TOPCON

3D-MC

Software

User's Manual

3D-MC Software
User's Manual

For more information contact Synergy Positioning Systems or
visit the Synergy Positioning Systems website at www.synergypositioning.co.nz
All branches: Phone 0800 867 266 Email: info@synergypositioning.co.nz

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Preface

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Manual Conventions

This manual uses the following conventions:

Convention	Description	Example
Bold	Menu, or drop-down menu selection	**File ▸ Exit** (Click the **File** menu and click **Exit**)
	Name of a dialog box or screen	From the **Connection** screen...
	Button commands	Click **Finish**.
`Mono`	User supplied text or variable	Type `guest`, and click **Enter.**
Italic	Reference to another manual or help document	Refer to the *Topcon Reference Manual.*

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

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

Notification that an action has the potential to result in system damage, loss of data, loss of warranty, or personal injury.

Introduction

Overview

3D-MC is the software interface between the operator and the machine's components. The menus and buttons allow files to be created, updated, superimposed, copied, or deleted. Information and files the operator can access will be stored and continuously updated to either the internal memory, or to a USB drive. Options available in 3D-MC will change depending on the machine type, antenna type, and sensors used.

To learn more about 3D-MC, create an account at Topcon Support (https://www.topconpositioning.com/support). There you can download video tutorials and receive general support.

GX-55/GX-75 Displays

The GX series graphical computer displays are designed for rugged machine environments. Light and compact with a full-color LCD touch sensitive screen and integrated grade indicator LEDs, Topcon's GX series displays are fully functioning Windows® computers that provide real-time grade information and control. Figure 1 shows the GX-55.

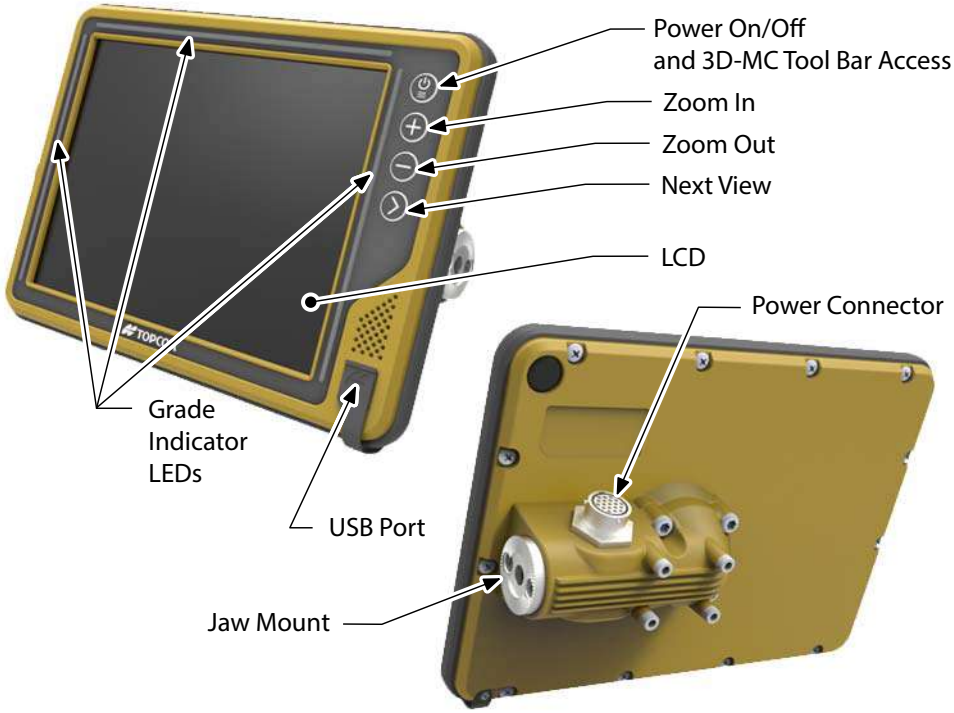


Figure 1: GX-55 Features

The **Power** button has three functions.

- Power On – press for one second.
- Power Off – press for five seconds.
- 3D-MC Main Menu Access – press to activate the 3D-MC tool bar. The tool bar will auto-hide after three seconds.

The **Zoom In/Out** buttons are active on any selected window.

Press the **Next View** button to switch the 3D-MC main screen between Plan, Section, or Profile view.

Configuring the GX-55/GX-75 Displays

1. Press and hold the **Next View** button for three seconds to activate the configuration screen (Figure 2).

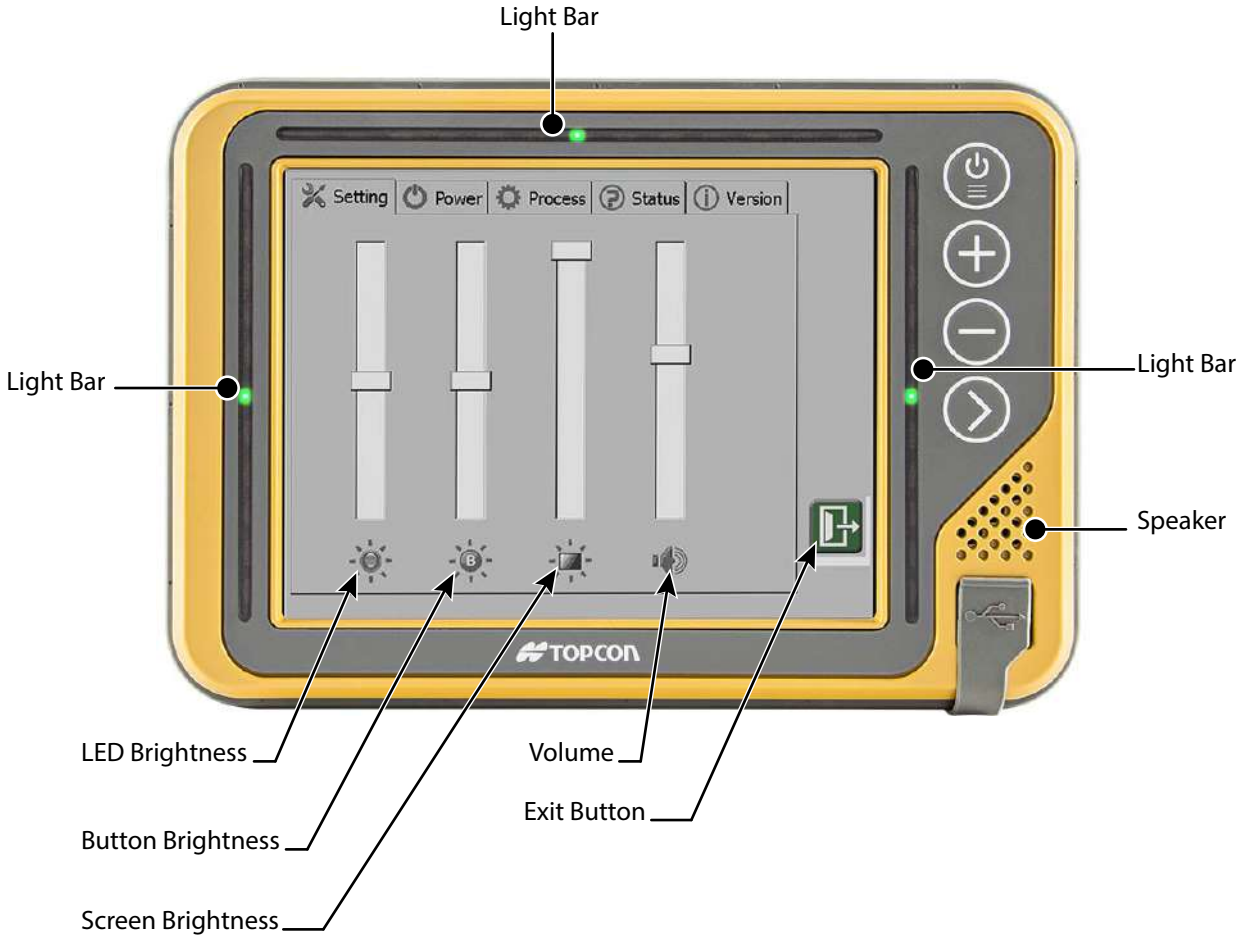


Figure 2: GX-55/GX-75 Configuration Screen

2. Adjust any of the parameters below as needed.
   - **LED Brightness** – adjust the brightness of the LEDs on the light bars.
   - **Button Brightness** – adjusts the brightness of the hard buttons on the display.
   - **Screen Brightness** – adjusts the brightness of the screen.
   - **Volume** – adjusts the volume of the speaker.
3. Tap the **Exit** button to return the main screen.

Accessing 3D-MC Help

1. Press and hold the **Zoom In** button for three seconds. The Windows **Start** menu appears (Figure 3).

Figure 3: Windows Start Menu

2. Tap **Documents**, and select **3DMC_UM** (Figure 4).

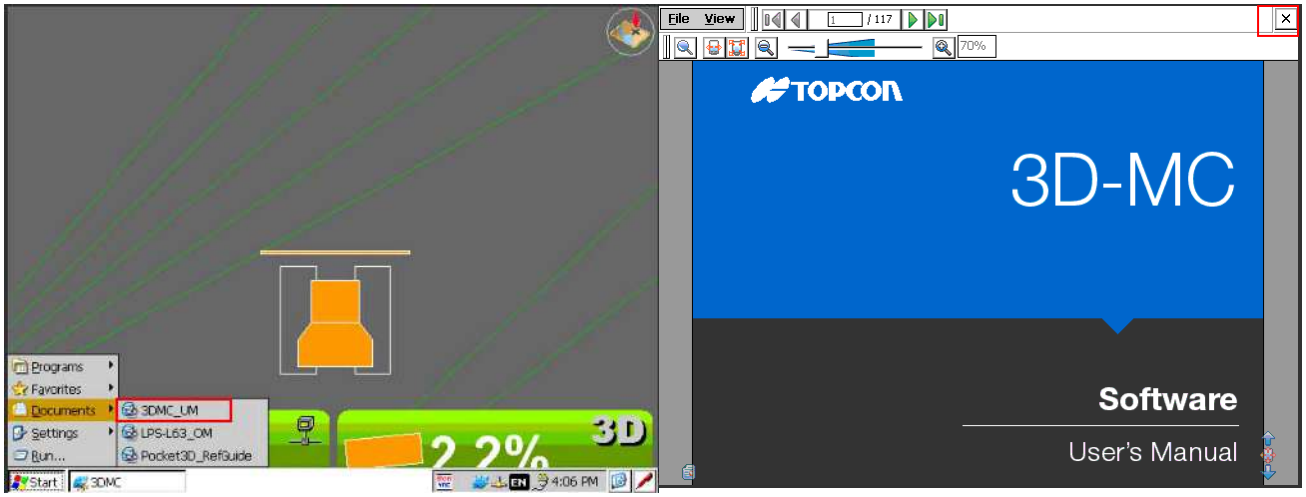


Figure 4: Access the 3D-MC Manual

LSP and Pocket-3D manuals are also available.

3. Tap **X** to return to the main screen (Figure 4).

Main Screen Display

This section provides an overview of the items in the 3D-MC main screen (Figure 5).

- **Main Screen** – the display varies, according to the selected file and display options.
- **Tool Bar** – icons for frequently used functions and pop-up menus for various functions, which depend on the type of file open and the information selected.
- **Shortcut Buttons** – Shortcut buttons are a quick way to enable, disable, or change functionality of an option.
- **Elevation Control Button** – displays cut/fill readings and offsets.
- **Slope Control Button** – Displays the slope of the blade.

Figure 5: Main Screen and Tool Bar Items

Topcon Logo Button (Legacy Displays)

This section applies to GX-60 and GX-30 displays.

In 3D-MC, tapping the Topcon Logo button (highlighted in red in Figure 6) displays the tool bar, which disappears after eight seconds of inactivity.

Figure 6: Topcon Logo Button

If using a GX-55 or GX-75, press the Power button to activate the tool bar.

Elevation Control Button

The Elevation Control Button (Figure 7 and Figure 8) displays cut/fill readings and the cut/fill offsets for the elevation of the blade or implement. It also indicates the status of the connected sensor with graphics, informational messages, and colors. The information displayed is different, depending on the control application.

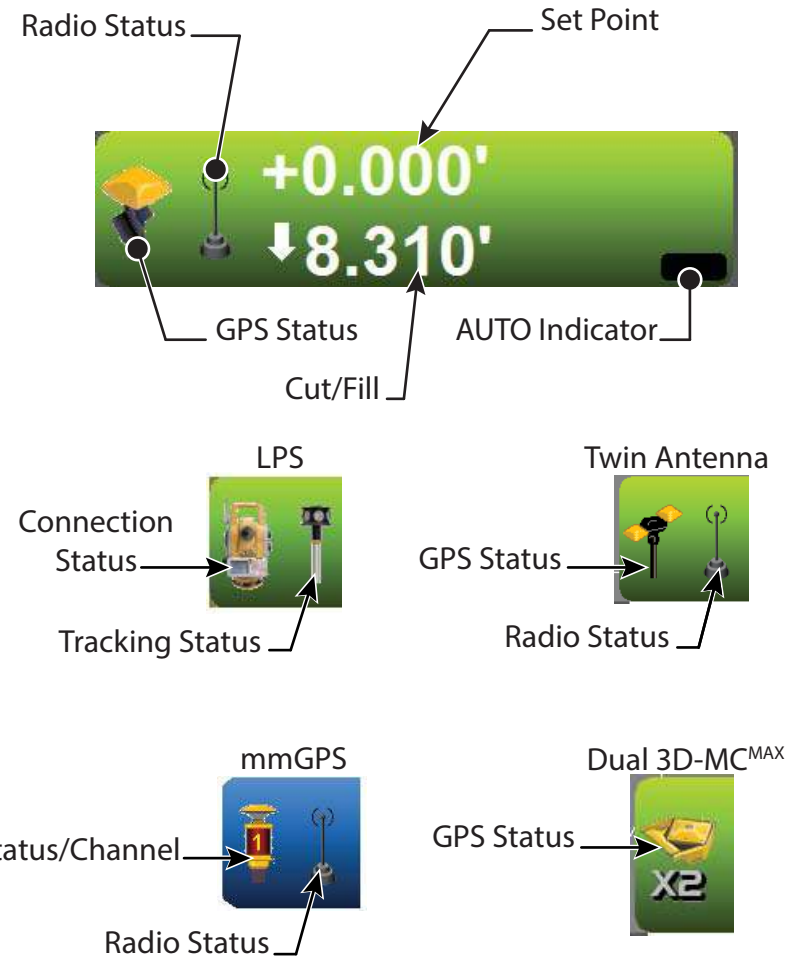


Figure 7: Elevation Control Button – Dozer/Grader

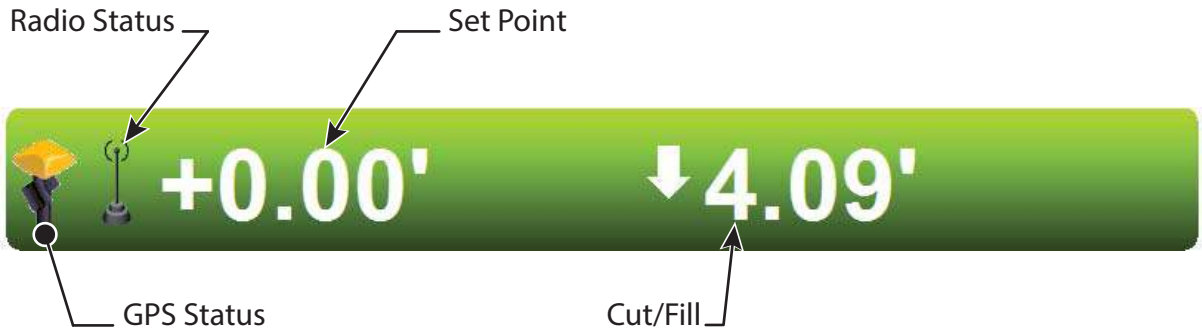


Figure 8: Elevation Control Button – Excavator

For more information on LPS systems, refer to the *LPS Operator's Manual* (p/n 1002375-01).

- **Set Point** – displays the current set point or vertical offset to the design surface. You can change it any time. Use set points to maintain an offset to the design surface, like trimming overbuilt areas to grade or managing lifts for fill material.
- **Cut/Fill** – in 3D control, displays the current cut/fill reading, or distance from finish grade. The number continuously updates according to the elevation difference between the cutting edge and the design surface.
- **AUTO Indicator** – when in AUTO, this box will display AUTO in yellow. If AUTO appears in red letters with a line through it, the elevation is outside of the working parameters and the feature is unavailable.
- **Elevation Control Button color** – the background color indicates sensor status.
  - **Green**: indicates sensor status suitable for grading.
  - **Orange**: in GPS applications, indicates low GPS precisions.
  - **Red**: indicates an error status and automatic control will be disabled.
- **GPS Status** – a crossed out icon indicates the corresponding sensor/receiver is not available. A flashing radio icon indicates the radio link is between three and ten seconds old (weak signal)

Tapping the Elevation Control Button activates the **Adjust elevation** screen (Figure 9).

Figure 9: Elevation Control Button – Adjust Elevation

Figure 9 shows a twin antenna set up. Other configurations may appear with only one **GPS info** button, or an **LPS info** button.

Elevations at the implement edges are displayed at the top of the screen. If the Topcon system has automatic valve drive capability enabled, the elevation gains are displayed. After installation, a certified Topcon dealer will calibrate the hydraulic system and gains.

For more information about gains and machine setup, refer to the following manuals:

- *3D-MC^2 Installation and Calibration Manual* (p/n 7010-0924)
- *3D-MC^2 for Graders Installation and Calibration Manual* (p/n 7030-1468)
- *3D-MC^{MAX} Installation Manual* (p/n 1009522-01)

Elevation Set Point

The Elevation set point is the user-defined vertical offset to the design surface. For example, if a value of 1.00' is entered as the Elevation set point, the grade will be 1.00' higher than the design surface. If a value of -1.00' is entered, the grade will be -1.00' below the design surface (see Figure 10).

Figure 10: Set the Elevation Point

To modify the **Elevation set point** tap **Set**, enter the desired offset, and tap **Set** again. To make the current elevation become the new on-grade elevation, tap **Match**. To zero out the Set Point, tap **Zero**.

GPS Information

When two **GPS info** buttons are visible, the left **GPS info** button represents the Main antenna, and the right **GPS info** button represents the Auxiliary antenna.

1. Tap the Elevation Control Button. The **Adjust elevation** screen appears.
2. Tap the **GPS info** button to view the GPS information tab list (Figure 11).

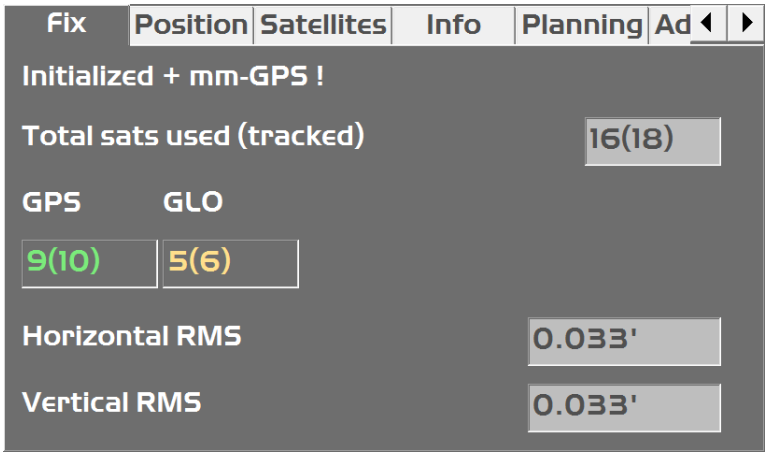


Figure 11: GPS Information Tab List

The following describes what is contained in each tab.

- **Fix** – GPS status and quality.
- **Position** – Cutting edge position.
- **Satellites** – Monitor visible and used satellites, and change elevation mask angle.
- **Info** – View receiver information or reset receiver.
- **Planning** – Satellite estimated accuracy information. The red vertical line marks the current time.
- **Advanced** – GPS options to enable/disable the tracking of all GLONASS satellites.

Under the **Advanced** tab, from the **Base manufacturer** drop-down list, select which GPS reference station manufacturer to use (Topcon, Sokkia, Trimble, etc.) This aids with RTK operation where GLONASS is used at the Base and Rover, but the Base is NOT a Topcon Base. The default is set to Automatic.

Slope Control Button

The Slope Control Button (Figure 12) displays the slope of the blade and whether the system is in 3D or 2D mode. It also indicates the status of the connected sensors and blade slope with graphic and colors. The information that displays will be different, depending on the control application.

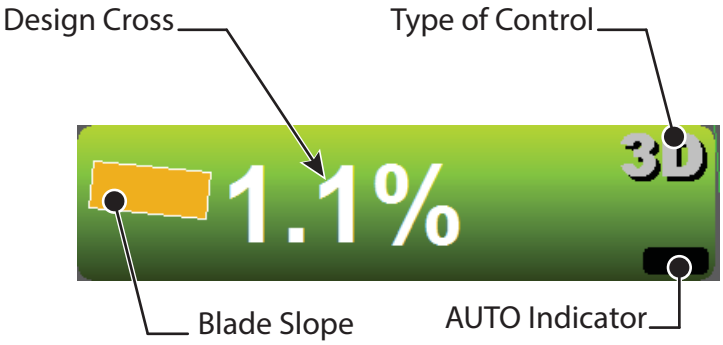


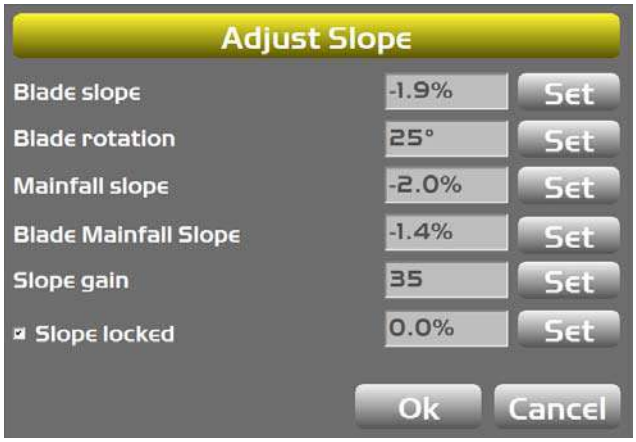
Figure 12: Slope Control Button

- **Blade Slope** – the blade graphic on the Slope Control Button will tilt depending on the slope of the design surface.
- **Design Cross** – displays the current cross slope of the design surface, perpendicular to the heading of the machine.
- **Type of Control** – displays the current control type. See "3D/2D Control" on page 50 for more information.
- **Slope Control Button color** – the background color indicates sensor status.
  - **Green**: indicates sensor status suitable for grading.
  - **Red**: indicates an error status and automatic control will be disabled.

Tapping the Slope Control Button activates the **Adjust Slope** screen (Figure 13).

MC² Dozer

MC² Motor Grader



3D-MC^{MAX} Dozer

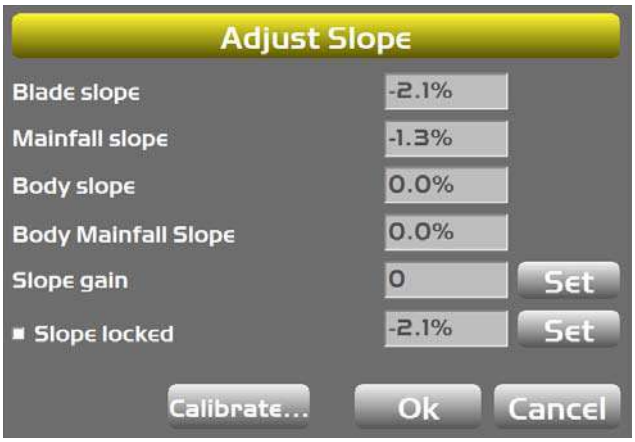


Figure 13: Slope Control Button – Adjust Slope

To modify values in the **Adjust Slope** screen, tap **Set** next to a value, enter the value, and tap **Set** again.

Changes to any settings except slope lock affect machine performance, and should only be set by your Topcon dealer.

Keyboard Functions

When entering text or numbers, one of the following two pop-up keyboards display (Figure 14):

- Alphanumeric keyboard – enter both letters and numbers.
- Numeric keyboard – enter numbers only.

Figure 14: Alphanumeric Keyboard (Left) and Numeric Keyboard (Right)

Alphanumeric Keyboard

To access the alphanumeric keyboard from any text entry field, tap in the field.

Tap in the field to enter the letters or numbers on the keyboard.

Numeric Keyboard

To access the numeric keyboard from any number entry field, tap in the field.

Tap the numbers on the keyboard to type in a value.

When you tap **OK** on the keyboard, the entry is submitted and the keyboard disappears. The keyboard types will change depending on the entry field.

File Menu Options

In the **File** menu (Figure 15) you can manage and create data, create and edit layers, and select or deselect active surfaces or alignments.

Figure 15: File Menu Options

Data refers to project (TP3), control (GC3), points (PT3), tin surface (TN3), Alignment (Rd3), and planar surface (PL3) files. For more information about data, refer to the *Data Menu* chapter of the *Pocket-3D Reference Manual* (p/n 7010-0628).

Project Files

Civil or project engineers typically provide a project file, which contains surface, alignment, point, and control files. In 3D-MC, you can accurately grade the job site as required. Make sure that all Displays and data collectors are current as edits or corrections are made.

Creating a Project File

A design project file for the job site is required. The correct file must be imported into the Display and selected as the project for the job site.

1. Press the Power button on the display, then tap **File** ▸ **Projects**.
2. Tap **New**.
3. From the keyboard, enter the name of the project and tap **OK**.

If a previous project was already loaded, creating a new project allows you to select control points and data from the previous project and bring them into the new project.

Copying Project Files from a USB Drive

1. Insert the USB drive into the USB port of the display.

2. Press the Power button on the display, then tap **File** ▸ **Projects**. The **Project Files** screen appears (Figure 16).

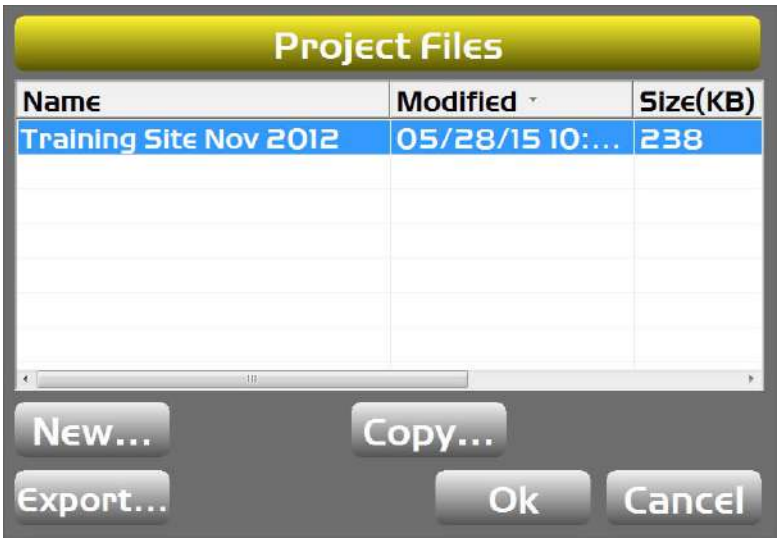


Figure 16: Project Files Screen

3. From the **Project files** screen, tap **Copy**.

4. From the **Copy files** screen, select [drive letter]**: to 3DMC folder** in the **From** drop-down list (Figure 17).

The drive letter is the assigned letter of the storage device. Depending on your system, the drive letter shown may be different.

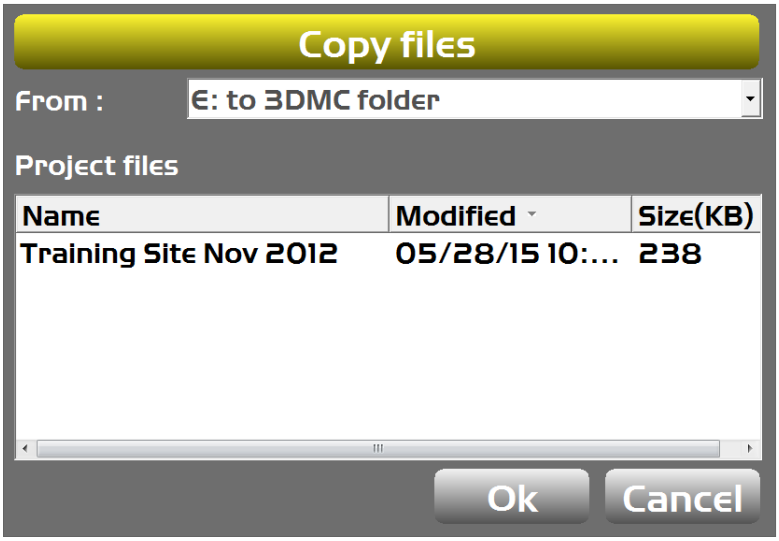


Figure 17: Select a File to Import

5. Select the files to copy from the **Project Files** list, and tap **OK**.

Exporting Project Files (TP3)

The following steps describe how to export certain items contained within an active project file (for example, surfaces, control points, etc.).

It is recommended that project files be exported to a USB drive, or to the internal disk, for use with Pocket-3D or other applications.

1. Press the Power button on the display, then tap **File** ▸ **Projects**.
2. Tap **Export**.
3. Select the location from the **Where** drop-down list (Figure 18). This option allows you to select the location the file is being exported to.
4. Tap **All** to select or deselect files to export. You can also choose an individual file, and tap **Select** to change the **Export** option to **Yes** or **No** (Figure 18).

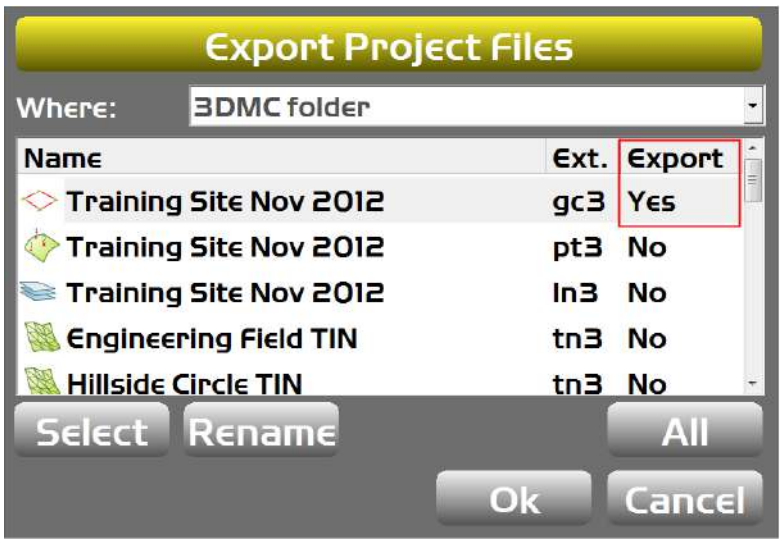


Figure 18: Select Location and Files to Export

5. If desired, choose a file, and tap **Rename**. Enter the new name, and tap **OK**.
6. Tap **OK** to export the files and return to the **Project Files** screen.
7. Tap **OK** again to return to the main screen.

If you want to copy the entire project file from the 3D-MC folder to a flash drive, follow the steps in "Copying Project Files from a USB Drive" on page 13.

Control Point Files (GC3)

Control points are required in 3D-MC for both 3D GPS and LPS. The **Control points** tab (Figure 19) creates, edits, and deletes the control points.

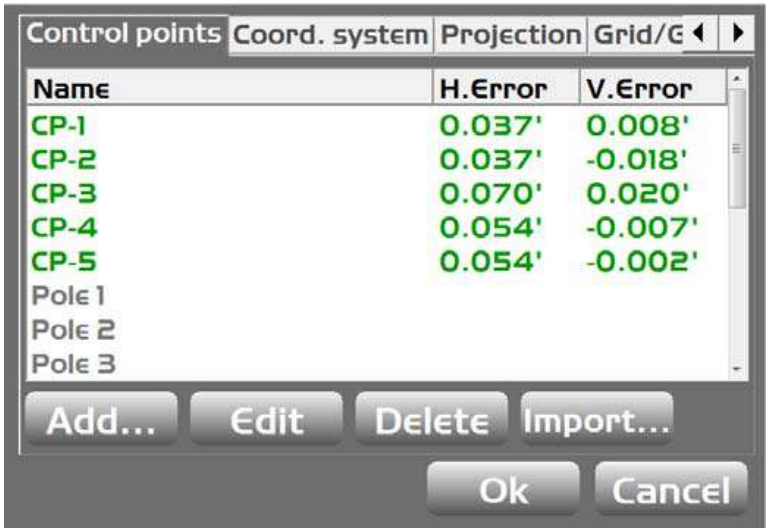


Figure 19: Control Points Tab

The control points are usually imported into 3D-MC with a project file, however control point files can also be imported into the current project file from an external device (USB or SiteLink) or from the internal disk.

Importing a GC3 File

To import a control point file:

1. If importing from a USB drive, insert it into the display.

2. Press the Power button on the display, then tap **File** ▸ **Control**. The **Control points** tab list appears
(Figure 20).

