

TopPAD

Survey and GIS Mapping Software



Reference Manual

 **Geodesical**



TopPAD Reference Manual



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The logo for Geodesical features the word "Geodesical" in a bold, blue, sans-serif font. A light blue, stylized ring or orbit surrounds the letter "G", extending from the top left to the bottom left of the letter.

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Preface

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Manual Conventions

This manual uses the following conventions:

Example	Explanation
File ▶ Exit	tap the File menu and tap Exit.
Enter	Indicates the button or key labeled Enter.
<i>Notes</i>	Indicates a field on a dialog box or screen, or a tab within a dialog box or screen.
<i>Topo</i>	Indicates the name of a dialog box or screen.



Further information to note about the configuration, maintenance, or setup of a system.



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



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

What's New with TopPAD

This chapter briefly describes new features and functions for the TopPAD software.

- ⇒ The manual has been arranged into the following chapters:
 - An introduction chapter that includes a general discussion on the different types of surveying (GIS mapping), a brief look at the Topcon systems available to use TopPAD with for GIS mapping, an installation section, and a discussion of the Security screen.
 - A user's chapter and getting started guide that includes basic setup and usage information for TopPAD and GIS mapping projects.
 - A reference chapter (formally the various chapters of a separate reference manual) that lists all available screens and fields of the TopPAD software.
- ⇒ Information for a point can be quickly added from the main screen using a pop-up menu. See "Point Information" on page 3-54.
- ⇒ When TopPAD is installed on a GMS-2, a picture can be taken of the waypoint. See "Points – Image Capture" on page 3-55 or "Using TopPAD with a GMS-2 Camera" on page 2-26 for more information.
- ⇒ The connected modem can be configured using a new Modem Config toolbar button. See "Radio Configuration" on page 3-57 for details.

- ⇒ Various types of Base radios for RT DPGS configurations can be configured using TopPAD. See “Config: Base Radio (For RT/ Network DGPS)” on page 3-10.
- ⇒ Various modem types can be configured. See “Surv Config” on page 3-6 for more information.
- ⇒ A Network DGPS survey can now be created. See “Surv Config” on page 3-6 for more information.



Introduction

TopPAD is a field data collection software used on a hand-held controller for GIS surveys. TopPAD is structured to provide the surveyor with capture and update functions for geographical data in a wide range of GIS-related applications.

TopPAD uses the ArcPad shell from ESRI as the basis of features designed for Topcon receivers and controllers. TopPAD includes features for creating survey configurations, starting a Base station, viewing tracked satellites, and switching between Bluetooth® devices.



Before continuing with the TopPAD manual, review the ArcPAD 6.0.2 or higher manual for details on using the ArcPAD software (browse to the Knowledge Base page of the ESRI support website: <http://support.esri.com/>).



Figure 1-1. TopPAD on Controller (Topcon's GMS-2)

Surveying Overview

Surveying with the right GPS receiver can provide you with accurate and precise positioning, 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) is a satellite-based line-of-sight radio navigation system run by the United States Department of Defense (DoD). This system offers a global, all weather, 24-hour positioning, velocity, and time service to any user equipped with a GPS tracking receiver on or near the Earth's surface. At any one time, with a standard 15° angle, up to 10 or 12 GPS satellites are visible from any point on earth. The Global Navigation Satellite System (GLONASS) is run by the Russian Federation Ministry of Defence—a counterpart to GPS.

For information on current GPS constellation status, visit the U.S. Naval Observatory website (<http://tycho.usno.navy.mil/>) or the U.S. Coast Guard Navigation Center website (www.navcen.uscg.gov). For information on the current GLONASS constellation, visit the GLONASS website (<http://www.glonass-center.ru>).

Despite numerous technical differences in the implementation of these systems, both GPS and GLONASS have three essential components:

- Space – GPS and GLONASS satellites orbiting approximately 12,000 nautical miles above Earth and are equipped with a clock and a radio. These satellites broadcast digital information (ephemerides, almanacs, time frequency corrections, etc.).
- Control – Ground stations located around the Earth that monitor the satellites and upload data, including clock corrections and new ephemerides (satellite positions as a function of time), to ensure the satellites transmit data properly.

- User – The community and military that use GPS/GLONASS receivers and the corresponding satellites to calculate positions.

Calculating Positions

Each GPS satellite continuously transmits signals on two carrier frequencies known as L1 and L2 carriers. The L1 carrier is modulated with a Coarse Acquisition Code (C/A code) and a Precise Code (P code). The L2 carrier is modulated only with the P code. Also, a navigation message is modulated and transmitted on both frequencies.

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

$$\text{Velocity} \times \text{Time} = \text{Distance}$$

Where *Velocity* is the speed at which radio waves travel (that is, the speed of light) and *Time* is the difference between the signal transmission time and signal reception time.

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

To provide fault tolerance 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 hooked onto 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, within a period of 30 seconds.
- GPS satellites broadcast almanac data cyclically with a period of 12.5 minutes; GLONASS satellites broadcast almanac data cyclically within a period of 2.5 minutes.

GPS Positioning

Achieving quality position results requires the following elements:

- Accuracy – The accuracy of a position depends upon the number, signal integrity, and placement (also known as a Dilution of Precision, or DOP) of satellites.
 - Differential GPS (DGPS) strongly mitigates atmospheric and orbital 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 (WAAS) 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

This overview simply outlines the basics of GPS and GLONASS positioning. A number of differential positioning implementations exist, including post-processing surveying, real-time kinematic (RTK) surveying, maritime radio beacons, geostationary satellites (such as OmniSTAR service), and the wide area augmentation system (WAAS/EGNOS) service.

DGPS Overview

DGPS, or Differential GPS, typically uses the measurements from two or more remote receivers to calculate difference (corrections) between measurements, thus providing more accurate position solutions.

With DPGS, one receiver is placed at a known, survey location and is referred to as the reference receiver or base station. Another receiver is placed at an unknown, location and is referred to as the remote receiver or rover/ The reference station collects the range measurements from each GPS satellite in view and forms the differences (corrections) between the calculated distance to the satellites and the measured pseudo-ranges to the satellites.

These corrections are then built up to the industry standard (RTCM or various proprietary standards) established for transmitting differential corrections and broadcast to the remote receiver(s) using a data communication link. The remote receiver applies the transmitted DGPS corrections to its range measurements of the same satellite.

Using this technique, the spatially correlated errors—such as satellite orbital errors, ionospheric errors, and tropospheric errors—can be significantly reduced, thus improving the position solution accuracy of the GPS. The maritime radio beacons system is one example of this approach to connection GPS solutions.

Another DGPS approach employs the geostationary satellites for the distribution of the corrections. One of the most widely used applications is the OmniSTAR Worldwide DGPS positioning service.

RTK DGPS Service

The real-time kinematic (RTK) method is the most precise method of real-time surveying. RTK requires at least two receivers collecting navigation data and communication data link between the receivers. One of the receivers is usually at a known location (Base) and the other is at an unknown location (Rover). The Base receiver collects carrier phase measurements, generates RTK corrections, and sends this data to the Rover receiver. The Rover processes this transmitted data with its own carrier phase observations to compute its relative

position with high accuracy, achieving an RTK accuracy of up to 1 cm horizontal and 1.5 cm vertical.

Coastal Navigation Beacons DGPS Service

The maritime radio beacons system improve the accuracy of maritime navigation around harbors and critical waterways. These signals also cover some inland areas in proximity to the radio beacon station.

In the United States, the coastal navigation beacons are managed by the United States Coast Guard and provide differential correction service in coastal areas and in much of the interior of the United States.

In other parts of the world, coastal navigation beacons modeled after the US Coast Guard system are available. Check with your local maritime authority to learn more about services available in your area. The Beacon system is provided free of charge in the United States.

- For detailed information on the coastal navigation beacon system in the United States, visit the US Coast Guard's Navigation Center website (www.navcen.uscg.gov).
- For detailed information on the coastal navigation system in other parts of the world, visit the International Association of Marine Aids to Navigation and Lighthouse Authorities website (<http://www.iala-aism.org/web/index.html>).

OmniSTAR DGPS Service

The OmniSTAR system provides differential corrections for all GPS satellites in view. Permanent ground stations compute corrections, forward these corrections to the Network Control Center which uploads the data to the OmniSTAR geostationary satellites. GPS receivers with OmniSTAR boards and a subscription to the OmniSTAR service can then receive these differential corrections for sub-meter survey accuracies.

OmniSTAR is an international service company offering worldwide, real-time, DGPS services. Visit the OmniSTAR website for more information (www.omnistar.com).

WAAS/EGNOS DGPS Service

The Wide Area Augmentation System (WAAS) is a satellite-based system developed by the Federal Aviation Administration (FAA) in the United States. WAAS is designed to improve the accuracy and availability of, as well as ensure the integrity of, information broadcast from GPS satellites.

WAAS works by providing a net of ground stations that receive GPS signals, generating correction messages and uploading them to geostationary satellites. These correction messages are then broadcast to a GPS receiver using GPS L1 frequency. The receiver applies these messages to correct for various errors that affect the measurements. In addition, the geostationary satellites can be used for positioning as ordinary GPS satellites, improving system availability.

WAAS provides accuracy performance of 0.6–0.7 meters horizontal and 0.9–1.0 meters vertical throughout the majority of the continental U.S. and large parts of Canada and Alaska. For more information on WAAS, visit the FAA website (<http://gps.faa.gov/>).

The European Geostationary Navigation Overlay System (EGNOS) is a similar satellite system under development at the European Space Agency (ESA), the European (EC), Eurocontrol, and the European Organization for the Safety of Air Navigation. For more information on EGNOS, visit the ESA website (<http://www.esa.int/esaNA/egnos.html>).

TopPAD and GIS Systems

TopPAD can be used with a number of GIS systems, such as various geodetic mapping systems (GMS) from Topcon. In these systems, TopPAD provides the mapping and management tools required for advanced GIS mapping.

When installed on the GMS-2, TopPAD provides advanced functionality in a single hand-held unit for mapping and surveying.



Figure 1-2. GMS-2 with Integrated Receiver, Antenna, and Controller

When installed on the FC-100 or other controller, TopPAD provides advanced functionality as part of a system that includes a GPS receiver, a GPS antenna, and a hand-held controller for mapping and surveying.

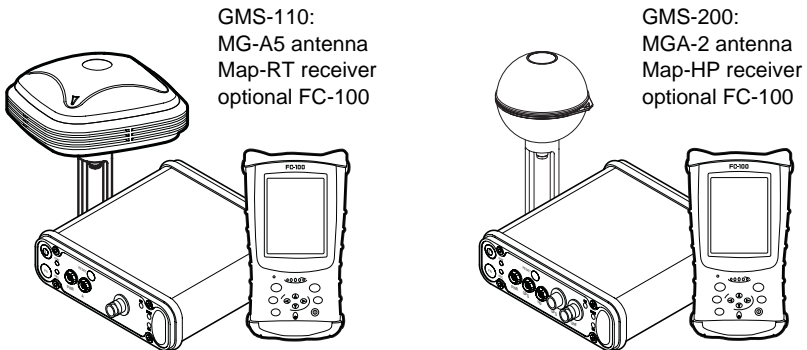


Figure 1-3. GMS-110 and GMS-200 Kits using an FC-100

Installing TopPAD

TopPAD installs on any hand-held controller that runs the Windows® CE.Net operating system, including Topcon's FC-100/FC-2000/GMS-2 or Compaq's iPAQ™. TopPAD initially loads onto your computer, then uses Microsoft® ActiveSync® to synchronize with the controller and install TopPAD onto the controller. ActiveSync is available for free from the Microsoft website (www.microsoft.com) and must be installed on the computer before installing TopPAD.

1. Connect your computer and hand-held controller. Because ActiveSync will automatically install TopPAD once it has been loaded onto the computer, this step can be performed at any time.
2. Insert the TopPAD software CD into the CD drive of the computer. Navigate to the CD's files using Explorer and open the TopPAD folder.
3. Click the TopPAD setup icon to run the install program and click **Next** on the *Welcome* screen. The TopPAD program is extracted to the computer and prepared for installing onto the controller.

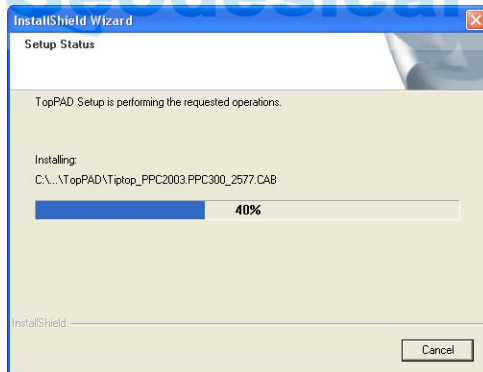


Figure 1-4. Begin TopPAD Installation

If TopPAD is already installed on the controller, a confirmation displays to proceed with the install. Click **Yes**.

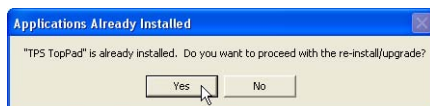


Figure 1-5. Proceed with Install?

- With the computer and the controller connected, ActiveSync will start up and retrieve the controller's program. Click **Yes** to install TopPAD into the default directory on the controller (Figure 1-6). If TopPAD is already installed, ActiveSync will ask to uninstall it from the controller. When ActiveSync completes the uninstall process, double-click the TopPAD setup icon to have ActiveSync install the software on the controller.

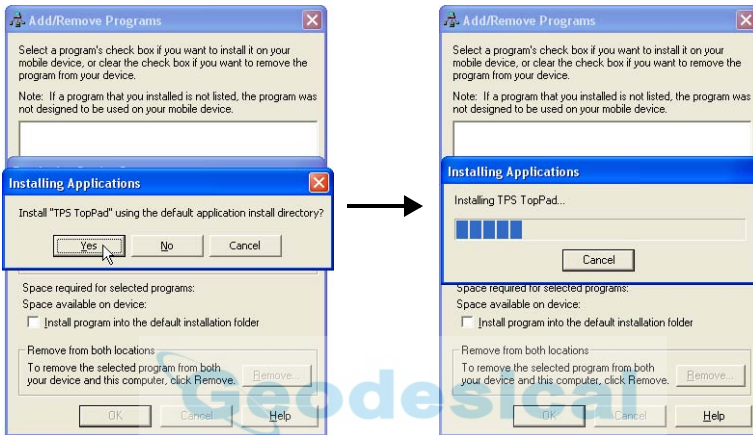


Figure 1-6. Install TopPAD into Default Directory

- When the controller install completes, ActiveSync displays a notice to check the controller for any further installation procedures. Click **OK** to continue.

