



GPS+ PRODUCT: Odyssey-E

TOPCON



Odyssey-E

Operator's Manual





Odyssey-E Operator's Manual

Part Number 7010-0507

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Preface

Thank you for purchasing your Topcon receiver. The materials available in this Manual (the “Manual”) have been prepared by Topcon Positioning Systems, Inc. (“TPS”) for owners of Topcon products. It is designed to assist owners with the use of the Odyssey-E receiver and its use is subject to these terms and conditions (the “Terms and Conditions”).



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Regulatory Information

The following sections provide information on this product's compliance with government regulations.

FCC Class B Compliance

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Move the equipment away from the receiver.
- Plug the equipment into an outlet on a circuit different from that to which the receiver is powered.
- Consult the dealer or an experienced radio/television technician for additional suggestions.



CAUTION

Any changes or modifications to the equipment not expressly approved by the

***party responsible for compliance could void
your authority to operate such equipment.***

Canadian Emissions Labeling Requirements

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Manual Conventions

This manual uses the following conventions:

- | | |
|-------------------------|--|
| File->Exit | Click the File menu, then click Exit . |
| Enter | Press the button or key labeled Enter . |
| OR | Alternate procedure for this step. |
| AND | Follow this step, and include this information, enable this function, or change this property. |
| [alt]+[ctrl]+[+] | Press the alt key, ctrl key, and + key in unison. |



Tip

Supplementary information that can help you configure, maintain, or set up a system.



NOTICE

Supplementary information that can have an affect on system operation, system performance, measurements, personal safety.



CAUTION

Notification that an action has the potential to adversely affect system operation, system performance, data integrity, or personal health.



WARNING

Notification that an action *will* result in system damage, loss of data, loss of warranty, or personal injury.



DANGER

UNDER NO CIRCUMSTANCES SHOULD THIS ACTION BE PERFORMED.

[illegible]

Introduction

This chapter describes:

- The Odyssey-E (Figure 1-1)
- Common Odyssey-E features and functions
- Standard package contents
- Getting acquainted with Odyssey-E components
- The Option Authorized File (OAF)



Figure 1-1. Odyssey-E

Overview

The Odyssey-E is a geodetic dual-frequency, dual-system receiver manufactured by Topcon Positioning Systems, Inc. This receiver uses navigational signals from the United States' Global

Positioning System (GPS) and Russia's GLObal Navigation Satellite System (GLONASS) to calculate positions.

The Odyssey-E is a multi-function, multi-purpose receiver intended for precision markets. Precision markets means markets for equipment, subsystems, components and software for surveying, construction, commercial mapping, civil engineering, precision agriculture and land-based construction and agriculture machine control, photogrammetry mapping, hydrographic and any use reasonably related to the foregoing.

Principles of Operation

Surveying with the right GPS receiver can provide users accurate and precise positions, a requirement for any surveying project.

This section gives an overview of GPS and receiver functions to help you understand and apply GPS principles, allowing you to get the most out of your receiver.

GPS Overview

The Global Positioning System (GPS), run by the United States Department of Defense (DoD), is a network of up to 28 satellites orbiting the earth every 12 hours. The Global Navigation Satellite System (GLONASS), is the Russian Federation Ministry of Defense counterpart to GPS. At any one time, with a standard 15 degree angle, up to 10 or 12 GPS satellites are visible from any point on earth. When a receiver can also track GLONASS satellites, between 10 and 16 satellites are visible.

The GPS and GLONASS network has three components:

- Space – GPS and GLONASS satellites orbiting approximately 12,000 nautical miles above Earth and are equipped with a clock and radio. These satellites broadcast digital information (ephemerides, almanacs, time frequency corrections, etc.).

- User – The community and military that use GPS/GLONASS receivers and the corresponding satellites to calculate positions.
- Control – Ground stations located around the Earth that upload data, including clock corrections and new ephemerides (satellite positions as a function of time) to ensure the satellites work properly.

GPS receivers use ephemeris and almanac data to calculate accurate positions, and the positions of your survey points.

Calculating Positions

Once the receiver locks on to a satellite, it starts recording measurements and receiving various digital information (ephemeris, almanac, and so on) the satellites broadcast. To calculate a position, receivers use the following basic formula:

$$\text{Speed of Light} \times \text{Time} = \text{Distance}$$

Where Speed of Light is the data baud rate and Time is the difference between the signal transmission time and signal reception time.

To calculate absolute 3-D positions—latitude, longitude, altitude—the receiver must lock on to four satellites. In a mixed, GPS and GLONASS scenario, receiver's must lock onto at least five satellites to obtain an absolute position.

Using only GPS or only GLONASS, the receiver must lock onto a fifth satellite. Six satellites will provide fault tolerance in mixed scenarios. Usually, the number of GPS and GLONASS satellites in view does not exceed twenty (20).

Once locked on to a satellite, the receiver collects ephemerides and almanacs, saving this information to its NVRAM (Non-Volatile RAM).

- GPS and GLONASS satellites broadcast ephemeris data cyclically, with a period of 30 seconds.
- GPS satellites broadcast almanac data cyclically with a period of 12.5 minutes; GLONASS satellites broadcast almanac data cyclically with a period of 2.5 minutes.

GPS Positioning

Calculating an accurate position requires the following three elements:

- Accuracy – The accuracy of a position depends upon the number, signal integrity, and placement (also known as Dilution of Precision, or DOP) of satellites.
 - Differential GPS (DGPS) strongly mitigates atmospheric and orbit errors, and counteracts anti-spoofing signals the US Department of Defense transmits with GPS signals.
 - The more satellites in view, the stronger the signal, the lower the DOP number, providing more accurate positioning.
- Availability – The availability of satellites affects the calculation of valid positions. The more visible satellites available, the more valid and accurate the position. Natural and man-made objects can block, interrupt, and weaken signals, lowering the number of available satellites.
- Integrity – Fault tolerance allows a position to have greater integrity, increasing accuracy. Several factors combine to provide fault tolerance, including:
 - Receiver Autonomous Integrity Monitoring (RAIM) detects faulty GPS and GLONASS satellites and removes them from the position calculation.
 - Wide Area Augmentation System (WASS) creates and transmits DGPS correction messages.

- Five or more visible satellites for only GPS or only GLONASS; six or more satellites for mixed scenarios.
- Current ephemerides and almanacs.
- Several algorithms to detect and correct faulty information.

Conclusion

Surveyors can use Topcon GPS+ receivers to collect data from a network of satellites and control stations to triangulate precise points anywhere on Earth.

This overview simply outlines the basics of GPS and GLONASS positioning. For more detailed information, visit the TPS website (www.topconps.com/gpstutorial/).

Receiver Overview

When power is turned on and the receiver self-test completes, the receiver's 40 channels initialize and begin tracking visible GPS and GLONASS satellites. Each of the receiver's channels can be used to track C/A-L1, P-L1, or P-L2 signals. The number of channels available allows the receiver to track simultaneously all visible GPS and GLONASS satellites at any time and location. The combination GPS and GLONASS (GPS+) antenna receives the different signals for processing.

An external GPS+ antenna equipped with an optional low noise amplifier (LNA) and the receiver's radio frequency (RF) device are connected with an appropriate coaxial cable. The wide-band signal received is down-converted, filtered, digitized, and assigned to different channels. The receiver processor controls the process of signal tracking.

Once the signal is locked in the channel, it is demodulated and necessary signal parameters (carrier and code phases) are measured. Also, the broadcast navigation data is retrieved from the navigation frame.

After the receiver locks on to four or more satellites, it is possible to solve the so-called “absolute positioning problem” and compute the receiver’s coordinates and time (in WGS-84). All this information is stored in the receiver’s memory, which can be downloaded later onto a PC and processed using a post-processing software package. When the receiver is run in RTK mode, raw data measurements are recorded into the receiver’s internal memory. This allows the operator to double check real-time results obtained in the field.

The Odyssey-E receiver has the following operation modes:

- Stand-alone positioning
- Relative (differential) positioning with two or more receivers running simultaneously and post-processing of collected raw data measurements.
- Code differential (DGPS)
- Real-time kinematic (RTK)

Differential measurements, processed later, can be collected in the following three modes:

- Static
- Stop-and-Go
- Kinematic

In differential mode, one receiver is static, and is referred to as the Reference or Base receiver. The other receiver can be either static or moving, and is called the Rover. The Base and Rover receivers use transmitting and receiving radio modems to communicate with each other and calculate differential corrections in the following formats:

- RTCM
- CMR
- CMR+
- TPS

When used in the field, raw data measurements are recorded in internal memory. Alternatively, raw data measurements can be logged directly to the integrated controller, by-passing the receiver's memory. Also, a raw data stream can be sent from the receiver to a PC. Raw data measurements can be outputted in different third-party and proprietary formats (binary TPS messages, etc.) at rates up to 20 Hz.

Topcon offers five different types of communication boards that can be installed in the receiver:

- Pacific Crest PDL (UHF) modem (450-470 MHz); receiving only.
- Pacific Crest PDL (UHF) modem (430-450 MHz); receiving only.

Topcon provides an optional PDL RF Transmitter (Pacific Crest Corporation). Signal output power is 2 or 35 Watts. The maximum link rate is 19,200 bps. External power supply 9–16 VDC. PDL Base quiescent/receive power consumption is 1.9 W. PDL Base in the low/high RF power setting consumes 13.8 W or 125 W during transmission (PDL Base power consumption measured at 12.5 VDC). The radio coverage of 2-Watt transmitter varies from 1.5 km up to 3.0 km. If there is a clear line of sight between the base and rover, the coverage is increased up to 5–6 km.



NOTICE

Some countries require licensing to use the radio spectrum. National radio regulatory organizations control this licensing process.

- Spread spectrum modem – 915 MHz (TPS). Spread-Spectrum is a radio communication technique in which the phase of the transmitted signal is intentionally changed by 180 degree shifts. This results in a bandwidth

significantly greater than the signal would have if its phase were not changed. This modem combines transmitter and receiver. The radio coverage of a one-watt transmitter varies from 1.5 km up to 2.0 km.

- Spread spectrum modem – 2.4 GHz (TPS). This modem combines a transmitter and receiver. The radio coverage of a one-watt transmitter varies from 1.5 km up to 2.0 km.
- Dual-band, dual-user GSM (Europe & Asia: 900/1800 MHz; USA & Canada: 900/1900 MHz)

This board uses digital mobile telephone system features to transmit and receive data. The coverage area is limited by the abilities of GSM, which are called roaming and routing, and the SIM card enabled for roaming. Roaming refers to the ability to move from one coverage area to another without interruption in service or loss in connectivity.

A complete list of the Odyssey-E specifications can be found in Appendix B.

Standard Package Components

The standard Odyssey-E package components include:

- Odyssey-E receiver with Pacific Crest PDL receiving modem
- Carrying case
- Cables
- Literature
- Software
- Ranger LCD screen protectors (10)

The Odyssey-E can also be included in an RTK package with a Legacy-E Base station. See the Legacy-E manual for standard Legacy-E package contents.

Cables

Standard package cables include:

- Receiver-to-computer RS-232 serial cable
- Receiver-to-SAE power cable
- SAE-to-SAE cable extension
- Receiver-to-receiver cross over cable (RNGR output)
- Power/charger cable
- Power supply W/48" SAFECO connector

Software

Standard Odyssey-E software includes:

- PC-CDU – controller software that runs on a Windows®-based computer. Please refer to the *PC-CDU User's Manual* for detailed information on this software.
- GPS radio configuration software

This software is also available on the Topcon website (www.topcongps.com/software/index.html).

The following software will also be useful for operating, caring for, and using your Odyssey-E receiver, and may be required for some applications.

- ActiveSync™ – free software from Microsoft® (www.microsoft.com/downloads) for data exchange between the controller and your computer.
- FLoader – available on the Topcon website
- PDLCONF from Pacific Crest – included with Base station package; firmware upgrades available from the Pacific Crest website (www.paccrst.com/download/upgrade)
- Survey Pro GPS – optional third-party software; contact your TPS dealer
- Carlson SurvCE – optional third-party software
- FieldFace – available on the Topcon website

Literature

Odyssey-E literature includes:

- One year warranty card
- *Odyssey-E Operator's Manual*
- Functional specifications

All literature is also available on the Topcon website (www.topcongps.com/support/manuals.html).

The following manuals will also be useful for operating and caring for your Odyssey-E receiver. These are available on the Topcon website (www.topcongps.com/support/manuals.html).

- *PC-CDU User's Manual*
- *GPS Receiver Interface Language (GRIL) manual*
- *FLoader User's Manual*
- *MINTER User's Manual*

Getting Acquainted

This unit has a total weight of 1.9 kg. The receiver's advanced design allows users to significantly reduce the number of cables required for receiver operation, allowing the user to perform jobs more reliably and efficiently, especially when the receiver is moving.

The Odyssey-E is also versatile and can be configured in many different ways. The casing allocates space for two nonremovable, on-board Li-Ion batteries, and two Euro cards. One of those cards is the GPS+ receiver and the other is used for communications (modem, spread spectrum, GSM, or DGPS).

The Odyssey-E includes standard internal receiver components and three user-interface panels. For Odyssey-E specifications, see Appendix B.

Internal Components

The Odyssey-E is an integrated unit providing Minimum INTERface (MINTER) and incorporating the following components:

- Windows® CE controller w/touch screen and keypad
- TPS Euro card
- Power board
- Radio modem
- Two Lithium-Ion batteries

This manual refers to the most common configurations available: the Odyssey-E GGD with Pacific Crest PDL (UHF) modem (450-470 MHz), receiving only, with integrated Windows® CE controller that uses various software; such as, TIC Controller, Survey Pro TDS, FieldFaceCE, and Carlson Survey CE.

The Odyssey-E can be controlled using a variety of external controllers and different software. The standard Odyssey-E package includes PC-CDU Lite software (downloadable

from TPS website) that can be run from a Windows-based computer. Please refer to the *PC-CDU User's Manual* for detailed information on PC-CDU Lite.

Integrated Controller

The Odyssey-E has an integrated Windows® CE ver.3.0 controller with 32 MB of SDRAM, 32MB (64 MB optional) of flash disk storage, and a 133 MHz processor. The 133 MHz Intel® StrongARM CPU provides over 145 MIPS (Millions of Instructions Per Second), and the 100 MHz SDRAM memory provides twice the throughput of older DRAM technology.

The controller's LCD includes a backlight, providing bright and crisp images under any light conditions.

The integrated Windows® CE controller uses various software: TIC controller, Survey Pro TDS, FieldFaceCE, and Carlson Survey CE. To install the appropriate software, use the RNGR port on the bottom panel of the receiver and the corresponding serial cable (see "Bottom Panel" on page 1-19 for the components of the receiver's bottom panel).

TPS Euro Card

The Odyssey-E receiver is supplied with the following Euro card model:

Euro-160 (E_GGD) – contains 40 universal channels that receive and process 20 GPS/GLONASS L1/L2 and WAAS signals from up to 20 satellites.

Table 1-1 lists the options available for this card.

Table 1-1. Euro Card Options

Euro Card Model	Available Options
Euro-160 (E_GGD)	G: GPS L1 GD: GPS L1/L2 GG: GPS/GLONASS L1 GGD: GPS/GLONASS L1/L2

The GGD variety allows users to receive L1/L2 signals from both GPS and GLONASS.

A WAAS-enabled TPS receiver allows simultaneous tracking of two WAAS satellites. Each of the WAAS satellites is allocated its own channel.

Radio Modem

The Odyssey-E incorporates an internal radio modem used to receive differential corrections. The reference station's modem transmits the carrier phase and code measurements along with the reference station information (i.e., location and description) to the rover modem.

In its most common configuration, the Odyssey-E has an on-board PDL (Positioning Data Link) radio receiver that allows the receiver to capture RTK corrections a PDL Base station broadcasts.

The PDL Base operator is responsible for complying with local regulations for radio operation. In the US, the FCC regulates the use of radio transmitters, requiring a license. Broadcasting without a license can result in severe penalties including the confiscation of your radio and GPS+ equipment. Please call TPS Customer Support if you need advice on obtaining the proper license in the USA.

Your internal PDL radio modem comes with a number of preset frequencies programmed at TPS.



WARNING

The use of these preset frequencies without a license is illegal. Contact your local authorities (the FCC in the US) to use these preset frequencies.

Once the FCC or your local authority issues the proper licenses, your TPS dealer will program your PDL radios (Base and Rover) to enable communications (see “Radio Configuration” on page 2-19 for more information).

Complete information regarding your radio system can also be found in the Pacific Crest radio manuals.

Power Board

The internal power board manages receiver power and battery charging, and is connected to the receiver board and the batteries. The power board receives power from the internal batteries, even when the receiver is turned off. This feature allows the internal batteries to charge, regardless of the receiver’s status (on or off). To prevent the batteries from discharging when the receiver is stored, put the receiver in Zero Power Mode (see “Zero Power Mode” on page 4-22 for more information). The batteries will not charge in this mode.

The power board has a processor and firmware independent of the receiver card. To ensure firmware compatibility, both the GPS receiver board and power board must be loaded with firmware from the same package

Batteries

Your Odyssey-E receiver is equipped with two Lithium-Ion battery packs connected to the receiver's power board. Each one of these Lithium-Ion battery packs is 7.4 V and 5.4 Ah, giving you a total power of 7.4 V, nominal, and 10.8 Ah when fully charged. With a full charge, the Odyssey-E internal batteries should power both the GPS receiver and the radio modem for at least 15 working hours. If the internal radio modem is turned off, the Odyssey-E GPS receiver should run at least 20 hours with fully charged on-board batteries.

The Li-Ion batteries used in the Odyssey-E should run at no less than 98% capacity after 500 charging cycles. These batteries do not need to be drained before recharging.

A battery charger (AC adapter) is included with the standard package. See Appendix B for technical specifications on the battery.

External Components

The Odyssey-E receiver has three main panels used for data collection and user interface, and to provide connections for external devices (Figure 1-2).



Figure 1-2. Odyssey-E Panels

Top Panel

Figure 1-3 shows the top panel components:

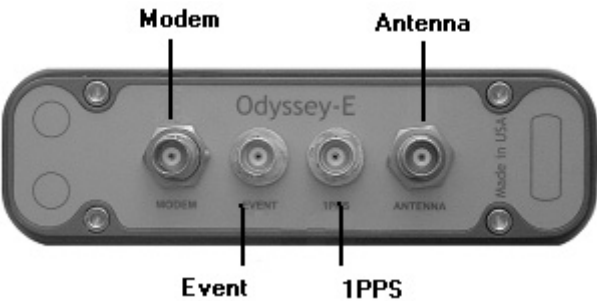


Figure 1-3. Odyssey-E Top Panel

- **Modem** – The modem antenna connector; used for RF connection of the internal modem. This is a BNC female connector for Pacific Crest PDL (UHF) modems, and a TNC female connector for spread spectrum and GSM modems.
- **Antenna** – The GPS/GLONASS antenna connector (50 ohm TNC female type); allows the receiver to accept RF signals from the antenna and to supply DC power (+5 V DC) to the antenna's low-noise amplifier (LNA). The antenna current is limited to 200 mA for the Euro-160 card.



NOTICE

If the antenna draws a current over the mentioned limits, a short-circuit protection device will disable the supply of electrical power to the antenna.

- **Event** – The BNC event marker connector; provides event input synchronized with a specified reference time.
- **1PPS** – The BNC connector for 1 pulse-per-second (1PPS); generates 1PPS signals with programmable reference time, period, and offset; synchronized to a specified reference time.

Front Panel

Figure 1-4 shows the front panel components:



Figure 1-4. Odyssey-E Front Panel

For more information on using the touch screen and keypad, see “Using the Integrated Controller” on page 4-7.