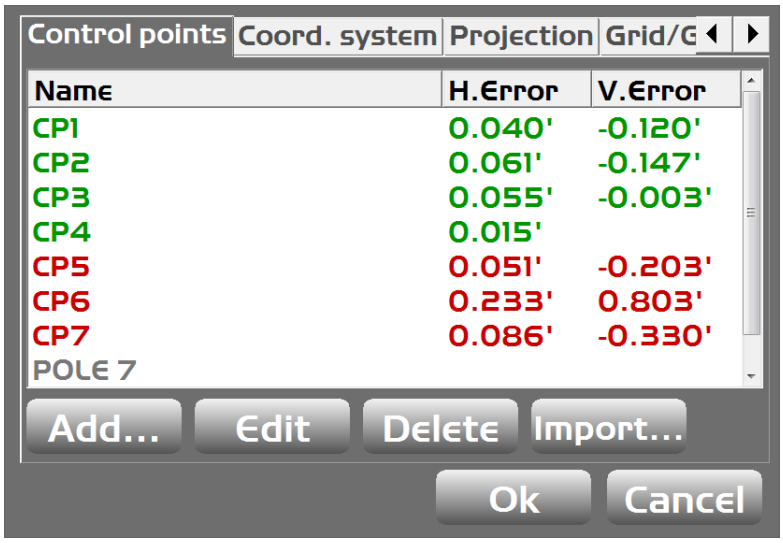


Figure 20: Control Points Tab List

3. Tap **Import**. The **Import Project Data** screen appears.

4. Select the file type from and location from the **What** and **Where** from the drop-down lists (Figure 21).

5. Select the file to import from **Control files**, and tap **OK** (Figure 21).

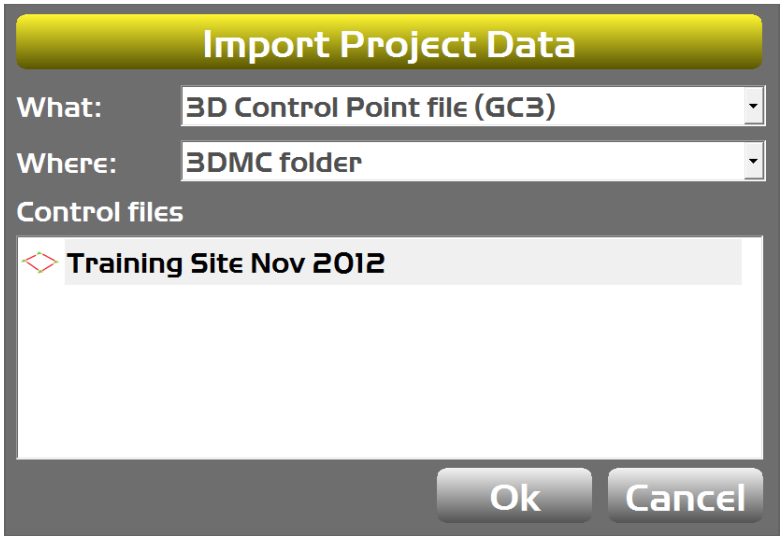


Figure 21: Import Project Data

Tap **OK** at the prompt to apply the data to the current job.

Adding a New Control Point

The **Local** tab of the **Control point** screen (Figure 22 on page 17) allows you to add control points from an existing project or create a single point from a GPS measurement.

The control point button, highlighted in red in Figure 22 on page 17, will add a control point from an existing project file.

The **WGS84** tab (Figure 22) provides options to take a single GPS measurement and populate latitude, longitude, and height values automatically. If you are on a small project site and need a one-point localization, using the **WGS84** tab is the preferred method in 3D-MC.

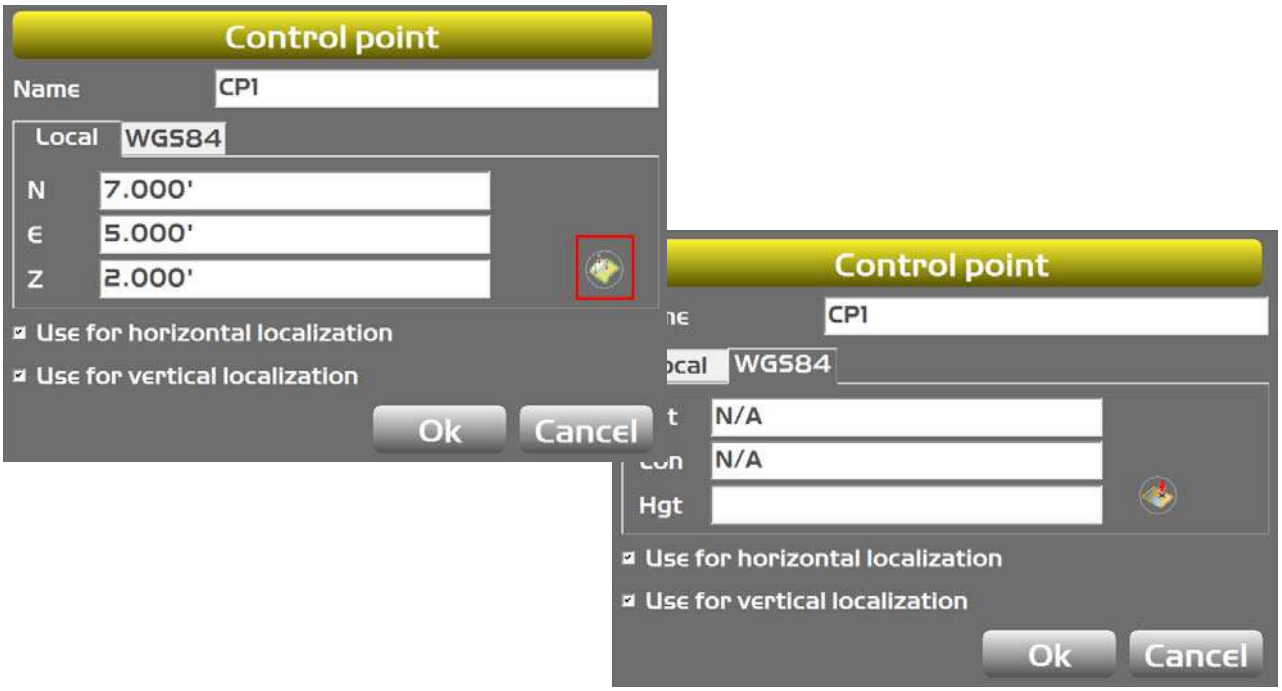


Figure 22: Add an New Point or Create a Single Point

1. On the **Control points** tab list, tap **Add**. The **Control point** screen appears (Figure 23).

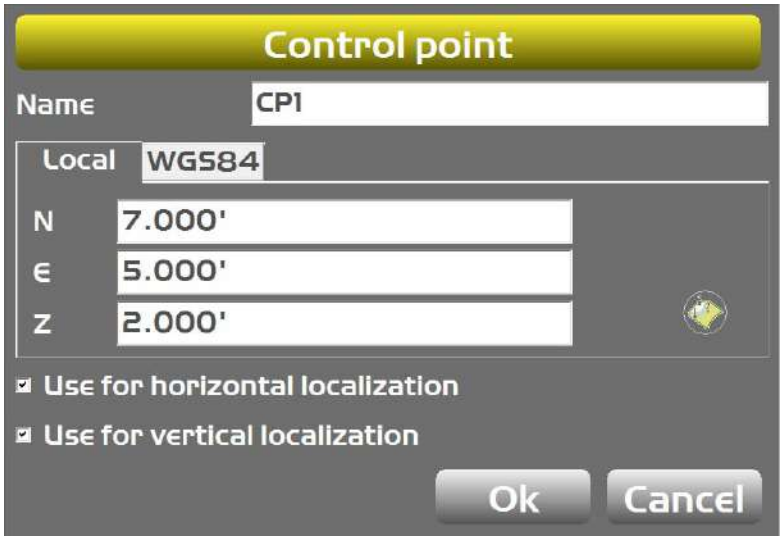


Figure 23: Control Point Screen

2. Enter a name for the control point file.
3. On the **Local** tab, enter values for **N**, **E**, and **Z**.
4. Select the Use for horizontal localization and Use for vertical localization check boxes.

5. If single-point localization is needed, tap the **WGS84** tab, and tap the control point button. 3D-MC will take a GPS measurement and populate the values for **Lat**, **Lon**, and **Hgt** (Figure 24).

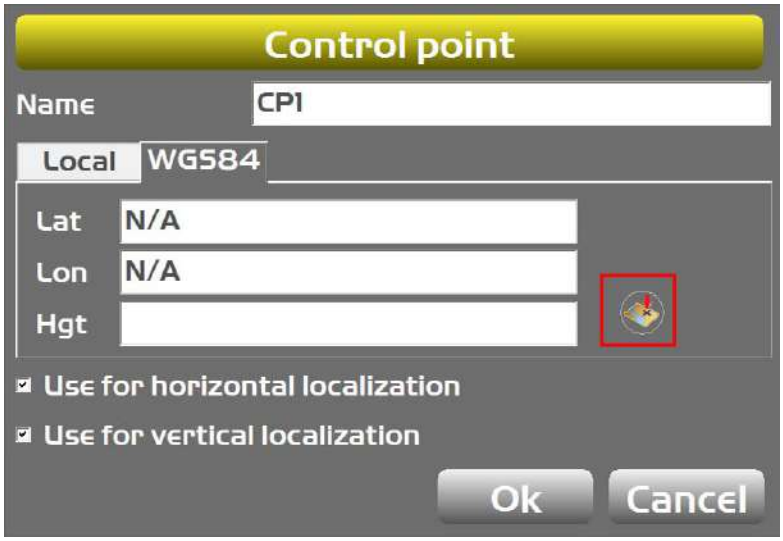


Figure 24: Tap the Control Point Button

6. Select the localization check boxes if GPS localization is currently being performed.

7. Tap **OK** to return to the **Control points** tab list.

Editing a Control Point

1. Select a point and tap **Edit** in the **Control points** tab list. The **Control point** screen appears.

2. Enter new site coordinates or GPS coordinates, and tap **OK** to return to the previous screen.

3. Tap **OK** again to return to the main screen.

Deleting a Control Point

1. Select a point and tap **Delete** in the **Control Points** tab list. A prompt appears.

2. Tap **Yes** at the prompt to delete the point and return to the **Control Points** tab list.

Layers

The **Project Layers** screen (Figure 25) displays all layers within the selected file. Layer options are described below.

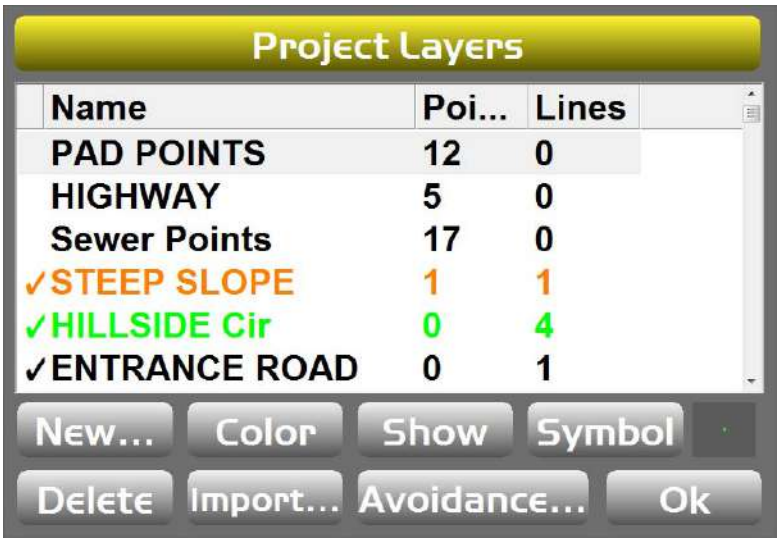


Figure 25: Project Layers Screen

- **New** – tap new to create a layer. Enter a name for the new layer, and tap **OK**. The layer appears in the **Project Layers** screen.
- **Color** – tap to select the desired color for the point symbols and lines.
- **Show** – with a layer selected, tap to show or hide the layer on the main screen.
- **Symbol** – tap to select the type of symbol for the points within the layer.
- **Delete** – tap to remove the selected layer.
- **Import** – tap to import data files such as LN3, PT3, and AutoCad DWG files from an external device or the internal disk.
- **Avoidance** – tap to set audible and visual alarms when within a user-defined proximity of the points within a selected layer.

Importing Data

Data files such as LN3, TN3, and PT3 files are uploaded into the current Project file using the **Import** button on the **Project Layers** screen. Files can be uploaded individually from a USB drive or from the **3DMC folder** on the internal disk. After uploading, the file resides in its own layer with the name of the data file.

1. Press the Power button on the display, then tap **File** ▸ **Layers**. The **Project Layers** screen appears.

2. Tap **Import**. The **Import Project Data** screen appears (Figure 26).

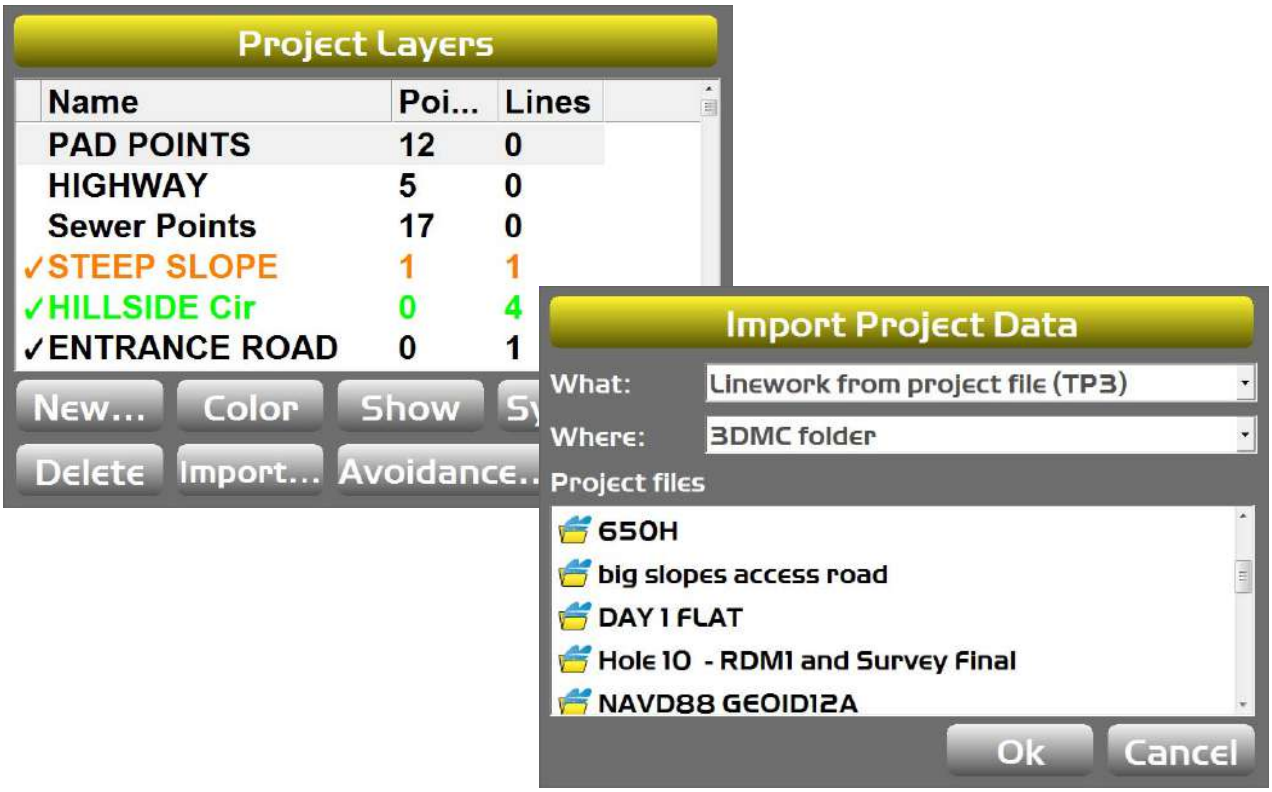


Figure 26: Project Layers Screen – Import Project Data

3. Select the file type and location from the **What** and **Where** drop-down lists.

4. Select the file to import, then do one of the following:

    a. If not importing data from a TP3 file, A pop up message displays asking to import the data into the current project file. Tap **OK** or **Cancel**. Tap **OK** again to return to the main screen.

    b. If importing data from a TP3 file, the **Point(s)** or **Linework(s)** screen appears (Figure 27). Select the data to import, and tap **Next**. The **Summary** screen appears (Figure 27), indicating how many points or lines will be imported. Tap **Finish** to import, or tap **Cancel**.

Figure 27: Importing Data from a TP3 File

5. Tap **OK** to return to the main screen.

Points (PT3)

The **Points** menu displays a list of all points in the project file. In the **Points** menu you can create new points, edit existing points, and delete points.

Use points to create TIN surfaces, and for navigation and stakeout. For more information, see "Creating Triangulated Surfaces From a Topo Survey File" on page 31 and "Using Points to Navigate" on page 58.

Surface Files

Surface File Types

- **Flat Plane Surface/Sloping Plane Surface (PL3)**
  - A planar (flat) surface with a 0% cross slope and mainfall. This surface is primarily used for building pads.
  - A sloping surface with cross slopes and mainfall based on a reference elevation.
- **Crown Road Surface (RD3)**
  - A crown road surface file contains a centerline with a defined width and cross slope.
- **TIN Surface File (TN3)**
  - A TIN surface represents a surface as a network of non-overlapping triangles. Within each triangle the surface is represented by a plane. The triangles are made from a set of points called mass points.
- **As-built Surface File**
  - A color map of the graded surface.

Import a Surface File from a Project File

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**. The **Project Surfaces** screen appears.

2. Tap **Import**. The **Import Project Data** screen appears (Figure 28).

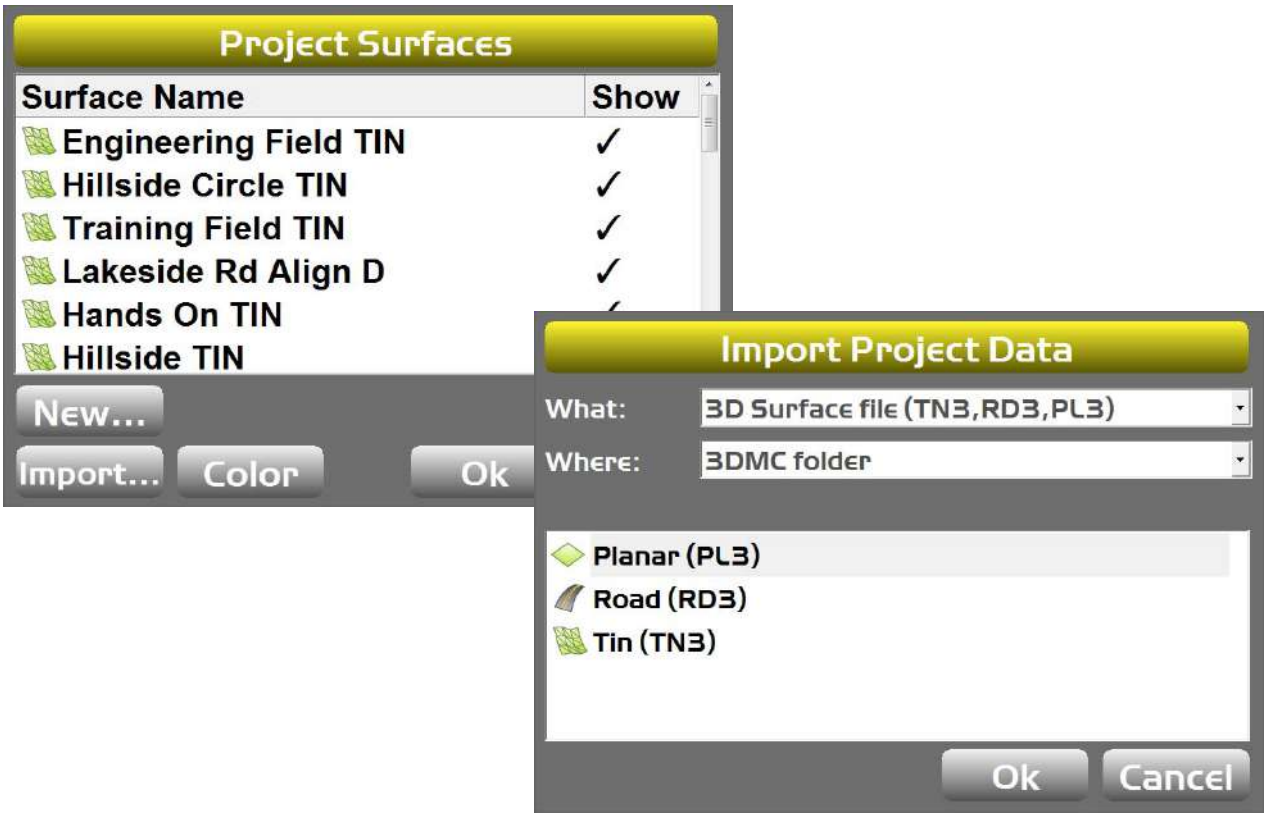


Figure 28: Project Surfaces Screen – Import Project Data

3. Select either **Surfaces from project file (TP3)** or **Surfaces from Autocad file (DWG)** from the **What** drop-down list.

4. If importing a 3D surface file, select **3D Surface file (TN3, RD3, PL3)** (Figure 29).

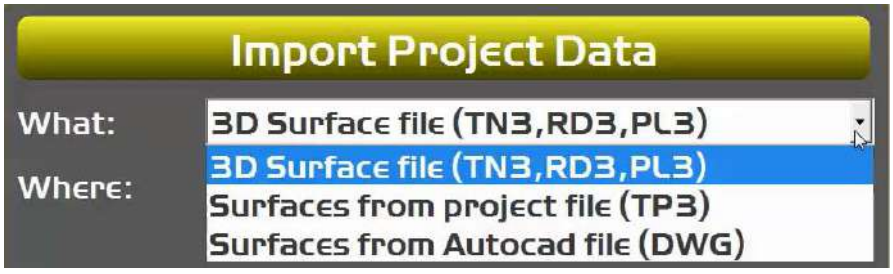


Figure 29: Project Data Import Location

5. Select either **3DMC folder**, [drive letter]**: (USB Drive)**, or **Sitelink3D inbox** from the **Where** drop-down list (Figure 30).

6. Select the file to import, then tap **OK**.

7. Double-tap on the file in the **Project files** list. The **Surface(s)** screen appears (Figure 30).

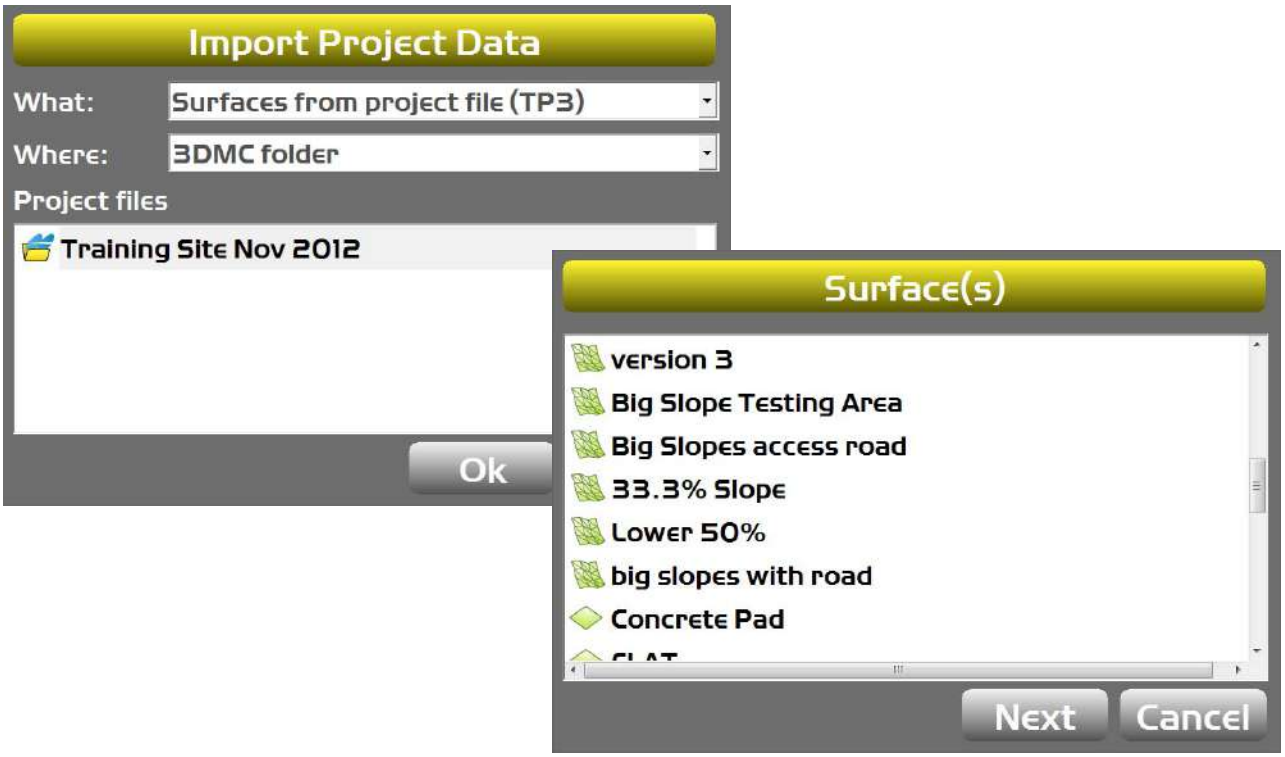


Figure 30: Import Project Data Screen – Surfaces

8. Select the file to import, and tap **Next**. The **Summary** screen appears (Figure 31).

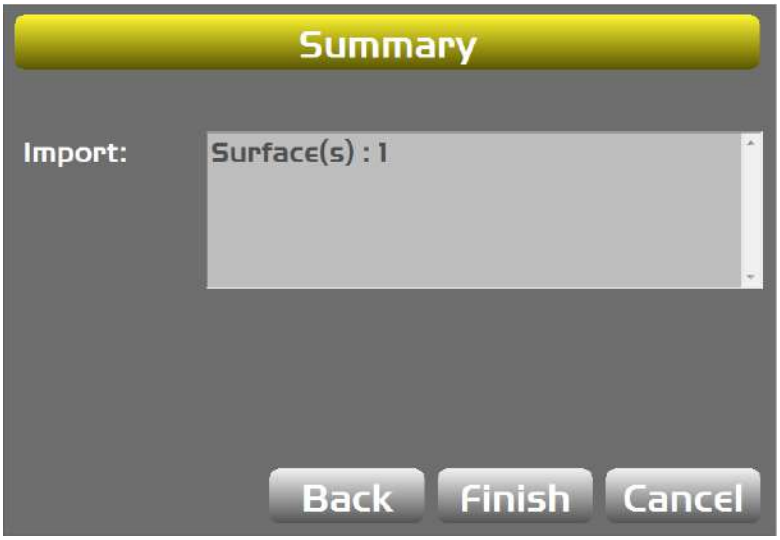


Figure 31: Import Surface(s) Summary Screen

9. Tap **Finish** to return to the **Project Surfaces** screen.

10. Tap **OK** to return to the main screen.

Creating Flat Surface Files

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**. The **Project Surfaces** screen appears.

2. Tap **New** to create a new flat or sloping surface file. The **Surface Name and Type** screen appears.

3. Enter a name for the surface file.

4. Select **Flat plane surface** and tap **Next** (Figure 32). The **Flat Plane Surface** screen appears (Figure 33 on page 26).

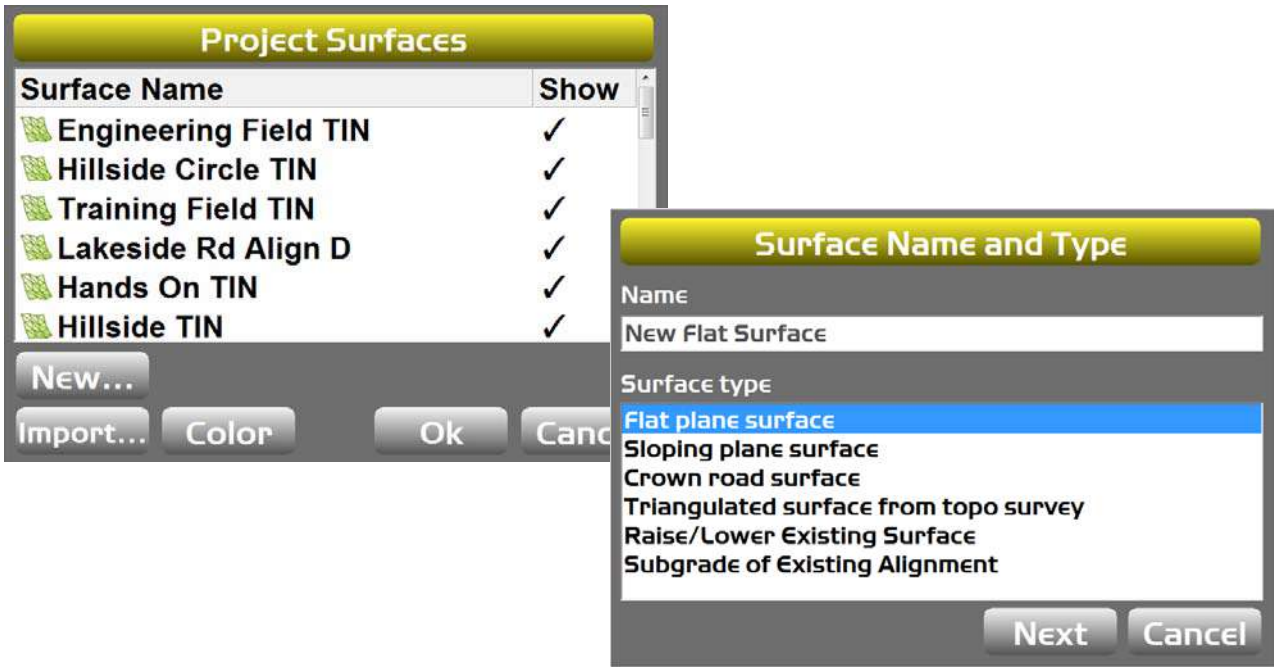


Figure 32: Project Surfaces Screen – New Flat Surface

5. Enter the reference point coordinate values in one of three ways:
   - Manually enter the reference point for **N**, **E**, and **Z**.
   - Place the machine in the desired location, and tap the Measure button.
   - Tap the Points button, and select a point.

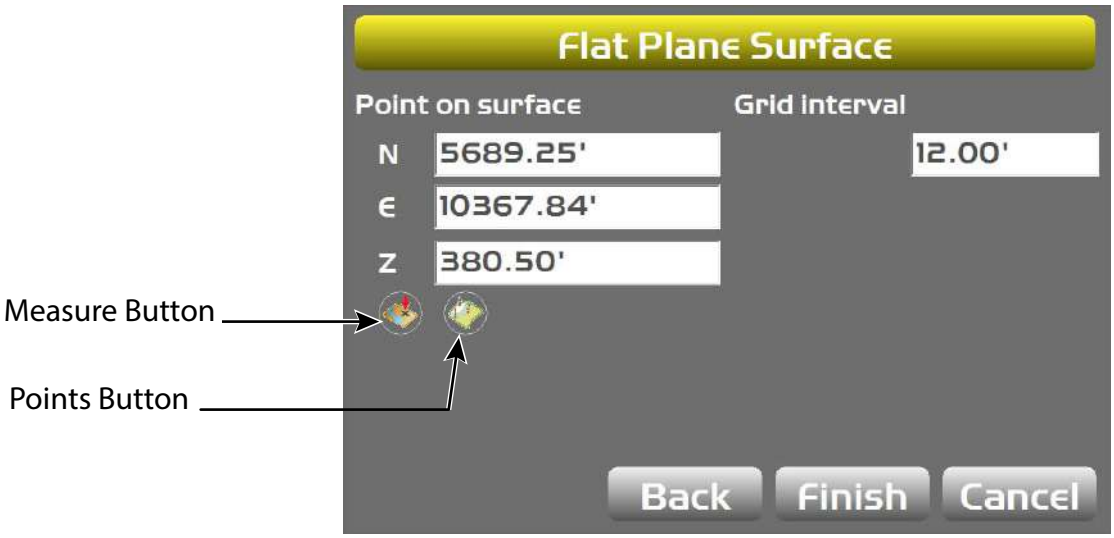


Figure 33: Flat Plane Surface Screen

6. Tap **Finish** to return to the **Project Surfaces** screen.
7. Tap **OK**.
8. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

Create a Sloping Plane Surface

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**. The **Project Surfaces** screen appears (Figure 34).

2. Tap **New** to create a new flat or sloping surface file. The **Surface Name and Type** screen appears (Figure 34).

3. Enter a name for the surface file.

4. Select **Sloping plane surface** and tap **Next** (Figure 34).

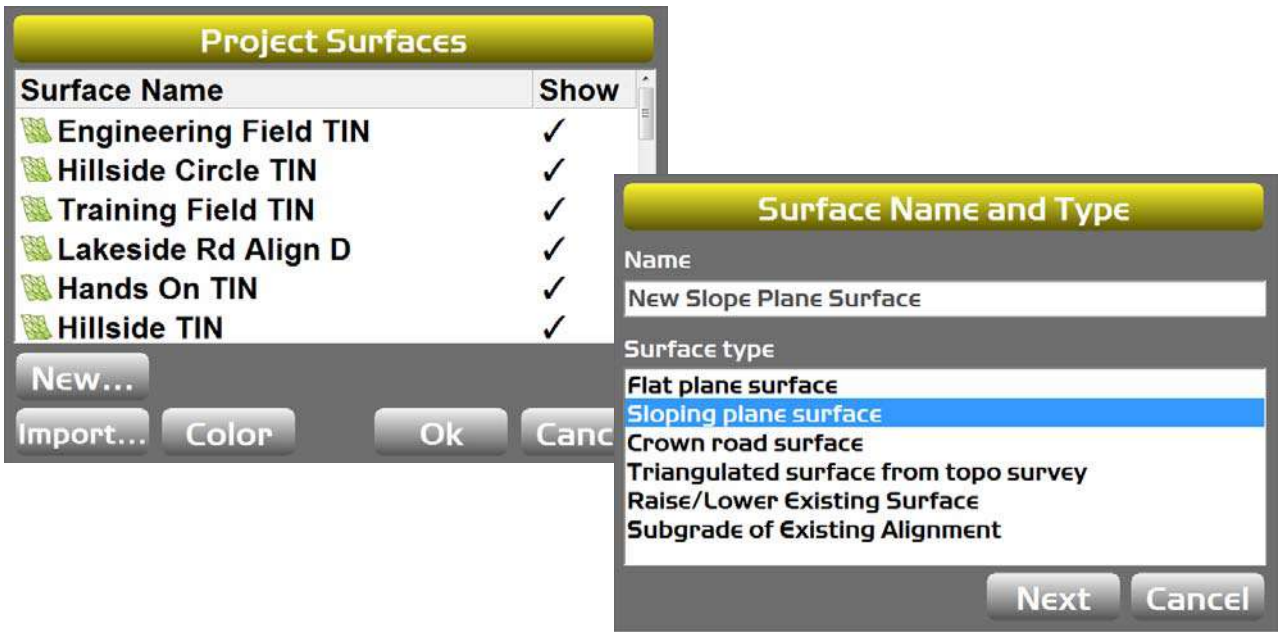


Figure 34: Project Surfaces Screen – New Slope Plane Surface

5. On the **Sloping Plane Surface** screen (Figure 35), enter the direction and mainfall grade in one of three ways:

   - Enter the direction and grade manually.
   - Use the Measure Points button.
   - Tap the Points button to select existing points for **A** and **B**.

