

Applying Job Files

Before beginning to work with the 3Dxi™ excavator system, you must have job files that contain the various information needed to accurately grade the jobsite. The job files you need include control point files and design surface file. Using 3Dxi, you can also create a plane surface model to use for the design surface.

Creating a Control Point File

The first task, when setting up the 3Dxi on a new jobsite, is to create a new control point file. You can use either Pocket-3D or the GX-60 control box to create your Control Point files.

The control point file consists of descriptions, local site coordinates, global GPS coordinates, and units of measurements for each control point located on the site. Typically, the project's survey team provides control point information after accurately measuring these points with a surveying instrument.



The accuracy of the surveyor's measurements for local site coordinates of control points directly affects the quality of grade.

The control point file created here may be tentative, but will provide a beginning from which to create a more thorough file later. When performing localization, the control box processes the GPS information as the operator sits in the cab.



If a control point file is already available, use a USB device to copy it to the GX-60 (see “Copying Files” on page 5-26 for details).

1. Power on the GX-60. When 3DMC loads, press **Topcon Logo ▶ File ▶ Control**.
2. Press **New** to create a new control point file (Figure 3-1).
3. Tap the Name entry field to enter a name for the control point file (Figure 3-1). Press **OK** on the keyboard and then the New file dialog box.

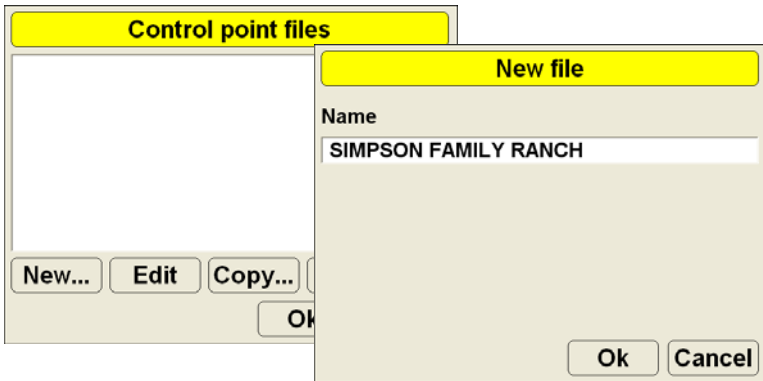


Figure 3-1. Create New Control Point File

4. Select the newly created control point file and press **Edit** (Figure 3-2).
5. Press **Add** to add a control point to the file.

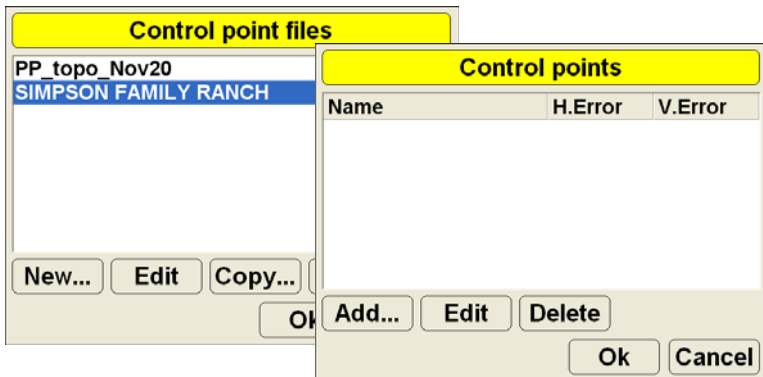


Figure 3-2. Edit Control Point File

6. Enter the following information (Figure 3-3) and press **Ok** to save the control point.
 - Name – tap and enter a name for the control point.
 - Site coords – tap each site coordinate entry box and enter the coordinates for point.
 - Check boxes – unless currently performing a GPS localization, disable (uncheck) the two GPS localization check boxes.
7. Repeat steps 6 and 7 for all available control points.



Data entry errors directly affect grading accuracy.

8. Once you have added all control points, press **OK** to save the control point file (Figure 3-3).

Control point

Name: MAGGIE

Site coords: WGS84

X: 2065148.01' Lat:

Y: 6178836.88' Lon:

Z: 376.79' Hgt:

Use for horizontal GPS localization

Use for vertical GPS localization

Measure... Ok

Control points

Name	H.Error	V.Error
MAGGIE		
LISA		
BART		
MARGE		
HOMER		

Add... Edit Delete Ok Cancel

Figure 3-3. Enter Control Point Coordinates Without GPS Localization and Save Control Point File

Selecting a Design Surface File

For 3Dxi applications, the project engineer provides a Design Surface file for the jobsite. Before grading, the correct file must be copied from a USB storage device to the GX-60 and selected (see “Copying Files” on page 5-26 for details).

Once the GX-60 control box contains the correct Design Surface file, select it and apply it to the machine. Available Design Surface files depends on the jobsite and project.

1. Press **Topcon Logo** ▶ **File** ▶ **Surfaces** ▶ **Design**.
2. On the *Surface files* dialog box (Figure 3-4), select the design surface file for the job and press **Ok**.

The main screen updates with the file’s information.

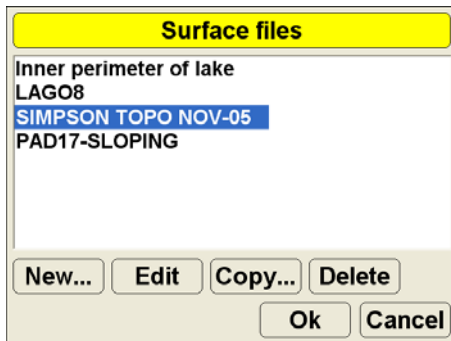


Figure 3-4. Select Design Surface Files

Creating a Plane Surface Model

The 3Dxi 3DMC software has the ability to create a plane surface model using a unique, on-site method. The plane surface model is created on the machine, in real-time, and can be used as a Design Surface file for grading. Unlike conventional applications using a laser, using 3Dxi to create a surface model eliminates the required, repetitive setup of a transmitter at the job site.

The plane surface model is composed of four basic factors: a mainfall orientation, a mainfall grade, a crossfall grade, and a reference elevation point on the plane. Just like aligning the rotating laser plane and adjusting the laser receiver height, the operator needs to be prepared with a set of relative information to fulfill the four factors. This information is composed of three points: A, B, and an elevation reference point.

Figure 3-5 on page 3-6 illustrates the basic factors needed for a plane surface model.

The following is the most common method using three reference points prepared at the site: two points (A and B) are measured to determine a mainfall orientation, and the other point (elevation reference point) is measured to determine an elevation.