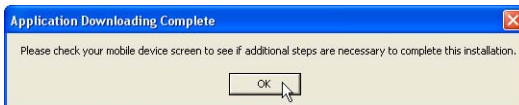


Figure 1-7. Complete Installation

- Click **Finish** to exit the install program.

Uninstalling TopPAD

TopPAD software can be uninstalled through the Remove Programs tool in Windows CE or through the Add/Remove Programs tool in ActiveSync.

Starting TopPAD

To start TopPAD, double-tap the **TopPAD** icon on the controller's desktop screen.

Upon initial startup, TopPAD requires authorization codes to properly run (Figure 1-8). Record the key value and contact your Topcon Dealer with the following information to receive a security ID:

- Device identification
- Company name
- Contact name
- Company address
- Contact phone number
- Contact email address
- Software Type (TopPAD)

When you receive the security ID, enter it into the appropriate field on the *Security* screen and press **OK** (Figure 1-8).

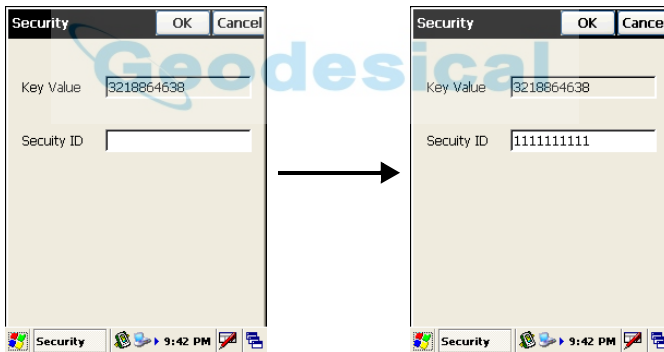


Figure 1-8. Enter Security ID to Run TopPAD

TopPAD Getting Started Guide

TopPAD combines the power of ESRI ArcPAD field software with a special user interface and hardware support specifically designed for Topcon GIS Mapping systems. The following sections provide basic setup and operating procedures for typical mapping projects using TopPAD.

Pre-Survey Configurations

Before beginning to survey, review setup procedures and ensure the following steps have been completed.

- The radio modem and Bluetooth module configured. Refer to the receiver's documentation for details.
- Protocol, GPS, and Capture options selected. See "Setting TopPAD Options" on page 2-2.
- A survey configuration selected or created. See "Applying Survey Configurations" on page 2-4 and "Creating a Configuration" on page 2-5 for details.
- If needed for the project, import project waypoints. See "Importing Waypoints" on page 2-16 for details.
- Create/set up a file in which to save data. See "Creating a New Layer (Shapefile)" on page 2-13 for details.

Setting TopPAD Options

TopPAD options apply the protocol and WGS84 datum for Topcon receivers, as well as connectivity parameters.



Refer to the ArcPad manual for details on setting other options.

1. Press the **Options** button on the Main toolbar to display the **Options** screen. Set the following *Protocol* parameters (Figure 2-1):
 - Protocol – select TopPAD from the drop-down list.
 - GPS/Datum – select WGS84 for the GPS/Datum. Do not change the setting for *Use Height in Datum Transform*.
 - GPS Initialization string – leave blank.



Figure 2-1. Setting Receiver Protocols

2. Tap the *GPS* tab and enable “Show GPS Activity...” as desired (Figure 2-2 on page 2-3).

Making any other changes will affect communication between TopPAD and the receiver.



When TopPAD connects to the receiver, it searches the ports and automatically sets communication parameters.

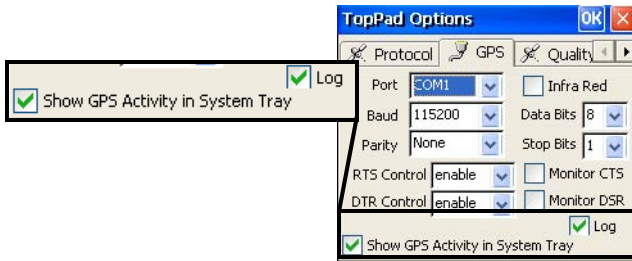


Figure 2-2. Setting Receiver GPS Options

3. Tap the *Capture* tab to set the number of continuous GPS measurements to average (Figure 2-3). Enter the following parameters:
 - Enable Averaging – always enable when working with TopPAD to ensure proper data processing. If disabled, the “Number of positions to average” fields will be set to one (1).
 - Number of positions to average – automatically determined based PP DGPS survey configuration parameters. To avoid overwriting this information, do not change these numbers.
 - Streaming Vertices Interval – enter the number of positions desired between locations when logging streaming vertices.

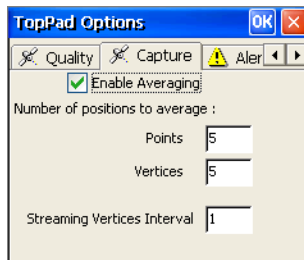


Figure 2-3. Setting Data Capture Parameters

4. Press **OK** to save the settings and return to the main screen.

Applying Survey Configurations

Survey configurations define instrument settings and can be independent of the maps (one configuration can be used on several maps). The settings describe receiver functions, work conditions, and data logging parameters.

TopPAD contains three default configurations for real time surveys, post processing surveys, and network DGPS surveys. These configurations contain the most common settings used at map sites; however, certain parameters may need to be edited for different jobs or hardware configurations. Use the default configuration—but change the name—as the basis for creating a survey configuration specific to the map/hardware.

Selecting a Configuration

Once a survey configuration is created and saved, it can be selected for any future use (Figure 2-4).

1. Press the **Config** button on the TopPAD toolbar to display the *Surv Config* screen.
2. Select a configuration from the drop-down box.
3. Press **OK** to set the selected configuration for mapping and return to the main screen.

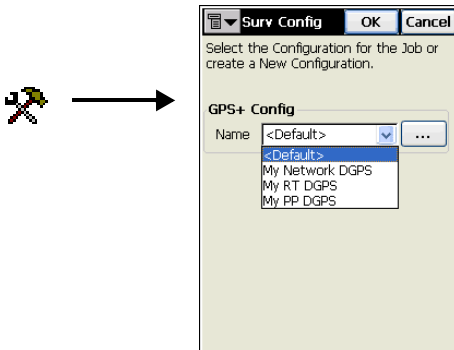


Figure 2-4. Select Survey Configuration

Creating a Configuration

When creating a GPS+ configuration, select a pre-defined configuration to edit or create a new one.

1. Press the **Config** button on the TopPAD toolbar to display the *Surv Config* screen (Figure 2-4).
2. Tap the **Browse (...)** button on the *Surv Config* screen. The *Configurations* screen displays (Figure 2-5).
3. Select a current configuration and press **Edit** or press **Add** to create a new configuration (Figure 2-5).

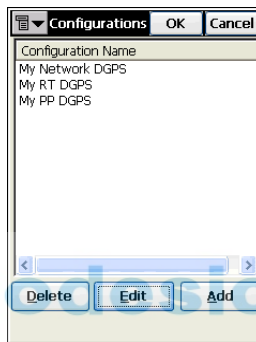


Figure 2-5. Select a Configuration

4. On the *Survey* screen, enter a name for the configuration and select the type. For RT DGPS and Network DGPS surveys, select the corrections type. Press **Next** (Figure 2-6).

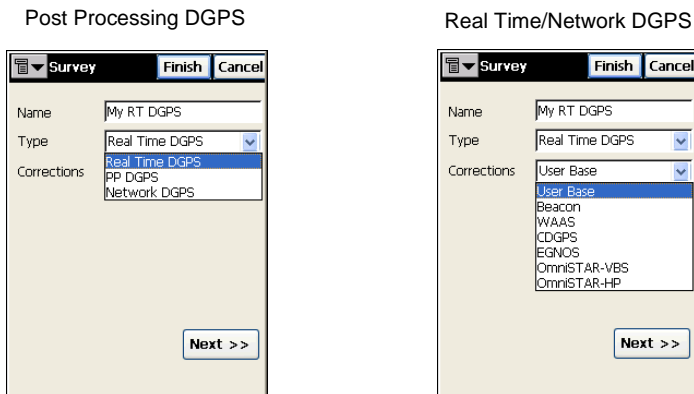


Figure 2-6. Select Survey Configuration Type

5. On the **Base Recvr** screen, select and enter the following parameters for the type of survey. Press **Next** (Figure 2-7).
 - For RT DGPS configurations, select the DGPS format and enter the elevation mask.
 - For PP DGPS configurations, enter the elevation mask and select Raw Data Logging parameters.

If using a GMS-2, select the connection method for the GPS receiver: either an external receiver via cable, the internal receiver, or an external receiver via Bluetooth.

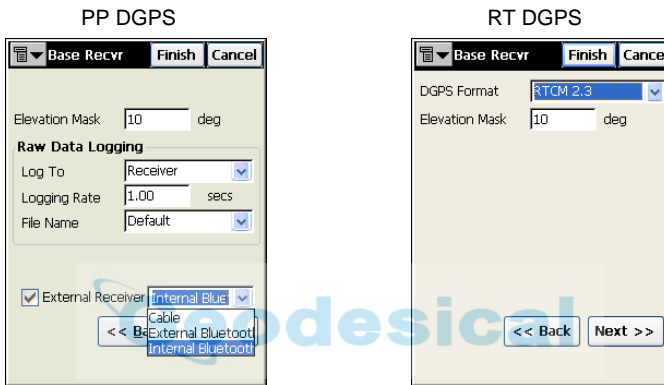


Figure 2-7. Configure the Base Receiver – PP DGPS/RT DGPS

6. For RT/Network DGPS configurations, select the type of radio modem and the port's settings for the Base radio and press **Next**. Depending on the type of modem selected, enter radio modem parameters and press **Next** (Figure 2-8 on page 2-7).

See the applicable section under “Config: Base Radio (For RT/ Network DGPS)” on page 3-10 for details on the radio’s setup screen.

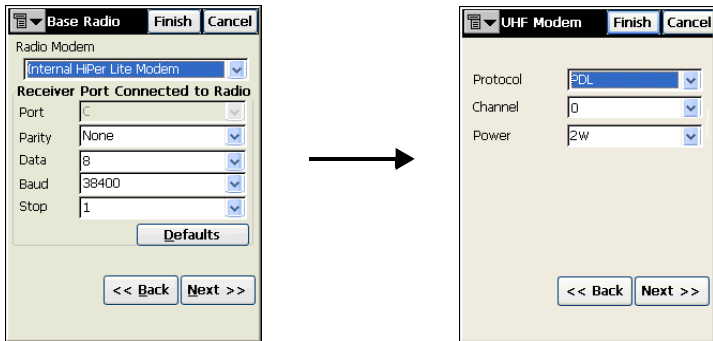


Figure 2-8. Configure RT DGPS Base Radio – UHF Example

7. On the **Base Ant** screen (Figure 2-9), select the type of antenna used and set measurement parameters. Press **Next**.

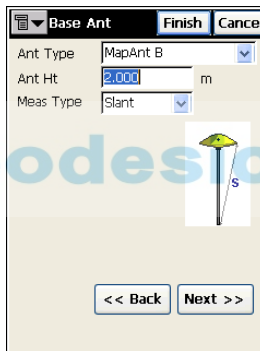


Figure 2-9. Configure the Base Antenna

8. On the **Rover Recvr** screen, select and enter the following parameters for the type of survey. If using an external receiver, select the field and the type. Press **Next** (Figure 2-10 on page 2-8).
 - For Real Time DGPS configurations, select the DGPS format and enter the elevation mask.
 - For PP DGPS configurations, enter the elevation mask and select Raw Data Logging parameters.
 - For Network DGPS configurations, enter the elevation mask and select the protocol. If selecting TCP/IP protocol, also select the RTK format.

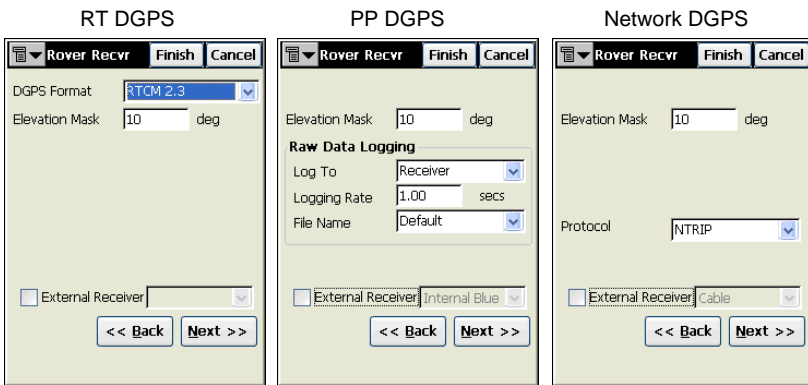


Figure 2-10. Configure the Rover Receiver – RT DGPS/PP DGPS/Network DGPS

9. Select the desired method for connecting to the modem, either via the controller or a connection to the receiver (Figure 2-11).

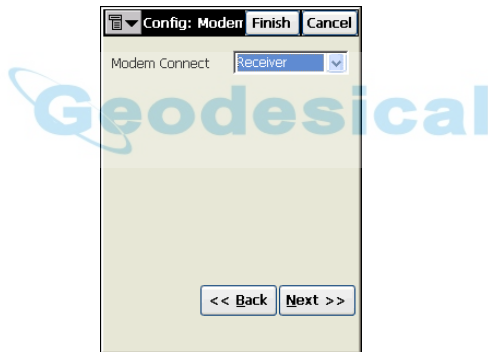
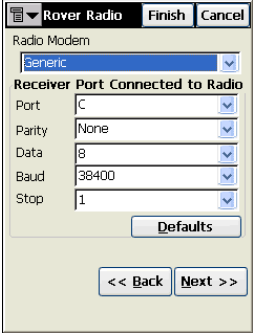
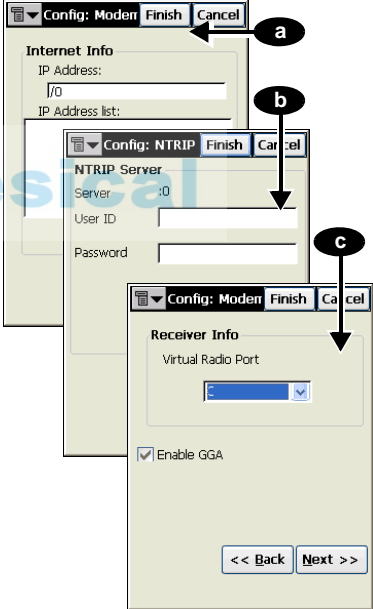


Figure 2-11. Select Modem Connection

10. Select the modem connection parameters for the select connection type as described in Table 2-1.

Table 2-1. Modem Connection Parameters

<p>If connecting to the modem via a receiver,</p>	
<p>If connecting to the modem via a controller, navigate through the screens for entering Internet, NTRIP Server, and Receiver information. Press Next.</p> <ul style="list-style-type: none"> • Select or enter an IP address to connect through. • Enter a user ID and password for the NTRIP server. • Select the virtual radio port of the receiver, usually C. 	

