THALES NAVIGATION

Receiver Communication Software

User's Guide

THALES

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Introduction

Overview

Receiver Communications Software™ (RCS) is a set of user-friendly utilities that make it easy to set up, communicate with, and transfer data between the receivers and equipment listed in Table 1.1. RCS runs under Windows 95, Windows 98, and Windows NT 4.0. RCS may work with receivers from other manufacturers, but compatibility is not assured.

Table 1.1: Equipment Supported by RCS

Equipment
ASHTECH RECEIVERS
Z-Surveyor - 12-channel dual-frequency GPS receiver
Z-12 - 12-channel dual-frequency GPS receiver
Z-12 with RTK
GG24 (GG Surveyor) - 24-channel GPS+GLONASS receiver for difficult reception environments
SCA-12 - 12-channel single-frequency GPS receiver
OTHER EQUIPMENT
Husky FS/2 and FS/3 handheld controller
Psion Workabout handheld controller
Pacific Crest RFM96 Series - UHF radio for data link communication
Ashtech SSRadio - UHF radio for data link communication

RCS Applications

RCS includes the following applications:

Commander

Commander lets you quickly and easily configure a receiver for a variety of surveying applications. Using a standard Windows interface, you can select serial port commands, set the required parameters, and send the commands to a receiver. **Commander** replaces **Remote**™ for local receiver control. Commander stores frequently-used receiver setup

configurations for easy recall. Commander includes features to upgrade receiver firmware and adds receiver options, and interact between several programs and the GPS receiver through the same COM port.

Download

Use **Download** to manage files on the receiver and transfer GPS data from a receiver via the COM port or modem to your PC hard drive. Because the receiver stores data in a compressed format, **Download** automatically converts the data for future use. The batch allows you to download more than one file at a time.

Handheld Transfer

Handheld Transfer transfers files between a handheld controller (either the FS/2, FS/3, or Workabout) and a PC.

Radio Setup

Use **Radio Setup** to set the parameters in the data link radio (Ashtech SSRadio or Pacific Crest 96 Series)

RINEX Converter

RINEX Converter converts RINEX files to Ashtech format and Ashtech files to RINEX format. The batch mode allows multiple files to be converted with one command.

Frequently Asked Questions

Table 1.2 lists some common and frequently used operations you can perform with RCS.

Table 1.2: Common RCS Operations

How do I....	Refer to	Page
Connect a PC to a GPS receiver?	Connecting to a receiver	14
Configure a radio modem for use in real-time survey applications	Remote connect	20
Configure a GPS receiver?	Setting up	35
Read the configuration of a receiver	Load parameters	39
Update firmware/options in a GPS receiver?	Upload	39
Download data from GPS receiver to PC for post-processing?	Download	41

Table 1.2: Common RCS Operations

How do I....	Refer to	Page
Transfer files between handheld controller and PC?	Handheld Transfer	45
Convert a RINEX file to Ashtech format or Ashtech to RINEX?	RINEX Converter	55

Installation

1. Start Windows. Close all active applications
2. Insert the RCS Disk 1 into your floppy drive.
3. Click the **Start** button, and select **Run**.
4. Type A:\setup and click **OK**.

   If the floppy drive is not A, use the appropriate letter in its place.
5. Follow the on-screen instructions.

   Be sure to read the License Agreement; by installing RCS, you agree to the terms in the License Agreement.
6. You must restart your computer before using RCS for the first time.

Using On-line Help

Any time you want to access the on-line help while using **RCS**, select **Help Topics** from the **Help** menu. The on-line Help system is more thorough than this manual, and is context sensitive.

The on-line Help system is a point-and-click reference tool, with information about each entry field, dialog box, or listbox on each of the windows in **RCS**. It also has brief explanations about common procedures.

To see reference information on any screen, press [**F1**]. Many screens have a **Help** button that directly opens the on-line Help system.

Commander

Overview

Commander™ provides a quick and easy way to save and recall script files, and retrieve the receiver status.

Receiver commands are organized by function, by survey application, and also by name. Ready-to-use survey applications let you easily set up your receiver for common post-processed or real-time surveys. **Commander** makes it unnecessary to type cryptic serial port commands.

You can save a series of parameters into a script file and recall the file so that multiple receivers can be configured identically. These scripts are compatible with the *Survey Control Software Suite*, to configure receivers in the field with various Husky and Psion handheld controllers.

The **Terminal** window displays the dialog between **Commander** and the receiver. If you wish, you can manually send Set ($PASHS) and Query ($PASHQ) commands from the **Terminal** window.

Commander can log standard NMEA messages as well as binary raw data messages from the receiver into a log file for later analysis.

Commander supports PC COM ports 1 through 4 at baud rates of up to 115,200. The checksums of received messages are automatically verified and automatically appended to outgoing commands, ensuring the highest confidence in serial port communications.

Starting Commander

Before using Commander, make sure that the receiver is turned on and connected to a serial port on your computer.

To start **Commander**, select the **Commander** icon  in the **Receiver Communication** menu in the **Programs** menu of the **Start** menu.

Connecting to a Receiver

Commander provides two methods to connect to a receiver:

1. Auto-connection at start-up
2. Custom configuration from main menu

Auto-Connection at StartUp

After starting **Commander**, the **StartUp** dialog box opens, Figure 2.1.

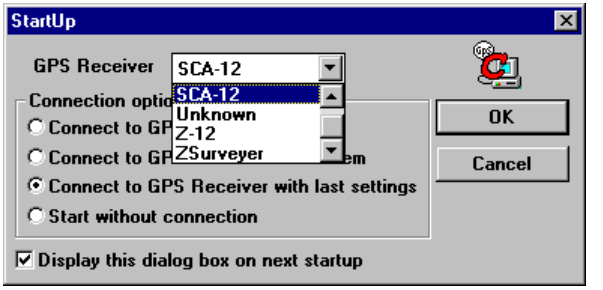

Figure 2.1: StartUp Dialog Box

Use the **StartUp** dialog to connect to a receiver with the same communication parameters as the last connection, set communication parameters and connect, or just start **Commander** without connecting to a receiver. Table 2.1 describes the options in the **StartUp** dialog box.

Table 2.1: Startup Dialog Box Options

Option	Description
Receiver drop down listbox	Select the receiver type by clicking the arrow and selecting a receiver from the list presented. Only the Z-Surveyor receiver is available in Version 1.0.
Display this dialog box on next startup checkbox	A check in this box indicates that the **Commander Startup Menu** dialog box opens when **Commander** starts.
Connection Options	
Connect to GPS Receiver	Click this radio button to connect to the specified receiver. The **Communications** window opens to set communication parameters and connect to the receiver.

Table 2.1: Startup Dialog Box Options (continued)

Option	Description
Connect to GPS Receiver with last settings	Click this radio button to connect to the selected receiver with the communication parameters used in the previous **Commander** session.
Start without connection	Click this radio button to start **Commander** without connecting to a receiver. Later in the session, you can connect to the specified receiver. Use this option to setup and save receiver parameters and later load them to a receiver, or to create and save a script file to use with a portable computer when programming receivers.

1. Click the arrow to the right of the GPS Receiver drop down listbox, and select the receiver from the list presented.

   The list includes the most common receivers (GG24, SCA-12, Z-12, Z-Surveyor), and a category **Unknown**. Use **Unknown** to configure other receivers not listed, and possibly some receivers from other manufacturers, although this function is not assured.

   After selecting a receiver from this list, **Commander** displays only the commands applicable for that receiver.
2. Select the connection option, and click **OK**.
3. **Commander** connects to the receiver and the **Commander** main window opens.

Connecting to a Receiver From the Main Window

From the **Commander** main window, you can connect to a receiver via the **Connect** menu.

The **Connect** menu has two connection options: **Direct Connect** and **Remote Connect**.

Direct Connect

Use Direct Connect if your receiver is attached via a serial port to your PC.

1. After selecting **Direct Connect**, the **Direct Connection** dialog box (Figure 2.2) opens.

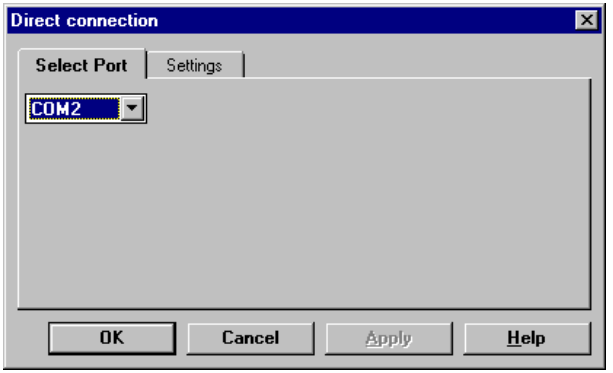

Figure 2.2: Direct Connection Dialog Box - Select Port Tab

2. In **Select Port** tab, select the COM port the receiver is attached.
3. Click the **Settings** tab to switch to the **Settings** tab (Figure 2.3) and set the communication parameter options listed in Table 2.2.

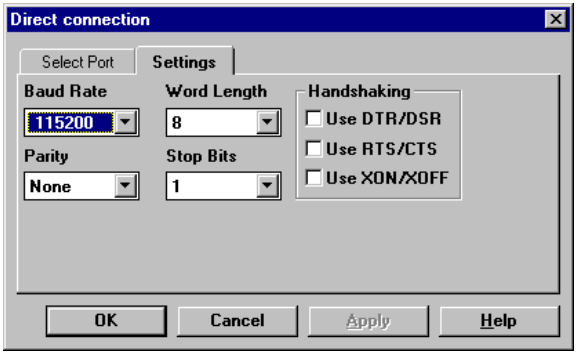

Figure 2.3: Direct Connection Dialog Box - Settings Tab

Table 2.2: Communication Parameter Options

Parameter	Options
Baud rate	2400 4800 9600 19200 38400 57600 115200 Default is 38400.
Word length	5, 6, 7, or 8 bits. Default is 8.
Parity	Even, none, mark, space. Default is none.
Stop bit	1 or 2 bits. Default is 1.
Use DTR/DSR (Data Terminal Ready/Data Set Ready)	Standard RS-232 protocol. “Use” means that the serial interface uses this line in the serial connection to the receiver. Default is **Off**.
Use RTS/CTS (Ready To Send/Clear To Send)	Standard RS-232 protocol. “Use” means that the serial interface uses this line in the serial connection to the receiver. Default is **Off**.
Use XON/XOFF Software handshake	Standard RS-232 protocol. “Use” means that the serial interface uses this line in the serial connection to the receiver. Default is **Off**.

4. Select the parameters you want to use, and click **OK**.

   The **Terminal** window opens displaying the $PASH set and query commands while **Commander** attempts to connect to the receiver.

5. Connects to the receiver, and a dialog box opens indicating the connection is complete. Click **OK**.
6. The **Terminal** window closes automatically.

Remote Connect

Remote Connect lets you connect your computer to a receiver out in the field via modem. In order to do this, your computer must be connected to the modem as specified in the applicable modem manual.

1. Select **Remote Connect** from the **Connect** menu.

The Remote Connection dialog box opens (Figure 2.4).

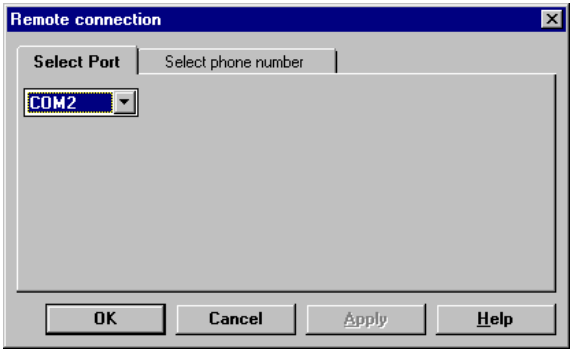

Figure 2.4: Remote Connection Dialog Box - Select Port Tab

2. In the **Select Port** tab, select the COM port the modem is attached.
3. Switch to the **Select Phone Number** tab (Figure 2.5).

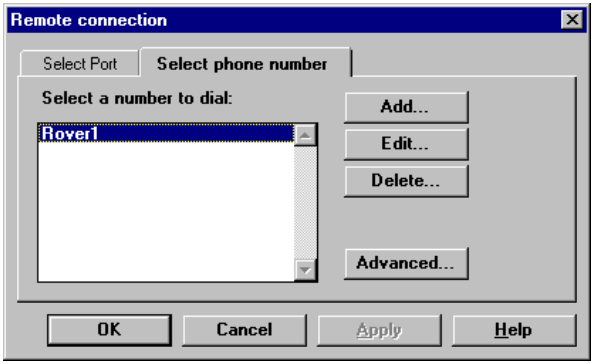

Figure 2.5: Remote Connection Dialog Box - Select Phone Number Tab

Table 2.3 describes the components in this dialog box.

Table 2.3: Components of the Select Phone Number Tab

Component	Description
Select a number to dial	This panel displays all numbers that have been added.
Add button	Use this button open the **Dial Entry Settings** dialog box.

Table 2.3: Components of the Select Phone Number Tab

Component	Description
Edit button	Use this button to edit dialing numbers and comments.
Delete button	Use this button to delete a highlighted dialing number and/or a comment in the list of dialing numbers.
Advanced button	Use this button to open the **Advanced Modem Settings** dialog box.

4. Select a number to dial.

   See “Entering a New Phone Number” on page 11 for more information on adding a telephone number to the **Select a number to dial** list.

5. Set any Advanced modem features as required.

   See “Setting Advanced Modem Features” on page 13 for more information on setting advanced modem features.

