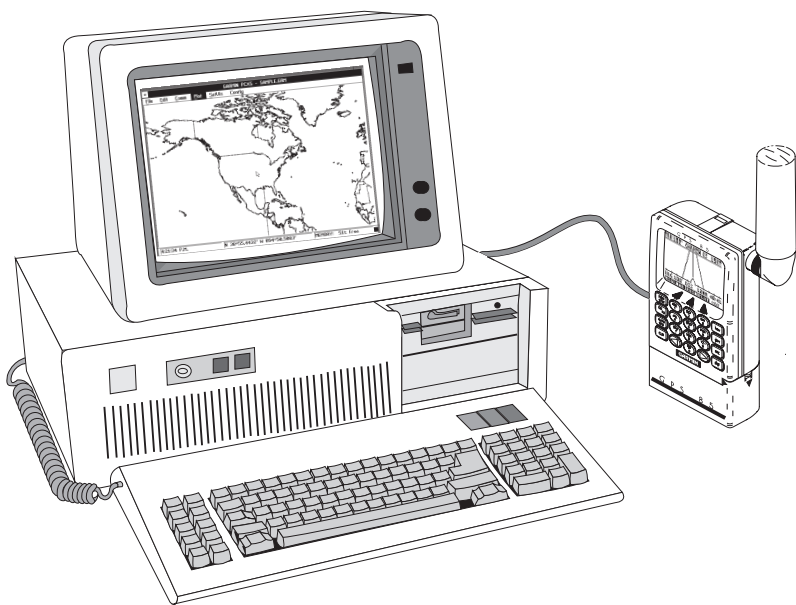


PCX5 / PCX5AVD / PC150

PC SOFTWARE KIT

OWNER'S MANUAL



GARMINSM



GARMIN SM

PCX5/PCX5AVD/PC150

PC Software Kit

OWNER'S MANUAL

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February 1999

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PREFACE

GARMIN thanks you for selecting our PCX5/PCX5AVD/PC150 software package. The PCX5/PCX5AVD/PC150 software is designed to enhance and compliment the capabilities of your GARMIN Personal Navigator™. This software package represents our continued commitment to provide you with the most versatile, easy to use - and now the most complete - navigation system possible. We are confident you will enjoy the PCX5/PCX5AVD/PC150 software and the additional capabilities it provides your GARMIN GPS unit.

This manual provides complete information on operating the PCX5/PCX5AVD/PC150 software to its full potential. Sample data has been provided to get you started. The manual is divided into two parts. Chapters 1 through 9 discuss features which are common to all three software packages. All references in these chapters will be made to the PCX5 software, but they apply to all software packages. Chapter 10 will highlight the features specific to the PCX5AVD and PC150 software. Chapter 11 will highlight features specific to the PC150 software only. Please review these chapters if you have purchased the PCX5AVD or PC150 package so you may gain full use of its capabilities. If you have any questions or comments, our Product Support Department is eager to serve you. GARMIN is fully committed to your satisfaction as a customer.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The PCX5 Software Kit is designed for use with GARMIN GPS units which do not contain a Jeppesen aviation database (i.e., 40, 45, 75 etc.). The PCX5AVD Software Kit is designed for use with GARMIN GPS units which do contain Jeppesen databases (i.e., 55AVD, 95XL etc.). The PC150 Software Kit is designed for use with the GARMIN GPS 150 aviation unit.

The PCX5 software provides considerable capabilities for processing, analyzing, displaying and outputting the data collected by your GARMIN Personal Navigator™. This software package covers most aspects of using a GPS system to collect and process position data for mapping, navigation and planning applications.

Running on an IBM compatible PC, the PCX5 software can be used to:

- **Download route, waypoint, proximity waypoint, almanac and track data** collected by your GARMIN GPS unit for analysis, plotting and processing.
- **Convert route, waypoint and track files to DXF format** for interfacing with other CAD systems (e.g., AutoSketch®).
- **Display digital map in real time** for mapping and navigation guidance.
- **Graphically plot** data files with zooming, panning and distance calculation capabilities.
- **Print** plot files to your system printer for track analysis.
- **Edit and upload routes, waypoints, proximity waypoints and track data** to your GPS unit for navigational guidance.
- **Upload almanac data** to your GPS unit for quick satellite acquisition.
- **Create satellite visibility charts for trip planning** using almanac data collected by your GPS unit.

1.2 CONVENTIONS USED IN THIS MANUAL

Commands to be typed from the computer's keyboard are in italics. The action to be taken is in all capital letters (e.g., "TYPE"). For example,

"TYPE: *PCX5*"

means you should type the word "PCX5" on the computer keyboard.

Specific computer keys are enclosed in angle brackets. For example,

"*CD GARMIN* <Enter>"

means you should type the command "CD GARMIN", followed by pressing the <Enter> key.

Two keys separated by a plus sign ("+") should be pressed simultaneously (e.g., <Alt+F4>).

Multiple menu selections are separated by a vertical line ("|"). For example,

"Config | Units Menu"

means you would select the "Config" menu, followed by the "Units" menu.

1.3 SAMPLE FILES

The original diskette contains several sample files that are copied to your program directory during installation. These sample files can be used to experiment with the PCX5 program as you read through this manual. These sample files include the following:

SAMPLE.ALM	Almanac file for the week the PCX5 program was released. (Note: This sample is provided for demonstration use only. For best performance, almanac data should be less than one month old.)
SAMPLE.PRX	Proximity waypoint file containing several proximity waypoints.
SAMPLE.TRK	Track log file containing over 100 points.
SAMPLE.RTE	Route file containing several short routes.
SAMPLE.WPT	Waypoint file containing several waypoint locations.

WORLD.GRM

Plot file consisting of worldwide geopolitical and coastal boundaries (NOTE: This file requires approximately two megabytes of expanded memory to load. It is provided for your own personal use and GARMIN assumes no responsibility for the accuracy of the data.) Due to the large size of this database, plotting efficiency will be decreased.

CHAPTER 2

INSTALLATION

2.1 PACKAGE CONTENTS

Your PCX5 Software Kit includes the following items:

- 1) Files obtained by installing software include:
 - PCX5.COM - Main program
 - README.TXT - May contain pertinent notes, information about the latest release
 - Sample data files
 - Auxiliary files required by PCX5

NOTE: The above files are in compressed format. See Section 2.6 for installation instructions.

- 2) PC Interface Cable
- 3) This Owner's Manual

2.2 SYSTEM REQUIREMENTS

Minimum PC configuration required:

- IBM-compatible computer (AT, 386 or 486)
- 640K memory
- 3.5" (1.44 Mb) floppy disk drive
- Hard Disk Drive
- EGA or VGA Graphics Adaptor

Highly recommended configuration (for speed considerations):

- 386 or better processor
- 2 Megabytes RAM or more
- LIM 3.2-compatible Expanded Memory Driver (EMS, up to 16 Mb, is used to store plot files)
- VGA Graphics Adaptor
- Microsoft®-compatible mouse

DOS Memory Requirements:

For the PCX5 software to function correctly, you must have a minimum of 435K of DOS memory free before running the program. To determine the amount of free memory, execute the following command:

For DOS versions 5.0 and above

TYPE: "*MEM* <Enter>"

For DOS versions prior to 5.0

TYPE: "*CHKDSK* <Enter>"

If you do not have enough memory to execute the software, there are several techniques for freeing up DOS memory. You should remove any unneeded TSRs (Terminate and Stay Resident programs). If your DOS version is 5.0 or above, you may alternatively attempt to load these programs into "high" memory. If you have a version of DOS prior to 5.0, it is recommended that you upgrade to the latest version. If the above steps do not provide the required free memory, there are third-party memory management tools (such as Qualitas' 386 MAX™) that may be of assistance.

2.3 VIDEO CONSIDERATIONS

The PCX5 software will function with any video card that adheres to the EGA or VGA graphics standards. If necessary, make sure that the proper graphics driver is installed in your system, according to the type of monitor and video card being used.

The PCX5 software automatically detects the presence of an EGA or VGA graphics adaptor. Some graphics adaptors may not be correctly detected. You may force the software into EGA mode by specifying the "-EGA" flag on the command line, as shown below:

"*PCX5 -EGA* <Enter>"

2.4 MOUSE CONSIDERATIONS

A mouse is **not required to run** the PCX5 software, although **some features require a mouse**. Operations requiring a mouse include:

- Distance calculation between two points
- Zoom Window operation
- Pan Window operation

PCX5 software will work with any Microsoft®-compatible mouse or any pointing device (e.g., trackball, light pen) that emulates a Microsoft® mouse. If you plan to use a mouse with the PCX5 program, make sure the proper mouse driver is installed in your system.

2.5 PERFORMANCE CONSIDERATIONS

The PCX5 software has the capability to load part of itself into expanded memory. This greatly increases the execution speed of the software.

Additionally, some (or all) plot data may be loaded into expanded memory. Up to 16 megabytes of expanded memory may be used by this software, giving it the capability to display very large plot files. (Approximately 16,000 points/megabyte times 16 megabytes = 256,000 points!)

Use of a disk caching program, such as Microsoft® Smartdrive, will improve performance by reducing access time to/from the disk drive. For information on setting up a disk cache, refer to your computer's operating system documentation.

2.6 INSTALLATION

Before actually installing the PCX5 program, you should make a backup copy of your original diskette and place the original in a safe place.

To install the software onto a hard drive, insert the diskette into the floppy drive (i.e., drive "A:") and run the installation program:

A:INSTALL target directory

where "A:" is the appropriate floppy drive and "target directory" is the directory on the hard drive in which the software is to reside. The install program will automatically copy the required files into the specified directory.

Once installed, consult the README.TXT file for any changes or additions not covered in this manual.

2.7 ERROR MESSAGES

The PCX5 software expects to find related support files in the same MS-DOS directory as the executable, PCX5.COM. If in the process of running the program, it cannot find one of these support files, an error message will be displayed:

ERROR! - Cannot locate file: <file>

Please reinstall the software from your distribution disk(s).

If this message occurs, the first thing to check is that your MS-DOS PATH environment variable points to the PCX5 program directory. If that is not the problem, then reinstall the software from the distribution disks. If the installation succeeds, then you can be certain all the files are present. If the problem still persists, then please contact a Garmin Product Support representative.

2.8 UPGRADING FROM AN EARLIER VERSION

For users upgrading from an earlier version of the PCX5 software, the file utility "GRMCONV.EXE" can be used to convert data files from the older version file formats. The convert utility supports the following file conversions:

1. PCX5 1.02 to PCX5 2.03
2. PC100S2 1.02 to PCX5 2.03
3. PCX5AVD 1.00 to PCX5 2.03

Figure 2-1 shows the main menu of the file conversion utility. The current version number of the files are shown on the right side of the screen. The user can select (tag) the desired files to be converted with the space bar. The user can then select the desired conversion type by selecting options 1, 2 or 3. The selected files will then be converted. The conversion utility saves a backup version of the data file with the last two characters of the file extension renamed to "\$\$". GARMIN files of extension WPT, PRX, RTE and TRK can be viewed by highlighting the file name and pressing the <ENTER> key. The <ESC> key will exit the view mode.

Other file conversion options available are:

- F2 - tag all files
- F3 - untag all files
- Q - Quit (exit)

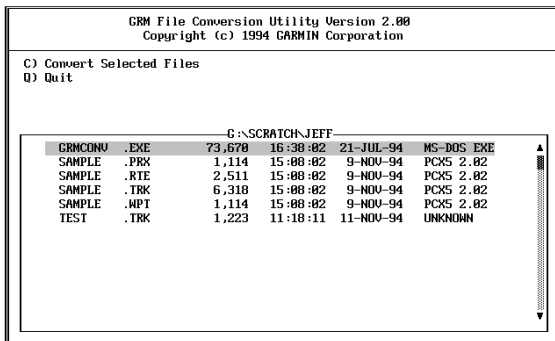


Figure 2-1: FILE CONVERSION UTILITY

CHAPTER 3

GETTING STARTED

3.1 RUNNING PCX5

The DOS command line syntax for executing PCX5 is:

PCX5 [-cXXX.cfg] [-ega] [-mc<n1>] [-me<n2>]

The optional parameters (shown in brackets) denote:

- cXXX.cfg*** configuration file to be loaded. “XXX” is any pre-defined configuration file (see Section 9.6). If no configuration file is specified, “PCX5.CFG” is used (either from the current directory, if available, or from the program directory).
- ega*** forces display into EGA mode (see Section 2.3).
- mc<n1>*** amount of conventional memory to allocate for plotting. “<N1>” is the amount in Kbytes. If unspecified, the program will use what it needs from available memory.
- me<n2>*** amount of expanded memory to allocate for plotting. “<N2>” is the amount in 16K-bytes. If unspecified, the program will use what it needs from available memory.

After invoking PCX5, the main program screen will appear as illustrated below:

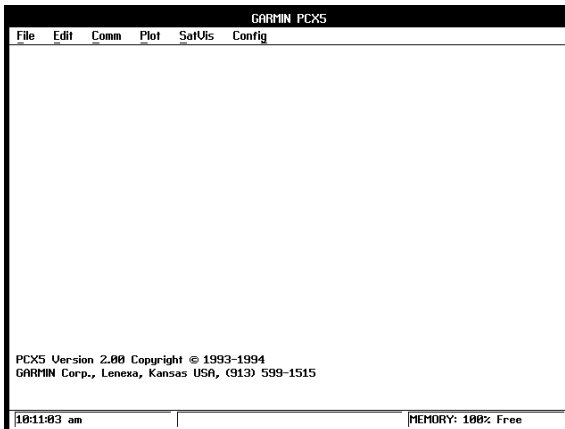


Figure 3-1: MAIN MENU

3.2 ACCESSING MENUS AND SELECTING OPTIONS

Menus may be pulled down by using one of the following methods:

- Keyboard - Press <Alt> and the underlined letter key from the desired menu label.
- Mouse - Direct the screen arrow to the appropriate menu label and click the left mouse button.

For either of the methods mentioned, pressing the left and right arrow keys will cycle from menu to menu. A displayed menu can be cleared from the screen by clicking the left mouse button off the menu or pressing <Esc>.