Figure 35: Sloping Plane Surface Screen

6. Tap **Finish** to return to the **Project Surfaces** screen.

7. Tap **OK**.

8. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

For more information about entering direction and mainfall grade, see "Entering Direction and Mainfall Grade".

Entering Direction and Mainfall Grade

To use the Measure Points button, move the machine to the desired location and place the blade on the ground. When the cutting edge rests on the ground, do the following:

1. Tap the Measure Point button for **A**. 3D-MC will measure a point (Figure 36).

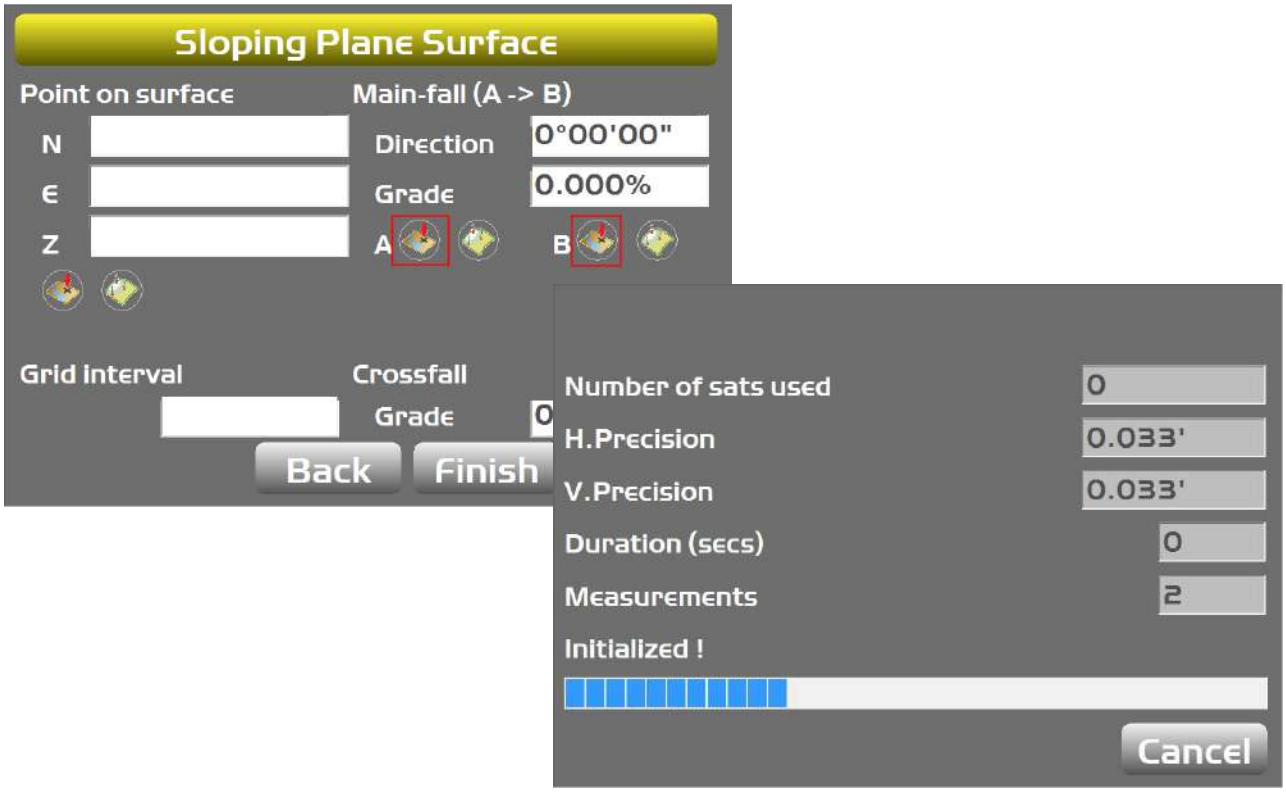


Figure 36: Measure Point A

2. Move the machine to the next desired location and repeat Step 1, and tap the Measure Point button for **B**.

3. Enter a **Grid interval**. The **Grid interval** keeps passes straight by setting the interval to the same length as the cutting edge.

4. Enter the desired **Crossfall Grade**, and tap **Finish**.

5. Tap **OK**.

6. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

Creating Crown Road Surface Files

Follow the steps in "Create a Sloping Plane Surface" on page 27 and "Entering Direction and Mainfall Grade" on page 28.

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**.
2. Tap **New** on the **Project Surfaces** screen.
3. On the **Surface Name and Type** screen, enter a name.
4. Select **Crown road surface** (Figure 37).

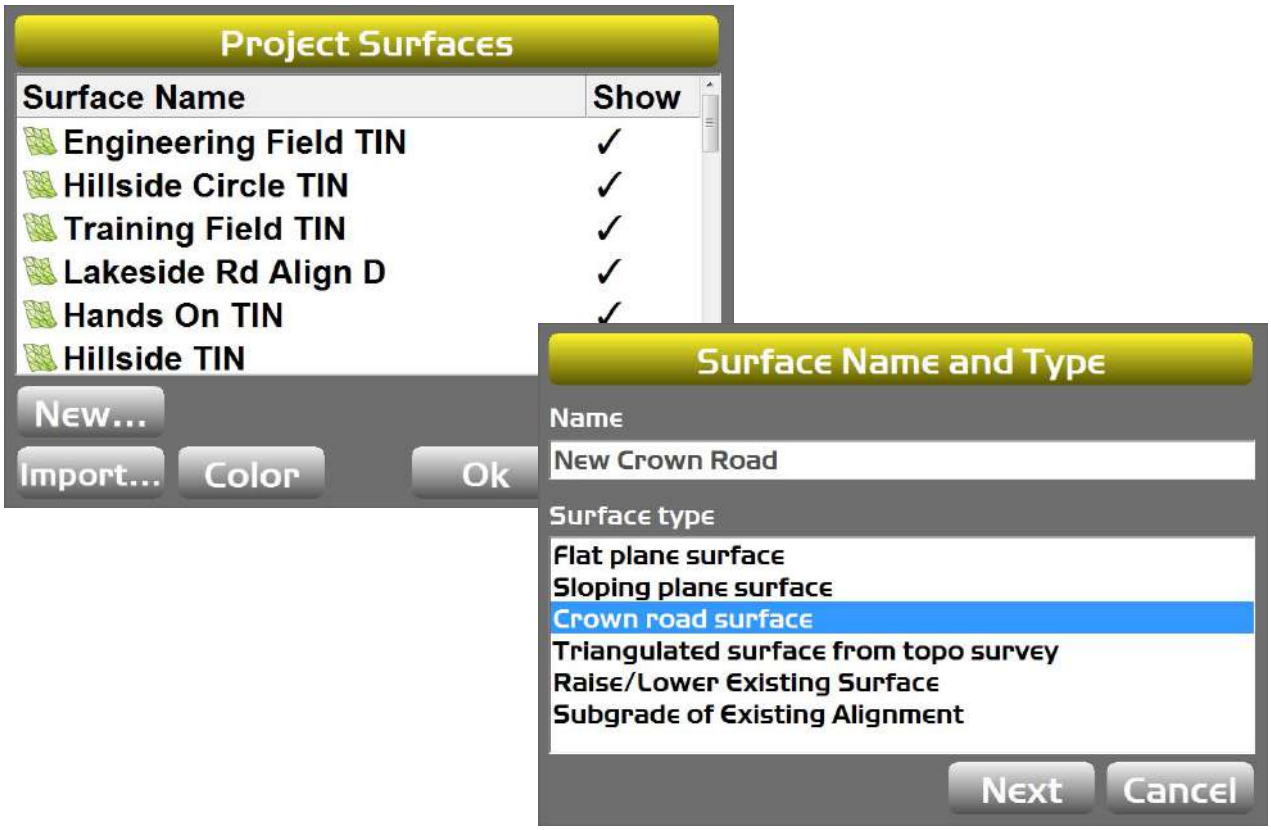


Figure 37: Project Surfaces Screen – New Crown Road Surface

5. Tap **Next**. The **Crown Surface** screen appears (Figure 38).

6. On the **Crown Surface** screen (Figure 38), enter the direction and mainfall grade in one of three ways.

   - Enter the direction and grade manually.
   - Use the Measure Points button.
   - Tap the Points button to select existing points for **A** and **B**.

Figure 38: Crown Road Surface – Measure Point A

7. Enter the desired **Length** and **Width** of the road.

8. Enter the desired **Cross-fall from crown Grade**.

Entering positive numbers creates a V-ditch.

---

9. Tap **Finish** to return to the **Project Surfaces** screen.

10. Tap **OK**.

11. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

Creating Triangulated Surfaces From a Topo Survey File

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**.

2. Tap **New** on the **Project Surfaces** screen.

3. From the **Surface Name and Type** screen, enter a name, and select **Triangulated surface from topo survey** (Figure 39).

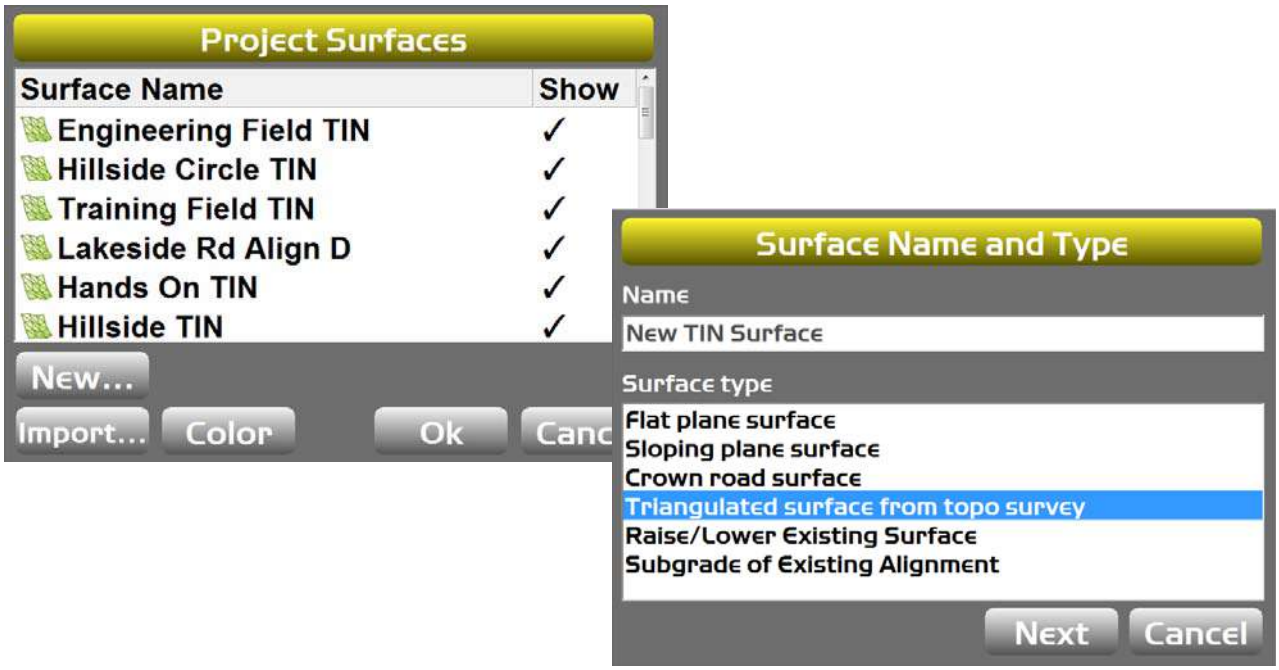


Figure 39: Project Surfaces Screen – New TIN Surface

4. Tap **Next**. The **Triangulation of Topo Points** screen appears (Figure 40).

5. Select a layer containing the desired points from the **Use points from layer** drop-down list (Figure 40).

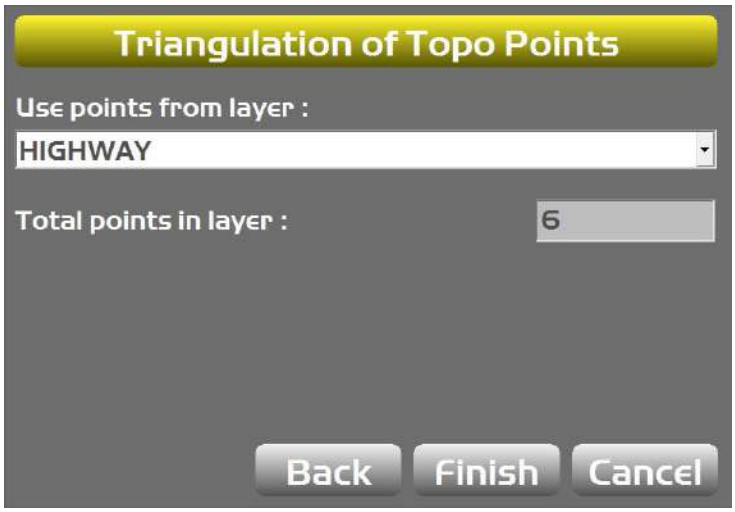


Figure 40: Select a Layer

6. Tap **Finish** to return to the **Project Surfaces** screen.

7. Tap **OK**.

8. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

Raising or Lowering an Existing Surface

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**.

2. From the **Project Surfaces** screen, tap **New**.

3. From the **Surface Name and Type** screen, enter a name and select **Raise/Lower Existing Surface** (Figure 41).

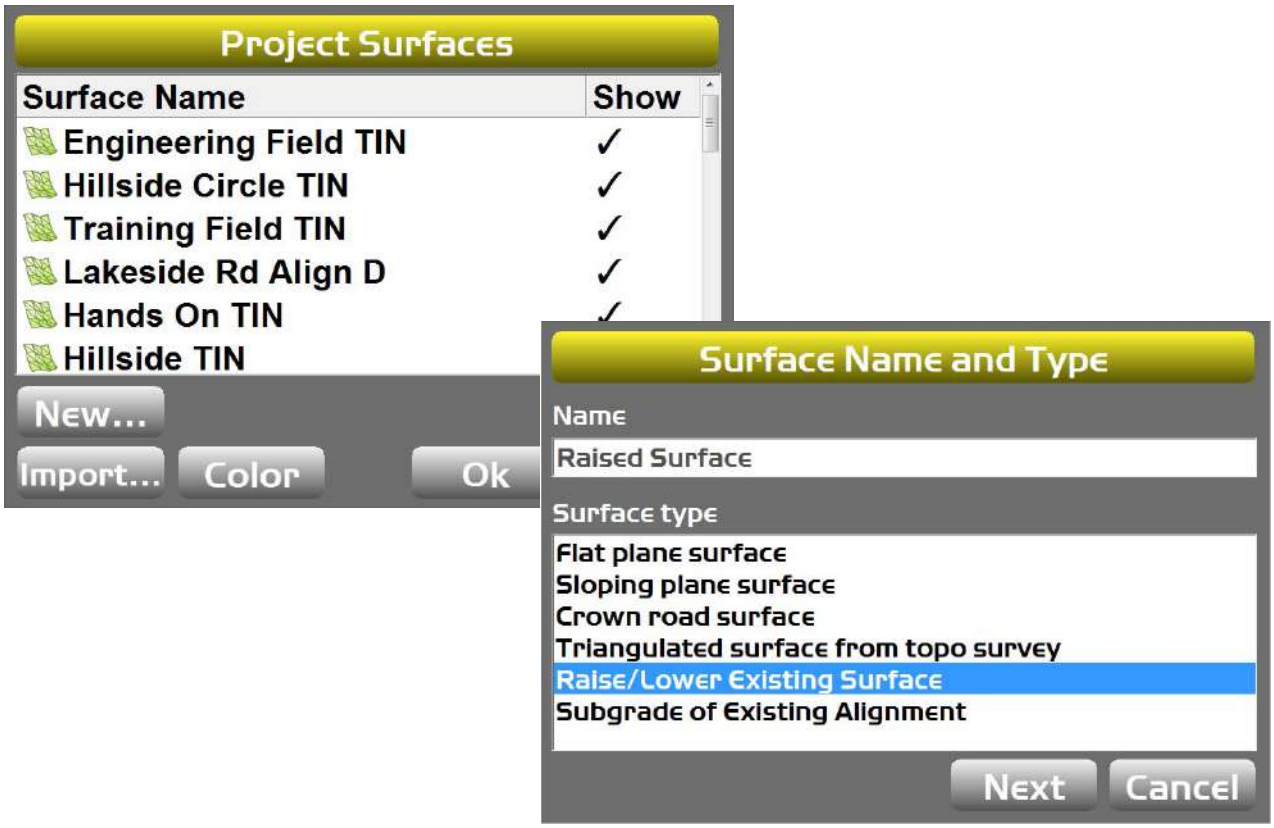


Figure 41: Project Surfaces Screen – Raise/Lower an Existing Surface

4. Tap **Next**.

5. On the **Raise/Lower Surface** screen (Figure 42), select an existing surface and enter an elevation adjustment value.

   - A positive number raises the grade relative to the working/reference surface, which is applied to the centerline of the working/reference surface.
   - A negative number lowers the subgrade relative to the working/reference surface.

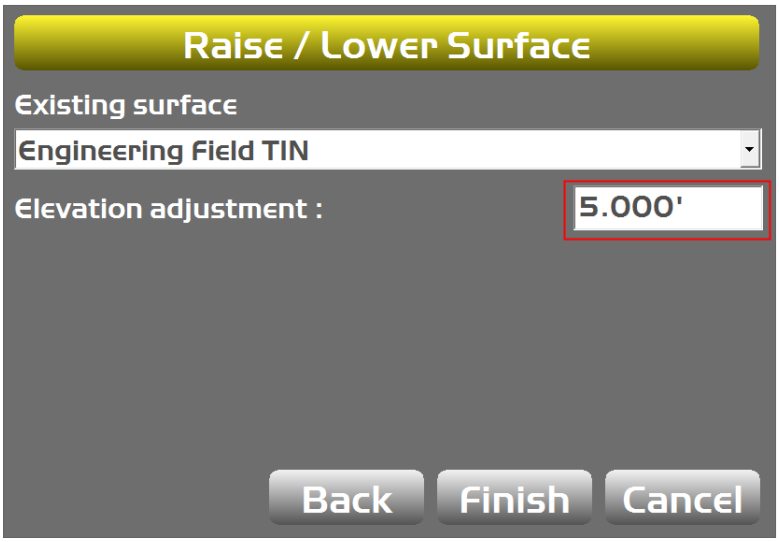


Figure 42: Enter an Elevation Adjustment Value

6. Tap **Finish** to return to the **Project Surfaces** screen.
7. Tap **OK**.
8. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

Subgrade an Existing Alignment

1. Press the Power button on the display, then tap **File** ▸ **Surfaces**.
2. From the **Project Surfaces** screen, tap **New.**

3. From the **Surface Name and Type** screen, enter a name and select **Subgrade of Existing Alignment** (Figure 43).

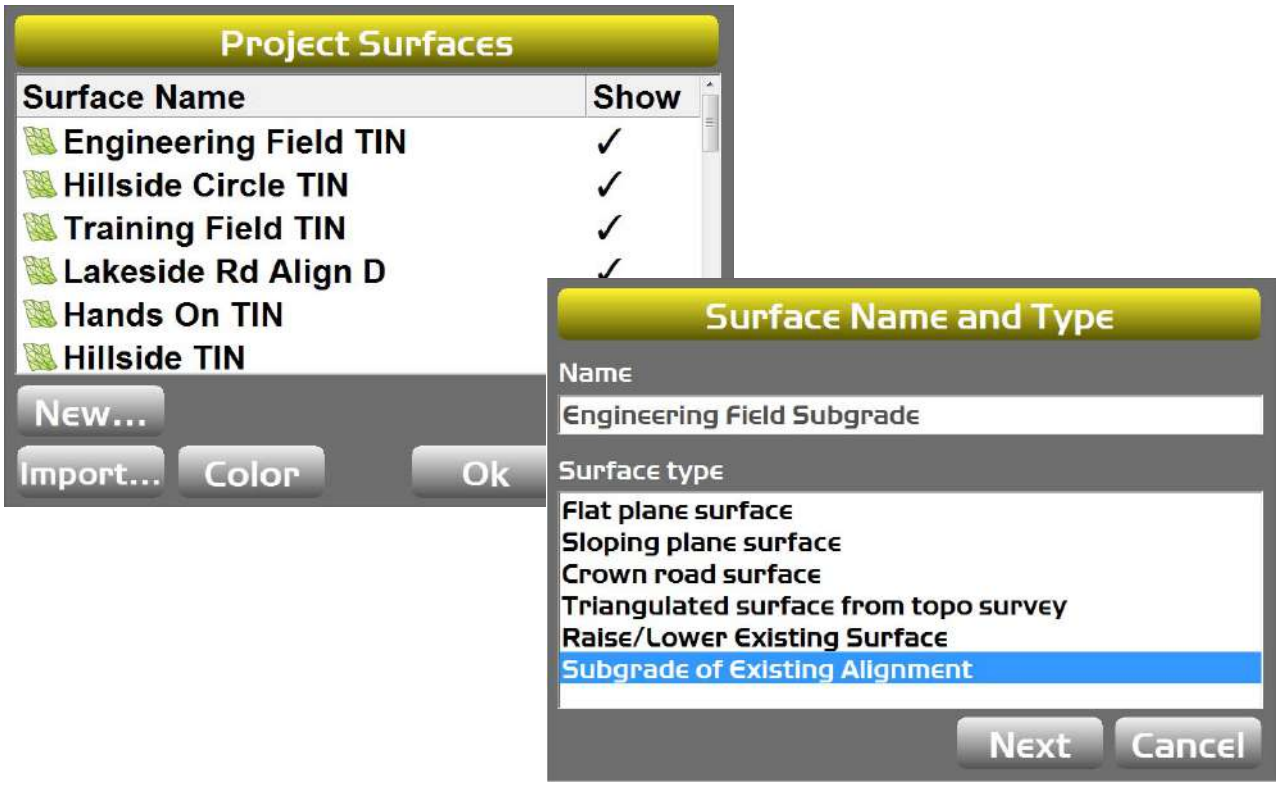


Figure 43: Project Surfaces Screen – Subgrade Existing Alignment

4. Tap **Next**.

5. From the **Subgrade of Existing Alignment** screen, select a reference road surface. This will be used to create the surface (Figure 44 on page 35).

6. Enter value for the existing surface for **Elevation adjustment** (Figure 44 on page 35).

   - A positive number raises the grade relative to the working/reference surface, which is applied to the centerline of the working/reference surface.
   - A negative number lowers the subgrade relative to the working/reference surface, which is applied to the working/reference surface.

7. Select a **Grade** type.

   - **Manual** – if enabled, enter the percentage of the Left/Right side of the subgrade element, which determines the slope for the left/right side of the machine or the road.
   - **Copy from** – if enabled, use the gradient (grade) of the reference cross-section element that matches the entered offset value (lateral offset from centerline). The left/right grade is copied from the existing road.

8. Select an option for **Extend slope** (Figure 44).

   - **Vertical** - if selected, the cross section of the subgrade stops at the same horizontal offset as the cross section of the reference surface.
   - **Continue** - if selected, the last element of both surfaces selected in the **Maximum extension** entry box is continued.

     – Use this option if there are more intersection points expected beyond the end of the cross section.

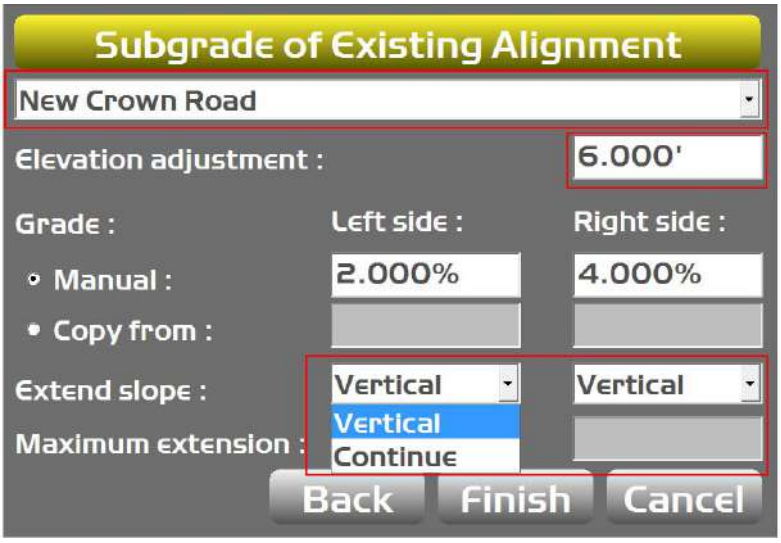


Figure 44: Select or Enter the Subgrade Values

9. Tap **Finish** to save the new surface file and return to the **Project Surfaces** screen.

10. Tap **OK**.

11. At the prompt, tap **Yes** to set the new surface as active, or tap **No** to make it inactive. The main screen appears.

Selecting an Active Surface File

1. Press the Power button on the display, then tap **File** ▸ **Active** ▸ **Surface**.
2. Select the surface file you want to be active on the main screen (Figure 45).

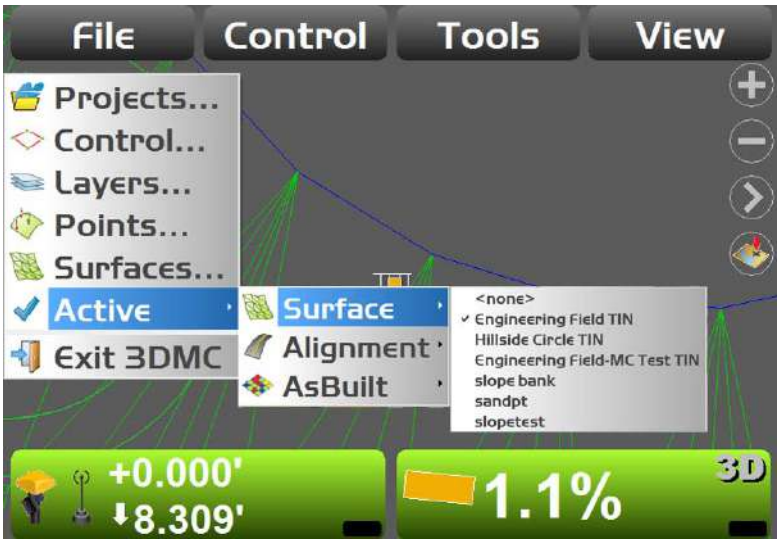


Figure 45: Select an Active Surface File

Selecting an Active Alignment File

1. Press the Power button on the display, then tap **File** ▸ **Active** ▸ **Alignment**.
2. Select the alignment file to be active on the main screen (Figure 46).

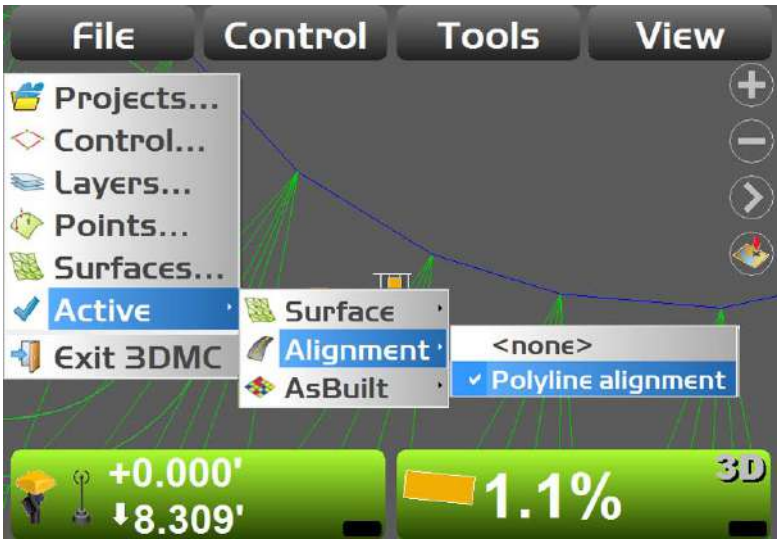


Figure 46: Select an Active Alignment File

Selecting an Active As-built File

As-built surface files display a colored map of the graded surface.

1. Press the Power button on the display, then tap **File ▸ Active ▸ As-built**.
2. Select the as-built file to be active on the main screen (Figure 47).

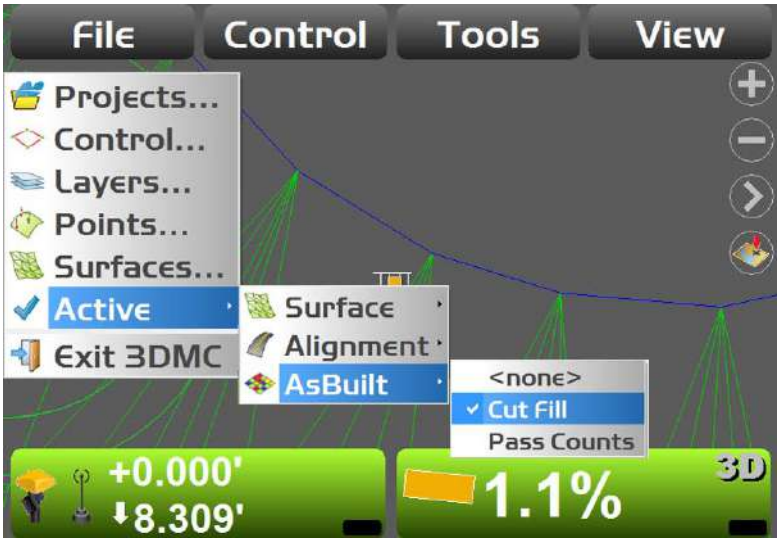


Figure 47: Select an Active As-built File

Control Menu Options

This chapter describes the most commonly used options in the **Control** menu. From this menu, you can create, edit, copy, and delete machine setup files. If a road file is selected as the reference surface, road subgrade properties can be set, valve offsets applied, and 2D control enabled. Figure 48 shows the options available.

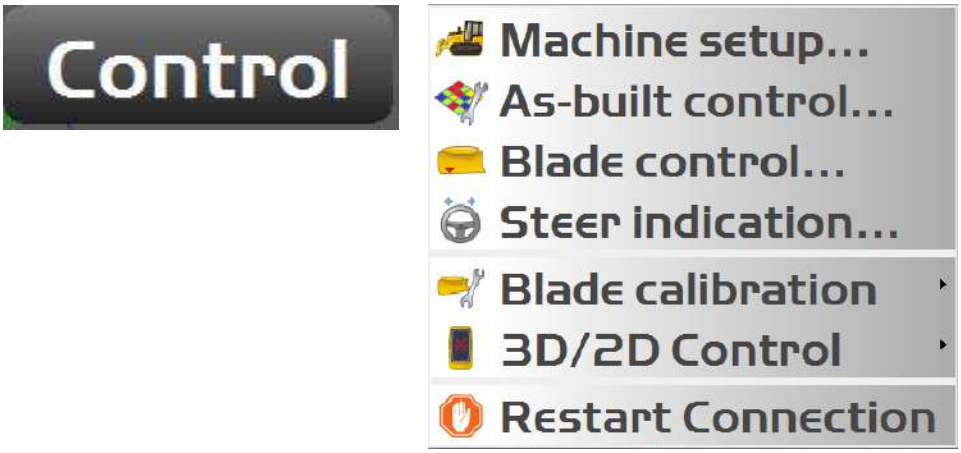


Figure 48: Control Menu Options

Machine Setup

Machine setup should be completed by your Topcon dealer. However, you can personalize the light bar menu and the audible guidance menu for excavators.

For more information about machine setup, refer to the following manuals:

- *3D-MC^2 Installation and Calibration Manual* (p/n 7010-0924)
- *3D-MC^2 for Graders Installation and Calibration Manual* (p/n 7030-1468)
- *3D-MC^{MAX} Installation Manual* (p/n 1009522-01)
- *Excavator Indicate Systems Installation and Calibration Manual* (p/n 7010-0697)
- *2D Excavator Indicate System Installation and Calibration Manual* (p/n1022461-01)

As-built Control

As-built layers may be created to monitor Cut/Fill Elevations or Pass Counts throughout the design surface. When active, a colored trail will be displayed on the screen behind the machine to indicate where the machine has been on the design surface. The color shown indicates either the Cut/Fill Elevation, or the number of passes the machine has made in that region.

Colors and intervals can be defined by the user by going to **Topcon Logo ▸ View ▸ Display Options ▸ As-Built surface**.

Activate an As-built Layer

1. Press the Power button on the display, then tap **Control ▸ As-built control**. The **As-built Control** screen appears (Figure 49).

Figure 49: As-built Control

2. Select whether the layer will be managed by the Sitelink3D server, or locally on the Display.
3. Select the **Layer** that the information will be saved to, or tap the trash can icon to delete layers.
4. Select the filter that will control the saved information from the **Filter** drop-down list.
   - To create a new filter, select **<new as-built filter>** from the **Filter** drop-down list (see "Creating As-Built Filters" on page 41).
   - If needed, tap the wrench icon to edit the filter ("Editing As-built Filters" on page 40).
   - If needed, tap the trash can icon to delete filters.
5. Tap **OK**.

Editing As-built Filters

1. To edit a filter, tap the wrench icon in the **As-built Control** screen. The **As-built Filter** screen appears (Figure 50).