- Windows® CE controller touch screen – A ¼ VGA (320 x 240 pixel) monochrome display is bright and crisp in sunlight, and includes an integrated CCFL (cold cathode fluorescent lamp) frontlight for low-light conditions.
- Windows® CE controller keypad – Positive data-entry is provided via the tactile-action keypad, and the convenient touch screen, that allows you to make selections with a stylus, the back of a standard pen, or even your finger.

Bottom Panel

Figure 1-5 shows the bottom panel components:

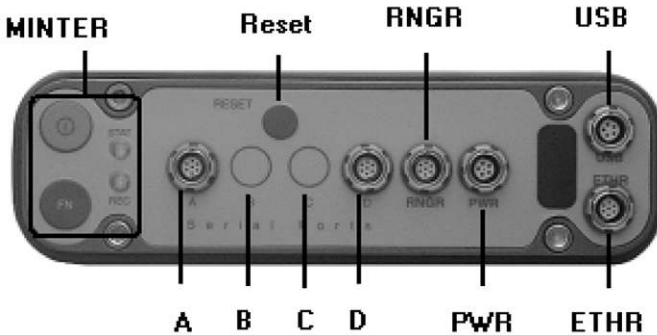


Figure 1-5. Odyssey-E Bottom Panel

- **MINTER** – The Minimum INTERface for the Odyssey-E receiver. The MINTER consists of two keys and two, three-color LEDs. See “Using the MINTER” on page 4-1 for descriptions and usages of the MINTER components.
- **Reset** – This key performs a hard reset for both the receiver board and the power board. Once this key is pressed, the controllers governing the receiver and power boards are rebooted and the device restarts.

This key can be used to leave Zero Power Mode or if the receiver does not respond to commands. See “Using the MINTER” on page 4-1 for more information on the Reset key.

- **A** – This serial port is used for communication between the Odyssey-E and the external controller, computer, external radio modem, or other devices.
- **B** – This serial port is installed upon request and only when the internal controller is absent. If the internal controller is present, this port is used internally to connect the receiver and controller boards.

- C – This serial port is installed upon request and only when the internal modem is absent. If the internal modem is present, this port is used internally to connect the receiver and modem boards.
- D – This serial port is used for communication between the Odyssey-E and the external controller, computer, external radio modem, or other devices.
- RNGR – This RS232 serial port is used for communication with the internal Windows® CE controller.
- PWR – This is the power input port to which an external power source (+6 to +28 V DC) is connected and where the unit is charged.
- USB – Contact Customer Support for USB support options.
- ETHR – Contact Customer Support for Ethernet support options.

GPS/GLONASS Antenna

The external GPS/GLONASS antenna is used to receive electromagnetic waves the satellites transmit and then convert them into the RF signals. The appropriate antenna must operate at the GPS L1/L2 (1575.42/1227.6 MHz) frequencies and the GLONASS L1/L2 frequency ranges (1602.56–1615.5 MHz/1246.44–1256.50 MHz). Also, the antenna's LNA must be able to accept voltage at $5 \pm 10\%$ V. Although many antennas are available on the market, Topcon can guarantee performance specifications of the Odyssey-E only when used with Topcon antennas.

Use the following antenna types:

- LegAnt-2
- LegAnt-3

The internal LNA (low noise amplifier) of these antennas accepts voltages between 2.7 V to 12 V. If you decide to use a third-party antenna, make sure that the antenna's LNA can handle the 5 V of power the Odyssey-E provides.

To connect the antenna to the ANTENNA port of the receiver, use the antenna cable (part number 14-008012-01) with a TNC male connector at each end.

Option Authorized File (OAF)

Topcon Positioning Systems issues an Option Authorized File (OAF) to enable the specific options that customers purchase. An Option Authorized File allows customers to customize and configure the Odyssey-E according to particular needs, thus only purchasing those options needed.

Typically, all Odyssey-E receivers ship with a temporary OAF that allows the receiver to be used for a predetermined period of time. When the receiver is purchased, a new OAF activates desired, purchased options permanently. Receiver options remain intact when clearing the NVRAM or resetting the receiver.

The OAF enables the following kinds of functions. For a complete list of available options and details, visit the TPS website (www.topcongps.com/tech/index) or consult your TPS dealer.

- Type of signal (standard L1; optional L2)
- Memory (standard 0Mb; optional 1Mb up to 96Mb)
- Update rate standard 1Hz (optional 5, 10, or 20Hz)
- RTK at 1Hz, 5Hz, 10Hz, and 20Hz
- RTCM/CMR Input/Output
- Event marker
- CoOp tracking
- Advanced multipath reduction

- Wide area augmentation system (WAAS)
- Receiver autonomous integrity monitoring (RAIM)
- 1 PPS (Pulse-Per-Second; a timing signal)

onfiguration

This chapter describes:

- Odyssey-E power supply
- Connecting the receiver and a computer
- Odyssey-E configuration
- Radio configuration
- Minimum INTERface (MINTER) configuration
- Calibrating the touch screen
- Collecting almanacs

Before you can use your Odyssey-E, you need to:

1. Charge the batteries. See “Powering the Odyssey-E” on page 2-2.
2. Configure and calibrate (as needed) the various parts of your receiver. See:
 - “Connecting the Odyssey-E and a Computer” on page 2-5,
 - “Odyssey-E Configuration” on page 2-8,
 - “Radio Configuration” on page 2-19,
 - “MINTER Configuration” on page 2-28, and
 - “Calibrating the Windows® CE Controller” on page 2-36.
3. Collect an almanac. See “Collecting Almanacs” on page 2-40.

Powering the Odyssey-E

You can power the Odyssey-E using:

- Internal batteries
- External batteries
- A battery charger

Internal batteries

With a full charge, the Odyssey-E internal batteries should power both the GPS receiver and the radio-modem for not less than 15 working hours. If the internal radio modem is turned off, the Odyssey-E GPS receiver should run not less than 20 hours with fully charged on-board batteries.

1. Plug the power/charger cable into the power input port.
2. Plug the power/charger cable into an available outlet.
3. Press the **Reset** key on the receiver. This will ensure that the receiver is in Normal mode for charging. The receiver will not charge in Zero Power Mode (see “Zero Power Mode” on page 4-22 for more information).
4. Leave overnight. An eight-hour charge will charge the batteries about 90%. A ten-hour charge will fully charge the receiver. The internal batteries cannot be overcharged.

The speed of the charge depends on Power and Charger settings on the PC-CDU Receiver Configuration screen and whether the receiver and controller are turned off or on. See “Power Management” on page 2-12 for more information.

The Li-Ion batteries used in the Odyssey-E should run at no less than 98% capacity after 500 charging cycles. These batteries do not need to be drained before recharging.

External Batteries

In addition to the internal batteries, you can use your Odyssey-E with external batteries. The use of external

batteries allows you to continue using the receiver in case the internal batteries are discharged. To use external batteries, you must have:

- a 12 V and 2.3 A*h battery
 - a 2.3 A*h battery clip to SAE cable
 - an SAE to Power Plug cable
1. Connect the two cables using the SAE connectors.
 2. Plug the power cable into the Odyssey-E power port
 3. Attach the battery to the battery clip. A single external 12 V and 2.3 A*h battery should run the Odyssey-E for about 7 hours and the Odyssey-E and modem for no less than 5 hours.



TIP

You can also use an SAE-to-SAE extender and an Alligator clip to SAE cable, and power your Odyssey-E directly from a battery, such as the battery used to power your base radio or similar battery.



NOTICE

When the receiver uses external batteries, make sure that the charger mode is set to off. Otherwise, the external batteries will also charge internal batteries, causing operation time to decrease. See “Power Management” on page 2-12 for more information on setting the charger mode.

Battery Charger

The same charger used to charge the Odyssey-E internal batteries can be used as an external power supply for the receiver. The charger is provided with the receiver.

1. Connect the battery charger to the power port on the Odyssey-E bottom panel
2. Plug the charger to a 110/220 V outlet. The power input for your battery charger should be AC between 90 and 264 V 1A (110 V AC) and between 47 Hz and 63 Hz. The battery charger outputs DC 12 V 2.5 A (30 W).

Turning On/Off the Odyssey-E

The Odyssey-E has two power keys, one for the integrated Windows® CE controller and one for the receiver.

You can turn either power key on first, but you must turn them both on.



NOTICE

When you turn Off the Odyssey-E, you must press both power keys, otherwise, the batteries will drain.

Receiver

To turn On the receiver, press the green power key on the MINTER for about 0.5 seconds and release it.

To turn Off the receiver, press the green power key on the MINTER for more than 1 second and less than 4 seconds (until both the STAT and the REC LEDs are off). This delay (about 1 second) is intended to prevent the receiver from being turned off by mistake.

**NOTICE**

If the receiver does not turn on, it may be in Zero Power Mode. See “Zero Power Mode” on page 4-22 for more information.

Windows® CE Controller

To turn On the controller, press the green On key on the front panel of the Odyssey-E.

To turn Off the controller, press the green On key on the front panel of the Odyssey-E.

Hold down the On key for approximately eight seconds to perform a hard reset of the controller.

Connecting the Odyssey-E and a Computer

To configure, manage files, or maintain the Odyssey-E, you need to connect the receiver and a computer using an RS232 cable, and start PC-CDU.

PC-CDU is a Personal Computer-Control Display Unit software used to manage the various functions of your receiver. The full range of PC-CDU configuration and function is outside the scope of this manual. For more information on any of the procedures in this section or on PC-CDU, refer to the *PC-CDU User's Manual* available on the TPS website.

1. Using the RS232 cable, connect the serial port of your computer (usually COM1) to the receiver's port A.
2. Press the **power** key on the receiver and computer to turn them on.

3. Start PC-CDU on your computer. The PC-CDU main screen displays (Figure 2-1).

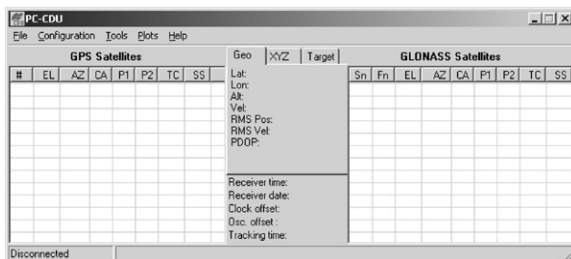


Figure 2-1. PC-CDU Main Screen

4. Click **File->Connect** (Figure 2-2).

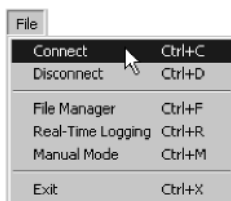


Figure 2-2. Click File->Connect

5. On the Connection Parameters dialog box, select the following parameters and click **Connect** (Figure 2-3 on page 2-7):
 - Set the Connection mode (Direct).
 - Set the port for your computer (typically COM1) from the Port drop-down list.
 - Set the communication rate between the receiver and the computer (usually 115200) from the Baud rate drop-down list.

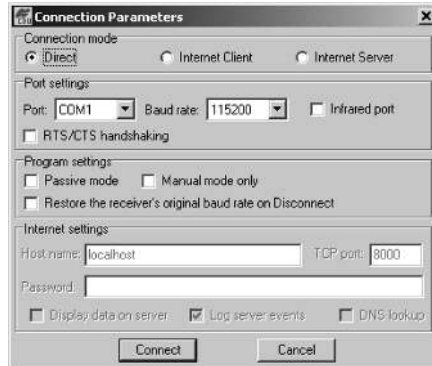


Figure 2-3. Connection Parameters

Once a connection has been established, the COM port and baud rate will be displayed in the lower-left corner of the main window of PC-CDU. A timer will begin to count up in the lower-right corner as well (Figure 2-4).

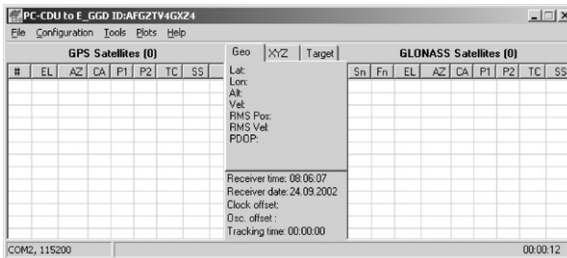


Figure 2-4. PC-CDU Connection Established

Odyssey-E Configuration

You use PC-CDU to configure the various parts of the Odyssey-E receiver. Any settings you make using PC-CDU will be saved in the Odyssey-E receiver's memory, and will be reflected when you use the MINTER. You can change the receiver's configuration in the field using the integrated Windows® CE controller and controller software.



TIP

Refer to the *PC-CDU User's Manual* to manage all possible Odyssey-E receiver configurations.

The following configuration is recommended for the most common applications. However, you can select the configuration parameters as needed for each job.



NOTICE

Click Apply after making any configuration change, otherwise your receiver will not accept the change.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
2. Once connected, click on **Configuration->Receiver** (Figure 2-5).

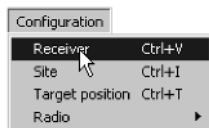


Figure 2-5. Configuration->Receiver

The Receiver Configuration dialog box displays (Figure 2-6).

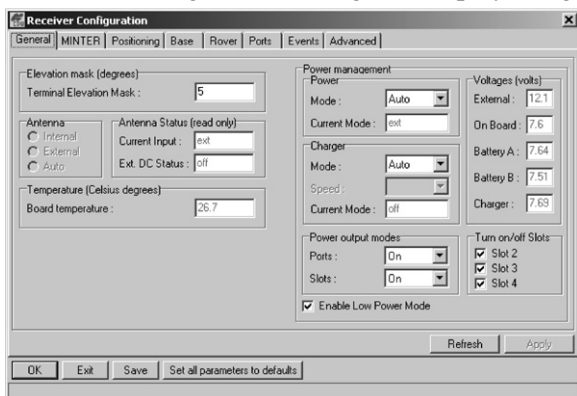


Figure 2-6. Receiver Configuration

3. Click the **MINTER** tab, configure the following settings, and click **Apply** (Figure 2-7):

- Set the Recording interval in seconds.
- Set the Elevation mask for Log file angle in degrees.
- Enter the File name prefix. Use the last three digits of the receiver serial number.

The receiver's serial number and part number can be found on the bottom panel.

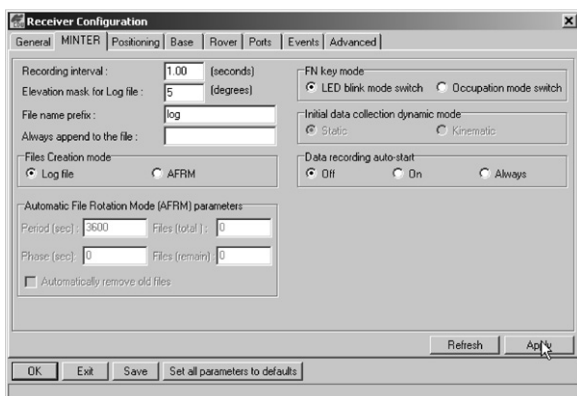


Figure 2-7. Receiver Configuration – MINTER Tab

If your jobsite is in an area that has obstructions (buildings, trees, etc.), and/or the antenna location is near reflective objects, configure the receiver to reduce errors from these sources in the Advanced tab.



WARNING

Do not make other changes without consulting the *PC-CDU User's Manual*.

- Click the **Advanced** tab on the Receiver Configuration screen (Figure 2-8).

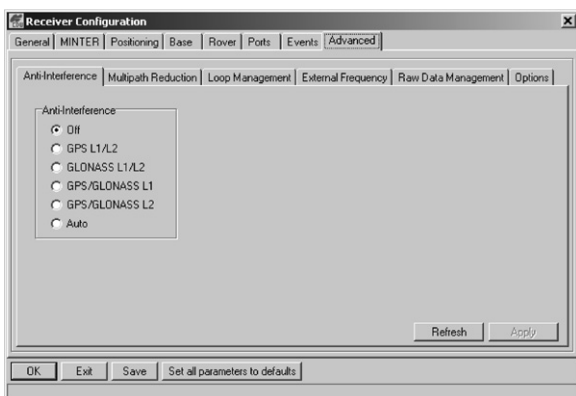


Figure 2-8. Receiver Configuration – Advanced Tab

- Click the **Multipath Reduction** tab, enable the following boxes, and click **Apply** (Figure 2-9 on page 2-11):
 - Code multipath reduction
 - Carrier multipath reduction

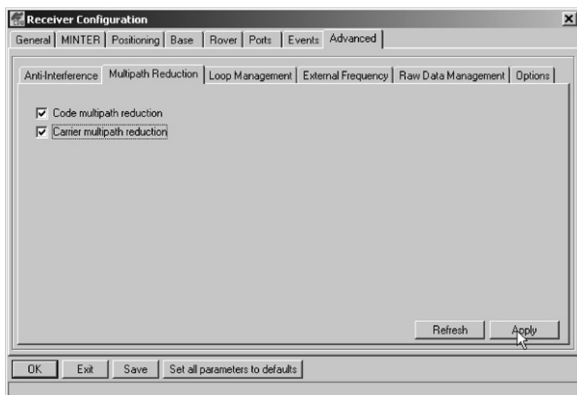


Figure 2-9. Advanced Configuration – Multipath Reduction

6. Click the **Loop Management** tab, enable the following boxes, and click **Apply** (Figure 2-10):

- Enable Co-Op tracking
- Static Mode

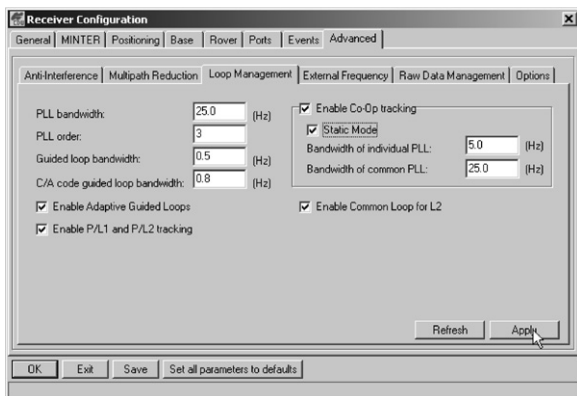


Figure 2-10. Advanced Configuration – Loop Management

7. Click **OK** to close the Receiver Configuration screen.

8. Click on **File->Disconnect**, then **File->Exit** to quit PC-CDU (Figure 2-11).



Figure 2-11. File->Disconnect then File->Exit



NOTICE

Disconnecting the receiver from the computer will eliminate any possible conflict in the management of your serial port.

Once the receiver is configured, the configuration will remain until you change it using PC-CDU, the integrated controller, or by clearing the NVRAM.

Power Management

You can use TPS's PC-CDU software to manage your receiver's power. The complete description of PC-CDU exceeds the scope of this manual but can be found in the *PC-CDU User's Manual*. The latest copy of this manual can be downloaded from the TPS website.

The Odyssey-E can be connected to a computer using an RS232 serial cable and the PC-CDU software program. To access the tab controlling the power settings of your receiver, take the following steps:

1. Connect your receiver and computer. See "Connecting the Odyssey-E and a Computer" on page 2-5 for this procedure.

2. Once connected, click **Configuration->Receiver** (Figure 2-12).

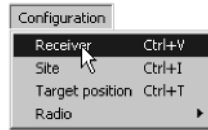


Figure 2-12. Configuration->Receiver

3. Select the Power Mode drop-down list to set the desired power source (Figure 2-13). Current Mode displays the current power source.
 - Auto – receiver will select automatically the power source.
 - Mix – receiver will detect automatically and start consuming power from the source with the highest voltage.
 - Battery A – receiver will consume power from battery A.
 - Battery B – receiver will consume power from battery B.
 - External – receiver will use an external power supply.