Once a menu is pulled down, you may select an item from the menu using one of the following methods:

- Keyboard - Press the arrow keys to move the highlight bar between menu options; press <Enter> to select the highlighted option.
- Keyboard ("Speed Keys") - Press the underlined letter to select the desired menu option.
- Mouse - Click the left mouse button on the desired menu item (the highlight bar will follow the pointer). Or, you may hold down the left mouse button as you move the pointer up/down the menu and release the button to select the item under the highlight bar.
- Any window or dialog box may be closed by pressing <Alt+F4>.

A short description of what operations are available with each menu follows.

The **File menu** contains options for file operation and program control:

- Open an ASCII data file and plot the data on the PC screen
- Save current screen plots to the current file
- Save current screen plots to a specific file
- Clear the screen plotting area
- Convert an ASCII data file to DXF format
- Perform various file utilities (delete, copy, rename)
- Print screen plot
- View information about the current version of PCX5
- Exit the PCX5 program

The **Edit menu** contains options for creating or editing file data:

- Waypoint editor
- Route editor

The **Comm menu** contains options for transferring various types of data between your GPS unit and a PC:

- *Download* (from GPS unit to PC) -
 - Waypoint data
 - Proximity Waypoint data
 - Route data
 - Track data
 - Almanac data
- *Upload* (from PC to GPS unit) -
 - Waypoint data
 - Proximity Waypoint data
 - Route data
 - Track file data
 - Almanac data
- Display real time data in graphical form
- Communications port selection

The **Plot menu** offers options for customizing the screen plotting parameters:

- Zoom in
- Zoom out
- Fit current plot to screen (Zoom Extents)
- Draw a window around a specific portion of screen plot and zoom in
- Pan to a specific point on your graph
- Refresh (update) screen

The **SatVis menu** gives you options to preview satellite visibility information:

- Animated satellite sky view for a specific location and time
- DOP/satellite availability chart for a specific location and time

The **Config menu** contains setup options:

- Select units distance, error/velocity and number of precision digits
- Choose coordinate system (e.g., latitude/longitude, UTM/UPS)
- Select a pre-defined map datum, or define your own
- Enable or disable plot display for -
 - Points
 - Lines
 - Identifiers
 - Descriptions
 - Proximity
- Specify Display Aspect Ratio
- Display all routes, no routes or one specific route
- Configure time difference between PC time (local) and UTC (Greenwich)
- Save or load a configuration file
- Enable configuration file Auto Save function

“Accelerator keys” are available for some menu options which enable you to select an option without pulling down the menu. Accelerator keys, which are available for all Plot Menu options and some File Menu options, are displayed beside the option name and are in the form <Ctrl+key>, where “key” is a specified letter. For example, pressing <Ctrl+I> performs the Plot Menu “Zoom In” function.

3.3 DIALOG BOXES

Certain menu options require the entry of additional information. The PCX5 program prompts you for the necessary information using a dialog box. A dialog box consists of a set of control items with which you may interact using the mouse or keyboard. Figure 3-2 shows an example of a typical dialog box.

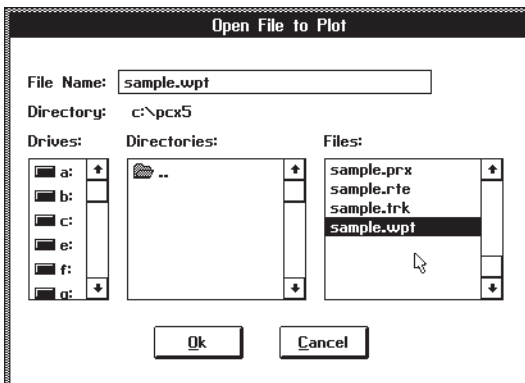


Figure 3-2: DIALOG BOX EXAMPLE

You may move within a dialog box using one of the following methods:

- Keyboard - Use <Tab> to cycle through the various selections; <Shift+Tab> will move your cursor in the opposite direction. Within a list box (e.g., a list of files or directories) or inside a group of option buttons, use the arrow keys to move among the options.
- Mouse - Move the screen pointer to the desired area and click the left mouse button.

Within a list box, with the mouse double-click the left button on the desired file or directory. Without a mouse, use the tab and arrow keys to highlight the desired file or directory, press <Enter> to display that selection in the File Name box, tab to the “OK” control button and press <Enter> (or press <Alt+O>).

To select an option button within a given group, move the screen pointer to the button which you want to “set” using <Tab>, or use the mouse to move the pointer to the desired button, and click the left mouse button.

Once the appropriate selections/entries have been made, move the cursor to the “OK” control button and press <Enter>, or use the mouse to select the “OK” button with a single left-button click. This will cause the chosen menu operation to begin execution. To exit the dialog box without beginning execution, select the “CANCEL” control button (or press <F3>).

3.4 FILE EXTENSIONS

As data is transferred between the GPS unit and a PC, five types of ASCII data files are used, each denoted by a different file extension:

- .TRK -- Track File
- .RTE -- Route File
- .WPT -- Waypoint File
- .PRX -- Proximity Waypoint File
- .ALM -- Almanac Data from unit (“YUMA” format)
- .CHK -- Checklist File (PC150 Only)
- .SCH -- Schedule File (PC150 Only)

Data that is created or modified on the PC will be saved to a sixth type of file:

- .GRM-- GARMIN Format File

The formats of these files are detailed in Sections 6.1 and 6.2.

CHAPTER 4

FILE MENU OPERATIONS

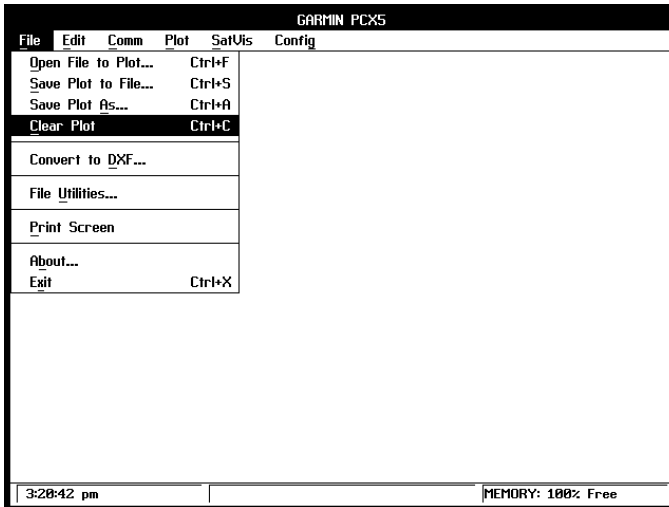


Figure 4-1: FILE MENU

From the File Menu you may perform various operations with data files produced by your GPS unit and/or the PCX5 program. You may open a file for plotting to the screen, save the screen plot to a “.GRM” file, clear a screen plot, convert an ASCII file into DXF format, perform various file utilities, print the current plot or exit the PCX5 program.

4.1 OPEN FILE TO PLOT

This option graphically plots data from an ASCII file to your PC screen using the parameters selected from the Plot and Config Menus, described in Chapters 7 and 9. The input file required for this option may be a file created during a previous Download operation (e.g., .TRK, .RTE, .WPT, .PRX) or a file in the GARMIN (.GRM) format as described in Section 6.1.

Upon choosing this selection, a dialog box will prompt you for the required information (drive, directory and file name).

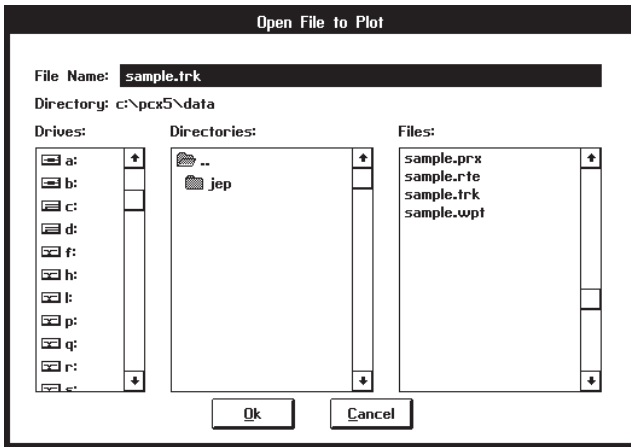


Figure 4-2: OPEN FILE TO PLOT DIALOG BOX

Enter the required information and select the “OK” button to begin the operation. If a plot is already loaded, another dialog box will prompt you whether to append to or clear the existing plot.

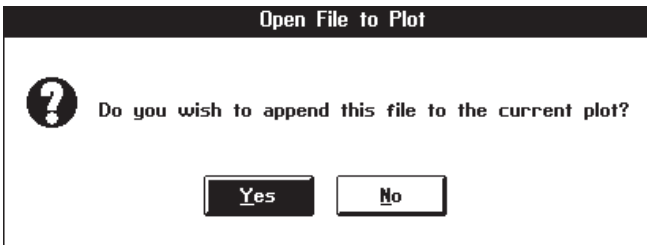


Figure 4-3: APPEND PLOT DIALOG BOX

A bar graph will be displayed as the file is loading. The ESC key can be used to abort the load.

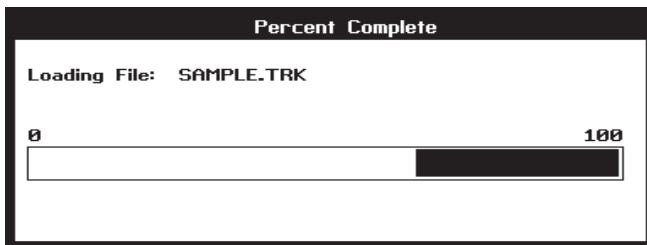


Figure 4-4: FILE LOAD BAR GRAPH

As the file is loading, the PCX5 program may determine there is not enough memory to load the entire file. Should this occur, sufficient memory is not available for the PCX5 program to continue functioning properly and you should **exit the PCX5 program immediately**.



Figure 4-5: MEMORY LIMITATION WARNING

The title bar, at the top of the display, will always indicate the file name of the last plot file loaded or saved.

GARMIN data files may contain multiple data types (e.g., waypoints, track, proximity information, etc.). The type of data displayed will depend on the settings in the Config | Config Display Menu (see Section 9.4).

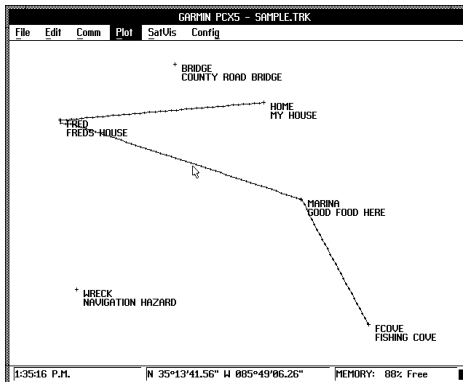


Figure 4-6: PLOT FILE EXAMPLE

Once the file is displayed, you can use the Plot Menu options (Chapter 7) to customize the display of your data, Config Menu options (Chapter 9) to change the units used for display or find the range and bearing between any two points simply by clicking on them (Section 4.2).

If the Error Dialog Box is displayed, PCX5 is trying to open a file not created by the current PCX5 version (i.e., created by either a different version of the PCX5 program or another software package). The data file will not be loaded and the error box shown in Figure 4-7 will appear.

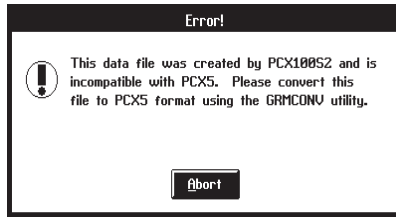


Figure 4-7: ERROR DIALOG BOX

4.2 SAVE PLOT TO FILE

This menu option automatically saves a copy of the data currently plotted on your PC monitor (i.e., waypoints, routes) to the **currently loaded data file**. The data is saved in the **currently selected coordinate system** format (e.g., Latitude/Longitude, UTM/UPS, etc.). If more than one file is currently loaded, the data will be saved to the file loaded last (named on the top display line).

4.3 SAVE PLOT AS

This menu option allows you to save a copy of the data currently plotted on your PC monitor (i.e., waypoints, routes) to an ASCII data file. The data is saved in the currently selected coordinate system format (e.g., Latitude/Longitude, UTM/UPS, etc.). To use this option, enter the requested information into the dialog box (drive, directory and file name) and select the "OK" button to save the file.

4.4 CLEAR PLOT

The clear plot menu option will clear all plot data displayed by the program.

4.5 CONVERT TO DXF FORMAT

This menu option gives you the capability to convert ASCII data files (e.g., track plots, waypoint and route files) into DXF format required for various CAD programs. To use this option, enter the information required for the file to be converted (drive, directory and file name) into the dialog box.

A second dialog box will appear to select the drive, directory and file name for the output file. The default file name is the input file name with a “.DXF” extension. Select “OK” to continue.

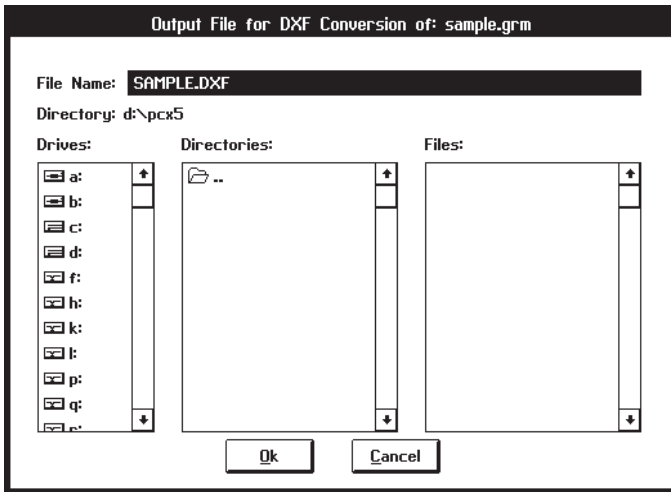


Figure 4-9: OUTPUT FILE DIALOG BOX

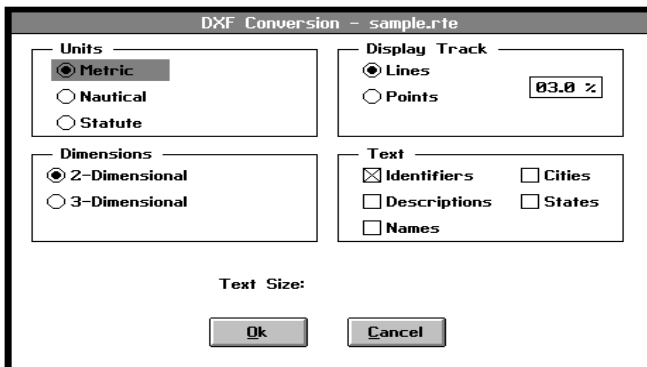


Figure 4-10: CONVERSION OPTIONS DIALOG BOX

The DXF Conversion Options dialog box will prompt you for conversion parameters. Select between “Metric”, “Nautical” or “Statute” to indicate the type of units into which you wish the data converted. Select between “Points” or “Lines” to designate whether the data shall be converted as discrete points or connected by lines. Indicate the waypoint text to be converted: identifier and/or descriptions. Enter the height for text characters expressed as the percentage of the vertical extent of the current plot. The default is 3%. The 2D option eliminates the altitude data (some GPS units do not support altitude) for a 2-dimensional DXF export to programs such as Microsoft Word® for Windows. Select “OK” to begin the file conversion.