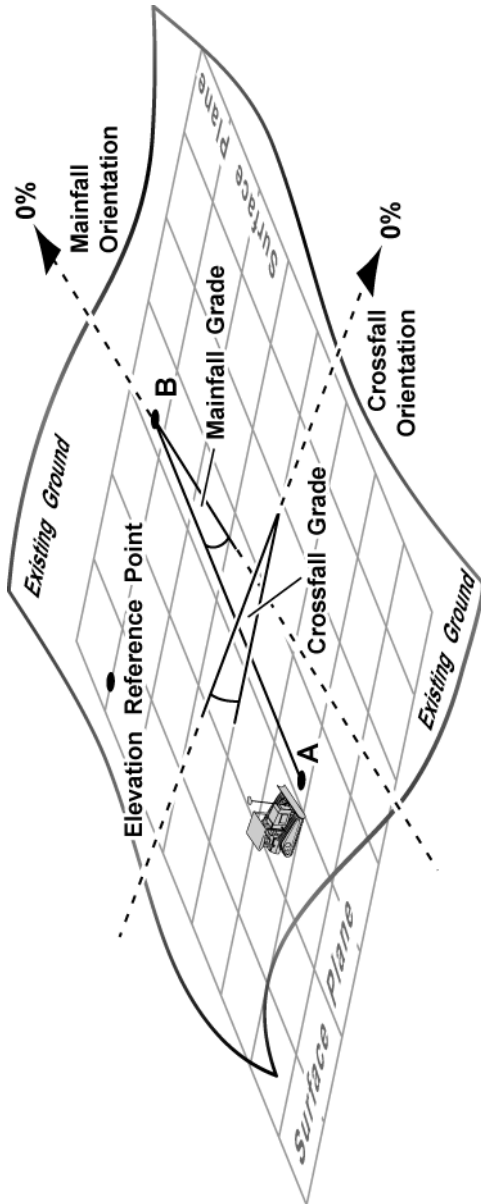


Figure 3-5. Plane Surface Diagram

1. Follow the directions in “Machine Setup” on page 4-9 to setup the 3Dxi components for the procedure that follows.
2. Press **Topcon Logo ▶ File ▶ Surfaces** and press **New** (Figure 3-6).

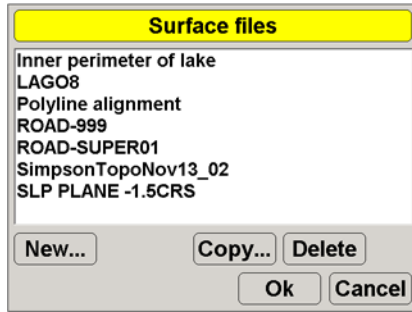


Figure 3-6. Design Surface Files

3. Enter and select the following information, then press **Next** (Figure 3-7):
 - Configuration name – tap and enter a name for the file.
 - Surface type – select either flat plane surface (no slope) or sloping plane surface (compound slope). If you select “flat plane surface”, skip to the step 8 on page 3-9.

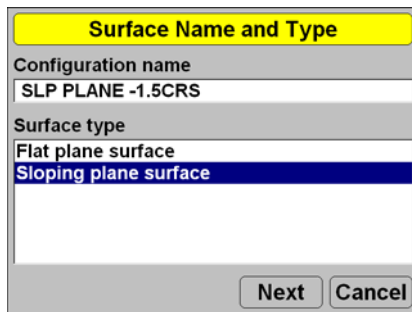


Figure 3-7. Surface Name and Type Dialog Box

4. Move the machine to point A and position the bucket over the selected point.

5. On the *Sloping Plane Surface* dialog box, and when the center of the bucket rests on the point/hub, press **A** to measure the point; the *Measuring* dialog box displays during the measurement process (Figure 3-8).
6. Move to B point and position the bucket over the selected point. On the *Sloping Plane Surface* dialog box, press **B** to measure the point; the *Measuring* dialog box displays during the measurement process (Figure 3-8).

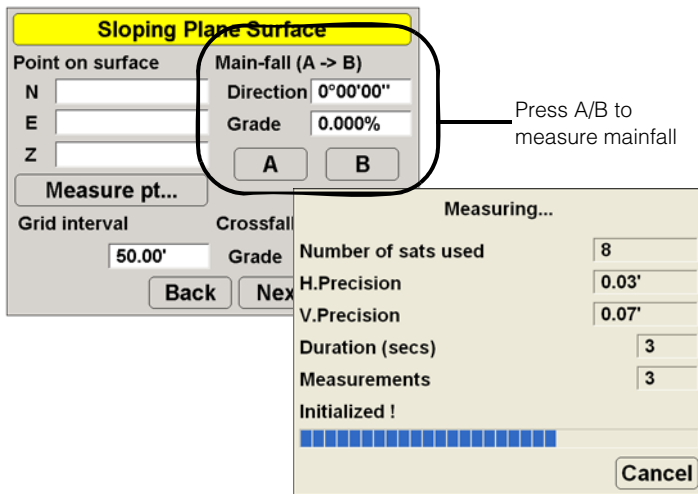


Figure 3-8. Measure Points A and B

Once the A and B point measurements finish, the control box determines the main fall orientation and grade connecting the A measurement toward the B measurement (see Figure 3-5 on page 3-6).

If needed, re-measure the points; the control box saves the A and B point coordinates separately. Also, it allows the operator to manually type in a desired grade by pressing the entry box.

A positive sign (+) designates an upgrade from A to B, and the negative (-) sign designates a downgrade from A to B (Figure 3-9 on page 3-9).

Figure 3-9. Points A and B Mainfall Grade Determined

7. Press the Crossfall Grade entry box, enter the desired cross fall grade and press **Ok** (Figure 3-10).

Figure 3-10. Enter Crossfall Grade

The cross fall grade is the grade that falls across at a 90° angle to the line of main fall (see Figure 3-5 on page 3-6), and together with the main fall, determines the plane with the compound slope. A positive (+) sign designates a fall from right to left, and a negative (-) sign designates a fall from left to right.

8. Move the machine to the elevation reference point. The measurement of this point brings the entire plane up or down to intersect with the plane and determine its relative elevation.



Use point A or point B for the elevation reference point.

- On the *Sloping Plane Surface* dialog box, and when the center of the bucket rests on the elevation reference point/hub, press **Measure pt** to measure the elevation reference point (Figure 3-11). The measuring dialog box briefly displays.

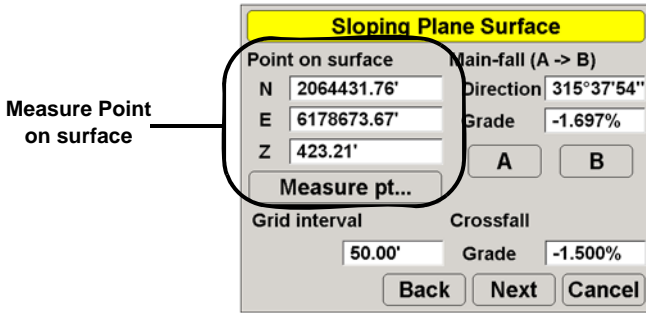


Figure 3-11. Measure Elevation Reference Point



If you have NEZ coordinates for the elevation reference point, press the applicable entry box and manually enter the information.

