

# G getting Started

## Creating a New Project



The first task when setting up your GPS system for the first time at a new job site is to create a new Project Configuration File. This file will contain all information specific to the new project including a list of “control” points that will be required in order to provide precise conversion of GPS coordinates to useful site coordinates. It will be necessary to obtain a list of all control points in and around the site. This point information will typically be available from the project’s survey team who will have accurately measured these points with a total station or theodolite. **The quality of the grade control system is directly affected by the quality of the surveyor’s measurement of these control points.** A minimum of 4 control points are required but it is recommended that you use at least 5.

To create a new project file turn on the computer and double-click the “Project Builder” icon on the desktop. At this stage the computer does not need to be attached to the GPS system or the machine. The first screen of the program allows you to create a new project or select an existing one for editing. Chose “Create new project” and press “Next” to move to the next screen.

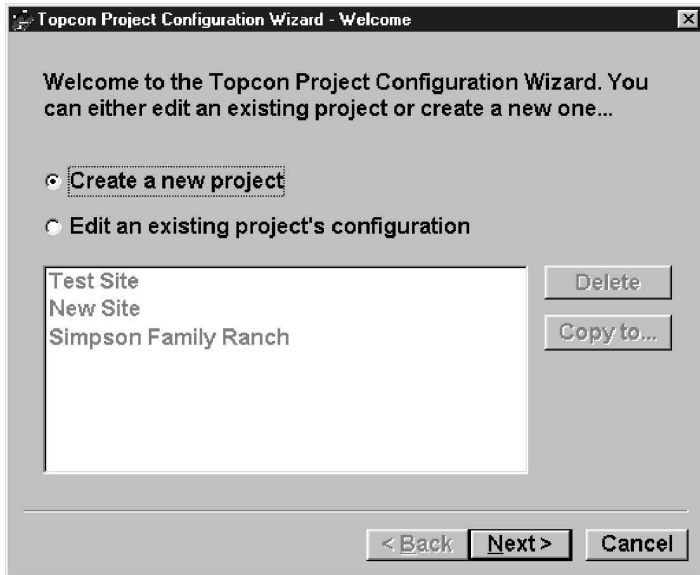


Fig 2.00

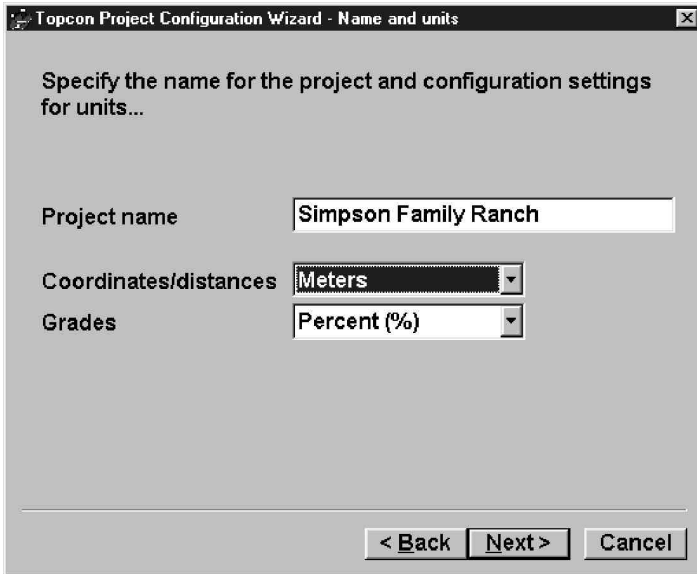


Fig 2.01

Press the “Name” box. Use the pop-up keyboard to enter the name of the project.

Specify how you want to view and enter coordinates and distances...

- Meters
- U.S. Survey feet (USA)
- International feet (English)

Specify how you want to view grades...

- Percent (e.g. 1%)
- Run : Rise (e.g. 100 : 1)

Press “Next”.

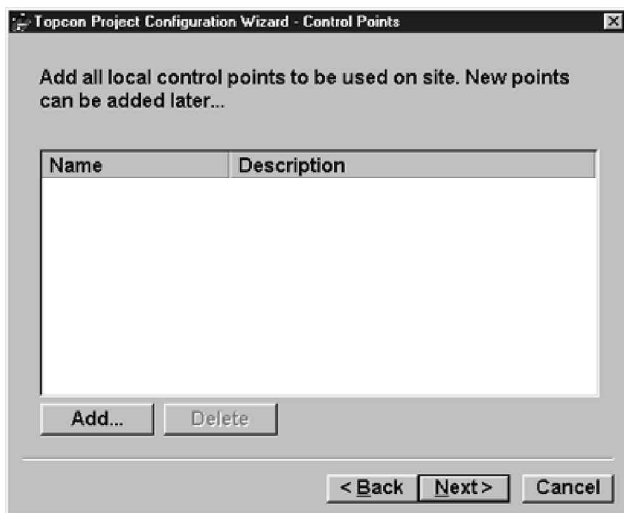


Fig 2.02

To add a new control point, press "Add". A dialog will be displayed where you can enter the name, description and local site coordinates for the control point. Take care to enter the correct coordinates.