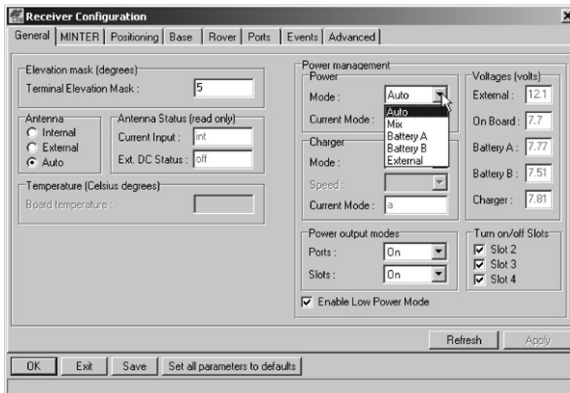


Figure 2-13. Select Power Mode

2-13

4. Select the Charger Mode drop-down list to set the desired charger mode (Figure 2-14). Current Mode displays the charging battery.

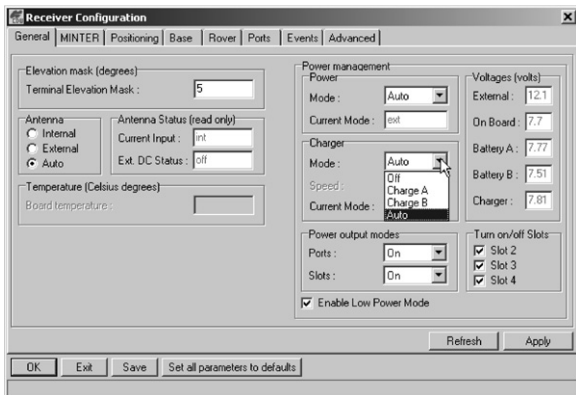


Figure 2-14. Select Charger Mode

- Off – receiver will not charge batteries.
- Charge A – receiver will charge only battery A.
- Charge B – receiver will charge only battery B.
- Auto – receiver will automatically detect and charge batteries.

5. Select the Power output modes Ports drop-down list to set power output on serial ports (Figure 2-15).

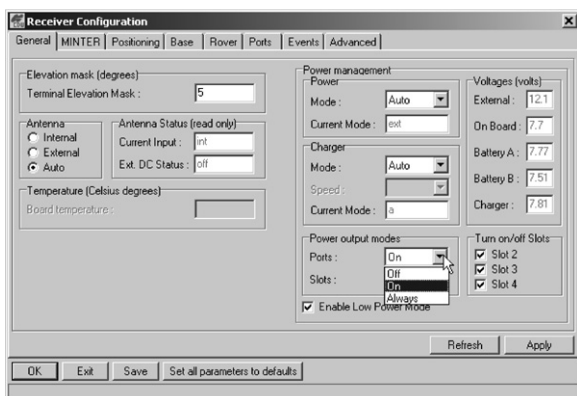


Figure 2-15. Select Power Output Modes – Ports

- On – the power board will deliver voltage on pin 1 of all serial port connectors when the receiver is turned on. If the receiver is turned off, there will not be any power on the ports.
- Off – the power will be absent even if the receiver is turned on.
- Always – the power board will deliver voltage on pin 1 of all serial port connectors even if the receiver is turned off.

6. Select the Power output modes Slots drop-down list to set power output on internal slots (Figure 2-16).

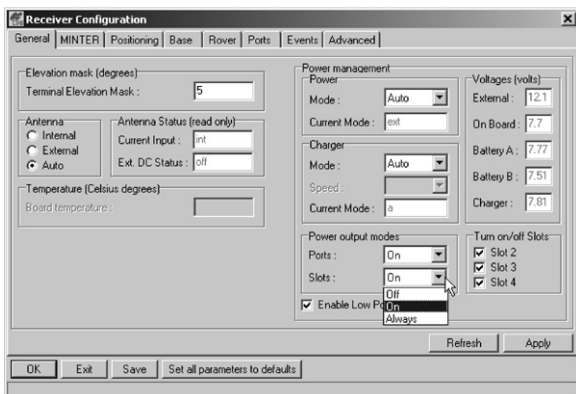


Figure 2-16. Select Power Output Modes – Slots

- On – all slots are powered if the receiver is turned on.
 - Off – internal slots will not be powered even if the receiver is turned on.
 - Always – internal slots will be powered even if the receiver is turned off.
7. View the Voltages information (Figure 2-17).

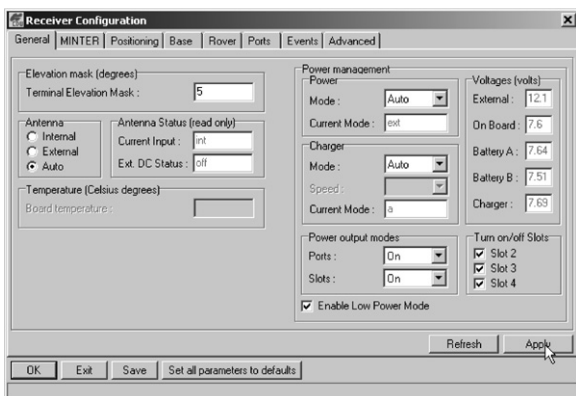


Figure 2-17. Voltages Information

- External – displays the external power supply's voltage.
 - On Board – displays the voltage drawn by the receiver board.
 - Battery A – displays the voltage of battery A.
 - Battery B – displays the voltage of battery B.
 - Charger – displays the charger's output voltage during battery charging.
8. Select and check each of the Turn on/off Slots check boxes to enable the corresponding internal slots (Figure 2-18).
 9. Select and check the Enable Low Power Mode check box to put the receiver's processor into low power consumption mode (Figure 2-18).

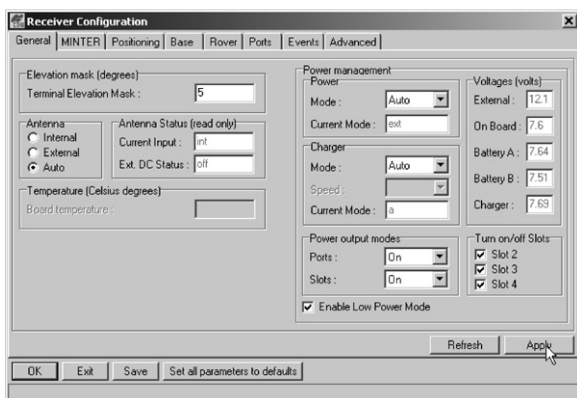


Figure 2-18. Enable and Apply Power Settings

10. Click **Apply**.

Charging Internal Batteries

Use one of the following conditions for maximum battery charge speed.

- Both the receiver and controller are turned off. Power Mode and Charger Mode are set to Auto. See “Power Management” on page 2-12 for setting these parameters.
 - The receiver or the on-board controller is turned on. Power Mode is set to External and Charger Mode is set to Auto.
1. Plug the power/charger cable into the power input port.
 2. Plug the power/charger cable into an available outlet.
 3. Press the **Reset** key on the receiver. This will ensure that the receiver is in Normal mode for charging. The receiver will not charge in Zero Power Mode (see “Zero Power Mode” on page 4-22 for more information).
 4. Leave overnight. An eight-hour charge will charge the batteries about 90%. A ten-hour charge will fully charge the receiver. The internal batteries cannot be overcharged.
 5. When finished charging, set **Power Mode** to Auto.



NOTICE

If you remove a power supply cable before setting Power Mode to Auto, both the receiver and the controller are turned off. To turn them on, you will need to connect an external power supply once again.

Checking Internal Battery Status

You have two options to check the status of the internal batteries:

1. Click on **Configuration->Receiver** and view the battery voltages on the Receiver Configuration screen (Figure 2-17 on page 2-16).
2. Click on **Help->About** and view the battery voltages on the About PC-CDU screen.

A fully charged battery should indicate 8.2 to 8.4 V.

Radio Configuration

The internal PDL radio in your Odyssey-E and the base radio can be configured differently depending of your needs and working conditions. Use PC-CDU and the PDL configuration program (from Pacific Crest; included with the base station) to:

- Access the internal PDL modem
- Configure the modem
- Check or change the modem configuration

To access your modem, you create a daisy chain between the Odyssey-E serial port (A or D) and the radio modem (Port C) using PC-CDU. You then activate the PDL configuration program on your PC and proceed with the radio configuration.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.

AND

Use a 38400 baud rate.

- Once connected, click on **File->Manual Mode** to create a daisy chain between the receiver's port (A or D) and the Odyssey-E PDL modem.

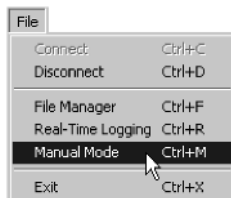


Figure 2-19. File->Manual Mode

- Write each of the following commands, pressing **Enter** (or clicking **Send command**) after each command (Figure 2-20 on page 2-21).
 - `%%set,dev/ser/c/rate,38400`
 - `%%set,dev/ser/c/echo,/cur/term`
 - `%%set,dev/ser/c/imode,echo`
 - `%%set,cur/term/eoff,QUIT`
 - `%%set,cur/term/echo,/dev/null`
 - `%%set,cur/term/imode,echo`
 - `%%set,cur/term/echo,/dev/ser/c`

The Manual Mode screen will show RE002%% in response to each of these commands. When finished, you should have seven responses (Figure 2-20 on page 2-21).



TIP

Save this set of commands to a script file and load this file later to the receiver with a single operation. To create a script file, see Appendix A.

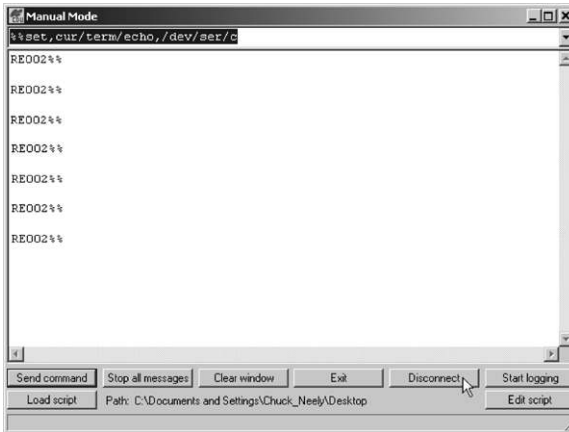


Figure 2-20. Manual Mode Command Responses

For further information on manual commands, refer to the *GPS Receiver Interface Language Manual*.

4. Click **Disconnect** (Figure 2-20).
5. Run the PDL Radio Configuration Program (pdlconf.exe) from Pacific Crest. Make sure you have the latest version (2.10 or higher). This software is also available at www.paccrst.com (Figure 2-21).

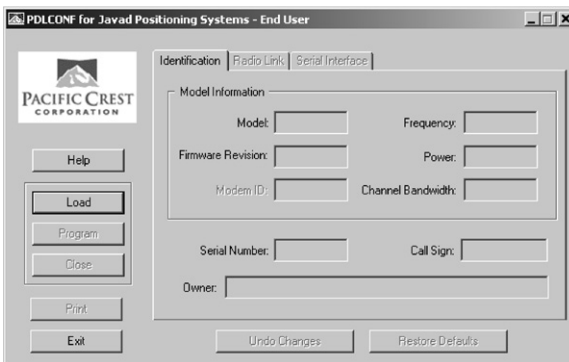


Figure 2-21. PDL Radio Configuration Main Screen

- Click the **Pacific Crest logo** in the upper left corner of the main screen (Figure 2-22).

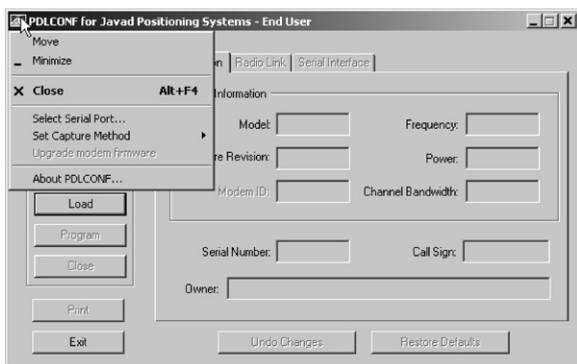


Figure 2-22. PDL Top Left Corner Icon Menu

- From the pop-up menu, click **Set Capture Method->Soft Break** (Figure 2-23).

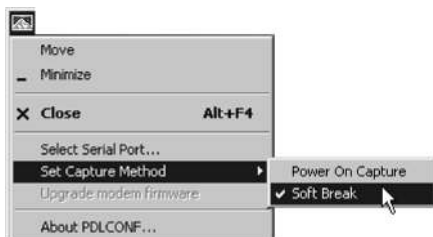


Figure 2-23. PDL Set Capture Method->Soft Break

8. Click **Load** to connect to the radio (Figure 2-24).

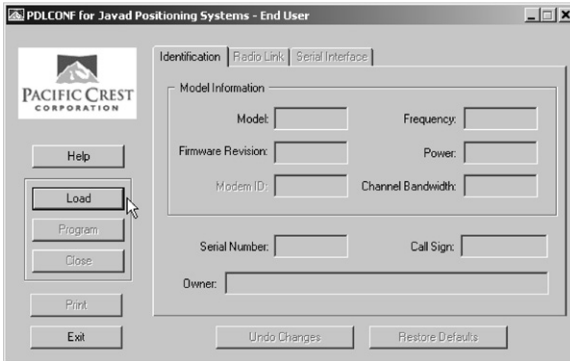


Figure 2-24. Click Load

9. On the Identification tab, type Owner information (Figure 2-25).

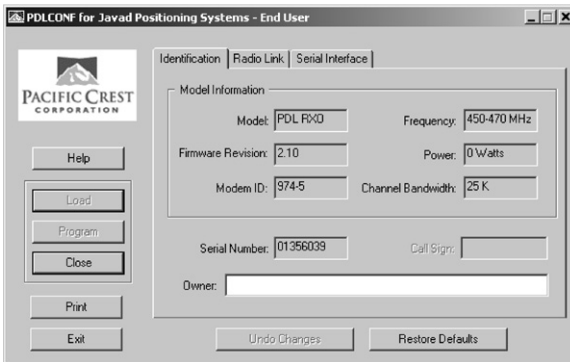


Figure 2-25. PDL Identification Tab

The Identification screen supplies current information concerning firmware revision, serial number, frequency and power. It also allows for the input of Owner information.

10. Click the **Radio Link** tab and set the following parameters (Figure 2-26):

- Manual – enable
- Channel TX RX – set channel and frequency as desired
- Link Rate – leave at 9600 (requires a modulation type of GMSK)
- Digisquelch – set on High for Rover; Low for Base station
- Forward Error Correction – disable
- Scrambling – enable
- Scrambling – enable
- Local Address – leave at 0

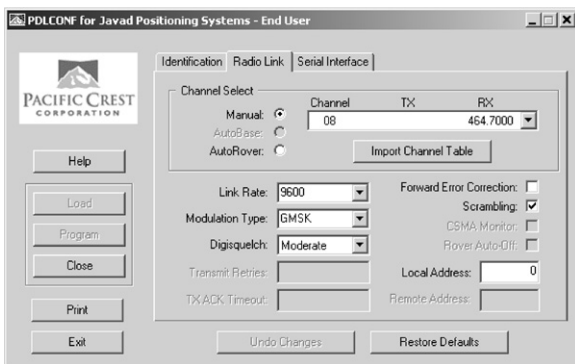


Figure 2-26. PDL Radio Link Tab

11. Click the **Serial Interface** tab and set the following parameters (Figure 2-27):

- Baud Rate – 38400
- Parity – None



NOTICE

Parity should always be set to None.

- Mode – Transparent w/EOT Timeout

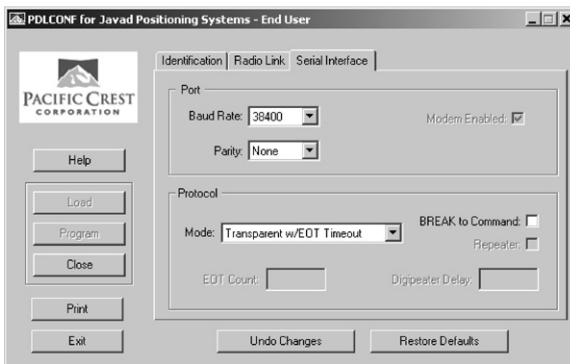


Figure 2-27. PDL Serial Interface Tab

12. If you made changes, click the **Program** button on the left of the screen to save setting changes to the modem's memory (Figure 2-28).

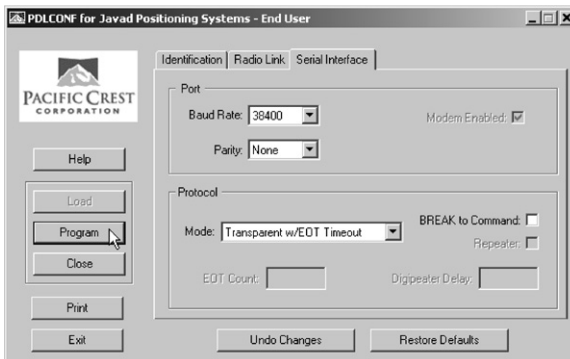


Figure 2-28. PDL – Click Program

13. Click **Close** and then **Exit** to quit the program (Figure 2-29).

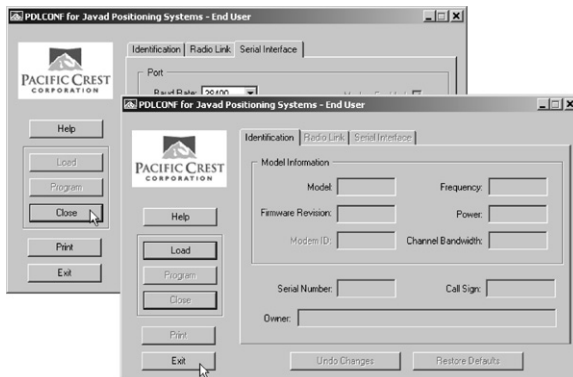


Figure 2-29. Click Close then Exit



NOTICE

The Base station and internal Odyssey-E PDL radios must be configured with the same Channels, Radio Link characteristics (except Digisquelch), and Serial Interface parameters.

14. Open PC-CDU.
15. Click **File->Connect**.

16. On the Connection Parameters screen, select a baud rate of 38400 and enable the Manual mode only check box (Figure 2-30), then click **Connect**.

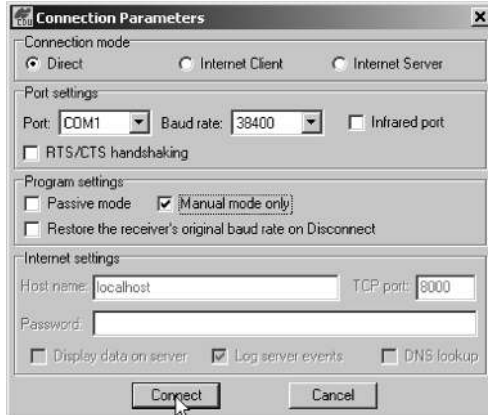


Figure 2-30. Connection Parameters – Manual Mode Only

17. On the Manual Mode screen, write the following commands, pressing **Enter** (or clicking **Send command**) after each command. When finished, you should have six responses (Figure 2-31 on page 2-28).

- QUIT
- %%set,cur/term/imode,cmd
- %%set,dev/ser/c/echo,/dev/null
- %%set,dev/ser/c/imode,cmd
- %%set,dev/ser/c/rate,38400
- %%set,cur/term/rate,115200

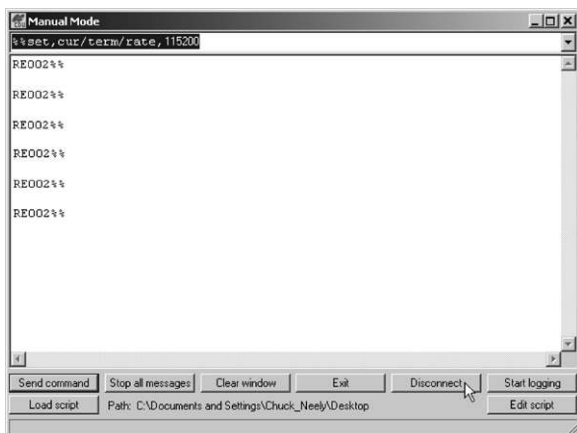


Figure 2-31. Manual Mode Command Responses

18. Click **Disconnect**. Continue with other configuration or operation functions.

MINTER Configuration

The Odyssey-E Minimum INTERface (MINTER) consists of two keys (Power and FN) and two LEDs (STAT and REC) that control and display the receiver's operation (Figure 2-32).