- Press the Grid interval entry box, enter the desired grid interval to be represented on the Main Screen, and press **Ok** (Figure 3-12).

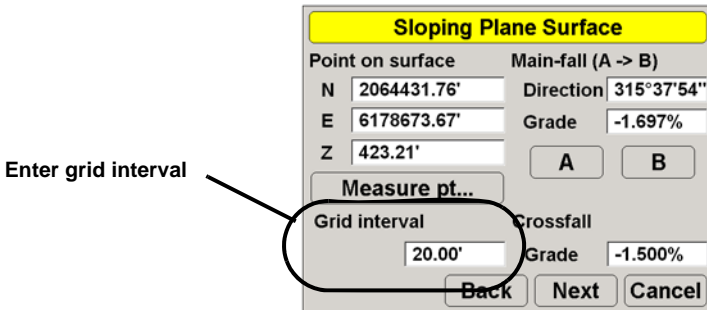


Figure 3-12. Enter Grid Interval

11. Press **Next** to review the created surface plane (Figure 3-13).
12. Press **Next** then **Finish** to save the created file and complete the plane surface (Figure 3-13).

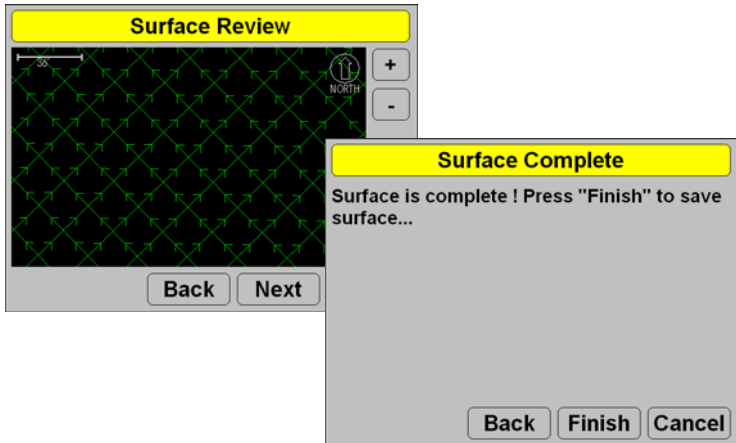


Figure 3-13. Review Surface and Save



Failure to press the Finish key will result in a loss of all the measurements and require the entire process to be repeated.

Jobsite Setup

For indicate applications, first set up the machine components, then setup and initialize the Base Station, and finally, localize the GPS coordinates before grading. Several of the following sections assume an initial setup of components is being performed. If most of the components are attached and localization has been completed, simply connect any removable components, turn on the control box, and perform an accuracy test to ensure consistent grade.

Equipment Setup: Base Station

The Base Station always sets up over a Control Point on the jobsite; to ensure accuracy, the Base Station GPS+ antenna must be positioned directly over the top of the Control Point.

The Base Station can be set up and taken down on a daily basis, or can be mounted on a permanently fixed pole and left for the duration of the project. A permanent setup prevents errors due to incorrect antenna height measurements.

When setting up the Base Station, make sure you select the correct point from the Control Points file and verify the point has a northing, easting, and elevation coordinate. The more accurate these coordinates are, the tighter the control while grading.

- Install the Base Station over a control point – see page 4-2
- Measure the antenna height – see page 4-6
- Connect all Base Station components – see page 4-4
- Select the correct radio settings – see page 4-6 (refer to your Base Station’s documentation for radio configuration procedures)
- Initialize the Base station – see page 4-6

Figure 4-2 on page 4-4 shows a completed Base Station setup.

Step 1: set up the tripod and GPS receiver/antenna over a control point, accurately level the tripod as described below.



Use a plumb bob for quick and easy setup of the tripod, especially if the ground is uneven.

1. Over a control point, extend the extension legs of the tripod to suitable lengths. Tighten the leg screws.
2. Attach the universal tribrach to the tripod, securing it in place (Figure 4-1) and insert the tribrach adapter into the tribrach.
3. Insert the horizontal spacer into the adapter and securely attach the GPS antenna to the spacer.

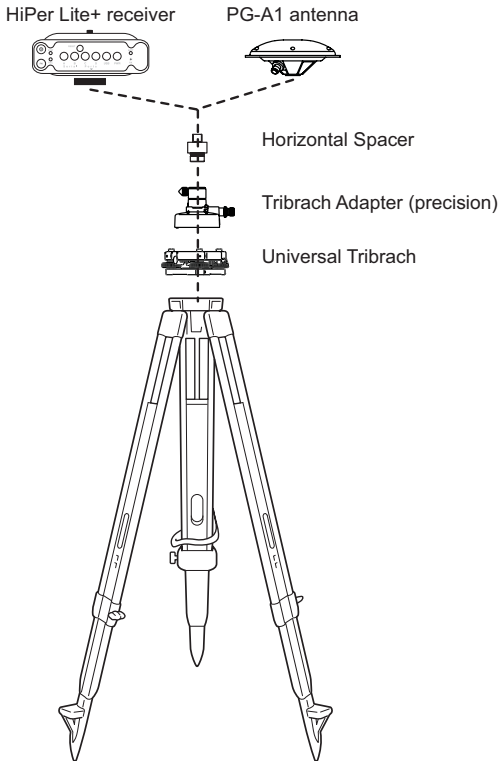
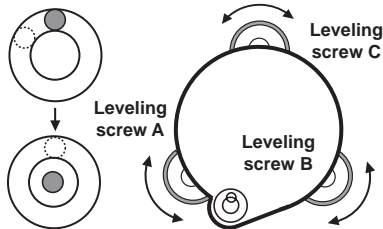


Figure 4-1. Base Station Setup

4. Roughly Level the Antenna Using the Circular Level.

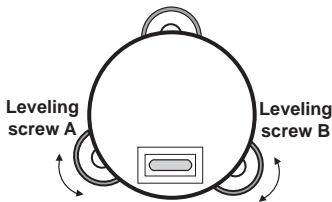
Turn leveling screws A and B to move the bubble in the circular level. The bubble is now located on a line perpendicular to a line running through the center of leveling screws A and B.



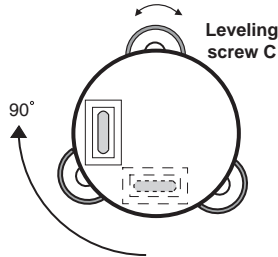
Turn leveling screw C to center the bubble in the circular level.