4.6 FILE UTILITIES

This menu option gives you the capability to delete, copy or rename your DOS files. To use this option, fill in the file information (drive, directory and file name). Select the DELETE button to delete the file; the COPY button to copy the file to another drive, directory or file name; or the RENAME button to give the file a different name.

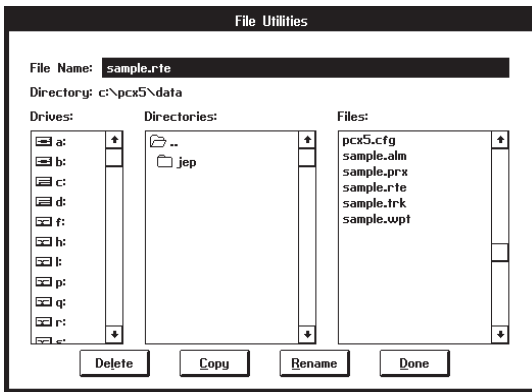


Figure 4.11: FILE UTILITIES BOX

If COPY or RENAME is selected, a second dialog box will be displayed prompting for the Copy Destination file name or the New file name. Select DONE to indicate file changes are complete.

4.7 PRINT SCREEN

This option allows you to print the contents of the current screen plot. **Prior to running the PCX5 program**, from the DOS prompt, execute the DOS “GRAPHICS” command with the proper parameters and designation for your printer. For example, the following command line sets up a Hewlett-Packard LaserJet II for printing in reverse mode (black w/ white background):

GRAPHICS LASERJETII /R

After executing the PCX5 software and the desired screen is displayed, select Print Screen. Refer to the user's guide provided with your computer's operating system for additional information on using the "GRAPHICS" command.

4.8 ABOUT

This option allows you to view information about the current version of the PCX5 software. Select "OK" to continue.

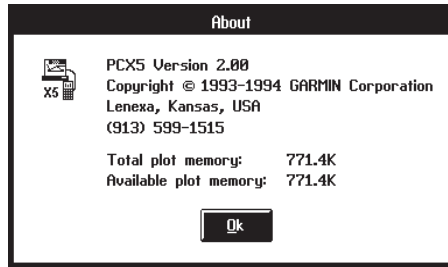


Figure 4-12: ABOUT PCX5 DIALOG BOX

4.9 EXIT

This option allows you to exit from the PCX5 program. You may also exit without pulling down the File menu by using the accelerator key <Ctrl+X>.

If the current plot has been modified, a dialog box will remind you to save the file.

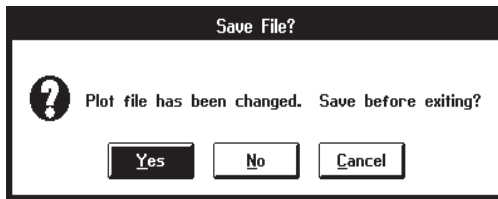


Figure 4-13: SAVE PLOT DIALOG BOX

If the SAVE ON EXIT option is selected on the Config Menu (see Section 9.8), all currently selected configuration parameters (e.g., Comm Port, Units, Coordinates) will be saved to the configuration file upon exiting the PCX5 program. If no customized configuration file was specified, configuration parameters will be written to the default configuration file, PCX5.CFG (see Section 9.7).

CHAPTER 5

EDIT MENU OPERATIONS

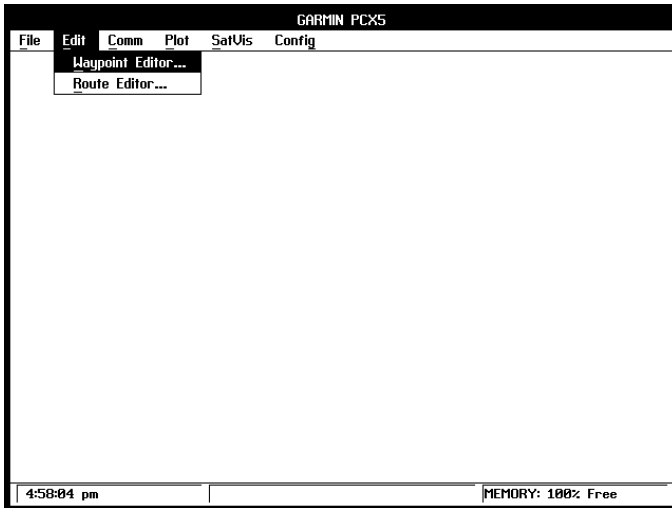


Figure 5-1: EDIT MENU

The Edit menu allows you to create or modify waypoint and route files.

5.1 WAYPOINT EDITOR

The waypoint editor allows you to create or modify waypoints. The waypoints from the "sample.wpt" waypoint file are listed as illustrated below.

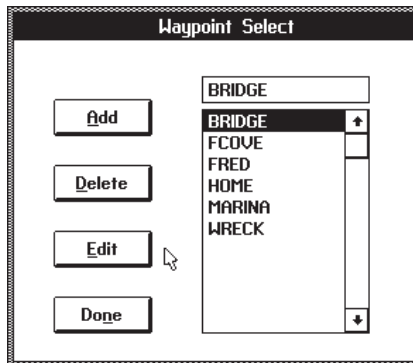


Figure 5-2: WAYPOINT SELECT DIALOG BOX

To edit an existing waypoint, select it with the left mouse button (or the arrow keys), then select EDIT to display the Waypoint Edit dialog box as illustrated below.

The image shows a 'Waypoint Edit' dialog box with the following fields and values:

- Identifier: BRIDGE
- Description: COUNTY ROAD BRIDGE
- Latitude: N 35°22.8349'
- Longitude: W 085°51.1903'
- Proximity: 00000.0000 km
- Units: Kilometers
- Distance: 00000.0000 km
- Ref Wpt: (empty)
- Bearing: 000°

Buttons: Ok, Cancel, Delete

Figure 5-3: WAYPOINT EDIT DIALOG BOX

Change the position of the waypoint either directly, by entering its coordinates, or in reference to another waypoint by selecting the reference waypoint from the “Ref Wpt:” list. If a reference waypoint is used, enter the distance and bearing from the reference waypoint, and the new waypoint position will be calculated (great circle) and displayed in the coordinate fields. Select the “OK” button to save the changes to the waypoint, or “CANCEL” to abort the waypoint modification.

To create a new waypoint, select the ADD control button from the Waypoint Select dialog box. A blank Waypoint Edit dialog box will be displayed. Enter the new waypoint identifier and its description (optional). Enter its coordinates directly, or select a reference waypoint and enter a distance and bearing. Select the “OK” button and the new waypoint will be added to the list.

If a plot is being displayed, you may go directly to the Waypoint Edit dialog box (skipping the Waypoint Select dialog box) by double-clicking the **right** mouse button on the plotted waypoint. Similarly, double-click on an open position to create a new waypoint.

To delete a waypoint, click on the waypoint in the Waypoint Select Box, and select the DELETE control button. Or, double-click on the plotted waypoint and select the DELETE control button in the Waypoint Edit dialog box.

When all modifications to the waypoint data have been made, select the DONE control button to exit the waypoint editor.

Remember, waypoint changes only affect the displayed plot - you must save the plot to a file to save any changes you have made. An icon of a diskette will be displayed in the lower right corner of your screen to remind you that the current plot has been modified.

NOTE: The PCX5 software waypoint editor will process up to a total of 500 waypoints to maintain compatibility with a greater number of Garmin GPS units. Your GPS unit may have a lower waypoint capability. Additionally your unit may not support the use of proximity waypoints.

5.2 ROUTE EDITOR

This menu option allows you to create or modify routes. The routes from the "sample.rte" (plotted) route file are listed as illustrated below.

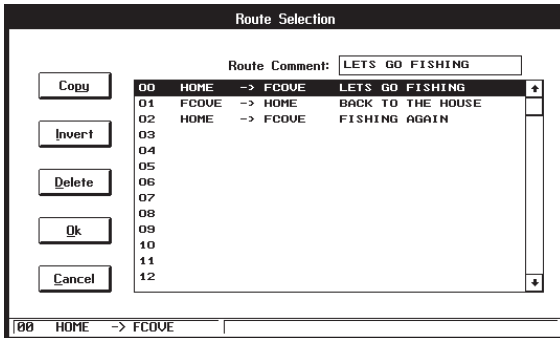


Figure 5-4: ROUTE EDIT DIALOG BOX

To enable graphical editing of an existing route, select it with the left mouse button and it will be displayed in the edit field (or use the arrow keys and <ENTER>). Copy the selected route to an empty route by selecting the COPY button and designating the destination route number. Reverse the selected route by selecting the INVERT button. Delete the selected route by selecting the DELETE button. Abort changes made to the routes by selecting the CANCEL button.

The sequence of the waypoints in a route is modified graphically on the plot screen. Select "OK" to plot the selected route graphically. "View One Route" mode will automatically be selected (see Section 9.4).

The first waypoint in the route will be highlighted (“selected”). Select other route waypoints using the left and right arrow keys. By pressing <Shift> plus the left or right arrow key, you can move between **all** displayed waypoints (including those not in the displayed route). You may also select any waypoint by clicking the right mouse button on it.

NOTE: While in Route Editing Mode, Range/Bearing and Waypoint Editor functions cannot be activated using the right mouse button.

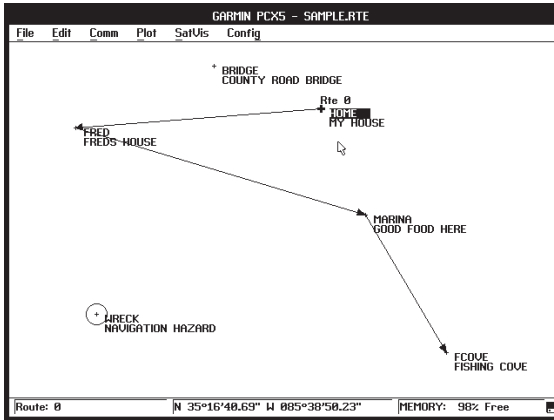


Figure 5-5: ROUTE EDIT EXAMPLE

To insert a waypoint into the displayed route, select the waypoint (with the right mouse button) which is to precede the inserted waypoint. “Drag” the mouse (while holding down the right mouse button) and release it at the waypoint to be inserted. The cursor will snap-to the waypoint. The route will be re-drawn, inserting the selected waypoint into the route immediately following the first selected waypoint. (To insert a waypoint without a mouse, select the waypoint to precede the inserted waypoint and press <Insert>. Move to the waypoint to be inserted into the route using the arrow keys, or <Shift> and the arrow keys. When the waypoint to be inserted is selected, press <Enter>.)

To insert a waypoint at the beginning of a route, select the waypoint which is to be inserted. “Drag” the mouse and release it at the first waypoint in the route. (To insert a waypoint at the beginning without a mouse, select the waypoint to be inserted and press <Insert>. Select the first waypoint in the route using the arrow keys, or <Shift> plus the arrow keys, and press <Enter>.)

To create a new waypoint and insert it into the displayed route, create the waypoint first from the Waypoint Editor (see Section 5.1). Insert the new waypoint into the route using the procedure described above.

To delete a waypoint from the displayed route, highlight the waypoint to be deleted and press <Delete>. To view a different route from the same route file, press <Page Up> to display the previous route or <Page Down> to display the next route. Changes to the current route will be saved in memory.

Route comments can be added to the route data file by selecting the route comment field with the left mouse button. The field can then be edited with the keyboard. Certain GPS units support the upload & download of route comments. Other GPS units will ignore the uploaded route comments. See Appendix B for GPS unit capability.

When all modifications to the route(s) have been made, save the plot to a file (see Sections 4.3 and 4.4). This saves **all routes from the loaded file** (not only the route currently displayed). Remember, after graphically displaying and editing a route, "View One Route" mode will be the current configuration selection.

NOTE: The PCX5 route editor will process up to a total of twenty routes and forty waypoints per route to maintain compatibility with a greater number of GARMIN GPS units. Your GPS unit may have a lower route and waypoint capability. See Appendix B for the route and waypoints per route capability of your unit.

5.3 RANGE AND BEARING BETWEEN TWO POINTS

PCX5 will display Great Circle relationships between two selected points. The Great Circle range and bearing are based on the shortest distance between two points **over the surface of the earth**. All information is referenced to True North (as opposed to Magnetic North).

Place the cursor on the first point (the "from" point) and click the **right** mouse button. You may select any location on the plot, including waypoints or track log points. The cursor will "snap to" a waypoint if it is close to the cursor. The status line at the bottom of the screen will remind you that "Range/Bearing" mode is active.

Move the cursor and click the right mouse button on the second point (the "to" point). A dialog box will display the coordinates of each point and the Great Circle range and bearing between them.

NOTE: The Range/Bearing function will not work when in a Route Editing Mode (i.e., when anything other than “view none” is selected on the Config | Config Display Menu).