11. For RT DGPS configurations, enter the *Beacon*, *WAAS/EGNOS*, *CDPG*, or *OmniSTAR Survey* parameters depending on the selected correction type (Table 2-2). Press **Next**.

Table 2-2. Differential Correction Parameters

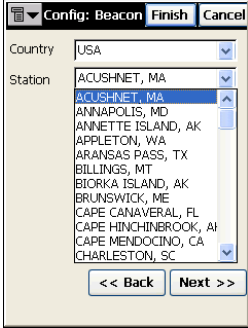

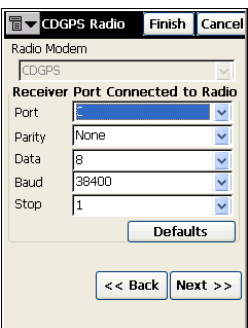
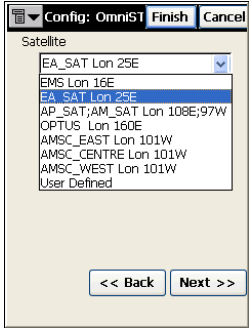
<p>For Beacon configurations:</p> <p>Select the Country in which the Beacon station resides and the Station closest to your position.</p>	
<p>For WAAS/EGNOS configurations:</p> <ul style="list-style-type: none"> • Select the WAAS/EGNOS PRN#. • Select the GPS PRN# to be associated with the WAAS/EGNOS PRN. • Select the desired ionospheric corrections (Iono Corr) for both channels. 	
<p>For CDGPS (Canadian nation-wide DGPS):</p> <p>Select the connection port, parity, number of data bits, baud rate, and number of stop bits.</p>	

Table 2-2. Differential Correction Parameters (Continued)

<p>For OmniSTAR-VBS/OmniSTAR-HP configurations:</p> <p>Select the same satellite that you subscribed to.</p> <p>The receiver will be ready to work when it logs on to the correct satellite signal and the subscription is valid.</p>	
--	---

12. On the **Rover Ant** screen, select the type of antenna used and set measurement parameters (Figure 2-12). Press **Next**.

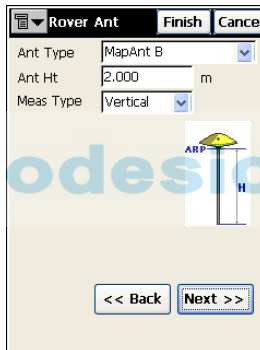


Figure 2-12. Configure the Rover Antenna

13. On the *Survey Params* screen, enter the following data collection parameters for the survey (Figure 2-13). Press **Next**.



Note the following for entering averaging numbers:

- In PP DGPS mode, the numbers entered here will be used to compute averaging. In the corresponding Options screen, the numbers will not be saved or used.
- In RT DTPS mode, the numbers entered here will be used to compute averaging. In the corresponding Options screen, changing the numbers will override these settings, and vice versa.

- Enable or disable point averaging.
- Select the number of epochs used for averaging points and/or vertices.
- Select the interval for streaming vertices.

Figure 2-13. Configure Data Collection Parameters

14. On the *Advanced* screen, enable *Multipath Reduction* and *Co-Op Tracking* to measure more accurate positions. Also, select the satellite system and RTK position method used during the survey (Figure 2-14 on page 2-13).

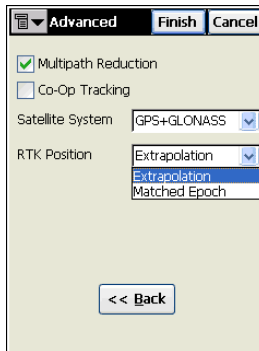


Figure 2-14. Set Advanced Parameters for the GPS+ Mode

15. Press **Finish** to save the configuration and return to the *Survey Config* screen. With the configuration selected, press **OK** to apply the configuration to the job.

Creating a New Layer (Shapefile)

Shapefiles store all data (positional information and attributes for the feature) for a project, including GPS positions, attributes associated with features, and images taken with an integrated camera. When creating a shapefile, a new layer is also created.

The following procedure describes adding a code, then adding attributes for the code.

1. Press the **Create Layers** button. The *Feature-Attributes* screen displays.
2. Next to the *Code* panel, press **Add** to add a new code. Or select a code and press **Edit** (Figure 2-15 on page 2-14).

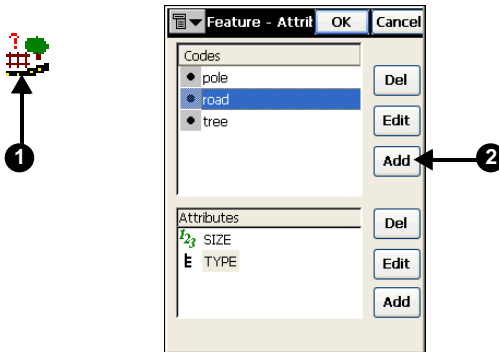


Figure 2-15. Add New Code to Layer (Shapefile)

3. On the *Code* screen, enter a name for the code and select the code type. Press **OK** to save (Figure 2-16).

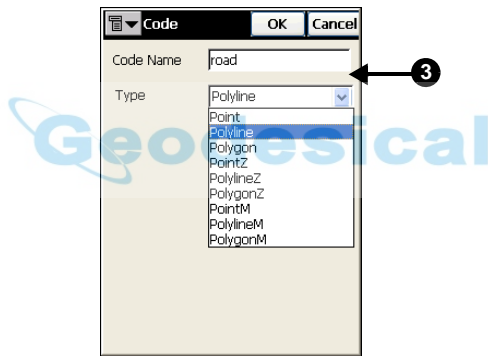


Figure 2-16. Select Parameters for Code

4. On the *Feature-Attributes* screen, select the code to add attributes to. Next to the *Attribute* panel, press **Add**. Or select an existing attribute and press **Edit**.
5. On the *Attributes* screen, enter a name for the attribute and select its type. Enter other parameters as needed and press **OK** (Figure 2-17 on page 2-15).
 - For Text and Numeric attributes, enter the length. For a Numeric attribute, also enter the precision.
 - For a Menu attribute, enter a description and press **Add** or select one from the list.

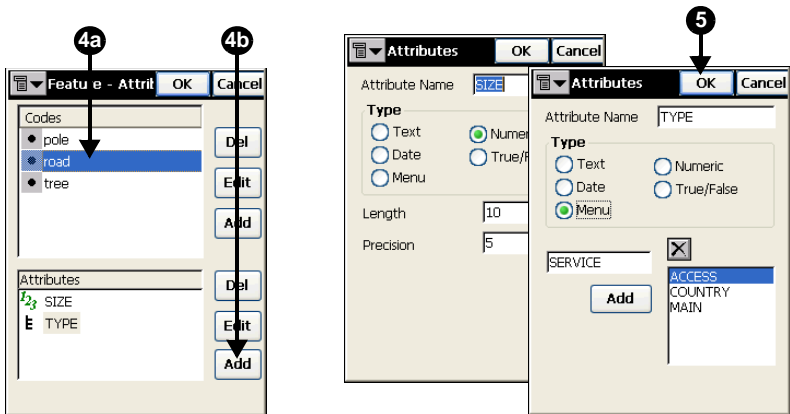


Figure 2-17. Add an Attribute to a Code

6. On the *Feature-Attributes* screen, press **OK**.
7. On the *New Layer* screen, select a location in which to save the shapefile. Press **OK** (Figure 2-18). The default name of the file is the same as the code name; changing the name of the file changes the name of the code.

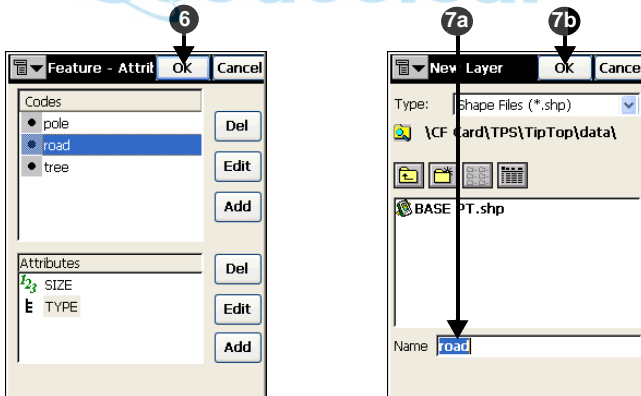


Figure 2-18. Save Shapefile (Create New Layer)

Importing Waypoints

Waypoints are measured points along a route used for navigation. TopPAD imports waypoints from text and LandXML files.

1. Press the **Import Waypoints** button to display the *Type And Format* screen (Figure 2-19).
2. Select the type of file to import from. For Text files also select ASCII file properties (Figure 2-19). Press **Next**.

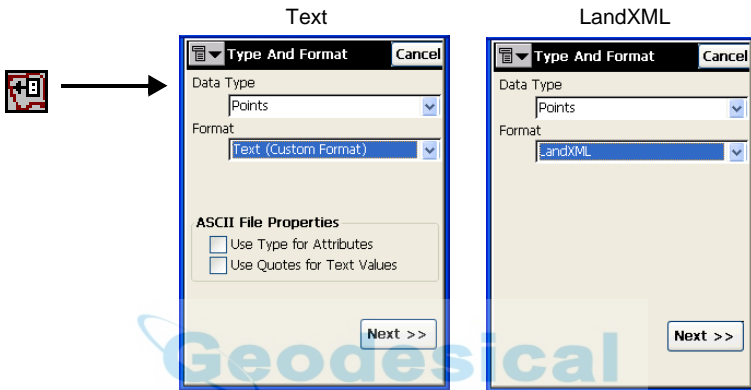


Figure 2-19. Select Data Type and Format.

3. On the *From Text/LandXML* screen (Figure 2-20), navigate to and select the file from which to import points. Press **OK**.

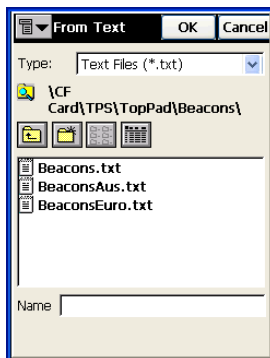


Figure 2-20. Select File Type and File

- For text files, select the delimiter and file format (Figure 2-21). Press **Next**.

To create a custom file, see “Creating a Custom File Format” on page 2-18.

- Select coordinate system parameters (Figure 2-21). Press **Next**.

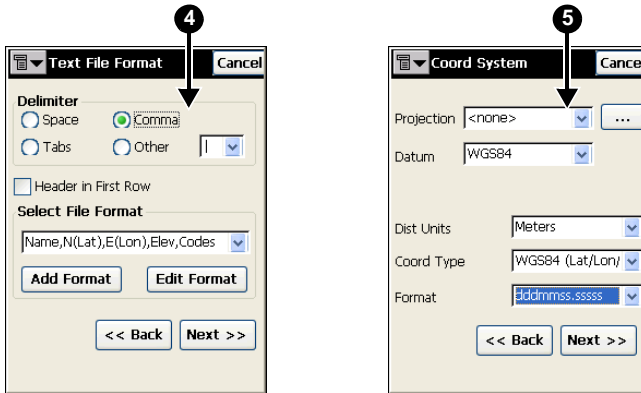


Figure 2-21. Select Text File and Coordinate System Parameters

- Navigate to the location in which to save the created shapefile and press **OK**. Press **Close** when the import completes (Figure 2-22).

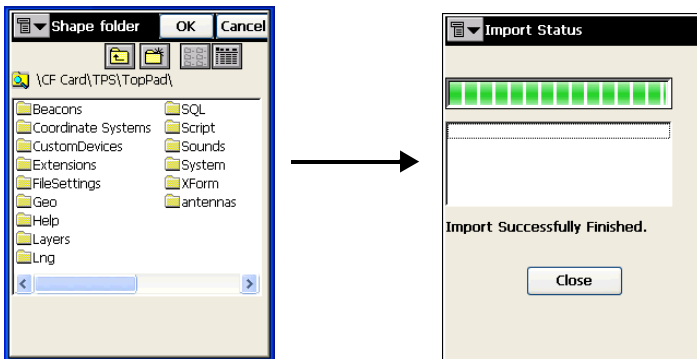


Figure 2-22. Save the Created Shapefile

Creating a Custom File Format

1. Press the **Import Waypoints** button. Select “Text” as the format type and press **Next**.
2. Continue through the screens until the *Text File Format* screen displays (Figure 2-23).
3. On the *Text File Format* screen, press **Add Format**. To edit a current custom format, select the format and press **Edit Format**.
4. Select an item in the Available list and tap the move down arrow to include it in the custom format (Figure 2-23).

The included items will be the “name” of the file.

- To arrange format items, select the item in the “included” list and tap the up/down order arrows.
- To remove a format item, select the item in the “included” list and tap the move up arrow.

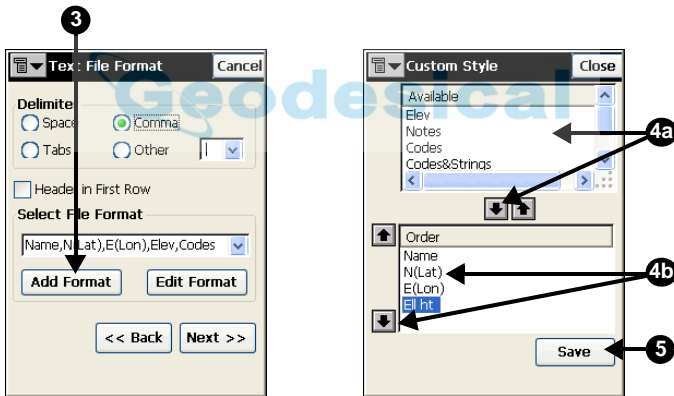


Figure 2-23. Create a Custom File Format

5. Press **Save** to create/update the custom file format.
6. Press **Close** to return to the *Text File Format* screen.

GIS Mapping Using TopPAD

TopPAD provides an easy-to-use interface for GIS mapping jobs and collecting GIS data. TopPAD allows provides functions for three types of GIS mapping projects: Real-Time DGPS, Post-Process DGPS, and Network DGPS.

- A PP DGPS survey uses a Base and Rover setup. The Rover receives corrections from the Base station. After completing the survey, data is processed at the office.
- An RT DGPS survey uses a Rover setup that receives corrections from a selected source, either a satellite system (such as, OmniSTAR or WAAS/EGNOS) or a radio beacon station.
- A Network DGPS survey uses a Rover setup that receives differential corrections from a reference station network via a selected source (such as, a virtual reference station (VRS), FKP, single base station, or external configuration).