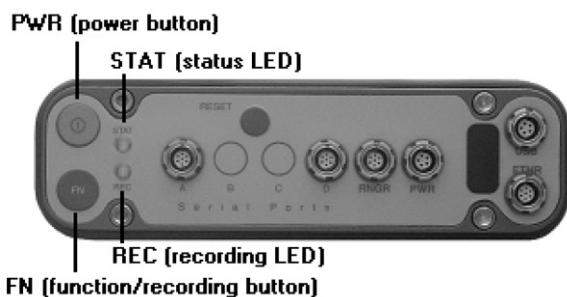


Figure 2-32. MINTER

2-28

The MINTER has one Status (STAT) LED and one Recording (REC) LED. Each LED has three colors: red, green, and orange.

The MINTER also has an ON/OFF key (PWR) and a function key (FN), as well as protection against stuck keys (e.g., when a key is held down unintentionally for a long time by other objects in a backpack).

The MINTER allows the user to perform various functions:

- Turn the receiver On or Off, put it in Sleep mode or Zero power mode.
- Turn data recording On or Off (FN key).
- Show the number of GPS (green) and GLONASS (orange) satellites being tracked (STAT LED).
- Show data recording status (REC LED).
- Show each time data is recorded to internal memory (REC LED).
- Show the status of post-processing mode (static or dynamic), during a Post-Processing Kinematic survey, using the FN key (REC LED).
- Allow changing the receiver's information mode.

You use PC-CDU to configure MINTER settings. Refer to the *PC-CDU User's Manual* for other possible MINTER configurations.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
AND
Enable RTS/CTS handshaking (Figure 2-33 on page 2-30).

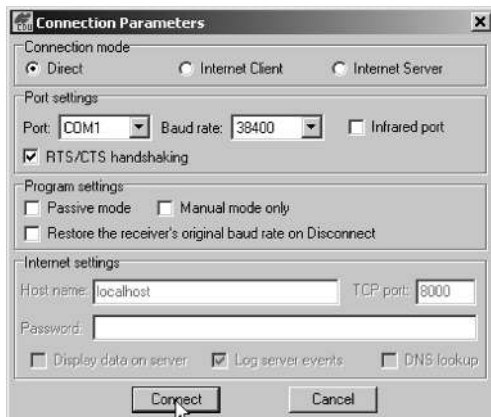


Figure 2-33. Connection Parameters – MINTER Settings

2. Click **Configuration->Receiver** (Figure 2-34).

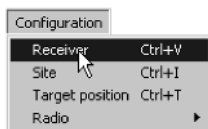


Figure 2-34. Configuration->Receiver

3. Click the **MINTER** tab, set the following parameters and click **Apply** (Figure 2-35 on page 2-31). See the following pages for descriptions of these parameters.
 - Recording interval on page 2-31
 - Elevation mask for Log file on page 2-31
 - File name prefix on page 2-31
 - Always append to the file on page 2-32
 - Files Creation mode on page 2-32
 - Automatic File Rotation Mode (AFRM) on page 2-32
 - FN key mode on page 2-33
 - Initial data collection dynamic mode on page 2-34
 - Data recording auto-start on page 2-34

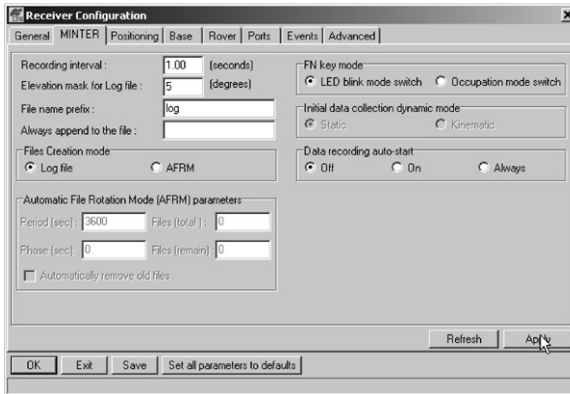


Figure 2-35. Receiver Configuration – MINTER

Recording Interval parameter

This parameter specifies the message output interval into the log file when the MINTER FN key (pressed for 1–5 seconds) activates data logging. This setting is used not only when logging a single log file, but also when logging receiver data in AFRM mode. Values are 1–86400 seconds.

The default value is one second.

Elevation Mask for Log File parameter

This parameter specifies the minimum elevation angle for the satellites whose data will be put in the receiver files logged via Minter when pressing **FN**.

The default value is five degrees.

File Name Prefix parameter

This parameter specifies what prefix will be added to the names of the receiver files created via Minter when pressing **FN**. The prefix can be up to 20 characters long.

The default value is “log”.

Log file names have the following structure:

<prefix><month><day><sequential alphabet letter>

The file name depends on both the file creation time (month and day) and additional letter suffixes to avoid confusion between files created on the same day.

Always Append to the File parameter

If you want the new receiver data to be appended to an existing log file, enter the desired filename in this parameter. The setting can be up to 20 characters long.

Files Creation Mode parameter

This parameter has two possible operation modes:

- **Log file** – If the log file radio button has been selected, pressing the **FN** key will result in closing the current log file. If data logging is off, pressing **FN** will open a new log file.
- **AFRM** – If AFRM radio button has been selected, pressing **FN** will enable this mode. If AFRM has been enabled, pressing **FN** will disable this mode.

Automatic File Rotation Mode (AFRM) parameters

TPS receivers are capable of automatically rotating log files. During a “file rotation” event, the receiver closes the previous, or current, file and opens a new one according to the user-defined schedule. The Period and Phase parameters specify this schedule. File rotation launches the moment Period is equal to Phase. More precisely, a new log file opens immediately before the scheduled epoch causing data tagged with this epoch to be recorded into the new log file.

When opening a new log file, the receiver enables the default set of messages outputted with the default output period. Both the default set of messages and the default output period are programmable.

- **Period** – specifies the time duration of each log file created in AFRM mode. Values are 60 to 86400 seconds. The default value is 3600 seconds.
- **Phase** – specifies the “phase” (constant time shift) of creating multiple log files in AFRM mode.

Values are 0 to 86400 seconds. The default value is zero seconds.

- Files (total) – a counter that specifies how many multiple log files must be created in AFRM until this mode automatically turns off. This counter decrements on every file rotation until it value becomes zero, then file rotation automatically stops. The counter initializes with AFRM.

Note that a log file is opened right after turning AFRM on. This startup file is not considered a file rotation event; the AFRM counter will not decrement.

Values are 0 to $[2^{31}-1]$. The default value is 0 (zero). Zero means that an unlimited number of log files will be created.



NOTICE

The receiver's memory holds up to 256 files.

- Files (remain) – specifies the number of files left for the receiver to create in AFRM.

Values are 0 to $[2^{31}-1]$. The default value is zero.

- Automatically remove old files – automatically removes the earliest log file when no free memory is available to log data. If this parameter is enabled, your receiver will erase the file with the earliest file creation time/date. AFRM must be enabled to use this FIFO (First-In, First-Out) feature.

The default value is off (disabled).

FN Key Mode parameter

You use these two radio buttons to program how the receiver will react when pressing the **FN** key.

- LED blink mode switch – pressing **FN** will toggle between MINTER's normal/extended information modes and start/stop data recording of Static survey.

–**FN** pressed less than 1 second: release to change the information mode (Normal or Extended Information (EI) Modes).

–**FN** pressed from 1 to 5 seconds: release to start/stop recording (Static post-processing mode).

- Occupation mode switch – pressing **FN** (less than one second) will insert into the corresponding log file a message indicating that the survey type has been changed from static to kinematic, or vice versa. If the REC LED blinks green, the current mode is dynamic, if it blinks orange, the current mode is static. For more details, see Table 4-1 on page 4-4, and refer to the *MINTER User's Manual* and *PC-CDU User's Manual*.

Initial Data Collection Dynamic Mode parameter

These radio buttons specify the starting occupation type descriptor inserted at the beginning of receiver files logged via MINTER. You select Static or Kinematic to specify that the corresponding log file will start with a static (STOP) or kinematic (GO, Trajectory) occupation, respectively.

Data Recording Auto-start parameter

These radio buttons allow you to program your receiver's behavior in the event of a power failure.

Table 2-1 on page 2-35 gives the different scenarios available and the results after power is restored to the receiver. "Specified file" refers to the file name entered in the Always append to file parameter.

Table 2-1. Data Recording Parameter Behavior

Scenario Before Power Failure	Enabled Radio Button Results		
	Off	On	Always
1 Receiver data logged to file specified.	Data logging will not resume when power is restored.	Receiver will resume data logging to the same file when power is restored.	Receiver will resume data logging to the same file when power is restored.
2 Receiver data logged to default file.	Data logging will not resume when power is restored.	A new log file will open when power is restored and data will log to this file.	A new log file will open when power is restored and data will log to this file.
3 Receiver data logging not started and file specified.	No file will open with this name. Data logging will not start when power is restored.	No file will open with this name. Data logging will not start when power is restored.	A log file with this name will open and data logging will start after power is restored.
4 Receiver data logging is off and no file specified.	Data logging will not start when power is restored.	Data logging will not start when power is restored.	A log file with a default name will open and data logging will start after power is restored.

Also, if Always is enabled, your receiver will automatically start logging data (to a newly created or an existing file) in the following three cases:

- After pressing the MINTER power key.
- After resetting the receiver (with PC-CDU or the Reset key).
- After taking the receiver out of sleep mode.

Calibrating the Windows® CE Controller

The use of the integrated Windows® CE controller allows the operator to significantly increase surveying productivity. Also, the controller permits the user to control surveying directly in the field (Figure 2-36).



Figure 2-36. Integrated Windows® CE Controller

To begin using the integrated controller, you need to:

1. Calibrate the touch screen. See “Touch Screen Calibration” on page 2-36.
2. Set the clock. See “Setting the Clock” on page 2-37.
3. Establish a partnership between the controller and your computer. See “Establishing a Partnership” on page 2-37.

Touch Screen Calibration

The screen on the integrated Windows® CE controller is sensitive to the touch of a finger or stylus. This touch screen functions similar to that of a traditional mouse. Simple use a stylus or your finger to touch the commands you want.

To begin using the touch screen function, you must first calibrate it.

1. Press the controller’s keypad **On** key.
2. Tap **Start->Settings->Control Panel->Stylus**.
OR
Press **[alt]+[ctrl]+[+]**
3. Follow the on-screen prompts.

If the calibration fails, repeat the procedure. Once it succeeds, the unit will tell you to press the **Enter** key on the controller's keypad to accept the new calibration settings. Press the **Esc** key to discard this calibration (to keep the old settings) and repeat the procedure.



TIP

To display the Start menu, press [Ctrl]+[Esc] or press the stylus on the lower left corner of the screen.

Setting the Clock

1. Double tap on the **time** located in the lower right corner of the display

OR

Tap **Start->Settings->Control Panel->Date/Time**.

2. Use the stylus or a finger to change the date and time on the Date/Time dialog box.
3. Press **Enter** to change settings or **Esc** to cancel.

Establishing a Partnership

You can use your computer to install software onto the controller. Before you start installing controller software, you may need to install the Microsoft® ActiveSync™ on your computer and establish a partnership.

Microsoft® ActiveSync™ allows data exchange between your PC and your Odyssey-E receiver's integrated controller, i.e., copying your personal files or survey jobs, installing programs on the controller from the PC and so on.

If Microsoft® ActiveSync™ is already installed on your PC, you can skip this installation.

1. Download MS ActiveSync. This software is free and is available on the Microsoft® website (www.microsoft.com/downloads).
2. After the file *msasync.exe* downloads onto your computer, run this executable file to start the installation.
3. After the installation is over, you are ready to run ActiveSync.

Once a partnership has been established, your computer will recognize the controller automatically when you connect them again. A green button on the ActiveSync tool bar indicates a successfully established partnership.

1. Press the controller's **On** key.
2. On your controller, tap **Start->Settings->Control Panel->Communication**.
3. Tap the **PC Connection** tab and verify that "Allow connection with desktop computer" is enabled and the connection is "COM1 @ 115K."
4. Connect the Odyssey-E receiver's integrated controller (RNGR port) to a computer using the Receiver-to-computer serial RS232 cable and a connection adapter (if required).
5. Turn on your computer and run MS ActiveSync.
6. Click on **File->Get Connected** (Figure 2-37).

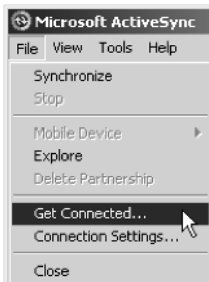


Figure 2-37. MS ActiveSync – File->Get Connected

7. Tap **Yes** on your controller when “Connect to desktop?” appears to start the connection.



Figure 2-38. Connect to Desktop?

The software will search for any device connected to the communication port.



Figure 2-39. Connecting Controller and Computer

If the connection has trouble, click **File->Connection Settings** and enable “Allow serial cable or infrared connection to this COM port,” and click **OK** (Figure 2-40).



Figure 2-40. MS ActiveSync – File->Connection Settings

8. Once a connection has successfully completed, the New Partnership dialog box displays.
9. Click **Yes**, then **Next**.
10. Disable all parameters at the next dialog box and click **Next** to finalize the partnership.
You may have to try again if the first attempt was unsuccessful.
11. To disconnect the controller and PC, click **File->Connection Settings** and disable the “Allow serial cable or infrared connection to this COM port.”



NOTICE

If you do not disconnect, ActiveSync will continue to use this port and it will be unavailable for other devices.

Collecting Almanacs

Each satellite broadcasts a message (almanac) which gives the approximate orbit for itself and all other satellites. If the receiver has an almanac, you can considerably reduce the time needed to search for and lock on to satellite signals.

The receiver regularly updates the almanac and stores the most recent almanac in its Non-Volatile Random Access Memory (NVRAM).

1. Connect the antenna to the receiver with the TNC-to-TNC GPS antenna cable (see page 1-21 for further information on this cable).
2. Set up the antenna in a location with a clear view of the sky.
3. Turn **on** the receiver.

**NOTICE**

If 15 minutes have passed and the receiver does not lock onto satellites to acquire an almanac, you may need to clear the NVRAM. See “Clearing the NVRAM” on page 4-19 for this procedure.

You will need to collect or update the almanac:

- If the receiver has been off for a long time.
- If the last known receiver position, stored in the NVRAM, is different from the present position by several hundred kilometers.
- After loading a new OAF.
- After loading new firmware.
- After clearing the NVRAM.
- Before surveying.

The collection and/or update of an almanac can take as long as 15 minutes.

Notes:

[illegible]

Setup and Survey

This chapter describes:

- Odyssey-E setup
- Static surveying with the Odyssey-E
- Kinematic surveying with the Odyssey-E
- RTK Base station setup
- RTK Rover setup

Odyssey-E Setup

To set up the Odyssey-E for surveying you need to:

1. Set up the antenna and measure its height. See “Setup Antenna” on page 3-1 and “Measure the Antenna Height” on page 3-1.
2. Set up the Base and Rover receivers. See “Setup Receiver” on page 3-5.
3. Begin collecting data. See “Collect Data” on page 3-6.

Setup Antenna

This section assumes you have already configured your receiver using PC-CDU.

1. Center the antenna over the point at which data will be collected. For most applications, this should be at a location with a clear view of the sky.

Measure the Antenna Height

The location of the antenna relative to the point being measured is very important for both surveys in which the

elevation of the points is important and in surveys for horizontal location only. The reason this is important in horizontal surveys is that they are often larger in area than can be reliably fitted to a flat plane, therefore the adjustment must be done in three dimensions and then projected onto a two-dimensional plane.

The receiver calculates the coordinates of the antenna's phase center. To determine the coordinates of the station marker, the user must specify the following:

- Measured height of the antenna above the station marker
- Method of measuring the antenna height
- Model of the antenna used

Antennas have two types of measurements:

- Vertical – measured from the marker to the antenna reference point (ARP) located on the bottom of the antenna at the base of the mounting threads.
 - Slant – measured from the marker to the lower edge of the antenna slant height measure mark (SHMM) located on the antenna radius.
2. Measure the antenna height above the point or marker. The antenna height can be measured vertically to the base of the antenna or slantwise to the lower edge of the seam around the antenna.

The LegAnt-2 (Figure 3-1 on page 3-3) and LegAnt-3 (Figure 3-2 on page 3-4) antenna offset lines of measurement are shown in the following drawings. The measurements for these offsets follow each drawing (Table 3-1 on page 3-3 for LegAnt-2 and Table 3-2 on page 3-4 for LegAnt-3).

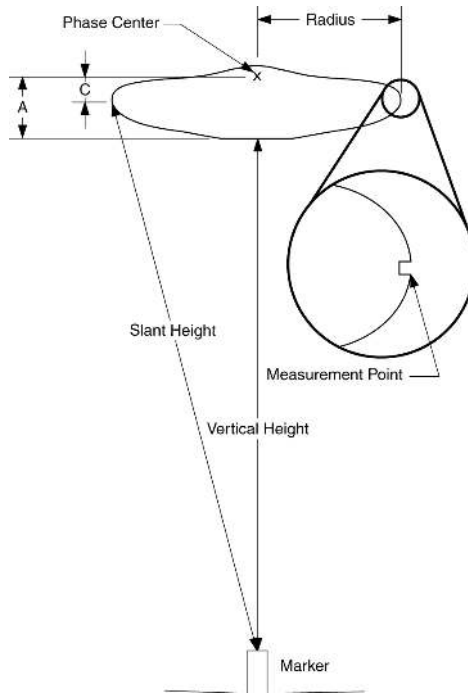


Figure 3-1. LegAnt-2 Antenna Offset Measurements

Table 3-1. LegAnt-2 Offset Measurements

Antenna	Radius	A, Vertical Offset (L1)	C, Slant Offset (L1)
LegAnt-2	0.122m 0.399 ft	0.054m 0.176 ft	0.021m 0.069 ft

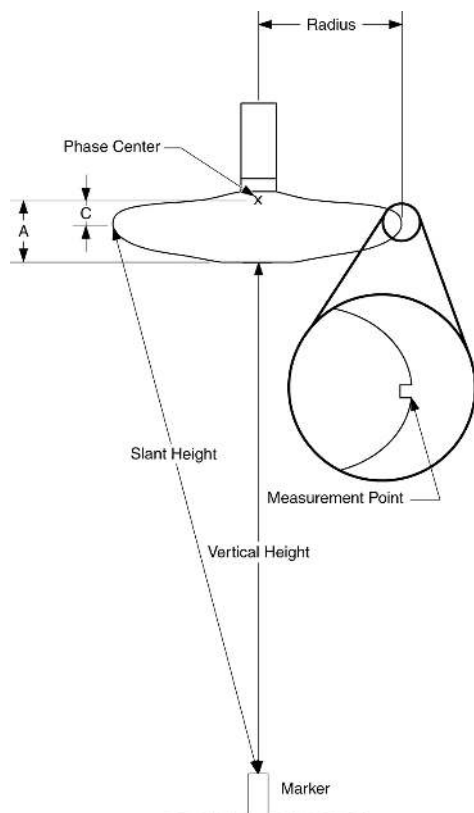


Figure 3-2. LegAnt-3 Antenna Offset Measurements

Table 3-2. LegAnt-3 Offset Measurements

Antenna	Radius	A, Vertical Offset (L1)	C, Slant Offset (L1)
LegAnt-3	0.123m 0.4 ft	0.114m 0.37 ft	0.033m 0.11 ft

The actual point to which surveying with GPS/GLONASS measures is called the Phase Center of the antenna. This is analogous to the point at which a distance meter measures in a prism. A user must enter the prism offset to compensate for this point not being at a physical surface of the prism.