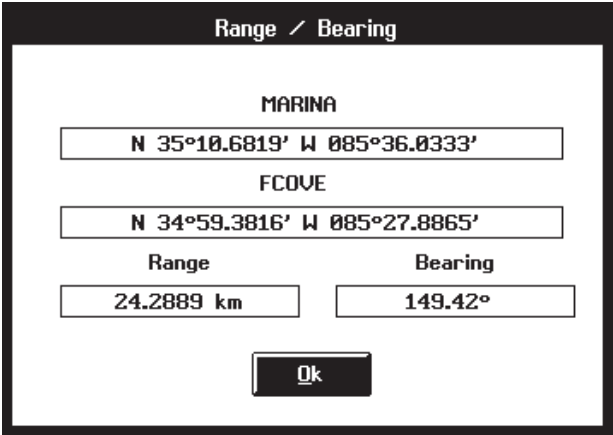


Figure 5-6: RANGE AND BEARING DIALOG BOX

CHAPTER 6

COMM MENU OPERATIONS

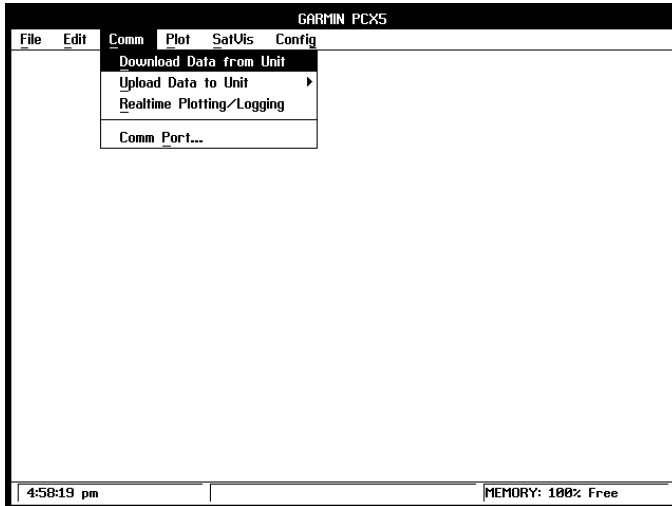


Figure 6-1: COMM MENU

The Communications menu allows you to transfer data between your GPS unit and a PC, monitor real time position data from the GPS unit or select the communications port to be used. The proper COM port must be selected prior to beginning a data transfer (see Section 6.5). The unit must be configured with the appropriate output selected on the Interface Page: "GARMIN" to download or upload data, or "NMEA 0183 (Version 1.5 or 2.0)" for realtime plotting.

Data transferred between the PC and the unit is in a GARMIN proprietary binary format. The PCX5 software converts the binary data to an ASCII readable file format for user editing. The ASCII file format is GARMIN for: Waypoint, Proximity Waypoint, Route, or Track Files and YUMA for almanac files. While the data is being transferred, a bar graph will indicate the progress of the transfer. The ESC key can be used to abort the data transfer.

NOTE: The PCX5 software will process up to 500 waypoints, 20 routes, route comments, proximity waypoints and up to forty waypoints per route. Your GPS unit may not support all the features available in the PCX5 software. Refer to your GPS owner's manual for the capability of your unit.

6.1 GARMIN FILE FORMAT

Waypoint, proximity waypoint, route and track data are stored as ASCII data files in GARMIN format, with file extensions “.WPT”, “.PRX”, “.RTE”, and “.TRK” respectively. Real time data logged to a file is saved as ASCII data in GARMIN format with a “.TRK” extension. Waypoint, proximity waypoint, route and track data must also be in GARMIN format to be used by the PCX5 plotting program or uploaded to the unit..

Each GARMIN file is composed of multiple data lines (each line is a “record”). The first character on each line is the record type, identifying the type of data to follow.

The following lists the valid record types:

- H = Header record (provides column titles only; contains no data)
- I = Software Identification
- M = Map Datum
- U = Coordinate System
- W = Waypoint record
- R = Route record
- T = Track record (track log file) and Real time logging record (select NMEA output format)
- C = Checklist record (PC150 Only)
- S = Schedule record (PC150 Only)

The data fields associated with the record follow the record type. All fields must be separated by spaces. Non-trailing empty fields will contain one or more space characters.

At least one header line (H record) precedes each logical group of data lines. For example, a ground track file may have hundreds (or thousands) of T records, but the file may have only one H record at the beginning of the file.

The following is a list of header titles used for data fields in the various types of GARMIN file records (units are given where appropriate):

- LATITUDE
- LONGITUDE
- DATE in form of DD-MMM-YY
- TIME in form of HH:MM:SS (UTC time)
- ALT = Altitude in meters
- ZONE = Grid coordinate zone identifier
- EASTING = Grid coordinate easting offset in meters
- NORTHING = Grid coordinate northing offset in meters

- COORDINATE SYSTEM=coordinate system configuration (text string)
- SOFTWARE NAME & VERSION (text string)
- R = Altitude Reference (E=Ellipsoid or G=Geoid)
- DATUM = map datum used (text string)
- IDNT = Identifier (text string)
- IDX = Datum index
- DA = Delta earth radius
- DF = Delta flattening factor
- DX, DY, DZ = Delta earth center
- DESCRIPTION = Waypoint description
- PROXIMITY = Proximity distance

An example of each record type is given in the sections that follow. Note that the time given in the points created by the unit is **UTC Time**; points created by the PC are in local **PC Time**.

6.2 DOWNLOAD DATA FROM UNIT

This option will transfer data from the unit into a PC. From the sub-menu select the type of data to download: Waypoints, Proximity Waypoints, Routes, Track log or Almanac.

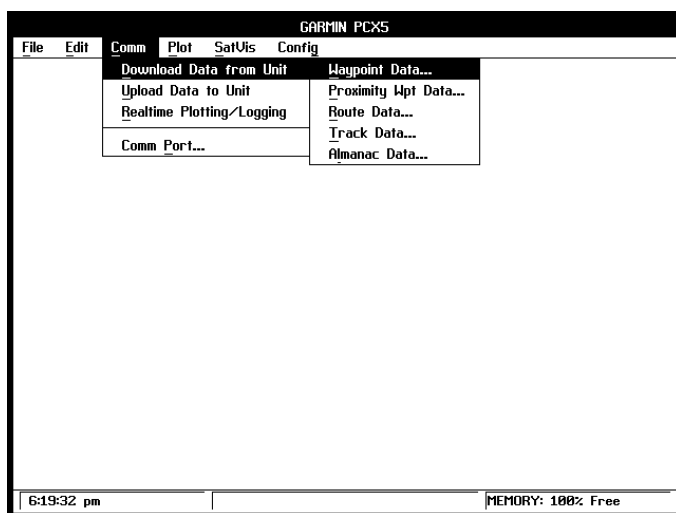


Figure 6-2: DOWNLOAD DATA OPTIONS

6.2.1 DOWNLOAD WAYPOINT DATA

Select "Waypoint Data" to download waypoints from the GPS unit to an ASCII file with a ".WPT" extension. Upon choosing this selection, a dialog box will

prompt you for the required information (drive, directory and file name). Indicate the destination file name for the waypoint data.

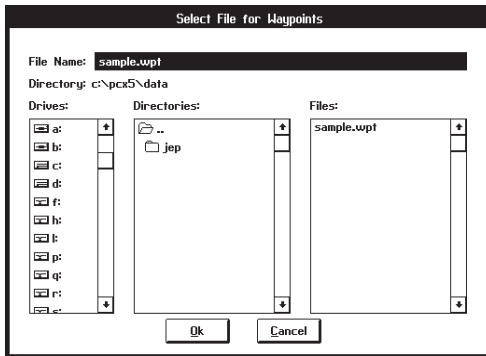


Figure 6-3: WAYPOINT DOWNLOAD DIALOG BOX

The ASCII file created follows the format described in Section 6.1. The file will include one header record (H record) followed by multiple waypoint data records (W records). Each line begins with the waypoint record identifier (W), followed by the user-assigned waypoint identifier. Appearing next are latitude and longitude (or easting and northing for grid coordinates), date (DD-MMM-YY) and time (UTC in HH:MM:SS) created, altitude, description (if applicable) and proximity waypoint distance (if applicable). An example of a waypoint data file in latitude and longitude (degrees/minutes/seconds) coordinates follows:

```
H SOFTWARE NAME & VERSION
I PCX5 2.00
```

```
H R DATUM      IDX DA      DF      DX      DY      DZ
M E WGS 84    100 +0.000000e+00 +0.000000e+00 +0.000000e+00 +0.000000e+00 +0.000000e+00
```

```
H COORDINATE SYSTEM
U LAT LON DM
```

```
H IDNT  LATITUDE  LONGITUDE  DATE      TIME      ALT  DESCRIPTION  PROXIMITY ;waypts
W HOME  N3519.3776  W08540.4503  07-JUN-93  14:26:47 -9999  MY HOUSE     0.00000e+00
W MARINA N3510.6819  W08536.0333  07-JUN-93  14:29:17 -9999  GOOD FOOD HERE 0.00000e+00
W BRIDGE N3522.8349  W08551.1903  07-JUN-93  14:30:16 -9999  COUNTY ROAD BRIDGE 0.00000e+00
W FCOVE  N3459.3816  W08527.8865  07-JUN-93  14:31:15 -9999  FISHING COVE  0.00000e+00
W WRECK  N3502.5195  W08602.9741  07-JUN-93  14:32:44 -9999  NAVIGATION HAZARD 0.00000e+00
W FRED   N3517.7816  W08605.0523  07-JUN-93  14:53:40 -9999  FRED'S HOUSE   0.00000e+00
```

NOTE: The -9999 value in the altitude field indicates that altitude information was not available.

6.2.2 DOWNLOAD PROXIMITY WAYPOINT DATA

Select "Proximity Wpt Data" to download waypoints from the GPS unit to a ".PRX" file. Upon choosing this selection, a dialog box will prompt you for the

required information (drive, directory and file name). Indicate the destination file name for the proximity waypoint data.

The ASCII file created follows the waypoint file format described in Section 6.2.1 (one “H” record followed by multiple “W” records), but with proximity data in each waypoint record. An example of a proximity waypoint data file in latitude and longitude (degrees/minutes) coordinates follows:

```
H SOFTWARE NAME & VERSION
I PCX5 2.00

H R DATUM      IDX DA      DF      DX      DY      DZ
M E WGS 84    100 +0.000000e+00 +0.000000e+00 +0.000000e+00 +0.000000e+00 +0.000000e+00

H COORDINATE SYSTEM
U LAT LON DM

H IDNT  LATITUDE  LONGITUDE  DATE      TIME      ALT  DESCRIPTION      PROXIMITY ;waypts
W HOME  N3519.3776  W08540.4503  07-JUN-93  14:26:47 -9999  MY HOUSE          1.00000e+03
W MARINA N3510.6819  W08536.0333  07-JUN-93  14:29:17 -9999  GOOD FOOD HERE   2.00000e+02
W BRIDGE N3522.8349  W08551.1903  07-JUN-93  14:30:16 -9999  COUNTY ROAD BRIDGE 1.25000e+03
W FCOVE  N3459.3816  W08527.8865  07-JUN-93  14:31:15 -9999  FISHING COVE     2.50000e+03
W WRECK  N3502.5195  W08602.9741  07-JUN-93  14:32:44 -9999  NAVIGATION HAZARD 1.60934e+03
W FRED   N3517.7816  W08605.0523  07-JUN-93  14:53:40 -9999  FRED'S HOUSE     1.00000e+04
```

6.2.3 DOWNLOAD ROUTE DATA

Select “Route Data” to download stored routes from the GPS unit into an ASCII file with a “.RTE” extension. Upon choosing this selection, a dialog box will prompt you for the required information (drive, directory and file name). Indicate the destination file name for the route data.

The ASCII file created follows the format described in Section 6.1 and will show data for each route downloaded from the unit. Each grouping of data for a specific route consists of one route identifier line (R record), one header record (H record) and the related waypoint data lines (W records). An example of a file created during a route download follows:

```
H SOFTWARE NAME & VERSION
I PCX5 2.00

H R DATUM      IDX DA      DF      DX      DY      DZ
M E WGS 84    100 +0.000000e+00 +0.000000e+00 +0.000000e+00 +0.000000e+00 +0.000000e+00

H COORDINATE SYSTEM
U LAT LON DM

R 00 LETS GO FISHING

H IDNT  LATITUDE  LONGITUDE  DATE      TIME      ALT  DESCRIPTION      PROXIMITY ;waypts
W HOME  N3519.3776  W08540.4503  07-JUN-93  14:26:47 -9999  MY HOUSE          1.00000e+03
W FRED  N3517.7816  W08605.0523  07-JUN-93  14:53:40 -9999  FRED'S HOUSE     1.00000e+04
W MARINA N3510.6819  W08536.0333  07-JUN-93  14:29:17 -9999  GOOD FOOD HERE   2.00000e+02
W FCOVE  N3459.3816  W08527.8865  07-JUN-93  14:31:15 -9999  FISHING COVE     2.50000e+03

R 01 BACK TO THE HOUSE

H IDNT  LATITUDE  LONGITUDE  DATE      TIME      ALT  DESCRIPTION      PROXIMITY ;waypts
W FCOVE N3459.3816  W08527.8865  07-JUN-93  14:31:15 -9999  FISHING COVE     2.50000e+03
W MARINA N3510.6819  W08536.0333  07-JUN-93  14:29:17 -9999  GOOD FOOD HERE   2.00000e+02
W FRED  N3517.7816  W08605.0523  07-JUN-93  14:53:40 -9999  FRED'S HOUSE     1.00000e+04
W HOME  N3519.3776  W08540.4503  07-JUN-93  14:26:47 -9999  MY HOUSE          1.00000e+03
```

6.2.4 DOWNLOAD TRACK DATA

A track log is downloaded into an ASCII file (with extension “.TRK”) in the format described in Section 6.1. It includes one header record (H record) followed by multiple “track” data records (T records). Each line of position file data begins with the track record identifier (T), followed by latitude and longitude (or easting and northing for grid coordinates), date (in DD-MMM-YY format) and time (UTC in HH:MM:SS format) recorded, and altitude. An example of a track file (using UTM/UPS coordinates) follows:

H SOFTWARE NAME & VERSION

I PCX5 2.00

H R DATUM	IDX DA	DF	DX	DY	DZ
M E WGS 84	100	+0.000000e+00	+0.000000e+00	+0.000000e+00	+0.000000e+00 +0.000000e+00

H COORDINATE SYSTEM

U UTM UPS

H ZONE	EASTING	NORTHING	DATE	TIME	ALT	:track
T 15S	0345695	4312736	23-MAR-94	09:31:58	-9999	
T 15S	0345652	4312736	23-MAR-94	09:32:00	-9999	
T 15S	0345594	4312738	23-MAR-94	09:32:02	-9999	
T 15S	0345551	4312738	23-MAR-94	09:32:04	-9999	
T 15S	0345493	4312740	23-MAR-94	09:32:06	-9999	
T 15S	0345435	4312741	23-MAR-94	09:32:08	-9999	

6.2.5 DOWNLOAD ALMANAC DATA

Select “Almanac Data” to download stored almanac data from the GPS unit into a YUMA formatted ASCII file with an “.ALM” extension. Upon choosing this selection, a dialog box will prompt you for the required information (drive, directory and file name). Indicate the destination file name for the almanac data.