6. Click OK to close the **Remote Connection** dialog box. The **Terminal** window opens displaying the connection $PASH set and query commands while Commander dials and attempts to connect to the receiver.
7. Commander connects to the receiver, and a dialog box opens indicating the connection is complete. Click **OK**.
8. The dialog box and **Terminal** window close.

Entering a New Phone Number

Use the **Dial Entry Settings** dialog box (Figure 2.6) to enter or edit a dial string (dialing number) with descriptive comments and select full-duplex (simultaneous send and receive) or half-duplex (send only) operation for the modem.

1. From the **Select Phone Number** tab in the **Remote Connection** dialog box, click the **Add** button to open the **Dial Entry Settings** dialog box (Figure 2.6).

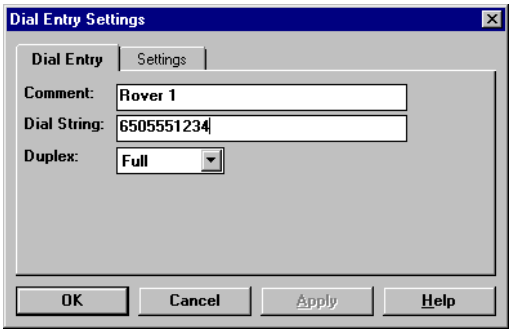

Figure 2.6: Dial Entry Settings Dialog Box - Dial Entry Tab

2. Enter a phrase to remember the receiver number in the **Comments** field such as Rover 1 or Park1Base.
3. Enter the number for the receiver in the **Dial String** field.
4. Select Duplex type as applicable to your modem.
5. Switch to the **Settings** tab (Figure 2.7).

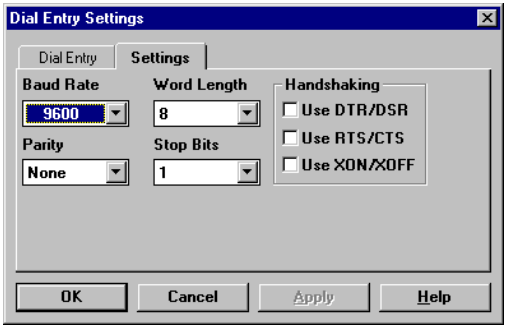

Figure 2.7: Settings Dialog Box - Settings Tab

6. The default settings in the **Settings** tab are set to work for most modems, but if you have reason to use different values, select the appropriate settings, then click **OK** to save the settings close the **Dial Entry Settings** dialog box.

7. The **Select a number to dial** listbox contains the number you entered. After selecting a number, **Commander** sends the number to the modem.

Setting Advanced Modem Features

Use the **Advanced Modem Settings** dialog box (Figure 2.8) to view or change the less common modem settings. The default setting are designed to work with most modems. However, you can use this dialogbox to fine-tune modem settings to fit any particular or unique requirements of your application. The **Advanced Modem Settings** dialog box has three tabs:

Modem Tab, Figure 2.8 and Table 2.4

Work Mode Tab, Figure 2.9 and Table 2.5

Modem Mode Tab, Figure 2.10 and Table 2.6

- You can switch between tabs by clicking a different tab name.
- The **OK** button accepts all changes to every tab and closes the **Advanced Modem Settings** dialog box.
- The **Apply** button accepts changes made to the active tab, but does not close the **Options** dialog box.
- The **Cancel** button closes the **Advanced Modem Settings** dialog box, disregarding any changes. If **Cancel** is clicked after clicking **Apply**, the changes made before clicking **Apply** are not affected.

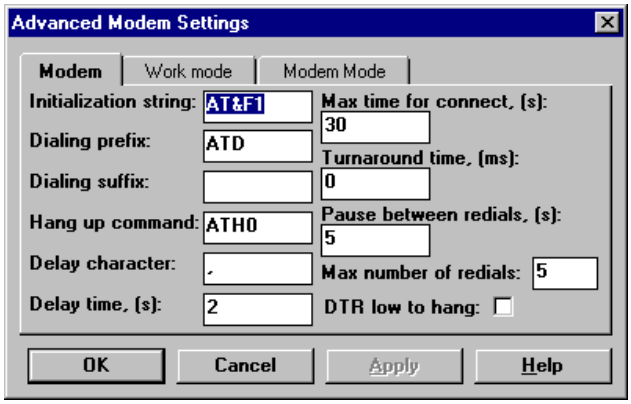

Figure 2.8: Advanced Modem Settings Dialog Box - Modem Tab

Table 2.4: Advanced Modem Settings - Modem Tab

Parameter	Description
Initialization string	Command which initializes the modem. Structure depends on the particular modem.
Dialing prefix	Set the prefix that may be required before the actual number is dialed.
Dialing suffix	Set the suffix that may be required after the actual number is dialed.
Hang up command	Abort the access to the telephone line.
Delay character	Define a delay character. This character, when inserted into a string, introduces a delay defined by the delay time parameter.
Delay time	The time that the modem waits for a delay character (seconds).
Max time for connect	Maximum time (seconds) that the modem waits for a connection.
Turnaround time	Delay from receiving message to transmitting response (seconds).
Pause between redials	Waiting time between redials (seconds).
Max number of redials	Maximum number of redials
DTR low to hang	Option to set DTR line low when modem hangs up.

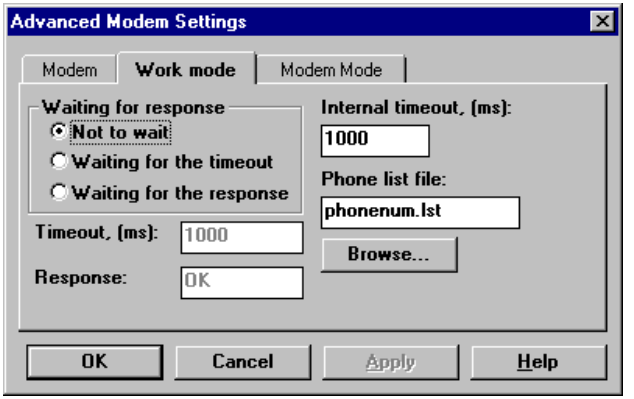

Figure 2.9: Advanced Modem Settings Dialog Box - Work Mode Tab

Table 2.5: Advanced Modem Settings Dialog Box - Work Mode Tab

Parameter	Description
Not to wait	Click this radio button to not wait for a response from the modem.
Waiting for the timeout	Click this radio button to set the modem to wait for timeout. Inactive if **Not to wait** is active.

Table 2.5: Advanced Modem Settings Dialog Box - Work Mode Tab (continued)

Parameter	Description
Waiting for the response	Click this radio button to set the modem to wait for response. Inactive if **Not to wait** is active.
Internal timeout, (ms)	Internal timeout interval.
Phone list file	The name the file which contains the numbers.
Browse...	Standard Windows file navigation to find and select a phone list file.
Timeout, (ms)	The time the modem waits for a response.
Response	OK indicates response has been received.

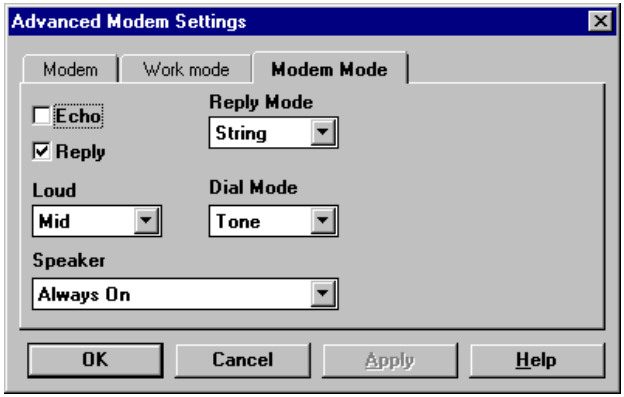

Figure 2.10: Advanced Modem Settings Dialog Box - Modem Mode Tab

Table 2.6: Advanced Modem Settings Dialog Box - Modem Mode Tab

Parameter	Description
Echo	Check this box to display the communication traffic between the modem and receiver on the computer screen.
Reply Mode	Check this box to set the modem to reply by string or bytes.
Reply	Check this box to turn on reply mode.
Speaker	Set the internal PC speaker to On During Dial, Always On, On Before Answer
Dial mode	Select pulse or tone mode of dialing.
Loud	Set speaker volume. Range is Min, Mid, Max. Active only if the **Reply** box is checked.

Using the Options Dialog Box

The **Options** dialog box sets the following **Commander** parameters: Log File, Send, Checksums, and displaying the **StartUp** menu.

To open the **Options** dialog box, select **Options** from the **Settings** menu. The **Options** dialog box has four tabs: **Log File**, **Send**, **Check**, and **Misc** (Figure 2.11).

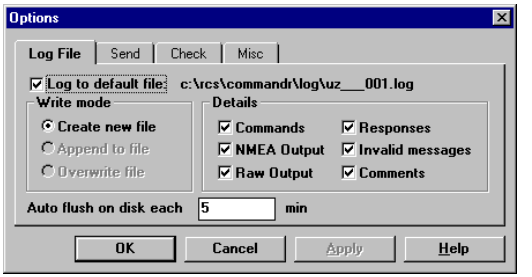

Figure 2.11: Options Dialog Box - Log File Tab

- You can switch between tabs by clicking a different tab name.
- The **OK** button accepts all changes to every tab and closes the **Options** dialog box.
- The **Apply** button accepts changes made to the active tab, but does not close the **Options** dialog box.
- The **Cancel** button closes the **Options** dialog box, disregarding any changes. If **Cancel** is clicked after clicking **Apply**, the changes made before clicking **Apply** are not affected.

Log File Tab

The **Log File** tab (Figure 2.11) is used to set the log file parameters. Table 2.7 defines the options in the **Log File** tab.

Table 2.7: Log File Tab Options

Option	Description
Log to Default File	Uncheck this box to write to the log file of your choice and not the default. **Commander** prompts for a file name after initiating the Log command.
Auto Flush	Enter time interval that the log information is saved to disk. Default is 5 minutes.
Write Mode	

Table 2.7: Log File Tab Options (continued)

Option	Description
Create New File	Check this radio button to write receiver output to a new file.
Append to File	Check this radio button to write receiver output to the end of the open file.
Overwrite File	Check this radio button to write receiver output into the open file removing the previous contents.
Details	
Commands	Check this box to write the sent commands to the log file.
NMEA Output	Check this box to write the NMEA output messages to the log file.
Raw Output	Check this box to write the Raw data output messages to the log file.
Responses	Check this box to write the command response messages to the log file.
Invalid Messages	Check this box to write the invalid command response messages to the log file.
Comments	Check this box to write the comment messages to the log file.

By default, the **Log File** tab parameters are set to not log to the default file, log to a new file each time, and to include all commands and response messages in the response file.

Send Tab

Use the **Send** tab (Figure 2.12) to set if you want Commander to wait for a response message before sending another command to the receiver. The parameters set in this

tab apply to only commands sent from the **Survey Application** windows, and is useful for monitoring progress when sending many commands at once.

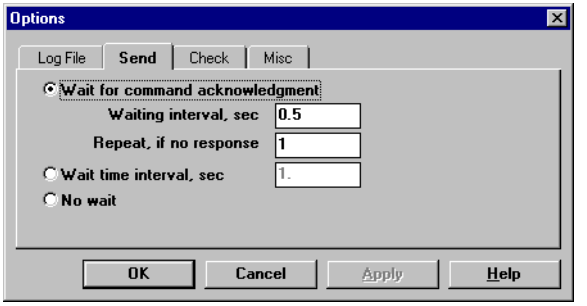

Figure 2.12: Options Dialog Box Send Tab

The **Send** tab has three options, outlined in Table 2.8, along with suggested uses. By default, **Commander** sets a wait time interval of 0.5 seconds to repeat once if a response message is not received within the wait interval.

Table 2.8: Options Dialog Box Send Tab Options

Option	Effect	Suggested Uses
Wait for command acknowledgment	Set the wait interval and number of times you wish to send the command again if **Commander** does not receive a response message in the wait interval.	Use this option when you wish to review the response messages for each command sent to verify that the command was successfully sent as desired. This option, however, requires the longest wait time when sending multiple commands at once.
Set wait time interval	Sets a wait interval and if **Commander** does not receive a response message before the wait interval has ended, Commander does not resend the command.	Use this option when you wish to review the response messages for each command sent to verify that the command was sent. If a response message is not sent before the wait interval concludes, the terminal window or Log file do not contain the command's response message verifying the command was sent successfully.
No wait	Sets **Commander** to not wait for a response before sending the next command.	Use this option if you wish to send multiple command quickly and you do not wish to view the response messages to confirm the command was sent successfully.

Check Tab

Use the **Check** tab (Figure 2.13) if you wish to view and verify the checksum messages on sent commands, received response messages, and parameters of response messages in the **Terminal** window. **Commander** automatically adds checksums to sent commands. This is a display feature in the **Terminal** window only. These options are useful for troubleshooting commands and responses functioning improperly.

Figure 2.13: Options Dialog Box Check Tab

The **Check** tab has three options outlined in Table 2.9. By default, **Commander** verifies the checksums and parameters on received messages

Table 2.9: Options Dialog Box Check Tab

Option	Description
Append Checksum on commands sent to receiver	Adds a checksum to the end of all commands.
Verify checksum on message received	Checks the checksum in the response message. If the checksum is invalid, the response message turns red in the **Terminal** window panes.
Verify parameters on message received	Check the response message parameters against set permissible ranges. If the response parameters fall outside of the ranges, the response message turns red in the **Terminal** window panes.