See “DGPS Overview” on page 1-5 for further details on the surveying (mapping) types.

Before beginning to survey, ensure the following are complete:

- Hardware has power or backup power is available.
- If using OmniSTAR, the subscription is active and current. Refer to your receiver’s documentation for details.
- Components are configured for the job/survey. See “Applying Survey Configurations” on page 2-4 for details.
- Waypoints for the job are imported and an output file selected. See “Importing Waypoints” on page 2-16 and “Creating a New Layer (Shapefile)” on page 2-13 for details.

Setting up Hardware

GIS mapping projects can be performed with a variety of hardware. The following steps present general setup information using TopPAD. Refer to your System's documentation for specific details.

Set up the Base Station for PP DGPS Surveys or User Base RT DGPS Surveys

Step 1: Set up the Base station (Figure 2-24) according to its documentation. Measure the height of the antenna (refer to the antenna's documentation for details).

Step 2: Start the Base (Figure 2-24).

1. Press the **Start Base** button. Enter or select the following point parameters for the Base station.
 - Enter the Point name over which the Base station is installed.
 - Select the name of the layer in which this point exists or should be stored.
 - If setting up a **User Base**, enter known coordinates for the Base. Or press the **AutoPos** button to record the current position.
2. Enter the antenna height and select the type of measurement.

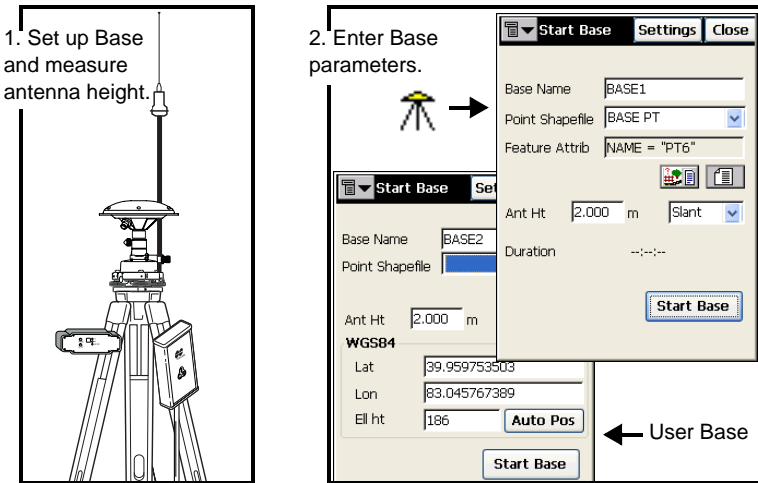
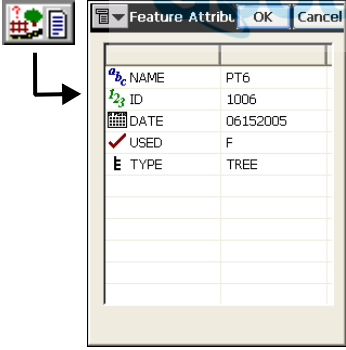
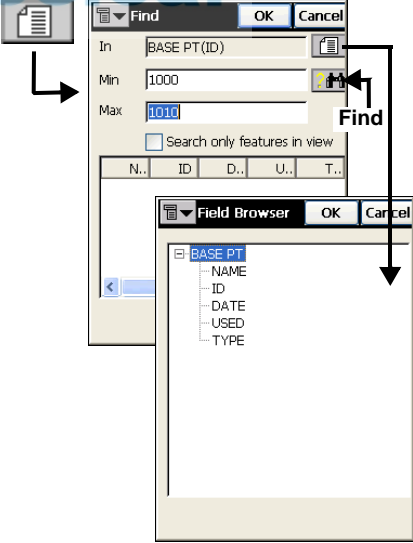


Figure 2-24. Set up the Base Station (PG-A1 w/ UHF Radio Base Station Example)

3. If the current map has more than one layer, select the feature attribute for the Base point. Use one of the following methods for assigning/finding the attribute(s) for the point described below.

Method 1	Method 2
<p>If the feature attribute is unknown, tap the Feature Attributes button to create a new attribute.</p> <ul style="list-style-type: none"> • The left column lists all attributes for the selected layer. • Tap a corresponding field in the right column to enter an attribute for the feature using the pop-up keyboard. <p>When done, press OK to save the settings.</p>  <p>Figure 2-25. Assign Feature Attribute(s)</p>	<p>If the feature attribute is known (exists), tap the Find button. The last used Find screen opens.</p> <ul style="list-style-type: none"> • To open a new Find screen, tap the Field Browser button. Select the feature and tap OK. • Enter/select feature criteria in the available fields and press the Find button. <p>Attributes assigned to the feature display at the bottom of the screen. Select the desired attribute and press OK to save the settings.</p>  <p>Figure 2-26. Find Feature Attribute(s) – ID Example</p>

4. Tap **Start Base** (Figure 2-24 on page 2-20) to set the receiver as a Base transmitting data. The selected base name and attributes are sent to the receiver.
 - If attributes were assigned (rather than searched for), a new point is created and saved to the selected layer.
 - If the configuration requires a user-defined file name, the Raw Data Logging screen displays. Browse for a location and enter a name for the data file. Press **OK** until the main screen display.

Set up a Rover System for GIS Mapping

1. Set up the Rover system according to its documentation.
2. Connect the receiver to the hand-held controller with the serial cable or using Bluetooth, and turn on the controller.

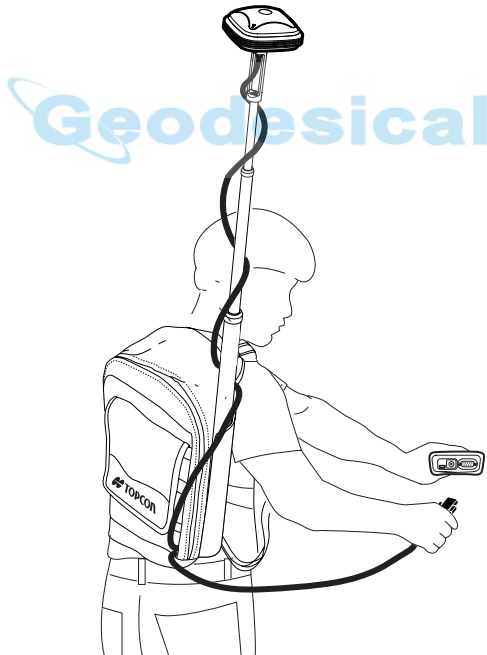


Figure 2-27. Get Ready to Survey (GMS-110 Example using Serial Cable)

Verifying Satellite Status in RT DGPS Surveys

The Status button on the TopPAD toolbar is enabled only in the RT DGPS mode when OmniSTAR or Beacon corrections have been selected in the configurations.

To check OmniSTAR status information, press the **Satellite Status** button. The *OmniSTAR Status* screen displays information on the OmniSTAR source for differential GPS corrections (Figure 2-28), as well as the following information:

- The satellite that delivers differential GPS corrections.
- The OmniSTAR's Virtual Base Station (VBS) version, Frequency, SV Lock, and S/N (Signal-to-Noise ratio).

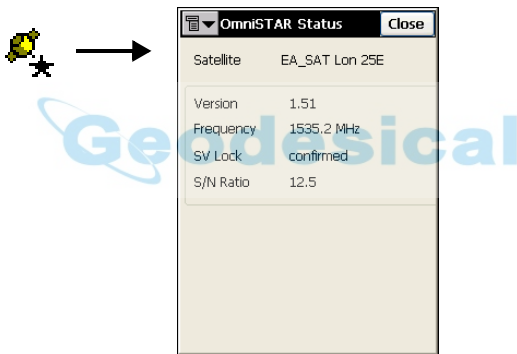


Figure 2-28. Check OmniSTAR Status Information

To check **Beacon status information**, press the **Satellite Status** button. The *Beacon Status* screen displays information on the Beacon source for differential GPS corrections (Figure 2-29), as well as the following information:

- The station that broadcasts the differential corrections for the rover.
- The version of the Beacon board in the receiver, the Beacon frequency, and the S/N ratio of the received signal.

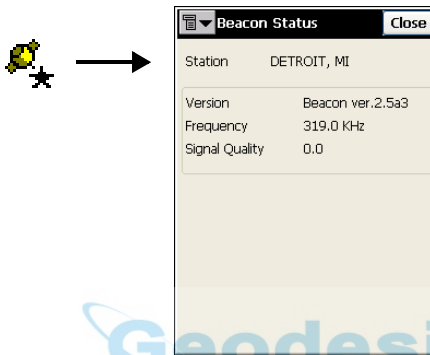


Figure 2-29. Check Beacon Status Information

Logging Raw Data in PP DGPS Surveys

When a PP DGPS survey type configuration is selected, raw observations made by the receiver are written to raw data files.



Begin raw data logging for the Rover in PP DGPS survey mode before performing any survey work.

1. To log raw data to the Rover receiver, press the **Raw Data Logging** button on the TopPAD toolbar (Figure 2-30 on page 2-25).
2. If the “user-defined filename” parameter is enabled in the configuration, enter the name of the files.

Tap **Browse** to navigate to the file and directory in which to save data. Press **OK** to save the filename and the path and to begin raw data logging to this file.



Figure 2-30. Log Raw Data to the Rover

3. To stop raw data logging, press the **Raw Data Logging** button again.

Using TopPAD with a GMS-2 Camera

The GMS-2 hand-held system incorporates digital imaging technology for capturing pictures of a waypoint or other location. When capturing pictures using TopPAD, the image data includes a GPS coordinate location, compass bearing, and other attribute information.

1. To take an image, double-tap on the main screen, then tap the *Image* tab (Figure 2-31 on page 2-26).
2. Tap **Capture**.
3. Aim the GMS-2 camera at the desired object to take a picture of.
4. Tap the *Take Image* button.

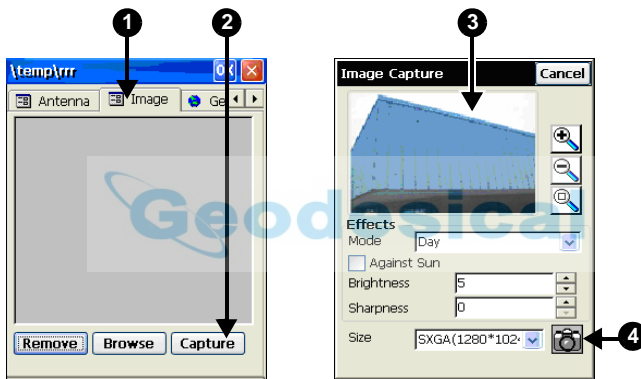


Figure 2-31. Capturing an Image

5. Review the image and tap **Accept** to save it.
6. Enter a name for the image and navigate to a location to save it in. Tap **Save**.

TopPAD Software Reference

This chapter provides detailed reference information on the Main screen, dialog boxes, tabs, parameters, and settings found throughout the TopPAD software interface.



Review the ArcPAD 6.0.2 or higher manual for details on using the ArcPAD software (browse to the Knowledge Base page of the ESRI support website: <http://support.esri.com/>).

Security Geodesical

Upon initial startup, a **Security** screen displays requesting access code to begin using TopPAD (Figure 3-1).

Record the *Key value* of the device and contact your Topcon dealer to acquire a *Security ID* code.

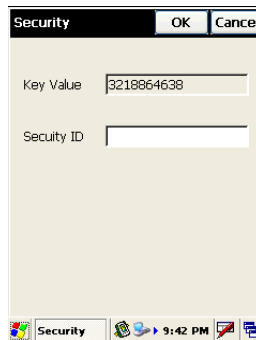


Figure 3-1. TopPAD Security Screen

Main Screen

The TopPAD main screen (Figure 3-2) has the following components:

- Toolbars – three ArcPad™ toolbars (Main, Browse, and Edit) and one TopPAD toolbar.
- Work Area – displays the current map panning frame.
- Scale Bar/Status Bar – shows the status of data received.

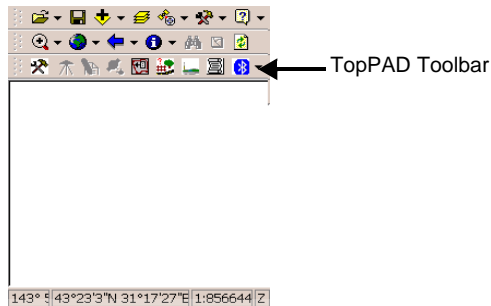


Figure 3-2. TopPAD Main Screen

Once positional updates are available, a moving cursor tracks the receiver's movement on the map.



A description of other main screen components can also be found in the ArcPad manual.

TopPAD Toolbar











The TopPAD toolbar has ten items for configuring Topcon receivers, supporting Network DGPS, Post Process DGPS and Real Time DGPS modes, importing waypoints, creating layers, and customizing data entry forms (Figure 3-3). If the controller has Bluetooth wireless technology capabilities, two more icons provide Bluetooth connections with Bluetooth enabled receivers.



Figure 3-3. TopPAD Toolbar (with Bluetooth Icon)



Table 3-1 describes the TopPAD toolbar buttons.

Table 3-1. TopPAD Toolbar Buttons


Icon	Description
Configuration 	Selects and configures the GPS survey configuration for Topcon receivers.
Start Base 	Sets up the Base receiver and starts logging raw data for post processing.
Raw Data Logging 	Logs raw data (available for PP DGPS configuration/surveys).
Satellite Status 	Displays the status of OmniSTAR/Beacon satellites.
Import 	Imports waypoints for navigation.
Create Layers 	Creates new layers and adds them to the current map.
Configure modem 	Configures radio modems for receiving and transmitting real time corrections.
Customize 	Customizes a data entry form for a layer.
Enable Bluetooth 	Connects the controller and receiver via Bluetooth or switches the Bluetooth from one receiver to another, if the controller uses Bluetooth wireless technology.
Switch Bluetooth 	Switches the Bluetooth wireless technology connection from one receiver to another.

The ArcPad toolbars provide tools to manage the maps and layers, to set options, to connect to GPS receivers and to observe the status of data received, to modify the current display, to add, edit and identify features, to move around the map, and to measure distances on the map. The Browse and Edit toolbars can be hidden, but the Main toolbar is always available.

GPS Configurations and Options

Pressing on the **Config** button  in the TopPAD toolbar or on the **Options** button  in the Main Toolbar can set configurations for a mapping project using Topcon receivers.

TopPAD Options

Pressing on the **Options** button  brings up the *TopPAD Options* screen (Figure 3-4). The essential fields for surveying with Topcon receivers are detailed below. Descriptions on all the other options in this sheet are provided in the ArcPad manual.

