SFO 241A, SFO 241B, SFO 241C, and SFO 241D, as shown in *Figure 33*.

MountainScope further subdivides each of these 7.5-minute quadrangles into 4 more parts (3.75-minute quadrangles). The names for these quadrangles are formed by appending the small letters: *a*, *b*, *c*, and *d* to the name of the 7.5-minute quadrangle that they subdivide. Once again, the naming order is west to east, and north to south. For example, the 7.5-minute quadrangle SFO 241A contains the subdivided 3.75-minute quadrangles: SFO 241Aa, SFO 241Ab, SFO 241Ac, and SFO 241Ad.

Non-Ambiguous Quadrangle Naming Convention

Note: MountainScope always shows the grid ID in the Current Location information panel with the name of the smallest 3.75-minute grid in which the location occurs.

To avoid ambiguity when describing a SAR Grid ID and its location, certain conventions apply. See *Figure 33* to clarify the following discussion:

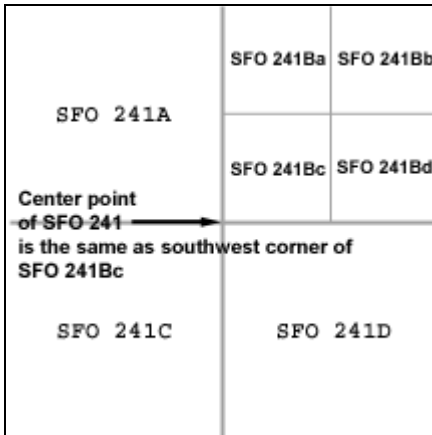


Figure 33: The entire figure represents the quadrangle SFO 241, which is subdivided into 4 more quadrangles: SFO 241A, SFO 241C, SFO241D, and SFO 241B (which in turn is subdivided into: SFO 241Ba, SFO 241Bb, SFO 241Bc, and SFO 241Bd). Note that the southwest corner of SFO 241Bc

and the center point of SFO 241 intersect, and that the naming convention uses SFO 241Bc to describe the location when you jump to SFO 241.

MountainScope follows the convention that the southwest corner of the northeast 3.75-minute quadrangle shares the same point as the center of the 7.5-minute quadrangle to which it belongs. So if you use the lookup feature (*Menu/Lookup/SAR Grid*) to lookup the 7.5-minute quadrangle *SFO 241A*, and then press the *Jump* button from the information display, you will jump to the center of the SFO 241A quadrangle, and the *Current Location* information panel will show: SFO 241Ab.

Similarly, for: 3.75-, 7.5-, and 15-minute quadrangles, the convention states that the southwest corner of the southwest 3.75-minute quadrangle of the northeast 7.5-minute quadrangle of a 15-minute quadrangle share the same point as the center of that 15-minute quadrangle. So if you use the lookup feature to lookup the 15-minute quadrangle SFO 241, and then press the *Jump* button, you will jump to the center of SFO 241, and the *Current Location* information panel shows SFO 241Bd.

Making Flight Plans to a SAR Grid ID

Flight plans may be created with a *SAR Grid ID* specified as the destination. You can use the *Lookup item/SAR Grid* option from the *Main* menu to locate the SAR grid from the classified directory. Once you select the SAR grid from the directory, the information appears in the panel, and you can set a new plan, create a checkpoint, or jump to the SAR grid using the buttons at the bottom of the information display.

Flight Track

The flight track feature records a flight track across the map display by plotting a pink line as the flight progresses. As an added feature, you may import and playback flight tracks between *MountainScope* and *Microsoft Flight Simulator 2002* or *2004*. The flight data is recorded real-time to a file in non-volatile memory, and so might qualify as a flight data recorder, since this data will be safe regardless of power loss or software failure.

To Start Recording a Flight Track

Open the *Main* menu, and select the *Track/Record* option. If you are moving, you will soon see a thin pink line appear along the track that you have covered. The option on the menu will have a check mark, indicating that flight track recording is in progress.

Saving and Loading Flight Tracks

You may save the flight track selecting the *Track/Save* option from the *Main* menu. A standard Windows *File Save* dialog opens, allowing you to name the file and folder where the flight track will be saved. Flight simulator recording files have the file extension: **.FSR**, while flight data recordings have the extension **.FDR**. Use the file type at the bottom to indicate what kind of file you want to load or save.

Replaying Flight Tracks with MountainScope

To replay a flight track on *MountainScope*, just click on the *Track/Replay* option from the *Main* menu. The currently-loaded flight track will replay in a loop until you turn it off again. There is also a *Replay 4X* option that will play it back 4 times as fast as its original speed.

Replaying Flight Tracks within Microsoft Flight Simulator 2002.

1. Copy the .FSR file to the Microsoft Flight Simulator flights/myflts folder (for example: Program Files/Microsoft Games/FS2002/Flights/myFlts).
2. Start a flight in the same general area.
3. Under options, select *Flight Video*.
4. Open the .FSR file named as selected above.