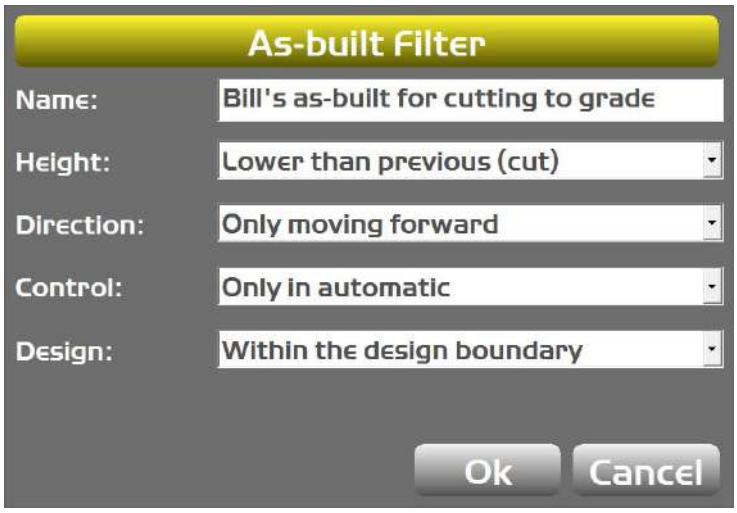


Figure 50: As-built Filter

2. Select the desired parameters described below, then tap **OK**.

Height

- **Higher than previous (fill)** – only updates when blade is higher than it was over a previous pass.
- **Lower than previous (cut)** – only updates when blade is lower than it was over a previous pass.

Direction

- **Only moving forward** – only updates when machine is traveling forward.
- **Only in reverse** – updates when machine is traveling in reverse.

Control

- **Only in automatic** – only updates when hydraulics are in automatic control.
- **Only in manual mode** – only updates when hydraulics are manually controlled.

Design

- **Within the design boundary** – only updates when machine is operated within a defined boundary configured in Sitelink3D.
- **Within vertical proximity** – only updates when within a vertical proximity of grade. Will apply proximity number to above and below grade.

Creating As-Built Filters

1. To create a new filter, select **<new as-built filter>** from the **Filter** drop-down list. The **As-built Filter** screen appears (Figure 51).

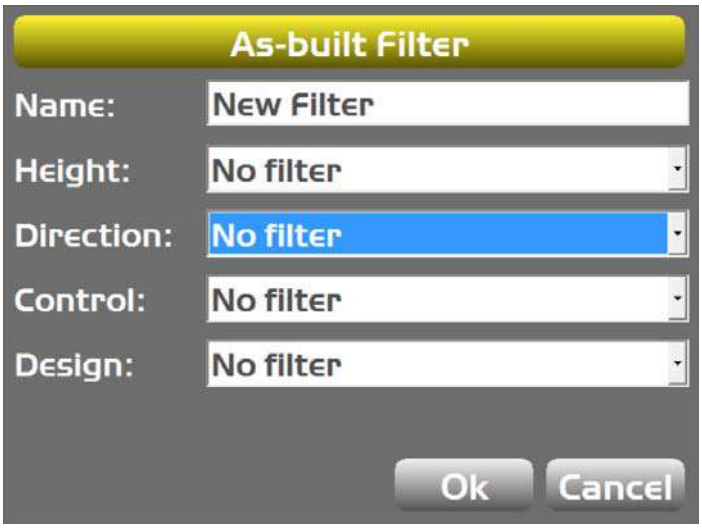


Figure 51: Create an As-Built Filter

2. Select the desired parameters described below, then tap **OK**.

Name

- Tap in the field, and enter a name for the filter.

Height

- **Higher than previous (fill)** – only updates when blade is higher than it was over a previous pass.
- **Lower than previous (cut)** – only updates when blade is lower than it was over a previous pass.

Direction

- **Only moving forward** – only updates when machine is traveling forward.
- **Only in reverse** – updates when machine is traveling in reverse.

Control

- **Only in automatic** – only updates when hydraulics are in automatic control.
- **Only in manual mode** – only updates when hydraulics are manually controlled.

Design

- **Within the design boundary** – only updates when machine is operated within a defined boundary configured in Sitelink3D.
- **Within vertical proximity** – only updates when within a vertical proximity of grade. Will apply proximity number to above and below grade.

Activate the As-built Shortcut

The color trail appears on screen when the As-built shortcut is active, and when an As-built file is active (see "Selecting an Active As-built File" on page 37).

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Shortcuts.** Ensure that the **Show** column (Figure 52) for the following is **Yes**:

   - **Start/Stop as-built updates**
   - **Toggle as-built mode**

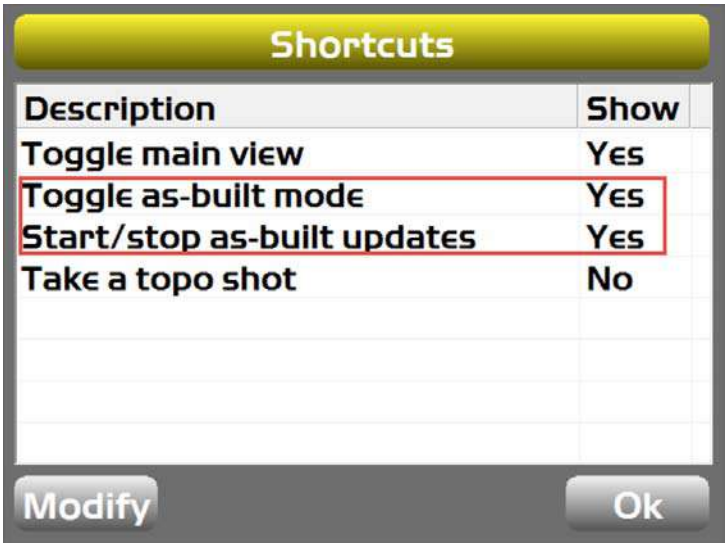


Figure 52: As-Built Shortcuts

2. If the **Show** column is **No**, highlight the item and tap **Modify**. The **Show** column changes to **Yes**.

3. Tap **OK** to return to the main screen.

4. From the main screen, tap the shortcut button until the **Enabling As-built Surface** message appears and the shortcut changes from a black and white image to a color image (Figure 53).

Figure 53: Shortcut Button Active

Import/Export As-built layers:

1. Press the Power button on the display, then tap **Control** ▸ **As-built control**. The **As-built Control** screen appears.
2. Tap the **Advanced** button to Import/Export As-built data.
3. Select the as-built layer to export.
4. Tap either **Import** or **Export**.
5. Select the surface file to pull from or merge into.
6. Tap **OK** three times to return to the Main Window.

Setting Blade Control

Automatic Best-fit or Single Point Blade Control

When using the automatic best-fit method, 3D-MC uses the entire cutting edge of the blade as the elevation reference.

1. Press the Power button on the display, then tap **Control** ▸ **Blade control**. The **Blade Control** screen appears
(Figure 54).

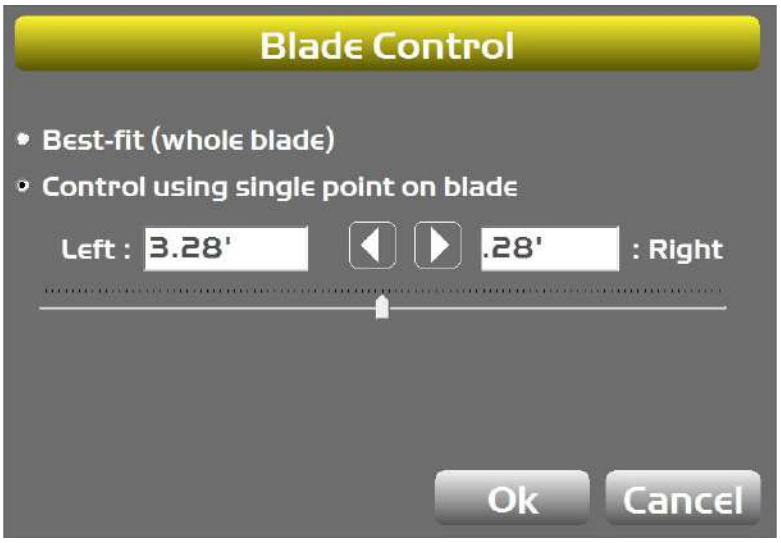


Figure 54: Blade Control Screen

2. Select **Best-fit (whole blade)** to enable grading. This option will not allow you to over cut or cut in another design element.
3. Select **Control using single point on blade** to grade to an area where the design surface is smaller than the blade itself.
When using the **Control using single point on blade** method, 3D-MC uses a selected point on the blade to use as the elevation reference rather than the entire cutting edge of the blade.
To change the blade control point when the section view is active, see "Change the Blade Control Point in 3D-MC Section View" on page 44. Otherwise, go to Step 4.

4. With **Control using single point on blade** selected, tap the slider button and move it left or right (or use the left/right arrows) to select a point at a distance from the left/right side of the blade.

5. Tap **OK** to apply the blade control point to the machine and return to the main screen.

Change the Blade Control Point in 3D-MC Section View

To change the blade control point using the section view in 3D-MC, follow the steps below.

1. Press the Power button on the display, then tap **View**.

2. Select the **Main**, **Left**, or **Lower** window, then select **Section**.

3. The selected screen changes to the section view (Figure 55).

4. Tap and hold the left or right edge of the blade for one second. A pop-up menu appears.

5. Depending on the side of the blade you chose, tap **Move control left** or **Move control right** (Figure 55). The control point of the blade in 3D-MC will move either left or right.

If you want to move the blade a position other than extreme left or right, tap and hold on any position of the blade and select **Move control**. The control point of the blade in 3D-MC will move to that point. For Excavators, blade control point is set to closest Left, Middle, or Right, depending on where you tap the screen.

Figure 55: Move Control Left

6. To return to **Plan** view, press the Power button on the display, then tap **View**.

7. Select the appropriate screen, then tap **Plan**.

Setting Steer Indication

3D-MC can be used to manually steer the machine to a polyline layer in the linework file. Typically, an alignment file is used to grade/pave along an alignment line. For more information, see "Steering/Grading to Polyline" on page 85.

Polylines represent features or objects, such as building pads, curbs, sidewalks, the top/toe of slopes, or any boundary on the project. If the polyline is composed of three dimensional information at each transition point, it can be selected on the main screen and used as the alignment line to manually steer to or as the design elevation to control the blade.

1. Press the Power button on the display, then tap **Control** ▸ **Steer indication**. The **Steer Indication** screen appears (Figure 56).

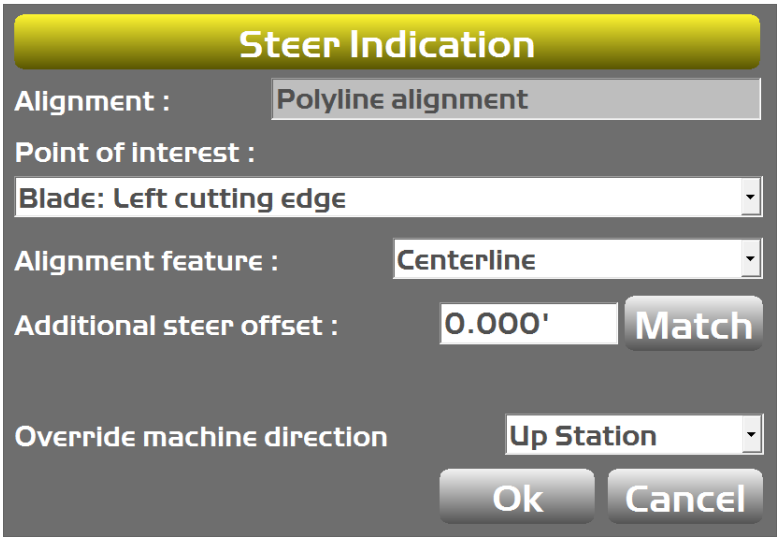


Figure 56: Steer Indication Screen

2. Select or enter the following parameters.

   - **Point of Interest** – select the edge of the blade to steer from.
   - **Alignment feature** – select the feature to steer to.
   - **Additional steer offset** – enter an offset from the feature to apply.
   - **Override machine** – selecting either **Up Station**/**Down Station** locks the machine orientation to be parallel to the Centerline. In this mode there is no need for the machine to move before the orientation is calculated.

If blade orientation is miscalculated, the slopes of the design will be inaccurate. This will cause errors in grading.

3. Tap **OK** to return to the main screen.

mmGPS

mmGPS Transmitters

Transmitters are stored in the TP3 file, and are copied into the GX series displays using Pocket-3D on a data collector. If the current project or TP3 file does not contain a transmitter, copy a transmitter with calibration data into 3D-MC using the **Transmitters** tab (Figure 57).

Figure 57: 3D-MC mmGPS Transmitters

1. Press the Power button on the display, then tap **Control** ▸ **mmGPS** ▸ **Transmitters**. The **mmGPS Transmitters** screen appears.

2. Tap the **Transmitters** tab.

3. Tap **Copy**. The **Copy Transmitter Data screen** appears (Figure 58).

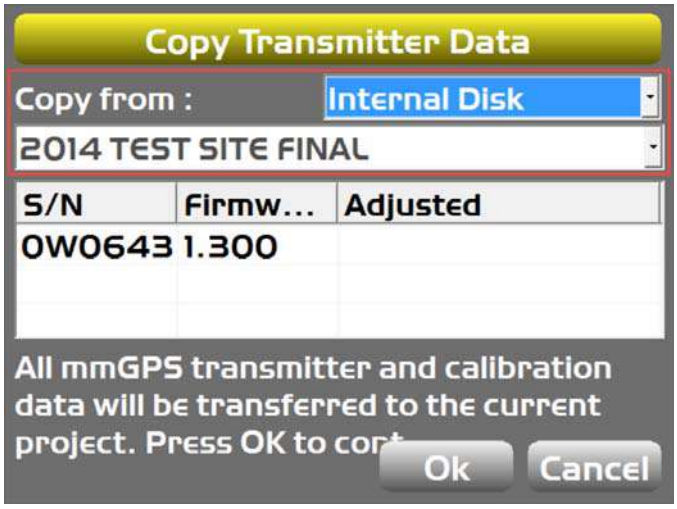


Figure 58: Copy Transmitter Data

4. In **Copy from**, select the location and project file that contains the desired transmitter and calibration data.

5. Tap **OK** to load the information. The **mmGPS Transmitters** screen appears.

6. If needed, repeat steps 3 through 5 for more transmitters.

Once you have copied more transmitters into 3D-MC, up to four can be assigned to unique channels using the individual channel tabs (Figure 59).

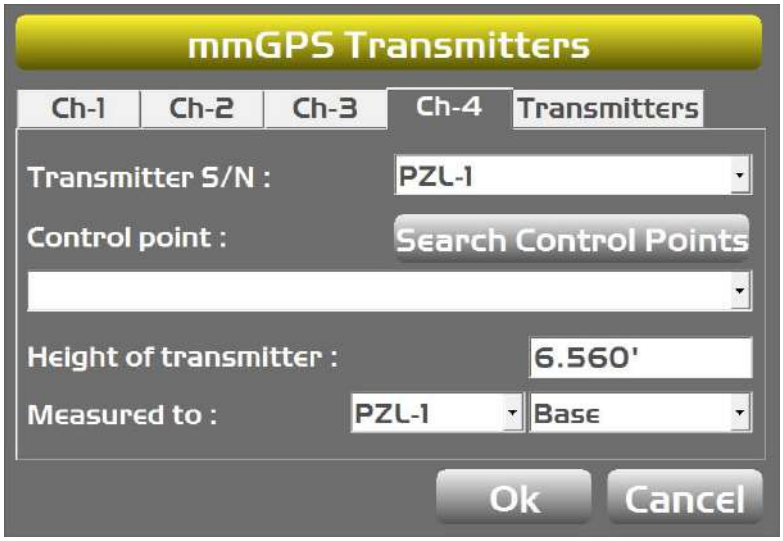


Figure 59: Transmitter Channels

To assign or edit a channel, do the following.

1. Tap any of the four channel tabs.
2. Select an ID from the **Transmitter S/N** drop-down list.
3. Tap **Search Control Points** to enter points, or select a point from the **Control point** drop-down list.
4. Enter the height for **Height of transmitter**.
5. Select the transmitter and either **Base** or **Mark/Slant** from the **Measured to** drop-down lists.
6. Tap **OK** to apply the settings, and return to the main screen.

mmGPS Receivers

To set up mmGPS receiver information, do the following.

1. Press the Power button on the display, then tap **Control ▸ mmGPS ▸ PZS-MC receiver**. The **PZS-MC Receiver** screen appears (Figure 60).

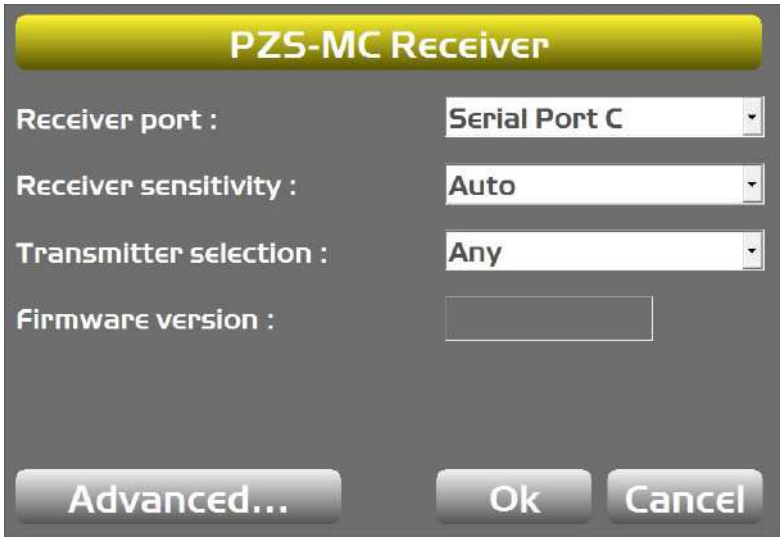


Figure 60: mmGPS Receiver Setup

2. Select the following.

   - **Receiver Port**: select the port for communication between the receiver and sensor (typically port C).
   - **Receiver sensitivity**: select **Auto** to automatically control the receiver's detection level of the transmitter's signal. Select a different setting when working at very short or very long distances, or if inclement weather affects laser detection.
   - **Transmitter selection**: select the channel to scan for an mmGPS connection. The default setting is **Any**.
   - **Firmware version**: If needed, make note of the receiver firmware version.

3. If needed, tap **Advanced**. The **Advanced Settings** screen appears (Figure 61).

Figure 61: mmGPS Advanced Receiver Settings

4. Select the following.

   - **Height Compensation**: determines how the system handles height differences when changing between different Transmitters. The default is **Off**.
   - **Signal Loss Strategy**: select the desired option.
   - **Max Search Time (secs)**: enter the desired time value.
   - **Min Hold Time (secs)**: enter the desired time value.

5. Tap **OK** to return to the **PZS-MC Receiver** screen.

6. Tap **OK** to save all settings and return to the main screen (Figure 62).

Figure 62: 3D-MC mmGPS

Blade Calibration

Blade calibration should be set by your Topcon dealer. For Motor Grader blade trim, see "Motor Grader Only Options" on page 92.

For more information about blade calibration, refer to the following manuals:

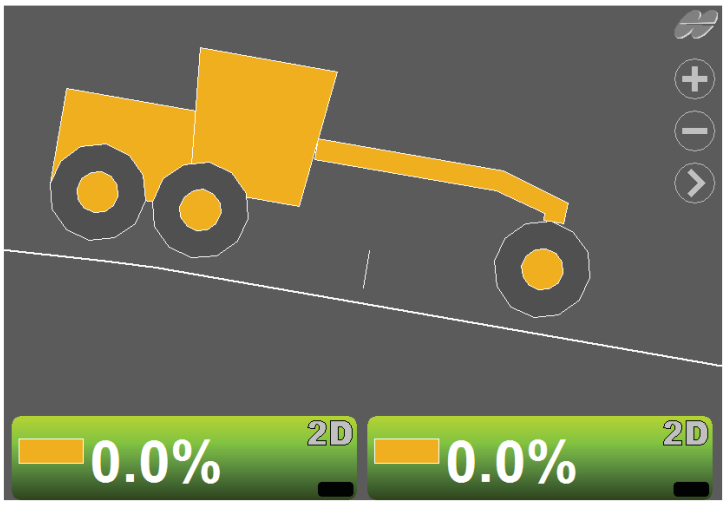
- *3D-MC^2 Installation and Calibration Manual* (p/n 7010-0924)
- *3D-MC^2 for Graders Installation and Calibration Manual* (p/n 7030-1468)
- *3D-MC^{MAX} Installation Manual* (p/n 1009522-01)

3D/2D Control

3D/2D Control allows you to set your machine to work with a 3D or 2D system. To select the type of control, press the Power button on the display, then tap **Control ▸ 3D/2D Control** and select an option appropriate for your system.

When the selection changes, the elevation and slope control buttons will change function. For example, selecting **Slope: Slope (2D)** will cause the Elevation Control Button to change to another Slope Control Button (Figure 63).

Slope Control Button



Slope Control Button

Figure 63: Slope Control Buttons

Setting 2D Slope Control

In 2D mode, the **Adjust Slope** screen displays the current blade slope at the top of the screen, and a **Survey** button on the lower left portion of the screen (Figure 64).

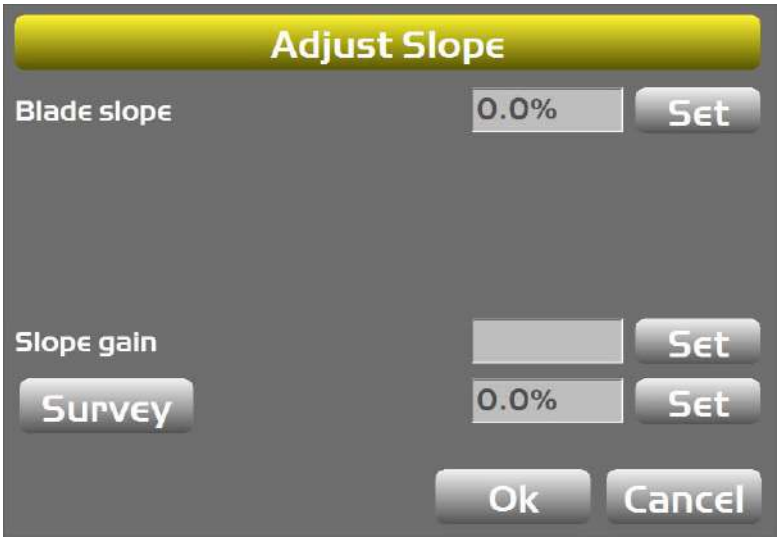


Figure 64: Adjust Slope – 2D Mode

1. Tap **Survey** to set the current design slope as the desired slope.

The design slope is perpendicular to the machine, which will be different to the **Blade slope** if it is rotated.

2. To enter a slope value, tap **Set** and enter a value. Tap **Set** again to lock the value.

Selecting **Elevation: Elevation (2D)** will cause the Slope Control Button to change to another Elevation Control Button (Figure 65). The 2D Elevation Control Button will function with a laser or sonic tracker.

Figure 65: 2D Elevation Control Buttons

Setting Reference Elevation in 2D Mode

The elevation control screens for 2D and 3D are different. In 2D mode, a reference elevation displays at the top of the screen (Figure 66).

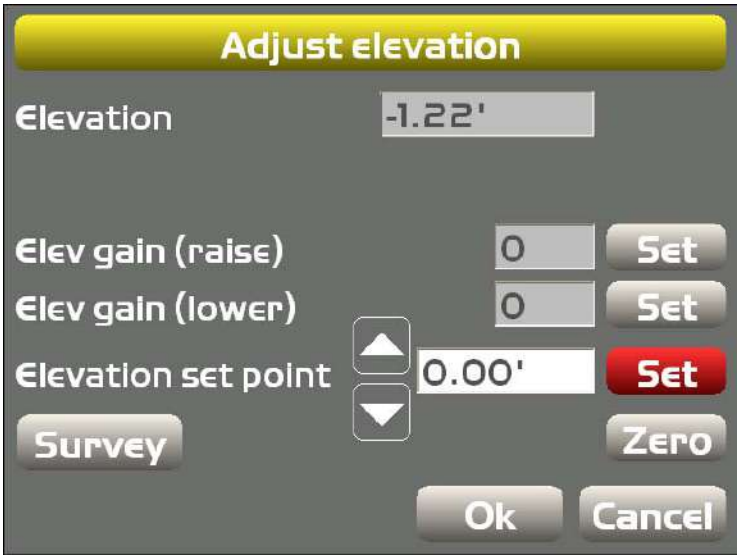


Figure 66: Adjust Elevation – 2D Mode

To set the reference elevation in 2D mode, do the following.

1. Tap **Survey** to engage the laser receiver or sonic tracker.

   – If using a Tracker Jack or TM-1, the laser will begin traveling up or down to find the laser beam.

2. If entering a known value tap **Survey**, enter the value, then tap **Set**.

If the value is grayed out, tap **Set**, enter the value, then tap **Set** again to lock the value.

Selecting **Elevation : Slope (2D)** or **Slope: Elevation (2D)** will change the Elevation Control Button to function with a laser or sonic tracker, rather than a GPS antenna. The Slope Control Button will change to the 2D Slope Control Button (Figure 67).

Figure 67: 2D Elevation and Slope Control Buttons

Selecting **Elevation (2D) : Slope (3D)** or **Slope (3D): Elevation (2D)** will get elevation from a laser or Sonic Tracker while receiving GPS or LPS corrections to control slope (Figure 68). Also, the 3D Slope Control Button is active. See "Slope Control Button" on page 9 for more information.

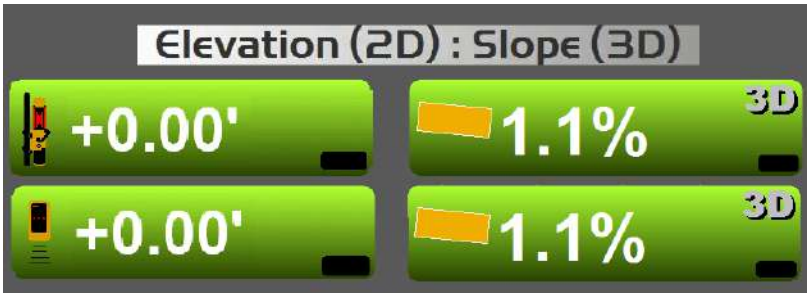


Figure 68: 2D Elevation/3D Slope Buttons

3D-MC^{MAX} dozers do not have 3D/2D options.

Restart Connection

Press the Power button on the display, then tap **Control** ▸ **Restart Connection** to resynchronize the system.

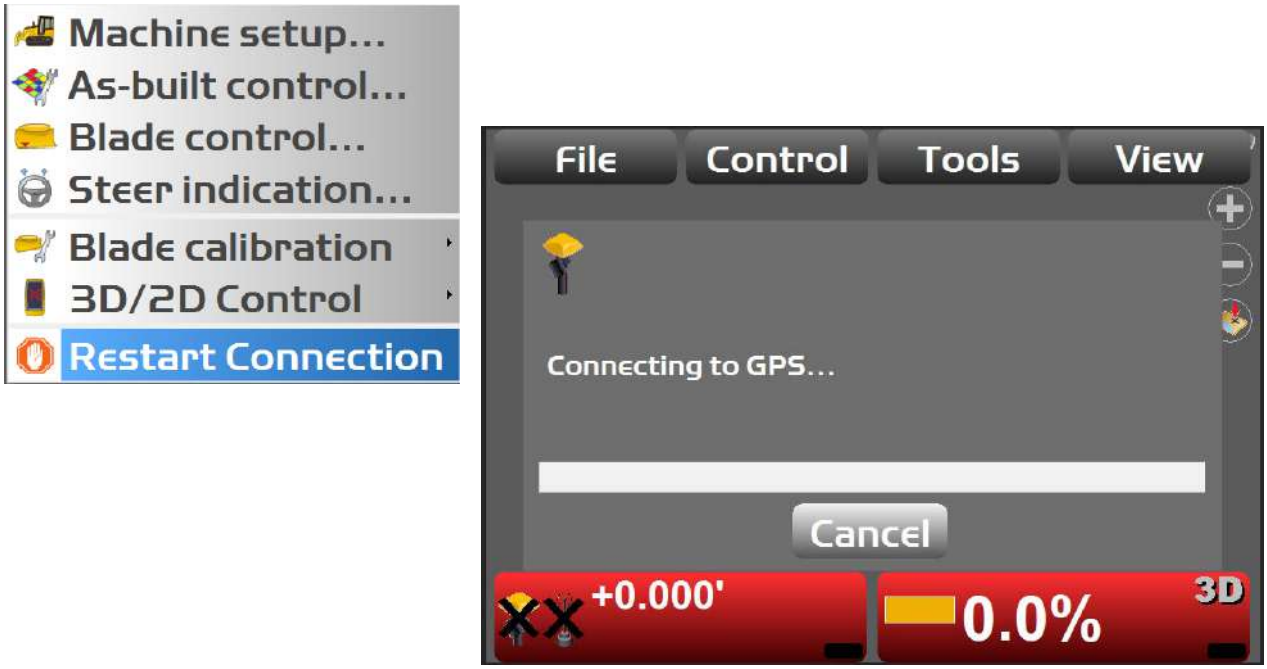


Figure 69: Restart Connection

Light Bars

Light bar setup is located in the **Control** menu, and is specific to the machine file in the machine setup menu. Topcon Recommends that a Topcon dealer configure the light bars with the operator, to ensure unwanted changes are not made to the calibration while configuring the light bars. Contact you local Topcon dealer for assistance.

The GX series displays have built-in light bars. Both can be configured for what they are tracking (cut/fills, slopes, steering, etc.), and also for the precision or sensitivity of the indicator LED's range. Figure 70 shows the screen for the GX-55 and GX-75.

Figure 70: GX-55/GX-75 Light Bar Setup Screen

Cut/fill is the elevation point of interest and is set to anywhere on the blade. If blade control is set to best fit, then cut/fill matches the value shown on the Elevation Control Button.

If blade control is set to single point, then cut/fill is referenced to the red triangle in section view (Figure 71).

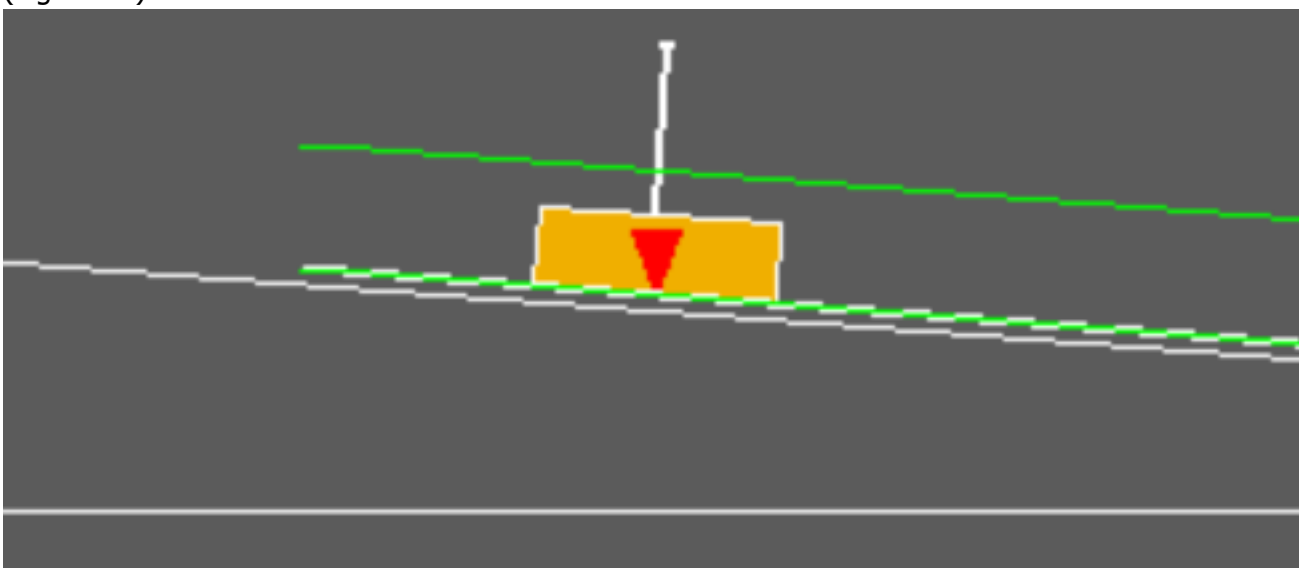


Figure 71: Single Point Cut/Fill Reference Location – Section View

The left and right cut/fill options are at the left and right sides of the blade, bucket, or implement. Main-Slope is only available on excavators.

Tools Menu Options

The **Tools** menu contains options for configuring the radio, collecting and navigating to topographic points, checking the position of the blade, data logging, and supervisor mode (locking or unlocking functions). Figure 72 shows the available options.

Figure 72: Tools Menu Options

Radio Configuration

This section describes how to perform system radio configurations. There are several radio choices, and the available options will be different depending on which radio is chosen.

1. Press the Power button on the display, then tap **Tools** ▸ **Configure radios**. The **GNSS Radio Setup** screen appears.

2. Select the appropriate options for **Radio type**, **Port**, **Baud rate**, and **Format** and tap **Configure**.
   The configuration screen for the selected radio appears (Figure 73).