Protocol

The *Protocol* page is used to set the TopPAD protocol and WGS84 datum for Topcon's receivers (Figure 3-4).



Figure 3-4. TopPAD Options – Protocol



Do not enter any GPS initialization string.

GPS

When connecting to Topcon's receivers, TopPAD searches all the ports at various baud rates and parities for connectivity, and upon connection sets the communication parameters to default values. Therefore, changes are not to be made to most of the fields in this page. *Log* and *Show GPS Activity in System Tray* checkboxes can be modified to suit the user's preferences (Figure 3-5).

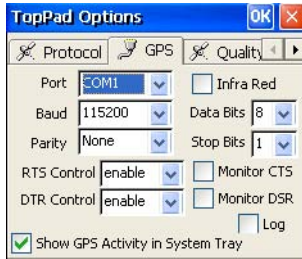


Figure 3-5. TopPAD Options – GPS

Quality

Specify quality thresholds in this page, as suggested in the ArcPad manual.

Capture

The *Capture* page is used to set the number of continuous GPS measurements to average when surveying a *Point* feature and a *Vertex* of a polyline or polygon feature (Figure 3-6 on page 3-6). These values will be the default values for new configurations. The *Config: Survey Parm*s screen can also be used to change these values.

Enable Averaging should always be enabled (checked) when working with TopPAD to ensure proper data processing. If *Averaging* is disabled, the program will automatically reset averaging to be enabled with Number of positions to average set to 1 for both Points and Vertices. The program will also automatically reset averaging values for PP DGPS config, based on the rover raw data logging period, and averaging values selected in the *Config: Survey Parm*s screen.

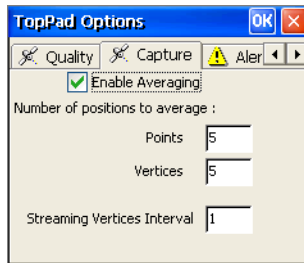


Figure 3-6. TopPAD Options – Capture


Alerts


Specify alerts in this page, as suggested in the ArcPad manual.

Location

Specify starting location for GPS position in this page, as suggested in the ArcPad manual.

Surv Config

Pressing on the **Config** button  brings up the *Select Survey Configuration* screen (Figure 3-7 on page 3-7). TopPAD allows the user to save the different DGPS configurations created.

- The GPS+ Config Name drop-down box displays all the available configurations, with the currently set configuration selected.
- The  bitmap opens the *Configurations* screen that edits the parameters of the configurations.
- **OK** – sets the selected configuration for surveying and returns to the main screen.

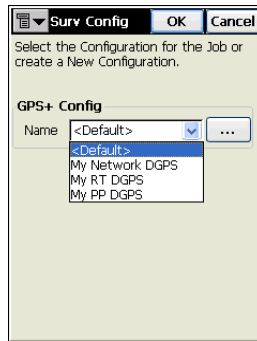


Figure 3-7. Select Survey Configuration

Configurations

The *Configurations* screen presents a list of available configurations (Figure 3-8). Editing and adding of a configuration is accomplished with the help of a wizard.

- **Delete** – deletes the highlighted configuration.
- **Edit** – opens the *Config: Survey* screen for changing configuration settings.
- **Add** – opens the *Config: Survey* screen for adding a new configuration.
- **OK** – returns to the *Select Survey Configurations* screen.

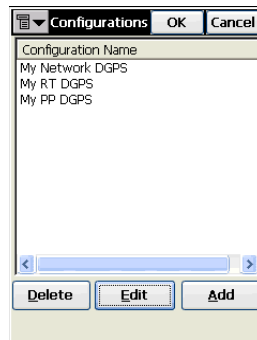


Figure 3-8. Configurations

Config: Survey

The *Config: Survey* screen contains general settings for the configuration (Figure 3-9).

- *Name* – the name of the configuration that will be displayed in the *Configurations* screen
- *Type* – the type of the configuration; Real Time DGPS, PP DGPS or Network DGPS.
 - Real Time DGPS (Real Time Differential GPS) implies the rover receiver uses differential correction data transmitted from DGPS services such as OmniSTAR and Beacon.
 - PP DGPS (Post Processing Differential GPS) implies that the raw observations made by the rover would have to be written to files, as well as the differential correction data from base.
 - Network DGPS (Network Differential GPS) implies the rover uses differential correction data from operating reference station networks like VRS (virtual reference stations data), or FKP parameters.

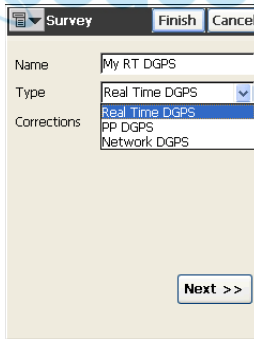


Figure 3-9. Config: Survey

Config: Survey for RT and Network DGPS For Real Time DGPS and Network DGPS configurations, the **Config: Survey** screen will have the *Corrections* field (Figure 3-10).

- **Corrections** – the type of correction data used. It can be *User Base*, *Beacon*, *WAAS*, *CDGPS*, *EGNOS*, *OmniSTAR-VBS* and *OmniSTAR-HP* for Real Time DGPS configuration or *VRS*, *FKP*, *Single Base* and *External Config* for Network DGPS configuration.
- **Next** – opens the **Config: Rover Receiver** for Network DGPS configuration, and the **Config: Base Receiver** screen for PP DGPS configuration and Real Time DGPS configuration.
- **Finish** – saves changes and returns to the **Configurations** screen.

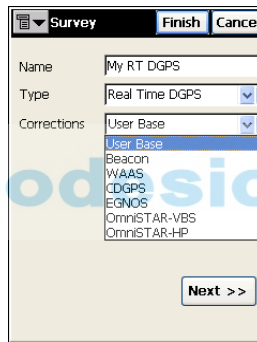


Figure 3-10. Survey Corrections

Config: Base Receiver

The **Config: Base Receiver** screen for the PP DGPS configuration has the following settings to record raw data to base files (Figure 3-11 on page 3-10).

- **Elevation Mask** – data from satellites below this elevation will not be used.
- **Raw Data Logging** – the set of logging parameters; logs to the receiver or the controller, sets the logging rate and select if the name of the raw data file is automatically generated or user-defined. In the latter case, a dialog box for entering the file name will be displayed at the start of logging for the base.

- *External Receiver* – for the GMS-2 unit, select whether using the internal GMS-2 receiver or an external receiver. Connectivity to external receivers can be chosen from Cable, External Bluetooth and Internal Bluetooth.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Base Antenna* screen and opens the *Config: Base Radio* screen for RT DGPS.
- **Finish** – saves the changes and returns to the *Configurations* screen.

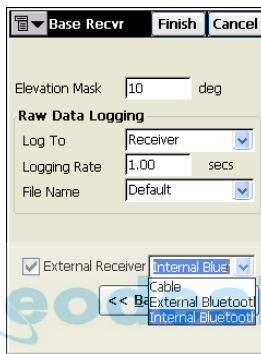


Figure 3-11. Config: Base Receiver

Config: Base Radio (For RT/Network DGPS)

The *Config: Base Radio* screen contains the settings for configuring a radio modem connected to the Base receiver (Figure 3-12 on page 3-11).

- *Radio Modem* – the type of the modem. The list of pre-defined modem types changes its contents depending upon the job configuration chosen.
- *Receiver Port Connected to Radio* – contains parameters for the connection port: port, parity, number of data bits, baud rate, and the number of stop bits.
- **Defaults** – returns all the values in the *Receiver Port Connected to Radio* fields to defaults.
- **Back** – returns to the previous screen.

- **Next** – opens different configuration screens based on the modem selected.
- **Finish** – saves the changes and returns to the *Surv Config* screen. All settings will be transmitted only when using the configuration.

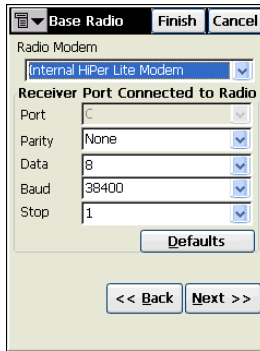


Figure 3-12. Config: Base Radio

Base Modem Config

Depending on the radio modem selected, one of the following screens will display after pressing **Next** on the *Config: Base Radio* screen:

- For HiPerXT GSM, Internal HiPer GSM, Motorola V60 Cell Phone, MultiTech GSM/GPRS Modem, Siemens TC35 Modem, Siemens M20 Modem, Nextel i58sr Cell Phone, Wavecom Fastrack GSM, the **Next** button on the *Config: Base Radio* screen opens the *Base Cell* screen. See “Config Base Cell” on page 3-12.
- For HiPerXT UHF and Internal HiPer Lite, the **Next** button on the *Config: Base Radio* screen opens the *UHF Modem* screen. See “Config UHF Modem” on page 3-12.
- For Pacific Crest and Internal HiPer (Pacific Crest), the **Next** button on the *Config: Base Radio* screen opens the *Pacific Crest* screen. See “Config Pacific Crest Radio” on page 3-13.
- For Satel modems, the **Next** button on the *Config: Base Radio* screen opens the *Satel Radio Params* screen. See “Config Satel Radio” on page 3-14.

- For Multicast UDP, the **Next** button on the *Config: Base Radio* screen opens the *Base Multicast* screen. See “Config Base Multicast UDP” on page 3-14.

Config Base Cell The *Base Cell* screen (Figure 3-13) contains the following parameters for a cell phone:

- *Base PIN* – a PIN number for a cell phone.
- **Back** – returns to the previous screen.
- **Next** – opens the *Base Antenna* screen.
- **Finish** – saves changes and returns to the *Select Survey Config* screen. All the settings will be transmitted only when the configuration is used.



Figure 3-13. Base Cell Phone Parameters

Config UHF Modem The *UHF Modem* screen contains the following parameters (Figure 3-14 on page 3-13).

- *Protocol* – selects the protocol for data transmission: either TPS, Topcon FCS mode to scan for the best channel to communicate on or PDL to communicate with the rover PDL radio.
- *Channel* – selects a dedicated channel for the PDL protocol.
- *Power* – selects the level of power for RF transmissions: either 1W or 2W.
- **Back** – returns to the previous screen.
- **Next** – opens the *Base Antenna* screen.

- **Finish** – saves changes and returns to the *Surv Config* screen. All the settings will be transmitted only when the configuration is used.

Figure 3-14. UHF Modem

Config Pacific Crest Radio The *Pacific Crest Radio* screen contains the following parameters (Figure 3-15).

- *Channel* – the operating channel for the radio modem.
- *Sensitivity* – the sensitivity level for the Radio Modem.
- **Back** – returns to the previous screen.
- **Next:** – opens the *Base Antenna* screen.
- **Finish** – saves changes and returns to the *Select Survey Config* screen. All the settings will be transmitted only when the configuration is used.

Figure 3-15. Pacific Crest Radio Parameters

Config Satel Radio The *Satel Radio* screen contains following parameters (Figure 3-16).

- *Model* – the model of the radio.
- *Channel* – the channel of the radio.
- *Frequency* – the frequency of the radio.
- **Back** – returns to the previous screen.
- **Next** – opens the *Base Antenna* screen.
- **Finish** – saves changes and returns to the *Select Survey Config* screen. All the settings will be transmitted only when the configuration is used.

Figure 3-16. Satel Radio Parameters

Config Base Multicast UDP The *Base Multicast* screen sets IP addresses for communication between the base and several rovers using UDP protocol (Figure 3-17 on page 3-15).

- *Address to Add* – enter the desired IP address.
- *IP Addresses list* – displays all available IP addresses.
- **Delete** – deletes the highlighted IP address.
- **Add** – adds the new address specified in the *Address to Add* field to the list of IP addresses.
- **Back** – returns to the previous screen.
- **Next** – opens the *Base Antenna* screen.

- **Finish** – saves changes and returns to the *Select Survey Config* screen. All the settings will be transmitted only when the configuration is used.

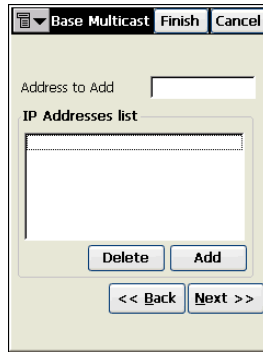


Figure 3-17. Base Multicast Parameters

Config: Base Antenna

The *Config: Base Antenna* screen contains settings for the antenna connected to the Base (Figure 3-18 on page 3-16).

- *Ant type* – the type of the Topcon antenna being used for survey. It can be *CR-3*, *CR-3 with Cone*, *CR-4*, *CR-4 with Cone*, *GMS2 antenna*, *HiPer GD*, *HiPer GGD*, *HiPer Lite/Lite+*, *HiPer Pro*, *HiPer+*, *HiPer XT*, *Legant2*, *Legant3 with UHF*, *Legant E*, *Legant L1*, *MapAnt B*, *MG-A1*, *MG-A2*, *PG-A1*, *PG-A1 with ground plane*, *PG-A2*, *PG-A5*, *Regant-DD*, *Regant-SD*, *Regency-DD*, *Regency-SD* or *Unknown*.
- *Ant Ht* – the height of the Antenna.
- *Meas Type* – the type of antenna height measurement; either *Vertical* (measuring to ARP, antenna reference point) or *Slant* (measuring to the edge of the antenna). The screen also illustrates the measurement type.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Receiver* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

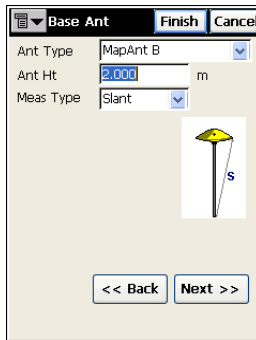


Figure 3-18. Config: Base Antenna

Config: Rover Receiver

The *Config: Rover Recvr* screen contains Rover settings.

For Real Time DGPS surveys, the screen contains the following parameters (Figure 3-19 on page 3-17).

- *DGPS format* – the format of the rover receiver differential corrections received from the base; either RTCM 2.1, RTCM 2.2, RTCM 2.3 or RTCM 3.0 for corrections data of type Beacon or, Full (RTCM 1,31, 3), partial (RTCM 9,34,3) for corrections data of type User Base.
- *Elevation Mask* – data from satellites below this elevation will not be used.
- *External Receiver* – enable to select an external receiver for the GMS-2 unit. Select either Cable, External Bluetooth, or Internal Bluetooth.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Beacon*, *Config: WAAS*, *Config: CDPG*, *Config: EGNOS*, *Config: OmniSTAR* or *Config:Rover Radio* screen, depending on the correction type selected on the *Config: Survey* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

Figure 3-19. Config: Rover Receiver – RT DGPS

For PP DGPS surveys, the screen contains the following parameters (Figure 3-20).