Operating Modes: Simulator and GPS

MountainScope is primarily intended for use in real-time operations where a *Global Positioning System (GPS)* receiver provides both latitude and longitude information, and possibly an altitude approximation, at regular intervals. When used in this real-time mode, *MountainScope* always displays information that is pertinent to the *Current Location* and *Ground Track Heading*. For real-time operations with GPS, see the following section *Real-time GPS Mode*.

MountainScope may also be used in two different *Simulator (SIM)* modes emulating real-time GPS reception:

- The stand-alone built-in *MountainScope Simulator*, which uses the *SimKeys* feature.
- The *FS 2002 Simulator* mode, where *MountainScope* uses *Microsoft Flight Simulator 2002* to provide simulated GPS data.

See the following section: *Simulator Modes*, for more information.

Setting Modes with the SIM-GPS Button

You use the *SIM-GPS Button* to switch between the different simulator and GPS modes. When you click or tap this button, the pop-up menu shown in *Figure 34* appears (unless you're in *Track/Replay* mode):

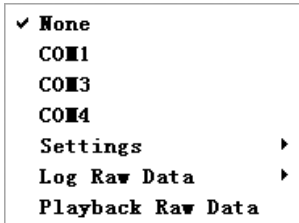
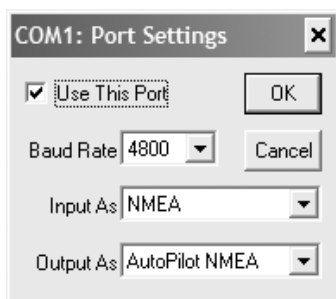


Figure 34: The *Simulator-GPS* mode pop-up menu opens when you press the *SIM-GPS Button*. The first option, *None*, turns off all sensor ports, and sets the mode to: *Stand-Alone Simulator*. Also note that the *FS2002* protocol is to be used with

***Microsoft Flight Simulator 2002*.**

MountainScope can monitor multiple ports to enable various gyros and GPS sensors to be connected. It will determine the protocol and baud rate automatically. In the picture above, no ports are open. If COM1 were checked and had an eGyro connected, it would say “eGyro (OK)” next to COM1. An item could also say (Acquiring) or (No Data). By invoking this menu, you can get some per-sensor status information. (The menu can be dispelled without making any changes by clicking somewhere away from it.)

COM Port Settings

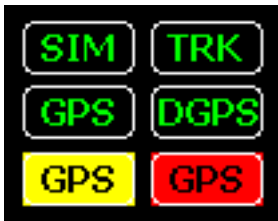


Using the Settings submenu, you can specify the input and output protocols and baud rate for each port. For instance, you could select COM1 to be Input As NMEA, Output As NMEA Autopilot, at 4800 baud, as in this figure.

Raw Data Logs

For diagnostic and support purposes – or to let you demonstrate MountainScope to your friends without going flying – you can use the Raw Data Log feature. This allows you to log timestamped raw data from a port into a file, so that you (or PCAvionics) can play back this data later and have it look and work very much like the device that was recorded is actually attached to the computer. This feature is used extensively for supporting new devices, and diagnosing observed problems caused by some GPS or other peripheral device.

When you start *MountainScope*, it uses the same settings last used when it was shut down. If it was last using a GPS receiver, and the GPS is now disconnected or reception is poor, the map display will be rendered black, and the GPS indicator on the *SIM-GPS Button* will flash red or yellow until things improve.



SIM-GPS Button Indicator

The SIM-GPS button indicates whether *MountainScope* is operating in *Simulator*, *Track/Replay*, or *GPS* mode. If the button is flashing yellow, the GPS is not sending valid data (e.g., it hasn't locked onto the satellites yet). If the button is flashing red, action may be required on your part because you may have selected the wrong protocol for your GPS receiver, or the GPS may have become disconnected. If WAAS or another differential GPS mode is in use, it will indicate DGPS in green. Clicking on the button brings up a pop-up menu for specifying aspects of the operating mode.

Simulator Modes

- The stand-alone built-in *MountainScope Simulator*.
- The *FS 2002 Simulator* mode, where *MountainScope* uses *Microsoft Flight Simulator 2002* to provide simulated GPS data—*Flight Simulator 2002* must be running on the same machine as *MountainScope*.

Stand-Alone Simulator

The first *Simulator* mode is a *Stand-alone* mode, where *MountainScope* emulates rudimentary flight travel features over the moving map, simulating GPS reception.

SimKeys used with Stand-Alone Simulator

While in *Stand-alone Simulator* mode, use the *SimKeys* feature located on the main *Menu* to enable the simulation key functions described in *Appendix A: Key Bindings* (see *Figure 35* for the *SimKeys* menu option).

Turning SimKeys On or Off

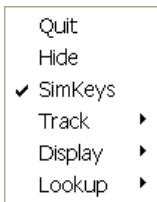


Figure 35: The main *Menu* pop-up, with the *SimKeys* feature turned *On*, as indicated by the checkmark. See *Appendix A, Key Bindings*, for the specific key bindings for your product. On the PocketPC, *SimKeys* is on a

Controls submenu.