Once all points are added move to the next screen by pressing "Next". You can add new control points to the project later if needed or edit existing ones.

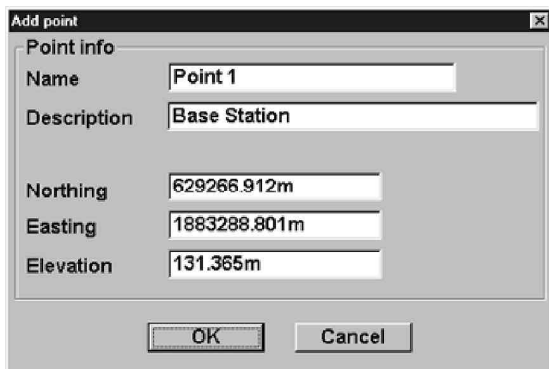


Fig 2.03

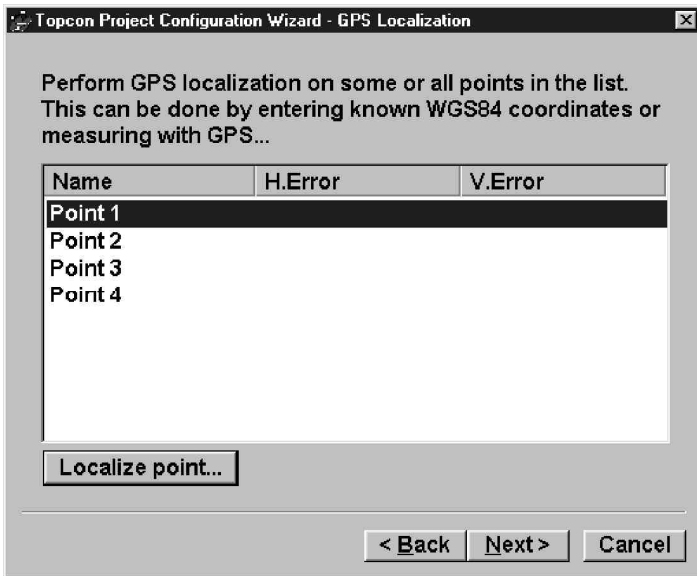


Fig 2.04

The GPS Localization screen is where you will come once you have set up your base station and are ready to “Localize” the GPS coordinates to your site (refer to Fig 4.00 ). If you have been provided with precise GPS coordinates (latitude, longitude, elevation) for your control points then now is a good time to enter these by pressing “Localize point” and entering the values. This will be discussed in more detail later. For most projects these are not likely to be available and for now you can skip to the next screen.

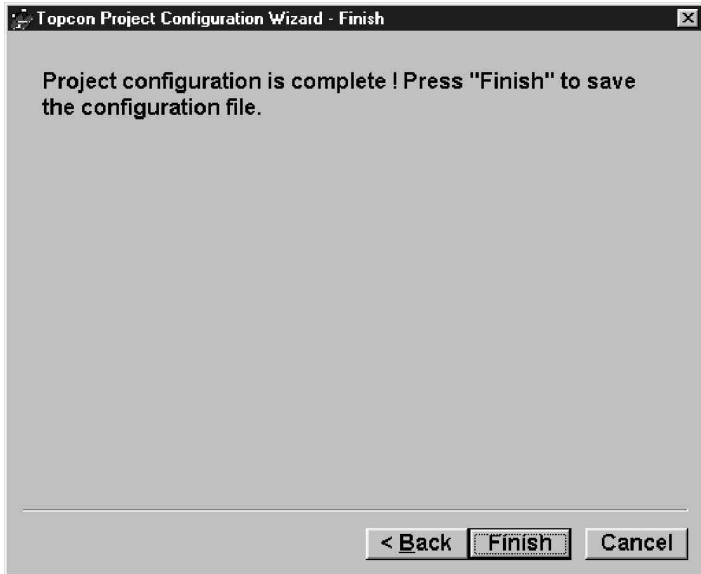


Fig 2.05

Press “Finish” to complete the creation of the new project file.