The file created will contain almanac data for each of the currently operational satellites. While the data is transferring, a bar graph will monitor the rate of the data transfer.

You **must** download almanac data before running the SkyView or Bar Chart options on the SatVis Menu described in Chapter 9 (or any third-party planning software). For best performance, satellite almanac data should be under one month old.

An example of the information contained in the file (for one specific satellite) follows. Note that the same block of information is repeated for each operational satellite.

**** Week700 almanac for PRN-02 ****

ID:	02
Health:	000
Eccentricity:	1.176691055E-02
Time of Applicability(s):	552960.000000000000
Orbital Inclination(rad):	9.566192031E-01
Rate of Right Ascen(r/s):	- 7.920330169E-09
SQRT(A) (m ^{1/2}):	5153.65771484375
Right Ascen at TOA(rad):	1.346327305E+00
Argument of Perigee(rad):	- 2.795347452E+00
Mean Anom(rad):	- 4.729050025E-02
Af0(s):	- 3.051757812E-05
Af1 (s/s):	0.000000000E+00
week:	700

The PCX5 software will only record to the selected almanac file satellites which are operational in the GPS constellation.

6.3 UPLOAD DATA TO UNIT

This option will upload an ASCII file of waypoint, proximity waypoint, route, track log or almanac data from the PC to a GPS unit. The upload file must be in the proper format. You may use a file previously created during a waypoint, route, track or almanac download (refer to Section 6.2), or you may use a file which you have created using the waypoint or route editor (see Chapter 5).

Prior to beginning the Upload operation, the proper COM port must be selected from the Comm | Comm Port Menu (see Section 6.5 or Chapter 11 for the GPS 150) and the input/output selection on the Interface Setup page of the GPS unit must be set to "GARMIN/GARMIN" and "HOST" mode.

Existing waypoint, proximity waypoint, route and track log data in the unit will be updated with the new information from the PC. **Uploaded waypoint, proximity waypoint, route and track log data are appended to the data currently in the unit; except when data exists in the unit with the same identifier (waypoint name or route number), in which case the original unit data is overwritten.**

For example, you want to upload a route file from the PC defining Route 1 which contains two waypoints, HOME and OFFICE, into your unit which already contains a waypoint named HOME and in which Route 1 is already defined. Route 1 and waypoint HOME in the unit will be overwritten with Route 1 and HOME from the data file; waypoint OFFICE will be added to the unit's waypoint list.

There is a limit for the maximum number of waypoints, proximity waypoints, waypoints per route, routes, route comments and track log points which can be stored in the GPS unit (refer to your unit's User's Manual for the actual numbers). If you attempt to upload a file which has more data than the unit can physically hold, the unit will give you a memory full message and excess information in the file will be ignored. Also, if a specific route in your file contains more waypoints than is allowed in a route by the unit, the route will be stored with the maximum number of waypoints allowed in a route, and the excess waypoints will simply be stored as new waypoints (provided memory is available).

Upon choosing the upload selection, a sub-menu will prompt you to select the type of data to be transferred.

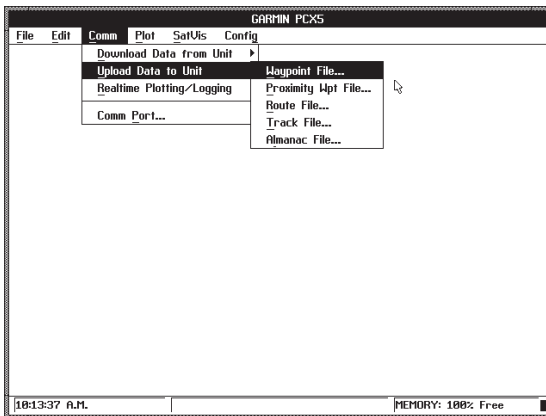


Figure 6-4: UPLOAD DATA

Upon selecting either Waypoint File, Proximity Wpt File, Route File, Track File or Almanac File, a dialog box will prompt you to specify the file to be uploaded (drive, directory and file name). After entering the required information, select "OK" to begin the operation.

While the data is being transferred, the bar graph will monitor the progression of the data transfer, and the number of data packets on the unit's Interface Control page will increment as the data is received.

On certain units, the uploaded waypoints will not be displayed if the unit is not in an active or simulated navigation mode, (i.e. operating indoors with poor GPS coverage). The uploaded waypoints will be displayed on the Map Page after a unit power is cycled or navigation becomes active.

6.4 REAL TIME PLOTTING/LOGGING

Select "Realtime Plotting/Logging" to receive real time data from the unit and monitor your position graphically (as well as viewing it in text form).

In the Display Plot Options dialog box, select between "Add to Plot" and "Clear Plot". "Add to Plot" appends to the currently displayed plot; "Clear Plot" clears the current plot prior to plotting any data.

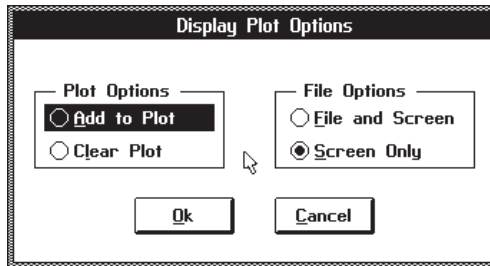


Figure 6-5: DISPLAY PLOT OPTIONS DIALOG BOX

You must also select between "File and Screen" or "Screen Only". "File and Screen" logs data to a file while displaying it on your monitor (you will be requested to specify file information); "Screen Only" displays data to your PC screen only (you may still save the plot to a file later).

As real time data is received from the GPS unit, each position is added to the plot on the screen. To end the data logging session, click the left mouse button on the STOP sign icon displayed in the upper left corner of the screen (or press <Esc>).

NOTE: During a real time logging session, options from the File, Edit, Comm and SatVis menus are unavailable; Plot and Config menu functions are all available.

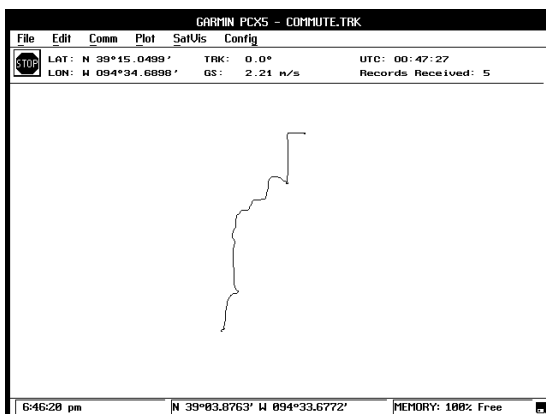


Figure 6-6: REAL TIME PLOT EXAMPLE

If “File and Screen” is selected, the “.TRK” file created will follow the format discussed in Section 6.1, and may be used as an input file for many popular spreadsheet software programs. Each row contains a position fix. Any non-trailing empty data fields in the file will contain spaces in order to maintain column integrity.

First to appear in the file will be a header (H record) followed by one software identification record (I record), specifying the name and version number of the software producing the file. Next will appear another H record followed by one coordinate system record (U record) naming the coordinate system in which the file is formatted. A third H record follows with one map datum record (M record) containing the following information: M (the record type); R (the altitude reference used, E=ellipsoid); DATUM NAME (the map datum used); IDX (the index number of the map datum); DA (delta earth radius); DF (delta flattening factor); and DX, DY and DZ (delta earth center parameters). Only one U record and one M record (and their associated headers) appear in the file unless data in one of these fields changes during a logging session.

Occurring next will be another header (providing column titles) followed by multiple real time logging data records (N records). An N record will always include the following data: N (record type), latitude and longitude (or easting and northing for grid coordinates), date (DD-MMM-YY) and time (UTC in form of HH:MM:SS). The following is an example of a real time logging file:

H SOFTWARE NAME & VERSION
I PCX5AVD 2.03

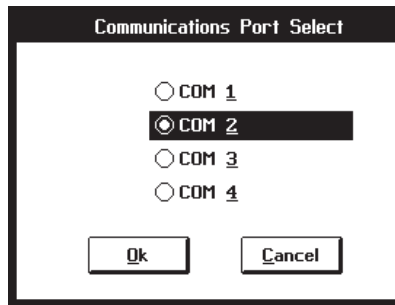
H R DATUM IDX DA DF DX DY DZ
M G WGS 84 100 +0.000000e+00 +0.000000e+00 0.000000e+00 +0.000000e+00 +0.000000e+00

H COORDINATE SYSTEM
U LAT LON DM

H LATITUDE LONGITUDE DATE TIME ALT ;track
T N3857.00698 W09444.76296 10-NOV-94 21:34:41 00340
T N3857.00698 W09444.76296 10-NOV-94 21:34:43 00341
T N3857.00698 W09444.76296 10-NOV-94 21:34:45 00340
T N3857.00698 W09444.76296 10-NOV-94 21:34:47 00340
T N3857.00698 W09444.76296 10-NOV-94 21:34:49 00340
T N3857.00698 W09444.76296 10-NOV-94 21:34:51 00340
T N3857.00698 W09444.76296 10-NOV-94 21:34:53 00340
T N3857.00698 W09444.76296 10-NOV-94 21:34:55 00339
T N3857.00698 W09444.76296 10-NOV-94 21:34:57 00339

6.5 COMM PORT

Select "Comm Port" to change the communications port setting between the PC and the GPS unit. Once selected, a dialog box will ask you to select "COM 1", "COM 2", "COM 3" or "COM 4" to indicate into which serial port the nine-pin D-shell (DB9) connector of the PC cable is plugged. When performing transmit and receive operations, the program establishes a communication



link with the GPS unit using the selected COM port.

Figure 6-7: COM SELECT DIALOG BOX

CHAPTER 7

PLOT MENU OPERATIONS

The PCX5 program allows you to control the display of your data through the use of the Plot Menu.

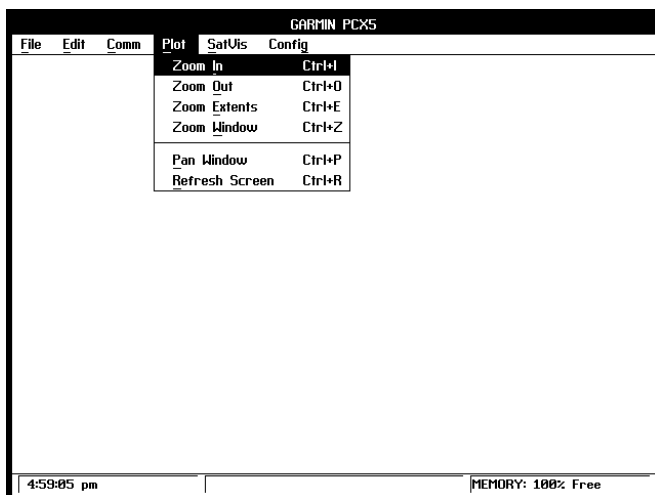
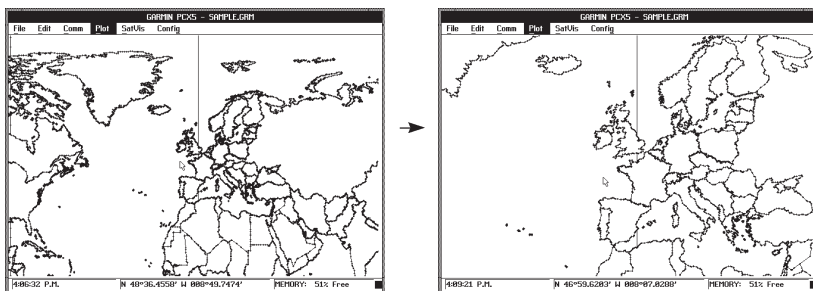


Figure 7-1: PLOT MENU

“Zoom In”, “Zoom Out” and “Zoom Window” control the size of the area displayed on your screen. “Zoom Extents” scales the plot to span the entire display area. “Pan Window” allows you to reposition displayed data as you specify.

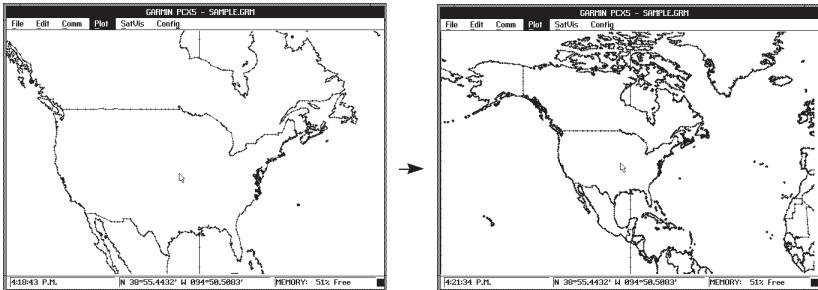
7.1 ZOOM IN

This option reduces the area of the map displayed on the screen, thus amplifying the appearance of the plot. The Zoom In function reduces the area displayed to half its original size (i.e., the distance from corner to corner represents half the original distance). The accelerator key for Zoom In is <Ctrl+I>.



7.2 ZOOM OUT

This option enlarges the area of the map displayed on the screen, thus reducing the appearance of the plot. The Zoom Out function enlarges the plot display area to twice its original size (i.e., the distance from corner to corner represents two times the original distance). The accelerator key for Zoom Out is <Ctrl+O>.