With *SimKeys* set to *On*, you can use the logical keys discussed in the next section to adjust the *Stand-alone Simulator* parameters for:

- Ground Speed
- Ground Track

-
- Altitude

Logical Keys to Control Simulator Mode

Since different Pocket PC devices and PC keyboards are manufactured with slightly different controls, this section describes the *SimKeys* features in terms of the *logical* key bindings (actual functional names, like: *speed up*, *turn left*) as opposed to the *physical* key bindings (actual device names, like: 'a' key, *down arrow*, etc.). Refer to *Appendix A, Key Bindings*, for the key mappings between logical and physical keys for your device.

Speed Up and Slow Down

The *Speed Up* and *Slow Down* keys change the *Simulated Ground Speed*. If you press and hold these keys while in *Simulator* mode with *SimKeys On*, you will simulate constant acceleration until you release the key, or press another key. The *Ground Speed* indicator (see the chapter *Concepts*, sections *Velocity: Ground Speed and Ground Track*, and also *Ground Speed Button*) will reflect the changes in speed.

Note: If you have a simulated ground speed (non-zero), the Pitch keys adjust the rate of climb—if you lose control of the resulting altitude changes, hit the Autotrim key.

Turn Left and Turn Right

The *Turn Left* and *Turn Right* keys change the ground track heading, and you will see the *Compass Rose* rotate *counterclockwise* and *clockwise*, respectively.

Autotrim

Autotrim rounds the altitude to the nearest 100 feet and sets the pitch to zero. If the speed is greater than zero and you become disoriented or overcompensate while

using the pitch keys, use *autotrim* to stabilize the simulation.

Pitch Keys: Pitch 1° Up and Pitch 1° Down

If the speed is greater than zero, then each press of the *Pitch-Up* or *Pitch-Down* key adjusts the pitch of the simulated airplane by one degree.

If the speed is zero, the *Pitch-Up* key increases altitude by 100 feet for each press of the key, and the *Pitch-Down* key decreases altitude by 100 feet.

FS 2002 Simulator Mode

To use *MountainScope* with *Microsoft Flight Simulator 2002 (FS2002)*, start *FS2002* in windowed mode, and then start *MountainScope* on the same machine. Click the *SIM-GPS* button, and set the pop-up menu to the FS2002 protocol (see section *Setting Modes with the SIM-GPS Button*). Then start flying *Microsoft Flight Simulator 2002* and *MountainScope* together. Have fun.

Note: You can also share your Flight Track recordings between MountainScope and Microsoft Flight Simulator 2002. See section Flight Track in chapter Flight Plans for more information.

Real-time GPS Mode

MountainScope is primarily intended to be used as a moving map which obtains its position and velocity data in real-time from a GPS device.

If you select a real-time GPS protocol and serial port (*COM* port) from the *SIM-GPS Mode* menu shown in *Figure 34*, and if an operating GPS receiver or other source of GPS data (*FS 2002*, avionics output, etc.) that uses that protocol is connected to the port, then the

MountainScope moving map and instrumentation will follow the real-time data updates received from the GPS source.

Note: Please read the Prologue section at the beginning of this User Guide for information about the reliability of GPS altitude information. Also note that while GPS altitude readings may not always be accurate, the longitude and latitude positioning is usually extremely accurate with today's modern GPS receivers and with military Selective Availability off.

Connecting the GPS Receiver to your PC or PocketPC

Since there are many different hardware configurations possible, and since newer and more convenient hardware becomes available constantly, please refer to your specific hardware documentation for instructions. Additional instructions may be found at the PCAvionics web site: <http://www.pcavionics.com>.

Most older hand-held GPS receivers provide a serial cable or proprietary-hybrid serial cable interface. You may need to provide cable adapters between devices, or purchase a proprietary cable from the OEM source that connects your specific devices together.

PCMCIA-adaptor based devices provide the cleanest interface, as these GPS cards plug directly into the PC or Pocket PC device without any cables. You may, however, need an external antenna depending on the placement of your GPS receiver. Most GPS receivers have good reception without requiring auxiliary antennas when placed in the cockpit areas near windows, the flight yoke, or instrument panel.

Appendix A: Key Bindings

MountainScope Logical Key		Physical Key on Device	
SimKeys Off	SimKeys On	PC Keyboard	Pocket PC Button
Zoom In	Speed Up	Up Arrow	Joypad or Action Up
Zoom Out	Slow Down	Down Arrow	Joypad or Action Down
Prior Info [1]	Turn Left	Left Arrow	Joypad Left
Next Info [1]	Turn Right	Right Arrow	Joypad Right
Reset Timer	Autotrim [3]	Spacebar or Enter	Press Action
	Pitch 1° Up [2, 3]	A	iPAQ 3 Casio 3
	Pitch 1° Down [2, 3]	Z	iPAQ 4 Casio 2
<u>Notes</u>			
<ol style="list-style-type: none"> 1. Info panels on the 240 x 320 display. 2. If speed is zero, the pitch-up key increases altitude by 100 feet for each keypress, and the pitch-down key decreases altitude by 100 feet. 3. If speed is greater than zero and you become disoriented with the pitch keys, use <i>autotrim</i> to stabilize the simulation, by rounding to nearest 100 feet and setting pitch to zero. 			
<u>Abbreviations</u>			
iPAQ 3	Application button 3 ('Q')		
iPAQ 4	Application button 4 ('arrow')		
Casio 2	Calendar button		
Casio 3	Contacts button		

Table 2. PC and Pocket PC key bindings for MountainScope. Note that there are two *SimKey* modes: *Off* and *On*. See Chapter *Simulator and GPS modes* for more information.