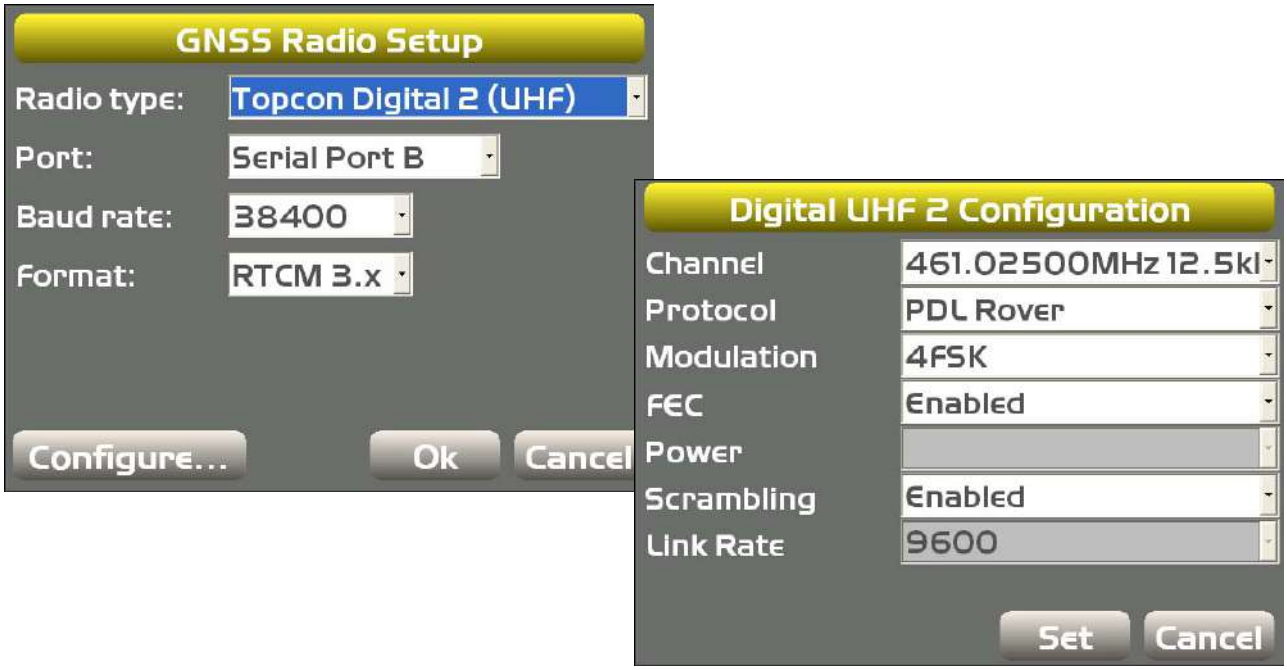


Figure 73: GNSS Radio Setup

3. Enter radio configuration information, and select the channel that matches the channel of the Base Station.

4. Tap **Set** to save the radio configuration settings and return to the **GNSS Radio Setup** screen.

5. Tap **OK** to save the radio configuration settings, and return to the main screen.

Checking the Blade or Implement Position

1. Press the Power button on the display, then tap **Tools** ▸ **Position check**. The **Position Check** screen appears.

2. Select the **Point** (either **Blade: Left**, **Blade: Middle**, or **Blade: Right**).

3. Tap **Measure**. 3D-MC will check the blade position and display the point on the job at the selected edge of the blade (Figure 74).

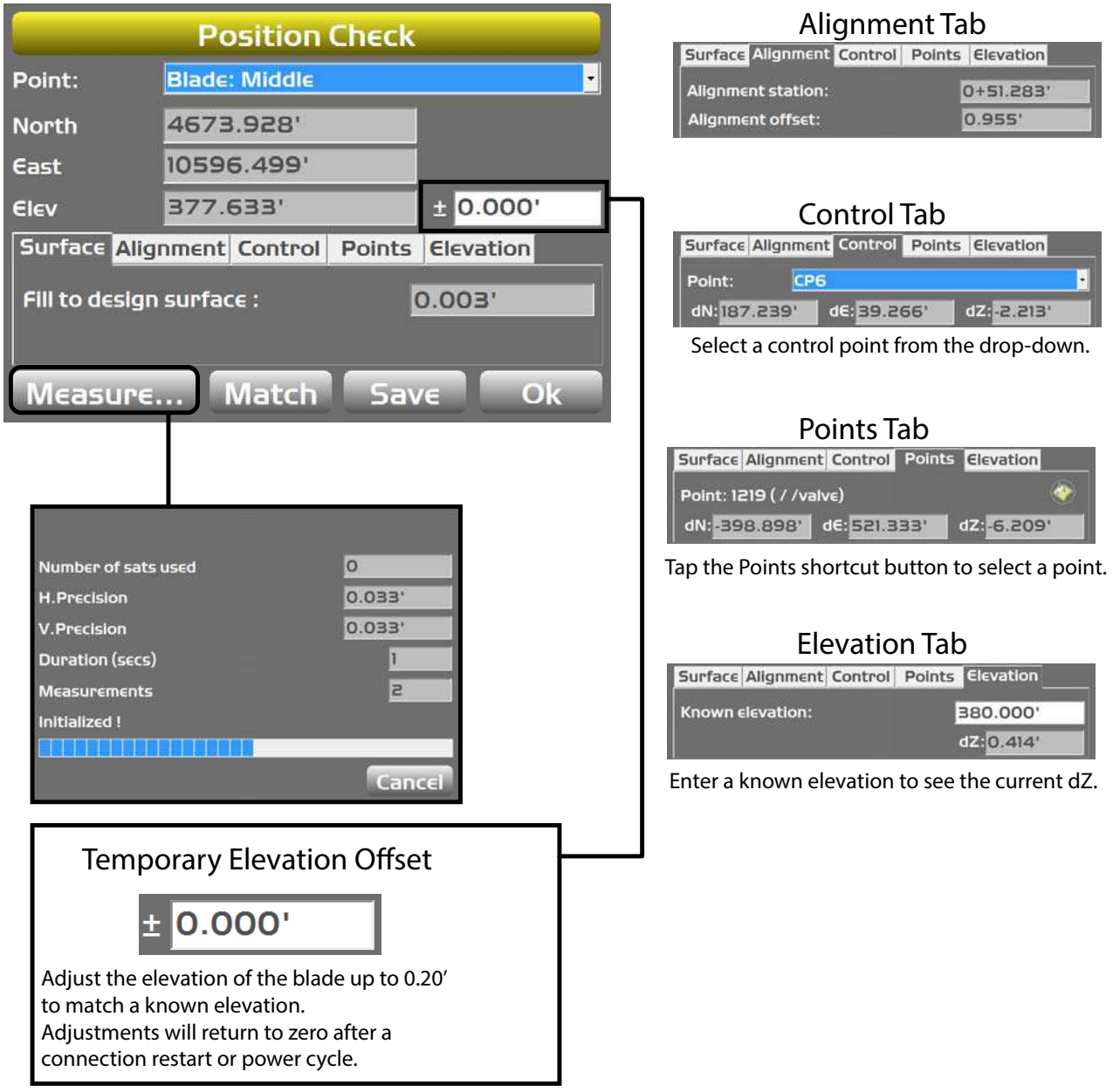


Figure 74: Check the Blade Position

4. Tap **Save**. The **Position Details** screen appears (Figure 75).

5. Select a **Layer** name and a point **Description**, and tap **OK** to return to the **Position Check** screen.

Figure 75: Select the Position Details

6. On the **Position Check** screen, tap **Cancel** or **OK** to return to the main screen.

Using Points to Navigate

Add/Remove Points

A list of points can be selected for navigation/stakeout. The list can be created by selecting points from any layer in the project file. You can see a list of available points by tapping **Topcon Logo ▸ File ▸ Points**.

1. Press the Power button on the display, then tap **Tools ▸ Navigate**. The **Points/Control** tab list appears.

2. Tap **Add/Remove**. The **Points** screen appears (Figure 76).

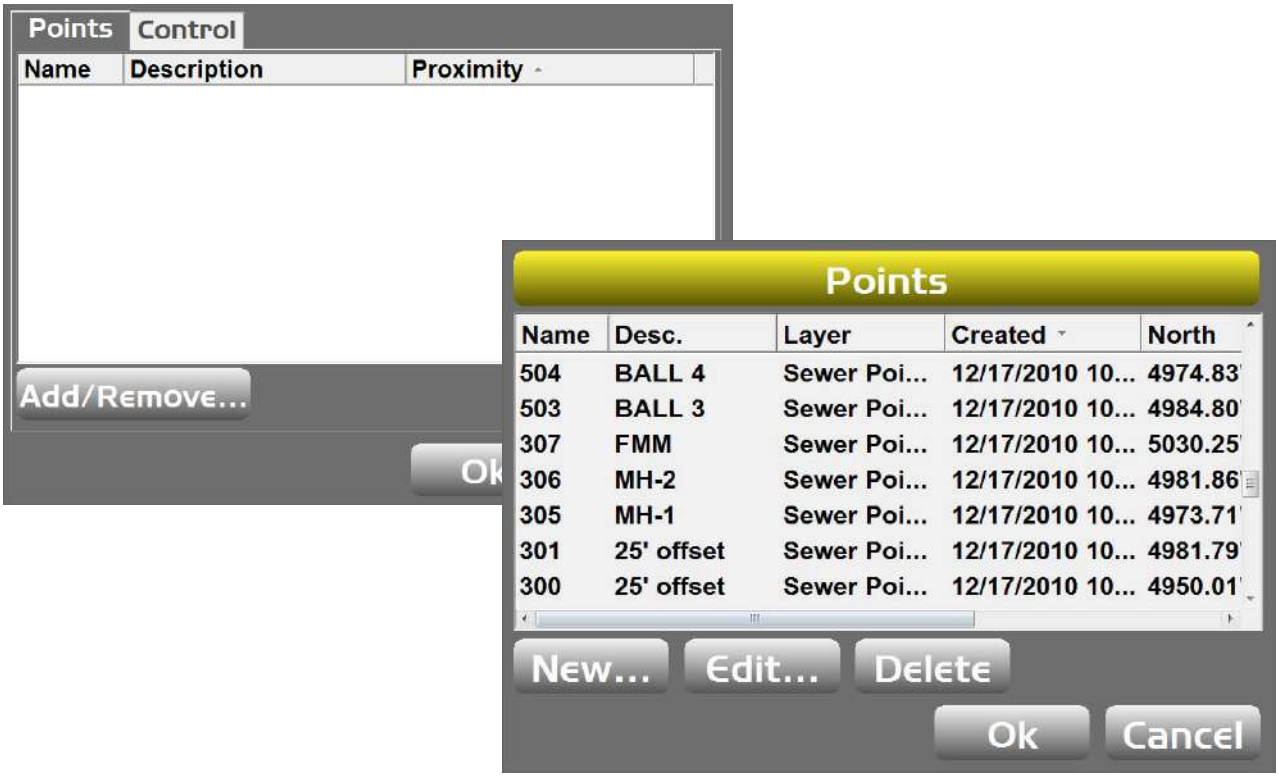


Figure 76: Add/Remove a Point

3. To add a point, tap **New**. a new **Point** screen appears (Figure 77).

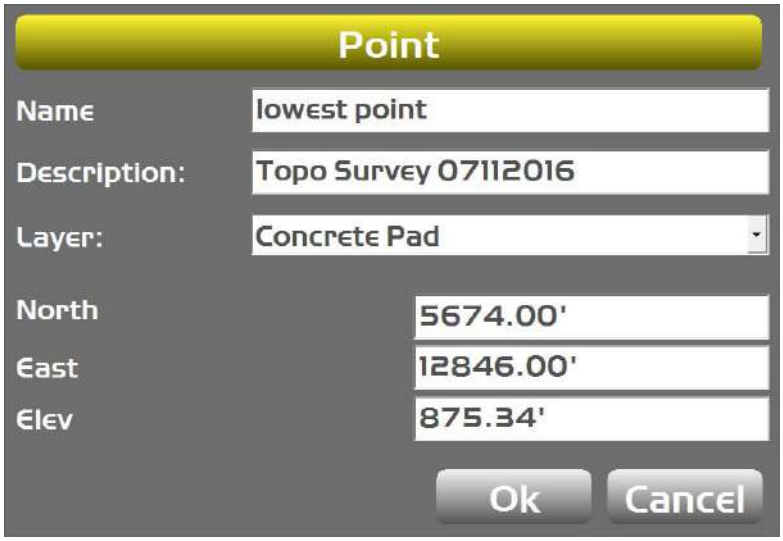


Figure 77: Add a New Point

4. Enter the appropriate information, and tap **OK**. The **Points** screen appears and displays the new point.

5. To remove a point, select the desired point in the **Points** screen and tap **Delete**.

6. Tap **Yes** at the confirmation dialog box. The **Points** screen appears and the selected point is removed.

7. Tap **OK** to return to the **Point/Control** tab list.

8. Select a point and tap **OK**. The tab list appears with the selected point (Figure 78).

Figure 78: Select a Point to Navigate

9. Select the point in the tab list, and tap **OK**. The main screen appears with stakeout information displayed (Figure 79).

The machine image will be drawn with an additional cross-hair to indicate point of reference.

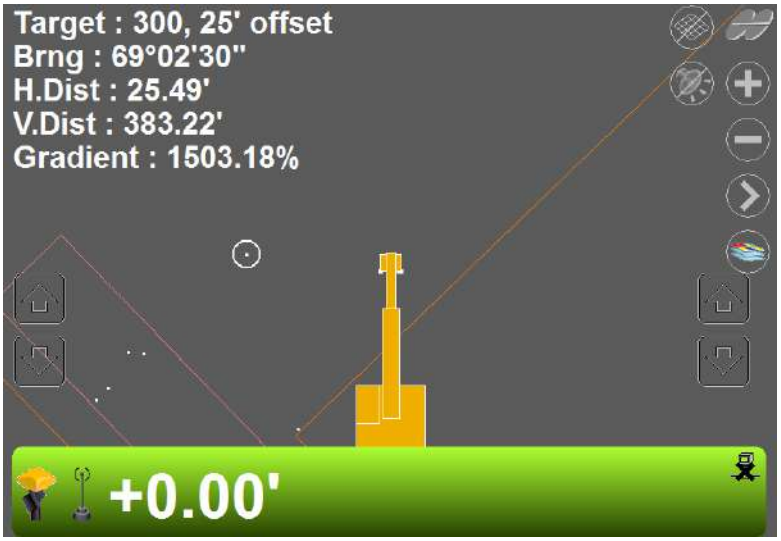


Figure 79: Machine Navigates to Selected Point

10. To stop the navigation, press the Power button on the display, then tap **Tools ▸ Stop navigation**. The stakeout information disappears from the main screen.

Navigating to Points Using the Navigate to Point Context Menu

1. From the main screen, tap on the point to navigate.
2. Tap and hold on the point to display the context pop-up menu.
3. Select **Navigate to point**. The points navigation results display on the main screen (Figure 80).

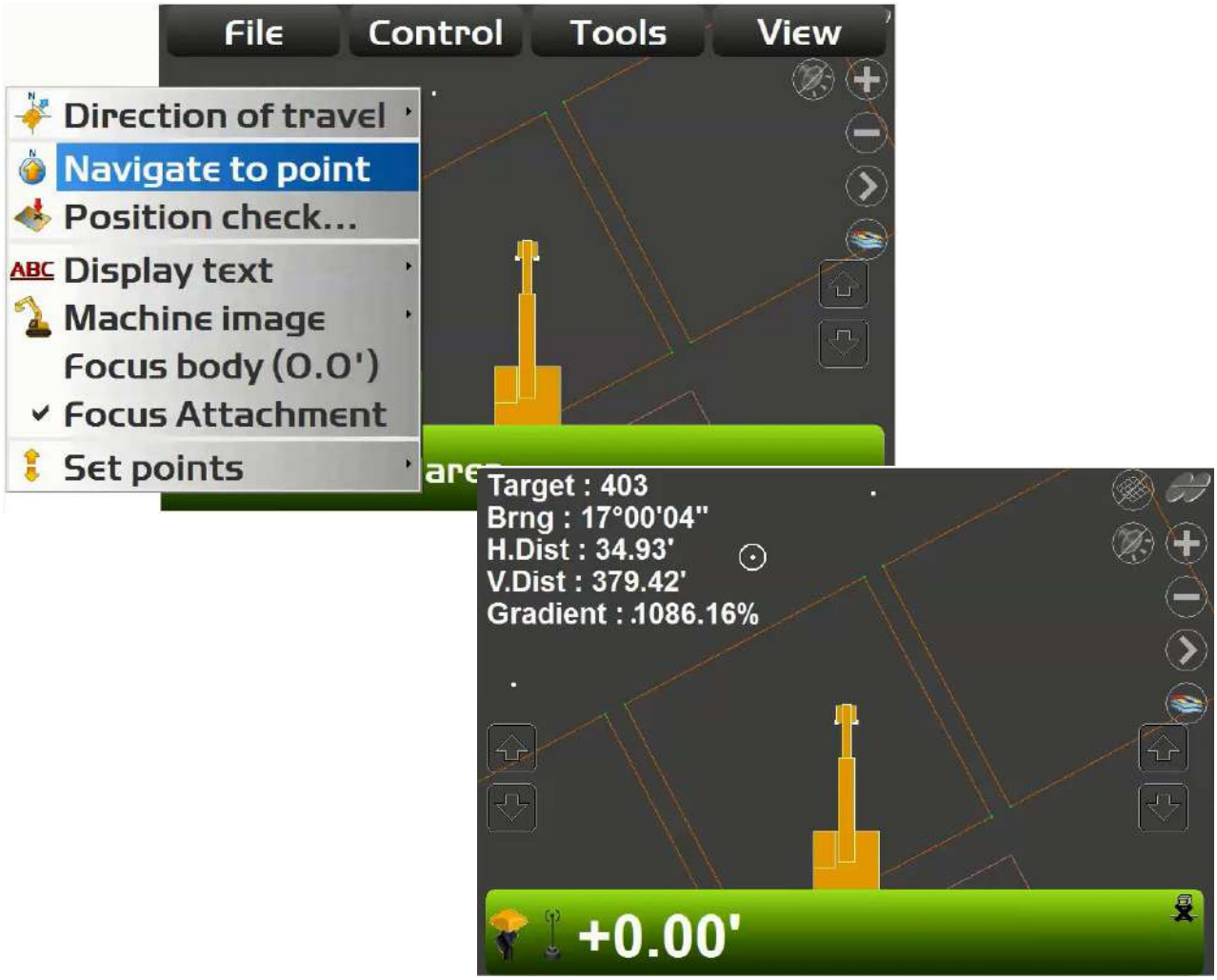


Figure 80: Navigate to Point

4. To stop the navigation, tap and hold anywhere on the main screen. Select **Stop navigation** from the **Context** pop-up menu.

Topographic Surveys

Prior to performing a topo survey, an existing point file must be selected or a new one created.

Select an Existing Point File

1. Press the Power button on the display, then tap **File** ▸ **Layers**. The **Project Layers** screen appears (Figure 81).

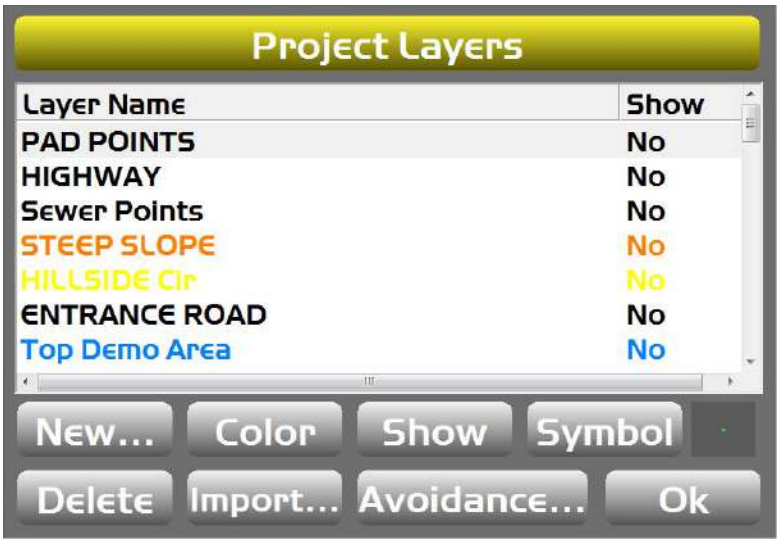


Figure 81: Project Layers Screen

2. Select an existing point file, and Tap **OK**. The main screen appears.

3. Follow the steps in "Perform the Topo Survey" on page 63.

Create a New Point File

1. Press the Power button on the display, then tap **File** ▸ **Layers**. The **Project Layers** screen appears.

2. Tap **New**, enter a name, and tap **OK**. The new point file appears in the **Project Layers** screen (Figure 82 on page 63).

Figure 82: Create and Name a New Point

3. Select the newly created point, and tap **OK**. The main screen appears and the point is added.

4. Follow the steps in "Perform the Topo Survey".

Perform the Topo Survey

Show Topo Shortcut Button

The topo shortcut button allows you to turn the topo survey on and off from the main screen of 3D-MC.

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Shortcuts**. The **Shortcuts** screen appears (Figure 83).

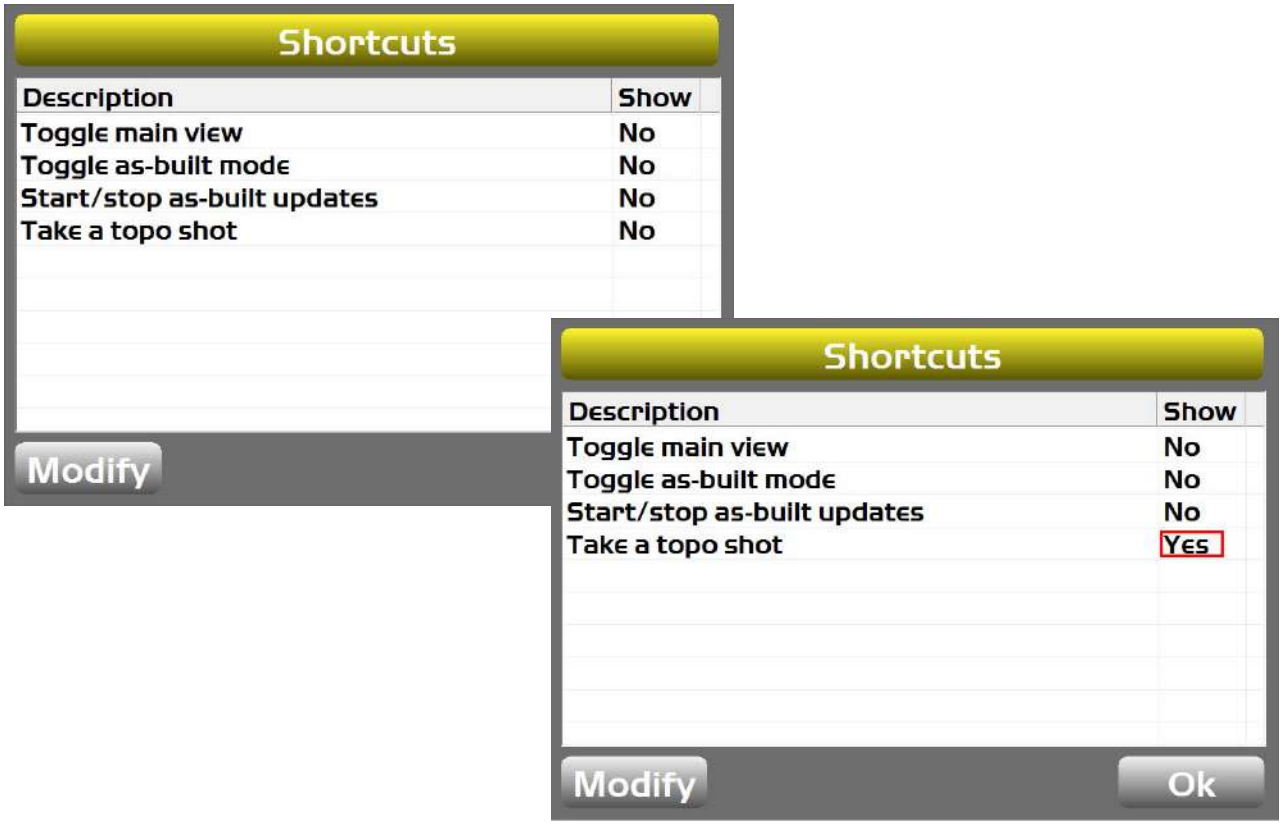


Figure 83: Activate the Topo Shortcut Button

2. Select **Take a topo shot** from the **Description** column, and tap **Modify**. The **Show** column will change to **Yes**, indicating that the topo shot function is active (Figure 83).

3. Tap **OK** to return to the main screen. The topo shortcut button will appear, highlighted in red (Figure 84).

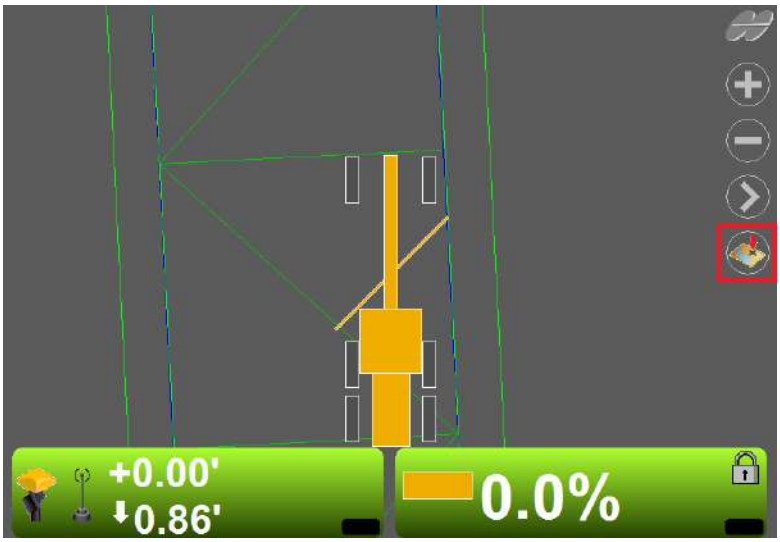


Figure 84: Topo Shortcut Button Active

Set Topo Survey Parameters

1. Press the Power button on the display, then tap **Tools** ▸ **Topo survey**. The **Topo Survey** screen appears (Figure 85).

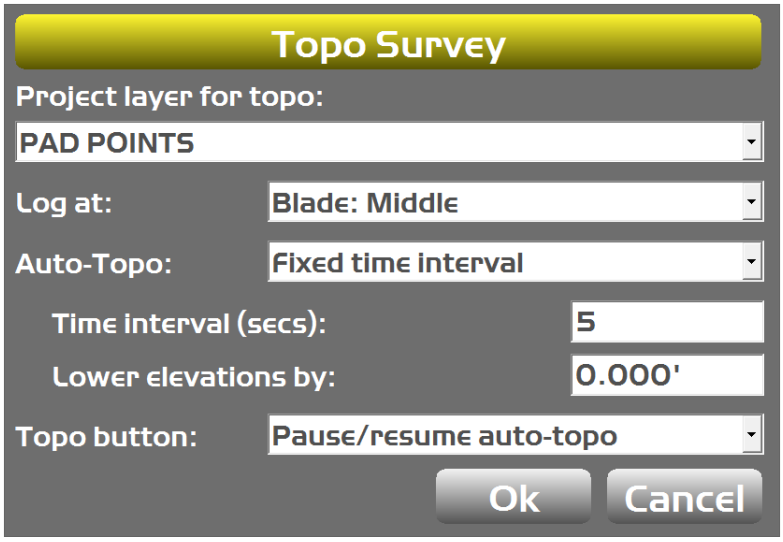


Figure 85: Topo Survey Screen

2. Enter or select the topo survey parameters, and tap **OK** to return to the main screen.

Entering values for **Lower elevations by** will add or reduce elevation from the measured points.

Begin Topo Survey

- If **Auto-Topo** is set to **Minimum horz. distance**, begin driving to the distance displayed. When the machine reaches that distance, 3D-MC will begin measuring and logging the data.
- If **Auto-Topo** is set to **Fixed time interval**, auto-topo will begin after the displayed interval.
- If **Topo button** is set to **Pause/resume auto-topo**, follow the steps below.
  a. Tap the topo shortcut button to start the topo survey. 3D-MC will indicate that it is resuming auto-topo (Figure 86 on page 66).

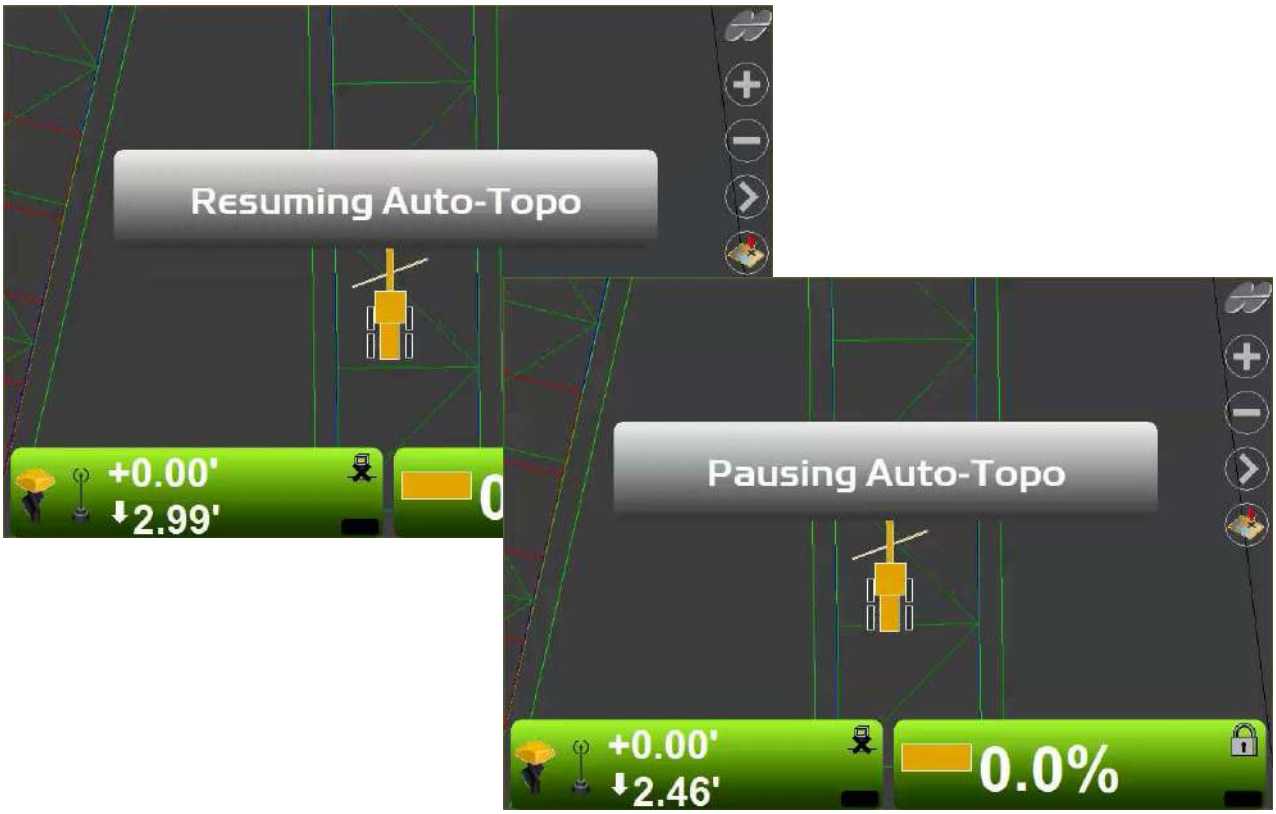


Figure 86: Resume/Pause Auto-Topo

b. To stop topo measurements, tap the topo shortcut button again. 3D-MC will indicate that it is pausing auto-topo (Figure 86).

If auto-topo is not paused, 3D-MC continues logging measurements.

Using Supervisor Mode

Using Supervisor mode in 3D-MC, a supervisor can disable menus, buttons and screen items from the user. A password is needed to access Supervisor mode. Passwords are case sensitive.

The default password is: *topcon*

1. Press the Power button on the display, then tap **Tools** ▸ **Supervisor**.

2. Enter the password using the keyboard, and tap **OK**.

3. Tap **OK** at the prompt (Figure 87).

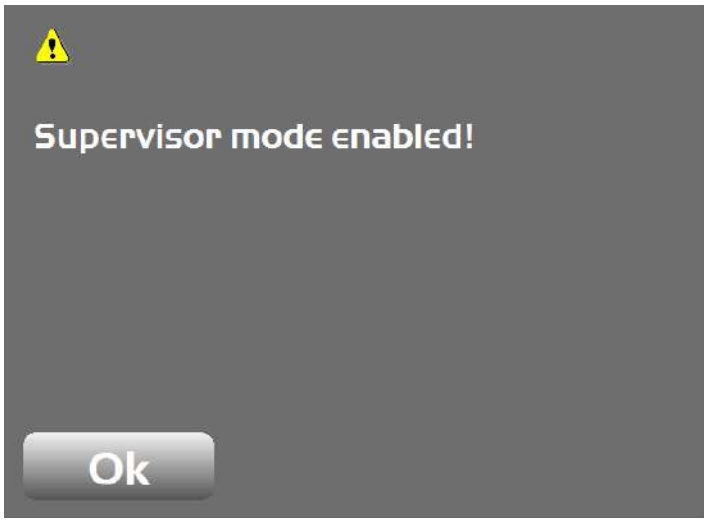


Figure 87: Supervisor Mode Enabled

4. Press the Power button on the display, then tap **Tools** ▸ **Supervisor** to access the supervisor menu (Figure 88).

Figure 88: Supervisor Menu

Changing the Password

1. Press the Power button on the display, then tap **Tools** ▸ **Supervisor** ▸ **Change password**.

2. Tap **OK** at the prompt (Figure 89).

Figure 89: Change Password Confirmation

3. Enter the new password twice, and tap **OK**. A confirmation screen appears (Figure 90).

Figure 90: Enter a New Password

4. Tap **OK** to return to the main screen.

Locking Menus, Buttons and Screen Items

You can lock the following items.

- **Menu** – a selection from the **File**, **Control**, **Tools**, or **View** menu.
- **Button** – a button on various 3D-MC screens, such as the **Edit** button on the **Machine Files** screen.
- **Screen item** – an alphanumeric entry field or drop-down menu.

1. Press the Power button on the display, then tap **Tools** ▸ **Supervisor**.
2. Select either **Lock menus**, **Lock buttons**, or **Lock screen items**. A confirmation screen appears (Figure 91).

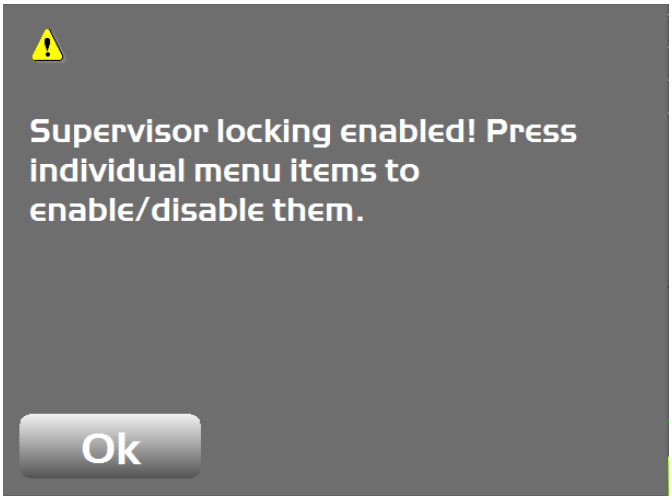


Figure 91: Supervisor Locking Enabled

3. Tap **OK**.
4. Tap any menu, button, or screen item to disable them. The selections display in red when locked (Figure 92).