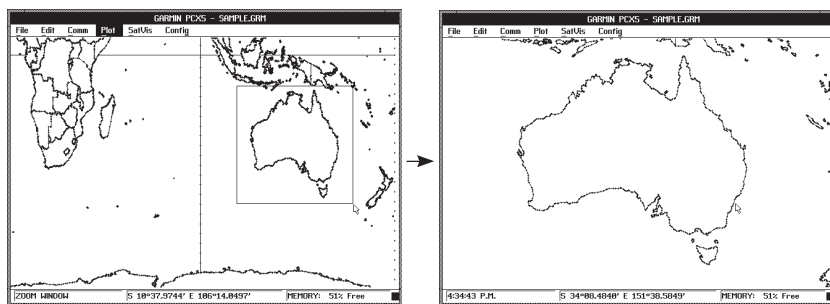
7.3 ZOOM EXTENTS

This option resets the boundaries and scale of the map such that the plot spans the entire display area. Note that new data points which are added to the plot after it has been fitted to the screen may not be visible in the display area.

7.4 ZOOM WINDOW

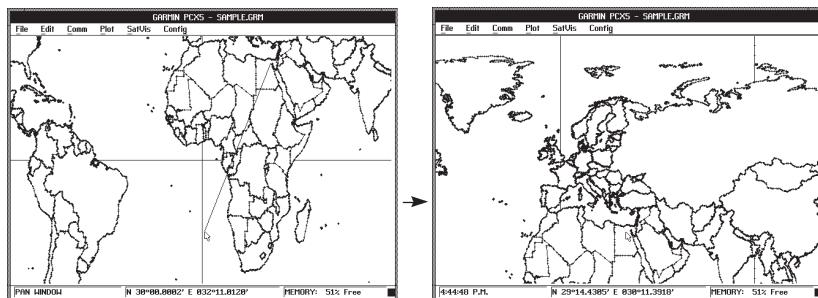
Zoom Window is an alternate way to zoom in on a specific area of your plot. After selecting this option, the status line on the bottom of the screen will indicate "Zoom Mode". The accelerator key for Zoom Window is <Ctrl+Z>.

Use the mouse to move the screen pointer near an area which you would like to enlarge. Click the left mouse button once. A box outline will appear with one corner attached to your screen pointer. Move the screen pointer using your mouse until the box outline frames the area you wish to enlarge. Click the left mouse button a second time and the area bounded by the box will be scaled to fit your screen. To cancel the zoom window (without pressing the left mouse button a second time), press <Esc>.



7.5 PAN WINDOW

This option shifts the boundaries of the map displayed on the screen. Either select “Pan Window” from the menu, press the accelerator key combination (<Ctrl+P>) or hold down the <Shift> key to activate Pan mode (and use the mouse). After selecting this option, the status line on the bottom of the screen will indicate “Pan Mode”. Use the mouse to place the screen pointer on any graph point which you wish to pan **from**. Click the left mouse button to select the position. A solid line will now stretch between the “from” point and the screen pointer. Move the pointer to the point on the graph that you want to pan **to**. Click the left mouse button again and the graph will shift such that the selected point moves from its original position to the position of the second mouse click.



7.6 REFRESH SCREEN

Select this option to redraw the graph currently on your screen. This will clear the display of any remnants left over from previous manipulations. The screen will display the data according to the selected configuration. The accelerator keys for “Refresh Screen” are <Ctrl+R> (or <F5>).

CHAPTER 8

SATVIS MENU OPERATIONS

Since all GPS satellites are now deployed, 3D coverage with good geometry will be available 24 hours a day worldwide. Satellite Visibility offers you a preview of the satellite constellation visible for a specific location on a given date, giving you the data necessary to plan your outings at times of maximum satellite visibility.

An animated view of the satellites in orbit (over a selected location) can be viewed, as well as line and bar graphs which detail the best times for satellite availability.

Remember, for SatVis displays to be accurate, almanac data must be recent (less than one month old), or updated since any major change in the satellite constellation. Almanac data is obtained by downloading it from the GPS unit (see Section 6.2.5).

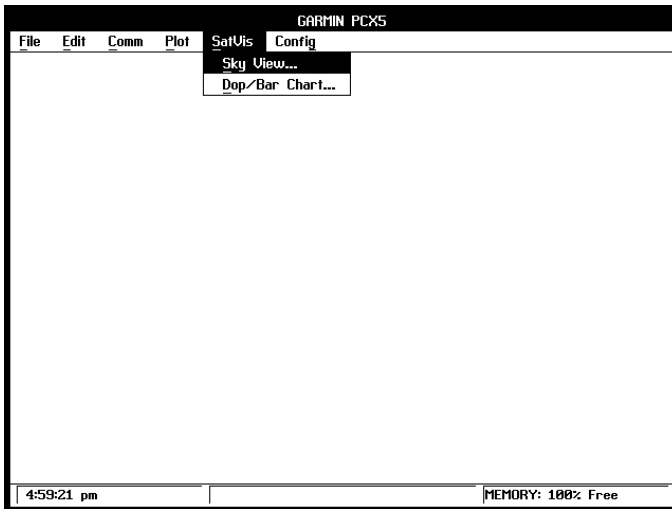


Figure 8-1: SATVIS MENU

8.1 SKYVIEW

After selecting this option, select the almanac file to be used in calculating the animated Satellite Visibility SkyView. Specify the name of the almanac file you wish to load and select "OK".

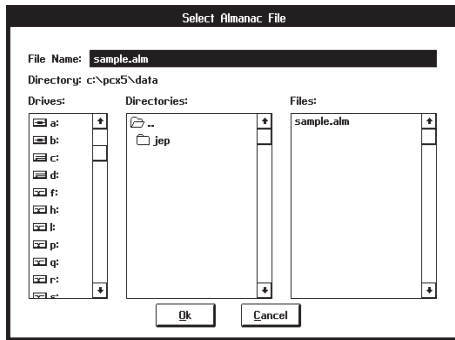


Figure 8-2: ALMANAC SELECT DIALOG BOX

Upon selecting an almanac file, the Satellite Visibility Options dialog box will be displayed allowing you to define the parameters used for the Satellite Visibility SkyView display.

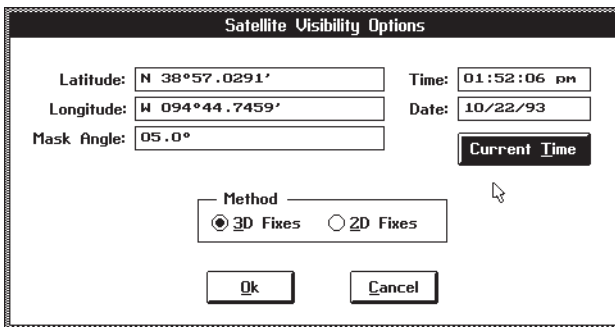


Figure 8-3: SATELLITE VISIBILITY OPTIONS DIALOG BOX

Enter the coordinates of the location for which satellite availability will be previewed. Input the time and date to start the SkyView display, or select CURRENT TIME to enter the current local time. Mask angle refers to the minimum acceptable satellite elevation. No satellites below the angle of elevation entered will be included in the SkyView display. Select between 3D- and 2D-Fixes, designating whether a minimum of four (3D) or three (2D) satellites must be available. Select "OK" to begin the SkyView display.

NOTE: The SkyView display will be based on UTC time information, but displayed as local time. For the SkyView display to be accurate, be sure to set the UTC to local time difference on the Config | Miscellaneous Menu (see Section 9.5).

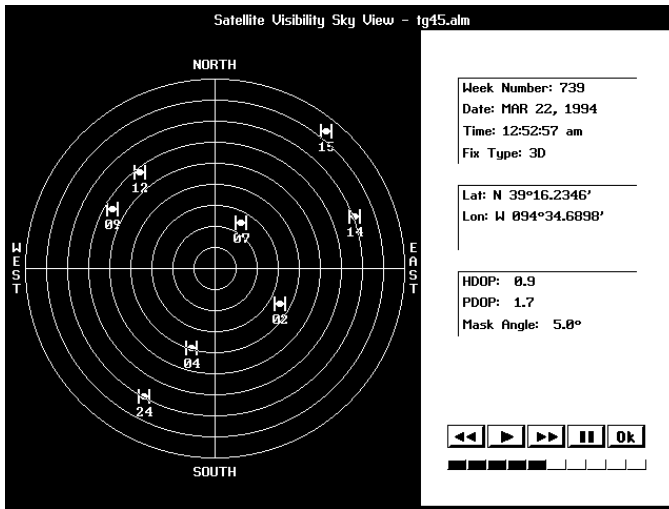


Figure 8-4: SATELLITE VISIBILITY SKY VIEW

The “North Up” format locates your selected position at the center of nine concentric rings. The outermost ring represents the horizon at this location; the next smaller ring represents 10° elevation above the horizon. Each successive ring depicts another 10° above the horizon, with the center of the sky chart (cross hair) representing the sky directly above the selected location.

All satellites which are visible at the selected location and at the indicated time (and are at an elevation at, or above, the entered mask angle) are plotted on the sky chart at their appropriate elevations and azimuths. Knowing the azimuth and elevation of each visible satellite is useful in determining whether its signal will be blocked by buildings, mountains or other obstructions. Horizontal Dilution of Precision (HDOP) and Position Dilution of Precision (PDOP) are displayed if the designated fix type (3D or 2D) can be achieved (if not, they appear dashed). (See Appendix A for a definition of these terms.)

When the satellites appear they will be stationary. To activate the satellites orbital motion, select “Go” (▶). As the time changes (by five minute intervals), each satellite moves across the graphic sky chart in its individual orbit. To adjust the speed of the satellites, select the “Slower” (◀◀) or “Faster” (▶▶) buttons. Select the “Pause” (||) button to temporarily stop the satellite movement; select “Go” (▶) to resume satellite motion. The bar graph below the speed buttons indicates the speed at which the time will change. Select “OK” to return to the Main Menu.

Computer systems without a mouse can use the arrow keys to control update

speed, space-bar to pause, enter-key to play and the esc-key to exit the Satellite Visibility Sky Menu.

8.2 DOP/BAR CHART

After selecting “DOP/Bar Chart”, select the almanac file to be used in calculating the Satellite Visibility DOP/Bar Chart from the Almanac Select dialog box. Select “OK” to continue.

Upon selecting an almanac file, the Satellite Visibility Options dialog box will be displayed allowing you to define the parameters used for the Satellite Visibility DOP/Bar Chart display.

Enter the coordinates of the location and the date for which satellite availability will be previewed. (You may select CURRENT TIME to enter the current date.) Again, mask angle refers to the minimum acceptable satellite elevation. Select between 3D or 2D-Fixes, specifying the number of satellites that must be visible. Select “OK” to display the chart.

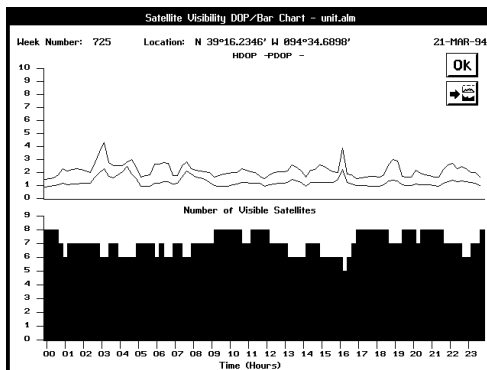


Figure 8-5: SATELLITE AVAILABILITY DOP/BAR CHART

The line graph on the top of the screen displays the HDOP (Horizontal Dilution of Precision) and PDOP (Position Dilution of Precision) at the selected position. The horizontal time scale is in one hour increments (beginning at midnight) and the vertical DOP scale shows the measure of the satellite geometry quality throughout the selected date. Lower DOP values represent better satellite geometry; higher DOP values represent poorer geometry. DOP will generally decrease as the number of visible satellites increase. When the selected fix-type (i.e., 3D or 2D) cannot be obtained, DOP is 10 (maximum value).

The bar graph on the bottom of the screen displays satellite availability at the selected position. The horizontal time scale is in one hour increments and the vertical scale shows the number of satellites visible.

The "OK" button in the top right corner of the screen or enter-key is used to exit the satellite visibility screen. A similar button below the "OK" button or a Cntl-P can be used to print the screen.

CHAPTER 9

CONFIG MENU OPERATIONS

The PCX5 program allows you to configure the displayed data according to the type of units, coordinates and map datum desired. You can input the time difference between UTC (Greenwich Mean Time) and Local Time, and save a configuration setup to a file for later use.

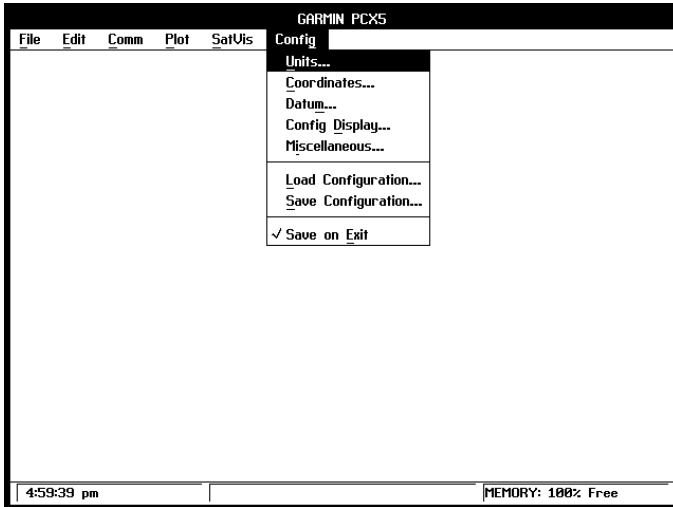


Figure 9-1: CONFIG MENU

9.1 UNITS CONFIGURATION

Upon selecting this option, the dialog box shown below will be displayed allowing you to select the units to be used for Distance, Error and Velocity.

For distance, select one of the following: Feet, Statute Miles, Nautical Miles, Meters or Kilometers. Next, in the field below the distance units selection box, enter the number of decimal precision digits to be displayed for distance measurements.

NOTE: "Precision Digits" fields will default to the maximum valid number of digits. ("Decimal precision digits" refers to the number of digits that will be displayed to the right of the decimal point.)

Select between Feet, Statute Miles, Nautical Miles, Meters and Kilometers for error/velocity values. Enter the number of decimal precision digits to display. Select “OK” to confirm the selected units.