Appendix B: Alerts

Alerts are appended to the alert list when certain situations occur, as explained in this section. The Alert indicator (!) flashes only when new alerts are appended to the list.

To Review Alerts



To review alerts, click on the *Alert Indicator* button. A *Details* window appears, listing all of the alerts. After you review the alerts, the flashing stops until another alert occurs. If you want to clear the alert list, you have the option whether or not to clear the list each time you view the alert list (the *Alerts* window includes a *Clear* button).

Missing Hi-Res Terrain

Example: "Missing Hi-Res terrain for N036 W124"

Cause: Hi-Res Terrain file for the square degree (whose southwest corner is at North 36 degrees Latitude, West 124 degrees Longitude in this example) would have been loaded for display but wasn't found.

Resolution: Copy the required file (in this case, N036W124.dem) from the CDROM (or PC, in Program Files\MtnScope\Terrain) to the terrain subdirectory of the installation. Or, just insert the CDROM, select to copy terrain files, say "No" to the "Copy All?" dialog, and select the files to copy.

<item> Expires in 5 days or Less

Example: "airports20020808 expires in 5 days or less"

Cause: The indicated aviation data file will soon expire. Usually, several of these will show up at the same time. In this case the airport database will expire within 5 days. This starts showing up for each data file that expires in 7 days or less.

Resolution: Install the next aviation database. If the newer one is also installed, this warning will not show up, and the new database will be used automatically when the time comes.

<item> Expired

Example: "airports20020808 expired 2002/9/4."

Cause: The indicated aviation data file expired on the given date. Usually, several of these will show up at the same time. In this case the airport database became valid at 8/8/2002 and expired 9/4/2002.

Resolution: Get the latest aviation data from the customer service area at <http://www.pcavionics.com/> and install it. For this example, the next airport database will be named airports20020905.

Could Not Open COM Port

Example: "Could not open COM1. A device reset may be needed"

Cause: Some other program may be using the serial port, or never closed it.

Resolution: Quit MountainScope, try shutting down other programs or doing a device reset, which usually means pushing a recessed button with the stylus.

<item> Just Expired—Please Restart to Load the Next One

Example: "airports20020808 just expired--please restart to load the next one"

Cause: The database indicated literally expired within the previous minute, and the next-valid database file is available.

Resolution: Quit and restart the program, and it will load the newly-valid data files.

<item> Just Expired—Next File Not Found

Example: "airports20020808 just expired--next file not found"

Cause: The database indicated literally expired within the previous minute, but the newer database file was not found.

Resolution: Keep in mind that you're flying with expired data, and go get the latest database (from the Customer Service area at <http://www.pcavionics.com/>) the next chance you get.

<item> Not Valid Until...

Example: "airports20020905 not valid until 2002/09/05."

Cause: The only database found for that type is not valid until the given date. You may have removed or uninstalled the older database prematurely.

Resolution: Put the older files back on your device, or just keep in mind that the data you're flying with is not yet valid. Things may be added or deleted!

Plugin file 'XYZ.dll' needs an upgrade, it is obsolete

Example: "Plugin file 'TFROverlay.dll' needs an upgrade, it is obsolete"

Cause: You have upgraded one part of the program, but not another – the required versions don't match between the plugin and MountainScope.

Resolution: You should make certain that you have the latest version of that plugin and MountainScope from www.pcavionics.com.

Plugin 'XYZ' failed to start: 0xnntnnnnnn

Example: "Plugin 'TFRs' failed to start: 0x80070002"

Cause: Something kept the plugin from initializing.

Resolution: If the plugin requires an internet connection, be sure you're connected. You might also be certain that you have the latest version of that plugin from www.pcavionics.com.

WindshieldView Init Failed : 0xnntnnnnnn

Example: "WindshieldView Init Failed : 0x80078876"

Cause: Something kept the Windshield View component from successfully initializing itself.

Resolution: This can be caused by out-of-date video drivers, missing or out-of-date DirectX, or inadequate memory on your video card. If your drivers and DirectX are up-to-date (from the video card manufacturer and Microsoft) then you should try other Display Settings, like higher/lower resolutions, and different color depth (number of colors).

Appendix C: Installation

Before you begin the installation, please close all programs and be sure you have at least 700Mb free on your hard drive.

To install *MountainScope*, insert the *MountainScope* CD into the CD-ROM drive on the PC. A dialog similar to that shown in *Figure 36* should open.



Figure 36: MountainScope Installer dialog.

If the dialog shown in *Figure 36* does not appear, run *Windows Explorer*, and open the folder for your computer (by default, *My Computer*), and then open

the folder for the *MountainScope* CD. Double-click on the **CDAutoRun.exe** file displayed in *Windows Explorer* to manually start the dialog.

Installing on the PC

After the dialog shown in *Figure 36* opens, first use the drop-down box at the top to select the region of data files you want to install, then click the *Install MountainScope* button shown near the upper-right corner of the dialog under *Installation to this computer*.