In the case of a GPS/GLONASS antenna, the offset is entered depending on the type of measurement taken. For vertical, the offset is simply added to the measured vertical height to produce a “true” vertical height. For slant height, the vertical height must be first calculated using the radius of the antenna, then the offset can be added. The offsets are not the same number because of the difference in location between the slant measuring point and the vertical measuring point.

3. Record the antenna height, point name and start time in the field notes.
4. Connect the antenna to the receiver using the antenna cable.

Setup Receiver

This section assumes you have already configured your receiver using PC-CDU.

5. Press the MINTER **power** key and release it to turn the receiver on. The STAT (status) light (LED) will blink red at first.
6. Once the receiver has locked onto satellites, the STAT light will blink green for GPS satellites, orange for GLONASS satellites, and a short red blink indicating it has not solved a position.
7. Once the short red blink is gone, the receiver has a position and surveying can be started. You should wait until there is no red blink before starting data collection. This ensures that the receiver has the correct date, time and is locked onto enough satellites to ensure good quality data.

The process of locking onto satellites normally takes less than one minute. In a new area, under heavy tree canopy, or after resetting the receiver, it may take several minutes.

Collect Data

8. To begin collecting data, press and hold the **FN** (function) key for more than one second and less than five seconds.
9. Release the **FN** key when the REC (recording) LED light turns green. This indicates that a file has opened and data collection has started. The REC LED blinks each time data is saved to the internal memory.



Tip

You can use PC-CDU to log data. See the *PC-CDU User's Manual* for this procedure.

10. When finished, press and hold the **FN** key until the REC LED light goes out.
11. Press and hold the **power** key until all lights go out, then release.

Surveying with the Odyssey-E

The Odyssey-E receiver can be used to perform the following types of surveying:

- Static (see “Static Survey” on page 3-7)
- Kinematic (see “Kinematic Survey” on page 3-10)
- Real-time kinematic (RTK) (see “Real-time Kinematic Survey” on page 3-15)

Static Survey

Static surveying is the classic survey method, well suited for all kinds of baselines (short, medium, long). At least two receiver antennas, plumbed over the survey marks, simultaneously collect raw data at each end of a baseline during a certain period of time. These two receivers track four or more common satellites, have the same data logging rate (5–30 seconds), and the same elevation mask angles. The length of the observation sessions can vary from a few minutes to several hours. The optimal observation session length depends on the surveyor’s experience as well as the following factors:

- The length of the baseline measured
- The number of satellites in view
- The satellite geometry
- The antenna’s location (DOP)
- The ionospheric activity level
- The types of the receivers used
- The accuracy requirements
- The necessity of resolving carrier phase ambiguities

Generally, single-frequency receivers are used for baselines with lengths 15 kilometers (9.32 miles) or less. For baselines 15 km or greater, use dual-frequency receivers.

Dual-frequency receivers have two major benefits. First, dual-frequency receivers can estimate and remove almost all the ionospheric effect from the code and carrier phase measurement corrections, providing much greater accuracy than single-frequency receivers over long baselines or during ionospheric storms. Secondly, dual frequency receivers need far less observation time to reach the desired accuracy requirement.

After the survey completes, data the receivers collect can be downloaded onto a computer and processed using post-processing software (for example, Pinnacle).

The procedure that follows describes the steps the operator should take to perform a static survey using MINTER.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
2. Using PC-CDU, click **Configuration->Receiver ->MINTER** and specify the following parameters, or specify parameters according to your particular job, then click **Apply** (Figure 3-3 on page 3-9):
 - Recording Interval – 15 seconds
 - Elevation Mask Angle – 15 degrees
 - File Name Prefix – last 3 digits of receiver serial number
 - LED blink mode switch – enable to start and stop static data recording using the FN key

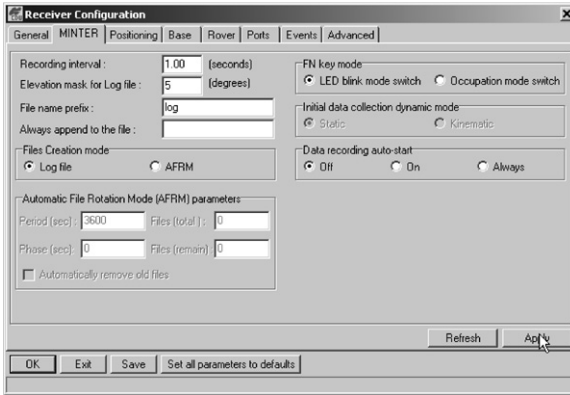


Figure 3-3. Configuration->Receiver->MINTER

3. Click **Advanced** and then the **Multipath** tab and set the following parameters, then click **Apply** (Figure 3-4):
 - Code Multipath Reduction – enable
 - Carrier Multipath Reduction – enable

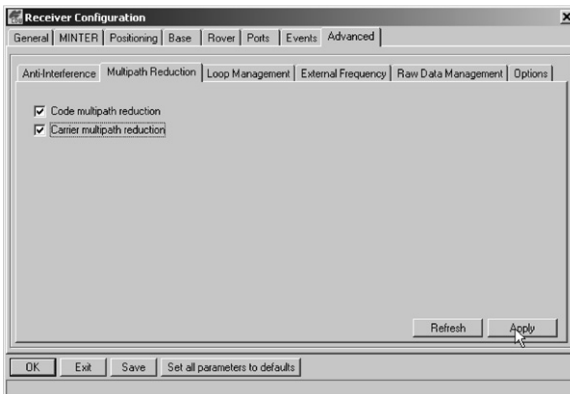


Figure 3-4. Advanced->Multipath

4. Click the **Loop Management** tab and set the following parameters, then click **Apply** (Figure 3-5):

- Enable Co-Op tracking – enable
- Static mode – enable

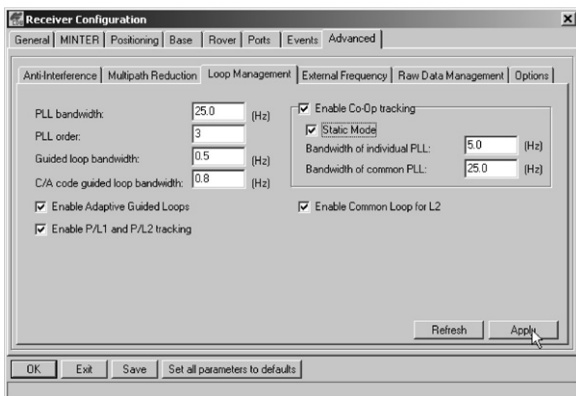


Figure 3-5. Advanced->Loop Management

5. Set up the receiver, or an external antenna and receiver, as described in “Odyssey-E Setup” on page 3-1.

Kinematic Survey

You can use the kinematic survey method in two ways:

- Stop and Go survey
- Kinematic continuous (Trajectory) survey

Stop and Go Survey

The stationary receiver (Base station) is set up at a known point such as a survey monument. The receiver continually tracks the satellites and logs the raw data into the memory. The rover receiver is set up at an unknown point and collects data in static mode for 2 to 10 minutes.

With the Rover, users move from survey point to survey point, assigning the Rover’s status between kinematic and static. The receiver continues to collect data while

moving from point to point. The occupation time for points depends on the same factors as for the static survey method. Remember that both the Base station and Rover must collect data

- from the same satellites,
- at the same data recording rate, and
- with identical elevation mask angles.

This method of GPS surveying allows operators to reduce point occupation time, permitting field crews to survey more points as compared to other surveying methods.

1. Using PC-CDU, configure and set up the Base station as described in “Static Survey” on page 3-7.
2. Using PC-CDU, click **Configuration->Receiver ->Minter**, configure the Rover with the following parameters, and click **Apply** (Figure 3-6):
 - FN Key Mode, Occupation Mode Switch – enable
 - Initial data collection dynamic mode, Static – enable
 Refer to Table 4-1 on page 4-4 for FN functions and REC LED statuses.

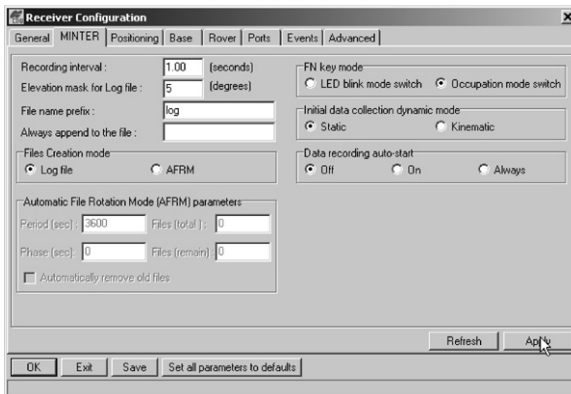


Figure 3-6. Rover MINTER Configuration

**NOTICE**

Remember, both receivers must collect data from the same satellites at the same data recording rate and with the identical elevation mask angles.

3. Set up the Rover at an unknown point and press **power**.
4. Press the **FN** key for one to five seconds. Allow the Rover to collect data during the time you specified. The REC LED will be orange.
5. Check the STAT light for satellites tracked.
6. When finished, quickly press and release the **FN** key to assign the Rover to kinematic.

**Tip**

Remember, if the REC LED blinks green, the current mode is dynamic, if it blinks orange, the current mode is static.

7. Move the Rover to the next location (survey point), and press the **FN** key for less than a second to collect the data in static mode for 2 to 10 minutes.
8. Repeat steps five and six until all the points have been surveyed. The occupation time for the points depends on the same factors as for the static survey method.
9. When finished, press the **FN** key to stop logging data. Turn off the Rover if needed.

Kinematic Continuous

Kinematic continuous surveying, also known as trajectory surveying, allows the Rover to move without having to stand still, record data, move to another point, and do it all again.

If the surveyor knows the coordinates of the starting point, the rover will not need to be initialized. This procedure (i.e., determination of the ambiguity parameters) is carried out while the rover is moving and is called “on-the-fly ambiguity resolution.” Furthermore, if loss of lock occurs (such as, an obstruction that prevents a clear view of the sky), the receiver will also be re-initialized on-the-fly.

After the survey completes, data the receivers collect can be downloaded onto a computer and processed using post-processing software (for example, Pinnacle).

1. Using PC-CDU, configure and set up the Base station as described in “Static Survey” on page 3-7.
2. Using PC-CDU, click **Configuration->Receiver ->MINTER**, and configure the Rover with the following parameters, then click **Apply** (Figure 3-6 on page 3-11):
 - FN Key Mode, Occupation Mode Switch – enable
 - Initial data collection dynamic mode, Kinematic – enable



NOTICE

Remember, both receivers must collect data from the same satellites at the same data recording rate and with identical elevation mask angles.

- Click the **Advanced** tab, then the **Loop Management** tab, and configure the Rover with the following parameters, then click **Apply** (Figure 3-7):

- Enable Co-Op tracking – enable
- Static mode – disable

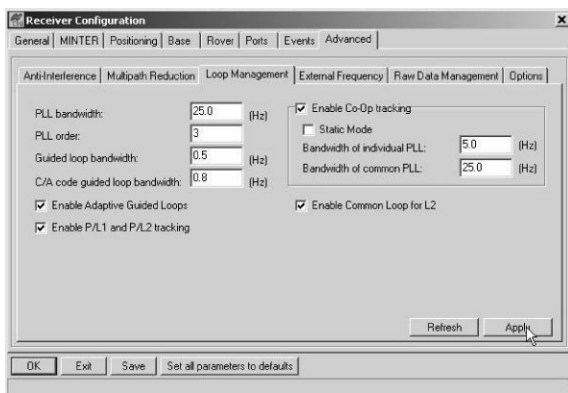


Figure 3-7. Advanced->Loop Management

- Set up the Rover at a start point with unknown coordinates and press the **power** key. Pause for several minutes while the receiver compiles an almanac.
- Check the STAT light for satellites tracked. Record the antenna height and a start point or trajectory name in the field notes.
- Press the **FN** key for one to five seconds to begin logging data in kinematic mode (the antenna status is kinematic).
- Move the Rover receiver along the selected trajectory.
- Once the Rover receiver reaches the end point of the trajectory, pause for several minutes.
- When finished, press the **FN** key to stop logging data and turn off the Rover.

10. Stop data logging and turn off the Base station receiver.

Real-time Kinematic Survey

Real-time kinematic (RTK) is a differential GPS process where information, such as differential corrections, is transmitted in real-time from a Base station to one or more Odyssey-E Rover stations.

Setting up an RTK Base Station

To configure a Legacy-E RTK Base station using PC-CDU, take the following steps:

1. Set up the Base station receiver's antenna as described in "Setup Antenna" on page 3-1.
2. Connect an external modem to port C (Legacy-E). The internal radio should already have been configured.

3. Set up hardware as shown in Figure 3-8. This setup shows a Legacy-E Base station setup.

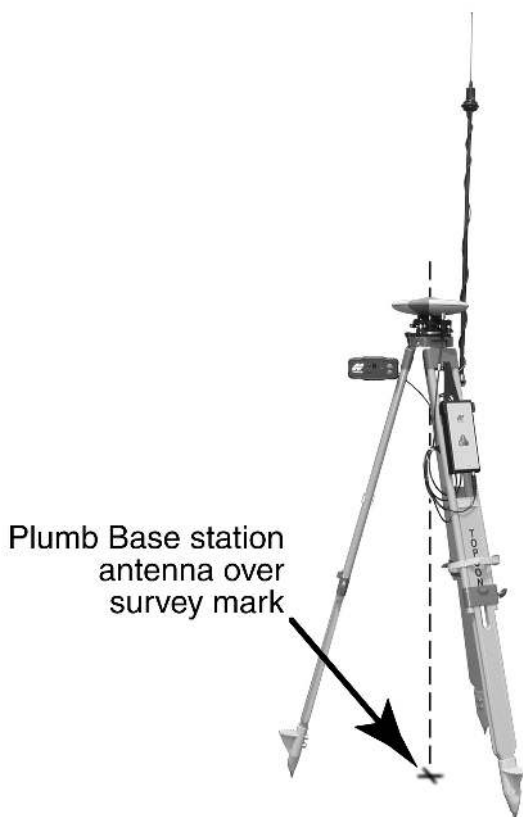


Figure 3-8. Legacy-E Base Station Setup



NOTICE

Connect the radio antenna before switching the modem to the transmitting mode.

4. Press the **power** key on the receiver.
5. Check the STAT light for tracked satellites.

6. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
7. Click **Configuration->Receiver**.
8. Restore the receiver’s default settings. Click the **Set all parameters to defaults** button located at the bottom of the Receiver Configuration screen (Figure 3-9).

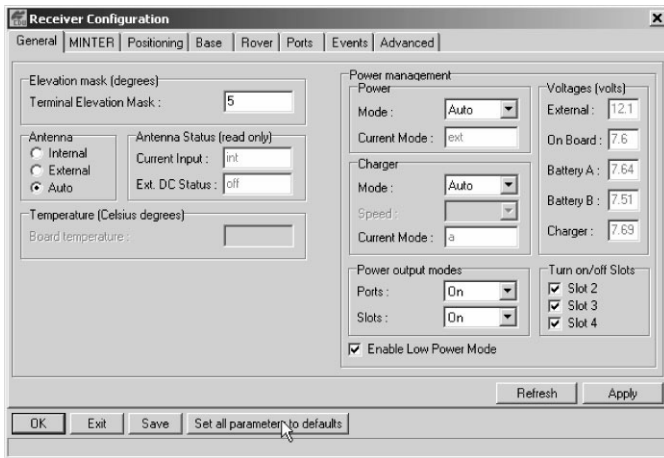


Figure 3-9. Set All Parameters to Defaults

9. On the Receiver Configuration screen, select the **MINTER** tab and specify your desired settings. See the *PC-CDU User’s Manual* for more information.

10. Select the **Positioning** tab and set the Position Masks, Elevation mask parameter to 15 (Figure 3-10).

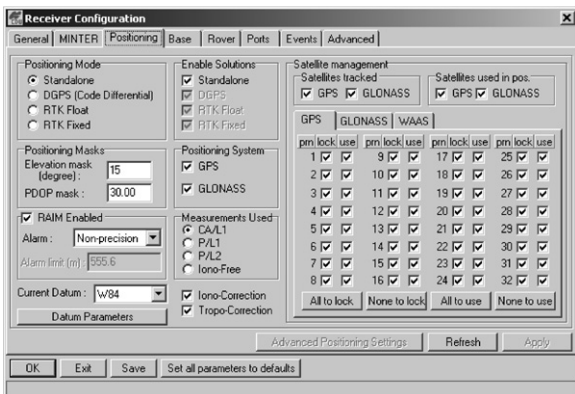


Figure 3-10. Receiver Configuration – Positioning

11. Select the **Base** tab and set the following parameters (Figure 3-11 on page 3-19):

- GPS/GLO at one time – enable
- Antenna position – enter Lat, Lon, and Alt values.

OR

Click **Get from receiver**.

OR

Select Averaged and enter the Averaged Span in seconds, then click **Apply**. Click **Tools->Reset receiver** and wait until the specified interval (span) completes. Examine the Base coordinates on the **Base** tab, they should correspond to the coordinates obtained from the average. Click **Refresh** if the coordinates are zeros.

**NOTICE**

The reference geodetic coordinates you specify on this tab will relate to the antenna L1 phase center.

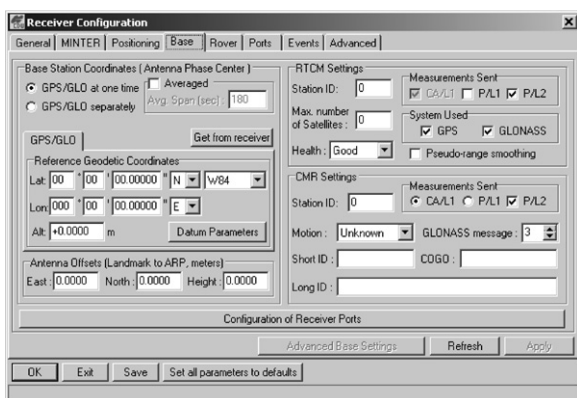


Figure 3-11. Base Tab Configuration

12. Select the **Ports** tab and set the following port parameters (Figure 3-12 on page 3-20).
 - Output drop-down list – select type and format of differential corrections.
 - Period (sec) – enter interval at which receiver will generate differential corrections.
 - Baud rate drop-down list – select a baud rate (i.e., the rate with which differential messages will be transmitted from receiver to modem).



Tip

For Pacific Crest PDL (UHF) modems, use a 38400 baud rate. For Spread Spectrum 915 MHz/2.4 GHz modems, use a 19200 baud rate.

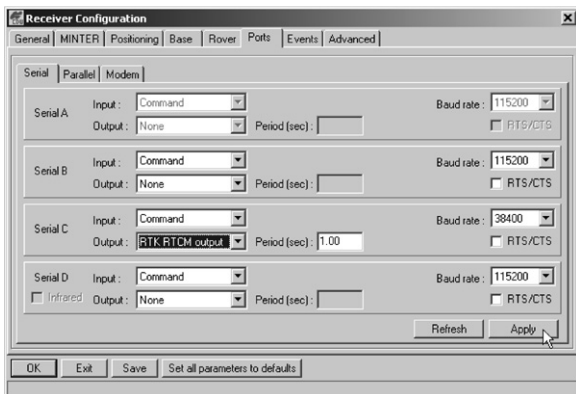


Figure 3-12. Base Configuration – Ports

13. Click **Apply**. The receiver begins generating data on the selected port.

When using a Pacific Crest PDL (UHF) external modem, follow these steps to configure this modem:

14. When finished with the previous steps, press the **power** button on the external modem.
15. Select the radio transmission power using the **Low/High** toggle on the rear panel of the modem. When in High, the AMP PWR LED will be turned on.
16. Use the **Channel** button to set the frequency channel. Check that the modem transmits the corrections (the TX LED will blink red each time the data is transmitted).