5. Center Using the Plate Level.

Rotate the instrument horizontally using the horizontal motion/clamp screw and place the plate level parallel with the line connecting leveling screws A and B. Turn leveling screws A and B to bring the bubble to the center of the plate level.



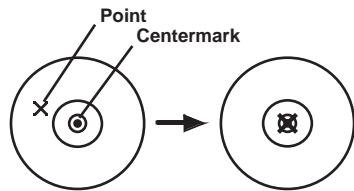
Rotate the instrument 90° around its vertical axis and turn leveling screw C to center the bubble once more.



Repeat step 4 for each 90° rotation of the instrument and check that the bubble correctly centers at all four points.

6. Center Using the Optical Plummet Telescope.

Adjust the eyepiece of the optical plummet telescope to your eyesight. Slide the instrument by loosening the tripod screw, place the point on the center mark, and then tighten the tripod screw. Slide the instrument carefully to prevent any dislocation of the bubble.



7. Level the Instrument.

Level the instrument as in step 4. Rotate the instrument, checking that the bubble is in the center of the plate level, regardless of telescope direction. Then tighten the tripod screw to lock in position.

Step 2: attach additional components to the tripod (Figure 4-2).

Attach and/or prepare additional Base Station components. These components will vary depending on the type of base station.

- For the PG-A1 base station, attach the radio modem, radio antenna, GPS receiver, and power source (optional).
- For the HiPer Lite+ base station, attach a power source (optional).

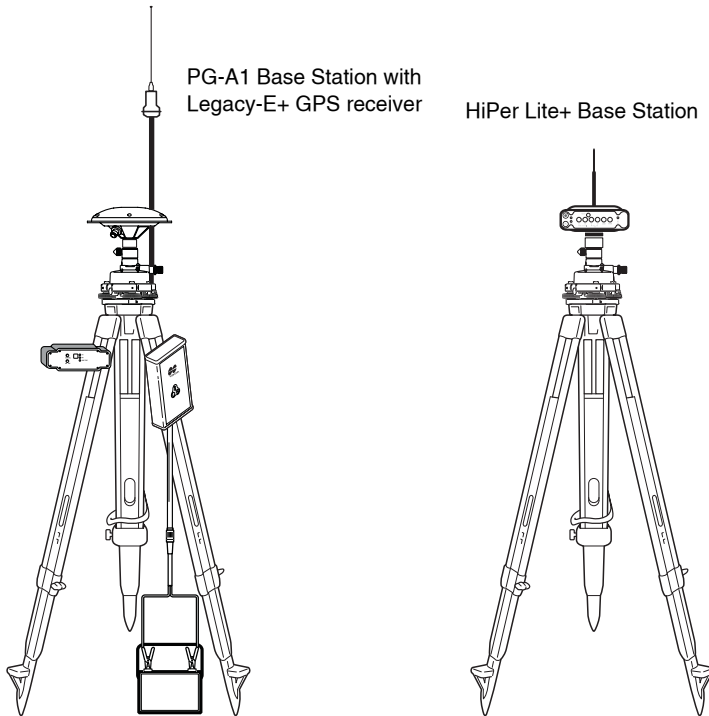


Figure 4-2. Base Station Setup

Step 3: connect component cables to the receiver (Legacy-E+ or HiPer Lite+), then connect the cables to other components (Figure 4-3 on page 4-5).

- If using Bluetooth wireless technology to connect a controller and the HiPer Lite+ receiver, refer to the controller's or receiver's documentation.

- Connect the following cables for the following components to the Legacy-E+ receiver, then to component:
 - GPS antenna: connect the antenna cable to the receiver’s ANT port, then to the GPS antenna.
 - Power: connect the power cable to the receiver’s PWR1 or PWR2 port. Attach the alligator clamps to the battery: RED to positive, BLACK to negative.
 - Radio Modem: connect the radio modem cable to the receiver’s port C and the radio modem. Connect the other end to the battery.
 - Controller: connect the cable with 7-pin circular connector to the receiver’s port A. Connect the other end of the cable to the controller. The controller will initialize the Base Station. See “Base Station Initialization” on page 4-6 for details.

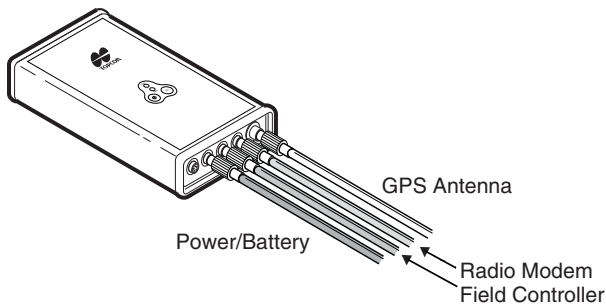


Figure 4-3. PG-A1 Base Station Cable Connections

Step 4: start the Base Station

1. Turn on the controller. For a PG-A1 base station, turn on the radio and select the correct channel on the radio modem.
2. Press the **PWR** button on the GPS receiver for one to two seconds. The power LED flashes red then rapidly green.

Once powered up, the number of successive red and green flashes indicates the number satellites being tracked.

- GPS – only green flashes
- GPS+GLONASS – green flashes followed by red flashes

To turn off the receiver, press **PWR** button for one to two seconds until LEDs are off.

Step 5: measure the antenna height from the control point to the rim (slant) or ARP (vertical) of the antenna (Figure 4-4).

This measurement will be used when initializing the Base Station.

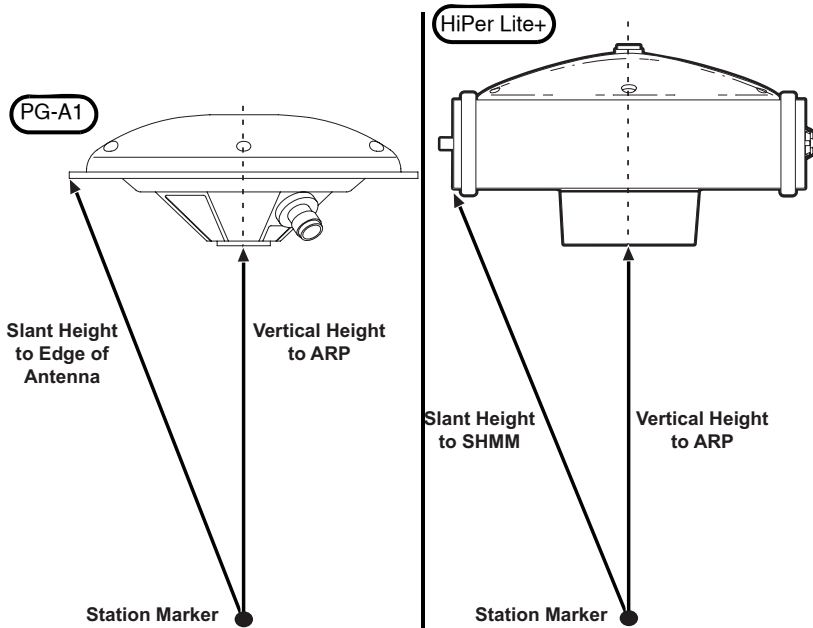


Figure 4-4. Measure Base Station Antenna Height

Base Station Initialization

Before initializing the Base Station, check the Units used in the current jobsite (Setup ▶ Units) and that the correct Control Point file is selected (Data ▶ Control). Figure 4-5 on page 4-7 shows the procedure listed below.