An installation *wizard* opens next. (A wizard is a guided tour of dialogs for completing specific steps). Please follow the instructions for each step in the wizard.

Note: If you see a dialog offering Repair or Remove, please select Remove and start this section over.

You will see a dialog appear listing several available software plugins for installation. Put checkmarks next to the ones that apply to your installation, and hit OK to install them. Note, many of the plugins are there to support specific hardware devices, so if you do not recognize what a plugin is, do not install it.

You should see a confirmation dialog telling you how many *Aviation Data* files were copied and how many were skipped. (This dialog is not shown here.) Click *Ok*.

Next you should see another *Confirmation Request* dialog, as shown in *Figure 37*. (*Note: This is the same dialog that opens by clicking the Copy Terrain Data button shown in Figure 36.*)

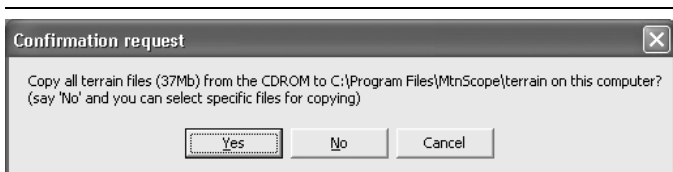


Figure 37: Copy confirmation dialog for terrain files.

- If you click *Yes*, then all of the files are copied.
- If you click *No*, you are presented with the dialog shown in *Figure 38*, allowing you to choose which files you want to copy.

If you click *Cancel*, no files are copied. You can copy files at a later time by using the *Copy Terrain Files* button on the dialog shown in *Figure 36*.

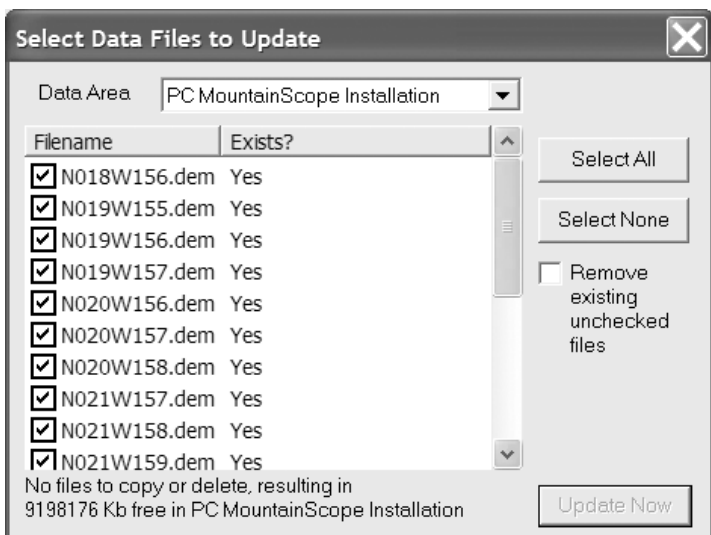


Figure 38: Dialog for copying and removing terrain files.

Note: The Remove existing unchecked files checkbox is selected by default. If you want to keep specific existing files, make sure those files are checked, or uncheck the Remove existing unchecked files checkbox.

The last step is to get an activation key for your installation. You will see a dialog as below, asking for the key.



Figure 39 : The Activation Dialog

The Save Activation Key button will not be enabled until a valid key is in the Activation Key box. The Copy button is for copying the Challenge Data to the clipboard, so it could be emailed to PCAvionics to get an activation key, which could then be put into its box by hitting the Paste button. This manual method is more difficult than the other automated ways of getting your activation key.

The easiest way to do this is to select “Download Via Internet.” You will then be asked if you have a username, password, and serial number. If you’re installing a 30-day trial, or if you do not know your serial number, hit “No” and you will then be prompted for first name, last name, email address, and outlet ID. The outlet ID is a 5-digit number printed on the CDROM or on its sleeve. You then hit the “Request Key” button, and an activation key will be downloaded and put into the box in *Figure 39*.

If you use a username, password, and serial number, you will need to enter that information in a similar

dialog and hit the “Request Key” button. Note, serial numbers have no spaces, and all letters are capitals.

Your activation purchase includes a full non-expiring activation for one PC and one portable. After you have used those two activations, you will be given 30-day trial keys any time you request one. If you switch computers or for some other reason need to move your non-expiring keys, please contact PCAvionics by phone or email.

Activation keys are made to work specifically on ONE computer, so copying a key from one computer to another will not result in a working copy of the software. Additionally, the key that will be required on any given computer will have some dependency on the installed version of the operating system and the hardware address of the network card. So, if you change network cards, install a service pack, etc, it will invalidate your key. If and when this happens, please download the new key (which will be a trial key by default) and then notify us of its Activation ID. We will upgrade the key, and then you can download it once more to get the non-expiring key.

More help for activation issues can be found at <http://www.pcavionics.com/activationHelp.jsp>

After successfully installing on the PC, you may proceed to the next step described in the section *Installing on the Pocket PC*. All of the same steps will occur, but they will apply to your PocketPC instead.