Misc Tab

The **Misc** tab (Figure 2.14) is used to set the **StartUp** dialog box display.

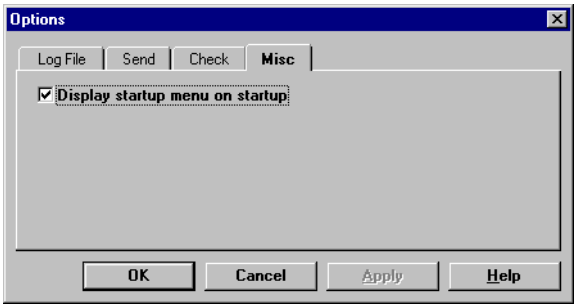

Figure 2.14: Options Dialog Box Misc. Tab

A check in the **Display StartUp dialog box on startup** indicates that the **StartUp** dialog box opens when **Commander** starts.

No check in the **Display StartUp** dialog box on startup indicates that **Commander** uses the Connection options set in the **StartUp** dialog box when starting and does not open the **StartUp** dialog box.

Disconnecting From a Receiver

Commander automatically disconnects from the receiver when closed however, you can disconnect from a receiver without terminating **Commander**. To disconnect from a receiver without terminating **Commander**:

1. Select **Disconnect** from the **Connect** menu.
2. **Commander** disconnects from the receiver.

Getting Around in Commander

Once **Commander** is connected to the receiver, you can use it to send command parameters to the receiver, or to load the receiver parameters into **Commander** for

viewing and editing. Figure 2.15 presents an overview of the commands menu structure.

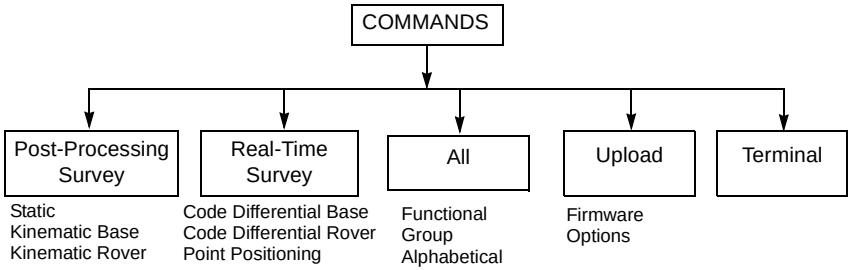

Figure 2.15: Commands Menu Structure

You can send commands to a receiver using either of two methods:

- Use the **Commands** menu to select commands or edit the parameters. The sequence of commands sent from the **Commands** menu is called a **script**. A **script** can be saved to a file for later use.
- Select **Terminal** from the **Commands** menu, and then use the **Terminal** window to send commands directly to the receiver and view the response messages.

The **Load** function loads the receiver parameters into **Commander**.

The **Log** function writes all receiver communications and response messages to a file. You can customize which types of communications and response messages to save by using the **Log File** tab of the **Options** dialog box.

You can also select the delay between sending commands and the verification of checksums in the **Options** dialog box. These features are useful for verifying the successful sending of commands, and for troubleshooting commands and responses that are functioning improperly.

The **Status Bar** at the bottom of the window describes selected menu items and provides information on ranges to enter when the cursor is placed in a range field in any descriptive parameter tab window. To hide the status bar, select **Status Bar** from the **View** menu to uncheck **Status Bar**.

Setting Up a Receiver

Commander has tab windows, called **Static Application** windows (Figure 2.16) listing descriptions of the receiver commands, making it unnecessary for you to type cryptic serial port commands.

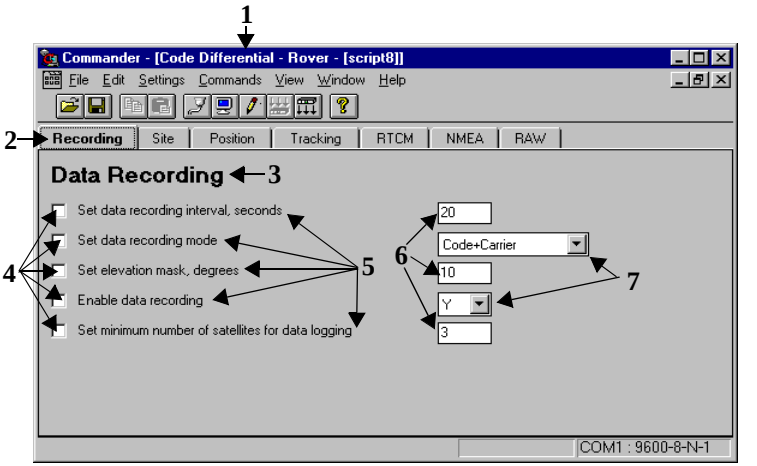

Figure 2.16: Typical Survey Application Window

Table 2.10 outlines the different elements numbered in Figure 2.16.

Table 2.10: Elements of a Survey Application Window

Element Number	Description
1	Survey application name.
2	Functional group or tab name. Click on the name to switch the tab.
3	Description of functional group.
4	Command check boxes. Check the box to send the command.
5	Description of command.
6	Parameter range field. Enter a range. Status bar lists the permissible ranges when the cursor is placed in a range field.
7	Parameter range drop-down list box. Click in field or on arrow, and select a value from the list presented. Status bar lists all values when you click in the field.

Each window contains a number of functional tabs with different commands. You can switch between tabs by single-clicking a different tab name.

Following is the basic procedure for setting a receiver up for a survey.

1. Select the survey application type, **All**, or **Setup** from the **Commands** menu.
2. Set the commands as needed for each functional tab.
3. Send the commands.
4. Save the script, if desired for later use.

To set receiver parameters:

1. Select the survey application from the **Commands** menu.

   For example, if you are planning a Code Differential survey, select **Code Differential-Rover** from the **Real Time Survey** submenu in the **Commands** menu to set the parameters for the rover receivers in the survey.

   See “Survey Applications” on page 26 for more information on Commander’s survey applications.

2. A **Survey Application** window opens corresponding to the survey option you choose with the **Recording** tab active (Figure 2.17).

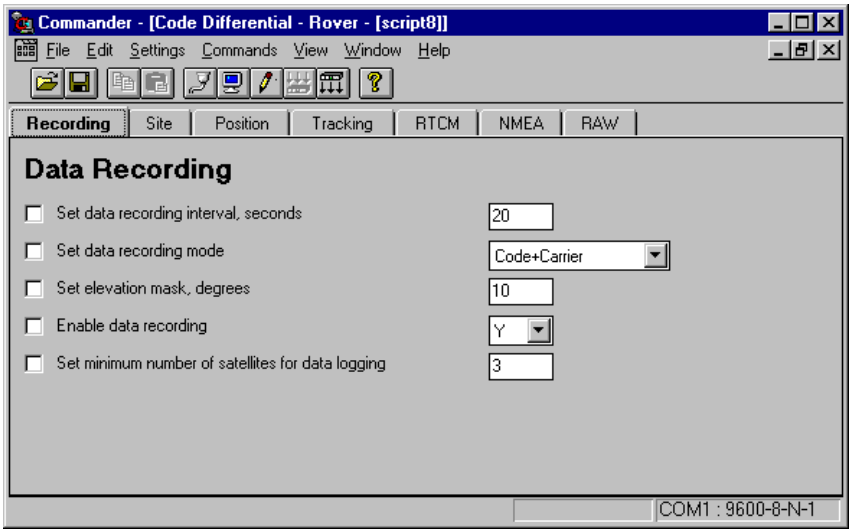

Figure 2.17: Recording Tab

3. Select parameters to set by checking the box to the left of the parameter.

See your receiver manual for more information about the receiver parameters and commands.

4. Place the cursor in the range field and type in or select the appropriate range.

The Status Bar displays the parameter ranges when the cursor is placed in the range field for a parameter.

To select every parameter in each functional tab, select Select All from the Edit menu. Change the ranges for each parameter to correspond to your needs.

5. Select a different functional group to set by clicking a different tab name at the top of the **Survey Application** window.
6. Select and set the parameters.
7. Continue selecting and setting parameters in each tab until complete.

Some descriptive parameters may conflict. The last parameter sent to the receiver overrides previously sent parameters.

8. After setting all needed parameters for the receiver, select **Send Parameters** from the **Commands** menu or press the **Send** button to send the parameters to the receiver.

   Commander sends the receiver commands corresponding to the parameters you selected and sent to the receiver. Depending upon the number of parameters and the baud rate, this procedure may take several minutes. The **Terminal** window, Figure 2.18, displays the receiver commands and response messages as they are sent to the receiver.

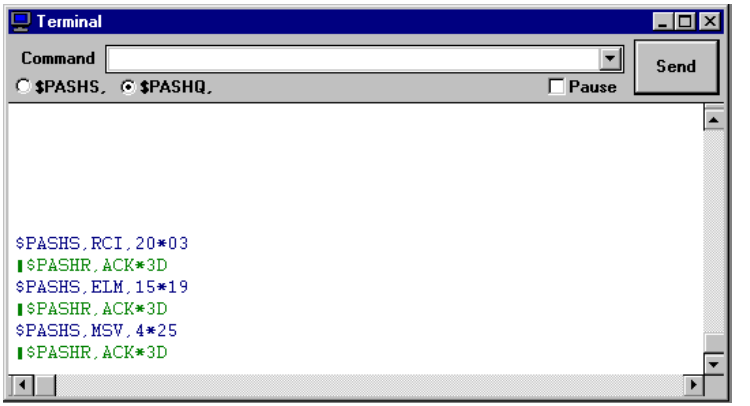

Figure 2.18: Terminal Window with Command and Response Messages

Upon completion, a dialog box appears indicating that the parameters were sent to the receiver, as shown in Figure 2.19.

Figure 2.19: Commander Dialog Box

9. Click **OK**. The dialog box closes.

Saving Parameter Script Files

You can save receiver parameters to a script file which can be opened at a later date to configure receivers identically for a given application, or loaded to a Husky, Psion, or other portable computer and used with the *Survey Control Software* to configure receivers.

This is a useful feature if you are programming several rover receivers for a survey and you want them configured the same, or if you use the same set of receivers for more than one survey application and want the receivers configured identically each time they return to the survey application.

Commander automatically prompts you about saving the current parameter settings as a script file any time you close a **Survey Application** window, select a different survey application, disconnect from a receiver, or quit **Commander**.

To save receiver parameters as a script file:

1. Select and set all receiver parameters as described in “Setting Up a Receiver” on page 22.
2. Click the **Save** button  or select **Save** or **Save As** from the **File** menu.

   The **File Save As** dialog box opens if the receiver parameters have not been saved as a script, or if you selected **Save As** from the **File** menu. Enter a file name, select a destination, and click **OK**.
3. If the receiver parameters have been saved as a script, **Commander** saves any additional changes to the script file.

Opening an Existing Script File

Saved script files can be opened for editing or used to configure receivers.

To open a script file:

1. Click the **Open** button  or select **Open** from the **File** menu.

   The **File Open** dialog box opens.
2. Select the script file you wish to open, and click **OK**.
3. If a script file is opened and/or unsaved, a dialog asks if you wish to save the changes to the script. Click **Yes**, **No,** or **Cancel**.

   Any opened **Survey Application** windows close, and a **Survey Application** window for the script opens with the parameters from the script file listed.

Loading Receiver Parameters From a Receiver

You can determine a receiver's parameters by loading the parameters from the receiver. This option is only available when a **Survey Application** window is open and active.

The **Load** function does not directly indicate the survey application the receiver was configured for. Loaded receiver parameters display in the active **Survey Application** window, and this survey application window may not necessarily be the survey application the receiver was configured for.

To load configuration parameters from a receiver:

1. Open a **Survey Application** window by selecting an application type, **All**, **Post Process**, or **Real-Time Survey** from the **Commands** menu.
2. Click the **Load** button  or select **Load** from the **Commands** menu.

   The **Status Bar** displays "Loading" indicating that Commander is loading the receiver parameters.

   The process typically takes ten to fifteen seconds. After loading the receiver parameters from the receiver, a dialog indicates the process has finished.
3. Click **OK**.
4. The receiver parameters listed in the **Survey Application** window change to reflect the parameters loaded from the receiver.

Survey Applications

When setting up your receiver, you first need to decide what type of survey to conduct. The **Commands** menu provides several options for setting receiver parameters depending on the type of survey, either post-processing or real-time, as summarized in Table 2.11.

In a post-processing survey, you can select parameters for static, kinematic base, or kinematic rover. In a real-time survey, you can select code differential base, code differential rover, carrier phase base/rover (if your receiver has this capability), or point positioning. For more information on selecting a survey type, see your receiver manual.

Post Process Survey and Real Time Survey are application groups and only allow you to select and set receiver parameters applicable to the specific survey.

ALL lists all available parameters alphabetically or by function.

Alphabetical Listing alphabetizes the $PASH commands and does not contain as much descriptive information as the other options.

This manual only covers accessing the command screens and changing parameters for each application. For more information on receiver commands, see the receiver manual.

Table 2.11: Survey Types

Survey Type	Survey Description	Requirements
Post Processing - Static	Long occupation time on a single survey point.	Base and rover receiver data collected simultaneously and post-processed
Post Processing - Kinematic	Short occupation time of multiple survey points.	Maintain lock on at least four satellites at all times during survey. Base and receiver data collected simultaneously and post-processed.
Real Time - Code Differential	Receiver position is differentially corrected in real-time using RTCM corrections.	Base station is broadcasts corrections via radio link.
Real Time - Carrier Differential	Receiver position is differentially corrected in real-time using CPD corrections.	Base station is broadcasts corrections via radio link.
Real Time - Point Positioning	Long occupation time on single survey point.	Receiver positions are averaged to minimize error.