1. Connect the controller and receiver. Tap **Setup ▶ Base station**.
2. Select the control point over which the base station is installed and the connection between controller and receiver. Press **Next**.
3. Enter antenna type and height information. Press **Next**.
4. Enter radio type and communication information. If using a Pacific Crest PDL UHF radio, press **Configure** the select channel information and press **Set**. Press **Next**.

5. Select GPS receiver settings. Press **Finish** to initialize the GPS receiver and start the Base.
6. Immediately disconnect the Pocket-3D controller from the receiver.



Performing any other activities while connected to the Base Station will convert the Base to a Rover.

7. Check that the TX LED on the Base radio flashes once a second. This indicates data transmission.

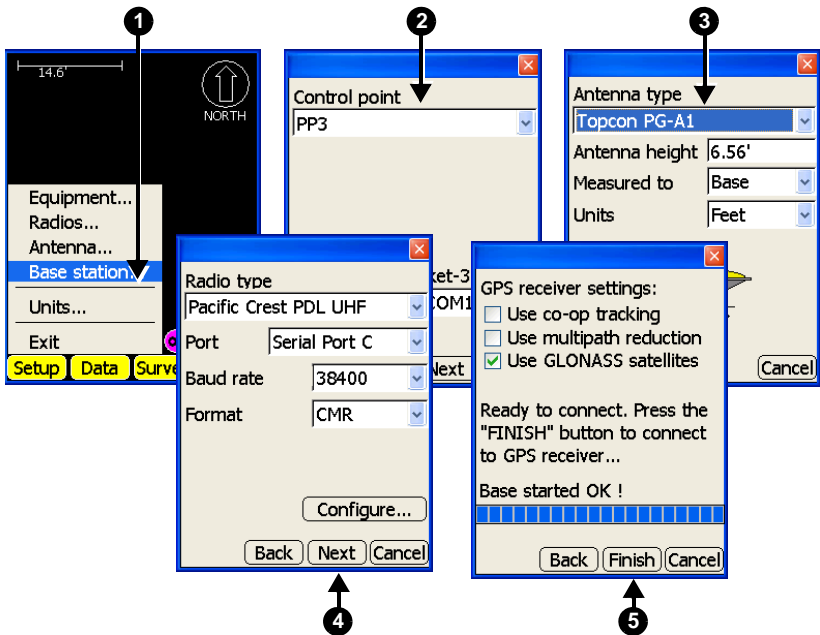


Figure 4-5. Enter Base Station Information and Start Base

General Base Station Setup Rules and Notes

- Every time the Base Station is setup, a new slant measurement must be taken since the height of the antenna will be different. Unless a fixed-height tripod, or something permanent, is used. Then you only need to measure the height of the antenna once. You will need to use Pocket-3D only for the initial processing since the GPS receiver will remember the initial settings. However, if any setting stored in the receiver has been changed or reset (like a reset function), you will need to re-initialize the Base Station.
- When the GPS receiver tracks a sufficient number of satellites, the receiver takes only a few seconds to process and report a successful start. See “Troubleshooting 3Dxi Components” on page 6-4 if the receiver fails to respond or fails to initialize.
- Ideally, the Base Station should be placed in an area free of object that can obstruct signals from satellites and degrade positioning accuracy. Obstructions can include trees, buildings, vehicles, or fences.
- Ideally, the radio antenna should not be placed too close to the GPS receiver. For large job sites, or sites with hilly terrain, use a tall tripod or a sturdy structure to raise the radio antenna as high as possible for better radio transmission range.

Machine Setup

Machine setup for 3Dxi excavator control application is quick and easy. First install the MC-A1 and Radio antennas, next install the MC-2.5 Receiver Box, then attach the GX-60 control box, and lastly connect the cables.

MC-A1 Antenna Setup

The MC-A1 GPS antenna is designed for quick setup at the beginning of the day and quick removal at the end of the day. Figure 4-6 illustrates the antenna setup for an excavator application.

1. Mount the MAIN antenna on the pole and connect the antenna cable to the antenna.
2. Tighten the hand knob firmly
3. Repeat steps 1 and 2 for the AUX antenna.



When facing forward, the MAIN antenna is on the left of the machine (Figure 4-6), or the side behind the cab.

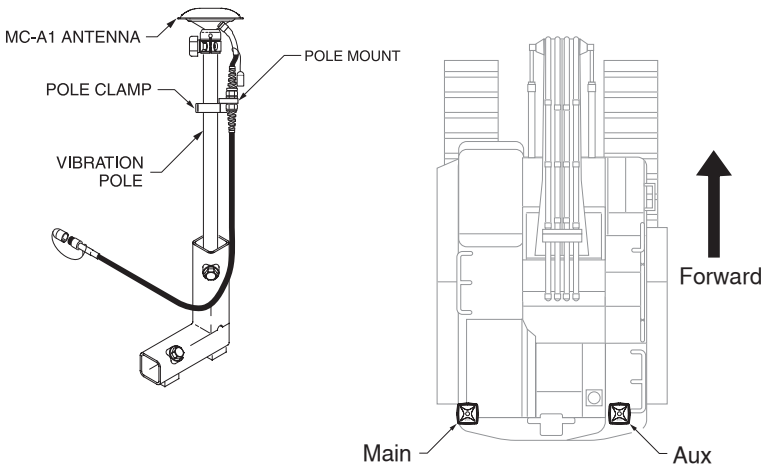


Figure 4-6. Excavator Antenna Attachment and Placement on Machine

Machine and Antenna Measurements

Take the following measurements for both antennas and the machine and record these measurements for entering into 3DMC (Figure 4-1):

- The distance from the center of the boom pivot line to the outside center of the Main antenna and to the AUX antenna.
- The distance from the boom center to the center of the Main antenna and to the AUX antenna.
- The height distance from the boom pivot line to the bottom of the ground plane of the Main antenna and the AUX antenna (from the rear, the Main antenna is on the left and the AUX antenna is on the right).
- The height distance from the ground to the boom pivot line.