You may press the *Close* button on the *MountainScope* CD-ROM *Installer* dialog shown in *Figure 36*, and start *MountainScope* on the PC by selecting the *MountainScope* shortcut from the *Windows Start*

menu, or under the *Programs, PCAvionics, MountainScope* submenu shortcut.

Note: If you choose to run MountainScope now and close the Installer, you can run the Installer later to complete the installation on the Pocket PC. When you're ready, just restart the Installer as described earlier in this section, and proceed to the next section. Note however, that the installer will not start if it detects that MountainScope is running, so you will need to quit MountainScope first.

Installing on the Pocket PC

First, be sure that you have established your connection between the Pocket PC and the PC through *Microsoft's ActiveSync* program: the status displayed by the *ActiveSync* program must be *Connected*.

Refer to the *Microsoft's* documentation for *ActiveSync*, and to the documentation for your Pocket PC product, for specific connection instructions.

Note: Enable your connection with the fastest link available for your particular hardware: a USB connection will be much faster than a serial connection, and a network connection will be the fastest. Refer to your ActiveSync documentation for more details.

After you have confirmed that your devices are connected, click the *Install MountainScope* button under the *Pocket PC Installations* area of the dialog shown in *Figure 36*. Then follow the *Wizard* instructions, which are similar to those that appear for the PC installation.

Using a flash card for terrain data

You can use a Compact Flash, Secure Digital or other storage card to hold your terrain data files – and these will appear in the “Data Area” list in *Figure 38*. The terrain copy dialog will automatically do this for you, but all that’s required is to make a Terrain directory on that card, copy whatever terrain files you want into that Terrain subdirectory, and be sure the card is inserted before starting *MountainScope*. *MountainScope* will search for terrain data in the Terrain subdirectory of any flash card present at startup right after it looks in its own installation at

```
\Program Files\MtnScope\Terrain
```

You should be aware that flash cards have the performance approximately equivalent to 1x-24x CDROM drives – they are not RAM. They correspond to something like a hard drive, but are usually nowhere near as fast. You can put data on them, but *MountainScope*’s performance may be degraded. We recommend putting terrain files in main memory whenever possible.

Removing MountainScope

If you need to repair or remove *MountainScope* from one of your devices, follow the steps in one of the following two sections:

- *Repair or Remove from the PC*
- *Repair or Remove from the Pocket PC*

Repair or Remove from the PC

If *MountainScope* is already installed on the PC, then the next time you start the installer and click the *Install MountainScope* button (under *Installation to this*

computer, Figure 36) another wizard appears. The wizard allows you to repair with a fresh install, or to remove *MountainScope*.

You may select either option, and then click *Finish*. Simply follow the instructions on the wizard steps that follow. (If you choose *Repair*, the steps will be almost the same as those described in the earlier section *Installing on the PC*.) If you don't want to start either option, just click *Cancel*.

Note: The removal script does **not** remove any terrain files. If you want to remove these files from your PC to reclaim the space used, use explorer to navigate via My Computer -> C: to locate the file folder:

```
C:\Program Files\MtnScope\Terrain
```

Delete that folder and its contents, and the terrain files will be gone.

Repair or Remove from the Pocket PC

You may repair a *MountainScope* installation on the Pocket PC by clicking the *Install MountainScope* button from under *Pocket PC Installation, Figure 36*.

Note: To remove MountainScope from the Pocket PC, do not press the Remove MountainScope option found on the Wizard dialog. Instead, use the following two procedures:

1. Procedure for Removing the Program from the Pocket PC

On the Pocket PC, look under:

```
Settings, System, Remove Programs
```

Under *Remove Programs*, you will see an entry called:

Select that entry, and then tap *Remove*. You may reload *MountainScope* by using the CDROM from the PC later.

Your installation may include plugins that are all optional, and each will show up in the list as things that can be uninstalled.

There will also be entries here for removing specific editions of the aviation database, which you should do once the older ones expire.

2. Procedure for Removing the Terrain Data Files from the Pocket PC

The removal script does not remove any terrain files. If you want to remove these files from the Pocket PC to reclaim the space used, use *Microsoft's ActiveSync* on the PC. Use the *Explore* feature from *ActiveSync* to locate the file folder:

```
\Mobile Device\My Pocket PC\Program  
Files\MtnScope\Terrain
```

You can then either move the contained data files to a storage card or simply delete them.

Appendix D: GPS Protocols

Some of our more technically-minded customers will want to know not only what GPS protocols are supported by MountainScope, but also which parts of them are used.

Apollo (Panel Mount)

The protocol listed as “Apollo” in MountainScope really supports several panel-mounted GPS units by UPS Aviation Technologies and Garmin. It is a text format that could be “understood” by connecting a terminal program to the output of your GPS.

MountainScope uses the protocol sentences starting with z, A, B, C, D, Q, and T. Other sentences having to do with routes and waypoints are not yet used.

Garmin (Handheld)

Garmin handheld GPS units (and possibly others) support a protocol listed usually as “Garmin, 9600.”

To use this binary format, both the handheld unit and MountainScope must be set to Garmin mode. This protocol usually has the advantage of faster update rate over NMEA.