The receiver parameters are listed by function and described in Table 2.12.

Table 2.12: Receiver Command Functional Groups

Functional Group	Description
Recording	Data recording including: elevation mask, epoch counter, recording interval, switch, and mode
Site	Antenna site information including: antenna altitude, slant, radius, height, latitude, longitude, site identifier, project information.
Position	Position computation including: HDOP mask, PDOP mask, position elevation mask, position mode, VDOP mask, enable/disable use of unhealthy satellite.
Tracking	Satellite tracking including: selection of satellites to track, Z mode switch.
RTCM	Code phase differential including: enabling/disabling auto-differential, RTCM type, setting differential parameters.
CPD	Carrier phase differential including: CPD modes, CPD parameters, multipath, PNAV processing cycle.
NMEA	Real-time data output including: enabling/disabling NMEA messages on each serial port.
RAW	Real-time data output including: enabling/disabling RAW messages on each serial port
Sessions	Session programming including: reference day, offset time, session name, session flag, recording interval, session elevation mask, minimum number of satellites to use.
PPS	Event marker input/1-pulse-per-second output.
Local	Local receiver coordinates and time compared to UTC.
Misc	Miscellaneous commands that do not fit in other functional groups including: modem and daisy chain commands.
Setup	Receiver setup commands including: initialization, save current parameters, port baud rates.

Receiver Setup

The **Receiver Setup** option in the **Commands** menu allows you to set a receiver's basic operating configuration including the baud rate for the serial port, resetting the receiver, and turning off the power (Figure 2.20). For more information on the commands, see the receiver manual.

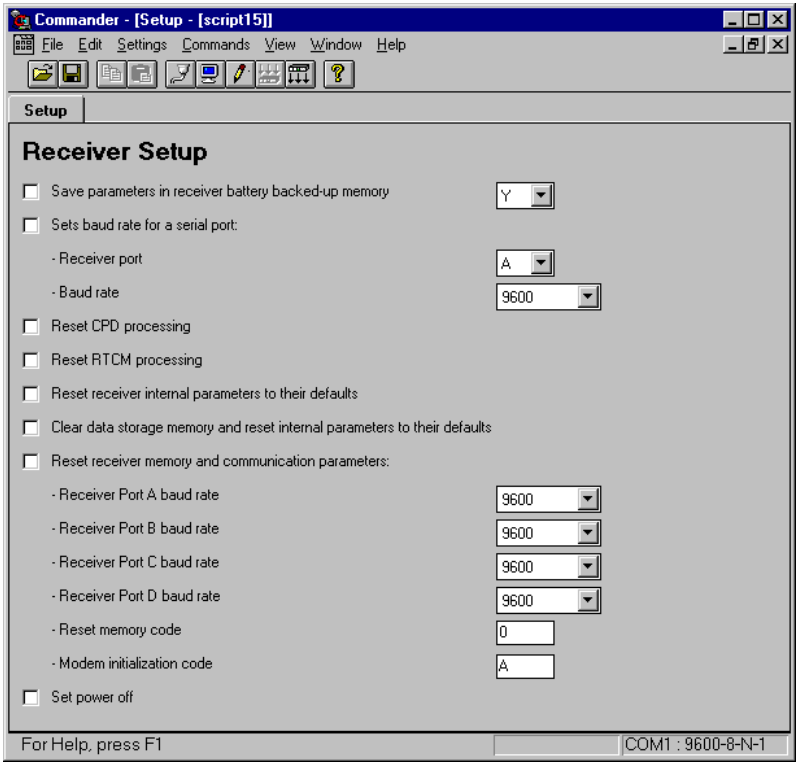

Figure 2.20: Typical Receiver Setup Survey Application Window

Receiver Information

The **Receiver Info** dialog box (Figure 2.21) lists information on the receiver type, firmware and channel version, channel/codeless options, and installed options. The options are indicated by a letter or number; see your receiver manual for information on options. You need this information if you have to discuss a receiver problem with Customer Support.

To open the **Receiver Info** dialog box, select **Receiver Info** from the **View** menu.

Click **Close** to close the **Receiver Info** dialog box.

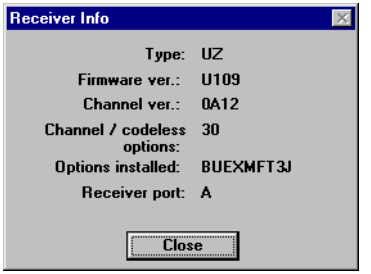

Figure 2.21: Receiver Info Dialog Box

Using the Terminal Window

The **Terminal** function has two primary purposes:

- Display communications between the receiver and computer.
- Send set and query commands to the receiver.

Experienced users can use the **Terminal** window to send commands to the receiver. See the receiver manual for more information on receiver commands and formats.

To open the **Terminal** window, select **Terminal** from the **Commands** menu or click the **Terminal** button  .

Communicating with the Receiver

The **Terminal** window (Figure 2.22) can be used to send set and query commands to the receiver.

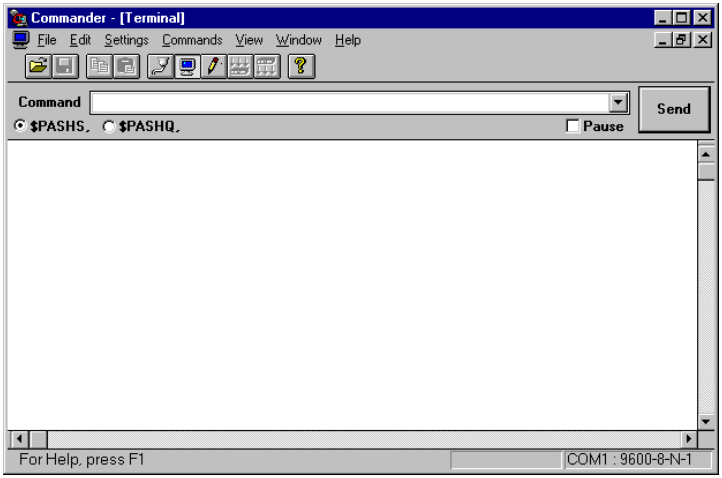

Figure 2.22: Terminal Window

1. Select the **$PASHS** or **$PASHQ** button corresponding to the command you wish to send (e.g. **$PASHQ,** for RID or **$PASHS,** for INI).
2. Type the rest of the receiver command and the parameters in the **Command** field.
3. Click **Send** or press **<Enter>**.
4. If you wish to pause the display to more easily view commands and receiver responses in the panes, click the **Pause** check box.

Pause also makes it possible to select responses to copy to the Windows clipboard.

Command History

The drop down arrow  next to the **Command** field in the **Terminal** window opens a drop-down list box with all commands sent to the receiver in the current session. This includes any commands sent when connecting to the receiver.

The commands are listed in chronological order, however the same command is only listed once. If a command is repeated, it moves to the top of the commands history list.

1. Click the drop down arrow  next to the **Command** field.
2. Select a command from the list presented. The scroll bar enables you to scroll up and down through the list.

   The command appears in the **Command** field.
3. Edit the command or parameters, if necessary.
4. Click **Send** or press **<Enter>**.

Copying and Pasting Commands

Highlighted commands or responses in any pane or in the **Command** field can be copied to the **Clipboard** when the **Pause** check box is checked or if the receiver is disconnected. To copy text, highlight the text, and do one of the following:

- select **Copy** from the **Edit** menu
- click the **Copy** button 
- type **[Ctrl]**+**C**
- select **Copy** from the right mouse pop-up menu.

The contents of the **Clipboard** can be pasted to the **Command** field at any time. To paste text, place the cursor in the **Command** field and do one of the following:

- select **Paste** from the **Edit** menu
- click the **Paste** button 
- type **[Ctrl]**+**V**
- select **Paste** from the right mouse pop-up menu.

Customizing the Terminal Window

The **Terminal** window (Figure 2.23) has four panes which can be customized for your particular needs. For example, to ease viewing receiver communications, you may wish to set one pane to display only NMEA messages, a second pane display

RAW data messages, and a third pane display commands, responses, and invalid messages.

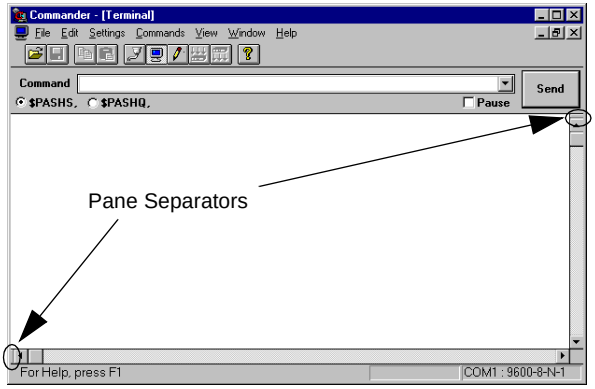

Figure 2.23: Terminal Window

1. Drag the pane separators (Figure 2.23) along the vertical and horizontal scroll bars to size the panes as needed.
2. Click the right mouse button to access the **Terminal** pop-up menu.

   By default, all options are selected to display except **Show Hexadecimal**.

   Table 2.13 outlines the menu options.

Table 2.13: Terminal Pop-Up Menu Options

Option	Description
Copy	Copies the selected text in the **Command** field to the Clipboard. Only available when the **Pause** box is checked, or if the receiver is disconnected.
Paste	Inserts the contents of the Clipboard at the cursor in the **Command** field. Only available when connected to a receiver.
Show Commands	A check mark next to this option shows the commands in the pane. No check mark hides the commands.
Show NMEA Data Message Output	A check mark next to this option shows the NMEA data output messages in the pane. No check mark hides the NMEA data output messages.
Show RAW Data Message Output	A check mark next to this option shows the RAW data output messages in the pane. No check mark hides the RAW data output messages.

Table 2.13: Terminal Pop-Up Menu Options (continued)

Option	Description
Show Responses	A check mark next to this option shows the ACK and NAK response messages in the pane. No check mark hides the response messages.
Show Invalid Messages	A check mark next to this option shows the invalid response messages in the pane. No check mark hides the invalid response messages. An incomplete message or bad checksum is considered “invalid.”
Show Comments	A check mark next to this option shows the comments in the pane. No check mark hides the comments.
Hexadecimal Display	A check mark next to this option shows the response messages in hexadecimal format in the pane. No check mark shows the response messages in ASCII format.

3. Select an option to hide or display in the pane.
4. The **Terminal** pop-up menu closes.
5. Repeat steps 2 and 3 for each additional option you wish to change.

Logging Receiver Messages

The **Log** function allows you to save all receiver commands and response messages to a file. This feature is useful if you want to record NMEA or RAW messages from the receiver for further analysis.

The Log function saves the receiver commands and responses messages specified in the Log File Tab of the Options dialog box. These commands and response messages do not necessarily correspond to commands and response messages displayed in the panes of the Terminal window. Commands and response messages displayed in the Terminal window panes are set independently from the Log file.

To log a file:

1. Select **Log** from the **File** menu or click the **Log** button  .
2. If you unchecked the **Log to Default File** box in the **Options** dialog box, the **Log to File** dialog box opens. Select or enter a file name, select a destination, and click **OK**.

   Commander writes all receiver communications corresponding to the **Details** options selected in the **Options** dialog box.

To stop logging receiver communications, select **Log** from the **File** menu so it is unchecked, or click the **Log** button.

Menus and Toolbar

The menu bar lists the menus to access the various functions. **Commander** has seven menus to access the function. Table 2.14 outlines the menus and the associated function.

Table 2.14: Commander Menu System

Menu Item	Description	Shortcut
	FILE	
Open	Opens a script file.	
Close	Closes the current script file.	
Save	Saves the current script file. See “Saving Parameter Script Files” on page 25 for more information.	
Save As	Saves the current script file to a name specified in the Save As dialog box. See “Saving Parameter Script Files” on page 25 for more information.	
Log	Logs the communication messages to a file. Specify the log file name in the **Options** dialog box. See “Logging Receiver Messages” on page 34 for more information.	
1... 2... 3...	List of the most recently opened script files. Selecting one opens the corresponding script file.	
Exit	Quits **Commander**.	
	EDIT	
Copy	Copies the highlighted text to the Windows clipboard. Only available in the **Terminal** window.	[**Ctrl**]+**C** 
Paste	Inserts the contents of the Windows clipboard at the cursor. Only available in the **Terminal** window.	[**Ctrl**]+**V** 
Select All	Check every command listed in each tab of the Survey Application window. Adjust ranges as necessary for each command.	