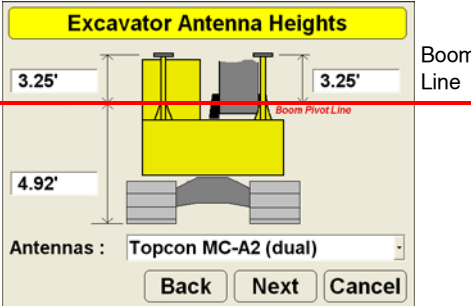
Incorrect measurements or data entry errors have a direct affect on grading accuracy.

Take each measurement twice to ensure accuracy.

Table 4-1. Machine Measurements

Measurements To Take	Screen Shot
Antenna Positions	

Table 4-1. Machine Measurements (Continued)

Measurements To Take	Screen Shot
Antenna Heights	

Machine Radio Antenna Setup

The machine radio antenna is attached to the machine's roof using a magnetic mount, and generally stays on the machine. The antenna should be positioned vertically and as high as possible on the machine to maximize signal reception (Figure 4-7).

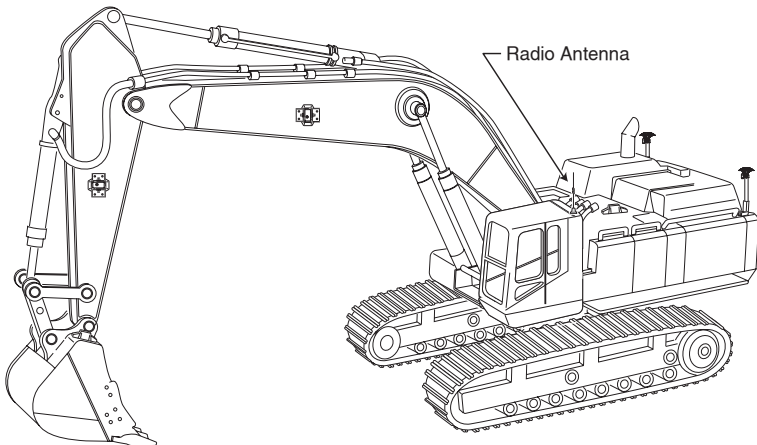


Figure 4-7. Rover Antenna Setup

MC-2.5 Receiver Box Setup

The MC-2.5 Receiver Box is designed for quick installation at the beginning of the day and quick removal at the end of the day.

1. Place the MC-2.5 Receiver Box in a suitable location (in the cab) where all four magnets attach to the machine. The LED lights should be visible to the operator, and all ports should be accessible to connect the cables.
2. Attach the following cables to the MC-2.5 Box (Figure 4-8):
 - The System Five-3D port to the control box.
 - The MC-A1 Antenna yellow cable to the Main GPS Antenna port, the black cable to the Aux GPS Antenna port.
 - The Rover Radio Antenna cable to Radio Antenna port.
 - Power cable to MAIN A.

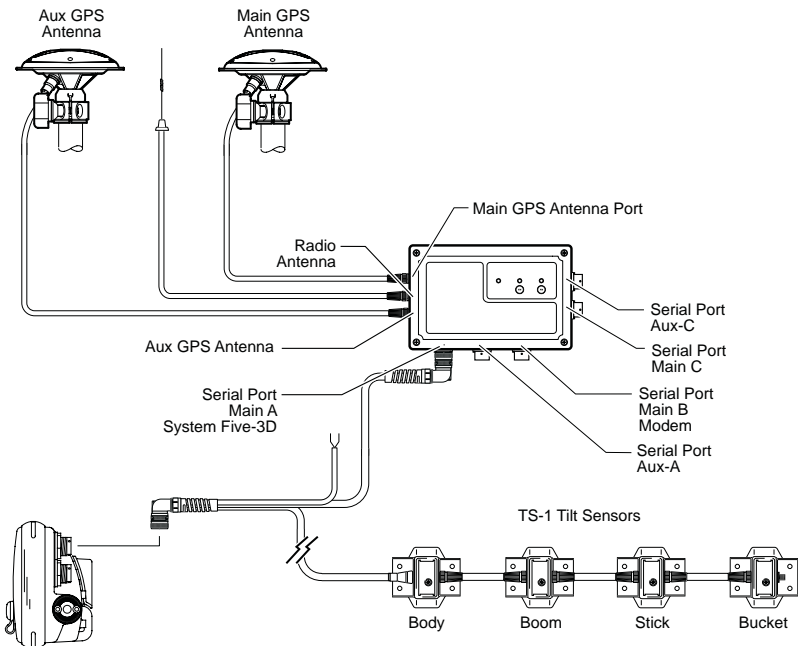


Figure 4-8. System Connections

Control Box Setup

The GX-60 control box is designed for quick attachment at the beginning of the day and quick removal at the end of the day.

1. Attach the control box to the in-cab mounting.
2. Connect the electrical cable to the top serial port (Figure 4-8).
3. Turn on the control box and allow the system to boot up.

Machine Configuration File for 3Dxi

The machine configuration file provides vital information about the type of machine, the setup of the components on the machine, machine measurements, and radio configuration information.



You must have a machine configuration file before beginning to grade.

Apply a 3Dxi Machine Configuration

1. Press **Topcon Logo** ▶ **Control** ▶ **Machine setup**.
2. Select the desired GPS-configured machine file and press **Ok** (Figure 4-9).

3DMC will connect to the GPS components and the Elevation Control key will display a single antenna icon.

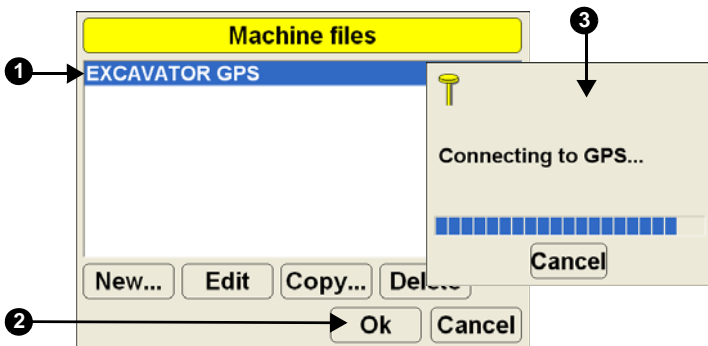


Figure 4-9. Selecting a GPS Machine Configuration



A simple check ensures that the machine receives corrections from the Base station: if the Elevation Control Key is green, the system is ready.

If the key is red or a status icon is crossed out, check the machine cable connections.

See “Troubleshooting 3Dxi Components” on page 6-4 for further information.

Create a 3Dxi Machine Configuration

For 3Dxi applications, select and enter antenna, bucket, and radio information.



Read the following procedure to determine the machine measurements required. Then have the measurements ready to enter when creating a machine configuration.