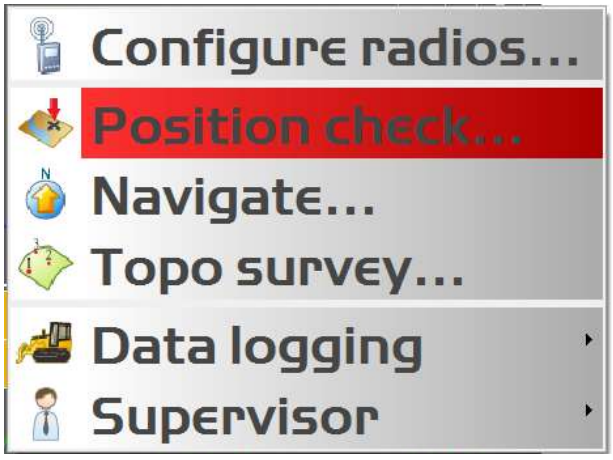


Figure 92: Locked Menu

If you selected an item to lock by mistake, tap the selection again to unlock it. The item will no longer display as red.

5. Press the Power button on the display, then tap **Tools** ▸ **Supervisor** ▸ **Exit lock mode**.

The main screen appears and the locked item is no longer visible (Figure 93).

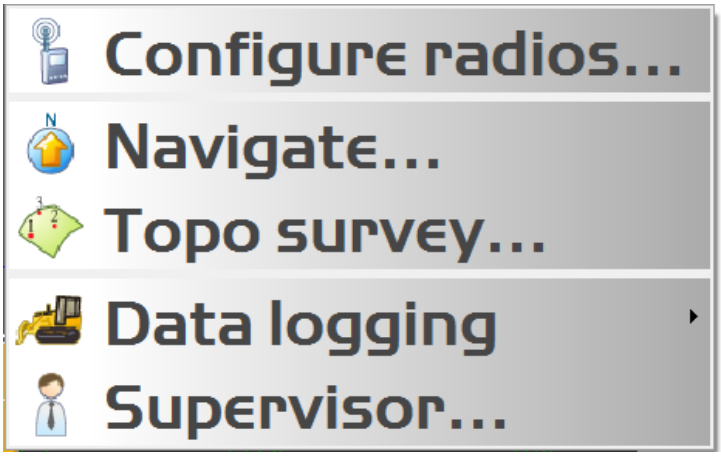


Figure 93: Locked Menu Removed

Unlocking Menus, Buttons and Screen Items

1. Press the Power button on the display, then tap **Tools** ▸ **Supervisor**. The alphanumeric keyboard appears.

2. Enter the password, and tap **OK**.

3. Tap **OK** at the prompt to enable supervisor mode (Figure 94). The main screen appears.

Figure 94: Supervisor Mode Enabled

4. Press the Power button on the display, then tap **Tools** ▸ **Release all locks**. A confirmation prompt appears (Figure 95).

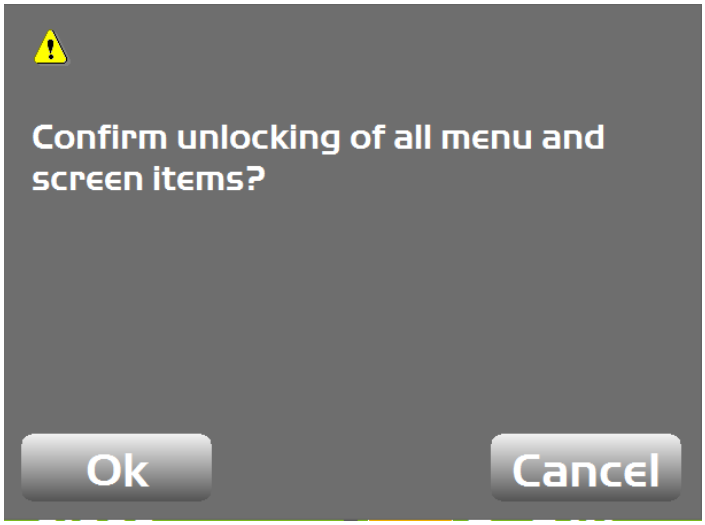


Figure 95: Confirm Unlocking of Items

5. Tap **OK** to return to the main screen.

6. Press the Power button on the display, then tap **Tools** ▸ **Supervisor** ▸ **Exit lock mode**. The previously locked item is available (Figure 96).

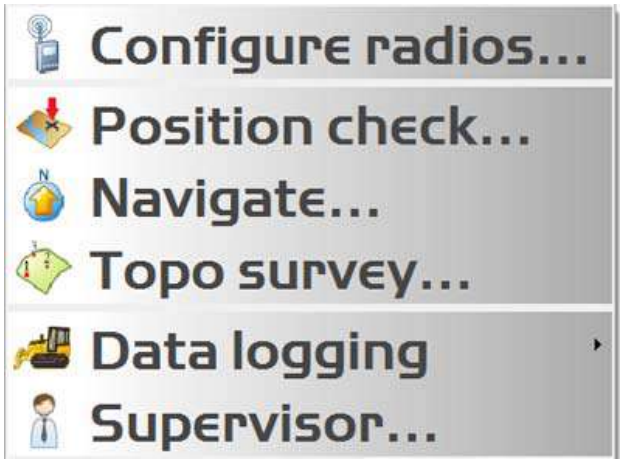


Figure 96: Item Unlocked

View Menu Options

3D-MC can display several types of views, each of which contain useful information:

- Display **Plan**, **Section**, or **Profile** views in the **Main window**.
- Display **Profile**, **Section**, or **Grade Indicator** in the **Left window**.
- Display the **Grade Indicator** in the **Right window**.
- Display the **Profile** or **Section** in the **Lower window**.
- Select **Display options** for various data, depending on the files selected for display.
- View 3D-MC information, authorization codes, and options from the **About 3DMC** screen.

Figure 97 shows the options available.

Figure 97: View Menu Options

Changing the View

To change the view, do the following.

1. Press the Power button on the display, then tap **View**.
2. Select the desired window and view type (Figure 98).

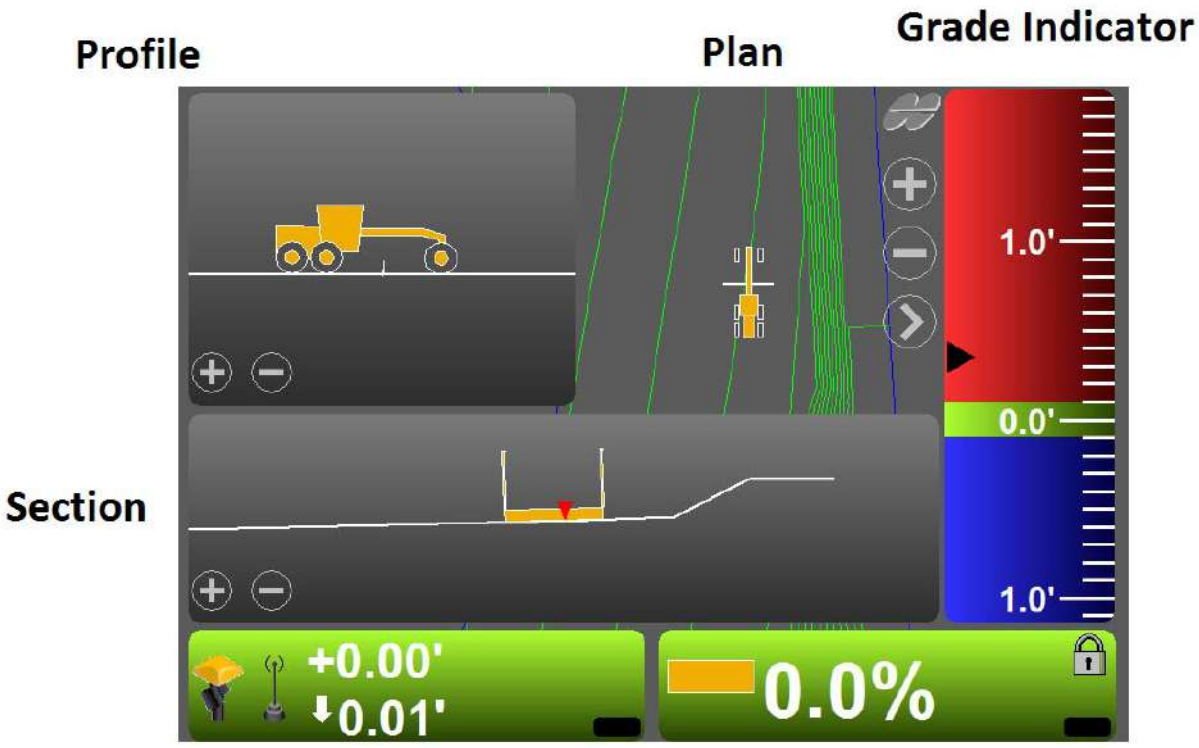


Figure 98: View Types

If using a GX series display, see "GX-55/GX-75 Displays" on page 1.

Changing the Grade Indicator

The grade indicator can be changed for position, color, grade display type, scale, and on-grade size.

Changing the Position

1. Press the Power button on the display, then tap **View**.
2. Tap either **Left window ▸ Grade indicator** or **Right window ▸ Grade indicator**.

Changing the Grade Display

1. Tap and hold the grade indicator for one second. A content menu appears.
2. Tap **Grade display**, then select the desired option (Figure 99 on page 74). This applies a cut/fill reference for a position on the cutting edge.
   - **At left edge** – the grade tape follows the left-edge position of the blade.
   - **In from edge** – the grade tape follows a position on the blade an entered distance from the left edge. Tap to display the numeric pop-up keyboard to enter a distance from the left edge. Tap **OK** to return to the main screen.

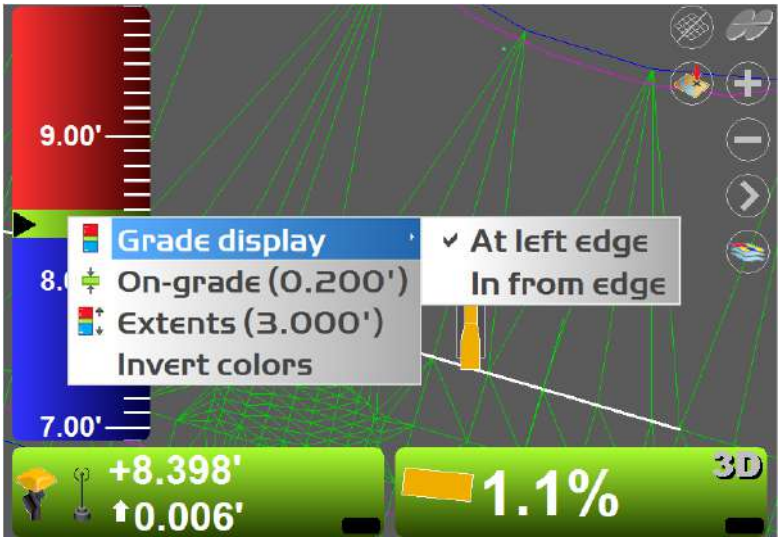


Figure 99: Grade Display Menu

Changing the On-grade or Extent Deadband

1. Tap and hold the grade indicator for one second, then tap the desired menu option.
   - **On-grade** – displays the current on-grade (green zone) width. Tap to change the on-grade width.
   - **Extents** – displays the current scale (unit spacing) for the grade indicator. Tap to change the unit spacing.
   - **Invert colors** – tap to reverse the colors of the grade indicator.

Display Options

Available Display Options

Press the Power button on the display, then tap **View** ▸ **Display options**. Figure 100 shows the options available.

Figure 100: Display Options

Display options vary depending on what is active. To change what is active, press the Power button on the display, then tap **File** ▸ **Active** Select the appropriate options from either **Surface**, **Alignment**, or **AsBuilt**.

Working Surface Display Options

To change the display options for a TIN file and turn grade transition markers On or Off, do the following.

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Working surface**. The **TIN/Section** tab list appears (Figure 101 on page 76).

2. Tap the **TIN** tab, and select the check box of the desired parameter(s).

3. Tap the **Color** button next to the desired parameter(s). The **Color Selection** screen appears (Figure 101 on page 76).

4. Select a color and tap **OK** to return to the **TIN/Section** tab list.

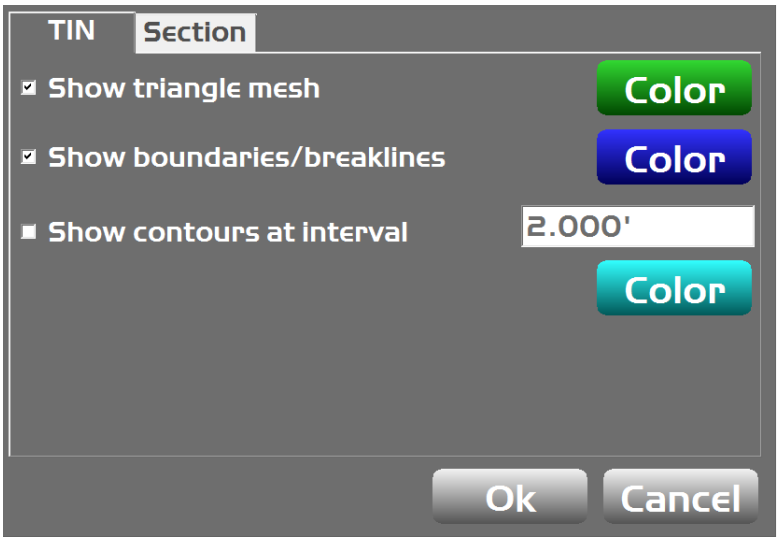


Figure 101: Select a Color for the TIN Parameters

5. Tap the **Section** tab and select the check box of the desired parameter(s).

6. Tap the **Color** button next to the desired parameter(s). The **Color Selection** screen appears (Figure 102).

7. Select a color and tap **OK** to return to the **TIN/Section** tab list.

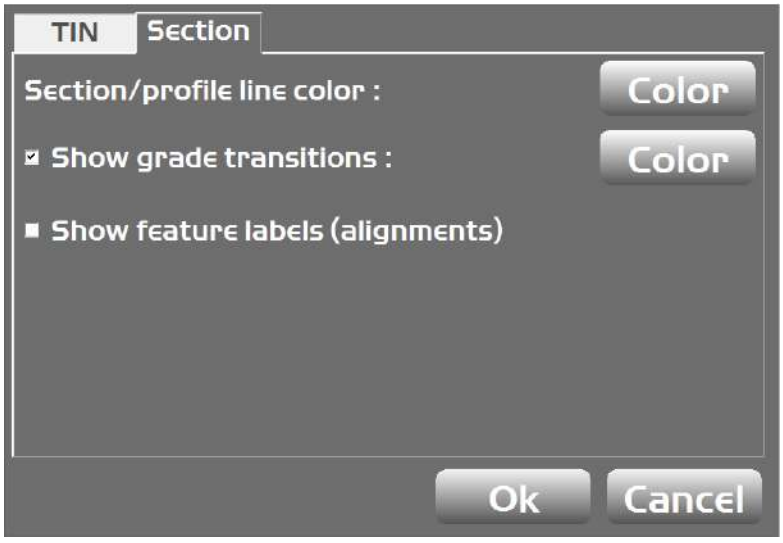


Figure 102: Select a Color for the Section Parameters

8. Tap **OK** to apply the color changes and return to the main screen.

Alignment Display Options

Display options vary depending on what is active. To change what is active, press the Power button on the display, then tap **File** ▸ **Active**. Select the appropriate options from either **Surface**, **Alignment**, or **AsBuilt**.

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Alignment**. The **Road/Section** tab list appears.
2. From the **Road** tab, tap the **Color** button to change the color of the alignment and station lines.
3. Select a color from the **Color Selection** screen and tap **OK** (Figure 103).

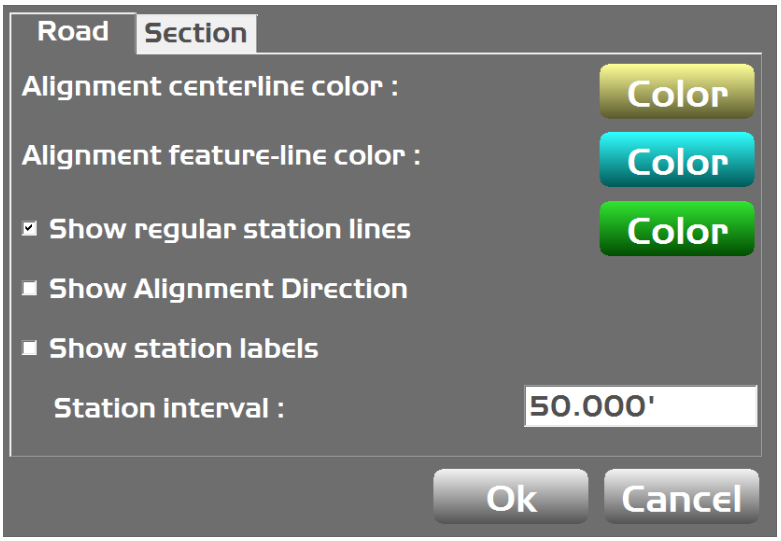


Figure 103: Select a Color for the Road Parameters

4. Tap the **Section** tab to enable grade transition markers on/off for road surfaces.
5. Tap the **Color** button to change the **Section/profile line color** and/or **Show grade transitions** (Figure 104).

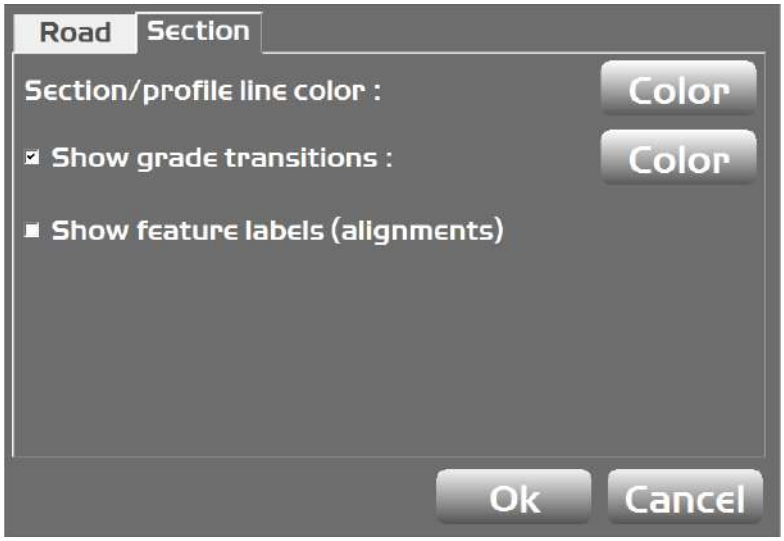


Figure 104: Select a Color for the Section Parameters

6. Select a color from the **Color Selection** screen and tap **OK**. The **Road/Section** tab list appears and the color button for selected parameters displays the chosen color (Figure 105).

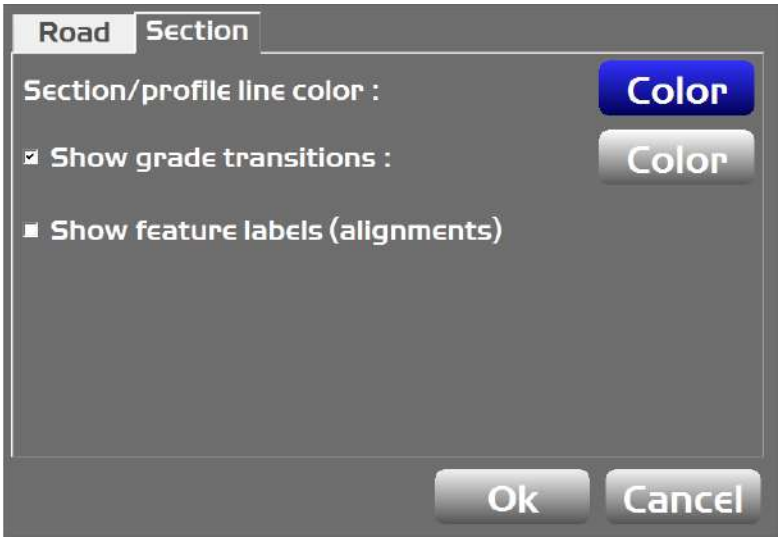


Figure 105: Color Button Displays Selected Color

7. Tap **OK** to return to the main screen.

As-built Surface Display Options

As-built surface files display a colored map of the graded surface.

1. Press the Power button on the display, then tap **View** ▸ **Display Options** ▸ **As-built surface**. The **As-built Surface** screen appears (Figure 106).

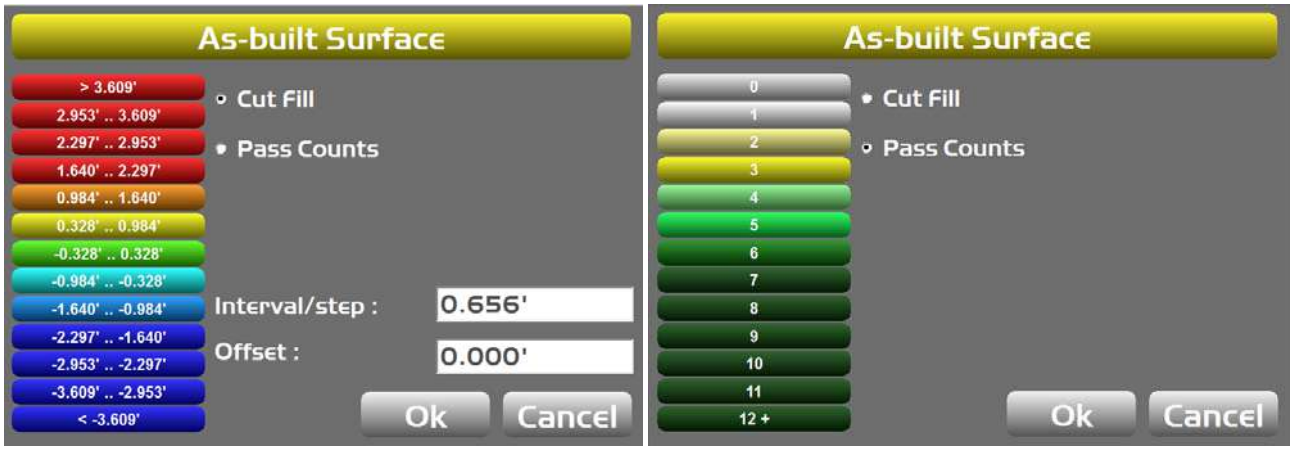


Figure 106: As-built Surface Screen

2. Select and/or enter the necessary options.

3. Tap any interval button to change its color in the **Color Selection** screen (Figure 106).

A total of 13 colors can be used for cut-fill, number of passes, pass difference, etc.

4. Tap **OK** to return to the main screen.

Point Display Options

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Points**. The **Point Options** screen appears.

2. Select the desired check box (Figure 107).

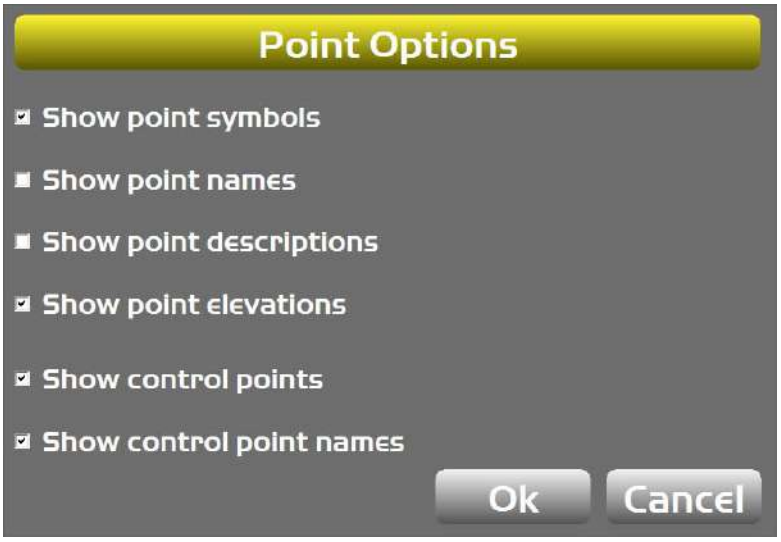


Figure 107: Point Options Screen

3. Tap **OK**. The main screen displays points symbols and/or point numbers during a topographic survey (Figure 108).

Figure 108: Point Options Displayed in 3D-MC

Enable/Disable Shortcut Buttons

The shortcut buttons appear on the main screen of 3D-MC, and allow you to quickly engage, disengage, or cycle through what the shortcut does. To enable or disable shortcut buttons, follow the steps below.

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Shortcuts**. The **Shortcuts** screen appears (Figure 109).

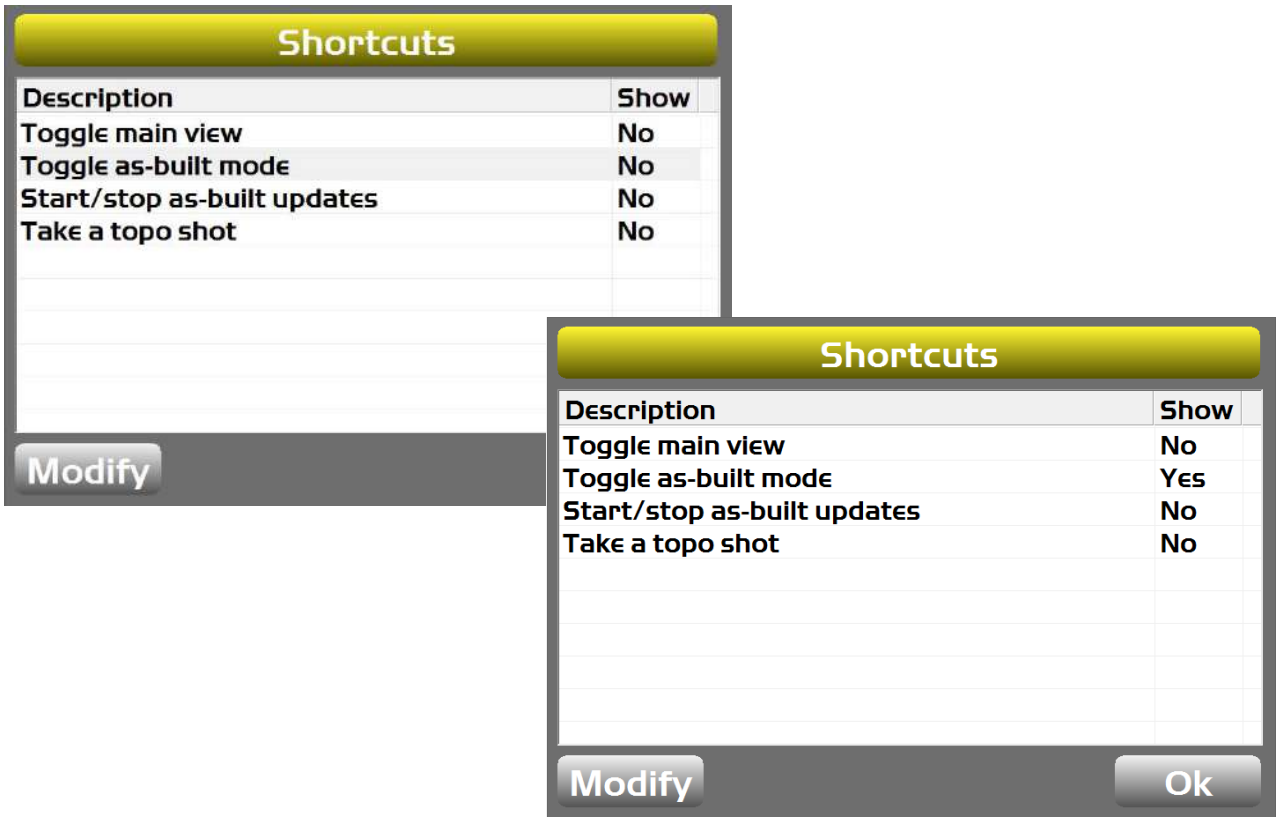


Figure 109: Shortcuts Screen

2. In the **Description** column, tap the option you want to either enable or disable, and tap **Modify**. The **Show** column will change to **Yes** if you enabled the option, or **No** if you disabled the option.

In the example shown in Figure 109, **Toggle as-built mode** was enabled because the **Show** column displays **Yes**. More options are available depending on machine type and enabling Sitelink3D.

3. Tap **OK** to return to the main screen. The active shortcut buttons appear (Figure 110).

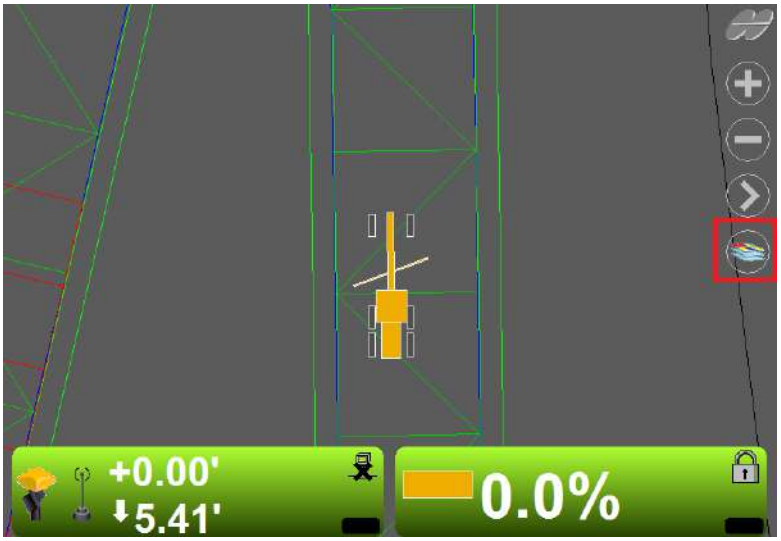


Figure 110: Shortcut Button on 3D-MC Main Screen

Using Shortcut Buttons

The following describes how to use a shortcut button in 3D-MC. The shortcut button used in this example is tied to As-built functionality.

1. Tap the As-built shortcut button. The main screen displays what the shortcut button is doing (Figure 111).

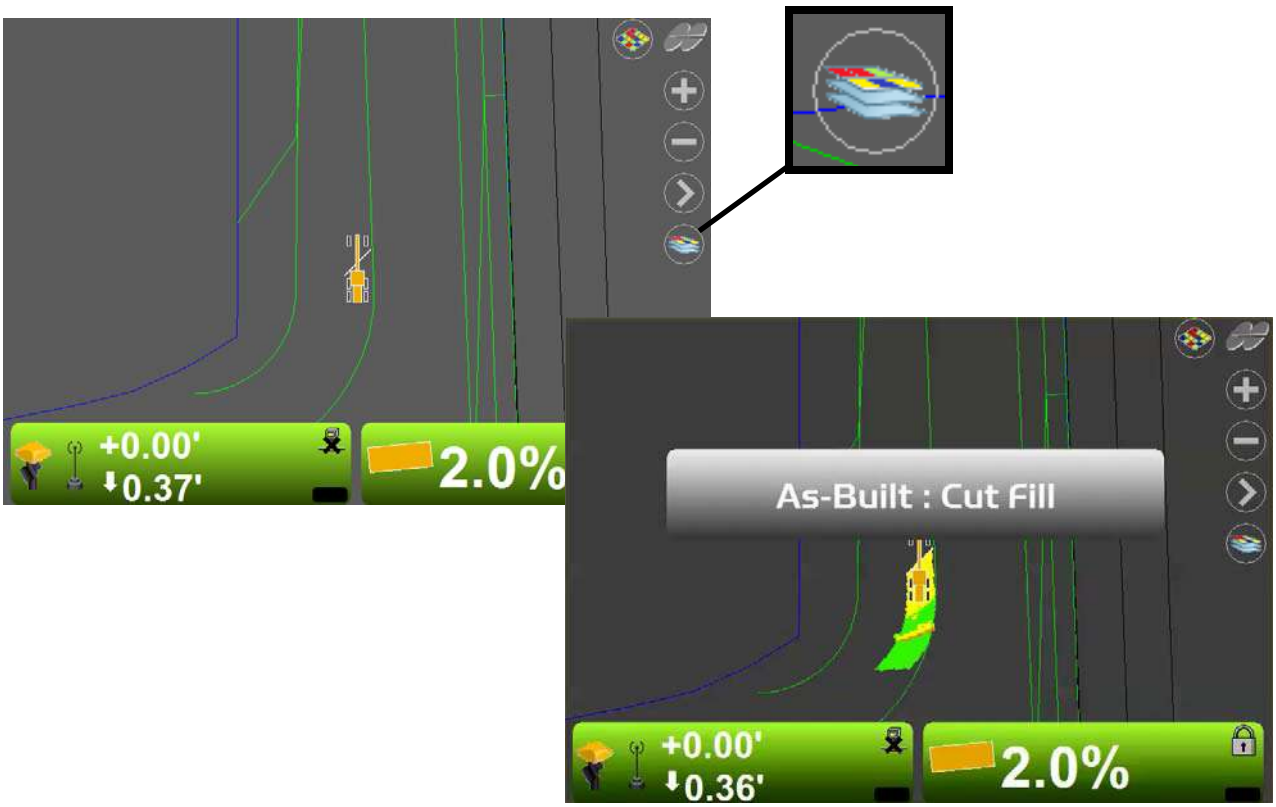


Figure 111: As-built Shortcut Button – Cut/Fill

As Figure 111 shows, tapping the shortcut button changes the As-built to **Cut Fill**.

2. Tap the As-built shortcut button again. The As-built changes to **Pass Counts** (Figure 112).

Figure 112: As-built Shortcut Button – Pass Counts/None

3. Tap the As-built shortcut button again to disengage the As-built (Figure 112).

Background Color Display Options

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Background color**.