# Base Station Setup

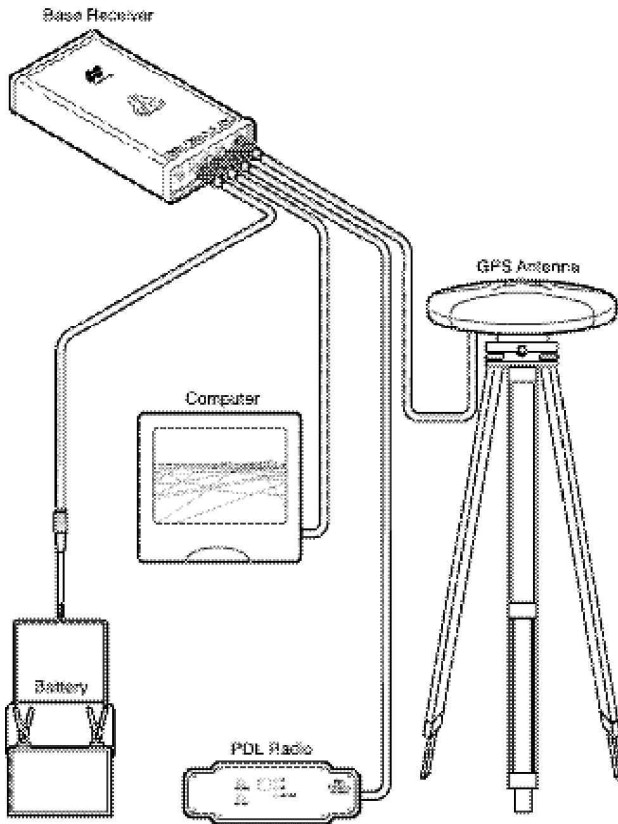


Fig 2.06

The base station antenna must be set up very accurately over a known control point. Ensure that the project file contains the point over which the antenna is to be placed.

**The point must have complete northing, easting and elevation values to be useful as a GPS base point.** Set the tripod and tribrach over the point, making sure that (a) the tripod's legs are firmly planted in the ground, (b) the tribrach level-bubble is centered and (c) the ground point is aligned with the cross-hairs when viewed through the optical plummet. Affix the antenna to the tribrach and attach the antenna cable.

For the duration of the day's grading work ensure that no vehicles or equipment are located too close to the base station. Any object including trees, buildings and fences that

in any way obstructs signals from satellites will have a direct effect on the quality of the grading. Ideally control points will be located such that there is an open view of the sky in all directions.

The radio antenna should be mounted vertically and preferably not too close to the GPS receiver or GPS antenna. For large sites or sites with difficult terrain, better radio range can be achieved by raising the radio antenna mast as high as possible using a sturdy tripod or post.



Fig 2.07

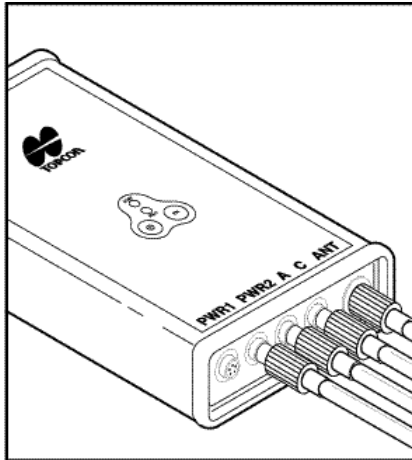


Fig 2.08

Cabling...

- **Antenna**

Use cable from GPS antenna to ANT port on GPS receiver.

- **Power**

Use cable with 5-pin circular connector and alligator clamps on either of the two power ports. Connect Alligator clamps connect to battery (red to positive, black to negative).

- **Port A**

Use cable with 7-pin circular connector to standard DB9 computer connector. Connect DB9 connector to COM1 of computer.

- **Port C**

Use cable with 7-pin circular connector to radio. Low power radios (e.g. spread spectrum) get their power supplied through Port C of the GPS receiver. High-power radios (e.g. Pacific Crest PDL base) require a separate power connection.



Fig 2.09

### Legacy-E Receiver

Press down the “PWR” button on the GPS receiver until the LED lights up. The LED will start flashing red. If the GPS antenna is connected properly it should take only a few seconds for the red flashes to be accompanied by rapid green flashes, indicating that satellites are being tracked. The number of successive green flashes indicates the number of GPS satellites tracked and the number of successive orange flashes indicates the number of GLONASS satellites being tracked. To turn the receiver off at the end of the day’s grading simply hold the power key for two seconds until both LEDs flash and are extinguished.

With all cables connected including serial cable from receiver to computer, switch on the computer. Also, check that the radio transmitter has the power LED lit. If it is not lit check the power cable connection to the GPS receiver.

## Base Station Software

For precise grading work it is necessary to insure that the GPS receiver has accurate coordinates for it's location on the site. These coordinates are obtained simply by choosing the appropriate control point from within the Base Station program. This together with an accurate measurement for height of antenna above the control mark and correct selection of radio settings for the given radio is all that is required to get the base station started. Once set, there will be some simple checks to insure that it is successfully transmitting information to the machine.