For more details on the settings available for configuring the Base station, see the *PC-CDU User's Manual* and the *GPS Receiver Interface Language Manual*.

Setting up an RTK Rover

Use the following steps to set up an Odyssey-E RTK Rover station. You should already have programmed the modem. Figure 3-13 shows the hardware setup for a Rover station with the Odyssey-E on a bipod.



Figure 3-13. Odyssey-E Rover Station Setup

1. Set up the Rover station receiver's antenna as described in "Setup Antenna" on page 3-1.
2. Connect the receiver and your computer as described in "Connecting the Odyssey-E and a Computer" on page 2-5.
3. Click **Configuration->Receiver**.
4. Select the **Positioning** tab and set the Position Masks, Elevation mask (degrees) parameter to 15 (Figure 3-10 on page 3-18).

5. Select the **Rover** tab and set the desired Positioning Mode (Figure 3-14).

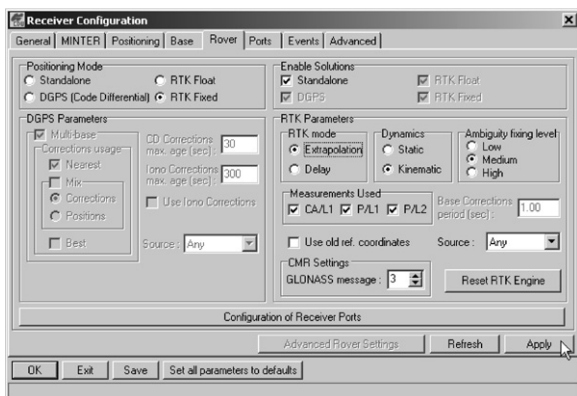


Figure 3-14. Rover Tab Configuration

If you selected RTK Float or RTK Fixed, adjust the following RTK Parameters settings:

- Select Extrapolation or Delay.
 - Extrapolation is for low-latency, high frequency output (≥ 5 Hz) RTK applications. The rover will extrapolate the base station's carrier phase measurement corrections when computing the rover's current RTK position.
 - Delay is for 1 Hz high precision RTK applications. The Rover RTK engine will compute either a delayed RTK position (for the epoch to which the newly received RTCM/CMR message corresponds) or the current stand-alone position (while waiting for new RTCM/CMR messages coming from the base).
- Select the Dynamics of the antenna status during RTK, either Static or Kinematic.
- Specify the Ambiguity fixing level. The Ambiguity Fixing Level radio buttons govern the process of the RTK engine fixing integer ambiguities. The RTK

engine uses the ambiguity fix indicator when making decision whether to fix ambiguities or not. Low, Medium, and High correspond to the indicator's 95%, 99.5% and 99.9% states, respectively. The higher the specified confidence level, the longer the integer ambiguity search time

6. Select the **Ports** tab and set the following parameters for Serial port C (Figure 3-15):
 - Input drop-down list – select desired differential correction format.
 - Period (sec) – leave as is.
 - Baud rate drop-down list – select a baud rate (i.e., the rate with which differential messages will be transmitted from modem to receiver).



Tip

For Pacific Crest PDL (UHF) modems, use a 38400 baud rate. For Spread Spectrum 915 MHz/2.4 GHz modems, use a 19200 baud rate.

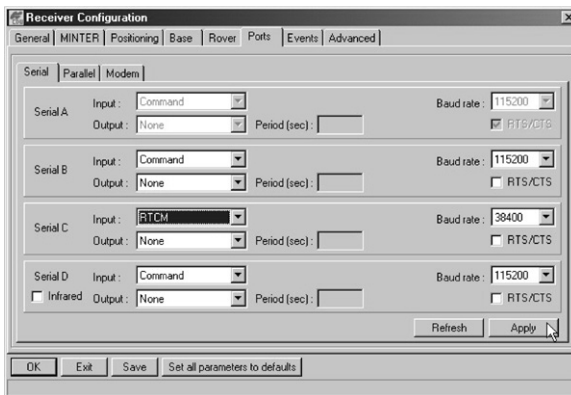


Figure 3-15. Rover Configuration – Ports

7. Click **Apply**.

8. Click **OK** to close the Receiver Configuration screen.
9. On the main screen (Figure 3-16), check the LQ field to ensure the receiver obtains differential corrections. Usually, the receiver will start to output the coordinates of the antenna's phase center among with the solution type in 10–30 seconds.

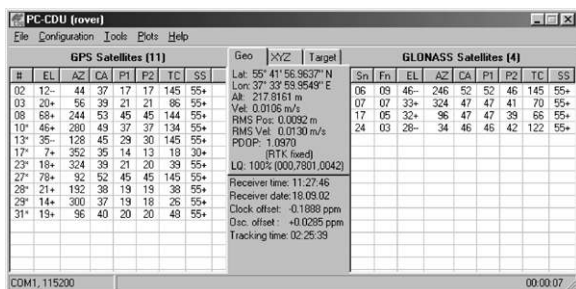


Figure 3-16. PC-CDU Main Screen

The geodetic coordinates displayed on the Geo tab are always computed in WGS84 and have four solution types:

- Standalone
- Code differential
- RTK float
- RTK fixed

The LQ field reflects the status of the received differential messages and contains the following information:

- Data link quality in percentage
- Time (in seconds) elapsed since the last received message
- Total number of received correct messages
- Total number of received corrupt messages

If the receiver is not (for some reason) receiving differential corrections or if none of the ports have been configured to receive differential corrections, the LQ field will either be empty or it will look like this: 100%(999,0000,0000).

For more details on the settings available for Rover configuration, refer to the *PC-CDU User's Manual* available on the TPS website.

[illegible]

Operation

Once you have configured your Odyssey-E receiver, operation is simple. This chapter describes standard Odyssey-E operating procedures:

- Using the MINTER
- Using the touch screen and keypad
- Downloading Odyssey-E files to a computer
- Deleting receiver files
- Checking options and loading an OAF
- Managing Odyssey-E memory
- Clearing the NVRAM
- Changing receiver modes
- Checking and loading firmware

Using the MINTER

The MINTER (Figure 4-1) is Topcon's Minimum INTERface used to display and control data input and output.

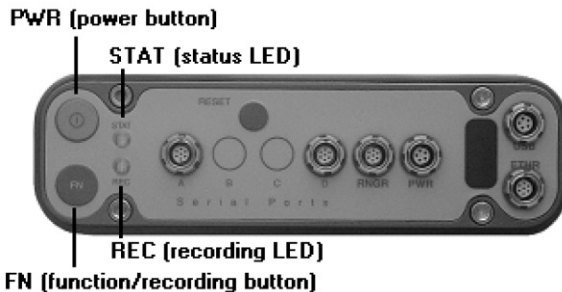


Figure 4-1. MINTER

Status LED

- When the receiver is on and no satellites are tracked, the STAT LED will blink red.
- When satellites are tracked, the STAT LED will produce one blink for each tracked satellite (green for GPS, orange for GLONASS).

FN Key and REC LED

- Pressing the **FN** key for less than one second switches the receiver between different information modes (normal and extended information), or between static and dynamic post-processing modes, depending on the receiver's configuration.

During the first second of pressing the **FN** key, the REC LED is orange.

- Pressing the **FN** key for more than one and less than five seconds will start/stop data recording.

During data recording the REC LED is green or orange.

If the REC LED is red, the receiver has run out of memory, has a hardware problem, or contains an improper OAF (see “Option Authorized File (OAF)” on page 1-21 for more information on OAFs).

- The REC LED blinks green or orange each time data is written to the internal receiver's memory.

You set the data recording time interval using PC-CDU. See “Recording Interval parameter” on page 2-31 for information on setting this function.

Each time you turn off or on data recording, either a new file opens or data appends to a particular file. See “Always Append to the File parameter” on page 2-32 and “Files Creation Mode parameter” on page 2-32 for information on setting this function.

- Pressing the **FN** key for more than five and less than eight seconds will turn the baud rate of serial port A to 9600.

After about five seconds of pressing the **FN** key, the REC LED becomes red. Release the **FN** key while the REC LED is red (during the next three seconds).

Pressing the **FN** key for more than eight seconds has no impact.

- After loading new firmware or clearing the receiver's NVRAM, the receiver checks its internal file system.

During this operation, the REC LED flashes orange, and the file system is not accessible for CDU (control display unit) applications or for data recording. This operation may require from fractions of a second to several minutes, depending on the circumstances and the amount of internal memory.

Table 4-1 on page 4-4 summarizes FN key functions and REC LED statuses. See “FN Key Mode parameter” on page 2-33 for information on setting FN key modes.

Table 4-1. FN Key Functions and REC LED Status

FN Key	REC LED	Status
When data recording is off...		
Not pressed	No light	No data recording.
	Orange blink	Internal file system test in progress.
	Red	No free memory; hardware problem with data recording.
Press < 1 second	If FN key mode is “LED blink mode switch”	
	Orange	Release to change information mode.
	If FN key mode is “Occupation mode switch”	
	Orange	No function.
Press 1–5 seconds	If FN key mode is “LED blink mode switch”	
	Green	Release to start data recording (post-processing occupation mode undefined).
	If FN key mode is “Occupation mode switch”	
	Green	Release to start recording (Kinematic or Static post-processing occupation mode)
Press 5–8 seconds	Red	Release to turn serial port A baud rate to 9600 bps.
Press > 8 seconds	No light	No function.

Table 4-1. FN Key Functions and REC LED Status

FN Key	REC LED	Status
When data recording is on...		
Not pressed	Red	No free memory; hardware problem with data recording.
	If FN key mode is “LED blink mode switch”	
	Green	Data recording started (post-processing occupation mode undefined).
	If FN key mode is Occupation mode switch	
	Green	Data recording started (Kinematic post-processing occupation mode).
	Orange	Data recording started (Static post-processing occupation mode).
Press < 1 second	If FN key mode is “LED blink mode switch”	
	Orange	Release to change information mode.
	If FN key mode is “Occupation mode switch”	
	Orange	Release to toggle between Static and Kinematic post-processing modes.
Press 1–5 seconds	No light	Release to stop data recording.
Press 5–8 seconds	Red	Release to turn serial port A baud rate to 9600 bps.
Press > 8 seconds	No light	No function (data recording still on).

Information Modes

The Odyssey-E MINTER has two information modes: Normal and Extended Information Mode (EIM).

Normal

In normal mode, the STAT LED indicates the number of tracked satellites and the position computation status.

Extended Information Mode (EIM)

Extended Information Mode is used for receiver testing purposes. In this mode, the receiver continues to work as usual, but the STAT LED indicates the following “extended” information:

- Delimiter – An easily distinguishable double-blink that shows the overall status of tests performed in EIM. Its color is calculated from colors of other blinks. It is orange if at least one of blinks is orange. It is red if no other blinks are orange and there is at least one red blink. It is green in all other cases.
- Enough data for position computation.
- GPS S/N (signal to noise) ratio is good (see Table 4-2).
- GLONASS S/N ratio is good (see Table 4-2).
- Oscillator frequency offset is not more than 3 ppm.
- Oscillator's Allan Variance is better than $2.7e-10$.
- Continuous tracking time is more than 15 minutes.

Table 4-2. Signal-to-Noise (S/N) “Good” Ratios

	CA/L1	P/L1	P/L2
GPS	51	39	39
GLONASS	51	49	40

In EIM, the receiver blinks 7 times per cycle. Each blink could be orange, red, or green.

- Orange – information for test isn't available.
 - Green – receiver passed the test.
 - Red – receiver failed the test.
1. To switch to EIM, press and quickly release (within one second) the **FN** key on the MINTER.
 2. Watch for the delimiter double-blink. With good receiver, antenna, and observation conditions, all blinks should be green within 15 minutes of powering on.
 - Green – ok
 - Orange – wait
 - Red – some tests failed
 3. To switch back to normal, press and quickly release the **FN** key.

Using the Integrated Controller

The Odyssey-E includes an integrated controller that allows you to change settings, enter data, and make selections in the field.

Touch Screen Functions

The integrated Windows CE controller uses a touch sensitive screen to assist with using the receiver's software. To use this screen:

- Use the cursor keys and press Enter.
- Use the stylus or a finger to tap or double tap a selection or object, or tap Enter.
- To move an object, press a stylus or finger on the object while dragging across the screen.

Keypad Functions

The keypad of the integrated controller is designed for a maximum comfort, efficiency, safety and ease of use, especially in the field (Figure 4-2).

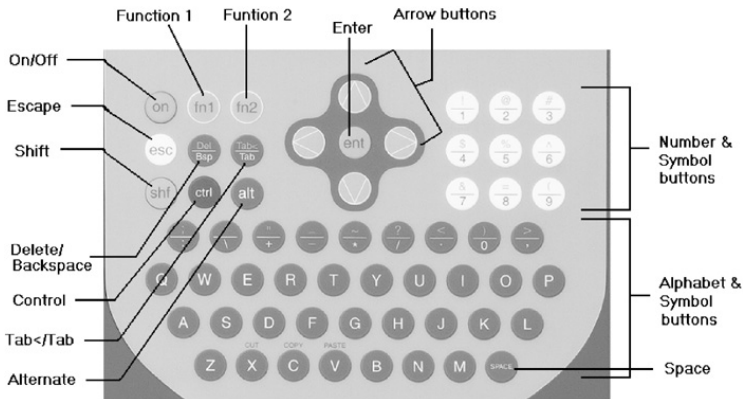


Figure 4-2. Windows® CE Controller Keypad

The keys on the keypad can be classified as follows:

- Alphanumeric (letters and numbers) and punctuation (comma, period, exclamation mark, and so on) keys. These keys allow data entry.
- Special keys (function keys, arrow keys, and so on). These keys can change the function of other keys, move the cursor or insertion point right, left, up or down, etc.

Table 4-3 lists particular keys and their function.

Table 4-3. Special Keys and Functions

Key	Function
on	Turns the receiver on/off
esc	Cancels the current task
shf	Activates function in yellow
ctrl	Shift key

Table 4-3. Special Keys and Functions

Key	Function
alt	Shift key
fn1	For future implementation
fn2	For future implementation
ent	Activate the selected item
arrow	Moves cursor or insertion point

Table 4-4 summarizes useful key combinations.

Table 4-4. Key Combinations

Key Combination	Function
[shf]+[on]	Turns the backlight on/off
[ctrl]+[C]	Copy
[ctrl]+[V]	Paste
[shf]+[Del]	Delete file in Explorer
[alt]+[<] or [alt]+[>]	Display contrast
[shf]+[ctrl]+[on]	Soft reset
[on] held for 5–8 seconds	Hard reset
[alt]+[tap on item]	Displays shortcut commands (sam as right-click on mouse)
[alt]+[ctrl]+[+]	Touch screen calibration
[ctrl]+[esc]	Windows Start menu
[alt]+[Tab]	Switch to another active program Display Windows CE Task Manager

Downloading Files to a Computer

The Odyssey-E stores files in its on board memory. This memory holds a finite amount of files and information, so downloading the files to your PC or laptop ensures that no files are lost.

You should download files as soon as possible after collecting data at the jobsite. PC-CDU provides a File Manager to download files to your computer and delete files from the Odyssey-E.

When your survey finishes, you can download your survey files to a computer for storage, post-processing, or backup.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.

AND

Enable RTS/CTS handshaking (Figure 4-3).

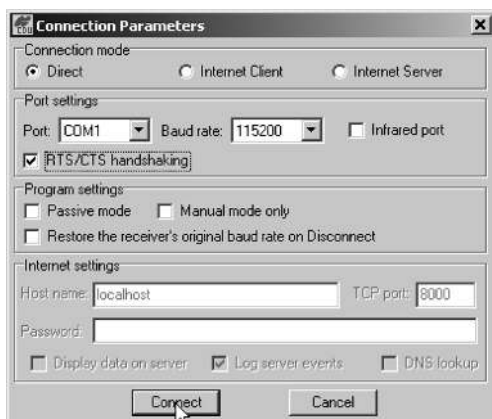


Figure 4-3. Connection Parameters – RTS/CTS Handshaking

- Click **File->File Manager** (Figure 4-4).

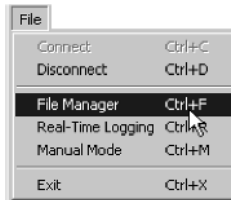


Figure 4-4. File->File Manager

- Click the **Download path** tab on the File Manager dialog box (Figure 4-5).

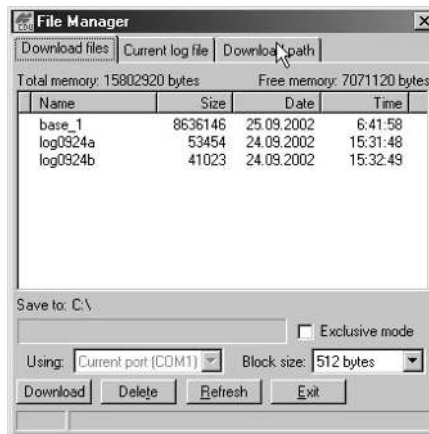


Figure 4-5. Find Files to Download

- Navigate to and open the folder in which to download and store files.

OR

Type a new folder name and click **Create** to create a new folder in which to download and store files. Open this new folder.

- Select the **Download files** tab.
- Select the file(s) you want to download (Figure 4-6 on page 4-12).

To select multiple files, hold down the **Shift** key and click on nonsequential files to select several files at once; or hold down the **Ctrl** key and click in individual files.



Figure 4-6. Download Files

- Click the **Download** button to begin downloading files (Figure 4-6).

During downloading, the following status indicators display next to each file (Figure 4-7 on page 4-13).

- Blue indicator – file in queue for downloading.
- Red indicator – file currently downloading.
- Green indicator – file has successfully downloaded.

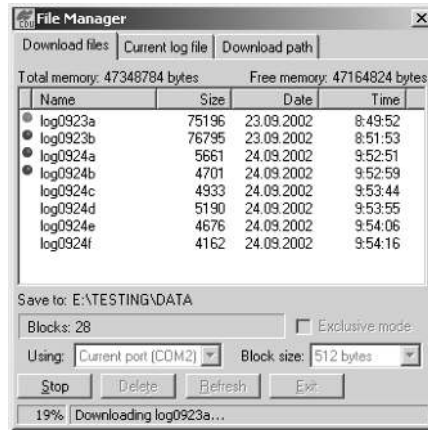


Figure 4-7. File Download in Progress

8. Click **Exit** on the File Manager screen.
9. Click **File->Disconnect**, then **File->Exit** to quit PC-CDU (Figure 4-8).

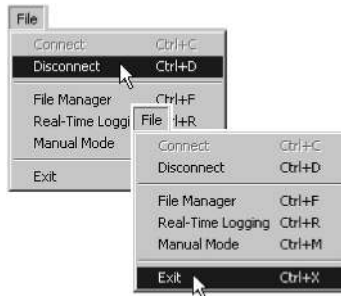


Figure 4-8. File->Disconnect then File->Exit

Deleting Files

Use the following steps to delete files from the Odyssey-E receiver.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.

AND

Enable RTS/CTS handshaking (Figure 4-9).