Table 2.14: Commander Menu System (continued)

Menu Item	Description	Shortcut
Unselect All	Unchecks every command listed in each tab of the Survey Application window.	
SETTINGS		
Direct Connect Remote Connect Disconnect	Opens the **Communications** dialog box to connect to a receiver. See "Starting Commander" on page 5 for more information.	
Options	Opens the **Options** dialog box to set Log File, Send, Check, and Miscellaneous information. See "Using the Options Dialog Box" on page 16 for more information.	
COMMANDS		
Post Processing Survey	Opens descriptive parameters window to set receiver parameters for Static, Kinematic Base, or Kinematic Rover surveys. See "Setting Up a Receiver" on page 22 and "Survey Applications" on page 26 for more information.	
Real Time Survey	Opens descriptive parameters window to set receiver parameters for a Code Differential Base, Code Differential Rover, Carrier Differential Base, Carrier Differential Rover, or Point Positioning survey. See "Setting Up a Receiver" on page 22 and "Survey Applications" on page 26 for more information.	
All	Opens Survey Application window for all parameters by Functional Group or Alphabetical Listing. See "Survey Applications" on page 26 for more information.	
Setup	Opens Receiver Setup parameters window. See"Receiver Setup" on page 28 for more information.	
Upload	Provides capability to load updated firmware and options to receiver.	
Send parameters	Uploads and sets the parameters in the current descriptive parameters window to the receiver. See"Setting Up a Receiver" on page 22 for more information.	[**Ctrl**]+**S** 
Load parameters	Downloads the receiver parameters to the open descriptive parameters window. See "Loading Receiver Parameters From a Receiver" on page 26 for more information.	[**Ctrl**]+**L** 
Show Advanced	Active after a survey type is selected under Post Process or Real Time. Click to turn on or off. If **off**, only the basic script settings are displayed. If **on**, all script settings are displayed.	
Terminal	Opens the **Terminal** window to manually send receiver commands and queries to the receiver. See"Using the Terminal Window" on page 30 for more information.	

Table 2.14: Commander Menu System (continued)

Menu Item	Description	Shortcut
VIEW		
Receiver Info	Opens the **Receiver Info** dialog box listing information describing the receiver and installed options. See “Receiver Information” on page 29 for more information.	
Toolbar	A check mark next to this menu item indicates the Toolbar is visible. No check mark indicates the Tool Bar is hidden.	
Status Bar	A check mark next to this menu item indicates the Status Bar is visible. No check mark indicates the Status Bar is hidden.	
WINDOW		
Cascade	Arrange all open windows so they overlap.	
Tile Horizontally	Arrange all open windows as non-overlapping tiles in a horizontal row.	
Tile Vertically	Arrange all open windows as non-overlapping tiles in a vertical row.	
Arrange Icons	Arranges icons (minimized windows) at the bottom of the window.	
1... 2...	List of open and minimized windows. Selecting one activates and moves the window to the top.	
HELP		
Search for Help On...	Displays a comprehensive index to information contained in the Help system.	
Contents	Opens the on-line Help system.	[**F1**] or 
Tech Support	Displays information on contacting customer support.	
About Commander...	Displays information about **Commander**.	

The **Commander** Toolbar provides easy access to frequently used commands.

- To display the Toolbar, select **Tool Bar** in the **View** menu.

- To choose a command from the Toolbar, click the button.

Table 2.15: Commander Toolbar Buttons

Button	Description
	**Open Button** - Click this button to open an existing setup file. See “Opening an Existing Script File” on page 25 for more information.
	**Save Button** - Click this button to save the current setup parameters to a setup file. See “Saving Parameter Script Files” on page 25 for more information.
	**Copy Button** - Click this button to copy the selected command to the Clipboard. See “Copying and Pasting Commands” on page 32 for more information.
	**Paste Button** - Click this button to paste the contents of the Clipboard at the insertion point. See “Copying and Pasting Commands” on page 32 for more information.
	**Communications Button** - Click this button to connect to a receiver. See “Connecting to a Receiver From the Main Window” on page 7 for more information.
	**Terminal Button** - Click this button to open the Terminal window to send and receive commands to a receiver. See “Using the Terminal Window” on page 30 for more information.
	**Log Button** - Click this button to log the receiver commands and response messages to a file. See “Logging Receiver Messages” on page 34 for more information.
	**Send Button** - Click this button to upload the receiver parameters to the receiver. See “Setting Up a Receiver” on page 22 for more information.
	**Load Button** - Click this button to download the receiver parameters to the open descriptive parameters window. See “Loading Receiver Parameters From a Receiver” on page 26 for more information.
	**Help Button** - Click this button to open the on-line help system.

Uploading Firmware and Options

Overview

The **Upload** utility, within Commander, is used to load updated firmware and new options into your receiver. Table 3.1 lists the file names of the various firmware/options. Firmware updates can be obtained from Customer Support via disk, e-mail, or other means; options must be purchased.

Table 3.1: Firmware and Options Identification

Receiver	Firmware Filename	Options Filename
SCA-12	GTAB.BIN MTAB.BIN INT.BIN	Assigned at time of purchase.
GG-24	24C_????.DAT where ???? is the firmware version, e.g. “GF00”	
Z-12	BIN.DAT BIN_L.DAT NAV.DAT	
Z-Surveyor	MZCODE.BIN	

1. Copy the firmware/option file(s) into a directory of choice in your computer.
2. Make sure your receiver is connected to the PC and is operating, as specified in the Chapter 3, **Commander**.
3. Start **Commander**.
4. Select **Upload** from the **Commands** menu.

5. Click on **Upload**, then click on **Firmware** or **Options**, as applicable. The Select dialog box opens, similar to Figure 3.2.

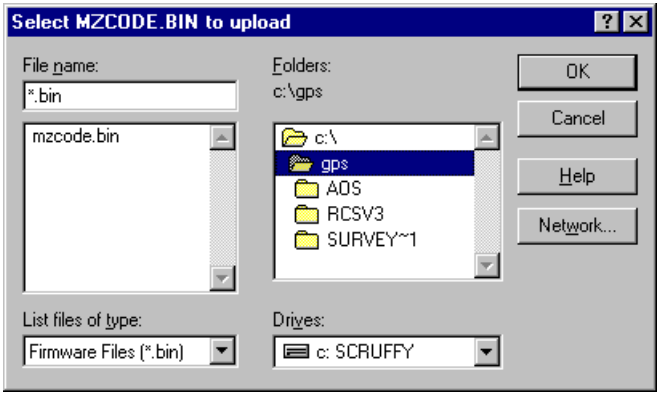

Figure 3.2: Typical File Selection Dialog Box

6. Navigate to and select the firmware/option file(s).
7. Click **OK**.

   Upload loads the firmware/option to your receiver.

CAUTION
1. Make sure the firmware/option file is correct for your receiver. An improper file can corrupt the receiver, making the receiver unusable and requiring return to factory. **2. Make sure there is no possibility of power interruptions when using Upload.**

Download

This chapter describes the tasks necessary to download data from a receiver to a PC. The download procedure depends upon the storage arrangement used in the receiver. In most receivers, the data are stored in the receiver memory; some receivers store data on a PCMCIA card.

Starting Download

Start **Download** by double-clicking the **Download** icon in the **RCS** program group. The **Download** main window opens (Figure 4.1).

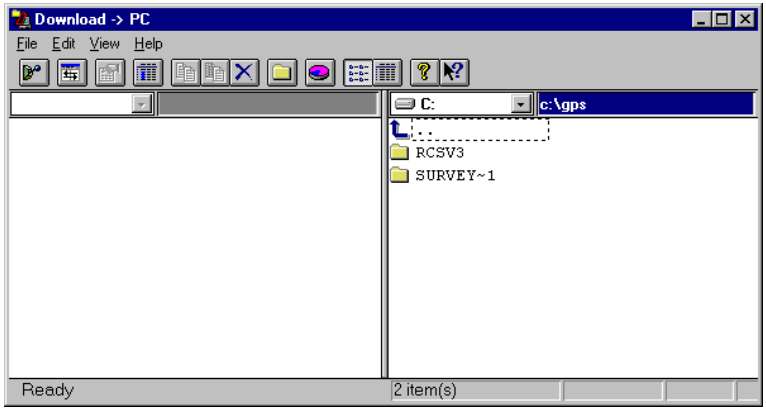

Figure 4.1: Download Main Window

Transferring Data - Overview

You can transfer data directly from the receiver, or from a PCMCIA card removed from the receiver.

Transferring a data set from the receiver to a PC requires two steps:

1. Connect PC to receiver.
2. Download the data set.

Transferring a data set from a PCMCIA card requires three steps:

1. Remove PCMCIA card from receiver and insert card in the PCMCIA drive in your PC.
2. Select PC drive corresponding to PCMCIA card.
3. Download the data set.

Transferring Data Directly from the Receiver

1. Click the Connect button  .

   If you select **Auto Connect** from the **Data Source** menu of the **Connect** menu, RCS queries the receiver serial port, and connects to the receiver using the communications parameters that it finds on the port.

If the receiver outputs NMEA or RAW data messages from the serial port, Download can not connect to the receiver. Switch to a different receiver port or turn off all automatic messages. Commander connects over automatic messages, and the messages are easily turned off. Refer to your receiver manual for more information.

The receiver stops recording data on the receiver memory card and closes the active file when Download connects to the receiver.

2. After successfully connecting to the receiver, the Receiver pane lists the files in the receiver.
3. Before copying or moving, verify that destination directory is active in the PC pane.
4. If you need to create a directory, click on the **New directory** button  .

   A field for the new directory appears in the PC pane. Enter a directory name.
5. If you wish to set or change the session information stored with the data, select **Session on Downloading** from the **Edit** menu.

   If you are using the Z-12, SCA-12, or GG-24 receiver, after copying or moving the files the **Session Information** dialog box opens, and you can change any information as needed.

   If you are using the Z-Surveyor receiver, the Session Information dialog box opens before the files are copied or moved.
6. Select the file(s) that you want to copy or move in the Receiver pane. You can select one, several, or all the files to transfer.

   To select particular files, use the **Control** key. To select a group of contiguous files, use the **Shift** key.

7. To copy files from the receiver, click the **Copy** button  . This does not delete the files from the receiver memory.
8. To move the files to the PC and delete them from the receiver memory, click the **Move** button  .

Transferring Data from PCMCIA Card in a Local Drive

1. Remove the PCMCIA card from the receiver and place it in the PCMCIA drive of your computer.
2. Select **PC Drive** from the **Data Source** menu in the **File** menu.
3. The drive selection menu becomes active in the Receiver pane.
4. Select the PCMCIA drive.
5. The Receiver pane lists all data files stored on the PCMCIA card.
6. Before copying or moving, verify that destination directory is active in the PC pane.
7. If you need to create a directory, click on the **New directory** button  .
   A field for the new directory appears in the PC pane. Enter a directory name.
8. Select the file(s) that you want to copy or move in the Receiver pane. You can select one, several, or all the files to transfer.
   To select particular files, use the **Control** key. To select a group of contiguous files, use the **Shift** key.
9. To copy files from the PCMCIA card, click the **Copy** button  . This does not delete the files from the PCMCIA card.
10. To move the files to the PC and delete them from the PCMCIA card, click the **Move** button  .

Handheld Transfer

Handheld Transfer provides communication between a PC and a handheld controller, to quickly copy, move, and delete files between the handheld and PC. **Handheld Transfer** supports the Husky FS/2 or FS/3 and the Psion WorkAbout handheld controllers.

Before Using Handheld Transfer

Before connecting the handheld to the PC, the handheld must be set to communicate with the PC. If you are using a FS/2 or FS/3, go to "FS/2 or FS/3 Setup" on page 45; if you are using a Workabout, go to "Workabout Setup" on page 46.

FS/2 or FS/3 Setup

1. Connect the FS/2 or FS/3 serial port 1 to a COM port on your PC using the serial data cable.
2. Power on the FS/2 or FS/3 by pressing the red power key W.
3. If the FS/2 or FS/3 displays a DOS prompt **C:\>** prompt go to step 6.

To reboot the FS/2 or FS/3, simultaneously pressing SHIFT+SHIFT+POWER (both shift keys and red power key) and holding for about 2 seconds.

4. If the FS/2 or FS/3 has been recharged, or if a power interruption has occurred (e.g., the batteries were replaced), then the FS/2 or FS/3 power parameters screen may appear, similar to Figure 5.1. If this is the case, change the settings as necessary (continue or stop recharging), and press **ESC** until you get a DOS prompt, and continue with step 6.

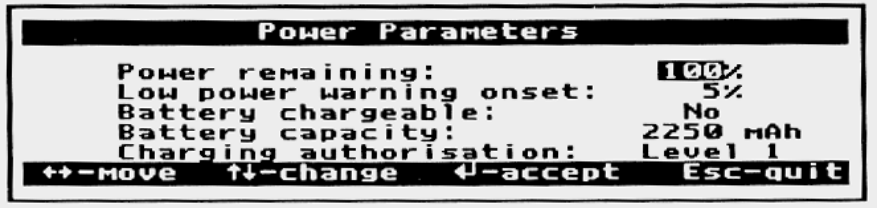

Figure 5.1: FS/2 or FS/3 Power Parameters Screen

See the FS/2 or FS/3 User's Guide for more information on recharging batteries.

5. If the FS/2 or FS/3 was running a program when last powered off, the program resumes when the FS/2 or FS/3 is turned back on. If this is the case, exit the program and go to step 6.
6. The FS/2 or FS/3 should display the DOS prompt **C:\>**. Type HCOM and press the Yes hey to start the File Transfer Utility.

   The File Transfer Utility screen appears indicating that the file transfer program is running, and ready to communicate with the PC.
7. To transfer files, go to "Using Handheld Transfer" on page 46.
8. Press the **Esc** key on the FS/2 or FS/3 to exit the file transfer utility and return to the DOS prompt.

Workabout Setup

1. Connect the Workabout serial port A to a COM port on your PC using the serial data cable.
2. Turn on the Workabout by pressing the **On/Esc** key.
3. Exit any application so that the M. prompt displays.
4. Press the **Menu** key.
5. Use the arrow keys to access the **Special** menu
6. Select **Remote Link** and press the **Enter** key to access the Remote Link screen appears.
7. Use the left or right arrow key to toggle **Remote Link** to **ON**
8. Use the down arrow key to move to the baud rate and select the baud rate with the left or right arrow keys. Baud rates up to 19200 are supported.