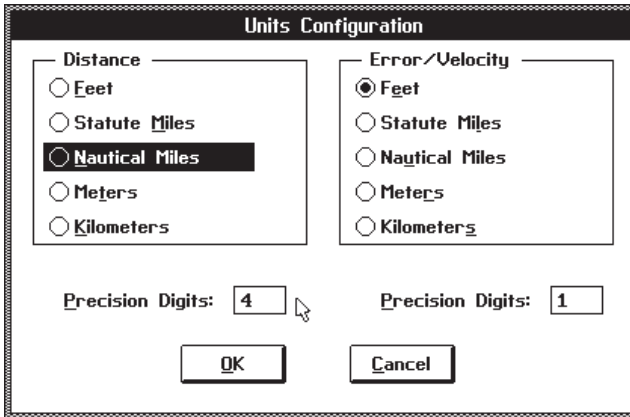


Figure 9-2: UNITS CONFIGURATION DIALOG BOX

9.2 COORDINATE SYSTEM CONFIGURATION

This option allows you to display positions in one of six different coordinate systems.

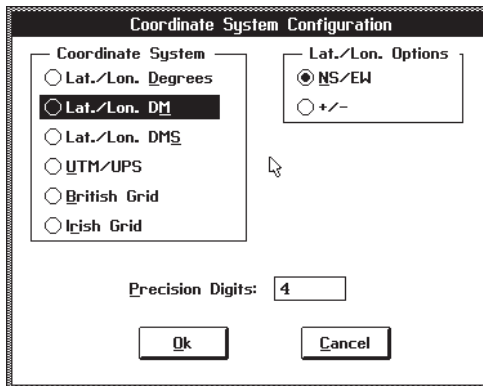


Figure 9-3: COORDINATE SYSTEM DIALOG BOX

In the dialog box displayed, select between Latitude and Longitude in decimal degrees, Latitude and Longitude in degrees/decimal minutes, Latitude and Longitude in degrees/minutes/decimal seconds, UTM/UPS Coordinates, the British National Grid or the Irish Transverse Mercator Grid.

Next, choose between indicating latitude and longitude as North/South/East/West (“NS/EW”) or positive/negative (“+/-”). (NOTE: Positive latitude is North and positive longitude is East.)

Enter the number of decimal precision digits that will be displayed for position coordinates. Select “OK” to confirm the coordinate system selection.

9.3 DATUM CONFIGURATION

The “Datum” selection is used to define the map datum from which all positions are calculated. Upon selecting this option, the dialog box shown below will be displayed.

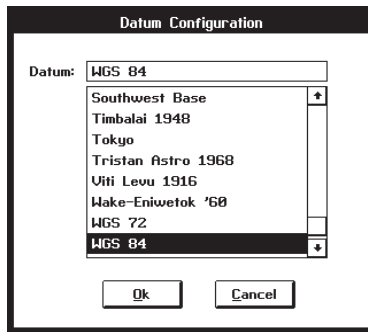


Figure 9-4: DATUM CONFIGURATION DIALOG BOX

Scroll through the list of map datums by left clicking the mouse pointer on the up/down arrows (on the right side of the datum list).

If USER is selected, the User Datum dialog box will be displayed, as illustrated below. Enter the parameters defining the differences between the WGS 84 earth model and the local datum’s earth model. DX, DY and DZ represent the differences in earth center; DA represents the difference in semi-major axis; DF represents the difference in flattening factor multiplied by 10,000 (1×10^4). The sign of these data should follow the convention: WGS 84 minus local geodetic system.

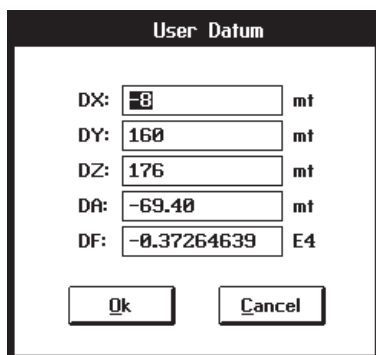


Figure 9-5: USER DATUM DIALOG BOX

9.4 CONFIG DISPLAY OPTIONS

The “Config Display” option allows you to define which items will be displayed. Upon selecting this option, the Display Options dialog box will appear as shown below.

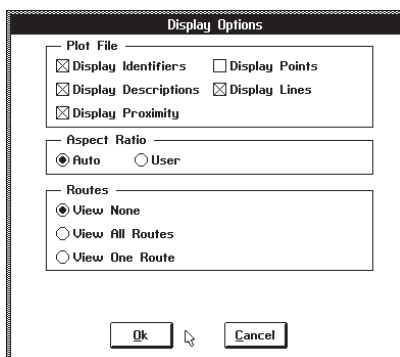


Figure 9-6: DISPLAY OPTIONS DIALOG BOX

You may turn on (click so that an “X” appears in the box) any number of Pot File Display Options:

- Display Identifiers - Displays identifiers, or names, beside all waypoints
- Display Descriptions - Displays descriptions (where applicable and available) beside all waypoints
- Display Proximity - Displays the proximity alarm radius (as a circle) around the appropriate waypoint(s)
- Display Points - Displays track log positions as individual points on a map

- Display Lines - Displays track log positions and connects them with lines

Select between “Auto” and “User” Aspect Ratio to specify the horizontal to vertical plot display ratio. “Auto” sets the ratio according to the display adapter in your PC. “User” allows you to input the decimal number representing the width-to-height ratio of your particular screen. Aspect ratio settings are not normally required, but may be necessary for some laptop computers with LCD displays.

Select one of the Route options: View None, View All Routes or View One Route. View None displays NO routes from the displayed file. View All Routes displays ALL routes in the displayed file. View One Route allows you to specify one route to be displayed from the file. View One Route will automatically be selected when performing graphic route editing (see Section 5.2).

Select the “OK” button to activate the selected display options.

9.5 MISCELLANEOUS

The “Miscellaneous” option allows you to define a UTC-to-local time difference. Enter the hours/minutes time difference between UTC Time (Greenwich Mean Time) and Local Time . This time difference will be used for Satellite Visibility computations. (NOTE: Time differences will be positive (“+”) for east longitudes and negative (“-”) for west longitudes.)

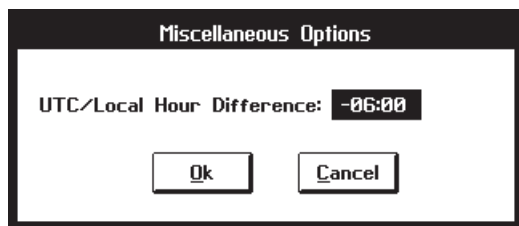


Figure 9-7: MISCELLANEOUS OPTIONS DIALOG BOX

Refer to the appendix in the GPS unit’s manual for more information on adjusting from UTC Time to Local Time.

9.6 LOAD CONFIGURATION

The parameters you have set from the various menus (e.g., Comm Port, Units, Position coordinates) may be saved to a configuration file so they may be easily re-loaded next time you run the PCX5 program.

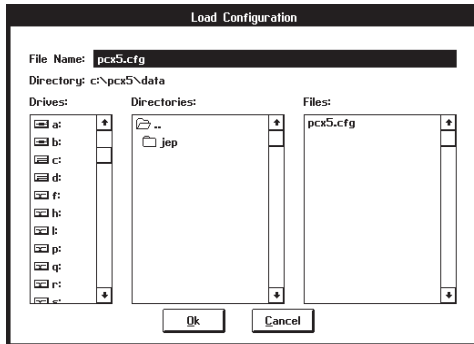


Figure 9-8: LOAD CONFIGURATION DIALOG BOX

Select "Load Configuration" to display the Load Configuration dialog box. Specify the name of the configuration file to load and select "OK".

Remember that a configuration file may also be loaded from the DOS command line when starting the PCX5 program (see Section 3.1).

9.7 SAVE CONFIGURATION

Select "Save Configuration" to save the currently selected parameters to a configuration file. A dialog box will be displayed. Specify the drive, directory and file name for the configuration file. (The default file name is "PCX5.CFG".) Select "OK" to save the configuration file.

9.8 SAVE ON EXIT

A check-mark (✓) next to "Save on Exit" will indicate that this option is active. The currently selected parameters will automatically be saved to a configuration file when exiting the PCX5 program. If no other configuration file has been specified, the parameters will be saved to the default file: "PCX5.CFG".

CHAPTER 10

PCX5AVD (Features also included in PC150)

This chapter describes the differences and additional features provided by the PCX5AVD and PC150 software packages. The PCX5AVD software is designed for GARMIN units which contain aviation databases. The PC150 software is designed for use with the GPS 150 and takes advantage of the built-in database and the checklist and scheduling features of the unit.

10.1 SETUP AND INSTALLATION

The PCX5AVD software kit includes the same physical items as the PCX5. The diskette files (see Sections 1.3 and 2.1), however, are different and include the following:

PCX5AVD.COM	PCX5AVD main program
README.TXT	may contain pertinent notes and information about PCX5AVD
SAMPLE.ALM	sample almanac file for the week the PCX5AVD program was released
SAMPLE.PRX	sample proximity waypoint file containing several proximity waypoints
SAMPLE.RTE	sample route file containing several short routes
SAMPLE.TRK	sample track log file containing over 150 points
SAMPLE.WPT	sample waypoint file containing several user waypoint locations
WORLD.GRM	sample plot file consisting of worldwide geopolitical and coastal boundaries (NOTE: This file requires approximately two megabytes of expanded memory to load. It is provided for your own personal use and GARMIN assumes no responsibility for the accuracy of the data.) Due to the extreme size of this database, plotting efficiency will be decreased.

10.2 MENU DIFFERENCES

The DOS command line syntax for executing PCX5AVD is similar to PCX5 (see Section 3.1). To run the program, type the following:

PCX5AVD [-cXXX.cfg] [-ega] [-mc<n1>] [-me<n2>]

After invoking PCX5AVD, the main program screen will appear as illustrated below:

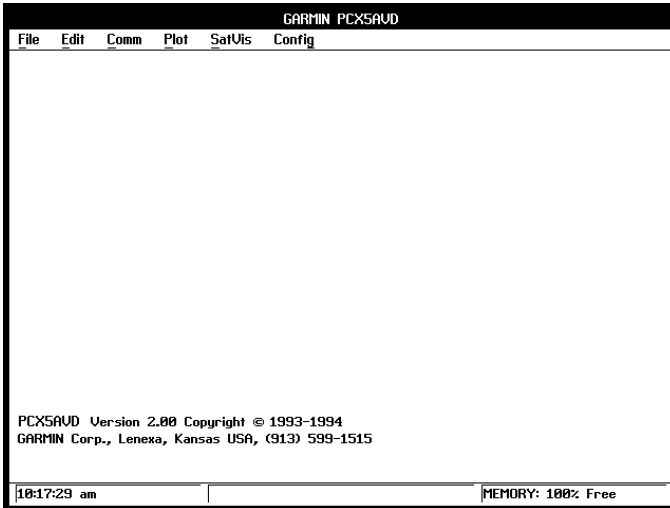


Figure 10-1: MAIN MENU

The following sections describe the menu differences that appear on the PCX5AVD program.

10.2.1 CONVERT TO DXF FORMAT

When converting ACSII data files to DXF format (see Section 4.5), the DXF Conversion Options dialog box provides additional options for outputting Facility Name, City and State to the DXF file. This additional information is available for Airport and NAVAID waypoints obtained from the GPS's aviation database.

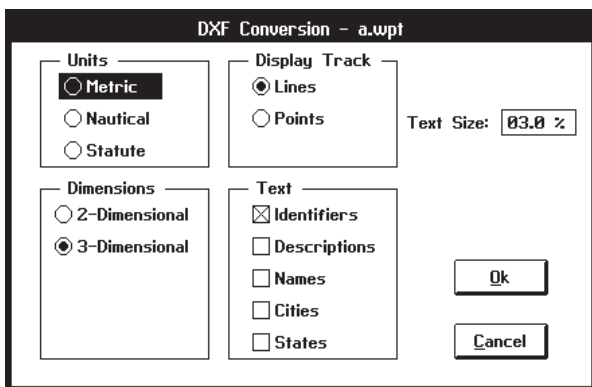


Figure 10-2: CONVERSION OPTIONS DIALOG BOX

10.2.2 WAYPOINT EDITOR

The Waypoint Edit dialog box (see Section 5.1) provides an additional information box to display Airport/NAVAID Facility Name, City, State and Class for the selected waypoint. Class information is provided for all waypoints and is displayed as Airport, Intersection, NDB, VOR, or User (as applicable).

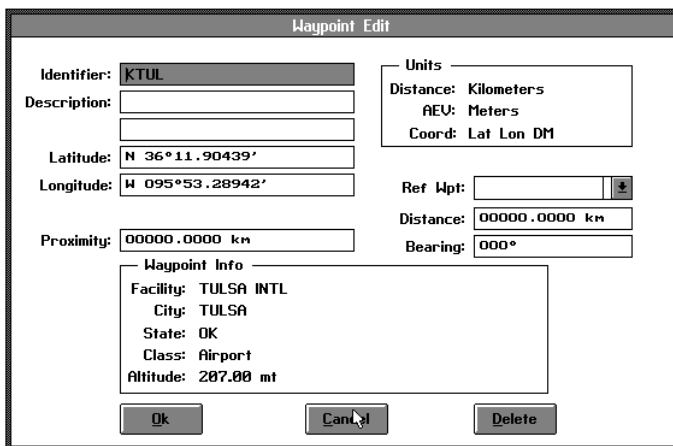


Figure 10-3: WAYPOINT EDIT DIALOG BOX

10.2.3 CONFIG DISPLAY OPTIONS

The Display Options dialog box (see Section 9.4) includes additional display options to show Facility Name, City and State on the plot.