1. With the control box on, press **Topcon Logo** ▶ **Control** ▶ **Machine setup** to display the *Machine files* dialog box (Figure 4-10 on page 4-15).
2. Press **New** to begin creating a machine configuration file (Figure 4-10 on page 4-15). Enter the following information and press **Next**:
 - Configuration name – tap the entry box to display the alphanumeric keyboard. Type a name for the machine configuration and press **OK**.
 - Sensor – only “GPS antenna” available.
 - Location – only “Middle” available.
 - Units of measure – select the unit of measure (meters, feet, inches, centimeters).

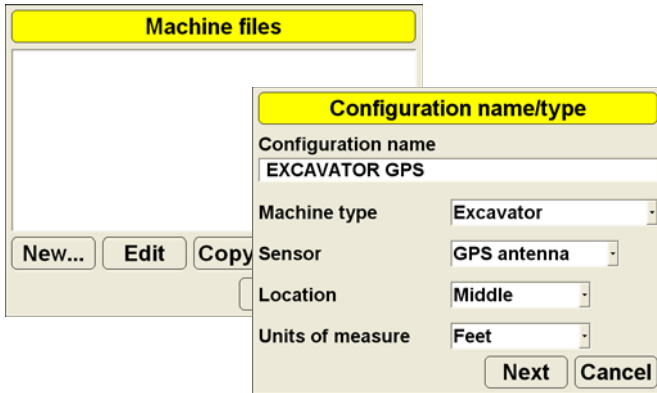


Figure 4-10. Create Machine Configuration File

- For the next six to nine screens, depending on the type of machine and its setup, see Appendix A. This chapter describes entering machine and antenna measurements, as well as calibrating the sensors. This information should already have been entered by the field manager or installer at this point.



Incorrect measurements or data entry errors have a direct affect on grading accuracy.

Take each measurement twice to ensure accuracy.

Table 4-2. Machine Measurements

Measurements	Screen Shot
Antenna Positions	

Table 4-2. Machine Measurements (Continued)

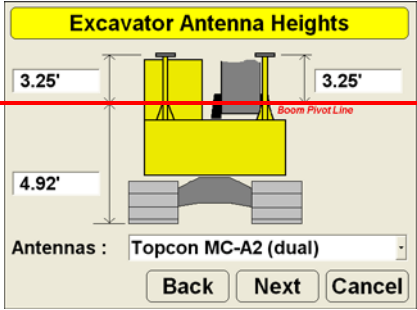
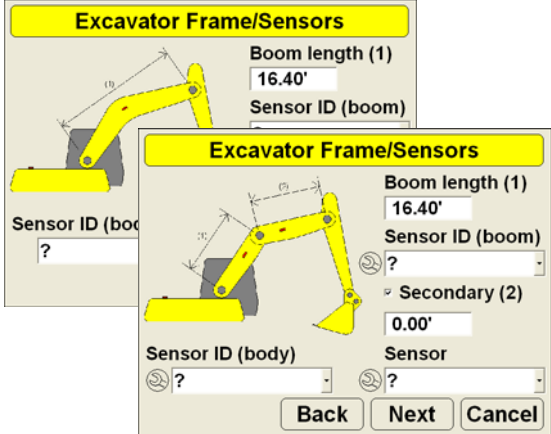
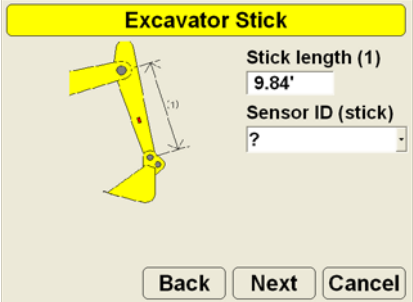
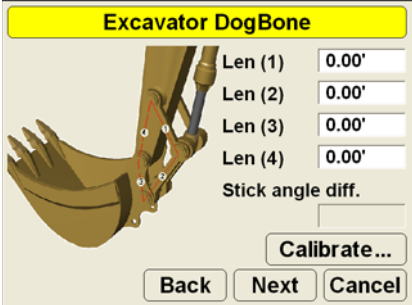
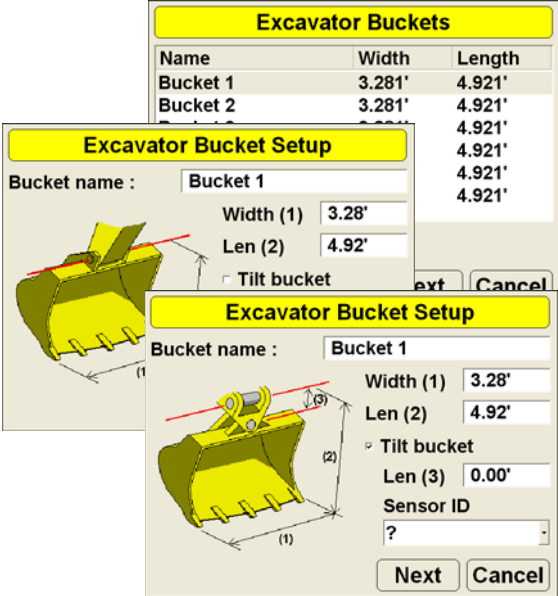
Measurements	Screen Shot
<p>Antenna Heights</p>	 <p>Excavator Antenna Heights</p> <p>3.25'</p> <p>3.25'</p> <p>4.92'</p> <p>Boom Pivot Line</p> <p>Antennas : Topcon MC-A2 (dual)</p> <p>Back Next Cancel</p>
<p>Boom Length Optional secondary boom length</p>	 <p>Excavator Frame/Sensors</p> <p>Boom length (1) 16.40'</p> <p>Sensor ID (boom) ?</p> <p>Excavator Frame/Sensors</p> <p>Boom length (1) 16.40'</p> <p>Sensor ID (boom) ?</p> <p>Secondary (2) 0.00'</p> <p>Sensor ID (body) ? ?</p> <p>Back Next Cancel</p>
<p>Stick Length</p>	 <p>Excavator Stick</p> <p>Stick length (1) 9.84'</p> <p>Sensor ID (stick) ?</p> <p>Back Next Cancel</p>

Table 4-2. Machine Measurements (Continued)

Measurements	Screen Shot
Optional Dog Bone	
Bucket Width and Length (repeated for each bucket) Optional tilt bucket measurement	

4. On the *Excavator Buckets* dialog box (after entering information for one to six buckets), press **Next**.
5. Enter the desired GPS precisions for roving and point measurements (Figure 4-11 on page 4-18).