   As soon as **Remote link** is ON, the parameters are sent to the PC, and continue until the Workabout is turned off.

The Remote Link screen also allows you to select the port. Always select port A.

   You are now ready to communicate with the Workabout.
9. Press the **On/Esc** key to exit the Remote Link screen.

Using Handheld Transfer

After preparing the handheld to communicate with the PC, you can use Handheld Transfer.

1. Double-click the **Handheld Transfer** icon on the PC. The Handheld Transfer main window opens (Figure 5.2).

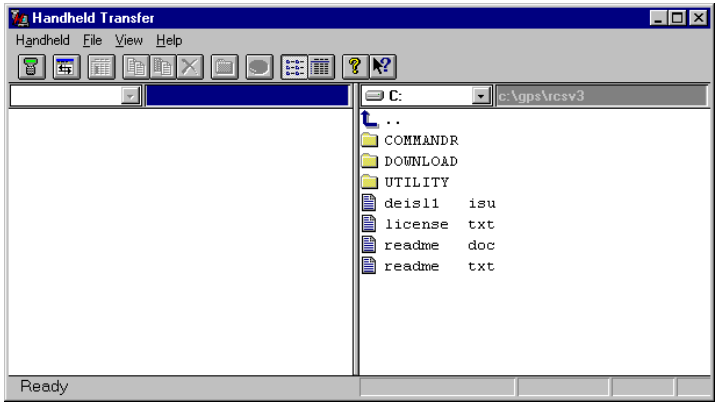

Figure 5.2: Handheld Transfer Main Window

The left half of the display is the Handheld pane, which shows the files in the handheld. The right half of the display is the PC pane, which shows the files, if any, in the indicated directory of the PC. The blue bar along the top edge of the pane shows that the pane is active (in the illustration above, the blue bar indicates the Handheld pane is active).

You use these two panes to transfer files from datalogger (handheld) to PC, or from PC to datalogger. The files may be data collected from a GPS receiver, executable files, templates such as FDF (feature definition) files, or any kind of information that must be transferred between units.

Operation

Switching Between Panes

To switch between panes, use one of the following methods:

1. Click the pane you want to be the current pane.
2. Use the **Tab** key on your keyboard.
3. Click the **Change pane** button on the toolbar.

Connecting a Handheld

Handheld Transfer provides two methods to connect a handheld: **Connect** and **Auto Connect**.

Connect Method

1. Click on **Handheld**. The Handheld menu appears, as shown in Figure 5.3.
2. Choose **Connect** from the **Handheld** menu or click the **Connect** button. The Connect to Handheld dialog box opens, as shown in Figure 5.3.

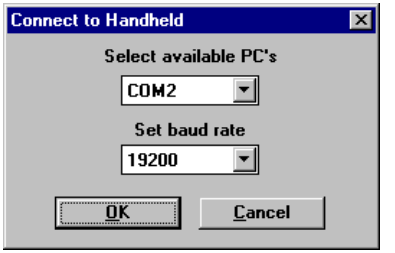

Figure 5.3: Connect to Handheld Dialog Box

3. In the **Select available PC's** box, click the down arrow and select the PC COM port that you want to use.
4. In the **Set baud rate** box, click the down arrow and select a baud rate from the list box.
5. Press **OK**. The Handheld Transfer software now connects your handheld to the PC using the parameters that you selected.

Auto Connect Method

1. Switch to the **Handheld** pane on the PC display.
2. Choose **Auto connect** from the **Handheld** menu.

Once the handheld is connected, Disconnect becomes available in the Handheld menu.

Viewing a List of Files and Directories

You can change the appearance of files and directories using the **Brief** or **Full** bottons on the Toolbar.

- **Brief** displays files and directories as a list

• **Full** displays files and directories with information about size and day of last modified.

Selecting a Drive

Handheld Transfer displays files and directories on the active drives of your computer or handheld. To change the active drive:

1. Click on the arrow to the right of the **Drive** drop down listbox.
2. Select the drive.

   The pane lists all files and directories on the drive.
3. Navigate to a directory on the drive as needed.

The title bar lists the active drive and directory.

Copying and Moving Files

You can use **Handheld Transfer** to transfer a single file or multiple files.

To copy a file do the following:

1. Make sure the destination directory is active.
2. Select the file or multiple files you want to copy. To select more than one file, hold down the **Control** key while selecting files.
3. Select **Copy to** from the **File** menu or press the **Copy to** button  .

You can copy files by using the right-click menu, or by clicking and dragging the files from one pane to the other.

To move a file or multiple files from the handheld current directory to the PC current directory, or vice versa:

1. Make sure the destination directory is active.
2. Select the file or multiple files you want to move. To select more than one file, hold down the **Control** key while selecting files.
3. Select **Move to** from the **File** menu or press the **Move to** button  .
4. Moving files deletes them from

You can copy files by using the right-click menu, or by clicking and dragging the files from one pane to the other.

Radio Setup

To configure your radio, Pacific Crest or Ashtech, select the Utilities icon in the **Receiver Communications** program group to open the Utilities window (Figure 6.1).

Figure 6.1: Utilities Window

The Utilities window has three selections to configuring your radio:

SS-Radio Programming - Use to program SSRadio firmware. Refer to the SSRadio User's Guide for more information.

SS-Radio Setup - Use to configure SSRadio operating parameters Refer to the SSRadio User's Guide for more information.

UHF-VHF Radio Setup - Use to configure Pacific Crest radio.

Pacific Crest UHF/VHF Radio Setup

Use the **Pacific Crest UHF/VHF Radio Setup** application to view and change the settings on Pacific Crest UHF/VHF radios. With this application you can set the frequency

channel, sensitivity, and data link speed (radio to radio) for a receiver with an internal radio, a receiver with an external radio, or a direct pc to radio connection.

Double-click **UHF-VHF Radio Setup** in the Utilities window to start **Pacific Crest UHF/VHF Radio Setup** to the main window opens (Figure 6.2)

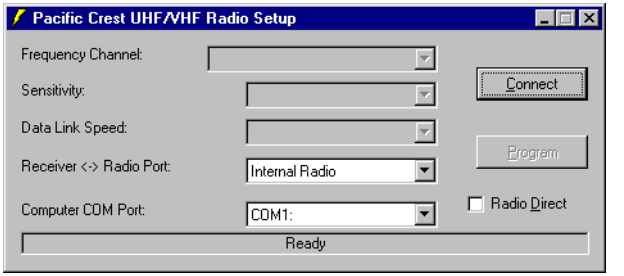

Figure 6.2: UHF-VHF Radio Setup Main Window

The parameters are available to change after connecting to a radio.

Connecting to a Pacific Crest Radio

1. Connect the radio to the PC using the serial data cable. See the radio manual for more information.
2. Click the arrow to the right of the **Receiver <-> Radio Port** field, and select how the radio is connected to the receiver.

   -or-

   If the radio is directly connected to the PC without a receiver, check the **Radio Direct** check box.
3. Click the arrow to the right of the **Computer COM Port** field, and select the COM port on the pc the radio is attached.
4. Click **Connect** to connect to the radio.

   Depending on the make and model of your radio, it may be necessary to cycle the radio power before connecting. If this is the case, a dialog box opens asking you to do this. Click **OK**, and cycle power to the radio within 10 seconds.

5. Upon successfully connecting to the radio, the main window displays the current settings for the radio (Figure 6.3).

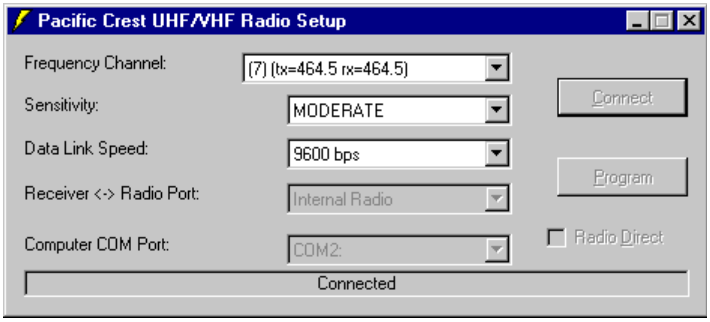

Figure 6.3: UHF-VHF Radio Setup Main Window - Connected

6. Make any necessary changes to the Frequency Channel, Sensitivity and Data Link Speed. The available choices reflect the specifications of the radio.
7. Click Program to save the changes in the radio.
8. Click the Close box to quit the application and break the communication link.

RINEX Converter

RINEX (**R**eceiver **IN**dependent **EX**change) is a standard format for GPS, GLONASS, or GPS+GLONASS data supported throughout the industry.

RINEX Converter provides a means to translate single or multiple RINEX formatted data files from any receiver to Ashtech formatted files, and, alternatively, convert Ashtech data files to RINEX format. *RINEX Converter* supports RINEX format version 2.01.

When *RINEX Converter* converts a RINEX file to Ashtech format, the conversion can produce up to four types of data:

Obs	Observation data
Nav	Navigation data
Nav G	GLONASS navigation data if available
Met	Meteorological data if available

In addition, the observation data is separated into three files:

B-file	GPS measurement data
E-file	Satellite ephemeris data
S-file	Site information, if recorded in receiver at time of observation

Preliminary Operations

Before you perform any conversions, create four directories to avoid confusion.

- **Rinexin** - Create this directory and load your **RINEX** files into it.
- **Rinexout** - Create this directory. Later, you will put your converted RINEX-Ashtech files in this directory.
- **Ashin** - Create this directory and load your **Ashtech** files into it.
- **Ashout** - Create this directory. Later, you will put your converted Ashtech-RINEX files in this directory.

The directory names listed above are suggestions; you can use whatever directory names you prefer.

Starting RINEX Converter

1. Select the **RINEX Converter** in the Utilities window to open the *RINEX Converter* to the **RINEX to Ashtech** tab opens (Figure 7.1).

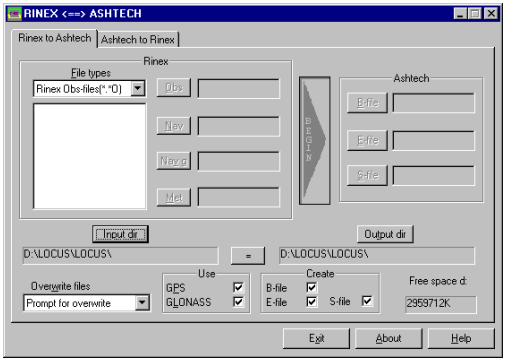

Figure 7.1: RINEX-to-Ashtech Tab

Use the RINEX-to-Ashtech tab to select the files you want to convert to Ashtech format, and define the conversion options. Table 7.2: describes the fields in the **RINEX to Ashtech** tab.

Table 7.2: RINEX to Ashtech Tab Parameters

Item	Description
File types	Lists the file types: RINEX Observation files (*.*O), All files (*.*). RINEX NAV-files*.*N, RINEX Nav g-files*.*G, RINEX Met-files *.*M. To select a file type, click the arrow to the right of the field and select file type from the list presented.
Available files list	Lists the files in the current directory. To select a file, click on the file. To select multiple files, select the first file, hold down the **Ctrl** key, and select additional files.
Obs	Lists the file name of the observation data file corresponding to the selected RINEX data file in the available files list.
Nav	Lists the file name of the GPS navigation data file corresponding to the selected RINEX data file in the available files list.
Navg	Lists the file name of the GLONASS navigation data file corresponding to the selected RINEX data file in the available files list. The field is empty if GLONASS data were not collected.
Met	Lists the file name of the Meteorological data file corresponding to the selected RINEX data file in the available files list. The field is empty if meteorological data were not collected.

Table 7.2: RINEX to Ashtech Tab Parameters (continued)

Item	Description
BEGIN	Click this button to begin converting the RINEX files to Ashtech format.
B-File	Lists the suggested file name for the output B-file (raw measurement data).
E-File	Lists the suggested file name for the output E-file (ephemeris data).
S-File	Lists the suggested file name for the output S-file.(site information). The field is empty if site data were not entered into receiver.
Input dir	Click this button to open the **Set input directory** dialog box.
Set input directory	Lists the directory where the RINEX files are stored.
=	Click this button to set the output directory the same as the input directory.
Output dir	Click this button to open the **Set output directory** dialog box.
Set output directory	Lists the directory where converted data files will be stored.
Overwrite files	Select the overwrite options: Prompt for **Overwrite**, **Always overwrite**, or **Never overwrite**. To select an overwrite option, click the arrow to the right of the field and select an overwrite option from the list presented.
GPS	Check this box if the source data files contain GPS data. This option is set default.
GLONASS	Check this box if the source data files contain GLONASS data. This option is on by default. Do not check unless a GLONASS receiver was used to collect data.
B-File	Check this box to create a B-file (position data) when converting RINEX files.
E-File	Check this box to create a E-file (ephemeris data) when converting RINEX files.
S-File	Check this box to create a S-file (site information) when converting RINEX files. The S-file is created only if site data are included in the RINEX file.
Free Space	Displays the available drive space for the selected output directory.
Exit	Closes *RINEX Converter.*
About	Opens the **About** dialog box which displays the software version number.
Help	Opens the on-line help system.

Converting RINEX to Ashtech Format

RINEX files from any GPS receiver can easily be converted to Ashtech format for post-processing. Verify that the RINEX files are saved to your hard drive before converting them.

If you are converting RINEX files translated from a RINEX converter that does not use the standard RINEX naming format, the observation files may not have the format *.*O. If the files are not listed in the Available Files list, change the File Types to All Files on the RINEX to Ashtech tab and All Files in the Input Directory.