2. Select a color from the **Color Selection** screen and tap **OK**. The background color changes to the newly selected color.

Units Display Options

1. Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Display units**. The **Display Units** screen appears.

2. Select the display unit options from the desired drop-down lists, and tap **OK** (Figure 113).

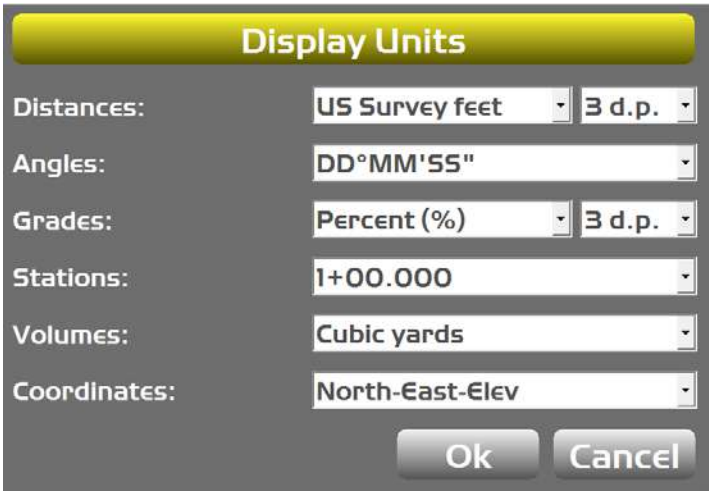


Figure 113: Display Units Screen

About 3D-MC

The **About 3DMC** option is where you will load an Option Authorization File (OAF), which contains the configuration you chose at the time of purchase. The OAF and a Keygen are pre-installed on the Display. You can also modify your configuration, which will require a new OAF from Topcon. Contact your Topcon dealer for more information.

Open Source Software Acknowledgment

Topcon's 3D-MC software uses some open source software components. To learn more, follow the steps below.

1. Press the Power button on the display, then tap **View** ▸ **About 3DMC**.

2. Tap **Info**. An acknowledgment screen appears displaying information about open source software usage (Figure 114).

Figure 114: Open Source Software Acknowledgment

3. To close each screen, tap **OK**.

Context Menu

This chapter briefly describes some of the other options available to you in 3D-MC.

Changing Steer Indication Settings

1. Press the Power button on the display, then tap **Control** ▸ **Steer indication**. The **Steer Indication** screen appears (Figure 115).

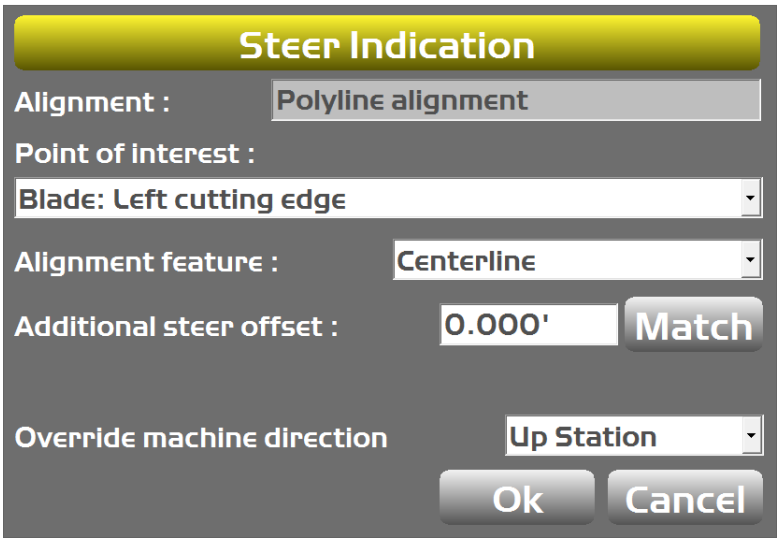


Figure 115: Steer Indication Screen

2. Change the desired information, and tap **OK**. The main screen appears with the changes applied.

Steering/Grading to Polyline

Steering to Polyline

Tap and hold the polyline to use for steering, then tap **Polyline** ▸ **Steer to** on the pop-up menu. Graphical cross lines display along the selected polyline (Figure 116).

Figure 116: Graphical Cross Lines Display Along the Polyline

To stop steering to the polyline, steer away from the selected polyline.

Grading to Polyline

1. From the main screen, tap and hold the polyline to use for grading to.
2. Tap **Polyline** from the pop-up menu.
3. Tap **Extend grade**, enter a value, and tap **OK**. Graphical cross lines display along the polyline (Figure 117).

Figure 117: Graphical Cross Lines Display Along the Polyline

4. Begin grading. Repeat Steps 1-3 to grade to another polyline.

Isolating a Surface

This section describes how to isolate a small piece of the active (TIN) surface and ignore any triangles outside of this isolated region.

1. Tap and hold on the main screen to display the context menu.

2. Select **Isolate surface** from the context menu. The **Isolate Surface Region** screen appears (Figure 118).

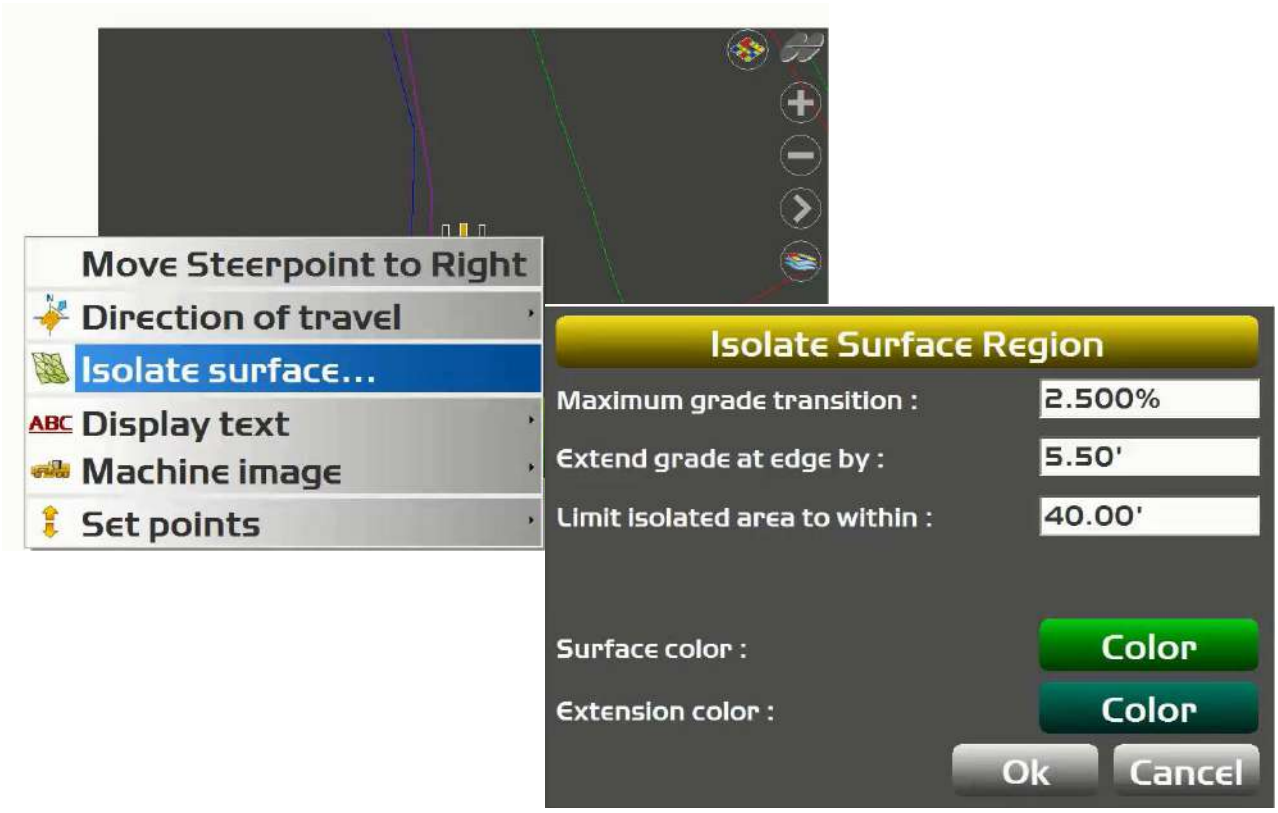


Figure 118: Isolate Surface Region Screen

3. Enter or select the following.

   - **Maximum grade transition** – enter a maximum deflection value between adjacent triangles in the TIN surface.
   - **Extend grade at edge by** – enter a value to extend the grade of the isolated region.
   - **Surface/Extension color** – tap to select a color to represent the surface, and the newly selected extension. Tap **OK** to return to the **Isolate Surface Region** screen.

4. Tap **OK** to return to the main screen. The isolated region appears in the color chosen in Step 3 (Figure 119).

Figure 119: Isolated Surface

Stop Isolating a Surface

1. Tap and hold on the main screen.

2. From the context menu, select **Stop isolating** (Figure 120).

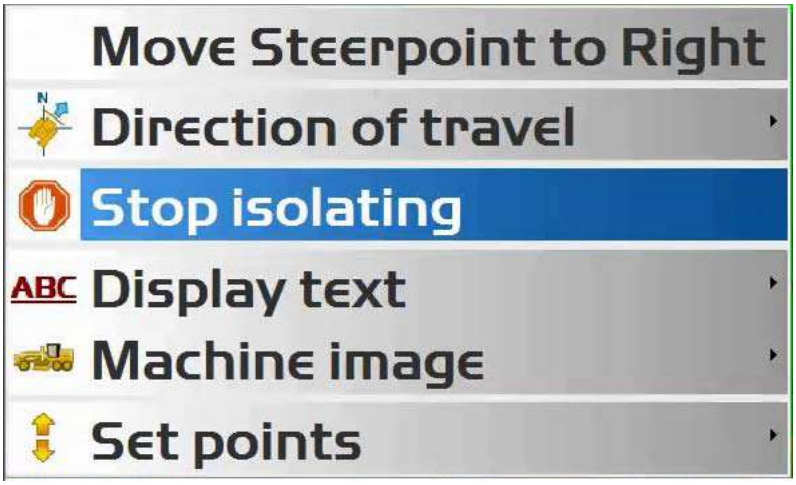


Figure 120: Stop Isolating a Surface

Adjusting Cut/Fill Offsets

1. From the 3D-MC main screen, tap the Elevation Control button. The **Adjust elevation** screen appears.

2. Tap the **Set** button for **Elevation set point**. The button changes to red.

3. Change the offset using the up/down arrows, then tap the **Set** button again to lock in the value. The button will revert to the default color and the value will display.

4. Tap **OK** to return to the main screen.

Change Cut/Fill Offsets Using Set Points Pop-up Menu

The **Set points** pop-up menu enables quick adjustment of the cut/fill offsets from the main screen. A check mark next to a menu items means it is active.

1. Tap hold anywhere on the main screen. The **Set points** pop-up menu appears (Figure 121).

2. Tap **Set points ▸ Enabled (left)** or **Enabled (right)** to display the set-point (cut/fill offsets) adjustment arrows (shown in red in Figure 121).

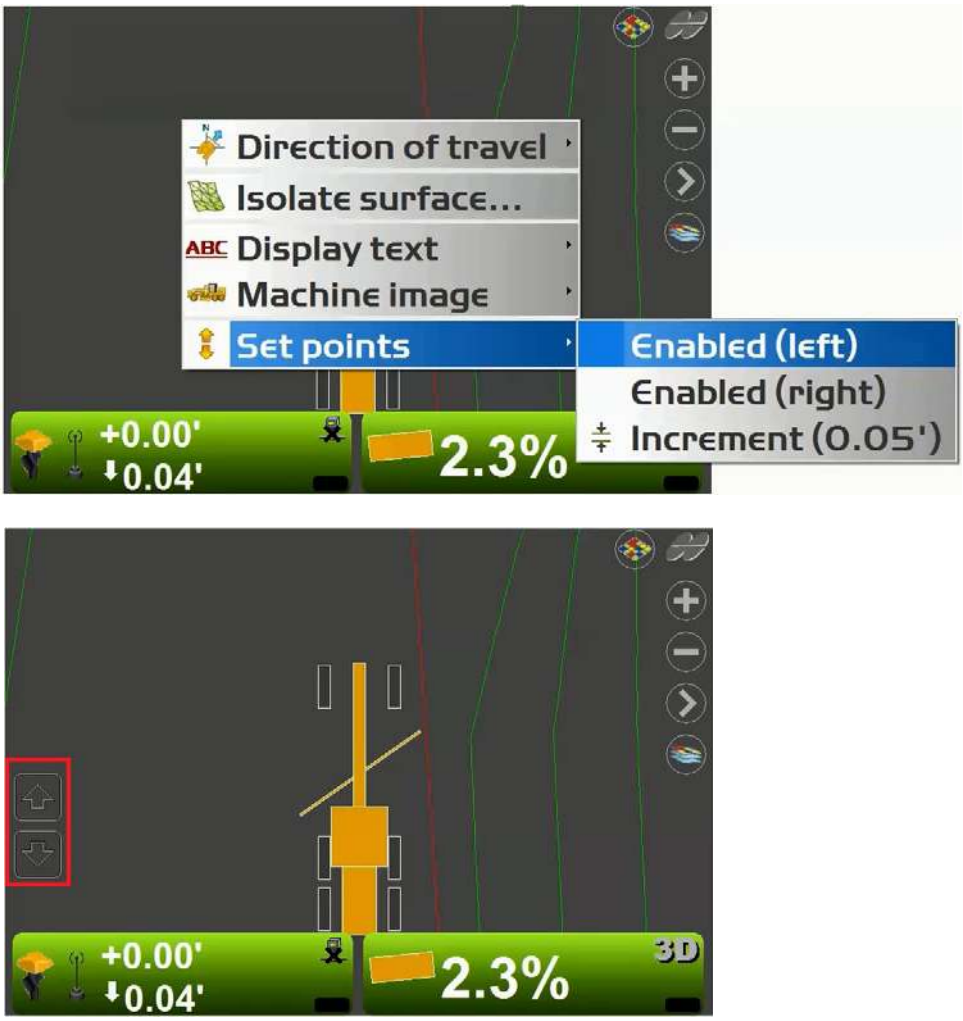


Figure 121: Set Points Pop-Up Menu and Left Arrows Enabled

3. With the Set Points buttons active above the Elevation Control Button, tap the arrows to adjust the cut/fill offsets.

Tapping the arrows above the Slope Control Button only works in 3D mode when **Slope Lock** is enabled (see "Slope Lock" on page 90). In 2D mode, the arrows will adjust the slope.

4. Tap **Set points ▸ Increment** to adjust the set-points increment.

Dozer/Motor Grader Options

Blade Wear

As the blade wears away, the system's calculated distance to the cutting edge changes, and can cause elevation errors. To compensate for this recession in the blade edge, blade wear adjustment is included in the machine builder. Refer to your machine's installation and calibration manual for instructions about entering machine builder and blade wear measurements.

As the blade wears over time, new measurements may be taken of the blade's cutting edge and adjusted from a sub-menu in the **Control** menu.

Press the Power button on the display, then tap **Control** ▸ **Blade calibration** ▸ **Blade wear** to enter the **Blade Measurement** adjustment screen (Figure 122).

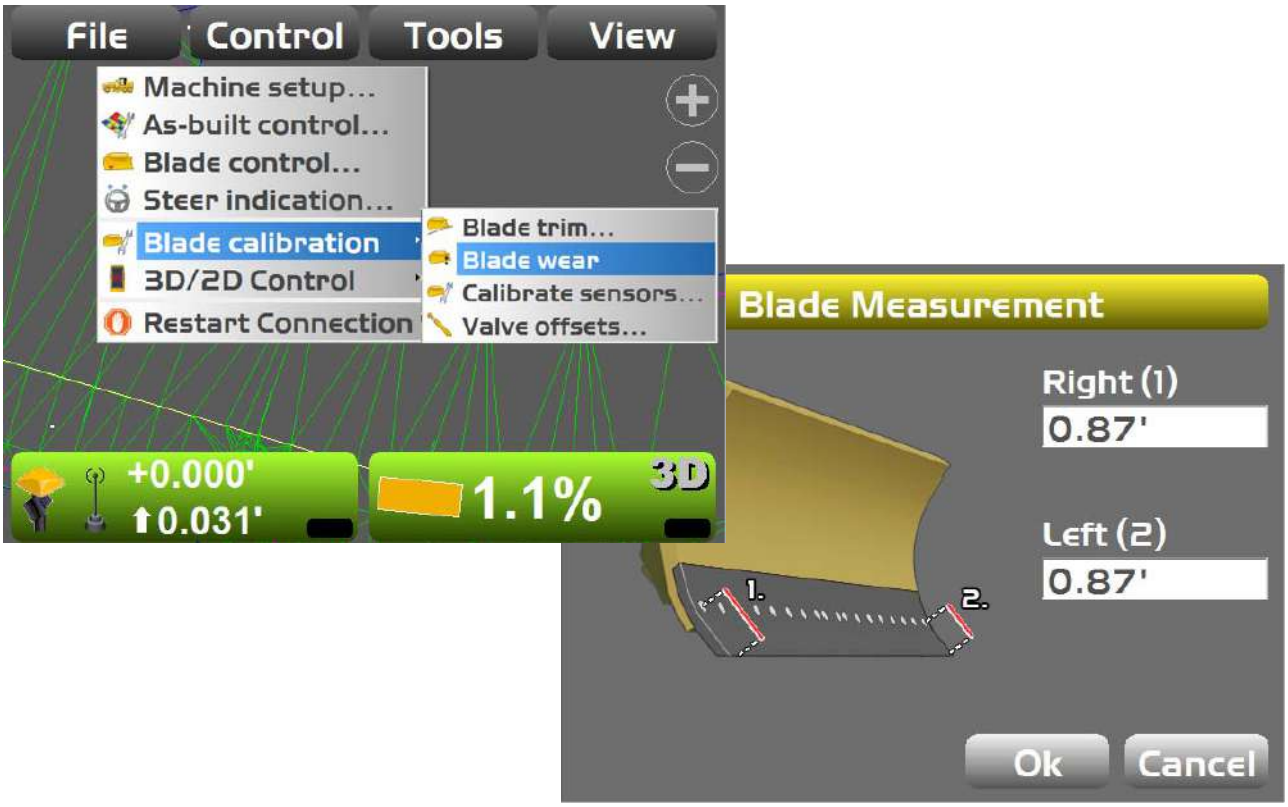


Figure 122: Blade Measurement Screen – Dual Mast

Figure 123 shows the **Blade Measurement** screen for a single mast setup.

Figure 123: Blade Measurement Screen – Single Mast

Blade wear is not currently supported on 3D-MC^{MAX} dozers.

Slope Lock

In 3D-MC, you can lock the blade at a fixed cross slope value. When **Auto** is activated on the slope side, the blade will tilt to the locked angle. Elevation control will still occur if **Auto** is activated on the elevation side. The cutting edge stays at the same slope until the slope percentage changes.

Change the slope percentage by entering a new value in the **Slope locked** box (Figure 124 on page 91), or use the Grade Adjustment knobs (9168 Control Box).

When the slope is locked, the Slope Control Button displays a lock icon. (Figure 124).

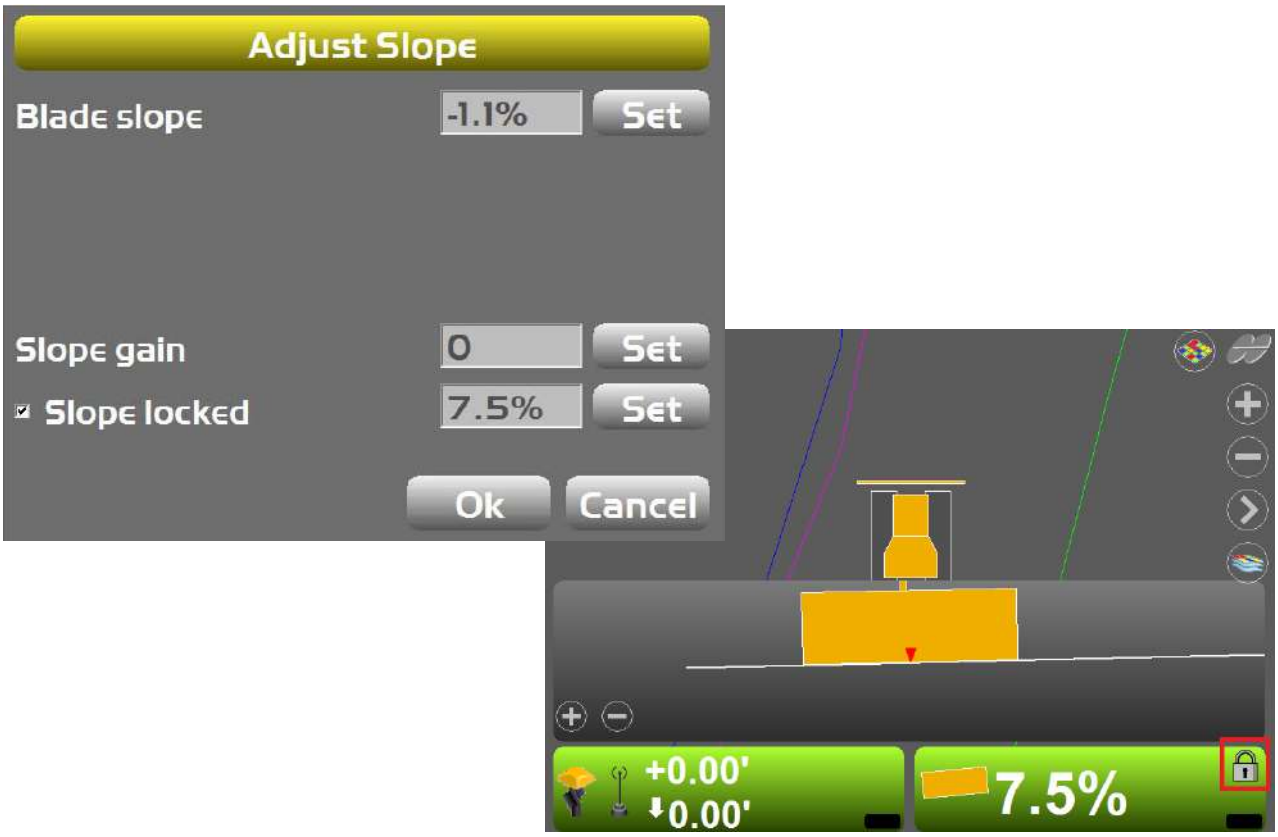


Figure 124: 3D-MC Slope Locked

Make sure to enable the **Slope locked** check box before tapping **OK**. Otherwise, the slope will not lock.

Motor Grader Only Options

Preparing the Grader for Blade Trim

Topcon recommends making several passes in one direction, two blade widths wide. Then, position the grader in the middle of the two passes, at the beginning of the graded passes.

Before using the blade trim feature do the following.

1. Activate a Planar surface, and engage automatics on both sides of the blade.
2. Place the blade on the ground, ensuring that it lightly touches the graded surface on both left and right blade edges.
3. Proceed to "Performing Blade Trim" on page 93.

Performing Blade Trim

1. Press the Power button on the display, then tap **Control** ▸ **Blade calibration** ▸ **Blade trim**. The **Blade trim first pass** screen appears (Figure 125).

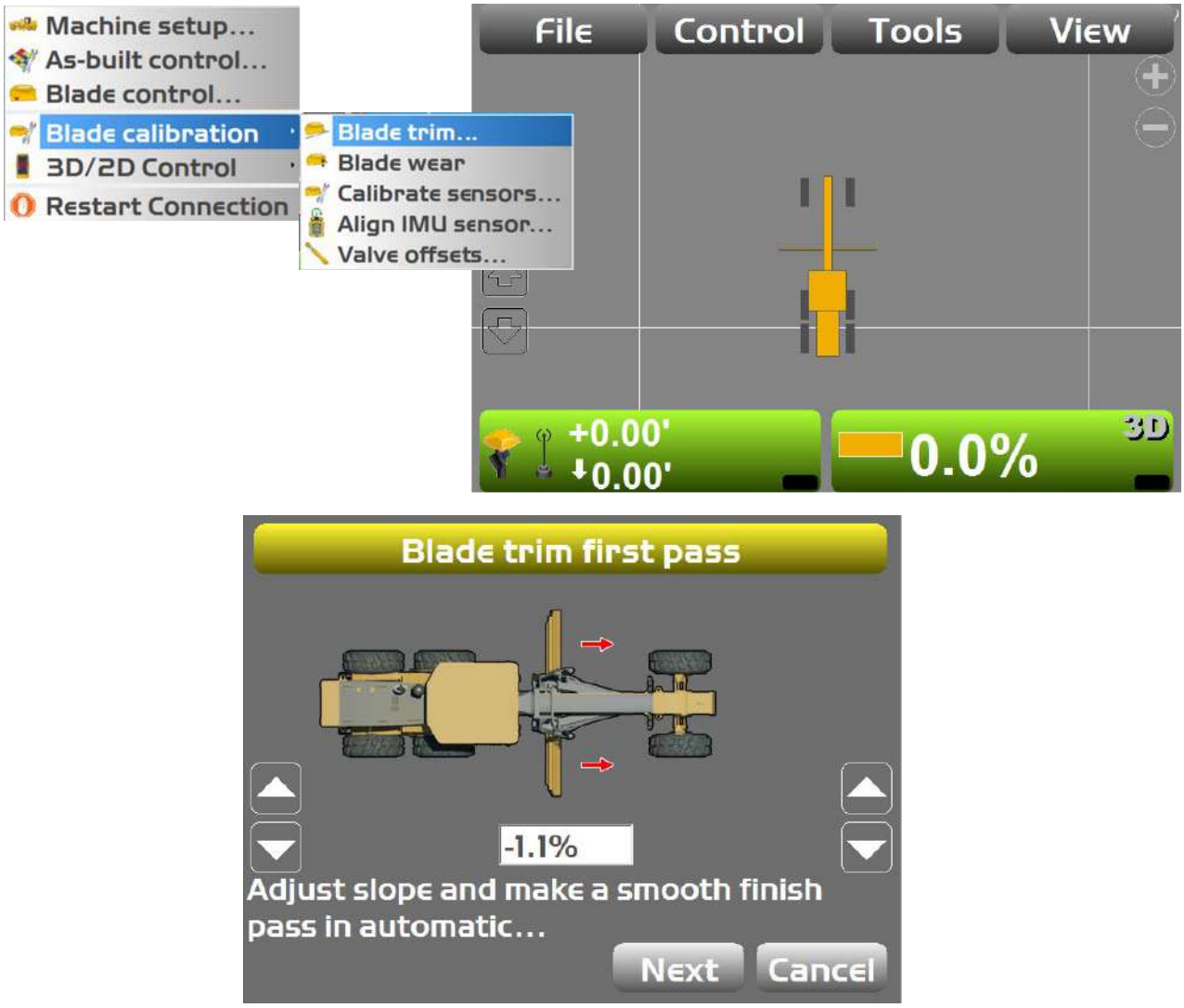


Figure 125: Blade Trim

2. Read the slope, and put one side of the blade in automatic control.
3. Make a pass across the surface, ensuring the manual side keeps contact with the ground.
4. At the end of the first pass, disengage auto, raise the blade, and turn around.
5. Align the center of the grader with the center of the previous pass, and tap **Next**.

6. Lower the blade close to the ground, and put one side of the blade in automatic control.
7. Lower the manual side until it touches the ground, and start the return pass.
8. In 3D-MC, use the Up/Down arrow buttons to adjust the automatic side ensuring that it keeps light contact with the ground. Make sure the manual side keeps contact with the ground.
9. Once the return pass is complete, Tap **Next**. The **Blade trim complete** screen appears.
10. Tap **Finish** to apply the new calibration. Tap **Cancel** to void the new calibration.

Side Shift

For CAN-enabled motor graders with blade side shift capabilities, 3D-MC² systems can control the blade sideways to a polyline. To use side shift, the following requirements must be met in 3D-MC.

- Machine valve types must be configured for CAN.
- A certified Topcon dealer will set the side shift valve offsets and gains.
- The **Side Shift Auto** button must be set to **Enable**.[1] [2]
- A polyline must be selected to steer to, and the blade must be within 2.00 feet of the line.
- Automatic control must be engaged.[3]

1. Tap **Topcon Logo** ▸ **Control** ▸ **Blade calibration** ▸ **Side Shift**. The **Side Shift Valve** screen appears (Figure 126).

Figure 126: Side Shift Offsets and Gains

2. Select **Enable** or **Disable** for **Side Shift Auto**.

---

1. The **Side Shift Auto** button appears in 3D-MC version 12.0.5 and higher. Controller Firmware version 3.01 or higher must be used for proper operation.
2. For 3D-MC versions prior to 12.0.5, the **Side Shift Auto** button does not appear, and Controller FW 2.87 must be used. Side shift is tied to the normal blade automatics. If side shift is undesired while operating in Auto, deselect a polyline, or set the side shift valve gains to zero.
3. Some machine manufacturers may have a dedicated Auto switch for side shift, which may be another option to disengage side shift.

3. When **Side Shift Auto** is enabled, a blade icon and **Auto** display on the Slope Control Button (Figure 127).

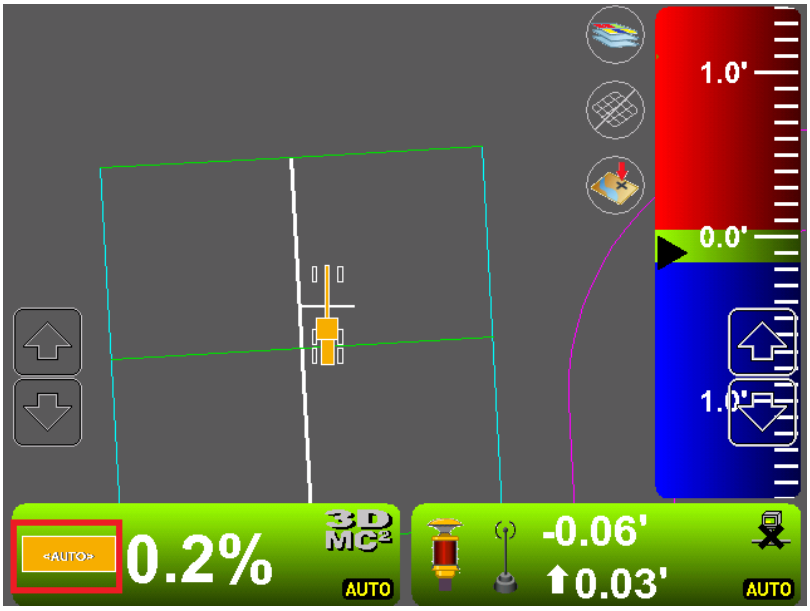


Figure 127: Side Shift Auto Enabled

Depending on the machine, side shift has its own auto switch. For machines without a dedicated switch, use the elevation auto button.

Audible Guidance

Audible guidance setup is located in the **Control** menu, and is specific to the machine file in the machine setup menu. Topcon Recommends that a Topcon dealer configure audible guidance with the operator, to ensure unwanted changes are not made to the calibration while configuring audible guidance. Contact you local Topcon dealer for assistance.

3D-MC provides audible tones (Figure 128) to help determine if the attachment is above, below, or on grade.

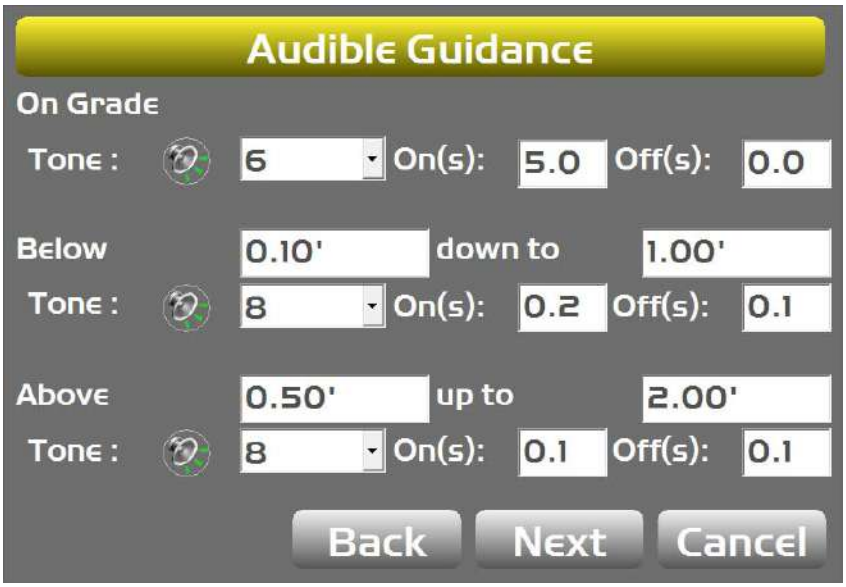


Figure 128: Audible Guidance

Use the audible guidance shortcut button to enable or disable the feature.

To activate the shortcut button, press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Shortcuts**. The button appears on the main screen when activated (Figure 129).