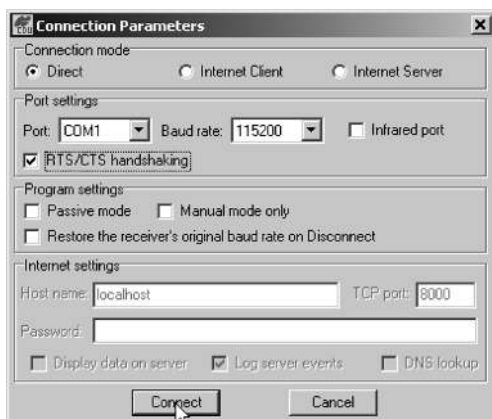


Figure 4-9. Connection Parameters – RTS/CTS Handshaking

2. Click **File->File Manager** (Figure 4-10).

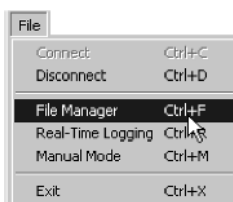


Figure 4-10. File->File Manager

3. On the **Download files** tab or **Current log files** tab, select the file(s) you want to delete (Figure 4-11 on page 4-15).

To select multiple files, hold down the **Shift** key and click on non-sequential files to select several files at once; or hold down the **Ctrl** key and click in individual files.

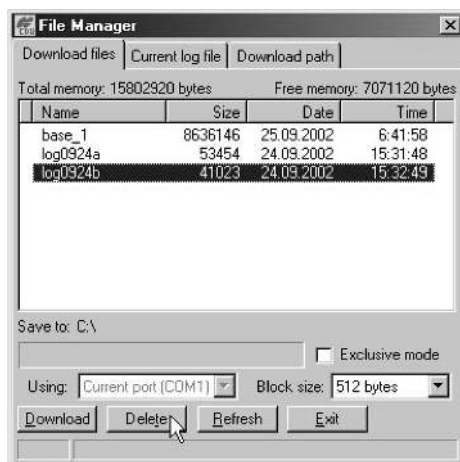


Figure 4-11. Delete Files

4. Click **Delete**.
5. Click **Yes** at the delete files confirmation dialog box. The selected files will be deleted.
6. Click **Exit**.
7. Click **File->Disconnect**, then **File->Exit** to quit PC-CDU (Figure 4-12).

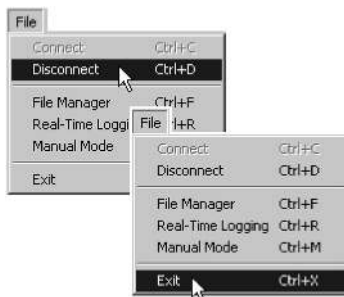


Figure 4-12. File->Disconnect then File->Exit

Checking Options



TIP

See “Option Authorized File (OAF)” on page 1-21 for a list of common options. For a complete list of options and their details, visit the Topcon website.

You can check the status of your receiver’s options, and load any new OAF, using the RS232 cable, a laptop or PC, and PC-CDU. Refer to the *PC-CDU User’s Manual* for a more complete description of the PC-CDU software.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
2. Click on **Tools->Receiver Options** (Figure 4-13).

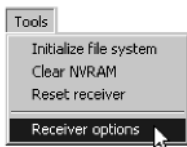
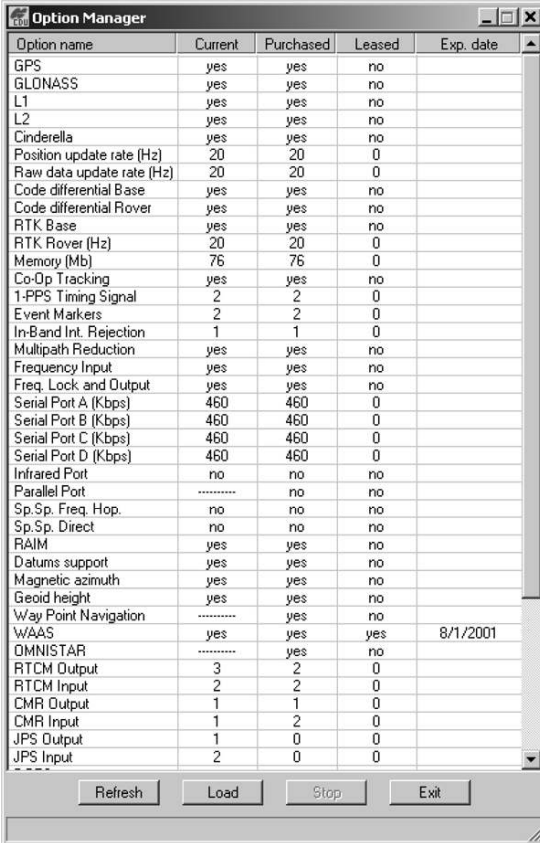


Figure 4-13. Tools->Receiver Options

The Options Manager screen displays (Figure 4-14 on page 4-17) and contains the following information:

- Option name – a name/description of the option
- Current – the current status of the option
- Purchased – if the option is purchased or not
- Leased – if the option is leased or not
- Expiration date – the date the option will disable, if applicable



Option name	Current	Purchased	Leased	Exp. date
GPS	yes	yes	no	
GLONASS	yes	yes	no	
L1	yes	yes	no	
L2	yes	yes	no	
Cinderella	yes	yes	no	
Position update rate (Hz)	20	20	0	
Raw data update rate (Hz)	20	20	0	
Code differential Base	yes	yes	no	
Code differential Rover	yes	yes	no	
RTK Base	yes	yes	no	
RTK Rover (Hz)	20	20	0	
Memory (Mb)	76	76	0	
Co-Op Tracking	yes	yes	no	
1-PPS Timing Signal	2	2	0	
Event Markers	2	2	0	
In-Band Int. Rejection	1	1	0	
Multipath Reduction	yes	yes	no	
Frequency Input	yes	yes	no	
Freq. Lock and Output	yes	yes	no	
Serial Port A (Kbps)	460	460	0	
Serial Port B (Kbps)	460	460	0	
Serial Port C (Kbps)	460	460	0	
Serial Port D (Kbps)	460	460	0	
Infrared Port	no	no	no	
Parallel Port	-----	no	no	
Sp.Sp. Freq. Hop.	no	no	no	
Sp.Sp. Direct	no	no	no	
RAIM	yes	yes	no	
Datums support	yes	yes	no	
Magnetic azimuth	yes	yes	no	
Geoid height	yes	yes	no	
Way Point Navigation	-----	yes	no	
WAAS	yes	yes	yes	8/1/2001
OMNISTAR	-----	yes	no	
RTCM Output	3	2	0	
RTCM Input	2	2	0	
CMR Output	1	1	0	
CMR Input	1	2	0	
JPS Output	1	0	0	
JPS Input	2	0	0	

Buttons: Refresh Load Stop Exit

Figure 4-14. Option Manager

Since options can be both purchased and leased, the “Current” status of the option displays the currently effective value.

- -1 – the firmware version does not support this option.
 - 0 – the receiver option is disabled.
 - positive integer – the option is enabled.
3. When finished, click **Exit** on the Option Manager screen, then click **File->Disconnect** to prevent conflicts with serial port management.

Loading an OAF

Topcon Positioning Systems dealers provide customers with OAF files. For any OAF related questions, E-mail TPS at options@topconps.com. Please have your receiver ID number available (see “Checking Firmware Version” on page 4-23).

1. To load a new OAF, follow steps one through eight in “Checking Options” on page 4-16.
2. Click **Load** at the bottom of the Option Manager screen (see Figure 4-14 on page 4-17).
3. Navigate to the location of the new Option Authorized File. OAFs have .jpo or .tpo extensions and are unique to each receiver (Figure 4-15).

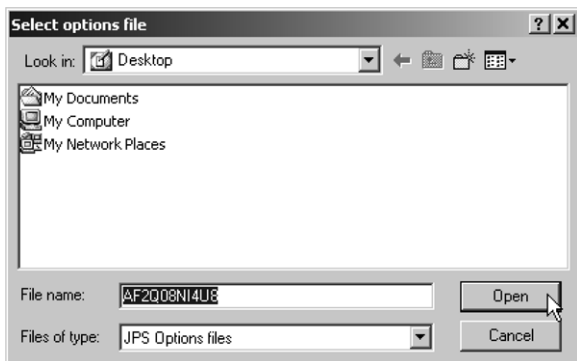


Figure 4-15. Load OAF

4. Select the appropriate file and click **Open** (Figure 4-15). The new OAF will load onto the receiver and the Option Manager table will update.
5. When finished, click **Exit** on the Option Manager screen, then click **File->Disconnect** to prevent conflicts with serial port management.

Managing Odyssey-E Memory

When using your Odyssey-E in static or dynamic applications, it is useful to know the amount of memory occupied by the receiver's log file. The specific memory size depends on the type of data being recorded. Use the formulas below to compute the approximate size of the receiver's log files.

- SS – the estimated size of one epoch of raw data in the receiver's log file (expressed in bytes).
- N – the number of observed satellites per epoch.

When recording only L1 data:

$$SS = 183 + 22 * N$$

When recording L1 and L2 data:

$$SS = 230 + 44 * N$$

Clearing the NVRAM

The receiver's non-volatile RAM (NVRAM) keeps data required for satellites tracking, like ephemeris and receiver position. NVRAM also keeps the current receiver's settings like active antenna input, elevation masks, recording interval and information about the receiver's internal file system.

Even though clearing the NVRAM is not a common (nor normally a recommended) operation, there are times when clearing the NVRAM can eliminate communication or tracking problems. Clearing the NVRAM in your Odyssey-E can be interpreted as a "soft boot" in your computer.



TIP

Firmware versions 2.2p1 or higher keep the PDL modem on after clearing NVRAM.

After clearing the NVRAM, your receiver will require some time to collect the new ephemerides and complete almanacs (around 15 minutes).

Clearing the NVRAM of your receiver will not delete any of the files already recorded in your Odyssey-E's memory. However, it will reset your receiver to factory default values.

In addition, the NVRAM is used to keep information about the receiver file system. Note that after clearing the NVRAM the receiver's REC LED will flash orange for a few seconds indicating that the receiver is scanning/checking the file system.

There are two ways to clear NVRAM:

1. In the field, using MINTER.
2. Using PC-CDU.

Use MINTER to Clear NVRAM

1. Press the **power** key to turn off the receiver.
2. Press and hold the **FN** key.
3. Press and hold the **power** key for about one second. Release the **power** key while continuing to hold the **FN** key.
4. Wait until both LEDs are green
5. Wait until both LEDs blink orange.
6. Release the **FN** key while LEDs blink orange.

Use PC-CDU to Clear NVRAM

1. Connect your receiver and computer. See "Connecting the Odyssey-E and a Computer" on page 2-5 for this procedure.

2. Click **Tools->Clear NVRAM** (Figure 4-16). The REC LED rapidly flashes green and red; the STAT LED flashes just red.

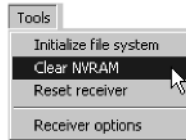


Figure 4-16. Tools->Clear NVRAM

3. The receiver will automatically disconnect once the NVRAM is cleared.

Changing Receiver Modes

The Odyssey-E receiver has four modes, two information modes and two power modes:

- Normal Mode
- Extended Information Mode
- Sleep Mode
- Zero Power Mode

See “Information Modes” on page 4-6 for a description of Normal Mode and Extended Information Mode.

Sleep Mode

Follow these steps to put the Odyssey-E into sleep mode. In sleep mode, the power board will continue to draw power from the batteries, causing the batteries to drain over time. Put the receiver in Zero Power Mode to prevent this (see “Zero Power Mode” on page 4-22).

1. Turn on your receiver.
2. Press the receiver’s **power** key for more than four seconds and less than eight seconds. The STAT LED will be orange.
3. Any activity on the RS232 port will turn the receiver on.

**NOTICE**

If you press the power key for more than 14 seconds, it will be ignored. This protects receiver operation against stuck keys.

Zero Power Mode

When your Odyssey-E is off, even in Sleep Mode, the power board will continue to draw power from the batteries. This means that if you fully charge your receiver, turn it off and store it, the receiver will drain its battery power in less than 2 months. To stop the power board from draining the batteries, put your receiver in Zero Power Mode.

1. Turn on your receiver.
2. Press and hold the **power** key for more than eight seconds, but less than 14 seconds; the STAT and REC LEDs will turn orange, then red.
3. When red, release the **power** key. When these LEDs turn off, your receiver will be in Zero Power Mode.
4. Press the **Reset** key for about one second to return to Normal mode.

The batteries will not charge if the receiver is in Zero Power Mode.

**NOTICE**

When the internal batteries have completely discharged and no external power is connected, the receiver will go into Zero Power Mode automatically to prevent battery over discharge.

Checking Firmware Version

You can use PC-CDU to check the firmware version of your receiver. Check the TPS website (www.topcongps.com/software/firmware) for current firmware versions.



NOTICE

The Odyssey-E receiver should be loaded with firmware version 2.2p1 or newer.



CAUTION

Do not use firmware versions 2.2r or older.

1. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
2. Click on **Help->About** (Figure 4-17).



Figure 4-17. Help->About

The About PC-CDU dialog box opens (Figure 4-18).

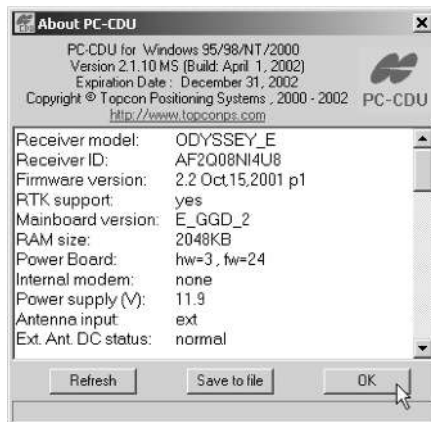


Figure 4-18. About PC-CDU

About PC-CDU lists important information about the different hardware accessories and software properties. This list includes the following, which you will need if you contact TPS or your dealer:

- Receiver model
 - Receiver ID
 - Firmware version
3. When finished, click **Ok**, then click **File->Disconnect** to prevent conflicts with serial port management.

Loading New Firmware

Base and rover receivers must be loaded with the same firmware version. Use the latest firmware version, available for download from the TPS website (www.topcongps.com/software/firmware), to ensure your receiver has access to the most recent updates.



NOTICE

The Odyssey-E receiver should be loaded with firmware version 2.2p1 or newer.



CAUTION

Do not use firmware versions 2.2r and older.

Firmware is released as a compressed file that you download and decompress. This file contains the following three files:

- ramimage.ldr – the Receiver board RAM file
- main.ldr – the Receiver board Flash file
- powbrd.ldr – the Power board RAM file

**NOTICE**

You must load all three files when loading new firmware. These files must come from the same firmware package.

The Odyssey-E uses FLoader, a Windows®-based utility, to load firmware onto the receiver board. You can download FLoader to your computer from the TPS website. For more information, refer to the *FLoader User Manual*, also available on the TPS website.

1. Download and install FLoader, if applicable.
2. Download the new firmware package to your computer.
3. Connect your receiver and computer. See “Connecting the Odyssey-E and a Computer” on page 2-5 for this procedure.
4. Activate FLoader (Figure 4-19).

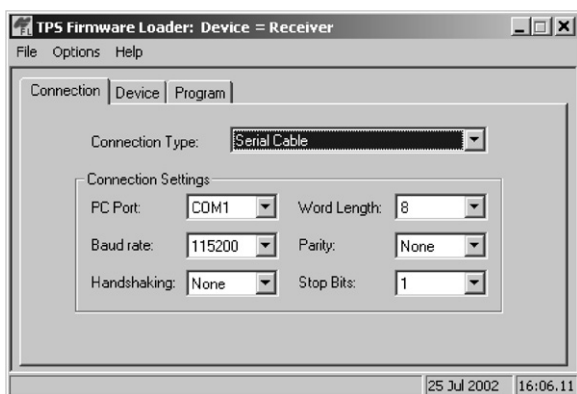


Figure 4-19. FLoader Main Screen

5. On the Connection tab, select the COM port on the computer that connects with your receiver and select its speed (usually 115200) (Figure 4-19).

- Click the **Device** tab and set the Device Type as Receiver (Figure 4-20).



Figure 4-20. Set Device Type

- Click **Get from Device** for Device Information.
- Click the **Program** tab and set the Capture Method to Soft Break Capture (recommended) (Figure 4-21).

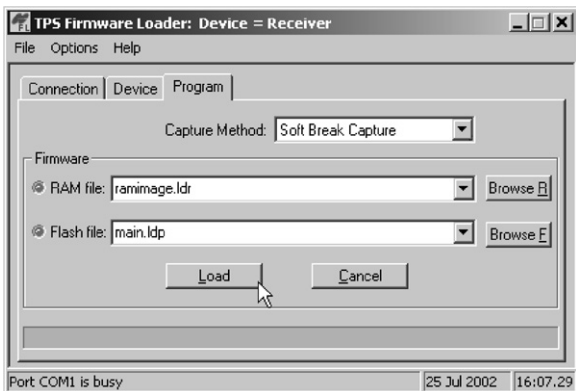


Figure 4-21. Program Tab Settings

- Browse for and select the Receiver board's RAM file (ramimage.ldr) and Flash file (main.ldp) (Figure 4-21).

10. Click **Load** and wait until 100% of the files load into your receiver.



NOTICE

If you selected an incorrect RAM or Flash file, an error message will display at the bottom of the dialog box. Select the correct file.

11. Click the **Device** tab and set the Device Type as Receiver's Power Board (Figure 4-22).



Figure 4-22. Set Device Type

12. Click the **Program** tab. Browse for and select the Power board's RAM file (powbrd.ldr) (Figure 4-23).



Figure 4-23. Program Tab Settings

13. Click **Load** and wait until 100% of the power board file load into your receiver.



NOTICE

If you selected an incorrect RAM file, an error message will display at the bottom of the dialog box. Select the correct file.

14. Click **File->Exit**.
15. Clear the receiver's NVRAM (see "Clearing the NVRAM" on page 4-19) and update the almanac (see "Collecting Almanacs" on page 2-40) after loading new firmware.

Troubleshooting

In general, as long as you follow the maintenance and safety instructions provided in this manual, you should have few problems with your Odyssey-E. This guide will help you diagnose and solve some common problems you may encounter with your Odyssey-E.

Before contacting TPS Customer support about any problems with the receiver, try the following:

- Reset the receiver using PC-CDU (Tools and Reset receiver)
- Restore factory default settings using PC-CDU (press **Set all parameters to defaults**)
- Clear the NVRAM
- Initialize the file system (this will erase all files inside the receiver)



WARNING

Do not attempt to repair equipment yourself. Doing so will void your warranty and may damage the hardware.

Power Problems

All Odyssey-E receivers are preset in the factory as “Auto Mode” for both the power and charger. If you want to check these settings, connect your receiver to your computer and run PC-CDU. Once connected, click **Configuration->Receiver**. On the General tab, you will find the Power and Charger fields. These fields should be set to Auto. If not, change them to Auto and click **Apply**.



TIP

Clearing the NVRAM will also return the receiver to Auto Mode.

- If your Odyssey-E does not power up, press the Reset key. The receiver may be in Zero Power Mode.
- If your Odyssey-E does not power up, please connect a fully charged external battery and retry.
- If receiver is now powered, your internal batteries are discharged. Charge the internal batteries overnight.
- If after charging your internal batteries overnight, your Odyssey-E is not powering, you may have a defective charger or defective internal batteries. In either case, contact TPS Customer Support for advice.
- If the receiver still does not power up, contact TPS Customer Support Group.

Receiver Problems

The following are some of the most commonly encountered problems.

Problem

The receiver cannot establish a connection to a PC or external controller.

Causes

- The cable's connectors are not properly plugged in.
- The cable is damaged.
- The Daisy Chain mode is still active.
- The receiver port used for connection is not in Command mode.