1. In the **RINEX to Ashtech** tab, click **Input di**r to open the **Set Input Directory** dialog box (Figure 7.3).

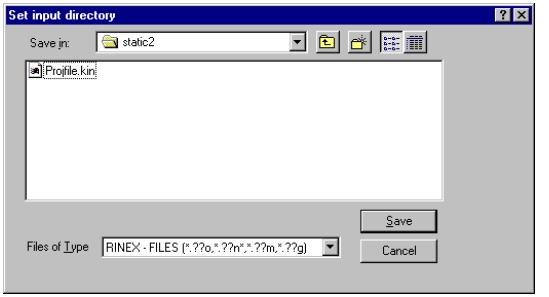

Figure 7.3: Set Input Directory Dialog Box

2. Using standard Windows file navigation procedures, navigate to the directory where the RINEX data files are located and click **Save**.

   The **Set Input Directory** dialog box closes. The **Input Directory** lists the directory path, and the **Available Files** list lists the RINEX files in the input directory (Figure 7.4).

Depending upon the type of file (i.e. Obs or Nav), the **OBS**, **NAV**, **B-File** and **E-File** fields populate with suggested file names. **Nav g**, **Met**, and **S-file** names may also appear if the information is contained in the RINEX file.

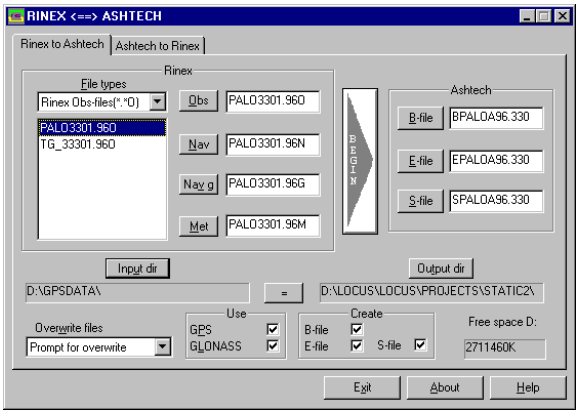

Figure 7.4: RINEX-to-Ashtech Tab with Suggested Output File Names

3. Click **Output dir** to open the **Set Output directory** dialog box (Figure 7.5).

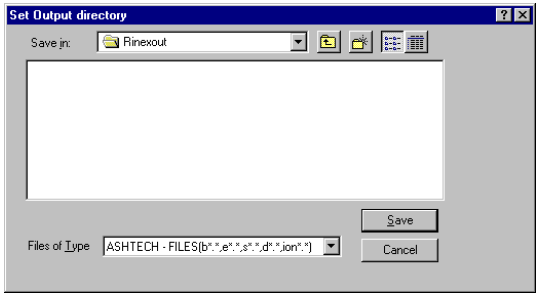

Figure 7.5: Set Output Directory Dialog Box

4. Using standard Windows navigation procedure, navigate to the directory where you want to store the converted files, and click **Save**.

To avoid confusion, save the converted Ashtech files to a directory different than where the RINEX files are located.

The **Set Output Directory** dialog box closes. The **Output Directory** lists the directory path.

To avoid confusion, do not change the suggested file names. To restore the original suggested output file name, double-click the filename in the available files list.

5. Select the **Overwrite files** option by clicking the arrow to the right of the **Overwrite files** list, and selecting an option from the list presented. There are three overwrite options:
   - **Prompt for Overwrite** - (Default setting). If *RINEX Converter* detects that a converted file has the same name as an existing file, meaning the new file overwrites the existing file. A dialog box opens asking if you wish to overwrite the existing file. If you click **NO**, *RINEX Converter* skips the file, and continues to the next file.
   - **Always Overwrite** - This option always writes over existing files with a new file.
   - **Never Overwrite** - This option does not overwrite data for a given file if a file with the same name already exists.

   By default, *RINEX Converter* assumes that the RINEX files use both GPS and GLONASS (Nav g) data, however a **Nav g** file does not display unless a GLONASS receiver was used to collect data.

   By default, *RINEX Converter* creates a B-file (GPS position data), an E-File (satellite ephemeris), and an S-File (site parameters, if recorded) in Ashtech format. If you do not want one or more of these file types created, uncheck the corresponding check boxes. Be aware that the S-file does not create unless the site information is recorded in the receiver file.
6. Click **BEGIN** to convert the selected RINEX files to Ashtech format. The **Conversion status** dialog box opens (Figure 7.6).

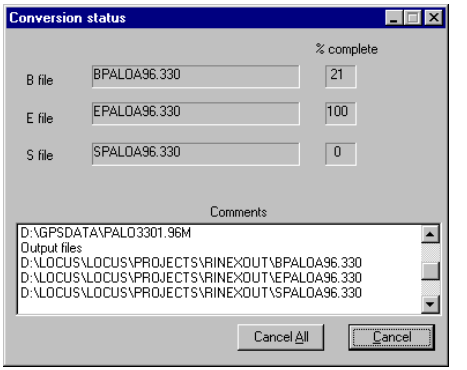

Figure 7.6: Conversion Status Dialog Box

The **Conversion status** dialog box indicates the status of each file as it converts. Upon completion, the display indicates 100% for each file, or 0 if a file was not converted for lack of data, e.g. GLONASS data.

- Click **Cancel** to cancel the conversion to the current file type and proceed to the next file type.
- Click **Cancel All** to cancel the entire conversion.

RINEX Converter creates a *.log file in the directory containing all conversion activity. After restarting, *RINEX converter* overwrites the existing log file. To save the old log file, rename or move the file before restarting RINEX Converter.

The selected RINEX files are now in Ashtech format and can be used with data files from Ashtech receivers for post-processing.

Converting Ashtech Files to RINEX Format

RINEX Converter can convert Ashtech files from any GPS or GPS+GLONASS receiver into RINEX format.

1. Click the **Ashtech to RINEX** tab to switch to the **Ashtech to RINEX** tab (Figure 7.7).

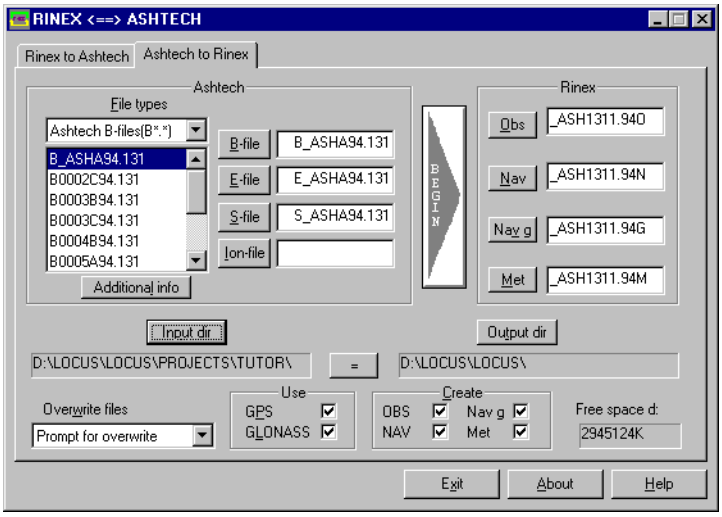

Figure 7.7: Ashtech to RINEX Tab

Table 7.8: describes the fields in the **Ashtech to RINEX** tab.

Table 7.8: Ashtech to RINEX Tab Fields

Item	Description
File Types	Lists the files types: Ashtech B-Files (B*.*), Ashtech E-files (E*.*), Ashtech S-files (S*.*) or All files (*.*). To select a file type, click the arrow to the right of the field and select file type from the list presented.
Available files list	Lists files in current directory. To select a file, click on the file. To select multiple files, select the first file and then hold the **Ctrl** key while selecting additional files.
B-File	Lists the file name of the B-File corresponding to the selected Ashtech data file in the available files list.
E-File	Lists the file name of the E-File corresponding to the selected Ashtech data file in the available files list.
S-File	Lists the file name of the S-File corresponding to the selected Ashtech data file in the available files list.
BEGIN Button	Click this button to begin converting the Ashtech files to RINEX file format.
Obs	Lists the file name for the converted observation data file.
Nav	Lists the file name for the converted navigation data file.
Navg	Lists the file name for the converted GLONASS navigation data file.
Met	Lists the file name for the converted meteorological data file.
Input dir	Click this button to open the **Set input directory** dialog box.
Set input directory	Displays the directory for the source files.
=	Click this button to set the output directory the same as the input directory.
Output dir	Click this button to open the **Set output directory** dialog box.
Set output directory	Displays the directory path for the converted RINEX files.
Overwrite files	Select the overwrite options: Prompt for overwrite, Always overwrite, or Never overwrite. To select an overwrite option, click the arrow to the right of the field and select an overwrite option from the list presented.
GPS	Check this box if the source data files contain GPS data. This option is on by default.

Table 7.8: Ashtech to RINEX Tab Fields (continued)

Item	Description
GLONASS	Check this box if the source data files contain GLONASS data. This option is on by default. Do not check unless a GLONASS receiver was used to collect data.
Obs	Check this box to create an observation file when converting to RINEX.
Nav	Check this box to create a navigation file when converting to RINEX files.
Navg	Check this box to create a GLONASS navigation file when converting to RINEX.
Met	Check this box to create a meteorological file when converting to RINEX. If no meteorological data are available, the Met file is not created.
Free Space	Displays the drive space available for the selected output directory.
Exit	Closes *RINEX Converter*.
About	Opens the **About** dialog box which displays the software version number.
Help	Opens the on-line help system.

2. Click **Input di**r to open the **Set input directory** dialog box (Figure 7.9).

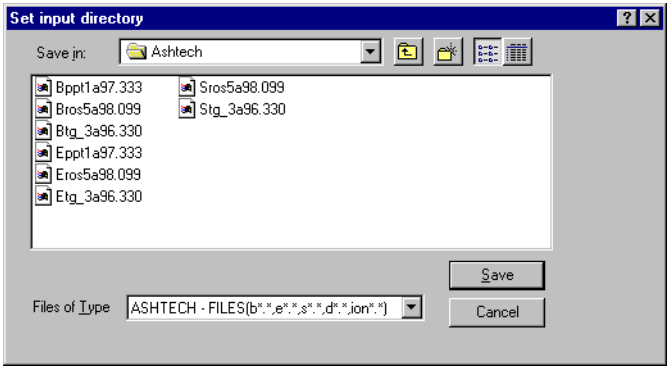

Figure 7.9: Set Input Directory Dialog Box

3. Using standard Windows navigation procedure, navigate to the directory where the Ashtech files you wish to convert are stored.

4. Click **Save** to accept the directory and close the **Set Input Directory** dialog box.

   The **Input Directory** lists the directory path, and **Available Files** lists the Ashtech files in the input directory (Figure 7.10).

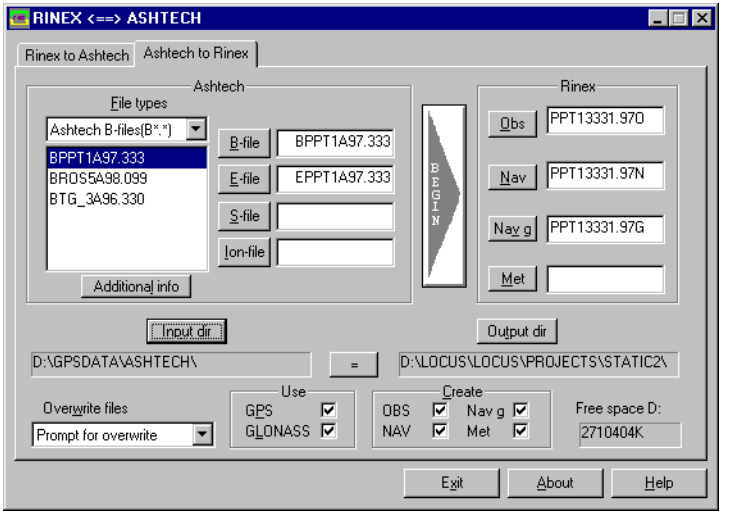

Figure 7.10: Ashtech Files in Selected Ashtech Input Directory

5. Select the file(s) you wish to convert to RINEX in the **Available Files** list.

   You can select multiple files by holding down the **Ctrl** key while selecting files.

   After selecting a file(s) to convert, the **B-File**, **E-File**, **S-File**, **OBS**, **NAV**, **NAVG**, and **MET** fields, as applicable to the data in the file, populate with suggested file names. If you selected multiple files, the file names listed are associated with the last file selected.

To avoid confusion, do not change the file names.

6. Click **Output dir** to open the **Set output directory** dialog box (Figure 7.11).

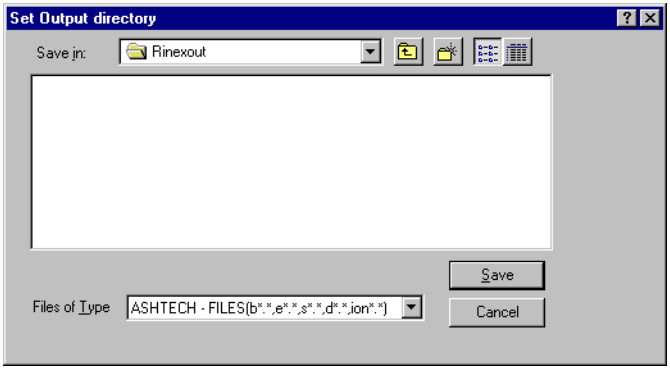

Figure 7.11: Set Output Directory Dialog Box

7. Using standard Windows navigation procedures, navigate to the directory where you want to store the converted files.

To avoid confusion, save the converted Ashtech files to a different directory than where the RINEX files are located.