NMEA

National Marine Electronics Association (NMEA) made its own protocol early in GPS history that has become a sort of de-facto standard for GPS data communications. Nearly all GPS receivers support this standard, although it may require visiting the unit’s setup menu. NMEA is a text format that you could “read” by connecting a terminal program to the GPS unit. Several common and proprietary sentences exist

for NMEA, and probably nobody knows or uses them all.

Although not all are needed, MountainScope understands the following sentence types:

GPRMC	NMEA Recommended minimum specific GPS/Transit data
GPGGA	NMEA Fix information
GPVTG	NMEA Velocity and Track Made Good
GPGLL	NMEA Lat/Lon data
GPGSA	NMEA Detailed Satellite data
PGRMZ	Garmin altitude (will be preferred over GPGGA because Garmin eTrex Vista will use this sentence to send barometric altitude)

SiRF

A popular chipset for many GPS units is made by SiRF. For example, many Compact Flash GPS units use the SiRF Star II/LP chipset, which is low power and WAAS-capable. MountainScope only understands enough of the SiRF binary protocol to recognize that it's in SiRF binary mode, enable WAAS reception, and switch back to NMEA mode. When SiRF units are detected, MountainScope will add an altitude correction to make the MSL more accurate (indicated by EG, standing for "Ellipsoid-Geoid," in the port status on the *SIM/GPS Menu*). More future SiRF support is planned.

Gyro modules

MountainScope currently supports several solid-state sensors that can supply pitch and roll information in order to display attitude on the Windshield View.

Dynon D-10, D-10A

The Dynon D-10 (D-10A) EFIS has a serial port where it can output its sensor data, and so far, MountainScope supports the pitch, roll and airdata information. The docs for hookup can be found on their web site, www.dynonavionics.com.

Crossbow

Crossbow (www.xbow.com) creates several sensor packages that supply GPS and/or attitude information, including certified units. Their protocol is proprietary, but is supported by MountainScope.

PC Flight Systems

MountainScope currently supports the RPY sentence (in NMEA format) from the solid-state gyro units made by PCFlightSystems. Their units range from simple backup attitude sensors to units with integrated GPS units and airdata inputs. Find them at www.pcfightsystems.com.

Other possible peripherals

There exist many other items that can be connected to MountainScope, currently including GPS autopilots (like from Trio Avionics), XM Weather receivers (from WxWorx), ADS-B (Garmin GDL90), and Zaon Flight TrafficScope XRX. We add support for new items frequently, so please check the web site or contact PCAvionics to find out if your favorite gadget is supported on MountainScope.

Appendix E: Data Information

Data Sources and Conversion Info

This section explains the sources of the data, why it is converted, and what comes out of the conversion process.

PCAvionics uses aviation and geographic data from various sources. Don't panic... you don't have to download this data from separate sources yourself, nor worry about how to fit it onto your hard drive. The following list is for reference:

Terrain Elevation

The terrain elevation data comes from the U.S. Geological Survey (USGS), freely available to the public as large, gzipped text files. The 956 original files for the Continental U.S. take up about 1 Gb. This data is being replaced as possible with data from the Shuttle Radar Topography Mission (SRTM), which offers better data at the same resolution, for everything within 60 degrees north/south.

Hydrography

The area taken up by lakes, water courses, seas, and oceans comes from "Spatial Digital Transfer Standard" (SDTS) data from the USGS. This is vector data that describes the water areas. The original 146,156 files take up over 3Gb.

Nav aids and Obstacles

Information about nav aids and obstacles come from a CDROM called the "Digital Aeronautical Information CD," available by subscription from the FAA's National Aeronautical Charting Office. This data is

identical to that used to generate the FAA charts. This CDROM is published every 56 days.

Airports, Runways, Airspace, and Waypoints

Information about airports, runways, airspace, and waypoints come from a National Imaging and Mapping Agency (NIMA) database, known as the "Digital Aeronautical Flight Information File" (DAFIF®). It is "an unclassified flight information database incorporating U.S. Military-selected aeronautical data similar to that published in the DoD Flight Information Publications (FLIP)." One limitation of this data source is that it does not include runways that are under 3000 feet or are not hard-surfaced. This policy was under review during 2002, so these excluded runways may one day become part of the DAFIF. This data is published every 28 days. Other sources may be used in the future, when they become available.

Why the Data is Converted

As you can see from the above-mentioned space requirements, this data is unpractical for real use in devices with limited space. Luckily, it's possible to make this data much smaller by expressing it in binary instead of textual form. Having the data in binary form also makes it much faster to use, since there is little or no interpretation required by the software.

Converted Data Files

The actual data files are in two groups:

Aviation Data Files

All the aviation data from NIMA and the FAA are compiled into smaller files such that the entire set for North America is about 6 Mb. The worldwide aviation

data is about 10Mb. This is a small enough size such that the entire set can be on the device running the software. This set has components that are updated every 28 days, so that will be the frequency of updates. The program will warn you when data has expired or if it will soon expire.