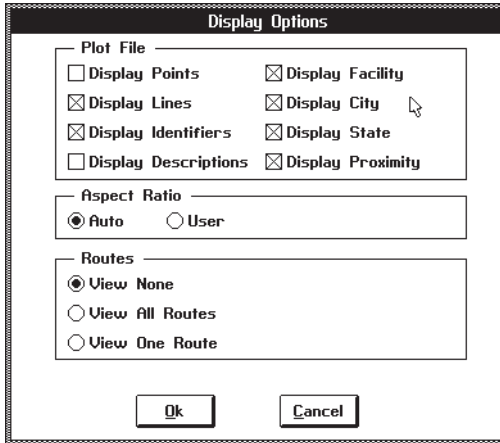


Figure 10-4: DISPLAY OPTIONS DIALOG BOX

10.3 ADDITIONAL FEATURES

Valid altitude information is provided for airport locations in proximity waypoint, route and plot (.GRM) data files. Altitude information is included when downloading, uploading, and editing these data files. Example waypoint and route files are shown on the following page. Note that for non-airport waypoints, altitude is "-9999" indicating valid altitude information is not available. The default configuration file for the PCX5AVD PC-Kit is PCX5AVD.CFG.

SAMPLE PROXIMITY WAYPOINT FILE

H	IDNT	LATITUDE	LONGITUDE	DATE	TIME	ALT	DESCRIPTION	PROXIMITY	NAME	CITY	STATE	CC	CLASS	waypts
W	HOME	N3851.3190	W09445.4221	26-AUG-93	20:02:52	-9999	MYHOUSE	1.609306e+06			KS	K3	4	
W	KPTS	N3726.8552	W09443.8698	29-JAN-07	03:38:08	+0250		8.046506e+03	ATKINSON MUN	PITTSBURG	KS	K3	0	
W	VAS	S2508.4194	W05729.7036	29-JAN-07	03:38:08	-9999		8.046506e+03	ASUNCION	ASUNCION	FL	SG	3	
W	KTX	N2830.8288	W08047.9681	29-JAN-07	03:38:08	+0012		1.609306e+04	SPACE CENTER EXECUTIVE	TITUSVILLE	FL	K7	0	
W	MYAT	N2644.9995	W07724.0033	29-JAN-07	03:38:08	+0003		5.609306e+02	TREASURE CAY	ABACO I	MY	0		
W	00A	N3348.6770	W08407.1640	27-AUG-93	03:38:08	+0502		1.609306e+02	STONE MOUNTAIN BRITT MEML	STONE MOUNTAIN	GA	K7	0	
W	OIC	N3850.4371	W09444.2094	27-AUG-93	03:38:08	-9999		3.609306e+02	JOHNSON CO	OLATHE	KS	K3	3	
W	RIS	N3907.2256	W09435.7948	27-AUG-93	03:38:08	-9999		2.609306e+03	RIVERSIDE	KANSAS CITY	MO	K3	3	
W	TOP	N3908.2246	W09532.9475	27-AUG-93	03:38:08	-9999			TOPEKA	TOPEKA	KS	K3	3	

SAMPLE ROUTE FILE

R	IDNT	LATITUDE	LONGITUDE	DATE	TIME	ALT	DESCRIPTION	PROXIMITY	NAME	CITY	STATE	CC	CLASS	waypts
R	01							0.000006e+00				CC	CLASS	waypts
H	HOME	N3851.3190	W09445.4221	26-AUG-93	20:02:52	-9999	MYHOUSE	0.000006e+00	TOPEKA	TOPEKA	KS	K3	3	
W	TOP	N3908.2246	W09532.9475	27-AUG-93	03:38:08	-9999		0.000006e+00	ATKINSON MUN	PITTSBURG	KS	K3	0	
W	KPTS	N3726.8552	W09443.8698	27-AUG-93	03:38:08	+0250		0.000006e+00	RIVERSIDE	KANSAS CITY	MO	K3	3	
W	RIS	N3907.2256	W09435.7948	27-AUG-93	03:38:08	-9999		0.000006e+00	JOHNSON CO	OLATHE	KS	K3	3	
W	OIC	N3850.4371	W09444.2094	27-AUG-93	03:38:08	-9999								
R	02							0.000006e+00				CC	CLASS	waypts
H	HOME	N3851.3190	W09445.4221	26-AUG-93	20:02:52	-9999	MYHOUSE	0.000006e+00	NEWBERG	NEWBERG	OR	K1	3	
W	UBG	N4521.1967	W12238.6926	29-JAN-07	03:38:08	-9999		0.000006e+00			LA	K4	0	
W	ALBUQ	N3509.2008	W10635.3220	26-AUG-93	20:08:00	-9999	ALBUQUERQUE NEW MEXICO	0.000006e+00	MARKSVILLE MUN	MARKSVILLE	LA	K4	0	
W	LA26	N3105.6845	W09204.1423	29-JAN-07	03:38:08	+0024		5.609306e+02	STONE MOUNTAIN BRITT MEML	STONE MOUNTAIN	GA	K7	0	
W	00A	N3348.6770	W08407.1640	27-AUG-93	03:38:08	+0502		8.046506e+02	SPACE CENTER EXECUTIVE	TITUSVILLE	FL	K7	0	
W	KTX	N2830.8288	W08047.9681	29-JAN-07	03:38:08	+0012		1.609306e+04	TREASURE CAY	ABACO I	MY	0		
W	MYAT	N2644.9995	W07724.0033	29-JAN-07	03:38:08	+0003								

NOTES: CC=country code; CLASS=0 (airport), 1 (intersector), 2 (NDB), 3 (VOR), or 4 (user waypoint)

CHAPTER 11

PC150

This chapter describes the differences between the PC150 software kit and the PCX5 and the PCX5AVD software kits. The additional features provided with the PC150 kit are the Schedule Editor and the Checklist Editor. Both are used to quickly and easily edit information and exchange it with the GPS 150.

11.1 SETUP AND INSTALLATION

The diskette files contained in the PC150 are slightly different and contain the following differences from the PCX5AVD:

PC150.COM	PC150 main program (instead of PCX5AVD)
SAMPLE.CHK	Sample checklist file containing several standard items
SAMPLE.SCH	Sample schedule file containing several standard items

The PC150 program is invoked using the **PC150** command in the same format (i.e. with the same command line switches) as the PCX5AVD. (See Section 3.1)

11.1.1 CHECKLIST EDITOR (EDIT MENU)

The Checklist Editor is used to create checklists for certain procedures used before, during or after flight. These could include pre-flight, starting engines, takeoff, landing, etc. Up to nine checklists of 30 items each may be created and stored in the GPS 150.

To use the Checklist Editor, select it from the Edit Menu and choose a file to use or type a name for a new file with the .CHK extension. After selecting the file to use, the editor will be displayed. The left column is the Checklist Name (Pre-Flight, etc.). The right column is the Checklist Procedure (Check Wings, etc.). To begin editing a new file, first select "ADD" and type the name of the new checklist in the top box on the left. Next, add procedures for each checklist on the right. You may add all of the Checklist Names first, then add each procedure, or edit names and procedures together.

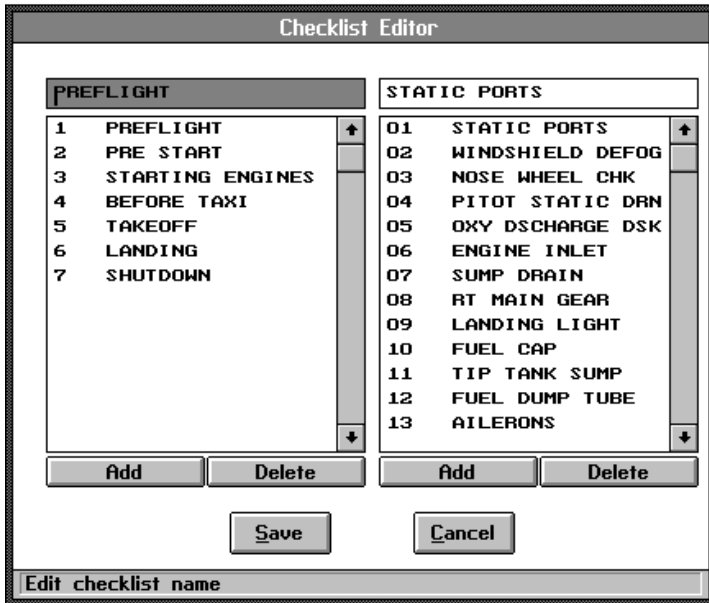


Figure 11-1: CHECKLIST EDITOR

11.1.2 SCHEDULE EDITOR (EDIT MENU)

The Schedule Editor provides reminders to the pilot while in flight. (These may include Check Fuel, Switch Tanks, etc.) Up to nine scheduled messages can be input to the GPS 150 at one time.

NOTE: Scheduled messages can be made specific to an individual flight and can then be stored on computer for later recall. This is handy if you fly several different, but repetitive flights. To enter scheduled messages, begin by selecting "Schedule Edit..." from the EDIT menu. Next, select an existing file or create a new one by simply typing the name with the .SCH extension.

To begin a new message file, select "Add" to add a new message, then type the message name. After entering the message time, press TAB or use the mouse to select the time field to the right of the message title field. This field is used to enter the time the scheduled message will be displayed. The format used is HH:MM (hours:minutes). Up to 99 hours and 59 minutes can be entered. (Seconds are not used.) The time elapsed is counted when the GPS 150 is powered on. See your GPS 150 Pilot's Guide for more information. The time elapsed is started from when the information is uploaded, and runs until it is either re-uploaded or re-programmed on the unit, regardless of how many times the unit is used.

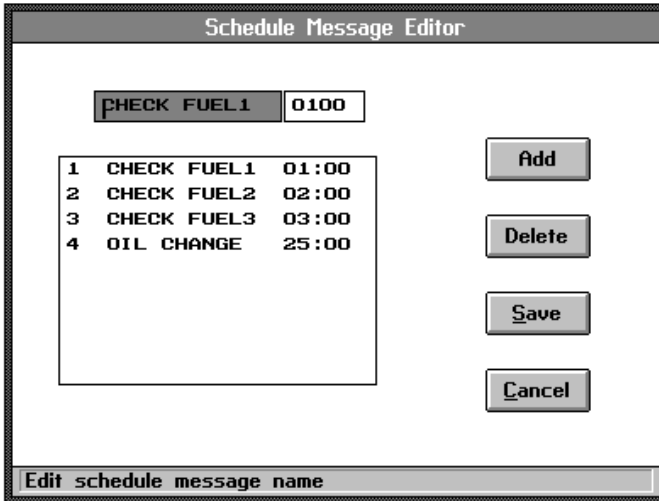


Figure 11-2: SCHEDULE EDITOR

It is important to remember when uploading new schedule or checklist information that the new items will replace the old items.

The following settings are used on the GPS 150 :

For normal PC kit interfacing (waypoint transfer, etc.)

Channel 2 : IN: Off
 OUT: Off 9600 baud

For real time plotting/logging or NMEA communication

Channel 2: IN: Off
 OUT: Plotting 4800 baud

These are covered in the GPS 150 Pilot's Guide.

11.2 ADDITIONAL FEATURES

The default configuration file for the PC150 PC-Kit is PC150.CFG

SAMPLE CHECKLIST FILE

H SOFTWARE NAME & VERSION

I PC150 2.03

C 0 PREFLIGHT

C STATIC PORTS

C WINDSHIELD DEFOG

C NOSE WHEEL CHK

C PITOT STATIC DRN

C OXY DSCHARGE DSK

C ENGINE INLET

C SUMP DRAIN

C 1 PRE START

C BRAKE SET

C OXYGEN CHECK

C SWITCHES OFF

C 2 STARTING ENGINES

C FUEL COMPUTER ON

C STARTER SW START

C SPR BELOW 0 DEG

SAMPLE SCHEDULE FILE

H SOFTWARE NAME & VERSION

I PC150 2.03

S 0 CHECK FUEL1 01:00

S 1 CHECK FUEL2 02:00

S 2 CHECK FUEL3 03:00

CHAPTER 12

CONNECTING THE GPS UNIT TO A COMPUTER

The PC Interface Cable supplied with this package allows you to connect your GPS unit to the serial port of a PC-compatible computer. This cable includes the proper connector to attach the cable to your unit and to a 9-pin D-Sub (DB9) connector at the computer's serial port. Computers with 25-pin D-Sub (DB25) serial port connectors will require an adaptor available at most computer supply stores.

Some PC Interface Cables also includes a round 7-pin power connector which may be used to power some models during data transfer operations (downloading, uploading and real time plotting/logging). This connector is compatible with the various GARMIN AC and 12V cigarette lighter adapters. Providing external power is not required (or available on all units), however, and data transfer can be done using the unit's main source of power.

These items may be purchased from your dealer or you may contact GARMIN directly to obtain these items.

Remember, when downloading/uploading data, the GPS unit should be set to "GARMIN" input/output. When performing real time plotting/logging operations, the GPS unit should be set to "NMEA 0183" output. Refer to the interface setup instructions in the owner's manual for your GPS unit.

APPENDIX A

GLOSSARY

Almanac data - A data file which indicates the orbital paths and status of all known satellites. Almanac data is transmitted by all operational GPS satellites and is stored in your GPS receiver.

ASCII file - A text file that follows the American Standard Code for Information Interchange. These files may be readily viewed/edited using a word processor program or a DOS text editor.

DXF format - Drawing Interchange Format. An ASCII file format used by various graphic and CAD programs (e.g. AutoSketch®). Each ASCII line in a DXF file describes an object within the overall drawing.

EMS - Expanded Memory System. Memory added to your computer above, and beyond, conventional memory (usually on an expanded memory board). The expanded memory board, and supporting expanded memory manager, should conform to the LIM (Lotus/Intel/Microsoft) version 3.2 specification.

HDOP - Horizontal Dilution of Precision. HDOP is an indicator of the quality of a horizontal position (latitude and longitude) based on satellite geometry (or, position of the satellites with respect to each other). A low HDOP value indicates better position accuracy.

PDOP - Position Dilution of Precision. PDOP is an indicator of the quality of a horizontal and vertical position (latitude, longitude and altitude) based on satellite geometry. A low PDOP value indicates better position accuracy.

Track log - This file contains a list of position data samples (each sample having a unique time assigned to it) which indicates where you have been. Track log files are created/stored in your GPS unit and downloaded to the PC.

UTM/UPS - Universal Transverse Mercator / Universal Polar Stereographic. UTM/UPS is a popular coordinate system used in survey and mapping applications. UTM/UPS relies on grid zone designations, easting/northing distances and provides one meter resolution.

YUMA format - An ASCII file format used to define the orbital parameters for each operational GPS satellite. YUMA format is used by a variety of satellite tracking programs.

APPENDIX B

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