Double-click the “Base Station” icon on the computer to run the setup program. Check that the correct project and control point are selected.

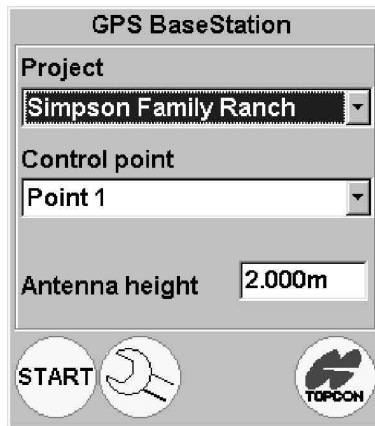


Fig 2.10

Next, press the wrench (setup) button to check all radio and antenna settings. Check the radio unit to see what type of radio it is and select it from the list of radio types. The “port” will normally be serial Port C. In general you should select the highest baud-rate for the given radio type.

The data format can be one of CMR, RTCM 2.1 and DBEN. The format should be set according to what type of system you have and what system compatibility you require. Earlier systems (installed prior to January 2001) will work only with DBEN format. All later systems are capable of either CMR or RTCM 2.1 operation. Both of these are industry standards that offer compatibility with other manufacturer’s GPS systems. For further information relating to manufacturer inter-operability please ask your 3DMC dealer.

Chose the “Antenna” tab and confirm that the correct antenna type is selected. For earlier systems (installed prior to January 2001) this will generally be “Topcon Geodetic III” but for later systems, “Legant” type antennas will be the predominant choice.

Press “OK” to accept the radio and antenna settings or press “Cancel” to discard any changes.

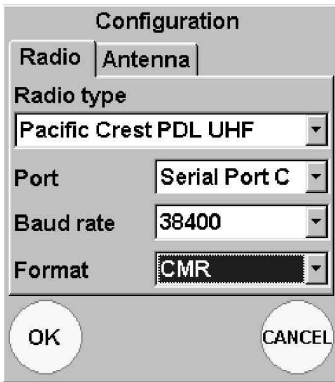


Fig 2.11a

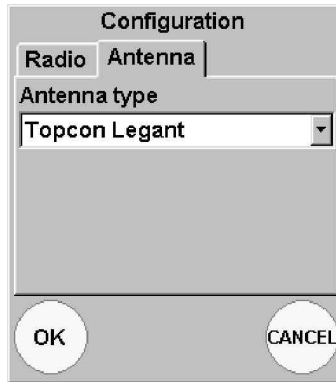


Fig 2.11b

Now that the correct antenna type is selected, accurately measure the height of the antenna above the ground mark. Using the Hi-Rod, measure from the top of the control mark to the outermost point on the rim of the antenna. The software compensates for the slant angle.

Every time that the tripod is setup over the control point, a new slant measurement must be taken since the setup height will be different. If you chose to use a fixed-height tripod for your base antenna or have the luxury of a permanently mounted antenna then of course this re-measurement will not be necessary. In fact, for permanent installations or fixed-height setups over the same control point, it is necessary to use the software only for the initial setup. Thereafter, you need only to connect the radio and power cables and switch the GPS receiver on. The receiver will remember it's settings from the initial setup. Any changes to the receiver or tripod require a "restart" using the Base Station Program.

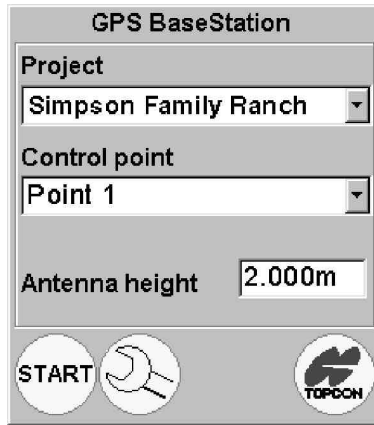
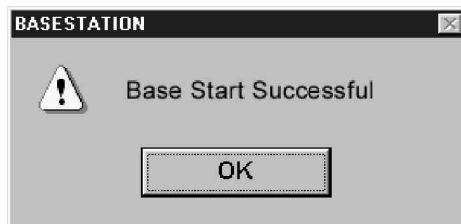


Fig 2.12

Press the “Start” button to start the base. If sufficient satellites are being tracked it should take only a few seconds to report a successful start. If success is reported check that data is being transmitted to the radio. To verify this, observe the radio’s transmit LED (often labelled TX). This LED should be flashing once a second. If start-up fails, refer to the Troubleshooting section within this manual. If it is flashing then it is a good sign that data is being transmitted and we can move our attention to the machine’s GPS system.



28 Fig 2.13