- *Elevation Mask* – data from satellites below this elevation will not be used.
- *Raw Data Logging* – the set of logging parameters; log to the receiver or the controller, set the logging rate and select if the name of the raw data file is automatically generated or user-defined. In the latter case, a dialog box for entering the file name will be displayed at the start of logging for the Rover.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

Figure 3-20. Config: Rover Receiver – PP DGPS

For Network DGPS configurations, the screen contains the following parameters (Figure 3-21).

- *Elevation Mask* – data from satellites below this elevation will not be used.
- *Protocol* – the protocol to receive the RTK corrections
 - *NTRIP*: from a NTRIP Caster.
 - *TCP/IP*: through the Internet.
 - *CSD Data*: through a cellular phone used as modem.
- *External Receiver* – enable to select an external receiver for the GMS-2 unit. Select either Cable, External Bluetooth, or Internal Bluetooth.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Modem* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

Figure 3-21. Config: Rover Receiver – Network DGPS

If **TCP/IP protocol or CSD Data protocol is selected** on the *Config: Rover Recvr* screen, the *RTK Format* field displays at the top of the screen (Figure 3-22 on page 3-19).

- *RTK Format* – the format of the Base receiver differential corrections transmitted to the Rover; either CMR, CMR+, RTCM 2.1, 2.2, 2.3, or 3.0.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Modem* screen.

Figure 3-22. Config: Rover Receiver – TCP/IP protocol

Config: Modem (Modem Connect)

On the *Config Modem* screen, select the desired parameters for connecting to the modem (Figure 3-23).

- *Modem Connect* – select either *Controller* or *Receiver* to connect the modem to.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Radio* screen if *Receiver* was selected as the modem, or opens the *Config: Modem* screen (Internet Info) if *Controller* was selected.
- **Finish** – saves changes and returns to the *Configurations* screen.

Figure 3-23. Config: Modem – Modem Connect

Config: Modem (Internet Info)

The *Config: Modem* screen contains settings for Internet information for the selected modem (Figure 3-24 on page 3-20).

- *IP Address* – the IP Address to be added.
- *IP address list* – the list of all IP Addresses used.
- **Add** – adds the IP Address to the list.
- **Delete** – deletes the IP Address from the list.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: NTRIP* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

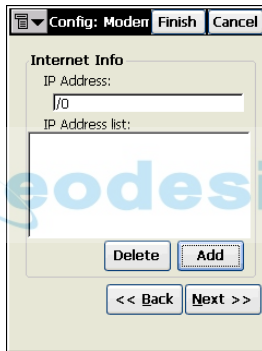


Figure 3-24. Config: Modem – Internet Info

Config: NTRIP

The *Config: NTRIP* screen contains information for the NTRIP server (Figure 3-25 on page 3-21).

- *User ID* – user's ID for the server.
- *Password* – user's password to login to the server
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Modem Receiver Info* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

Figure 3-25. Config: NTRIP

Config: Modem (Receiver Info)

The *Config: Modem* screen contains information for the selected receiver (Figure 3-26 on page 3-22).

- *Virtual Radio Port* – Virtual Port for AIM (Advanced Input Mode).
- *Enable GGA* – Enables GGA transmission messages. Only available if Single Base was selected as the Correction type on the *Config: Survey* screen or if the Network protocol on the *Rover Recvr* screen was selected as *TCP/IP* and the modem connection is made to the *Controller* (Figure 3-26 on page 3-22).
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.



Figure 3-26. Config: Modem – Receiver Info

Config: Rover Radio

The *Config: Rover Radio* screen contains parameters for the radio modem connected to the Rover receiver (Figure 3-27 on page 3-23).

- *Radio Modem* – the type of modem.
- *Receiver Port Connected to Radio* – contains the parameters of the connection port.
- **Defaults** – returns all the values to defaults in the *Receiver Port connected to radio* fields.
- **Back** – returns to the previous screen.
- **Next** – displays the parameters for the chosen modem.

Opens the *Config: Rover Antenna* screen if the selected modem type does not require additional settings or opens the *UHF Modem* screen for Real Time DGPS and User base Corrections which has *Protocol* and *Channel* selection options.

- **Finish** – saves changes and returns to the *Select Survey Config* screen. All the settings will be transmitted only when the configuration is used.

Figure 3-27. Config: Rover Radio

Config: Beacon

The *Config: Beacon* screen contains settings for a radio-beacon source of differential GPS corrections (Figure 3-28).

- *Country* – the country where the radio-beacon differential service is located.
- *Station* – the station that broadcasts differential corrections for the Rover.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

Figure 3-28. Config: Beacon

Config: WAAS

The *Config: WAAS* screen (Figure 3-29) contains settings for the WAAS source of differential correction data.

- *Channel 1* and *Channel 2* – two receiver channels that can be allocated to WAAS satellites
- *WAAS PRN #* – the WAAS satellite’s PRN number.
- *GPS PRN#* – the GPS satellite’s PRN number, which is associated with the WAAS PRN number.
- *Ionospheric corrections* – enable/disable the use of ionospheric corrections from the WAAS satellite when computing positions:
 - *None*: ionospheric corrections are not used
 - *Apply if avail*: use ionospheric corrections if available
 - *Use sat only if avail*: use only the satellites for which ionospheric corrections are available.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.



For GMS-2 WAAS PRN# and Ionospheric corrections are available.

Channel	WAAS PRN#	GPS PRN#	Iono Corr
Channel 1	None	12	Use sat only if avi
Channel 2	None	12	Use sat only if avi

Figure 3-29. Config: WAAS

CDGPS Radio

The *CDGPS Radio* screen contains settings for the CDGPS radio to receive differential correction data (Figure 3-30 on page 3-25).

- *Receiver Port Connected to Radio* – contains parameters for the connection port: port, parity, number of data bits, baud rate, and the number of stop bits.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

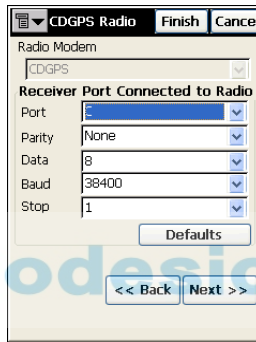


Figure 3-30. CDGPS Radio

Config: EGNOS

The *Config: EGNOS* screen contains settings for the EGNOS source of differential correction data (Figure 3-31 on page 3-26).

- *Channel 1* and *Channel 2* – two receiver channels that can be allocated to EGNOS satellites.
- *EGNOS PRN #* – the EGNOS satellite's PRN number.
- *GPS PRN#* – the GPS satellite's PRN number, which is associated with the EGNOS PRN number.
- *Ionospheric corrections* – enable/disable the use of ionospheric corrections from the EGNOS satellite when computing positions:
 - *None*: ionospheric corrections are not used
 - *Apply if avail*: use ionospheric corrections if available

– *Use sat only if avail*: use only the satellites for which ionospheric corrections are available.

- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

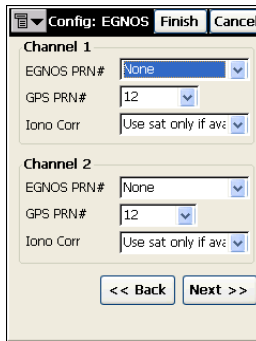


Figure 3-31. Config: EGNOS

Config: OmniSTAR

The *Config: OmniSTAR* screen contains settings for an OmniSTAR source of differential correction data (Figure 3-32).

- *Satellite* – the satellite that delivers differential GPS corrections.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Rover Antenna* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

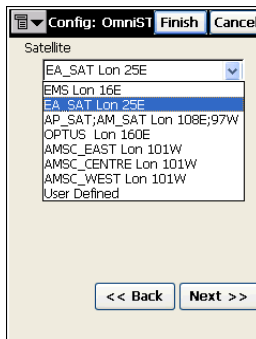


Figure 3-32. Config: OmniSTAR

Config: Rover Antenna

The *Config: Rover Antenna* screen contains settings for the antenna connected to the Rover (Figure 3-33).

- *Ant Type* – the type of Topcon antenna.
- *Ant Ht* – the height of the antenna.
- *Meas Type* – the type of antenna height measurement; either *Vertical* (measuring to ARP, antenna reference point) or *Slant* (measuring to the edge of the antenna). The screen also illustrates the measurement type.
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Survey Parameters* screen.
- **Finish** – saves changes and returns to the *Configurations* screen.

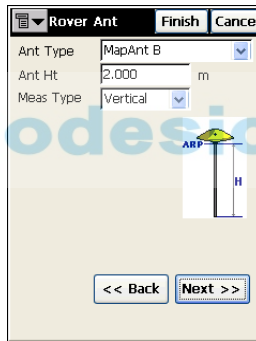


Figure 3-33. Config: Rover Antenna

Config: Survey Parameters

The *Config: Survey Params* screen contains the default parameters that will be used during the survey (Figure 3-34 on page 3-28). These parameters can also be changed using the Options button when the selected configuration is an RT DGPS type.

- *Enable Averaging* – enable or disable point averaging.
- *Num Epochs to Avg: Points* – sets the number of epochs used for averaging for points.

- *Num Epochs to Avg: Vertices* – sets the number of epochs used for averaging for vertices.
- *Streaming Vertices Int* – sets the interval for streaming vertices
- **Back** – returns to the previous screen.
- **Next** – opens the *Config: Advanced* screen.
- **Finish** – saves the changes and returns to the *Configurations* screen.

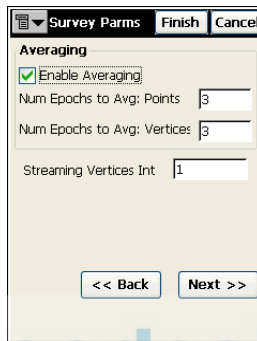


Figure 3-34. Config: Survey Params

Config: Advanced

The *Config: Advanced* screen sets several additional parameters for the GPS+ mode (Figure 3-35 on page 3-29).

- *Multipath reduction* – enable when a signal received includes multiple reflections from nearby objects. Check this field to use this mode during survey.
- *Co-op tracking* – enable to involve additional resources for acquisition of the signal, phase-lock and delay-lock loops.
- *Satellite System* – defines the system of satellites to use.
- **Back** – returns to the previous screen.
- **Finish** – saves the changes and returns to the *Configurations* screen.

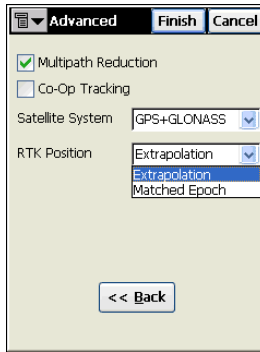


Figure 3-35. Config: Advanced

Additional TopPAD Options

Along with the other options listed in the *TopPAD Options* screen, note the following.

- *Display Units* under the *Display* page are applicable only to the scale bar, the Geography page of the Feature Properties dialog box and the measure, freehand measure, and radial measure results displayed on the status bar and the Measurement information dialog box (Figure 3-36). All other TopPAD dialogs use *Meters* as the display unit.

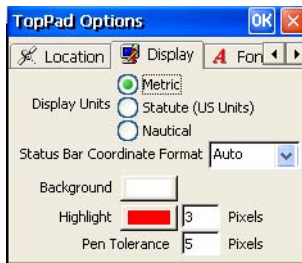


Figure 3-36. TopPAD Options – Display

- *System Files Path* and *Applets File Path* under the *Paths* page should not be modified unless the directory structure has been changed since installation (Figure 3-37 on page 3-30). These strings should always point to the correct System and Applets directory else the program will not perform as intended.

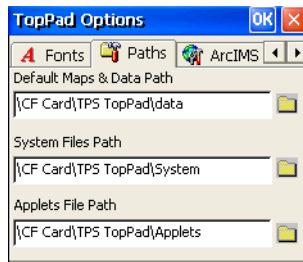




Figure 3-37. TopPAD Options – Path


Starting the Base

When a PP DGPS or User Base RT DGPS survey type configuration is selected, set a receiver as a Base for transmitting data.

Start Base

Click the **Start Base**  button available only for PP DGPS and User Base RT DGPS survey types to start the Base. The **Start Base** screen contains fields for entering base settings, and information about the base receiver, in case it has already been set (Figure 3-38 on page 3-32).

- *Base Name* – manually enter the name of the point of the Base receiver location
- *Point Shapefile* – the name of the layer in which this point exists or should be stored. The field lists all the point layers in the current map.
- *Feature Attrib* – for PP DGPS, this is a read-only box that lists the attributes of the base point.
-  – brings up the **Feature Attributes** screen, where the user can enter the values for the different attributes associated with the point layer, for the base point. This button is only available when at least one point layer is present in the current map.

-  – brings up the *Find* dialog, which allows the user to search for specific attributes within the selected the shapefile, and select those to be set for the base point. This button is available when at least one point layer is present in the current map.
- *Ant Ht* – the antenna height and type of measurement (vertical or slant).
- *Duration* – for PP DGPS, displays the time passed since the base was started.
- **WGS84** – for User Base, enters known coordinates for the base.
- **Auto Pos** – for User Base, measures the position of the current point. Once pressed, it becomes a **Stop** button to stop position averaging. The average of the coordinates displays in the selected coordinate system.
- **Start Base** – sets the receiver as a Base transmitting data. The selected base name and attributes are sent to the receiver. A new point with selected attributes is created at the current position in the base point layer if the attributes values have not been determined by searching for them.

For PP DGPS, if a *User Defined File Name* is selected in the configurations, the **Raw Data Logging** screen is launched (see “Raw Data Logging” on page 3-35), and a raw data file is created either on the controller or the receiver.

- The bitmap on the upper-left corner displays the following pop-up menus:
 - *Base Ant*: opens the **Base Antenna** screen (see “Config: Base Antenna” on page 3-15).
 - *Config Modem*: opens the base radio (see “Config: Modem (Receiver Info)” on page 3-21). Only available for User Base RT DGPS survey type.
- **Settings** – opens the **Config: Base Receiver** screen (see “Config: Base Receiver” on page 3-9).

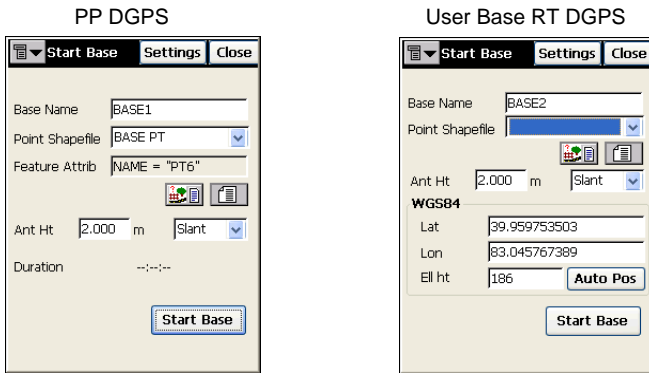


Figure 3-38. Start Base

Feature Attributes

The *Feature Attributes* screen allows the user to enter the values for attributes of the selected base point layer (Figure 3-39).