8. Click **Save** to accept the directory and return to the **Set input directory** dialog box.

   The **Output Directory** field lists the directory path.

9. Click **Additional Info** to open the **Additional info for selected files** dialog box to the **OBS** Tab (Figure 7.12).

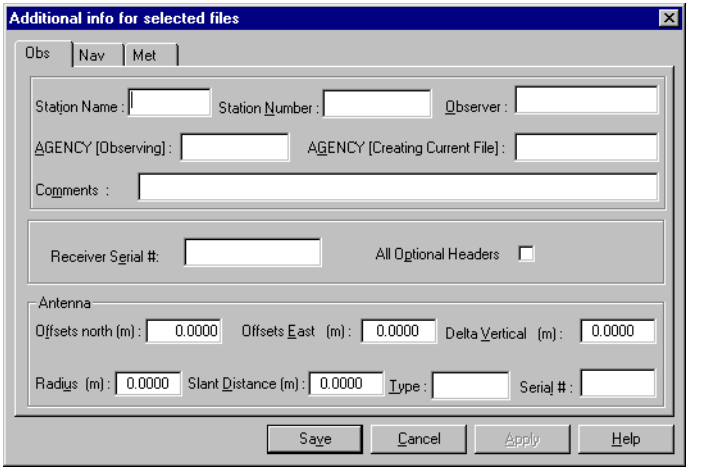

Figure 7.12: Additional Info for Selected Files Dialog Box- OBS Tab

The information listed in these tabs are stored in RINEX files to give you reference information about the data. Although this additional information is optional, it provides a useful reference for future use.

10. Complete the fields in the **OBS** tab. The information entered in the **OBS** dialog is stored in the observation data file. Table 7.13: describes each field.

Table 7.13: Additional Info for Selected Files Dialog Box - OBS Tab

Field	Description
STATION INFORMATION	
Station Name	Name of the survey point or station where data were collected.
Station Number	Number of the survey point or station where data were collected.
Observer	Name or code of the surveyor who collected the data.
AGENCY (Observing)	Name of the company or agency who collected the data.
AGENCY (Creating Current File)	Name of the company or agency who converted the data to RINEX.
Comments	Any comments pertaining to the station, data quality, cover, GPS/ GLONASS, etc. 50-character length limit.

Table 7.13: Additional Info for Selected Files Dialog Box - OBS Tab (continued)

Field	Description
RECEIVER INFORMATION	
Receiver Serial #	Serial number of the receiver that collected the data.
All Optional Headers	Check this box if you want all non-mandatory fields to be filled in the RINEX file header.
ANTENNA INFORMATION	
Offsets north (m)	Horizontal distance, in meters, that the antenna is offset from the marker in the north/south direction. + is north, - is south.
Offsets East (m)	Horizontal distance, in meters, that the antenna is offset from the marker in the east/west direction. + is east, - is west.
Delta Vertical (m)	True vertical distance, in meters, between the bottom of antenna and the marker.
Radius (m)	Radius of the antenna in meters.
Slant Distance (m)	Measured distance, in meters, from the edge of the antenna to the marker. If a value for an antenna are entered, it overwrites the values in the S-file.
Type	Type of antenna used in data collection.
Serial #	Serial number of antenna used for data collection.

11. Click **Apply** to save the changes made to the **OBS** tab.

You can enter information for all three tabs and save all the data using the Save button. The best practice however, is to save the data using the Apply button, for each tab immediately after entering the data in case of a computer or power failure.

The Save button saves the data entered on the active tab only, and closes the Additional info for Selected Files dialog.

12. Click **Nav** to switch to the **Nav** tab (Figure 7.14).

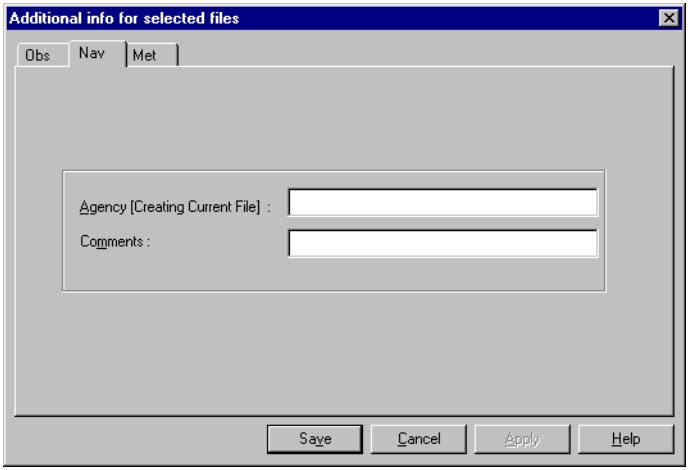

Figure 7.14: Additional Info for Selected Files Dialog Box - NAV Tab

13. Complete the fields in the **NAV** tab. The information entered in the **NAV** dialog is stored in the navigation data file. Table 7.15: describes each field.

Table 7.15: Additional Info for Selected Files Dialog Box - NAV Tab

Field	Description
Agency (Creating Current File)	Name of the company or agency who converted the data to RINEX.
Comments	Any comments pertaining to the station, data quality, cover, GPS/GLONASS, etc. 50-characters maximum.

14. Click **Apply** to save the changes made to the **NAV** tab, and click on the **MET** tab to switch to the **MET** tab (Figure 7.16).

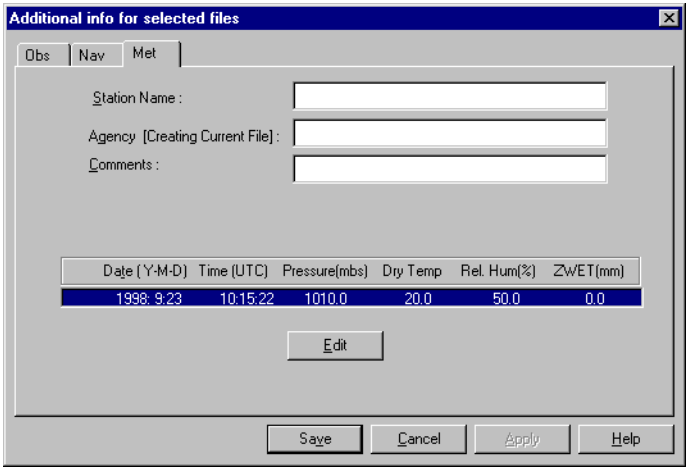

Figure 7.16: Additional Info for Selected Files Dialog Box - MET Tab

15. Complete the fields in the **MET** tab. The information entered in the **MET** dialog is stored in the meteorological data file. Table 7.17: describes each field.

Table 7.17: Additional Info for Selected Files Dialog Box - MET Tab

Field	Description
Station Name	Name of the survey point or station where data were collected.
Agency (Creating Current File)	Name of the company or agency that converted the data to RINEX.
Comments	Any comments pertaining to the station, data quality, cover, GPS/ GLONASS, etc. 50-character limit.
Meteorological Data List	Date and time atmospheric data was collected (atmospheric pressure, temperature, relative humidity, and ZWET (Zenith Wet Tropospheric Delay).
Edit	Click this button to open the **Edit** dialog box and edit the selected meteorological data line.

16. Click **Edit** to open the **Edit** dialog box and inspect or change the meteorological data.

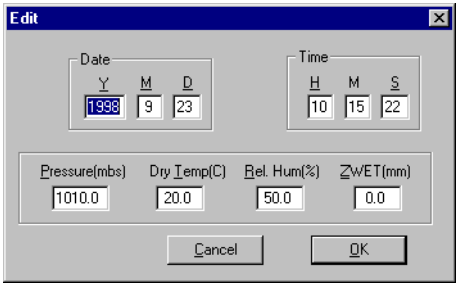

Figure 7.18: Edit Dialog Box

17. Enter the meteorological data, the date and the UTC time that the data was taken, and click **OK**. Table 7.19: describes the fields in the **Edit** dialog box.

Table 7.19: Edit Dialog Box Parameters

Field	Description
Date	The year, month, and date that the data were recorded. D is the day of the month (not Julian day) the data was recorded.
Time	The time the data were recorded. H is the hour of the day the data were recorded in UTC time (24 hour time scale) M is the minute of the hour the data were recorded in UTC time. S is the second of the minute the data were recorded in UTC time
Pressure (mbs)	The recorded barometric pressure of the atmosphere in millibars.
Dry Temp (C)	The recorded temperature of the air not corrected for humidity, in degrees Celsius.
Rel. Hum (%)	The recorded relative humidity of the air in percent.
ZWET (mm)	Zenith Wet Tropospheric Delay—in millimeters (default = 0)

18. Click **OK** to accept the meteorological data and close the **Edit** dialog box.

19. Click **Save** to save the changes made to the **Met** tab and close the **Additional info for selected files** dialog box.
    - The **Apply** button saves any changes made to the active tab, and does not close the **Additional info for selected files** dialog.
    - The **Save** button saves any changes made any tab, and closes the **Additional info for selected files** dialog.
    - Click **Begin** to convert the selected Ashtech files to RINEX format. The **Conversion Status** dialog box opens (Figure 7.20), indicating the status of the conversion process. Upon completion, the dialog indicates 100% for each file. Click **Cancel** to cancel the conversion to the current file type and proceed to the next file type.
    - Click **Cancel All** to cancel the entire conversion.

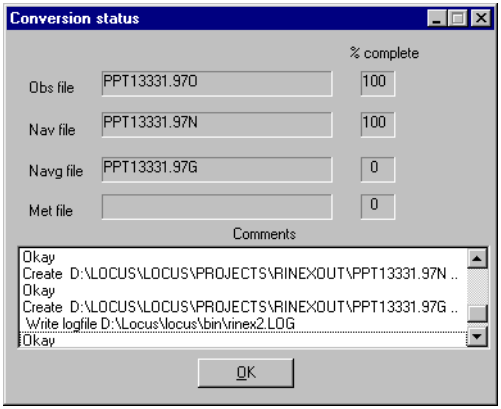

Figure 7.20: Conversion Status Dialog

20. Click **OK**.

    RINEX Converter creates a *.log file in the directory containing all conversion activity. After restarting, *RINEX converter* overwrites the existing log file. To save the old log file, rename or move the file before restarting RINEX Converter.

File Structures

This appendix provides an overview of the various types of files used with the supported receivers, and the naming conventions for these files.

Names Convention

Post-processing packages, such as WinPRISM, Locus, or AOSS require data in a specific format using a specific file naming convention. Figure A.1 outlines the preferred and often required file name convention.

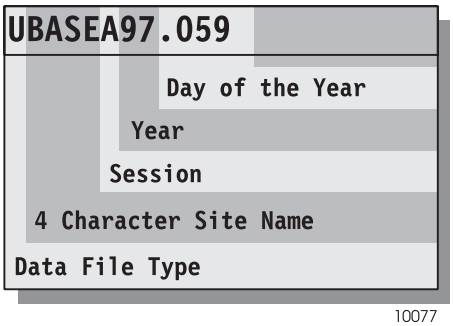

Figure A.1: File Naming Convention

File names must not contain the following characters: spaces, tabs, commas (,), periods (.), equal signs (=), conditionals (< or >), question marks (?), colons (:), semicolons (;), asterisks (*), slashes (/ or \), the DOS pipe (|), quotation marks (“) or square brackets ([or]).

File names may contain the following characters: the letters A through Z, numbers 0 through 9, and the underscore (_). We recommend that file names be limited to these characters.

The following characters may be used in file names, but are not recommended: ‘ ' ~ ! @ # $ % ^ & ( ) { } -.

For example, the file name **BBASEA97.059** indicates:

Table A.1: Explanation of File Name BBASEA97.059

Parameter	Description
B	B-file type (raw GPS data)
BASE	Site identification
A	Session A - first recorded session
97	Year file recorded- 1997
059	Day of the year - day 059 corresponding to February 28

Types

Several types of files are used in conjunction with GPS receivers:

A-File	Almanac data
B- File	GPS measurement data
C-File	Position data
D-File	Descriptor data
E-File	Ephemeris data
M-File	Event marker data
S-File	Site information)

A-File

Raw bit-packed binary almanac data broadcast from each satellite and recorded by the receiver. An almanac file is a list of all the satellites and their orbit parameters. This file can be used for predicting satellite position. Each satellite sends the almanac of every satellite, so if you lock onto one satellite, it indicates where all the other satellites are located.

B-File

Raw data binary file containing carrier phase, code phase, and computed receiver position for every epoch, along with health flags indicating the confidence of the measurements.

C-File

ASCII file containing a chronological listing of time, site, number of satellites, and PDOP for every position. This file contains position information only, not carrier phase information.

D-File

ASCII descriptor file containing feature and attribute data downloaded from the receiver. This file gives time in seconds of week (measured from midnight Saturday).

E-File

Binary ephemeris file downloaded from a receiver. Unlike an almanac file, which gives information on all satellites, an ephemeris file applies only to the satellite which sent ephemeris data. The file is a record of the broadcast message comprising accurate orbit parameters and time corrections for all tracked satellites during the data recording period. This information is used for computing the satellite position. The ephemeris data are deciphered and configured into a readable structure.

M-File

ASCII file containing photogrammetry event marker time tag for each pulse coming through the photogrammetry input.

S-File

ASCII file containing information entered by a field surveyor, including site information, receiver type, receiver version, and receiver channel version information.

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