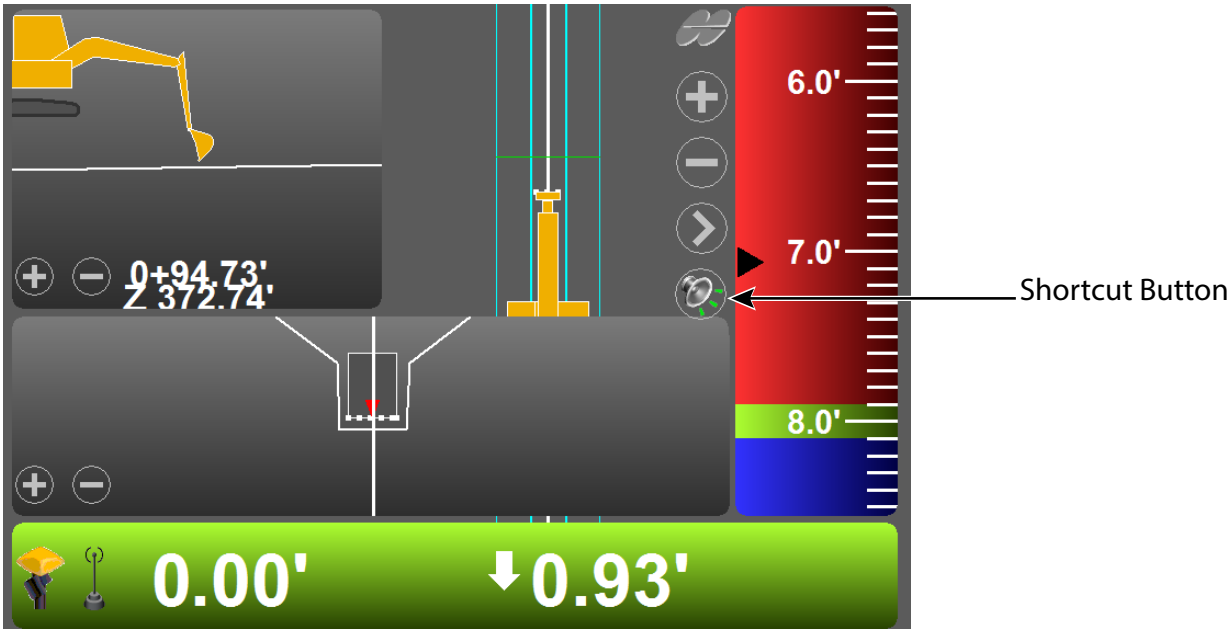


Figure 129: Audible Guidance Icon

Elevation Reference

The reference point of the bucket can be set in the **Control** menu. Choose either the left edge, middle, or right edge (Figure 130).

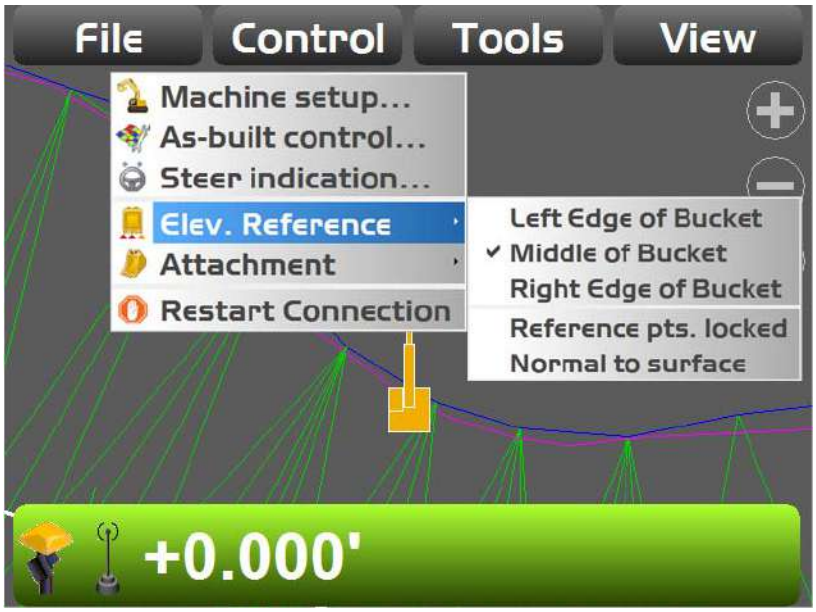


Figure 130: Elevation Reference

Locked Reference Points

Select **Reference pts. locked** to lock together the Elevation reference point and Steer To reference point of interest.

Normal To Surface

Select **Normal to surface** to reference elevations at a perpendicular angle to the design surface, rather than vertically (Figure 131). This differentiation is important on sloping surfaces.

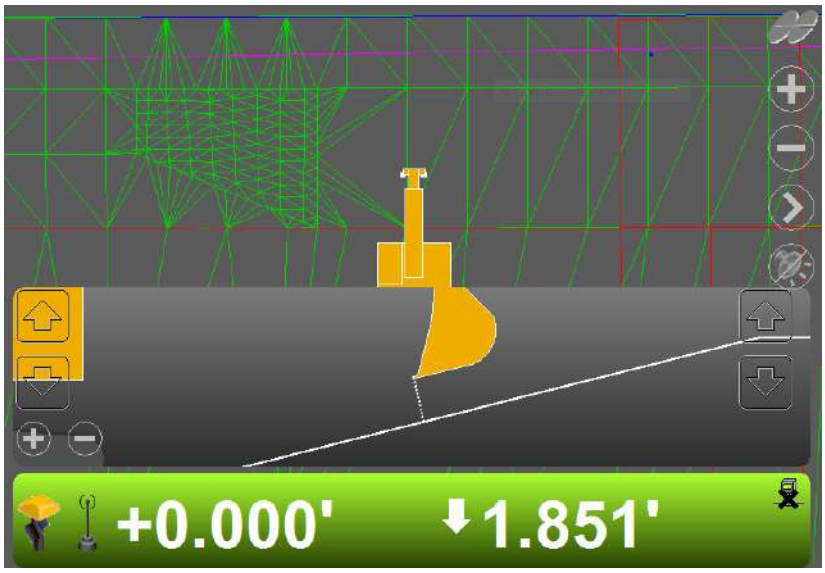


Figure 131: Normal To Surface

Press the Power button on the display, then tap **Control ▸ Elev. Reference ▸ Normal to surface** to access the function.

Attachments

Excavators frequently use different size buckets/attachments while working. 3D-MC allows you to define multiple attachments so that exchanges can be made quickly.

For more information about attachments and calibrations, refer to the calibration chapter in the *Excavator Indicate Systems Installation and Calibration Manual* (p/n 7010-0697).

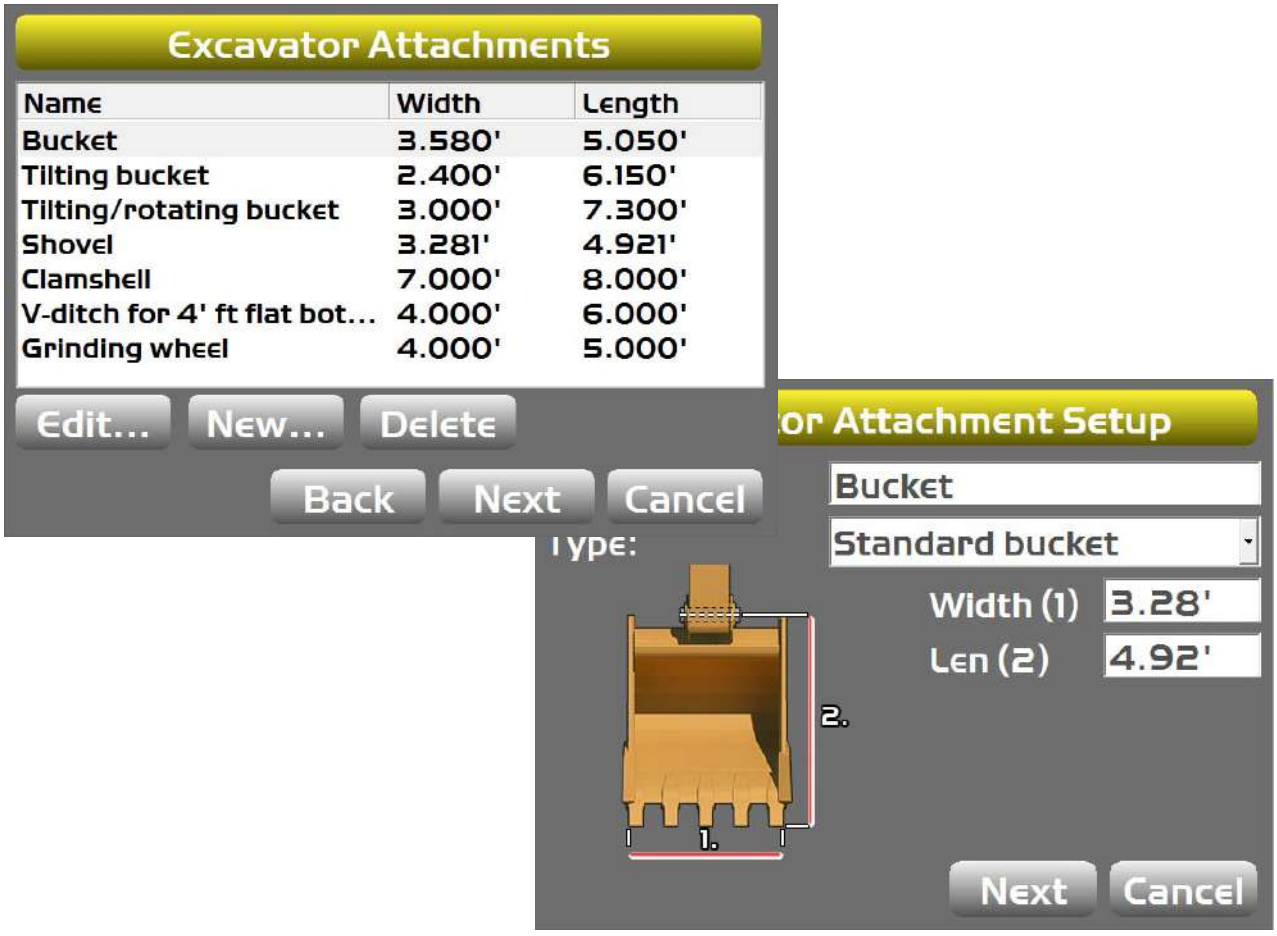


Figure 132: Excavator Attachment Setup

After creating an attachment and configuring your machine, press the Power button on the display, then tap **Control ▸ Attachment** to access the **Excavator Attachments** screen (Figure 133).

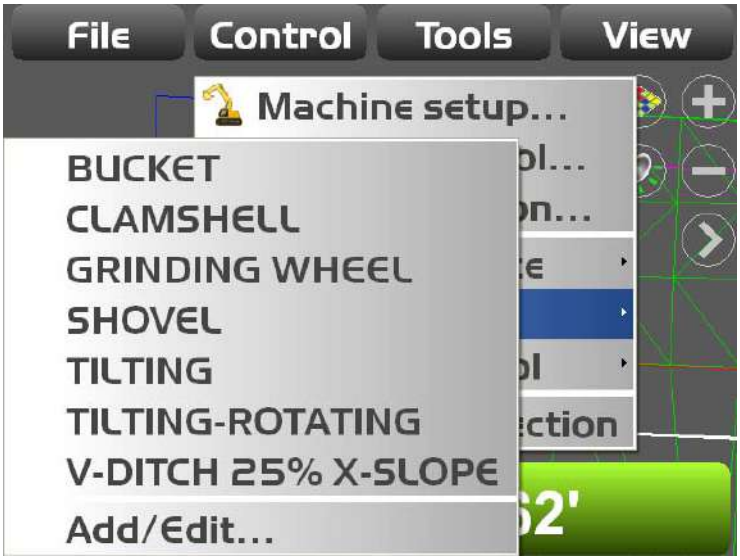


Figure 133: Access Excavator Attachments from the Control Menu

Tap **Add** or **Edit** on the **Attachments** screen to add or edit attachments.

2D Operation

With 3D-MC, you can use a compass, a 2D laser receiver, or reference a bucket elevation. 2D mode must be engaged to use a 2D laser receiver. To switch to 2D mode, tap **Topcon Logo ▸ Control ▸ 3D/2D Control** (Figure 134).

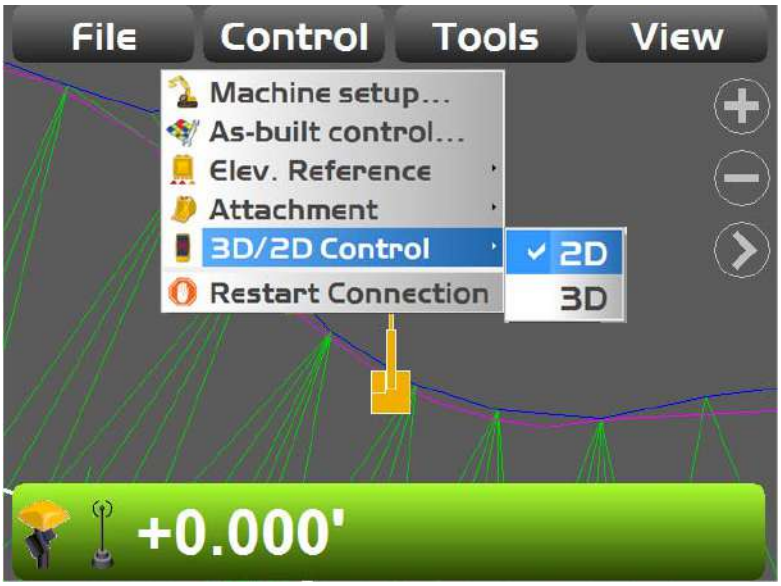


Figure 134: Switch Between 2D and 3D Mode

2D mode is only available if **2D**, **GPS and 2D**, or **Prism and 2D** are selected as the **Sensor type** during machine setup,

When the excavator is starting for the day, or moves its tracks to a new location while working, an elevation reference must be established. In the Elevation Control Button menu, tap **Zero to bucket** (Figure 135) to touch the bucket to a known reference point and set the elevation reference to zero. Elevations are then calculated for the area within the reach of the excavator. If the excavator moves to a different location, or tracks are counter rotated, repeat the process to follow the elevation or slope.

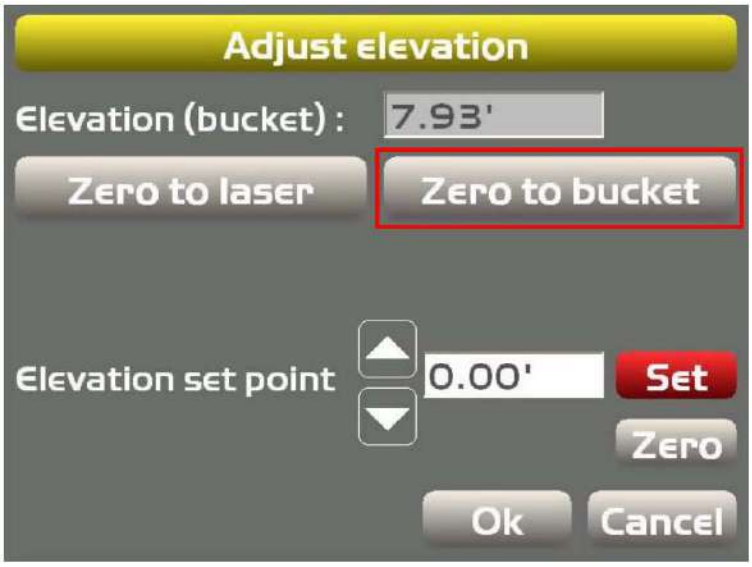


Figure 135: 2D Mode – Adjust Elevation

Similarly, set up a laser transmitter over a known point and mount a laser receiver on the stick of the excavator (Figure 136). When the laser receiver is in the path of the transmitted laser beam, tap **Zero to laser** (Figure 136) to zero out the elevation so that all elevations within the reach of the excavator are known.

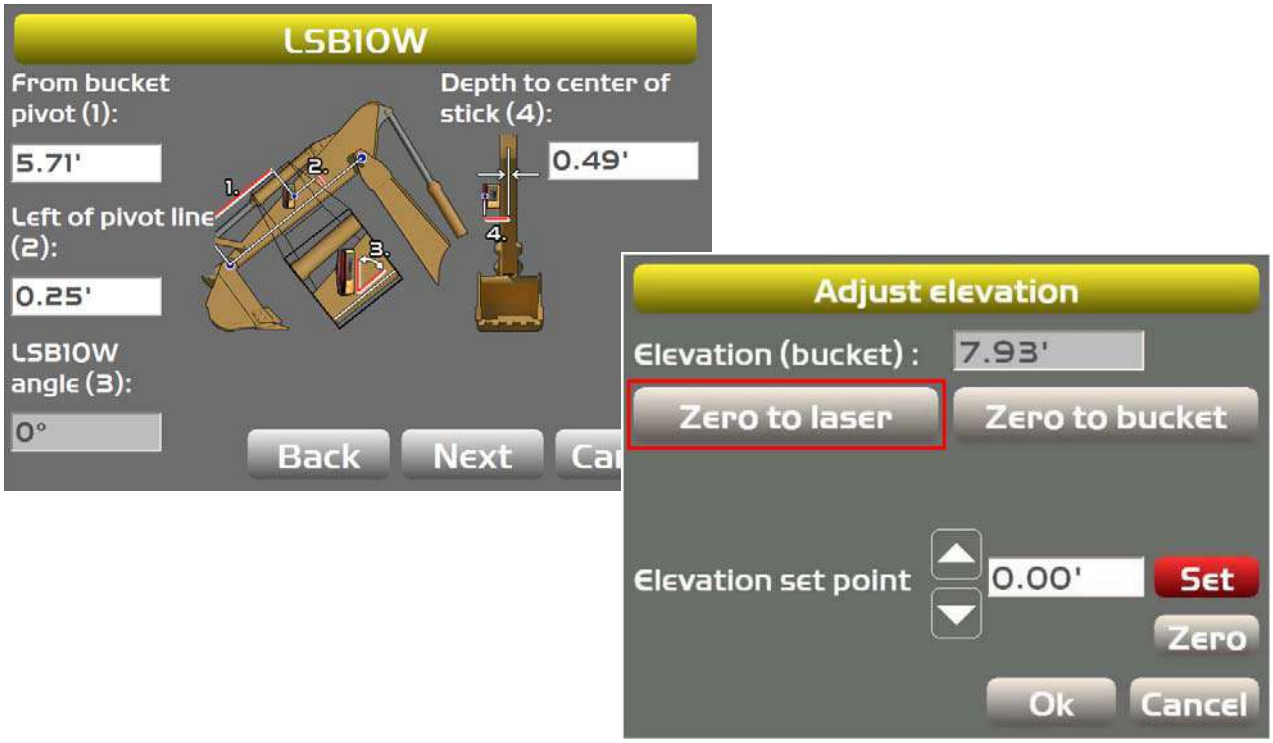


Figure 136: Set Up and Zero to Laser

Creating 2D Slopes

3D-MC can create various surfaces by referencing known elevations, and using the 2D sensors on the machine. Surfaces are projected in the mainfall direction.

Known Slope

To create a simple sloping surface, press the Power button on the display, then tap **Tools ▸ Known Slope**. Enter a slope percentage, or both the rise and run, to create the 2D surface (Figure 137).

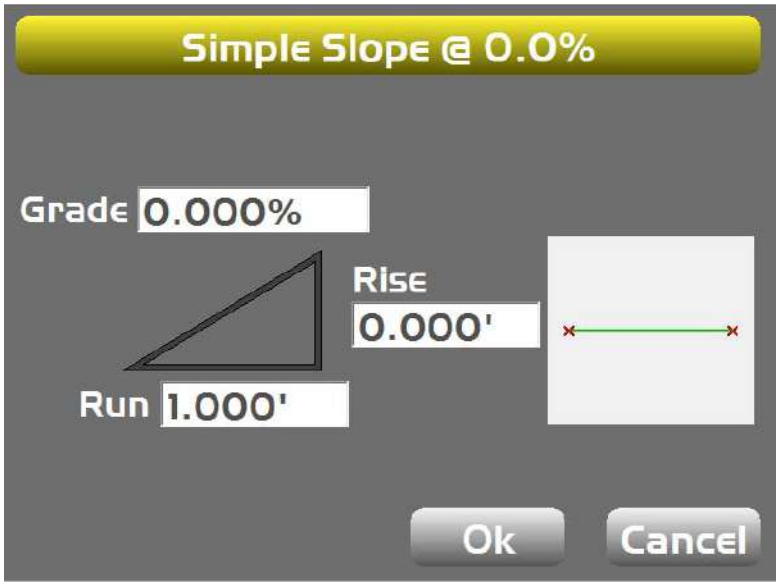


Figure 137: Enter a Slope Percentage

Known Dual Slope

Known dual slopes require an installed compass.

1. To create a known dual slope, press the Power button on the display, then tap **Tools** ▸ **Known Dual Slope**.

2. Enter a percentage, or both the **Rise** and **Run** for each slope (Figure 138).

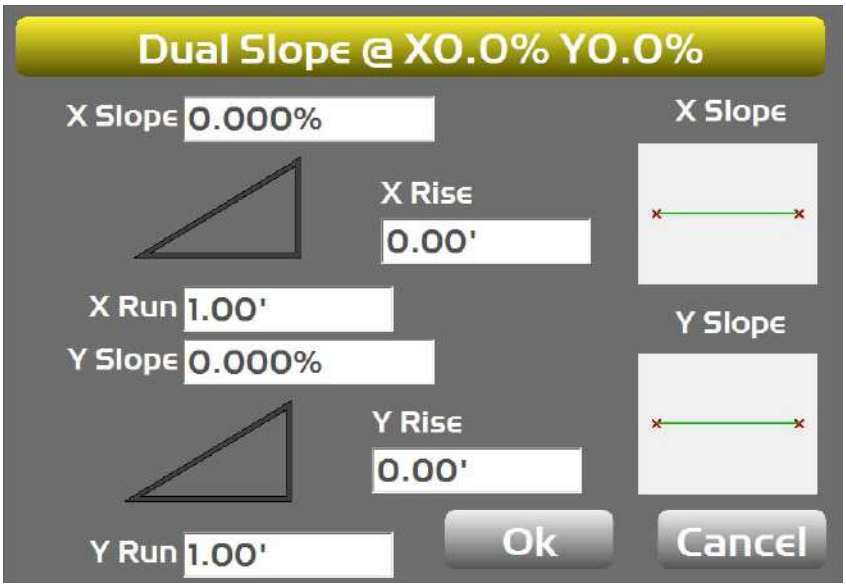


Figure 138: Known Dual Slope

Simple Sloping Surface

To create a simple sloping surface, press the Power button on the display, then tap **Tools** ▸ **Known Slope**. Enter a slope percentage to create the 2D surface.

Measure Slope

To create a simple sloping surface by measuring two points with the bucket, press the Power button on the display, then tap **Tools** ▸ **Measure Slope**. Follow the on-screen instructions.

Complex Slope

Complex slopes are created in a series of segments. The segments are added and shown from left to right. When adding or editing a segment, any two of the four parameters may be entered to calculate the remaining parameters.

To create a complex, slope, do the following.

1. Press the Power button on the display, then tap **Tools ▸ Complex Slope**. The **Complex Slope** screen appears (Figure 139).

2. To add a slope element, tap **Add** and enter the parameters on the **Slope Element** screen (Figure 139).

3. Tap **OK** to return to the **Complex Slope** screen.

4. On the **Complex Slope** screen, move the bucket or laser transmitter to the desired transition location and tap **OK** to return to the main screen.

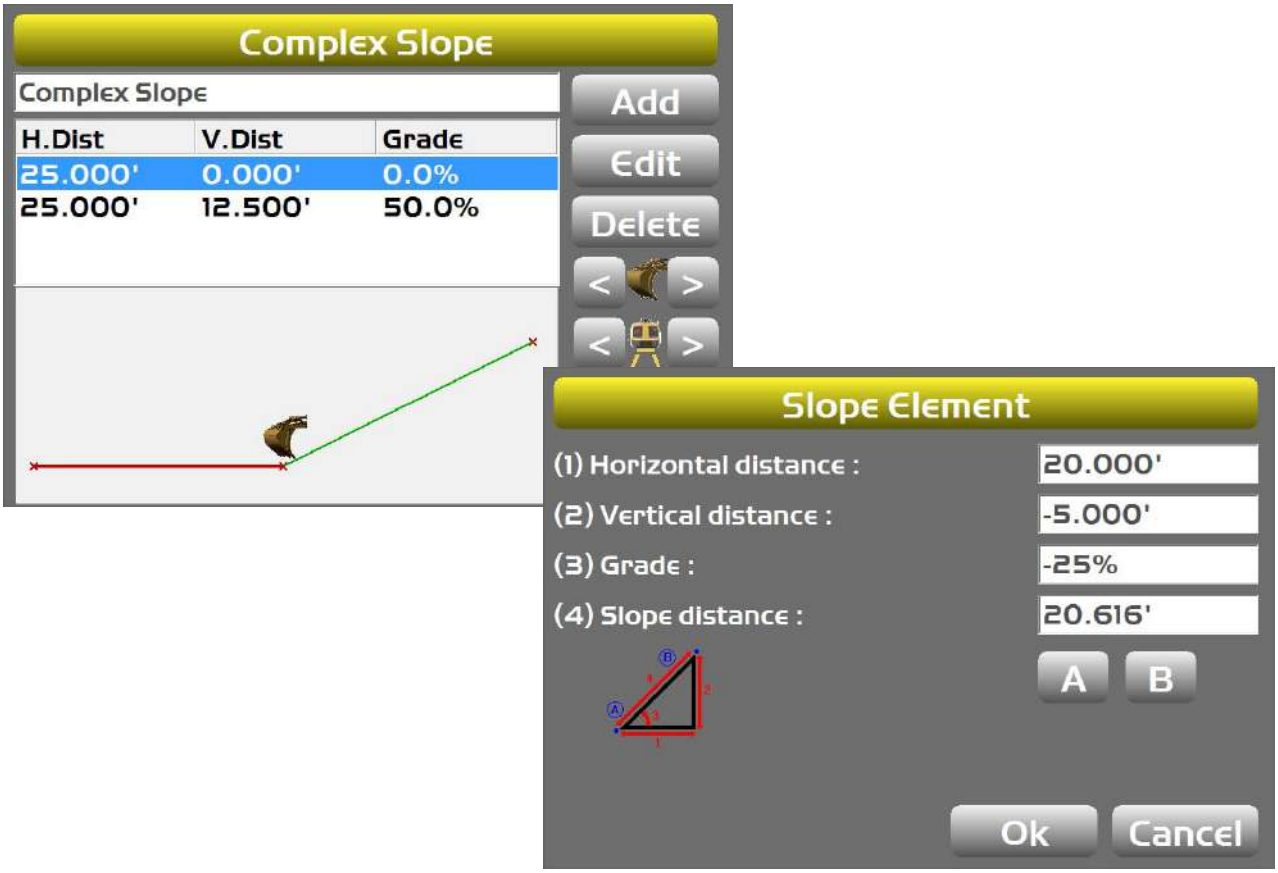


Figure 139: Set Up a Complex Slope

5. On the main screen, tap the Elevation Control Button and reference the elevation with **Zero to bucket** or **Zero to laser**.

To view the appropriate slopes and directions on the main screen, the slope or the view may need to be reversed. Tap and hold on the screen to activate the on-screen pop-up menu. On the pop-up menu, the **Show reversed** option appears. You can also tap **Tools ▸ Reverse slope direction**.

Shortcuts

Excavator-specific shortcuts in 3D-MC are shown on the main screen and include: audible guidance, bucket attachments, elevation reference point, set reference elevation to laser (2D mode), and set reference elevation to bucket (2D mode).

Press the Power button on the display, then tap **View** ▸ **Display options** ▸ **Shortcuts** to enable/disable shortcut buttons (Figure 140).

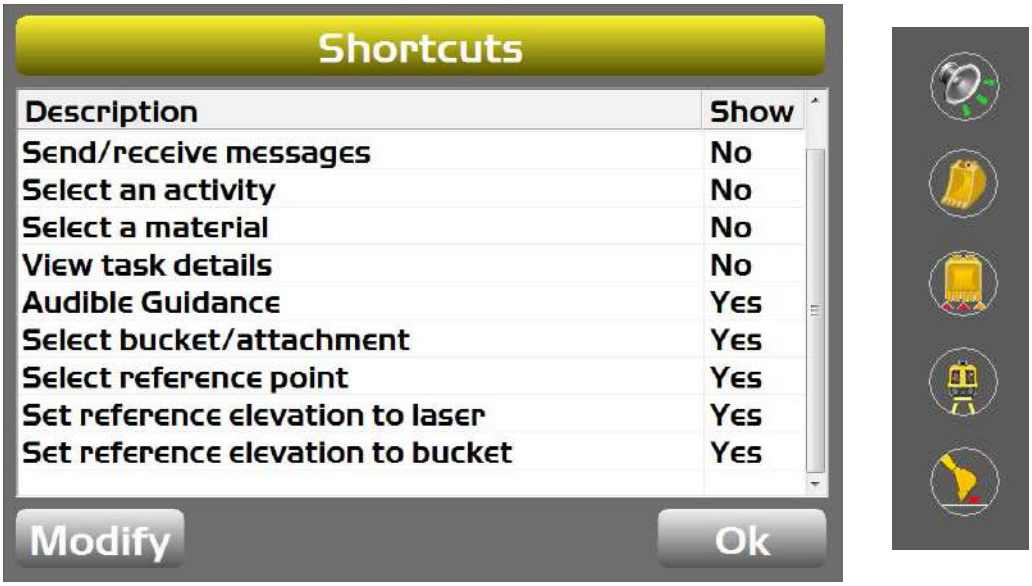


Figure 140: Shortcuts

Troubleshooting

Before contacting Topcon customer support, try the following.

- Check that the various components for your Topcon 3D Machine Control system (radio, MC-R3 Controller, Display, Base Station receiver) have power and are on.
- Check that all cables are securely and properly connected to the various components of system.
- Disconnect cables and inspect them for damage or contamination. Clean all connections with an electrical contact cleaner.

Display Problems

This section lists possible display problems. If problems persists, contact Topcon Support.

Problem	
Display does not power on.	
Causes	**Solutions**
The cable is the wrong cable, incorrectly connected, or damaged.	Check that the power cable supplies 12 to 24 VDC and is negative conductive. A socket (positive) = 12 to 24 VDC E socket = Ground Check that the power cable is connected to the correct port and the ends are securely fastened. If the cable is damaged, contact your dealer to purchase a new cable.
Problem	
Screen display turns off by itself.	
Causes	**Solutions**
The fan may be damaged, causing the display to overheat.	Check that the fan is rotating. If the fan is not rotating, it may be damaged and needs to be replaced with a new one. Contact your dealer. Contact your dealer for information on replacing the fan.
Problem	
Screen display goes dim by itself	
Causes	**Solutions**
The fan may not be rotating.	Check that the fan is rotating. If the fan is not rotating, it may be damaged and needs to be replaced with a new one. Contact your dealer for information on replacing the fan.

The display has the self-adjusting ability of screen brightness.	Brightness may be dimmed when the display gets over-heated with high temperature around the cab, as well as when the ambient light becomes dim. The backlight also reduces when the ambient light becomes dim.
Problem	
Screen has transferred to operating system.	
Causes	**Solutions**
Exit 3DMC function may have been pressed unexpectedly or incorrectly.	If the screen displays the desktop, the **My Computer** folder should be visible. Double-tap the **My Computer** folder. Look for the folder named **Disk C**, and double-tap on it. Look for the **Display** icon and double-tap. The application program opens and returns to the main screen.
Problem	
"Control file has no GPS localization" message.	
Causes	**Solutions**
No GPS localization has been performed for the project.	Plan to implement the GPS localization.
Problem	
"Loading…." or "Building…." message.	
Causes	**Solutions**
The program in the display is in the middle of loading files or making graphics.	If the pointer on the main screen moves when you press in different places, the display is computing. When the system is busy, the pointer becomes an hourglass. Wait for a few more minutes to let it complete the process. Remember, computing will take longer when a larger file is selected.
If the pointer does not move, the display may have a computing problem.	Switching off the display can fix the computing problem.
Problem	
Elevation/Slope Control pad displays: "GPS receiver not connected!"	
Causes	**Solutions**
Either the GPS+ signal or radio signal is invalid. The graphic may indicate what causes the problem.	For GPS+ signal, check cable connections along the GPS antenna cable from the GPS Antenna port on the MC-R3 Controller to the Rover antenna. Check cable connections at the MC-R3 Controller and at the display.

Problem	
Elevation Control Button displays: "Waiting for radio link"	
Causes	**Solutions**
Radio transmission, radio antenna, lights status on the receiver, and/or power may have a problem.	Check that the Base Station is working correctly. Also check that the Rover radio antenna on the machine and its cable connections are properly connected. Make sure that the radio channel is identical between the Base Station and the machine Rover, and that the radio is correctly configured on the display.
Problem	
Elevation Control Button displays: "Waiting for Initialization"	
Causes	**Solutions**
The GPS+ receiver has not been successful tracking enough valid satellites.	Check that the Rover antenna has a clear view of the sky. Check for obstructions, such as trees, buildings, and vehicles, that can block or reflect satellite signals.
The system is still in the process of determining a solid position.	If this is the very first time operation, this message may persist for several minutes while the receiver obtains a new almanac.
Problem	
Elevation Control Button displays: "Out of design area"	
Causes	**Solutions**
The machine is out of the Design Surface area.	Make sure that the correct project file is selected and **Surface file** is made active. Move into the design surface area so the operator can begin grading.
Problem	
Elevation Control Button displays : "No GPS localization"	
Causes	**Solutions**
The Layer currently selected has not been localized properly.	Make sure that the correct layer is selected.
You are in a process of building a Control Point file or just starting the process.	Disregard the message until the localization is complete.

Problem	
Slope Control Button displays: "3DMC² sensor not connected!"	
Causes	**Solutions**
Cross slope system is not connected properly.	Check cable connections display, the MC² sensor.
Wrong sensor type selected in 3D-MC Machine Configuration.	Select **GPS Antenna** for **Sensor type** in 3D-MC.

Blade Response Problems

This section lists possible Blade Response problems. If problems persists, contact Topcon Support.

Problem	
Blade is moving too slowly. The blade seems to move too slowly in Control mode. The grade indicator takes too long to reach grade.	
Causes	**Solutions**
The Valve Gain setting is too low.	Increase the Valve Gain setting, which will cause the hydraulics to respond quicker. Check which control is slow before adjusting the Valve Gain. Remember that the larger number setting speeds up the response.
Problem	
Blade is moving too fast. The blade seems to move too fast in Control mode. The grade indicator skips through on-grade.	
Causes	**Solutions**
The Valve Gain setting is too high.	Decrease the Valve Gain setting, which will cause the hydraulics to respond slower. Check which side control is fast before adjusting the Valve Gain. Remember that the lower number setting slows down the response.
Problem	
Blade reacts, but does not reach On Grade	
Causes	**Solutions**
Valve offsets are too small.	Assume that valve offsets are too small, and perform a valve offset calibration.
Problem	
Blade reacts, but overshoots around On Grade	
Causes	**Solutions**
Valve offsets are too large.	Assume that valve \offsets are too large, and perform a valve offset calibration.

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