- All the attributes of the selected point layer are indicated in the left side column of the list. Attribute values can be entered in the corresponding row on the right side column.
- **OK** – saves the attribute values and returns to the *Start Base* screen.

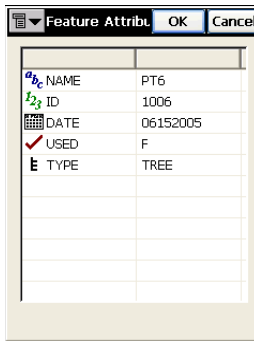




Figure 3-39. Feature Attributes

Find

The **Find** screen allows the user to search for existing features in a point layer using a search query (Figure 3-40 on page 3-34). The attributes associated with the selected feature are then set for the base.

- *In* – is a read-only field, which lists the name of the point shapefile to be searched. Additional text specified within brackets indicates a specific attribute to be searched in.
-  – brings up the **Field Browser** dialog, which allows the user to select the point file and the attribute to be searched in.
- The search criterion fields vary depending on the attribute type selected from the **Field Browser** screen.
 - *Find* (text): If only a point file is selected or if an attribute of type *Text* is selected a text entry field is made available. The search text can be entered in this field.
 - *Min, Max*: If the attribute type is *Numeric* these fields are made available to enter the range of acceptable search result values for this field.
 - *Start, End*: If the attribute type is *Date*, then the Start and End fields allow the entry of range of acceptable dates for this attribute.
 - *Find* (Boolean): If the attribute type is *Boolean*, this field can be checked to allow only results of either True or False (depending on the selection) to be displayed.
 - *Find*: If the attribute type is *Menu*, the acceptable values for the attribute are listed in this field for selection.
-  – searches the selected point shapefile for features satisfying the indicated search criterion.
- *Search only features in view* – if checked, would only search for features that lie within the map's current display boundaries.
- The list displays the results of the current search, with values for all the attributes for the displayed features.
- **OK** – saves the attribute values of the selected feature and returns to the **Start Base** screen.

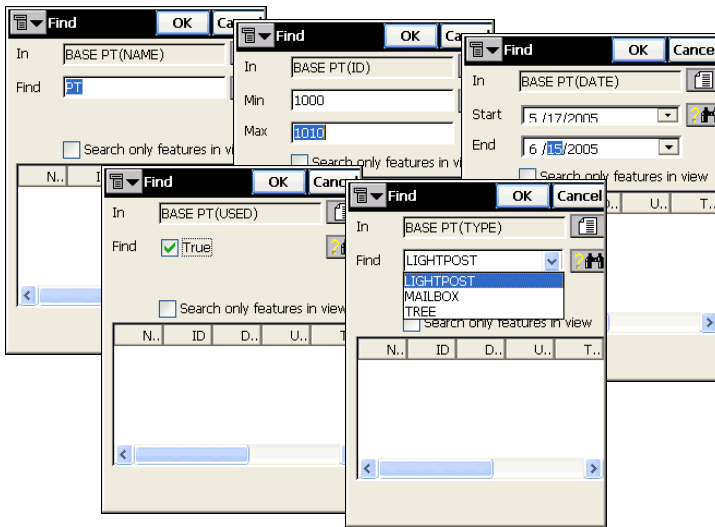


Figure 3-40. Find (Examples of Search Criteria)

Field Browser

The *Field Browser* screen lists all the point files in the current map along with their attributes (Figure 3-41).

- The point file names tree lists all the point layers in the current map. When clicking the “+” symbol, an expanded list containing all attributes of the selected point file are displayed.
- **OK** – saves the selected point file and attribute (if selected, as well) and returns to the *Find* screen.

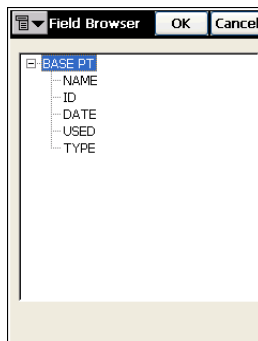



Figure 3-41. Field Browser

Raw Data Logging

When a PP DGPS survey type configuration is selected, raw data is logged to the Rover for post-processing. Start raw data logging for the Rover in the PP DGPS survey mode before performing any survey work for obtaining post process corrections.

The **Raw Data Logging** screen for the Rover is launched after pressing the **Raw Data Logging**  button and after selecting a *User Defined File Name* in the configurations (Figure 3-42 on page 3-35). To stop raw data logging, press the same button.

- **File Name** – accepts the name for the raw data file. A default filename is displayed when the dialog is first launched.
- **Folder Name** – gets displayed at the top of the dialog, when the settings require the file to be saved in the controller.
- **Browse** – helps browse directories on the controller where the file should be saved.
- **OK** – saves the filename and the path, in case of the controller, and starts raw data logging to this file.

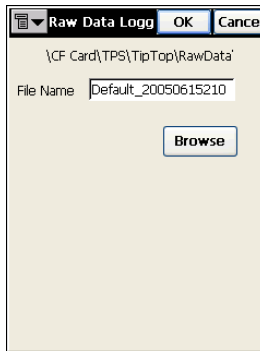



Figure 3-42. Raw Data Logging

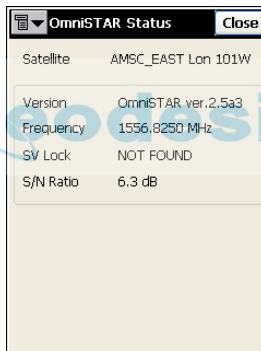
Status

The OmniSTAR and Beacon status can be observed by pressing on the **Status**  button. This button is enabled only in the RT DGPS mode, when OmniSTAR or Beacon corrections have been selected in the configurations.

OmniSTAR Status

The *OmniSTAR Status* screen displays information on the OmniSTAR source for differential GPS corrections (Figure 3-43).

- *Satellite* – the satellite that delivers differential GPS corrections.
- *Status* – displays the OmniSTAR's Virtual Base Station (VBS) version, Frequency, SV Lock and Signal to Noise ratio.



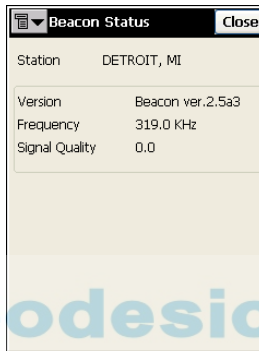
OmniSTAR Status		Close
Satellite	AMSC_EAST Lon 101W	
Version	OmniSTAR ver.2.5a3	
Frequency	1556.8250 MHz	
SV Lock	NOT FOUND	
S/N Ratio	6.3 dB	

Figure 3-43. OmniSTAR Status

Beacon Status

The *Beacon Status* screen displays information on the Beacon source for differential GPS corrections (Figure 3-44).

- *Station* – the station that broadcasts the differential corrections for the Rover.
- *Status* – displays the version of the Beacon board in the receiver, the Beacon frequency, and the signal-to-noise ratio of the received signal.




The screenshot shows a window titled "Beacon Status" with a "Close" button. The window contains a table with the following data:

Station	DETROIT, MI
Version	Beacon ver.2.5a3
Frequency	319.0 KHz
Signal Quality	0.0

Figure 3-44. Beacon Status

Import Waypoints

Points can be imported from text and Land XML files for navigational purposes. The **Import WayPoints**  button launches a Wizard for achieving this purpose.

Type and Format

The *Type And Format* screen allows selection of the format of the import file along with some of its properties (Figure 3-45).

- *Data Type* – selects the data type to import from the file. Currently only *Points* are supported.
- *Format* – selects the type of the file being exported. This can be either *LandXML* or *Text (Custom Format)*.
- *ASCII File Properties* – define the conditions of the imported file interpretation. The conditions use the same type for the attributes and quotes for text values. This field appears only when *Text (Custom Format)* is selected.
- **Next** – opens the *Import From Format* screen for the selected format.

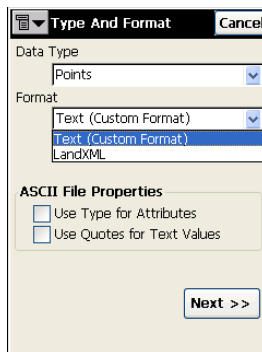


Figure 3-45. Type and Format

Import From <Format>

The *Import From <Format>* screen browses directories from which to select the file to import data from (Figure 3-46).

- *Type* – specifies the extension for the filename.
- *Name* – the name of the imported file.
- **OK** – approves the selection and opens the *Text File Format* screen for text file types and the *Coordinate System* screen for the LandXML types.

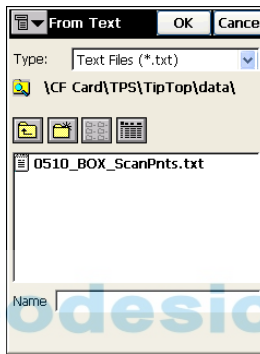


Figure 3-46. Import From Format

Text File Format

The *Text File Format* screen imports a file of arbitrary text format (Figure 3-47 on page 3-40).

- *Delimiter* – sets the separator symbol between data in the import file; either a space, a comma, tabs or other (select from the list).
- *Header in First Row* – check if the text file has a header.
- *Select File Format* – sets the order of fields in the selected file.
- **Add Format** – creates a new file format with the help of the *Custom Style* screen.
- **Edit Format** – changes the selected file format with the same *Custom Style* screen.
- **Back** – returns to the previous screen.

- **Next** – opens the *Coordinate System* screen.

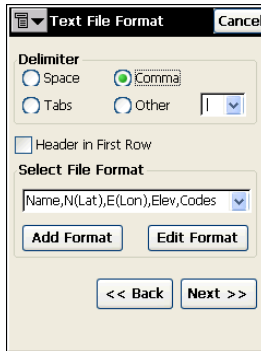


Figure 3-47. Text File Format

Custom Style

Using the arrows, move the necessary items from the Available column to the Order column in the desired order (Figure 3-48).

- **Save** – saves the File Style and returns to the *Text File Format* screen. A new string appears in the *Select File Format* drop-down menu.
- **Close** – returns to the previous screen.

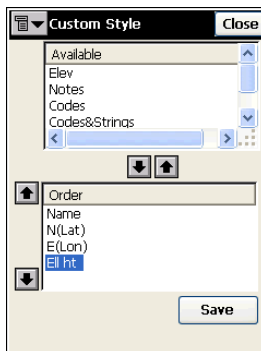


Figure 3-48. Custom Style

Coordinate System

The *Coordinate System* screen contains the coordinate system information of the selected import file (Figure 3-49).

- *Projection* – specifies the projection to be used. The button opens the *Choose Projection* screen where a projection can be selected from a list of predefined projections.
- *Datum* – shows the datum for the selected projection.
- *Dist Units* – specifies the distance units of *Meters*, *Ifcet* or *USFeet* used in the file.
- *Coordinate Type* – specifies the type for the imported file. These can be: *WGS84*, *Datum*, or *Grid*.
- *Format* – if a Coordinate Type of *WGS84* or *Datum* is selected, the format of the Latitude and Longitude values can be specified here. These can be *ddd.mmsssss*, *ddd mm ss.ssss*, *dddmms.ssss* or *ddd. (Decimal)*.
- **Back** – returns to the previous screen.
- **Next** – saves the coordinate system information and opens the *Shape folder* screen.

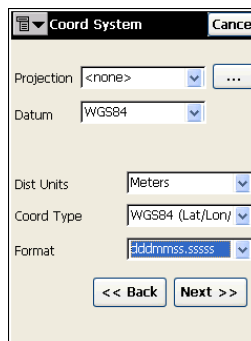


Figure 3-49. Coordinate System

Choose Projection

The *Choose Projection* screen browses directories from which to select the projection file (Figure 3-50).

- *Type* – specifies the extension for the filename.
- *Name* – the name of the projection file.
- **OK** – approves the selection and returns to the *Coordinate System* screen.

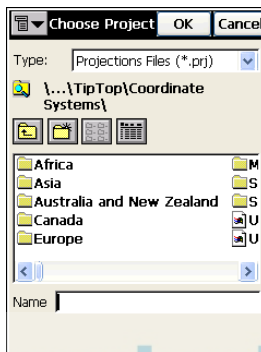


Figure 3-50. Choose Projection

Shape Folder

The *Shape folder* screen allows the selection of the folder in which the *WayPoints* shapefile should get created (Figure 3-51).

- **OK** – approves the selection and starts the import process.
- **Cancel** – returns to the *Coordinate System* screen.

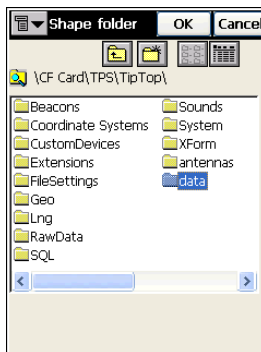


Figure 3-51. Shape Folder

Import Status

The *Import Status* screen reflects the import process and contains a progress bar and a comments window. Press the **Close** button to return to the main screen (Figure 3-52).

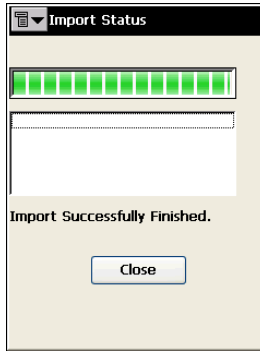




Figure 3-52. Import Status

Shapefile Creation

New shapefiles can be created and added to the current map.

Feature – Attributes

New shapefiles can be created and added to the current map, and data entry forms created for it from the *Feature-Attributes* screen (Figure 3-53 on page 3-44) accessed using the  button. This method of creating shapefiles is suggested over the *New Layer* dialog accessed using the  button, since this creates data entry forms and also generates desirable fields for surveying.

- *Codes* – lists all the layer files in the current map. Codes to be added to the map also get listed here.
- *Attributes* – contains a list of attributes for the selected code/feature.
- **Del** – deletes the highlighted entry. Available only for newly added codes.

- **Edit** – opens the applicable *Code* or the *Attributes* screen with the properties of the highlighted entry. Available only for newly added codes.
- **Add** – opens the applicable blank *Code* or *Attributes* screen. A new attribute can be added if at least one code exists and is highlighted.
- **OK** – brings up the *New layer* screen, where the folder for the shapefile can be selected. At least one attribute should be provided for each code.