Terrain and hydrography

This data set was created using a proprietary compression technique, and they integrate the USGS terrain elevation data with SDTS hydrography data. This is by far the larger group of files, with US/Hawaii/Alaska taking up 603Mb, but the device that is running MountainScope only requires specific files for the current flight plan. This data set does not change frequently; but if and when it does, updates will be shipped for a nominal cost covering duplication and shipping.

The files are named according to latitude and longitude, one file each per square degree on the planet. For example, the file containing 38.5 North Latitude, 121.5 West Longitude, would be named N038W122.dem. You can use this knowledge to copy the files directly where needed.

Current Supported Coverage Area

Currently, *MountainScope* covers the entire world (up to 60 degrees north latitude) with terrain data at 300-foot intervals. We have data available for the rest of the world at 3000-foot intervals.

Coverage maps showing the actual filenames for the US and Alaska are available at the PCAvionics Customer Service web site. Go to www.pcavionics.com and select Customer Login.

Appendix F: Pocket PC Issues

This appendix explores and explains various issues having to do specifically with Pocket PCs.

Compatible Pocket PCs

Any color Pocket PC that was new within the last couple of years would work for running MountainScope. We would recommend at least 64Mb RAM and a 400MHz processor. If you want to hold more high-resolution terrain than just your RAM will hold, we recommend a Secure Digital card for extra storage. 1Gb will hold all of the United States terrain, with room to spare.

The better units have more memory, faster processors, and bigger displays. Some of the latest ones even offer some 3D graphics acceleration that may soon enable the Windshield View.

As of this writing, there are no Pocket PCs on which MountainScope will enable the Windshield View – but we plan on supporting it as soon as there is hardware, which there now appears to be.

Choosing your Pocket PC may be related to what GPS you can use with it, so see the section below on *Picking a GPS*.

Care and Feeding

You should treat your Pocket PC like you might treat a camera: keep it safe (e.g., in a special case) when you're not using it and avoid bumping or dropping it. You should also be aware that many Pocket PCs will “forget” their installed programs if you leave them sit

without a charger for more than a week or two – so we recommend keeping the Pocket PC in its cradle/charger when it is not in use.

We also recommend that when you throw your Pocket PC into your flight bag, you unplug your GPS from it, to avoid breaking the connector.

Picking a GPS

GPS receivers come in as many costs, sizes, and shapes as you could imagine. MountainScope should run with nearly all of them, but we encourage users with problem GPS units to lend them to us, to help us improve software support for the many models.

There are GPS units that connect with a serial cable (via the Pocket PC cradle connector), via USB (mainly for laptops and tablets), Compact Flash (CF)/PCMCIA, SDIO, and Bluetooth. Not all GPS receivers will work with all Pocket PCs, so once you decide what type of connection you want, be sure your Pocket PC can support it.

Serial cable GPS receivers are among the oldest, and it is possible in most cases to get an adapter to connect your Pocket PC to any handheld or panel-mount GPS. This offers less in terms of a backup solution in cases of power loss to the GPS, but saves the cost of a separate GPS.

CF and SDIO GPS units plug directly into the Pocket PC, and run from its power. This makes the system into a completely battery-operated backup device. We recommend the CF units over the SDIO because the SDIO cards are so thin that they seem likely to break with heavier use. SD is also a handy and inexpensive way to increase the storage on your device.

Bluetooth GPS units use a wireless radio protocol to communicate with the Pocket PC in the 2.4GHz range. They usually have the same hardware inside as the CF/SDIO units. They are nice for reducing wires in the cockpit, but require their own power source (usually a rechargeable Li-Ion).

Terrain Data Files

To conserve *Pocket PC* resources, typically only those terrain files needed for current flight plans or areas of interest are stored on the device. The files are copied as part of the *Flight Plan/Upload to Pocket PC* feature of the *PC* version of *MountainScope*, or by using the *Copy Terrain Data* feature of the *Installation* program. Both of these features are able to remove unnecessary files from the *Pocket PC*, while copying the required files. You may also manually transfer terrain files between the *MtnScope/Terrain* folders on the *Pocket PC* and the *PC* by using the *ActiveSync file explorer*. (For more information, see chapter *Flight Plans*, section *Upload to Pocket PC*, and *Appendix C, Installation, Figure 38: Dialog for copying and removing terrain files.*)

Since the majority of today's *PC* hard drives have enough storage to hold all of the terrain files, most users may want to copy all of the terrain files from the CD-ROM to the *PC* when *MountainScope* is installed. The full collection of files is available on the CD-ROM, however, and may be loaded as required. If the *Upload to Pocket PC* flight plan feature is requested by the user, and the *PC* version of *MountainScope* cannot locate a required terrain file in the *MtnScope/Terrain* folder on the hard disk, then it will automatically copy it from the CD-ROM, if the disk is loaded. If the disk is not loaded, a dialog asks the user if it should try and

find the file again, in which case, the user either inserts the disk and chooses *Yes*, or chooses *No*.

Using a Mouse/Trackball

On the PocketPC, the *Main Menu* has a submenu called *Controls*. On this submenu is an option called *Mouse on COM1* that allows you to connect a serial mouse or trackball to the PocketPC and use it to move a pointer around the screen much like your PC. This has the potential to be much easier to use in turbulence.

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