6. On the **GPS radio configuration** dialog box (Figure 4-11), select the following information and tap **Next**:
- Radio type – the radio type (examine the MC-2.5 box for a label indicating the type of internal radio)
 - Connected to – the serial port the radio is connected to, usually Serial Port B
 - Baud rate – 38400
 - Format – CMR

The figure shows two overlapping dialog boxes. The background dialog box is titled "GPS Precisions" and contains the following fields:

- Max. GPS errors (roving) :
- Max. Horizontal RMS : 0.20'
- Max. Vertical RMS : 0.30'
- Max. GPS errors (point measurement) :
- Max. Horizontal RMS : 0.10'
- Max. Vertical RMS : 0.20'

Buttons at the bottom of the "GPS Precisions" dialog are "Back", "Next", and "Cancel".

The foreground dialog box is titled "GPS radio configuration" and contains the following fields:

- Radio type : Internal Spread Spectrum
- Connected to : Serial Port B
- Baud rate : 38400
- Format : CMR

Buttons at the bottom of the "GPS radio configuration" dialog are "Back", "Next", and "Cancel".

Figure 4-11. Enter GPS Precisions and Configure GPS Radio

7. Press **Finish** to complete and save the machine configuration file and return to the **Machine setup** dialog box.



You must press Finish to save the file. Failure to do so will result in losing all entered information.

8. Select the desired machine file, then press **Ok**.



An incorrect radio configuration setting will prevent the machine's radio from connecting with the Base Station. "No radio link" will display on the Elevation Control Key.

GPS Localization

After you have set up all the hardware components and initialized the Base Station, you need to localize the GPS coordinates to the jobsite's coordinates.

This section gives information on the principles of GPS localization and methods of GPS localization, as well as the procedures needed to localize using either Pocket-3D and an RTK Rover system, or the GX-60 control box and machine.

Principles of GPS Localization

The GPS system is capable of precise positioning, but the positions it computes are relative to a global reference system defined in terms of a geographic latitude, longitude and height above (a representation of) the earth's surface. To be useful for local site work, global GPS coordinates need to be converted into local site coordinates, defined in terms of a distance north and east of some origin point and some distance above an elevation datum. These north, east, and elevation coordinates (often abbreviated to NEZ coordinates) may be those of a regional coordinate system—e.g., a state plane system in the United States—or the project's survey crew may arbitrarily define these coordinates for the specific site. NEZ coordinates must be defined in terms of the construction design data. In either case, a mathematical conversion is necessary to turn global GPS coordinates into NEZ coordinates relative to the locally defined coordinate system.

The basic approach to calculating the mathematical conversion is to provide pairs of point coordinates for each control point on the project. A point pair consists of the following coordinates:

- local NEZ coordinates for the point (obtained from the project's survey crew)
- global latitude, longitude, and height coordinates for the point (measured as described in this section or obtained from the project's survey crew)

These point pairs are needed to calculate a precise mathematical conversion formula for converting all global GPS coordinates

generated in the GPS receiver to local NEZ coordinates for a particular project.

The following steps will help to ensure a high-quality localization suitable for centimeter-level machine grading with 3Dxi.

- First, the surveyor's local control points must be precisely measured. The quality of measurements directly affects grade accuracy.
- Second, the control points need to be located more or less evenly around the site. Generally, the more control points the better, but if they are clustered together or are all at one section of the site, the results will be less than ideal.

A good rule of success is to locate control points evenly distributed around a perimeter of the site or grading area. While not directly related to quality of localization, locate control points that are elevated, easily accessible, and are not frequently obstructed by trees, buildings, other structures, moving vehicles, etc.

- GPS localization requires a minimum of three control points, but at least four or more points should be used for the localization.

Entering Localized GPS Coordinates

GPS localization is processed in the control point file created prior to beginning each project. This control point file contains the formula necessary for the mathematical conversion between global GPS coordinates and NEZ coordinates. The control point file can be localized by entering global GPS coordinates directly into the GX-60 control box. One of the following sources can measure points and provide coordinates:

- Each control point is measured with a Topcon GPS+ or GPS RTK Survey Rover System and Pocket-3D.
- A third party source provides GPS coordinates.

If the control point file in 3DMC needs to be updated with localized coordinates, the operator can enter global GPS coordinates directly into the GX-60 control box. The control box then processes the localization as the operator sits in the cab.

Because this method deals with control point files, see “Creating a Control Point File” on page 3-1 for further information.

1. Power on the control box and allow the 3DMC application program start up. Have the measurements for each Control Point available.
2. Press **Topcon Logo ▶ File ▶ Control Points**. The *Control point files* dialog box displays (Figure 4-12).
3. On the *Control point files* dialog box, select the correct control points file, and press **Edit**. The *Control points* dialog box displays, listing all control points for the file and jobsite (Figure 4-12).

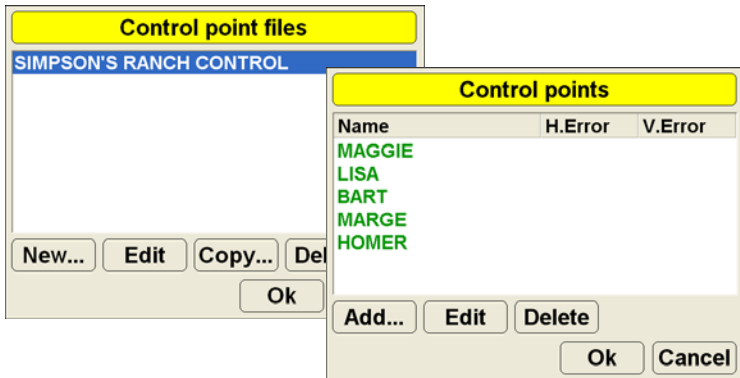


Figure 4-12. Control Point Files Dialog Box

4. Select a control point and press **Edit**, the *Control point* dialog box displays. This control point file should already have local site coordinates from the selected control point file (Figure 4-13 on page 4-22).
5. Tap in each WGS84 coordinate entry box to display the numeric pop-up keyboard and enter the coordinates for latitude (Lat), longitude (Lon) and height (Hgt) (Figure 4-13 on page 4-22).
6. Tap the two GPS localization check boxes to enable (check) them for performing the GPS localization mathematical conversion (Figure 4-13 on page 4-22).

Figure 4-13. Control Point Coordinates and GPS Localization

7. Press **Ok** to return to the *Control point files* dialog box.
8. Repeat step 4 to step 7 for all listed control points. When finished, check the horizontal (H.Error) and vertical (V.Error) values listed on the *Control points* dialog box. They should be within acceptable tolerances (Figure 4-14).

Name	H.Error	V.Error
MAGGIE	0.023'	0.001'
LISA	0.016'	0.047'
BART	0.006'	-0.048'
MARGE	0.010'	-0.010'
HOMER		

Figure 4-14. Control Point Files with GPS Localization

9. Press **Ok** until you return to the 3DMC main screen, saving the control point localization information and the control points file.



At this time, make a backup copy of the control point file on a USB device.