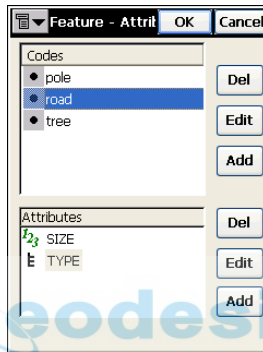


Figure 3-53. Feature – Attributes

Code

The *Code* screen contains the parameters of a code (Figure 3-54 on page 3-45).

- *Code Name* – the name of the shapefile to create.
- *Type* – of the shapefile. The options include *Point*, *Polyline*, *Polygon*, *PointZ*, *PolylineZ*, *PolygonZ*, *PointM*, *PolylineM* and *PolygonM*.
- **OK** – saves the changes, closes the screen and returns to the *Features - Attributes* screen.

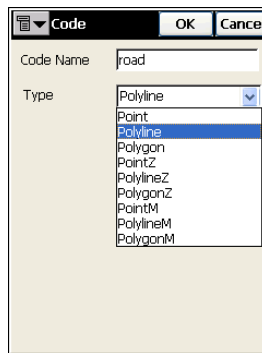



Figure 3-54. Code

Attributes

The *Attributes* screen contains an attribute's parameters (Figure 3-55 on page 3-46).

- *Attribute Name* – the name of the attribute/field.
- *Type* – sets the type of the attribute
 - *Text*: if the attribute value is an alphanumeric string.
 - *Numeric*: if the attribute value is a number
 - *Date*: if the attribute value is a date
 - *True/False*: if the attribute value is Boolean
 - *Menu*: if the attribute value can only be selected from a list of available values.
- *Length* – specifies the maximum length of the attribute value. It is modifiable for *Text* and *Numeric*, and not applicable for *Menu*. *Date* and *Boolean* have default values.
- *Precision* – specifies the precision for the *Numeric* field.
-  – deletes the highlighted entry from the menu.
- **OK** – saves changes, closes the screen and returns to the *Features-Attributes* screen.

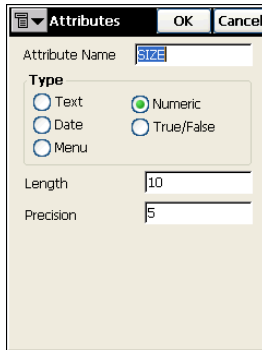


Figure 3-55. Attributes

For the *Menu* type attribute, the set of admissible values can be entered in the text field and added to the list with the **Add** button (Figure 7-4).

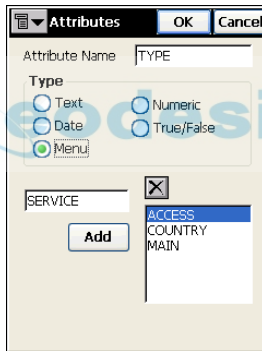


Figure 3-56. Attributes – Menu

New Layer

The *New Layer* screen browses directories for saving the shapefiles in (Figure 3-57).

- *Type* – specifies the extension for the filename.
- *Name* – the name of the layer file.
- **OK** – creates the shapefiles with required attributes for the newly added codes, adds them to the current map, creates data entry forms for these, and returns to the main screen.

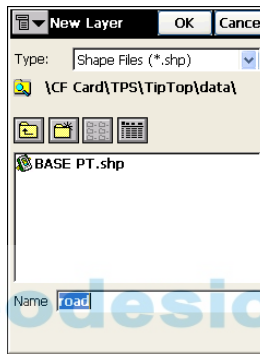



Figure 3-57. New Layer

Customizing Data Entry Forms

The data entry forms created by TopPAD after adding features and attributes in the *Features-Attributes* screen can be further customized to add data validation and set range of values from the  button.

Select Shapefile

The *Select Shapefile* screen selects the shapefile whose data entry forms need to be customized (Figure 3-58).

- Select the shapefile from the current map to be customized.
- **OK** – saves the selection and opens the *Select fields to include* screen.

If data entry forms (stored in layer definition (.apl) files) are already available for the shapefile, a message box prompting backing up of the existing layer definition file gets displayed.

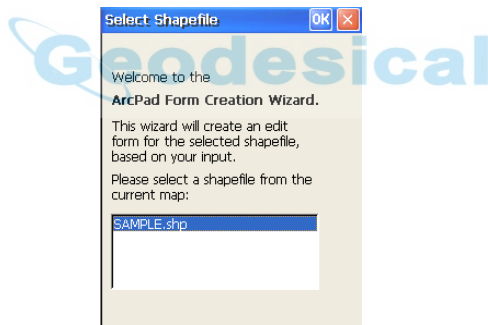


Figure 3-58. Select Shapefile

Select Fields to Include

This screen allows selection of the attributes/fields desired in the form for data entry (Figure 3-59 on page 3-49).

- *Fields in shapefile* – lists all the attributes in the selected shapefile
- *Fields to include in form* – lists the attributes selected for inclusion in the data entry form.

- **[>]** – moves the selected attribute in the *Fields in shapefile* to *Fields to include in form* list.
- **[>>]** – adds all the attributes in the shapefile to the *Fields to include in form* list.
- **[<]** – moves the selected attribute in the *Fields to include in form* list back to the *Fields in shapefile* list.
- **[<<]** – removes all the attributes from the *Fields to include in form* list.
- **Include Antenna Page** – checks if the page for including antenna height information for survey is to be added.
- **Include Image Page** – for the GMS-2 unit, checks if the page for including a captured image for points is to be added.
- **UP** – changes the order of the attributes in the data entry form by moving the selected attribute in the *Fields to include in form* list above the prior attribute in the list.
- **DOWN** – changes the order of the attributes in the data entry form by moving the selected attribute in the *Fields to include in form* list below the following attribute in the list.
- **OK** – saves the selection and opens the *Field: Name* screen.

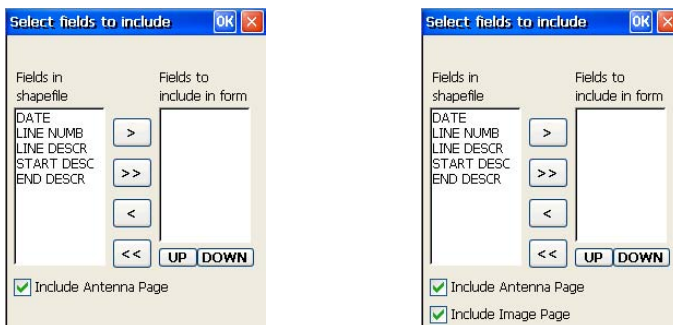


Figure 3-59. Select Fields to Include

Field: Name

The *Field: Name* screen accepts customized parameters and validation for the specific attribute/field in the data entry form. This screen gets displayed as many times, as the number of fields in the *Fields to include in form* list in the *Select Fields to Include* screen. This screen also varies based on the attribute type.

If the attribute type is *Text* or *Menu*, the following parameters are accepted in the *General* page (Figure 3-60 on page 3-50).

- *Field* – displays the name of the attribute being customized.
- *Type* – displays the attribute type.
- *Include this field in the form* – checks if the field should be included in the data entry form
- *Field Label* – selects the text to be displayed on the field label, if it is to be different from the name of the field. For example, Field: HEIGHT, Field Label: Height of the Tree.
- *Default Value* – selects the value to be displayed in the field by default.
- *Display this field as a read-only* – checks if the field is read-only.
- *This field is a required field* – ensures that data entry form does not close, unless the user enters a value in this field.
- *Field m/n* – displays the number of the current attribute in the list against the total number of attributes selected for the data entry form.


The screenshot shows a dialog box titled "Text Field: TEXT" with "OK" and "X" buttons in the top right corner. It has two tabs: "General" (selected) and "Pick List". The "General" tab contains the following fields and options:

- Field: **TEXT** Type: String
- Include this field in the form
- Field Label:
- Default value:
- Display this field as read-only
- This field is a required field

At the bottom right of the dialog, it says "Field 1 / 4".

Figure 3-60. Field: Name – General

The **Pick List** page allows entering of range of values for the attribute. This page remains the same for the *Text*, *Menu* and *Numeric* types, and is not available for the *Boolean* and *Date* types (Figure 3-61 on page 3-52).

- *Enter pick list values manually* – allows manual addition of values to the pick list.
- *Value* – accepts the range of values for the attribute
- *Text* – accepts the text to be added to the data entry form to denote the value entered. For example, Text of “Oak Tree” signifies a numeric value of zero (0) to be stored in the attributes *.dbf file.
- **Add** – adds the entered *Value* and *Text* strings to the pick list.
- **Delete** – deletes entries from the pick list.
- *Use a DBF table for the pick list* – allows using values in existing attribute DBF files to comprise the pick list. Either this option or the *Enter pick list values manually* option is available at any one point.
- *DBF Table* – displays the name of the DBF file selected by the  button.
- *Value Field* – selects the field in the DBF file whose values comprise the Value in the pick list.
- *Text Field* – selects the field in the DBF file whose values comprise the Text in the pick list.
- **OK** – in either of the pages confirms the selection and moves to the customization form for the next attribute, or starts the creation of forms, after the last attribute.

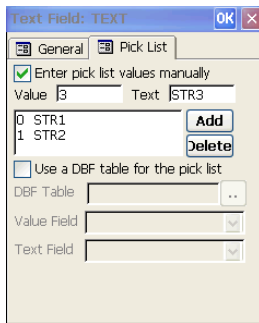


Figure 3-61. Field: Name – Pick List

For attribute type of *Numeric*, not only are the parameters as for *Text* are accepted in the **General** page but also *Min* and *Max* values for the numbers are accepted (Figure 3-62).

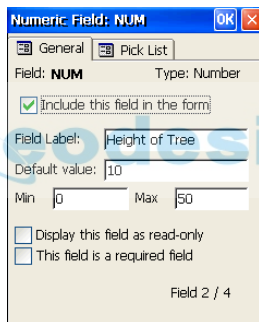


Figure 3-62. Numeric Field

When the attribute type is *Boolean/Logical*, the screen only accepts a subset of the parameters as that for *Text* and *Numeric*, as shown below (Figure 3-63).

Figure 3-63. Logical Field

For attribute type of *Date*, the only additional parameter accepted is that of *Use the current date as the default* which checks if the current date is to be always used as the default date (Figure 3-64).

Figure 3-64. Date Field

At the end of form creation, a message box is displayed asking whether the modified shapefile should be reloaded with the new form.

Point Information

Click on the main screen to set attributes, antenna measurement, and image capture information for a point.

Points – Attributes

The *Attributes* page contains all current parameters for the point's attributes (Figure 3-65). Use the text and drop-down boxes to change any attribute. Listed attributes will change depending on what has been selected for the point.

- OK – confirms the selection and returns to the main screen.

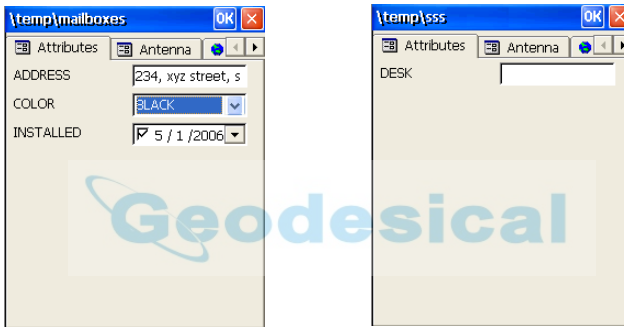


Figure 3-65. Points – Attributes (Examples)

Points – Antenna

The *Antenna* page contains parameters for the current measurement (Figure 3-66 on page 3-55).

- *Meas. type* – the type of antenna height measurement; either vertical or slant.
- *Antenna Height* – the height from the mark to the antenna reference point (ARP).
- OK – confirms the selection and returns to the main screen.

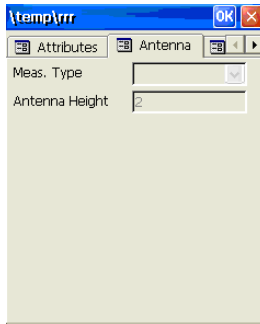


Figure 3-66. Points – Antenna

Points – Image Capture

The *Image Capture* page lists current images taken with the GMS-2 digital camera (Figure 3-67).

- Image list – pictures currently associated with the waypoint.
- **Remove** – tap to remove an image.
- **Browse** – tap to browse for an image.
- **Capture** – tap to display the *Image Capture* screen; captures an image on the GMS-2.

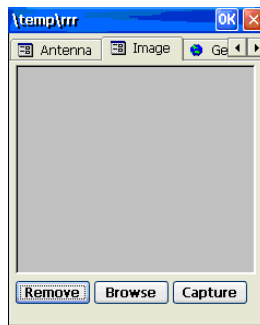






Figure 3-67. Points – Image

Image Capture

The *Image Capture* screen has the following options for taking pictures with a GMS-2 camera (Figure 3-68).

- Image area – shows the current zoom and area of the digital camera.
-  – zoom in on image.
-  – zoom out on image.
-  – zoom to image extents.
- *Mode* – select either Day, Night, or Auto.
- *Against Sun* – enable to set the camera against the sun.
- *Brightness* – select the level of brightness for the image.
- *Sharpness* – select the level of sharpness for the image.
- *Size* – select either VGA, QVGA, QQVGA, SXGA for image size.
- **Cancel** – cancels taking an image and returns to the *Image* page.
-  – captures the current image in the image area. A new window opens to accept the captured image. Tap the **Accept** button to display the *Save Image As* screen.

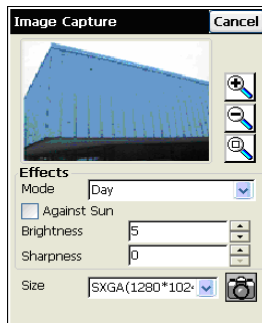


Figure 3-68. Image Capture

Radio Configuration

The **Config: Radio** screen contains the parameters of the radio modem to set (Figure 3-69).

- **Radio Connected to** – select either Base or Rover to connect the radio to.
- **Type** – shows the selected radio type.
- **Other selections** – depends on the type of radio that was selected during survey configuration. See one of the following sections for details on the settings.
 - “Config: Modem (Modem Connect)” on page 3-19
 - “Config: Modem (Internet Info)” on page 3-20
 - “Config: NTRIP” on page 3-20
 - “Config: Modem (Receiver Info)” on page 3-21
- **Disconnect** – disconnects from the radio modem.
- **Connect** – connects to the radio modem.

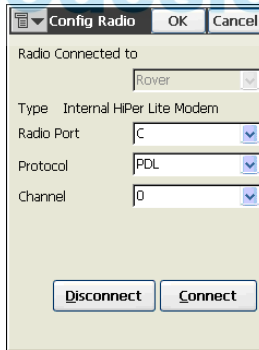


Figure 3-69. Configure Radio

 **Geodesical**

Geodesical



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ISO 9001:2000
FM 68448

TopPAD Reference Manual

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