Problem

The receiver does not lock onto satellites for a long period of time.

Causes

- The receiver stores an old almanac.
- The antenna cable is damaged.

Problem

The receiver tracks few satellites.

Causes

- The elevation angle mask value is too high (e.g., above 15 degrees).
- Satellites may be disabled.
- One of the satellite systems is disabled.
- The survey is conducted near obstructions (tree canopy, large multipath, etc.).

Problem

The receiver cannot obtain Code Differential and/or RTK solutions.

Causes

- An improper receiver status has been chosen.
- The corresponding receiver options may be disabled or expired.
- There are not a sufficient number of common satellites. In order to obtain a fixed solution, the Base and Rover should track at least five common satellites.
- Poor satellite geometry (PDOP and GDOP values are too high).
- The elevation angle mask value is too high (e.g., above 15 degrees).
- There is poor connection between the receiver and the antenna.
- The Base and Rover modems are set to different radio channels.
- A discrepancy between the differential standards used at the Base and Rover receivers.
- The specified link rate is not compatible with the link rates supported by the modem. The link rate is the rate at which data is transmitted over the RF link.
- The specified baud rate is not compatible with the baud rates supported by the modem. The baud rate is the speed with which differential messages will be transmitted from the receiver to the modem, and vice versa.
- The Digisquelch control at the transmitting modem should be On and set to Low. Recommended: off.
- The Digisquelch control at the receiving modem should be On and set to Medium or High.
- The modem battery is low.

- Poor bandwidth quality (lots of jamming signals)
- The distance between the Base and Rover is too far.

Problem

The receiver does not start data logging.

Causes

- Data is recorded into the controller's memory only.
- There is no free space for files.
- The receiver has already logged 256 files into the internal memory.

[illegible]

Creating Scripts

You can use the following procedure to create script files. Script files allow you to save manual commands into one file. You can then load this single script instead of typing each individual command.



TIP

For more information on script files, see the *PC-CDU User's Manual*.

1. Connect your receiver and computer.
2. Start PC-CDU.
3. Click on **File->Manual Mode**.
4. Click **Edit Script**.
5. Navigate to the folder in which you want to save the script file.
6. Type a file name. All files have a .jpc extension.
For example, Daisy_38400.jpc to enable the daisy chain and Daisy_Off.jpc to disable the daisy chain.
7. Click **Yes** to create the file.

8. Type in the appropriate commands, pressing **Enter** or clicking **Send Command** after each one. See Table A-1 for these commands.

Table A-1. Script Commands

To Create Daisy Chain	To End Daisy Chain
%%set,dev/ser/c/rate,38400 %%set,dev/ser/c/echo,/cur/term %%set,dev/ser/c/imode,echo %%set,cur/term/eoff,QUIT %%set,cur/term/echo,/dev/null %%set,cur/term/imode,echo %%set,cur/term/echo,/dev/ser/c	QUIT %%set,cur/term/imode,cmd %%set,dev/ser/c/echo,/dev/null %%set,dev/ser/c/imode,cmd %%set,dev/ser/c/rate,38400 %%set,cur/term/rate,115200

9. Click **Save Script**.

10. Click **Close Editor**.

Once you have created a script file,

1. Click **Load Script** on the Manual Mode dialog box.
2. Navigate to the folder that contains your script file.
3. Select the appropriate script file and click **Load**.

S specifications

This TPS product is a 40-channel, GPS+ (GPS and GLONASS) receiver with an integrated Windows® CE controller with touch screen and keypad, internal PDL/UHF radio, two batteries, and a power board, all contained in a rugged aluminum housing complete with MINTER and cable connectors.

Odyssey-E Specifications

This section lists Odyssey-E component details.

Table B-1. Odyssey-E Specifications

Component	Details
Receiver Type	
	Euro-160 GGD – set by activating the proper OAF: G – GPS L1 GD – GPS L1/L2 GG – GPS/GLONASS L1 GGD – GPS/GLONASS L1/L2
Tracking Specifications	
Standard Channels	40 L1 GPS (20 L1+L2+GLONASS on Cinderella days, see page B-7 for more information)
Optional Channels	20 GPS L1+L2 (GD), 20 GPS L1+GLONASS (GG), 20 GPS L1+L2+GLONASS (GGD)
Tracked Signal	L1/L2 C/A and P Code and Carrier, WAAS/EGNOS

Table B-1. Odyssey-E Specifications

Component	Details
Survey Mode	
	Static Kinematic (Continuous, Stop and Go) RTK (Real-time Kinematic) DGPS (Differential GPS)
Survey Accuracy	
Static	For L1+L2 – H: 3mm + 1ppm x D; V: 5mm + 1ppm x D For L1 – H: 5mm + 1.5ppm x D; V: 6mm + 1.5ppm x D
Kinematic	For L1+ L2 – H: 10mm + 1.5ppm x D; V: 20mm + 1.5ppm x D For L1 – H: 15mm + 1.5ppm x D; V: 30mm + 1.5ppm x D
RTK	For L1+ L2 – H: 10mm + 1.5ppm x D; V: 20mm + 1.5ppm x D For L1 – H: 15mm + 1.5ppm x D; V: 30mm + 1.5ppm x D
Cold Start Warm Start Reacquisition	< 60 sec < 10 sec < 1 sec
Technology	
	Co-Op Tracking Multipath Reduction WAAS Adjustable PLL and DLL parameters
Radio Modem	
Spread Spectrum	Internal 900 MHz or 2.4 GHz Spread Spectrum transceiver
UHF Radio modem	Internal Rx or External Tx/Rx

Table B-1. Odyssey-E Specifications

Component	Details
GSM modem	Europe and Asia – 900/1800 MHz USA and Canada – 900/1900 MHz
Control and Display Unit	
Data Collector	Integrated Windows® CE controller w/touch screen and keypad
Status Indicator	Two, three-color LED's and three-function keys
I/O	
Communication Ports	Up to four serial RS-232 ports, USB, and Ethernet
Connectors	External GPS/GLONASS Antenna, Modem Antenna, 1PPS (optional), EVENT (optional), 1 PWR
GPS+ Antenna	
GPS/GLONASS Antenna	External
Antenna Type	Microstrip (zero-centered)
Ground Plane	Antenna on a flat ground plane or Choke Ring
Memory	
Internal Memory	Compact Flash Card
Capacity	Standard: 0 MB Max: 96 MB
Logging Time	53 hours (8 MB, 15 seconds, L1/L2 and 7 satellites)
Logging Interval	0.05 to 86400 sec, depending on the purchased options.

Table B-1. Odyssey-E Specifications

Component	Details
Power	
Internal battery	Li-ion, 5400 mAh, 7.4 V
Battery size	198 x 38 x 19 (mm)
Battery weight	165 g (1 battery)
Number of built-in batteries	2 batteries
Change battery	Not detachable battery
Operating time	~15 hours with UHF PDL Radio ON ~20 hours with UHF PDL Radio OFF
External power	1 port
Input voltage	6 to 28 V DC (for work) 9 to 28 V DC (for charge battery) Minimum Charge Current ≥ 2 Amp
Consumption	Less than 4.3 watts (with integrated data collector)
Environment	
Operating temperature	-10 C° to + 50 C° with batteries
Storage temperature	-20 C° to +35 C° with batteries
Physical	
Enclosure	Aluminum extrusion, rainproof
Color	TPS Yellow
Dimensions	W:159 x H:242 x D:49 mm
Weight	1.9 kg

Table B-1. Odyssey-E Specifications

Component	Details
NMEA	
NMEA version	Ver. 2.1, 2.2, 2.3, 3.0
Messages	GGA, GLL, GNS, GRS, GSA, GST, GSV, HDT, RMC, VTG, ZDA, ROT
Output interval	1, 5, 10, 20 Hz (5 to 20 Hz is optional)
DGPS	
Correction format	RTCM SC104 Ver 2.1, 2.2, and 2.3
RTCM message type	1, 3, 9, 31, 32, 34 user selectable
Process interval	1, 5, 10, 20 (5 to 20 Hz is optional)
Output interval for RTCM correction data	1, 5, 10, 20 (5 to 20 Hz is optional)
Elevation mask	0 to 90 deg (independent with data logging)
Multi-base DGPS	Differential correction select mode: Nearest, Mix, Best (optional)
RTK	
Correction format	CMR2/CMR+ (Trimble compatible), RTCM SC104 Ver 2.2 and 2.3
RTCM message type	3, 18, 19, 20, 21, 22 user selectable
Reverse RTK	Will be available in future
Ambiguity initialize	OTF (L1, L1/L2)
Baseline Length	Up to 50km in the morning and evening. Up to 32 km at noon.
Initialize time	5 seconds to 10 min depending on the base line length and multipath conditions

Table B-1. Odyssey-E Specifications

Component	Details
Output interval for CMR/RTCM	1, 5, 10, 20 Hz (5 to 20 Hz is optional)
Elevation	0 to 90 deg (independent with data logging)
Process interval	1, 5, 10, 20 Hz (5 to 20 Hz is optional)
Latency	Delay mode: 20 msec–20 sec (depends on latency which receives corrections data from base receiver). Extrapolation: 20–30 msec
Raw Data logging	The receiver can record the raw data at another interval while RTK operation.
Status	Fix, Float, DOP, Data Link Status, Modem Latency, Common sats, Percentage of the fixing
Results	RTK coordinates, HRMS, VRMS, Covariance Matrix
Ambiguity fixing level	Selectable the thresholds Low: 95%, Medium: 99.5%, High: 99.9%
PPS Output (optional)	
Number of PPS port	1
Edge	Rise, Fall
Period	10–1000000000 ms
Offset	-500000000–500000000 msec -500000–500000 nsec
Reference time	GPS, GLONASS, UTC (USNO), UTC (SU)
Event Marker (optional)	
Number of Event Marker port	1
Edge	Rise, Fall

Table B-1. Odyssey-E Specifications

Component	Details
Reference time	GPS, GLONASS, UTC (USNO), UTC (SU)
Tracking Functions	
Multi-path reduction	(optional) Code, Carrier
PLL/DLL setting	Bandwidth, order, adjustable
Co-op tracking loop setting	On/Off, Static Mode, Bandwidth of individual PLL, Bandwidth of common PLL
Smoothing interval	Code, Carrier
WAAS/EGNOS support	Available
Battery Charger (AC Adapter)	
Size	W:60 x L:112 x H:36 (mm)
Weight	235 g
Operating Temperature	0 C° to +40 C°
Storage Temperature	-40 C° to +85 C°
Input	AC 90–264 V 1A (110 V AC) 47–63 Hz
Output	DC 12 V 2.5 A (30 W)
Connector	Input (AC): Outlet Output (DC): Fisher 5Pin
Battery charge time	10 hours for Full Charge 8 hours for 90% Charge

Cinderella days is an option that turns a single frequency, GPS receiver into a dual-frequency, GPS+GLONASS receiver for 24 hours every other Tuesday at GPS midnight. Refer to Topcon's website for more information and specific Cinderella day dates.



NOTICE

Performance specifications assume a minimum of 6 GPS or 7 GPS/GLONASS satellites above 15 degrees in elevation and adherence to procedures recommended in this manual.



NOTICE

In areas of high multipath, during periods of high PDOP, and during periods of high ionospheric activity, performance may degrade.



NOTICE

Robust checking procedures are recommended in areas of extreme multipath or under dense foliage.

Connector Specifications

This section lists Odyssey-E connector details.

Power Connector

The power connector (Figure B-1) is a sealed receptacle, 5 pin connector with ODU part number G80F1C-T05QF00-0000.



Figure B-1. Power Connector

Table B-2 gives power connector specifications.

Table B-2. Power Connector Specifications

Number	Signal Name	Dir	Details
1	Power_INP	P	6 to 28 volts DC input
2	Power_INP	P	6 to 28 volts DC input
3	Power_GND	P	Ground, power return
4	Power_GND	P	Ground, power return
5			Not used

Serial RS232 Connector

For ports A and D. The RS232 connectors (Figure B-2) are sealed receptacle, 7 pin connector with ODU part number G80F1C-T07QC00-0000.



Figure B-2. RS232 Connector

Table B-3 gives the RS232 connector specifications.

Table B-3. RS232 Connector Specifications

Number	Signal Name	Dir	Details
1	Power_OUT	P	Power Output ($I < 0.2$ A)
2	GND	-	Signal ground
3	CTS	I	Clear to send
4	RTS	O	Request to send
5	RXD	I	Receive data
6	TXD	O	Transmit data
7			Not used

Serial RNGR Connector

The RNGR connector (Figure B-3) is a sealed receptacle, 7 pin connector with ODU part number G80F1C-T07QC00-0000.



Figure B-3. RNGR Connector

Table B-4 gives the RNGR connector specifications.

Table B-4. RNGR Connector Specifications

Number	Signal Name	Dir	Details
1			Not Used
2	GND	-	Signal ground
3	CTS	I	Clear to send
4	RTS	O	Request to send
5	RXD	I	Receive data
6	TXD	O	Transmit data
7			Not used

Radio (Modem) RF Connector

The Pacific Crest PDL (UHF) modem connector type is a BNC Bulkhead Jack RF connector with an Applied Engineering Product part number of 6501-7051-003.

Table B-5. Pacific Crest PDL (UHF) Modem Connector Specifications

Type	Signal Name	Dir	Details
BNC	Modem I/O	I	RF input from PDL antenna

Spread Spectrum modem (TPS) or GSM modem connector type is TNC RF connector.

Table B-6. Spread Spectrum/GSM Modem Connector Specifications

Type	Signal Name	Dir	Details
TNC	Modem I/O	I/O	RF input from modem antenna

GPS External Antenna RF Connector

The external antenna connector type is a TNC RF connector with an Applied Engineering Product part number 6001-7051-003.

Table B-7. External Antenna Connector Specifications

Type	Signal Name	Dir	Details
TNC	Ant_IN	I	RF input from LNA, 60 mA at 5.0 volts

USB Connector

The USB connector (Figure B-4) is a sealed receptacle, 5 pin connector with ODU part number G80F1C-T05QF00-0000.

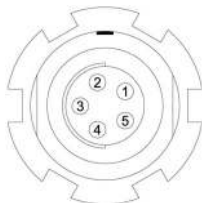


Figure B-4. USB Connector

Table B-8 gives the USB connector specifications.

Table B-8. USB Connector Specifications

Number	Signal Name	Dir	Details
1			Not used
2	USB_PWR	P	Bus power
3	GND	-	Ground
4	USB D+	I/O	Data plus
5	USB D-	I/O	Data minus

ETHR Connector

The ETHR connector (Figure B-5) is a sealed receptacle, 7 pin connector with ODU part number G80F1C-T07QC00-0000.



Figure B-5. ETHR Connector

Table B-9 gives the ETHR connector specifications.

Table B-9. ETHR Connector Specifications

Number	Signal Name	Dir	Details
1			Not used
2	GND	-	Ground (Link LED cathode)
3	TXD+	O	Transmit data plus
4	TXD-	O	Transmit data minus
5	RXD+	I	Receive data plus
6	RXD-	I	Receive data minus
7	LINKLED	O	Link LED anode

EVENT and 1PPS Connectors

The EVENT and 1PPS connectors are coaxial female receptacles of BNC series, Kings Electronics part number KC-79-108. These connectors are optional.

Safety Warnings

This appendix includes general safety warnings for using and operating this Topcon Positioning System product.

General Warnings



DANGER

THE ODYSSEY-E IS DESIGNED FOR SURVEY AND SURVEY RELATED USES (I.E., SURVEYING COORDINATES, DISTANCES, ANGLES AND DEPTHS, AND RECORDING SUCH MEASUREMENTS). THIS PRODUCT SHOULD NEVER BE USED:

- **WITHOUT THE USER THOROUGHLY UNDERSTANDING THIS MANUAL.**
- **AFTER DISABLING SAFETY SYSTEMS OR ALTERING THE PRODUCT.**
- **WITH UNAUTHORIZED ACCESSORIES.**
- **WITHOUT PROPER SAFEGUARDS AT THE SURVEY SITE.**
- **CONTRARY TO APPLICABLE LAWS, RULES, AND REGULATIONS.**



DANGER

THE ODYSSEY-E SHOULD NEVER BE USED IN DANGEROUS ENVIRONMENTS. USE IN RAIN OR SNOW FOR A LIMITED PERIOD IS PERMITTED.

Internal Battery Pack Warnings



DANGER

NEVER ATTEMPT TO OPEN THE ODYSSEY-E CASING OR REPLACE THE BATTERIES! LITHIUM-ION BATTERIES CAN BE DANGEROUS IF MISHANDLED!



DANGER

DO NOT INCINERATE OR HEAT BATTERY PACK ABOVE 212 DEGREES FAHRENHEIT (100 DEGREES CELSIUS). EXCESSIVE HEAT CAN CAUSE SERIOUS DAMAGE AND POSSIBLE EXPLOSION.



WARNING

Tampering with the internal batteries by end users or non-factory authorized technicians will void the receiver's warranty.

- Do not attempt to open the battery pack or replace it.**
- Do not disassemble the battery pack.**
- Do not charge in conditions different than specified.**
- Do not use other than the specified battery charger.**
- Do not short circuit.**
- Do not crush or modify.**

Usage Warnings



CAUTION

If this product has been dropped, altered, transported or shipped without proper packaging, or otherwise treated without care, erroneous measurements may occur.

The owner should periodically test this product to ensure it provides accurate measurements.

Inform TPS immediately if this product does not function properly.



CAUTION

Only allow authorized TPS warranty service centers to service or repair this product.

[illegible]

Using the Radio



NOTICE

Many countries require a license for radio users (such as the United States). Be sure you comply with all local laws while operating a UHF radio.

Surveying in RTK mode has made UHF the most popular choice for communications between base and rover receivers. It is important for the user to know the strengths and weaknesses of this technology to get the best use out of your Odyssey-E system. The quality and strength on the UHF signals translates into the range of your UHF communications. The following are concepts that will help you get the most out of your UHF based communication systems:

1. Your system's range will greatly depend on the local conditions.

Topography, local communications and even meteorological conditions play a major role in the possible range of your RTK communications. A 35 Watt base radio will allow your Odyssey-E system to reach distances of up to 12 miles using the standard antenna, depending on the local conditions. Distances in the order of 4 to 7 miles (6 to 11 km) are easily reached.



TIP

Use a scanner to find clear channels for communication.

2. Your system's range will increase by adjusting the antenna of your Base station in one of the following ways.
 - Ensure the Base radio has a fully charged battery.
 - Use directional antennas and/or repeaters to increase your system's range. Directional antennas concentrate the signal power within a more narrow direction, significantly increasing the range of your system.
 - Check out the TPS accessory line for various items to elevate your Base radio.
 - Check out the TPS accessory line for and external, "rubber-duck" UHF antenna.

arranty Terms

TPS laser and electronic positioning equipment is guaranteed against defective material and workmanship under normal use and application consistent with this Manual. The equipment is guaranteed for the period indicated, on the warranty card accompanying the product, starting from the date that the product is sold to the original purchaser by a TPS Authorized Dealer.¹

During the warranty period, TPS will, at its option, repair or replace this product at no additional charge. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. This limited warranty does not include service to repair damage to the product resulting from an accident, disaster, misuses, abuse or modification of the product.

Warranty service may be obtained from an authorized TPS warranty service dealer. If this product is delivered by mail, purchaser agrees to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or equivalent. A letter should accompany the package furnishing a description of the problem and/or defect.

The purchaser's sole remedy shall be replacement as provided above. In no event shall TPS be liable for any damages or other claim including any claim for lost profits, lost savings or other incidental or consequential damages arising out of the use of or inability to use the product.

-
1. The warranty against defects in Topcon battery, charger, or cable is 90 days.

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Notes:

[illegible]



TOPCON



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